Low-Angle Mating / Unmating Interface Connectors
EX60B Series

Features

1. Angle Mating / Unmating
   The cradle mount plug incorporates a unique rotating mating/unmating guide allowing the portable device to be placed or removed at an angle, up to 20° max. In addition, the angle mating force is approximately 3N (29 pos.), with extremely low unmating forces.

2. High durability
   Bellow configuration of the contacts guarantees 10,000 angle mating/unmating cycles, without any degradation of electrical and mechanical performance.

3. High-Speed Data Transfer
   A full eye pattern is maintained at a speed of 2.5 Gbps, making it applicable for high-speed differential signals of the USB 2.0 and PCI-EXPRESS.

4. Secure attachment
   Standard or extended flange versions of the receptacle can be mounted directly to the portable device’s case. The cradle mount plug is attached using screws.

5. Low profile - Space-Saving
   Small size (4 mm high × 6.8 mm deep) of the Receptacle allows efficient use of space in a portable device.

Applications

PDA and POS terminals, electronic books, tablet PCs, mobile TVs, media players, digital cameras and other devices requiring high durability angle mating/unmating connectors.

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

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Insulation resistance</td>
<td>1000MΩ min.</td>
<td>250V DC</td>
</tr>
<tr>
<td>2. Dielectric withstanding voltage</td>
<td>No flashover or insulation breakdown.</td>
<td>250V AC/ one minute</td>
</tr>
<tr>
<td>3. Contact resistance</td>
<td>60mΩ max.</td>
<td>100mA DC</td>
</tr>
<tr>
<td>4. Vibration</td>
<td>No electrical discontinuity of 1µ sec. max.</td>
<td>Frequency: 10 to 55 Hz, single amplitude of 0.75mm, for 2 hours in 6 axis.</td>
</tr>
<tr>
<td>5. Shock</td>
<td>No electrical discontinuity of 1µ sec. max.</td>
<td>Acceleration of 490 m/s², 11 ms duration, sine half-wave waveform, 3 cycles in each of the 6 axis.</td>
</tr>
<tr>
<td></td>
<td>Un-mating: 10N max. (Horizontal), 2N max. (At 20° angle)</td>
<td></td>
</tr>
<tr>
<td>7. Durability (mating/un-mating)</td>
<td>Contact resistance: 100mΩ max.</td>
<td>5000 cycles (Straight mating)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10000 cycles (At 20° angle)</td>
</tr>
<tr>
<td>8. Temperature cycle</td>
<td>Contact resistance: 100mΩ max.</td>
<td>Temperature: -55°C to +15°C to +35°C to +85°C to +15°C to +35°C</td>
</tr>
<tr>
<td></td>
<td>Insulation resistance: 1000MΩ min.</td>
<td>Time (Minutes): 30 → 2 to 3 → 30 → 2 to 3 5 cycles</td>
</tr>
<tr>
<td>9. Humidity</td>
<td>Contact resistance: 100mΩ max.</td>
<td>96 hours at temperature of 60°C and humidity of 90% to 95%.</td>
</tr>
<tr>
<td></td>
<td>Insulation resistance: 5MΩ min. (Dry state)</td>
<td></td>
</tr>
<tr>
<td>10. Salt spray</td>
<td>No corrosions</td>
<td>5% salt water solution for 48 hours</td>
</tr>
</tbody>
</table>

Note: Includes temperature rise caused by the current flow.

## Materials / Finish

### Receptacles (Portable device mount)

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
<th>Finish</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>LCP</td>
<td>Color: Black</td>
<td>UL94V-0</td>
</tr>
<tr>
<td>Contacts</td>
<td>Copper alloy</td>
<td>Contact area: Gold plated</td>
<td></td>
</tr>
<tr>
<td>Metal shield</td>
<td>Stainless steel</td>
<td>Tin plated</td>
<td></td>
</tr>
</tbody>
</table>

### Plugs (Cradle mount)

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
<th>Finish</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>Polyamide</td>
<td>Color: Black</td>
<td>UL94V-0</td>
</tr>
<tr>
<td>Contacts</td>
<td>Copper alloy</td>
<td>Contact area: Gold plated</td>
<td></td>
</tr>
<tr>
<td>Metal shield</td>
<td>Stainless steel</td>
<td>Tin-plated</td>
<td></td>
</tr>
<tr>
<td>Guide</td>
<td>Stainless steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>Stainless steel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Ordering Information

### Receptacles (Portable device mount)

- **EX 60 B - 29 P - FL**
  - Series name: EXB
  - Termination type: 60: Right angle SMT
  - Number of contacts: 15, 29
  - Contact type: P: Male contact (Receptacle = device mount)
  - Option: FL: Extended flanges

### Plugs (Cradle mount)

- **EX 60 B - 29 S**
  - Series name: EXB
  - Termination type: 60: Right angle SMT
  - Number of contacts: 15, 29
  - Contact type: P: Male contact (Receptacle = device mount)
## Receptacles

### 15 pos., 29 pos. (Standard)

![Image of receptacle](image)

### 29 pos. (Extended flanges)

![Image of receptacle with extended flanges](image)

<table>
<thead>
<tr>
<th>Part number</th>
<th>CL No.</th>
<th>HRS No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX60B-29P</td>
<td>29</td>
<td>CL232-0611-5</td>
<td>16.8</td>
<td>13.65</td>
<td>12.35</td>
<td>14.25</td>
<td>12.95</td>
<td>13.5</td>
<td>12.2</td>
<td>YES</td>
</tr>
<tr>
<td>EX60B-15P</td>
<td>15</td>
<td>CL232-0621-9</td>
<td>8.4</td>
<td>9.45</td>
<td>8.15</td>
<td>10.05</td>
<td>8.75</td>
<td>9.3</td>
<td>8.0</td>
<td></td>
</tr>
</tbody>
</table>

### Recommended PCB mounting pattern

- **EX60B-29P and EX60B-29P-FL**
- **EX60B-15P**
EX60B Series ● Low-Angle Mating / Unmating Interface Connectors

■ Portable device case cutout

![Portable device case cutout diagram]

- Dimensions:
  - A: 20.2
  - B: 40.4
  - C: 44.0
  - D: 44.4

- Unreeling direction:
  - A
  - B
  - C
  - D

- Part numbers:
  - EX60B-29P
  - EX60B-29P-FL
  - EX60B-15P

- Note: 1,200 pieces per reel.

■ Packaging specifications

![Packaging specifications diagram]

- Dimensions:
  - A: 14.2
  - B: 28.4
  - C: 32.0
  - D: 32.4

- Unreeling direction:
  - A
  - B
  - C
  - D

- Part numbers:
  - EX60B-29P
  - EX60B-29P-FL
  - EX60B-15P
Plug (Cradle mount)

- 15 pos., 29 pos.

![Image of plug](image)

<table>
<thead>
<tr>
<th>Part number</th>
<th>Number of contacts</th>
<th>HRS No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX60B-29S</td>
<td>29</td>
<td>CL232-0613-0</td>
<td>16.0</td>
<td>15.6</td>
<td>13.6</td>
<td>13.2</td>
<td>11.15</td>
<td>10.75</td>
<td>16.8</td>
<td>13.3</td>
<td>12.0</td>
<td>11.65</td>
<td>11.45</td>
<td>15.85</td>
<td>15.45</td>
<td>YES</td>
</tr>
<tr>
<td>EX60B-15S</td>
<td>15</td>
<td>CL232-0622-1</td>
<td>11.8</td>
<td>11.4</td>
<td>9.4</td>
<td>9.0</td>
<td>6.95</td>
<td>6.65</td>
<td>8.4</td>
<td>9.1</td>
<td>7.8</td>
<td>7.65</td>
<td>7.25</td>
<td>11.65</td>
<td>11.25</td>
<td></td>
</tr>
</tbody>
</table>

Recommended PCB mounting pattern

<table>
<thead>
<tr>
<th>Part number</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX60B-29S</td>
<td>15.85</td>
<td>15.45</td>
<td>13.6</td>
<td>13.2</td>
<td>11.85</td>
<td>11.45</td>
<td>16.8</td>
</tr>
<tr>
<td>EX60B-15S</td>
<td>11.65</td>
<td>11.25</td>
<td>9.4</td>
<td>9.0</td>
<td>7.65</td>
<td>7.25</td>
<td>8.4</td>
</tr>
</tbody>
</table>
Cradle case mounting recommendations - Plug

Notes:
1. The maximum opening angle of the rotating mating/unmating guide is 25°. Do not exceed this angle.
2. Device’s case must have the recommended cutout dimensions.
3. Assure that there is no interference with the free movement and operation of the mating/unmating guide.
4. Use screw (not supplied) to attach the receptacle to the case.

Packaging Specifications (Plug, EX60B-29S)

Note: 800 pieces per reel.
Mating cross-section

Recommended Temperature Profile

Note 1: Up to 2 cycles of Reflow soldering are possible under the same conditions, provided that there is a return to normal temperature between the first and second cycle.

Note 2: The temperature profile indicates the board surface temperature at the point of contacts with the connector terminals.
1. Mating/unmating angles (see illustrations below)
   (1) Angle on the Z-axis is 20° max.
   (2) Angle on the X-axis is 3° max.

2. Dimensional requirements
   (1) Distance between the flanges of the receptacle and plug: 0 to 0.7 mm.
   (2) Distance between the PCB mounting surface of the plug (cradle) and the PCB surface of the receptacle (portable device): 4.8±0.1 mm.

3. Portable device removal
   The point of the rotation of the portable device during its removal from the cradle should be at the distance of 6.5 mm min. as illustrated below.