# Signal Generator SMX

# 0.1 to 1000 MHz

Cost-effective, system-compatible universal signal source



# Uses, characteristics

Signal Generator SMX is a cost-effective, fully system-compatible synthesizer with excellent signal characteristics and comprehensive basic configuration. It is an economical solution for universal use in laboratory and production. Its spectral purity allows for instance in-channel and blocking measurements on AM, FM and SSB receivers.

#### Main features

- · Overload protection up to 30 W
- Nonvolatile memory for 40 complete instrument setups
- Modulation generator with four fixed frequencies
- Precise output level from –137 to +13 dBm
- Oven-controlled reference oscillator for extremely high frequency accuracy (option SMX-B1)
- AF synthesizer as an internal modulation source; can be used as an AF signal source for external applications (option SMX-B 2)

# Frequency

The wide frequency range is produced without a doubler. Underranging is possible down to a lower limit of 10 kHz, overranging upto 1005 MHz.

#### Level

The low total level error of less than  $\pm 1.5\,\mathrm{dB}$  ensures accurate and reproducible sensitivity measurements. There are no transients upon level changes. The SMX features non-interrupting level setting over a range of 10 dB.

#### Spectral purity

Low residual FM, low SSB phase noise and excellent suppression of nonharmonic spurious signals are the outstanding features of the SMX in this class of equipment and price range.

### Modulation

The modulation capabilities of the SMX include AM, FM and pulse modulation (separate, combined, internal or external). For two-tone modulation, the internal and external sources can be switched on simultaneously.

Frequency modulation is possible up to high modulation frequencies and even with maximum deviation; frequency response is flat. The Low Rate FM Modification Kit (SCM-U1) ensures extremely low sag for digital modulations thanks to the very small low-end limit frequency. With simultaneous AM and FM, modulation depth and deviation can be set separately;

different modulation sources can be selected. AM and FM ensure high accuracy and low distortion.

With pulse modulation full level accuracy is preserved. The RF envelope shows rise/fall times of 2 µs, the on/off ratio is 40 dB. The standard modulation generator with four fixed frequencies or the optional AF synthesizer are available as modulation sources. The AF synthesizer is also used as an AF signal source for external applications with an output level of 1 V and phase-continuous frequency change in less than 10 ms.

## Operation

Carrier frequency, modulation and output levels with selectable units as well as supplementary information can be simultaneously indicated on the illuminated LCD displays. The step keys allow each parameter to be varied in any preset step size. Up to 40 complete instrument setups can be stored in a nonvolatile memory.

The RF level can be switched off while the  $50-\Omega$  source impedance remains effective. By setting a frequency offset, the converted frequency can be directly entered and indicated on the SMX in LO applications.

Specifications					
Frequency Range Underrange and overrange Resolution of indication	100 kHz to 1000 MHz 10 kHz to 1005 MHz				
f < 100 MHz 100 MHz <f 500="" <="" mhz<br="">f &gt; 500 MHz Setting time</f>	10 Hz 50 Hz 100 Hz				
with AM and CW with FM Frequency error f ≥31.25 MHz f <31.25 MHz	approx. 60 ms approx. 120 ms <1x10 <sup>-7</sup> (max. 45 Hz) <12 Hz				
Reference frequency	standard OCXO oscillator				
Aging (after 30 days of operation)	2x10 <sup>-6</sup> /year <1x10 <sup>-9</sup> /day				
Temperature effect	$2.5 \times 10^{-6}$ / 0 to 50				
Input/output for external/ internal reference frequencies	10 MHz				
Level					
Range Total error	−137 to +13 dBm <±1.5 dB				
Frequency response at 0 dBm output level	<1 dB				
Characteristic impedance VSWR	50 Ω <1.5 (level ≤0 dBm]				
Setting time	<1.8 (level >0 dBm) <25 ms				
Non-interrupting level setting	0 to -10 dB				
Spectral purity					
Spurious signals Harmonics	<-30 dBc (for level <10 dBm)				
Residual AM, rms (0.03 to 20 kHz]	<0.02% (f≥8 MHz)				
Nonharmonic spurious signals at >5 kHz from carrier see line a in table below					
Residual FM, rms 0.3 to 3 kHz (CCITT) 0.03 to 20 kHz	see line b in table below see line c in table below				
SSB phase noise					
(carrier offset 20 kHz, 1 Hz bandwidth) guaranteed typical	see line d in table below see line e in table below				
f< 31.25 125 25	0 500 1000 MHz				
a <-60 <-72 <-72	2 <-66 <-60 dBc				
b <3 <2 <2 c					
d <-130 <-130 <-12 e -136 -136 -136	28 <-122 <-116 dBc				
	4 120 122 UBC				
Broadband noise (carrier offset >2 MHz, 1 Hz bandwidth) f≥31.25 MHz	typ. –145 dBc				
Amplitude modulation					
Modes If Modulation depth	NT, EXT, INT + EXT 0 to 99%				
Setting error at 1 kHz (80%)	<4% ±0.5%				
AM distortion at 1 kHz 0 to 30% AM	<1 %				
30 to 80% AM Modulation frequency	<2%				
AM EXT AM INT	DC to 50 kHz 0.4/1/3/15 kHz				
AM INT with option SMX-B2	10 Hz to 50 kHz				
Modulation frequency response up to 15 kHz	typ. 0.1 dB				
up to 50 kHz	typ. 0.5 dB				

typ. 0.5 dB

<0.2 rad 100 kn, link-selectable to 600  $\Omega$  level-dependent in level range from +7 to +13 dBm

Extras

Service Kit

Rear-panel connectors for RF, AF

SMX-Z10

SMX-Z2

0827.0250.02

0827.0150.02

AF 1 kHz Modulation input

AM overrange

Incidental φM with AM (30%),

Modes			INT,	EXT, INT	+ EXT				
f<	31.25	62.5	125	250	500	1000	MHz		
Max.		T							
deviation	100	50	100	200	400	800	kHz		
Cotting orror	(at f	1  -1	-7	% of set v	roluo.				
Setting error FM distortion	at 1 kHz	and	<1	% or set v	/aiue				
50% of maxi		ation	<0.	5% (typ.	0.1%)				
Modulation f FM EXT	requency		20	Hz to 50	M kHz				
FM INT				/1/3/15					
FM INT wit	FM INT with option SMX-B2 Modulation frequency response			20 Hz to 100 kHz					
from 100 Hz			-1	dB					
Incidental A				ab and					
40 kHz devi	ation		<0.1 % 100 kn, link-selectable to 600 n						
Modulation i	nput		10	0 kn, link	-selectab	le to 600	) n		
Low Rate FM	(Modificat	ion Kit SC							
Mode 3-dBbandwi	idth		EX.	Г Hz to >5	00 kHz				
Sag	idiri				th 12 Hz	squarev	vave		
Maximum de	eviation		sar	ne as with	normal	FM			
Pulse modula	ation								
Mode	ation		ext	ernal					
Pulse on/off		.00/		40 dB					
Rise/fall time Max. repetition			2 J 50	ıs kHz					
Min. pulse w				us					
Modulation i	nput			00 kn, lin	k-selectab	ole to 60	0 n		
AF Synthesiz	er (Option	SMX-B2)							
Frequency				Hz to 10	)0 kHz				
Readout Frequency er	rror			3-digit <4x10 <sup>-5</sup>					
Level error at				<±3% (typ. 1 %)					
Distortion				1 % (typ.	0.03%)				
Phase-contin response tim			ige,						
command an			<10	) ms					
Remote conti	rol								
System				C625-1 (I					
Connector Remote-cont	rolled funct	ione		24-contact Amphenol all manual settings except power					
Kemote-cont	Tollearunct	10115			spinwheel				
Interface fund	ctions			listener and talker,					
				SH1,AH1, T6,L4,SR1,RL1,PPO, DC1,DTO,CO					
				, , , , , ,					
Overload pro		ogoinet							
externally ap									
RF power an	d DC volta	ige							
Max. permiss Max. permiss			30 35	W					
Max. pulse l		-	33	35 V					
(pulse width			1 r	nWs or 1	50 V <sub>p</sub>				
General data									
Power supply			10	0/120/2	20/240	v ±10%	,		
Dimensions	04/	,		47 to 440 Hz, max. 90 VA					
Dimensions ( Weight	(W X H X L	))	435 mm x 147 mm x 460 mm 12.5 kg						
				9					
Ordering	inform	nation							
8	Higher	# K							
Signal Gener	rator		SM	IX		0826.4	517 52		
orginal Oction	GIOI		SIV			0020.4	517.52		
Options	aillet		0.	V D4		0000	E40.00		
Reference Os AF Synthesiz				SMX-B1 0826.9519.02 SMX-B2 0826.9619.02					
Low Rate FN		ion Kit		M-U1			615.02		

INT, EXT, INT + EXT

Frequency modulation

Modes