

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.

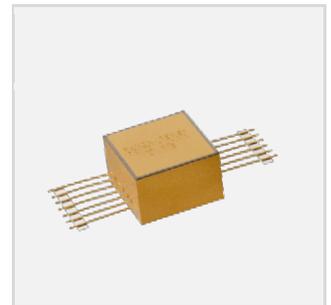
Features

- 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•cm ² /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 | k Ω |

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.

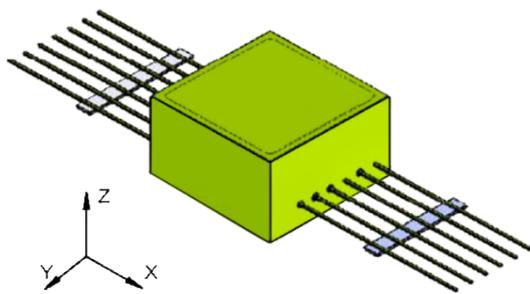
3.0 Performance

| 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) | 1 st 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 |

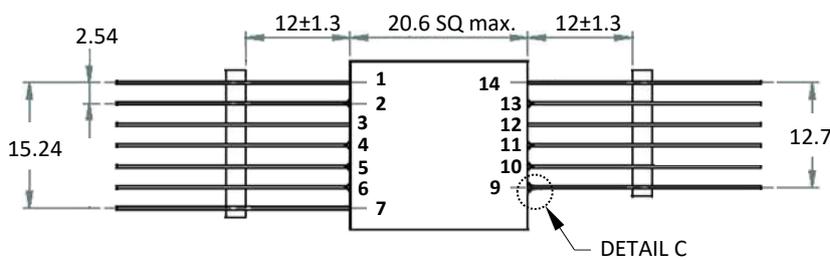
4.0 Model Outline and Pin Connections

| 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. |

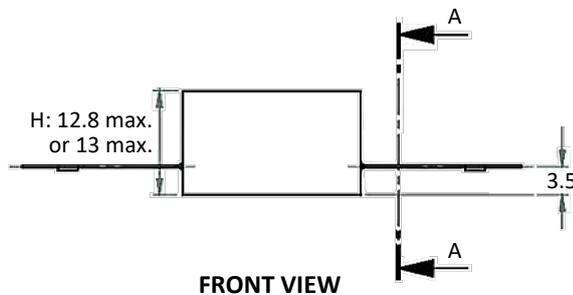
Model outline:



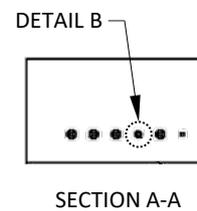
| Pin (s) | Symbol | Connections / Notes |
|-----------------------|------------------|--|
| 1, 3, 7, 12, 14 | GND | Electrical & mechanical ground |
| 2 | V _{CC} | Supply voltage |
| 4, 5, 9, 10, 11 | DNC | Do not connected |
| 6 | R _{ADJ} | Resistor frequency adjustment (Option 1) |
| 13 | F _{OUT}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



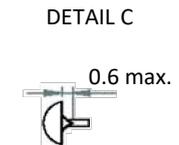
TOP VIEW



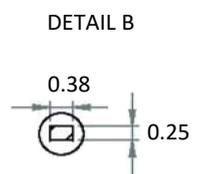
FRONT VIEW



SECTION A-A



DETAIL C



DETAIL B

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

