Common mode filters
High-speed differential signal line (USB2.0, LVDS, etc.)
TCM-M series

TCM0403M type

**FEATURES**
- Thin-film common mode filter based on the thin-film processing techniques and material technology.
- Has EMC suppression by achieving wide frequency range (cutoff frequency of 4GHz or higher) differential mode transmission while ensuring deep common mode attenuation at high frequencies with virtually no affect on the high-speed differential transmission line signal.
- Lineup includes 0403 (L0.45×W0.30×T0.23mm), the industry's smallest thin-film common mode filter.
- Operating temperature range: –25 to +85°C

**APPLICATION**
- Noise countermeasure for high-speed differential interfaces (USB, HDMI, LVDS, MIPI, etc.) for mobile devices and general consumer products such as smartphones, tablets, digital cameras, and portable music players.
- Application guides: Smart phones/tablets

**PART NUMBER CONSTRUCTION**

<table>
<thead>
<tr>
<th>Series name</th>
<th>LxWxT dimensions</th>
<th>Product internal code</th>
<th>Characteristic internal code</th>
<th>Number of lines</th>
<th>Packaging style</th>
<th>Internal code</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCM</td>
<td>0.45×0.3×0.23 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CHARACTERISTICS SPECIFICATION TABLE**

<table>
<thead>
<tr>
<th>Common mode attenuation (dB)</th>
<th>Cutoff frequency (GHz)typ.</th>
<th>DC resistance [1 line] (Ω)</th>
<th>Rated current (A)max.</th>
<th>Rated voltage (V)max.</th>
<th>Insulation resistance (MΩ)min.</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>18min. @5.0GHz</td>
<td>16.0</td>
<td>1.0±30%</td>
<td>0.05</td>
<td>5</td>
<td>10</td>
<td>TCM0403M-120-2P-T210</td>
</tr>
<tr>
<td>15min. @4.0G to 6.0GHz</td>
<td>13.0</td>
<td>2.0±30%</td>
<td>0.05</td>
<td>5</td>
<td>10</td>
<td>TCM0403M-350-2P-T210</td>
</tr>
<tr>
<td>18min. @2.4GHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18min. @2.0G to 3.0GHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23min. @700M to 850MHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24min. @850M to 1.0GHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12min. @1.0G to 2.0GHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Measurement equipment

<table>
<thead>
<tr>
<th>Measurement item</th>
<th>Product No.</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common mode attenuation</td>
<td>N5230A</td>
<td>Keysight Technologies</td>
</tr>
<tr>
<td>DC resistance</td>
<td>4338A</td>
<td>Keysight Technologies</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>4339A</td>
<td>Keysight Technologies</td>
</tr>
</tbody>
</table>

* Equivalent measurement equipment may be used.

Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.
Please note that the contents may change without any prior notice due to reasons such as upgrading.

20210827

cmf_commercial_signal_tcm0403m_en
TCM0403M type

**IMPEDEANCE VS. FREQUENCY CHARACTERISTICS**

![Graph showing impedance vs. frequency characteristics for TCM0403M type](image)

**INSERTION LOSS VS. FREQUENCY CHARACTERISTICS**

![Graph showing insertion loss vs. frequency characteristics for TCM0403M type](image)

<table>
<thead>
<tr>
<th>Measurement equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product No.</strong></td>
</tr>
<tr>
<td>E4991A</td>
</tr>
</tbody>
</table>

* Equivalent measurement equipment may be used.

<table>
<thead>
<tr>
<th>Measurement equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product No.</strong></td>
</tr>
<tr>
<td>N5230A</td>
</tr>
</tbody>
</table>

* Equivalent measurement equipment may be used.
TCM0403M type

### SHAPE & DIMENSIONS

Dimensions in mm

### PACKAGING STYLE

#### REEL DIMENSIONS

### RECOMMENDED LAND PATTERN

Dimensions in mm

### CIRCUIT DIAGRAM

*No polarity*

### RECOMMENDED REFLOW PROFILE

![Reflow Profile Diagram]

### RECOMMENDED REFLOW PROFILE

Time

- **Preheating**
  - Temperature: 150°C
  - Duration: 60 to 120s
- **Soldering**
  - Peak Temperature: 245°C
  - Duration: 10 to 30s
- **Natural Cooling**
  - Temperature: 230°C
  - Duration: 2s

### TAPE DIMENSIONS

Dimensions in mm

### RECOMMENDED REFLOW PROFILE

- **Type**
- **A**
- **B**
- **K**

<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
<th>B</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCM0403M</td>
<td>0.40</td>
<td>0.55</td>
<td>0.27</td>
</tr>
</tbody>
</table>

### PACKAGING QUANTITY

| Package quantity | 10,000 pcs/reel |

### TEMPERATURE RANGE, INDIVIDUAL WEIGHT

<table>
<thead>
<tr>
<th>Operating temperature range</th>
<th>Storage temperature range*</th>
<th>Individual weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25°C to 85°C</td>
<td>-25°C to 85°C</td>
<td>0.2 mg</td>
</tr>
</tbody>
</table>

* The storage temperature range is for after the assembly.

---

⚠️ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.

Please note that the contents may change without any prior notice due to reasons such as upgrading.

---

20210827

cmf_commercial_signal_tcm0403m_en
REMINDERS FOR USING THESE PRODUCTS

Before using these products, be sure to request the delivery specifications.

SAFETY REMINDERS

Please pay sufficient attention to the warnings for safe designing when using this products.

⚠️ REMINDERS

- The storage period is within 6 months. Be sure to follow the storage conditions (temperature: 5 to 40°C, humidity: 20 to 70% RH or less).
  If the storage period elapses, the soldering of the terminal electrodes may deteriorate.
- Do not use or store in locations where there are conditions such as gas corrosion (salt, acid, alkali, etc.).
- Before soldering, be sure to preheat components.
  The preheating temperature should be set so that the temperature difference between the solder temperature and chip temperature does not exceed 150°C.
- Soldering corrections after mounting should be within the range of the conditions determined in the specifications.
  If overheated, a short circuit, performance deterioration, or lifespan shortening may occur.
- When embedding a printed circuit board where a chip is mounted to a set, be sure that residual stress is not given to the chip due to the overall distortion of the printed circuit board and partial distortion such as at screw tightening portions.
- Self heating (temperature increase) occurs when the power is turned ON, so the tolerance should be sufficient for the set thermal design.
- Carefully lay out the coil for the circuit board design of the non-magnetic shield type.
  A malfunction may occur due to magnetic interference.
- Use a wrist band to discharge static electricity in your body through the grounding wire.
- Do not expose the products to magnets or magnetic fields.
- Do not use for a purpose outside of the contents regulated in the delivery specifications.
- The products listed on this catalog are intended for use in general electronic equipment (AV equipment, telecommunications equipment, home appliances, amusement equipment, computer equipment, personal equipment, office equipment, measurement equipment, industrial robots) under a normal operation and use condition.
  The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require a more stringent level of safety or reliability, or whose failure, malfunction or trouble could cause serious damage to society, person or property.
  If you intend to use the products in the applications listed below or if you have special requirements exceeding the range or conditions set forth in the each catalog, please contact us.

1. Aerospace/aviation equipment
2. Transportation equipment (cars, electric trains, ships, etc.)
3. Medical equipment
4. Power-generation control equipment
5. Atomic energy-related equipment
6. Seabed equipment
7. Transportation control equipment
8. Public information-processing equipment
9. Military equipment
10. Electric heating apparatus, burning equipment
11. Disaster prevention/crime prevention equipment
12. Safety equipment
13. Other applications that are not considered general-purpose applications

When designing your equipment even for general-purpose applications, you are kindly requested to take into consideration securing protection circuit/device or providing backup circuits in your equipment.