Example: `PM:STAT ON`
activates PM.

Manual operation: See "State" on page 212

6.13.12 SOURce:POWer Subsystem

This subsystem contains the commands for setting the output level, level control and level correction of the RF signal.

Other units can also be used instead of dBm:

- by entering the unit directly after the numerical value (example `:POW 0.5V`)
- by changing the DEFault unit in the `UNIT` system (see the command `:UNIT:POWer`).

[:SOURce<hw>]:POWer:ALC:OMODe 382
[:SOURce<hw>]:POWer:ALC:SONCe 383
[:SOURce<hw>]:POWer:ALC[:STATe] 383
[:SOURce<hw>]:POWer:ATTenuation:RFOFf:MODE 384
[:SOURce<hw>]:POWer:EMF:STATe 384
[:SOURce<hw>]:POWer[:LEVel][:IMMediate][:AMPLitude] 384
[:SOURce<hw>]:POWer[:LEVel][:IMMediate]:OFFSet 385
[:SOURce<hw>]:POWer[:LEVel][:IMMediate]:RCL 386
[:SOURce<hw>]:POWer:LIMit[:AMPLitude] 386
[:SOURce]:POWer:WIGNore 386
[:SOURce<hw>]:POWer:LMODe 387
[:SOURce<hw>]:POWer:MANual 387
[:SOURce<hw>]:POWer:MODE 388
[:SOURce<hw>]:POWer:POWer 388
[:SOURce<hw>]:POWer:SPC:CRANge 389
[:SOURce<hw>]:POWer:SPC:DELay 389
[:SOURce<hw>]:POWer:SPC:PEAK 390
[:SOURce<hw>]:POWer:SPC:SELect 390
[:SOURce<hw>]:POWer:SPC:STATe 390
[:SOURce<hw>]:POWer:SPC:TARGet 390
[:SOURce<hw>]:POWer:STARt 391
[:SOURce<hw>]:POWer:STEP[:INCRement] 391
[:SOURce<hw>]:POWer:STEP:MODE 392
[:SOURce<hw>]:POWer:STOP 392

[:SOURce<hw>]:POWer:ALC:OMODe <OffMode>

The command sets the level control mode which becomes active when automatic level control is deactivated (ALC Off).

Parameters:

<OffMode> SHOLd

SHOLd
Level control is activated briefly if the level or frequency changes ("ALC Off Sample & Hold").

*RST: SHOLd

Example: `POW:ALC OFF`
deactivates automatic level control for RF output A.
`POW:ALC:OMOD SHOL`
level control is briefly activated if the frequency or level changes.

[:SOURce<hw>]:POWer:ALC:SONCe

Temporarily activates level control for correction purposes.

Example: `POW:ALC OFF`
deactivates automatic level control for RF output A.
`POW:ALC:SONC`
level control is performed once only.

Usage: Event

Manual operation: See "Search Once - ALC" on page 155

[:SOURce<hw>]:POWer:ALC[:STATe] <State>

Activates/deactivates automatic level control.

Parameters:

<State> ON | OFF | AUTO

ON
Internal level control is permanently activated.

OFF
Internal level control is deactivated; Sample & Hold mode is activated.

AUTO
Internal level control is activated/deactivated automatically depending on the operating state.

*RST: AUTO

Example: `POW:ALC ON`
activates automatic level control for RF output A.

Manual operation: See "State - ALC" on page 155

[:SOURce<hw>]:POWer:ATTenuation:RFOFf:MODE <Mode>

Selects the attenuator mode, when the RF signal is switched off.

Parameters:

<Mode> UNCHanged | FATTenuation

UNCHanged
Freezes the setting of the attenuator when RF is switched off.
The attenuator is only activated when RF is switched on.
This setting recommended if a constant VSWR (**V**oltage **S**tanding **W**ave **R**atio) is required.
Furthermore, on instruments equipped with a mechanical attenuator, it provides fast and wear-free operation.

FATTenuation
Sets attenuation to maximum when the RF signal is switched off.
This setting is recommended for applications that require a high level of noise suppression.

*RST: n.a. (factory preset: FATTenuation)

Example: `SOUR:POW:ATT:RFOF:MODE FATT`
sets the RF OFF attenuator to maximum.

Manual operation: See "RF OFF Mode" on page 151

[:SOURce<hw>]:POWer:EMF:STATe <State>

Displays the signal level as voltage of the EMF. The displayed value represents the voltage over a 50 Ohm load.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: n.a. (factory preset: 0)

Example: `POW:EMF:STAT 1`
activates voltage level display.

Manual operation: See "Display Level as Voltage of EMF - RF Level" on page 153

[:SOURce<hw>]:POWer[:LEVel][:IMMediate][:AMPLitude] <Amplitude>

Sets the RF level applied to the DUT.

Notes:

If specified, a level offset `[:SOURce<hw>]:POWer[:LEVel][:IMMediate]:OFFSet` is included according to the formula:

`Minimum level + OFFSet ... Maximum level + OFFSet`

In addition to numerical values, you can increase or decrease the values step by step with the `UP` and `DOWN` according to the step width defined with `[:SOURce<hw>]:POWer:STEP[:INCRement]`.

The RF output is activated with `:OUTPut<hw>[:STATe]` on page 317 (RF ON / RF OFF).

Parameters:

<Amplitude> Minimum level ... Maximum level

Determines the RF output level.

Range: Minimum level to Maximum level
*RST: -30

Example: The keywords of this command are largely optional. Therefore, both the long and short form of the command are shown.

```
SOUR:POW:LEV:IMM:AMPL 15
```

or

```
:POW 15
```

sets the RF level at output A to 15 dBm.

Manual operation: See "RF Level" on page 147

[:SOURce<hw>]:POWer[:LEVel][:IMMediate]:OFFSet <Offset>

Note: The level offset is also effective for level sweeps!

Specifies the constant level offset of a downstream attenuator/amplifier. If a level offset is entered, the level entered with `:POWer` no longer corresponds to the RF output level.

The following correlation applies:

`POWer` = RF output level + `POWer:OFFSet`.

Entering a level offset does not change the RF output level, but rather the query value of `:POWer`.

For more information, see "RF level vs. RF output level" on page 146.

Only dB is permitted as the unit here. The linear units (V, W, etc.) are not permitted.

The keywords of this command are largely optional. Therefore, both the long and short form of the command are shown in the example.

Parameters:

<Offset> float

Range: -100 to 100
Increment: 0.01
*RST: 0

Example:

```
SOURce:POWer:LEVel:IMMediate:OFFSet -10
```

or

```
POW:OFFS 10
```

sets the RF level offset to 10 dB

Manual operation: See "Offset (Level)" on page 150

[:SOURce<hw>]:POWer[:LEVel][:IMMediate]:RCL <Rcl>

Determines whether the RF level is retained or taken from a loaded instrument configuration, when you recall instrument settings with the command `*RCL`.

Parameters:

<Rcl> INCLude | EXCLude

INCLude
Takes the level value of the loaded settings.

EXCLude
Retains the current level when an instrument configuration is loaded.

*RST: INCLude

Example: `POW:RCL INCL`
takes the level value from an instrument configuration loaded with command `*RCL`.

Manual operation: See "Exclude Level" on page 131

[:SOURce<hw>]:POWer:LIMit[:AMPLitude] <Amplitude>

Limits the maximum RF output level in CW and SWEEP mode. It does not influence the "Level" display or the response to the `POW?` query command.

Parameters:

<Amplitude> float

Minimum level ... Maximum level
The value range for the level setting varies according to the instrument model.
The values are given in the data sheet.

Increment: 0.01
*RST: n.a. (factory preset: 30)

Example: `SOURce:POWer:LIMit:AMPLitude 10`
or
`:POW:LIM 10`
limits the RF level to maximum +10 dBm.

Manual operation: See "Limit - RF Level" on page 149

[:SOURce]:POWer:WIGNore <State>

Ignores level range warnings.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: n.a. (factory preset: 0)

Example: `POW:WIGN ON`
suppresses the level range warnings.

Manual operation: See "Ignore Level Range Warnings" on page 150

[:SOURce<hw>]:POWer:LMODe <LevMode>

Sets the RF level mode.

Parameters:

<LevMode> NORMal | LOWNoise | LOWDistortion

NORMal
The RF signal is output in the standard values of the instrument.

LOWNoise
A very low noise sinewave signal is output.

LOWDistortion
A very pure sinewave signal is output.

*RST: NORMal

Example: `POW:LMODE LOWD`
sets the LOWDistortion mode. The instrument reduces distortions of the RF signal to a minimum.

Manual operation: See "RF Mode" on page 148

[:SOURce<hw>]:POWer:MANual <Manual>

In Sweep mode (`:SOUR:POW:MODE SWE`) the command sets the level for the next sweep step in the Step sweep mode (`:SOUR:SWE:POW:MODE MAN`). Here only level values between the settings `[:SOUR]:POW:STAR` and `[:SOUR]:POW:STOP` are permitted. Each sweep step is triggered by a separate `:SOUR:POW:MAN` command.

As with the "Level" value entered in the "RF Level" menu, the `OFFSet` value is also taken into consideration with this command.

The specified value range is therefore only effective if `:SOURce:POWer:OFFSet` is set to 0. The value range for other `OFFset` values can be calculated using the following formula:

Minimum level + `OFFSet` ... Maximum level + `OFFSet`

Parameters:

<Manual> float

Minimum level ... Maximum level
The value range for the level setting varies according to the instrument model
The values are given in the data sheet.

Increment: 0.01
*RST: -30

Example: `POW:SWE:MODE MAN`
sets the Step sweep mode for RF output A.
`POW:MAN -5 dBm`
sets an RF level of -5 dBm for the next setting in the Step sweep mode for RF output A.
`POW:MODE SWE`
sets the Level Sweep mode for RF output A.
`POW:MAN -5.5 dBm`
triggers the next sweep step with a level of -5.5 dBm.

Manual operation: See "Current Level - Level Sweep" on page 191

[:SOURce<hw>]:POWer:MODE <Mode>

Sets the instrument operating mode and therefore also the commands used to set the output level.

Parameters:

<Mode> CW | FIXed | SWEep

CW|FIXed
Operates at a constant level.
`CW` and `FIXed` are synonyms. To set the output level value, use the command `[:SOURce<hw>]:POWer[:LEVel][:IMMediate][:AMPLitude]`.

SWEep
Operates in power sweep mode.
Set the range and current level with the commands `[:SOURce<hw>]:POWer:STARt`, `[:SOURce<hw>]:POWer:STOP` and `[:SOURce<hw>]:POWer:MANual`.

*RST: CW

Example: `POW:MODE SWEep`
selects the SWEep mode using the `POW:STAR; POW:STOP; POW:MAN` settings.

Manual operation: See "State - Level Sweep" on page 187

[:SOURce<hw>]:POWer:POWer <Power>

Sets the RF level of the RF output connector.

The level entered with this command corresponds to the level at the RF output, i.e. any offset entry is not taken into consideration.

Note: The SCPI command `[:SOURce<hw>]:POWer[:LEVel][:IMMediate][:AMPLitude]` sets the level of the "Level" display, i.e. the level containing offset.

Parameters:

<Power> Minimum level ... Maximum level

The value range for the level setting varies according to the instrument model.
The values are given in the data sheet.

Increment: 0.01
*RST: -30

Example: `SOUR:POW:POW 15`
sets the RF level at output to 15 dBm.

Manual operation: See "Amplitude" on page 149

[:SOURce<hw>]:POWer:SPC:CRANge <PowCntrlCRange>

Defines the capture range of the power control system.

Within the range:

Target Level +/- Catch Range

the power control locks and tries to achieve the target level. Readings outside the range are not considered.

Parameters:

<PowCntrlCRange> float

Range: 0 to 50
Increment: 0.01
*RST: 30
Default unit: dB

Example: `POW:SPC:CRAN 15`
sets the capture range to +/- 15 dB.

Manual operation: See "Catch Range +/-" on page 159

[:SOURce<hw>]:POWer:SPC:DELay <PowCntrlDelay>

Defines a waiting period between the level adjustment of the generator and the next measurement of the power sensor.

Parameters:

<PowCntrlDelay> integer

Range: 0 to 1000
*RST: 0

Example: `POW:SPC:DEL 2 ms`
the sensor starts the next reading 2 ms after the level adjustment.

Manual operation: See "Delay Time" on page 159

[:SOURce<hw>]:POWer:SPC:PEAK <PowCntrlPeak>

Activates power control by means of the peak power values, provided the power sensor supports this function.

Parameters:

<PowCntrlPeak> 0 | 1 | OFF | ON

*RST: 0

Example: `POW:SPC:PEAK ON`
uses the measured peak power for power control.

Manual operation: See "Use Peak Power" on page 159

[:SOURce<hw>]:POWer:SPC:SELect <PowCntrlSelect>

Defines the currently selected sensor to be used for power control.

Parameters:

<PowCntrlSelect> SENS1 | SENS2 | SENS3 | SENS4

*RST: SENS1

Example: `POW:SPC:SEL SENS2`
selects the sensor connected to a second USB interface for power control.

Manual operation: See "Sensor" on page 157

[:SOURce<hw>]:POWer:SPC:STATe <PowCntrlState>

Activates power control using the selected sensor. The control loop periodically adjusts the generator output. After switching off, the running loop is completed.

Parameters:

<PowCntrlState> 0 | 1 | OFF | ON

*RST: 0

Example: `POW:SPC:STAT ON`
activates power control.

Manual operation: See "State" on page 157

[:SOURce<hw>]:POWer:SPC:TARGet <PowCntrlTarget>

Sets the nominal level expected at the input of the sensor. To define the unit of the power value, use command `:SENSe<ch>:UNIT[:POWer]` on page 330.

Parameters:

<PowCntrlTarget> float

Range: -50 to 30
Increment: 0.01
*RST: -10

Example: `SENS:UNIT dBm`
selects unit dBm for setting the target level value.
`POW:SPC:TARG -10`
sets -10 dBm target level.

Manual operation: See "Target Level" on page 158

[:SOURce<hw>]:POWer:STARt <Start>

Sets the start level for the RF sweep.

Note: You can select any level within the setting range. The range is defined by this start value and the `[:SOURce<hw>]:POWer:STOP` value.

A defined offset (`[:SOURce<hw>]:POWer[:LEVel][:IMMediate]:OFFSet`) affects the level values according to the formula:

`Minimum level + OFFSet ... Maximum level + OFFSet`

Parameters:
<Start> float

Determines the first level value of the sweep setting range.

Range: full specified level range
Increment: see the data sheet: Level sweep > Step size setting resolution
*RST: -30

Example: `POW:STAR -20 dBm`
sets the start level for the level sweep to -15 dBm for RF output A.

Manual operation: See "Start Level - Level Sweep" on page 190

[:SOURce<hw>]:POWer:STEP[:INCRement] <Increment>

Sets the step width for `POW:STEP:MODE USER`.

To adjust the level step by step with this step size, use the `POW:UP` and `POW:UP` commands.

Note: This value also applies to the step width of the rotary knob of the instrument and increases or decreases the level accordingly, when you work in user-defined step mode.

Parameters:
<Increment> float

Range: full specified level range
Increment: see the data sheet: Level sweep > Step size setting resolution
*RST: 1

Example: `POW:STEP 2`
sets the step width for entering the RF level to 2 dB.