



## Introduction

Rakon is one of the world’s largest solution providers of high reliability frequency control products. Through Rakon India (formally Centum Rakon India), Rakon offers a wide variety of high reliability solutions for the Indian space market. Rakon continuously develops state of the art frequency control products at the cutting edge of innovative technology, supporting the “Make in India” initiative directed by the Indian government.

## Rakon India Space Product Range and Heritage

- Rakon India has a long history of providing high reliability space-grade XOs, VCOs, VCXOs, TCXOs and OCXOs to the Indian market for more than 15 years, and has helped to build India’s domestic heritage in space missions.
- Our space-grade products are qualified and certified by the Indian Space Research Organisation (ISRO). Products are manufactured following the guidelines of MIL-PRF-55310 Class S and the ISRO approved Process Identification Document.
- As your strategic frequency control partner, Rakon can provide standard products or modified solutions, ranging from Commercial Off The Shelf products and high performance crystals all the way through to ovenised oscillators.
- Many government and commercial programmes use Rakon oscillators across the globe in systems where high performance is required under the most demanding conditions. Examples of Indian spacecraft and launch vehicles include: GSAT-19, GSAT-17, GSAT-15, MARS-Mission, ASTROSAT, IRNSS-1D, IRNSS 1D, PSLV-25 (MARS-Mission), PSLV-27 (IRNSS 1D), GSLV D6 (GSAT 6), GSLV Mk3 (GSAT- 19), GSLV FO9 (GSAT 9), PSLV-38 (Cartosat).

## Rakon High Reliability Solutions for Spacecraft and Launch Vehicles



### Clock Oscillators (XOs)

- 2013-14: PSLV-25, MARS-Mission [ 2 Variants]
- 2015 : PSLV-27, IRNSS 1D [ 1 Variant]
- 2016: GSLV D6, GSAT 6 [ 4 Variants], RLV TD [ 1 Variant ]
- 2017: GSLV FO9, GSLV FO9 , Cartosat [ 1 Variant]

### TCXOs






- 2013-14: PSLV-25, MARS-Mission [ 2 Variants]
- 2016: GSLV D6, GSAT 6, [ 4 Variants]
- 2017 : GSLV Mk3, GSAT-19 [ 2 TCXO Variants]
- 2017 : GSLV FO9, GSAT 9 [ 4 TCXO Variants]



# High-Reliability Products for Space: Rakon India

## Solutions for Space

Rakon India has an extensive portfolio of products with extreme capabilities. We have frequency control solutions for all types of spacecraft including: Transportation vehicles, Exploration probes as well as Navigation, Observation and Telecommunication Satellites.

Products	Screening and Manufacturing	Features	Radiation Capability	Key Performance
<b>XO</b> 	Following the guidelines of MIL-PRF-55310 Class S	<ul style="list-style-type: none"> <li>Frequency range 256 kHz–52.5 MHz</li> <li>AT-Cut, open blank design</li> <li>14 pin hermetic package</li> <li>22.1 x 12.65 x 4.8 mm</li> </ul>	TID 100 kRad	<ul style="list-style-type: none"> <li>±50 ppm (-55°C to 125°C)</li> </ul>
<b>VCO</b> 	Per ISRO-PAS-206	<ul style="list-style-type: none"> <li>Frequency range 970–1450 MHz</li> <li>Wide band tuneable Voltage Controlled Oscillator</li> <li>Colpitts configuration</li> <li>15.875 x 15.875 x 4.3 mm</li> </ul>		<ul style="list-style-type: none"> <li>Control Voltage: 1–11 V</li> </ul>
<b>VCXO</b> 	Following the guidelines of MIL-PRF-55310 Class S	<ul style="list-style-type: none"> <li>Frequency range 15–40 MHz</li> <li>AT-Cut, flat pack crystal</li> <li>24 pin, hermetic</li> <li>35 x 20.19 x 10 mm</li> </ul>	TID 100 kRad	<ul style="list-style-type: none"> <li>±20 ppm (-30°C to 60°C)</li> <li>Spurious &lt; -80 dBc</li> </ul>
<b>TCXO</b> 	Following the guidelines of MIL-PRF-55310 Class S	<ul style="list-style-type: none"> <li>Frequency range 5.5–375 MHz</li> <li>AT-Cut, TO-5 crystal</li> <li>24 pin, hermetic</li> <li>35 x 20.19 x 15 mm</li> </ul>	TID 100 kRad	<ul style="list-style-type: none"> <li>±2 ppm (-30°C to 60°C)</li> <li>Spurious &lt; -80 dBc</li> </ul>
		<ul style="list-style-type: none"> <li>Frequency range 14–375 MHz</li> <li>AT-Cut, flat pack crystal</li> <li>24 pin, hermetic</li> <li>Bath tub package</li> </ul>		<ul style="list-style-type: none"> <li>±1 ppm (-15°C to 60°C)</li> <li>Spurious &lt; -80 dBc</li> </ul>
<b>Miniature OCXO</b> 	Following the guidelines of MIL-PRF-55310 Class S	<ul style="list-style-type: none"> <li>Frequency range 100–128 MHz</li> <li>State of the art high frequency OCXO</li> <li>Low power</li> <li>Vibration hardened</li> <li>36 x 36 x 28 mm</li> </ul>	TID 100 kRad	<ul style="list-style-type: none"> <li>Power level: Min +7 dBm</li> <li>Vibration: 10-2000 Hz, 30g, 12 Hours each axis</li> </ul>
<b>OCXO</b> 	Following the guidelines of MIL-PRF-55310 Class S	<ul style="list-style-type: none"> <li>Frequency range 70–128 MHz</li> <li>State of the art high frequency OCXO</li> <li>SC-Cut</li> <li>SMA connector version</li> <li>55 x 55 x 35 mm</li> </ul>	TID 100 kRad	<ul style="list-style-type: none"> <li>±10 ppb (-10°C to 60°C)</li> <li>Spurious &lt; -100 dBc</li> </ul>

## Upcoming Products (Images are representative only)

<b>Ultra-low Noise 10MHz Space grade OCXO</b> 	<b>Low Noise High Frequency Space grade TCXO</b> 
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