

RK408

The RK408 is a high-reliability Space OCXO in the 10^{-8} frequency stability class. This OCXO series is meticulously engineered to generate ultra-low phase noise signals across frequencies from 10 to 125 MHz. The RK408 provides exceptional stability even in extreme temperature variations, with deviations as low as ± 20 ppb in a vacuum environment. Additionally, it exhibits an extremely low noise floor, reaching levels of -165 dBc/Hz at a high frequency of 120 MHz.

The RK408 Space OCXO has two package types: SM1 (Micro D + SMA) and PS1 (Pin side + SMA), providing flexibility to meet system board requirements. For this product, Rakon can perform thorough testing following MIL-PRF-55310 (Class 1, type 4, level S) or provide a streamlined and optimised screening process tailored to specific needs. The RK408 satisfies high precision and reliability demands in navigation, positioning, and SAR (Synthetic Aperture Radar) systems.

Features

- Frequency: 10 to 125 MHz
- Short lead time for 10, 20, 40, 50, 80, 100 and 120 MHz frequencies
- FvT: ± 20 ppb under vacuum
- Low phase noise
- Steady-state consumption: ≤ 2 W under vacuum ≤ 3 W under atmospheric pressure
- Warm-up consumption: ≤ 5 W
- Supply voltage: +12 V
- Ageing ± 300 ppb max over 18 years at 10 MHz
- Output waveform: sine 50 Ω
- Output level: 10 to 12 dBm
- Component selected as per ECSS-Q-ST-70-08C and ECSS-Q-ST-70-38C
- Materials selected as per ECSS-Q-ST-70

Applications

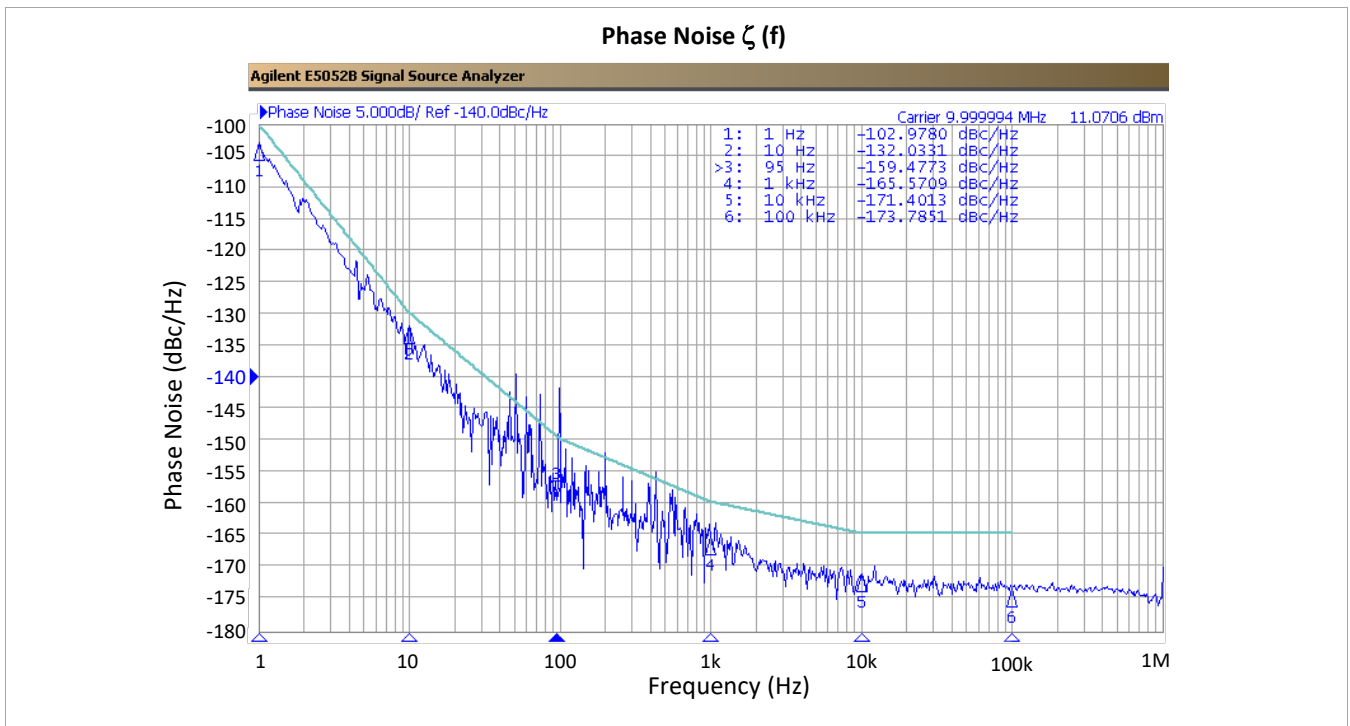
- SAR systems
- GNSS receivers
- Navigation
- Low noise synthesizers
- Frequency generator unit (FGU)

40 x 66 x 20 mm

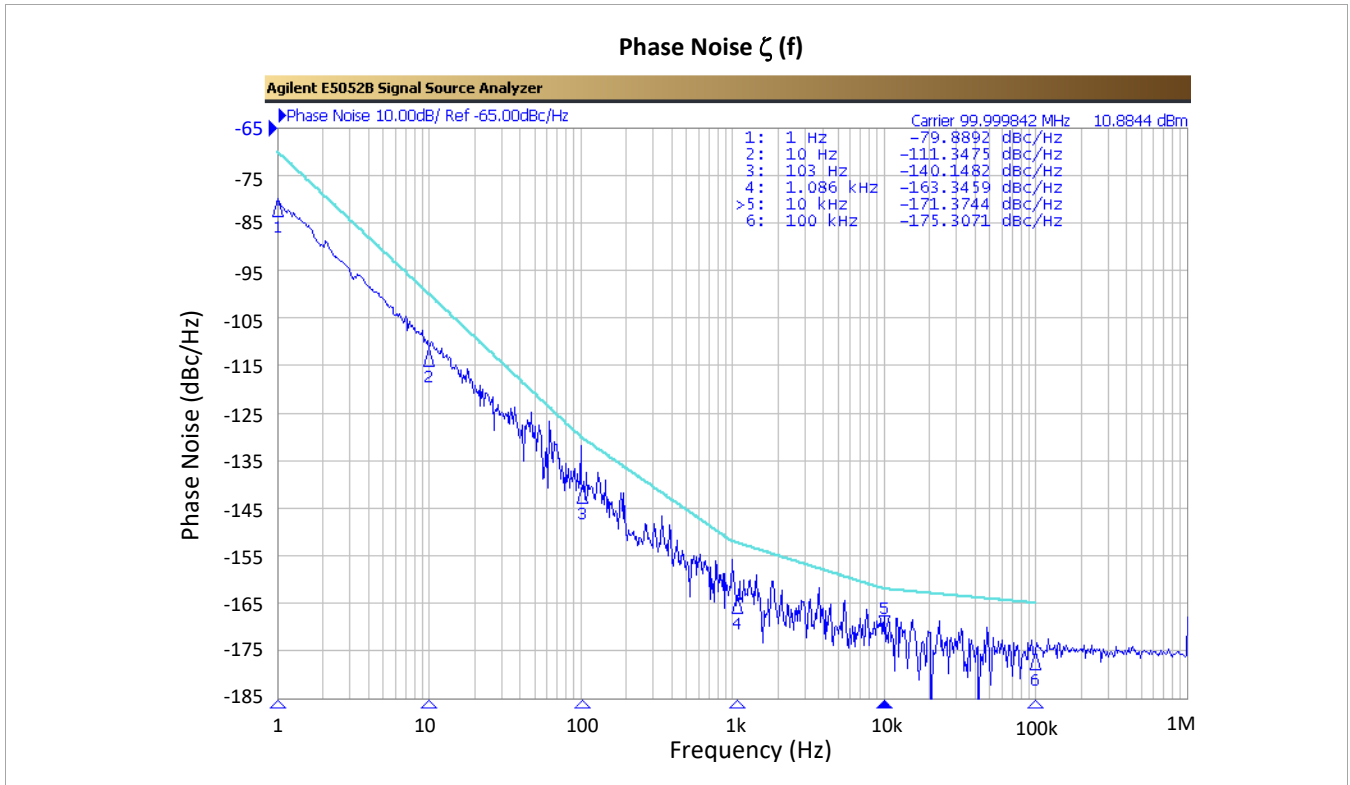
Packages: MS1 and PS1



Phase Noise $\zeta(f)$ – 10 MHz



Phase Noise $\zeta(f)$ – 100 MHz



Environmental Conditions

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Operating temperature (TO _p)	Option A	-5	25	60	°C
	Option B	-20	25	70	
	Option C	-40	25	70	
Switch-on temperature	TS _o	-40	-	85	°C
Non-operating temperature	TNO _p	-40	-	85	°C
Random vibration	MIL-STD-202 Method 214, conduction K (46.3 grms)				
Sine vibration	MIL-STD-202 Method 204, Condition D (20 g)				
Mechanical shock	MIL-STD-202, Method 213, conduction F: Half sine with a peak acceleration of 1500 g for a duration of 0.5 ms				
Radiation	Total Ionizing Dose (TID) of 100 krad, low dose rate (36 to 360 rad/h), No SEL up to LET = 60 MeV.cm ² /mg				

Electrical Interface

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Power supply	Option 2 (12 V)	11.4	12	12.6	V
Load impedance		45	50	55	Ω
Supply voltage (V _{CC})	Option 2 (12 V)	6.75	7.25	7.75	V
Control voltage (V _C)	When V _C option is selected	0	-	V _{REF}	V

Phase Noise

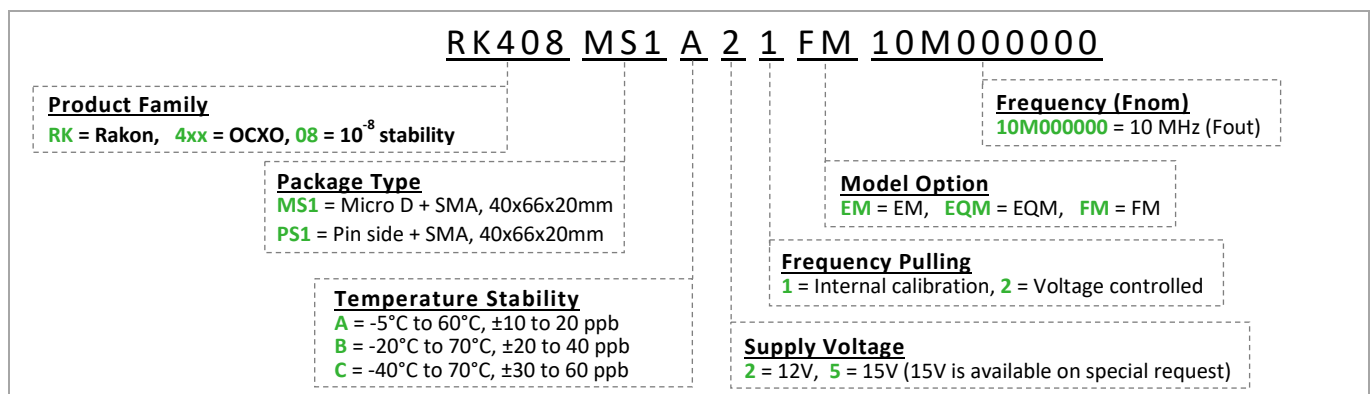
Parameter	Condition / Remarks	@ 10 MHz		@ 100 MHz		@ 120 MHz		Unit
		Typ.	Max.	Typ.	Max.	Typ.	Max.	
Phase noise ¹	1 Hz offset	-105	-100	-75	-70	-70	-65	dBc/Hz
	10 Hz offset	-135	-130	-105	-100	-100	-95	dBc/Hz
	100 Hz offset	-155	-150	-135	-130	-130	-125	dBc/Hz
	1 kHz offset	-165	-160	-157	-152	-155	-150	dBc/Hz
	10 kHz offset	-170	-165	-157	-162	-170	-162	dBc/Hz
	100 kHz offset	-170	-165	-172	-165	-170	-165	dBc/Hz

Frequency Characteristics

Parameter (Fn: 10 to 120 MHz)	Condition / Remarks	Min.	Typ.	Max.	Unit
Nominal frequency (Fn)	Standard frequencies: 10, 100, 120 MHz	-	10 – 120	-	MHz
Steady state input current power	Vacuum @ -20°C	-	-	3	W
Warm up supply power	Vacuum, End of Life (EOL)	-	-	5	W
Initial frequency accuracy	Frequency pulling	-	-	±0.1	ppm
Allan variance	tau = 1s	-	5*10 ⁻¹²	1*10 ⁻¹¹	-
Frequency warm up	Time needed to reach the initial frequency accuracy (1h ref.)	-	-	10	mn
Output waveform	Sine	-	-	-	-
Output level	Beginning of Life (BOL)	10	-	12	dBm
Harmonics level	DC to 10xFn	-	-	-30	dBc
Non harmonics level	1MHz to 5GHz	-	-	-85	dBc
Frequency adjustment (Positive slope, option 2)	10 MHz typ. 100 MHz typ. 120 MHz typ.	±0.4 ±1.1 ±1.3	-	-	ppm

Parameter (Standard Fn)	Condition / Remarks	10 MHz	100 MHz	120 MHz	Unit
Frequency stability vs. temperature (FvT. max.)	TOP option A	±10	±20	±20	ppb
	TOP option B	±20	±40	±40	
	TOP option C	±30	±60	±60	
Supply voltage sensitivity (max.)	Over operating temperature	±1	±2	±2	ppb
Load sensitivity (max.)	Over operating temperature	±25	±50	±50	ppb
Pressure (max.)	Over operating temperature	±100	±200	±200	ppb
Ageing per year (max.)	Over operating temperature	±100	±300	±500	ppb
Ageing over 18 years (max.)	Over operating temperature	±300	±1000	±1200	ppb

Ordering Part Example

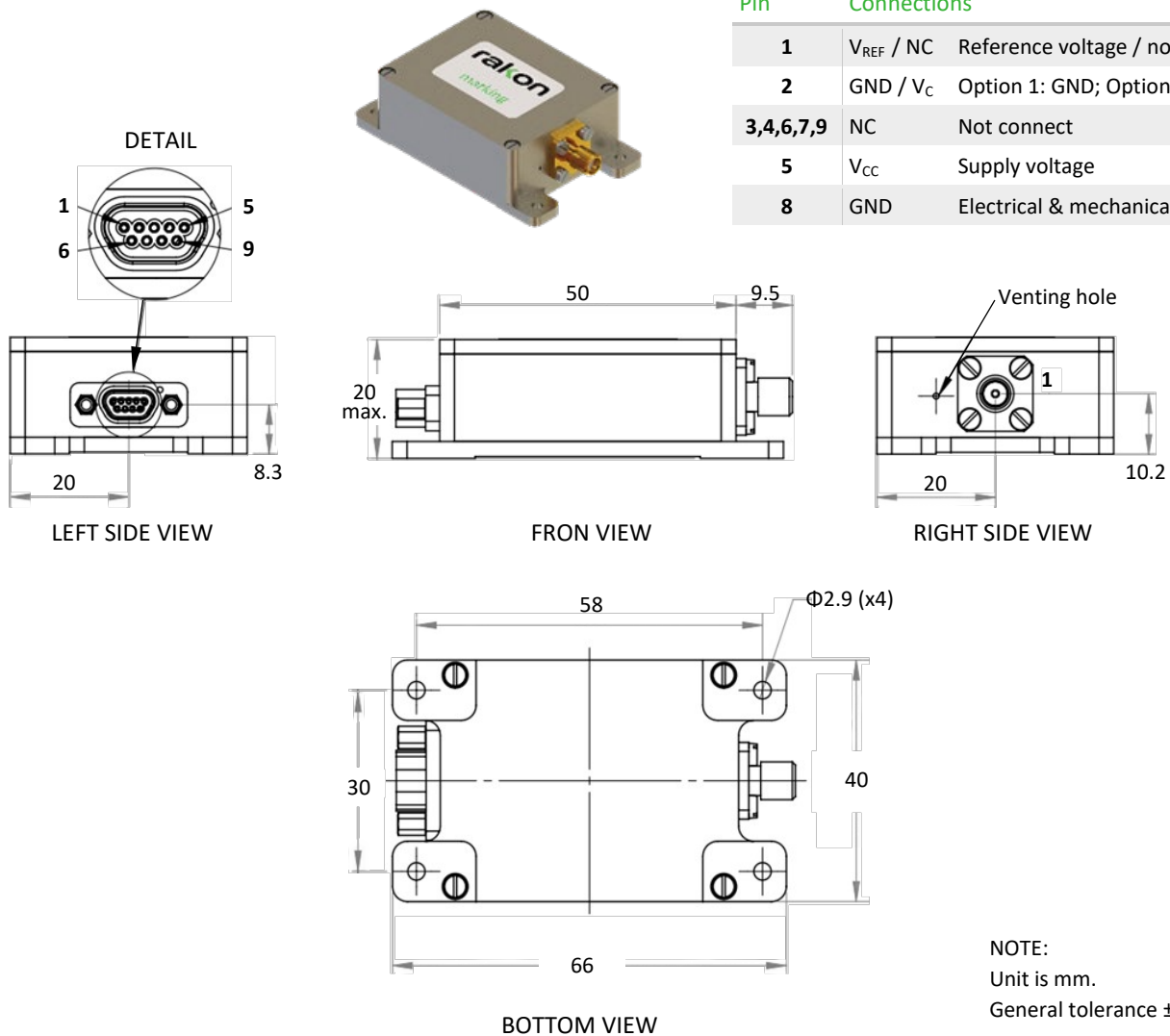


¹ Better phase noise performance products can be delivered if needed.

Model Outline (MS1) and Pin Connections

Parameter	Remarks
Package size	40 x 66 x 20 mm (Micro D + SMA)
Net weight	70 g max; 80 g max.
STEP file	RK408 MS1 3D model 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



Model Outline (PS1) and Pin Connections

Parameter	Remarks
Package size	40 x 66 x 20 mm (Pin side + SMA)
Net weight	70 g max; 80 g max.
STEP file	RK408 PS1 3D model 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



Pin	Connections
2	V _{REF} / NC Reference voltage / not connect
3	GND / V _C Option 1: GND; Option 2: Vc
4	V _{CC} Supply voltage
5	NC Not connect
6	GND Electrical & mechanical ground

