**28+Gbps 0.5mm pitch Board to Board Connector**

**IT9 Series**

### Mechanical features
- 3row or 4row 0.5mm pitch SMT array
- Number of contacts: 84pos, 224pos.
- Mating length: 2.0mm
- High density
  - 50 Differential pairs / linear inch (224pos.)
- Blade variation
  - Differential signal blade (GSSGSSG…)
  - Power & low signal blade (SSSS…)
- Large mating guide ±1.6mm
- Multiple connectors are allowed on the same PCB
- Robustness (Large retention pegs)

### Signal integrity features
- **Insertion Loss-to-Crosstalk-Ratio (ICR)**
  The insertion loss-to-crosstalk ratio (ICR) with 5-aggressor differential FEXT meets the IEEE802.3ap specification for 28Gbps with plenty of margins.

### Transmission blade variation
- Cross section A-A
  - GSSG...GSSG
  - Differential Signal Blade
- Ground Plate

In cases where the application will demand a high level of reliability, such as automotive, please contact a company representative for further information.
### Product Specifications

**Rating**
- Current Rating: 0.3A (Differential signal blade)
- 0.5A (Power and low speed signal blade)
- Operating Temperature Range: -55~+85°C (Note 1)
- Storage Temperature Range: -10~+60°C (Note 2)

**Voltage Rating**: AC/DC 50V

**Item** | **Specification** | **Conditions**
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1. Contact Resistance | Row a: 60mΩ max Row b: 70mΩ max Row c: 80mΩ max Row d: 90mΩ max | 100mA
2. Insulation Resistance | 100MΩ min | 100V DC
3. Voltage Proof | No flashover or insulation breakdown | 150V AC / 1min
4. Durability (matting/unmating) | Contact resistance change: 10mΩ or less No damage, crack or looseness of parts | 100 cycles
5. Vibration | No electrical discontinuity of 1µs or more No damage, crack or looseness of parts | Frequency: 20 to 500Hz, Power spectral density: 0.02G²/Hz for 60 min in 3 directions
6. Thermal Shock | Contact resistance change: 10mΩ or less No damage, crack or looseness of parts | Temperature: -55°C → 20~35°C → 85°C → 20~35°C Time(min) 30 → 5MAX → 30 → 5MAX Under 10 cycles
7. Cyclic Temperature and Humidity | Contact resistance change: 10mΩ or less No damage, crack or looseness of parts | 25°C, 90-95% RH: 120 min Dwell time 65°C, 90-95% RH: 120 min Dwell time Under 60 cycles
8. Dry Heat | Contact resistance change: 10mΩ or less No damage, crack or looseness of parts | 105°C, 300 hours
9. Dust | Contact resistance change: 10mΩ or less | Unmated 1 hour
10. Mixed Flow Gas | Contact resistance change: 10mΩ or less | 30°C 70% RH, Mated 10days Cl₂: 10ppb, NO₂: 200ppb, H₂S: 10ppb, SO₂: 100ppb

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**Materials / Finish**

#### Receptacle
- **Part**: Housing, Contact, Retention peg
- **Material**: LCP, Copper alloy, Copper alloy
- **Finish & Remarks**: Black, UL94V-0, Contact area: Gold, Tin plating

#### Right Angle Plug
- **Part**: Housing, Contact, Blade, Ground plate, Retention peg
- **Material**: LCP, Copper alloy, Stainless steel
- **Finish & Remarks**: Black, UL94V-0, Contact area: Gold, Mount area: Gold, Tin plating

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### Product Number Structure

Refer to the chart below when determining the product specifications from the product number. Please select from the product numbers listed in this catalog when placing orders.

#### Straight Receptacle

**IT9M2 - *** S - 0.5 SV * (**)

#### Right Angle Plug

**IT9M2 - *** P - 0.5 SH * (**)

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**Note 1**: Includes temperature rise caused by current flow.
**Note 2**: "Storage" means a long-term storage state for the unused product before assembly to PCB.
**Note 3**: The rated current applies to per contact.
**Note 4**: Information contained in this catalog represents general requirements for this Series. Contact us for the drawings and specifications for a specific part number shown.
## Pin Assignment

### 84pos. : IT9M2-84P-0.5SH3 – IT9M2-84S-0.5SV3

#### Pin Number

<table>
<thead>
<tr>
<th>Number of Contacts</th>
<th>Column</th>
<th>Pin Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Row a</td>
<td>U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U</td>
<td></td>
</tr>
</tbody>
</table>

**Row c**: For High Speed Signal  
**Row b**: For High Speed Signal  
**Row a**: For Power and Low Speed Signal  

**S**: Differential Signal Pin (36 Pins / 18 Pairs)  
**G**: Dedicated Ground Pin (20 Pins)  
**U**: Universal Pin (28 Pins)

### 224pos. : IT9M2-224P-0.5SH4 – IT9M2-224S-0.5SV4

#### Pin Number

<table>
<thead>
<tr>
<th>Number of Contacts</th>
<th>Column</th>
<th>Pin Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Row d</td>
<td>U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U</td>
<td></td>
</tr>
<tr>
<td>Column</td>
<td>56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29</td>
<td></td>
</tr>
<tr>
<td>Row d</td>
<td>U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U U</td>
<td></td>
</tr>
</tbody>
</table>

**Row d**: For Power and Low Speed Signal  
**Row c**: For High Speed Signal  
**Row b**: For High Speed Signal  
**Row a**: For High Speed Signal  

**S**: Differential Signal Pin (108 Pins / 54 Pairs)  
**G**: Dedicated Ground Pin (60 Pins)  
**U**: Universal Pin (56 Pins)
**Signal Integrity**

- Pin assignment

![Diagram showing pin assignment](image)

- Insertion Loss and Return Loss

![Graphs showing insertion loss and return loss for different rows](image)
● Pin assignment

● Crosstalk
● Insertion-loss-to-crosstalk ratio (ICR)

The insertion-loss-to-crosstalk ratio (ICR) with 5-aggressor meets the extrapolated IEEE 802.3ap specification to 14GHz with plenty of margins.
# Receptacle

- **3row type : IT9M2-84S-0.5SV3**

- **4row type : IT9M2-224S-0.5SV4**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HRS No.</th>
<th>No. of Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT9M2-84S-0.5SV3</td>
<td>636-1610-0</td>
<td>84</td>
</tr>
<tr>
<td>IT9M2-224S-0.5SV4</td>
<td>636-1611-0</td>
<td>224</td>
</tr>
</tbody>
</table>
Right angle plug

3row type: IT9M2-84P-0.5SH3

4row type: IT9M2-224P-0.5SH4

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HRS No.</th>
<th>No. of Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT9M2-84P-0.5SH3</td>
<td>636-1606-0</td>
<td>84</td>
</tr>
<tr>
<td>IT9M2-224P-0.5SH4</td>
<td>636-1607-0</td>
<td>224</td>
</tr>
</tbody>
</table>
■ Recommended PCB Mounting Pattern
(Stencil thickness: t=0.13mm)

● Receptacle

IT9M2-84S-0.5SV3

IT9M2-224S-0.5SV4

● Right angle plug

IT9M2-84P-0.5SH3

IT9M2-224P-0.5SH4
**Processing recommendations**

***Mating Alignment Requirements***

Maximum mating guidance is up to ±1.6mm in both longitudinal and lateral directions.

These values do not include the influence of misalignment in other axis nor rotation / inclination in the same time, except for the misalignment in the single axis shown in each figure.

***Mating Angle Requirements***

2.5°Max
# Mounting Temperature Profile (Reference)

<table>
<thead>
<tr>
<th>Profile Feature</th>
<th>Condition</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheat/Soak</td>
<td>150˚C</td>
<td>Soak requirements should be determined by board design, oven capability, and paste activation requirements. Caution: “oversoaking” may exhaust flux and affect soldering.</td>
</tr>
<tr>
<td>Temperature Min (T&lt;sub&gt;min&lt;/sub&gt;)</td>
<td>200˚C</td>
<td>60-120 seconds</td>
</tr>
<tr>
<td>Time (ts) from (T&lt;sub&gt;min&lt;/sub&gt; to T&lt;sub&gt;max&lt;/sub&gt;)</td>
<td>223˚C</td>
<td>60-120 seconds</td>
</tr>
<tr>
<td>Ramp-up rate (TL to T&lt;sub&gt;p&lt;/sub&gt;)</td>
<td>3˚C/second max.</td>
<td>Other components may limit ramp rate to 2˚C/sec.</td>
</tr>
<tr>
<td>Liquidous temperature (TL)</td>
<td>217˚C</td>
<td>60-150 seconds</td>
</tr>
<tr>
<td>Time (t&lt;sub&gt;L&lt;/sub&gt;) maintained above TL</td>
<td>245˚C</td>
<td>30 seconds max.</td>
</tr>
<tr>
<td>Peak package body temperature (T&lt;sub&gt;p&lt;/sub&gt;)</td>
<td>245˚C</td>
<td>Cooler peak temperatures may require longer t&lt;sub&gt;L&lt;/sub&gt;. For users T&lt;sub&gt;p&lt;/sub&gt; must not exceed the classification temp (T&lt;sub&gt;c&lt;/sub&gt;) of 250˚C.</td>
</tr>
<tr>
<td>Time (t&lt;sub&gt;p&lt;/sub&gt;)* within 5˚C of the specified classification temperature (T&lt;sub&gt;c&lt;/sub&gt;)</td>
<td>30 seconds</td>
<td>5 seconds max.</td>
</tr>
<tr>
<td>Ramp-down rate (T&lt;sub&gt;p&lt;/sub&gt; to TL)</td>
<td>6˚C/second max.</td>
<td>Adjust profile if maximum exposure limits approached or exceeded.</td>
</tr>
<tr>
<td>Package Body Exposure Limit at Maximum Temperature</td>
<td>5 seconds</td>
<td>5 seconds</td>
</tr>
</tbody>
</table>

All temperatures refer to the center of the connector body, measured on the connector body surface that is facing up during assembly reflow. Reflow profiles in this document are based according to IPC/JEDEC J-STD-020D.1 and are for preconditioning. Actual board assembly profiles should be developed based on specific process needs and board designs and should not exceed the parameters in the table above.

Different solder pastes have different thermal performance characteristics. Consult with paste manufacturer for optimum profile setting.