Microwave Signal Generator SMR

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

- Instrument family with 4 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 sweeper 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

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The allrounder - designed for future-proofness

Maximum ease of operation

- High-contrast LC display
- Online help including IEC/IEEE-bus commands
- All settings simple and self-explanatory
- 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, levelled output power

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

High precisision output level

- High precision, frequency-response-compensated level control
- The setting range can be extended to –130 dB with the optional 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 sweeper 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)

- Built-in upconverter for digitally modulated IF signals from DC to 700 MHz
- Ideal for use with Vector Signal Generator SMIQ and I/Q Modulation Generator AMIQ

CW, signal generator or synthesized sweep generator...

Memory

- Space for 50 complete instrument setups
- Convenient memory sequence modes

SMR as CW generator

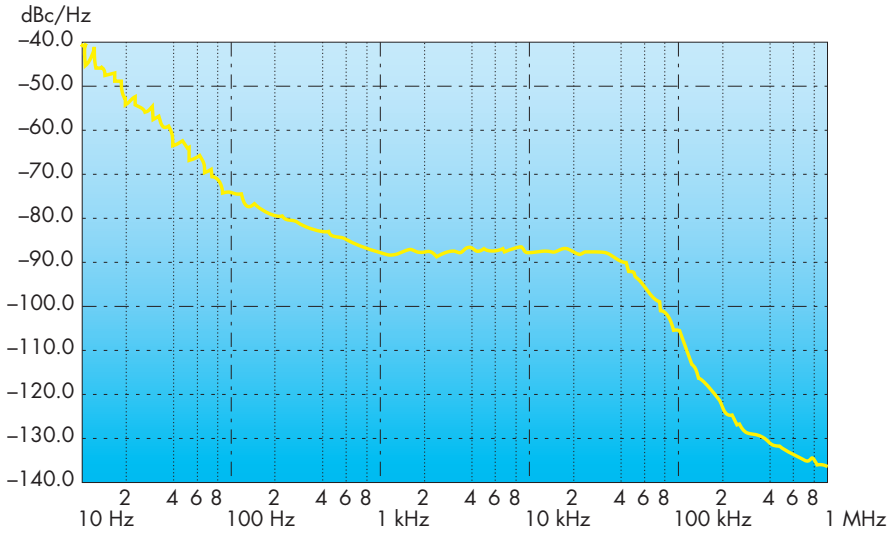
The SMR family comprises four basic models designed as CW generators with pulse modulation capability. The three models have a common lower frequency limit of 1 GHz and provide frequency coverage up to 20 GHz (SMR20), 27 GHz (SMR27), 30 GHz (SMR30) and 40 GHz (SMR40). The lower limit can be expanded to 10 MHz by the optional Frequency Extension 0.01 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 measurements become more demanding - no problem with SMR: all basic models can be upgraded fast and easily by means of options to give a signal generator with AM/FM modulation capability or a synthesized sweep generator featuring fast, fully synthesized analog ramp sweep.

Excellent spectral purity
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/SMR-B17.

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



SSB phase noise at 10 GHz

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 SMR: the high output power provided by all models eliminates the need for such costly component.

Application-oriented frequency resolution
The standard frequency resolution of 1 kHz of 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, eg for scientific applications and research, option SMR-B3 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. So, each of our basic units is 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 less than 20 ns are possible. These guaranteed values make SMR ideal for use in the development, production and maintenance of radar equipment.

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.

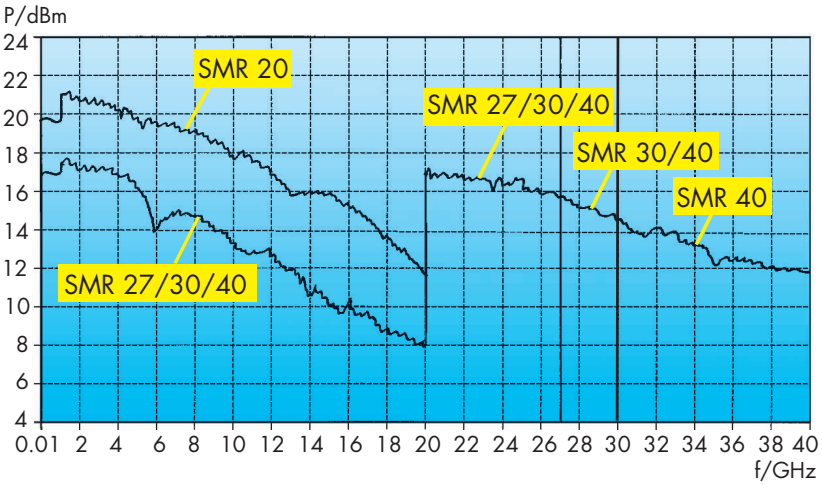
The 20 dB level sweep allows, for example, amplifier or mixer compression to be determined.

SMR as signal generator

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 in the range 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 to 2 MHz.

Simultaneous modulation modes
All modulation modes of 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.



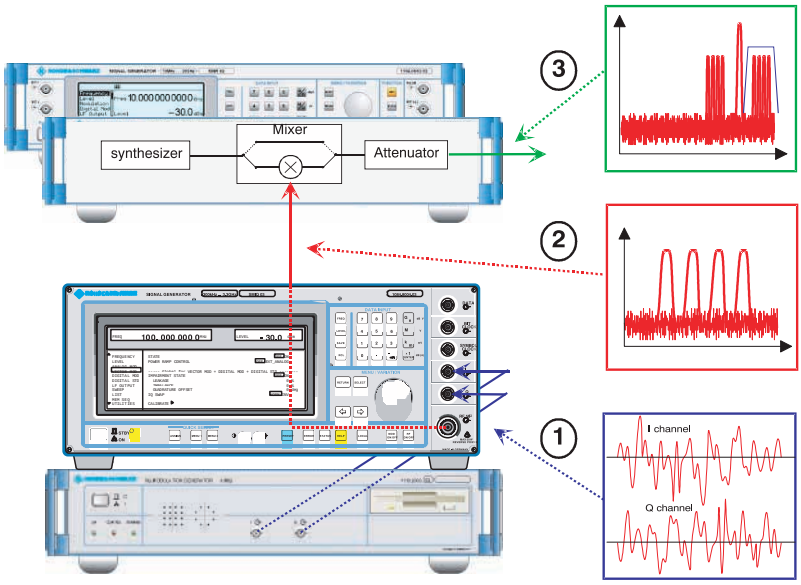
Typical max. output level as a function of frequency (with optional SMR-B15/-B17)

SMR as synthesized sweep generator

Analog ramp sweep option

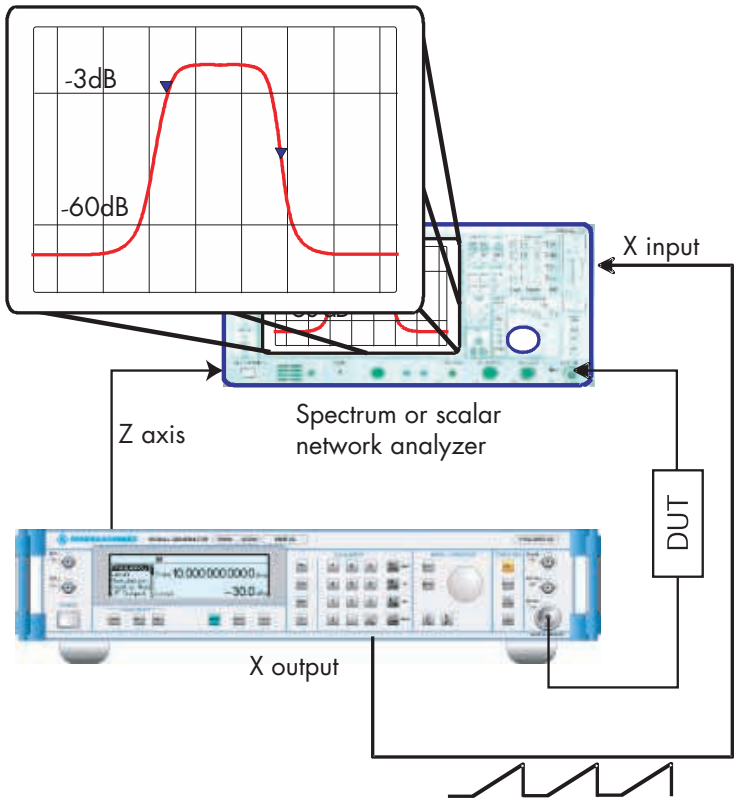
The analog ramp sweep mode corresponds to the analog sweep of classical sweep generators except that the sweep is fully synchronized over the complete range. In this way, the excellent frequency accuracy of digital step sweeps is achieved on the whole, and this at much higher sweep rates of min. 600 MHz/ms from 2 GHz on. In conjunction with scalar network analyzers or suitable spectrum analyzers, realtime adjustment of microwave filters can be performed.

To mark important frequency ranges such as filter bandwidths or the position of attenuation poles, 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).



SMR as upconverter for digitally modulated signals

The use of SMR in conjunction with a scalar network or spectrum analyzer is illustrated by the figure below.



Network analysis with SMR as synthesized sweeper

SMR as upconverter

IF input option

Vector signal generators like SMIQ generate all types of digitally modulated signals up to RF frequencies of 6.4 GHz. To generate digitally modulated signals up to 40 GHz, SMR offers upconversion capability by means of the IF input option.

A typical application is shown by the figure above. I/Q Modulator AMIQ supplies the I and Q signals (1) for modulation of Vector Signal Generator SMIQ. The modulated RF signal of SMIQ (2) is applied directly to the IF input of SMR. At the RF output of SMR, the converted, digitally modulated signal of 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.

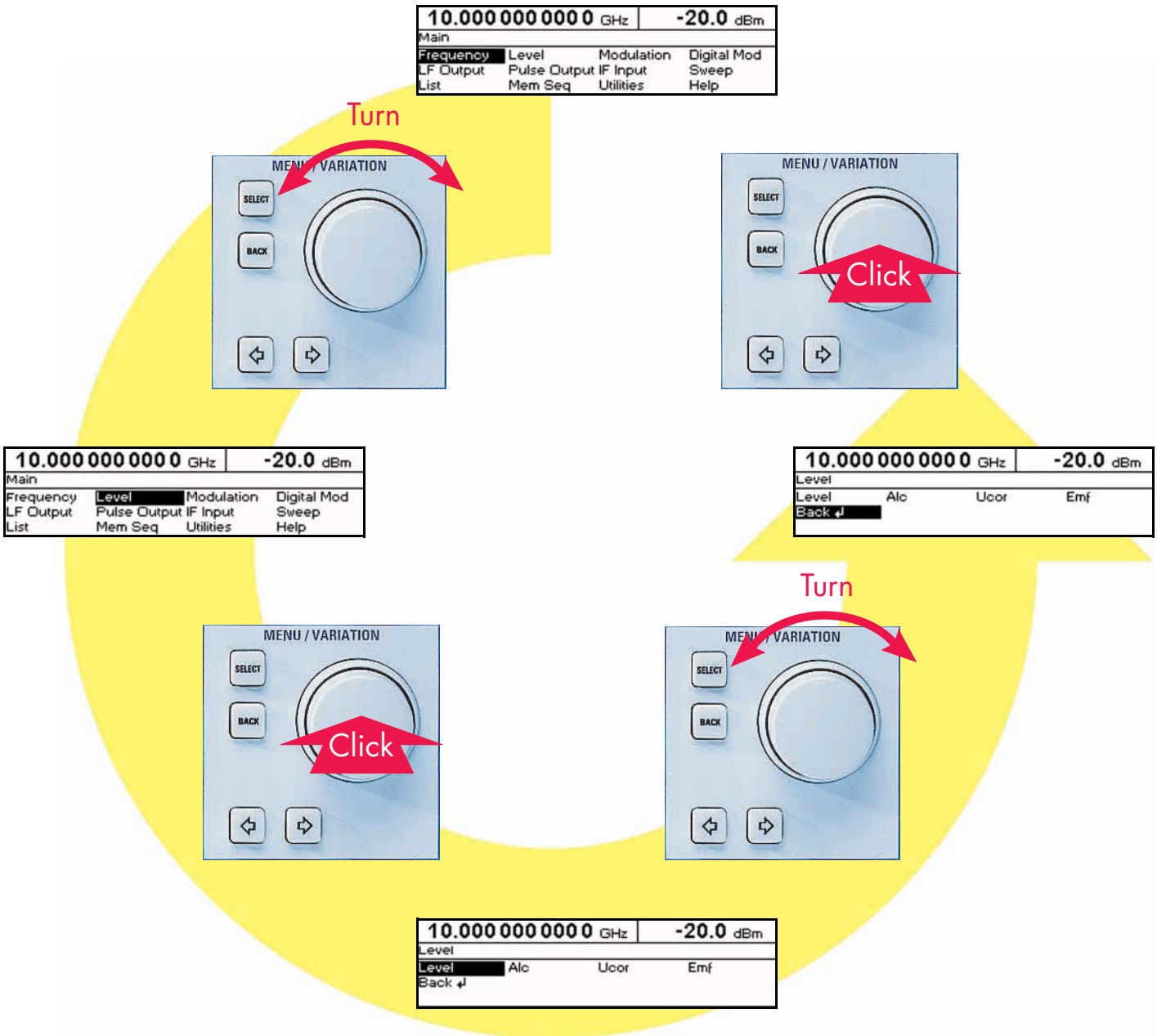
EasyWheel – the trick with the click

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

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 $<1 \cdot 10^{-6}$) after IEC/IEEE-bus delimiter	<10 ms + 1 ms/GHz
Phase offset	adjustable in 1° steps

Reference frequency	**Standard**	**Option SMR-B1**
Aging (after 30 days of operation)	$1 \cdot 10^{-6}$/year	$<1 \cdot 10^{-9}$/day
Temperature effect (0 to 55°C)	$2 \cdot 10^{-6}$	$<5 \cdot 10^{-8}$
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 error	$3 \cdot 10^{-6}$	
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 (>50 kHz from carrier)	
f <1 GHz	<–60 dBc
1 GHz ... 2 GHz	<–50 dBc
>2 GHz ... 10 GHz	<–60 dBc
>10 GHz ... 20 GHz	<–54 dBc
f >20 GHz	<–48 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

[1] SMR20: Level <+5 dBm without resp. <+3 dBm with option SMR-B23. SMR27/30/40: Level <+2 dBm without resp. <+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.

Level

Maximum level without option SMR-B23/-B24[1]

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

Maximum level with option SMR-B23/-B24, normal mode (IF input off)[1]

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

[1] With option SMR-B19/-B20 the maximum level is expected 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.

Minimum level of all models	
without option SMR-B15/B17	-20 dBm
with option SMR-B15/B17	-130 dBm
Resolution	0.1dB or 0.01 dB, selectable
Total error (level = 0 dBm)	
f ≤20 GHz	<±1 dB
f >20 GHz	<±1.4 dB
Frequency response (level = 0 dBm)	
f ≤20 GHz[1]	<±0.5 dB, typ. <±0.3 dB
f >20 GHz	<±0.7 dB, typ. <±0.4 dB
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

[1] In the frequency range 10 MHz to 50 MHz the given total error is only valid in the temperature range 15 °C to 35°C. Out of this temperature range the error is expected to be max. 0.7 dB higher.

Linear amplitude modulation with option SMR-B5

Operating modes	internal, external AC/DC
Modulation depth[1]	0% to 100%
Resolution	0.1%
Setting error (AF = 1 kHz, m <80%)[2]	<4% of reading +1%
AM distortion (AF = 1 kHz, m =60%)[2]	
f < 1 GHz	<3%
f ≥ 1 GHz	<1%
Modulation frequency response (m = 60%)[2]	
f < 1 GHz	
DC to 50 kHz	<3 dB
f ≥ 1 GHz	
20 Hz to 20 kHz	<1 dB
DC to 100 kHz	<3 dB
Incidental φM with AM, peak value (AF = 1 kHz, m = 30%)	<0.4 rad
EXT1, EXT2 modulation input	
Input impedance	600 Ω or 100 kΩ
Input voltage V_p for selected modulation depth	1 V (high/low indication for inaccuracy >3%)

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

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

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

Operating modes	internal, external
Dynamic range	>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	600 Ω 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	(N = –8)	39.0625 kHz
>15.625 MHz to 31.25 MHz	(N = –7)	78.125 kHz
>31.25 MHz to 62.5 MHz	(N = –6)	156.25 kHz
>62.5 MHz to 125 MHz	(N = –5)	312.5 kHz
>125 MHz to 250 MHz	(N = –4)	625 kHz
>250 MHz to 500 MHz	(N = –3)	1.25 MHz
>500 MHz to <1 GHz	(N = –2)	2.5 MHz
1 GHz to 2 GHz	(N = –1)	5 MHz
>2 GHz to 10 GHz	(N = 0)	10 MHz
>10 GHz to 20 GHz	(N = 1)	20 MHz
f >20 GHz	(N = 2)	40 MHz
Resolution		<1%, min. 10 Hz
Setting error (AF = 1 kHz)		<5% of reading +20 Hz
FM distortion (AF = 1 kHz, half maximum deviation)		<0.5%
Modulation frequency range		DC to 5 MHz
Modulation frequency response		<3 dB
Carrier frequency offset with FM		$100 \cdot 2^N$ Hz + 1% of deviation
EXT1, EXT2 modulation input		
Input impedance		600 Ω 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 to 200 kHz
Rise/fall time (10% / 90%)	<10 µs
EXT1 modulation input	
Input impedance	600 Ω or 100 kΩ
Input level	TTL signal, selectable polarity

FSK modulation with option SMR-B5

Operating modes	external
Maximum deviation	$10 \cdot 2^N$ MHz
Resolution	<1%, min. 10 Hz
Data rate	0 to 2 MHz
Rise/fall time (10% / 90%)	<10 µs
EXT1 modulation input	
Input impedance	600 Ω or 100 kΩ
Input level	TTL signal, selectable polarity

Pulse modulation

Operating modes	external, internal with option SMR-B14	
On/off ratio	>80 dB	
Rise/fall time (10% / 90%)	62,5 MHz to 125 MHz:	<50 ns [1]
	>125 MHz to 450 MHz:	<20 ns [1]
	>450 MHz:	<12 ns [1]
Pulse repetition frequency	62,5 MHz to 125 MHz:	≤0 to 1 MHz
	>125 MHz to 450 MHz:	≤0 to 2 MHz
	>450 MHz:	≤0 to 10 MHz
Minimum pulse width	20 ns[1]	
Pulse delay	typ. 50 ns	
Video feedthrough U_{pp}	<20 mV	
PULSE modulation input		
Input level	TTL signal	
Input impedance	50 Ω or 10 kΩ	

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

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.

IF input option SMR-B23/-B24

	SMR-B23	SMR-B24
IF input		
Frequency range	DC to 700 MHz	
Level	<0 dBm	
SWR	<2	
RF-Output		
Frequency range	1 GHz to 20 GHz	2 GHz to 27/30/40 GHz
Level[1]	<–10 dBm	
SWR	<2	

[1] The RF output level can be lowered from 0 dB to 110 dB in steps of 10 dB with option SMR-B15/-B17.

LF generator with option SMR-B5

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

Pulse generator option SMR-B14

Operating modes	automatic, external trigger, external gate mode, single pulse, double pulse, delayed pulse (externally triggered)
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	40 ns to 1 s
Resolution	4 digits, min. 20 ns
Accuracy	$<1 \times 10^{-4}$ +3 ns
Trigger delay	typ. 50 ns
Jitter	<10 ns
PULSE modulation input	
Input level	TTL signal
Input impedance	50 Ω or 10 kΩ
SYNC output	TTL signal, (R_L=50 Ω) 40 ns pulse width
PULSE/VIDEO output	TTL 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 1 s
Resolution	0.1 ms
Markers	10, freely selectable
MARKER output signal	TTL level, selectable polarity
X output	0 to 10 V
BLANK output signal	TTL level, selectable polarity

Ramp sweep option SMR-B4

RF sweep	
Operating modes	automatic, single-shot, manual or externally triggered start/stop, center freq./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	600 MHz/ms · 2^N
Markers	10, freely selectable
MARKER output signal	TTL level, selectable polarity
X output	0 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 extremely fast; permissible level variation: 20 dB
Operating modes	auto, single-shot, manual/external trigger
Max. number of channels	2003
Step time	10 ms to 1 s
Resolution	0.1 ms

Memory for instrument setups

Storable setups	50
Memory sequence modes	automatic, single-shot, manual or externally triggered
Step time	50 ms to 60 s
Resolution	1 ms

Remote control

System	IEC 625 (IEEE 488)
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

General data

Temperature stressing

Specifications met in range	0 °C to +55 °C; according to IEC68-2-1 and IEC68-2-2
Storage temperature range	–40 °C to +70 °C

Climatic stressing

Damp heat	95% relative humidity at +40 °C; according to IEC68-2-3

Mechanical stressing

Sinewave vibration	5 Hz to 150 Hz, max. 2 g at 55 Hz,max. 0.5 g from 55 Hz to 150 Hz, according to IEC68-2-6, IEC1010-1 and MIL-T-28800D, class 5
Random vibration	10 Hz to 300 Hz, acceleration 1.2 g (RMS)
Shock	40 g shock spectrum, according to MIL-STD-810 D, MIL-T-28800D, class 3/5

Electromagnetic compatibility	according to EN 50081-1 and EN 50082-2 (EMC directive of EU)
Leakage (carrier frequency <1 GHz)	<0.1µV (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 Hz to 60 Hz, 200 V to 240 V (AC), 50 Hz to 60 Hz, autosetting to AC voltage, max. 200 VA
Safety	according to DIN EN 61010-1, IEC 1010-1, UL 3111-1, CSA 22.2 No. 1010-1
Dimensions (WxHxD)	426.7 mm x 87.6 mm x 450 mm
Weight	<12 kg when fully equipped

Ordering information

Order designation	Signal Generator SMR20	1104.0002.20
	Signal Generator SMR27	1104.0002.27
	Signal Generator SMR30	1104.0002.30
	Signal Generator SMR40	1104.0002.40
Accessories supplied	power cable, operating manual female adapter 3.5 mm (SMR20/SMR27) female adapter 2.9 mm (SMR30/40)	

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 (SMR20/27)[1)]	SMR-B15	1104.4989.02
RF Attenuator 40 GHz (SMR30/40)[1)]	SMR-B17	1104.5233.02
Rear Connectors for RF, AF (SMR20/27)[1)]	SMR-B19	1104.6281.02
Rear Connectors for RF, AF (SMR30/40)[1)]	SMR-B20	1104.6381.02
IF Input 20 GHz (SMR20)[1)]	SMR-B23	1104.5804.02
IF Input 40 GHz (SMR27/30/40)[1)]	SMR-B24	1104.6100.02

Recommended Extras		
service kit	SMR-Z1	1103.9506.02
19" rack adapter	ZZA-211	1096.3260.00
Adapter (SMR20/27)		
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 (SMR30/40)		
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.

Fax Reply (Microwave Signal Generator SMR)

❑ **Please send me an offer**

❑ **I would like a demo**

❑ **Please call me**

❑ **I would like to receive your free-of-charge CD-ROM catalogs**

Others: _____

_____

_____

Name: _____

Company/Department: _____

Position: _____

Address: _____

_____

_____

Country: _____

Telephone: _____

Fax: _____

E-mail: _____

Printed in Germany 1/2000 (Bi as)

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