Return Format

The query returns 1 or 0.

Example

```
:SYSTem:DGSTatus? /*The query returns 1 if the instrument has
installed the DG module; otherwise, it returns 0.*/
```

3.24.19 :SYSTem:KEYBOARDCheck?

Syntax

:SYSTem:KEYBOARDCheck?

Description

Queries the status of the keyboard.

Parameter

N/A

Remarks

N/A

Return Format

The query returns true or false.

Example

```
N/A
```

3.25 :SOURce Commands

:SOURce commands are used to set AFG parameters.

This series oscilloscope has a standard built-in 25 MHz AFG, which integrates the signal source and the oscilloscope into one.

NOTE

The commands are only available for DHO914S and DHO924S.

3.25.1 :SOURce:OUTPut:STATe

Syntax

:SOURce:OUTPut:STATe <*bool*>

:SOURce:OUTPut:STATe?

Description

Enables or disables the channel output; or queries the channel output status.

Parameter

Name	Type	Range	Default
<bool>	Bool	{{1|ON}|{0|OFF}}	0|OFF

Remarks

N/A

Return Format

The query returns 0 or 1.

Examples

```
:SOURce:OUTPut:STATe ON /*Enables the channel output for AFG.*/
:SOURce:OUTPut:STATe? /*The query returns 1.*/
```

3.25.2 :SOURce:FUNCtion

Syntax

:SOURce:FUNCtion <*wave*>

:SOURce:FUNCtion?

Description

Sets or queries the function of the basic waveform.

Parameter

Name	Type	Range	Default
<wave>	Discrete	{SINusoid|SQUare|RAMP|DC|NOISe|ARB}	SINusoid

Remarks

The built-in Function/Arbitrary Waveform Generator of this series can output a variety of basic waveforms, including Sine, Square, Ramp, DC, Noise, and Arb.

Return Format

The query returns SIN, SQU, RAMP, DC, NOIS, or ARB.

Example

```
:SOURce:FUNCtion SQUare /*Sets the output waveform type to Square.*/
:SOURce:FUNCtion? /*The query returns SQU.*/
```

3.25.3 :SOURce:FREQuency

Syntax

:SOURce:FREQuency <*freq*>

:SOURce:FREQuency?

Description

Sets or queries the frequency of basic waveforms.

Parameter

Name	Type	Range	Default
<freq>	Real	Refer to *Remarks*	1 kHz

Remarks

- Sine: 2 mHz to 25 MHz
- Square: 2 mHz to 15 MHz
- Ramp: 2 mHz to 150 kHz
- Arb: 2 mHz to 10 MHz
- DC and Noise: no frequency parameter

You can use *:SOURce:FUNCtion* to set or query the basic wave type.

Return Format

The query returns the frequency in scientific notation, for example, 2.000000E+5.

Example

```
:SOURce:FREQuency 1000 /*Sets the frequency of the basic waveform
to 1 kHz.*/
:SOURce:FREQuency? /*The query returns 1.000000E+3.*/
```

3.25.4 :SOURce:PHASe

Syntax

:SOURce:PHASe <*phase*>

:SOURce:PHASe?

Description

Sets or queries the starting phase of basic waveforms.

Parameter

Name	Type	Range	Default
<phase>	Real	0° to 360°	0°

Remarks

N/A

Return Format

The query returns the starting phase in scientific notation. For example, the query might return 1.0000000000E+01, indicating that the starting phase is 10°.

Example

```
:SOURce:PHASe 10 /*Sets the starting phase of basic waveforms to
10°.*/
:SOURce:PHASe? /*The query returns 1.0000000000E+01.*/
```

3.25.5 :SOURce:FUNCtion:RAMP:SYMMetry

Syntax

:SOURce:FUNCtion:RAMP:SYMMetry <*symm*>

:SOURce:FUNCtion:RAMP:SYMMetry?

Description

Sets or queries the symmetry of Ramp.

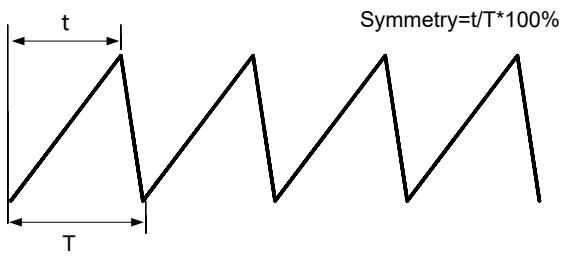
Parameter

Name	Type	Range	Default
<symm>	Real	0% to 100%	50%

Remarks

This command is available only when the waveform function (*:SOURce:FUNCtion*) is set to Ramp.

Symmetry is defined as the percentage of the amount of time Ramp wave is rising in the period.



Return Format

The query returns the symmetry in scientific notation. For example, the query might return 5.5000000000E+01, indicating that the Ramp symmetry is 55%.

Example

```
:SOURce:FUNCtion:RAMP:SYMMetry 55 /*Sets the symmetry of Ramp to
55%.*/
:SOURce:FUNCtion:RAMP:SYMMetry? /*The query returns 5.5000000000E
+01.*/
```

3.25.6 :SOURce:FUNCtion:SQUare:DUYT

Syntax

:SOURce:FUNCtion:SQUare:DUYT <*percent*>

:SOURce:FUNCtion:SQUare:DUYT?

Description

Sets or queries the duty cycle of the square wave generated by the AFG function.

Parameter

Name	Type	Range	Default
<percent>	Real	0 to 100	50

Remarks

This command is valid only when the wave type is set to "Square". You can use *:SOURce:FUNCtion* to set or query the waveform type.

Square duty cycle is the percentage of time that the square wave is at a high level over the period of the square wave.

Return Format

The query returns the duty cycle in scientific notation.

Example

```
:SOURce:FUNCtion:SQUare:DUYT 55 /*Sets the square duty cycle to
55%.*/
:SOURce:FUNCtion:SQUare:DUYT? /*The query returns 5.5000000000E
+01.*/
```

3.25.7 :SOURce:VOLTage:AMPLitude

Syntax

:SOURce:VOLTage:AMPLitude <*amp*>

:SOURce:VOLTage:AMPLitude

Description

Sets or queries the amplitude of basic waveforms. The default unit is V.

Parameter

Name	Type	Range	Default
<amp>	Real	Refer to *Remarks*	6 V

Remarks

The amplitude range of basic waveforms is related to the frequency:

- 2 mV to 10 V (frequency ≤ 10 MHz)
- 2 mV to 5 V (frequency > 10 MHz)

You can use *:SOURce:FREQuency* to set or query the frequency of the basic waveform.

Return Format

The query returns the amplitude in scientific notation. The unit is V.

Example

```
:SOURce:VOLTage:AMPLitude 1 /*Sets the amplitude to 1 V.*/
:SOURce:VOLTage:AMPLitude? /*The query returns 1.0000000000E+00.*/
```

3.25.8 :SOURce:VOLTage:OFFSet

Syntax

:SOURce:VOLTage:OFFSet <*offset*>

:SOURce:VOLTage:OFFSet?

Description

Sets or queries the offset of basic waveforms. The default unit is V.

Parameter

Name	Type	Range	Default
<offset>	Real	Refer to *Remarks*	0 V

Remarks

The offset range of basic waveforms is related to the amplitude:

Offset range = ± (maximum amplitude that can be set - current amplitude)/2

For example,

- If the frequency of the current basic waveform is 5 MHz, the maximum amplitude that can be set is 10 V, and the set amplitude is 6 V, then the offset range is ±(10 V - 6 V)/2 = ±2 V.
- If the frequency of the current basic waveform is 15 MHz, the maximum amplitude that can be set is 5 V, and the set amplitude is 3 V, then the offset range is ±(5 V - 3 V)/2 = ±1 V.

You can use *:SOURce:VOLTage:AMPLitude* to set or query the amplitude of the basic waveform.

Return Format

The query returns the offset in scientific notation. The unit is V.

Example

```
:SOURce:VOLTage:OFFSet 0.2 /*Sets the waveform offset to 200 mV.*/
:SOURce:VOLTage:OFFSet? /*The query returns 2.0000000000E-01.*/
```

3.25.9 :SOURce:MOD:STATe

Syntax

:SOURce:MOD:STATe <*bool*>

:SOURce:MOD:STATe?

Description

Enables or disables the modulation output; or queries the modulation output status.

Parameter

Name	Type	Range	Default
<bool>	Bool	{{1|ON}|{0|OFF}}	0|OFF

Remarks

N/A

Return Format

The query returns 1 or 0.

Example

```
:SOURce:MOD:STATe /*Enables the modulation output*/
:SOURce:MOD:STATe? /*The query returns 1.*/
```

3.25.10 :SOURce:MOD:TYPe

Syntax

:SOURce:MOD:TYPe <*type*>

:SOURce:MOD:TYPe?

Description

Sets or queries the modulation type.

Parameter

Name	Type	Range	Default
<type>	Discrete	{AM|FM|PM}	AM

Remarks

- **AM:** amplitude modulation. The amplitude of the carrier waveform is varied by the voltage of the modulating waveform.
- **FM:** frequency modulation. The frequency of the carrier waveform is varied by the voltage of the modulating waveform.
- **PM:** phase modulation. The phase of the carrier waveform is varied by the voltage of the modulating waveform.

Return Format

The query returns AM, FM, or PM.

Example

```
:SOURce:MOD:TYPe AM /*Sets the modulation type to AM*/
:SOURce:MOD:TYPe? /*The query returns AM.*/
```

3.25.11 :SOURce:MOD:AM:DEPTh

Syntax

:SOURce:MOD:AM:DEPTh <*depth*>

:SOURce:MOD:AM:DEPTh?

Description

Sets or queries the modulation depth of AM.

Parameter

Name	Type	Range	Default
<depth>	Real	0% to 120%	100%

Remarks

Modulation depth is a percentage that represents the amplitude variation.

- At 0% depth, the amplitude is one-half of the carrier's amplitude setting.
- At 100% depth, the amplitude is identical to the carrier's amplitude setting.
- At greater than 100% depth, envelop distortion will occur which must be avoided in actual circuits. The instrument will not exceed 2.5 Vpp on the output (into a 50 Ω load).

Return Format

The query returns the AM modulation depth in scientific notation. For example, the query might return 5.0000000000E+01, indicating that the modulation depth is 50%.

Example

```
:SOURce:MOD:AM:DEPTh 50 /*Sets the modulation depth of AM to 50%.*/
:SOURce:MOD:AM:DEPTh? /*The query returns 5.0000000000E+01.*/
```

3.25.12 :SOURce:MOD:AM:INTernal:FREQuency

Syntax

`:SOURce:MOD:AM:INTernal:FREQuency` <*freq*>

`:SOURce:MOD:AM:INTernal:FREQuency?`

Description

Sets or queries the modulation frequency of AM.

Parameter

Name	Type	Range	Default
<freq>	Real	2 mHz to 1 MHz	100 Hz

Remarks

N/A

Return Format

The query returns the AM modulation frequency in scientific notation. For example, the query might return 1.5000000000E+02, indicating that the modulation frequency is 150 Hz.

Example

```
:SOURce:MOD:AM:INTernal:FREQuency 150 /*Sets the modulation
frequency of AM to 150 Hz.*/
:SOURce:MOD:AM:INTernal:FREQuency? /*The query returns 1.5000000000E
+02.*/
```

3.25.13 :SOURce:MOD:AM:INTernal:FUNCtion

Syntax

:SOURce:MOD:AM:INTernal:FUNCtion <*function*>

:SOURce:MOD:AM:INTernal:FUNCtion?

Description

Sets or queries the modulation waveform of AM.

Parameter

Name	Type	Range	Default
<function>	Discrete	{SINusoid|SQUare|TRIangle| UPRamp|DNRamp|NOISe}	SINusoid

Remarks

- **SINusoid:** sine wave.
- **SQUare:** square with 50% duty cycle.
- **TRIangle:** triangle with 50% symmetry
- **UPRamp:** UpRamp with 100% symmetry.
- **DNRamp:** DnRamp with 0% symmetry.
- **NOISe:** noise-white gaussian noise.

Return Format

The query returns SIN, SQU, TRI, UPR, DNR, and NOIS.

Example

```
:SOURce:MOD:AM:INTernal:FUNCtion SQUare /*Sets the modulation
waveform of AM to Square.*/
:SOURce:MOD:AM:INTernal:FUNCtion? /*The query returns SQU.*/
```

3.25.14 :SOURce:MOD:FM:DEViation

Syntax

:SOURce:MOD:FM:DEViation <*deviation*>

:SOURce:MOD:FM:DEViation?

Description

Sets or queries the frequency deviation of FM.

Parameter

Name	Type	Range	Default
<deviation>	Real	2 mHz to the current carrier frequency	1 kHz

Remarks

- Frequency deviation represents the peak variation in frequency of the modulated waveform from the carrier frequency.
- The carrier frequency plus the deviation must be less than or equal to the selected carrier's maximum frequency plus 1 kHz.
- The ranges of different carrier frequencies (*:SOURce:FREQuency*) vary in different modulation modes.

Return Format

The query returns the frequency deviation in scientific notation. For example, the query might return 1.0000000000E+02, indicating that the frequency deviation is 100 Hz.

Example

```
:SOURce:MOD:FM:DEViation 100 /*Sets the frequency deviation of FM
to 100 Hz.*/
:SOURce:MOD:FM:DEViation? /*The query returns 1.0000000000E+02.*/
```

3.25.15 :SOURce:MOD:FM:INTernal:FREQuency

Syntax

:SOURce:MOD:FM:INTernal:FREQuency <*freq*>

:SOURce:MOD:FM:INTernal:FREQuency?

Description

Sets or queries the modulation frequency of FM.

Parameter

Name	Type	Range	Default
<freq>	Real	2 mHz to 1 MHz	100 Hz

Remarks

N/A

Return Format

The query returns the FM modulation frequency in scientific notation. For example, the query might return 1.5000000000E+02, indicating that the modulation frequency is 150 Hz.

Example

```
:SOURce:MOD:FM:INTernal:FREQuency 150 /*Sets the modulation
frequency of FM to 150 Hz.*/
:SOURce:MOD:FM:INTernal:FREQuency? /*The query returns 1.5000000000E
+02.*/
```

3.25.16 :SOURce:MOD:FM:INTernal:FUNCtion

Syntax

`:SOURce:MOD:FM:INTernal:FUNCtion` <*function*>

`:SOURce:MOD:FM:INTernal:FUNCtion?`

Description

Sets or queries the modulation waveform of FM.

Parameter

Name	Type	Range	Default
<function>	Discrete	{SINusoid|SQUare|TRIangle| UPRamp|DNRamp|NOISe}	SINusoid

Remarks

- **SINusoid:** sine wave.
- **SQUare:** square with 50% duty cycle.
- **TRIangle:** triangle with 50% symmetry
- **UPRamp:** UpRamp with 100% symmetry.
- **DNRamp:** DnRamp with 0% symmetry.
- **NOISe:** noise-white gaussian noise.

Return Format

The query returns SIN, SQU, TRI, UPR, DNR, and NOIS.

Example

```
:SOURce:MOD:FM:INTernal:FUNCtion SQUare /*Sets the modulation
waveform of FM to Square.*/
:SOURce:MOD:FM:INTernal:FUNCtion? /*The query returns SQU.*/
```

3.25.17 :SOURce:MOD:PM:DEViation

Syntax

:SOURce:MOD:PM:DEViation <*deviation*>

:SOURce:MOD:PM:DEViation?

Description

Sets or queries the phase deviation of PM.

Parameter

Name	Type	Range	Default
<deviation>	Real	0° to 360°	90°

Remarks

Phase deviation represents the peak variation in phase of the modulated waveform from the carrier waveform.

Return Format

The query returns the PM phase deviation in scientific notation. For example, the query might return 5.0000000000E+01, indicating that the phase deviation is 50°.

Example

```
:SOURce:MOD:PM:DEViation 50 /*Sets the phase deviation of PM to
50°.*/
:SOURce:MOD:PM:DEViation? /*The query returns 5.0000000000E+01.*/
```

3.25.18 :SOURce:MOD:PM:INTernal:FREQuency

Syntax

:SOURce:MOD:PM:INTernal:FREQuency <*freq*>

:SOURce:MOD:PM:INTernal:FREQuency?

Description

Sets or queries the modulation frequency of PM.

Parameter

Name	Type	Range	Default
<freq>	Real	2 mHz to 1 MHz	100 Hz

Remarks

N/A

Return Format

The query returns the PM modulation frequency in scientific notation. For example, the query might return 1.5000000000E+02, indicating that the modulation frequency is 150 Hz.

Example

```
:SOURce:MOD:PM:INTernal:FREQuency 150 /*Sets the modulation
frequency of PM to 150 Hz.*/
:SOURce:MOD:PM:INTernal:FREQuency? /*The query returns 1.5000000000E
+02.*/
```

3.25.19 :SOURce:MOD:PM:INTernal:FUNCtion

Syntax

`:SOURce:MOD:PM:INTernal:FUNCtion` <*function*>

`:SOURce:MOD:PM:INTernal:FUNCtion?`

Description

Sets or queries the modulation waveform of PM.

Parameter

Name	Type	Range	Default
<function>	Discrete	{SINusoid|SQUare|TRIangle| UPRamp|DNRamp|NOISe}	SINusoid

Remarks

- **SINusoid:** sine wave.
- **SQUare:** square with 50% duty cycle.
- **TRIangle:** triangle with 50% symmetry
- **UPRamp:** UpRamp with 100% symmetry.
- **DNRamp:** DnRamp with 0% symmetry.
- **NOISe:** noise-white gaussian noise.

Return Format

The query returns SIN, SQU, TRI, UPR, DNR, and NOIS.

Example

```
:SOURce:MOD:PM:INTernal:FUNCtion SQUare /*Sets the modulation
waveform of PM to Square.*/
:SOURce:MOD:PM:INTernal:FUNCtion? /*The query returns SQU.*/
```

3.26 :TIMebase Commands

:TIMebase commands are used to set the horizontal system. For example, you can enable the Zoom mode or set the horizontal time base mode.

Horizontal Time Base Mode

- **YT Mode:** By default, this series oscilloscope uses the YT mode for waveform display window. In YT mode, Y-axis indicates the Voltage and X-axis indicates the Time.
- **XY Mode:** In XY mode, both the X-axis and Y-axis indicate voltage. The XY mode converts the oscilloscope from a "Voltage-Time" display to a "Voltage-Voltage" display using two input channels. The XY mode can be used to measure the phase deviation occurred when the signal under test passes through a circuit network.
- **Roll Mode:** The roll mode causes the waveform to move across the screen from right to left. It allows you to view the acquired data without waiting for a complete acquisition. The Roll mode is automatically enabled when the horizontal time base is set to 50 ms/div or slower.

TIP

- If the Zoom mode is currently turned on, enabling the roll mode automatically turns off the Zoom mode.
- The following functions are not available when the roll mode is enabled: To Adjust the Horizontal Position (available when the oscilloscope run state is STOP), Zoom Mode (Delayed Sweep), Triggering the Oscilloscope, Protocol Decoding, Pass/Fail Test, Waveform Recording and Playing, Persistence Time, XY Mode, and Average.