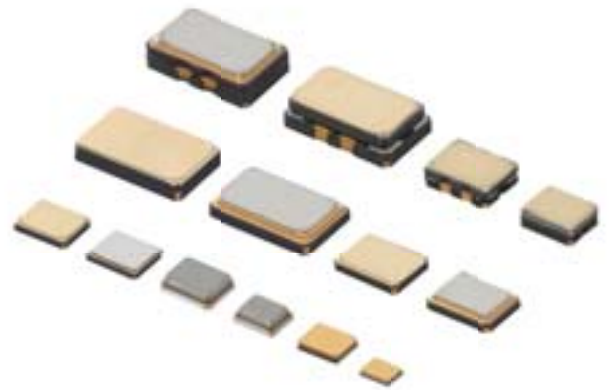


# Crystal Units/Crystal Oscillators



#### **EU RoHS Compliant**

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- 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 website 'Murata's Approach for EU RoHS' (<http://www.murata.com/en-eu/support/compliance/rohs>).

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Product specifications are as of March 2015.

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

## Selection Guide

### Applications?

Consumer		Automotive	Industrial	
Crystal Units		Crystal Units	Crystal Units	Crystal Oscillators
±100ppm 2016	±10ppm 1612	±100ppm 2016	±100ppm 2016	±1ppm 2520
<b>XRCGB_F_L</b> 2.0x1.6x0.7mm 24.0000–48.0000MHz	<b>XRCFD</b> 1.6x1.2x0.35mm 24.0000–31.9999MHz	<b>XRCGB_F_A</b> 2.0x1.6x0.7mm 24.0000–48.0000MHz	<b>XRCGB_F_Z</b> 2.0x1.6x0.7mm 24.0000–48.0000MHz	<b>XNCHH</b> 2.5x2.0x1.0mm 10.0000–52.0000MHz
<b>XRCPB_F_L</b> 2.0x1.6x0.5mm 24.0000–48.0000MHz	<b>XRCMD</b> 1.6x1.2x0.33mm 32.0000–48.0000MHz	<b>XRCGB_F_G</b> 2.0x1.6x0.7mm 24.0000–48.0000MHz	<b>XRCPB_F_Z</b> 2.0x1.6x0.5mm 24.0000–48.0000MHz	<b>XTCHH</b> 2.5x2.0x1.0mm 10.0000–52.0000MHz
2520	2016	2520	2520	3225
<b>XRCHA_F_L</b> 2.5x2.0x0.8mm 16.0000–20.0000MHz	<b>XRCGD</b> 2.0x1.6x0.45mm 26.0000–48.0000MHz	<b>XRCHA_F_A</b> 2.5x2.0x0.8mm 16.0000–24.0000MHz	<b>XRCHA_F_Z</b> 2.5x2.0x0.8mm 16.0000–20.0000MHz	<b>XNCJH</b> 3.2x2.5x1.0mm 10.0000–52.0000MHz
±30/45ppm 2016	2520		±10ppm 2520	<b>XTCJH</b> 3.2x2.5x1.0mm 10.0000–52.0000MHz
<b>XRCGB_F_M</b> 2.0x1.6x0.7mm 24.0000–48.0000MHz	<b>XRCHJ</b> 2.5x2.0x0.5mm 16.0000–52.0000MHz		<b>XRCHH</b> 2.5x2.0x0.5mm 16.0000–52.0000MHz	5032
<b>XRCPB_F_M</b> 2.0x1.6x0.5mm 24.0000–48.0000MHz	3225		<b>XRCHJ</b> 3.2x2.5x0.6mm 13.0000–52.0000MHz	<b>XTCLH_E</b> 5.0x3.2x1.5mm 10.0000–40.0000MHz
±20ppm 2016	5032		5032	±0.5ppm 5032
<b>XRCGB_F_P</b> 2.0x1.6x0.7mm 24.0000–32.0000MHz	<b>XRCLK</b> 5.0x3.2x1.05mm 10.0000–52.0000MHz		<b>XRCLH</b> 5.0x3.2x1.0mm 10.0000–52.0000MHz	<b>XTCLH_J</b> 5.0x3.2x1.5mm 10.0000–40.0000MHz
<b>XRCPB_F_P</b> 2.0x1.6x0.5mm 24.0000–32.0000MHz				

● Part Numbering

Crystal Unit

(Part Number)



① Product ID

Product ID	
<b>XR</b>	Crystal Unit

② Lead Style

Code	Lead Style
<b>C/T</b>	SMD

③ Size · Structure

Code	Size · Structure
<b>FD</b>	1612 (STD) Metal Sealing
<b>MD</b>	1612 (Low Profile) Metal Sealing
<b>GD</b>	2016 (STD) Metal Sealing
<b>GB</b>	2016 (STD) Resin Sealing
<b>PB</b>	2016 (Low Profile) Resin Sealing
<b>HA</b>	2520 Resin Sealing
<b>HH</b>	2520 Metal Sealing
<b>HJ</b>	2520 Seam Sealing
<b>JH</b>	3225 Metal Sealing
<b>JK</b>	3225 Seam Sealing
<b>LH</b>	5032 Metal Sealing
<b>LK</b>	5032 Seam 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 Overtone Order

Code	Overtone Order
<b>F</b>	Fundamental
<b>K</b>	Customized Fundamental

⑥ Frequency Tolerance

Code	Frequency Tolerance
<b>0</b>	±100ppm
<b>1</b>	±10ppm
<b>2</b>	±20ppm
<b>3</b>	±30ppm
<b>4</b>	±45ppm/±40ppm*1
<b>A</b>	±25ppm/±15ppm*2
<b>Y</b>	Total*3±20ppm

\*1 \*2 In the case when ③ is "HH" or "JK"

\*3 Including Initial Tolerance+Temperature Characteristics+Aging+Reflow

⑦ Frequency Shift by Temperature

Code	Frequency Shift by Temperature
<b>A</b>	±100ppm max. (Automotive Grade)
<b>G</b>	±50ppm (Car Multimedia Grade)
<b>L</b>	±50ppm min.
<b>M</b>	±40ppm
<b>N</b>	±25ppm or 30ppm
<b>P</b>	±20ppm
<b>Q</b>	±10ppm to ±15ppm/±10ppm to ±19ppm*1
<b>Z</b>	±100ppm (for Industrial)

\*1 In the case when ③ is "HH" or "JK"

⑧ Individual Specification

Code	
**	Two-digit alphanumeric express Individual Specification.

00: Standard specification type.

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

Code	Packaging
<b>R*/E*/J*/P*</b>	Plastic Taping

## Crystal Oscillator

(Part Number)

XN	C	HH	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
HH	2520 Metal Sealing
JH	3225 Metal Sealing
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

### 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 alphanumeric 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

# for Consumer

1

## Crystal Units



The crystal unit that realized small package and highly accurate frequency, based on Murata's excellent package technology and high grade quartz crystal elements.

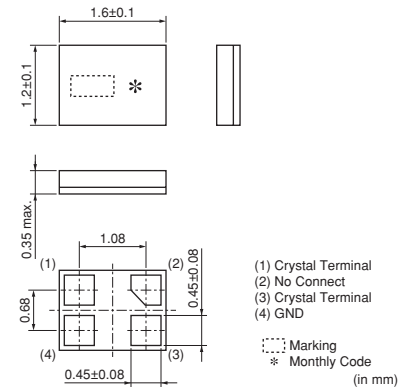
### ■ Features

1. The series is available in the applications to be necessary for high accuracy crystal units.  
 Especially, it is the best for the communication clocks such as GPS, Wi-Fi, B.T. (Bluetooth®), BLE (Bluetooth® Low Energy), SATA and USB3.0.
2. The crystal units is extremely small size, and contribute to reduction in mounting area.
3. The series complies to RoHS directive, being lead-free (phase 3).

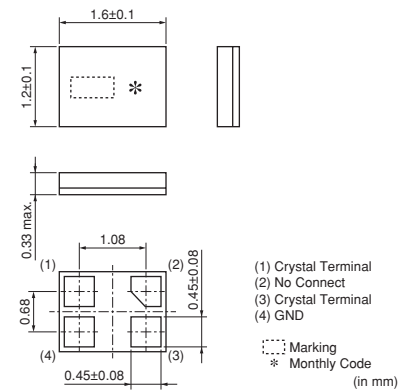
### ■ Applications

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

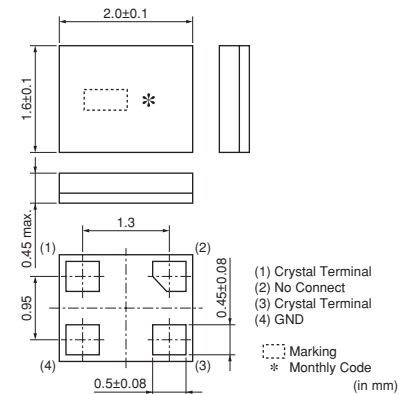
**XRCFD**  
 24.0000–31.9999MHz



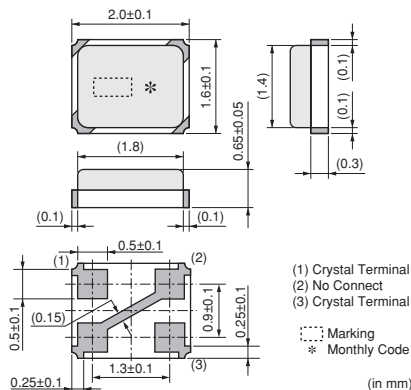
**XRCMD**  
 32.0000–48.0000MHz



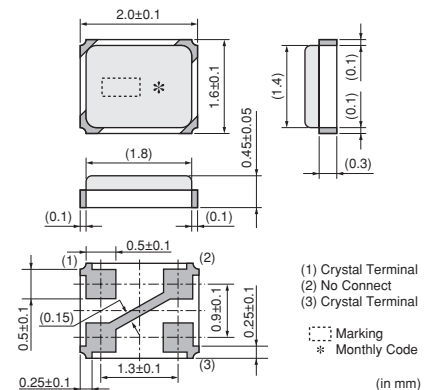
**XRCGD**  
 26.0000–48.0000MHz



**XRCGB\_F\_L/M**  
 24.0000–48.0000MHz  
**XRCGB\_F\_P**  
 24.0000–32.0000MHz



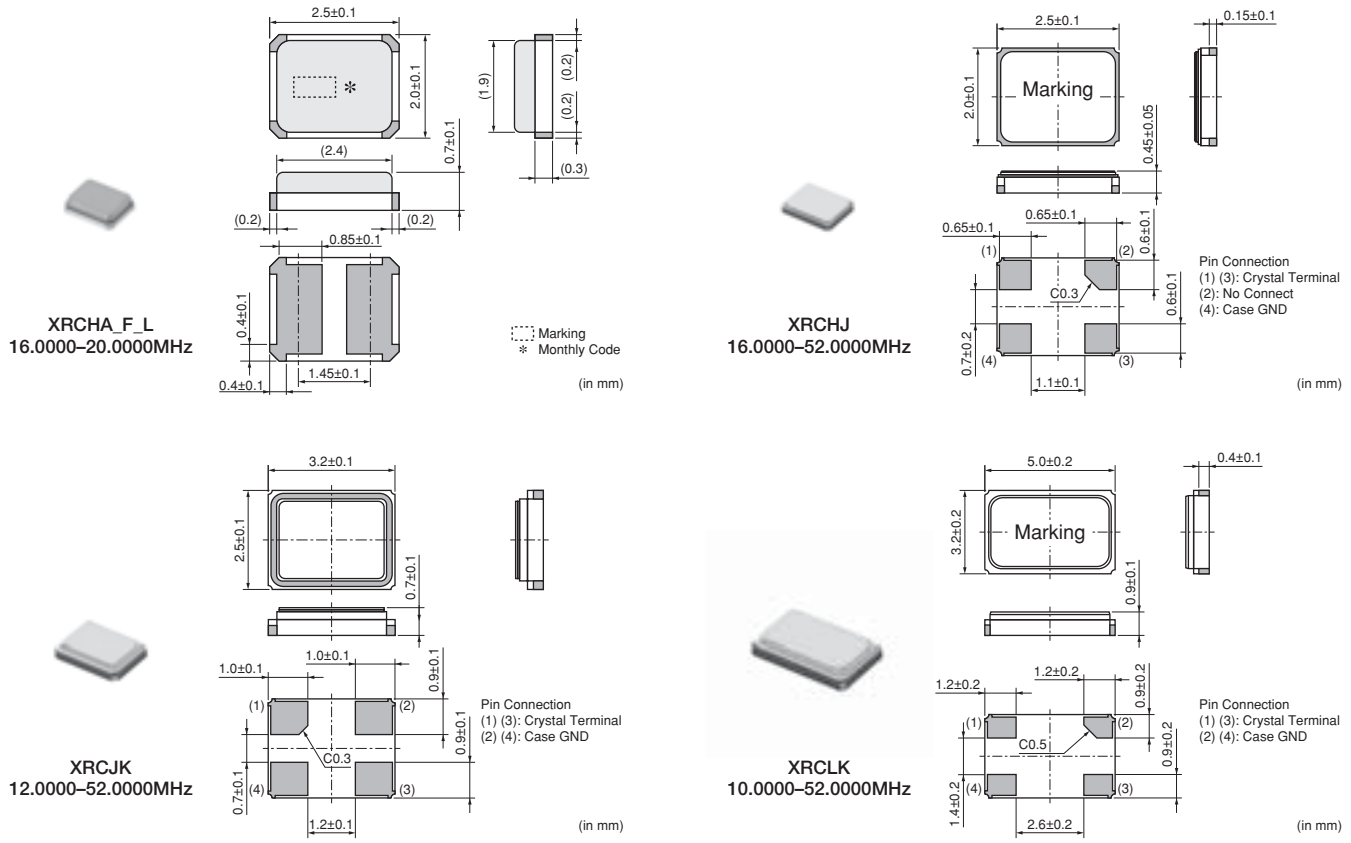
**XRCPB\_F\_L/M**  
 24.0000–48.0000MHz  
**XRCPB\_F\_P**  
 24.0000–32.0000MHz



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1



Series

Series	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)	Drive Level (µW max.)	Operating Temperature Range (°C)	
XRCFD	1612	Metal	24.0000 to 31.9999	±10	±10	±1	100	-20 to +70	
XRCMD			32.0000 to 48.0000						
XRCGD			26.0000 to 48.0000						
XRCGB_F_L	2016	Resin	24.0000 to 48.0000	±100	±50	±5	300	-30 to +85	
XRCPB_F_L				±30/45	±40				
XRCGB_F_M			24.0000 to 32.0000	±20	±20				
XRCPB_F_M				16.0000 to 20.0000	±100				±100
XRCCHA_F_L					16.0000 to 20.0000				±100
XRCHJ	3225	Seam	16.0000 to 52.0000	±10	±15	±3	30		
XRCJK	12.0000 to 52.0000								
XRCLK	5032	10.0000 to 52.0000							

XRCPB series is low profile type of XRCGB series.

Part Number List

Series	Part Number	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.)
XRCMD	XRCMD37M400F1Q01R0	37.4000	±10	±10 (-20 to +70°C)	±1	60	8	100
XRCGD	XRCGD26M000K1Q01R0	26.0000	±10	±10 (-20 to +70°C)	±1	60	8	100
XRCGD	XRCGD37M400K1Q01R0	37.4000	±10	±10 (-20 to +70°C)	±1	50	8	100
XRCGD	XRCGD48M000K1Q01R0	48.0000	±10	±10 (-20 to +70°C)	±1	22	8	100
XRCGB_F_L	XRCGB24M000F0L00R0	24.0000	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCGB_F_L	XRCGB24M576F0L00R0	24.5760	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCGB_F_L	XRCGB25M000F0L00R0	25.0000	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCGB_F_L	XRCGB26M000F0L00R0	26.0000	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCGB_F_L	XRCGB27M000F0L00R0	27.0000	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCGB_F_L	XRCGB27M120F0L00R0	27.1200	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCGB_F_L	XRCGB30M000F0L00R0	30.0000	±100	±50 (-30 to +85°C)	±5	100	6	300

\*: Equivalent Series Resistance



Continued from the preceding page.

Series	Part Number	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.)
XRCGB_F_L	XRCGB31M250F0L00R0	31.2500	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCGB_F_L	XRCGB32M000F0L00R0	32.0000	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCGB_F_L	XRCGB33M868F0L00R0	33.8688	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCGB_F_L	XRCGB40M000F0L00R0	40.0000	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCGB_F_L	XRCGB48M000F0L00R0	48.0000	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCPB_F_L	XRCPB24M000F0L00R0	24.0000	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCPB_F_L	XRCPB24M576F0L00R0	24.5760	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCPB_F_L	XRCPB25M000F0L00R0	25.0000	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCPB_F_L	XRCPB26M000F0L00R0	26.0000	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCPB_F_L	XRCPB27M000F0L00R0	27.0000	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCPB_F_L	XRCPB27M120F0L00R0	27.1200	±100	±50 (-30 to +85°C)	±5	150	6	300
XRCPB_F_L	XRCPB30M000F0L00R0	30.0000	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCPB_F_L	XRCPB31M250F0L00R0	31.2500	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCPB_F_L	XRCPB32M000F0L00R0	32.0000	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCPB_F_L	XRCPB33M868F0L00R0	33.8688	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCPB_F_L	XRCPB40M000F0L00R0	40.0000	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCPB_F_L	XRCPB48M000F0L00R0	48.0000	±100	±50 (-30 to +85°C)	±5	100	6	300
XRCGB_F_M	XRCGB24M000F3M00R0	24.0000	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCGB_F_M	XRCGB24M576F3M00R0	24.5760	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCGB_F_M	XRCGB25M000F3M00R0	25.0000	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCGB_F_M	XRCGB26M000F3M00R0	26.0000	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCGB_F_M	XRCGB27M000F3M00R0	27.0000	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCGB_F_M	XRCGB27M120F3M00R0	27.1200	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCGB_F_M	XRCGB27M120F3M10R0	27.1200	±30	±40 (-30 to +85°C)	±5	80	10	300
XRCGB_F_M	XRCGB30M000F3M00R0	30.0000	±30	±40 (-30 to +85°C)	±5	100	6	300
XRCGB_F_M	XRCGB31M250F3M00R0	31.2500	±30	±40 (-30 to +85°C)	±5	100	6	300
XRCGB_F_M	XRCGB32M000F3M00R0	32.0000	±30	±40 (-30 to +85°C)	±5	100	6	300
XRCGB_F_M	XRCGB33M868F4M00R0	33.8688	±45	±40 (-30 to +85°C)	±5	100	6	300
XRCGB_F_M	XRCGB40M000F4M00R0	40.0000	±45	±40 (-30 to +85°C)	±5	100	6	300
XRCGB_F_M	XRCGB48M000F4M00R0	48.0000	±45	±40 (-30 to +85°C)	±5	100	6	300
XRCPB_F_M	XRCPB24M000F3M00R0	24.0000	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCPB_F_M	XRCPB24M576F3M00R0	24.5760	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCPB_F_M	XRCPB25M000F3M00R0	25.0000	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCPB_F_M	XRCPB26M000F3M00R0	26.0000	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCPB_F_M	XRCPB27M000F3M00R0	27.0000	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCPB_F_M	XRCPB27M120F3M00R0	27.1200	±30	±40 (-30 to +85°C)	±5	150	6	300
XRCPB_F_M	XRCPB30M000F3M00R0	30.0000	±30	±40 (-30 to +85°C)	±5	100	6	300
XRCPB_F_M	XRCPB31M250F3M00R0	31.2500	±30	±40 (-30 to +85°C)	±5	100	6	300
XRCPB_F_M	XRCPB32M000F3M00R0	32.0000	±30	±40 (-30 to +85°C)	±5	100	6	300
XRCPB_F_M	XRCPB33M868F4M00R0	33.8688	±45	±40 (-30 to +85°C)	±5	100	6	300
XRCPB_F_M	XRCPB40M000F4M00R0	40.0000	±45	±40 (-30 to +85°C)	±5	100	6	300
XRCPB_F_M	XRCPB48M000F4M00R0	48.0000	±45	±40 (-30 to +85°C)	±5	100	6	300
XRCGB_F_P	XRCGB24M000F2P00R0	24.0000	±20	±20 (-30 to +85°C)	±5	150	6	300
XRCGB_F_P	XRCGB25M000F2P00R0	25.0000	±20	±20 (-30 to +85°C)	±5	150	6	300
XRCGB_F_P	XRCGB26M000F2P00R0	26.0000	±20	±20 (-30 to +85°C)	±5	150	6	300
XRCGB_F_P	XRCGB27M000F2P00R0	27.0000	±20	±20 (-30 to +85°C)	±5	150	6	300
XRCGB_F_P	XRCGB27M120F2P00R0	27.1200	±20	±20 (-30 to +85°C)	±5	150	6	300
XRCGB_F_P	XRCGB27M120F2P10R0	27.1200	±20	±20 (-30 to +85°C)	±5	80	10	300
XRCGB_F_P	XRCGB30M000F2P00R0	30.0000	±20	±20 (-30 to +85°C)	±5	100	6	300
XRCGB_F_P	XRCGB31M250F2P00R0	31.2500	±20	±20 (-30 to +85°C)	±5	100	6	300
XRCGB_F_P	XRCGB32M000F2P00R0	32.0000	±20	±20 (-30 to +85°C)	±5	100	6	300
XRCPB_F_P	XRCPB24M000F2P00R0	24.0000	±20	±20 (-30 to +85°C)	±5	150	6	300
XRCPB_F_P	XRCPB25M000F2P00R0	25.0000	±20	±20 (-30 to +85°C)	±5	150	6	300
XRCPB_F_P	XRCPB26M000F2P00R0	26.0000	±20	±20 (-30 to +85°C)	±5	150	6	300
XRCPB_F_P	XRCPB27M000F2P00R0	27.0000	±20	±20 (-30 to +85°C)	±5	150	6	300
XRCPB_F_P	XRCPB27M120F2P00R0	27.1200	±20	±20 (-30 to +85°C)	±5	150	6	300

\*: Equivalent Series Resistance

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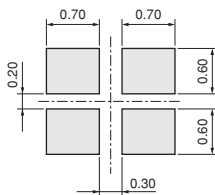
Series	Part Number	Frequency (MHz)	Frequency Tolerance (ppm max.) [at 25°C±3°C]	Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C]	Frequency Aging (ppm max./Year)	ESR* (Ωmax.)	Load Capacitance (pF)	Drive Level (μW max.)
XRCPB_F_P	XRCPB30M000F2P00R0	30.0000	±20	±20 (-30 to +85°C)	±5	100	6	300
XRCPB_F_P	XRCPB31M250F2P00R0	31.2500	±20	±20 (-30 to +85°C)	±5	100	6	300
XRCPB_F_P	XRCPB32M000F2P00R0	32.0000	±20	±20 (-30 to +85°C)	±5	100	6	300
XRCHA_F_L	XRCHA16M000F0L01R0	16.0000	±100	±100 (-30 to +85°C)	±5	100	8	300
XRCHA_F_L	XRCHA20M000F0L01R0	20.0000	±100	±100 (-30 to +85°C)	±5	80	8	300
XRCHJ	XRCHJ16M000F1QB1P0	16.0000	±10	±15 (-30 to +85°C)	±3	100	8	30
XRCHJ	XRCHJ19M200F1QA9P0	19.2000	±10	±15 (-30 to +85°C)	±3	100	8	30
XRCHJ	XRCHJ20M000F1QA7P0	20.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCHJ	XRCHJ26M000F1QD1P0	26.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCHJ	XRCHJ36M000F1QA0P0	36.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCHJ	XRCHJ40M000F1QB0P0	40.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCHJ	XRCHJ52M000F1QA0P0	52.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCJK	XRCJK12M000F1QB4P0	12.0000	±10	±15 (-30 to +85°C)	±3	100	8	30
XRCJK	XRCJK13M000F1QA3P0	13.0000	±10	±15 (-30 to +85°C)	±3	100	8	30
XRCJK	XRCJK15M360F1QA0P0	15.3600	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCJK	XRCJK20M000F1QB3P0	20.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCJK	XRCJK24M576F1QA0P0	24.5760	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCJK	XRCJK26M000F1QC3P0	26.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCJK	XRCJK36M000F1QA0P0	36.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCJK	XRCJK40M000F1QA2P0	40.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCJK	XRCJK52M000F1QA0P0	52.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCLK	XRCLK10M000F1QA8P0	10.0000	±10	±15 (-30 to +85°C)	±3	80	8	30
XRCLK	XRCLK12M000F1QA6P0	12.0000	±10	±15 (-30 to +85°C)	±3	60	8	30
XRCLK	XRCLK14M745F1QB6P0	14.7456	±10	±15 (-30 to +85°C)	±3	60	8	30
XRCLK	XRCLK16M000F1QA7P0	16.0000	±10	±15 (-30 to +85°C)	±3	60	8	30
XRCLK	XRCLK21M250F1QA8P0	21.2500	±10	±15 (-30 to +85°C)	±3	60	8	30
XRCLK	XRCLK52M000F1QA0P0	52.0000	±10	±15 (-30 to +85°C)	±3	60	8	30

\*: Equivalent Series Resistance

### Standard Land Pattern Dimensions

#### XRCFD, XRCMD

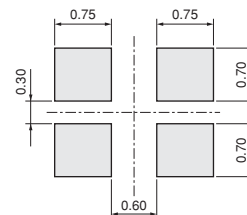
(Recommendable Land Pattern)



(in mm)

#### XRCGD

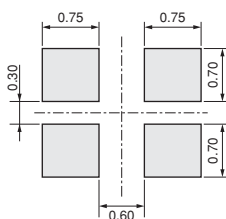
(Recommendable Land Pattern)



(in mm)

#### XRCGB\_F\_L/M/P, XRCPB\_F\_L/M/P

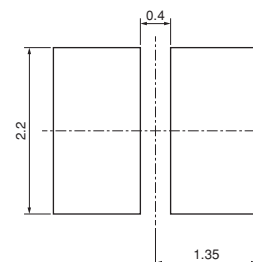
(Recommendable Land Pattern)



(in mm)

#### XRCHA\_F\_L

(Recommendable Land Pattern)



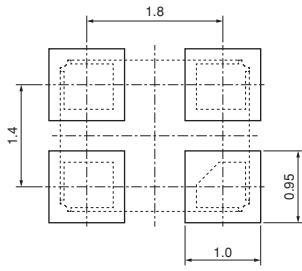
(in mm)

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☐ Continued from the preceding page.

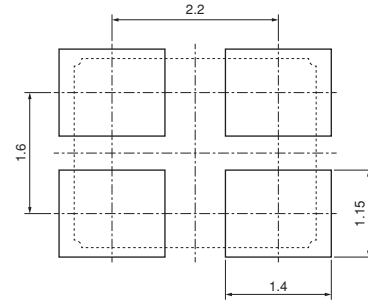
### ■ Standard Land Pattern Dimensions

XRCHJ



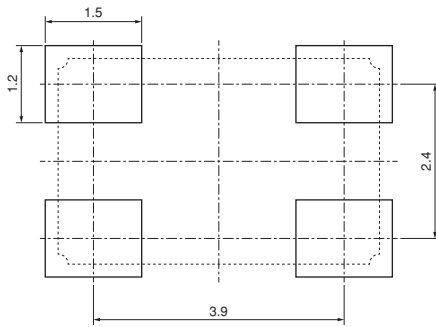
(in mm)

XRCJK



(in mm)

XRCLK



(in mm)

## Notice -Crystal Units for Consumer-

### ■ Notice (Soldering and Mounting)

#### 1.1. Soldering Condition

##### (1) Reflow

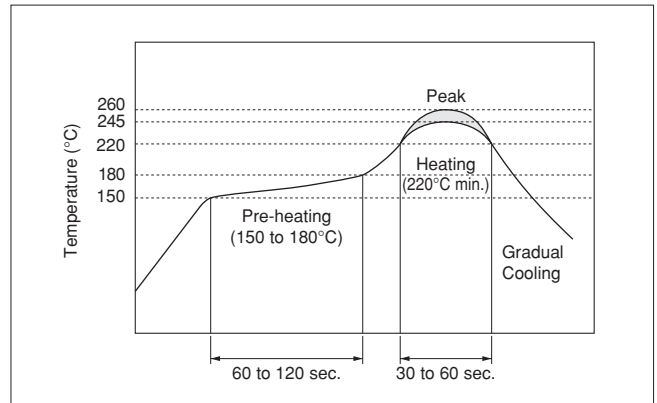
Please mount components on a circuit board by the re-flow soldering.

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 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 off 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 make 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-

1

☐ 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

Expire date (Shelf life) of the products is six months after delivery under the conditions of a sealed and an unopened package. Please use the products within six months after delivery. If you store the products for a long time (more than six months), use carefully because the products may be degraded in the 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 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 such as: in a damp heated place, in a place where direct sunlight comes in, in place applying vibrations.
- (4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in the solderability due to storage under the poor condition.
- (5) Please do not drop the products to avoid cracking of crystal element.

#### 4. Others

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. Irregular or stop 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.

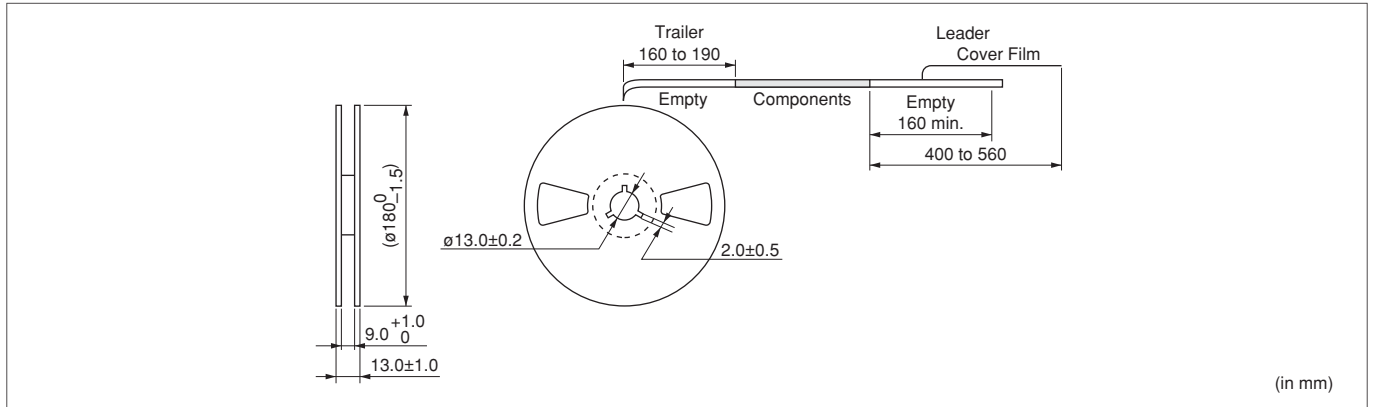
3. Please do not use this products in following applications in transportation equipment (vehicles, trains, ships, etc.).  
(example: engine control, brake control, steering control, body control.)

# Packaging -Crystal Units for Consumer-

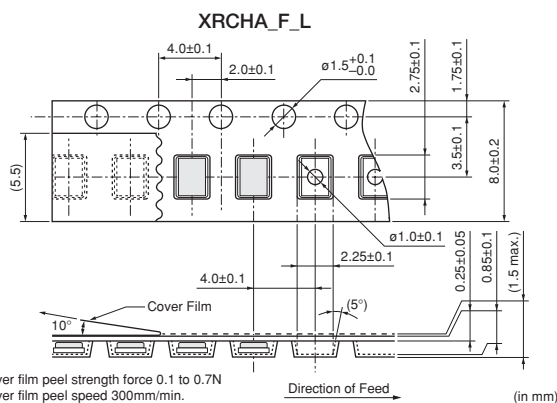
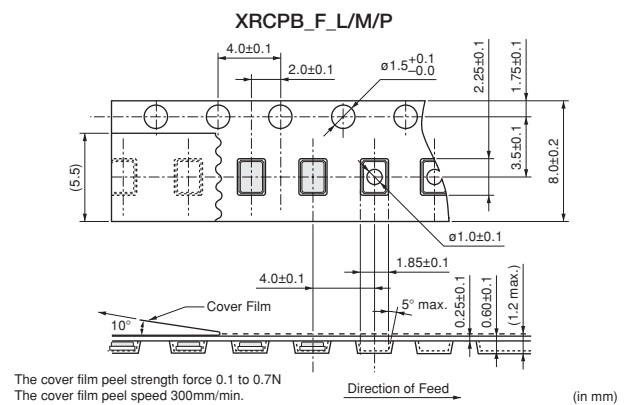
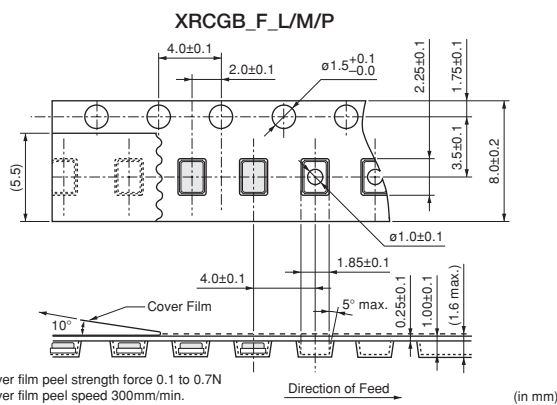
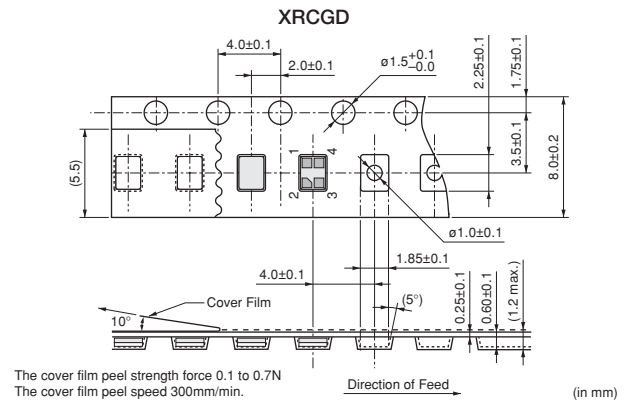
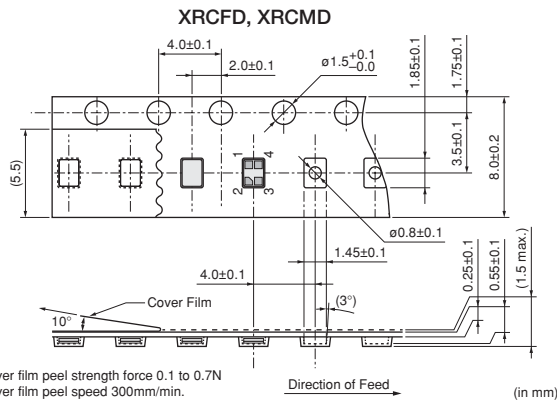
## Minimum Quantity/Dimensions of Reel

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

(pcs.)



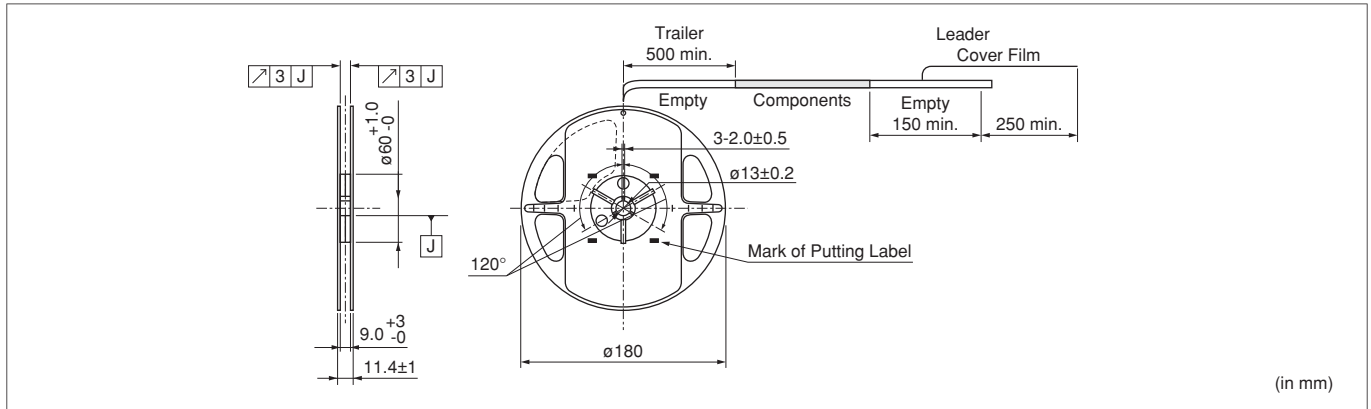
## Dimensions of Taping



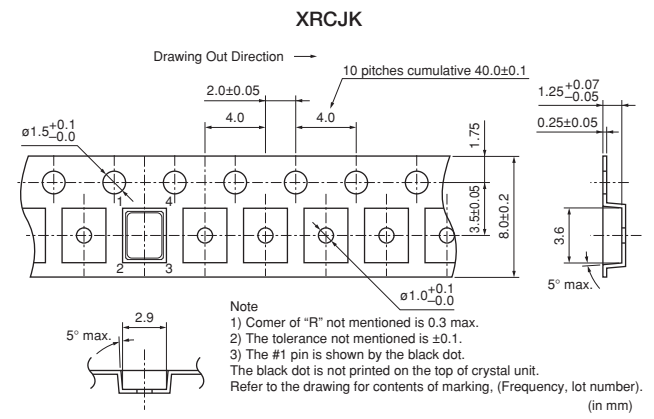
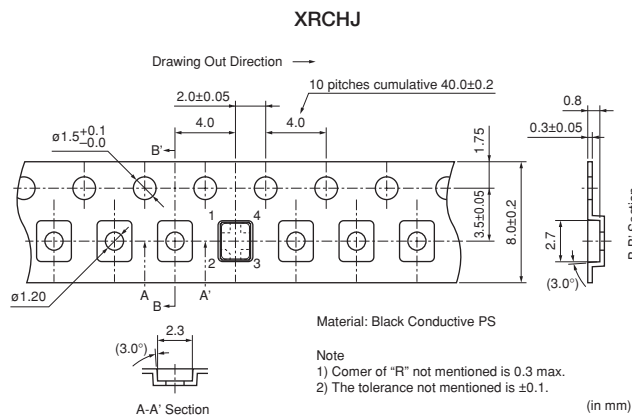
# Packaging -Crystal Units for Consumer-

## Minimum Quantity/Dimensions of Reel

<b>Plastic Tape ø180mm</b>
3,000
(pcs.)



## Dimensions of Taping



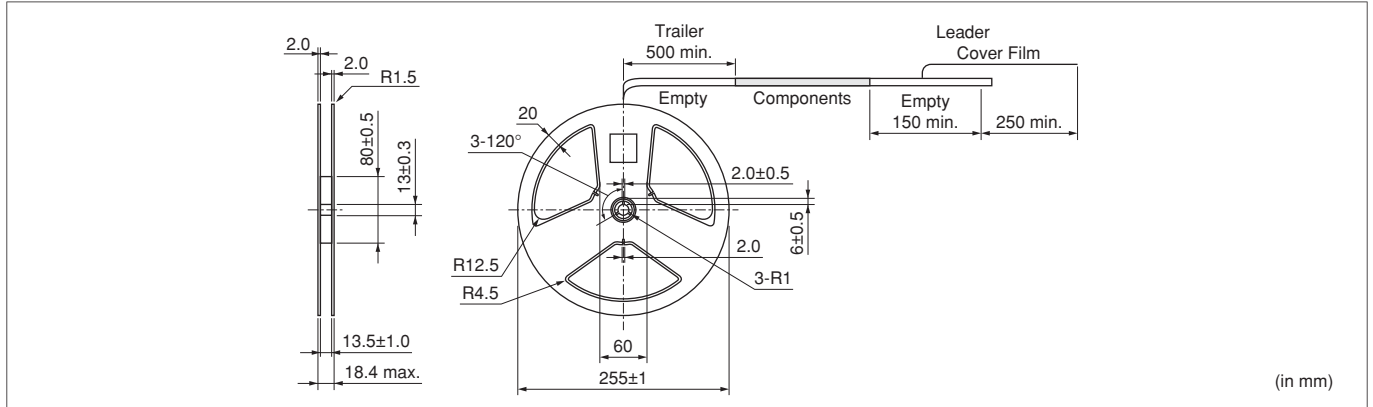
# 1 Packaging -Crystal Units for Consumer-

## Minimum Quantity/Dimensions of Reel

Plastic Tape ø255mm

3,000

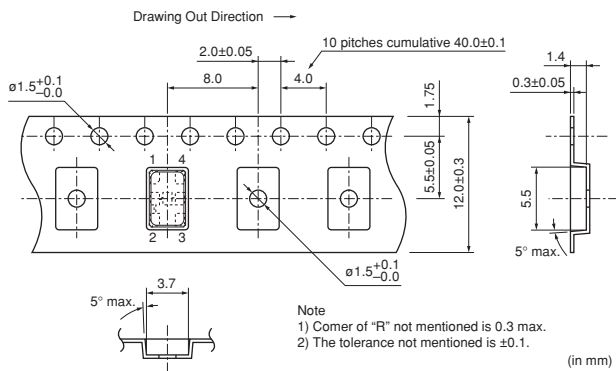
(pcs.)



(in mm)

## Dimensions of Taping

XRCLK



(in mm)



# for Automotive

## Crystal Units



The crystal unit for automotive that realized small package and highly accurate frequency, based on Murata's excellent package technology and high grade quartz crystal elements.

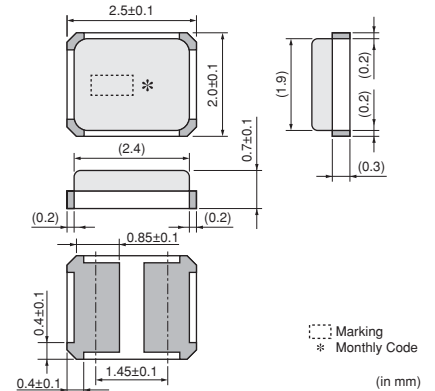
### ■ Features

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

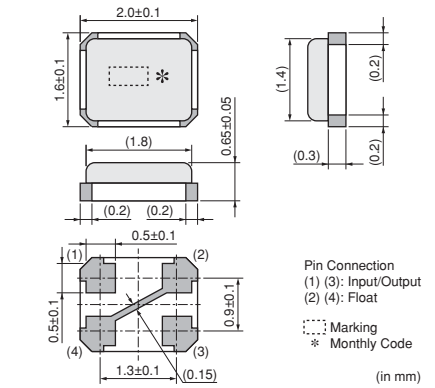
### ■ Applications

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

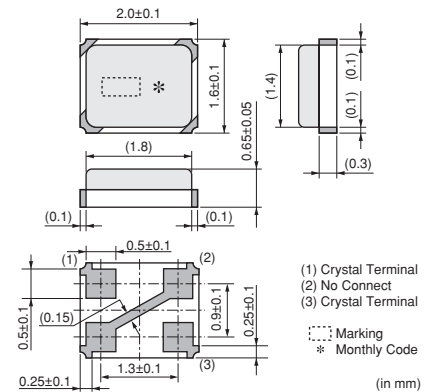
**XRCHA\_F\_A**  
 16.0000–24.0000MHz



**XRCGB\_F\_A**  
 24.0000–48.0000MHz



**XRCGB\_F\_G**  
 24.0000–48.0000MHz



### ■ Series

Series	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)	Applications
XRCHA_F_A	2520	Resin	16.0000 to 24.0000	±100	±100	±5	-40 to +125*	ADAS, Power Train, Chassis, Safety
XRCGB_F_A	2016		24.0000 to 48.0000	±30/±50	±35/±65	±2	-40 to +125	ADAS, Power Train, Chassis, Safety
XRCGB_F_G			±50	±50	±5	-40 to +85	Car Multimedia	

\*: +150°C is available.

2

■ Part Number List

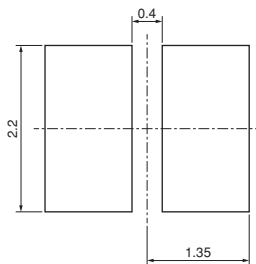
Series	Part Number	Frequency (MHz)	Frequency Tolerance (ppm max.) [at 25°C±3°C]	Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C]	Frequency Aging (ppm max./Year)	ESR* (Ωmax.)	Load Capacitance (pF)	Drive Level (μW max.)
XRCHA_F_A	XRCHA16M000F0A01R0	16.0000	±100	±100 (-40 to +125°C)	±5	100	8	300
XRCHA_F_A	XRCHA16M000F0A11R0	16.0000	±100	±100 (-40 to +125°C)	±5	100	8	600
XRCHA_F_A	XRCHA16M000F0A12R0	16.0000	±100	±100 (-40 to +150°C)	±5	100	8	300
XRCHA_F_A	XRCHA16M000F0A13R0	16.0000	±100	±100 (-40 to +150°C)	±5	100	8	600
XRCHA_F_A	XRCHA20M000F0A01R0	20.0000	±100	±100 (-40 to +150°C)	±5	80	8	300
XRCHA_F_A	XRCHA20M000F0A11R0	20.0000	±100	±100 (-40 to +125°C)	±5	80	8	600
XRCHA_F_A	XRCHA20M000F0A12R0	20.0000	±100	±100 (-40 to +150°C)	±5	80	8	300
XRCHA_F_A	XRCHA20M000F0A13R0	20.0000	±100	±100 (-40 to +150°C)	±5	80	8	600
XRCHA_F_A	XRCHA24M000F0A01R0	24.0000	±100	±100 (-40 to +125°C)	±5	80	8	300
XRCHA_F_A	XRCHA24M000F0A11R0	24.0000	±100	±100 (-40 to +125°C)	±5	80	8	600
XRCHA_F_A	XRCHA24M000F0A12R0	24.0000	±100	±100 (-40 to +150°C)	±5	80	8	300
XRCHA_F_A	XRCHA24M000F0A13R0	24.0000	±100	±100 (-40 to +150°C)	±5	80	8	600
XRCGB_F_A	XRCGB24M000F3A00R0	24.0000	±30	±35 (-40 to +125°C)	±2	120	6	300
XRCGB_F_A	XRCGB25M000F3A00R0	25.0000	±30	±35 (-40 to +125°C)	±2	100	6	300
XRCGB_F_A	XRCGB27M000F3A00R0	27.0000	±30	±35 (-40 to +125°C)	±2	80	6	300
XRCGB_F_A	XRCGB27M120F3A00R0	27.1200	±30	±35 (-40 to +125°C)	±2	80	6	300
XRCGB_F_G	XRCGB24M000F0G00R0	24.0000	±100	±50 (-40 to +85°C)	±5	150	6	300
XRCGB_F_G	XRCGB24M000F3G00R0	24.0000	±30	±50 (-40 to +85°C)	±5	150	6	300
XRCGB_F_G	XRCGB24M576F0G00R0	24.5760	±100	±50 (-40 to +85°C)	±5	150	6	300
XRCGB_F_G	XRCGB24M576F3G00R0	24.5760	±30	±50 (-40 to +85°C)	±5	150	6	300
XRCGB_F_G	XRCGB25M000F0G00R0	25.0000	±100	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB25M000F3G00R0	25.0000	±30	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB26M000F0G00R0	26.0000	±100	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB26M000F3G00R0	26.0000	±30	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB27M000F0G00R0	27.0000	±100	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB27M000F3G00R0	27.0000	±30	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB27M120F3G00R0	27.1200	±30	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB30M000F0G00R0	30.0000	±100	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB30M000F3G00R0	30.0000	±30	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB33M868F0G00R0	33.8688	±100	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB33M868F4G00R0	33.8688	±45	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB40M000F0G00R0	40.0000	±100	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB40M000F4G00R0	40.0000	±45	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB48M000F0G00R0	48.0000	±100	±50 (-40 to +85°C)	±5	100	6	300
XRCGB_F_G	XRCGB48M000F4G00R0	48.0000	±45	±50 (-40 to +85°C)	±5	100	6	300

\*: Equivalent Series Resistance

■ Standard Land Pattern Dimensions

XRCHA\_F\_A

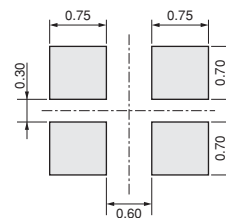
(Recommendable Land Pattern)



(in mm)

XRCGB\_F\_A/G

(Recommendable Land Pattern)



(in mm)

## Notice -Crystal Units for Automotive-

### ■ Notice (Soldering and Mounting)

#### 1.1. Soldering Condition

##### (1) Reflow

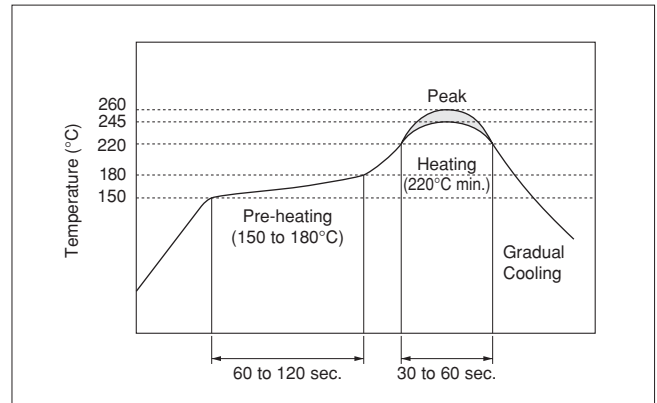
Please mount components on a circuit board by the re-flow soldering.

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

##### (2) Soldering Iron

If compelled to mount the component by using 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 make 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.

#### 1.3. Others

Do not reuse components once mounted onto a circuit board.

#### 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

Expire date (Shelf life) of the products is six months after delivery under the conditions of a sealed and an unopened package. Please use the products within six months after delivery. If you store the products for a long time (more than six months), use carefully because the products may be degraded in the 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 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 such as: in a damp heated place, in a place where direct sunlight comes in, in place applying vibrations.

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

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

#### 4. Others

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 stop 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.

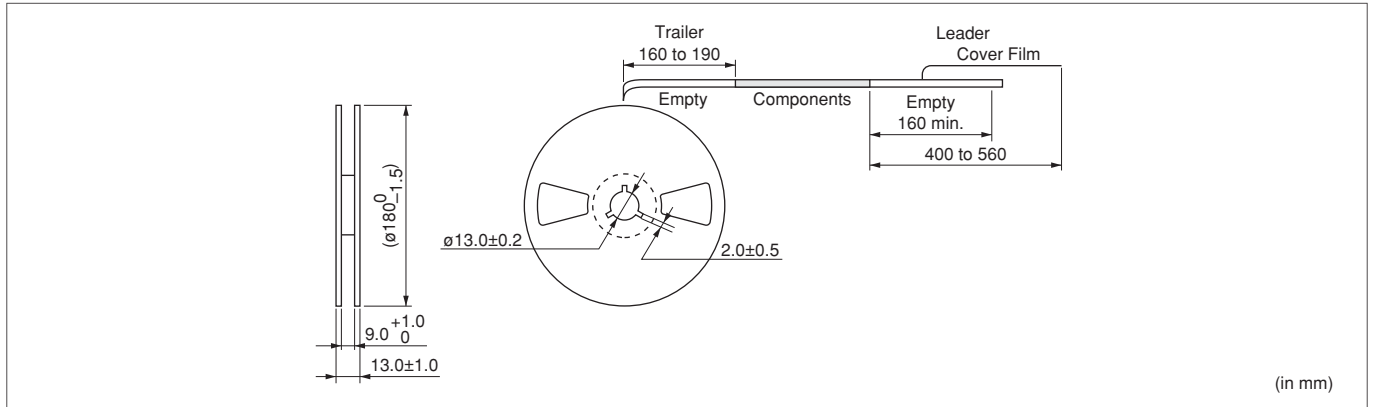
2. Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

# Packaging -Crystal Units for Automotive-

## ■ Minimum Quantity/Dimensions of Reel

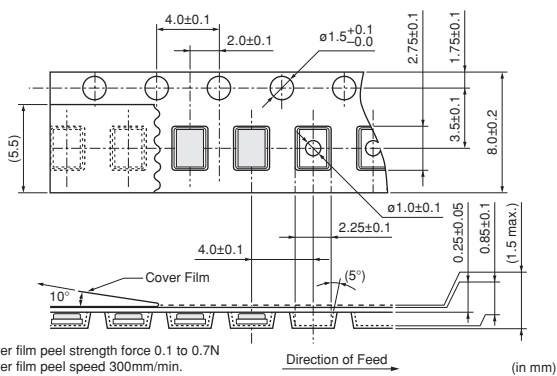
Plastic Tape ø180mm	Plastic Tape ø330mm
3,000	9,000

(pcs.)



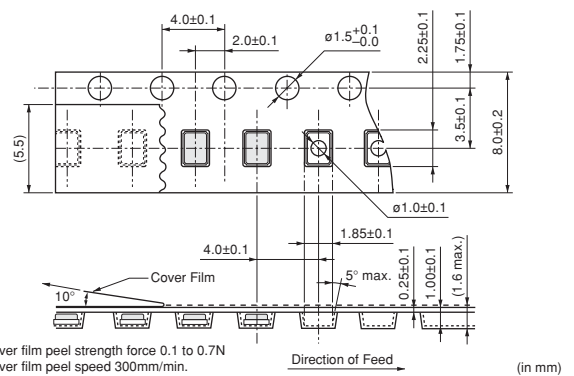
## ■ Dimensions of Taping

**XRCHA\_F\_A**



The cover film peel strength force 0.1 to 0.7N  
 The cover film peel speed 300mm/min.

**XRCGB\_F\_A/G**



The cover film peel strength force 0.1 to 0.7N  
 The cover film peel speed 300mm/min.

# for Industrial

## Crystal Units



The crystal unit that realized small package and highly accurate frequency. Based on Murata's excellent package technology and high grade quartz crystal elements, achieving small size and high accuracy crystal units.

3

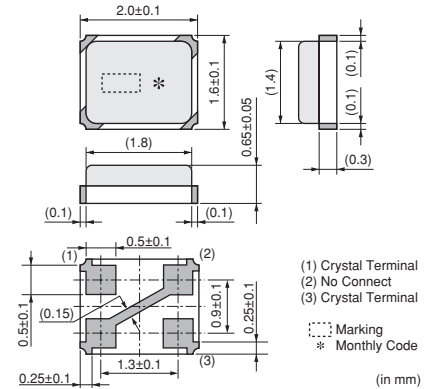
### ■ Features

1. The series is available in the applications to be necessary for high accuracy crystal units.
2. The crystal units is extremely small size, and contribute to reduction in mounting area.
3. The series complies to RoHS directive, being lead-free (phase 3).

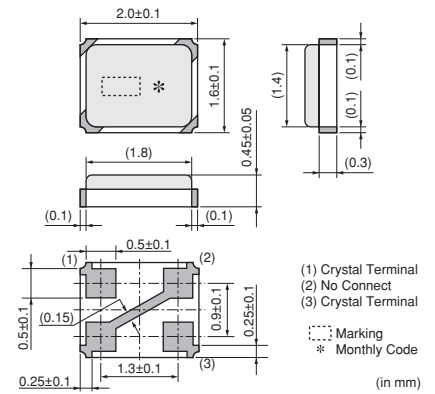
### ■ Applications

1. Clock for PLC, Inverter, Servo Amp, Servo Motor, etc. controller ICs
2. Clock for LCD, Programmable display and Visual equipment controller ICs
3. Storage devices with SATA interface (Server, 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. Other applications for replacement from the other crystal units or oscillators

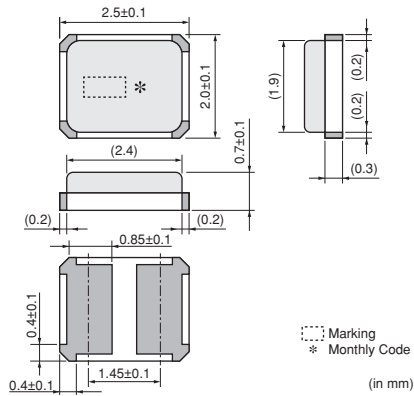
XRCGB\_F\_Z  
 24.0000-48.0000MHz



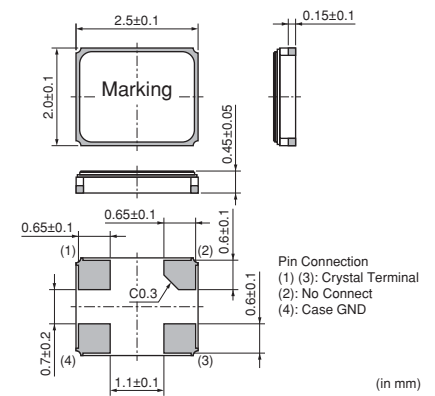
XRCPB\_F\_Z  
 24.0000-48.0000MHz



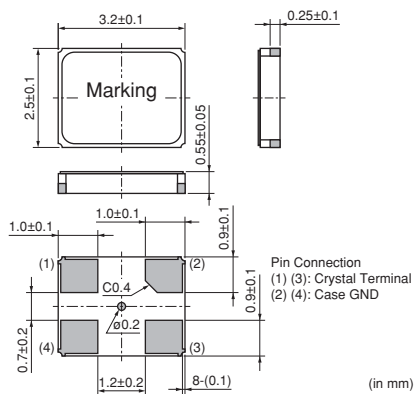
XRCHA\_F\_Z  
 16.0000-20.0000MHz



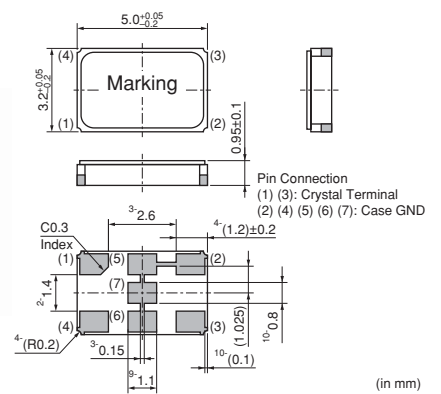
XRCHH  
 16.0000-52.0000MHz



XRCJH  
 13.0000-52.0000MHz



XRCLH  
 10.0000-52.0000MHz



■ Series

Series	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)	Drive Level (μW max.)	Operating Temperature Range (°C)
XRCGB_F_Z	2016	Resin	24.0000 to 48.0000	±100	±100	±5	300	-40 to +105
XRCPB_F_Z			16.0000 to 20.0000					
XRCHA_F_Z	2520	Metal	16.0000 to 52.0000	±10	±15	±1 (±3/5Years)	30	-30 to +85
XRCHH			13.0000 to 52.0000					
XRCJH	3225		10.0000 to 52.0000					
XRCLH	5032							

XRCPB series is low profile type of XRCGB series.

■ Part Number List

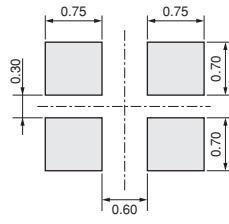
Series	Part Number	Frequency (MHz)	Frequency Tolerance (ppm max.) [at 25°C±3°C]	Frequency Shift by Temperature (ppm max.) [Standard Condition: +25°C]	Frequency Aging (ppm max./Year)	ESR* (Ωmax.)	Load Capacitance (pF)	Drive Level (μW max.)
XRCGB_F_Z	XRCGB24M000F0Z00R0	24.0000	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCGB_F_Z	XRCGB24M576F0Z00R0	24.5760	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCGB_F_Z	XRCGB25M000F0Z00R0	25.0000	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCGB_F_Z	XRCGB26M000F0Z00R0	26.0000	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCGB_F_Z	XRCGB27M000F0Z00R0	27.0000	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCGB_F_Z	XRCGB27M120F0Z00R0	27.1200	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCGB_F_Z	XRCGB30M000F0Z00R0	30.0000	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCGB_F_Z	XRCGB31M250F0Z00R0	31.2500	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCGB_F_Z	XRCGB32M000F0Z00R0	32.0000	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCGB_F_Z	XRCGB33M868F0Z00R0	33.8688	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCGB_F_Z	XRCGB40M000F0Z00R0	40.0000	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCGB_F_Z	XRCGB48M000F0Z00R0	48.0000	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCPB_F_Z	XRCPB24M000F0Z00R0	24.0000	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCPB_F_Z	XRCPB24M576F0Z00R0	24.5760	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCPB_F_Z	XRCPB25M000F0Z00R0	25.0000	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCPB_F_Z	XRCPB26M000F0Z00R0	26.0000	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCPB_F_Z	XRCPB27M000F0Z00R0	27.0000	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCPB_F_Z	XRCPB27M120F0Z00R0	27.1200	±100	±100 (-40 to +105°C)	±5	150	6	300
XRCPB_F_Z	XRCPB30M000F0Z00R0	30.0000	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCPB_F_Z	XRCPB31M250F0Z00R0	31.2500	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCPB_F_Z	XRCPB32M000F0Z00R0	32.0000	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCPB_F_Z	XRCPB33M868F0Z00R0	33.8688	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCPB_F_Z	XRCPB40M000F0Z00R0	40.0000	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCPB_F_Z	XRCPB48M000F0Z00R0	48.0000	±100	±100 (-40 to +105°C)	±5	100	6	300
XRCHA_F_Z	XRCHA16M000F0Z01R0	16.0000	±100	±100 (-40 to +105°C)	±5	100	8	300
XRCHA_F_Z	XRCHA20M000F0Z01R0	20.0000	±100	±100 (-40 to +105°C)	±5	80	8	300
XRCHH	XRCHH16M000F1QB7P0	16.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	80	8	30
XRCHH	XRCHH20M000F1QB1P0	20.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCHH	XRCHH26M000F1QD8P0	26.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCHH	XRCHH36M000F1QA3P0	36.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCHH	XRCHH40M000F1QB3P0	40.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCHH	XRCHH52M000F1QA2P0	52.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCJH	XRCJH13M000F1QA0P0	13.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	80	8	30
XRCJH	XRCJH16M000F1QB5P0	16.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	80	8	30
XRCJH	XRCJH20M000F1QB3P0	20.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCJH	XRCJH26M000F1QC1P0	26.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCJH	XRCJH36M000F1QA1P0	36.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCJH	XRCJH40M000F1QB2P0	40.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCJH	XRCJH52M000F1QA1P0	52.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCLH	XRCLH10M000F1QA4P0	10.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCLH	XRCLH12M000F1QA0P0	12.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	60	8	30
XRCLH	XRCLH14M745F1QA0P0	14.7456	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	40	8	30
XRCLH	XRCLH16M000F1QA2P0	16.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	40	8	30
XRCLH	XRCLH21M250F1QA0P0	21.2500	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	40	8	30
XRCLH	XRCLH52M000F1QA1P0	52.0000	±10	±15 (-30 to +85°C)	±1 (±3/5Years)	40	8	30

\*: Equivalent Series Resistance

### Standard Land Pattern Dimensions

#### XRCGB\_F\_Z, XRCPB\_F\_Z

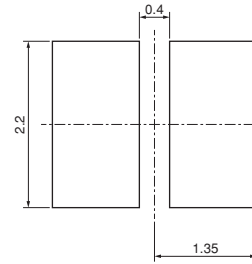
(Recommendable Land Pattern)



(in mm)

#### XRCHA\_F\_Z

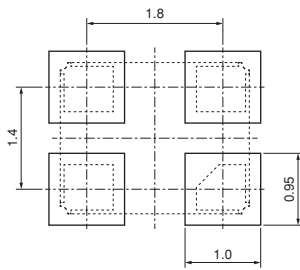
(Recommendable Land Pattern)



(in mm)

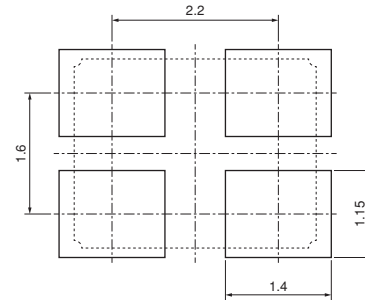
3

#### XRCHH



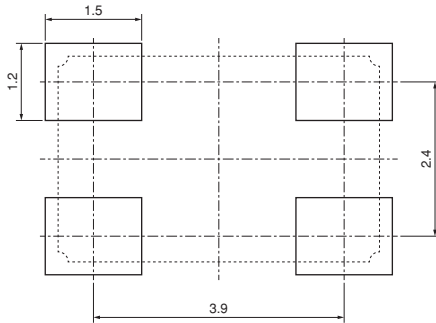
(in mm)

#### XRCJH



(in mm)

#### XRCLH



Avoid to put on signal lines under the product except reference land pattern.

(in mm)



## Notice -Crystal Units for Industrial-

### ■ Notice (Soldering and Mounting)

#### 1.1. Soldering Condition

##### (1) Reflow

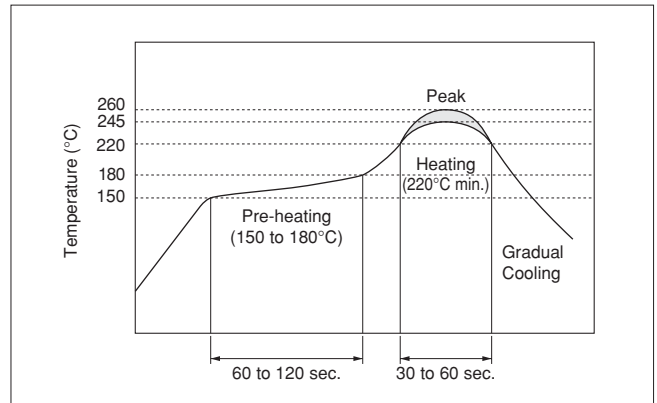
Please mount components on a circuit board by the re-flow soldering.

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.	



3

##### (2) Soldering Iron

If compelled to mount the component by using 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 off 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 make 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 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

Expire date (Shelf life) of the products is six months after delivery under the conditions of a sealed and an unopened package. Please use the products within six months after delivery. If you store the products for a long time (more than six months), use carefully because the products may be degraded in the 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 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 such as: in a damp heated place, in a place where direct sunlight comes in, in place applying vibrations.
- (4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in the solderability due to storage under the poor condition.
- (5) Please do not drop the products to avoid cracking of crystal element.

#### 4. Others

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. Irregular or stop 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.

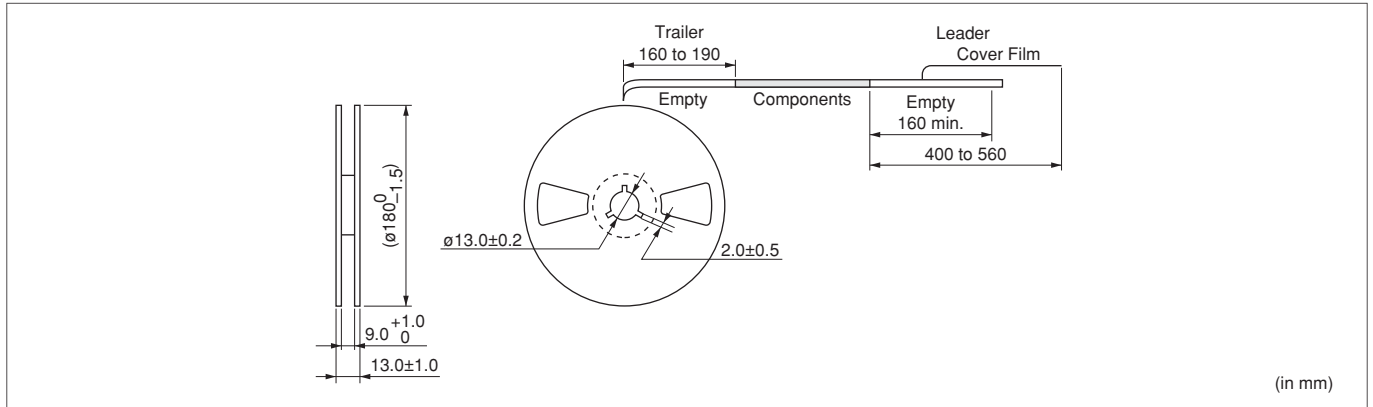
3. Please do not use this products in following applications in transportation equipment (vehicles, trains, ships, etc.).  
(example: engine control, brake control, steering control, body control.)

## Packaging -Crystal Units for Industrial-

### Minimum Quantity/Dimensions of Reel

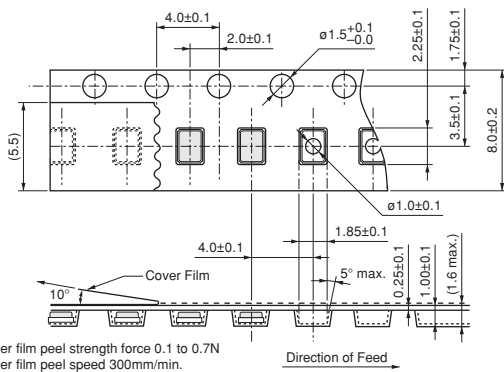
Plastic Tape $\phi 180\text{mm}$	Plastic Tape $\phi 330\text{mm}$
3,000	9,000

(pcs.)

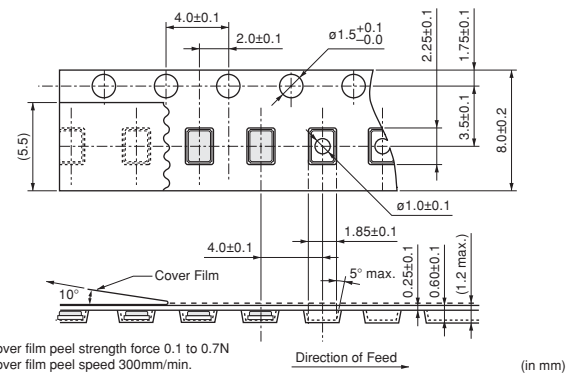


### Dimensions of Taping

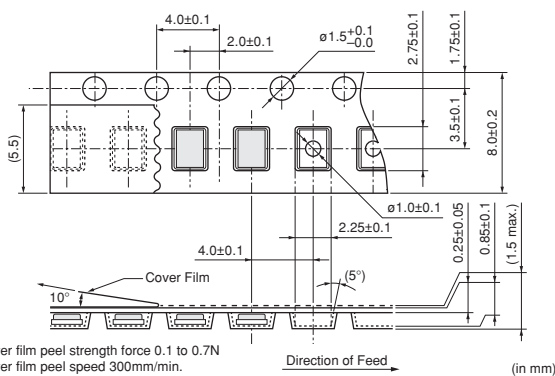
#### XRCGB\_F\_Z



#### XRCPB\_F\_Z



#### XRCHA\_F\_Z



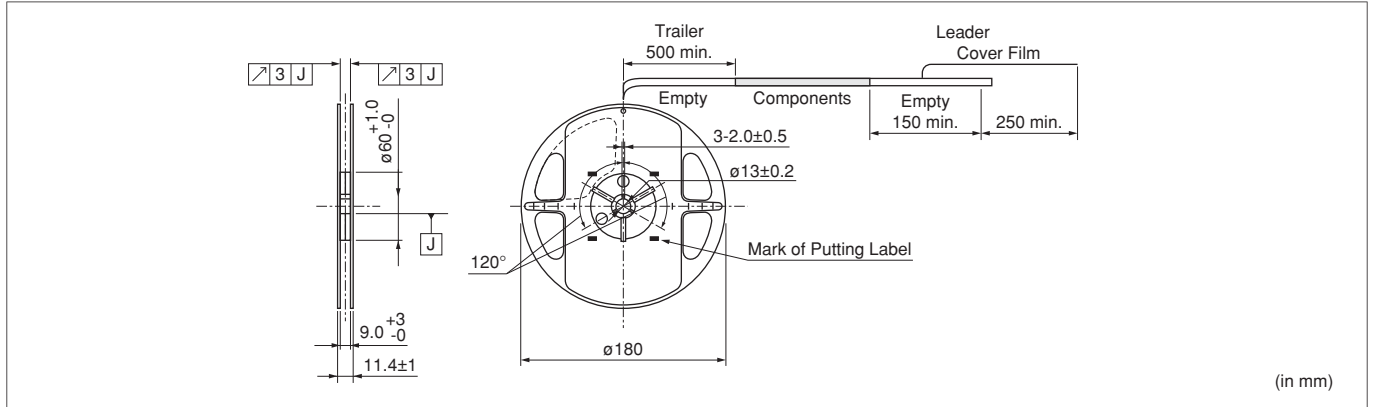
## Packaging -Crystal Units for Industrial-

### Minimum Quantity/Dimensions of Reel

Plastic Tape  $\phi 180\text{mm}$

3,000

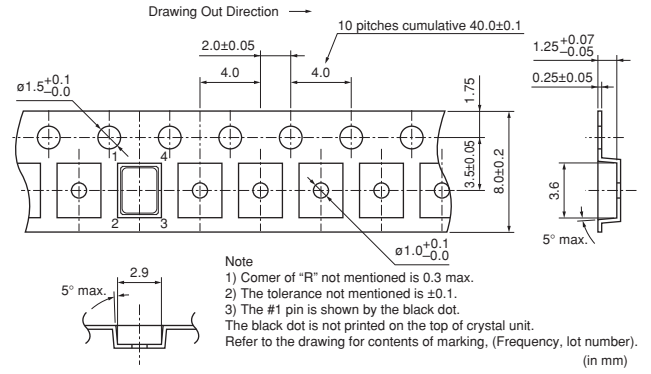
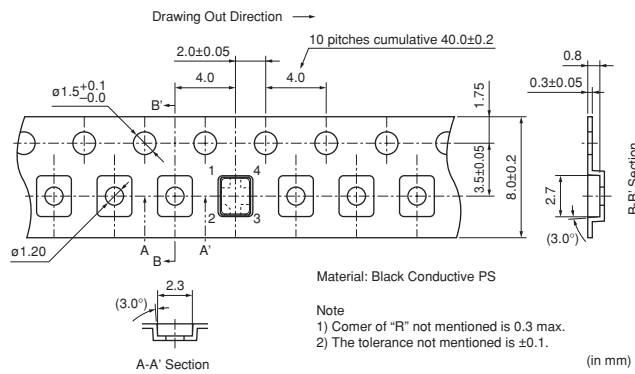
(pcs.)



### Dimensions of Taping

XRCHH

XRCJH



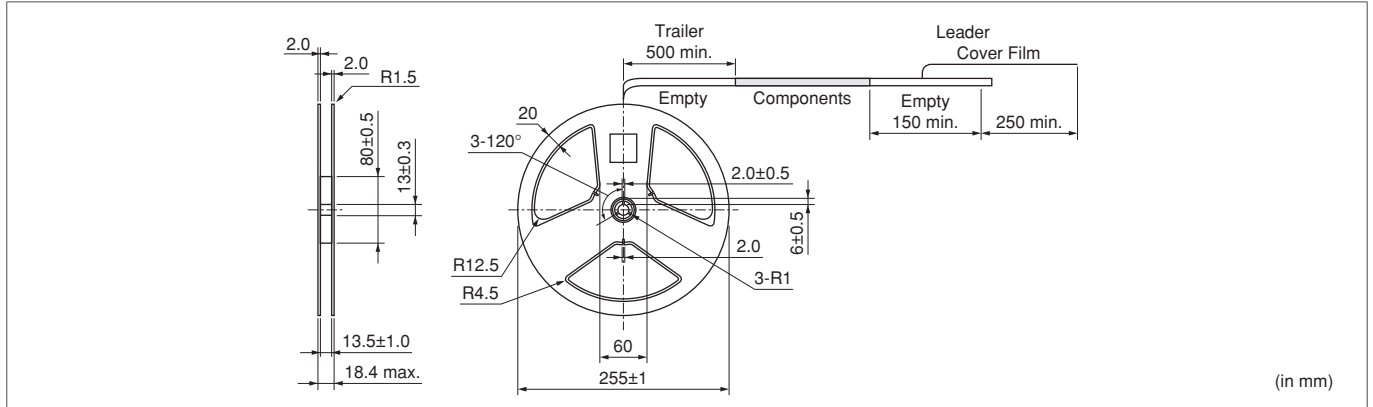
## Packaging -Crystal Units for Industrial-

### ■ Minimum Quantity/Dimensions of Reel

Plastic Tape  $\phi 255\text{mm}$

3,000

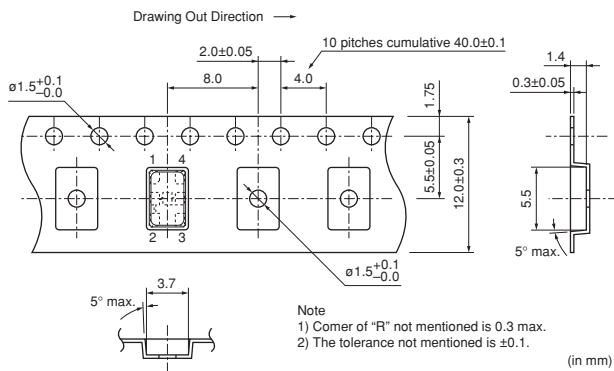
(pcs.)



3

### ■ Dimensions of Taping

XRCLH



# for Industrial

## Crystal Oscillators



We offer various 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 which is fostered by our long experience and activity.

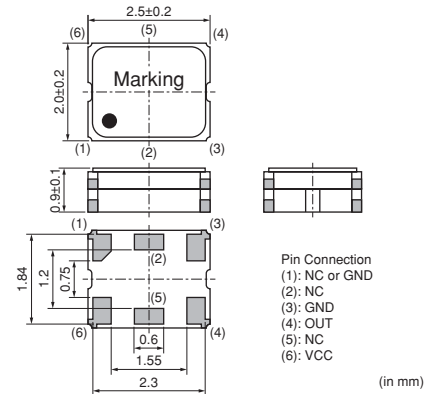
### ■ Features

1. Excellent frequency stability over temperature
2. Low profile
3. Low supply voltage
4. SMD type (Reflow soldering available)
5. The series complies to RoHS directive, being lead-free (phase 3).

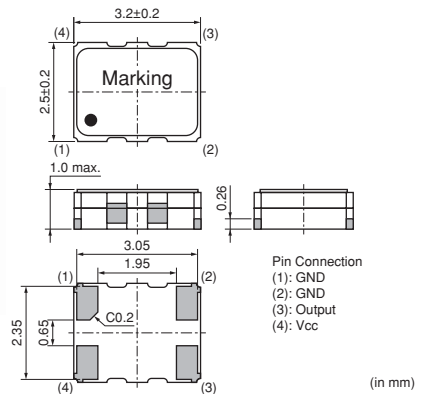
### ■ Applications

1. Business Radio
2. GPS (GNSS) system
3. Small cells
4. Wireless devices

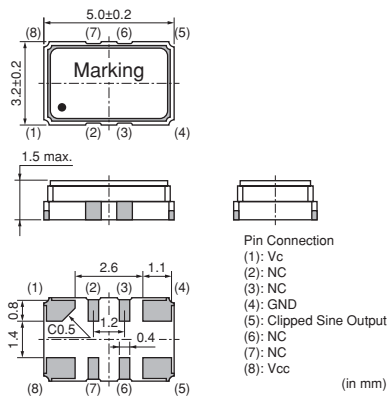
**XNCHH, XTCHH**  
10.0000–52.0000MHz



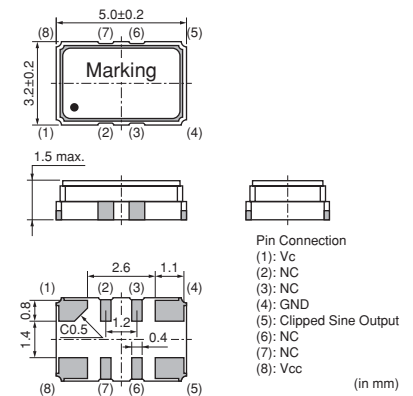
**XNCJH, XTCJH**  
10.0000–52.0000MHz



**XTCLH\_E**  
10.0000–40.0000MHz



**XTCLH\_J**  
10.0000–40.0000MHz



### ■ Series

Series	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)	Supply Voltage (Vp-p)	VC Function
XNCHH	2520	Metal	10.0000 to 52.0000	±1.0	±0.5	±1.0	-30 to +85	+3.0±5%	—
XTCHH									○
XNCJH	3225		10.0000 to 40.0000	±0.5	±0.2	±0.5	-40 to +85		—
XTCJH			○						
XTCLH_E	5032	10.0000 to 40.0000	±0.5	±0.2	±0.5	-40 to +85	—		
XTCLH_J		○							

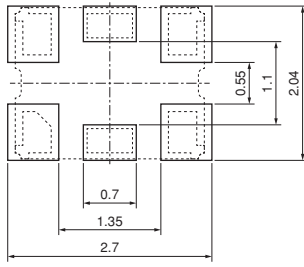
■ Part Number List

Series	Part Number	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)	Current Consumption (mA max.)	Frequency Controlled Range (ppm)
XNCHH	XNCHH10M000TJEA2P0	10.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCHH	XNCHH15M300TJEA0P0	15.3000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCHH	XNCHH16M368TJEA4P0	16.3680	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCHH	XNCHH16M800TJEA3P0	16.8000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCHH	XNCHH19M200TJEC1P0	19.2000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCHH	XNCHH26M000TJEE5P0	26.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCHH	XNCHH28M800TJEA1P0	28.8000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCHH	XNCHH32M000TJEB5P0	32.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCHH	XNCHH38M400TJEB3P0	38.4000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCHH	XNCHH52M000TJEA1P0	52.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XTCHH	XTCHH10M000TJEA3P0	10.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCHH	XTCHH15M300TJEA2P0	15.3000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCHH	XTCHH16M800TJEA2P0	16.8000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCHH	XTCHH19M200TJEB4P0	19.2000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCHH	XTCHH20M950TJEA0P0	20.9500	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCHH	XTCHH21M250TJEA0P0	21.2500	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCHH	XTCHH26M000TJEB1P0	26.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCHH	XTCHH28M800TJEA0P0	28.8000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCHH	XTCHH38M400TJEA1P0	38.4000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCHH	XTCHH52M000TJEA1P0	52.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XNCJH	XNCJH10M000TJEA8P0	10.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCJH	XNCJH15M300TJEA0P0	15.3000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCJH	XNCJH16M800TJEA1P0	16.8000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCJH	XNCJH19M200TJEA5P0	19.2000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCJH	XNCJH26M000TJEB4P0	26.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCJH	XNCJH28M800TJEA1P0	28.8000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCJH	XNCJH38M400TJEA3P0	38.4000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XNCJH	XNCJH52M000TJEA0P0	52.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	—
XTCJH	XTCJH10M000TJEB0P0	10.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCJH	XTCJH15M300TJEA3P0	15.3000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCJH	XTCJH16M800TJEB0P0	16.8000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCJH	XTCJH19M200TJEB6P0	19.2000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCJH	XTCJH26M000TJEB4P0	26.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCJH	XTCJH28M800TJEA0P0	28.8000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCJH	XTCJH38M400TJEA3P0	38.4000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCJH	XTCJH52M000TJEA5P0	52.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±5min. to ±15max.
XTCLH_E	XTCLH10M000TJEB4P0	10.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±3min. to ±15max.
XTCLH_E	XTCLH13M000TJEA3P0	13.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±3min. to ±15max.
XTCLH_E	XTCLH16M800TJED2P0	16.8000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±3min. to ±15max.
XTCLH_E	XTCLH19M200TJEC4P0	19.2000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±3min. to ±15max.
XTCLH_E	XTCLH20M000TJEB7P0	20.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±3min. to ±15max.
XTCLH_E	XTCLH21M250TJEA0P0	21.2500	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±3min. to ±15max.
XTCLH_E	XTCLH26M000TJEA7P0	26.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±3min. to ±15max.
XTCLH_E	XTCLH38M400TJEA0P0	38.4000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±3min. to ±15max.
XTCLH_E	XTCLH40M000TJEB0P0	40.0000	±1.0	±0.5 (-30 to +85°C)	±1.0	2	±3min. to ±15max.
XTCLH_J	XTCLH19M200TJJC3P0	19.2000	±0.5	±0.2 (-40 to +85°C)	±0.5	3	±3min. to ±6max.
XTCLH_J	XTCLH25M000TJJA5P0	25.0000	±0.5	±0.2 (-40 to +85°C)	±0.5	3	±3min. to ±6max.
XTCLH_J	XTCLH26M000TJJA6P0	26.0000	±0.5	±0.2 (-40 to +85°C)	±0.5	3	±3min. to ±6max.

4

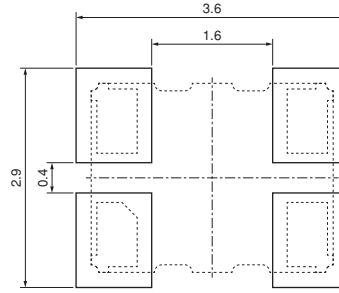
■ Standard Land Pattern Dimensions

XNCHH, XTCHH



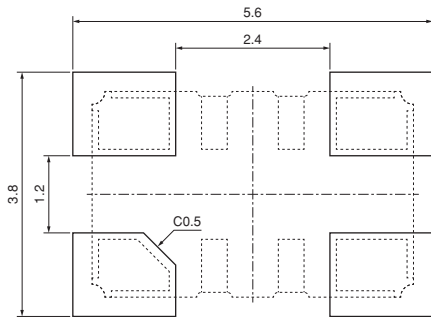
(in mm)

XNCJH, XTCJH



(in mm)

XTCLH\_E/J



(in mm)

4



## Notice -Crystal Oscillators for Industrial-

### ■ Notice (Soldering and Mounting)

#### 1.1. Soldering Condition

##### (1) Reflow

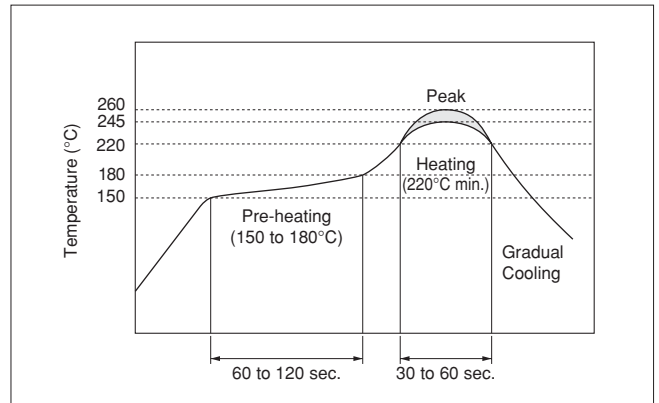
Please mount components on a circuit board by the re-flow soldering.

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 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 make 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 Oscillators for 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

Expire date (Shelf life) of the products is six months after delivery under the conditions of a sealed and an unopened package. Please use the products within six months after delivery. If you store the products for a long time (more than six months), use carefully because the products may be degraded in the 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 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 such as: in a damp heated place, in a place where direct sunlight comes in, in place applying vibrations.
- (4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in the solderability due to storage under the poor condition.
- (5) Please do not drop the products to avoid cracking of crystal element.

#### 4. Others

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 this products in following applications in transportation equipment (vehicles, trains, ships, etc.).  
(example: engine control, brake control, steering control, body control.)

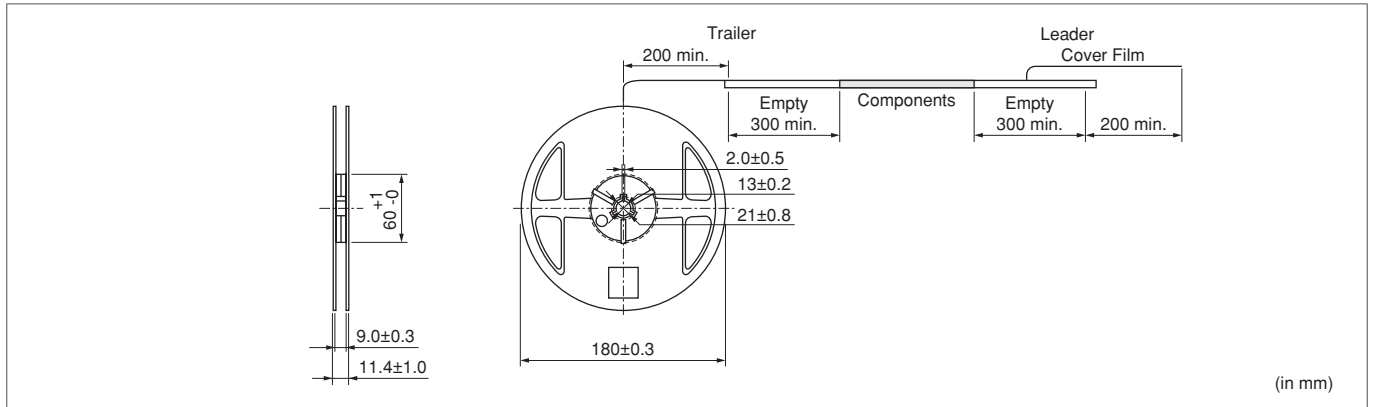
## Packaging -Crystal Oscillators for Industrial-

### Minimum Quantity/Dimensions of Reel

Plastic Tape  $\phi 180\text{mm}$

3,000

(pcs.)

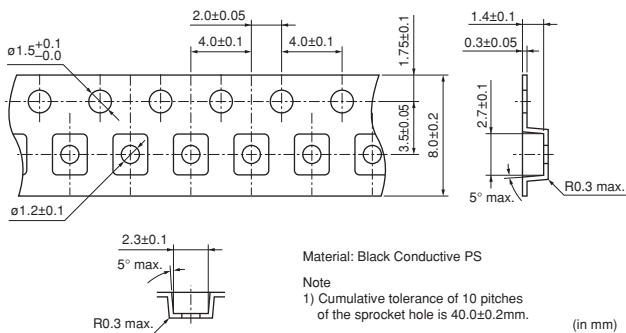


4

### Dimensions of Taping

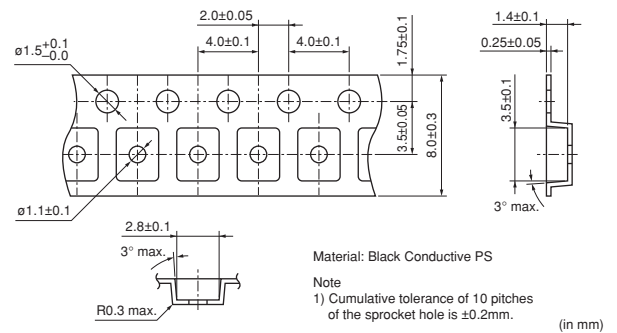
XNCHH, XTCHH

Drawing Out Direction →



XNCJH, XTCJH

Drawing Out Direction →

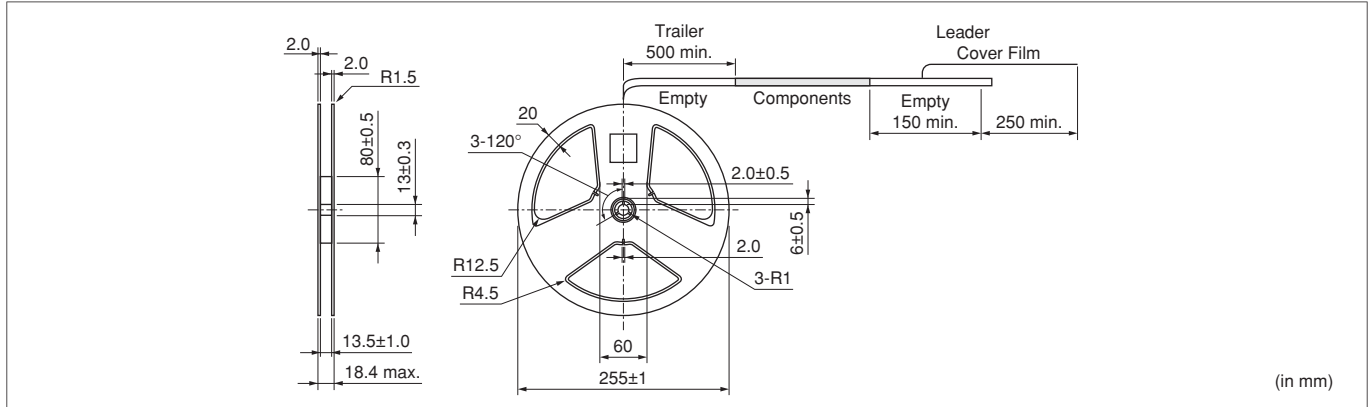


# Packaging -Crystal Oscillators for Industrial-

## Minimum Quantity/Dimensions of Reel

Plastic Tape ø255mm
3,000

(pcs.)

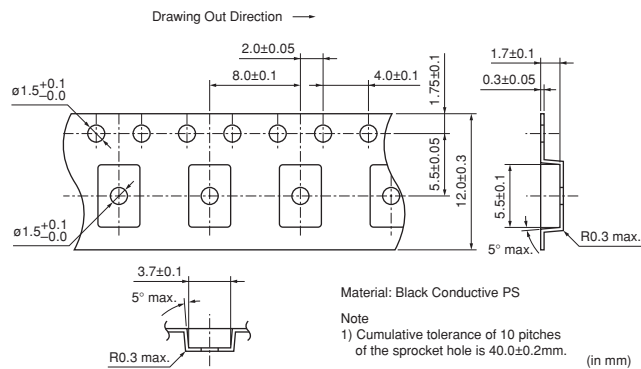


(in mm)

4

## Dimensions of Taping

XTCLH\_E/J



## Measuring Circuit of Crystal Units

### ■ Measuring Circuit

#### 1. Frequency Measuring Method

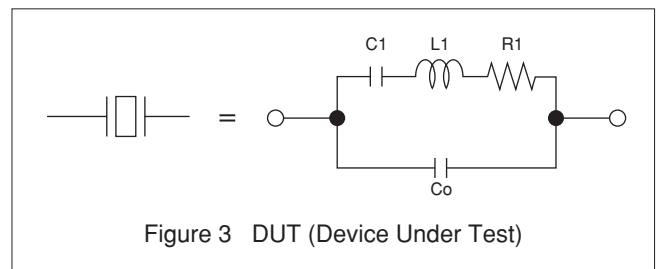
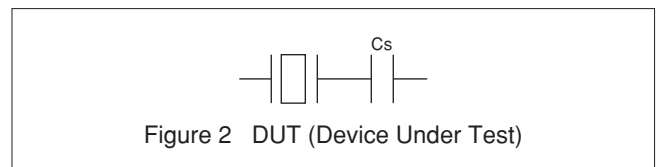
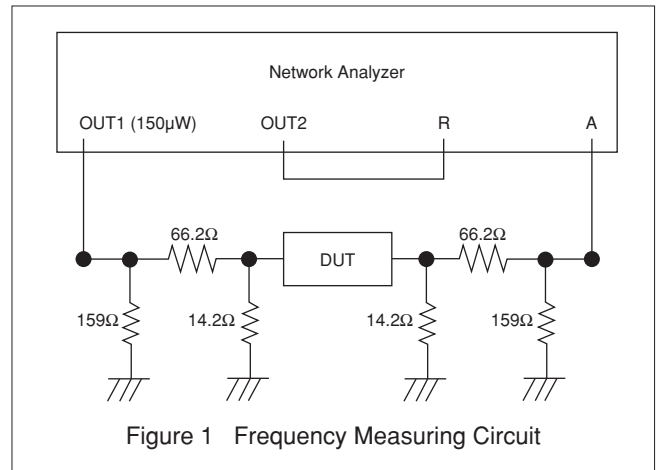
The load resonance frequency (Lower frequency of the two given when the electrical impedance of the component becomes resistant near its resonance point) measured by network analyzer (Agilent E5100A or the equivalent) and the circuit in Figure 1. DUT is shown in Figure 2, and the value of  $C_s$  is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

#### 2. Equivalent Series Resistance

The equivalent series resistance ( $R_1$ ) is measured by network analyzer (Agilent E5100A or equivalent) and the circuit in Figure 1. DUT is shown in Figure 3.

#### 3. Measuring Condition

Standard conditions for the measurement shall be  $+25\pm 3^\circ\text{C}$  temperature and the 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 March 2015. 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.

[www.murata.com](http://www.murata.com)

**muRata**  
INNOVATOR IN ELECTRONICS



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

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