

Frequency Components and Antennas  
for  
Wearables Applications



**RALTRON**

# Introduction



**Raltron** offers the most comprehensive line of frequency management components for Wearables Applications, 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.

# What is Wearables Applications?



**Smart Watches**



**Smart Glasses**



**Smart Rings**



**Virtual Reality Glasses**



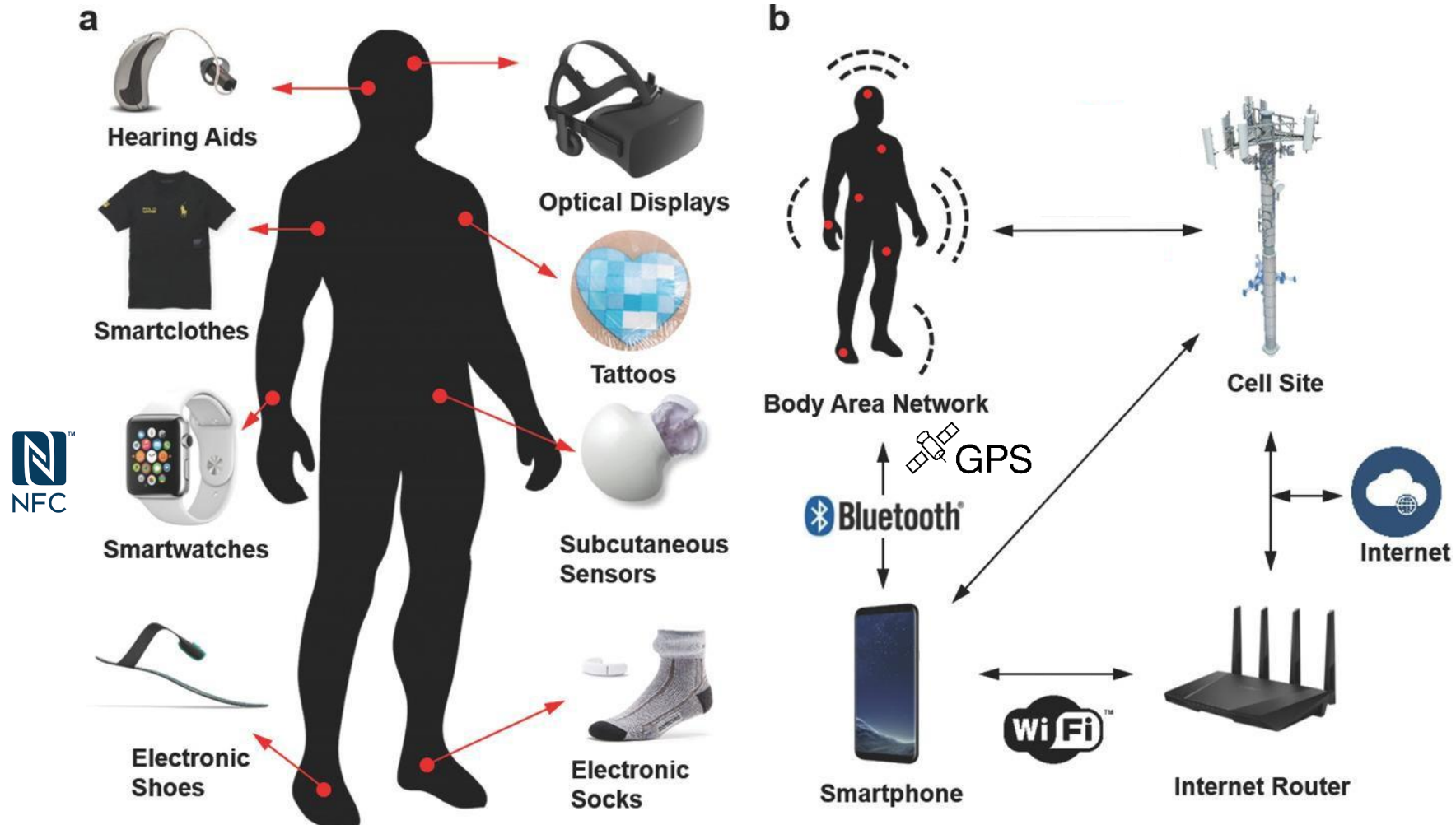
**Smart Shoes**



**Smart Nicotine Patch**

- Wearable technology is any technology that is designed to be used while worn. Common types of wearable technology include smartwatches and smart glasses.
- Wearable devices are close to the body and can detect, analyze, and send data about the body and the environment. They can also provide feedback to the wearer.

# Wearables in Medicine Example



Source: [https://onlinelibrary.wiley.com/doi/full/10.1002/adma.201706910?\\_utm\\_campaign=mention57529&\\_utm\\_medium=inline&\\_utm\\_content=lnk241316896300&\\_utm\\_source=xakep](https://onlinelibrary.wiley.com/doi/full/10.1002/adma.201706910?_utm_campaign=mention57529&_utm_medium=inline&_utm_content=lnk241316896300&_utm_source=xakep)

# 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** Wearables Applications 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

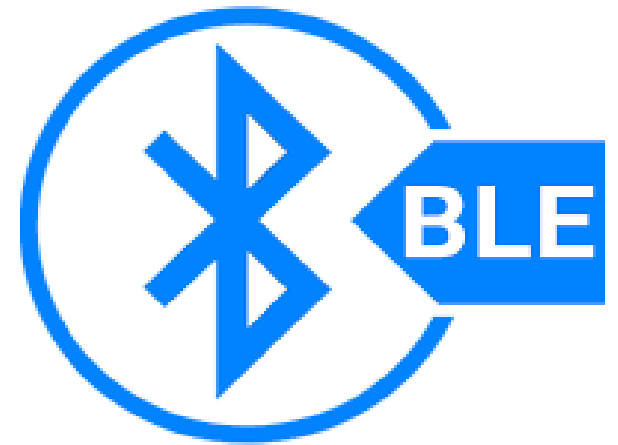
Nordic Semiconductor - nRF52810 - 64 MHz Crystal Oscillator, 32 MHz Crystal  
32.768 kHz Crystal Oscillator, 32.768 kHz Crystal  
1 MHz/16 MHz/32 MHz Peripheral Clock  
- 2.4 GHz Antenna

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** Wearables Applications ICs:

NXP Semiconductors - PN7160\_PN7161 - 27.12 MHz Crystal, 40 MHz Oscillator  
PN7150 - 27.12 MHz Crystal, 40 MHz Oscillator

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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** Wearables Applications ICs:

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

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STMicroelectronics - STA8100GA - 32.768 kHz Crystal

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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

# Raltron Solutions - MHz Crystals











## Available Crystal Packages

Part #	Size(mm)
<a href="#">R1210-32.000-5-F-0720-TR</a>	1.20 x 1.00 x 0.35
<a href="#">R1612-27.120-8-F-3030-EXT-TR</a>	1.60 x 1.25 x 0.32
<a href="#">R2016-48.000-8-F-1030-EXT-TR</a>	2.00 x 1.60 x 0.50
<a href="#">R2520-27.120-10-F-1515-TR-NS1</a>	2.50 x 2.00 x 0.65
<a href="#">RH100-24.000-9-1010-TR</a>	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
<b>R1210</b> <a href="#">View products in stock</a>			<a href="#">Buy Now</a>
<b>R1612</b> <a href="#">View products in stock</a>			<a href="#">Buy Now</a>
<b>R2016</b> <a href="#">View products in stock</a>			<a href="#">Buy Now</a>
<b>R2520</b> <a href="#">View products in stock</a>			<a href="#">Buy Now</a>
<b>RH100</b> <a href="#">View products in stock</a>			<a href="#">Buy Now</a>

### [See All Crystal Products](#)



# Raltron Solutions - Tuning Fork 32.768 kHz

## Available Tuning Fork Crystal Packages

Part #	SIZE(mm)
<a href="#">RT1210B-32.768-6-TR-NS2</a>	1.2 x 1.0
<a href="#">RT1210-32.768-9-TR</a>	1.2 x 1.0
<a href="#">RT1610-32.768-12.5-TR</a>	1.6 x 1.0
<a href="#">RT2012-32.768-7-20-EXT-TR</a>	2.0 x 1.2
<a href="#">RT3215-32.768-12.5-TR</a>	3.2 x 1.5

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

Frequency Tolerances:  $\pm 20$  ppm and  $\pm 10$  ppm















## Stock at our Distributors

Product Series	Datasheet	Image	Contact Us / Buy Now
<b>RT1210B</b> <a href="#">View products in stock</a>			<a href="#">Contact Us</a>
<b>RT1210</b> <a href="#">View products in stock</a>			<a href="#">Buy Now</a>
<b>RT1610</b> <a href="#">View products in stock</a>			<a href="#">Buy Now</a>
<b>RT2012</b> <a href="#">View products in stock</a>			<a href="#">Buy Now</a>
<b>RT3215</b> <a href="#">View products in stock</a>			<a href="#">Buy Now</a>

[See All Crystal Products](#)

# Raltron Solutions – Antennas

## Raltron Antennas Solutions

Part #	Datasheet	Image	Frequency(MHz)	Contact Us / Buy Now
<a href="#">RCA-W2A1-1005-W-001</a>	 PDF		2400~2500	Contact Us
<a href="#">RCA-3216-A1-TR</a>	 PDF		BLUETOOTH: 2450±50	Contact Us
<a href="#">RCA-E-3216-A2-TR</a>	 PDF		BLUETOOTH: 2400~2483.5	Contact Us
<a href="#">RCA-E-3216-E1-TR</a>	 PDF		GPS: 1575	Contact Us
<a href="#">RCA-W2-P-3216-A29-G</a>	 PDF		BLUETOOTH: 2545	Contact Us
<a href="#">RCA-W2A1-3216-Z-040</a>	 PDF		2400~2500	<a href="#">Buy Now</a>

[See Antenna Products for Bluetooth](#)



# Raltron Solutions – Speakers and Microphone

## Raltron Speakers

Part #	Size
<a href="#">RSP-1300.000-1255-NS1</a>	12 x 5.5 x 3
<a href="#">RSP-1300.000-1255-NS2</a>	12 x 5.5 x 3.3
<a href="#">RSP-900.000-1306-CS-NS1</a>	13 x 6 x 3



## Raltron Microphones

Part #	Size
<a href="#">RMIC-110-5-3015-NS1</a>	Ø3.0 x 1.5
<a href="#">RMIC-115-10-4013-NS1</a>	Ø4.0 x 1.3
<a href="#">RMIC-110-5-4015-NS2</a>	Ø4.0 x 1.3



# Contact



<http://www.raltron.com>

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