

## Rakon Has the Answer for Shock and Vibration Tolerant Crystals and TCXOs

Acceleration forces can affect the output frequency stability of TCXOs. Rakon recognises the need for acceleration tolerant crystals and TCXOs in rugged environments. With this in mind, the RGX-3, a SMD strip crystal design, has been developed offering G sensitivity as low as 0.2ppb/G or shock survivability of up to 20,000G.

The RGX-3 is Rakon's unique strip crystal technology available in a 6.0mmx3.5mm, seam sealed ceramic package that is supplied on tape and reel. This acceleration tolerant crystal is the same crystal used in Rakon's IT7500DG Series; high performance TCXOs providing a combination of tight stability (up to 0.1ppm), superior phase noise, and very low G sensitivity in high vibration environments.

Different environments require different performance capabilities. Lock-on every time with the Hi-G range from Rakon.

### RGX-3

#### SMD Communication Crystals

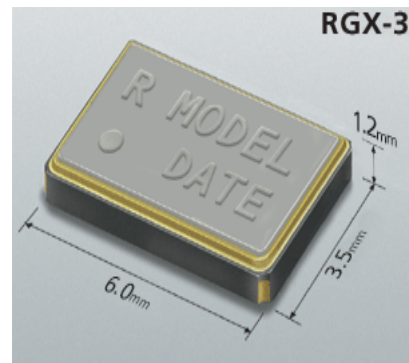
Acceleration tolerant SMD AT-cut quartz crystal in ceramic package with 6 \* 3.5mm footprint.

#### Product Description

SMD AT-cut quartz crystal specifically designed to operate in vibration prone environments . True SMD style, ceramic package with metal lid, seam sealed. The product is supplied on tape and reel.

Parts are able to survive acceleration 20,000G & higher with minimal parameter change.

Vibration G-sensitivity significantly reduced.



#### Features

- Up to 50,000G acceleration event survival
- G-sensitivity down to 0.2ppb/G
- No frequency perturbations
- Very good short term stability
- Low aging

### 1.0 SPECIFICATION REFERENCES

1.1	<b>Model Description</b>	RGX-3
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### 2.0 FREQUENCY CHARACTERISTICS

Line	Parameter	Test Condition	Min.	Max.	Units
2.1	<b>Fundamental frequency range</b>	Nominal frequency referenced to frequency at 23°C ±2°C	10.0	26.0	MHz

<b>2.2 Calibration tolerance</b>	Frequency at 23°C ±2°C (Note 1)	10.0	20.0	±ppm
<b>2.3 Frequency stability over temperature</b>	Referenced to frequency reading at 25°C and the specified Load Capacitance (Note 2)	4.0	40.0	±ppm
<b>2.4 Temperature range</b>	Maximum operating temperature available (Note 3)	-45.0	95.0	°C
<b>2.5 <u>Frequency perturbations</u></b>	Peak to peak deviation from the frequency vs temperature 5th order curve fit. Minimum of 1 frequency reading every 3°C, over the operating temperature range	0.2	1.0	ppm
<b>2.6 Short term stability</b>	Root Allan Variance for 1 second Tau	1.0		ppb
<b>2.7 Long term stability</b>	Frequency drift over 1 year (Note 1)	1.0		±ppm
<b>2.8 Long term stability</b>	Frequency drift over 10 year (Note 1)	5.0		±ppm
<b>2.9 G-Sensitivity</b>	Gamma vector of all three axes from 30Hz to 1500Hz, typical values. Values as low as 0.2ppb/G available depending on design (Note 1, 4)	0.2	0.8	ppb/G
<b>2.10 Frequency offset after acceleration event</b>	20,000G/2ms acceleration event in the z axis. Theoretical recovery time of 100ms (Note 4)	-3.0	0.0	ppm

3.0 ELECTRICAL					
Line	Parameter	Test Condition	Min.	Max.	Units
3.1	<b>Load capacitance (CL)</b>	Frequency is calibrated to a load at room temperature. Value required to be specified (Note 5)	7.0	35.0	pF
3.2	<b>Pullability</b>	Load and crystal design dependant. (Note 6)	2.0	40.0	ppm/pF
3.3	<b>Drive level</b>	Operating specification		100.0	micro W

4.0 EQUIVALENT SERIES RESISTANCE (ESR)					
Line	Parameter	Test Condition	Min.	Max.	Units
4.1	<b>Fundamental</b>	10MHz to 26MHz (Note 1)		50.0	Ohms

5.0 ENVIRONMENTAL					
Line	Parameter	Test Condition	Min.	Max.	Units
5.1	<b>Shock</b>	Half sinewave acceleration of 3,000G peak amplitude for 0.3ms duration, 2 cycles in each axis (Note 7).			
5.2	<b>Vibration</b>	10G RMS 30Hz to 1500Hz duration of 2 hours in each axis (Note 7).			
5.3	<b>Humidity</b>	After 48 hours at 85°C 85% relative humidity non-condensing (Note 7).			
5.4	<b>Thermal shock</b>	Exposed at -40°C for 30 minutes then to 85°C for 30 minutes constantly for a period of 5 days (Note 7).			

**5.5 Storage temperature** -55 to 105°C.

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## **6.0 MANUFACTURING INFORMATION**

**6.1 Reflow** Able to withstand two solder reflow process. See reflow profile attached.

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**6.2 Packaging description** Tape and Reel. 2000pcs per reel standard. Refer to drawing for details.

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## **7.0 MARKING**

**7.1 Type** Laser engraved

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**7.2 Line 1** Rakon Logo and the last four characters of the Rakon Part Number

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**7.3 Line 2** Pin 1 mark and Date Code

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## **8.0 SPECIFICATION NOTES**

**8.1 Note 1** The maximum value is the specification. A minimum value, if present, indicates the tightest specification available.

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**8.2 Note 2** A maximum frequency stability over the temperature range needs to be specified.

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**8.3 Note 3** The operating temperature range needs to be specified

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**8.4 Note 4** The min G-Sensitivity and max acceleration event survival specifications can not be met at

the same time. Please contact Rakon Sales with specific requirements.

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**8.5 Note 5**

The crystal frequency is calibrated to a load between min. and max. Note Series Resonance options are available for this model, and under certain conditions, loads above 35pF may also be available.

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**8.6 Note 6**

A more precise min. and/or max. may be specified should the exact pullability be of importance for a particular application.

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**8.7 Note 7**

The environmental condition will cause less than 1ppm shift in frequency measured at 25°C.