

3 GHz RF-Synthesizer HM8135

HM8135

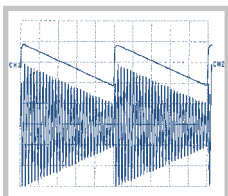


- ✓ Outstanding Frequency range 1Hz...3GHz
- ✓ Output power -135...+13dBm
- ✓ Frequency resolution 1Hz (accuracy 0.5ppm)
- ✓ Input for external time base (10MHz)
- ✓ Modulation modes: AM, FM, Pulse, Φ , FSK, PSK
- ✓ Rapid pulse modulation: typ. 200ns
- ✓ Internal modulator (sine wave, square wave, triangle, sawtooth) 10Hz...200kHz
- ✓ High spectral purity
- ✓ Standard: TCXO (temperature stability: $\pm 0.5 \times 10^{-6}$)
Optional: OCXO (temperature stability: $\pm 1 \times 10^{-8}$)
- ✓ Galvanically isolated USB/RS-232 Interface, optional IEEE-488
- ✓ 10 configuration memories including turn-on configuration

HO880 IEEE-488
(GPIB) Interface (Option)



Internal modulation source



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

Frequency	
Range:	1 Hz...3 GHz
Resolution:	1 Hz
Settling time:	< 10ms
Frequency Reference 10 MHz	
Standard:	TCXO
Temperature stability (0...50°C):	≤ ± 0,5 ppm
Aging:	≤ ± 1 ppm/year
Option: OCXO (HO85)	
Temperature stability (0...50 °C):	≤ ± 1x10 ⁻⁸
Aging:	≤ ± 1x10 ⁻⁹ /day
Internal reference output:	(rear panel)
Level:	TTL
External reference input:	(rear panel)
Level:	> 0 dBm
Frequency:	10MHz ± 20ppm
Spectral purity (without modulation)	
Harmonics:	≤ -35 dBc (typ.)
Non-harmonics:	≤ -50 dBc (> 15 kHz from carrier)
Sub-harmonics:	≤ -50 dBc (typ.)
Phase noise:	(at 20kHz from carrier)
f < 16 MHz:	≤ -120 dBc/Hz
16 MHz ≤ f < 250 MHz:	≤ -95 dBc/Hz
250 MHz ≤ f < 500 MHz:	≤ -105 dBc/Hz
500 MHz ≤ f < 1000 MHz:	≤ -100 dBc/Hz
1 GHz ≤ f < 2 GHz:	≤ -95 dBc/Hz
2 GHz ≤ f < 3 GHz:	≤ -90 dBc/Hz
Residual FM:	typ. < 4 Hz; ≤ 6.5 Hz (in 0.3...3 kHz bandwidth)
Residual AM:	typ. < 0.06% (in 0.03...20kHz bandwidth)

Typical phase noise at 1 GHz

Output level	
Range:	-135...+13 dBm
Resolution:	0.1 dB
Precision f < 1.5 GHz; level > -120 dBm	
for level > -57 dBm:	≤ ± 0.5 dB
for level < -57 dBm:	≤ ± (0.5 dB + (0.2 x (-57 dBm - level))/10)
Precision f > 1.5 GHz; level > -120 dBm	
for level > -57 dBm:	≤ ± 0.7 dB
for level < -57 dBm:	≤ ± (0.7 dB + (0.5 x (-57 dBm - level))/10)
Impedance:	50 Ω
V.S.W.R.:	f ≤ 1 GHz: ≤ 1.5 f > 1 GHz: ≤ 2.5
Modulation sources	
Internal:	10 Hz...200kHz sine wave 10 Hz...20kHz square wave, triangle, sawtooth
Resolution:	10 Hz
External:	(input on front panel)
Impedance:	10 kΩ 50 pf
Input level:	2 V _{pp} for full scale
Coupling:	AC or DC
Output:	(front panel)
Level:	2 V _{pp}
Impedance:	1 kΩ
Amplitude modulation (Level ≤ +7 dBm)	
Source:	Internal or external
AM-depth:	0...100%
Resolution:	0.1 %
Accuracy:	± 4% displayed rate ± 0.5% (AM-depth ≤ 80%, f _{mod} ≤ 50 kHz)
Ext. frequency resp. (to -1 dB):	10 Hz...100 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...400 kHz (depending on frequency band)
Resolution:	100 Hz
Accuracy:	± 3% + residual FM (f _{mod} ≤ 5 kHz) ± 7% + residual FM (5 kHz < f _{mod} < 100 kHz)
Ext. frequency response: (to -1 dB):	
DC coupling:	0...100 kHz
AC coupling:	100 Hz...100 kHz
Distortion:	< 1% for deviation ≥ 50 kHz at 1 kHz < 3% for deviation ≥ 10 kHz
Phase modulation	
Source:	internal or external
Deviation:	< 16 MHz: 0...3.14 rad > 16 MHz: 0...10 rad
Resolution:	0.01 rad
Accuracy:	± 5% to 1 kHz + residual PM
Ext. frequency response (to -1 dB):	
DC coupling:	0...100 kHz
AC coupling:	100 Hz...100 kHz
Distortion:	< 3% for f _{mod} = 1 kHz and deviation = 10 rad
FSK modulation	
Range (F0...F1):	16 MHz...3 GHz
Mode:	2 FSK levels
Data source:	external
Max. rate:	10 kbit/s
Shift (F1...F0):	0...10 MHz
Resolution:	100 Hz
Accuracy:	see under FM
PSK modulation	
Mode:	2 PSK levels
Data source:	external
Max. rate:	10 kbit/s
Shift (Ph1...Ph0):	
< 16 MHz:	0...± 3.14 rad
> 16 MHz:	0...± 10 rad
Resolution:	0.01 rad
Accuracy:	see under PM
Pulse modulation	
Source:	external (rear panel)
Dynamic range:	
f < 2 GHz:	> 80 dB
f > 2 GHz:	> 55 dB
Rise/fall times:	< 50 ns (typ. < 10 ns)
Delay:	< 100 ns
Max. frequency:	2.5 MHz (typ. 5 MHz)
Input level:	TTL
Sweep mode	
Range:	1...3000 MHz
Depth:	500 Hz...2999 MHz
Sweep time:	20 ms...5 s
Trigger:	internal
Protective functions	
The synthesizer is protected against reverse power applied on RF output up to 1 W for a 50 Ω source and against any DC source up to ± 7V. The protection disconnects the output until manually rearmed by operator.	
Miscellaneous	
Interfaces:	USB/RS-232 (HO820), IEEE-488 (optional)
Configuration memories:	10
Safety class:	Safety Class I (EN61010-1)
Power supply:	115...230V ± 10%, 50/60Hz, CAT II
Power consumption:	approx. 40 VA
Operating temperature:	+5...+40°C
Storage temperature:	-20...+70°C
Rel. humidity:	5...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, USB/RS-232 Interface (HO820)
Optional accessories:	
HO85	OCXO temperature stability ± 1x10 ⁻⁸
HO880	IEEE-488 (GPIB) Interface (galvanically isolated)
HZ13	Interface cable (USB) 1,8m
HZ14	Interface cable (serial) 1:1
HZ20	Adapter, BNC to 4mm banana
HZ21	Adapter plug
HZ24	Attenuator Set 50Ω (3/6/10/20dB)
HZ33	Test Cable 50Ω (BNC-BNC) 0,5m
HZ34	Test Cable 50Ω (BNC-BNC) 1,0m
HZ42	19" Rackmount kit 2RU
HZ72	GPIB-Cable 2m