RK300

The RK300 is a Space TCXO, engineered in a hermetically sealed, flat-pack package to withstand demanding applications that require long-term stability and reliability. It is ideally suited for navigation payloads, RF communication units, onboard processing electronics, and frequency & timing systems.

This high-performance TCXO offers low power consumption (0.4 W), excellent phase noise, and frequency stability from ±0.5 ppm over the temperature range. The device is ITAR-free and manufactured in accordance with MIL-PRF-55310 (Class 1, Type 3, Level S), ensuring long-term stability of ±5 ppm over 15 years for space missions.

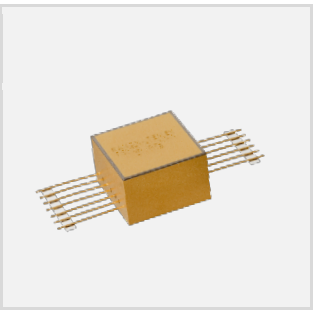
Features

- Frequency (Fn): 10 to 100 MHz
- Supply voltage: 5 or 12 V
- Low consumption: 30 mA max
- Frequency stability (FvT): ±0.5 ppm, 0 to 50°C
- Ageing: ±5 ppm/15 years
- Output waveform: sine 50 Ω
- Output level: 0 dBm (5 V); 7 dBm (12 V)
- ITAR-free
- Component selected per ECSS-Q-ST-60C
- Materials selected per ECSS-Q-70
- Manufacturing in accordance with:
- MIL-PRF-55310 (Class 1, type 3, level S), ECSS-Q-ST-70-08C, ECSS-Q-ST-70-38C

Applications

- GNSS receivers,
- Transponders, converters
- Processing boards, digital cards
- Synthesisers, Frequency generation units (FGUs)

20 x 20 x 13 mm



1.0 Environmental Conditions

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Operating temperature (T_{OP})	Option A: 0 to 50°C, ±0.5 ppm Option B: -20 to 70°C, ±1 ppm Option C: -40 to 85°C, ±5 ppm	0 -20 -40	25 25 25	50 70 85	°C
Switch-on temperature (T_{SO})		-40	-	85	°C
Non-operating temperature (T_{NOP})		-55	-	105	°C
Random vibration	MIL-STD-202, Method 214, Condition 1-K; over level 46.3 gRMS				
Sine vibration	MIL-STD-202, Method 204, Condition D; 20 g peak				
Mechanical shock	MIL-STD-202, Method 213, Condition E; half-sine, with a peak acceleration of 1000 g, duration 0.5 ms				
Radiation (TID[1])	100 krad (Si), low dose rate				
Radiation (SEL[2])	No SEL observed up to LET = 60 MeV•cm²/mg				

2.0 Electrical Interface

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Power supply (V_{CC})	Option 1 Option 2	4.75 11.4	5 12	5.25 12.6	V
Load impedance[3]	Sine output	45	50	55	Ω
Resistance frequency adjustment (R_{ADJ})	R_{ADJ} / Calibration option 1	0	R_{ADJ}[4]	10	kΩ

[1] TID: Total Ionizing Dose

[2] SEL: Single Event Latchup

[3] Value of the capacitor in parallel to the resistive load depends on the frequency.

[4] R_{ADJ} is the nominal calibration resistor value, indicated in the final test report.

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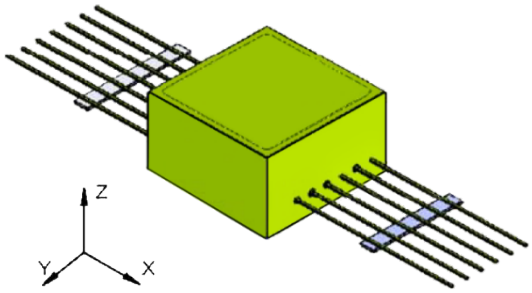
3.0 Performance

Parameter	Condition / Remarks	Min.	Typ.	Max.	Unit
Nominal frequency (Fn)	-	10	-	100	MHz
Steady state power supply	Option 1: 5 V Option 2: 12 V	-	-	0.2 0.4	W
Initial frequency accuracy		-	-	±1	ppm
Frequency adjustment	Calibration option 1 / negative slope	-	-	±5	ppm
Freq. stability vs temperature (FvT)	Option A: 0 to 50°C Option B: -20 to 70°C Option C: -40 to 85°C	-	-	±0.5 ±1 ±5	ppm
Freq. stability vs supply voltage (Vcc)	Over operating temperature	-	-	±0.1	ppm
Freq. stability vs load	Over operating temperature	-	-	±0.2	ppm
Long-term stability (ageing)	1st year 15 years	-	-	±1 ±5	ppm
Start-up time		-	-	10	ms
Allan standard deviation	Tau = 1s @25°C (@30 samples)	-	-	1	ppb
Phase noise (Static)	10 Hz offset 100 Hz offset 1 kHz offset 10 kHz offset	-	-	-75 -105 -130 -145	dBc/Hz
Output waveform – Sine					
Output	Vcc option 1 (5 V) Vcc option 2 (12 V)	0 7	-	-	dBm
Harmonics	From DC to 10 x Fn (Nominal frequency)	-	-	-30	dBc
Spurious	100 Hz to 100 kHz	-	-	-80	dBc

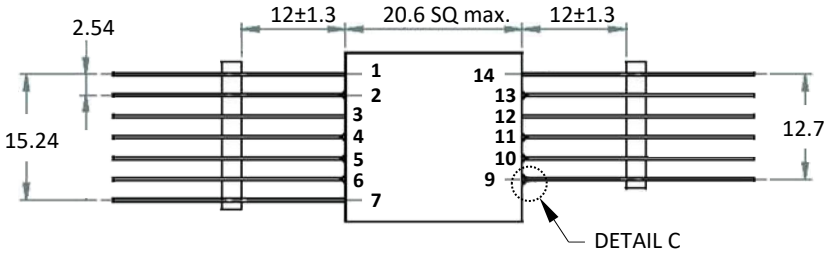
4.0 Model Outline and Pin Connections

Parameter	Package
Package size (L x W x H)	Atmospheric pressure: 20.6 x 20.6 x 12.8 mm max. Under vacuum: 20.6 x 20.6 x 13 mm max.
Package type	Flat pack, 13-lead
Net weight	20 g max.
STEP file	RK300 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.*

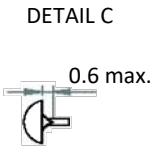
Model outline:

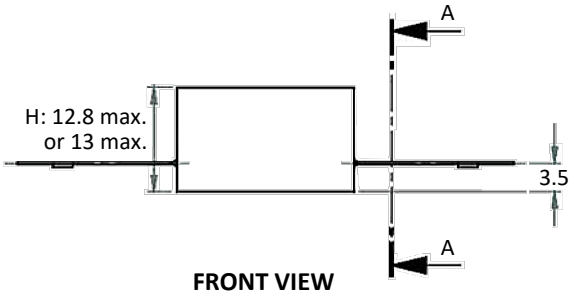


Pin (s)	Symbol	Connections / Notes
1, 3, 7, 12, 14	GND	Electrical & mechanical ground
2	V_{CC}	Supply voltage
4, 5, 9, 10, 11	DNC	Do not connected
6	R_{ADJ}	Resistor frequency adjustment (Option 1)
13	F_{OUT}	Frequency output
2, 4, 5, 6, 9, 11, 13	I.D. bead pins	

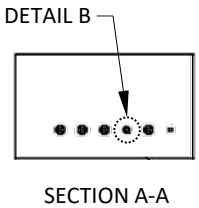


TOP VIEW

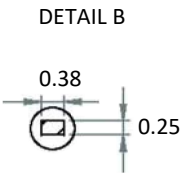




FRONT VIEW



SECTION A-A



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

5.0 Model Definition Matrix – Characteristics and Requirements

Model	EM Engineering Model	EQM Engineering Qualification Model	FM Flight Model	FMC Flight Model + Group C
Components	Passive commercial parts, Active parts from the same manufacturer of HiRel parts	Mil Grade parts procured from the same manufacturer of HiRel parts	HiRel Parts	HiRel Parts
Crystal material	Swept quartz stabilised	Swept quartz stabilised	ESCC3501 Swept quartz stabilised	ESCC3501 Swept quartz stabilised
Mechanical interface	Flight representative in form-fit-function	Flight representative in form-fit-function	Flight design	Flight design
Electrical interface	Flight design	Flight design	Flight design	Flight design
Tests	Acceptance testing	Qualification testing	Acceptance testing (including screening)	Acceptance testing (including screening + Group C)
Workmanship	IPC610	ECSS-Q-ST-70-08 & 70-38	ECSS-Q-ST-70-08 & 70-38	ECSS-Q-ST-70-08 & 70-38

6.0 Flight Model (FM) Screening According to MIL-PRF-55310

- Full Level S

7.0 Options for Engineering Qualification Model (EQM)

- Production manufacturing, qualification flow, including qualification mechanical tests
- Production manufacturing, electrical tests only

8.0 Deliverable Documentation

- Test data
- Full specification
- Certificate of Conformity (CoC)

9.0 Order Part Example