

Signal Generator SME

SME02: 5 kHz to 1.5 GHz

SME03: 5 kHz to 3 GHz

SME03E: 5 kHz to 2.2 GHz

SME06: 5 kHz to 6 GHz

For digital communication with all types of modulation of mobile radio

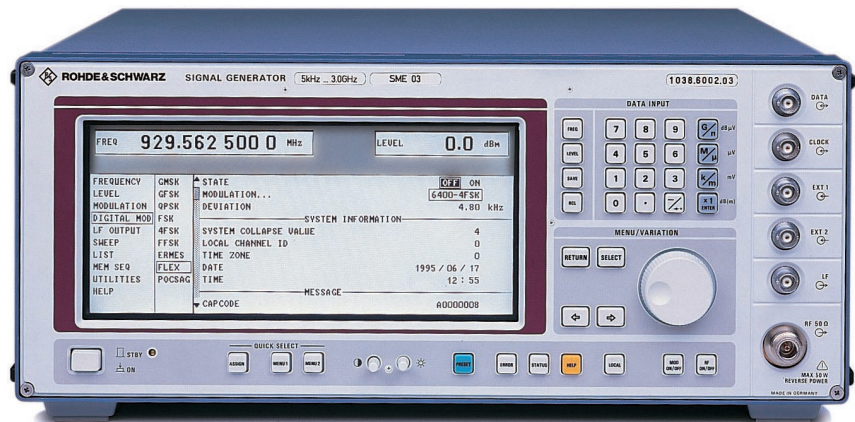


Photo 42212

Brief description

The SME supplies the complex signals required for the development and testing of digital mobile radio receivers. It is capable of generating all signals used in the main digital radio networks in line with relevant standards regarding the type of modulation, data format, TDMA structure and frequency hop patterns. The SME is completely at home also in the analog signal world of conventional signal generators.

SME02, SME03 and SME06 are identical except for the frequency range. Economy Signal Generator SME03E has been designed as an especially economical solution for applications involving digitally modulated signals. The large variety of options available allows the SME to be tailored to the specific needs of the user.

Main features

- All common digital modulation modes provided in one unit
- Great ease of operation thanks to a novel menu concept
- No external modulation and data sources required

- User-programmable data sequences and TDMA structure
- RF, LF and level sweep
- Ultra-low RF leakage for measurements on highly sensitive pagers
- List mode: programmable measurement sequence for up to 4096 frequency and level combinations, setting time <0.5 ms (not SME03E)

Overview of options

Designation, functions	Option
Reference Oscillator OCXO: aging <1 x 10 ⁻⁹ /day	SM-B1
LF Generator: supplies sinewave, noise 0.1 Hz to 500 kHz, triangular, squarewave 0.1 Hz to 50 kHz signals	SM-B2
Pulse Modulator: on/off ratio >80 dB, rise/fall time <10 ns	SME02: SM-B3 SME03E, SME03: SM-B8 SME06: SM-B9
Pulse Generator: only in conjunction with SM-B3/SM-B8/SM-B9; provides single, delayed and double pulses	SM-B4
FM/φM Modulator: FM DC to 2 MHz, φM DC to 100 kHz	SM-B5
Multifunction Generator: produces stereo multiplex and VOR/ILS signals, as well as sinewave, noise 0.1 Hz to 1 MHz, triangular, sawtooth, squarewave 0.1 Hz to 50 kHz signals	SM-B6
DM Coder: generates FSK, FFSK, 4FSK, GFSK, GMSK, QPSK, π/4 QPSK, π/4 DQPSK, O-QPSK; user-programmable data sequences and PRBS	SME-B11 *
DM Memory Extension 8 Mbit: expands the 8-kbit memory of the DM Coders to 8 Mbit (data only); required for fitting SME-B41 and SME-B42	SME-B12
FLEX Protocol: generates call signals to FLEX standard for testing pagers	SME-B41
POCSAG Protocol: generates call signals to POCSAG standard for testing pagers	SME-B42
Rear Connectors for RF and LF: to replace front-panel connectors	SMT-B19

* Already included in basic model of SME03E

Specifications in brief

Frequency

Range	SME02/03	5 kHz to 1.5/3 GHz
	SME03E/06	5 KHz to 2.2/6 GHz
Resolution		0.1 Hz
Setting time		
after IEC/IEEE-bus delimiter		<10 ms
after trigger pulse in list mode		<500 μ s
Phase offset		adjustable in steps of 1°

Reference frequency

Aging (after 30 days of operation)	standard	option SM-B1
Temperature effect (0 to 55°C)	1×10^{-6} /year	$<1 \times 10^{-9}$ /day
	2×10^{-6}	$<5 \times 10^{-8}$

Spectral purity

Spurious signals	
Harmonics	<-30 dBc, <-26 dBc with SMB3/B8/B9
Nonharmonics at	
>5 kHz from carrier, $f < 1.5$ GHz	<-80 dBc
SSB phase noise at 20 kHz from carrier, 1 Hz bandwidth,	
FM/ ϕ M deviation <5% of max. deviation	
<93.75 125 250 MHz 0.5 1 2 3 6 GHz	
<-129 <-140 <-137 <-132 <-126 <-120 <-116 <-116 dBc	
Residual FM, rms (f=1 GHz)	
0.3 to 3 kHz (CCITT)	<1 Hz
0.03 to 20 kHz	<4 Hz

Level

Resolution	-144 to +13 dBm
Accuracy for levels ≥ -127 dBm	
f < 1.5 GHz	± 1 dB
f > 1.5 GHz	± 1.5 dB
f > 3 GHz	± 2 dB
Level frequency response at 0 dBm	1 dB, typ. 0.3 dB

Overload protection

protects the unit from externally applied RF power (50 Ω source) and DC voltage, SME02 and 03: ≤ 50 W/35 V; SME06: ≤ 1 W/0 V

Simultaneous modulation

any combination of AM, FM (ϕ M), pulse modulation and DM (DM = FSK, 4FSK, FFSK, GFSK, GMSK or QPSK)

Frequency modulation

Operating modes	with option SM-B5 internal, external AC/DC, two-tone with two separate channels FM1 and FM2
Maximum deviation	depending on carrier frequency: 500 kHz (<130 MHz) to 4 MHz (6 GHz) <3% of reading + 20 Hz
Setting error at AF=1 kHz	<0.5%, typ. 0.05%
FM distortion at AF=1 kHz and 50% of max. deviation	
Modulation frequency range for maximum deviation	DC to 500 kHz
for <25% of max. deviation	DC to 2 MHz
Carrier frequency offset with FM	depending on carrier frequency: <50 Hz ($f_c < 93.75$ MHz) to <100/200 Hz ($f_c 1.5/3$ GHz) +1% of deviation

Phase modulation

Operating modes	with option SM-B5 internal, external AC/DC, two-tone with two separate channels ϕ M1 and ϕ M2
Maximum deviation	depending on carrier frequency: 5 rad ($f_c < 130$ MHz) to 40 rad ($f_c 6$ GHz) <3% of reading + 0.01 rad
Setting error at AF=1 kHz	<1%
Distortion at AF=1 kHz and 50% of max. deviation	
Modulation frequency range	DC to 100 kHz

Digital modulation

Modulation modes	with option SME-B11, standard in SME03E FSK, 4FSK, FFSK, GFSK, GMSK, QPSK, $\pi/4$ DQPSK
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Operating modes
Internal data generator

Storage capacity
Frequency accuracy
PRBS (pseudo-random bit sequence)

FSK

Shift, filtered
unfiltered
Data rate, filtered
unfiltered

FFSK

Shift
Data rate

4FSK

Shift

Data rate

GFSK

Shift

Data rate

GMSK

Data rate

QPSK, $\pi/4$ DQPSK

for f > 3 GHz

Data rate

Filter

internal, external programming of data, level switching and burst output
3 x 8192 bit
same as reference frequency
selectable lengths: 2^9-1 , $2^{15}-1$, $2^{20}-1$, $2^{21}-1$ or $2^{23}-1$
to Cityruf, POCSAG, FLEX specs
4/4.5/4.8 kHz
0.01 to 400 kHz, maximum shift depending on carrier frequency
0.05 to 90 kbit/s
0.05 to 1900 kbit/s
to Cityruf, POCSAG specifications
1.5/2/3/3.5/4/4.5 kHz
0.05 to 90 kbit/s
to APCO25, ERMES, FLEX, MODACOM specifications
0.01 to 400 kHz, maximum shift depending on carrier frequency
1 to 24.3/27 to 48.6 kbit/s
to CT2, CT3, DECT specifications
18/160/288 kHz as well as non-standard shifts
10 to 585/640 to 1170 kbit/s
to CDPD, GSM1800, DSRR, GSM, MC9, MD24 to MD192, MOBITE8000 specifications
2.4/3.6/4/4.8/6/8/9.6/10/12/16/19.2/270.833/1000 kbit/s
to APCO25, MSAT, NADC, PDC, TETRA, TFFS specifications
not specified
1 to 24.3/27 to 48.6 kbit/s
 $\sqrt{\cos 0.35/0.4/0.5/0.6}$
 $\cos 0.2/0.35/0.4/0.5/0.6$

Amplitude modulation, pulse modulation, internal modulation generator, LF generator, multifunction generator, stereo multiplex signal, VOR modulation signal, ILS modulation signal, pulse generator and sweep see SMT, page 198

List mode

(not SME03E)
Max. number of channels
Step time

automatic, single-shot, manual, externally triggered
2000
1 ms to 1 s

Remote control

Command set

IEC 625 (IEEE 488)
SCPI 1992.0

General data

Power supply

90 to 132/180 to 265 V,
47 to 440 Hz, autotsetting to AC voltage, max. 300 VA
435 mm x 192 mm x 460 mm
25 kg for fully equipped unit

Dimensions (W x H x D)

Weight

Ordering information

Signal Generator

SME02	1038.6002.02
SME03	1038.6002.03
SME03E	1038.6002.13
SME06	1038.6002.06

Options

Reference Oscillator OCXO	SM-B1	1036.7599.02
LF Generator	SM-B2	1036.7947.02
Pulse Modulator for SME02	SM-B3	1036.6340.02
for SME03	SM-B8	1036.6805.02
for SME06	SM-B9	1039.5100.02
Pulse Generator (only in combination with SM-B3, SM-B8 or SM-B9)	SM-B4	1036.9310.02
FM/ ϕ M Modulator	SM-B5	1036.8489.02
Multifunction Generator	SM-B6	1036.7760.02
DM Coder	SME-B11	1036.8720.02
DM Memory Extension (8 Mbit)	SME-B12	1039.4090.02
FLEX Protocol	SME-B41	1039.5645.02
POCSAG Protocol	SME-B42	1039.5745.02
Rear Connectors for RF and LF	SME-B19	1039.3907.02