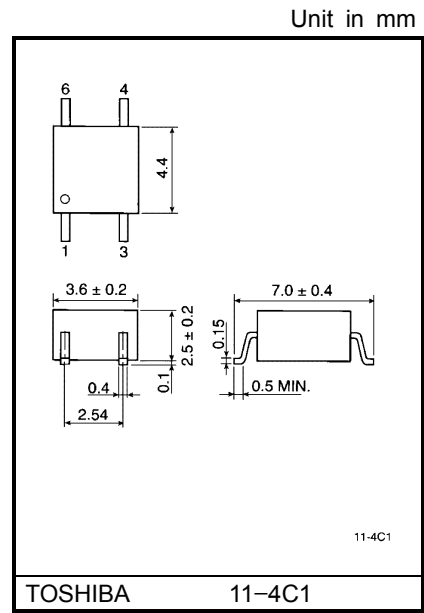


# TLP124

Office Machine  
 Programmable Controllers  
 AC / DC-Input Module  
 Telecommunication

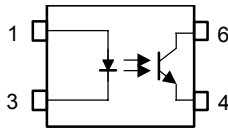
The TOSHIBA mini flat coupler TLP124 is a small outline coupler, suitable for surface mount assembly. TLP124 consists of a photo transistor optically coupled to a gallium arsenide infrared emitting diode.

- Collector-emitter voltage: 80 V min.
- Current transfer ratio: 100% min.  
 Rank BV: 200% min.
- Isolation voltage: 3750Vrms min.
- UL recognized: UL1577, file No. E67349



Weight: 0.09g

## Pin Configurations (top view)



- 1 : Anode
- 3 : Cathode
- 4 : Emitter
- 6 : Collector

## Current Transfer Ratio

| Classification | Current Transfer Ratio (min.) |                          |                        | Marking Of Classification |
|----------------|-------------------------------|--------------------------|------------------------|---------------------------|
|                | Ta = 25°C                     |                          | Ta = -25~75°C          |                           |
|                | If = 1mA<br>VCE = 0.5V        | If = 0.5mA<br>VCE = 1.5V | If = 1mA<br>VCE = 0.5V |                           |
| Rank BV        | 200%                          | 100%                     | 100%                   | BV                        |
| Standard       | 100%                          | 50%                      | 50%                    | BV, Blank                 |

(Note) Application type name for certification test, please use standard product type name, i. e. TLP124 (BV): TLP124

## Maximum Rations (Ta = 25°C)

| Characteristic                                       |                                             | Symbol                        | Rating           | Unit    |
|------------------------------------------------------|---------------------------------------------|-------------------------------|------------------|---------|
| LED                                                  | Forward current                             | $I_F$                         | 50               | mA      |
|                                                      | Forward current derating                    | $\Delta I_F / ^\circ\text{C}$ | -0.7 (Ta ≥ 53°C) | mA / °C |
|                                                      | Peak forward current (100µs pulse, 100pps)  | $I_{FP}$                      | 1                | A       |
|                                                      | Reverse voltage                             | $V_R$                         | 5                | V       |
|                                                      | Junction temperature                        | $T_j$                         | 125              | °C      |
| Detector                                             | Collector-emitter voltage                   | $V_{CEO}$                     | 80               | V       |
|                                                      | Emitter-collector valtage                   | $V_{ECO}$                     | 7                | V       |
|                                                      | Collector current                           | $I_C$                         | 50               | mA      |
|                                                      | Peak collector current (10ms pulse, 100pps) | $I_{CP}$                      | 100              | mA      |
|                                                      | Power dissipation                           | $P_C$                         | 150              | mW      |
|                                                      | Power dissipation derating (Ta ≥ 25°C)      | $\Delta P_C / ^\circ\text{C}$ | -1.5             | mA / °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                      | $P_T$                                       | 200                           | mW               |         |
| Total package power dissipation derating (Ta ≥ 25°C) | $\Delta P_T / ^\circ\text{C}$               | -2.0                          | mW / °C          |         |
| Isolation voltage (AC, 1min., R.H. ≤ 60%) (Note 1)   | $BV_S$                                      | 3750                          | Vrms             |         |

(Note 1) Device considered a two terminal device: Pins1, 3 shorted together and pins 4, 6 shorted together.

## Recommended Operating Conditions

| Characteristic        | Symbol    | Min. | Typ. | Max. | Unit |
|-----------------------|-----------|------|------|------|------|
| Supply voltage        | $V_{CC}$  | —    | 5    | 48   | V    |
| Forward current       | $I_F$     | —    | 1.6  | 20   | mA   |
| Collector current     | $I_C$     | —    | 1    | 10   | mA   |
| Operating temperature | $T_{opr}$ | -25  | —    | 75   | °C   |

## Individual Electrical Characteristics (Ta = 25°C)

| Characteristic                   |                                     | Symbol                     | Test Condition                                  | Min. | Typ. | Max. | Unit          |
|----------------------------------|-------------------------------------|----------------------------|-------------------------------------------------|------|------|------|---------------|
| LED                              | Forward voltage                     | $V_F$                      | $I_F = 10 \text{ mA}$                           | 1.0  | 1.15 | 1.3  | V             |
|                                  | Reverse Current                     | $I_R$                      | $V_R = 5 \text{ V}$                             | —    | —    | 10   | $\mu\text{A}$ |
|                                  | Capacitance                         | $C_T$                      | $V = 0, f = 1 \text{ MHz}$                      | —    | 30   | —    | pF            |
| Detector                         | Collector-emitter breakdown voltage | $V_{(BR)CEO}$              | $I_C = 0.5 \text{ mA}$                          | 80   | —    | —    | V             |
|                                  | Emitter-collector breakdown voltage | $V_{(BR)ECO}$              | $I_E = 0.1 \text{ mA}$                          | 7    | —    | —    | V             |
|                                  | Collector dark current              | $I_D$                      | $V_{CE} = 48 \text{ V}$                         | —    | 10   | 100  | nA            |
|                                  |                                     |                            | $V_{CE} = 48 \text{ V}, T_a = 85^\circ\text{C}$ | —    | 2    | 50   | $\mu\text{A}$ |
| Capacitance collector to emitter | $C_{CE}$                            | $V = 0, f = 1 \text{ MHz}$ | —                                               | 12   | —    | pF   |               |

## Coupled Electrical Characteristics (Ta = 25°C)

| Characteristic                       | Symbol                   | Test Condition                                            | Min.                                                | Typ. | Max. | Unit          |     |
|--------------------------------------|--------------------------|-----------------------------------------------------------|-----------------------------------------------------|------|------|---------------|-----|
| Current transfer ratio               | $I_C / I_F$              | $I_F = 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$<br>Rank BV   | 100                                                 | —    | 1200 | %             |     |
|                                      |                          |                                                           | 200                                                 | —    | 1200 |               |     |
| Low input CTR                        | $I_C / I_F (\text{low})$ | $I_F = 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$<br>Rank BV | 50                                                  | —    | —    | %             |     |
|                                      |                          |                                                           | 100                                                 | —    | —    |               |     |
| Collector-emitter saturation voltage | $V_{CE} (\text{sat})$    | $I_C = 0.5 \text{ mA}, I_F = 1 \text{ mA}$                | —                                                   | —    | 0.4  | V             |     |
|                                      |                          |                                                           | $I_C = 1 \text{ mA}, I_F = 1 \text{ mA}$<br>Rank BV | —    | 0.2  |               | —   |
|                                      |                          |                                                           |                                                     | —    | —    |               | 0.4 |
| Off-state collector current          | $I_{C(\text{off})}$      | $V_F = 0.7 \text{ V}, V_{CE} = 48 \text{ V}$              | —                                                   | —    | 10   | $\mu\text{A}$ |     |

## Coupled Electrical Characteristics (Ta = -25~75°C)

| Characteristic         | Symbol                   | Test Condition                                            | Min. | Typ. | Max. | Unit |
|------------------------|--------------------------|-----------------------------------------------------------|------|------|------|------|
| Current transfer ratio | $I_C / I_F$              | $I_F = 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$<br>Rank BV   | 50   | —    | —    | %    |
|                        |                          |                                                           | 100  | —    | —    |      |
| Low input CTR          | $I_C / I_F (\text{low})$ | $I_F = 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$<br>Rank BV | —    | 50   | —    | %    |
|                        |                          |                                                           | —    | 100  | —    |      |

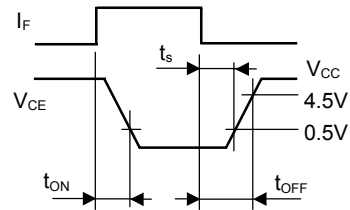
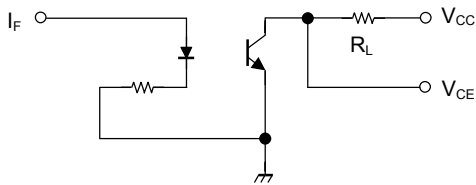
**Isolation Characteristics (Ta = 25°C)**

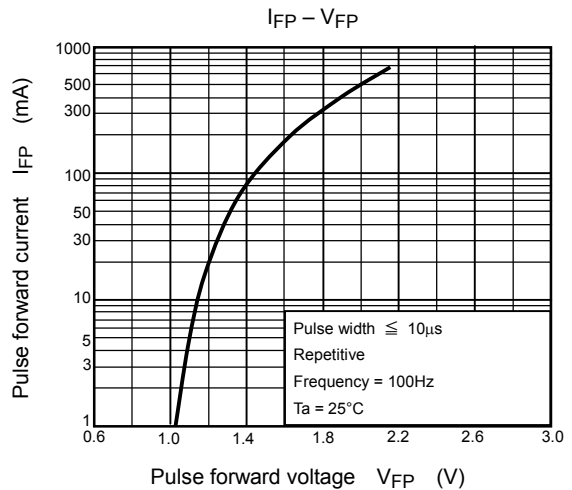
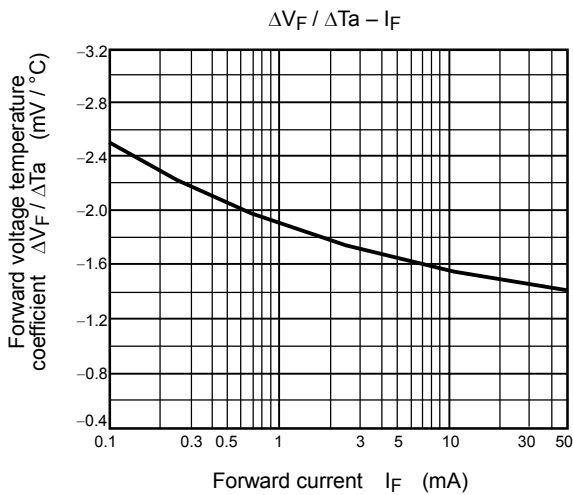
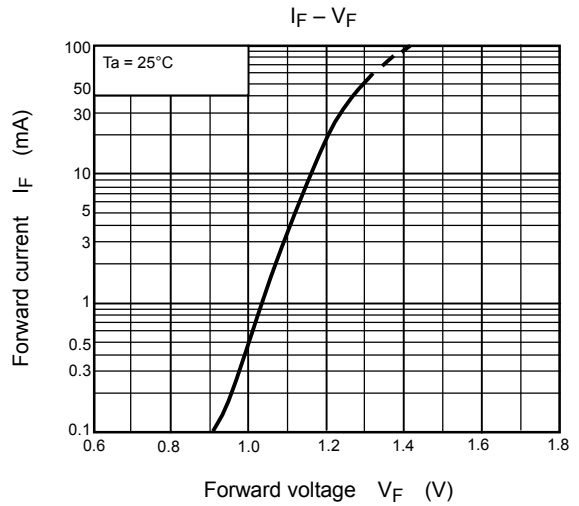
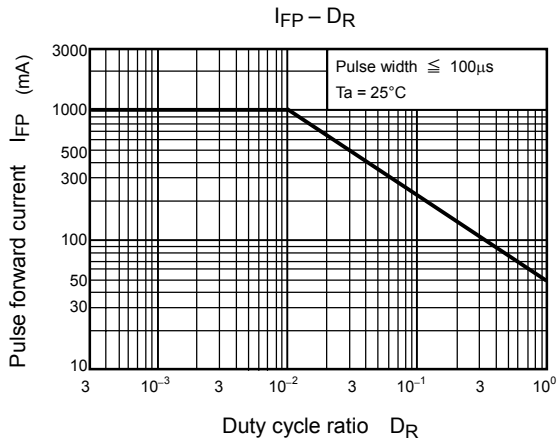
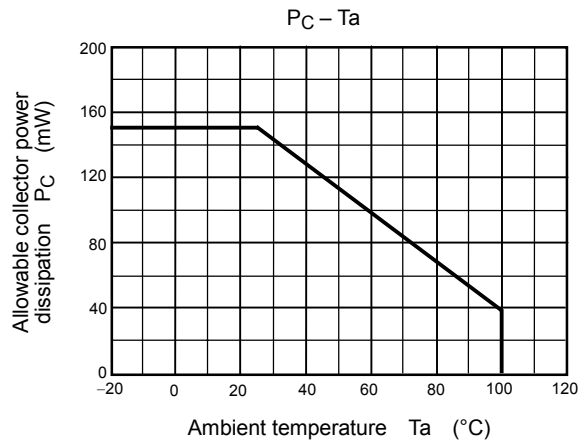
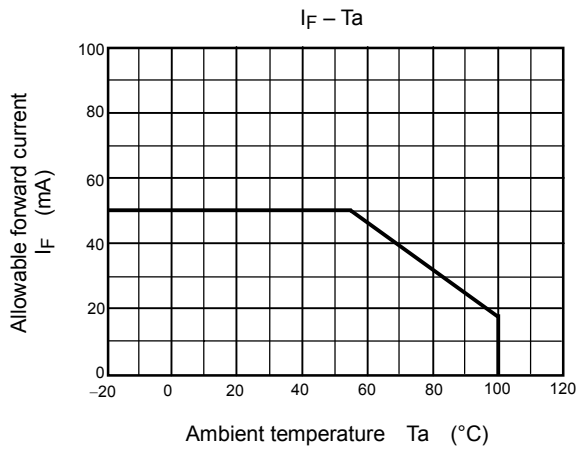
| Characteristic                | Symbol          | Test Condition                     | Min.               | Typ.             | Max. | Unit             |
|-------------------------------|-----------------|------------------------------------|--------------------|------------------|------|------------------|
| Capacitance (input to output) | C <sub>S</sub>  | V <sub>S</sub> = 0, f = 1 MHz      | —                  | 0.8              | —    | pF               |
| Isolation resistance          | R <sub>S</sub>  | V <sub>S</sub> = 500 V, R.H. ≤ 60% | 5×10 <sup>10</sup> | 10 <sup>14</sup> | —    | Ω                |
| Isolation voltage             | BV <sub>S</sub> | AC, 1 minute                       | 3750               | —                | —    | V <sub>rms</sub> |
|                               |                 | AC, 1 s, in oil                    | —                  | 10000            | —    |                  |
|                               |                 | DC, 1 minute, in oil               | —                  | 10000            | —    | V <sub>dc</sub>  |

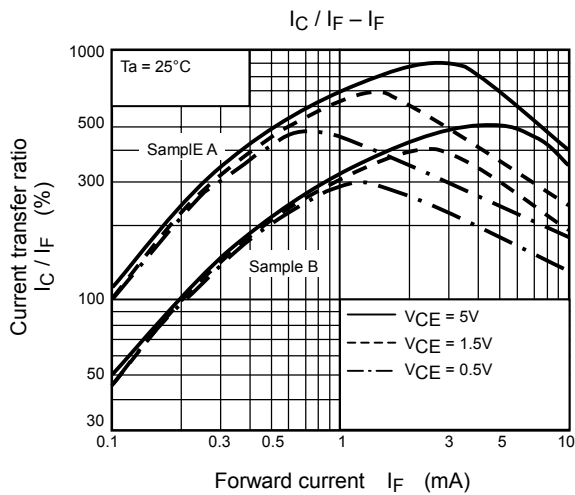
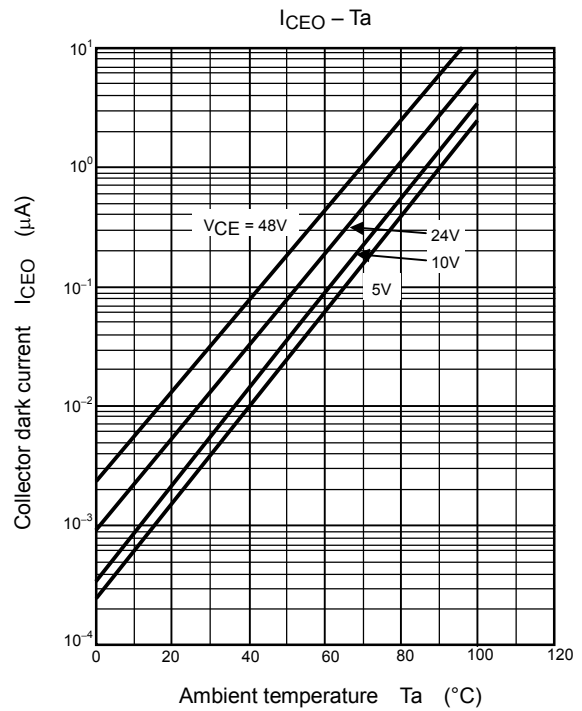
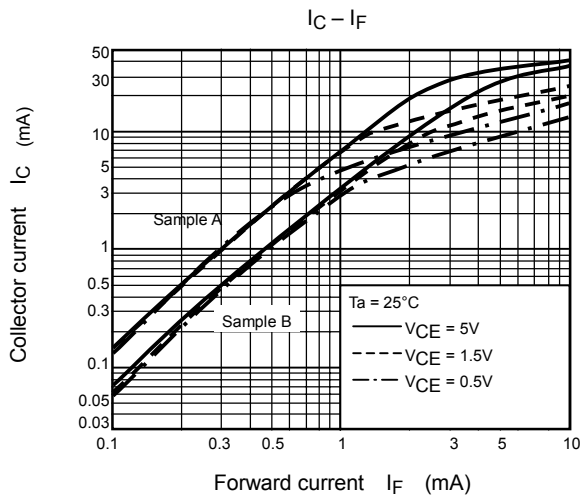
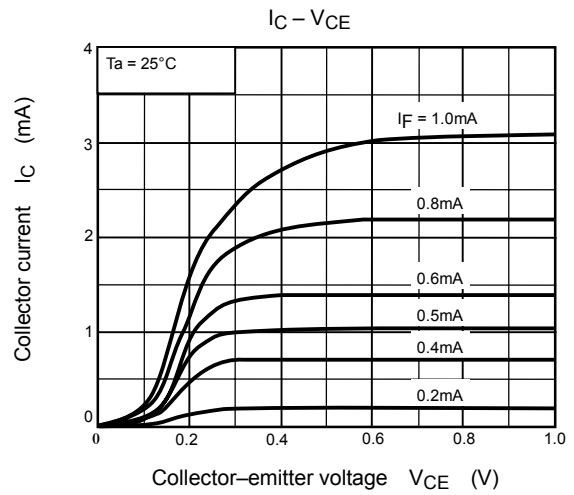
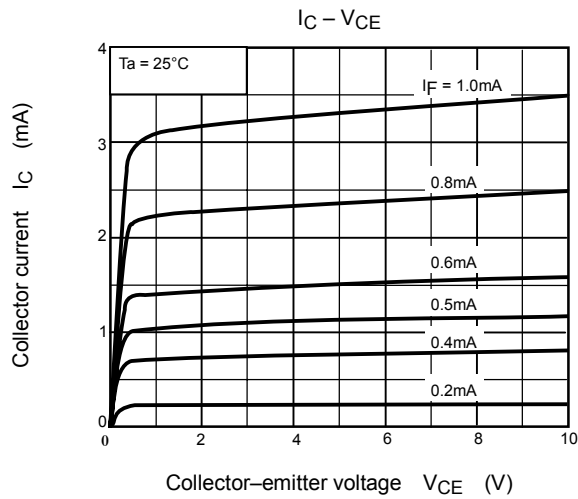
**Switching Characteristics (Ta = 25°C)**

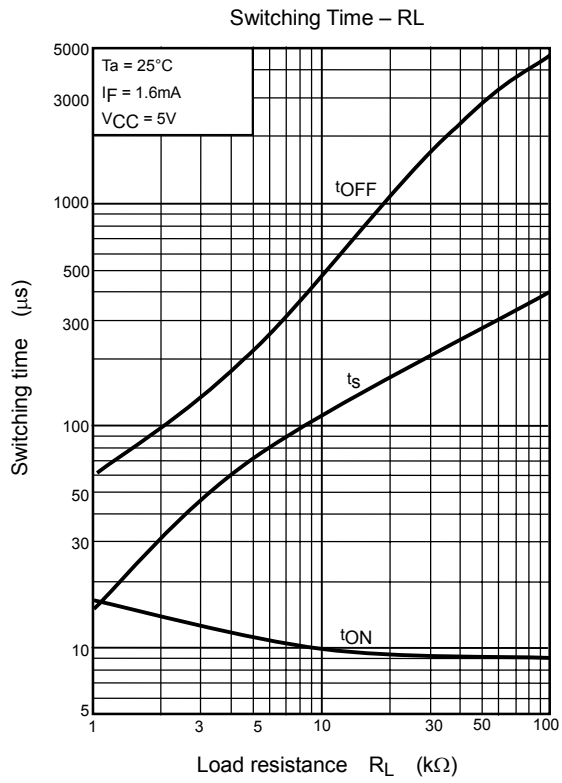
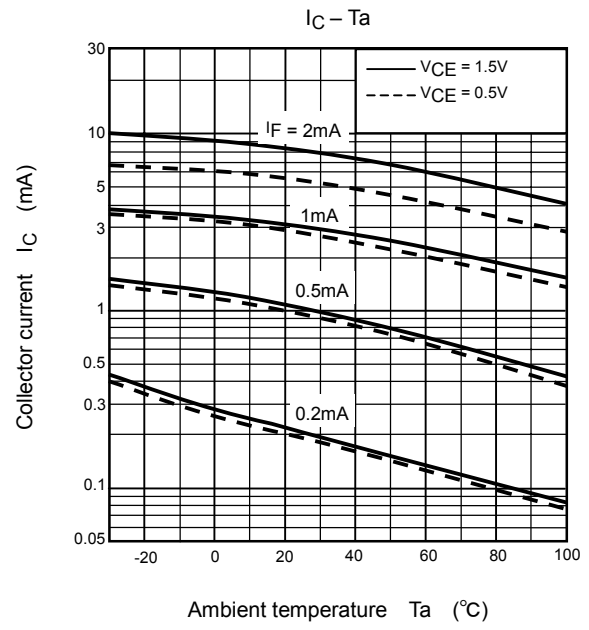
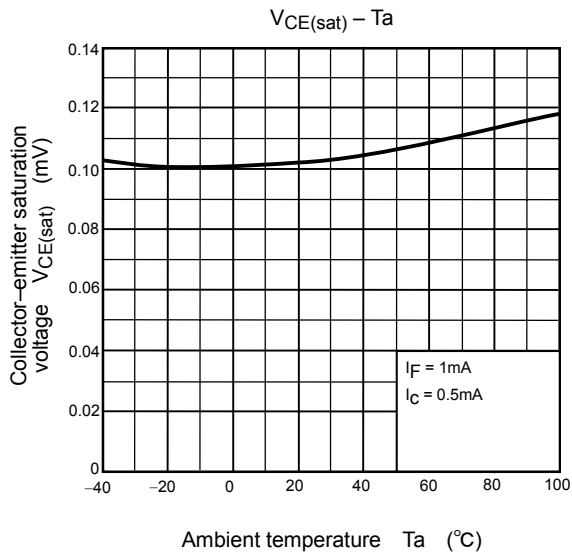
| Characteristic | Symbol           | Test Condition                                                                    | Min. | Typ. | Max. | Unit |
|----------------|------------------|-----------------------------------------------------------------------------------|------|------|------|------|
| Rise time      | t <sub>r</sub>   | V <sub>CC</sub> = 10 V, I <sub>C</sub> = 2 mA<br>R <sub>L</sub> = 100Ω            | —    | 8    | —    | μs   |
| Fall time      | t <sub>f</sub>   |                                                                                   | —    | 8    | —    |      |
| Turn-on time   | t <sub>ON</sub>  |                                                                                   | —    | 10   | —    |      |
| Turn-off time  | t <sub>OFF</sub> |                                                                                   | —    | 8    | —    |      |
| Turn-on time   | t <sub>ON</sub>  | R <sub>L</sub> = 4.7 kΩ<br>V <sub>CC</sub> = 5 V, I <sub>F</sub> = 1.6 mA (Fig.1) | —    | 10   | —    | μs   |
| Storage time   | t <sub>s</sub>   |                                                                                   | —    | 50   | —    |      |
| Turn-off time  | t <sub>OFF</sub> |                                                                                   | —    | 300  | —    |      |

Fig. 1 Switching time test circuit









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000707EBC

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