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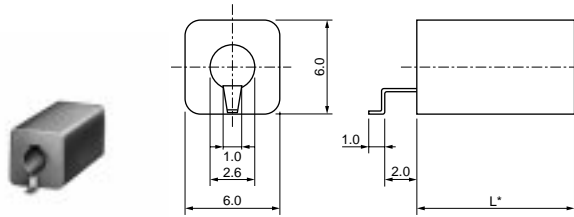
# Dielectric Resonators (RESOMICS®)



## Dielectric Resonator K Series (DRR Copper Plated Type)

### ■ Features

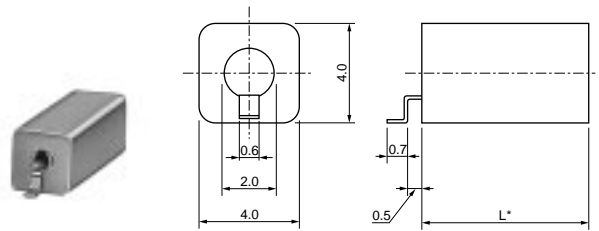
1. High dielectric constant:  $\epsilon_r=92$
2. Lower price by copper electrode
3. Excellent solderability by copper electrode
4. These resonators cover wide range of resonant frequencies (by 10MHz step).



DRR060 Type

\* Dimension L can be calculated by the following, using dielectric constant and resonant frequency.  
 $L \approx 3 \times 10^{11} / (n\sqrt{\epsilon_r} \cdot f_0)$  (fo : Hz)  
 $\lambda/4$  TEM mode : n=4     $\lambda/2$  TEM mode : n=2

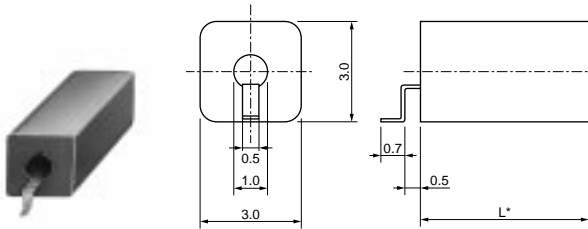
(in mm)



DRR040 Type

\* Dimension L can be calculated by the following, using dielectric constant and resonant frequency.  
 $L \approx 3 \times 10^{11} / (n\sqrt{\epsilon_r} \cdot f_0)$  (fo : Hz)  
 $\lambda/4$  TEM mode : n=4     $\lambda/2$  TEM mode : n=2

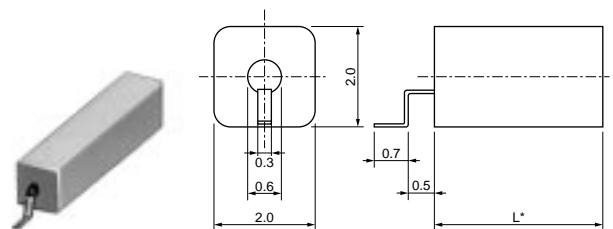
(in mm)



DRR030 Type

\* Dimension L can be calculated by the following, using dielectric constant and resonant frequency.  
 $L \approx 3 \times 10^{11} / (n\sqrt{\epsilon_r} \cdot f_0)$  (fo : Hz)  
 $\lambda/4$  TEM mode : n=4

(in mm)



DRR020 Type

\* Dimension L can be calculated by the following, using dielectric constant and resonant frequency.  
 $L \approx 3 \times 10^{11} / (n\sqrt{\epsilon_r} \cdot f_0)$  (fo : Hz)  
 $\lambda/4$  TEM mode : n=4

(in mm)

Part Number	fo (MHz)	Unloaded Q (min.)	Wavelength	Za (ohm)
DRR060□□□□□KTC00T	440 to 490	330	Lambda/4	5.7
DRR060□□□□□KTC00T	500 to 790	350	Lambda/4	5.7
DRR060□□□□□KTC00T	800 to 1300	400	Lambda/4	5.7
DRR060□□□□□KPC00T	1000 to 1690	470	Lambda/2	5.7
DRR060□□□□□KPC00T	1700 to 2200	510	Lambda/2	5.7
DRR040□□□□□KTC00R	500 to 540	200	Lambda/4	4.8
DRR040□□□□□KTC00R	550 to 640	220	Lambda/4	4.8
DRR040□□□□□KTC00R	650 to 790	240	Lambda/4	4.8
DRR040□□□□□KTC00R	800 to 890	260	Lambda/4	4.8
DRR040□□□□□KTC00R	900 to 1490	270	Lambda/4	4.8
DRR040□□□□□KTC00R	1500 to 1800	290	Lambda/4	4.8
DRR040□□□□□KPC00R	1000 to 1390	300	Lambda/2	4.8
DRR040□□□□□KPC00R	1400 to 1890	340	Lambda/2	4.8
DRR040□□□□□KPC00R	1900 to 3000	370	Lambda/2	4.8
DRR030□□□□□KTC00R	900 to 1490	230	Lambda/4	7.4
DRR030□□□□□KTC00R	1500 to 1600	250	Lambda/4	7.4
DRR020□□□□□KTC00R	900 to 1590	150	Lambda/4	8.0
DRR020□□□□□KTC00R	1600 to 2600	190	Lambda/4	8.0

Tolerance of resonant frequency:  $\pm 0.7\%$ max. (Please contact our sales representatives for details.)

Unloaded Q is value at lower limit frequency range.

Five blank boxes of the above Part Numbers are filled with Resonant Frequency codes. Please see Part Numbering for details.

# Dielectric Resonators (RESOMICS®)

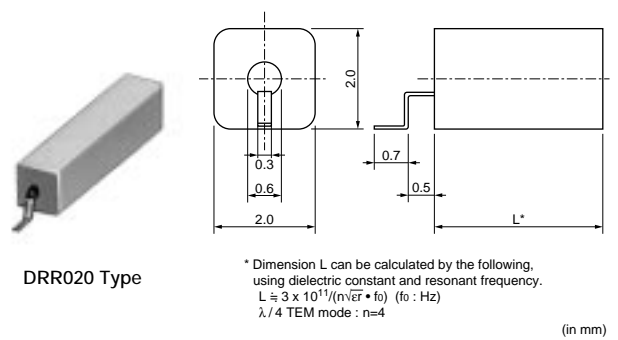
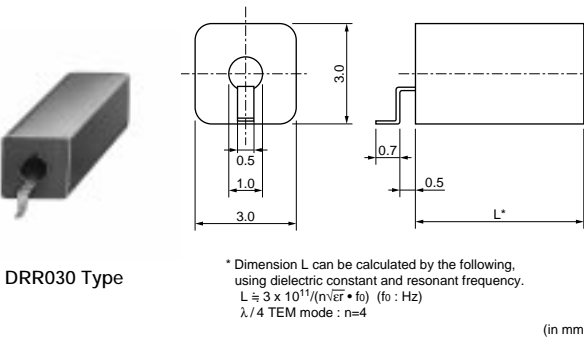
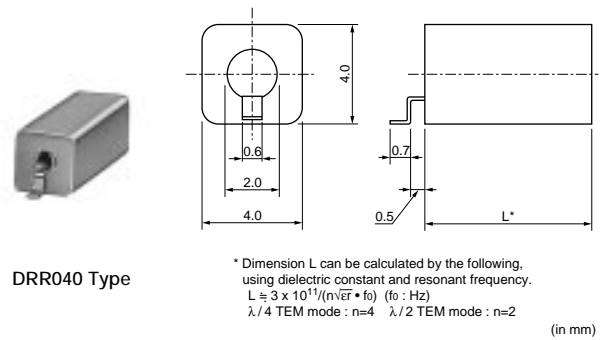
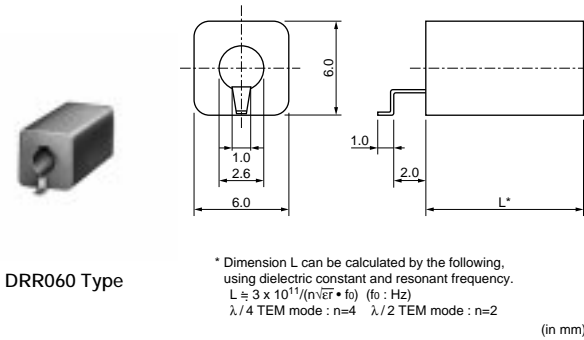


## Dielectric Resonator P Series (DRR Copper Plated Type)

2

### ■ Features

1. High dielectric constant:  $\epsilon_r=21$
2. Lower price by copper electrode
3. Excellent solderability by copper electrode
4. These resonators cover wide range of resonant frequencies (by 10MHz step).



Part Number	$f_0$ (MHz)	Unloaded Q (min.)	Wavelength	$Z_a$ (ohm)
DRR060□□□□PTC00T	1000 to 1190	550	Lambda/4	11.9
DRR060□□□□PTC00T	1200 to 1790	600	Lambda/4	11.9
DRR060□□□□PTC00T	1800 to 2700	650	Lambda/4	11.9
DRR060□□□□PPC00T	2000 to 2490	800	Lambda/2	11.9
DRR060□□□□PPC00T	2500 to 3000	850	Lambda/2	11.9
DRR040□□□□PTC00R	1300 to 1490	350	Lambda/4	10.0
DRR040□□□□PTC00R	1500 to 1990	400	Lambda/4	10.0
DRR040□□□□PTC00R	2000 to 3000	450	Lambda/4	10.0
DRR040□□□□PPC00R	2500 to 3000	550	Lambda/2	10.0
DRR030□□□□PTC00R	1900 to 2490	380	Lambda/4	15.4
DRR030□□□□PTC00R	2500 to 3000	400	Lambda/4	15.4
DRR020□□□□PTC00R	2800 to 3500	250	Lambda/4	16.7
DRR020□□□□PTC00R	3510 to 5000	300	Lambda/4	16.7

Tolerance of resonant frequency:  $\pm 0.7\%$  max. (Please contact our sales representatives for details.)

Unloaded Q is value at lower limit of frequency range.

Five blank boxes of the above Part Numbers are filled with Resonant Frequency codes. Please see Part Numbering for details.

## TEM Mode Resonator (DRR Copper Plated Type) Notice

### ■ Notice (Soldering and Mounting)

> Standard soldering conditions

1. Temperature Profile:

- (1) Pre-heating: Heat the resonator between 150(degree C) to 180(degree C) for about 90 sec.
- (2) Soldering: Please solder at the peak temperature range from 240(degree C) to 250(degree C). However, don't keep the soldering time longer than 50 sec. when the temperature is higher than 220 (degree C).
- (3) Cooling: Spontaneous cooling

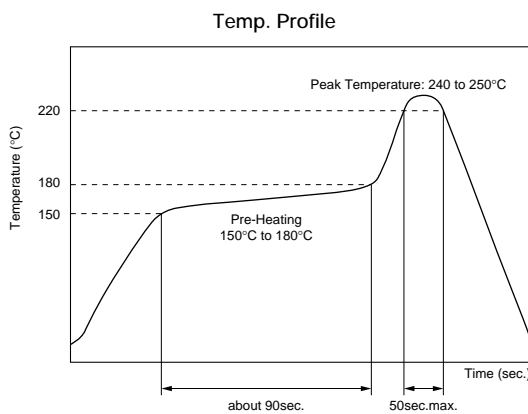
2. Board land pattern

- (1) Pattern width is same as resonator width (T).
- (2) Pattern length is 3L/4 against resonator length (L).  
Recommended soldering position is 3/4 part on the middle of the resonator surface.

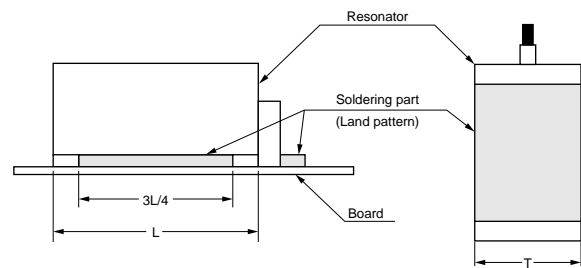
> Other

If you are concerned that the products may be affected by corrosive gas or ionic material, you have to keep those products in the completely closed package or container.

### ■ Notice (Soldering and Mounting)



Recommended Land Pattern Dimensions



### ■ Notice (Storage and Operating Conditions)

Please keep the following articles to preserve the solderability and the unloaded Q.

> Storage condition

1. Store the products under the conditions of environmental temperature less than 50(degree C) and relative humidity less than 80%RH.
2. Do not store the products in an environment of corrosive gas (hydrogen sulfide, NaCl etc.).

### ■ Notice (Handling)

1. Do not apply excessive force onto terminals of the products.
2. The products are made of ceramics and copper electrodes. Rapid heating and cooling may damage the products during soldering. Please refer to our standard soldering conditions when you solder the products.

### ■ Minimum Quantity of Taping

DRR020 type: 2500pcs./phi 330mm reel

DRR030 type: 2000pcs./phi 330mm reel

DRR040 type: 1500pcs./phi 330mm reel

## Dielectric Resonator (RESOMICS®) Features/Applications/Characteristics

Reduces the size of microwave devices.  
 Low loss and high dielectric constant.

### ■ Features

1. High-purity, high-density ceramics minimize loss.
2. High dielectric constant makes possible the miniaturization of microwave circuits.
3. Temperature-compensated dielectric constant enables stable microwave oscillators.
4. A variety of shapes are available for custom application requirements.

### ■ Applications

- Burglar alarms
- Multi-channel microwave communications systems
- Land mobile radio
- Mobile phone systems

### ■ Circuit Applications

- VCO
- Filters
- Tank circuits

### ■ Electrical and Physical Characteristics of Dielectric Resonators (TEM Mode)

Material Code	K	P
Dielectric Constant ( $\epsilon_r$ )	92±1	21.4±0.2
Temp. Coefficient (ppm/°C)	$\tau f^* = 3 \pm 3$	$\tau f^* = 4 \pm 2$
Q (=1/tanδ)	1500 min. (at 3GHz)	7000 min. (at 7GHz)
Ins. Resistance ( $\Omega \cdot \text{cm}$ )	$1 \times 10^{13}$ min.	$1 \times 10^{13}$ min.
Expansion Coefficient (ppm/°C)	10.7	10.5
Thermal Conductivity (W/(m·°C))	2.0	8.4
Specific Heat (J/(kg·°C))	500	740
Density (g/cm <sup>3</sup> )	6.0	3.8
Water Absorption (%)	0.01 max.	0.01 max.
Vicker's Hardness Number	700	800
Bend Strength (MPa)	180	240

\*:  $\tau f$  denotes temperature coefficient of resonant frequency.

## Part Numbering

### ● Part Numbering

#### Dielectric Resonators (RESOMICS®) TEM Mode

(Part Number) 

DR	R	020	1G590	K	T	C	00	T
①	②	③	④	⑤	⑥	⑦	⑧	⑨

#### ① Product ID

Product ID	
<b>DR</b>	Dielectric Resonators (RESOMICS®)

#### ② Product

Code	Product
<b>R</b>	TEM Mode

#### ③ Outer Dimension

Code	Outer Dimension
<b>020</b>	2.0×2.0mm
<b>030</b>	3.0×3.0mm
<b>040</b>	4.0×4.0mm
<b>060</b>	6.0×6.0mm

#### ④ Nominal Center Frequency

Expressed by five figures. If the unit is "MHz", it is expressed by three figures plus "M". If the unit is "GHz", a decimal point is expressed by capital letter "G".

Ex.)

Code	Nominal Center Frequency
<b>900M0</b>	900MHz
<b>1G200</b>	1200MHz

#### ⑤ Materials

Code	Materials
<b>K</b>	K Series
<b>P</b>	P Series

#### ⑥ Wave Length

Code	Wave Length
<b>T</b>	$\lambda / 4$
<b>P</b>	$\lambda / 2$

#### ⑦ Electrode

Code	Electrode
<b>C</b>	Copper

#### ⑧ Individual Specification Code (Serial)

Code	Individual Specification Code (Serial)
<b>00</b>	Standard

#### ⑨ Packaging

Code	Packaging
<b>T</b>	Tray
<b>R</b>	Taping

#### **for EU RoHS Compliant**

- All the products on this catalog are complied with EU RoHS.
- EU RoHS is "the European Directive 2002/95/EC 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/info/rohs.html>).

**△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 July 2007. 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 because there is no space for detailed 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.**