

## RK409NS

The RK409NS is a NewSpace OXCO with a frequency stability of  $10^{-9}$ . This cost effective and low phase noise OXCO is designed specifically for the NewSpace market, such as mini-satellites and constellations. The NewSpace OXCO is an ideal choice for applications demanding high tolerance to Total Ionizing Dose (TID) and excellent phase noise performance, with a mission life of up to 12 years.

The standard frequency of the RK409NS is 10 MHz, with additional frequencies ranging from 10 to 40 MHz available upon request.

### Features

- Frequency: 10 MHz / 10.23MHz / 10.24MHz
- 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 inputs power supplies on specific request
- Excellent ADEV (4s):  $4.67E-13$
- Low phase noise:  $< -110$  dBc/Hz @1Hz;  $< -139$  dBc/Hz @10Hz
- Output waveform: sine 50  $\Omega$
- TID limit: 30 krad
- Latch up free up to LET: 43 MeV.cm<sup>2</sup>/mg

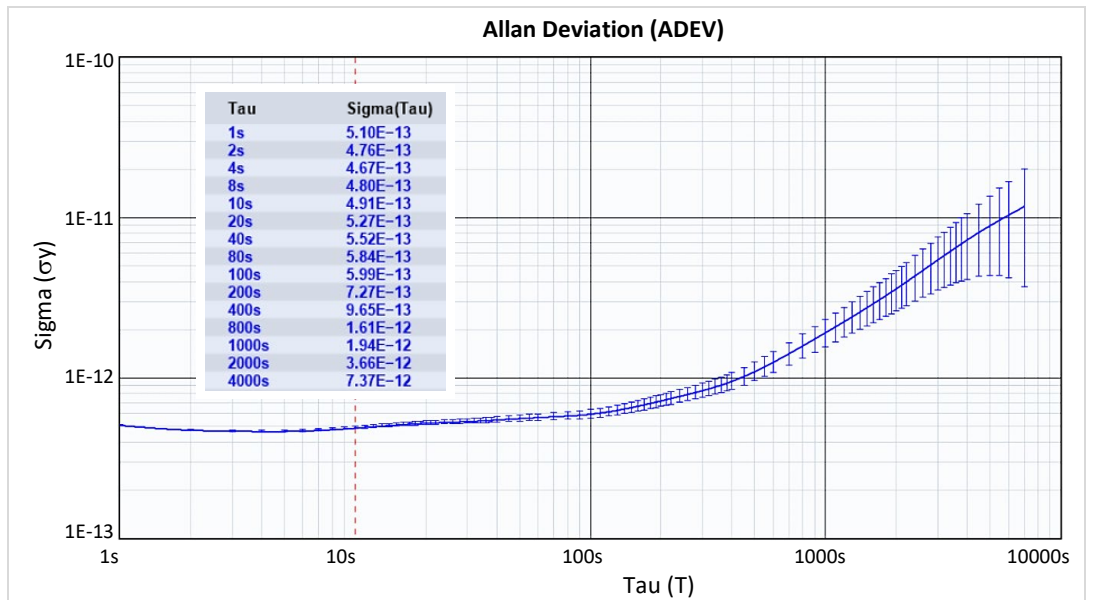
### Applications

- MRO Reference
- Synthesizers

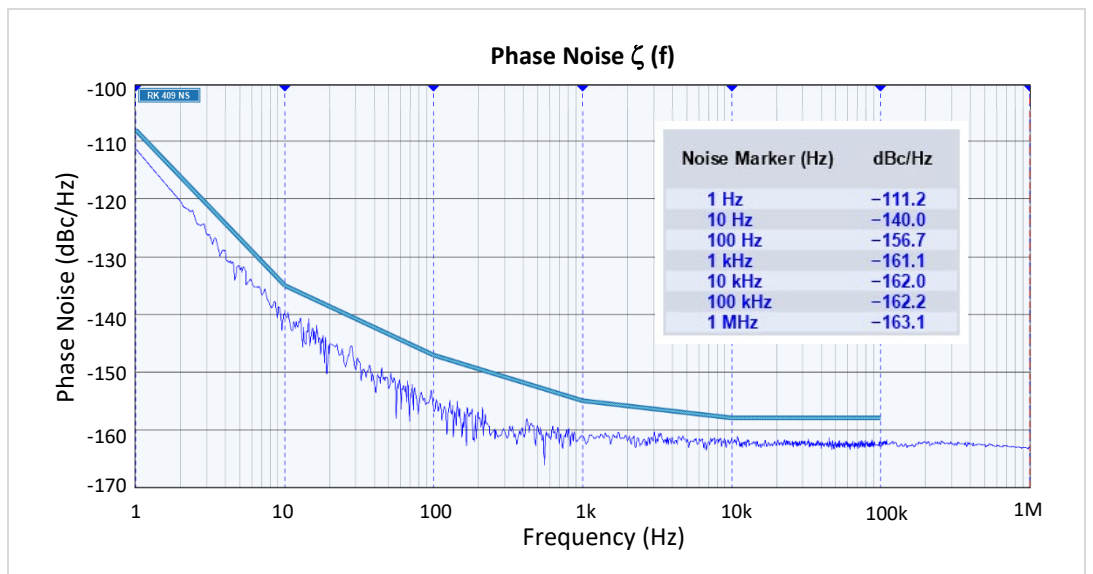
50 x 50 x 30 mm



### Allan Deviation (ADEV)



### Phase Noise $\zeta$ (f)



## 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, 20 Hz-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.cm <sup>2</sup> /mg				

## 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	Ω
Reference voltage	V <sub>REF</sub> / 1mA max.	7.5	-	9.5	V
Control voltage	V <sub>C</sub>	0	-	V <sub>REF</sub>	V

## Screening Options

Parameter	Condition / Remarks	EM Option	FM Option
Ageing	@ 25°C	-	√
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-PRF-55310	√	√
External visual inspection	MIL-STD-883, Method 2009	√	√

## Performances @ 10 MHz / 10.23 MHz / 10.24 MHz

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Nominal frequency (Fn)	-	-	-	-	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
Frequency ageing	Per day after 1 month Per month First year Over lifetime (12y), including radiations	-	-	±0.5 ±5 ±30 ±200	ppb

Overall Frequency drift	Initial, temperature range, EOL (12y)	-	-	±500	ppb
Allan Standard Deviation	At 1s	-	$5 \cdot 10^{-13}$	$1 \cdot 10^{-12}$	-
	At 10s	-	$8 \cdot 10^{-13}$	$2 \cdot 10^{-12}$	-
Output waveform	Sine	-			
Output level	Over lifetime	4	-	8	dBm
Output level stability	Over lifetime and acceptance temperature range	-	-	2	dBpp
Harmonics level	From DC to 1 GHz	-	-	-40	dBc
Non-harmonic (spurious) level	From 10 Hz to 1 MHz offset	-	-110	-100	dBc/Hz
	From 1 MHz to 70 MHz	-	-90	-80	
Phase noise	1Hz offset	-	-110	-108	dBc/Hz
	10Hz offset	-	-137	-135	
	100Hz offset	-	-150	-147	
	1kHz offset	-	-158	-155	
	10kHz offset	-	-160	-158	
Warm-up supply power	EOL	-	3	3.5	W
Steady state supply power	Vacuum @ -20°C. EOL	-	-	2.5	W
	Vacuum @ 25°C. EOL	-	-	1.5	
Warm-up time	Meet all the requirements (DC power, output power, etc.)	-	-	20	mn

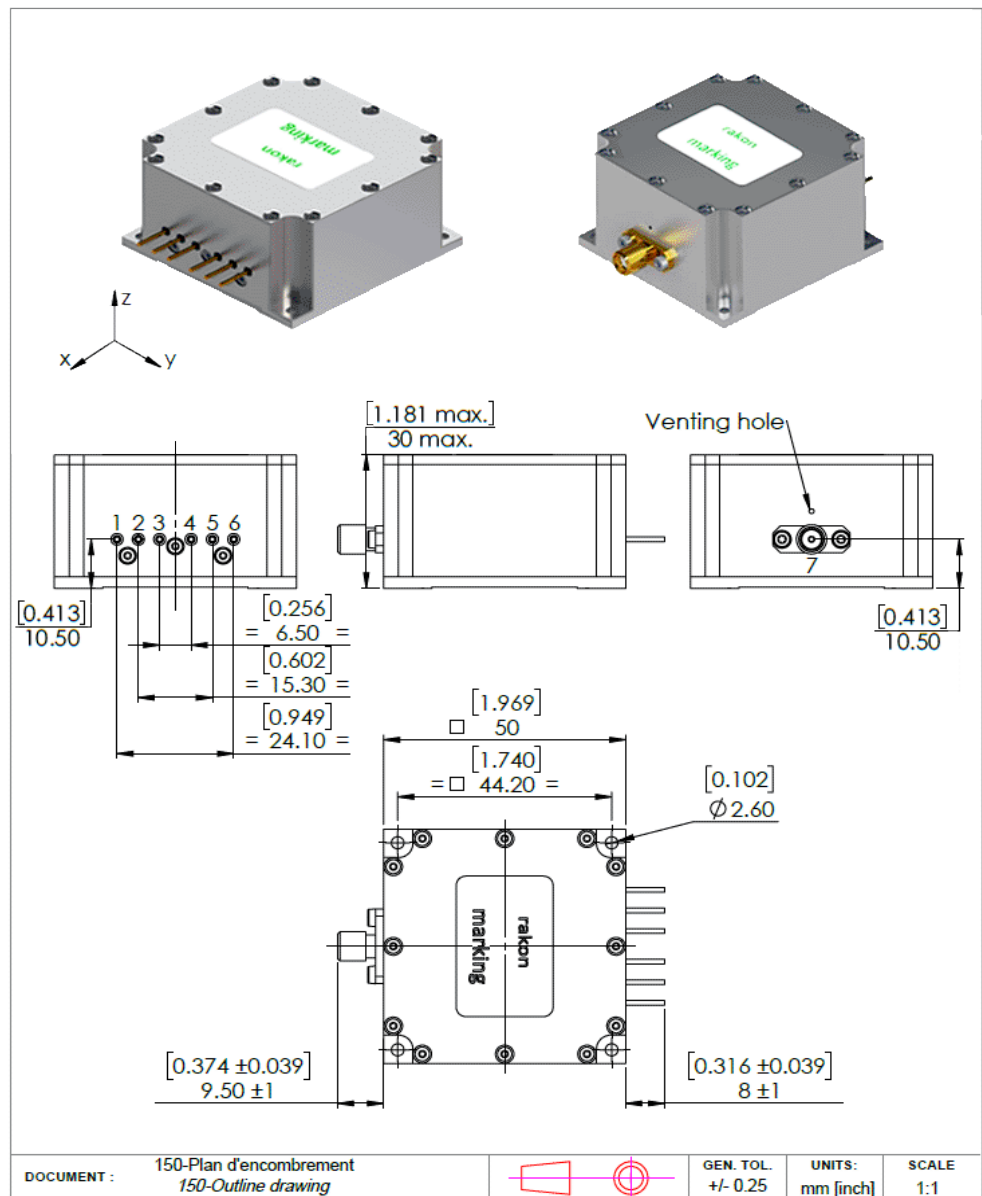
### 3D Step file

Parameter	Package
Net weight	Typical: 120 g Maximum: 130 g
STEP file	<a href="#">RK409NS 3D model</a> To open or view the STP file, you will need to import it into one of the following software programs: Autodesk Fusion 360, CATIA, SolidWorks, Solid Edge, TurboCAD, Kubotek KeyCreator, FreeCAD, ABViewer, ShareCAD, or eMachineShop.

## Model Outline and Pin Connections

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

### Model outline



## Ordering Part Example

