

**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 <i>Remarks</i>	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.

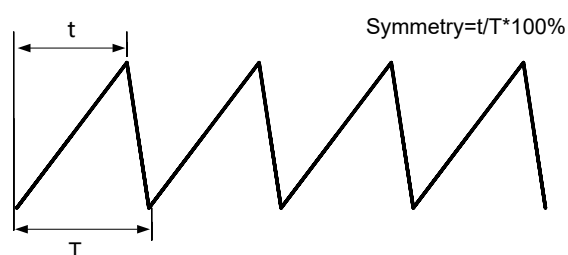
**Parameter**

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:VOLTag:e:AMPLitude

### Syntax

:SOURce:VOLTag:e:AMPLitude <amp>

:SOURce:VOLTag:e:AMPLitude

**Description**

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

**Parameter**

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

**Remarks**

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

- 2 mV to 10 V (frequency  $\leq$  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 <i>Remarks</i>	0 V

**Remarks**

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

Offset range =  $\pm$  (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  $\pm(10\text{ V} - 6\text{ V})/2 = \pm 2\text{ V}$ .
- 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  $\pm(5\text{ V} - 3\text{ V})/2 = \pm 1\text{ V}$ .

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  $\Omega$  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.