

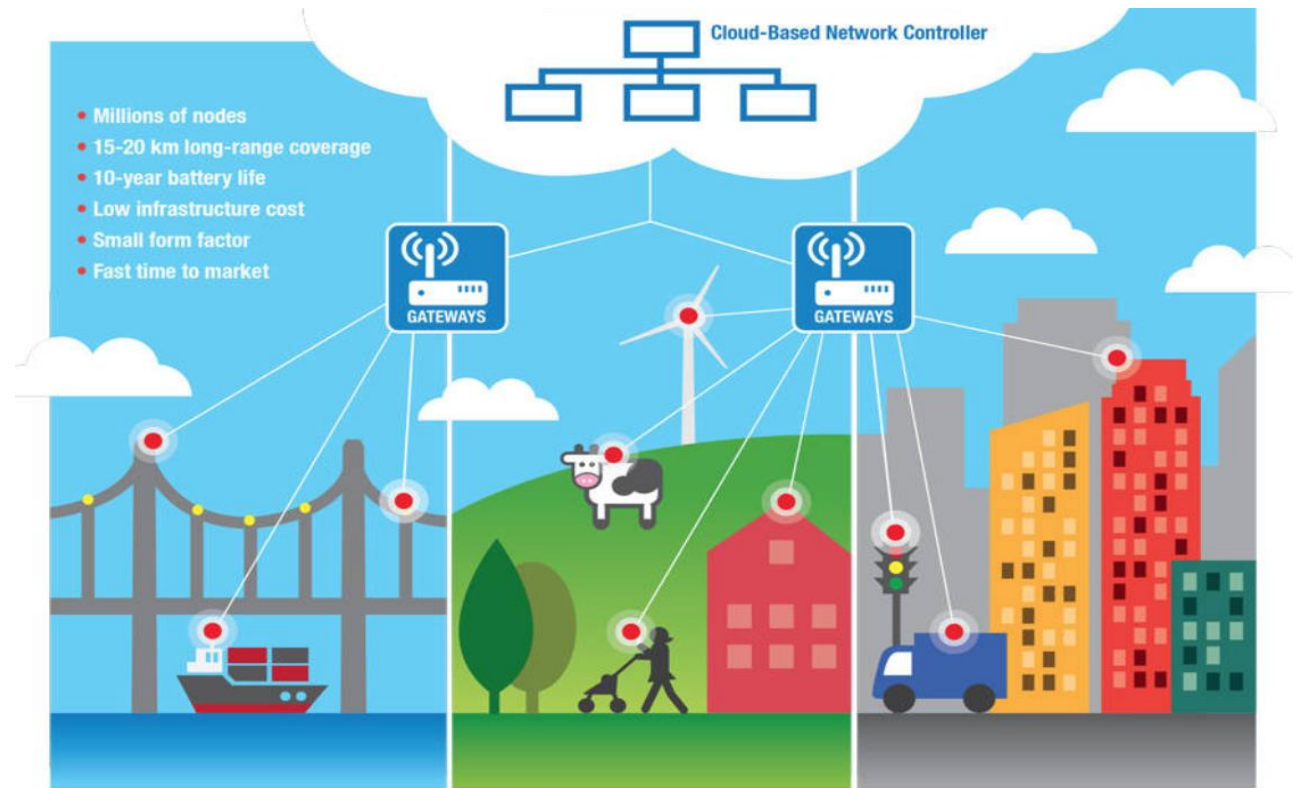
Passive Components
and Antennas for
LoRa Applications



LoRa Frequency Bands

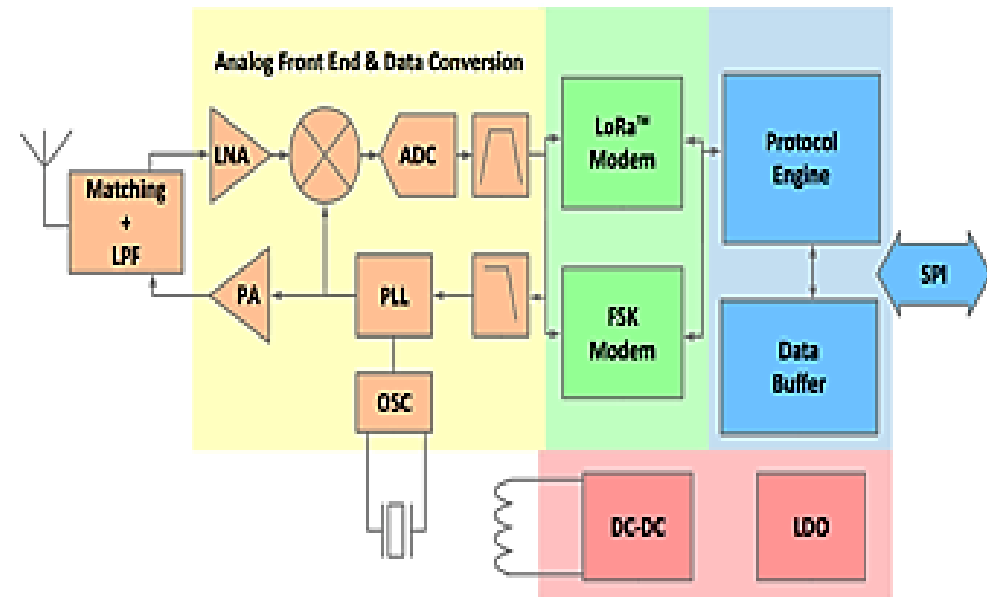
Frequencies/bands used for LoRa:

- 433 MHz band for Asia
- 868 MHz for Europe
- 915 MHz for North America



Typical Solutions ICs for LoRa

- SEMTECH-SX1261
- SEMTECH-SX1262
- SEMTECH-SX1272
- SEMTECH-SX1273
- SEMTECH-SX1276
- SEMTECH-SX1277
- SEMTECH-SX1236

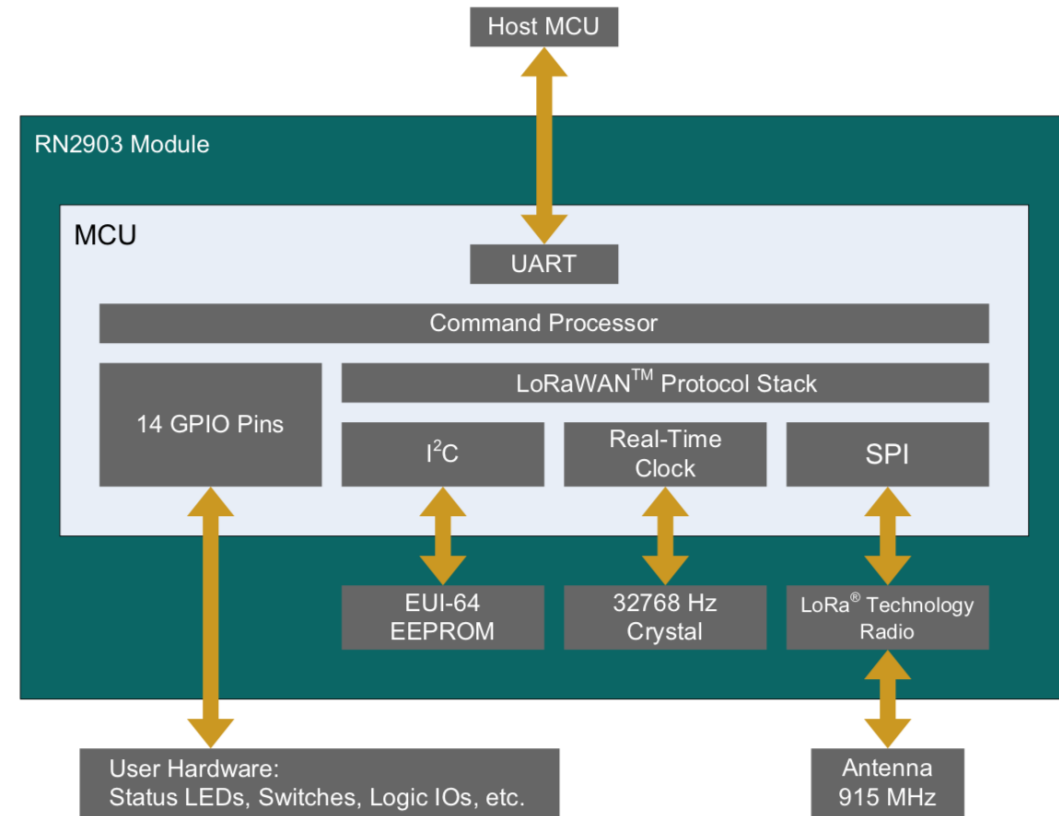


Example: SX1261/2 Block Diagram

- 32.000MHz Crystals or TCXOs
- 433 / 868/ 915 MHz SAW Filters
- Antennas

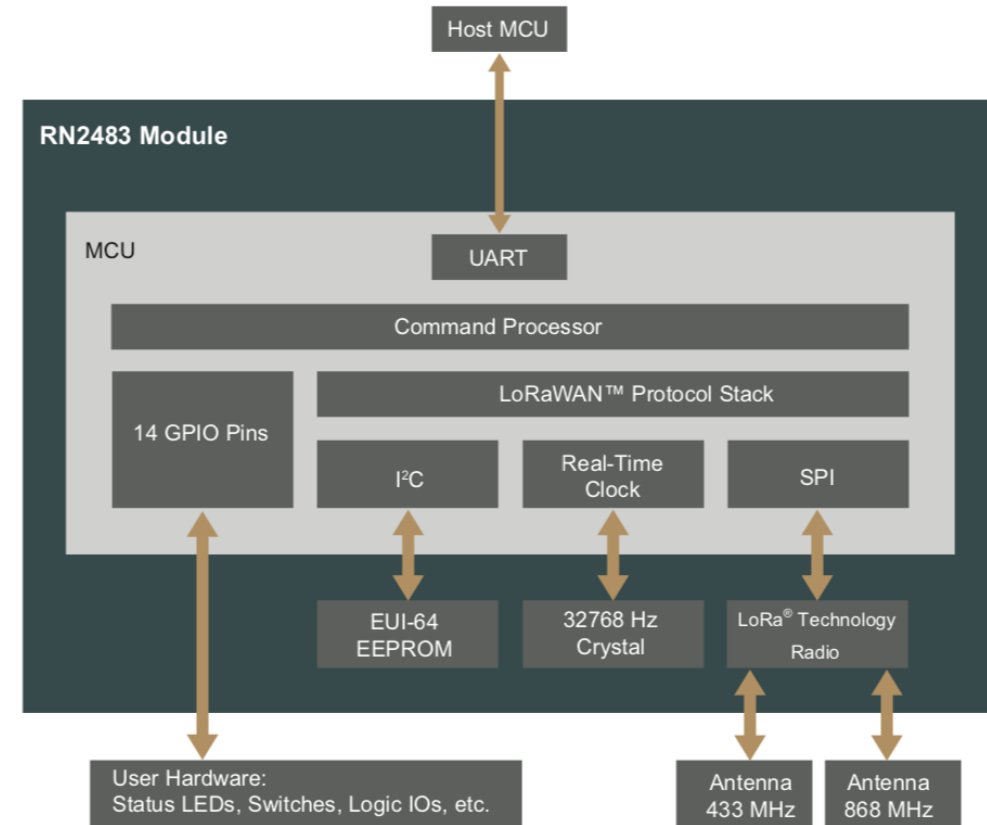
Typical Solutions ICs for LoRa

- MICROCHIP RN2903
- 32.768 kHz Crystal
- 915MHz Antenna



Typical Solutions ICs for LoRa

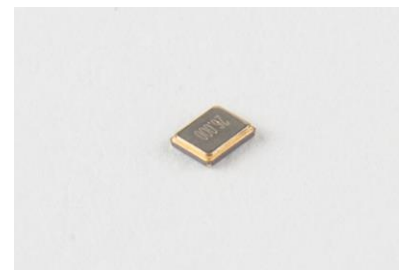
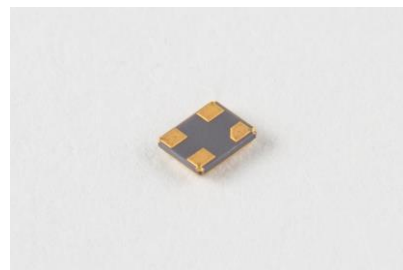
- MICROCHIP RN2483
- 32.768 kHz Crystal Oscillators
- 433 MHz Antenna
- 868 MHz Antenna



Raltron Products –MHz Crystals

Part#	Size
<u>R1612-32.000-10-F-1010-TR-B1B</u>	1.6x1.2mm
<u>R2016-32.000-10-F-1010-TR-B1B</u>	2.0x1.6mm
<u>R2520-32.000-10-F-1010-TR-B1B</u>	2.5x2.0mm
<u>RH100-32.000-10-F-1010-TR-B1B</u>	3.2x2.5mm

- Frequency temperature characteristics fully compatible with LoRa standard requirements
- Low-G sensitivity compatible with LoRa standard requirements

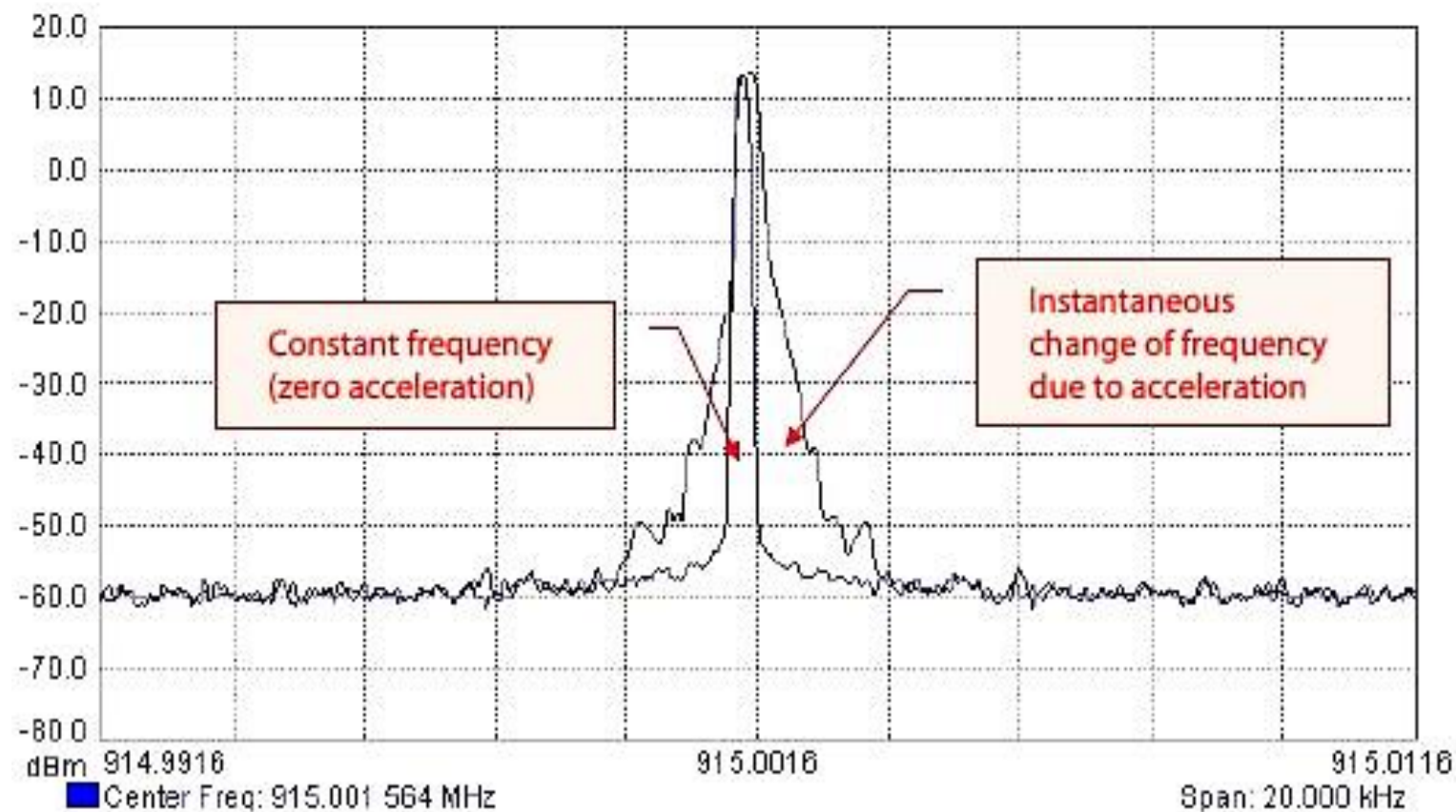


Raltron Products –MHz Crystals

Since LoRa modulations contain both relative time and frequency information, any short-term frequency variance can lead to incorrect detection of encoded data

For applications subjected to acceleration forces, including shock and vibration, a low-G sensitivity crystal should be used as the reference oscillator. For example, smartphone and in-vehicle mobile link applications using a SX1272 transceiver

Raltron Products –MHz Crystals



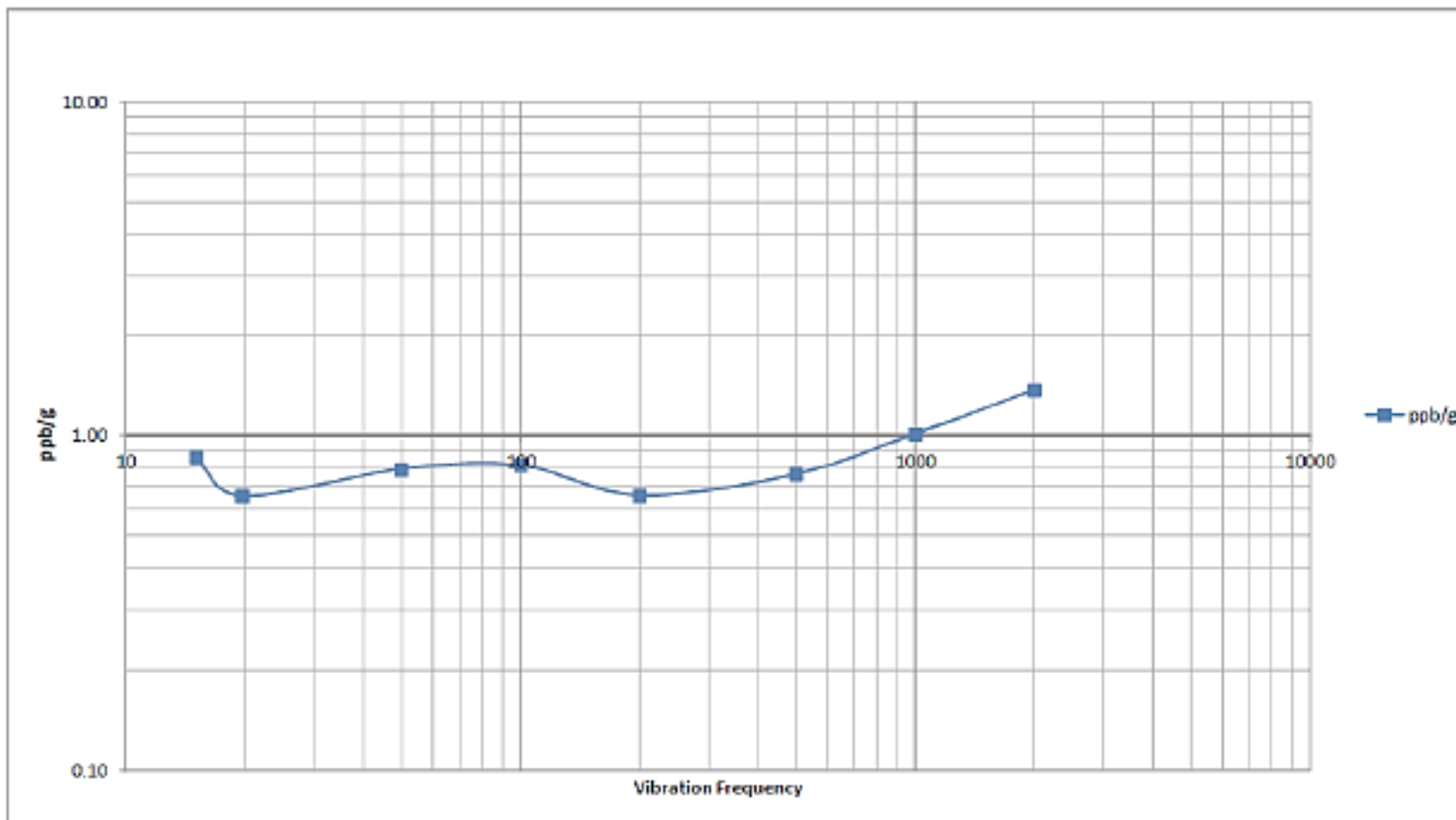
Effect of Acceleration due to Shock on a Crystal-Referenced PLL Transmitted Carrier

Raltron Products –MHz Crystals

A G-Sensitivity test was conducted to prove that a crystal RH100-32.000-10-F-1010-TR-B1B is rugged enough to stay below 2ppb/g when exposed to vibration in all three perpendicular axis X,Y and Z. Below the results, PSD (Power Spectral Density) vs Vibration Frequency, 1 hour in each of three mutually perpendicular axis.

Frequency (Hz)	PSD (g ² /Hz)
15	0.02
30	0.08
1000	0.08
2000	0.02

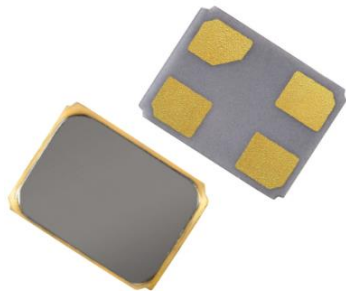
Raltron Products –MHz Crystals



Graph of the X-axis ppb/g over frequency shows that the worst-case axis still stays well below the 2.0 ppb/g

Raltron Products–TCXO

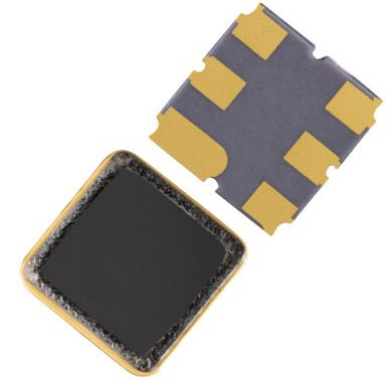
Part#	Size
<u>RTX-1612BD32-S-32.000- TR</u>	1.6x1.2mm
<u>RTX-1612BD32-S-52.000- TR</u>	1.6x1.2mm
<u>RTX-2016BD32-S-32.000-TR-NS1</u>	2.0x1.6mm
<u>RTX-2016BD32-S-52.000-TR-NS1</u>	2.0x1.6mm



Raltron Products–SAW Filters

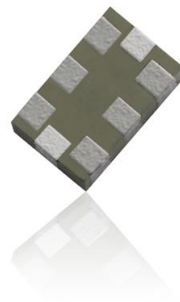


Part#	Size
<u>RSF-433.920-1600-3030-TR-NS2</u>	3.0 x 3.0 mm
<u>RSF-866.000-7000-2015-TR-NS1-RevB</u>	2.0 x 1.5 mm
<u>RSF-866.500-7000-3030-TR-NS2</u>	3.0 x 3.0 mm
<u>RSF-868.300-7000-3030-TR</u>	3.0 x 3.0 mm
<u>RSF-915.000-26000-3030-TR-NS6</u>	3.0 x 3.0 mm
<u>RSF-915.000-26000-3030-TR-NS7</u>	3.0 x 3.0 mm
<u>RSF-915.000-26000-2015-TR-NS3-RevB</u>	2.0 x 1.5 mm



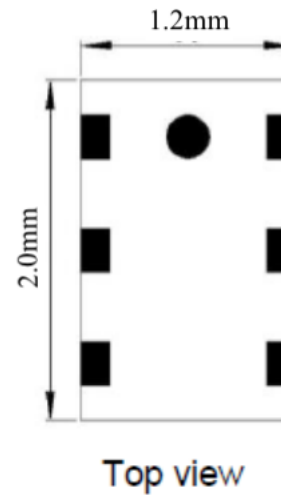
Raltron Products –Ceramic Filters

Part#	Size
<u>RCF-868.000-20000-2012-TR</u>	2.0 x 1.2 mm
<u>RCF-915.000-26000-2012-W-TR</u>	2.0 x 1.2 mm



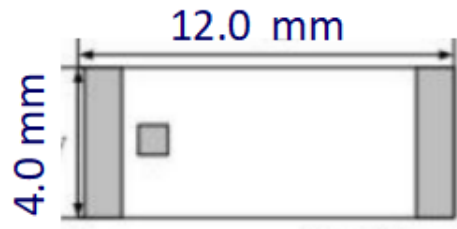
Raltron Products–LTCC Filters

Part#	Frequency	Size
<u>RBB-2012-G9-TR</u>	863-928MHz	2.0 x 1.2 mm
<u>RBL-2012-G9D4-TR</u>	915 MHz	2.0 x 1.2 mm

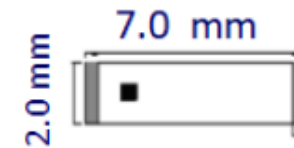
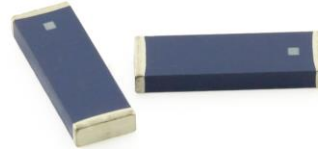


Raltron Products– Chip Antennas

Part#	Frequency	Size
<u>RCA-W1A0-1204-Z-001</u>	433 MHz	12.0 x 4.0 mm
<u>RCA-868-P-1204-A37-G</u>	868 MHz	12.0 x 4.0 mm
<u>RCA-915-7020-S1-S-TR</u>	915 MHz	7.0 x 2.0 mm



RCA-868-P-1204-A37-G



RCA-915-7020-S1-S-TR

Raltron Products–Dipole Antennas

Part#	Frequency	Length
<u>RDP-GS-P-255-MMCX-3000-G</u>	824 ~ 960 MHz	286.5 mm
<u>RDP-GPRS-P-300-SMAM-3000-A-H</u>	915 MHz	300 mm
<u>RDP-GPRS-P-300-SMAM-3000-M-H</u>	915 MHz	300 mm



RDP-915



RDP-GPRS



RDP-GS

Raltron Products– Stub Antennas

Part#	Frequency	Gain	Size
<u>RST-W1A0-10608-22M-FY-002</u>	433 MHz	1 ~ 2 dBi	104 X 8 mm
<u>RST-MA11-10808-22M-FY-001</u>	868 MHz	2 dBi	108 x 8 mm
<u>RST-MA16-5008-23M-FY-001</u>	868 MHz	2 dBi	50 x 8 mm
<u>RST-868-P-48-SMA-G</u>	868 MHz	3 dBi	48 x 8 mm
<u>RST-W1B6-5008-23M-FY-002</u>	915 MHz	2 dBi	50 x 8 mm
<u>RST-W1B6-10808-22M-FY-001</u>	915 MHz	2 dBi	108 x 8 mm
<u>RST-MB-P-157-SMA-G</u>	868/915 MHz	3 dBi	157 x 21 mm



Raltron LoRa Kit



- MHz CRYSTALS
- TCXO
- SAW FILTERS
- CERAMIC FILTERS
- ANTENNAS

Raltron LoRa Kit



Contact



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