rakon

High Stability Oscillator series

# HSO 13 *$10^{-13}$ Short-term stability class OCXO*

*Specific request can be addressed to RAKON hirel@rakon.com*

## Product Description

*The Rakon HSO13 is available with an Allan Standard Deviation of $5.10^{-13}$ down to $2.10^{-13}$ @5&10MHz. It is in the $10^{-11}$ stability class over the temperature range of 0°C to +50°C and is available at 5MHz, 10MHz and around these two frequencies. The HSO13 is specially designed to meet the request of the calibration and metrology laboratories that have high stability frequency standards but also the applications that require high performance reference oscillators like the ground stations.*

## Features

- High Stability Oscillator (HSO), Oven Controlled Crystal Oscillator (OCXO)
- Frequency: 5 or 10 MHz
- Short-term stability: down to $2.10^{-13}$ @5&10MHz
- Stability over 0°C to +50°C: ± $5.10^{-11}$
- Supply Voltage: +12V
- Package: pin-through-hole (67x60x40mm)
- Ageing: ± $5.10^{-11}$ per day

## Applications

- Reference oscillator for laboratories
- Master clocks
- GPS receivers
- Ground stations

## Specifications

### 1. Environmental conditions

| Parameters | Conditions/remarks | Min | Nom | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | Max. 1°C / hour | 0 | 25 | 50 | °C |
| Non-Operating Temperature | | 0 | 25 | 50 | °C |
| Storage Temperature | | 0 | | 50 | °C |
| Frequency stability after mechanical shocs | Half sine 30g/11 ms | | | ± 1E-8 | |
| Frequency stability after sine vibrations | 10 to 500Hz 10g acceleration | | | ± 5E-9 | |

### 2. Electrical interface

| Parameters | Conditions/remarks | Min | Nom | Max | Unit |
|---|---|---|---|---|---|
| Power supply | | 11.40 | 12 | 12.60 | V |
| Load Impedance | | 47.5 | 50 | 52.5 | Ω |

## 3. Performance data

### 3.1. Performance @ 5 MHz

| Parameters | Conditions/Remarks | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Nominal Frequency (Fn) | | | 5 | | MHz |
| Relative pulling frequency range | With internal potentiometer | ± 50 | | ± 100 | ppb |
| | Frequency tuning with Vc input from 0V to 10V | ± 20 | | | ppb |
| Steady state supply current | Typical @ 25°C | | | 3 | W |
| Warm up supply current | Frequency achievement 5mn after start up @ 25°C | | | 10 | W |
| Frequency warm up time | For frequency in the range Fn +/- 1 ppm | | | 5 | mn |
| | For full performance | 1 | | 28 | day |
| Frequency stability vs temperature | | | | ± 5E-11 | |
| Frequency variation vs. supply voltage | Vcc ±1% @25°C | | | ± 1E-11 | |
| Frequency variation vs. load | For ±10% variation of load | | | ± 2E-11 | |
| Frequency ageing after 30 days of continuous operation | per day | | | ± 5E-11 | |
| | per month | | | ± 1.5E-9 | |
| | per year | | | ± 1E-8 | |
| | 10 years cumulated | | | ± 5E-8 | |
| G-sensitivity | | | | ± 1 | ppb/G |
| Output waveform | | | Sine | | |
| Output level | | 4 | | | dBm |
| Harmonics level | | | | -40 | dBc |
| Spurious level | | | | -70 | dBc |

### 3.2. Performance @ 10 MHz

| Parameters | Conditions/Remarks | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Nominal Frequency (Fn) | | | 10 | | MHz |
| Relative pulling frequency range | With internal potentiometer | ± 50 | | ± 100 | ppb |
| | Frequency tuning with Vc input from 0V to 10V | ± 20 | | 70 | ppb |
| Steady state supply current | Typical @ 25°C | | | 3 | W |
| Warm up supply current | Frequency achievement 5mn after start up @ 25°C | | | 10 | W |
| Frequency warm up time | For frequency in the range Fn +/- 1 ppm | | | 5 | mn |
| | For full performance | 1 | | 28 | day |
| Frequency stability vs temperature | | | | ± 5E-11 | |
| Frequency variation vs. supply voltage | Vcc ±1% @25°C | | | ± 1E-11 | |
| Frequency variation vs. load | For ±10% variation of load | | | ± 2E-11 | |
| Frequency ageing after 30 days of continuous operation | per day | | | ± 5E-11 | |
| | per month | | | ± 1.5E-9 | |
| | per year | | | ± 1E-8 | |
| | 10 years cumulated | | | ± 5E-8 | |
| G-sensitivity | | | | ± 1 | ppb/G |
| Output waveform | | | Sine | | |
| Output level | | 4 | | | dBm |
| Harmonics level | Subharmonics | | | -40 | dBc |
| Spurious level | | | | -70 | dBc |

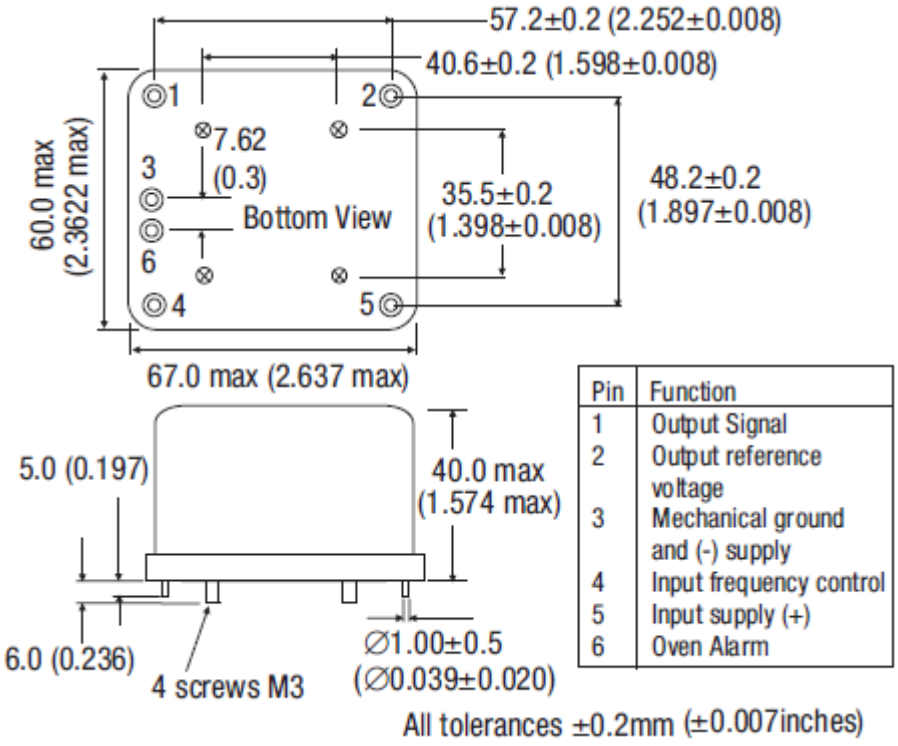
## 4. Short-term stability options & phase noise

| ADEV option | Conditions/Remarks | Tau = 1s - 30s | Frequency | 1Hz Max/Typ. | 10Hz Max/Typ. | 100Hz Max/Typ. | 1kHz Max/Typ. | 10kHz Max/Typ. |
|---|---|---|---|---|---|---|---|---|
| 20 | ADEV= 20E-14 | 20E-14 (2E-13) | @5MHz | -125/-126 | -135/-136 | -147/-148 | -147/-148 | -147/-148 |
| | | | @10MHz | -118/-119 | -128/-129 | -140/-142 | -140/-142 | -140/-142 |
| 25 | ADEV= 25E-14 | 25E-14 (2.5E-13) | @5MHz | -123/-124 | -135/-136 | -147/-148 | -147/-148 | -147/-148 |
| | | | @10MHz | -116/-117 | -128/-129 | -140/-142 | -140/-142 | -140/-142 |
| 50 | ADEV= 50E-14 | 50E-14 (5E-13) | @5MHz | -117/-118 | -132/-133 | -147/-148 | -147/-148 | -147/-148 |
| | | | @10MHz | -110/-111 | -125/-126 | -140/-142 | -140/-142 | -140/-142 |

## 5. Mechanical features

| Package name | Description | Dimensions |
|---|---|---|
| PTH1 | Pin-throuh-hole package | 2.36”x2.63”x1.57” 60x67x40 mm |

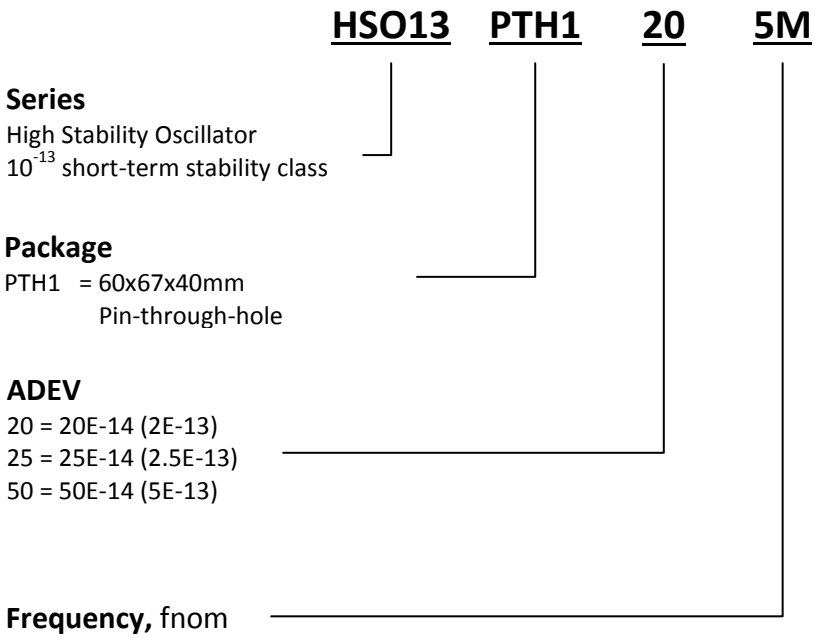
### 5.1. Package PTH1 (Pin-through-hole)




| Pin | Function |
|---|---|
| 1 | Output Signal |
| 2 | Output reference voltage |
| 3 | Mechanical ground and (-) supply |
| 4 | Input frequency control |
| 5 | Input supply (+) |
| 6 | Oven Alarm |

## 6. Ordering part number definition

The part number breakdown is defined as follows:




Note:the standard frequencies are 5 and 10MHz. Please consult your sales office for any other frequency.