

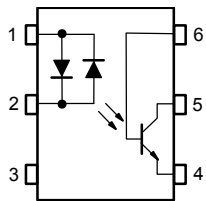
TLP330

Programmable Controllers
 AC / DC-Input Module
 Telecommunication

The TOSHIBA TLP330 consists of a photo-transistor optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel in a six lead plastic DIP package. This is suitable for application of AC input current up to 150mA.

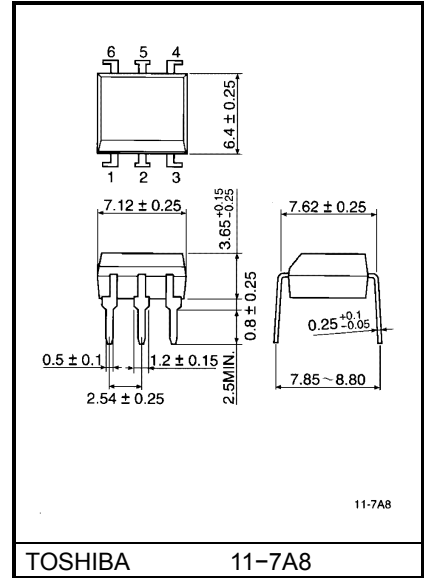
- If maximum rating: $\pm 150\text{mA}$
- Collector-Emitter voltage: 55V(min.)
- Current transfer ratio: 25% (min.) ($I_F = \pm 20\text{mA}$)
- Isolation voltage: 5000Vrms (min.)
- UL recognized: UL1577, file no. E67349

Pin Configurations (top view)



- 1: Anode, cathode
- 2: Cathode, anode
- 3: NC
- 4: Emitter
- 5: Collector
- 6: Base

Unit in mm



TOSHIBA 11-7A8
 Weight: 0.39 g

Maximum Ratings (Ta = 25°C)

| Characteristic | | Symbol | Rating | Unit |
|--|--|-------------------------------|-----------|---------|
| LED | Forward current | I_F | ± 150 | mA |
| | Forward current derating (Ta $\geq 25^\circ\text{C}$) | $\Delta I_F / ^\circ\text{C}$ | -1.5 | mA / °C |
| | Peak forward current (100 μs pulse, 100pps) | I_{FP} | ± 1 | A |
| | Junction temperature | T_j | 125 | °C |
| Detector | Collector-emitter voltage | V_{CEO} | 55 | V |
| | Collector-base voltage | V_{CBO} | 80 | V |
| | Emitter-collector voltage | V_{ECO} | 7 | V |
| | Emitter-base voltage | V_{EBO} | 7 | V |
| | Collector current | I_C | 80 | mA |
| | Power dissipation | P_C | 150 | mW |
| | Power dissipation derating (Ta $\geq 25^\circ\text{C}$) | $\Delta P_C / ^\circ\text{C}$ | -1.5 | mW / °C |
| | Junction temperature | T_j | 125 | °C |
| Storage temperature range | | T_{stg} | -55~125 | °C |
| Operating temperature range | | T_{opr} | -55~100 | °C |
| Lead soldering temperature (10s) | | T_{sol} | 260 | °C |
| Total package power dissipation | | P_T | 250 | mW |
| Total package power dissipation derating (Ta $\geq 25^\circ\text{C}$) | | $\Delta P_T / ^\circ\text{C}$ | -2.5 | mW / °C |
| Isolation voltage (AC, 1 min, R.H. $\leq 60\%$) (Note 1) | | BV_S | 5000 | Vrms |

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

Recommended Operating Conditions

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|-----------------------|--------------|------|------|------|------|
| Supply voltage | V_{CC} | — | 5 | 24 | V |
| Forward current | $I_{F(RMS)}$ | — | 20 | 120 | mA |
| Collector current | I_C | — | 1 | 10 | mA |
| Operating temperature | T_{opr} | -25 | — | 85 | °C |

Individual Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------------------|-------------------------------------|----------------------------|---|------|------|------|---------------|
| LED | Forward voltage | V_F | $I_F = \pm 100 \text{ mA}$ | — | 1.4 | 1.7 | V |
| | Forward current | I_F | $V_F = \pm 0.7 \text{ V}$ | — | 2.5 | 20 | μA |
| | Capacitance | C_T | $V = 0, f = 1 \text{ MHz}$ | — | 100 | — | pF |
| Detector | Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C = 0.5 \text{ mA}$ | 55 | — | — | V |
| | Emitter-collector breakdown voltage | $V_{(BR)ECO}$ | $I_E = 0.1 \text{ mA}$ | 7 | — | — | V |
| | Collector-base breakdown voltage | $V_{(BR)CBO}$ | $I_C = 0.1 \text{ mA}$ | 80 | — | — | V |
| | Emitter-base breakdown voltage | $V_{(BR)EBO}$ | $I_E = 0.1 \text{ mA}$ | 7 | — | — | V |
| | Collector dark current | I_{CEO} | $V_{CE} = 24 \text{ V}$ | — | 10 | 100 | nA |
| | | | $V_{CE} = 24 \text{ V}, T_a = 85^\circ\text{C}$ | — | 2 | 50 | μA |
| | Collector dark current | I_{CER} | $V_{CE} = 24 \text{ V}, T_a = 85^\circ\text{C}$ $R_{BE} = 1 \text{ M}\Omega$ | — | 0.5 | 10 | μA |
| | Collector dark current | I_{CBO} | $V_{CE} = 10 \text{ V}$ | — | 0.1 | — | nA |
| | DC forward current gain | h_{FE} | $V_{CE} = 5 \text{ V}, I_C = 0.5 \text{ mA}$ | — | 400 | — | — |
| Capacitance (collector to emitter) | C_{CE} | $V = 0, f = 1 \text{ MHz}$ | — | 10 | — | pF | |

Coupled Electrical Characteristics (Ta = 25°C)

| Characteristic | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--------------------------------------|----------------------------|---|------|------|------|---------------|
| Current transfer ratio | I_C / I_F | $I_F = \pm 20 \text{ mA}, V_{CE} = 1 \text{ V}$ | 25 | — | — | % |
| | $I_C / I_{F(\text{high})}$ | $I_F = \pm 100 \text{ mA}, V_{CE} = 1 \text{ V}$ | 20 | — | 80 | % |
| Base photo-current | I_{PB} | $I_F = \pm 5 \text{ mA}, V_{CB} = 5 \text{ V}$ | — | 10 | — | μA |
| Collector-emitter saturation voltage | $V_{CE(\text{sat})}$ | $I_C = 2.4 \text{ mA}, I_F = 20 \text{ mA}$ | — | — | 0.4 | V |
| | | $I_C = 2.4 \text{ mA}, I_F = \pm 100 \text{ mA}$ | — | — | 0.4 | |
| Off-state collector current | $I_{C(\text{off})}$ | $V_F = \pm 0.7 \text{ V}, V_{CE} = 24 \text{ V}$ | — | 1 | 10 | μA |
| CTR symmetry | $I_C(\text{ratio})$ | $I_C(I_F = -20 \text{ mA}) / I_C(I_F = +20 \text{ mA})$ | 0.5 | 1 | 2 | — |

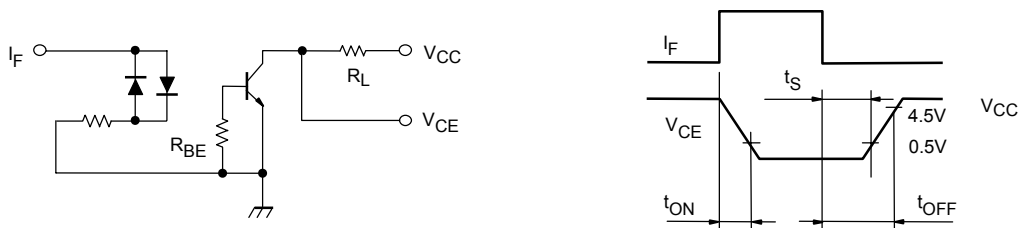
Isolation Characteristics (Ta = 25°C)

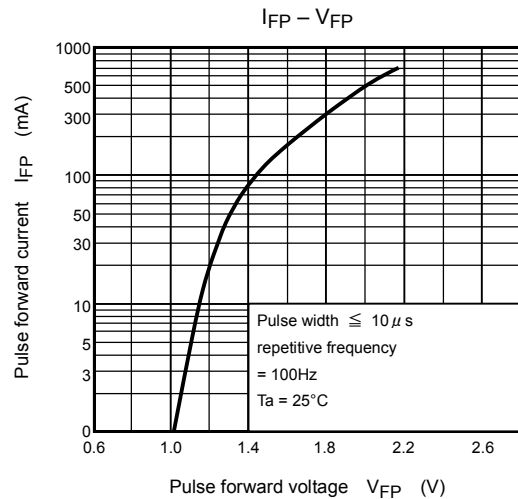
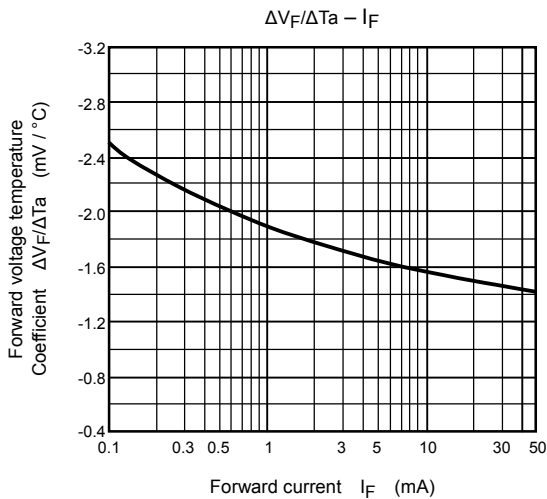
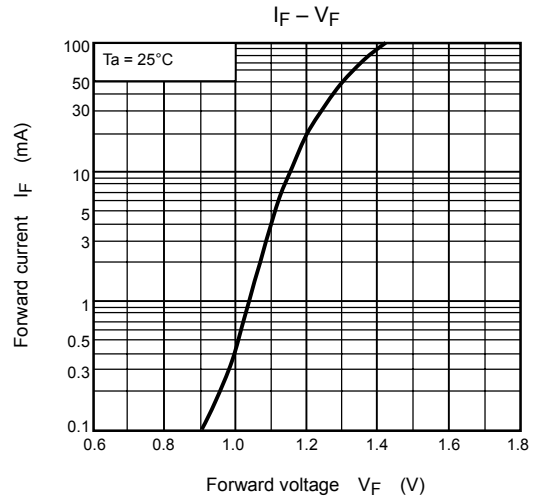
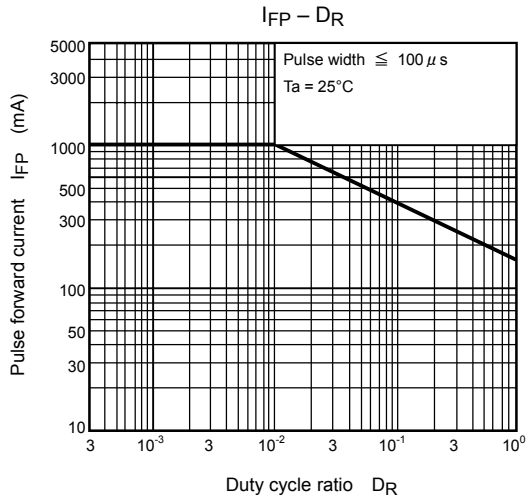
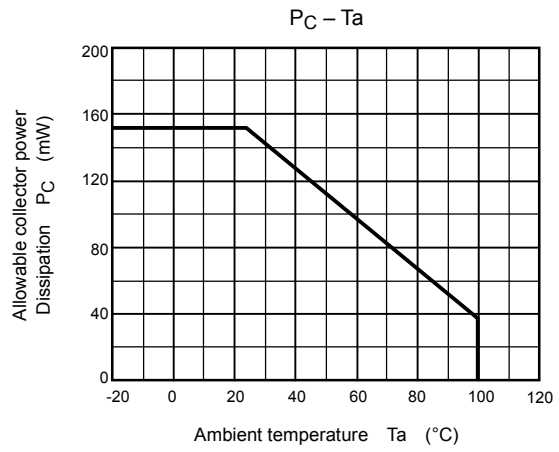
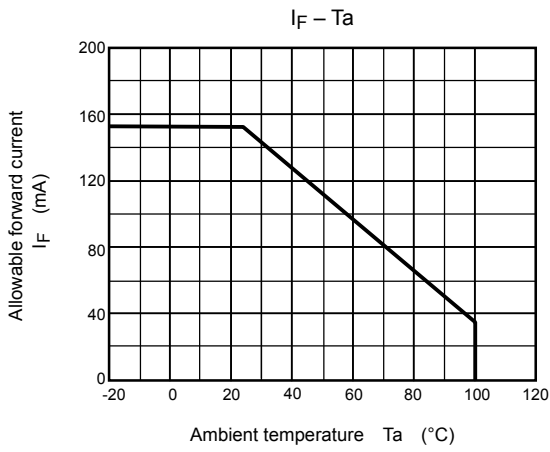
| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|-------------------------------|-----------------|------------------------------------|--------------------|------------------|------|------|
| Capacitance (input to output) | C _S | V _S = 0, f = 1 MHz | — | 0.8 | — | pF |
| Isolation resistance | R _S | V _S = 500 V, R.H. ≤ 60% | 5×10 ¹⁰ | 10 ¹⁴ | — | Ω |
| Isolation voltage | BV _S | AC, 1 minute | 5000 | — | — | Vrms |
| | | AC, 1 second, in oil | — | 10000 | — | Vrms |
| | | DC, 1 minute, in oil | — | 10000 | — | Vdc |

Switching Characteristics (Ta = 25°C)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|----------------|------------------|--|------|------|------|------|
| Rise time | t _r | V _{CC} = 10 V I _C = 2 mA R _L = 100Ω | — | 2 | — | μs |
| Fall time | t _f | | — | 3 | — | |
| Turn-on time | t _{on} | | — | 3 | — | |
| Turn-off time | t _{off} | | — | 3 | — | |
| Turn-on time | t _{ON} | R _L = 1.9 kΩ (Fig.1) R _{BE} = OPEN V _{CC} = 5 V, I _F = ±16 mA | — | 2 | — | μs |
| Storage time | t _s | | — | 15 | — | |
| Turn-off time | t _{OFF} | | — | 25 | — | |
| Turn-on time | t _{ON} | R _L = 1.9 kΩ (Fig.1) R _{BE} = 220kΩ V _{CC} = 5 V, I _F = ±16 mA | — | 2 | — | μs |
| Storage time | t _s | | — | 12 | — | |
| Turn-off time | t _{OFF} | | — | 20 | — | |

Fig. 1 Switching time test circuit





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