FIBER OPTIC TRANSMITTING MODULE

TOTX1350(V,F)

GENERAL PURPOSE OPTICAL TRANSMITTING MODULE

- JIS F05 type fiber optic connector
- 650 nm LED
- Low current LED drive
- Vertical mounting type

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	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 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
Data Rate		DC	-	10	Mb / s

Start of commercial production
2013-11

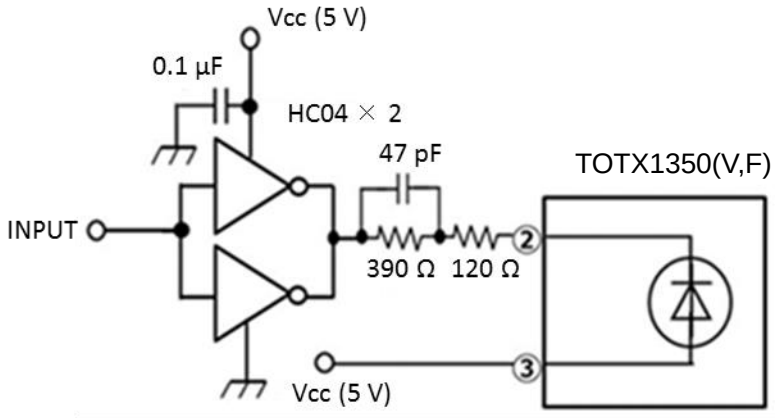
3. Electrical and Optical Characteristics (Ta = 25°C, Vcc = 5 V)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Data Rate (Note 2)		NRZ Code	DC	-	10	Mb / s
Transmission Distance (Note 2)		APF (Note 3), I_F = 6 mA, Using TORX1350A(V,F)	40	-	100	m
		APF (Note 3), I_F = 1.5 mA, Using TORX1350A(V,F)	0.2	-	50	m
		APF (Note 3), I_F = 6 mA, Using TORX1355(V,F)	0.2	-	10	m
Transmission Distance (Note 2), (Note 4)		I_F = 6 mA, Using TORX1350A(V,F) and TOCA1300	-	23.6	-	mm
		I_F =6 mA, Using TORX1355(V,F) and TOCA1300				
		I_F = 6 mA, Using TORX1350A(V,F) and TOCA1301	-	34.0	-	mm
		I_F = 6 mA, Using TORX1355(V,F) and TOCA1301				
Pulse Width Distortion (Note 5)	Δtw		-30	-	30	%
Fiber Output Power (Note 6)	P_f	I_F = 6 mA, APF (Note3),	- 6	-	-2	dBm
		I_F = 1.5 mA, APF (Note3),	-13	-	-8	dBm
Center Emission Wavelength	λc		-	650	-	nm
Forward Voltage	V_F	I_F = 6 mA	-	2.0	2.1	V
		I_F = 1.5 mA	-	1.8	2.0	V
Reverse Current	I_R	V_R = 5 V	-	-	10	μA

Note 2: Use the drive circuit of Chapter 4.
Note 3: All Plastic Fiber (980 μm core / 1000 μm cladding, NA = 0.5). Polished surface.
Transmission loss is less than 0.18 dB/m. (100m @650nm).
Note 4: A distance between fixing pin of TOTX1350(V,F) and fixing pin of TORX1350A(V,F) or TORX1355(V,F) when they connect with optical adapter (TOCA1300 or TOCA1301).
Note 5: Between input of driver circuit of TOTX1350(V,F) and output of TORX1350A(V,F) or TORX1355(V,F). Use the drive circuit of Chapter 4.
Note 6: Measure with a standard optical fiber with fiber optic connectors. Valued by peak.

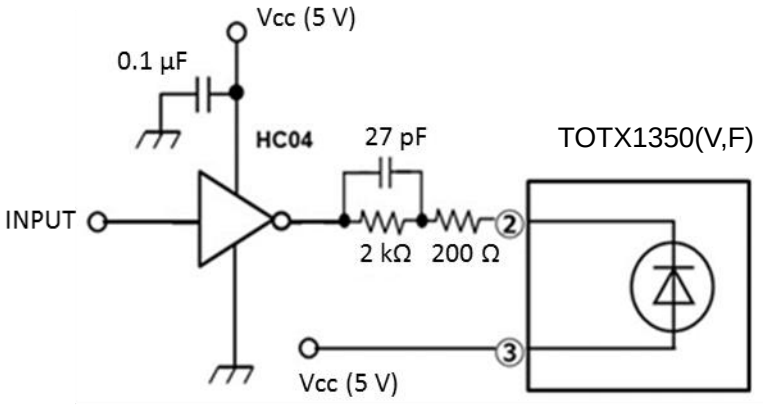
4. Application Circuit

(1) I_F = 6mA operation, Using TORX1350A(V,F)

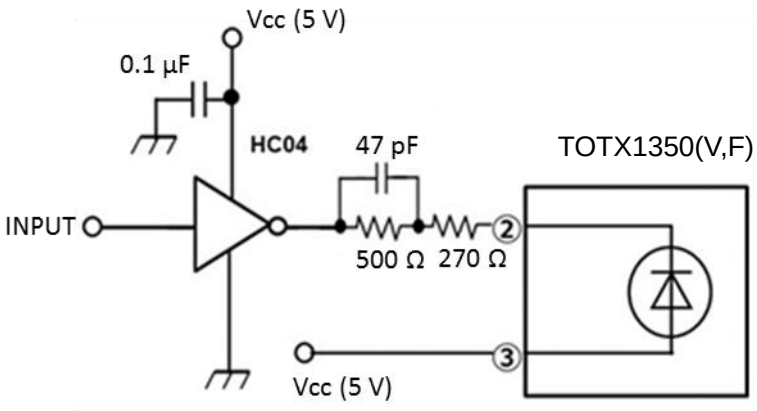


Replace 47 pF of capacitor with 82 pF if need a smaller jitter.

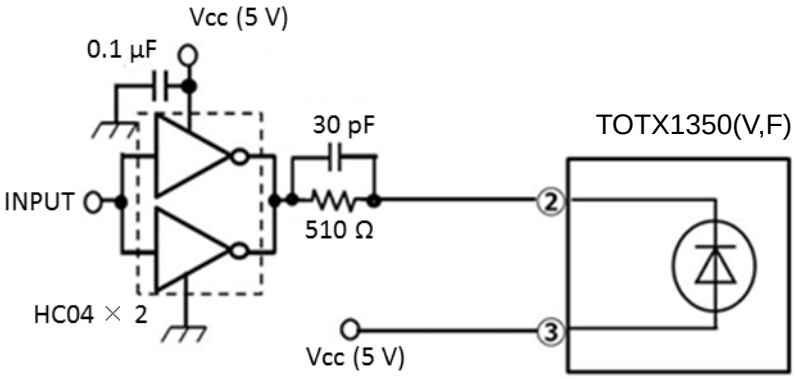
(2) I_F = 1.5mA operation, Using TORX1350A(V,F)



(3) I_F = 4 mA operation, Using TORX1355(V,F)



(4) I_F = 6 mA operation, Using TOCA1300 or TOCA1301



5. Applicable Optical Fiber with Fiber Optic Connectors

All Plastic Fiber (980 µm core / 1000 µm cladding, NA = 0.5) with F05 type optical connector. Polished surface.
Transmission loss is less than 0.18 dB/m. (100m @650nm).

6. Applicable Optical Adapters

TOCA1300, TOCA1301

7. Precautions during use

(1) Absolute maximum rating

The absolute maximum ratings are the limit values which must not be exceeded during operation of device. Any 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 damaged.

(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 they are 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 recommends that lifetime characteristics be checked.
Depending on the environment conditions, Toshiba recommends the 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.

This optical module comes 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 are not recommended. Toshiba recommends 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.

(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 optical transmitting module

Solder the fixing pin (pins 4 and 5) of fiber optic transmitting module TOTX1350(V,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 into the optical connector ports. If solvent is inadvertently poured into them, clean it off using cotton tips.

(8) Protective cap

When the TOTX1350(V,F) is not in use, attach the protective cap.

(9) An influence of flash or strong light

Do not emit a flash or a strong light to the optical module directly they may cause an error in data transmission.

(10) Soldering condition

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

(11) 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.

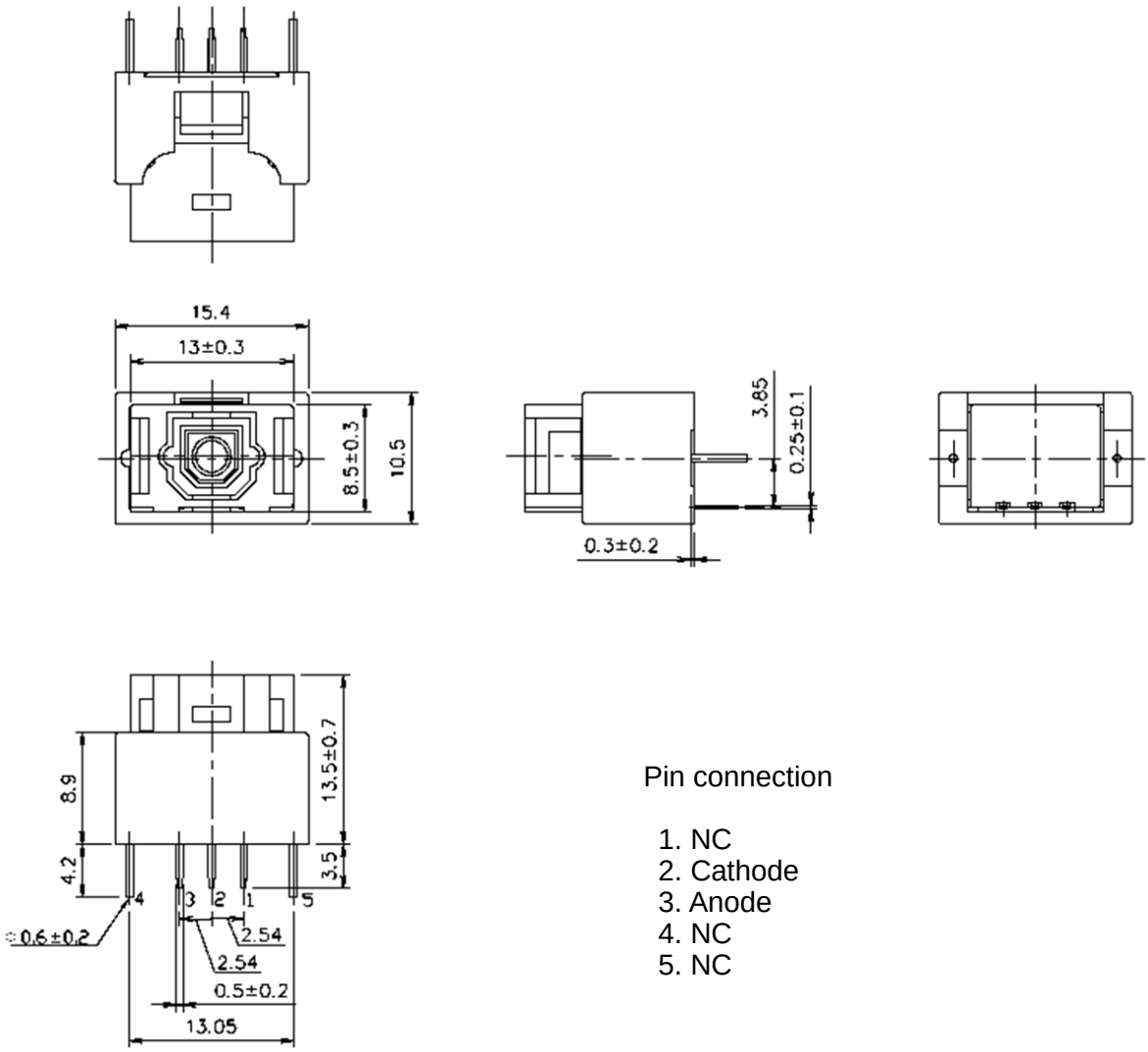
(12) Others

This product is an optical transmitting module for plastic optical fiber.

Use only for an optical transmitting module purpose.

8. Package Outline drawing

Unit: mm



Pin connection

1. NC
2. Cathode
3. Anode
4. NC
5. NC

Weight: 2.4 g (typ.)

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