

Revised in September 2021

High stability low phase-noise OCXO

Features

300 MHz frequency range (multiplication is used)
 Up to 3 ppb stability in (-40...+85)°C at 100 MHz
 Very low aging – to 50 ppb/year at 100 MHz
 Low Allan variance, 5s to 1×10^{-12}
 Compact Packaging

Typical Applications

Cellular Base Stations
 Instrumentation
 Microwave Applications
 Stratum 3E clock systems
 Radar reference

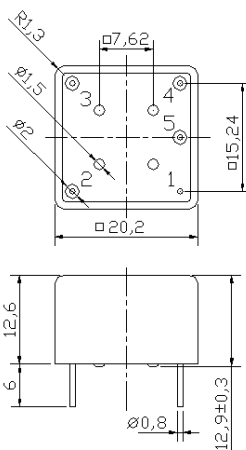
Packaging: 20.2 x 20.2 mm

RoHS compliant

Description

The OCXOs of series MXOHR operate in wide frequency range - from 30 to 300 MHz with usage of internal frequency multiplication by 3 or 5. Besides, the internal multiplication of frequency enables to the oscillators improvement, comparing with the MXOC series, of the temperature stability, aging and Allan variance in 30-150 MHz operational range. The module concept of the OCXOs design allowed realization of same performance in a variety of small packages on customer choice: MXOHE, MXOHI, MXOHR, MXOHS models.

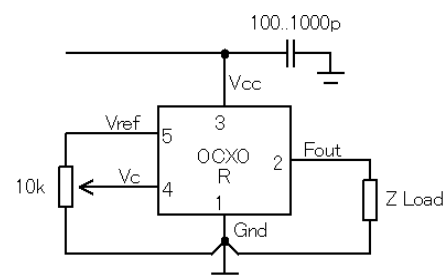
Physical Dimensions



12.0 mm, 10.3mm heights are available

The manufacturer reserves the right to reduce the external dimensions without changing of connecting dimensions.

Pin Connections



| Pin | Signal |
|-----|-------------------|
| 1 | GND |
| 2 | RF Out |
| 3 | +V Supply |
| 4 | Electrical tuning |
| 5 | Reference voltage |

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Specification

| Parameter | Sym. | Conditions | Value | | | Unit | Note | |
|---|--|--|-----------------------------------|--------------------|----------------------|------------|--|---------|
| | | | Min. | Typ. | Max. | | | |
| Frequency range | f_0 | | 30 | | 300 | MHz | Frequency multiplication by 3 or 5 | |
| Initial tolerance | $(f-f_0)/f_0$ | +25°C, $V_C=0.5*V_{ref}$ | ±0.01 | ±0.1 | | ppm | | |
| RF output | | | | | | | | |
| HCMOS (TTL) option | Load | | 10 | | 5 | kOhm pF | 100 MHz | |
| | H-level voltage | V_H | $V_{CC}=5V, 12V$ $V_{CC}=3.3V$ | 3.7 2.4 | | V | | |
| | L-level voltage | V_L | | | 0.4 | V | | |
| | Duty cycle | | | 45 | | 55 | % | |
| | Rise/Fall time | | | | | 3 | ns | 100 MHz |
| Sine-wave option | Level | L | $V_{CC}=5V, 12V$ $V_{CC}=3.3V$ | +7 +4 | | dBm | | |
| | Load | R_L | | | 50 | Ohm | | |
| | Harmonics level | | | | | -30 | dBe | |
| Sub-harmonics level | | | | | | -40 | dBe | 100 MHz |
| Power supply | | | | | | | | |
| Voltage | V_{CC} | | 11.4 4.75 3.15 | 12.0 5.0 3.3 | 12.6 5.25 3.45 | V | | |
| Power consumption | | Warm-up time Steady state, +25°C | | | 3500 1200 | mW | 100MHz, -40°C..85°C | |
| Warm-up time | t_{up} | at +25°C to $\Delta f/f=1e-7$ | | | 180 | s | ref. to freq. after 15 min. of operation | |
| Frequency control | | | | | | | | |
| Control voltage range | V_C | $V_{CC}=5V, 12V$ $V_{CC}=3.3V$ | 0 0 | | 4.3 3.1 | V | | |
| Tuning range | | Compliance with 10 years of aging | ±0.5 | | | ppm | positive slope | |
| Reference voltage | V_{ref} | $V_{CC}=5V, 12V$ $V_{CC}=3.3V$ | 4.0 2.5 | | 4.3 3.1 | V | | |
| Frequency stability | | | | | | | | |
| vs. temperature | | ref. 25°C, air flow 0.5 m/s max. | ±3.0 | | | ppb | See ordering code | |
| vs. supply voltage | | ref V_{CC} typ. | | ±0.2 | | ppb | | |
| G – sensitivity | | worst direction, 0 – 1kHz vibration BW (for 0 – 2kHz BW consult the factory) | ±0.2 | ±1.0 | | ppb/G | | |
| Retrace | | 24h work after 24h off | | | ±10 | ppb | 100MHz | |
| SSB Phase noise | | 10 Hz | -110 | | -95 | dBc/Hz | 100MHz Frequency multiplication on 5 $V_{CC}=5V, 12V$ | |
| | | 100 Hz | -130 | | -120 | | | |
| | | 1 kHz | -145 | | -135 | | | |
| | | 10 kHz | -155 | | -145 | | | |
| | | 100 kHz | -155 | | -150 | | | |
| Allan deviation | | 1 s | 5 | | 30 | e-12 | 100MHz | |
| Aging | per day | after 30 days of operation | ±0.5 | | | ppb | 100MHz see ordering code | |
| | first year | | ±0.05 | | | ppm | | |
| Environmental, mechanical conditions | | | | | | | | |
| Airflow velocity | 0.5 m/s maximum | | | | | | | |
| Operating temperature range | See ordering code | | | | | | | |
| Storage temperature range | -60°C to +85°C | | | | | | | |
| Power voltage | -0.5V to $V_{CC}+20\%$ | | | | | | | |
| Control voltage | -0.5V to 6V | | | | | | | |
| Humidity | Hermetically sealed | | | | | | | |
| Mechanical shock | Per MIL-STD-202, 30G half sine pulse, 11ms | | | | | | | |
| Vibration | Per MIL-STD-202, 10G sweep sine 0 to 2000Hz (10G swept sine 0 to 500Hz for OCXO with 0.5mm pins) | | | | | | | |
| Soldering conditions | Hand solder only – not reflow compatible. 260°C 10s (on pins) | | | | | | | |
| Washing Conditions | Washing with water or alcohol based detergent allowed only with final enough drying stage | | | | | | | |

For ordering code – see next page

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Ordering code

| | | | | | | | | |
|-------|---|---|----|---|---|---|---|---------|
| MXOHR | - | B | 18 | B | 5 | T | - | 100 MHz |
| | | 1 | 2 | 3 | 4 | 5 | | |

| 1 Temperature range | |
|---------------------|---------------|
| Code | Specification |
| A | 0°C..50°C |
| B | -10°C..60°C |
| C | 0°C..70°C |
| D | -20°C..70°C |
| E | -30°C..70°C |
| F | -40°C..85°C |
| G | -55°C..85°C |
| Q | -60°C..85°C |

| 2 Stability over temperature | | | |
|------------------------------|-----------|--|--|
| Code | Specific. | Temperature range code available for 100MHz 5V | Temperature range code available for 300MHz 5V |
| XY | ±Xe-Y | | |
| 19 | ±1e-9 | A, B, C, D, E, F | - |
| 29 | ±2e-9 | A, B, C, D, E, F, G | A, B, C, D, E |
| 39 | ±3e-9 | A, B, C, D, E, F, G, Q | A, B, C, D, E, F |
| 59 | ±5e-9 | A, B, C, D, E, F, G, Q | A, B, C, D, E, F, G |
| 18 | ±1e-8 | A, B, C, D, E, F, G, Q | A, B, C, D, E, F, G, Q |
| 28 | ±2e-8 | A, B, C, D, E, F, G, Q | A, B, C, D, E, F, G, Q |
| 38 | ±3e-8 | A, B, C, D, E, F, G, Q | A, B, C, D, E, F, G, Q |
| 58 | ±5e-8 | A, B, C, D, E, F, G, Q | A, B, C, D, E, F, G, Q |

| 3 Aging per day/year, ppb/ppm | |
|-------------------------------|---------------|
| Code | Specification |
| A | 0.1/0.015 |
| B | 0.2/0.02 |
| Z | 0.3/0.03 |
| C | 0.5/0.05 |
| D | 1/0.1 |
| E | 1.5/0.15 |
| F | 2/0.2 |
| G | 3/0.3 |
| H | 5/0.5 |

For frequency range of 30-150 MHz

For frequency range of 150-300 MHz

| 4 Supply voltage | |
|------------------|---------------|
| Code | Specification |
| 3 | 3.3V±5% |
| 5 | 5V±5% |
| 2 | 12V±5% |

| 5 Output | |
|----------|---------------|
| Code | Specification |
| T | HCMOS/TTL |
| S | Sine wave |

Deviation of the parameters is possible on customer's requirements. Please consult the factory.