FIBER OPTIC TRANSMITTING MODULE

TOTX1701A(F)

○ FIBER OPTIC TRANSMITTING MODULE FOR HIGH SPEED DATA TRANSMISSION

- For JIS F05 type optical connector
- Data rate : 20Mb/s to 125Mb/s
- Tansmission distance : Up to 20m (125Mb/s, Using APF)
  Up to 100m (125Mb/s, Using GI-PCF)
- Transmitting IC built-in
- Compatible with 3.3 V PECL Level
- 650nm LED
- Resin molded type

1. Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Storage Temperature	T_{stg}	−40 to 85	°C
Operating Temperature	T_{opr}	−10 to 70	°C
Supply Voltage	V_{CC}	-0.5 to 4.5	V
Soldering Temperature	T_{sol}	260 (Note 1)	°C

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

Using continuously heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/ "Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

2. Operating Ranges

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}	3.0	3.3	3.6	V
Data Rate		20	-	125	Mb/s
Mark Ratio		-	50	-	%

Start of commercial production
2015-06

3. Electrical and Optical Characteristics (Ta = 25°C, V_{CC} = 3.3V)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Data Rate		NRZ code (Note.2)	20	-	125	Mb/s
Transmission Distance		Using APF (Note.3) and TORX1701A(F) 125Mb/s	0.1	-	20	m
		Using GI-PCF (Note.4) and TORX1701A(F) 125Mb/s	0.1	-	100	m
Center Emission Wavelength	λ_C		-	650	-	nm
Fiber Output Power (Note 5)	P_f(H)	APF 1m,	-12.0	-	- 8.0	dBm
	P_f(L)	APF 1m,	-	-	-27.5	dBm
	P_f(H)	GI-PCF 1m	-18.0	-	-	dBm
	P_f(L)	GI-PCF 1m	-	-	-32.5	dBm
Current Consumption (Note 6)	I_{CC}(T)		-	40	50	mA
High Level Input Voltage	V_{IH}		Vcc-1.19	-	Vcc-0.59	V
Low Level Input Voltage	V_{IL}		Vcc-2.09	-	Vcc-1.49	V

Note.2: LED is on when input signal is high level, it is off when low level.
The duty cycle must be kept 25 to 75%.

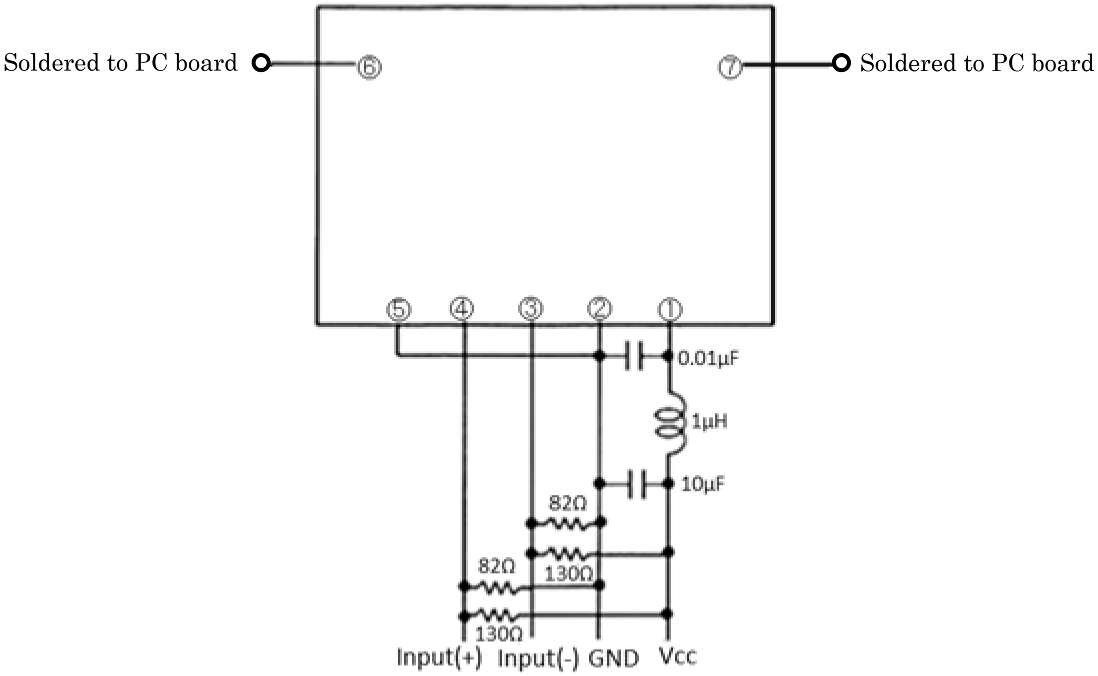
Note.3: All Plastic Fiber (980 μm core / 1000 μm cladding, NA=0.5) .Polished surface.

Note.4: GI-PCF (200 μm core / 230μm cladding, NA=0.4). polished surface.

Note.5: 1Mb/s duty 50%. Measured by standard optical fiber. Averaged value.

Note.6: Without terminating resistance current.

4. Application Circuit



(Bottom View)

Note.7 : Place termination resistors near physical layer device data input pin.
Make differential signal paths short and the same length.
Use ground plane(or multi-layer)printed circuit board for best high frequency performance.
Signal trace should be 50 Ω transmission lines(micro strip or strip line).
Use high-frequency monolithic ceramic bypass capacitors and low DC resistance inductors.

5. Applicable Optical Fiber with Fiber Optic Connectors

All Plastic Fiber (980 µm core / 1000 µm cladding, NA=0.5) with F05 Connectors. Polished surface.

GI-PCF (200 µm core / 230µm cladding, NA=0.4) with F05 Connectors. polished surface.

6. Precautions during use

(1) Absolute maximum rating

The absolute 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 absolute maximum rating value is exceeded, the characteristics of devices may never be restored properly. In extreme cases, the device may be permanently damages.

(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) Lifetime of light emitters

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

The lifetime of light emitters is greatly influenced by the operating conditions and the environment in which it is used as well as by the lifetime characteristics unique to the device type. Thus, when a light emitting device and its operating conditions determined, Toshiba recommend that lifetime characteristics be checked.

Depending on the environment conditions, Toshiba recommend that maintenance such as regular checks of the amount of optical output in accordance with the condition of operating environment.

(4) 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.

(5) 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.

(6) Fixing fiber optic transmitting module

Solder the fixed pin (pins 6 and 7) of fiber optic transmitting module TOTX1701A(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 to the optical connector ports. If solvent is inadvertently poured in to them, clean it off using cotton tips.

(8) Protective cap

When the TOTX1701A(F) is not in use, attach the protective cap.

(9) Incidence of a photo flash

If strong light such as a photo flash is incident on an optical module, a transmission error may occur. Be careful, to avoid such situations.

(10) Supply voltage

Use the supply voltage within the operating range (V_{CC} =3.3 ± 0.3 V). Make sure that supply voltage does not exceed the absolute maximum rating value of 4.5 V, even for an instant.

(11) Soldering condition

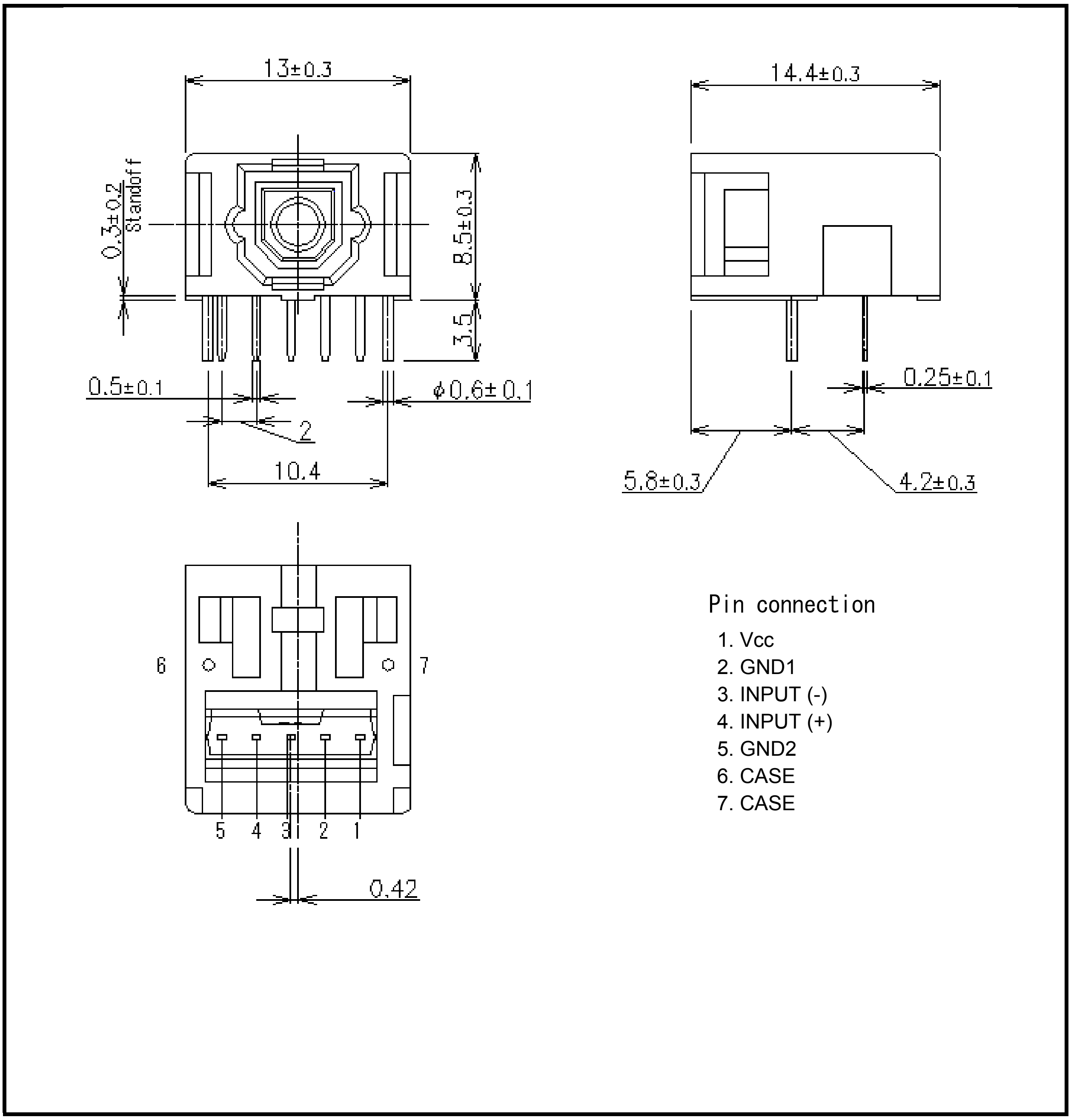
Solder at 260°C or less for no more than ten seconds.

(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.

7. Package Outline drawing

Unit: mm



Pin connection

1. Vcc
2. GND1
3. INPUT (-)
4. INPUT (+)
5. GND2
6. CASE
7. CASE

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