FIBER OPTIC TRANSCEIVING MODULE

TODX2350A(F)

GENERAL PURPOSE OPTICAL TRANSCEIVING MODULE

- For JIS F07(PN) type fiber optic connector
- 650 nm LED
- Low current LED drive
- ATC (Automatic Threshold Control) circuit built-in.

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

Characteristics	Symbol	Rating	Unit
Storage Temperature	T_{stg}	−40 to 95	°C
Operating Temperature	T_{opr}	−40 to 85	°C
Forward Current (DC)	IFDC	30	mA
Reverse Voltage	V_R	MAX 5	V
Supply Voltage	V_{CC}	-0.5 to 6	V
High Level Output Current	I_{OH}	-20	mA
Low Level Output Current	I_{OL}	20	mA
Soldering Temperature	T_{sol}	260 (Note 1)	°C

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

Using continuously under 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
Forward Current (DC)	I_F	-	6	8	mA
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Data Rate		DC	-	10	Mb/s
High Level Output Current	I_{OH}	-	-	-2.0	mA
Low Level output Current	I_{OL}	-	-	2.0	mA

Start of commercial production
2016-01

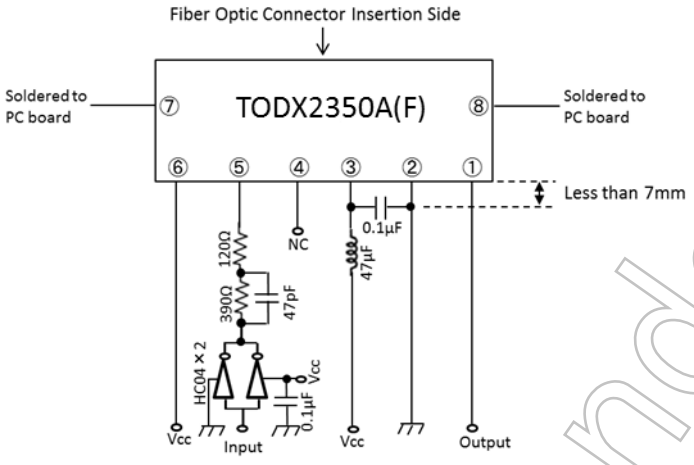
3. Electrical and Optical Characteristics (Ta = 25°C, V_{CC} = 5 V)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Data Rate	-	NRZ Code(Note 2)	DC	-	10	Mb/s
Transmission Distance (Note 2)	-	APF(Note 3), I_F=6mA, Using TODX2350A(F)	40	-	100	m
		APF(Note 3), I_F=1.5mA, Using TODX2350A(F)	0.2	-	50	m
Pulse Width Distortion (Note 4)	Δtw	-	-30	-	30	%
Fiber Output Power (Note 5)	P_f	I_F=6mA, Using APF (Note3),	- 6	-	-2	dBm
		I_F=1.5mA, Using APF (Note3),	-13	-	-8	dBm
Center Emission Wavelength	λ_C	-	-	650	-	nm
Forward Voltage	V_F	I_F=6mA	-	2.0	2.1	V
		I_F=1.5mA	-	1.8	2.0	V
Reverse Current	I_R	V_R=5V	-	-	10	μA
Maximum Receivable Power (Note 6)	P_{MAX}	APF(Note 3), DC to 10Mb/s	-8	-	-	dBm
Minimum Receivable Power (Note 6)	P_{MIN}	APF(Note 3), DC to 10Mb/s	-	-	-27	dBm
Current Consumption	I_{CC}	-	-	9	20	mA
High Level Output Voltage	V_{OH}	V_{CC}=4.75V	4.1	4.5	-	V
Low Level Output Voltage	V_{OL}	V_{CC}=4.75V	-	0.1	0.4	V

Note 2: Data rate and transmission distance differ from driver circuit.
High level output when optical flux is received. Low level output when it is not received.
Note 3: All Plastic Fiber (980μm core / 1000μm cladding, NA=0.5). Polished surface.
Transmission loss is less than 0.18dB/m. (100m @650nm).
Note 4: Between input of driver circuit of TODX2350A(F) and output of TODX2350A(F).
A value changes with LED drive circuits.
Note 5: Measure with a standard optical fiber with fiber optic connectors. Valued by peak.
Note 6: BER≤10^{-9}, Valued by peak.

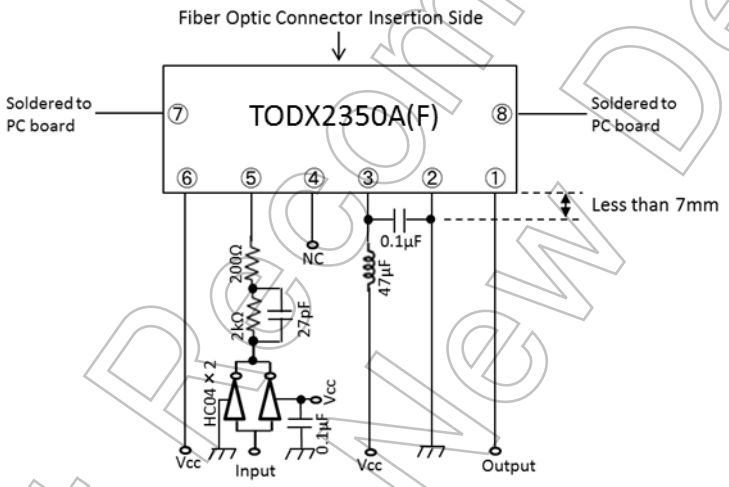
4. Application Circuit

(1) I_F = 6mA operation



(Bottom View)

(2) I_F = 1.5mA operation



(Bottom View)

5. Applicable Optical Fiber with Fiber Optic Connectors

All Plastic Fiber (980μm core / 1000μm cladding, NA=0.5) with F07(PN) type optical connector. Polished surface. Transmission loss is less than 0.18dB/m. (100m @650nm).

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 case, check the reliability.

(5) Noise resistance

When using optical transceiving module, Toshiba recommends that you test using the actual device and check the noise resistance.
Use a simple noise filter on the fiber optic transceiving module power line. If the ripple in 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 filetr with a metallic cover.

(6) Vibration and shock

This module is plastic sealed and has its wire fixed by resin. This structure is relatively resistant to vibration or shock. In actual equipment, there are sometime cases in which vibration, shock, and 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.

(7) Fixing fiber optical transceiving module
Solder the fixed pin (pins 7 and 8) of fiber optic transceiving module TODX2350A(F) to the printed circuit board to fix the module to the board.

(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 TODX2350A(F) is not in use, attach the protective cap..

(10) Influence 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.

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

(12) Supply Voltage
Use the supply voltage within the recommended operating condition (Vcc=5±0.25V). Make sure that supply voltage does not exceed the absolute maximum rating value of 6V, even instantaneously.

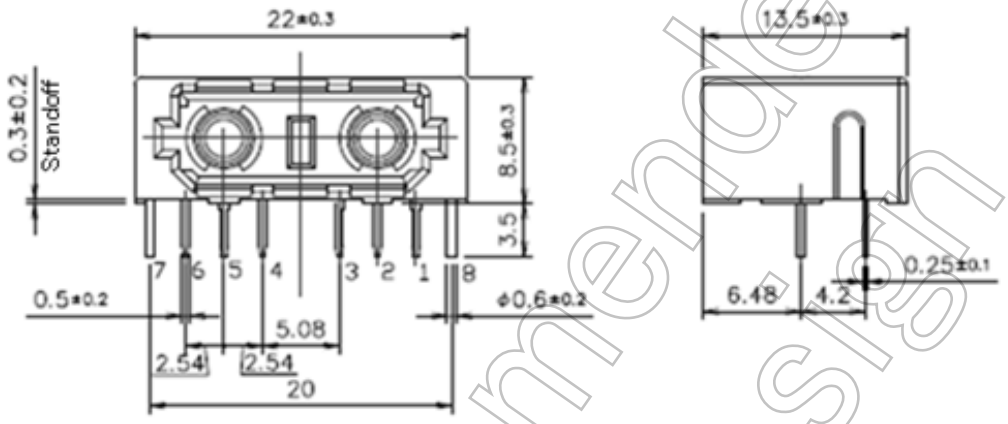
(13) Output
When the receiver output is at low level and connected to the power supply, or when the output is at high level and connected to GND, the internal IC may be destroyed.

(14) 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.

(15) Others
This product is an optical transceiving module for plastic optical fiber.
Use only for an optical transceiving module purpose.

7. Package Outline drawing

Unit: mm



Pin connection

1. Output
2. GND
3. Vcc
4. NC
5. Cathode
6. Anode
7. NC
8. NC

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