

3GHz RF-Synthesizer HM8135 | HM8135-X



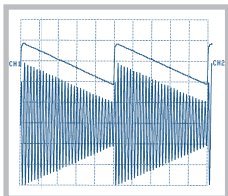
HM8135



HO880 IEEE-488 (GPIB)
Interface (option)



Internal modulation source



- ✓ Frequency range: 1 Hz to 3 GHz
- ✓ High dynamic output power: -135 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 200 kHz): sine, square, triangle, ramp
- ✓ External Ref.-Input/Output (10 MHz) via BNC-connector
- ✓ HM8135: TCXO (temperature stability: $\pm 0.5 \times 10^{-6}$)
HM8135-X: OCXO (temperature stability: $\pm 1.0 \times 10^{-8}$)
- ✓ RS-232/USB dual interface, IEEE-488 (GPIB) optional

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

Frequency

Range:	1 Hz to 3 GHz
Resolution:	1 Hz
Settling time:	<10 ms

Frequency reference 10 MHz

HM8135 (TCXO):

Temperature stability (0 to 50 °C)	$\leq \pm 0.5 \times 10^{-6}$
Aging	$\leq \pm 1.0 \times 10^{-6}/\text{year}$

HM8135-X (OCXO):

Temperature stability (0 to 50 °C)	$\leq \pm 1.0 \times 10^{-8}$
Aging	$\leq \pm 1.0 \times 10^{-9}/\text{day}$

Internal reference output:

Level (rear panel)

TTL

External reference input:

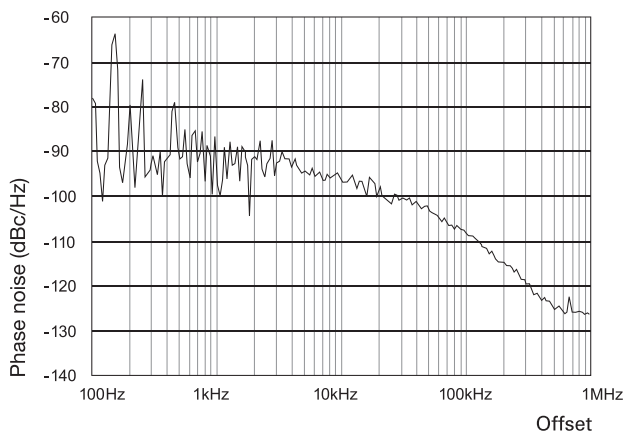
Level (rear panel)

>0 dBm

Frequency 10 MHz $\pm 20 \times 10^{-6}$

Spectral purity (without modulation)

Harmonics:	≤ -30 dBc (typ. < -35 dBc)
Non-harmonics:	≤ -50 dBc (> 15 kHz from carrier)
Sub-harmonics: <2,1 GHz	≤ -50 dBc
Sub-harmonics: >2,1 GHz	≤ -43 dBc (typ. -47 dBc)
Phase noise:	(at 20 kHz from carrier)
f < 16 MHz	≤ -120 dBc/Hz
16 MHz $\leq$ f < 250 MHz	≤ -95 dBc/Hz
250 MHz $\leq$ f < 500 MHz	≤ -105 dBc/Hz
500 MHz $\leq$ f < 1 GHz	≤ -100 dBc/Hz
1 GHz $\leq$ f < 2 GHz	≤ -95 dBc/Hz
2 GHz $\leq$ f < 3 GHz	≤ -90 dBc/Hz
Residual FM:	typ. <4 Hz; ≤ 6.5 Hz (in 0.3 to 3 kHz bandwidth)
Residual AM:	typ. <0.06 % (in 0.03 to 20 kHz bandwidth)



(Typical phase noise at 1 GHz)

Output level

Range:	-135 to +13 dBm
Resolution:	0.1 dB
Display-offset for ext. attn.:	0.0 to 30.0 dB in 0.1 dB steps
Precision f < 1.5 GHz; level > -120 dBm:	
for level > -57 dBm	$\leq \pm 0.5$ dB
for level < -57 dBm	$\leq \pm [0.5 \text{ dB} + (0.2 \times [-57 \text{ dBm} - \text{level}]) / 10]$
Precision f > 1.5 GHz; level > -120 dBm:	
for level > -57 dBm	$\leq \pm 0.7$ dB
for level < -57 dBm	$\leq \pm [0.7 \text{ dB} + (0.5 \times [-57 \text{ dBm} - \text{level}]) / 10]$
Impedance:	50 Ω
V.S.W.R.:	f < 1 GHz: ≤ 1.5 f > 1 GHz: ≤ 2.5

Modulation sources

Internal:	10 Hz to 200 kHz sine wave 10 Hz to 20 kHz square wave, triangle, ramp
Resolution	10 Hz
External:	Input on front panel
Impedance	10 k Ω 50 pF
Input level	2 V _{pp} for full scale
Coupling	AC or DC
Output:	Front panel
Level	2 V _{pp}
Impedance	1 k Ω

Amplitude modulation (Level $\leq +7$ dBm)

Source:	Internal or external
AM-depth:	0 to 100 %
Resolution:	0.1 %
Accuracy:	± 4 % displayed rate ± 0.5 % (AM-depth ≤ 80 %, $f_{\text{mod}} \leq 50$ kHz)
Ext. frequency resp. (to -1 dB):	10 Hz to 100 kHz for AC
Distortion:	< 2 % (AM-depth ≤ 60 %, $f_{\text{mod}} \leq 1$ kHz) < 6 % (AM-depth ≤ 80 %, $f_{\text{mod}} < 20$ kHz)

Frequency modulation

Source:	internal or external
Deviation:	± 200 Hz to 400 kHz (depending on frequency band)
Resolution:	100 Hz
Accuracy:	± 3 % + residual FM ($f_{\text{mod}} \leq 5$ kHz) ± 7 % + residual FM (5 kHz $< f_{\text{mod}} < 100$ kHz)
Ext. frequency response (to -1 dB):	
DC coupling	0 to 100 kHz
AC coupling	100 Hz to 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 to 3.14 rad
> 16 MHz	0 to 10 rad
Resolution:	0.01 rad
Accuracy:	± 5 % up to 1 kHz + residual PM
Ext. frequency response (to -1 dB):	
DC coupling	0 to 100 kHz
AC coupling	100 Hz to 100 kHz
Distortion:	< 3 % for $f_{\text{mod}} = 1$ kHz and deviation = 10 rad

FSK modulation

Range (F0 to F1):	16 MHz to 3 GHz
Mode:	2 FSK levels
Data source:	external
Max. rate:	10 kbit/s
Shift (F1 to F0):	0 to 10 MHz
Resolution:	100 Hz
Accuracy:	± 3 % + residual FM ($f_{\text{mod}} \leq 5$ kHz) ± 7 % + residual FM (5 kHz $< f_{\text{mod}} < 100$ kHz)

PSK modulation

Mode:	2 PSK levels
Data source:	external
Max. rate:	10 kbit/s
Shift (Ph1 to Ph0):	
< 16 MHz	0 to ± 3.14 rad
> 16 MHz	0 to ± 10 rad
Resolution:	0.01 rad
Accuracy:	± 5 % up to 1 kHz + residual 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 MHz to 3 GHz
Depth:	500 Hz to 2.999 GHz
Sweep time:	20 ms to 5 s
Trigger:	internal

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	
Interfaces:	Dual interface USB/RS-232 (H0820), IEEE-488 (GPIB) (optional)
Configuration memories:	10
Safety class:	Safety class I (EN61010-1)
Power supply:	115/230 V $\pm 10\%$, 50 to 60 Hz, CAT II
Power consumption:	approx. 40 VA
Operating temperature:	+5 to +40 °C
Storage temperature:	-20 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, printed Operating manual, CD

Recommended accessories:

H0880	Interface IEEE-488 (GPIB), galvanically isolated
HZ13	Interface cable (USB) 1.8 m
HZ14	Interface cable (serial) 1:1
HZ20	Adapter, BNC to 4 mm banana
HZ21	Adapter, N male to BNC female
HZ24	Attenuators 50 Ω (3/6/10/20 dB)
HZ33	Test cable 50 Ω , BNC/BNC, 0.5 m
HZ34	Test cable 50 Ω , BNC/BNC, 1.0 m
HZ42	19" rackmount kit 2RU
HZ72	GPIB-cable 2 m