HM8134-3, HM8134-3X
1.2 GHz RF-Synthesizer
Technical Data

HAMEG Instruments
A Rohde & Schwarz Company

USB | RS-232 | optional IEEE-488 | Lab-VIEW

Key facts

- Frequency range: 1 Hz to 1.2 GHz
- High dynamic output power: -127 dBm to +13 dBm
- Frequency resolution: 1 Hz
- High spectral purity, excellent SWEEP mode
- Modulation modes: AM, FM, pulse, phase, FSK, PSK
- Internal modulation (10 Hz to 150 kHz): sine, square, triangle, ramp
- External Ref.-Input/Output (10 MHz) via BNC-connector
- HM8134-3: TCXO (temperature stability: $\pm 0.5 \times 10^{-6}$)
  HM8134-3X: OCXO (temperature stability: $\pm 1.0 \times 10^{-8}$)
- RS-232/USB dual interface, IEEE-488 (GPIB) optional

Test & Measurement

Technical Data

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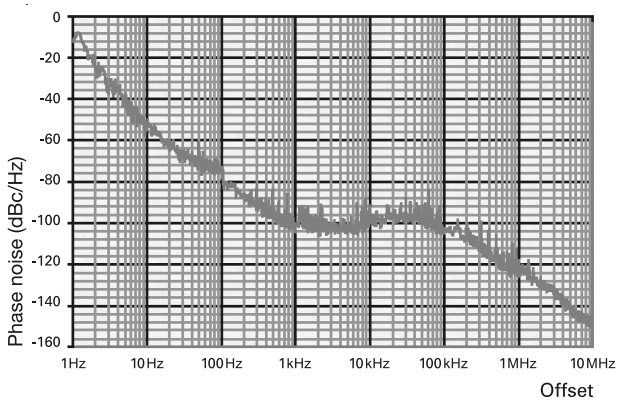
Technical Data

1,2 GHz HF-Synthesizer HM8134-3

All data valid at 23°C after 30 minutes warm-up.

Frequency		
Range	1 Hz to 1200 MHz	
Resolution	1 Hz	
Settling time	<10 ms	
Frequency Reference 10 MHz		
Temperature stability	TCXO (HM8134-3)	OCXO (HM8134-3X)
0…50 °C Aging	≤±0.5 x 10^{-6} ≤±1 x 10^{-6}/year	≤±1 x 10^{-8} ≤±1 x 10^{-9}/day
Internal reference output		
Level	TTL	
External reference input		
Level	>0 dBm	
Frequency	10 MHz ±20 ppm	
Spectral purity (without modulation)		
Harmonics	f < 50 Mhz: -25 dBc f ≥ 50 Mhz: -35 dBc	
Non-harmonics	≤ -55 dBc (>100 kHz from carrier)	
Phase noise (at 20 kHz from carrier)		
f <16 MHz	≤-120 dBc/Hz	
16 MHz ≤f <250 MHz	≤-94 dBc/Hz	
250 MHz ≤f <500 MHz	≤-105 dBc/Hz	
500 MHz ≤f <1.000 MHz	≤-100 dBc/Hz	
1.000 MHz ≤f <1.200 MHz	≤-95 dBc/Hz	
Residual FM	≤6.5Hz (at 1 GHz, 0.3 to 3 kHz bandwidth)	
Residual AM	<0.06 % (0.03 to 20 kHz bandwidth)	



Typical phase noise at 1 GHz

Output level		
Range	-127 dBm to +13 dBm	
Resolution	0.1 dB	
Display-Offset for ext. Attn.	0.0 dB to 30.0 dB in 0.1 dB steps	
Precision for level >-57 dBm for level <-57 dBm	≤±0.5 dB ≤±(0.5 dB + (0.2 x (-57 dBm - level))/10)	
Impedance	50 Ω	
V.S.W.R.	≤2	
Modulation sources		
Internal 10 Hz…150 kHz 10 Hz…20 kHz	sine wave, square wave, triangle, sawtooth	
Resolution	10 Hz	
External		
Impedance	10 kΩ II 50 pF	
Input level	2 V_{pp} for full scale	
Coupling	AC or DC	
Output		
Level	2 V_{pp}	
Impedance	1 kΩ	
Amplitude modulation (Level -30...+7dBm)		
Source	internal or external	
Modulation depth	0% to 100 %	
Resolution	0.1 %	
Accuracy	±5 % @ f_{mod} 1 kHz, f>16 MHz	
Ext. frequency resp. (to -1 dB)	10 Hz to 50 kHz for AC	
Distortion	<2 % (AM-depth ≤60 %, f_{mod} ≤1 kHz) <6 % (AM-depth ≤80 %, f_{mod} <20 kHz)	
Frequency modulation		
Source	internal or external	
Deviation	±200 Hz to 400 kHz (depending on frequency band)	
Resolution	100 Hz	
Accuracy	±3 % + res. FM (f_{mod} ≤5 kHz) ±7 % + res. FM (5 kHz <f_{mod} <100 kHz))	
Ext. frequency response (to -1 dB)		
DC coupling	0 kHz to 100 kHz	
AC coupling	10 Hz to 100 kHz	
Distortion	<1 % for deviation ≥50 kHz at 1 kHz <3 % for deviation ≥10 kHz at 1 kHz	
Phase modulation		
Source	internal or external	
Deviation <16 MHz >16 MHz	0 rad to 3.14 rad 0 rad to 10 rad	
Resolution	0.01 rad	
Accuracy	±5 % up to 1 kHz + residual PM	
Ext. frequency response (to -1 dB)		
DC coupling	0 kHz to 100 kHz	
AC coupling	10 Hz to 100 kHz	
Distortion	<3 % for fmod = 1 kHz and deviation = 10 rad	
FSK modulation		
Range (F0…F1)	16 MHz to 1200 MHz	
Mode	2 FSK levels	
Data source	external	
Max. rate	10 kbit/s	
Shift (F1…F0)	0 MHz to 10 MHz	
Resolution	100 Hz	
Accuracy	±3 % + residual FM (f_{mod} ≤5 kHz) ±7 % + residual FM (5 kHz <f_{mod} <100 kHz)	
PSK modulation		
Mode	2 PSK levels	
Data source	external	
Max. rate	10 kbit/s	
Shift (Ph1…Ph0) <16 MHz >16 MHz	0 rad to ±3.14 rad 0 rad to ±10 rad	
Resolution	0.01 rad	
Accuracy	±5 % up to 1 kHz + residual PM	
Pulse modulation		
Source	external	
Dynamic range	>80 dB	
Rise/fall times	<50 ns	

Delay	<100 ns
Max. frequency	2.5 MHz
Input level	TTL
Sweep mode	
Range	1 MHz to 1200 MHz
Depth	500 Hz to 1199 MHz
Sweep time	20 ms to 5 s
Trigger	intern
Protective functions	
The synthesizer is protected against reverse power applied to the RF output up to 1 W for a 50 Ω source and against any DC source up to ±7 V. The protection disconnects the output until manually reset by operator.	
Miscellaneous	
Interface	Dual-Interface USB/RS-232 (HO820), optional HO880 IEEE-488 (GPIB)
Configuration memories	10
Safety class	Safety Class I (EN61010-1)
Power supply	115/230 V ±10 %, 50…60 Hz, CAT II
Power consumption	ca. 40 VA
Operating temperature	+5 °C to +40 °C
Storage temperature	-20 °C to +70 °C
Rel. humidity	5% to 80 % (non condensing)
Dimensions (W x H x D)	285 x 75 x 365 mm
Weight	approx. 5 kg

Accessories supplied: Line cord, Operating manual

Recommended accessories:

HO880 Interface IEEE-488 (GPIB), galvanically isolated
HZ20 Adapter, BNC to 4 mm banana
HZ24 Attenuators 50 Ω (3/6/10/20 dB)
HZ42 19“ Rackmount kit 2RU
HZ72 GPIB-Cable 2 m