

Vector Signal Generator SMV03

Allrounder with excellent vector modulator



Photo 43792/1

FIG 1 The Vector Signal Generator SMV03 is the allrounder among the economy generators from Rohde & Schwarz

With the addition of the SMV03 (FIG 1), which comprises a vector modulator with analog I/Q inputs for the frequency range from 9 kHz to 3.3 GHz, Rohde & Schwarz has extended its range of successful economy Signal Generators SML [1].

The RF modulation bandwidth of 100 MHz makes the new generator the ideal choice for all applications involving high data rates.

The allrounder

The SMV03 is the allrounder among the economy signal generators from Rohde & Schwarz. Excellent RF characteristics with versatile vector and analog modulation modes, short frequency and level setting times, an amazingly attractive price and, last but not least, compact dimensions and low weight make the SMV03 the ideal generator for production, service and laboratory applications.

RF characteristics

Thanks to its wide frequency range from 9 kHz to 3.3 GHz, the SMV03 covers all important frequency bands for communication, WLAN and ISM applications* as

well as for EMC measurements. The frequency synthesis is based on a tried-and-tested DDS concept, which allows crystal-controlled frequency settings with a resolution of 0.1 Hz. With the SML-B1 option (OCXO reference oscillator), frequency accuracy fulfills even the most exacting requirements. The synthesis concept also makes for the excellent SSB phase noise of typically -128 dBc (at 1 GHz, carrier offset 20 kHz, 1 Hz measurement bandwidth), short frequency setting times (typ. 7 ms) and high spurious suppression (typ. -70 dBc up to 1.1 GHz).

* ISM applications: industrial, scientific and medical high-frequency applications

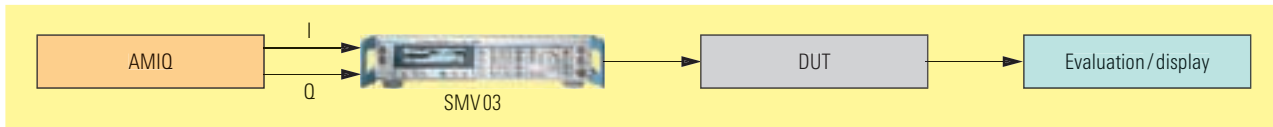


FIG 2 Signal Generator SMV03 in conjunction with the I/Q Modulation Generator AMIQ: component test application example

The RF level, too, meets all requirements. Using a wear-free electronic attenuator, which has a setting time of typically 5 ms, the RF level can be varied in 0.1 dB steps between -140 dBm and $+13$ dBm ($+11$ dBm below 5 MHz). In the overrange, even $+19$ dBm are available. All in all, the RF characteristics correspond to those of the proven Signal Generator SML03 [2] with analog modulation capability.

Vector modulation

The vector modulator of the SMV03 owes its excellent characteristics to a patented integrated circuit developed by Rohde & Schwarz. The analog I and Q inputs can be controlled by any external I/Q signal sources, in particular by the I/Q Modulation Generator AMIQ [3] (FIG 2). The AMIQ and its WinIQSIM software make it exceptionally easy to generate all possible digitally modulated I/Q signals.

The RF modulation bandwidth of the SMV03 is typically 100 MHz for RF frequencies from 500 MHz to 3 GHz (FIG 3) – a value previously reserved for high-end generators. High data rates, such as those in WLAN applications, are therefore no problem. The modulation bandwidth of the SMV03 is more than adequate for measuring components for WCDMA applications. FIG 4 shows the output spectrum of the SMV03 at 2.14 GHz, i.e. the center frequency of the 3GPP downlink band 2.11 GHz to 2.17 GHz. With an offset of 5 MHz, the typical ACP value of the generator is

-62 dBc. In this case, the SMV03 was modulated using an AMIQ, test model 1 (64DPCH, crest factor 10.7 dB).

Analog modulation modes

In addition to vector modulation, the SMV03 features all classic modulation modes, which are available in the SML family as standard. The SMV03 can consequently generate amplitude-, frequency- and phase-modulated RF signals, and also (with the SML-B3 option) pulse-modulated RF signals; the generator can thus perform all classic receiver measurements. The FM modulator is also suitable for externally fed stereo multiplex signals. The SMV03 contains an AF generator with a fre-

quency range from 0.1 Hz to 1 MHz to generate sinewave modulation signals. If the optional pulse modulator has been built-in, the associated pulse generator is also available. AM, FM/ ϕ M and pulse modulation can be performed simultaneously. The same applies to vector modulation, FM/ ϕ M and pulse modulation.

As with the RF data, the analog modulation characteristics of the SMV03 correspond to those of the SML03.

Low cost of ownership

Not only its versatility and attractive price, but also the low follow-on costs make the SMV03 a highly attractive investment. These low costs are ensured

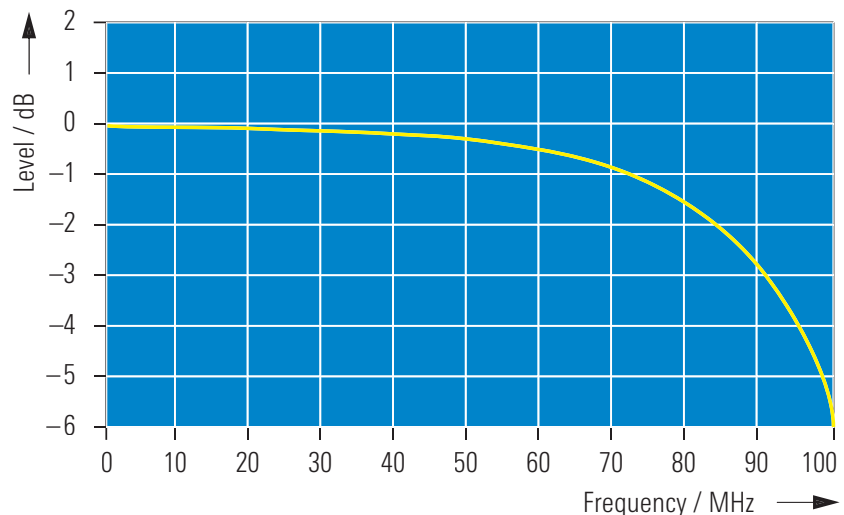


FIG 3 Typical I/Q modulation frequency response of the SMV03 at 1 GHz

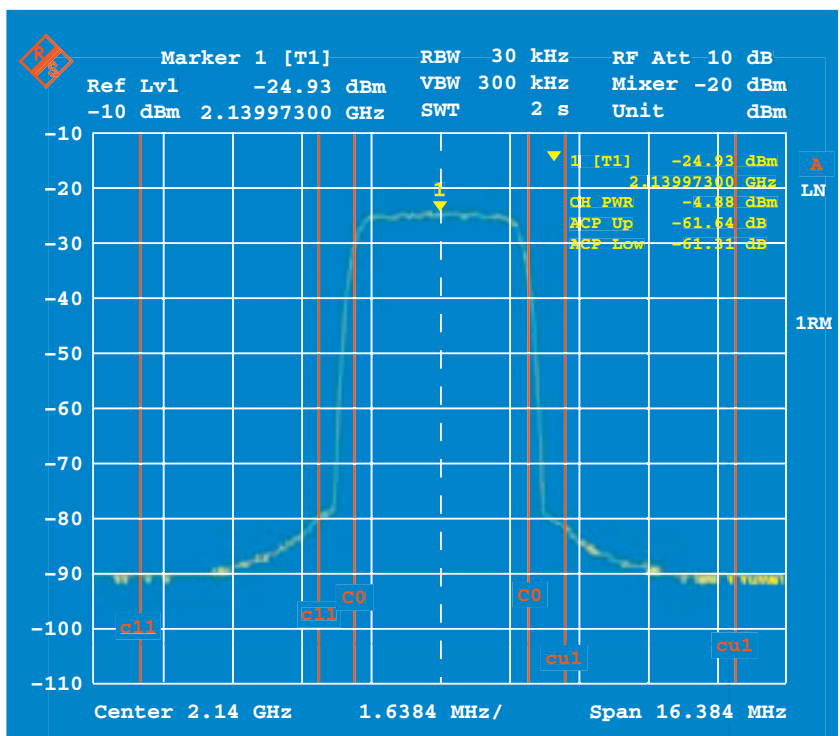


FIG 4 Typical WCDMA output signal at 2.14 GHz (test model 1, 64DPCH, crest factor 10.7 dB)

► by the signal generator’s high reliability, its short repair times in the event of a failure (thanks to built-in diagnostics), and, last but not least, the calibration cycle of three years.

Wilhelm Kraemer

Condensed data of the Signal Generator SMV03

Frequency range	9 kHz to 3.3 GHz
Resolution	0.1 Hz
Setting time	<10 ms
Harmonics	<-30 dBc
Subharmonics	none (f ≤ 1.1 GHz)
	<-50 dBc (f > 1.1 GHz)
Spurious	<-70 dBc (f ≤ 1.1 GHz)
	<-64 dBc (> 1.1 GHz to 2.2 GHz)
	<-58 dBc (f > 2.2 GHz)
SSB phase noise	<-122 dBc (f = 1 GHz, 20 Hz carrier offset, 1 Hz bandwidth)
Level	-140 dBm to +13 dBm (> 5 MHz to 3 GHz)
	-140 dBm to +11 dBm (f ≤ 5 MHz, f > 3 GHz)
Resolution	0.1 dB
Vector modulation	
Static error vector	< 0.5% (rms value), < 1% (peak value)
I/Q bandwidth (3 dB)	DC to 30 MHz (f ≤ 500 MHz, f > 3 GHz)
	DC to 50 MHz (> 500 MHz to 3 GHz)
Residual carrier	<-45 dBc
AM (3 dB bandwidth)	0 to 100% (DC to 50 kHz)
FM (3 dB bandwidth)	deviation up to 4 MHz (DC to 500 kHz)
φM (3 dB bandwidth)	deviation up to 40 rad (DC to 100 kHz)
	deviation up to 8 rad (DC to 500 kHz)
Pulse modulation (option SML-B3)	
On/off ratio	> 80 dB
Rise/fall time	< 20 ns
AF generator	0.1 Hz to 1 MHz
Pulse generator (option SML-B3)	
Pulse period	100 ns to 85 s

More information at www.rohde-schwarz.com (search word: SMV03)

REFERENCES

- [1] Signal Generator SML01 – Top-class economy generator. News from Rohde & Schwarz (1999) No. 165, pp 8–10
- [2] Signal Generators SML02/03 – Economy class extended to 3.3 GHz. News from Rohde & Schwarz (2000) No. 169, pp 18–20
- [3] I/Q Modulation Generator AMIQ: Convenient generation of complex I/Q signals. News from Rohde & Schwarz (1998) No. 159, pp 10–12