

# Space Mini USO

Space Qualified Mini USO – Ultra Stable Crystal Oscillator,  
General Specification (rev1)

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February 5th, 2008

## ▣ Features

- Case type (s) : 70x70 height 50mm
- Frequency range : 5 – 12 MHz
- Temperature Range : from – 20°to + 70°C
- Frequency stability vs. temperature range from +/- 0.05ppb under vacuum
- Short term stability : 5.10-13 at 1s-100s
- Frequency Control Range : depending on spec
- Ageing per year : +/- 10 ppb first year
- Output wave form : sine 50 Ohms
- Output level : 5 to 10 dBm
- Supply Voltage : +12V or +15V
- Power consumption during Warm Up : 10W
- Power consumption steady state : 4W atmospheric pressure ; 2W under vacuum
- Radiation : TDR from 50kRad up to 100 kRad (Si)
- FM in accordance with MIL-PRF-55310 rev D

## ▣ Applications

Recommended for space clock applications, navigation and positioning onboard systems. Very good short term stability (Allan variance).

## ▣ Environmental conditions

Parameters	Unit	Minimum	Typical	Maximum
Operating temperature range	°C	- 20		+ 70
Storage temperature range	°C	- 55		+ 125
Sine vibration		20g as per MIL-STD-202, Method 204, Condition D		
Random vibration		50 Grms ; 1,7g <sup>2</sup> /Hz from 100 Hz to 1000Hz		
Acceleration		25g		
Shocks (pyrotechnic shock)		1500g @ 1.5kHz		
Shocks (half sine)		1200g, 0.3ms		
Radiation		Up to 100 kRad total dose		

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## ▣ Mechanical characteristics

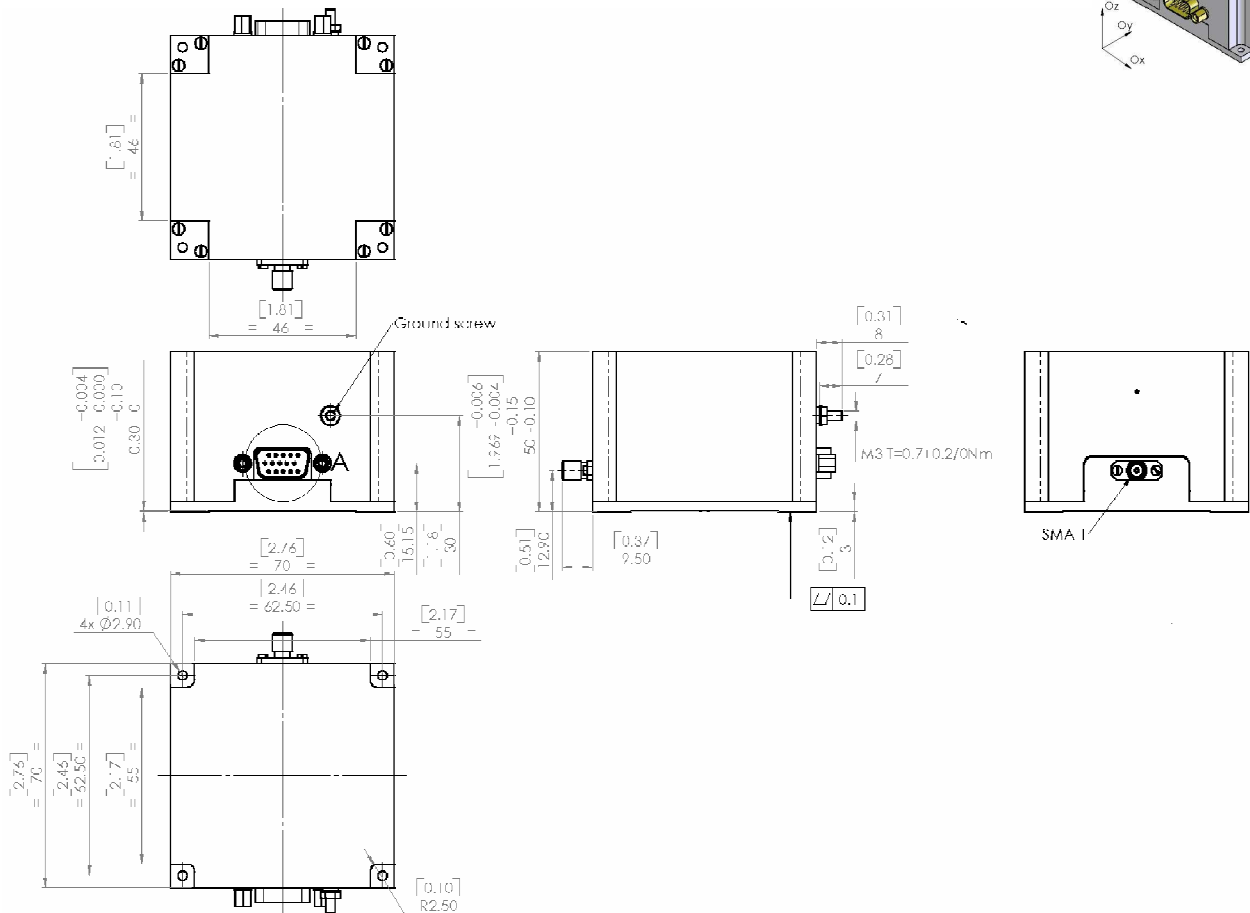
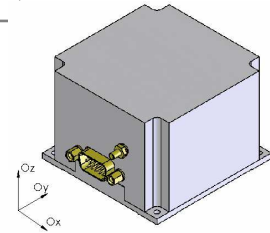


Figure 1 : Oscillator outline

Pin number	Name	Function
1	Vctrl	Voltage control for electrical tuning
2 - 3 - 4 - 12	NC	
6 - 7 - 8 - 13 - 14 - 15	GND	Electrical & Mechanical ground
9 - 10 - 5	Vcc	Power supply
11	Vref	Reference voltage
SMA connector	Fout	Frequency output

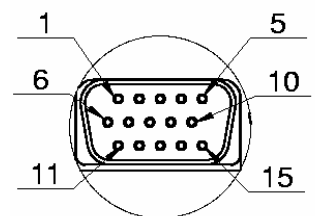


Table 1 : Pin description

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## □ Performance characteristics

Electrical Parameters	Unit	Minimum	Typical	Maximum
<b>Frequency output (SMA Connector)</b>				
Nominal frequency range	MHz	5		12
Output level (50 $\Omega$ load)	dBm	5		10
Harmonics level	dBc			- 40
Spurious (offset > 50 Hz)	dBc			- 80
<b>Phase noise in static conditions @ 10 MHz</b>				
@ 1 Hz offset	dBc/Hz			- 115
@ 10 Hz offset	dBc/Hz			- 140
@ 100 Hz offset	dBc/Hz			- 145
@ 1 kHz offset	dBc/Hz			- 150
@ 10 kHz offset or greater	dBc/Hz			- 155
<b>Allan variance</b>				
@ 1 s	ppb			0.0005
@ 10 s	ppb			0.0005
@ 100 s	ppb			0.0005
<b>Free running mode (Vctrl pin NC)</b>				
Initial setting	ppb			10
Stability vs. temperature	ppb			0.1
Stability vs. 5 % supply voltage variation	ppb			0.01
Stability vs. 10 % load variation	ppb			0.01
Aging over first year	ppb			20
Retrace	ppb			1
<b>Electrical tuning (Vctrl pin)</b>				
Relative pulling frequency range	ppb	$\pm 200$		$\pm 500$
Input impedance	$\Omega$	10k		
Voltage range	V <sub>DC</sub>	0		8
<b>Reference voltage (Vref pin)</b>				
Nominal value	V <sub>DC</sub>		8	
<b>Supply voltage (Vcc pin)</b>				
Voltage range	V <sub>DC</sub>	11.4	12	15.75
Supply power @ 25 °C under vacuum	W			2
Supply power @ warm up	W			10

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Allan Variance USO TEMEX

