Programming Commands

Agilent Technologies
ESA-E Series Spectrum Analyzers
GSM Measurement Personality

This manual provides documentation for the following instruments:

ESA-E Series

E4402B (9 kHz - 3.0 GHz)
E4404B (9 kHz - 6.7 GHz)
E4405B (9 kHz - 13.2 GHz)
E4407B (9 kHz - 26.5 GHz)

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1 Programming Command Cross-References

Functional Index to SCPI Subsection

The following table lists the SCPI subsystems or subsections associated with the instrument GSM function categories. The commands listed are for GSM specific functions. These commands are documented in Chapter 2 , "Language Reference." If you require information on the commands for the Agilent ESA Spectrum Analyzers, refer to the *Agilent ESA Spectrum Analyzers Programmer's Guide*.

Function Category	SCPI Subsection or Subsystem
AMPLITUDE	:CALCulate:ORFSpectrum :CALCulate:PSTeps :CALCulate:RSPur :CALCulate:TSPur [:SENSe]:PVTime [:SENSe]:TXPower [:SENSe]:OOBSpur [:SENSe]:POWer :CONFigure :FETCh :MEASure :READ
ATTENUATION	[:SENSe]:POWer [:SENSe]:CORRection [:SENSe]:OOBSpur
AVERAGING	[:SENSe]:ORFSpectrum [:SENSe]:MONitor [:SENSe]:OOBSpur [:SENSe]:CFLocation [:SENSe]:PFERror [:SENSe]:PVTime [:SENSe]:TSPur [:SENSe]:TXPower
BAND, BANDWIDTH	[:SENSe]:MONitor [:SENSe]:OOBSpur [:SENSe]:RADio [:SENSe]:CFLocation [:SENSe]:TXPower [:SENSe]:PSTeps [:SENSe]:PVTime :CONFigure :FETCh :MEASure :READ

Function Category	SCPI Subsection or Subsystem
BURST	TRIGger [:SENSe]:TXPower [:SENSe]:SYNC [:SENSe]:CHANnel [:SENSe]:PFERror
CABLE FAULTS	[:SENSe]:CFLocation :CONFigure :FETCh :MEASure :READ
CORRECTED MEASUREMENTS	[:SENSe]:CORRection
DEMODULATION	[:SENSe]:TXPower
DETECTOR	[:SENSe]:MONitor
DISPLAY	[:SENSe]:MONitor
FREQUENCY	[:SENSe]:OOBSpur [:SENSe]:FREQuency [:SENSe]:CHANnel [:SENSe]:PFERror [:SENSe]:CFLocation :CONFigure :FETCh :MEASure :READ
FREQUENCY SPAN	[:SENSe]:CFLocation [:SENSe]:OOBSpur :CONFigure :FETCh :MEASure :READ
LIMIT MASK	[:SENSe]:PVTime
LIMITS	:CALCulate:ORFSpectrum :CALCulate:OOBSpur :CALCulate:PFERror :CALCulate:PSTeps :CALCulate:RSPur :CALCulate:TSPur
MARKER	[:SENSe]:CFLocation

Function Category	SCPI Subsection or Subsystem
MEASURE	:CONFigure :FETCh :MEASure :READ [:SENSe]:MONitor [:SENSe]:OOBSpur
MIXER	[:SENSe]:OOBSpur
POWER VERSUS TIME	[:SENSe]:PVTime
REFERENCE OSCILLATOR	[:SENSe]:ROSCillator
SPECTRUM/ MODULATION	MEASure :CALCulate:ORFSpectrum
SPURIOUS	:CALCulate:OOBSpur
SWEEP	[:SENSe]:OOBSpur [:SENSe]:PSTeps
TIME SLOT	[:SENSe]:TXPower [:SENSe]:CHANnel
TIMING SEQUENCE CODE	[:SENSe]:CHANnel
TRIGGER	TRIGger [:SENSe]:TXPower [:SENSe]:PSTeps [:SENSe]:PFERror [:SENSe]:ORFSpectrum :CONFigure :FETCh :MEASure :READ

2   Language Reference

These commands are only available when the GSM mode has been selected using INSTrument:SELect. If GSM mode is selected, commands that are unique to another mode are not available.

ABORt Subsystem

`:ABORt`

Stops any sweep or measurement in progress and resets the sweep or trigger system. A measurement refers to any of the measurements found in the **MEASURE** menu.

> If `:INITiate:CONTinuous` is off (single measure), then `:INITiate:IMMediate` will start a new single measurement.

> If `:INITiate:CONTinuous` is on (continuous measure), a new continuous measurement begins immediately.

The INITiate and/or TRIGger subsystems contain additional related commands.

Front Panel
Access: For the continuous measurement mode, the **Restart** key is equivalent to `ABORt`.

CALCulate Subsystem

This subsystem is used to perform post-acquisition data processing. In effect, the collection of new data triggers the CALCulate subsystem. In this instrument, the primary functions in this subsystem are markers and limits.

Test Current Results Against all Limits

`:CALCulate:CLIMits:FAIL?`

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

CALCulate:MARKers Subsystem

This subsystem is documented in the ESA Programmer's Manual. The phase frequency measurement does not support the use of markers.

Marker X Position

`:CALCulate:MARKer[1]|2|3|4:X:POSition <integer>`

`:CALCulate:MARKer[1]|2|3|4:X:POSition?`

Position the designated marker on its assigned trace at the specified X position. A trace is composed of 401 points (X positions.)

The query returns the current X position for the designated marker.

Range: 0 to 400

Front Panel
Access: `Marker`

Out Of Band Spurious Emissions (OOBS) Absolute Limits Commands

The commands in this section are presented according to the following devices: MS, BTS, UBTS1, UBTS2, UBTS3 and PBTS1.

OOBS Absolute Limits Commands—BTS

`:CALCulate:OOBSpur:LIMit:<standard>:BTS[:UPPer]:DATA[n]`

`:CALCulate:OOBSpur:LIMit:<standard>:BTS[:UPPer]:DATA[n]?`

Set or query any of the MS related limits for the out of band spurious measurement. Replace <standard> in the above command strings with GSM450, GSM480, GSM850, PGSM900, EGSM900, RGSM900, DCS1800 or PCS1900.

Table 2-1 shows how each <standard> is associated with a value that must be indexed using a numeric between 1 and 4. Replace n in the above command strings with the appropriate numeric to set or query the desired limit.

Factory Preset
and *RST: Limit values default to the GSM450/GSM480/GSM850/PGSM900/EGSM900/ RGSM900/DCS1800 /PCS1900 standards as shown in Table 2-1.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-1   **Out Of Band Spurious Absolute Limits Commands—BTS: Default Values**

	Standard							
Details	**GSM 450**	**GSM 480**	**GSM 850**	**PGSM 900**	**EGSM 900**	**RGSM 900**	**DCS 1800**	**PCS 1900**
<= 1000 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)
> 1000 kHz	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)

Table 2-1   **Out Of Band Spurious Absolute Limits Commands—BTS: Default Values**

	Standard							
Details	**GSM 450**	**GSM 480**	**GSM 850**	**PGSM 900**	**EGSM 900**	**RGSM 900**	**DCS 1800**	**PCS 1900**
GSM850 Tx band limit (869 - 894 MHz)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-57.0 (n=3)
GSM Tx band limit (921 - 960 MHz)	-57.0 (n=4)	-57.0 (n=4)	N/A	N/A	N/A	N/A	-57.0 (n=3)	N/A
DCS Tx band limit (1805 - 1880 MHz)	-47.0 (n=3)	-47.0 (n=3)	N/A	-47.0 (n=3)	-47.0 (n=3)	-47.0 (n=3)	N/A	N/A
PCS Tx band limit (1930 - 1990 MHz)	N/A	N/A	-47.0 (n=3)	N/A	N/A	N/A	N/A	N/A

OOBS Emissions Absolute Limits Commands—MS

`:CALCulate:OOBSpur:LIMit:<standard>:MS[:UPPer]:DATA[n]`

`:CALCulate:OOBSpur:LIMit:<standard>:MS[:UPPer]:DATA[n]?`

Set or query any of the MS related limits for the out of band spurious measurement. Replace <standard> in the above command strings with GSM450, GSM480, GSM850, PGSM900, EGSM900, RGSM900, DCS1800 or PCS1900.

Table 2-2 shows how each <standard> is associated with a value that must be indexed using a numeric between 1 and 7. Replace n in the above command strings with the appropriate numeric to set or query the desired limit.

Factory Preset
and *RST: Refer to Table 2-2.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-2   **Out Of Band Spurious Absolute Limits Commands—MS: Default Values**

Details	Standard							
	GSM 450	GSM 480	GSM 850	PGSM 900	EGSM 900	RGSM 900	DCS 1800	PCS 1900
For MS allocated: <= 1000 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)
For MS allocated: > 1000 kHz	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)
For MS idle: <= 1000 kHz	-57.0 (n=3)	-57.0 (n=3)	-57.0 (n=3)	-57.0 (n=3)	-57.0 (n=3)	-57.0 (n=3)	-57.0 (n=3)	-57.0 (n=3)
For MS idle: > 1000 kHz	-47.0 (n=4)	-47.0 (n=4)	-47.0 (n=4)	-47.0 (n=4)	-47.0 (n=4)	-47.0 (n=4)	-47.0 (n=4)	-47.0 (n=4)
For MS idle: GSM450 Tx band limit (450.4 - 457.6)	-67.0 (n=5)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For MS idle: GSM480 Tx band limit (478.8 - 486.0)	N/A	-67.0 (n=5)	N/A	N/A	N/A	N/A	N/A	N/A
For MS idle: GSM850 Tx band limit (824 - 849)	N/A	N/A	-57.0 (n=5)	N/A	N/A	N/A	N/A	N/A
For MS idle: GSM Tx band limit (880 - 915 MHz)	-59.0 (n=6)	-59.0 (n=6)	-59.0 (n=6)	-59.0 (n=5)	-59.0 (n=5)	-59.0 (n=5)	-59.0 (n=5)	N/A
For MS idle: DCS Tx band limit (1710 - 1785 MHz)	-53 (n=7)	-53 (n=7)	-53 (n=7)	-53.0 (n=6)	-53.0 (n=6)	-53.0 (n=6)	-53.0 (n=6)	N/A
For MS idle: PCS Tx Band Limit (1850 - 1910 MHz)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-53.0 (n=5)

OOBS Emissions Absolute Limits Commands—PBTS1

`:CALCulate:OOBSpur:LIMit:<standard>:PBTS1[:UPPer]:DATA[n]`

`:CALCulate:OOBSpur:LIMit:<standard>:PBTS1[:UPPer]:DATA[n]?`

Set or query any of the PBTS1 related limits for the out of band spurious measurement. Replace <standard> in the above command strings with GSM450, GSM480, GSM850, PGSM900, EGSM900, RGSM900, DCS1800 or PCS1900.

Table 2-3 shows how each <standard> is associated with a value that must be indexed using a numeric between 1 and 4. Replace n in the above command strings with the appropriate numeric to set or query the desired limit.

Factory Preset
and *RST: Limit values default to the PGSM/EGSM/RGSM/DCS /PCS standards as shown in Table 2-3.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-3   **Out Of Band Spurious Absolute Limits Commands—PBTS1: Default Values**

Details	Standard							
	GSM 450	GSM 480	GSM 850	PGSM 900	EGSM 900	RGSM 900	DCS 1800	PCS 1900
<= 1000 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)
> 1000 kHz	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)
GSM850 Tx band limit (869 - 894 MHz)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-57.0 (n=3)
GSM Tx band limit (921 - 960 MHz)	-57.0 (n=4)	-57.0 (n=4)	N/A	N/A	N/A	N/A	-57.0 (n=3)	N/A
DCS Tx band limit (1805 - 1880 MHz)	-47.0 (n=3)	-47.0 (n=3)	N/A	-47.0 (n=3)	-47.0 (n=3)	-47.0 (n=3)	N/A	N/A
PCS Tx band limit (1930 - 1990 MHz)	N/A	N/A	-47.0 (n=3)	N/A	N/A	N/A	N/A	N/A

OOBS Absolute Limits Commands—UBTS1

`:CALCulate:OOBSpur:LIMit:<standard>:UBTS1[:UPPer]:DATA[n]`

`:CALCulate:OOBSpur:LIMit:<standard>:UBTS1[:UPPer]:DATA[n]?`

Set or query any of the UBTS1 related limits for the out of band spurious measurement. Replace <standard> in the above command strings with GSM450, GSM480, GSM850, PGSM900, EGSM900, RGSM900, DCS1800 or PCS1900.

Table 2-4 shows how each <standard> is associated with a value that must be indexed using a numeric between 1 and 4. Replace n in the above command strings with the appropriate numeric to set or query the desired limit.

Factory Preset
and *RST: Limit values default to the PGSM/EGSM/RGSM/DCS /PCS standards as shown in Table 2-4.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-4   **Out Of Band Spurious Absolute Limits Commands—UBTS1: Default Values**

Details	Standard							
	GSM 450	GSM 480	GSM 850	PGSM 900	EGSM 900	RGSM 900	DCS 1800	PCS 1900
<= 1000 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)
> 1000 kHz	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)
GSM850 Tx band limit (869 - 894 MHz)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-57.0 (N=3)
GSM Tx band limit (921 - 960 MHz)	-57.0 (n=4)	-57.0 (n=4)	N/A	N/A	N/A	N/A	-57.0 (n=3)	N/A
DCS Tx band limit (1805 - 1880 MHz)	-47.0 (n=3)	-47.0 (n=3)	N/A	-47.0 (n=3)	-47.0 (n=3)	-47.0 (n=3)	N/A	N/A

Table 2-4   **Out Of Band Spurious Absolute Limits Commands—UBTS1: Default Values**

	Standard							
Details	GSM 450	GSM 480	GSM 850	PGSM 900	EGSM 900	RGSM 900	DCS 1800	PCS 1900
PCS Tx band limit (1930 - 1990 MHz)	N/A	N/A	-47.0 (n=3)	N/A	N/A	N/A	N/A	

OOBS Emissions Absolute Limits Commands—UBTS2

`:CALCulate:OOBSpur:LIMit:<standard>:UBTS2[:UPPer]:DATA[n]`

`:CALCulate:OOBSpur:LIMit:<standard>:UBTS2[:UPPer]:DATA[n]?`

Set or query any of the UBTS2 related limits for the out of band spurious measurement. Replace <standard> in the above command strings with GSM450, GSM480, GSM850, PGSM900, EGSM900, RGSM900, DCS1800 or PCS1900.

Table 2-5 shows how each <standard> is associated with a value that must be indexed using a numeric between 1 and 4. Replace n in the above command strings with the appropriate numeric to set or query the desired limit.

Factory Preset
and *RST: Limit values default to the PGSM/EGSM/RGSM/DCS /PCS standards as shown in Table 2-5.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-5   **Out Of Band Spurious Absolute Limits Commands—UBTS2: Default Values**

	Standard							
Details	GSM 450	GSM 480	GSM 850	PGSM 900	EGSM 900	RGSM 900	DCS 1800	PCS 1900
<= 1000 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)

Table 2-5   **Out Of Band Spurious Absolute Limits Commands—UBTS2: Default Values**

Details	Standard							
	GSM 450	GSM 480	GSM 850	PGSM 900	EGSM 900	RGSM 900	DCS 1800	PCS 1900
> 1000 kHz	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)
GSM850 Tx band limit (869 - 894 MHz)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-57.0 (n=3)
GSM Tx band limit (921 - 960 MHz)	-57.0 (n=4)	-57.0 (n=4)	N/A	N/A	N/A	N/A	-57.0 (n=3)	N/A
DCS Tx band limit (1805 - 1880 MHz)	-47.0 (n=3)	-47.0 (n=3)	N/A	-47.0 (n=3)	-47.0 (n=3)	-47.0 (n=3)	N/A	N/A
PCS Tx band limit (1930 - 1990 MHz)	N/A	N/A	-47.0 (n=3)	N/A	N/A	N/A	N/A	N/A

OOBS Emissions Absolute Limits Commands—UBTS3

:CALCulate:OOBSpur:LIMit:<standard>:UBTS3[:UPPer]:DATA[n]

:CALCulate:OOBSpur:LIMit:<standard>:UBTS3[:UPPer]:DATA[n]?

Set or query any of the UBTS3 related limits for the out of band spurious measurement. Replace <standard> in the above command strings with GSM450, GSM480, GSM850, PGSM900, EGSM900, RGSM900, DCS1800 or PCS1900.

Table 2-6 on page 12 shows how each <standard> is associated with a value that must be indexed using a numeric between 1 and 4. Replace n in the above command strings with the appropriate numeric to set or query the desired limit.

Factory Preset
and *RST: Limit values default to the PGSM/EGSM/RGSM/DCS /PCS standards as shown in Table 2-6 on page 12.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-6   **Out Of Band Spurious Absolute Limits Commands—UBTS3: Default Values**

Details	Standard							
	GSM 450	GSM 480	GSM 850	PGSM 900	EGSM 900	RGSM 900	DCS 1800	PCS 1900
<= 1000 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)
> 1000 kHz	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)	-30.0 (n=2)
GSM850 Tx band limit (869 - 894 MHz)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-57.0 (n=3)
GSM Tx band limit (921 - 960 MHz)	-57.0 (n=4)	-57.0 (n=4)	N/A	N/A	N/A	N/A	-57.0 (n=3)	N/A
DCS Tx band limit (1805 - 1880 MHz)	-47.0 (n=3)	-47.0 (n=3)	N/A	-47.0 (n=3)	-47.0 (n=3)	-47.0 (n=3)	N/A	N/A
PCS Tx band limit (1930 - 1990 MHz)	N/A	N/A	-47.0 (n=3)	N/A	N/A	N/A	N/A	N/A

Output RF Spectrum - Limits

Output RF Spectrum (ORFS) Due To Modulation Absolute Limits Commands

Use the commands in this section to change the output RF spectrum absolute limits to your own custom limits values.

ORFS limits are generally specified in dB relative to the reference power. This equates to the absolute power which the result must not exceed. Standards documents also supply an absolute power level— which the calculated relative limit (ref power - relative limit) must not lie below—for each ORFS type, radio standard, device type and offset frequency.

Therefore the relative limit applies if the calculated limit (ref power - relative limit) is greater than the absolute limit. Otherwise the absolute limit applies.

Example:

If relative limit = -75 dB and absolute limit = -65 dBm.

1.	If the ref power is measured at 43 dBm, then: Upper result limit due to relative limit = 43 - 75 = -32 dBm Upper result limit due to absolute limit = -65 dBm A relative limit of -32 dBm therefore applies.
2.	If the ref power is measured at 0 dBm, then: Upper result limit due to relative limit = 0 - 75 = -75 dBm Upper result limit due to absolute limit = -65 dBm An absolute limit of -65 dBm therefore applies.

The commands are presented according to the following devices: MS, BTS, UBTS1, UBTS2, UBTS3 and PBTS1.

ORFS Due To Modulation Absolute Limits—BTS

```
:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:BTS
  :ABSolute[:UPPer]:DATA[n]
```

```
:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:BTS
  :ABSolute[:UPPer]:DATA[n]?
```

Set or query any of the absolute BTS related limits for the ORFS due to modulation measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-7 on page 14 shows how each <standard> is associated with a value that must be indexed using a numeric between 1 and 2. Replace n in the above command strings with the appropriate numeric to set or query the desired limit. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation Absolute Limits—MS command.

Factory Preset
and *RST: Refer to Table 2-7 on page 14.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-7   **ORFS Due To Modulation Absolute Limits—BTS: Default Values**

Details	Standard		
	GSM	**DCS**	**PCS**
< 1800 kHz	-65.0 (n=1)	-57.0 (n=1)	-57.0 (n=1)
>= 1800 kHz	-65.0 (n=2)	-57.0 (n=2)	-57.0 (n=2)

ORFS Due To Modulation Absolute Limits—MS

```
:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:MS
  :ABSolute[:UPPer]:DATA[n]
```

```
:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:MS
  :ABSolute[:UPPer]:DATA[n]?
```

Set or query any of the absolute MS related limits for the ORFS due to modulation measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-8 shows how each <standard> is associated with a value that must be indexed using a numeric between 1 and 3. Replace n in the above command strings with the appropriate numeric to set or query the desired limit.

Example:

> The following command sets the absolute result limit to -40 dBm when testing a PGSM MS device at 1800 kHz offset (the default value is -46.0 dBm):

```
:CALCulate:ORFSpectrum:MODulation:LIMit:GSM:MS
:ABSolute:UPPer:DATA3 -40.0
```

Factory Preset
and *RST: Refer to Table 2-8.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use
                   INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-8   **ORFS Due To Modulation Absolute Limits—MS: Default Values**

Details	Standard		
	GSM	DCS	PCS
< 600 kHz,	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)
>= 600 kHz, < 1800 kHz	-51.0 (n=2)	-56.0 (n=2)	-56.0 (n=2)
>= 1800 kHz	-46.0 (n=3)	-51.0 (n=3)	-51.0 (n=3)

ORFS Due To Modulation Absolute Limits—PBTS1

`:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:PBTS1 :ABSolute[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:PBTS1 :ABSolute[:UPPer]:DATA[n]?`

Set or query any of the absolute PBTS1 related limits for the ORFS due to modulation measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-9 on page 16 shows how each <standard> is associated with a value that must be indexed using the numeric 1. Replace n in the above command strings with 1 to set or query the desired limit. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation Absolute Limits—MS command.

Factory Preset
and *RST: Refer to Table 2-9 on page 16.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-9   **ORFS Due To Modulation Absolute Limits—PBTS1: Default Values**

	Standard		
Details	**GSM**	**DCS**	**PCS**
>= 1800 kHz	-68.0 (n=1)	-65.0 (n=1)	-65.0 (n=1)

ORFS Due To Modulation Absolute Limits—UBTS1

`:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:UBTS1`
  `:ABSolute[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:UBTS1`
  `:ABSolute[:UPPer]:DATA[n]?`

Set or query any of the absolute UBTS1 related limits for the ORFS due to modulation measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-10 below shows how each <standard> is associated with a value that must be indexed using the numeric 1. Replace n in the above command strings with 1 to set or query the desired limit. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation Absolute Limits—MS command.

Factory Preset
and *RST: Refer to Table 2-10.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-10   **ORFS Due To Modulation Absolute Limits—UBTS1: Default Values**

	Standard		
Details	**GSM**	**DCS**	**PCS**
>= 1800 kHz	-59.0 (n=1)	-57.0 (n=1)	-57.0 (n=1)

ORFS Due To Modulation Absolute Limits—UBTS2

`:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:UBTS2`
  `:ABSolute[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:UBTS2`
  `:ABSolute[:UPPer]:DATA[n]?`

Set or query any of the absolute UBTS2 related limits for the ORFS due to modulation measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-11 below shows how each <standard> is associated with a value that must be indexed using the numeric 1. Replace n in the above command strings with 1 to set or query the desired limit. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation Absolute Limits—MS command.

Factory Preset
and *RST: Refer to Table 2-11.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-11   **ORFS Due To Modulation Absolute Limits—UBTS2: Default Values**

Details	Standard		
	GSM	DCS	PCS
>= 1800 kHz	-64.0 (n=1)	-62.0 (n=1)	-62.0 (n=1)

ORFS Due To Modulation Absolute Limits—UBTS3

`:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:UBTS3`
  `:ABSolute[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:MODulation:LIMit:<standard>:UBTS3`
  `:ABSolute[:UPPer]:DATA[n]?`

Set or query any of the absolute UBTS3 related limits for the ORFS due

to modulation measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-12 below shows how each <standard> is associated with a value that must be indexed using the numeric 1. Replace n in the above command strings with 1 to set or query the desired limit. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation Absolute Limits—MS command.

Factory Preset
and *RST: Refer to Table 2-12.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

**Table 2-12   ORFS Due To Modulation Absolute
                      Limits—UBTS3: Default Values**

Details	Standard		
	GSM	DCS	PCS
>= 1800 kHz	-69.0 (n=1)	-67.0 (n=1)	-67.0 (n=1)

Output RF Spectrum (ORFS) Due To Modulation Relative Limits Commands

Use the commands in this section to change the output RF spectrum relative limits to your own custom limits values.

ORFS limits are generally specified in dB relative to the reference power. This equates to the absolute power which the result must not exceed. Standards documents also supply an absolute power level—which the calculated relative limit (ref power - relative limit) must not lie below—for each ORFS type, radio standard, device type and offset frequency.

Therefore the relative limit applies if the calculated limit (ref power - relative limit) is greater than the absolute limit. Otherwise the absolute limit applies.

Example:

If relative limit = -75 dB and absolute limit = -65 dBm.

1.	If the ref power is measured at 43 dBm, then: Upper result limit due to relative limit = 43 - 75 = -32 dBm Upper result limit due to absolute limit = -65 dBm A relative limit of -32 dBm therefore applies.
2.	If the ref power is measured at 0 dBm, then: Upper result limit due to relative limit = 0 - 75 = -75 dBm Upper result limit due to absolute limit = -65 dBm An absolute limit of -65 dBm therefore applies.

The commands are presented according to standards DCS, GSM and PCS for devices MS, BTS and UBTS.

ORFS Due To Modulation DCS Relative Limits—BTS

```
:CALCulate:ORFSpectrum:MODulation:LIMit:DCS:BTS:<Pnn>
  [:UPPer]:DATA[n]
```

```
:CALCulate:ORFSpectrum:MODulation:LIMit:DCS:BTS:<Pnn>
[:UPPer]:DATA[n]?
```

Set or query any of the absolute DCS relative BTS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-13 on page 20 shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

NOTE   The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-13 on page 20.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use

INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-13 **ORFS Due To Modulation DCS Relative Limits—BTS: Default Values**

Pnn	Power Level (dBm)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. DCS1800 BTS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P43	>43	43	+0.5 (n=1)	-30 (n=2)	-33 (n=3)	-60 (n=4)	-70 (n=5)	-73 (n=6)	-75 (n=7)	-80 (n=8)
										(n=9)
P41	41	41	+0.5 (n=1)	-30 (n=2)	-33 (n=3)	-60 (n=4)	-68 (n=5)	-71 (n=6)	-73 (n=7)	-80 (n=8)
										(n=9)
P39	39	39	+0.5 (n=1)	-30 (n=2)	-33 (n=3)	-60 (n=4)	-66 (n=5)	-69 (n=6)	-71 (n=7)	-80 (n=8)
										(n=9)
P37	37	37	+0.5 (n=1)	-30 (n=2)	-33 (n=3)	-60 (n=4)	-64 (n=5)	-67 (n=6)	-69 (n=7)	-80 (n=8)
										(n=9)
P35	35	35	+0.5 (n=1)	-30 (n=2)	-33 (n=3)	-60 (n=4)	-62 (n=5)	-65 (n=6)	-67 (n=7)	-80 (n=8)
										(n=9)
P33	<33	33	+0.5 (n=1)	-30 (n=2)	-33 (n=3)	-60 (n=4)	-60 (n=5)	-63 (n=6)	-65 (n=7)	-80 (n=8)
										(n=9)

ORFS Due To Modulation DCS Relative Limits—MS

```
:CALCulate:ORFSpectrum:MODulation:LIMit:DCS:MS:<Pnn>
  [:UPPer]:DATA[n]
```

```
:CALCulate:ORFSpectrum:MODulation:LIMit:DCS:MS:<Pnn>
  [:UPPer]:DATA[n]?
```

Table 2-14 shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency.

Set or query any of the absolute DCS relative MS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

NOTE The relative limit applied depends on the measured total carrier power.

If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Example:

The following command sets the relative result limit to -65.0 dB (the default value is -46.0 dB) when testing a DCS MS device at 400 kHz offset and total carrier power = 39 dBm:

```
:CALCulate:ORFSpectrum:MODulation:LIMit:DCS:MS
:P39:UPPer:DATA4 -65.0
```

Factory Preset
and *RST: Refer to Table 2-14.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-14   ORFS Due To Modulation DCS Relative Limits—MS: Default Values

Pnn	Power Level (dBm)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. DCS1800 MS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P36	>36	36 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-71 (n=8)	-79 (n=9)
P34	34	34 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-69 (n=8)	-77 (n=9)
P32	32	32 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-67 (n=8)	-75 (n=9)
P30	30	30 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-65 (n=8)	-73 (n=9)
P28	28	28 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-63 (n=8)	-71 (n=9)
P26	26	26 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-61 (n=8)	-69 (n=9)

Table 2-14   **ORFS Due To Modulation DCS Relative Limits—MS: Default Values**

Pnn	Power Level (dBm)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. DCS1800 MS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P24	<24	24 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-59 (n=8)	-67 (n=9)

ORFS Due To Modulation DCS Relative Limits—PBTS

```
:CALCulate:ORFSpectrum:MODulation:LIMit:DCS:PBTS:<Pnn>
  [:UPPer]:DATA[n]
```

```
:CALCulate:ORFSpectrum:MODulation:LIMit:DCS:PBTS:<Pnn>
  [:UPPer]:DATA[n]?
```

Set or query any of the absolute DCS relative PBTS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-15 shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

NOTE   The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-15.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel

Access: None: accessible via remote panel only.

Table 2-15 **ORFS Due To Modulation DCS Relative Limits—PBTS: Default Values**

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. DCS1800 PBTS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P23	<=23	23 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-63 (n=7)	-76 (n=8)	-80 (n=9)

ORFS Due To Modulation DCS Relative Limits—UBTS

:CALCulate:ORFSpectrum:MODulation:LIMit:DCS:UBTS:<Pnn>
  [:UPPer]:DATA[n]

:CALCulate:ORFSpectrum:MODulation:LIMit:DCS:UBTS:<Pnn>
  [:UPPer]:DATA[n]?

Set or query any of the absolute DCS relative UBTS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-16 on page 24 shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

NOTE   The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-16 on page 24.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use
                INSTrument:SELect to set the mode.

Front Panel

Access: None: accessible via remote panel only.

Table 2-16   **ORFS Due To Modulation DCS Relative Limits—UBTS: Default Values**

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. DCS1800 UBTS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P33	>35	35 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-62 (n=6)	-65 (n=7)	-76 (n=8)	-76 (n=9)
P35	<33	33 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-63 (n=7)	-76 (n=8)	-76 (n=9)

ORFS Due To Modulation GSM Relative Limits—BTS

```
:CALCulate:ORFSpectrum:MODulation:LIMit:GSM:BTS:<Pnn>
  [:UPPer]:DATA[n]
```

```
:CALCulate:ORFSpectrum:MODulation:LIMit:GSM:BTS:<Pnn>
  [:UPPer]:DATA[n]?
```

Set or query any of the absolute GSM relative BTS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-17 shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

NOTE   The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-17.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-17 **ORFS Due To Modulation GSM Relative Limits—BTS: Default Values**

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. GSM900 BTS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P43	>43	43 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-70 (n=6)	-73 (n=7)	-75 (n=8)	-80 (n=9)
P41	41	41 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-68 (n=6)	-71 (n=7)	-73 (n=8)	-80 (n=9)
P39	39	39 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-66 (n=6)	-69 (n=7)	-71 (n=8)	-80 (n=9)
P37	37	37 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-64 (n=6)	-67 (n=7)	-69 (n=8)	-80 (n=9)
P35	35	35 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-62 (n=6)	-65 (n=7)	-67 (n=8)	-80 (n=9)
P33	<33	33 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-63 (n=7)	-65 (n=8)	-80 (n=9)

ORFS Due To Modulation GSM Relative Limits—MS

:CALCulate:ORFSpectrum:MODulation:LIMit:GSM:MS:<Pnn>
  [:UPPer]:DATA[n]

:CALCulate:ORFSpectrum:MODulation:LIMit:GSM:MS:<Pnn>
  [:UPPer]:DATA[n]?

Set or query any of the absolute GSM relative MS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-18 on page 26 shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

NOTE	The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-18.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-18   **ORFS Due To Modulation GSM Relative Limits—MS: Default Values**

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. GSM900 MS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P39	>39	39 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-66 (n=6)	-69 (n=7)	-71 (n=8)	-77 (n=9)
P37	37	37 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-64 (n=6)	-67 (n=7)	-69 (n=8)	-75 (n=9)
P35	35	35 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-62 (n=6)	-65 (n=7)	-67 (n=8)	-73 (n=9)
P33	<33	33 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-63 (n=7)	-65 (n=8)	-71 (n=9)

ORFS Due To Modulation GSM Relative Limits—PBTS

`:CALCulate:ORFSpectrum:MODulation:LIMit:GSM:PBTS:<Pnn>`
`[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:MODulation:LIMit:GSM:PBTS:<Pnn>`
`[:UPPer]:DATA[n]?`

Set or query any of the absolute GSM relative PBTS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-19 below shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

| NOTE | The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated. |

Factory Preset
and *RST: Refer to Table 2-19.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-19   ORFS Due To Modulation GSM Relative Limits—UBTS: Default Values

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. GSM900 PBTS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P20	<=20	20 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-63 (n=7)	-70 (n=8)	-80 (n=9)

ORFS Due To Modulation GSM Relative Limits—UBTS

`:CALCulate:ORFSpectrum:MODulation:LIMit:GSM:UBTS:<Pnn>`
  `[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:MODulation:LIMit:GSM:UBTS:<Pnn>`
  `[:UPPer]:DATA[n]?`

Set or query any of the absolute GSM relative UBTS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-20 on page 28 shows how each <Pnn> is associated with a value

that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-20.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-20   **ORFS Due To Modulation GSM Relative Limits—UBTS: Default Values**

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. GSM900 MS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P33	<33	33 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-63 (n=7)	-70 (n=8)	-70 (n=9)

ORFS Due To Modulation PCS Relative Limits—BTS

:CALCulate:ORFSpectrum:MODulation:LIMit:PCS:BTS:<Pnn>
  [:UPPer]:DATA[n]

:CALCulate:ORFSpectrum:MODulation:LIMit:PCS:BTS:<Pnn>
  [:UPPer]:DATA[n]?

Set or query any of the absolute PCS relative BTS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-21 shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above

command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

NOTE   The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-21.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-21   **ORFS Due To Modulation PCS Relative Limits—BTS: Default Values**

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. PCS1900 BTS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P43	>43	43 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	70 (n=6)	-73 (n=7)	-75 (n=8)	-80 (n=9
P41	41	41 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-68 (n=6)	-71 (n=7)	-73 (n=8)	-80 (n=9)
P39	39	39 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-66) (n=6)	-69 (n=7)	-71 (n=8)	-80 (n=9)
P37	<37	37 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-64 (n=6)	-67 (n=7)	-69 (n=8)	-80 (n=9)
P35	35	35 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-62 (n=6)	-65 (n=7)	-67 (n=8)	-80 (n=9)
P33	<33	33 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-63 (n=7)	-65 (n=8)	-80 (n=9)

ORFS Due To Modulation PCS Relative Limits—MS

```
:CALCulate:ORFSpectrum:MODulation:LIMit:PCS:MS:<Pnn>
  [:UPPer]:DATA[n]
```

```
:CALCulate:ORFSpectrum:MODulation:LIMit:PCS:MS:<Pnn>
  [:UPPer]:DATA[n]?
```

Set or query any of the absolute PCS relative MS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-22 below shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

NOTE   The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-22.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-22   **ORFS Due To Modulation PCS Relative Limits—MS: Default Values**

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. PCS1900 MS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P33	>33	33 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-68 (n=8)	-76 (n=9)

Table 2-22   **ORFS Due To Modulation PCS Relative Limits—MS:
Default Values**

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. PCS1900 MS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P32	**32**	32 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-67 (n=8)	-75 (n=9)
P30	**30**	30 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-65 (n=8)	-73 (n=9)
P28	**28**	28 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-63 (n=8)	-71 (n=9)
P26	**26**	26 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-61 (n=8)	-69 (n=9)
P24	**<24**	24 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-60 (n=7)	-59 (n=8)	-67 (n=9)

ORFS Due To Modulation PCS Relative Limits—PBTS

```
:CALCulate:ORFSpectrum:MODulation:LIMit:PCS:PBTS:<Pnn>
  [:UPPer]:DATA[n]
```

```
:CALCulate:ORFSpectrum:MODulation:LIMit:PCS:PBTS:<Pnn>
  [:UPPer]:DATA[n]?
```

Set or query any of the absolute PCS relative PBTS related limits for the ORFS due to modulation measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry.

Table 2-23 on page 32 below shows how each <Pnn> is associated with a value that must be indexed using a numeric between 1 and 9. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. For further information, refer to the example provided earlier in this section for the ORFS Due To Modulation DCS Relative Limits—MS command.

NOTE   The relative limit applied depends on the measured total carrier power. If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-23.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-23   **ORFS Due To Modulation PCS Relative Limits—PBTS:
                    Default Values**

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. PCS1900 PBTS						
			100	200	250	400	600 to <1200	1200 to <1800	>1800
			30 kHz RBW						100 kHz RBW
P23	>23	23 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-63 (n=7)	-76 (n=8)

ORFS Due To Modulation PCS Relative Limits—UBTS

`:CALCulate:ORFSpectrum:MODulation:LIMit:PCS:UBTS:<Pnn>`
  `[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:MODulation:LIMit:PCS:UBTS:<Pnn>`
  `[:UPPer]:DATA[n]?`

Set or query any of the absolute PCS relative UBTS related limits for
the ORFS due to modulation measurement. Replace <Pnn> in the
above command strings with the appropriate Pnn entry.

Table 2-24 shows how each <Pnn> is associated with a value that must
be indexed using a numeric between 1 and 9. Replace n in the above
command strings with the appropriate numeric to set or query the
desired relative limit for the required offset frequency. For further
information, refer to the example provided earlier in this section for the
ORFS Due To Modulation DCS Relative Limits—MS command.

NOTE   The relative limit applied depends on the measured total carrier power.

If the measured reference power lies between these discrete power values noted in the specific table the limit value is linearly interpolated.

Factory Preset
and *RST: Refer to Table 2-24.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-24   ORFS Due To Modulation PCS Relative Limits—UBTS: Default Values

Pnn	Power Level (dBm) (SCPI node)	Power	Maximum relative level (dB) at specific carrier offsets (kHz), using specified measurement resolution bandwidths. PCS1900 UBTS							
			100	200	250	400	600 to <1200	1200 to <1800	1800 to <6000	>6000
			30 kHz RBW						100 kHz RBW	
P43	>43	43 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-70 (n=6)	-73 (n=7)	-76 (n=8)	-76 (n=9)
P41	41	41 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-68 (n=6)	-71 (n=7)	-76 (n=8)	-76 (n=9)
P39	39	39 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-66 (n=6)	-69 (n=7)	-76 (n=8)	-76 (n=9)
P37	37	37 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-64 (n=6)	-67 (n=7)	-76 (n=8)	-76 (n=9)
P35	35	35 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-62 (n=6)	-65 (n=7)	-76 (n=8)	-76 (n=9)
P33	<33	33 (n=1)	+0.5 (n=2)	-30 (n=3)	-33 (n=4)	-60 (n=5)	-60 (n=6)	-63 (n=7)	-76 (n=8)	-76 (n=9)

Output RF Spectrum (ORFS) Due To Switching Transients Absolute Limits Commands—BTS and UBTS

Use the commands in this section to change the output RF spectrum due to switching transients absolute limits to your own custom limits values.

ORFS limits are generally specified in dB relative to the reference power. This equates to the absolute power which the result must not exceed. Standards documents also supply an absolute power level—which the calculated relative limit (ref power - relative limit) must not lie below—for each ORFS type, radio standard, device type and offset frequency.

Therefore the relative limit applies if the calculated limit (ref power - relative limit) is greater than the absolute limit. Otherwise the absolute limit applies.

Example:

If relative limit = -75 dB and absolute limit = -65 dBm.

1.	If the ref power is measured at 43 dBm, then: Upper result limit due to relative limit = 43 - 75 = -32 dBm Upper result limit due to absolute limit = -65 dBm A relative limit of -32 dBm therefore applies.
2.	If the ref power is measured at 0 dBm, then: Upper result limit due to relative limit = 0 - 75 = -75 dBm Upper result limit due to absolute limit = -65 dBm An absolute limit of -65 dBm therefore applies.

Note that for ORFS due to switching transients the above only applies to BTS, UBTS and PBTS devices as MS limits are specified in absolute terms (dBm) only.

The commands are presented according to devices BTS, UBTS1, UBTS2, UBTS3 and PBTS1.

ORFS Due To Switching Transients Absolute Limits—BTS

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:BTS:ABSolute[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:BTS:ABSolute[:UPPer]:DATA[n]?`

Set or query any of the absolute BTS related limits for the ORFS due to switching transients measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850,PGSM900, EGSM900 and RGSM900.

Table 2-25 shows how each <standard> is associated with a value that must be indexed using the numerics 1 or 2. Replace n in the above

command strings with the appropriate numeric to set or query the desired limit.

Example:

The following command sets the absolute result limit to -40 dBm when testing an E-GSM BTS device for offsets >= 1800 kHz (the default value is -36.0 dBm):

`:CALCulate:ORFSpectrum:SWITching:LIMit:GSM:BTS:ABSolute:UPPer:DATA2 -40.0`

Factory Preset and *RST:	Refer to Table 2-25.
Range:	-150 dBm to 150 dBm
Default Unit:	dBm
Remarks:	You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	None: accessible via remote panel only.

Table 2-25   **ORFS Due To Switching Transients Absolute Limits Commands—BTS: Default Values**

Details	Standard		
	GSM	DCS	PCS
< 1800 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)
>= 1800 kHz	-36.0 (n=2)	-36.0 (n=2)	-36.0 (n=2)

ORFS Due To Switching Transients Absolute Limits—PBTS1

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:PBTS1:ABSolute[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:PBTS1:ABSolute[:UPPer]:DATA[n]?`

Set or query any of the absolute PBTS1 related limits for the ORFS due to switching transients measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-26 on page 36 shows how each <standard> is associated with a value that must be indexed using the numeric 1. Replace n in the above

command strings with 1 to set or query the desired limit. For further information, refer to the example provided earlier in this section for the ORFS Due To Switching Transients Absolute Limits—BTS command.

Factory Preset
and *RST: Refer to Table 2-26.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-26   **ORFS Due To Switching Transients Absolute Limits Commands—PBTS1: Default Values**

	Standard		
Details	**GSM**	**DCS**	**PCS**
>= 1800 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)

ORFS Due To Switching Transients Absolute Limits—UBTS1

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:UBTS1:ABSolute[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:UBTS1:ABSolute[:UPPer]:DATA[n]?`

Set or query any of the absolute UBTS1 related limits for the ORFS due to switching transients measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-27 shows how each <standard> is associated with a value that must be indexed using the numeric 1. Replace n in the above command strings with 1 to set or query the desired limit. For further information, refer to the example provided earlier in this section for the ORFS Due To Switching Transients Absolute Limits—BTS command.

Factory Preset
and *RST: Refer to Table 2-27.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use
                INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-27   **ORFS Due To Switching Transients Absolute
                      Limits Commands—UBTS1: Default Values**

Details	Standard		
	GSM	**DCS**	**PCS**
>= 1800 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)

ORFS Due To Switching Transients Absolute Limits—UBTS2

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:UBTS2:ABSolute[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:UBTS2:ABSolute[:UPPer]:DATA[n]?`

Set or query any of the absolute UBTS2 related limits for the ORFS due to switching transients measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-28 on page 38 shows how each <standard> is associated with a value that must be indexed using the numeric 1. Replace n in the above command strings with 1 to set or query the desired limit. For further information, refer to the example provided earlier in this section for the ORFS Due To Switching Transients Absolute Limits—BTS command.

Factory Preset
and *RST: Refer to Table 2-28 on page 38.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use
                INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-28   **ORFS Due To Switching Transients Absolute Limits Commands—UBTS2: Default Values**

	Standard		
Details	**GSM**	**DCS**	**PCS**
>= 1800 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)

ORFS Due To Switching Transients Absolute Limits—UBTS3

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:UBTS3:ABSolute[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:SWITching:LIMit:<standard>:UBTS3:ABSolute[:UPPer]:DATA[n]?`

Set or query any of the absolute UBTS3 related limits for the ORFS due to switching transients measurement. Replace <standard> in the above command strings with GSM, DCS or PCS. Note that GSM applies to all of GSM450, GSM480, GSM850, PGSM900, EGSM900 and RGSM900.

Table 2-29 shows how each <standard> is associated with a value that must be indexed using the numeric 1. Replace n in the above command strings with 1 to set or query the desired limit. For further information, refer to the example provided earlier in this section for the ORFS Due To Switching Transients Absolute Limits—BTS command.

Factory Preset
and *RST: Refer to Table 2-29.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-29   ORFS Due To Switching Transients Absolute Limits Commands—UBTS3: Default Values

	Standard		
Details	**GSM**	**DCS**	**PCS**
>= 1800 kHz	-36.0 (n=1)	-36.0 (n=1)	-36.0 (n=1)

Output RF Spectrum (ORFS) Due To Switching Transients Relative Limits Commands—BTS, PBTS and UBTS

Use the commands in this section to change the output RF spectrum due to switching transients relative limits to your own custom limits values.

ORFS limits are generally specified in dB relative to the reference power. This equates to the absolute power which the result must not exceed. Standards documents also supply an absolute power level—which the calculated relative limit (ref power - relative limit) must not lie below—for each ORFS type, radio standard, device type and offset frequency.

Therefore the relative limit applies if the calculated limit (ref power - relative limit) is greater than the absolute limit. Otherwise the absolute limit applies.

Example:

If relative limit = -75 dB and absolute limit = -65 dBm.

1.	If the ref power is measured at 43 dBm, then: Upper result limit due to relative limit = 43 - 75 = -32 dBm Upper result limit due to absolute limit = -65 dBm A relative limit of -32 dBm therefore applies.
2.	If the ref power is measured at 0 dBm, then: Upper result limit due to relative limit = 0 - 75 = -75 dBm Upper result limit due to absolute limit = -65 dBm An absolute limit of -65 dBm therefore applies.

Note that for ORFS due to switching transients the above only applies to BTS and UBTS devices as MS limits are specified in absolute terms (dBm) only.

ORFS Due To Switching Transients Relative Limits—DCS

`:CALCulate:ORFSpectrum:SWITching:LIMit:DCS:<device>:[:UPPer ]:DATA[n]`

`:CALCulate:ORFSpectrum:SWITching:LIMit:DCS:<device>:[:UPPer ]:DATA[n]?`

Set or query any of the relative DCS related limits for the ORFS due to switching transients measurement. Replace <device> in the above command strings with the appropriate entry.

Table 2-30 shows how each <device> is associated with a value that must be indexed using a numeric from 2 to 5. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. Note that entries in the Power column (n=1) are currently not used. For further information, refer to the example provided earlier in this section for the ORFS Due To Switching Transients Relative Limits—GSM command.

Factory Preset
and *RST: Refer to Table 2-30.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-30   **ORFS Due To Switching Transients Relative Limits—DCS: Default Values**

		Offset Frequency (kHz)			
Device	**Power**	**400**	**600**	**1200**	**1800**
BTS	0.0 (n=1)	-50dB (n=2)	-58dB (n=3)	-66dB (n=4)	-66dB (n=5)
UBTS	0.0 (n=1)	-50dB (n=2)	-58dB (n=3)	-66dB (n=4)	-66dB (n=5)
PBTS	0.0 (n=1)	-50dB (n=2)	-58dB (n=3)	-66dB (n=4)	-66dB (n=5)

ORFS Due To Switching Transients Relative Limits—GSM

`:CALCulate:ORFSpectrum:SWITching:LIMit:GSM:<device>:[:UPPer`
`]:DATA[n]`

`:CALCulate:ORFSpectrum:SWITching:LIMit:GSM:<device>:[:UPPer`
`]:DATA[n]?`

Set or query any of the relative GSM related limits for the ORFS due to switching transients measurement. Replace <device> in the above command strings with the appropriate entry.

Table 2-31 shows how each <device> is associated with a value that must be indexed using a numeric from 2 to 5. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. Note that entries in the Power column (n=1) are currently not used.

Example:

The following command sets the relative result limit to -70 dB (the default value is -74.0 dB) when testing a GSM BTS device at 1200 kHz offset:

`:CALCulate:ORFSpectrum:SWITching:LIMit:GSM:BTS:UPPer`
`:DATA4 -70.0`

Factory Preset
and *RST: Refer to Table 2-31.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

Table 2-31   ORFS Due To Switching Transients Relative Limits—GSM: Default Values

Device	Power	Offset Frequency (kHz)			
		400	600	1200	1800
BTS	0.0 (n=1)	-57dB (n=2)	-67dB (n=3)	-74dB (n=4)	-74dB (n=5)
UBTS	0.0 (n=1)	-57dB (n=2)	-67dB (n=3)	-74dB (n=4)	-74dB (n=5)
PBTS	0.0 (n=1)	-57dB (n=2)	-67dB (n=3)	-74dB (n=4)	-74dB (n=5)

ORFS Due To Switching Transients Relative Limits—PCS

```
:CALCulate:ORFSpectrum:SWITching:LIMit:PCS:<device>:[:UPPer
]:DATA[n]
```

```
:CALCulate:ORFSpectrum:SWITching:LIMit:PCS:<device>:[:UPPer
]:DATA[n]?
```

Set or query any of the relative PCS related limits for the ORFS due to switching transients measurement. Replace <device> in the above command strings with the appropriate entry.

Table 2-32 shows how each <device> is associated with a value that must be indexed using a numeric from 2 to 5. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. Note that entries in the Power column (n=1) are currently not used. For further information, refer to the example provided earlier in this section for the ORFS Due To Switching Transients Relative Limits—GSM command.

Factory Preset
and *RST: Refer to Table 2-32.

Range: -150 dB to 150 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

**Table 2-32   ORFS Due To Switching Transients Relative
                     Limits—PCS: Default Values**

		Offset Frequency (kHz)			
Device	Power	400	600	1200	1800
BTS	0.0 (n=1)	-50dB (n=2)	-58dB (n=3)	-66dB (n=4)	-66dB (n=5)
UBTS	0.0 (n=1)	-50dB (n=2)	-58dB (n=3)	-66dB (n=4)	-66dB (n=5)
PBTS	0.0 (n=1)	-50dB (n=2)	-58dB (n=3)	-66dB (n=4)	-66dB (n=5)

Output RF Spectrum (ORFS) Due To Switching Transients Commands—MS

Use the commands in this section to change the output RF spectrum due to switching transients limits for MS devices, to your own custom limits values. The output RF spectrum due to switching transients test for MS devices, uses limits that are specified in absolute units—that is, dBm.

Note that the limit applied—as shown in the table that accompanies each command—depends on the total carrier power. If the measured carrier power lies between these discrete power values, the limit value is linearly interpolated. If it lies above or below the range specified, the upper or lower limit set are used respectively.

ORFS Due To Switching Transients DCS MS Limits

`:CALCulate:ORFSpectrum:SWITching:LIMit:DCS:MS:<Pnn>:[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:SWITching:LIMit:DCS:MS:<Pnn>:[:UPPer]:DATA[n]?`

Set or query any of the DCS MS related commands for the ORFS due to switching transients measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry. The measured total carrier power will determine which row of limits will be applied.

Table 2-33 on page 44 shows how each <Pnn> is associated with a value that must be indexed using a numeric from 1 to 5. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. You can also change the values in the Power column (n=1) to alter the carrier power required for each set of limits. For further information, refer to the examples provided earlier in this section for the ORFS Due To Switching Transients GSM MS Limits command.

Factory Preset
and *RST: Refer to Table 2-33 on page 44.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

**Table 2-33   ORFS Due To Switching Transients DCS MS
Limits: Default Values**

			Offset Frequency (kHz)			
Pnn	Power Level (dBm)	Power (dBm)	400	600	1200	1800
39	39	39.0 (n=1)	-21dBm (n=2)	-26dBm (n=3)	-32dBm (n=4)	-36dBm (n=5)
37	<=37	37.0 (n=1)	-23dBm (n=2)	-26dBm (n=3)	-32dBm (n=4)	-36dBm (n=5)

ORFS Due To Switching Transients GSM MS Limits

`:CALCulate:ORFSpectrum:SWITching:LIMit:GSM:MS:<Pnn>:[:UPPer]:DATA[n]`

`:CALCulate:ORFSpectrum:SWITching:LIMit:GSM:MS:<Pnn>:[:UPPer]:DATA[n]?`

Set or query any of the GSM MS related limits for the ORFS due to switching transients measurement. Replace <Pnn> in the above command strings with the appropriate Pnn entry. The measured total carrier power will determine which row of limits will be applied.

Table 2-34 shows how each <Pnn> is associated with a value that must be indexed using a numeric from 1 to 5. Replace n in the above command strings with the appropriate numeric to set or query the desired relative limit for the required offset frequency. You can also change the values in the Power column (n=1) to alter the carrier power required for each set of limits.

Example 1:

The following command sets the result limit to -30.0 dBm (the default value is -21.0 dBm) when testing a GSM MS device, total carrier power 39 dBm, at 400 kHz offset:

`:CALCulate:ORFSpectrum:SWITching:LIMit:GSM:MS:P39:UPPER:DATA2 -30.0`

Example 2:

The following command configures the limits to use the P39 limits when the total carrier power level is 37dBm (instead of the default 39.0 dBm) when testing a GSM MS device:

`:CALCulate:ORFSpectrum:SWITching:LIMit:GSM:MS:P39:UPPER:DATA1 -37.0`

Factory Preset
and *RST: Refer to Table 2-34.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use
                INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

**Table 2-34   ORFS Due To Switching Transients GSM MS
                    Limits: Default Values**

Pnn	Power Level (dBm)	Power (dBm)	Offset Frequency (kHz)			
			400	600	1200	1800
39	39	39.0 (n=1)	-21dBm (n=2)	-26dBm (n=3)	-32dBm (n=4)	-36dBm (n=5)
37	<=37	37.0 (n=1)	-23dBm (n=2)	-26dBm (n=3)	-32dBm (n=4)	-36dBm (n=5)

ORFS Due To Switching Transients PCS MS Limits

```
:CALCulate:ORFSpectrum:SWITching:LIMit:PCS:MS:<Pnn>:[:UPPer
]:DATA[n]
```

```
:CALCulate:ORFSpectrum:SWITching:LIMit:PCS:MS:<Pnn>:[:UPPer
]:DATA[n]?
```

Set or query any of the PCS MS related commands for the ORFS due to
switching transients measurement. Replace <Pnn> in the above
command strings with the appropriate Pnn entry. The measured total
carrier power will determine which row of limits will be applied.

Table 2-35 on page 46 shows how each <Pnn> is associated with a value
that must be indexed using a numeric from 1 to 5. Replace n in the
above command strings with the appropriate numeric to set or query
the desired relative limit for the required offset frequency. You can also
change the values in the Power column (n=1) to alter the carrier power
required for each set of limits. For further information, refer to the
examples provided earlier in this section for the ORFS Due To Switching
Transients GSM MS Limits command.

Factory Preset
and *RST: Refer to Table 2-35.

Range: -150 dBm to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Front Panel
Access: None: accessible via remote panel only.

**Table 2-35   ORFS Due To Switching Transients PCS MS
                       Limits: Default Values**

			Offset Frequency (kHz)			
Pnn	**Power Level (dBm)**	**Power (dBm)**	**400**	**600**	**1200**	**1800**
39	39	39.0 (n=1)	-21dBm (n=2)	-26dBm (n=3)	-32dBm (n=4)	-36dBm (n=5)
37	<=37	37.0 (n=1)	-23dBm (n=2)	-26dBm (n=3)	-32dBm (n=4)	-36dBm (n=5)

Phase and Frequency Error Measurement Limits Commands

Phase and Frequency Error—Limits State

`:CALCulate:PFERror:LIMit[:STATe]ON|OFF|1|0`

`:CALCulate:PFERror:LIMit[:STATe]?`

Turn limit checking on or off.

Factory Preset
and *RST: On

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Limit Test**

Phase and Frequency Error—RMS Phase Error Limit

`:CALCulate:PFERror:LIMit:<standard>:<device>:RPERror[:UPPer][:DATA] <degrees>`

`:CALCulate:PFERror:LIMit:<standard>:<device>:RPERror[:UPPer][:DATA]?`

Set the maximum value for RMS phase limit.

<standard> = GSM450|GSM480|GSM850|PGSM900|EGSM900|RGSM900|DCS1800|PCS1900

<device> = MS|BTS|UBTS1|UBTS2|UBTS3|PBTS1

   MS – Mobile station transmitter

   BTS – Base station transmitter

   UBTS1 – Micro base station class M1 transmitter

   UBTS2 – Micro base station class M2 transmitter

   UBTS3 – Micro base station class M3 transmitter

   PBTS1 – Pico base station class P1 transmitter

Factory Preset
and *RST: Values default to the GSM/DCS/PCS standards as
                  shown in .

Range: 0 to 180

Default Unit: degrees RMS

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Limits....**

Phase and Frequency Error—Peak Phase Error Limit

`:CALCulate:PFERror:LIMit:<standard>:<device>:PPERror[:UPPer][:DATA] <degrees>`

`:CALCulate:PFERror:LIMit:<standard>:<device>:PPERror[:UPPer][:DATA]?`

Set the maximum value for peak phase limit.

<standard> = GSM450 | GSM480 | GSM850 | PGSM900 | EGSM900 | RGSM900 | DCS1800 | PCS1900

<device> = MS | BTS | UBTS1 | UBTS2 | UBTS3 | PBTS1

   MS – Mobile station transmitter

   BTS – Base station transmitter

   UBTS1 – Micro base station class M1 transmitter

   UBTS2 – Micro base station class M2 transmitter

   UBTS3 – Micro base station class M3 transmitter

   PBTS1 – Pico base station class P1 transmitter

Factory Preset
and *RST: Values default to the GSM/DCS/PCS standards as
                 shown in Table 2-36.

Range: 0 to 180

Default Unit: degrees peak

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Limits....**

Phase and Frequency Error—Frequency Error Limit

`:CALCulate:PFERror:LIMit:<standard>:<device>:MFERror[:UPPer][:DATA] <ppm>`

`:CALCulate:PFERror:LIMit:<standard>:<device>:MFERror[:UPPer][:DATA]?`

Set the absolute maximum value for frequency limit.

<standard> = GSM450 | GSM480 | GSM850 | PGSM900 | EGSM900

|RGSM900|DCS1800|PCS1900

<device> = MS|BTS|UBTS1|UBTS2|UBTS3|PBTS1

    MS – Mobile station transmitter

    BTS – Base station transmitter

    UBTS1 – Micro base station class M1 transmitter

    UBTS2 – Micro base station class M2 transmitter

    UBTS3 – Micro base station class M3 transmitter

    PBTS1 – Pico base station class P1 transmitter

Factory Preset
and *RST: Values default to the GSM/DCS/PCS standards as shown in Table 2-36.

Range: 0 to 100

Default Unit: parts per million (ppm)

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Limits**

Table 2-36   Phase And Frequency Error Commands: Default Values

Standard	RMS Phase Limit (deg) RPERror	Peak Phase Limit (deg) PPERror	Mean Frequency Limit (ppm) MFERror
GSM450 BTS	5	20	0.05
GSM480 BTS	5	20	0.05
GSM850 BTS	5	20	0.05
PGSM900 BTS	5	20	0.05
EGSM900 BTS	5	20	0.05
RGSM900 BTS	5	20	0.05
DCS1800 BTS	5	20	0.05
PCS1900 BTS	5	20	0.05
GSM450 MS	5	20	0.1
GSM480 MS	5	20	0.1

Table 2-36 **Phase And Frequency Error Commands: Default Values**

Standard	RMS Phase Limit (deg) RPERror	Peak Phase Limit (deg) PPERror	Mean Frequency Limit (ppm) MFERror
GSM850 MS	5	20	0.1
PGSM900 MS	5	20	0.1
EGSM900 MS	5	20	0.1
RGSM900 MS	5	20	0.1
DCS1800 MS	5	20	0.1
PCS1900 MS	5	20	0.1

Power Steps Measurement Limits Commands

Power Steps—Limits State

`:CALCulate:PSTeps:LIMit[:STATe]ON|OFF|1|0`

`:CALCulate:PSTeps:LIMit[:STATe]?`

Turn limits state on or off.

Factory Preset
and *RST: On

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Limit Test**

Power Steps—Power Step Upper Limit

`:CALCulate:PSTeps:LIMit:<standard>:<device>:PDELta[:UPPer][:DATA] <dB>`

`:CALCulate:PSTeps:LIMit:<standard>:<device>:PDELta[:UPPer][:DATA]?`

Set the delta power step upper limit.

<standard> = GSM450|GSM480|GSM850|PGSM900|EGSM900|RGSM900|DCS1800|PCS1900

<device> = MS|BTS|UBTS1|UBTS2|UBTS3|PBTS1

    MS – Mobile station transmitter

    BTS – Base station transmitter

    UBTS1 – Micro base station class M1 transmitter

    UBTS2 – Micro base station class M2 transmitter

    UBTS3 – Micro base station class M3 transmitter

    PBTS1 – Pico base station class P1 transmitter

Factory Preset
and *RST: Values default to the GSM/DCS/PCS standards as
                 shown in .

Range: 0 to 200

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Limit...**

Power Steps—Power Step Lower Limit

```
:CALCulate:PSTeps:LIMit:<standard>:<device>:PDELta:LOWer
[:DATA] <dB>
```

```
:CALCulate:PSTeps:LIMit:<standard>:<device>:PDELta:LOWer
[:DATA]?
```

Set the delta power step lower limit.

<standard> = GSM450 | GSM480 | GSM850 | PGSM900 | EGSM900 | RGSM900 | DCS1800 | PCS1900

<device> = MS | BTS | UBTS1 | UBTS2 | UBTS3 | PBTS1

    MS – Mobile station transmitter

    BTS – Base station transmitter

    UBTS1 – Micro base station class M1 transmitter

    UBTS2 – Micro base station class M2 transmitter

    UBTS3 – Micro base station class M3 transmitter

    PBTS1 – Pico base station class P1 transmitter

Factory Preset
and *RST: Values default to the GSM/DCS/PCS standards as shown in Table 2-37.

Range: 0 to 200

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Limit...**

Table 2-37 **Power Steps Commands: Default Values**

	Power Step Upper Limit (dB) PDEL:UPP	**Power Step Lower Limit (dB) PDEL:LOW**
GSM450 BTS	3.5	0.5
GSM480 BTS	3.5	0.5
GSM850 BTS	3.5	0.5
PGSM900 BTS	3.5	0.5

Table 2-37   Power Steps Commands: Default Values

	Power Step Upper Limit (dB) PDEL:UPP	Power Step Lower Limit (dB) PDEL:LOW
EGSM900 BTS	3.5	0.5
RGSM900 BTS	3.5	0.5
DCS1800 BTS	3.5	0.5
PCS1900 BTS	3.5	0.5
GSM450 MS	3.5	0.5
GSM480 MS	3.5	0.5
GSM850 MS	3.5	0.5
PGSM900 MS	3.5	0.5
EGSM900 MS	3.5	0.5
RGSM900 MS	3.5	0.5
DCS1800 MS	3.5	0.5
PCS1900 MS	3.5	0.5

Receive Band Spurious - Limits

Receive Band Spurious Limit

`:CALCulate:RSPur:LIMit:<standard>:<device>[:IDLE][:UPPer][:DATA]<dBm>`

`:CALCulate:RSPur:LIMit?`

Set the maximum limit value for the current measurement.

<standard> = GSM450|GSM480|GSM850|PGSM900|EGSM900 |RGSM900|DCS1800|PCS1900

<device> = MS|BTS|UBTS1|UBTS2|UBTS3|PBTS1

    MS – Mobile station transmitter

    BTS – Base station transmitter

    UBTS1 – Micro base station class M1 transmitter

    UBTS2 – Micro base station class M2 transmitter

    UBTS3 – Micro base station class M3 transmitter

    PBTS1 – Pico base station class P1 transmitter

Factory Preset
and *RST: Limit values default to the GSM/DCS/PCS standards

as shown in Table 2-38.

Range: -200 to 100

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Limit....**

Table 2-38 **Receive Band Spurious Command: Default Limit Values**

Standard	MS	BTS	UBTS1	UBTS2	UBTS3	PBTS1
GSM450	-67.0	-98.0	-91.0	-86.0	-81.0	-70.0
GSM480	-67.0	-98.0	-91.0	-86.0	-81.0	-70.0
GSM850	-79.0	-98.0	-91.0	-86.0	-81.0	-70.0
PGSM900	-79.0	-98.0	-91.0	-86.0	-81.0	-70.0
EGSM900	-67.0	-98.0	-91.0	-86.0	-81.0	-70.0
RGSM900	-60.0	-89.0	-91.0	-86.0	-81.0	-70.0
DCS1800	-71.0	-98.0	-96.0	-91.0	-86.0	-80.0
PCS1900	-71.0	-98.0	-96.0	-91.0	-86.0	-80.0

Transmit Band Spurious - Limits

Transmit Band Spurious Limit

`:CALCulate:TSPur:LIMit:<standard>:<device>:<idle mode>`
`[:UPPer][:DATA] <dBm>`

`:CALCulate:TSPur:LIMit?`

Set the maximum limit value for the current measurement.

<standard> = GSM450|GSM480|GSM850|PGSM900|EGSM900|RGSM900|DCS1800|PCS1900

<device> = MS|BTS|UBTS1|UBTS2|UBTS3|PBTS1

MS – Mobile station transmitter

BTS – Base station transmitter

UBTS1 – Micro base station class M1 transmitter

UBTS2 – Micro base station class M2 transmitter

UBTS3 – Micro base station class M3 transmitter

PBTS1 – Pico base station class P1 transmitter

<idle mode> = :IDLE|[ACTIVE]

Factory Preset
and *RST: Limit values default to the GSM/DCS/PCS standards
               as shown in Table 2-39.

Range: -200 to 100 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use
               INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Limit....**

Table 2-39   **Transmit Band Spurious Command: Default
                      Limit Values**

Standard	Active Mode	Idle Mode
GSM450 BTS	-36.0	-36.0
GSM480 BTS	-36.0	-36.0
GSM850 BTS	-36.0	-36.0
PGSM900 BTS	-36.0	-36.0
EGSM900 BTS	-36.0	-36.0

Table 2-39   **Transmit Band Spurious Command: Default
Limit Values**

Standard	Active Mode	Idle Mode
RGSM900 BTS	-36.0	-36.0
DCS1800 BTS	-36.0	-36.0
PCS1900 BTS	-36.0	-36.0
GSM450 MS	-36.0	-57.0
GSM480 MS	-36.0	-57.0
GSM850 MS	-36.0	-57.0
PGSM900 MS	-36.0	-59.0
EGSM900 MS	-36.0	-59.0
RGSM900 MS	-42.0	-59.0
DCS1800 MS	-36.0	-53.0
PCS1900 MS	-36.0	-53.0

CONFigure Subsystem

The CONFigure commands are used with several other commands to control the measurement process. These commands are described in the section on the "MEASure Group of Commands" on page 65.

Each measurement sets the instrument state that is appropriate for that measurement. Other commands are available for each **Mode** to allow changing settings, view, limits, etc. Refer to:

> SENSe:<measurement>, SENSe:CHANnel, SENSe:CORRection, SENSe:FREQuency, SENSe:POWer, SENSe:RADio, SENSe:SYNC
> CALCulate:<measurement>, CALCulate:CLIMits
> DISPlay:<measurement>
> TRIGger

Configure the Selected Measurement

`:CONFigure:<measurement>`

A CONFigure command must specify the desired measurement. It will set the instrument settings for that measurements standard defaults, but will not initiate the taking of data. The available measurements are described in the MEASure subsystem.

DISPlay Subsystem

The DISPlay controls the selection and presentation of textual, graphical, and TRACe information. Within a DISPlay, information may be separated into individual WINDows.

Display Output RF Spectrum Measurement Results

`:DISPlay:ORFSpectrum:TABLe RESults|LIMits|MARGins`

Displays the Output RF Spectrum Measurement results in tabular form, allowing the user to switch between displaying results, applied limits and margins of error for six offset frequencies

Factory Preset
and *RST: Results

Front Panel
Access: **Display**

FETCh Subsystem

The FETCh? commands are used with several other commands to control the measurement process. These commands are described in the section on the "MEASure Group of Commands" on page 65.

FETCh subsystem commands apply only to measurements found in the MEASURE menu. FETCh commands can only be used as queries.

FETCh commands put valid data into the output buffer, but do not initiate data acquisition. Use the :INITiate[:IMMediate] command to acquire data. You can only fetch results from the measurement that is selected, and when current measurement results are valid.

:FETCh <meas>? will return valid data only when the measurement is in one of the following states:

    idle
    initiated
    paused

Fetch the Current Measurement Results

`:FETCh:<measurement>[n]?`

A FETCh? command must specify the desired measurement. It will return the valid results that are currently available, but will not initiate the taking of any new data. You can only fetch results from the measurement that is currently selected. The code number n selects the kind of results that will be returned. The available measurements and data results are described in the "MEASure Group of Commands" on page 65.

INITiate Subsystem

The INITiate subsystem is used to control the initiation of the trigger. Refer to the TRIGger and ABORt subsystems for related commands.

Continuous or Single Measurements

`:INITiate:CONTinuous OFF|ON|0|1`

`:INITiate:CONTinuous?`

Selects whether the trigger system is continuously initiated or not.

This command affects sweep in normal spectrum analyzer mode, and affects trigger when in a measurement. A "measurement" refers to any of the functions under the MEASURE key. This corresponds to continuous sweep or single sweep operation when not in a measurement, and continuous measurement or single measurement operation when in a measurement.

NOTE   When not in a measurement, this command does the following:

- When ON at the completion of each sweep cycle, the sweep system immediately initiates another sweep cycle.

- When OFF, the sweep system remains in the "idle" state until an :INITiate[:IMMediate] command is received. On receiving the :INITiate[:IMMediate] command, it will go through a single sweep cycle, and then return to the "idle" state.

- The query returns 1 or 0 into the output buffer. 1 is returned when there is continuous sweeping. 0 is returned when there is only a single sweep.

When in a measurement, this command does the following:

- When ON at the completion of each trigger cycle, the trigger system immediately initiates another trigger cycle.

- When OFF, the trigger system remains in an "idle" state until CONTinuous is set to ON or an :INITiate[:IMMediate] command is received. On receiving the :INITiate[:IMMediate] command, it will go through a single trigger cycle, and then return to the "idle" state.

- The query returns 1 or 0 into the output buffer. 1 is returned when there is continuous triggering. 0 is returned when there is only a single trigger.

Factory Preset: On

*RST: On (OFF recommended for remote operation)

Front Panel
Access: **Single**

                Meas Control, Measure Cont Single

Take New Data Acquisitions

`:INITiate[:IMMediate]`

This command initiates a sweep if not in a measurement. If in a measurement and the measurement is in the idle state (i.e. not running), it triggers the instrument if trigger conditions are met. If the measurement is currently running, the command is ignored. A "measurement" refers to any function under the MEASURE key.

Remarks: See also the *TRG command and the TRIGger subsystem.

                Use the [:SENSe]:<meas>:TRIGger:SOURce command to select the desired trigger. The instrument must be in the single measurement mode. If :INITiate:CONTinuous is ON then the command is ignored.

                Use :FETCh? to transfer a measurement result from memory to the output buffer. Refer to individual commands in the FETCh subsystem for more information.

                If the analyzer is in signal identification mode, two sweeps are required, as this mode relies on the acquisition of data from two successive sweeps. Therefore, if the analyzer is in single sweep mode, two sweep triggers are needed to generate the sweep pair. In image suppress mode, synchronization is ensured by first turning off signal identification, initiating a single sweep, then turning on signal identification followed by two single sweeps. See [:SENSe]:SIDentify for more information about signal identification state.

Front Panel
Access: **Sweep, Sweep Cont Single** (SA mode)

                Single

                Meas Control, Measure Cont Single

Pause the Measurement

`:INITiate:PAUSe`

Pauses the current measurement by changing the current measurement state from the "wait for trigger" state to the "paused" state. If the measurement is not in the "wait for trigger" state, when the command is issued, the transition will be made the next time that state is entered as part of the trigger cycle. When in the paused state, the spectrum analyzer auto-align process stops. If the analyzer is paused for a long period of time, measurement accuracy may degrade.

Front Panel
Access: **Meas Control, Pause**

Restart the Measurement

`:INITiate:RESTart`

This command applies to measurements found in the MEASURE menu.

It restarts the current measurement from the "idle" state regardless of its current operating state. It is equivalent to:

INITiate[:IMMediate] (for single measurement mode)

ABORt (for continuous measurement mode)

Front Panel
Access: **Restart**

                        or

                Meas Control, Restart

Resume the Measurement

`:INITiate:RESume`

Resumes the current measurement by changing the current measurement state from the "paused state" back to the "wait for trigger" state. If the measurement is not in the "paused" state, when the command is issued, an error is reported. Only include if INIT:IMM is implemented as an overlapping command. Note: INITiate:PAUSE was TEST:RESume.

Front Panel
Access: **Meas Control, Resume**

INSTrument Subsystem

This subsystem includes commands for querying and selecting instrument measurement (personality option) modes.

Catalog Query

`:INSTrument:CATalog?`

Returns a comma separated list of strings which contains the names of all installed applications.

Select Application by Number

`:INSTrument:NSELect <integer>`

`:INSTrument:NSELect?`

Select the measurement application by its instrument number. The actual available choices depends upon which applications are installed in the instrument.

> 1 = SA
>
> 3 = GSM
>
> 4 = cdmaOne
>
> 10 = Bluetooth
>
> 14 = phase noise

NOTE If you are using the SCPI status registers and the analyzer mode is changed, the status bits should be read, and any errors resolved, prior to switching modes. Error conditions that exist prior to switching modes cannot be detected using the condition registers after the mode change. This is true unless they recur after the mode change, although transitions of these conditions can be detected using the event registers.

Changing modes resets all SCPI status registers and mask registers to their power-on defaults. Hence, any event or condition register masks must be re-established after a mode change. Also note that the power up status bit is set by any mode change, since that is the default state after power up.

Factory Preset
and *RST: Persistent state with factory default of 1

Range: 1 to x, where x depends upon which applications are installed.

Front Panel
Access: **Mode**

Select Application

```
:INSTrument[:SELect]
  'SA'|'GSM'|'CDMA'|'PNOISE'|'Bluetooth'|

:INSTrument[:SELect]?
```

Select the measurement application mode by enumerated choice. The actual available choices depend upon which applications (modes) are installed in the instrument. See the manual for installed options for the mode designator (if any) for that option.

Once the instrument mode is selected, only the commands that are valid for that mode can be executed.

NOTE   If you are using the status bits and the analyzer mode is changed, the status bits should be read, and any errors resolved, prior to switching modes. Error conditions that exist prior to switching modes cannot be detected using the condition registers after the mode change. This is true unless they recur after the mode change, although transitions of these conditions can be detected using the event registers.

Changing modes resets all SCPI status registers and mask registers to their power-on defaults. Hence, any event or condition register masks must be re-established after a mode change. Also note that the power up status bit is set by any mode change, since that is the default state after power up.

Factory Preset
and *RST: Persistent state with factory default of Spectrum
                Analyzer

Front Panel
Access: **Mode**

MEASure Group of Commands

This group includes the CONFigure, FETCH, MEASure, and READ commands that are used to make measurements and return results. The different commands can be used to provide fine control of the overall measurement process, like altering measurement parameters from their default settings. Most measurements should be done in single measurement mode, rather than doing the measurement continuously.

Measure Commands

`:MEASure:<measurement>[n]?`

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Radio Standard that is currently selected.

- Stops the current measurement and sets up the instrument for the specified measurement using the factory defaults

- Initiates the data acquisition for the measurement

- Blocks other SCPI communication, waiting until the measurement is complete before returning results.

- Turns the averaging function on and sets the number of averages to 10 for all measurements.

- After the data is valid it returns the scalar results, or the trace data, for the specified measurement.

  If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command, or the INITiate and FETCh? commands, to initiate the measurement and query the results. See Figure 2-1 on page 66.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command or INITiate and FETCh? commands, to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Figure 2-1   **Measurement Group of Commands**

ca81a
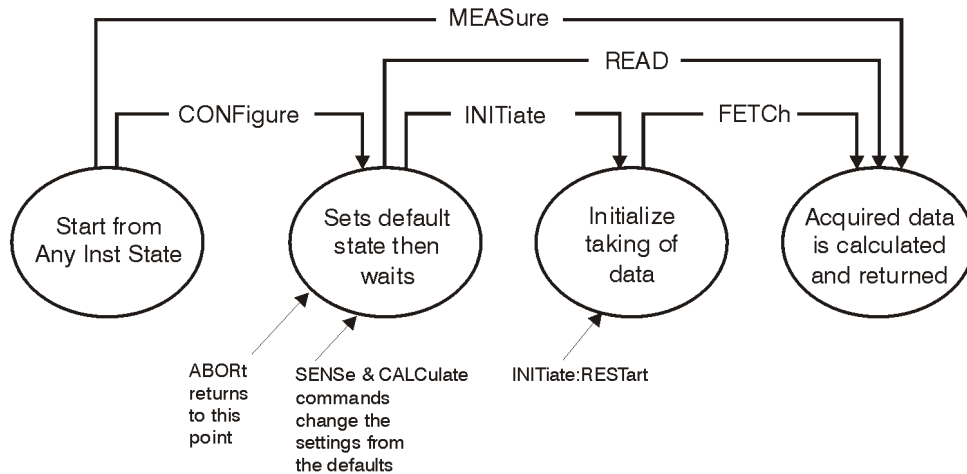
Configure Commands

`:CONFigure:<measurement>`

This command stops the current measurement and sets up the instrument for the specified measurement using the factory default instrument settings. It does not initiate the taking of measurement data. This command also turns the averaging function on and sets the number of averages to 10 for all measurements.

The CONFigure? query returns the current measurement name.

Fetch Commands

`:FETCh:<measurement>[n]?`

This command puts selected data from the most recent measurement into the output buffer (data acquisition is not initiated, however). Use the INITiate[:IMMediate] command to acquire data before you use the FETCh command. You can only fetch results from the measurement that is currently selected.

If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each

command for details of what types of scalar results or trace data results are available.

FETCh may be used to return results other than those specified with the READ or MEASure commands.

Read Commands

`:READ:<measurement>[n]?`

- Does not preset the measurement to the factory defaults. (The MEASure? and CONFigure? commands reset the parameters to the default values.) READ uses the settings from the last measurement.

- Initiates the measurement which puts new data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.

- Blocks other SCPI communication, waiting until the measurement is complete before returning the results

  If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Cable Fault Location Measurement

Displays the reflected signal of a transmission line as a function of the distance down the line. This complements the return loss measurement. If a cable under test fails a return loss measurement, the cable fault location measurement can be used to identify the location of the fault. The measurement is particularly useful when a base station and antenna are connected by a long length of cable

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:CFLocation commands for more measurement related commands.

`:CONFigure:CFLocation`

`:FETCh:CFLocation[n]?`

`:READ:CFLocation[n]?`

`:MEASure:CFLocation[n]?`

Front Panel
Access: **Measure, Cable Fault Location**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

n	Results Returned
not specified or n=1	Returns Seven scalar values: 1. **Max Range** 2. **Marker Distance** 3. **Marker Amplitude** 4. **Marker Amplitude Coeff (rho)** 5. **Accuracy** 6. **Velocity Factor** 7. **Cable Loss**
2	Returns the RF Envelope Trace (data array). The number of data points in the array depends on the settings in use. The default number of data points is 512.
3	Returns the FFT Trace (data array). The number of data points in the array depends on the settings in use. The default number of data points is 512.

Monitor Band/Channel Measurement

Verified the GSM band and channels are free of interference by measuring the spurious signals in the bands and channels specified by the selected standard and tuning plan.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:MONitor commands for more measurement related commands.

:CONFigure:MONitor

:FETCh:MONitor[n]

:READ:MONitor[n]

:MEASure:MONitor[n]

Front Panel
Access: **Measure, Monitor Band/Channel**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

n	Results Returned
not specified or n=1	Returns one scalar value: Total Power (only for band meas)
2	Returns the RF Envelope Trace (data array). This data array contains 401 data points.
3	Returns the Max Hold Trace (data array). This trace contains 401 data points.

Out of Band Spurious Emissions Measurement

This measures the out of band spurious emissions relative to the receive channel power in the selected channel. You must be in the GSM or cdmaOne mode to use these commands. Use INSTrument:SELect to set the mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:OOBSpur commands for more measurement related commands.

`:CONFigure:OOBSpur`

`:FETCh:OOBSpur[n]?`

`:READ:OOBSpur[n]?`

`:MEASure:OOBSpur[n]?`

Front Panel
Access:.   **Measure, Out Of Band Spurious**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

n	Results Returned
not specified or n=1	Returns a list of spurious result values for each of the spurs found: 1. Frequency (a) Hz 2. Amplitude (a) dBm 3. Limit specification (a) dBm 4. Delta from limit (a) dB Where a = 0 to number of spurs (variable).
2	Returns the number of spurs found.

Output RF Spectrum Measurement

This measures adjacent channel power. From 1 to 15 offsets can be measured at one time. You must be in the GSM mode to use these commands. Use INSTrument:SELect to set the mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:ORFSpectrum commands for more measurement related commands.

:CONFigure:ORFSpectrum

:FETCh:ORFSpectrum[n]?

:READ:ORFSpectrum[n]?

:MEASure:ORFSpectrum[n]?

Front Panel
Access: **Measure, Output RF Spectrum**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

The default settings for the MEASure command only measure the carrier and 5 standard offsets. The default does not measure the switching transients. If you use the CONFigure, INITiate, and FETCh commands in place of the MEASure command, you can then use the SENSe commands to change the settings from these defaults.

Measurement Method	n	Results Returned
Single offset	not specified or n=1	Returns 4 comma-separated results for the specified offset: 1. Modulation spectrum power, dB 2. Modulation spectrum power, dBm 3. Switching transient power, dB 4. Switching transient power, dBm

Measurement Method	n	Results Returned
Multiple offsets	not specified or n=1	Returns a list of comma-separated values for the modulation spectrum at all the offsets (lower and upper.) This is followed by the switching transients results at all the offsets (lower and upper). Note that the carrier is considered offset zero (0) and is the first set of results sent. Four values are provided for each of the offsets (including the carrier), in this order: 1. Negative offset(a) - power relative to carrier (dB) 2. Negative offset(a) - absolute average power (dBm) 3. Positive offset(a) - power relative to carrier (dB) 4. Positive offset(a) - absolute average power (dBm) Values for all possible offsets are sent. Zeros are sent for offsets that have not been defined. The total number of values sent (120) = (4 results/offset) × (15 offsets) × (2 measurement types - modulation & switching) Carrier - modulation measurement values Offset 1 - modulation measurement values and so on Offset 14 - modulation measurement values Carrier - switching transients measurement values Offset 16 - switching transients measurement values Offset 29 - switching transients measurement values and so on This measurement defaults to modulation measurements and not switching measurements. If you want to return the switching measurement values, you must change that default condition and use FETCh or READ to return values, rather than MEASure. NOTE: When using custom modulation and switching offsets the maximum number of measured values returned is: 13 modulation offsets + 0 Hz carrier 4 switching offsets + 0 Hz carrier
Swept	Not specified, or n=1	Returns l boolean value: 1 if limits passed, 0 if limits failed.
Single offset	2	Returns floating point numbers (in dBm) of the captured trace data. It contains 401 data points of the "spectrum due to modulation" signal.
Swept	2	Returns floating point numbers (in dBm) of the captured trace data. It contains 401 points of the "spectrum due to modulation" signal.
Single offset	3	Returns floating point numbers (in dBm) of the captured trace data. It contains 401 points of the "spectrum due to switching transients" signal.

Measurement Method	n	Results Returned
Swept	3	Returns floating point numbers (in dBm) of the captured trace data. It contains 401 points of the "spectrum due to switching transients" signal.

Phase & Frequency Error Measurement

This measures the modulation quality of the transmitter by checking phase and frequency accuracy. You must be in the GSM mode to use these commands. Use INSTrument:SELect to set the mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:PFERror commands for more measurement related commands.

`:CONFigure:PFERror`

`:FETCh:PFERror[n]?`

`:READ:PFERror[n]?`

`:MEASure:PFERror[n]?`

Front Panel
Access: **Measure, Phase & Freq**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

n	Results Returned
0	Returns a series of floating point numbers (in volts) that represent each sample of the complete current time record **raw I/Q vector trace length** scalar value (giving the total number of I/Q vector sample pairs = n/2).
	The I/Q vector sample pair data is organized as: I(0), Q(0), I(1), Q(1), ------------- I([n/2]-1), Q([n/2]-1)
	The start of bit 0 (zero) of the useful part of the measured GSM burst within the vector sample pairs is located at: I(x/2), Q(x/2) where x = raw I/Q vector trace index to burst.

n	Results Returned
not specified or n=1	Returns the following 15 scalar values: 1. **RMS phase error** is a floating point number (in degrees) of the rms phase error between the measured phase and the ideal phase. The calculation is based on symbol decision points and points halfway between symbol decision points (i.e. 2 points/symbol). If averaging is on, this is the average of the individual rms phase error measurements. 2. **Peak phase error** is a floating point number (in degrees) of the peak phase error of all the individual symbol decision points (prior to the rms averaging process). If averaging is on, this is the average of the individual peak phase error measurements. 3. **Peak phase symbol** is a floating point number (in symbols) representing the symbol number at which the peak phase error occurred. Averaging does not affect this calculation. 4. **Frequency error** is a floating point number (in Hz) of the frequency error in the measured signal. This is the difference between the measured phase trajectory and the reference phase trajectory. If averaging is on, this is the average of the individual frequency error measurements. 5. **I/Q offset** is a floating point number (in dB) of the I and Q error (magnitude squared) offset from the origin. If averaging is on, this is the average of the individual IQ Offset measurements. 6. **Trace phase sample** is a floating point number (in units of bits) representing the time between samples. It is used in querying phase error vector traces. 7. **Trace bit 0 decision offset** is an integer number in units of sample pairs for the sample points in an I/Q vector trace that represents the bit 0 (zero) decision point. The sample pairs in the trace are numbered 0 to N. 8. **Trace sync start** is an integer number in units of bits for the bit number, within the data bits trace, that represents the start of the sync word. 9. **Trace time sample** is a floating point number (in seconds) of the time between samples. It is used in querying time domain traces. For the n=0 trace, of acquired I/Q pairs, this is the time between pairs. 10. **Phase error trace length** is an integer number (in units of samples) representing the number of samples returned by the current phase error trace and phase error frequency trace. 11. **RF envelope trace length** is an integer number (in units of samples) representing the number of samples returned by the current RF envelope trace. 12. **RF envelope trace index to burst** is an integer number (in units of samples) representing the trace sample which represents the start of bit 0 (zero) decision point of the useful part of the measured GSM burst.

n	Results Returned
not specified or n=1 (cont.)	13. I/Q vector trace length is an integer number (in units of samples) representing the number of samples returned by the current IQ Vector Trace (i.e. this number divided by two represents the number of sample pairs in the trace.)
	14. Raw I/Q vector trace length is an integer number (in units of samples) representing the number of samples returned by the current Raw IQ Vector Trace (i.e. this number divided by two represents the number of sample pairs in the trace.
	15. Raw I/Q vector trace index to burst is an integer number (in units of samples) representing the trace sample which represents the start of bit 0 (zero) decision point of the useful part of the measured GSM burst.
2	Returns a series of floating point numbers (in degrees) that represent each sample of the current phase error trace data over the useful part of the measured GSM burst. It contains n samples, where n = **phase error trace length** scalar value. The first sample represents the start of bit 0 (zero) of the useful part of the demodulated burst.
3	Returns a series of floating point numbers (in degrees) that represent each sample of the current phase error with frequency trace data over the useful part of the measured GSM burst. Phase error with frequency is the error vector between the measured phase (that has not had frequency compensation) and the ideal reference phase. It contains n samples, where n = **phase error trace length** scalar value. The first sample represents the start of bit 0 (zero) of the useful part of the demodulated burst.
4	Returns a series of floating point numbers (in dB relative to peak of signal) that represent each sample of the complete current time record RF envelope trace data. It contains n samples where n = **RF envelope trace length** scalar value.
	The start of bit 0 (zero) of the useful part of the measured GSM burst within the sample time record is located at the point referred to by 'RF envelope trace index to burst'.

n	Results Returned
5	Returns a series of floating point numbers (with magnitudes normalized to 1) that represent each sample of the current correlated I/Q vector trace data over the useful part of the measured GSM burst. It contains n samples where n = **I/Q vector trace length** scalar value (giving the total number of I/Q vector sample pairs = n/2. The I/Q vector sample pair data is organized as: I(0), Q(0), I(1), Q(1), ------------- I([n/2]-1), Q([n/2]-1) The decision point pairs are located at: I(d), Q(d) I(d+10), Q(d+10) I(d+20), Q(d+20) and so on. where d = **trace bit 0 decision offset**.

Power Steps Measurement

This measurement uses long sweep times to display the different power steps resulting from adaptive power control. You must be in GSM mode to use these commands. Use INSTrument:SELect to set the mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:PSTeps commands for more measurement related commands.

```
:CONFigure:PSTeps
```

```
:FETCh:PSTeps[n]?
```

```
:READ:PSTeps[n]?
```

```
:MEASure:PSTeps[n]?
```

Front Panel
Access: **Measure, Power Steps**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

n	Results Returned
not specified or n=1	Returns 5 scalar values: 1. **Power Difference** is the relative difference in power (in dB) between the two active marker positions. 2. **Time Difference** is the relative difference in time (in seconds) between the two active marker positions. 3. **Mean Carrier Power** is the mean power (in dBm) of the trace data between the two active marker positions. 4. **Max Carrier Power** is the maximum power (in dBm) of the trace data between the two active marker positions. 5. **Min Carrier Power** is the minimum power (in dBm) of the trace data between the two active marker positions.

Power vs. Time Measurement

This measures the average power during the "useful part" of the burst comparing the power ramp to required timing mask. You must be in GSM mode to use these commands. Use INSTrument:SELect to set the mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:PVTime commands for more measurement related commands.

```
:CONFigure:PVTime
```

```
:FETCh:PVTime[n]?
```

```
:READ:PVTime[n]?
```

```
:MEASure:PVTime[n]?
```

Front Panel
Access: **Measure, Power vs Time**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

n	Results Returned
not specified or n=1	Returns the following comma-separated scalar results: 1. **Sample time** is a floating point number that represents the time between samples when using the trace queries (n=0,2,etc.). 2. **Power of single burst** is the mean power (in dBm) across the useful part of the selected burst in the most recently acquired data, or in the last data acquired at the end of a set of averages. If averaging is on, the power is for the last burst. 3. **Power averaged** is the power (in dBm) of N averaged bursts, if averaging is on. The power is averaged across the useful part of the burst. Average *m* is a single burst from the acquired trace. If there are multiple bursts in the acquired trace, only one burst is used for average *m*. This means that N traces are acquired to make the complete average. If averaging is off, the value of **power averaged** is the same as the **power single burst** value. 4. **Number of samples** is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0,2,etc.). 5. **Start point of the useful part of the burst** is the index of the data point at the start of the useful part of the burst 6. **Stop point of the useful part of the burst** is the index of the data point at the end of the useful part of the burst 7. **Index of the data point where T_0 occurred.** 8. **Burst width of the useful part of the burst** is the width of the burst measured at –3dB below the mean power in the useful part of the burst. 9. **Maximum value** is the maximum value of the most recently acquired data (in dBm). 10. **Minimum value** is the minimum value of the most recently acquired data (in dBm). 11. **Burst search threshold** is the value (in dBm) of the threshold where a valid burst is identified, after the data has been acquired.
2	Returns the entire captured RF envelope (data array). It is represented as log-magnitude versus time. The number of data points contained in the array is determined by the Trace Points setting. The default number of data points is 1601.

Receiver Spurious Response Measurement

This measures the spurious emissions in the receive band relative to the channel power in the selected channel. You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:RSPur commands for more measurement related commands.

:CONFigure:RSPur

:FETCh:RSPur[n]?

:READ:RSPur[n]?

:MEASure:RSPur[n]?

Front Panel
Access:.   **Measure, RX Spur**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

n	Results Returned
not specified or n=1	Returns 3 comma-separated scalar results for the worst spur 1. The worst spur's frequency (in Hz) 2. The worst spur's amplitude (in dB relative to the limit) 3. This is not supported in GSM, and a value of Float32NAN (9.9099E37) will be returned
n=2	Returns the current trace data (401 data points, comma separated list of real numbers)

Transmit Band Spurs Measurement

This measures the spurious emissions in the transmit band relative to the channel power in the selected channel. You must be in the GSM mode to use these commands. Use INSTrument:SELect to set the mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:TSPur commands for more measurement related commands.

```
:CONFigure:TSPur
```

```
:FETCh:TSPur[n]?
```

```
:READ:TSPur[n]?
```

```
:MEASure:TSPur[n]?
```

History: Version A.03.00 or later

Front Panel
Access: **Measure, Tx Band Spurs**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

n	Results Returned
Not specified or n=1	Returns 3 comma-separated scalar results: 1. The frequency of the worst spur (in Hz) 2. The amplitude of the worst spur relative to limit (in dB) 3. Float32NAN (9.9099E37) is returned at all times for GSM
2	Returns the current trace data (401 point real number comma separated list).

Transmit Power Measurement

This measures the power in the channel. It compares the average power of the RF signal burst to a specified threshold value. You must be in the GSM mode to use these commands. Use INSTrument:SELect to set the mode.

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSe:TXPower commands for more measurement related commands.

`:CONFigure:TXPower`

`:FETCh:TXPower[n]?`

`:READ:TXPower[n]?`

`:MEASure:TXPower[n]?`

Front Panel
Access: **Measure, Transmit Power**

After the measurement is selected, press **Restore Meas Defaults** to restore factory defaults.

Measurement Results Available

n	Results Returned
not specified or n=1	Returns the following comma-separated scalar results: 1. **Sample time** is a floating point number representing the time between samples when using the trace queries (n=0,2,etc). 2. **Power** is the mean power (in dBm) of the power above the threshold value. If averaging is on, the power is for the latest acquisition. 3. **Power averaged** is the threshold power (in dBm) for N averages, if averaging is on. An average consists of N acquisitions of data which represents the current trace. If averaging is off, the value of **power averaged** is the same as the **power** value. 4. **Number of samples** is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0,2,etc.). 5. **Threshold value** is the threshold (in dBm) above which the power is calculated. 6. **Threshold points** is the number of points that were above the threshold and were used for the power calculation. 7. **Maximum value** is the maximum of the most recently acquired data (in dBm). 8. **Minimum value** is the minimum of the most recently acquired data (in dBm).

n	Results Returned
2	Returns the RF Envelope Trace (data array). This array contains 401 points of data.

MMEMory Subsystem

The purpose of the MMEMory subsystem is to provide access to mass storage devices such as internal or external disk drives. Any part of memory that is treated as a device will be in the MMEMory subsystem.

The purpose of the MMEMory subsystem is to provide access to mass storage devices such as internal or external disk drives.

NOTE   Refer also to :CALCulate and :TRACe subsystems for more trace and limit line commands.

Agilent ESA analyzers use two types of mass storage devices:

- 3.5 inch disk drive (high density, 1.44 MBytes formatted) designated "A:"

- Part of flash memory and treated as a device designated "C:"

The MMEMory command syntax term <file_name> is a specifier having the form: drive:name.ext, where the following rules apply:

- "drive" is "A:" or "C:"

- "name" is a DOS file name of up to eight characters, letters (A-Z, a-z) and numbers (0-9) only (lower case letters are read as uppercase)

- "ext" is an optional file extension using the same rules as "name," but consists of up to three characters total. (The default file extension will be added if it is not specified.)

Store a Measurement Results in a File

`:MMEMory:STORe:RESults filename.csv`

Saves the measurement results to a file in memory. The file name must have a file extension of .csv and will be in the CSV (comma-separated values) format.

Example: MMEM:STOR:RES 'C:mymeas.csv'

Front Panel
Access: **File**, **Save**, **Type, Measurement Results**

READ Subsystem

The READ? commands are used with several other commands and are documented in the section on the "MEASure Group of Commands" on page 65.

SENSe Subsystem

Sets the instrument state parameters so that you can measure the input signal.

SENSe subsystem commands used for measurements in the MEASURE and Meas Setup menus may only be used to set parameters of a specific measurement when the measurement is active. Otherwise, an error will occur. You must first select the appropriate measurement using the :CONFigure:<measurement> command. If a :SENSe command is used to change a parameter during a measurement (while not in its idle state), the measurement will be restarted.

Cable Fault Location Measurement

Commands for querying the cable fault location measurement results and for setting to the default values are found in the MEASure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Cable Fault** measurement has been selected from the **MEASURE** key menu.

Cable Fault Location—Average Count

`[:SENSe]:CFLocation:AVERage:COUNt <integer>`

`[:SENSe]:CFLocation:AVERage:COUNt?`

Set the number of sweeps that will be averaged. After the specified number of sweeps (average counts) have been averaged, the averaging mode (termination control) setting determines the averaging action.

Factory Preset
and *RST: 10

Range: 1 to 1,000

Remarks: You must be in GSM mode to use this command. Use
                INSTrument:SELect to set the mode.

Cable Fault Location—Averaging State

`[:SENSe]:CFLocation:AVERage[:STATe] ON|OFF|1|0`

`[:SENSe]:CFLocation:AVERage:STATe?`

Turn cable fault location averaging on or off.

Factory Preset
and *RST: On

Remarks: You must be in GSM mode to use this command. Use
                INSTrument:SELect to set the mode.

Cable Fault Location—Averaging Termination Control

`[:SENSe]:CFLocation:AVERage:TCONtrol EXPonential|REPeat`

`[:SENSe]:CFLocation:AVERage:TCONtrol?`

Select the type of termination control used for averaging. This determines the averaging action after the specified number of frames (average count) is reached.

   Exponential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the existing average.

Repeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset
and *RST: Exp

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Cable Fault Location—Resolution Bandwidth

`[:SENSe]:CFLocation:BANDwidth|BWIDth[:RESolution] <freq>`

`[:SENSe]:CFLocation:BANDwidth|BWIDth:[RESolution?]`

Set the resolution BW. This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default may cause invalid measurement results.

Factory Preset
and *RST: 3 MHz

Default Unit: Hz

Range: ESA model dependent.

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Cable Fault Location—Resolution Bandwidth Coupling Mode

`[:SENSe]:CFLocation:BANDwidth|BWIDth[:RESolution]:RAUTo ON|OFF|1|0`

`[:SENSe]:CFLocation:BANDwidth|BWIDth:[:RESolution]RAUTo?`

Specify the resolution bandwidth (OFF or 0) or couple the resolution bandwidth to the frequency span (ON or 1).

Factory Preset
and *RST: Auto

Range: On/Off/1/0

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Cable Fault Location—Video Bandwidth

`[:SENSe]:CFLocation:BANDwidth|BWIDth:VIDeo <freq>`

`[:SENSe]:CFLocation:BANDwidth|BWIDth:VIDeo?`

Specifies the video bandwidth.

Factory Preset
and *RST: 3 MHz

Range: 1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Cable Fault Location—Video Bandwidth Coupling Mode

`[:SENSe]:CFLocation:BANDwidth|BWIDth:VIDeo:VAUTo ON|OFF|1|0`

`[:SENSe]:CFLocation:BANDwidth|BWIDth:VIDeo:VAUTo?`

Couples the video bandwidth to the resolution bandwidth.

Factory Preset
and *RST: On or 1

Range: On/Off/1/0

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Cable Fault Location—Calibrate

`[:SENSe]:CFLocation:CALibrate`

Calibrate for the measurement.

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Cable Fault Location—Cable Loss Per Meter

`[:SENSe]:CFLocation:CLOSs <cable loss dB>`

`[:SENSe]:CFLocation:CLOSs?`

Specify the known loss per meter for the cable to be measured.

Factory Preset
and *RST: 0 dB

Range: 0 to 5 dB

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Cable Fault Location—FFT Window

`[:SENSe]:CFLocation:FFT:WINDow`
`RECTangular|FTOP|GAUSsian|HANNing`

`[:SENSe]:CFLocation:FFT:WINDow?`

Specify the type of windowing function to apply when performing the FFT.

Factory Preset
and *RST: FTOP

Range   RECT/FTOP/GAUS/HANN

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Cable Fault Location—Center Frequency

`[:SENSe]:CFLocation:FREQuency:CENTer <freq>`

`[:SENSe]:CFLocation:FREQuency:CENTer?`

Set the center frequency.

Default Unit: Hz

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Cable Fault Location—Frequency Span

`[:SENSe]:CFLocation:FREQuency:SPAN <freq>`

`[:SENSe]:CFLocation:FREQuency:SPAN?`

Set the frequency span.

Default Unit: Hz

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Cable Fault Location—Start Frequency

`[:SENSe]:CFLocation:FREQuency:STARt <freq>`

`[:SENSe]:CFLocation:FREQuency:STARt?`

Set the start frequency.

Factory Preset
and *RST: 3 MHz

Default Unit: Hz

Range: ESA model dependent.

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Cable Fault Location—Stop Frequency

`[:SENSe]:CFLocation:FREQuency:STOP <freq>`

`[:SENSe]:CFLocation:FREQuency:STOP?`

Set the stop frequency.

Factory Preset
and *RST: 3 MHz

Default Unit: Hz

Range: ESA model dependent.

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Cable Fault Location—Distance Marker

`[:SENSe]:CFLocation:MARKer <distance>`

`[:SENSe]:CFLocation:MARKer?`

Adjust the position of the marker on the display.

Factory Preset
and *RST: 10 m

Range: 0 to the value of CFLocation:RANGe?
                  (for further information, refer to the next command)

Default Unit: meters

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Cable Fault Location—Number of Trace Points

`[:SENSe]:CFLocation:POINts <number of points>`

`[:SENSe]:CFLocation:POINts?`

Specify the number of trace points per sweep. Higher numbers of points

result in greater accuracy, but the measurements take longer to be performed.

Factory Preset
and *RST: 512

Range: Minimum: 128

                  Maximum: 8192

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

                  Measurements will be performed faster if you select a number which is a power of 2, for example 256, 512 or 1024.

Cable Fault Location—Trace Points

`[:SENSe]:CFLocation:POINts:AUTO AUTO|MANual|1|0`

`[:SENSe]:CFLocation:POINts:AUTO?`

Select auto or manual control of the number of trace points used in the measurement.

Factory Preset
and *RST: Auto

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

                  In AUTO mode, the number of points used is determined by a combination of factors such as range, resolution and measurement speed. In MANual mode, the minimum and maximum distances change depending on the number of trace points you have entered.

Cable Fault Location—Measured Range

`[:SENSe]:CFLocation:RANGe <distance>`

`[:SENSe]:CFLocation:RANGe?`

Specify the range in meters to be measured. This is usually slightly more than the DUT length.

Factory Preset
and *RST: 20 m

Range: Minimum: (trace pts/2)(speed of light x velocity factor)/2 x max span

Maximum: (trace pts/2)(speed of light x velocity factor)/2 x 100kHz.

Default Unit: meters

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Cable Fault Location—Measured Offset

`[:SENSe]:CFLocation:RANGe:OFFSet <distance>`

`[:SENSe]:CFLocation:RANGe:OFFSet?`

Specify the start position, measured in meters from the beginning of the DUT.

Factory Preset
and *RST: 0 m

Range: Minimum: 0 meters

Maximum: Must be less than the range specified in SENSe:CFLocation:RANGe command (above)

Default Unit: meters

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Cable Fault Location—TG Amplitude

`[:SENSe]:CFLocation:SOURce:POWer <dBm power>`

`[:SENSe]:CFLocation:SOURce:POWer?`

Set the tracking generator source power.

Factory Preset
and *RST: −10 dBm

Range: −66 to +3 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Cable Fault Location—Velocity Factor

`[:SENSe]:CFLocation:VFACtor <velocity factor>`

`[:SENSe]:CFLocation:VFACtor?`

Specify the speed a signal can travel through the cable as a factor of the speed of light in a vacuum(3×10^8)

Factory Preset
and *RST: 0.71

Range: 0 to 1

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Channel Commands

Select the ARFCN—Absolute RF Channel Number

`[:SENSe]:CHANnel:ARFCn <integer>`

`[:SENSe]:CHANnel:ARFCn?`

Set the analyzer to a frequency that corresponds to the ARFCN (Absolute RF Channel Number).

Factory Preset
and *RST: 38

Range: 0 to 124, and 975 to 1023 for E-GSM

                  1 to 124 for P-GSM

                  0 to 124, and 955 to 1023 for R-GSM

                  512 to 885 for DCS1800

                  512 to 810 for PCS1900

                  259 to 293 for GSM450

                  306 to 340 for GSM480

                  128 to 251 for GSM850

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

                  Global to the current mode.

Front Panel
Access: FREQUENCY Channel, ARFCN

Channel Burst Type

`[:SENSe]:CHANnel:BURSt NORMal|SYNC|ACCess`

`[:SENSe]:CHANnel:BURSt?`

Set the burst type that the analyzer will search for and to which it will sync. This only applies with normal burst selected.

   Normal: Traffic Channel (TCH) and Control Channel (CCH)

   Sync: Synchronization Channel (SCH)

   Access: Random Access Channel (RACH)

Remarks: Global to the current mode.

                  You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **FREQUENCY Channel, Burst Type**

Auto ARFCN

`[:SENSe]:CHANnel:LOCate`

Locate the strongest signal in the current band and update ARFCN accordingly. If there is no signal in the current band, other bands will be searched until a signal is detected

Remarks: Global to the current mode.

You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

This command cannot be queried.

Front Panel
Access: **FREQUENCY Channel, Auto ARFCN**

DCS/PCS Overlap Priority

`[:SENSe]:CHANnel:PREFerences DCS|PCS`

`[:SENSe]:CHANnel:PREFerences?`

Select a priority band when entering an ARFCN that is common to more than one band.

Factory Preset
and *RST: DCS

Remarks: Global to the current mode.

You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Mode Setup, Radio, DCS/PCS Overlap Priority**

Reference Burst Type

`[:SENSe]:CHANnel:RBURst NORMal|SYNC|ACCess`

`[:SENSe]:CHANnel:RBURSst?`

Select the type of burst to be used as the reference burst.

Factory Preset
and *RST: Normal

Remarks: Global to the current mode.

You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **FREQUENCY Channel, Timeslot, Ref Burst**

Reference Training Sequence Code

`[:SENSe]:CHANnel:RTSCode <integer>`

`[:SENSe]:CHANnel:RTSCode?`

Set the reference training sequence code to search for, with normal burst selected and RTSC auto set to off.

Factory Preset
and *RST: 0

Range: 0 to 7

Remarks: Global to the current mode.

                     You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **TIMESLOT, Ref TSC (Std)**

Reference Training Sequence Code Auto

`[:SENSe]:CHANnel:RTSCode:AUTO ON|OFF|1|0`

`[:SENSe]:CHANnel:RTSCode:AUTO?`

Select auto or manual control for reference training sequence code (RTSC) search. With auto on, the measurement is made on the first burst found to have one of the valid TSCs in the range 0 to 7 (i.e. normal bursts only). With auto off, the measurement is made on the 1st burst found to have the selected TSC.

Factory Preset
and *RST: Auto

Remarks: Global to the current mode.

                     You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **TIMESLOT, Ref TSC (Std)**

Frequency Hopping

`[:SENSe]:CHANnel:SFHopping ON|OFF|1|0`

`[:SENSe]:CHANnel:SFHopping?`

Set the signal's frequency hopping repetition factor on or off.

Factory Preset
and *RST: Off

Remarks: Global to the current mode.

                  You must be in the GSM mode to use this command.
                  Use INSTrument:SELect to set the mode.

Front Panel
Access: **Mode Setup, Radio, Frequency Hopping Repetition Factor**

Frequency Hopping Repetition Factor

`[:SENSe]:CHANnel:SFHRepeat <integer>`

`[:SENSe]:CHANnel:SFHRepeat?`

Set the frequency hopping repetition factor.

Factory Preset
and *RST: 3

Range: 1 to 100

Remarks: Global to the current mode.

                  You must be in the GSM mode to use this command.
                  Use INSTrument:SELect to set the mode.

Front Panel
Access: **Mode Setup, Radio, Frequency Hopping Repetition Factor**

Time Slot number

`[:SENSe]:CHANnel:SLOT <integer>`

`[:SENSe]:CHANnel:SLOT?`

Select the slot number that you want to measure.

In GSM mode the measurement frame is divided into the eight expected measurement timeslots.

Factory Preset
and *RST: 0

Range: 0 to 7

Remarks:

Front Panel
Access: **Frequency Channel, Timeslot, Timeslot**

Time Slot Auto

`[:SENSe]:CHANnel:SLOT:AUTO OFF|ON|0|1`

`[:SENSe]:CHANnel:SLOT:AUTO?`

Select auto or manual control for slot searching. The feature is only supported in external and frame trigger source modes. In external trigger mode when timeslot is set on, the demodulation measurement is made on the nth timeslot specified by the external trigger point + n timeslots, where n is the selected timeslot value 0 to 7. In frame trigger mode when timeslot is set on, then demodulation measurement is only made on the nth timeslot specified by bit 0 of frame reference burst + n timeslots, where n is the selected timeslot value 0 to 7 and where the frame reference burst is specified by Ref Burst and Ref TSC (Std) combination.

Factory Preset
and *RST: Off, for GSM mode

Remarks: You must be in GSM mode to use this command.Use
                 INSTrument:SELect to set the mode.

Front Panel
Access: **Frequency Channel, Timeslot, Timeslot**

Training Sequence Code (TSC)

`[:SENSe]:CHANnel:TSCode <integer>`

`[:SENSe]:CHANnel:TSCode?`

Set the training sequence code to search for, with normal burst selected and TSC auto set to off.

Factory Preset
and *RST: 0

Range: 0 to 7

Remarks: Global to the current mode.

                 You must be in the GSM mode to use this command.
                 Use INSTrument:SELect to set the mode.

Front Panel
Access: **FREQUENCY Channel, TSC (Std)**

Training Sequence Code (TSC) Auto

`[:SENSe]:CHANnel:TSCode:AUTO OFF|ON|0|1`

`[:SENSe]:CHANnel:TSCode:AUTO?`

Select auto or manual control for training sequence code (TSC) search. With auto on, the measurement is made on the first burst found to have one of the valid TSCs in the range 0 to 7 (i.e. normal bursts only). With auto off, the measurement is made on the 1st burst found to have the selected TSC.

Factory Preset
and *RST: Auto

Remarks: Global to the current mode.

               You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **FREQUENCY Channel, TSC (Std)**

Signal Corrections Commands

Correction For BTS RF Port External Gain

`[:SENSe]:CORRection:BTS:GAIN <rel_power>`

`[:SENSe]:CORRection:BTS:GAIN?`

Set equal to the external gain used when measuring base transmit stations. This is only used in 'Receive Band' measurements.

Factory Preset and *RST:	0 dB
Range:	0 to 81.9 dB
Default Unit:	dB
Remarks:	Global to the current mode.
	You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Mode Setup, Input....**
	or
	Input, Ext Gain, Base Gain

Correction For BTS RF Port External Attenuation

`[:SENSe]:CORRection:BTS:LOSS <rel_power>`

`[:SENSe]:CORRection:BTS:LOSS?`

Set equal to the external attenuation used when measuring base transmit stations. This is only used in 'Transmit Band' measurements.

Factory Preset and *RST:	0 dB
Range:	0 to 81.9 dB
Default Unit:	dB
Remarks:	Global to the current mode.
	You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Mode Setup, Input....**
	or
	Input, Ext Atten, Base Atten

Correction For MS RF Port External Gain

`[:SENSe]:CORRection:MS:GAIN <rel_power>`

`[:SENSe]:CORRection:MS:GAIN?`

Set equal to the gain of an external amplifier used when measuring mobile stations.

Factory Preset and *RST:	0 dB
Range:	0 to 81.9 dB
Default Unit:	dB
Remarks:	Global to the current mode.
	You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Mode Setup, Input....**
	or
	Input, Ext Gain, Mobile Gain

Correction For MS RF Port External Attenuation

`[:SENSe]:CORRection:MS:LOSS <rel_power>`

`[:SENSe]:CORRection:MS:LOSS?`

Set equal to the external attenuation used when measuring mobile stations. This is only used for 'Transmit Band' measurements.

Factory Preset and *RST:	0 dB
Range:	0 to 81.9 dB
Default Unit:	dB
Remarks:	Global to the current mode.
	You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Mode Setup, Input....**
	or
	Input, Ext Atten, Mobile Atten

Default Reset

`[:SENSe]:DEFaults`

Restores personality Mode Setup defaults.

Front Panel
Access: **Mode Setup**

Remarks: This command sets all the SENSe defaults but has no
                  effect on the MEASure default settings. Use the
                  CONFigure:<measurement> command to set
                  measurement defaults

Frequency Commands

Center Frequency

`[:SENSe]:FREQuency:CENTer <freq>`

`[:SENSe]:FREQuency:CENTer?`

Set the center frequency.

Factory Preset
and *RST: 942.6 MHz for GSM

Range: ESA E4401B, E4411B: −80 MHz to 1.58 GHz for SA

                ESA E4402B, E4403B: −80 MHz to 3.10 GHz for SA

                ESA E4404B: −80 MHz to 6.78 GHz for SA

                ESA E4405B: −80 MHz to 13.3 GHz for SA

                ESA E4407B, E4408B: −80 MHz to 27.0 GHz for SA

Default Unit: Hz

Remarks: Global to the current mode.

Front Panel
Access: **FREQUENCY/Channel, Channel Freq**

Monitor Band/Channel Measurement

Commands for querying the monitor band/channel measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 65. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Monitor Band/Channel** measurement has been selected from the **MEASURE** key menu.

Monitor Band/Channel—Average Count

`[:SENSe]:MONitor:AVERage:COUNt <integer>`

`[:SENSe]:MONitor:AVERage:COUNt?`

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset
and *RST: 10

Range: 1 to 1,000

Remarks: You must be in the Bluetooth, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Avg Number**

Monitor Band/Channel—Averaging State

`[:SENSe]:MONitor:AVERage[:STATe] OFF|ON|0|1`

`[:SENSe]:MONitor:AVERage[:STATe]?`

Turn averaging on or off.

Factory Preset
and *RST: On for GSM, Bluetooth

                Off for cdmaOne

Remarks: You must be in the Bluetooth, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Avg Number**

Monitor Band/Channel—Averaging Termination Control

`[:SENSe]:MONitor:AVERage:TCONtrol EXPonential|REPeat`

`[:SENSe]:MONitor:AVERage:TCONtrol?`

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Exponential - After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.

Repeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset
and *RST: Exponential

Remarks: You must be in the Bluetooth, cdmaOne, or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Avg Mode**

Monitor Band/Channel—Transmit or Receive Band Selection

`[:SENSe]:MONitor:BAND TRANsmit|RECeive`

`[:SENSe]:MONitor:BAND?`

Set the band monitor measurement to monitor the transmit or receive band.

Factory Preset
and *RST: Transmit

Remarks: You must be in the cdmaOne or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Band Setup, Band**

Monitor Band/Channel—Band Method Resolution Bandwidth

`[:SENSe]:MONitor:BAND:BANDwidth|BWIDth[:RESolution] <freq>`

`[:SENSe]:MONitor:BAND:BANDwidth|BWIDth[:RESolution]?`

Set the value of the resolution bandwidth for the band method of the monitor band/channel measurement. If span is set to a value greater than 5 MHz, minimum resolution bandwidth is limited to 1 kHz.

Factory Preset
and *RST: 100 kHz for GSM, Bluetooth

Range: 10 Hz to 5 MHz for GSM

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command.
                   Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Band Setup, Res BW**

Monitor Band/Channel—Band Method Video Bandwidth

`[:SENSe]:MONitor:BAND:BANDwidth|BWIDth:VIDeo <freq>`

`[:SENSe]:MONitor:BAND:BANDwidth|BWIDth:VIDeo?`

Set the video bandwidth for the band method of the monitor band/channel measurement.

Factory Preset
and *RST: 100 kHz for GSM

Range: Option 1DR—30 Hz to 3 MHz

                   non-Option 1DR—1 KHz to 3 MHz

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command.
                   Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Band Setup, Video BW**

Monitor Band/Channel—Band Method Maximum Hold Trace Average State

`[:SENSe]:MONitor:BAND:MAXHold[:STATe] OFF|ON|0|1`

`[:SENSe]:MONitor:BAND:MAXHold[:STATe]?`

Turn maximum hold trace average feature on or off for the band method of the monitor band/channel measurement.

Factory Preset
and *RST: Off

Remarks: You must be in the Bluetooth, cdmaOne, or GSM mode
                  to use this command. Use INSTrument:SELect to set
                  the mode.

Front Panel
Access: **Meas Setup, Band Setup, Max Hold**

Monitor Band/Channel—Channel Span

`[:SENSe]:MONitor:CHANnel SINGle|TRIPle`

`[:SENSe]:MONitor:CHANnel?`

Switch view between a single or triple channel display.

Factory Preset
and *RST: Single

Remarks: You must be in Bluetooth or GSM mode to use this
                  command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Channel Span**

Monitor Band/Channel—Channel Method Resolution Bandwidth

`[:SENSe]:MONitor:CHANnel:BANDwidth|BWIDth[:RESolution] <freq>`

`[:SENSe]:MONitor:CHANnel:BANDwidth|BWIDth[:RESolution]?`

Set the resolution bandwidth for the channel method of the monitor
band/channel measurement. If span is set to a value greater than
5 MHz, minimum resolution bandwidth is limited to 1 kHz.

Factory Preset
and *RST: 10 kHz for GSM, Bluetooth

                   30 kHz for cdmaOne

Range: Option 1DR—10 Hz to 5 MHz

                  non-Option 1DR—1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in the Bluetooth, cdmaOne, or GSM mode
               to use this command. Use INSTrument:SELect to set
               the mode.

Front Panel
Access: **Meas Setup, Chan Setup, Res BW**

Monitor Band/Channel—Channel Method Video Bandwidth

`[:SENSe]:MONitor:CHANnel:BANDwidth|BWIDth:VIDeo <freq>`

`[:SENSe]:MONitor:CHANnel:BANDwidth|BWIDth:VIDeo?`

Set the video bandwidth for the channel method of the monitor
band/channel measurement.

Factory Preset
and *RST: 10kHz for GSM, Bluetooth

               30 kHz for cdmaOne

Range: Option 1DR—30 Hz to 3 MHz

               non- Option 1DR—1 kHz to 3 MHz

Default Unit: Hz

Remarks: You must be in the Bluetooth, cdmaOne, or GSM mode
               to use this command. Use INSTrument:SELect to set
               the mode.

Front Panel
Access: **Meas Setup, Chan Setup, Video BW**

Monitor Band/Channel—Channel Method Detector Mode

`[:SENSe]:MONitor:CHANnel:DETector POSitive|SAMPle|NEGative`

`[:SENSe]:MONitor:CHANnel:DETector?`

Set the detector mode type for the channel method of the monitor
band/channel measurement.

Factory Preset
and *RST: Positive

Remarks: You must be in the Bluetooth, cdmaOne, or GSM mode
               to use this command. Use INSTrument:SELect to set
               the mode.

Front Panel
Access: **Meas Setup, Chan Setup, Detector**

Monitor Band/Channel—Channel Method Maximum Hold Trace Average State

`[:SENSe]:MONitor:CHANnel:MAXHold[:STATe] OFF|ON|0|1`

`[:SENSe]:MONitor:CHANnel:MAXHold[:STATe]?`

Turn maximum hold trace average feature on or off for the channel method of the monitor band/channel measurement. When max hold is turned on, trace averaging is turned off.

Factory Preset
and *RST: Off

Remarks: You must be in the Bluetooth, cdmaOne, or GSM mode
                 to use this command. Use INSTrument:SELect to set
                 the mode.

Front Panel
Access: **Meas Setup, Chan Setup, Max Hold**

Monitor Band/Channel—Method Selection

`[:SENSe]:MONitor:METHod CHANnel|BAND`

`[:SENSe]:MONitor:METHod?`

Sets the monitor measurement method to either channel or band.

Factory Preset
and *RST: Band

Remarks: You must be in the Bluetooth, cdmaOne, or GSM mode
                 to use this command. Use INSTrument:SELect to set
                 the mode.

Front Panel
Access: **Meas Setup, Method**

Out of Band Spurious Measurement

Commands for querying the out of band spurious measurement results and for setting to the default values are found in the Measure group of commands. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Out Of Band Spurious** measurement has been selected from the **MEASURE** key menu.

Out of Band Spurious—Average Count

`[:SENSe]:OOBSpur:AVERage:COUNt <integer>`

`[:SENSe]:OOBSpur:AVERage:COUNt?`

Set the number of max hold data acquisitions that will be averaged per frequency range. The averaging mode (terminal control) setting is unavailable for this measurement.

Factory Preset
and *RST: 10

Range: 1 to 1,000

Remarks: You must be in cdmaOne or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Avg Number**

Out of Band Spurious—Averaging State

`[:SENSe]:OOBSpur:AVERage[:STATe] OFF|ON|0|1`

`[:SENSe]:OOBSpur:AVERage[:STATe]?`

Turn averaging on or off.

Factory Preset
and *RST: Off

Remarks: You must be in cdmaOne or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Avg Number**

Out of Band Spurious—Inspect Spur Resolution Bandwidth

`[:SENSe]:OOBSpur:BANDwidth[:RESolution] <freq>`

`[:SENSe]:OOBSpur:BANDwidth[:RESolution]?`

Set the resolution bandwidth of the out of band spurious measurement.

Can only be used when the measurement has completed and Inspect Spur is set to on. ([:SENSe]:OOBSpur:ISPur:STATe ON)

Range: 1 kHz to 5 Mhz

Default Unit: Hz

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Inspect Spur, Res BW**

Out of Band Spurious—Inspect Spur Video Bandwidth

`[:SENSe]:OOBSpur:BANDwidth:VIDeo <freq>`

`[:SENSe]:OOBSpur:BANDwidth:VIDeo?`

Set the video bandwidth of the out of band spurious measurement. Can only be used when the measurement has completed and Inspect Spur is set to on. ([:SENSe]:OOBSpur:ISPur:STATe ON)

Range: 1 kHz to 3 MHz

Default Unit: Hz

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Inspect Spur, Video BW**

Out of Band Spurious—Inspect Spur Center Frequency

`[:SENSe]:OOBSpur:FREQuency[:CENTer] <freq>`

`[:SENSe]:OOBSpur:FRequency[:CENTer]?`

Set the center frequency of the out of band spurious measurement. Can only be used when the measurement has completed and Inspect Spur is set to on. ([:SENSe]:OOBSpur:ISPur:STATe ON)

Range: 9 kHz to maximum of current ESA model.

Default Unit: Hz

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **FREQUENCY Channel**

Out of Band Spurious—Inspect Spur Frequency Span

`[:SENSe]:OOBSpur:FREQuency:SPAN <freq>`

`[:SENSe]:OOBSpur:FREQuency:SPAN?`

Set the frequency span of the out of band spurious measurement. Can only be used when the measurement has completed and Inspect Spur is set to on. ([:SENSe]:OOBSpur:ISPur:STATe ON)

Range:	ESA model dependent.
Default Unit:	Hz
Remarks:	You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**SPAN X Scale**, **Span**

Out of Band Spurious—Inspect Spur

`[:SENSe]:OOBSpur:ISPur:COUNt <integer>`

`[:SENSe]:OOBSpur:ISPur:COUNt?`

Select the spur number that you want to inspect from the table of results. Can only be used when the measurement has completed and Inspect Spur is set to on. ([:SENSe]:OOBSpur:ISPur:STATe ON)

Remarks:	You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Meas Setup, Inspect Spur, Inspect Spur**

Out of Band Spurious—Inspect Spur

`[:SENSe]:OOBSpur:ISPur:[STATe] ON|OFF|1|0`

`[:SENSe]:OOBSpur:ISPur?`

Set inspect spur on or off. The measurement must have completed and found at least one spur.

Factory Preset and *RST:	OFF
Remarks:	You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.
Front Panel Access:	**Meas Setup, Inspect Spur, Inspect Spur**

Out of Band Spurious—MS Idle

`[:SENSe]:OOBSpur:MSIDle ON|OFF|1|0`

`[:SENSe]:OOBSpur:MSIDle?`

Set MS idle on to specify that you wish to measure a mobile station that is in idle mode—that is, with no call in progress. The measurement uses filter bandwidth and sweep times according to the specifications. This may involve sweep times of greater than 60 seconds.

Factory Preset
and *RST: OFF

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, MS Idle**

Out of Band Spurious—Maximum Mixer Level

`[:SENSe]:OOBSpur:POWer:MIXer:RANGe[:UPPer] <dB>`

`[:SENSe]:OOBSpur:POWer:MIXer:RANGe?`

Set the maximum power at the input mixer for the out of band spurious measurement.

Factory Preset
and *RST: 5 dBm

Range: -100 dBm to 10 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Advanced, Max Mxr Lvl**

Out of Band Spurious—Inspect Spur RF Port Input Attenuation

`[:SENSe]:OOBSpur:POWer[:RF]:ATTenuation <dB>`

`[:SENSe]:OOBSpur:POWer[:RF]:ATTenuation?`

Set the RF input attenuator. Can only be used when the measurement has completed and Inspect Spur is set to on.
([:SENSe]:OOBSpur:ISPur:STATe ON)

Range: 0 to 75 dB in 5 dB steps.

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **AMPLITUDE Y Scale, Atten**

Out of Band Spurious—Inspect Spur Reference Level

`[:SENSe]:OOBSpur:RLEVel <dBm>`

`[:SENSe]:OOBSpur:RLEVel?`

Set the reference level when inspecting spurs. Can only be used when the measurement has completed and Inspect Spur is set to on. ([:SENSe]:OOBSpur:ISPur:STATe ON)

Range: -150 to 150 dBm

Default Unit: dBm

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **AMPLITUDE Y Scale, Ref Level**

Out Of Band Spurious—Inspect Spur Sweep Time

`[:SENSe]:OOBSpur:SWEep:TIME <seconds>`

`[:SENSe]:OOBSpur:SWEep:TIME?`

Change the sweep time when inspecting spurs. Can only be used when the measurement has completed and Inspect Spur is set to on ([:SENSe]:OOBSpur:ISPur:STATe ON)

Factory Preset
and *RST: 2 s

Range: 4 ms to 500 s

Default Unit: Seconds

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Inspect Spur, Sweep Time**

Reference Oscillator External Frequency

`[:SENSe]:OPTion:ROSCillator:EXTernal:FREQuency <freq>`

`[:SENSe]:OPTion:ROSCillator:EXTernal:FREQuency?`

Set the frequency of the external reference oscillator being supplied to the option B7E RF assembly Ext Ref In jack. This provides the proper frequency division in the option B7E RF assembly to achieve the required 10 MHz reference frequency. Switch to the external reference with OPT:ROSC:SOUR.

Preset
and *RST: 10 MHz

Range: 1 MHz to 30 MHz

Default Unit: Hz

Front Panel
Access: **Mode Setup, Demod**

Reference Oscillator Rear Panel Output

`[:SENSe]:OPTion:ROSCillator:OUTPut[:STATe] OFF|ON|0|1`

`[:SENSe]:OPTion:ROSCillator:OUTPut?`

Set the frequency source for the option B7E RF assembly 10 MHz Out jack to the option reference oscillator.

Preset
and *RST: Off

Front Panel
Access: **Mode Setup, Demod**

Reference Oscillator Source

`[:SENSe]:OPTion:ROSCillator:SOURce INTernal|EXTernal`

`[:SENSe]:OPTion:ROSCillator:SOURce?`

Select the reference oscillator (time base) source to the internal reference oscillator or an external oscillator. Use OPT:ROSC:EXT:FREQ to tell the instrument the frequency of the external reference.

INTernal - uses 10 MHz internal time base

EXTernal - uses the signal at the rear panel external reference input port.

Preset
and *RST:

Internal

Front Panel
Access:

Mode Setup, Properties

Output RF Spectrum Measurement

Commands for querying the output RF spectrum measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 65. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Output RF Spectrum** measurement has been selected from the **MEASURE** key menu.

Output RF Spectrum—Number of Bursts Averaged

`[:SENSe]:ORFSpectrum:AVERage:COUNt <integer>`

`[:SENSe]:ORFSpectrum:AVERage:COUNt?`

Set the number of bursts that will be averaged. For the output RF spectrum due to switching transients, it is more accurate to consider this the number of frames that are measured. After the specified number of bursts (average counts), the averaging mode (terminal control) setting determines the averaging action.

Factory Preset
and *RST: 10

Range: 1 to 1,000

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Output RF Spectrum—Averaging Control

`[:SENSe]:ORFSpectrum:AVERage[:STATe] OFF|ON|0|1`

`[:SENSe]:ORFSpectrum:AVERage[:STATe]?`

Turn averaging on or off.

Factory Preset
and *RST: On

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Output RF Spectrum—Averaging Mode

`[:SENSe]:ORFSpectrum:AVERage:TCONtrol EXPonential|REPeat`

`[:SENSe]:ORFSpectrum:AVERage:TCONtrol?`

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of frames (average count) is reached.

Exponential - After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average.

Repeat - After reaching the average count, the averaging is reset and a new average is started.

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Factory Preset
and *RST: Repeat

Output RF Spectrum—Resolution BW For Modulation At Close Offsets

```
[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]
  :MODulation:OFFSet:CLOSe <freq>
```

```
[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]
  :MODulation:OFFSet:CLOSe?
```

Set the resolution bandwidth used for the spectrum due to modulation part of the ORFS measurement for offset frequencies less than 1800 kHz.

Factory Preset
and *RST: 30 kHz

Range: 1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Output RF Spectrum—Resolution BW for Modulation at Far Offsets

```
[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]
  :MODulation:OFFSet:FAR <freq>
```

```
[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]
  :MODulation:OFFSet:FAR?
```

Set the resolution bandwidth used for the spectrum due to modulation part of the ORFS measurement for offset frequencies greater than or equal to 1800 kHz.

Factory Preset
and *RST: 100 kHz

Range: 1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Output RF Spectrum—Resolution BW For Switching Transients At Close Offsets

```
[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]
  :SWITching:OFFSet:CLOSe <freq>
```

```
[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]
  :SWITching:OFFSet:CLOSe?
```

Set the resolution bandwidth used for the spectrum due to switching transients part of the ORFS measurement for offset frequencies less than 1800 kHz.

Factory Preset
and *RST: 30 kHz

Range: 1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Output RF Spectrum—Resolution BW For Switching Transients At Far Offsets

```
[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]
  :SWITching:OFFSet:FAR <freq>
```

```
[:SENSe]:ORFSpectrum:BANDwidth[:RESolution]
  :SWITching:OFFSet:FAR?
```

Set the resolution bandwidth used for the spectrum due to switching transients part of the ORFS measurement for offset frequencies greater than or equal to 1800 kHz.

Factory Preset
and *RST: 100 kHz

Range: 1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Output RF Spectrum—Burst Synchronization Source

`[:SENSe]:ORFSpectrum:BSYNc:SOURce TSEQuence|RFAMplitude |NONE`

`[:SENSe]:ORFSpectrum:BSYNc:SOURce?`

Select the method of synchronizing the measurement to the GSM bursts.

Training Sequence - the training sequence burst synch performs a demodulation of the burst and determines the start and stop of the useful part of the burst based on the midamble training sequence.

RF amplitude - the RF amplitude burst synch approximates the start and stop of the useful part of the burst without digital demodulation of the burst.

None - no burst sync is used.

Factory Preset
and *RST: Training sequence

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Output RF Spectrum—Offset Frequency List

`[:SENSe]:ORFSpectrum:LIST:SELect SHORt|STANdard`

`[:SENSe]:ORFSpectrum:LIST:SELect?`

Select the list of frequency offsets and bandwidths to be used to make the ORFS measurement. Is used only in ORFS multiple measurement method for both ORFS due to modulation and switching transients.

Short - a shortened list of the offset frequencies specified in the GSM Standards. It uses two internal offset frequency lists, one for modulation spectrum and the other for switching transient spectrum. These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the SENSe:ORFSpectrum subsystem.

Standard - the complete list of the offset frequencies specified in the GSM Standards, except for those offsets greater than 6 MHz. It uses two internal offset frequency lists, one for modulation spectrum and the other for switching transient spectrum. These offset frequencies cannot be changed, but the resolution bandwidths can be changed by other commands in the SENSe:ORFSpectrum subsystem.

Factory Preset
and *RST: Short

Remarks: This command is only valid if SENS:ORFS:MEAS is set

to multiple.

You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Output RF Spectrum—Measure Offsets Measurement Method

`[:SENSe]:ORFSpectrum:MEASure MULTiple|SINGle|SWEPt`

`[:SENSe]:ORFSpectrum:MEASure?`

Select the measurement method to be used.

Multiple - the measurement is done at all offsets in the offset frequency list.

Single - the measurement is done at only one offset as determined by the offset frequency setting. This allows detailed examination of the time-domain waveform at the specified offset frequency.

Swept - the measurement is done in the frequency domain. For output RF spectrum due to modulation it is done using time-gated spectrum analysis to sweep the analyzer with the gate turned on for the desired portion of the burst only.

Factory Preset
and *RST: Multiple

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Output RF Spectrum—Offset Frequency

`[:SENSe]:ORFSpectrum:OFRequency <freq>`

`[:SENSe]:ORFSpectrum:OFRequency?`

Set the offset frequency that is used to measure a single offset. This command is only valid if SENS:ORFS:MEAS is set to single.

Factory Preset
and *RST: 250 kHz

Range: −6.0 MHz to +6.0 MHz, step size: steps through the
                values in the selected offset frequency list.

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Output RF Spectrum—Maximum RF Mixer Power

`[:SENSe]:ORFSpectrum:POWer:MIXer:RANGe[:UPPer] <power>`

`[:SENSe]:ORFSpectrum:POWer:MIXer:RANGe?`

Set the attenuation to automatically maintain the specified maximum power level at the RF mixer input.

Factory Preset
and *RST: 0 dBm

Range: -100 to +10 dBm

Remarks: This is an advanced parameter that has been set up for maximum performance. Using settings greater than 0 dBm could result in a compressed signal or spurious signals or both.

Front Panel
Access: **Meas Setup, Advanced**

Output RF Spectrum—Reference Power Averages

`[:SENSe]:ORFSpectrum:REFerence:AVERage:COUNt <integer>`

`[:SENSe]:ORFSpectrum:REFerence:AVERage:COUNt?`

Set the number of bursts to be averaged when measuring the reference power. Reference power average state must be set to OFF (for further information refer to the next command). Reference power averages is valid only if SENS:ORFS:MEAS is set to single.

Factory Preset
and *RST: 10

Range: 1 to 1,000

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Output RF Spectrum—Reference Power Average State

`[:SENSe]:ORFSpectrum:REFerence:AVERage[:AUTO] ON|OFF|1|0`

`[:SENSe]:ORFSpectrum:REFerence:AVERage[:AUTO]?`

Specifies how many averages to use when measuring the reference power. Set it to ON to use the same number of averages as specified in the number of bursts averaged command. Set it to OFF to use the number specified in the reference power averages command (for further information refer to the previous command). Reference power average state is valid only if SENS:ORFS:MEAS is set to single.

Factory Preset
and *RST: ON

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Output RF Spectrum—Trigger Source

`[:SENSe]:ORFSpectrum:TRIGger:SOURce EXTernal|RFBurst|FRAMe|IMMediate`

`[:SENSe]:ORFSpectrum:TRIGger:SOURce?`

Select the trigger source used to control the data acquisitions.

External - rear panel external trigger input

Frame - uses the internal frame timer, which has been synchronized to the selected burst sync

Immediate - the next data acquisition is immediately taken, capturing the signal asynchronously (also called free run)

RF Burst - wideband RF burst envelope trigger that has automatic level control for periodic burst signals

Factory Preset and *RST: RF Burst if the RF Burst Hardware (option B7E) has been installed

External if option B7E has not been installed

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Output RF Spectrum—Measurement Type

`[:SENSe]:ORFSpectrum:TYPE MODulation|SWITching`

`[:SENSe]:ORFSpectrum:TYPE?`

Select the measurement type.

Modulation - only the modulation spectrum is measured.

Switching - only the switching transient spectrum is measured.

Factory Preset and *RST: Modulation

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Output RF Spectrum—Wideband Noise

`[:SENSe]:ORFSpectrum:WBNoise ON|OFF|1|0`

`[:SENSe]:ORFSpectrum:WBNoise?`

Set wideband noise function to ON or OFF. When set to OFF, the analyzer is tuned to the carrier and -1800 kHz to +1800 kHz either side of the center frequency is swept. When set to ON, the whole of the relevant band 2 MHz either side is swept.

Factory Preset
and *RST: OFF

Remarks: You must be in the GSM mode to use this command.
                  Use INSTrument:SELect to set the mode.

Phase & Frequency Error Measurement

Commands for querying the phase and frequency error measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 65. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Phase & Frequency** measurement has been selected from the **MEASURE** key menu.

Phase & Frequency Error—Number Of Bursts Averaged

`[:SENSe]:PFERror:AVERage:COUNt <integer>`

`[:SENSe]:PFERror:AVERage:COUNt?`

Set the number of bursts that will be averaged. After the specified number of bursts (average counts), the averaging mode (terminal control) setting determines the averaging action.

Factory Preset
and *RST: 10

Range: 1 to 1,000

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Phase & Frequency Error—Averaging State

`[:SENSe]:PFERror:AVERage[:STATe] OFF|ON|0|1`

`[:SENSe]:PFERror:AVERage[:STATe]?`

Turn averaging on or off.

Factory Preset
and *RST: Off

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Phase & Frequency Error—Averaging Mode

`[:SENSe]:PFERror:AVERage:TCONtrol EXPonential|REPeat`

`[:SENSe]:PFERror:AVERage:TCONtrol?`

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of bursts (average count) is reached.

Exponential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the

existing average.

Repeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset
and *RST: Exp

Remarks: You must be in the GSM mode to use this command.
                 Use INSTrument:SELect to set the mode.

Phase & Frequency Error—Averaging Type

`[:SENSe]:PFERror:AVERage:TYPE MEAN|MAXimum`

`[:SENSe]:PFERror:AVERage:TYPE?`

Select the type of averaging:

Mean - the scalar results are averaged.

Maximum - the maximum scalar results are retained.

Factory Preset
and *RST: Maximum.

Remarks: You must be in the GSM mode to use this command.
                 Use INSTrument:SELect to set the mode.

Phase & Frequency Error—Bit Dots State

`[:SENSe]:PFERror:SDOTs[:STATe] ON|OFF|1|0`

`[:SENSe]:PFERror:SDOTs[:STATe]?`

Set the graphical displays of Phase Error, Phase Error w/Freq and the Constellation Diagram to show (ON) or hide (OFF) the measurement points on the trace.

Factory Preset
and *RST: On.

Remarks: You must be in the GSM mode to use this command.
                 Use INSTrument:SELect to set the mode.

                 This SCPI command is included for completeness. but only affects the traces displayed on the screen.

Phase & Frequency Error—Burst Synchronization

`[:SENSe]:PFERror:BSYNc:SOURce TSEQuence|RFAMplitude`

`[:SENSe]:PFERror:BSYNc:SOURce?`

Select the method of synchronizing the measurement to the GSM bursts.

Training Sequence - the training sequence burst sync performs a demodulation of the burst and determines the start and stop of the useful part of the burst based on the midamble training sequence.

RF Amplitude - the RF amplitude burst sync approximates the start and stop of the useful part of the burst without demodulation of the burst.

None - no burst synchronization is used

Factory Preset
and *RST: Training sequence

Remarks: You must be in the GSM mode to use this command.
                  Use INSTrument:SELect to set the mode.

Phase & Frequency Error—Trigger Source

`[:SENSe]:PFERror:TRIGger:SOURce`
`EXTernal|FRAMe|IMMediate|RFBurst`

`[:SENSe]:PFERror:TRIGger:SOURce?`

Select the trigger source used to control the data acquisitions.

External - rear panel external trigger input.

Frame - uses the internal frame timer, which has been synchronized to the selected burst sync.

Immediate - the next data acquisition is immediately taken, capturing the signal asynchronously (also called free run).

RF Burst - wideband RF burst envelope trigger that has automatic level control for periodic burst signals.

Factory Preset
and *RST: RF burst

Remarks: You must be in the GSM mode to use this command.
                  Use INSTrument:SELect to set the mode.

RF Power Commands

RF Port Input Attenuation

`[:SENSe]:POWer[:RF]:ATTenuation <rel_power>`

`[:SENSe]:POWer[:RF]:ATTenuation?`

Set the RF input attenuator. This value is set at its auto value if RF input is set to auto.

Factory Preset
and *RST: 10 dB for SA

5 dB for Bluetooth, cdmaOne, GSM

Range: ESA E4401B, E4411B: 0 to 60 dB for SA

ESA E4402B, E4403B: 0 to 75 dB for SA

ESA E4404B: 0 to 75 dB for SA

ESA E4405B: 0 to 75 dB for SA

ESA E4407B, E4408B: 0 to 65dB for SA

0 to 75 dB in 5 dB steps for cdmaOne, GSM

0 to 65 dB in 5 dB steps for Bluetooth

Default Unit: dB

Front Panel
Access: **Input, Input Atten** for Bluetooth, cdmaOne, GSM

or

Mode Setup, Input, Tab⇒, **Input Attenuation** for Bluetooth, cdmaOne, GSM

or

AMPLITUDE/Y Scale, Attenuation for SA, Bluetooth, cdmaOne, GSM

RF Carriers

`[:SENSe]:POWer[:RF]:CARRiers SINGle|MULTiple`

`[:SENSe]:POWer[:RF]:CARRiers?`

Switch between single and multiple carrier modes.

Factory Preset
and *RST: Single

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Input, Tab⇒, Input Atten**

                 or

                 Input/Output, Tab⇒, Input Atten

RF Input Port Power Gain

`[:SENSe]:POWer[:RF]:GAIN[:STATe] OFF|ON|0|1`

`[:SENSe]:POWer[:RF]:GAIN[:STATe]?`

Turns the internal preamp on or off for the currently selected measurement.

Factory Preset
and *RST: Off

Remarks: You must be in GSM or Bluetooth mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **AMPLITUDE/Y Scale, Int Preamp for SA**

                 or

                 Mode Setup, Input... for GSM, Bluetooth

                 or

                 Input, Int Preamp for GSM, Bluetooth

RF Port Power Range

`[:SENSe]:POWer[:RF]:RANGe <dBm>`

`[:SENSe]:POWer[:RF]:RANGe?`

Set the maximum total power to be applied at the RF input. There are two modes of operation as follows:

  When RF Port Power Range Auto = AUTO, Max Total Pwr displays the actual measured power level.

  When RF Port Power Range Auto = MANual, the input power range is determined by the manually entered Max Total Pwr value.

Range: -100 to +80

Default Unit: dBm

Remarks: You must be in GSM or Bluetooth mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel

Access: **Mode Setup, Input....**

or

Input, Max Total Pwr

RF Port Power Range Auto

`[:SENSe]:POWer[:RF]:RANGe:AUTO ON|OFF|1|0`

`[:SENSe]:POWer[:RF]:RANGe:AUTO?`

Select the RF port power range to be set either automatically or manually.

ON or 1 - power range is automatically set as determined by the actual measured power level at the start of a measurement, as displayed by the Max Total Pwr value.

OFF or 0 - power range is manually set by either the manually entered Max Total Pwr or Input Atten value.

Factory Preset
and *RST: On

Remarks: You must be in GSM or Bluetooth mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Mode Setup, Input....**

or

Input, Max Total Pwr

Power Steps Measurement (PST)

Commands for querying the power steps measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 65. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Power Steps** measurement has been selected from the **MEASURE** key menu.

Power Steps—Resolution Bandwidth

`[:SENSe]:PSTeps:BANDwidth|BWIDth[:RESolution] <freq>`

`[:SENSe]:PSTeps:BANDwidth|BWIDth[:RESolution]?`

Set the resolution bandwidth to be used to make the power steps measurement over.

Factory Preset
and *RST: 1 MHz

Range: 10 Hz to 5 MHz

Default unit: Hz

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power Steps—Video Bandwidth

`[:SENSe]:PSTeps:BANDwidth|BWIDth:VIDeo <freq>`

`[:SENSe]:PSTeps:BANDwidth|BWIDth:VIDeo?`

Set the video bandwidth to be used to make the power steps measurement over.

Factory Preset
and *RST: 300 kHz

Range: 30 Hz to 3 MHz

Default unit: Hz

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power Steps—Sweep Time

`[:SENSe]:PSTeps:SWEep:TIME <integer>`

`[:SENSe]:PSTeps:SWEep:TIME?`

Set the sweep time that will be used to make the power steps

measurement over. The value should be set to s $\geq$ 2 seconds to ensure that the GSM modulation does not affect the trace.

Factory Preset
and *RST: 2

Range: 5 ms to 4000 s

Default unit: Seconds

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time Measurement

Commands for querying the power versus time measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 65. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Power vs Time** measurement has been selected from the **MEASURE** key menu.

Power vs. Time—Number of Bursts Averaged

`[:SENSe]:PVTime:AVERage:COUNt <integer>`

`[:SENSe]:PVTime:AVERage:COUNt?`

Set the number of bursts that will be averaged. After the specified number of bursts (average counts), the averaging mode (terminal control) setting determines the averaging action.

Factory Preset
and *RST: 10

Range: 1 to 1,000

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Power vs. Time—Averaging State

`[:SENSe]:PVTime:AVERage[:STATe] OFF|ON|0|1`

`[:SENSe]:PVTime:AVERage[:STATe]?`

Turn averaging on or off.

Factory Preset
and *RST: On

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Power vs. Time—Averaging Mode

`[:SENSe]:PVTime:AVERage:TCONtrol EXPonential|REPeat`

`[:SENSe]:PVTime:AVERage:TCONtrol?`

Select the type of termination control used for the averaging function. This specifies the averaging action after the specified number of bursts (average count) is reached.

Exponential - Each successive data acquisition after the average count is reached is exponentially weighted and combined with the

existing average.

Repeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset
and *RST: Exponential

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Averaging Type

`[:SENSe]:PVTime:AVERage:TYPE LPOWer|POWer`

`[:SENSe]:PVTime:AVERage:TYPE?`

Select the type of averaging to be performed.

LPOWer - logarithmically averages the power of the video data.

POWer - averages the linear power of successive measurements.

Factory Preset
and *RST: POWer

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Resolution BW

`[:SENSe]:PVTime:BANDwidth|BWIDth[:RESolution] <freq>`

`[:SENSe]:PVTime:BANDwidth|BWIDth[:RESolution]?`

Set the resolution BW. This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default, may cause invalid measurement results.

Factory Preset
and *RST: 300 kHz

Range: 1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Video BW

`[:SENSe]:PVTime:BANDwidth|BWIDth:VIDeo <freq>`

`[:SENSe]:PVTime:BANDwidth|BWIDth:Video?`

Specify the video bandwidth.

Factory Preset
and *RST: 300 kHz

Range: 1 Hz to 3 MHz

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command.
                   Use INSTrument:SELect to set the mode.

Power vs. Time—Burst Synchronization Source

`[:SENSe]:PVTime:BSYNc:SOURce TSEQuence|RFAMplitude|NONE`

`[:SENSe]:PVTime:BSYNc:SOURce?`

Select the method of synchronizing the measurement to the GSM
bursts.

   TSEQuence - the training sequence burst sync performs a
   demodulation of the burst and determines the start and stop of the
   useful part of the burst based on the midamble training sequence.

   RFAMplitude - performs burst synchronization based on the rising
   and falling edges of the burst.

   NONE - performs no burst synchronization.

Factory Preset
and *RST: TSEQuence

Remarks: You must be in the GSM mode to use this command.
                   Use INSTrument:SELect to set the mode.

Power vs. Time—Current Data Calculation

`[:SENSe]:PVTime:CDATa OFF|ON|0|1`

`[:SENSe]:PVTime:CDATa?`

Turn calculation of current data results on or off. Current data is
calculated at the end of each sweep and is based only on that sweep.

Factory Preset
and *RST: ON

Range: ON/OFF

Remarks: Set the parameter to OFF to gain additional
                   measurement speed over averaged results.

You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Limit Line Mask Display

`[:SENSe]:PVTime:LIMit:MASK OFF|ON|0|1`

`[:SENSe]:PVTime:LIMit:MASK?`

Show or hide the limit mask. Does not affect limit pass/fail calculation.

Factory Preset
and *RST: ON

Range: ON/OFF

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Power vs. Time—Limit Line Mask Test

`[:SENSe]:PVTime:LIMit:TEST OFF|ON|0|1`

`[:SENSe]:PVTime:LIMit:TEST?`

Turn on or off limit pass/fail testing. Does not affect limit line display.

Factory Preset
and *RST: ON

Range: ON/OFF

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Power vs. Time—Lower Mask Absolute Amplitude Levels

`[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute <power>{,<power>}`

`[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute?`

Enter the absolute power level for any of your mask line segments that require absolute limits in addition to their relative limits. Normally, your defined relative mask values are used as the limits for testing. If the power of the reference level is decreased, all of these relative mask power levels will decrease by the same amount until they reach a defined minimum absolute power. That minimum absolute power will then be used as the test limit. For each segment, that minimum absolute power will either be the default value, or the value you set using this command.

Any portion of the signal that has no limit line segment defined for it,

will default its to a very low limit (–200 dBm). Because of this, all data in that undefined area will pass the test.

Factory Preset
and *RST: Selected GSM standard

Range: −200 dBm to +100 dBm

Default Unit: dBm

Remarks: You need power values for each of the defined time points. You must put a comma in the SCPI command as a place holder for any points where an absolute power is not specified.

                You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Lower Mask Points

`[:SENSe]:PVTime:MASK:LIST:LOWer:POINts?`

Query the number of elements in the lower mask. This value is determined by the number of time points entered using `[:SENSe]:PVTime:MASK:LIST:LOWer:TIME`.

Range: integer, 1 to 25

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Lower Mask Relative Amplitude Levels

`[:SENSe]:PVTime:MASK:LIST:LOWer:RELative`
`<rel_power>{,<rel_power>}`

`[:SENSe]:PVTime:MASK:LIST:LOWer:RELative?`

   Enter the relative power level for each of the horizontal line segments in the lower limit mask. There should be a power level for each time point entered using the
`[:SENSe]:PVTime:MASK:LIST:LOWer:TIME` command. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data). When an upper and lower limit mask have been defined, the Reference Power Level is the mid-point between these two limits at time t_0.

Factory Preset
and *RST: Selected GSM standard

Range: +200 dB to −100 dB, relative to the reference power

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Lower Mask Time Points

`[:SENSe]:PVTime:MASK:LIST:LOWer:TIME <seconds>{,<seconds>}`

`[:SENSe]:PVTime:MASK:LIST:LOWer:TIME?`

Enter the ending points for the horizontal line segments that define the lower limit mask. All the line segments begin at the time = t_0 reference point at the center of the useful data (usually the center of the burst). For example, all the mask line segments to the right of t_0 will have positive time values that get successively larger, while those to the left get successively more negative. See Figure 2-2 on page 142.

We recommend that you select a large time value for your first and last mask points (e.g. −1 and +1 second). This guarantees that you've defined a limit for all the measured data.

Factory Preset
and *RST: Selected GSM standard

Range: −1s to +1s, referenced to t_0 at the center of the useful data (burst center)

             1 to 25 time points in a mask

Default Unit: seconds

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Upper Mask Absolute Amplitude Levels

`[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute <power>{,<power>}`

`[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute?`

Enter the absolute power level for any of your mask line segments that require absolute limits in addition to their relative limits. Normally, your defined relative mask values are used as the limits for testing. If the power of the reference level is increased, all of the relative mask power levels will increase by the same amount until they reach a defined maximum absolute power. That maximum absolute power will then be used as the test limit. For each segment, that maximum absolute power will either be the default value, or the value you set using this command. See Figure 2-2 on page 142.

Any portion of the signal that has no limit line segment defined for it, will default its to a very high limit (100 dBm). Because of this, all data

in that undefined area will pass the test.

Factory Preset
and *RST: Selected GSM standard

Range: −200 dBm to +100 dBm

Default Unit: dBm

Remarks: You need power values for each of the defined time
                 points. You must put a comma in the SCPI command as
                 a place holder for any points where an absolute power
                 is not specified.

                 You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Power vs. Time—Upper Mask Points

`[:SENSe]:PVTime:MASK:LIST:UPPer:POINts?`

Query the number of elements in the upper mask. This value is
determined by the number of time points entered using
`[:SENSe]:PVTime:MASK:LIST:UPPer:TIME`.

Range: integer, 1 to 25

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Power vs. Time—Upper Mask Relative Amplitude Levels

`[:SENSe]:PVTime:MASK:LIST:UPPer:RELative`
`<rel_power>{,<rel_power>}`

`[:SENSe]:PVTime:MASK:LIST:UPPer:RELative?`

Enter the relative power level for each of the horizontal line segments
in the upper limit mask. There should be a power level for each time
point entered using `[:SENSe]:PVTime:MASK:LIST:UPPer:TIME`. These
power levels are all relative to the defined Reference Power Level (the
average power in the useful part of the data). When an upper and lower
limit mask have been defined, the Reference Power Level is the
mid-point between these two limits at time t_0. See Figure 2-2 on page
142.

Factory Preset
and *RST: Selected GSM standard

Range: 200 dB to −100 dB, relative to the reference power

Default Unit: dB

Remarks: You must be in GSM mode to use this command. Use
INSTrument:SELect to set the mode.

Power vs. Time—Upper Mask Time Points

`[:SENSe]:PVTime:MASK:LIST:UPPer:TIME <seconds>{,<seconds>}`

`[:SENSe]:PVTime:MASK:LIST:UPPer:TIME?`

Enter the ending points for the horizontal line segments that define the
upper limit mask. All the line segments begin at the time = t_0 reference
point at the center of the useful data (usually the center of the burst).
For example, all the mask line segments to the right of t_0 will have
positive time values that get successively larger, while those to the left
get successively more negative.

We recommend that you select a large time value for your first and last
mask points (e.g. −1 and +1 second). This guarantees that you've
defined a limit for all the measured data.

Figure 2-2   **Custom Upper Limit Mask Example**
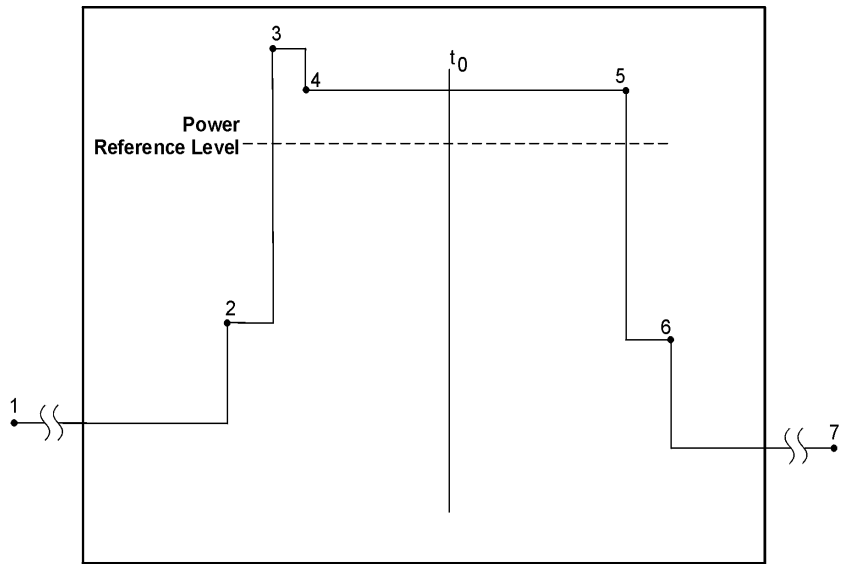
ca819a

Mask Segment	Selected Time Value	Selected Relative Power (with Ref Level = −12 dBm)		Selected Absolute Power	Segment Position on Screen
		Selected Power	**Equivalent Absolute Power**		
1	−1 sec	−43 dB	−55 dBm	−68 dBm	−55
2	−300 μs	−25 dB	−37 dBm		−37
3	−280 μs	7 dB	−5 dBm	0 dBm[a]	0[a]
4	−270 μs	4 dB	−8 dBm		−8
5	280 μs	4 dB	−8 dBm		−8
6	295 μs	−32 dB	−44 dBm		−44
7	1 sec	−48 dB	−60 dBm	−68 dBm	−60

a. The zero value was selected because the absolute power specifies the lowest allowed value of the mask, in this case 0 dBm.

Example: `PVT:mask:list:upper:time -1, -300e-6, -280e-6, -270e-6, 280e-6, 295e-6, 1`

Factory Preset
and *RST: Selected GSM standard

Range: −1s to +1s, referenced to t_0 at the center of the useful data (burst center)

1 to 25 time points in a mask

Default Unit: seconds

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Custom Limit Masks

`[:SENSe]:PVTime:MASK:SELect STANdard|CUSTom`

`[:SENSe]:PVTime:MASK:SELect?`

Select standard masks or user-defined custom masks to compare you measured data against.

Factory Preset
and *RST: Standard

Remarks: You must be in GSM mode to use this command. Use INSTrument:SELect to set the mode.

Power vs. Time—Maximum Hold

`[:SENSe]:PVTime:MAXHold 0|1|ON|OFF`

`[:SENSe]:PVTime:MAXHold?`

Turn the max hold feature on or off. Available only in monitor view.

Factory Preset
and *RST: OFF

Range: OFF/ON

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Power vs. Time—Maximum Timeslots

`[:SENSe]:PVTime:MTIMe <integer>`

`[:SENSe]:PVTime:MTIMe?`

Set the number of timeslots to show on screen.

Factory Preset
and *RST: 1

Range: 1 to 8

Remarks: You must be in GSM mode to use this command. Use
                 INSTrument:SELect to set the mode.

Power vs. Time—Number of Trace Points

`[:SENSe]:PVTime:POINts 401|801|1601|3201|6401`

`[:SENSe]:PVTime:POINts?`

Set the number of trace points used in the measurement.

Factory Preset
and *RST: 1601

Range: 401, 801, 1601, 3201, 6401

Remarks: The higher the value used here, the more accurate but
                 slower the measurement will be.

                 More than 801 points are recommended for rise and fall
                 views

Power vs. Time—Trigger Source

`[:SENSe]:PVTime:TRIGger:SOURce EXTernal|RFBurst|FRAMe`

`[:SENSe]:PVTime:TRIGger:SOURce?`

Select the trigger source used to control the data acquisitions.

External - rear panel external trigger input

Frame - uses the frame timer, which has been synchronized to the selected burst sync.

RF Burst - wideband RF burst envelope trigger that has automatic level control for periodic burst signals.

Factory Preset
and *RST: RF Burst if the RF Burst Hardware (option B7E) has been installed

External if option B7E has not been installed

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Radio Standards Commands

Radio Device Under Test

`[:SENSe]:RADio:DEVice MS|BTS|UBTS1|UBTS2|UBTS3|PBTS1`

`[:SENSe]:RADio:DEVice?`

Select the type of radio device to be tested.

MS – Mobile station transmitter test

BTS – Base station transmitter test

UBTS1 – Micro base station class M1 transmitter test

UBTS2 – Micro base station class M2 transmitter test

UBTS3 – Micro base station class M3 transmitter test

PBTS1 – Pico base station class P1 transmitter test

Factory Preset
and *RST: BTS

Remarks: You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

                  Global to current mode.

Front Panel
Access: **Mode Setup, Radio, Device**

Radio Device Under Test

`[:SENSe]:RADio:DEVice:CLASS?`

Query the type of device being tested. The two possible reults are:

BTS - Base station transmitter test

MS - Mobile station test

Front Panel
Access: Mode Setup, Radio, Device

Radio Standard Band

`[:SENSe]:RADio:STANdard:BAND`
  `PGSM900|EGSM900|RGSM900|DCS1800|PCS1900|GSM450|`
  `GSM480|GSM850`

`[:SENSe]:RADio:STANdard:BAND?`

Select the standard variant that applies to the radio to be tested.

EGSM900 - Extended GSM in the 900 MHz band

PGSM900 - Primary GSM in the 900 MHz band

RGSM900 - Railway GSM in the 900 MHz band

DCS1800 - DSC1800 band; also known as GSM-1800

PCS - PCS1900 band; also known as GSM-1900

GSM450 - GSM450 band

GSM480 - GSM480 band

GSM850 - GSM850 band, for IS-136HS

Factory Preset
and *RST: EGSM-900

Remarks: Global to the current mode.

                  You must be in GSM mode to use this command. Use
                  INSTrument:SELect to set the mode.

Front Panel
Access: **Mode Setup, Radio, Band**

Receiver Spurious Measurement

Commands for querying the receiver spurious responses measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 65. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **RX Spur** measurement has been selected from the **MEASURE** key menu.

Receiver Spurious—Average Count

`[:SENSe]:RSPur:AVERage:COUNt <integer>`

`[:SENSe]:RSPur:AVERage:COUNt?`

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset
and *RST: 10

Range: 1 to 1,000

Remarks: You must be in cdmaOne or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Avg Number**

Receiver Spurious—Averaging State

`[:SENSe]:RSPur:AVERage[:STATe] OFF|ON|0|1`

`[:SENSe]:RSPur:AVERage[:STATe]?`

Turn averaging on or off.

Factory Preset
and *RST: On

Remarks: You must be in the cdmaOne or mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Avg Number**

Receiver Spurious—Averaging Termination Control

`[:SENSe]:RSPur:AVERage:TCONtrol EXPonential|REPeat`

`[:SENSe]:RSPur:AVERage:TCONtrol?`

Select the type of termination control used for averaging.

This determines the averaging action after the specified number of data acquisitions (average count) is reached.

Exponential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the existing average.

Repeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset
and *RST: Exponential

Remarks: You must be in the cdmaOne or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Avg Mode**

Receiver Spurious—Resolution Bandwidth

`[:SENSe]:RSPur:BANDwidth|BWIDth[:RESolution] <freq>`

`[:SENSe]:RSPur:BANDwidth|BWIDth[:RESolution]?`

Set the resolution bandwidth that will be used. If span is set to a value greater than 5 MHz, minimum resolution bandwidth is limited to 1 kHz.

Factory Preset
and *RST: 30 kHz

Range: Option 1DR—10 Hz to 5 MHz

                    non- Option 1DR—1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in the cdmaOne mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup, Advanced, Resolution BW**

Receiver Spurious—Video Bandwidth

`[:SENSe]:RSPur:BANDwidth|BWIDth:VIDeo <freq>`

`[:SENSe]:RSPur:BANDwidth|BWIDth:VIDeo?`

Set the video bandwidth that will be used.

Factory Preset
and *RST: 3 kHz

Range: Option 1DR—30 Hz to 3 MHz

                non- Option 1DR—1 kHz to 3 MHz

Default Unit: Hz

Remarks: You must be in the cdmaOne mode to use this
                command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Meas Setup**, **Advanced**, **Video BW**

Synchronization Commands

Sync Alignment

`[:SENSe]:SYNC:ALIGnment GSM|HALF`

`[:SENSe]:SYNC:ALIGnment?`

Select the sync alignment to be either to the GSM standard or the standard offset by 1/2 bit.

GSM - burst alignment as defined in the GSM standard

HALF - burst alignment is advanced by1/2 bit, which corresponds to an earlier interpretation of the GSM standard

Factory Preset
and *RST: Half bit

Remarks: Global to the current mode.

                 You must be in the GSM mode to use this command.
                 Use INSTrument:SELect to set the mode.

Front Panel
Access: **Mode Setup, Demod, Burst Align**

Sync Burst RF Amplitude Delay

`[:SENSe]:SYNC:BURSt:RFAMplitude:DELay <time>`

`[:SENSe]:SYNC:BURSt:RFAMplitude:DELay?`

Set the delay for the RF amplitude sync.

Factory Preset
and *RST: 0 s

Range: -5 ms to 5 ms

Default Unit: seconds

Remarks: Global to the current mode.

                 You must be in the Bluetooth or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Mode Setup, Trigger, RF Burst, Delay**

Burst Search Threshold

`[:SENSe]:SYNC:BURSt:STHReshold <rel_power>`

`[:SENSe]:SYNC:BURSt:STHReshold?`

Set the power threshold, relative to the peak power, that is used to determine the burst rising edge and falling edge.

Factory Preset
and *RST: −10 dB

                   −3.00 dB for Bluetooth

Range: −200 to −0.01 dB

                   −50.00 to −0.01 dB for Bluetooth

Default Unit: dB

Remarks: You must be in the Bluetooth or GSM mode to use this command. Use INSTrument:SELect to set the mode.

Front Panel
Access: **Mode Setup, Demod....**

                   or

                   Det/Demod, Burst Search Threshold

Transmit Band Spurs Measurement

Commands for querying the transmit band spurs measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 65. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **TxBand Spur** measurement has been selected from the **MEASURE** key menu.

Transmit Band Spurs—Average Count

`[:SENSe]:TSPur:AVERage:COUNt <integer>`

`[:SENSe]:TSPur:AVERage:COUNt?`

Set the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

Factory Preset
and *RST: 10

Range: 1 to 1,000

Remarks: You must be in the GSM mode to use this command. Use INSTrument:SELect to set the mode.

Transmit Band Spurs—Averaging State

`[:SENSe]:TSPur:AVERage[:STATe] OFF|ON|0|1`

`[:SENSe]:TSPur:AVERage[:STATe]?`

Turn averaging on or off.

Factory Preset
and *RST: On

Remarks: You must be in the EDGE(w/GSM), GSM mode to use this command. Use INSTrument:SELect to set the mode.

History: Version A.03.00 or later

Transmit Band Spurs—Idle Mode

`[:SENSe]:TSPur:IDLE ON|OFF|1|0`

`[:SENSe]:TSPur:IDLE?`

Set idle mode to YES if the transmitter is set to idle, or NO if the transmitter has an active channel.

Factory Preset
and *RST: NO

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Transmit Band Spurs—Type

`[:SENSe]:TSPur:TYPE EXAMine|FULL`

`[:SENSe]:TSPur:TYPE?`

Select the measurement type.

Examine - measures spurs in all the valid segments and then displays the segment that has the worst spur

Full - continuously measures the spurs in all the valid segments

Factory Preset
and *RST: Full

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Transmit Power Measurement

Commands for querying the transmit power measurement results and for setting to the default values are found in the "MEASure Group of Commands" on page 65. The equivalent front panel keys for the parameters described in the following commands, are found under the **Meas Setup** key, after the **Transmit Power** measurement has been selected from the **MEASURE** key menu.

Transmit Power—Number of Bursts Averaged

`[:SENSe]:TXPower:AVERage:COUNt <integer>`

`[:SENSe]:TXPower:AVERage:COUNt?`

Set the number of bursts that will be averaged. After the specified number of bursts (average counts), the averaging mode (terminal control) setting determines the averaging action.

Factory Preset
and *RST: 10

Range: 1 to 10,000

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Transmit Power—Averaging State

`[:SENSe]:TXPower:AVERage[:STATe] OFF|ON|0|1`

`[:SENSe]:TXPower:AVERage[:STATe]?`

Turn averaging on or off.

Factory Preset
and *RST: On

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Transmit Power—Averaging Mode

`[:SENSe]:TXPower:AVERage:TCONtrol EXPonential|REPeat`

`[:SENSe]:TXPower:AVERage:TCONtrol?`

Select the type of termination control used for the averaging function. This determines the averaging action after the specified number of frames (average count) is reached.

Exponential - Each successive data acquisition after the average count is reached, is exponentially weighted and combined with the

existing average.

Repeat - After reaching the average count, the averaging is reset and a new average is started.

Factory Preset
and *RST: Exponential

Remarks: You must be in the GSM mode to use this command.
                 Use INSTrument:SELect to set the mode.

Transmit Power—Averaging Type

`[:SENSe]:TXPower:AVERage:TYPE LPOWer|POWer`

`[:SENSe]:TXPower:AVERage:TYPE?`

Select the type of averaging to be performed.

LPOWer - logarithmically averages the power of the video data.

POWer - averages the linear power of successive measurements.

Factory Preset
and *RST: POWer

Remarks: You must be in the GSM mode to use this command.
                 Use INSTrument:SELect to set the mode.

Transmit Power—Resolution BW

`[:SENSe]:TXPower:BANDwidth|BWIDth[:RESolution] <freq>`

`[:SENSe]:TXPower:BANDwidth|BWIDth[:RESolution]?`

Set the resolution BW. This is an advanced control that normally does not need to be changed. Setting it to a value other than the factory default, may cause invalid measurement results.

Factory Preset
and *RST: 300 kHz

Range: 1 kHz to 5 MHz

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command.
                 Use INSTrument:SELect to set the mode.

Transmit Power—Video Bandwidth

`[:SENSe]:TXPower:BANDwidth|BWIDth:VIDeo <freq>`

`[:SENSe]:TXPower:BANDwidth|BWIDth:VIDeo?`

Specify the video bandwidth.

Factory Preset
and *RST: 300 kHz

Range: 1Hz to 3MHz

Default Unit: Hz

Remarks: You must be in the GSM mode to use this command.
                   Use INSTrument:SELect to set the mode.

Transmit Power—Burst Synchronization Source

`[:SENSe]:TXPower:BSYNc:SOURce TSEQuence|RFAMplitude|NONE`

`[:SENSe]:TXPower:BSYNc:SOURce?`

Select the method of synchronizing the measurement to the GSM bursts.

TSEQuence - the training sequence burst sync performs a demodulation of the burst and determines the start and stop of the useful part of the burst based on the midamble training sequence.

RFAMplitude - the RF amplitude burst synch approximates the start and stop of the useful part of the burst without digital demodulation of the burst.

NONE - performs no burst synchronization.

Factory Preset
and *RST: NONE

Remarks: You must be in the GSM mode to use this command.
                   Use INSTrument:SELect to set the mode.

Transmit Power—Current Data Calculation

`[:SENSe]:TXPower:CDATa ON|OFF|1|0`

`[:SENSe]:TXPower:CDATa?`

Turns calculation of current data calculation on of off. Current data is calculated at the end of each sweep and is based only on that sweep.

Factory Preset
and *RST: ON

Range: ON/OFF

Remarks: You must be in the GSM mode to use this command.
                   Use INSTrument:SELect to set the mode.

Transmit Power—Maximum Timeslots

`[:SENSe]:TXPower:MTIMe <num timeslots>`

`[:SENSe]:TXPower:MTIMe?`

Sets the number of timeslots to capture and show on screen.

Factory Preset
and *RST: 1

Range: 1 to 8

Remarks: You must be in the GSM mode to use this command.
                   Use INSTrument:SELect to set the mode.

Transmit Power—Threshold Level

`[:SENSe]:TXPower:THReshold <power>`

`[:SENSe]:TXPower:THReshold?`

Set the amplitude threshold level. Only the data above the threshold level is kept and used to compute the average transmit carrier power.

Factory Preset
and *RST: −6.0 dB

                   −6.0 dB

Range: −60 dB to 0 dB, for relative mode

                   −60 dBm to +60 dBm, for absolute mode

Default Unit: dB for relative mode

                   dBm for absolute mode

Remarks: You must be in the GSM mode to use this command.
                   Use INSTrument:SELect to set the mode.

                   The command (SENSe:TXPower:THReshold:TYPe
                   ABSolute|RELative) determines whether this
                   command is setting an absolute or a relative power
                   level.

Transmit Power—Threshold Type

`[:SENSe]:TXPower:THReshold:TYPE ABSolute|RELative`

`[:SENSe]:TXPower:THReshold:TYPE?`

Select auto or manual control of the threshold level.

Absolute - threshold value is set to an absolute power level

Relative - threshold value is set relative to the reference

Factory Preset
and *RST: Relative

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

Transmit Power—Trigger Source

`[:SENSe]:TXPower:TRIGger:SOURce IMMediate|EXTernal|RFBurst`
`|FRAMe`

`[:SENSe]:TXPower:TRIGger:SOURce?`

Select the trigger source used to control the data acquisitions.

External - rear panel external trigger input

Immediate - the next data acquisition is immediately taken (also
called free run)

RFBurst - wideband RF burst envelope trigger that has automatic
level control for periodic burst signals.

Frame - uses the frame timer, which has been synchronized to the
selected burst sync.

Factory Preset
and *RST: RF Burst if the RF Burst Hardware (option B7E) has
                been installed

                External if option B7E has not been installed

Remarks: You must be in the GSM mode to use this command.
                Use INSTrument:SELect to set the mode.

STATus Subsystem

The STATus subsystem controls the SCPI-defined instrument-status reporting structures. Each status register has a set of five commands used for querying or masking that particular register.

Operation Register

Operation Condition Query

`:STATus:OPERation:CONDition?`

This query returns the decimal value of the sum of the bits in the Status Operation Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

Operation Enable

`:STATus:OPERation:ENABle <integer>`

`:STATus:OPERation:ENABle?`

This command determines what bits in the Operation Event register, will set the Operation Status Summary bit (bit 7) in the Status Byte Register. The variable <number> is the sum of the decimal values of the bits you want to enable.

NOTE   The preset condition is to have all bits in this enable register set to 0. To have any Operation Events reported to the Status Byte Register, one or more bits need to be set to 1.

Factory Preset
and *RST: 0

Range: 0 to 32767

Operation Event Query

`:STATus:OPERation[:EVENt]?`

This query returns the decimal value of the sum of the bits in the Operation Event register.

NOTE   The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register.

The data in this register is latched until it is queried. Once queried, the register is cleared.

Operation Negative Transition

`:STATus:OPERation:NTRansition <integer>`

`:STATus:OPERation:NTRansition?`

This command determines what bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a negative transition (1 to 0). The variable <number> is the sum of the decimal values of the bits that you want to enable.

Factory Preset
and *RST: 0

Range: 0 to 32767

Operation Positive Transition

`:STATus:OPERation:PTRansition <integer>`

`:STATus:OPERation:PTRansition?`

This command determines what bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a positive transition (0 to 1). The variable <number> is the sum of the decimal values of the bits that you want to enable.

Factory Preset
and *RST: 32767 (all 1's)

Range: 0 to 32767

TRIGger Subsystem

The Trigger Subsystem is used to set the controls and parameters associated with triggering the data acquisitions. Other trigger-related commands are found in the INITiate and ABORt subsystems.

Rear Panel External Trigger Delay

`:TRIGger[:SEQuence]:EXTernal:DELay <time>`

`:TRIGger[:SEQuence]:EXTernal:DELay?`

Set the trigger delay when using the rear panel external trigger.

Factory Preset
and *RST: 0.0 s

Range: 0 ns to 429 s Anything less than 300 ns is equal to off.

                 -5 ms to +5 ms, for GSM

Default Unit: seconds

Front Panel
Access: **Mode Setup, Trigger....**

                 or

                 Trig, External, Delay

Rear Panel External Trigger Slope

`:TRIGger[:SEQuence]:EXTernal:SLOPe NEGative|POSitive`

`:TRIGger[:SEQuence]:EXTernal:SLOPe?`

Sets the trigger slope when using the rear panel external trigger input.

This command activates the trigger condition that allows the next sweep to start when the external voltage (connected to GATE TRIG/EXT TRIG IN on the rear panel) passes through approximately 1.5 volts. The external trigger signal must be a 0 V to +5 V TTL signal. This function only controls the trigger polarity (for positive or negative-going signals).

Factory Preset
and *RST: Positive

Front Panel
Access: **Mode Setup, Trigger**

                 or

                 Trig, External, Slope

Frame Trigger Delay

`:TRIGger[:SEQuence]:FRAMe:DELay <time>`

`:TRIGger[:SEQuence]:FRAMe:DELay?`

Set trigger delay to be used in zero span measurements to adjust the active burst within a mask. Use positive values to achieve trigger delay (that is, to measure later than the trigger source event) and use negative values to achieve pre-trigger (that is, to measure earlier than the trigger source event).

Factory Preset
and *RST: 0

Range: -5 ms to +5 ms

Default Unit: seconds

Front Panel
Access: **Mode Setup, Trigger....**

or

Trig, Tab⇒, Frame Timer Delay

RF Burst Trigger Delay

`:TRIGger:RFBurst:DELay <time>`

`:TRIGger:RFBurst:DELay?`

Set the trigger delay when using the RF burst (wideband) trigger.

Factory Preset
and *RST: 0 s

Range: −5 ms to +5 ms

Default Unit: seconds

Front Panel
Access: **Mode Setup, Trigger....**

or

Trig, RF Burst, Delay

RF Burst Trigger Level

`:TRIGger:RFBurst:LEVel <dB>`

`:TRIGger:RFBurst:LEVel?`

Set the trigger level when using the RF Burst (wideband) Trigger. The value is relative to the peak of the signal.

Factory Preset
and *RST: −6.0

Range: −25 to 0

Default Unit: dB

Front Panel
Access: **Mode Setup, Trigger....**

or

Trig, RF Burst, Peak Level

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