Specifications

Frequency
Range ..... 100 kHz to 2160 MHz (SMGU)
100 kHz to 4320 MHz (SMHU)
Underrange (specs not binding) .... down to 1 kHz

Frequency bands
If the step width is small, there is hysteresis on band switchover

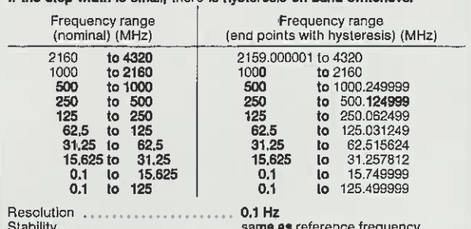
Frequency range (nominal) (MHz)	Frequency range (end points with hysteresis) (MHz)
2160 to 4320	2159.000001 to 4320
1000 to 2160	1000 to 2160
500 to 1000	500 to 1000.249999
250 to 500	250 to 500.124999
125 to 250	125 to 250.062499
62.5 to 125	62.5 to 125.031249
31.25 to 62.5	31.25 to 62.515624
15.625 to 31.25	15.625 to 31.257812
0.1 to 15.625	0.1 to 15.749999
0.1 to 125	0.1 to 125.499999

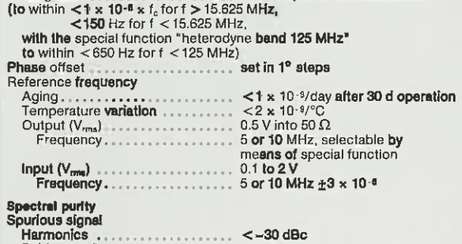
Resolution ..... 0.1 Hz
Stability ..... same as reference frequency
Setting time ..... < 10 ms, < 1 ms in fast mode
(to within $< 1 \times 10^{-8} \times f_c$ for f > 15.625 MHz,
< 150 Hz for f < 15.625 MHz,
with the special function "heterodyne band 125 MHz"
to within < 650 Hz for f < 125 MHz)
Phase offset ..... set in 1° steps
Reference frequency
Aging ..... $< 1 \times 10^{-9}$/day after 30 d operation
Temperature variation ..... $< 2 \times 10^{-9}$/°C
Output (V_{rms}) ..... 0.5 V into 50 Ω
Frequency ..... 5 or 10 MHz, selectable by means of special function
Input (V_{rms}) ..... 0.1 to 2 V
Frequency ..... 5 or 10 MHz ±3 × 10^{-6}

Spectral purity
Spurious signal
Harmonics ..... < −30 dBc
Subharmonics
f < 2160 MHz ..... none
f > 2160 MHz ..... < −60 dBc[1])
Nonharmonics
> 10 kHz from carrier[1])
f ≤ 1000 MHz ..... < −100 dBc[2])
f > 1000 MHz ..... < − 94 dBc
f > 2160 MHz ..... < − 88 dBc
Wideband noise for CW[1])
(offset from carrier > 2 MHz;
> 5 MHz for f > 2.16 GHz,
1 Hz bandwidth) ..... typ. < −145 dBc

Single-sideband phase noise 20 kHz from carrier at a bandwidth of 1 Hz (FM/φM deviation < 2% of maximum deviation[2])

15.6	125	250	500	1000	2000	4000 MHz
< −141	< −144	< −142	< −136	< −130	< −124	< −118 dBc





Typical single-sideband phase noise at 1000 MHz

Residual FM, rms (FM/φM deviation < 2% of maximum deviation)

Frequency range (MHz)	Weighting bandwidth 0.3 to 3 kHz (CCITT) (Hz)	0.03 to 20 kHz (Hz)
0.1 to 500	< 0.5	< 1
500 to 1000	< 1	< 2
1000 to 2160	< 2	< 4
2160 to 4320	< 4	< 8

Residual AM, rms
(0.3 to 3 kHz) ..... < 0.01 %

Level
Range ..... −140 to +13 dBm
Overrange not to specifications .... to 16 dBm (SMGU)
to 19 dBm (SMHU)
Resolution ..... 0.1 dB
Total error for levels > −127 dBm[1])[3])
f ≤ 2160 MHz ..... < ±1.5 dB
f > 2160 MHz ..... < ±2.5 dB
Flatness at 0 dBm[1])[3])
f ≤ 2160 MHz ..... < 1 dB
f > 2160 MHz ..... < 1.5 dB
Output impedance ..... 50 Ω
VSWR ..... < 1.5 for levels ≤ 0 dBm (SMGU)[1])
< 1.8 for levels > 0 dBm (SMGU)[3])
< 1.8 for f ≤ 3000 MHz (SMHU)
< 2.5 for f > 3000 MHz (SMHU)
Setting time ..... < 25 ms (< 10 ms for transient-free level settings)
Transient-free level settings ..... 0 to −20 dB, from any level

Reverse power protection
(protects the set from externally applied RF power (50-Ω source) and DC voltages)
Max. RF power ..... 50 W (SMGU)
30 W (SMHU)
Max. DC ..... 35 V

Modulation generator
AF synthesizer
Frequency range
Sine ..... 1 Hz to 100 kHz
Sawtooth, squarewave ..... 1 Hz to 2 kHz
Resolution ..... 1 Hz
Display ..... 4 digits, floating point
Frequency error ..... < 4 × 10^{-5}
Output level (V_s)
AF INT connector ..... 0.2 mV to 2 V
Resolution up to 200 mV ..... 0.2 mV
Resolution above 200 mV ..... 2 mV
Level error at 1 kHz ..... < 1 % ± 0.5 mV
Frequency response flatness
up to 20 kHz ..... < ±2.5 %
up to 100 kHz ..... < ±3.5 %
Distortion (level > 0.5 V) ..... < 0.1 %
Setting time for phase-continuous frequency changes ..... < 5 ms
AF fixed-frequency generator ..... 409.6 Hz, 1024 Hz

Amplitude modulation
Operating modes ..... INT, EXT AC, EXT DC, two tone
Modulation depth ..... 0 to 100 %
(modulation depths that meet the AM specifications decrease linearly between 7 and 13 dBm; a status message is output if the modulation depth is too great.)
Resolution ..... 0.1 %
Setting error at 1 kHz
and m < 80 %[1])
f < 2160 MHz ..... < (4 % of reading + 1 %)
f > 2160 MHz ..... < (6 % of reading + 1 %)
AM distortion at 1 kHz[1])
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
Modulation frequency response[1])
10 Hz (DC) to 20 kHz ..... < 1 dB
Incidental φM, AM (30 %), f_{mod} = 1 kHz
f < 2000 MHz ..... < 0.2 rad
f > 2000 MHz ..... < 0.4 rad
Modulation input AM EXT
Input impedance ..... 100 kΩ, link selectable to 600 Ω
Input voltage for the set modulation depth (V_p) ..... 1 V (high/low display at ±3 %)

AM square (AM-SQU)
Dynamic range[1]) ..... typ. 30 dB
Rise/fall time ..... typ. 2 µs
Modulation signal (AM EXT) ..... logic signal (low < 1 V/high > 3.5 V), polarity selectable via special function

Frequency modulation
Operating modes ..... INT, EXT AC, EXT DC, two tone, preemphasis

Carrier (MHz)	Max. dev. (kHz)	Max. dev. (kHz) with preemphasis
2160 to 4320	3200	800
1000 to 2160	1600	400
500 to 1000	800	200
250 to 500	400	100
125 to 250	200	50
62.5 to 125	100	25
31.25 to 62.5	50	12.5
15.625 to 31.25	25	6.25
0.1 to 15.625	200	50
0.1 to 125*)	800	200

*) With the "125 MHz heterodyne band"

Resolution ..... < 1 %, min. 10 Hz
Setting error at
f_{mod} = 1 kHz ..... < 3 % of reading + 20 Hz
with preemphasis ..... < 5 % of reading + 20 Hz
FM distortion at 1 kHz
and half 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 maximum deviation)
Modulation frequency response
20 Hz to 100 kHz ..... < 0.5 dB
Preemphasis ..... 50 µs, 75 µs
Incidental AM at f_{mod} = 1 kHz, deviation = 40 kHz (f > 1 MHz) ..... < 0.1 %
Carrier frequency deviation
at FM
f > 15.625 MHz ..... < 1 × 10^{-7} × f_c + 1 % of deviation
f < 15.625 MHz ..... < 15 Hz + 1 % of deviation
With the "125 MHz heterodyne band" special function for
f < 125 MHz ..... < 65 Hz + 1 % of deviation
Modulation input FM/φM EXT
Input impedance ..... 100 kΩ, link selectable to 600 Ω
Input voltage for deviation set (V_p) ..... 1 V (high/low display at ±3 %)

FSK modulation
The deviation is the same as for FM.
Frequency accuracy ..... same as for FM AC + 4 % of deviation
Rise/fall time ..... 10 µs
Modulation signal (FM/φM EXT) .... logic signal (low < 1 V/high > 3.5 V), polarity selectable with special function

Phase modulation
Operating modes ..... INT, EXT AC, dual tone

φM deviation

Carrier (MHz)	Max. dev. (rad)
2160 to 4320	320
1000 to 2160	160
500 to 1000	80
250 to 500	40
125 to 250	20
62.5 to 125	10
31.25 to 62.5	5
15.625 to 31.25	2.5
0.1 to 15.625	20
0.1 to 125*)	80

*) With the "heterodyne band 125 MHz" special function

Resolution ..... < 1 %, min. 0.001 rad
Setting error at f_{mod} = 1 kHz ..... < 5 % of reading + 0.01 rad
φM distortion at f = 1 kHz
and half max. deviation ..... < 0.5 %
Modulation frequency ..... 10 Hz to 10 kHz
Modulation frequency response
10 Hz to 10 kHz ..... < 1 dB
Carrier frequency deviation ..... same as for FM (FM dev. ≙ φM dev. × 10 kHz)
Modulation input FM/φM EXT
Input impedance ..... 100 kΩ, link selectable 600 Ω
Input voltage for the deviation set (V_p) ..... 1 V (high/low display at ±3 %)

Pulse modulation
Operating mode ..... external
On/off ratio ..... > 80 dB
Rise/fall time ..... < 20 ns (f > 125 MHz)
Modulation signal ..... HCT signal, selectable polarity by means of a special function

Simultaneous modulation ..... AM + FM, AM + φM, FM + Pulse, φM + Pulse

Sweep
Operating modes ..... automatic, single shot or manual

	RF sweep	AF sweep	RF level sweep	Memory sweep
Sweep range	user select.	user select.	0.1 to 20 dB	user select.
Step width (lin)	user select.	user select.	—	1
Step width (log)	0.01 to 50 %	0.01 to 50 %	0.1 to 20 dB	—
Time for step	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*)
Marker	user select.	user select.	user select.	—

*) in fast mode

X output ..... 0 to 10 V
Z output ..... 0/5 V logic signal, polarity selection via special function

Remote control
System ..... IEC 625-1 (IEEE 488)
Connector type ..... Amphenol 24-contact
Remote controllable functions ..... all, except those of spinwheel and power switch
IEC-bus address ..... set via the keypad (0 to 30)
Interface functions SH1, AH1, T6, L4, SR1, RL1, PP0 DC1, DT1, C0

General data
Rated temperature range ..... 0 to 50 °C
Storage temperature range ..... −40 to +75 °C
RF leakage ..... to VDE 0871 and MIL STD 461 B (Method. CE 03 and RE 02), radiated and conducted interference; also meets VDE 0875 (RFI class K)
Mechanical shock ..... Shock tested to DIN 40046, part 7 (30 g, 11 ms) and vibration tested to DIN 40046, part 8 (5 to 55 Hz, 2 g), corresponds to IEC Publications 68-2-27 and 68-2-6
Power supply ..... 100/120/220/240 V ± 10 %
47 to 63 Hz (max. 270 VA)
safety class I to VDE 0411 (IEC 348)
Dimensions (W x H x D) ..... 435 mm × 192 mm × 460 mm
Weight ..... 25 kg

Supplementary data for model SMGU 55
Level range ..... −140 to +16 dBm
Overrange not to specifications ..... to +19 dBm
Frequency response at 0 dBm[1])[3])
9 kHz ≤ f ≤ 2160 MHz ..... < 1 dB
Harmonic spurious signals
for levels ≤ 13 dBm ..... < −30 dBc
for levels ≤ 16 dBm ..... < −25 dBc

Supplementary data for models SMGU 56 and SMHU 56
Number of memory locations 4800
Parallel interface
(fast hop bus) ..... 13 address lines (A_0 to A_{12}) and DATA VALID

Ordering information

Order designations	▶ Signal Generator SMGU	
Model 52 (standard model)	819.0010.52	
Model 55 with extended level range	819.0010.55	
Model 56 with extended memory capacity and parallel interface	819.0010.56	
	▶ Signal Generator SMHU	
Model 52 (standard model)	835.8011.52	
Model 56 with extended memory capacity and parallel interface	835.8011.56	
Supplied accessories	power cable	
Recommended extras		
Rear-panel connectors for RF and AF	SMGU-Z9	820.4415.02
19" Rack Adapter	ZZA-94	396.4905.00
Service Kit	SMGU-Z2	820.4515.02
Service Manual for SMGU		820.4150.02
for SMHU		820.4180.02

[1]) does not apply to special function "transient-free level settings".
[2]) does not apply to special function "125 MHz heterodyne band".
[3]) does not apply to special function "AGC off" and to pulse modulation.