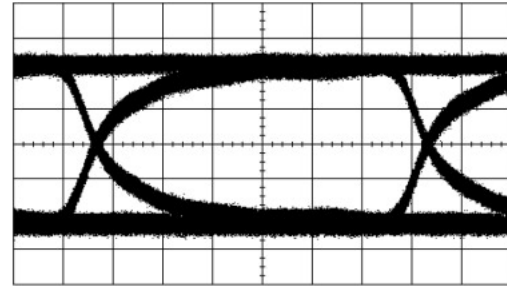


# High-Speed Differential Signal Connectors

## EXT Series



1 Gbps Eye Pattern Waveform



(One End of Connector: 2 m of AWG #28 Twinax Cable)

### ■ Features

#### 1. High-Speed Differential Signals

The construction supports high-speed differential signals such as LVDS, IEEE 1394, and USB 2.0. Use of twisted pair cable or twinax cable permits transmission speeds up to several hundred Mbps and higher per twisted pair.

##### (A) Impedance Matching

The connector is designed to minimize reflections with a differential impedance of 100 ohms between adjacent contacts.

##### (B) Low Skew Construction

An equivalent electrical length is maintained between adjacent contacts while the equivalent electrical length between opposing terminals is approximately zero. Consequently the skew within differential pairs as well as between differential pairs is approximately zero.

However, a low skew between differential pairs is permitted by going through another layer of the board.

##### (C) Low Crosstalk

The design features a staggered arrangement between opposing contacts for low crosstalk effects between opposing pairs even though these are low-profile connectors.

#### 2. Batch Wiring of Cables Using Solder Paste

Soldered wiring has been used as the wiring method for the plug side composite cable, thin cable, and drain wires; however, paste soldering permits the batch wiring of prepared cables. (Existing soldering methods can also be used to wire the connectors.)

#### 3. No Shrink Tubing Required

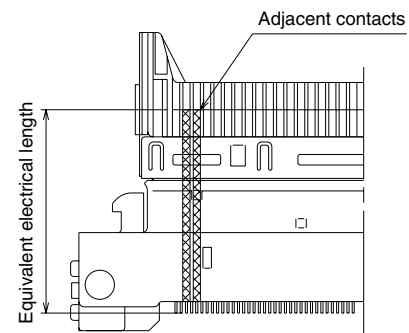
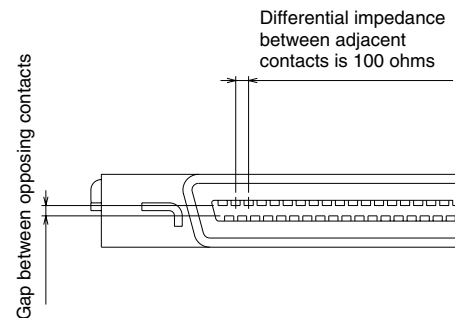
The wiring portion of the plug side is secured by the molding which prevents short circuits without the use of shrink tubing. Since shrink tubing is not used, this allows the twist back length of the twisted pair cable or the twinax cable to be shortened, thereby permitting the impedance of the wiring section to be kept in check.

#### 4. Power and Signal Contacts

The 65 position connector is designed with 59 signal contacts and 6 power contacts. Each power contact is rated for 2 Amps. The 71 position connector is supplied with signal contacts only.

#### 5. Low-Profile Design

With the trend toward lower profiles, the receptacle is made to drop into the board, which results in a height dimension, including the board, of 5.6mm.



## ■Product Specification

|         |                             |                       |      |
|---------|-----------------------------|-----------------------|------|
| Ratings | Operation temperature range | -55°C to +85°C        |      |
|         | Voltage                     | 125 V AC              |      |
|         | Current                     | Signal contacts       | 0.5A |
|         |                             | Power supply contacts | 2A   |

| Item                                   | Standard   | Condition   |
|--|--|---|
| 1. Contact resistance                  | Signal contacts: 40 mΩ max.<br>Power supply contacts: 16 mΩ max.   | 100 mA  |
| 2. Insulation resistance               | 500 MΩ max.  | 250 V DC  |
| 3. Withstanding voltage                | No flashover or insulation breakdown   | 350 V AC / one minute   |
| 4. Durability<br>(mating / unmating)   | Contact resistance<br>Signal contacts: 60 mΩ max.<br>Power supply contacts: 24 mΩ max.<br>No damage, cracks, or parts dislocation. | 3,000 cycles  |
| 5. Vibration                           | No electrical discontinuity of 1μs or more.<br>Contact resistance  | Frequency: 10 to 55 Hz (5 minutes per cycle)<br>Total amplitude: Test at 1.5 mm in 3 directions, 2 hours each     |
| 6. Shock                               | Signal contacts: 60 mΩ max.<br>Power supply contacts: 24 mΩ max.<br>No damage, cracks, or parts dislocation.                       | Acceleration of 490 m/s <sup>2</sup> , 11 ms duration,<br>sine halfwave waveform, 3 cycles in each of the 3 axis. |
| 7. Temperature cycle                   | Contact resistance<br>Signal contacts: 60 mΩ max.<br>Power supply contacts: 24 mΩ max.   | Temperature : -55 → +15 to +35 → +85 → +15 to +35°C<br>Time : 30 → 10 to 15 → 30 → 10 to 15(Minutes)<br>5 cycles  |
| 8. Steady-state<br>humidity resistance | Insulation resistance: 500 MΩ max.<br>No damage, cracks, or parts dislocation.   | Temperature of 40°C ±2°C and humidity of 90% to 95%<br>for 96 hours   |
| 9. Salt spray                          | No corrosion   | 5% concentration of salt water for 48 hours   |

## ■Materials

### ●Receptacle

| Part          | Material        | Finish         |
|---------------|-----------------|----------------|
| Contacts      | Copper alloy    | Gold plating   |
| Insulator     | LCP             | UL94V-0        |
| Body          | Steel           | Nickel plating |
| Metal Fitting | Stainless steel | Tin plating    |

### ●Plug

| Part          | Material      | Finish                 |
|---------------|---------------|------------------------|
| Contacts      | Copper alloy  | Selective gold plating |
| Insulator     | LCP           | UL94V-0                |
| Body          | Steel         | Nickel plating         |
| Strain relief | Polycarbonate | UL94V-0                |

### ●Cover

| Part            | Material        | Finish               |
|-----------------|-----------------|----------------------|
| Cover           | Polycarbonate   | UL94HB               |
| Shield          | Stainless steel | —                    |
| Lock            | Stainless steel | —                    |
| Push button     | Polycarbonate   | UL94HB               |
| Clamp           | Brass           | —                    |
| Metal hold down | Steel           | Black nickel plating |
| screw           | Steel           | Black chromate       |

## Ordering Information

### Receptacles

**EX 60 T - C 71 P (50)**  
 ① ② ① ③ ④ ⑤ ⑧

### Plugs

**EX 40 T - C 71 P R (50)**  
 ① ② ① ③ ④ ⑤ ⑥ ⑧

### Cover

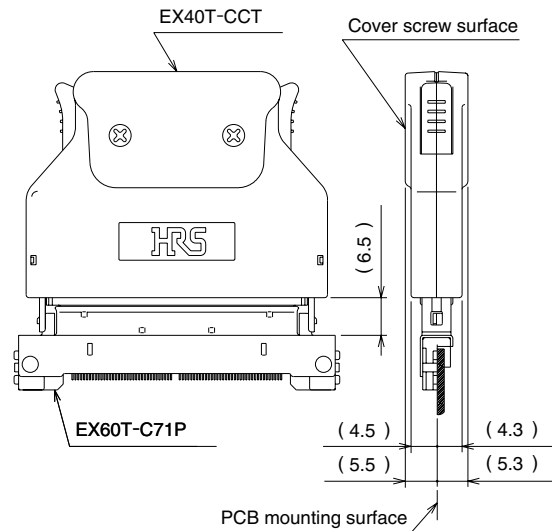
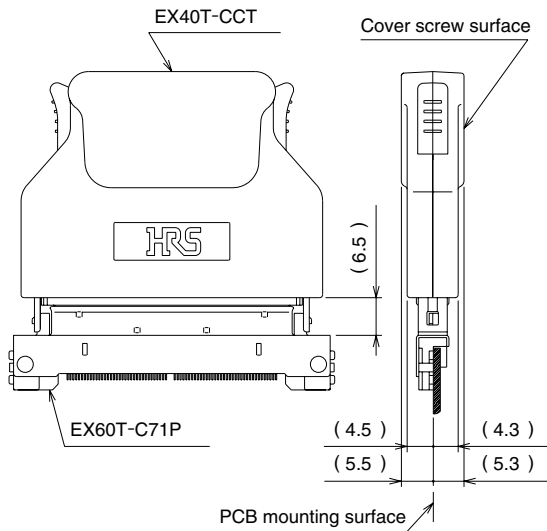
**EX 40 T - C CT (50)**  
 ① ② ① ③ ⑦ ⑧

|   |  |
|---|--|
| ① | Series name : EX*T   |
| ② | Wiring type : 40 : Cable soldering type<br>: 60 : Right angle SMT type |
| ③ | Body size  |
| ④ | Number of contacts   |
| ⑤ | Contact type : P : Male contact<br>: S : Female contact                |
| ⑥ | Connector mating direction Brank : Standard type<br>R : Reverse type   |
| ⑦ | Cover type : CT : Straight type<br>: CV : Angled type                  |
| ⑧ | Plating : Termination : Gold plating<br>: Metal fitting : Tin plating  |

## Connector Mounting Reference Diagram

Using a standard type plug (EX40T-C71S)

Using a reverse type plug (EX40T-C71SR)



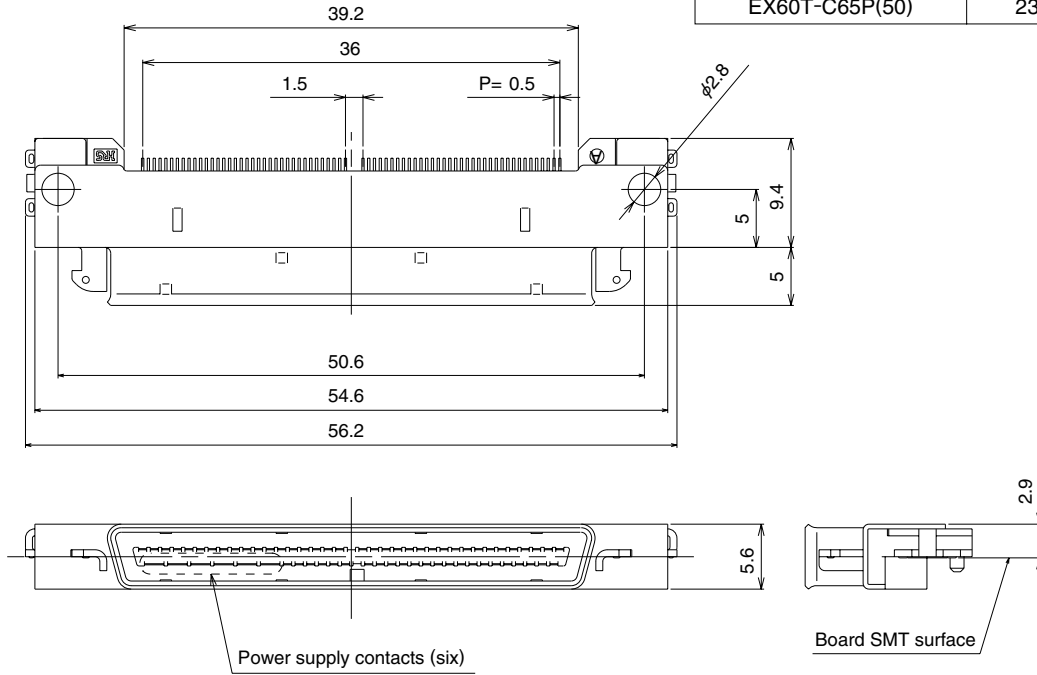


## ■ Receptacle

### ● 65 contact (59 signal contacts, 6 power supply contacts)

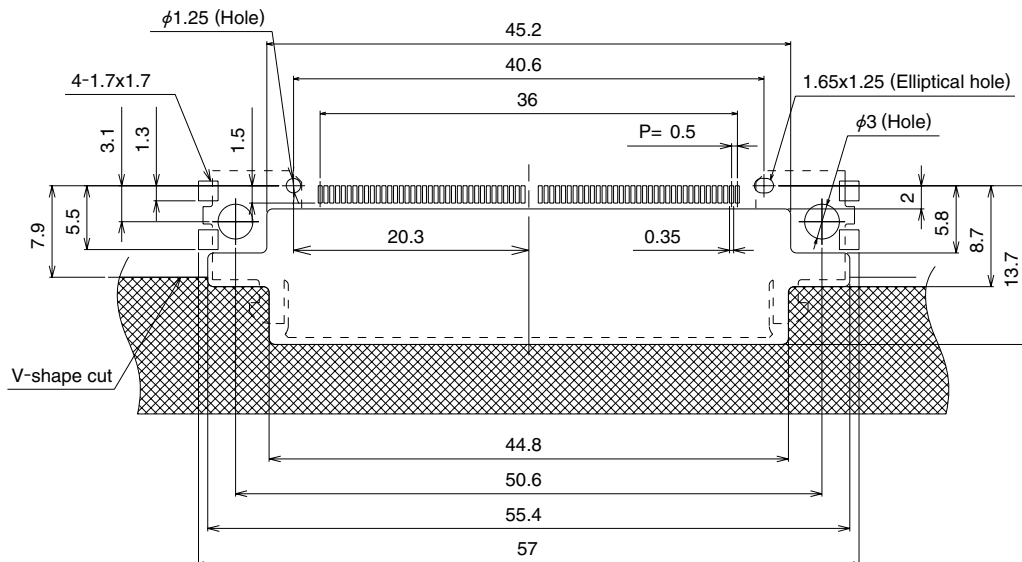
EX60T-C65P(50)

| Part number    | CL No.        | RoHS |
|----------------|---------------|------|
| EX60T-C65P(50) | 232-0588-5-50 | YES  |



## ◆ Board Mounting Diagram (for Reference)

Establishing the discardable portion of the board indicated by the shaded area of the diagram below, serves to prevent the board from falling forward at the time of reflow. Making a V-shaped cut in the discardable portion of the board allows access to the connector by bending and breaking off this portion after reflow.

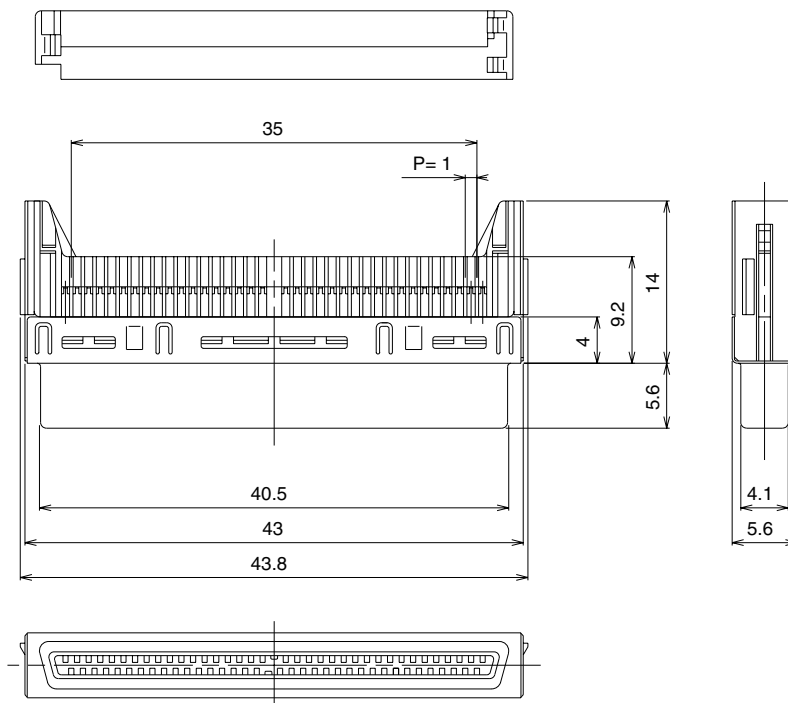


## ■ Plug (Standard type)

### ● 71 contact (Signal contacts only)

EX40T-C71S(50)

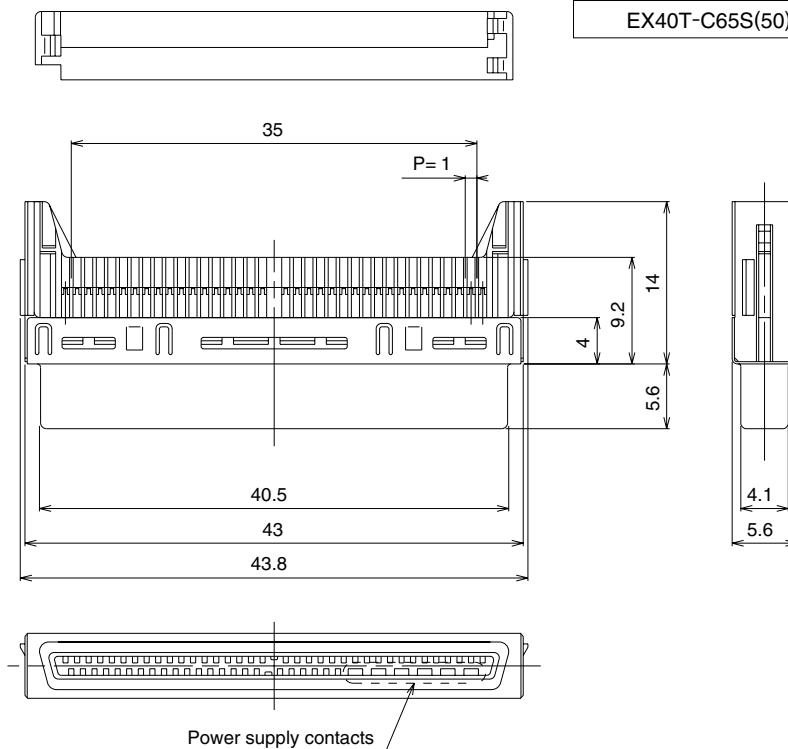
| Part number    | CL No.        | RoHS |
|----------------|---------------|------|
| EX40T-C71S(50) | 232-0583-1-50 | YES  |



### ● 65 contact (59 signal contacts, 6 power supply contacts)

EX40T-C65S(50)

| Part number    | CL No.        | RoHS |
|----------------|---------------|------|
| EX40T-C65S(50) | 232-0589-8-50 | YES  |

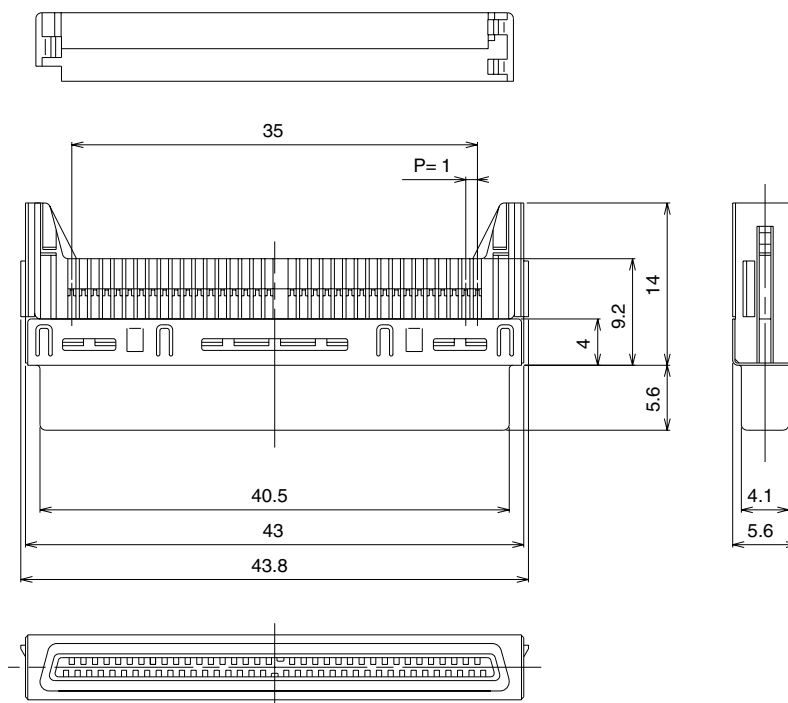


## ■ Plug (Reverse type)

### ● 71 contact (Signal contacts only)

EX40T-C71SR(50)

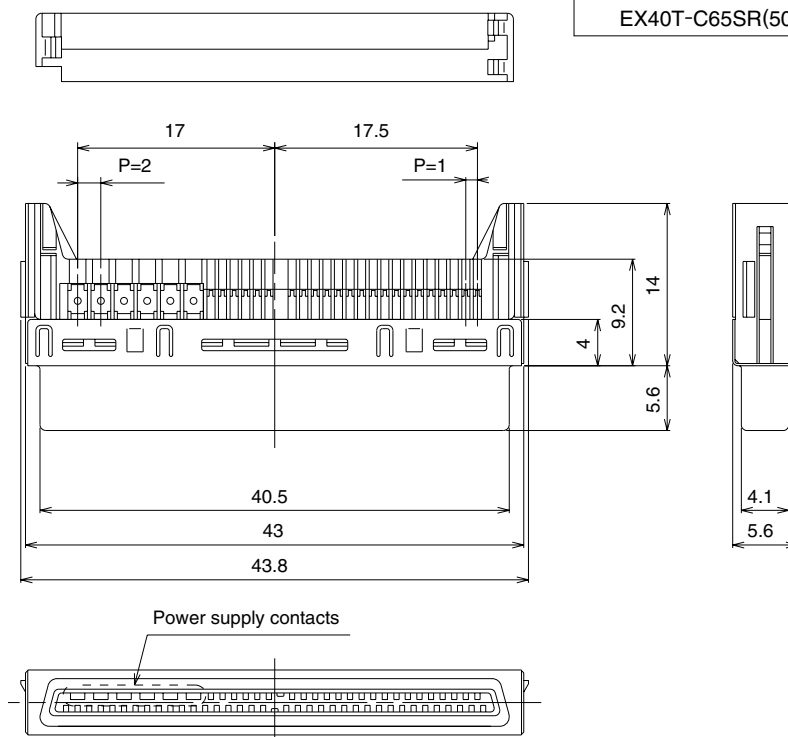
| Part number     | CL No.        | RoHS |
|-----------------|---------------|------|
| EX40T-C71SR(50) | 232-0587-2-50 | YES  |



### ● 65 contact (59 signal contacts, 6 power supply contacts)

EX40T-C65SR(50)

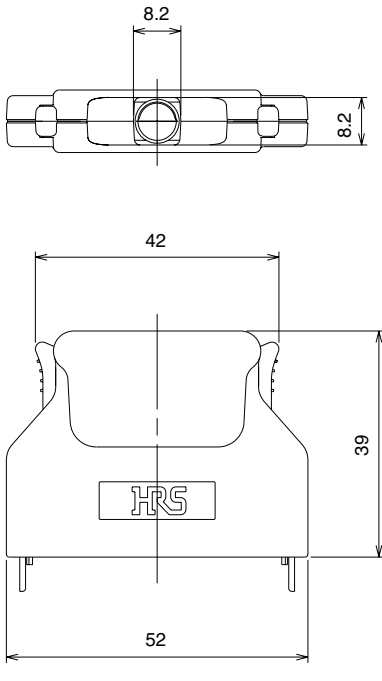
| Part number     | CL No.        | RoHS |
|-----------------|---------------|------|
| EX40T-C65SR(50) | 232-0594-8-50 | YES  |



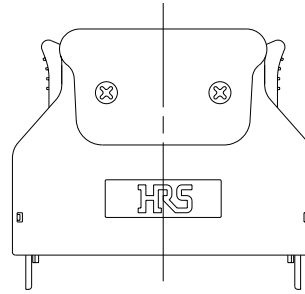
## ■ Cover

### ● Straight cover

EX40T-CCT(50)

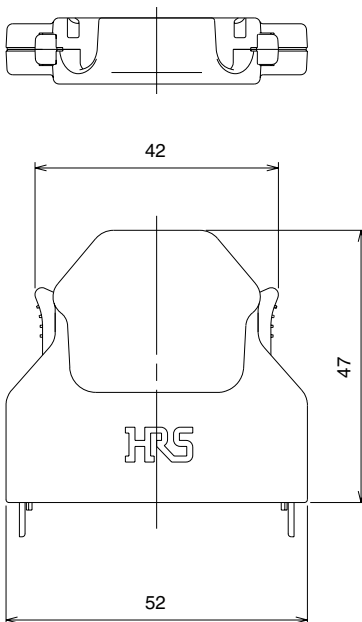


| Part number   | CL No.        | RoHS |
|---------------|---------------|------|
| EX40T-CCT(50) | 232-0586-0-50 | YES  |

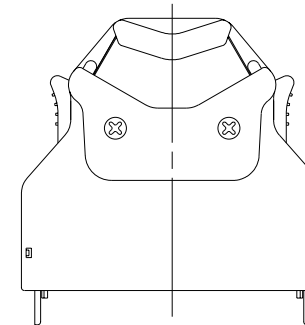


### ● Angled cover

EX40T-CCV(50)



| Part number   | CL No.        | RoHS |
|---------------|---------------|------|
| EX40T-CCV(50) | 232-0591-0-50 | YES  |



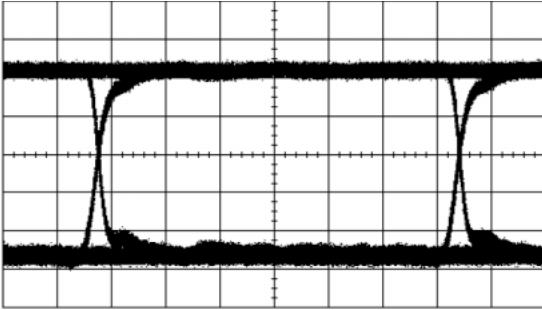


## ■ Technical Notes 1

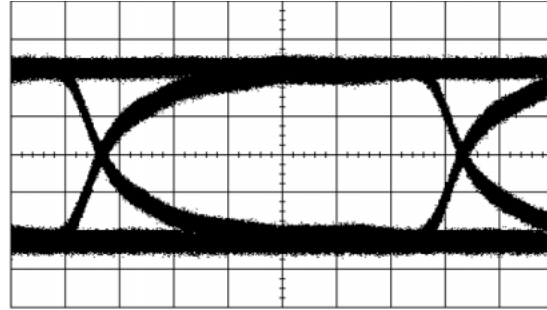
### ● Eye Pattern Waveforms

These eye pattern waveforms are from connectors harnessed with 2 m of twinax cable for high-speed differential signal applications.

Input Waveform

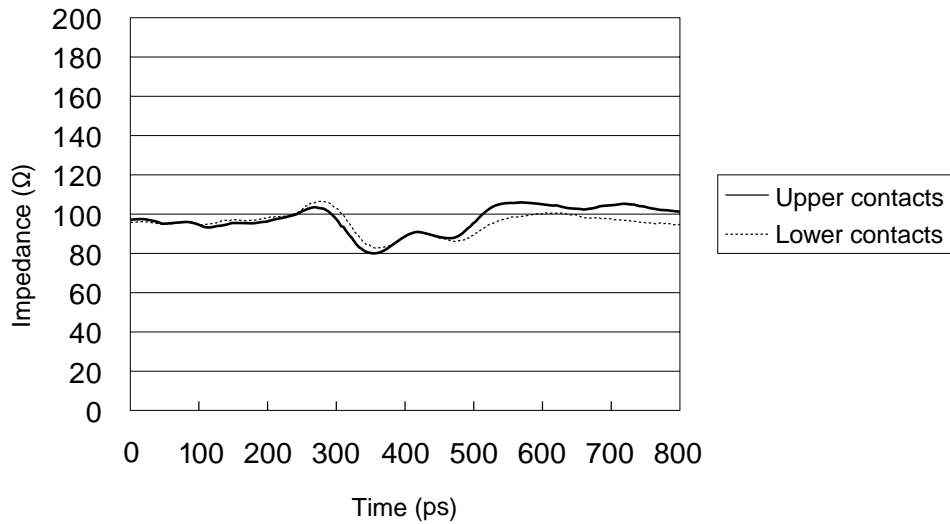


Output Waveform



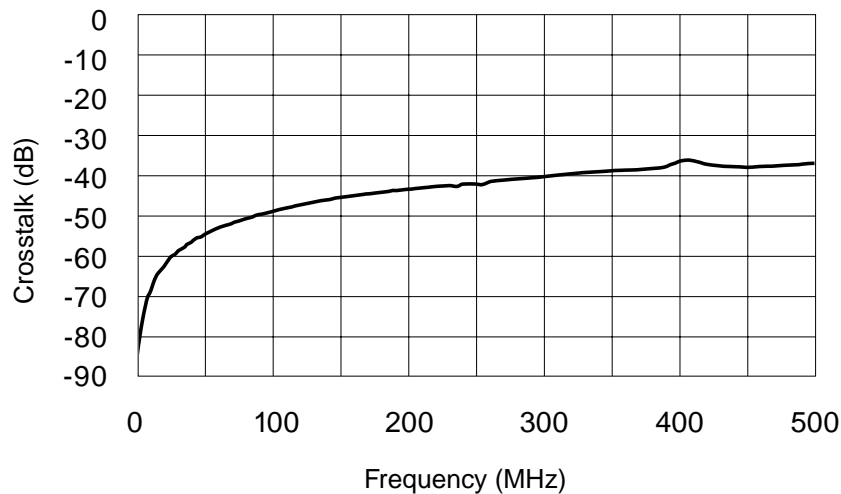
### ● Impedance Characteristics

These differential impedance characteristics have been measured with 45 ps rise time pulses. The impedance drops slightly in the vicinity of the connector coupling portion.



### ● Crosstalk Characteristics

Crosstalk characteristics between opposing differential pairs.

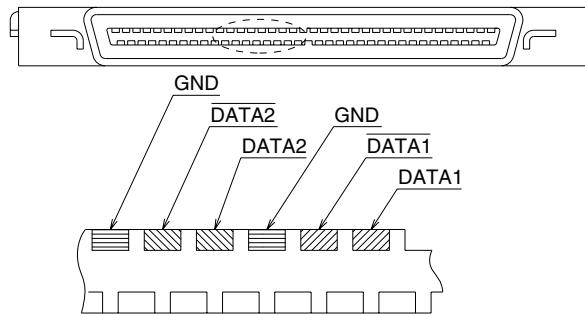


## ■ Technical Notes 2

### ● Connection Pattern of Differential Signals

Differential signals should be arranged between adjacent contacts as illustrated in the diagram below for the purpose of impedance matching and equivalent electrical length. Furthermore, the establishment of a ground will be effective in reducing the crosstalk between adjacent differential pairs.

Note also that for faster high-speed differential signals, gathering them to the center portion will permit control of the electrical length at the time of harnessing.

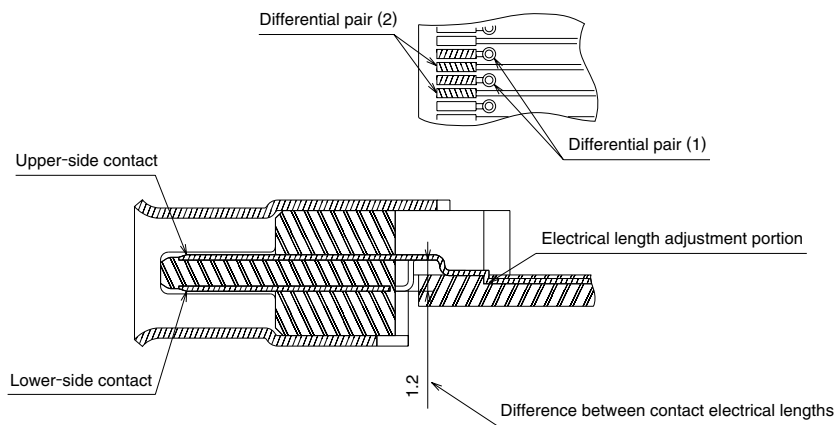


### ● Low Skew Between Opposing Differential Pairs

The electrical length between adjacent contacts is equal, but the electrical length between opposing contacts differs by approximately 1.2 mm.

As illustrated in the diagram to the right, the differential pair of contacts having a short electrical length on the upper side of the board can be given an electrical length equivalent to that between the opposing differential pair by adjusting the electrical length using such methods as through holes in the board.

The crosstalk on the board between differential pairs is also reduced.

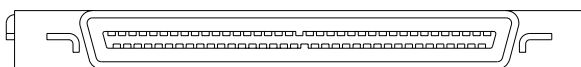


### ● Power Supply Contacts Configuration Diagram

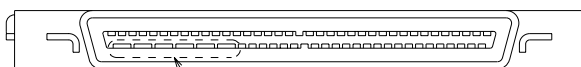
The 65-contact type is configured with 6 power supply contacts.

The power supply contacts are divided into 2 leads within the receptacle-side connector (EX60T-C65P) which results in differing numbers of coupling surface-side contacts and board-side lead portion contacts.

EX60T-C71P



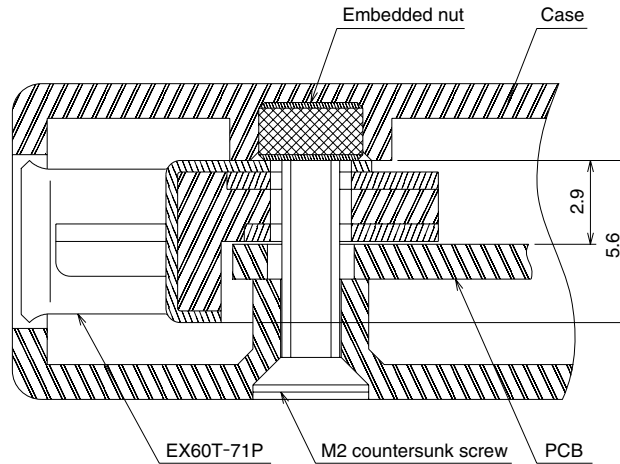
EX60T-C65P



Power supply contacts (6)

## ●Anchoring to the Case

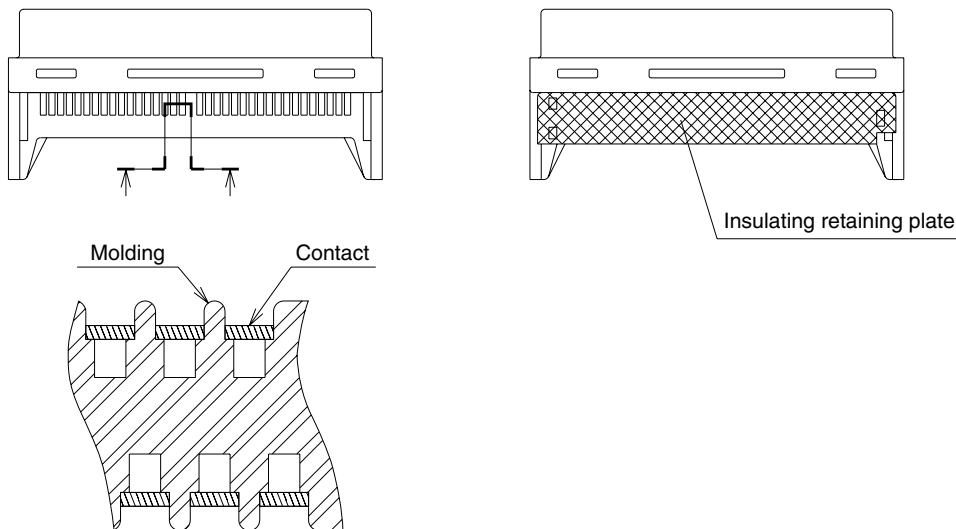
Mounting of the receptacle connectors makes use of screws to fasten the connectors to the case as illustrated in the diagram below. This contributes to a structure that is resistant to twisting.



## ●A Design that Doesn't Use Heat-Shrink Tubing

The soldered wiring portion of the plug connector is secured to the molding which serves as a measure against the short-circuiting of adjacent contacts. This eliminates the need to attach heat-shrink tubing.

The plug connector has been furnished with a retaining plate made of resin material for the purpose of preventing short circuits with the metal portions of the cover case.



## ●Batch Wiring of Plug Connectors

These connectors permit the batch soldered wiring of cables prepared with paste solder and partial reflow. (Regularly soldered wiring is used for power supply contacts.)

Please contact our Technical Department about harness details for the purpose of satisfying harness qualities and high-speed transmission characteristics.