
**User's
Manual**

**FG410/FG420
Arbitrary/Function Generator
Communication Interface**

Introduction

This manual explains the FG410/FG420 GPIB and USB interfaces. For operations from the panel, refer to the FG400 Arbitrary/Function Generator User's Manual (Basic).

The GPIB and USB interfaces of the FG410/FG420 feature a large array of functions, which allow control of almost all front panel operations. Moreover, the setting values can be read from outside the equipment.

This manual has the following chapter organization.

1. PREPARATIONS BEFORE USE

Describes the interface settings and GPIB address settings.

2. COMMAND EXPLANATION

Outlines the commands, lists the commands, and describes the individual commands.

3. STATUS SYSTEM

Describes status reporting, including the status byte and standard event status register.

4. ERROR MESSAGES

Describes the error numbers and the error contents.

5. SPECIFICATIONS

Describes the specifications of the external control interfaces.

6. COMMAND TREE

Commands are shown in the tree structure.

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1. PREPARATIONS BEFORE USE

1.1 Outline of FG410/FG420 GPIB/USB Interface

Almost all the functions of the FG410/FG420 can be remotely set via the GPIB or USB interface. Moreover, by allowing measurement data and setting statuses to be transferred outside the equipment, an automatic measuring system can be configured easily.

1.2 USB Preparations

The FG410/FG420 can be controlled by USB Test and Measurement Class (hereafter, USB-TMC). Almost all panel operations can be controlled, and internal statuses, such as setting values and errors, can be read out. Install a USB-TMC class driver 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 VISA Run-time Engine page on the website of National Instruments Corporation, or select “VISA driver downloads” from the following URL:
<http://www.ni.com/support/visa/>
2. Download VISA Run-time Engine from the VISA Run-time Engine page. User registration is required at this time. Download Ver. 4.6 or a later version of VISA Run-time Engine.
3. The downloaded file is self-extracting. Extract and install the file.
4. Once the file has installed successfully, the USB-TMC class driver is installed.

For details, refer to the website of National Instruments Corporation.

1.3 GPIB Preparations

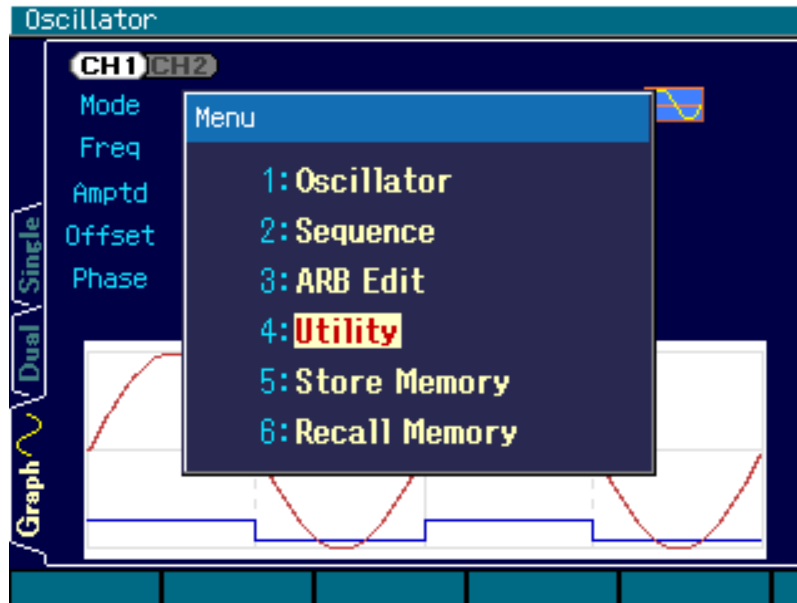
Install a GPIB controller board (card) in the controlling computer and connect it with a commercially available GPIB cable. For details, refer to the user's manual of the GPIB controller board (card) that is used.

1.4 Selecting the Interface

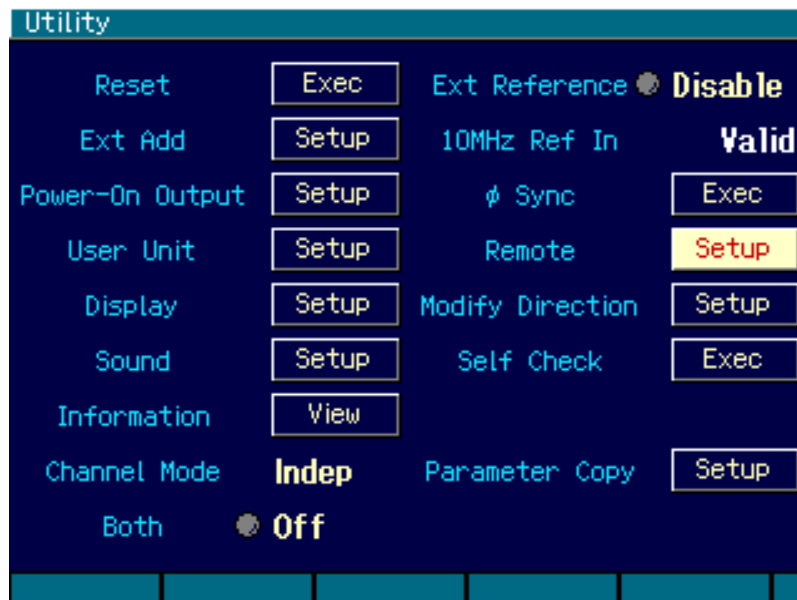
Either GPIB or USB can be used as the interface to be used. The FG410/FG420 cannot be controlled from the interface that is not selected. The selected interface is retained even after the power is switched off.

The USB interface is selected at shipping.

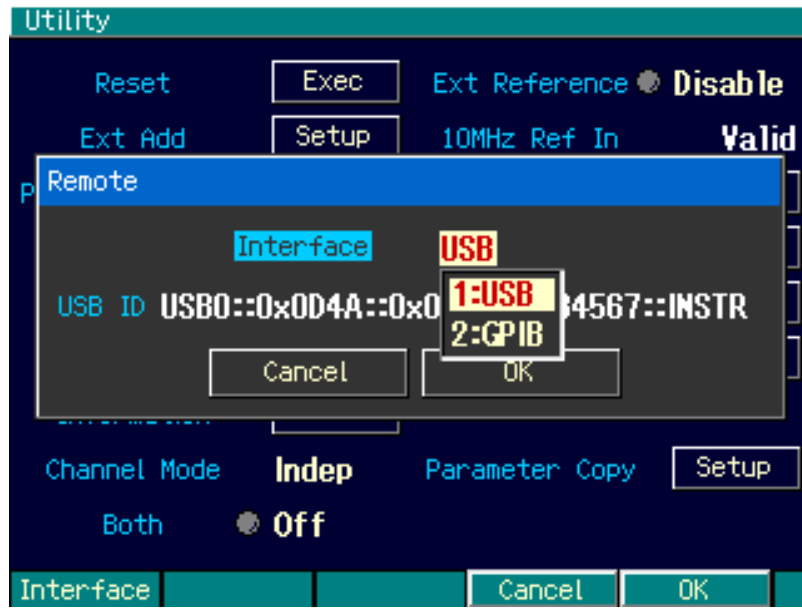
1. From [MENU], select “4:Utility” and then press the [ENTER] key.



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



3. Select “Interface” and then press the [ENTER] key to display the screen for selecting the interface.



CAUTION When the computer recognizes FG410/FG420, if you switch the interface from USB to GPIB or disconnect the USB cable, the computer may exhibit unexpected behavior.

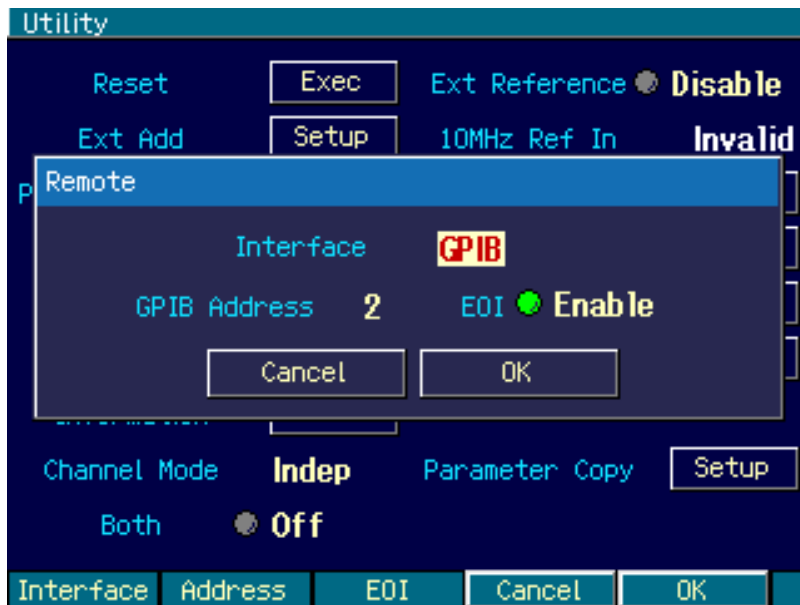
1.5 GPIB Address Setting

The GPIB address can be set when the GPIB interface is selected.

Set the GPIB address to a different value than the addresses of other devices connected with a GPIB cable. The set value is backed up when the power is turned off.

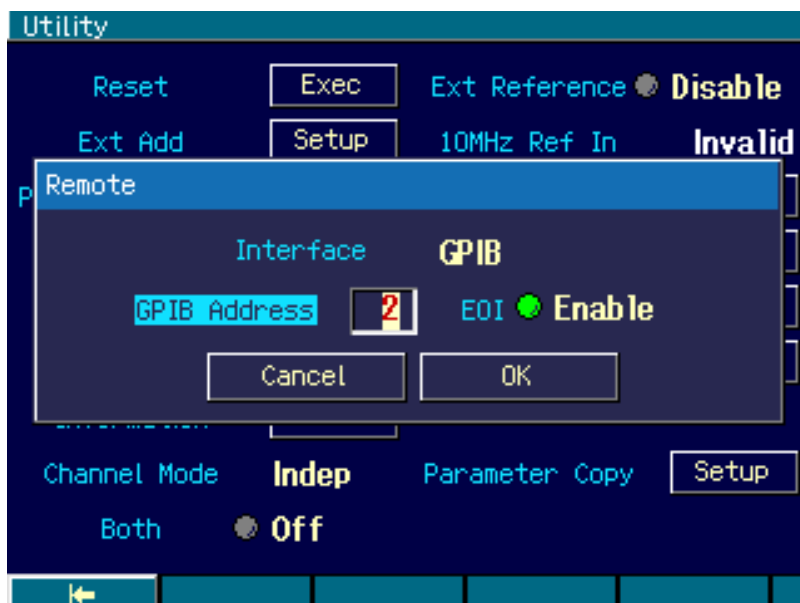
“2” is set at shipping.

1. Set “Interface” to [GPIB] by performing steps 1 to 3 in “1.4 Selecting the Interface”.



2. Select “GPIB Address” and then press the [ENTER] key to display the screen for setting the GPIB address.

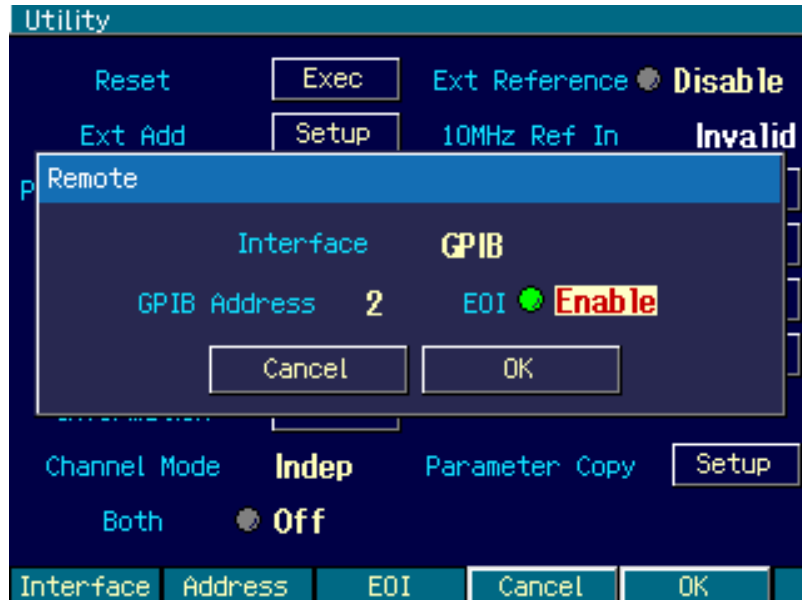
Enter the address by using the numeric keypad on the panel.



1.6 GPIB EOI Setting

When you select the GPIB interface, you can switch the message terminator recognized by FG410/FG420. 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 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 cannot deal with the binary data transfer.

⚠ CAUTION Please use as the EOI setting usually “Enable.”

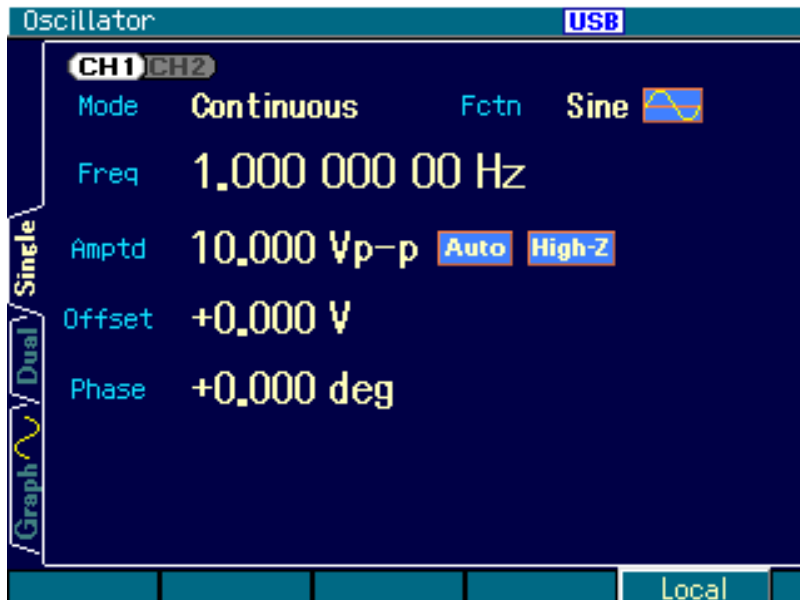
1.7 USB ID

If multiple units of FG410/FG420 are connected within a system via USB, the following numbers are used to enable the application to identify each unit.

- Vendor number : 2849(0x0B21)
- Product number : 82(0x0052)/FG410, 83(0x0053)/FG420
- Serial number : Product's manufacturing number (serial number)

1.8 Releasing Remote State

In the remote control remote state, the “USB” or “GPIB” icon is lit on the LCD, and “LOCAL” is displayed on the [F5] software key. When the [F5] key is pressed in this status, the remote state is released, and panel operation becomes possible. However, when “LOCAL” is not displayed (local lockout status), panel operation is disabled. To enable panel operation, specify local control from the remote control controller.



1.9 Cautions

- 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/disconnect the GPIB connector only after powering off all the units connected on the bus.
- When using the GPIB interface, power on all devices connected on the bus.
- The total cable length should be $2 \text{ m} \times (\text{number of units})$ or 20 m, whichever is the shorter.
- The length of each 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. EXPLANATION OF COMMANDS

2.1 Outline of Commands

The commands of the FG410/FG420 comply with IEEE488.2 and SCPI (version 1999.0). SCPI defines a communication method using between controllers and measuring devices. For general information regarding SCPI, refer to other appropriate documents.

2.1.1 Notation

For convenience, the following notation system is used in this document.

- <> <> indicates something other than the item itself. In the case of parameters and response data, the abbreviation of the type is enclosed in <>.
- [] Options, which can be omitted, are indicated between [].
- {abc|xyz}
- Means that either “abc” or “xyz” can be used.
- [abc|xyz]
- Indicates that either “abc” or “xyz” can be used, but that both are options, which may be omitted.
- Uppercase, lowercase
- Keywords in both uppercase and lowercase are the long form, while keywords in uppercase only are the short form.

2.1.2 Commands

The program messages of the FG410/FG420 are configured of common commands and subsystem commands. The format of each type of command, the subsystem command tree, etc., are described below.

2.1.2.1 Common commands

Common commands are commands that are used to control comprehensive functions of the equipment. Figure 2.1 shows the common command syntax.

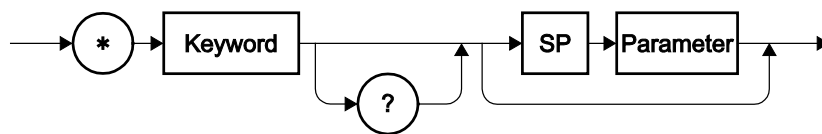


Figure 2.1. Common Command Syntax

The keyword in Figure 2.1 consists of 3 alphabetic characters. Here, SP is a space character (ASCII code 32).

2.1.2.2 Subsystem commands

Subsystem commands are commands that are used to execute specific functions of the equipment. Each such command consists of a root keyword, one or more lower-level keywords, a parameter, and a suffix. A sample command and query are shown below.

```
: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 Command tree of subsystem command

(A) Command tree structure

In SCPI, a hierarchical structure resembling a file system is used for subsystem commands. This command structure is called a command tree.

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

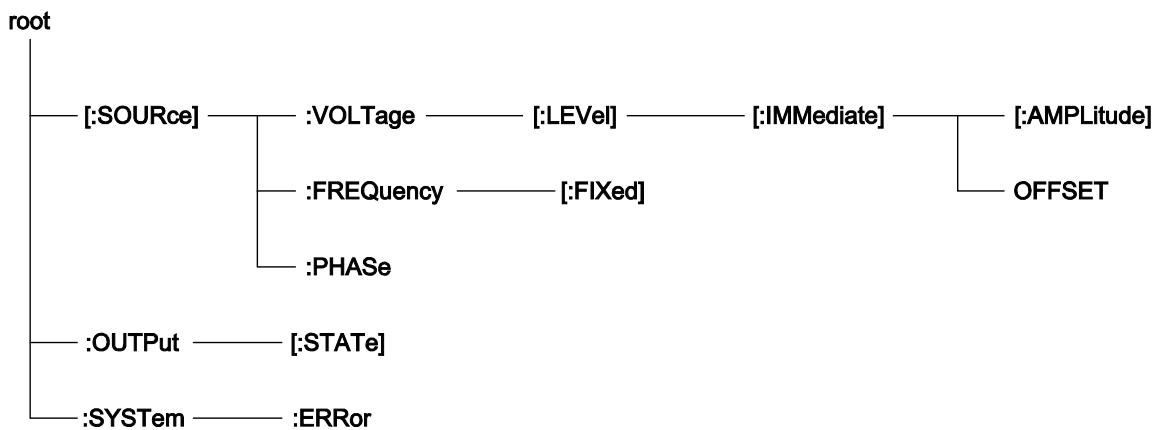


Figure 2.2. Example of Command Tree for Subsystem Commands

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 traveled. For example, the access path to [:OFFSet] is [:SOURce]-[:VOLTage]-[:LEVel]-[:IMMediate]-[:OFFSet].

(B) Current path transition

The current path is the first level that is searched by the parser among the various levels of the command tree 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 root.

(2) Message terminator

Upon reception of a message terminator, the current path is set to 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 root.

(5) Semicolon

Semicolons have no influence on the current path.

(6) Space

Spaces have no influence on the current path.

(7) Comma

Commas have no influence on the current path.

(8) IEEE488.2 common commands

Common commands have no influence on the current path.

Through appropriate use of semicolons, multiple commands can be sent efficiently. For example, the following string

```
:SOURce:VOLTage:LEVel:IMMEDIATE:AMPLitude 1.0; OFFSet 1.0
```

achieves the transmission of the following two commands:

```
:SOURce:VOLTage:LEVel:IMMEDIATE:AMPLitude 1.0  
:SOURce:VOLTage:LEVel:IMMEDIATE:OFFSet 1.0
```

When an optional keyword is omitted, caution about the current path movement is required. For example, in the case of

```
:VOLTage 1.0
```

the current path is [:SOURce]. Therefore, if

```
:SOURce:VOLTage:LEVel:IMMEDIATE:AMPLitude 1.0  
:SOURce:FREQuency:FIXed 1000.0
```

are transmitted as one program message, as follows,

```
: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

Figure 2.3 shows the syntax of subsystem commands.

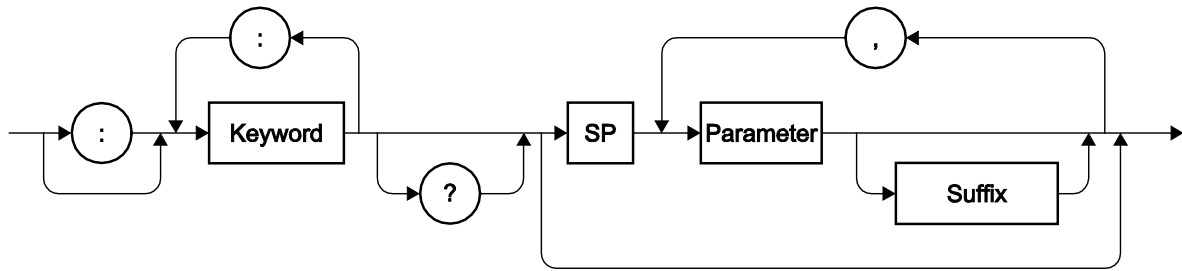


Figure 2.3. Subsystem Command Syntax

(A) Keyword

The keyword in Figure 2.3 is a string of up to 12 characters, starts with an alphabetic character, and is comprised of uppercase and lowercase alphabetic characters, underscore (_), and numeric characters. The majority of the keywords listed in “2.2 Command List” consist of a mix of uppercase and lowercase characters. Here, uppercase characters are used for the short form, and a mix of uppercase and lowercase characters is used for the long form of keywords. For convenience, keywords use uppercase and lowercase characters, but in the case of actual commands, no distinction is made between uppercase and lowercase. Examples for the “OUTPut” keyword 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 the 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 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 analyzes that command as if that option keyword had been received.

For example, in the case of

:OUTPut[:STATe]

either of the following two commands can be used.

:OUTPut:STATe

:OUTPut

(D) Channel specification

In the case of a two-channel unit, the channel can be specified for the majority of the commands by using an omissible numeric keyword suffix.

For example, in the case of

:OUTPut[1|2]:STATe

Channel 1 and Channel 2 commands are as follows:

:OUTPut[1]:STATe

:OUTPut2:STATe

If no channel number is specified, [1] is considered to have been omitted, and the command is interpreted as a command for Channel 1. For example, when the output of Channel 1 is controlled to “On”, either of the following commands can be used:

:OUTPut1:STATe ON

:OUTPut:STATe ON

(E) Parameters

The parameter types are as follows.

(1) Numeric parameter (<REAL>, <INT>)

The numeric parameter syntax is shown in Figure 2.4.

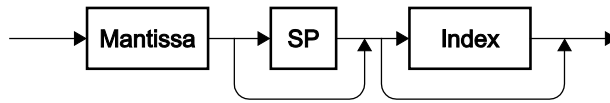


Figure 2.4. Numeric Parameter (<REAL>, <INT>) Syntax

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

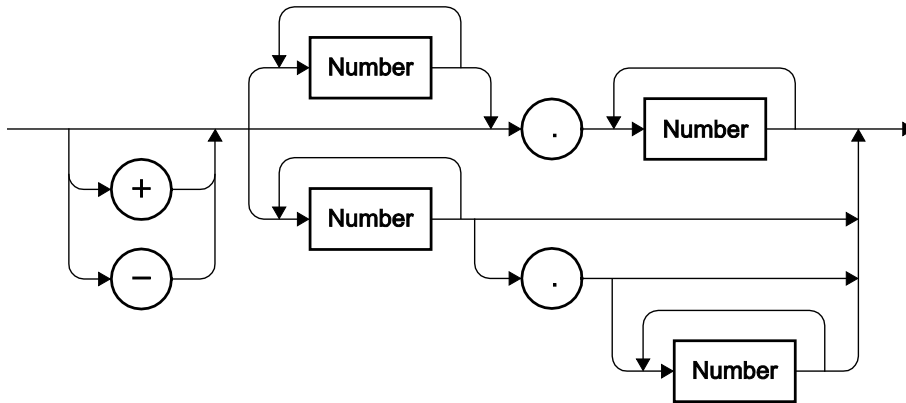


Figure 2.5. Mantissa Syntax

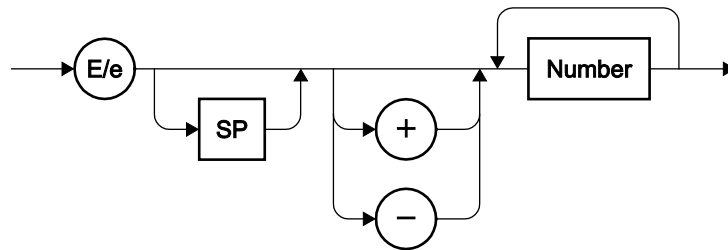


Figure 2.6. Index Syntax

(2) Discrete parameter (<DISC>)

The discrete parameter syntax is shown in Figure 2.7.

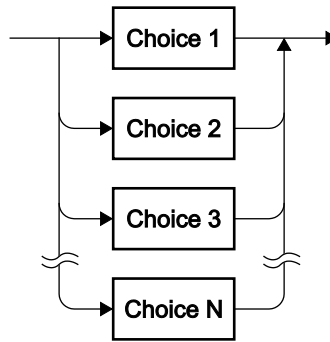


Figure 2.7. Discrete Parameter (<DISC>) Syntax

(3) Truth value parameter (<BOL>)

The truth value parameter syntax is shown in Figure 2.8.

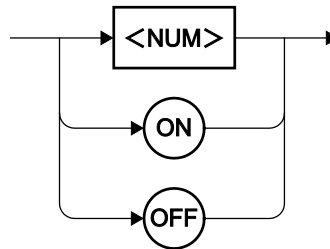


Figure 2.8. Truth Value Parameter (<BOL>) Syntax

The truth value parameter is interpreted as true for values other than 0, and as false for “0”.

If a value that includes a fractional part is specified, this value is interpreted as the whole number obtained by rounding off the fractional part. Therefore, for example, “0.4” is false, and “0.5” is true.

(4) Character string parameter (<STR>)
 The character string parameter syntax is shown in Figure 2.9.

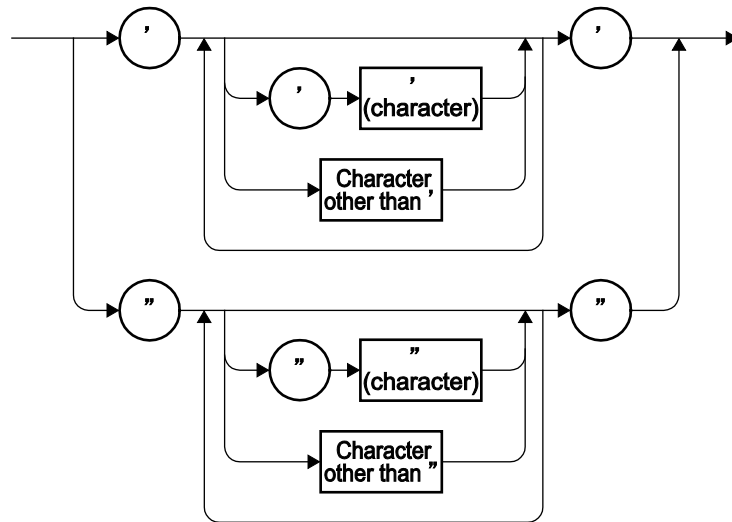


Figure 2.9. Character String Parameter (<STR>) Syntax

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

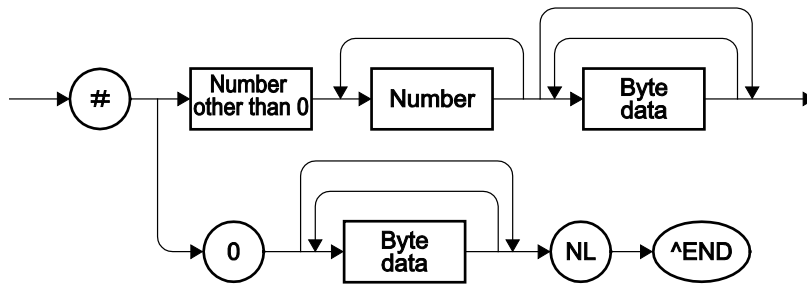


Figure 2.10. Block Parameter (<BLK>) Syntax

NL is a line feed (ASCII code 10), and ^END is an EOI asserted at the last byte.

(F) Parameter separator
 The parameter separator is used for commands that have two or more parameters, and serves as a separator between parameters.

(G) Query parameter
 The query parameter is specified after “?” of the query, and can be used for most queries for commands with numeric parameters. For example, when "MINimum" or "MAXimum" is specified as a query parameter, the settable minimum value or settable maximum value can be queried, respectively.

(H) Suffix

The suffix syntax is shown in Figure 2.11.

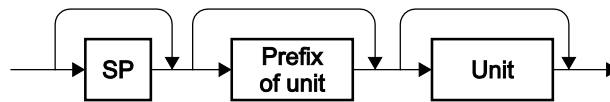


Figure 2.11. Suffix Syntax

In the FG410/FG420, the prefix of the unit and the unit attached to a parameter are valid only for that command, and have no influence on other commands.

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

2.1.2.5 Program message syntax

Two or more common commands and subsystem commands can be combined and transmitted from the controller to the equipment as one program message.

The program message syntax is shown in Figure 2.12.

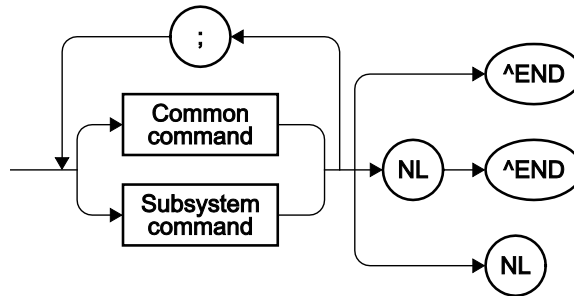


Figure 2.12. Program Message Syntax

Commands are separated by a semicolon (;).

2.1.2.6 Response message syntax

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

(A) Response message syntax

The response message syntax is shown in Figure 2.13.

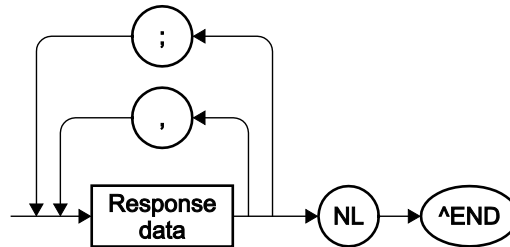


Figure 2.13. Response Message Syntax

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

(B) Response message data

The response message data types are as follows.

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

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

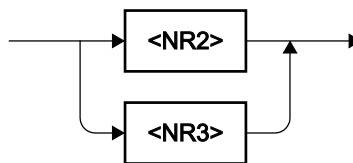


Figure 2.14. Real Number Response Data (<REAL>) Syntax

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

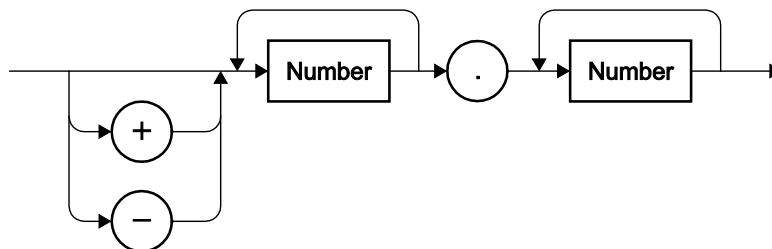


Figure 2.15. NR2 Real Number Response Data (<NR2>)

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

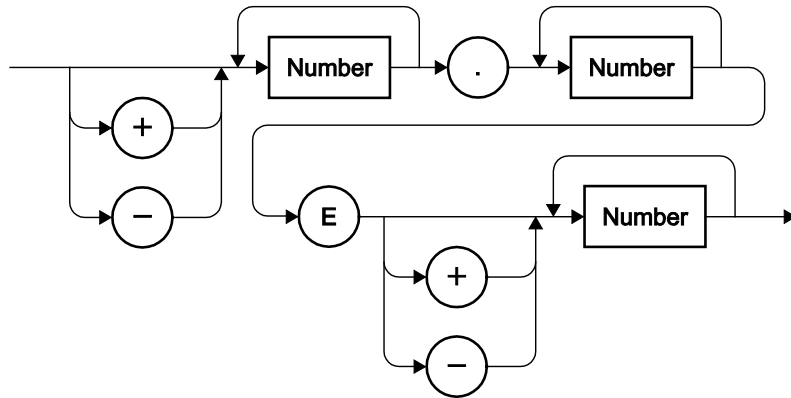


Figure 2.16. NR3 Real Number Response Data (<NR3>) Syntax

(2) Integer response data (<INT>)

The integer response data syntax is shown in Figure 2.17.

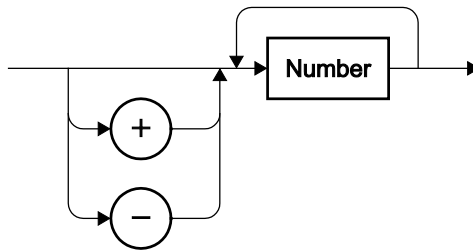


Figure 2.17. Integer Response Data (<INT>) Syntax

(3) Discrete response data (<DISC>)

The discrete response data syntax is shown in Figure 2.18.

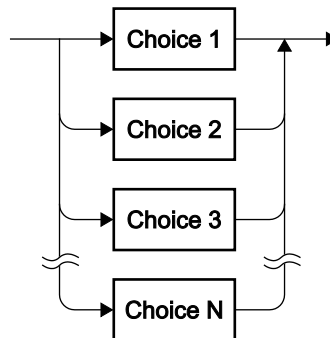


Figure 2.18. Discrete Response Data (<DISC>) Syntax

(4) Numeric truth value response data (<NBOL>)

The numeric truth value response data syntax is shown in Figure 2.19.

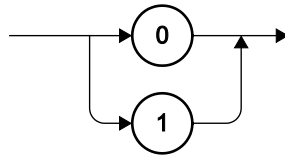


Figure 2.19. Numeric Truth Value Response Data (<NBOL>) Syntax

(5) Character string response data (<STR>)

The character string response data syntax is shown in Figure 2.20.

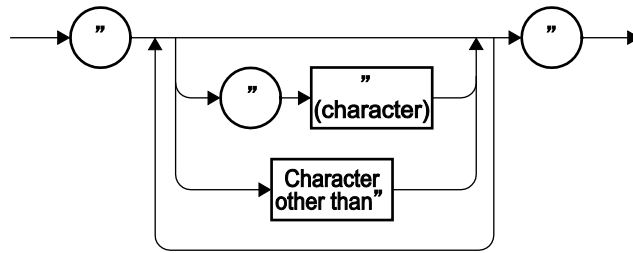


Figure 2.20. Character String Response Data (<STR>) Syntax

(6) Determined length block response data (<DBLK>)

The determined length block response data syntax is shown in Figure 2.21.

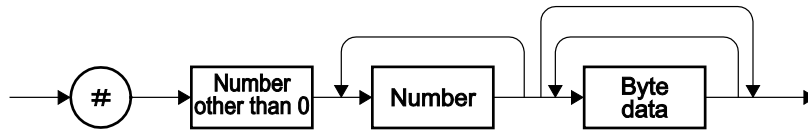


Figure 2.21. Determined Length Block Response Data (<DBLK>) Syntax

(7) Indeterminate length block response data (<IBLK>)

The indeterminate length block response data syntax is shown in Figure 2.22.

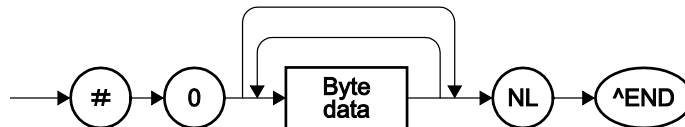


Figure 2.22. Indeterminate Length Block Response Data (<IBLK>) Syntax

2.2 Command List

Table 2.2 lists the commands of the FG410/FG420.

The meanings of the symbols used in Table 2.2 are as follows. The lowercase part of each keyword is omissible.

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

Table 2.2. Command List

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
			USB	GPIB
FG420				
2-channel equipment (FG420) Channel mode setting/query	:CHANnel:MODE	2.3.1	345/10	345/10
2-channel equipment (FG420) Frequency difference setting/query	:CHANnel:DELTA	2.3.2	250/10	250/15
2-channel equipment (FG420) Frequency ratio setting/query	:CHANnel:RATio	2.3.3	490/10	485/10
2-channel equipment (FG420) Same value setting to 2 channels setting/query	:INSTrument:COUPlE	2.3.4	20/10	20/15
Output				
Output on/off setting/query	:OUTPut[1|2]::STATe	2.3.5	15/10	15/15
Output status at power-on setting/query	:OUTPut[1|2]:PON	2.3.6	220/10	335/10
Autorange selection selection/query	[[:SOURce[1|2]]:VOLTage:RANGe:AUTO	2.3.7	70/10	70/15
Phase synchronization setting	[[:SOURce[1|2]]:PHASe:INITiate	2.3.8	45/–	45/–
External addition input setting/query	[[:SOURce[1|2]]:COMBine:FEED	2.3.9	65/10	65/10
Load impedance setting/query	:OUTPut[1|2]:LOAD	2.3.10	260/10	260/10
Trigger				
Sweep				
Trigger operation sweep mode Trigger source selection/query	:TRIGger[1|2]:SWEep:SOURce	2.3.11	15/10	15/15
Trigger operation sweep mode Internal trigger cycle setting/query	:TRIGger[1|2]:SWEep:TIMer	2.3.12	10/10	15/15
Trigger operation sweep mode External trigger signal polarity selection/query	:TRIGger[1|2]:SWEep:SLOPe	2.3.13	10/10	10/10

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
Burst				
Trigger operation burst mode Trigger source selection/query	:TRIGger[1|2]:BURSt:SOURce	2.3.14	10/10	10/15
Trigger operation burst mode Internal trigger cycle setting/query	:TRIGger[1|2]:BURSt:TIMer	2.3.15	10/10	15/15
Trigger operation burst mode External trigger signal polarity selection/query	:TRIGger[1|2]:BURSt:SLOPe	2.3.16	10/10	10/10
Manual trigger (TRIG key operation)	*TRG	2.3.17	10/-	10/-
Manual trigger (TRIG key operation)	:TRIGger[1|2][:SEQuence][:IMMediate]	2.3.18	10/-	10/-
Control				
Trigger operation execution control setting	:TRIGger[1|2]:SELEcted:EXECute	2.3.19	30/-	30/-
Basic parameter				
Frequency				
Frequency setting/query	[:SOURce[1|2]]:FREQUency[:CW]:FIXed]	2.3.20	45/10	45/15
Frequency Unit selection/query	[:SOURce[1|2]]:FREQUency:UNIT	2.3.21	10/10	10/15
Frequency User-defined unit setting/query	[:SOURce[1|2]]:FREQUency:USER	2.3.22	15/15	15/15
Amplitude				
Amplitude setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]	2.3.23	95/10	95/15
Amplitude Unit selection/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:UNIT	2.3.24	10/10	10/15
Amplitude User-defined unit setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:USER	2.3.25	15/15	20/15
DC offset				
DC offset setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet	2.3.26	95/15	95/10
DC offset Unit setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:UNIT	2.3.27	10/10	10/15
DC offset User unit setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:USER	2.3.28	15/15	20/15
Phase				
Phase setting/query	[:SOURce[1|2]]:PHASe[:ADJust]	2.3.29	20/15	20/15
Phase Unit selection/query	[:SOURce[1|2]]:PHASe:UNIT	2.3.30	10/10	10/15
Phase User-defined unit setting/query	[:SOURce[1|2]]:PHASe:USER	2.3.31	15/15	15/15

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
USB				
GPIB				
Output voltage range (Switching setting between amplitude and DC offset)				
Output voltage range High level setting/query	[[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH	2.3.32	70/15	70/15
Output voltage range High level Unit selection/query	[[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH:UNIT	2.3.33	10/10	10/15
Output voltage range Low level setting/query	[[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW	2.3.34	145/15	145/20
Output voltage range Low level Unit selection/query	[[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW:UNIT	2.3.35	10/10	10/15
Square/pulse wave shared commands				
Square/pulse wave shared commands Duty Unit selection/query	[[:SOURce[1|2]]:PULSe:DCYClE:UNIT	2.3.36	10/15	10/15
Square/pulse wave shared commands Duty User-defined unit setting/query	[[:SOURce[1|2]]:PULSe:DCYClE:USER	2.3.37	15/20	15/15
Square wave				
Square wave Duty setting/query	[[:SOURce[1|2]]:FUNctIon:SQUare:DCYClE	2.3.38	20/15	20/15
Pulse wave				
Pulse wave Duty setting/query	[[:SOURce[1|2]]:PULSe:DCYClE	2.3.39	65/15	45/20
Pulse wave Pulse width setting/query	[[:SOURce[1|2]]:PULSe:WIDTh	2.3.40	65/10	45/20
Pulse wave Rising time setting/query	[[:SOURce[1|2]]:PULSe:TRANsition[:LEADing]	2.3.41	35/10	30/15
Pulse wave Falling time setting/query	[[:SOURce[1|2]]:PULSe:TRANsition:TRAILing	2.3.42	25/10	25/15
Pulse wave Period setting/query	[[:SOURce[1|2]]:PULSe:PERiod	2.3.43	95/15	75/20
Pulse wave Period Unit selection/query	[[:SOURce[1|2]]:PULSe:PERiod:UNIT	2.3.44	10/10	10/10
Pulse wave Period User-defined unit setting/query	[[:SOURce[1|2]]:PULSe:PERiod:USER	2.3.45	15/15	20/15
Ramp wave				
Ramp wave Symmetry setting/query	[[:SOURce[1|2]]:FUNctIon:RAMP:SYMMetry	2.3.46	30/10	30/15

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
USB				
GPIB				
Waveform				
Waveform selection/query	[:SOURce[1|2]]:FUNction[:SHAPE]	2.3.47	300/10	300/15
Waveform polarity selection/query	:OUTPut[1|2]:POLarity	2.3.48	100/10	100/15
Amplitude range selection/query	:OUTPut[1|2]:SCALE	2.3.49	100/10	100/15
Square wave Extension on/off selection/query	[:SOURce[1|2]]:FUNction:SQUare:EXTend	2.3.50	15/10	20/15
Parameter variable waveform				
Unbalanced sine wave: First-half amplitude setting/query	[:SOURce[1|2]]:FUNction:USINe :AMPLitude[1]	2.3.51	65/10	65/15
Unbalanced sine wave: Second-half amplitude setting/query	[:SOURce[1|2]]:FUNction:USINe:AMPLitude2	2.3.52	60/15	60/15
Clipped sine wave: Clip rate setting/query	[:SOURce[1|2]]:FUNction:CSINe:CLIP	2.3.53	25/15	30/15
CF controlled sine wave: Crest factor setting/query	[:SOURce[1|2]]:FUNction:CFCSine:CFACTOR	2.3.54	30/10	30/15
Conduction angle controlled sine wave: Conduction angle setting/query	[:SOURce[1|2]]:FUNction:ACSine:ANGLE	2.3.55	25/10	30/15
Staircase sine wave: Number of steps setting/query	[:SOURce[1|2]]:FUNction:SSINe:STEPS	2.3.56	90/10	90/15
Multi-cycle sine wave: Number of cycles setting/query	[:SOURce[1|2]]:FUNction:MCsine:CYCLES	2.3.57	35/15	35/15
Multi-cycle sine wave: Start phase setting/query	[:SOURce[1|2]]:FUNction:MCsine:PHASe	2.3.58	35/15	35/15
On-phase controlled sine wave: Complete-on phase setting/query	[:SOURce[1|2]]:FUNction:ONPSine:ONPHase	2.3.59	25/15	30/15
On-phase controlled sine wave: On-slope time setting/query	[:SOURce[1|2]]:FUNction:ONPSine:STIME	2.3.60	25/15	30/15
Off-phase controlled sine wave: Off-phase setting/query	[:SOURce[1|2]]:FUNction:OFPSine:OFPHase	2.3.61	25/15	25/15
Off-phase controlled sine wave: Off-slope time setting/query	[:SOURce[1|2]]:FUNction:OFPSine:STIME	2.3.62	20/10	20/10
Chattering-on sine wave: On-phase setting/query	[:SOURce[1|2]]:FUNction:CONSine:ONPHase	2.3.63	25/15	25/15
Chattering-on sine wave: Number of chattering setting/query	[:SOURce[1|2]]:FUNction:CONSine :NCHattering	2.3.64	25/10	25/15
Chattering-on sine wave: On-state time setting/query	[:SOURce[1|2]]:FUNction:CONSine:TON	2.3.65	25/10	30/15
Chattering-on sine wave: Off-state time setting/query	[:SOURce[1|2]]:FUNction:CONSine:TOFF	2.3.66	25/10	30/15

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
			USB	GPIB
Chattering-off sine wave: Off-phase setting/query	[:SOURce[1|2]]:FUNction:COFSine:OFPHase	2.3.67	25/15	25/15
Chattering-off sine wave: Number of chattering setting/query	[:SOURce[1|2]]:FUNction:COFSine :NCHattering	2.3.68	20/10	20/15
Chattering-off sine wave: On-state time setting/query	[:SOURce[1|2]]:FUNction:COFSine:TON	2.3.69	20/10	20/15
Chattering-off sine wave: Off-state time setting/query	[:SOURce[1|2]]:FUNction:COFSine:TOFF	2.3.70	20/10	20/15
Gaussian pulse: Standard deviation setting/query	[:SOURce[1|2]]:FUNction:GAUSSian:SIGMa	2.3.71	30/10	30/15
Lorentz pulse: Half value of width setting/query	[:SOURce[1|2]]:FUNction:LORentz:HWIDth	2.3.72	30/10	30/15
Haversine: Width setting/query	[:SOURce[1|2]]:FUNction:HAVersine:WIDTh	2.3.73	85/10	85/15
Half-sine pulse Width setting/query	[:SOURce[1|2]]:FUNction:HSPulse:WIDTh	2.3.74	80/15	80/15
Trapezoid pulse: Slope width setting/query	[:SOURce[1|2]]:FUNction:TPULse:RFALI	2.3.75	20/15	20/15
Trapezoid pulse: Upper base width setting/query	[:SOURce[1|2]]:FUNction:TPULse:UBASe	2.3.76	25/10	20/15
Sin(x)/x: Number of zero crossings setting/query	[:SOURce[1|2]]:FUNction:SINC:ZCRossing	2.3.77	40/10	40/15
Exponential rise: Time constant setting/query	[:SOURce[1|2]]:FUNction:ERISe:TCONstant	2.3.78	30/15	30/15
Exponential fall: Time constant setting/query	[:SOURce[1|2]]:FUNction:EFALI:TCONstant	2.3.79	15/15	15/15
Second order LPF step response: Natural frequency setting/query	[:SOURce[1|2]]:FUNction:SOLStep :NFRequency	2.3.80	35/10	35/15
Second order LPF step response: Q setting/query	[:SOURce[1|2]]:FUNction:SOLStep:Q	2.3.81	30/10	30/15
Damped oscillation: Oscillation frequency setting/query	[:SOURce[1|2]]:FUNction:DOSCillation :OFRequency	2.3.82	40/15	40/15
Damped oscillation: Damping time constant setting/query	[:SOURce[1|2]]:FUNction:DOSCillation :DTConstant	2.3.83	30/15	30/15
Oscillation surge: Oscillation frequency setting/query	[:SOURce[1|2]]:FUNction:OSURge :OFRequency	2.3.84	170/15	170/15
Oscillation surge: Damping time constant setting/query	[:SOURce[1|2]]:FUNction:OSURge :DTConstant	2.3.85	170/15	170/15
Oscillation surge: Trailing time constant setting/query	[:SOURce[1|2]]:FUNction:OSURge:TTConstant	2.3.86	170/15	170/15

Function	Command	Reference	Processing Time [ms] Setting/Query	
			USB	GPIO
Pulse surge: Rising time setting/query	[:SOURce[1|2]]:FUNCTION:PSURge:TR	2.3.87	30/10	30/15
Pulse surge: Duration time setting/query	[:SOURce[1|2]]:FUNCTION:PSURge:TD	2.3.88	30/15	30/15
Trapezoid with offset: Leading delay setting/query	[:SOURce[1|2]]:FUNCTION:TOFFset:DELay	2.3.89	20/15	20/15
Trapezoid with offset: Rising-slope width setting/query	[:SOURce[1|2]]:FUNCTION:TOFFset:RISe	2.3.90	20/10	20/15
Trapezoid with offset: Upper base width setting/query	[:SOURce[1|2]]:FUNCTION:TOFFset:UBASe	2.3.91	20/10	20/15
Trapezoid with offset: Falling-slope width setting/query	[:SOURce[1|2]]:FUNCTION:TOFFset:FALL	2.3.92	20/15	20/15
Trapezoid with offset: Offset setting/query	[:SOURce[1|2]]:FUNCTION:TOFFset:OFFSet	2.3.93	20/10	20/15
Half-sine edge pulse: Leading-edge time setting/query	[:SOURce[1|2]]:FUNCTION:HSEPulse:LE	2.3.94	25/10	25/15
Half-sine edge pulse: Trailing-edge time setting/query	[:SOURce[1|2]]:FUNCTION:HSEPulse:TE	2.3.95	25/10	25/15
Half-sine edge pulse: Duty setting/query	[:SOURce[1|2]]:FUNCTION:HSEPulse:DCYCLe	2.3.96	20/10	20/15
Bottom referenced ramp wave: Symmetry setting/query	[:SOURce[1|2]]:FUNCTION:BRRAMp :SYMMetry	2.3.97	20/10	20/15
Arbitrary waveform				
Arbitrary waveform selection/query	[:SOURce[1|2]]:FUNCTION:USER	2.3.98	25/10	25/15
Arbitrary waveform memory				
Arbitrary waveform memory Arbitrary waveform data transfer/read out	{:TRACe[:DATA]}[:DATA] Array format (4K-Word) Array format (512K-Word) Control point format (10-point) Control point format (10000-point)	2.3.99	450/50 28000/ 7000 250/20 2200/ 150	820/150 41000/ 22000 370/25 3100/ 1200
Arbitrary waveform memory Store	{:TRACe[:DATA]}:STORe	2.3.100	540/–	660/–
Arbitrary waveform memory Recall	{:TRACe[:DATA]}:RECall	2.3.101	50/–	50/–
Arbitrary waveform memory Copy	{:TRACe[:DATA]}:COpy	2.3.102	380/–	540/–
Arbitrary waveform memory Delete	{:TRACe[:DATA]}:DELete	2.3.103	600/–	620/–
Arbitrary waveform memory information acquisition	{:TRACe[:DATA]}:INFormation?	2.3.104	–/35	–/20

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
Continuous oscillation				
Continuous oscillation mode selection	[:SOURce[1|2]]:CONTInuous[:IMMediate]	2.3.105	90/-	90/-
Continuous oscillation mode query	[:SOURce[1|2]]:CONTInuous:STATe?	2.3.106	-/10	-/15
Modulation				
FSK				
Modulated oscillation mode FSK selection/query	[:SOURce[1|2]]:FSKey:STATe	2.3.107	100/10	100/15
Modulated oscillation mode FSK Hop frequency setting/query	[:SOURce[1|2]]:FSKey[:FREQuency]	2.3.108	10/15	10/15
Modulated oscillation mode FSK Modulation source selection/query	[:SOURce[1|2]]:FSKey:SOURce	2.3.109	10/10	15/15
Modulated oscillation mode FSK Modulation frequency setting/query	[:SOURce[1|2]]:FSKey:INTernal:FREQuency	2.3.110	20/15	20/15
Modulated oscillation mode FSK Sync output selection/query	:OUTPut[1|2]:SYNC:FSKey:TYPE	2.3.111	10/10	10/10
PSK				
Modulated oscillation mode PSK selection/query	[:SOURce[1|2]]:PSKey:STATe	2.3.112	100/10	100/15
Modulated oscillation mode PSK Deviation setting/query	[:SOURce[1|2]]:PSKey[:DEViation]	2.3.113	10/10	10/15
Modulated oscillation mode PSK Modulation source selection/query	[:SOURce[1|2]]:PSKey:SOURce	2.3.114	20/10	20/15
Modulated oscillation mode PSK Modulation frequency setting/query	[:SOURce[1|2]]:PSKey:INTernal:FREQuency	2.3.115	20/10	20/15
Modulated oscillation mode PSK Sync output selection/query	:OUTPut[1|2]:SYNC:PSKey:TYPE	2.3.116	10/10	10/15
FM				
Modulated oscillation mode FM selection/query	[:SOURce[1|2]]:FM:STATe	2.3.117	100/10	100/10
Modulated oscillation mode FM Peak deviation setting/query	[:SOURce[1|2]]:FM[:DEViation]	2.3.118	25/15	10/15
Modulated oscillation mode FM Modulation source election/query	[:SOURce[1|2]]:FM:SOURce	2.3.119	15/10	15/10
Modulated oscillation mode FM Modulation frequency setting/query	[:SOURce[1|2]]:FM:INTernal:FREQuency	2.3.120	15/10	20/15
Modulated oscillation mode FM Modulation waveform selection/query	[:SOURce[1|2]]:FM:INTernal:FUNctIon[:SHAPE]	2.3.121	10/10	10/15

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
			USB	GPIO
Modulated oscillation mode FM Arbitrary waveform of modulation waveform	[:SOURce[1|2]]:FM:INTernal:FUNction:USER	2.3.122	25/10	35/15
Modulated oscillation mode FM Sync output selection/query	:OUTPut[1|2]:SYNc:FM:TYPE	2.3.123	10/10	10/15
PM				
Modulated oscillation mode PM selection/query	[:SOURce[1|2]]:PM:STATe	2.3.124	100/10	100/15
Modulated oscillation mode PM Peak deviation setting/query	[:SOURce[1|2]]:PM[:DEViation]	2.3.125	20/10	20/15
Modulated oscillation mode PM Modulation source selection/query	[:SOURce[1|2]]:PM:SOURce	2.3.126	10/10	20/10
Modulated oscillation mode PM Modulation frequency setting/query	[:SOURce[1|2]]:PM:INTernal:FREQuency	2.3.127	15/10	20/15
Modulated oscillation mode PM Modulation waveform selection/query	[:SOURce[1|2]]:PM:INTernal:FUNction[:SHAPE]	2.3.128	10/10	10/15
Modulated oscillation mode PM Arbitrary waveform of modulation waveform selection/query	[:SOURce[1|2]]:PM:INTernal:FUNction:USER	2.3.129	25/10	35/15
Modulated oscillation mode PM Sync output selection/query	:OUTPut[1|2]:SYNc:PM:TYPE	2.3.130	10/10	15/15
AM				
Modulated oscillation mode AM selection/query	[:SOURce[1|2]]:AM:STATe	2.3.131	100/10	100/10
Modulated oscillation mode AM Modulation depth setting/query	[:SOURce[1|2]]:AM[:DEPTH]	2.3.132	10/10	15/15
Modulated oscillation mode AM Modulation source selection/query	[:SOURce[1|2]]:AM:SOURce	2.3.133	10/10	15/15
Modulated oscillation mode AM Modulation frequency setting/query	[:SOURce[1|2]]:AM:INTernal:FREQuency	2.3.134	20/10	20/15
Modulated oscillation mode AM Modulation waveform selection/query	[:SOURce[1|2]]:AM:INTernal:FUNction[:SHAPE]	2.3.135	10/10	10/10
Modulated oscillation mode AM Arbitrary waveform of modulation waveform selection/query	[:SOURce[1|2]]:AM:INTernal:FUNction:USER	2.3.136	25/10	25/15
Modulated oscillation mode AM Sync output selection/query	:OUTPut[1|2]:SYNc:AM:TYPE	2.3.137	10/10	10/10

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
AM(DSB-SC)				
Modulated oscillation mode AM(DSB-SC) selection/query	[:SOURce[1|2]]:AMSC:STATe	2.3.138	100/10	100/10
Modulated oscillation mode AM (DSB-SC) Modulation depth setting/query	[:SOURce[1|2]]:AMSC[:DEPT]h	2.3.139	10/10	10/15
Modulated oscillation mode AM (DSB-SC) Modulation source selection/query	[:SOURce[1|2]]:AMSC:SOURce	2.3.140	10/10	15/10
Modulated oscillation mode AM (DSB-SC) Modulation frequency setting/query	[:SOURce[1|2]]:AMSC:INTernal:FREQuency	2.3.141	20/10	20/15
Modulated oscillation mode AM (DSB-SC) Modulation waveform selection/query	[:SOURce[1|2]]:AMSC:INTernal:FUNCTion [:SHAPe]	2.3.142	10/10	10/10
Modulated oscillation mode AM (DSB-SC) Arbitrary waveform of modulation waveform selection/query	[:SOURce[1|2]]:AMSC:INTernal:FUNCTion :USER	2.3.143	25/10	30/15
Modulated oscillation mode AM (DSB-SC) Sync output selection/query	:OUTPut[1|2]:SYNC:AMSC:TYPE	2.3.144	10/10	10/10
DC offset modulation				
Modulated oscillation mode DC offset modulation selection/query	[:SOURce[1|2]]:OFSM:STATe	2.3.145	100/10	100/20
Modulated oscillation mode DC offset modulation Peak deviation setting/query	[:SOURce[1|2]]:OFSM[:DEVI]ation]	2.3.146	65/15	65/15
Modulated oscillation mode DC offset modulation Modulation source selection/query	[:SOURce[1|2]]:OFSM:SOURce	2.3.147	10/10	15/10
Modulated oscillation mode DC offset modulation Modulation frequency setting/query	[:SOURce[1|2]]:OFSM:INTernal:FREQuency	2.3.148	15/15	15/15
Modulated oscillation mode DC offset modulation Modulation waveform selection/query	[:SOURce[1|2]]:OFSM:INTernal:FUNCTion [:SHAPe]	2.3.149	10/10	10/10
Modulated oscillation mode DCOffset modulation Arbitrary waveform of modulation waveform selection/query	[:SOURce[1|2]]:OFSM:INTernal:FUNCTion :USER	2.3.150	25/10	25/15
Modulated oscillation mode DC offset modulation Sync output selection/query	:OUTPut[1|2]:SYNC:OFSM:TYPE	2.3.151	10/10	10/10

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
PWM				
Modulated oscillation mode PWM selection/query	[:SOURce[1|2]]:PWM:STATe	2.3.152	120/10	120/10
Modulated oscillation mode PWM Peak deviation setting/query	[:SOURce[1|2]]:PWM[:DEViation]:DCYClE	2.3.153	25/15	25/15
Modulated oscillation mode PWM Modulation source selection/query	[:SOURce[1|2]]:PWM:SOURce	2.3.154	10/10	15/10
Modulated oscillation mode PWM Modulation frequency setting/query	[:SOURce[1|2]]:PWM:INTErnal:FREQuency	2.3.155	15/15	15/15
Modulated oscillation mode PWM Modulation waveform selection/query	[:SOURce[1|2]]:PWM:INTErnal:FUNCTion [:SHAPE]	2.3.156	10/10	10/15
Modulated oscillation mode PWM Arbitrary waveform of modulation waveform selection/query	[:SOURce[1|2]]:PWM:INTErnal:FUNCTion :USER	2.3.157	25/10	25/15
Modulated oscillation mode PWM Sync output selection/query	:OUTPut[1|2]:SYNC:PWM:TYPE	2.3.158	10/10	10/10
Sweep				
Sweep mode selection				
Sweep oscillation mode Sweep selection/query	[:SOURce[1|2]]:SWEep:MODE	2.3.159	15/10	15/15
Basic sweep setting Sweep slope selection/query	[:SOURce[1|2]]:SWEep:SPACing	2.3.160	10/10	10/15
Basic sweep setting Sweep direction selection/query	[:SOURce[1|2]]:SWEep:INTErnal:FUNCTion	2.3.161	10/10	10/15
Basic sweep setting Sweep time setting/query	[:SOURce[1|2]]:SWEep:TIME	2.3.162	15/10	10/15
Basic sweep setting Stop level setting/query	[:SOURce[1|2]]:SWEep:SLEVel	2.3.163	10/10	10/15
Basic sweep setting Stop level selection/query	[:SOURce[1|2]]:SWEep:SLEVel:STATe	2.3.164	10/10	10/15
Basic sweep setting oscillation stop unit setting/query	[:SOURce[1|2]]:SWEep:OSTop	2.3.165	10/10	10/15
Basic sweep setting Multiconnector control on/off selection/query	[:SOURce[1|2]]:SWEep:MCONnector:STATe	2.3.166	10/10	10/15
Basic sweep setting Sync output selection/query	:OUTPut[1|2]:SYNC:SWEep:TYPE	2.3.167	10/10	10/15

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
Frequency sweep				
Sweep oscillation mode Frequency sweep selection/query	[:SOURce[1|2]]:FREQUency:MODE	2.3.168	180/10	180/15
Frequency sweep Start value setting/query	[:SOURce[1|2]]:FREQUency:STARt	2.3.169	20/15	20/15
Frequency sweep Stop value setting/query	[:SOURce[1|2]]:FREQUency:STOP	2.3.170	20/15	20/15
Frequency sweep Center value setting/query	[:SOURce[1|2]]:FREQUency:CENTer	2.3.171	20/15	20/15
Frequency sweep Span value setting/query	[:SOURce[1|2]]:FREQUency:SPAN	2.3.172	20/15	20/15
Frequency sweep Marker value setting/query	[:SOURce[1|2]]:MARKer:FREQUency	2.3.173	15/15	15/15
Frequency sweep Start/stop value swapping setting	[:SOURce[1|2]]:FREQUency:SWAP	2.3.174	25/–	15/–
Frequency sweep Start/stop value output setting	[:SOURce[1|2]]:FREQUency:STATe	2.3.175	10/–	15/–
Phase sweep				
Sweep oscillation mode Phase sweep selection/query	[:SOURce[1|2]]:PHASe:MODE	2.3.176	190/10	190/15
Phase sweep Start value setting/query	[:SOURce[1|2]]:PHASe:STARt	2.3.177	20/15	20/15
Phase sweep Stop value setting/query	[:SOURce[1|2]]:PHASe:STOP	2.3.178	20/15	20/15
Phase sweep Center value setting/query	[:SOURce[1|2]]:PHASe:CENTer	2.3.179	20/15	20/15
Phase sweep Span value setting/query	[:SOURce[1|2]]:PHASe:SPAN	2.3.180	20/15	20/15
Phase sweep Marker value setting/query	[:SOURce[1|2]]:MARKer:PHASe	2.3.181	15/15	15/15
Phase sweep Start/stop value swapping setting	[:SOURce[1|2]]:PHASe:SWAP	2.3.182	15/–	20/–
Phase sweep Start/stop value output setting	[:SOURce[1|2]]:PHASe:STATe	2.3.183	10/–	15/–
Amplitude sweep				
Sweep oscillation mode Amplitude sweep selection/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:MODE	2.3.184	230/15	230/20
Amplitude sweep Start value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:STARt	2.3.185	20/15	20/20

Function	Command	Reference	Processing Time [ms] Setting/Query	
			USB	GPIO
Amplitude sweep Stop value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:STOP	2.3.186	20/15	20/20
Amplitude sweep Center value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:CENTER	2.3.187	20/15	25/20
Amplitude sweep Span value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:SPAN	2.3.188	20/15	20/20
Amplitude sweep Marker value setting/query	[:SOURce[1|2]]:MARKer:VOLTage[:LEVel] [:IMMediate][:AMPLitude]	2.3.189	20/15	20/20
Amplitude sweep Start/stop value swapping setting	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:SWAP	2.3.190	20/–	20/–
Amplitude sweep Start/stop value output setting	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] [:AMPLitude]:STATE	2.3.191	15/–	15/–
DC offset sweep				
Sweep oscillation mode DC offset sweep selection/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:MODE	2.3.192	230/15	230/20
DC offset sweep Start value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:START	2.3.193	20/20	20/20
DC offset sweep Stop value	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:STOP	2.3.194	20/15	20/20
DC offset sweep Center value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:CENTer	2.3.195	20/15	20/20
DC offset sweep Span value setting/query	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:SPAN	2.3.196	20/15	20/20
DC offset sweep Marker value setting/query	[:SOURce[1|2]]:MARKer:VOLTage[:LEVel] [:IMMediate]:OFFSet	2.3.197	15/20	15/20
DC offset sweep Start/stop value swapping setting	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:SWAP	2.3.198	20/–	20/–
DC offset sweep Start/stop value output setting	[:SOURce[1|2]]:VOLTage[:LEVel][:IMMediate] :OFFSet:STATE	2.3.199	15/–	15/–
Duty sweep				
Sweep oscillation mode Duty sweep selection/query	[:SOURce[1|2]]:PULSe:DCYClE:MODE	2.3.200	250/15	250/15
Duty sweep Start value setting/query	[:SOURce[1|2]]:PULSe:DCYClE:START	2.3.201	20/15	20/15
Duty sweep Stop value setting/query	[:SOURce[1|2]]:PULSe:DCYClE:STOP	2.3.202	20/15	20/15
Duty sweep Center value setting/query	[:SOURce[1|2]]:PULSe:DCYClE:CENTer	2.3.203	20/15	20/15

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
			USB	GPIB
Duty sweep Span value setting/query	[:SOURce[1|2]]:PULSe:DCYClE:SPAN	2.3.204	20/15	20/15
Duty sweep Marker value setting/query	[:SOURce[1|2]]:MARKer:PULSe:DCYClE	2.3.205	20/15	20/15
Duty sweep Start/stop value swapping setting	[:SOURce[1|2]]:PULSe:DCYClE:SWAP	2.3.206	20/-	20/-
Duty sweep Start/stop value output setting	[:SOURce[1|2]]:PULSe:DCYClE:STATe	2.3.207	10/-	10/-
Burst				
Burst oscillation				
Burst oscillation mode Selection/query	[:SOURce[1|2]]:BURSt:STATe	2.3.208	100/10	100/10
Burst oscillation Burst mode selection/query	[:SOURce[1|2]]:BURSt:MODE	2.3.209	10/10	10/10
Burst oscillation Stop level setting/query	[:SOURce[1|2]]:BURSt:SLEVel	2.3.210	10/10	10/15
Burst oscillation Stop level selection/query	[:SOURce[1|2]]:BURSt:SLEVel:STATe	2.3.211	10/10	10/10
Burst oscillation Sync output selection/query	:OUTPut[1|2]:SYNc:BURSt:TYPE	2.3.212	10/10	10/10
Burst oscillation Auto burst mode: mark wave number setting/query	[:SOURce[1|2]]:BURSt:AUTO:NCYCles	2.3.213	10/10	10/15
Burst oscillation Auto burst mode: space wave number setting/query	[:SOURce[1|2]]:BURSt:AUTO:SPACe	2.3.214	10/10	10/10
Burst oscillation Trigger burst mode: mark wave number setting/query	[:SOURce[1|2]]:BURSt[:TRIGger]:NCYCles	2.3.215	10/10	10/15
Burst oscillation Trigger burst mode: trigger delay time setting/query	[:SOURce[1|2]]:BURSt[:TRIGger]:TDELay	2.3.216	10/10	15/15
Burst oscillation Gate burst mode: oscillation stop unit setting/query	[:SOURce[1|2]]:BURSt:GATE:OSTop	2.3.217	10/10	10/15
Burst oscillation Triggered gate mode: oscillation stop unit setting/query	[:SOURce[1|2]]:BURSt:TGATE:OSTop	2.3.218	10/10	10/10

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
USB				
GPIB				
Sequence				
Sequence selection	[:SOURce[1|2]]:SEQuence:STATe	2.3.219	20/10	20/15
Store	:TRACe|DATA:SEQuence:STORe	2.3.220	1600/-	1800/-
Recall	:TRACe|DATA:SEQuence:RECall	2.3.221	90/-	90/-
Sequence data I/O	:TRACe|DATA:SEQuence	2.3.222	2000/ 160	3000/ 285
Sequence data compilation	:TRIGGer[1|2]:COMPile[:IMMediate]	2.3.223	2000/-	2000/-
Current step number acquisition	[:SOURce[1|2]]:SEQuence:CSTep?	2.3.224	-/10	-/10
Sequence data initialization	:TRACe|DATA:SEQuence:CLEAr	2.3.225	2000/-	2000/-
Setting memory				
Basic setting memory				
Basic setting memory clear	:MEMory:STATe:DELeTe	2.3.226	700/-	700/-
Basic setting memory store	*SAV	2.3.227	900/-	900/-
Basic setting memory recall	*RCL	2.3.228	250/-	250/-
Status				
Status operations				
Status register and related queue clear	*CLS	2.3.229	105/-	100/-
Status reporting related preset setting	:STATus:PRESet	2.3.230	10/-	10/-
Power-on status register clear flag setting/query	*PSC	2.3.231	10/10	10/10
Status byte register query	*STB?	2.3.232	-/10	-/10
Service request enable register setting/query	*SRE	2.3.233	10/10	10/10
Standard event status register query	*ESR?	2.3.234	-/10	-/10
Standard event enable register setting/query	*ESE	2.3.235	10/10	10/10
Operation status register group (common to CH1/CH2)				
Condition register query	:STATus:OPERation:CONDition?	2.3.236	-/10	-/10
Transition filter register (negative) setting/query	:STATus:OPERation:NTRansition	2.3.237	10/10	10/10
Transition filter register (positive) setting/query	:STATus:OPERation:PTRansition	2.3.238	10/10	10/10
Event register query	:STATus:OPERation[:EVENT]?	2.3.239	-/10	-/10
Event enable register setting/query	:STATus:OPERation:ENABle	2.3.240	10/10	10/10

Function	Command	Reference	Processing Time [ms]			
			Setting/Query			
USB					GPIB	
CH1 operation status register group						
CH1 operation status register group Condition register query	:STATus:OPERation:CH1:CONDition?	2.3.241	-/10	-/10		
CH1 operation status register group Transition filter register (negative) setting/query	:STATus:OPERation:CH1:NTRansition	2.3.242	10/10	10/10		
CH1 operation status register group Transition filter register (positive) setting/query	:STATus:OPERation:CH1:PTRansition	2.3.243	10/10	10/15		
CH1 operation status register group Event register query	:STATus:OPERation:CH1[:EVENT]?	2.3.244	-/10	-/10		
CH1 operation status register group Event enable register setting/query	:STATus:OPERation:CH1:ENABle	2.3.245	10/10	10/10		
CH2 operation status register group						
CH2 operation status register group Condition register query	:STATus:OPERation:CH2:CONDition?	2.3.246	-/10	-/15		
CH2 operation status register group Transition filter register (negative) setting/query	:STATus:OPERation:CH2:NTRansition	2.3.247	10/10	10/10		
CH2 operation status register group Transition filter register (positive) setting/query	:STATus:OPERation:CH2:PTRansition	2.3.248	10/10	10/10		
CH2 operation status register group Event register query	:STATus:OPERation:CH2[:EVENT]?	2.3.249	-/10	-/15		
CH2 operation status register group Event enable register setting/query	:STATus:OPERation:CH2:ENABle	2.3.250	10/10	10/15		
Questionable data status register group						
Questionable data status register group Condition register query	:STATus:QUEStionable:CONDition?	2.3.251	-/10	-/10		
Questionable data status register group Transition filter register (negative) setting/query	:STATus:QUEStionable:NTRansition	2.3.252	10/10	10/15		

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
			USB	GPIB
Questionable data status register group Transition filter register (positive) setting/query	:STATus:QUEStionable:PTRansition	2.3.253	10/10	10/10
Questionable data status register group Event register query	:STATus:QUEStionable[:EVENT]?	2.3.254	-/10	-/10
Questionable data status register group Event enable register setting/query	:STATus:QUEStionable:ENABLE	2.3.255	10/10	10/10
Warning event register group				
Warning event register group Event register query	:STATus:WARNIing[:EVENT]?	2.3.256	-/10	-/10
Warning event register group Event enable register setting/query	:STATus:WARNIing:ENABLE	2.3.257	10/10	10/10
CH1 warning event register group				
CH1 warning event register group Event register query	:STATus:WARNIing:CH1[:EVENT]?	2.3.258	-/10	-/10
CH1 warning event register group Event enable register setting/query	:STATus:WARNIing:CH1:ENABLE	2.3.259	10/10	10/15
CH2 warning event register group				
CH2 warning event register group Event register query	:STATus:WARNIing:CH2[:EVENT]?	2.3.260	-/10	-/10
CH2 warning event register group Event enable register setting/query	:STATus:WARNIing:CH2:ENABLE	2.3.261	10/10	10/10

Function	Command	Reference	Processing Time [ms]	
			Setting/Query	
Other				
Equipment-specific information query	*IDN?	2.3.262	-/10	-/15
Error message query	:SYSTem:ERRor?	2.3.263	-/10	-/15
Setting initialization (status registers, etc. not cleared)	*RST	2.3.264	330/-	330/-
Operation completion event bit setting	*OPC	2.3.265	10/-	10/-
Setting output key to 1 at operation completion	*OPC?	2.3.266	-/10	-/10
Waiting for command/query execution	*WAI	2.3.267	10/-	10/-
Self diagnosis result query	*TST?	2.3.268	-/10	-/10
External reference frequency input setting/query	[:SOURce[1|2]]:ROSCillator:SOURce	2.3.269	15/10	15/15

2.3 Description of Individual Commands

Each command is described in detail below.

2.3.1 2-channel equipment (FG420) channel mode select/query :CHANnel:MODE

■:CHANnel:MODE

□:CHANnel:MODE?

Description

Selects/queries channel mode

Setting parameters

INDePendent|PHASe|TONE|RATio|DIFFerential

INDePendent → Independent

PHASe → 2-phase

TONE → Constant frequency difference

RATio → Constant frequency ratio

DIFFerential → Differential output

Query parameters

None

Response format

IND|PHAS|TONE|RAT|DIFF

* For the meaning of the response data, see the setting parameters.

Setting example

:CHANnel:MODE INDePendent

Sets the channel mode to independent

Remarks

* This command can be used only for 2-channel device.

2.3.2 2-channel equipment (FG420) 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 parameters

<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 parameters

[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 be used only for 2-channel device.

2.3.3 2-channel equipment (FG420) constant frequency ratio mode: frequency ratio setting/query :CHANnel:RATio

■:CHANnel:RATio

□:CHANnel:RATio?

Description

Sets/queries the frequency ratio of the constant frequency ratio

Setting parameters

<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 parameters

None

Response format

<NR1>,<NR1>

Setting example

:CHANnel:RATio 2,3
Sets frequency ratio to 2:3

Remarks

* This command can be used only for 2-channel device.

2.3.4 2-channel equipment (FG420) 2-channel same value operation setting/query :INSTrument:COUPlE

■:INSTrument:COUPlE

□:INSTrument:COUPlE?

Description

Selects/queries the 2-channel equivalence setting

Setting parameters

ALL|NONE
ALL → Equivalence setting on
NONE → Equivalence setting off

Query parameters

None

Response format

ALL|NONE

* For the meaning of the response data, see the setting parameters.

Setting example

:INSTrument:COUPle ALL

Uses 2-channel equivalence setting

Remarks

* This command can be used only for 2-channel device.

2.3.5 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 parameters

<state> ::= <BOL>

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

Query parameters

None

Response format

<NBOL>

<NBOL>	→	0: Output off
		1: Output on

Setting example

:OUTPut1:STATe ON

Sets the output of CH1 to on

2.3.6 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 parameters

ON|OFF|LAST

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

Query parameters

None

Response format

ON|OFF|LAST

* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut1:PON ON

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

2.3.7 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 parameters

<state> ::= <BOL>

<BOL> → 0/OFF: Automatic range off

1/ON: Automatic range on

Query parameters

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

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

■[:SOURce[1|2]]:PHASe:INITiate

Description

Executes the phase synchronization

Setting parameters

None

2.3.9 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 parameters

OFF|X2|X10

OFF → Disables the external addition

X2 → Adds 2 times of external input to the output

X10 → Adds 10 times of external input to the output

Query parameters

None

Response format

OFF|X2|X10

Setting example

:SOURce1:COMBine:FEED X2

Adds 2 times of external input to the output of CH1

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

■:OUTPut[1|2]:LOAD

□:OUTPut[1|2]:LOAD?

Description

Sets/queries the load impedance

Setting parameters

<load>|MINimum|MAXimum|INFinity

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

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

<eunits> ::= K

<units> ::= OHM

MINimum → 1Ω

MAXimum → 10kΩ

INFinity → High-Z

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR1>

Setting example

:OUTPut1:LOAD 50OHM

Sets the load impedance of CH1 to 50Ω

2.3.11 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 parameters

TIMer|EXTernal|CH1

TIMer → Trigger with the internal trigger period

EXTernal → External trigger

CH1 → External trigger of CH1 (Only CH2 can be selected)

Query parameters

None

Response format

TIM|EXT|CH1

* For the meaning of each response data, see the setting parameters.

Setting example

:TRIGger2:SWEep:SOURce EXT

Sets the sweep trigger source of CH2 to external

2.3.12 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 parameters

<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 parameters

[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

2.3.13 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 parameters

POSitive|NEGative|OFF

POSitive → Rising

NEGative → Falling

OFF → Disabled

Query parameters

None

Response format

POS|NEG|OFF

* For the meaning of each response data, see the setting parameters.

Setting example

:TRIGger:SWEep:SLOPe NEGative

Sets the external sweep trigger polarity to falling

2.3.14 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 parameters

TIMer|EXTernal|CH1

TIMer → Trigger with the internal trigger period

EXTernal → External trigger

CH1 → External trigger of CH1 (Only CH2 can be selected)

Query parameters

None

Response format

TIM|EXT|CH1

* For the meaning of each response data, see the setting parameters.

Setting example

:TRIGger2:BURSt:SOURce EXT

Sets the burst trigger source of CH2 to external

2.3.15 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 parameters

<period>|MINimum|MAXimum

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

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

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

<units> ::= S

MINimum → 1.0 μ s

MAXimum → 1,000 s

Query parameters

[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

2.3.16 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 parameters

POSitive|NEGative|OFF

POSitive → Rising

NEGative → Falling

OFF → Disabled

Query parameters

None

Response format

POS|NEG|OFF

* For the meaning of each response data, see the setting parameters.

Setting example

:TRIGger:BURSt:SLOPe NEGative

Sets the external burst trigger polarity to falling

2.3.17 Trigger operation manual trigger (MAN TRIG key operation) *TRG

■*TRG

Description

Corresponds to [MANUAL TRIGGER] button

Setting parameters

None

Remarks

* Cannot specify channels. It becomes trigger to CH1.

* May not be used depending on the oscillation mode (see Table 2.3).

2.3.18 Trigger operation manual trigger (MAN TRIG key operation) :TRIGger[1|2][:SEQuence][:IMMediate]

■:TRIGger[1|2][:SEQuence][:IMMediate]

Description

Corresponds to [MANUAL TRIGGER] button

Setting parameters

None

Remarks

* May not be used depending on the oscillation mode (see Table 2.3).

2.3.19 Trigger operation execution control setting :TRIGger[1|2]:SElected:EXECute

■:TRIGger[1|2]:SElected:EXECute

Description

Controls each oscillation mode

Setting parameters

Modulated oscillation mode

START|STOP

START → Start

STOP → Stop

Sweep oscillation mode

START|STOP|HOLD|RESume

START → Start

STOP → Stop

HOLD → Hold

RESume → Resume

Sequence

START|STOP|ISTop|HOLD|RESume|EBRanch

START → Start

STOP → Stop

ISTop → Forced stop

HOLD → Hold

RESume → Resume

EBRanch → Event branch

Remarks

* Whether "[1|2]" exists in sequence has no influence on the operation.

* Cannot be used in the burst oscillation mode.

2.3.20 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 parameters

<frequency>|MINimum|MAXimum

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

<REAL> → Frequency: 0.01μHz to 30MHz,

Resolution: 0.01μHz

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

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

<units> ::= HZ|USER

MINimum → Sets the maximum value

MAXimum → Sets the minimum value

Query parameters

[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

Remarks

* Sequence frequency setting/query is not possible with this command.

2.3.21 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 parameters

HZ|USER

HZ → Hz

USER → User-defined unit

Query parameters:

None

Response format

HZ|USER

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:FREQuency:UNIT HZ

Sets the frequency unit of CH1 to Hz

2.3.22 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 parameters

[<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 → Logarithmic

* 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 parameters

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,1000,0
 Sets the user-defined unit of frequency of CH1 to "kHz"

2.3.23 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 parameters

<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:(999.9mVp-p or less) 4 digits or 0.1 mVp-p
 (1Vp-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 parameters

[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

Remarks

* Sequence amplitude setting/query is not possible with this command.

2.3.24 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 parameters

VPP|VPK|VRMS|DBV|DBM|USER

VPP	→	Vp-p
VPK	→	Vpk
VRMS	→	Vrms
DBV	→	dBV
DBM	→	dBm
USER	→	User-defined unit

Query parameters

None

Response format

VPP|VPK|VRMS|DBV|DBM|USER

* For the meaning of each response data, see the setting parameters.

Setting example

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

Sets the amplitude unit of CH1 to Vp-p

2.3.25 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 parameters

[<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 → Logarithmic

* 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 parameters

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 parameters.

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:USER "mVpk",LINear,0.001,0
Sets the user-defined unit of amplitude of CH1 to "mVpk"

2.3.26 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 parameters

<offset>|MINimum|MAXimum
<offset> ::= <REAL>[<eunits>][<units>]
<REAL> → DC offset: ± 10V/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 parameters

[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

2.3.27 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 parameters

V|USER
V → V
USER → User-defined unit

Query parameters

None

Response format

V|USER

* For the meaning of each response data, see the setting parameters.

Setting example

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

Sets the DC offset of CH1 to V

2.3.28 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

Setting parameters

[<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 → Logarithmic

* 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 parameters

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 parameters.

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:OFFSet:USER "mV",LINear,0.001,0

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

2.3.29 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 parameters

<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 parameters

[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°

2.3.30 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 parameters

DEG|USER

DEG → °

USER → User-defined unit

Query parameters

None

Response format

DEG|USER

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:PHASe:UNIT DEG

Sets the unit of phase of CH1 to °

2.3.31 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 parameters

[<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 → Logarithmic

* 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 parameters

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 parameters.

Setting example

:SOURce1:PHASe:USER "rad",LINear,57.32,0

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

2.3.32 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 parameters

<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 parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMEDIATE:HIGH 5V

Sets the high level of CH1 to 5 V

2.3.33 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 parameters

V|USER

V → V

USER → User-defined unit

Query parameters

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.

2.3.34 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 parameters

<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 parameters

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

Response format

<NR3>

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:LOW 0V
 Sets the low level of CH1 to 0 V

2.3.35 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 parameters

V|USER
 V → V
 USER → User-defined unit

Query parameters

None

Response format

V|USER
 * For the meaning of each response data, see the setting parameters.

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.

2.3.36 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 parameters

PCT|USER
 PCT → %
 USER → User-defined unit

Query parameters

None

Response format

PCT|USER

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:PULSe:DCYClE:UNIT PCT

Sets the duty of CH1 to %

2.3.37 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 parameters

[<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 → Logarithmic

* 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 parameters

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 parameters.

Setting example

:SOURce1:PHASe:USER "INTN",LINear,100,0

Sets the user-defined unit of duty of CH1 to "INTN"

2.3.38 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 parameters

<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 parameters

[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 "2.3.50 Square wave extension on/off selection."

* Sequence duty setting/query is not possible with this command.

2.3.39 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 parameters

<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 parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:PULSe:DCYCLe 20PCT
 Sets the duty of CH1 (pulse wave) to 20%

2.3.40 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 parameters

<width>|MINimum|MAXimum
 <width> ::= <REAL>[<eunits>][<units>]
 <REAL> → Pulse width: 25.50 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 parameters

[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

2.3.41 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 parameters

<seconds>|MINimum|MAXimum
 <seconds> ::= <REAL>[<eunits>][<units>]

<REAL> → Rising time: 15.0 ns to 58.8 Ms,
 Resolution: 3 digits or 0.1 ns
 <eunits> ::= MA|K|M|U|N
 <units> ::= S
 MINimum → 15.0 ns
 MAXimum → 58.8 Ms

Query parameters

[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

2.3.42 Pulse 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 parameters

<seconds>|MINimum|MAXimum
 <seconds> ::= <REAL>[<eunits>][<units>]
 <REAL> → Falling time: 15.0 ns to 58.8 Ms,
 Resolution: 3 digits or 0.1 ns
 <eunits> ::= MA|K|M|U|N
 <units> ::= S
 MINimum → 15.0 ns
 MAXimum → 58.8 Ms

Query parameters

[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

2.3.43 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 parameters

<period>|MINimum|MAXimum

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

<REAL> → Period: 33.33 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 parameters

[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

2.3.44 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 parameters

S|USER

S → s

USER → User-defined unit

Query parameters

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

2.3.45 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 parameters

[<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 → Logarithmic
 * 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 parameters

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,0.001,0
 Sets the user-defined unit of period of CH1 to "ms"

2.3.46 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 parameters

<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 parameters

[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%

2.3.47 Waveform selection/query [:SOURce[1|2]]:FUNCTION[:SHAPE]

■[:SOURce[1|2]]:FUNCTION[:SHAPE]

□[:SOURce[1|2]]:FUNCTION[:SHAPE]?

Description

Sets/queries the waveform

Setting parameters

DC|NOISE|SINusoid|SQUare|PULSe|RAMP
|USINe|CSINe|CFCSine|ACSine|SSINe|MCSine
|ONPSine|OFPSine|CONSine|COFSine
|GAUSSian|LORentz|HAVersine|HSPulse|TPULse|SINC
|ERISe|EFALl|SOLStep|DOSCillation
|OSURge|PSURge
|TOFFset|HSEPulse|BRRamp
|USER

DC	→	DC
NOISE	→	Noise
SINusoid	→	Sine wave
SQUare	→	Square wave
PULSe	→	Pulse wave
RAMP	→	Ramp wave
USINe	→	Unbalanced sine wave
CSINe	→	Clipped sine wave
CFCSine	→	CF controlled sine wave
ACSine	→	Conduction angle controlled sine wave
SSINe	→	Staircase sine wave
MCSine	→	Multi-cycle sine wave
ONPSine	→	On-phase controlled sine wave
OFPSine	→	Off-phase controlled sine wave
CONSine	→	Chattering-on sine wave
COFSine	→	Chattering-off sine wave
GAUSSian	→	Gaussian pulse
LORentz	→	Lorentz pulse
HAVersine	→	Haversine
HSPulse	→	Half-sine pulse
TPULse	→	Trapezoid pulse
SINC	→	Sin(x)/x
ERISe	→	Exponential rise
EFALl	→	Exponential fall
SOLStep	→	Second order LPF step response
DOSCillation	→	Damped oscillation
OSURge	→	Oscillation surge
PSURge	→	Pulse surge
TOFFset	→	Trapezoid with offset
HSEPulse	→	Half-sine edge pulse
BRRamp	→	Bottom referenced ramp wave
USER	→	Arbitrary waveform

Query parameters

None

Response format

DC|NOIS|SIN|SQU|PULS|RAMP
|USIN|CSIN|CFCS|ACS|SSIN|MCS
|ONPS|OFPS|CONS|COFS
|GAUS|LOR|HAV|HSP|TPUL|SINC
|ERIS|EFAL|SOLS|DOSC
|OSUR|PSUR
|TOFF|HSEP|BRR
|USER

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:FUNCTION:SHAPE RAMP

Sets the waveform of CH1 to ramp wave

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

■:OUTPut[1|2]:POLarity

□:OUTPut[1|2]:POLarity?

Description

Selects/queries the polarity of waveform

Setting parameters

<shape>,<polarity>

<shape> ::= SINusoid|SQUare|PULSe|RAMP
|USINe|CSINe|CFCSine|ACSine|SSINe|MCSine
|ONPSine|OFPSine|CONSine|COFSine
|GAUSSian|LORentz|HAVersine|HSPulse|TPULse|SINC
|ERISe|EFAL|SOLStep|DOSCillation
|OSURge|PSURge
|TOFFset|HSEPulse|BRRamp
|USER

SINusoid	→	Sine wave
SQUare	→	Square wave
PULSe	→	Pulse wave
RAMP	→	Ramp wave
USINe	→	Unbalanced sine wave
CSINe	→	Clipped sine wave
CFCSine	→	CF controlled sine wave
ACSine	→	Conduction angle controlled sine wave
SSINe	→	Staircase sine wave
MCSine	→	Multi-cycle sine wave
ONPSine	→	On-phase controlled sine wave
OFPSine	→	Off-phase controlled sine wave
CONSine	→	Chattering-on sine wave
COFSine	→	Chattering-off sine wave
GAUSSian	→	Gaussian pulse
LORentz	→	Lorentz pulse
HAVersine	→	Haversine
HSPulse	→	Half-sine pulse
TPULse	→	Trapezoid pulse

SINC	→	Sin(x)/x
ERISe	→	Exponential rise
EFALl	→	Exponential fall
SOLStep	→	Second order LPF step response
DOSCillation	→	Damped oscillation
OSURge	→	Oscillation surge
PSURge	→	Pulse surge
TOFFset	→	Trapezoid with offset
HSEPulse	→	Half-sine edge pulse
BRRamp	→	Bottom referenced ramp wave
USER	→	Arbitrary waveform

<polarity> ::= NORMAl|INVerted

NORMAl	→	Normal
INVerted	→	Invert

Query parameters

<shape> ::= SINusoid|SQUare|PULSe|RAMP
 |USINe|CSINe|CFCSine|ACSine|SSINe|MCSine
 |ONPSine|OFPSine|CONSine|COFSine
 |GAUSSian|LORentz|HAVersine|HSPulse|TPULse|SINC
 |ERISe|EFALl|SOLStep|DOSCillation
 |OSURge|PSURge
 |TOFFset|HSEPulse|BRRamp
 |USER

* For the meaning of each parameter, see the setting parameters.

Response format

NORM|INV

* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut1:POLarity SINusoid,NORMAl
 Sets the polarity of sine wave of CH1 to normal

2.3.49 Amplitude range selection/query :OUTPut[1|2]:SCALe

■:OUTPut[1|2]:SCALe

□:OUTPut[1|2]:SCALe?

Description

Selects/queries the amplitude range of waveform

Setting parameters

<shape>,<scale>

<shape> ::= SINusoid|SQUare|PULSe|RAMP
 |USINe|CSINe|CFCSine|ACSine|SSINe|MCSine
 |ONPSine|OFPSine|CONSine|COFSine
 |GAUSSian|LORentz|HAVersine|HSPulse|TPULse|SINC
 |ERISe|EFALl|SOLStep|DOSCillation
 |OSURge|PSURge
 |TOFFset|HSEPulse|BRRamp
 |USER

SINusoid	→	Sine wave
SQUare	→	Square wave
PULSe	→	Pulse wave
RAMP	→	Ramp wave

USINe	→	Unbalanced sine wave
CSINe	→	Clipped sine wave
CFCSine	→	CF controlled sine wave
ACSine	→	Conduction angle controlled sine wave
SSINe	→	Staircase sine wave
MCSine	→	Multi-cycle sine wave
ONPSine	→	On-phase controlled sine wave
OFPSine	→	Off-phase controlled sine wave
CONSine	→	Chattering-on sine wave
COFSine	→	Chattering-off sine wave
GAUSSian	→	Gaussian pulse
LORentz	→	Lorentz pulse
HAVersine	→	Haversine
HSPulse	→	Half-sine pulse
TPULse	→	Trapezoid pulse
SINC	→	Sin(x)/x
ERISe	→	Exponential rise
EFALI	→	Exponential fall
SOLStep	→	Second order LPF step response
DOSCillation	→	Damped oscillation
OSURge	→	Oscillation surge
PSURge	→	Pulse surge
TOFFset	→	Trapezoid with offset
HSEPulse	→	Half-sine edge pulse
BRRamp	→	Bottom referenced ramp wave
USER	→	Arbitrary waveform

<scale> ::= MFS|FS|PFS

MFS → -FS/0

FS → ± FS

PFS → 0/+FS

Query parameters

<shape> ::= SINusoid|SQUare|PULSe|RAMP
 |USINe|CSINe|CFCSine|ACSine|SSINe|MCSine
 |ONPSine|OFPSine|CONSine|COFSine
 |GAUSSian|LORentz|HAVersine|HSPulse|TPULse|SINC
 |ERISe|EFALI|SOLStep|DOSCillation
 |OSURge|PSURge
 |TOFFset|HSEPulse|BRRamp
 |USER

* For the meaning of each parameter, see the setting parameters.

Response format

MFS|FS|PFS

* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut1:SCALE SINusoid,FS

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

2.3.50 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 parameters

<state> ::= <BOL>

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

Query parameters

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

2.3.51 Unbalanced sine wave former amplitude setting/query

[:SOURce[1|2]]:FUNCTION:USINe:AMPLitude[1]

■[:SOURce[1|2]]:FUNCTION:USINe:AMPLitude[1]

□[:SOURce[1|2]]:FUNCTION:USINe:AMPLitude[1]?

Description

Sets/queries former amplitude of unbalanced sine wave

Setting parameters

<amplitude>|MINimum|MAXimum

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

<REAL> → Former amplitude: -100.00% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → -100.00%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:USINe:AMPLitude1 20PCT
Sets former amplitude of unbalanced sine wave of CH1 to 20%.

2.3.52 Unbalanced sine wave latter amplitude setting/query [:SOURce[1|2]]:FUNction:USINe:AMPLitude2

■[:SOURce[1|2]]:FUNction:USINe:AMPLitude2

□[:SOURce[1|2]]:FUNction:USINe:AMPLitude2?

Description

Sets/queries latter amplitude of unbalanced sine wave

Setting parameters

<amplitude>|MINimum|MAXimum

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

<REAL> → Latter amplitude: -100.00% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → -100.00%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNction:USINe:AMPLitude2 20PCT

Sets latter amplitude of unbalanced sine wave of CH1 to 20%.

2.3.53 Clipped sine wave clip rate setting/query [:SOURce[1|2]]:FUNction:CSINe:CLIP

■[:SOURce[1|2]]:FUNction:CSINe:CLIP

□[:SOURce[1|2]]:FUNction:CSINe:CLIP?

Description

Sets/queries clip rate of clipped sine wave.

Setting parameters

<clip>|MINimum|MAXimum

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

<REAL> → Clip rate: 0.00% to 99.99%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 99.99%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNction:CSINe:CLIP 20PCT

Sets clip rate of clipped sine wave of CH1 to 20%

2.3.54 CF controlled sine wave crest factor setting/query [:SOURce[1|2]]:FUNction:CFCSine:CFActor

■[:SOURce[1|2]]:FUNction:CFCSine:CFActor

□[:SOURce[1|2]]:FUNction:CFCSine:CFActor?

Description

Sets/queries crest factor of CF controlled sine wave

Setting parameters

<cf>|MINimum|MAXimum

<cf> ::= <REAL>

<REAL> → Crest factor: 1.41 to 10.00,
Resolution: 0.01

MINimum → 1.41

MAXimum → 10.00

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNction:CFCSine:CFActor 5.00

Sets crest factor of CF controlled sine wave of CH1 to 5.00

2.3.55 Conduction angle controlled sine wave conduction angle setting/query [:SOURce[1|2]]:FUNction:ACSine:ANGLE

■[:SOURce[1|2]]:FUNction:ACSine:ANGLE

□[:SOURce[1|2]]:FUNction:ACSine:ANGLE?

Description

Sets/queries conduction angle setting for conduction angle controlled sine wave

Setting parameters

<angle>|MINimum|MAXimum

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

<REAL> → Conduction angle: -180.00° to 180.00°,
Resolution: 0.01°

<units> ::= DEG

MINimum → -180.00°

MAXimum → 180.00°

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNction:ACSine:ANGLE 30DEG

Sets conduction angle of conduction angle controlled sine wave of CH1 to 30°

2.3.56 Staircase sine wave number of steps setting/query [:SOURce[1|2]]:FUNCTION:SSINe:STEPs

■[:SOURce[1|2]]:FUNCTION:SSINe:STEPs

□[:SOURce[1|2]]:FUNCTION:SSINe:STEPs?

Description

Sets/queries number of steps of staircase sine wave

Setting parameters

<steps>|MINimum|MAXimum

<steps> ::= <INT>

<INT> → Number of steps: 2 to 100

MINimum → 2

MAXimum → 100

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR1>

Setting example

:SOURce1:FUNCTION:SSINe:STEPs 10

Sets number of steps of staircase sine wave of CH1 to 10

2.3.57 Multi-cycle sine wave number of cycles setting/query [:SOURce[1|2]]:FUNCTION:MCSine:CYCLes

■[:SOURce[1|2]]:FUNCTION:MCSine:CYCLes

□[:SOURce[1|2]]:FUNCTION:MCSine:CYCLes?

Description

Sets/queries number of cycles of multi-cycle sine wave

Setting parameters

<cycles>|MINimum|MAXimum

<cycles> ::= <REAL>

<REAL> → Number of cycles: 0.01 to 50.00,

Resolution: 0.01

MINimum → 0.01

MAXimum → 50.00

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:MCSine:CYCLes 0.2

Sets the number of cycles of multi-cycle sine wave of CH1 to 0.2

2.3.58 Multi-cycle sine wave start phase setting/query [:SOURce[1|2]]:FUNction:MCsine:PHASe

■[:SOURce[1|2]]:FUNction:MCsine:PHASe

□[:SOURce[1|2]]:FUNction:MCsine:PHASe?

Description

Sets/queries start phase of multi-cycle sine wave

Setting parameters

<clip>|MINimum|MAXimum

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

<REAL> → Start phase: -360.00° to 360.00°,
Resolution: 0.01°

<units> ::= DEG

MINimum → -360.00°

MAXimum → 360.00°

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNction:MCsine:PHASe 30DEG

Sets start phase of multi-cycle sine wave of CH1 to 30°

2.3.59 On-phase controlled sine wave complete-on phase setting/query [:SOURce[1|2]]:FUNction:ONPSine:ONPHase

■[:SOURce[1|2]]:FUNction:ONPSine:ONPHase

□[:SOURce[1|2]]:FUNction:ONPSine:ONPHase?

Description

Sets/queries complete-on phase of on-phase controlled sine wave.

Setting parameters

<phase>|MINimum|MAXimum

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

<REAL> → Complete-on phase: 0.00° to 360.00°,
Resolution: 0.01°

<units> ::= DEG

MINimum → 0.00°

MAXimum → 360.00°

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNction:ONPSine:ONPHase 30DEG

Sets complete-on phase of on-phase controlled sine wave of CH1 to 30°

2.3.60 On-phase controlled sine wave on-slope time setting/query [:SOURce[1|2]]:FUNction:ONPSine:STIME

■[:SOURce[1|2]]:FUNction:ONPSine:STIME

□[:SOURce[1|2]]:FUNction:ONPSine:STIME?

Description

Sets/queries on-slope time of on-phase controlled sine wave

Setting parameters

<time>|MINimum|MAXimum

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

<REAL> → On-slope time: 0.00% to 50.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 50.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNction:ONPSine:STIME 20PCT

Sets on-slope time of on-phase controlled sine wave of CH1 to 20%

2.3.61 Off-phase controlled sine wave off-phase setting/query [:SOURce[1|2]]:FUNction:OFPSine:OFPHase

■[:SOURce[1|2]]:FUNction:OFPSine:OFPHase

□[:SOURce[1|2]]:FUNction:OFPSine:OFPHase?

Description

Sets/queries off-phase of off-phase controlled sine wave

Setting parameters

<phase>|MINimum|MAXimum

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

<REAL> → Off-phase: 0.00° to 360.00°,
Resolution: 0.01°

<units> ::= DEG

MINimum → 0.00°

MAXimum → 360.00°

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNction:OFPSine:OFPHase 30DEG

Sets off-phase of off-phase controlled sine wave of CH1 to 30°

2.3.62 Off-phase controlled sine wave off-slope setting/query [:SOURce[1|2]]:FUNCTION:OFPSine:STIME

■[:SOURce[1|2]]:FUNCTION:OFPSine:STIME

□[:SOURce[1|2]]:FUNCTION:OFPSine:STIME?

Description

Sets/queries off-slope time of off-phase controlled sine wave

Setting parameters

<time>|MINimum|MAXimum

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

<REAL> → Off-slope: 0.00% to 50.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 50.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:OFPSine:STIME 20PCT

Sets off-slope time of off-phase controlled sine wave of CH1 to 20%

2.3.63 Chattering-on sine wave on-phase setting/query [:SOURce[1|2]]:FUNCTION:CONSine:ONPHase

■[:SOURce[1|2]]:FUNCTION:CONSine:ONPHase

□[:SOURce[1|2]]:FUNCTION:CONSine:ONPHase?

Description

Sets/queries on-phase of chattering-on sine wave

Setting parameters

<phase>|MINimum|MAXimum

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

<REAL> → On-phase: 0.00° to 360.00°,
Resolution: 0.01°

<units> ::= DEG

MINimum → 0.00°

MAXimum → 360.00°

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:CONSine:ONPhase 30DEG
Sets on-phase of chattering-on sine wave of CH1 to 30°

2.3.64 Chattering-on sine wave number of chatterings setting/query [:SOURce[1|2]]:FUNCTION:CONSine:NCHattering

■[:SOURce[1|2]]:FUNCTION:CONSine:NCHattering

□[:SOURce[1|2]]:FUNCTION:CONSine:NCHattering?

Description

Sets/queries number of chatterings of chattering-on sine wave

Setting parameters

<chattering>|MINimum|MAXimum

<chattering> ::= <INT>

<INT> → Number of chatterings: 0 to 3,

MINimum → 0

MAXimum → 3

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR1>

Setting example

:SOURce1:FUNCTION:CONSine:NCHattering 2

Sets number of chatterings of chattering-on sine wave of CH1 to 2

2.3.65 Chattering-on sine wave on-time setting/query [:SOURce[1|2]]:FUNCTION:CONSine:TON

■[:SOURce[1|2]]:FUNCTION:CONSine:TON

□[:SOURce[1|2]]:FUNCTION:CONSine:TON?

Description

Sets/queries on-time of chattering-on sine wave

Setting parameters

<time>|MINimum|MAXimum

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

<REAL> → On-time: 0.00% to 20.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 20.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:CONSine:TON 20PCT

Sets on-time of chattering-on sine wave of CH1 to 20%

2.3.66 Chattering-on sine wave off time setting/query [:SOURce[1|2]]:FUNction:CONSine:TOFF

■[:SOURce[1|2]]:FUNction:CONSine:TOFF

□[:SOURce[1|2]]:FUNction:CONSine:TOFF?

Description

Sets/queries off time of chattering-on sine wave

Setting parameters

<time>|MINimum|MAXimum

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

<REAL> → Off time: 0.00% to 20.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 20.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNction:CSine:CLIP 20PCT

Sets off time of chattering-on sine wave of CH1 to 20%

2.3.67 Chattering-off sine wave off-phase setting/query [:SOURce[1|2]]:FUNction:COFSine:OFFHase

■[:SOURce[1|2]]:FUNction:COFSine:OFFHase

□[:SOURce[1|2]]:FUNction:COFSine:OFFHase?

Description

Sets/queries off-phase of chattering-off sine wave

Setting parameters

<phase>|MINimum|MAXimum

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

<REAL> → Off-phase: 0.00° to 360.00°,
Resolution: 0.01°

<units> ::= DEG

MINimum → 0.00°

MAXimum → 360.00°

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:COFSine:OPPhase 30DEG
Sets off-phase of chattering-off sine wave of CH1 to 30°

2.3.68 Chattering-off sine wave number of chatterings setting/query [:SOURce[1|2]]:FUNCTION:COFSine:NCHattering

■[:SOURce[1|2]]:FUNCTION:COFSine:NCHattering

□[:SOURce[1|2]]:FUNCTION:COFSine:NCHattering?

Description

Sets/queries number of chatterings of chattering-off sine wave

Setting parameters

<chattering>|MINimum|MAXimum

<chattering> ::= <INT>

<INT> → Number of chatterings: 0 to 3

MINimum → 0

MAXimum → 3

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR1>

Setting example

:SOURce1:FUNCTION:COFSine:NCHattering 2

Sets number of chatterings of chattering-off sine wave of CH1 to 2

2.3.69 Chattering-off sine wave on-time setting/query [:SOURce[1|2]]:FUNCTION:COFSine:TON

■[:SOURce[1|2]]:FUNCTION:COFSine:TON

□[:SOURce[1|2]]:FUNCTION:COFSine:TON?

Description

Sets/queries on-time of chattering-off sine wave

Setting parameters

<time>|MINimum|MAXimum

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

<REAL> → On-time: 0.00% to 20.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 20.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:COFSine:TON 20PCT

Sets on-time of chattering-off sine wave of CH1 to 20%

2.3.70 Chattering-off sine wave off time setting/query [:SOURce[1|2]]:FUNCTION:COFSine:TOFF

■[:SOURce[1|2]]:FUNCTION:COFSine:TOFF

□[:SOURce[1|2]]:FUNCTION:COFSine:TOFF?

Description

Sets/queries off time of chattering-off sine wave

Setting parameters

<time>|MINimum|MAXimum

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

<REAL> → Off time: 0.00% to 20.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 20.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:COFSine:TOFF 20PCT

Sets off time of chattering-off sine wave of CH1 to 20%

2.3.71 Gaussian pulse standard deviation setting/query [:SOURce[1|2]]:FUNCTION:GAUSSian:SIGMa

■[:SOURce[1|2]]:FUNCTION:GAUSSian:SIGMa

□[:SOURce[1|2]]:FUNCTION:GAUSSian:SIGMa?

Description

Sets/queries standard deviation of Gaussian pulse

Setting parameters

<sigma>|MINimum|MAXimum

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

<REAL> → Standard deviation: 0.00% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:GAUSSian:SIGMa 20PCT
Sets standard deviation of Gaussian pulse of CH1 to 20%

2.3.72 Lorentz pulse half value of width setting/query [:SOURce[1|2]]:FUNCTION:LOREntz:HWIDth

■[:SOURce[1|2]]:FUNCTION:LOREntz:HWIDth

□[:SOURce[1|2]]:FUNCTION:LOREntz:HWIDth?

Description

Sets/queries half value of width of Lorentz pulse

Setting parameters

<width>|MINimum|MAXimum

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

<REAL> → Half value of width: 0.01% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.01%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:LOREntz:HWIDth 20PCT

Sets half value of width of Lorentz pulse of CH1 to 20%

2.3.73 Haversine width setting/query [:SOURce[1|2]]:FUNCTION:HAVersine:WIDTh

■[:SOURce[1|2]]:FUNCTION:HAVersine:WIDTh

□[:SOURce[1|2]]:FUNCTION:HAVersine:WIDTh?

Description

Sets/queries haversine width

Setting parameters

<width>|MINimum|MAXimum

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

<REAL> → Width: 0.01% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.01%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:HAVersine:WIDTH 20PCT

Sets haversine width of CH1 to 20%

2.3.74 Half-sine pulse width setting/query

[[:SOURce[1|2]]:FUNCTION:HSPulse:WIDTH

■[:SOURce[1|2]]:FUNCTION:HSPulse:WIDTH

□[:SOURce[1|2]]:FUNCTION:HSPulse:WIDTH?

Description

Sets/queries half-sine pulse width

Setting parameters

<width>|MINimum|MAXimum

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

<REAL> → Width: 0.01% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.01%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:HSPulse:WIDTH 20PCT

Sets half-sine pulse width of CH1 to 20%

2.3.75 Trapezoid pulse slope width setting/query

[[:SOURce[1|2]]:FUNCTION:TPULse:RFALI

■[:SOURce[1|2]]:FUNCTION:TPULse:RFALI

□[:SOURce[1|2]]:FUNCTION:TPULse:RFALI?

Description

Sets/queries slope width of trapezoid pulse

Setting parameters

<width>|MINimum|MAXimum

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

<REAL> → Slope width: 0.00% to 50.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 50.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:TPULse:RFALI 20PCT
Sets slope width of trapezoid pulse of CH1 to 20%

**2.3.76 Trapezoid pulse
upper base width setting/query
[:SOURce[1|2]]:FUNCTION:TPULse:UBASe**

■[:SOURce[1|2]]:FUNCTION:TPULse:UBASe

□[:SOURce[1|2]]:FUNCTION:TPULse:UBASe?

Description

Sets/queries upper base width of trapezoid pulse

Setting parameters

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

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:TPULse:UBASe 20PCT
Sets upper base width of trapezoid pulse of CH1 to 20%

**2.3.77 Sin(x)/x
number of zero crossing setting/query
[:SOURce[1|2]]:FUNCTION:SINC:ZCRossing**

■[:SOURce[1|2]]:FUNCTION:SINC:ZCRossing

□[:SOURce[1|2]]:FUNCTION:SINC:ZCRossing?

Description

Sets/queries number of zero crossing of Sin(x)/x

Setting parameters

<number>|MINimum|MAXimum
<number> ::= <INT>
<REAL> → Number of zero crossing: 1 to 50
MINimum → 1
MAXimum → 50

Query parameters

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

Response format

<NR1>

Setting example

:SOURce1:FUNCTION:SINC:ZCRossing 10
Sets number of zero crossings of Sin(x)/x of CH1 to 10

2.3.78 Exponential rise time constant setting/query [:SOURce[1|2]]:FUNCTION:ERISe:TCONstant

■[:SOURce[1|2]]:FUNCTION:ERISe:TCONstant

□[:SOURce[1|2]]:FUNCTION:ERISe:TCONstant?

Description

Sets/queries time constant of exponential rise

Setting parameters

<tc>|MINimum|MAXimum

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

<REAL> → Time constant: 0.01% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.01%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:ERISe:TCONstant 20PCT
Sets time constant of exponential rise of CH1 to 20%

2.3.79 Exponential fall time constant setting/query [:SOURce[1|2]]:FUNCTION:EFALI:TCONstant

■[:SOURce[1|2]]:FUNCTION:EFALI:TCONstant

□[:SOURce[1|2]]:FUNCTION:EFALI:TCONstant?

Description

Sets/queries time constant of exponential fall

Setting parameters

<tc>|MINimum|MAXimum

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

<REAL> → Time constant: 0.01% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.01%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:EFALL:TConstant 20PCT
Sets time constant of exponential fall of CH1 to 20%

2.3.80 Second order LPF step response natural frequency setting/query
[[:SOURce[1|2]]:FUNCTION:SOLStep:NFRrequency

■[:SOURce[1|2]]:FUNCTION:SOLStep:NFRrequency

□[:SOURce[1|2]]:FUNCTION:SOLStep:NFRrequency?

Description

Sets/queries natural frequency of LPF of second order LPF step response

Setting parameters

<frequency>|MINimum|MAXimum
<frequency> ::= <REAL>
<REAL> → Natural frequency: 1.00 to 50.00,
Resolution: 0.01
MINimum → 1.00
MAXimum → 50.00

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:SOLStep:NFRrequency 10
Sets natural frequency of second order LPF step response of CH1 to 10

2.3.81 Second order LPF step response Q setting/query
[[:SOURce[1|2]]:FUNCTION:SOLStep:Q

■[:SOURce[1|2]]:FUNCTION:SOLStep:Q

□[:SOURce[1|2]]:FUNCTION:SOLStep:Q?

Description

Sets/queries Q of LPF of second order step response

Setting parameters

<q>|MINimum|MAXimum
<q> ::= <REAL>
<REAL> → Q of LPF: 0.50 to 50.00,
Resolution: 0.01
MINimum → 0.50
MAXimum → 50.00

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCtion:SOLStep:Q 10
Sets Q of second order LPF step response of CH1 to 10

2.3.82 Damped oscillation oscillation frequency setting/query [:SOURce[1|2]]:FUNCtion:DOSCillation:OFRequency

■[:SOURce[1|2]]:FUNCtion:DOSCillation:OFRequency

□[:SOURce[1|2]]:FUNCtion:DOSCillation:OFRequency?

Description

Sets/queries oscillation frequency of damped oscillation

Setting parameters

<frequency>|MINimum|MAXimum
<frequency> ::= <REAL>
<REAL> → Oscillation frequency: 0.01 to 50.00,
Resolution: 0.01
MINimum → 0.01
MAXimum → 50.00

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCtion:DOSCillation:OFRequency 10
Sets oscillation frequency of damped oscillation of CH1 to 10

2.3.83 Damped oscillation damping time constant setting/query [:SOURce[1|2]]:FUNCtion:DOSCillation:DTConstant

■[:SOURce[1|2]]:FUNCtion:DOSCillation:DTConstant

□[:SOURce[1|2]]:FUNCtion:DOSCillation:DTConstant?

Description

Sets/queries damping time constant of damped oscillation

Setting parameters

<tc>|MINimum|MAXimum
<tc> ::= <REAL>[<units>]
<REAL> → Damping time constant: -100.00% to 100.00%,
Resolution: 0.01%
<units> ::= PCT
MINimum → -100.00%
MAXimum → 100.00%

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCtion: DOSCillation:DTConstant 20PCT

Sets damping time constant of damped oscillation of CH1 to 20%

2.3.84 Oscillation surge oscillation frequency setting/query [:SOURce[1|2]]:FUNCtion:OSURge:OFRequency

■[:SOURce[1|2]]:FUNCtion:OSURge:OFRequency

□[:SOURce[1|2]]:FUNCtion:OSURge:OFRequency?

Description

Sets/queries oscillation frequency of oscillation surge

Setting parameters

<frequency>|MINimum|MAXimum

<frequency> ::= <REAL>

<REAL> → Oscillation frequency: 0.01 to 50.00,
Resolution: 0.01

MINimum → 0.01

MAXimum → 50.00

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCtion:OSURge:OFRequency 10

Sets oscillation frequency of oscillation surge of CH1 to 10

2.3.85 Oscillation surge damping time constant setting/query [:SOURce[1|2]]:FUNCtion:OSURge:DTConstant

■[:SOURce[1|2]]:FUNCtion:OSURge:DTConstant

□[:SOURce[1|2]]:FUNCtion:OSURge:DTConstant?

Description

Sets/queries damping time constant of oscillation surge

Setting parameters

<tc>|MINimum|MAXimum

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

<REAL> → Damping time constant: 0.01% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.01%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:OSURge:DTConstant 20PCT
Sets damping time constant of oscillation surge of CH1 to 20%

2.3.86 Oscillation surge trailing time constant setting/query [:SOURce[1|2]]:FUNCTION:OSURge:TTConstant

■[:SOURce[1|2]]:FUNCTION:OSURge:TTConstant

□[:SOURce[1|2]]:FUNCTION:OSURge:TTConstant?

Description

Sets/queries trailing time constant of oscillation surge

Setting parameters

<tc>|MINimum|MAXimum
<tc> ::= <REAL>[<units>]
<REAL> → Trailing time constant: 0.01% to 100.00%,
Resolution: 0.01%
<units> ::= PCT
MINimum → 0.01%
MAXimum → 100.00%

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:OSURge:TTConstant 20PCT
Sets trailing time constant of oscillation surge of CH1 to 20%

2.3.87 Pulse surge rising time setting/query [:SOURce[1|2]]:FUNCTION:PSURge:TR

■[:SOURce[1|2]]:FUNCTION:PSURge:TR

□[:SOURce[1|2]]:FUNCTION:PSURge:TR?

Description

Sets/queries rising time of pulse surge

Setting parameters

<time>|MINimum|MAXimum
<time> ::= <REAL>[<units>]
<REAL> → Rising time: 0.01% to 100.00%,
Resolution: 0.01%
<units> ::= PCT
MINimum → 0.01%
MAXimum → 100.00%

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:PSURge:TR 20PCT
Sets rising time of pulse surge of CH1 to 20%

**2.3.88 Pulse surge
duration time setting/query
[:SOURce[1|2]]:FUNCTION:PSURge:TD**

■[:SOURce[1|2]]:FUNCTION:PSURge:TD

□[:SOURce[1|2]]:FUNCTION:PSURge:TD?

Description

Sets/queries duration time of pulse surge

Setting parameters

<time>|MINimum|MAXimum
<time> ::= <REAL>[<units>]
<REAL> → Duration time: 0.01% to 100.00%,
Resolution: 0.01%
<units> ::= PCT
MINimum → 0.01%
MAXimum → 100.00%

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:PSURge:TD 20PCT
Sets duration time of pulse surge of CH1 to 20%

**2.3.89 Trapezoid with offset
leading delay setting/query
[:SOURce[1|2]]:FUNCTION:TOFFset:DELay**

■[:SOURce[1|2]]:FUNCTION:TOFFset:DELay

□[:SOURce[1|2]]:FUNCTION:TOFFset:DELay?

Description

Sets/queries leading delay of trapezoid with offset

Setting parameters

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

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:TOFFset:DELay 20PCT

Sets leading delay of trapezoid with offset of CH1 to 20%

2.3.90 Trapezoid with offset rising-slope width setting/query

[[:SOURce[1|2]]:FUNCTION:TOFFset:RISe

■[:SOURce[1|2]]:FUNCTION:TOFFset:RISe

□[:SOURce[1|2]]:FUNCTION:TOFFset:RISe?

Description

Sets/queries rising-slope width of trapezoid with offset

Setting parameters

<width>|MINimum|MAXimum

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

<REAL> → Rising-slope width: 0.00% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:TOFFset:RISe 20PCT

Sets rising-slope width of trapezoid with offset of CH1 to 20%

2.3.91 Trapezoid with offset upper base width setting/query

[[:SOURce[1|2]]:FUNCTION:TOFFset:UBASe

■[:SOURce[1|2]]:FUNCTION:TOFFset:UBASe

□[:SOURce[1|2]]:FUNCTION:TOFFset:UBASe?

Description

Sets/queries upper base width of trapezoid with offset

Setting parameters

<width>|MINimum|MAXimum

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

<REAL> → Upper base width: 0.00% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:TOFFset:UBASe 20PCT

Sets upper base width of trapezoid with offset of CH1 to 20%

2.3.92 Trapezoid with offset falling-slope setting/query
[[:SOURce[1|2]]:FUNCTION:TOFFset:FALL

■[:SOURce[1|2]]:FUNCTION:TOFFset:FALL

□[:SOURce[1|2]]:FUNCTION:TOFFset:FALL?

Description

Sets/queries falling-slope width of trapezoid with offset

Setting parameters

<width>|MINimum|MAXimum

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

<REAL> → Falling-slope width: 0.00% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:TOFFset:FALL 20PCT

Sets falling-slope width of trapezoid with offset of CH1 to 20%

2.3.93 Trapezoid with offset offset setting/query
[[:SOURce[1|2]]:FUNCTION:TOFFset:OFFSet

■[:SOURce[1|2]]:FUNCTION:TOFFset:OFFSet

□[:SOURce[1|2]]:FUNCTION:TOFFset:OFFSet?

Description

Sets/queries offset of trapezoid with offset

Setting parameters

<offset>|MINimum|MAXimum

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

<REAL> → Offset: 0.00% to 100.00%,
Resolution: 0.01%

<units> ::= PCT

MINimum → 0.00%

MAXimum → 100.00%

Query parameters

[MINimum|MAXimum]

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:TOFFset:OFFSet 20PCT
Sets offset of trapezoid with offset of CH1 to 20%

**2.3.94 Half-sine edge pulse
leading-edge time setting/query
[:SOURce[1|2]]:FUNCTION:HSEpulse:LE**

■[:SOURce[1|2]]:FUNCTION:HSEpulse:LE

□[:SOURce[1|2]]:FUNCTION:HSEpulse:LE?

Description

Sets/queries leading-edge time of half-sine edge pulse

Setting parameters

<time>|MINimum|MAXimum
<time> ::= <REAL>[<units>]
<REAL> → Leading-edge time: 0.00% to 100.00%,
Resolution: 0.01%
<units> ::= PCT
MINimum → 0.00%
MAXimum → 100.00%

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:HSEpulse:LE 20PCT
Sets leading-edge time of half-sine edge pulse of CH1 to 20%

**2.3.95 Half-sine edge pulse
trailing-edge time setting/query
[:SOURce[1|2]]:FUNCTION:HSEpulse:TE**

■[:SOURce[1|2]]:FUNCTION:HSEpulse:TE

□[:SOURce[1|2]]:FUNCTION:HSEpulse:TE?

Description

Sets/queries trailing-edge time of half-sine edge pulse

Setting parameters

<time>|MINimum|MAXimum
<time> ::= <REAL>[<units>]
<REAL> → Trailing-edge time: 0.00% to 100.00%,
Resolution: 0.01%
<units> ::= PCT
MINimum → 0.00%
MAXimum → 100.00%

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:HSEPulse:TE 20PCT
 Sets trailing-edge time of half-sine edge pulse of CH1 to 20%

2.3.96 Half-sine edge pulse duty setting/query
[:SOURce[1|2]]:FUNCTION:HSEPulse:DCYCLE

■[:SOURce[1|2]]:FUNCTION:HSEPulse:DCYCLE
 □[:SOURce[1|2]]:FUNCTION:HSEPulse:DCYCLE?

Description

Sets/queries duty of half-sine edge pulse

Setting parameters

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

Query parameters

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

Response format

<NR3>

Setting example

:SOURce1:FUNCTION:HSEPulse:DCYCLE 20PCT
 Sets duty of half-sine edge pulse of CH1 to 20%

2.3.97 Bottom referenced ramp wave symmetry setting/query
[:SOURce[1|2]]:FUNCTION:BRRAMP:SYMMetry

■[:SOURce[1|2]]:FUNCTION:BRRAMP:SYMMetry
 □[:SOURce[1|2]]:FUNCTION: BRRAMP:SYMMetry?

Description

Sets/queries bottom referenced ramp wave symmetry

Setting parameters

<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 parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:FUNcTion:BRRAMp:SYMMetry 20PCT

Sets symmetry of bottom referenced ramp wave of CH1 to 20%

2.3.98 Arbitrary waveform selection/query [:SOURce[1|2]]:FUNcTion:USER

■[:SOURce[1|2]]:FUNcTion:USER

□[:SOURce[1|2]]:FUNcTion:USER?

Description

Sets/queries the arbitrary waveform

Setting parameters

<memory> ::= <INT>

<INT> → Memory number: 0 to 128

Query parameters

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

2.3.99 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 parameters

<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 parameters

<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 parameters.

Remarks

- ① <format>, <number>, <data[i]>, <x[i]>, <y[i]> are binary data. (Big endian)
- ② 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).
- ③ The 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.
- ④ The control point <x[i]> must be sorted in ascending order from the beginning of data. If it is not sorted, an error occurs.
- ⑤ The 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 V_{p-p}, 1 LSB 1/32767 V is used.
* All of the logical signal output values are not guaranteed.

- ⑥ Arbitrary wave memory number 0 is the edit memory.
- ⑦ The arbitrary wave name of the memory number 0 is “<Edit Memory> ”(20 characters).
- ⑧ Array format data cannot be set for the arbitrary wave memory number 0.
- ⑨ Arbitrary wave name cannot be set for the arbitrary wave memory number 0. If it is specified, it is ignored.

2.3.100 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 parameters

<memory>,<name>

<memory> ::= <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

2.3.101 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 parameters

<memory>

<memory> ::= <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.

2.3.102 Arbitrary waveform memory

copy

{:TRACe|:DATA}:COPY

■{:TRACe|:DATA}:COPY

Description

Copies the arbitrary wave data

Setting parameters

<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

|USINe|CSINe|CFCSine|ACSine|SSINe|MCSine

|ONPSine|OFPSine|CONSine|COFSine

|GAUSSian|LORentz|HAVersine|HSPulse|TPULse|SINC

|ERISe|EFALl|SOLStep|DOSCillation

|OSURge|PSURge

|TOFFset|HSEPulse|BRRamp

|USER

SINusoid → Sine wave

SQUare → Square wave

PULSe → Pulse wave

RAMP → Ramp wave

USINe → Unbalanced sine wave

CSINe → Clipped sine wave

CFCSine → CF controlled sine wave

ACSine → Conduction angle controlled sine wave

SSINe → Staircase sine wave

MCSine → Multi-cycle sine wave

ONPSine → On-phase controlled sine wave

OFPSine → Off-phase controlled sine wave

CONSine → Chattering-on sine wave

COFSine → Chattering-off sine wave

GAUSSian → Gaussian pulse

LORentz → Lorentz pulse

HAVersine → Haversine

HSPulse → Half-sine pulse

TPULse → Trapezoid pulse

SINC → Sin(x)/x

ERISe → Exponential rise

EFALl → Exponential fall

SOLStep → Second order LPF step response

DOSCillation → Damped oscillation

OSURge → Oscillation surge

PSURge → Pulse surge

TOFFset	→	Trapezoid with offset
HSEpulse	→	Half-sine edge pulse
BRRamp	→	Bottom referenced ramp wave
USER	→	Arbitrary waveform

* 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.

2.3.103 Arbitrary waveform memory

delete

{:TRACe|:DATA}:DELeTe

■ {:TRACe|:DATA}:DELeTe

Description

Deletes the arbitrary wave memory

Setting parameters

<memory>

<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.

2.3.104 Arbitrary waveform memory

information acquisition

{:TRACe|:DATA}:INFormation?

□{:TRACe|:DATA}:INFormation?

Description

Acquires the information of arbitrary wave memory

Query parameters

<memory> ::= <INT>

<INT> → Memory number: 1 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

2.3.105 Continuous oscillation mode selection [:SOURce[1|2]]:CONTInuous[:IMMediate]

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

Description

Sets the oscillation mode to the continuous oscillation

Setting parameters

None

Setting example

:SOURce1:CONTInuous:IMMediate

Sets the oscillation mode of CH1 to the continuous oscillation

2.3.106 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 parameters

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.

2.3.107 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 parameters

<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 parameters

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

2.3.108 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 parameters

<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 maximum value

MAXimum → Sets the minimum value

Query parameters

[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

2.3.109 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 parameters

INTernal|EXTernal|CH1

INTernal → Internal

EXTernal → External

CH1 → External of CH1 (Only CH2 can be selected)

Query parameters

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

2.3.110 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 parameters

<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 parameters

[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

2.3.111 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 parameters

SYNC|MSYNc

SYNC → Waveform synchronization

MSYN → Internal modulation synchronization

Query parameters

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

2.3.112 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 parameters

<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 parameters

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

2.3.113 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 parameters

<deviation>[MINimum|MAXimum]

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

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

<units> ::= DEG

MINimum → -1800.000°

MAXimum → 1800.000°

Query parameters

[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°

2.3.114 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 parameters

INTernal|EXTernal|CH1

INTernal → Internal

EXTernal → External

CH1 → External of CH1 (Only CH2 can be selected)

Query parameters

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

2.3.115 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 parameters

<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 parameters

[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

2.3.116 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 parameters

SYNC|MSYNc

SYNC → Waveform synchronization

MSYN → Internal modulation synchronization

Query parameters

None

Response format

SYNC|MSYN

* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut1:SYNC:PSKey:TYPE SYNC

Sets the PSK synchronization output of CH1 to waveform synchronization

2.3.117 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 parameters

<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 parameters

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 the modulation (FM)

2.3.118 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 parameters

<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 parameters

[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

2.3.119 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 parameters

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameters

None

Response format

INT|EXT

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:FM:SOURce INTernal

Sets the FM modulation source of CH1 to internal

2.3.120 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 parameters

<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 parameters

[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

2.3.121 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 parameters

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 waveform

Query parameters

None

Response format

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

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:FM:INTernal:FUNCTion:SHAPe SINusoid

Sets the FM internal modulation waveform of CH1 to sine wave

2.3.122 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 parameters

<memory> ::= <INT>

<INT> → Memory number: 0 to 128

Query parameters

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.

2.3.123 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 parameters

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization

MSYNc → Internal modulation synchronization

FCTn → Internal modulation signal

Query parameters

None

Response format

SYNC|MSYN|MFCT

* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut1:SYNC:FM:TYPE SYNC

Sets the FM synchronization output of CH1 to waveform synchronization

2.3.124 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 parameters

<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 parameters

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

2.3.125 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 parameters

<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 parameters

[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°

2.3.126 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 parameters

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameters

None

Response format

INT|EXT

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:PM:SOURce INTernal

Sets the PM modulation source of CH1 to internal

2.3.127 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 parameters

<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 → 0.1mHz

MAXimum → 100kHz

Query parameters

[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

2.3.128 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 parameters

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 waveform

Query parameters

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

2.3.129 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 parameters

<memory> ::= <INT>

<INT> → Memory number: 0 to 128

Query parameters

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.

2.3.130 Modulated oscillation mode PM synchronization signal 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 parameters

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization

MSYNc → Internal modulation synchronization

MFCTn → Internal modulation signal

Query parameters

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

2.3.131 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 parameters

<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 parameters

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

2.3.132 Modulated oscillation mode AM modulation depth 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 parameters

<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 parameters

[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%

2.3.133 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 parameters

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameters

None

Response format

INT|EXT

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:AM:SOURce INTernal

Sets the AM modulation source of CH1 to internal

2.3.134 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 parameters

<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 parameters

[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

2.3.135 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 parameters

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 waveform

Query parameters

None

Response format

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

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:AM:INTernal:FUNCTion:SHAPE SINusoid
Sets the AM internal modulation waveform of CH1 to sine wave

2.3.136 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 parameters

<memory> ::= <INT>
<INT> → Memory number: 0 to 128

Query parameters

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.

2.3.137 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 parameters

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

Query parameters

None

Response format

SYNC|MSYN|MFCT
* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut1:SYNC:AM:TYPE SYNC
Sets the AM synchronization output of CH1 to waveform synchronization

2.3.138 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 parameters

<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 parameters

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)

2.3.139 Modulated oscillation mode AM (DSB-SC) modulation depth 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 parameters

<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 parameters

[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%

2.3.140 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 parameters

INTernal|EXTernal

INTernal → Internal modulation source

EXTernal → External modulation source

Query parameters

None

Response format

INT|EXT

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:AMSC:SOURce INTernal

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

2.3.141 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 parameters

<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 parameters

[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

2.3.142 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 parameters

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 waveform

Query parameters

None

Response format

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

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURCE1:AMSC:INTERNAL:FUNCTION:SHAPE SINusoid

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

2.3.143 Modulated oscillation mode AM (DSB-SC) arbitrary waveform 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 parameters

<memory> ::= <INT>

<INT> → Memory number: 0 to 128

Query parameters

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.

2.3.144 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 parameters

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization

MSYNc → Internal modulation synchronization

MFCTn → Internal modulation signal

Query parameters

None

Response format

SYNC|MSYN|MFCT

* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut1:SYNC:AMSC:TYPE SYNC

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

2.3.145 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 parameters

<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 parameters

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

2.3.146 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 parameters

<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 parameters

[MINimum|MAXimum]

MINimum → Queries the minimum value

MAXimum → Queries the maximum value

Response format

<NR3>

Setting example

:SOURce1:OFSM:DEVIation 3V

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

2.3.147 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 parameters

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameters

None

Response format

INT|EXT

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:OFSM:SOURce INTernal

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

2.3.148 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 parameters

<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 parameters

[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

2.3.149 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 parameters

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 waveform

Response format

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

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:FM:INTernal:FUNction:SHAPE SINusoid

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

2.3.150 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 parameters

<memory> ::= <INT>

<INT> → Memory number: 0 to 128

Query parameters

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.

2.3.151 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 parameters

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization

MSYNc → Internal modulation synchronization

MFCTn → Internal modulation signal

Query parameters

None

Response format

SYNC|MSYN|MFCT

* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut1:SYNC:OFSM:TYPE SYNC

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

2.3.152 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 parameters

<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 parameters

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

2.3.153 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 parameters

<deviation>|MINimum|MAXimum

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

<REAL> → (Square (duty variable range standard))

Peak deviation :0.0000% to 49.9900%,

Resolution :0.0001%,

(Square (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 (duty variable range standard)) 49.9900%,

(Square (duty variable range extend)) 50.0000%,

(Pulse wave) 49.9000%

Query parameters

[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%

2.3.154 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 parameters

INTernal|EXTernal

INTernal → Internal

EXTernal → External

Query parameters

None

Response format

INT|EXT

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:PWM:SOURce INTernal

Sets the PWM modulation source of CH1 to internal

2.3.155 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 parameters

<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 parameters

[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

2.3.156 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 parameters

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 waveform

Query parameters

None

Response format

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

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:PWM:INTernal:FUNCTion:SHAPE SINusoid

Sets the PWM internal modulation waveform of CH1 to sine wave

2.3.157 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 parameters

<memory> ::= <INT>

<INT> → Memory number: 0 to 128

Query parameters

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.

2.3.158 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 parameters

SYNC|MSYNc|MFCTn

SYNC → Waveform synchronization

MSYNc → Internal modulation synchronization

MFCTn → Internal modulation signal

Query parameters

None

Response format

SYNC|MSYN|MFCT

* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut1:SYNC:PWM:TYPE SYNC

Sets the PWM synchronization output of CH1 to waveform synchronization

2.3.159 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 parameters

SINGle|CONTInuous|GATed

SINGle → Single

CONTInuous → Continuous

GATed → Gated single

Query parameters

None

Response format

SING|CONT|GAT

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:SWEep:MODE SINGle

Sets the sweep mode of CH1 to the single

2.3.160 Basic sweep setting sweep slop selection/query [:SOURce[1|2]]:SWEep:SPACing

■[:SOURce[1|2]]:SWEep:SPACing

□[:SOURce[1|2]]:SWEep:SPACing?

Description

Selects/queries the sweep slope

Setting parameters

LINear|LOGarithmic

LINear → Linear

LOGarithmic → Logarithmic

Query parameters

None

Response format

LIN|LOG

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:SWEep:SPACing LINear

Sets the slope of CH1 to linear

2.3.161 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 parameters

RAMP|TRIangle

RAMP → One way

TRIangle → Shuttle

Query parameters

None

Response format

RAMP|TRI

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:SWEep:INTernal:FUNctIon RAMP

Sets the sweep direction of CH1 to one way

2.3.162 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 parameters

<time>|MINimum|MAXimum
<time> ::= <REAL>[<eunits>][<units>]
<REAL> → Sweep time: 0.1ms 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 parameters

[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

2.3.163 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 parameters

<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 parameters

[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%

2.3.164 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 parameters

<state> ::= <BOL>
<BOL> → 0/OFF: Disable
 1/ON: Enable

Query parameters

None

Response format

<NBOL>

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

2.3.165 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 parameters

HALF|CYCLe
HALF → Half cycle
CYCLe → 1 cycle

Query parameters

None

Response format

HALF|CYCL
* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:SWEep:OSTop HALF
Sets the oscillation stop unit of sweep oscillation of CH1 to half cycle

2.3.166 Basic sweep setting Multiconnector control on/off selection/query [:SOURce[1|2]]:SWEep:MCONnector:STATe

■[:SOURce[1|2]]:SWEep:MCONnector:STATe

□[:SOURce[1|2]]:SWEep:MCONnector:STATe?

Description

Selects/queries multiconnector control enable/disable

Setting parameters

<state> ::= <BOL>
<BOL> → 0/OFF: Disable
1/ON: Enable

Query parameters

None

Response format

<NBOL>

Setting example

:SOURce1:SWEep:MCONnector:STATe ON
Enables multiconnector control of CH1

2.3.167 Basic sweep setting sweep synchronization signal selection/query :OUTPut[1|2]:SYNC:SWEep:TYPE

■:OUTPut[1|2]:SYNC:SWEep:TYPE

□:OUTPut[1|2]:SYNC:SWEep:TYPE?

Description

Selects/queries sweep synchronization output

Setting parameters

SYNC|SSYNc|XDRive|MARKer
SYNC → Reference phase synchronization
SSYNc → Sweep synchronization
XDRive → Sweep X drive
MARKer → Marker

Query parameters

None

Response format

SYNC|SSYN|XDR|MARK

* For the meaning of each response data, see the setting parameters.

Setting example

:OUTPut[1|2]:SYNC:SWEep:TYPE SYNC
Sets CH1 sweep synchronization output to reference phase synchronization

2.3.168 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 parameters

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 parameters

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

2.3.169 Frequency sweep start 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 parameters

<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 parameters

[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

2.3.170 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 parameters

<frequency>|MINimum|MAXimum

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

<REAL> → Stop value: 0.01 μHz to 30MHz,
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 parameters

[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

2.3.171 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 parameters

<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 parameters

[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

2.3.172 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 parameters

<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 parameters

[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

2.3.173 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 parameters

<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 parameters

[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

2.3.174 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 parameters

None

Setting example

:SOURce1:FREQuency:SWAP

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

2.3.175 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 parameters

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

2.3.176 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 parameters

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 parameters

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

2.3.177 Phase sweep start 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 parameters

<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 parameters

[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°

2.3.178 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 parameters

<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 parameters

[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°

2.3.179 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 parameters

<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 parameters

[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°

2.3.180 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 parameters

<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 parameters

[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°

2.3.181 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 parameters

<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 parameters

[CENTer|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°

2.3.182 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 parameters

None

Setting example

:SOURce1:PHASe:SWAP

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

2.3.183 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 parameters

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

2.3.184 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 parameters

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 parameters

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

2.3.185 Amplitude sweep

start 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 parameters

<amplitude>|MINimum|MAXimum

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

<REAL> → Start 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 0.1mVp-p,
(1 Vp-p or more) 5 digits or 1mVp-p

<eunits> ::= M

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

MINimum → 0 Vp-p

MAXimum → 20 Vp-p/open, 10 Vp-p/50Ω

Query parameters

[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

2.3.186 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 parameters

<amplitude>|MINimum|MAXimum

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

<REAL> → Stop 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 0.1mVp-p,
(1 Vp-p or more) 5 digits or 1mVp-p

<eunits> ::= M

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

MINimum → 0 Vp-p

MAXimum → 20 Vp-p/open, 10 Vp-p/50Ω

Query parameters

[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

2.3.187 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 parameters

<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 0.1mVp-p,
(1 Vp-p or more) 5 digits or 1mVp-p

<eunits> ::= M

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

MINimum → 0 Vp-p

MAXimum → 20 Vp-p/open, 10 Vp-p/50Ω

Query parameters

[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

2.3.188 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 parameters

<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, 10 Vp-p/50Ω

Query parameters

[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

2.3.189 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 parameters

<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 0.1mVp-p,
 (1 Vp-p or more) 5 digits or 1mVp-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 parameters

[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

2.3.190 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 parameters

None

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:AMPLitude:SWAP

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

2.3.191 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 parameters

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

2.3.192 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 parameters

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 parameters

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

2.3.193 DC offset sweep

start 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 parameters

<offset>|MINimum|MAXimum

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

<REAL> → Start value: ± 10 V/open, ± 5 V/50 Ω ,

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/50 Ω

MAXimum → 10 V/open, 5 V/50 Ω

Query parameters

[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

2.3.194 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 parameters

<offset>|MINimum|MAXimum

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

<REAL> → Stop value: ± 10 V/open, ± 5 V/50 Ω ,

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/50 Ω

MAXimum → 10 V/open, 5 V/50 Ω

Query parameters

[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

2.3.195 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 parameters

<offset>|MINimum|MAXimum

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

<REAL> → DC offset: ± 10V/open, ± 5V/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 → -10V/open, -5V/50Ω

MAXimum → 10V/open, 5V/50Ω

Query parameters

[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

2.3.196 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 parameters

<offset>|MINimum|MAXimum

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

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

[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

2.3.197 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 parameters

<offset>|CENTer|MINimum|MAXimum

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

<REAL> → Marker value: ± 10 Vp-p/open, ± 5 Vp-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 parameters

[CENTer|MINimum|MAXimum]

CENTer → Queries the center value of DC offset 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

2.3.198 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 parameters

None

Setting example

:SOURce1:VOLTage:LEVel:IMMediate:OFFSet:SWAP
Swaps the start value with stop value of the DC offset sweep of CH1

2.3.199 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 parameters

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

2.3.200 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 parameters

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 parameters

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

2.3.201 duty sweep start 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 parameters

<duty>|MINimum|MAXimum
 <duty> ::= <REAL>[<units>]
 <REAL> → (Square (duty variable range standard))
 Start value: 0.0100% to 99.9900%,
 Resolution: 0.0001%,
 (Square (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 (duty variable range standard)) 0.0100%,
 (Square (duty variable range extend)) 0.0000%,
 (Pulse wave) 0.0170%
 MAXimum → (Square (duty variable range standard)) 99.9900%,
 (Square (duty variable range extend)) 100.0000%,
 (Pulse wave) 99.9830%

Query parameters

[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%

2.3.202 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 parameters

<duty>|MINimum|MAXimum
 <duty> ::= <REAL>[<units>]
 <REAL> → (Square (duty variable range standard))
 Stop value: 0.0100% to 99.9900%,
 Resolution: 0.0001%,
 (Square (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 (duty variable range standard)) 0.0100%,
 (Square (duty variable range extend)) 0.0000%,
 (Pulse wave) 0.0170%

MAXimum → (Square (duty variable range standard)) 99.9900%,
(Square (duty variable range extend)) 100.0000%,
(Pulse wave) 99.9830%

Query parameters

[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%

2.3.203 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 parameters

<duty>|MINimum|MAXimum

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

<REAL> → (Square (duty variable range standard))

Center value: 0.0100% to 99.9900%,

Resolution: 0.0001%,

(Square (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 (duty variable range standard)) 0.0100%,

(Square (duty variable range extend)) 0.0000%,

(Pulse wave) 0.0170%

MAXimum → (Square (duty variable range standard)) 99.9900%,

(Square (duty variable range extend)) 100.0000%,

(Pulse wave) 99.9830%

Query parameters

[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%

2.3.204 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 parameters

<duty>|MINimum|MAXimum
 <duty> ::= <REAL>[<units>]
 <REAL> → (Square (duty variable range standard))
 Span value: 0.0000% to 99.9800%,
 Resolution: 0.0001%,
 (Square (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 (duty variable range standard)) 99.9800%,
 (Square (duty variable range extend)) 100.0000%,
 (Pulse wave) 99.9660%

Query parameters

[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%

2.3.205 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 parameters

<duty>|CENTer|MINimum|MAXimum
 <duty> ::= <REAL>[<units>]
 <REAL> → (Square (duty variable range standard))
 Marker value: 0.0100% to 99.9900%,
 Resolution: 0.0001%,
 (Square (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 (duty variable range standard)) 0.0100%,
(Square (duty variable range extend)) 0.0000%,
(Pulse wave) 0.0170%
MAXimum → (Square (duty variable range standard)) 99.9900%,
(Square (duty variable range extend)) 100.0000%,
(Pulse wave) 99.9830%

Query parameters

[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%

2.3.206 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 parameters

None

Setting example

:SOURce1:PULSe:DCYClE:SWAP
Swaps the start value with stop value of the duty sweep of CH1

2.3.207 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 parameters

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

2.3.208 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 parameters

<state> ::= <BOL>
<BOL> → 0/OFF: Continuous
1/ON: Burst

Query parameters

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

2.3.209 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 parameters

AUTO|TRIGger|GATE|TGATe
AUTO → Auto burst
TRIGger → Trigger burst
GATE → Gate
TGATe → Triggered gate

Query parameters

None

Response format

AUTO|TRIG|GATE|TGAT
* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:BURSt:MODE AUTO
Sets the burst mode of CH1 to auto burst

2.3.210 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 parameters

<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 parameters

[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%

2.3.211 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 parameters

<state> ::= <BOL>

<BOL> → 0/OFF: Disable
1/ON: Enable

Query parameters

None

Response format

<NBOL>

Setting example

:SOURce1:BURSt:SLEVel:STATe ON

Sets the stop level of burst oscillation of CH1 to enable

2.3.212 Burst oscillation Synchronization 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 parameters

SYNC|BSYNc

SYNC → Reference phase synchronization

BSYNc → Burst synchronization

Query parameters

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

2.3.213 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 parameters

<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 parameters

[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

2.3.214 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 parameters

<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 parameters

[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

2.3.215 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 parameters

<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 parameters

[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

2.3.216 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 parameters

<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 → 0.0 μs

MAXimum → 100 s

Query parameters

[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

2.3.217 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 parameters

HALF|CYCLe

HALF → Half cycle

CYCLe → 1 cycle

Query parameters

None

Response format

HALF|CYCL

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:BURSt:GATE:OSTop HALF

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

2.3.218 Burst oscillation triggered gate mode: oscillation stop 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 parameters

HALF|CYCLe

HALF → Half cycle

CYCLe → 1 cycle

Query parameters

None

Response format

HALF|CYCL

* For the meaning of each response data, see the setting parameters.

Setting example

:SOURce1:BURSt:TGATe:OSTop HALF

Sets the oscillation stop unit of triggered gate of CH1 to half cycle

2.3.219 Sequence sequence selection/query [:SOURce[1|2]]:SEQuence:STATe

■ [:SOURce[1|2]]:SEQuence:STATe

□ [:SOURce[1|2]]:SEQuence:STATe?

Description

Switches oscillation mode between continuous and sequence

Queries whether the oscillation mode is sequence or not

Setting parameters

<state> ::= <BOL>

<BOL> → 0/OFF: Continuous

1/ON: Sequence

Query parameters

None

Response format

<NBOL>

Setting example

:SOURce1:SEQuence:STATe ON

Sets oscillation mode of CH1 to sequence

2.3.220 Sequence store {:TRACe|:DATA}:SEQuence:STORE

■ {:TRACe|:DATA}:SEQuence:STORE

Description

Saves sequence data

Setting parameters

<memory>,<name>
 <memory> ::= <INT>
 <INT> → Memory number: 1 to 10
 <name> ::= <STR>
 <STR> → Sequence name (up to 20 characters)
 * 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:SEQuence:STORe 2,"name"
 Saves the sequence data to Memory 2 with sequence name "name"

2.3.221 Sequence recall
{:TRACe|:DATA}:SEQuence:RECall

■{:TRACe|:DATA}:SEQuence:RECall

Description

Reads out sequence data

Setting parameters

<memory>|MINimum|MAXimum
 <memory> ::= <INT>
 <INT> → Memory number: 1 to 10
 MINimum → 1
 MAXimum → 10

Setting example

:TRACe:SEQuence:RECall 2
 Reads in sequence data of Memory 2

2.3.222 Sequence sequence data I/O
{:TRACe|:DATA}:SEQuence

■{:TRACe|:DATA}:SEQuence

□{:TRACe|:DATA}:SEQuence?

Description

Inputs/outputs sequence data

Setting parameters

<memory>,<name>,<data>
 <memory> ::= <INT>
 <INT> → Memory number: 0 to 10
 <name> ::= <STR>
 <STR> → Sequence name (up to 20 characters)
 * 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> → Sequence data
 (See "2.4 Sequence I/O Data Specifications.")

Query parameters

<memory>
 <memory> ::= <INT>

<INT> → Memory number: 0 to 10

Response format

<name>,<sequence>

<name> ::= <STR>

<STR> → Sequence name (20 characters)

<sequence> ::= <BLK>

<BLK> → #<digit><byte><data>

→ Start of binary data

<digit> → The number of digits of subsequent <byte>

<byte> → The number of bytes of subsequent data

<data> → Sequence data

(See “2.4 Sequence I/O Data Specifications.”)

Remarks

- ① The sequence data is in text format.
- ② Memory 0 is current memory.
- ③ Sequence name of Memory 0 is “<Current Memory>” (20 characters).

2.3.223 Sequence sequence data compilation :TRIGger[1|2]:COMPile[:IMMEDIATE]

■:TRIGger[1|2]:COMPile[:IMMEDIATE]

Description

Compiles sequence data

Setting parameters

None

Remarks

* Whether “[1|2]” exists has no influence on the operation.

2.3.224 Sequence current step number acquisition [:SOURce[1|2]]:SEQUence:CSTep?

□[:SOURce[1|2]]:SEQUence:CSTep?

Description

Queries current step of sequence

Query parameters

None

Response format

<NR1>

Remarks

* Whether “[1|2]” exists has no influence on the operation.

2.3.225 Sequence sequence data clear {:TRACe[:DATA]}:SEQUence:CLEAr

■{:TRACe[:DATA]}:SEQUence:CLEAr

Description

Initializes sequence data

Setting parameters

<memory>

<memory> ::= <INT>
<INT> → Memory number: 1 to 10

Remarks

* Memory 0 is current memory.

2.3.226 Basic setting memory

clear
:MEMory:STATe:DELeTe

■:MEMory:STATe:DELeTe

Description

Clears the setting memory

Setting parameters

<memory>|MINimum|MAXimum
<memory> ::= <INT>
<INT> → Memory number: 1 to 10
MINimum → 1
MAXimum → 10

2.3.227 Basic setting memory

store
***SAV**

■*SAV

Description

Stores to the setting memory

Setting parameters

<memory> ::= <INT>
<INT> → Memory number: 1 to 10

2.3.228 Basic setting memory

recall
***RCL**

■*RCL

Description

Recalls from the setting memory

Setting parameters

<memory> ::= <INT>
<INT> → Memory number: 1 to 10

2.3.229 Status register and related queue clear

***CLS**

■*CLS

Description

Clears event register and error queue

Setting parameters

None

Remarks

① The 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
- ② This command can clear the overload message (No.23133).

2.3.230 Status reporting related preset setting :STATus:PRESet

■:STATus:PRESet

Description

Presets the registers

Setting 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

2.3.231 Status register at power-on clear flag setting/query *PSC

■*PSC

□*PSC?

Description

Sets/queries the power-on status clear flag

Setting parameters

<state> ::= <INT>
 <INT> → 0: OFF
 1: ON

Query parameters

None

Response format

<NR1>

Setting example

*PSC 1

Sets the automatic clear of the enable register, etc. at power-on to enable

2.3.232 Status byte register query
***STB?**

□*STB?

Description

Queries the status byte register

Query parameters

None

Response format

<NR1>

2.3.233 Service request enable register setting/query
***SRE**

■*SRE

□*SRE?

Description

Sets/queries the service request enable register

Setting parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

*SRE 8

Sets the service request enable register to 8

2.3.234 Standard event status register query
***ESR?**

□*ESR?

Description

Queries the standard event status register

Query parameters

None

Response format

<NR1>

2.3.235 Standard event enable register setting/query
***ESE**

■*ESE

□*ESE?

Description

Sets/queries the standard event status enable register

Setting parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

*ESE 8

Sets the standard event status enable register to 8

**2.3.236 Condition register query
:STATus:OPERation:CONDition?**

□:STATus:OPERation:CONDition?

Description

Queries the operation status condition register

Query parameters

None

Response format

<NR1>

**2.3.237 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

:STATus:OPERation:NTRansition 512

Set the bit 9 of the operation status transition filter (negative) to 1

**2.3.238 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

:STATus:OPERation:PTRansition 512

Set the bit 9 of the operation status transition filter (positive) to 1

**2.3.239 Event register query
:STATus:OPERation[:EVENTt]?**

□:STATus:OPERation[:EVENTt]?

Description

Queries the operation status event register

Query parameters

None

Response format

<NR1>

Setting example

:STATus:OPERation:EVENTt?

Queries the operation status event register

**2.3.240 Event enable register setting/query
:STATus:OPERation:ENABLE**

■:STATus:OPERation:ENABLE

□:STATus:OPERation:ENABLE?

Description

Sets/queries the operation status event enable register

Setting parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

:STATus:OPERation:ENABLE 512

Sets the bit 9 of the operation status event enable register to 1

**2.3.241 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 parameters

None

Response format

<NR1>

2.3.242 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

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

2.3.243 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

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

2.3.244 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 parameters

None

Response format

<NR1>

2.3.245 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

:STATus:OPERation:CH1:ENABle 8

Sets the bit 3 of the operation status event enable register to 1

2.3.246 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 parameters

None

Response format

<NR1>

2.3.247 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

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

2.3.248 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

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

2.3.249 Operation status register group (CH2) event register setting :STATus:OPERation:CH2[:EVENTt]?

□:STATus:OPERation:CH2[:EVENTt]?

Description

Queries the CH2 operation status event register

Query parameters

None

Response format

<NR1>

2.3.250 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

:STATus:OPERation:CH2:ENABLE 8

Sets the bit 3 of the operation status event enable register to 1

2.3.251 Questionable data status register group condition register query :STATus:QUEStionable:CONDition?

□:STATus:QUEStionable:CONDition?

Description

Queries the questionable data status condition register

Query parameters

None

Response format

<NR1>

2.3.252 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

:STATus:QUEStionable:NTRansition 16

Sets the bit 4 of questionable data status transition filter (negative) to 1

2.3.253 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

:STATus:QUEStionable:PTRansition 16

Sets the bit 4 of questionable data status transition filter (positive) to 1

2.3.254 Questionable data status register group event register query :STATus:QUEStionable[:EVENT]?

□:STATus:QUEStionable[:EVENT]?

Description

Queries the questionable data status event register

Query parameters

None

Response format

<NR1>

2.3.255 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 parameters

<value> ::= <INT>

<INT> → For setting value, see “3. Status System.”

Query parameters

None

Response format

<NR1>

Setting example

:STATus:QUEStionable:ENABle 16

Sets the bit 4 of the questionable data status event enable register to 1

2.3.256 Warning event register group event register query :STATus:WARNIing[:EVENT]?

□:STATus:WARNIing[:EVENT]?

Description

Queries the warning event register

Query parameters

None

Response format

<NR1>

2.3.257 Warning event register group event enable register setting/query :STATus:WARNIing:ENABle

■:STATus:WARNIing:ENABle

□:STATus:WARNIing:ENABle?

Description

Sets/queries the warning event enable register

Setting parameters

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameters

None

Response format

<NR1>

Setting example

:STATus:WARNing:ENABle 512

Sets the bit 9 of the warning event enable register to 1

**2.3.258 Warning event register group (CH1)
event register query
:STATus:WARNing:CH1[:EVENT]?**

□:STATus:WARNing:CH1[:EVENT]?

Description

Queries the CH1 warning event register

Query parameters

None

Response format

<NR1>

**2.3.259 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 parameters

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameters

None

Response format

<NR1>

Setting example

:STATus:WARNing:CH1:ENABLE 16

Sets the bit 4 of the CH1 warning event enable register to 1

**2.3.260 Warning event register group (CH2)
event register query
:STATus:WARNing:CH2[:EVENT]?**

□:STATus:WARNing:CH2[:EVENT]?

Description

Queries the CH2 warning event register

Query parameters

None

Response format

<NR1>

**2.3.261 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 parameters

<value> ::= <INT>

<INT> → For setting value, see "3. Status System."

Query parameters

None

Response format

<NR1>

Setting example

:STATus:WARNing:CH2:ENABLE 16

Sets the bit 4 of the CH2 warning event enable register to 1

**2.3.262 Equipment-specific information query
*IDN?**

□*IDN?

Description

Reads the ID of equipment

Query parameters

None

Response format

<corporation>,<model>,<serial>,<firmware>

<corporation> → Manufacturer: YOKOGAWA

<model> → Model: (Example) FG410

<serial> → Serial number: (Example) NKP4A0001

<firmware> → Firmware version: (Example) 1.00

**2.3.263 Error message query
:SYSTem:ERRor?**

□:SYSTem:ERRor?

Description

Queries errors

Query parameters

None

Response format

<code>,<message>

<code> ::= <INT>

<INT> → Error code

<message> ::= <STR>

<STR> → Error message

2.3.264 Setting initialization (status registers, etc. not cleared) *RST

■*RST

Description

Initializes the setting

Setting parameters

None

2.3.265 Operation completion event bit setting *OPC

■*OPC

Description

Sets the OPC bit to 1 when all the previous commands are completed

Setting parameters

None

2.3.266 Setting output key to 1 at operation completion *OPC?

□*OPC?

Description

Setting output key to 1 at operation completion

Query parameters

None

2.3.267 Waiting for command/query execution *WAI

■*WAI

Description

Waits for completion of all the previous commands execution

Setting parameters

None

2.3.268 Self diagnosis result query *TST?

□*TST?

Description

Queries the self diagnosis result

Query parameters

None

Response format

<NR1> → 0

Remarks

- ① This instrument always responds with 0.
- ② External control cannot check the internal state. Use the panel operation to check the internal state.

2.3.269 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 parameters

INTernal|EXTernal

INTernal → Internal clock

EXTernal → External reference frequency input

Query parameters

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.

2.4 Sequence I/O Data Specifications

The INI file format is used for the data handled with the “TRACe|DATA:SEQUENCE” input/output command of the sequence.

The INI file sections and keys are described below.

2.4.1 [FILE] section

Sets the parameters related to the file format. This section is mandatory.

(1) File version

```
VERSION = <version>
<version> ::= <STR>
<STR> → File version
* Specify "1.00" for file version.
```

2.4.2 [SYSTEM] section

Sets the system information on the equipment side. This section is mandatory.

(1) Model

```
MODEL = <mod>
<mod> ::= <STR>
<STR> → Model
```

(2) Number of channels

```
NCHAN = <chan>
<chan> ::= <INT>
<INT> → Number of channels
```

(3) Firmware version

```
VERSION = <version>
<version> ::= <STR>
<STR> → Firmware version
* Specify "1.00" for firmware version.
```

2.4.3 [DATA] section

(1) Sequence

Set the data related to the entire sequence.

```
SEQ = <stsstp>,<syncout>,<dctrl>,<dctrl_mode>,<trgslp>
```

```
<stsstp> ::= <INT>
<INT> → Start step (1 to 225)
```

```
<syncout> ::= <DISC>
<DISC> → Sync output
(SYNC: Waveform synchronization, SSYN: Sequence synchronization)
```

```
<dctrl> ::= <BOL>
<BOL> → Digital control input ON/OFF (0/OFF: OFF, 1/ON: ON)
```

```
<dctrl_mode> ::= <DISC>
<DISC> → Digital control usage method (STAR: Start, SBR: State branch)
```

```
<trgslp> ::= <DISC>
```

<DISC> → Trigger polarity (POS: Positive, NEG: Negative, OFF: Prohibited)

(2) Step

Set the data related to each step.

STEP#<step> = <time>,<stern>,<auto_hold>,<scode>,<stbra_sw>,<stbra>,<evbra_sw>,
<evbra>,<jpstp_sw>,<jpstp>,<jpcnt_sw>,<jpcnt>,<sphase_sw>,<sphase>

<step> ::= <INT>
<INT> → Step number (0 to 225)

<time> ::= <REAL>
<REAL> → Step time

<stern> ::= <DISC>
<DISC> → Step termination (CONT: Continuous, STOP: End)

<auto_hold> ::= <BOL>
<BOL> → Auto hold ON/OFF (0/OFF: OFF, 1/ON: ON)

<scode> ::= <INT>
<INT> → Step code

<stbra_sw> ::= <BOL>
<BOL> → State branch step ON/OFF (0/OFF: OFF, 1/ON: ON)

<stbra> ::= <INT>
<INT> → State branch step (0 to 225)

<evbra_sw> ::= <BOL>
<BOL> → Event branch step ON/OFF (0/OFF: OFF, 1/ON: ON)

<evbra> ::= <INT>
<INT> → Event branch step (0 to 225)

<jpstp_sw> ::= <BOL>
<BOL> → Jump step ON/OFF (0/OFF: OFF, 1/ON: ON)

<jpstp> ::= <INT>
<INT> → Jump step (0 to 225)

<jpcnt_sw> ::= <DISC>
<DISC> → Jump count specification
(INF: Infinite number, ON: Jump only the specified number of jumps)

<jpcnt> ::= <INT>
<INT> → Jump count

<sphase_sw> ::= <BOL>
<BOL> → End phase ON/OFF (0/OFF: OFF, 1/ON: ON)

<sphase> ::= <REAL>
<REAL> → End phase

(3) Channel data

Set the data of each channel.

CHAN#<step>#<chan> = <wf_type>,<wf_arb_no>,<wf_polarity>,<wf_scale>,<wf_squex>,
<freq_val>,<freq_actn>,<amptd_val>,<amptd_actn>,<ofs_val>,
<ofs_actn>,<ph_val>,<ph_actn>,<dy_val>,<dy_actn>

<step> ::= <INT>
<INT> → Step number (0 to 225)

<chan> ::= <INT>
<INT> → Channel number (1 to 2)

<wf_type> ::= <DISC>
<DISC> → Waveform (DC: DC, NOIS: Noise, SIN: Sine wave, SQU: Square wave, USER: Arbitrary waveform)

<wf_arb_no> ::= <INT>
<INT> → Arbitrary waveform number (0 to 128)

<wf_polarity> ::= <DISC>
<DISC> → Waveform polarity (NORM: Normal, INV: Inverted)

<wf_scale> ::= <DISC>
<DISC> → Waveform amplitude range (PFS: 0/+FS, FS: ±FS, MFS:-FS/0)

<wf_squex> ::= <BOL>
<BOL> → Square wave extension (0/OFF: OFF, 1/ON: ON)

<freq_val> ::= <REAL>
<REAL> → Frequency

<freq_actn> ::= <DISC>
<DISC> → Operation type (CONS: Constant, KEEP: Keep, SWE: Sweep)

<amptd_val> ::= <REAL>
<REAL> → Amplitude

<amptd_actn> ::= <DISC>
<DISC> → Operation type (CONS: Constant, KEEP: Keep, SWE: Sweep)

<ofs_val> ::= <REAL>
<REAL> → DC offset

<ofs_actn> ::= <DISC>
<DISC> → Operation type (CONS: Constant, KEEP: Keep, SWE: Sweep)

<ph_val> ::= <REAL>
<REAL> → Phase

<ph_actn> ::= <DISC>
<DISC> → Operation type (CONS: Constant, KEEP: Keep, SWE: Sweep)

<dy_val> ::= <REAL>
<REAL> → Duty

<dy_actn> ::= <DISC>
<DISC> → Operation type (CONS: Constant, KEEP: Keep, SWE: Sweep)

2.5 Trigger/Oscillation Status Control

The command for activating the trigger from the external control (GET (Group Execution Trigger) “*TRG” and “TRIGger[1|2][:SEquence][:IMMEDIATE]”), and the command for controlling the oscillation status (“:TRIGger[1|2]:SElected:EXEcute”) are supported for the FG410 and FG420.

These commands may be invalid, depending on the oscillation mode as shown in Table 2.3. When the invalid command is received, it is ignored.

Table 2.3. Validity of Trigger/Oscillation Status Control Command on Each Oscillation Mode

Oscillation mode	GET/*TRG/ :TRIGger[1|2][:SEquence][:IMMEDIATE]	:TRIGger[1|2]:SElected:EXEcute
Continuous	Invalid	Invalid
Modulation	Invalid	Valid
Sweep		
Continuous	Invalid	Valid
Single-shot	Valid	Valid
Gated single-shot	Valid	Valid
Burst		
Auto burst	Invalid	Invalid
Trigger burst	Valid	Invalid
Gate	Invalid	Invalid
Triggered gate	Valid	Invalid
Sequence	Invalid	Valid

In the above commands, GET and “*TRG” are only applied to CH1, and therefore cannot specify the channels. However, when the setting of the same value to two channels is ON, they are applied to both CH1 and CH2 (in the FG420 only).

2.6 System Unit

A system unit is the default unit in setting/querying the amplitude and frequency by the external control. When the unit is omitted by the parameter setting, it is interpreted that a system unit is specified as the unit and is being executed. In addition, when querying parameters, a response message is replied based on the system unit.

For example, if the system unit of the amplitude is Vrms, the amplitude is set as below in this device.

When Vp-p is specified as the unit:

```
:SOURCE1:VOLTage:LEVel:IMMediate:AMPLitude 1.0Vpp
```

→ The amplitude is set to 1.0 Vp-p because the command is interpreted in the specified unit.

When the unit is omitted:

```
:SOURCE1:VOLTage:LEVel:IMMediate:AMPLitude 1.0
```

→ The amplitude is set to 1.0 Vrms because the command is interpreted as if the system unit is specified for the unit.

For setting the system unit, the following commands are used.

Frequency system unit setting:

```
[:SOURCE[1|2]]:FREQuency:UNIT
```

Amplitude system unit setting:

```
[:SOURCE[1|2]]:VOLTage[:LEVel][:IMMediate]:AMPLitude:UNIT
```

DC offset and high/low level system unit settings:

```
[:SOURCE[1|2]]:VOLTage[:LEVel][:IMMediate]:OFFSet:UNIT
```

```
[:SOURCE[1|2]]:VOLTage[:LEVel][:IMMediate]:HIGH:UNIT
```

```
[:SOURCE[1|2]]:VOLTage[:LEVel][:IMMediate]:LOW:UNIT
```

* DC offset and high/low level settings share one system unit. The commands of the above three units have the same function.

Phase system unit setting:

```
[:SOURCE[1|2]]:PHASe:UNIT
```

Square wave/pulse duty system unit setting:

```
[:SOURCE[1|2]]:PULSe:DCYClE:UNIT
```

Frequency system unit setting:

```
[:SOURCE[1|2]]:PULSe:PERiod:UNIT
```

3. STATUS SYSTEM

The FG410/FG420 include a status reporting function defined in IEEE488.2.

3.1 Status Byte Register and Service Request Enable Register

Figure 3.1 shows the configurations of the service byte register and service request enable register.

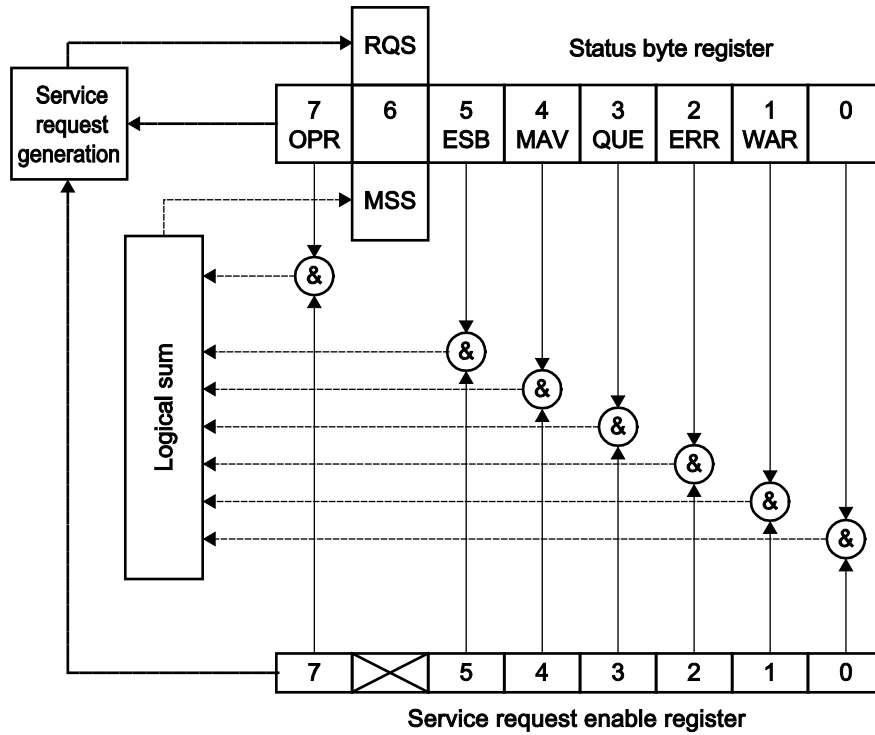


Figure 3.1. Status Byte Register and Service Request Enable Register

3.1.1 Status byte register

Table 3.1 describes the bits of the status byte register.

Table 3.1. Status Byte Register

Bit	Weight	Symbol	Description
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 upon reception of the *CLS command.

3.1.2 Service request enable register

The service request enable register is used to select the summary bit in the status byte register that generates service requests shown in Figure 3.1.

The service request enable register is cleared at power-on if the status of the power-on status clear flag (set with *PSC) is True.

3.2 Standard Event Status Register Group

Figure 3.2 shows the standard event status register group.

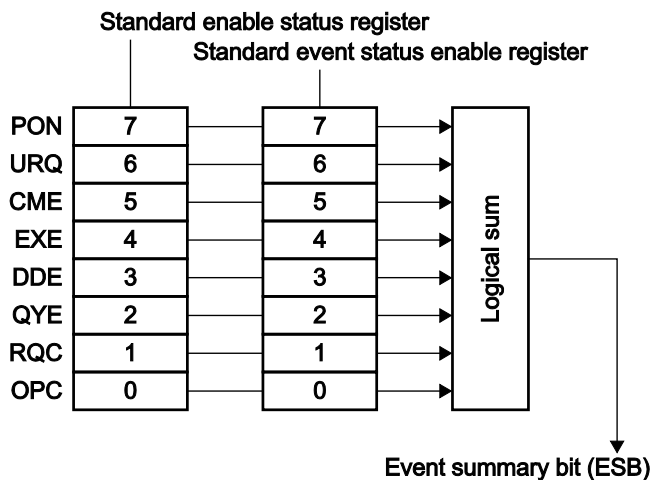


Figure 3.2. Standard Event Status Register Group

3.2.1 Standard event status register

Table 3.2 describes the bits of the standard event status register.

Table 3.2. Standard Event Status Register

Bit	Weight	Symbol	Description
0	1	OPC	Operation completion
1	2	RQC	Request control
2	4	QYE	Query error
3	8	DDE	Device 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 upon reception of the *ESR? query addressed to this register or *CLS command.

3.2.2 Standard event status enable register

The standard event status enable register, as shown in Figure 3.2, is used to select the bit of the standard event status register, and reflects the status of the selected bit to the ESB of the status byte register.

The standard event status enable register is cleared at power-on when the status of the power-on status clear flag (set with *PSC) is True.

3.3 Operation Status Register Group/ Questionable Data Status Register Group

Figure 3.3. shows the configurations of the operation status register group and questionable data status register group.

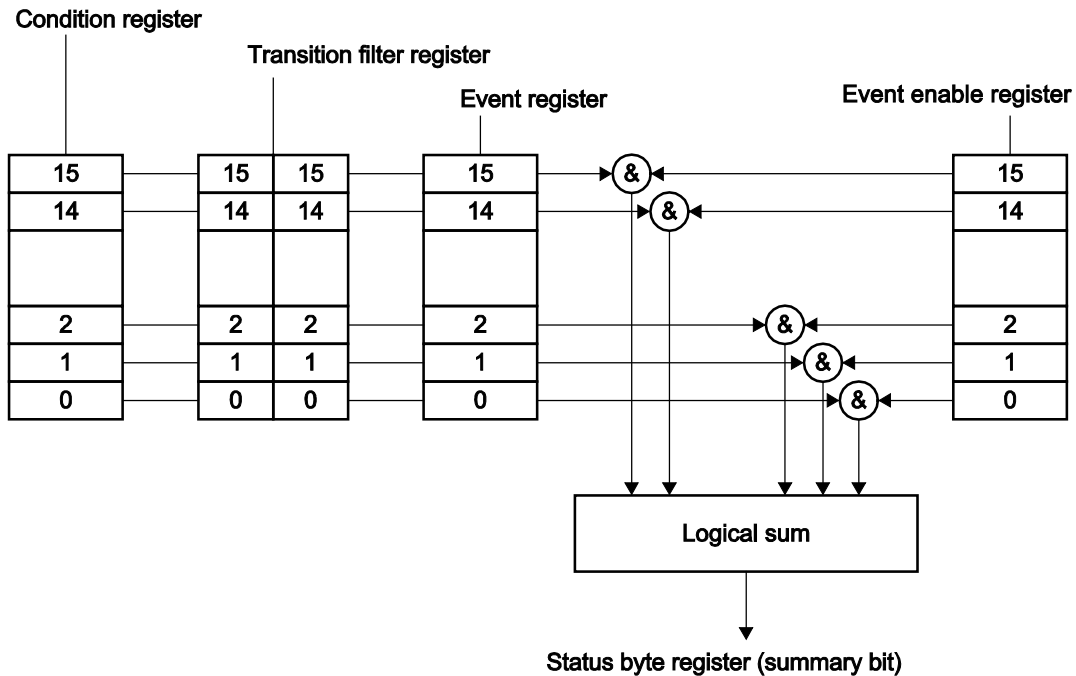


Figure 3.3. Operation Status Register Group/Questionable Data Status Register Group

3.3.1 Outline of registers

3.3.1.1 Condition register

The condition register indicates the current status of the FG410/FG420.
This register is not cleared even when a query addressed to this register is received.

3.3.1.2 Transition filter register

The transition filter register is used to determine the event bit transition.
Table 3.3 shows the relationship between the transition filter setting and event register transitions.

Table 3.3. Transition Filter and Event Register Transitions

Each Bit Setting of Positive Transition Filter	Each Bit Setting of Negative Transition Filter	Transition of Condition Register to Set Event Register to 1
1	0	0 → 1
0	1	1 → 0
1	1	0 → 1 or 1 → 0
0	0	Event register bit does not become 1.

The transition filter register is cleared upon reception of the :STATus:PRESet command, or at power-on when the status of the power-on status clear flag (set with *PSC) is True.

3.3.1.3 Event register

The event register reflects the changes to the condition register according to the setting of the transition filter register.

The event register is cleared upon reception of a query addressed to this 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, as shown in Figure 3.3, is used to select bits of the event register, and reflects the status of the selected bit to the summary bit of the status byte register.

The event enable register is cleared upon reception of the :STATus:PRESet command, or at power-on when the status of the power-on status clear flag (set with *PSC) is True.

3.3.2 Operation status register group

Figure 3.3 shows the operation status register group. It comprises one register set per channel and one register set for summarizing these sets.

Table 3.4 and Table 3.5 describe the operation status registers.

Table 3.4. Operation Status Register

Bit	Weight	Description
0		(Unused)
1		(Unused)
2		(Unused)
3		(Unused)
4		(Unused)
5		(Unused)
6		(Unused)
7		(Unused)
8		(Unused)
9	512	CH1 operation status register summary
10	1024	CH2 operation status register summary
11		(Unused)
12		(Unused)
13		(Reserved)
14		(Reserved)
15		Always 0

Table 3.5. CH1 (CH2) Operation Status Register

Bit	Weight	Description
0	1	Sequence: EDIT Indicates the Edit status.
1	2	Sequence: READY Indicates the ready status.
2	4	Sequence: RUN Indicates the Run status and the Hold status
3	8	Sequence: HOLD Indicates the Hold status.
4		(Unused)
5		(Unused)
6		(Unused)
7	128	Modulation/sweep/burst: STOP Indicates a status in which the oscillation mode basically does not perform oscillation, such as the Stop status and the Conflict status. Moreover, even in the Run status, the value of this bit is 1 during the trigger delay period in the case of trigger burst, the half pulse from when the gate closes in the case of triggered gate, and also during the oscillation period for all waves.
8	256	Continuous oscillation/modulation/sweep/burst: RUN Indicates the Run status and the Hold status.
9	512	Modulation/sweep/burst: HOLD Indicates the Hold status.
10	1024	Modulation/sweep/burst: TRIGGER WAIT Indicates the TrigWait status.
11	2048	Modulation/sweep/burst: CONFLICT Indicates the Conflict status.
12		(Unused)
13		(Unused)
14		(Unused)
15		Always 0

The relationships between the bits listed in Table 3.5 and the output waveform are described below.

3.3.2.1 Continuous oscillation

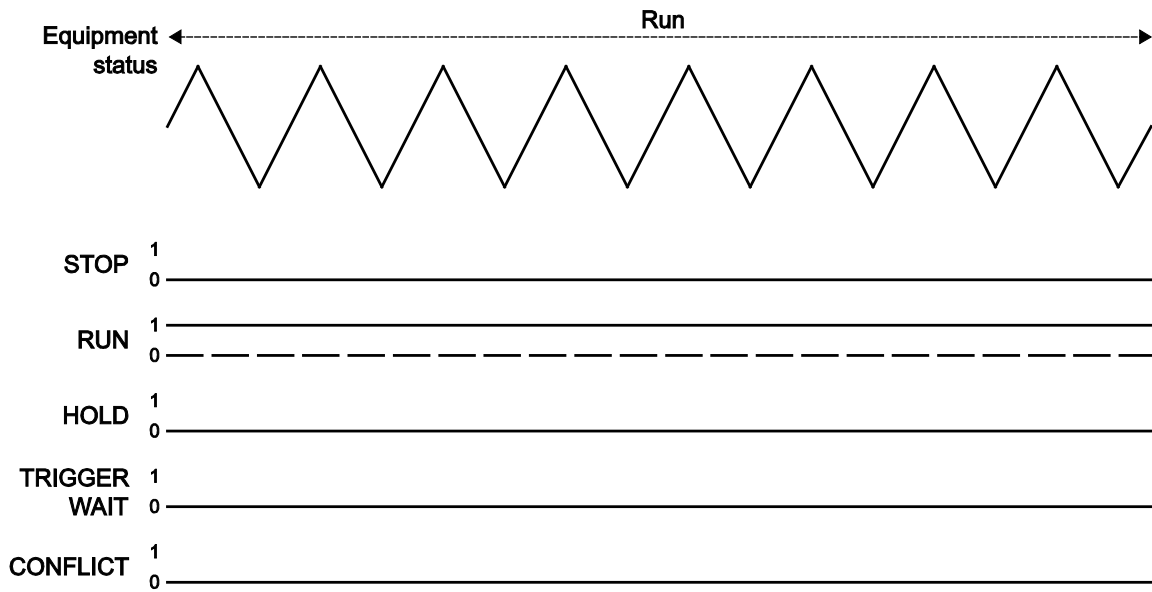


Figure 3.4. Relationship Between Output and Operation Status Register (Bits 7 to 11) During Continuous Oscillation

3.3.2.2 Modulation

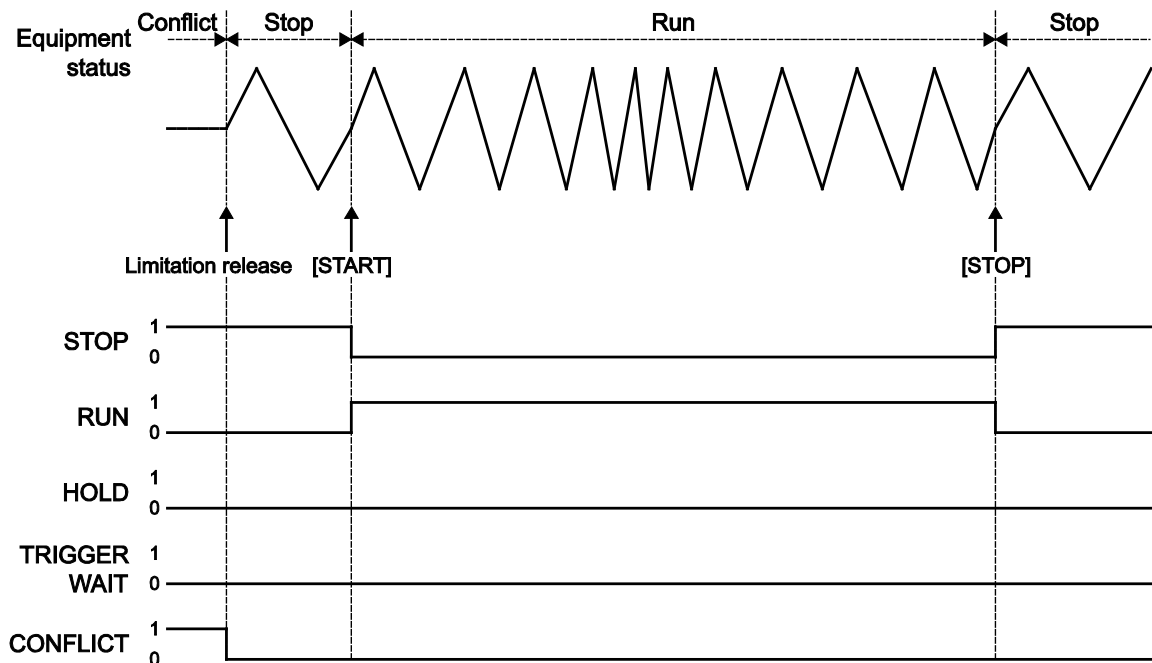


Figure 3.5. Relationship Between Output and Operation Status Register (Bits 7 to 11) During Modulation

3.3.2.3 Sweep

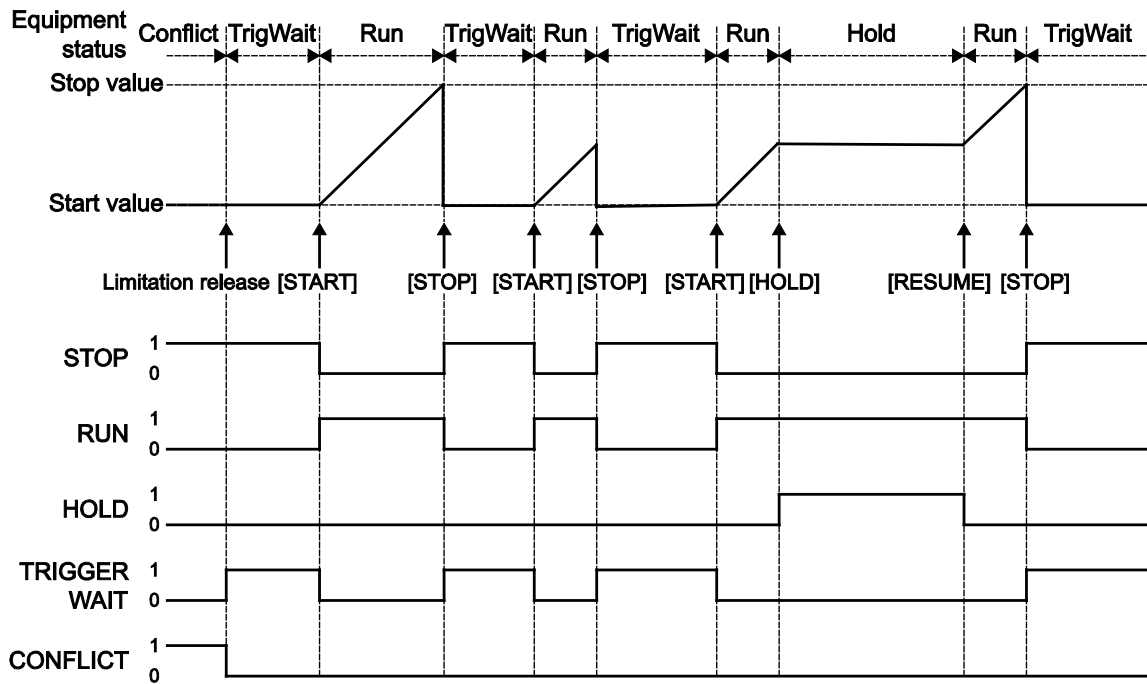


Figure 3.6. Relationship Between Output and Operation Status Register (Bits 7 to 11) During Single-Shot Sweep, Gated Single-Shot Sweep

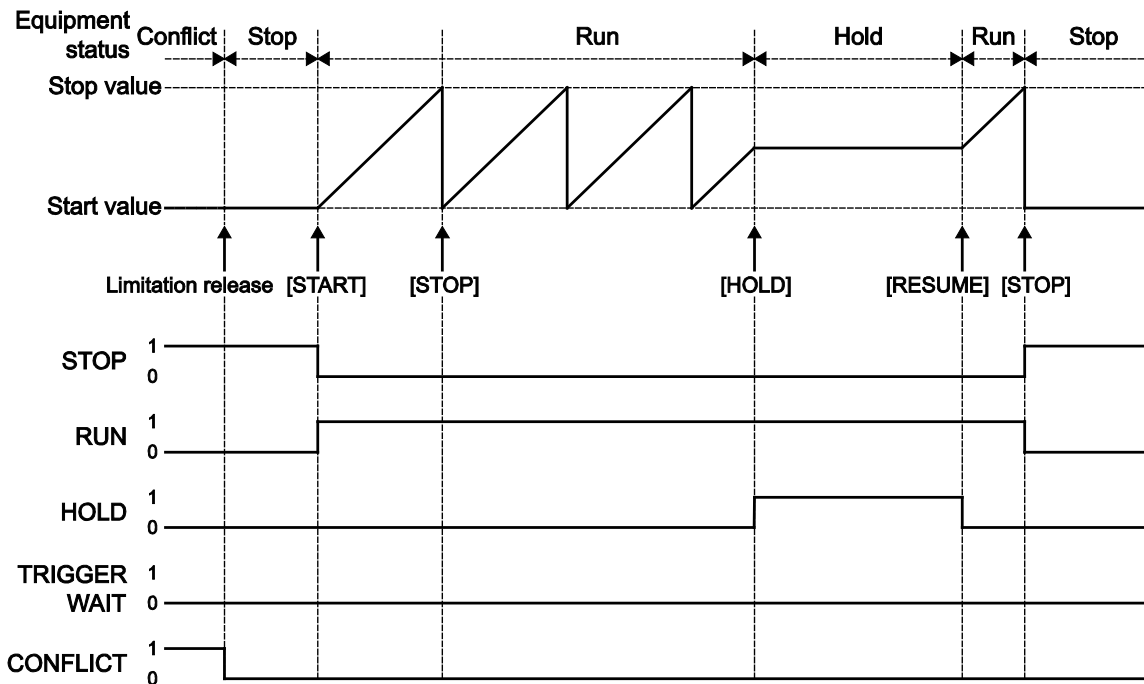


Figure 3.7. Relationship Between Output and Operation Status Register (Bits 7 to 11) During Continuous Sweep

3.3.2.4Burst

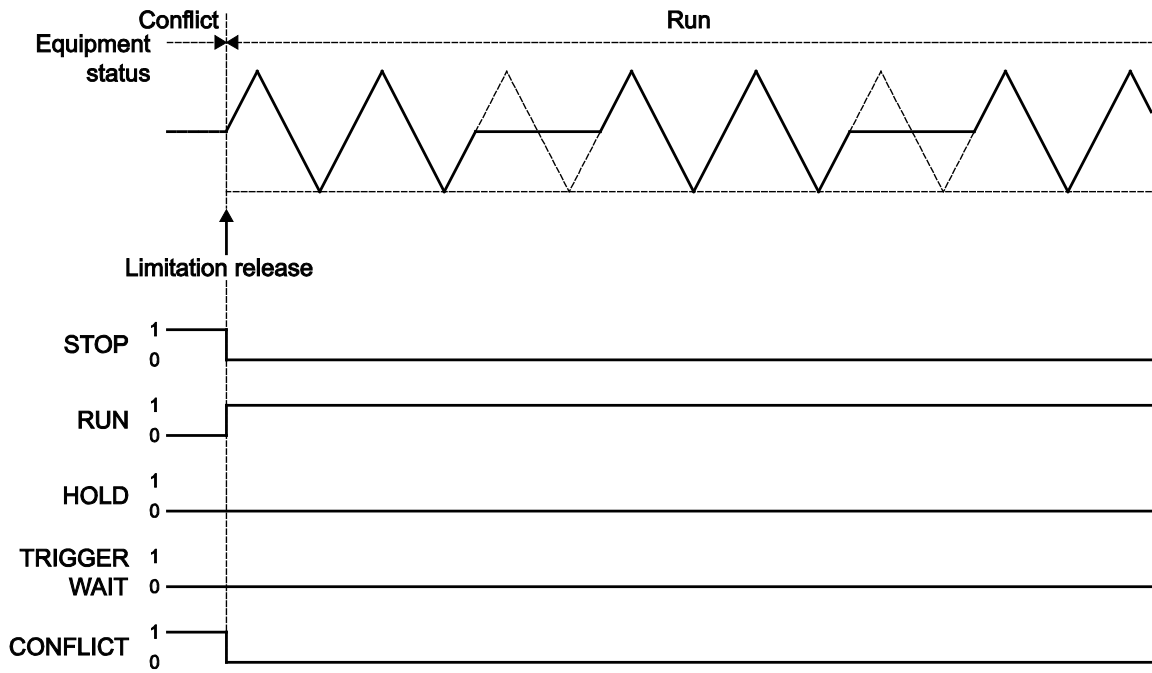


Figure 3.8. Relationship Between Output and Operation Status Register (Bits 7 to 11) During Auto Burst

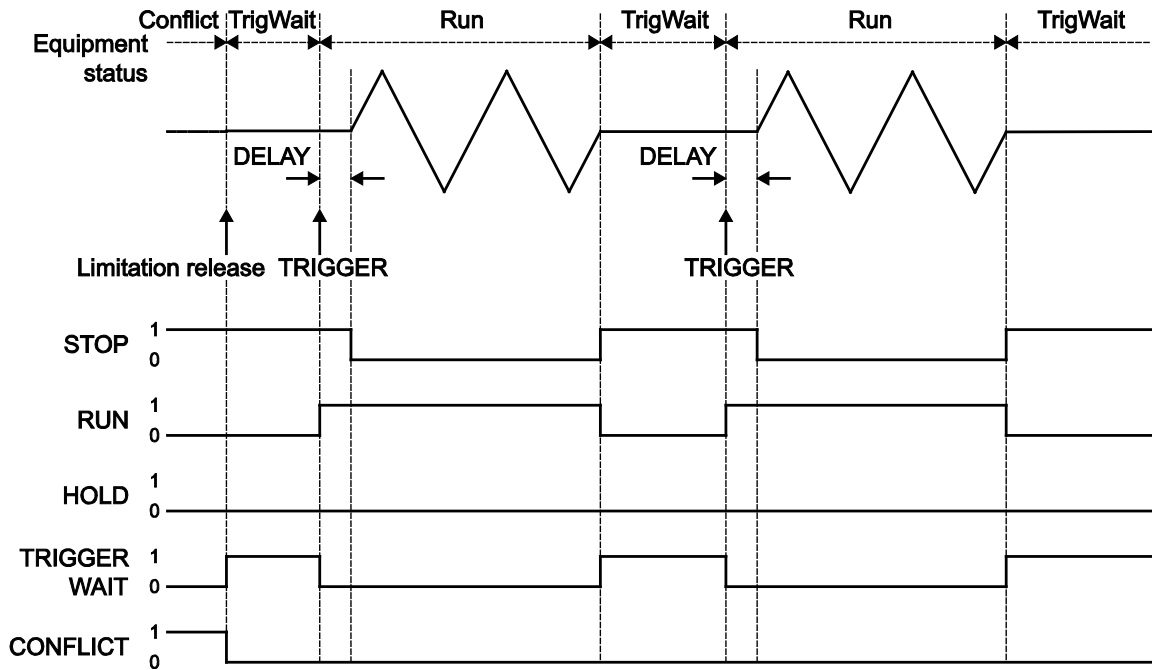


Figure 3.9. Relationship Between Output and Operation Status Register (Bits 7 to 11) During Trigger Burst

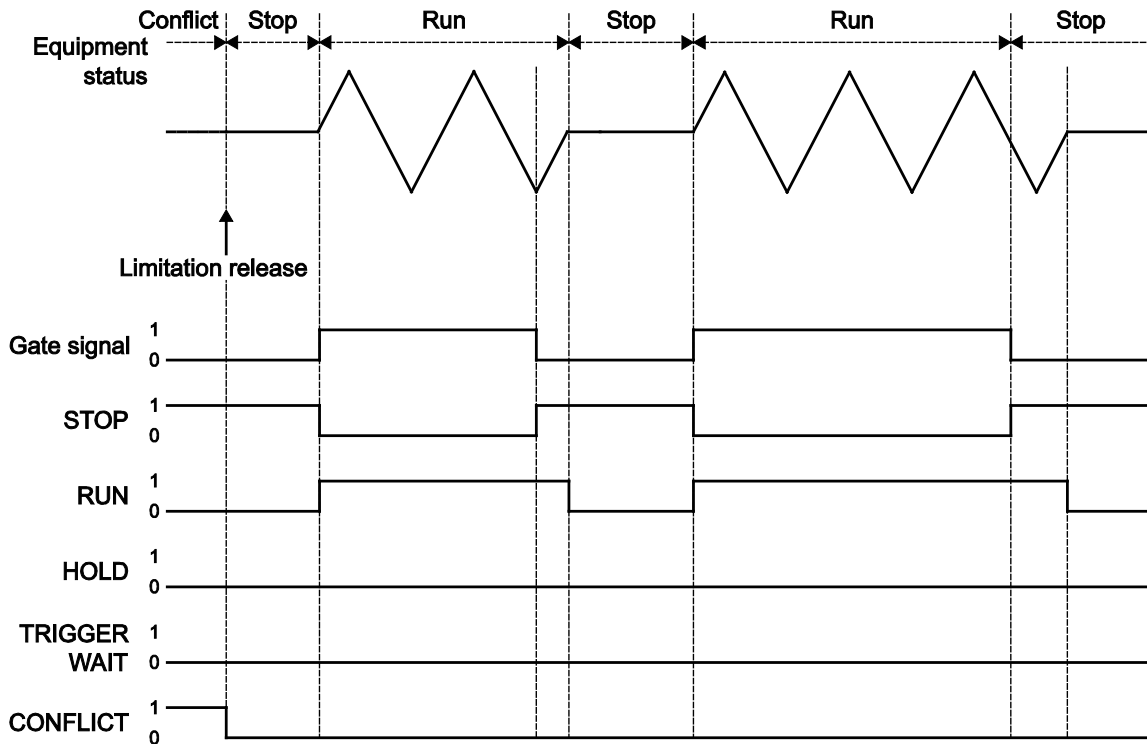


Figure 3.10. Relationship Between Output and Operation Status Register (Bits 7 to 11) During Gate

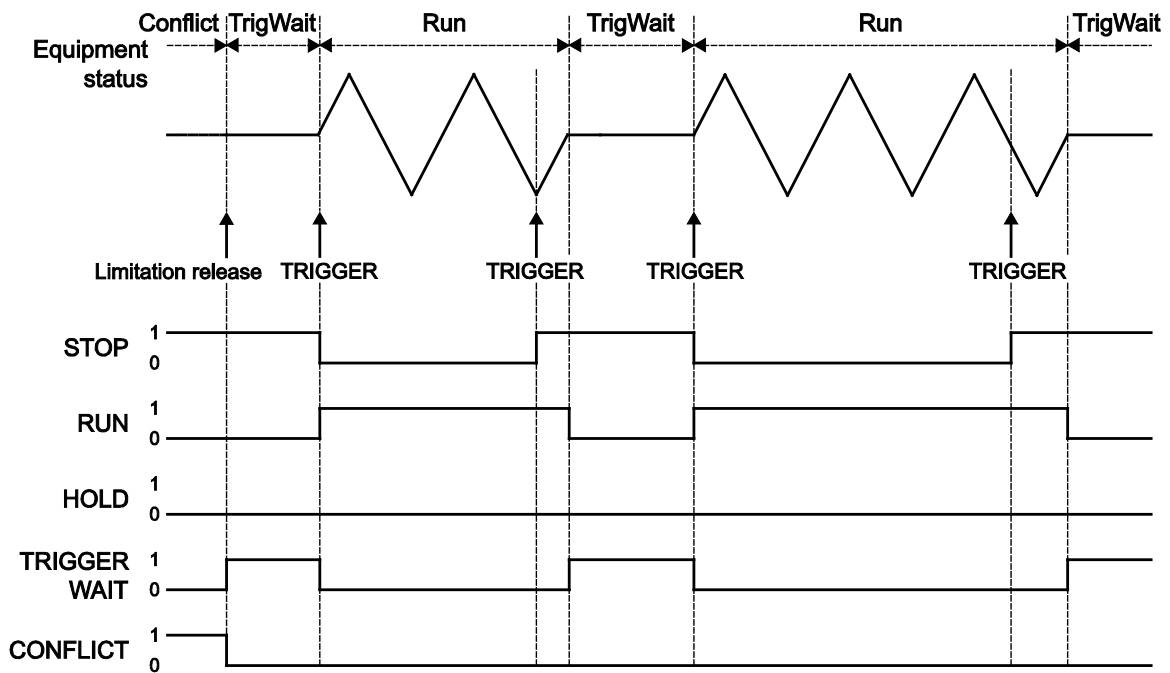


Figure 3.11. Relationship Between Output and Operation Status Register (Bits 7 to 11) During Triggered Gate

3.3.2.5 Sequence

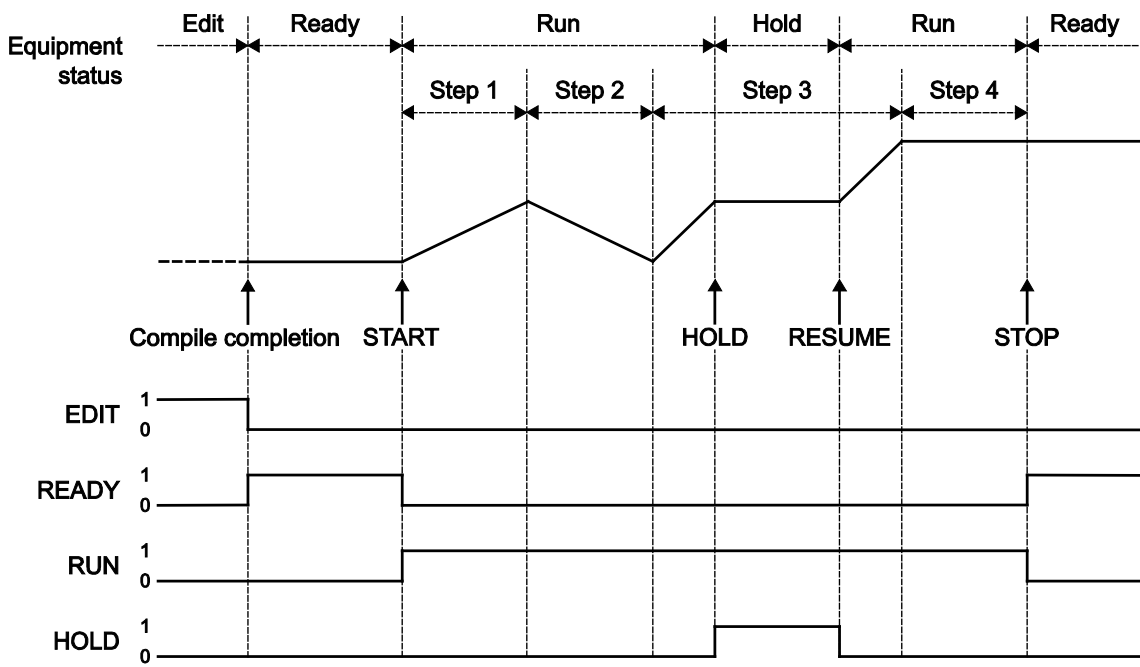


Figure 3.12. Relationship Between Output and Operation Status Register (Bits 0 to 13) During Sequence

3.3.3 Questionable data status register group

Table 3.6 describes the bits of the questionable data status register.

Table 3.6. Questionable Data Status Register

Bit	Weight	Description
0	1	Overload (CH1)
1		(Unused)
2		(Unused)
3		(Unused)
4	16	Overheating detection
5		(Unused)
6	64	No external reference clock
7		(Unused)
8	256	Indicates status in which calibration could not be done
9		(Unused)
10	1024	Overload (CH2)
11		(Unused)
12		(Unused)
13		(Unused)
14		(Unused)
15		Always 0

3.4 Warning Event Register Group

Table 3.7 shows the warning event register group. It comprises three register sets, one register set per channel, and two register sets for summarizing these sets.

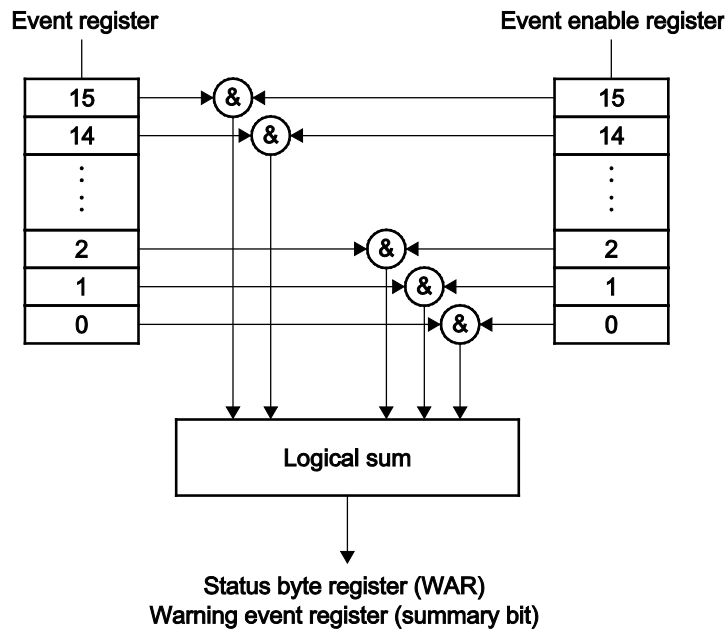


Figure 3.13. Warning Event Status Register Group Model

3.4.1 Event register

Tables 3.7 and 3.8 show the bits of the warning event register and CH1 (CH2) warning event register. Here, the meanings of the terms used in Table 3.8 are shown below.

Channel mode parameters:

Indicates frequency differences or frequency ratio.

Waveform parameters:

Indicates duty variable range, waveform polarity, amplitude range, ramp wave symmetry, and parameters unique to other parameter variable waves.

Basic parameters:

Indicates frequency, period, phase, amplitude, DC offset, high level, low level, duty, pulse width and leading/trailing time.

Other parameters:

Indicates channel mode, channel mode parameter, waveform, waveform parameter, basic parameters and parameters in other than system units.

The warning event register indicates the only status change of the device by the external controls, not the status change of the device by the panel operation.

Table 3.7. Warning Event Register

Bit	Weight	Description
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	Description
0	1	The waveform or the waveform parameters were changed due to the changes of channel mode or channel mode parameters.
1	2	The basic parameters were changed due to the changes of channel mode or channel mode parameters.
2	4	The oscillation mode was changed due to the changes of channel mode or channel mode parameters.
3	8	Other parameters were changed due to the changes of channel mode or channel mode parameters.
4	16	The channel mode or the channel mode parameters were changed due to the changes of waveform or waveform parameters.
5	32	The basic parameters were changed due to the changes of waveform or waveform parameters.
6	64	The oscillation mode was changed due to the changes or waveform or waveform parameters.
7	128	Other parameters were changed due to the changes of waveform or waveform parameters.
8	256	The other basic parameters were changed due to basic parameter (frequency, period, phase, amplitude, DC offset, high level or low level) change.
9	512	The other basic parameters were changed due to basic parameter (duty or pulse width) change.
10	1024	The other basic parameters were changed due to basic parameter (leading time or trailing time) change.
11	2048	Other parameters were changed due to basic parameter change.
12	4096	The system unit was changed.
13		(Unused)
14	16384	Other parameters were changed.
15		Always 0

The event register is cleared upon reception of a query or *CLS command addressed to this register.

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 upon reception of the :STATus:PRESet command or at power-on when the status of the power-on status clear flag (set with *PSC) is True.

3.5 Other

The FG410/FG420 provides an error queue and a message queue.

4. ERROR MESSAGE

When errors occur during under external control, the error numbers are stored in an error queue. These error numbers and their corresponding messages, and the error contents are as shown in Table 4.1. The error numbers and messages can be queried by the “SYSTem:ERRor?” command.

Table 4.1. Error Numbers, Messages, and Contents

Error number	Message	Contents (Figures in parentheses indicate the error codes displayed on the screen)
-102	Syntax error	Received character strings contain syntax errors.
-108	Parameter not allowed	There are too many parameters for the procedure.
-109	Missing parameter	There are missing parameters.
-110	Command header error	There is an error in the command header.
-111	Header separator error	There is an error in the keyword separator in the command header.
-113	Undefined header	Received character strings contain an undefined header.
-120	Numeric data error	Numeric parameters contain a data error.
-130	Suffix error	Numeric parameters contain a suffix error.
-140	Character data error	Discrete parameter contains a character data error.
-150	String data error	Character string parameters contain an error.
-160	Block data error	Block parameters contain a data error.
-200	Execution error	Command cannot be executed. This error occurs in the following cases. <ul style="list-style-type: none"> • When “*CLS” could not be executed due to the device status • When “*RST” could not be executed due to the device status • When the modification from sequence to other oscillation modes could not be executed due to the device status • In any case of non-execution other than the above
-211	Trigger ignored	GET (Group execution trigger), “*TRG” or other commands regarding trigger are ignored. This error occurs in the following cases. <ul style="list-style-type: none"> • When compilation instruction was ignored because the device is not in Edit status sequence • When the remote trigger was ignored because the device is not in Ready status sequence • When the control command was ignored due to the device status
-220	Parameter error	There is a parameter error. This error occurs in the following cases. <ul style="list-style-type: none"> • When there was an error in prefix/unit in a numeric parameter • When the specified unit cannot be used due to the device status • When an arbitrary waveform name has exceeded 20 characters • When a double quotation (”) was contained in an arbitrary waveform name • When the data points of an arbitrary waveform were not correct • When the compilation of a sequence could not be passed due to the following reasons. <ul style="list-style-type: none"> ◦ The number of the used waveforms exceeds 128 or the total amount of that exceeds 512 KW. ◦ When the check was not executed because the setting of a sequence is too complicated.

Error number	Message	Contents (Figures in parentheses indicate the error codes displayed on the screen)
-221	Settings conflict	<p>Parameters with an appropriate syntax are received but cannot be executed due to the device status. This error occurs in the following cases.</p> <ul style="list-style-type: none"> • When the sweep function could not be set to the log because the frequency sweep was not supported for the device • When the arbitrary waveform data in the array format was to be set to the edit memory of an arbitrary waveform • When the specification of the array format/control point format to an arbitrary waveform data contained an error • When the same values were set to two channels, the setting for the specified channel could not be executed due to a restriction on another channel (22039) • When the compilation of a sequence cannot be completed for the following reasons. <ul style="list-style-type: none"> ◦ Upon the relationship between two steps, when the frequency exceeded the upper limit of a waveform (23121) ◦ Upon the relationship between two steps, when the amplitude and offset did not satisfy the interdependent restriction (23122) ◦ Upon the relationship between two steps, a square waveform frequency and a duty did not satisfy the interdependent restriction. (23123) • When an external modulation/addition input connector could not be used for the external modulation because it is used for the external addition (23129) • When an external modulation/addition input connector could not be used for the external addition because it is used for the external modulation (23130)
-222	Data out of range	<p>Parameters with an appropriate syntax are received but cannot be executed because the data is out of range. This error occurs in the following cases.</p> <ul style="list-style-type: none"> • When the data which is out of range was set to each register in a status system • When 0 was set to the frequency ratio of N/M • When the data which was out of range was set to the user-defined unit, m/n. • When the standard waveform of CH2 was copied to the memory in one channel device. • When the data which was out of range was to be set (23045)
-225	Out of memory	<p>Memory capacity is insufficient for the execution. This error occurs in the following cases.</p> <ul style="list-style-type: none"> • When the arbitrary waveform data could not be saved due to memory shortage
-290	Memory use error	<p>Cannot be executed due to a memory error. This error occurs in the following cases.</p> <ul style="list-style-type: none"> • When the empty memory was specified by the arbitrary waveform number • When the sequence compilation did not pass because the empty memory was specified by the arbitrary waveform number (23125) • When the arbitrary waveforms which are output or used currently are to be deleted (32004)

Error number	Message	Contents (Figures in parentheses indicate the error codes displayed on the screen)
-291	Out of memory	There is no specified memory. This error occurs in the following cases. <ul style="list-style-type: none"> • When an arbitrary waveform number of other than 0 to 128 was specified • When a sequence number of other than 0 to 10 was specified
-310	System error	Malfunction of the main system. This error occurs in the following cases. <ul style="list-style-type: none"> • When an arbitrary waveform could not be read by a sequence compilation (23124) • When an internal error occurred (24135, 24136, 35005)
-350	Queue overflow	An error occurred but was deleted because the error queue overflowed.
-410	Query INTERRUPTED	Old response message was deleted from a message queue due to the interruption of a new message.
-420	Query UNTERMINATED	Talker was specified but there is no response message in a message queue.
-440	Query UNTERMINATED after indefinite response	There was a query after “*IDN?” in received character strings. (“*IDN?” must be the last query in the received character strings.)

5. SPECIFICATIONS

5.1 Interface Functions

Table 5.1. USB Interface Functions

Function	Subset	Description
Source handshake	SH1	All send handshake functions provided
Acceptor handshake	AH1	All receive handshake functions provided
Talker	T6	Basic talker function, talker cancellation through MLA provided
Listener	L2	Basic listener function provided
Service request	SR1	All service request functions provided
Remote/local	RL1	All remote/local functions provided
Parallel poll	PP0	No parallel poll function provided
Device clear	DC1	All device clear functions provided
Device trigger	DT1	Device trigger function provided
Controller	C0	No controller function provided

Table 5.2. GPIB Interface Functions

Function	Subset	Description
Source handshake	SH1	All send handshake functions provided
Acceptor handshake	AH1	All receive handshake functions provided
Talker	T6	Basic talker function, talker cancellation through MLA provided
Listener	L4	Basic listener function, talker cancellation through MTA provided
Service request	SR1	All service request functions provided
Remote/local	RL1	All remote/local functions provided
Parallel poll	PP0	No parallel poll function provided
Device clear	DC1	All device clear functions provided
Device trigger	DT1	Device trigger function provided
Controller	C0	No controller function provided

5.2 Response to Interface Messages

Table 5.3. Response to Interface Messages

IFC	<ul style="list-style-type: none"> • Initializes interface • Cancels specified listener, talker
DCL and SDC	<ul style="list-style-type: none"> • Clears I/O buffer • Clears errors • Cancels SRQ origination and resets bit that is source in status byte • Prohibits SRQ originations
LLO	<ul style="list-style-type: none"> • Disables use of LOCAL keys on panel (software keys)
GTL	<ul style="list-style-type: none"> • Sets local status

5.3 Multiline Interface Messages

b7 →					0	0	0	0	0	1	1	1	1	1	1					
b6 →					0	0	0	① MSG	1	MSG	1	MSG	0	MSG	0	MSG	1	MSG		
b5 →					0	0	1	0	MSG	1	0	MSG	1	0	MSG	1	1	MSG		
②					Column	0	1	2	3	4	5	6	7	7						
b4	b3	b2	b1	Low																
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	BOT	SDC	DC4	DCL	\$	↑	4	↑	D	↑	T	↑	d	↑	t	
0	1	0	1	5	ENQ	PPC③	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	↑	-	↑	DEL	
					Address command group (ACG)				Universal command group (UCG)				Listener address group (LAG)				Tarker address group (TAG)			
Primary command group (PCG)										Secondary command group (SCG)										

- Remarks:
- ①MSG: Interface message
 - ②b1=D101 ... b7=D107, D108 not used
 - ③With secondary command
 - ④IEC standard = "\", JIS standard = "¥"
 - GTL ... Go to Local
 - SDC ... Selected Device Clear
 - PPC ... Parallel Poll Configure
 - GET ... Group Execute Trigger
 - TCT ... Take Control
 - LLO ... Local Lookout
 - DCL ... Device Clear
 - PPU ... Parallel Poll Unconfigure
 - SPE ... Serial Poll Enable
 - SPD ... Serial Poll Disable
 - UNL ... Unlisten
 - UNT ... Untalk

6. COMMAND TREE

6.1 Command Tree

CHANnel		..... USER	▶ 2.3.143
..... DELT	▶ 2.3.2	..... SOURce	▶ 2.3.140
..... MODE	▶ 2.3.1	..... STATe	▶ 2.3.138
..... RATio	▶ 2.3.3	..... BURSt	
INSTrument		..... AUTO	
..... COUPle	▶ 2.3.4	..... NCYCles	▶ 2.3.213
MEMory		..... SPACe	▶ 2.3.214
..... STATe		..... GATE	
..... .. DELete	▶ 2.3.226	..... OSTop	▶ 2.3.217
OUTPut		..... MODE	▶ 2.3.209
..... LOAD	▶ 2.3.10	..... SLEVel	▶ 2.3.210
..... POLarity	▶ 2.3.48	..... STATe	▶ 2.3.211
..... PON	▶ 2.3.6	..... STATe	▶ 2.3.208
..... SCALe	▶ 2.3.49	..... TGATe	
..... [STATe]	▶ 2.3.5	..... OSTop	▶ 2.3.218
..... SYNC		..... [TRIGger]	
..... .. AM		..... NCYCles	▶ 2.3.215
..... TYPE	▶ 2.3.137	..... TDELay	▶ 2.3.216
..... AMSC		..... COMBine	
..... TYPE	▶ 2.3.144	..... FEED	▶ 2.3.9
..... BURSt		..... CONTinuous	
..... TYPE	▶ 2.3.212	..... [IMMediate]	▶ 2.3.105
..... FM		..... STATe?	▶ 2.3.106
..... TYPE	▶ 2.3.123	..... FM	
..... FSKey		..... [DEViation]	▶ 2.3.118
..... TYPE	▶ 2.3.111	..... INTernal	
..... OFSM		..... FREQuency	▶ 2.3.120
..... TYPE	▶ 2.3.151	..... FUNCTion	
..... PM		..... [SHAPe]	▶ 2.3.121
..... TYPE	▶ 2.3.130	..... USER	▶ 2.3.122
..... PSKey		..... SOURce	▶ 2.3.119
..... TYPE	▶ 2.3.116	..... STATe	▶ 2.3.117
..... PWM		..... FREQuency	
..... TYPE	▶ 2.3.158	..... CENTer	▶ 2.3.171
..... SWEep		..... [CW|FIXed]	▶ 2.3.20
..... TYPE	▶ 2.3.167	..... MODE	▶ 2.3.168
[SOURce[1|2]]		..... SPAN	▶ 2.3.172
..... AM		..... START	▶ 2.3.169
..... .. [DEPth]	▶ 2.3.132	..... STATe	▶ 2.3.175
..... .. INTernal		..... STOP	▶ 2.3.170
..... FREQuency	▶ 2.3.134	..... SWAP	▶ 2.3.174
..... FUNCTion		..... UNIT	▶ 2.3.21
..... [SHAPe]	▶ 2.3.135	..... USER	▶ 2.3.22
..... USER	▶ 2.3.136	..... FSKey	
..... SOURce	▶ 2.3.133	..... [FREQuency]	▶ 2.3.108
..... STATe	▶ 2.3.131	..... INTernal	
..... .. AMSC		..... FREQuency	▶ 2.3.110
..... [DEPth]	▶ 2.3.139	..... SOURce	▶ 2.3.109
..... INTernal		..... STATe	▶ 2.3.107
..... FREQuency	▶ 2.3.141	..... FUNCTion	
..... FUNCTion		..... ACSine	
..... [SHAPe]	▶ 2.3.142	..... ANGLE	▶ 2.3.55

..... BRRamp		..... Q	▶ 2.3.81
..... SYMMetry	▶ 2.3.97	..... SQUare	
..... CFCSine		..... DCYCLE	▶ 2.3.38
..... CFACtor	▶ 2.3.54	..... EXTend	▶ 2.3.50
..... COFSine		..... SSINe	
..... NCHattering	▶ 2.3.68	..... STEP	▶ 2.3.56
..... OFPHase	▶ 2.3.67	..... TOFFset	
..... TOFF	▶ 2.3.70	..... DELay	▶ 2.3.89
..... TON	▶ 2.3.69	..... FALL	▶ 2.3.92
..... CONSine		..... OFFSet	▶ 2.3.93
..... NCHattering	▶ 2.3.64	..... RISE	▶ 2.3.90
..... ONPHase	▶ 2.3.63	..... UBASe	▶ 2.3.91
..... TOFF	▶ 2.3.66	..... TPULse	
..... TON	▶ 2.3.65	..... RFALI	▶ 2.3.75
..... CSINe		..... UBASe	▶ 2.3.76
..... CLIP	▶ 2.3.53	..... USER	▶ 2.3.98
..... DOSCillation		..... USINe	
..... DTConstant	▶ 2.3.83	..... AMPLitude[1]	▶ 2.3.51
..... OFRequency	▶ 2.3.82	..... AMPLitude2	▶ 2.3.52
..... EFALI		..... MARKer	
..... TCONstant	▶ 2.3.79	..... FREQuency	▶ 2.3.173
..... ERISe		..... PHASe	▶ 2.3.181
..... TCONstant	▶ 2.3.78	..... PULSe	
..... GAUSSian		..... DCYCLE	▶ 2.3.205
..... SIGMa	▶ 2.3.71	..... VOLTage	
..... HAVersine		..... [LEVe]	
..... WIDTh	▶ 2.3.73	..... [IMMediate]	
..... HSEPulse		..... [AMPLitude]	▶ 2.3.189
..... DCYCLE	▶ 2.3.96	..... OFFSet	▶ 2.3.197
..... LE	▶ 2.3.94	..... OFSM	
..... TE	▶ 2.3.95	..... [DEViation]	▶ 2.3.146
..... HSPulse		..... INTernal	
..... WIDTh	▶ 2.3.74	..... FREQuency	▶ 2.3.148
..... LORentz		..... FUNCTion	
..... WIDTh	▶ 2.3.72	..... [SHAPe]	▶ 2.3.149
..... MCSine		..... USER	▶ 2.3.150
..... CYCLes	▶ 2.3.57	..... SOURce	▶ 2.3.147
..... PHASe	▶ 2.3.58	..... STATe	▶ 2.3.145
..... OFPSine		..... PHASe	
..... OFPHase	▶ 2.3.61	..... [ADJust]	▶ 2.3.29
..... STIME	▶ 2.3.62	..... CENTer	▶ 2.3.179
..... ONPSine		..... INITiate	▶ 2.3.8
..... ONPHase	▶ 2.3.59	..... MODE	▶ 2.3.176
..... STIME	▶ 2.3.60	..... SPAN	▶ 2.3.180
..... OSURge		..... START	▶ 2.3.177
..... DTConstant	▶ 2.3.85	..... STATe	▶ 2.3.183
..... OFRequency	▶ 2.3.84	..... STOP	▶ 2.3.178
..... TTConstant	▶ 2.3.86	..... SWAP	▶ 2.3.182
..... PSURge		..... UNIT	▶ 2.3.30
..... TD	▶ 2.3.88	..... USER	▶ 2.3.31
..... TR	▶ 2.3.87	..... PM	
..... RAMP		..... [DEViation]	▶ 2.3.125
..... SYMMetry	▶ 2.3.46	..... INTernal	
..... [SHAPe]	▶ 2.3.47	..... FREQuency	▶ 2.3.127
..... SINC		..... FUNCTion	
..... ZCRossing	▶ 2.3.77	..... [SHAPe]	▶ 2.3.128
..... SOLStep		..... USER	▶ 2.3.129
..... NFRequency	▶ 2.3.80	..... SOURce	▶ 2.3.126

..... STATE	▶ 2.3.124 START	▶ 2.3.185
..... PSKey	 STATE	▶ 2.3.191
..... [DEVIation]	▶ 2.3.113 STOP	▶ 2.3.186
..... INTernal	 SWAP	▶ 2.3.190
..... FREQuency	▶ 2.3.115 UNIT	▶ 2.3.24
..... SOURce	▶ 2.3.114 USER	▶ 2.3.25
..... STATE	▶ 2.3.112 HIGH	▶ 2.3.32
..... PULSe	 UNIT	▶ 2.3.33
..... DCYCLE	▶ 2.3.39 LOW	▶ 2.3.34
..... CENTer	▶ 2.3.203 UNIT	▶ 2.3.35
..... MODE	▶ 2.3.200 OFFSet	▶ 2.3.26
..... SPAN	▶ 2.3.204 CENTer	▶ 2.3.195
..... START	▶ 2.3.201 MODE	▶ 2.3.192
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