Features
1. Fast Ethernet Support
Conforms to the TIA/EIA-568-A data wiring standard and meets requirements of CAT5 transmission performance for 1,2-3,6 conductor pairs. As such, these products fully support Fast Ethernet (100BASE-TX) transmission.

2. Subminiature Design Contributes to Saving Space in the Equipment
Having built-in optical indicators, with height of only 11.5mm, width of 15mm and depth of 17.5mm the connectors can be used in extremely limited spaces.

3. Built-in Optical Indicators
Optical indicators are integral part of the connectors help saving space on customer’s board. Compared with LED type indicators, they do not emit any electrical noise.

4. EMI protection
Metal shield covers the outer surfaces of the connectors assuring complete protection against electromagnetic interference. Built-in multiple shield and ground contacts assure reliable connection with the mounting panel as well as with the mating connectors.

5. Environmental considerations
Plating is lead-free in order to protect environment.

6. FCC Standards
Meets requirements of FCC Title 47, Part 68, Subpart F.

Applications
Telecom Hubs, Routers, Bridges and ATM Transmission Equipment, Ethernet Switches and Networking Equipment, Test and Measurement Equipment, Medical Diagnostic Equipment.
### Product Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Insulation resistance</td>
<td>100 M ohms min.</td>
<td>100 V DC</td>
</tr>
<tr>
<td>2. Dielectric Withstanding Voltage (between adjacent contacts)</td>
<td>No flashover or insulation breakdown</td>
<td>500 V AC applied for one minute</td>
</tr>
<tr>
<td>3. Withstanding voltage (between contact and shield)</td>
<td>No flashover or insulation breakdown</td>
<td>1500 V AC / one minute</td>
</tr>
<tr>
<td>4. Contact resistance</td>
<td>230 m ohms max.</td>
<td>100mA</td>
</tr>
<tr>
<td>5. Vibration</td>
<td>No electrical discontinuity of 5 μ sec. or more. Contact resistance: 250m ohms max.</td>
<td>Frequency: 10 to 55 Hz, single amplitude of 0.75 mm, 2 hours / 3 axis</td>
</tr>
<tr>
<td>6. Shock</td>
<td>No electrical discontinuity of 5 μ sec. or more. Contact resistance: 250m ohms max.</td>
<td>Acceleration of 490 m/s², 11 ms duration, sine half-wave waveform, 3 cycles in each of the 3 axis</td>
</tr>
<tr>
<td>7. Durability (mating/un-mating)</td>
<td>Contact resistance: 250m ohms max.</td>
<td>200 cycles</td>
</tr>
<tr>
<td>8. Temperature cycle</td>
<td>Contact resistance: 250 m ohms max. Insulation resistance: 100 M ohms min.</td>
<td>Temperature: -55°C→+15°C to +35°C→+85°C→+15°C to +35°C Duration: 30→2 to 3→30→2 to 3(Minutes) 5 cycles</td>
</tr>
<tr>
<td>9. Humidity</td>
<td>Contact resistance: 250 m ohms max. Insulation resistance: 1 M ohms min. (High humidity) Insulation resistance: 10 M ohms min. (Dry state)</td>
<td>500 hours at temperature of 40°C and humidity of 90% to 95%</td>
</tr>
<tr>
<td>10. Salt Spray</td>
<td>Contact resistance: 250 m ohms max.</td>
<td>Exposed to density 5% salt water for 48 hours</td>
</tr>
</tbody>
</table>

Note: Includes temperature rise caused by current flow.

### Materials

<table>
<thead>
<tr>
<th>Part</th>
<th>Material</th>
<th>Finish</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>PBT</td>
<td>Color: Black</td>
<td>UL94V-0</td>
</tr>
<tr>
<td>Contact</td>
<td>Copper alloy</td>
<td>Contact area: Gold plating Termination area: Tin alloy plating</td>
<td>——</td>
</tr>
<tr>
<td>Optical pipe</td>
<td>Polycarbonate</td>
<td>Color: Transparent</td>
<td>UL94V-0</td>
</tr>
<tr>
<td>Shield</td>
<td>Copper alloy</td>
<td>Tin plating</td>
<td>——</td>
</tr>
</tbody>
</table>

### Ordering Information

- **Jacks**

  TM11 R - 5M2 - 8 8 - LP

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series name</td>
<td>TM11 Series</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector type</td>
<td>R: Jack</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jack type</td>
<td>5M2: PCB Right-angle through hole type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jack opening code</td>
<td>8: 8 contacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of inserted contacts</td>
<td>8: 8 contact</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical pipe</td>
<td>LP: With optical pipe inserted Blank: Without optical pipe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Modular Jack Connectors Supporting CAT5e (for 1,2-3,6 pair)**

**Single Port With Built-in Optical Pipe**

![Image of modular jack connectors with built-in optical pipe]

<table>
<thead>
<tr>
<th>Part Number</th>
<th>CL No.</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM11R-5M2-88-LP</td>
<td>222-2905-0</td>
<td>YES</td>
</tr>
</tbody>
</table>

**Single Port Without Optical Pipe**

![Image of modular jack connectors without optical pipe]

<table>
<thead>
<tr>
<th>Part Number</th>
<th>CL No.</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM11R-5M2-88</td>
<td>222-2906-2</td>
<td>YES</td>
</tr>
</tbody>
</table>
**Recommended PCB mounting patterns**

*With Built-in Optical Pipe*  
*Without Optical Pipe*

> Suggested LEDs

---

**Recommendations for PCB Design**

1. Areas indicated should be free of conductive traces.
2. Area indicated should be free of conductive & ground traces.
3. Recommended board thickness: 1.6mm.
4. To assure that the indicator light pipes operate correctly, the LED’s must be installed directly on the PCB, within recommended dimensions and with light emitting center in upward direction.
   Contact applicable manufacturer for LED specification.

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**Panel Cutout**

*For Both Types, With and Without Built-in Optical Pipe*

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**Recommendations for Panel Design**

1. The shield contacts should connect with the panel cut-out on all sides.

Note: IPA cleaning at room temperature is recommended for the cleaning of this product.  
When an aqueous cleaning agent is to be used, there is a concern that the light pipe (made of polycarbonate resin) may change color; therefore, please make a selection based on a table showing the effects on the resin.  
These tables are issued by the various manufacturers of cleaning agents.
CAT5 Transmission Characteristics Data

For fully mated receptacle (TM11R-5M2-88-LP) and plug (TM21P-88P).

Signal Attenuation

![Signal Attenuation Graph](image)

Near-End Crosstalk (NEXT)

![Near-End Crosstalk Graph](image)

Return Loss

![Return Loss Graph](image)
GUIDANCE FOR MODULAR CONNECTORS

Modular Connector Terminal Numbers

Unless otherwise specified, see the figures below for the terminal numbers of the product.

Attention to Plug Mating

Use only plugs conforming to FCC standards. Please pay particular attention to dimensions shown right.

Opening Size and Number of Conductors (6-Conductor)

See the figures below for the relationship between the opening size and the number of conductors of the jack connectors.

Recommended Soldering for Modular Dip Connectors

- Flow solder (automatic soldering machine)
  Pre-heat: 90 - 130°C
  Pre-heat time: 120 seconds maximum
  Solder temperature: 240 - 260°C
  Soldering time: 10 seconds maximum

- Hand soldering
  Soldering iron tip temperature: 350°C
  Soldering temperature: 5 seconds maximum
  Soldering iron output: 30 - 40W

Note: When soldering, use care not to apply excessive force to the connector terminals.

Recommended Solder composition: Paste, 96.5%Sn/3.0%Ag/0.5%Cu

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