	AM	FM	PhiM	Pulse
Phase modulation (PhiM)	+	-	/	+
Pulse modulation (Pulse)	(+)	+	+	/

4.4.2 Amplitude Modulation (AM)

An internal and/or external source can be selected for amplitude modulation. The LF modulation generator is available as the internal source.

Two-tone AM is possible by simultaneously switching on the external and internal source.

The [MOD EXT] input connector for external feed of analog modulation signals is at the front of the instrument. The coupling mode of the input (AC or DC) can be selected.

The AM modulation depth is limited by the maximum peak envelope power (PEP).

Exponential AM (Instruments with high frequency options)

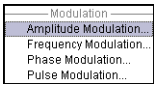
Besides the linear amplitude modulation, whereby the signal voltage is proportional to the modulation signal, instruments equipped with the frequency options (R&S SMB-B112(L) /-B120(L) /-B140(L)) provide a level-proportional power or amplitude modulation.

In this case, the R&S SMB exponentially distorts the modulation signal, before it is output at the [LF connector] - regardless of the AM Source Int, or Ext. The AM Depth is then indicated in dB.

Signal Sources for Exponential AM

You can perform exponential AM using either the internal, or an external modulation signal. However, in contrast to linear AM, the signal at the LF output connector is distorted in any operating mode. AM Source Int+Ext is not available.

4.4.2.1 Amplitude Modulation Settings

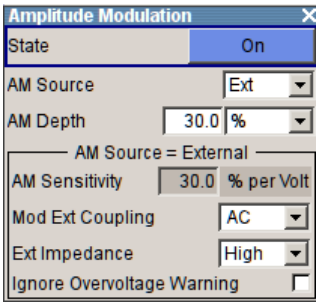


To open the "Amplitude Modulation" dialog, select "Modulation > Configure > Amplitude Modulation" or use the [MENU] key under "Modulation".

In the upper section of the dialog, the modulation source is selected and the modulation switched on. The modulation source can be selected independently for the different modulation types and the LF output.

The configuration of the selected external and/or internal modulation source is performed in the lower section of the dialog or in the "LF Output" dialog (internal source only).

These settings affect all modulations which use the same modulation source.



State
Activates amplitude modulation.

Remote command:
`[:SOURce<hw>]:AM:STATe` on page 333

AM Source
Selects the source for the AM modulation signal.

"Internal" Uses the internal LF generator as modulation signal source for AM.

"External" Uses an externally applied modulation signal.
The external signal is input via the [MOD EXT] connector.

"Intern + Extern"
Uses both, the internal and externally applied modulation signal, for example to perform two-tone AM.
Note: This setting applies to linear AM, see "Exponential AM (Instruments with high frequency options)" on page 204.

Remote command:
`[:SOURce<hw>]:AM:SOURce` on page 333

AM Type
Selects between linear or exponential (logarithmic) amplitude modulation, if you work with an instrument that is equipped with a 12 GHz, or higher frequency option.

Remote command:
`[:SOURce<hw>]:AM:TYPE` on page 334

AM Depth
Sets the modulation depth in percent.

Note: With two-tone modulation, observe that the set modulation depth applies to both signals and the sum modulation depth is determined by doubling the set modulation depth. This results in overmodulation if the maximal value for modulation depth is exceeded (see data sheet).

For instruments with frequency option 12 GHz or higher, you can additionally select AM Type Exponential. In this case, the generator sets modulation depth in dB (logarithmic).

Modulation is possible both, upwards and downwards. Accordingly, the dynamic range extends for instruments without attenuator from minimum to maximum level. For instruments with attenuator, the dynamic range corresponds to the Fixed Range (PEP) In; these are downwards about 20 dB, and upwards about 5 dB, that means in total about 25 dB around the set level.

Effects of positive/negative modulation depth:

- AM Source Int
  - positive depth -> downwards modulation
  - negative depth -> upwards modulation
- AM Source Ext
  - positive depth and negative external voltage -> downwards modulation
  - positive depth and positive external voltage -> upwards modulation
  - negative depth and negative external voltage -> upwards modulation
  - negative depth and positive external voltage -> downwards modulation

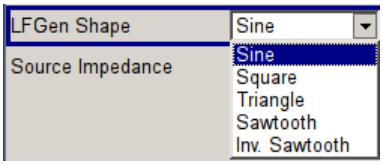
Remote command:
`[:SOURce<hw>]:AM:DEPTh:LINear` on page 332
`[:SOURce<hw>]:AM:DEPTh:EXPonential` on page 331

LF Gen Freq
Sets the frequency of the LF generator.

This setting affects all analog modulations which use the LF generator as the internal modulation source.

Remote command:
`[:SOURce]:LFOutput<ch>:FREQuency` on page 355

LF Gen Shape
Selects the waveform shape of the LF signal.



Note: The installed hardware determines the available settings. Use the Hardware Config dialog to check the hardware the instrument is equipped with.

For information on the required hardware revision, refer to the release notes.

Remote command:
`[:SOURce]:LFOutput:SHAPe` on page 363

AM Sensitivity
Displays the input sensitivity of the externally applied modulation signal at the [MOD EXT] input in %/V in AM Type Linear mode, and dB/V in AM Type Exponential mode.

The modulation depth entered under AM Depth is achieved with 1 Volt modulation of the input.

Remote command:
`[:SOURce<hw>]:AM:SENSitivity?` on page 332

Mod Ext Coupling
Selects the coupling mode (AC or DC) for external feed.

Note: Coupling for external feed via input [MOD EXT] can be set independently for all modulations using the external modulation signal.