

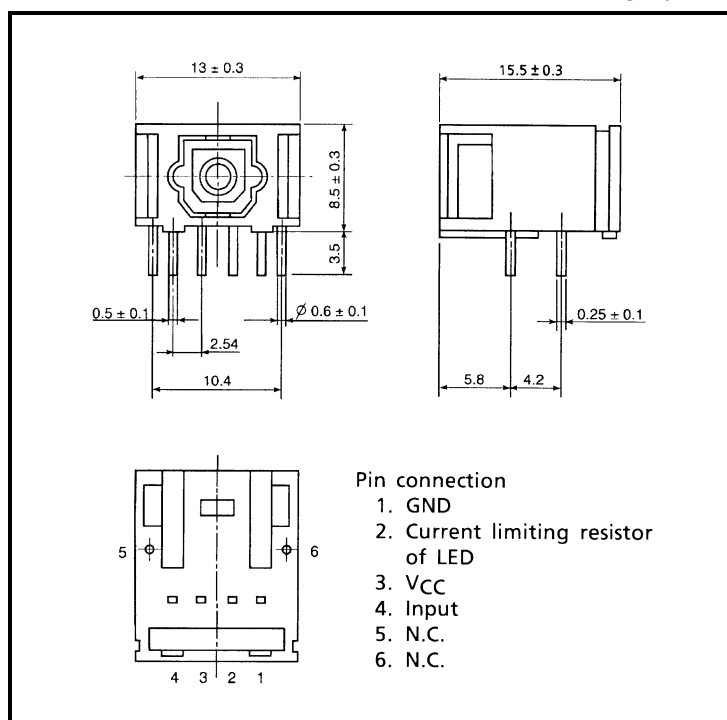
FIBER OPTIC TRANSMITTING MODULE

TOTX173A(F)

FIBER OPTIC TRANSMITTING MODULE FOR DIGITAL AUDIO

Unit: mm

- Conform to JEITA Standard CP-1201 (For Digital Audio Interfaces including Fiber Optic inter-connections).
- TTL Interface
- LED is driven by differential circuit.
- 650 nm LED
- RoHS Compliant



1. Absolute 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 7	V
Input Voltage	V _{IN}	-0.5 to V _{CC} + 0.5	V
Soldering Temperature	T _{sol}	260 (Note 1)	°C

Note 1: Soldering time ≤ 10 s (More than 1 mm apart from the package).

2. Operating Ranges

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply Voltage	V _{CC}	4.75	5.0	5.25	V
High Level Input Voltage	V _{IH}	2.0	—	V _{CC}	V
Low Level Input Voltage	V _{IL}	0	—	0.8	V

Handling precaution: The LEDs used in this product contain GaAs (Gallium Arsenide).

Care must be taken to protect the safety of people and the environment when scrapping or terminal processing.

3. Electrical and Optical Characteristics (Ta = 25°C, VCC = 5 V)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Data Rate		NRZ Code (Note 2)	DC	—	6	Mb / s
Transmission Distance		Using APF(Note 3) and TORX173(F)	0.2	—	10	m
Pulse Width Distortion (Note 4)	Δtw	Pulse Width 165 ns Pulse cycle 330 ns, $C_L = 10 \text{ pF}$ Using TORX173(F)	-20	—	20	ns
Fiber Output Power	P_f	APF 1 m, $R = 8.2 \text{ k}\Omega$ (Note 5)	-21	—	-15	dBm
Peak Emission Wavelength	λ_p		—	650	—	nm
Current Consumption	I_{CC}	$R = 8.2 \text{ k}\Omega$	—	8	20	mA
High Level Input Voltage	V_{IH}		2.0	—	—	V
Low Level Input Voltage	V_{IL}		—	—	0.8	V
High Level Input Current	I_{IH}		—	—	20	μA
Low Level Input Current	I_{IL}		—	—	-0.4	mA

Note 2: LED is on when input signal is high level, it is off when low level.

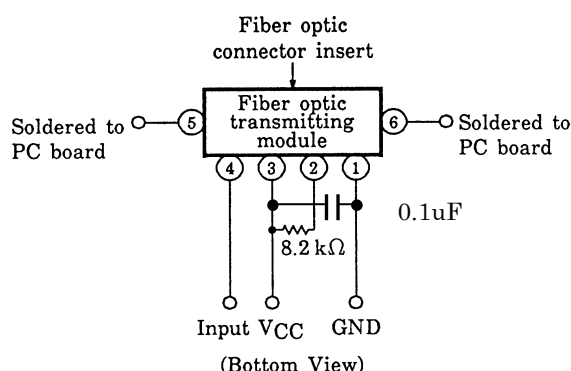
For data rate > 3 Mb / s, the duty factor must be kept 25 to 75%.

Note 3: All Plastic Fiber (980 / 1000 μm).

Note 4: Between input of TOTX173A(F) and output of a fiber optic receiving module TORX173(F).

Note 5: Measure with a standard optical fiber with fiber optic connectors.

4. Application Circuit



5. Precautions during use

(1) Absolute maximum rating

The absolute maximum ratings are the limit values which must not be exceeded when using the device. Any one of the rating must not be exceeded. If The absolute maximum rating is exceeded, the characteristics may not be recovered. In some extreme cases, the device may be permanently damage.

(2) Operating Range

The operating range is the range of conditions necessary for the device to operate as specified in individual technical datasheets and databooks. Care must be exercised in the design of the equipment. If a device is used under conditions that do not exceed absolute maximum ratings but exceed the operating range, the specifications related to device operation and electrical characteristics may not be met, resulting in a decrease in reliability.

If greater reliability is required, derate the device's operating ranges for voltage, current, power and temperature before use.

(3) Life of light emitters

When the optical module is used for over a long period, degeneration of characteristics is mostly due to lowering of the fiber output power (Pf). This is caused by the degradation of the optical output of the LED's used as the light source. The cause of degradation of the optical output of the LED' may be defects in wafer crystallization or mold resin stress. The detailed causes are, however, not clear.

The life of light emitters is greatly influenced by operating conditions and usage environment as well as the life characteristics unique to the device. Thus, when selecting a light emitter and setting the operating conditions, Toshiba recommends that you check the life characteristics.

Depending on the environment conditions, Toshiba recommends maintenance such as regular checks on the amount of optical output.

(4) Soldering

Optical modules use semiconductor devices internally. However, in principle, optical modules are optical components. At soldering, take care that flux dose not contact the emitting surface or detecting surface. Also take care at flux removal after soldering.

Some optical modules come with protective cap. The protective cap is used to avoid malfunction when the optical module is not in use. Not that it is not dust or waterproof.

As mentioned before, optical modules are optical component. Thus, in principle, soldering where there may be flux residue or flux removal after soldering is not recommended. Toshiba recommends that soldering be performed without the optical module mounted on the board. Then, after the board is cleaned, solder the optical module manually. Do not perform any further cleaning.

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.

(5) Vibration and shock

This module is resin-molded construction with wire fixed by resin. This structure is relatively sound against vibration or shock, In actual equipment, there are some cases where vibration, shock, and stress is applied to soldered parts or connected parts, resulting in line cut. Attention must be paid to the design of the mechanism for applications which are subject to large amounts of vibration.

(6) Fixing fiber optical transmitting module

Solder the fixed pin (pins 5 and 6) of fiber optic transmitting module TOTX173A (F) to the printed circuit board to fix the module 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 the optical connector ports. If solvent is inadvertently poured there, clean with cotton tips.

(8) Protective cap

When the fiber optic transmitting module TOTX173A(F) is not in use, use the protective cap.

(9) Supply Voltage

Use the supply voltage within the operating condition ($V_{CC} = 5 \pm 0.25$ V). Make sure that supply voltage does not exceed the absolute maximum rating value of 7 V, even instantaneously.

(10) Input voltage

If a voltage exceeding the absolute maximum rating value ($V_{CC} + 0.5$ V) is applied to the transmitter input, the internal IC may degrade causing some damage. If excessive voltage due to surges may be added to the input, insert a protective circuit.

(11) Soldering condition

Solder at 260°C or less for no more than ten seconds.

(12) Precaution on waste

When discarding devices and packing materials, follow procedures stipulated by local regulations in order to protect the environment against contamination.

Compound semiconductors such as GaAs are used as LED materials for this module. When discarding waste or at final processing, attention must be paid to workers and the environment.

(13) Precaution on use

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In developing your designs, please ensure that Toshiba products are used within specified operating ranges as 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.

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