MULTIFUNCTION GENERATOR

WF1947/WF1948

Instruction Manual
(External Control)

NF Corporation

DA00037649-003

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Instruction Manual
(External Control)

Preface

This instruction manual describes the GPIB and USB interfaces of WF1947/WF1948. For operations from the panel, see the separate manual "WF1947/WF1948 Instruction Manual (Operations)."

The GPIB and USB interfaces of WF1947/WF1948 features abundant functions and can control almost all operations on the front panel. In addition, they can read the setting values from external equipment such as PC.

WF1947/WF1948 Instruction Manual (External Control) consists of the following chapters.

1. Preparations before Use
   This chapter describes the interface settings and the GPIB address settings.

2. Command Descriptions
   This chapter describes the overview of the commands and setting examples.

3. Status System
   This chapter describes the status reporting, including status byte, and standard event status register.

4. Error Message
   This chapter describes the error numbers and their meaning.

5. Specifications
   This chapter describes the specifications of the external control interfaces.

6. Compatibility of External Control
   This chapter describes the differences of control methods and the commands to which you need to pay attention when migrating from our other WAVE FACTORY series products to WF1947/WF1948.

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1. Preparations before Use

1.1 Overview of WF1947/WF1948 GPIB/USB Interface

Almost all the functions of WF1947/WF1948 can be remotely set via the GPIB or USB interface. Moreover, the saved data and the settings can be transferred to an external device. This allows you to easily configure an automatic measurement system.

1.2 USB Preparations

The WF1947/WF1948 can be controlled by NI-VISA from National Instruments Corporation . Almost all panel operations can be controlled, and internal statuses, such as setting values and errors, can be read out. Install a NI-VISA on the controlling computer, and connect it using a commercially available USB cable. The installation file for this driver can be downloaded from the website of National Instruments Corporation. The driver installation is described below.

1. Either search the NI-VISA page on the website of National Instruments Corporation.
2. Download the version of NI-VISA that supports your OS from the NI-VISA page.
3. Execute the downloaded file and install it.
4. Once the file has installed successfully, the NI-VISA is installed.

For details of NI-VISA, contact National Instruments Corporation or visit the National Instruments Website.

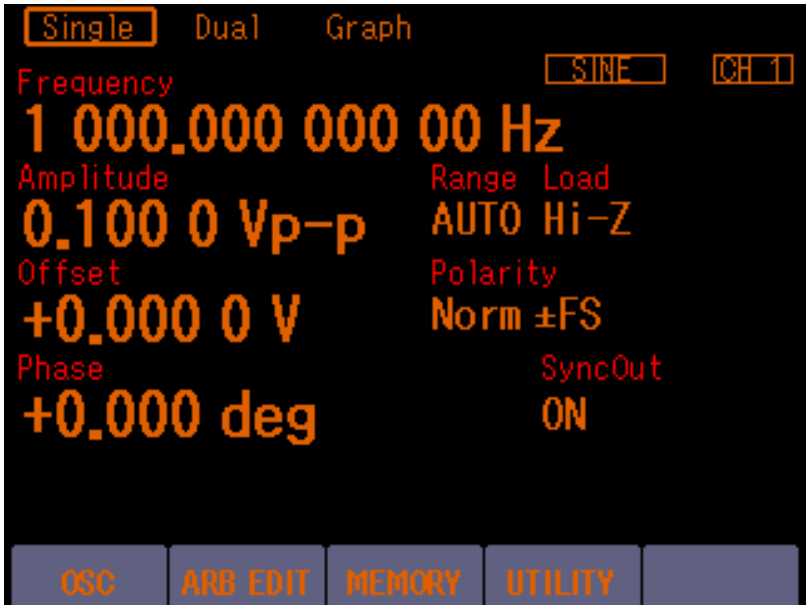
1.3 GPIB Preparations

Mount a GPIB controller board (card) to the controlling computer, then connect between them using a commercial GPIB cable. For details, see the instruction manual of your GPIB controller board (card).

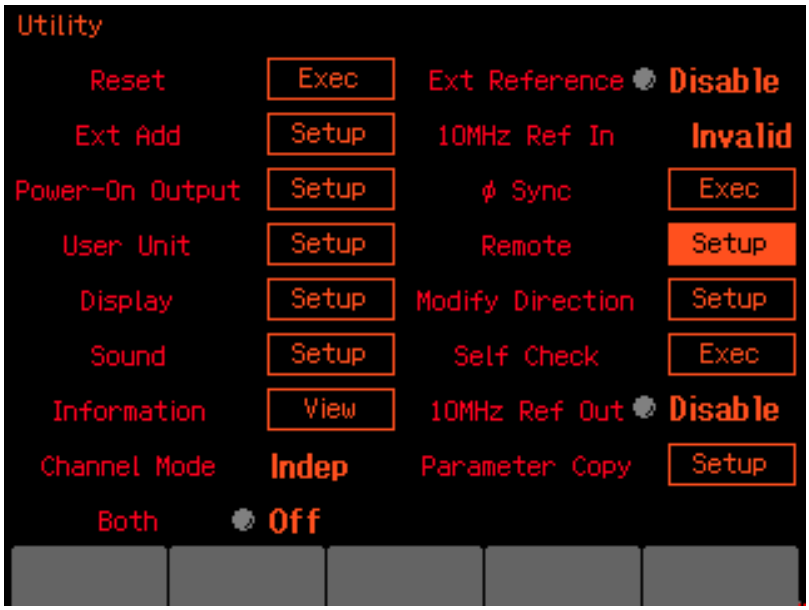
1.4 Selecting Interface

You can select whether the GPIB or the USB interface is to be used. WF1947/WF1948 cannot be controlled from the interface that is not selected. The selected interface is backed up even when the power is turned off. "USB" is selected at shipping.

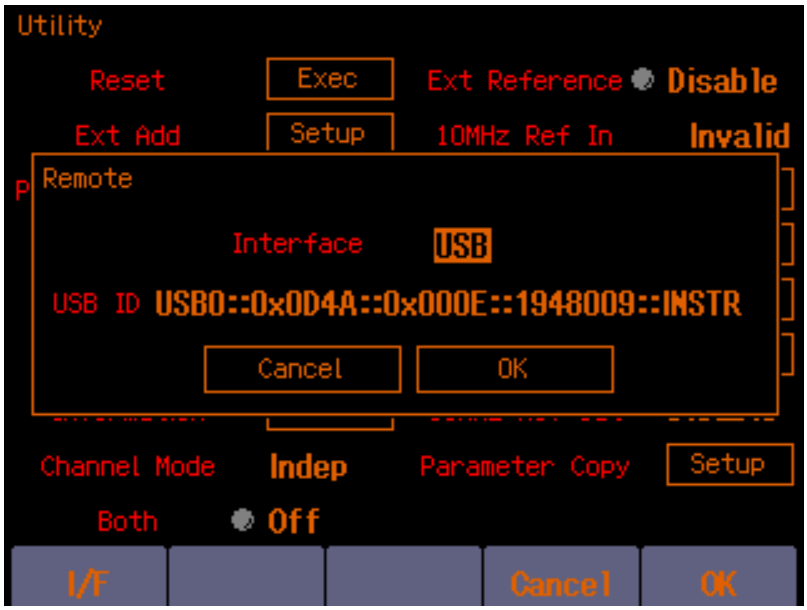
① Press the MENU key and then press the [Utility] soft-key.

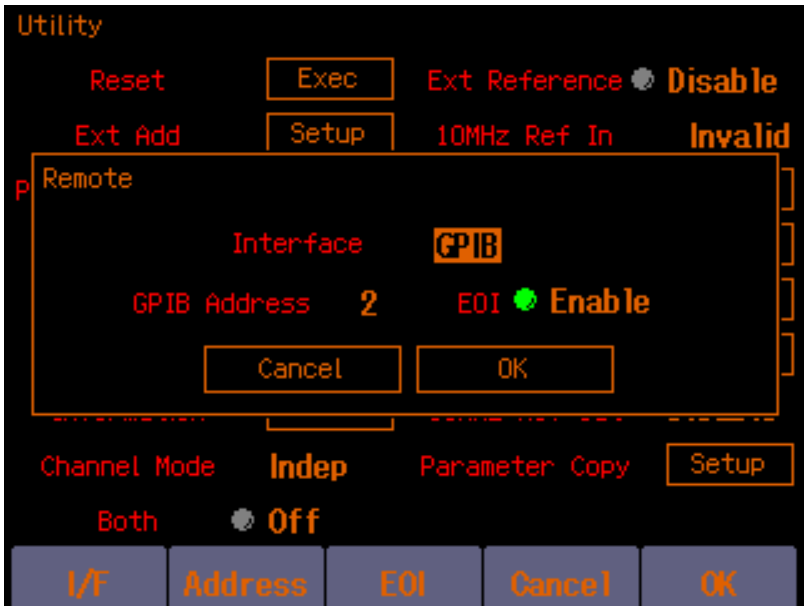


② Select [Remote] and then press the ENTER key.



③ Select [Interface] and then press the ENTER key to display the screen for selecting USB or GPIB.





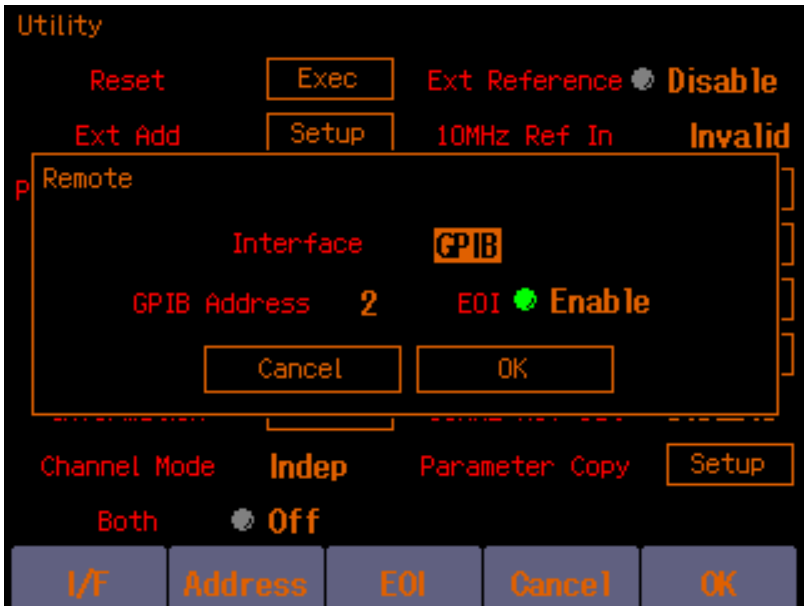
⚠ CAUTION

When the computer recognizes WF1947/WF1948, if you switch the interface from USB to GPIB or disconnect the USB cable, the computer may exhibit unexpected behavior.

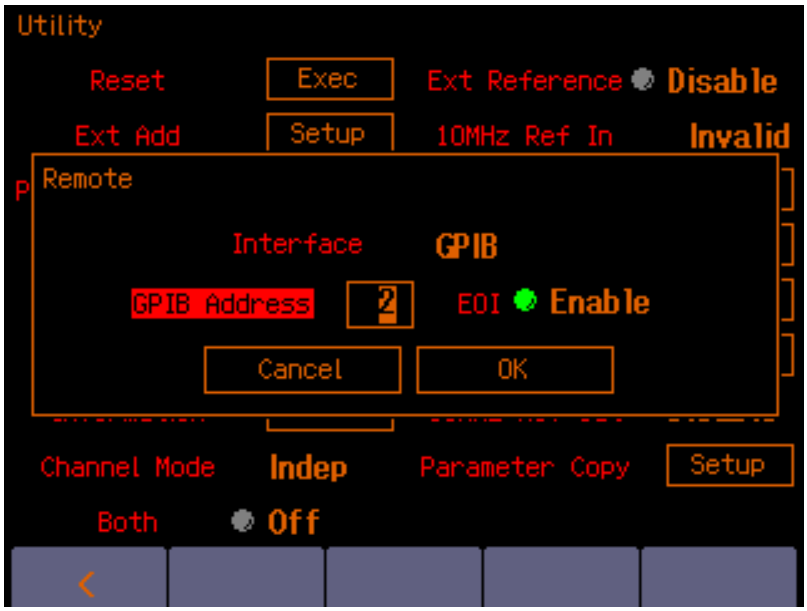
1.5 GPIB Address Setting

When you select the GPIB interface, you can set the GPIB address.
Set the GPIB address to a different value than the addresses of other devices connected with GPIB cable. The set value is retained in the memory even when the power is turned off.
"2" is set at shipping.

① Set [Interface] to "GPIB" by performing step (1) to (3) described in "1.4 Selecting Interface."



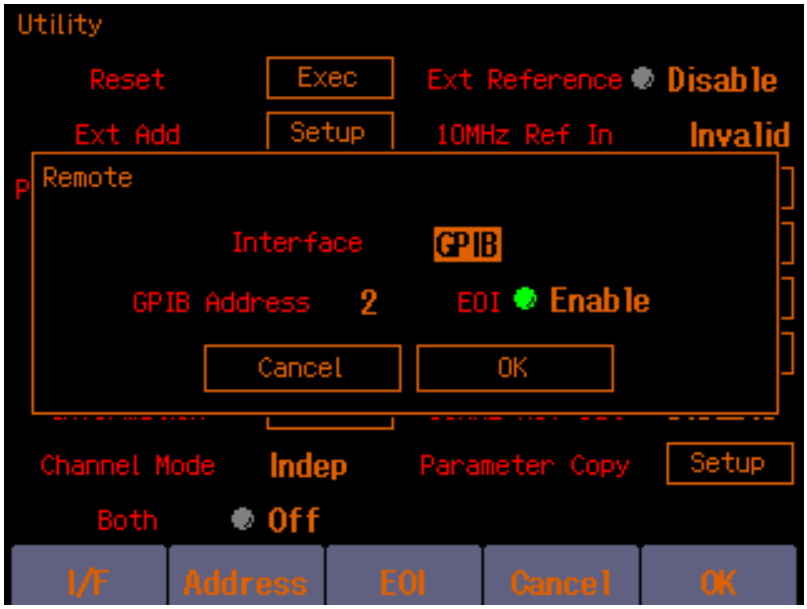
② Select [GPIB Address] and then press the ENTER key to display the screen for setting the GPIB address.
Enter the address by using the numeric keypad on the panel.



1.6 GPIB EOI Setting

When you select the GPIB interface, you can switch the message terminator recognized by WF1947/WF1948.
The set value is retained in the memory even when the power is turned off.
"Enable" is set at shipping.

① Set [Interface] to "GPIB" by performing step (1) to (3) described in "1.4 Selecting Interface."



② Select [EOI] and then press the ENTER key to display the screen for switching the message terminator recognized.

- Enable : Recognizes the EOI signal, run the command that was entered.
- Disable : Recognizes the EOI signal, LF (without EOI signal) or CR+LF (without EOI signal), run the command that was entered. However, it does not correspond to the binary data transfer.

⚠ CAUTION

Please use as the EOI setting usually “Enable”

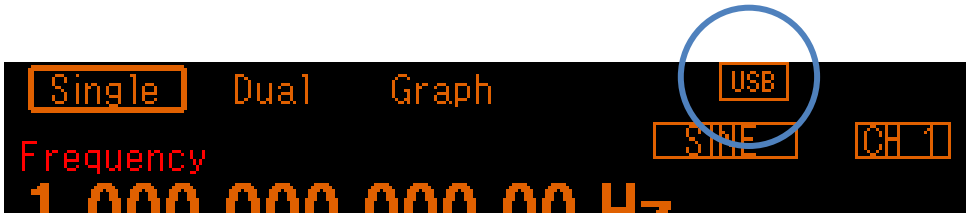
1.7 USB ID

If multiple units of WF1947/WF1948 are connected within a system via USB, the following numbers are used to enable the application identify each unit.

- Vendor number : 3402(0x0D4A)
- Product number : 13(0x000D)/WF1947, 14(0x000E)/WF1948
- Serial number : Product's manufacturing number (serial number)

1.8 Releasing Remote State

In the external control remote state, the "USB" or "GPIB" icon is lit on the LCD, and "LOCAL" is displayed on the [F5] soft-key. When the [F5] key is pressed in this state, the remote state is released and the panel operations become enabled. If "LOCAL" is not displayed (local lockout status), the [F5] key operation is disabled. To enable the panel operations, specify the local control from the external control controller.



1.9 Considerations

- The USB and GPIB connectors are located on the rear panel.
- The USB and GPIB interfaces are expected to be used under a relatively stable environment.
  Avoid using in a place that has power fluctuation or environment with much electrical noise.
- Connect or disconnect the GPIB connector only after all devices connected on the bus are powered off.
- When using the GPIB interface, power on all devices connected on the bus.
- The total cable length must be 2 m x (number of devices) or 20 m, whichever is the shorter.
- The length of a single cable must be 4 m or shorter.
- Check carefully for the GPIB address before setting it.
  If a duplicate address is set to multiple units within the same system, the equipment may be damaged.
- When using the GPIB interface, set EOI with the controller of the GPIB connected with the equipment.

2. Command Descriptions

2.1 Overview of Commands

The commands of WF1947/WF1948 comply with IEEE488.2 and SCPI (version 1999.0). SCPI defines the communication method used between controllers and measurement equipment. For general information about SCPI, refer to other appropriate documents.

2.1.1 Conventions

For convenience in describing the commands, the following conventions are used in this document.

< > < > indicates something other than itself. In the case of parameter or response data, the abbreviation of the type is enclosed in < > .

[ ] The items enclosed in [ ] are optional, and can be omitted.

{abc|xyz}
Indicates that either "abc" or "xyz" can be used.

[abc|xyz]
Indicates that either "abc" or "xyz" can be used,
but that both are optional and can be omitted.

Uppercase, lowercase
Keywords in a mixture of uppercase and lowercase letters are the long form, while keywords in uppercase letters only are the short form.

2.1.2 Commands

The program messages of WF1947/WF1948 consist of common commands and subsystem commands. This section describes the format of each command, the subsystem command tree, and so on.

2.1.2.1 Common commands

The common commands are to control the comprehensive functions of the equipment.
Figure 2.1 shows the syntax of common commands.

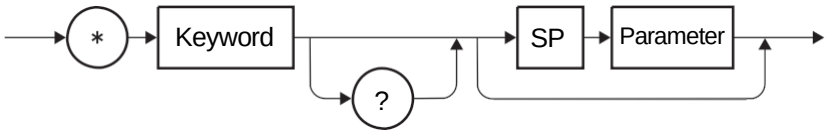


Figure 2.1 Common Command Syntax

The keyword in Figure 2.1 consists of three alphabetic characters. Here, SP is a space character (ASCII code 32).

2.1.2.2 Subsystem commands

The subsystem commands are used to execute specific functions of the equipment. Each subsystem command consists of a root keyword, one or more lower-level keywords, a parameter, and a suffix.
The followings show examples of command and query.

:OUTPut:STATe ON
:OUTPut:STATe?

OUTPut is the root-level keyword linking a second-level keyword, and ON is a parameter.

2.1.2.3 Subsystem command tree

(A) Structure of command tree

In SCPI, a hierarchical structure similar to the one used in a file system is used for the subsystem commands. This command structure is called "command tree."

Figure 2.2 shows an example of a command tree of subsystem commands.

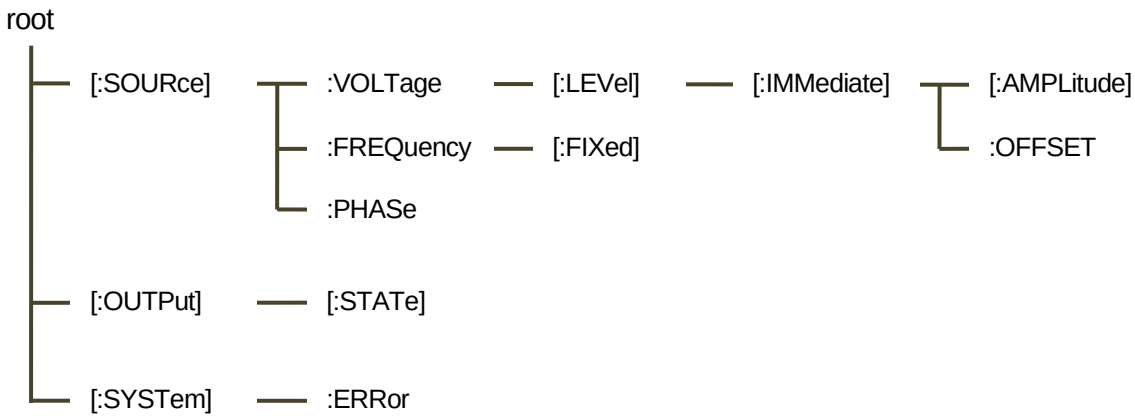


Figure 2.2 Example of Subsystem Command Tree

In the command tree in Figure 2.2, the keywords nearest the top ([:SOURce], [:OUTPut], and [:SYSTem]) are root level keywords, and to reach the keywords on the lower levels, a specific path must be followed. For example, to access ":OFFSet", the path must be [:SOURce] - :VOLTage - [:LEVel] - [:IMMediate] - :OFFSet.

(B) Current path movement

The current path is a level within the command tree, and becomes the first level from which the parser starts the search when the user sends the next command. The parser determines the current path according to the following rules.

(1) At power-on and reset
The current path is set to the root.

(2) Message terminator
Upon reception of a message terminator, the current path is set to the root.

(3) Colon (command separator)
When a colon is placed between two keywords, the colon moves the current path one level down in the command tree.

(4) Colon (root specifier)
When a colon is placed at the beginning of a command, the current path is set to the root.

(5) Semicolon
Semicolons do not affect to the current path.

(6) Space
Spaces do not affect to the current path.

(7) Comma
Commas do not affect to the current path.

(8) IEEE488.2 common commands
Common commands do not affect to the current path.

By using semicolons properly, multiple commands can be sent efficiently.
For example,

:SOURce:VOLTage:LEVel:IMMediate:AMPLitude 1.0; OFFSet 1.0

is the same as sending the following two commands:

:SOURce:VOLTage:LEVel:IMMediate:AMPLitude 1.0
:SOURce:VOLTage:LEVel:IMMediate:OFFSet 1.0

When an optional keyword is omitted, you should pay careful attention to the current path movement.
For example,

:VOLTage 1.0

sets the current path to ":SOURce." Therefore, if following two program messages

:SOURce:VOLTage:LEVel:IMMediate:AMPLitude 1.0
:SOURce:FREQuency:FIXed 1000.0

are send as one program message,

:SOURce:VOLTage:LEVel:IMMediate:AMPLitude 1.0; FREQuency:FIXed 1000.0

results in an error. However,

:SOURce:VOLTage 1.0; FREQuency:FIXed 1000.0

does not result in an error.

2.1.2.4 Subsystem command syntax

The syntax of subsystem commands is shown in Figure 2.3.

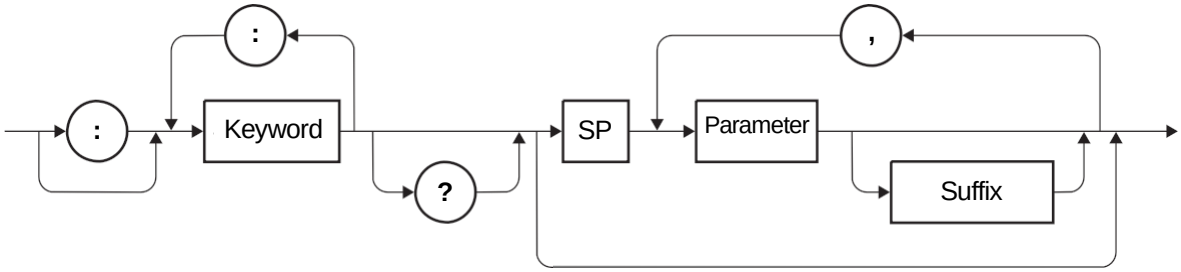


Figure 2.3 Subsystem Command Syntax

(A) Keyword

The keyword in Figure 2.3 is a string of up to 12 characters consisting of uppercase and lowercase alphabetic characters, underscore (_), and numeric characters, beginning with an alphabetic character.
Most of the keywords listed in "2.2 Command List" consist of a mixture of uppercase and lowercase letters. Here, uppercase letters indicate the short form of keywords, while uppercase and lowercase letters indicate the long form of keywords. Keywords are written in uppercase and lowercase letter for convenience, but actual commands are not case sensitive. Examples for the keyword "OUTPut" are listed in Table 2.1.

Table 2.1 Keywords Accepted and Not Accepted by Equipment (for "OUTPut")

Keyword	Description
OUTPUT	Can be used as long form.
OUTP	Can be used as short form.
OuTpUt	Not case sensitive. Can be used as long form.
oUtP	Not case sensitive. Can be used as short form.
OUTPU	Cannot be used because it corresponds to neither long form nor short form.
OUT	Cannot be used because it corresponds to neither long form nor short form.

(B) Keyword separator

The colons (:) in Figure 2.3 are interpreted as keyword separators. These keyword separators serve to separate an upper-level keyword from a lower-level keyword in a command tree as shown in Figure 2.2.

The colon (:) at the beginning of the subsystem command is interpreted as a root specifier. This root specifier sets the current path to the root.

(C) Keyword omission
The keywords enclosed in square brackets ([ ]) in the commands listed in "2.2 Command List" can be omitted. If omitted, the equipment interprets the command as if that optional keyword is received.
For example,

:OUTPut[:STATe]

means that you can use either of the following commands:

:OUTPut:STATe
:OUTPut

(D) Channel specification
In the case of a 2-channel equipment, many commands allow you to specify the channel by using an optional numeric keyword suffix.
For example,

:OUTPut[1|2]:STATe

means commands for channel 1 and 2 as follows:

:OUTPut[1]:STATe
:OUTPut2:STATe

If no channel number is specified, [1] is considered to be omitted, and the command is interpreted as the command for channel 1. For example, to control the channel 1 output to be turned ON, you can use either of the following commands.

:OUTPut1:STATe ON
:OUTPut:STATe ON

(E) Parameters
Parameter types are described below.

(1) Numeric parameter (<REAL>, <INT>)
The syntax of numeric parameters is shown in Figure 2.4.

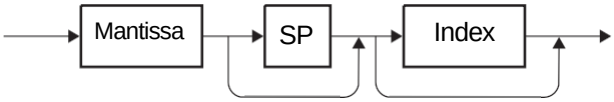


Figure 2.4 Numeric Parameter (<REAL>, <INT>) Syntax

The syntaxes of the mantissa and index in Figure 2.4 are shown in Figure 2.5 and 2.6.

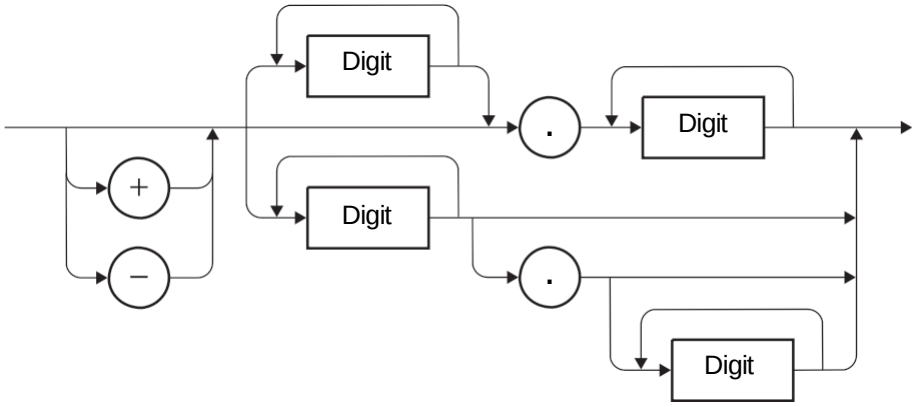


Figure 2.5 Mantissa Syntax

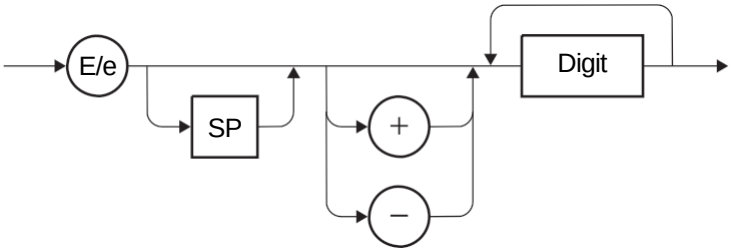


Figure 2.6 Index Syntax

(2) Discrete Parameter (<DISC>)
The syntax of the discrete parameter is shown in Figure 2.7.

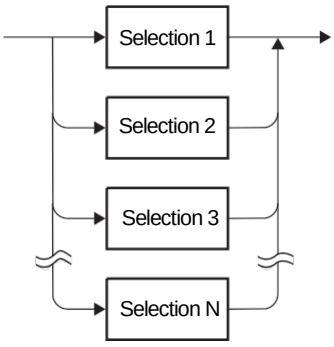


Figure 2.7 Discrete Parameter (<DISC>) Syntax

(3) Boolean Value Parameter (<BOL>)
The syntax of the Boolean value parameter is shown in Figure 2.8.

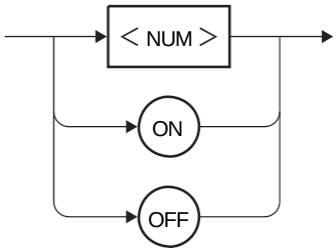


Figure 2.8 Boolean Value Parameter (<BOL>) Syntax

The Boolean value parameter is interpreted as true for values other than 0, and as false for 0 (zero). If the specified value includes a fractional part, that value is interpreted as the whole number obtained by rounding the fractional part. Therefore, for example, "0.4" is false, and "0.5" is true.

(4) String parameter (<STR>)
The syntax of string parameters is shown in Figure 2.9.

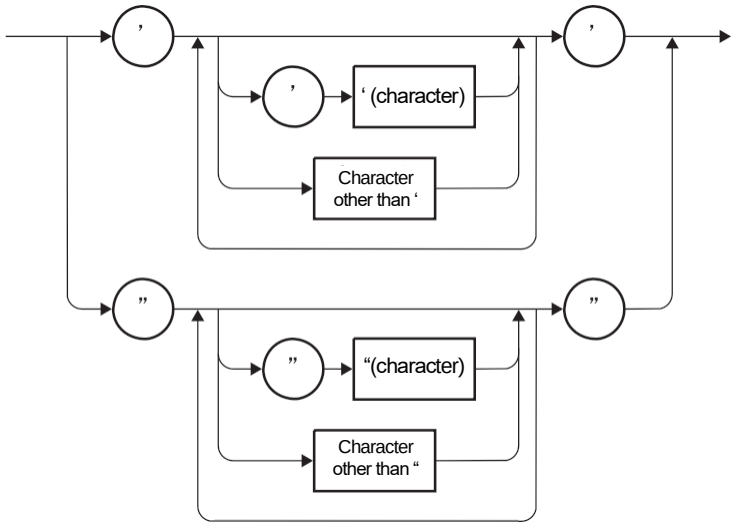


Figure 2.9 String Parameter (<STR>) Syntax

(5) Block parameter (<BLK>)
The syntax of block parameters is shown in Figure 2.10.

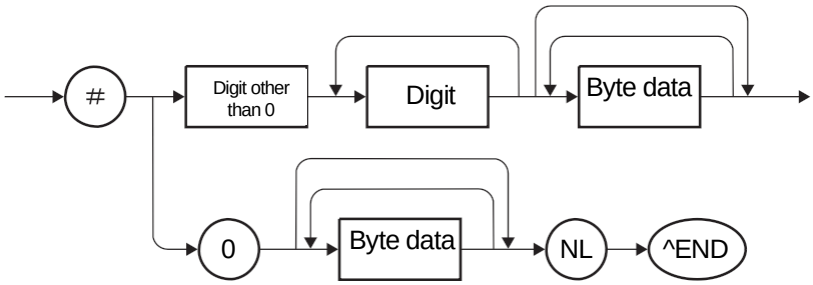


Figure 2.10 Block Parameter (<BLK>) Syntax

In the figure, NL is a new line character (ASCII code 10), and ^END is an EOI asserted by the last byte.

(F) Parameter separator
Parameter separators are used to separate parameters in a command which have two or more parameters.

(G) Query parameter
A query parameter is specified after "?" of query, and can be used for most of queries supported by the commands that have numeric parameters. For example, "MINimum" or "MAXimum" is specified as query parameter, the settable minimum value or settable maximum value can be queried, respectively.

(H) Suffix
The syntax of suffix is shown in Figure 2.11.

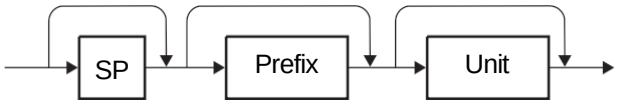


Figure 2.11 Suffix Syntax

In WF1947/WF1948, the prefix and unit attached to a parameter are valid only for that command, and do not affect other commands.

:SOURce1:VOLTage:AMPLitude:UNIT VRMS	Sets the amplitude unit to Vrms
:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude 2.0	Sets the amplitude to 2.0Vrms
:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude 2.0VPP	Sets the amplitude to 2.0Vp-p

2.1.2.5 Program message syntax

Two or more common commands and subsystem commands can be combined and sent from the controller to the equipment as one program message. The syntax of the program message is shown in Figure 2.12.

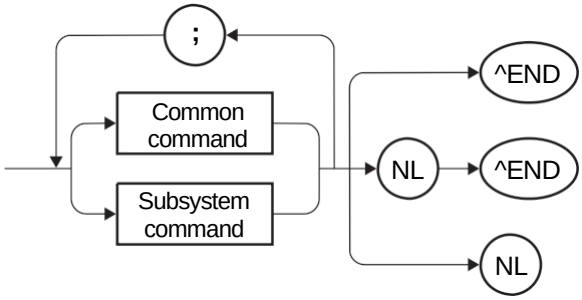


Figure 2.12 Program Message Syntax

Commands are separated by a semicolon (;).

2.1.2.6 Response message syntax

A response message is the data that is transmitted from the equipment in response to a query.

(A) Response message syntax

The syntax of the response message is shown in Figure 2.13.

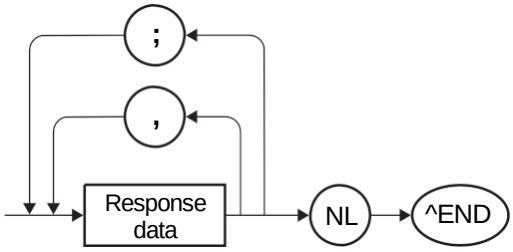


Figure 2.13 Response Message Syntax

In response messages, commas (,) and semicolons (;) are used as separators. When multiple values are returned by one command, the data are separated by commas (,). On the other hand, when there are multiple queries in one program message, the data for each query are separated by semicolons (;).

(B) Response message data
The data types of response messages are as follows.

(1) Real number response data (<REAL>)

The syntax of the real number response data is shown in Figure 2.14.

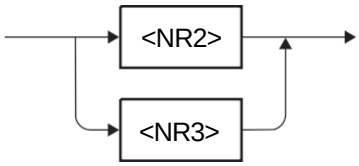


Figure 2.14 Real Number Response Data (<REAL>) Syntax

The syntax of the NR2 number response data is shown in Figure 2.15.

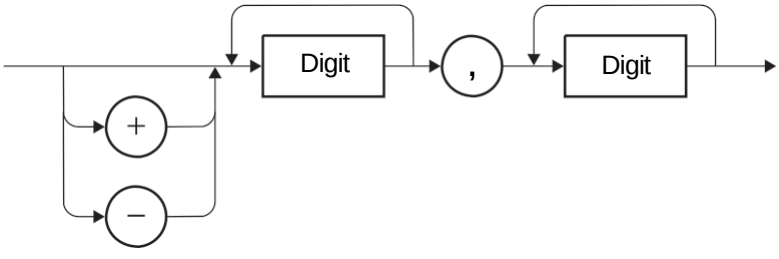


Figure 2.15 NR2 Number Response Data (<NR2>) Syntax

The syntax of the NR3 number response data is shown in Figure 2.16.

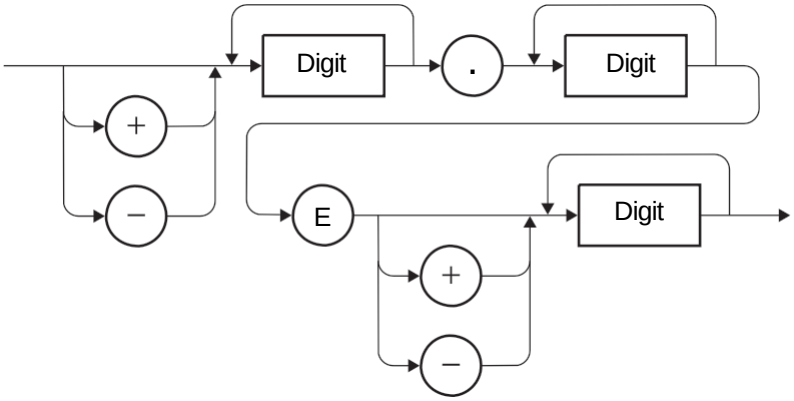


Figure 2.16 NR3 Number Response Data (<NR3>) Syntax

(2) Integer response data (<INT>)
The syntax of the integer response data is shown in Figure 2.17.

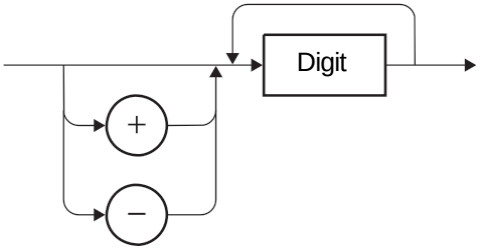


Figure 2.17 Integer Response Data (<INT>) Syntax

(3) Discrete response data (<DISC>)
The syntax of the discrete response data is shown in Figure 2.18.

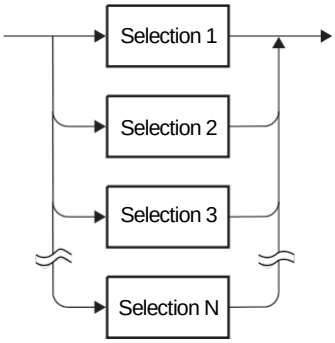


Figure 2.18 Discrete Response Data (<DISC>) Syntax

(4) Numeric Boolean value response data (<NBOL>)
The syntax of the numeric Boolean value response data is shown in Figure 2.19.

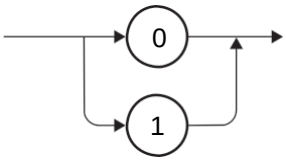


Figure 2.19 Numeric Boolean Value Response Data (<NBOL>) Syntax

(5) String response data (<STR>)
The syntax of the string response data is shown in Figure 2.20.

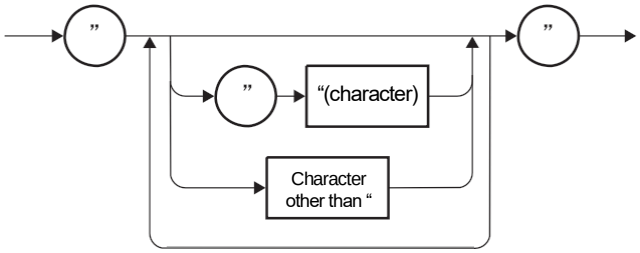


Figure 2.20 String Response Data (<STR>) Syntax

(6) Definite length arbitrary block response data (<DBLK>)
The syntax of the definite length arbitrary block response data is shown in Figure 2.21.

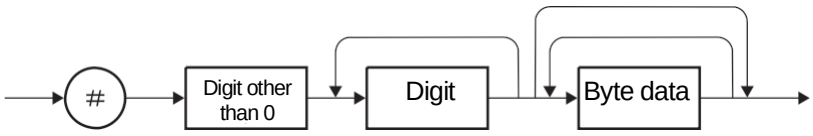


Figure 2.21 Definite Length Arbitrary Block Response Data (<DBLK>) Syntax

(7) Indefinite length arbitrary block response data (<IBLK>)
The syntax of the indefinite length arbitrary block response data is shown in Figure 2.22.

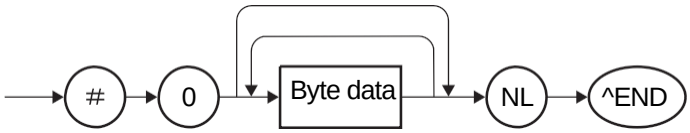


Figure 2.22 Indefinite Length Arbitrary Block Response Data (<IBLK>) Syntax

2.2 Command List

This section shows the list of the external control commands of WF1947/WF1948.

2.2.1 List Classification

The commands are listed according to the following classification.

Basic output signal settings
- •Oscillation mode selection Command list
- •Output waveform selection Command list
- •Individual output waveform setting Command list
- •Output signal setting Command list

Signal output control
- •Signal output operation Command list
- •Trigger operation Command list

Advanced settings for each oscillation mode
- •Modulated oscillation mode Command list
- •Sweep oscillation mode Command list
- •Burst oscillation mode Command list

Memory save/read operations
- •Memory operations Command list

Commands related to external control status system
- •Status system Command list

Commands dedicated to 2-channel equipment WF1948
- •Channel operation 2-channel equipment (WF1948) Command list

Other commands for information acquisition, etc.
- •Other operations Command list

2.2.2 Notations in Lists

"Reference" indicates the section number where each command is described in detail.

"Processing time" indicates the typical time for command processing by this equipment.
The actual processing time depends on the operation status of this equipment and the speed of the controller (PC).
So please verify the system sufficiently before performing the external control.

In the table, the processing time for a setting command is the time from the transmission of the command to the reflection on the behavior of the equipment, and the processing time for a query command is the time from the transmission of the command to the reception of the response message by the controller (PC).

The meanings of the symbols used in the command list table are as follows.
The lowercase part of each keyword indicates that the part can be omitted.

- •Square brackets ([ ]) indicate optional keywords. (implicit keywords)
- •Vertical bars (|) indicate that one of multiple keywords can be selected.

2.2.3 Oscillation Mode Selection Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Continuous oscillation mode selection	[:SOURce[1|2]]:CONTinuous[:IMMediate]	2.3.1.1	90/–	90/–
Continuous oscillation mode query	[:SOURce[1|2]]:CONTinuous:STATe?	2.3.1.2	–/10	–/15
Modulated oscillation mode FSK selection/query	[:SOURce[1|2]]:FSKey:STATe	2.3.1.3	100/10	100/15
Modulated oscillation mode PSK selection/query	[:SOURce[1|2]]:PSKey:STATe	2.3.1.4	100/10	100/15
Modulated oscillation mode FM selection/query	[:SOURce[1|2]]:FM:STATe	2.3.1.5	100/10	100/10
Modulated oscillation mode PM selection/query	[:SOURce[1|2]]:PM:STATe	2.3.1.6	100/10	100/15
Modulated oscillation mode AM selection/query	[:SOURce[1|2]]:AM:STATe	2.3.1.7	100/10	100/10
Modulated oscillation mode AM (DSB-SC) selection/query	[:SOURce[1|2]]:AMSC:STATe	2.3.1.8	100/10	100/10
Modulated oscillation mode DC offset modulation selection/query	[:SOURce[1|2]]:OFSM:STATe	2.3.1.9	100/10	100/20
Modulated oscillation mode PWM selection/query	[:SOURce[1|2]]:PWM:STATe	2.3.1.10	120/10	120/10
Sweep oscillation mode sweep selection/query	[:SOURce[1|2]]:SWEep:MODE	2.3.1.11	15/10	15/15
Sweep oscillation mode frequency sweep selection/query	[:SOURce[1|2]]:FREQuency:MODE	2.3.1.12	180/10	180/15
Sweep oscillation mode phase sweep selection/query	[:SOURce[1|2]]:PHASe:MODE	2.3.1.13	190/10	190/15
Sweep oscillation mode amplitude sweep selection/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:MODE	2.3.1.14	230/15	230/20
Sweep oscillation mode DC offset sweep selection/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:MODE	2.3.1.15	230/15	230/20
Sweep oscillation mode duty sweep selection/query	[:SOURce[1|2]]:PULSe:DCYCle:MODE	2.3.1.16	250/15	250/15
Burst oscillation mode selection/query	[:SOURce[1|2]]:BURSt:STATe	2.3.1.17	100/10	100/10

2.2.4 Output Waveform Selection Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Waveform selection/query	[:SOURce[1|2]]:FUNCtion[:SHAPe]	2.3.2.1	300/10	300/15
Arbitrary waveform selection/query	[:SOURce[1|2]]:FUNCtion:USER	2.3.2.2	25/10	25/15
Waveform polarity selection/query	:OUTPut[1|2]:POLarity	2.3.2.3	100/10	100/15
Amplitude range selection/query	:OUTPut[1|2]:SCALe	2.3.2.4	100/10	100/15

2.2.5 Individual Output Waveform Setting Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Square/pulse wave shared commands				
Square/pulse wave shared commands duty unit selection/query	[:SOURce[1|2]]:PULSe:DCYCle:UNIT	2.3.3.1	10/15	10/15
Square/pulse wave shared commands duty user-defined unit setting/query	[:SOURce[1|2]]:PULSe:DCYCle:USER	2.3.3.2	15/20	15/15
Square wave				
Square wave duty value setting/query	[:SOURce[1|2]]:FUNCtion:SQUare:DCYCle	2.3.3.3	20/15	20/15
Square wave extension on/off selection/query	[:SOURce[1|2]]:FUNCtion:SQUare:EXTend	2.3.3.4	15/10	20/15
Pulse wave				
Pulse wave duty value setting/query	[:SOURce[1|2]]:PULSe:DCYCle	2.3.3.5	65/15	45/20
Pulse wave pulse width setting/query	[:SOURce[1|2]]:PULSe:WIDTh	2.3.3.6	65/10	45/20
Pulse wave rising time setting/query	[:SOURce[1|2]]:PULSe:TRANsition[:LEADing]	2.3.3.7	35/10	30/15
Pulse wave falling time setting/query	[:SOURce[1|2]]:PULSe:TRANsition:TRAiling	2.3.3.8	25/10	25/15
Pulse wave period setting/query	[:SOURce[1|2]]:PULSe:PERiod	2.3.3.9	95/15	75/20
Pulse wave period unit selection/query	[:SOURce[1|2]]:PULSe:PERiod:UNIT	2.3.3.10	10/10	10/10
Pulse wave period user-defined unit setting/query	[:SOURce[1|2]]:PULSe:PERiod:USER	2.3.3.11	15/15	20/15
Ramp wave				
Ramp wave symmetry setting/query	[:SOURce[1|2]]:FUNCtion:RAMP:SYMMetry	2.3.3.12	30/10	30/15

2.2.6 Output Signal Setting Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Frequency				
Frequency setting/query	[:SOURce[1|2]]:FREQuency[:CW|:FIXed]	2.3.4.1	45/10	45/15
Frequency unit selection/query	[:SOURce[1|2]]:FREQuency:UNIT	2.3.4.2	10/10	10/15
Frequency user-defined unit setting/query	[:SOURce[1|2]]:FREQuency:USER	2.3.4.3	15/15	15/15
Amplitude				
Amplitude setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]	2.3.4.4	95/10	95/15
Amplitude unit selection/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:UNIT	2.3.4.5	10/10	10/15
Amplitude user-defined unit setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:USER	2.3.4.6	15/15	20/15
DC offset				
DC offset setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet	2.3.4.7	95/15	95/10
DC offset unit setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:UNIT	2.3.4.8	10/10	10/15
DC Offset user-defined unit setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:USER	2.3.4.9	15/15	20/15
Phase				
Phase setting/query	[:SOURce[1|2]]:PHASe[:ADJust]	2.3.4.10	20/15	20/15
Phase unit selection/query	[:SOURce[1|2]]:PHASe:UNIT	2.3.4.11	10/10	10/15
Phase user-defined unit setting/query	[:SOURce[1|2]]:PHASe:USER	2.3.4.12	15/15	15/15
Output voltage range (Switching setting between amplitude and DC offset)				
Output voltage range high level setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH	2.3.4.13	70/15	70/15
Output voltage range high level unit selection/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH:UNIT	2.3.4.14	10/10	10/15
Output voltage range low level setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW	2.3.4.15	145/15	145/20
Output voltage range low level unit selection/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW:UNIT	2.3.4.16	10/10	10/15

2.2.7 Signal Output Operation Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Output on/off setting/query	:OUTPut[1|2][:STATe]	2.3.5.1	15/10	15/15
Output-on at power-on setting/query	:OUTPut[1|2]:PON	2.3.5.2	220/10	335/10
Auto-range operation (output range) selection/query	[:SOURce[1|2]]:VOLTage:RANGe:AUTO	2.3.5.3	70/10	70/15
Phase synchronization setting	[:SOURce[1|2]]:PHASe:INITiate	2.3.5.4	45/–	45/–
External addition input setting/query	[:SOURce[1|2]]:COMBine:FEED	2.3.5.5	65/10	65/10
Load impedance setting/query	:OUTPut[1|2]:LOAD	2.3.5.6	260/10	260/10

2.2.8 Trigger Operation Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Manual trigger operation				
Manual trigger (TRIG key operation)	*TRG	2.3.6.1	10/–	10/–
Trigger operation sweep mode				
Trigger operation sweep mode trigger source selection/query	:TRIGger[1|2]:SWEep:SOURce	2.3.6.2	15/10	15/15
Trigger operation sweep mode internal trigger cycle setting/query	:TRIGger[1|2]:SWEep:TIMer	2.3.6.3	10/10	15/15
Trigger operation sweep mode external trigger signal polarity selection/query	:TRIGger[1|2]:SWEep:SLOPe	2.3.6.4	10/10	10/10
Trigger operation burst mode				
Trigger operation burst mode trigger source selection/query	:TRIGger[1|2]:BURSt:SOURce	2.3.6.5	10/10	10/15
Trigger operation burst mode internal trigger cycle setting/query	:TRIGger[1|2]:BURSt:TIMer	2.3.6.6	10/10	15/15
Trigger operation burst mode external trigger signal polarity selection/query	:TRIGger[1|2]:BURSt:SLOPe	2.3.6.7	10/10	10/10
Trigger operation execution control				
Trigger operation execution control setting	:TRIGger[1|2]:SELected:EXECute	2.3.6.8	30/-	30/-

2.2.9 Modulated Oscillation Mode Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
AM				
Modulated oscillation mode AM modulation degree setting/query	[:SOURce[1|2]]:AM[:DEPTh]	2.3.7.1	10/10	15/15
Modulated oscillation mode AM modulation source selection/query	[:SOURce[1|2]]:AM:SOURce	2.3.7.2	10/10	15/15
Modulated oscillation mode AM modulation frequency setting/query	[:SOURce[1|2]]:AM:INTernal:FREQuency	2.3.7.3	20/10	20/15
Modulated oscillation mode AM modulation waveform selection/query	[:SOURce[1|2]]:AM:INTernal:FUNCtion [:SHAPe]	2.3.7.4	10/10	10/10
Modulated oscillation mode AM modulation waveform - arbitrary waveform selection/query	[:SOURce[1|2]]:AM:INTernal:FUNCtion:USER	2.3.7.5	25/10	25/15
Modulated oscillation mode AM synchronization signal output selection/query	:OUTPut[1|2]:SYNC:AM:TYPE	2.3.7.6	10/10	10/10
AM (DSB-SC)				
Modulated oscillation mode AM (DSB-SC) modulation degree setting/query	[:SOURce[1|2]]:AMSC[:DEPTh]	2.3.7.7	10/10	10/15
Modulated oscillation mode AM (DSB-SC) modulation source selection/query	[:SOURce[1|2]]:AMSC:SOURce	2.3.7.8	10/10	15/10
Modulated oscillation mode AM (DSB-SC) modulation frequency setting/query	[:SOURce[1|2]]:AMSC:INTernal:FREQuency	2.3.7.9	20/10	20/15
Modulated oscillation mode AM (DSB-SC) modulation waveform selection/query	[:SOURce[1|2]]:AMSC:INTernal:FUNCtion [:SHAPe]	2.3.7.10	10/10	10/10
Modulated oscillation mode AM (DSB-SC) modulation waveform - arbitrary waveform selection/query	[:SOURce[1|2]]:AMSC:INTernal:FUNCtion :USER	2.3.7.11	25/10	30/15
Modulated oscillation mode AM (DSB-SC) synchronization signal output selection/query	:OUTPut[1|2]:SYNC:AMSC:TYPE	2.3.7.12	10/10	10/10

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
FM				
Modulated oscillation mode FM peak deviation setting/query	[:SOURce[1|2]]:FM[:DEViation]	2.3.7.13	25/15	10/15
Modulated oscillation mode FM modulation source selection/query	[:SOURce[1|2]]:FM:SOURce	2.3.7.14	15/10	15/10
Modulated oscillation mode FM modulation frequency setting/query	[:SOURce[1|2]]:FM:INTernal:FREQuency	2.3.7.15	15/10	20/15
Modulated oscillation mode FM modulation waveform selection/query	[:SOURce[1|2]]:FM:INTernal:FUNCtion [:SHAPe]	2.3.7.16	10/10	10/15
Modulated oscillation mode FM modulation waveform - arbitrary waveform selection/query	[:SOURce[1|2]]:FM:INTernal:FUNCtion:USER	2.3.7.17	25/10	35/15
Modulated oscillation mode FM synchronization signal output selection/query	:OUTPut[1|2]:SYNC:FM:TYPE	2.3.7.18	10/10	10/15
FSK				
Modulated oscillation mode FSK hop frequency setting/query	[:SOURce[1|2]]:FSKey[:FREQuency]	2.3.7.19	10/15	10/15
Modulated oscillation mode FSK modulation source selection/query	[:SOURce[1|2]]:FSKey:SOURce	2.3.7.20	10/10	15/15
Modulated oscillation mode FSK modulation frequency setting/query	[:SOURce[1|2]]:FSKey:INTernal:FREQuency	2.3.7.21	20/15	20/15
Modulated oscillation mode FSK synchronization signal output selection/query	:OUTPut[1|2]:SYNC:FSKey:TYPE	2.3.7.22	10/10	10/10
PM				
Modulated oscillation mode PM peak deviation setting/query	[:SOURce[1|2]]:PM[:DEViation]	2.3.7.23	20/10	20/15
Modulated oscillation mode PM modulation source selection/query	[:SOURce[1|2]]:PM:SOURce	2.3.7.24	10/10	20/10
Modulated oscillation mode PM modulation frequency setting/query	[:SOURce[1|2]]:PM:INTernal:FREQuency	2.3.7.25	15/10	20/15
Modulated oscillation mode PM modulation waveform selection/query	[:SOURce[1|2]]:PM:INTernal:FUNCtion [:SHAPe]	2.3.7.26	10/10	10/15
Modulated oscillation mode PM modulation waveform - arbitrary waveform selection/query	[:SOURce[1|2]]:PM:INTernal:FUNCtion:USER	2.3.7.27	25/10	35/15
Modulated oscillation mode PM synchronization output selection/query	:OUTPut[1|2]:SYNC:PM:TYPE	2.3.7.28	10/10	15/15

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
PSK				
Modulated oscillation mode PSK deviation setting/query	[:SOURce[1|2]]:PSKey[:DEViation]	2.3.7.29	10/10	10/15
Modulated oscillation mode PSK modulation source selection/query	[:SOURce[1|2]]:PSKey:SOURce	2.3.7.30	20/10	20/15
Modulated oscillation mode PSK modulation frequency setting/query	[:SOURce[1|2]]:PSKey:INTernal:FREQuency	2.3.7.31	20/10	20/15
Modulated oscillation mode PSK synchronization signal output selection/query	:OUTPut[1|2]:SYNC:PSKey:TYPE	2.3.7.32	10/10	10/15
PWM				
Modulated oscillation mode PWM peak deviation setting/query	[:SOURce[1|2]]:PWM[:DEViation]:DCYCle	2.3.7.33	25/15	25/15
Modulated oscillation mode PWM modulation source selection/query	[:SOURce[1|2]]:PWM:SOURce	2.3.7.34	10/10	15/10
Modulated oscillation mode PWM modulation frequency setting/query	[:SOURce[1|2]]:PWM:INTernal:FREQuency	2.3.7.35	15/15	15/15
Modulated oscillation mode PWM modulation waveform selection/query	[:SOURce[1|2]]:PWM:INTernal:FUNCtion [:SHAPe]	2.3.7.36	10/10	10/15
Modulated oscillation mode PWM modulation waveform - arbitrary waveform selection/query	[:SOURce[1|2]]:PWM:INTernal:FUNCtion :USER	2.3.7.37	25/10	25/15
Modulated oscillation mode PWM synchronization signal output selection/query	:OUTPut[1|2]:SYNC:PWM:TYPE	2.3.7.38	10/10	10/10
DC offset modulation				
Modulated oscillation mode DC offset modulation peak deviation setting/query	[:SOURce[1|2]]:OFSM[:DEViation]	2.3.7.39	65/15	65/15
Modulated oscillation mode DC offset modulation modulation source selection/query	[:SOURce[1|2]]:OFSM:SOURce	2.3.7.40	10/10	15/10
Modulated oscillation mode DC offset modulation modulation frequency setting/query	[:SOURce[1|2]]:OFSM:INTernal:FREQuency	2.3.7.41	15/15	15/15
Modulated oscillation mode DC offset modulation modulation waveform selection/query	[:SOURce[1|2]]:OFSM:INTernal:FUNCtion [:SHAPe]	2.3.7.42	10/10	10/10
Modulated oscillation mode DC offset modulation modulation waveform - arbitrary waveform selection/query	[:SOURce[1|2]]:OFSM:INTernal:FUNCtion :USER	2.3.7.43	25/10	25/15

Modulated oscillation mode DC offset modulation synchronization signal output selection/query	:OUTPut[1|2]:SYNC:OFSM:TYPE	2.3.7.44	10/10	10/10

2.2.10 Sweep Oscillation Mode Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Basic sweep setting				
Basic sweep setting sweep slope selection/query	[:SOURce[1|2]]:SWEep:SPACing	2.3.8.1	10/10	10/15
Basic sweep setting sweep direction selection/query	[:SOURce[1|2]]:SWEep:INTernal:FUNCtion	2.3.8.2	10/10	10/15
Basic sweep setting sweep time setting/query	[:SOURce[1|2]]:SWEep:TIME	2.3.8.3	15/10	10/15
Basic sweep setting stop level setting/query	[:SOURce[1|2]]:SWEep:SLEVel	2.3.8.4	10/10	10/15
Basic sweep setting stop level selection/query	[:SOURce[1|2]]:SWEep:SLEVel:STATe	2.3.8.5	10/10	10/15
Basic sweep setting oscillation stop unit setting/query	[:SOURce[1|2]]:SWEep:OSTop	2.3.8.6	10/10	10/15
Frequency sweep				
Frequency sweep starting value setting/query	[:SOURce[1|2]]:FREQuency:STARt	2.3.8.7	20/15	20/15
Frequency sweep stop value setting/query	[:SOURce[1|2]]:FREQuency:STOP	2.3.8.8	20/15	20/15
Frequency sweep center value setting/query	[:SOURce[1|2]]:FREQuency:CENTer	2.3.8.9	20/15	20/15
Frequency sweep span value setting/query	[:SOURce[1|2]]:FREQuency:SPAN	2.3.8.10	20/15	20/15
Frequency sweep marker value setting/query	[:SOURce[1|2]]:MARKer:FREQuency	2.3.8.11	15/15	15/15
Frequency sweep start/stop value swapping setting	[:SOURce[1|2]]:FREQuency:SWAP	2.3.8.12	25/–	15/–
Frequency sweep start/stop value output setting	[:SOURce[1|2]]:FREQuency:STATe	2.3.8.13	10/–	15/–

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Phase sweep				
Phase sweep starting value setting/query	[:SOURce[1|2]]:PHASe:STARt	2.3.8.14	20/15	20/15
Phase sweep stop value setting/query	[:SOURce[1|2]]:PHASe:STOP	2.3.8.15	20/15	20/15
Phase sweep center value setting/query	[:SOURce[1|2]]:PHASe:CENTer	2.3.8.16	20/15	20/15
Phase sweep span value setting/query	[:SOURce[1|2]]:PHASe:SPAN	2.3.8.17	20/15	20/15
Phase sweep marker value setting/query	[:SOURce[1|2]]:MARKer:PHASe	2.3.8.18	15/15	15/15
Phase sweep start/stop value swapping setting	[:SOURce[1|2]]:PHASe:SWAP	2.3.8.19	15/–	20/–
Phase sweep start/stop value output setting	[:SOURce[1|2]]:PHASe:STATe	2.3.8.20	10/–	15/–
Amplitude sweep				
Amplitude sweep starting value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:STARt	2.3.8.21	20/15	20/20
Amplitude sweep stop value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:STOP	2.3.8.22	20/15	20/20
Amplitude sweep center value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:CENTer	2.3.8.23	20/15	25/20
Amplitude sweep span value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:SPAN	2.3.8.24	20/15	20/20
Amplitude sweep marker value setting/query	[:SOURce[1|2]]:MARKer:VOLTage[:LEVel] [:IMMediate][:AMPLitude]	2.3.8.25	20/15	20/20
Amplitude sweep start/stop value swapping setting	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:SWAP	2.3.8.26	20/–	20/–
Amplitude sweep start/stop value output setting	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:STATe	2.3.8.27	15/–	15/–

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
DC offset sweep				
DC offset sweep starting value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:STARt	2.3.8.28	20/20	20/20
DC offset sweep stop value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:STOP	2.3.8.29	20/15	20/20
DC offset sweep center value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:CENTer	2.3.8.30	20/15	20/20
DC offset sweep span value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:SPAN	2.3.8.31	20/15	20/20
DC offset sweep marker value setting/query	[:SOURce[1|2]]:MARKer:VOLTage[:LEVel] [:IMMediate]:OFFSet	2.3.8.32	15/20	15/20
DC offset sweep start/stop value swapping setting	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:SWAP	2.3.8.33	20/–	20/–
DC offset sweep start/stop value output setting	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:STATe	2.3.8.34	15/–	15/–
Duty sweep				
Duty sweep starting value setting/query	[:SOURce[1|2]]:PULSe:DCYCle:STARt	2.3.8.35	20/15	20/15
Duty sweep stop value setting/query	[:SOURce[1|2]]:PULSe:DCYCle:STOP	2.3.8.36	20/15	20/15
Duty sweep center value setting/query	[:SOURce[1|2]]:PULSe:DCYCle:CENTer	2.3.8.37	20/15	20/15
Duty sweep span value setting/query	[:SOURce[1|2]]:PULSe:DCYCle:SPAN	2.3.8.38	20/15	20/15
Duty sweep marker value setting/query	[:SOURce[1|2]]:MARKer:PULSe:DCYCle	2.3.8.39	20/15	20/15
Duty sweep start/stop value swapping setting	[:SOURce[1|2]]:PULSe:DCYCle:SWAP	2.3.8.40	20/–	20/–
Duty sweep start/stop value output setting	[:SOURce[1|2]]:PULSe:DCYCle:STATe	2.3.8.41	10/–	10/–

2.2.11 Burst Oscillation Mode Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Burst oscillation				
Burst oscillation burst mode selection/query	[:SOURce[1|2]]:BURSt:MODE	2.3.9.1	10/10	10/10
Burst oscillation stop level setting/query	[:SOURce[1|2]]:BURSt:SLEVel	2.3.9.2	10/10	10/15
Burst oscillation stop level selection/query	[:SOURce[1|2]]:BURSt:SLEVel:STATe	2.3.9.3	10/10	10/10
Burst oscillation synchronization signal output selection/query	:OUTPut[1|2]:SYNC:BURSt:TYPE	2.3.9.4	10/10	10/10
Burst oscillation auto burst mode: mark wave number setting/query	[:SOURce[1|2]]:BURSt:AUTO:NCYCles	2.3.9.5	10/10	10/15
Burst oscillation auto burst mode: space wave number setting/query	[:SOURce[1|2]]:BURSt:AUTO:SPACe	2.3.9.6	10/10	10/10
Burst oscillation trigger burst mode: mark wave number setting/query	[:SOURce[1|2]]:BURSt[:TRIGger]:NCYCles	2.3.9.7	10/10	10/15
Burst oscillation trigger burst mode: trigger delay time setting/query	[:SOURce[1|2]]:BURSt[:TRIGger]:TDELay	2.3.9.8	10/10	15/15
Burst oscillation gate mode: oscillation stop unit setting/query	[:SOURce[1|2]]:BURSt:GATE:OSTop	2.3.9.9	10/10	10/15
Burst oscillation triggered gate mode: oscillation stop unit setting/query	[:SOURce[1|2]]:BURSt:TGATe:OSTop	2.3.9.10	10/10	10/10

2.2.12 Memory Operation Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Basic setting memory				
Basic setting memory clear	:MEMory:STATe:DELete	2.3.10.1	700/–	700/–
Basic setting memory store	*SAV	2.3.10.2	900/–	900/–
Basic setting memory recall	*RCL	2.3.10.3	250/–	250/–
Arbitrary waveform memory				
Arbitrary waveform memory arbitrary waveform data transfer/read-out	{:TRACe|DATA}[:DATA] Array format (4 K-word) Array format (512 K-word) Control point format (10-point) Control point format (10,000-point)	2.3.10.4	 450/50 28000/7000 250/20 2200/150	 820/150 41000/22000 370/25 3100/1200
Arbitrary waveform memory store	{:TRACe|DATA}:STORe	2.3.10.5	540/–	660/–
Arbitrary waveform memory recall	{:TRACe|DATA}:RECall	2.3.10.6	50/–	50/–
Arbitrary waveform memory copy	{:TRACe|DATA}:COPY	2.3.10.7	380/–	540/–
Arbitrary waveform memory delete	{:TRACe|DATA}:DELete	2.3.10.8	600/–	620/–
Arbitrary waveform memory information acquisition	{:TRACe|DATA}:INFormation?	2.3.10.9	–/35	–/20

2.2.13 Status System Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Status operations				
Status register and related queue clear	*CLS	2.3.11.1	105/–	100/–
Status reporting related preset setting	:STATus:PRESet	2.3.11.2	10/–	10/–
Status register at power-on clear flag setting/query	*PSC	2.3.11.3	10/10	10/10
Status byte register query	*STB?	2.3.11.4	–/10	–/10
Service request enable register setting/query	*SRE	2.3.11.5	10/10	10/10
Standard event status register query	*ESR?	2.3.11.6	–/10	–/10
Standard event enable register setting/query	*ESE	2.3.11.7	10/10	10/10
Operation status register group (common to CH1/CH2)				
Condition register query	:STATus:OPERation:CONDition?	2.3.11.8	–/10	–/10
Transition filter register (negative) setting/query	:STATus:OPERation:NTRansition	2.3.11.9	10/10	10/10
Transition filter register (positive) setting/query	:STATus:OPERation:PTRansition	2.3.11.10	10/10	10/10
Event register query	:STATus:OPERation[:EVENt]?	2.3.11.11	–/10	–/10
Event enable register setting/query	:STATus:OPERation:ENABle	2.3.11.12	10/10	10/10
Operation status register group (CH1)				
Operation status register group (CH1) condition register query	:STATus:OPERation:CH1:CONDition?	2.3.11.13	–/10	–/10
Operation status register group (CH1) transition filter register (negative) setting/query	:STATus:OPERation:CH1:NTRansition	2.3.11.14	10/10	10/10
Operation status register group (CH1) transition filter register (positive) setting/query	:STATus:OPERation:CH1:PTRansition	2.3.11.15	10/10	10/15
Operation status register group (CH1) event register query	:STATus:OPERation:CH1[:EVENt]?	2.3.11.16	–/10	–/10
Operation status register group (CH1) event enable register setting/query	:STATus:OPERation:CH1:ENABle	2.3.11.17	10/10	10/10

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Operation status register group (CH2)				
Operation status register group (CH2) condition register query	:STATus:OPERation:CH2:CONDition?	2.3.11.18	–/10	–/15
Operation status register group (CH2) transition filter register (negative) setting/query	:STATus:OPERation:CH2:NTRansition	2.3.11.19	10/10	10/10
Operation status register group (CH2) transition filter register (positive) setting/query	:STATus:OPERation:CH2:PTRansition	2.3.11.20	10/10	10/10
Operation status register group (CH2) event Register setting	:STATus:OPERation:CH2[:EVENt]?	2.3.11.21	–/10	–/15
Operation status register group (CH2) event enable register setting/query	:STATus:OPERation:CH2:ENABle	2.3.11.22	10/10	10/15
Questionable data status register group				
Questionable data status register group condition register query	:STATus:QUEStionable:CONDition?	2.3.11.23	–/10	–/10
Questionable data status register group transition filter register (negative) setting/query	:STATus:QUEStionable:NTRansition	2.3.11.24	10/10	10/15
Questionable data status register group transition filter register (positive) setting/query	:STATus:QUEStionable:PTRansition	2.3.11.25	10/10	10/10
Questionable data status register group event register query	:STATus:QUEStionable[:EVENt]?	2.3.11.26	–/10	–/10
Questionable data status register group event enable register setting/query	:STATus:QUEStionable:ENABle	2.3.11.27	10/10	10/10

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Warning event register group				
Warning event register group event register query	:STATus:WARNing[:EVENt]?	2.3.11.28	–/10	–/10
Warning event register group event enable register setting/query	:STATus:WARNing:ENABle	2.3.11.29	10/10	10/10
Warning event register group (CH1)				
Warning event register group (CH1) event register query	:STATus:WARNing:CH1[:EVENt]?	2.3.11.30	–/10	–/10
Warning event register group (CH1) event enable register setting/query	:STATus:WARNing:CH1:ENABle	2.3.11.31	10/10	10/15
Warning event register group (CH2)				
Warning event register group (CH2) event register query	:STATus:WARNing:CH2[:EVENt]?	2.3.11.32	–/10	–/10
Warning event register group (CH2) event enable register setting/query	:STATus:WARNing:CH2:ENABle	2.3.11.33	10/10	10/10

2.2.14 Channel Operation 2-channel Equipment (WF1948) Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
2-channel equipment (WF1948) channel mode setting/query	:CHANnel:MODE	2.3.12.1	345/10	345/10
2-channel equipment (WF1948) 2-channel same value operation setting/query	:INSTrument:COUPle	2.3.12.2	20/10	20/15
2-channel equipment (WF1948) constant frequency difference mode: frequency difference setting/query	:CHANnel:DELTa	2.3.12.3	250/10	250/15
2-channel equipment (WF1948) constant frequency ratio mode: frequency ratio setting/query	:CHANnel:RATio	2.3.12.4	490/10	485/10

2.2.15 Other Operations Command List

Function	Command	Reference	Processing time [ms] Setting/Query	
			USB	GPIB
Equipment-specific information query	*IDN?	2.3.13.1	–/10	–/15
Error message query	:SYSTem:ERRor?	2.3.13.2	–/10	–/15
Setting initialization (status registers, etc. not cleared)	*RST	2.3.13.3	330/–	330/–
Operation completion event bit setting	*OPC	2.3.13.4	10/–	10/–
Setting output key to 1 at operation completion	*OPC?	2.3.13.5	–/10	–/10
Waiting for command/query execution	*WAI	2.3.13.6	10/–	10/–
Self diagnosis result query	*TST?	2.3.13.7	–/10	–/10
External reference frequency input setting/query	[:SOURce[1|2]]:ROSCillator:SOURce	2.3.13.8	15/10	15/15
External reference frequency output setting/query	[:SOURce[1|2]]:ROSCillator:OUTPut[:STATe]	2.3.13.9	15/10	15/15

2.3 Descriptions of Individual Commands

This section describes the details of each command.

2.3.1 Oscillation Mode Selection Command Details

2.3.1.1 Continuous oscillation mode selection [:SOURce[1|2]]:CONTinuous[:IMMediate]

■[:SOURce[1|2]]:CONTinuous[:IMMediate]

Description

Sets the oscillation mode to the continuous oscillation

Setting parameter

None

Setting example

:SOURce1:CONTinuous:IMMediate

Sets the oscillation mode of CH1 to the continuous oscillation

2.3.1.2 Continuous oscillation mode query [:SOURce[1|2]]:CONTinuous:STATe?

□[:SOURce[1|2]]:CONTinuous:STATe?

Description

Queries whether or not the oscillation mode is the continuous oscillation

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not the continuous oscillation mode
1 : The oscillation mode is the continuous oscillation mode

Remarks

If you want to switch to the continuous oscillation without being affected by the oscillation mode set at that time, use this command to switch to the continuous oscillation mode.

2.3.1.3 Modulated oscillation mode FSK selection/query [:SOURce[1|2]]:FSKey:STATe

■[:SOURce[1|2]]:FSKey:STATe

□[:SOURce[1|2]]:FSKey:STATe?

Description

Switches the oscillation mode to the modulated oscillation mode FSK

Queries whether or not the oscillation mode is the modulated oscillation mode FSK

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Switches to the continuous oscillation mode if the oscillation mode is the modulated oscillation mode FSK

1/ON: Switches the oscillation mode to the modulation (FSK)

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not the modulated oscillation mode FSK

1 : The oscillation mode is the modulated oscillation mode FSK

Setting example

:SOURce1:FSKey:STATe ON

Switches the oscillation mode of CH1 to FSK

2.3.1.4 Modulated oscillation mode PSK selection/query [:SOURce[1|2]]:PSKey:STATe

■[:SOURce[1|2]]:PSKey:STATe

□[:SOURce[1|2]]:PSKey:STATe?

Description

Switches the oscillation mode to the modulated oscillation mode PSK

Queries whether or not the oscillation mode is the modulated oscillation mode PSK

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Switches to the continuous oscillation mode if the oscillation mode is the modulated oscillation mode PSK

1/ON: Switches the oscillation mode to the modulation (PSK)

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not the modulated oscillation mode PSK

1 : The oscillation mode is the modulated oscillation mode PSK

Setting example

:SOURce1:FSKey:STATe ON

Switches the oscillation mode of CH1 to PSK

2.3.1.5 Modulated oscillation mode FM selection/query [:SOURce[1|2]]:FM:STATe

■[:SOURce[1|2]]:FM:STATe

□[:SOURce[1|2]]:FM:STATe?

Description

Switches the oscillation mode to the modulated oscillation mode FM

Queries whether or not the oscillation mode is the modulated oscillation mode FM

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Switches to the continuous oscillation mode if the oscillation mode is the modulated oscillation mode FM

1/ON: Switches the oscillation mode to the modulation (FM)

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not the modulated oscillation mode FM

1 : The oscillation mode is the modulated oscillation mode FM

Setting example

:SOURce1:FM:STATe ON

Switches the oscillation mode of CH1 to FM

2.3.1.6 Modulated oscillation mode PM selection/query [:SOURce[1|2]]:PM:STATe

■[:SOURce[1|2]]:PM:STATe

□[:SOURce[1|2]]:PM:STATe?

Description

Switches the oscillation mode to the modulated oscillation mode PM

Queries whether or not the oscillation mode is the modulated oscillation mode PM

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Switches to the continuous oscillation mode if the oscillation mode is the modulated oscillation mode PM

1/ON: Switches the oscillation mode to the modulation (PM)

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not the modulated oscillation mode PM

1 : The oscillation mode is the modulated oscillation mode PM

Setting example

:SOURce1:PM:STATe ON

Switches the oscillation mode of CH1 to PM

2.3.1.7 Modulated oscillation mode AM selection/query [:SOURce[1|2]]:AM:STATe

■[:SOURce[1|2]]:AM:STATe

□[:SOURce[1|2]]:AM:STATe?

Description

Switches the oscillation mode to the modulated oscillation mode AM

Queries whether or not the oscillation mode is the modulated oscillation mode AM

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Switches to the continuous oscillation mode if the oscillation mode is the modulated oscillation mode AM

1/ON: Switches the oscillation mode to the modulation (AM)

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not the modulated oscillation mode AM

1 : The oscillation mode is the modulated oscillation mode AM

Setting example

:SOURce1:AM:STATe ON

Switches the oscillation mode of CH1 to AM

2.3.1.8 Modulated oscillation mode AM (DSB-SC) selection/query [:SOURce[1|2]]:AMSC:STATe

■[:SOURce[1|2]]:AMSC:STATe

□[:SOURce[1|2]]:AMSC:STATe?

Description

Switches the oscillation mode to the modulated oscillation mode AM (DSB-SC)

Queries whether or not the oscillation mode is the modulated oscillation mode AM (DSB-SC)

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Switches to the continuous oscillation mode if the oscillation mode is the modulated oscillation mode AM (DSB-SC)

1/ON: Switches the oscillation mode to the modulation AM (DSB-SC)

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not the modulated oscillation mode AM (DSB-SC)

1 : The oscillation mode is the modulated oscillation mode AM (DSB-SC)

Setting example

:SOURce1:AMSC:STATe ON

Switches the oscillation mode of CH1 to AM (DSB-SC)

2.3.1.9 Modulated oscillation mode DC offset modulation selection/query [:SOURce[1|2]]:OFSM:STATe

■[:SOURce[1|2]]:OFSM:STATe

□[:SOURce[1|2]]:OFSM:STATe?

Description

Switches the oscillation mode to the modulated oscillation mode DC offset modulation

Queries whether or not the oscillation mode is the modulated oscillation mode DC offset modulation

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Switches to the continuous oscillation mode if the oscillation mode is the modulated oscillation mode DC offset modulation

1/ON: Switches the oscillation mode to the modulation (DC offset modulation)

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not the modulated oscillation mode DC offset modulation

1 : The oscillation mode is the modulated oscillation mode DC offset modulation

Setting example

:SOURce1:OFSM:STATe ON

Switches the oscillation mode of CH1 to the DC offset modulation

2.3.1.10 Modulated oscillation mode PWM selection/query [:SOURce[1|2]]:PWM:STATe

■[:SOURce[1|2]]:PWM:STATe

□[:SOURce[1|2]]:PWM:STATe?

Description

Switches the oscillation mode to the modulated oscillation mode PWM

Queries whether or not the oscillation mode is the modulated oscillation mode PWM

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Switches to the continuous oscillation mode if the oscillation mode is the modulated oscillation mode PWM

1/ON: Switches the oscillation mode to the modulation (PWM)

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not the modulated oscillation mode PWM
1 : The oscillation mode is the modulated oscillation mode PWM

Setting example

:SOURce1:PWM:STATe ON

Switches the oscillation mode of CH1 to PWM

2.3.1.11 Sweep oscillation mode sweep selection/query [:SOURce[1|2]]:SWEep:MODE

■[:SOURce[1|2]]:SWEep:MODE

□[:SOURce[1|2]]:SWEep:MODE?

Description

Selects/queries the sweep mode

Setting parameter

SINGle|CONTinuous|GATed

SINGle → Single
CONTinuous → Continuous
GATed → Gated single

Query parameter

None

Response format

SING|CONT|GAT

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:SWEep:MODE SINGle

Sets the sweep mode of CH1 to the single

2.3.1.12 Sweep oscillation mode frequency sweep selection/query [:SOURce[1|2]]:FREQuency:MODE

■[:SOURce[1|2]]:FREQuency:MODE

□[:SOURce[1|2]]:FREQuency:MODE?

Description

Switches the oscillation mode to the sweep oscillation frequency sweep

Queries whether or not the oscillation mode is the sweep oscillation frequency sweep

Setting parameter

CW|FIXed|SWEep

CW → Switch to the continuous oscillation when the oscillation mode is the sweep oscillation frequency sweep
FIXed → Switch to the continuous oscillation when the oscillation mode is the sweep oscillation frequency sweep
SWEep → Switches the oscillation mode to the sweep oscillation frequency sweep

Query parameter

None

Response format

CW|FIX|SWE

CW | FIX : The oscillation mode is not the sweep oscillation frequency sweep

SWE : The oscillation mode is the sweep oscillation frequency sweep

Setting example

:SOURce1:FREQuency:MODE SWEep

Sets the oscillation mode of CH1 to the frequency sweep

2.3.1.13 Sweep oscillation mode phase sweep selection/query [:SOURce[1|2]]:PHASe:MODE

■[:SOURce[1|2]]:PHASe:MODE

□[:SOURce[1|2]]:PHASe:MODE?

Description

Switches the oscillation mode to the sweep oscillation phase sweep

Queries whether or not the oscillation mode is the sweep oscillation phase sweep

Setting parameter

FIXed|SWEep

FIXed → Switch to the continuous oscillation when the oscillation mode is the sweep oscillation phase sweep

SWEep → Switches the oscillation mode to the sweep oscillation phase sweep

Query parameter

None

Response format

FIX|SWE

FIX : The oscillation mode is not the sweep oscillation phase sweep

SWE : The oscillation mode is the sweep oscillation phase sweep

Setting example

:SOURce1:PHASe:MODE SWEep

Sets the oscillation mode of CH1 to the phase sweep

2.3.1.14 Sweep oscillation mode amplitude sweep selection/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:MODE

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:MODE

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:MODE?

Description

Switches the oscillation mode to the sweep oscillation amplitude sweep

Queries whether or not the oscillation mode is the sweep oscillation amplitude sweep

Setting parameter

FIXed|SWEep

FIXed → Switch to the continuous oscillation when the oscillation mode is the sweep oscillation amplitude sweep

SWEep → Switches the oscillation mode to the sweep oscillation amplitude sweep

Query parameter

None

Response format

FIX|SWE

FIX : The oscillation mode is not the sweep oscillation amplitude sweep
SWE : The oscillation mode is the sweep oscillation amplitude sweep

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:MODE SWEep
Sets the oscillation mode of CH1 to the amplitude sweep

2.3.1.15 Sweep oscillation mode DC offset sweep selection/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:MODE

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:MODE

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:MODE?

Description

Switches the oscillation mode to the sweep oscillation DC offset sweep
Queries whether or not the oscillation mode is the sweep oscillation DC offset sweep

Setting parameter

FIXed|SWEep

FIXed → Switch to the continuous oscillation when the oscillation mode is the sweep oscillation DC offset sweep
SWEep → Switches the oscillation mode to the sweep oscillation DC offset sweep

Query parameter

None

Response format

FIX|SWE

FIX : The oscillation mode is not the sweep oscillation DC offset sweep
SWE : The oscillation mode is the sweep oscillation DC offset sweep

Setting example

:SOURce1:VOLTage[:LEVel][:IMMediate]:OFFSet:MODE SWEep
Sets the oscillation mode of CH1 to the DC offset sweep

2.3.1.16 Sweep oscillation mode duty sweep selection/query [:SOURce[1|2]]:PULSe:DCYCle:MODE

■[:SOURce[1|2]]:PULSe:DCYCle:MODE

□[:SOURce[1|2]]:PULSe:DCYCle:MODE?

Description

Switches the oscillation mode to the sweep oscillation duty sweep

Queries whether or not the oscillation mode is the sweep oscillation duty sweep

Setting parameter

FIXed|SWEep

FIXed → Switch to the continuous oscillation when the oscillation mode is the sweep oscillation duty sweep

SWEep → Switches the oscillation mode to the sweep oscillation duty sweep

Query parameter

None

Response format

FIX|SWE

FIX : The oscillation mode is not the sweep oscillation duty sweep

SWE : The oscillation mode is the sweep oscillation duty sweep

Setting example

:SOURce1:PULSe:DCYCle:MODE SWEep

Sets the oscillation mode of CH1 to the duty sweep

2.3.1.17 Burst oscillation mode selection/query [:SOURce[1|2]]:BURSt:STATe

■[:SOURce[1|2]]:BURSt:STATe

□[:SOURce[1|2]]:BURSt:STATe?

Description

Switches the oscillation mode between the continuous and burst oscillation modes

Queries whether or not the oscillation mode is burst

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Continuous

1/ON: Burst

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : The oscillation mode is not a burst oscillation mode

1 : The oscillation mode is a burst oscillation mode

Setting example

:SOURce1:BURSt:STATe ON

Sets the oscillation mode of CH1 to burst

2.3.2 Output Waveform Selection Command Details

2.3.2.1 Waveform selection/query [:SOURce[1|2]]:FUNCtion[:SHAPe]

■[:SOURce[1|2]]:FUNCtion[:SHAPe]

□[:SOURce[1|2]]:FUNCtion[:SHAPe]?

Description

Sets/queries the waveform

Setting parameter

DC|NOISe|SINusoid|SQUare|PULSe|RAMP|USER

DC → DC
NOISe → Noise
SINusoid → Sine wave
SQUare → Square wave
PULSe → Pulse wave
RAMP → Ramp wave
USER → Arbitrary wave

Query parameter

None

Response format

DC|NOIS|SIN|SQU|PULS|RAMP|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:FUNCtion:SHAPe RAMP

Sets the waveform of CH1 to ramp wave

2.3.2.2 Arbitrary waveform selection/query [:SOURce[1|2]]:FUNCtion:USER

■[:SOURce[1|2]]:FUNCtion:USER

□[:SOURce[1|2]]:FUNCtion:USER?

Description

Selects/queries the arbitrary waveform

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

Query parameter

None

Response format

<NR1>

Setting example

:SOURce1:FUNCtion:USER 3

Sets the arbitrary waveform of CH1 to the data of the memory number 3

Remarks

† Memory number 0 is the edit memory.

2.3.2.3 Waveform polarity selection/query :OUTPut[1|2]:POLarity

■:OUTPut[1|2]:POLarity

□:OUTPut[1|2]:POLarity?

Description

Selects/queries the polarity of waveform

Setting parameter

<shape>,<polarity>

<shape> ::= SINusoid|SQUare|PULSe|RAMP|NOISe|USER

SINusoid → Sine wave
SQUare → Square wave
PULSe → Pulse wave
RAMP → Ramp wave
NOISe → Noise
USER → Arbitrary wave

<polarity> ::= NORMal|INVerted

NORMal → Normal
INVerted → Invert

Query parameter

<shape> ::= SINusoid|SQUare|PULSe|RAMP|NOISe|USER

† For the meaning of each parameter, see the setting parameter

Response format

NORM|INV

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:POLarity SINusoid, NORMal

Sets the polarity of sine wave of CH1 to normal

2.3.2.4 pAmplitude range selection/query :OUTPut[1|2]:SCALe

■:OUTPut[1|2]:SCALe

□:OUTPut[1|2]:SCALe?

Description

Selects/queries the amplitude range of waveform

Setting parameter

<shape>,<scale>

<shape> ::= SINusoid|SQUare|PULSe|RAMP|NOISe|USER

SINusoid → Sine wave
SQUare → Square wave
PULSe → Pulse wave
RAMP → Ramp wave
NOISe → Noise
USER → Arbitrary wave

<scale> ::= MFS|FS|PFS

MFS → -FS/0
FS → ± FS
PFS → 0/+FS

Query parameter

<shape> ::= SINusoid|SQUare|PULSe|RAMP|NOISe|USER

† For the meaning of each parameter, see the setting parameter

Response format

MFS|FS|PFS

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SCALe SINusoid, FS

Sets the amplitude range of sine wave of CH1 to ± FS

2.3.3 Individual Output Waveform Setting Command Details

2.3.3.1 Square/pulse wave shared duty unit selection/query [:SOURce[1|2]]:PULSe:DCYCle:UNIT

■[:SOURce[1|2]]:PULSe:DCYCle:UNIT

□[:SOURce[1|2]]:PULSe:DCYCle:UNIT?

Description

Selects/queries the phase unit

Setting parameter

PCT|USER

PCT → %

USER → User-defined unit

Query parameter

None

Response format

PCT|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PULSe:DCYCle:UNIT PCT

Sets the duty of CH1 to %

Remarks

† This command is system unit setting command, it is not reflected on this device screen.

† For system unit, see the Chapter 2.5.

2.3.3.2 Square/pulse wave shared duty user-defined unit setting/query [:SOURce[1|2]]:PULSe:DCYCle:USER

■[:SOURce[1|2]]:PULSe:DCYCle:USER

□[:SOURce[1|2]]:PULSe:DCYCle:USER?

Description

Sets/queries the user-defined unit of duty

Setting parameter

[<name>],[<form>],[<m>],[<n>]

<name> ::= <STR>

<STR> → User-defined unit name (up to 4 characters)

† Optional (if omitted, nothing is changed)

<form> ::= LINear|LOGarithmic

LINear → Linear

LOGarithmic → Log

† Optional (if omitted, nothing is changed)

<m> ::= <REAL>|MINimum|MAXimum

<REAL> → m (scale)

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

† Optional (if omitted, nothing is changed)

<n> ::= <REAL>|MINimum|MAXimum
<REAL> → n (offset)
MINimum → Sets the minimum value
MAXimum → Sets the maximum value
† Optional (if omitted, nothing is changed)

Query parameter

None

Response format

<name>,<form>,<m>,<n>
<name> ::= <STR>
<form> ::= LIN|LOG
<m> ::= <NR3>
<n> ::= <NR2>
† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PULSe:DCYCle:USER "INTN",LINear,100,0
Sets the user-defined unit of duty of CH1 to "INTN"

2.3.3.3 Square wave duty value setting/query [:SOURce[1|2]]:FUNCtion:SQUare:DCYCle

■[:SOURce[1|2]]:FUNCtion:SQUare:DCYCle

□[:SOURce[1|2]]:FUNCtion:SQUare:DCYCle?

Description

Sets/queries the duty of oscillator (square wave)
† The setting range of duty varies depending on the oscillator frequency.

Setting parameter

<duty>|MINimum|MAXimum
<duty> ::= <REAL>[<units>]
<REAL> → Duty (square wave):
(Standard range) 0.0100% to 99.9900%,
(Extended range) 0.0000% to 100.0000%,
Resolution: 0.0001%
<units> ::= PCT|USER
MINimum → (Standard range) 0.0100%,
(Extended range) 0.0000%
MAXimum → (Standard range) 99.9900%,
(Extended range) 100.0000%

Query parameter

[MINimum|MAXimum]
MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCtion:SQUare:DCYCle 20PCT
Sets the duty of CH1 (square wave) to 20%

Remarks

To enable the duty extended range of square wave, set the square wave extension to on at "[:SOURce[1|2]]:FUNCtion:SQUare:EXTend" in "2.3.3.4 Square wave extension on/off selection."

2.3.3.4 Square wave extension on/off selection/query [:SOURce[1|2]]:FUNCtion:SQUare:EXTend

■[:SOURce[1|2]]:FUNCtion:SQUare:EXTend

□[:SOURce[1|2]]:FUNCtion:SQUare:EXTend?

Description

Selects/queries on/off of the square wave extension

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Square wave extension off
1/ON: Square wave extension on

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : Square wave extension off
1 : Square wave extension on

Setting example

:SOURce1:FUNCtion:SQUare:EXTend ON

Sets the square wave extension of CH1 to on

2.3.3.5 Pulse wave duty value setting/query [:SOURce[1|2]]:PULSe:DCYCle

■[:SOURce[1|2]]:PULSe:DCYCle

□[:SOURce[1|2]]:PULSe:DCYCle?

Description

Sets/queries the duty (pulse wave)

† The setting range of duty varies depending on the oscillator frequency.

Setting parameter

<duty>|MINimum|MAXimum

<duty> ::= <REAL>[<units>]

<REAL> → Duty (pulse wave):0.0170% to 99.9830%,
Resolution :0.0001%

<units> ::= PCT|USER

MINimum → 0.0170%

MAXimum → 99.9830%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PULSe:DCYCle 20PCT

Sets the duty of CH1 (pulse wave) to 20%

2.3.3.6 Pulse wave pulse width setting/query [:SOURce[1|2]]:PULSe:WIDTh

■[:SOURce[1|2]]:PULSe:WIDTh

□[:SOURce[1|2]]:PULSe:WIDTh?

Description

Sets/queries the pulse width

Setting parameter

<width>|MINimum|MAXimum

<width> ::= <REAL>[<eunits>][<units>]

<REAL> → Pulse width: 24.00 ns to 99.9830 Ms,
Resolution: 0.001% or less of period or 0.01 ns

<eunits> ::= MA|K|M|U|N

<units> ::= S

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PULSe:WIDTh 1ms

Sets the pulse width of CH1 to 1 ms

2.3.3.7 Pulse wave rising time setting/query [:SOURce[1|2]]:PULSe:TRANsition[:LEADing]

■[:SOURce[1|2]]:PULSe:TRANsition[:LEADing]

□[:SOURce[1|2]]:PULSe:TRANsition[:LEADing]?

Description

Sets/queries the pulse wave rising time

Setting parameter

<seconds>|MINimum|MAXimum

<seconds> ::= <REAL>[<eunits>][<units>]

<REAL> → Rising time: 15.0 ns to 62.5 Ms, Resolution: 3 digits or 0.1 ns

<eunits> ::= MA|K|M|U|N

<units> ::= S

MINimum → 15.0 ns

MAXimum → 62.5 Ms

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PULSe:TRANsition:LEADing 1ms

Sets the rising time of pulse wave of CH1 to 1 ms

2.3.3.8 Pulse wave falling time setting/query [:SOURce[1|2]]:PULSe:TRANsition:TRAiling

■[:SOURce[1|2]]:PULSe:TRANsition:TRAiling

□[:SOURce[1|2]]:PULSe:TRANsition:TRAiling?

Description

Sets/queries the pulse wave falling time

Setting parameter

<seconds>|MINimum|MAXimum

<seconds> ::= <REAL>[<eunits>][<units>]

<REAL> → Falling time: 15.0 ns to 62.5 Ms, Resolution: 3 digits or 0.1 ns

<eunits> ::= MA|K|M|U|N

<units> ::= S

MINimum → 15.0 ns

MAXimum → 62.5 Ms

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PULSe:TRANsition:TRAiling 1ms

Sets the falling time of pulse wave of CH1 to 1 ms

2.3.3.9 Pulse wave period setting/query [:SOURce[1|2]]:PULSe:PERiod

■[:SOURce[1|2]]:PULSe:PERiod

□[:SOURce[1|2]]:PULSe:PERiod?

Description

Sets/queries the period

Setting parameter

<period>|MINimum|MAXimum

<period> ::= <REAL>[<eunits>][<units>]

<REAL> → Period: 50 ns to 100 Ms

† The setting range varies depending on the waveform or oscillation mode.

<eunits> ::= MA|K|M|U|N

<units> ::= S|USER

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PULSe:PERiod 1US

Sets the period of CH1 to 1 μs

2.3.3.10 Pulse wave period unit selection/query [:SOURce[1|2]]:PULSe:PERiod:UNIT

■[:SOURce[1|2]]:PULSe:PERiod:UNIT

□[:SOURce[1|2]]:PULSe:PERiod:UNIT?

Description

Selects/queries the period unit

Setting parameter

S|USER

S → s

USER → User-defined unit

Query parameter

None

Response format

S|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PULSe:PERiod:UNIT S

Sets the period unit of CH1 to s

Remarks

† This command is system unit setting command, it is not reflected on this device screen.

† For system unit, see the Chapter 2.5.

2.3.3.11 Pulse wave period user-defined unit setting/query [:SOURce[1|2]]:PULSe:PERiod:USER

■[:SOURce[1|2]]:PULSe:PERiod:USER

□[:SOURce[1|2]]:PULSe:PERiod:USER?

Description

Sets/queries the user-defined unit of period

Setting parameter

[<name>],[<form>],[<m>],[<n>]

<name> ::= <STR>

<STR> → User-defined unit name (up to 4 characters)

† Optional (if omitted, nothing is changed)

<form> ::= LINear|LOGarithmic

LINear → Linear

LOGarithmic → Log

† Optional (if omitted, nothing is changed)

<m> ::= <REAL>|MINimum|MAXimum

<REAL> → m (scale)

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

† Optional (if omitted, nothing is changed)

<n> ::= <REAL>|MINimum|MAXimum
<REAL> → n (offset)
MINimum → Sets the minimum value
MAXimum → Sets the maximum value
† Optional (if omitted, nothing is changed)

Query parameter

None

Response format

<name>,<form>,<m>,<n>
<name> ::= <STR>
<form> ::= LIN|LOG
<m> ::= <NR3>
<n> ::= <NR2>

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PULSe:PERiod:USER "ms",LINear,1000,0

Sets the user-defined unit of period of CH1 to "ms"

2.3.3.12 Ramp wave symmetry setting/query [:SOURce[1|2]]:FUNCtion:RAMP:SYMMetry

■[:SOURce[1|2]]:FUNCtion:RAMP:SYMMetry

□[:SOURce[1|2]]:FUNCtion:RAMP:SYMMetry?

Description

Sets/queries the symmetry of ramp wave

Setting parameter

<symmetry>|MINimum|MAXimum
<symmetry> ::= <REAL>[<units>]
<REAL> → Symmetry: 0.00% to 100.00%, Resolution: 0.01%
<units> ::= PCT
MINimum → 0.00%
MAXimum → 100.00%

Query parameter

[MINimum|MAXimum]
MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCtion:RAMP:SYMMetry 20PCT

Sets the symmetry of ramp wave of CH1 to 20%

2.3.4 Output Signal Setting Command Details

2.3.4.1 Frequency setting/query [:SOURce[1|2]]:FREQuency[:CW|:FIXed]

■[:SOURce[1|2]]:FREQuency[:CW|:FIXed]

□[:SOURce[1|2]]:FREQuency[:CW|:FIXed]?

Description

Sets/queries the frequency of oscillator

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Frequency: 0.01 Hz to 30 MHz, Resolution: 0.01 μHz

† The setting range varies depending on the waveform or oscillation mode.

<eunits> ::= M|K|U|N

<units> ::= HZ|USER

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FREQuency:CW 1MHZ

Sets the frequency of CH1 to 1 MHz

2.3.4.2 Frequency unit selection/query [:SOURce[1|2]]:FREQuency:UNIT

■[:SOURce[1|2]]:FREQuency:UNIT

□[:SOURce[1|2]]:FREQuency:UNIT?

Description

Selects/queries the frequency unit

Setting parameter

HZ|USER

HZ → Hz

USER → User-defined unit

Query parameter:

None

Response format

HZ|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:FREQuency:UNIT HZ

Sets the frequency unit of CH1 to Hz

Remarks

† This command is system unit setting command, it is not reflected on this device screen.

† For system unit, see the Chapter 2.5.

2.3.4.3 Frequency user-defined unit setting/query [:SOURce[1|2]]:FREQuency:USER

■[:SOURce[1|2]]:FREQuency:USER

□[:SOURce[1|2]]:FREQuency:USER?

Description

Sets/queries the user-defined unit of frequency

Setting parameter

[<name>],[<form>],[<m>],[<n>]

<name> ::= <STR>

<STR> → User-defined unit name (up to 4 characters)

† Optional (if omitted, nothing is changed)

<form> ::= LINear|LOGarithmic

LINear → Linear

LOGarithmic → Log

† Optional (if omitted, nothing is changed)

<m> ::= <REAL>|MINimum|MAXimum

<REAL> → m (scale)

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

† Optional (if omitted, nothing is changed)

<n> ::= <REAL>|MINimum|MAXimum

<REAL> → n (offset)

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

† Optional (if omitted, nothing is changed)

Query parameter

None

Response format

<name>,<form>,<m>,<n>

<name> ::= <STR>

<form> ::= LIN|LOG

<m> ::= <NR3>

<n> ::= <NR2>

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:FREQuency:USER "kHz",LINear,0.001,0

Sets the user-defined unit of frequency of CH1 to "kHz"

2.3.4.4 Amplitude setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]?

Description

Sets/queries the amplitude of oscillator

Setting parameter

<amplitude>|MINimum|MAXimum

<amplitude> ::= <REAL>[<eunits>][<units>]

<REAL> → Amplitude: 0 Vp-p to 20 Vp-p/open,
0 Vp-p to 10 Vp-p/50Ω,
Resolution: (999.9 mVp-p or less) 4 digits or 0.1 mVp-p,
(1 Vp-p or more) 5 digits or 1 mVp-p

<eunits> ::= M

<units> ::= VPP|VPK|VRMS|DBV|DBM|USER

MINimum → 0 Vp-p

MAXimum → 20 Vp-p/open, 10 Vp-p/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude 10VPP

Sets the amplitude of CH1 to 10 Vp-p

2.3.4.5 Amplitude unit selection/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:UNIT

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:UNIT

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:UNIT?

Description

Selects/queries the amplitude unit

Setting parameter

VPP|VPK|VRMS|DBV|DBM|USER

VPP → Vp-p

VPK → Vpk

VRMS → Vrms

DBV → dBV

DBM → dBm

USER → User-defined unit

Query parameter

None

Response format

VPP|VPK|VRMS|DBV|DBM|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:UNIT VPP

Sets the amplitude unit of CH1 to Vp-p

Remarks

† This command is system unit setting command, it is not reflected on this device screen.

† For system unit, see the Chapter 2.5.

2.3.4.6 Amplitude user-defined unit setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:USER

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:USER

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:USER?

Description

Sets/queries the user-defined unit of amplitude

Setting parameter

[<name>],[<form>],[<m>],[<n>]

<name> ::= <STR>
<STR> → User-defined unit name (up to 4 characters)
† Optional (if omitted, nothing is changed)

<form> ::= LINear|LOGarithmic
LINear → Linear
LOGarithmic → Log
† Optional (if omitted, nothing is changed)

<m> ::= <REAL>|MINimum|MAXimum
<REAL> → m (scale)
MINimum → Sets the minimum value
MAXimum → Sets the maximum value
† Optional (if omitted, nothing is changed)

<n> ::= <REAL>|MINimum|MAXimum
<REAL> → n (offset)
MINimum → Sets the minimum value
MAXimum → Sets the maximum value
† Optional (if omitted, nothing is changed)

Query parameter

None

Response format

<name>,<form>,<m>,<n>

<name> ::= <STR>
<form> ::= LIN|LOG
<m> ::= <NR3>
<n> ::= <NR2>

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:USER "mVpk",LINear,1000,0

Sets the user-defined unit of amplitude of CH1 to "mVpk"

2.3.4.7 DC offset setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet?

Description

Sets/queries the DC offset of oscillator

Setting parameter

<offset>|MINimum|MAXimum

<offset> ::= <REAL>[<eunits>][<units>]

<REAL> → DC offset: ± 10 V/open, ± 5 V/50Ω,
Resolution: (± 499.9 mV or less) 4 digits or 0.1 mV,
(± 0.5 V or more) 5 digits or 1 mV

<eunits> ::= M

<units> ::= V|USER

MINimum → -10 V/open, -5 V/50Ω

MAXimum → 10 V/open, 5 V/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:OFFSet 2.5V

Sets the DC offset of CH1 to 2.5 V

2.3.4.8 DC offset unit setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:UNIT

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:UNIT

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:UNIT

Description

Selects/queries the DC offset unit

Setting parameter

V|USER

V → V

USER → User-defined unit

Query parameter

None

Response format

V|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:OFFSet:UNIT V

Sets the DC offset of CH1 to V

Remarks

† This command is system unit setting command, it is not reflected on this device screen.

† For system unit, see the Chapter 2.5.

2.3.4.9 DC offset user-defined unit setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:USER

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:USER

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:USER?

Description

Sets/queries the user-defined unit of DC offset

Setting parameter

[<name>],[<form>],[<m>],[<n>]

<name> ::= <STR>

<STR> → User-defined unit name (up to 4 characters)

† Optional (if omitted, nothing is changed)

<form> ::= LINear|LOGarithmic

LINear → Linear

LOGarithmic → Log

† Optional (if omitted, nothing is changed)

<m> ::= <REAL>|MINimum|MAXimum

<REAL> → m (scale)

MINimum → Minimum value

MAXimum → Maximum value

† Optional (if omitted, nothing is changed)

<n> ::= <REAL>|MINimum|MAXimum

<REAL> → n (offset)

MINimum → Minimum value

MAXimum → Maximum value

† Optional (if omitted, nothing is changed)

Query parameter

None

Response format

<name>,<form>,<m>,<n>

<name> ::= <STR>

<form> ::= LIN|LOG

<m> ::= <NR3>

<n> ::= <NR2>

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:OFFSet:USER "mV",LINear,1000,0

Sets the user-defined unit of DC offset of CH1 to "mV"

2.3.4.10 Phase setting/query [:SOURce[1|2]]:PHASe[:ADJust]

■[:SOURce[1|2]]:PHASe[:ADJust]

□[:SOURce[1|2]]:PHASe[:ADJust]?

Description

Sets/queries the phase of oscillator

Setting parameter

<phase>|MINimum|MAXimum

<phase> ::= <REAL>[<units>]

<REAL> → Phase: -1800.000° to 1800.000°,
Resolution: 0.001°

<units> ::= DEG|USER

MINimum → -1800.000°

MAXimum → 1800.000°

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PHASe:ADJust 90DEG

Sets the phase of CH1 to 90°

2.3.4.11 Phase unit selection/query [:SOURce[1|2]]:PHASe:UNIT

■[:SOURce[1|2]]:PHASe:UNIT

□[:SOURce[1|2]]:PHASe:UNIT?

Description

Selects/queries the phase unit

Setting parameter

DEG|USER

DEG → °

USER → User-defined unit

Query parameter

None

Response format

DEG|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PHASe:UNIT DEG

Sets the unit of phase of CH1 to °

Remarks

† This command is system unit setting command, it is not reflected on this device screen.

† For system unit, see the Chapter 2.5.

2.3.4.12 Phase user-defined unit setting/query [:SOURce[1|2]]:PHASe:USER

■[:SOURce[1|2]]:PHASe:USER

□[:SOURce[1|2]]:PHASe:USER?

Description

Sets/queries the user-defined unit of phase

Setting parameter

[<name>],[<form>],[<m>],[<n>]

<name> ::= <STR>

<STR> → User-defined unit name (up to 4 characters)

† Optional (if omitted, nothing is changed)

<form> ::= LINear|LOGarithmic

LINear → Linear

LOGarithmic → Log

† Optional (if omitted, nothing is changed)

<m> ::= <REAL>|MINimum|MAXimum

<REAL> → m (scale)

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

† Optional (if omitted, nothing is changed)

<n> ::= <REAL>|MINimum|MAXimum

<REAL> → n (offset)

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

† Optional (if omitted, nothing is changed)

Query parameter

None

Response format

<name>,<form>,<m>,<n>

<name> ::= <STR>

<form> ::= LIN|LOG

<m> ::= <NR3>

<n> ::= <NR2>

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PHASe:USER "rad",LINear,0.01745,0

Sets the user-defined unit of phase of CH1 to "rad"

2.3.4.13 Output voltage range high level setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH?

Description

Sets/queries the high level

Setting parameter

<high>|MINimum|MAXimum

<high> ::= <REAL>[<eunits>][<units>]

<REAL> → High level

† The setting range varies depending on the state.

<eunits> ::= M

<units> ::= V|USER

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:HIGH 5

Sets the high level of CH1 to 5 V

2.3.4.14 Output voltage range high level unit selection/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH:UNIT

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH:UNIT

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH:UNIT?

Description

Selects/queries the high level unit

Setting parameter

V|USER

V → V

USER → User-defined unit

Query parameter

None

Response format

V|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:HIGH:UNIT V

Sets the unit of high level of CH1 to V

Remarks

† The user-defined unit is the same as that of DC offset.

† This command is system unit setting command, it is not reflected on this device screen.

† For system unit, see the Chapter 2.5.

2.3.4.15 Output voltage range low level setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW?

Description

Sets/queries the low level

Setting parameter

<low>|MINimum|MAXimum

<low> ::= <REAL>[<eunits>][<units>]

<REAL> → Low level

† The setting range varies depending on the state.

<eunits> ::= M

<units> ::= V|USER

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:LOW 0

Sets the low level of CH1 to 0 V

2.3.4.16 Output voltage range low level unit selection/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW:UNIT

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW:UNIT

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW:UNIT?

Description

Selects/queries the low level unit

Setting parameter

V|USER

V → V

USER → User-defined unit

Query parameter

None

Response format

V|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:LOW:UNIT V

Sets the unit of low level of CH1 to V

Remarks

† The user-defined unit is the same as that of DC offset.

† This command is system unit setting command, it is not reflected on this device screen.

† For system unit, see the Chapter 2.5.

2.3.5 Signal Output Operation Command Details

2.3.5.1 Output on/off setting/query :OUTPut[1|2][:STATe]

■:OUTPut[1|2][:STATe]

□:OUTPut[1|2][:STATe]?

Description

Selects/queries the output on/off

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Output Off
1/ON: Output On

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : Output Off
1 : Output On

Setting example

:OUTPut1:STATe ON

Sets the output of CH1 to on

2.3.5.2 Output-on at power-on setting/query :OUTPut[1|2]:PON

■:OUTPut[1|2]:PON

□:OUTPut[1|2]:PON?

Description

Selects/queries the output on/off of power-on operation

Setting parameter

ON|OFF|LAST

ON → Output on
OFF → Output off
LAST → Setting of previous output off operation

Query parameter

None

Response format

ON|OFF|LAST

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:PON ON

Sets the output of power-on operation of CH1 to on

2.3.5.3 Auto-range operation (output range) selection/query [:SOURce[1|2]]:VOLTage:RANGe:AUTO

■[:SOURce[1|2]]:VOLTage:RANGe:AUTO

□[:SOURce[1|2]]:VOLTage:RANGe:AUTO?

Description

Selects/queries the automatic range on/off

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Automatic range off
1/ON: Automatic range on

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : Automatic range off
1 : Automatic range on

Setting example

:SOURce1:VOLTage:RANGe:AUTO ON

Sets the automatic range of CH1 to on

2.3.5.4 Phase synchronization setting [:SOURce[1|2]]:PHASe:INITiate

■[:SOURce[1|2]]:PHASe:INITiate

Description

Executes the phase synchronization

Setting parameter

None

2.3.5.5 External addition input setting/query [:SOURce[1|2]]:COMBine:FEED

■[:SOURce[1|2]]:COMBine:FEED

□[:SOURce[1|2]]:COMBine:FEED?

Description

Selects/queries the external addition

Setting parameter

OFF|X0.4|X2|X10

OFF → Disables the external addition
X0.4 → Adds 0.4 times of external input to the output
X2 → Adds 2 times of external input to the output
X10 → Adds 10 times of external input to the output

Query parameter

None

Response format

OFF|X0.4|X2|X10

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:COMBine:FEED X2

Adds 2 times of external input to the output of CH1

2.3.5.6 Load impedance setting/query :OUTPut[1|2]:LOAD

■:OUTPut[1|2]:LOAD

□:OUTPut[1|2]:LOAD?

Description

Sets/queries the load impedance

Setting parameter

<load>|MINimum|MAXimum|INFinity

<load> ::= <INT>[<eunits>][<units>]

<INT> → Load impedance: 1 Ω to 10 kΩ, Resolution: 1 Ω

<eunits> ::= K

<units> ::= OHM

MINimum → 1 Ω

MAXimum → 10 kΩ

INFinity → High-Z

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<INT>|INF

Setting example

:OUTPut1:LOAD 50OHM

Sets the load impedance of CH1 to 50 Ω

2.3.6 Trigger Operation Command Details

2.3.6.1 Trigger operation Manual trigger (TRIG key operation) *TRG

■*TRG

Description

This is the same behavior as the trigger execution when pressing the [TRIG] button

Setting parameter

None

Remarks

† Channels cannot be specified. The trigger for CH1 is assumed.

† It may not be used depending on the oscillation mode (see Table 2.3).

2.3.6.2 Trigger operation sweep mode trigger source selection/query :TRIGger[1|2]:SWEep:SOURce

■:TRIGger[1|2]:SWEep:SOURce

□:TRIGger[1|2]:SWEep:SOURce?

Description

Selects/queries the sweep trigger source

Setting parameter

TIMer|EXTernal|CH1

TIMer → Trigger with the internal trigger period
EXTernal → External trigger
CH1 → External trigger of CH1 (Only CH2 can be selected)

Query parameter

None

Response format

TIM|EXT|CH1

† For the meaning of each response data, see the setting parameter

Setting example

:TRIGger2:SWEep:SOURce EXT

Sets the sweep trigger source of CH2 to external

2.3.6.3 Trigger operation sweep mode internal trigger cycle setting/query :TRIGger[1|2]:SWEep:TIMer

■:TRIGger[1|2]:SWEep:TIMer

□:TRIGger[1|2]:SWEep:TIMer?

Description

Sets/queries the internal sweep trigger period

Setting parameter

<period>|MINimum|MAXimum

<period> ::= <REAL>[<eunits>][<units>]
<REAL> → Period: 100.0 μs to 10,000 s, Resolution :5 digits or 0.1 μs
<eunits> ::= MA|K|M|U|N
<units> ::= S

MINimum → 100.0 μs
MAXimum → 10,000 s

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:TRIGger1:SWEep:TIMer 1MS

Sets the internal sweep trigger period of CH1 to 1 ms

2.3.6.4 Trigger operation sweep mode external trigger signal polarity selection/query :TRIGger[1|2]:SWEep:SLOPe

■:TRIGger[1|2]:SWEep:SLOPe

□:TRIGger[1|2]:SWEep:SLOPe?

Description

Selects/queries the external sweep trigger polarity

Setting parameter

POSitive|NEGative|OFF

POSitive	→	Rising
NEGative	→	Falling
OFF	→	Disabled

Query parameter

None

Response format

POS|NEG|OFF

† For the meaning of each response data, see the setting parameter

Setting example

:TRIGger:SWEep:SLOPe NEGative

Sets the external sweep trigger polarity to falling

2.3.6.5 Trigger operation burst mode trigger source selection/query :TRIGger[1|2]:BURSt:SOURce

■ :TRIGger[1|2]:BURSt:SOURce

□:TRIGger[1|2]:BURSt:SOURce?

Description

Selects/queries the burst trigger source

Setting parameter

TIMer|EXTernal|CH1

TIMer	→	Trigger with the internal trigger period
EXTernal	→	External trigger
CH1	→	External trigger of CH1 (Only CH2 can be selected)

Query parameter

None

Response format

TIM|EXT|CH1

† For the meaning of each response data, see the setting parameter

Setting example

:TRIGger2:BURSt:SOURce EXT

Sets the burst trigger source of CH2 to external

2.3.6.6 Trigger operation burst mode internal trigger cycle setting/query :TRIGger[1|2]:BURSt:TIMer

■:TRIGger[1|2]:BURSt:TIMer

□:TRIGger[1|2]:BURSt:TIMer?

Description

Sets/queries the internal burst trigger period

Setting parameter

<period>|MINimum|MAXimum

<period> ::= <REAL>[<eunits>][<units>]

<REAL> → Period: 1.0 μs to 1,000 s, Resolution: 5 digits or 0.1 μs

<eunits> ::= MA|K|M|U|N

<units> ::= S

MINimum → 1.0 μs

MAXimum → 1,000 s

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:TRIGger1:BURSt:TIMer 1MS

Sets the internal burst trigger period of CH1 to 1 ms

2.3.6.7 Trigger operation burst mode external trigger signal polarity selection/query :TRIGger[1|2]:BURSt:SLOPe

■:TRIGger[1|2]:BURSt:SLOPe

□:TRIGger[1|2]:BURSt:SLOPe?

Description

Selects/queries the external burst trigger polarity

Setting parameter

POSitive|NEGative|OFF

POSitive → Rising

NEGative → Falling

OFF → Disabled

Query parameter

None

Response format

POS|NEG|OFF

† For the meaning of each response data, see the setting parameter

Setting example

:TRIGger:BURSt:SLOPe NEGative

Sets the external burst trigger polarity to falling

2.3.6.8 Trigger operation execution control setting :TRIGger[1|2]:SELected:EXECute

■:TRIGger[1|2]:SELected:EXECute

Description

Controls each oscillation mode

Setting parameter

Modulated oscillation mode

STARt|STOP

STARt → Start

STOP → Stop

Sweep oscillation mode

STARt|STOP|HOLD|RESume

STARt → Start

STOP → Stop

HOLD → Hold

RESume → Resume

Remarks

† This command cannot be used for the burst oscillation mode.

2.3.7 Modulated Oscillation Mode Command Details

2.3.7.1 Modulated oscillation mode AM modulation degree setting/query [:SOURce[1|2]]:AM[:DEPTh]

■[:SOURce[1|2]]:AM[:DEPTh]

□[:SOURce[1|2]]:AM[:DEPTh]?

Description

Sets/queries the AM modulation depth

Setting parameter

<depth>|MINimum|MAXimum

<depth> ::= <REAL>[<units>]

<REAL> → Modulation depth: 0.0% to 100.0%, Resolution: 0.1%

<units> ::= PCT

MINimum → 0.0%

MAXimum → 100.0%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:AM:DEPTh 30PCT

Sets the AM modulation depth of CH1 to 30%

2.3.7.2 Modulated oscillation mode AM modulation source selection/query [:SOURce[1|2]]:AM:SOURce

■[:SOURce[1|2]]:AM:SOURce

□[:SOURce[1|2]]:AM:SOURce?

Description

Selects/queries the AM modulation source

Setting parameter

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameter

None

Response format

INT|EXT

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:AM:SOURce INTernal

Sets the AM modulation source of CH1 to internal

2.3.7.3 Modulated oscillation mode AM modulation frequency setting/query [:SOURce[1|2]]:AM:INTernal:FREQuency

■[:SOURce[1|2]]:AM:INTernal:FREQuency

□[:SOURce[1|2]]:AM:INTernal:FREQuency?

Description

Sets/queries the AM internal modulation frequency

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Internal modulation frequency: 0.1 mHz to 1 MHz, Resolution: 5 digits or 0.1 mHz

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → 0.1 mHz

MAXimum → 1 MHz

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:AM:INTernal:FREQuency 1kHz

Sets the AM internal modulation frequency of CH1 to 1 kHz

2.3.7.4 Modulated oscillation mode AM modulation waveform selection/query [:SOURce[1|2]]:AM:INTernal:FUNCtion[:SHAPe]

■[:SOURce[1|2]]:AM:INTernal:FUNCtion[:SHAPe]

□[:SOURce[1|2]]:AM:INTernal:FUNCtion[:SHAPe]?

Description

Selects/queries the AM internal modulation waveform

Setting parameter

SINusoid|SQUare|TRIangle|PRAMp|NRAMp|NOISe|USER

SINusoid → Sine wave
SQUare → Square wave
TRIangle → Triangle wave
PRAMp → Rising ramp wave
NRAMp → Falling ramp wave
NOISe → Noise
USER → Arbitrary wave

Query parameter

None

Response format

SIN|SQU|TRI|PRAM|NRAM|NOIS|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:AM:INTernal:FUNCtion:SHAPe SINusoid

Sets the AM internal modulation waveform of CH1 to sine wave

2.3.7.5 Modulated oscillation mode AM arbitrary waveform of modulation waveform selection/query [:SOURce[1|2]]:AM:INTernal:FUNCtion:USER

■ [:SOURce[1|2]]:AM:INTernal:FUNCtion:USER

□ [:SOURce[1|2]]:AM:INTernal:FUNCtion:USER?

Description

Selects/queries the arbitrary waveform of AM internal modulation waveform

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

Query parameter

None

Response format

<NR1>

Setting example

:SOURce1:AM:INTernal:FUNCtion:USER 3

Sets the arbitrary waveform of AM internal modulation waveform of CH1 to the data of the memory number 3

Remarks

† Memory number 0 is the edit memory.

2.3.7.6 Modulated oscillation mode AM synchronization signal output selection/query :OUTPut[1|2]:SYNC:AM:TYPE

■:OUTPut[1|2]:SYNC:AM:TYPE

□:OUTPut[1|2]:SYNC:AM:TYPE?

Description

Selects/queries the AM synchronization output

Setting parameter

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization
MSYNc → Internal modulation synchronization
MFCTn → Internal modulation signal

Query parameter

None

Response format

SYNC|MSYN|MFCT

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SYNC:AM:TYPE SYNC

Sets the AM synchronization output of CH1 to waveform synchronization

2.3.7.7 Modulated oscillation mode AM (DSB-SC) modulation degree setting/query [:SOURce[1|2]]:AMSC[:DEPTh]

■[:SOURce[1|2]]:AMSC[:DEPTh]

□[:SOURce[1|2]]:AMSC[:DEPTh]?

Description

Sets/queries the AM (DSB-SC) modulation depth

Setting parameter

<depth>|MINimum|MAXimum

<depth> ::= <REAL>[<units>]

<REAL> → Modulation depth :0.0% to 100.0%, Resolution :0.1%
<units> ::= PCT

MINimum → 0.0%
MAXimum → 100.0%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:AMSC:DEPTh 30PCT

Sets the AM (DSB-SC) modulation depth of CH1 to 30%

2.3.7.8 Modulated oscillation mode AM (DSB-SC) modulation source selection/query [:SOURce[1|2]]:AMSC:SOURce

■[:SOURce[1|2]]:AMSC:SOURce

□[:SOURce[1|2]]:AMSC:SOURce?

Description

Selects/queries the AM (DSB-SC) modulation source

Setting parameter

INTernal|EXTernal

INTernal → Internal modulation source

EXTernal → External modulation source

Query parameter

None

Response format

INT|EXT

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:AMSC:SOURce INTernal

Sets the AM (DSB-SC) modulation source of CH1 to internal modulation source

2.3.7.9 Modulated oscillation mode AM (DSB-SC) modulation frequency setting/query [:SOURce[1|2]]:AMSC:INTernal:FREQuency

■[:SOURce[1|2]]:AMSC:INTernal:FREQuency

□[:SOURce[1|2]]:AMSC:INTernal:FREQuency?

Description

Sets/queries the AM (DSB-SC) internal modulation frequency

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Internal modulation frequency: 0.1 mHz to 1 MHz, Resolution: 5 digits or 0.1 mHz

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → 0.1 mHz

MAXimum → 1 MHz

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:AMSC:INTernal:FREQuency 1kHz

Sets the AM (DSB-SC) internal modulation frequency of CH1 to 1 kHz

2.3.7.10 Modulated oscillation mode AM (DSB-SC) modulation waveform selection/query [:SOURce[1|2]]:AMSC:INTernal:FUNCtion[:SHAPe]

■[:SOURce[1|2]]:AMSC:INTernal:FUNCtion[:SHAPe]

□[:SOURce[1|2]]:AMSC:INTernal:FUNCtion[:SHAPe]?

Description

Selects/queries the AM (DSB-SC) internal modulation waveform

Setting parameter

SINusoid|SQUare|TRIangle|PRAMp|NRAMp|NOISe|USER

SINusoid → Sine wave
SQUare → Square wave
TRIangle → Triangle wave
PRAMp → Rising ramp wave
NRAMp → Falling ramp wave
NOISe → Noise
USER → Arbitrary wave

Query parameter

None

Response format

SIN|SQU|TRI|PRAM|NRAM|NOIS|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:AMSC:INTernal:FUNCtion:SHAPe SINusoid

Sets the AM (DSB-SC) internal modulation waveform of CH1 to sine wave

2.3.7.11 Modulated oscillation mode AM (DSB-SC) arbitrary waveform of modulation waveform selection/query [:SOURce[1|2]]:AMSC:INTernal:FUNCtion:USER

■ [:SOURce[1|2]]:AMSC:INTernal:FUNCtion:USER

□ [:SOURce[1|2]]:AMSC:INTernal:FUNCtion:USER?

Description

Selects/queries the arbitrary waveform of AM (DSB-SC) internal modulation waveform

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

Query parameter

None

Response format

<NR1>

Setting example

:SOURce1:AMSC:INTernal:FUNCtion:USER 3

Sets the arbitrary waveform of AM (DSB-SC) internal modulation waveform of CH1 to the data of the memory number 3

Remarks

† Memory number 0 is the edit memory.

2.3.7.12 Modulated oscillation mode AM (DSB-SC) synchronization signal output selection/query :OUTPut[1|2]:SYNC:AMSC:TYPE

■:OUTPut[1|2]:SYNC:AMSC:TYPE

□:OUTPut[1|2]:SYNC:AMSC:TYPE?

Description

Selects/queries the AM (DSB-SC) synchronization output

Setting parameter

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization
MSYNc → Internal modulation synchronization
MFCTn → Internal modulation signal

Query parameter

None

Response format

SYNC|MSYN|MFCT

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SYNC:AMSC:TYPE SYNC

Sets the AM (DSB-SC) synchronization output of CH1 to waveform synchronization

2.3.7.13 Modulated oscillation mode FM peak deviation setting/query [:SOURce[1|2]]:FM[:DEViation]

■[:SOURce[1|2]]:FM[:DEViation]

□[:SOURce[1|2]]:FM[:DEViation]?

Description

Sets/queries the FM peak deviation

Setting parameter

<deviation>|MINimum|MAXimum

<deviation> ::= <REAL>[<eunits>][<units>]
<REAL> → Peak deviation: 0.00 μHz to less than 15 MHz,
Resolution: 8 digits or 0.01 μHz
<eunits> ::= M|K|U|N
<units> ::= HZ
MINimum → Sets the minimum value
MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FM:DEViation 1KHZ

Sets the FM peak deviation of CH1 to 1 kHz

2.3.7.14 Modulated oscillation mode FM modulation source selection/query [:SOURce[1|2]]:FM:SOURce

■[:SOURce[1|2]]:FM:SOURce

□[:SOURce[1|2]]:FM:SOURce?

Description

Selects/queries the FM modulation source

Setting parameter

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameter

None

Response format

INT|EXT

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:FM:SOURce INTernal

Sets the FM modulation source of CH1 to internal

2.3.7.15 Modulated oscillation mode FM modulation frequency setting/query [:SOURce[1|2]]:FM:INTernal:FREQuency

■[:SOURce[1|2]]:FM:INTernal:FREQuency

□[:SOURce[1|2]]:FM:INTernal:FREQuency?

Description

Sets/queries the FM internal modulation frequency

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Internal modulation frequency: 0.1 mHz to 1 MHz,
Resolution: 5 digits or 0.1 mHz

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → 0.1 mHz

MAXimum → 1 MHz

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FM:INTernal:FREQuency 1kHz

Sets the FM internal modulation frequency of CH1 to 1 kHz

2.3.7.16 Modulated oscillation mode FM modulation waveform selection/query [:SOURce[1|2]]:FM:INTernal:FUNCtion[:SHAPe]

■[:SOURce[1|2]]:FM:INTernal:FUNCtion[:SHAPe]

□[:SOURce[1|2]]:FM:INTernal:FUNCtion[:SHAPe]?

Description

Selects/queries the FM internal modulation waveform

Setting parameter

SINusoid|SQUare|TRIangle|PRAMp|NRAMp|NOISe|USER

SINusoid → Sine wave
SQUare → Square wave
TRIangle → Triangle wave
PRAMp → Rising ramp wave
NRAMp → Falling ramp wave
NOISe → Noise
USER → Arbitrary wave

Query parameter

None

Response format

SIN|SQU|TRI|PRAM|NRAM|NOIS|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:FM:INTernal:FUNCtion:SHAPe SINusoid

Sets the FM internal modulation waveform of CH1 to sine wave

2.3.7.17 Modulated oscillation mode FM arbitrary waveform of modulation waveform selection/query [:SOURce[1|2]]:FM:INTernal:FUNCtion:USER

■ [:SOURce[1|2]]:FM:INTernal:FUNCtion:USER

□ [:SOURce[1|2]]:FM:INTernal:FUNCtion:USER?

Description

Selects/queries the arbitrary waveform of FM internal modulation waveform

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

Query parameter

None

Response format

<NR1>

Setting example

:SOURce1:FM:INTernal:FUNCtion:USER 3

Sets the arbitrary waveform of FM internal modulation waveform of CH1 to the data of the memory number 3

Remarks

† Memory number 0 is the edit memory.

2.3.7.18 Modulated oscillation mode FM synchronization signal output selection/query :OUTPut[1|2]:SYNC:FM:TYPE

■:OUTPut[1|2]:SYNC:FM:TYPE

□:OUTPut[1|2]:SYNC:FM:TYPE?

Description

Selects/queries the FM synchronization output

Setting parameter

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization
MSYNc → Internal modulation synchronization
MFCTn → Internal modulation signal

Query parameter

None

Response format

SYNC|MSYN|MFCT

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SYNC:FM:TYPE SYNC

Sets the FM synchronization output of CH1 to waveform synchronization

2.3.7.19 Modulated oscillation mode FSK hop frequency setting/query [:SOURce[1|2]]:FSKey[:FREQuency]

■[:SOURce[1|2]]:FSKey[:FREQuency]

□[:SOURce[1|2]]:FSKey[:FREQuency]?

Description

Selects/queries the FSK hop frequency

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Hop frequency

† The setting range is within the allowed frequency setting range for each carrier waveform.

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → Sets the minimum value
MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FSKey:FREQuency 1kHz

Sets the FSK hop frequency of CH1 to 1 KHZ

2.3.7.20 Modulated oscillation mode FSK modulation source selection/query [:SOURce[1|2]]:FSKey:SOURce

■[:SOURce[1|2]]:FSKey:SOURce

□[:SOURce[1|2]]:FSKey:SOURce?

Description

Selects/queries the FSK modulation source

Setting parameter

INTernal|EXTernal|CH1

INTernal → Internal
EXTernal → External
CH1 → External of CH1 (Only CH2 can be selected)

Query parameter

None

Response format

INT|EXT|CH1

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:FSKey:SOURce INTernal

Sets the FSK modulation source of CH1 to internal

2.3.7.21 Modulated oscillation mode FSK modulation frequency setting/query [:SOURce[1|2]]:FSKey:INTernal:FREQuency

■[:SOURce[1|2]]:FSKey:INTernal:FREQuency

□[:SOURce[1|2]]:FSKey:INTernal:FREQuency?

Description

Sets/queries the FSK internal modulation frequency

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Internal modulation frequency: 0.1 mHz to 3 MHz
Resolution: 5 digits or 0.1 mHz

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → 0.1 mHz

MAXimum → 3 MHz

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FSKey:INTernal:FREQuency 1kHz

Sets the FSK internal modulation frequency of CH1 to 1 kHz

2.3.7.22 Modulated oscillation mode FSK synchronization signal output selection/query :OUTPut[1|2]:SYNC:FSKey:TYPE

■:OUTPut[1|2]:SYNC:FSKey:TYPE

□:OUTPut[1|2]:SYNC:FSKey:TYPE?

Description

Selects/queries the FSK synchronization output

Setting parameter

SYNC|MSYNc

SYNC → Waveform synchronization

MSYNc → Internal modulation synchronization

Query parameter

None

Response format

SYNC|MSYN

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SYNC:FSKey:TYPE SYNC

Sets the FSK synchronization output of CH1 to waveform synchronization

2.3.7.23 Modulated oscillation mode PM peak deviation setting/query [:SOURce[1|2]]:PM[:DEViation]

■[:SOURce[1|2]]:PM[:DEViation]

□[:SOURce[1|2]]:PM[:DEViation]?

Description

Sets/queries the PM peak deviation

Setting parameter

<deviation>|MINimum|MAXimum

<deviation> ::= <REAL>[<units>]

<REAL> → Peak deviation: 0.000° to 180.000°, Resolution: 0.001°

<units> ::= DEG

MINimum → 0.000°

MAXimum → 180.000°

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PM:DEViation 30DEG

Sets the PM peak deviation of CH1 to 30°

2.3.7.24 Modulated oscillation mode PM modulation source selection/query [:SOURce[1|2]]:PM:SOURce

■[:SOURce[1|2]]:PM:SOURce

□[:SOURce[1|2]]:PM:SOURce?

Description

Selects/queries the PM modulation source

Setting parameter

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameter

None

Response format

INT|EXT

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PM:SOURce INTernal

Sets the PM modulation source of CH1 to internal

2.3.7.25 Modulated oscillation mode PM modulation frequency setting/query [:SOURce[1|2]]:PM:INTernal:FREQuency

■[:SOURce[1|2]]:PM:INTernal:FREQuency

□[:SOURce[1|2]]:PM:INTernal:FREQuency?

Description

Sets/queries the PM internal modulation frequency

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Internal modulation frequency: 0.1 mHz to 1 MHz
Resolution: 5 digits or 0.1 mHz

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → 0.1 mHz

MAXimum → 1 MHz

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PM:INTernal:FREQuency 1kHz

Sets the PM internal modulation frequency of CH1 to 1 kHz

2.3.7.26 Modulated oscillation mode PM modulation waveform selection/query [:SOURce[1|2]]:PM:INTernal:FUNCtion[:SHAPe]

■[:SOURce[1|2]]:PM:INTernal:FUNCtion[:SHAPe]

□[:SOURce[1|2]]:PM:INTernal:FUNCtion[:SHAPe]?

Description

Selects/queries the PM internal modulation waveform

Setting parameter

SINusoid|SQUare|TRIangle|PRAMp|NRAMp|NOISe|USER

SINusoid → Sine wave
SQUare → Square wave
TRIangle → Triangle wave
PRAMp → Rising ramp wave
NRAMp → Falling ramp wave
NOISe → Noise
USER → Arbitrary wave

Query parameter

None

Response format

SIN|SQU|TRI|PRAM|NRAM|NOIS|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PM:INTernal:FUNCtion:SHAPe SINusoid

Sets the PM internal modulation waveform of CH1 to sine wave

2.3.7.27 Modulated oscillation mode PM arbitrary waveform of modulation waveform selection/query [:SOURce[1|2]]:PM:INTernal:FUNCtion:USER

■ [:SOURce[1|2]]:PM:INTernal:FUNCtion:USER

□ [:SOURce[1|2]]:PM:INTernal:FUNCtion:USER?

Description

Selects/queries the arbitrary waveform of PM internal modulation waveform

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

Query parameter

None

Response format

<NR1>

Setting example

:SOURce1:PM:INTernal:FUNCtion:USER 3

Sets the arbitrary waveform of PM internal modulation waveform of CH1 to the data of the memory number 3

Remarks

† Memory number 0 is the edit memory.

2.3.7.28 Modulated oscillation mode PM synchronization output selection/query :OUTPut[1|2]:SYNC:PM:TYPE

■:OUTPut[1|2]:SYNC:PM:TYPE

□:OUTPut[1|2]:SYNC:PM:TYPE?

Description

Selects/queries the PM synchronization output

Setting parameter

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization
MSYNc → Internal modulation synchronization
MFCTn → Internal modulation signal

Query parameter

None

Response format

SYNC|MSYN|MFCT

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SYNC:PM:TYPE SYNC

Sets the PM synchronization output of CH1 to waveform synchronization

2.3.7.29 Modulated oscillation mode PSK deviation setting/query [:SOURce[1|2]]:PSKey[:DEViation]

■[:SOURce[1|2]]:PSKey[:DEViation]

□[:SOURce[1|2]]:PSKey[:DEViation]?

Description

Sets/queries the PSK deviation

Setting parameter

<deviation>|MINimun|MAXimum

<deviation> ::= <REAL>[<units>]
<REAL> → Deviation: -1800.000° to 1800.000°, Resolution: 0.001°
<units> ::= DEG

MINimum → -1800.000°
MAXimum → 1800.000°

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PSKey:DEViation 30DEG

Sets the PSK deviation of CH1 to 30°

2.3.7.30 Modulated oscillation mode PSK modulation source selection/query [:SOURce[1|2]]:PSKey:SOURce

■[:SOURce[1|2]]:PSKey:SOURce

□[:SOURce[1|2]]:PSKey:SOURce?

Description

Selects/queries the PSK modulation source

Setting parameter

INTernal|EXTernal|CH1

INTernal → Internal
EXTernal → External
CH1 → External of CH1 (Only CH2 can be selected)

Query parameter

None

Response format

INT|EXT|CH1

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PSKey:SOURce INTernal

Sets the PSK modulation source of CH1 to internal

2.3.7.31 Modulated oscillation mode PSK modulation frequency setting/query [:SOURce[1|2]]:PSKey:INTernal:FREQuency

■[:SOURce[1|2]]:PSKey:INTernal:FREQuency

□[:SOURce[1|2]]:PSKey:INTernal:FREQuency?

Description

Sets/queries the PSK internal modulation frequency

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]
<REAL> → Internal modulation frequency: 0.1 mHz to 3 MHz, Resolution: 5 digits or 0.1 mHz
<eunits> ::= M|K|U|N
<units> ::= HZ
MINimum → 0.1 mHz
MAXimum → 3 MHz

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PSKey:INTernal:FREQuency 1kHz

Sets the PSK internal modulation frequency of CH1 to 1 kHz

2.3.7.32 Modulated oscillation mode PSK synchronization signal output selection/query :OUTPut[1|2]:SYNC:PSKey:TYPE

■:OUTPut[1|2]:SYNC:PSKey:TYPE

□:OUTPut[1|2]:SYNC:PSKey:TYPE?

Description

Selects/queries the PSK synchronization output

Setting parameter

SYNC|MSYNc

SYNC → Waveform synchronization

MSYNc → Internal modulation synchronization

Query parameter

None

Response format

SYNC|MSYN

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SYNC:PSKey:TYPE SYNC

Sets the PSK synchronization output of CH1 to waveform synchronization

2.3.7.33 Modulated oscillation mode PWM peak deviation setting/query [:SOURce[1|2]]:PWM[:DEViation]:DCYCle

■[:SOURce[1|2]]:PWM[:DEViation]:DCYCle

□[:SOURce[1|2]]:PWM[:DEViation]:DCYCle?

Description

Sets/queries the PWM peak deviation

Setting parameter

<deviation>|MINimum|MAXimum

<deviation> ::= <REAL>[<units>]

<REAL> → (Square wave (duty variable range standard))
Peak deviation: 0.0000% to 49.9900%, Resolution: 0.0001%,
(Square wave (duty variable range extend))
Peak deviation: 0.0000% to 50.0000%, Resolution: 0.0001%,
(Pulse wave)
Peak deviation :0.0000% to 49.9000%, Resolution: 0.0001%

<units> ::= PCT

MINimum → 0.0000%

MAXimum → (Square wave (duty variable range standard)) 49.9900%,
(Square wave (duty variable range extend)) 50.0000%,
(Pulse wave) 49.9000%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PWM:DEViation:DCYCle 30PCT

Sets the PWM peak deviation of CH1 to 30%

2.3.7.34 Modulated oscillation mode PWM modulation source selection/query [:SOURce[1|2]]:PWM:SOURce

■[:SOURce[1|2]]:PWM:SOURce

□[:SOURce[1|2]]:PWM:SOURce?

Description

Selects/queries the PWM modulation source

Setting parameter

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameter

None

Response format

INT|EXT

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PWM:SOURce INTernal

Sets the PWM modulation source of CH1 to internal

2.3.7.35 Modulated oscillation mode PWM modulation frequency setting/query [:SOURce[1|2]]:PWM:INTernal:FREQuency

■[:SOURce[1|2]]:PWM:INTernal:FREQuency

□[:SOURce[1|2]]:PWM:INTernal:FREQuency?

Description

Sets/queries the PWM internal modulation frequency

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Internal modulation frequency: 0.1 mHz to 1 MHz
Resolution: 5 digits or 0.1 mHz

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → 0.1 mHz

MAXimum → 1 MHz

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PWM:INTernal:FREQuency 1kHz

Sets the PWM internal modulation frequency of CH1 to 1 kHz

2.3.7.36 Modulated oscillation mode PWM modulation waveform selection/query [:SOURce[1|2]]:PWM:INTernal:FUNCtion[:SHAPe]

■[:SOURce[1|2]]:PWM:INTernal:FUNCtion[:SHAPe]

□[:SOURce[1|2]]:PWM:INTernal:FUNCtion[:SHAPe]?

Description

Selects/queries the PWM internal modulation waveform

Setting parameter

SINusoid|SQUare|TRIangle|PRAMp|NRAMp|NOISe|USER

SINusoid → Sine wave
SQUare → Square wave
TRIangle → Triangle wave
PRAMp → Rising ramp wave
NRAMp → Falling ramp wave
NOISe → Noise
USER → Arbitrary wave

Query parameter

None

Response format

SIN|SQU|TRI|PRAM|NRAM|NOIS|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:PWM:INTernal:FUNCtion:SHAPe SINusoid

Sets the PWM internal modulation waveform of CH1 to sine wave

2.3.7.37 Modulated oscillation mode PWM arbitrary waveform of modulation waveform selection/query [:SOURce[1|2]]:PWM:INTernal:FUNCtion:USER

■[:SOURce[1|2]]:PWM:INTernal:FUNCtion:USER

□[:SOURce[1|2]]:PWM:INTernal:FUNCtion:USER?

Description:

Selects/queries the arbitrary waveform of PWM internal modulation waveform

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

Query parameter

None

Response format

<NR1>

Setting example

:SOURce1:PWM:INTernal:FUNCtion:USER 3

Sets the arbitrary waveform of PWM internal modulation waveform of CH1 to the data of the memory number 3

Remarks

† Memory number 0 is the edit memory.

2.3.7.38 Modulated oscillation mode PWM synchronization signal output selection/query :OUTPut[1|2]:SYNC:PWM:TYPE

■:OUTPut[1|2]:SYNC:PWM:TYPE

□:OUTPut[1|2]:SYNC:PWM:TYPE?

Description

Selects/queries the PWM synchronization output

Setting parameter

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization
MSYNc → Internal modulation synchronization
MFCTn → Internal modulation signal

Query parameter

None

Response format

SYNC|MSYN|MFCT

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SYNC:PWM:TYPE SYNC

Sets the PWM synchronization output of CH1 to waveform synchronization

2.3.7.39 Modulated oscillation mode DC offset modulation peak deviation setting/query [:SOURce[1|2]]:OFSM[:DEViation]

■[:SOURce[1|2]]:OFSM[:DEViation]

□[:SOURce[1|2]]:OFSM[:DEViation]?

Description

Sets/queries the peak deviation of DC offset modulation

Setting parameter

<deviation>|MINimum|MAXimum

<deviation> ::= <REAL>[<eunits>][<units>]

<REAL> → Peak deviation: 0 V to 10 V/open,
Resolution: (499.9 mV or less) 4 digits or 0.1 mV,
(0.5 V or more) 5 digits or 1 mV

<eunits> ::= M

<units> ::= V

MINimum → 0 V/open

MAXimum → 10 V/open

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:OFSM:DEViation 3V

Sets the peak deviation of DC offset modulation of CH1 to 3 V

2.3.7.40 Modulated oscillation mode DC offset modulation modulation source selection/query [:SOURce[1|2]]:OFSM:SOURce

■[:SOURce[1|2]]:OFSM:SOURce

□[:SOURce[1|2]]:OFSM:SOURce?

Description

Selects/queries the modulation source of DC offset modulation

Setting parameter

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameter

None

Response format

INT|EXT

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:OFSM:SOURce INTernal

Sets the modulation source of DC offset modulation of CH1 to internal

2.3.7.41 Modulated oscillation mode DC offset modulation modulation frequency setting/query [:SOURce[1|2]]:OFSM:INTernal:FREQuency

■[:SOURce[1|2]]:OFSM:INTernal:FREQuency

□[:SOURce[1|2]]:OFSM:INTernal:FREQuency?

Description

Sets/queries the internal modulation frequency of DC offset modulation

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Internal modulation frequency: 0.1 mHz to 100 kHz, Resolution: 5 digits or 0.1 mHz

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → 0.1 mHz

MAXimum → 100 kHz

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:OFSM:INTernal:FREQuency 1KHZ

Sets the internal modulation frequency of DC offset modulation of CH1 to 1 kHz

2.3.7.42 Modulated oscillation mode DC offset modulation modulation waveform selection/query [:SOURce[1|2]]:OFSM:INTernal:FUNCtion[:SHAPe]

■[:SOURce[1|2]]:OFSM:INTernal:FUNCtion[:SHAPe]

□[:SOURce[1|2]]:OFSM:INTernal:FUNCtion[:SHAPe]?

Description

Selects/queries the internal modulation waveform of DC offset modulation

Setting parameter

SINusoid|SQUare|TRIangle|PRAMp|NRAMp|NOISe|USER

SINusoid → Sine wave

SQUare → Square wave

TRIangle → Triangle wave

PRAMp → Rising ramp wave

NRAMp → Falling ramp wave

NOISe → Noise

USER → Arbitrary wave

Response format

SIN|SQU|TRI|PRAM|NRAM|NOIS|USER

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:FM:INTernal:FUNCtion:SHAPe SINusoid

Sets the internal modulation waveform of DC offset modulation of CH1 to sine wave

2.3.7.43 Modulated oscillation mode DC offset modulation arbitrary waveform of modulation waveform selection/query [:SOURce[1|2]]:OFSM:INTernal:FUNCtion:USER

■ [:SOURce[1|2]]:OFSM:INTernal:FUNCtion:USER

□ [:SOURce[1|2]]:OFSM:INTernal:FUNCtion:USER?

Description

Selects/queries the arbitrary waveform of internal modulation waveform of DC offset modulation

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

Query parameter

None

Response format

<NR1>

Setting example

:SOURce1:OFSM:INTernal:FUNCtion:USER 3

Sets the arbitrary waveform of internal modulation waveform of DC offset modulation of CH1 to the data of the memory number 3

Remarks

† Memory number 0 is the edit memory.

2.3.7.44 Modulated oscillation mode DC offset modulation synchronization signal output selection/query :OUTPut[1|2]:SYNC:OFSM:TYPE

■:OUTPut[1|2]:SYNC:OFSM:TYPE

□:OUTPut[1|2]:SYNC:OFSM:TYPE?

Description

Selects/queries the synchronization output of DC offset modulation

Setting parameter

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization
MSYNc → Internal modulation synchronization
MFCTn → Internal modulation signal

Query parameter

None

Response format

SYNC|MSYN|MFCT

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SYNC:OFSM:TYPE SYNC

Sets the DC offset modulation synchronization output of CH1 to waveform synchronization

2.3.8 Sweep Oscillation Mode Command Details

2.3.8.1 Basic sweep setting sweep slope selection/query [:SOURce[1|2]]:SWEep:SPACing

■[:SOURce[1|2]]:SWEep:SPACing

□[:SOURce[1|2]]:SWEep:SPACing?

Description

Selects/queries the sweep slope

Setting parameter

LINear|LOGarithmic

LINear → Linear

LOGarithmic → Logarithm

Query parameter

None

Response format

LIN|LOG

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:SWEep:SPACing LINear

Sets the slope of CH1 to linear

2.3.8.2 Basic sweep setting sweep direction selection/query [:SOURce[1|2]]:SWEep:INTernal:FUNCtion

■[:SOURce[1|2]]:SWEep:INTernal:FUNCtion

□[:SOURce[1|2]]:SWEep:INTernal:FUNCtion?

Description

Selects/queries the sweep direction

Setting parameter

RAMP|TRIangle

RAMP → One way

TRIangle → Shuttle

Query parameter

None

Response format

RAMP|TRI

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:SWEep:INTernal:FUNCtion RAMP

Sets the sweep direction of CH1 to one way

2.3.8.3 Basic sweep setting sweep time setting/query [:SOURce[1|2]]:SWEep:TIME

■[:SOURce[1|2]]:SWEep:TIME

□[:SOURce[1|2]]:SWEep:TIME?

Description

Sets/queries the sweep time

Setting parameter

<time>|MINimum|MAXimum

<time> ::= <REAL>[<eunits>][<units>]

<REAL> → Sweep time: 0.1 ms to 10,000 s
Resolution: 4 digits or 0.1 ms

<eunits> ::= MA|K|M|U|N

<units> ::= S

MINimum → 0.1 ms

MAXimum → 10,000 s

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:SWEep:TIME 1MS

Sets the sweep time of CH1 to 1 ms

2.3.8.4 Basic sweep setting stop level setting/query [:SOURce[1|2]]:SWEep:SLEVel

■[:SOURce[1|2]]:SWEep:SLEVel

□[:SOURce[1|2]]:SWEep:SLEVel?

Description

Sets/queries the stop level value of oscillation stop of gated single-shot sweep

Setting parameter

<level>|MAXimum|MINimum

<level> ::= <REAL>[<units>]

<REAL> → Stop level value: -100.00% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → -100.00%

MAXimum → 100.00%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:SWEep:SLEVel 20PCT

Set the stop level value of oscillation stop of gated single-shot sweep of CH1 to 20%

2.3.8.5 Basic sweep setting stop level selection/query [:SOURce[1|2]]:SWEep:SLEVel:STATe

■[:SOURce[1|2]]:SWEep:SLEVel:STATe

□[:SOURce[1|2]]:SWEep:SLEVel:STATe?

Description

Selects/queries the stop level of oscillation stop of single-shot sweep and gated single-shot sweep

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Disable
1/ON: Enable

Query parameter

None

Response format

<NBOL>

<NBOL> → 0: Disable
1: Enable

Setting example

:SOURce1:SWEep:SLEVel:STATe ON

Sets the stop level of oscillation stop of single-shot sweep and gated single-shot sweep of CH1 to enable

2.3.8.6 Basic sweep setting oscillation stop unit setting/query [:SOURce[1|2]]:SWEep:OSTop

■[:SOURce[1|2]]:SWEep:OSTop

□[:SOURce[1|2]]:SWEep:OSTop?

Description

Selects/queries the oscillation stop unit of sweep oscillation

Setting parameter

HALF|CYCLe

HALF → Half cycle
CYCLe → 1 cycle

Query parameter

None

Response format

HALF|CYCL

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:SWEep:OSTop HALF

Sets the oscillation stop unit of sweep oscillation of CH1 to half cycle

2.3.8.7 Frequency sweep starting value setting/query [:SOURce[1|2]]:FREQuency:STARt

■[:SOURce[1|2]]:FREQuency:STARt

□[:SOURce[1|2]]:FREQuency:STARt?

Description

Sets/queries the start value of frequency sweep

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Start value: 0.01 μHz to 30 MHz,
Resolution: 0.01 μHz
† The setting range varies depending on the waveform or oscillation mode.

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FREQuency:STARt 1KHZ

Sets the start value of frequency sweep of CH1 to 1 kHz

2.3.8.8 Frequency sweep stop value setting/query [:SOURce[1|2]]:FREQuency:STOP

■[:SOURce[1|2]]:FREQuency:STOP

□[:SOURce[1|2]]:FREQuency:STOP?

Description

Sets/queries the stop value of frequency sweep

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Stop value: 0.01 μHz to 30 MHz,
Resolution: 0.01 μHz
† The setting range varies depending on the waveform or oscillation mode.

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → Sets the minimum value
MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FREQuency:STOP 1KHZ
Sets the stop value of frequency sweep of CH1 to 1 kHz

2.3.8.9 Frequency sweep center value setting/query [:SOURce[1|2]]:FREQuency:CENTer

■[:SOURce[1|2]]:FREQuency:CENTer

□[:SOURce[1|2]]:FREQuency:CENTer?

Description

Sets/queries the center value of frequency sweep

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Center value: 0.01 μHz to 30 MHz
Resolution: 0.01 μHz
† The setting range varies depending on the waveform or oscillation mode.

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → Sets the minimum value
MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value
MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FREQuency:CENTer 1KHZ
Sets the center value of frequency sweep of CH1 to 1 kHz

2.3.8.10 Frequency sweep span value setting/query [:SOURce[1|2]]:FREQuency:SPAN

■[:SOURce[1|2]]:FREQuency:SPAN

□[:SOURce[1|2]]:FREQuency:SPAN?

Description

Sets/queries the span value of frequency sweep

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Span value: 0.00000000 Hz to 29999999.99999999 Hz,
Resolution: 0.01 μHz
† The setting range varies depending on the waveform or oscillation mode.

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FREQuency:SPAN 1KHZ

Sets the span value of frequency sweep of CH1 to 1 kHz

2.3.8.11 Frequency sweep marker value setting/query [:SOURce[1|2]]:MARKer:FREQuency

■[:SOURce[1|2]]:MARKer:FREQuency

□[:SOURce[1|2]]:MARKer:FREQuency?

Description

Sets/queries the marker value of frequency sweep

Setting parameter

<frequency>|CENTer|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Marker value: 0.01 μHz to 30 MHz,
Resolution: 0.01 μHz
† The setting range varies depending on the waveform or oscillation mode.

<eunits> ::= M|K|U|N

<units> ::= HZ

CENTer → Center value of frequency sweep

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Query parameter

[CENTer|MINimum|MAXimum]

CENTer → Queries the center value of frequency sweep

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:MARKer:FREQuency 1KHZ

Sets the marker value of frequency sweep of CH1 to 1 kHz

2.3.8.12 Frequency sweep start/stop value swapping setting [:SOURce[1|2]]:FREQuency:SWAP

■[:SOURce[1|2]]:FREQuency:SWAP

Description

Swaps the start value with stop value of the frequency sweep

Setting parameter

None

Setting example

:SOURce1:FREQuency:SWAP

Swaps the start value with stop value of the frequency sweep of CH1

2.3.8.13 Frequency sweep start/stop value output setting [:SOURce[1|2]]:FREQuency:STATe

■[:SOURce[1|2]]:FREQuency:STATe

Description

Switches the state of frequency sweep

Setting parameter

STARt|STOP

STARt → Switches the output to the start value

STOP → Switches the output to the stop value

Setting example

:SOURce1:FREQuency:STATe STARt

Switches the state of frequency sweep of CH1 to the start value

2.3.8.14 Phase sweep starting value setting/query [:SOURce[1|2]]:PHASe:STARt

■[:SOURce[1|2]]:PHASe:STARt

□[:SOURce[1|2]]:PHASe:STARt?

Description

Sets/queries the start value of phase sweep

Setting parameter

<phase>|MINimum|MAXimum

<phase> ::= <REAL>[<units>]

<REAL> → Start value: -1800.000° to 1800.000°, Resolution: 0.001°

<units> ::= DEG

MINimum → -1800.000°

MAXimum → 1800.000°

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PHASe:STARt 90DEG

Sets the start value of phase sweep of CH1 to 90°

2.3.8.15 Phase sweep stop value setting/query [:SOURce[1|2]]:PHASe:STOP

■[:SOURce[1|2]]:PHASe:STOP

□[:SOURce[1|2]]:PHASe:STOP?

Description

Sets/queries the stop value of phase sweep

Setting parameter

<phase>|MINimum|MAXimum

<phase> ::= <REAL>[<units>]

<REAL> → Stop value: -1800.000° to 1800.000°, Resolution: 0.001°

<units> ::= DEG

MINimum → -1800.000°

MAXimum → 1800.000°

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PHASe:STOP 90DEG

Sets the stop value of phase sweep of CH1 to 90°

2.3.8.16 Phase sweep center value setting/query [:SOURce[1|2]]:PHASe:CENTer

■[:SOURce[1|2]]:PHASe:CENTer

□[:SOURce[1|2]]:PHASe:CENTer?

Description

Sets/queries the center value of phase sweep

Setting parameter

<phase>|MINimum|MAXimum

<phase> ::= <REAL>[<units>]

<REAL> → Center value: -1800.000° to 1800.000°, Resolution: 0.001°

<units> ::= DEG

MINimum → -1800.000°

MAXimum → 1800.000°

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PHASe:CENTer 90DEG

Sets the center value of phase sweep of CH1 to 90°

2.3.8.17 Phase sweep span value setting/query [:SOURce[1|2]]:PHASe:SPAN

■[:SOURce[1|2]]:PHASe:SPAN

□[:SOURce[1|2]]:PHASe:SPAN?

Description

Sets/queries the span value of phase sweep

Setting parameter

<phase>|MINimum|MAXimum

<phase> ::= <REAL>[<units>]

<REAL> → Span value: 0.000° to 3600.000°, Resolution: 0.001°

<units ::= DEG

MINimum → 0.000°

MAXimum → 3600.000°

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PHASe:SPAN 90DEG

Sets the span value of phase sweep of CH1 to 90°

2.3.8.18 Phase sweep marker value setting/query [:SOURce[1|2]]:MARKer:PHASe

■[:SOURce[1|2]]:MARKer:PHASe

□[:SOURce[1|2]]:MARKer:PHASe?

Description

Sets/queries the marker value of phase sweep

Setting parameter

<phase>|CENTer|MINimum|MAXimum

<phase> ::= <REAL>[<units>]

<REAL> → Marker value: -1800.000° to 1800.000°, Resolution: 0.001°

<units> ::= DEG

CENTer → Center value of phase sweep

MINimum → -1800.000°

MAXimum → 1800.000°

Query parameter

[CNETer|MINimum|MAXimum]

CENTer → Queries the center value of phase sweep

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:MARKer:PHASe 90DEG

Sets the marker value of phase sweep of CH1 to 90°

2.3.8.19 Phase sweep start/stop value swapping setting [:SOURce[1|2]]:PHASe:SWAP

■[:SOURce[1|2]]:PHASe:SWAP

Description

Swaps the start value with stop value of the phase sweep

Setting parameter

None

2.3.8.20 Phase sweep start/stop value output setting [:SOURce[1|2]]:PHASe:STATe

■[:SOURce[1|2]]:PHASe:STATe

Description

Switches the state of phase sweep

Setting parameter

STARt|STOP

STARt → Switches the output to the start value

STOP → Switches the output to the stop value

Setting example

:SOURce1:PHASe:STATe STARt

Switches the state of phase sweep of CH1 to the start value

2.3.8.21 Amplitude sweep starting value setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STARt

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STARt

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STARt?

Description

Sets/queries the start value of amplitude sweep

Setting parameter

<amplitude>|MINimum|MAXimum

<amplitude> ::= <REAL>[<eunits>][<units>]

<REAL> → Start value: 0 Vp-p to 20 Vp-p/open,
0 Vp-p to 10Vp-p/50Ω,
Resolution: (999.9 mVp-p or less) 4 digits or 0.1 mVp-p,
(1 Vp-p or more) 5 digits or 1 mVp-p

<eunits> ::= M

<units> ::= VPP|VPK|VRMS|DBV|DBM

MINimum → 0 Vp-p

MAXimum → 20 Vp-p/open, 10 Vp-p/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:STARt 5VPP

Sets the start value of amplitude sweep of CH1 to 5 Vp-p

2.3.8.22 Amplitude sweep stop value setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STOP

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STOP

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STOP?

Description

Sets/queries the stop value of amplitude sweep

Setting parameter

<amplitude>|MINimum|MAXimum

<amplitude> ::= <REAL>[<eunits>][<units>]

<REAL> → Stop value: 0 Vp-p to 20 Vp-p/open,
0 Vp-p to 10Vp-p/50Ω,
Resolution: (999.9 mVp-p or less) 4 digits or 0.1 mVp-p,
(1 Vp-p or more) 5 digits or 1 mVp-p

<eunits> ::= M

<units> ::= VPP|VPK|VRMS|DBV|DBM

MINimum → 0 Vp-p

MAXimum → 20 Vp-p/open, 10 Vp-p/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:STOP 5VPP

Sets the stop value of amplitude sweep of CH1 to 5 Vp-p

2.3.8.23 Amplitude sweep center value setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:CENTer

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:CENTer

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:CENTer?

Description

Sets/queries the center value of amplitude sweep

Setting parameter

<amplitude>|MINimum|MAXimum

<amplitude> ::= <REAL>[<eunits>][<units>]

<REAL> → Center value: 0 Vp-p to 20 Vp-p/open,
0 Vp-p to 10 Vp-p/50Ω,
Resolution: (999.9 mVp-p or less) 4 digits or 0.1 mVp-p,
(1 Vp-p or more) 5 digits or 1 mVp-p

<eunits> ::= M

<units> ::= VPP|VPK|VRMS|DBV|DBM

MINimum → 0 Vp-p

MAXimum → 20 Vp-p/open, 10 Vp-p/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:CENTer 5VPP

Sets the center value of amplitude sweep of CH1 to 5 Vp-p

2.3.8.24 Amplitude sweep span value setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:SPAN

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:SPAN

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:SPAN?

Description

Sets/queries the span value of amplitude sweep

Setting parameter

<amplitude>|MINimum|MAXimum

<amplitude> ::= <REAL>[<eunits>][<units>]

<REAL> → Span value: 0 Vp-p to 20 Vp-p/open,
0 Vp-p to 10 Vp-p/50Ω

† Resolution depends on the start value and stop value.

<eunits> ::= M

<units> ::= VPP|VPK|VRMS|DBV|DBM

MINimum → 0 Vp-p

MAXimum → 20 Vp-p/open, 10Vp-p/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:SPAN 5VPP

Sets the span value of amplitude sweep of CH1 to 5 Vp-p

2.3.8.25 Amplitude sweep marker value setting/query [:SOURce[1|2]]:MARKer:VOLTage[:LEVel][:IMMediate][:AMPLitude]

■[:SOURce[1|2]]:MARKer:VOLTage[:LEVel][:IMMediate][:AMPLitude]

□[:SOURce[1|2]]:MARKer:VOLTage[:LEVel][:IMMediate][:AMPLitude]?

Description

Sets/queries the marker value of amplitude sweep

Setting parameter

<amplitude>|CENTer|MINimum|MAXimum

<amplitude> ::= <REAL>[<eunits>][<units>]

<REAL> → Marker value: 0 Vp-p to 20 Vp-p/open,
0 Vp-p to 10 Vp-p/50Ω,
Resolution: (999.9 mVp-p or less) 4 digits or 0.1 mVp-p,
(1 Vp-p or more) 5 digits or 1 mVp-p

<eunits> ::= M

<units> ::= VPP|VPK|VRMS|DBV|DBM

CENTer → Center value of amplitude sweep

MINimum → 0 Vp-p

MAXimum → 20 Vp-p/open, 10 Vp-p/50Ω

Query parameter

[CENTer|MINimum|MAXimum]

CENTer → Queries the center value of amplitude sweep

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:MARKer:VOLTage:LEVel:IMMediate:AMPLitude 5VPP

Sets the marker value of amplitude sweep of CH1 to 5 Vp-p

2.3.8.26 Amplitude sweep start/stop value swapping setting [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:SWAP

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:SWAP

Description

Swaps the start value with stop value of the amplitude sweep

Setting parameter

None

2.3.8.27 Amplitude sweep start/stop value output setting [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STATe

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STATe

Description

Switches the state of amplitude sweep

Setting parameter

STARt|STOP

STARt → Switches the output to the start value

STOP → Switches the output to the stop value

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:STATe STARt

Switches the state of amplitude sweep of CH1 to the start value

2.3.8.28 DC offset sweep starting value setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:STARt

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:STARt

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:STARt?

Description

Sets/queries the DC offset start value

Setting parameter

<offset>|MINimum|MAXimum

<offset> ::= <REAL>[<eunits>][<units>]

<REAL> → Start value: ± 10 V/open, ± 5 V/50Ω,
Resolution: (± 499.9 mV or less) 4 digits or 0.1 mV,
(± 0.5 V or more) 5 digits or 1 mV

<eunits> ::= M

<units> ::= V

MINimum → -10 V/open, -5 V/50Ω

MAXimum → 10 V/open, 5 V/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage[:LEVel][:IMMediate]:OFFSet:STARt 2.5V

Sets the start value of DC offset of CH1 to 2.5 V

2.3.8.29 DC offset sweep stop value setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:STOP

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:STOP

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:STOP?

Description

Sets/queries the stop value of DC offset

Setting parameter

<offset>|MINimum|MAXimum

<offset> ::= <REAL>[<eunits>][<units>]

<REAL> → Stop value: ± 10 V/open, ± 5 V/50Ω,
Resolution: (± 499.9 mV or less) 4 digits or 0.1 mV,
(± 0.5 V or more) 5 digits or 1 mV

<eunits> ::= M

<units> ::= V

MINimum → -10 V/open, -5 V/50Ω

MAXimum → 10 V/open, 5 V/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage[:LEVel][:IMMediate]:OFFSet:STOP 2.5V

Sets the stop value of DC offset of CH1 to 2.5 V

2.3.8.30 DC offset sweep center value setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:CENTer

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:CENTer

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:CENTer?

Description

Sets/queries the center value of DC offset

Setting parameter

<offset>|MINimum|MAXimum

<offset> ::= <REAL>[<eunits>][<units>]

<REAL> → DC offset: ± 10 V/open, ± 5 V/50Ω,
Resolution: (± 499.9 mV or less) 4 digits or 0.1 mV,
(± 0.5 V or more) 5 digits or 1 mV

<eunits> ::= M

<units> ::= V

MINimum → -10 V/open, -5 V/50Ω

MAXimum → 10 V/open, 5 V/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage[:LEVel][:IMMediate]:OFFSet:CENTer 2.5V

Sets the center value of DC offset of CH1 to 2.5 V

2.3.8.31 DC offset sweep span value setting/query [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:SPAN

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:SPAN

□[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:SPAN?

Description

Sets/queries the span value of DC offset

Setting parameter

<offset>|MINimum|MAXimum

<offset> ::= <REAL>[<eunits>][<units>]

<REAL> → DC offset: 0 V to 20 V/open, 0 V to 10V/50Ω,

† Resolution depends on the start value and stop value.

<eunits> ::= M

<units> ::= V

MINimum → 0 V

MAXimum → 20 V/open, 10 V/50Ω

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage[:LEVel][:IMMediate]:OFFSet:SPAN 2.5V

Sets the span value of DC offset of CH1 to 2.5 V

2.3.8.32 DC offset sweep marker value setting/query [:SOURce[1|2]]:MARKer:VOLTage[:LEVel][:IMMediate]:OFFSet

■[:SOURce[1|2]]:MARKer:VOLTage[:LEVel][:IMMediate]:OFFSet

□[:SOURce[1|2]]:MARKer:VOLTage[:LEVel][:IMMediate]:OFFSet?

Description

Sets/queries the marker value of DC offset

Setting parameter

<offset>|CENTer|MINimum|MAXimum

<offset> ::= <REAL>[<eunits>][<units>]

<REAL> → Marker value: ± 10 Vp-p/open, ± 5Vp-p/50Ω,
Resolution: (± 499.9 mV or less) 4 digits or 0.1 mV,
(± 0.5 V or more) 5 digits or 1 mV

<eunits> ::= M

<units> ::= V

CENTer → Center value of the DC offset sweep

MINimum → -10 V/open, -5 V/50Ω

MAXimum → 10 V/open, 5 V/50Ω

Query parameter

[CENTer|MINimum|MAXimum]

CENTer → Queries the center value of amplitude sweep

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:MARKer:VOLTage:LEVel:IMMediate:OFFSet 2.5V

Sets the marker value of DC offset of CH1 to 2.5 V

2.3.8.33 DC offset sweep start/stop value swapping setting [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:SWAP

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:SWAP

Description

Swaps the start value with stop value of the DC offset sweep

Setting parameter

None

2.3.8.34 DC offset sweep start/stop value output setting [:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:STATe

■[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:STATe

Description

Switch the state of DC offset sweep

Setting parameter

STARt|STOP

STARt → Switches the output to the start value

STOP → Switches the output to the stop value

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:OFFSet:STATe STARt

Switches the state of DC offset sweep of CH1 to the start value

2.3.8.35 Duty sweep starting value setting/query [:SOURce[1|2]]:PULSe:DCYCle:STARt

■[:SOURce[1|2]]:PULSe:DCYCle:STARt

□[:SOURce[1|2]]:PULSe:DCYCle:STARt?

Description

Sets/queries the start value of duty sweep

Setting parameter

<duty>|MINimum|MAXimum

<duty> ::= <REAL>[<units>]

<REAL> → (Square wave (duty variable range standard))
Start value: 0.0100% to 99.9900%, Resolution: 0.0001%,
(Square wave (duty variable range extend))
Start value: 0.0000% to 100.0000%, Resolution: 0.0001%,
(Pulse wave)
Start value: 0.0170% to 99.9830%, Resolution: 0.0001%

<units> ::= PCT

MINimum → (Square wave (duty variable range standard)) 0.0100%,
(Square wave (duty variable range extend)) 0.0000%,
(Pulse wave) 0.0170%

MAXimum → (Square wave (duty variable range standard)) 99.9900%,
(Square wave (duty variable range extend)) 100.0000%,
(Pulse wave) 99.9830%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PULSe:DCYCle:STARt 20PCT

Sets the start value of duty sweep of CH1 to 20%

2.3.8.36 Duty sweep stop value setting/query [:SOURce[1|2]]:PULSe:DCYCle:STOP

■[:SOURce[1|2]]:PULSe:DCYCle:STOP

□[:SOURce[1|2]]:PULSe:DCYCle:STOP?

Description

Sets/queries the stop value of duty sweep

Setting parameter

<duty>|MINimum|MAXimum

<duty> ::= <REAL>[<units>]

<REAL> → (Square wave (duty variable range standard))
Stop value: 0.0100% to 99.9900%, Resolution :0.0001%,
(Square wave (duty variable range extend))
Stop value: 0.0000% to 100.0000%, Resolution: 0.0001%,
(Pulse wave)
Stop value :0.0170% to 99.9830%, Resolution :0.0001%

<units> ::= PCT

MINimum → (Square wave (duty variable range standard)) 0.0100%,
(Square wave (duty variable range extend)) 0.0000%,
(Pulse wave) 0.0170%

MAXimum → (Square wave (duty variable range standard)) 99.9900%,
(Square wave (duty variable range extend)) 100.0000%,
(Pulse wave) 99.9830%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PULSe:DCYCle:STOP 20PCT

Sets the stop value of duty sweep of CH1 to 20%

2.3.8.37 Duty sweep center value setting/query [:SOURce[1|2]]:PULSe:DCYCle:CENTer

■[:SOURce[1|2]]:PULSe:DCYCle:CENTer

□[:SOURce[1|2]]:PULSe:DCYCle:CENTer?

Description

Sets/queries the center value of duty sweep

Setting parameter

<duty>|MINimum|MAXimum

<duty> ::= <REAL>[<units>]

<REAL> → (Square wave (duty variable range standard))
Center value: 0.0100% to 99.9900%, Resolution: 0.0001%,
(Square wave (duty variable range extend))
Center value: 0.0000% to 100.0000%, Resolution: 0.0001%,
(Pulse wave)
Center value: 0.0170% to 99.9830%, Resolution: 0.0001%

<units> ::= PCT

MINimum → (Square wave (duty variable range standard)) 0.0100%,
(Square wave (duty variable range extend)) 0.0000%,
(Pulse wave) 0.0170%

MAXimum → (Square wave (duty variable range standard)) 99.9900%,
(Square wave (duty variable range extend)) 100.0000%,
(Pulse wave) 99.9830%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PULSe:DCYCle:CENTer 20PCT

Sets the center value of duty sweep of CH1 to 20%

2.3.8.38 Duty sweep span value setting/query [:SOURce[1|2]]:PULSe:DCYCle:SPAN

■[:SOURce[1|2]]:PULSe:DCYCle:SPAN

□[:SOURce[1|2]]:PULSe:DCYCle:SPAN?

Description

Sets/queries the span value of duty sweep

Setting parameter

<duty>|MINimum|MAXimum

<duty> ::= <REAL>[<units>]

<REAL> → (Square wave (duty variable range standard))
Span value: 0.0000% to 99.9800%, Resolution: 0.0001%,
(Square wave (duty variable range extend))
Span value: 0.0000% to 100.0000%, Resolution: 0.0001%,
(Pulse wave)
Span value: 0.0000% to 99.9660%, Resolution: 0.0001%

<units> ::= PCT

MINimum → 0.0000%

MAXimum → (Square wave (duty variable range standard)) 99.9800%,
(Square wave (duty variable range extend)) 100.0000%,
(Pulse wave) 99.9660%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:PULSe:DCYCle:SPAN 20PCT

Sets the span value of duty sweep of CH1 to 20%

2.3.8.39 Duty sweep marker value setting/query [:SOURce[1|2]]:MARKer:PULSe:DCYCle

■[:SOURce[1|2]]:MARKer:PULSe:DCYCle

□[:SOURce[1|2]]:MARKer:PULSe:DCYCle?

Description

Sets/queries the marker value of duty sweep

Setting parameter

<duty>|CENTer|MINimum|MAXimum

<duty> ::= <REAL>[<units>]

<REAL> → (Square wave (duty variable range standard))
Marker value: 0.0100% to 99.9900%, Resolution: 0.0001%,
(Square wave (duty variable range extend))
Marker value: 0.0000% to 100.0000%, Resolution: 0.0001%,
(Pulse wave)
Marker value: 0.0170% to 99.9830%, Resolution: 0.0001%

<units> ::= PCT

CENTer → Center value of duty sweep

MINimum → (Square wave (duty variable range standard)) 0.0100%,
(Square wave (duty variable range extend)) 0.0000%,
(Pulse wave) 0.0170%

MAXimum → (Square wave (duty variable range standard)) 99.9900%,
(Square wave (duty variable range extend)) 100.0000%,
(Pulse wave) 99.9830%

Query parameter

[CENTer|MINimum|MAXimum]

CENTer → Queries the center value of duty sweep

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:MARKer:PULSe:DCYCle 20PCT

Sets the marker value of duty sweep of CH1 to 20%

2.3.8.40 Duty sweep start/stop value swapping setting [:SOURce[1|2]]:PULSe:DCYCle:SWAP

■[:SOURce[1|2]]:PULSe:DCYCle:SWAP

Description

Swaps the start value with stop value of the duty sweep

Setting parameter

None

2.3.8.41 Duty sweep start/stop value output setting [:SOURce[1|2]]:PULSe:DCYCle:STATe

■[:SOURce[1|2]]:PULSe:DCYCle:STATe

Description

Switches the state of duty sweep

Setting parameter

STARt|STOP

STARt → Switches the output to the start value

STOP → Switches the output to the stop value

Setting example

:SOURce1:PULSe:DCYCle:STATe STARt

Switches the state of duty sweep of CH1 to the start value

2.3.9 Burst Oscillation Mode Command Details

2.3.9.1 Burst oscillation burst mode selection/query [:SOURce[1|2]]:BURSt:MODE

■[:SOURce[1|2]]:BURSt:MODE

□[:SOURce[1|2]]:BURSt:MODE?

Description

Selects/queries the burst mode

Setting parameter

AUTO|TRIGger|GATE|TGATe

AUTO → Auto burst
TRIGger → Trigger burst
GATE → Gate
TGATe → Trigger gate

Query parameter

None

Response format

AUTO|TRIG|GATE|TGAT

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:BURSt:MODE AUTO

Sets the burst mode of CH1 to auto burst

2.3.9.2 Burst oscillation stop level setting/query [:SOURce[1|2]]:BURSt:SLEVel

■[:SOURce[1|2]]:BURSt:SLEVel

□[:SOURce[1|2]]:BURSt:SLEVel?

Description

Sets/queries the stop level value of burst

Setting parameter

<level>|MAXimum|MINimum

<level> ::= <REAL>[<units>]

<REAL> → Stop level value: -100.00% to 100.00%, Resolution: 0.01%

<units> ::= PCT

MINimum → -100.00%

MAXimum → 100.00%

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:BURSt:SLEVel 20PCT

Sets the stop level value of burst of CH1 to 20%

2.3.9.3 Burst oscillation stop level selection/query [:SOURce[1|2]]:BURSt:SLEVel:STATe

■[:SOURce[1|2]]:BURSt:SLEVel:STATe

□[:SOURce[1|2]]:BURSt:SLEVel:STATe?

Description

Selects/queries the stop level of burst oscillation

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Disable
1/ON: Enable

Query parameter

None

Response format

<NBOL>

<NBOL> → 0: Disable
1: Enable

Setting example

:SOURce1:BURSt:SLEVel:STATe ON

Sets the stop level of burst oscillation of CH1 to enable

2.3.9.4 Burst oscillation synchronization signal output selection/query :OUTPut[1|2]:SYNC:BURSt:TYPE

■:OUTPut[1|2]:SYNC:BURSt:TYPE

□:OUTPut[1|2]:SYNC:BURSt:TYPE?

Description

Selects/queries the burst synchronization output

Setting parameter

SYNC|BSYNc

SYNC → Reference phase synchronization
BSYNc → Burst synchronization

Query parameter

None

Response format

SYNC|BSYN

† For the meaning of each response data, see the setting parameter

Setting example

:OUTPut1:SYNC:BURSt:TYPE SYNC

Sets the burst synchronization output of CH1 to reference phase synchronization

2.3.9.5 Burst oscillation auto burst mode: mark wave number setting/query [:SOURce[1|2]]:BURSt:AUTO:NCYCles

■[:SOURce[1|2]]:BURSt:AUTO:NCYCles

□[:SOURce[1|2]]:BURSt:AUTO:NCYCles?

Description

Sets/queries the mark wave number of auto burst

Setting parameter

<mark>|MINimum|MAXimum

<mark> ::= <REAL>

<REAL> → Mark wave number: 0.5 waves to 999,999.5 waves, Resolution: 0.5 waves

MINimum → 0.5 waves

MAXimum → 999,999.5 waves

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:BURSt:AUTO:NCYCles 10

Sets the mark wave number of auto burst of CH1 to 10 waves

2.3.9.6 Burst oscillation auto burst mode: space wave number setting/query [:SOURce[1|2]]:BURSt:AUTO:SPACe

■[:SOURce[1|2]]:BURSt:AUTO:SPACe

□[:SOURce[1|2]]:BURSt:AUTO:SPACe?

Description

Sets/queries the space wave number of auto burst

Setting parameter

<mark>|MINimum|MAXimum

<mark> ::= <REAL>

<REAL> → Space wave number: 0.5 waves to 999,999.5 waves, Resolution: 0.5 waves

MINimum → 0.5 waves

MAXimum → 999,999.5 waves

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:BURSt:AUTO:SPACe 10

Sets the space wave number of auto burst of CH1 to 10 waves

2.3.9.7 Burst oscillation trigger burst mode: mark wave number setting/query [:SOURce[1|2]]:BURSt[:TRIGger]:NCYCles

■ **[:SOURce[1|2]]:BURSt[:TRIGger]:NCYCles**

□ **[:SOURce[1|2]]:BURSt[:TRIGger]:NCYCles?**

Description

Sets/queries the mark wave number of trigger burst

Setting parameter

<mark>|MINimum|MAXimum

<mark> ::= <REAL>

<REAL> → Mark wave number: 0.5 waves to 999,999.5 waves, Resolution: 0.5 waves

MINimum → 0.5 waves

MAXimum → 999,999.5 waves

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:BURSt:TRIGger:NCYCles 10

Sets the mark wave number of trigger burst of CH1 to 10 waves

2.3.9.8 Burst oscillation trigger burst mode: trigger delay time setting/query [:SOURce[1|2]]:BURSt[:TRIGger]:TDELay

■[:SOURce[1|2]]:BURSt[:TRIGger]:TDELay

□[:SOURce[1|2]]:BURSt[:TRIGger]:TDELay?

Description

Sets/queries the trigger delay time of trigger burst

Setting parameter

<delay>|MINimum|MAXimum

<delay> ::= <REAL>[<eunits>][<units>]

<REAL> → Trigger delay time: 0.0 μs to 100 s, Resolution: 5 digits or 0.1 μs

<eunits> ::= MA|K|M|U|N

<units> ::= S

MINimum → 0.0μs

MAXimum → 100s

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:BURSt:TRIGger:TDELay 10MS

Sets the trigger delay time of trigger burst of CH1 to 10 ms

2.3.9.9 Burst oscillation gate mode: oscillation stop unit setting/query [:SOURce[1|2]]:BURSt:GATE:OSTop

■ [:SOURce[1|2]]:BURSt:GATE:OSTop

□ [:SOURce[1|2]]:BURSt:GATE:OSTop?

Description

Selects/queries the oscillation stop unit of gate

Setting parameter

HALF|CYCLe

HALF → Half cycle

CYCLe → 1 cycle

Query parameter

None

Response format

HALF|CYCL

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:BURSt:GATE:OSTop HALF

Sets the oscillation stop unit of gate of CH1 to half cycle

2.3.9.10 Burst oscillation triggered gate mode: oscillation stop unit setting/query [:SOURce[1|2]]:BURSt:TGATe:OSTop

■ **[:SOURce[1|2]]:BURSt:TGATe:OSTop**

□ **[:SOURce[1|2]]:BURSt:TGATe:OSTop?**

Description

Selects/queries the oscillation stop unit of triggered gate

Setting parameter

HALF|CYCLe

HALF → Half cycle

CYCLe → 1 cycle

Query parameter

None

Response format

HALF|CYCL

† For the meaning of each response data, see the setting parameter

Setting example

:SOURce1:BURSt:TGATe:OSTop HALF

Sets the oscillation stop unit of triggered gate of CH1 to half cycle

2.3.10 Memory Operation Command Details

2.3.10.1 Basic setting memory clear :MEMory:STATe:DELete

■:MEMory:STATe:DELete

Description

Clears the setting memory

Setting parameter

<memory>|MINimum|MAXimum

<memory> ::= <INT>

<INT> → Memory number : 1 to 10

MINimum → 1

MAXimum → 10

2.3.10.2 Basic setting memory store *SAV

■*SAV

Description

Stores to the setting memory

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 1 to 10

2.3.10.3 Basic setting memory recall *RCL

■*RCL

Description

Recalls from the setting memory

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 1 to 10

2.3.10.4 Arbitrary waveform memory arbitrary waveform data transfer/read-out {:TRACe|DATA} [:DATA]

■{:TRACe|DATA} [:DATA]

□{:TRACe|DATA} [:DATA]?

Description

Transfers/reads out the arbitrary wave data

Setting parameter

<memory>,[<name>],<data>

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

<name> ::= <STR>

<STR> → Arbitrary wave name (20 characters or less)

† Optional (if omitted, nothing is changed)

† If the arbitrary wave name is less than 20 characters, the remaining characters are filled with spaces (with the ASCII code 32).

<data> ::= <BLK>

<BLK> → Arbitrary wave data

(Data formats)

Array format

#<digit><byte><format><number><data[0]>…<data[n-1]>

→ Start of the binary data

<digit> → The number of digits of subsequent <byte>

<byte> → The number of bytes of subsequent data

<format> → Data format (4 bytes)

† Specify 0 for the array format

<number> → The number of data points (4 bytes)

<data[i]> → i-th value (2 bytes)

Control point format

#<digit><byte><format><number><x[0]><y[0]>…<x[n-1]><y[n-1]>

→ Start of the binary data

<digit> → The number of digits of subsequent <byte>

<byte> → The number of bytes of subsequent data

<format> → Data format (4 bytes)

† Specify 1 for the control point format

<number> → The number of data points (4 bytes)

<x[i]> → x value of i-th control point (4 bytes)

<y[i]> → y value of i-th control point (2 bytes)

† Save the arbitrary data of <data> as the arbitrary wave name of <name> to the memory number of <memory>

Query parameter

<memory>

<memory> ::= <INT>

<INT> → Memory number: 0 to 128

Response format

<name>,<data>

<name> ::= <STR>

<STR> → Arbitrary wave name (20 characters)

<data> ::= <BLK>

† For <BLK>, see the setting parameter

Remarks

① <format>, <number>, <data[i]>, <x[i]>, and <y[i]> are binary data.
(Big endian)

②<data[i]> is the two's complement form and from -32767 (H'8001) to 32767 (H'7FFF).
If a value is -32768 (H'8000), set it as -32767 (H'8001).

③The control point <x[i]> is treated as a numeric value of X axis from 0 up to 31th power of two.
The numeric range is expressed as a range from H'00000000 to H'7FFFFFFF in hexadecimal.
If data exceeds the setting range, it is treated as an error and no command is executed.

④The control point <x[i]> must be sorted in ascending order from the beginning of data.
If it is not sorted, an error occurs.

⑤The control point <y[i]> is treated as a numeric value of Y axis from -32767 to 32767.
The numeric range is expressed as a range from H'8001 to H'7FFF in hexadecimal.
The value 0 is expressed as H'0000.
-32768 (H'8000) is set as -32767 (H'8001).

If the amplitude width of actual signal output is ±1.0 Vp-p, 1 LSB 1/32767 V is used.
† All of the logical signal output values are not guaranteed.

⑥Arbitrary wave memory number 0 is the edit memory.
⑦The arbitrary wave name of the memory number 0 is "<Edit Memory> "(20 characters).
⑧Array format data cannot be set for the arbitrary wave memory number 0.
⑨Arbitrary wave name cannot be set for the arbitrary wave memory number 0.
If it is specified, it is ignored.

2.3.10.5 Arbitrary waveform memory store {:TRACe|DATA}:STORe

■ {:TRACe|DATA}:STORe

Description

Saves the contents of edit memory (memory number 0) as an arbitrary wave file to the memory

Setting parameter

<file>,<name>

<file> ::= <INT>

<INT> → Memory number of location to save: 1 to 128

<name> ::= <STR>

<STR> → Arbitrary wave name (20 characters or less)

† Optional (if omitted, nothing is changed)

† If the arbitrary wave name is less than 20 characters, the remaining characters are filled with spaces (with the ASCII code 32).

Setting example

:TRACe:STORe 2,"name"

Saves the contents of edit memory as the arbitrary wave name "name" to the memory number 2

2.3.10.6 Arbitrary waveform memory recall {:TRACe|DATA}:RECall

■ {:TRACe|DATA}:RECall

Description

Reads the arbitrary wave file of the specified memory number into the edit memory (memory number 0)

Setting parameter

<file>

<file> ::= <INT>

<INT> → Memory number of calling source: 1 to 128

Setting example

:TRACe:STORe:RECall 2

Reads the contents of memory number 2 into the edit memory.

2.3.10.7 Arbitrary waveform memory copy {:TRACe|DATA}:COPY

■{:TRACe|DATA}:COPY

Description

Copies the arbitrary wave data.

Setting parameter

<memory>,[<name>],<chan>,<wave>

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

<name> ::= <STR>

<STR> → Arbitrary wave name (20 characters)

† Optional (If omitted, the destination name is assumed.)

† If the arbitrary wave name is less than 20 characters, the remaining characters are filled with spaces (with the ASCII code 32).

<chan> ::= <INT>

<INT> → Channel number:1 to 2

<wave> ::= SINusoid|SQUare|PULSe|RAMP

SINusoid → Sine wave

SQUare → Square wave

PULSe → Pulse wave

RAMP → Ramp wave

USER → Arbitrary wave

† Copy the waveform <wave> of the channel number <chan> as the arbitrary wave name <name> to the memory number <memory>.

Setting example

:TRACe:COPY 1,"name",1,SINusoid

Copies the waveform memory of sine wave of CH1 as the arbitrary wave name "name" to the arbitrary wave memory 1

Remarks

① Memory number 0 is the edit memory.

② The arbitrary wave name of the memory number 0 is "<Edit Memory> "(20 characters).

③ The arbitrary wave data of the memory selected in "[:SOURce[1|2]]:FUNCtion:USER" is copied as a copy of arbitrary wave.

2.3.10.8 Arbitrary waveform memory delete {:TRACe|DATA}:DELete

■ {:TRACe|DATA}:DELete

Description

Deletes the arbitrary wave memory

Setting parameter

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

Setting example

:TRACe:DELete 1

Deletes the memory number 1

Remarks

① Memory number 0 is the edit memory.

② Specifying the memory number 0 gives the same effect as the case of operating the [New] soft-key in the Edit arbitrary waveform screen on the main unit.

2.3.10.9 Arbitrary waveform memory information acquisition {:TRACe|DATA}:INFormation?

□{:TRACe|DATA}:INFormation?

Description

Acquires the information of arbitrary wave memory

Query parameter

<memory> ::= <INT>

<INT> → Memory number : 0 to 128

Response format

<name>,<format>,<number>

<name> ::= <STR>

<STR> → Arbitrary wave name (20 characters)

<format> ::= <INT>

<INT> → Data format

0 → Array format

1 → Control point format

<number> ::= <INT>

<INT> → The number of data points

2.3.11 Status System Command Details

2.3.11.1 Status register and related queue clear *CLS

■*CLS

Description

Clears event register and error queue

Setting parameter

None

Remarks

①The following registers are cleared:

- Status byte register
- Standard event status register
- Operation status event register
- CH1 operation status event register
- CH2 operation status event register
- Questionable data status event register
- Warning event register
- CH1 warning event register
- CH2 warning event register
- Error queue

②This command can clear the overload message (No.23133).

2.3.11.2 Status reporting related preset setting :STATus:PRESet

■:STATus:PRESet

Description

Presets the registers

Parameters

None

Remarks

† The following registers are cleared by this command:

- Operation status transition filter (negative)
- Operation status transition filter (positive)
- Operation status enable register
- CH1 operation status transition filter (negative)
- CH1 operation status transition filter (positive)
- CH1 operation status enable register
- CH2 operation status transition filter (negative)
- CH2 operation status transition filter (positive)
- CH2 operation status enable register
- Questionable data status transition filter (negative)
- Questionable data status transition filter (positive)
- Questionable data status enable register
- Warning event enable register
- CH1 warning event enable register
- CH2 warning event enable register

2.3.11.3 Status register at power-on clear flag setting/query *PSC

■***PSC**

□***PSC?**

Description

Sets/queries the power-on status clear flag

Setting parameter

<state> ::= <INT>

<INT> → 0:OFF
1:ON

Query parameter

None

Response format

<NR1>

Setting example

*PSC 1

Sets the automatic clear of the enable register, etc. at power-on to enable

2.3.11.4 Status byte register query *STB?

□***STB?**

Description

Queries the status byte register

Query parameter

None

Response format

<NR1>

2.3.11.5 Service request enable register setting/query *SRE

■***SRE**

□***SRE?**

Description

Sets/queries the service request enable register

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

*SRE 8

Sets the service request enable register to 8

2.3.11.6 Standard event status register query *ESR?

□*ESR?

Description

Queries the standard event status register

Query parameter

None

Response format

<NR1>

2.3.11.7 Standard event enable register setting/query *ESE

■*ESE

□*ESE?

Description

Sets/queries the standard event status enable register

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

*ESE 8

Sets the standard event status enable register to 8

2.3.11.8 Condition register query :STATus:OPERation:CONDition?

□:STATus:OPERation:CONDition?

Description

Queries the operation status condition register

Query parameter

None

Response format

<NR1>

2.3.11.9 Transition filter register (negative) setting/query :STATus:OPERation:NTRansition

■:STATus:OPERation:NTRansition

□:STATus:OPERation:NTRansition?

Description

Sets/queries the operation status transition filter (negative)

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:NTRansition 512

Set the bit 9 of the operation status transition filter (negative) to 1

2.3.11.10 Transition filter register (positive) setting/query :STATus:OPERation:PTRansition

■:STATus:OPERation:PTRansition

□:STATus:OPERation:PTRansition?

Description

Sets/queries the operation status transition filter (positive)

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:PTRansition 512

Set the bit 9 of the operation status transition filter (positive) to 1

2.3.11.11 Event register query :STATus:OPERation[:EVENt]?

□:STATus:OPERation[:EVENt]?

Description

Queries the operation status event register

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:EVENt?

Queries the operation status event register

2.3.11.12 Event enable register setting/query :STATus:OPERation:ENABle

■:STATus:OPERation:ENABle

□:STATus:OPERation:ENABle?

Description

Sets/queries the operation status event enable register

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:ENABle 512

Sets the bit 9 of the operation status event enable register to 1

2.3.11.13 Operation status register group (CH1) Condition register query :STATus:OPERation:CH1:CONDition?

□:STATus:OPERation:CH1:CONDition?

Description

Queries the CH1 operation status condition register

Query parameter

None

Response format

<NR1>

2.3.11.14 Operation status register group (CH1) Transition filter register (negative) setting/query :STATus:OPERation:CH1:NTRansition

■:STATus:OPERation:CH1:NTRansition

□:STATus:OPERation:CH1:NTRansition?

Description

Sets/queries the CH1 operation status transition filter (negative)

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:CH1:NTRansition 8

Set the bit 3 of the CH1 operation status transition filter (negative) to 1

2.3.11.15 Operation status register group (CH1) Transition filter register (positive) setting/query :STATus:OPERation:CH1:PTRansition

■:STATus:OPERation:CH1:PTRansition

□:STATus:OPERation:CH1:PTRansition?

Description

Sets/queries the CH1 operation status transition filter (positive)

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:CH1:PTRansition 8

Set the bit 3 of the CH1 operation status transition filter (positive) to 1

2.3.11.16 Operation status register group (CH1) Event register query :STATus:OPERation:CH1[:EVENt]?

□:STATus:OPERation:CH1[:EVENt]?

Description

Queries the CH1 operation status event register

Query parameter

None

Response format

<NR1>

2.3.11.17 Operation status register group (CH1) Event enable register setting/query :STATus:OPERation:CH1:ENABle

■:STATus:OPERation:CH1:ENABle

□:STATus:OPERation:CH1:ENABle?

Description

Sets/queries the operation status event enable register

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:CH1:ENABle 8

Sets the bit 3 of the operation status event enable register to 1

2.3.11.18 Operation status register group (CH2) condition register query :STATus:OPERation:CH2:CONDition?

□:STATus:OPERation:CH2:CONDition?

Description

Queries the CH2 operation status condition register

Query parameter

None

Response format

<NR1>

2.3.11.19 Operation status register group (CH2) transition filter register (negative) setting/query :STATus:OPERation:CH2:NTRansition

■:STATus:OPERation:CH2:NTRansition

□:STATus:OPERation:CH2:NTRansition?

Description

Sets/queries the CH2 operation status transition filter (negative)

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:CH2:NTRansition 8

Set the bit 3 of the CH2 operation status transition filter (negative) to 1

2.3.11.20 Operation status register group (CH2) transition filter register (positive) setting/query :STATus:OPERation:CH2:PTRansition

■:STATus:OPERation:CH2:PTRansition

□:STATus:OPERation:CH2:PTRansition?

Description

Sets/queries the CH2 operation status transition filter (positive)

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:CH2:PTRansition 8

Set the bit 3 of the CH2 operation status transition filter (positive) to 1

2.3.11.21 Operation status register group (CH2) event Register setting :STATus:OPERation:CH2[:EVENt]?

□:STATus:OPERation:CH2[:EVENt]?

Description

Queries the CH2 operation status event register

Query parameter

None

Response format

<NR1>

2.3.11.22 Operation status register group (CH2) event enable register setting/query :STATus:OPERation:CH2:ENABle

■:STATus:OPERation:CH2:ENABle

□:STATus:OPERation:CH2:ENABle?

Description

Sets/queries the operation status event enable register

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:OPERation:CH2:ENABle 8

Sets the bit 3 of the operation status event enable register to 1

2.3.11.23 Questionable Data Status Register Group condition register query :STATus:QUEStionable:CONDition?

□:STATus:QUEStionable:CONDition?

Description

Queries the questionable data status condition register

Query parameter

None

Response format

<NR1>

2.3.11.24 Questionable Data Status Register Group transition filter register (negative) setting/query :STATus:QUEStionable:NTRansition

■:STATus:QUEStionable:NTRansition

□:STATus:QUEStionable:NTRansition?

Description

Sets/queries the questionable data status transition filter (negative)

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:QUEStionable:NTRansition 16

Sets the bit 4 of questionable data status transition filter (negative) to 1

2.3.11.25 Questionable Data Status Register Group transition filter register (positive) setting/query :STATus:QUEStionable:PTRansition

■:STATus:QUEStionable:PTRansition

□:STATus:QUEStionable:PTRansition?

Description

Sets/queries the questionable data status transition filter (positive)

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:QUEStionable:PTRansition 16

Sets the bit 4 of questionable data status transition filter (positive) to 1

2.3.11.26 Questionable Data Status Register Group event register query :STATus:QUEStionable[:EVENt]?

□:STATus:QUEStionable[:EVENt]?

Description

Queries the questionable data status event register

Query parameter

None

Response format

<NR1>

2.3.11.27 Questionable Data Status Register Group event enable register setting/query :STATus:QUEStionable:ENABle

■:STATus:QUEStionable:ENABle

□:STATus:QUEStionable:ENABle?

Description

Sets/queries the questionable data status event enable register

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:QUEStionable:ENABle 16

Sets the bit 4 of the questionable data status event enable register to 1

2.3.11.28 Warning Event Register Group event register query :STATus:WARNing[:EVENt]?

□:STATus:WARNing[:EVENt]?

Description

Queries the warning event register

Query parameter

None

Response format

<NR1>

2.3.11.29 Warning Event Register Group event enable register setting/query :STATus:WARNing:ENABle

■:STATus:WARNing:ENABle

□:STATus:WARNing:ENABle?

Description

Sets/queries the warning event enable register

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:WARNing:ENABle 512

Sets the bit 9 of the warning event enable register to 1

2.3.11.30 Warning Event Register Group (CH1) event register query :STATus:WARNing:CH1[:EVENt]?

□:STATus:WARNing:CH1[:EVENt]?

Description

Queries the CH1 warning event register

Query parameter

None

Response format

<NR1>

2.3.11.31 Warning Event Register Group (CH1) event enable register setting/query :STATus:WARNing:CH1:ENABle

■:STATus:WARNing:CH1:ENABle

□:STATus:WARNing:CH1:ENABle?

Description

Sets/queries the CH1 warning event enable register

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:WARNing:CH1:ENABle 16

Sets the bit 4 of the CH1 warning event enable register to 1

2.3.11.32 Warning Event Register Group (CH2) event register query :STATus:WARNing:CH2[:EVENt]?

□:STATus:WARNing:CH2[:EVENt]?

Description

Queries the CH2 warning event register

Query parameter

None

Response format

<NR1>

2.3.11.33 Warning Event Register Group (CH2) event enable register setting/query :STATus:WARNing:CH2:ENABle

■:STATus:WARNing:CH2:ENABle

□:STATus:WARNing:CH2:ENABle?

Description

Sets/queries the CH2 warning event enable register

Setting parameter

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameter

None

Response format

<NR1>

Setting example

:STATus:WARNing:CH2:ENABle 16

Sets the bit 4 of the CH2 warning event enable register to 1

2.3.12 Channel Operation 2-channel Equipment (WF1948) Command Details

2.3.12.1 2-channel equipment (WF1948) channel mode setting/query :CHANnel:MODE

■:CHANnel:MODE

□:CHANnel:MODE?

Description

Selects/queries the channel mode

Setting parameter

INDependent|PHASe|TONE|RATio|DIFFerential

INDependent	→	Independent
PHASe	→	2 phase
TONE	→	Constant frequency difference
RATio	→	Constant frequency ratio
DIFFerential	→	Differential output

Query parameter

None

Response format

IND|PHAS|TONE|RAT|DIFF

† For the meaning of each response data, see the setting parameter

Setting example

:CHANnel:MODE INDependent

Sets the channel mode to independent

Remarks

† This command can use only for 2-channel machine

2.3.12.2 2-channel equipment (WF1948)
2-channel same value operation setting/query
:INSTrument:COUPle

■:INSTrument:COUPle

□:INSTrument:COUPle?

Description

Selects/queries the 2-channel equivalence setting

Setting parameter

ALL|NONE

ALL	→	Equivalence setting on
NONE	→	Equivalence setting off

Query parameter

None

Response format

ALL|NONE

† For the meaning of each response data, see the setting parameter

Setting example

:INSTrument:COUPle ALL

2-channel equivalence setting is used

Remarks

† This command can use only for 2-channel machine

2.3.12.3 2-channel equipment (WF1948) constant frequency difference mode: frequency difference setting/query :CHANnel:DELTa

■:CHANnel:DELTa

□:CHANnel:DELTa?

Description

Sets/queries the frequency difference of the constant frequency difference

Setting parameter

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>[<eunits>][<units>]

<REAL> → Frequency difference: (CH2 frequency - CH1 frequency), Resolution: 0.01 μHz

<eunits> ::= M|K|U|N

<units> ::= HZ

MINimum → Sets the minimum value

MAXimum → Sets the maximum value

Query parameter

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:CHANnel:DELTa 1KHZ

Sets the frequency difference to 1 kHz

Remarks

† This command can use only for 2-channel machine

2.3.12.4 2-channel equipment (WF1948) constant frequency ratio mode: frequency ratio setting/query :CHANnel:RATio

■:CHANnel:RATio

□:CHANnel:RATio?

Description

Sets/queries the frequency ration of the constant frequency ratio

Setting parameter

<value1>|MINimum|MAXimum,<value2>|MINimum|MAXimum

<value1> ::= <INT>

<INT> → Frequency ratio of CH1: 1 to 9,999,999

<value2> ::= <INT>

<INT> → Frequency ratio of CH2: 1 to 9,999,999

MINimum → 1

MAXimum → 9,999,999

Query parameter

None

Response format

<NR1>,<NR1>

Setting example

:CHANnel:RATio 2,3

Sets the frequency ratio to 2:3

Remarks

† This command can use only for 2-channel machine

2.3.13 Other Operations Command Details

2.3.13.1 Equipment-specific information query *IDN?

□*IDN?

Description

Reads the ID of equipment

Query parameter

None

Response format

<corporation>,<model>,<serial>,<firmware>

<corporation> → Manufacturer: NF Corporation
<model> → Model: (Example) WF1947
<serial> → Serial number: (Example) 1234567
<firmware> → Firmware version: (Example) Ver1.00

2.3.13.2 Error message query :SYSTem:ERRor?

□:SYSTem:ERRor?

Description

Queries errors

Query parameter

None

Response format

<code>,<message>

<code> ::= <INT>
<INT> → Error code
<message> ::= <STR>
<STR> → Error message

2.3.13.3 Setting initialization (status registers, etc. not cleared) *RST

■*RST

Description

Initializes the setting

Setting parameter

None

2.3.13.4 Operation completion event bit setting *OPC

■*OPC

Description

Sets the OPC bit to 1 when all the previous commands are completed

Setting parameter

None

2.3.13.5 Setting output key to 1 at operation completion *OPC?

□*OPC?

Description

Sets the output buffer to 1 when all the previous commands are completed

Query parameter

None

2.3.13.6 Waiting for command/query execution *WAI

■*WAI

Description

Waits for completion of all the previous commands execution

Setting parameter

None

2.3.13.7 Self diagnosis result query *TST?

□*TST?

Description

Queries the self diagnosis result

Query parameter

None

Response format

<NR1> → 0

Remarks

①This instrument always responds with 0.

②External control cannot check the internal state. Use the panel operation to check the internal state.

2.3.13.8 External reference frequency input setting/query [:SOURce[1|2]]:ROSCillator:SOURce

■[:SOURce[1|2]]:ROSCillator:SOURce

□[:SOURce[1|2]]:ROSCillator:SOURce?

Description

Sets/queries the reference frequency source

Setting parameter

INTernal|EXTernal

INTernal → Internal clock
EXTernal → External reference frequency input

Query parameter

None

Response format

INT|EXT

Setting example

:SOURce:ROSCillator:SOURce INTernal

Sets the reference frequency source to internal clock

Remarks

† Specifying "[1|2]" does not affect the operation.

2.3.13.9 External reference frequency output setting/query [:SOURce[1|2]]:ROSCillator:OUTPut[:STATe]

■[:SOURce[1|2]]:ROSCillator:OUTPut[:STATe]

□[:SOURce[1|2]]:ROSCillator:OUTPut[:STATe]?

Description

Selects/queries the reference frequency output on/off

Setting parameter

<state> ::= <BOL>

<BOL> → 0/OFF: Output Off
1/ON: Output On

Query parameter

None

Response format

<NBOL>

<NBOL> → 0 : Output Off
1 : Output On

Setting example

:ROSCillator:OUTPut:STATe ON

Set the reference frequency output to on

Remarks

† Specifying "[1|2]" does not affect the operation.

2.4 Trigger/Oscillation Status Control

WF1947/WF1948 provides the commands to give a trigger from the external control (GET (Group Execute Trigger) and "*TRG") and the command to control an oscillation status (":TRIGger[1|2]:SELected:EXEcute").

These commands may be disabled depending on the oscillation mode as shown in Table 2.3. If a disabled command is received, it is ignored.

Table 2.3 Enable/disable of Trigger/Oscillation Status Control Commands for Each Oscillation Mode

Oscillation mode	GET/*TRG/ :TRIGger[1|2][:SEQuence][:IMMediate]	:TRIGger[1|2]:SELected:EXEcute
Continuous	Disable	Disable
Modulation	Disable	Enable
Sweep		
Continuous	Disable	Enable
Single	Enable	Enable
Gated single	Enable	Enable
Burst		
Auto burst	Disable	Disable
Trigger burst	Enable	Disable
Gate	Disable	Disable
Triggered gate	Enable	Disable

In above commands, channel cannot be specified for GET and "*TRG" since they assume CH1. However, when 2-channel equivalence setting is on, CH1 and CH2 are used for target (WF1948 only).

2.5 System Unit

The system unit is assumed to be a default unit in the setting/query of parameters such as the frequency and amplitude with the external control. Changing the system unit is not reflected on this device screen. If you omit the unit in the parameter setting, the system unit is assumed to be the unit when executing a command. When you query parameters, the response message is returned based on the system unit.
For example, when the system unit of amplitude is Vrms, this instrument sets the amplitude as shown below.

When the unit is specified as Vp-p:
:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude 1.0Vpp
→ Sets the amplitude to 1.0 Vp-p because this instrument interprets the command in the specified unit.

When the unit is omitted:
:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude 1.0
→ Sets the amplitude to 1.0 Vrms because this instrument interprets the command that the system unit is specified as the unit.

The following commands are used to set the system unit:

Setting of system unit for frequency:
[:SOURce[1|2]]:FREQuency:UNIT

Setting of system unit for amplitude:
[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:AMPLitude:UNIT

Setting of system units for DC offset, high level, and low level:
[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:UNIT
[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH:UNIT
[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW:UNIT

† One system unit is shared with DC offset, high level, and low level. The above three commands have the same function.

Setting of system unit for phase:
[:SOURce[1|2]]:PHASe:UNIT

Setting of system unit for duty of square wave/pulse:
[:SOURce[1|2]]:PULSe:DCYCle:UNIT

Setting of system unit for period:
[:SOURce[1|2]]:PULSe:PERiod:UNIT

3. Status System

WF1947/WF1948 provide the status reporting function defined in IEEE488.2.

3.1 Status Byte Register and Service Request Enable Register

The configuration of the service byte register and the service request enable register is shown in Figure 3.1.

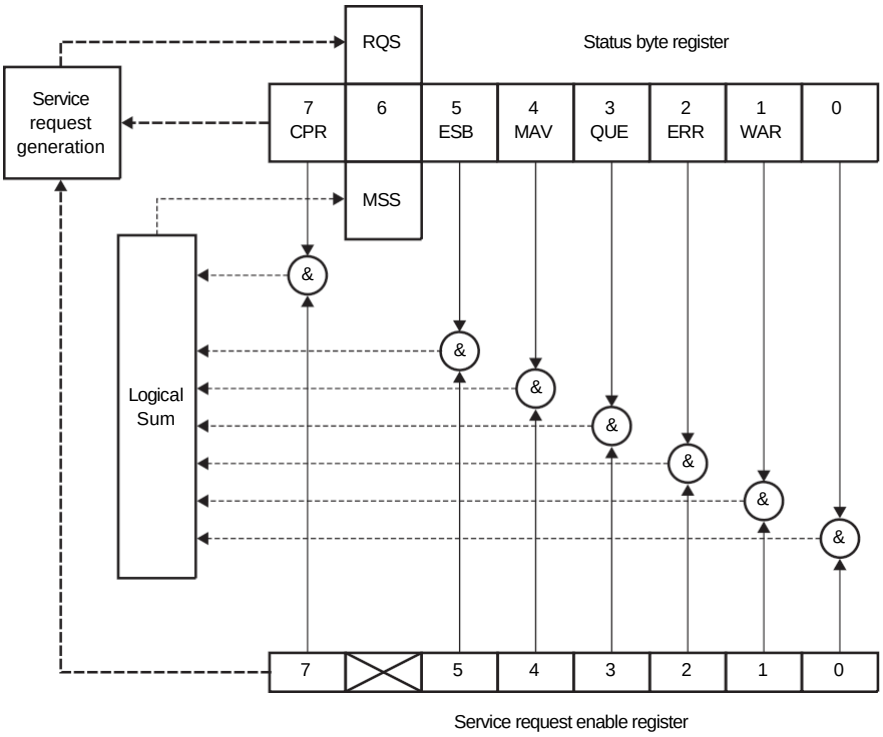


Figure 3.1 Status Byte Register and Service Request Enable Register

3.1.1 Status Byte Register

Each bit of the status byte register is described in Table 3.1.

Table 3.1 Status Byte Register

Bit	Weight	Symbol	Contents
0			(Unused)
1	2	WAR	Warning event register summary
2	4	ERR	Error queue summary
3	8	QUE	Questionable data status register summary
4	16	MAV	Message queue summary
5	32	ESB	Event summary bit
6	64	RQS/MSS	Request service/master summary status
7	128	OPR	Operation status register summary

The status byte register is cleared when a *CLS command is received.

3.1.2 Service Request Enable Register

The service request enable register is used to select the summary bit within the status byte register that generates service requests shown in Figure 3.1. The service request enable register is cleared when the power is turned on while the power on status clear flag (set in *PSC) is set to TRUE .

3.2 Standard Event Status Register Group

The standard event status register group is shown in Figure 3.2.

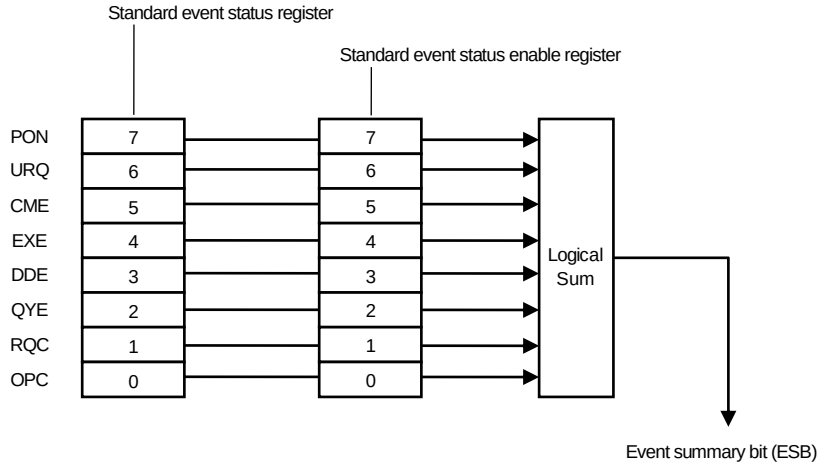


Figure 3.2 Standard Event Status Register Group

3.2.1 Standard Event Status Register

Each bit of the standard event status register is shown in Table 3.2 .

Table 3.2 Standard Event Status Register

Bit	Weight	Symbol	Contents
0	1	OPC	Operation completion
1	2	RQC	Request control
2	4	QYE	Query error
3	8	DDE	Equipment-specific error
4	16	EXE	Execution error
5	32	CME	Command error
6	64	URQ	User request
7	128	PON	Power on

The standard event status register is cleared when the *ESR? query or *CLS command is received.

3.2.2 Standard Event Status Enable Register

The standard event status enable register is used to select the bit of the standard event status register as shown in Figure 3.2, and reflect the status of the selected bit to the ESB of the status byte register.

The standard event status enable register is cleared when the power is turned on while the power on status clear flag (set in *PSC) is set to TRUE.

3.3 Operation Status Register Group / Questionable Data Status Register Group

The configuration of the operation status register group and the questionable data status register group is shown in Figure 3.3.

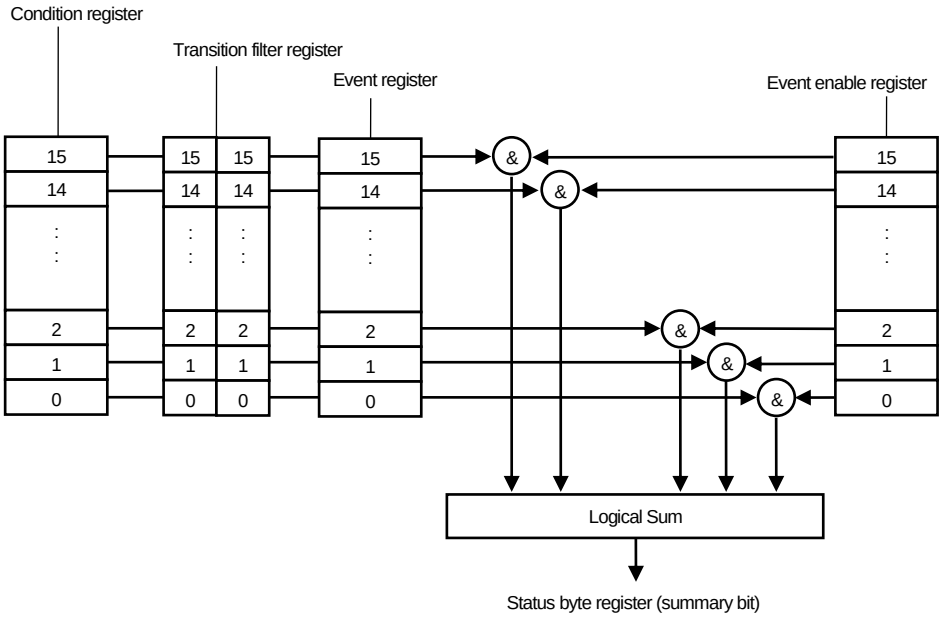


Figure 3.3 Operation Status Register Group/
Questionable Data Status Register Group

3.3.1 Overview of Registers

3.3.1.1 Condition register

The condition register shows the current status of WF1947/WF1948. This register is not cleared even when a query addressed to the condition register is received.

3.3.1.2 Transition filter register

The transition filter register is used to determine the event bit transition. The relationship between the transition filter setting and the event register transition is shown in Table 3.3.

Table 3.3 Transition Filter and Event Register Transition

Each bit setting of positive transition filter	Each bit setting of negative transition filter	Transition of condition register to make each bit of event register 1
1	0	$0 \rightarrow 1$
0	1	$1 \rightarrow 0$
1	1	$0 \rightarrow 1$ or $1 \rightarrow 0$
0	0	Each bit of event register bit is not made 1.

The transition filter register is cleared when :STATus:PRESet command is received or when the power on is turned on while the power on status clear flag (set in *PSC) is set to TRUE.

3.3.1.3 Event register

The event register is a register that reflects the changes of the condition register according to the setting of the transition filter register. The event register is cleared upon reception of a query addressed to the event register or the *CLS command.

3.3.1.4 Event enable register

The event enable register is used to select bits in the event register to be summarized.
The event enable register is used to select the bit of the event register as shown in Figure 3.3, and reflect the status of the selected bit to the summary bit of the status byte register.
The event enable register is cleared when :STATus:PRESet command is received or when the power on is turned on while the power on status clear flag (set in *PSC) is set to TRUE.

3.3.2 Operation Status Register Group

The operation status register group is shown in Figure 3.3. This register group has one register set for each channel and one register set to summarize their sets. Content of each operation status register is described in Table 3.4 and Table 3.5.

Table 3.4 Operation Status Register

Bit	Weight	Contents
0		(Non-use)
1		(Non-use)
2		(Non-use)
3		(Non-use)
4		(Non-use)
5		(Non-use)
6		(Non-use)
7		(Non-use)
8		(Non-use)
9	512	CH1 operation status register summary
10	1024	CH2 operation status register summary
11		(Non-use)
12		(Non-use)
13		(Reserved)
14		(Reserved)
15		Always 0

Table 3.5 CH1 (CH2) Operation Status Register

Bit	Weight	Contents
0		(Unused)
1		(Unused)
2		(Unused)
3		(Unused)
4		(Unused)
5		(Unused)
6		(Unused)
7	128	Modulation/sweep/burst: STOP Shows the status such as the Stop and Conflict status in which the primary oscillation mode is not made. Even if the status is Run, this bit is set to 1 during the trigger delay period in the trigger burst or during the oscillation period of the half wave and full-wave after the triggered gate is closed.
8	256	Continuous oscillation/modulation/sweep/burst: RUN Shows the Run status and Hold status.
9	512	Sweep: HOLD Shows the Hold status.
10	1024	Sweep/burst: TRIGGER WAIT Shows the TrigWait status.
11	2048	Modulation/sweep/burst: CONFLICT Shows the Conflict status.
12		(Unused)
13		(Unused)
14		(Unused)
15		Always 0

The relationship between each bit in Table 3.5 and the output waveform is shown below.

3.3.2.1 Continuous oscillation

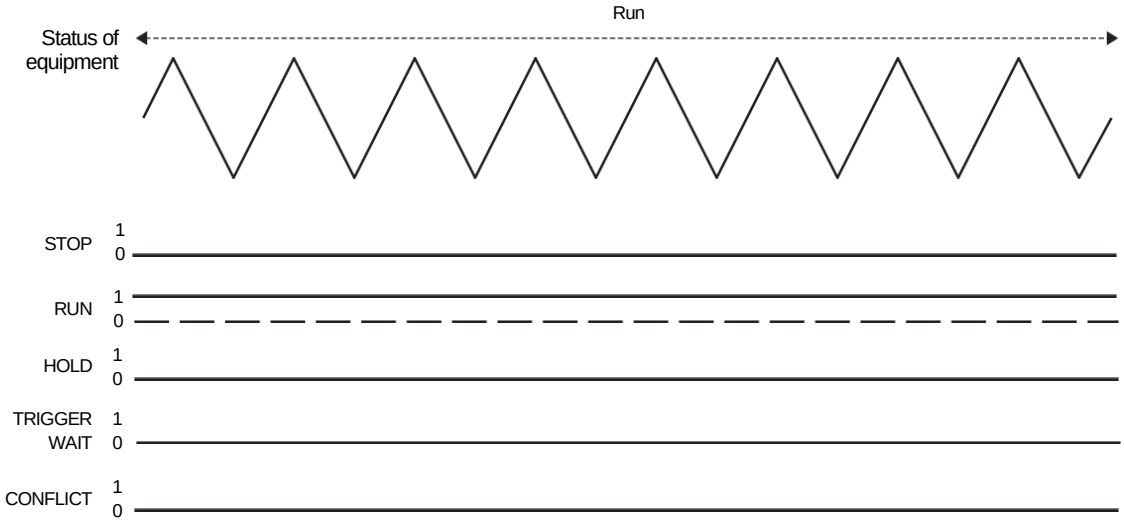


Figure 3.4 Relationship between Output and Operation Status Register (Bit 7 to 11) at Continuous Oscillation

3.3.2.2 Modulation

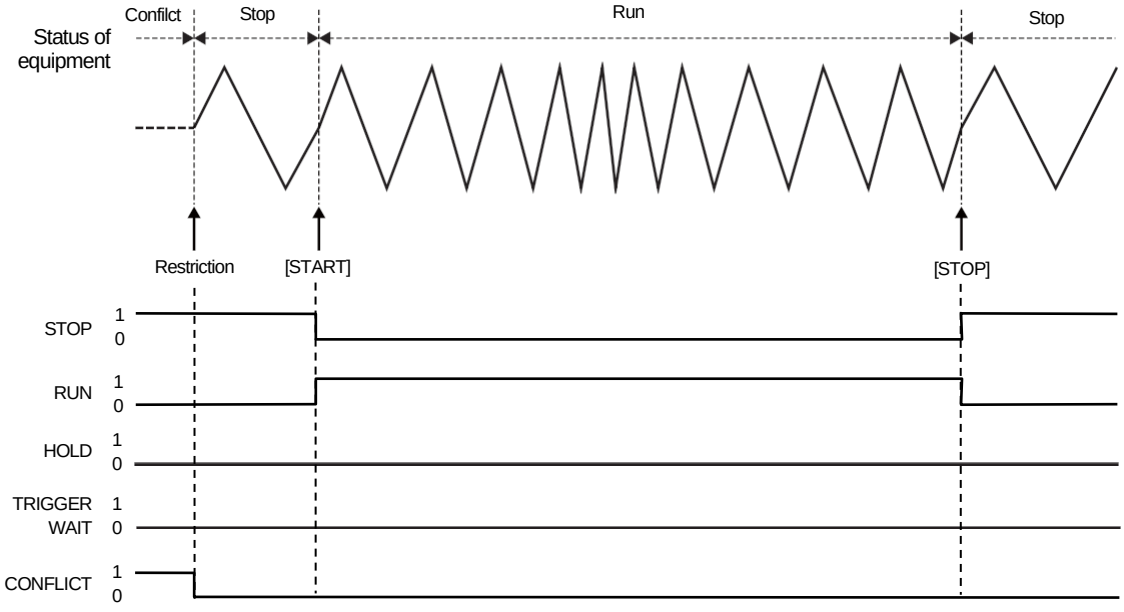


Figure 3.5 Relationship between Output and Operation Status Register (Bit 7 to 11) at Modulation

3.3.2.3 Sweep

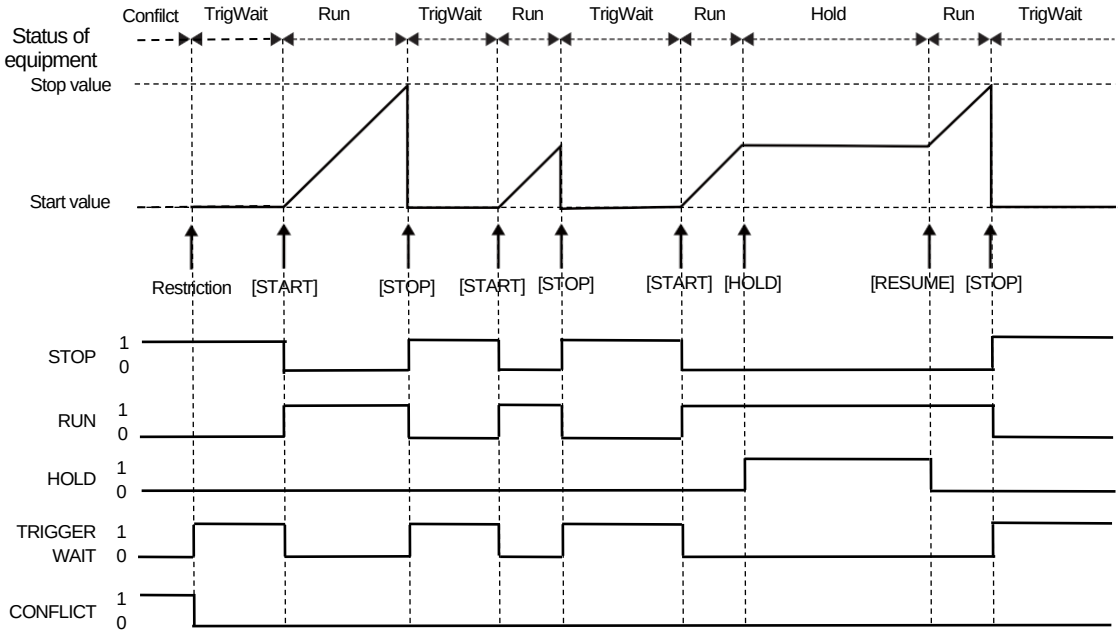


Figure 3.6 Relationship between Output and
Operation Status Register (Bit 7 to 11) at Single-Shot Sweep or Gated Single-Shot Sweep

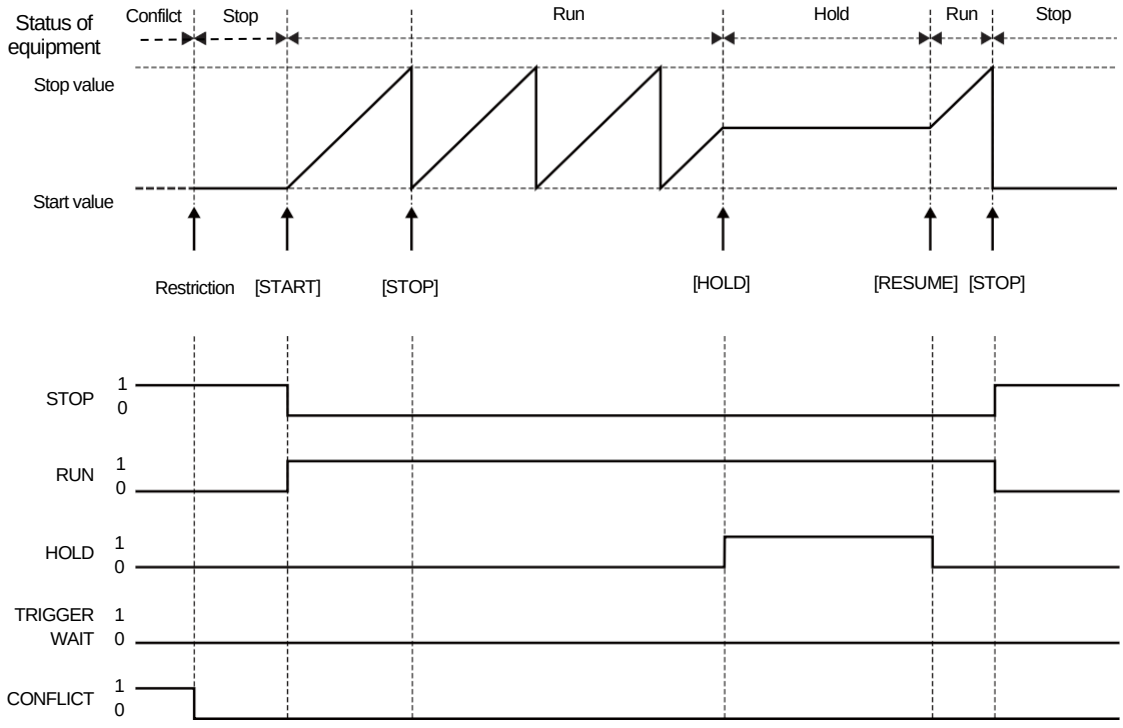


Figure 3.7 Relationship between Output and Operation Status Register (Bit 7 to 11) at Continuous Sweep

3.3.2.4 Burst

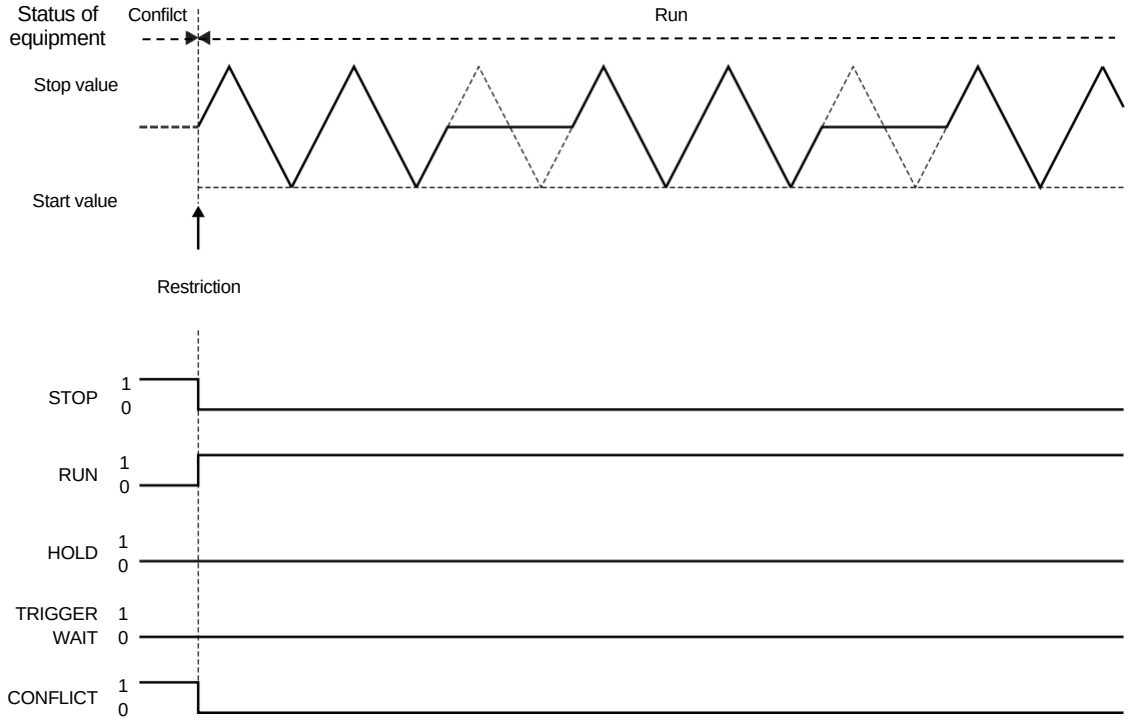


Figure 3.8 Relationship between Output and Operation Status Register (Bit 7 to 11) at Auto Burst

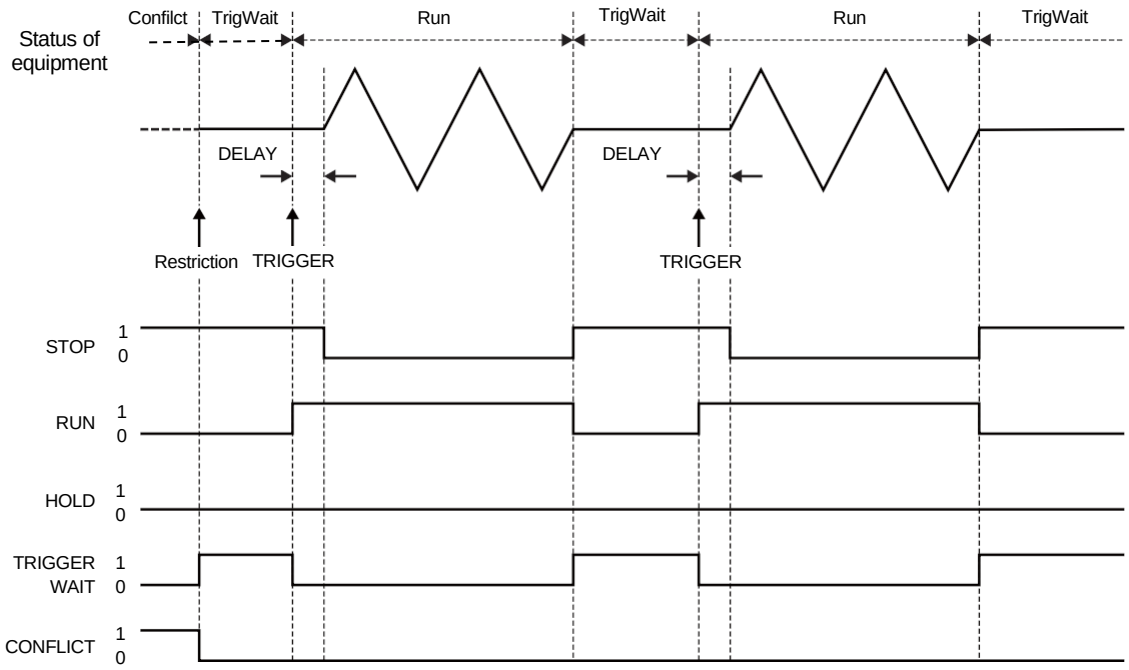


Figure 3.9 Relationship between Output and Operation Status Register (Bit 7 to 11) at Trigger Burst

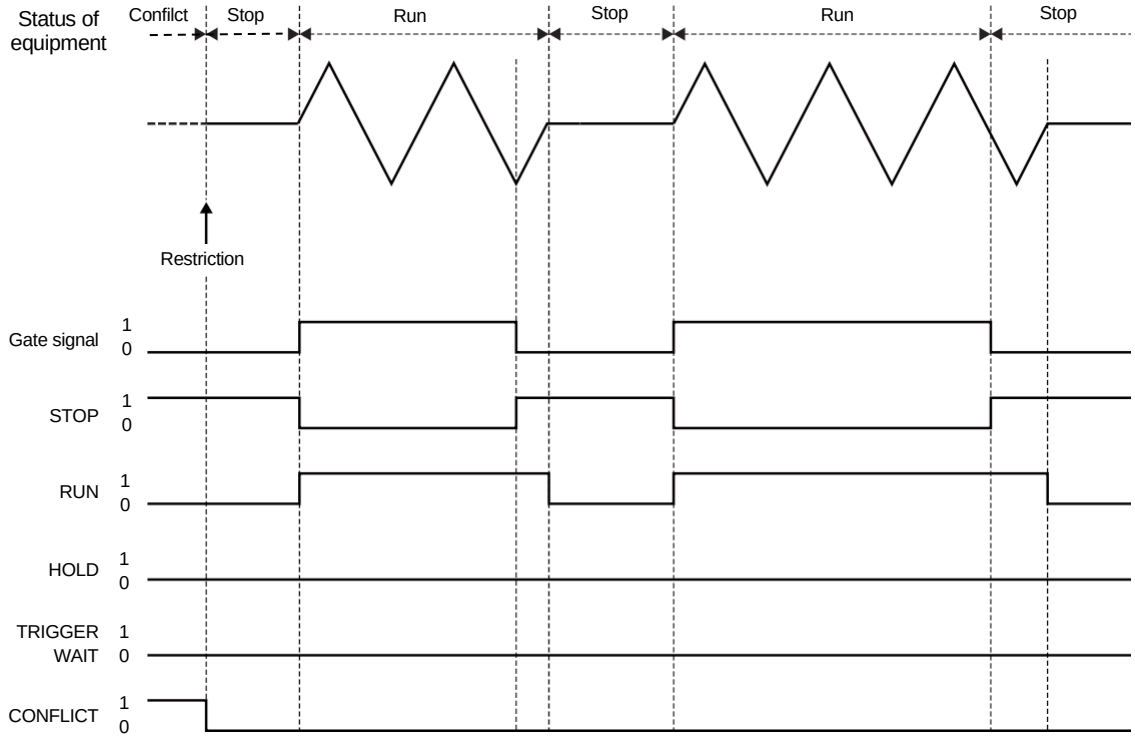


Figure 3.10 Relationship between Output and Operation Status Register (Bit 7 to 11) at Gate

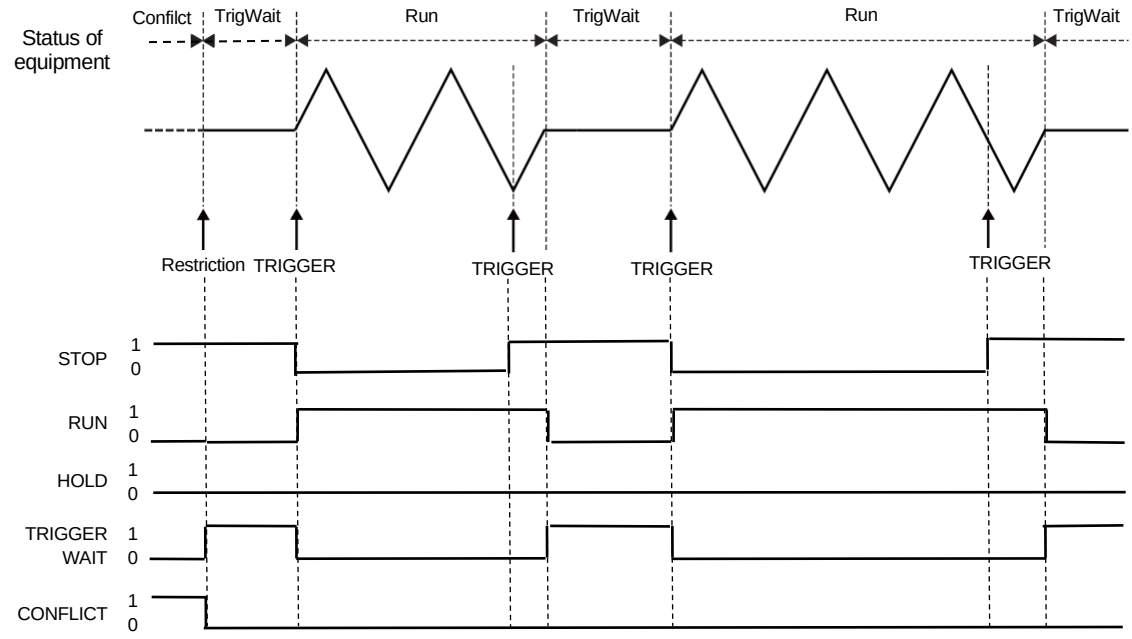


Figure 3.11 Relationship between Output and Operation Status Register (Bit 7 to 11) at Triggered Gate

3.3.3 Questionable Data Status Register Group

The contents of the questionable data status register is shown in Table 3.6.

Table 3.6 Questionable Data Status Register

Bit	Weight	Contents
0	1	Overload (CH1)
1		(Unused)
2		(Unused)
3		(Unused)
4	16	Overheat detection
5		(Unused)
6	64	No external reference clock
7		(Unused)
8	256	Shows that the calibration is not completed.
9		(Unused)
10	1024	Overload (CH2)
11		(Unused)
12		(Unused)
13		(Unused)
14		(Unused)
15		Always 0

3.4 Warning Event Register Group

The warning event register group is shown in Table 3.7. This register group configures three register sets: one register set for each channel and one register set to summarize their sets.

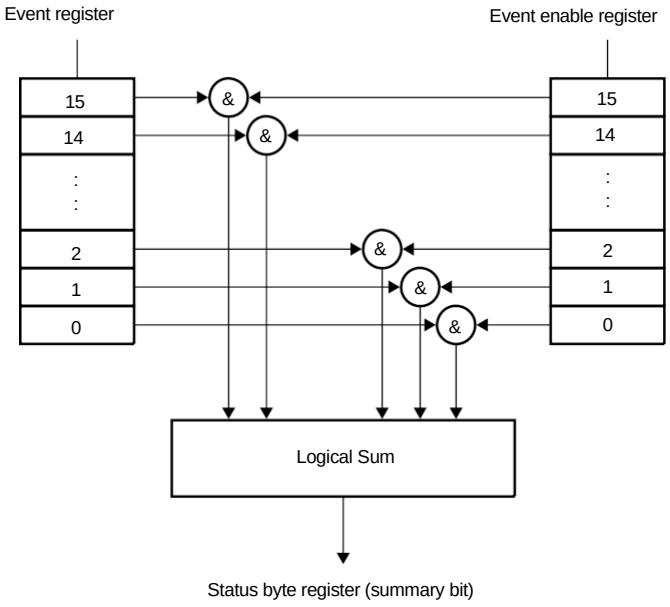


Figure 3.12 Warning Event Status Register Group Model

3.4.1 Event register

Each bit of the warning event register and the CH1 (CH2) warning event register is shown in Table 3.7 and Table 3.8.

The meaning of terms in Table 3.8 is as follows:

Channel mode parameters:

Means the frequency difference and frequency ratio. Waveform parameters:

Means the duty variable range, waveform polarity, amplitude range, ramp wave symmetry, and parameter variable waveform-specific parameter.

Basic parameters:

Means the frequency, period (cycle), phase, amplitude, DC offset, high level, low level, duty, pulse width, and rising/falling time.

Other parameters: Means the channel mode, channel mode parameter, waveform, waveform parameter, basic parameter, and parameters other than system unit.

The warning event register shows the status change of the equipment due to the external control and does not show the status change of the equipment due to the panel operation.

Table 3.7 Warning Event Register

Bit	Weight	Contents
0		(Unused)
1		(Unused)
2		(Unused)
3		(Unused)
4		(Unused)
5		(Unused)
6		(Unused)
7		(Unused)
8		(Unused)
9	512	CH1 warning event register summary
10	1024	CH2 warning event register summary
11		(Unused)
12		(Unused)
13		(Unused)
14		(Unused)
15		Always 0

Table 3.8 CH1 (CH2) Warning Event Register

Bit	Weight	Contents
0	1	The waveform or waveform parameter is changed due to the change of channel mode or channel mode parameter.
1	2	The basic parameter is changed due to the change of channel mode or channel mode parameter.
2	4	The oscillation mode is changed due to the change of channel mode or channel mode parameter.
3	8	Other parameters are changed due to the change of channel mode or channel mode parameter.
4	16	The channel mode or channel mode parameter is changed due to the change of waveform or waveform parameter.
5	32	The basic parameter is changed due to the change of waveform or waveform
6	64	The oscillation mode is changed due to the change of waveform or waveform
7	128	Other parameters are changed due to the change of waveform or waveform parameter.
8	256	Other basic parameters are changed due to the change of basic parameters (frequency, period (cycle), phase, amplitude, DC offset, high level, and low level).
9	512	Other basic parameters are changed due to the change of basic parameters (duty and pulse width).
10	1024	Other basic parameters are changed due to the change of basic parameters (rising time and falling time).
11	2048	Other parameters are changed due to the change of basic parameters.
12	4096	System unit is changed.
13		(Unused)
14	16384	Other parameters are changed.
15		Always 0

The event register is cleared upon reception of a query addressed to the event register or the *CLS command.

3.4.2 Event enable register

The event enable register is used to select bits in the event register to be summarized.
The event enable register is cleared when :STATus:PRESet command is received or when the power on is turned on while the power on status clear flag (set in *PSC) is set to TRUE.

3.5 Others

WF1947/WF1948 provide the error queue and error message queue.

4. Error Message

If an error occurs when the external control is performed, the error number is stored in the error queue. The error numbers and their corresponding messages and error contents are shown in Table 4.1. You can query the error number and message using “:SYSTem:ERRor?”.

Table 4.1 Error Numbers, Messages, and their Contents

Error number	Message	Contents (numbers in parentheses are error codes displayed in the screen)
-102	Syntax error	The received string contains an incorrect syntax.
-108	Parameter not allowed	There are too many parameters.
-109	Missing parameter	One or more parameters are missing.
-110	Command header error	There is an error in the header.
-111	Header separator error	There is an error in the keyword separator of the header.
-113	Undefined header	The received string contains an invalid header.
-120	Numeric data error	There is an error in the numerical parameter.
-130	Suffix error	There is an error in the suffix of the numerical parameter.
-140	Character data error	There is an error in the discrete parameter.
-150	String data error	There is an error in the string parameter.
-160	Block data error	There is an error in the block parameter.
-200	Execution error	The command cannot be executed. The relevant error occurs in the following cases: • When "*CLS" cannot be executed due to the status of equipment • When "*RST" cannot be executed due to the status of equipment • When other commands cannot be executed
-211	Trigger ignored	GET (Group Execute Trigger), "*TRG", and other commands relating to the trigger are ignored. The relevant error occurs in the following cases: • When the control command is ignored due to the status of equipment
-220	Parameter error	There is an error in the parameter. The relevant error occurs in the following cases: • When there is an error in the prefix/unit of the numerical parameter • When the specified unit cannot be used due to the status of equipment • When the name of arbitrary waveform exceeds 20 characters • When the name of arbitrary waveform contains the double quotation (") • When the number of data points for the arbitrary waveform is incorrect When the number of used waveforms exceeds 128 or total amount exceeds 512 KW

Error number	Message	Contents (numbers in parentheses are error codes displayed in the screen)
-221	Settings conflict	The correct syntax parameter is received but the command cannot be executed due to the status of equipment. The relevant error occurs in the following cases: •When the sweep function cannot be set in the log because the equipment is not a frequency sweep •When arbitrary waveform data in the array format is set in the arbitrary waveform edit memory •When the specification of array/control point format of the arbitrary waveform data is incorrect • When the specified channel setting cannot be set in 2-channel equivalence setting due to another channel's restriction (22039) •When the external modulation/addition input connector cannot be used for the external modulation because it is used for the external addition (23129) •When the external modulation/addition input connector cannot be used for the external addition because it is used for the external modulation (23130)
-222	Data out of range	The correct syntax parameter is received but the command cannot be executed due to the value out of range. The relevant error occurs in the following cases: • When a value out of range is set for each register of the status system • When 0 is set for the frequency ratio, N/M • When a value out of range is set for the user-defined unit, m/n • When the standard waveform of CH2 in the 1-channel machine is copied to the memory • When a value out of the setting range is set (23045)
-225	Out of memory	Memory required for execution is insufficient. The relevant error occurs in the following cases: • When arbitrary waveform data cannot be saved due to insufficient memory
-290	Memory use error	Command cannot be executed because an error occurs relating to memory. The relevant error occurs in the following cases: • When empty memory is specified for the arbitrary waveform number • When the currently output or used arbitrary wave is deleted (32004)
-291	Out of memory	Specified memory does not exist. The relevant error occurs in the following cases: • When a value other than 0 to 128 is specified for the arbitrary wave number
-310	System error	This is a failure of this instrument. The relevant error occurs in the following cases: • When the internal error occurs (24135, 24136, 35005)
-350	Queue overflow	An error occurs but the error is discarded because the error cannot be entered in the error queue.
-410	Query INTERRUPTED	A new response message entered the message queue, and thus the previous response message was deleted.
-420	Query UNTERMINATED	The talker was specified, but the message queue has no response message.
-440	Query UNTERMINATED after indefinite response	Query exists after "*IDN?" in the received string ("*IDN?" must be the last query in the received string).

5. Specifications

5.1 Interface Functions

Table 5.1 Interface Functions of USB

Function	Subset	Description
Source handshake	SH1	All send handshake functions provided
Acceptor handshake	AH1	All receive handshake functions provided
Talker	T6	Basic talker functions and talker release by the MLA
Listener	L2	Basic listener functions provided
Service request	SR1	All service request functions provided
Remote/Local	RL1	All remote/local functions provided
Parallel poll	PP0	Parallel poll function not provided
Clear the device	DC1	All device clear functions provided
Device trigger	DT1	Device trigger function provided
Controller	C0	Controller function not provided

Table 5.2 Interface Functions of GPIB

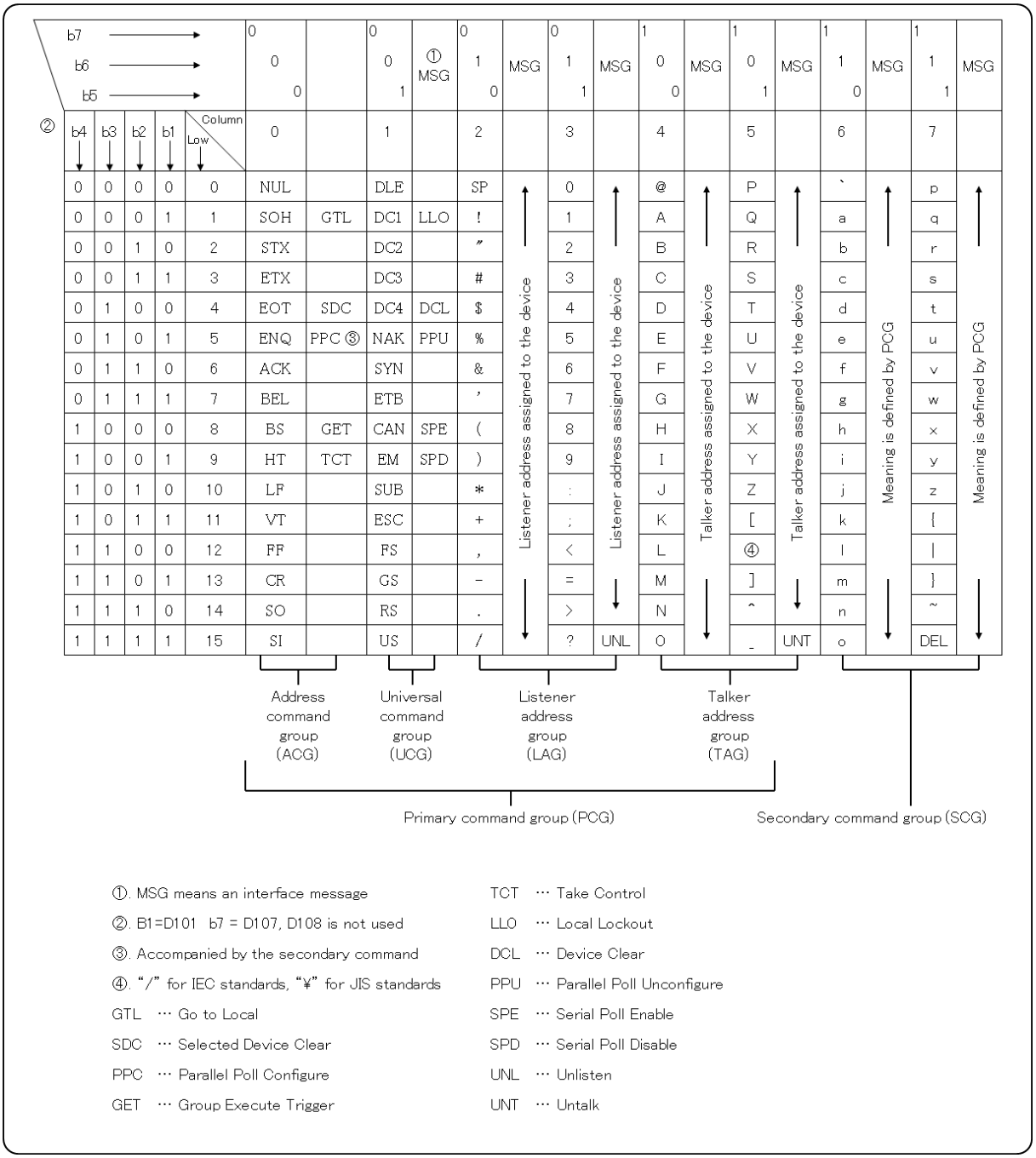
Function	Subset	Description
Source handshake	SH1	All send handshake functions provided
Acceptor handshake	AH1	All receive handshake functions provided
Talker	T6	Basic talker functions and talker release by the MLA
Listener	L4	Basic listener functions and listener release by the MTA
Service request	SR1	All service request functions provided
Remote/Local	RL1	All remote/local functions provided
Parallel poll	PP0	Parallel poll function not provided
Clear the device	DC1	All device clear functions provided
Device trigger	DT1	All device trigger functions provided
Controller	C0	Controller function not provided

5.2 Response to Interface Message

Table 5.3 Response to Interface Message

IFC	•Initialize the interface. •Release the specified listener or talker.
DCL and SDC	•Clear the I/O buffer. •Clear the error. •Release the SRQ send and reset the error factor bits in the status byte. •Disable the SRQ send.
LLO	•Disable the LOCAL key (software key) operation of the panel.
GTL	•Turn to the Local state.

5.3 Multi-Line Interface Message



b7	b6	b5	b4	b3	b2	b1	Column / Low	0 0 0		0 0 1	① MSG	0 1 0	MSG	0 1 1	MSG	1 0 0	MSG	1 0 1	MSG	1 1 0	MSG	1 1 1	MSG
②			b4	b3	b2	b1	Low	0		1		2		3		4		5		6		7	
			0	0	0	0	0	NUL		DLE		SP		0		@		P		`		p	
			0	0	0	1	1	SOH	GTL	DC1	LLO	!		1		A		Q		a		q	
			0	0	1	0	2	STX		DC2		"		2		B		R		b		r	
			0	0	1	1	3	ETX		DC3		#		3		C		S		c		s	
			0	1	0	0	4	EOT	SDC	DC4	DCL	$		4		D		T		d		t	
			0	1	0	1	5	ENQ	PPC ③	NAK	PPU	%		5		E		U		e		u	
			0	1	1	0	6	ACK		SYN		&		6		F		V		f		v	
			0	1	1	1	7	BEL		ETB		'		7		G		W		g		w	
			1	0	0	0	8	BS	GET	CAN	SPE	(		8		H		X		h		x	
			1	0	0	1	9	HT	TCT	EM	SPD	)		9		I		Y		i		y	
			1	0	1	0	10	LF		SUB		*		:		J		Z		j		z	
			1	0	1	1	11	VT		ESC		+		;		K		[		k		{	
			1	1	0	0	12	FF		FS		,		<		L		④		l		|	
			1	1	0	1	13	CR		GS		-		=		M		]		m		}	
			1	1	1	0	14	SO		RS		.		>		N		^		n		~	
			1	1	1	1	15	SI		US		/		?	UNL	O		_	UNT	o		DEL	

Listener address assigned to the device

Listener address assigned to the device

Talker address assigned to the device

Talker address assigned to the device

Meaning is defined by PCG

Meaning is defined by PCG

Address command group (ACG)

Universal command group (UCG)

Listener address group (LAG)

Talker address group (TAG)

Primary command group (PCG)

Secondary command group (SCG)

① MSG means an interface message

② B1=D101 b7 = D107, D108 is not used

③ Accompanied by the secondary command

④ "/" for IEC standards, "¥" for JIS standards

GTL … Go to Local

SDC … Selected Device Clear

PPC … Parallel Poll Configure

GET … Group Execute Trigger

TCT … Take Control

LLO … Local Lockout

DCL … Device Clear

PPU … Parallel Poll Unconfigure

SPE … Serial Poll Enable

SPD … Serial Poll Disable

UNL … Unlisten

UNT … Untalk

6. Compatibility of External Control

6.1 Overview

This chapter describes the compatibility of WF series in the external control of WF1947/WF1948.

■Older product WF194x† [1]series (hereinafter abbreviated as "older WF194x series.)

Supports the command system in type 1 format of WF1947/WF1948. (excluding a part)
For details of partial restrictions, see "6.1.1 External Control Interface (Compatibility with older WF194x series)."

† 1) TARGET MODELS OF OLDER WF194X SERIES ARE AS FOLLOWS:

WF1943 / WF1944 / WF1945 / WF1946
WF1943A / WF1944A / WF1945A / WF1946A
WF1943B / WF1944B / WF1945B / WF1946B

■WF1973/WF1974

It is compatible with the external control interface and commands of WF1973/WF1974.
According to the number of output channels provided, as for 1-channel machine, WF1973 can be controlled as WF1947 and as for 2-channel machine, WF1974 can be controlled as WF1948.

The model name in the returned string by the device information query (*IDN?) is changed.
It can be used as WF1947 or WF1948.

The corresponding commands are not supported because the following functions are not provided with WF1947/WF1948:

[Unsupported commands]
- •Sequence function related commands
- •Commands relating to PWF parametrically-variable waveform setting
- •Multi-I/O related commands

For detailed functions of equipment, see the separate manual "WF1947/WF1948 Instruction Manual (Operations)."

6.1.1 External Control Interface (Compatibility with older WF194x series)

[GPIB]

In the GPIB setting on the side of controller such as PC, be sure to perform the output setting of EOI for the command send. If output setting of EOI is not performed, no command is executed. Other connection specification is not changed.

[USB]

As for the USB connection specification with the external control equipment, older WF194x series used the USB488 connection specification but the WF1947/WF1948 changes to the USB-TMC specification.

USB driver software in the PC used for the external control must be changed.

About USB ID of USB-TMC

The USB ID is represented in the following format:

USB0::[Vendor number]::[Product number]::[Serial number]::INSTR

Vendor number:	Fixed to 3402 (0x0D4A)
Product number:	13 (0x000D)/WF1947, 14 (0x000E)/WF1948
Serial number:	A unique number (serial number) has been set for each product.

For how to install the driver software of the USB-TMC specification, see "1. Preparations before Use."

[Difference of USB programming]

The following table shows the comparison for the primary programming APIs:
USB-TMC can use the VISA programming interface.

VISA APIs equivalent to APIs used for USB488 are provided.

USB488	**USB-TMC VISA programming**
UsbOpenDevice( )	viOpen( )
UsbDevClear( )	viClear( )
UsbEnableRemote( )	viGpibControlREN( )
UsbSendTextData( )	viWrite( )
UsbRecieveTextData( )	viRead( )
UsbCloseDevice( )	viClose( )

From the USB488, the specification method of the recognition ID for the individual device is changed.

From the specification of address number, the following VISA resource name format is used:

[Example of older WF194x series]
2

[Example of WF1947: VISA resource name format]
USB0:: 0x0D4A:: 0x000D::[Serial number]::INSTR

6.1.2 General Differences in Commands (Compatibility with older WF194x series)

It is not recommended to mix the commands of older WF194x series with the commands of WF1947/WF1948 because each concept of channel setting differs. Additional information on the command to be replaced is described in the detailed description for each command.

WF1947/WF1948 do not support the commands in the type 2 format of older WF194x series. Replace with the WF1947/WF1948 commands that support the older WF194x series commands.

[Difference of channel synchronization]

Older WF194x series can perform the 2-channel synchronization in the trigger operation, but the WF1947/WF1948 perform the pseudo channel synchronization.

[Status System]

Contents of each operation event status register differs.
Contents of each overload event status register differs.
Contents of each warning event status register differs.

If the program is written in the system to reference the status bit in the register, change to reference the corresponding bit assigned to each register.

For details, see "3. Status System."

[Parameter specification]

When you specify the command parameters, be sure to insert the space (code: 32) between the command and the parameter.

6.1.3 Commands Subject to Restrictions (Compatibility with older WF194x series)

Some commands are restricted when using older WF194x series command.
The restrictions are described below. The command notation is shown in the type 1 command.
For details of each command, see "6.3 Descriptions of Individual Commands."

[Commands recognized as WF1947/WF1948 commands]
When you replace the commands in the type 2 format of older WF194x series with the commands of WF1947/WF1948, if the behavior differs, replace them with the compatible commands in type 1 format of older WF194x series. For support status, see the compatibility support items in "6.2 Older WF194x Series Commands Support List."

[Commands partially restricted to their operations]

(ACP) As the copy of standard waveform, rising sawtooth wave, and falling sawtooth wave, the triangle wave with the symmetry value set at that time is copied.

(ARB/ARW)

Arbitrary waveform transfer supports only the ASCII mode.

When you transfer data with 1024 or more bytes, ARB/ARW must be prepended to the head.

(ORG) Only the automatic range is supported as the output range setting.

(MRK) Setting of mark wave number Only the setting of auto burst and trigger burst is supported.

(TRE) Only the sweep and burst mode are supported in the status of external trigger input connector for remote.

(TRG) The gate oscillation mode is not supported.

(RST) Output is made off at the command execution.

(BRO/MDO/SWO)

If the setting is common to both channels, setting the command to change the frequency and amplitude changes to the setting common to both channels.

(SFC) The sweep function square wave and sine wave sweep are set/queried using the different implementation method.

[Commands whose parameter specification method must be changed]

(DDV) Half deviation of pulse width modulation must be set.

(ODV) Half deviation of DC offset must be set.

(PDV) The phase deviation setting must be set up to 180.000 deg.

(STO) Memory number must be set/queried within 1 to 10.

(RCL) Memory number must be set/queried within 1 to 10.

(MCO) Memory number must be set/queried within 1 to 10.

(MDL) Memory number must be set/queried within 1 to 10.

[Commands whose response data at query must be changed]

(?ALT) The fixed string <Edit Memory> is returned as the name corresponding to the arbitrary waveform memory number 0.

(?ERR) Returns the corresponding error message of WF1947/WF1948.

(?MCO) The set memory comments are not recorded.

(?IDT) ID read　Returns the WF1947/WF1948 ID.

[Commands that must be replaced with WF1947/WF1948 commands]

(?VSC/VSE/?VC1/?VC2/VE1/VE2) Setting/query of the overload status register.

(SYT) Setting/query of the modulated oscillation mode FSK, PSK, and AMSC in the SYNCOUT output selection.

[Commands not functioned]

(WAI)　WAI target command does not exist.

(OPC)　OPC target command does not exist.

(HLE)　Not functioned because the sweep pose input connector does not exist.

6.2 Older WF194x Series Commands Support List

The following table is the commands list of previous WF194x series.

Each item of the commands list shows the followings:

[function] Command function

[Type 1] Setting/query command of previous WF194x series type 1 1

[Type 2] Setting/inquiry command of previous WF194x series type 2

Attach ? to the end of query/command.

lower-case characters can be omitted.

[Compatibility support]

◎ : Compatibility is supported.

○ : Commands in type 2 format are handled as WF1947/WF1948 commands.
The action may be different from previous F194x series, or
the commands may not be accepted.
If the action differs, replace it with the type 1 command.

● : There are restrictions on some actions.

□ : The method to specify the parameter is changed.

■ : Response data at query must be changed.

△ : It is necessary to replace with the command of WF1947/WF1948.

▲ : Does not work, though no command error occurs.

Function	Type 1	Type 2 (For reference)	Compatibility support
Output On/Off selection	SIG/?SIG	:OUTPut:STATe	○
Channel mode selection †1	CMO/?CMO	:CHANnel:MODE	○
Channel selection †1	CHA/?CHA	:CHANnel	◎
Simultaneous setting †1	CPL/?CPL	:INSTrument:COUPle	◎
Oscillation mode selection	OMO/?OMO	:SOURce:MODE	◎
ENTRY			
Frequency	FRQ/?FRQ	:FREQuency	○
Measurement unit selection	FRU/?FRU	:FREQuency:UNIT	○
User-defined unit	UFU/?UFU	:FREQuency:USER	○
Amplitude	AMV/?AMV	:VOLTage	○
Measurement unit selection	AMU/?AMU	:VOLTage:UNIT	○
User-defined unit	UAU/?UAU	:VOLTage:USER	○
DC Offset	OFS/?OFS	:VOLTage:OFFSet	○
Unit selection †3	OFU/?OFU	:VOLTage:OFFSet:UNIT	○
User-defined unit	UOU/?UOU	:VOLTage:OFFSet:USER	○
Phase	PHS/?PHS	:PHASe	○
Measurement unit selection	PHU/?PHU	:PHASe:UNIT	○
User-defined unit	UHU/?UHU	:PHASe:USER	○
Duty	DTY/?DTY	:PULSe:DCYCle	○
Measurement unit selection	DTU/?DTU	:PULSe:DCYCLe:UNIT	○
User-defined unit	UDU/?UDU	:PULSe:DCYCLe:USER	○
Pulse width	PUW/?PUW	:PULSe:WIDTh	○
Unit selection †2	PWU/?PWU	:PULSe:WIDTh:UNIT	◎
Period	PRD/?PRD	:PULSe:PERiod	○
Unit selection †2	PRU/?PRU	:PULSe:PERiod:UNIT	○
User-defined unit	UPU/?UPU	:PULSe:PERiod:USER	○
High level	HIV/?HIV	:VOLTage:HIGH	○
Unit selection †3	HVU/?HVU	:VOLTage:HIGH:UNIT	○
Low level	LOV/?LOV	:VOLTage:LOW	○
Unit selection †3	LVU/?LVU	:VOLTage:LOW:UNIT	○

† 1: WF1948 only

† 2: The unit selections for pulse width and cycle are set as the same value.

† 3: The unit selections for DC offset, high level and low level are set as the same value.

Function	Type 1	Type 2 (For reference)	Compatibility support
Frequency difference at 2TONE †1	FDI/?FDI	:CHANnel:DELTa	○
Frequency ratio at RATIO †1	FRA/?FRA	:CHANnel:RATio	○
Waveform Selection	FNC/?FNC	:FUNCtion:SHAPe	○
Burst menu			
Burst type selection	BTY/?BTY	:BM:TYPE	◎
Trigger/gate source selection	TRS/?TRS	:BM:SOURce	◎
Internal trigger cycle	BIR/?BIR	:BM:INTernal:RATE	◎
Polarity of trigger signal selection	BES/?BES	:BM:SLOPe	◎
CH 2 external trigger selection †1	BEC/?BEC	:BM:EXTernal:CHANnel	◎
Trigger delay	TRD/?TRD	:BM:DELay	◎
Mark wave number	MRK/?MRK	:BM:MARK	◎
Space wave number	SPC/?SPC	:BM:SPACe	◎
Stop level	BSV/?BSV	:BM:SLEVel	◎
selection	BSS/?BSS	:BM:SLEVel:STATe	◎
Trigger operation Chanel-independent/common selection	BRO/?BRO	:BM:OCOMmon	●
Output selection of SYNC OUT	SYT/?SYT	:OUTPut:SYNC:TYPE	●
Sweep menu			
Sweep type selection	STY/?STY	:SWEep:TYPE	◎
Sweep trigger source selection (Single /gated sweep)	SGS/?SGS	:SWEep:SOURce	◎
Internal trigger cycle (Single /gated sweep)	SIR/?SIR	:SWEep:INTernal:RATE	◎
Polarity of trigger signal selection (Single /gated sweep)	SES/?SES	:SWEep:SLOPe	◎
CH2 external trigger selection (Single /gated sweep) †1	SEC/?SEC	:SWEep:EXTernal:CHANnel	◎
Selects sweep mode	SMO/?SMO	:SWEep:MODE	○
Select Sweep function	SSC/?SSC	:SWEep:SPACing	○
	SFC/?SFC	:SWEep:INTernal:FUNCtion	●
Sweep time	STM/?STM	:SWEep:TIME	○
Stop level (gated sweep)	SLV/?SLV	:SWEep:SLEVel	○
Selection (gated sweep)	SLS/?SLS	:SWEep:SLEVel:STATe	○
Start value of frequency sweep	STF/?STF	:FREQuency:STARt	○
Stop value	SPF/?SPF	:FREQuency:STOP	○

† 1: WF1948 only

Function	Type 1	Type 2 (For reference)	Compatibility support
Center value	CTF/?CTF	:FREQuency:CENTer	○
Span value	SNF/?SNF	:FREQuency:SPAN	○
marker value	MKF/?MKF	:FREQuency:MARKer	◎
Start status/stop status	FSS/-	:FREQuency:STATe	○
Start value of oscillation sweep	STA/?STA	:VOLTage:STARt	○
Stop value	SPA/?SPA	:VOLTage:STOP	○
Center value	CTA/?CTA	:VOLTage:CENTer	○
Span value	SNA/?SNA	:VOLTage:SPAN	○
marker value	MKA/?MKA	:VOLTage:MARKer	◎
Start status/stop status	ASS/-	:VOLTage:STATe	○
Start value of DC offset sweep	STE/?STE	:VOLTage:OFFSet:STARt	○
Stop value	SPE/?SPE	:VOLTage:OFFSet:STOP	○
Center value	CTE/?CTE	:VOLTage:OFFSet:CENTer	○
Span value	SNE/?SNE	:VOLTage:OFFSet:SPAN	○
marker value	MKE/?MKE	:VOLTage:OFFSet:MARKer	◎
Start status/stop status	OSS/-	:VOLTage:OFFSet:STATe	○
Start value of phase sweep	STP/?STP	:PHASe:STARt	○
Stop value	SPP/?SPP	:PHASe:STOP	○
Center value	CTP/?CTP	:PHASe:CENTer	○
Span value	SNP/?SNP	:PHASe:SPAN	○
marker value	MKP/?MKP	:PHASe:MARKer	◎
Start status/stop status	PSS/-	:PHASe:STATe	○
Start value of duty sweep	STU/?STU	:PULSe:DCYCle:STARt	○
Stop value	SPU/?SPU	:PULSe:DCYCle:STOP	○
Center value	CTU/?CTU	:PULSe:DCYCle:CENTer	○
Span value	SNU/?SNU	:PULSe:DCYCle:SPAN	○
marker value	MKU/?MKU	:PULSe:DCYCle:MARKer	◎
Start status/stop status	USS/-	:PULSe:DCYCle:STATe	○
Selection common to triggers (Single/gated sweep) †1	SWO/?SWO	:SWEep:OCOMmon	●

† 1: WF1948 only

Function	Type 1	Type 2 (For reference)	Compatibility support
Wait until single/gated sweep operation completes	WAI/-	*WAI	▲
Modulation menu			
Modulation type selection	MTY/?MTY	:MODulation:TYPE	◎
Deviation of frequency modulation	FDV/?FDV	:FM:DEViation	○
modulation frequency	FFQ/?FFQ	:FM:INTernal:FREQuency	○
Modulation waveform selection	FFC/?FFC	:FM:INTernal:FUNCtion	○
Deviation of phase modulation	PDV/?PDV	:PM:DEViation	□
modulation frequency	PFQ/?PFQ	:PM:INTernal:FREQuency	○
Modulation waveform selection	PFC/?PFC	:PM:INTernal:FUNCtion	○
Modulation degree of amplitude modulation	ADV/?ADV	:AM:DEPTh	○
modulation frequency	AFQ/?AFQ	:AM:INTernal:FREQuency	○
Modulation waveform selection	AFC/?AFC	:AM:INTernal:FUNCtion	○
Deviation of DC offset modulation	ODV/?ODV	:OM:DEViation	□
modulation frequency	OFQ/?OFQ	:OM:INTernal:FREQuency	◎
Modulation waveform selection	OFC/?OFC	:OM:INTernal:FUNCtion	◎
Deviation of pulse width modulation	DDV/?DDV	:PWM:DEViation	□
modulation frequency	DFQ/?DFQ	:PWM:INTernal:FREQuency	○
Modulation waveform selection	DFC/?DFC	:PWM:INTernal:FUNCtion	○
Modulation operation Chanel-independent/common selection	MDO/?MDO	:MODulation:OCOMmon	●
Selection of start/stop, etc. (Burst, sweep, modulation)	TRG/?TRG	:TRIGger:SOURce	●
Arbitrary waveform menu			
Arbitrary waveform selection	AFN/?AFN	:FUNCtion:USER	○
Data writing	ARB/-	:DATA:DAC	●
Data writing	ARW/-	:DATA:DAC:WORD	●
Name query	-/?ALT	:DATA:CATalog	■
Specification of transfer starting address	STT/?STT	:DATA:DAC:ADDRess	◎
Selection of data transfer order	AFM/?AFM	:FORMat:BORDer	○
Copy operation	ACP/-	:DATA:COPY	●
clear	ACL/-	:DATA:CLEar	◎
All clear	AAC/-	:DATA:CLEar:ALL	◎

† 1: WF1948 only

Function	Type 1	Type 2 (For reference)	Compatibility support
Data size selection	APT/?APT	:DATA:ATTRibute:POINts	◎
query of arithmetic average of data	-/?AAP	:DATA:ATTRibute:MEAN	◎
query of arithmetic average of data	-/?AAV	:DATA:ATTRibute:AVERage	◎
query of p-p value of data	-/?APP	:DATA:ATTRibute:PTPeak	◎
System Menus			
Output range selection	ORG/?ORG	:OUTPut:RANGe	○
Setting initialization (Clear an event status register)	PST/-	:SYSTem:PRESet	◎
(An event status register is not cleared)	RST/-	*RST	●
LOAD	OLD/?OLD	:OUTPut:LOAD	○
Function On/Off selection	OLS/?OLS	:OUTPut:LOAD:STATe	◎
Copy the setting between the channels †1	CDC/-	:CHANnel:DATA:COPY	◎
External AM	AMM/?AMM	:EXTernal:AM:STATe	◎
External addition	EAS/?EAS	:EXTernal:ADD:STATe	◎
Executes the phase synchronization	SYN/-	:OUTPut:PSYNc	◎
Selection of output status at power-on	POS/?POS	:SYSTem:PON	◎
Duty variable timing	DTT/?DTT	[SOURce]:PULSe:TYPE	●
Memory menu			
Saving the setting	STO/-	*SAV	□
Recalling settings	RCL/-	*RCL	□
Clears the setting memory	MDL/-	:MEMory:STATe:DELete	□
Comment on setting memory	MCO/?MCO	:MEMory:STATe:COMMent	■
Status byte			
Clearing event status registers and related queues	CLS/-	*CLS	◎
Flag of clearing a status register at power-on	PSC/?PSC	*PSC	◎
Reading status bytes	-/?STS	*STB	◎
Service request enable register	MSK/?MSK	*SRE	◎

† 1: WF1948 only

Function	Type 1	Type 2 (For reference)	Compatibility support
Reading the standard event status register	-/?ESR	*ESR	◎
Enable register	ESE/?ESE	*ESE	◎
Query of operation event status register	-/?OSC	:STATus:OPERation:CONDition	◎
Enable register	OSE/?OSE	:STATus:OPERation:ENABle	◎
Query of CH 1 operation event status register	-/?OC1	:STATus:OPERation:CH1:CONDition	◎
Enable register	OE1/?OE1	:STATus:OPERation:CH1:ENABle	◎
Query of CH 2 operation event status register †1	-/?OC2	:STATus:OPERation:CH2:CONDition	◎
Enable register †1	OE2/?OE2	:STATus:OPERation:CH2:ENABle	◎
Query of over load event status register	-/?VSC	:STATus:OVERload:CONDition	◎
Enable register	VSE/?VSE	:STATus:OVERload:ENABle	△
Query of CH 1 over load event status register	-/?VC1	:STATus:OVERload:CH1:CONDition	△
Enable register	VE1/?VE1	:STATus:OVERload:CH1:ENABle	△
Query of CH 2 over load event status register †1	-/?VC2	:STATus:OVERload:CH2:CONDition	△
Enable register †1	VE2/?VE2	:STATus:OVERload:CH2:ENABle	△
Query of warning event status register	-/?WSC	:STATus:WARNing:CONDition	◎
Enable register	WSE/?WSE	:STATus:WARNing:ENABle	◎
Query of CH 1 warning event status register	-/?WC1	:STATus:WARNing:CH1:CONDition	◎
Enable register	WE1/?WE1	:STATus:WARNing:CH1:ENABle	◎
Query of CH 2 warning event status register †1	-/?WC2	:STATus:WARNing:CH2:CONDition	◎
Enable register †1	WE2/?WE2	:STATus:WARNing:CH2:ENABle	◎
GPIB specific function			
Function equivalent to a group execute trigger	GET/-	*TRG	◎
Selection of external trigger input connecter status	TRE/?TRE	:TRIGger:EIN:STATe	●
Selection of sweep pause input connecter status	HLE/?HLE	:TRIGger:PIN:STATe	▲
Know completion of single sweep/gated sweep	OPC/?OPC	*OPC	▲
Query of a result of self diagnosis at power-on	-/?TST	*TST	◎
Queries errors	-/?ERR	:SYSTem:ERRor	■
Selection of header On/Off	HDR/?HDR	None	◎
Version query	-/?VER	:SYSTem:VERSion	◎
Load the ID	-/?IDT	*IDN	■

† 1: WF1948 only

6.2.1 Notes on Operations with External Control (Compatibility with older WF194x series)

•Output on/off

Equipment with 2-channel oscillation output (for WF1948)

For an output On/Off operation by the external control, a channel is selected beforehand.

•Setting by user-defined unit

For settings by user-defined unit through the external control, the dedicated commands for frequency, amplitude, DC offset, phase, duty and cycle set a name formula, factor and offset collectively.

•Manual trigger, sweep/modulation operation

Start/stop operations of trigger, sweep/modulation by the external control is executed by the TRG (:TRIG:SOUR) command. In addition, the GET (*TRG) command executes some similar operations.

•Sweep setting

A start value/stop value/center value/span value/marker value/start status/stop status by the external control is set using the dedicated command for each sweep type.

•Difference of "ARB" and "ARW" arbitrary waveform writing commands

The "ARB" command is preserved to ensure compatibility with WF1943/WF1944/WF1945/WF1946/WF1943A/WF1944 A/WF1945 A/WF1946 A.

A waveform data value specified with parameter is converted to a twice number of the value so that it is correct waveform data, and then stored in the waveform memory of WF1947/WF1948.

The "ARW" command stores the waveform data value specified with parameter in the waveform memory of WF1947/WF1948, as value itself.

•Relation between arbitrary waveform memory and output D/A

	Number of memory bits	Number of D/A bits
WF1947 / WF1948	16	16
WF1973 / WF1974	16	14
WF1943B / WF1944B	16	14
WF1945B / WF1946B	16	16

The values for the lower-level 2 bit of memory of WF1945B/WF1946B are not reflected to the output.

6.3 Descriptions of Individual Commands (Compatibility with older WF194x series)

This section describes the details of external control commands. The commands for Type 1 are aligned in alphabetical order. The lower-case part of Type 2 can be omitted. (Type 2 is not supported.)
The meanings of the symbols used in the description are shown below:

[ ]: This parenthesis can be omitted

{ }: Select either of choices in this parenthesis

〈 〉: Specify the value or the character string in this parenthesis

The detailed description explains the following content:

Command name (Command in Type 1 format)

Description

Describes the action of the command.

Parameters

Describes the command specified by parameters.
† Be sure to enter a space character (code: 32)
between the command and the parameter.

Response format

Describes the response format of the query command.

Type 2 (For reference)

WF1947/WF1948 do not support the commands in the type 2 format of older WF194x series, but this is described as a reference for command replacement.

Settings: Describes the specification with commands in Type 2 format.
Query: Describes the specification with commands in Type 2 format.

Compatibility Information

Describes the cautions for use of the commands compatible with the old WF194x series. For command with no special caution, only compatibility support is described.

6.3.1 AAC

Description

Clears all arbitrary waveforms.

Parameters

None

Type 2 (For reference)

Settings: :DATA:CLEar:ALL
Query: None

Compatibility Information

Compatibility support
Clears all arbitrary waveform data from No. 0 to No. 128 of WF1947/WF1948 arbitrary waveform memory.

6.3.2 ?AAP

Description

Inquires the arithmetic average of all arbitrary waveform data selected at that time in the unit that indicates the whole available range of waveform data value for setting as 1. After the arithmetic average is calculated, it rounded up to four decimal point digits.

Response format

-0.5000~+0.5000

Type 2 (For reference)

Settings: None
Query: :DATA:ATTRibute:MEAN?

Response example

AAP 0.0000

Compatibility Information

Compatibility support
If an arbitrary waveform data of WF1947/WF1948 in the control point form is stored in the memory, the command causes an execution error. Only data in array format are supported.

6.3.3 ?AAV

Description

Inquires the arithmetic average of all arbitrary waveform data selected at that time in the unit of LSB that number of bits of memory is considered as 15.
The command to make a setting value compatible with WF1943/44/45/46/43A/44A/45A/46A. This command returns 1/2 of the average value in the memory.
Usually, use the "?AAP" command.

Response format

-16384.0~+16383.0

Type 2 (For reference)

Settings: None
Query: :DATA:ATTRibute:AVERage?

Response example

AAV 0.0

Compatibility Information

Compatibility support
If an arbitrary waveform data of WF1947/WF1948 in the control point form is stored in the memory, the command causes an execution error. Only data in array format are supported.

6.3.4 ACL

Description

Clears arbitrary waveforms with the specified name.
If a name is omitted, then clears the arbitrary waveforms selected at that time.

Parameters

Name of the arbitrary waveform to be cleared (character string data, up to eight characters, can be omitted)

Type 2 (For reference)

Settings: :DATA:CLEar [<arb name>]
Query: None

Setting example

Clears the arbitrary waveform with name of "ARB_00".
Type 1: ACL“ARB_00”
Type 2 (For reference):DATA:CLE“ARB_00”

Compatibility Information

Compatibility support

6.3.5 ACP

Description

Copies an arbitrary waveform data with the specified name to another arbitrary waveform.
A name of the destination arbitrary waveform can be omitted. If omitted, it is copied to the waveform that is selected at that time.

Parameters

① Name of the destination arbitrary waveform (character string data, up to eight characters, can be omitted)
② Name of the source waveform memory (character string data, up to 8 characters). In addition to an arbitrary waveform, the standard waveform is also available.

The names are shown in the following table:
•SINusoid (sine wave)
•TRIangle (triangular wave)
•SQUare (rectangular wave)

A name can be specified only for the above uppercase section, but is should be specified with uppercase only.

An arbitrary waveform that has the same name with the standard waveform (even in abbreviated format) cannot be used as a source.

Type 2 (For reference)

Settings: :DATA:COPY [<arb name>],<source arb name>
Query: None

Setting example

Copies a triangular wave to the arbitrary waveform with the name of “ARB_00”.
Type 1: ACP “ARB_00”,“TRI”
Type 2 (For reference):DATA:COPY “ARB_00”,“TRI”

Compatibility Information

Parameters of PRAMp (riding sawtooth wave) and NRAMp (falling sawtooth wave) do not cause a command error. However, the triangular wave based on the symmetry setting at that time is copied.

6.3.6 ADV/?ADV

Description

Sets/inquires the modulation degree of amplitude.

Parameters

Modulation degree of amplitude modulation
0.0 (0%) ~100.0 (100%)

Type 2 (For reference)

Settings: [:SOURce]:AM:DEPTh {<depth in percent>|MINimum|MAXimum}
Query: [:SOURce]:AM:DEPTh? [MINimum|MAXimum]

Setting example

Set the modulation degree of amplitude modulation as 10%.
Type 1: ADV 10
Type 2 (For reference):AM:DEPT 10

Compatibility Information

Compatibility support

6.3.7 AFC/?AFC

Description

Selects/inquires the modulation waveform of amplitude modulation.

Parameters

Modulation waveform selection (0 to 4)

Type 1	Type 2 (For reference)
0	: SINusoid (sine wave)
1	: TRIangle (triangular wave)
2	: SQUare (rectangular wave)
3	: PRAMp (Rising sawtooth wave)
4	: NRAMp (Falling sawtooth wave)

Type 2 (For reference)

Settings: [:SOURce]:AM:INTernal:FUNCtion
{SINusoid|TRIangle|SQUare|PRAMp|NRAMp}
Query: [:SOURce]:AM:INTernal:FUNCtion?

Setting example

Changes a modulation waveform of amplitude modulation into a square wave.
Type 1: AFC 2
Type 2 (For reference):AM:INT:FUNC SQU

Compatibility Information

Compatibility support

6.3.8 AFM/?AFM

Description

Selects/inquires the order of transferred bytes of an arbitrary waveform data.
Specifies whether to exchange upper/lower bytes when an arbitrary waveform data is written with binary data.
Selected so that bytes are not exchanged when the PST (:SYSTem:PRESet) or RST (*RST) command is executed at the time of power-on.

Parameters

Order of transferred bytes (0/1)
Type 1 Type 2 (For reference)
0 : NORMal (Not exchanged, transferred in the order of upper byte → lower byte)
1 : SWAPped (Exchanged, transferred in the order of lower byte → upper byte)

Type 2 (For reference)

Settings: :FORMat:BORDer {NORMal|SWAPped}
Query: :FORMat:BORDer?

Setting example

Set so that arbitrary waveform data are written in the order from the upper byte to the lower byte.
Type 1: AFM 0
Type 2 (For reference):FORM:BORD NORM

Compatibility Information

Does not have impacts on the operation command for arbitrary waveform of WF1947/WF1948.
This is effective only under control by the command to write arbitrary waveforms of the old WF194x series.

6.3.9 AFN/?AFN

Description

Selects/inquires the arbitrary waveform.

Parameters

Any one of "number of arbitrary waveform +', '+ name of arbitrary waveform", or "number of arbitrary waveform", or "', '+ name of arbitrary waveform".
A name of arbitrary waveform is up to eight characters of character string data, and space at the head is acceptable.
0 to 11 can be set as the number of arbitrary waveform for arbitrary waveform data size of 8KW, 0 to 5 can be set for 16KW, 0 to 2 for 32KW, and 0 for 64KW.

Response format

"number of arbitrary waveform +', '+ name of arbitrary waveform"

Type 2 (For reference)

Settings: [:SOURce]:FUNCtion:USER {<arb number>}, {<arb name>}or
[:SOURce]:FUNCtion:USER {<arb number>}or
[:SOURce]:FUNCtion:USER, {<arb name>}
Query: [:SOURce]:FUNCtion:USER?

Setting example

Selects the arbitrary waveform with name of "ARB_03".
Type 1: AFN,“ARB_03”
Type 2 (For reference):FUNC:USER,“ARB_03”

Compatibility Information

Compatibility support

6.3.10 AFQ/?AFQ

Description

Sets/inquires the modulation frequency of amplitude.

Parameters

modulation frequency : 0.1E-3 (0.1mHz) ~1000000 (1MHz)
Resolution: 5 digits for 1Hz or higher, 0.1E-3 (0.1mHz) for less than 1Hz

Type 2 (For reference)

Settings: [:SOURce] :AM:INTernal:FREQuency {〈frequency〉|MINimum|MAXimum}
Query: [:SOURce] :AM:INTernal:FREQuency? [MINimum|MAXimum]

Setting example

Set the modulation frequency of amplitude modulation as 100Hz.
Type 1: AFQ 100
Type 2 (For reference):AM:INT:FREQ 100

Compatibility Information

Compatibility support
The maximum value is changed, compared to the old WF194x.(500Hz → 1MHz)

6.3.11 ?ALT

Description

Inquires names of all arbitrary waveforms.

Response format

Character string data (Responded by separating names with comma)

Type 2 (For reference)

Settings: None
Query: :DATA:CATalog?

Response example

ALT “ARB_00 ”,“ARB_01 ”,....,“ARB_11 ”

Compatibility Information

The fixed string <Edit Memory> is returned as the name corresponding to the arbitrary waveform memory number 0.

6.3.12 AMM/?AMM

Description

Selects/inquires the external AM.

Parameters

Status selection (0/1)

Type 1 Type 2 (For reference)

0 : OFF (Turn off the external AM)

1 : ON (Turn on the external AM)

Type 2 (For reference)

Settings: [:SOURce] :EXTerna1:AM:STATe {0|1|OFF|ON}

Query: [:SOURce] :EXTerna1:AM:STATe?

Setting example

Turns on the external AM.

Type 1: AMM 1

Type 2 (For reference):EXT:AM:STAT ON

Compatibility Information

Compatibility support

6.3.13 AMU/?AMU

Description

Selects/inquires the amplitude unit.

Parameters

Amplitude unit selection (0 to 4)

Type 1 Type 2 (For reference)

0 : VPP (Vp-p)

1 : VRMS (Vrms)

2 : DBV (dBV)

3 : DBM (dBm)

4 : USER (user-defined unit)

When setting Type 2 (For reference), "DEFault" is handled as being equivalent to "Vpp".

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:UNIT
{VPP|VRMS|DBV|DBM|USER|DEFault}

Query: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:UNIT?

Setting example

Set the unit of amplitude width as dBV.

Type 1: AMU 2

Type 2 (For reference):VOLT:UNIT DBV

Compatibility Information

Compatibility support

6.3.14 AMV/?AMV

Description

Sets/inquires the amplitude. The setting for amplitude sweep is ignored. For query to amplitude sweep/modulation, the instantaneous value of the query is returned.
In case that the actual amplitude is 0, "-INF" is returned as a response when dBV/dBm is selected as the amplitude unit for the "AMU" command. Or, when LOG is used as the amplitude user-defined unit for the "UAU" command, "-INF" or "+INF" is returned as a response.
To set the actual amplitude as 0, specify substantially small/large value or "-INF"/"+INF".

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]
{<amplitude>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]?
[MINimum|MAXimum]

Setting example

Sets the amplitude as 10Vp-p/open.
It is assumed that the amplitude unit is Vp-p, and LOAD is set to OPEN in advance.
Type 1: AMV 10
Type 2 (For reference):VOLT 10

Compatibility Information

Compatibility support

6.3.15 ?APP

Description

Inquires the difference between the maximum and minimum values (peak-to-peak (p-p) value) of waveform data in one arbitrary waveform.
It is indicated as the ratio to the p-p value = 65535 (p-p value of min./max. values of available waveform data). After the ratio is calculated, it rounded up to four decimal point digits.

Response format

0.0000~1.0000

Type 2 (For reference)

Settings: None
Query: :DATA:ATTRibute:PTPeak?

Response example

AAP 1.0000

Compatibility Information

Compatibility support
If an arbitrary waveform data of WF1947/WF1948 in the control point form is stored in the memory, the command causes an execution error. Only data in array format are supported.

6.3.16 APT/?APT

Description

Selects/inquires the size of an arbitrary waveform data.

Parameters

Arbitrary waveform data size (0 to 3)

Type 1 Type 2 (For reference)

0 : 8KW

1 : 16KW

2 : 32KW

3 : 64KW

When setting Type 2 (For reference), "DEFault" is handled as being equivalent to "8KW".

Type 2 (For reference)

Settings: :DATA:ATTRibute:POINts {8KW|16KW|32KW|64KW|DEFault}

Query: :DATA:ATTRibute:POINts?

Setting example

Set the size of arbitrary waveform data as 8KW.

Type 1: APT 0

Type 2 (For reference):DATA:ATTR:POIN 8KW

Compatibility Information

Compatibility support

6.3.17 ARB

Description

Names the waveform memory that is selected at that time to transfer the data.
If a name is omitted, the waveform data is transferred without changing the name already exists.
In case of name only, rename the waveform memory that is selected at that time.
The waveform data can be transferred from the middle of the waveform memory by using STT command.

Parameters

①Name of waveform memory
Up to character string data of 8 characters. A name can be omitted.
However, cannot be omitted, if the name is changed.
②Transferred data (ASCII data list, waveform data:-16384 to +16383)
ASCII data list : Waveform data[, waveform data[, waveform data...]]

Type 2 (For reference)

Settings: :DATA:DAC {<arb name>|[<arb name>]}
Query: None

Setting example

Name as “ARB_01”, and then write data with ASCII data list.
Type 1: ARB “ARB_01”,237,1779,-986,...
Type 2 (For reference):DATA:DAC “ARB_01”, 237, 1779, -986,...

Note

In case of ASCII data list, an error occurs if number of characters transferred at the same time exceeds 1024 bytes. Insert delimiters in appropriate interval to transfer. Lines other than the final line must be ended with "," (comma).
+16383 is set for waveform data of +16384 or higher, and -16385 is set for -16384 or lower.
The waveform data is stored internally as a double value.

Compatibility Information

Binary data transmission is not supported.
Transfer data that binary data is converted into ASCII data list.
In addition, to transfer a data list exceeding 1024 bytes,
transfer the subsequent waveform data with the identical waveform memory name including the command character string.

<Example>
[1st]
ARB “ARB_01”,123,456,789,…….123,456,789,
[2nd]
ARB “ARB_01” ,987,654,321,…….987,654,321,
:
[Final] The end of data must be data without "," (comma).
ARB “ARB_01” ,-123,-456,-789,…….-123,-456,-789

6.3.18 ARW

Description

Names the waveform memory that is selected at that time to transfer the data.
If a name is omitted, the waveform data is transferred without changing the name already exists.
In case of name only, rename the waveform memory that is selected at that time.
The waveform data can be transferred from the middle of the waveform memory by using "STT" command.
The data changes by the number transferred from the starting address with this command.
The specified number of bits are top aligned. If the number of memory bits is larger, align 0 to the subordinated bit. If the specified number of bits is larger, the subordinated bit of transferred data is omitted.

Parameters

(1) Name of waveform memory
Up to character string data of 8 characters. A name can be omitted.
However, cannot be omitted, if the name is changed.
(2) Specify the number of transferred data bits
16bit fixed
(3) Transferred data
(ASCII data list, waveform data is transferred, waveform data:-32768 to +32767)
ASCII data list: Waveform data[, waveform data[, waveform data...]]

Type 2 (For reference)

Settings: :DATA:DAC:WORD {<arb name>|[<arb name>],[<bit length>]}
Query: None

Setting example

Name as “ARB_01”, and then write data with ASCII data list.
Type 1: ARW “ARB_01”,,123,245,-456,...
Type 2 (For reference):DATA:DAC:WORD “ARB_01”, , 123, 245, -456,...

Note

In case of ASCII data list, an error occurs if number of characters transferred at the same time exceeds 1024 bytes. Therefore, the data can be transferred to multiple records that end with "," by delimiting with delimiter.

Compatibility Information

Binary data transmission is not supported.
Transfer data that binary data is converted into ASCII data list.
In addition, to transfer a data list exceeding 1024 bytes,
transfer the subsequent waveform data with the identical waveform memory name including the command character string.

<Example>

[1st]
ARW “ARB_01”,123,456,789,…….123,456,789,
[2nd]
ARW “ARB_01” ,987,654,321,…….987,654,321,
:
[Final] The end of data must be data without "," (comma).
ARW “ARB_01” ,-123,-456,-789,…….-123,-456,-789

6.3.19 ASS

Description

Sets the output as the start value/stop value in the amplitude sweep.

Parameters

Start value/stop value (0/1)
Type 1 Type 2 (For reference)
0 : STOP (Sets the output as the stop value)
1 : STARt (Sets the output as the starting value)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STATe {STARt|STOP}
Query: None

Setting example

Sets the output as the stop value in the amplitude sweep.
Type 1: ASS 0
Type 2 (For reference):VOLT:STAT STOP

Compatibility support

Compatibility support

6.3.20 BEC/?BEC (WF1948)

Description

Selects/inquires CH 2 external trigger.

Parameters

Channel number (1 to 2)
Type 1, 2
1: Use the TRIG/SWEEP IN of CH 1 as the trigger source of CH 2
2: Use the TRIG/SWEEP IN of CH 2 as the trigger source of CH 2
When setting :Type 2 (For reference), "DEFault" is handled as being equivalent to "2".

Type 2 (For reference)

Settings: [:SOURce]:BM:EXTernal:CHANnel {<channel>|DEFault}
Query: [:SOURce]:BM:EXTernal:CHANnel?

Setting example

Use the TRIG/SWEEP IN of CH 1 as the trigger source of CH 2.
Type 1: BEC 1

Type 2 (For reference):BM:EXT:CHAN 1

Compatibility Information

Compatibility support

6.3.21 BES/?BES

Description

Selects/queries the trigger signal polarity.

Parameters

Trigger signal polarity selection (0/1)

Type 1 Type 2 (For reference)

0 : POSitive (Trigger oscillation:Trigger at the rising, Gate oscillation: Oscillate at the high level)

1 : NEGative (Trigger oscillation:Trigger at the falling, Gate oscillation: Oscillate at the low level)

When setting :Type 2 (For reference), "DEFault" is handled as being equivalent to "NEgative".

Type 2 (For reference)

Settings: [:SOURce]:BM:SLOPe {POSitive|NEGative|DEFault}

Query: [:SOURce]:BM:SLOPe?

Setting example

In case of trigger oscillation, trigger at the falling.

Type 1: BES 1

Type 2 (For reference):BM:SLOP NEG

Compatibility Information

Compatibility support

6.3.22 BIR/?BIR

Description

Sets/inquires the internal trigger cycle in burst mode.

Parameters

Internal trigger cycle setting
1E-06 (1µs) to 1000 (1000.0s), Resolution: 4 digits for 1ms or higher, 1E-06 (1µs) for less than 1ms

Type 2 (For reference)

Settings: [:SOURce]:BM:INTernal:RATE {<rate>|MINimum|MAXimum}
Query: [:SOURce]:BM:INTernal:RATE? [MINimum|MAXimum]

Setting example

Set the internal trigger cycle as 1ms.
Type 1: BIR 1E-03
Type 2 (For reference):BM:INT:RATE 1E-03

Compatibility Information

Compatibility support
The maximum value is changed, compared to the old WF194x. (100s → 1000s)

6.3.23 BRO/?BRO (WF1948)

Description

Selects/inquires whether to operate the trigger from the panel key and the external control separately for each channel, or common to both channels.

Parameters

Operation status selection (0/1)
Type 1 Type 2 (For reference)
0 : OFF (Independent for each channel)
1 : ON (Common to both channels)

Type 2 (For reference)

Settings: [:SOURce]:BM:OCOMmon {0|1|OFF|ON}
Query: [:SOURce]:BM:OCOMmon?

Setting example

Set the trigger operation as common to both channels.
Type 1: BRO 1
Type 2 (For reference):BM:OCOM ON

Compatibility Information

In case of common channel setting (1 or ON), when setting the command to change frequency or amplitude, it is set as common to both channels.
If you set different frequency or amplitude for each channel, set as 0 or OFF once, and then set the frequency and/or amplitude.

6.3.24 BSS/?BSS

Description

Selects/inquires the stop level.

Parameters

Stop level selection (0/1)

Type 1 Type 2 (For reference)

0 : OFF (Stop level OFF)

1 : ON (Stop level ON)

Type 2 (For reference)

Settings: [:SOURce]:BM:SLEVel:STATe {0|1|OFF|ON}

Query: [:SOURce]:BM:SLEVel:STATe?

Setting example

Select the stop level as unused (OFF).

Type 1: BSS 0

Type 2 (For reference):BM:SLEV:STAT OFF

Compatibility Information

Compatibility support

6.3.25 BSV/?BSV

Description

Sets/inquires the stop level.

Parameters

Stop level

-100.00 (-100%) to +100.00 (+100%), Resolution:0.01 (0.01%)

Type 2 (For reference)

Settings: [:SOURce]:BM:SLEVel {<stop level>|MINimum|MAXimum}

Query: [:SOURce]:BM:SLEVel? [MINimum|MAXimum]

Setting example

Set the stop level as +33.3%.

Type 1: BSV 33.3

Type 2 (For reference):BM:SLEV 33.3

Compatibility Information

Compatibility support

6.3.26 BTY/?BTY

Description

Selects/inquires the burst type.

Parameters

Burst type selection (0 to 3)
Type 1 Type 2 (For reference)
0 : BURSt (Burst)
1 : TRIGger (Trigger)
2 : GATE (Gate)
3 : TGATe (Trigger gate)

Type 2 (For reference)

Settings: [:SOURce]:BM:TYPE {BURSt|TRIGger|GATE|TGATe}
Query: [:SOURce]:BM:TYPE?

Setting example

Set the burst type as Gate.
Type 1: BTY 2
Type 2 (For reference):BM:TYPE GATE

Compatibility Information

Compatibility support

6.3.27 CDC (WF1948)

Description

Copy the setting between the channels.
If the source and destination channels are identical, a parameter error occurs.

Parameters

①Destination channel (1 to 2)
②Source channel (1 to 2)

Type 2 (For reference)

Settings: :CHANnel:DATA:COPY <dst_channel>,<src_channel>
Query: None

Setting example

Copy the setting of CH 1 to CH 2.
Type 1: CDC 2,1
Type 2 (For reference):CHAN:DATA:COPY 2,1

Compatibility Information

Compatibility support

6.3.28 CHA/?CHA (WF1948)

Description

Selects/inquires the channel.

Parameters

Channel number (1 to 2)

Type 2 (For reference)

Settings: :CHANnel[:SELect] <channel>
Query: :CHANnel[:SELect]?

Setting example

Select CH 1.
Type 1: CHA 1
Type 2 (For reference):CHAN 1

Compatibility Information

Compatibility support

6.3.29 CLS

Description

Clears the event status register that is reflected to each bit of the status byte.
•Standard event status register
•Operation event status register
•Overload event status register
•Warning event status register
•CH 1 operation event status register
•CH 1 Overload event status register
•CH 1 Warning event status register
•CH 2 operation event status register (WF1948)
•CH 2 Overload event status register (WF1948)
•CH 2 Warning event status register (WF1948)
In addition, cancels the received OPC/?OPC command, and then clears the error queue.

Parameters

None

Type 2 (For reference)

Settings: *CLS
Query: None

Compatibility Information

Compatibility support

6.3.30 CMO/?CMO (WF1948)

Description

Selects/inquires the channel mode.

Parameters

Channel mode (1 to 5)

Type 1	Type 2 (For reference)	
1	: INDependent	(2 channels independent)
2	: PHASe	(2 phase)
3	: TONE	(Constant frequency difference)
4	: RATio	(Constant frequency ratio)
5	: DIFFerential	(Differential output)

Type 2 (For reference)

Settings: :CHANnel:MODE {INDependent|PHASe|TONE|RATio|DIFFerential }
Query: :CHANnel:MODE?

Setting example

Set the channel mode as 2 channels independent.
Type 1: CMO 1
Type 2 (For reference):CHAN:MODE IND

Compatibility Information

Compatibility support

6.3.31 CPL/?CPL (WF1948)

Description

Selects/inquires the simultaneous setting.

Parameters

Simultaneous setting selection (0/1)

Type 1	Type 2 (For reference)
0	: OFF (Simultaneous setting OFF)
1	: ON (Simultaneous setting ON)

Type 2 (For reference)

Settings: :INSTrument:COUPle {ALL|NONE}
Query: :INSTrument:COUPle?

Setting example

Select "Use simultaneous setting (ON)".
Type 1: CPL 1
Type 2 (For reference):INST:COUP ALL

Compatibility Information

Compatibility support

6.3.32 CTA/?CTA

Description

Sets/inquires the center value of amplitude sweep.
Cannot be set if dBV, dBm, or LOG (as user-defined unit) is selected. Returns "INVALID" as a value, if inquired.

Parameters

The setting range is the same as amplitude setting (AMV)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:CENTer
{<amplitude>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:CENTer? [MINimum|MAXimum]

Setting example

Set the center value of amplitude sweep as 5.5Vp-p/open (It is assumes that the unit of amplitude is Vp-p, and LOAD is set as OPEN in advance).
Type 1: CTA 5.5
Type 2 (For reference):VOLT:CENT 5.5

Compatibility Information

Compatibility support

6.3.33 CTE/?CTE

Description

Inquires the center value of DC offset sweep setting/. Cannot be set if LOG is selected as the user-defined unit. Returns "INVALID" as a value, if inquired.

Parameters

The setting range is the same as that of the DC offset setting (OFS)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:CENTer
{<offset>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:CENTer?
[MINimum|MAXimum]

Setting example

Set the center value of DC offset sweep as 0V/open (It is assumes that the unit of DC offset is V, and LOAD is set as OPEN in advance).
Type 1: CTE 0
Type 2 (For reference):VOLT:OFFS:CENT 0

Compatibility Information

Compatibility support

6.3.34 CTF/?CTF

Description

Sets/inquires the value of center frequency sweep. Cannot be set if LOG is selected as the user-defined unit. Returns "INVALID" as a value, if inquired.

Parameters

The setting range is the same as that of the frequency setting (FRQ)

Type 2 (For reference)

Settings: [:SOURce]:FREQuency:CENTer {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:FREQuency:CENTer? [MINimum|MAXimum]

Setting example

Set the center value of frequency as 5.5kHz.
Type 1: CTF 5.5E+03
Type 2 (For reference):FREQ:CENT 5.5E+03

Compatibility Information

Compatibility support

6.3.35 CTP/?CTP

Description

Sets/inquires the center value of phase sweep. Cannot be set if LOG is selected as the user-defined unit. Returns "INVALID" as a value, if inquired.

Parameters

The setting range is the same as that of the phase setting (PHS)

Type 2 (For reference)

Settings: [:SOURce]:PHASe:CENTer {<phase>|MINimum|MAXimum}
Query: [:SOURce]:PHASe:CENTer? [MINimum|MAXimum]

Setting example

Set the center value of phase as 0deg.
Type 1: CTP 0
Type 2 (For reference):PHAS:CENT 0

Compatibility Information

Compatibility support

6.3.36 CTU/?CTU

Description

Inquires the center value of duty sweep setting/. Cannot be set if LOG is selected as the user-defined unit. Returns "INVALID" as a value, if inquired.

Parameters

The setting range is the same as that of the duty setting (DTY)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:DCYCle:CENTer {<duty cycle>|MINimum|MAXimum}
Query: [:SOURce]:PULSe:DCYCle:CENTer? [MINimum|MAXimum]

Setting example

Set the center value of duty sweep as 50%.
Type 1: CTU 50
Type 2 (For reference):PULS:DCYC:CENT 50

Compatibility Information

Compatibility support

6.3.37 DDV/?DDV

Description

Sets/inquires the pulse width deviation of pulse width modulation.
The setting range can be changed through the front panel and the DTT command.
Cannot be set if LOG is selected as the user-defined unit.
Returns "INVALID" as a value, if inquired.

Parameters

Set the duty
When the setting range is 0.01% to 99.9%
0.0000 (0%) ~99.9800 (99.8%)
When the setting range is 0% to 100%
0.0000 (0%) ~100.0000 (100%)

Type 2 (For reference)

Settings: [:SOURce]:PWM:DEViation {<peak deviation>|MINimum|MAXimum}
Query: [:SOURce]:PWM:DEViation? [MINimum|MAXimum]

Setting example

Set the pulse width deviation of pulse width modulation as 10%.
Type 1: DDV 10
Type 2 (For reference):PWM:DEV 10

Compatibility Information

Change the duty setting to 1/2 of that.
WF1947/WF1948 treats the peak deviation of 50% as the maximum.
For details, see "2. Command Descriptions Descriptions of Individual Commands [:SOURce[1|2]]:PWM[:DEViation]:DCYCle."

6.3.38 DFC/?DFC

Description

Selects/inquires the modulation waveform of pulse width modulation.

Parameters

Modulation waveform selection (0 to 4)
Type 1 Type 2 (For reference)
0 : SINusoid (sine wave)
1 : TRIangle (triangular wave)
2 : SQUare (rectangular wave)
3 : PRAMp (Rising sawtooth wave)
4 : NRAMp (Falling sawtooth wave)

Type 2 (For reference)

Settings: [:SOURce]:PWM:INTernal:FUNCtion
{SINusoid|TRIangle|SQUare| PRAMp|NRAMp}
Query: [:SOURce]:PWM:INTernal:FUNCtion?

Setting example

Set the modulation waveform of pulse width modulation as falling sawtooth wave.
Type 1: DFC 4
Type 2 (For reference):PWM:INT:FUNC NRAM

Compatibility Information

Compatibility support

6.3.39 DFQ/?DFQ

Description

Sets/inquires the modulation frequency of pulse width.

Parameters

modulation frequency : 0.1E-3 (0.1mHz) ~1000000 (1MHz),
Resolution: 5 digits for 1Hz or higher, 0.1E-3 (0.1mHz) for less than 1Hz

Type 2 (For reference)

Settings: [:SOURce]:PWM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:PWM:INTernal:FREQuency? [MINimum|MAXimum]

Setting example

Set the modulation frequency of pulse width modulation as 100Hz.
Type 1: DFQ 100
Type 2 (For reference):PWM:INT:FREQ 100

Compatibility Information

Compatibility support
The maximum value is changed, compared to the old WF194x.(250Hz → 1MHz)

6.3.40 DTT/?DTT

Description

Sets/inquires the setting timing of duty variable square wave.

Parameters

Setting timing of duty variable square wave
Type 1 Type 2 (For reference)
0 : ASYNchronous (The setting value is immediately effective)
1 : SYNChronous (The value that is set immediately before the cycle is effective at the end of one cycle)
2 : EXPand (The setting range of duty is 0.0000% to 100.0000%)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:TYPE {SYNChronous|ASYNchronous|EXPand}
Query: [:SOURce]:PULSe:TYPE?

Setting example

Sets the setting timing of duty variable square wave as cycle synchronization.
Type 1: DTT 1
Type 2 (For reference):PULS:TYPE SYNC

Compatibility Information

The setting as immediately effective is changed to 1: SYNChronous (the value that is set immediately before the cycle is effective at the end of one cycle).

6.3.41 DTU/?DTU

Description

Selects/queries the duty unit.

Parameters

Duty unit selection (0/1)
Type 1 Type 2 (For reference)
0 : PERCent (%)
1 : USER (User-defined unit)
Type 2 (For reference), "DEFault" is handled as being equivalent to "PERCent".

Type 2 (For reference)

Settings: [:SOURce]:PULSe:DCYCle:UNIT {PERCent|USER|DEFault}
Query: [:SOURce]:PULSe:DCYCle:UNIT?

Setting example

Set the duty unit as %.
Type 1: DTU 0
Type 2 (For reference):PULS:DCYC:UNIT PERC

Compatibility Information

Compatibility support

6.3.42 DTY/?DTY

Description

Sets/queries the duty.
The setting range can be changed through the front panel and the DXX command.

Parameters

Set the duty
When the setting range is 0.01% to 99.9%
0.0100 (0.01%) to 99.9900 (99.99%), Resolution:0.0001 (0.0001%)
When the setting range is 0% to 100%
0.0000 (0%) to 100.0000 (100%), Resolution:0.0001 (0.0001%)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:DCYCle {<duty cycle>|MINimum|MAXimum}
Query: [:SOURce]:PULSe:DCYCle? [MINimum|MAXimum]

Setting example

Set the duty as 20%.
Type 1: DTY 20
Type 2 (For reference):PULS:DCYC 20

Compatibility Information

Compatibility support

6.3.43 EAS/?EAS

Description

Selects/inquires the external addition.

Parameters

Status selection (0/1)
Type 1 Type 2 (For reference)
0 : OFF (Set the external addition as OFF)
1 : ON (Set the external addition as ON)

Type 2 (For reference)

Settings: [:SOURce]:EXTernal:ADD:STATe {0|1|OFF|ON}
Query: [:SOURce]:EXTernal:ADD:STATe?

Setting example

Turns on the external addition.
Type 1: EAS 1
Type 2 (For reference):EXT:ADD:STAT ON

Compatibility Information

Compatibility support

6.3.44 ?ERR

Description

Inquires errors.

Response format

Error number, message
☞See "Error Message".

Type 2 (For reference)

Settings: None
Query: :SYSTem:ERRor?

Response example

ERR 0,“No error”

Compatibility Information

Returns the corresponding error message of WF1947/WF1948.

6.3.45 ESE/?ESE

Description

Sets the standard event status enable register as write/read.

Parameters

The mask (allow/disallow) pattern 0 to 255 of the standard event status enable register, enabled when 1 is set to the bit

Type 2 (For reference)

Settings: *ESE <enable value>
Query: *ESE?

Setting example

Set all of the standard event status enable registers as disable
Type 1: ESE 0
Type 2 (For reference): *ESE 0
☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.46 ?ESR

Description

Read the standard event status register.
When reading by using the query command, all bits are cleared to zero.

Response format

Contents of the standard event status register (0 to 255)

Type 2 (For reference)

Settings: None
Query: *ESR?

Response example

ESR 0
☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.47 FDI/?FDI (WF1948)

Description

Sets/inquires the difference of frequency at the time of 2TONE. The unit specified at the selected channel ("CHA" command) is used (However, treated as [Hz] if LOG is specified as the user-defined unit).
When frequency is set to each of CH1 and CH2 and inquired with "?FDI", the frequency difference value is returned.

Parameters

Frequency difference at 2TONE:
0 (0Hz) ~ 29999999.99999999 (29999999.99999999Hz)
Resolution:0.00000001 (10nHz)

Type 2 (For reference)

Settings: :CHANnel:DELTa {<frequency>|MINimum|MAXimum}
Query: :CHANnel:DELTa? [MINimum|MAXimum]

Setting example

Set the frequency difference as 1kHz.
Type 1: FDI 1000
Type 2 (For reference):CHAN:DELT 1000

Compatibility Information

Compatibility support
The maximum value is changed, compared to the old WF194x.
(14999999.99999999Hz → 29999999.99999999Hz)

6.3.48 FDV/?FDV

Description

Sets/inquires the frequency deviation of frequency modulation. Cannot be set if LOG is selected as the user-defined unit. Returns "INVALID" as a value, if inquired.

Parameters

The setting range: when the unit is "Hz",
0 (0Hz) ~29999999.99999999 (29999999.99999999Hz),
Resolution:0.00000001 (10nHz)

Type 2 (For reference)

Settings: [:SOURce]:FM:DEViation {<peak deviation>|MINimum|MAXimum}
Query: [:SOURce]:FM:DEViation? [MINimum|MAXimum]

Setting example

Set the deviation of frequency modulation as 1kHz.
Type 1: FDV 1E+03
Type 2 (For reference):FM:DEV 1E+03

Compatibility Information

Compatibility support
The maximum value is changed, compared to the old WF194x.
(14999999.99999998Hz → 29999999.99999999Hz)

6.3.49 FFC/?FFC

Description

Selects/inquires the modulation waveform of frequency modulation.

Parameters

Modulation waveform selection (0 to 4)

Type 1	Type 2 (For reference)
0	: SINusoid (sine wave)
1	: TRIangle (triangular wave)
2	: SQUare (rectangular wave)
3	: PRAMp (Rising sawtooth wave)
4	: NRAMp (Falling sawtooth wave)

Type 2 (For reference)

Settings: [:SOURce]:FM:INTernal:FUNCtion
{SINusoid|TRIangle|SQUare| PRAMp|NRAMp}
Query: [:SOURce]:FM:INTernal:FUNCtion?

Setting example

Changes a modulation waveform of frequency modulation into a sine wave.
Type 1: FFC 0
Type 2 (For reference):FM:INT:FUNC SIN

Compatibility Information

Compatibility support

6.3.50 FFQ/?FFQ

Description

Sets/inquires the modulation frequency of frequency modulation.

Parameters

modulation frequency : 0.1E-3 (0.1mHz) ~1000000 (1MHz),
Resolution: 5 digits for 1Hz or higher, 0.1E-3 (0.1mHz) for less than 1Hz

Type 2 (For reference)

Settings: [:SOURce]:FM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:FM:INTernal:FREQuency? [MINimum|MAXimum]

Setting example

Set the modulation frequency of frequency modulation as 100Hz.
Type 1: FFQ 100
Type 2 (For reference):FM:INT:FREQ 100

Compatibility Information

Compatibility support
The maximum value is changed, compared to the old WF194x.(500Hz → 1MHz)

6.3.51 FNC/?FNC

Description

Selects/inquires the waveform.

Parameters

Waveform selection (1 to 7)

Type 1	Type 2 (For reference)	
1	: SINusoid	(Sine wave)
2	: TRIangle	(Triangle wave)
3	: FSQUare	(Duty 50% fixed square wave)
4	: PRAMp	(Rising sawtooth wave)
5	: NRAMp	(Falling sawtooth wave)
6	: USER	(Arbitrary Waveform)
7	: VSQUare	(Duty variable square wave)

Type 2 (For reference)

Settings: [:SOURce]:FUNCtion:SHAPe
{SINusoid|TRIangle|FSQUare| PRAMp|NRAMp|USER|VSQUare}
Query: [:SOURce]:FUNCtion:SHAPe?

Setting example

Set the waveform as triangular wave.
Type 1: FNC 2
Type 2 (For reference):FUNC:SHAP TRI

Compatibility Information

Compatibility support

6.3.52 FRA/?FRA (WF1948)

Description

Sets/inquires the frequency ratio at the time of RATIO.
The frequency unit specification for CH1 or CH2 has no impact. If the frequency is set for each of CH1 and CH2, and then inquire with "?FRA", the setting value with the previous "FRA" is returned instead of the frequency ratio of those.

Parameters

①Frequency ratio of CH 1 (1 to 9999999)
②Frequency ratio of CH 2 (1 to 9999999)

Type 2 (For reference)

Settings: :CHANnel:RATio {<valuel>,<value2>}
Query: :CHANhel:RATio?

Setting example

Frequency ratio to 2:3.
Type 1: FRA 2,3
Type 2 (For reference):CHAN:RAT 2,3

Compatibility Information

Compatibility support

6.3.53 FRQ/?FRQ

Description

Sets/inquires the frequency. The setting for frequency sweep is ignored.
For query to frequency sweep/modulation, the instantaneous value of the query is returned.

Parameters

Frequency setting (the range varies depending on the unit setting)
When the unit is Hz, the setting range is 10E-09 (10nHz) to 30E+06 (30MHz)
The resolution is 0.01μHz.

Type 2 (For reference)

Settings: [:SOURce]:FREQuency {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:FREQuency? [MINimum|MAXimum]

Setting example

Set the frequency as 1MHz.
Type 1: FRQ 1E+06
Type 2 (For reference):FREQ 1E+06

Compatibility Information

Compatibility support
The maximum value is changed, compared to the old WF194x.(15MHz → 30MHz)

6.3.54 FRU/?FRU

Description

Selects/inquires the unit of frequency.

Parameters

Frequency unit selection (0/1)

Type 1 Type 2 (For reference)

0 : HZ (Hz)

1 : USER (user-defined unit)

When setting Type 2 (For reference), "DEFault" is handled as being equivalent to "Hz".

Type 2 (For reference)

Settings: [:SOURce]:FREQuency:UNIT {HZ|USER|DEFault}

Query: [:SOURce]:FREQuency:UNIT?

Setting example

Set the unit of frequency as Hz.

Type 1: FRU 0

Type 2 (For reference):FREQ:UNIT HZ

Compatibility Information

Compatibility support

6.3.55 FSS

Description

Sets the output as the start value/stop value in the frequency sweep.

Parameters

Start value/stop value (0/1)

Type 1 Type 2 (For reference)

0 : STOP (Sets the output as the stop value)

1 : STARt (Sets the output as the starting value)

Type 2 (For reference)

Settings: [:SOURce]:FREQuency:STATe {STARt|STOP}

Query: None

Setting example

Sets the output as the stop value in the frequency sweep.

Type 1: FSS 0

Type 2 (For reference):FREQ:STAT STOP

Compatibility Information

Compatibility support

6.3.56 GET

Description

As with the group execute trigger (GET), this works as follows.
•In the burst mode, it trigger once for the trigger oscillation or the triggered gate oscillation.
•In the sweep mode, it starts a sweep once for the single sweep or the gates sweep. Note that correspond bits on the operation event register is set or cleared once the sweep start. The combination of sweep parameters is beyond the allowable setting range, errors occur.

Parameters

None

Type 2 (For reference)

Settings: *TRG
Query: None

Note

While executing the sweep, when the oscillation mode is changed on the other channel, the sweep is aborted.

Compatibility Information

Compatibility support

6.3.57 HDR/?HDR

Description

Selects/queries of/off of a response header to the inquiry message of a type 1 command. The response header in not attached to the inquiry for type 2 (For reference).

Parameters

Selection of header On/Off (0/1)
0 : OFF (a header is not attached)
1 : ON (a header is attached)

Type 2 (For reference)

Settings: None
Query: None

Setting example

A header is not attached.
Type 1: HDR 0

Compatibility Information

Compatibility support

6.3.58 HIV/?HIV

Description

Sets/queries the setting of the high level. This setting is ignored during the amplitude/offset sweep.
In a query for the amplitude/offset sweep and the modulation, an instantaneous value is returned at that time.
When LOG is used with the high level user-defined unit of the "UHU" command, specify as follows.
When the actual high level is 0, the response is “-INF” or “+INF”. To specify the value, specify “-INF”/“+INF”.
When the actual high level is negative, the response is “OVER”. You cannot specify the actual high level as negative.

Parameters

High level setting (the range changes based on the unit and the LOAD settings)
When the range is 10V ,the load is open, and the unit is V: -10 (-10V) to + 10 (10V)
When the user-defined unit is selected, the setting/query cannot be less than 0V.

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:HIGH
{<high>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:HIGH? [MINimum|MAXimum]

Setting example

Sets the high level to +5V. It is assumed that the high level unit is selected as V, and LOAD is set to OPEN in advance.
Type 1: HIV 5
Type 2 (For reference):VOLT:HIGH 5

Compatibility Information

Compatibility support
The maximum value is changed, compared to the old WF194x.(20V → 10V)

6.3.59 HLE/?HLE

Description

Selects/queries the status of the sweep poses input connector for remote.

•The sweep pose input connector is always enabled on local.

•At power-on, When the PST (:SYSTem:PRESet) or RST (*RST) command is executed, it become HLE 1.

Parameters

Status selection (0/1)

Type 1, 2 Type 2 (For reference):

0 : OFF (disables SWEEP PAUSE IN)

1 : ON (enables SWEEP PAUSE IN)

Type 2 (For reference)

Settings: :TRIGger[:SEQueunce]:PIN:STATe {0|1|OFF|ON}

Query: :TRIGger[:SEQueunce]:PIN:STATe?

Setting example

Enables SWEEP PAUSE IN.

Type 1: HLE 1

Type 2 (For reference):TRIG:PIN:STAT ON

Compatibility Information

Although any errors do not occur, the command does not work.

6.3.60 HVU/?HVU

Description

Selects/queries the high level unit. When a unit is selected, units of low level and DC offset are also changed.

Parameters

High level unit selection (0/1)

Type 1 Type 2 (For reference)

0 : V (V)

1 : USER (user-defined unit)

When setting with Type 2 (For reference), "DEFault" is handled as being equivalent to "V".

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:HIGH:UNIT {V|USER|DEFault}

Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:HIGH:UNIT?

Setting example

Sets the high level unit to V.

Type 1: HVU 0

Type 2 (For reference):VOLT:HIGH:UNIT V

Compatibility Information

Compatibility support

6.3.61 ?IDT

Description

Reads the device ID.

Response format

Returns “NF corporation, the model number, the serial number, the version” in the string format.

Type 2 (For reference)

Settings: None
Query: *IDN?

Response example

IDT “NF Corporation,WF1947,1234567,Ver1.00”

Compatibility Information

Returns the device information of WF1947/WF1948.
A response example of the previous WF194x series IDT “NF corporation,WF1943B,0000000,1.00”

6.3.62 LOV/?LOV

Description

Sets/queries the low level. The setting for the amplitude/offset sweep is ignored.
In a query for the amplitude/offset sweep and the modulation, an instantaneous value is returned at that time.
When LOG is used with the low level user-defined unit of the "ULU" command, specify as follows.
When the actual low level is 0, the response is “-INF” or “+INF”. To specify the value, specify “-INF”/“+INF”.
When the actual low level is negative, the response is “OVER”. You cannot specify the actual low level as negative.

Parameters

Low level setting (the range changes based on the unit and the LOAD settings)
When the range is 10V ,the load is open, and the unit is V: -10 (-10V) to + 10 (+10V)
When the user-defined unit is selected, the setting/query cannot be less than 0V.

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:LOW
{<low>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:LOW? [MINimum|MAXimum]

Setting example

Sets the low level to 0V/open. It is assumed that the low level unit is selected as V, and LOAD is set to OPEN in advance.
Type 1: LOV 0
Type 2 (For reference):VOLT:LOW 0

Compatibility Information

Compatibility support
The minimum value has been changed from the previous WF194x series.(-20V → -10V)

6.3.63 LVU/?LVU

Description

Selects/queries the low level unit. When a unit is selected, units of high level and DC offset are also changed.

Parameters

Low level unit selection (0/1)

Type 1 Type 2 (For reference)

0 : V (V)

1 : USER (user-defined unit)

When setting with Type 2 (For reference), "DEFault" is handled as being equivalent to "V".

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:LOW:UNIT {V|USER|DEFault}

Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:LOW:UNIT?

Setting example

Sets the low level unit to V.

Type 1: LVU 0

Type 2 (For reference):VOLT:LOW:UNIT V

Compatibility Information

Compatibility support

6.3.64 MCO/?MCO

Description

Sets/queries the comment of the setting memory.

Parameters

①The number of the setting memory (1 to 10) to add a comment

②Comment (string data, up to 20 characters)

In query commands, the parameter is only ①.

Response format

The setting number and a comment of memory

Type 2 (For reference)

Settings: :MEMory:STATe:COMMent {1|2|3|4|5|6|7|8|9|10},<comment>

Query: :MEMory:STATe:COMMent? {1|2|3|4|5|6|7|8|9|10}

Setting example

Writes a comment “Comment” to the first setting memory.

Type 1: MCO 1,“Comment”

Type 2 (For reference):MEM:STAT:COMM 1,“Comment”

Query example

Sets/queries the comment of the first setting memory.

Type 1: ?MCO 1

Type 2 (For reference):MEM:STAT:COMM? 1

Compatibility Information

The method to specified memory number is changed from the previous WF194x series. (0 to 9 → 1 to 10)
The set memory comments are not recorded.
They are initialized at power-on.

6.3.65 MDL

Description

Deletes the setting memory.

Parameters

The setting memory number to delete (1 to 10)

Type 2 (For reference)

Settings: :MEMory:STATe:DELete {1|2|3|4|5|6|7|8|9|10}
Query: None

Setting example

Deletes the first setting memory.
Type 1: MDL 1
Type 2 (For reference):MEM:STAT:DEL 1

Compatibility Information

The method to specified memory number is changed from the previous WF194x series. (0 to 9 → 1 to 10)

6.3.66 MDO/?MDO (WF1948)

Description

Selects/inquires whether to operate start/stop of modulation from the panel key and the external control separately for each channel, or common to both channels.

Parameters

Operation status selection (0/1)

Type 1		Type 2 (For reference)
0	:	OFF (Independent for each channel)
1	:	ON (Common to both channels)

Type 2 (For reference)

Settings: [:SOURce]:MODulation:OCOMmon {0|1|OFF|ON}
Query: [:SOURce]:MODulation:OCOMmon?

Setting example

Makes the start/stop operation common to both channels.
Type 1: MDO 1
Type 2 (For reference):MOD:OCOM ON

Compatibility Information

In case of common channel setting (1 or ON), when setting the command to change frequency or amplitude, it is set as common to both channels.
If you set different frequency or amplitude for each channel, set as 0 or OFF once, and then set the frequency and/or amplitude.

6.3.67 MKA/?MKA

Description

Sets/queries the marker value of the amplitude sweep.

Parameters

The setting range is the same as amplitude setting (AMV)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:MARKer {<amplitude>|MINimum|MAXimum}

Query: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:MARKer? [MINimum|MAXimum]

Setting example

Sets the marker value of the amplitude sweep to 5Vp-p/open. It is assumed that the amplitude unit is Vp-p, and LOAD is set to OPEN in advance.

Type 1: MKA 5

Type 2 (For reference):VOLT:MARK 5

Compatibility Information

Compatibility support

6.3.68 MKE/?MKE

Description

Sets/queries the marker value of the DC offsets sweep.

Parameters

The setting range is the same as that of the DC offset setting (OFS)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:MARKer {<offset>|MINimum|MAXimum}

Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:MARKer? [MINimum|MAXimum]

Setting example

Sets the marker value of the DC offset sweep to 0V. It is assumed that the unit of DC offset is V, and LOAD is set to OPEN in advance.

Type 1: MKE 0

Type 2 (For reference):VOLT:OFFS:MARK 0

Compatibility Information

Compatibility support

6.3.69 MKF/?MKF

Description

Sets/inquires the value of marker frequency sweep.

Parameters

The setting range is the same as that of the frequency setting (FRQ)

Type 2 (For reference)

Settings: [:SOURce]:FREQuency:MARKer {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:FREQuency:MARKer? [MINimum|MAXimum]

Setting example

Sets the marker value of the frequency sweep to 5kHz.
Type 1: MKF 5E03
Type 2 (For reference):FREQ:MARK 5E03

Compatibility Information

Compatibility support

6.3.70 MKP/?MKP

Description

Sets/queries the marker value of the phase sweep.

Parameters

The setting range is the same as that of the phase setting (PHS)

Type 2 (For reference)

Settings: [:SOURce]:PHASe:MARKer {<phase>|MINimum|MAXimum}
Query: [:SOURce]:PHASe:MARKer? [MINimum|MAXimum]

Setting example

Sets the marker value of the phase sweep to 0deg.
Type 1: MKP 0
Type 2 (For reference):PHAS:MARK 0

Compatibility Information

Compatibility support

6.3.71 MKU/?MKU

Description

Sets/queries the marker value of duty sweep.

Parameters

The setting range is the same as that of the duty setting (DTY)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:DCYCle:MARKer {<duty cycle>|MINimum|MAXimum}
Query: [:SOURce]:PULSe:DCYCle:MARKer? [MINimum|MAXimum]

Setting example

Set the marker value of duty sweep as 50%.
Type 1: MKU 50
Type 2 (For reference):PULS:DCYC:MARK 50

Compatibility Information

Compatibility support

6.3.72 MRK/?MRK

Description

Sets/queries the mark wave number (the frequency for the burst oscillation and trigger oscillation).

Parameters

Mark wave number setting
0.5 (0.5 waves) to 999999.5 (999999.5 waves)

Type 2 (For reference)

Settings: [:SOURce]:BM:MARK {<mark>|MINimum|MAXimum}
Query: [:SOURce]:BM:MARK? [MINimum|MAXimum]

Setting example

Sets the mark wave number to 10 waves.
Type 1: MRK 10
Type 2 (For reference):BM:MARK 10

Compatibility Information

The maximum value has been changed from the previous WF194x series.
(500000.0 waves → 999999.5 waves)
It is supported when the auto burst and trigger burst modes are set.

6.3.73 MSK/?MSK

Description

Writes/reads the service request enable register.
Each bit of the service request enable register corresponds to each bit of the status byte.
When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The pattern for the mask of the service request enable register (enable/disable) pattern 0 to 255.
When the bit is 1, SRQ become enabled
However, bit 6 does not become enabled. If 255 is sent, 191 is set

Type 2 (For reference)

Settings: *SRE <enable value>
Query: *SRE?

Setting example

Generates the SRQ only on the overload event.
Type 1: MSK 1
Type 2 (For reference): *SRE 1
☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.74 MTY/?MTY

Description

Selects/inquires the modulation type.

Parameters

Modulation type selection (0 to 4)

Type 1	Type 2 (For reference)	
0	: FREQuency	(Frequency)
1	: PHASe	(Phase)
2	: AMPLitude	(Amplitude)
3	: OFFSet	(DC Offset)
4	: DUTY	(Duty)

Type 2 (For reference)

Settings: [:SOURce]:MODulation:TYPE
{FREQuency|PHASe|AMPLitude|OFFSet|DUTY}
Query: [:SOURce]:MODulation:TYPE?

Setting example

Sets the modulation type to the phase modulation.
Type 1: MTY 1
Type 2 (For reference):MOD:TYPE PHAS

Compatibility Information

Compatibility support

6.3.75 ?OC1

Description

Inquire CH 1 operation event status register.

The CH 1 operation event status register is cleared in the case of the follows.

- •After power-on
- •The CLS (*CLS) command is executed
- •The PST(:SYSTem:PRESet) command is executed
- •Reading is performed in a query command (B9, B11)

The relationship between each operation and set/clear of the bits is as follows.

(-shows not changed)

		B3 (executing)	B9 (start)	B10 (pause)	B11 (stop)	B12 (space)
Modulation/ Sweep	Start	SET	SET	CLEAR	-	-
	Pause	CLEAR	-	SET	SET	-
	Clear pause	SET	SET	CLEAR	-	-
	Stop	CLEAR	-	CLEAR	SET	-
Oscillation	Start	-	-	-	-	CLEAR
	Stop	-	-	-	-	SET
Load the status register		-	CLEAR	-	CLEAR	-

Response format

A value (0 to 65535) of CH 1 operation event status register

Type 2 (For reference)

Settings: None

Query: :STATus:OPERation:CH1:CONDition?

Response example

OC1 0

☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.76 ?OC2 (WF1948)

Description

Inquire CH 2 operation event status register.

The CH 2 operation event status register is cleared in the case of the follows.

- •After power-on
- •The CLS (*CLS) command is executed
- •The PST(:SYSTem:PRESet) command is executed
- •Reading is performed in a query command (B9, B11)

The relationship between each operation and set/clear of the bits is as follows.

(-shows not changed)

		B3 (executing)	B9 (start)	B10 (pause)	B11 (stop)	B12 (space)
Modulation/ Sweep	Start	SET	SET	CLEAR	-	-
	Pause	CLEAR	-	SET	SET	-
	Clear pause	SET	SET	CLEAR	-	-
	Stop	CLEAR	-	CLEAR	SET	-
Oscillation	Start	-	-	-	-	CLEAR
	Stop	-	-	-	-	SET
Load the status register		-	CLEAR	-	CLEAR	-

Response format

A value (0 to 65535) of CH 2 operation event status register

Type 2 (For reference)

Settings: None

Query: :STATus:OPERation:CH2: CONDition?

Response example

OC2 0

☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.77 ODV/?ODV

Description

Sets/queries the DC offset deviation for the DC offset modulation. Cannot be set if LOG is selected as the user-defined unit. Returns “INVALID” as a value, if inquired.

Parameters

DC offset deviation for DC offset modulation
(The range changes based on the unit and the LOAD settings)
When the range is 10V, the load is open, the unit is V: 0 (0V) to 20 (20V)

Type 2 (For reference)

Settings: [:SOURce]:OM:DEViation {<peak deviation>|MINimum|MAXimum}
Query: [:SOURce]:OM:DEViation? [MINimum|MAXimum]

Setting example

Set the deviation for the DC offset modulation to 1V.
Type 1: ODV 1
Type 2 (For reference):OM:DEV 1

Compatibility Information

Change the DC offset deviation setting to 1/2 of that.
WF1947/WF1948 treats the DC offset deviation of 10V as the maximum.
For details, see "2. Command Descriptions Descriptions of Individual Commands [:SOURce[1|2]]:OFSM[:DEViation]."

6.3.78 OE1/?OE1

Description

Sets/queries the CH 1 operation event status enable register. When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The mask (enable/disable) pattern of the CH 1 operation event status enable register (0 to 65535)

Type 2 (For reference)

Settings: :STATus:OPERation:CH1: ENABle <value>
Query: :STATus:OPERation:CH1: ENABle?

Setting example

Sets the CH 1 operation event status enable register to
8 (bit 3: single/gated sweep)
Type 1: OE1 8
Type 2 (For reference):STAT:OPER:CH1: ENAB 8
☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.79 OE2/?OE2 (WF1948)

Description

Sets/queries the CH 2 operation event status enable register.
When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The mask (enable/disable) pattern of the CH 2 operation event status enable register (0 to 65535)

Type 2 (For reference)

Settings: :STATus:OPERation:CH2: ENABle <value>
Query: :STATus:OPERation:CH2: ENABle?

Setting example

Sets the CH 2 operation event status enable register to
512 (bit 9: single/gated sweep)
Type 1: OE2 512
Type 2 (For reference):STAT:OPER:CH2: ENAB 512
☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.80 OFC/?OFC)

Description

Sets/queries the modulation waveform for the DC offset modulation.

Parameters

Modulation waveform selection (0 to 4)

Type 1	Type 2 (For reference)	
0	: SINusoid	(Sine wave)
1	: TRIangle	(Triangle wave)
2	: SQUare	(Rectangular wave)
3	: PRAMp	(Rising sawtooth wave)
4	: NRAMp	(Falling sawtooth wave)

Type 2 (For reference)

Settings: [:SOURce]:OM:INTernal:FUNCtion
{SINusoid|TRIangle|SQUare|PRAMp|NRAMp}
Query: [:SOURce]:OM:INTernal:FUNCtion?

Setting example

Set the modulation waveform of DC offset modulation as rising sawtooth wave.
Type 1: OFC 3
Type 2 (For reference):OM:INT:FUNC PRAM

Compatibility Information

Compatibility support

6.3.81 OFQ/?OFQ

Description

Sets/queries the modulation frequency for the DC offset modulation.

Parameters

Modulation frequency : 0.1E-3 (0.1mHz) ~100000 (100kHz),
Resolution: 5 digits for 1Hz or higher, 0.1E-3 (0.1mHz) for less than 1Hz

Type 2 (For reference)

Settings: [:SOURce]:OM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:OM:INTernal:FREQuency? [MINimum|MAXimum]

Setting example

Set the modulation frequency of DC offset modulation as 100Hz.
Type 1: OFQ 100
Type 2 (For reference):OM:INT:FREQ 100

Compatibility Information

The maximum value has been changed from the previous WF194x series.(500Hz → 100kHz)

6.3.82 OFS/?OFS

Description

Sets/queries DC offset. During offset sweep, this setting is ignored.
In a query for the offset sweep and the modulation, an instantaneous value is returned at that time.
When the user-defined unit LOG is used as the unit of DC offset, do as follows.
When the actual DC offset is 0, the response is "-INF" or "+INF". To set to this value, specify "-INF"/"+INF".
When the actual DC offset is negative, the response is "OVER". You cannot specify the actual DC offset as negative.

Parameters

DC offset setting (the range changes based on the unit and the LOAD settings)
When the range is 10V ,the load is open, and the unit is V: -10 (-10V) to + 10 (10V)
When a user-defined unit is selected, it may not be possible to set less than 0V.

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet
{<offset>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet?
[MINimum|MAXimum]

Setting example

Sets DC offset to 2.5V/open. It is assumed that the unit of DC offset is V, and LOAD is set to OPEN in advance.
Type 1: OFS 2.5
Type 2 (For reference):VOLT:OFFS 2.5

Compatibility Information

Compatibility support

6.3.83 OFU/?OFU

Description

Selects/inquires the unit of DC offset.

Parameters

DC offset unit selection (0/1)

Type 1 Type 2 (For reference)

0 : V (V)

1 : USER (user-defined unit)

When setting with Type 2 (For reference), "DEFault" is handled as being equivalent to "V".

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:UNIT
{V|USER|DEFault}

Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:UNIT?

Setting example

Sets the unit of DC offset to the user-defined unit.

Type 1: OFU 1

Type 2 (For reference):VOLT:OFFS:UNIT USER

Compatibility Information

Compatibility support

6.3.84 OLD/?OLD

Description

Sets/inquires the LOAD function.

It is a function to set the actual output voltage when the load connects FUNCTION OUT. Between the actual output voltage and the output voltage when the load is open, the following relation exists:

[the actual output voltage]=

$$[\text{the output voltage when the load is open}]\times\frac{[\text{Load impedance setting}]}{50+[\text{Load impedance setting}]}$$

Parameters

Load impedance

1 (1Ω) ~10000 (10000Ω)

Type 2 (For reference)

Settings: :OUTPut:LOAD {<load>|MINimum|MAXimum}

Query: :OUTPut:LOAD? [MINimum|MAXimum]

Setting example

Allows FUNCTION OUT to set/display the actual output voltage when terminated at 50Ω.

Type 1: OLD 50

Type 2 (For reference):OUTP:LOAD 50

Compatibility Information

The minimum and maximum value has been changed from the previous WF194x series.

(45Ω~999Ω → 1Ω~10000Ω)

6.3.85 OLS/?OLS

Description

Selects/queries the On/Off of the LOAD function.

Parameters

Termination status

Type 1 Type 2 (For reference)

0 : OFF (Sets/displays the voltage when the load is opened)

1 : ON (Sets/displays the actual output voltage when terminated at the load specified in OLD)

Type 2 (For reference)

Settings: :OUTPut:LOAD:STATe {0|1|OFF|ON}

Query: :OUTPut:LOAD:STATe?

Setting example

Sets/displays the voltage when the load is opened (the LOAD function is off).

Type 1: OLS 0

Type 2 (For reference):OUTP:LOAD:STAT OFF

Compatibility Information

Compatibility support

6.3.86 OMO/?OMO

Description

Selects/inquires the oscilaltion mode.

Parameters

The selection of oscillation mode (0 to 5)

Type 1	Type 2 (For reference)	
0	: NORMal	(Continuous)
1	: BURSt	(Burst)
2	: SWEep	(Sweep)
3	: MODulation	(Modulation)
4	: NOISe	(Noise)
5	: DC	(DC)

Type 2 (For reference)

Settings: [:SOURce]:MODE {NORMal|BURSt|SWEep|MODulation|NOISe|DC}
Query: [:SOURce]:MODE?

Setting example

Enables the burst oscillation mode.
Type 1: OMO 1
Type 2 (For reference):MODE BURS

Compatibility Information

Compatibility support

6.3.87 OPC/?OPC

Description

This is a command to notify the single/gated sweep on each channel has finished. When the OPC command is executed and the single/gated sweep on each channel has finished, the OPC bit on the normal event status register is set.
When the ?OPC command is executed and the single/gated sweep on each channel has finished, the response is 1.
The bit is reset at power-on.

Parameters

None

Response format

1 (the response is just 1 without the header)

Type 2 (For reference)

Settings: *OPC
Query: *OPC?

Compatibility Information

Compatibility support

6.3.88 ORG/?ORG

Description

Selects/queries the output range.

Parameters

Output range (0 to 2)

Type 1 Type 2 (For reference)

0 : AUTO (auto range selection)

1 : 10V (10V range)

2 : 1V (1V range)

Type 2 (For reference)

Settings: :OUTPut:RANGe {AUTO|10V|1V}| {AUTO|2V|200mV|20mV}

Query: :OUTPut:RANGe?

Setting example

Enables the auto range.

Type 1: ORG 0

Type 2 (For reference):OUTP:RANG AUTO

Compatibility Information

Although any errors do not occur with a command to select the range, it is enable with the auto range setting.

In the command, the range hold setting of WF1947/WF1948 is not available.

6.3.89 ?OSC

Description

Inquire operation event status register.

The operation event status register is cleared in the following cases.

- After power-on
- The CLS (*CLS) command is executed
- The PST(:SYSTem:PRESet) command is executed

Response format

A value (0 to 65535) of operation event status register

Type 2 (For reference)

Settings: None

Query: :STATus:OPERation:CONDition?

Response example

OSC 0

☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.90 OSE/?OSE

Description

Sets/queries the operation event status enable register.
When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The mask (enable/disable) pattern of the operation event status enable register (0 to 65535)

Type 2 (For reference)

Settings: :STATus:OPERation:ENABle <value>
Query: :STATus:OPERation:ENABle?

Setting example

Sets the operation event status enable register to 3
(both bit 0: the CH 1 operation event status register and bit 1: the CH2 operation event status register).
Type 1: OSE 3
Type 2 (For reference):STAT:OPER:ENAB 3
☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.91 OSS

Description

Sets the output as the start value/stop value in the DC offset sweep.

Parameters

Start value/stop value (0/1)

Type 1 Type 2 (For reference)

0 : STOP (Sets the output as the stop value)

1 : STARt (Sets the output as the starting value)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:STATe {STARt|STOP}

Query: None

Setting example

Sets the output as the stop value in the DC offset sweep.

Type 1: OSS 0

Type 2 (For reference):VOLT:OFFS:STAT STOP

Compatibility Information

Compatibility support

6.3.92 PDV/?PDV

Description

Sets/queries the phase deviation for the phase modulation. Cannot be set if LOG is selected as the user-defined unit. When queried, "INVALID" is returned.

Parameters

When the phase for the phase modulation is deviation and the unit is deg

0.000 (0deg) to 3600.000 (3600deg), the resolution: 0.001 (0.001deg)

Type 2 (For reference)

Settings: [:SOURce]:PM:DEViation {<peak deviation>|MINimum|MAXimum}

Query: [:SOURce]:PM:DEViation? [MINimum|MAXimum]

Setting example

Sets the deviation for the phase modulation to 90deg.

Type 1: PDV 90

Type 2 (For reference):PM:DEV 90

Compatibility Information

Set the phase deviation setting up to 180.000deg.

WF1947/WF1948 treats the phase deviation of 180.000deg as the maximum.

For details, see "2. Command Descriptions, Descriptions of Individual Commands, [:SOURce[1|2]]:PM[:DEViation]."

6.3.93 PFC/?PFC

Description

Selects/queries the modulation waveform for the phase modulation.

Parameters

Modulation waveform selection (0 to 4)

Type 1	Type 2 (For reference)	
0	: SINusoid	(Sine wave)
1	: TRIangle	(Triangle wave)
2	: SQUare	(Rectangular wave)
3	: PRAMp	(Rising sawtooth wave)
4	: NRAMp	(Falling sawtooth wave)

Type 2 (For reference)

Settings: [:SOURce]:PM:INTernal:FUNCtion
{SINusoid|TRIangle|SQUare|PRAMp|NRAMp}
Query: [:SOURce]:PM:INTernal:FUNCtion?

Setting example

Changes a modulation waveform of phase modulation into a triangular wave.
Type 1: PFC 1
Type 2 (For reference):PM:INT:FUNC TRI

Compatibility Information

Compatibility support

6.3.94 PFQ/?PFQ

Description

Sets/inquires the modulation frequency of phase.

Parameters

Modulation frequency : 0.1E-3 (0.1mHz) ~1000000 (1MHz)
5 digits for the resolution of :1Hz or higher, 0.1E-3 (0.1mHz) for less than 1Hz

Type 2 (For reference)

Settings: [:SOURce]:PM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:PM:INTernal:FREQuency? [MINimum|MAXimum]

Setting example

Set the modulation frequency of phase modulation as 100Hz.
Type 1: PFQ 100
Type 2 (For reference):PM:INT:FREQ 100

Compatibility Information

The maximum value has been changed from the previous WF194x series.(500Hz → 1MHz)

6.3.95 PHS/?PHS

Description

Sets/inquires the phase. During phase sweep, this setting is ignored.
For query to phase sweep/modulation, the instantaneous value of the query is returned.
When LOG is used with the phase user-defined unit of the "PHU" command, specify as follows.
When the actual phase is 0, the response is "-INF" or "+INF". To set to this value, specify "-INF"/"+INF".
When the actual phase is negative, the response is "OVER". You cannot specify the actual phase as negative in this case.

Parameters

Phase setting (the range varies depending on the unit setting)
When the unit is the degree, the setting range is as follows.
-1800.000 (-1800deg) to +1800.000 (+1800deg), resolution: 0.001 (0.001deg)

Type 2 (For reference)

Settings: [:SOURce]:PHASe {<phase>|MINimum|MAXimum}
Query: [:SOURce]:PHASe? [MINimum|MAXimum]

Setting example

Sets the phase to 90deg.
Type 1: PHS 90
Type 2 (For reference):PHAS 90

Compatibility Information

Compatibility support

6.3.96 PHU/?PHU

Description

Selects/inquires the unit of phase.

Parameters

Phase unit selection (0/1)

Type 1	Type 2 (For reference)
0	: DEG (degree)
1	: USER (user-defined unit)

When setting with Type 2 (For reference), "DEFault" is handled as being equivalent to "DEG".

Type 2 (For reference)

Settings: [:SOURce]:PHASe:UNIT {DEG|USER|DEFault}
Query: [:SOURce]:PHASe:UNIT?

Setting example

Sets the unit of the phase to user-defined unit.
Type 1: PHU 1
Type 2 (For reference):PHAS:UNIT USER

Compatibility Information

Compatibility support

6.3.97 POS/?POS

Description

Selects/queries the output status at power-on.

Parameters

Output status at power-on (0 to 2)

Type 1 Type 2 (For reference)

0 : LAST (restores to the status when power is previously turned off)

1 : OFF (off)

2 : ON (on)

Type 2 (For reference)

Settings: :SYSTem:PON {LAST|OFF|ON}

Query: :SYSTem:PON?

Setting example

Turns the output on at power-on.

Type 1: POS 2

Type 2 (For reference):SYST:PON ON

Compatibility Information

Compatibility support

6.3.98 PRD/?PRD

Description

Sets/inquires the frequency. During frequency sweep, this setting is ignored.
For query to frequency sweep/modulation, the instantaneous value of the query is returned.

Parameters

Cycle setting (the range varies depending on the unit setting)
When the unit is the second, the setting range is as follows.
33.333333334E-09 (33.333333334ns=30MHz) ~100E+06 (100000000s=10nHz)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:PERiod {<period>|MINimum|MAXimum}

Query: [:SOURce]:PULSe:PERiod? [MINimum|MAXimum]

Setting example

Set the period to 1µs.

Type 1: PRD 1E-06

Type 2 (For reference):PULSE:PER 1E-06

Compatibility Information

The minimum value has been changed from the previous WF194x series.
(66.666666667ns=15MHz ~ 33.333333334ns=30MHz)

6.3.99 PRU/?PRU

Description

Selects/inquires the frequency unit.

Parameters

Cycle unit selection (0/1)
When the unit is changed, the unit of the pulse width is also changed.
Type 1 Type 2 (For reference)
0 : SEC (s: second)
1 : USER (user-defined unit)
When setting with Type 2 (For reference), "DEFault" is handled as being equivalent to "SEC".

Type 2 (For reference)

Settings: [:SOURce]:PULSe:PERiod:UNIT {SEC|USER|DEFault}
Query: [:SOURce]:PULSe:PERiod:UNIT?

Setting example

Set the unit of cycle as s.
Type 1: PRU 0
Type 2 (For reference):PULS:PER SEC

Compatibility Information

Compatibility support

6.3.100 PSC/?PSC

Description

Controls/loads the clear at power-on flag for status register (status/status enable/service request enable).
When this flag set, all of status registers are cleared at power-on. However, the PON bit of the standard event status register is not cleared. Also, although the status byte is not included in the status register, eventually it becomes all zero.
This flag is set to 1 at factory shipment and when any error occurs due to the backup battery drain.

Parameters

The status of the clear at power-on flag (0/1)
0: Not clear the status register at power-on
1: Clear the status register at power-on

Type 2 (For reference)

Settings: *PSC {0|1}
Query: *PSC?

Setting example

Clear the status register at power-on.
Type 1: PSC 1
Type 2 (For reference): *PSC 1

Compatibility Information

Compatibility support

6.3.101 PSS

Description

Sets the output as the start value/stop value in the phase sweep.

Parameters

Start value/stop value (0/1)

Type 1 Type 2 (For reference)

0 : STOP (Sets the output as the stop value)

1 : STARt (Sets the output as the starting value)

Type 2 (For reference)

Settings: [:SOURce]:PHASe:STATe {STARt|STOP}

Query: None

Setting example

Sets the output as the stop value in the phase sweep.

Type 1: PSS 0

Type 2 (For reference):PHAS:STAT STOP

Compatibility Information

Compatibility support

6.3.102 PST

Description

Sets each setting to the initial value. For the initial values, see the instruction manual of the main unit.

Cancels the previous received OPC/?OPC command.

Also, the following event status registers are cleared.

- •Operation event status register
- •Overload event status register
- •Warning event status register
- •CH 1 operation event status register
- •CH 1 Overload event status register
- •CH 1 Warning event status register
- •CH 2 operation event status register WF1948
- •CH 2 Overload event status register WF1948
- •CH 2 Warning event status register WF1948

Also, the setting status set by the following command changes.

AFM, HLE, TRE

Parameters

None

Type 2 (For reference)

Settings: :SYSTem:PRESet

Query: None

Compatibility Information

Compatibility support

6.3.103 PUW/?PUW

Description

Sets/inquires the pulse width. During duty sweep, this setting is ignored. For query to duty sweep/pulse width modulation, the instantaneous value of the query is returned.

Parameters

Pulse width setting (the range varies depending on the unit setting)
When the unit is the second, the setting range is as follows.
When the unit is s, it is 24.0E-09 (24ns) to 99.983E+06 (99.983Ms)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:WIDTh {<width>|MINimum| MAXimum}
Query: [:SOURce]:PULSe:WIDTh? [MINimum|MAXimum]

Setting example

Sets the pulse wave to 1ms.
Type 1: PUW 0.001
Type 2 (For reference):PULS:WIDT 0.001

Compatibility Information

The minimum and maximum value has been changed from the previous WF194x series.
(0.0066666666667ns ~99990000s → 24ns ~99.983Ms)

6.3.104 PWU/?PWU

Description

Selects/inquires the unit of pulse width.
When the unit is selected, the unit of the period is also changed.
When the pulse width unit is USER, the period user-defined unit is used.

Parameters

Pulse width unit selection (0/1)

Type 1	Type 2 (For reference)
0	: SEC (s: second)
1	: USER (user-defined unit)

When setting with Type 2 (For reference), "DEFault" is handled as being equivalent to "SEC".

Type 2 (For reference)

Settings: [:SOURce]:PULSe:WIDTh:UNIT {SEC|USER|DEFault}
Query: [:SOURce]:PULSe:WIDTh:UNIT?

Setting example

Set the unit of pulse width as s.
Type 1: PWU 0
Type 2 (For reference):PULS:WIDT SEC

Compatibility Information

Compatibility support

6.3.105 RCL

Description

Loads the setting.
There are 10 pairs of the setting memories.
If the setting memory that is not saved is loaded, an error occurs.

Parameters

Setting Memory number: 1~10

Type 2 (For reference)

Settings: *RCL {1|2|3|4|5|6|7|8|9|10}
Query: None

Setting example

Loads the first setting memory.
Type 1: RCL 1
Type 2 (For reference): *RCL 1

Compatibility Information

The method to specified memory number is changed from the previous WF194x series. (0 to 9 → 1 to 10)

6.3.106 RST

Description

Initializes the setting.
Sets each setting to the initial value. For the initial values, see the instruction manual of the main unit.
Cancels the previous received OPC/?OPC command.
The event status register is not cleared.
Also, the setting status set by the following command changes.
AFM, HLE, TRE

Parameters

None

Type 2 (For reference)

Settings: *RST
Query: None

Compatibility Information

When the RST command is executed, the output is set to off.

6.3.107 SEC/?SEC (WF1948)

Description

Selects/queries the external trigger channel of CH 2 while the single sweep and gated sweep.

Parameters

Channel number (1 to 2)

1: Use the TRIG/SWEEP IN of CH 1 as the trigger source of CH 2
2: Use the TRIG/SWEEP IN of CH 2 as the trigger source of CH 2
When setting with Type 2 (For reference), "DEFault" is handled as being equivalent to "2".

Type 2 (For reference)

Settings: [:SOURce]:SWEep:EXTernal:CHANnel {<channel>|DEFault}
Query: [:SOURce]:SWEep:EXTernal:CHANnel?

Setting example

Use the TRIG/SWEEP IN of CH 1 as the trigger source of CH 2.
Type 1: SEC 1
Type 2 (For reference):SWE:EXT:CHAN 1

Compatibility Information

Compatibility support

6.3.108 SES/?SES

Description

Selects/queries the polarity of the trigger signal while the single sweep and gated sweep.

Parameters

Trigger signal polarity (0/1)

Type 1	Type 2 (For reference)
0	: POSitive (Triggers at rising)
1	: NEGative (triggers at falling)

When setting with Type 2 (For reference), "DEFault" is handled as being equivalent to "NEGative".

Type 2 (For reference)

Settings: [:SOURce]:SWEep:SLOPe {POSitive|NEGative|DEFault}
Query: [:SOURce]:SWEep:SLOPe?

Setting example

Sets to start the single sweep at rising of the trigger signal.
Type 1: SES 0
Type 2 (For reference):SWE:SLOP POS

Compatibility Information

Compatibility support

6.3.109 SFC/?SFC

Description

Selects/queries the sweep function.

Parameters

Select (0 to 1) Sweep function

Type 1	Type 2 (For reference)
0	: TRIangle (triangular waveform sweep)
1	: RAMP (ramp waveform sweep)

Type 2 (For reference)

Settings: [:SOURce]:SWEep:INTernal:FUNCtion
{SINusoid|TRIangle|SQUare|RAMP|DEFault}
Query: [:SOURce]:SWEep:INTernal:FUNCtion?

Setting example

Sets the sweep function to the triangular waveform sweep.
Type 1: SFC 1
Type 2 (For reference):SWE:INT:FUNC TRI

Compatibility Information

Selection and query of the rectangular and sine waveform sweep in WF194x series are not supported. Consider other approach.
Followings are commands in WF1947/WF1948 that are available for the sweep.

[Sweep function]
Modulation: specify a sweep function for corresponding each oscillation mode of FSK, PSK, FM, PM, AM, and AM(DSB-SC).

FSK	[:SOURce[1|2]]:FSKey:INTernal:FUNCtion[:SHAPe]
PSK	[:SOURce[1|2]]:PSKey:INTernal: FUNCtion[:SHAPe]
FM	[:SOURce[1|2]]:FM:INTernal: FUNCtion[:SHAPe]
PM	[:SOURce[1|2]]:PM:INTernal: FUNCtion[:SHAPe]
AM	[:SOURce[1|2]]:AM:INTernal: FUNCtion[:SHAPe]
AM(DSB-SC)	[:SOURce[1|2]]:AMSC:INTernal: FUNCtion[:SHAPe]

For details, see "2. Command Descriptions Descriptions of Individual Commands."

6.3.110 SGS/?SGS

Description

Selects/queries the sweep trigger source for the single sweep and gated sweep.

Parameters

Trigger source (0/1)
Type 1 Type 2 (For reference)
0 : INTernal (uses the internal trigger oscillator as the trigger source)
1 : EXTernal (uses the signal of the TRIG/SWEEP IN connector as the trigger source)

Type 2 (For reference)

Settings: [:SOURce]:SWEep:SOURce {INTernal|EXTernal}
Query: [:SOURce]:SWEep:SOURce?

Setting example

Sets the signal of the TRIG/SWEEP IN connector as the trigger source.
Type 1: SGS 1
Type 2 (For reference):SWE:SOUR EXT

Compatibility Information

A trigger source of the SWEEP IN connector signal is not supported.

6.3.111 SIG/?SIG

Description

Selects/queries the On/Off of the output.

Parameters

Output status (0/1)

Type 1 Type 2 (For reference)

0 : OFF (output off)

1 : ON (output on)

Type 2 (For reference)

Settings: :OUTPut:STATe {0|1|OFF|ON}

Query: :OUTPut:STATe?

Setting example

Turn on the output.

Type 1: SIG 1

Type 2 (For reference):OUTP:STAT ON

Compatibility Information

Compatibility support

6.3.112 SIR/?SIR

Description

Sets/queries the internal trigger period for the single and gates sweep.

Parameters

Internal trigger cycle: 1E-04 (100µs) ~10000.0 (10000s)

Resolution: 4 digits for more than 1ms, 1E-07 (0.1µs) for less than 1ms

Type 2 (For reference):

Settings: [:SOURce]:SWEep:INTernal:RATE {<rate>|MINimum|MAXimum}

Query: [:SOURce]:SWEep:INTernal:RATE? [MINimum|MAXimum]

Setting example

Sets the oscillation period of the internal trigger oscillator to 1ms.

Type 1: SIR 1E-03

Type 2 (For reference):SWE:INT:RATE 1E-03

Compatibility Information

The minimum and maximum value has been changed from the previous WF194x series.

(1µs ~ 100s → 100µs ~ 10000s)

The resolution less than 1ms has been changed from the previous WF194x series.

(1µs → 0.1µs)

6.3.113 SLS/?SLS

Description

Selects/queries the stop level to stop oscillation for the gated sweep.

For the duty sweep, this command is disabled.

Parameters

Stop level status (0/1)
Type 1 Type 2 (For reference)
0 : OFF (Stop level OFF)
1 : ON (Stop level ON)

Type 2 (For reference)

Settings: [:SOURce]:SWEep:SLEVel:STATe {0|1|OFF|ON}
Query: [:SOURce]:SWEep:SLEVel:STATe?

Setting example

Set the stop level function as unused (OFF).
Type 1: SLS 0
Type 2 (For reference):SWE:SLEV:STAT OFF

Compatibility Information

Compatibility support

6.3.114 SLV/?SLV

Description

The gated sweep sets/queries the stop level to stop oscillation.

Parameters

Stop level value: -100.00 (-100%) ~+100.00 (+100%)
Resolution: 0.01 (0.01%)

Type 2 (For reference)

Settings: [:SOURce]:SWEep:SLEVel {<stop level>|MINimum|MAXimum}
Query: [:SOURce]:SWEep:SLEVel? [MINimum|MAXimum]

Setting example

Set the stop level as +33.3%.
Type 1: SLV 33.3
Type 2 (For reference):SWE:SLEV 33.3

Compatibility Information

Compatibility support

6.3.115 SMO/?SMO

Description

Selects/queries the sweep mode.

Parameters

Selects sweep mode (0 to 2)
Type 1 Type 2 (For reference)
0 : SINGle (single sweep)
1 : CONTinuous (continuous sweep)
2 : GATed (gated sweep)

Type 2 (For reference)

Settings: [:SOURce]:SWEep:MODE {SINGle|CONTinuous|GATed}
Query: [:SOURce]:SWEep:MODE?

Setting example

Select the continuous sweep.
Type 1: SMO 1
Type 2 (For reference):SWE:MODE CONT

Compatibility support

Compatibility support

6.3.116 SNA/?SNA

Description

Sets/inquires the value of span amplitude sweep.
Cannot be set if it is any of dBV, dBm, or LOG (as user-defined unit). Returns "INVALID" as a value, if inquired.

Parameters

The setting range is the same as amplitude setting (AMV).

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:SPAN
{<amplitude>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:SPAN?
[MINimum|MAXimum]

Setting example

Sets the span value for the amplitude sweep to 9 Vp-p/open. It is assumed that the amplitude unit is Vp-p, and LOAD is set to OPEN in advance.
Type 1: SNA 9
Type 2 (For reference):VOLT:SPAN 9

Compatibility support

Compatibility support

6.3.117 SNE/?SNE

Description

Sets/queries the span value of the DC offsets sweep. Cannot be set if LOG is selected as the user-defined unit. Returns "INVALID" as a value, if inquired.

Parameters

DC offset span (the range changes based on the unit and the LOAD settings)
When the range is 10 V, the load is open, the unit is V: 0 (0 V) ~20 (20 V)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:SPAN
{<offset>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:SPAN?
[MINimum|MAXimum]

Setting example

Sets the span value of the DC offset sweep to 20 V. It is assumed that the unit of DC offset is V, and LOAD is set to OPEN in advance.
Type 1: SNE 20
Type 2 (For reference):VOLT:OFFS:SPAN 20

Compatibility Information

Compatibility support

6.3.118 SNF/?SNF

Description

Sets/inquires the value of span frequency sweep. Cannot be set if LOG is selected as the user-defined unit. Returns "INVALID" as a value, if inquired.

Parameters

Frequency span (the range varies depending on the unit setting)
0.00000000 (0 Hz) ~29999999.99999999 (29999999.99999999 Hz)

Type 2 (For reference)

Settings: [:SOURce]:FREQuency:SPAN {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:FREQuency:SPAN? [MINimum|MAXimum]

Setting example

Sets the span value of the frequency sweep to 9 kHz.
Type 1: SNF 9E+3
Type 2 (For reference):FREQ:SPAN 9E+3

Compatibility Information

The maximum value has been changed from the previous WF194x series.
(14999999.99999998Hz → 29999999.99999999Hz)

6.3.119 SNP/?SNP

Description

Sets/inquires the value of span phase sweep. It cannot be set
when LOG is selected as the user-defined unit. Returns "INVALID" as a value, if inquired.

Parameters

Span phase (the range varies depending on the unit setting)
0.000 (0 deg) to 3600.000 (3600 deg), the resolution: 0.001 (0.001 deg)

Type 2 (For reference)

Settings: [:SOURce]:PHASe:SPAN {<phase>|MINimum|MAXimum}
Query: [:SOURce]:PHASe:SPAN? [MINimum|MAXimum]

Setting example

Sets the span value for the phase sweep to 180 deg.
Type 1: SNP 180
Type 2 (For reference):PHAS:SPAN 180

Compatibility Information

Compatibility support

6.3.120 SNU/?SNU

Description

Sets/queries the span value of duty sweep. Cannot be set if LOG is selected as the user-defined unit. Returns "INVALID" as a value, if inquired.

Parameters

Duty span (the range varies depending on the unit setting)
When the setting range is 0.01% to 99.99%: 0.0000 (0%) to 99.9800 (99.98%)
When the setting range is 0% to 100% 0.0000 (0%) ~100.0000 (100%)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:DCYCle:SPAN {<duty cycle>|MINimum|MAXimum}
Query: [:SOURce]:PULSe:DCYCle:SPAN? [MINimum|MAXimum]

Setting example

Set the span value of duty sweep as 20%.
Type 1: SNU 20
Type 2 (For reference):PULS:DCYC:SPAN 20

Compatibility Information

Compatibility support

6.3.121 SPA/?SPA

Description

Sets/queries the stop value for the amplitude sweep.

Parameters

The setting range is the same as amplitude setting (AMV)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STOP
{<amplitude>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STOP?
[MINimum|MAXimum]

Setting example

Sets the stop value for the amplitude sweep to 10 Vp-p/open. It is assumed that the amplitude unit is Vp-p, and LOAD is set to OPEN in advance.
Type 1: SPA 10
Type 2 (For reference):VOLT:STOP 10

Compatibility Information

Compatibility support

6.3.122 SPC/?SPC

Description

Sets/queries the space wave number (the frequency for the burst oscillation).

Parameters

Number of space wave setting: 0.5 (0.5 waves) to 999999.5 (999999.5 waves)

Type 2 (For reference)

Settings: [:SOURce]:BM:SPACe {<space>|MINimum|MAXimum}
Query: [:SOURce]:BM:SPACe? [MINimum|MAXimum]

Setting example

Sets the space wave number to 10 waves.
Type 1: SPC 10
Type 2 (For reference):BM:SPAC 10

Compatibility Information

The maximum value has been changed from the previous WF194x series.
(500000 waves → 999999.5 waves)

6.3.123 SPE/?SPE

Description

Sets/queries the stop value of the DC offsets sweep.

Parameters

The setting range is the same as that of the DC offset setting (OFS)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:STOP
{<offset>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:STOP?
[MINimum|MAXimum]

Setting example

Sets the stop value of the DC offset sweep to +10V. It is assumed that the unit of DC offset is V, and LOAD is set to OPEN in advance.
Type 1: SPE 10
Type 2 (For reference):VOLT:OFFS:STOP 10

Compatibility Information

Compatibility support

6.3.124 SPF/?SPF

Description

Sets/inquires the value of stop frequency sweep.

Parameters

The setting range is the same as that of the frequency (FRQ)

Type 2 (For reference)

Settings: [:SOURce]:FREQuency:STOP {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:FREQuency:STOP? [MINimum|MAXimum]

Setting example

Sets the stop value for the frequency sweep to 10kHz.
Type 1: SPF 1E4
Type 2 (For reference):FREQ:STOP 1E4

Compatibility Information

Compatibility support

6.3.125 SPP/?SPP

Description

Sets/queries the stop value for the phase sweep.

Parameters

The setting range is the same as that of the phase setting (PHS)

Type 2 (For reference)

Settings: [:SOURce]:PHASe:STOP {<phase>|MINimum|MAXimum}
Query: [:SOURce]:PHASe:STOP? [MINimum|MAXimum]

Setting example

Sets the stop value for the phase sweep to +90deg.
Type 1: SPP +90
Type 2 (For reference):PHAS:STOP +90

Compatibility Information

Compatibility support

6.3.126 SPU/?SPU

Description

Sets/queries the stop value for the duty sweep.

Parameters

The setting range is the same as that of the duty setting (DTY)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:DCYCle:STOP {<duty cycle>|MINimum|MAXimum}
Query: [:SOURce]:PULSe:DCYCle:STOP? [MINimum|MAXimum]

Setting example

Set the stop value of duty sweep as 60%.
Type 1: SPU 60
Type 2 (For reference):PULS:DCYC:STOP 60

Compatibility Information

Compatibility support

6.3.127 SSC/?SSC

Description

Selects/queries the sweep function.

Parameters

Select (0/1) Sweep function
Type 1 Type 2 (For reference)
0 : LINear (Linear sweep)
1 : LOGarithmic (Log sweep)

Type 2 (For reference)

Settings: [:SOURce]:SWEep:SPACing {LINear|LOGarithmic}
Query: [:SOURce]:SWEep:SPACing?

Setting example

Sets the sweep function to the log sweep.
Type 1: SSC 1
Type 2 (For reference):SWE:SPAC LOG

Compatibility Information

Compatibility support

6.3.128 STA/?STA

Description

Sets/queries the start value for the amplitude sweep.

Parameters

The setting range is the same as amplitude setting (AMV)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STARt
{<amplitude>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:STARt?
[MINimum|MAXimum]

Setting example

Sets the start value for the amplitude sweep to 1Vp-p/open. It is assumed that the amplitude unit is Vp-p, and LOAD is set to OPEN in advance.
Type 1: STA 1
Type 2 (For reference):VOLT:STAR 1

Compatibility Information

Compatibility support

6.3.129 STE/?STE

Description

Sets/queries the start value of the DC offsets sweep.

Parameters

The setting range is the same as that of the DC offset setting (OFS)

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:STARt
{<offset>|MINimum|MAXimum}
Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:STARt?
[MINimum|MAXimum]

Setting example

Sets the start value of the DC offset sweep to -10V. It is assumed that the unit of DC offset is V, and LOAD is set to OPEN in advance.
Type 1: STE -10
Type 2 (For reference):VOLT:OFFS:STAR –10

Compatibility Information

Compatibility support

6.3.130 STF/?STF

Description

Sets/queries the start value for the frequency sweep.

Parameters

The setting range is the same as that of the frequency setting (FRQ)

Type 2 (For reference)

Settings: [:SOURce]:FREQuency:STARt {<frequency>|MINimum|MAXimum}
Query: [:SOURce]:FREQuency:STARt? [MINimum|MAXimum]

Setting example

Sets the start value for the frequency sweep to 1kHz.
Type 1: STF 1E3
Type 2 (For reference):FREQ:STAR 1E3

Compatibility Information

Compatibility support

6.3.131 STM/?STM

Description

Sets/queries the sweep time.

Parameters

Sweep time setting: 1E-3 (1ms) ~10E3 (10000s)
Resolution: 1E-3 (1ms)

Type 2 (For reference)

Settings: [:SOURce]:SWEep:TIME {<seconds>|MINimum|MAXimum}
Query: [:SOURce]:SWEep:TIME?

Setting example

Sets the sweep time to 0.5s.
Type 1: STM 0.5
Type 2 (For reference):SWE:TIME 0.5

Compatibility Information

Compatibility support

6.3.132 STO

Description

Saves the setting.
There are 10 pairs of the setting memories.

Parameters

Setting Memory number (1 to 10)

Type 2 (For reference)

Settings: *SAV {1|2|3|4|5|6|7|8|9|10}
Query: None

Setting example

Saves the current device setting to the first setting memory.
Type 1: STO 1
Type 2 (For reference): *SAV 1

Compatibility Information

The method to specified memory number is changed from the previous WF194x series.
(0 to 9 → 1 to 10)

6.3.133 STP/?STP

Description

Sets/queries the start value for the phase sweep.

Parameters

The setting range is the same as that of the phase setting (PHS)

Type 2 (For reference)

Settings: [:SOURce]:PHASe:STARt {<phase>|MINimum|MAXimum}
Query: [:SOURce]:PHASe:STARt? [MINimum|MAXimum]

Setting example

Sets the start value for the phase sweep to -90deg.
Type 1: STP -90
Type 2 (For reference):PHAS:STAR -90

Compatibility Information

Compatibility support

6.3.134 ?STS

Description

Read status bytes.
Only RQS bit (Bit 6) is cleared among each bit of status byte even if it is read from the ?STS and the serial port.
The other bits are cleared when each register/event is cleared.
When the clear at power-on flag is set to 1 by PSC commands, the flag consequently become 0.

Response format

Status byte (0 to 255)

Type 2 (For reference)

Settings: None
Query: *STB?

Response example

STS 0
☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.135 STT/?STT

Description

Sets/queries the transfer start address to update the waveform data in the middle of the arbitrary waveform.
The transfer start address is reset (address: 0) in the case of the following situations.

- The waveform data transfer is stopped by the ARB command
- The size of the arbitrary waveform data is changed
- After power-on
- The transfer start address is omitted

Parameters

Transfer starting address
The arbitrary waveform data size 8KW → 0~8191, 16KW → 0~16383,
32KW → 0~32767, 64KW → 0~65535

Type 2 (For reference)

Settings: :DATA:DAC:ADDRess [<start address>]
Query: :DATA:DAC:ADDRess?

Setting example

Transfers the arbitrary waveform data from the address 2048.
Type 1: STT 2048
Type 2 (For reference):DATA:DAC:ADDR 2048

Compatibility Information

Compatibility support

6.3.136 STU/?STU

Description

Sets/queries the start value for the duty sweep.

Parameters

The setting range is the same as that of the duty setting (DTY)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:DCYCle:STARt {<duty cycle>|MINimum|MAXimum}
Query: [:SOURce]:PULSe:DCYCle:STARt? [MINimum|MAXimum]

Setting example

Sets the start value for the duty sweep to 40%.
Type 1: STU 40
Type 2 (For reference):PULS:DCYC:STAR 40

Compatibility Information

Compatibility support

6.3.137 STY/?STY

Description

Selects/inquires the sweep type.

Parameters

Sweep type selection (0 to 4)

Type 1	Type 2 (For reference)	
0	: FREQuency	(Frequency)
1	: PHASe	(Phase)
2	: AMPLitude	(Amplitude)
3	: OFFSet	(DC Offset)
4	: DUTY	(Duty)

Type 2 (For reference)

Settings: [:SOURce]:SWEep:TYPE {FREQuency|PHASe|AMPLitude|OFFSet|DUTY}
Query: [:SOURce]:SWEep:TYPE?

Setting example

Sets the sweep type to the phase sweep.
Type 1: STY 1
Type 2 (For reference):SWP:TYPE PHAS

Compatibility Information

Compatibility support

6.3.138 SWO/?SWO (WF1948)

Description

Sets/inquires whether to operate start/stop/pause of sweep from the panel key and the external control separately for each channel, or common to both channels.

Parameters

Operation status selection (0/1)

Type 1	Type 2 (For reference)
0	: OFF (Independent for each channel)
1	: ON (Common to both channels)

Type 2 (For reference)

Settings: [:SOURce]:SWEep:OCOMmon {0|1|OFF|ON}
Query: [:SOURce]:SWEep:OCOMmon?

Setting example

Makes the sweep start/stop/pause operation common in both channels.
Type 1: SWO 1
Type 2 (For reference):SWE:OCOM ON

Compatibility Information

In case of common channel setting (1 or ON), when setting the command to change frequency or amplitude, it is set as common to both channels.
If you set different frequency or amplitude for each channel, set as 0 or OFF once, and then set the frequency and/or amplitude.

6.3.139 SYN

Description

Performs the phase synchronization.

Parameters

None

Type 2 (For reference)

Settings: :OUTPut:PSYNc
Query: None

Compatibility Information

Compatibility support

6.3.140 SYT/?SYT

Description

Selects/queries SYNC OUT for the burst/sweep/modulation.

Parameters

SYNC OUT for burst/sweep/modulation
Type 1 Type 2 (For reference)
0 : ASYNchronous (synchronizes with the burst/sweep/moduration signal)
1 : SYNChronous (synchronizes with one wave of the waveform)

Type 2 (For reference)

Settings: :OUTPut:SYNC:TYPE {SYNChronous|ASYNchronous}
Query: :OUTPut:SYNC:TYPE?

Setting example

Synchronizes SYNCOUT for the burst/sweep/modulation with FUNCTION OUT.
Type 1: SYT 1
Type 2 (For reference):OUTP:SYNC:TYPE SYNC

Compatibility Information

Selection/query of SYNC OUT for the modulation of FSK, PSK, and AMSC is not supported.

To Select/query SYNC OUT for the modulation of FSK, PSK, and AMSC, the command needs to be replaced with the WF1947/WF1948 command.

[SYNC OUT]
Modulation Specify SYNCOUT for the corresponding each oscillation mode of FSK, PSK, and AM(DSB-SC)

FSK	[:SOURce[1|2]]: SYNC:FSKey:TYPE
PSK	[:SOURce[1|2]]:SYNC:PSKeyTYPE
AM(DSB-SC)	[:SOURce[1|2]]:SYNC:AMSC:TYPE

For details, see "2. Command Descriptions Descriptions of Individual Commands."

6.3.141 TRD/?TRD

Description

Sets /queries the trigger delay.

Parameters

Trigger delay setting: 0 (0s) ~100.00 (100s)
Resolution: 5 digits for more than 1ms, 0.1µs for less than 1ms

Type 2 (For reference)

Settings: [:SOURce]:BM:DELay {<delay>|MINimum|MAXimum}
Query: [:SOURce]:BM:DELay? [MINimum|MAXimum]

Setting example

Sets the trigger delay to 1ms.
Type 1: TRD 1E-3
Type 2 (For reference):BM:DEL 1E-3

Compatibility Information

The minimum value has been changed from the previous WF194x series.(0.3µs → 0s)

6.3.142 TRE/?TRE

Description

Selects/queries the status of the external trigger input connector for remote.
•For the Remote state, when the trigger source is EXT and TRE 1,
TRIG/SWEEP IN on the front panel becomes enabled. For local, always enabled.
•At power-on, when the PST(:SYSTem:PRESet) or RST (*RST) command is executed, it becomes TRE 1.

Parameters

Status selection (0/1)
Type 1 Type 2 (For reference)
0 : OFF (disables TRIG/SWEEP IN)
1 : ON (enables TRIG/SWEEP IN)

Type 2 (For reference)

Settings: :TRIGger[:SEQuence]:ElN:STATe {0|1|OFF|ON}
Query: :TRIGger[:SEQuence]:EIN:STATe?

Setting example

Enables TRIG/SWEEP IN.
Type 1: TRE 1
Type 2 (For reference):TRIG:EIN:STAT ON

Compatibility Information

It is not support oscillation mode except for the sweep and burst.
A trigger source of the SWEEP IN connector signal is not supported.

6.3.143 TRG/?TRG

Description

Selects/queries start, stop, and so on for the burst, sweep, modulation. After operation like start and stop of the sweep and the modulation is performed, corresponding bits on the operation event register are set or cleared. The response returns a first set value. The value does not always correspond with the actual operation status.
It becomes 0 at power-on.
This command includes the following functions.
1. Burst
   Burst oscillation : Does not change with TRG command. The query result is undefined.
   Trigger oscillation : Trigger with TRG 1 (START). The query result is always 0.
   Triggered Gate Oscillation: The oscillation state changed by TRG 1 (START). The query result is always 0.
2. Sweep
   TRG 0 to 3 select to stop/start/pause/resume of the sweep respectively.
3. Modulation
   TRG 0 and 1 select to stop/start of the modulation respectively.
   Does not change with TRG 2, 3.

Parameters

Trigger selection (0 to 3)
Type 1 Type 2 (For reference)
0 : STOP (stop)
1 : STARt (start)
2 : PAUSe (pause)
3 : CONTinue (resume)

Type 2 (For reference)

Settings: :TRIGger[:SEQuence]:SOURce {STOP|STARt|PAUSe|CONTinue}
Query: :TRIGger[:SEQuence]:SOURce?

Setting example

Modulation is canceled.
Type 1: TRG 0
Type 2 (For reference):TRIG:SOUR STOP

Note

While executing the sweep or the modulation, when the oscillation mode is changed on the other channel, the sweep/modulation is aborted.

Compatibility Information

The gate oscillation is not supported.

6.3.144 TRS/?TRS

Description

Selects/queries the trigger/gate source.
This command is disabled for the trigger gate.

Parameters

Trigger/gate source selection (0/1)
Type 1 Type 2 (For reference)
0 : INTernal (uses the internal trigger oscillator as the trigger source)
1 : EXTernal (uses the signal of the TRIG/SWEEP IN connector as the trigger source)

Type 2 (For reference)

Settings: [:SOURce]:BM:SOURce {INTemal|EXTernal}
Query: [:SOURce]:BM:SOURce?

Setting example

Sets the signal of the TRIG/SWEEP IN connector as the trigger source.
Type 1: TRS 1
Type 2 (For reference):BM:SOUR EXT

Compatibility Information

Compatibility support
A trigger source of the SWEEP IN connector signal is not supported.

6.3.145 ?TST

Description

Queries whether or not the setting memory was successfully saved as a result of the self-check at power-on.

Response format

Normal/abnormal (0 to 3)
0: No error
1: An error occurred while saving memory. The setting was initialized
2: An error occurred while saving memory. The output voltage accuracy is not guaranteed
3: An error occurred while saving memory. The setting was initialized and the output voltage accuracy is not guaranteed

Type 2 (For reference)

Settings: None
Query: *TST?

Response example

TST 0

Compatibility Information

In previous WF194x, the memory was saved through the battery backup.
In WF1947/WF1948, the memory is saved by the non-volatile memory.

6.3.146 UAU/?UAU

Description

Sets/queries the user-defined unit of amplitude.

Parameters

The last three parameter among four can be omitted.

①The unit name

Type 1: Up to character string data of 4 characters

Type 2 (For reference): Up to character string data of 4 characters
or DEFault (handled same as "USER").

②Use/not use of LOG

Type 1 Type 2 (For reference)

0 : NONE (LOG is not used. The user setting = (original value + offset) x scale)

1 : LOGarithmic
(LOG is used. The user setting = (log (original value) + offset) x scale)

③Scale

The scaling factor: -9.99999E+9 to +9.99999E+9 (except for 0)

The exponent of the scaling factor is E-9 to E+9.

④Offset

Scaling factor: -9.99999E+4 to +9.99999E+4

The exponent of the scaling factor is E-4 to E+4.

Response format

Unit name, 0/1, scale, offset

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:USER
{<unit name>|DEFault}[,{NONE|LOGarithmic|DEFault}
[,{<scale>|DEFault}[,{<offset>|DEFault}]]]

Query: [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]:USER?

Setting example

The name of the amplitude user-defined unit is "km/h". LOG is not used. The scale is 10. The offset is set to 0.

Type 1: UAU “km/h”,0,10,0

Type 2 (For reference):VOLT:USER “km/h”,NONE,10,0

Compatibility Information

Compatibility support

6.3.147 UDU/?UDU

Description

Sets/queries the user-defined unit of duty.

Parameters

The last three parameter among four can be omitted.

①The unit name

Type 1: Up to character string data of 4 characters

Type 2 (For reference): Up to character string data of 4 characters
or DEFault (handled same as "USER").

②Use/not use of LOG

Type 1 Type 2 (For reference)

0 : NONE (LOG is not used. The user setting = (original value + offset) x scale)

1 : LOGarithmic
(LOG is used. The user setting = (log (original value) + offset) x scale)

③Scale

The scaling factor: -9.99999E+6 to +9.99999E+6 (except for 0)

The exponent of the scaling factor is E-6 to E+6

④Offset

Scaling factor: -9.99999E+4 to +9.99999E+4

The exponent of the scaling factor is E-4 to E+4

Response format

Unit name, 0/1, scale, offset

Type 2 (For reference)

Settings: [:SOURce]:PULSe:DCYCLe:USER
{<unit name>|DEFault}[,{NONE|LOGarithmic|DEFault}
[,{<scale>|DEFault}[,{<offset>|DEFault}]]]

Query: [:SOURce]:PULSe:DCYCLe:USER?

Setting example

The name of the duty user-defined unit is "INTN". LOG is not used. The scale is 100. The offset is set to 0.

Type 1: UDU “INTN”,0,100,0

Type 2 (For reference):PULS:DCYC:USER “INTN”,NONE,100,0

Compatibility Information

Compatibility support

6.3.148 UFU/?UFU

Description

Sets/queries the frequency user-defined unit.

Parameters

The last three parameter among four can be omitted.

①The unit name

Type 1: Up to character string data of 4 characters

Type 2 (For reference): Up to character string data of 4 characters
or DEFault (handled same as "USER").

②Use/not use of LOG

Type 1 Type 2 (For reference)

0 : NONE (LOG is not used. The user setting = (original value + offset) x scale)

1 : LOGarithmic
(LOG is used. The user setting = (log (original value) + offset) x scale)

③Scale

The scaling factor: -9.99999999999999E+9 to +9.99999999999999E+9 (except for 0)

The exponent of the scaling factor is E-9 to E+9

④Offset

Scaling factor: -9.99999999999999E+9 to +9.99999999999999E+9

The exponent of the scaling factor is E-9 to E+9

Response format

Unit name, 0/1, scale, offset

Type 2 (For reference)

Settings: [:SOURce]:FREQuency:USER
{<unit name>|DEFault}[,{NONE|LOGarithmic|DEFault}
[,{<scale>|DEFault}[,{<offset>|DEFault}]]]

Query: [:SOURce]:FREQuency:USER?

Setting example

The name of the frequency user-defined unit is "rpm". LOG is not used. The scale is 60. The offset is set to 0.

Type 1: UFU “rpm”,0,60,0

Type 2 (For reference):FREQ:USER “rpm”,NONE,60,0

Compatibility Information

Compatibility support

6.3.149 UHU/?UHU

Description

Sets/queries the user-defined unitof phase.

Parameters

The last three parameter among four can be omitted.

①The unit name

Type 1: Up to character string data of 4 characters

Type 2 (For reference): Up to character string data of 4 characters
or DEFault (handled same as "USER").

②Use/not use of LOG

Type 1 Type 2 (For reference)

0 : NONE (LOG is not used. The user setting = (original value + offset) x scale)

1 : LOGarithmic
(LOG is used. The user setting = (log (original value) + offset) x scale)

③Scale

The scaling factor: -9.999999E+9 to +9.999999E+9 (except for 0)

The exponent of the scaling factor is E-9 to E+9

④Offset

Scaling factor: -9.999999E+8 to +9.999999E+8

The exponent of the scaling factor is E-8 to E+8

Response format

Unit name, 0/1, scale, offset

Type 2 (For reference)

Settings: [:SOURce]:PHASe:USER
{<unit name>|DEFault}[,{NONE|LOGarithmic|DEFault}
[,{<scale>|DEFault}[,{<offset>|DEFault}]]]

Query: [:SOURce]:PHASe:USER?

Setting example

The name of the phase unit is "W". LOG is not used. The scale is 3.141592654. The offset is set to 0.

Type 1: UHU “W”,0,3.141592654,0

Type 2 (For reference):PHAS:USER “W”,NONE,3.141592654,0

Note

When LOG is used, negative values cannot be set as the phase.

Compatibility Information

Compatibility support

6.3.150 UOU/?UOU

Description

Sets/queries the user-defined unit of DC offset.

Parameters

The last three parameter among four can be omitted.

①The unit name

Type 1: Up to character string data of 4 characters

Type 2 (For reference): Up to character string data of 4 characters
or DEFault (handled same as "USER").

②Use/not use of LOG

Type 1 Type 2 (For reference)

0: NONE (LOG is not used. The user setting = (original value + offset) x scale)

1 : LOGarithmic
(LOG is used. The user setting = (log (original value) + offset) x scale)

③Scale

The scaling factor: -9.99999E+9 to +9.99999E+9 (except for 0)

The exponent of the scaling factor is E-9 to E+9.

④Offset

Scaling factor: -9.99999E+4 to +9.99999E+4

The exponent of the scaling factor is E-4 to E+4.

Response format

Unit name, 0/1, scale, offset

Type 2 (For reference)

Settings: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:USER
{<unit name>|DEFault}[,{NONE|LOGarithmic|DEFault}
[,{<scale>|DEFault}[,{<offset>|DEFault}]]]

Query: [:SOURce]:VOLTage[:LEVel][:IMMediate]:OFFSet:USER?

Setting example

The name of the DC offset unit is "kgf". LOG is not used. The scale is 9.8. The offset is set to 0.

Type 1: UOU “kgf”,0,9.8,0

Type 2 (For reference):VOLT:OFFS:USER “kgf”,NONE,9.8,0

Note

When LOG is used, negative values cannot be set as the phase.

Compatibility Information

Compatibility support

6.3.151 UPU/?UPU

Description

Sets/queries the period user-defined unit.

Parameters

The last three parameter among four can be omitted.

①The unit name

Type 1: Up to character string data of 4 characters

Type 2 (For reference): Up to character string data of 4 characters
or DEFault (handled same as "USER").

②Use/not use of LOG

Type 1 Type 2 (For reference)

0 : NONE (LOG is not used. The user setting = (original value + offset) x scale)

1: LOGarithmic
(LOG is used. The user setting = (log (original value) + offset) x scale)

③Scale

The scaling factor: -9.99999999999999E+9 to +9.99999999999999E+9 (except for 0)

The exponent of the scaling factor is E-9 to E+9

④Offset

Scaling factor: -9.99999999999999E+9 to +9.99999999999999E+9

The exponent of the scaling factor is E-9 to E+9

Response format

Unit name, 0/1, scale, offset

Type 2 (For reference)

Settings: [:SOURce]:PULSe:PERiod:USER
{<unit name>|DEFault}[,{NONE|LOGarithmic|DEFault}
[,{<scale>|DEFault}[,{<offset>|DEFault}]]]

Query: [:SOURce]:PULSe:PERiod:USER?

Setting example

The name of the period user-defined unit is "PW". LOG is not used. The scale is 1/2.
The offset is set to 0.

Type 1: UPU “PW”,0,0.5,0

Type 2 (For reference):PULS:PER:USER “PW”,NONE,0.5,0

Compatibility Information

Compatibility support

6.3.152 USS

Description

The output is set as the start/stop value for the duty sweep.

Parameters

Start status/stop status (0/1)

Type 1 Type 2 (For reference)

0 : STOP (stops the sweep)

1 : STARt (starts the sweep)

Type 2 (For reference)

Settings: [:SOURce]:PULSe:DCYCle:STATe {STARt|STOP}

Query: None

Setting example

Stops duty sweep.

Type 1: USS 0

Type 2 (For reference):PULS:DCYC:STAT STOP

Compatibility Information

Compatibility support

6.3.153 ?VC1

Description

Queries the CH1 overload event status register.

The CH 1 overload event status register is cleared in the case of the follows.

- After power-on
- The CLS (*CLS) command is executed
- The PST(:SYSTem:PRESet) command is executed

When over occurs, Bit0 is set. When overload disappears, Bit0 is cleared.

Response format

CH 1 Overload event status register value (0 to 65535)

Type 2 (For reference)

Settings: None

Query: STATus:OVERload:CH1:CONDition?

Response example

VC1 0

☞ See "3. Status System."

Compatibility Information

It is not supported. It is necessary to replace with the corresponding command of WF1947/WF1948.

Questionable data status event register related command

:STATus:QUEStionable:CONDition?

:STATus:QUEStionable:ENABle

:STATus:QUEStionable[:EVENt]?]

For details, see "3. Status System."

6.3.154 ?VC2 (WF1948)

Description

Queries the CH2 overload event status register.

The CH 2 overload event status register is cleared in the case of the follows.

- After power-on
- The CLS (*CLS) command is executed
- The PST(:SYSTem:PRESet) command is executed

When over occurs, Bit0 is set. When overload disappears, Bit0 is cleared.

Response format

CH 2 Overload event status register value (0 to 65535)

Type 2 (For reference)

Settings: None

Query: STATus:OVERload:CH2:CONDition?

Response example

VC2 0

☞ See "3. Status System."

Compatibility Information

It is not supported. It is necessary to replace with the corresponding command of WF1947/WF1948.

Questionable data status event register related command

:STATus:QUEStionable:CONDition?

:STATus:QUEStionable:ENABle

:STATus:QUEStionable[:EVENt]?]

For details, see "3. Status System."

6.3.155 VE1/?VE1

Description

Sets/queries the CH 1 overload event status enable register.
When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The mask (enable/disable) pattern of the CH 1 overload event status enable register (0 to 65535)

Type 2 (For reference)

Settings: :STATus:OVERload:CH1:ENABle<Value>
Query: :STATus:OVERload:CH1:ENABle?

Setting example

Sets the CH1 overload event status enable register to 1 (CH1 overload).
Type 1: VE1 1
Type 2 (For reference):STAT:OVER:CH1:ENAB 1
☞See "3. Status System."

Compatibility Information

It is not supported. It is necessary to replace with the corresponding command of WF1947/WF1948.
Questionable data status event register related command
:STATus:QUEStionable:CONDition?
:STATus:QUEStionable:ENABle
:STATus:QUEStionable[:EVENt]?]

For details, see "3. Status System."

6.3.156 VE2/?VE2 (WF1948)

Description

Sets/queries the CH 2 overload event status enable register.
When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The mask (enable/disable) pattern of the CH 2 overload event status enable register (0 to 65535)

Type 2 (For reference)

Settings: :STATus:OVERload:CH2:ENABle <Value>
Query: :STATus:OVERload:CH2:ENABle?

Setting example

Sets the CH2 overload event status enable register to 1 (CH2 overload).
Type 1: VE2 1
Type 2 (For reference):STAT:OVER:CH2:ENAB 1
☞ See "3. Status System."

Compatibility Information

It is not supported. It is necessary to replace with the corresponding command of WF1947/WF1948.

Questionable data status event register related command

:STATus:QUEStionable:CONDition?

:STATus:QUEStionable:ENABle

:STATus:QUEStionable[:EVENt]?]

For details, see "3. Status System."

6.3.157 ?VER

Description

Inquire the version.

Response format

(numeric) + (.) + (two digit of numeric)

Type 2 (For reference)

Settings: None

Query: SYSTem:VERSion?

Response example

VER 1.00

Compatibility Information

Compatibility support

6.3.158 ?VSC

Description

Queries the overload event status register.

The overload event status register is cleared in the case of the follows.

- After power-on
- The CLS (*CLS) command is executed
- The PST(:SYSTem:PRESet) command is executed

Response format

The value of the overload event status register (0 to 65535)

Type 2 (For reference)

Settings: None

Query: STATus:OVERload: CONDition?

Response example

VSC 0

☞ See "3. Status System."

Compatibility Information

It is not supported. It is necessary to replace with the corresponding command of WF1947/WF1948.

Questionable data status event register related command

:STATus:QUEStionable:CONDition?

:STATus:QUEStionable:ENABle

:STATus:QUEStionable[:EVENt]?]

For details, see "3. Status System."

6.3.159 VSE/?VSE

Description

Sets/queries the overload event status enable register.

When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The mask (enable/disable) pattern of the overload event status enable register (0 to 65535)

Type 2 (For reference)

Settings: :STATus:OVERload:ENABle <value>

Query: :STATus:OVERload:ENABle?

Setting example

Sets the overload event status enable register as 0.

Type 1: VSE 0

Type 2 (For reference):STAT:OVER:ENAB 0

☞ See "3. Status System."

Compatibility Information

It is not supported. It is necessary to replace with the corresponding command of WF1947/WF1948.

Questionable data status event register related command

:STATus:QUEStionable:CONDition?

:STATus:QUEStionable:ENABle

:STATus:QUEStionable[:EVENt]?]

For details, see "3. Status System."

6.3.160 WAI

Description

Waits to execute subsequent commands until the single sweep/gated sweep is finished.

Parameter:

None

Type 2 (For reference)

Settings: *WAI

Query: None

Compatibility Information

Compatibility support

6.3.161 ?WC1

Description

Queries the CH1 warning event status register.

The CH 1 warning event status register is cleared in the case of the follows.

- After power-on
- The CLS (*CLS) command is executed
- The PST(:SYSTem:PRESet) command is executed

Response format

The value of the CH1 warning event status register (0 to 65535)

Type 2 (For reference)

Settings: None

Query: STATus:WARNing:CH1:CONDition?

Response example

WC1 0

☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.162 ?WC2 (WF1948)

Description

Queries the CH2 warning event status register.

The CH 2 warning event status register is cleared in the case of the follows.

- •After power-on
- •The CLS (*CLS) command is executed
- •The PST(:SYSTem:PRESet) command is executed

Response format

The value of the CH2 warning event status register (0 to 65535)

Type 2 (For reference)

Settings: None

Query: STATus:WARNing:CH2:CONDition?

Response example

WC2 0

☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.163 WE1/?WE1

Description

Sets/queries the CH1 warning event status enable register. When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The mask (enable/disable) pattern of the CH 1 warning event status enable register (0 to 65535)

Type 2 (For reference)

Settings: :STATus:WARNing:CH1:ENABle <value>

Query: :STATus:WARNing:CH1:ENABle?

Setting example

Sets the CH1 warning event status enable register to 16 (bit 4:unit forced change).

Type 1: WE1 16

Type 2 (For reference):STAT:WARN:CH1:ENAB 16

☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.164 WE2/?WE2 (WF1948)

Description

Sets/queries the CH2 warning event status enable register. When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The mask (enable/disable) pattern of the CH 2 warning event status enable register (0 to 65535)

Type 2 (For reference)

Settings: :STATus:WARNing:CH2:ENABle <value>
Query: :STATus:WARNing:CH2:ENABle?

Setting example

Sets the CH2 warning event status enable register to 24 (bit 3 and 4).
Type 1: WE2 24
Type 2 (For reference):STAT:WARN:CH2:ENAB 24
☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.165 ?WSC

Description

Queries the warning event status register.
The warning event status register is cleared in the case of the follows.

- •After power-on
- •The CLS (*CLS) command is executed
- •The PST(:SYSTem:PRESet) command is executed

Response format

The value of the warning event status register (0 to 65535)

Type 2 (For reference)

Settings: None
Query: STATus:WARNing:CONDition?

Response example

WSC 0
☞ See "3. Status System."

Compatibility Information

Compatibility support

6.3.166 WSE/?WSE

Description

Sets/queries the warning event status enable register.
When the clear at power-on flag is set to 1 by PSC commands, the flag is reset to 0.

Parameters

The mask (enable/disable) pattern of the warning event status enable register (0 to 65535)

Type 2 (For reference)

Settings: :STATus:WARNing:ENABle <value>
Query: :STATus:WARNing:ENABle?

Setting example

Sets the warning event status enable register to 3 (both bit 0: CH1 warning event status register and bit 1: CH 2 warning event status register).
Type 1: WSE 3
Type 2 (For reference):STAT:WARN:ENAB 3
☞ See "3. Status System."

Compatibility Information

Compatibility support

WABUN: (DA00036700-005)

Notes

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Multifunction Generator

WF1947/WF1948

Instruction Manual (External Control)

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