:SOURce[:MOD]:AM

Command List:

[:SOURce[<n>]][:MOD]:AM[:DEPTh]

Syntax

[:SOURce[<n>]][:MOD]:AM[:DEPTh] {<depth>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:AM[:DEPTh]? [MINimum|MAXimum]

Description

Sets the AM modulation depth of the specified channel.
Queries the AM modulation depth of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<depth>	Real	0% to 120%	100%

Remarks

- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- Modulation depth indicates the amplitude variation. It is expressed in percentage. When the modulation depth is 0%, the output amplitude is half of the amplitude of the carrier signal. At 100% depth, the output amplitude is equal to carrier waveform amplitude. When the modulation depth is greater than 100%, the output amplitude of the instrument will not exceed 10 Vpp (when the load is 50 Ω).
- When the external modulation source ([:SOURce[<n>]][:MOD]:AM:SOURce) is selected, the output amplitude of the instrument is controlled by the ±5 V signal level on the rear-panel **[Sync/Ext Mod/Trig/FSK]** connector. For example, if the modulation depth is set to 100%, the output amplitude will be the maximum when the modulating signal is +5 V and the minimum when the modulating signal is -5 V.

Return Format

The query returns the AM modulation depth in scientific notation, with 7 effective digits. For example, 5.000000E+01 (the AM modulation depth is 50°).

Example

```
:SOUR1:AM 50      /*Sets the AM modulation depth of CH1 to 50%.*/
:SOUR1:AM?        /*Queries the AM modulation depth of CH1 and the query returns 5.000000E+01.*/
```

[:SOURce[<n>]][:MOD]:AM:DSSC

Syntax
[:SOURce[<n>]][:MOD]:AM:DSSC {ON|1|OFF|0}
[:SOURce[<n>]][:MOD]:AM:DSSC?

Description
Enables or disables the AM carrier waveform suppression function of the specified channel.
Queries the on/off status of the AM carrier waveform suppression function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{ON|1|OFF|0}	Bool	ON|1|OFF|0	OFF

Remarks
- DG2000 supports two types of amplitude modulation: normal amplitude modulation and double sideband suppressed carrier (DSB-SC) amplitude modulation. In the normal amplitude modulation, the modulated waveform contains carrier waveform components. Because carrier waveform components carry no information, the modulation is less efficient. In order to improve the modulation efficiency, the carrier waveform components are suppressed on the basis of the normal amplitude modulation. At this time, the modulated waveforms all carry information. This method is called double sideband suppressed carrier modulation.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns ON or OFF.

Example
```
:SOUR1:AM:DSSC ON      /*Enables the AM carrier waveform suppression function of CH1.*/
:SOUR1:AM:DSSC?        /*Queries the on/off status of the AM carrier waveform suppression function of
                         CH1 and the query returns ON.*/
```

[:SOURce[<n>]][:MOD]:AM:INTernal:FREQuency

Syntax
[:SOURce[<n>]][:MOD]:AM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:AM:INTernal:FREQuency? [MINimum|MAXimum]

Description
Sets the AM modulation frequency of the specified channel.
Queries the AM modulation frequency of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<frequency>	Real	2 mHz to 1 MHz	100 Hz

Remarks
- This command is only applicable to the internal modulation source ([:SOURce[<n>]][:MOD]:AM:SOURce).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns the AM modulation frequency in scientific notation, with 7 effective digits. For example, 1.500000E+02 (the AM modulation frequency is 150 Hz).

Example
:SOUR1:AM:INT:FREQ 150 /*Sets the AM modulation frequency of CH1 to 150 Hz.*/
:SOUR1:AM:INT:FREQ? /*Queries the AM modulation frequency of CH1 and the query returns 1.500000E+02.*/

[:SOURce[<n>]][:MOD]:AM:INTernal:FUNCtion

Syntax
[:SOURce[<n>]][:MOD]:AM:INTernal:FUNCtion {SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER}
[:SOURce[<n>]][:MOD]:AM:INTernal:FUNCtion?

Description
Sets the AM modulation waveform of the specified channel.
Queries the AM modulation waveform of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER}	Discrete	SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER	SINusoid

Remarks
- This command is only applicable to the internal modulation source.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- SQUare: 50% duty cycle; TRIangle: 50% symmetry; RAMP: 100% symmetry; NRAMp: 0% symmetry; USER: the arbitrary waveform selected for the specified channel.

Return Format
The query returns SIN, SQU, TRI, RAMP, NRAM, NOIS, or USER.

Example
:SOUR1:AM:INT:FUNC SQU /*Sets the AM modulation waveform of CH1 to Square.*/
:SOUR1:AM:INT:FUNC? /*Queries the AM modulation waveform of CH1 and the query returns SQU.*/

[:SOURce[<n>]][:MOD]:AM:SOURce

Syntax
[:SOURce[<n>]][:MOD]:AM:SOURce {INTernal|EXTernal}
[:SOURce[<n>]][:MOD]:AM:SOURce?

Description
Sets the AM modulation source of the specified channel to internal (INTernal) or external (EXTernal) modulation source.
Queries the AM modulation source of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{INTernal|EXTernal}	Discrete	INTernal|EXTernal	INTernal

Remarks
- DG2000 can receive modulating waveform from the internal or external modulation source.
- When the internal modulation source is selected, the modulation waveform can be SINusoid, SQUare, TRIangle, RAMP, NRAMp, NOISe, or USER. The default is SINusoid. NOISe can be used as the modulation waveform but cannot be used as carrier waveform.

- When the external source is selected, the generator receives the external modulating signal from the rear-panel **[Sync/Ext Mod/Trig/FSK]** connector. At this time, amplitude of the modulated waveform is controlled by the ±5 V signal level of the connector. For example, if the modulation depth is set to 100%, the output amplitude will be the maximum when the modulating signal is +5 V and the minimum when the modulating signal is -5 V.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns INT or EXT.

Example
:SOUR1:AM:SOUR EXT /*Sets the AM modulation source of CH1 to external modulation source.*/
:SOUR1:AM:SOUR? /*Queries the AM modulation source of CH1 and the query returns EXT.*/

[:SOURce[<n>]][:MOD]:AM:STATe

Syntax
[:SOURce[<n>]][:MOD]:AM:STATe {ON|1|OFF|0}
[:SOURce[<n>]][:MOD]:AM:STATe?

Description
Enables or disables the AM modulation function of the specified channel.
Queries the on/off status of the AM modulation function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{ON|1|OFF|0}	Bool	ON|1|OFF|0	OFF

Remarks
- AM (Amplitude Modulation): the amplitude of the carrier waveform changes with the transient voltage of the modulating waveform.
- The AM carrier waveform could be Sine, Square, Ramp, or Arbitrary waveform. The default is Sine. Pulse, Noise and DC cannot be used as carrier waveform. The different settings of various parameters (e.g. frequency, amplitude, offset, and start phase) of the carrier waveform will affect the output AM modulated waveform.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- If the sweep function ([:SOURce[<n>]]:SWEep:STATe) or burst function ([:SOURce[<n>]]:BURSt[:STATe]) is currently enabled, it will be disabled automatically when the modulation function is enabled.
- If the harmonic function is currently enabled ([:SOURce[<n>]]:HARMonic[:STATe]), the modulation function cannot be enabled (i.e. the harmonic cannot be modulated).

Return Format
The query returns ON or OFF.

Example
:SOUR1:AM:STAT ON /*Enables the AM modulation function of CH1.*/
:SOUR1:AM:STAT? /*Queries the on/off status of the AM modulation function of CH1 and the query returns ON.*/

:SOURce[:MOD]:ASKey

Command List:

[:SOURce[<n>]][:MOD]:ASKey:AMPLitude

Syntax

[:SOURce[<n>]][:MOD]:ASKey:AMPLitude {<amplitude>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:ASKey:AMPLitude? [MINimum|MAXimum]

Description

Sets the ASK modulation amplitude of the specified channel.
Queries the ASK modulation amplitude of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<amplitude>	Real	0 Vpp to 10 Vpp (HighZ)	2 Vpp

Remarks

- In ASK modulation, the signal generator shifts its output amplitude between two preset amplitudes (the carrier amplitude and modulation amplitude).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format

The query returns the ASK modulation amplitude in scientific notation, with 7 effective digits. For example, 1.000000E+00 (the AM modulation amplitude is 1 Vpp).

Example

```
:SOUR1:ASK:AMPL 1      /*Sets the ASK modulation amplitude of CH1 to 1 Vpp.*/
:SOUR1:ASK:AMPL?       /*Queries the ASK modulation amplitude of CH1 and the query returns
                         1.000000E+00.*/
```

[:SOURce[<n>]][:MOD]:ASKey:INTernal[:RATE]

Syntax

[:SOURce[<n>]][:MOD]:ASKey:INTernal[:RATE] {<frequency>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:ASKey:INTernal[:RATE]? [MINimum|MAXimum]

Description

Sets the ASK modulation rate of the specified channel.
Queries the ASK modulation rate of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<frequency>	Real	2 mHz to 1 MHz	100 Hz

Remarks

- This command is only applicable to the internal modulation source. The ASK modulation rate refers to the frequency at which the output amplitude "shifts" between the carrier amplitude and modulation amplitude.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format

The query returns the ASK modulation rate in scientific notation, with 7 effective digits. For example, 1.500000E+02 (the AM modulation rate is 150 Hz).

Example

```
:SOUR1:ASK:INT 150      /*Sets the ASK modulation rate of CH1 to 150 Hz.*/
:SOUR1:ASK:INT?         /*Queries the ASK modulation rate of CH1 and the query returns
                          1.500000E+02.*/
```

[:SOURce[<n>]][:MOD]:ASKey:POLarity

Syntax

[:SOURce[<n>]][:MOD]:ASKey:POLarity {POSitive|NEGative}
[:SOURce[<n>]][:MOD]:ASKey:POLarity?

Description

Sets the ASK modulation polarity of the specified channel to Positive (POSitive) or Negative (NEGative). Queries the ASK modulation polarity of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{POSitive|NEGative}	Discrete	POSitive|NEGative	POSitive

Remarks

- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- In the internal modulation ([:SOURce[<n>]][:MOD]:ASKey:SOURce), set the polarity to "Positive", and the generator will output an amplitude whichever is smaller between the carrier amplitude and modulating amplitude ([:SOURce[<n>]][:MOD]:ASKey:AMPLitude) when the modulating waveform is a logic low level. It will output an amplitude whichever is greater between the carrier amplitude and modulating amplitude when the modulating waveform is a logic high level. The situation is the opposite when the polarity is set to "Negative".
- In the external modulation ([:SOURce[<n>]][:MOD]:ASKey:SOURce), set the polarity to "Positive", and the generator will output an amplitude whichever is smaller between the carrier amplitude and modulating amplitude ([:SOURce[<n>]][:MOD]:ASKey:AMPLitude) when the external input signal is a logic low level. It will output an amplitude whichever is greater between the carrier amplitude and the modulating amplitude when the external input signal is a logic high level. The situation is the opposite when the polarity is set to "Negative".

Return Format

The query returns POS or NEG.

Example

```
:SOUR1:ASK:POL POS      /*Sets the ASK modulation polarity of CH1 to Positive.*/
:SOUR1:ASK:POL?         /*Queries the ASK modulation polarity of CH1 and the query returns POS.*/
```

[:SOURce[<n>]][:MOD]:ASKey:SOURce

Syntax
[:SOURce[<n>]][:MOD]:ASKey:SOURce {INTernal|EXTernal}
[:SOURce[<n>]][:MOD]:ASKey:SOURce?

Description
Sets the ASK modulation source of the specified channel to internal (INTernal) or external (EXTernal) modulation source.
Queries the ASK modulation source of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{INTernal|EXTernal}	Discrete	INTernal|EXTernal	INTernal

Remarks
- DG2000 can receive modulating waveform from the internal or external modulation source.
- When the internal source is selected, the modulating waveform is set as a Square with 50% duty cycle. At this time, the rate at which the output amplitude "shifts" between "carrier amplitude" and "modulating amplitude" ([:SOURce[<n>]][:MOD]:ASKey:AMPLitude) is determined by the modulation rate.
- When the external source is selected, the generator receives the external modulating signal from the rear-panel **[Sync/Ext Mod/Trig/FSK]** connector. For the connector, controlling ASK modulation externally is different from controlling AM/FM/PM modulations externally. While controlling the ASK modulation, you can set the polarity ([:SOURce[<n>]][:MOD]:ASKey:POLarity).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns INT or EXT.

Example
:SOUR1:ASK:SOUR EXT /*Sets the ASK modulation source of CH1 to external modulation source.*/
:SOUR1:ASK:SOUR? /*Queries the ASK modulation source of CH1 and the query returns EXT.*/

[:SOURce[<n>]][:MOD]:ASKey:STATe

Syntax
[:SOURce[<n>]][:MOD]:ASKey:STATe { ON|1|OFF|0}
[:SOURce[<n>]][:MOD]:ASKey:STATe?

Description
Enables or disables the ASK modulation function of the specified channel.
Queries the on/off status of the ASK modulation function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{ON|1|OFF|0}	Bool	ON|1|OFF|0	OFF

Remarks
- ASK (Amplitude Shift Keying): the signal generator shifts the output amplitude between two preset amplitudes (the carrier amplitude and modulation amplitude).
- The AM carrier waveform can be Sine, Square, Ramp, or Arbitrary waveform. The default is Sine. Pulse, Noise, and DC cannot be used as carrier waveform. The different settings of various parameters (e.g. frequency, amplitude, offset, and start phase) of the carrier waveform will affect the output ASK

modulated waveform.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- If the sweep function ([:SOURce[<n>]]:SWEep:STATe) or burst function ([:SOURce[<n>]]:BURSt[:STATe]) is currently enabled, it will be disabled automatically when the modulation function is enabled.
- If the harmonic function is currently enabled ([:SOURce[<n>]]:HARMonic[:STATe]), the modulation function cannot be enabled (i.e. the harmonic cannot be modulated).

Return Format
The query returns ON or OFF.

Example
```
:SOUR1:ASK:STAT ON      /*Enables the ASK modulation function of CH1.*/
:SOUR1:ASK:STAT?        /*Queries the on/off status of the ASK modulation function of CH1 and the query
                          returns ON.*/
```

:SOURce[:MOD]:FM

Command List:

- [:SOURce[<n>]][:MOD]:FM[:DEViation]
- [:SOURce[<n>]][:MOD]:FM:INTernal:FREQuency
- [:SOURce[<n>]][:MOD]:FM:INTernal:FUNCtion
- [:SOURce[<n>]][:MOD]:FM:SOURce
- [:SOURce[<n>]][:MOD]:FM:STATe

[:SOURce[<n>]][:MOD]:FM[:DEViation]

Syntax
[:SOURce[<n>]][:MOD]:FM[:DEViation] {<deviation>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:FM[:DEViation]? [MINimum|MAXimum]

Description
Sets the FM frequency deviation of the specified channel.
Queries the FM frequency deviation of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<deviation>	Real	Refer to "**Remarks**".	1 kHz

Remarks
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- Frequency deviation is the deviation of the modulating waveform frequency ([:SOURce[<n>]][:MOD]:FM:INTernal:FREQuency) relative to the carrier frequency. The frequency deviation must be smaller than or equal to the carrier frequency. The sum of frequency deviation and carrier frequency must be smaller than or equal to the upper limit of the current carrier frequency plus 1 kHz.
- If Sine is selected currently as the carrier waveform, the carrier amplitude will be limited at 2 Vpp when the sum of the frequency deviation and the carrier frequency is greater than the frequency upper limit of the current carrier.
- When the external modulation source ([:SOURce[<n>]][:MOD]:FM:SOURce) is selected, the frequency deviation is controlled by the ±5 V signal level on the rear-panel **[Sync/Ext**

Mod/Trig/FSK] connector. Positive signal level corresponds to frequency increase, and negative signal level corresponds to frequency decrease. Lower signal levels produce less deviation. For example, if the frequency deviation is set to 1 kHz, +5 V signal level corresponds to a 1 kHz increase in frequency and -5 V signal level corresponds to a 1 kHz decrease in frequency.

Return Format
The query returns the frequency deviation in scientific notation, with 7 effective digits. For example, 1.000000E+02 (the frequency deviation is 100 Hz).

Example
:SOUR1:FM 100 /*Sets the FM frequency deviation of CH1 to 100 Hz.*/
:SOUR1:FM? /*Queries the FM frequency deviation of CH1 and the query returns 1.000000E+02.*/

[:SOURce[<n>]][:MOD]:FM:INTernal:FREQuency

Syntax
[:SOURce[<n>]][:MOD]:FM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:FM:INTernal:FREQuency? [MINimum|MAXimum]

Description
Sets the FM modulation frequency of the specified channel.
Queries the FM modulation frequency of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<frequency>	Real	2 mHz to 1 MHz	100 Hz

Remarks
- This command is only applicable to the internal modulation source ([:SOURce[<n>]][:MOD]:FM:SOURce).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns the FM modulation frequency in scientific notation, with 7 effective digits. For example, 1.500000E+02 (the FM modulation frequency is 150 Hz).

Example
:SOUR1:FM:INT:FREQ 150 /*Sets the FM modulation frequency of CH1 to 150 Hz.*/
:SOUR1:FM:INT:FREQ? /*Queries the FM modulation frequency of CH1 and the query returns 1.500000E+02.*/

[:SOURce[<n>]][:MOD]:FM:INTernal:FUNCtion

Syntax
[:SOURce[<n>]][:MOD]:FM:INTernal:FUNCtion {SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER}
[:SOURce[<n>]][:MOD]:FM:INTernal:FUNCtion?

Description
Sets the FM modulation waveform of the specified channel.
Queries the FM modulation waveform of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER}	Discrete	SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER	SINusoid

Remarks

- This command is only applicable to the internal modulation source ([:SOURce[<n>]][:MOD]:FM:SOURce).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- SQUare: 50% duty cycle; TRIangle: 50% symmetry; RAMP: 100% symmetry; NRAMp: 0% symmetry; USER: the arbitrary waveform selected for the specified channel.

Return Format

The query returns SIN, SQU, TRI, RAMP, NRAM, NOIS, or USER.

Example

```
:SOUR1:FM:INT:FUNC SQU     /*Sets the FM modulation waveform of CH1 to Square.*/
:SOUR1:FM:INT:FUNC?        /*Queries the FM modulation waveform of CH1 and the query returns SQU.*/
```

[:SOURce[<n>]][:MOD]:FM:SOURce

Syntax

[:SOURce[<n>]][:MOD]:FM:SOURce {INTernal|EXTernal}
[:SOURce[<n>]][:MOD]:FM:SOURce?

Description

Sets the FM modulation source of the specified channel to internal (INTernal) or external (EXTernal) modulation source.
Queries the FM modulation source of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{INTernal|EXTernal}	Discrete	INTernal|EXTernal	INTernal

Remarks

- DG2000 can receive modulating waveform from the internal or external modulation source.
- When the internal modulation source is selected, the modulation waveform can be SINusoid, SQUare, TRIangle, RAMP, NRAMp, NOISe, or USER. The default is SINusoid. NOISe can be used as the modulation waveform but cannot be used as carrier waveform.
- When the external source is selected, the generator receives the external modulating signal from the rear-panel **[Sync/Ext Mod/Trig/FSK]** connector. At this time, the frequency deviation of the modulated waveform is controlled by the ±5 V signal level on the connector. For example, if the frequency deviation is set to 1 kHz, +5 V signal level corresponds to a 1 kHz increase in frequency and -5 V signal level corresponds to a 1 kHz decrease in frequency.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format

The query returns INT or EXT.

Example

```
:SOUR1:FM:SOUR EXT     /*Sets the FM modulation source of CH1 to external modulation source.*/
:SOUR1:FM:SOUR?        /*Queries the FM modulation source of CH1 and the query returns EXT.*/
```

[:SOURce[<n>]][:MOD]:FM:STATe

Syntax
[:SOURce[<n>]][:MOD]:FM:STATe {ON|1|OFF|0}
[:SOURce[<n>]][:MOD]:FM:STATe?

Description
Enables or disables the FM modulation function of the specified channel.
Queries the on/off status of the FM modulation function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{ON|1|OFF|0}	Bool	ON|1|OFF|0	OFF

Remarks
- FM (Frequency Modulation): the frequency of the carrier waveform changes with the transient voltage of the modulating waveform.
- The FM carrier waveform can be Sine, Square, Ramp, or Arbitrary waveform. The default is Sine. Pulse, Noise, and DC cannot be used as carrier waveform. The different settings of various parameters (e.g. frequency, amplitude, offset, and start phase) of the carrier waveform will affect the output FM modulated waveform.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- If the sweep function ([:SOURce[<n>]]:SWEep:STATe) or burst function ([:SOURce[<n>]]:BURSt[:STATe]) is currently enabled, it will be disabled automatically when the modulation function is enabled.
- If the harmonic function is currently enabled ([:SOURce[<n>]]:HARMonic[:STATe]), the modulation function cannot be enabled (i.e. the harmonic cannot be modulated).

Return Format
The query returns ON or OFF.

Example
```
:SOUR1:FM:STAT ON      /*Enables the FM modulation function of CH1.*/
:SOUR1:FM:STAT?        /*Queries the on/off status of the FM modulation function of CH1 and the query
                         returns ON.*/
```

:SOURce[:MOD]:FSKey

Command List:

- [:SOURce[<n>]][:MOD]:FSKey[:FREQuency]
- [:SOURce[<n>]][:MOD]:FSKey:INTernal:RATE
- [:SOURce[<n>]][:MOD]:FSKey:POLarity
- [:SOURce[<n>]][:MOD]:FSKey:SOURce
- [:SOURce[<n>]][:MOD]:FSKey:STATe

[:SOURce[<n>]][:MOD]:FSKey[:FREQuency]

Syntax
[:SOURce[<n>]][:MOD]:FSKey[:FREQuency] {<frequency>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:FSKey[:FREQuency]? [MINimum|MAXimum]

Description
Sets the FSK hop frequency of the specified channel.
Queries the FSK hop frequency of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<frequency>	Real	Frequency range of the specified channel	10 kHz

Remarks
- In FSK modulation, the signal generator shifts its output frequency between two preset frequencies (the carrier frequency and the hop frequency).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns the FSK hop frequency in scientific notation, with 7 effective digits. For example, 5.000000E+03 (the FSK hop frequency is 5 kHz).

Example
:SOUR1:FSK 5000 /*Sets the FSK hop frequency of CH1 to 5 kHz.*/
:SOUR1:FSK? /*Queries the FSK hop frequency of CH1 and the query returns 5.000000E+03.*/

[:SOURce[<n>]][:MOD]:FSKey:INTernal:RATE

Syntax
[:SOURce[<n>]][:MOD]:FSKey:INTernal:RATE {<rate>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:FSKey:INTernal:RATE? [MINimum|MAXimum]

Description
Sets the FSK modulation rate of the specified channel.
Queries the FSK modulation rate of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<rate>	Real	2 mHz to 1 MHz	100 Hz

Remarks
- This command is only applicable to the internal modulation source ([:SOURce[<n>]][:MOD]:FSKey:SOURce). The FSK modulation rate refers to the frequency at which the output frequency "shifts" between the carrier frequency and the hop frequency ([:SOURce[<n>]][:MOD]:FSKey[:FREQuency]).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns the FSK modulation rate in scientific notation, with 7 effective digits. For example, 1.500000E+02 (the FSK modulation rate is 150 Hz).

Example
:SOUR1:FSK:INT:RATE 150 /*Sets the FSK modulation rate of CH1 to 150 Hz.*/
:SOUR1:FSK:INT:RATE? /*Queries the FSK modulation rate of CH1 and the query returns 1.500000E+02.*/

[:SOURce[<n>]][:MOD]:FSKey:POLarity

Syntax
[:SOURce[<n>]][:MOD]:FSKey:POLarity {POSitive|NEGative}
[:SOURce[<n>]][:MOD]:FSKey:POLarity?

Description
Sets the FSK modulation polarity of the specified channel to Positive (POSitive) or Negative (NEGative).
Queries the FSK modulation polarity of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{POSitive|NEGative}	Discrete	POSitive|NEGative	POSitive

Remarks
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- In the internal modulation ([:SOURce[<n>]][:MOD]:FSKey:SOURce), set the polarity to "Positive", and the generator will output the carrier frequency when the modulating waveform amplitude is a logic low level. It will output the hop frequency ([:SOURce[<n>]][:MOD]:FSKey[:FREQuency]) when the modulating waveform amplitude is a logic high level. The situation is the opposite when the polarity is set to "Negative".
- In the external modulation ([:SOURce[<n>]][:MOD]:FSKey:SOURce), set the polarity to "Positive", and the generator will output the carrier frequency when the external input signal is a logic low level. It will output the hop frequency ([:SOURce[<n>]][:MOD]:FSKey[:FREQuency]) when the external input signal is a logic high level. The situation is the opposite when the polarity is set to "Negative".

Return Format
The query returns POS or NEG.

Example
:SOUR1:FSK:POL POS /*Sets the FSK modulation polarity of CH1 to Positive.*/
:SOUR1:FSK:POL? /*Queries the FSK modulation polarity of CH1 and the query returns POS.*/

[:SOURce[<n>]][:MOD]:FSKey:SOURce

Syntax
[:SOURce[<n>]][:MOD]:FSKey:SOURce {INTernal|EXTernal}
[:SOURce[<n>]][:MOD]:FSKey:SOURce?

Description
Sets the FSK modulation source of the specified channel to internal (INTernal) or external (EXTernal) modulation source.
Queries the FSK modulation source of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{INTernal|EXTernal}	Discrete	INTernal|EXTernal	INTernal

Remarks

- DG2000 can receive modulating waveform from the internal or external modulation source.
- When the internal source is selected, the modulating waveform is set as a Square with 50% duty cycle. At this time, the rate at which the output frequency "shifts" between "carrier frequency" and "hop frequency" ([:SOURce[<n>]][:MOD]:FSKey[:FREQuency]) is determined by the modulation rate ([:SOURce[<n>]][:MOD]:FSKey:INTernal:RATE).
- When the external source is selected, the generator receives the external modulating signal from the rear-panel **[Sync/Ext Mod/Trig/FSK]** connector. For the connector, controlling FSK modulation externally is different from controlling AM/FM/PM modulations externally. While controlling the FSK modulation, you can set the polarity ([:SOURce[<n>]][:MOD]:FSKey:POLarity).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format

The query returns INT or EXT.

Example

```
:SOUR1:FSK:SOUR EXT      /*Sets the FSK modulation source of CH1 to external modulation source.*/
:SOUR1:FSK:SOUR?         /*Queries the FSK modulation source of CH1 and the query returns EXT.*/
```

[:SOURce[<n>]][:MOD]:FSKey:STATe

Syntax

[:SOURce[<n>]][:MOD]:FSKey:STATe {ON|1|OFF|0}
[:SOURce[<n>]][:MOD]:FSKey:STATe?

Description

Enables or disables the FSK modulation function of the specified channel.
Queries the on/off status of the FSK modulation function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{ON|1|OFF|0}	Bool	ON|1|OFF|0	OFF

Remarks

- FSK (Frequency Shift Keying): the signal generator shifts the output frequency between two preset frequencies (the carrier frequency and hop frequency).
- The FSK carrier waveform can be Sine, Square, Ramp, or Arbitrary waveform. The default is Sine. Pulse, Noise, and DC cannot be used as carrier waveform. The different settings of various parameters (e.g. frequency, amplitude, offset, and start phase) of the carrier waveform will affect the output FSK modulated waveform.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- If the sweep function ([:SOURce[<n>]]:SWEep:STATe) or burst function ([:SOURce[<n>]]:BURSt[:STATe]) is currently enabled, it will be disabled automatically when the modulation function is enabled.
- If the harmonic function is currently enabled ([:SOURce[<n>]]:HARMonic[:STATe]), the modulation function cannot be enabled (i.e. the harmonic cannot be modulated).

Return Format

The query returns ON or OFF.

Example

```
:SOUR1:FSK:STAT ON       /*Enables the FSK modulation function of CH1.*/
:SOUR1:FSK:STAT?         /*Queries the on/off status of the FSK modulation function of CH1 and the query
                           returns ON.*/
```

:SOURce[:MOD]:PM

Command List:

[:SOURce[<n>]][:MOD]:PM[:DEViation]

Syntax

[:SOURce[<n>]][:MOD]:PM[:DEViation] {<deviation>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:PM[:DEViation]? [MINimum|MAXimum]

Description

Sets the PM phase deviation of the specified channel.
Queries the PM phase deviation of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<deviation>	Real	0° to 360°	90°

Remarks

- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- Phase deviation indicates the deviation of the modulating waveform phase from the carrier waveform phase.
- When the external modulation source ([:SOURce[<n>]][:MOD]:PM:SOURce) is selected, the phase deviation is controlled by the ±5 V signal level on the rear-panel **[Sync/Ext Mod/Trig/FSK]** connector. For example, if the phase deviation is set to 180°, +5 V signal level corresponds to a 180º phase variation. The lower external signal levels produce less deviation.

Return Format

The query returns the PM phase deviation in scientific notation, with 7 effective digits. For example, 5.000000E+01 (the PM phase deviation is 50°).

Example

```
:SOUR1:PM 50      /*Sets the PM phase deviation of CH1 to 50°.*/
:SOUR1:PM?        /*Queries the PM phase deviation of CH1 and the query returns 5.000000E+01.*/
```

[:SOURce[<n>]][:MOD]:PM:INTernal:FREQuency

Syntax

[:SOURce[<n>]][:MOD]:PM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:PM:INTernal:FREQuency? [MINimum|MAXimum]

Description

Sets the PM modulation frequency of the specified channel.
Queries the PM modulation frequency of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<frequency>	Real	2 mHz to 1 MHz	100 Hz

Remarks

- This command is only applicable to the internal modulation source ([:SOURce[<n>]][:MOD]:PM:SOURce).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format

The query returns the PM modulation frequency in scientific notation, with 7 effective digits. For example, 1.500000E+02 (the PM modulation frequency is 150 Hz).

Example

```
:SOUR1:PM:INT:FREQ 150      /*Sets the PM modulation frequency of CH1 to 150 Hz.*/
:SOUR1:PM:INT:FREQ?         /*Queries the PM modulation frequency of CH1 and the query returns
                              1.500000E+02.*/
```

[:SOURce[<n>]][:MOD]:PM:INTernal:FUNCtion

Syntax

[:SOURce[<n>]][:MOD]:PM:INTernal:FUNCtion {SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER}
[:SOURce[<n>]][:MOD]:PM:INTernal:FUNCtion?

Description

Sets the PM modulation waveform of the specified channel.
Queries the PM modulation waveform of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER}	Discrete	SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER	SINusoid

Remarks

- This command is only applicable to the internal modulation source ([:SOURce[<n>]][:MOD]:PM:SOURce).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- SQUare: 50% duty cycle; TRIangle: 50% symmetry; RAMP: 100% symmetry; NRAMp: 0% symmetry; USER: the arbitrary waveform selected for the specified channel.

Return Format

The query returns SIN, SQU, TRI, RAMP, NRAM, NOIS, or USER.

Example

```
:SOUR1:PM:INT:FUNC SQU      /*Sets the PM modulation waveform of CH1 to Square.*/
:SOUR1:PM:INT:FUNC?         /*Queries the PM modulation waveform of CH1 and the query returns SQU.*/
```

[:SOURce[<n>]][:MOD]:PM:SOURce

Syntax
[:SOURce[<n>]][:MOD]:PM:SOURce {INTernal|EXTernal}
[:SOURce[<n>]][:MOD]:PM:SOURce?

Description
Sets the PM modulation source of the specified channel to internal (INTernal) or external (EXTernal) modulation source.
Queries the PM modulation source of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{INTernal|EXTernal}	Discrete	INTernal|EXTernal	INTernal

Remarks
- DG2000 can receive modulating waveform from the internal or external modulation source.
- When the internal modulation source is selected, the modulation waveform can be SINusoid, SQUare, TRIangle, RAMP, NRAMp, NOISe, or USER. The default is SINusoid. NOISe can be used as the modulation waveform but cannot be used as carrier waveform.
- When the external source is selected, the generator receives the external modulating signal from the rear-panel **[Sync/Ext Mod/Trig/FSK]** connector. At this time, the phase deviation of the modulated waveform is controlled by the ±5 V signal level of the connector. For example, if the phase deviation is set to 180°, +5 V signal level corresponds to a 180° phase variation. The lower external signal levels produce less deviation.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns INT or EXT.

Example
:SOUR1:PM:SOUR EXT /*Sets the PM modulation source of CH1 to external modulation source.*/
:SOUR1:PM:SOUR? /*Queries the PM modulation source of CH1 and the query returns EXT.*/

[:SOURce[<n>]][:MOD]:PM:STATe

Syntax
[:SOURce[<n>]][:MOD]:PM:STATe {ON|1|OFF|0}
[:SOURce[<n>]][:MOD]:PM:STATe?

Description
Enables or disables the PM modulation function of the specified channel.
Queries the on/off status of the PM modulation function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{ON|1|OFF|0}	Bool	ON|1|OFF|0	OFF

Remarks
- PM (Phase Modulation): the phase of the carrier waveform changes with the transient voltage of the modulating waveform.
- PM carrier waveform can be Sine, Square, Ramp, or Arbitrary waveform. The default is Sine. Pulse, Noise, and DC cannot be used as carrier waveform. The different settings of various parameters (e.g. frequency, amplitude, and offset) of the carrier waveform will affect the output PM modulated

waveform.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- If the sweep function ([:SOURce[<n>]]:SWEep:STATe) or burst function ([:SOURce[<n>]]:BURSt[:STATe]) is currently enabled, it will be disabled automatically when the modulation function is enabled.
- If the harmonic function is currently enabled ([:SOURce[<n>]]:HARMonic[:STATe]), the modulation function cannot be enabled (i.e. the harmonic cannot be modulated).

Return Format
The query returns ON or OFF.

Example
```
:SOUR1:PM:STAT ON      /*Enables the PM modulation function of CH1.*/
:SOUR1:PM:STAT?        /*Queries the on/off status of the PM modulation function of CH1 and the query
                         returns ON.*/
```

:SOURce[:MOD]:PSKey

Command List:

- [:SOURce[<n>]][:MOD]:PSKey:INTernal:RATE
- [:SOURce[<n>]][:MOD]:PSKey:PHASe
- [:SOURce[<n>]][:MOD]:PSKey:POLarity
- [:SOURce[<n>]][:MOD]:PSKey:SOURce
- [:SOURce[<n>]][:MOD]:PSKey:STATe

[:SOURce[<n>]][:MOD]:PSKey:INTernal:RATE

Syntax
[:SOURce[<n>]][:MOD]:PSKey:INTernal:RATE {<rate>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:PSKey:INTernal:RATE? [MINimum|MAXimum]

Description
Sets the PSK modulation rate of the specified channel.
Queries the PSK modulation rate of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<frequency>	Real	2 mHz to 1 MHz	100 Hz

Remarks
- This command is only applicable to the internal modulation source ([:SOURce[<n>]][:MOD]:PSKey:SOURce). The PSK modulation rate refers to the rate at which the output phase "shifts" between the carrier phase and the modulation phase ([:SOURce[<n>]][:MOD]:PSKey:PHASe).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns the PSK modulation rate in scientific notation, with 7 effective digits. For example, 1.500000E+02 (the PSK modulation rate is 150 Hz).

Example
:SOUR1:PSK:INT:RATE 150 /*Sets the PSK modulation rate of CH1 to 150 Hz.*/
:SOUR1:PSK:INT:RATE? /*Queries the PSK modulation rate of CH1 and the query returns 1.500000E+02.*/

[:SOURce[<n>]][:MOD]:PSKey:PHASe

Syntax
[:SOURce[<n>]][:MOD]:PSKey:PHASe {<phase>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:PSKey:PHASe? [MINimum|MAXimum]

Description
Sets the PSK modulation phase of the specified channel.
Queries the PSK modulation phase of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<phase>	Real	0° to 360°	180°

Remarks
- In PSK modulation, the signal generator shifts its output phase between two preset phases (the carrier phase and modulation phase).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns the PSK modulation phase in scientific notation, with 7 effective digits. For example, 9.000000E+01 (the PSK modulation phase is 90°).

Example
:SOUR1:PSK:PHAS 90 /*Sets the PSK modulation phase of CH1 to 90°.*/
:SOUR1:PSK:PHAS? /*Queries the PSK modulation phase of CH1 and the query returns 9.000000E+01.*/

[:SOURce[<n>]][:MOD]:PSKey:POLarity

Syntax
[:SOURce[<n>]][:MOD]:PSKey:POLarity {POSitive|NEGative}
[:SOURce[<n>]][:MOD]:PSKey:POLarity?

Description
Sets the PSK modulation polarity of the specified channel to Positive (POSitive) or Negative (NEGative).
Queries the PSK modulation polarity of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{POSitive|NEGative}	Discrete	POSitive|NEGative	POSitive

Remarks
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- In the internal modulation ([:SOURce[<n>]][:MOD]:PSKey:SOURce), set the polarity to "Positive", and the generator will output the carrier phase when the modulating waveform amplitude is a logic low level. It will output the modulating phase ([:SOURce[<n>]][:MOD]:PSKey:PHASe) when the modulating waveform amplitude is a logic high level. The situation is the opposite when the polarity is

set to "Negative".

- In the external modulation ([:SOURce[<n>]][:MOD]:PSKey:SOURce), set the polarity to "Positive", and the generator will output the carrier phase when the external input signal is a logic low level. It will output the modulating phase ([:SOURce[<n>]][:MOD]:PSKey:PHASe) when the external input signal is a logic high level. The situation is the opposite when the polarity is set to "Negative".

Return Format
The query returns POS or NEG.

Example
:SOUR1:PSK:POL POS /*Sets the PSK modulation polarity of CH1 to Positive.*/
:SOUR1:PSK:POL? /*Queries the PSK modulation polarity of CH1 and the query returns POS.*/

[:SOURce[<n>]][:MOD]:PSKey:SOURce

Syntax
[:SOURce[<n>]][:MOD]:PSKey:SOURce {INTernal|EXTernal}
[:SOURce[<n>]][:MOD]:PSKey:SOURce?

Description
Sets the PSK modulation source of the specified channel to internal (INTernal) or external (EXTernal) modulation source.
Queries the PSK modulation source of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{INTernal|EXTernal}	Discrete	INTernal|EXTernal	INTernal

Remarks

- DG2000 can receive modulating waveform from the internal or external modulation source.
- When the internal source is selected, the modulating waveform is set as a Square with 50% duty cycle. At this time, the rate at which the output phase "shifts" between "carrier phase" and "modulating phase" ([:SOURce[<n>]][:MOD]:PSKey:PHASe) is determined by the modulation rate ([:SOURce[<n>]][:MOD]:PSKey:INTernal:RATE).
- When the external source is selected, the generator receives the external modulating signal from the rear-panel **[Sync/Ext Mod/Trig/FSK]** connector. For the connector, controlling PSK modulation externally is different from controlling AM/FM/PM modulations externally. While controlling the PSK modulation, you can set the polarity ([:SOURce[<n>]][:MOD]:PSKey:POLarity).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns INT or EXT.

Example
:SOUR1:PSK:SOUR EXT /*Sets the PSK modulation source of CH1 to external modulation source.*/
:SOUR1:PSK:SOUR? /*Queries the PSK modulation source of CH1 and the query returns EXT.*/

[:SOURce[<n>]][:MOD]:PSKey:STATe

Syntax
[:SOURce[<n>]][:MOD]:PSKey:STATe {ON|1|OFF|0}
[:SOURce[<n>]][:MOD]:PSKey:STATe?

Description
Enables or disables the PSK modulation function of the specified channel.
Queries the on/off status of the PSK modulation function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{ON|1|OFF|0}	Bool	ON|1|OFF|0	OFF

Remarks
- PSK (Phase Shift Keying): the signal generator shifts the output phase between two preset phases (the carrier phase and modulation phase).
- The PSK carrier waveform can be Sine, Square, Ramp, or Arbitrary waveform. The default is Sine. Pulse, Noise, and DC cannot be used as carrier waveform. The different settings of various parameters (e.g. frequency, amplitude, offset, and start phase) of the carrier waveform will affect the output PSK modulated waveform.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- If the sweep function ([:SOURce[<n>]:SWEep:STATe) or burst function ([:SOURce[<n>]:BURSt[:STATe]) is currently enabled, it will be disabled automatically when the modulation function is enabled.
- If the harmonic function is currently enabled ([:SOURce[<n>]:HARMonic[:STATe]), the modulation function cannot be enabled (i.e. the harmonic cannot be modulated).

Return Format
The query returns ON or OFF.

Example
```
:SOUR1:PSK:STAT ON      /*Enables the PSK modulation function of CH1.*/
:SOUR1:PSK:STAT?        /*Queries the on/off status of the PSK modulation function of CH1 and the query
                          returns ON.*/
```

:SOURce[:MOD]:PWM

Command List:

- [:SOURce[<n>]][:MOD]:PWM[:DEViation]:DCYCle
- [:SOURce[<n>]][:MOD]:PWM[:DEViation][:WIDTh]
- [:SOURce[<n>]][:MOD]:PWM:INTernal:FREQuency
- [:SOURce[<n>]][:MOD]:PWM:INTernal:FUNCtion
- [:SOURce[<n>]][:MOD]:PWM:SOURce
- [:SOURce[<n>]][:MOD]:PWM:STATe

[:SOURce[<n>]][:MOD]:PWM[:DEViation]:DCYCle

Syntax
[:SOURce[<n>]][:MOD]:PWM[:DEViation]:DCYCle {<percent>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:PWM[:DEViation]:DCYCle? [MINimum|MAXimum]

Description
Sets the PWM duty cycle deviation of the specified channel.
Queries the PWM duty cycle deviation of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<percent>	Real	Refer to **"Remarks"**.	20%

Remarks
- Duty cycle deviation represents the variation of the modulated waveform duty cycle from the original pulse duty cycle, expressed in %.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- Duty cycle deviation is limited by the minimum duty cycle and current edge time setting. The duty cycle deviation cannot exceed the current pulse duty cycle.
- If "Duty" is currently selected in the pulse of the specified channel, "Duty Dev" is displayed in the interface when the PWM modulation function is enabled; if "Width" is currently selected in the pulse of the specified channel, "Width Dev" is displayed in the interface when the PWM modulation function is enabled.

Return Format
The query returns the PWM duty cycle deviation in scientific notation, with 7 effective digits. For example, 1.500000E+01 (the PWM duty cycle deviation is 15%).

Example
:SOUR1:PWM:DCYC 15 /*Sets the PWM duty cycle deviation of CH1 to 15%.*/
:SOUR1:PWM:DCYC? /*Queries the PWM duty cycle deviation of CH1 and the query returns 1.500000E+01.*/

[:SOURce[<n>]][:MOD]:PWM[:DEViation][:WIDTh]

Syntax
[:SOURce[<n>]][:MOD]:PWM[:DEViation][:WIDTh] {<deviation>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:PWM[:DEViation][:WIDTh]? [MINimum|MAXimum]

Description
Sets the PWM width deviation of the specified channel.
Queries the PWM width deviation of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<deviation>	Real	Refer to "**Remarks**".	200 μs

Remarks
- Width deviation represents the variation of the modulated waveform pulse width from the original pulse width.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- The width deviation is limited by the minimum pulse width and current edge time setting. The width deviation cannot exceed the current pulse width.

- If "Duty" is currently selected in the pulse of the specified channel, "Duty Dev" is displayed in the interface when the PWM modulation function is enabled; if "Width" is currently selected in the pulse of the specified channel, "Width Dev" is displayed in the interface when the PWM modulation function is enabled.

Return Format
The query returns the PWM width deviation in scientific notation, with 7 effective digits. For example, 1.000000E-04 (the PWM width deviation is 100 us, (i.g. 0.0001 s)).

Example
```
:SOUR1:PWM 0.0001      /*Sets the PWM width deviation is 100 μs, (i.g. 0.0001 s).*/
:SOUR1:PWM?            /*Queries the PWM width deviation of CH1 and the query returns
                         1.000000E-04.*/
```

[:SOURce[<n>]][:MOD]:PWM:INTernal:FREQuency

Syntax
[:SOURce[<n>]][:MOD]:PWM:INTernal:FREQuency {<frequency>|MINimum|MAXimum}
[:SOURce[<n>]][:MOD]:PWM:INTernal:FREQuency? [MINimum|MAXimum]

Description
Sets the PWM modulation frequency of the specified channel.
Queries the PWM modulation frequency of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
<frequency>	Real	2 mHz to 1 MHz	100 Hz

Remarks
- This command is only applicable to the internal modulation source ([:SOURce[<n>][:MOD]:PWM:SOURce](#)).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format
The query returns the PWM modulation frequency in scientific notation, with 7 effective digits. For example, 1.500000E+02 (the PWM modulation frequency is 150 Hz).

Example
```
:SOUR1:PWM:INT:FREQ 150    /*Sets the PWM modulation frequency of CH1 to 150 Hz.*/
:SOUR1:PWM:INT:FREQ?       /*Queries the PWM modulation frequency of CH1 and the query returns
                             1.500000E+02.*/
```

[:SOURce[<n>]][:MOD]:PWM:INTernal:FUNCtion

Syntax
[:SOURce[<n>]][:MOD]:PWM:INTernal:FUNCtion
{SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER}
[:SOURce[<n>]][:MOD]:PWM:INTernal:FUNCtion?

Description
Sets the PWM modulation waveform of the specified channel.
Queries the PWM modulation waveform of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER}	Discrete	SINusoid|SQUare|TRIangle|RAMP|NRAMp|NOISe|USER	SINusoid

Remarks

- This command is only applicable to the internal modulation source ([:SOURce[<n>]][:MOD]:PWM:SOURce).
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- SQUare: 50% duty cycle; TRIangle: 50% symmetry; RAMP: 100% symmetry; NRAMp: 0% symmetry; USER: the arbitrary waveform selected for the specified channel.

Return Format

The query returns SIN, SQU, TRI, RAMP, NRAM, NOIS, or USER.

Example

```
:SOUR1:PWM:INT:FUNC SQU      /*Sets the PWM modulation waveform of CH1 to Square.*/
:SOUR1:PWM:INT:FUNC?         /*Queries the PWM modulation waveform of CH1 and the query returns
                               SQU.*/
```

[:SOURce[<n>]][:MOD]:PWM:SOURce

Syntax

[:SOURce[<n>]][:MOD]:PWM:SOURce {INTernal|EXTernal}
[:SOURce[<n>]][:MOD]:PWM:SOURce?

Description

Sets the PWM modulation source of the specified channel to internal (INTernal) or external (EXTernal) modulation source.
Queries the PWM modulation source of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{INTernal|EXTernal}	Discrete	INTernal|EXTernal	INTernal

Remarks

- DG2000 can receive modulating waveform from the internal or external modulation source.
- When the internal modulation source is selected, the modulation waveform can be SINusoid, SQUare, TRIangle, RAMP, NRAMp, NOISe, or USER. The default is SINusoid. NOISe can be used as the modulation waveform but cannot be used as carrier waveform.
- When the external source is selected, the generator receives the external modulating signal from the rear-panel **[Sync/Ext Mod/Trig/FSK]** connector. At this time, the width deviation ([:SOURce[<n>]][:MOD]:PWM[:DEViation][:WIDTh]) or the duty cycle deviation ([:SOURce[<n>]][:MOD]:PWM[:DEViation]:DCYCle) of the modulated waveform is controlled by the ±5 V signal level on the connector. For example, if the width deviation is set to 10 s, the +5 V signal level corresponds to a 10 s width variation.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.

Return Format

The query returns INT or EXT.

Example

```
:SOUR1:PWM:SOUR EXT      /*Sets the PWM modulation source of CH1 to external modulation source.*/
:SOUR1:PWM:SOUR?         /*Queries the PWM modulation source of CH1 and the query returns EXT.*/
```

[:SOURce[<n>]][:MOD]:PWM:STATe

Syntax
[:SOURce[<n>]][:MOD]:PWM:STATe {ON|1|OFF|0}
[:SOURce[<n>]][:MOD]:PWM:STATe?

Description
Enables or disables the PWM modulation function of the specified channel.
Queries the on/off status of the PWM modulation function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{ON|1|OFF|0}	Bool	ON|1|OFF|0	OFF

Remarks
- PWM (Pulse Width Modulation): the carrier pulse width changes with the transient voltage of the modulating waveform.
- The PWM carrier waveform can only be Pulse, and the PWM function can only be enabled when the current waveform of the specified channel is Pulse. The different settings of various parameters (e.g. frequency, amplitude, offset, pulse width, and duty cycle) of the Pulse waveform will affect the output PWM modulated waveform.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- If the sweep function ([:SOURce[<n>]:SWEep:STATe) or burst function ([:SOURce[<n>]:BURSt[:STATe]) is currently enabled, it will be disabled automatically when the modulation function is enabled.

Return Format
The query returns ON or OFF.

Example
Assume that the current waveform of CH1 is pulse,
```
:SOUR1:PWM:STAT ON      /*Enables the PWM modulation function of CH1.*/
:SOUR1:PWM:STAT?        /*Queries the on/off status of the PWM modulation function of CH1 and the
                          query returns ON.*/
```

:SOURce:MOD

Command List:

- [:SOURce[<n>]:MOD[:STATe]
- [:SOURce[<n>]:MOD:TYPe

[:SOURce[<n>]:MOD[:STATe]

Syntax
[:SOURce[<n>]:MOD[:STATe] {ON|1|OFF|0}
[:SOURce[<n>]:MOD[:STATe]?

Description
Enables or disables the modulation function of the specified channel.
Queries the on/off status of the modulation function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{ON|1|OFF|0}	Bool	ON|1|OFF|0	OFF

Remarks

- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- If the sweep function ([:SOURce[<n>]]:SWEep:STATe) or burst function ([:SOURce[<n>]]:BURSt[:STATe]) is currently enabled, it will be disabled automatically when the modulation function is enabled.
- If the harmonic function is currently enabled ([:SOURce[<n>]]:HARMonic[:STATe]), the modulation function cannot be enabled (i.e. the harmonic cannot be modulated).

Return Format

The query returns ON or OFF.

Example

```
:SOUR1:MOD ON      /*Enables the modulation function of CH1.*/
:SOUR1:MOD?        /*Queries the on/off status of the modulation function of CH1 and the query returns
                     ON.*/
```

[:SOURce[<n>]]:MOD:TYPe

Syntax

[:SOURce[<n>]]:MOD:TYPe {AM|FM|PM|ASK|FSK|PSK|PWM}
[:SOURce[<n>]]:MOD:TYPe?

Description

Sets the modulation type of the specified channel.
Queries the modulation type of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2	1
{AM|FM|PM|ASK|FSK|PSK|PWM}	Discrete	AM|FM|PM|ASK|FSK|PSK|PWM	AM

Remarks

- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the related parameters of CH1 by default.
- AM (Amplitude Modulation): the amplitude of the carrier waveform changes with the transient voltage of the modulating waveform.
- FM (Frequency Modulation): the frequency of the carrier waveform changes with the transient voltage of the modulating waveform.
- PM (Phase Modulation): the phase of the carrier waveform changes with the transient voltage of the modulating waveform.
- ASK (Amplitude Shift Keying): the signal generator shifts the output amplitude between two preset amplitudes (the carrier amplitude and modulation amplitude).
- FSK (Frequency Shift Keying): the signal generator shifts the output frequency between two preset frequencies (the carrier frequency and hop frequency).
- PSK (Phase Shift Keying): the signal generator shifts the output phase between two preset phases (the carrier phase and modulation phase).
- PWM (Pulse Width Modulation): the carrier pulse width changes with the transient voltage of the modulating waveform.

Return Format

The query returns AM, FM, PM, ASK, FSK, PSK, or PWM.

Example

:SOUR1:MOD:TYPE FM /*Sets the modulation type of CH1 to FM.*/
:SOUR1:MOD:TYPE? /*Queries the modulation type of CH1 and the query returns FM.*/