FIBER OPTIC TRANSMITTING MODULE

TOTX147AL(F,T)

FIBER OPTIC TRANSMITTING MODULE FOR DIGITAL AUDIO EQUIPMENT

- Conforms to JEITA Standard CP- 1212 (Digital Audio Optical Interface for Consumer Equipment).
- LED is driven by differential circuit.
- A Self- tapping hole for easy attachment to Audio Equipment panels.
- Shutter System

Characteristics	Symbol	Rating	Unit
Storage Temperature	T _{stg}	- 40 to 70	°C
Operating Temperature	T _{opr}	- 20 to 70	°C
Supply Voltage	Vcc	- 0.5 to 4.5	V
Input Voltage	ЧN	- 0.5 to V _{CC} + 0.5	V
Soldering Temperature	T _{sol}	260 (Note 1)	°C

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

Note 1: Soldering time = 10 seconds (At a distance of 1 mm 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 and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions/"derating Concept and Methods") and individual data (i.e. reliability test report and estimated failure rate, etc).

2. Operating Ranges

Characteristics	Symbol	Min	Тур.	Max	Unit
Supply Voltage	Vcc	2.7	3.0	3.6	V
High- Level Input Voltage	VIH	2.1	-	V _{CC}	V
Low- Level Input Voltage	VIL	0	-	0.9	V

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

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Data Rate		NRZ Code (Note 2)	DC	-	15	Mb/s
Transmission Distance		Using APF (Note 3) and TORX147L(F,T)	0.2	-	5	m
Pulse Width Distortion (Note 4)	t w	Pulse Width = 67 ns Pulse Cycle = 134 ns Using TORX147L(F,T) $C_L = 10_pF$	- 15	-	15	ns
Fiber Output Power (Note 5)	Pf		- 21	-	- 15	dBm
Peak Emission Wavelength	с		-	650	-	nm
Current Consumption	lсс		-	8	15	mA
High Level Input Voltage	VIH		2.1	-	-	V
Low Level Input Voltage	VIL		-	-	0.9	V

Note 2: LED is on when input signal is high, and off when it is low.

7.5Mb/s (max.) Biphase Signal.

Note 3: All Plastic Fiber (980 / 1000 $\mu m).$

Note 4: Between input of TOTX147AL(F,T) and output of TORX147L(F,T).

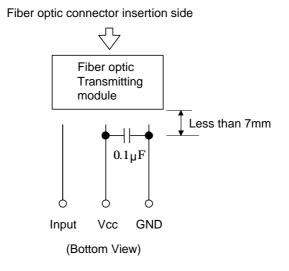
Note 5: Measure with a standard optical fiber, peak value.

4. Mechanical Characteristics (Ta = 25°C)

Characteris	tics	Symbol	Test Condition	Min	Тур.	Max	Unit
Insertion Force	(Note 6)		Initial value	-	-	39.2	Ν
Withdrawal Force	(Note 6)		Initial value	5.9	-	39.2	Ν
Torque for Self- Tap			Using self- tapping screw (M3 × 8)	58.8	-	98	N⋅cm

Note 6: Square type connector : JEITA RC-5720B

5. Application Circuit

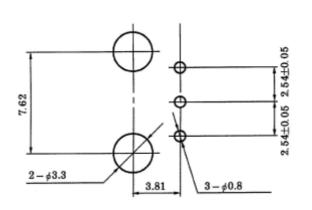


6. Required Optical Fiber with Fiber Optic Connectors

All Plastic Fiber with Square Type Connector (JEITA RC-5720B)

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7. Board layout hole pattern (Recommendation)



Unit: mm Tolerance: ±0.05 mm Recommended PCB thickness: 1.6 mm

8. 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 shutter system. The shutter system 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.

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(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 sometimes 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) Support pins

The optical transmission module TOTX147AL(F,T) has support pins in order to fix itself to the PCB temporary. Please make the hole for these pins in the PCB under the condition described in board layout hole pattern.

(7) Panel attachment

TOTX147AL(F,T) has hole for panel attachment. Please be sure to attach it to panel with self-tapping screw.

(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.

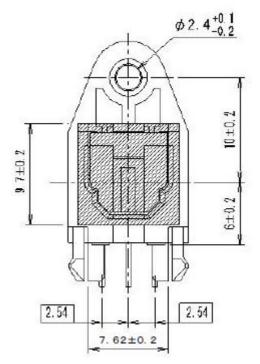
(9) Supply voltage

Use the supply voltage within the recommended operating condition ($V_{CC} = 2.7$ to 3.6V). Make sure that supply voltage does not exceed the absolute maximum rating value of 4.5 V, even for an instant.

- (10) Input voltage If a voltage exceeding the absolute maximum rating value (V_{CC} + 0.5 V) is applied to the transmitters' 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.
- (11) Soldering condition

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

(12) The hole for chassis Please make a hole for inserting optical connector the slash part in the following figure.



(13) Case(receptacle) material

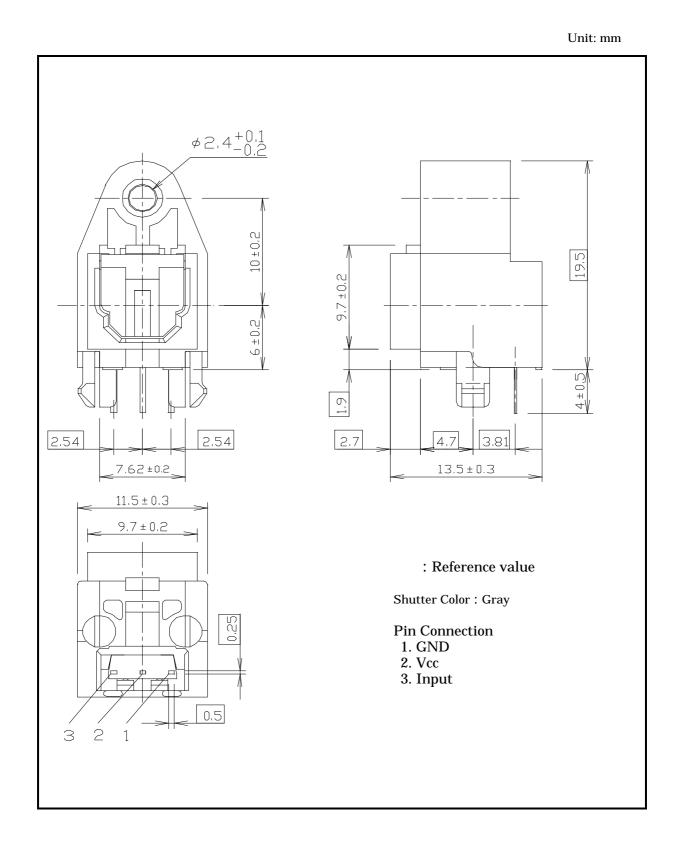
The case is made of polycarbonate. Polycarbonate is usually stable with acid, alcohol, and aliphatic hydrocarbons however, with petrochemicals (such as benzene, toluene, and acetone), alkali, aromatic hydrocarbons, or chloric hydrocarbons, polycarbonate becomes cracked, swollen, or melted. Please take care when choosing a packaging material by referencing the table below. Chemicals to avoid with polycarbonate

	Chemicals to avoid with polycarbonate				
	PHENOMENON	CHEMICALS			
Α	Little deterioration	 nitric acid(low concentration), hydrogen peroxide, chlorine 			
	But staining				
В	Cracked crazed,	acetic acid(70% or more)			
	or Swollen	• gasoline			
		 methyl ethyl ketone, ehtyl aetate, butyl acetate 			
		 ethyl methacrylate, ethyl ether, MEK 			
		 acetone, m-amino alcohol, carbon tetrachloride 			
		 carbon disulfide, trichloroethylene, cresol 			
		thinners, oil of turpentine			
		triethanolamine			
С	Melted	 concentrated sulfuric acid 			
	<pre>{ }: used as solvent</pre>	• benzene			
		 styrene, acrylonitrile, vinyl acetate 			
		 ethylenediamine, diethylenediamine 			
		 {chloroform, methyl chloride, tetrachloromethane, dioxane} 			
		{1,2-dichloroethane}			
D	Decomposed	ammonia water			
		• other alkali			

(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.

9. Package Outline drawing



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