HM8134-3, HM8134-3X
1.2 GHz RF-Synthesizer

Technical Data

Key facts
- Frequency range: 1 Hz to 1.2 GHz
- High dynamic output power: -127 dBm to +13 dBm
- Frequency resolution: 1 Hz
- High spectral purity, excellent SWEEP mode
- Modulation modes: AM, FM, pulse, phase, FSK, PSK
- Internal modulation (10 Hz to 150 kHz): sine, square, triangle, ramp
- External Ref.-Input/Output (10 MHz) via BNC-connector
- HM8134-3: TCXO (temperature stability: ±0.5 x 10^-6)
  HM8134-3X: OCXO (temperature stability: ±1.0 x 10^-8)
- RS-232/USB dual interface, IEEE-488 (GPIB) optional
## Technical Data

### 1.2GHz HF-Synthesizer HM8134-3

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

#### Frequency

<table>
<thead>
<tr>
<th>Frequency Reference 10MHz</th>
<th>0...50°C</th>
<th>Internal reference output</th>
<th>DC-coupling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature stability</td>
<td>TCXO (HM8134-3)</td>
<td>≤0.5 x 10^-6</td>
<td>≤±0.5% (AM-depth ≤60%, fmod ≤5kHz)</td>
</tr>
<tr>
<td></td>
<td>OCXO (HM8134-3x)</td>
<td>≤1 x 10^-6</td>
<td>≤±7% + res. FM (5kHz &lt;fmod &lt;100kHz)</td>
</tr>
<tr>
<td>Aging</td>
<td>≤±1 x 10^-4/year</td>
<td>≤±20 ppm</td>
<td></td>
</tr>
<tr>
<td>Non-harmonics</td>
<td>≤-55dBc (&gt;100kHz from carrier)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase noise (at 20kHz from carrier)</td>
<td>≤-120dBc/Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤-95dBc/Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤-100dBc/Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤-105dBc/Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤-120dBc/Hz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Typical phase noise at 1GHz

-127dBm to +13dBm

#### Output level

- Range: 0.1 dB
- Display-Offset for ext. Attn.: 0.0 dB to 30.0 dB in 0.1 dB steps
- Precision for level ≤57dBm: ±0.5dB
- for level ≥57dBm: ±(0.5dB + 0.2 x (-57dBm-level)/10)
- Impedance: 50Ω
- V.S.W.R.: ≤2

#### Modulation sources

| Internal | 10Hz...150kHz | sine wave, square wave, triangle, sawtooth |
| Resolution | 10Hz...20kHz | 10Hz |
| Resolution | 10Hz | |
| Dynamic range | >80dB | |
| Rise/fall times | <50ns | |

### 10kΩ II 50pF

#### Input level

2Vpp, for full scale

#### Coupling

AC or DC

### Level

2Vpp

### Impedance

1kΩ

### Amplitude modulation (Level -30...+7dBm)

Source: internal or external

- Modulation depth: 0% to 100%
- Resolution: 0.1%
- Accuracy: ≤±5% @ fmod 1kHz, f>16MHz
- Ext. frequency resp. (to -1dB): 10Hz to 60kHz for AC
- Distortion: ≤2% (AM-depth ≤60%, fmod ≤1kHz)
- ≤8% (AM-depth ≤80%, fmod <20kHz)

### Frequency modulation

Source: internal or external

- Deviation: ≤±200Hz to 400kHz (depending on frequency band)
- Resolution: 100Hz
- Accuracy: ≤±3% + res. FM (fmod ≤5kHz)
- ≤±7% + res. FM (5kHz <fmod <100kHz)
- Ext. frequency response (to -1dB): 0kHz to 100kHz
- DC coupling: 0kHz to 100kHz
- AC coupling: 10Hz to 100kHz
- Distortion: ≤1% for deviation ≥50kHz at 1kHz
- ≤3% for deviation ≥10kHz at 1kHz

### Phase modulation

Source: internal or external

- Deviation: ≤<16MHz >16MHz 0rad to ±10rad
- ≤<3.14 rad 0rad to ±10rad
- Resolution: 0.01rad
- Accuracy: ≤±5% up to 1kHz + residual PM
- Ext. frequency response (to -1dB): 0kHz to 100kHz
- DC coupling: 0kHz to 100kHz
- AC coupling: 10Hz to 100kHz
- Distortion: ≤3% for fmod = 1kHz and deviation = 10rad

### FSK modulation

Range (F0...F1): 16MHz to 1200MHz

- Mode: 2 FSK levels
- Data source: external
- Max. rate: 10kbit/s
- Shift (F1...F0): 0MHz to 10MHz
- Resolution: 100Hz
- Accuracy: ≤±3% + residual FM (fmod ≤5kHz)
- ≤±7% + residual FM (5kHz <fmod <100kHz)

### PSK modulation

Mode: 2 PSK levels

- Data source: external
- Max. rate: 10kbit/s
- Shift (Ph1...Ph0): ≤<16MHz >16MHz 0rad to ±3.14 rad
- ≤<3.14 rad 0rad to ±10rad
- Resolution: 0.01 rad
- Accuracy: ≤±5% up to 1kHz + residual PM

### Pulse modulation

Source: external

- Dynamic range: >80dB
- Rise/fall times: <50ns
**Accessories supplied:** Line cord, Operating manual

**Recommended accessories:**
- HO880 Interface IEEE-488 (GPIB), galvanically isolated
- HZ20 Adapter, BNC to 4 mm banana
- HZ24 Attenuators 50 Ω (3/6/10/20 dB)
- HZ42 19" Rackmount kit 2RU
- HZ72 GPIB-Cable 2m

### Delay
- <100 ns

### Max. frequency
- 2.5 MHz

### Input level
- TTL

#### Sweep mode
- **Range:** 1 MHz to 1200 MHz
- **Depth:** 500 Hz to 1199 MHz
- **Sweep time:** 20 ms to 5 s
- **Trigger:** intern

#### Protective functions
The synthesizer is protected against reverse power applied to the 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

<table>
<thead>
<tr>
<th>Interface</th>
<th>Dual-Interface USB/RS-232 (HO820), optional HO880 IEEE-488 (GPIB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration memories</td>
<td>10</td>
</tr>
<tr>
<td>Safety class</td>
<td>Safety Class I (EN61010-1)</td>
</tr>
<tr>
<td>Power supply</td>
<td>115/230 V ±10%, 50...60 Hz, CAT II</td>
</tr>
<tr>
<td>Power consumption</td>
<td>ca. 40VA</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>+5°C to +40°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20°C to +70°C</td>
</tr>
<tr>
<td>Rel. humidity</td>
<td>5% to 80% (non condensing)</td>
</tr>
<tr>
<td>Dimensions (W x H x D)</td>
<td>285 x 75 x 365 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 5 kg</td>
</tr>
</tbody>
</table>

**Power supply**
- 115/230 V ±10 %, 50…60 Hz, CAT II
- 40 VA
- +5°C to +40°C
- -20°C to +70°C
- 5% to 80% (non condensing)
- 285 x 75 x 365 mm
- approx. 5 kg