FIBER OPTIC TRANSMITTING
MODULE FOR DIGITAL AUDIO EQUIPMENT

- Conforms to JEITA Standard CP−1201 (For Digital Audio Interfaces including Fiber Optic inter−connections).
- TTL interface.
- LED is driven by differential circuit.
- A Self−tapping hole for easy attachment to Audio Equipment panels.

1. Maximum Ratings (Ta = 25°C)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>T_{stg}</td>
<td>−40 to 70</td>
<td>°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>T_{opr}</td>
<td>−20 to 70</td>
<td>°C</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>V_{CC}</td>
<td>−0.5 to 7</td>
<td>V</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>V_{IN}</td>
<td>−0.5 to V_{CC} + 0.5</td>
<td>V</td>
</tr>
<tr>
<td>Soldering Temperature</td>
<td>T_{sol}</td>
<td>260 (Note 1)</td>
<td>°C</td>
</tr>
</tbody>
</table>

Note 1: Soldering time ≤ 10 seconds (At a distance of 1 mm from the package).

2. Recommended Operating Conditions

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>V_{CC}</td>
<td>4.75</td>
<td>5.0</td>
<td>5.25</td>
<td>V</td>
</tr>
<tr>
<td>High−Level Input Voltage</td>
<td>V_{IH}</td>
<td>2.0</td>
<td>—</td>
<td>V_{CC}</td>
<td>V</td>
</tr>
<tr>
<td>Low−Level Input Voltage</td>
<td>V_{IL}</td>
<td>0</td>
<td>—</td>
<td>0.8</td>
<td>V</td>
</tr>
</tbody>
</table>

Handling precaution: The LED's 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.
3. Electrical and Optical Characteristics (Ta = 25°C, VCC = 5 V)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Rate</td>
<td>NRZ Code</td>
<td>(Note 2) DC</td>
<td>—</td>
<td>12.8</td>
<td>—</td>
<td>Mb / s</td>
</tr>
<tr>
<td>Transmission Distance</td>
<td>Using APF (Note 3) and TORX179</td>
<td>0.2</td>
<td>—</td>
<td>5</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>Pulse Width Distortion</td>
<td>Δtw</td>
<td>Pulse Width = 78 ns Pulse Cycle = 156 ns Using TORX179</td>
<td>—25</td>
<td>—</td>
<td>25</td>
<td>ns</td>
</tr>
<tr>
<td>Fiber Output Power</td>
<td>Pf</td>
<td>—21</td>
<td>—</td>
<td>—15</td>
<td>—</td>
<td>dBm</td>
</tr>
<tr>
<td>Peak Emission Wavelength</td>
<td>λc</td>
<td>—</td>
<td>650</td>
<td>—</td>
<td>—</td>
<td>nm</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>Icc</td>
<td>—</td>
<td>15</td>
<td>20</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>High Level Input Voltage</td>
<td>Vih</td>
<td>2.0</td>
<td>—</td>
<td>—</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Low Level Input Voltage</td>
<td>vil</td>
<td>—</td>
<td>—</td>
<td>0.8</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

Note 2: LED is on when input signal is high, and off when it is low.
The duty factor must be maintained between 25 to 75%.
Note 3: All Plastic Fiber (970 / 1000 µm).
Note 4: Between input of TOTX179 and output of fiber optic receiving module.
Note 5: Measure with a standard optical fiber, peak value.

4. Mechanical Characteristics (Ta = 25°C)

| Characteristics          | Symbol | Test Condition | Min | Typ. | Max | Unit | |
|--------------------------|--------|----------------|-----|------|-----|------| |
| Insertion Force          | Using TOCP172, Initial value | —   | —   | 39.2 | N   | |
| Withdrawal Force         | Using TOCP172, Initial value | 5.9 | —   | 39.2 | N   | |
| Torque for Self-Tap      | Using self-tapping screw (M3 × 8) | 58.8 | —   | 98   | N·cm | |

5. Application Circuit

![Diagram of fiber optic connector insertion side](image)

6. Required Optical Fiber with Fiber Optic Connectors

TOCP172–□□B
7. Board layout hole pattern (for reference)

![Board layout hole pattern diagram]

Unit: mm
Tolerance: ±0.1 mm
Recommended PCB thickness: 1.6 mm

8. 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 values 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 damaged.

(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 (P0). 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 case, be sure to check the devices’ reliability.

(4) 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.

(5) Support pins
The optical transmission module TOTX179 has support pins in order to fix itself to the PCB temporarily. Please make the hole for these pins in the PCB under the condition described in board layout hole pattern.
(6) Panel attachment
TOTX179 has hole for panel attachment. Please be sure to attach it to panel with self-tapping screw.

(7) 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.

(8) Protective cap
When the TOTX179 is not in use, attach the protective cap.

(9) Supply voltage
Use the supply voltage within the recommended operating condition (VCC = 5 ± 0.25 V). Make sure that supply voltage does not exceed the maximum rating value of 7 V, even for an instant.

(10) Input voltage
If a voltage exceeding the maximum rating value (VCC + 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) 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.

(13) Precautions during use
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