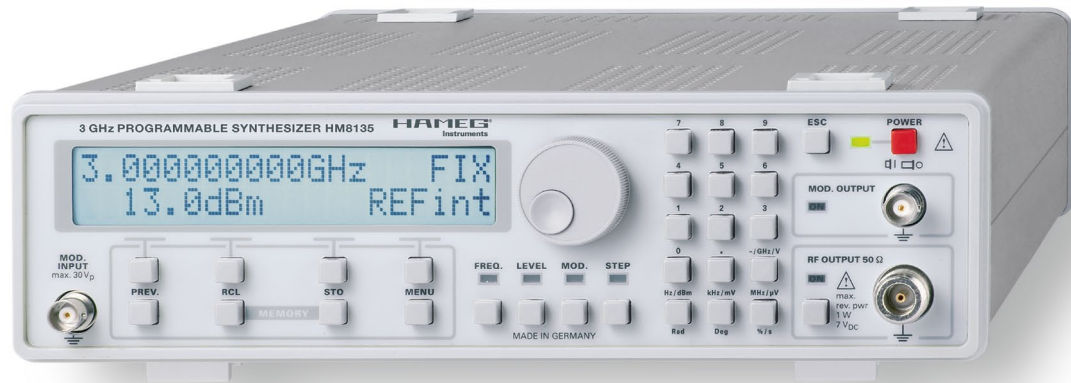


## 3GHz RF-Synthesizer HM8135



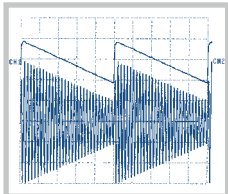
HM8135



HO880 IEEE-488  
(GPIB) Interface (Option)



Internal Modulation Source



- 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,  $\Phi$ , FSK, PSK
- Rapid Pulse Modulation: typ. 200ns
- Internal Modulator (Sine Wave, Square Wave, Triangle, Sawtooth) 10Hz...200kHz
- High spectral Purity
- 10 Configuration Memories including Turn-On Configuration
- 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 (GPIB)

# 3 GHz RF-Synthesizer HM8135

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

## Frequency

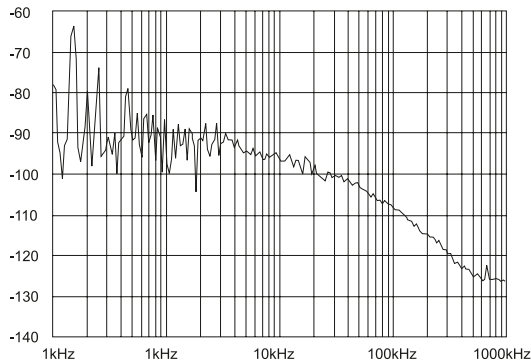
Range:	1 Hz...3 GHz
Resolution:	1 Hz
Settling time:	<10 ms

## Frequency Reference 10 MHz

Standard: TCXO	
Temperature stability (0...50 °C):	≤±0.5 ppm
Aging:	≤±1 ppm/year
Option: OCXO (H085)	
Temperature stability (0...50 °C):	≤±1x 10 <sup>-8</sup>
Aging:	≤±1x 10 <sup>-9</sup> /day
Internal reference output:	(rear panel)
Level:	TTL
External reference input:	(rear panel)
Level:	>0 dBm
Frequency:	10 MHz ±20 ppm

## Spectral purity (without modulation)

Harmonics:	≤-35 dBc
Non-harmonics:	≤-50 dBc (>15 kHz from carrier)
Sub-harmonics:	≤-50 dBc
Phase noise:	(at 20 kHz 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...20 kHz bandwidth)



(Typical phase noise at 1 GHz)

## Output level

Range:	-135...+13 dBm
Resolution:	0.1 dB
Display-Offset for ext. Attn.:	0.0...30.0 dB in 0.1 dB steps
Precision f < 1.5 GHz; level > -120 dBm	
for level > -57 dBm:	≤±0.5 dB
for level < -57 dBm:	≤±(0.5 dB + (0.2x (-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 + (0.5x (-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...200 kHz sine wave 10 Hz...20 kHz square wave, triangle, sawtooth
Resolution:	10 Hz
External:	Input on front panel
Impedance:	10 kΩ    50 pF
Input level:	2V <sub>pp</sub> for full scale
Coupling:	AC or DC
Output:	Front panel
Level:	2V <sub>pp</sub>
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 <sub>mod</sub> ≤ 50 kHz)
Ext. frequency resp. (to -1 dB):	10 Hz...100 kHz for AC
Distortion:	<2 % (AM-depth ≤ 60 %, f <sub>mod</sub> ≤ 1 kHz) <6 % (AM-depth ≤ 80 %, f <sub>mod</sub> < 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 <sub>mod</sub> ≤ 5 kHz) ±7 % + residual FM (5 kHz < f <sub>mod</sub> < 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 <sub>mod</sub> = 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 ±7 V. The protection disconnects the output until manually reset by operator.

## Miscellaneous

Interfaces:	USB/RS-232 (H0820), IEEE-488 (option)
Configuration memories:	10
Safety class:	Safety Class I (EN61010-1)
Power supply:	115...230 V ±10 %, 50/60 Hz, 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

**Recommended accessories:**

H085 OCXO temperature stability  $\pm 1 \times 10^{-8}$   
H0880 IEEE-488 (GPIB) Interface (galvanically isolated)  
HZ13 Interface cable (USB) 1.8 m  
HZ14 Interface cable (serial) 1:1  
HZ20 Adapter, BNC to 4 mm banana  
HZ21 Adapter plug  
HZ24 Attenuator Set 50  $\Omega$  (3/6/10/20 dB)  
HZ33 Test Cable 50  $\Omega$  (BNC-BNC) 0.5 m  
HZ34 Test Cable 50  $\Omega$  (BNC-BNC) 1.0 m  
HZ42 19" Rackmount kit 2RU  
HZ72 GPIB-Cable 2 m