

RK410 Mini USO

The RK410 platform is a very stable and compact Mini USO (Ultra Stable Oscillator) dedicated to the traditional space market offering a very high frequency stability in the 10^{-10} stability class. This frequency source is characterised by a superior frequency stability vs. temperature range down to ± 0.5 ppb under vacuum and ± 20 ppb per year. The Mini USO has a short-term stability (ADEV) of 2×10^{-13} at $\tau = 1$ s.

This mini Ultra Stable Oscillator is an ideal reference oscillator for instruments, very precise altimeters as well as navigation and positioning systems.

Features

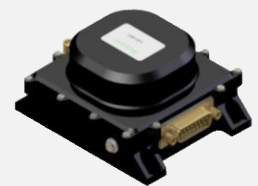
- Frequency range from 4.5 to 12MHz
- ADEV 2×10^{-13} @ 1 to 10s for 5MHz
- ADEV 5×10^{-13} @ 100s
- ADEV 7×10^{-13} @ 1 000s
- Warm up consumption: 8W max
- Steady state consumption: 2W under vacuum and 4W under atmospheric pressure @25°C
- Frequency stability vs. temperature: $\pm 5 \times 10^{-11}$ under vacuum
- Ageing: ± 100 ppb over 15 years at 5 or 10MHz
- Supply voltage: +15V
- Output wave form: sine 50Ω
- Output level from 0 to 4dBm
- Component selected as per ECSS-Q-ST-60C
- Materials selected as per ECSS-Q-ST-70
- Manufactured and tested following the guidelines of the ECSS-Q-ST-70-08C and the equipment related standards

Applications

- Master clocks
- Navigation
- Compact reference for MRO/FGU
- Deep space exploration
- Gravitational waves
- High precision altimetry
- High precision instruments

99 x 88 x 54 mm

Mini USO



Environmental Conditions

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Operating temperature	TO _p	-20	25	50	°C
Switch-on temperature	TS _o	-30	-	70	°C
Non-operating temperature	TNO _p	-40	-	85	°C
Random vibration	> 20 - 100 Hz: +3 dB/oct > 100 - 400 Hz: 0,7g ² /Hz > 400 - 2000 Hz: -3 dB/oct > Duration: 2 minute per axis Global level: 26.4grms				
Sine vibration	Level as per MIL-STD-202 Method 204 (20g from 20Hz to 100Hz)				
Mechanical shock	Level as per MIL-STD-202, Method 213: Half sine with a peak acceleration of 800g / 0.5ms				
Radiation	Total Ionizing Dose (TID) of 100krad, low dose rate. No SEL up to LET=60MeV/mg/cm ²				

Electrical Interface

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Power supply	-	14.25	15	15.75	V
Load impedance	-	45	50	55	Ω
Reference voltage (Vref)	1mA max	6.5	7	7.5	V
Control voltage (Vc)	When Vc option is selected	0	-	Vref	V

Frequency Characteristics @5 & 10 MHz

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Nominal frequency (Fn)	-	-	5 / 10	-	MHz
Steady state input current power	Vacuum @ -20°C	-	-	3.5	W
Warm up supply power	-	-	-	8	W
Initial frequency accuracy	-	-	-	±50	ppb
Frequency stability over temperature	-	-	-	±0.05	ppb
Frequency stability vs. acceleration	According to MIL-PRF-55310 / method 2g tip over	-	±5x10 ⁻¹⁰	±1x10 ⁻⁹	-
Retrace	48h Power ON / 24h Power OFF / 24h Power ON Vacuum @25°C	-	±2x10 ⁻¹⁰	±5x10 ⁻⁹	-
Supply voltage stability	Over operating temperature – Vcc ±5%	-	-	±0.05	ppb
Load sensitivity	Over operating temperature – VSWR 1.1	-	-	±0.05	ppb
Pressure sensitivity	Over operating temperature	-	-	±30	ppb
Ageing	Over 1 year Over 15 years According to the MIL-PRF-55310 issue C	-	-	±10 ±100	ppb
Allan variance (ADEV)	tau = 1s – 10s tau = 100s	-	-	2x10 ⁻¹³ 5x10 ⁻¹³	-
Frequency warm up	-	-	-	30	mn
Output waveform	Sine	-	-	-	-
Output level	EoL (End of Life)	0	-	4	dBm
Harmonics level	-	-	-	-40	dBc
Non harmonics level	-	-	-	-85	dBc
Phase noise @5MHz	1Hz offset	-	-130	-122	dBc
	10Hz offset	-	-148	-142	dBc
	100Hz offset	-	-150	-146	dBc
	1kHz offset	-	-152	-150	dBc
	10kHz offset	-	-152	-150	dBc
Phase noise @10MHz	1Hz offset	-	-122	-116	dBc
	10Hz offset	-	-140	-135	dBc
	100Hz offset	-	-145	-140	dBc
	1kHz offset	-	-146	-145	dBc
	10kHz offset	-	-146	-145	dBc

Model Outline and Pin Connections

