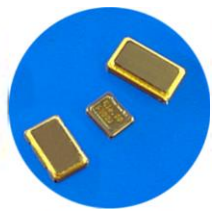


## PRODUCT SELECTION GUIDE



- 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**



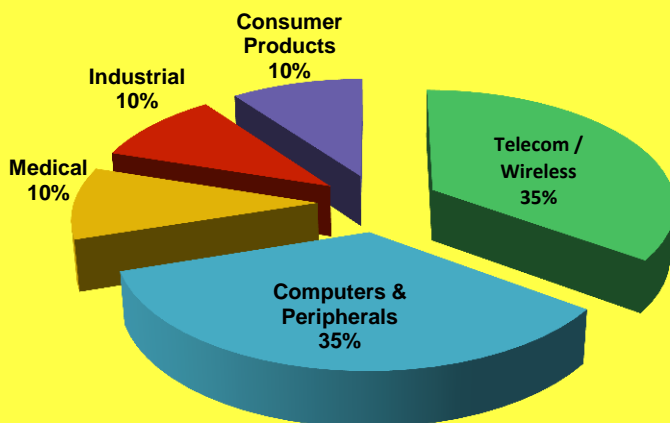
**Worldwide Market Recognition**



**Dedicated Supply Management Team**



**Shipping hubs in HK and Miami, FL**

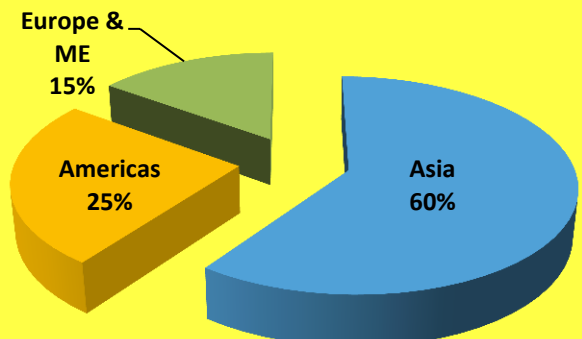


**Sales by Market Sector**



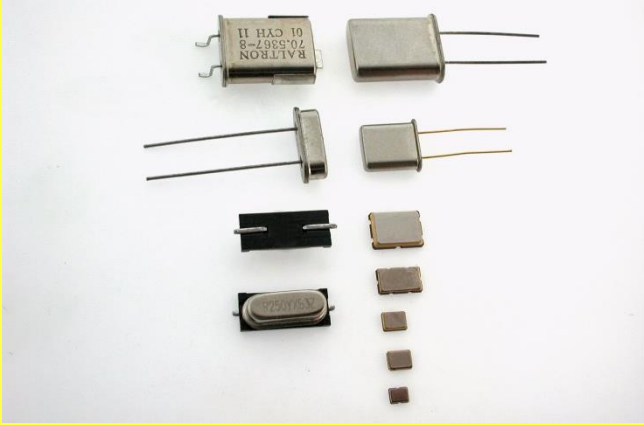
## Markets Served

- 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



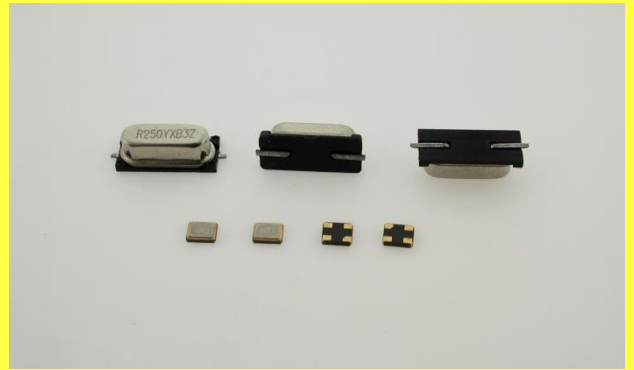
**Worldwide Presence**

## Crystals



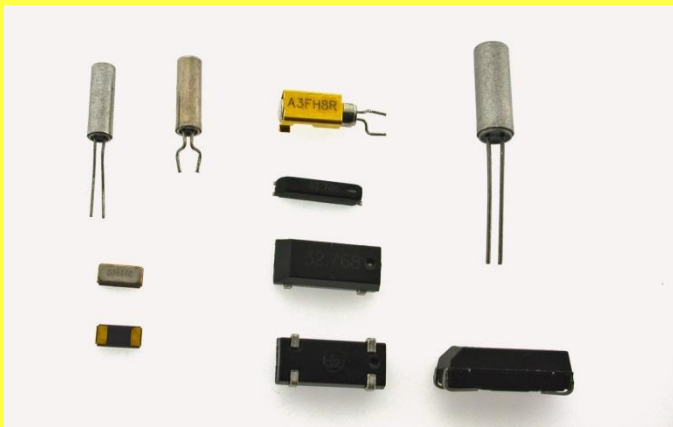
Frequency Range: 1.8432 MHz to 300.00 MHz  
 Frequency Tolerance:  $\pm 5$  ppm to  $\pm 30$  ppm  
 Frequency Stability:  $\pm 5$  ppm to  $\pm 50$  ppm  
 Operating Temperature Range:  
     Standard:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
     Extended:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 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



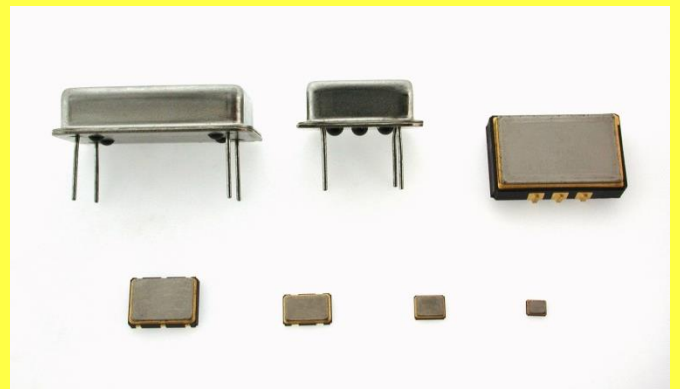
AEC Q200 Reliability Program  
 ISO TS-16949  
 Frequency Range: 3.579545 MHz to 50.00 MHz  
 Frequency Tolerance:  $\pm 10$  ppm to  $\pm 25$  ppm  
 Frequency Stability:  $\pm 15$  ppm to  $\pm 100$  ppm  
 Operating Temperature Range:  
     Standard:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
     Extended 1:  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$   
     Extended 2:  $-40^{\circ}\text{C}$  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:  $\pm 5$  ppm to  $\pm 20$  ppm  
 Operating Temperature Range:  
     Standard:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
     Extended:  $-40^{\circ}\text{C}$  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

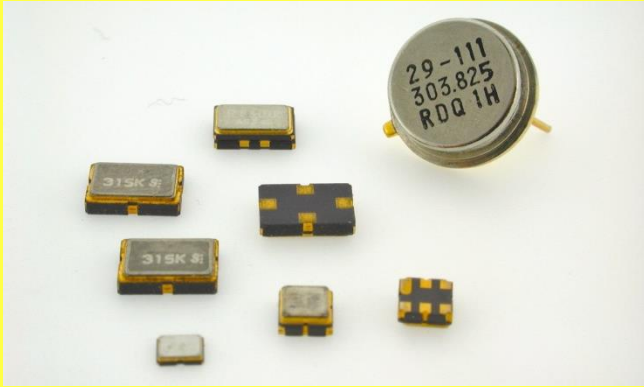
## Clock Oscillators



Frequency Range: 1.0 MHz to 1200.00 MHz  
 Frequency Stability:  $\pm 5$  ppm to  $\pm 100$  ppm  
 Operating Temperature Range:  
     Standard:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
     Extended:  $-40^{\circ}\text{C}$  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

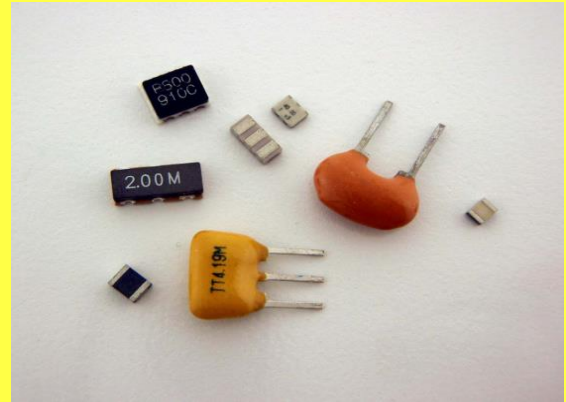
Customized Designs Available

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)

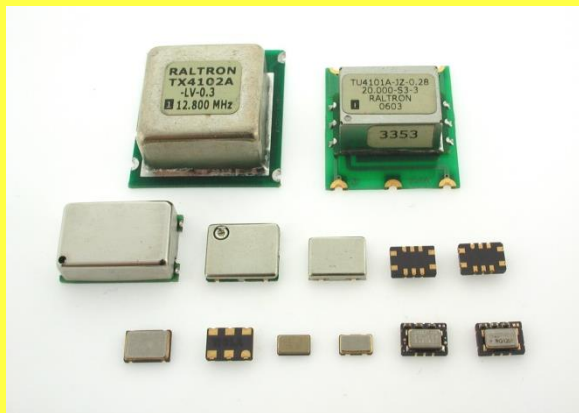
Available Packages:

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  $\pm 4.6$  ppm (Stratum 3)  
 Frequency Stability: down to  $\pm 0.1$  ppm  
 Operating Temperature Range:  
     Standard:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
     Extended:  $-40^{\circ}\text{C}$  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:  $\pm 0.5$  ppb to  $\pm 0.1$  ppm  
 Operating Temperature Range:  
     Standard:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
     Extended:  $-40^{\circ}\text{C}$  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



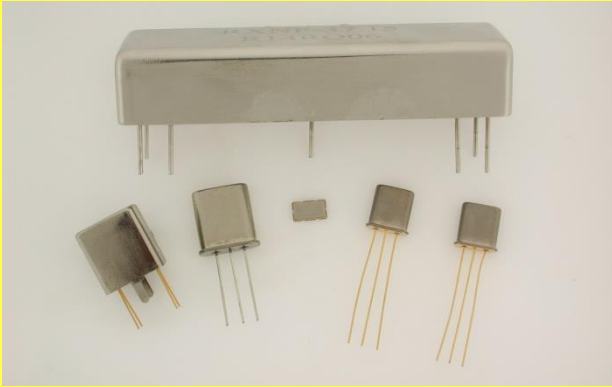
Frequency Range: 1.00 MHz to 700.00 MHz  
 Frequency Tolerance:  $\pm 5$  ppm to  $\pm 30$  ppm  
 Frequency Stability:  $\pm 5$  ppm to  $\pm 50$  ppm  
 Operating Temperature Range:  
     Standard:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
     Extended:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 Absolute Pull Range (APR):  $\pm 30$  to  $\pm 500$  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



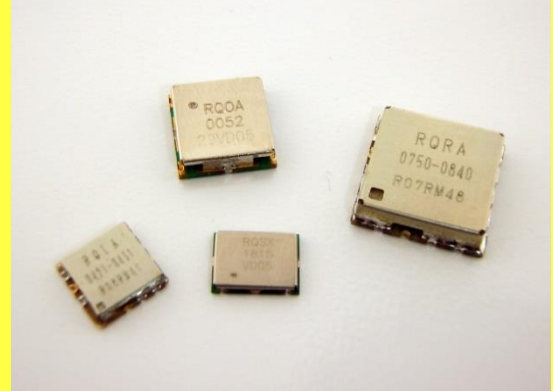
IEEE 1588 Compatible TCXO and OCXO;  
 Meets Telcordia GR-1244 Standard for Wander (MTIE and TDEV)  
 Frequency Range: 1.00 MHz to 125.00 MHz  
 Stability TCXO's: down to  $\pm 0.1$  ppm  
 Stability OCXO's: down to  $\pm 0.5$  ppb  
 Excellent Phase Noise and Jitter performance  
 Operating Temperature Range:  
     Standard:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
     Extended:  $-40^{\circ}\text{C}$  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:  $\pm 3.5$  kHz to  $\pm 15$  kHz  
 Poles: 2 to 10 or Customized Design  
 Operating Temperature Range:  
     Standard:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
     Extended:  $-40^{\circ}\text{C}$  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

- **RALTRON ELECTRONICS**  
RAMI TECHNOLOGY USA, LLC  
10400 NW 33<sup>rd</sup> Street Suite 290  
Miami, Florida 33172 USA  
Tel: +1-305-593-6033  
Fax: +1-305-594-3973  
E-mail: [sales@raltron.com](mailto:sales@raltron.com)  
E-mail: [sales@ramitechnology.com](mailto:sales@ramitechnology.com)
- **RAMI TECHNOLOGY Shenzhen**  
Room 402A, Technology Building  
DuoLi Industrial Park  
No 105 MeiHua Road, Futian District  
Shenzhen, China  
Tel: +86 755 21537033  
Fax: +86 755 21537933  
E-mail: [sales@ramitechnology.com](mailto:sales@ramitechnology.com)
- **RAMI TECHNOLOGY Hong Kong Limited**  
Flat C1, 11/F  
Hoi Bun Industrial Building,  
6 Wing Yip Street Kwun Tong  
Kowloon, Hong Kong  
Tel: +852-2793-1111  
E-mail: [sales@ramitechnology.com](mailto:sales@ramitechnology.com)
- **RAMI TECHNOLOGY Taiwan**  
6-3F, 159 Yang Ming Road  
Kaohsiung  
Taiwan, ROC  
Tel: +886 928 553 993  
E-mail: [sales@ramitechnology.com](mailto:sales@ramitechnology.com)
- **RAMI TECHNOLOGY (S) PTE, LTD**  
Block 1003 Bukit Merah Central,  
#04-20 Technopreneur Centre,  
Singapore 159836  
Tel: +65-65130280  
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E-mail: [sales@ramitechnology.com](mailto:sales@ramitechnology.com)

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