

# Signal Generator

## SMT

### Characteristics

#### Signal Generator SMT

#### Frequency -

Range:

SMT02: 5 kHz to 1.5 GHz.

SMT03: 5 kHz to 3 GHz.

SMT06: 5 kHz to 6 GHz.

Resolution: 0.1 Hz.

Phase offset: Adjustable in 1° steps.

Reference Frequency	Standard	Opt. B1
Aging (after 30 days of operation)	$1 \times 10^{-6}/\text{year}$	$< 1 \times 10^{-9}/\text{day}$
Temperature effect (0 to 55°C)	$2 \times 10^{-6}$	$< 5 \times 10^{-8}$

#### Spectral Purity -

Spurious signals:

Harmonics:  $< -30$  dBc, with Opt. B8/B9;  $< -26$  dBc.

Nonharmonics:

$f < 1.5$  GHz:  $< -80$  dBc.

$f > 1.5$  GHz:  $< -74$  dBc.

$f > 3$  GHz:  $< -68$  dBc.

SSB phase noise at 20 kHz from carrier, 1 Hz bandwidth:

$< 67.5$  MHz:  $< -120$  dBc.

125 MHz:  $< -134$  dBc.

250 MHz:  $< -128$  dBc.

500 MHz:  $< -122$  dBc.

1000 MHz:  $< -116$  dBc.

2000 MHz:  $< -110$  dBc.

3000 MHz:  $< -109$  dBc.



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6000 MHz: < -103 dBc.

Residual FM, RMS (f = 1 GHz):

0.3 to 3 kHz (CCITT): < 8 Hz.

0.03 to 20 kHz: < 20 Hz.

**Level** - -114 to +13 dBm.

Resolution: 0.1 dB.

Accuracy for levels >-127 dBm:

f < 1.5 GHz:  $\pm 1$  dB.

f >1.5 GHz:  $\pm 1.5$  dB.

f >3 GHz:  $\pm 2$  dB.

Level frequency response at 0 dBm: 1 dB, typ. 0.3 dB.

**Overload Protection** - Protects the unit from externally applied Rf power (50 Ohm source) and DC voltages, SMT02 and 03:  $\leq 50$  W/35 V, SMT06:  $\leq 1$  W/0 V.

**Simultaneous Modulation** - Any combination of AM, FM (phiM) and pulse modulation.

**Amplitude Modulation** - Internal, external AC/DC.

Modulation depth/resolution: 0 to 100%/0.1%.

Setting error at 1 kHz (m < 80%): < 4% of reading  $\pm 1\%$ .

AM distortion at 1 kHz:

m = 30%: < 1%.

m = 80%: < 2%.

Modulation frequency range: DC to 100 kHz.

**Frequency Modulation** - Internal, external AC/DC, two-tone with two separate channels FM1 and FM2.

Maximum deviation:

Depending on carrier frequency: 5 MHz (at  $f_c < 130$  MHz) to 40 MHz (at  $f_c \leq 6$  GHz).

Setting error at AF=1 kHz (FM AC): < (3% of reading + 20 MHz).

FM distortion at AF=1 kHz and 50% of max. deviation: < 0.2%, typ. 0.1%.

Modulation frequency response:

FM1/2: 20 Hz (DC) to 100 kHz: 0.5 dB.

FM2: 20 Hz (DC) to 8 MHz: 3 dB.

Stereo modulation:

Crosstalk attenuation: >50 dB.

Unweighted S/N ratio: >76 dB.

Carrier frequency offset (FM DC): < 0.1% of deviation.

**Phase Modulation** - Internal, external AC/DC, two-tone with two separate channels broadband  $\phi_M$  or narrowband  $\phi_M$  (broadband  $\phi_M$  only possible with  $\phi_{M2}$ ).

Maximum deviation: Depending on carrier frequency.

$\phi_M$  range 1 - DC to 100 kHz: 12.5 to 400 rad.

$\phi_M$  range 2 - DC to 2 MHz: 0.625 to 20 rad.

**Pulse Modulation** - With Opt. B3, B8, B9.

Operating modes: External; internal with optional Pulse Generator SM-B4.

On/off ratio: >80 dB.

Rise/fall time (10/90%): < 10 ns.

**Internal Modulation Generator** - 0.4/1/3/15 kHz $\pm$ 3%.

Level (EMF) at LF socket: 1 V  $\pm$ 1% ( $R_{out}$ =10 Ohm,  $R_L$  >200 Ohm).

**LF Generator** - Opt. B2.

Sinewave, noise: 0.1 Hz to 500 kHz.

Triangle, squarewave: 0.1 Hz to 50 kHz.

Distortion (20 Hz to 100 kHz): < 0.1% (level >0.5 V).

Level (EMF) at LF socket: 1 mV to 4 V ( $R_{out}$ =10 Ohm,  $R_L$  >200 Ohm).

**Multifunction Generator** - Opt. B6.

Modulation signals: Sinewave, triangular, sawtooth, squarewave, noise, stereo MPX, VOR/ILS.

Sinewave, noise: 0.1 Hz to 1 MHz.

Triangle, sawtooth, squarewave: 0.1 Hz to 50 kHz.

Distortion (20 Hz to 100 kHz): < 0.1% (level >0.5 V).

Level (EMF) at LF socket: 1 mV to 4 V ( $R_{out}$ =10 Ohm,  $R_L$  >200 Ohm).

**Stereo Multiplex Signal** - With Opt. B6.

Stereo operating modes: R, L, R=L, R=-L, ARI (pilot tone or MPX signal can be connected to LF socket).

Frequency range of L, R signal: 0.1 Hz to 15 kHz.

Preemphasis: 50  $\mu$ s, 75  $\mu$ s.

Pilot phase/resolution: 0 to 360 $^\circ$ /0.1 $^\circ$ .

**VOR Modulation Signal** - With Opt. B6.

Settings: 30 Hz (VAR, REF)/9.96 kHz FM carrier, FM deviation, COM/ID tone.

Phase/phase resolution: 0 to 360 $^\circ$ /0.01 $^\circ$ .

Bearing error (RF output, 108 to 118 MHz):  $< 0.05^\circ$ .

**ILS Modulation Signal - With Opt. B6.**

Settings: 90 Hz, 150 Hz tone, COM/ID tone, marker beacon.

DDM setting range/resolution: 0 to  $\pm 0.8/0.0001$ .

DDM error (RF output):

Localizer (108 to 112 MHz):  $< 0.0004 + 1\%$  of DDM reading.

Glideslope (329 to 335 MHz):  $< 0.0008 + 1\%$  of DDM reading.

**Pulse Generator - Opt. B4.**

Operating modes: Single, delayed and double pulse.

Pulse repetition period: 100 ns to 85 s.

Pulse width: 20 ns to 1 s.

Pulse delay: 40 ns to 1 s.

Double pulse: 60 ns to 1 s.

**Overview of Options**

Designation	Functions	Option
Reference Oscillator OCXO	Aging $< 1 \times 10^{-9}$ /day	B1
LF Generator	Supplies sinewave, noise 0.1 Hz to 500 kHz, triangular, squarewave 0.1 Hz to 50 kHz signals	B2
Pulse Modulator	On/off ratio $> 80$ dB, rise/fall time $< 10$ ns	B3 (SMT02)
		B8 (SMT03)
		B9 (SMT06)
Pulse Generator	Only in conjunction with SM-B3/SM-B8/SM-B9; provides single, delayed and double pulses	B4
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	B6

Rear Connectors for RF and LF	To replace front-panel connectors	B19
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**Sweep** - Digital sweep in discrete steps for RF, level and LF. LF sweep with Opt. B2 or B6.

**Remote Control** - IEC 625 (IEEE 488).  
Command set: SCPI 1993.0.

**General Data -**

Power supply:

90 to 132/180 to 265 V.

47 to 440 Hz (300 VA).

**Physical Characteristics**

Dimensions	mm.	in.
Width	435	17.1
Height	192	7.6
Depth	350	13.7
Weight	kg.	lb.
For fully equipped unit	20	44.1

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