

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

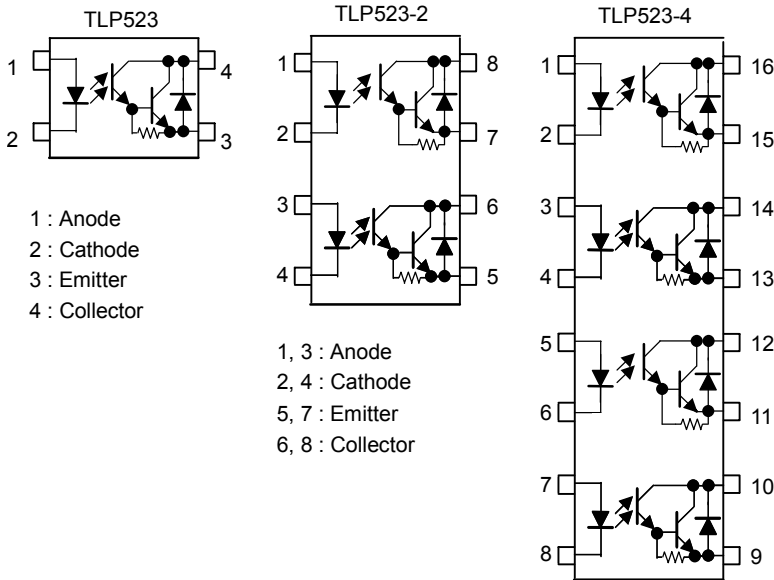
TLP523, TLP523-2, TLP523-4

Programmable Controllers
DC-Output Module
Solid State Relay

The TOSHIBA TLP523, -2 and -4 consists of a gallium arsenide infrared emitting diode coupled with a silicon, darlington connected, phototransistor which has an integral base-emitter resistor to optimize switching speed and elevated temperature characteristics. The TLP523-2 offers two isolated channels in a eight lead plastic DIP package, while the TLP523-4 provide four isolated channels per package.

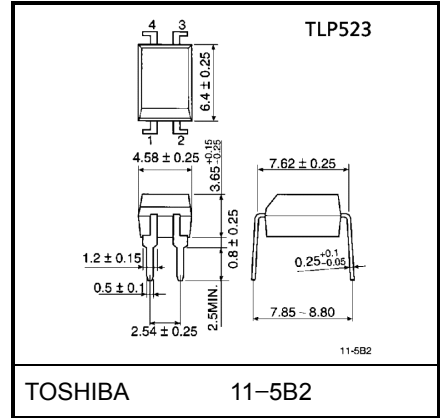
- Current transfer ratio: 500% (min.) ($I_F = 1 \text{ mA}$)
- Isolation voltage: 2500 Vrms (min.)
- Collector-emitter voltage: 55 V (min.)
- Leakage current: 10 μA (max.) ($T_a = 85^\circ\text{C}$)
- UL recognized: UL1577, file no. E67349

Pin Configurations (top view)



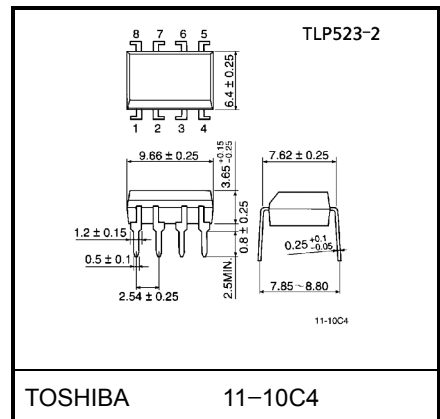
1, 3, 5, 7 : Anode
2, 4, 6, 8 : Cathode
9, 11, 13, 15 : Emitter
10, 12, 14, 16: Collector

Unit in mm



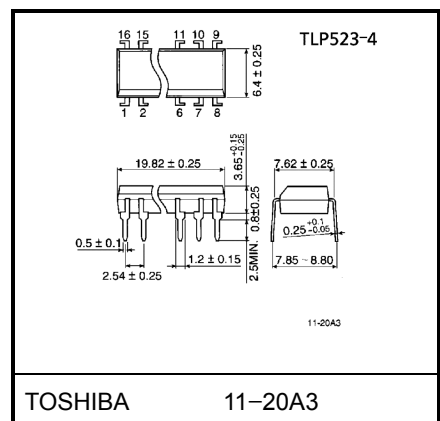
TOSHIBA 11-5B2

Weight: 0.26 g



TOSHIBA 11-10C4

Weight: 0.54 g



TOSHIBA 11-20A3

Weight: 1.1 g

Maximum Ratings (Ta = 25°C)

| Characteristic | Symbol | Rating | | Unit | |
|--|--|-----------------------------|-------------------------|------------------|--------|
| | | TLP523 | TLP523-2 TLP523-4 | | |
| LED | Forward current | I _F | 60 | 50 | mA |
| | Forward current derating | ΔI _F /°C | -0.7 (Ta ≥ 39°C) | -0.5 (Ta ≥ 25°C) | mA /°C |
| | Pulse forward current | I _{FP} | 1 (100μs pulse, 100pps) | | A |
| | Reverse voltage | V _R | 5 | | V |
| Detector | Collector-emitter voltage | V _{CEO} | 55 | | V |
| | Emitter-collector voltage | V _{ECO} | 0.3 | | V |
| | Collector current | I _C | 150 | | mA |
| | Collector power dissipation (1 circuit) | P _C | 150 | 100 | mW |
| | Collector power dissipation derating (1 circuit (Ta ≥ 25°C)) | ΔP _C /°C | -1.5 | -1.0 | mW /°C |
| Operating temperature range | T _{opr} | -55~100 | | °C | |
| Storage temperature range | T _{stg} | -55~125 | | °C | |
| Lead soldering temperature (10 s) | T _{sol} | 260 | | °C | |
| Total power dissipation | P _T | 250 | 150 | mW | |
| Total power dissipation derating (Ta ≥ 25°C) | ΔP _T /°C | -2.5 | -1.5 | mW /°C | |
| Isolation voltage (Note 1) | BV _S | 2500 (AC, 1min., R.H.≤ 60%) | | V _{rms} | |

(Note 1) Device considered a two terminal device: LED side pins shorted together and detector side pins shorted together.

Recommended Operating Conditions

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|-----------------------------|------------------|------|------|------|------|
| Supply voltage | V _{CC} | — | 5 | 24 | V |
| Forward current | I _F | — | 16 | 20 | mA |
| Operating temperature range | T _{opr} | -25 | — | 85 | °C |

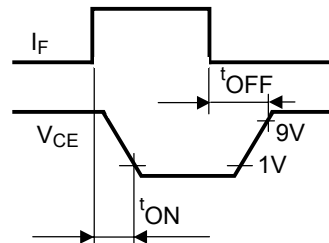
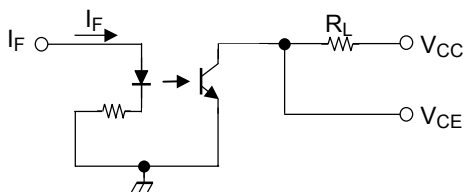
Electrical Characteristics (Ta = 25°C)

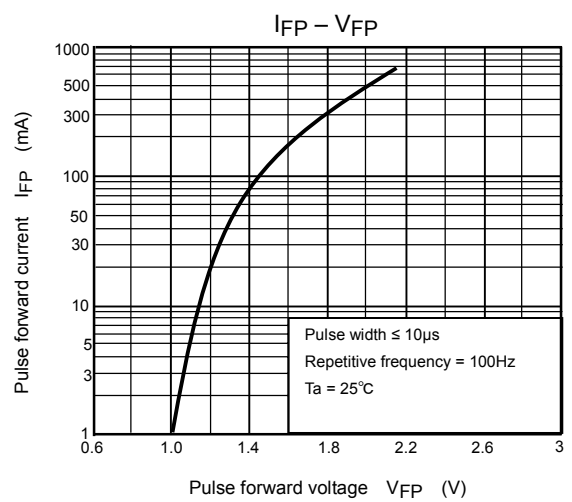
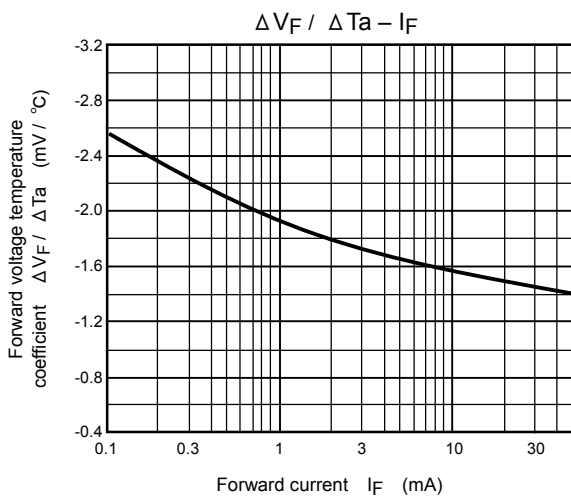
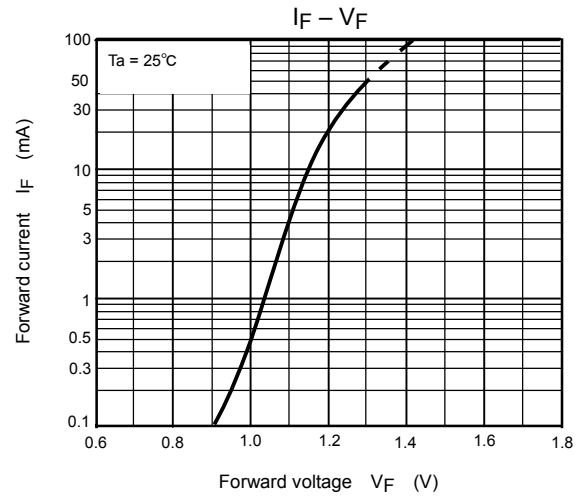
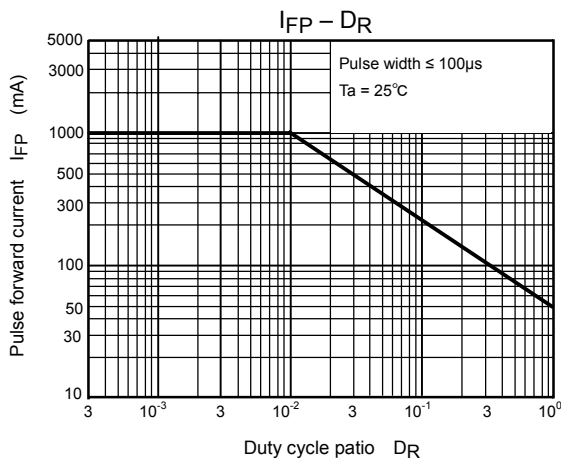
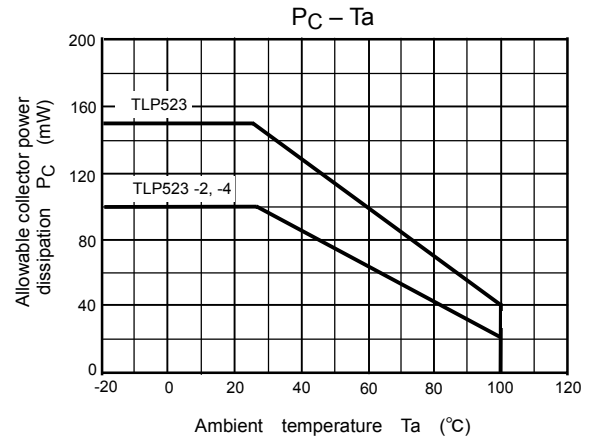
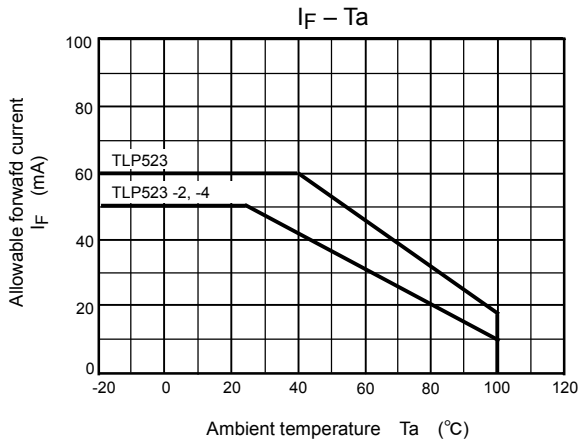
| Characteristic | | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|----------------------------------|--------------------------------------|----------------------------|---|--------------------|-----------|------|---------------|
| LED | Forward voltage | V_F | $I_F = 10 \text{ mA}$ | 1.0 | 1.15 | 1.3 | V |
| | Reverse current | I_R | $V_R = 5 \text{ V}$ | — | — | 10 | μA |
| | Capacitance | C_T | $V = 0, f = 1 \text{ MHz}$ | — | 30 | — | pF |
| Detector | Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C = 1 \text{ mA}$ | 55 | — | — | V |
| | Collector dark current | I_{CEO} | $V_{CE} = 24 \text{ V}$ | — | 10 | 200 | nA |
| | | | $V_{CE} = 24 \text{ V}, T_a = 85^\circ\text{C}$ | — | 0.5 | 10 | μA |
| Capacitance collector to emitter | C_{CE} | $V = 0, f = 1 \text{ MHz}$ | — | 10 | — | pF | |
| Coupled | Current transfer ratio | I_C / I_F | $I_F = 1 \text{ mA}, V_{CE} = 1 \text{ V}$ | 500 | 2000 | — | % |
| | Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 50 \text{ mA}, I_F = 10 \text{ mA}$ | — | — | 1 | V |
| | Capacitance input to output | C_S | $V_S = 0, f = 1 \text{ MHz}$ | — | 0.8 | — | pF |
| | Isolation resistance | R_S | $V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$ | 5×10^{10} | 10^{14} | — | Ω |

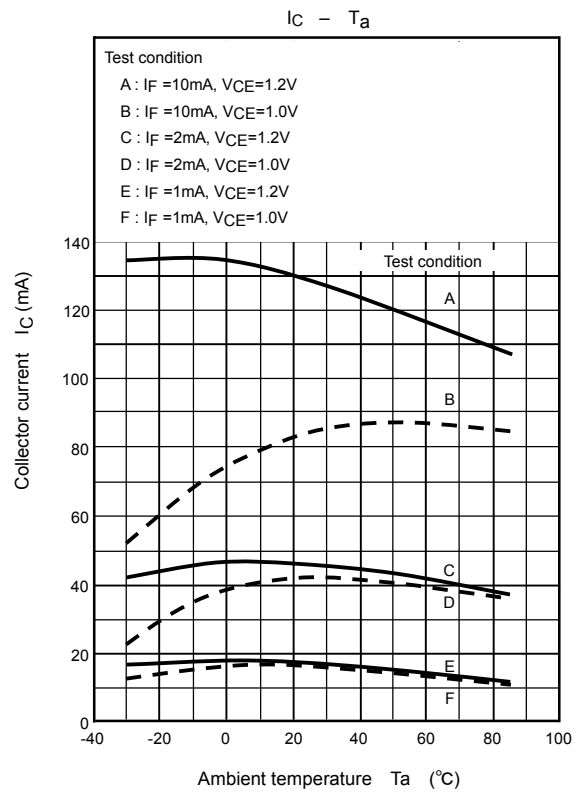
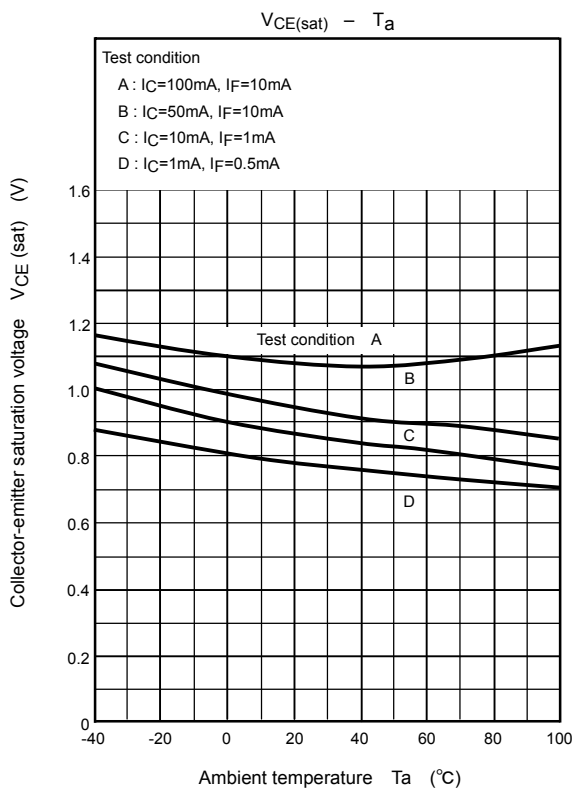
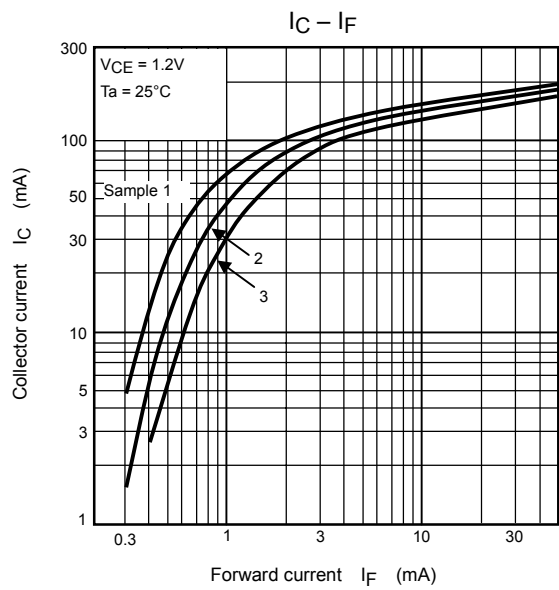
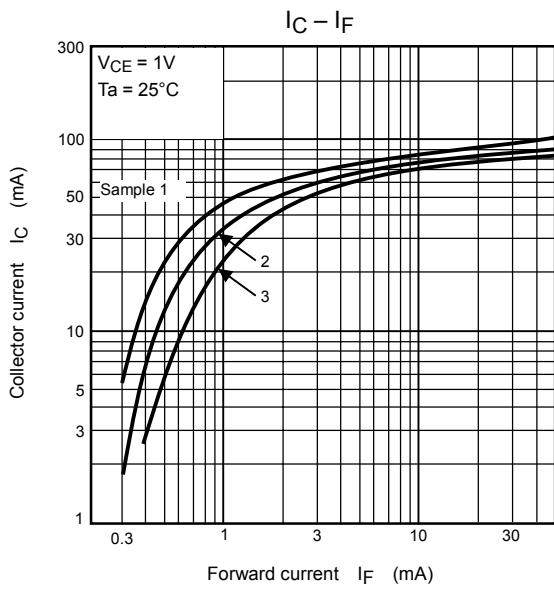
Switching Characteristics (Ta = 25°C)

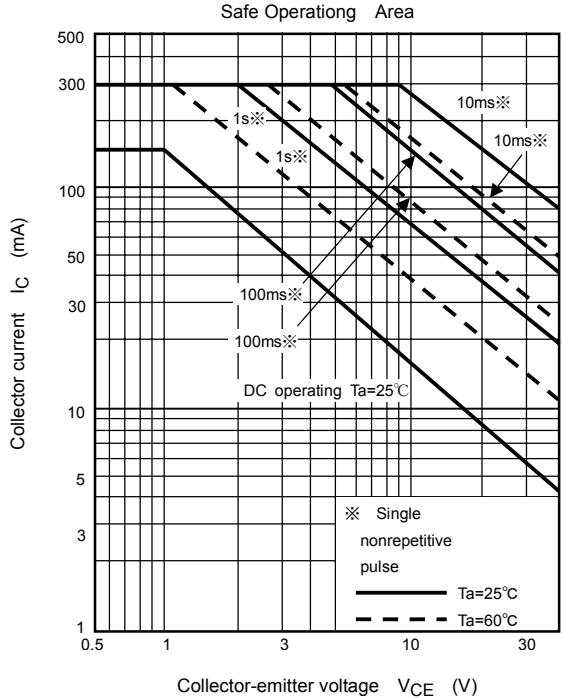
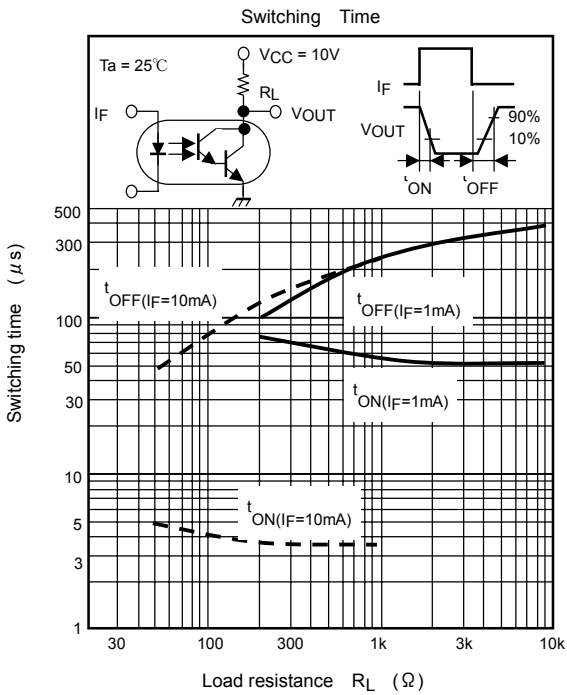
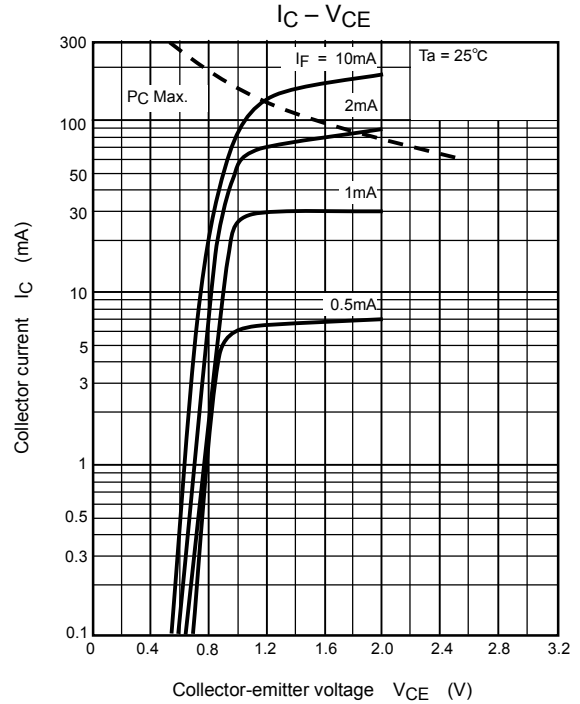
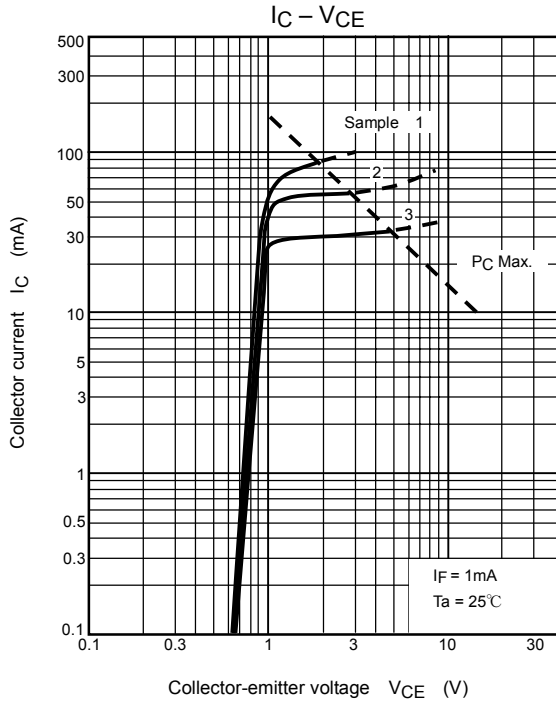
| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|----------------|-----------|---|------|------|------|---------------|
| Turn-on time | t_{ON} | $V_{CC} = 10 \text{ V}, R_L = 180 \Omega$ | — | 3 | — | μs |
| Turn-off time | t_{OFF} | $I_F = 16 \text{ mA}$ | — | 80 | — | μs |

Switching Time Test Circuit









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000707EAA

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