

RK409AV

The RK409AV is a compact Ultra-Stable Oscillator (USO) designed for the space market. It delivers 10⁻⁹ class frequency stability. The high-end oscillator achieves short-term stability of 2.5E-13 at tau 1 s, making it ideal for telecommunications, Low-Earth Orbit (LEO), Global Navigation Satellite Systems (GNSS), and Precision Navigation and Timing (PNT) payloads.

The USO provides exceptional frequency stability of ±0.2 ppb over operating temperature ranges of -10 to 60°C under vacuum. It is capable of operating in harsh environments and delivering stable frequency sources for over 15 years, making it a qualified reference oscillator.

Two package options are available: Pin-side SMA (PS) and Pin-through hole (PTH), to suit different system requirements.

Features

- Frequency: 10, 10.23 and 10.24 MHz
- Allan Variance: 2.5E-13 @ 1 s
- Warm-up consumption: 8 W max.
- FvT: ±0.4 ppb typ. under vacuum
- Ageing: ±200 ppb max over 15 years at 10 MHz
- Supply voltage: 12 V
- Output waveform: sine 50 Ω
- Output level from 4 to 8 dBm
- Weight: ≤250 g
- TID Limit: 100 krad
- Latch-up free up to LET: 62 MeV.cm²/mg

Applications

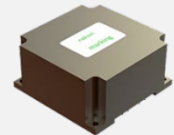
- PNT
- GNSS
- Earth Observation
- Navigation
- Compact reference for MRO/FGU

Packages

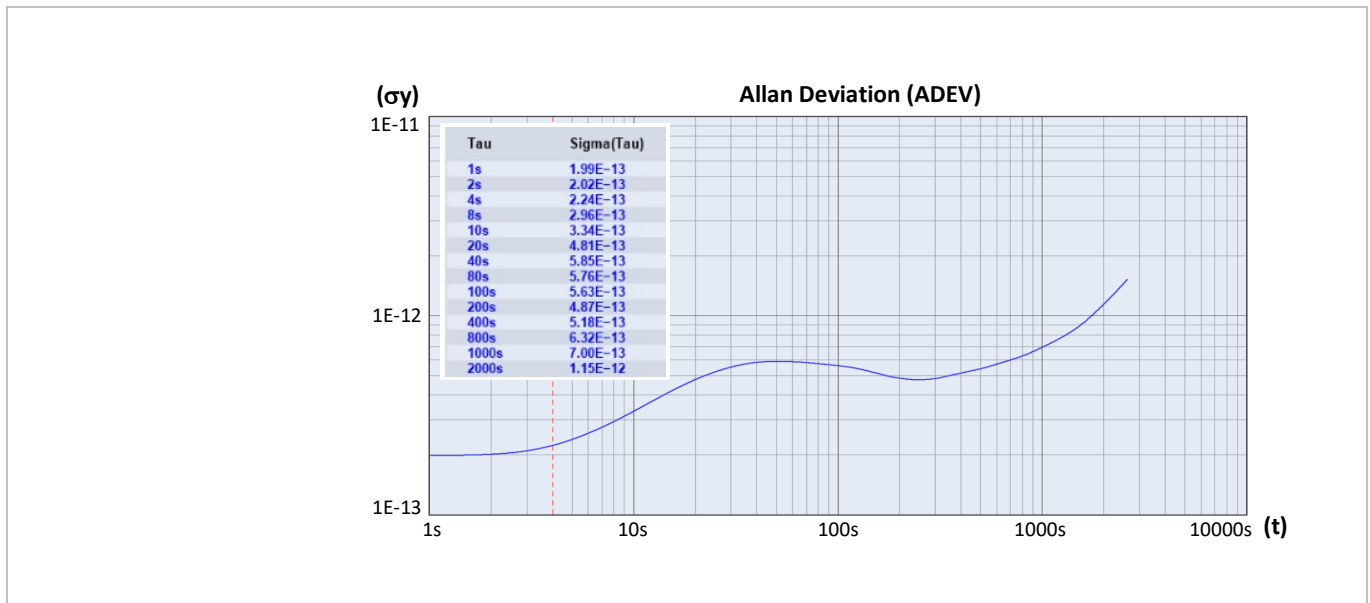
Pin-side SMA (PS)
60 x 60 x 32 mm



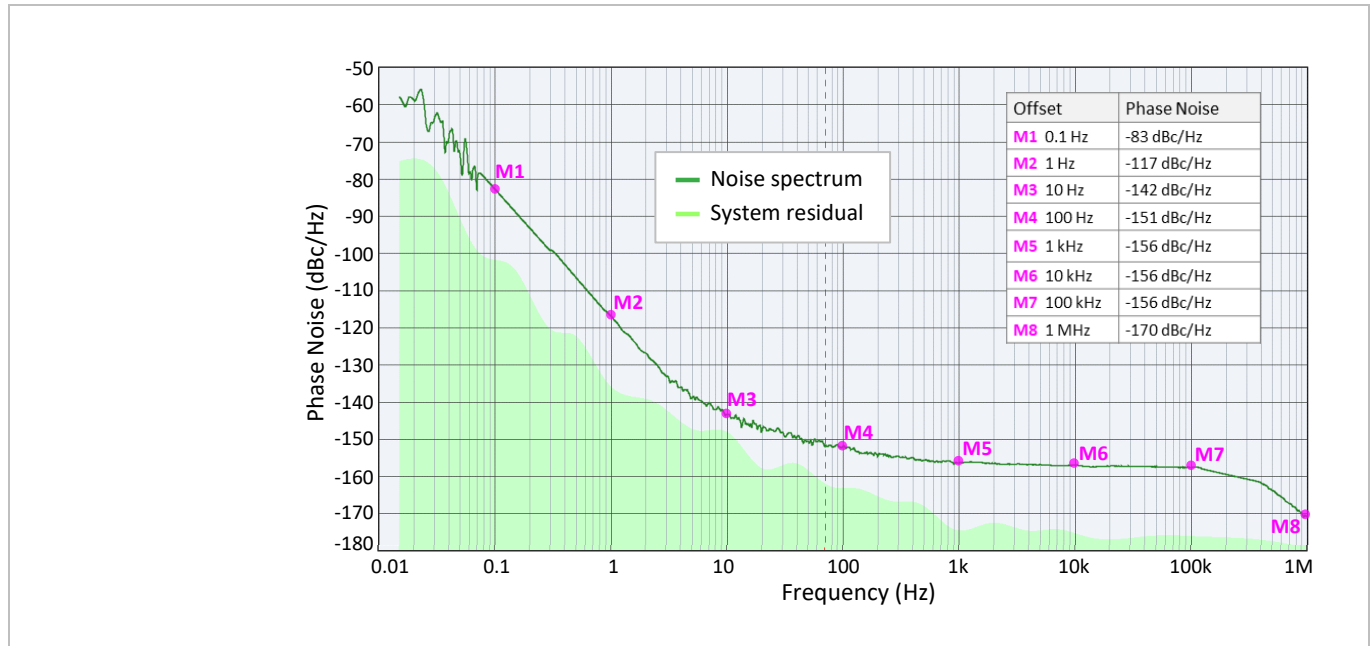
Pin-through hole (PTH)
60 x 60 x 32 mm



Allan Deviation (ADEV)



Phase Noise



Environmental Conditions

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Operating temperature (T _{OP})	-	-10	25	+60	°C
Switch-on temperature (T _{SO})	-	-25	-	+65	°C
Non-operating temperature (T _{NOP})	-	-30	-	+70	°C
Random vibration	MIL-STD-202 Method 214, conditions: 20 – 100 Hz +3 dB/oct, 100 – 400 Hz 0.7 g ² /Hz 400 – 2000 Hz -3 dB/oct, duration: 60 s/axis				
Sine vibration	MIL-STD-202 Method 214, conditions: 5 – 21 Hz 11 mm peak, 21 – 100 Hz 20 g Sweep rate: 2 oct/mn up and down, 3 axis				
Mechanical shock	Level as per MIL-STD-202, Method 213, conditions: half sine with a peak acceleration of 1000 g for a duration of 0.3 ms				
Radiation	Total Ionizing Dose (TID) is 100 krad, with a low dose rate. No SEL up to LET = 62 MeV.cm ² /mg				

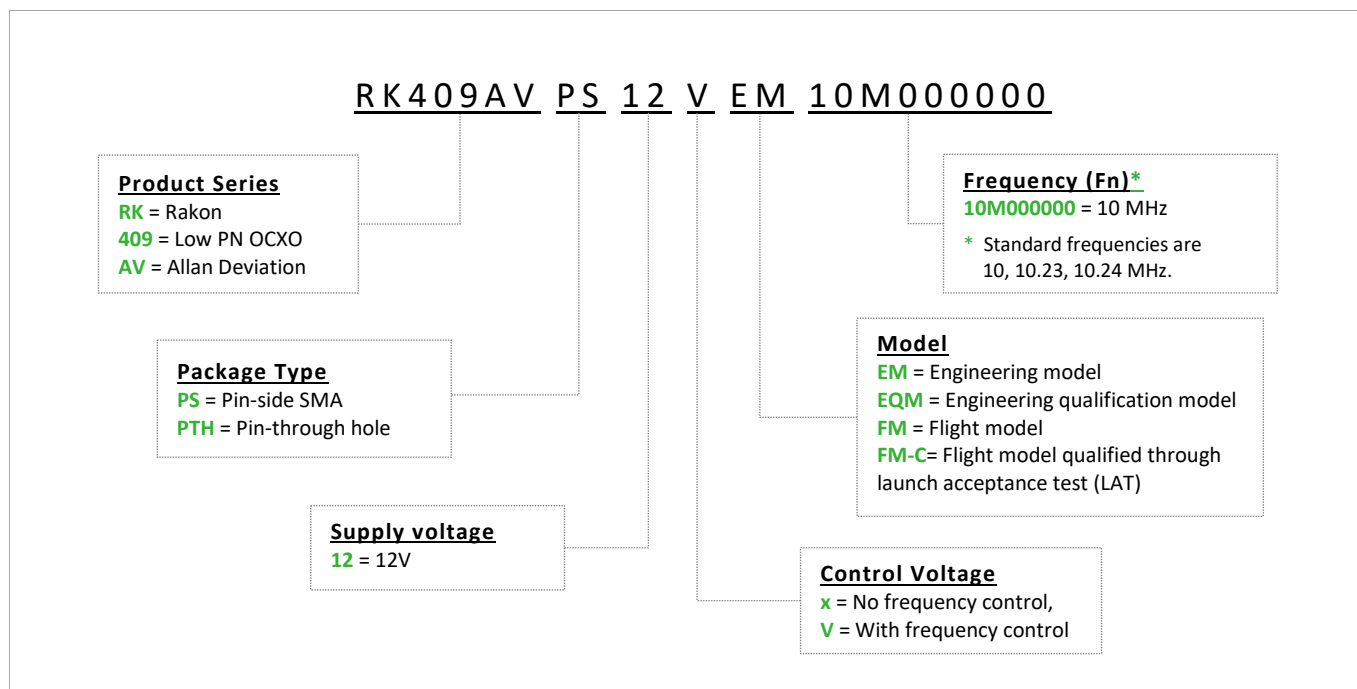
Electrical Interface

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Power supply	-	11.4	12	12.6	V
Load impedance	VSWR 1.1	45	50	55	Ω
Reference voltage (V _{REF})	-	7.5	8	8.5	V
Control voltage (V _{CTRL})	When V _{CTRL} option is selected	0	-	V _{REF}	V

Frequency Characteristics

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Standard frequency	Custom option available on request	-	10, 10.23, 10.24	-	MHz
Steady-state input current power	Vacuum @ -10°C	-	-	5	W
Warm-up supply power	-	-	-	8	W
Initial frequency accuracy	-	-	-	±100	ppb
Frequency adjustment	Positive slope	±250	±350	±500	ppb
Frequency stability over temperature	-	-	±0.4	±1	ppb
Supply voltage stability	Over operating temperature	-	-	±0.1	ppb
Load sensitivity	Over operating temperature	-	-	±0.1	ppb
Pressure	-	-	-	±40	ppb
Ageing	Over 1 year Over 15 years	-	-	±30 ±200	ppb
Allan variance (AV)	tau = 1 s tau = 10 s tau = 100 s	-	2.5 3.5 5	3 6 10	E-13
Frequency warm-up	Vacuum @ -10 °C	-	-	30	mn
Output waveform	Sine	-	-	-	-
Output level	EOL (End of Life)	4	-	8	dBm
Harmonics level	From DC to 500 MHz	-	-	-40	dBc
Non-harmonics level	From DC to 3 GHz	-	-	-85	dBc

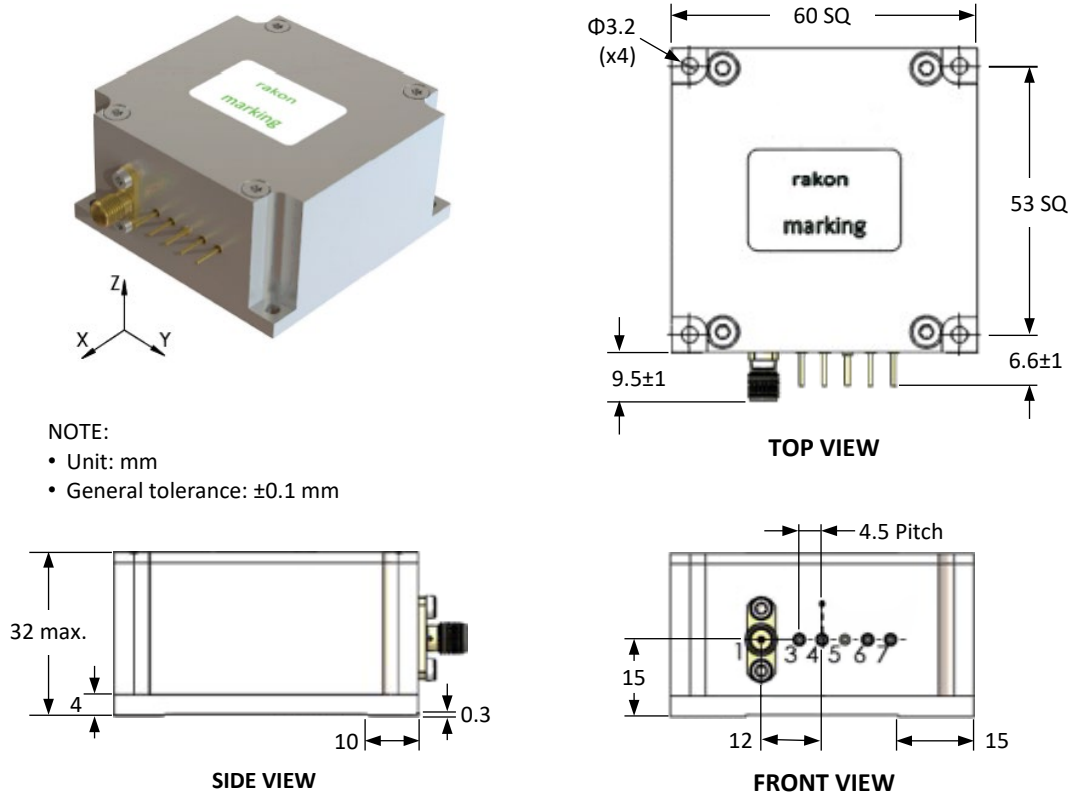
Ordering Part Example



Model Outline and Pin Connections – Pin-Side (PS) SMA Package

Parameter	Package
Package size	60 x 60 x 32 mm
Net weight	150 g (Typ), 250 g (Max)
STEP file	RK409AV PS 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

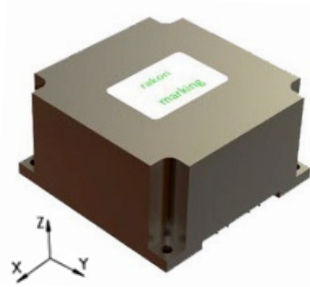
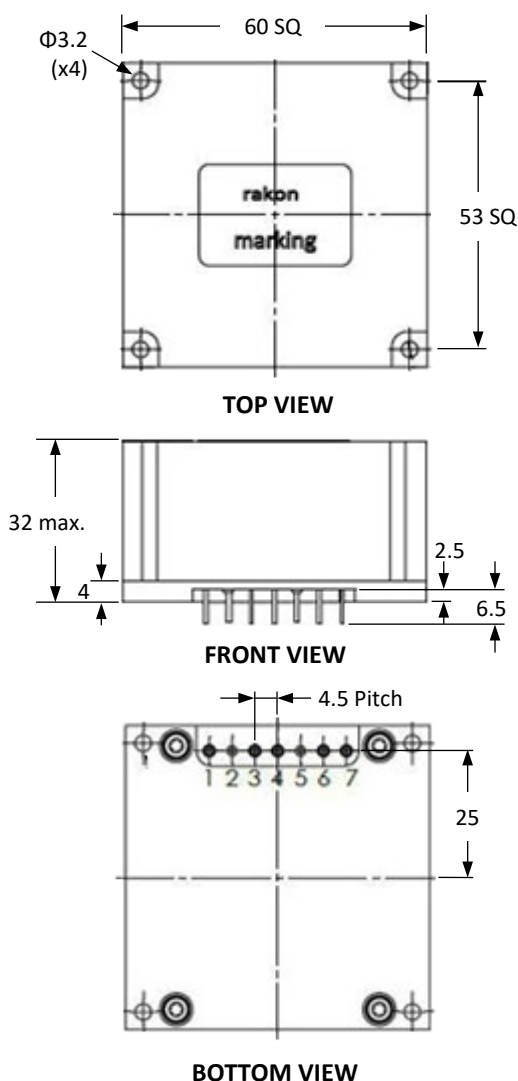


Pin	Diameter	Symbol	Connections
1	Ø0.8 mm	SF	RF output
2	N/A	GND	RF electrical & mechanical
3	Ø1.0 mm	VCTRL	Voltage control for electrical
4	Ø1.0 mm	VREF	Reference voltage
5	Ø0.8 mm	GND	Electrical & mechanical ground
6	Ø1.0 mm	NC	Not connected
7	Ø1.0 mm	Vcc	Supply voltage

Model Outline and Pin Connections – Pin-Through Hole (PTH) Package

Parameter	Package
Package size	60 x 60 x 32 mm
Net weight	150 g (Typ), 250 g (Max)
STEP file	RK409AV PTH 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



NOTE:
 • Unit: mm
 • General tolerance: ± 0.1 mm

Pin	Diameter	Symbol	Connections
1	$\Phi 0.8$ mm	SF	RF output
2	$\Phi 1.0$ mm	GND	RF electrical & mechanical
3	$\Phi 0.8$ mm	VCTRL	Voltage control for electrical
4	$\Phi 0.8$ mm	VREF	Reference voltage
5	$\Phi 1.0$ mm	GND	Electrical & mechanical ground
6	$\Phi 0.8$ mm	NC	Not connected
7	$\Phi 0.8$ mm	VCC	Supply voltage