

### About New Space

The traditional space sector has been dominated by governments. Only the space communications sector has developed a dominant private component. The other traditional space sectors (e.g. launchers, human spaceflight, earth observation, global navigation systems and scientific missions) have remained subject to government control.

New Space refers to the recent democratisation of the space sector, which implies that more private companies, including startups, participate in this industry. This transformation is driven by innovations in launch and satellite manufacturing technology. In 60 years, the satellite launch mass has evolved from 20,000 kg to less than 4 kg.

A major trend in the New Space sector is the availability of high performance, Commercial-off-the-Shelf (COTS) approach, where satellite manufacturers are able to use standard commercial products, radiation tolerant or not, which are part of the equipment flown directly into space, or where products can be upscaled for spaceflight. This new approach speeds up development times and reduces production costs significantly. One area where COTS products are in use, is the small Low Earth Orbit (LEO) satellite market, where the satellites have a short mission lifetime and do not require the higher reliability standards of large Geostationary Earth Orbit satellites (GEO). Never-the-less it's important to note that COTS products do not fit the suitability of all New Space programmes, and cost-effectiveness is balanced by the need for high-reliability solutions that perform under demanding environmental conditions.

#### Master Reference Oscillator (MRO) for New Space

The **MRO NS** is an ideal solution for LEO satellite constellations, where ultra-low noise and very-low power consumption features are essential. The test and screening flows can be tailored according to customer requirements to reduce cost and lead time.

- Package: 46 x 174 x 75 mm
- Frequency: 10 to 500 MHz. Single output: 10 or 100 MHz
- Power bus: 28 or 50/75 V
- Overall frequency stability:  $\pm 0.2$  ppm (12 year) via sync. to 1 PPS
- Frequency Distribution Unit (FDU): Up to 8 outputs
- Integrated DC/DC converter
- On and Off TM/TC
- Output power: 0 to 25 dBm

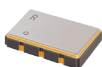


#### Phase noise @ 10 MHz

- @ 1 Hz: -110 dBc/Hz
- @ 10 Hz: -137 dBc/Hz
- @ 100 Hz: -147 dBc/Hz
- @ 1 kHz: -155 dBc/Hz
- Floor phase noise: -160 dBc/Hz

#### Radiation Tolerant COTS VCXO RK205

New Space grade radiation tolerant COTS VCXO **RK205** is designed for LEO satellites/mega-constellations.



- Frequency: 8 to 1500 MHz
- Hermetically sealed package: 5.0 x 3.2 x 1.2 mm SMD
- Absolute Pull Range (APR):  $\pm 50$  ppm
- TID limit: 72/100 kRad
- Latch-up free till 32.4/62 MeV
- Supply voltage: 2.5 or 3.3V
- Quick time to market

#### OCXO for New Space

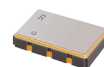
The OCXO **RK409NS** and **RK406NS** are cost-effective low power consumption Space OCXOs. They are uniquely designed for the New Space market.



OCXO	RK409NS	RK406NS
Package	50 x 50 x 30 mm	25.4 x 25.4 x 13 mm
Frequency	10 MHz	10 to 125 MHz
Overall freq. stability	$\pm 0.2$ ppm (12y)	$\pm 0.5$ ppm (5y)
Phase noise @ 10 MHz	-115/-140 dBc/Hz	-85/-105 dBc/Hz
Supply voltage	12 V	5 V
Power consumption	1 W	450 mW
Output waveform	Sine 50 $\Omega$ or Square	
TID limit	30 kRad	
Latch-up free up to LET	43 MeV/mg/cm <sup>2</sup>	

#### Radiation Tolerant COTS XO RK105

New Space grade radiation tolerant COTS XO **RK105** is designed for LEO satellites/mega-constellations.



- Frequency: 8 to 1500 MHz
- Hermetically sealed package: 5.0 x 3.2 x 1.2 mm SMD
- TID limit: 72/100 kRad
- Latch-up free till 32.4/62 MeV
- Supply voltage: 2.5 or 3.3V
- Quick time to market

