

### RK409NS

The RK409NS is a  $10^{-9}$  frequency stability NewSpace OCXO. This cost-effective, low phase noise OCXO is designed for the NewSpace market, and is ideal for use in mini-satellites and constellations. The NewSpace OCXO is the best choice for applications where tolerance to TID and excellent phase noise performance are required for missions of up to 12 years.

The standard frequency of the RK409NS is 10 MHz. Additional frequencies from 10 to 40 MHz are available on request.

#### Features

- Frequency: 10 MHz
- Package: 50 x 50 x 30 mm
- Supply voltage: 12 V
- Steady state consumption: 1 W
- Overall frequency stability:  $\pm 0.5$  ppm over 12 years
- 2 input power supplies on specific request

- Phase noise:  $< -110$  dBc/Hz (@1 Hz)
- Phase noise @10 Hz:  $< -137$  dBc/Hz
- Output wave form: sine 50  $\Omega$
- TID limit: 30krads
- Latch up free up to LET: 43 MeV/mg/cm<sup>2</sup>
- MRO reference
- Synthesizers

#### Applications

50 x 50 x 30 mm



#### Environmental Conditions

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Operating temperature	T <sub>OP</sub>	-20	25	65	°C
Switch-on temperature	T <sub>SO</sub>	-40	-	85	°C
Non-operating temperature	T <sub>NOP</sub>	-40	-	85	°C
Random Vibration	Level as per MIL-STD-202, Method 214, condition I-H, 29.28 grms				
Sine vibration	Level as per MIL-STD-202, Method 204, condition G, 20Hz-2000 Hz: 30 g				
Shocks	Mechanical shock as per MIL-STD-202, Method 213 Half sine with a peak acceleration of 1 500 g for duration of 0.5 ms				
Radiation	Total Ionizing Dose (TID) of 30 krad, low dose rate (36 to 360 rad/h), Latch up free up to LET = 43 MeV/mg/cm <sup>2</sup>				

#### Electrical Interface

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Power supply	V <sub>CC</sub>	11.4	12	12.6	V
Load impedance	VSWR 1.1 reference	45	50	55	$\Omega$
Reference voltage	V <sub>REF</sub> / 1mA max.	7.5	-	9.5	k $\Omega$
Control voltage	V <sub>C</sub>	0	-	V <sub>REF</sub>	V

#### Screening Options

Parameter	Condition / Remarks	EM Option	FM Option
Ageing	@ maximum operating temperature range	–	✓
Random acceleration	Level as per MIL-STD-202, Method 214, Condition I-D	–	✓
Thermal shocks	MIL-STD-202, Method 107, Condition A1	–	✓
Final measurement	MIL-STD-883, Method 2020, Condition B	✓	✓
External visual inspection	MIL-STD-883, Method 2009	✓	✓

## Performances @ 10 MHz

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Nominal frequency (Fn)		-	10	-	MHz
Initial frequency accuracy	at ambient temperature at DC/DC turn ON within 1.5 hour	-	-	±20	ppb
Frequency adjustment	Positive slope	±300	-	±500	ppb
Frequency stability Vs. temperature	For any 24 hours at any temperature within acceptance temperature range, under vacuum	-	-	±0.5	ppb
Overall Frequency drift	Initial, temperature range, EOL (12 years)	-	-	±500	ppb
Frequency ageing	Per day after 1 month	-	-	±0.5	ppb
	Per month	-	-	±5	ppb
	First year	-	-	±30	ppb
	Over lifetime (12 years), including radiations, and over acceptance temperature range with regards to the frequency at initial setting and at ambient temperature	-	-	±200	ppb
Output waveform	Sine	-			
Output level	Over lifetime	4	-	8	dBm
Output level stability	Over life time and over acceptance temperature range	-	-	2	dBpp
Non-harmonic (spurious) level	From 10 Hz to 1 MHz offset	-	-110	-100	dBc/Hz
	From 1 MHz to 70 MHz	-	-90	-80	dBc/Hz
Harmonics level	From DC to 1 GHz	-	-	-40	dBc
Phase noise	1 Hz offset	-	-110	-108	dBc/Hz
	10 Hz offset	-	-137	-135	
	100 Hz offset	-	-150	-147	
	1 kHz offset	-	-158	-155	
	10 kHz offset	-	-160	-158	
Steady state supply power	Vacuum @ -20°C. EOL	-	-	2.5	W
	Vacuum @ 25°C. EOL	-	1	1.5	W
Warm-up time	Meet all the requirements (DC power, output power, etc.)	-	-	20	mn
Warm-up supply power	EOL	-	3	3.5	W

## Model Outline and Pin Connections

Parameter	Package	Pin #	Connections
Package type	Size: 50 x 50 x 30 mm	1	V <sub>REF</sub> (Reference voltage output)
		2	GND (Ground)
		3	NC (Do not connect) <i>** Telemetry could be provided as an option</i>
		4, 5	V <sub>CC</sub> (Supply voltage) <i>* Power supply could be separated on specific request</i>
		6	V <sub>C</sub> (Voltage control for electrical tuning)
		7	RF output

### Model outline

