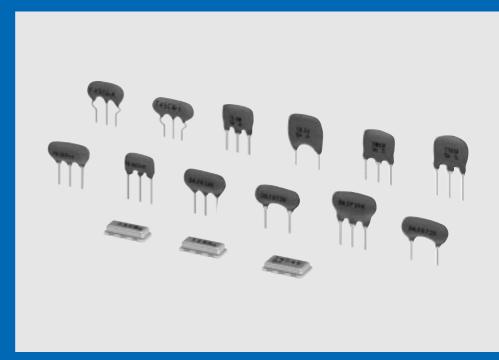
CERAFIL®
(FILTERS/TRAPS
/DISCRIMINATORS)
FOR TV/VCR







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CERAFIL® in this catalog are the trademarks of Murata Manufacturing Co., Ltd.

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1 2

1 1

■ 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.)

CERAFIL® for TV/VCR

(Global Part Number) SF S RA 4M50 CF 00 -B0

●Product ID

| Product ID | |
|------------|-----------------|
| SF | Ceramic Filters |

2Oscillation/Numbers of Element

| Code | Oscillation/Numbers of Element |
|------|------------------------------------|
| s | 2 Elements Thickness Shear mode |
| Т | 3 Elements Thickness Expander mode |

3Structure/Size

| Code | Structure/Size |
|------|----------------|
| R□ | Lead Type |
| K□ | Chip Type |

is expressed "A" or subsequent code, which indicates the size.

4 Nominal Center Frequency

Expressed by four-digit alphanumerics. The unit is in hertz (MHz). Decimal point is expressed by capital letter "M".

5Product Specification Code (1)

| Code | Product Specification Code (1) |
|------|--------------------------------|
| AF | Standard Bandwidth Type |
| BF | Tight Bandwidth Type |
| CF | Standard Bandwidth Type |
| DF | Broad Bandwidth Type |
| EF | Ultra-broad Bandwidth Type |

The code **AF** is only applied to **SFT** series.

6 Product Specification Code (2)

| Code | Product Specification Code (2) |
|------|--------------------------------|
| 00 | Standard Type |

Packaging

| Code | Packaging |
|------|------------------------------------|
| -B0 | Bulk |
| -A0 | Radial Taping H ₀ =18mm |
| -R1 | Plastic Taping ø=330mm |

Radial taping is applied to lead type and plastic taping to chip type. With non-standard products, two-digit alphanumerics indicating "Individual Specification" is added between "Sproduct Specification Code (1)" and "Sproduct Specification Code (2)".

Ceramic Traps

(Global Part Number)



●Product ID

| Product ID | |
|------------|---------------|
| TP | Ceramic Traps |

2Function

| Code | Function |
|------|--------------|
| S | Single Traps |
| Т | Triple Traps |
| w | Double Traps |

3Structure/Size

| Code | Structure/Size |
|------|----------------|
| R□ | Lead Type |
| K□ | Chip Type |

 $\hfill \square$ is expressed "A" or subsequent code, which indicates the size.

4 Nominal Center Frequency

Expressed by four-digit alphanumerics. The unit is in hertz (MHz). Decimal point is expressed by capital letter "M".

5Product Specification Code (1)

| Code | Product Specification (1) |
|------|---------------------------|
| В | Broad-bandwidth Type |
| С | Low-capacitance Type |

6 Product Specification Code (2)

| Code | Product Specification Code (2) |
|------|--------------------------------|
| 00 | Standard Type |

Packaging

| Code | Packaging | | | | | | |
|------|------------------------------------|--|--|--|--|--|--|
| -B0 | Bulk | | | | | | |
| -A0 | Radial Taping H ₀ =18mm | | | | | | |
| -R1 | Plastic Taping ø=330mm | | | | | | |

Radial taping is applied to lead type and plastic taping to chip type. With non-standard products, three-digit alphanumerics indicating "Individual Specification" is added between "Product Specification Code (2)" and "Packaging".



Discriminators for TV/VCR

(Global Part Number) CD S RH 4M50 E K 048 -A0

Product ID

| Product ID | |
|------------|----------------|
| CD | Discriminators |

2Oscillation

| Code | Oscillation |
|------|----------------------|
| s | Thickness Shear mode |

3Structure/Size

| Code | Structure/Size |
|------|----------------|
| RH | Standard Type |
| RL | Low-profile |

4 Nominal Center Frequency

Expressed by four-digit alphanumerics. The unit is in hertz (MHz). Decimal point is expressed by capital letter "M".

6Product Specification Code (1)

| Code | Product Specification Code (1) | | | | | |
|------|--------------------------------|--|--|--|--|--|
| С | Three-terminals | | | | | |
| E | Two-terminals | | | | | |

6 Product Specification Code (2)

| Code | Product Specification Code (2) |
|------|--------------------------------|
| K | Specification |

7IC

| Code | IC |
|------|----------------------------|
| 048 | Applicable IC control code |

8 Packaging

| Code | Packaging | | | | | |
|------|------------------------------------|--|--|--|--|--|
| -B0 | Bulk | | | | | |
| -A0 | Radial Taping H ₀ =18mm | | | | | |

With non-standard products, an alphabet Indicating "Individual Specification" is added between "OIC" and "OPackaging".





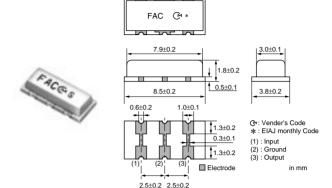
CERAFIL® Chip Type SFSKA Series

SMD ceramic filter SFSKA_CF is a small and thin SMD filter sealed with a metal cap.

Recommended for LCD-TVs, and small and thin tuners.

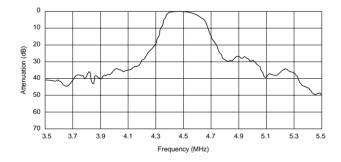
■ Features

- 1. High attenuation outside bandwidth.
- 2. Small and thin pakage.
- 3. Reflow-solderable.

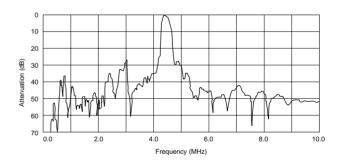


| Part Number | Nominal Center | 3dB | 20dB | Insertion | Spurious | Spurious | Input/Output |
|------------------|----------------|------------|-----------|-----------|-----------------------------|----------------------------------|--------------|
| | Frequency (fn) | Bandwidth | Bandwidth | Loss | Attenuation(1) | Attenuation(2) | Impedance |
| | (MHz) | (kHz) | (kHz) | (dB) | (dB) | (dB) | (ohm) |
| SFSKA4M50CF00-R1 | 4.500 | fn±60 min. | 600 max. | 6.0 max. | 20 min. [within 0 to fn] | 15 min. [within fn to 7.0MHz] | 1000 |

■ Frequency Characteristics



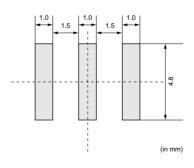
■ Spurious Response



■ Test Circuit

R1 R1+Rg=R2=1000Ω ±5%, Rg=50Ω C2=10pF (Including stray capacitance and Input capacitance of RF Voltmeter) E1:S.S.G. Output voltage

■ Standard Land Pattern Dimensions



CERAFIL® Chip Type Notice

■ Notice (Soldering and Mounting)

1. Standard Reflow Soldering Condition

(1) Reflow

Filter is soldered one time within the following temperature condition and then being placed in natural condition for 4 hours.

(2) Soldering Iron

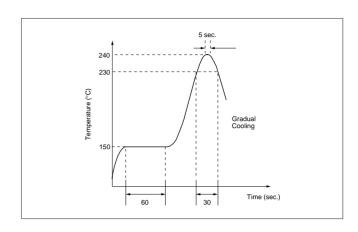
Lead terminal is directly contacted with the tip of soldering iron of $280\pm5^{\circ}$ C for 3.0 seconds ±0.5 seconds, and then being placed in natural condition for 4 hours.

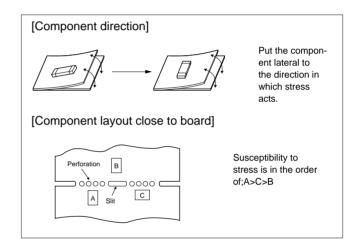
2. Wash

The component cannot be withstand washing.

■ Notice (Handling)

- The component may be damaged if excess mechanical stress is applied to it mounted on the printed circuit hoard
- Design layout of components on the PC board to minimize the stress imposed on the wrap or flexure of the board
- 3. After installing chips, if solder is excessively applied to the circuit board, mechanical stress will cause destruction resistance characteristics to lower. To prevent this, be extremly careful in determining shape and dimension before designing the circuit board diagram.
- 4. When the positioning claws and pick up nozzle are worn, the load is applied to the chip while positioning is concentrated to one positioning accuracy, etc. Careful checking and maintenance are necessary to prevent unexpected trouble.
- When correcting chips with a soldering iron, the tip of the soldering iron should not directly touch the chip component.
- 6. Cleaning or washing of the component is not acceptable due to non sealed construction.
- 7. In case of covering filter with over coat, conditions such as material of resin, cure temperature, and so on should be evaluated well.
- 8. Accurate test circuit values are required to measure electrical characteristics. It may be a cause of misscorrelation if there is any deviation, especially stray capacitance, from the test circuit in the specification.









CERAFIL® Picture Band Low-Suprious SFSRA Series

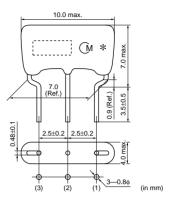
As part of the environment protection activity, solder for terminal plating and terminal-element connection inside of ceramic filter SFSRA series contain no lead(Pb).

This series also features thickness shear vibration mode same as SFSRH series(current type), which provides very low spurious response within video signal band.

■ Features

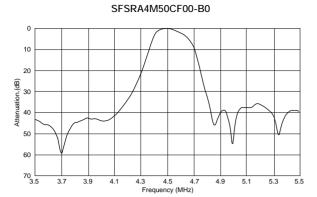
- 1. Excellent spurious suppression characteristics within video signal band.
- 2. Available 4 pass bandwidth variation to meet various requests.
- 3. Low profile (H=7.0mm max.)
- 4. Lead dimension: Improved mounting reliability (cut & clinch) due to round terminal.

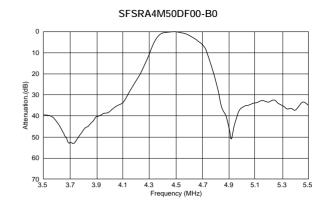


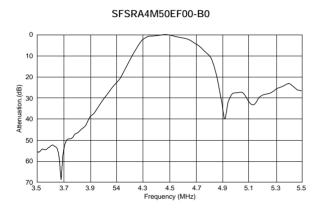


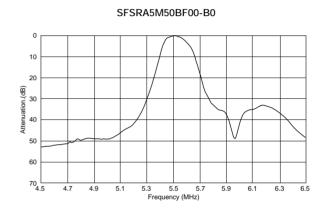
| Part Number | Nominal Center Frequency (fn) (MHz) | 3dB Bandwidth (kHz) | 20dB Bandwidth (kHz) | Insertion Loss (dB) | Spurious Attenuation(1) (dB) | Spurious Attenuation(2) (dB) | Input/Output Impedance (ohm) |
|------------------|---|---------------------------|----------------------------|---------------------------|------------------------------------|------------------------------------|------------------------------------|
| SFSRA4M50CF00-B0 | 4.500 | fn±60 min. | 600 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 7.0MHz] | 1000 |
| SFSRA4M50DF00-B0 | 4.500 | fn±70 min. | 750 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 7.0MHz] | 1000 |
| SFSRA4M50EF00-B0 | 4.500 | fn±125 min. | 850 max. | 6.0 max. | 25 min. [within 0 to fn] | 18 min. [within fn to 7.0MHz] | 1000 |
| SFSRA5M50BF00-B0 | 5.500 | fn±50 min. | 400 max. | 8.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 7.57MHz] | 600 |
| SFSRA5M50CF00-B0 | 5.500 | fn±60 min. | 600 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to7.5MHz] | 600 |
| SFSRA5M50DF00-B0 | 5.500 | fn±80 min. | 750 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 7.5MHz] | 600 |
| SFSRA5M74BF00-B0 | 5.742 | fn±50 min. | 400 max. | 8.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 8.0MHz] | 600 |
| SFSRA5M74CF00-B0 | 5.742 | fn±60 min. | 600 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 7.5MHz] | 600 |
| SFSRA6M00CF00-B0 | 6.000 | fn±60 min. | 600 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 8.0MHz] | 470 |
| SFSRA6M00DF00-B0 | 6.000 | fn±80 min. | 750 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 8.0MHz] | 470 |
| SFSRA6M50CF00-B0 | 6.500 | fn±70 min. | 650 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 8.5MHz] | 470 |
| SFSRA6M50DF00-B0 | 6.500 | fn±80 min. | 800 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 8.5MHz] | 470 |

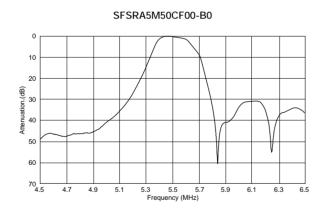
■ Frequency Characteristics

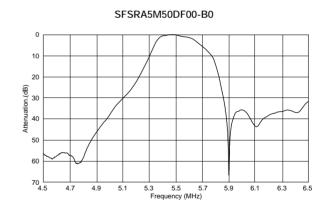


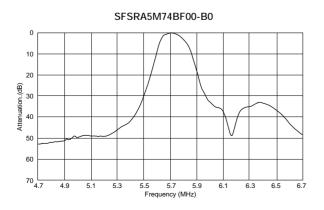


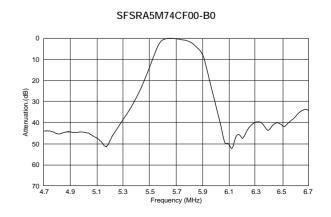










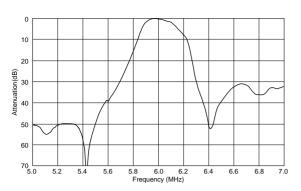


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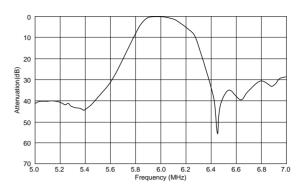
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■ Frequency Characteristics

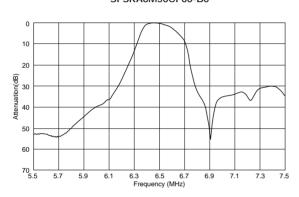
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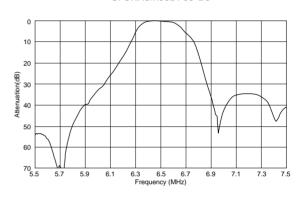
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SFSRA6M50CF00-B0

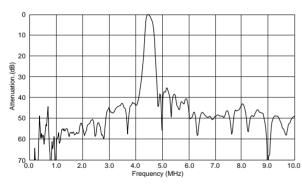


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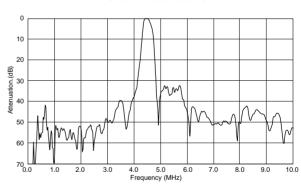


■ Spurious Response

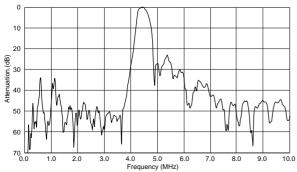




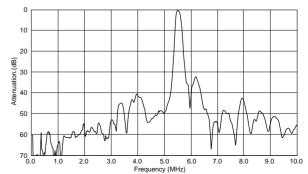
SFSRA4M50DF00-B0



SFSRA4M50EF00-B0

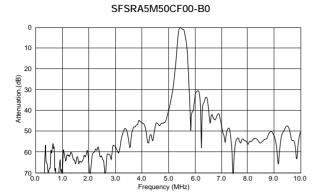


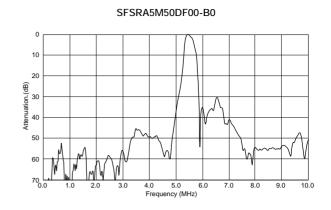
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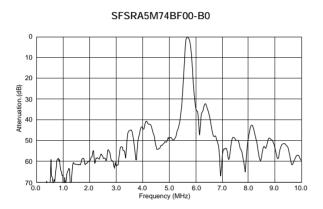


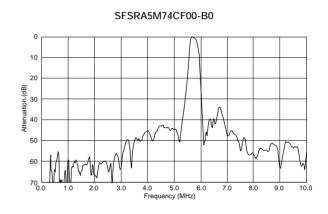


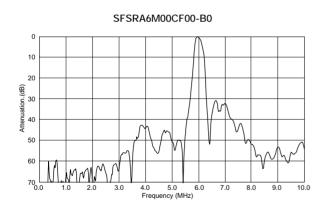
■ Spurious Response

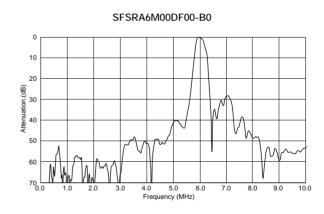


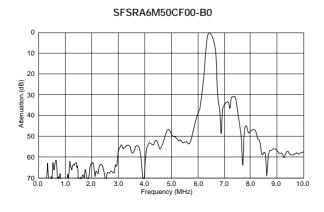


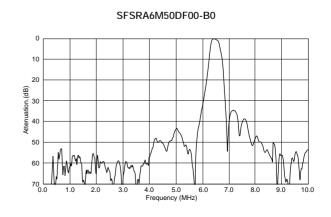




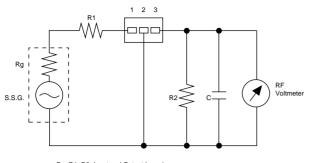








■ Test Circuit



Rg+R1=R2=Input and Output Impedance C=10pF (Including stray capacitance and input capacitance of RF voltmeter)



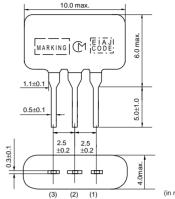
CERAFIL® Low-profile SFSRL Series

SFSRL series are the Low-profile type of standard SFSRA series.

■ Features

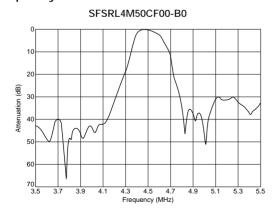
- 1. Installed height is 6.0mm, making it well suited for compact, thin sets.
- 2. Electrical char. and performance are the same as those of SFSRA series.
- 3. 2 types, narrow and middle bandwidth, are prepared.

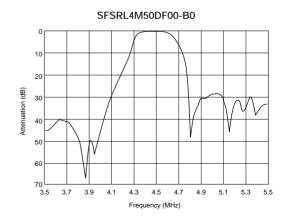




| Part Number | Nominal Center Frequency (fn) (MHz) | 3dB Bandwidth (kHz) | 20dB Bandwidth (kHz) | Insertion Loss (dB) | Spurious Attenuation(1) (dB) | Spurious Attenuation(2) (dB) | Input/Output Impedance (ohm) |
|------------------|---|---------------------------|----------------------------|---------------------------|------------------------------------|------------------------------------|------------------------------------|
| SFSRL4M50CF00-B0 | 4.500 | fn±60 min. | 600 max. | 6.0 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 7.0MHz] | 1000 |
| SFSRL4M50DF00-B0 | 4.500 | fn±70 min. | 750 max. | 6.0 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 5.7MHz] | 1000 |
| SFSRL5M50CF00-B0 | 5.500 | fn±60 min. | 600 max. | 6.0 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 7.0MHz] | 600 |
| SFSRL5M50DF00-B0 | 5.500 | fn±80 min. | 750 max. | 6.0 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 7.0MHz] | 600 |
| SFSRL6M00CF00-B0 | 6.000 | fn±60 min. | 600 max. | 6.0 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 7.5MHz] | 470 |
| SFSRL6M00DF00-B0 | 6.000 | fn±80 min. | 750 max. | 6.0 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 7.5MHz] | 470 |
| SFSRL6M50CF00-B0 | 6.500 | fn±70 min. | 650 max. | 6.0 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 8.5MHz] | 470 |
| SFSRL6M50DF00-B0 | 6.500 | fn±80 min. | 800 max. | 6.0 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 8.0MHz] | 470 |

■ Frequency Characteristics



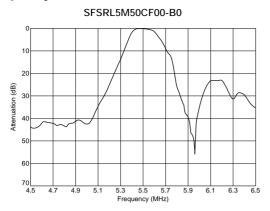


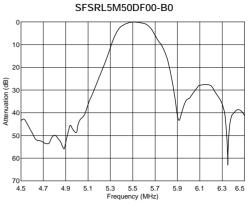
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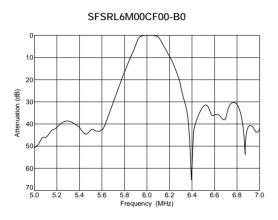


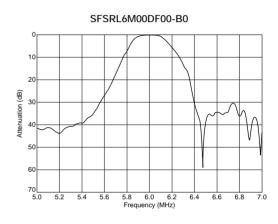


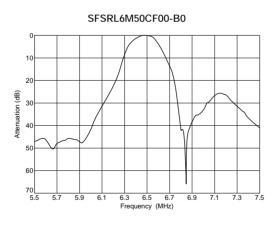
■ Frequency Characteristics

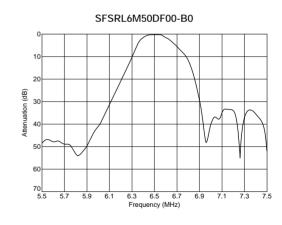




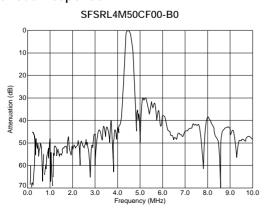


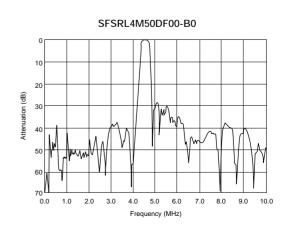




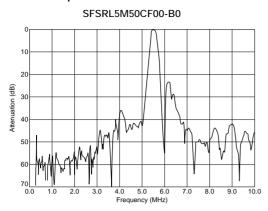


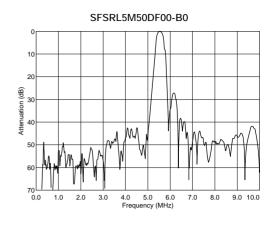
■ Spurious Response

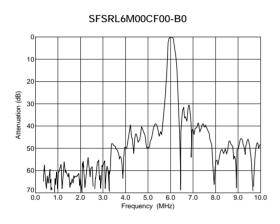


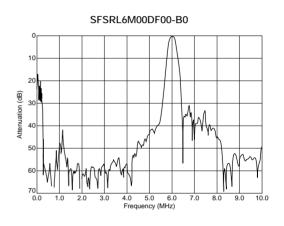


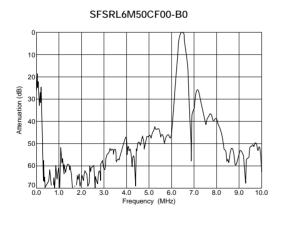
■ Spurious Response

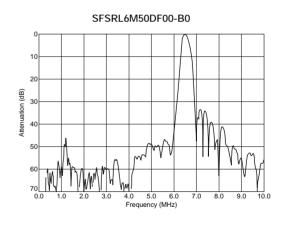




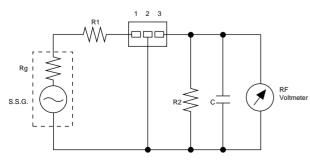








■ Test Circuit



Rg+R1=R2=Input and Output Impedance C=10pF (Including stray capacitance and input capacitance of RF voltmeter)

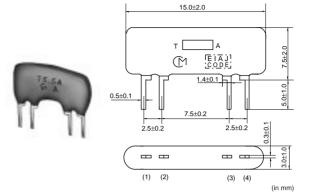


CERAFIL® High-selectivity Type SFTRD Series

Ceramic filter SFTRD_AF series are high selectivity filter which involves 3-elements filter unit.

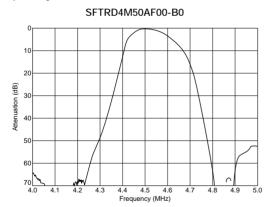
■ Features

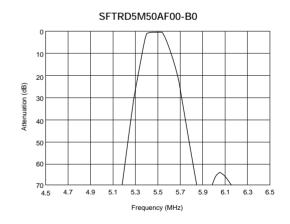
- 1. Excellent shape factor.
- 2. Good performance for spurious suppression.
- 3. Four-terminals type.
- 4. Suitable for 2 channel Multi-sound TV of Germany and Korea.



| Part Number | Nominal Center Frequency (fn) (MHz) | 3dB Bandwidth (kHz) | 20dB Bandwidth (kHz) | Insertion Loss (dB) | Spurious Attenuation(1) (dB) | Spurious Attenuation(2) (dB) | Input/Output Impedance (ohm) |
|------------------|---|---------------------------|----------------------------|---------------------------|-------------------------------------|-------------------------------------|------------------------------------|
| SFTRD4M50AF00-B0 | 4.500 | fn±40 min. | 370 max. | 10.0 max. | 50 min. [within fn-1.0MHz to fn] | 40 min. [within fn to fn+0.8MHz] | 1000 |
| SFTRD5M50AF00-B0 | 5.500 | fn±50 min. | 350 max. | 9.0 max. | 50 min. [within fn-1.0MHz to fn] | 50 min. [within fn to fn+1.0MHz] | 600 |
| SFTRD5M74AF00-B0 | 5.742 | fn±50 min. | 350 max. | 9.0 max. | 50 min. [within fn-1.0MHz to fn] | 50 min. [within fn to fn+1.0MHz] | 600 |
| SFTRD6M00AF00-B0 | 6.000 | fn±50 min. | 400 max. | 9.0 max. | 50 min. [within fn-1.0MHz to fn] | 50 min. [within fn to fn+1.0MHz] | 470 |
| SFTRD6M50AF00-B0 | 6.500 | fn±50 min. | 400 max. | 9.0 max. | 50 min. [within fn-1.0MHz to fn] | 50 min. [within fn to fn+1.0MHz] | 470 |

■ Frequency Characteristics



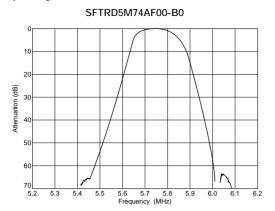


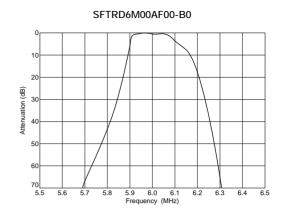
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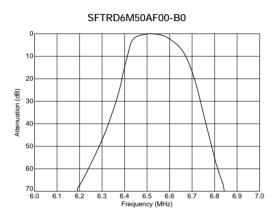




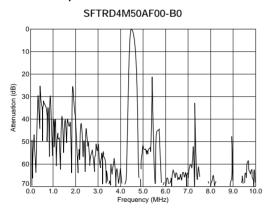
■ Frequency Characteristics

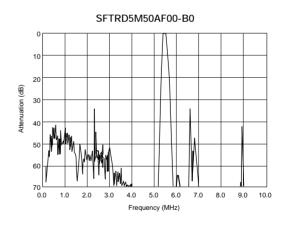


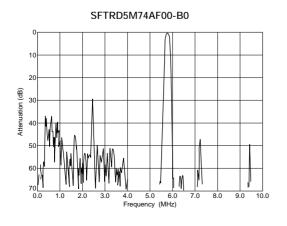


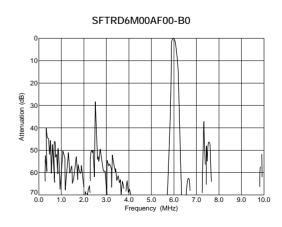


■ Spurious Response



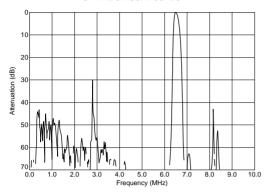




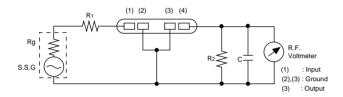


■ Spurious Response

SFTRD6M50AF00-B0



■ Test Circuit



 $\begin{array}{l} Rg+R_1=R_2=330\Omega \\ C=10pF \ (Including \ stray \ capacitance \ and \ input \ capacitance \ of \ RF \ voltmeter.) \end{array}$



CERAFIL® Chroma Signal SFSRA/H/L Series

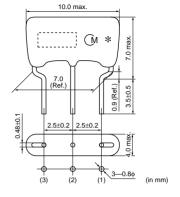
Chroma signals frequency conversion process is involved in VCRs video signal processing circuit. These SFSRA/SFSRH/SFSRL series are suitable for B.P.F.

■ Features

- 1. Frequency adjustment free.
- 2. Responsible for VHS. 8mm VCR system.

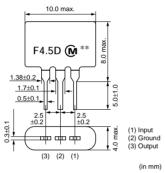


SFSRA Series





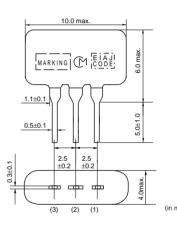






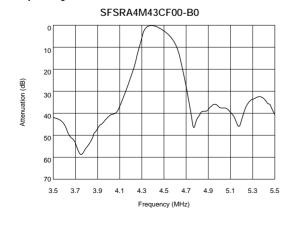


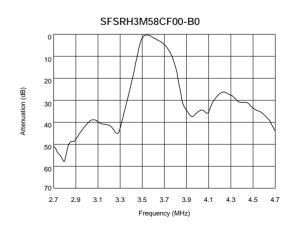
SFSRL Series



| Part Number | Nominal Center Frequency (fn) (MHz) | 3dB Bandwidth (kHz) | 20dB Bandwidth (kHz) | Insertion Loss (dB) | Spurious Attenuation(1) (dB) | Spurious Attenuation(2) (dB) | Input/Output Impedance (ohm) |
|------------------|---|---------------------------|----------------------------|---------------------------|------------------------------------|------------------------------------|------------------------------------|
| SFSRA4M43CF00-B0 | 4.430 | fn±60 min. | 600 max. | 6.0 max. | 30 min. [within 0 to fn] | 20 min. [within fn to 7.0MHz] | 1000 |
| SFSRH3M58CF00-B0 | 3.580 | fn±40 min. | 530 max. | 6.0 max. | 25 min. [within 0 to fn] | 15 min. [within fn to 6.0MHz] | 1000 |
| SFSRL4M32DF00-B0 | 4.320 | fn±70 min. | 750 max. | 6.0 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 5.5MHz] | 1000 |
| SFSRL5M17DF00-B0 | 5.170 | fn±70 min. | 750 max. | 7.5 max. | 30 min. [within 0 to fn] | 15 min. [within fn to 7.0MHz] | 600 |

■ Frequency Characteristics





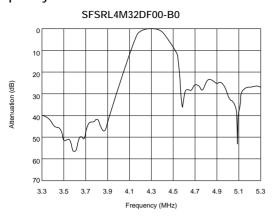
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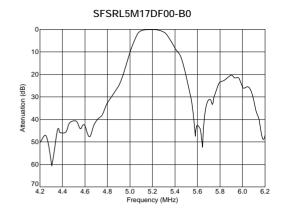




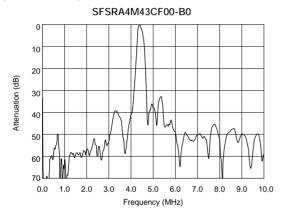
5

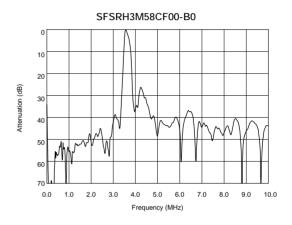
■ Frequency Characteristics

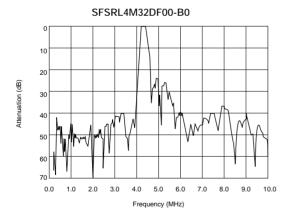


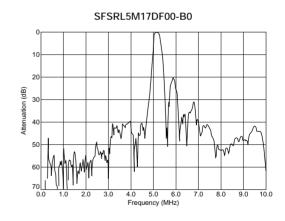


■ Spurious Response

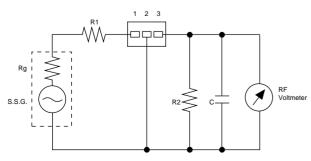








■ Test Circuit



Rg+R1=R2=Input and Output Impedance C=10pF (Including stray capacitance and input capacitance of RF voltmeter)

CERAFIL® Lead Type Notice

■ Notice (Soldering and Mounting)

The component cannot be withstand washing.

■ Notice (Handling)

- 1. Do not use this product with bend. The component may be damaged if excess mechanical stress is applied to it mounted on the printed circuit board.
- 2. The component may be damaged when an excess stress will be applied.
- 3. All kinds of re-flow soldering must not be applied on the component.
- 4. Do not clean or wash the component as it is not hermetically sealed.
- 5. Please contact Murata or Murata representative for soldering condition, in case of using lead free

solder.

- 6. Do not use strong acidity flux, more than 0.2wt% chlorine content, in flow soldering.
- 7. In case of covering filter with over coat, conditions such as material of resin, cure temperature, and so on should be evaluated well.
- 8. Accurate test circuit values are required to measure electrical characteristics. It may be a cause of miss-correlation if there is any deviation, especially stray capacitance, from the test circuit in the specification.



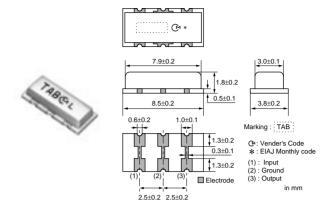


Ceramic Traps Chip Type TPSKA Series

SMD ceramic trap TPSKA_B is small and thin SMD trap sealed with a metal cap. Recommended for LCD-TVs, and small and thin tuners.

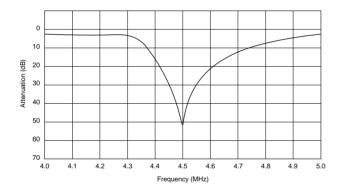
■ Features

- 1. High attenuation and high performance group delay time.
- 2. Small and thin pakage.
- 3. Reflow-solderable.

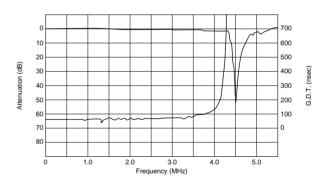


| Part Number | Nominal Center | Attenuation | 30dB Attenuation |
|-----------------|-----------------|-------------|------------------|
| | Frequency (fn1) | (at fn1) | BW (fn1) |
| | (MHz) | (dB) | (kHz) |
| TPSKA4M50B00-R1 | 4.500 | 35 min. | 50 min. |

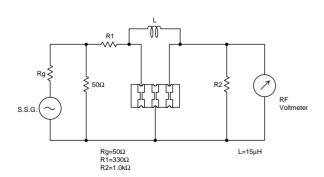
■ Frequency Characteristics



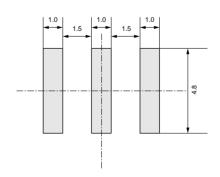
■ Spurious Response



■ Test Circuit



■ Standard Land Pattern Dimensions





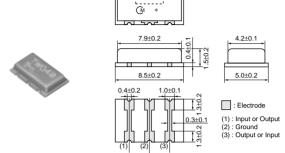
Double Trap Chip Type TPWKA Series

SMD ceramic trap TPWKA is small and thin SMD trap sealed with a metal cap. Recommended for LCD-TVs, and small and thin tuners.

This series consist of 2 wafers with 2 trap frequencies. Recommended for Multi standard set.

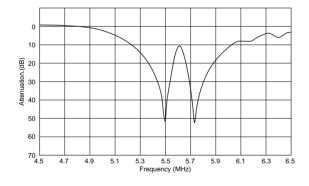
■ Features

- 1. Good performance of attenuation.
- 2. Small and thin package.
- 3. Reflow-solderable.

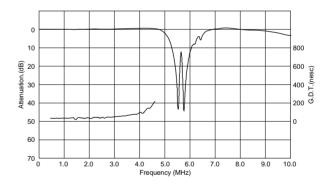


| Part Number | Nominal Center | Nominal Center | Attenuation | Attenuation | 30dB Attenuation |
|-----------------|-----------------|-----------------|-------------|-------------|------------------|
| | Frequency (fn1) | Frequency (fn2) | (at fn1) | (at fn2) | BW (fn1) |
| | (MHz) | (MHz) | (dB) | (dB) | (kHz) |
| TPWKA5M50B04-R1 | 5.500 | 5.742 | 30 min. | 30 min. | 50 min. |

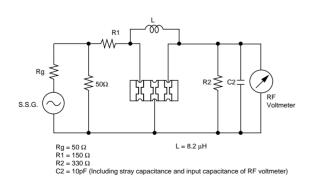
■ Frequency Characteristics



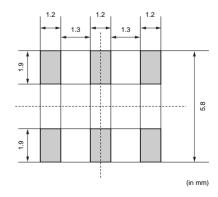
■ Spurious Response



■ Test Circuit



■ Standard Land Pattern Dimensions



Ceramic Trap Chip Type Notice

■ Notice (Soldering and Mounting)

1. Standard Reflow Soldering Condition

(1) Reflow

Trap is soldered one time within the following temperature condition and then being placed in natural condition for 4 hours.

(2) Soldering Iron

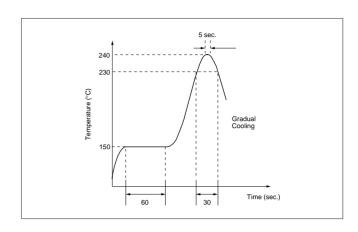
Lead terminal is directly contacted with the tip of soldering iron of $280\pm5^{\circ}$ C for 3.0 seconds ±0.5 seconds, and then being placed in natural condition for 4 hours.

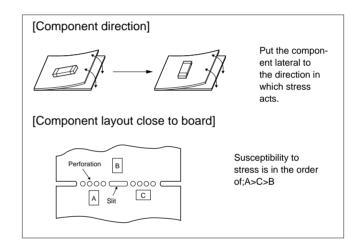
2. Wash

The component cannot be withstand washing.

■ Notice (Handling)

- The component may be damaged if excess mechanical stress is applied to it mounted on the printed circuit board.
- Design layout of components on the PC board to minimize the stress imposed on the wrap or flexure of the board
- 3. After installing chips, if solder is excessively applied to the circuit board, mechanical stress will cause destruction resistance characteristics to lower. To prevent this, be extremly careful in determining shape and dimension before designing the circuit board diagram.
- 4. When the positioning claws and pick up nozzle are worn, the load is applied to the chip while positioning is concentrated to one positioning accuracy, etc. Careful checking and maintenance are necessary to prevent unexpected trouble.
- When correcting chips with a soldering iron, the tip of the soldering iron should not directly touch the chip component.
- 6. Cleaning or washing of the component is not acceptable due to non sealed construction.
- 7. In case of covering filter with over coat, conditions such as material of resin, cure temperature, and so on should be evaluated well.
- 8. Accurate test circuit values are required to measure electrical characteristics. It may be a cause of misscorrelation if there is any deviation, especially stray capacitance, from the test circuit in the specification.











Ceramic Traps Three-terminals TPSRA Series

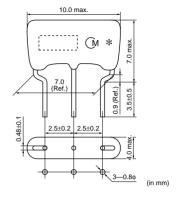
As part of the environment protection activity, solder for terminal plating and terminal-element connection inside of ceramic filter TPSRA series contain no lead(Pb).

This series consist of 2 trap element on one wafer. Suitable for the sound IF trap of CTV/VCR.

■ Features

- 1. Good performance of attenuation.
- 2. Shape factor can be changed by the value of Inductor "L".
- 3. Three-terminals type.
- 4. Low profile (H=7.0mm max.).
- 5. Lead dimension: Improved mounting reliability(cut & clinch) due to round terminal.

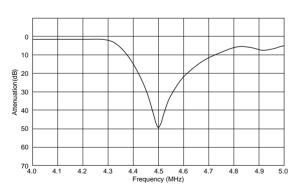




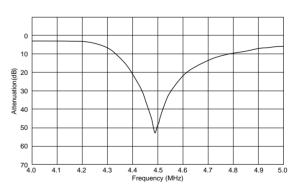
| Part Number | Nominal Center Frequency (fn1) (MHz) | Attenuation (at fn1) (dB) | 30dB Attenuation BW (fn1) (kHz) |
|-----------------|--|---------------------------------|---------------------------------------|
| TPSRA4M50B00-B0 | 4.500 | 35 min. | 50 min. |
| TPSRA4M50C00-B0 | 4.500 | 30 min. | - |
| TPSRA5M50B00-B0 | 5.500 | 35 min. | 70 min. |
| TPSRA5M74B00-B0 | 5.742 | 35 min. | 70 min. |
| TPSRA6M00B00-B0 | 6.000 | 35 min. | 70 min. |
| TPSRA6M50B00-B0 | 6.500 | 35 min. | 70 min. |

■ Frequency Characteristics

TPSRA4M50B00-B0



TPSRA4M50C00-B0



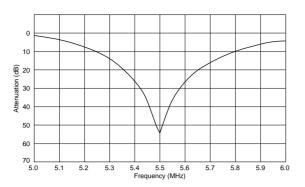
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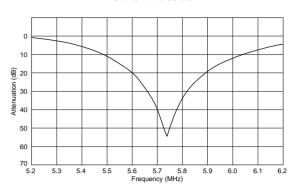


■ Frequency Characteristics

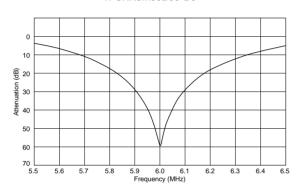




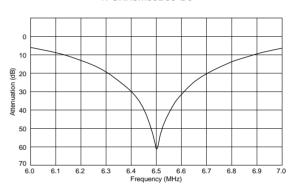
TPSRA5M74B00-B0



TPSRA6M00B00-B0



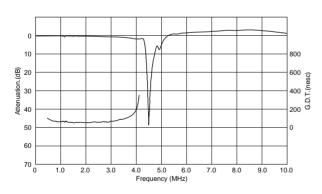
TPSRA6M50B00-B0



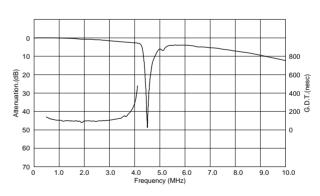
■ Spurious Response

8

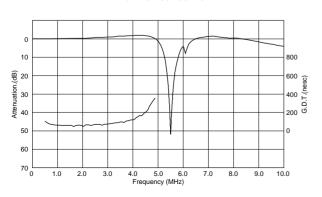
TPSRA4M50B00-B0



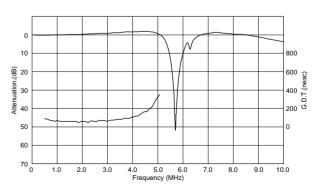
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TPSRA5M50B00-B0



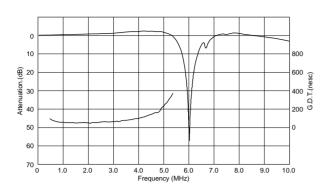
TPSRA5M74B00-B0

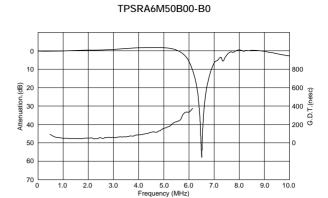




■ Spurious Response

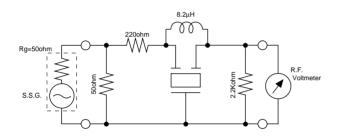




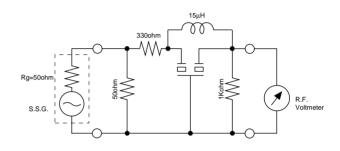


■ Test Circuit

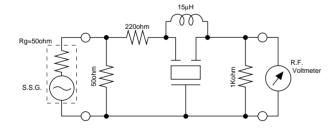
TPSRA4M50B00-B0



TPSRA4M50C00-B0



TPSRA5M50/5M74/6M00/6M50B00-B0





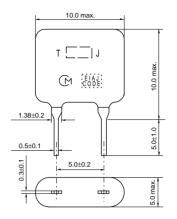
Ceramic Traps Two-terminals TPSRD Series

Ceramic Trap TPSRD_J series are two-terminals type. Which are recommended for the attenuation of sound IF in B/W TV and the attenuation of chroma signal in Video Camcorder.

■ Features

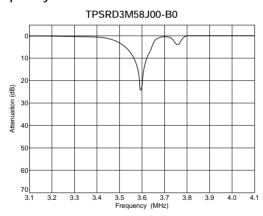
- 1. Small-size, Light-weight.
- 2. High performance, durability.
- 3. Easy to design due to two-terminals type.

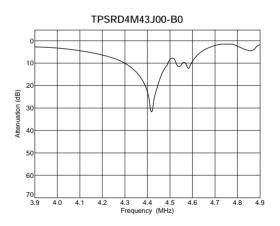


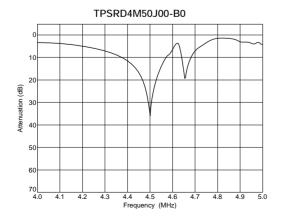


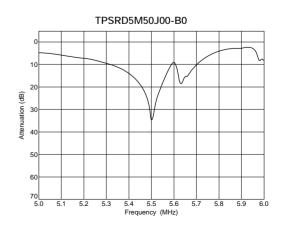
| Part Number | Nominal Center Frequency (fn1) (MHz) | Attenuation (at fn1) (dB) | 30dB Attenuation BW (fn1) (kHz) |
|-----------------|--|---------------------------------|---------------------------------------|
| TPSRD3M58J00-B0 | 3.580 | 20 min. | 20 min.[20dB Att.BW] |
| TPSRD4M43J00-B0 | 4.430 | 20 min. | 40 min.[20dB Att.BW] |
| TPSRD4M50J00-B0 | 4.500 | 20 min. | 30 min.[20dB Att.BW] |
| TPSRD5M50J00-B0 | 5.500 | 20 min. | 30 min.[20dB Att.BW] |
| TPSRD6M00J00-B0 | 6.000 | 20 min. | 40 min.[20dB Att.BW] |
| TPSRD6M50J00-B0 | 6.500 | 20 min. | 40 min.[20dB Att.BW] |

■ Frequency Characteristics







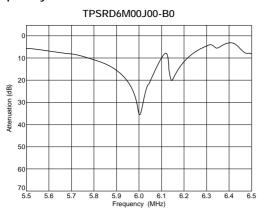


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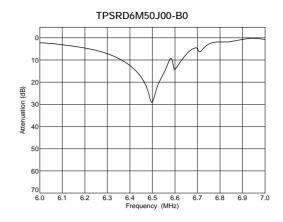




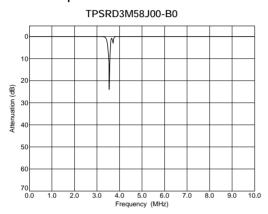
■ Frequency Characteristics

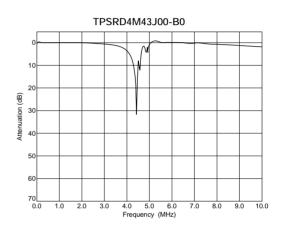


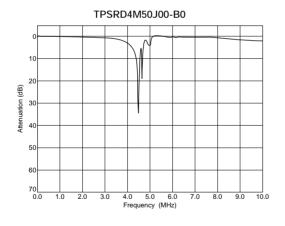
Please read CAUTION and Notice in this catalog for safety. This catalog has only typical specifications. Therefore you are requested to approve our product specification or to transact the approval sheet for product specification, before your ordering.

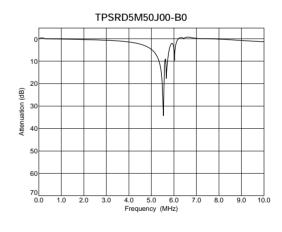


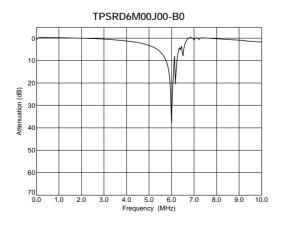
■ Spurious Response

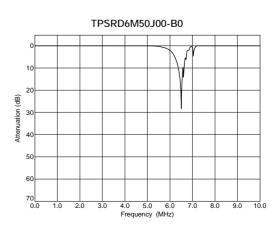




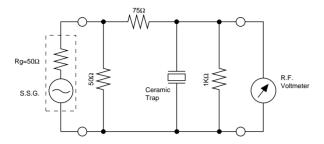








■ Test Circuit





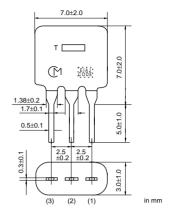
Ceramic Traps TPSRD Series for 2ch Sound TV in Germany

Ceramic trap TPSRD_W series has same structure as TPSRD_B series. But they can trap 2 individual frequencies in one time. Recommended for 2 channels multi-sound TV system.

■ Features

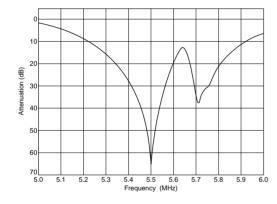
- 1. Space saving.
- 2. Three-terminals type.



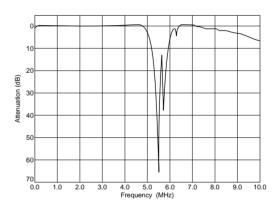


| Part Number | Nominal Center | Nominal Center | Attenuation | Attenuation | 30dB Attenuation |
|-----------------|-----------------|-----------------|-------------|-------------|------------------|
| | Frequency (fn1) | Frequency (fn2) | (at fn1) | (at fn2) | BW (fn1) |
| | (MHz) | (MHz) | (dB) | (dB) | (kHz) |
| TPSRD5M50W00-B0 | 5.500 | 5.742 | 32 min. | 25 min. | 70 min. |

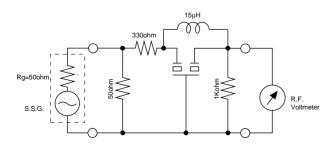
■ Frequency Characteristics



■ Spurious Response



■ Test Circuit





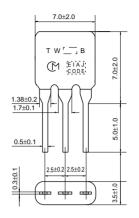
Double Traps TPWRD Series

Ceramic trap TPWRD_B series consist of 2 wafers with 2 trap frequencies. Recommended for Dual standard set.

■ Features

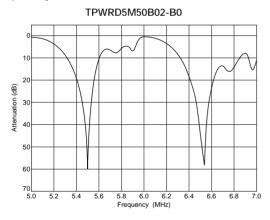
- 1. Good performance of attenuation.
- 2. Small and thin package.
- 3. Three-terminals type.

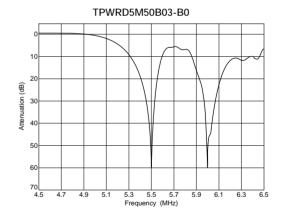


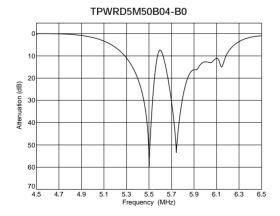


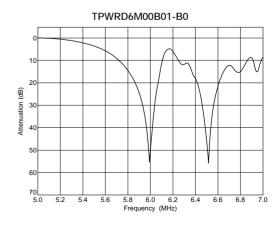
| Part Number | Nominal Center Frequency (fn1) (MHz) | Nominal Center Frequency (fn2) (MHz) | Attenuation (at fn1) (dB) | Attenuation (at fn2) (dB) | 30dB Attenuation BW (fn1) (kHz) |
|-----------------|--|--|---------------------------------|---------------------------------|---------------------------------------|
| TPWRD5M50B02-B0 | 5.500 | 6.500 | 30 min. | 30 min. | 50 min. |
| TPWRD5M50B03-B0 | 5.500 | 6.000 | 30 min. | 30 min. | 50 min. |
| TPWRD5M50B04-B0 | 5.500 | 5.742 | 30 min. | 30 min. | 50 min. |
| TPWRD6M00B01-B0 | 6.000 | 6.500 | 30 min. | 30 min. | 70 min. |

■ Frequency Characteristics







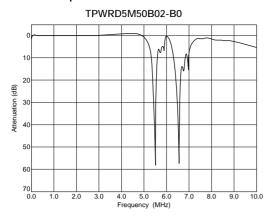


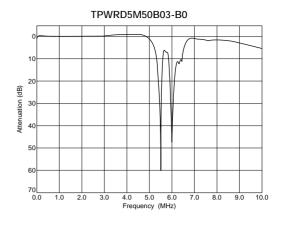
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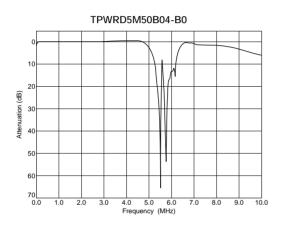


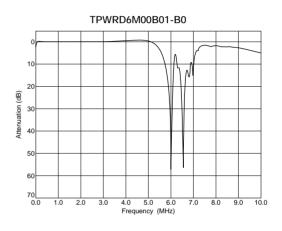


■ Spurious Response

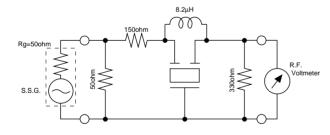








■ Test Circuit





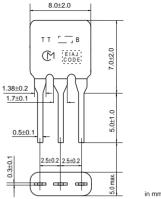
Triple Traps TPTRD Series

Ceramic trap TPTRD_B series consist of 3 wafers with 3 trap frequencies. Recommended for Multi standard set.

■ Features

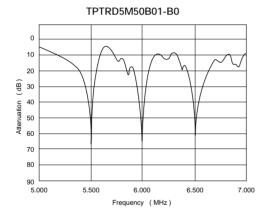
- 1. Good performance of attenuation.
- 2. Space saving for Multi set.
- 3. Three-terminals type.



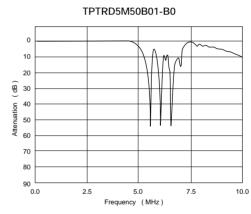


| Part Number | Nominal Center | Nominal Center | Nominal Center | Attenuation | Attenuation | Attenuation | 30dB Attenuation |
|-----------------|-----------------|-----------------|-----------------|-------------|-------------|-------------|------------------|
| | Frequency (fn1) | Frequency (fn2) | Frequency (fn3) | (at fn1) | (at fn2) | (at fn3) | BW (fn1) |
| | (MHz) | (MHz) | (MHz) | (dB) | (dB) | (dB) | (kHz) |
| TPTRD5M50B01-B0 | 5.500 | 6.000 | 6.500 | 30 min. | 30 min. | 30 min. | 50 min. |

■ Frequency Characteristics



■ Spurious Response



■ Test Circuit

Ceramic Trap Lead Type Notice

■ Notice (Soldering and Mounting)

The component cannot be withstand washing.

■ Notice (Handling)

- 1. Do not use this product with bend. The component may be damaged if excess mechanical stress is applied to it mounted on the printed circuit board.
- 2. The component may be damaged when an excess stress will be applied.
- 3. All kinds of re-flow soldering must not be applied on the component.
- 4. Do not clean or wash the component as it is not hermetically sealed.
- 5. Please contact Murata or Murata representative for soldering condition, in case of using lead free

solder.

- 6. Do not use strong acidity flux, more than 0.2wt% chlorine content, in flow soldering.
- 7. In case of covering filter with over coat, conditions such as material of resin, cure temperature, and so on should be evaluated well.
- 8. Accurate test circuit values are required to measure electrical characteristics. It may be a cause of miss-correlation if there is any deviation, especially stray capacitance, from the test circuit in the specification.





Discriminators Wide-Band Type CDSRH Series

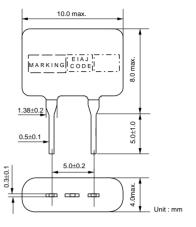
Ceramic discriminator CDSRH series is a wide band, low profil type using thickness shear mode vibration.

■ Features

- 1. Low profile 8.0mm type.
- 2. Suitable for Multi-sound Broadcasting system.
- 3. Two-terminals type and three-terminals type are available.

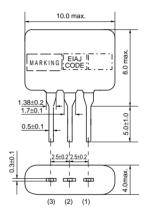


CDSRH_EK Series





CDSRH_CK Series



| n | m | ır | n |
|---|---|----|---|

| Part Number | Nominal Center Frequency (fn) (MHz) | Recovered Audio 3dB BW (kHz) | Recovered Audio Output Voltage(at fn) (mV) | Distortion (%) | IC | Detection Method |
|-------------------|---|------------------------------------|--|-------------------|-------------|------------------|
| CDSRH4M50EK020-B0 | 4.500 | fn±80 min. | 245 min. | 1.0 max. | LA7550/7555 | Quadrature |
| CDSRH4M50EK023-B0 | 4.500 | fn±60 min. | 230 min. | 2.5 max. | M51496P | Quadrature |
| CDSRH4M50EK035-B0 | 4.500 | fn±55 min. | 240 min. | 1.0 max. | LA7680/7681 | Quadrature |
| CDSRH4M50EK049-B0 | 4.500 | fn±100 min. | 220 min. | 1.0 max. | LA7577 | Quadrature |
| CDSRH4M50EK060-B0 | 4.500 | fn±90 min. | 90 min. | 1.0 max. | M52318SP | Quadrature |
| CDSRH4M50EK069-B0 | 4.500 | fn±60 min. | 320 min. | 1.5 max. | TA8701N | Quadrature |
| CDSRH4M50EK070-B0 | 4.500 | fn±50 min. | 65 min. | 1.5 max. | M52007FP | Quadrature |
| CDSRH5M50EK023-B0 | 5.500 | fn±45 min. | 220 min. | 1.0 max. | M51496P | Quadrature |
| CDSRH5M50EK035-B0 | 5.500 | fn±80 min. | 350 min. | 1.0 max. | LA7680/7681 | Quadrature |
| CDSRH5M50EK049-B0 | 5.500 | fn±60 min. | 500 min. | 1.0 max. | LA7577 | Quadrature |
| CDSRH5M50EK054-B0 | 5.500 | fn±100 min. | 300 min. | 1.2 max. | TDA3857 | Quadrature |
| CDSRH5M50EK060-B0 | 5.500 | fn±70 min. | 190 min. | 1.5 max. | M52318SP | Quadrature |
| CDSRH5M74EK054-B0 | 5.742 | fn±90 min. | 340 min. | 1.2 max. | TDA3857 | Quadrature |
| CDSRH6M00EK049-B0 | 6.000 | fn±60 min. | 500 min. | 1.0 max. | LA7577 | Quadrature |
| CDSRH6M00EK054-B0 | 6.000 | fn±90 min. | 340 min. | 1.5 max. | TDA3857 | Quadrature |
| CDSRH6M00EK060-B0 | 6.000 | fn±60 min. | 180 min. | 2.5 max. | M52318SP | Quadrature |
| CDSRH6M50EK020-B0 | 6.500 | fn±110 min. | 350 min. | 1.2 max. | LA7550/7555 | Quadrature |
| CDSRH6M50EK049-B0 | 6.500 | fn±60 min. | 500 min. | 1.0 max. | LA7577 | Quadrature |
| CDSRH6M50EK054-B0 | 6.500 | fn±90 min. | 340 min. | 1.5 max. | TDA3857 | Quadrature |
| CDSRH6M50EK060-B0 | 6.500 | fn±60 min. | 160 min. | 2.5 max. | M52318SP | Quadrature |
| CDSRH4M50CK020-B0 | 4.500 | fn±50 min. | 280 min. | 2.0 max. | μPC1382C | Quadrature |
| CDSRH4M50CK026-B0 | 4.500 | fn±40 min. | 70 min. | 1.2 max. | LA7530 | Quadrature |
| CDSRH4M50CK029-B0 | 4.500 | fn±65 min. | 250 min. | 1.2 max. | M51365SP | Quadrature |
| CDSRH4M50CK030-B0 | 4.500 | fn±40 min. | within130 +30/-20mV | 3.0 max. | M51348FP | Quadrature |

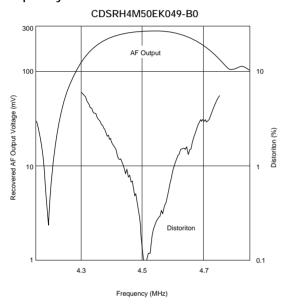
| Part Number | Nominal Center Frequency (fn) (MHz) | Recovered Audio 3dB BW (kHz) | Recovered Audio Output Voltage(at fn) (mV) | Distortion (%) | IC | Detection Method |
|-------------------|---|------------------------------------|--|-------------------|----------|------------------|
| CDSRH5M50CK026-B0 | 5.500 | fn±50 min. | 500 min. | 3.0 max. | LA7530 | Quadrature |
| CDSRH5M50CK029-B0 | 5.500 | fn±70 min. | 420 min. | 1.5 max. | M51365SP | Quadrature |
| CDSRH5M50CK030-B0 | 5.500 | fn±55 min. | 150 min. | 3.0 max. | M51348FP | Quadrature |
| CDSRH6M00CK026-B0 | 6.000 | fn±50 min. | 400 min. | 3.0 max. | LA7530 | Quadrature |
| CDSRH6M00CK029-B0 | 6.000 | fn±70 min. | 450 min. | 1.7 max. | M51365SP | Quadrature |
| CDSRH6M00CK030-B0 | 6.000 | fn±55 min. | 150 min. | 3.0 max. | M51348FP | Quadrature |
| CDSRH6M50CK020-B0 | 6.500 | fn±60 min. | 480 min. | 2.0 max. | μPC1382C | Quadrature |
| CDSRH6M50CK026-B0 | 6.500 | fn±35 min. | 400 min. | 3.0 max. | LA7530 | Quadrature |
| CDSRH6M50CK029-B0 | 6.500 | fn±70 min. | 430 min. | 2.0 max. | M51365SP | Quadrature |

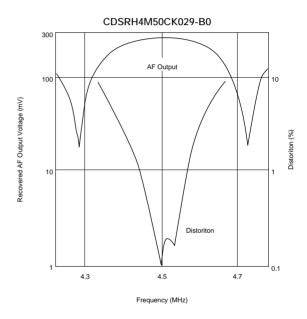
Characteristics shown above is as of 100% Dev.

Part Numbers are varied with applied IC.

Please note circuits and specifications are also varied with IC. (->Please check TM1561)

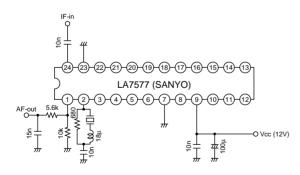
■ Frequency Characteristics



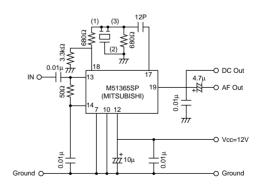


■ Test Circuit

CDSRH4M50EK049-B0



CDSRH4M50CK029-B0





Discriminators Low-Profile Type CDSRL Series

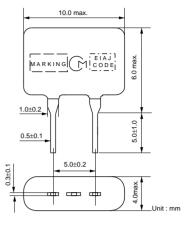
Ceramic discriminator CDSRL series is a wide band, low profile type using thickness shear mode vibration.

■ Features

- 1. Low profile 6.0mm type.
- 2. Suitable for Multi-sound Broadcasting system.
- 3. Two-terminals type and three-terminals type are available.

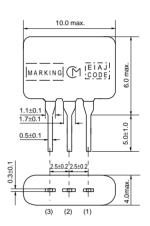


CDSRL_EK Series





CDSRL_CK Series



| n | mm |
|---|----|

| Part Number | Nominal Center Frequency (fn) (MHz) | Recovered Audio 3dB BW (kHz) | Recovered Audio Output Voltage(at fn) (mV) | Distortion (%) | IC | Detection Method |
|-------------------|---|------------------------------------|--|-------------------|-------------|------------------|
| CDSRL4M50EK020-B0 | 4.500 | fn±80 min. | 245 min. 1.0 max. | | LA7550/7555 | Quadrature |
| CDSRL5M50EK020-B0 | 5.500 | fn±100 min. | 330 min. | 1.2 max. | LA7550/7555 | Quadrature |
| CDSRL4M50CK020-B0 | 4.500 | fn±50 min. | 280 min. | 2.0 max. | μPC1382C | Quadrature |
| CDSRL4M50CK029-B0 | 4.500 | fn±65 min. | 250 min. | 1.2 max. | M51365SP | Quadrature |
| CDSRL4M50CK030-B0 | 4.500 | fn±40 min. | within130 +30/-20mV | 3.0 max. | M51348FP | Quadrature |
| CDSRL5M50CK030-B0 | 5.500 | fn±55 min. | 150 min. | 3.0 max. | M51348FP | Quadrature |
| CDSRL6M00CK029-B0 | 6.000 | fn±70 min. | 450 min. | 1.7 max. | M51365SP | Quadrature |
| CDSRL6M00CK030-B0 | 6.000 | fn±55 min. | 150 min. | 3.0 max. | M51348FP | Quadrature |
| CDSRL6M50CK020-B0 | 6.500 | fn±60 min. | 480 min. | 2.0 max. | μPC1382C | Quadrature |
| CDSRL6M50CK026-B0 | 6.500 | fn±35 min. | 400 min. | 3.0 max. | LA7530 | Quadrature |

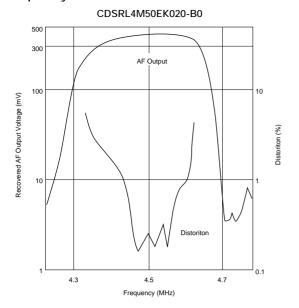
Characteristics shown above is as of 100% Dev.

Part Numbers are varied with applied IC.

Please note circuits and specifications are also varied with IC. (->Please check TM1561)

14

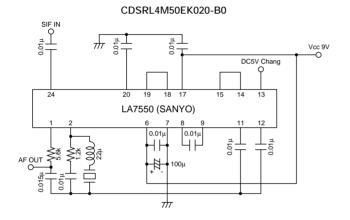
■ Frequency Characteristics



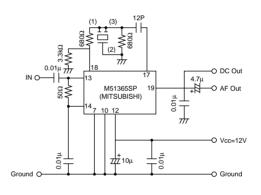
300 AF Output 10 (%) vojugisja 10 Distoriton 0.1 Frequency (MHz)

CDSRL4M50CK029-B0

■ Test Circuit



CDSRL4M50CK029-B0



Ceramic Discriminator Notice

■ Notice (Soldering and Mounting)

The component cannot be withstand washing.

■ Notice (Handling)

- Do not use this product with bend. The component may be damaged if excess mechanical stress is applied to it mounted on the printed circuit board.
- 2. The component may be damaged when an excess stress will be applied.
- 3. All kinds of re-flow soldering must not be applied on the component.
- 4. Do not clean or wash the component as it is not hermetically sealed.
- 5. Please contact Murata or Murata representative for soldering condition, in case of using lead free

solder.

- 6. Do not use strong acidity flux, more than 0.2wt% chlorine content, in flow soldering.
- In case of covering filter with over coat, conditions such as material of resin, cure temperature, and so on should be evaluated well.
- 8. Accurate test circuit values are required to measure electrical characteristics. It may be a cause of miss-correlation if there is any deviation, especially stray capacitance, from the test circuit in the specification.

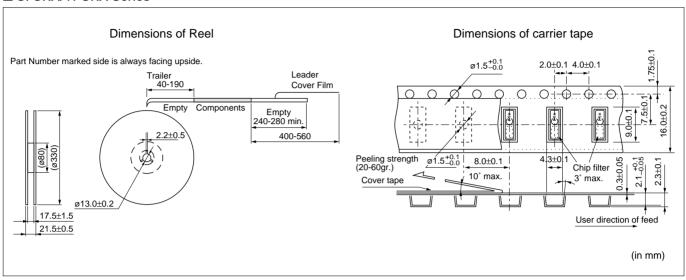


Chip Type Packaging

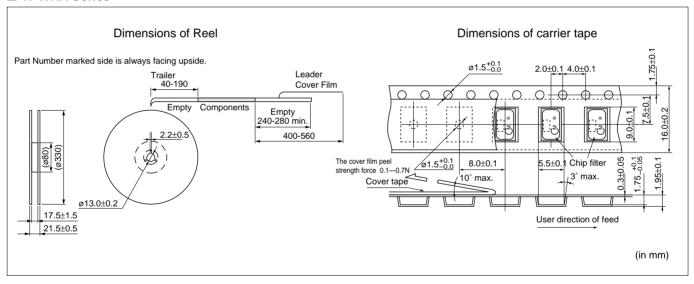
■ Chip Type Minimum Quantity

3000 pcs./dia. 330mm Reel 500 pcs./Bag (TPWKA series only)

■ SFSKA/TPSKA Series



■ TPWKA Series



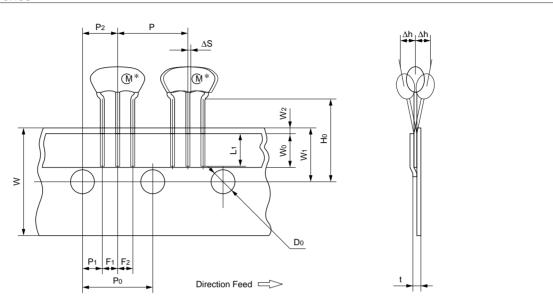
Lead Type Packaging

■ Lead Type Minimum Quantity

Bulk: 500 pcs.

Ammo Pack : 2000 pcs. (SFSRA/TPSRA series) 1500 pcs. (CDSRH/TPWRD/TPTRD series)

■ SFSRA/TPSRA Series



| Item | Code | Dimensions | Tolerance | Remarks |
|---|----------------|------------|------------|---|
| Lead length under the hole down tape | L1 | 5.0 min. | | |
| Pitch of component | Р | 12.7 | ±0.5 | Tolerance for Pitches 10XP0=127±1 |
| Pitch of sprocket hole (I) | Po | 12.7 | ±0.2 | |
| Length from hole center to lead | P1 | 3.85 | ±0.5 | |
| Length from hole center to component center | P ₂ | 6.35 | ±0.5 | |
| Lead spacing (I) | F1 | 2.5 | ±0.2 | |
| Lead spacing (II) | F2 | 2.5 | ±0.2 | |
| Slant to the forward or backward | Δh | 0 | ±1.0 | |
| Slant to the left or right | ΔS | 0 | ±1.0 | |
| Width of carrier tape | W | 18.0 | ±0.5 | |
| Width of hold down tape | Wo | 6.0 min. | | |
| Position of Sprocket hole | W1 | 9.0 | ±0.5 | |
| Gap of hold down tape and carrier Tape | W2 | 0 | +0.5 -0 | Hold down tape doesn't exceed the carrier tape. |
| Distance between the center of sprocket hole and lead stopper | Ho | 18.0 | ±0.5 | |
| Diameter of sprocket hole | D ₀ | ø4.0 | ±0.2 | |
| Total tape thickness | t | 0.6 | ±0.2 | |
| Pitch of sprocket hole (II) | Po20 | 254.0 | ±1.5 | The pitch of 20 sprocket holes |

(in mm)

Continued on the following page.

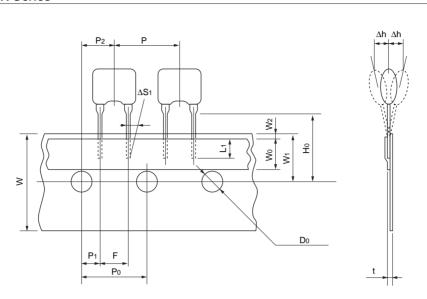




Lead Type Packaging

Continued from the preceding page.

■ TPSRD/CDSRH_EK Series



| Item | Code | Dimensions | Tolerance | Remarks |
|---|----------------|------------|--------------|--|
| Lead length under the hole down tape | L1 | 3.0 min. | | |
| Pitch of component | Р | 12.7 | ±0.5 | |
| Pitch of sprocket hole (1) | P0 | 12.7 | ±0.2 | |
| Length from hole center to lead | P1 | 3.85 | ±0.5 | |
| Length from hole center to component center | P2 | 6.35 | ±0.5 | |
| Lead spacing | F | 5.0 | +0.5 -0.2 | |
| Slant to the forward or backward | Δh | 0 | ±1.0 | |
| Slant to the left or right | ΔS1 | 0 | ±1.0 | |
| Width of carrier tape | W | 18.0 | ±0.5 | |
| Width of hold down tape | Wo | 6.0 min. | | |
| Position of sprocket hole | W1 | 9.0 | ±0.5 | |
| Gap of hold down tape and Carrier tape | W2 | 0 | +0.5 -0.0 | Hold down tape doesn't exceed the carrier tape |
| Distance between the center of sprocket hole and lead stopper | Ho | 18.0 | ±0.5 | |
| Diameter of sprocket hole | D ₀ | ø4.0 | ±0.2 | |
| Total tape thickness | t | 0.6 | ±0.2 | |
| Pitch of sprocket hole (2) | Po20 | 254.0 | ±1.5 | The pitch of 20 sprocket holes |

(in mm)

Continued on the following page.



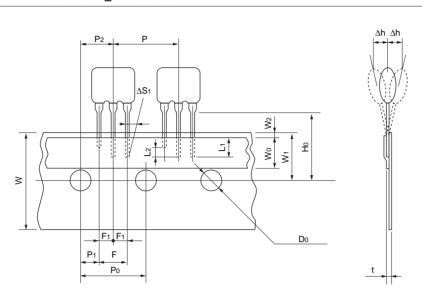


Lead Type Packaging



Continued from the preceding page.

■ TPSRD_W/TPWRD/TPTRD/CDSRH_CK Series



| Item | Code | Dimensions | Tolerance | Remarks |
|---|----------------|------------|--------------|---------------------------------------|
| Lead Length under the Hold Down Tape | L1 | 3.0 min. | | |
| Length of Cat off | L2 | 2.0 max. | | To distinguish the direction |
| Pitch of Components | Р | 12.7 | ±0.5 | |
| Pitch of Sprocket Hole (1) | Po | 12.7 | ±0.2 | |
| Length from Hole Center to Lead | P1 | 3.85 | ±0.5 | |
| Length from Hole Center to Component Center | P2 | 6.35 | ±0.5 | |
| Pitch of the Terminal (1) | F | 5.0 | +0.5 -0.2 | |
| Pitch of the Terminal (2) | F1 | 2.5 | ±0.2 | |
| Slant to the Forward or Backward | Δh | 0 | ±1.0 | |
| Slant to the Left or Right | ΔS1 | 0 | ±1.0 | |
| Width of Carrier Tape | W | 18.0 | ±0.5 | |
| Width of Hold Down Tape | Wo | 6.0 min. | | Must not protrude to the carrier tape |
| Position of Sprocket Hole | W1 | 9.0 | ±0.5 | |
| Gap of Hold Down Tape and Carrier Tape | W2 | 0 | +0.5 -0 | |
| Distance Between the Center of Sprocket Hole and Lead Stpper | H ₀ | 18.0 | ±0.5 | |
| Diameter of Sprocket Hole | D ₀ | ø4.0 | ±0.2 | |
| Total Tape Thickness | t | 0.6 | ±0.2 | |
| Pitch of Sprocket Hole (2) | P020 | 254.0 | ±1.5 | The pitch of 20 sprocket holes |

(in mm)



∧ 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

- 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.)
 - Traffic signal equipment
 - 8 Disaster prevention / crime prevention equipment
 - 9 Data-processing equipment
 - ① Application of similar complexity and/or reliability requirements to the applications listed in the above
- 3. Product specifications in this catalog are as of September 2001. 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 your ordering. If there are any questions, please contact our sales representatives or product engineers
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