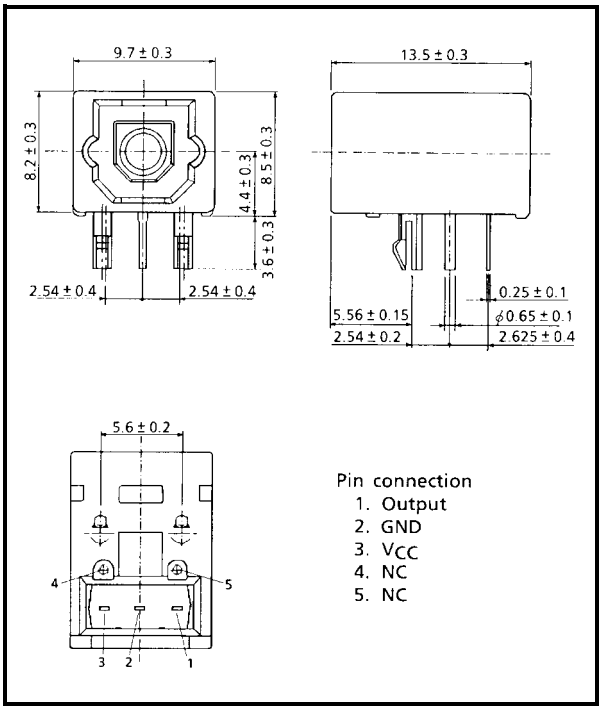
FIBER OPTIC RECEIVING MODULE

TORX141P

Fiber Optic Receiving Module for Digital Audio Interface

- Conform to JEITA standard CP-1201 (for digital audio interface including fiber optic inter-connections).

Unit: mm



Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Storage temperature	T_{stg}	−40 to 70	°C
Operating temperature	T_{opr}	−20 to 70	°C
Supply voltage	V_{CC}	−0.5 to 4.5	V
High level output current	I_{OH}	−2	mA
Low level output current	I_{OL}	2	mA
Soldering temperature	T_{sol}	260 (Note 1)	°C

Note 1: Soldering time ≦ 10 seconds. (More than 1 mm apart from package)

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	2.7	3.0	3.6	V

Electrical and Optical Characteristics (Ta = 25°C, V_{CC} = 3 V)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Data rate		NRZ code (Note 2)	0.1	—	15	Mb/s
Transmission distance		With APF and TOTX141P (Note 3)	0.2	—	10	m
Pulse width distortion (Note 4)	Δtw	Pulse Width 67 ns Pulse Cycle 134 ns CL = 10 pF	−20	—	20	ns
Maximum receivable power (Note 5)	P_{MAX}	15 Mb/s, Using APF	−14.5	—	—	dBm
Minimum receivable power (Note 5)	P_{MIN}	15 Mb/s, Using APF	—	—	−27	dBm
Current consumption	I_{CC}		—	10	15	mA
High level output voltage	V_{OH}		2.1	2.5	—	V
Low level output voltage	V_{OL}		—	0.2	0.4	V

Note 2: High level output when optical flux is received. Low level output when optical flux is not received. The duty factor must be kept 25 to 75%.

Note 3: All Plastic Fiber (970/1000 μm).

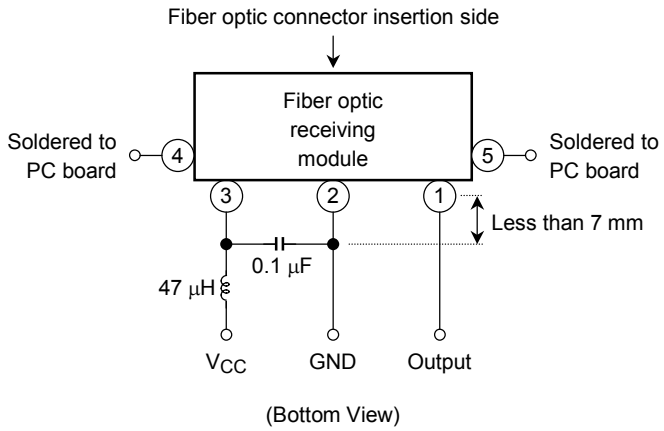
Note 4: Between input of TOTX141P and output of TORX141P.

Note 5: BER ≦ 10^{-9}, peak value.

Mechanical Characteristics (Ta = 25°C)

Characteristics	Test Condition	Min	Typ.	Max	Unit
Mating force	Using TOCP172, Initial value	—	—	39.2	N
Unmating force	Using TOCP172, Initial value	5.9	—	39.2	N

Application Circuit

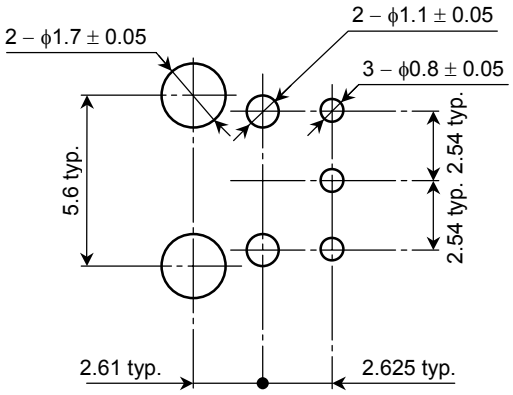


Applicable Optical Fiber with Fiber Optic Connectors

TOCP172-□□B

Board Layout Hole Pattern (for reference)

Unit: mm
Recommended PCB thickness: 1.6 mm



Precautions on Use

(1) Maximum rating
The maximum ratings are the limit values which must not be exceeded during operation of device. None of these rating value must not be exceeded. If the maximum rating value is exceeded, the characteristics of devices may never be restored properly. In extreme cases, the device may be permanently damages.

(2) Soldering
Optical modules are comprised of internal semiconductor devices. However, in principle, optical modules are optical components. During soldering, ensure that flux does not contact with the emitting surface or the detecting surface. Also ensure that proper flux removal is conducted after soldering.
Some optical modules come with a protective cap. The protective cap is used to avoid malfunction when the optical module is not in use. Note that it is not dust or waterproof.
As mentioned before, optical modules are optical components. Thus, in principle, soldering where there may be flux residue and flux removal after soldering is not recommended. Toshiba recommend that soldering be performed without the optical module mounted on the board. Then, after the board has been cleaned, the optical module should be soldered on to the board manually.
If the optical module cannot be soldered manually, use non-halogen (chlorine-free) flux and make sure, without cleaning, there is no residue such as chlorine. This is one of the ways to eliminate the effects of flux. In such a cases, be sure to check the devices' reliability.

(3) Noise resistance
It is believed that the use of optical transfer devices improve noise resistance. In theory, optical fiber is not affected by noise at all. However, receiving modules which handle signals whose level is extremely small, are susceptible to noise.
TOSLINK improve noise resistance to use a conductive case. However, the current signal output by the optical receiving modules' photodiode is extremely small. Thus, in some environments, shielding the case may not achieve sufficient noise resistance.
First systems which incorporate TOSLINK, Toshiba recommend testing using the actual device to check its noise resistance.
Use a simple noise filter on TOSLINK fiber optic transceiving module's power line. If the ripple in the power supply used is significant, reinforce the filter.
The optical module is to be used in an area which is susceptible to radiated noise, increase the shielding by covering the optical module and the power line filter with a metallic cover.

(4) Vibration and shock
This module is plastic sealed and has its wire fixed by resin. This structure is relatively resistant to vibration and shock. In actual equipment, there are sometime cases in which vibration, shock, or stress is applied to soldered parts or connected parts, resulting in lines cut. A care must be taken in the design of equipment which will be subject to high levels of vibration.

(5) Support pins
The TORX141P has support pins in order to fix itself to the PCB temporary. Please make the hole for these pins in the PCB under the condition described in board layout hole pattern.

(6) Attaching the fiber optic receiving module
Solder the fixed pins (pins 4 and 5) of the fiber optic receiving module TORX141P to the printed circuit board in order to fix it to the board.

(7) Solvent
When using solvent for flux removal, do not use a high acid or high alkali solvent. Be careful not to pour solvent in to the optical connector ports. If solvent is inadvertently poured in to them, clean it off using cotton tips.

(8) Protective cap
When the TORX141P is not in use, attach the protective cap.

(9) Supply voltage
Use the supply voltage within the recommended operating condition (V_{CC} = 2.7 to 3.3 V). Make sure that supply voltage does not exceed the maximum rating value of 4.5 V, even for an instant.

(10) Output
If the receiver output is at low and is connected to the power supply, or if the output is high and is connected to GND, the internal IC may be destroyed.

(11) Soldering condition
Solder at 260°C or less for no more than ten seconds.

(12) Precautions when disposing of devices and packing materials.
When disposing devices and packing materials, follow the procedures stipulated by local regulations in order to protect the environment against contamination.

(13) Precautions during use
Toshiba is continually working to improve the quality and the reliability of their products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and their vulnerability to physical stress. It is the responsibility of the buyer, when utilizing Toshiba products, to observe standards of safety, and to avoid situations in which the malfunction or failure of a Toshiba product could cause loss of human life, bodily injury or damage to property.
When developing equipment, please ensure that Toshiba products are used within the specified operating ranges set forth in the most recent product specifications. Also, please keep in mind the precautions and conditions set forth in the Toshiba Semiconductor Reliability Handbook.

RESTRICTIONS ON PRODUCT USE

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