

FIBER OPTIC RECEIVING MODULE

# TORX1355(V,F)

## GENERAL PURPOSE OPTICAL RECEIVING MODULE

- For JIS F05 Optical Connector
- CMOS level Interface
- +5 V Single Power Supply
- ATC (Automatic Threshold Control) circuit built-in
- Low current consumption 1.5 mA max (Active) / 70  $\mu$ A max (Standby)
- Vertical mounting type

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

Characteristics	Symbol	Rating	Unit
Storage Temperature	T <sub>stg</sub>	-40 to 95	°C
Operating Temperature	T <sub>opr</sub>	-40 to 85	°C
Supply Voltage	V <sub>CC</sub>	-0.5 to 6	V
High Level Output Current	I <sub>OH</sub>	-5	mA
Low Level Output Current	I <sub>OL</sub>	5	mA
Soldering Temperature	T <sub>sol</sub>	260 (Note 1)	°C

Note 1: Soldering time  $\leq$  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
Supply Voltage	V <sub>CC</sub>	4.75	5.0	5.25	V
Data Rate		DC	-	10	Mb / s
High Level Output Current	I <sub>OH</sub>	-	-	-0.4	mA
Low Level Output Current	I <sub>OL</sub>	-	-	0.4	mA

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Data Rate			NRZ Code (Note 2)	DC	-	10	Mb / s
Transmission Distance (Note 4)			Using APF (Note 3) and TOTX1350(V,F)	0.2	-	10	m
Transmission Distance (Note 5)			Using TOTX1350(V,F) and TOCA1300	-	23.6	-	mm
			Using TOTX1350(V,F) and TOCA1301	-	34.0	-	mm
Pulse Width Distortion (Note 4) (Note 6)		$\Delta tw$		-30	-	30	%
Maximum Receivable Power (Note 7)		P <sub>MAX</sub>	Using APF (Note 3), DC to 10 Mb / s	0	-	-	dBm
Minimum Receivable Power (Note 7)		P <sub>MIN</sub>	Using APF (Note 3), DC to 10 Mb / s	-	-	-19	dBm
Current Consumption	Active (Optical flux on)	I <sub>CC(1)</sub>	V <sub>CC</sub> = 5.25 V, C <sub>L</sub> = 10 pF	-	0.6	1.5	mA
	Standby (No optical flux on)	I <sub>CC(2)</sub>	V <sub>CC</sub> = 5.25 V, C <sub>L</sub> = 10 pF	-	-	70	μA
High Level Output Voltage		V <sub>OH</sub>	V <sub>CC</sub> = 4.75 V, I <sub>OH</sub> = -0.4 mA	4.2	4.6	-	V
Low Level Output Voltage		V <sub>OL</sub>	V <sub>CC</sub> = 4.75 V, I <sub>OL</sub> = 0.4 mA	-	0.1	0.4	V

Note 2: High level output when optical flux is received. Low level output when it is not received.

Note 3: All Plastic Fiber (980 μm core / 1000 μm cladding, NA = 0.5), Polished surface.

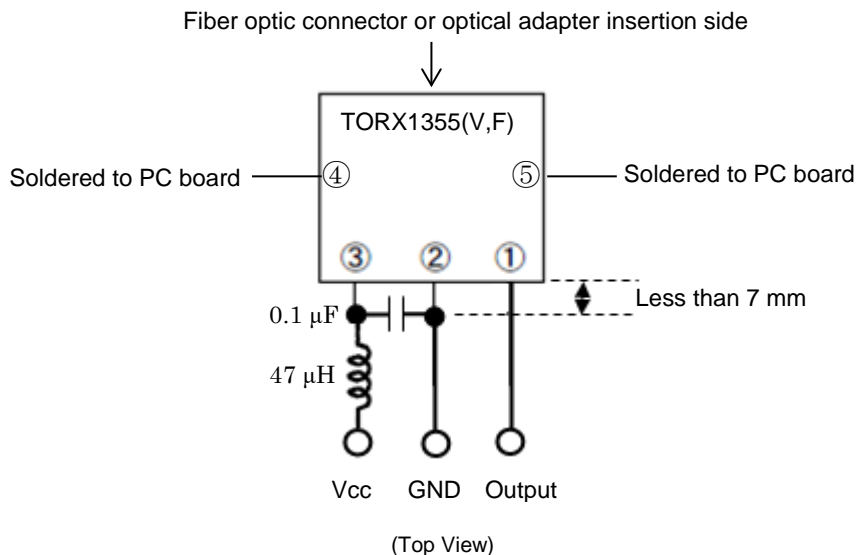
Note 4: A value changes with LED drive circuits.

Note 5: A distance between fixing pin of TOTX1350(V,F) and fixing pin of TORX1355(V,F) when they connect with optical adapter (TOCA1300 or TOCA1301).

Note 6: Between input of driver circuit of TOTX1350(V,F) and output of TORX1355(V,F).

Note 7: BER ≤ 10<sup>-9</sup>, Valued by peak.

### 4. Application Circuit



### 5. Applicable Optical Fiber with Fiber Optic Connectors

All Plastic Fiber (980 μm core / 1000 μm cladding, NA = 0.5).

F05 type optical connector with polished surface.

## 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 maximum rating value is exceeded, the characteristics of devices may never be recovered 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 data books. 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) 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 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 or 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 is cleaned, solder the optical module manually. Do not perform any further cleaning.

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.

(4) Noise resistance

Use a simple noise filter on the fiber optic receiving module power line. If the ripple in power supply used is high, further reinforce the filter.

When locating the optical module in an area susceptible to radiated noise, increase shielding by covering the optical module and the power line filter using a metallic cover.

(5) Vibration and shock

This module is resin-molded construction with wire fixed by resin. This structure is relatively resistant to vibration or shock. In actual equipment, there are some cases where vibration, shock, or stress is applied to soldered parts or connected parts, resulting in line cut. Attention must be paid to the design of the mechanism for applications which are subject to large amounts of vibration.

(6) Fixing fiber optical receiving module

Solder the fixing pin (pins 4 and 5) of fiber optic receiving module TORX1355(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 fiber optic receiving module TORX1355(V,F) is not in use, use the protective cap.

- (9) Supply voltage  
Use the supply voltage within the operating ranges ( $V_{CC} = 5 \pm 0.25 \text{ V}$ ). Make sure that supply voltage does not exceed the absolute maximum rating value of 6 V, even instantaneously.
  
- (10) 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.
  
- (11) Soldering condition  
Solder at 260°C or less within ten seconds.
  
- (12) 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.
  
- (13) Precaution on waste  
When discarding devices and packing materials, follow procedures stipulated by local regulations in order to protect the environment against contamination.



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