

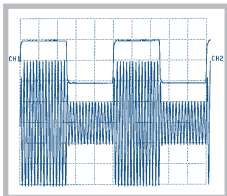
3 GHz RF-Synthesizer HM8135



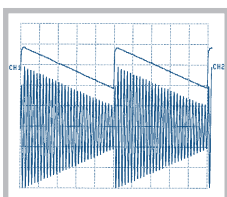
H0870 USB Interface



Internal modulation source



Internal modulation source



Frequency range from 1 Hz to 3 GHz

Output power from -135 dBm to +13 dBm

Frequency resolution 1 Hz
(accuracy 0.5 ppm)

Input for external time base (10 MHz)

Modulation modes: AM, FM, Pulse, Φ , FSK, PSK

Rapid pulse modulation: typ. 200 ns

Internal modulator from 10 Hz to 200 kHz

High spectral purity

OCXO optional

RS-232 Interface
optional: USB, IEEE-488



3 GHz RF-Synthesizer HM8135

Valid at 23 °C after a 30 minute warm-up period

Frequency

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

Frequency Reference 10 MHz

Standard: TCXO

Stability (0 to 50°C):	$\leq \pm 0.5$ ppm
Aging:	$\leq \pm 1$ ppm/year

Option: OCXO (H085)

Stability:	$\leq \pm 1 \times 10^{-8}$
Aging:	$\leq \pm 5 \times 10^{-8}$ /year

Internal reference output: [rear panel]

Level: TTL

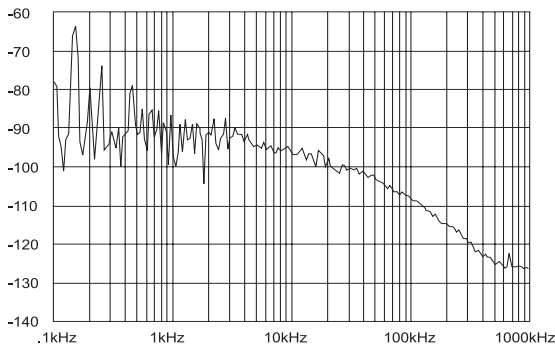
External reference input: [rear panel]

Level: > 0 dBm

Frequency: 10 MHz \pm 20 ppm

Spectral purity (without modulation)

Harmonics:	≤ -35 dBc (typ.)
Non-harmonics:	≤ -50 dBc (> 15 kHz from carrier)
Sub-harmonics:	≤ -50 dBc (typ.)
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 < 1000 MHz:	≤ -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 - 3 kHz bandwidth)
Residual AM:	typ. < 0.06 % (in 0.03 - 20 kHz bandwidth)



(Typical phase noise at 1 GHz)

Output level

Range:	-135 to +13 dBm
Resolution:	0.1 dB
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 \leq 1 GHz:	≤ 1.5
f > 1 GHz:	≤ 2.5

Modulation sources

Internal:	10 Hz - 200 kHz sine wave 10 Hz - 20 kHz square wave, triangle, sawtooth
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 _{mod} ≤ 50 kHz)

Ext. frequency resp. (to -1dB):	10 Hz to 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 to 400 kHz (depending on frequency band)
Resolution:	100Hz
Accuracy:	± 3 % + residual FM (f _{mod} ≤ 5 kHz) ± 7 % + residual FM (5 kHz < f _{mod} < 100 kHz)
Ext. frequency response: (to -1dB):	
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 % to 1 kHz + residual PM
Ext. frequency response (to -1dB):	
DC coupling:	0 to 100 kHz
AC coupling:	100 Hz to 100 kHz
Distortion:	< 3 % for f _{mod} = 1 kHz and deviation = 10 rad

FSK modulation

Range (F0 - F1):	16 to 3000 MHz
Mode:	2 FSK levels
Data source:	external
Max. rate:	10 kbit/s
Shift (F1 - F0):	0 to 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 to ± 3.14 rad
> 16 MHz:	0 to ± 10 rad
Resolution:	0.01 rad
Accuracy:	see under PM

Pulse modulation

Source:	external (rear panel)
Dynamic range:	
f < 2 GHz:	> 80dB
f > 2 GHz:	> 55dB
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 3000 MHz
Depth:	500 Hz to 2999 MHz
Sweep time:	20 ms to 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 ± 7 V. The protection disconnects the output until manually rearmed by operator.

Miscellaneous

Interfaces:	RS-232 (standard), IEEE-488 (optional), USB (optional)
Configuration memories:	10
Safety class:	Safety Class I (EN61010-1)
Power supply:	115/230V ± 10 %, 50/60Hz
Power consumption:	approx. 40 VA
Operating temperature:	+ 10 to + 40 °C
Max. relative humidity:	10 to 90 % (without condensation)
Dimensions (W x H x D):	285 x 75 x 365 mm
Weight:	approx. 5 kg

Accessories supplied: Operator's manual, power cable
Optional accessories: HZ33/HZ34 Test Cable 50 Ω (BNC-BNC), HZ21 Adapter plug, HZ42 19" Rackmount kit 2RU, H0870 USB Interface, H0880 IEEE-488 Interface, H0890 RS-232 Interface, H085 OCXO (Installation only ex factory)