Raltron Electronics

Oscillators for Satellite Applications

May 2025

Raltron Electronics

- Founded in 1983, headquartered in Miami ,Fl .
- Design, manufacturing and distribution of frequency management and IoT related products including:
  - Precision crystal oscillators (VCXO s, TCXOs, OCXO s), crystal and ceramic resonators.
  - Microwave components: VCO ' s , PLL 's, custom modules.
  - Filters(SAW, crystal).
  - LTCC products (filters, baluns, diplexers)
  - Antennas and RF Cable Assemblies
  - Audio Products
- Worldwide operations and distribution.
- Global presence through a network of sales offices, representatives and distributors.

Production Facilities

Miami, Florida – Design, Engineering and Production Precision Oscillators

- TOTAL PERSONNEL: 50
- ENGINEERS: 13
- Precision Oscillators Design and Manufacturing
- ISO 9001:2008
- High Mix Low and Medium volume, Customized manufacturing

PRODUCTION CAPACITY (MONTH)
Programmable Oscillators 100k pcs
OCXO's 10k pcs
TCXO's 100k pcs

Raltron Products for Satellite Applications

Ground Systems
OCXO's
TCXO's
Filters

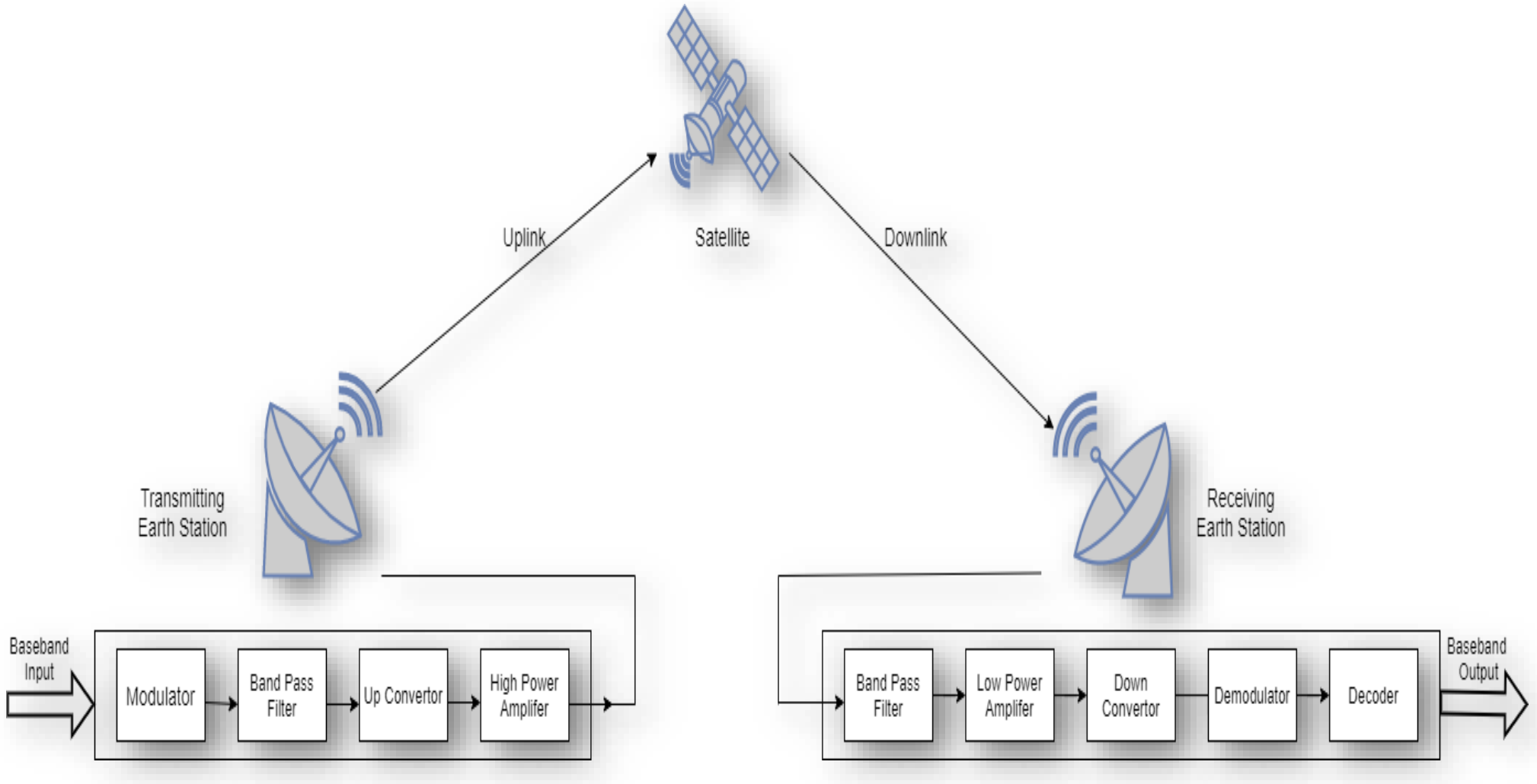
LEO Satellites
OCXO's
TCXO's

Launch Systems
TCXO's
VCXO's
Filters

Ground Based Communications

Systems containing Block Up Converters utilize:
OCXO's, TCXO's, Filters

Satellite Communication System

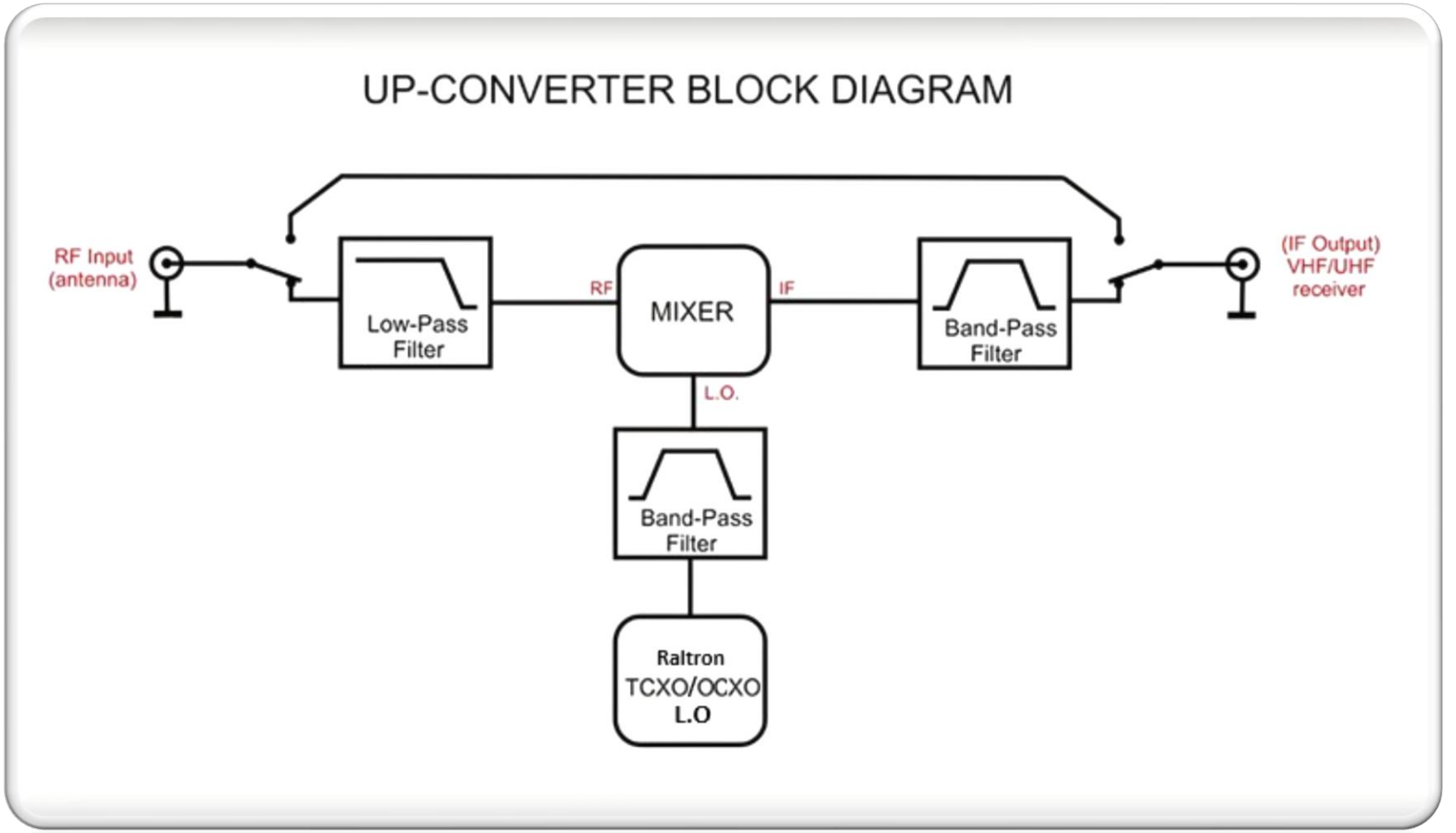


Block Up Converter: BUC

Function: The BUC is a component in the transmission side (up-Link)of a satellite communications system

The BUC converts lower frequencies into higher frequencies(information/data) which are transmitted to the satellites via a High-Power Amplifier

Basic BUC Block Diagram



Components used for Block Up Convertor

- Local Oscillators(Low Phase Noise OCXO's)

  *10 MHz for Lower RF communications

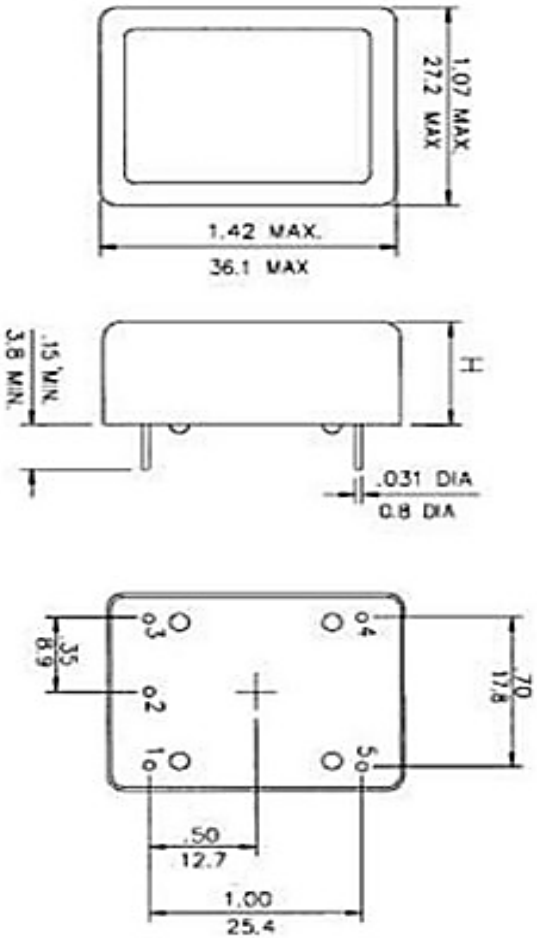
  *100MHz for Higher RF communications
- Local Oscillator Filters
- Low Pass Filters
- Bandpass Filters

The frequencies vary according to the BUC manufacturer and the specific transmission application.

Raltron Low Phase Noise OCXO 10MHz, 12V

PARAMETER	SYMBOL	CONDITION	VALUE			UNIT
			Min.	Typ.	Max.	
Nominal Frequency	f_o			10.000		MHz
Supply Voltage	V_s	Vs ±5% @ 25°C	11.4	12.0	12.6	V
Input Current	I_S	Steady state, @ 25°C			150	mA
	$I_{S,w}$	During warm-up ,@ 25°C			400	mA
Frequency Stability vs. Temperature	$\Delta f/f_0$ (T_a)	Ta= -40°C…+85°C, measurement ref to (f_{max}+f_{min})/2	-50		+50	ppb
Electronic Frequency Adjust		V_C = 0.0Vdc to 9.0Vdc		±1.0		ppm
Output Signal		Sine Wave into 50Ω	8	10	12	dBm
Phase Noise						
@10Hz Offset	£ (Δf)	50Ω Load		-130	-125	dBc/Hz
@100Hz Offset	£ (Δf)	50Ω Load		-150	-145	dBc/Hz
@1kHz Offset	£ (Δf)	50Ω Load		-155	-150	dBc/Hz
@10kHz Offset	£ (Δf)	50Ω Load		-163	-155	dBc/Hz
@100kHz Offset	£ (Δf)	50Ω Load		-165	-160	dBc/Hz
Aging, after 30 days of operation	$\Delta f/\Delta t_d$	Daily	-0.5		+0.5	ppb
	$\Delta f/\Delta t_y$	First year	-100		+100	ppb
G-Sensitivity		Ta=25°C, Vs=12V			1	ppb/g
Radiation Hardness		Compliant with satellite requirements				

*Lower Phase Noise is available
**Lower G-Sensitivity options are available



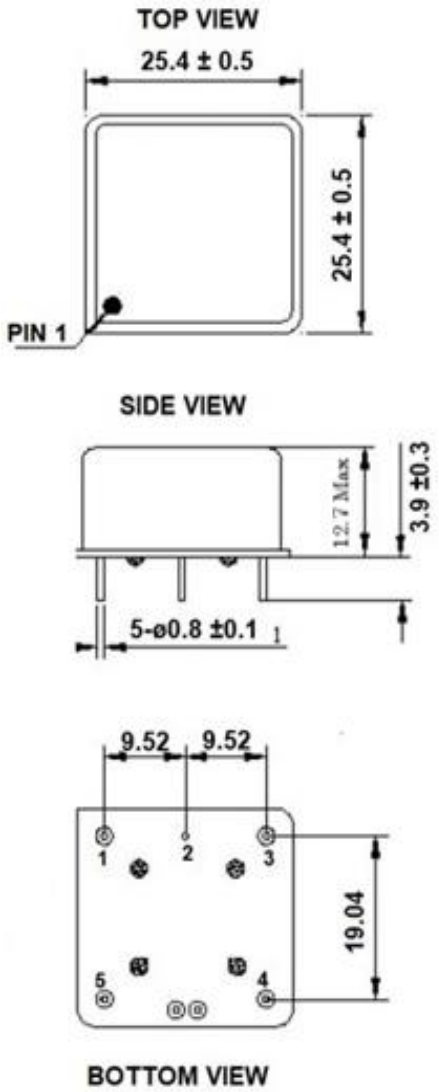
PIN	SYMBOL	FUNCTION
1	VC	Voltage Control
2	NC	Not Connected
3	Vs	Supply Voltage
4	RF Out	Output
5	GND	Ground

H: 19.0mm max

Raltron Low Phase Noise OCXO 100MHz,12V

PARAMETER	SYMBOL	CONDITION	VALUE			UNIT
			Min.	Typ.	Max.	
Nominal Frequency	f_o			100.000		MHz
Supply Voltage	V_s	Vs ±5% @ 25°C	11.4	12.0	12.6	V
Input Current	I_S	Steady state, @ 25°C			150	mA
	$I_{S,w}$	During warm-up, @ 25°C			400	mA
Frequency Stability vs. Temperature	$\Delta f/f_0$ (T_a)	Ta= -40°C…+85°C, measurement ref to $(f_{max}+f_{min})/2$	-100		+100	ppb
Electronic Frequency Adjust		Vc = 0.0Vdc to 9.0Vdc		±1.0		ppm
Output Signal		Sine Wave into 50Ω	8	10	12	dBm
Phase Noise						
@10Hz Offset	£ (Δf)	50Ω Load		-100	-95	dBc/Hz
@100Hz Offset	£ (Δf)	50Ω Load		-130	-125	dBc/Hz
@1kHz Offset	£ (Δf)	50Ω Load		-155	-150	dBc/Hz
@10kHz Offset	£ (Δf)	50Ω Load		-165	-160	dBc/Hz
@100kHz Offset	£ (Δf)	50Ω Load		-170	-165	dBc/Hz
Aging, after 30 days of operation	$\Delta f/\Delta t_d$	Daily	-1		+1	ppb
	$\Delta f/\Delta t_y$	First year	-300		+300	ppb
G-Sensitivity		Ta=25°C, Vs=12V			1	ppb/g
Radiation Hardness		Compliant with satellite requirements				

*Lower G-Sensitivity rates are available

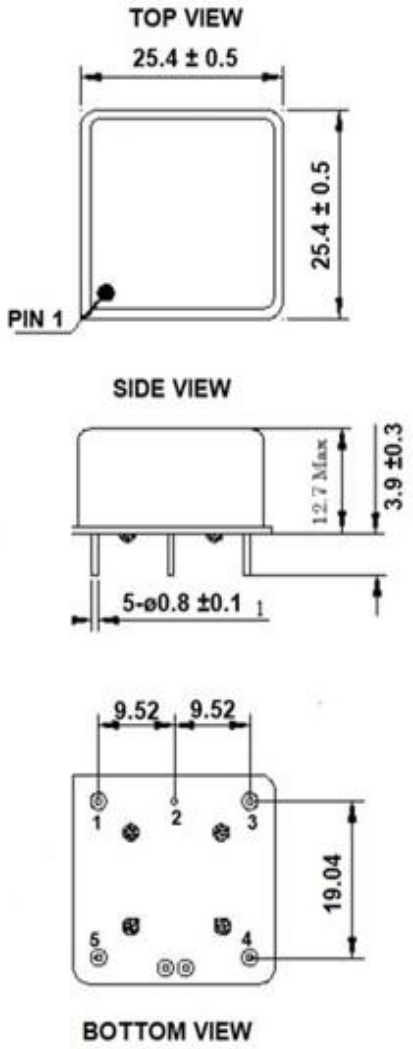


PIN	SYMBOL	FUNCTION
1	OUT	Output
2	GND	Ground
3	Vc	Control Voltage
4	NC	Not Connected
5	Vs	Supply Voltage

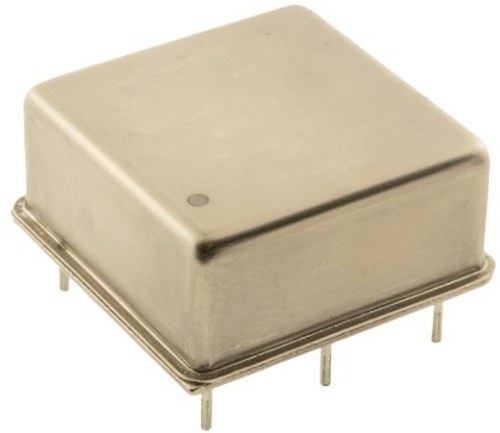
Raltron Low Phase Noise OCXO 10MHz, 5V

PARAMETER	SYMBOL	CONDITION	VALUE			UNIT
			Min.	Typ.	Max.	
Nominal Frequency	f_o			10.000		MHz
Supply Voltage	V_s	Vs ±5% @ 25°C	4.75	5.0	5.25	V
Input Current	I_S	Steady state, @ 25°C			150	mA
	$I_{S,w}$	During warm-up, @ 25°C			400	mA
Frequency Stability vs. Temperature	$\Delta f/f_0$ (T_a)	Ta= -20°C…+70°C, measurement ref to (f_{max}+f_{min})/2	-50		+50	ppb
Electronic Frequency Adjust		V_C = 0.0Vdc to 4.5Vdc		±0.5		ppm
Output Signal		Sine Wave into 50Ω	7	9	11	dBm
Phase Noise						
@10Hz Offset	£ (Δf)	50Ω Load		-125	-120	dBc/Hz
@100Hz Offset	£ (Δf)	50Ω Load		-145	-140	dBc/Hz
@1kHz Offset	£ (Δf)	50Ω Load		-160	-155	dBc/Hz
@10kHz Offset	£ (Δf)	50Ω Load		-165	-160	dBc/Hz
@100kHz Offset	£ (Δf)	50Ω Load		-170	-165	dBc/Hz
Aging, after 30 days of operation	$\Delta f/\Delta t_d$	Daily	-0.5		+0.5	ppb
	$\Delta f/\Delta t_y$	First year	-100		+100	ppb
G-Sensitivity		Ta=25°C, Vs=12V			1	ppb/g
Radiation Hardness		Compliant with satellite requirements				

*Lower G-Sensitivity rates are available



PIN	SYMBOL	FUNCTION
1	OUT	Output
2	GND	Ground
3	Vc	Control Voltage
4	NC	Not Connected
5	Vs	Supply Voltage



Raltron Examples of Specs for Satellite OCXOs

PN	Datasheet
OX4180MRHA-D3-2-10.000-5	PDF
OX6180MRHA-D3-2-100.000-5	PDF

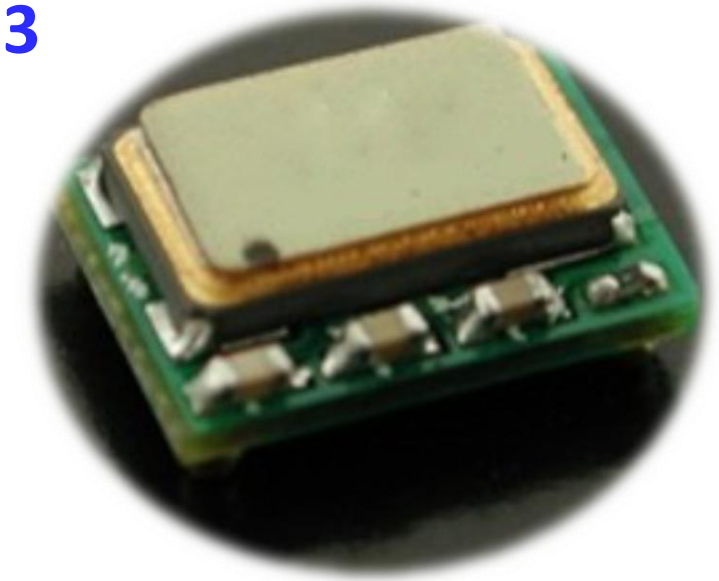
Raltron Standard Mechanical Performance

Soldering	All LEO produced products will be built to IPC-J-STD-001HS or Equivalent Levels
Storage Temperature Range	-55°C to +105°C
G-Sensitivity	Standard 1 ppb/g, custom values available
Mechanical Shock	MIL-STD-202, Method 213, Test Condition J (30 g, 11 ms half-sine)
Vibration	MIL STD 202, Method 201, (0.06” Peak to Peak, 10 to 55 Hz)
Humidity	MIL STD 202, Method 103, Test Condition B (95% at 40°C for 96 hours)
Radiation Tolerance	This Product will be built with: a. Active and Passive Components which will meet or exceed AEC criterium b. All Active Components integrated in the design will have been up-screened to 35krad level c. All materials utilized will be traceable to the manufacturer’s Lot# and Date Code d. Swept Quartz will be utilized when specified by the customer at additional charge e. Additional Screening or Lot Acceptance Testing can be customized / specified with additional charges

Technology Road Map – Stratum III SMD VCTCXO/TCXO

•STRATUM 3

SIZE (mm)	FREQUENCY (MHz)	VOLTAGE (VDC)	Frequency Stability	OUTPUT WAVEFORM
5.0 x 7.0 x 1.5	10 - 52	2.5 to 5.0	0.20 ppm -40°C to +105°C	Clipped Sine Wave & CMOS
5.0 x 3.2 x 1.5	10 - 52	2.7 to 5.5	0.20 ppm -40°C to +105°C	Clipped Sine Wave & CMOS



- Stratum 3 compliant: ± 0.28 ppm over - 40° C to + 105°C
  ± 4.6 ppm overall including 20 years Aging
- Low Phase Noise Performance: -135 dBc /Hz at 1 kHz and -150 dBc/Hz on the floor
- Low power substitute for AT cut OCXO s

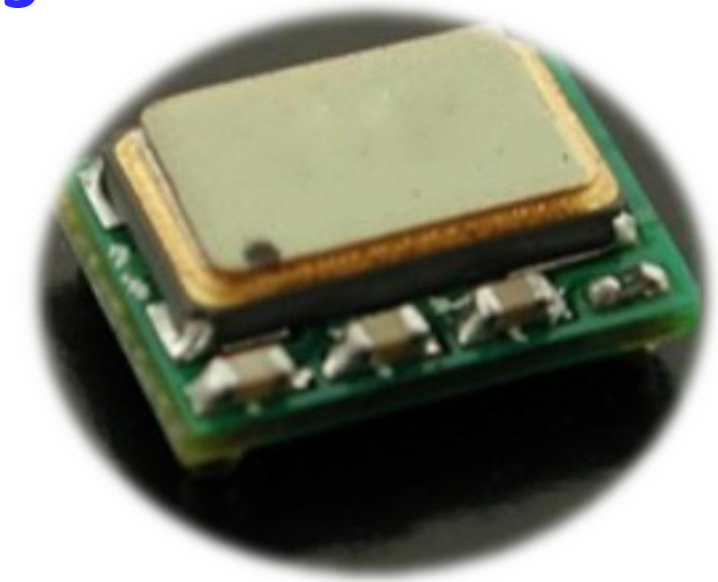
APPLICATION

Telecom Infrastructure, Network Equipment, Wireless Equipment, Test and Measurement Equipment, Picocell, Femtocell, Satellite

Technology Road Map – Stratum III SMD VCTCXO/TCXO

Product Series	Datasheet	Image
TV-35	PDF	
TX-35	PDF	
TV-57 View products in stock	PDF	
TX-57 View products in stock	PDF	

•STRATUM 3



See STRATUM 3 TCXOs Products

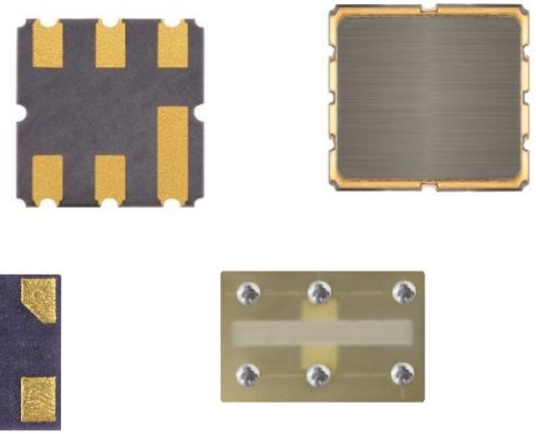
APPLICATION

Telecom Infrastructure, Network Equipment, Wireless Equipment, Test and Measurement Equipment, Picocell, Femtocell, Satellite

Technology Road Map – SAW Resonators and Filters

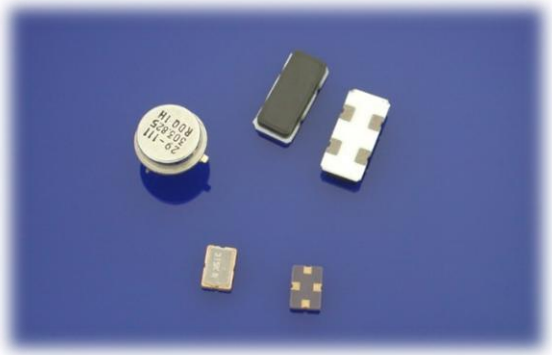
SAW Resonators:

- **Frequency range:**
  - **IF: 32 MHz to 975 MHz**
  - **RF: 139 MHz to 2675 MHz**
- **Metal Can and Ceramic SMD**



- **SAW Filters:**

- **Frequency range:**
  - **100 MHz to 4200 MHz**
- **Metal Can, Ceramic SMD, CSP**
- **Standard Products and Customized Designs**



See All SAW Filters Products

APPLICATION

Wireless Communications Infrastructure, Wireless Microphones, Instrumentation, Utility Metering, Navigation, Security

Raltron High Performance OCXOs and Stratum 3 TCXOs

- Design and Applications Engineering located in the USA
- OCXO and Stratum 3 TCXO Manufacturing located in Miami, Florida
- State-of-the Art Testing and Data Acquisition Systems used in manufacturing
- Established North American supply chain of critical Raw Materials

Contact

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