

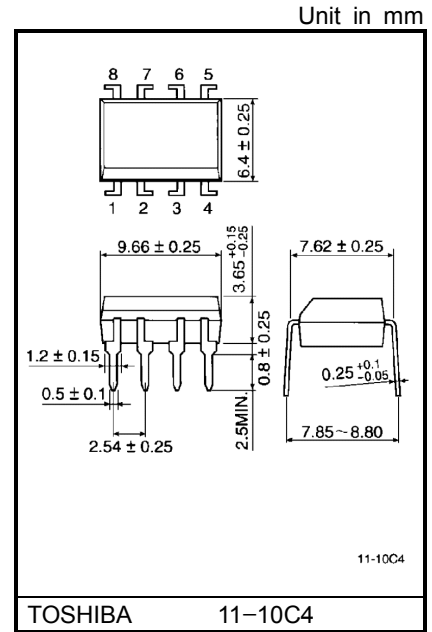
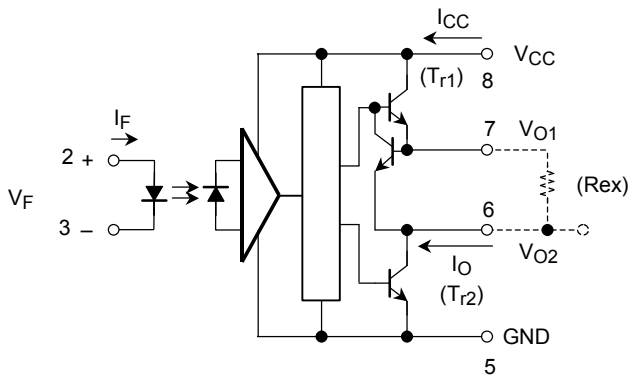
# TLP557

Transistor Invertor  
 Inverter For Air Conditionor  
 Power Transistor Base Drive

The TOSHIBA TLP557 consists of a GaAlAs light emitting diode and a integrated photodetector.  
 This unit is 8-lead DIP package.  
 TLP557 is suitable for base driving circuit of power transistor module up to 20A.  
 External resistor needs to connect between pin 6 and pin 7.  
 This is for constant current driving.

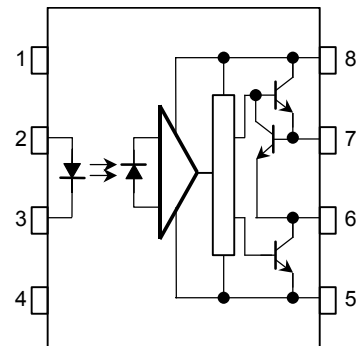
- Input threshold current:  $I_F=5\text{mA}(\text{max.})$
- Guaranteed performance temperature range:  $-30\sim 70^\circ\text{C}$
- Supply voltage:  $16\text{V}(\text{max.})$
- Output current:  $\pm 0.3\text{A}(\text{max.})$
- Switching time ( $t_{pLH} / t_{pHL}$ ):  $5\mu\text{s}(\text{max.})$
- Isolation voltage:  $2500V_{\text{rms}}(\text{min.})$
- UL recognized: UL1577, file No. E67349

## Schematic



Weight: 0.54g

## Pin Configuration (top view)



- 1 : N.C.
- 2 : Anode
- 3 : Cathode
- 4 : N.C.
- 5 : GND
- 6 :  $V_{O2}(\text{Output})$
- 7 :  $V_{O1}(\text{Rex Terminal})$
- 8 :  $V_{CC}$

## Truth Table

|     |     | Tr1   | Tr2 |
|-----|-----|-------|-----|
|     |     | Input | On  |
| LED | On  | On    | Off |
|     | Off | Off   | On  |

## Maximum Ratings

| Characteristic   |  | Symbol    | Rating        | Unit |
|--|--|-----------|---------------|------|
| LED  | Forward current  | $I_F$     | 25            | mA   |
|  | Peak transient forward current (Note 1)                                  | $I_{FPT}$ | 1             | A    |
|  | Reverse voltage  | $V_R$     | 5             | V    |
|  | Junction temperature   | $(T_j)$   | 125           | °C   |
| Detector   | Output current (f ≤ 5kHz, Duty ≤ 50%)                                    | $I_O$     | +0.32 / -0.32 | A    |
|  | Peak output current ( $P_W \leq 10\mu s$ , f ≤ 5kHz)                     | $I_{OP}$  | +2 / -0.5     | A    |
|  | Output voltage   | $V_O$     | 16            | V    |
|  | Supply voltage   | $V_{CC}$  | 16            | V    |
|  | O <sub>1</sub> terminal to O <sub>2</sub> terminal (pin 7–pin 6) voltage | $V_{1-2}$ | 1.5           | V    |
|  | O <sub>2</sub> terminal to O <sub>1</sub> terminal (pin 6–pin 7) voltage | $V_{2-1}$ | 5             | V    |
|  | Power dissipation (Note 2)   | $P_o$     | 0.5           | W    |
|  | Junction temperature   | $(T_j)$   | 125           | °C   |
| Total package power dissipation (Note 3)                     |  | $P_{OT}$  | 0.55          | W    |
| Operating temperature range                                  |  | $T_{opr}$ | -30~70        | °C   |
| Storage temperature range                                    |  | $T_{stg}$ | -55~125       | °C   |
| Lead solder temperature (10 s)                               |  | $T_{sol}$ | 260           | °C   |
| Isolation voltage (AC, 1 min., R.H. ≤ 60%, Ta=25°C) (Note 4) |  | $BV_S$    | 2500          | Vrms |

(Note 1) Pulse width  $PW \leq 1\mu s$ , 300pps

(Note 2)  $\Delta P_o / ^\circ C = -6.7mW / ^\circ C$  ( $T_a \geq 50^\circ C$ )

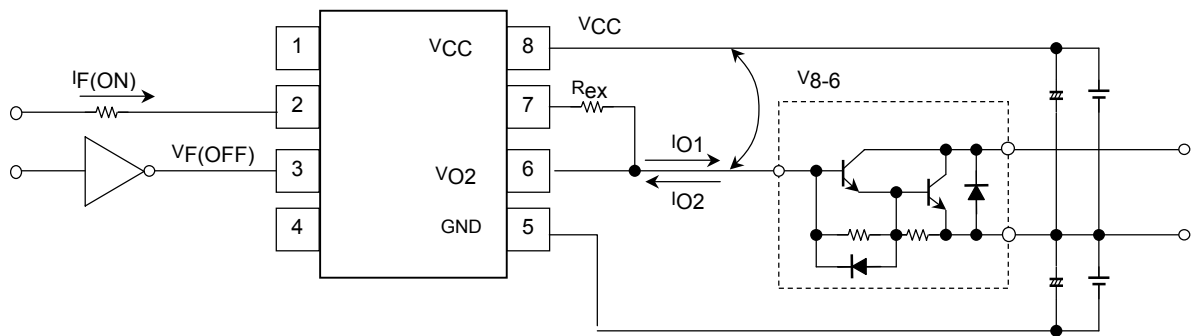
(Note 3)  $\Delta P_{OT} / ^\circ C = -7.4mW / ^\circ C$  ( $T_a \geq 50^\circ C$ )

(Note 4) Device considered a two terminal device: Pins 1, 2, 3 and 4 shorted together, and pins 5, 6, 7 and 8 shorted together.

**Recommended Operating Condition**

| Characteristic                              | Symbol            | Min. | Typ.                             | Max.                               | Unit               |
|---|-------------------|------|----------------------------------|------------------------------------|--------------------|
| Input current on                            | $I_F(\text{ON})$  | 7    | 8                                | 20                                 | mA                 |
| Input voltage off                           | $V_F(\text{OFF})$ | 0    | —                                | 0.8                                | V                  |
| Supply voltage                              | $V_{CC}$          | 5    | 6                                | 13                                 | V                  |
| $I_{B1}$ Drive current                      | $I_{O1}$          | —    | 0.15                             | 0.25                               | A                  |
| $I_{B2}$ Drive current                      | $I_{O2}$          | —    | —                                | 0.5                                | A                  |
| External resistance                         | $R_{ex}$          | 2.7  | 4.3                              | —                                  | $\Omega$           |
| $V_{CC}-V_{O2}$ (pin 8–pin 6)<br>ON voltage | $V_{8-6}$         | 2.3  | 3<br>( $I_{O1} = 0.15\text{A}$ ) | 2.5<br>( $I_{O1} = 0.25\text{A}$ ) | V                  |
| Operating temperature                       | $T_{opr}$         | -30  | 25                               | 70                                 | $^{\circ}\text{C}$ |

( $R_{ex}$  is for constant current driving)



## Electrical Characteristics (Ta = -30~70°C , unless otherwise specified)

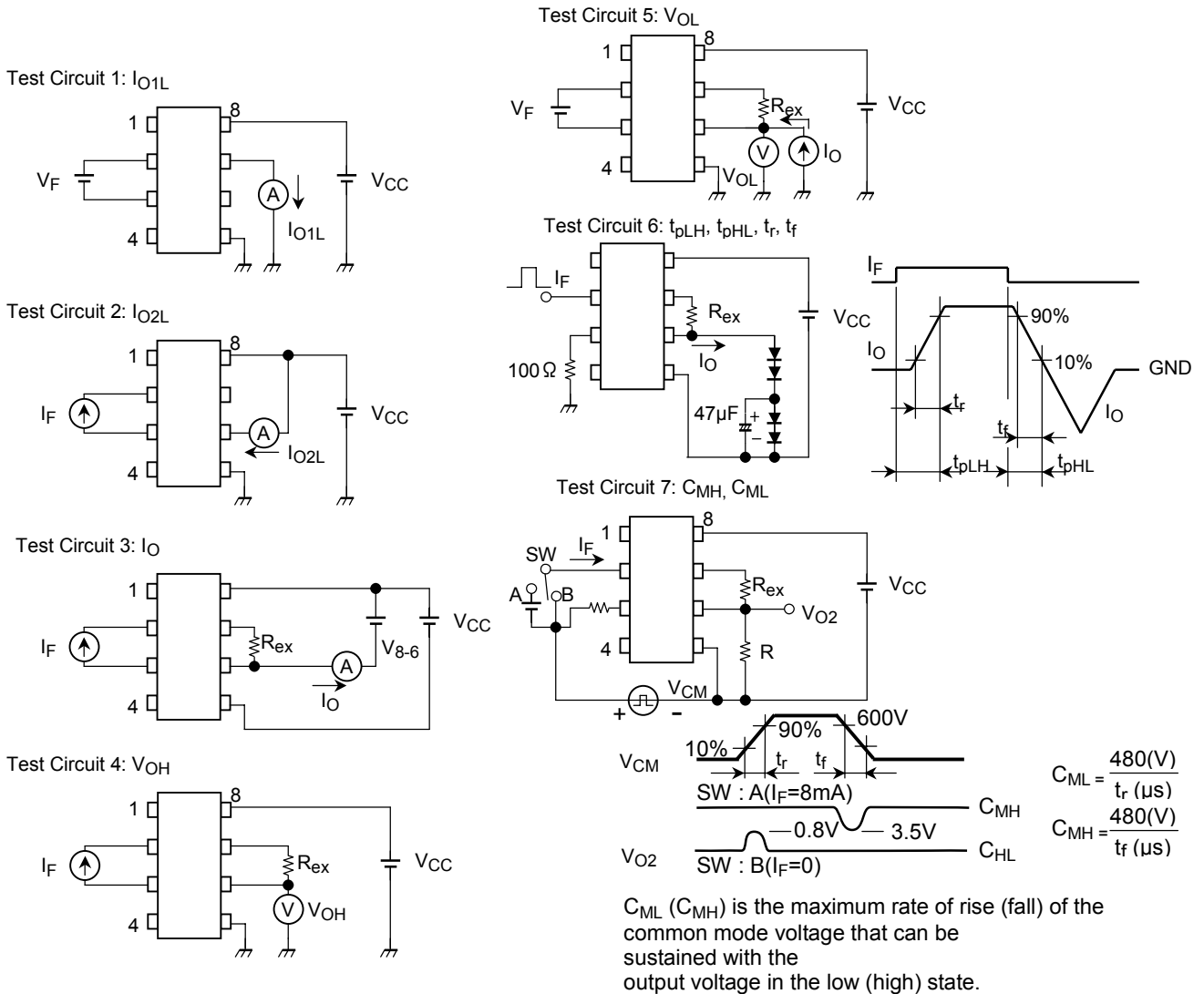
| Characteristic                             | Symbol                | Test Condition   | Min.                  | Typ.*            | Max. | Unit    | Test Circuit |   |
|--|-----------------------|--|-----------------------|------------------|------|---------|--------------|---|
| Input forward voltage                      | V <sub>F</sub>        | I <sub>F</sub> = 5mA , Ta = 25°C   | —                     | 1.55             | 1.7  | V       |              |   |
| Temperature coefficient of forward voltage | ΔV <sub>F</sub> / ΔTa | I <sub>F</sub> = 5mA   | —                     | -2.0             | —    | mV / °C |              |   |
| Input reverse current                      | I <sub>R</sub>        | V <sub>R</sub> = 5V, Ta = 25°C   | —                     | —                | 10   | μA      |              |   |
| Input capacitance                          | C <sub>T</sub>        | V = 0 , f = 1MHz , Ta = 25°C   | —                     | —                | 250  | pF      |              |   |
| O <sub>1</sub> Output leakage current      | I <sub>O1L</sub>      | V <sub>CC</sub> = 16V, V <sub>O1</sub> = 0, V <sub>F</sub> = 0.8V                        | —                     | 0.01             | 200  | μA      | 1            |   |
| O <sub>2</sub> Output leakage current      | I <sub>O2L</sub>      | V <sub>CC</sub> = 16V, V <sub>O2</sub> = 16V, I <sub>F</sub> = 5mA                       | —                     | 0.2              | 200  | μA      | 2            |   |
| O <sub>1</sub> Output current              | I <sub>O</sub>        | V <sub>8-6</sub> = 2.3V<br>R <sub>ex</sub> = 2.7Ω<br>I <sub>F</sub> = 5mA, Ta = 25°C     | V <sub>CC</sub> = 6V  | 0.22             | 0.27 | 0.32    | A            | 3 |
|  |                       |  | V <sub>CC</sub> = 16V | 0.22             | 0.27 | 0.32    |              |   |
| O <sub>2</sub> High level output voltage   | V <sub>OH</sub>       | V <sub>CC</sub> = 6V, R <sub>ex</sub> = 2.7Ω<br>I <sub>F</sub> = 5mA                     | 3.5                   | 5.5              | —    | V       | 4            |   |
| O <sub>2</sub> Low level output voltage    | V <sub>OL</sub>       | V <sub>F</sub> = 0.8V, R <sub>ex</sub> = 2.7Ω<br>I <sub>O</sub> = 0.25A, Ta = 25°C       | V <sub>CC</sub> = 6V  | —                | 0.2  | 0.4     | V            | 5 |
|  |                       |  | V <sub>CC</sub> = 16V | —                | 0.2  | 0.4     |              |   |
|  |                       | V <sub>F</sub> = 0.8V, R <sub>ex</sub> = 2.7Ω<br>I <sub>O</sub> = 0.5A (*1)<br>Ta = 25°C | V <sub>CC</sub> = 6V  | —                | 0.4  | —       | V            |   |
|  |                       |  | V <sub>CC</sub> = 16V | —                | 0.4  | —       |              |   |
| High level supply current                  | I <sub>CCH</sub>      | V <sub>CC</sub> = 6V, I <sub>F</sub> = 5mA<br>R <sub>ex</sub> = 2.7Ω, Ta = 25°C          | —                     | 3.8              | 10   | mA      |              |   |
|  |                       | V <sub>CC</sub> = 6V, I <sub>F</sub> = 5mA, R <sub>ex</sub> = 2.7Ω                       | —                     | —                | 13   |         |              |   |
|  |                       | V <sub>CC</sub> = 16V, I <sub>F</sub> = 5mA, R <sub>ex</sub> = 2.7Ω                      | —                     | 5.2              | 17   |         |              |   |
| Low level supply current                   | I <sub>CCL</sub>      | V <sub>CC</sub> = 6V, I <sub>F</sub> = 0mA<br>R <sub>ex</sub> = 2.7Ω, Ta = 25°C          | —                     | 11               | 17   | mA      |              |   |
|  |                       | V <sub>CC</sub> = 6V, I <sub>F</sub> = 0mA, R <sub>ex</sub> = 2.7Ω                       | —                     | —                | 22   |         |              |   |
|  |                       | V <sub>CC</sub> = 16V, I <sub>F</sub> = 0mA, R <sub>ex</sub> = 2.7Ω                      | —                     | 13               | 25   |         |              |   |
| “Output L→H” threshold input current       | I <sub>FLH</sub>      | R <sub>ex</sub> = 2.7Ω<br>I <sub>O</sub> = 0.25A<br>V <sub>O2</sub> > 3V                 | V <sub>CC</sub> = 6V  | —                | 2.5  | 5       | mA           |   |
|  |                       |  | V <sub>CC</sub> = 16V | —                | —    | 5       |              |   |
| “Output H→L” threshold input current       | V <sub>FHL</sub>      | R <sub>ex</sub> = 2.7Ω<br>I <sub>O</sub> = 0.25A<br>V <sub>O2</sub> < 0.4V               | V <sub>CC</sub> = 6V  | 0.8              | —    | —       | V            |   |
|  |                       |  | V <sub>CC</sub> = 16V | 0.8              | —    | —       |              |   |
| Input current hysteresis                   | I <sub>HYS</sub>      | V <sub>CC</sub> = 6V, R <sub>ex</sub> = 2.7Ω, Ta = 25°C                                  | —                     | 0.05             | —    | mA      |              |   |
| Supply voltage                             | V <sub>CC</sub>       |  | 5                     | —                | 16   | V       |              |   |
| Capacitance (input-output)                 | C <sub>S</sub>        | V <sub>S</sub> = 0, f = 1MHz, Ta = 25°C  | —                     | 1.0              | 2.0  | pF      |              |   |
| Resistance (input-output)                  | R <sub>S</sub>        | V <sub>S</sub> = 500V, Ta = 25°C, R.H. ≤ 60%   | 5×10 <sup>10</sup>    | 10 <sup>12</sup> | —    | Ω       |              |   |

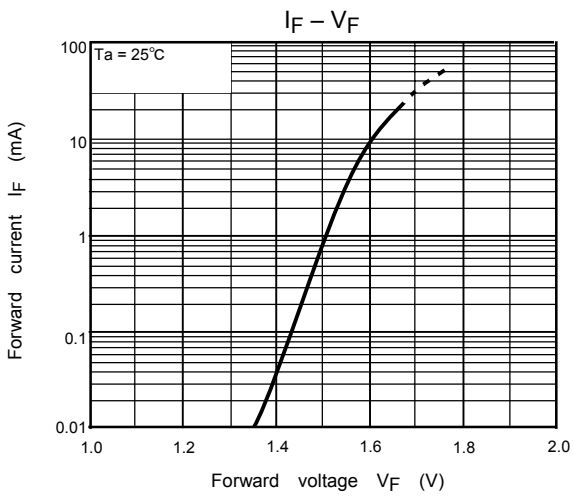
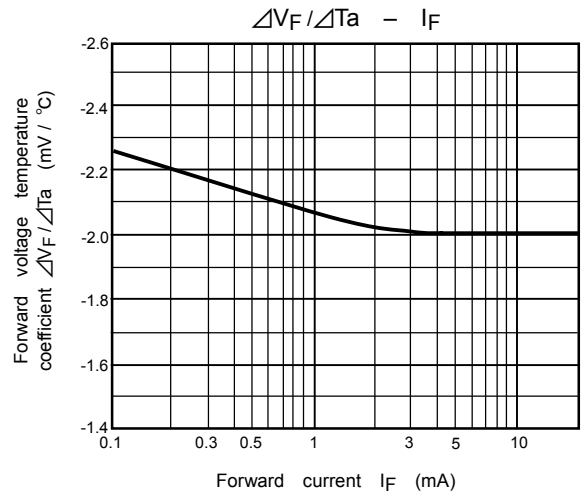
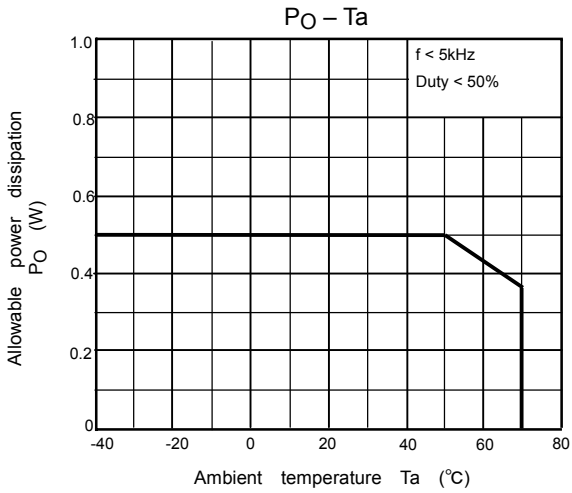
\* All typical values are at Ta = 25°C (\*1): Duration of I<sub>O</sub> time ≤ 100μs

**Switching Characteristics (Ta = -30~70°C unless otherwise specified)**

| Characteristic                                      | Symbol | Test Condition   | Min.  | Typ.* | Max. | Unit   | Test Circuit |
|---|--------|--|-------|-------|------|--------|--------------|
| Propagation delay time, L→H                         | tpLH   | VCC = 6V, IF = 8mA<br>Rex = 2.7Ω<br>f = 5kHz, Duty = 10%           | —     | 1     | 5    | μs     | 6            |
| Propagation delay time, H→L                         | tpHL   |  | —     | 1     | 5    | μs     |              |
| Output rise time                                    | tr     |  | —     | 0.05  | —    | μs     |              |
| Output fall time                                    | tf     |  | —     | 0.05  | —    | μs     |              |
| Common mode transient immunity at high level output | CMH    | VCM = 600V, IF = 8mA<br>VCC = 6V, Rex = 270Ω<br>R = 1kΩ, Ta = 25°C | -2000 | —     | —    | V / μs | 7            |
| Common mode transient immunity at low level output  | CML    | VCM = 600V, IF = 0mA<br>VCC = 6V, Rex = 270Ω<br>R = 1kΩ, Ta = 25°C | 2000  | —     | —    | V / μs | 7            |

\* All typical values are at Ta = 25°C.





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