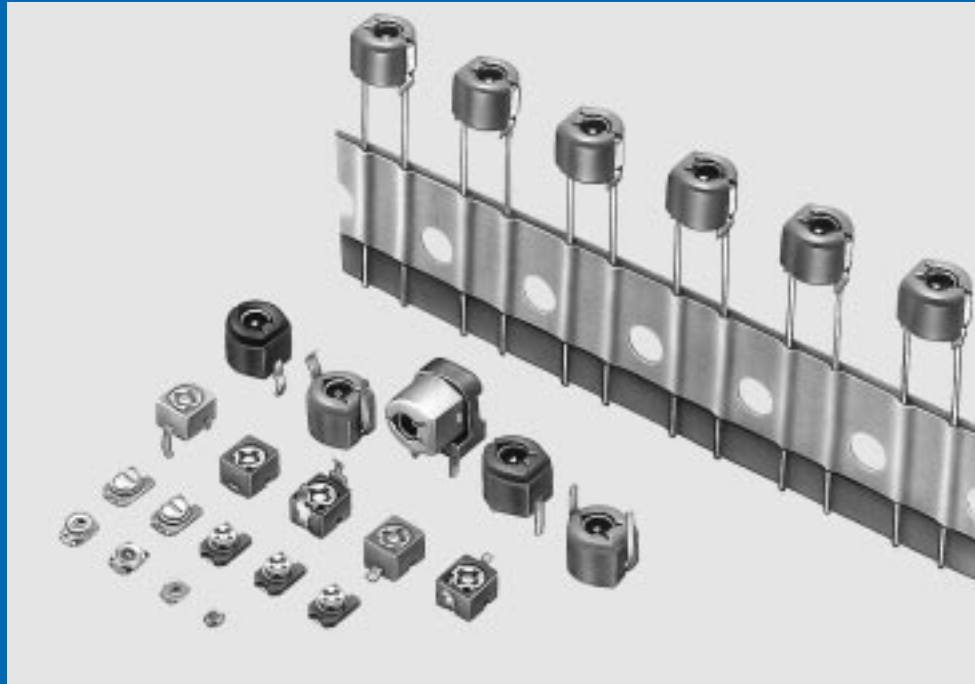


# Ceramic Trimmer Capacitors

## CERAMIC TRIMMER CAPACITORS



**muRata** *Innovator  
in Electronics*

Murata  
Manufacturing Co., Ltd.

Cat.No.T13E-7

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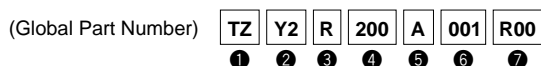
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● **Part Numbering** (The structure of the "Global Part Numbers" that have been adopted since June 2001 and the meaning of each code are described herein.)  
 (If you have any questions about details, inquire at your usual Murata sales office or distributor.)

**Ceramic Trimmer Capacitors**



① Product ID

Product ID	
<b>TZ</b>	Trimmer Capacitors

② Series/Terminal

Code	Series/Terminal
<b>03</b>	6mm Size Lead Type
<b>B4</b>	4mm Size SMD/Lead Type
<b>C3</b>	3mm Size SMD Type
<b>S2</b>	2mm Size SMD Type (Height 1.0mm)
<b>Y2</b>	2mm Size SMD Type (Height 1.25mm)
<b>V2</b>	2mm Size SMD Type (Height 1.45mm)
<b>R1</b>	1mm Size SMD Type (Height 0.90mm)

③ Temperature Characteristics

Code	Temperature Characteristics
<b>Z</b>	NP0 ppm/°C
<b>S</b>	N150ppm/°C
<b>N</b>	N200ppm/°C
<b>T</b>	N450ppm/°C
<b>R</b>	N750ppm/°C
<b>K</b>	N1000ppm/°C
<b>P</b>	N1200ppm/°C

Please refer to ratings for tolerance of temperature characteristics.

④ Maximum Capacitance

Expressed by three figures. The unit is pico-farad(pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two numbers. If there is a decimal point, it is expressed by the capital letter "R". In this case, all figures are significant digits.

⑤ Terminal Shape

Code	Terminal Shape
<b>A</b>	Top Adjustment: <b>TZR1, TZS2, TZY2, TZV2, TZC3, TTB4</b> (SMD Type)
<b>B</b>	Top Adjustment: <b>TTB4</b> (SMD Type), Rear Adjustment: <b>TZ03</b> (Lead Type)
<b>C</b>	Top Adjustment: <b>TTB4</b> (Lead Type)
<b>D</b>	Rear Adjustment: <b>TTB4</b> (Lead Type)
<b>E</b>	Top Adjustment: <b>TZ03</b> (Lead Type), Rear Adjustment: <b>TTB4</b> (SMD Type)
<b>F</b>	Top Adjustment: <b>TZ03</b> (Lead Type)
<b>N</b>	Rear Adjustment: <b>TZ03</b> (Lead Type)
<b>T</b>	Top Adjustment: <b>TZ03</b> (Taping Type)
<b>Y</b>	Side Adjustment: <b>TZ03</b> (Lead Type)

Please refer to dimensions for terminals in detail.

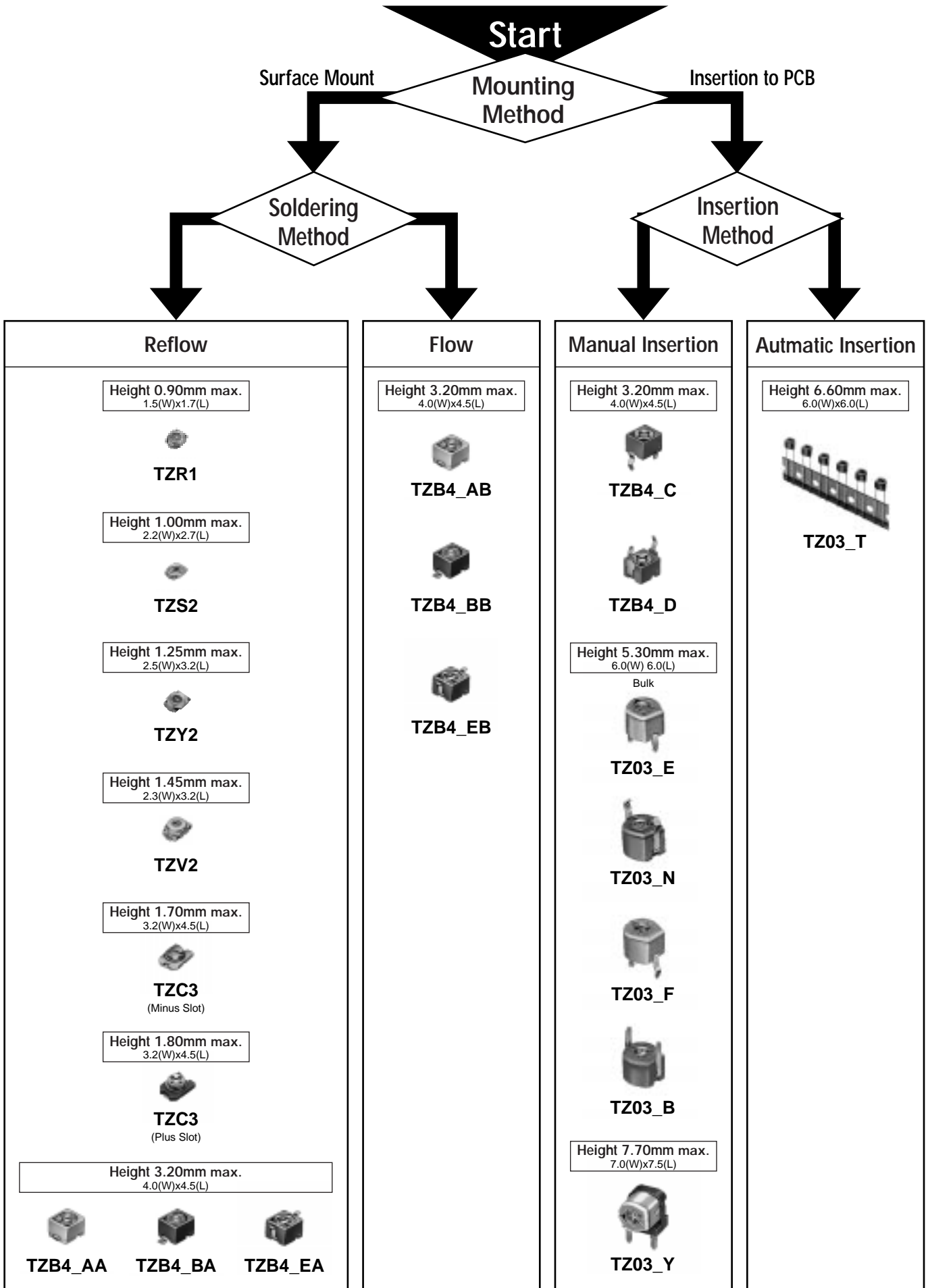
⑥ Individual Specification

Code	Individual Specifications
<b>001</b>	<b>TZR1, TZS2, TZY2</b> Standard Type
<b>110</b>	<b>TZV2, TZC3</b> (Minus Slot) Standard Type
<b>169</b>	<b>TZ03</b> Standard Type
<b>310</b>	<b>TZC3</b> (Plus Slot) Standard Type
<b>A10</b>	<b>TTB4</b> No-cover Film Standard Type
<b>B10</b>	<b>TTB4</b> with Cover Film Standard Type

⑦ Packaging

Code	Packaging
<b>A00</b>	Ammo Pack (Radial Taping)
<b>B00</b>	Bulk
<b>M00</b>	Magazine
<b>R00</b>	Reel (Taping ø180mm)
<b>R01</b>	Reel (Taping ø330mm)

## Selection Guide of Ceramic Trimmer Capacitor



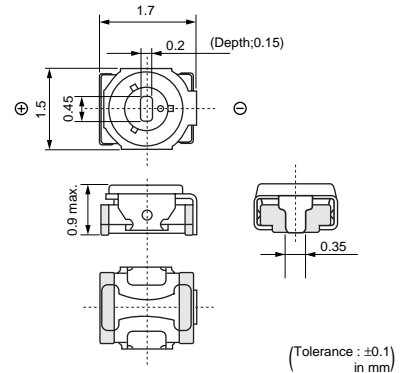
# Ceramic Trimmer Capacitors



## TZR1 Series

### ■ Features

1. Ultra-small and thin type with external dimensions of 1.5(W)x1.7(L)x0.85(H)mm. (80% less in volume from the current product.)
2. Unique construction with no plastic material provides superior soldering heat resistance to maintain excellent characteristic performance after reflow soldering.
3. Harmful materials (lead etc.) are not contained in the product.
4. Including the fixed capacitor in parallel with trimmer capacitor makes reduction of space and cost of mounting in circuit. Please contact us about the capacitance value of built-in fixed capacitor.



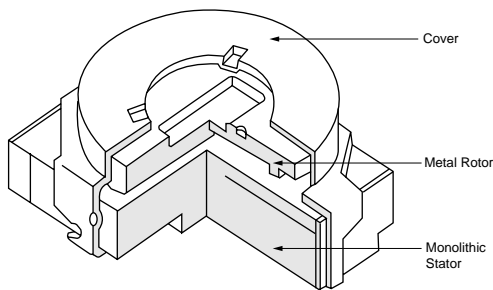
### ■ Applications

1. Bluetooth
2. Crystal oscillators
3. Crystal filters
4. Hand radios
5. Miniature tuner pack (FM Radio, TV)
6. Remote keyless entry systems
7. Pagers

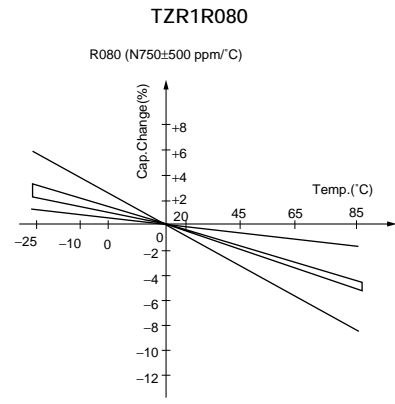
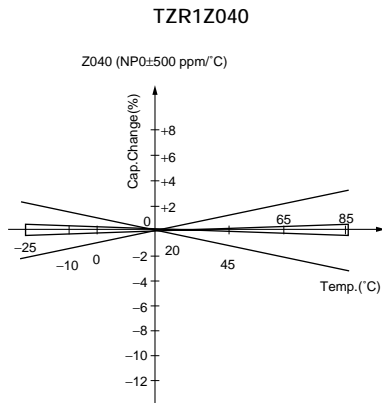
Part Number	Cmin. (pF)	Cmax. (pF)	TC	Q	Rated Voltage	Withstanding Voltage
TZR1Z040A001	1.5 max.	4.0 +100/-0%	NP0±500ppm/°C	300min. at 1MHz, Cmax.	25Vdc	55Vdc
TZR1R080A001	3.0 max.	8.0 +100/-0%	N750±500ppm/°C	300min. at 1MHz, Cmax.	25Vdc	55Vdc

Insulation Resistance : 10000M ohm min. Torque : 0.1~1.0mN.m Operating Temperature Range : -25 ~ +85°C

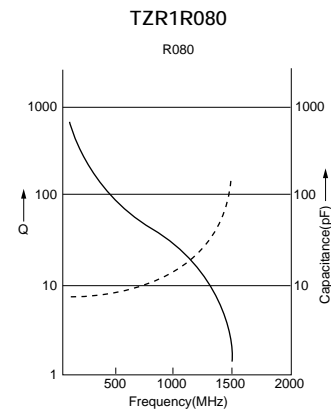
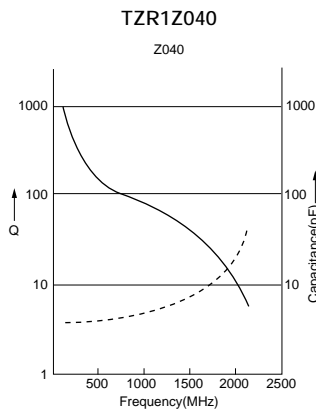
### ■ Construction



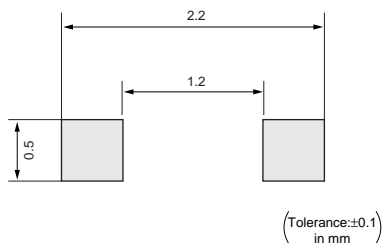
Temperature Characteristics



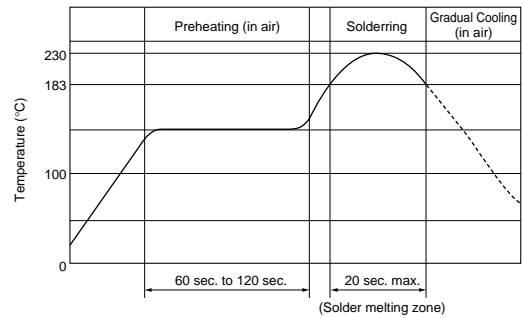
Frequency Characteristics




Land Pattern



Temperature Profile



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### ■ Screwdriver

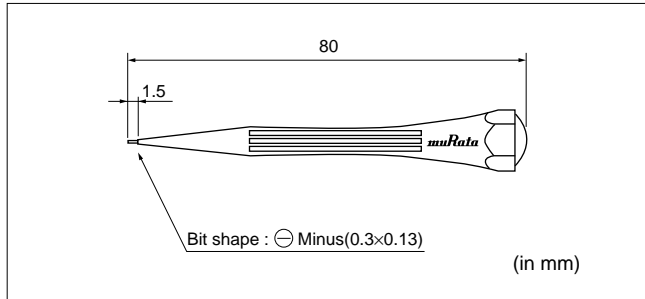
Please use the following recommended screwdriver.

You can order this driver with below part number.

Though you can also adjust the capacitance value by commercial products, please use one which has the same head size as the below driver.

Screwdriver for Manual Adjustment

Murata Part No. : **KMDR160**



### ■ Notice (Storage and operating condition)

1. Do not use the trimmer capacitor under atmosphere of RTV silicone rubber (Room Temperature Vulcanizing Silicone Rubber) except Acetone liberating silicone sealant.
2. Before using trimmer capacitor, please store under the condition of -10 to +40 C. and 30 to 85%RH.
3. Do not store in or near corrosive gasses.
4. Use within 6 months of delivery.
5. Open the package just before using.
6. Prior to storing previously opened packages, the packaging should be heat-sealed. Avoid using rubber bands for repackaging.
7. Do not store under direct sunlight.

8. Do not use the trimmer capacitor under the conditions listed below.
  - (1) Corrosive gasses atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
  - (2) In liquid (Ex. water, oil, medical liquid, organic solvent, etc.)
  - (3) Dusty / dirty atmosphere
  - (4) Direct sunlight
  - (5) Static voltage nor electric/magnetic fields
  - (6) Direct sea breeze
  - (7) Other variations of the above

### ■ Notice (Soldering)

#### 1. Soldering

- (1) TZR1 series can be soldered by reflow soldering method and soldering iron. Do not use flow soldering method (dipping).
- (2) Standard soldering condition
  - (a) Reflow soldering : Refer to the standard temperature profile.
  - (b) Soldering iron:
    - > Temperature of tip 260±10 C.
    - > Soldering time 3 sec. max.
    - > Diameter 0.5mm max.
    - > Wattage of iron 20W max.


Before using other soldering conditions than those listed above, please consult with Murata factory representative prior to using. If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer capacitor may deviate from the specified characteristics.

- (3) The amount of solder is critical.
- (4) The thickness of solder paste should be printed from 100microm to 150microm and the dimension of land pattern should be used Murata's standard land pattern at reflow soldering.

Insufficient amounts of solder can lead to insufficient soldering strength on PCB.

Excessive amounts of solder may cause the bridging between the terminals or the contact failure due to flux wicking up.

- (5) When using soldering iron, the diameter of the string solder shall be less than 0.5mm. The string solder shall be applied to the lower part of the terminal only and do not apply flux except the terminals. Excessive amounts of solder and/or applying solder to the upper part of the terminal may cause fixed metal rotor or the contact failure due to flux invasion into the movable part and/or the contact point. The soldering iron should not come in contact with the monolithic stator of the trimmer capacitor. If such contact does occur, the trimmer capacitor may be damaged.
- (6) Our recommendable chlorine content of solder is as follows.
  - (a) Solder paste: 0.2wt% max.
  - (b) String solder: 0.5wt% max.
- (7) Do not use water-soluble flux (for water

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cleaning). To prevent the deterioration of trimmer capacitor characteristics, apply flux only to terminals.

2. Mounting

- (1) Do not apply excessive force (preferable 5.0N (Ref.; 500gf)max.), when the trimmer capacitor is mounted on the PCB.
- (2) Do not warp and/or bend PCB to prevent trimmer capacitor from breakage.

(3) Use the suitable dimension of the pick-up nozzle. (1.1-1.2mm external diameter and 0.8-0.9mm bore diameter.)

3. Cleaning

Can not be cleaned because of open construction.

4. Other

Note the polarity of the trimmer capacitor to minimize influence by stray capacitance. (Refer to the dimensions concerning the polarity.)

■ Notice (Handling)

- 1. Use suitable screwdrivers that fit comfortably in driver slot.  
\*Recommended screwdriver for manual adjustment  
MURATA : KMDR160
- 2. When adjusting with a screwdriver, do not apply excessive force(preferable 0.5N(Ref;50gf) max.) to minimize capacitance drift. If excessive force applied to the screwdriver slot, it may cause deformation of the products.
- 3. Do not apply adhesive, lock paints, or any other substances to the trimmer capacitor to secure the rotor position. They may cause corrosion or electrical contact problems.

■ Notice (Other)

- 1. Before using trimmer capacitor, please test after assembly in your particular mass production system.
- 2. We have an application manual for trimmer capacitor. (Only for chip type) If you need it, please feel free to contact us.



# Ceramic Trimmer Capacitors

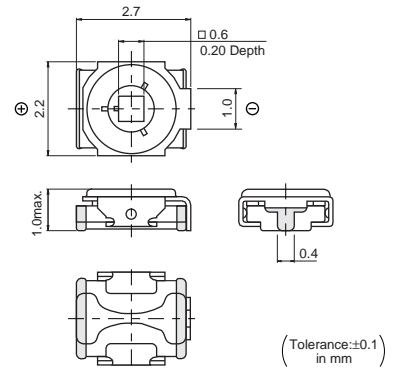


## TZS2 Series

2

### ■ Features

1. Ultra-small and thin type with external dimensions of 2.2(W)x2.7(L)x0.95(H)mm. (30% less in volume from the current product.)
2. Unique construction with no plastic material provides superior soldering heat resistance to maintain excellent characteristic performance after reflow soldering.
3. Pierced square hole allows for high resistance to tuning force and in-process automatic adjustment.
4. Including the fixed capacitor in parallel with trimmer capacitor makes reduction of space and cost of mounting in circuit. Please contact us about the capacitance value of built-in fixed capacitor.



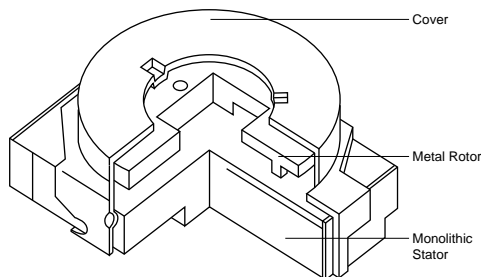
### ■ Applications

- Crystal oscillators
- Crystal filters
- Hand radios
- Cordless telephones
- Cellular telephones
- Tuner packs
- Pagers
- Remote keyless entry systems
- PHS
- Radar detectors
- W-LAN
- Compact radios
- Headphone stereos

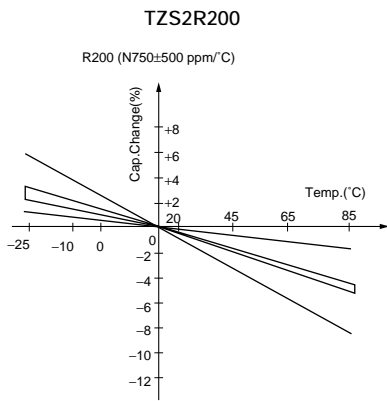
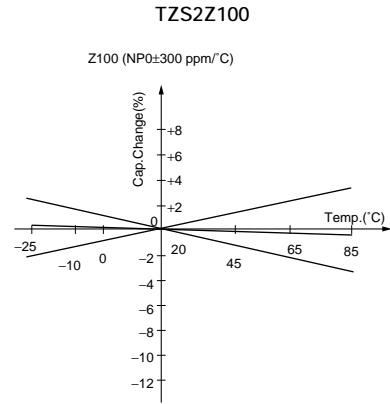
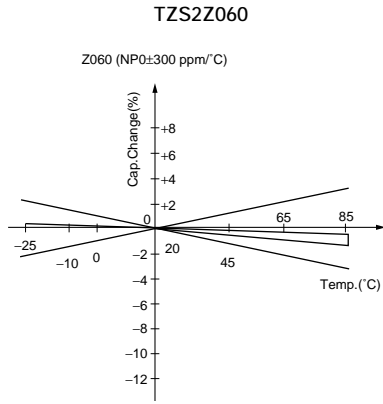
Part Number	Cmin. (pF)	Cmax. (pF)	TC	Q	Rated Voltage	Withstanding Voltage
TZS2Z060A001	3.0 max.	6.0 +100/-0%	NP0±300ppm/°C	500min. at 1MHz, Cmax.	25Vdc	55Vdc
TZS2Z100A001	3.5 max.	10.0 +100/-0%	NP0±300ppm/°C	500min. at 1MHz, Cmax.	25Vdc	55Vdc
TZS2R200A001	7.0 max.	20.0 +100/-0%	N750±500ppm/°C	500min. at 1MHz, Cmax.	25Vdc	55Vdc

Insulation Resistance : 10000M ohm min. Torque : 0.5~5.0mNm Operating Temperature Range : -25~+85°C

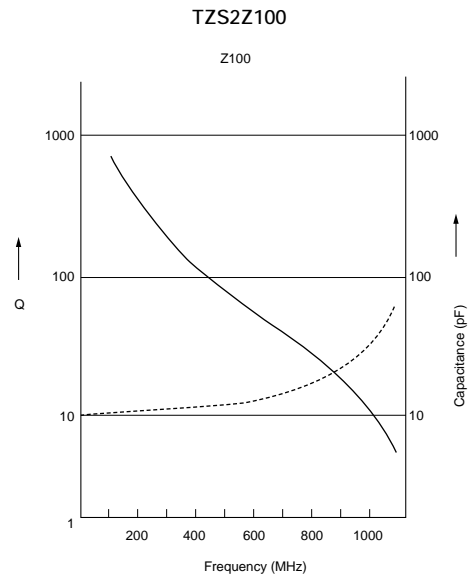
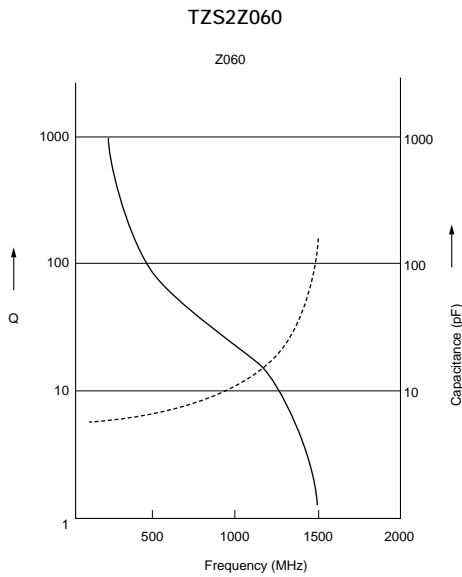
### ■ Construction



Temperature Characteristics



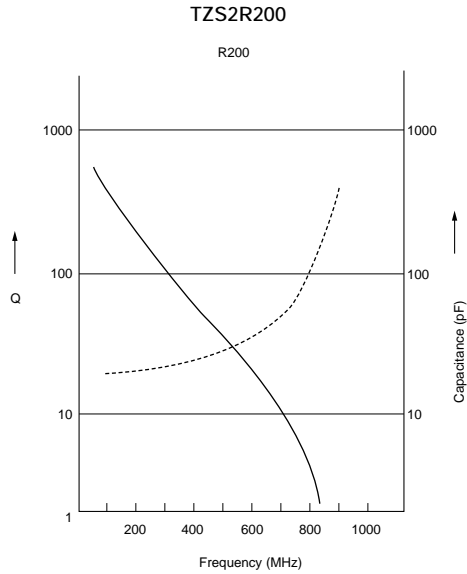
Frequency Characteristics



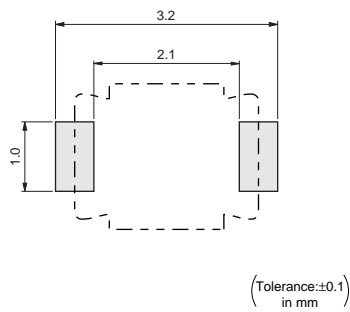
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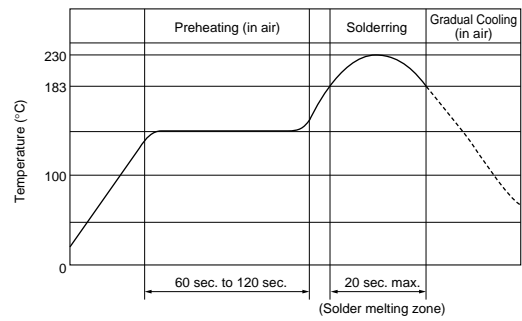
## Frequency Characteristics



## Land Pattern



## Temperature Profile

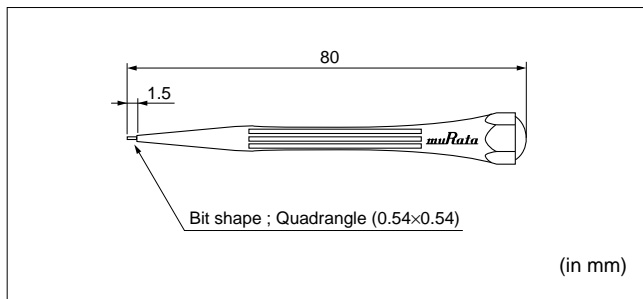


## Screwdriver and Screwdriver Bit

Please use the following recommended screwdriver.  
You can order this driver with below part number.  
Though you can also adjust the capacitance value by commercial products, please use one which has the same head size as the below driver.

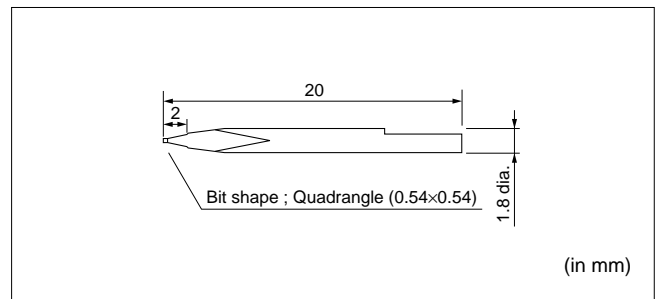
Screwdriver for Manual Adjustment

Murata Part No. : **KMDR050**



Screwdriver Bit for Automatic Adjustment

Murata Part No. : **KMBT050**



■ Notice (Storage and operating condition)

1. Do not use the trimmer capacitor under atmosphere of RTV silicone rubber (Room Temperature Vulcanizing Silicone Rubber) except Acetone liberating silicone sealant.
2. Before using trimmer capacitor, please store under the condition of -10 to +40 C. and 30 to 85%RH.
3. Do not store in or near corrosive gasses.
4. Use within 6 months of delivery.
5. Open the package just before using.
6. Prior to storing previously opened packages, the packaging should be heat-sealed. Avoid using rubber bands for repackage.
7. Do not store under direct sunlight.

8. Do not use the trimmer capacitor under the conditions listed below.
  - (1) Corrosive gasses atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
  - (2) In liquid (Ex. water, oil, medical liquid, organic solvent, etc.)
  - (3) Dusty / dirty atmosphere
  - (4) Direct sunlight
  - (5) Static voltage nor electric/magnetic fields
  - (6) Direct sea breeze
  - (7) Other variations of the above

■ Notice (Soldering)

1. Soldering
    - (1) TZS2 series can be soldered by reflow soldering method and soldering iron. Do not use flow soldering method (dipping).
    - (2) Standard soldering condition
      - (a) Reflow soldering : Refer to the standard temperature profile.
      - (b) Soldering iron:
        - > Temperature of tip 260±10 C.
        - > Soldering time 3 sec. max.
        - > Diameter 1mm max.
        - > Wattage of iron 20W max.
- Before using other soldering conditions than those listed above, please consult with Murata factory representative prior to using. If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer capacitor may deviate from the specified characteristics.
- (3) The amount of solder is critical.
  - (4) The thickness of solder paste should be printed from 100micro m to 150micro m and the dimension of land pattern should be used Murata's standard land pattern at reflow soldering. Insufficient amounts of solder can lead to insufficient soldering strength on PCB. Excessive amounts of solder may cause the bridging between the terminals or the contact failure due to flux wicking up.
  - (5) When using soldering iron, the diameter of the string solder shall be less than 0.5mm. The string solder shall be applied to the lower part of the terminal only and do not apply

flux except the terminals. Excessive amounts of solder and/or applying solder to the upper part of the terminal may cause fixed metal rotor or the contact failure due to flux invasion into the movable part and/or the contact point. The soldering iron should not come in contact with the monolithic stator of the trimmer capacitor. If such contact does occur, the trimmer capacitor may be damaged.

- (6) Our recommendable chlorine content of solder is as follows.
    - (a) Solder paste : 0.2wt% max.
    - (b) String solder : 0.5wt% max.
  - (7) Do not use water-soluble flux (for water cleaning). To prevent the deterioration of trimmer capacitor characteristics, apply flux only to terminals.
2. Mounting
    - (1) Do not apply excessive force (preferable 5.0N (Ref.; 500gf)max.), when the trimmer capacitor is mounted on the PCB.
    - (2) Do not warp and/or bend PCB to prevent trimmer capacitor from breakage.
    - (3) Use the suitable dimension of the pick-up nozzle. (1.8mm external diameter and 1.3mm bore diameter.)
  3. Cleaning
 

Can not be cleaned because of open construction.
  4. Other
 

Note the polarity of the trimmer capacitor to minimize influence by stray capacitance. (Refer to the dimensions concerning the polarity.)

### ■ Notice (Handling)

1. Use suitable screwdrivers that fit comfortably in driver slot.
  - (1) Recommended screwdriver for manual adjustment  
MURATA : KMDR050
  - (2) Recommended screwdriver bit for automatic adjustment  
MURATA : KMBT050
2. When adjusting with a screwdriver, do not apply

- excessive force(preferable 1.0N(Ref;100gf) max.) to minimize capacitance drift. If excessive force applied to the screwdriver slot, it may cause deformation of the products.
3. Do not apply adhesive, lock paints, or any other substances to the trimmer capacitor to secure the rotor position. They may cause corrosion or electrical contact problems.

### ■ Notice (Other)

1. Before using trimmer capacitor, please test after assembly in your particular mass production system.
2. We have an application manual for trimmer capacitor. (Only for chip type) If you need it, please feel free to contact us.

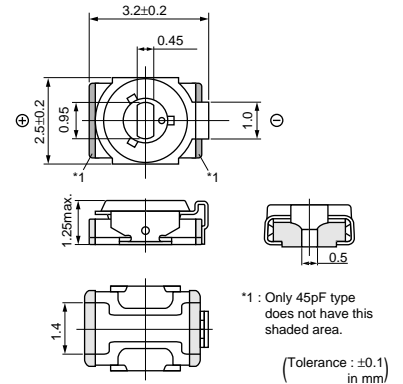
# Ceramic Trimmer Capacitors



## TZY2 Series

### ■ Features

1. Small and thin size available-just 2.5(W)x3.2(L)x1.25(H)mm.
2. New shape of cover can improve the flux invasion compared with current products.
3. Improvement of the adhesion between rotor and stator leads superior stability.
4. Unique construction with no plastic material provides superior soldering heat resistance to maintain excellent characteristic performance after reflow soldering.



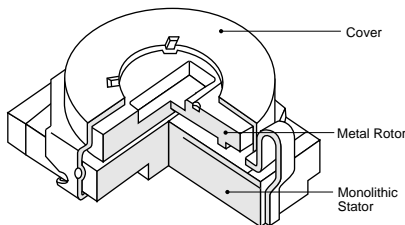
### ■ Applications

- Crystal oscillators
- Crystal filters
- Pagers
- Cordless telephones
- PHS
- Hand radios
- Cellular telephones
- Watches
- Remote keyless entry systems
- W-LAN
- Radar detectors
- Compact radios
- DVD
- Burglarproof devices
- Headphone stereos

Part Number	Cmin. (pF)	Cmax. (pF)	TC	Q	Rated Voltage	Withstanding Voltage
TZY2Z010A001	0.5 max.	1.0 +100/-0%	NP0±300ppm/°C	200min. at 200MHz, Cmax.	25Vdc	55Vdc
TZY2Z2R5A001	0.65 max.	2.5 +100/-0%	NP0±300ppm/°C	200min. at 200MHz, Cmax.	25Vdc	55Vdc
TZY2Z030A001	1.5 max.	3.0 +100/-0%	NP0±300ppm/°C	300min. at 1MHz, Cmax.	25Vdc	55Vdc
TZY2Z060A001	2.5 max.	6.0 +100/-0%	NP0±300ppm/°C	500min. at 1MHz, Cmax.	25Vdc	55Vdc
TZY2Z100A001	3.0 max.	10.0 +100/-0%	NP0±300ppm/°C	500min. at 1MHz, Cmax.	25Vdc	55Vdc
TZY2R200A001	4.5 max.	20.0 +100/-0%	N750±500ppm/°C	500min. at 1MHz, Cmax.	25Vdc	55Vdc
TZY2R250A001	5.5 max.	25.0 +100/-0%	N750±500ppm/°C	300min. at 1MHz, Cmax.	25Vdc	55Vdc
TZY2K450A001	8.0 max.	45.0 +100/-0%	N1000±500ppm/°C	300min. at 1MHz, Cmax.	25Vdc	55Vdc

Insulation Resistance : 10000M ohm min. Torque : 0.5~5.0mNm Operating Temperature Range : -25~+85°C

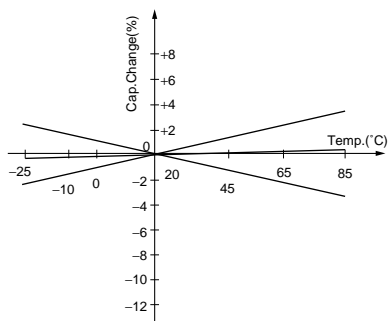
### ■ Construction



## Temperature Characteristics

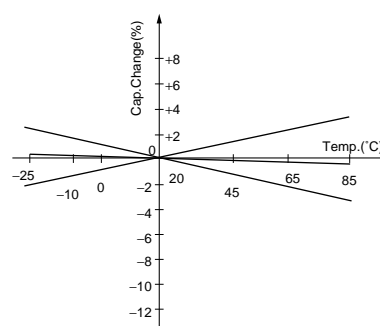
**TZY2Z2R5**

Z2R5 (NP0±300 ppm/°C)



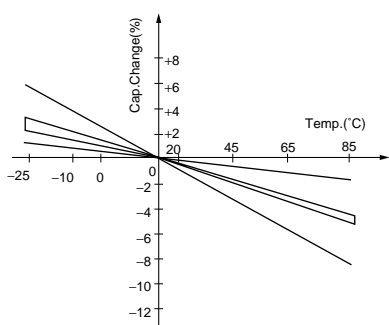
**TZY2Z100**

Z100 (NP0±300 ppm/°C)



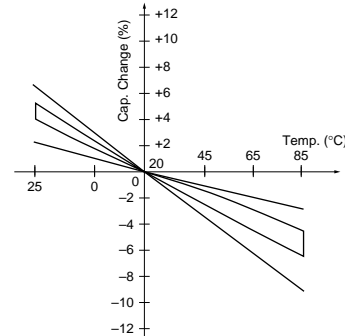
**TZY2R200**

R200 (N750±500 ppm/°C)



**TZY2K450**

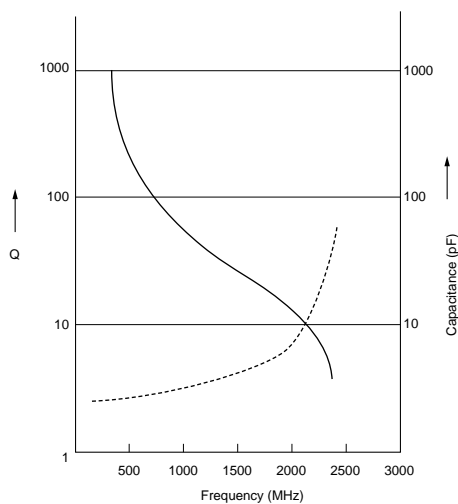
K450 (N1000±500 ppm/°C)



## Frequency Characteristics

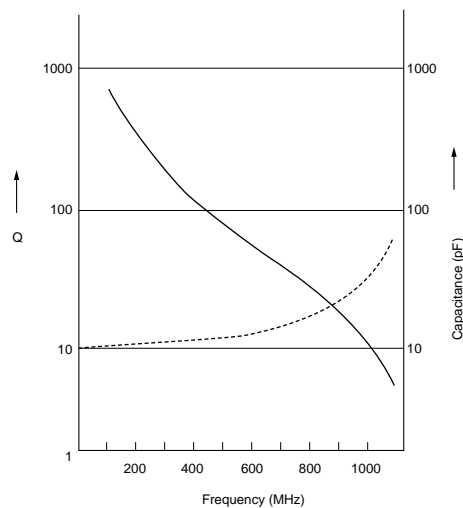
**TZY2Z2R5**

Z2R5



**TZY2Z100**

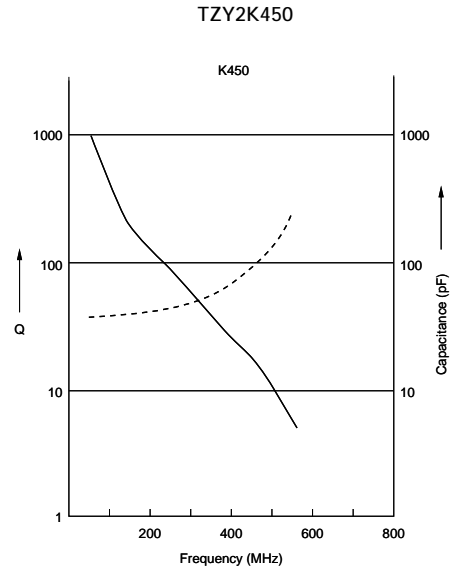
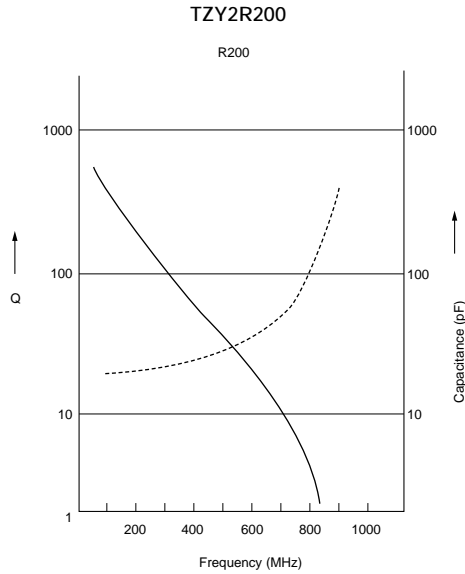
Z100



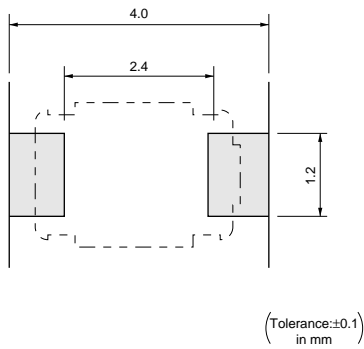
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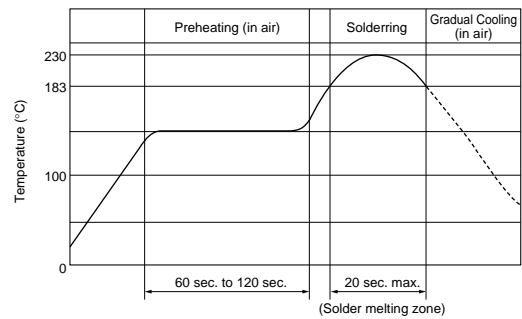
### Frequency Characteristics



### Land Pattern



### Temperature Profile

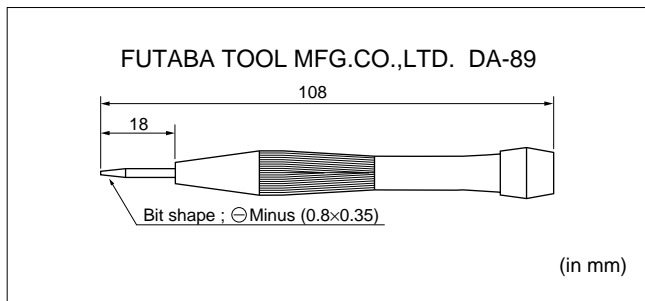


### Screwdriver and Screwdriver Bit

Please use the following recommended screwdriver.  
You can order this driver with below part number.  
Though you can also adjust the capacitance value by commercial products, please use one which has the same head size as the below driver.

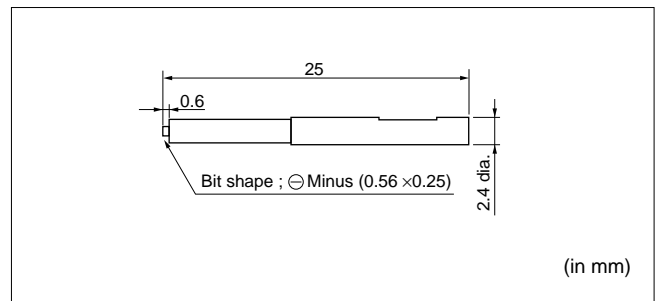
Screwdriver for Manual Adjustment

Murata Part No. : **KMDR060**



Screwdriver Bit for Automatic Adjustment

Murata Part No. : **KMBT060**





■ Notice (Storage and operating condition)

1. Do not use the trimmer capacitor under atmosphere of RTV silicone rubber (Room Temperature Vulcanizing Silicone Rubber) except Acetone liberating silicone sealant.
2. Before using trimmer capacitor, please store under the condition of -10 to +40 C. and 30 to 85%RH.
3. Do not store in or near corrosive gasses.
4. Use within 6 months of delivery.
5. Open the package just before using.
6. Prior to storing previously opened packages, the packaging should be heat-sealed. Avoid using rubber bands for repackage.
7. Do not store under direct sunlight.

8. Do not use the trimmer capacitor under the conditions listed below.
  - (1) Corrosive gasses atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
  - (2) In liquid (Ex. water, oil, medical liquid, organic solvent, etc.)
  - (3) Dusty / dirty atmosphere
  - (4) Direct sunlight
  - (5) Static voltage nor electric/magnetic fields
  - (6) Direct sea breeze
  - (7) Other variations of the above

■ Notice (Soldering)

1. Soldering
  - (1) TZY2 series can be soldered by reflow soldering method and soldering iron. Do not use flow soldering method (dipping).
  - (2) Standard soldering condition
    - (a) Reflow soldering : Refer to the standard temperature profile.
    - (b) Soldering iron:
      - > Temperature of tip 260±10 C.
      - > Soldering time 3 sec. max.
      - > Diameter 1mm max.
      - > Wattage of iron 20W max.

Before using other soldering conditions than those listed above, please consult with Murata factory representative prior to using. If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer capacitor may deviate from the specified characteristics.

  - (3) The amount of solder is critical.
  - (4) The thickness of solder paste should be printed from 120micro m to 170micro m and the dimension of land pattern should be used Murata's standard land pattern at reflow soldering. Insufficient amounts of solder can lead to insufficient soldering strength on PCB. Excessive amounts of solder may cause the bridging between the terminals or the contact failure due to flux wicking up.
  - (5) When using soldering iron, the diameter of the string solder shall be less than 0.5mm. The string solder shall be applied to the lower part of the terminal only and do not apply flux

except the terminals. Excessive amounts of solder and/or applying solder to the upper part of the terminal may cause fixed metal rotor or the contact failure due to flux invasion into the movable part and/or the contact point. The soldering iron should not come in contact with the monolithic stator of the trimmer capacitor. If such contact does occur, the trimmer capacitor may be damaged.

- (6) Our recommendable chlorine content of solder is as follows.
    - (a) Solder paste : 0.2wt% max.
    - (b) String solder : 0.5wt% max.
  - (7) Do not use water-soluble flux (for water cleaning). To prevent the deterioration of trimmer capacitor characteristics, apply flux only to terminals.
2. Mounting
    - (1) Do not apply excessive force (preferable 5.0N (Ref.; 500gf)max.), when the trimmer capacitor is mounted on the PCB.
    - (2) Do not warp and/or bend PCB to prevent trimmer capacitor from breakage.
    - (3) Use the suitable dimension of the pick-up nozzle. (1.8mm external diameter and 1.3mm bore diameter.)
  3. Cleaning
 

Can not be cleaned because of open construction.
  4. Other
 

Note the polarity of the trimmer capacitor to minimize influence by stray capacitance. (Refer to the dimensions concerning the polarity.)

### ■ Notice (Handling)

1. Use suitable screwdrivers that fit comfortably in driver slot.
  - (1) Recommended screwdriver for manual adjustment  
FUTABA : DA-89  
(Murata P/N is KMDR060)
  - (2) Recommended screwdriver bit for automatic adjustment  
MURATA : KMBT060
2. When adjusting with a screwdriver, do not apply

- excessive force(preferable 1.0N(Ref;100gf) max.) to minimize capacitance drift. If excessive force applied to the screwdriver slot, it may cause deformation of the products.
3. Do not apply adhesive, lock paints, or any other substances to the trimmer capacitor to secure the rotor position. They may cause corrosion or electrical contact problems.

### ■ Notice (Other)

1. Before using trimmer capacitor, please test after assembly in your particular mass production system.
2. We have an application manual for trimmer capacitor. (Only for chip type) If you need it, please feel free to contact us.

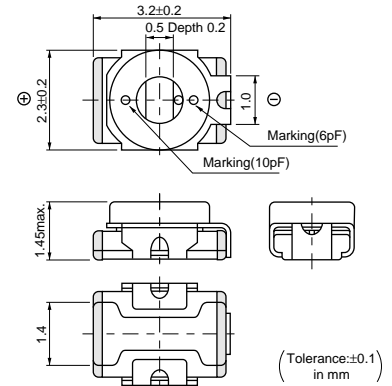
# Ceramic Trimmer Capacitors



## TZV2 Series

### ■ Features

1. Small size with external dimensions of 2.3(W)x3.2(L)x1.45(H)mm.
2. Unique construction with no plastic material provides superior soldering heat resistance to maintain excellent characteristic performance after reflow soldering.
3. Designed for automatic placement in surface mount applications.
4. Funnel shaped metal case enable in-process automatic adjustment.



4

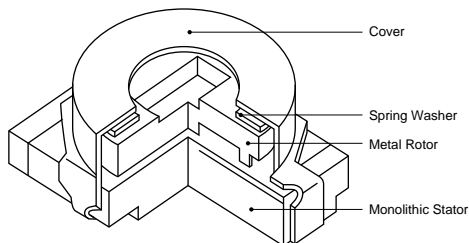
### ■ Applications

- Crystal oscillator
- Crystal filters
- Hand radios
- Cordless telephones
- Cellular telephones
- Tuner packs
- Pagers
- Remote keyless entry systems
- PHS
- Radar detectors
- W-LAN
- Compact radios
- Headphone stereos
- DVD
- Burglarproof devices

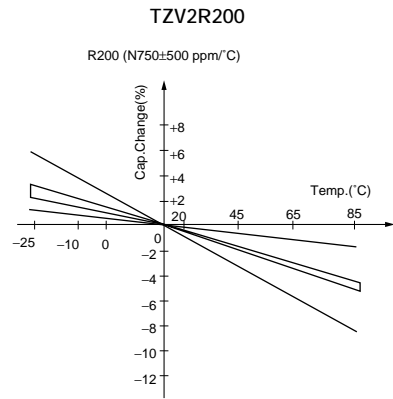
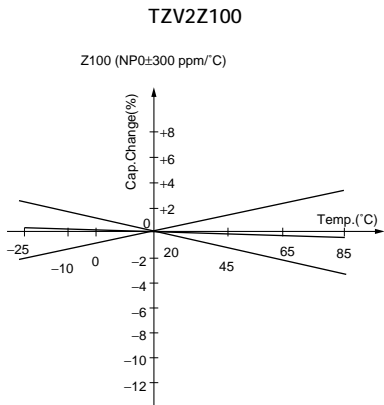
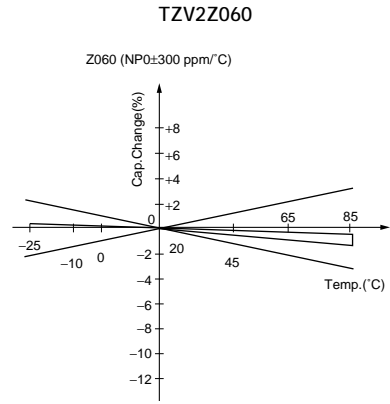
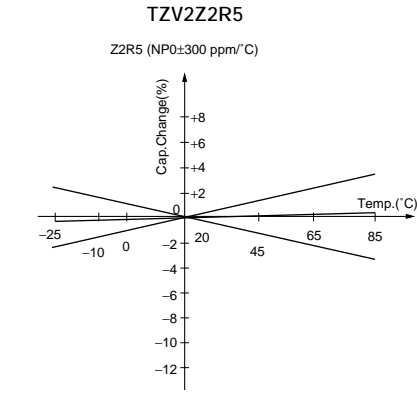
Part Number	Cmin. (pF)	Cmax. (pF)	TC	Q	Rated Voltage	Withstanding Voltage
TZV2Z2R5A110	0.65 max.	2.5 +100/-0%	NP0±300ppm/°C	200min. at 200MHz, Cmax.	25Vdc	55Vdc
TZV2Z030A110	1.5 max.	3.0 +100/-0%	NP0±300ppm/°C	300min. at 1MHz, Cmax.	25Vdc	55Vdc
TZV2Z060A110	2.5 max.	6.0 +100/-0%	NP0±300ppm/°C	500min. at 1MHz, Cmax.	25Vdc	55Vdc
TZV2Z100A110	3.0 max.	10.0 +100/-0%	NP0±300ppm/°C	500min. at 1MHz, Cmax.	25Vdc	55Vdc
TZV2R200A110	4.5 max.	20.0 +100/-0%	N750±500ppm/°C	500min. at 1MHz, Cmax.	25Vdc	55Vdc

Insulation Resistance : 10000M ohm min. Torque : 1.0~10.0mNm Operating Temperature Range : -25~+85°C

### ■ Construction

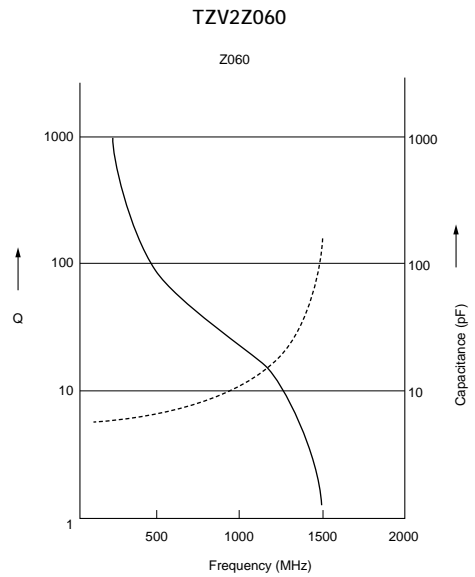
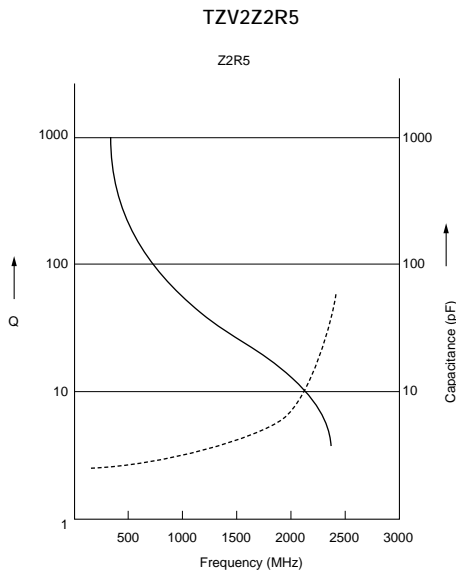


### Temperature Characteristics



4

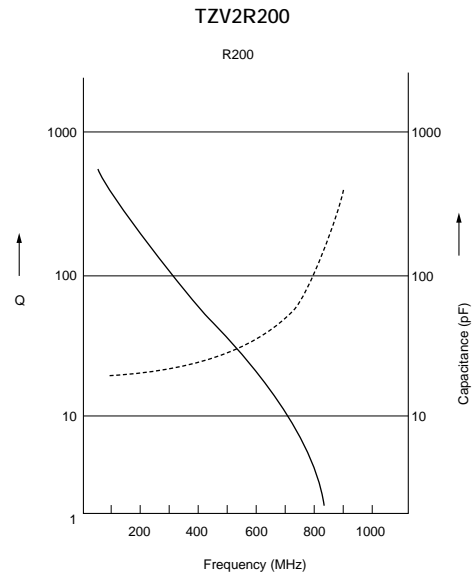
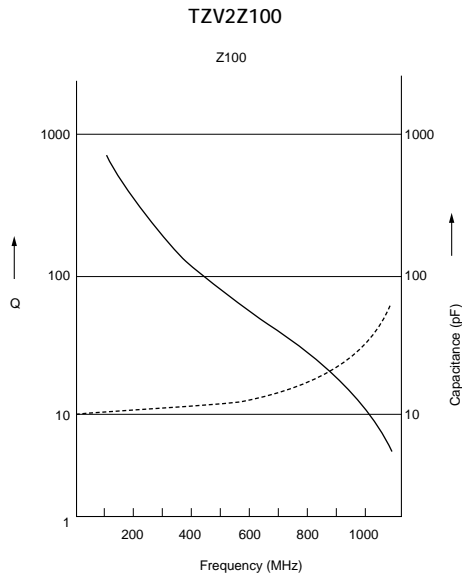
### Frequency Characteristics



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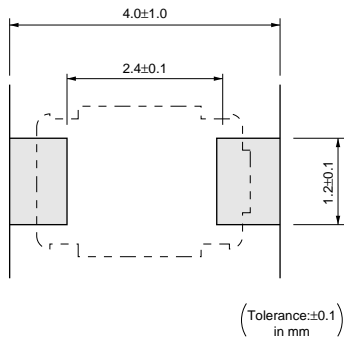
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### Frequency Characteristics

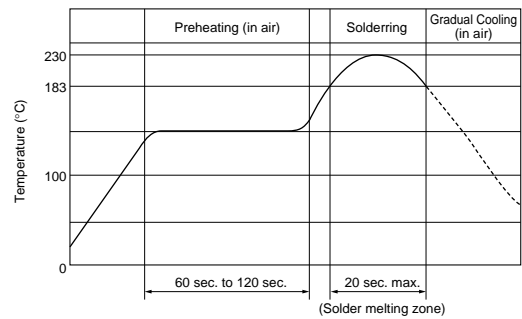


4

### Land Pattern



### Temperature Profile

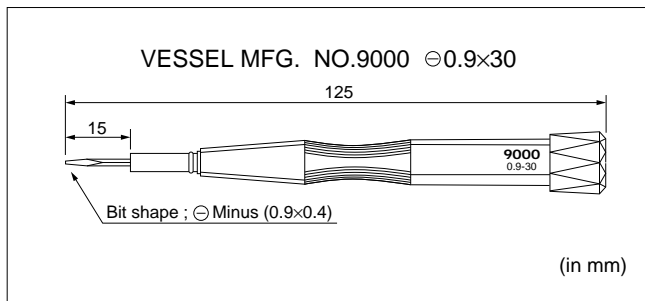


### Screwdriver and Screwdriver Bit

Please use the following recommended screwdriver.  
You can order this driver with below part number.  
Though you can also adjust the capacitance value by commercial products, please use one which has the same head size as the below driver.

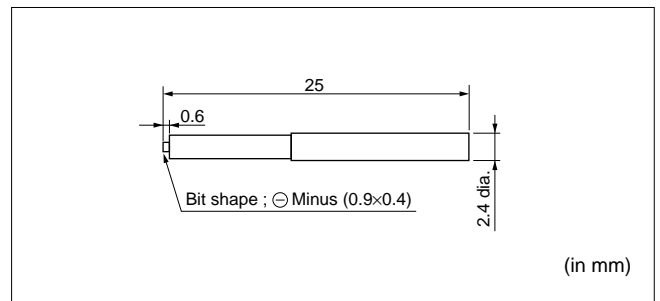
Screwdriver for Manual Adjustment

Murata Part No. : **KMDR020**



Screwdriver Bit for Automatic Adjustment

Murata Part No. : **KMBT020**



### ■ Notice (Storage and operating condition)

1. Do not use the trimmer capacitor under atmosphere of RTV silicone rubber (Room Temperature Vulcanizing Silicone Rubber) except Acetone liberating silicone sealant.
2. Before using trimmer capacitor, please store under the condition of -10 to +40 C. and 30 to 85%RH.
3. Do not store in or near corrosive gasses.
4. Use within 6 months of delivery.
5. Open the package just before using.
6. Prior to storing previously opened packages, the packaging should be heat-sealed. Avoid using rubber bands for repackage.
7. Do not store under direct sunlight.

### ■ Notice (Soldering)

#### 1. Soldering

- (1) TZV2 series can be soldered by reflow soldering method and soldering iron. Do not use flow soldering method (dipping).
- (2) Standard soldering condition
  - (a) Reflow soldering : Refer to the standard temperature profile.
  - (b) Soldering iron:
    - >Temperature of tip 260+-10 C.
    - >Soldering time 3 sec. max.
    - >Diameter 1mm max.
    - >Wattage of iron 20W max.

Before using other soldering conditions than those listed above, please consult with Murata factory representative prior to using. If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer capacitor may deviate from the specified characteristics.

- (3) The amount of solder is critical.
- (4) The thickness of solder paste should be printed from 120micro m to 170micro m and the dimension of land pattern should be used Murata's standard land pattern at reflow soldering. Insufficient amounts of solder can lead to insufficient soldering strength on PCB. Excessive amounts of solder may cause the bridging between the terminals or the contact failure due to flux wicking up.
- (5) When using soldering iron, the diameter of the string solder shall be less than 0.5mm. The string solder shall be applied to the lower part of the terminal only and do not apply flux

8. Do not use the trimmer capacitor under the conditions listed below.
  - (1) Corrosive gasses atmosphere (Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
  - (2) In liquid (Ex. water, oil, medical liquid, organic solvent, etc.)
  - (3) Dusty / dirty atmosphere
  - (4) Direct sunlight
  - (5) Static voltage nor electric/magnetic fields
  - (6) Direct sea breeze
  - (7) Other variations of the above

except the terminals. Excessive amounts of solder and/or applying solder to the upper part of the terminal may cause fixed metal rotor or the contact failure due to flux invasion into the movable part and/or the contact point. The soldering iron should not come in contact with the monolithic stator of the trimmer capacitor. If such contact does occur, the trimmer capacitor may be damaged.

- (6) Our recommendable chlorine content of solder is as follows.
    - (a) Solder paste : 0.2wt% max.
    - (b) String solder : 0.5wt% max.
  - (7) Do not use water-soluble flux (for water cleaning). To prevent the deterioration of trimmer capacitor characteristics, apply flux only to terminals.
- #### 2. Mounting
- (1) Do not apply excessive force (preferable 5.0N (Ref.; 500gf)max.), when the trimmer capacitor is mounted on the PCB.
  - (2) Do not warp and/or bend PCB to prevent trimmer capacitor from breakage.
  - (3) Use the suitable dimension of the pick-up nozzle. (1.8mm external diameter and 1.3mm bore diameter.)
- #### 3. Cleaning
- Can not be cleaned because of open construction.
- #### 4. Other
- Note the polarity of the trimmer capacitor to minimize influence by stray capacitance. (Refer to the dimensions concerning the polarity.)

### ■ Notice (Handling)

1. Use suitable screwdrivers that fit comfortably in driver slot.
  - (1) Recommended screwdriver for manual adjustment  
VESSEL : No.9000-0.9x30  
(Murata P/N : KMDR020)
  - (2) Recommended screwdriver bit for automatic adjustment  
MURATA : KMBT020
2. When adjusting with a screwdriver, do not apply

- excessive force(preferable 1.0N(Ref;100gf) max.) to minimize capacitance drift. If excessive force applied to the screwdriver slot, it may cause deformation of the products.
3. Do not apply adhesive, lock paints, or any other substances to the trimmer capacitor to secure the rotor position. They may cause corrosion or electrical contact problems.

### ■ Notice (Other)

1. Before using trimmer capacitor, please test after assembly in your particular mass production system.
2. We have an application manual for trimmer capacitor. (Only for chip type) If you need it, please feel free to contact us.

# Ceramic Trimmer Capacitors



## TZC3 Series

### ■ Features

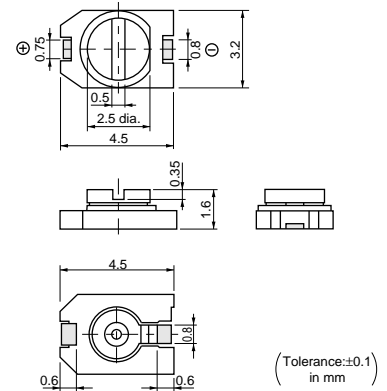
1. Small size with external dimension of 3.2(W)x4.5(L)x1.6(H)mm (Cross slot type : 1.7(H)mm)
2. Color coded stator permits easy identification of capacitance and reduces mounting errors.
3. Can be adjusted with conventional adjustment tools having a thickness of 0.5mm.
4. Available for cross slot type to provide better adjustability.
5. Providing mechanism to prevent air leak offers better mountability with automatic mounter. (Cross slot type)
6. Designed for automatic placement in surface mount applications.
7. Heat resistant resin withstands reflow soldering temperatures.

### ■ Applications

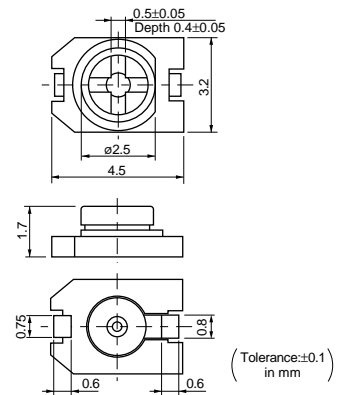
- Compact radios
- Headphone stereos
- Pagers
- Portable radio equipments
- Hybrid ICs
- Cellular telephones
- Cordless telephones
- Remote keyless entry systems



Standard Type



Cross Slot Type

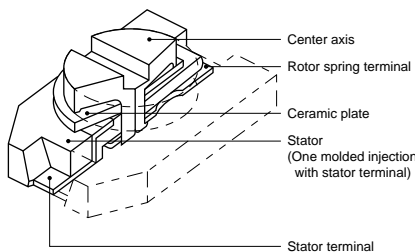


Part Number	Cmin. (pF)	Cmax. (pF)	TC	Q	Rated Voltage	Withstanding Voltage	Stator/Case Color
TZC3Z030A□□□	1.4 max.	3.0 +50/-0%	NP0±300ppm/°C	300min. at 1MHz, Cmax.	100Vdc	220Vdc	Brown
TZC3Z060A□□□	2.0 max.	6.0 +50/-0%	NP0±300ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	Blue
TZC3R100A□□□	3.0 max.	10.0 +50/-0%	N750±300ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	White
TZC3P200A□□□	5.0 max.	20.0 +50/-0%	N1200±500ppm/°C	300min. at 1MHz, Cmax.	100Vdc	220Vdc	Red
TZC3P300A□□□	6.5 max.	30.0 +50/-0%	N1200±500ppm/°C	300min. at 1MHz, Cmax.	100Vdc	220Vdc	Green

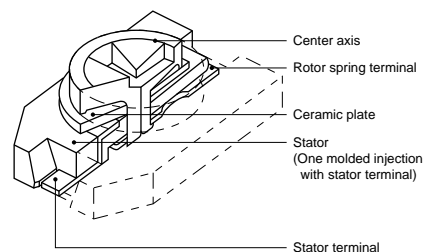
Insulation Resistance : 10000M ohm min. Torque : 1.5~10.0mNm Operating Temperature Range : -25~+85°C  
 The last three digits show the slot type. 110:standard(minus) type, 310:plus type.

### ■ Construction

Standard Type



Cross Slot Type



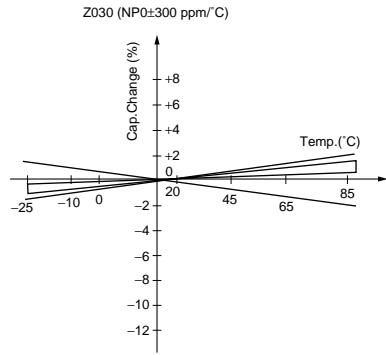
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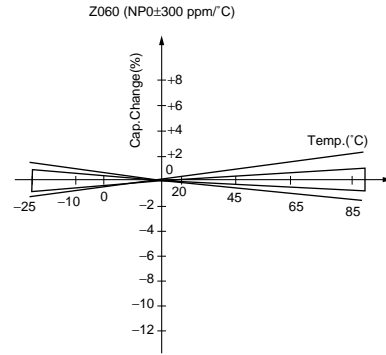
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**Temperature Characteristics**

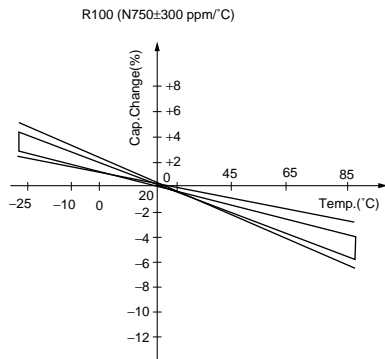
**TZC3Z030**



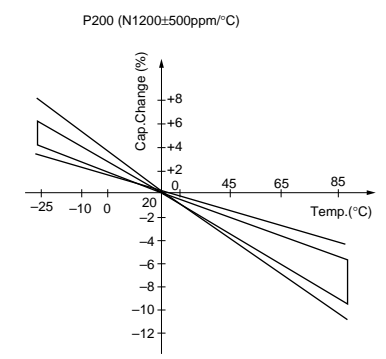
**TZC3Z060**



**TZC3R100**



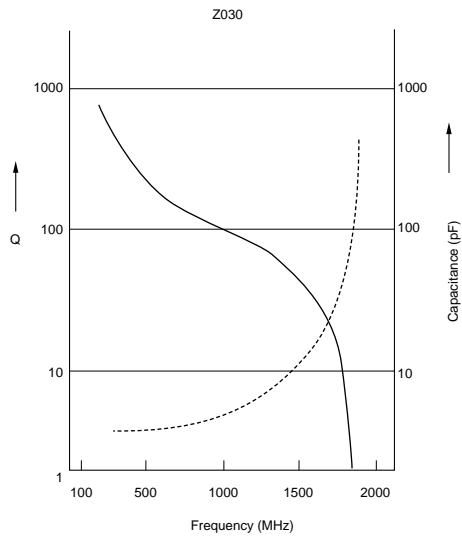
**TZC3P200**



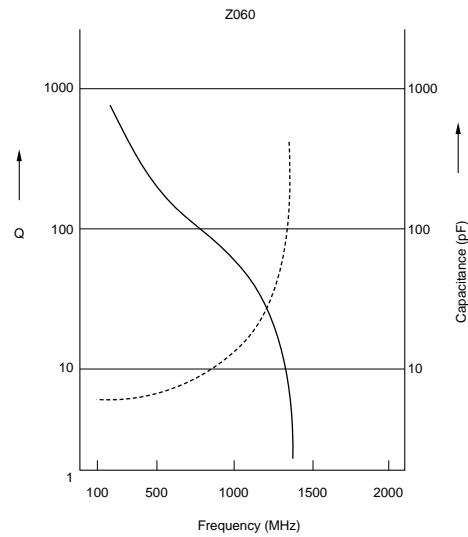
5

**Frequency Characteristics**

**TZC3Z030**



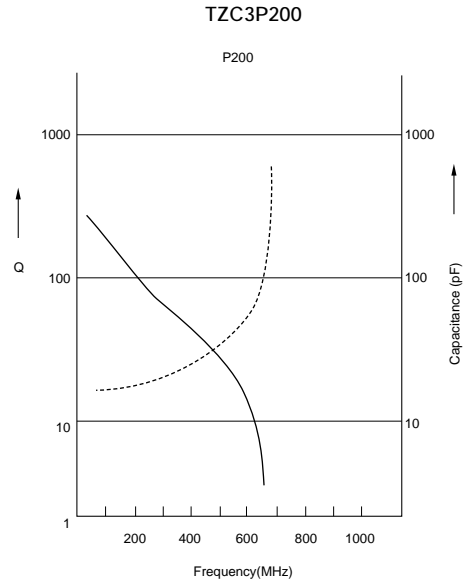
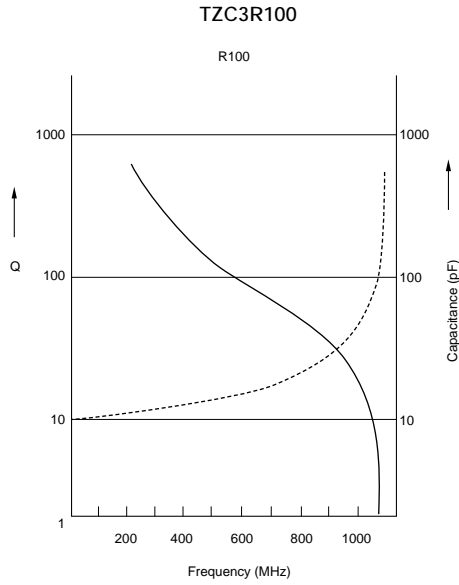
**TZC3Z060**



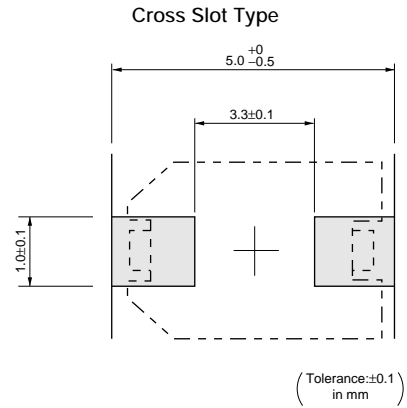
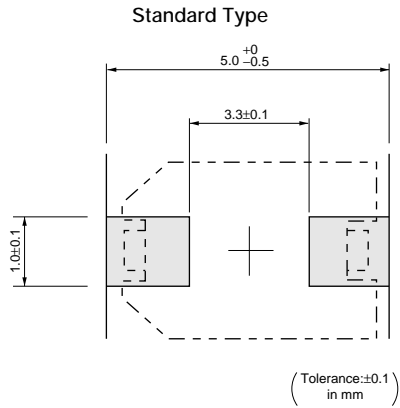
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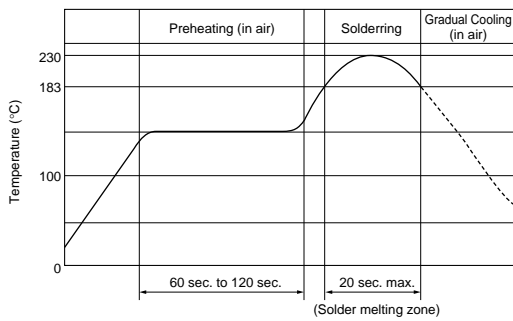
### Frequency Characteristics




### Land Pattern



### Temperature Profile



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**Standard Type Screwdriver and Screwdriver Bit**

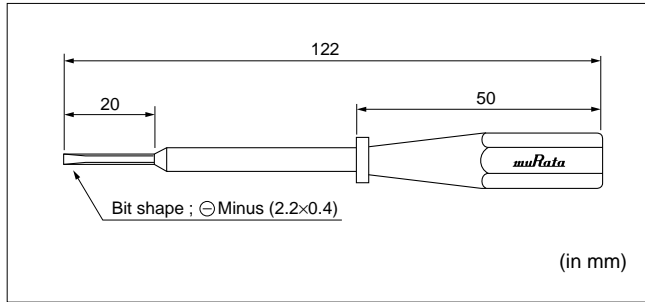
Please use the following recommended screwdriver.

You can order this driver with below part number.

Though you can also adjust the capacitance value by commercial products, please use one which has the same head size as the below driver.

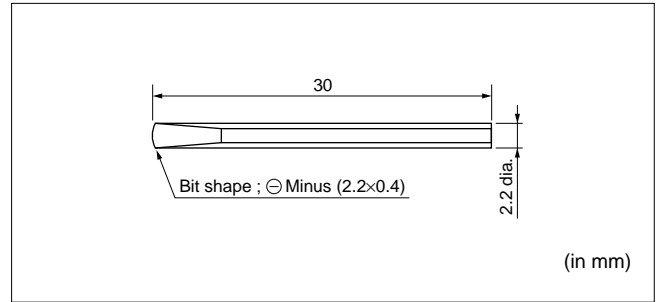
**Screwdriver for Manual Adjustment**

Murata Part No. : **KMDR010**



**Screwdriver Bit for Automatic Adjustment**

Murata Part No. : **KMBT010**



**Cross Slot Type Screwdriver and Screwdriver Bit**

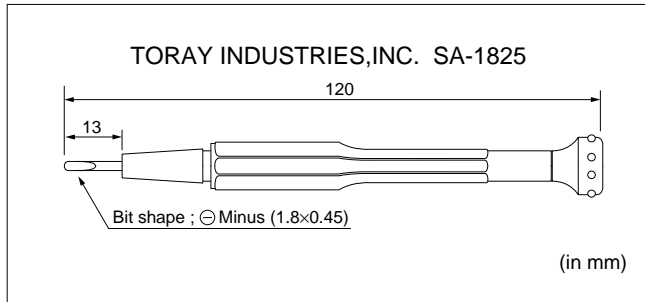
Please use the following recommended screwdriver.

You can order this driver with below part number.

Though you can also adjust the capacitance value by commercial products, please use one which has the same head size as the below driver.

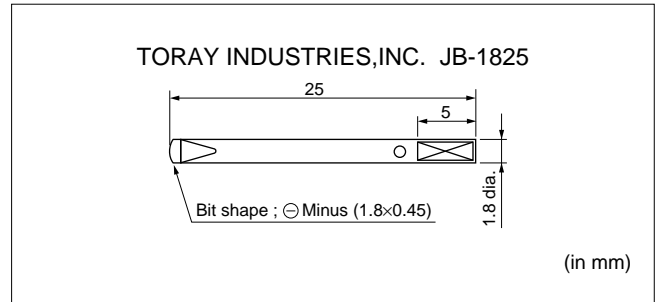
**Screwdriver for Manual Adjustment**

Murata Part No. : **KMDR040**



**Screwdriver Bit for Automatic Adjustment**

Murata Part No. : **KMBT040**



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**Notice (Storage and operating condition)**

1. Do not use the trimmer capacitor under atmosphere of RTV silicone rubber (Room Temperature Vulcanizing Silicone Rubber) except Acetone liberating silicone sealant.
2. Before using trimmer capacitor, please store under the condition of -10 to +40 C. and 30 to 85%RH.
3. Do not store in or near corrosive gasses.
4. Use within 6 months of delivery.
5. Open the package just before using.
6. Prior to storing previously opened packages, the packaging should be heat-sealed. Avoid using rubber bands for repackage.
7. Do not store under direct sunlight.

8. Do not use the trimmer capacitor under the conditions listed below.
  - (1) Corrosive gasses atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
  - (2) In liquid (Ex. water, oil, medical liquid, organic solvent, etc.)
  - (3) Dusty / dirty atmosphere
  - (4) Direct sunlight
  - (5) Static voltage nor electric/magnetic fields
  - (6) Direct sea breeze
  - (7) Other variations of the above

■ Notice (Soldering)

1. Soldering

- (1) TZC3 series can be soldered by reflow soldering method and soldering iron. Do not use flow soldering method (dipping).
- (2) Standard soldering condition
  - (a) Reflow soldering : Refer to the standard temperature profile.
  - (b) Soldering iron:
    - > Temperature of tip 260+-10 C.
    - > Soldering time 3 sec. max.
    - > Diameter 1mm max.
    - > Wattage of iron 20W max.

Before using other soldering conditions than those listed above, please consult with Murata factory representative prior to using. If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer capacitor may deviate from the specified characteristics.

- (3) The amount of solder is critical.
- (4) The thickness of solder paste should be printed from 150micro m to 200micro m and the dimension of land pattern should be used Murata's standard land pattern at reflow soldering. Insufficient amounts of solder can lead to insufficient soldering strength on PCB. Excessive amounts of solder may cause the bridging between the terminals or the contact failure due to flux wicking up.
- (5) When using soldering iron, the diameter of the string solder shall be less than 0.5mm. The string solder shall be applied to the lower part of the terminal only and do not apply flux except the terminals. Excessive amounts of solder and/or applying solder to the upper part

of the terminal may cause fixed metal rotor or the contact failure due to flux invasion into the movable part and/or the contact point. The soldering iron should not come in contact with the stator of the trimmer capacitor. If such contact does occur, the trimmer capacitor may be damaged.

- (6) Our recommendable chlorine content of solder is as follows.
  - (a) Solder paste : 0.2wt% max.
  - (b) String solder : 0.5wt% max.
- (7) Do not use water-soluble flux (for water cleaning). To prevent the deterioration of trimmer capacitor characteristics, apply flux only to terminals.
- (8) When soldering the TZC3 series, the solder should not flow into the staking part of the substrate. If such flow does occur, driver slot rotation will be damaged.

2. Mounting

- (1) Do not apply excessive force (preferable 5.0N (Ref.; 500gf)max.), when the trimmer capacitor is mounted on the PCB.
- (2) Do not warp and/or bend PCB to prevent trimmer capacitor from breakage.
- (3) Use the suitable dimension of the pick-up nozzle. (2.5mm external diameter and 1.5mm bore diameter.)

3. Cleaning

Can not be cleaned because of open construction.

4. Other

Note the polarity of the trimmer capacitor to minimize influence by stray capacitance. (Refer to the dimensions concerning the polarity.)

■ Notice (Handling)

1. Use suitable screwdrivers that fit comfortably in driver slot.

- (1) Recommended screwdriver for manual adjustment
  - Standard type --> MURATA : KMDR010
  - Cross slot type --> TORAY : SA-1825  
(Murata P/N is KMDR040)
- (2) Recommended screwdriver bit for automatic adjustment
  - Standard type --> MURATA : KMBT010
  - Cross slot type --> TORAY : JB-1825

(Murata P/N is KMBT040)

- 2. When adjusting with a screwdriver, do not apply excessive force(preferable 1.0N(Ref;100gf) max.) to minimize capacitance drift. If excessive force applied to the screwdriver slot, it may cause deformation of the products.
- 3. Do not apply adhesive, lock paints, or any other substances to the trimmer capacitor to secure the rotor position. They may cause corrosion or electrical contact problems.

■ Notice (Other)

- 1. Before using trimmer capacitor, please test after assembly in your particular mass production system.
- 2. We have an application manual for trimmer capacitor. (Only for chip type) If you need it, please feel free to contact us.

# Ceramic Trimmer Capacitors



## TZB4 Series

### ■ Features

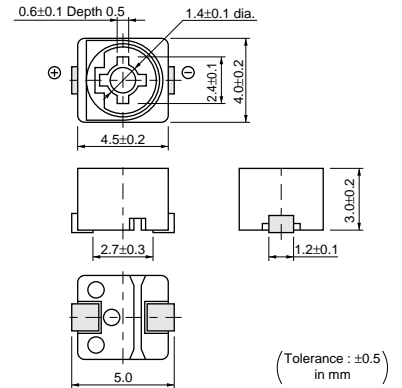
1. Miniature rectangular shape :  
4.0(W)x4.5(L)x3.0(H)mm.
2. Color coded case facilitates identification of capacitance range.
3. Designed for automatic placement in surface mount applications.
4. Designed to withstand flux baths and solder baths.  
(with cover film type)
5. Can be temporarily attached to PCB with adhesives.  
(Terminal style A and B)
6. Can be reflow and flow(with cover film type) soldering method.
7. Stable characteristics over a wide frequency range.  
(Resonant frequency : 1000 MHz min. / 6pF)

### ■ Applications

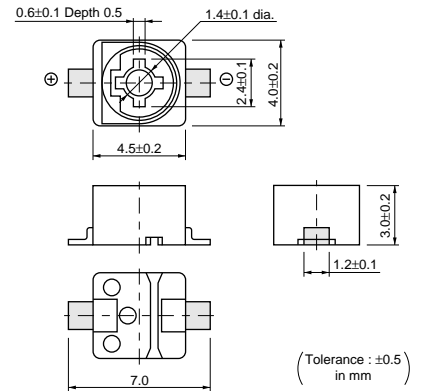
- Car audio systems
- Hybrid ICs
- Remote keyless entry systems
- Tuner packs
- DVD
- Cordless telephones
- Pagers
- Surveillance cameras
- Burglarproof devices



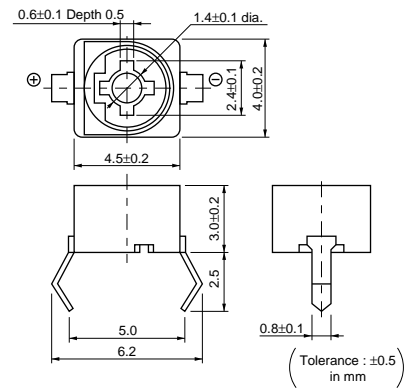
A Type



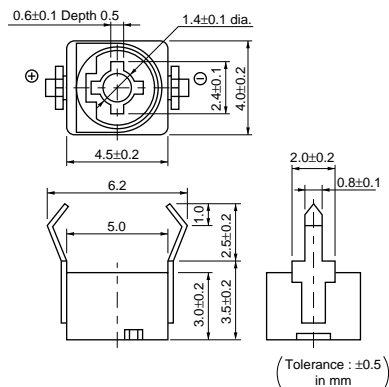
B Type



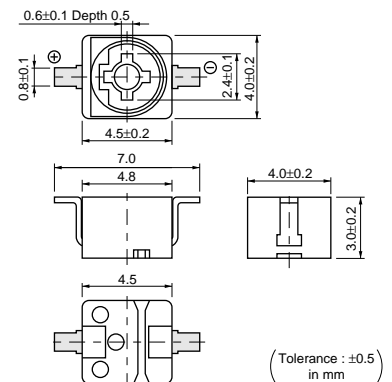
C Type



D Type



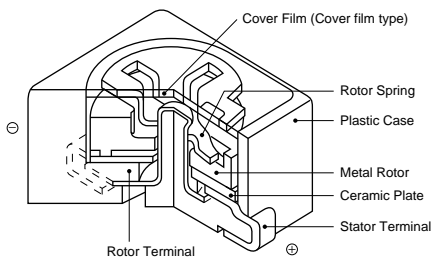
E Type



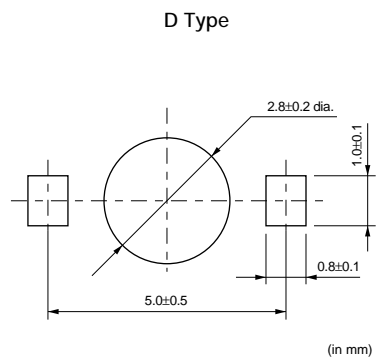
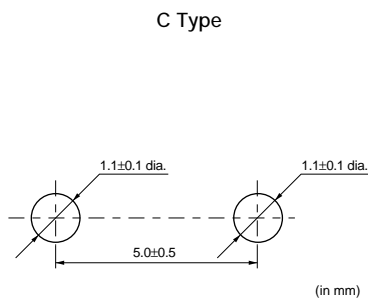
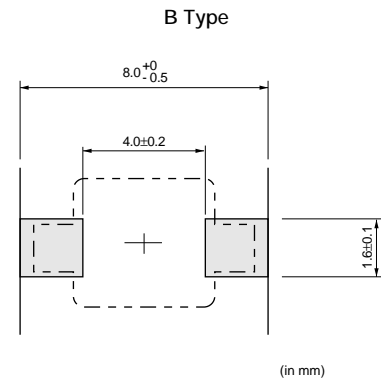
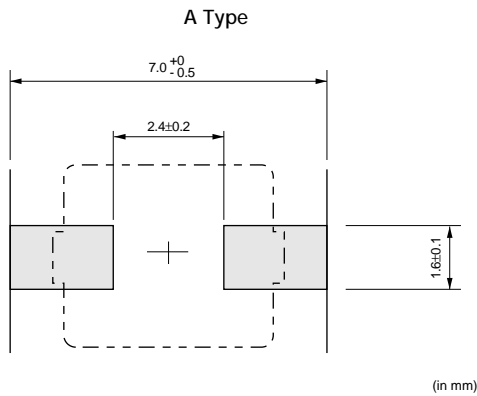
Part Number	Cmin. (pF)	Cmax. (pF)	TC	Q	Rated Voltage	Withstanding Voltage	Stator/Case Color
TZB4Z030□□10	1.4 max.	3.0 +50/-0%	NP0±200ppm/°C	300min. at 1MHz, Cmax	100Vdc	220Vdc	Brown
TZB4Z060□□10	2.0 max.	6.0 +50/-0%	NP0±200ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	Blue
TZB4Z100□□10	3.0 max.	10.0 +50/-0%	NP0±300ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	White
TZB4R200□□10	4.5 max.	20.0 +50/-0%	N750±300ppm/°C	500min. at 1MHz, Cmax	100Vdc	220Vdc	Red
TZB4P300□□10	6.5 max.	30.0 +50/-0%	N1200±500ppm/°C	300min. at 1MHz, Cmax	100Vdc	220Vdc	Green
TZB4P400□□10	8.5 max.	40.0 +50/-0%	N1200±500ppm/°C	300min. at 1MHz, Cmax	100Vdc	220Vdc	Yellow
TZB4Z250□□10	4.0 max.	25.0 +100/-0%	NP0±300ppm/°C	300min. at 1MHz, Cmax.	50Vdc	110Vdc	Black+Marking
TZB4R500□□10	7.0 max.	50.0 +100/-0%	N750±300ppm/°C	300min. at 1MHz, Cmax	50Vdc	110Vdc	Black+Marking

Insulation Resistance : 10000M ohm min. Torque : 1.5~10.0mNm Operating Temperature Range : -25~+85°C  
 Two blank columns are terminal type codes and filled with cover film codes (A: not provided, B: provided).

Construction



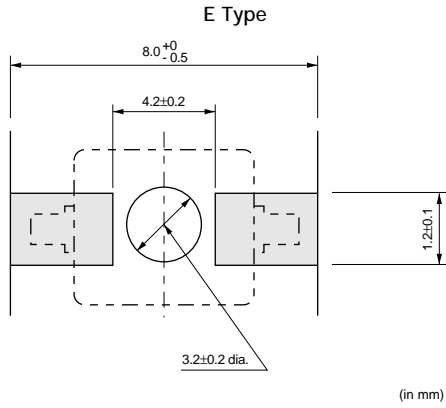
Land Pattern/Mounting Holes



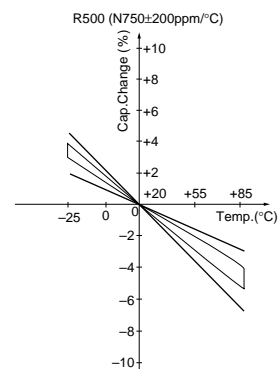
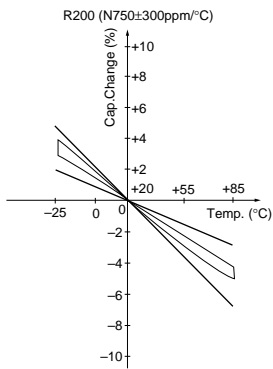
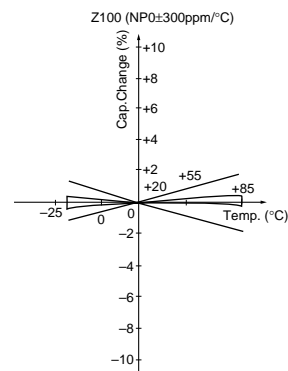
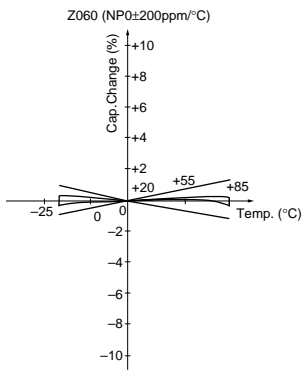
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### Land Pattern/Mounting Holes



### Temperature Characteristics

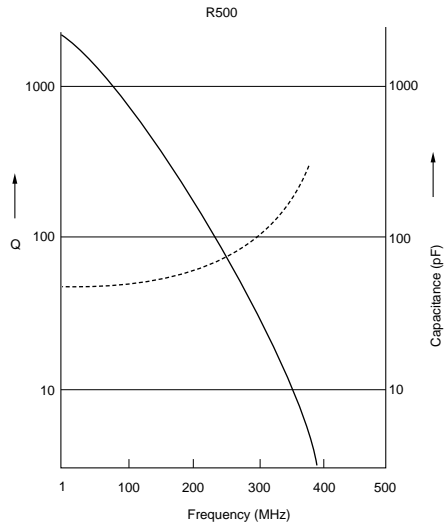
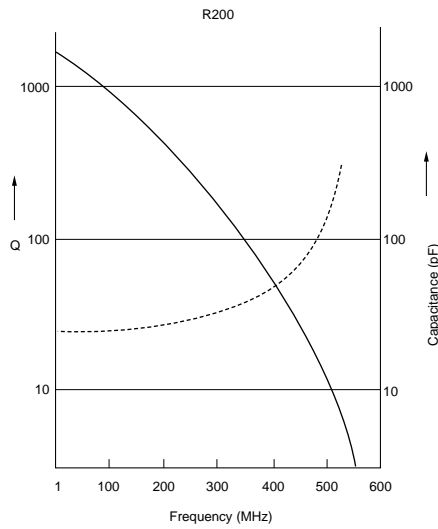
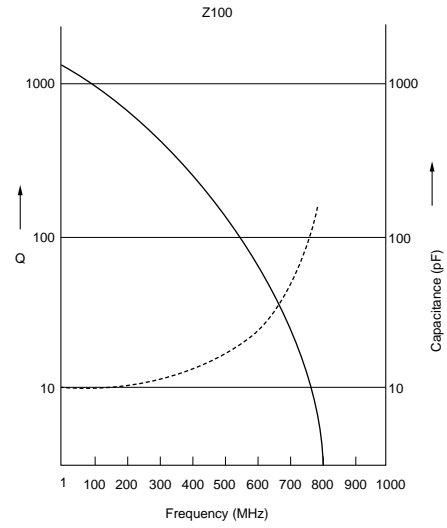
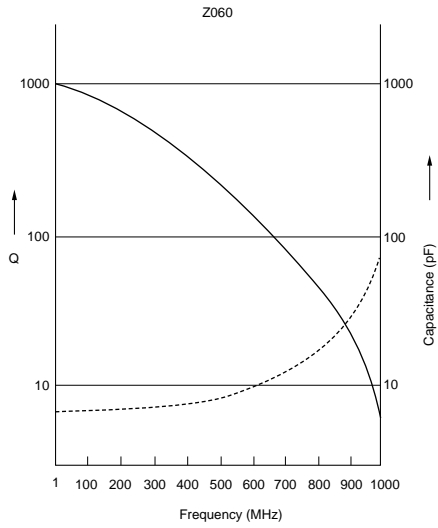


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6

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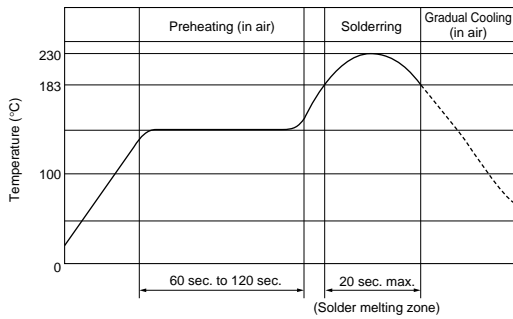
## Frequency Characteristics



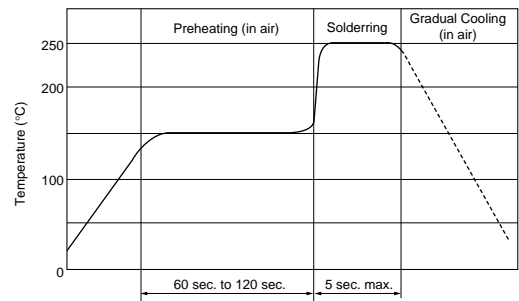
6

## Temperature Profile

Reflow




Flow



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**■ Screwdriver and Screwdriver Bit**

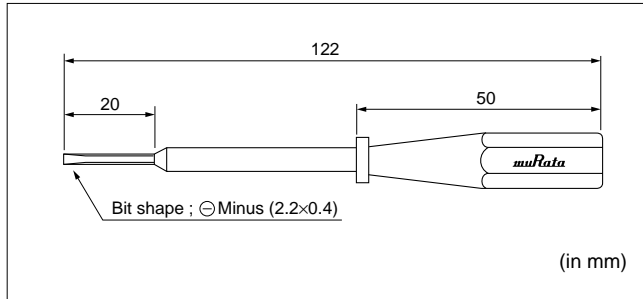
Please use the following recommended screwdriver.

You can order this driver with below part number.

Though you can also adjust the capacitance value by commercial products, please use one which has the same head size as the below driver.

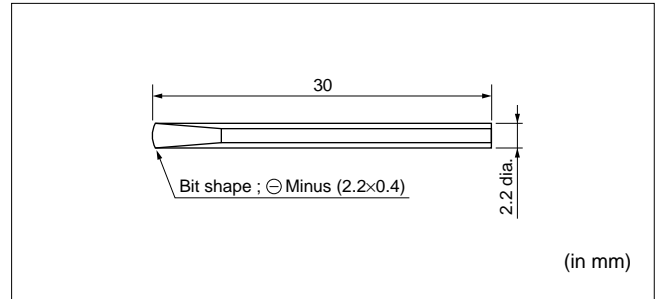
**Screwdriver for Manual Adjustment**

Murata Part No. : **KMDR010**



**Screwdriver Bit for Automatic Adjustment**

Murata Part No. : **KMBT010**



**■ Notice (Storage and operating condition)**

1. Do not use the trimmer capacitor under atmosphere of RTV silicone rubber (Room Temperature Vulcanizing Silicone Rubber) except Acetone liberating silicone sealant.
2. Before using trimmer capacitor, please store under the condition of -10 to +40 C. and 30 to 85%RH.
3. Do not store in or near corrosive gasses.
4. Use within 6 months of delivery.
5. Open the package just before using.
6. Prior to storing previously opened packages, the packaging should be heat-sealed. Avoid using rubber bands for repackaging.
7. Do not store under direct sunlight.

8. Do not use the trimmer capacitor under the conditions listed below.
  - (1) Corrosive gasses atmosphere (Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
  - (2) In liquid (Ex. water, oil, medical liquid, organic solvent, etc.)
  - (3) Dusty / dirty atmosphere
  - (4) Direct sunlight
  - (5) Static voltage nor electric/magnetic fields
  - (6) Direct sea breeze
  - (7) Other variations of the above

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**■ Notice (Soldering)**


1. Soldering

- (1) Can be soldered by reflow soldering method, flow soldering method, and soldering iron.
- (2) Standard soldering condition
  - (a) Reflow soldering : Refer to the standard temperature profile.
    - \*Available for terminal shape A, B, and E.
  - (b) Flow soldering : Refer to the standard temperature profile.
    - > Immerse the body in solder bath
      - Available for cover film type
    - > Only immerse the terminal in solder bath
      - Available for terminal shape C and D.
  - (c) Soldering iron:
    - > Temperature of tip 260±10 C.
    - > Soldering time 3 sec. max.
    - > Diameter 3mm max.
    - > Wattage of iron 30W max.

Before using other soldering conditions than those listed above, please consult with Murata factory representative prior to using. If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer capacitor

- may deviate from the specified characteristics.
- (3) The amount of solder is critical.
- (4) The thickness of solder paste should be printed from 200micro m to 250micro m and the dimension of land pattern should be used Murata's standard land pattern at reflow soldering. Insufficient amounts of solder can lead to insufficient soldering strength on PCB. Excessive amounts of solder may cause the bridging between the terminals or the contact failure due to flux wicking up.
- (5) When using soldering iron, the string solder shall be applied to the lower part of the terminal only and do not apply flux except the terminals. Excessive amounts of solder and/or applying solder to the upper part of the terminal may cause fixed rotor or the contact failure due to flux invasion into the movable part and/or the contact point. The soldering iron should not come in contact with the plastic case of the trimmer capacitor. If such contact does occur, the trimmer capacitor may be damaged.
- (6) Our recommendable chlorine content of solder is

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as follows.

- (a) Solder paste : 0.2wt% max.
- (b) String solder : 0.5wt% max.

(7) Do not use water-soluble flux (for water cleaning).  
To prevent the deterioration of trimmer capacitor characteristics, apply flux only to terminals.

## 2. Mounting

- (1) Do not apply excessive force (preferable 5.0N (Ref.; 500gf)max.), when the trimmer capacitor is mounted on the PCB.
- (2) Do not warp and/or bend PCB to prevent trimmer capacitor from breakage.
- (3) Use the suitable PCB holes which are the same pitch as the terminal of the trimmer capacitor. If it would not fit with the terminal, the excessive stress would be applied to the terminal and the trimmer capacitor may deviate from the specified characteristics.(Terminal shape C and D.)
- (4) Do not apply bending stress more than 10.0N (Ref.; 1kgf) after the trimmer capacitor has been mounted on the PCB.(Terminal shape C and D.)
- (5) Mount trimmer capacitor in contact with PCB. (Terminal shape C and D.)
- (6) In case of bending the terminals, do not apply excessive force to the body of the product and prevent the terminal fixing part from damaging.
- (7) Use the suitable dimension of the pick-up nozzle.
  - > Without cover film type
    - External dimensions of 4.5x4.0mm and 2.5mm bore diameter.

- > With cover film type
  - 4.0mm external diameter and 2.0mm bore diameter.

## 3. Cleaning [with cover film type]

- (1) Isopropyl alcohol and Ethyl alcohol are available material for cleaning. Water group material like Pinealpha, Cleanthru can not be used. For other materials, please consult with Murata factory representative prior to using.
- (2) The total cleaning time by dipping, vapor and ultra-sonic method shall be less than 2 minutes. For ultra-sonic cleaning, the available condition is as follows.
  - > Cleaning time : 1 min. max.
  - > Power : 20W/liter max.
  - > Frequency : 20 - 60kHz
  - > Temperature : Ambient temperature

Due to the ultra-sonic cleaning equipment peculiar self resonance point and the cleaning compatibility usually depends on the jig construction and/or the cleaning condition such as the depth of immersion, please check the cleaning equipment to determine the suitable conditions. If the trimmer capacitor is cleaned by other conditions, the trimmer capacitor may deviate from the specified characteristics.

## 4. Other

Note the polarity of the trimmer capacitor to minimize influence by stray capacitance. (Refer to the dimensions concerning the polarity.)

## ■ Notice (Handling)

- 1. Use suitable screwdrivers that fit comfortably in driver slot.
  - (1) Recommended screwdriver for manual adjustment  
MURATA : KMDR010
  - (2) Recommended screwdriver bit for automatic adjustment  
MURATA : KMBT010
- 2. When adjusting with a screwdriver, do not apply excessive force(preferable 1.0N(Ref;100gf) max.) to minimize capacitance drift. If excessive force applied to the screwdriver slot, it may cause deformation of the products.

- 3. Do not apply adhesive, lock paints, or any other substances to the trimmer capacitor to secure the rotor position. They may cause corrosion or electrical contact problems.
- 4. Do not break the cover film before the completion of PCB mounting, soldering, and cleaning.
- 5. Do not clean the trimmer capacitor after the cover film has been broken.
- 6. To break the cover film, first turn the screwdriver more than 45deg., the set the capacitance value. (Only inserting the screwdriver cannot break the cover film.)

## ■ Notice (Other)

- 1. Before using trimmer capacitor, please test after assembly in your particular mass production system.
- 2. We have an application manual for trimmer capacitor. (Only for chip type) If you need it, please feel free to contact us.

# Ceramic Trimmer Capacitors



## TZ03 Series

### ■ Features

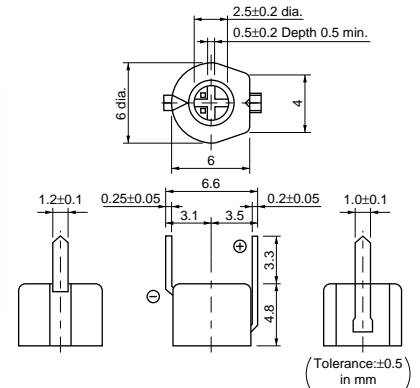
1. Color coded case facilitates identification of capacitance range.
2. Sealed construction prevents the penetration of flux and dust.
3. Available in three adjustment styles : Top/Rear/Side.
4. Available in both tape and reel and magazine packaging for automatic insertion.
5. +(Cross-shaped) slot enables automatic adjustment.

### ■ Applications

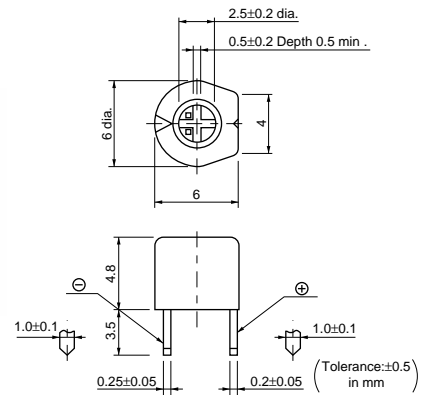
- Car audio systems
- Car clocks
- Stereos
- Radio cassette tape recorders
- Cordless telephones
- Video games
- Compact radio equipments
- Remote keyless entry systems
- Burglarproof devices



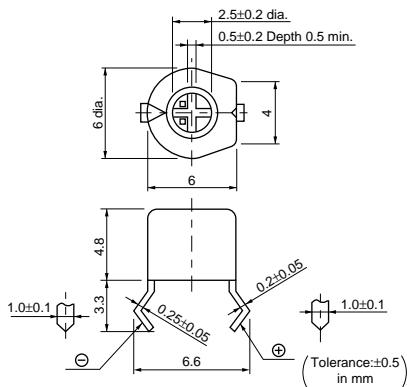
B Type



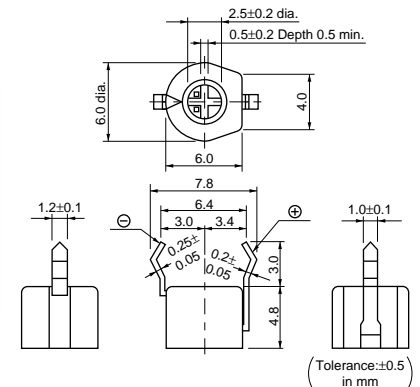
E Type



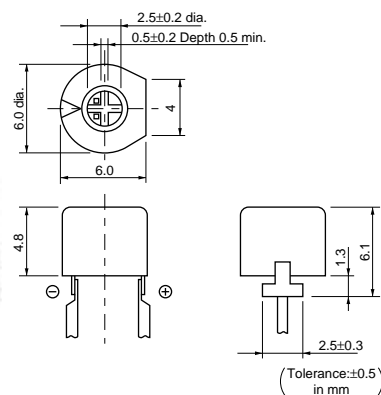
F Type



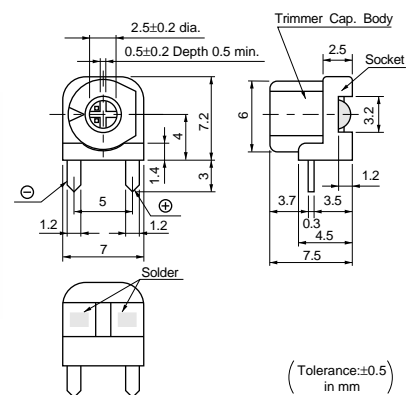
N Type



T Type



Y Type

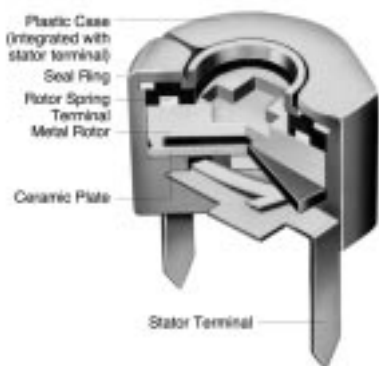


7

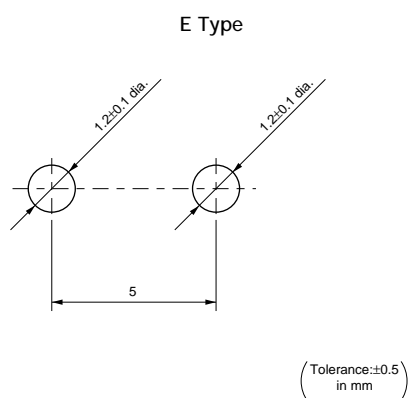
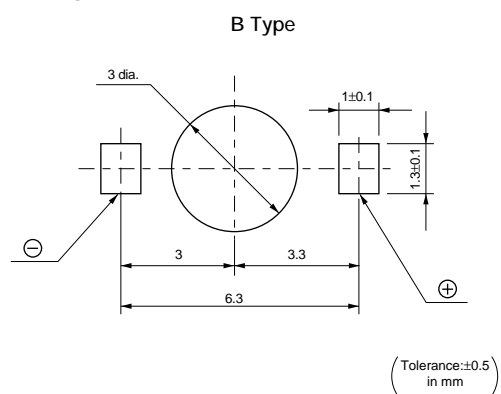
Part Number	Cmin. (pF)	Cmax. (pF)	TC	Q	Rated Voltage	Withstanding Voltage	Stator/Case Color
TZ03Z2R3□169	1.25 max.	2.3 +50/-0%	NP0±200ppm/°C	300min. at 1MHz, Cmax.	100Vdc	220Vdc	Black
TZ03Z050□169	1.5 max.	5.0 +50/-0%	NP0±200ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	Blue
TZ03Z070□169	2.0 max.	7.0 +50/-0%	NP0±200ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	Blue
TZ03N100□169	2.1 max.	10.0 +50/-0%	N200±200ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	White
TZ03Z100□169	2.7 max.	10.0 +50/-0%	NP0±200ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	Blue
TZ03T110□169	3.0 max.	11.0 +50/-0%	N450±300ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	White
TZ03R200□169	4.2 max.	20.0 +50/-0%	N750±300ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	Red
TZ03T200□169	4.2 max.	20.0 +50/-0%	N450±300ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	Pink
TZ03R300□169	5.2 max.	30.0 +50/-0%	N750±300ppm/°C	500min. at 1MHz, Cmax.	100Vdc	220Vdc	Green
TZ03P450□169	6.8 max.	45.0 +50/-0%	N1200±500ppm/°C	300min. at 1MHz, Cmax.	100Vdc	220Vdc	Yellow
TZ03P600□169	9.8 max.	60.0 +50/-0%	N1200±500ppm/°C	300min. at 1MHz, Cmax.	100Vdc	220Vdc	Brown
TZ03Z500□169	6.0 max.	50.0 +100/-0%	NP0±300ppm/°C	300min. at 1MHz, Cmax.	50Vdc	110Vdc	Orange
TZ03R900□169	9.0 max.	90.0 +100/-0%	N750±300ppm/°C	300min. at 1MHz, Cmax.	50Vdc	110Vdc	Black+Dot
TZ03R121□169	10.0 max.	120.0 +100/-0%	N750±300ppm/°C	300min. at 1MHz, Cmax.	50Vdc	110Vdc	Black

Insulation Resistance : 10000M ohm min. Torque : 2.0~15.0mNm Operating Temperature Range : -25~+85°C  
 A blank column is filled with terminal type codes.

### Construction



### Mounting Holes

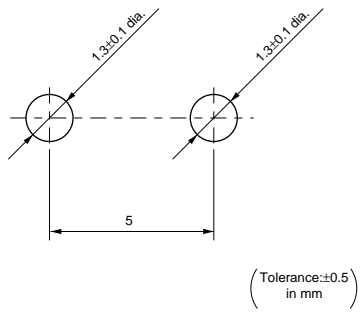


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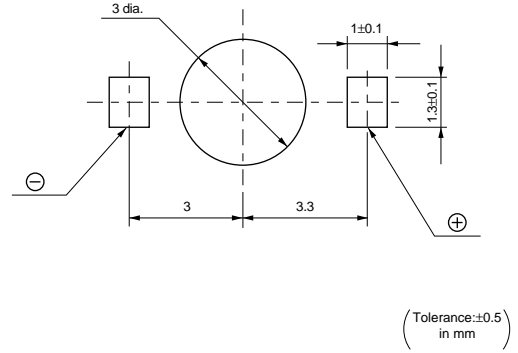
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### Mounting Holes

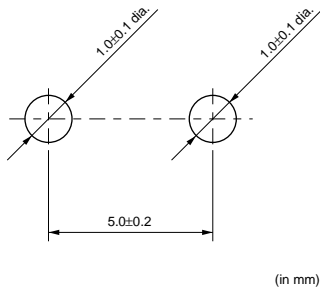
F Type



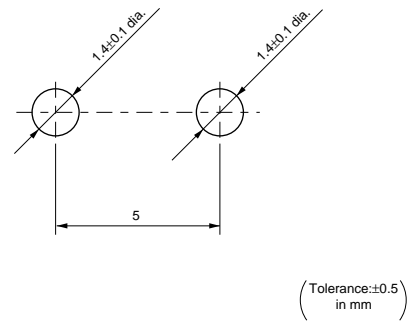
N Type



T Type

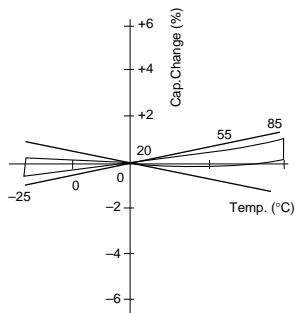


Y Type

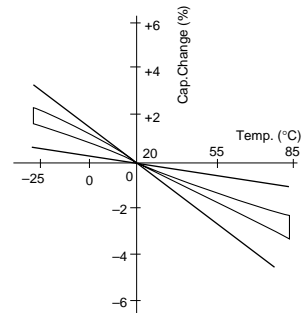


### Temperature Characteristics

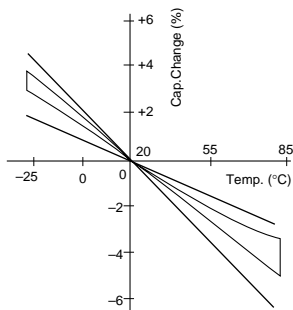
Z070 (NP0±200ppm/°C)



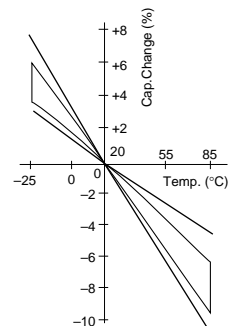
T110 (N450±300ppm/°C)



R200 (N750±300ppm/°C)



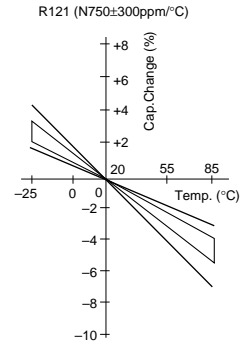
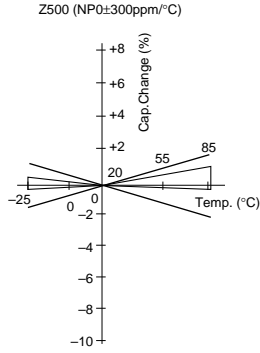
P600 (N1200±500ppm/°C)



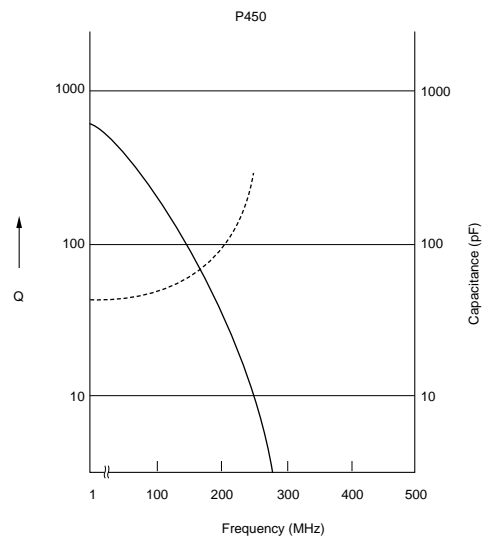
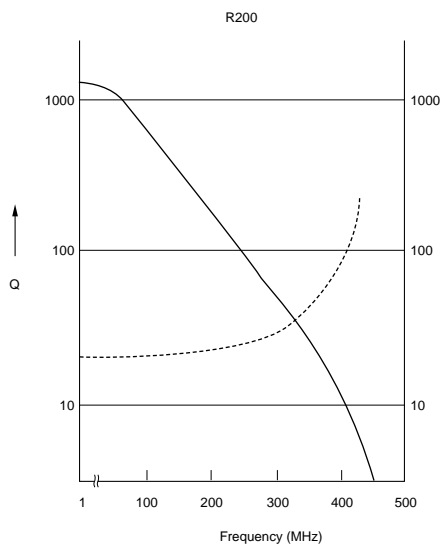
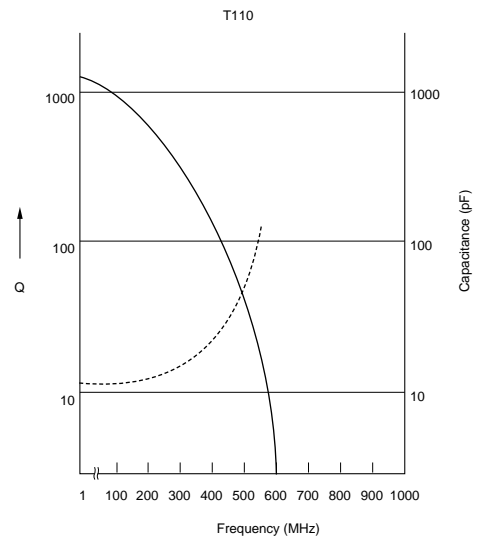
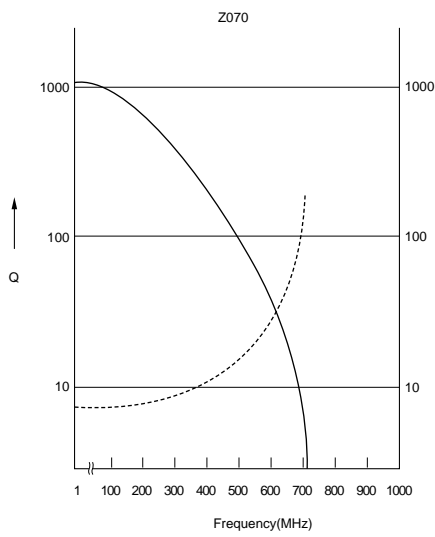
7

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### Temperature Characteristics



### Frequency Characteristics

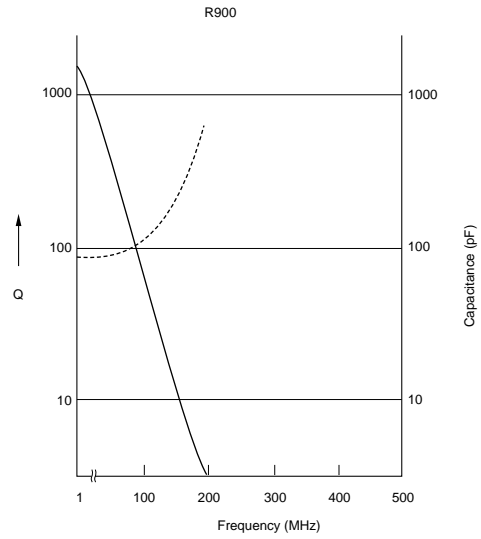
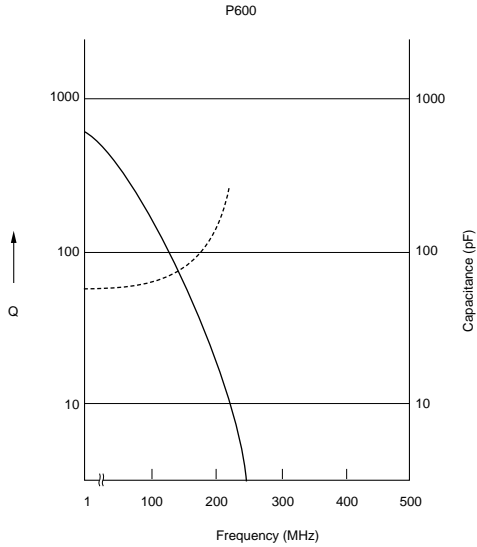


7

Continued on the following page.

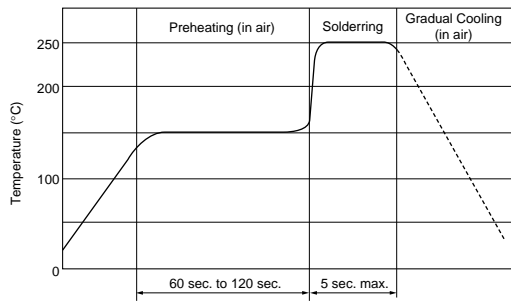
Continued from the preceding page.

### Frequency Characteristics



### Temperature Profile

Flow

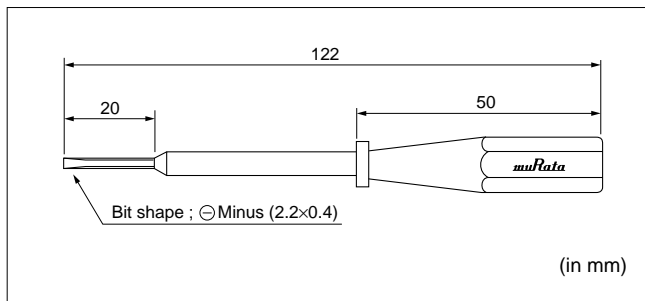


### Screwdriver and Screwdriver Bit

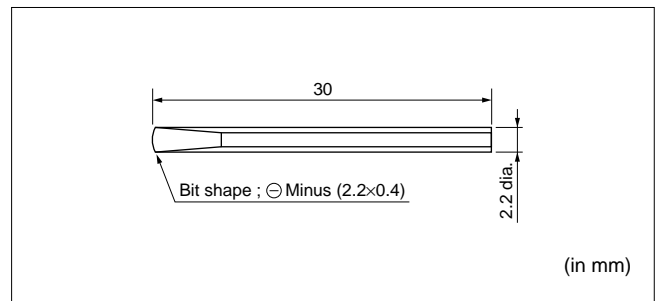
Please use the following recommended screwdriver. You can order this driver with below part number. Though you can also adjust the capacitance value by commercial products, please use one which has the same head size as the below driver.

7

Screwdriver for Manual Adjustment  
Murata Part No. : **KMDR010**



Screwdriver Bit for Automatic Adjustment  
Murata Part No. : **KMBT010**



■ Notice (Storage and operating condition)

1. Do not use the trimmer capacitor under atmosphere of RTV silicone rubber (Room Temperature Vulcanizing Silicone Rubber) except Acetone liberating silicone sealant.
2. Before using trimmer capacitor, please store under the condition of -10 to +40 C. and 30 to 85%RH.
3. Do not store in or near corrosive gasses.
4. Use within 6 months of delivery.
5. Open the package just before using.
6. Prior to storing previously opened packages, the packaging should be heat-sealed. Avoid using rubber bands for repackage.
7. Do not store under direct sunlight.

8. Do not use the trimmer capacitor under the conditions listed below.
  - (1) Corrosive gasses atmosphere  
(Ex. Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
  - (2) In liquid (Ex. water, oil, medical liquid, organic solvent, etc.)
  - (3) Dusty / dirty atmosphere
  - (4) Direct sunlight
  - (5) Static voltage nor electric/magnetic fields
  - (6) Direct sea breeze
  - (7) Other variations of the above

■ Notice (Soldering)


1. Soldering
  - (1) TZ03 series can be soldered by flow soldering method and soldering iron. Do not use reflow soldering method.
  - (2) Standard soldering condition
    - (a) Flow soldering : Refer to the standard temperature profile.
    - (b) Soldering iron :
      - > Temperature of tip 260+-10 C.
      - > Soldering time 3 sec. max.
      - > Diameter 3mm max.
      - > Wattage of iron 30W max.

Before using other soldering conditions than those listed above, please consult with Murata factory representative prior to using. If the soldering conditions are not suitable, e.g., excessive time and/or excessive temperature, the trimmer capacitor may deviate from the specified characteristics.
- (3) The dimension of mounting hole should be used Murata's standard mounting hole at flow soldering. The amount of solder is critical. Insufficient amounts of solder can lead to insufficient soldering strength on PCB. Excessive amounts of solder may cause the bridging between the terminals or the contact failure due to flux wicking up.
- (4) When using soldering iron, the string solder shall be applied to the lower part of the terminal only and do not apply flux except the terminals. Excessive amounts of solder and/or applying solder to the upper part of the terminal may cause fixed rotor or the contact failure due to flux invasion into the movable part and/or the contact point. The soldering iron should not come in contact with the plastic case of the trimmer capacitor. If such contact does occur, the trimmer capacitor may be damaged.
- (5) Our recommendable chlorine content of string solder is 0.5wt% max.
- (6) Do not use water-soluble flux (for water cleaning). To prevent the deterioration of trimmer

- capacitor characteristics, apply flux only to terminals.
2. Mounting
    - (1) Do not apply excessive force (preferable 5.0N (Ref.; 500gf)max.), when the trimmer capacitor is mounted on the PCB.
    - (2) Use the suitable PCB holes which are the same pitch as the terminal of the trimmer capacitor. If it would not fit with the terminal, the excessive stress would be applied to the terminal and the trimmer capacitor may deviate from the specified characteristics.
    - (3) Do not apply bending stress more than 10.0N (Ref.; 1kgf) after the trimmer capacitor has been mounted on the PCB.
    - (4) Mount trimmer capacitor in contact with PCB.
    - (5) In case of bending the terminals, do not apply excessive force to the body of the product and prevent the terminal fixing part from damaging.
  3. Cleaning [with cover film type]
    - (1) Isopropyl alcohol and Ethyl alcohol are available material for cleaning. Water group material like Pinealpha, Cleanthru can not be used. For other materials, please consult with Murata factory representative prior to using.
    - (2) The total cleaning time by dipping, vapor and ultra-sonic method shall be less than 2 minutes. For ultra-sonic cleaning, the available condition is as follows.
      - > Cleaning time : 30 sec. max.
      - > Power : 20W/liter max.
      - > Frequency : 20 - 60kHz
      - > Temperature : Ambient temperature

Due to the ultra-sonic cleaning equipment peculiar self resonance point and the cleaning compatibility usually depends on the jig construction and/or the cleaning condition such as the depth of immersion, please check the cleaning equipment to determine the suitable conditions. If the trimmer capacitor is cleaned by other conditions, the trimmer capacitor may deviate from the specified characteristics.



 Continued from the preceding page.

#### 4. Other

Note the polarity of the trimmer capacitor to

minimize influence by stray capacitance.  
(Refer to the dimensions concerning the polarity.)

#### ■ Notice (Handling)

1. Use suitable screwdrivers that fit comfortably in driver slot.

(1) Recommended screwdriver for manual adjustment  
MURATA : KMDR010

(2) Recommended screwdriver bit for automatic adjustment

MURATA : KMBT010

2. When adjusting with a screwdriver, do not apply

excessive force(preferable 1.0N(Ref;100gf) max.) to minimize capacitance drift. If excessive force applied to the screwdriver slot, it may cause deformation of the products.

3. Do not apply adhesive, lock paints, or any other substances to the trimmer capacitor to secure the rotor position. They may cause corrosion or electrical contact problems.

#### ■ Notice (Other)

Before using trimmer capacitor, please test after assembly in your particular mass production system.

# Packaging

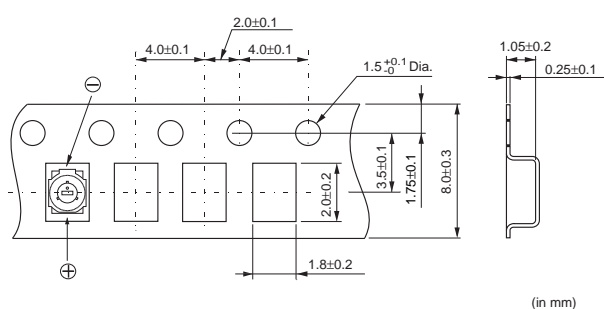
## Minimum Quantity

Part Number	Minimum Quantity (pcs.)				
	φ180mm Reel	φ330mm Reel	Ammo Pack	Magazine	Bulk
TZR1	3000	10000	-	-	500
TZS2	3000	10000	-	-	500
TZY2	2000	10000	-	-	500
TZV2	2000	8000	-	-	500
TZC3	1000	4000	-	-	500
TZB4	500	2500	-	-	500
TZ03	-	-	1000	80	1000*

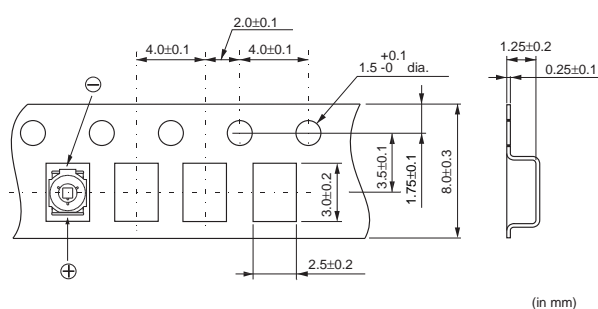
\*Depending on terminal shape, some products are supplied on the 500pcs./bulk basis.

## Dimension of Tape

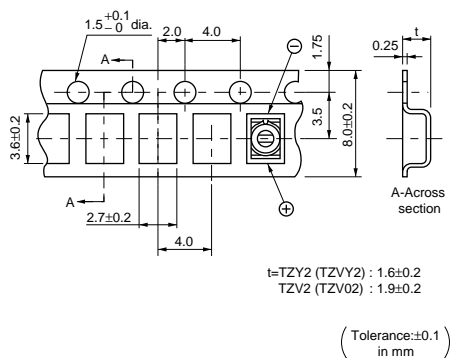
TZR1R Series



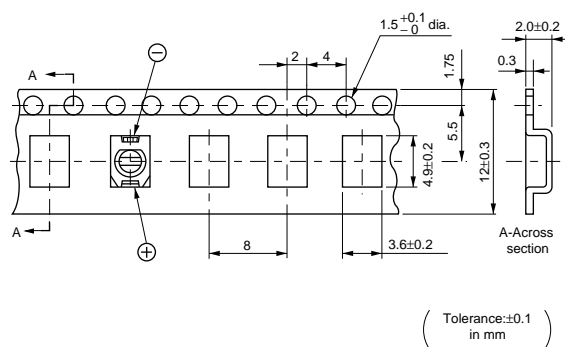
TZS02 Series



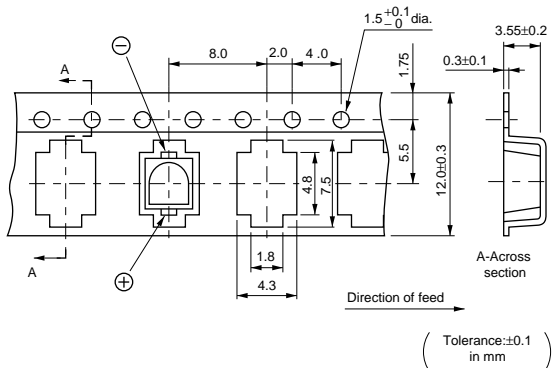
TZY2/TZV2 Series



TZC3 Series



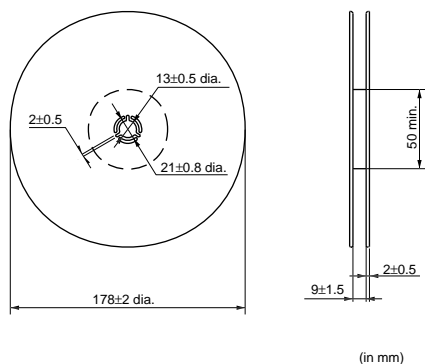
TZB4 Series



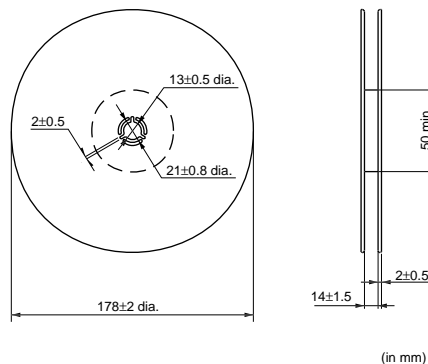
## Packaging

### ■ Dimension of dia. 180mm Reel

TZR1/TZS2/TZY2/TZV2 Series

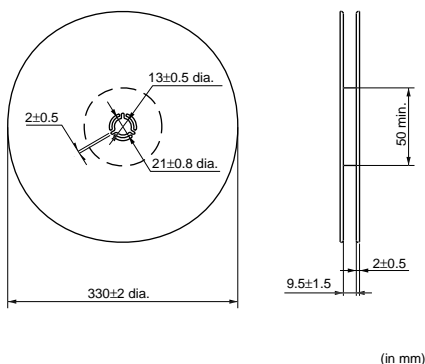


TZC3/TZB4 Series

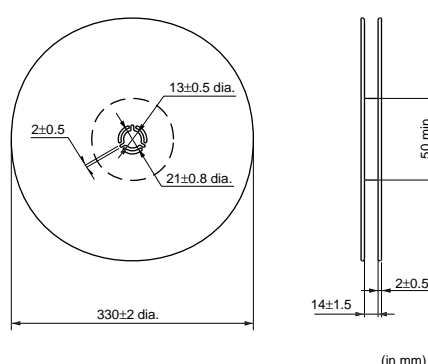


### ■ Dimension of dia. 330mm Reel

TZR1/TZS2/TZY2/TZV2 Series

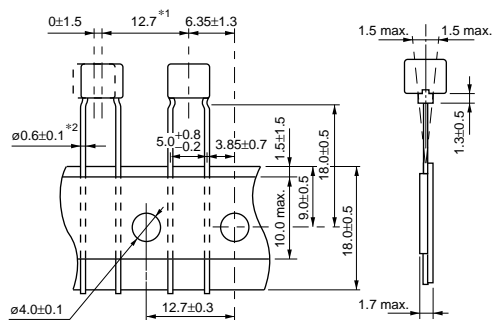


TZC3/TZB4 Series



### ■ Dimension of Tape

TZ03 Series



\*1 : Tolerance varies with ΔS.  
\*2 : Except 1mm from the stand-off position.

(in mm)

### ■ Ammo Pack

TZ03 Series



## Recommendable Adjustment Tools

### ■ For Manual Adjustment

Trimmer Capacitor Series	MURATA Model Number	Manufactures	Model Number	Bit Shape
<b>TZR1</b>	<b>KMDR160</b>	MURATA MFG.	<b>KMDR160</b>	Minus
<b>TZS2</b>	<b>KMDR050</b>	MURATA MFG.	<b>KMDR050</b>	Quadrangle
<b>TZY2</b>	<b>KMDR060</b>	FUTABA TOOL MFG.	<b>DA-89</b>	Minus
<b>TZV2</b>	<b>KMDR020</b>	VESSEL MFG.	<b>NO.9000-0.9×30</b>	Minus
<b>TZC3</b> Cross Slot Type	<b>KMDR040</b>	TORAY INDUSTRIES.INC.	<b>SA-1825</b>	Minus
<b>TZC3</b> Standard Type (Minus Slot)	<b>KMDR010</b>	MURATA MFG.	<b>KMDR010</b>	Minus
<b>TZB4</b>				
<b>TZ03</b>				

### ■ For Automatic Adjustment

Trimmer Capacitor Series	MURATA Model Number	Manufactures	Model Number	Bit Shape
<b>TZS2</b>	<b>KMBT050</b>	MURATA MFG.	<b>KMBT050</b>	Quadrangle
<b>TZY2</b>	<b>KMBT060</b>	MURATA MFG.	<b>KMBT060</b>	Minus
<b>TZV2</b>	<b>KMBT020</b>	MURATA MFG.	<b>KMBT020</b>	Minus
<b>TZC3</b> Cross Slot Type	<b>KMBT040</b>	TORAY INDUSTRIES.INC.	<b>JB-1825</b>	Minus
<b>TZC3</b> Standard Type (Minus Slot)	<b>KMBT010</b>	MURATA MFG.	<b>KMBT010</b>	Minus
<b>TZB4</b>				
<b>TZ03</b>				

## Qualified Standards

The products listed here has been produced by the QS9000 and ISO9002 certified factory

MURATA FACTORY	Qualified Date	Standard	Qualified Number
Sabae Murata Mfg.Co.,Ltd.	August.14.1997	UNDERWRITERS LABORATORIES INC.	A5704

\* No ODCs (Ozone Depleting Chemicals) are used on Murata's all trimmer potentiometers

\* TRIMCAP® is a registered trademark of murata Mfg. Co.,Ltd.

**⚠ Note:**

1. Export Control

⟨For customers outside Japan⟩

Murata products should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destructive weapons (nuclear weapons, chemical or biological weapons, or missiles), or any other weapons.

⟨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 our products listed in this catalog for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property, or when intending to use one of our products for other applications than 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 in the above |

3. Product specifications in this catalog are as of March 2002. 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 CAUTION and Notice in this catalog for safety. This catalog has only typical specifications. Therefore you are requested to approve our product specification or to transact the approval sheet for product specification, before ordering.

5. 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 third party's intellectual property rights and other related rights in consideration of your using 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.

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