

Signal Generator SMGU, SMHU

SMGU: 100 kHz to 2160 MHz

SMHU: 100 kHz to 4320 MHz

High-performance generators
with excellent features over a
wide frequency range



SMHU (photo 37927)

Brief description

SMGU and SMHU are ideal for applications which the majority of signal generators cannot handle. In addition to out-of-channel measurements, they are for instance able to determine the spurious rejection of radiotelephone equipment up to 4 GHz as laid down by CEPT.

Main features

- Extremely high spectral purity
- Frequency setting time <1 ms
- Frequency resolution 0.1 Hz
- RF, AF, level and memory sweeps
- Broadband FM from DC to 1 MHz
- Frequency-accurate and drift-free FM DC for FSK applications
- OCXO as a reference
- Pulse modulator

Characteristics

Frequency

The frequency can be set with a resolution of 0.1 Hz over the entire range, and this is sufficient even for measurements on extremely narrowband DUTs. Both instruments supply frequencies down to 1 kHz.

The frequency setting time is below 10 ms. In the fast mode up to 200 user-defined frequencies can be handled by means of a trigger signal or by memory sweep in less than 1 ms per setting.

Spectral purity

SMGU/SMHU fulfill requirements for selectivity measurements on top-class receivers. Signals of extremely high spectral purity afford critical adjacent-channel, in-channel and out-of-channel measurements with a wide tolerance margin.

Phase noise remains low right up to the carrier. SMGU and SMHU are therefore ideal for LO applications or as a low-noise reference in noise measurement systems.

Frequency modulation

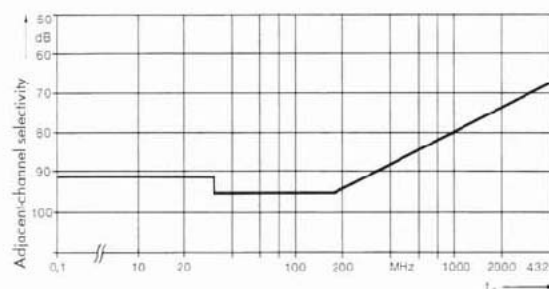
The FM modulation frequency range extends from DC to 1 MHz. In FM DC mode a high carrier-frequency accuracy is attained. The frequency offset occurring with FM DC selected is extremely small.

Amplitude modulation

The whole of the modulation frequency range can be used down to carrier frequencies of less than 100 kHz. The minimal phase shift at 30 Hz (AM DC) and a flat frequency response make for the precision amplitude modulation that is required for testing VOR/ILS navigation receivers.

Pulse modulation

Rise/fall times of 20 ns (typ. <10 ns for frequencies >200 MHz) and an



Dynamic adjacent-channel selectivity can be measured with an uncertainty of <1 dB (modulation for RT applications, channel spacing 20 Hz, AF bandwidth 3 kHz)

on/off ratio of 80 dB open up a wide range of possibilities for testing telemetry, microwave link, radar and satellite communications systems.

Digital and analog sweep

In addition to the digital, step-by-step sweep with presettable start and stop

frequency, span, step width and step time, an analog frequency and level sweep is also provided.

Phase offset

The phase of the RF output signal can be varied in steps of 1° using keyboard entry or the spinwheel. This

makes it easier to adjust for phase quadrature during noise measurements and to investigate phase-critical components.

Specifications in brief

Frequency	
Range	100 kHz to 2160 MHz (SMGU) 100 kHz to 4320 MHz (SMHU)
Underrange without guarantee of specs	down to 1 kHz
Resolution	0.1 Hz
Stability	same as reference frequency
Setting time	<10 ms, <1 ms in fast mode
Reference frequency, aging	<1 x 10 ⁻⁹ /day after 30 days of operation
Temperature effect	<2 x 10 ⁻⁹ /°C
Reference frequency input/output	5 or 10 MHz, selectable

Level	
Range	-140 to +13 dBm
Overrange without guarantee of specs	up to 16 dBm (SMGU) up to 19 dBm (SMHU)
Frequency response at 0 dBm f ≤ 2160 MHz	1 dB 50 Ω
Characteristic impedance	<1.5 for levels ≤ 0 dBm (SMGU) <1.8 for f ≤ 3000 MHz (SMHU)
VSWR	<25 ms (<10 ms with non-interrupting level setting)
Setting time	0 to -20 dB
Non-interrupting level setting	
Overload protection (maximum permissible RF power)	50 W (SMGU)/30 W (SMHU)

Spectral purity	
Spurious signals	
Harmonics	<-30 dBc
Subharmonics	none
f < 2160 MHz	<-60 dBc
f > 2160 MHz	
Nonharmonic spurious signals at >10 kHz from carrier	see line a in table below
Residual FM, rms, 0.3 to 3 kHz (CCITT)	see line b in table below
SSB phase noise at 20 kHz from carrier, 1 Hz bandwidth (FM/φM deviation <2% of max. deviation), typical	see line c in table below

f <	15.6	125	250	500	1000	2000	4000	MHz
a <	-100	-100	-100	-100	-94	-94	-88	dBc
b <	0.5	0.5	0.5	0.5	1	2	4	Hz
c	-145	-150	-145	-137	-134	-128	-121	dBc

Amplitude modulation	
Modes	INT, EXT AC, EXT DC, two-tone
Modulation depth	0 to 100%
AM distortion at 1 kHz and m = 60%	<2%
Modulation frequency (3-dB bandwidth)	
AM EXT AC (DC)	10 Hz (DC) to 50 kHz
AM INT	1 Hz to 50 kHz

AM square (AM-SQU)	
Dynamic range	typ. 30 dB
Rise/fall time	typ. 2 μs
Modulation signal (AM EXT)	logic signal

Frequency modulation	
Modes	INT, EXT AC, EXT DC, two-tone, preemphasis
Max. deviation (without preemphasis)	
f <	15.625 31.25 62.5 125 250 500 1000 2160 4320 MHz
	200 25 50/800* 100 200 400 800 1600 3200 kHz

*] With special function »heterodyne band 0.1 to 125 MHz«

FM distortion at 1 kHz and 50% of max. deviation	<0.2% (<1% with preemphasis)
Modulation frequency	
FM INT	10 Hz to 100 kHz
FM EXT AC (DC)	10 Hz (DC) to 100 kHz, 10 Hz (DC) to 1 MHz (with deviation <10% of max. deviation)
Preemphasis	50 μs, 75 μs

FSK modulation	
Rise/fall time	10 μs
Modulation signal (FM/φM EXT)	logic signal
Phase modulation	
Modes	INT, EXT AC, two-tone
Maximum deviation	
f <	15.625 31.25 62.5 125 250 500 1000 2160 4320 MHz
	20 2.5 5/80* 10 20 40 80 160 320 rad

*] With special function »heterodyne band 125 MHz«

φM distortion at f = 1 kHz and 50% of max. deviation	<0.5%
Modulation frequency	10 Hz to 10 kHz
Pulse modulation	
On/off ratio	external >80 dB
Rise/fall time	<20 ns (f > 125 MHz)

Sweep				
Modes	automatic, single-shot or manual			
	RF sweep	AF sweep	RF level sweep	Memory sweep
Sweep range	user-selectable	user-selectable	0.1 to 20 dB	user-selectable
Step size (lin)	user-selectable	user-selectable	-	1
Step time	10 ms to 1 s	10 ms to 1 s	10 ms to 1 s	50 ms to 60 s 1 ms to 60 s*)

*] In fast mode

General data	
Remote control	IEC 625-1 (IEEE 488)
Power supply	100/120/220/240 V ±10%, 47 to 63 Hz, max. 270 VA

Ordering information

Signal Generator	SMGU	0319.0010.52
	SMHU	0335.0011.52