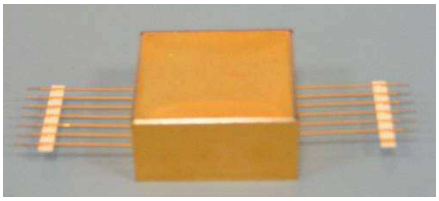
# Space Voltage Controlled Crystal Oscillator

# TE 200 VCXO Series 200

*For this product, full and detailed specifications can be delivered on request.*
*Specific request can be addressed to RAKON info@rakon.fr*

## Product Description

This ITAR free Space Flat Pack VCXO is featured by excellent pulling range of +/- 70ppm, good ageing characteristics of +/- 1 ppm per year, low power consumption of 0.15W, compact package size (20x20x13mm), and weight of 20g. The main applications are space synthesizers and transponders. These Space Flat Pack VCXOs are manufactured in accordance with MIL-PRF-55310 (Class 1, type 2, level S).



## Features

- Frequency Range : 10MHz to 40 MHz
- Supply Voltage : +5V or +12V
- Low Consumption : 30 mA max
- Frequency Stability vs. Operating Temperature : from +/- 10ppm to +/- 15ppm
- Ageing : +/– 5ppm over 15 years
- Output Wave Form : sine 50 Ohms
- Output Level : from 0 to 8 dBm
- Component selected as per ECSS-Q-ST-60C
- Materials selected as per ECSS-Q-70
- Manufacturing in accordance with:
  - MIL-PRF-55310 (Class 1, type 2, level S)
  - ECSS-Q-ST-70-08C and ECSS-Q-ST-70-38C

## Applications

- GPS receivers
- Converters
- Board calculators
- Synthesizers
- FGU

## Specifications

### 1.0 Environmental conditions

| Line | Parameters | Conditions/remarks | Min | Nom | Max | Unit |
|---|---|---|---|---|---|---|
| 1.1 | Operating Temperature | Temperature option A | 0 | 25 | 50 | °C |
| | | Temperature option B | -20 | 25 | 70 | °C |
| | | Temperature option C | -40 | 25 | 85 | °C |
| 1.2 | Switch-on Temperature | TSo | -40 | | 85 | °C |
| 1.3 | Non-Operating Temperature | TNOp | - 55 | | 125 | °C |
| 1.4 | Random Vibration | Level as per MIL-STD-202), Method 214, Condition I-K (47,60 Grms) | | | | |
| 1.5 | Sine Vibration | Level as per MIL-STD-202), Method 204, Condition D (20G) | | | | |
| 1.6 | Shocks | Mechanical shock as per MIL-STD-202, Method 213, Condition E (half sine with a peak acceleration of 1000g for duration of 0.5 msec) | | | | |
| 1.7 | Radiation | TID : 100 kRad, low dose rate<br>No SEL up to LET=60 MeV/mg/cm² | | | | |

## 2.0 Electrical interface

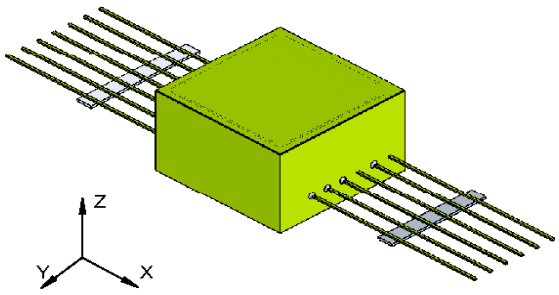
| Line | Parameters | Conditions/remarks | | Min | Nom | Max | Unit |
|---|---|---|---|---|---|---|---|
| 2.1 | Power supply | Supply option 1 | | 4.75 | 5.0 | 5.25 | V |
| | | Supply option 2 | | 11.4 | 12.0 | 12.6 | V |
| 2.2 | Load Impedance | | | 45 | 50 | 55 | Ω |
| 2.3 | Control voltage | | | 0 | | 5 | V |
| 2.4 | Adjustment Resistor | Radj | Calibration option A | 0 | | 10 | kΩ |
| | | | Calibration option B | NA | NA | NA | |

## 3.0 Performances

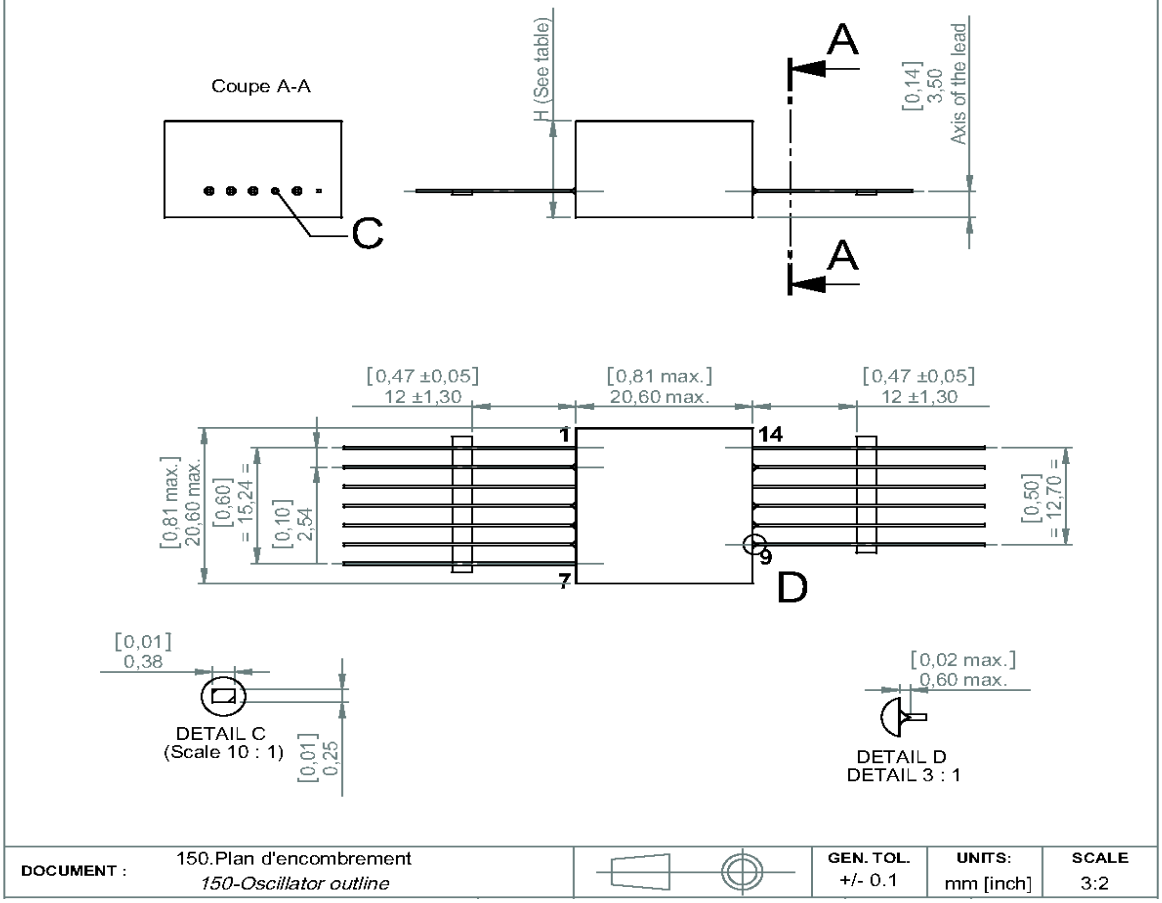
| Line | Parameters | Conditions/Remarks | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| 3.1 | Nominal Frequency | | | 10 | | 40 | MHz |
| 3.2 | Steady state input current power | (Rnom) | | | | 30 | mA |
| 3.3 | Initial frequency accuracy | Calibration option A | Rnom | | | ± 1 | ppm |
| 3.4 | Frequency adjustment | Calibration option A | Negative slope | | | | |
| | | | RadjMin | +5 | | | ppm |
| | | | RadjMax | | | - 5 | ppm |
| 3.5 | Frequency control | Control voltage option A | | ±40 | | | ppm |
| | | Control voltage option B | | ±70 | | | ppm |
| 3.6 | Frequency stability vs temperature | Temperature option A | | | ± 10 | | ppm |
| | | Temperature option B | | | ± 10 | | |
| | | Temperature option C | | | ± 15 | | |
| 3.7 | Frequency variation vs. supply voltage | Over Operating Temperature | | | ± 0.5 | | ppm |
| 3.8 | Frequency variation vs. load | Over Operating Temperature | | | ± 0.5 | | ppm |
| 3.9 | Frequency ageing | Over 1 years | | | | ± 1 | ppm |
| 3.10 | Output waveform | | | Sine | | | |
| 3.11 | Output level | | | 0 | | | dBm |
| 3.12 | Harmonics level | | | | | – 30 | dBc |
| 3.13 | Spurious level | | | | | – 80 | dBc |
| 3.14 | Phase noise | noisefloor | | | | – 145 | dBc/Hz |

## 4.0 Mechanical features

**Weight 20 grams**




| | |
|---|---|
| H | Hauteur maximum du boitier sous pression atmosphérique<br>*Maximum package height under atmospheric pressure*<br>**12.8 [0.504] max**<br>Hauteur maximum du boitier sous dépression<br>*Maximum package height under underpressure*<br>**13 [0.511] max** |
| Number of lead : 13 | Leads on 2 sides |
| I.D bead : Pins # : 2, 4, 5, 6, 9, 10, 11, 13 | Grounds pins : Pins # : 1, 3, 7, 12, 14 |




## 5.0 Pin description

| Line | Pin number | Name | Function |
|---|---|---|---|
| 5.1 | 1-3-7-12-14 | GND | Electrical & Mechanical Ground |
| 5.2 | 2 | Vcc | Supply Voltage |
| 5.3 | 4 | Radj | Calibration option A Resistor Adjustment |
| | | NC | Calibration option B Do not connect |
| 5.4 | 6 | Vc | Control voltage input |
| 5.5 | 5-9-10-11 | NC | Do not connect |
| 5.6 | 13 | Fout | Frequency Output |

## 6.0 Model philosophy

| Representativeness | Engineering Model<br><br>(option A) | Engineering Qualification Model<br><br>(options B, C) | Qualification Model<br><br>(option D) | Flight Model<br><br>(options E, F, G, H) | Flight Model + Lot Acceptance test<br><br>(option I) |
|---|---|---|---|---|---|
| **Component** | Passive commercial parts<br>Active parts from the same manufacturer of HiRel parts | Mil Grade parts procured from the same manufacturer of HiRel parts | HiRel Parts | HiRel Parts | HiRel Parts |
| **Crystal material** | Swept quartz<br><br>Stabilized | Swept quartz<br><br>Stabilized | Swept quartz ESCC3501<br>Stabilized | Swept quartz ESCC3501<br>Stabilized | Swept quartz ESCC3501<br>Stabilized |
| **Mechanical interface** | Flight representative in form-fit-function | Flight representative in form-fit-function | Flight design | Flight design | Flight design |
| **Electrical interface** | Flight design | Flight design | Flight design | Flight design | Flight design |
| **Tests** | Acceptance testing | Qualification testing | Qualification testing (including screening) | Acceptance testing (including screening) | Acceptance testing (including screening)+ LAT |
| **Workmanship** | IPC610 | ECSS-Q-ST-70-08 & 70-38 | ECSS-Q-ST-70-08 & 70-38 | ECSS-Q-ST-70-08 & 70-38 | ECSS-Q-ST-70-08 & 70-38 |

## 7.0 Flight Model Screening according to MIL-PRF-55310

- Full Level S (option E)
- Level S with combined burn in aging of 480 hours (option F)
- Full Level B (option G)
- Level B with combined burn in aging of 480 hours (option H)

Lot Acceptance test could be performed on all screening options

## 8.0 Options for Engineering Qualification Model

- Production manufacturing, qualification flow including qualification mechanical tests (option B)
- Production manufacturing, electrical tests only (option C)

## 9.0 Deliverable documentation

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

## 10.0 Ordering part number definition

The part number breakdown is defined as follows:

**TE 200 E A 1 1 1 20M000000**

**Series**

**Model**
A = EM
B = EQM full environmental testing
C = EQM reduced environmental testing
D = QM
E = FM level S
F = FM level S with combined BI-aging
G = FM level B
H = FM level B with combined BI-aging
I = FM + group C

**Temperature range/Stability**
A = 0℃ to +50℃, ± 10 ppm
B = 0℃ to +70℃, ± 10 ppm
C = –20℃ to +70℃, ± 15 ppm

**Supply voltage**
1 = 5V
2 = 12V

**Wave form**
1 = Sine

**Frequency pulling range**
1 = ± 40 ppm
2 = ± 70 ppm

**Frequency,** fnom