

Crystal-Based Master Oscillator (MO)

High Precision & Performance Source

The MO is a cost-effective, high-performance master crystal oscillator. It's designed with long-lifetime, high-reliability technology for advanced space applications.

Key Features

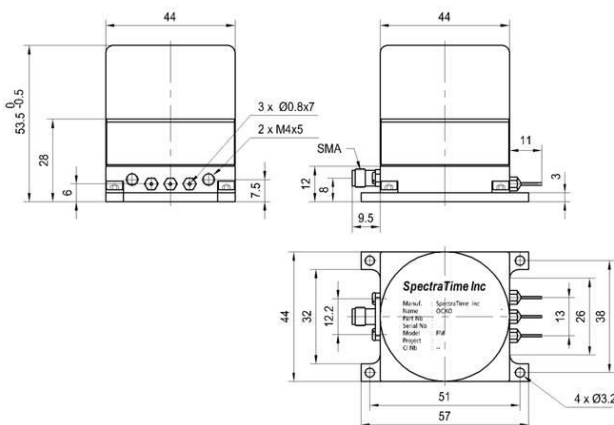
- Small mass and volume
- Low power consumption
- Low temperature sensitivity
- Excellent short and long term stability
- Fast warm-up
- Wide operating temperature
- Pre-adjusted frequency



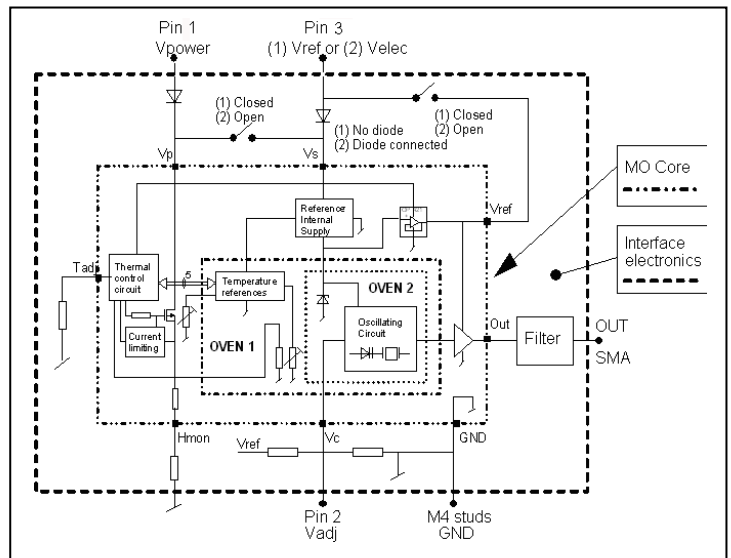
Applications

- Navigation
- SAR
- FGU
- MRO

Master Oscillator external dimensions



All dimensions in mm
*Screw length not to exceed 5 mm length within case



FUNCTIONAL BLOCK DIAGRAM OF THE MO CORE

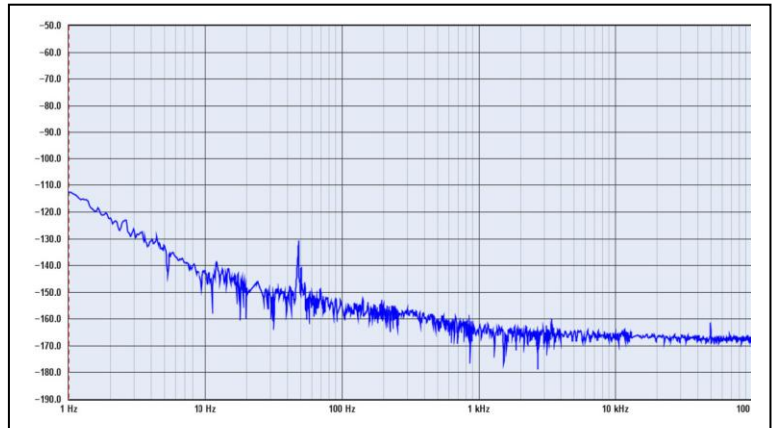
User Accessible Parameters:

The externally accessible parameters are the frequency adjustment control voltage (Vadj) and the reference voltage (Vref). To adjust the frequency, a control voltage shall be applied on the Vadj pin. The allowed voltage range is $GND \leq Vadj \leq Vref$. This can be performed through the use of a resistor bridge or a 100kΩ variable resistor, connected between the Vref pin and the power ground. In the standard version, all the modifiable parameters are factory adjusted by fixed value SMD resistors which are soldered on the user accessible interface PCB. The parameters can also be re-adjusted by the user, if required.

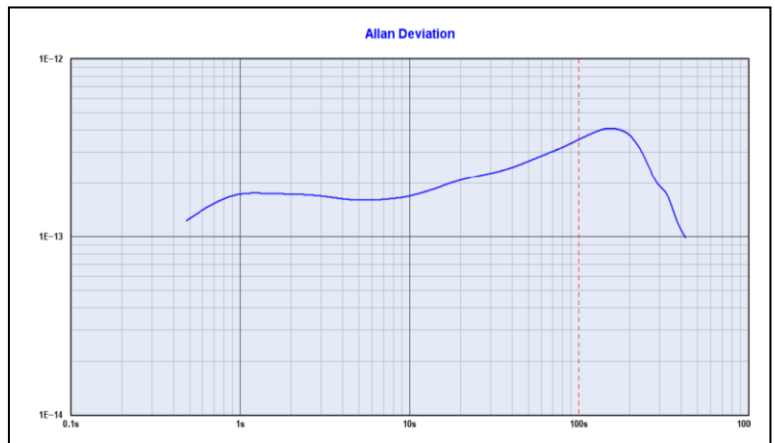
SPECIFICATIONS

Type		MO4D-SC	
Parameter	Value		
Dimensions	44 x 54 x 57 (44) mm		
Output signal frequency	10 MHz*		
Frequency long term stability, 1st year	$< \pm 3 \times 10^{-8}$ / year		
Average ageing per day after 1 month	$< \pm 1 \times 10^{-10}$ / day		
Frequency long term stability, years after	$< \pm 1 \times 10^{-8}$ / year		
Frequency short term stability(0.1-10 s)	LN	Std	
	$< 5 \times 10^{-13}$	$< 3 \times 10^{-12}$	
Frequency stability over full temp. range	$< \pm 1 \times 10^{-9}$		
Frequency adjustment	$> \pm 1.5$ Hz		
SSB phase noise assuming 10MHz carrier in dBc/Hz	LN	Std	
	1 Hz	< -105	< -100
	10 Hz	$< -135^*$	$< -130^*$
	100 Hz	< -145	< -140
	1000 Hz	< -155	< -150
	10000 Hz	< -160	< -155
	* Subject to export control (end user statement required)		
Output signal level	4,5 dBm \pm 1dBm		
Output impedance	50 Ω \pm 20%		
Harmonics	-30 dBc		
Spurious signals	-120 dBc		
Power consumption during warm-up	8 W		
Nominal power consumption	3.5 W		
Maximum power consumption in operation	5.5 W		
Volume	< 0.15 dm ³		
Power supply	12 - 18 V		
Warm-up time (accuracy $< \pm 2 \times 10^{-8}$ at 25°C)	20 minutes		
Mass (stainless steel cover)	220 gr		

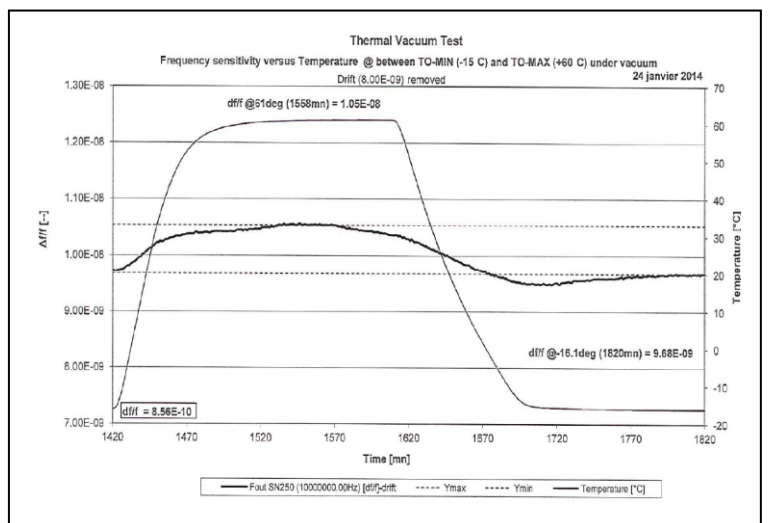
Type		MO4D-SC	
Parameter	Value		
Connectors	1) Power / TC 2) RF Output 3) Case ground	3 x solderable pins SMA 2 x M4 screw***	
Mechanical interface	flat base plate		
Max. baseplate operating temperature	+60 °C		
Min. baseplate operating temperature	-20 °C		
Storage temperature	-40 to +85 °C		
First natural resonance	> 800 Hz		
Random Vibration tested, with axis perpendicular to the mounting plane.	20 - 80 Hz 80 - 350 Hz 350 - 443 Hz 443 - 600Hz 600 - 2000 Hz	+6 dB/oct 0.56 (0.8) g ² /Hz** -6 dB/oct 0.35 (0.5) g ² /Hz** -6 dB/oct	
Duration	60 (120) sec/axis**		
Random Vibration tested, with axis parallel to the mounting plane.	20 - 80 Hz 80 - 350 Hz 350 - 443 Hz 443 - 950 Hz 950 - 2000 Hz	+6 dB/oct 0.22 (0.32) g ² /Hz** -6 dB/oct 0.14 (0.2) g ² /Hz** -6 dB/oct	
Duration	60 (120) sec/axis**		
Sinusoidal vibration	5 - 19 Hz 19 - 80 Hz 80 - 100 Hz	11 mm 0-peak 16 g 8 g	
Sweep rate	2(1) oct/min.**		
Life time / MTBF	15 years/9 Mio hrs		
Pressure sensitivity vacuum to atmosphere (thermal effect)	$< \pm 1 \times 10^{-8}$ @25°C		



Typical MO LN Phase Noise at 10MHz



Typical MO LN Allan Deviation at 10MHz



Typical MO Frequency Stability versus Temperature

* Other frequencies (5 MHz to 15 MHz) and related specifications available upon request.
 ** Values in brackets only applicable for qualification testing
 *** Screw length not to exceed 5 mm length within case