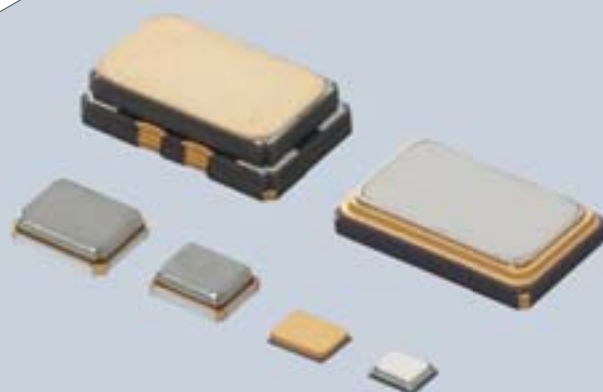


# Crystal Units/Crystal Oscillators





### **EU RoHS Compliant**

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment."
- For more details, please refer to our web page, "Murata's Approach for EU RoHS" (<https://www.murata.com/en-eu/support/compliance/rohs>).

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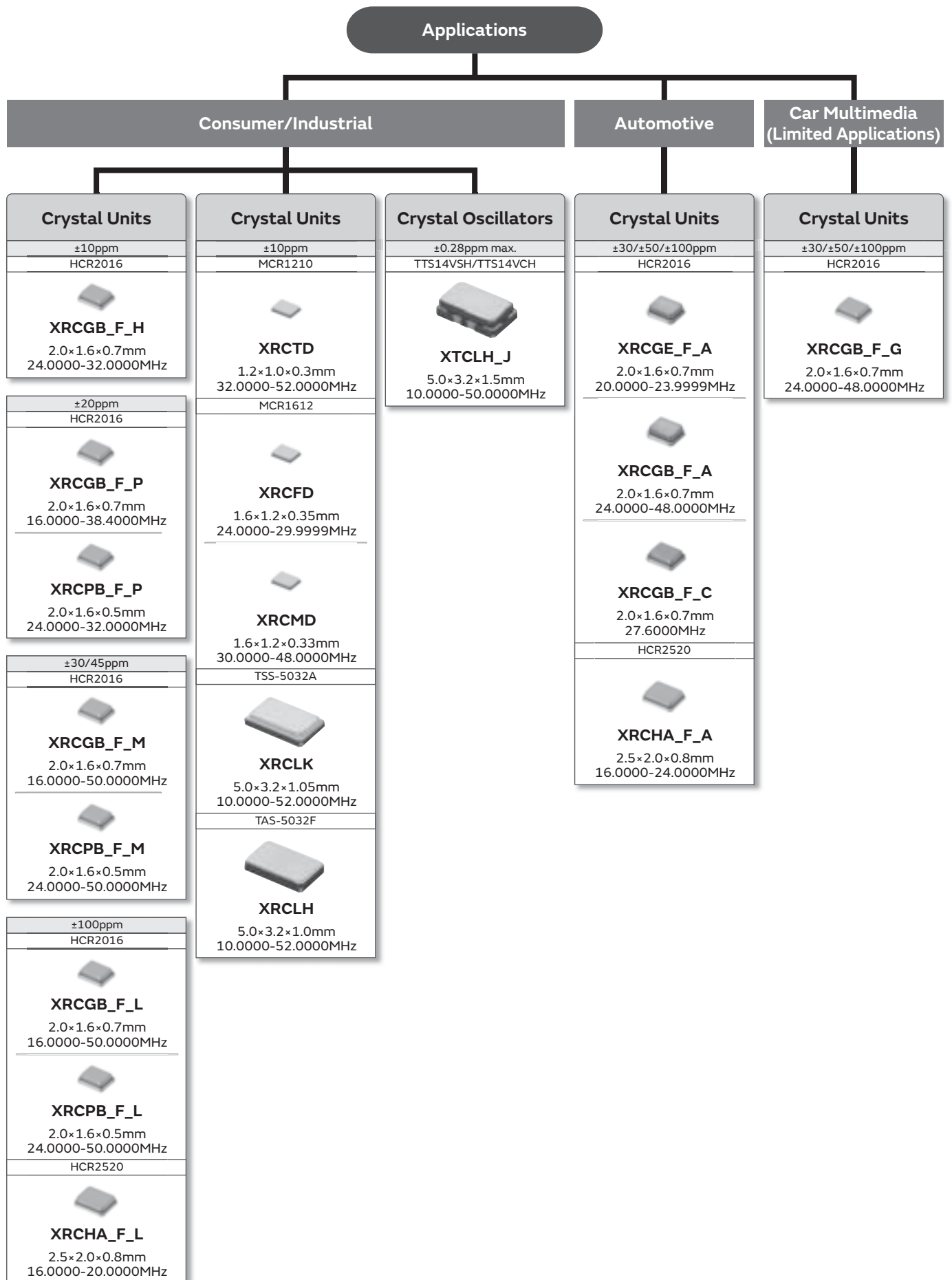
Product specifications are as of October 2019.

Bluetooth® is a registered trademark or trademark of Bluetooth SIG, Inc. in the United States and other countries.

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Please check the MURATA website (<https://www.murata.com/>) if you cannot find a part number in this catalog.

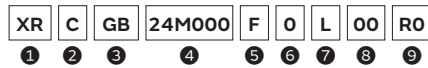
# Selection Guide



● Part Numbering

Crystal Unit

(Part Number)



① Product ID

| Product ID |              |
|------------|--------------|
| XR         | Crystal Unit |

② Lead Style

| Code | Lead Style |
|------|------------|
| C    | SMD        |

③ Size · Structure

| Code  | Size · Structure                      |
|-------|---------------------------------------|
| TD    | 1210 (STD) Metal Sealing 4pad         |
| FD    | 1612 (STD) Metal Sealing 4pad         |
| MD    | 1612 (Low Profile) Metal Sealing 4pad |
| GB/GE | 2016 (STD) Resin Sealing 4pad         |
| PB    | 2016 (Low Profile) Resin Sealing 4pad |
| HA    | 2520 (STD) Resin Sealing 2pad         |
| LH    | 5032 Metal Sealing 4pad               |
| LK    | 5032 Seam Sealing 4pad                |

④ Nominal Center Frequency

Expressed by six-digit alphanumeric. The unit is in hertz (Hz).  
 Decimal point is expressed by capital letter "M".

⑤ Overtone Order

| Code | Overtone Order         |
|------|------------------------|
| F    | Fundamental            |
| K    | Customized Fundamental |

⑥ Frequency Tolerance

| Code | Frequency Tolerance         |
|------|-----------------------------|
| 0    | ±100ppm                     |
| 1    | ±10ppm                      |
| 2    | ±20ppm                      |
| 3    | ±30ppm                      |
| 4    | ±45ppm                      |
| 5    | ±50ppm                      |
| A    | ±25ppm                      |
| X    | Total Frequency Tolerance*1 |

\*1 Including Initial Tolerance+Temperature Characteristics

⑦ Frequency Shift by Temperature

| Code | Frequency Shift by Temperature  |
|------|---------------------------------|
| A/C  | ±100ppm max. (Automotive Grade) |
| G    | ±50ppm (Car Multimedia Grade)   |
| L    | ±50ppm min.                     |
| M    | ±40ppm                          |
| N    | ±25ppm or 30ppm                 |
| P    | ±20ppm                          |
| H/Q  | ±10ppm to ±15ppm                |

⑧ Individual Specification

| Code |   |
|------|---|
| **   | Two-digit alphanumerics express Individual Specification. |

00: Standard specification type.

⑨ Packaging (Quantity and Plastic taping reel diameter are expressed by one-digit number in "\*\*")

| Code        | Packaging      |
|-------------|----------------|
| R*/E*/J*/P* | Plastic Taping |

## Crystal Oscillator

(Part Number)

|    |   |    |        |   |   |   |    |    |
|----|---|----|--------|---|---|---|----|----|
| XN | C | LH | 19M200 | T | J | E | A5 | P0 |
| ①  | ② | ③  | ④      | ⑤ | ⑥ | ⑦ | ⑧  | ⑨  |

### ① Product ID

| Product ID |         |
|------------|---------|
| XT         | VC-TCXO |
| XN         | TCXO    |

### ② Lead Style

| Code | Lead Style |
|------|------------|
| C    | SMD        |

### ③ Size · Structure

| Code | Size · Structure   |
|------|--------------------|
| LH   | 5032 Metal Sealing |

### ④ Nominal Center Frequency

Expressed by six-digit alphanumeric. The unit is in hertz (Hz).  
 Decimal point is expressed by capital letter "M".

### ⑤ Output Wave

| Code | Output Wave       |
|------|-------------------|
| T    | Clipped Sign Wave |
| C    | CMOS              |

### ⑥ Frequency Tolerance

| Code | Frequency Tolerance |
|------|---------------------|
| J    | ±1.0 to ±1.4ppm     |

### ⑦ Frequency Shift by Temperature

| Code | Frequency Shift by Temperature |
|------|--------------------------------|
| E    | ±0.5ppm max.                   |
| J    | Less than ±0.3ppm              |

### ⑧ Individual Specification

| Code |   |
|------|---|
| **   | Two-digit alphanumerics express Individual Specification. |

### ⑨ Packaging (Quantity and Plastic taping reel diameter are expressed by one-digit number in "\*\*")

| Code     | Packaging      |
|----------|----------------|
| E*/G*/P* | Plastic Taping |

# Crystal Units

for Consumer and Industrial



These crystal units feature a small package and highly accurate frequency, based on Murata's excellent package technology and high grade quartz crystal elements.

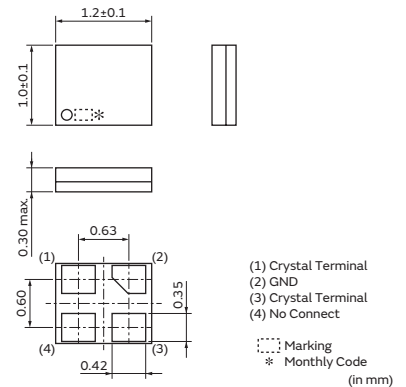
## Features

1. This series is ideal for applications requiring high accuracy crystal units, especially communication clocks such as Wi-Fi, B.T. (Bluetooth®), BLE (Bluetooth® Low Energy), SATA and USB3.0.
2. The crystal units are extremely small, contributing to a reduction in the mounting area.
3. The series complies to RoHS directive, being lead-free (phase 3).

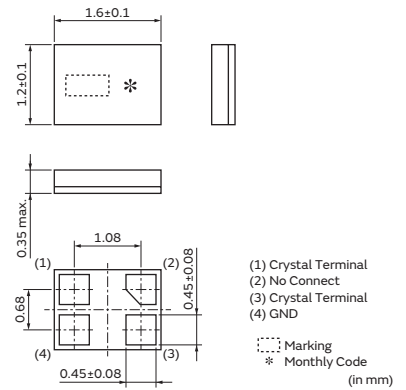
## Applications

1. Clock for Wi-Fi, B.T. and ACPU controller ICs: smartphone, wearable device, module, etc.
2. Clock for BLE controller ICs: wearable, fitness and healthcare devices, module, etc.
3. Storage devices with SATA interface: HDD, SSD, Optical storage device, etc.
4. Clock for USB (Ultra-Speed and High-Speed) controller ICs: Mobile phone, DVC, DSC, Portable audio, PC peripheral, etc.
5. Clock for PC, visual equipment controller ICs
6. Audio equipment and musical instrument, etc.
7. Clock for PLC, Inverter, Servo Amp, Servo Motor, etc. controller ICs
8. Clock for LCD, Programmable display and Visual equipment controller ICs
9. Other applications for replacement of other crystal units or oscillators.

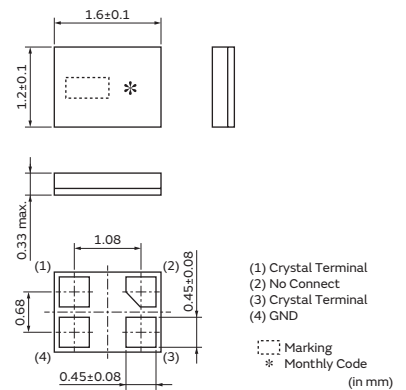
**XRCTD  
 (MCR1210)**  
 32.0000–52.0000MHz



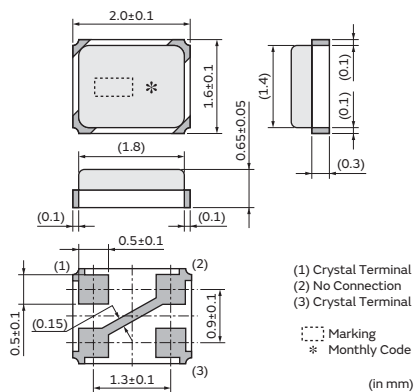
**XRCFD  
 (MCR1612)**  
 24.0000–29.9999MHz



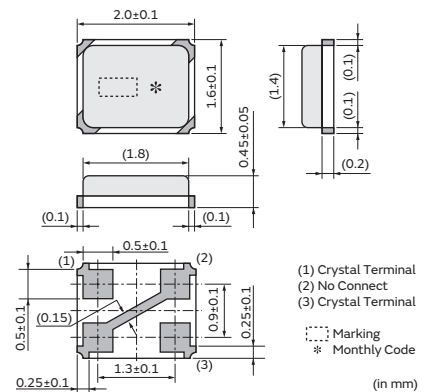
**XRCMD  
 (MCR1612)**  
 30.0000–48.0000MHz



**XRCGB  
 (HCR2016)**  
 16.0000–50.0000MHz

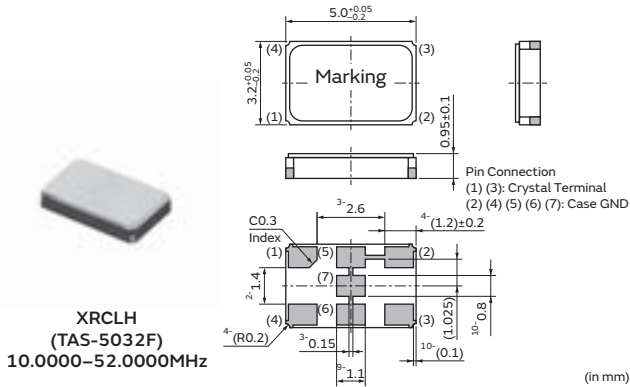
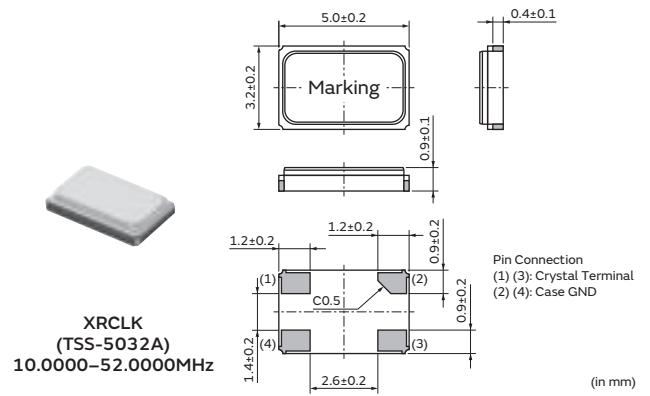
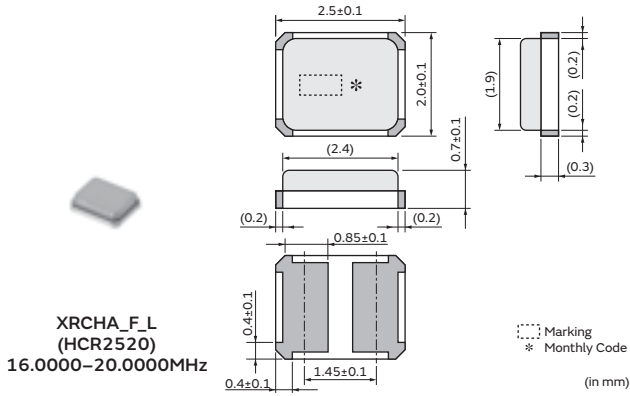


**XRCPB  
 (HCR2016)**  
 24.0000–50.0000MHz



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## Series

| Series    | Type      | Package | Frequency (MHz)    | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | Drive Level (μW max.) | Operating Temperature Range (°C) |            |
|-----------|-----------|---------|--------------------|--|---|---------------------------------|-----------------------|----------------------------------|------------|
| XRCTD     | MCR1210   | Metal   | 32.0000 to 52.0000 | ±20ppm (Total)                               |   |                                 | 100                   | -30 to +85                       |            |
| XRCFD     | MCR1612   |         | 24.0000 to 29.9999 | ±10  | ±10   | ±1                              |                       | -20 to +70                       |            |
| XRCMD     |           |         | 30.0000 to 48.0000 |  |   |                                 | -20 to +70            |                                  |            |
| XRCGB_F_H | HCR2016   | Resin   | 24.0000 to 25.0000 |  |   | ±20                             | ±20                   | ±5                               | -20 to +70 |
| XRCGB_F_P |           |         | 26.0000 to 32.0000 | ±2   | 300   |                                 |                       |                                  | -30 to +85 |
| XRCPB_F_P |           |         | 16.0000            | ±40 (Total)                                  |   |                                 |                       |                                  | ±1         |
| XRCGB_F_M |           |         | 24.0000 to 38.4000 | ±30/±45                                      | ±40   |                                 |                       |                                  |            |
| XRCPB_F_M |           |         | 16.0000 to 50.0000 | ±100   | ±50   |                                 |                       |                                  |            |
| XRCGB_F_L |           |         | 24.0000 to 50.0000 |  |   |                                 |                       |                                  |            |
| XRCPB_F_L |           |         | 16.0000 to 50.0000 |  |   |                                 |                       |                                  |            |
| XRCHA_FL  |           |         | HCR2520            | 16.0000 to 20.0000                           | ±100  | ±100                            | ±3                    | 60                               | -30 to +85 |
| XRCLK     |           |         | TSS-5032A          | 10.0000 to 52.0000                           | ±10   | ±15                             |                       |                                  |            |
| XRCLH     | TAS-5032F | Metal   | 10.0000 to 52.0000 | ±10  | ±15   | ±1 (±3/5Years)                  | 60                    | -30 to +85                       |            |

XRCPB series is a low profile type of XRCGB series.

\*1 16MHz: 100μW max.

## Part Number List

<XRCTD/XRCFD/XRCMD>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCTD37M400FXQ50R0 | MCR1210 | 37.4000         | ±20ppm (Total)(-30 to +85°C)                 |   |                                 | 60           | 6                     | 100                   |
| XRCFD26M000FYQ01R0 | MCR1612 | 26.0000         | ±20ppm (Total)(-30 to +85°C)                 |   |                                 | 150          | 8                     | 100                   |
| XRCMD32M000FXP50R0 | MCR1612 | 32.0000         | ±30ppm (Total)(-30 to +85°C)                 |   |                                 | 100          | 6                     | 100                   |
| XRCMD37M400F1Q01R0 | MCR1612 | 37.4000         | ±10  | ±10(-20 to +70°C)   | ±1                              | 60           | 8                     | 100                   |
| XRCMD38M400FXQ56R0 | MCR1612 | 38.4000         | ±20ppm (Total)(-30 to +85°C)                 |   |                                 | ±1           | 60                    | 10                    |
| XRCMD40M000FXQ57R0 | MCR1612 | 40.0000         | ±20ppm (Total)(-30 to +85°C)                 |   |                                 | ±1           | 60                    | 10                    |
| XRCMD48M000FXQ58R0 | MCR1612 | 48.0000         | ±20ppm (Total)(-30 to +85°C)                 |   |                                 | ±1           | 40                    | 7                     |

\* Equivalent Series Resistance

<XRCGB\_F\_H>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCGB24M000F1H00R0 | HCR2016 | 24.0000         | ±10  | ±10 (-20 to +70°C)  | ±2                              | 80           | 6                     | 300                   |
| XRCGB25M000F1H00R0 | HCR2016 | 25.0000         | ±10  | ±10 (-20 to +70°C)  | ±2                              | 80           | 6                     | 300                   |
| XRCGB26M000F1H00R0 | HCR2016 | 26.0000         | ±10  | ±10 (-30 to +85°C)  | ±2                              | 60           | 6                     | 300                   |
| XRCGB32M000F1H00R0 | HCR2016 | 32.0000         | ±10  | ±10 (-30 to +85°C)  | ±2                              | 60           | 6                     | 300                   |

\* Equivalent Series Resistance

<XRCGB\_F\_P/XRCPB\_F\_P>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCGB16M000FXN01R0 | HCR2016 | 16.0000         | ±40ppm (Total)(-30 to +85°C)                 |   | ±5                              | 200          | 8                     | 100                   |
| XRCGB24M000F2P00R0 | HCR2016 | 24.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB25M000F2P00R0 | HCR2016 | 25.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB26M000F2P00R0 | HCR2016 | 26.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB27M000F2P00R0 | HCR2016 | 27.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB27M120F2P00R0 | HCR2016 | 27.1200         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB30M000F2P00R0 | HCR2016 | 30.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB31M250F2P00R0 | HCR2016 | 31.2500         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB32M000F2P00R0 | HCR2016 | 32.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB38M400F2P00R0 | HCR2016 | 38.4000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB24M000F2P00R0 | HCR2016 | 24.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB25M000F2P00R0 | HCR2016 | 25.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB26M000F2P00R0 | HCR2016 | 26.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB27M000F2P00R0 | HCR2016 | 27.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB27M120F2P00R0 | HCR2016 | 27.1200         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB30M000F2P00R0 | HCR2016 | 30.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB31M250F2P00R0 | HCR2016 | 31.2500         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB32M000F2P00R0 | HCR2016 | 32.0000         | ±20  | ±20 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |

\* Equivalent Series Resistance

<XRCGB\_F\_M/XRCPB\_F\_M>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCGB24M000F3M00R0 | HCR2016 | 24.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB24M576F3M00R0 | HCR2016 | 24.5760         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB25M000F3M00R0 | HCR2016 | 25.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB26M000F3M00R0 | HCR2016 | 26.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB27M000F3M00R0 | HCR2016 | 27.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB27M120F3M00R0 | HCR2016 | 27.1200         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB30M000F3M00R0 | HCR2016 | 30.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB31M250F3M00R0 | HCR2016 | 31.2500         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB32M000F3M00R0 | HCR2016 | 32.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB33M868F4M00R0 | HCR2016 | 33.8688         | ±45  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB38M400F4M00R0 | HCR2016 | 38.4000         | ±45  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB40M000F4M00R0 | HCR2016 | 40.0000         | ±45  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB48M000F4M00R0 | HCR2016 | 48.0000         | ±45  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB50M000F4M00R0 | HCR2016 | 50.0000         | ±45  | ±40 (-30 to +85°C)  | ±5                              | 65           | 6                     | 300                   |
| XRCPB24M000F3M00R0 | HCR2016 | 24.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB24M576F3M00R0 | HCR2016 | 24.5760         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB25M000F3M00R0 | HCR2016 | 25.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB26M000F3M00R0 | HCR2016 | 26.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB27M000F3M00R0 | HCR2016 | 27.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB27M120F3M00R0 | HCR2016 | 27.1200         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB30M000F3M00R0 | HCR2016 | 30.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB31M250F3M00R0 | HCR2016 | 31.2500         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |

\* Equivalent Series Resistance

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1

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCPB32M000F3M00R0 | HCR2016 | 32.0000         | ±30  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB33M868F4M00R0 | HCR2016 | 33.8688         | ±45  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB40M000F4M00R0 | HCR2016 | 40.0000         | ±45  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB48M000F4M00R0 | HCR2016 | 48.0000         | ±45  | ±40 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB50M000F4M00R0 | HCR2016 | 50.0000         | ±45  | ±40 (-30 to +85°C)  | ±5                              | 65           | 6                     | 300                   |

\* Equivalent Series Resistance

<XRCGB\_F\_L/XRCPB\_F\_L>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCGB24M000F0L00R0 | HCR2016 | 24.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB24M576F0L00R0 | HCR2016 | 24.5760         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB25M000F0L00R0 | HCR2016 | 25.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB26M000F0L00R0 | HCR2016 | 26.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB27M000F0L00R0 | HCR2016 | 27.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB27M120F0L00R0 | HCR2016 | 27.1200         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB30M000F0L00R0 | HCR2016 | 30.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB31M250F0L00R0 | HCR2016 | 31.2500         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB32M000F0L00R0 | HCR2016 | 32.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB33M868F0L00R0 | HCR2016 | 33.8688         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB38M400F0L00R0 | HCR2016 | 38.4000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB40M000F0L00R0 | HCR2016 | 40.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB48M000F0L00R0 | HCR2016 | 48.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB50M000F0L00R0 | HCR2016 | 50.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB24M000F0L00R0 | HCR2016 | 24.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB24M576F0L00R0 | HCR2016 | 24.5760         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB25M000F0L00R0 | HCR2016 | 25.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB26M000F0L00R0 | HCR2016 | 26.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB27M000F0L00R0 | HCR2016 | 27.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB27M120F0L00R0 | HCR2016 | 27.1200         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCPB30M000F0L00R0 | HCR2016 | 30.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB31M250F0L00R0 | HCR2016 | 31.2500         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB32M000F0L00R0 | HCR2016 | 32.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB33M868F0L00R0 | HCR2016 | 33.8688         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB40M000F0L00R0 | HCR2016 | 40.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB48M000F0L00R0 | HCR2016 | 48.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCPB50M000F0L00R0 | HCR2016 | 50.0000         | ±100   | ±50 (-30 to +85°C)  | ±5                              | 100          | 6                     | 300                   |

\* Equivalent Series Resistance

<XRCHA\_F\_L>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCHA16M000F0L01R0 | HCR2520 | 16.0000         | ±100   | ±100 (-30 to +85°C)   | ±5                              | 100          | 8                     | 300                   |
| XRCHA20M000F0L01R0 | HCR2520 | 20.0000         | ±100   | ±100 (-30 to +85°C)   | ±5                              | 80           | 8                     | 300                   |

\* Equivalent Series Resistance

<XRCLK>

| Part Number        | Type      | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|-----------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCLK10M000F1QA8P0 | TSS-5032A | 10.0000         | ±10  | ±15 (-30 to +85°C)  | ±3                              | 80           | 8                     | 60                    |
| XRCLK12M000F1QA6P0 | TSS-5032A | 12.0000         | ±10  | ±15 (-30 to +85°C)  | ±3                              | 60           | 8                     | 60                    |
| XRCLK14M745F1QB6P0 | TSS-5032A | 14.7456         | ±10  | ±15 (-30 to +85°C)  | ±3                              | 60           | 8                     | 60                    |
| XRCLK16M000F1QA7P0 | TSS-5032A | 16.0000         | ±10  | ±15 (-30 to +85°C)  | ±3                              | 60           | 8                     | 60                    |
| XRCLK21M250F1QA8P0 | TSS-5032A | 21.2500         | ±10  | ±15 (-30 to +85°C)  | ±3                              | 60           | 8                     | 60                    |
| XRCLK52M000F1QA0P0 | TSS-5032A | 52.0000         | ±10  | ±15 (-30 to +85°C)  | ±3                              | 60           | 8                     | 60                    |

\* Equivalent Series Resistance

8

<XRCLH>

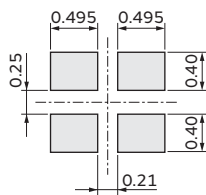
| Part Number        | Type      | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|-----------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCLH10M000F1QA4P0 | TAS-5032F | 10.0000         | ±10  | ±15 (-30 to +85°C)  | ±1 (±3/5Years)                  | 60           | 8                     | 60                    |
| XRCLH12M000F1QA0P0 | TAS-5032F | 12.0000         | ±10  | ±15 (-30 to +85°C)  | ±1 (±3/5Years)                  | 60           | 8                     | 60                    |
| XRCLH14M745F1QA0P0 | TAS-5032F | 14.7456         | ±10  | ±15 (-30 to +85°C)  | ±1 (±3/5Years)                  | 40           | 8                     | 60                    |
| XRCLH16M000F1QA2P0 | TAS-5032F | 16.0000         | ±10  | ±15 (-30 to +85°C)  | ±1 (±3/5Years)                  | 40           | 8                     | 60                    |
| XRCLH21M250F1QA0P0 | TAS-5032F | 21.2500         | ±10  | ±15 (-30 to +85°C)  | ±1 (±3/5Years)                  | 40           | 8                     | 60                    |
| XRCLH52M000F1QA1P0 | TAS-5032F | 52.0000         | ±10  | ±15 (-30 to +85°C)  | ±1 (±3/5Years)                  | 40           | 8                     | 60                    |

\* Equivalent Series Resistance

Standard Land Pattern Dimensions

XRCTD  
 (MCR1210)

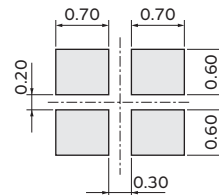
(Recommended Land Pattern)



(in mm)

XRCFD, XRCMD  
 (MCR1612)

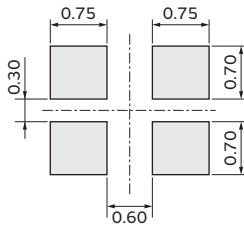
(Recommended Land Pattern)



(in mm)

XRCGB\_F\_H/P/M/L, XRCPB\_F\_P/M/L  
 (HCR2016)

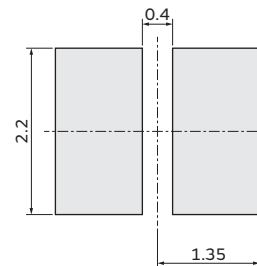
(Recommended Land Pattern)



(in mm)

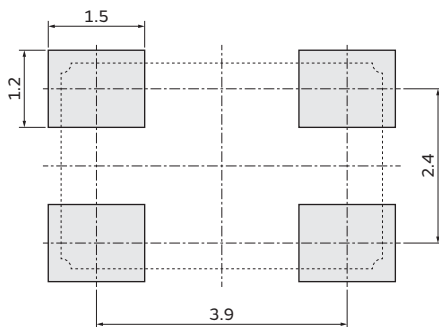
XRCHA\_F\_L  
 (HCR2520)

(Recommended Land Pattern)



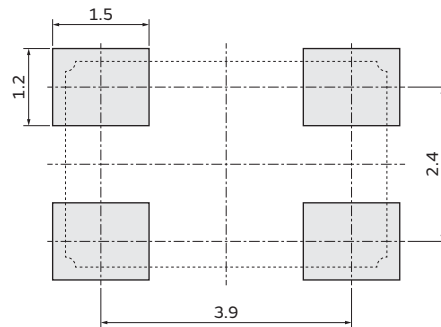
(in mm)

XRCLK  
 (TSS-5032A)



(in mm)

XRCLH  
 (TAS-5032F)



Avoid putting signal lines under the product except referenced land pattern.

(in mm)

## Notice -Crystal Units for Consumer and Industrial-

1

### <XRCTD, XRCFD, XRCMD Series>

#### Notice (Soldering and Mounting)

##### 1.1. Soldering Condition

Reflow

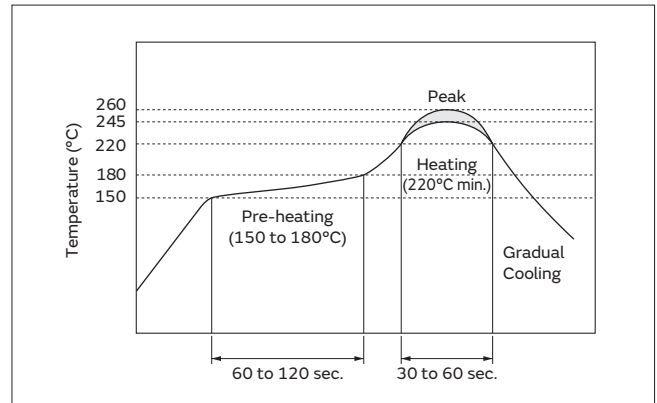
Please mount components on a circuit board by the reflow soldering.

Flux: Please use rosin based flux; but do not use water soluble flux.

Solder: Please use solder (Sn-3.0Ag-0.5Cu) under the following condition.

Standard thickness of soldering paste: 0.10 to 0.15mm

|                  | Condition             |                |
|------------------|-----------------------|----------------|
| Pre-heating      | 150 to 180°C          | 60 to 120 sec. |
| Heating          | 220°C min.            | 30 to 60 sec.  |
| Peak Temperature | 245°C min. 260°C max. | 5 sec. max.    |



##### 1.2. Optimum Solder Amount for Soldering

Please keep the solder volume below the height of the substrate. When exceeding the substrate, the damage of sealing part between the metal cap and the substrate may occur.

##### 2. Notice for Mounting

The component is recommended with placement

machines employing optical placement capabilities.

The component might be damaged by mechanical force depending on placement machine and condition.

Make sure that you have evaluated by using placement machines before going into mass production.

Do not use placement machines employing mechanical positioning.

Please contact Murata for details beforehand.

Continued on the following page. ↗

## Notice -Crystal Units for Consumer and Industrial-

Continued from the preceding page. ↘

### Notice (Storage and Operating Condition)

#### 1. Product Storage Condition

Please store the products in room where the temperature/humidity is stable. And avoid such places where there are large temperature changes. Please store the products under the following conditions:

Temperature: -10 to + 40 degrees C

Humidity: 15 to 85% R.H.

#### 2. Expire Date on Storage

Expiration date (shelf life) of the products is 6 months after delivery under the conditions of an unopened package. Please use the products within 6 months after delivery. If you store the products for a long time (more than 6 months), use carefully because the products may be degraded in solderability and/or rusty.

Please confirm solderability and characteristics for the products regularly.

#### 3. Notice on Product Storage

(1) Please do not store the products in a chemical atmosphere (Acids, Alkali, Bases, Organic gas, Sulfides and so on), because the characteristics may be reduced in quality, and/or be degraded in solderability due to the storage in a chemical atmosphere.

(2) Please do not put the products directly on the floor without anything under them to avoid damp places and/or dusty places.

(3) Please do not store the products in the places under direct sunlight, heat and vibration.

(4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in solderability due to storage under poor conditions.

(5) Please do not drop the products to avoid cracking the crystal element.

### Notice (Rating)

The component may be damaged if excess mechanical stress is applied.

### Notice (Handling)

1. Please confirm circuit the conditions on your set, because irregular or stop oscillation may occur under unmatched circuit conditions.

2. Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

3. Please do not use these products in the following applications in transportation equipment: vehicles, trains, ships, etc.

(example: engine control, brake control, steering control, body control.)

## Notice -Crystal Units for Consumer and Industrial-

1

### <XRCGB\_F\_H/P/M/L, XRCPB\_F\_P/M/L, XRCHA\_F\_L, XRCLK, XRCLH Series>

#### Notice (Soldering and Mounting)

##### 1.1. Soldering Condition

###### (1) Reflow

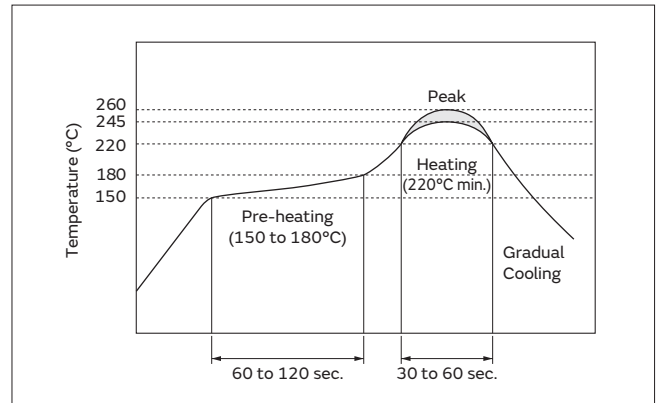
Please mount components on a circuit board by the reflow soldering.

Flux: Please use rosin based flux; but do not use water soluble flux.

Solder: Please use solder (Sn-3.0Ag-0.5Cu) under the following condition.

Standard thickness of soldering paste: 0.10 to 0.15mm

|                  | Condition                         |                |
|------------------|-----------------------------------|----------------|
| Pre-heating      | 150 to 180°C                      | 60 to 120 sec. |
| Heating          | 220°C min.                        | 30 to 60 sec.  |
| Peak Temperature | 245°C min. 260°C max. 5 sec. max. |                |



###### (2) Soldering Iron

If compelled to mount the component by using a soldering iron, please do not directly touch the component with the soldering iron. The component terminals or electrical characteristics may be damaged if excessive thermal stress is applied. Please keep solder away from the metal cap (Lid) portion.

|                               | Condition      |
|-------------------------------|----------------|
| Pre-heating                   | 150°C 60 sec.  |
| Heating of the Soldering Iron | 350°C max.     |
| Watt                          | 30W max.       |
| Shape of the Soldering Iron   | ø3mm max.      |
| Soldering Time                | 5 sec. max.    |
| Solder                        | Sn-3.0Ag-0.5Cu |

##### 1.2. Optimum Solder Amount for Soldering

Please keep the solder volume below the height of the substrate. When exceeding the substrate, the damage of sealing part between the metal cap and the substrate may occur.

##### 2. Wash

The component cannot withstand washing.

##### 3. Notice for Mounting

The component is recommended with placement machines employing optical placement capabilities. The component might be damaged by mechanical force depending on placement machine and condition. Make sure that you have evaluated by using placement machines before going into mass production. Do not use placement machines employing mechanical positioning. Please contact Murata for details beforehand.

Continued on the following page. ↗

## Notice -Crystal Units for Consumer and Industrial-

Continued from the preceding page. ↘

### Notice (Storage and Operating Condition)

#### 1. Product Storage Condition

Please store the products in room where the temperature/humidity is stable. And avoid such places where there are large temperature changes. Please store the products under the following conditions:

Temperature: -10 to + 40 degrees C

Humidity: 15 to 85% R.H.

#### 2. Expire Date on Storage

Expiration date (shelf life) of the products is 6 months after delivery under the conditions of an unopened package. Please use the products within 6 months after delivery. If you store the products for a long time (more than 6 months), use carefully because the products may be degraded in solderability and/or rusty.

Please confirm solderability and characteristics for the products regularly.

#### 3. Notice on Product Storage

(1) Please do not store the products in a chemical atmosphere (Acids, Alkali, Bases, Organic gas, Sulfides and so on), because the characteristics may be reduced in quality, and/or be degraded in solderability due to the storage in a chemical atmosphere.

(2) Please do not put the products directly on the floor without anything under them to avoid damp places and/or dusty places.

(3) Please do not store the products in the places under direct sunlight, heat and vibration.

(4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in solderability due to storage under poor conditions.

(5) Please do not drop the products to avoid cracking the crystal element.

#### 4. Other

Conformal coating or washing of the component is not acceptable.

Please be sure to consult with our sales representative or engineer prior to using the products.

### Notice (Rating)

The component may be damaged if excess mechanical stress is applied.

### Notice (Handling)

1. Please confirm circuit the conditions on your set, because irregular or stop oscillation may occur under unmatched circuit conditions.

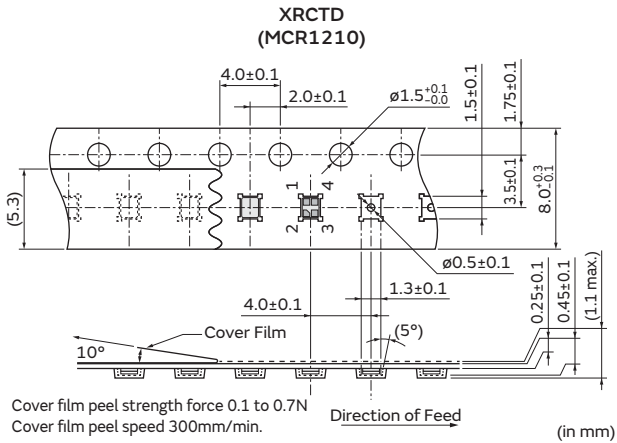
2. Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

3. Please do not use these products in the following applications in transportation equipment: vehicles, trains, ships, etc.

(example: engine control, brake control, steering control, body control.)

# 1 Packaging -Crystal Units for Consumer and Industrial-

## Dimensions of Taping

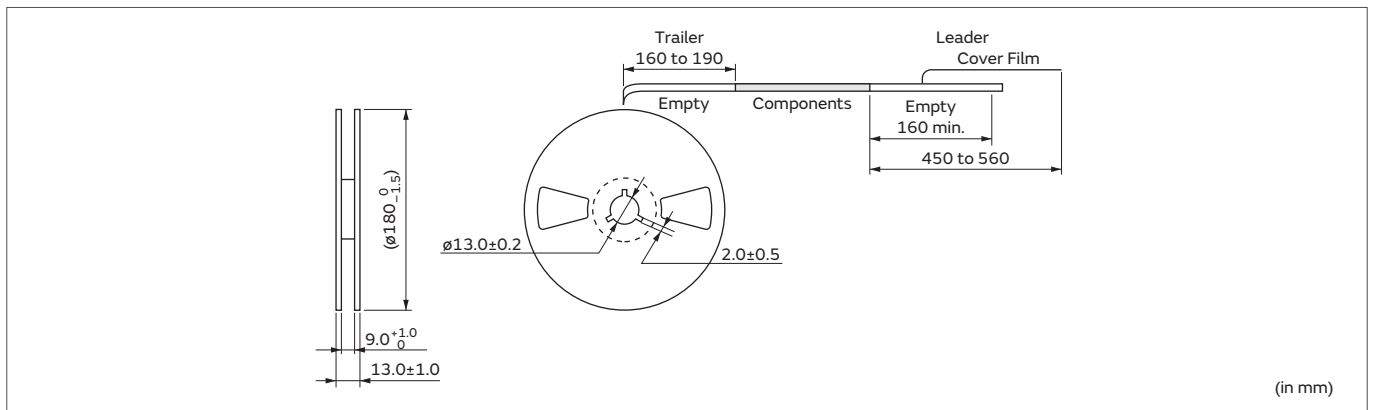


## Minimum Quantity/Dimensions of Reel

Plastic Tape  $\phi 180$ mm

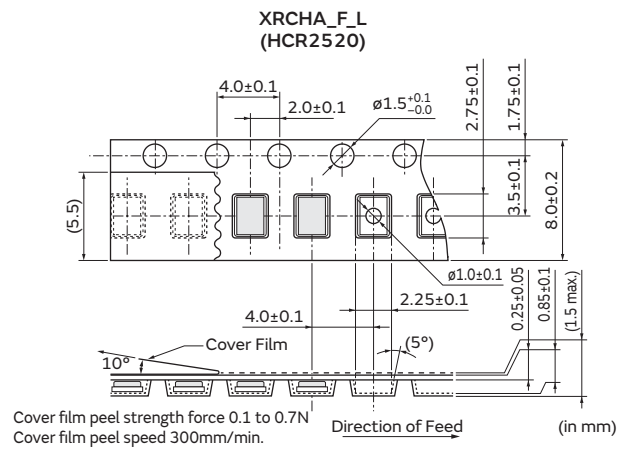
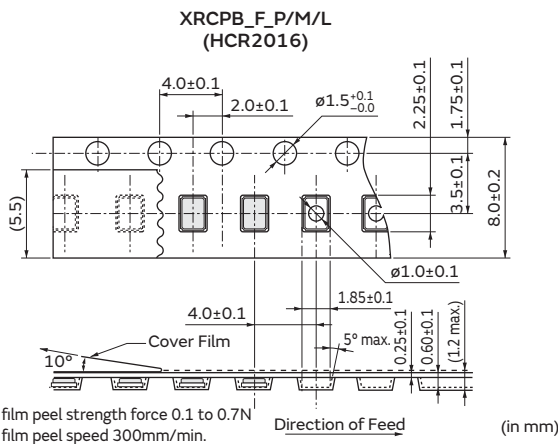
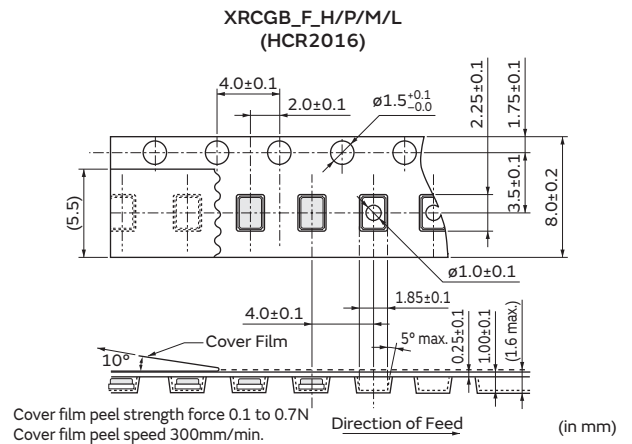
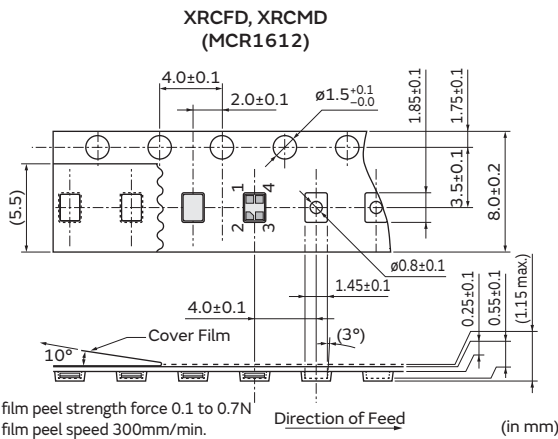
3,000

(pcs.)



# Packaging -Crystal Units for Consumer and Industrial-

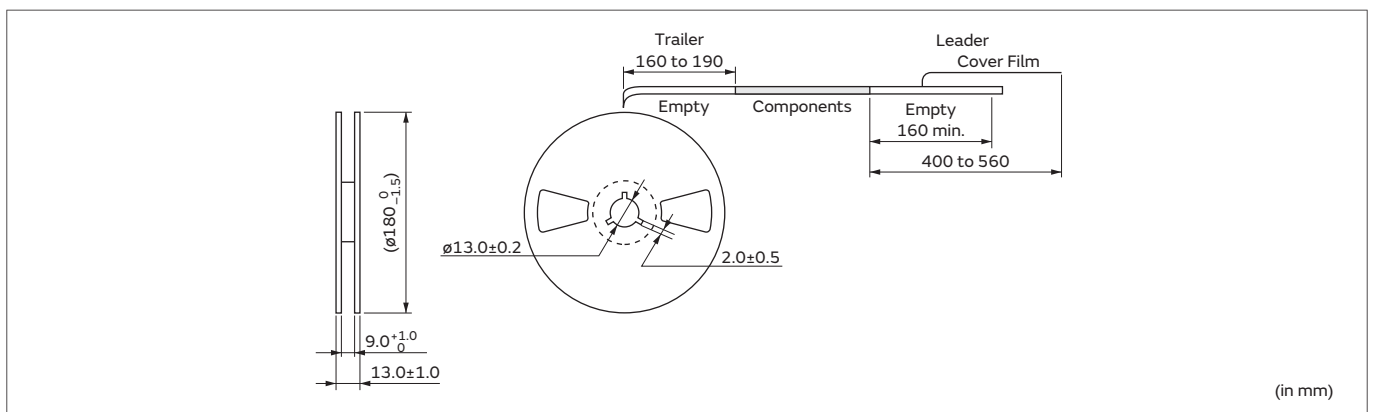
## Dimensions of Taping



## Minimum Quantity/Dimensions of Reel

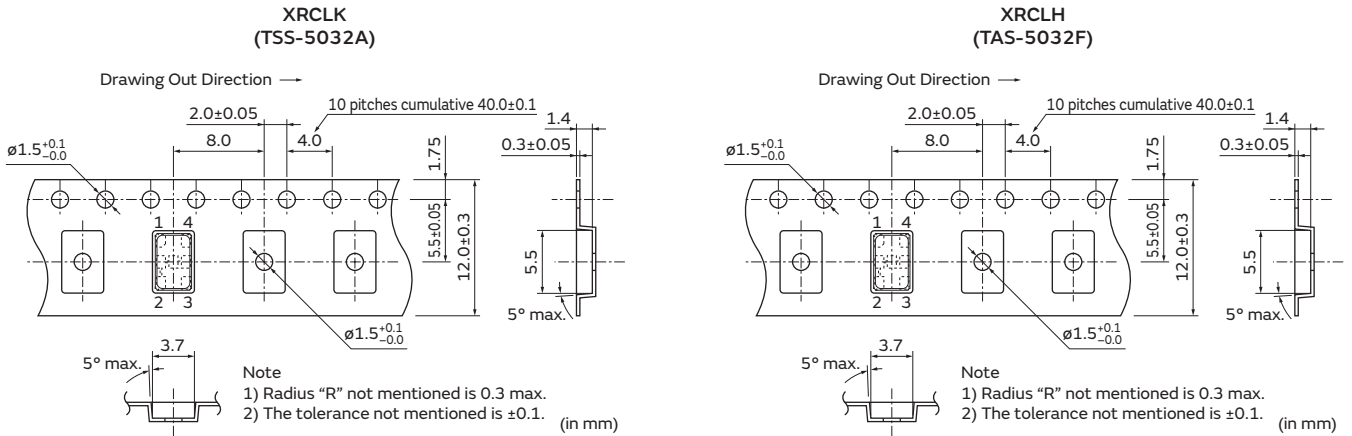
| Plastic Tape ø180mm | Plastic Tape ø330mm |
|---------------------|---------------------|
| 3,000               | 9,000               |

(pcs.)



# 1 Packaging -Crystal Units for Consumer and Industrial-

## Dimensions of Taping

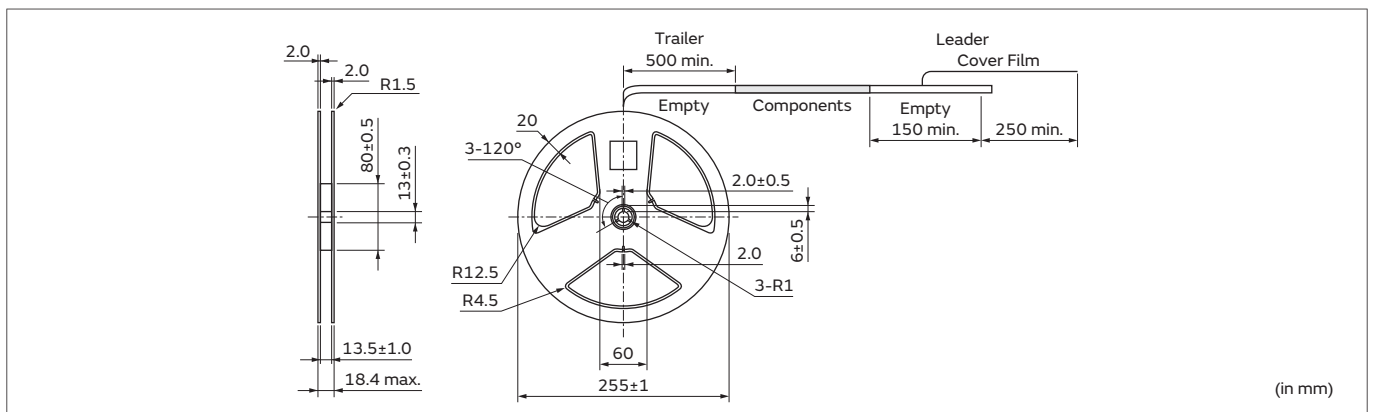


## Minimum Quantity/Dimensions of Reel

Plastic Tape ø255mm

2,000

(pcs.)



# Crystal Oscillators

for Industrial



We offer a varied lineup of TCXO (Temperature compensated crystal oscillator)/VC-TCXO (Voltage-controlled temperature compensated crystal oscillator) based on highly reliable crystal units, superior temperature compensation and adjusting method fostered by our long experience and expertise.

## Features

1. Excellent frequency stability over temperature
2. Excellent aging characteristic
3. Low phase noise
4. Low hysteresis
5. The series complies to RoHS directive, being lead-free (phase 3).

## Applications

1. Small cells
2. Network equipment (Stratum 3, Sync E, IEEE 1588)
3. GPS (GNSS) systems
4. Business radios

## Series

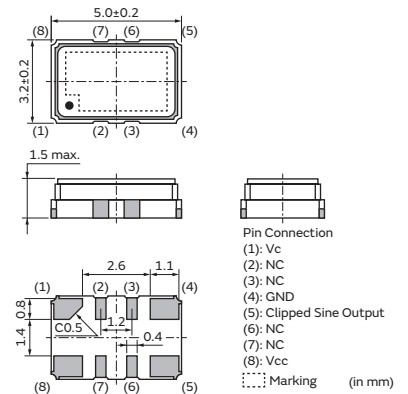
| Series  | Type     | Size | Package | Frequency (MHz)    | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | Operating Temperature Range (°C) | VC Function |
|---------|----------|------|---------|--------------------|--|---|---------------------------------|----------------------------------|-------------|
| XTCLH_J | TTS14VSH | 5032 | Metal   | 10.0000 to 50.0000 | ±0.5   | ±0.2  | ±0.5                            | -40 to +85°C                     | ○           |
|         | TTS14VCH |      |         |                    |  | ±0.28   |                                 |                                  |             |

## Part Number List

<XTCLH\_J>

| Part Number        | Type     | Frequency (MHz) | Frequency Tolerance (ppm max.) | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | Frequency Controlled Range (ppm) | Output            |
|--------------------|----------|-----------------|--------------------------------|---|---------------------------------|----------------------------------|-------------------|
| XTCLH19M200TJJC3PO | TTS14VSH | 19.2000         | ±0.5ppm max. (25±3°C)          | ±0.2(-40 to +85°C)  | ±0.5                            | ±3min. to ±6max.                 | Clipped Sine Wave |
| XTCLH25M000TJA5PO  | TTS14VSH | 25.0000         | ±0.5ppm max. (25±3°C)          | ±0.2(-40 to +85°C)  | ±0.5                            | ±3min. to ±6max.                 | Clipped Sine Wave |
| XTCLH26M000TJA6PO  | TTS14VSH | 26.0000         | ±0.5ppm max. (25±3°C)          | ±0.2(-40 to +85°C)  | ±0.5                            | ±3min. to ±6max.                 | Clipped Sine Wave |
| XTCLH20M000CYJB6PO | TTS14VCH | 20.0000         | ±1.12ppm max. (25±2°C)         | ±0.28(-40 to +85°C)   | ±0.8                            | ±4.12min. to ±9max.              | CMOS              |
| XTCLH40M000CYJC4PO | TTS14VCH | 40.0000         | ±1.12ppm max. (25±2°C)         | ±0.28(-40 to +85°C)   | ±0.8                            | ±4.12min. to ±9max.              | CMOS              |
| XTCLH10M000CHJA1PO | TTS14VCH | 10.0000         | ±0.5ppm max. (25±3°C)          | ±0.28(-40 to +85°C)   | ±0.5                            | ±3min. to ±6max.                 | CMOS              |
| XTCLH20M000CHJA0PO | TTS14VCH | 20.0000         | ±0.5ppm max. (25±3°C)          | ±0.28(-40 to +85°C)   | ±0.5                            | ±3min. to ±6max.                 | CMOS              |
| XTCLH40M000CHJA0PO | TTS14VCH | 40.0000         | ±0.5ppm max. (25±3°C)          | ±0.28(-40 to +85°C)   | ±0.5                            | ±3min. to ±6max.                 | CMOS              |
| XTCLH50M000CHJA3PO | TTS14VCH | 50.0000         | ±0.5ppm max. (25±3°C)          | ±0.28(-40 to +85°C)   | ±0.5                            | ±3min. to ±6max.                 | CMOS              |

XTCLH\_J  
 (TTS14VSH/TTS14VCH)  
 10.0000–50.0000MHz

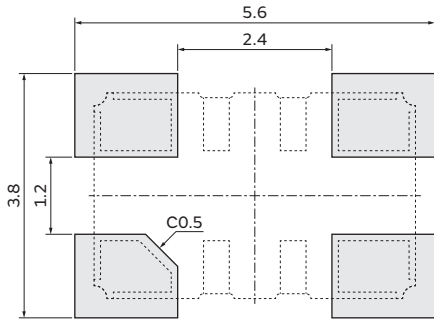


2

## Standard Land Pattern Dimensions

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XTCLH\_J (TTS14VSH/TTS14VCH)



(in mm)

## Notice -Crystal Oscillators for Consumer and Industrial-

### Notice (Soldering and Mounting)

#### 1.1. Soldering Condition

##### (1) Reflow

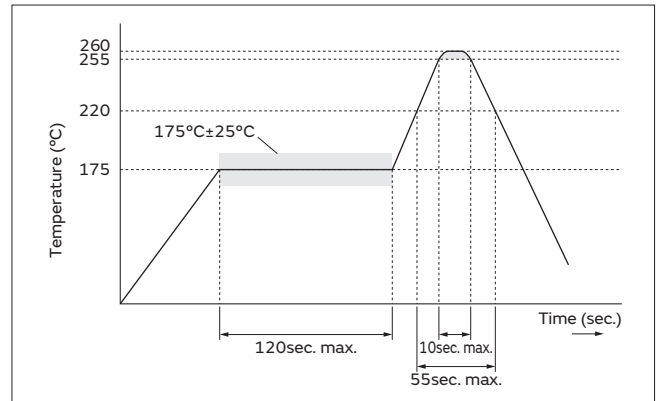
Please mount components on a circuit board by the reflow soldering.

Flux: Please use rosin based flux; but do not use water soluble flux.

Solder: Please use solder (Sn-3.0Ag-0.5Cu) under the following condition.

Standard thickness of soldering paste: 0.10 to 0.15mm

|                  | Condition             |               |
|------------------|-----------------------|---------------|
| Pre-heating      | 150 to 200°C          | 120 sec. max. |
| Heating          | 220°C min.            | 55 sec. max.  |
| Peak Temperature | 255°C min. 260°C max. | 10 sec. max.  |



##### (2) Soldering Iron

If compelled to mount the component by using a soldering iron, please do not directly touch the component with the soldering iron. The component terminals or metal lid may be damaged if excessive thermal stress is applied.

|                               | Condition      |
|-------------------------------|----------------|
| Pre-heating                   | 150°C 60 sec.  |
| Heating of the Soldering Iron | 350°C max.     |
| Watt                          | 30W max.       |
| Shape of the Soldering Iron   | ø3mm max.      |
| Soldering Time                | 5 sec. max.    |
| Solder                        | Sn-3.0Ag-0.5Cu |

#### 1.2. Optimum Solder Amount for Soldering

Please keep the solder volume below the height of the substrate. When exceeding the substrate, damage of sealing part between the metal cap and the substrate may occur.

#### 2. Wash

The component cannot withstand washing.

#### 3. Notice for Mounting

The component is recommended with placement machines employing optical placement capabilities. The component might be damaged by mechanical force depending on placement machine and condition. Make sure that you have evaluated by using placement machines before going into mass production. Do not use placement machines employing mechanical positioning. Please contact Murata for details beforehand.

Continued on the following page. ↗

## Notice -Crystal Oscillators for Consumer and Industrial-

Continued from the preceding page. ↘

### Notice (Storage and Operating Condition)

#### 1. Product Storage Condition

Please store the products in a room where the temperature/humidity is stable. And avoid such places where there are large temperature changes. Please store the products under the following conditions:

Temperature: -10 to + 40 degrees C

Humidity: 15 to 85% R.H.

#### 2. Expire Date on Storage

Expiration date (shelf life) of the products is 6 months after delivery under the conditions of an unopened package. Please use the products within 6 months after delivery. If you store the products for a long time (more than 6 months), use carefully because the products may be degraded in solderability and/or rusty.

Please confirm solderability and characteristics for the products regularly.

#### 3. Notice on Product Storage

(1) Please do not store the products in a chemical atmosphere (Acids, Alkali, Bases, Organic gas, Sulfides and so on), because the characteristics may be reduced in quality, and/or be degraded in the solderability due to storage in a chemical atmosphere.

(2) Please do not put the products directly on the floor without anything under them to avoid damp places and/or dusty places.

(3) Please do not store the products in the places under direct sunlight, heat and vibration.

(4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in solderability due to storage under poor conditions.

(5) Please do not drop the products to avoid cracking the crystal element.

#### 4. Other

Conformal coating or washing of the component is not acceptable.

Please be sure to consult with our sales representative or engineer whenever and prior to using the products.

### Notice (Rating)

The component may be damaged if excess mechanical stress is applied.

### Notice (Handling)

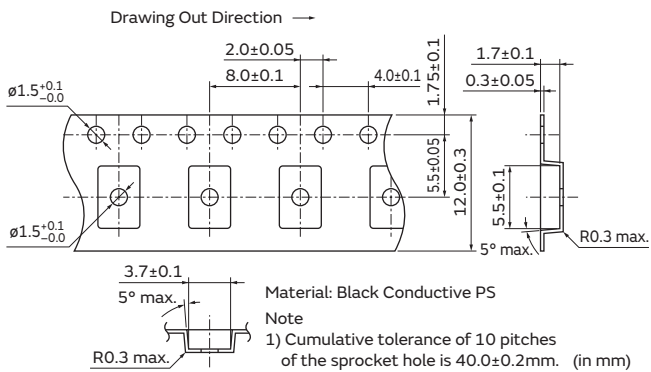
1. Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

2. Please do not use these products in the following applications in transportation equipment (vehicles, trains, ships, etc.).  
(example: engine control, brake control, steering control, body control.)

## Packaging -Crystal Oscillators for Consumer and Industrial-

### Dimensions of Taping

XTCLH\_J (TTS14VSH/TTS14VCH)

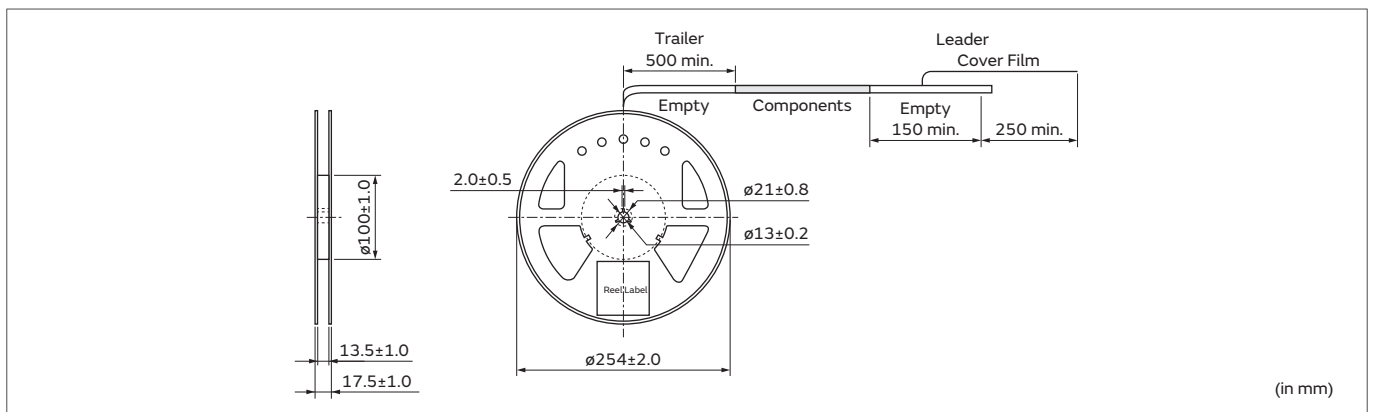


### Minimum Quantity/Dimensions of Reel

Plastic Tape ø255mm

2,000

(pcs.)



# Crystal Units

for Automotive



These crystal units for automotive feature a small package and highly accurate frequency, based on Murata's excellent package technology and high grade quartz crystal elements.

## Features

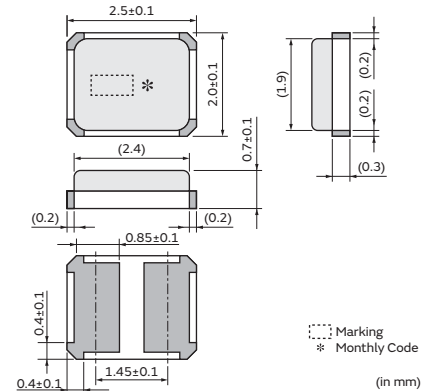
1. The series has high reliability and is available for a wide temperature range.
2. The crystal units are extremely small, contributing to a reduction in the mounting area.
3. The series complies to RoHS and ELV directives, being lead-free (phase 3).
4. The series complies to AEC-Q200.

## Applications

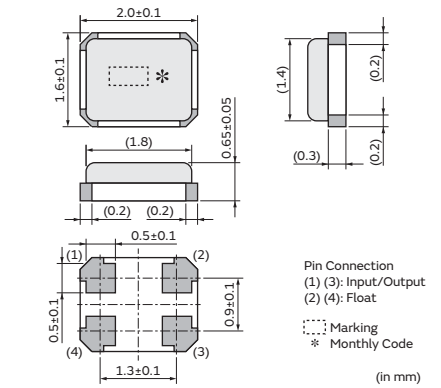
1. Power Train (ex. Engine/Transmission management ECU)
2. ADAS (ex. Camera for driver assist, Image processing, Emergency Brake Assist ECU)
3. Chassis, Safety applications, etc.
4. Car multimedia equipment.

3

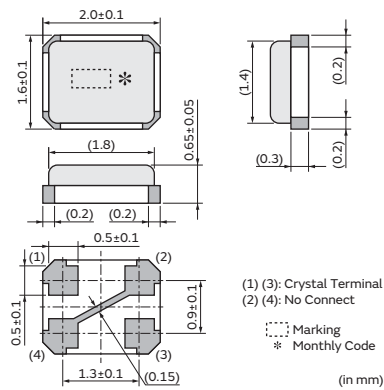
**XRCHA\_F\_A**  
 (HCR2520)  
 16.0000-24.0000MHz



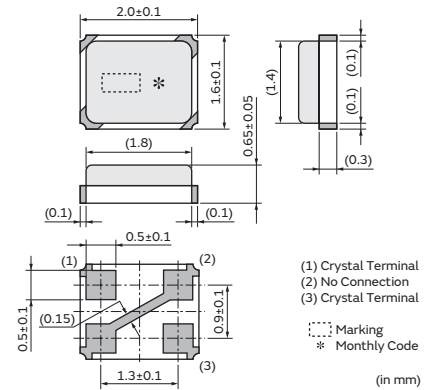
**XRCGE\_F\_A**  
 (HCR2016)  
 20.0000-23.9999MHz



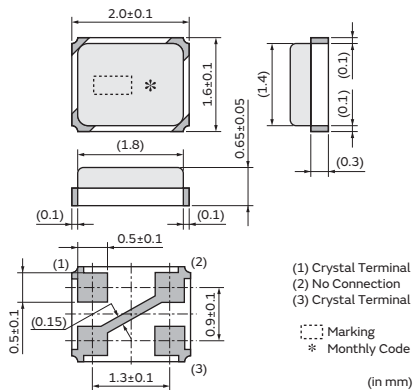
**XRCGB\_F\_A**  
 (HCR2016)  
 24.0000-48.0000MHz



**XRCGB\_F\_C**  
 (HCR2016)  
 27.6000MHz



**XRCGB\_F\_G**  
 (HCR2016)  
 24.0000-48.0000MHz



## Series

| Series    | Type    | Package | Frequency (MHz)    | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | Operating Temperature Range (°C) | Applications                                 |
|-----------|---------|---------|--------------------|--|---|---------------------------------|----------------------------------|--|
| XRCHA_F_A | HCR2520 | Resin   | 16.0000 to 24.0000 | ±100   | ±100  | ±5                              | -40 to +125*                     | ADAS, Power Train, Chassis, Safety           |
| XRCGE_F_A | HCR2016 |         | 20.0000 to 23.9999 | ±30  | ±40   | ±5                              | -40 to +125                      | Microcomputer for Automotive                 |
|           |         |         | 24.5454 to 27.6000 | ±15  | ±35   | ±10/10Years                     | -40 to +125                      | ADAS, Safety                                 |
| XRCGB_F_A |         |         | 24.0000 to 48.0000 | ±30/±50                                      | ±35/±65   | ±2                              | -40 to +125                      | ADAS, Power Train, Chassis, Safety, Security |
| XRCGB_F_C |         |         | 27.6000            | ±20  | ±20   | ±2                              | -30 to +85                       | Comfort, Security, Infotainment              |
| XRCGB_F_G |         |         | 24.0000 to 48.0000 | ±30/±45/±100                                 | ±50   | ±5                              | -40 to +85                       | Car Multimedia                               |

\* +150°C is available.

## Part Number List

### <XRCHA\_F\_A (For Automotive)>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCHA16M000FOA01R0 | HCR2520 | 16.0000         | ±100   | ±100 (-40 to +125°C)  | ±5                              | 100          | 8                     | 300                   |
| XRCHA16M000FOA11R0 | HCR2520 | 16.0000         | ±100   | ±100 (-40 to +125°C)  | ±5                              | 100          | 8                     | 600                   |
| XRCHA16M000FOA12R0 | HCR2520 | 16.0000         | ±100   | ±100 (-40 to +150°C)  | ±5                              | 100          | 8                     | 300                   |
| XRCHA16M000FOA13R0 | HCR2520 | 16.0000         | ±100   | ±100 (-40 to +150°C)  | ±5                              | 100          | 8                     | 600                   |
| XRCHA20M000FOA01R0 | HCR2520 | 20.0000         | ±100   | ±100 (-40 to +125°C)  | ±5                              | 80           | 8                     | 300                   |
| XRCHA20M000FOA11R0 | HCR2520 | 20.0000         | ±100   | ±100 (-40 to +125°C)  | ±5                              | 80           | 8                     | 600                   |
| XRCHA20M000FOA12R0 | HCR2520 | 20.0000         | ±100   | ±100 (-40 to +150°C)  | ±5                              | 80           | 8                     | 300                   |
| XRCHA20M000FOA13R0 | HCR2520 | 20.0000         | ±100   | ±100 (-40 to +150°C)  | ±5                              | 80           | 8                     | 600                   |
| XRCHA24M000FOA01R0 | HCR2520 | 24.0000         | ±100   | ±100 (-40 to +125°C)  | ±5                              | 80           | 8                     | 300                   |
| XRCHA24M000FOA11R0 | HCR2520 | 24.0000         | ±100   | ±100 (-40 to +125°C)  | ±5                              | 80           | 8                     | 600                   |
| XRCHA24M000FOA12R0 | HCR2520 | 24.0000         | ±100   | ±100 (-40 to +150°C)  | ±5                              | 80           | 8                     | 300                   |
| XRCHA24M000FOA13R0 | HCR2520 | 24.0000         | ±100   | ±100 (-40 to +150°C)  | ±5                              | 80           | 8                     | 600                   |

\* Equivalent Series Resistance

### <XRCGE\_F\_A (For Automotive)>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCGE20M000F3A1BR0 | HCR2016 | 20.0000         | ±30  | ±45 (-40 to +125°C)   | ±5                              | 150          | 8                     | 300                   |
| XRCGE24M545FBA1AR0 | HCR2016 | 24.5454         | ±15  | ±35 (-40 to +125°C)   | ±10/10Years                     | 100          | 6                     | 300                   |
| XRCGE25M000FBA1AR0 | HCR2016 | 25.0000         | ±15  | ±35 (-40 to +125°C)   | ±10/10Years                     | 100          | 6                     | 300                   |
| XRCGE26M000FBA1AR0 | HCR2016 | 26.0000         | ±15  | ±35 (-40 to +125°C)   | ±10/10Years                     | 80           | 6                     | 300                   |
| XRCGE27M000FBA1AR0 | HCR2016 | 27.0000         | ±15  | ±35 (-40 to +125°C)   | ±10/10Years                     | 80           | 6                     | 300                   |
| XRCGE27M600FBA1AR0 | HCR2016 | 27.6000         | ±15  | ±35 (-40 to +125°C)   | ±10/10Years                     | 80           | 6                     | 300                   |

\* Equivalent Series Resistance

### <XRCGB\_F\_A (For Automotive)>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCGB24M000F3A00R0 | HCR2016 | 24.0000         | ±30  | ±35 (-40 to +125°C)   | ±2                              | 120          | 6                     | 300                   |
| XRCGB24M305F3A00R0 | HCR2016 | 24.3050         | ±30  | ±35 (-40 to +125°C)   | ±2                              | 110          | 6                     | 300                   |
| XRCGB25M000F3A00R0 | HCR2016 | 25.0000         | ±30  | ±35 (-40 to +125°C)   | ±2                              | 100          | 6                     | 300                   |
| XRCGB26M000F3A00R0 | HCR2016 | 26.0000         | ±30  | ±35 (-40 to +125°C)   | ±2                              | 80           | 6                     | 300                   |
| XRCGB27M000F3A00R0 | HCR2016 | 27.0000         | ±30  | ±35 (-40 to +125°C)   | ±2                              | 80           | 6                     | 300                   |
| XRCGB27M120F3A00R0 | HCR2016 | 27.1200         | ±30  | ±35 (-40 to +125°C)   | ±2                              | 80           | 6                     | 300                   |

\* Equivalent Series Resistance

Continued on the following page. ↗

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| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCGB30M000F5A00R0 | HCR2016 | 30.0000         | ±50  | ±65 (-40 to +125°C)   | ±2                              | 70           | 6                     | 300                   |
| XRCGB40M000F5A00R0 | HCR2016 | 40.0000         | ±50  | ±65 (-40 to +125°C)   | ±2                              | 70           | 6                     | 300                   |
| XRCGB48M000F5A00R0 | HCR2016 | 48.0000         | ±50  | ±65 (-40 to +125°C)   | ±2                              | 60           | 6                     | 300                   |

\* Equivalent Series Resistance

### <XRCGB\_F\_C (For Automotive)>

| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCGB27M600F2C00R0 | HCR2016 | 27.6000         | ±20  | ±20 (-30 to +85°C)  | ±2                              | 80           | 6                     | 300                   |

\* Equivalent Series Resistance

### <XRCGB\_F\_G (For Car Multimedia)>

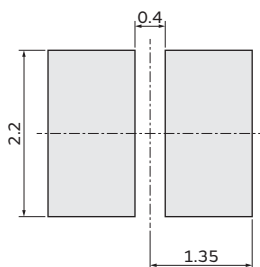
| Part Number        | Type    | Frequency (MHz) | Frequency Tolerance (ppm max.) [at 25°C±3°C] | Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C] | Frequency Aging (ppm max./Year) | ESR* (Ωmax.) | Load Capacitance (pF) | Drive Level (μW max.) |
|--------------------|---------|-----------------|--|---|---------------------------------|--------------|-----------------------|-----------------------|
| XRCGB24M000F0G00R0 | HCR2016 | 24.0000         | ±100   | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB24M000F3G00R0 | HCR2016 | 24.0000         | ±30  | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB24M576F0G00R0 | HCR2016 | 24.5760         | ±100   | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB24M576F3G00R0 | HCR2016 | 24.5760         | ±30  | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB25M000F0G00R0 | HCR2016 | 25.0000         | ±100   | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB25M000F3G00R0 | HCR2016 | 25.0000         | ±30  | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB26M000F0G00R0 | HCR2016 | 26.0000         | ±100   | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB26M000F3G00R0 | HCR2016 | 26.0000         | ±30  | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB27M000F0G00R0 | HCR2016 | 27.0000         | ±100   | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB27M000F3G00R0 | HCR2016 | 27.0000         | ±30  | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB27M120F3G00R0 | HCR2016 | 27.1200         | ±30  | ±50 (-40 to +85°C)  | ±5                              | 150          | 6                     | 300                   |
| XRCGB30M000F0G00R0 | HCR2016 | 30.0000         | ±100   | ±50 (-40 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB30M000F3G00R0 | HCR2016 | 30.0000         | ±30  | ±50 (-40 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB33M868F0G00R0 | HCR2016 | 33.8688         | ±100   | ±50 (-40 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB33M868F4G00R0 | HCR2016 | 33.8688         | ±45  | ±50 (-40 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB40M000F0G00R0 | HCR2016 | 40.0000         | ±100   | ±50 (-40 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB40M000F4G00R0 | HCR2016 | 40.0000         | ±45  | ±50 (-40 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB48M000F0G00R0 | HCR2016 | 48.0000         | ±100   | ±50 (-40 to +85°C)  | ±5                              | 100          | 6                     | 300                   |
| XRCGB48M000F4G00R0 | HCR2016 | 48.0000         | ±45  | ±50 (-40 to +85°C)  | ±5                              | 100          | 6                     | 300                   |

\* Equivalent Series Resistance

### Standard Land Pattern Dimensions

XRCHA\_F\_A  
 (HCR2520)

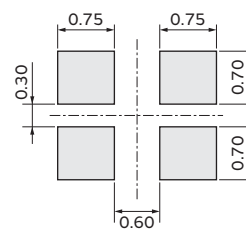
(Recommended Land Pattern)



(in mm)

XRCGE\_F\_A, XRCGB\_F\_A/C/G  
 (HCR2016)

(Recommended Land Pattern)



(in mm)

## Notice -Crystal Units for Automotive-

### Notice (Soldering and Mounting)

#### 1.1. Soldering Condition

##### (1) Reflow

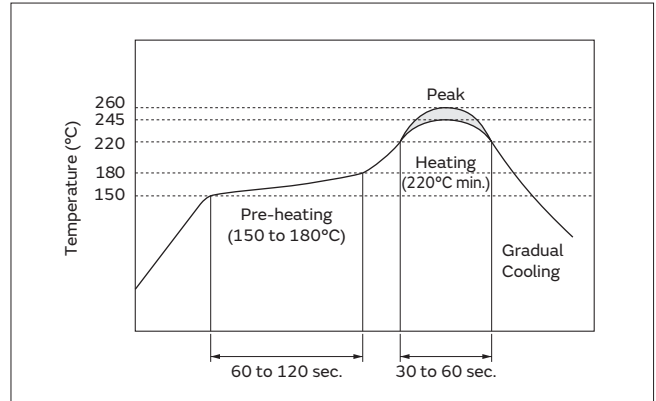
Please mount components on a circuit board by the reflow soldering.

Flux: Please use rosin based flux; but do not use water soluble flux.

Solder: Please use solder (Sn-3.0Ag-0.5Cu) under the following condition.

Standard thickness of soldering paste: 0.10 to 0.15mm

|                  | Condition                         |                |
|------------------|-----------------------------------|----------------|
| Pre-heating      | 150 to 180°C                      | 60 to 120 sec. |
| Heating          | 220°C min.                        | 30 to 60 sec.  |
| Peak Temperature | 245°C min. 260°C max. 5 sec. max. |                |



##### (2) Soldering Iron

If compelled to mount the component by using a soldering iron, please do not directly touch the component with the soldering iron. The component terminals or electrical characteristics may be damaged if excessive thermal stress is applied.

|                               | Condition      |
|-------------------------------|----------------|
| Pre-heating                   | 150°C 60 sec.  |
| Heating of the Soldering Iron | 350°C max.     |
| Watt                          | 30W max.       |
| Shape of the Soldering Iron   | ø3mm max.      |
| Soldering Time                | 5 sec. max.    |
| Solder                        | Sn-3.0Ag-0.5Cu |

#### 1.2. Optimum Solder Amount for Soldering

Please keep the solder volume below the height of the substrate. When exceeding the substrate, damage of sealing part between the metal cap and the substrate may occur.

#### 2. Wash

The component cannot withstand washing.

#### 3. Notice for Mounting

The component is recommended with placement machines employing optical placement capabilities. The component might be damaged by mechanical force depending on placement machine and condition. Make sure that you have evaluated by using placement machines before going into mass production. Do not use placement machines employing mechanical positioning. Please contact Murata for details beforehand.

Continued on the following page. ↗

## Notice -Crystal Units for Automotive-

Continued from the preceding page. ↘

### Notice (Storage and Operating Condition)

#### 1. Product Storage Condition

Please store the products in room where the temperature/humidity is stable. And avoid such places where there are large temperature changes. Please store the products under the following conditions:

Temperature: -10 to + 40 degrees C

Humidity: 15 to 85% R.H.

#### 2. Expire Date on Storage

Expiration date (shelf life) of the products is 6 months after delivery under the conditions of an unopened package. Please use the products within 6 months after delivery. If you store the products for a long time (more than 6 months), use carefully because the products may be degraded in solderability and/or rusty.

Please confirm solderability and characteristics for the products regularly.

#### 3. Notice on Product Storage

(1) Please do not store the products in a chemical atmosphere (Acids, Alkali, Bases, Organic gas, Sulfides and so on), because the characteristics may be reduced in quality, and/or be degraded in solderability due to the storage in a chemical atmosphere.

(2) Please do not put the products directly on the floor without anything under them to avoid damp places and/or dusty places.

(3) Please do not store the products in the places under direct sunlight, heat and vibration.

(4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in solderability due to storage under poor conditions.

(5) Please do not drop the products to avoid cracking the crystal element.

#### 4. Other

Conformal coating or washing of the component is not acceptable because it is not hermetically sealed.

Please be sure to consult with our sales representative or engineer whenever and prior to using the products.

### Notice (Rating)

The component may be damaged if excess mechanical stress is applied.

### Notice (Handling)

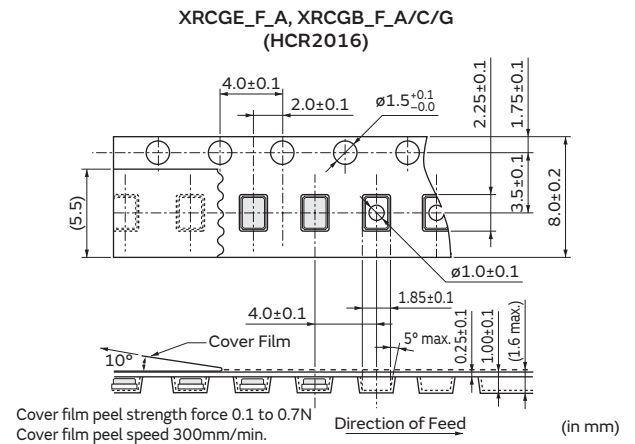
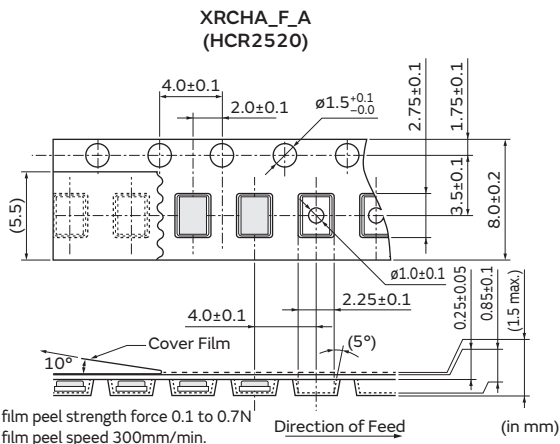
1. Irregular or stopped oscillation may occur under unmatched circuit conditions.

Please design your oscillation circuit to get 5 times or more of a negative resistance against the maximum value of the Equivalent Series Resistance, that is specified in order.

2. Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

## Packaging -Crystal Units for Automotive-

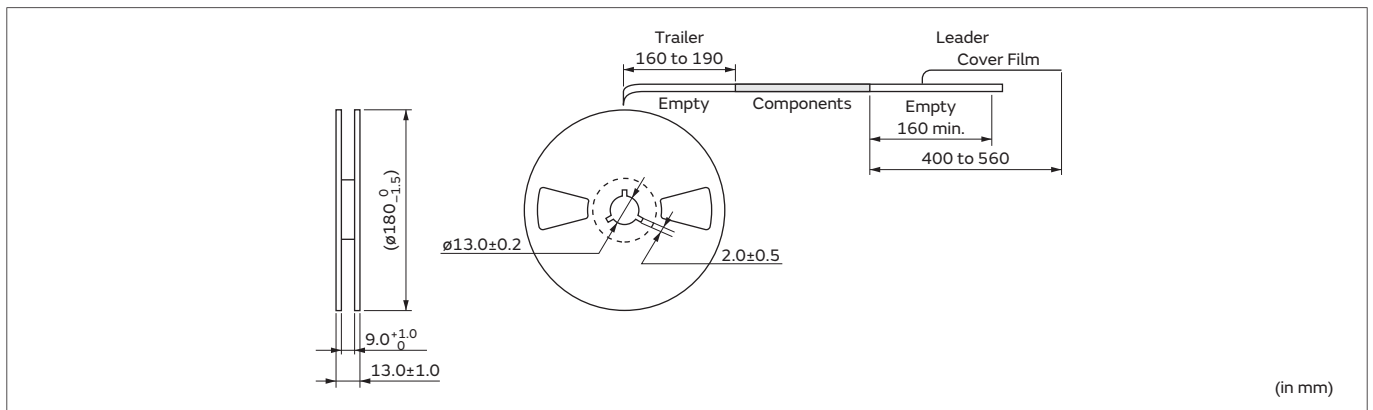
### Dimensions of Taping



### Minimum Quantity/Dimensions of Reel

| Plastic Tape ø180mm | Plastic Tape ø330mm |
|---------------------|---------------------|
| 3,000               | 9,000               |

(pcs.)



## Measuring Circuit of Crystal Units

### Measuring Circuit

#### 1. Frequency Measuring Method

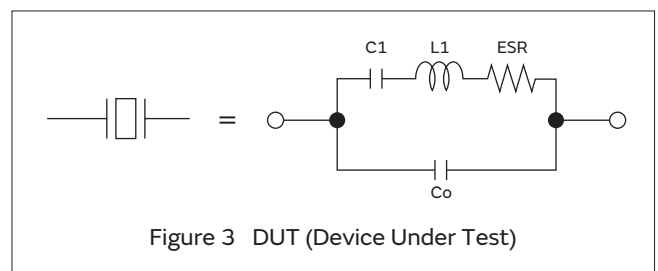
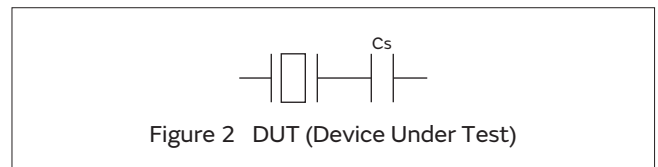
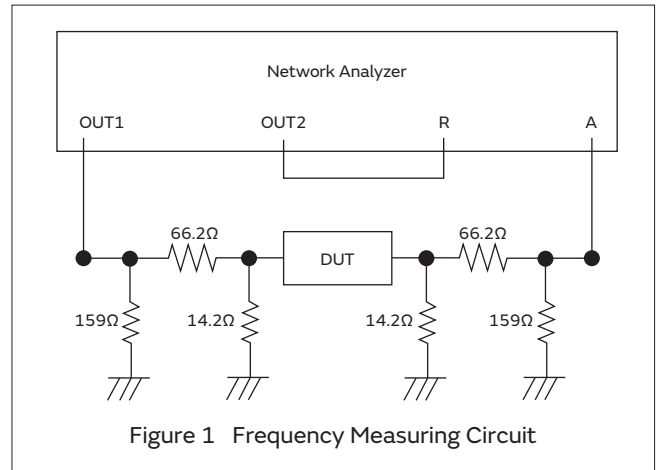
The load resonance frequency (Lower frequency of the two given when the electrical impedance of the component becomes resistant near its resonance point) is measured by network analyzer (KEYSIGHT E5100A or the equivalent) and the circuit in Figure 1. DUT is shown in Figure 2, and the value of Cs refers to the load capacitance value in specifications.

#### 2. Equivalent Series Resistance

The equivalent series resistance (ESR) is measured by network analyzer (KEYSIGHT E5100A or equivalent) and the circuit in Figure 1. DUT is shown in Figure 3.

#### 3. Measuring Condition

Standard conditions for measurement shall be  $+25\pm 3^{\circ}\text{C}$  temperature and humidity of 45 to 85%R.H.



# Global Locations

For details please visit [www.murata.com](http://www.murata.com)



## ⚠ Note

### 1 Export Control

*For customers outside Japan:*

No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

*For customers in Japan:*

For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

2 Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.

- ① Aircraft equipment
- ② Aerospace equipment
- ③ Undersea equipment
- ④ Power plant equipment
- ⑤ Medical equipment
- ⑥ Transportation equipment (vehicles, trains, ships, etc.)
- ⑦ Traffic signal equipment
- ⑧ Disaster prevention / crime prevention equipment
- ⑨ Data-processing equipment
- ⑩ Application of similar complexity and/or reliability requirements to the applications listed above

3 Product specifications in this catalog are as of October 2019. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.

4 Please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.

5 This catalog has only typical specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

6 Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.

7 No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

Murata Manufacturing Co., Ltd.

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