Rohde & Schwarz SMHU58 RF Signal Generator

- I/Q Modulator for Any Phase and Amplitude Modulation (PSK, QAM, ASK, etc.), Modulation Bandwidth DC to 200 MHz
- Second, Coherent Carrier for Simple I/Q Demodulation
- Broadband Amplitude Modulation for TV Applications
- Broadband Frequency Modulation for Satellite Communications, Radar, and Video Applications
- Optional Coders for Generating Modulating Signals for Digital Radio Networks to Relevant Standards (GSM, NADC, DECT, CDMA)
- Frequency Hopping - 4800 Stored Frequency and Level Settings
- Parallel Bus Interface for External Addressing of Memories
- Setting Time <1 ms for Frequency-agile Systems
- High Spectral Purity for Out-of-channel Measurements and LO Applications
- High Output Power (+19 dBm)
- High Carrier Frequency Accuracy and Drift-free FM DC for FSK and VCO Modes
- Fast AM DC for Generating Level Bursts

RF, AF, Level, and Memory Sweeps for Automatic Test Runs

The SMHU58 Signal Generator can generate complex test signals for modern communications and radar systems. Its high versatility is based upon the great variety of modulation capabilities in conjunction with high spectral purity and frequency hopping.

The I/Q and the broadband AM/FM modulators make all digital and analog modulation modes for directional radio and satellite communications possible. Modern radio networks use digital modulation methods, for which the SMHU58 is ideally suited due to the high accuracy of its I/Q modulator.

For modulation using serial data signals, coders can be integrated for the necessary signal processing and filtering to relevant standards. The optional coders produce filtered analog signals from a serial data stream for driving the

I/Q modulator. The accuracy of the resulting phase modulation meets all requirements placed on a reference signal for NADC, DECT, PDC, and GSM testing. The CDMA coder uses Qualcomm chips to generate standard channels.

Broadband FM can be used for fast FSK, analog sweeping, video modulation, and for generating chirp signals.

Modulation

Internal and external, or both internal modulation sources, can be combined for two-tone modulation.

Frequency Modulation: The maximum deviation depends upon the carrier frequency. Starting from a maximum deviation of 3.2 MHz in the frequency range 2.16 to 4.320 GHz, the maximum deviation decreases with the carrier frequency.

By selecting a special function, deviations of up to 800 kHz can be set even below 125 MHz. The FM modulation frequency range covers DC to 1 MHz. In FM DC mode, a high carrier-frequency accuracy is ensured. The frequency offset occurring with FM DC selected is extremely small.

Amplitude Modulation: The whole of the modulation frequency range can be used down to carrier frequencies of less than 100 kHz. The minimal phase shift at 30 Hz (AM DC) and a flat frequency response provide the precision amplitude modulation required for testing VOR/ILS navigation receivers.

Pulse Modulation: Rise/fall times of 20 ns (<10 ns typical for frequencies >200 MHz) and an on/off ratio of 80 dB open up a wide range of possibilities for testing telemetry, radio link, radar, and satellite communications systems.

I/Q Modulator: The I/Q modulator is adjusted for minimum amplitude and phase error in an automatic calibration routine. The settings can also be varied to simulate a non-ideal behavior of the modulator. With the aid of selectable defined

modulation distortion, effects on bit error rates can be determined and demodulator maladjustments corrected.

Coder Options: The serial data signal may be derived from an external source or from a PRBS generator in the coder. By digital processing in the coder, the data signal is shaped as required for the prescribed filter function and split into I and Q signals. In addition to the standard filter functions provided, special filter functions for various bandwidths are programmed in the coder. They are used for specific variations of the modulation spectrum to enable investigations of non-standard signals. The extremely high modulation accuracy meets all the requirements placed on a reference signal for use in receiver testing. Separate coders are required for CDMA, GSM, DECT and NADC/PDC networks, since type of modulation, clock frequency, and baseband filtering are different in each network. The SMHU58 can accommodate one coder module.

Broadband AM: The I/Q modulator is also used for broadband amplitude modulation within a modulation bandwidth of 50 MHz. There are no limiting effects up to a level of +7 dBm. Modulation range, linearity, and bandwidth make the SMHU58 an ideal instrument for TV applications.

Broadband FM: This mode allows modulation frequencies up to 20 MHz. The frequency deviation can be adjusted in fine steps in the range from 1 kHz to 50 MHz. Through the simultaneous use of pulse modulation and Broadband FM, the SMHU58 can generate radar chirps with a frequency variation of 100 MHz in less than 100 ns. Further applications are in the field of video measurements and in satellite reception.

Frequency Modulation: FM applications range from high-quality stereo modulation to fast FSK. The maximum deviation usually decreases with the carrier frequency. This is different when FM is simultaneously used with I/Q or Broadband AM. The maximum deviation then has a constant value of 3.2 MHz in the range between 5 MHz and 1.95 GHz.

High carrier frequency accuracy is ensured in FM DC mode. When FM DC is selected, the frequency offset remains smaller than 10^{-7} x f_c (f_c = carrier frequency) and smaller than 400 Hz for I/Q modulation and Broadband AM. There is practically no drift. This is particularly useful for receivers with digital signaling.