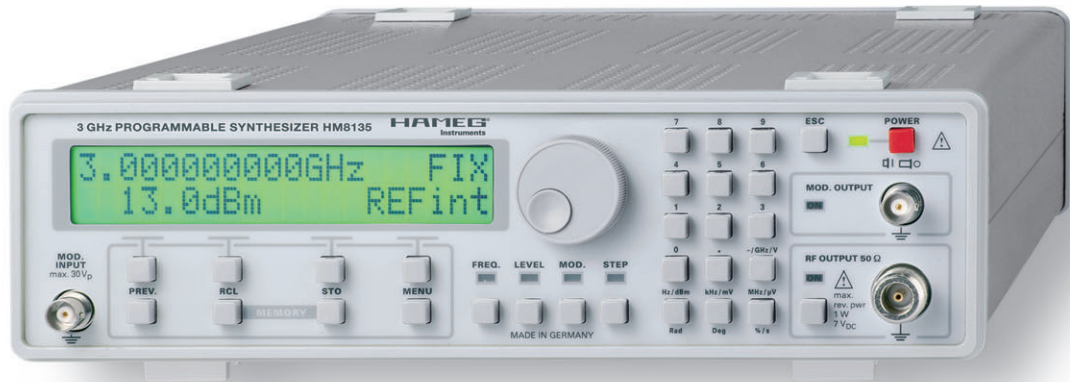


## 3 GHz RF-Synthesizer HM8135

HM8135



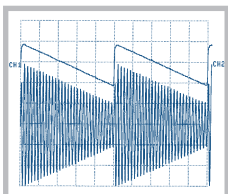
H0870 USB Interface



H0880 IEEE-488  
(GPIB) Interface



Internal modulation source



Outstanding 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,  $\Phi$ , FSK, PSK

Rapid pulse modulation: typ. 200 ns

Internal modulator (sine wave, square wave, triangle, sawtooth)  
from 10 Hz to 200 kHz

High spectral purity

Standard: TCXO (temperature stability:  $\pm 0,5 \times 10^{-6}$ )

Optional: OCXO (temperature stability:  $\pm 1 \times 10^{-8}$ )

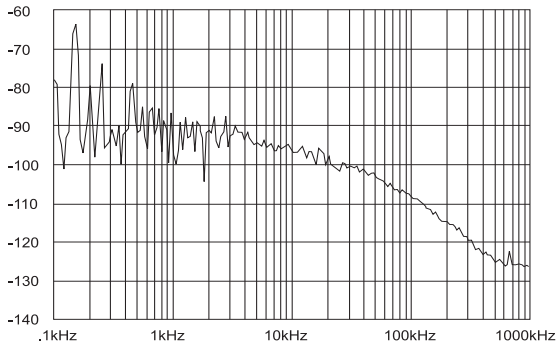
RS-232 Interface, optional: USB, IEEE-488

10 configuration memories including turn-on configuration

## 3 GHz RF-Synthesizer HM8135

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

Frequency	
Range:	1 Hz bis 3 GHz
Resolution:	1 Hz
Settling time:	< 10 ms
Frequency Reference 10 MHz	
Standard: TCXO	
Temperature stability (0 to 50°C): $\leq \pm 0,5$ ppm	
Aging: $\leq \pm 1$ ppm/year	
Option: OCXO (Type HM8135X)	
Temperature stability (0 to 50 °C): $\leq \pm 1 \times 10^{-9}$	
Aging: $\leq \pm 1 \times 10^{-7}$ /day	
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:	$\leq -35$ dBc (typ.)
Non-harmonics:	$\leq -50$ dBc (> 15 kHz from carrier)
Sub-harmonics:	$\leq -50$ dBc (typ.)
Phase noise: (at 20 kHz from carrier)	
f < 16 MHz:	$\leq -120$ dBc/Hz
16 MHz $\leq$ f < 250 MHz:	$\leq -95$ dBc/Hz
250 MHz $\leq$ f < 500 MHz:	$\leq -105$ dBc/Hz
500 MHz $\leq$ f < 1000 MHz:	$\leq -100$ dBc/Hz
1 GHz $\leq$ f < 2 GHz:	$\leq -95$ dBc/Hz
2 GHz $\leq$ f < 3 GHz:	$\leq -90$ dBc/Hz
Residual FM:	typ. < 4 Hz; $\leq 6,5$ 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 $\Omega$
V.S.W.R.:	
f $\leq$ 1 GHz:	$\leq 1,5$
f > 1 GHz:	$\leq 2,5$
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 $\Omega$    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 k $\Omega$
Amplitude modulation (Level $\leq$ +7 dBm)	
Source:	internal or external
AM-depth:	0 to 100 %
Resolution:	0.1 %

Accuracy:	$\pm 4$ % displayed rate $\pm 0,5$ % (AM-depth $\leq 80$ %, fmod $\leq 50$ kHz)
Ext. frequency resp. (to -1dB):	10 Hz to 100 kHz for AC
Distortion:	< 2 % (AM-depth $\leq 60$ %, fmod $\leq 1$ kHz) < 6 % (AM-depth $\leq 80$ %, fmod < 20 kHz)
Frequency modulation	
Source:	internal or external
Deviation:	$\pm 200$ Hz to 400 kHz (depending on frequency band)
Resolution:	100 Hz
Accuracy:	$\pm 3$ % + residual FM (fmod $\leq 5$ kHz) $\pm 7$ % + residual FM (5 kHz < fmod < 100 kHz)
Ext. frequency response: (to -1dB):	
DC coupling:	0 to 100 kHz
AC coupling:	100 Hz to 100 kHz
Distortion:	< 1 % for deviation $\geq 50$ kHz at 1 kHz < 3 % for deviation $\geq 10$ 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:	$\pm 5$ % 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 fmod = 1 kHz and deviation = 10 rad
FSK modulation	
Range (F0 – F1):	16 MHz to 3 GHz
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 $\pm 3,14$ rad
> 16 MHz:	0 to $\pm 10$ 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 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 $\Omega$ source and against any DC source up to $\pm 7$ 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 $\pm 10$ %, 50/60Hz
Power consumption:	approx. 40 VA
Operating temperature:	0 to +50 °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 $\Omega$ (BNC-BNC), HZ21 Adapter plug, HZ42 19" Rackmount kit 2RU, H0870 USB Interface, H0880 IEEE-488 (GPIB) Interface, H0890 RS-232 Interface, OCXO (Type HM8135X)	

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