ELECTRONICS & DEFENSE

MO

ULTRA-STABLE, SPACE-QUALIFIED MASTER CRYSTAL OSCILLATOR.

The MO is a cost-effective, ultra-stable 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

- LEO, MEO, GEO, Deep Space
- Earth Orbit / Altimeter
- SAR
- GNSS
- Telecommunications (civil & defense)
- Science

Safran Electronics & Defense is with you every step of the way, building in the intelligence that gives you a critical advantage in observation, decision-making and guidance.

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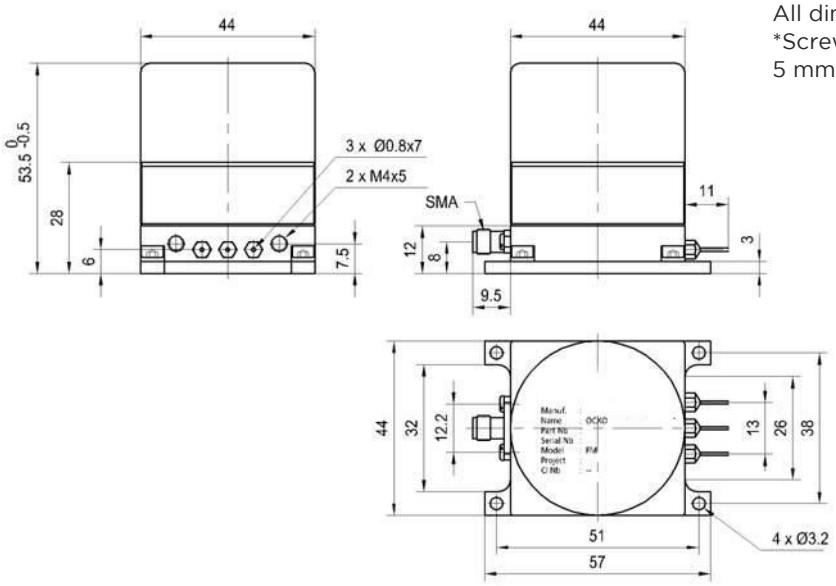
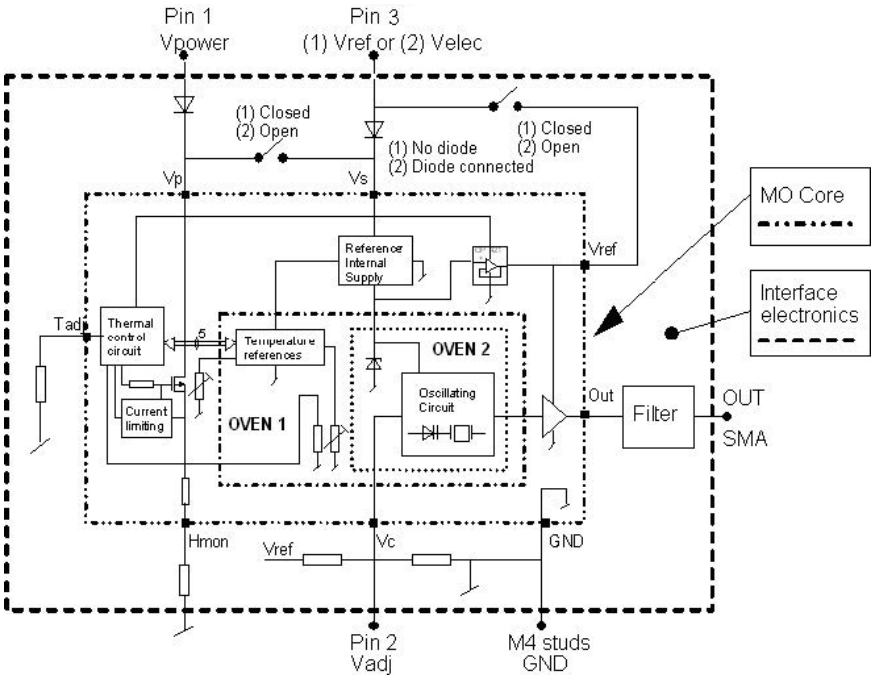
Master Oscillator external dimensions

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





FUNCTIONAL BLOCK DIAGRAM OF THE MO

Electrical Interface	
Power / TC	Pin 1 to 3 : soledrable Pins
RF Output	SMA connector
Ground	M4 screw
Mechanical Interface	
	Flat base plate

User Accessible Parameters:

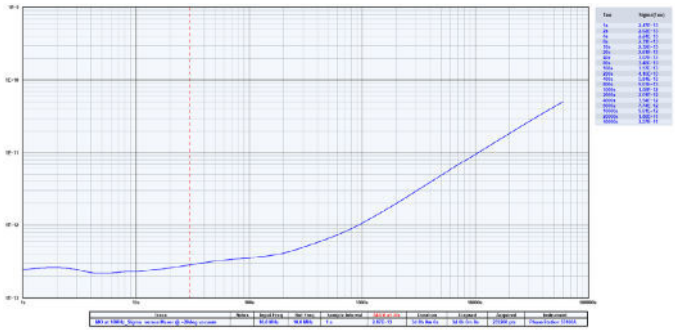
The externally accessible parameters are the frequency adjustment control voltage (Vadj) and the reference voltage (Vref)
To adjust the frequency, a control voltage shall be applied on the Vadj pin. The allowed voltage range is GND ≤ Vadj ≤ Vref. This can be performed through the use of a resistor bridge 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.

Technical Specifications

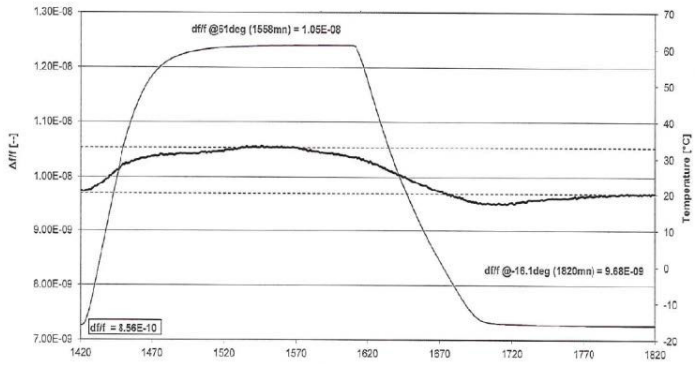
Parameter	Value		
Dimensions	44 x 54 x 57 (44) mm		
Output signal frequency	10 MHz*		
Frequency Long term stability, years after	< $\pm 1 \times 10^{-8}$ / year		
Frequency Long term stability per day	< $\pm 1 \times 10^{-10}$ / day		
Frequency short term stability(0.1-10 s)	STD	LN	ULN
	< 3×10^{-12}	< 5×10^{-13}	< $\pm 3 \times 10^{-13}$
Frequency stability over full temp. range	< $\pm 1 \times 10^{-9}$		
Pressure sensitivity vacuum	< $\pm 1 \times 10^{-8}$ @25°C		
Frequency adjustment	> ±1.5 Hz		
SSB phase noise assuming 10MHz carrier in dBc/Hz	STD	LN	ULN
1 Hz	< -100	< -105	<-110
10 Hz	< -130*	< -135*	<-140*
100 Hz	< -140	< -145	<-150
1000 Hz	< -150	< -155	<-155
10000 Hz	< -155	< -160	<-160
	* Subject to export control (end user statement required)		
Output signal level	4,5 dBm ± 1dBm		
Output impedance	50 Ω ± 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		
Life time / MTBF	15 years/9 Mio hrs		

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	20 - 80 Hz	+6 dB/oct
tested, with axis	80 - 350 Hz	0.56 (0.8) g^2/Hz**
perpendicular	350 - 443 Hz	-6 dB/oct
to the mounting	443 - 600Hz	0.35 (0.5) g^2/Hz**
plane.	600 - 2000 Hz	-6 dB/oct
Duration		60 (120) sec/axis**
Random Vibration	20 - 80 Hz	+6 dB/oct
tested, with axis	80 - 350 Hz	0.22 (0.32) g^2/Hz**
parallel to the	350 - 443 Hz	-6 dB/oct
mounting plane.	443 - 950 Hz	0.14 (0.2) g^2/Hz**
	950 - 2000 Hz	-6 dB/oct
Duration		60 (120) sec/axis**
Sinusoidal vibration	5 - 19 Hz	11 mm 0-peak
	19 - 80 Hz	16 g
	80 - 100 Hz	8 g
Sweep rate		2(1) oct/min.**
Shock	100Hz	100g
	2000Hz	2000g
	10000Hz	10000g

Typical MO ULN Phase Noise at 10MHz



Typical MO ULN 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

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