RK407

The RK407 is a Hi-Rel Space OCXO in the $10^{-7}$ frequency stability class. It is designed for scenarios where low power consumption is required, but where the frequency stability of a Space TCXO is insufficient. The RK407 delivers low phase noise in a compact flat pack package.

Screening to MIL-PRF-55310 (Class 1, type 4, level S) guidelines or to an optimised and shorter flow are available for this product. The RK407 is ideal for communication equipment such as signal generation, transponders, digital cards, down and up converters and synthesizers. This Space OCXO is available with short lead-times.

### Features

- Wide frequency range from 10 to 130 MHz with standard frequencies 10, 40, 100 and 125 MHz
- Low consumption: 0.7 W
- Supply voltage: +5 or +12 V
- Warm up consumption: 2.1 W
- Frequency stability vs. temperature: ±0.25 ppm under vacuum
- Ageing: ±1 ppm over 18 years
- Output wave form: sine 50 Ω
- Compatible with flat pack TCXO pin-out
- Component selected as per ECSS-Q-ST-60C
- Materials selected as per ECSS-Q-ST-70
- Manufacturing in accordance with ECSS-Q-ST-70-08C and ECSS-Q-ST-70-38C

### Applications

- Transponders
- GNSS receivers
- Navigation
- Converters
- On-board calculators
- Synthesizers

### Environmental Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition / Remarks</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>$T_{op}$</td>
<td>-40</td>
<td>25</td>
<td>70</td>
<td>°C</td>
</tr>
<tr>
<td>Switch-on temperature</td>
<td>$T_{so}$</td>
<td>-40</td>
<td>-</td>
<td>85</td>
<td>°C</td>
</tr>
<tr>
<td>Non-operating temperature</td>
<td>$T_{nop}$</td>
<td>-40</td>
<td>-</td>
<td>85</td>
<td>°C</td>
</tr>
<tr>
<td>Random vibration</td>
<td>Level as per MIL-STD-202 Method 214: 20 to 100 Hz: +6 dB/oct; 100 to 1000 Hz: 2.6 g²/Hz; 1000 to 2000 Hz: -6 dB/oct; Overall: 61 grms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sine vibration</td>
<td>Level as per MIL-STD-202 Method 204, Condition D (20 g)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical shock</td>
<td>Level as per MIL-STD-202, Method 213: Half sine with a peak acceleration of 3000 g or duration of 0.3 ms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiation</td>
<td>Total Ionizing Dose (TID) of 100 krad, low dose rate (36 to 360 rad/h). Latch up free up to LET = 60 MeV/mg/cm²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Electrical Interface

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition / Remarks</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply ($V_{CC}$)</td>
<td>Option 1 (12 V)</td>
<td>11.40</td>
<td>4.75</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Option 2 (5 V)</td>
<td>12.5</td>
<td>5.25</td>
<td>12.60</td>
<td>5.25</td>
</tr>
<tr>
<td>Load impedance</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>Reference voltage ($V_{REF}$)</td>
<td>Option 1 (12 V)</td>
<td>5.4</td>
<td>2.85</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Option 2 (5 V)</td>
<td>6.6</td>
<td>3.15</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>Control voltage ($V_{C}$)</td>
<td>Frequency adjustment: Option 2 (5 V) only</td>
<td>0</td>
<td>-</td>
<td>$V_{REF}$</td>
<td>V</td>
</tr>
</tbody>
</table>

### Phase Noise (Maximum value)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>10 to 45 MHz</th>
<th>90 to 110 MHz</th>
<th>120 to 130 MHz</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Hz offset</td>
<td>-65</td>
<td>-55</td>
<td>-55</td>
<td>dBC/Hz</td>
</tr>
<tr>
<td>10 Hz offset</td>
<td>-95</td>
<td>-85</td>
<td>-85</td>
<td>dBC/Hz</td>
</tr>
<tr>
<td>100 Hz offset</td>
<td>-125</td>
<td>-115</td>
<td>-115</td>
<td>dBC/Hz</td>
</tr>
<tr>
<td>1 kHz offset</td>
<td>-145</td>
<td>-135</td>
<td>-135</td>
<td>dBC/Hz</td>
</tr>
<tr>
<td>10 kHz offset</td>
<td>-152</td>
<td>-150</td>
<td>-150</td>
<td>dBC/Hz</td>
</tr>
</tbody>
</table>

### Frequency Characteristics

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Specifications are subject to change without notice
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sales@rakon.com
### Parameter | Condition / Remarks | Min. | Typ. | Max. | Unit
--- | --- | --- | --- | --- | ---
Nominal frequency (Fn) | Standard frequencies: 10, 40, 100 and 120 MHz | - | 10 – 130 | - | MHz
Steady state supply power | Vacuum, EOL, @-40 °C | - | - | 1.1 | W
Warm up supply power | Vacuum, EOL | - | - | 2.1 | W
Initial frequency accuracy | Vacuum (with Vc) | - | - | ±0.4 | ppm
Frequency adjustment | With Vc | - | - | ±1.2 | ppm
Frequency stability over temperature (FvT) | -20°C to 70°C | - | - | ±0.1 | ppm
| -40°C to 70°C | | | | ±0.25 | ppm
Supply voltage stability (FvT) | Over operating temperature | - | - | ±0.05 | ppm
Load sensitivity (FvT) | Over operating temperature | - | - | ±0.05 | ppm
Pressure (FvT) | Atm to vacuum | - | - | ±0.2 | ppm
Ageing (FvT) over 1 day | Fnom: 10 to 45 MHz | - | - | ±5 | ppb
| Fnom: 90 to 130 MHz | | | | ±10 | ppb
Ageing (FvT) over 1 year | Fnom: 10 to 130 MHz | - | - | ±0.3 | ppm
Ageing (FvT) over 18 years | Fnom: 10 to 130 MHz | - | - | ±1 | ppm
Allan variance | $\tau = 1 \text{ s}$ | - | - | 5E-11 | -
Frequency warm up | Time needed to reach the initial frequency accuracy (1h ref.) | - | - | 7 | mn
Output waveform | Sine | - | - | - | -
Output level | BOL: 12 V | 5 | 4 | 6 | dBm
| BOL: 5 V | | | 5 | |
Harmonics level | - | - | -25 | dBc
Spurious level | 100 Hz to 100 kHz | - | - | -100 | dBc
| 100 kHz to 5 GHz | | | -85 | |

### Ordering Part Example

RK407 1 1 FM 10M000000

**Product Family**

RK = Rakon
4xx = OCXO
07 = $10^{-7}$ stability class

**Supply Voltage**

1 = 12 V
2 = 5 V

**Frequency (Fn)**

100M000000 = 10 MHz (Fn)

**Model Option**

EM = EM
EQM = EQM
FM = FM

**Frequency Adjustment**

1 = Internal calibration
2 = Voltage controlled