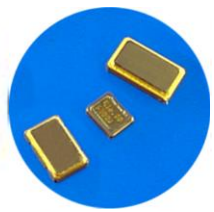


RALTRON

FREQUENCY MANAGEMENT COMPONENTS



PRODUCT SELECTION GUIDE

- Crystals
- Clock Oscillators
- RF Ceramic Filters
- VCXO, VCSO
- TCXO, OCXO
- GPS Synchronization
- VCO
- SAW Devices
- Ceramic Resonators
- Microwave Filters



RALTRON MIAMI – R&D and Manufacturing of High End Frequency Management Products

- Research and Development
- Manufacturing and NPI
- Automated Calibration and Test
- Environmental Test Lab
- Failure Analysis Lab
- Isolated Aging Room
- Sales & Marketing



Headquarters – Miami, Florida USA

RAMI Technology China – Mass Manufacturing of Crystals, Oscillators, and High End Frequency Management Products



- ISO 9001:2008 Manufacturing and Design
- High Volume Manufacturing
- Clock Oscillators
- Metal Can and Ceramic Package Crystals
- Precision Oscillator Design & Manufacturing
- Class 10K Clean Rooms
- Automated Production Lines



World class Engineering Support

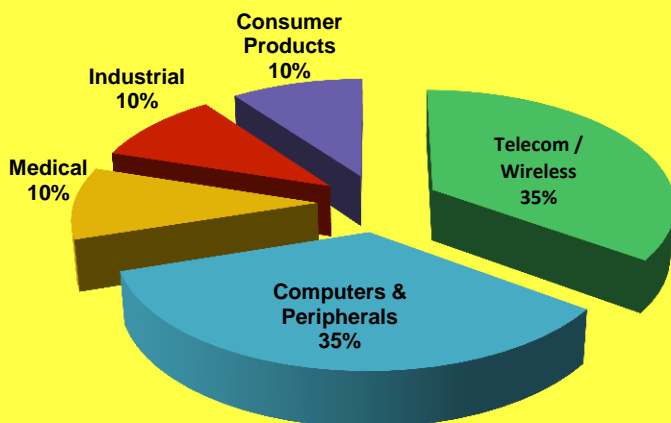
- Knowledgeable Personnel and Resources
- Circuit Design and Modification at any Stage
- Product Analysis and Custom Development
- Quick-Turn Prototype Available
- Technical Papers and Application Notes
- Software for Oscillator Circuit
- Technical Seminars
- Web based Engineering and Design Tools



✓ Broadest Line of Frequency Control Products

- Crystals –
 - Microprocessor Crystals
 - High Accuracy Crystals
- Automotive Grade Crystals
- Tuning Forks
- Clock Oscillators
- SAW Devices
- Ceramic Resonators
- LTCC RF Ceramic Products
- Antennas
- Temperature Compensated Crystal Oscillators – TCXO
 - Stratum 3 – TCXO
- Oven Controlled Crystal Oscillators – OCXO
- Voltage Controlled Crystal Oscillators – VCXO
 - Voltage Controlled SAW Oscillators – VCSO
- IEEE 1588 Compatible Oscillators
- Crystal Filters
- Voltage Controlled Oscillators – VCO
- Microwave Filters
- GPS Clock Synchronization Modules

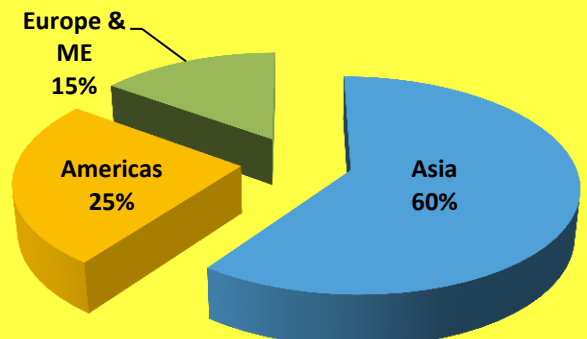
- ✓ Worldwide Distribution Network
- ✓ Global Subcontracting Support
- ✓ Worldwide Market Recognition
- ✓ Dedicated Supply Management Team
- ✓ Shipping hubs in HK and Miami, FL



Sales by Market Sector

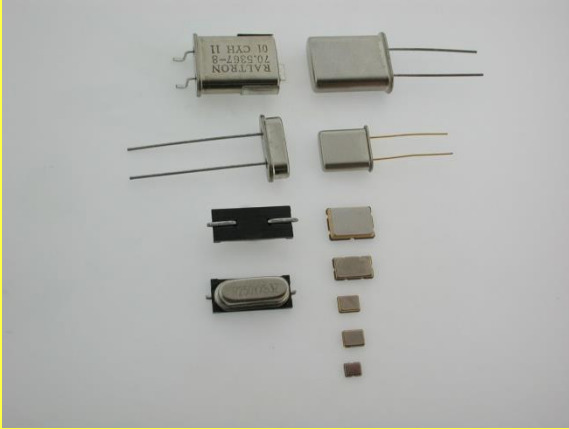
✓ Markets Served

- Alarm & Security
- Bluetooth, Zigbee
- Computer & Storage
- Consumer – Entertainment
- Fiber Infrastructure
- Gigabit / 10 Gigabit Ethernet
- Industrial Control
- Instrumentation
- Medical
- Microwave Radio / Base Stations
- Solar Technology
- Utility Metering and Smart Grid
- VoIP
- WLAN, WiMax
- Wearable Technology



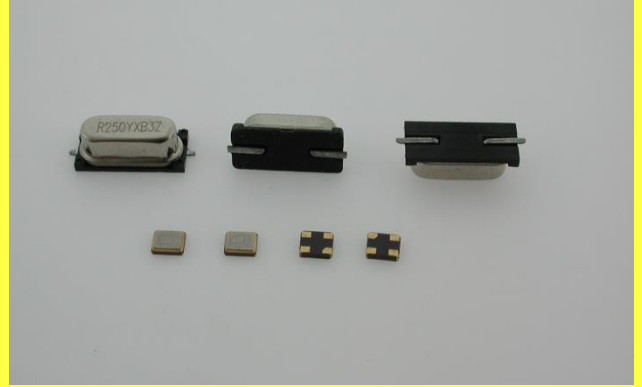
Worldwide Presence

Crystals



Frequency Range: 1.8432 MHz to 300.00 MHz
Frequency Tolerance: ± 5 ppm to ± 30 ppm
Frequency Stability: ± 5 ppm to ± 50 ppm
Operating Temperature Range:
Standard: -20°C to $+70^{\circ}\text{C}$
Extended: -40°C to $+85^{\circ}\text{C}$
Available Packages: Thru-Hole and SMD configuration
HC-49/U, HC-49/S, UM-1, UM-4 and UM-5
Ceramic: 11.8 x 5.5 to 1.6 x 1.0 mm (SMD)
Cylindrical: 10 x 3 and 9 x 3 mm

Automotive Grade Crystals



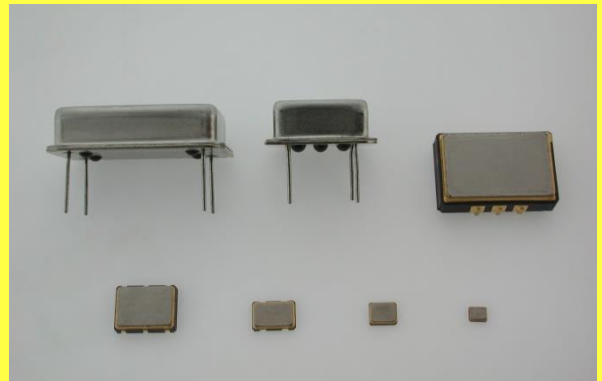
AEC Q200 Reliability Program
ISO TS-16949
Frequency Range: 3.579545 MHz to 50.00 MHz
Frequency Tolerance: ± 10 ppm to ± 25 ppm
Frequency Stability: ± 15 ppm to ± 100 ppm
Operating Temperature Range:
Standard: -40°C to $+85^{\circ}\text{C}$
Extended 1: -40°C to $+105^{\circ}\text{C}$
Extended 2: -40°C to $+125^{\circ}\text{C}$
Available Packages: HC-49/S-SMD, Ceramic: 3.2 x 2.5

Tuning Forks



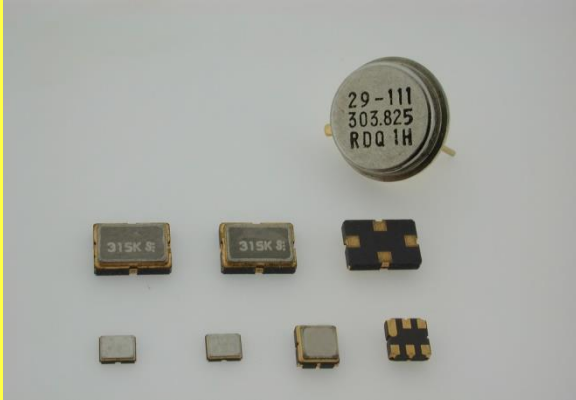
Frequency Range: 32.768 kHz and 24 to 615 kHz
Frequency Tolerance: ± 5 ppm to ± 20 ppm
Operating Temperature Range:
Standard: -20°C to $+70^{\circ}\text{C}$
Extended: -40°C to $+85^{\circ}\text{C}$
Available Packages:
8.0 x 3.8, 7.3 x 4.3, 7.0 x 1.4, 4.1 x 1.5, 3.2 x 1.5, 2.0 x 1.2 mm
Cylindrical: 8.2 x 3.1, 6.2 x 2.1, 5.1 x 1.5 mm

Clock Oscillators



Frequency Range: 1.0 MHz to 1200.00 MHz
Frequency Stability: ± 5 ppm to ± 100 ppm
Operating Temperature Range:
Standard: -20°C to $+70^{\circ}\text{C}$
Extended: -40°C to $+85^{\circ}\text{C}$
Voltage: +1.8, +2.5, +3.3 and +5 VDC
Output: TTL, HCMOS, LVDS, ECL, PECL, and LVPECL
Low RMS Jitter down to 0.3 ps
Available Packages:
8 pin or 14 pin DIP or Gullwing configuration
Ceramic: 7x5, 5x3.2, 3.2x2.5, 2.5x2, 2.0x1.6 mm

SAW Devices



SAW Resonators and Filters

Frequency: IF: 32~975 MHz RF: 139~2675 MHz

Excellent Thermal Stability

Operating Temperature Range:

Standard: -20°C to +70°C

Extended: -40°C to +85°C

Voltage: Up to +12.0 VDC

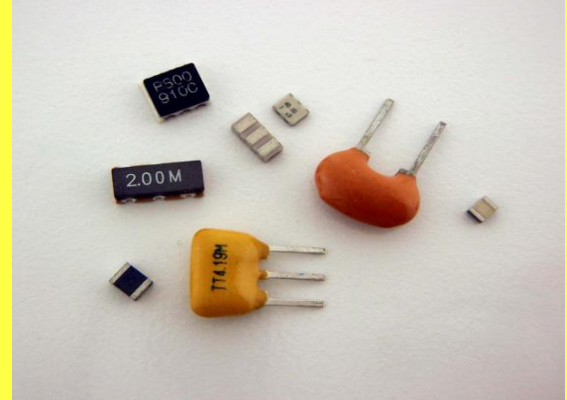
Customized Designs Available

Available Packages:

Metal Can: TO39 and various sizes

Ceramic: 5 x 5, 3.8 x 3.8 and 3 x 3 mm footprints

Ceramic Resonators



Frequency Range: 2.00 MHz to 50.00 MHz

Frequency Tolerance: $\pm 0.3\%$ to $\pm 0.5\%$

Frequency Stability: $\pm 0.3\%$ to $\pm 0.5\%$

Operating Temperature Range: -20°C to +70°C

Aging per Year: $\pm 0.3\%$ to $\pm 0.5\%$

Drive Level: 0.1 mW to 1.0 mW

Capacitance: 8 pF to 30 pF

Available Packages:

Plastic-Epoxy: 10 x 10 to 7 x 9 mm

Ceramic: 7.2 x 3.7, 3.7 x 3.1, 2.5 x 2, 1.6 x 1.0 mm

LTCC RF Ceramic Products



Low Temperature Co-fired Ceramic (LTCC)

RF Ceramics Products

Band Pass Filters, Low-Pass Filters, High-Pass Filters,
Baluns, Diplexers, Common Mode Filters

Applications: Bluetooth, Bluetooth LE, Wi-Fi, ZigBee,
WiMAX, LTE, and other RF standards

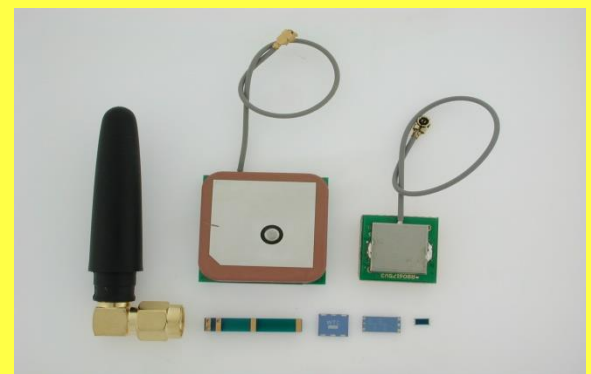
Frequency Range:

900 MHz; 2.3 to 2.6 GHz, 3.5 GHz, 5 GHz

Available Packages:

Ceramic: 2.5 x 2.0, 2.0 x 1.2, 1.6 x 0.8 (0603),
1.0 x .05 (0402)

Antennas



Antennas: Stub Antennas, Patch Antennas, Chip Antennas

Frequencies:

GPS (1.575 GHz);

GLONASS (1.602 GHz)

Bluetooth / Wi-Fi (2.4 / 5 GHz),

ZigBee (2.45 GHz);

WiMAX (2.6 / 3.5 GHz)

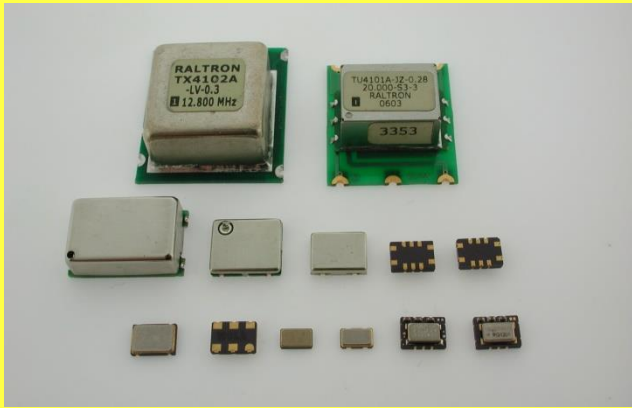
Available Packages:

Chip: 6.0 x 5.0 mm to 3.2 x 1.6 mm

Stub: Length 5 to 17 cm; Straight, Right Angle or
Swivel

Patch with or without LNA: 12 mm sq to 27 mm sq

TCXO & Stratum 3 TCXO



Frequency Range: 1.00 MHz to 800.00 MHz
Overall Frequency Stability ± 4.6 ppm (Stratum 3)
Frequency Stability: down to ± 0.1 ppm
Operating Temperature Range:
 Standard: -20°C to $+70^{\circ}\text{C}$
 Extended: -40°C to $+85^{\circ}\text{C}$
Voltage: +1.8, +2.5, +3.3 and +5.0 VDC
Available Packages:
 Metal Can: 11 x 9 to 38 x 38 mm
 Ceramic: 7x5, 5x3.2, 3.2x2.5, 2.5x2.0, 2.0x1.6 mm

OCXO



Frequency Range: 1.00 MHz to 200.00 MHz
Frequency Stability: ± 0.5 ppb to ± 0.1 ppm
Operating Temperature Range:
 Standard: -20°C to $+70^{\circ}\text{C}$
 Extended: -40°C to $+105^{\circ}\text{C}$
Voltage: +3.3, +5.0, +12.0 and +15 VDC
Output: TTL, HCMOS, Sine and Clipped Sine
Available Packages:
 Metal Can: 14 Pin DIP to 38 x 38 mm
 Metal Can SMD: 22 x 25.4 mm and 14 x 9 mm

VCXO/VCSO



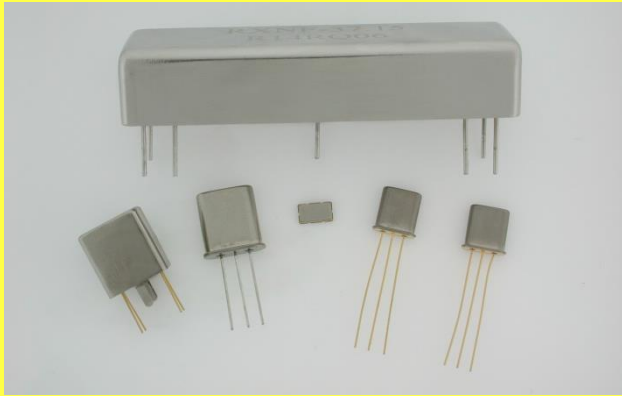
Frequency Range: 1.00 MHz to 700.00 MHz
Frequency Tolerance: ± 5 ppm to ± 30 ppm
Frequency Stability: ± 5 ppm to ± 50 ppm
Operating Temperature Range:
 Standard: -20°C to $+70^{\circ}\text{C}$
 Extended: -40°C to $+85^{\circ}\text{C}$
Absolute Pull Range (APR): ± 30 to ± 500 ppm
Available Packages: 8 pin or 14 pin DIP-Metal Can
 Ceramic: 14 x 9, 5 x 7, 5 x 3.2, and 3.2 x 2.5 mm
 FR4/5: 14 x 9 and 5 x 7 mm

IEEE 1588 Compatible Oscillators



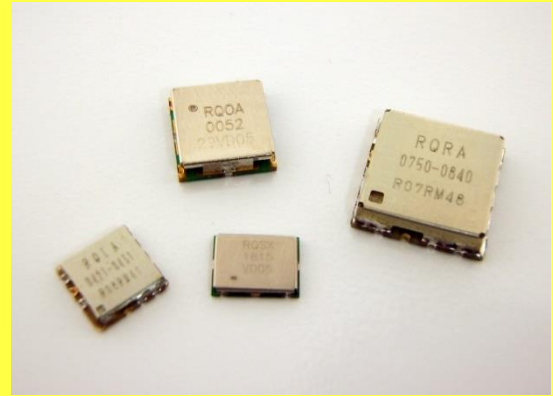
IEEE 1588 Compatible TCXO and OCXO;
Meets Telcordia GR-1244 Standard for Wander (MTIE and TDEV)
Frequency Range: 1.00 MHz to 125.00 MHz
Stability TCXO's: down to ± 0.1 ppm
Stability OCXO's: down to ± 0.5 ppb
Excellent Phase Noise and Jitter performance
Operating Temperature Range:
 Standard: -20°C to $+70^{\circ}\text{C}$
 Extended: -40°C to $+85^{\circ}\text{C}$
Available Packages: OCXO: Euro Package, 50x50, 14x9
 TCXO: 5x3.2, 7x5 SMD

Crystal Filters



Frequency Range: 10.7 MHz to 150.00 MHz
 Pass Bandwidth: ± 3.5 kHz to ± 15 kHz
 Poles: 2 to 10 or Customized Design
 Operating Temperature Range:
 Standard: -20°C to $+70^{\circ}\text{C}$
 Extended: -40°C to $+85^{\circ}\text{C}$
 Available Packages:
 Metal Can: HC-49/U, UM-1, UM-4 and UM-5,
 12 x 15 mm Multi-pole, 65 x 20 x 13 mm
 Ceramic: 7 x 5, 6 x 3.5, 3.8 x 3.8, 3 x 3 mm

VCO



Frequency Range up to 6.00 GHz
 Low Phase Noise and Fast Settling Time
 Excellent Return Loss
 Voltage: $+2.2$ to $+12.0$ VDC
 Ultra wide tuning ranges
 Applications:
 Point-to-Point, Point-to-Multipoint for PLL
 transmission, WCDMA, GSM and UMTS, WiMAX
 base stations, Instrumentation
 Available Packages: 8x6 to 20x20 mm footprint

Microwave Filters



MONO BLOCK AND ARRAY
 Frequency Range: 100.00 MHz to 3900.00 MHz
 Low Insertion Loss
 High attenuation
 Temperature Compensated
 Applications: Cellular Base Station
 Cordless and DECT phones
 Repeaters
 Transceivers

GPS Clock Synchronization



Frequency Range: 10.00 MHz and other frequencies
 Accurate GPS referenced time with coherent
 1 PPS signal
 Output optimized for low phase noise
 Very flexible hardware implementation in FPGA
 Application areas include: WiMAX, LTE, DVB-T,
 UMTS, Satellite communications equipment and
 cellular infrastructure timing needs

RAMI TECHNOLOGY GROUP

RALTRON ELECTRONICS is a member of the RAMI TECHNOLOGY GROUP

With worldwide operations and controlled from its main business center in Miami, Florida, RAMI TECHNOLOGY GROUP is one of the fastest growing manufacturers of frequency components . The company offers one of the broadest lines of quartz crystals and crystal based products from simple resonators to precision oscillators, such as VCXO, TCXO and OCXO. The company has also recently introduced RF products such as LTCC Filters, Baluns, Band-Pass Filters, and both Chip Antennas and Stub / Patch Antennas.

RAMI TECHNOLOGY is interacting with its customers worldwide through its sales offices, reps and distributors. Most sales personnel are veterans of the frequency component market, who share their experience with the customers. The company is offering full technical support with two application engineering teams and failure analysis labs based in Miami and Shenzhen (China).

RAMI TECHNOLOGY GROUP is committed to excellence in its complete interaction with its customers, suppliers, employees and the communities where it is operating.

Worldwide Facilities

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