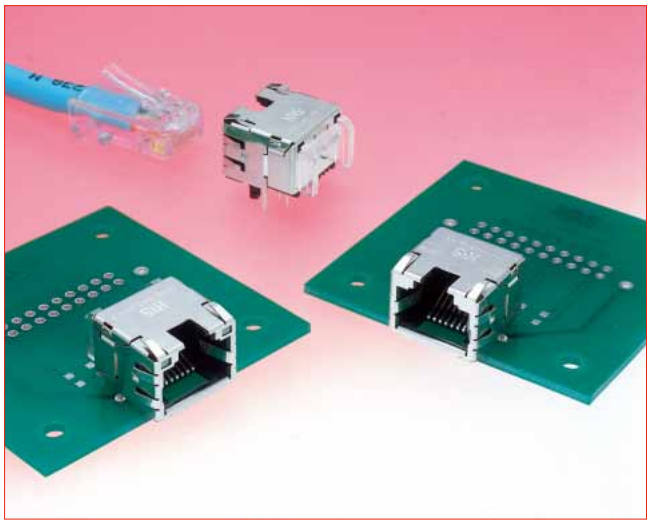
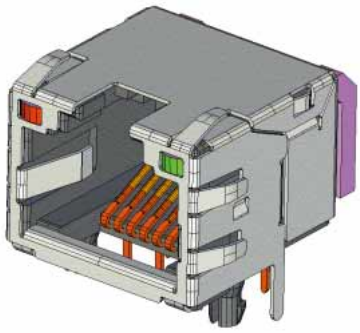
Subminiature, LAN Modular Jack Connectors

TM11R-5M2 Series





Features

1. Fast Ethernet Support

Complies with TIA/EIA-568-B data wiring requirements, guaranteeing Cat.5 transmission 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 light 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 Light Indicators

There is no need to design a separate space for the light indicators as they are built-in the connector, enabling space-saving. (Fig. 2)
Compared with LED type indicators, they do not emit any electrical noise. (Fig. 3)

4. EMI Protection

Metal shield covers the outer surfaces of the connectors assuring complete protection against electromagnetic interference.

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.

7. THR (Through-Hole Mounting) Type

THR (Through-Hole Mounting) compatible type is available.

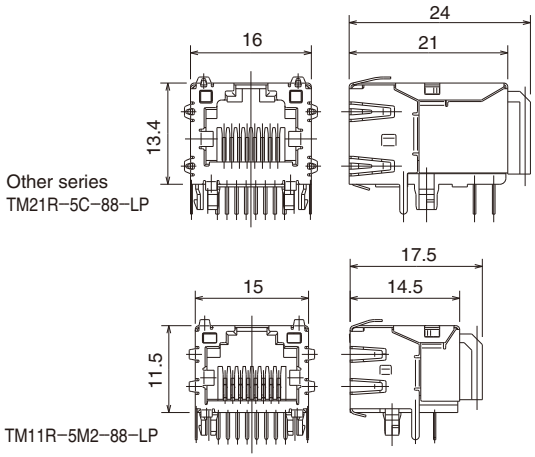


Fig.1 : Comparison with Existing (Actual Size).

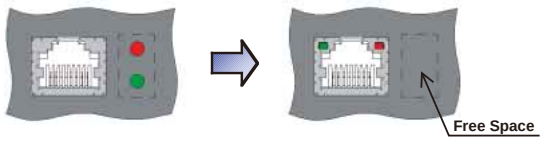


Fig.2 : Space saving of Light Indicator Area

Built-in LED type
(Easily affected by noise.)

Built-in Light Pipe Type
(Not affected by noise.)

Fig.3 : EMI Protection

■Product Specifications

Rating	Rated Current 1A	Operating Temperature : -55 to +85℃ (Note)
	Rated Voltage 125V AC	Storage Temperature Range : -25 to +60℃

Item	Specification	Conditions
1. Insulation Resistance	100MΩ min.	100V DC
2. Withstanding Voltage (Between Adjacent Ccontacts)	No flashover or insulation breakdown	500V AC for 1 min.
3. Withstanding Voltage (Between Contact and Shield)	No flashover or insulation breakdown	1500V AC for 1 min.
4. Contact Resistance	50mΩ max.	100mA
5. Vibration	No electrical discontinuity of 5μ sec. or more. Contact resistance : 70mΩ max	Frequency : 10 to 55 to 10Hz, single amplitude 0.75mm, 1 octabe / min, 10 cycles / 3 axis
6. Shock	No electrical discontinuity of 5μ sec. or more. Contact resistance : 70mΩ max.	Acceleration of 490m/s², 11ms duration, sine half-wave waveform, 3 cycles / 6 axis.
7. Mating Durability	Contact resistance : 70mΩ max.	200 cycles
8. Temperature Cycle	Contact resistance : 70mΩ max. Insulation resistance : 100MΩ min.	Temperature : -55℃→+15℃ to +35℃→+85℃→+15℃ to +35℃ Duration : 30→2 to 3→30→2 to 3 (Minutes) 5 cycles
9. Humidity	Contact resistance : 70mΩ max. Insulation resistance : 1MΩ min. (High humidity) Insulation resistance : 10MΩ min. (Dry state)	500 hours at temperature of 40℃ and humidity of 90% to 95%
10. Salt Spray	Contact resistance : 250mΩ max.	Exposed to density 5% salt water for 48 hours

Note : Includes temperature rise caused by current flow.

■Materials / Finish

Part	Material	Finish	Remarks
Insulator	Synthetic Resin	Color : Black	UL94V-0
Contact	Copper Alloy	Contact Area : Gold Plating 1.27μ Termination Area : Tin Plating	——
Light Pipe	Polycarbonate	Color : Clear	UL94V-0
Shield	Copper Alloy	Tin Plating	——

■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.

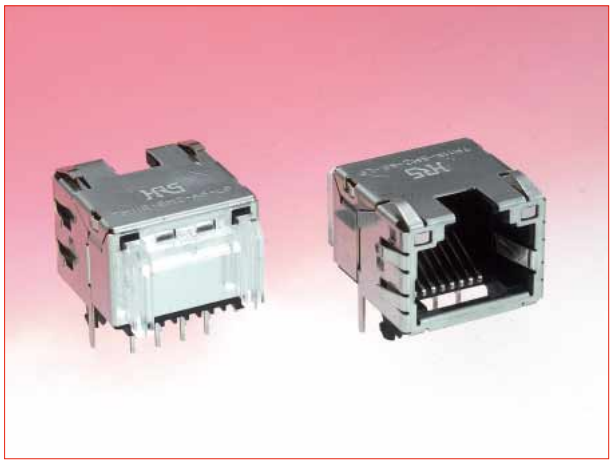
●Jacks

TM11 R - 5M2 - 8 8 - LP
❶ ❷ ❸ ❹ ❺ ❻

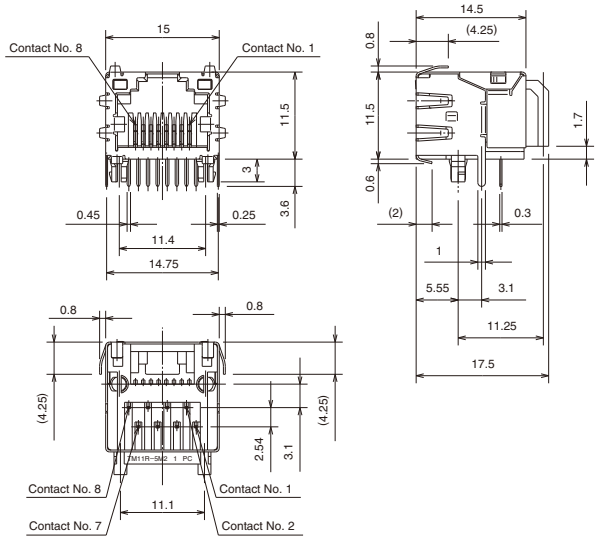
❶ Series name	TM11 Series
❷ Connector Type	R : Jack
❸ Jack Type	5M2 : PCB Right-angle through hole type
❹ Jack Mating Port Size	8 : 8 Contacts
❺ Number of Contacts	8 : 8 Contacts
❻ Option	LP : With light pipe inserted Blank : Without light pipe DIR : THR (Through-Hole Mounting)

■Modular Jack Connectors Supporting Cat.5 (for 1,2-3,6 pair)

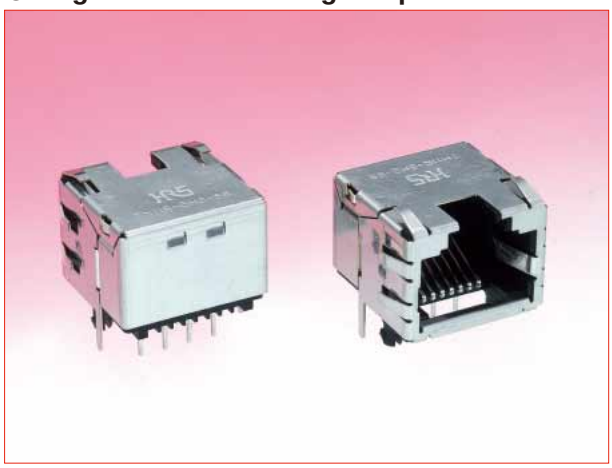
●Single Port With Built-in Light Pipe



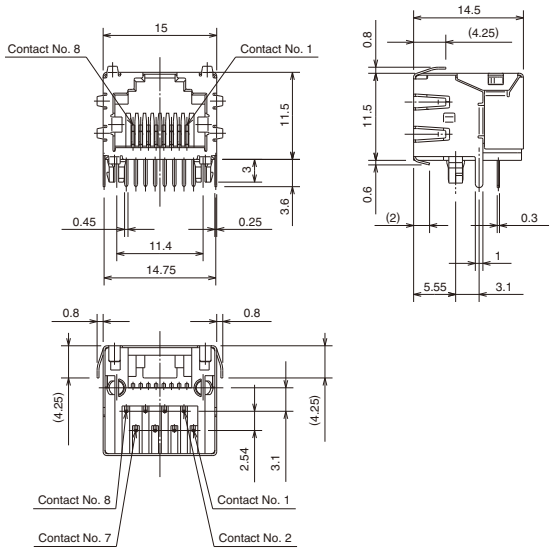
Part No.	HRS No.	RoHS
TM11R-5M2-88-LP(70)	222-2905-0 70	YES



●Single Port Without Light Pipe

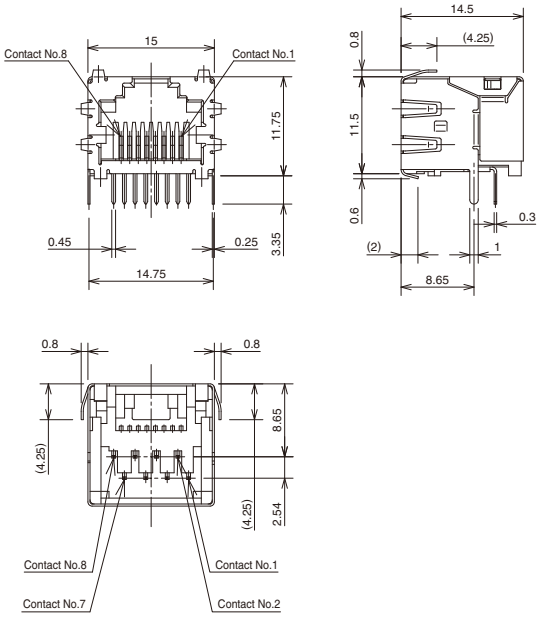


Part No.	HRS No.	RoHS
TM11R-5M2-88(70)	222-2906-2 70	YES



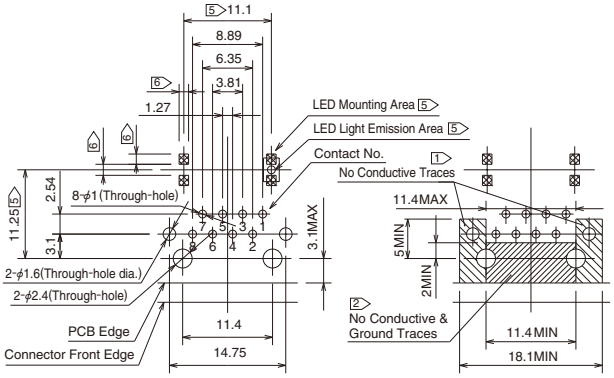
●Single Port (Through-Hole Mounting Type)

Part No.	HRS No.	RoHS
TM11R-5M2-88-DIR(70)	222-2984-6 70	YES



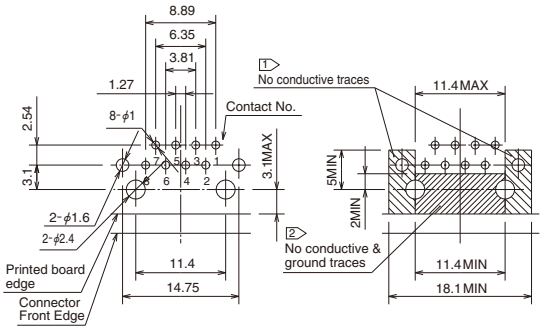
◆Recommended PCB Mounting Patterns

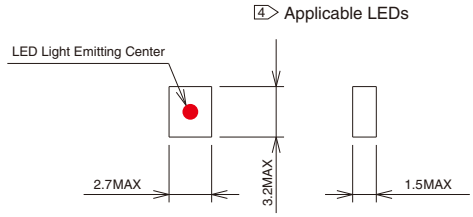
●With Built-in Light Pipe



●Without Light Pipe

●Through-Hole Mounting Type



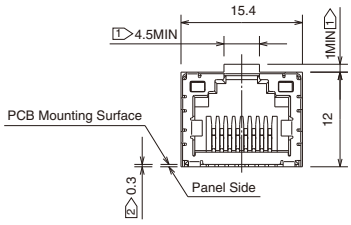


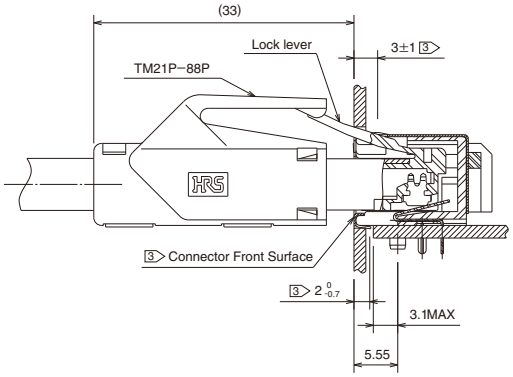
✻Recommendations for PCB Design

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 The LED for the jack connector with built-in light pipe is mounted on the PCB.
Please use an LED within the specified dimensions.
For LED specifications, contact the LED manufacturer.
5 Mount so that the center of the light emitting part of the LED is at the center of the dimensions indicated in the diagram.
6 Please check the latest dimension of LED pad with the corresponding LED manufacturer before designing.

◆Recommended Panel Cutout Diagram

●Same Recommended Cutout for Built-in Light Indicator Type, Type Without Light Indicator and Through-Hole Mounting Type





✻Recommendations for Panel Design

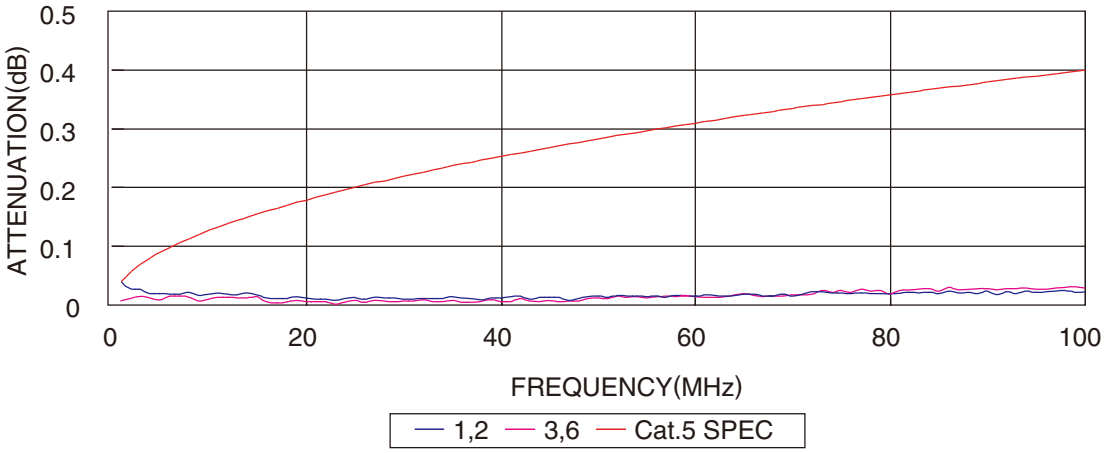
1 When making the panel, make a notch according to the dimensions shown as a relief for the plug lock lever.
2 Set the panel mounting position so that the bottom surface of the panel is 0.3mm below the PCB mounting surface.
3 The contact position of the contact spring is 3±1 (top and sides) and $2^{0}_{-0.7}$ (back side) from the front surface of the connector. Please be careful when setting the panel position.

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.

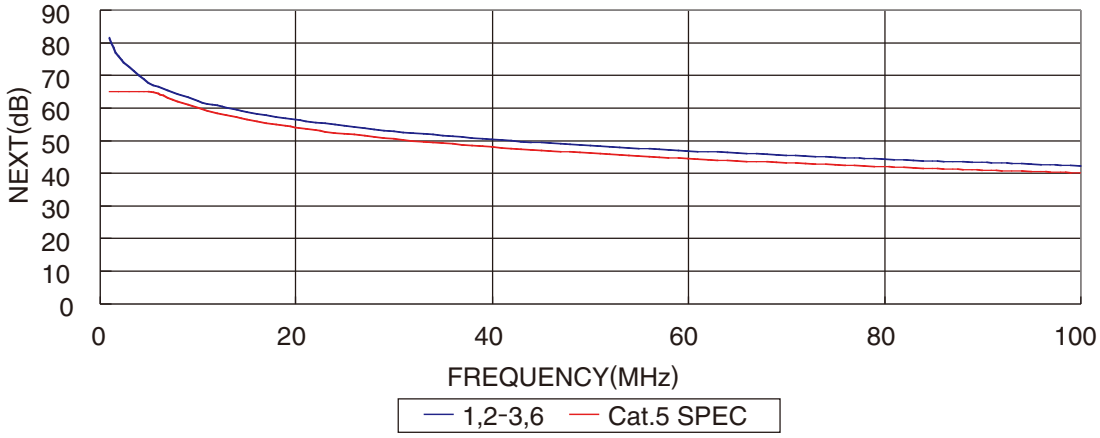
◆Cat.5 Transmission Characteristics Data

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

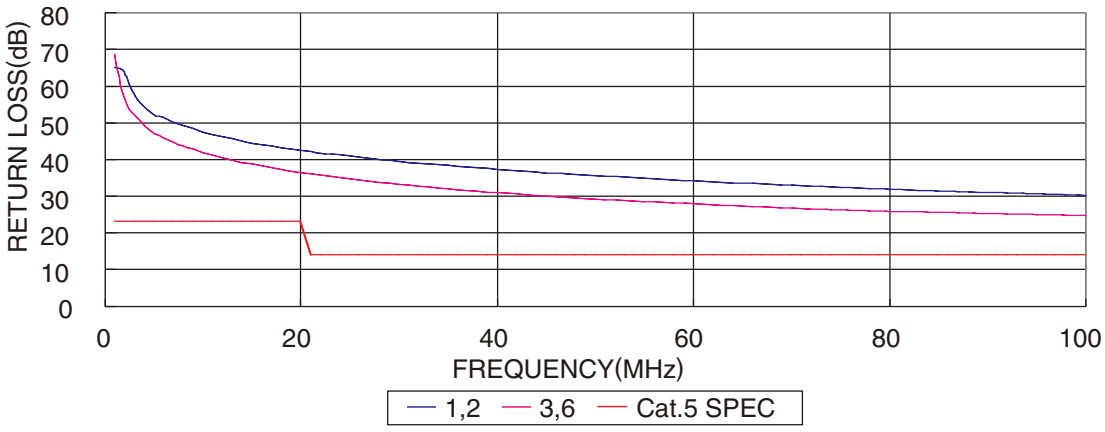
●Signal Attenuation



●Near-End Crosstalk (NEXT)



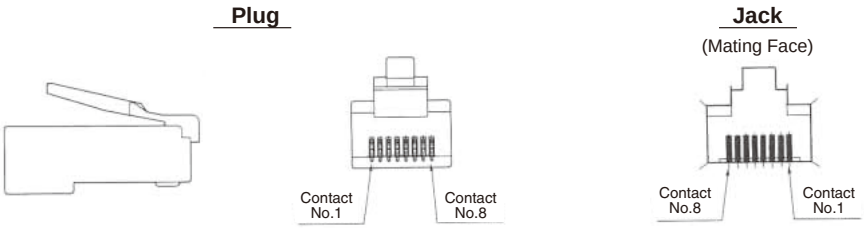
●Return Loss



Modular Connector Guide

■Modular Connector Contact Numbers (8pos.)

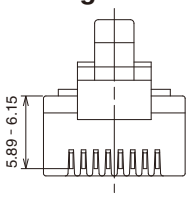
The numbers below comply with FCC standards. Please be aware of how contact numbers are decided during design.



■Plug Mating Cautions

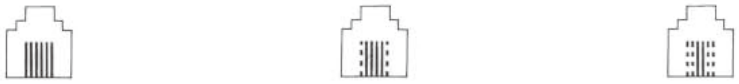
Use only plugs that conform to FCC standards. Pay particular attention to the contact height shown to the right.

FCC Plug Dimensions



■Mating Port Size and Number of Contacts (6pos.)

The relationship between the mating port size of the jack connector and number of contacts is shown below.



Models 64 and 62 are obtained by removing 1 pin and 2 pins, respectively, from both sides of model 66.
For details, please contact us for drawings because only standard models are shown in the catalogs.

■Recommended Soldering for Modular Through-Hole Connectors

●Same for Types With/Without Built-in Light Pipe

●Flow solder (automatic soldering machine)

Pre-heat	: 90 - 130℃
Pre-heat time	: 120 seconds maximum
Solder temperature	: 240 - 260℃
Soldering time	: 10 seconds maximum

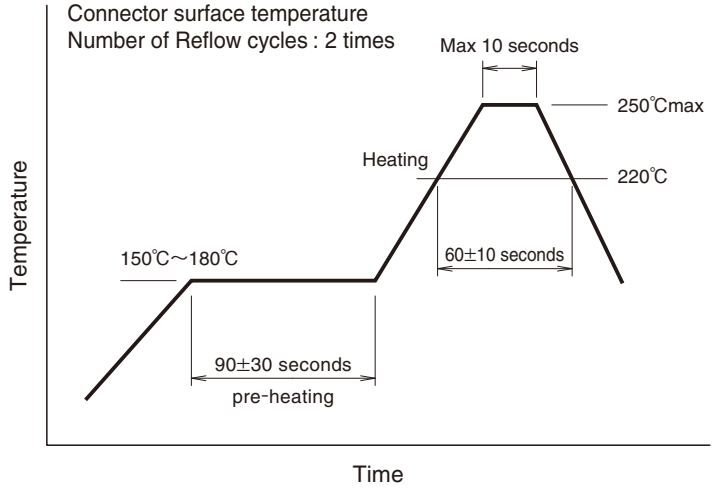
●Hand soldering

Soldering iron tip temperature	: 350℃
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

●Through-Hole Mounting Type



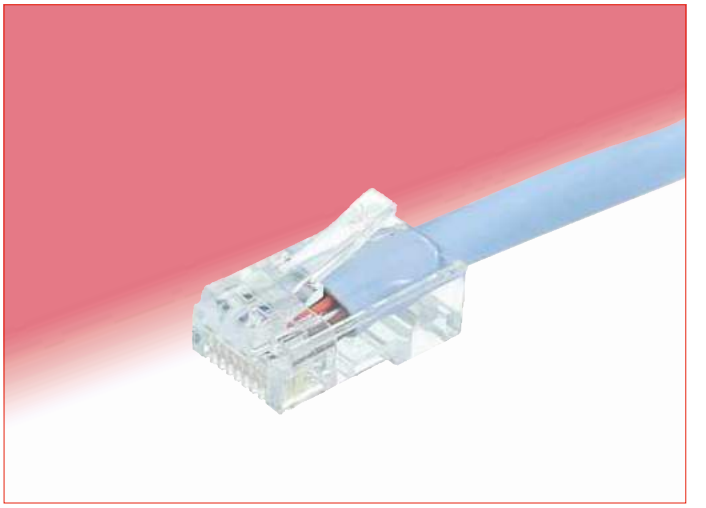
The temperature profile may vary due to external conditions such as the type of cream solder, manufacturer, and board size. Please contact the solder manufacturer for their specifications.

HIROSE ELECTRIC CO.,LTD.

Modular Plug Connectors Compliant to Enhanced Category 5 Standards

TM21P Series (Shielded Type)

TM22P-88P (Non-shielded Type)



■Features

1. Supports High-Speed LAN Transmission

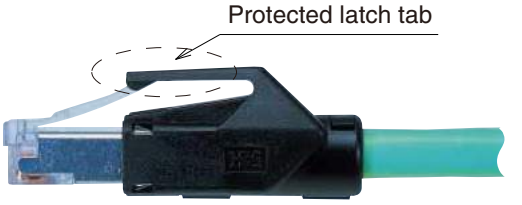
Conforms to requirements of TIA/EIA-568B data wiring standard, meeting transmission performance of Enhanced Category 5.
Supports Gigabit Ethernet (1000BASE-T) and Fast Ethernet (100BASE-TX) high-speed LAN transmission.

2. EMI protection (TM21∗P-88P)

360° coverage of the engagement area with a metal shield assures protection against electromagnetic interference. When mated with corresponding connector the shield surfaces are securely connected to provide continuous circuit.

3. Protected latch tab (TM21P-88P)

Flexible case extends over the release tab preventing the possibility of breaking-off during handling of the complete cable assembly.



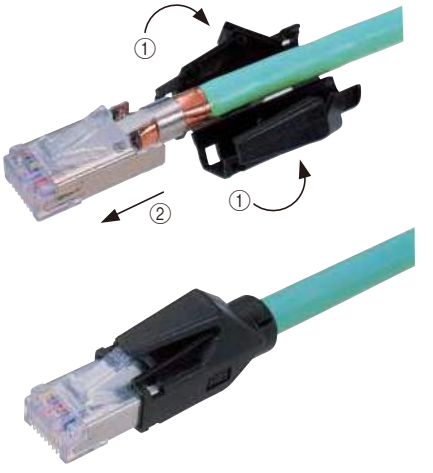
4. Termination of conductors

Self located 24 AWG conductors (solid or stranded) are terminated against pre-inserted contacts using simple tooling.

5. Simplified termination (TM21∗P-88P)

Removeable one piece cover allows easy access to the termination areas.

6. Conforms to the ISO 8877 Standard (ISDN Interface Connector)



Cover Installation Procedure

■Applications

Telecom Hubs, Routers, Bridges and ATM Transmission Equipment, Ethernet Switches and Networking Equipment, Test and Measurement Equipment and other equipment requiring this type of simple and reliable connection.

■Product Specification

Rating	Current rating 1A	Operating temperature range : -25 to +60℃ (Note)
	Voltage rating 125V AC	Storage temperature range : -25 to +60℃

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

Note : Includes temperature rise caused by current flow.

■Materials / Finish

Part	Material	Finish	Remarks
Insulator	Polycarbonate	Color : Clear	UL94V-2
Contacts	Copper alloy	Contact area : Gold plating 1.27μm	——
Shield	Copper alloy	Tin plating	——
Conductor holding tray	Polycarbonate	Color : Clear	UL94V-2
Cover	Polyamide	Color : Light beige (Note)	UL94V-2

Note : Cover available in various colors. Refer to page 3.

■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.

●Plugs- Shielded

TM21 C P - 8 8P
❶ ❷ ❶ ❸ ❹

❶ Series name	TM21P : Shielded
❷ Cover Type	Blank : Protective latch cover C : Short cover
❸ Size	8 : For 8 contacts
❹ Inserted contacts	8P : 8

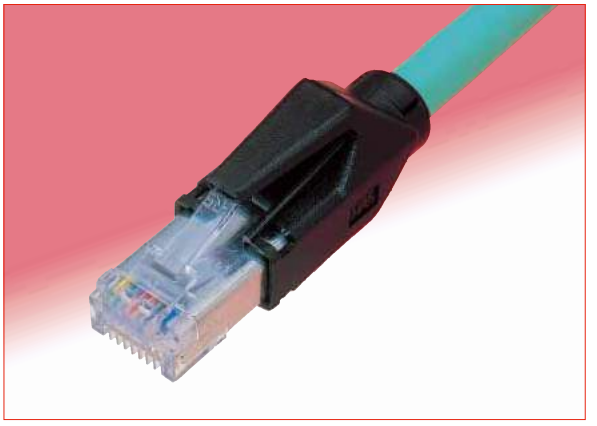
●Plugs - Non-shielded

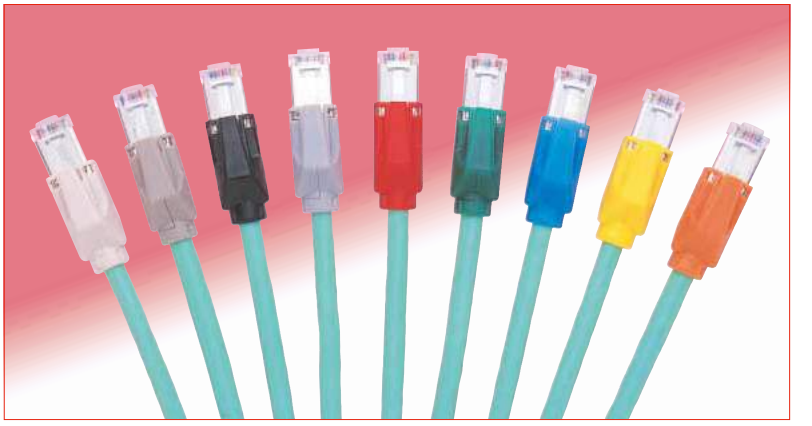
TM22P - 8 8P
❶ ❷ ❸

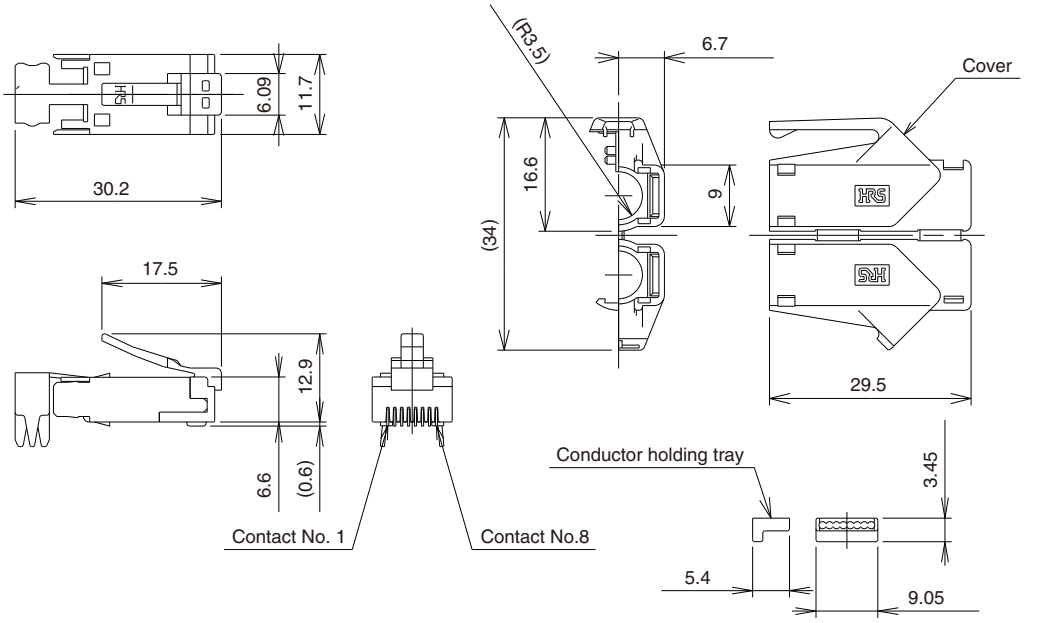
❶ Series name	TM22P : Non-shielded
❷ Size	8 : For 8 contacts
❸ Inserted contacts	8P: 8

■Plug Connectors

●Shielded

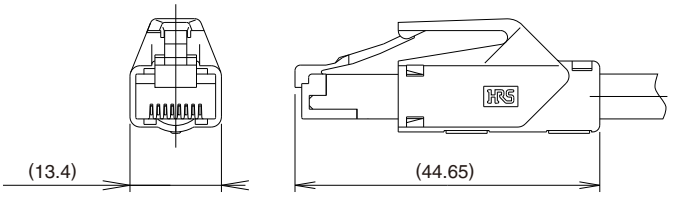




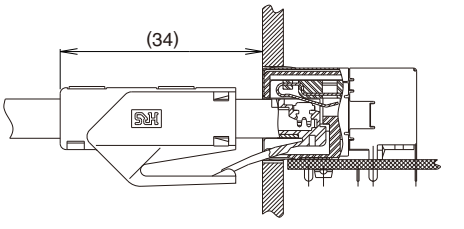


Part No.	HRS No.	Cover Color	Remarks	RoHS
TM21P-88P	222-2862-9 00	Light beige	Plug unit and Cover	YES
TM21P-88P(11)	222-2862-9 11	Light beige	Cover	
TM21P-88P(12)	222-2862-9 12	Medium gray	Cover	
TM21P-88P(13)	222-2862-9 13	Black	Cover	
TM21P-88P(14)	222-2862-9 14	Natural light gray	Cover	
TM21P-88P(15)	222-2862-9 15	Red	Cover	
TM21P-88P(16)	222-2862-9 16	Green	Cover	
TM21P-88P(17)	222-2862-9 17	Blue	Cover	
TM21P-88P(18)	222-2862-9 18	Yellow	Cover	
TM21P-88P(19)	222-2862-9 19	Orange	Cover	

◆Cover installed

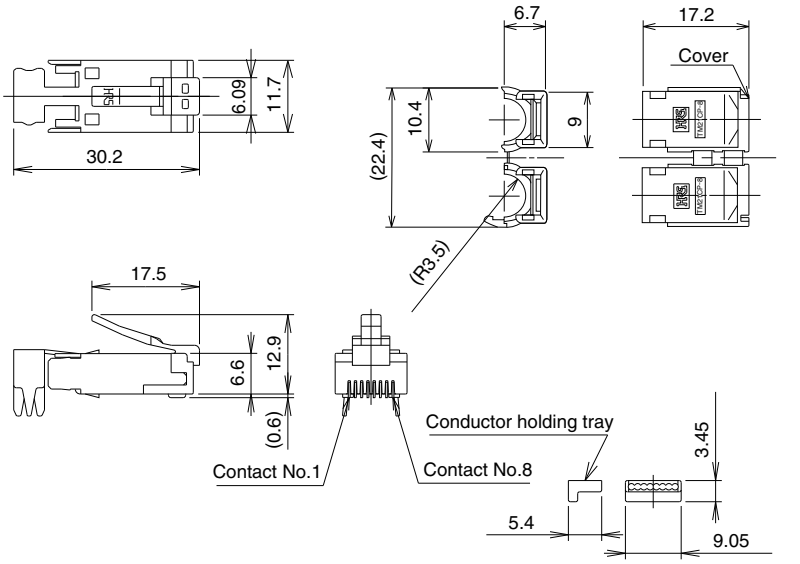


◆Mated with corresponding receptacle (shown for reference only)



■Plug Connectors

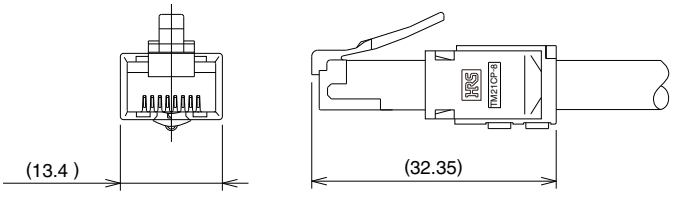
●Shielded-Short Cover



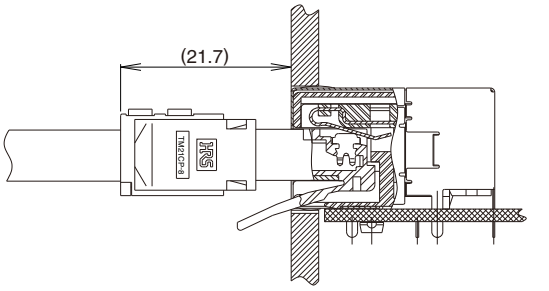
Part No.	HRS No.	Cover color	RoHS
TM21CP-88P(03)	222-2884-1 03	Black	YES

Note : For other colors contact Hirose sales representative.

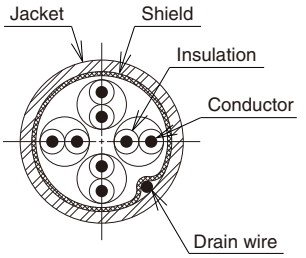
◆Cover installed



◆Mated with corresponding receptacle (shown for reference only)



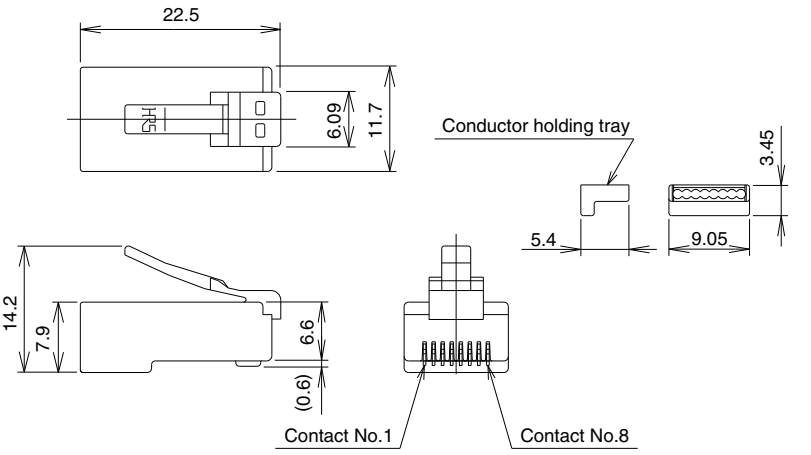
◆Applicable Shielded Cable Specifications

Specifications		
	Conductor	Solid copper conductor : 0.5mm dia.
		Stranded copper conductor : 24 AWG (Dia. 0.2mm x 7 pcs)
	Individual conductor insulation dia.	(0.9mm to 1.0mm)
	Drain wire	26 AWG (tin coated)
	Overall jacket dia.	(dia. 6.6mm)

Note : For cable termination procedures refer to:
[TM21P-88P Cable Termination Procedure Manual] (ETA-E2349) and [TM21CP-88P Cable termination Procedure Manual] (ETA-E2353).
Some cables may not meet the required service ratings. Contact Hirose sales representative for specific cable applications recommendations.

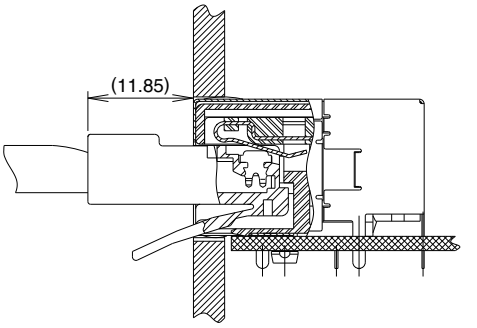
■Plug Connectors

●Non-shielded

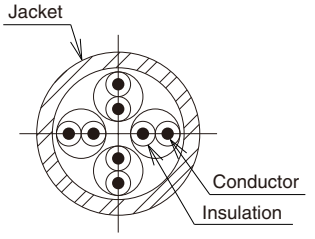


Part No.	HRS No.	RoHS
TM22P-88P	222-2899-9	YES

◆Mated with corresponding receptacle (shown for reference only)



◆Applicable Non-shielded Cable Specifications

Specifications		
	Conductor	Solid copper conductor : 0.5mm dia.
		Stranded copper conductor : 24 AWG (Dia. 0.2mm x 7 pcs)
	Individual conductor insulation dia.	(0.9mm to 1.0mm)
	Overall jacket dia.	(dia. 5.4mm to 5.7mm)

Note : For cable termination procedures refer to :
[TM22P-88P Cable Termination Procedure Manual] (ETA-E2381).
Some cables may not meet the required service ratings. Contact Hirose sales representative for specific cable applications recommendations.

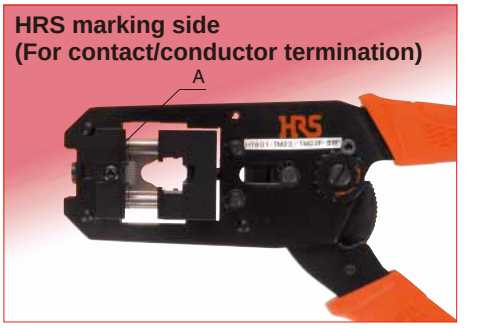
◆Hand termination tools

●For contact/conductor termination (For cable and shield crimping)

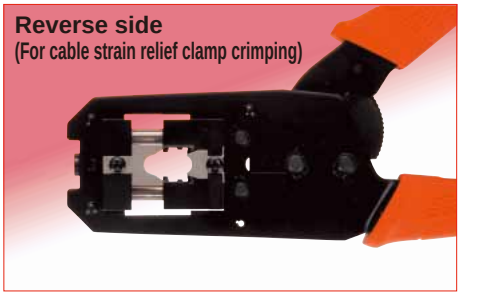
Part No.	HRS No.	Applicable connector
HT603/TM21P-88P	902-2532-0	TM21P-88P TM21CP-88P

●For contact/conductor termination (Non-shielded connectors)

HRS marking side
(For contact/conductor termination)



Reverse side
(For cable strain relief clamp crimping)



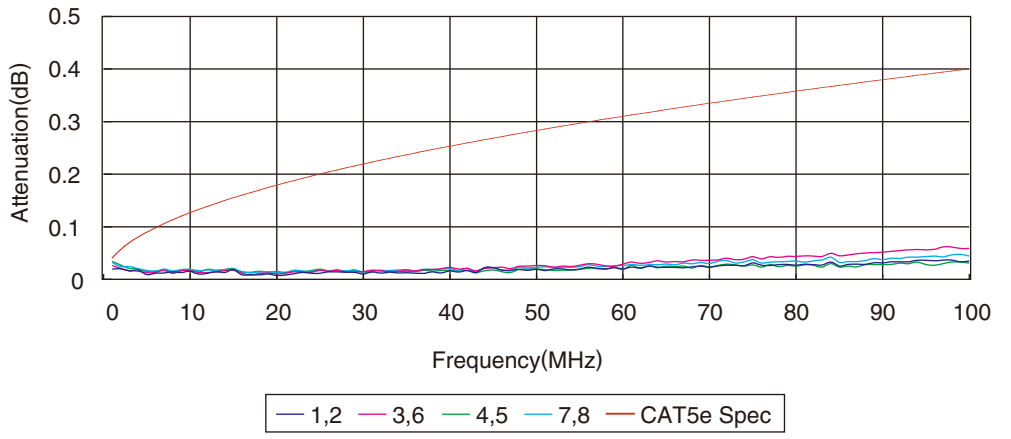
Part No.	HRS No.	Applicable connector
HT601-TM23/22P-88P	902-2128-1	TM22P-88P
		TM23P-88P

Technical Documentation

●CAT5e Transmission Characteristics Data

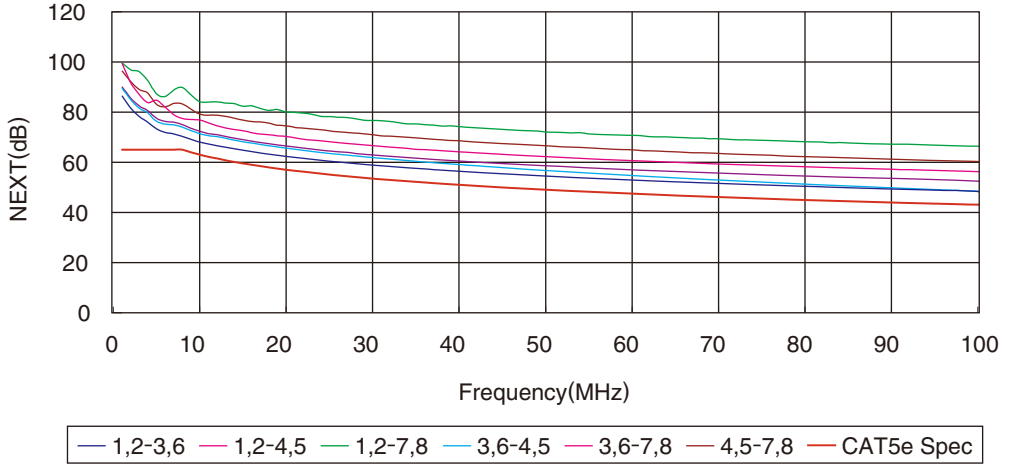
These are the representative values of the various transmission characteristics data for connector assemblies TM21P-88P and TM21R-5C-88-LP when fully mated.

• Signal Attenuation

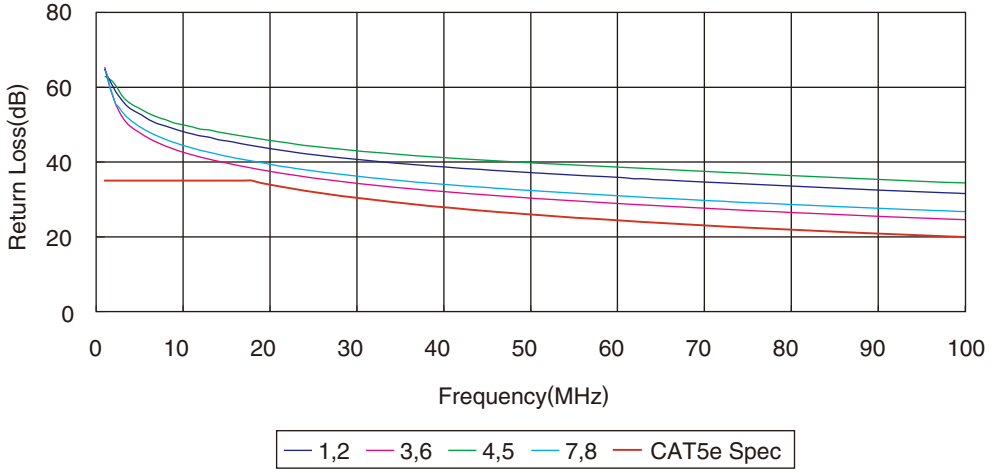


(Each two numbers are for the pair of individual contact position.)

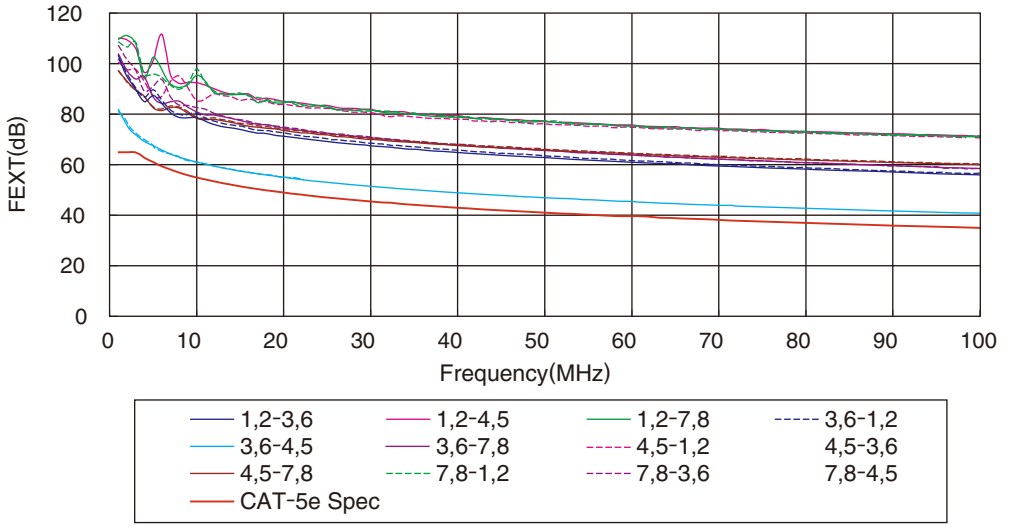
• Near-End Crosstalk Attenuation (NEXT)



• Return Loss

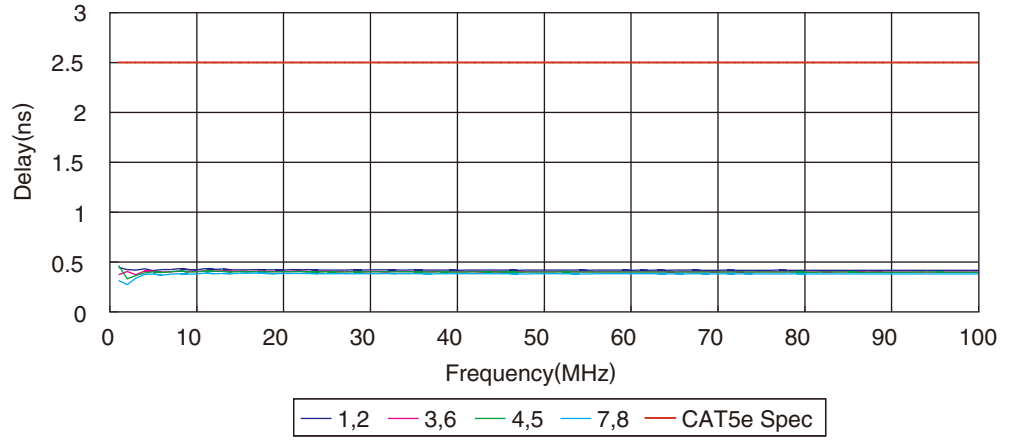


• Far-End Crosstalk Attenuation (FEXT)

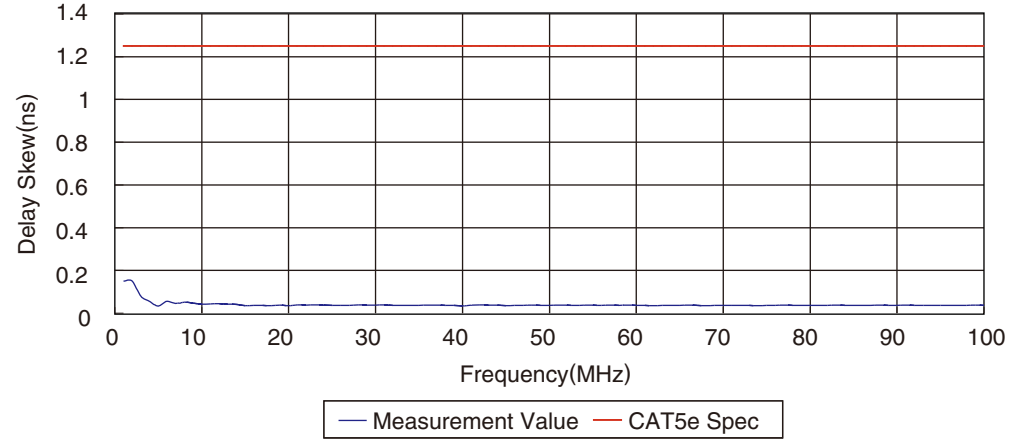


(Each two numbers are for pair of individual contact position.)

• Propagation Delay



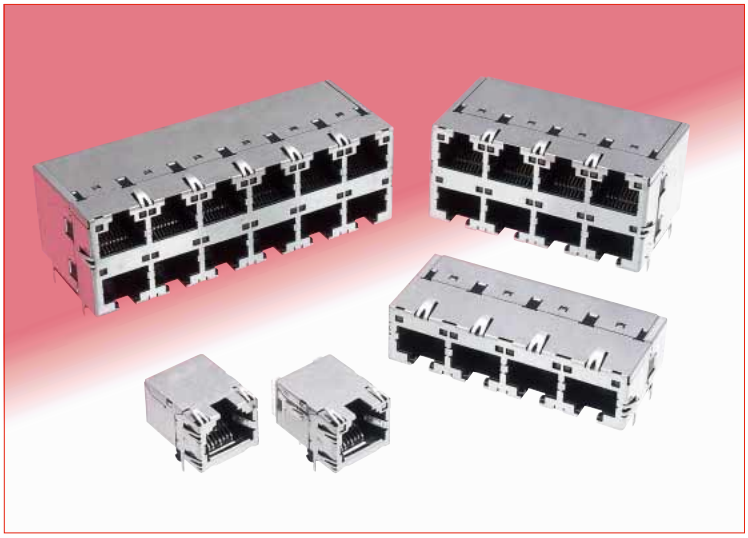
• Propagation Delay skew



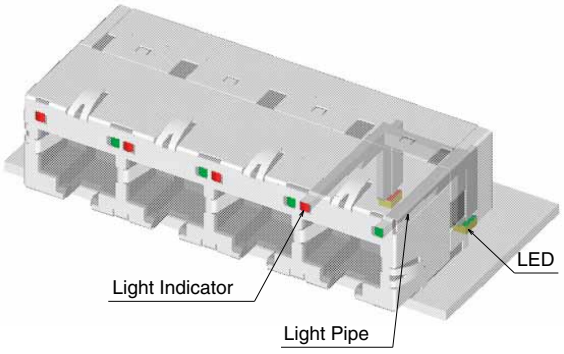
HIROSE ELECTRIC CO.,LTD.
2-6-3,Nakagawa Chuoh,Tsuzuki-Ku,Yokohama-Shi 224-8540,JAPAN
https://www.hirose.com/

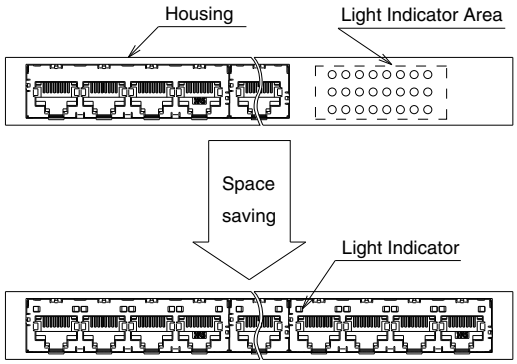
Modular Jack Connectors for High Speed LAN Transmission

TM21R Series



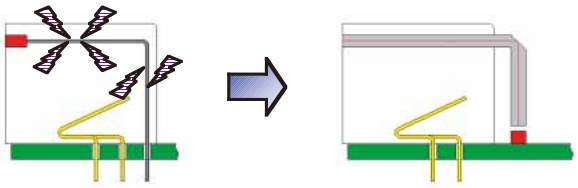
Built-in Light Indicators





One additional TM21 multi-port jack can be mounted in the space previously occupied by LEDs.

Fig.1



Built-in LED Type (Easily affected by noise.)

Built-in Light Pipe Type (Not affected by noise.)

Fig.2

■Features

1. Supports High Speed LAN Transmission

Complies with TIA/EIA-568-B data wiring requirements, guaranteeing Cat.5e transmission for the single port configuration and Cat.5 transmission performance for the multi-port configuration.
As such, these products fully support Gigabit Ethernet (1000BASE-T) and Fast Ethernet (100BASE-TX) high speed LAN transmission.

2. Built-in Light Indicators

There is no need to design a separate space for the light indicators as they are built-in the connector, enabling space-saving. (Fig.1)
Compared with LED type indicators, they do not emit any electrical noise. (Fig.2)

3. EMI protection

Metal shield covers the outer surfaces of the connectors assuring complete protection against electromagnetic interference.

4. FCC Standards

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

5. THR (Through-Hole Mounting) Type

THR (Through-Hole Mounting) compatible type is available.

■Applications

LAN Equipment, Office Equipment and Measuring Devices.

■Product Specifications

Ratings	Rated Current 1A	Operating Temperature : -55 to +85℃ (Note)
	Rated Voltage 125V AC	Storage Temperature Range : -25 to +60℃

Item	Specification	Conditions
1.Insulation Resistance	100MΩ min	100V DC
2.Withstanding Voltage (Between Adjacent Contacts)	No flashover or insulation breakdown	500V AC for 1min.
3.Withstanding Voltage (Between Contact and Shield)	No flashover or insulation breakdown	1500V AC for 1min.
4.Contact Resistance	230mΩ max.	100mA DC
5.Vibration	No electrical discontinuity of 5 μs or more Contact resistance : 250mΩ max.	Frequency : 10 to 55 Hz, single amplitude of 0.75mm, 2 hours / 3 axis
6.Shock	No electrical discontinuity of 5 μs or more Contact resistance : 250mΩ max.	Acceleration of 490 m/s², 11 ms duration, sine half-wave waveform, 3 cycles in each of the 3 axis
7.Mating Durability	Contact resistance : 250mΩ max.	200 cycles
8.Temperature Cycle	Contact resistance : 250mΩ max. Insulation resistance : 100MΩ min.	(Temperature : -55℃→+5℃ to +35℃→+85℃→+5℃ to +35℃ Duration : 30 → 5 → 30 → 5 (Minutes) 5 cycles
9.Humidity	Contact resistance : 250mΩ max. Insulation resistance : 1MΩ min. (High humidity) Insulation resistance : 10MΩ min. (Dry state)	500 hours at temperature of 40℃ and humidity of 90% to 95%
10.Salt Spray	Contact resistance : 250mΩ max.	Exposed to density 5% salt water for 48 hours

Note : Includes temperature rise caused by current flow.

■Materials / Finish

Part	Material	Finish	Remarks
Insulator	Synthetic Resin	Color : Black	UL94V-0
Contact	Copper Alloy	Contact Area : Gold Plating 1.27μ Termination Area : Gold Plating	——
Light Pipe	Polycarbonate	Color : Clear	——
Shield	Copper Alloy	Tin Plating	——

■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.

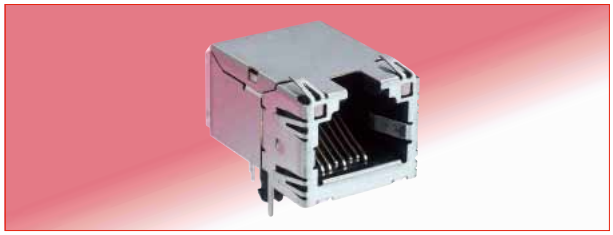
●Jacks

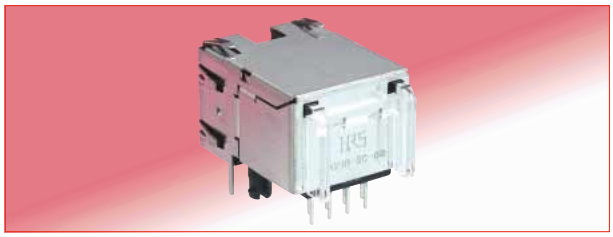
TM21 R - 5 A - 32 32 D - LP (50)
❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾

❶ Series Name	TM21
❷ Connector Type	R : Jack
❸ Jack Type Number	5 : Right Angle PCB Through-Hole Type
❹ Jack Performance Level Code	A : Cat.5 (Single row, multi-port) B : Cat.5 (Double row, multi port) C : Supports Cat.5e (Single port)
❺ Jack Mating Port Size	8 : 8 contacts 32 : 8 contacts /4 ports 48 : 8 contact/6 ports
❻ Number of Contacts	8 : 8 contacts 32 : 8 contacts inserted in 4 ports=32 contacts 48 : 8 contacts inserted in 6 ports=48 contacts
❼ Number of Rows	Blank : Single row D : Double row
❽ Option	LP : With light pipe inserted Blank : Without light pipe DIR : THR (Through-Hole Mounting)
❾ RoHS Compliant	(50)

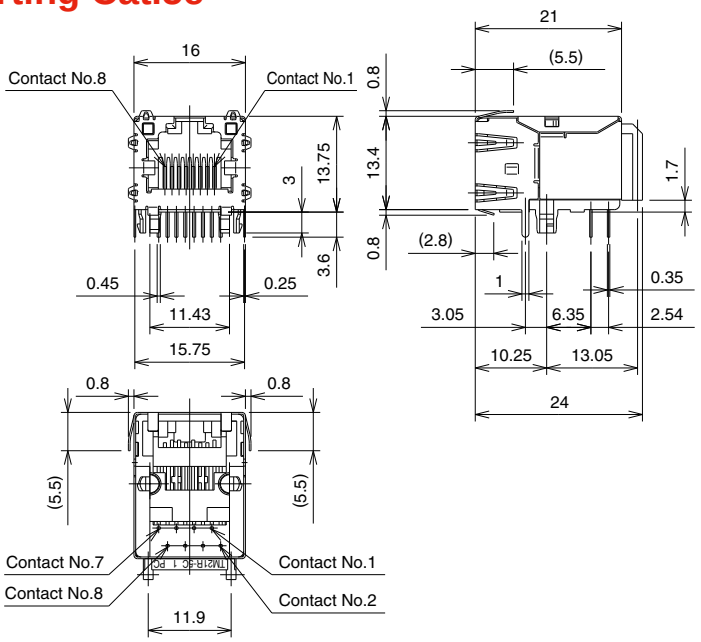
■Modular Jack Connectors Supporting Cat.5e

●Single Port With Built-in Light Pipe

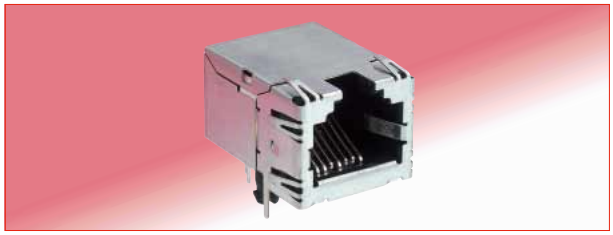


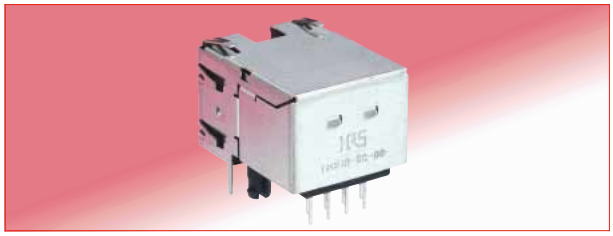


Part No.	HRS No.	RoHS
TM21R-5C-88-LP(50)	222-2892-0 50	YES

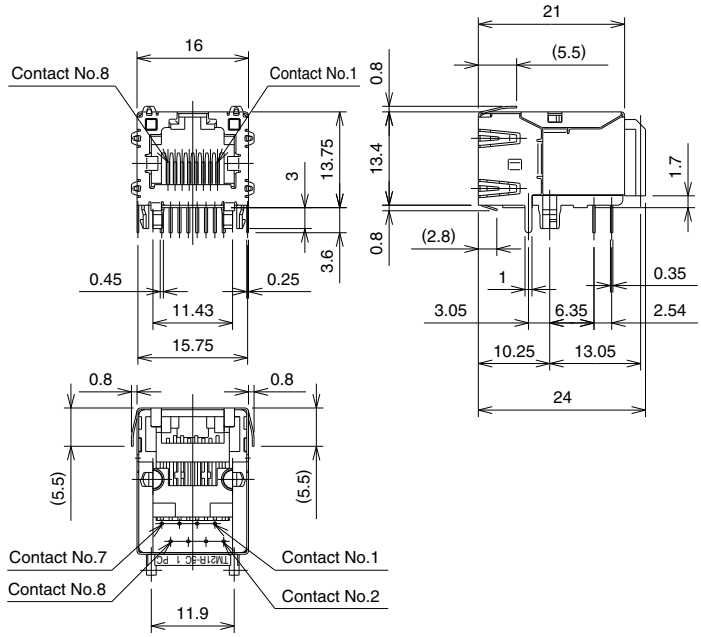


●Single Port Without Light Pipe

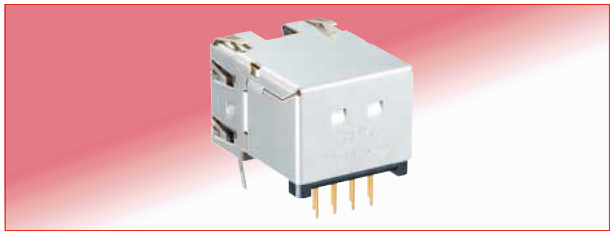




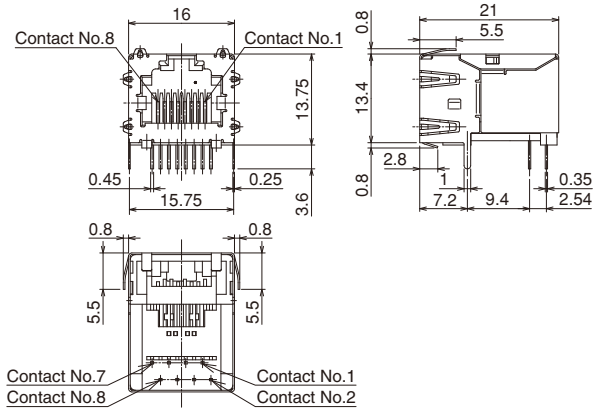
Part No.	HRS No.	RoHS
TM21R-5C-88(50)	222-2893-2 50	YES



●Single Port (Through-Hole Mounting Type)

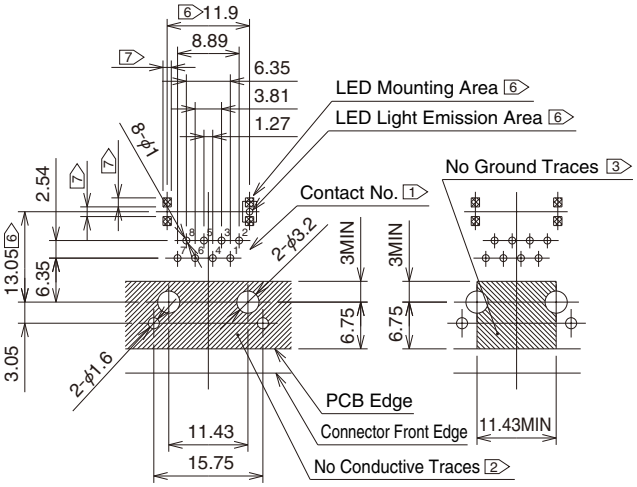


Part No.	HRS No.	RoHS
TM21R-5C-88-DIR	222-2091-0 00	YES

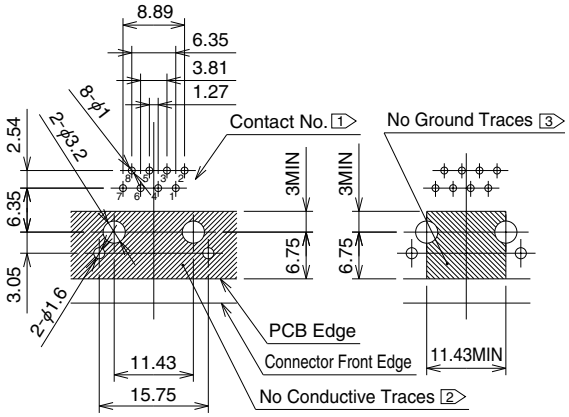


◆Recommended PCB Mounting Patterns

●With Built-in Light Pipe



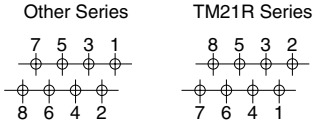
●Without Light Pipe
●Through-Hole Mounting Type



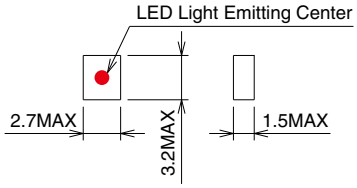
✻Recommendations for PCB Design

1 Note that the contact arrangement for contact No.1 and No.2 and No.7 and No.8 are switched.
2 Areas indicated should be free of conductive traces.
3 Area indicated should be free of ground traces.
4 Recommended board thickness: 1.6mm.
5 The LED for the jack connector with built-in light pipe is mounted on the PCB. Please use an LED within the specified dimensions.
For LED specifications, contact the LED manufacturer.
6 Mount so that the center of the light emitting part of the LED is at the center of the dimensions indicated in the diagram.
7 Please check the latest dimension of LED pad with the corresponding LED manufacturer before designing.

1 Contact Arrangement

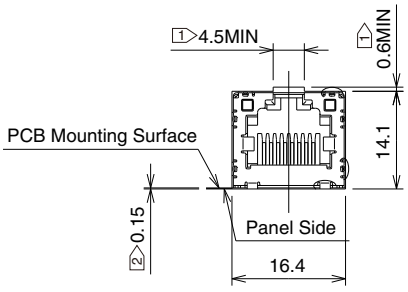


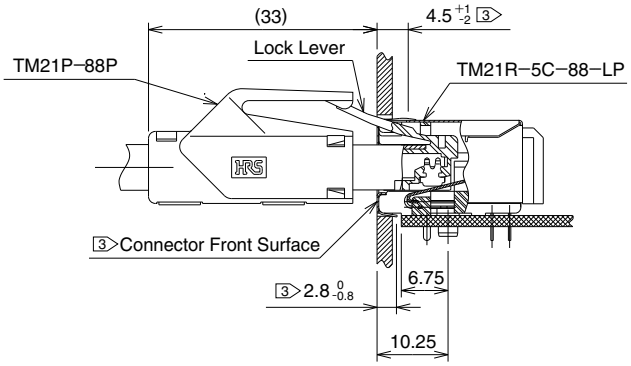
5 Applicable LEDs



◆Recommended Panel Cutout Diagram

●Same Recommended Cutout for Built-in Light Indicator Type, Type Without Light Indicator and Through-Hole Mounting Type





✻Recommendations for Panel Design

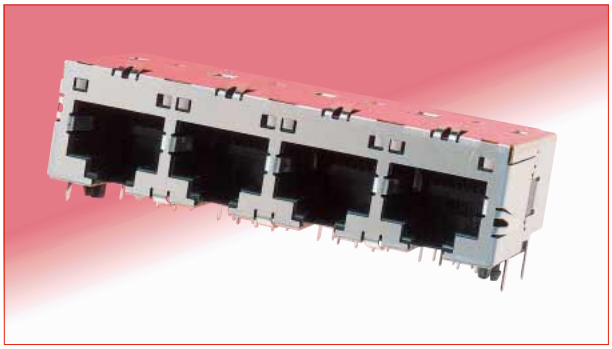
1 When making the panel, make a notch according to the dimensions shown as a relief for the plug lock lever.
2 Set the panel mounting position so that the bottom surface of the panel is 0.15mm below the PCB mounting surface.
3 The contact position of the contact spring is 4.5^{+1}_{-2} (top and sides) and $2.8^{0}_{-0.8}$ (back side) from the front surface of the connector. Please be careful when setting the panel position.

●Usage Precautions for Built-in Light Pipe Type

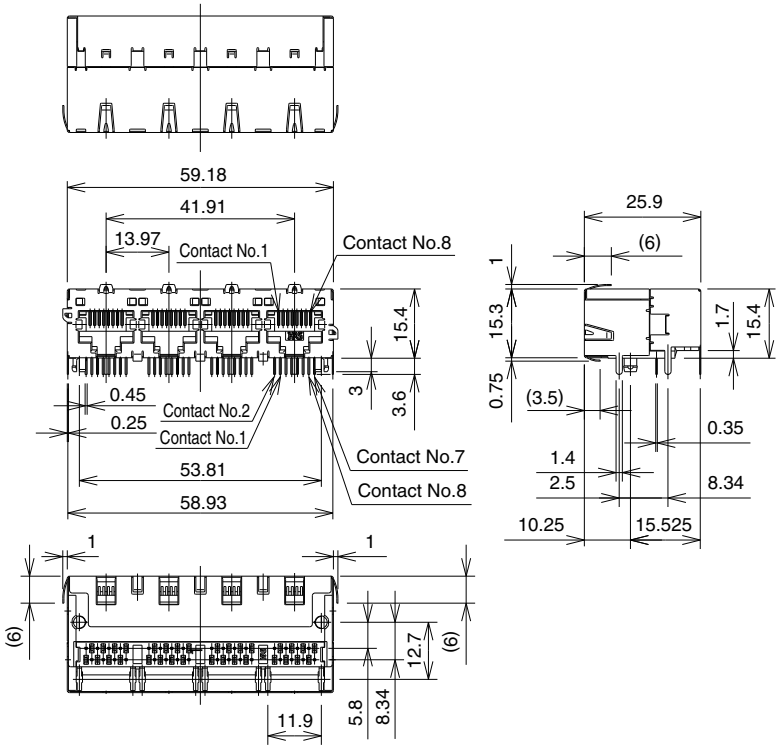
IPA cleaning at room temperature is recommended for cleaning. When using a liquid-based cleaning agent, the color of the light pipe (made of polycarbonate resin) may change. Please select a cleaning agent after reviewing the table of cleaning agent effects on resin issued by cleaning agent manufacturers.

■Modular Receptacles Supporting Cat.5

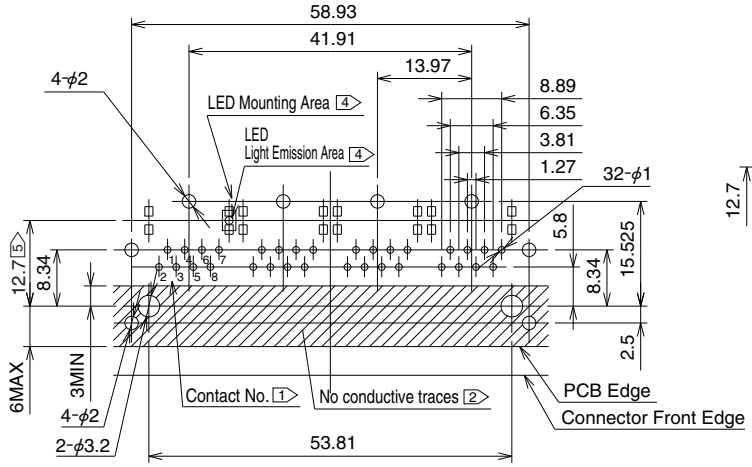
●1 Row×4 Ports



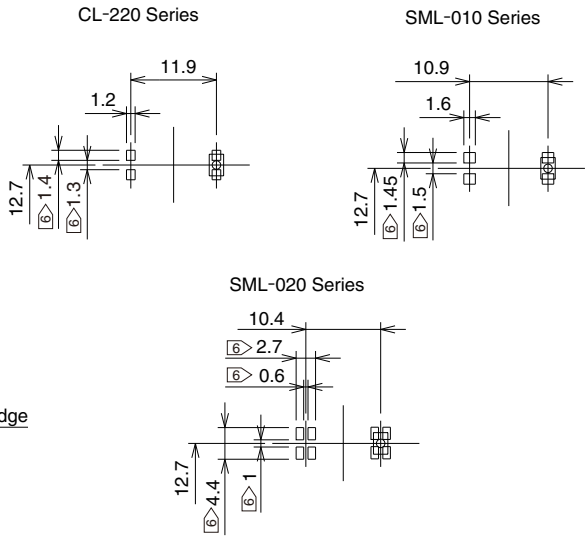
Part No.	HRS No.	RoHS
TM21R-5A-3232-LP(50)	222-2873-50	YES



◆Recommended PCB Mounting Patterns



LED Mount Area Dimensions



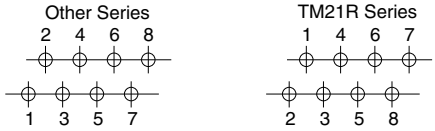
✻Recommendations for PCB Design

1. Note that the contact arrangement for contact No.1 and No.2 and No.7 and No.8 are switched.
   For LED specifications, contact the LED manufacturer.
2. Areas indicated should be free of conductive traces.
3. Recommended board thickness: 1.6mm.
4. The LED for the jack connector with built-in light pipe is mounted on the PCB. Please use the compatible LEDs shown on the table.
   For LED specifications, contact the LED manufacturer.
5. Mount so that the center of the light emitting part of the LED is at the center of the dimensions indicated in the diagram.
6. Please check the latest dimension of LED pad with the corresponding LED manufacturer before designing.

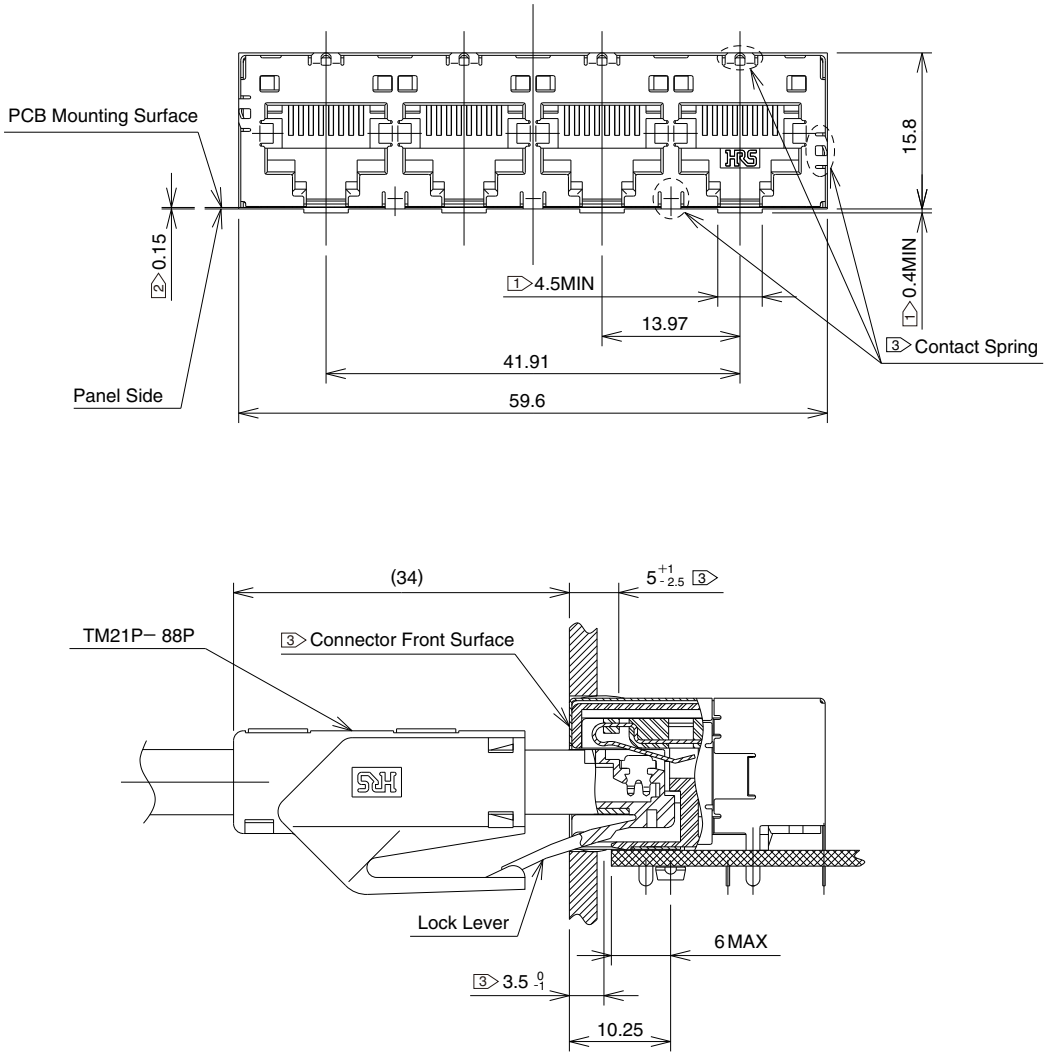
4 Applicable LEDs

Series Name	Manufacturer
CL-220	Citizen Electronics Co., Ltd.
CL-221	Citizen Electronics Co., Ltd.
SML-010	Rohm Co., LTD
SML-020	Rohm Co., LTD

1 Contact Arrangement



◆Recommended Panel Cutout Diagram



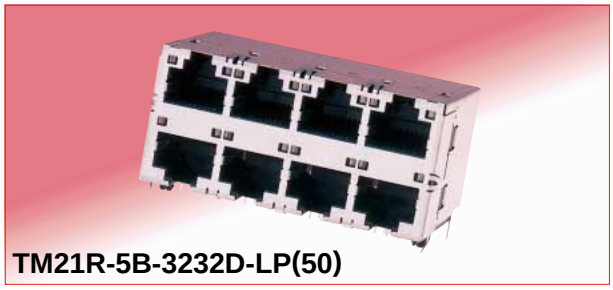
✻Recommendations for Panel Design

1 When making the panel, make a notch according to the dimensions shown as a relief for the plug lock lever.
2 Set the panel mounting position so that the bottom surface of the panel is 0.15mm below the PCB mounting surface.
3 The contact position of the contact spring is $5^{+1}_{-2.5}$ (top and sides) and 3.5^{0}_{-1} (back side) from the front surface of the connector. Please be careful when setting the panel position.

●Usage Precautions for Built-in Light Pipe Type

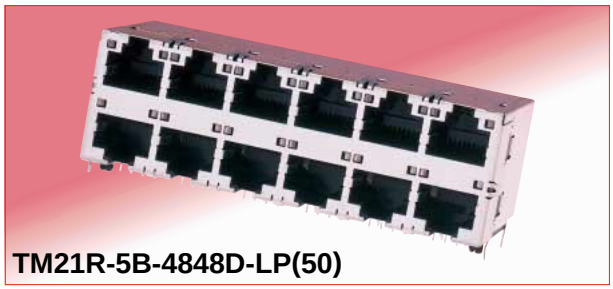
IPA cleaning at room temperature is recommended for cleaning. When using a liquid-based cleaning agent, the color of the light pipe (made of polycarbonate resin) may change. Please select a cleaning agent after reviewing the table of cleaning agent effects on resin issued by cleaning agent manufacturers.

●2 Row×4 Ports

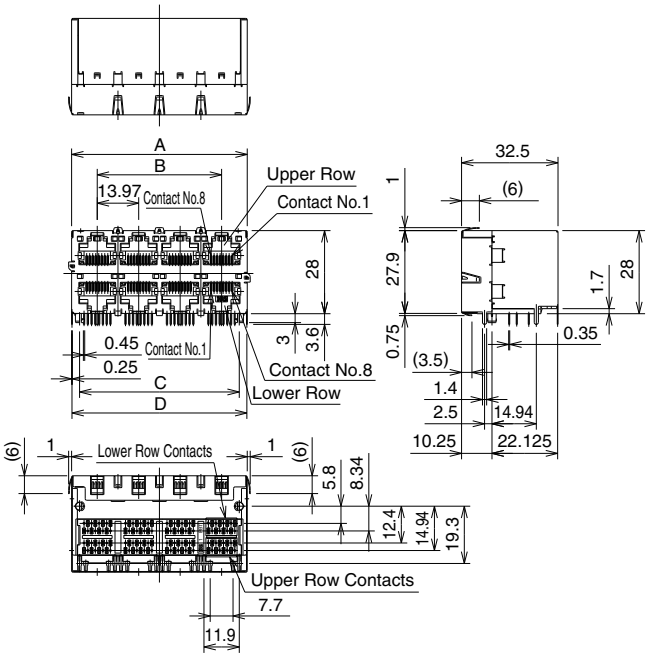


TM21R-5B-3232D-LP(50)

●2 Row×6 Ports

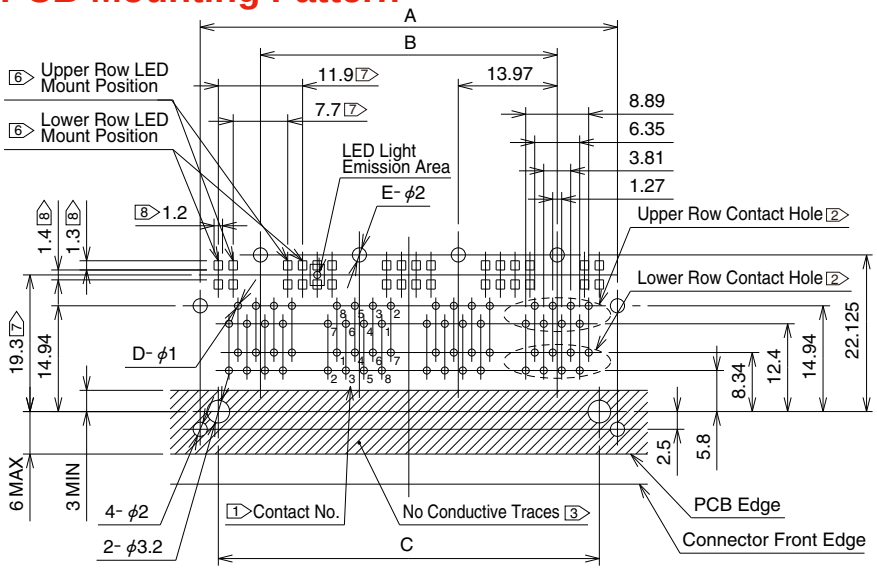


TM21R-5B-4848D-LP(50)



Part No.	HRS No.	A	B	C	D	RoHS
TM21R-5B-3232D-LP(50)	222-2879-1 50	59.18	41.91	53.81	58.93	YES
TM21R-5B-4848D-LP(50)	222-2885-4 50	87.12	69.85	81.75	86.87	

◆Recommended PCB Mounting Pattern



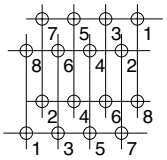
Part No.	HRS No.	A	B	C	D	E
TM21R-5B-3232D-LP(50)	222-2879-1 50	58.93	41.91	53.81	64	4
TM21R-5B-4848D-LP(50)	222-2885-4 50	86.87	69.85	81.75	96	6

✻Recommendations for PCB Design

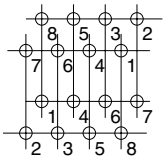
1. Note that the contact arrangement for contact No.1 and No.2 and No.7 and No.8 are switched.
2. The positions of the upper and lower contacts are as shown in the drawing.
3. Areas indicated should be free of conductive traces.
4. Recommended board thickness : 1.6mm.
5. The LED for the jack connector with built-in light pipe is mounted on the PCB. Please use the compatible LEDs shown on the table. For LED specifications, contact the LED manufacturer.
6. The mounting positions of the upper and lower LED are as shown in the drawing.
7. Mount so that the center of the light emitting part of the LED is at the center of the dimensions indicated in the diagram.
8. Please check the latest dimension of LED pad with the corresponding LED manufacturer before designing.

1 Contact Arrangement

Other Series



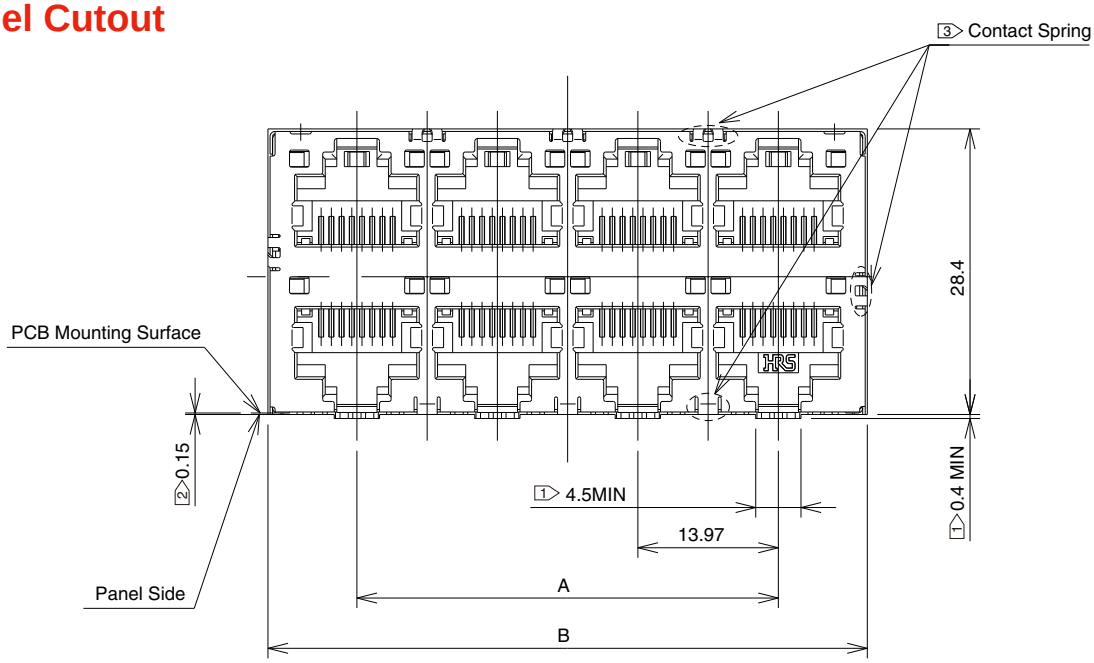
TM21R Series



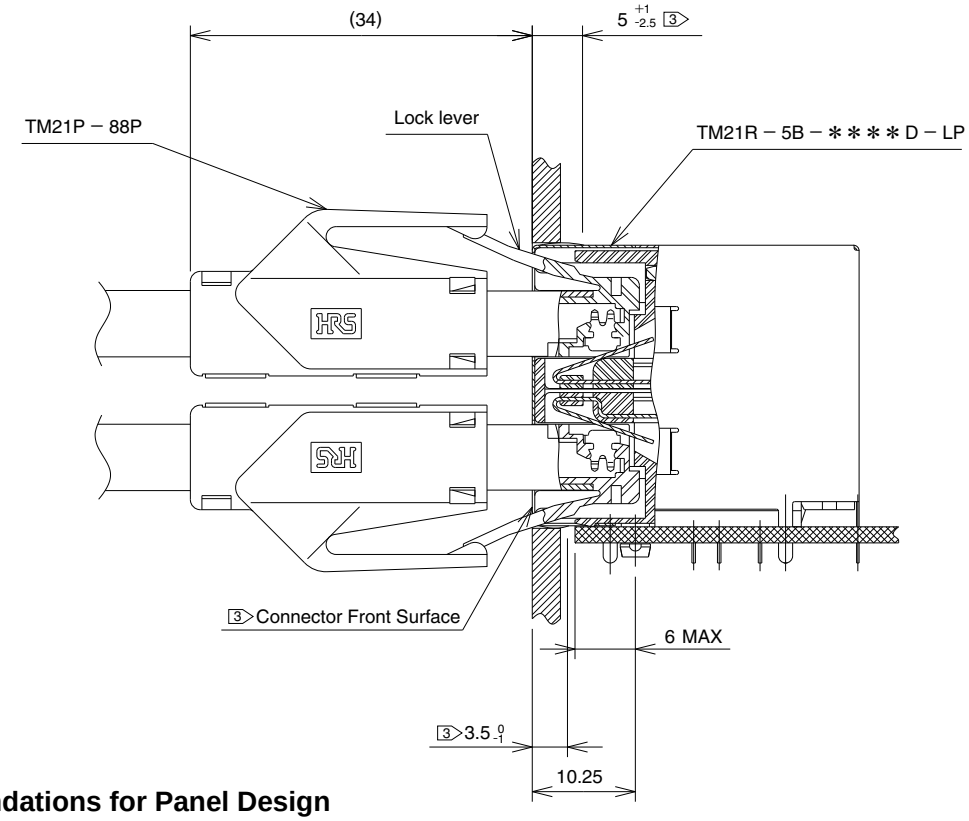
5 Applicable LEDs

Series Name	Manufacturer
CL-220	Citizen Electronics Co., Ltd.
CL-221	Citizen Electronics Co., Ltd.

◆Panel Cutout



Part No.	HRS No.	A	B	RoHS
TM21R-5B-3232D-LP(50)	222-2879-1 50	41.91	59.6	YES
TM21R-5B-4848D-LP(50)	222-2885-4 50	69.85	87.54	



＊Recommendations for Panel Design

1 When making the panel, make a notch according to the dimensions shown as a relief for the plug lock lever.
2 Set the panel mounting position so that the bottom surface of the panel is 0.15mm below the PCB mounting surface.
3 The contact position of the contact spring is $5^{+1}_{-2.5}$ (upper and side) and 3.5^{0}_{-1} (lower) from the front surface of the connector. Please be careful when setting the panel position.

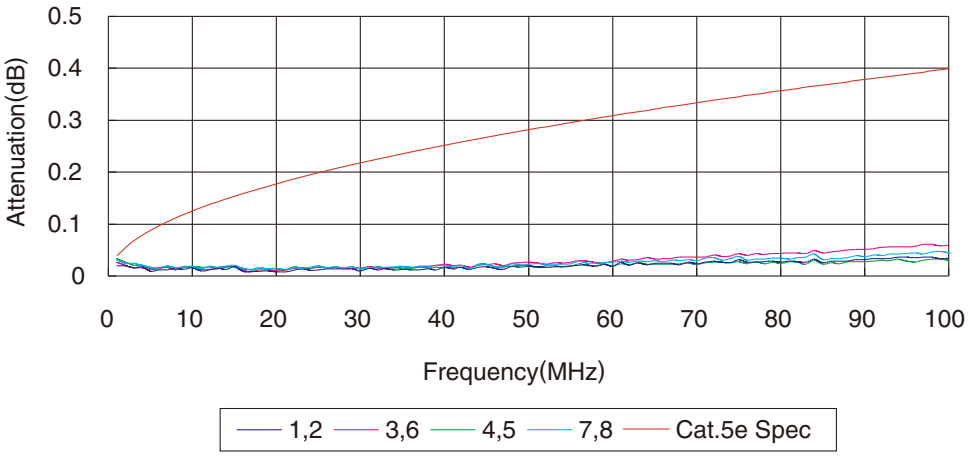
●Usage Precautions for Built-in Light Pipe Type

IPA cleaning at room temperature is recommended for cleaning. When using a liquid-based cleaning agent, the color of the light pipe (made of polycarbonate resin) may change. Please select a cleaning agent after reviewing the table of cleaning agent effects on resin issued by cleaning agent manufacturers.

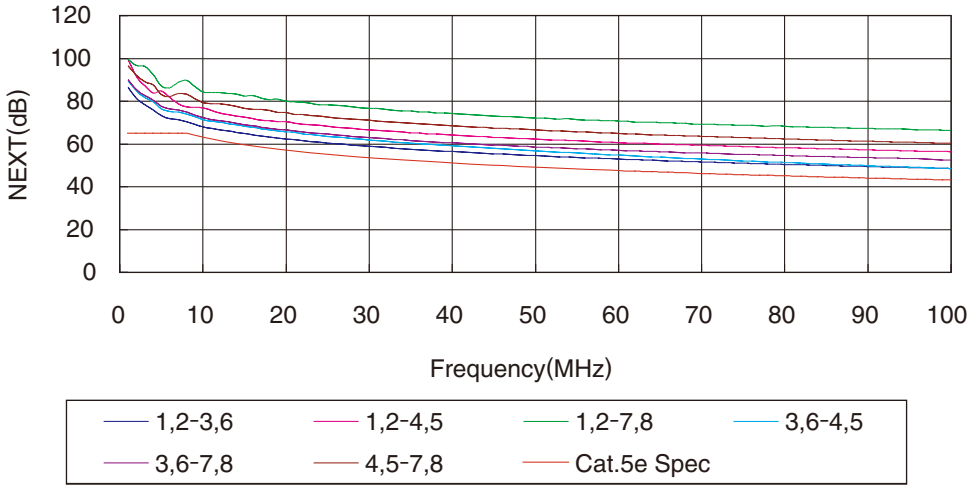
◆Technical Documentation Cat.5e Transmission Characteristics Data

The below graph is of representative values for the various transmission characteristics for the receptacle (TM21R-5C-88P) mated with plug (TM21P-88P).
The TM21R-5C series meets the requirements for Cat.5e single transmission when used with plugs manufactured on the De-embedded method of the TIA/EIA-568-B.2 standard.
Note : This data is for the listed mated connector pair. For other combinations, please contact a Hirose Electric representative.

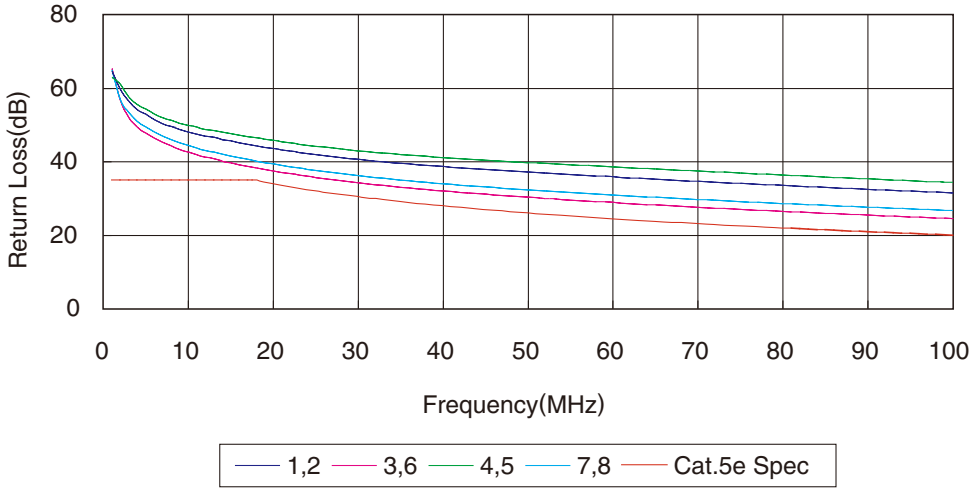
●Signal Attenuation



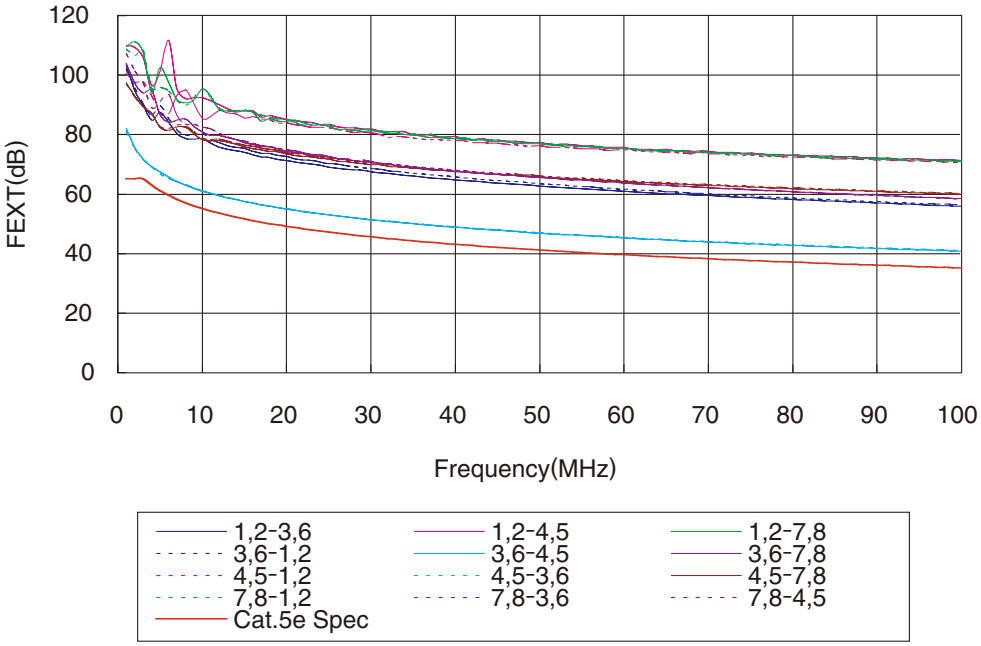
●Near-End Crosstalk (NEXT) Data



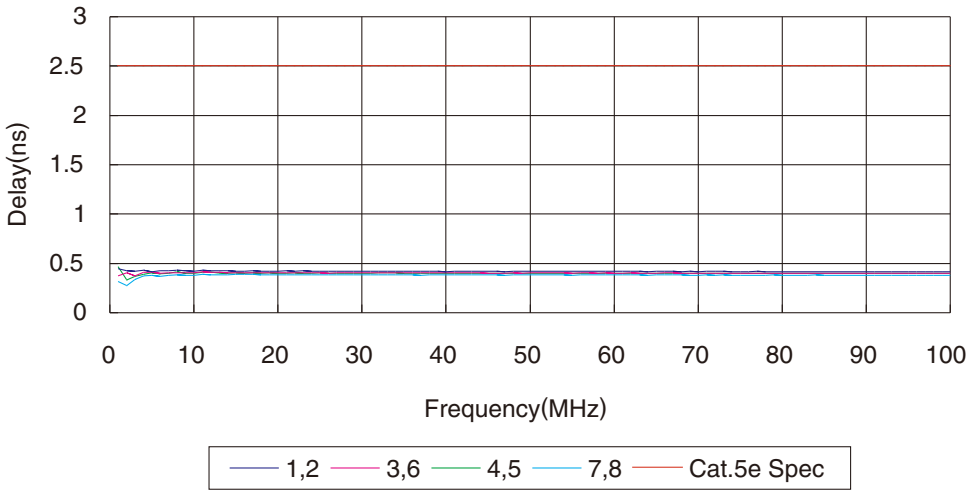
●Return Loss



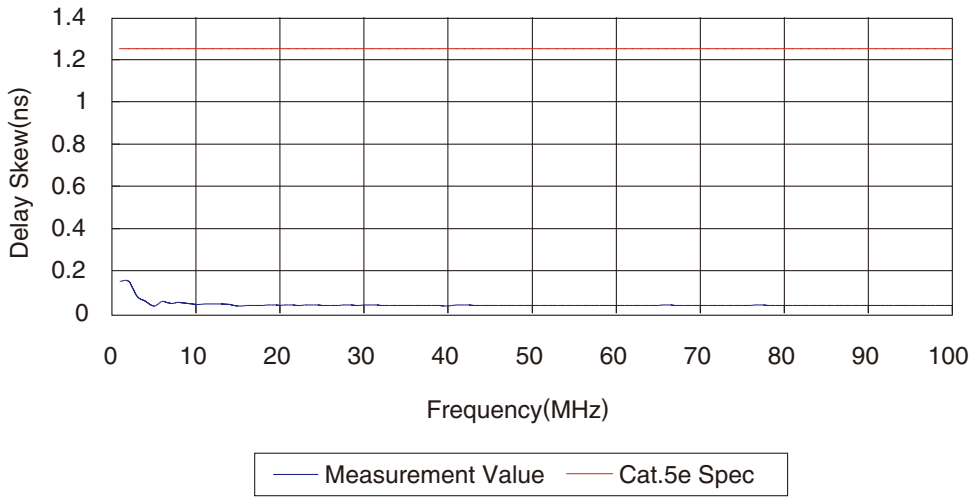
●Far-End Crosstalk (FEXT)



●Propagation Delay



●Propagation Delay (Delay Skew)

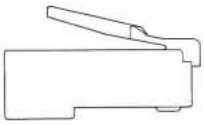


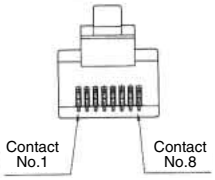
Modular Connector Guide

■Modular Connector Contact Numbers (8pos.)

The numbers below comply with FCC standards. Please be aware of how contact numbers are decided during design.

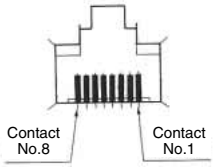
Plug





Jack

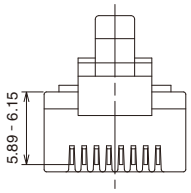
(Mating Face)



■Plug Mating Cautions

Use only plugs that conform to FCC standards. Pay particular attention to the contact height shown to the right.

FCC Plug Dimensions



■Mating Port Size and Number of Contacts (6pos.)

The relationship between the mating port size of the jack connector and number of contacts is shown below.

Model 66

Model 64

Model 62

Models 64 and 62 are obtained by removing 1 pin and 2 pins, respectively, from both sides of model 66. For details, please contact us for drawings because only standard models are shown in the catalogs.

■Recommended Soldering for Modular Through-Hole Connectors

●Same for Types With/Without Built-in Light Pipe

●Flow solder (automatic soldering machine)

Pre-heat	: 90 - 130℃
Pre-heat time	: 120 seconds maximum
Solder temperature	: 240 - 260℃
Soldering time	: 10 seconds maximum

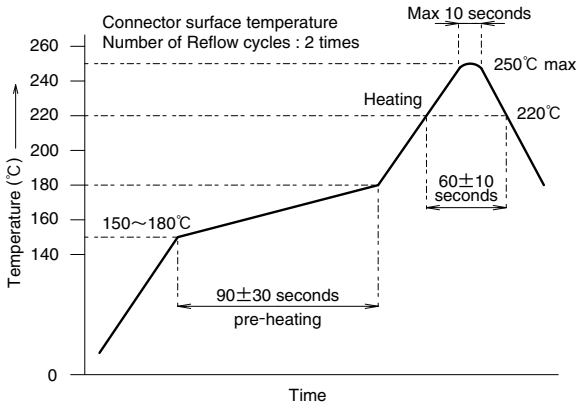
●Hand soldering

Soldering iron tip temperature	: 350℃
Soldering temperature	: 5seconds maximum
Soldering iron output	: 30 - 40W

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

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

●Through-Hole Mounting Type



The temperature profile may vary due to external conditions such as the type of cream solder, manufacturer, and board size. Please contact the solder manufacturer for their specifications.

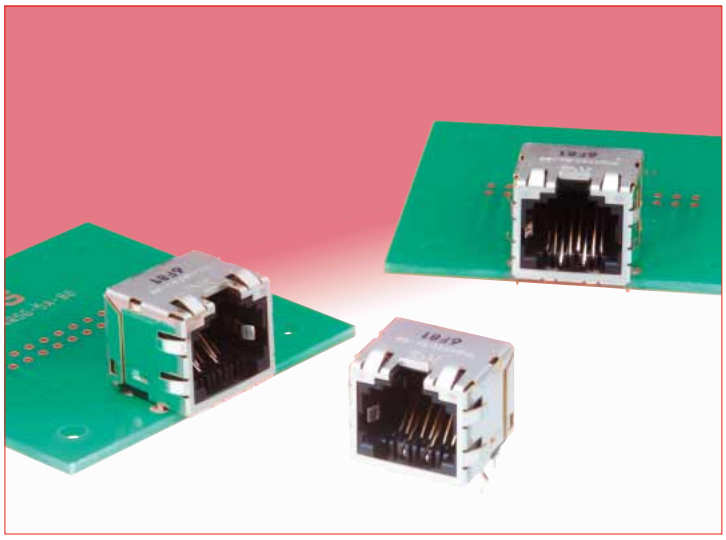
HIROSE ELECTRIC CO.,LTD.

2-6-3,Nakagawa Chuoh,Tsuzuki-Ku,Yokohama-Shi 224-8540,JAPAN

https://www.hirose.com/

Modular Jack Connector for High-Speed Transmission

TM24R Series



■Features

1. Unique contact configuration and board-mounting pattern

The adjacent contacts have different angles of engagement thus increasing the distance between them, in effect reducing the cross talk within connector and its footprint. Contact #3 and # 6, affecting the cross talk the most; have been isolated from other contacts resulting in maximum NEXT noise suppression.
In addition, the board layout allows easy tracing of the differential signal lines.

2. Full EMI shielding

The entire connector is covered with a metal shell. Multiple panel ground contact springs (2 on each side of the mating opening) and 4 board ground connection solder contacts placed at each corner of the connector guarantee effective suppression of noise radiation.

3. Sequential mating

Separate ground springs make contact with the mating connector's ground before the signal contacts, allowing equalization of any ground differential.

4. Conforms to FCC (Federal Communications Commission) standards

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

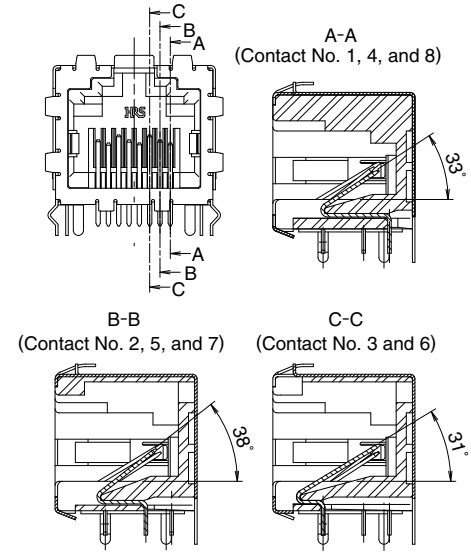
5. RoHS Compliant

Considering environment compatibility, substances prohibited by RoHS are not used.

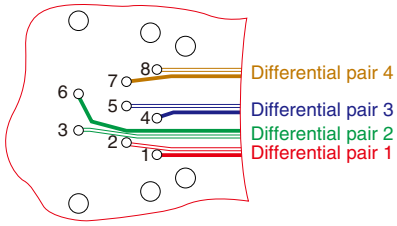
■Applications

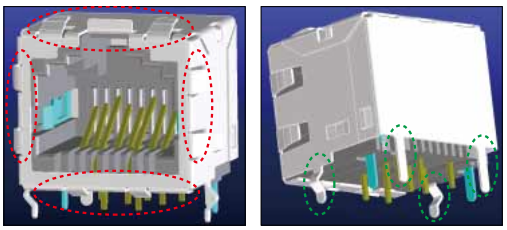
LAN related equipment, measuring instruments, office equipment and other high transmission speed applications requiring use of high performance modular jacks.

Unique Contact Configuration



Recommended board layout for differential routing

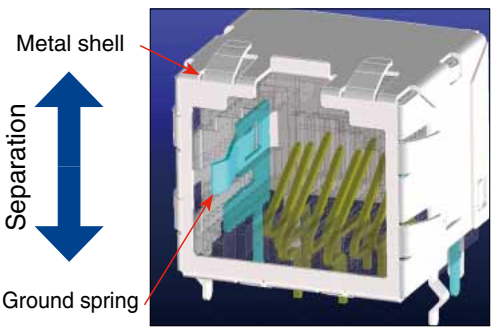




Panel ground contact springs

Board ground connection solder contacts

Separate ground springs



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

Ratings	Current rating 1A	Operating temperature range : -55 to +85℃ (Note)
	Voltage rating 125V AC	Storage temperature range : -25 to +60℃

Item	Specification	Conditions
1. Insulation resistance	100MΩ min.	100V DC
2. Withstanding voltage (Basic terminal between 123-456-78)	No flashover or insulation breakdown.	500V AC / 1 minute
3. Withstanding voltage (Terminal to shield)	No flashover or insulation breakdown.	1500V AC / 1 minute
4. Contact resistance	50mΩ max.	100mA
5. Vibration	No electrical discontinuity of 5μs or more. No damage, cracks, or parts dislocation.	Frequency : 10 to 55Hz, single amplitude of 0.75mm, 3 axis, 10 cycles
6. Shock	No electrical discontinuity of 5μs or more. Contact resistance : 60m ohms max.	Acceleration of 490 m/s^2, 11ms duration, sine half-wave waveform, 3 cycles / each of 6 axis
7. Durability (insertion/withdrawal)	Contact resistance : 60mΩ max.	700 cycles
8. Temperature cycle	Insulation resistance : 100MΩ min. Contact resistance : 60mΩ max.	(Temperature : -55℃ →+15℃ to +35℃ →+85 →+15℃ to +35℃ Duration : 30 → 2 to 3 → 30 →2 to 3 (Minutes) 5 cycles
9. Humidity	Insulation resistance : 1MΩ min. (High hujmidity) Insulation resistance : 10MΩ min. (Dry state)	500 hours at 40℃, HR 90% to 95%
10. Salt spray	Contact resistance : 60mΩ max.	5% water solution for 48 hours

Note : Includes temperature rise caused by current flow.
Temperature range for mechanical operation : -25℃ to +60℃

■Materials / Finish

Part	Material	Finish	Remarks
Insulator	PBT	Color: Black	UL94V-0
Contact	Phosphor bronze	Contact area : Gold plated 1.27 μm Termination area : Gold plated 0.03 μm Under plate : Nickel plated 1μm	–
Shield	Brass	Tin reflow plated 1μm	–
Ground spring	Phosphor bronze	Tin reflow plated 1μm	–

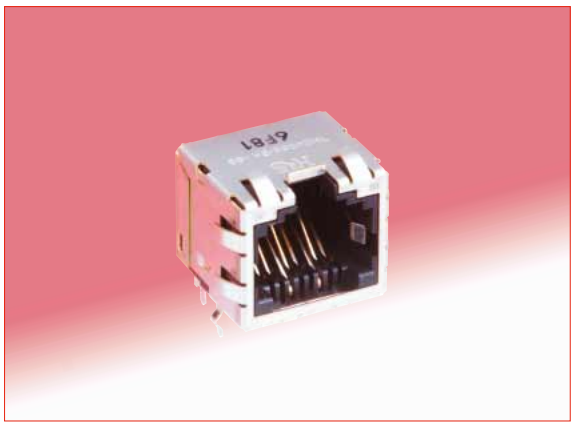
■Product Number Structure

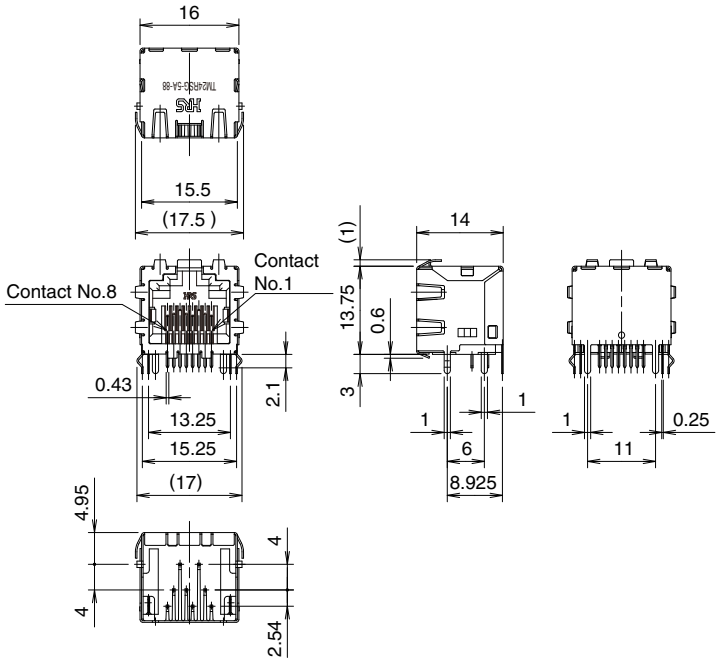
Refer to the chart below when determining the product specifications from the product number.
Please select from the product numbers listed in this catalog when placing orders.

TM24 R SG – 5A 8 8
❶ ❷ ❸ ❹ ❺ ❻

❶Series name	: TM24
❷Connector type	: R...Jack
❸Shell type	: SG...Separate ground spring –outer shell
❹Jack type	: 5A...Right-angle dip
❺Jack opening code	: 8...8 contacts
❻Number of inserted contact	: 8...8 contacts

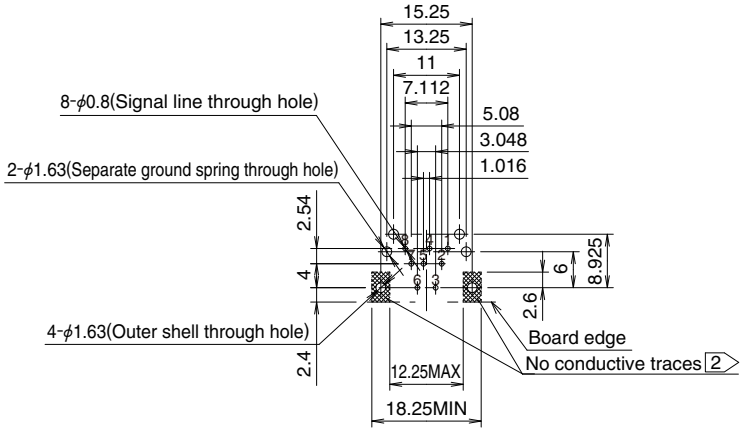
■Modular Jack Connectors





Part No.	HRS No.	RoHS
TM24RSG-5A-88	222-2946-7	YES

◆Recommended PCB mounting pattern



◆Recommended panel cutout