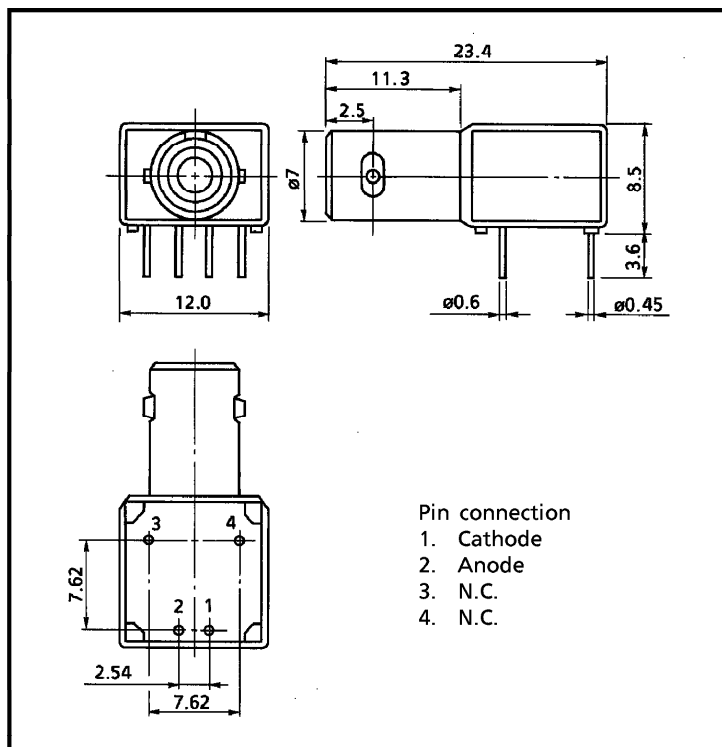


FIBER OPTIC TRANSMITTING MODULE

TOED102FIBER OPTIC TRANSMITTING MODULE FOR
MIDDLE DISTANCE TRANSMISSION

Unit : mm

- Compatible with ST type fiber optic connectors.
- Digital data transmission with the external circuit.
- Data rate : up to 20 Mb/s (NRZ code)
- Transmission distance :
0.2 to 1000 m ($I_F = 25$ mA)

1. Maximum Ratings ($T_a = 25^\circ\text{C}$)

PARAMETER	SYMBOL	RATINGS	UNIT
Storage Temperature	T_{stg}	$-40 \sim 85$	$^\circ\text{C}$
Operating Temperature	T_{opr}	$-40 \sim 85$	$^\circ\text{C}$
Forward Current (DC)	I_{FDC}	MAX 75	mA
Forward Current (Pulse) ⁽¹⁾	I_{FPK}	MAX 120	mA
Reverse Voltage	V_R	MAX 3	V
Soldering Temperature	T_{sol}	260 ⁽²⁾	$^\circ\text{C}$

Note ⁽¹⁾ Frequency 100 kHz, Duty cycle 50%.⁽²⁾ Soldering time ≤ 3 s (More than 1 mm apart from the package).

2. Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT
Forward Current	I_F	20	—	75	mA

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.

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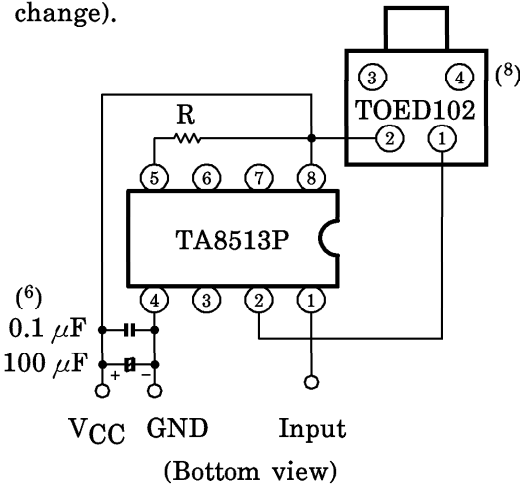
3. Electrical and Optical Characteristics (Ta = 25°C, VCC = 5 V)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP.	MAX	UNIT
Data Rate		NRZ code ⁽³⁾	DC	—	20	Mb / s
Transmission Distance		I _F = 25 mA	0.2	—	1000	m
		Using TA8513P	0.2	—	1600	m
Pulse Width Distortion	Δtw	C _L = 10 pF ⁽⁴⁾	−25	—	25	ns
Fiber Output Power	P _f	I _F = 50 mA ⁽⁵⁾	−17	—	−13.5	dBm
Peak Emission Wavelength	λ _p	I _F = 50 mA	780	850	880	nm
Cut-off Frequency	f _c	I _F = 25 mA (−3 dB)	20	35	—	MHz
Forward Voltage	V _F	I _F = 50 mA	—	1.6	2.0	V
Reverse Current	I _R	V _R = 3 V	—	—	10	μA

- ⁽³⁾ Duty cycle 25~75%. Using TORX102.
⁽⁴⁾ Pulse width 50 ns, pulse cycle 100 ns. Between input of TA8513P and output of TORX102.
⁽⁵⁾ Measure with a standard fiber optical connectors. Valued by peak value.

4. Application Circuit

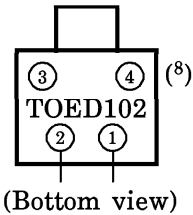
a) Driving TOED102 by TA8513P (resistor change).



Change external resistor R according to the transmission distance.

TRANSMISSION DISTANCE (m)	RESISTOR VALUE (Ω)
0.2 ~ 700	3.3 k
700 ~ 1200	1.2 k
1200 ~ 1600	0 ⁽⁷⁾

b) Designing TOED102 driving circuit with constant I_F value.

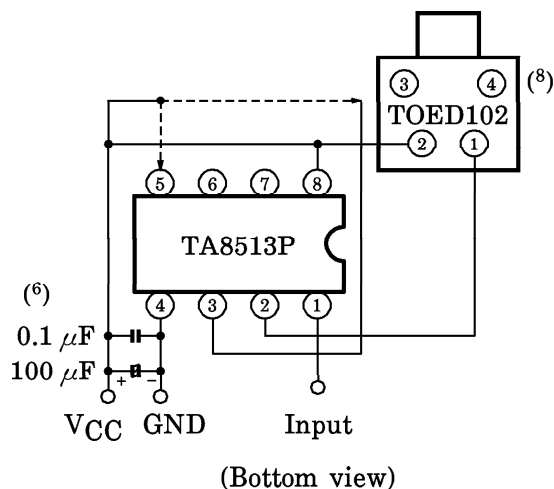


Set the I_F value to that given in the table below according to the transmission distance (within ±5%).

TRANSMISSION DISTANCE (m)	I _F (mA)
0.2 ~ 1000	25
1000 ~ 1800	50

- ⁽⁶⁾ Connect the 0.1 μF capacitor within 5 mm and the 100 μF capacitor within 15 mm of TA8513P pin 8.
⁽⁷⁾ Connect also pin 7 to VCC only in this case.
⁽⁸⁾ Solder TOED102 pins 3 and 4 to the printed circuit board.

c) Driving TOED102 by TA8513P (pin change).

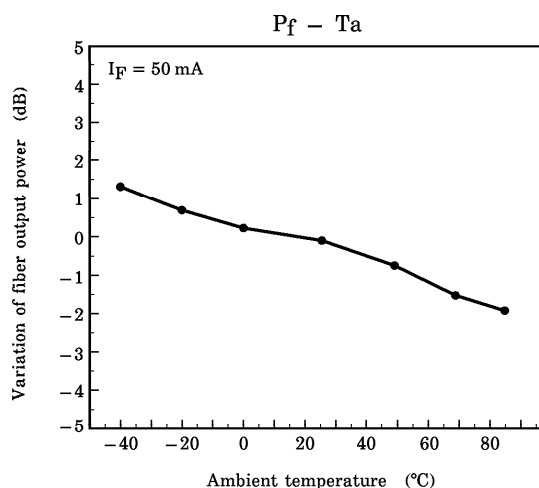
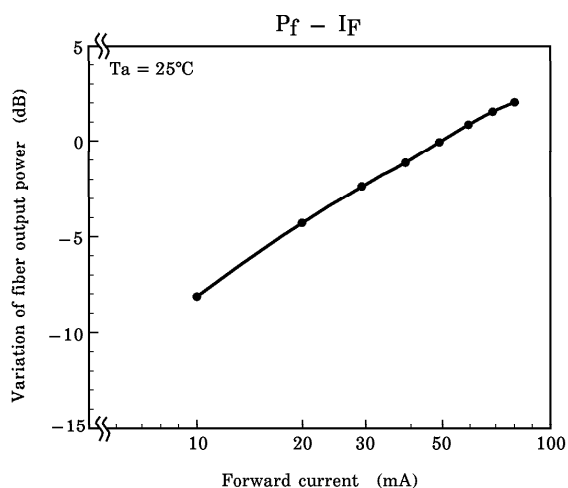


Change the connected pin of TA8513P according to the transmission distance.

TRANSMISSION DISTANCE (m)	Pin No. (CONNECT V_{CC})
0.2 ~ 700	⑥
700 ~ 1200	③

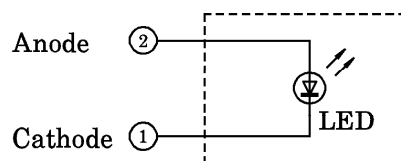
- (6) Connect the $0.1\ \mu\text{F}$ capacitor within 5 mm and the $100\ \mu\text{F}$ capacitor within 15 mm of TA8513P pin 8.
- (8) Solder TOED102 pins 3 and 4 to the printed circuit board.

○ Example of Typical Characteristics ⁽⁹⁾



- ⁽⁹⁾ There give characteristic examples, and its values are not guaranteed.

5. Pin Layout



6. Applicable fiber optic connectors.

ST type fiber optic connector (with 62.5 / 125 μm GI fiber, Transmission Loss $\leq 3 \text{ dB/km}$).

7. Precautions during 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) Vibration and shock

This module is a can type package 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.

(5) Fixing fiber optical transmitting module

Solder the fixed pin (pins 3 and 4) of fiber optic transmitting module TOED102 to the printed circuit board to fix the module to the board.

(6) 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.

(7) Protective cap

When the TOED102 is not in use, attach the protective cap.

(8) Soldering condition

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

(9) 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.

(10) Precautions during use

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