

Frequency Components and Antennas for Electric Vehicle Charger



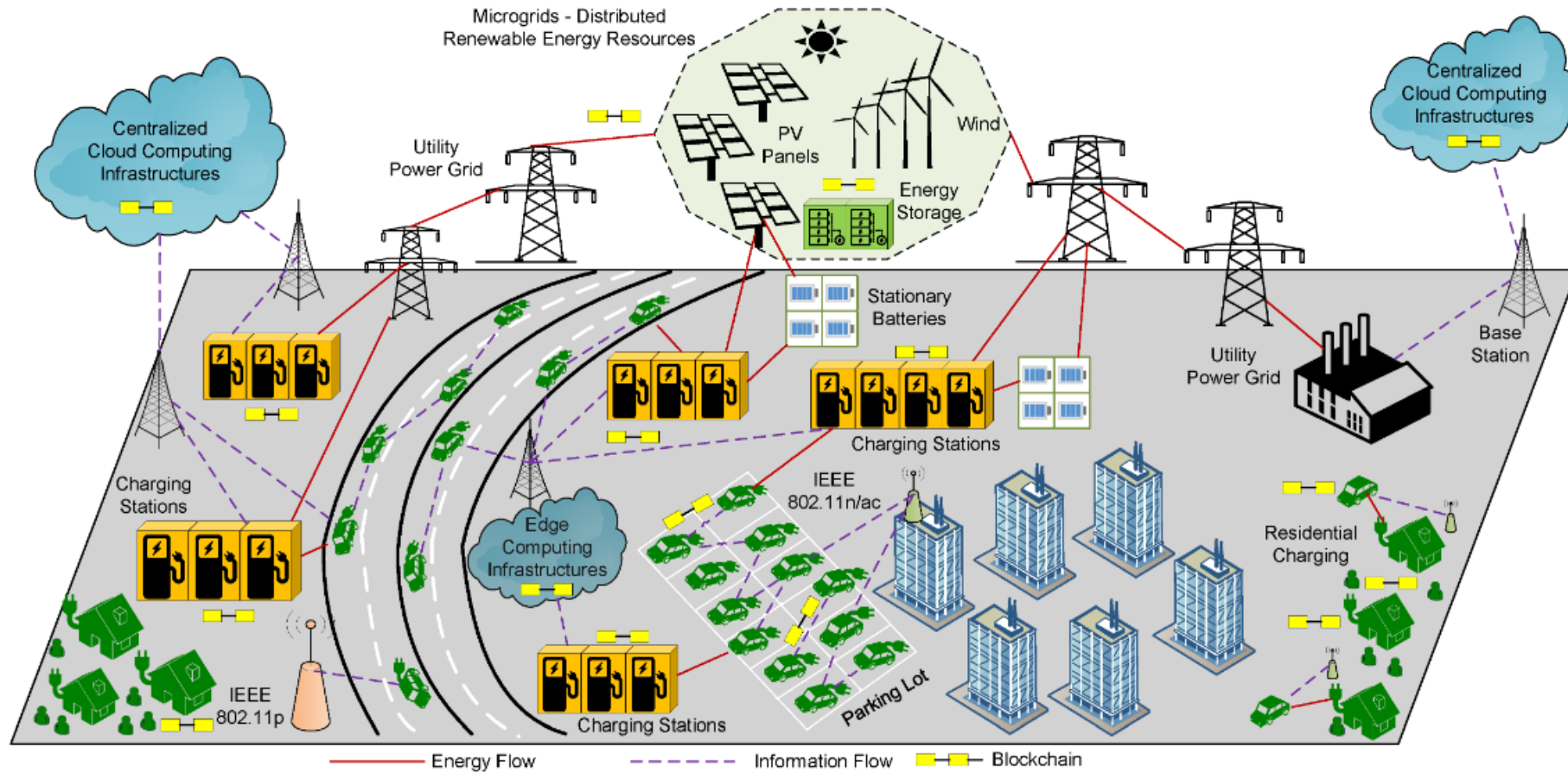
RAFLTRON

Introduction



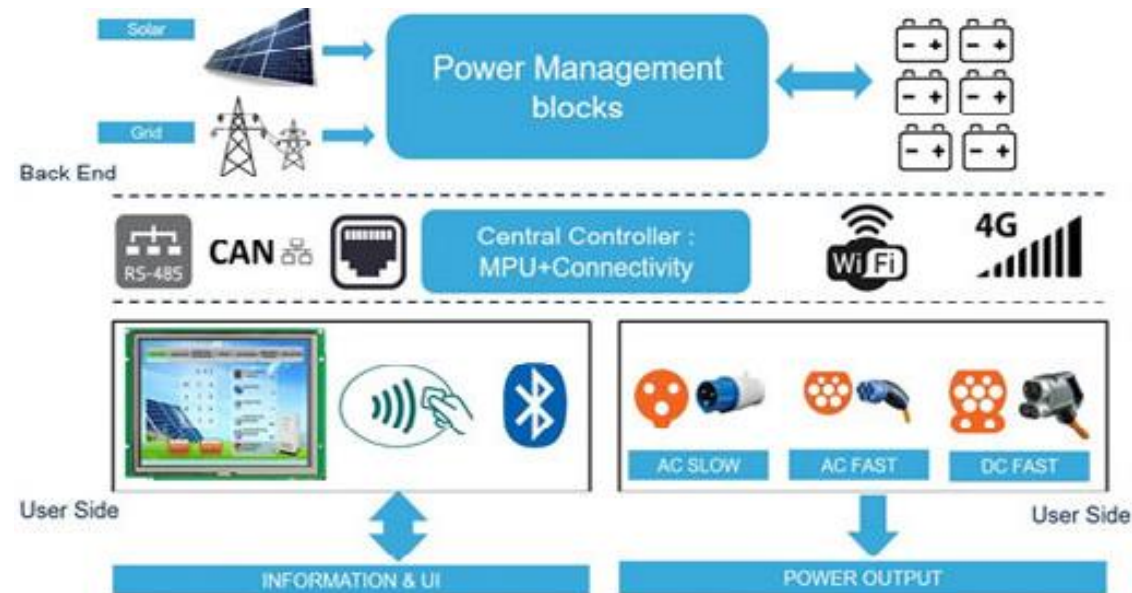
Raltron offers the most comprehensive line of frequency management components for EV Charger, from simple tuning fork crystals to high stability temperature compensated crystal oscillators and antennas. These products are designed to satisfy the ultra-low power, small footprint, and low-cost requirements of this growing market.

The Internet of Vehicles Vision



Source: <https://www.mdpi.com/1996-1073/15/5/1908/htm>

Solar EV Charging Station Functional Blocks



There is the user side, which basically depicts the functionalities visible to the end user. Information exchange and the user interaction is taken care of, here. It would typically consist of a TFT screen with touch sensing, NFC card readers for authentication or payments, and also a Bluetooth interface for more advanced features.

Source: <https://www.saurenergy.com/ev-storage/solar-energy-and-ev-charging-infrastructure>

Solutions for Wi-Fi Protocol

The Wi-Fi/IEEE 802.11 has three frequency bands, 2.4/5/6 GHz.

Some Typical Crystal or TCXO frequencies for **Wi-Fi** EV Charger ICs:

Infineon - CYW43012 - 37.4 MHz, 32.768 kHz
CY8C62xA - 16 to 35 MHz , 32.768 kHz

Silicon Labs - WF200 - 38.4 MHz, 32.768 kHz
RS9116 - 40 MHz, 32.768 kHz

Microchip - ATWINC3400A-MU - 26 MHz, 32.768 kHz

Raltron Stub Antennas Solutions

[RST-2400-P-190-IPEX-H](#)

[RST-MB-P-153-SMA-G](#)



The Wi-Fi 6/IEEE 802.11ax has two frequency bands, 2.4/5 GHz.

The Crystals for lower frequencies of Wi-Fi 6 such as 38.4 and 48 MHz, and for higher are 76.8 and 96 MHz

Some Typical Crystals or TCXO frequencies for **Wi-Fi 6** EV Charger ICs:

SparkLan - WNFB-266AXI(BT) - 37.4 MHz, 32.768 kHz
AP6281 - 59.97 MHz, 32.768 kHz

[See All Crystal Products](#)

[See Antenna Products for Wi-Fi](#)

Solutions for Bluetooth & BLE Protocol

Bluetooth Low Energy uses the same 2.4 GHz radio frequencies as classic Bluetooth
Some Typical Crystal or TCXO frequencies for **Bluetooth & BLE** EV Charger ICs:

Infineon - PSoC 6 MCU: CY8C63x6, CY8C63x7 - 16 MHz/32 MHz Crystal Oscillator
16 to 35 MHz, 32.768 kHz On-chip Crystal Oscillators
- 2.4 GHz Chip Antenna

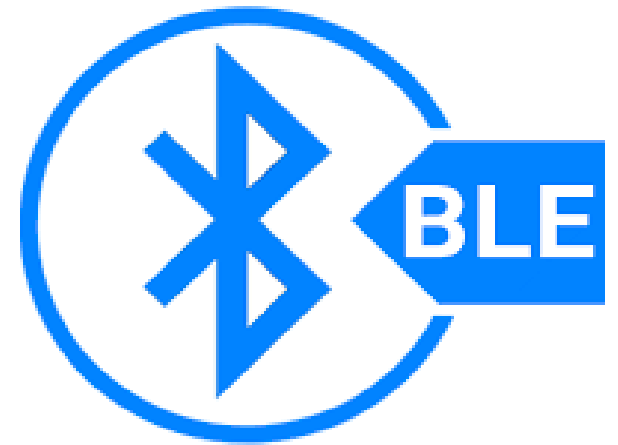
Nordic Semiconductor - nRF52810 - 64 MHz Crystal Oscillator, 32 MHz Crystal
32.768 kHz Crystal Oscillator, 32.768 kHz Crystal
1 MHz/16 MHz/32 MHz Peripheral Clock
- 2.4 GHz Antenna

Texas Instruments - CC2640R2F - 32.8 kHz/48 MHz RC Oscillator, 24 MHz Crystal Oscillator
32.768 kHz Crystal Oscillator
- 2.4 GHz Antenna

NXP Semiconductors - MKW39/38/37 - 26 MHz/32 MHz Crystal, 32.768 kHz Crystal Oscillator
- 2.4 GHz Antenna

Dialog Semiconductor - DA1469x - 32 MHz Crystal, 32.768 kHz Crystal Oscillator
- 2.4 GHz Antenna

STMicroelectronics - BlueNRG-LPS - 32 MHz Crystal, 32.768 kHz Crystal
- 2.4 GHz Antenna



[See All Crystal Products](#)

[See Antenna Products for Bluetooth](#)

Solutions for Near-field Communication Protocol

NFC operates at 13.56 MHz on ISO/IEC 18000-3 air interface. The technology is a simple extension of the ISO/IEC14443 proximity-card standard(contactless card, RFID).

Some Typical Crystal or TCXO frequencies for **Near-field communication** EV Charger ICs:

NXP Semiconductors - PN7160_PN7161 - 27.12 MHz Crystal, 40 MHz Oscillator
PN7150 - 27.12 MHz Crystal, 40 MHz Oscillator

STMicroelectronics - ST25R3916 - 27.12 MHz Crystal, 27 kHz RC Oscillator, 32.768 kHz Crystal
ST25RU3993 - 20 MHz TCXO
ST95HF - 27.12 MHz Crystal



[See All Crystal Products](#)

[See Antenna Products for NFC](#)

Solutions for GNSS

Global Navigation Satellite System (GNSS) is the standard generic term for all navigation satellites systems like GPS, GLONASS, GALILEO, BeiDou, QZSS, NAVIC.

Some Typical Crystal or TCXO frequencies
for **GNSS** EV Charger ICs:

Unicore Communications - UC6228CI - 26 MHz TCXO, 32.768 kHz Crystal

STMicroelectronics - STA8100GA - 32.768 kHz Crystal

Maxim Integrated - MAX2769 - 16.368 MHz Crystal

Raltron GNSS Antennas Solutions

[RPA-GP-1575-A-18-IPEX-27-G](#)

[RPA-GP-P-18-G](#)

[See All Products for GNSS](#)

| GPS | BeiDou |
|---|---|
| L1: 1575.42 MHz / L2: 1227.6 MHz / L5: 1176.45 MHz | B1: 1561.098 MHz – 1589.742 MHz / B2: 1207.14 MHz / B3: 1268.52 MHz |
| GALILEO | NAVIC |
| E1: 1575.42 MHz / E6: 1278.75 MHz / E5: 1176.45 – 1204.14 MHz | L5: 1176.45 MHz / S: 2492.028 MHz |
| GLONASS | QZSS |
| L1: 1598.0625 - 1604.40 MHz L2: 1242.9375 - 1248.63 MHz | L1C/A, L1C, L1AIF, L1S, L1Sb: 1575.42 MHz / L2C: 1227.60 MHz / L5, L5S: 1176.45 MHz / LEX: 1278.75 MHz / S-band: 2GHz |

Frequency Band

Solutions for ZigBee Protocol

The ZigBee/IEEE 802.15.4 has three frequency bands, allowing operation in all regions of the world: 2.4 GHz for worldwide applications, 868 MHz for Europe and 915 MHz for the American.

Some Typical Crystal or TCXO frequencies for **ZigBee** EV Charger ICs :

Texas Instruments - CC2652RSIP - 48 MHz Crystal
48 MHz Crystal Oscillator
32.768 kHz Crystal Oscillator
- 2.4 GHz Inverted F Antenna

Nordic Semiconductor - nRF52832 - 64 MHz Crystal Oscillator
32 MHz Crystal, 32.768 kHz Crystal Oscillator
- 2.4 GHz Chip Antenna

NXP Semiconductors - JN5189 - 32 MHz Crystal Oscillator
32.768 kHz Crystal Oscillator
- 2.4 GHz Antenna

Raltron Stub Antennas Solutions

[RST-2400-P-190-IPEX-H](#)

[RST-MB-P-153-SMA-G](#)















[See All Crystal Products](#)

[See Antenna Products for ZigBee](#)

Raltron Solutions – Antennas

Raltron Antennas Solutions

| Part # | Datasheet | Image | Frequency(MHz) | Contact Us / Buy Now |
|-------------------------------------|--|--|------------------------|----------------------|
| RCA-3216-A1-TR |  |  | BLUETOOTH: 2450±50 | Contact Us |
| RCA-5220-A0-TR |  |  | BLUETOOTH: 2450±50 | Buy Now |
| RCA-E-3216-A2-TR |  |  | BLUETOOTH: 2400~2483.5 | Contact Us |
| RCA-E-3216-E1-TR |  |  | GPS: 1575 | Contact Us |
| RCA-W2-P-3216-A29-G |  |  | BLUETOOTH: 2545 | Contact Us |
| RCA-W2A1-3216-Z-040 |  |  | 2400~2500 | Buy Now |

[See Antenna Products for Wi-Fi](#)

[See Antenna Products for Bluetooth](#)

[See Antenna Products for GNSS](#)

[See Antenna Products for ZigBee](#)

[See Antenna Products for NFC](#)



Raltron Solutions - MHz Crystals









Available Crystal Packages

| Part # | Size(mm) |
|---|--------------------|
| R1612-27.120-8-F-3030-EXT-TR | 1.60 x 1.25 x 0.32 |
| R2016-48.000-8-F-1030-EXT-TR | 2.00 x 1.60 x 0.50 |
| R2520-27.120-10-F-1515-TR-NS1 | 2.50 x 2.00 x 0.65 |
| RH100-24.000-9-1010-TR | 3.20 x 2.50 x 0.70 |

Typical Frequencies:

16 MHz, 26 MHz, 32 MHz, 37.4 MHz, 38.4 MHz, 40 MHz, 48 MHz, 59.97 MHz , 64 MHz

Stock at our Distributors

| Product Series | Datasheet | Image | Contact Us / Buy Now |
|--|---|---|-------------------------|
| R1612 View products in stock |  |  | Buy Now |
| R2016 View products in stock |  |  | Buy Now |
| R2520 View products in stock |  |  | Buy Now |
| RH100 View products in stock |  |  | Buy Now |

[See All Crystal Products](#)



Raltron Solutions - Tuning Fork 32.768 kHz

Available Tuning Fork Crystal Packages

| Part # | SIZE(mm) |
|---|-----------|
| RT1210-32.768-9-TR | 1.2 x 1.0 |
| RT1610-32.768-12.5-TR | 1.6 x 1.0 |
| RT2012-32.768-7-20-EXT-TR | 2.0 x 1.2 |
| RT3215-32.768-12.5-TR | 3.2 x 1.5 |
| RSE-32.768-12.5-H14-TR | 6.9 x 1.4 |
| RSM200S-32.768-12.5-TR | 8.0 x 3.8 |

Load capacitance values: 6 pF, 7 pF, 9 pF and 12.5 pF

Frequency Tolerances: ± 20 ppm and ± 10 ppm



Stock at our Distributors

| Product Series | Datasheet | Image | Contact Us / Buy Now |
|--|-----------|-------|-------------------------|
| RT1210 View products in stock | | | Buy Now |
| RT1610 View products in stock | | | Buy Now |
| RT2012 View products in stock | | | Buy Now |
| RT3215 View products in stock | | | Buy Now |
| RSE H14 | | | Buy Now |
| RSM200S View products in stock | | | Buy Now |

Typical example of IC for EV Charger using a 32.768 kHz crystal as frequency reference:

Texas Instruments - CC1352P7

Using 32.768 kHz crystal

CL: 6, 7 or 12 pF

ESR: 90 k Ω max

[See All Crystal Products](#)

Raltron Solutions - TCXOs and VCTCXOs


Raltron TCXOs Solutions

| Part # | Size(mm) |
|---|-----------|
| RTX-1612BD32-S-52.000-TR | 1.6 x 1.2 |
| RTX-2016AD333-S-26.000-TR | 2.0 x 1.6 |
| RTX-2520AD31-S-26.000-TR | 2.5 x 2.0 |
| RTX-2520AF32-S-48.000-TR | 2.5 x 2.0 |

[See All TCXOs Products](#)

- Tighter Stability: ± 0.5 ppm ~ ± 2.5 ppm, -40 ~ +85°C
- Improved Frequency Tuning Characteristic
- Superior Phase Noise Performance (-130 dBc/Hz on the floor)
- Range Supply Voltage: 1.8 V ~ 3.3 V
- Typical Frequencies: 10.0 MHz, 16.0 MHz, 19.2 MHz, 20.0 MHz, 26.0 MHz, 32.0 MHz, 38.4MHz, 48.0 MHz, 50.0 MHz, 52.0 MHz

Stock at our Distributors

| Product Series | Datasheet | Image | Contact Us / Buy Now |
|---|---|---|-------------------------|
| RTX-1612 View products in stock |  |  | Buy Now |
| RTV-2016 View products in stock |  |  | Buy Now |
| RTX-2520 View products in stock |  |  | Buy Now |



Raltron Solutions – VCOs

Raltron VCOs Solutions

| VCO SIZE (mm) | FREQUENCY(GHz) |
|---------------|----------------|
| 5 x 4 | 300 to 2.6 |
| 8 x 6 | Up to 12 |
| 7.6 x 7.6 | Up to 12 |
| 12.5 x 12.5 | Up to 12 |

Raltron VCOs:

Frequency Range: up to 12.00 GHz

Low Phase Noise and Fast Settling Time

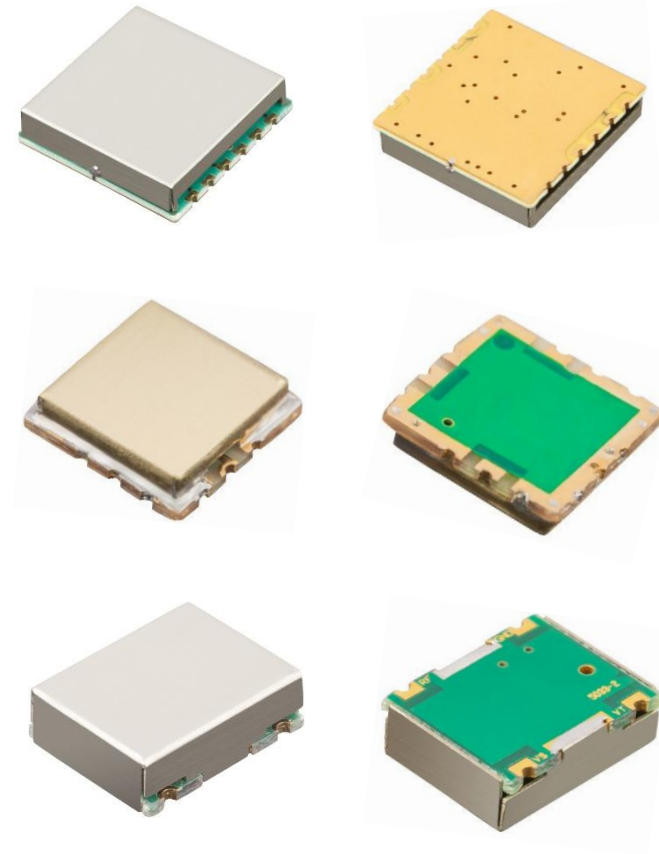
Excellent Return Loss

Supply Voltage: +2.2 to +12.0 VDC

Ultra Wide Tuning Ranges













Packages: 5 x 4 to 20 x 20 mm footprint

[See All VCOs Products](#)



Raltron Solutions - RF Connectors











Raltron RF connectors with low insertion loss and excellent voltage standing wave ratio support the high-level performance demanded by EV Charger Applications.

| Product # | Datasheet | Image | Connector Family | Description |
|-------------------------------------|---|---|----------------------|--|
| RCN-3F-3108-K-001 |  |  | BNC | BNC Straight Jack PCB Receptacle |
| RCN-4F-28012-K-001 |  |  | MCX | MCX Straight Jack PCB Receptacle |
| RCN-5F-33106-K-001 |  |  | MMCX | MMCX Straight Jack PCB Receptacle |
| RCN-17M-12816-K-001 |  |  | N | Type N Right Angle Plug |
| RCN-1M-21419-K-001 |  |  | SMA | SMA Straight Plug (Quick Fit) for Semi Rigid Cable |
| RCN-9F-16801-K-001 |  |  | TNC | TNC Straight Jack Bulkhead Crimp |



Raltron Solutions - RF Cable Assemblies

Raltron cable assemblies range from simple jumpers to power and high-speed data cables.

| Product # | Datasheet | Image | Cable Assemblies | Description |
|---------------------------------------|---|---|-----------------------------|--|
| RCB-16-F-95-11-SD |  PDF |  | SMA to IPEX | RP SMA Jack S/T For RF1.13 Cable |
| RCB-21-174-150-DO-001 |  PDF |  | MCX to MCX | MCX Plug to MCX R/A Plug For RG174 Cable |
| RCB-14-H-100-12-SD |  PDF |  | MCX to SMA | SMA Jack to MCX Plug For RF1.37 Cable |
| RCB-15-A-100-12-SD |  PDF |  | MMCX to SMA | SMA to MMCX For RG174 Cable |
| RCB-13-J-600-13-SD |  PDF |  | TNC to SMA | TNC Jack S/T For RG316 Cable |



[CABLE ASSEMBLIES SHORT FORM CATALOG](#)



Contact



<http://www.raltron.com>

Raltron Electronics

10400 N.W. 33rd Street

Miami, FL 33172, U.S.A.

Phone: 305 593 6033

Fax: 305 594 3973