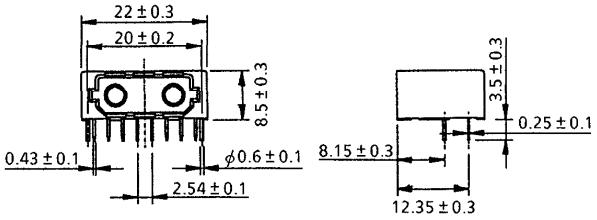
FIBER OPTIC TRANSCEIVING MODULE

TODX283

FIBER OPTIC TRANSCEIVING MODULE FOR DUPLEX DIGITAL SIGNAL COMMUNICATION

Uni in mm

- Data rate : DC to 50 Mb/s (NRZ code)
- Transmission distance
  : Up to 10 m (APF)
  Up to 100 m (PCF)
- Ceramic Package Type
- TTL interface
- ATC (Automatic Threshold Control) circuit is used for stabilized output at wide range of optical power level.
- For PN and F07 type connector



Pin connection
1. Output
2. GND1
3. $V_{CC}1$
4. GND2
5. GND3
6. Current limiting resistor of LED
7. $V_{CC}2$
8. Input
9. Case
10. Case

1. Maximum Ratings (Ta = 25°C)

PARAMETER	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 7	V
Input Voltage	V_{IN}	−0.5 to V_{CC} + 0.5	V
Low Level Output Current	I_{OL}	20	mA
High Level Output Current	I_{OH}	−1	mA
Soldering Temperature	T_{sol}	260 (1)	°C

Note (1) Soldering time ≦ 3 s (More than 1 mm apart from the package).

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.

2. Recommended Operating Conditions

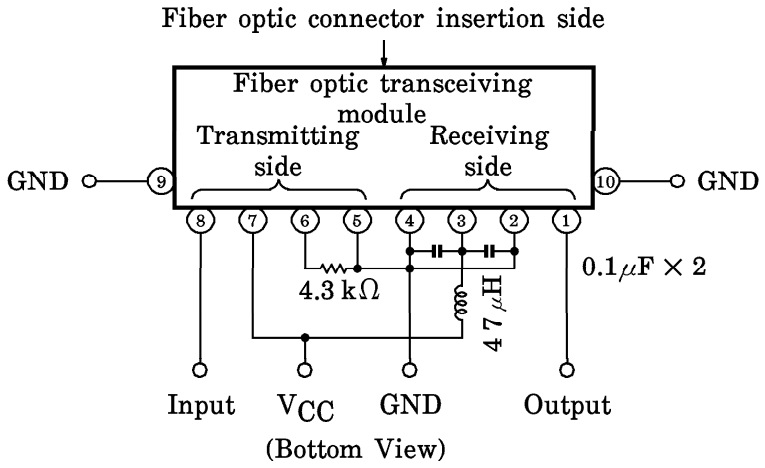
PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Data Rate	—	20	—	50	Mb / s
Mark Rate	—	—	50	—	%
High Level Input Voltage	V_{IH}	2.0	—	V_{CC}	V
Low Level Input Voltage	V_{IL}	0	—	0.8	V
High Level Output Current	I_{OH}	—	—	−1.6	mA
Low Level Output Current	I_{OL}	—	—	1.6	mA

3. Electrical and Optical Characteristics (Ta = − 10 to 70°C, V_{CC} = 5 ± 0.25V)

PARAMETER		SYMBOL	CONDITION	MIN	TYP.	MAX	UNIT
Data Rate		—	NRZ Code	DC	—	50	Mb / s
Transmission Distance		—	Using PCF (2)	0.1	—	10	m
			Using PCF (3)	0.1	—	100	m
Pulse Width Distortion		Δtw	50Mb / s Random Pattern	−7	—	7	ns
Fiber Output Power	Input H	Pf (H)	APF 1m (4), R = 4.3 kΩ	−10	—	−6.5	dBm
	Input L	Pf (L)	APF 1m (4), R = 4.3 kΩ	—	—	−30	dBm
	Input H	Pf (H)	PCF 1m (4), R = 4.3 kΩ	−18.5	—	—	dBm
	Input L	Pf (L)	PCF 1m (4), R = 4.3 kΩ	—	—	−37	dBm
Center Wavelength		λc		—	650	—	nm
Maximum Receivable Power (5)		P_{MAX}	APF (2), 50 Mb / s	−6.5	—	—	dBm
		P_{MAX}	PCF (3), 50 Mb / s	−14	—	—	dBm
Minimum Receivable Power (5)		P_{MIN}	APF (2), 50 Mb / s	—	—	−15.5	dBm
		P_{MIN}	PCF (3), 50 Mb / s	—	—	−21.5	dBm
Current Consumption		I_{CC}	—	—	100	130	mA
High Level Input Voltage		V_{IH}	—	2.0	—	—	V
Low Level Input Voltage		V_{IL}	—	—	—	0.8	V
High Level Output Voltage		V_{OH}	—	2.7	—	—	V
Low Level Output Voltage		V_{OL}	—	—	—	0.5	V

(2) All Plastic Fiber (980 / 1000 μm)
(3) Plastic Cladding Silica Faiber (200 / 230 μm)
(4) Peak Value. Measured with standard optical fiber.
(5) BER ≦ 10^{-9}. Peak Value.

5. Application Circuit



6. Applicable Optical Fiber with Fiber Optic Connectors

TOCP200-□□B, TOCP200P-□□B, TOCP200Q-□□B, TOCP200X-□□B

7. Precaution 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) 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.

(3) 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.

(4) 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.

(5) Vibration and shock

This module is ceramic packaged which internal device is hollow so that the wire is not fixed to the device. This structure is not relatively sound against vibration and shock. Attention must be paid to the design of the mechanism for applications which are subject to large amounts of vibration.

(6) Fixing fiber optical transceiving module

Solder the fixed pin (pins 9 and 10) of fiber optic transceiving module TODX283 to the printed circuit board to fix the module to the board.

(7) Shielding and wiring pattern of fiber optic transceiving modules

To shield, connect the fixed pins (pins 9 and 10) of fiber optic transceiving module TODX283 to the GND.
Where the fiber optic transceiving module uses conductive resin, be careful that the case does not touch wiring (including land).
To improve noise resistance, shield the optical module and the power line filter using a metallic cover.

(8) 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.

(9) Protective cap

When the TODX283 is not in use, attach the protective cap.

(10) Supply voltage

Use the supply voltage within the recommended operating condition (V_{CC} = 5 ± 0.25 V). Make sure that supply voltage does not exceed the maximum rating value of 7 V, even for an instant.

(11) Input voltage

If a voltage exceeding the maximum rating value (V_{CC} + 0.5 V) is applied to the transmitter input, the internal IC may suffer damage. If there is a possibility that excessive voltage due to surges may be added to the input terminal, insert a protective circuit.

(12) Output

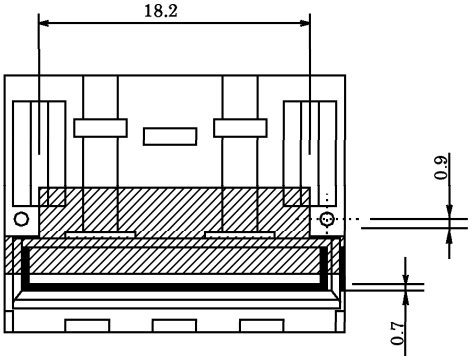
If the receiver output is at low and is connected to the power supply, or if the output is high and is connected to GND, the internal IC may be destroyed.

(13) Soldering condition

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

(14) Precaution at the printed wiring board design

For avoid the transmission trouble due to soldering, requested no set up the through-hole treatment at within the hatched area.



(15) 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.
Compound semiconductors such as GaAs are used as LED materials in this module. When devices are disposed of, worker safety and protection of the environment must be taken into account.

(16) 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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