









EWOS0535

High mechanical resistance OCXO for Space applications, Flight Proven

PRODUCT OVERVIEW

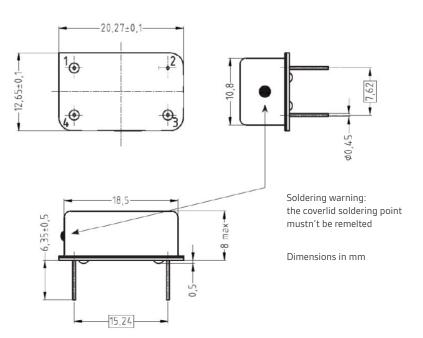
EWOS0535 is a 10 MHz OCXO using a quartz resonator with very high mechanical resistance and low accelerometric sensitivity. It has a very high frequency stability over short and medium term and is perfectly suited for LEO space missions subject to significant environmental constraints (vibrations & shocks). This OCXO is based on COTS components and is an ideal compromise in terms of cost and performance for cubesat applications, nanosat, micro-minisat, space gnss receivers, ranging functions and radio links.



KEY FEATURES

- 10 MHz
- ±0.1 ppm (typ.) thermal sensitivity
- 300 mW @ -40°C (typ.)
- ±2 ppb/day after 30 days (typ.)

DIMENSIONS & PIN-OUT



PIN	FUNCTION
1	Frequency control
2	Ground
3	RF Out
4	Power Supply

ORDERING INFORMATION

EWOS

0535



ELECTRICAL CHARACTERISTICS

Temperature Range	PARAMETERS		Unit	Min	Тур.	Max	Note	Comments
Temperature Range	Output Frequency		MHz		10		1	Nominal frequency
- Operating	Frequency Tolerance		ppm		±0.5	±1	1	+25°C, Vctrl= 1.5V or Rcde = 5.76 KOhms
Storage °C -55 +125 Supply Voltage V 5 ± 5% Supply Current Warm-up mA 200 250 3 During 10 seconds • Steady state / -40°C mA 60 70 3 • Steady state / +45°C mA 12 15 3 Warm-up time 5 * 12 15 3 1E-7 accuracy referred to frequen measured at 25°C. To achieve mentronment Frequency Stability * 15 2 1E-10 short term stability - quiete environment • Vs temperature variation ppb ± 100 ±250 1 -40°C to 65°C • Vs temperature variation ppb ± 50 ± 100 ± 20 ± 100 ± 20 ± 100	Temperature Range							
Supply Voltage	 Operating 		°C	-40		+65	1	
Supply Current Warm-up MA 200 250 3 During 10 seconds	• Storage		°C	-55		+125		
• Warm-up mA 200 250 3 During 10 seconds • Steady state / -40°C mA 60 70 3 • Steady state / +25°C mA 12 15 3 • Steady state / +65°C mA 12 15 3 • Warm-up time s 60 3 1E-7 accuracy referred to frequent measured at 25°C. To achieve environment • Warm-up time s 15 2 1E-10 short term stability - quiet environment • Vs temperature variation ppb ±100 ±250 1 -40°C to 65°C • Vs supply voltage variation ppb ±100 ±250 1 -40°C to 65°C • Vs supply voltage variation ppb ±100 ±200 2 (10 KCV/10 pF) ±10% • Vs supply voltage variation ppb ±100 ±200 2 (10 KCV/10 pF) ±10% • Vs supply voltage variation ppb ±2 ±5 2 Atlan deviation / 100ms • Vs lemperature variation ppb ±2 ±5 2 Atlan deviation / 100ms <td>Supply Voltage</td> <td></td> <td>V</td> <td></td> <td>5 ± 5%</td> <td></td> <td></td> <td></td>	Supply Voltage		V		5 ± 5%			
• Steady state / +40°C mA 60 70 3 - Steady state / +25°C mA 30 35 3 • Steady state / +65°C mA 12 15 3 - IE-7 accuracy referred to frequen measured at 25°C. To achieve merivironment 15 2 1E-10 short term stability - quiet environment Frequency Stability - Vs temperature variation ppb ±100 ±250 1 -40°C to 65°C -40°C to 65°C <t< td=""><td>Supply Current</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Supply Current							
• Steady state / +25°C mA 30 35 3 • Steady state / +65°C mA 12 15 3 Warm-up time s 60 3 1E-7 accuracy referred to frequen measured at 25°C. To achieve	• Warm-up		mA		200	250	3	During 10 seconds
Steady state / +65°C mA 12 15 3	• Steady state / -40°C		mA		60	70	3	
S	• Steady state / +25°C		mA		30	35	3	
Per day Aging Per day Aging Per day Aging Pick Pick	• Steady state / +65°C		mA		12	15	3	
Per day pp	Warm-up time		S			60	3	1E-7 accuracy referred to frequency measured at 25°C. To achieve
• Vs temperature variation ppb ±100 ±250 1 -40°C to 65°C • Vs supply voltage variation ppb ±50 ±100 3 5V ±1% • Vs load variation ppb ±100 ±200 2 (10 KΩ//10 pF) ± 10% • Short-term 5 E-11 1E-10 2 Allan deviation / 100ms • Aging Per day ppb ±2 ±5 2 Alfer 30 days • First year ppm ±2 ±5 2 Over full temperature range Phase noise *** ±5 2 Over full temperature range **10 Hz dBC/Hz -102 1 *** **100 Hz dBC/Hz -152 1 *** **100 Hz dBC/Hz -150 1 *** **100 Hz dBC/Hz -152 1 *** **100 Hz dBC/Hz -150 1 *** *** **100 Hz -100 3 *** *** *** *** ***<			mn			15	2	, .
· Vs supply voltage variation ppb ±50 ±100 3 5V ±1% · Vs load variation ppb ±100 ±200 2 (10 KΩ//10 pF) ± 10% · Short-term ±100 ±20 2 Allan deviation / 100ms · Aging Per day ppb ±2 ±5 2 After 30 days First year ppm ±1 ±1 2 Over full temperature range Phase noise ±5 2 Over full temperature range © 25°C and Vctrl = 1.5V · 10 Hz dBc/Hz -132 1 -150 1 · 10 Hz dBc/Hz -150 1 -150 1 -150 · 10 Hz dBc/Hz -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 1 -150 <td>Frequency Stability</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Frequency Stability							
· Vs load variation ppb ±100 ±200 2 (10 KΩ//10 pF) ±10% · Short-term 5E-11 1E-10 2 Allan deviation / 100ms · Aging Per day ppb ±2 ±5 2 After 30 days First year ppm ±1 2 After 30 days Phase noise ±1 2 Over full temperature range • 10 Hz ±6 2 Over full temperature range • 100 Hz dBc/Hz -102 1 • 10 kHz dBc/Hz -152 1 • 10 kHz dBc/Hz -152 1 • 10 kHz dBc/Hz -152 1 • 10 kHz Berequency Control Prequency Control • 10 kHz Prequency Shift Prequency Shift Prequency Control Voltage Over the Account of	 Vs temperature variation 		ppb		±100	±250	1	-40°C to 65°C
• Short-term SE-11 1E-10 2 Allan deviation / 100ms • Aging Per day First year Ppm ±2 ±5 2 After 30 days • After 10 years Ppm ±1 2 Over full temperature range • Phase noise ±5 2 Over full temperature range • 10 Hz 40 Hz 10 Hz 12<	 Vs supply voltage variation 		ppb		±50	±100	3	5V ±1%
• Aging Per day First year First year ppm ±2 ±5 2 After 30 days After 10 years ppm ±1 2 Phase noise #5 2 Over full temperature range • 10 Hz • 100 Hz -102 1 1 • 10 Hz • 40BC/Hz -132 1 -1 • 1 kHz • 40BC/Hz -150 1 -1 • 10 kHz • 4 1 Frequency control Frequency Shift V 0 1.5 4 1 Frequency Control voltage Over the AV - Positive slope or 0 Ohm to MOhm resistance Rcde to ground Tuning Input Impedance kΩ 100 3 Output level Vpp 1.6 1.8 4 Clipped sinewave - Use with DC or coupling capacitance Load 10 kΩ // 10pF Output Impedance kΩ 1 3	Vs load variation		ppb		±100	±200	2	$(10 \text{ K}\Omega//10 \text{ pF}) \pm 10\%$
Per day ppb ±2 ±5 2 After 30 days	Short-term				5E-11	1E-10	2	Allan deviation / 100ms
First year ppm ±1 2 2	• Aging							
After 10 years ppm ±5 2 Over full temperature range @ 25°C and Vctrl = 1.5V		Per day	ppb		±2	±5	2	After 30 days
Phase noise © 25°C and Vctrl = 1.5V • 10 Hz dBc/Hz -102 1 • 100 Hz dBc/Hz -132 1 • 1 kHz dBc/Hz -150 1 • 10 kHz dBc/Hz -152 1 Control Voltage (Vctrl) V 0 1.5 4 1 Frequency control Frequency Shift ppm ±5 ±6 1 Referred to nominal frequency measured at 25°C. Control voltage 0V to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground to 4V - Positive slope or 0 Ohm to 4V -		First year	ppm			±1	2	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		After 10 years	ppm			±5	2	Over full temperature range
+ 100 Hz	Phase noise							@ 25°C and Vctrl = 1.5V
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	• 10 Hz		dBc/Hz		-102		1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	• 100 Hz		dBc/Hz		-132		1	
Control Voltage (Vctrl) V 0 1.5 4 1 Frequency control Frequency Shift ppm ±5 ±6 1 Referred to nominal frequency measured at 25°C. Control voltage OV to 4V - Positive slope or 0 Ohm to MOhm resistance Rcde to ground MOhm resistance Rcde to ground MOhm resistance Rcde to ground and pF Tuning Input Impedance kΩ 100 3 pF 100 3 Output level Vpp 1.6 1.8 4 Clipped sinewave - Use with DC coupling capacitance Load 10 kΩ // 10pF Output Impedance kΩ 1 3 pF 5 3	• 1 kHz		dBc/Hz		-150		1	
Frequency Shift $ \begin{array}{ccccccccccccccccccccccccccccccccccc$	• 10 kHz		dBc/Hz		-152		1	
	Control Voltage (Vctrl)		V	0	1.5	4	1	Frequency control
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Frequency Shift		ppm	±5	±6		1	Referred to nominal frequency mea- sured at 25°C. Control voltage OV to 4V - Positive slope or 0 Ohm to 1 MOhm resistance Rcde to ground
Output level Vpp 1.6 1.8 4 Clipped sinewave - Use with DC c coupling capacitance Load 10 k Ω // 10pF Output Impedance k Ω 1 3 pF 5 3	Tuning Input Impedance		kΩ		100		3	
			pF		100		3	
pF 5 3	Output level		Vpp	1.6	1.8		4	
r e e e e e e e e e e e e e e e e e e e	Output Impedance		kΩ		1		3	
Fraguency sensitivity to acceleration 5F-10/a 3 All three avec			pF		5		3	
requestey sensitivity to deceleration SE-10/9 S All tilled axes	Frequency sensitivity to acceleration				5E-10/g		3	All three axes

Notes

1. Parameter inspected at 100%

3. Parameter guaranteed by design and charaterization

2. Parameter inspected by sampling 4. Parameter guaranteed by periodical qualification

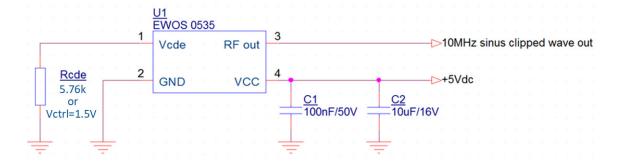
ABSOLUTE MAXIMUM RATINGS

Supply Voltage Vcc: 4.5V / 5.5VControl Voltage Vctrl: 0V / 6V

Operation of the device beyond these limits may affect device reliability or may cause permanent damage.



TYPICAL APPLICATION



Rated performance requires using good high frequency board layout techniques. It is recommended to connect decoupling capacitors (100 nF ceramic and 10 μ F tantalum capacitors) to the supply pin.

A decoupling capacitor is recommended in parallel of Rcde for best phase noise performances. The value is to be adjusted depending on customer board configuration.

Oscillator case has to be mechanically maintained or glued on the equipment board in order not to be damaged by environment vibrations and shocks.

The resistance Rcde permits to adjust very precisely the frequency accuracy. This resistance must have very low temperature sensitivity.

ENVIRONMENTAL CONDITIONS						
Shocks	1500G peak / 0.5 ms / 3 axis ; MIL-STD-883 method 2002, Test Condition B					
Random Vibrations	23.91 Grms / 10 to 2000 Hz / 3 min per axis, MIL STD 202-214 cond G					
Sine Vibrations	20G / 10 to 2000 Hz / 3 min per axis, MIL-STD-883 method 2007, Test Condition A					
Radiations: Total Ionizing Dose (TID)	100 krad at low dose rate (36 to 360 rad/h)					
Radiations: Single Event Effects	No SEE up to LET = 80.7 MeV/mg/cm ²					
Soldering instructions	Maximum EWOS Case (body) T°C is 110°C max during soldering operation					
	Hand soldering					
	Recommended temperature for pins soldering: Signals pin $320^{\circ}\text{C} + /-5^{\circ}\text{C}$ (t=3-5sec) GND pin $370^{\circ}\text{C} + /-5^{\circ}\text{C}$ (t=3-5sec) Use of preheat plate 100°C max is recommended in order to maximize the solder through hole's filling					
	Selective wave soldering Pre-heating Temperature 110°C max (case T°C) Liquidus contact 3sec for pins soldering					
Mounting instructions	Metallic Case glued onto the PCB, without glue overflow into the metallized holes					
	No spacer material between OCXO and PCB					
PCB cleaning/washing	Washable with a temperature below 85°C					

OCXO HERMETICITY Metallic housing hermetically sealed Fine Leaks and Gross Leaks tests performed 100%