

3GHz RF-Synthesizer HM8135 | HM8135-X



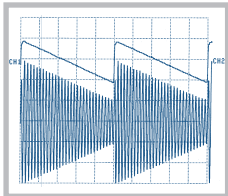
HM8135



H0880 IEEE-488 (GPIB)
Interface (option)



Internal modulation source



- ✓ Frequency range: 1 Hz to 3 GHz
- ✓ High dynamic output power: -135 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 200 kHz): sine, square, triangle, ramp
- ✓ External Ref.-Input/Output (10 MHz) via BNC-connector
- ✓ HM8135: TCXO (temperature stability: $\pm 0.5 \times 10^{-6}$)
HM8135-X: OCXO (temperature stability: $\pm 1.0 \times 10^{-8}$)
- ✓ RS-232/USB dual interface, IEEE-488 (GPIB) optional

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

Frequency

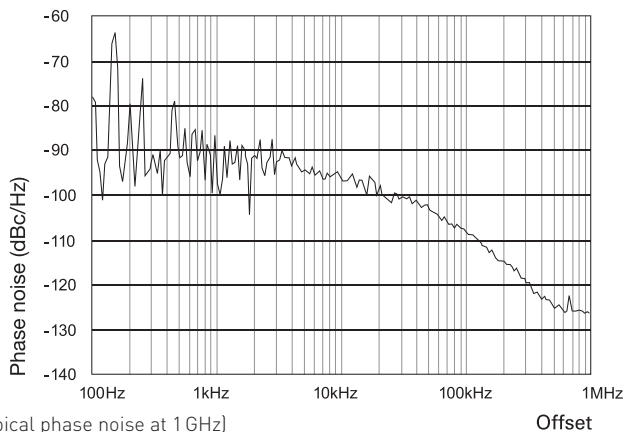
| | |
|----------------|---------------|
| Range: | 1 Hz to 3 GHz |
| Resolution: | 1 Hz |
| Settling time: | <10 ms |

Frequency reference 10 MHz

| | |
|------------------------------------|----------------------------|
| Standard: TCXO | |
| Temperature stability (0 to 50 °C) | ±0.5 ppm |
| Aging | ±1 ppm/year |
| Option: OCXO (H085) | |
| Temperature stability (0 to 50 °C) | ±1 × 10 ⁻⁸ |
| Aging | ±1 × 10 ⁻⁹ /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: | ≤-30 dBc (typ. <-35 dBc) |
| Non-harmonics: | ≤-50 dBc (>15 kHz from carrier) (from 249.95 MHz to 249.999999 MHz ≤ -35 dBc) |
| Sub-harmonics: <2,1 GHz | ≤-50 dBc |
| Sub-harmonics: >2,1 GHz | ≤-43 dBc (typ. -47 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 <1,000 MHz | ≤-90 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 to 3 kHz bandwidth) |
| Residual AM: | typ. <0.06 % (in 0.03 to 20 kHz bandwidth) |



Output level

| | |
|--|--|
| Range: | -135 to +13 dBm |
| Resolution: | 0.1 dB |
| Display-offset for ext. attn.: | 0.0 to 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 + (0.2 × (-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 × (-57 dBm - level))/10) |
| Impedance: | 50 Ω |
| V.S.W.R.: | f ≤500 MHz: ≤1.5 f >500 MHz: ≤2.5 |

Modulation sources

| | |
|----------------------------|---|
| 10 Hz to 200 kHz sine wave | |
| Internal: | 10 Hz to 20 kHz square wave, triangle, sawtooth |
| Resolution | 10 Hz |
| External: | Input on front panel |
| Impedance | 10 kΩ 50 pF |
| Input level | 2V _{pp} for full scale |
| Coupling | AC or DC |
| Output: | Front panel |
| Level | 2V _{pp} |
| Impedance | 1 kΩ |

Amplitude modulation (Level ≤+7 dBm)

| | |
|----------------------------------|---|
| Source: | Internal or external |
| AM-depth: | 0 to 100 % |
| Resolution: | 0.1 % |
| Accuracy: | ±4 % displayed rate ±0.5 % (AM-depth ≤80 %, f _{mod} ≤50 kHz) |
| Ext. frequency resp. (to -1 dB): | 10 Hz to 100 kHz for AC |
| Distortion: | <2 % (AM-depth ≤60 %, f _{mod} ≤1 kHz) <6 % (AM-depth ≤80 %, f _{mod} <20 kHz) |

Frequency modulation

| | |
|-------------------------------------|--|
| Source: | internal or external |
| Deviation: | ±200 Hz to 400 kHz (depending on frequency band) |
| Resolution: | 100 Hz |
| Accuracy: | ±3 % + residual FM (f _{mod} ≤5 kHz) ±7 % + residual FM (5 kHz < f _{mod} <100 kHz) |
| Ext. frequency response (to -1 dB): | |
| DC coupling | 0 to 100 kHz |
| AC coupling | 100 Hz to 100 kHz |
| Distortion: | <1 % for deviation ≥50 kHz at 1 kHz <3 % for deviation ≥10 kHz |

Phase modulation

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|-------------------------------------|--|
| Source: | internal or external |
| Deviation: | <16 MHz: 0 to 3.14 rad >16 MHz: 0 to 10 rad |
| Resolution: | 0.01 rad |
| Accuracy: | ±5 % up to 1 kHz + residual PM |
| Ext. frequency response (to -1 dB): | |
| DC coupling | 0 to 100 kHz |
| AC coupling | 100 Hz to 100 kHz |
| Distortion: | <3 % for f _{mod} = 1 kHz and deviation = 10 rad |

FSK modulation

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|-------------------|--|
| Range (F0 to F1): | 16 MHz...3 GHz |
| Mode: | 2 FSK levels |
| Data source: | external |
| Max. rate: | 10 kbit/s |
| Shift (F1 to F0): | 0 to 10 MHz |
| Resolution: | 100 Hz |
| Accuracy: | ±3 % + residual FM (f _{mod} ≤5 kHz) ±7 % + residual FM (5 kHz < f _{mod} <100 kHz) |

PSK modulation

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|---------------------|--|
| Mode: | 2 PSK levels |
| Data source: | external |
| Max. rate: | 10 kbit/s |
| Shift (Ph1 to Ph0): | <16 MHz: 0 to ±3.14 rad >16 MHz: 0 to ±10 rad |
| Resolution: | 0.01 rad |
| Accuracy: | ±5 % up to 1 kHz + residual PM |

Pulse modulation

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|------------------|--------------------------------------|
| 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

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|-------------|---------------------|
| Range: | 1 to 3,000 MHz |
| Depth: | 500 Hz to 2,999 MHz |
| Sweep time: | 20 ms to 5 s |
| Trigger: | internal |

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

| | |
|--------------------------------|--|
| Interfaces: | Dual interface USB/RS-232 (H0820), IEEE-488 (GPIB) (optional) |
| Configuration memories: | 10 |
| Safety class: | Safety class I (EN61010-1) |
| Power supply: | 115/230V ±10%, 50 to 60 Hz, CAT II |
| Power consumption: | approx. 40 VA |
| Operating temperature: | +5 to +40 °C |
| Storage temperature: | -20 to +70 °C |
| Rel. humidity: | 5 to 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, CD

Recommended accessories:

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|-------|---|
| H085 | OCXO, temperature stability $\pm 1 \times 10^{-8}$ (installation only ex factory) |
| H0880 | Interface IEEE-488 (GPIB), galvanically isolated |
| HZ13 | Interface cable (USB) 1.8 m |
| HZ14 | Interface cable (serial) 1:1 |
| HZ20 | Adapter, BNC to 4 mm banana |
| HZ21 | Adapter, N male to BNC female |
| HZ24 | Attenuators 50 Ω (3/6/10/20 dB) |
| HZ33 | Test cable 50 Ω , BNC/BNC, 0.5 m |
| HZ34 | Test cable 50 Ω , BNC/BNC, 1.0 m |
| HZ42 | 19" rackmount kit 2RU |
| HZ72 | GPIB-cable 2 m |