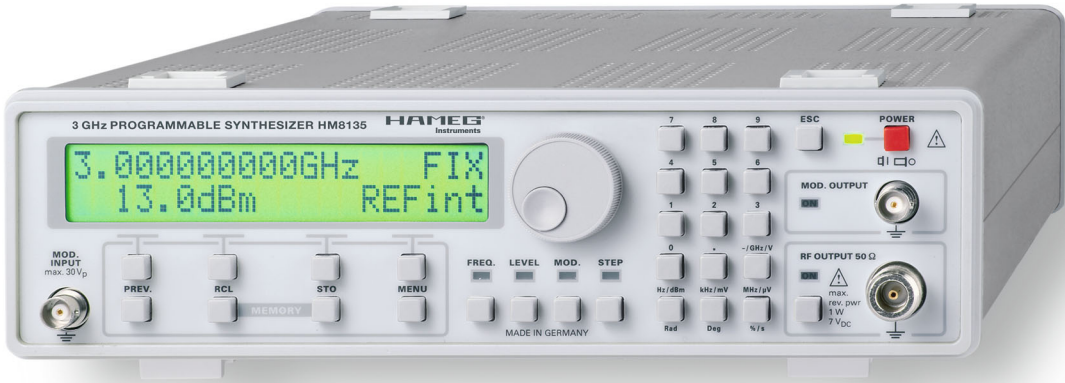


# 3 GHz RF-Synthesizer HM8135

HM8135

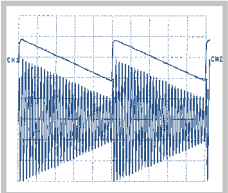


- Outstanding Frequency range 1Hz...3GHz
- Output power -135dBm...+13dBm
- Frequency resolution 1Hz (accuracy 0.5ppm)
- Input for external time base (10MHz)
- Modulation modes: AM, FM, Pulse,  $\Phi$ , FSK, PSK
- Rapid pulse modulation: typ. 200ns
- Internal modulator (sine wave, square wave, triangle, sawtooth) 10Hz...200kHz
- High spectral purity
- 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

H0880 IEEE-488 (GPIB) Interface (Option)



Internal modulation source



## 3 GHz RF-Synthesizer HM8135

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

### Frequency

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

### Frequency Reference 10 MHz

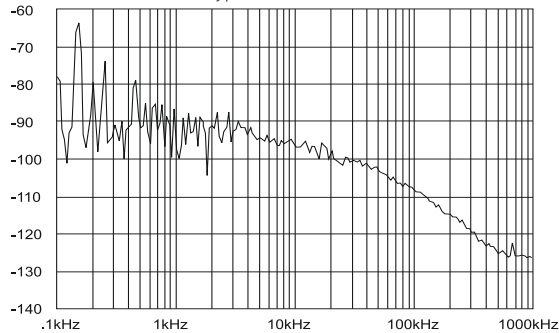
Standard:	TCXO
Temperature stability (0...50°C):	≤ ± 0,5 ppm
Aging:	≤ ± 1 ppm/year

Option: OCXO (H085)	
Temperature stability (0...50 °C):	≤ ± 1x10 <sup>-9</sup>
Aging:	≤ ± 1x10 <sup>-7</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 (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 ≤ 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
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...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:	2 V <sub>pp</sub> for full scale
Coupling:	AC or DC
Output:	(front panel)
Level:	2 V <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 %, fmod ≤ 50 kHz)

Ext. frequency resp. (to -1dB):	10 Hz...100 kHz for AC
Distortion:	< 2 % (AM-depth ≤ 60 %, fmod ≤ 1 kHz) < 6 % (AM-depth ≤ 80 %, fmod < 20 kHz)

### Frequency modulation

Source:	internal or external
Deviation:	± 200 Hz...400 kHz (depending on frequency band)
Resolution:	100 Hz
Accuracy:	± 3% + residual FM (fmod ≤ 5 kHz) ± 7% + residual FM (5 kHz < fmod < 100 kHz)

Ext. frequency response: (to -1dB):	
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 -1dB):	
DC coupling:	0...100 kHz
AC coupling:	100 Hz...100 kHz
Distortion:	< 3 % for fmod = 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 MHz...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 rearmed by operator.

### Miscellaneous

Interfaces:	USB/RS-232 (H0820), 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°C...+40°C
Storage temperature:	-20°C...+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:** Operator's manual, power cable  
**Optional accessories:** HZ33/HZ34 Test Cable 50 Ω (BNC-BNC), HZ21 Adapter plug, HZ42 19" Rackmount kit 2RU, H0880 IEEE-488 (GPIB) Interface (galvanically isolated), OCXO (H085)