

## HSO13

The Ground USO HSO13 is a High Stability Oscillator (HSO) specifically designed to meet the stringent requirements of calibration and metrology laboratories, as well as high-performance applications such as master clocks and ground stations.

This  $10^{-11}$  stability class USO exhibits impressive short-term stability (Allan Standard Deviation, ADEV) of  $8 \times 10^{-14}$ . It delivers excellent close-in phase noise (e.g.,  $< -130$  dBc/Hz at 1 Hz offset, 5 MHz). The HSO13 is a high performance reference oscillator ideal for scenarios that require highly stable frequency stability, reliable signals and excellent ADEV performance. It is available in the following frequencies: 5 MHz or 10 MHz.

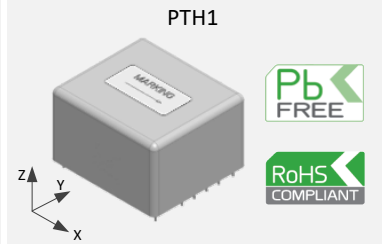
### Features

- Frequency: 5 or 10 MHz
- Short-term stability:  $8 \times 10^{-14}$  at 5 and 10 MHz
- Frequency stability:  $\pm 5 \times 10^{-11}$  over 0 to  $+50^\circ\text{C}$
- Supply voltage: 24 V (12 V available on request)
- Ageing:  $\pm 5 \times 10^{-11}$  ( $\pm 50$  ppt) per day

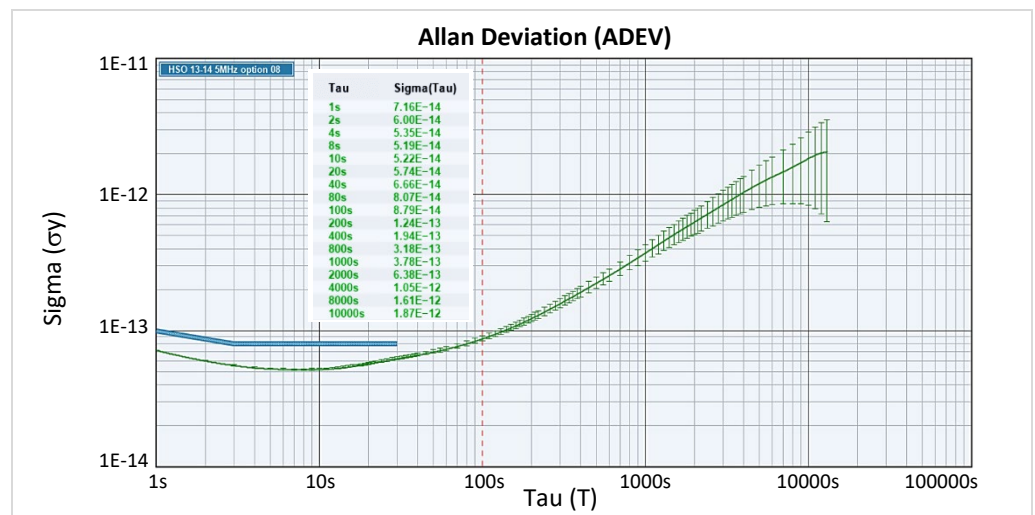
### Applications

- Master clocks
- Reference oscillator for laboratories
- Ground stations

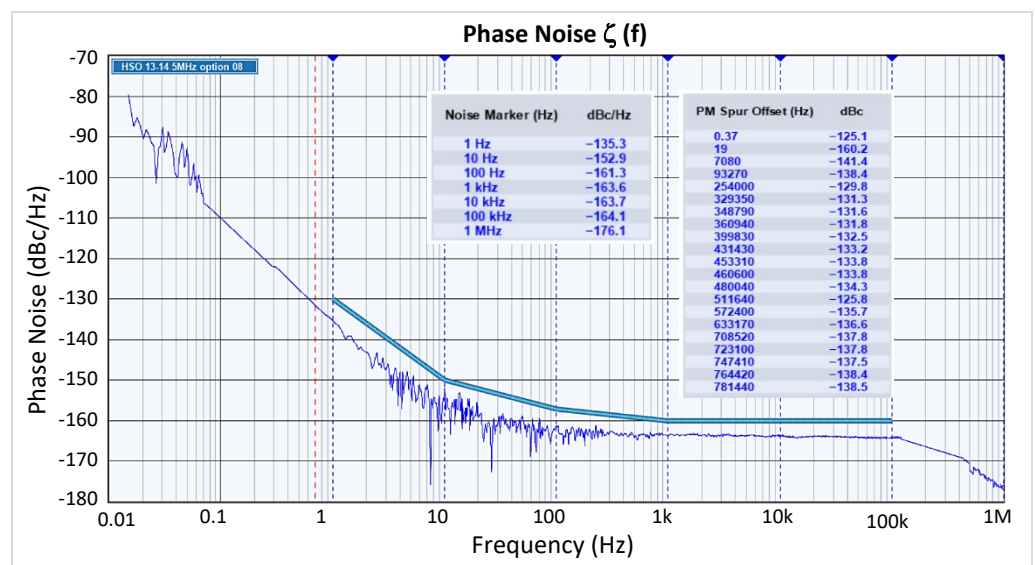
67 x 60 x 40 mm



### Allan Deviation (ADEV) at 5 MHz



### Phase Noise $\zeta$ (f) at 5 MHz



## 1. Environmental Conditions

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
Operating temperature	0	25	50	°C	Max. 1 °C/hour
Non-operating temperature	0	25	50	°C	-
Storage temperature	0	-	50	°C	-
Frequency stability after mechanical shocks	-	-	±10	ppb	Half sine 30 g/11 ms
Frequency stability after sine vibrations	-	-	±5	ppb	10 – 500 Hz 10 g acceleration

## 2. Performance Data

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
Nominal frequency (Fn)	-	5, 10		MHz	-
Relative pulling frequency range	±20	-	±50	ppb	With V <sub>C</sub> tuning from 0 to 10 V
Power supply		2.4	3	W	Typical 25°C
		-	10		Achieving 15 minutes after startup @ 25 °C
Frequency warm-up time	1	-	15	mn	For frequency in the range Fn ± 1 ppm
			28	day	For full performance
Frequency stability vs. temperature	-	-	±50	ppt	-
Frequency variation vs. supply voltage (V <sub>CC</sub> )	-	-	±10	ppt	V <sub>CC</sub> ± 1 % at 25 °C
Frequency variation vs. load	-	-	±20	ppt	For ±10% of load variation
Ageing	-	-	±50	ppt/day	After a minimum of 21 days of continuous operation
			±1.5	ppb/month	
			±10	ppb/year	Ageing according to the MIL-PRF-55310 version C
			±50	ppb/10 years	
g-sensitivity	-	-	±1	ppb/g	Quadratic sum
Output level	4	-	6	dBm	Output waveform: Sinewave
Harmonics	-	-	-40	dBc	-
Spurious	-	-	-70	dBc	-

## 3. Electrical Interface

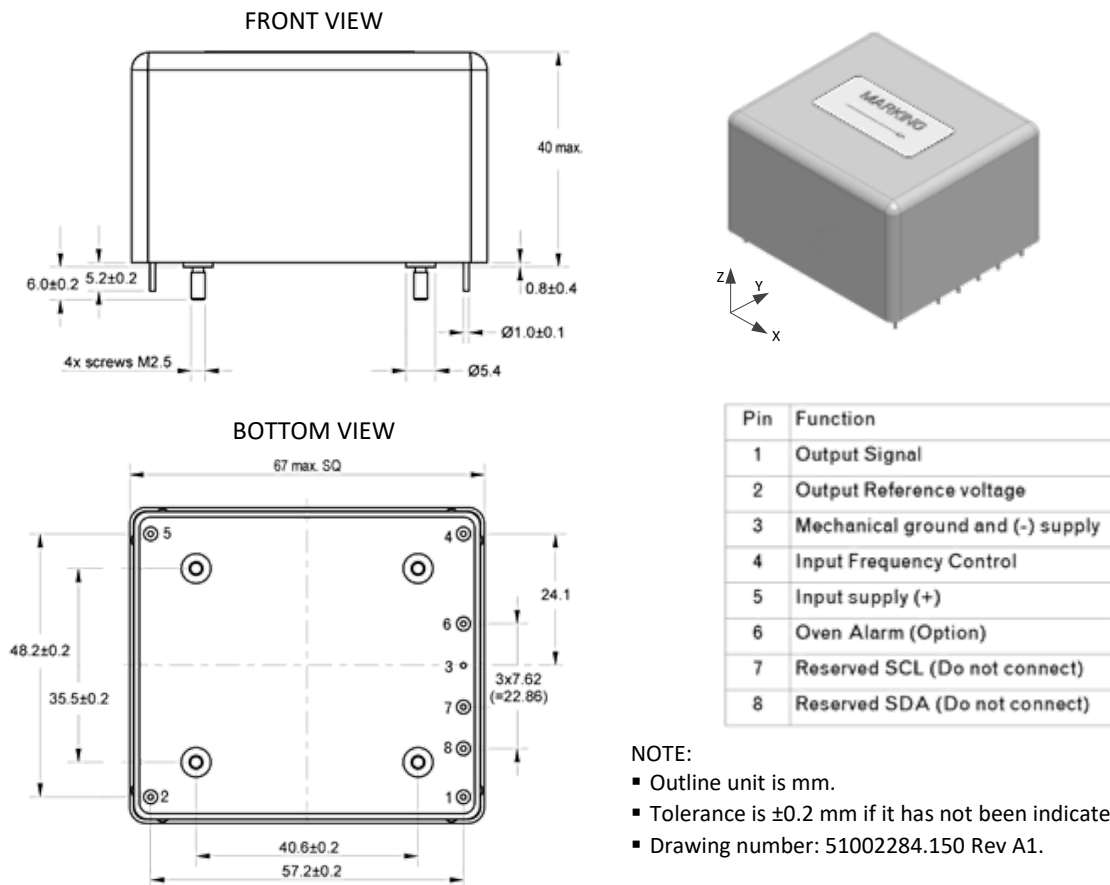
Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Power supply	24 V 12 V (available on request)	22.80 11.40	24 12	25.20 12.60	V
Load impedance	-	47.5	50	52.5	Ω
Reference voltage (V <sub>REF</sub> )	Output current: 0 to 1 mA max.	-	8	-	-

## 4. Short-term Stability Options and Phase Noise

ADEV Option	Remarks	Tau=1s	Tau= 3s – 30s	Frequency	1Hz	10Hz	100Hz	1kHz	10kHz
08	ADEV = 08E-14	1E-13	8E-14	5 MHz 10 MHz	-130 -123	-150 -141	-157 -143	-160 -143	-160 -143
10	ADEV = 10E-14		1E-13	5 MHz 10 MHz	-128 -121	-148 -141	-155 -143	-160 -143	-160 -143
15	ADEV = 15E-14		1.5E-13	5 MHz 10 MHz	-	-	-	-	-
20	ADEV = 20E-14		2E-13	5 MHz 10 MHz	-	-	-	-	-
25	ADEV = 25E-14		2.5E-13	5 MHz 10 MHz	-	-	-	-	-

## 5. Model Outline and Pin Connections – PTH1 (pin-through-hole) Package

Parameter	Remarks
Package size	60 x 67 x 40 mm. SMA1 (SMA + DE-9P) package
Net weight	350 g typ.
STEP file	<a href="#">HSO13 3D model</a> To open or view the STP file, you will need to import it into one of the following software programs: Autodesk Fusion 360, CATIA, SolidWorks, Solid Edge, TurboCAD, Kubotek KeyCreator, FreeCAD, ABViewer, ShareCAD, or eMachineShop.



## 6. Order Part Example

