

## 3 GHz HF Synthesizer HM8135

3<sup>rd</sup> Quarter



Frequency range from 1 Hz to 3 GHz

Output power from -144 dBm to +13 dBm

High frequency accuracy:  $\pm 1 \times 10^{-8}$

Modulation modes: AM, FM,  $\phi$ M, pulse modulation, FSK, PSK

Rapid pulse modulation: 200 ns

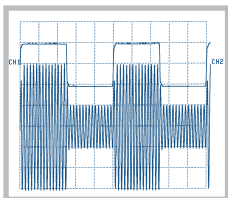
Internal modulator 10 Hz to 300 kHz

High spectral purity: harmonics  $< -40$  dBc

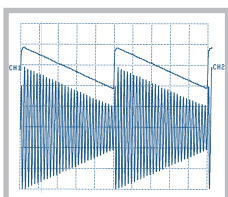
Electronic attenuator 30 dB for broad output voltage range without switch peaks

RS-232/USB interface included as standard (IEEE-488 optional)

Internal modulation source



Internal modulation source



## 3 GHz HF-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

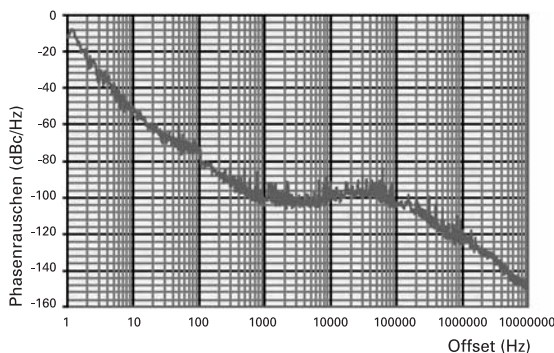
### 10 MHz reference (internal)

Stability:	$\leq \pm 1 \times 10^{-8}$ [0 to + 50 °C]
Aging:	$\leq \pm 5 \times 10^{-9}$ /year
Output (rear panel):	
Level:	TTL
Input (rear panel):	
Level:	> 0 dBm;
Frequency:	10 MHz

### Spectral purity (without modulation)

Harmonic:	$\leq -40$ dBc (typ.)
Non-harmonic:	$\leq -60$ dBc (> 15 kHz from carrier)

Phase noise:	[at 20 kHz from carrier]
< 16 MHz:	$\leq -130$ dBc/Hz
16 to 250 MHz:	$\leq -95$ dBc/Hz
250 to 500 MHz:	$\leq -105$ dBc/Hz
500 to 1000 MHz:	$\leq -100$ dBc/Hz
1 to 2 GHz:	$\leq -95$ dBc/Hz
2 to 3 GHz:	$\leq -90$ dBc/Hz



(Typical phase noise at 1 GHz)

### Output level

Range:	-144 to +13 dBm
Resolution:	0.1 dB
Precision:	$\leq \pm 0.5$ dB (for level > -57 dBm)
Impedance:	50 $\Omega$
V.S.W.R.:	$\leq 1 : 1.5$

### Modulation sources

Internal:	10 Hz - 300 kHz sine wave 10 Hz - 100 kHz square wave, triangle, saw tooth
Resolution:	10 Hz
External:	[input on front panel]
Impedance:	10 k $\Omega$
Input level:	2 $V_{rms}$ for full scale
Coupling:	AC or DC
Output:	front panel
Impedance:	1 k $\Omega$
Level:	2 $V_{rms}$

### Amplitude modulation (level $\leq +7$ dBm)

Source:	internal or external
AM-depth:	0 to 100 %
Resolution:	0.1 %
Accuracy:	$\pm 4$ % of reading $\pm 0.5$ % [AM depth $\leq 80$ %, $f_{mod} \leq 1$ kHz]
Ext. frequency resp. (to -1 dB):	10 Hz to 300 kHz for AC
Distortion:	< 2 % [AM-depth $\leq 60$ %, $f_{mod} \leq 1$ kHz] < 6 % [AM-depth $\leq 80$ %, $f_{mod}$ : 10 Hz to 100 kHz]

### Frequency modulation

Source:	internal or external
Deviation:	$\pm 200$ Hz to 400 kHz (depending on frequency band)
Resolution:	100 Hz
Accuracy:	$\pm 5$ % + residual FM
Ext. frequency response: (to -1 dB):	
DC coupling:	0 to 300 kHz
AC coupling:	10 Hz to 300 kHz
Distortion:	< 3 % for deviation $\geq 10$ kHz at 1 kHz

### Phase modulation

Source:	internal or external
Deviation:	0 to 3.14 rad (< 16 MHz) 0 to 10 rad (> 16 MHz)
Resolution:	0.01 rad
Accuracy:	$\pm 5$ % to 1 kHz + residual PM
Ext. frequency response (to -1 dB):	
DC coupling:	0 to 300 kHz
AC coupling:	10 Hz to 300 kHz
Distortion:	< 3 % for $f_{mod} = 1$ kHz and deviation = 10 rad

### FSK modulation

Range:	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

Range:	16 to 3000 MHz
Mode:	2 PSK levels
Data source:	external
Max. rate:	10 kbit/s
Shift (Ph1 - Ph0):	< 20 MHz: 0 to $\pm 3.14$ rad > 20 MHz: 0 to $\pm 10$ rad
Resolution:	0.01 rad
Accuracy:	see under PM

### Pulse modulation

Source:	external (rear panel)
Dynamic range:	> 60 dB
Rise/fall times:	< 200 ns
Delay:	< 100 ns
Max. frequency:	2.5 MHz
Input level:	TTL

### Sweep mode

Range:	16 MHz to 3000 MHz
Depth:	500 Hz to 2984 MHz
Sweep time:	20 ms to 5 s
Trigger:	internal

### Protective functions

The synthesiser 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, 9-pole D-sub; USB (standard)
Configuration memories:	10
Safety class:	Safety Class I (EN61010-1)
Power supply:	115/230 V $\pm 10$ %, 50/60 Hz
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:** HZ33/34 Test cable 50  $\Omega$ , HZ21 Adapter plug, HZ42 19" Rackmount Kit 2RU