RK508NS [PRELIMINARY]

The RK508NS is a cost-effective and low power consumption OCXO dedicated to the NewSpace market, such as smallsats and constellations. This NewSpace OCXO is ideal for applications requiring tolerance to Total Ionizing Dose (TID), very low power consumption, high stability, and good phase noise. It is designed for missions up to 12 years.

The standard frequencies of the RK508NS are 10 MHz and 100 MHz. Custom frequencies are available from 10 to 125 MHz. The RK508NS is a small form-factor, low profile NewSpace OCXO in a 25 x 25 x 13 mm Pin Through Hole (PTH) package. It can be adapted to large package sizes to fit specific PCB boards' layouts and requests.

Features

- Frequency: 10 to 125 MHz
- Supply voltage: 3.3V / 5V
- Voltage control function
- Steady state consumption: 500 mW
- **Low profile PTH: 22 x22 x 13 mm**
- ADEV (1s): <5E-11 @ 10 MHz
- Output wave form: square or sine 50 Ω
- TID limit: 50 kRads
- Latch-up free up to LET: 60 MeV/mg/cm^2

Applications

- Frequency converters
- GNSS receivers
- Synthesizers

22 x 22 x 13 mm

Environmental Conditions

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Operating temperature	T_{OP}	-40	25	70	°C
Switch-on temperature	T_{SO}	-40	-	85	°C
Non-operating temperature	T_{NOP}	-40	-	85	°C
Random vibration	20 to 50 Hz: +6 dB/oct 50 to 350 Hz: 0.8 g^2/Hz 350 to 2000 Hz: -6 dB/oct Overall: 61 grms				
Sine vibrations	Level as per MIL-STD-202 Method 204, Condition D (20g)				
Shocks	Level as per MIL-STD-202, Method 213: - Half sine with a peak acceleration of 3000g for a duration of 0.3msec - 3 shocks per direction, applied along the 3 mutually perpendicular axes - 18 shocks in total				
Radiation	Total Ionizing Dose (TID) of 50 kRad, low dose rate (36 to 360rad/h) Latch up free up to LET = 43 MeV/mg/cm^2				

Electrical Interface

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Power supply	3V ption	3.15	3.3	3.45	V
	5V option	4.85	5	5.15	
Load impedance[1]	Sine wave	45	50	55	Ω
	Square (1)	-	10	-	kΩ
	[1] Value of the capacitor in parallel to the resistive load depends on the frequency @10 MHz, C_{LOAD} = 15 pF in //				

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Screening Options

Parameter	Condition / Remarks	EM Option	FM Option
Ageing	@ max 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	-	-	10	-	MHz
Initial frequency accuracy	Vacuum, at time of shipment, @25°C	-	-	±100	ppb
Pull range	Sufficient for 12 years	±1	-	-	ppm
Freq. stability vs temperature	Referenced to +25°C, under vacuum & Atm.	-	-	±150	ppb
Freq. stability vs supply voltage	Vcc ±3.3% @25°C	-	-	±10	ppb
Freq. stability vs load	For ±10% variation of load	-	-	±10	ppb
Freq. stability vs pressure	Atm to vacuum	-	-	±50	ppb
Freq. ageing (after 30 days of continuous operation)	1st year 5 years	-	-	±100 ±500	ppb
Allan standard deviation	Tau = 1s @25°C	-	-	5E-11	-
Phase noise (Achieved after 10 mn warm-up) @ 25°C	10 Hz offset 100 Hz offset 1 kHz offset 10 kHz offset 100 kHz offset	-	-	-115 -135 -145 -150 -155	dBc/Hz
Retrace		-	-	5	ppb
Output waveform			Square		-
Output level V_{OL}	-	-	-	0.5	V
Output level V_{OH}	-	2.5	-	-	V
Rise time / Fall time	10%-90% of V_{CC} / 90%-10% of V_{CC}	-	-	10	ns
Duty cycle	-	45	-	55	%
Frequency warm-up	Time to be within the init. Freq. Accuracy compared to freq. after 1 hour	-	-	5	mn
Warm-up supply power	Nominal frequency is achieved after start-up 5 minutes, @ 25°C	-	700	950	mW
Steady-state supply power	@ -20°C vacuum	-	500	800	mW
	@ +25°C vacuum	-	-	500	mW

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Performances @ 100 MHz

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Nominal frequency (Fn)	-	-	100	-	MHz
Initial frequency accuracy	Vacuum, Rakon provide the control voltage to reach the frequency accuracy	-	-	±0.1	ppm
Frequency pulling range	Positive slope	±0.7	±1	-	ppm
Freq. stability vs temperature	Referenced to +25°C, under vacuum & Atm.	-	±100	±200	ppb
Freq. stability vs supply voltage	For Vcc ±5% @25°C	-	-	±100	Ppb
Freq. stability vs load	For ±10% variation of load	-	-	±10	ppb
Freq. stability vs pressure	Atm to vacuum	-	-	±200	ppb
Freq. ageing (after 30 days of continuous operation)	1st year 5 years	-	-	±0.7 ±1.5	ppm
Allan standard deviation	Tau = 1s @ 25°C	-	-	5E-11	-
Phase noise (Achieved after 10 mn warm-up) @ 25°C	1 Hz offset 10 Hz offset 100 Hz offset 1 kHz offset 10 kHz offset 100 kHz offset	-	-76 -106 -126 -140 -150 -152	-70 -100 -120 -130 -145 150	dBc/Hz
Retrace		-	-	5	ppb
Output waveform			Square		-
Output level V_{OL}	-	-	-	0.5	V
Output level V_{OH}	-	2.5	-	-	V
Rise time / Fall time	10%-90% of V_{CC} / 90%-10% of V_{CC}	-	-	4	ns
Duty cycle	-	45		55	%
Frequency warm-up	Time to be within the init. Freq. Accuracy compared to frequency after 1 hour	-	-	5	mn
Warm-up supply power	Nominal frequency is achieved 5min after start-up @ 25°C	-	700	950	mW
Steady-state supply power	@ -20°C vacuum	-	-	500	mW
	@ +25°C vacuum	-	500	800	mW

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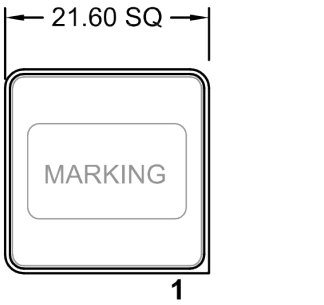
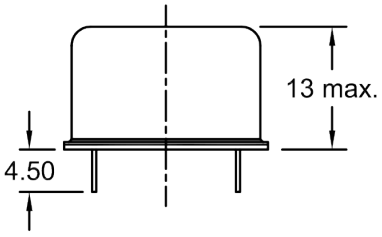
Model Outline and Pin Connections

Parameter	Package	Pin #	Connections	
Package type	Pin through-hole Size: 22 x 22 x 13 mm	1	V_{CC}	Supply voltage
		2	DNC	Do Not Connect
		3	DNC	Do Not Connect
		4	Vref	Reference voltage
		5	V_{CTRL}	Control Voltage
		6	F_{OUT}	Frequency output
		7	GND	Electrical & Mechanical ground
		8	DNC	Do Not Connect

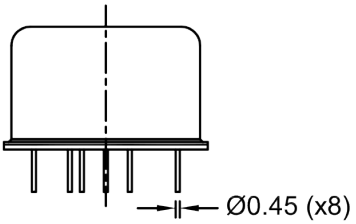
Model outline



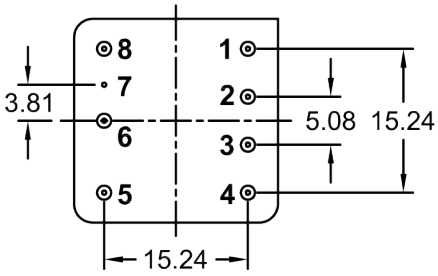
TOP VIEW



FRONT VIEW



SIDE VIEW



BOTTOM VIEW

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