Microwave Signal Generator SMR

High-performance, cost-effective and reliable up to 40 GHz

- Instrument family with four models
  - SMR20 (10 MHz to 20 GHz)
  - SMR27 (10 MHz to 27 GHz)
  - SMR30 (10 MHz to 30 GHz)
  - SMR40 (10 MHz to 40 GHz)
- Standard version:
  CW generator with pulse modulation and digital frequency sweep
- Easily upgradeable to AM/FM signal generator and synthesized sweep generator with analog ramp sweep thanks to flexible options concept
- Optional pulse generator for radar and EMC applications
- Optional IF input for upconversion of digitally modulated IF signals
- Compact, lightweight, user-friendly: ideal in the lab and for field applications
- 3-year calibration cycle

ROHDE&SCHWARZ

The allrounder – designed for future-proofness

Maximum ease of operation

- High-contrast LC display
- Online help including IEC/IEEE-bus commands
- Simple and self-explanatory settings
- User-assignable keys
- One-hand operation with EasyWheel

Wide frequency range

- SMR20 (1 GHz to 20 GHz)
- SMR27 (1 GHz to 27 GHz)
- SMR30 (1 GHz to 30 GHz)
- SMR40 (1 GHz to 40 GHz)
- Optional extension of lower frequency limit to 10 MHz (SMR-B11)
- Frequency resolution 1 kHz, optional 0.1 Hz (SMR-B3)

High output power

- SMR20 >+10 dBm (at 20 GHz)
- SMR27 >+11 dBm (at 27 GHz)
- SMR30/40 >+9 dBm (at 30/40 GHz)

High-precision level control

- High-precision, frequency-response-compensated level control
- Setting range extendible to –130 dBm by means of RF attenuator option (SMR-B15/-B17)

Three instruments in one

- CW generator with pulse modulation capability (standard version)
- Signal generator with AM/FM and LF generator (option SMR-B5)
- Synthesized sweep generator with analog ramp sweep (option SMR-B4)

Optional pulse generator (SMR-B14)

- Operating modes: single pulse, double pulse, externally triggered, gate mode
- Pulse repetition 100 ns to 85 s
- Pulse width 20 ns to 1 s

Sweep capabilities

- Digital RF and level sweep (standard version)
- Analog ramp sweep (RF sweep, option SMR-B4)
- Max. sweep rate for ramp sweeps min. 600 MHz/ms (frequency >2 GHz)
- Digital sweep of LF generator (with option SMR-B5)
- 10 freely selectable frequency markers for RF sweep
- Operating modes: automatic, single-shot, manual, externally triggered

Optional IF input (SMR-B23/SMR-B24/SMR-B25)

- Built-in upconverter for digitally modulated IF signals (SMR-B23/-B24: DC to 700 MHz, SMR-B25: 40 MHz to 6 GHz for SMR 20 only)
- Ideal for use with Vector Signal Generator SMIQ and I/Q Modulation Generator AMIQ

CW, signal or synthesized sweep generator

Memory

- Space for 50 complete instrument setups

SMR as CW generator

The SMR family comprises four basic models designed as CW generators with pulse modulation capability. The four models have a common lower frequency limit of 1 GHz and provide frequency coverage up to 20 GHz (SMR20), 27 GHz (SMR27), 30 GHz (SMR30) and 40 GHz (SMR40). The lower limit can be expanded to 10 MHz by the optional Frequency Extension 0.01 GHz to 1 GHz (SMR-B11).

Offering an excellent price/performance ratio, each of the four basic models is ideal for the user wishing to enter the field of microwave testing at an affordable price. Should the measurement tasks become more demanding, the basic models can be upgraded any time by means of options to give an AM/FM signal generator or a synthesized sweep generator featuring fast, fully synthesized, analog ramp sweep.

Excellent spectral purity
The SMR stands out from other generators for its excellent spectral purity. Advanced frequency synthesis with fractional-N divider makes for low SSB phase noise and high spurious suppression, both of which are for example prerequisites for reliable receiver measurements. Modern microwave filters in the output path of the instrument ensure excellent harmonics suppression. This is necessary to obtain conclusive results in scalar network analysis measurements.

High-precision output level
Microwave signal generators are frequently used for calibrating test receivers. This task calls for a highly accurate and stable output level settable with high resolution. This is ensured by a high-precision, frequency-response-compensated level control for levels higher than –20 dBm. The setting range can be extended to –130 dB with the optional RF Attenuator SMR-B15 or SMR-B17.

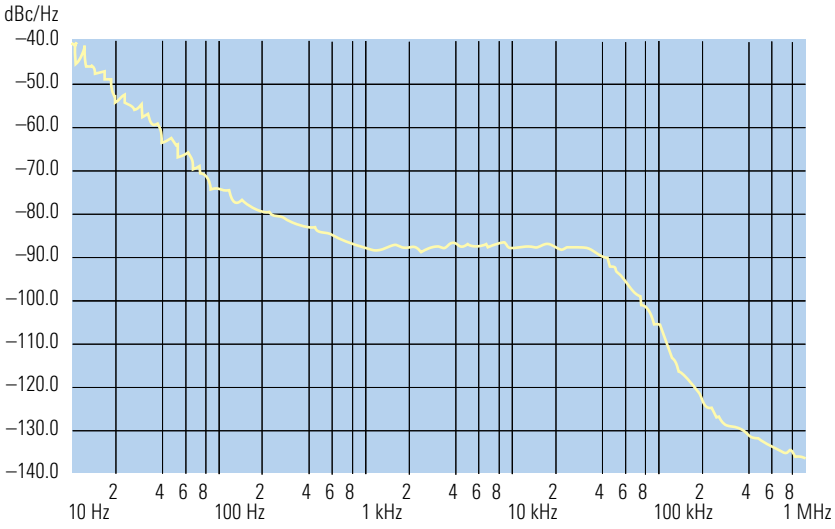
Stable output frequency
The crystal reference built in as standard ensures an accurate, low-drift output frequency. The SMR can be fitted with the optional OCXO Reference Oscillator SMR-B1 to satisfy the most stringent requirements on accuracy and aging.

High output level saves you real cash
All microwave test setups involve high losses caused by the use of long cables, power dividers, directional couplers and RF relays. Expensive microwave amplifiers are usually the only means to remedy this. But not with the SMR: the high output power provided by all models eliminates the need for such a costly component.

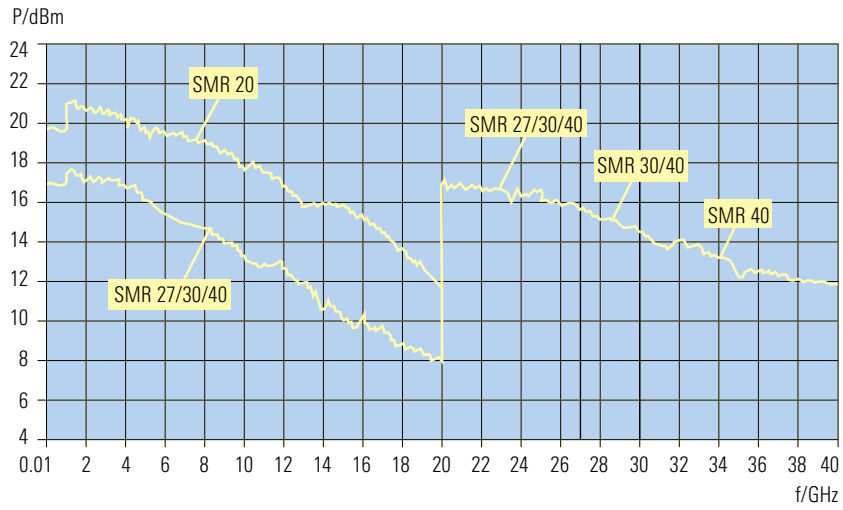
Application-oriented frequency resolution
The standard frequency resolution of 1 kHz of the SMR offers a comfortable margin for most applications, for example frequency response measurements in the laboratory and in production and servicing. To satisfy more stringent requirements, e.g. for scientific applications and research, the SMR-B3 option is available to improve frequency resolution to 0.1 Hz.

Pulse modulator included
Pulse modulation is still the most important modulation mode for microwave applications. Each of our basic units is, therefore equipped with a high-quality pulse modulator. The on/off ratio is better than 80 dB, the rise/fall time shorter than 12 ns. Pulse widths of up to 25 ns are possible.

These guaranteed values illustrate that the SMR is the ideal generator for use in the development, production and maintenance of radar equipment.



SSB phase noise at 10 GHz



Typical max. output level as a function of frequency (with options SMR-B15 and SMR-B17)

Pulse generator option

The optional Pulse Generator SMR-B14 is an ideal complement to the pulse modulator. It generates single and double pulses with pulse frequencies up to 10 MHz. The pulse generator can also be triggered externally and operated in the external gate mode. The pulse width and delay are freely selectable over a wide range.

Digital frequency and level sweeps

The digital frequency sweep with step times from 10 ms allows convenient frequency response measurements on microwave circuits. The start and stop frequencies are freely selectable. A trigger input enables synchronous operation with external equipment.

The 20 dB level sweep allows, for example, amplifier or mixer compression to be determined.

SMR as signal generator

AM/FM/Scan modulator option

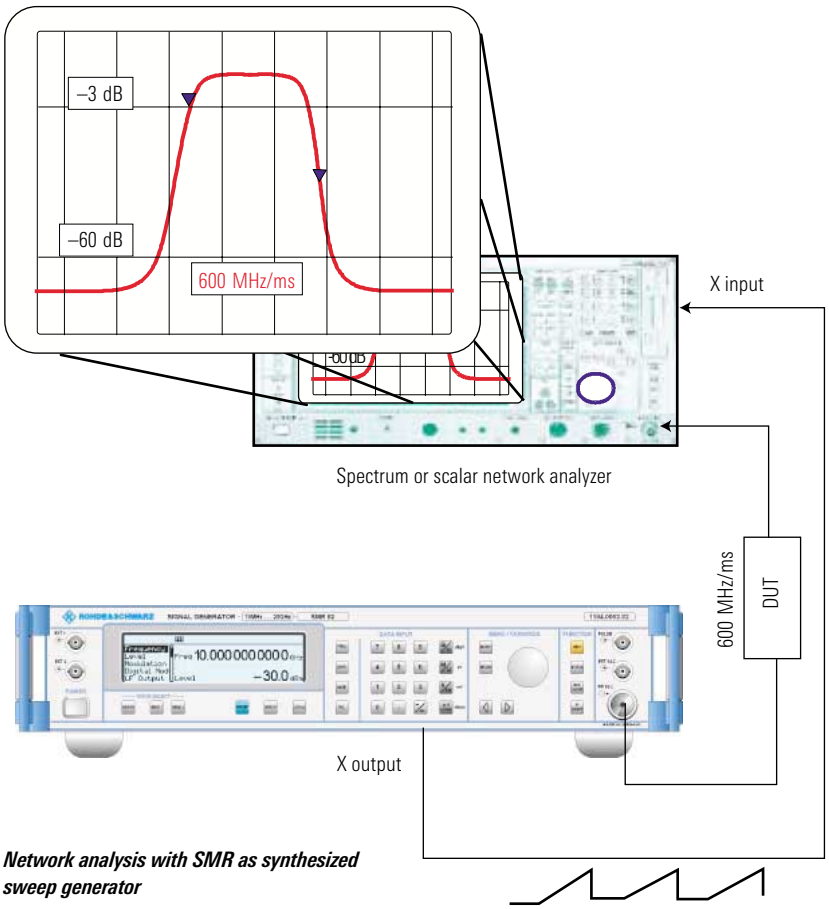
The optional AM/FM/Scan Modulator SMR-B5 added to the basic models turns them into fully-fledged signal generators with AM and FM modulation capability. The option also includes an LF generator for sinewave and squarewave signals from 0.1 Hz to 10 MHz.

FM and FSK

The FM modulator has a modulation bandwidth from DC to 5 MHz. Digital frequency shift keying (FSK) is possible with data rates from 0 Hz to 2 MHz.

Simultaneous modulation modes

All modulation modes of the SMR can be combined. This allows the generation of complex modulation signals for modern communication and location systems. The combination of pulse modulation and FM simulates Doppler effects or chirp signals. Simultaneous AM and pulse modulation provides the types of signal occurring in pulse radar applications with rotating antenna. The combination of FM and AM can be used to check fading effects of FM receivers.



Network analysis with SMR as synthesized sweep generator

SMR as synthesized sweep generator

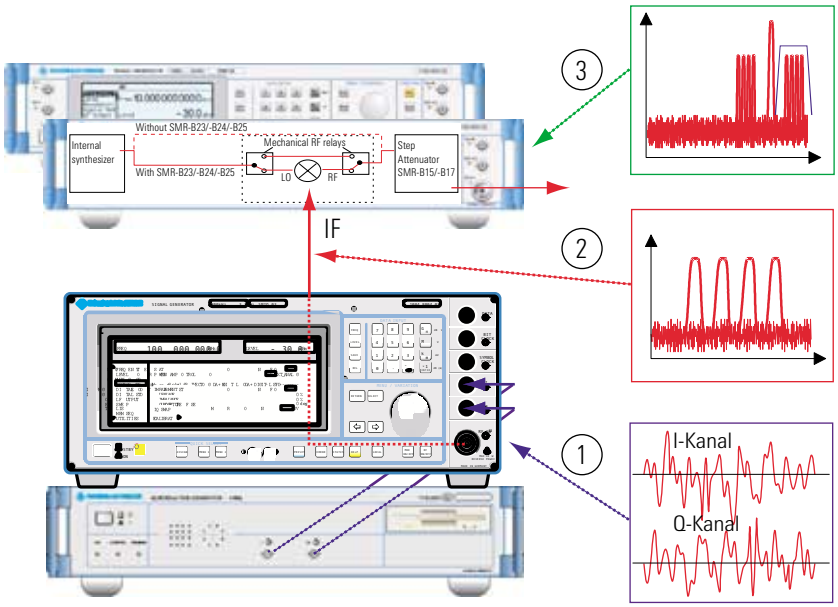
Analog ramp sweep option

The analog ramp sweep mode corresponds to the analog sweep of classic sweep generators except that the sweep is fully synchronized over the complete range. In this way, the excellent frequency accuracy of digital step sweeps is achieved on the whole, and this at much higher sweep rates of min. 600 MHz/ms from 2 GHz on.

In conjunction with scalar network analyzers or suitable spectrum analyzers, realtime adjustment of microwave filters can be performed, for example.

To mark important frequency ranges such as filter bandwidths or the position of attenuation poles, the SMR has 10 user-selectable frequency markers which can be output as pulse markers at the marker output (TTL level) or alternatively modulated on the RF level as level markers (level reduction of 1 dB).

The use of the SMR in conjunction with a scalar network or spectrum analyzer is illustrated by the figure at the bottom of page 4.



SMR as upconverter for digitally modulated signals

SMR as upconverter

IF input option

Vector signal generators like the SMIQ generate all types of digitally modulated signals up to 6.4 GHz. To generate signals up to 40 GHz, the SMR offers upconversion capability by means of the IF input option. A typical application is shown by the figure above. The I/Q Modulation Generator AMIQ supplies the I and Q signals (1) for modulating the Vector Signal Generator SMIQ.

The modulated RF signal of the SMIQ (2) is applied directly to the IF input of the SMR. At the RF output of the SMR, the converted, digitally modulated signal of the SMIQ is brought out (3). In the example illustrated above, the selective circuits of the DUT separate the wanted signal from unwanted components generated during upconversion.

Alternatively, suitable external bandpass filters can be used.

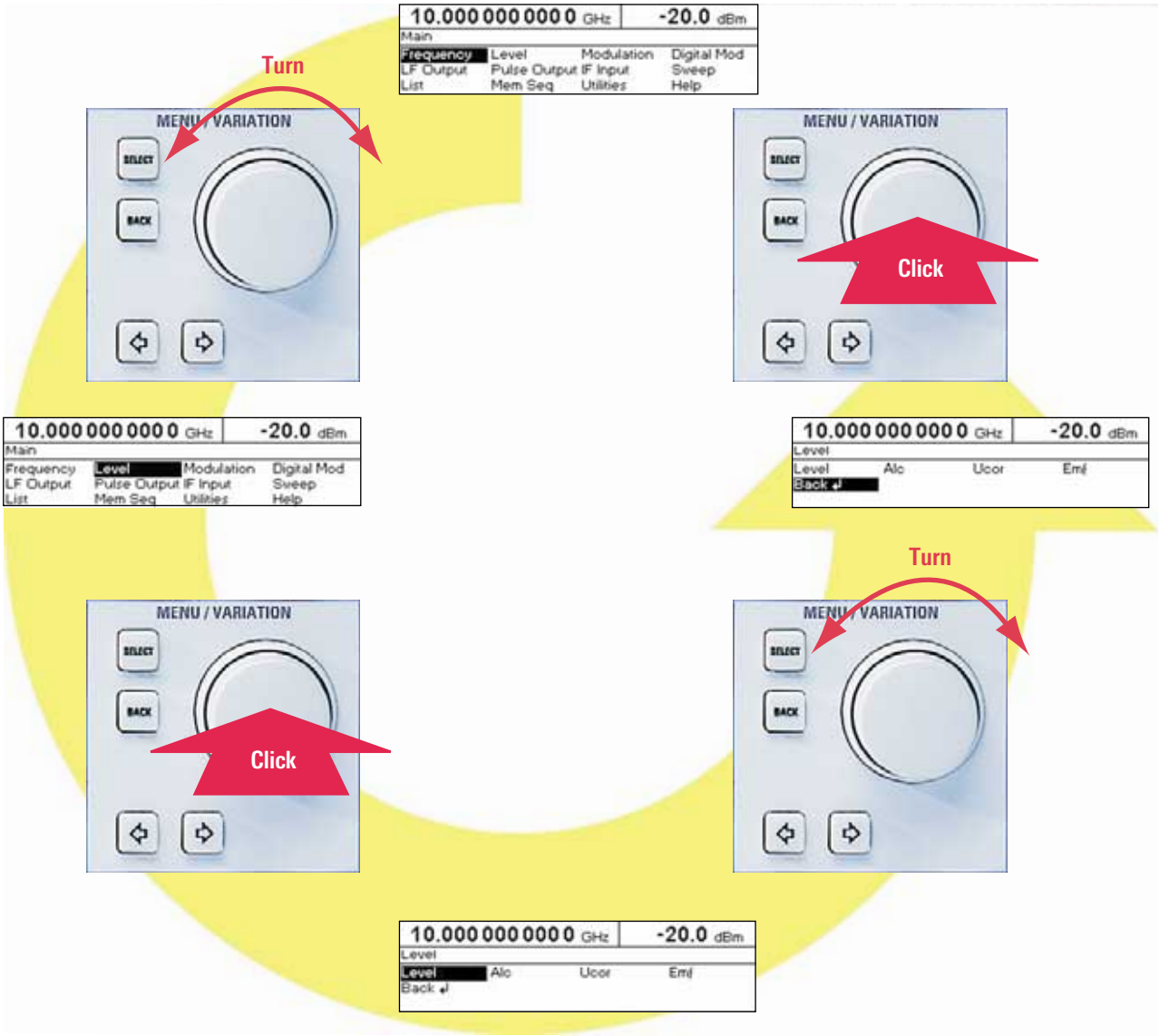
EasyWheel – the trick with the click

Transparent menu structure

The EasyWheel makes it extremely simple to operate the SMR user interface.

Just turn the wheel to go to the next menu item, then press the wheel to perform the desired function.

There is no easier way to operate a measuring instrument!



Specifications

The specifications are guaranteed under the following conditions:
warmup time 30 minutes, specified environmental conditions met, calibration cycle adhered to and total calibration performed.
Data designated "nom." apply to design parameters and are not tested. Data designated "overrange" or "underrange" are not guaranteed.

Frequency range

SMR20	
Without option SMR-B11	1 GHz to 20 GHz
With option SMR-B11	10 MHz to 20 GHz
SMR27	
Without option SMR-B11	1 GHz to 27 GHz
With option SMR-B11	10 MHz to 27 GHz
SMR30	
Without option SMR-B11	1 GHz to 30 GHz
With option SMR-B11	10 MHz to 30 GHz
SMR40	
Without option SMR-B11	1 GHz to 40 GHz
With option SMR-B11	10 MHz to 40 GHz
Resolution	
Without option SMR-B3	1 kHz
With option SMR-B3	0.1 Hz
Setting time (to within <1 x 10^{-6}) after IEC/IEEE-bus delimiter	<10 ms + 2 ms/GHz

Reference frequency	**Standard**	**Option SMR-B1**
Aging (after 30 days of operation)	1 x 10^{-6}/year	<1 x 10^{-7}/year
Temperature effect (0°C to 55°C)	2 x 10^{-6}	<1 x 10^{-10}/°C
Warmup time	–	15 min
Output for internal reference		
Frequency	10 MHz	
Level, V_{rms} (EMF, sinewave)	1 V	
Source impedance	50 Ω	
Input for external reference		
Frequency	10 MHz	
Permissible frequency drift	3 x 10^{-6}	
Input level, V_{rms}	0.1 V to 2 V	
Input impedance	50 Ω	

Spectral purity

Spurious signals	
Harmonics[1]	
f ≤20 GHz	<–55 dBc
f >20 GHz[2]	<–40 dBc
Subharmonics	
f ≤20 GHz	<–65 dBc
f >20 GHz	<–30 dBc
Nonharmonics	
f ≤20 GHz	<–60 dBc
f >20 GHz	<–54 dBc
SSB phase noise (f = 10 GHz, 10 kHz from carrier, 1 Hz bandwidth, CW, FM off)	<–83 dBc
Residual FM, rms (f = 10 GHz, FM off)	
0.3 kHz to 3 kHz	<20 Hz
0.03 kHz to 20 kHz	<200 Hz

Level

Maximum level without option SMR-B23/-B24/-B25[3]

Frequency range	SMR20		SMR27/SMR30/SMR40	
	Without option SMR-B15	With option SMR-B15	Without option SMR-B15/-B17	With option SMR-B15/-B17
0.01 GHz to <1 GHz	>+13 dBm		>+12 dBm	
1 GHz to <18 GHz	>+11 dBm	>+10 dBm	>+8 dBm	>+7 dBm
18 GHz to 20 GHz	>+10 dBm	>+8 dBm	>+7 dBm	>+5 dBm
>20 GHz to 27 GHz	–	–	>+11 dBm	>+9 dBm
>27 GHz to 30 GHz	–	–	>+9 dBm	>+7 dBm
>30 GHz to 40 GHz	–	–	>+9 dBm	>+7 dBm

Maximum level with option SMR-B23/-B24/-B25, normal mode (IF input off)[3]

Frequency range	SMR20		SMR27/SMR30/SMR40	
	Without option SMR-B15	With option SMR-B15	Without option SMR-B15/-B17	With option SMR-B15/-B17
0.01 GHz to <1 GHz	>+13 dBm		>+12 dBm	
1 GHz to <18 GHz	>+10 dBm	>+9 dBm	>+7 dBm	>+6 dBm
18 GHz to 20 GHz	>+8 dBm	>+6 dBm	>+5 dBm	>+3 dBm
>20 GHz to 27 GHz	–	–	>+8 dBm	>+6 dBm
>27 GHz to 30 GHz	–	–	>+6 dBm	>+4 dBm
>30 GHz to 40 GHz	–	–	>+6 dBm	>+4 dBm

Minimum level of all models	
Without option SMR-B15/-B17	–20 dBm (underrange <–20 dBm)
With option SMR-B15/-B17	–130 dBm
Resolution	0.1 dB or 0.01 dB, selectable
Total deviation (level = 0 dBm)	
f ≤20 GHz[4]	<1 dB
f >20 GHz	<1.4 dB
Frequency response (level = 0 dBm)	
f ≤20 GHz[5]	<0.5 dB, <0.3 dB typ.
f >20 GHz	<0.7 dB, <0.4 dB typ.
Impedance	50 Ω
SWR	<2
Setting time after IEC/IEEE-bus delimiter	<10 ms
With option SMR-B15/-B17, with switching in attenuator	<25 ms
Range for non-interrupting level setting	20 dB (overrange >20 dB)
Residual level[6] with switchoff via RF OFF	
Without option SMR-B15/-B17	nom. <–70 dBm
With option SMR-B15/-B17	nom. <–140 dBm

Linear amplitude modulation with option SMR-B5

Operating modes	internal, external AC/DC
Modulation depth[7]	0% to 100%
Resolution	0.1%
Setting accuracy (AF = 1 kHz, m <80%)[8]	<4% of reading + 1%
AM distortion[8] (f >50 MHz, AF = 1 kHz, m = 60%)	
f <1 GHz	<3%
f ≥1 GHz	<1%
Modulation frequency response (m = 60%)[8]	
f <1 GHz	
DC to 50 kHz	<3 dB
f ≥1 GHz	
20 Hz to 20 kHz	<1 dB
DC to 50 kHz	<3 dB
Incidental PM with AM, peak value (AF = 1 kHz, m = 30%)	<0.4 rad
EXT1, EXT2 modulation input	
Input impedance	50 Ω/600 Ω[9] or 100 kΩ
Input voltage V_p for selected modulation depth	1 V (high/low indication for inaccuracy >3%)

Logarithmic amplitude modulation with option SMR-B5 (SCAN AM)

Operating modes	internal, external
Dynamic range	30 dB (overrange >30 dB)
Sensitivity	±0.1 dB/V to ±10 dB/V
Resolution	0.01 dB
Rise/fall time (10%/90%)	<10 µs
EXT1, EXT2 modulation input	
Input impedance	50 Ω/600 Ω[9] or 100 kΩ
Input voltage range	–6 V to +6 V

Frequency modulation with option SMR-B5

Operating modes	internal, external AC/DC
Maximum deviation	
≤15.625 MHz	39.0625 kHz
>15.625 MHz to 31.25 MHz	78.125 kHz
>31.25 MHz to 62.5 MHz	156.25 kHz
>62.5 MHz to 125 MHz	312.5 kHz
>125 MHz to 250 MHz	625 kHz
>250 MHz to 500 MHz	1.25 MHz
>500 MHz to <1 GHz	2.5 MHz
1 GHz to <2 GHz	5 MHz
2 GHz to 10 GHz	10 MHz
>10 GHz to 20 GHz	20 MHz
>20 GHz	40 MHz
Resolution	<1%, min. 10 Hz
Setting accuracy (AF = 1 kHz)	<5% of reading + 20 Hz
FM distortion (AF = 1 kHz, half max. deviation)	<0.5%
Modulation frequency range	DC to 5 MHz
Modulation frequency response	<3 dB
Carrier frequency offset with FM	
≤15.625 MHz	0.39063 Hz + 1% of deviation
>15.625 MHz to 31.25 MHz	0.78125 Hz + 1% of deviation
>31.25 MHz to 62.5 MHz	1.5625 Hz + 1% of deviation
>62.5 MHz to 125 MHz	3.125 Hz + 1% of deviation
>125 MHz to 250 MHz	6.25 Hz + 1% of deviation
>250 MHz to 500 MHz	12.5 Hz + 1% of deviation
>500 MHz to <1 GHz	25 Hz + 1% of deviation
1 GHz to <2 GHz	50 Hz + 1% of deviation
2 GHz to 10 GHz	100 Hz + 1% of deviation
>10 GHz to 20 GHz	200 Hz + 1% of deviation
>20 GHz	400 Hz + 1% of deviation
EXT1, EXT2 modulation input	
Input impedance	50 Ω/600 Ω[9] or 100 kΩ
Input voltage V_p for selected deviation	1 V (high/low indication for inaccuracy >3%)

ASK modulation with option SMR-B5

Operating modes	external
Maximum modulation depth	90%
Resolution	0.1%
Data rate	0 Hz to 200 kHz
Rise/fall time (10%/90%)	<10 µs
EXT1 modulation input	
Input impedance	50 Ω/600 Ω[9] or 100 kΩ
Input level	TTL/HCT signal, selectable polarity

FSK modulation with option SMR-B5

Operating modes	external
Maximum deviation	
≤15.625 MHz	39.0625 kHz
>15.625 MHz to 31.25 MHz	78.125 kHz
>31.25 MHz to 62.5 MHz	156.25 kHz
>62.5 MHz to 125 MHz	312.5 kHz
>125 MHz to 250 MHz	625 kHz
>250 MHz to 500 MHz	1.25 MHz
>500 MHz to <1 GHz	2.5 MHz
1 GHz to <2 GHz	5 MHz
2 GHz to 10 GHz	10 MHz
>10 GHz to 20 GHz	20 MHz
>20 GHz	40 MHz
Data rate	0 Hz to 2 MHz
Rise/fall time (10%/90%)	<10 µs
EXT1 modulation input	
Input impedance	50 Ω/600 Ω[9] or 100 kΩ
Input level	TTL/HCT signal, selectable polarity

Pulse modulation

Operating modes	external, internal with option SMR-B14
On/off ratio	>80 dB
On/off ratio (10%/90%)	
62.5 MHz to 125 MHz	<50 ns[10]
>125 MHz to 450 MHz	<20 ns[10]
>450 MHz	<12 ns[10]
Minimum pulse width	
With level control on (ALC ON)	500 ns
With level control off (ALC OFF)	25 ns
Maximum pulse pause	
With level control on (ALC ON)	40 ms
With level control off (ALC OFF)	any
Minimum pulse/pause ratio	
With level control on (ALC ON)	1/100
With level control off (ALC OFF)	any
Maximum pulse repetition frequency	
62.5 MHz to 125 MHz	1 MHz
>125 MHz to 450 MHz	2 MHz
>450 MHz	10 MHz
Pulse delay	50 ns typ.
Video feedthrough V_{pp}	<20 mV
PULSE modulation input	
Input level	TTL/HCT signal or selectable switching thresholds
Input impedance	at +0.5 V or –2.5 V 50 Ω (max. 2 W, overload protection) or 10 kΩ

Simultaneous modulation

FM (FSK) is independent of AM (SCAN AM, ASK) and pulse modulation. Reduced AM bandwidth for simultaneous AM (SCAN AM, ASK) and pulse modulation

SMR-B23/-B24/-B25 IF input option

	SMR-B23	SMR-B24	SMR-B25
IF input			
Frequency range	DC to 700 MHz	DC to 700 MHz	40 MHz to 6 GHz
Level	<0 dBm	<0 dBm	<0 dBm
Frequency response	<5 dB	<7 dB	<7 dB
SWR	<2	<2	<2
RF output			
Frequency range	1 GHz to 20 GHz	2 to 27/30/40 GHz	1 GHz to 20 GHz
LO level	<–6 dBm	<–3 dBm	<0 dBm
SWR	<2	<2	<2
Conversion loss (IF input/RF output)			
With option SMR-B15/-B17[11]	3 dB to 18 dB	3 dB to 23 dB	3 dB to 23 dB
Without option SMR-B15/-B17	3 dB to 16 dB	3 dB to 19 dB	3 dB to 19 dB

LF generator with option SMR-B5

Frequency range	0.1 Hz to 10 MHz
Resolution	0.1 Hz
Waveforms	sinewave, squarewave
Frequency drift	<1 x 10^{-4}
Frequency response (up to 500 kHz)	<0.5 dB
Distortion (up to 100 kHz)	<0.5% (R_L >200 Ω, level = 0.5 V)
Open-circuit voltage V_p (LF connector)	40 mV to 4 V
Resolution	1 mV
Setting accuracy (at 1 kHz, V_p = 1 V)	1.5%
Output impedance	approx. 10 Ω
Frequency setting time (after IEC/IEEE-bus delimiter)	<10 ms

SMR-B14 pulse generator option

Operating modes	single or double pulse (automatically or externally triggered), delayed pulse (externally triggered), gate mode (external)
Active trigger edge	positive or negative
Pulse repetition period	100 ns to 85 s
Resolution	5 digits, min. 20 ns
Accuracy	$<1 \times 10^{-4}$
Pulse width	20 ns to 1 s
Resolution	4 digits, min. 20 ns
Accuracy	$<1 \times 10^{-4} + 3$ ns
Pulse delay	20 ns to 1 s
Resolution	4 digits, min. 20 ns
Accuracy	$<1 \times 10^{-4} + 3$ ns
Double pulse	60 ns to 1 s
Resolution	4 digits, min. 20 ns
Accuracy	$<1 \times 10^{-4} + 3$ ns
Trigger delay	50 ns typ.
Jitter	<10 ns
PULSE modulation input	
Input level	TTL/HCT signal or selectable switching thresholds
Input impedance	at +0.5 V or –2.5 V 50 Ω (max. 2 W, overload protection) or 10 kΩ
SYNC output	TTL/ACT signal, (R_L ≥50 Ω), 40 ns pulse width
PULSE/VIDEO output	TTL/ACT signal (R_L ≥50 Ω)

Digital sweep, sweep in discrete steps

RF sweep, AF sweep	
Operating modes	automatic, single-shot, manual or externally triggered, linear or logarithmic
Sweep range	freely selectable
Step width (lin)	freely selectable
Step width (log)	0.01% to 100%
Level sweep	
Operating modes	automatic, single-shot, manual or externally triggered, logarithmic
Sweep range	0 dB to 20 dB
Step width	0.01 dB to 20 dB
Step time	10 ms to 5 s
Resolution	0.1 ms
Markers	10, freely selectable
MARKER output signal	TTL level, selectable polarity
X output	0 V to 10 V
BLANK output signal	TTL level, selectable polarity

SMR-B4 ramp sweep option

RF sweep	
Operating modes	automatic, single-shot, manual or externally triggered start/stop, center frequency/span
Sweep range	freely selectable
Resolution	1 kHz
Accuracy	(0.005% (of deviation)/(sweep time/s) + reference error
Sweep time	10 ms to 100 s (switchover time ≤30 ms at 1 GHz, 2 GHz, 10 GHz and 20 GHz)
Max. sweep rate	
≤15.625 MHz	2.34375 MHz/ms
>15.625 MHz to 31.25 MHz	4.6875 MHz/ms
>31.25 MHz to 62.5 MHz	9.375 MHz/ms
>62.5 MHz to 125 MHz	18.75 MHz/ms
>125 MHz to 250 MHz	37.5 MHz/ms
>250 MHz to 500 MHz	75 MHz/ms
>500 MHz to <1 GHz	150 MHz/ms
1 GHz to <2 GHz	300 MHz/ms
2 GHz to 10 GHz	600 MHz/ms
>10 GHz to 20 GHz	1200 MHz/ms
>20 GHz	2400 MHz/ms
MARKER output signal	TTL level, selectable polarity
X output	0 V to 10 V
BLANK output signal	TTL level, selectable polarity

List mode

	frequency and level values can be stored in a list and will be set fast
Permissible level variation	20 dB
Operating modes	auto, single-shot, manual/external trigger
Maximum number of channels	2003
Step time	10 ms to 5 s
Resolution	0.1 ms

Memory for instrument setups

Storable setups	50

Remote control

System	IEC625 (IEEE488)
Command set	SCPI 1995.0
Connector	24-contact Amphenol
IEC/IEEE-bus address	0 to 30
Interface functions	SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0

[1] SMR20: level <+5 dBm without or <+3 dBm with option SMR-B23 or SMR-B25; SMR27/30/40: level <+2 dBm without or <+0 dBm with option SMR-B24.

[2] Specifications for harmonics above 20 GHz (SMR20), 27 GHz (SMR27), 30 GHz (SMR30) and 40 GHz (SMR40) only typical.

[3] With option SMR-B19/-B20 the maximum level is likely to be reduced by up to 0.1 dB/GHz. The maximum level is reduced by up to –2 dB in the temperature range 35 °C to 55 °C.

[4] From 10 MHz to 50 MHz, the specified total deviation is only valid in the temperature range 15 °C to 35 °C. The deviation outside this temperature range is likely to be higher by max. 0.7 dB.

[5] From 10 MHz to 50 MHz, the specified frequency response is only valid in the temperature range 15 °C to 35 °C.

[6] Residual level at set RF.

[7] The modulation depth adjustable within the AM specifications continuously decreases from 6 dB below the maximum level up to the maximum level.

[8] This specification does not apply
a) to non-interrupting level setting (ATTENUATOR MODE FIXED) if option SMR-B15/-B17 is used,
b) to levels below –7 dBm without option SMR-B15/-B17,
c) to external level control mode (EXT ALC).

[9] 50 Ω or 600 Ω selectable by means of internal jumpers.

[10] Only valid if level control set to OFF (ALC OFF).

[11] Option SMR-B15/-B17 in 0 dB position. The conversion loss can be increased by 10 dB to 110 dB in 10 dB steps using option SMR-B15/-B17. With option SMR-B19/-B20, the conversion loss is increased by up to 0.1 dB/GHz.

General data

Temperature resistance	
Rated temperature range	0 °C to +55 °C; meets IEC 68-2-1 and IEC 68-2-2
Storage temperature range	–40 °C to +70 °C
Climatic resistance	
Damp heat	95% relative humidity, cyclic test at +25 °C/+40 °C, meets IEC 68-2-3
Mechanical resistance	
Vibration, sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz, 55 Hz to 150 Hz, 0.5 g const.; meets IEC 68-2-6, IEC 1010-1 and MIL-T-28800D class 5
Vibration, random	10 Hz to 300 Hz, acceleration 1.2 g (rms)
Shock	40 g shock spectrum, meets MIL-STD-810D, MIL-T-28800D, class 3/5
Electromagnetic compatibility	meets EN 50081-1 and EN 50082-1 (EMC directive of EU)
Leakage (carrier frequency <1 GHz)	<0.1 µV (induced in a two-turn coil 25 mm in diameter at a distance of 25 mm from any surface of the enclosure)
Radiated susceptibility	10 V/m
Power supply	100 V to 120 V (AC), 50 to 400 Hz 200 V to 240 V (AC), 50 to 60 Hz, autoranging, max. 200 VA
Safety standards	DIN EN 61010-1, IEC 1010-1, UL 3111-1, CSA 22.2 No. 1010-1
Conformity marks	VDE-GS, CSA, NRTL/C
Dimensions (W x H x D)	427 mm x 88 mm x 450 mm
Weight	<12 kg when fully equipped

Ordering information

Order designation	Type	Order No.
Signal Generator		
1 GHz to 20 GHz	SMR 20	1104.0002.20
1 GHz to 27 GHz	SMR 27	1104.0002.27
1 GHz to 30 GHz	SMR 30	1104.0002.30
1 GHz to 40 GHz	SMR 40	1104.0002.40
Accessories supplied		
Power cable, operating manual, adapter		
3.5 mm, female	SMR 20	
2.9 mm, female	SMR 27/30/40	

Options

OCXO Reference Oscillator	SMR-B1	1104.5485.02
Frequency Resolution 0.1 Hz	SMR-B3	1104.5585.02
Ramp Sweep	SMR-B4	1104.5685.02
AM/FM/Scan Modulator	SMR-B5	1104.3501.02
Frequency Extension 0.01 GHz to 1 GHz[1]	SMR-B11	1104.4250.02
Pulse Generator	SMR-B14	1104.3982.02
RF Attenuator 20 GHz (SMR 20/27)[1]	SMR-B15	1104.4989.02
RF Attenuator 40 GHz (SMR 30/40)[1]	SMR-B17	1104.5233.02
Rear Connectors for RF, AF (SMR 20/27)[1]	SMR-B19	1104.6281.02
Rear Connectors for RF, AF (SMR 30/40)[1]	SMR-B20	1104.6381.02
IF Input 20 GHz (SMR 20)[1]	SMR-B23	1104.5804.02
IF Input 40 GHz (SMR 27/30/40)[1]	SMR-B24	1104.6100.02
IF Input 0.04 GHz to 6 GHz (SMR 20)[1]	SMR-B25	1135.1998.02
Recommended extras		
Service Kit	SMR-Z1	1103.9506.02
19"Rack Adapter	ZZA-211	1096.3260.00
Adapter (SMR 20)		
3.5 mm, female		1021.0512.00
3.5 mm, male		1021.0529.00
N, female		1021.0535.00
N, male		1021.0541.00
Adapter (SMR 27/30/40)		
2.9 mm, female		1036.4790.00
2.9 mm, male		1036.4802.00
N, female		1036.4777.00
N, male		1036.4783.00

[1] Factory-fitted option.

Certified Environmental System
ISO 14001
REG. NO 1954

Certified Quality System
ISO 9001
DQS REG. NO 1954

ROHDE&SCHWARZ

ROHDE&SCHWARZ GmbH & Co. KG · Mühldorfstraße 15 · 81671 München · Germany · P.O.B. 80 14 69 · 81614 München · Germany · Telephone +49 89 41 29-0
www.rohde-schwarz.com · Customer Support: Tel. +49 1805 12 42 42, Fax +49 89 41 29-13777, E-mail: CustomerSupport@rohde-schwarz.com

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