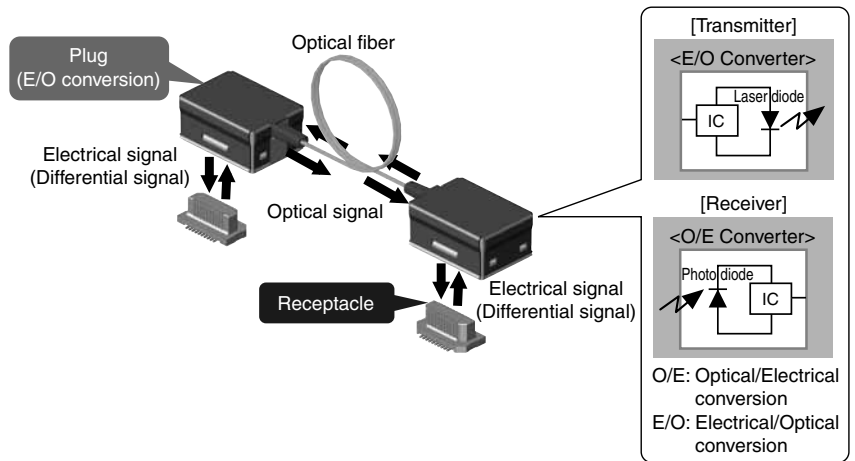
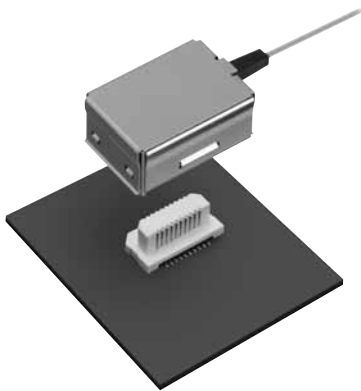


Vertical insertion type	<b>V Series</b>
<b>Active Optical Connector</b>	

### FEATURES

1. Plug connector is equipped with electrical/optical conversion function (bi-direction, Max. 6 Gbps transmission).



- 2. High speed and wide data rate transmission possible: 20 Mbps to 6 Gbps
- 3. Integration is possible to a small apparatus with compact, bi-directional transmission device.
- 4. Noise reduction and electrical isolation easily achieved.

### APPLICATIONS

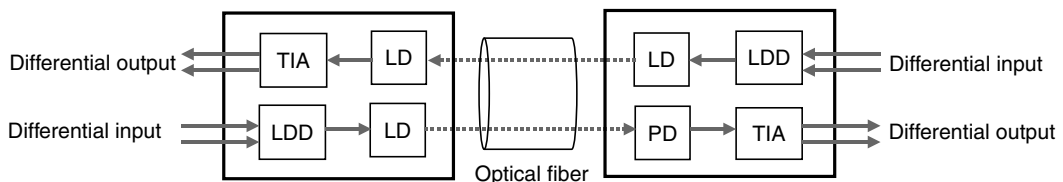
Recommended for the following high speed device transmission or electrical isolation applications

- Measuring equipment
- Printer
- Industrial robots, etc.
- Image processing instrument
- Medical equipment

### BLOCK DIAGRAM

The differential input signal is converted to an optical signal by the Laser Diode Driver (LDD) and Laser Diode (LD) in the plug.

The optical signal is transmitted through the optical fiber and reproduced as differential output signal by the Photo Diode (PD) and Trans Impedance Amplifier (TIA).



LDD: Laser Diode Driver, LD: Laser Diode, TIA: Trans Impedance Amplifier, PD: Photo Diode

## PRODUCT TYPES

### 1. Integrated cable and plug

Transmission rate	Transmission specifications	Cable length	Part No.	Packing quantity
20 Mbps to 6 Gbps	Bi-direction, 1 channel	50 mm	AYG4V10565M1	10 pieces
		300 mm	AYG4V13065M1	
		1 m	AYG4V1A065M1	
		50 mm	AYG4V10565M3	100 pieces
		300 mm	AYG4V13065M3	
		1 m	AYG4V1A065M3	

### 2. Receptacle (PC board side)

Receptacle	Part No.	Packing quantity
Receptacle	AXK6S20447M1	20 pieces
	AXK6S20447M3	200 pieces (reel)

## SPECIFICATIONS

### 1. Rated specifications

Item	Min.	Typical	Max.	Unit	Condition
Supply voltage	3.2	3.3	3.4	V	—
Power consumption	—	—	230	mW	Bi-direction 1channel
Transmission rate	0.02	—	6	Gbps	8b/10b coding
Input/output characteristic impedance	80	100	125	$\Omega$	—
Differential input voltage	200	—	1200	mV	—
Input common mode voltage	150	—	340	mV	Note 1)
Input total jitter	—	—	0.24	UI	Note 2)
Input rise-time	—	—	0.30	UI	—
Input fall-time	—	—	0.30	UI	—
Differential output voltage	150	220	275	mV	Note 2)
Output common mode voltage	150	250	275	mV	Note 2)
Output rise-time	—	—	0.50	UI	Note 2)
Output fall-time	—	—	0.50	UI	Note 2)
Output total jitter	—	—	0.60	UI	Note 2), Dj + Rjpp

Notes: 1. When performing AC coupling, the input common mode voltage is 0 to 1.8 V.

2. Input data pattern is PRBS 2<sup>7</sup>-1.

Rjpp is equivalent to BER 10<sup>-12</sup>.

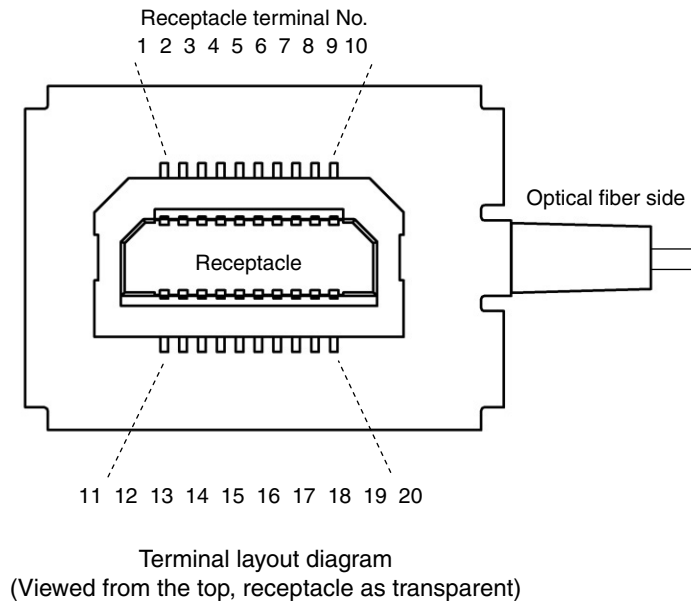
### 2. Use conditions

Item	Performance	Remarks
Operating ambient temperature	0°C to +70°C	No icing or condensation.
Storage temperature	-20°C to +50°C (Packaged form) -20°C to +85°C (Product only)	No icing or condensation.
Relative humidity	20% to 80%RH	No condensation.
Electrical static discharge	2kV	Applied 3 times on the external shell C = 100pF, R = 1.5k $\Omega$ C = 150pF, R = 330 $\Omega$
Immunity	Conformed to IEC61000-6-2 standard	—
Electromagnetic interference	Conformed to VCCI class B standard	—

## 3. Materials specifications

Component name	Materials	Specifications and Remarks
Shell	Copper alloy	Nickel plating
Bushing	Elastomer	Black
Optical fiber	Silica, UV-cured resin	Cross section: 0.4 × 0.6 mm, 2 cores
Connector	LCP resin, copper alloy	Terminal (Au-plating on Ni-base)
Photoelectric conversion PC board	Glass-fibered epoxy, epoxy resin, etc.	—
IC	CMOS	—
LD	GaAs	—
Photo diode	GaAs	—

## TERMINAL LAYOUT



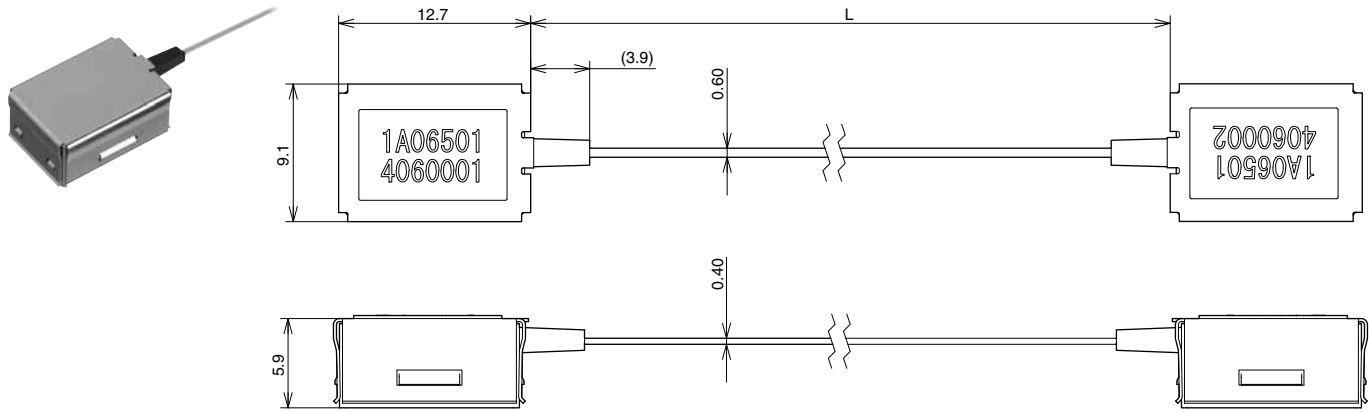
No.	Name	Wiring
1	Open	No connection
2	GND	—
3	Differential output -	Differential output
4	Differential output +	Differential output
5	GND	—
6	Open	No connection
7	Open	No connection
8	Power Supply	3.3V DC
9	Power Supply	3.3V DC
10	GND	—
11	Open	No connection
12	GND	—
13	Differential input -	Differential input
14	Differential input +	Differential input
15	GND	—
16	GND	—
17	Power Supply	3.3V DC
18	Power Supply	3.3V DC
19	Power Supply	3.3V DC
20	GND	—

# Active Optical Connector V Series

## DIMENSIONS (Unit: mm)

### 1. Integrated cable and plug

External dimensions

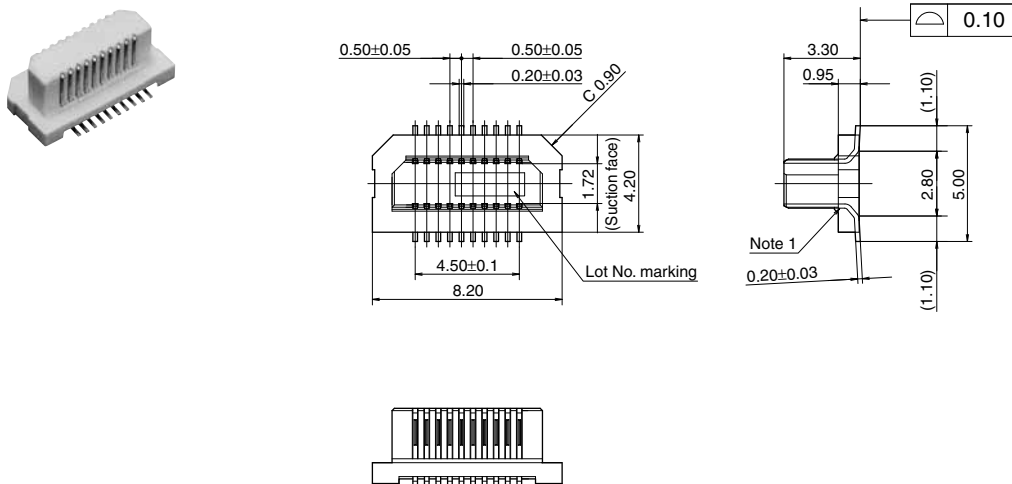


General tolerance:  $\pm 0.3$

L: Cable length	Unit	Tolerance (mm)	Part No.
	50		
300	mm	+50 -0	AYG4V13065
1	m	+100 -0	AYG4V1A065

### 2. Receptacle

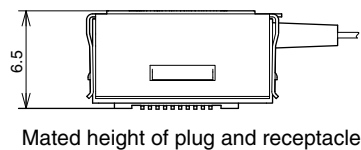
External dimensions



General tolerance:  $\pm 0.2$

Note 1: The terminal close to the portion to be soldered have nickel barriers (except nickel portions).

### 3. Plug and receptacle are mated



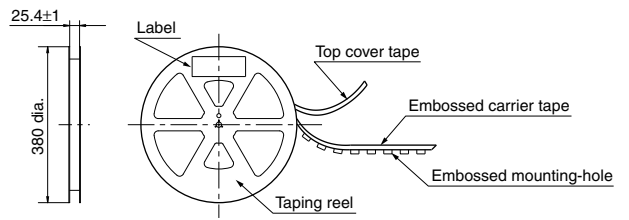
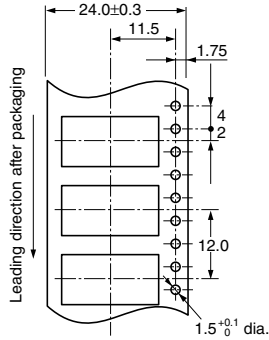
Mated height of plug and receptacle

## EMBOSSED TAPE DIMENSIONS (Unit: mm)

### Receptacle: Embossed tape packaging

• Specifications for taping (In accordance with JIS C 0806:1990. However, not applied to the mounting-hole pitch of some connectors.)

• Specifications for the plastic reel (In accordance with EIAJ ET-7200B.)



### Receptacle orientation with respect to embossed tape feeding direction

Direction of tape progress	Type	Receptacle

Please refer to the latest product specifications when designing your product.

# Notes on Using Active Optical Connector V Series

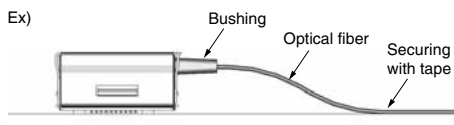
## ■ About safety Remarks

- 1) Do not use these connectors beyond the specification sheets. The usage outside of specified rated current, dielectric strength, and environmental conditions and so on may cause circuitry damage via abnormal heating, smoke, and fire.
- 2) In order to avoid accidents, your thorough specification review is appreciated. Please contact us if your usage is out of the specifications. Otherwise, Panasonic Corporation cannot guarantee the quality and reliability.
- 3) Panasonic Corporation is consistently striving to improve quality and reliability. However, the fact remains that electrical components and devices generally cause failures at a given statistical probability. Furthermore, their durability varies with use environments or use conditions. In this respect, please check for actual electrical components and devices under actual conditions before use. Continued usage in a state of degraded condition may cause the deteriorated insulation, thus result in abnormal heat, smoke or firing. Please carry out safety design and periodic maintenance including redundancy design, design for fire spread prevention, and design for malfunction prevention so that no accidents resulting in injury or death, fire accidents, or social damage will be caused as a result of failure of the products or ending life of the products.

## ■ Cautions when using the product

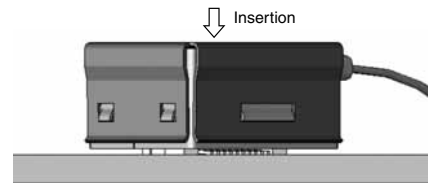
Please use the product in accordance with the conditions described in these specifications. The product quality cannot be warranted if the product fails because it is used outside the conditions in these specifications.

- 1) Cautions about the operating and storage environments
  - Product failure due to condensation cannot be warranted.
  - Use caution for avoiding dust.
  - The following environment may deteriorate the product's appearance and affect the product characteristics, and should thus be avoided.
    - An environment in which the possible adherence of chemicals such as acid and alkali exists.
    - In a gaseous atmosphere of salt, sulfide, etc.
- 2) This product has a structure requiring an insertion force for mating, but the mating may come off when an external force is applied to the plug, impact is applied by dropping, or vibration is applied in equipment. Sufficient caution should be used with the equipment to avoid such incidents.
- 3) The product cannot be used in a movable parts while the optical fiber is bent. Such use may cause deformation of the receptacle or breakage of the optical fiber.
- 4) In order to avoid a load on the plug and receptacle applied by the tensile force of the optical fiber, a redundant design is required with respect to the optical fiber length.

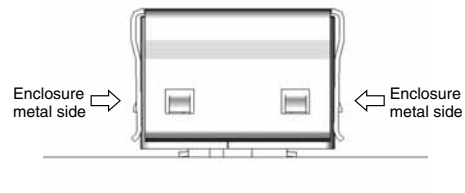


- 5) Use caution for wiring the optical fiber to avoid getting entangled or twisting. Also, use adhesive tape for securing the optical fiber for preventing excessive stress caused by vibration and impact.

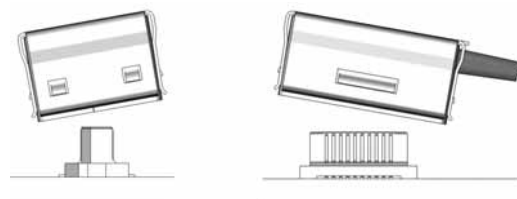
- 6) Insertion and removal operations must be performed while the power is off. Insertion or removal operations in a live condition (with current and voltage) may lead to a breakage.
- 7) Use caution with regard to the generation and handling of static electricity in the operating environment to protect the plug.
- 8) Secure sufficient insulation distance between the external metal enclosure of the plug and the peripheral components. The plug enclosure, which is connected to the ground, may give rise to danger from a short-circuit.
- 9) Mating of plug
  - Mating direction  
Mating of the plug and receptacle requires orientation. Align the receptacle shape in the direction of the optical fiber of plug.
  - Mated condition  
Make sure the plug is securely inserted into the receptacle. After mating, a gap remains between the PC board and plug. Avoid applying excessive pressure.



- 10) Plug removal  
For the removal operation, hold both sides of the metal enclosure and lift the plug upward.
  - \* Do not pull the optical fiber and bushing.



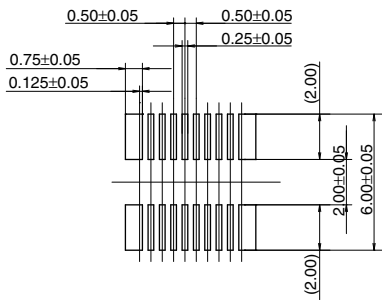
- 11) Plug insertion  
Because this product has been designed with a thin mating structure between the plug and receptacle for compact-sizing purposes, excessive tilting during insertion or removal leads to product fracture and separation of the solder section of terminals.  
For avoiding breakage of the mating parts, confirm the alignment before mating.



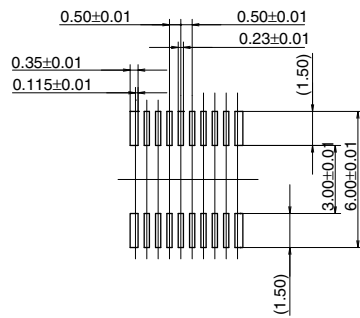
- 12) When the product is used in a different environment and in accordance with a method other than described in this document, please consult us.

## ■ Receptacle

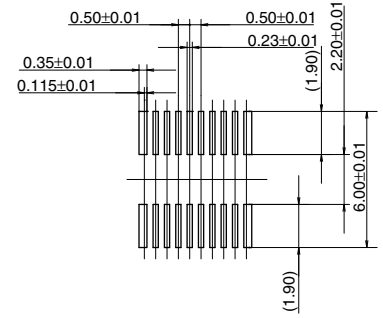
Recommended PC board pattern (TOP VIEW)



Recommended metal mask pattern  
Metal mask thickness: When 150μm  
(Opening ratio: 69%)



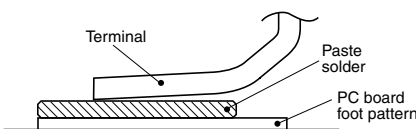
Recommended metal mask pattern  
Metal mask thickness: When 120μm  
(Opening ratio: 87%)



## Regarding soldering (for Receptacle)

### ■ Reflow soldering

- 1) Measure the recommended profile temperature for reflow soldering by placing a sensor on the PC board near the connector surface or terminals. (Please refer to the specification for detail because the temperature setting differs by products.)
- 2) As for cream solder printing, screen printing is recommended.
- 3) When setting the screen opening area and PC board foot pattern area, refer the recommended PC board pattern and window size of metal mask on the specification sheet, and make sure that the size of board pattern and metal mask at the base of the terminals are not increased.
- 4) Please pay attentions not to provide too much solder. It makes miss mating because of interference at soldering portion when mating.

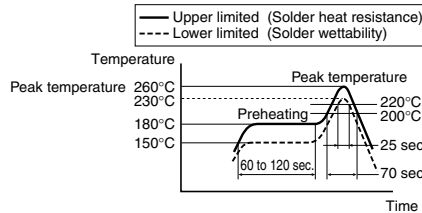


- 5) When mounting on both sides of the PC board and the connector is mounting on the underside, use adhesives or other means to ensure the connector is properly fixed to the PC board. (Double reflow soldering on the same side is possible.)
- 6) The condition of solder or flux rise and wettability varies depending on the type of solder and flux. Solder and flux characteristics should be taken into consideration and also set the reflow temperature and oxygen level.
- 7) Do not use resin-containing solder. Otherwise, the contacts might be firmly fixed.

### • Soldering conditions

Please use the reflow temperature profile conditions recommended below for reflow soldering. Please contact us before using a temperature profile other than that described below (e.g. lead-free solder).

### • Narrow pitch connectors



For products other than the ones above, please refer to the latest product specifications.

8) The temperature profiles given in this catalog are values measured when using the connector on a resin-based PC board. When performed reflow soldering on a metal board (iron, aluminum, etc.) or a metal table to mount on a FPC, make sure there is no deformation or discoloration of the connector before mounting.

9) Consult us when using a screen-printing thickness other than that recommended.

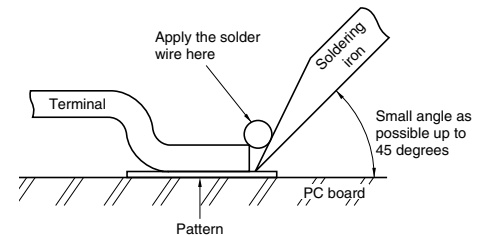
### ■ Manual soldering

- 1) Set the soldering iron so that the tip temperature is less than that given in the table below.

Table A

Product name	Soldering iron temperature
SMD type connectors	300°C within 5 sec. 350°C within 3 sec.

- 2) Do not allow flux to spread onto the connector leads or PC board. This may lead to flux rising up to the connector inside.
- 3) Touch the soldering iron to the foot pattern. After the foot pattern and connector terminal are heated, apply the solder wire so it melts at the end of the connector terminals.



- 4) Be aware that soldering while applying a load on the connector terminals may cause improper operation of the connector.
- 5) Thoroughly clean the soldering iron.
- 6) Flux from the solder wire may get on the contact surfaces during soldering operations. After soldering, carefully check the contact surfaces and clean off any solder before use.
- 7) These connector is low profile type. If too much solder is supplied for hand soldering, It makes miss mating because of interference at soldering portion. Please pay attentions.

### ■ Solder reworking

- 1) Finish reworking in one operation.
- 2) In case of soldering rework of bridges. Don't use supplementary solder flux. Doing so may cause contact problems by flux.
- 3) Keep the soldering iron tip temperature below the temperature given in Table A.

## Handling Single Components (for Receptacle)

- 1) Make sure not to drop or allow parts to fall from work bench.
- 2) Excessive force applied to the terminals could cause warping, come out, or weaken the adhesive strength of the solder. Handle with care.
- 3) Do not insert or remove the connector when it is not soldered. Forcibly applied external pressure on the terminals can weaken the adherence of the terminals to the molded part or cause the terminals to lose their evenness.

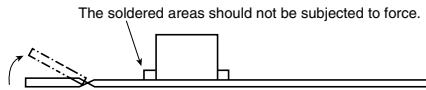
## Cleaning flux from PC board (for Receptacle)

There is no need to clean this product. If cleaning it, pay attention to the following points to prevent the negative effect to the product.

- 1) Keep the cleaning solvent clean and prevent the connector contacts from contamination.
- 2) Some cleaning solvents are strong and they may dissolve the molded part and characters, so pure water passed liquid solvent is recommended.

## Handling the PC board after mounting the connector (for Receptacle)

When cutting or bending the PC board after mounting the connector, be careful that the soldered sections are subjected to excessive force.



## Storage of connectors (for Receptacle)

- 1) To prevent problems from voids or air pockets due to heat of reflow soldering, avoid storing the connectors in areas of high humidity.
- 2) Depending on the connector type, the color of the connector may vary from connector to connector depending on when it is produced.
- 3) Some connectors may change color slightly if subjected to ultraviolet rays during storage. This is normal and will not affect the operation of the connector.
- 3) When storing the connectors with the PC boards assembled and components already set, be careful not to stack them up so the connectors are subjected to excessive forces.
- 4) Avoid storing the connectors in locations with excessive dust. The dust may accumulate and cause improper connections at the contact surfaces.

## Other Notes (for Receptacle)

- 1) Do not remove or insert the electrified connector (in the state of carrying current or applying voltage).
- 2) Dropping of the products or rough mishandling may bend or damage the terminals and possibly hinder proper reflow soldering.
- 3) Before soldering, try not to insert or remove the connector more than absolutely necessary.
- 4) When coating the PC board after soldering the connector to prevent the deterioration of insulation, perform the coating in such a way so that the coating does not get on the connector.
- 5) There may be variations in the colors of products from different production lots. This is normal.
- 6) The connectors are not meant to be used for switching.
- 7) Product failures due to condensation are not covered by warranty.

Please refer to the latest product specifications when designing your product.

Please contact .....

## Panasonic Corporation

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