



STD93003

HIGH VOLTAGE FAST-SWITCHING PNP POWER TRANSISTOR

- REVERSE PINS OUT Vs STANDARD IPAK (TO-251) / DPAK (TO-252) PACKAGES
- MEDIUM VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- SURFACE-MOUNTING DPAK (TO-252) POWER PACKAGE IN TAPE & REEL (Suffix "T4")
- THROUGH-HOLE IPAK (TO-251) POWER PACKAGE IN TUBE (Suffix "-1")

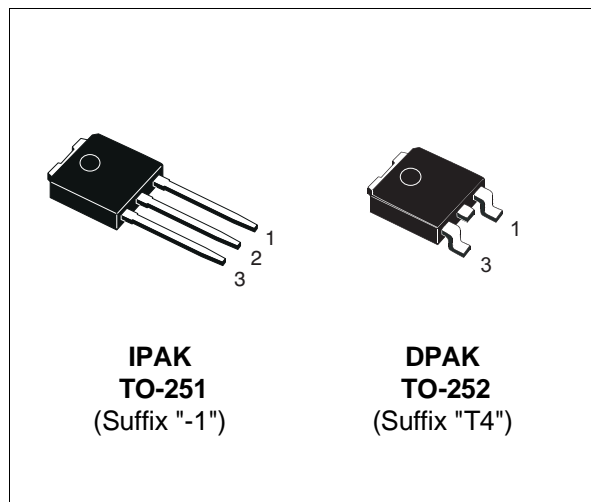
APPLICATIONS:

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING

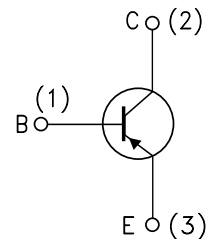
DESCRIPTION

The device is manufactured using high voltage Multi-Epitaxial Planar technology for high switching speeds and medium voltage capability. It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA.

The STD93003 is expressly designed for a new solution to be used in compact fluorescent lamps, where it is coupled with the STD83003, its complementary NPN transistor.



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------|--|---------------|------------|
| V_{CES} | Collector-Emitter Voltage ($V_{BE} = 0$) | -500 | V |
| V_{CEO} | Collector-Emitter Voltage ($I_B = 0$) | -400 | V |
| V_{EBO} | Emitter-Base Voltage ($I_C = 0$, $I_B = -0.75$ A, $t_p < 10\mu s$, $T_j < 150^\circ C$) | $V_{(BR)EBO}$ | V |
| I_C | Collector Current | -1.5 | A |
| I_{CM} | Collector Peak Current ($t_p < 5$ ms) | -3 | A |
| I_B | Base Current | -0.75 | A |
| I_{BM} | Base Peak Current ($t_p < 5$ ms) | -1.5 | A |
| P_{tot} | Total Dissipation at $T_c = 25^\circ C$ | 20 | W |
| T_{stg} | Storage Temperature | -65 to 150 | $^\circ C$ |
| T_j | Max. Operating Junction Temperature | 150 | $^\circ C$ |

THERMAL DATA

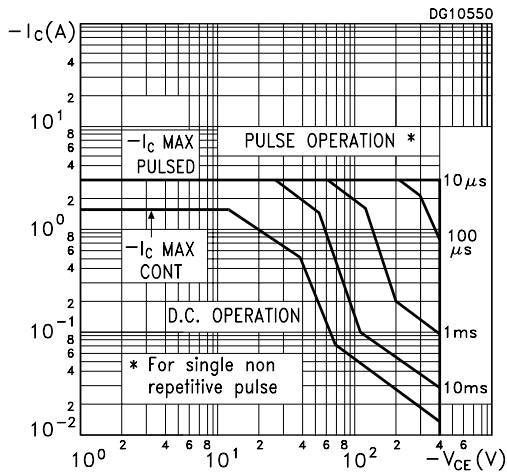
| | | | | |
|-----------------------|-------------------------------------|-----|------|------|
| R _{thj-case} | Thermal Resistance Junction-case | Max | 6.25 | °C/W |
| R _{thj-amb} | Thermal Resistance Junction-ambient | Max | 100 | °C/W |

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

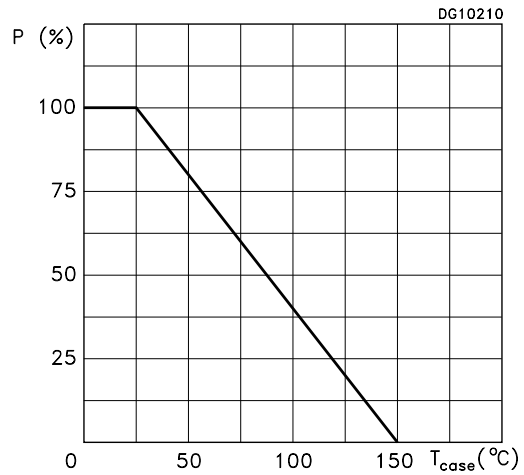
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit | |
|--|---|---|--|---------------|------------------|----------------|--|
| I _{CES} | Collector Cut-off Current (V _{BE} = 0) | V _{CE} = -500V V _{CE} = -500V T _j = 125°C | | | -1 -5 | mA mA | |
| V _{(BR)EBO} | Emitter Base Breakdown Voltage (I _C = 0) | I _E = -10 mA | -5 | | -10 | V | |
| V _{CEO(sus)*} | Collector-Emitter Sustaining Voltage (I _B = 0) | I _C = -10 mA L = 25 mH | -400 | | | V | |
| V _{CE(sat)*} | Collector-Emitter Saturation Voltage | I _C = -0.5 A I _C = -0.35 A | | | -0.5 -0.5 | V V | |
| V _{BE(sat)*} | Base-Emitter Saturation Voltage | I _C = -0.5 A I _B = -0.1 A | | | -1 | V | |
| h _{FE} * | DC Current Gain | I _C = -10 mA I _C = -0.35 A I _C = -1 A | V _{CE} = -5 V V _{CE} = -5 V V _{CE} = -5 V | 10 16 4 | 25 | 32 | |
| t _r t _s t _f | RESISTIVE LOAD Rise Time Storage Time Fall Time | I _C = -0.35 A I _{B1} = -70 mA T _p ≥ 25 μs | V _{CC} = 125 V I _{B2} = 70 mA (see Figure 2) | 1.5 | 90 2.2 0.1 | ns μs μs | |
| t _s t _f | INDUCTIVE LOAD Storage Time Fall Time | I _C = -0.5 A V _{BE(off)} = 5 V V _{clamp} = 300 V | I _{B1} = -0.1 A L = 10 mH (see Figure 1) | | 400 40 | ns ns | |
| E _{sb} | Avalanche Energy | L = 4 mH I _{BR} ≤ 2.5 A | C = 1.8 nF 25°C < T _C < 125°C | 12 | | mJ | |

* Pulsed: Pulse duration = 300μs, duty cycle = 1.5 %.

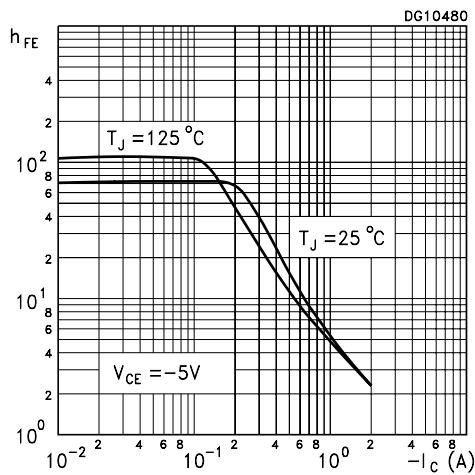
Safe Operating Area



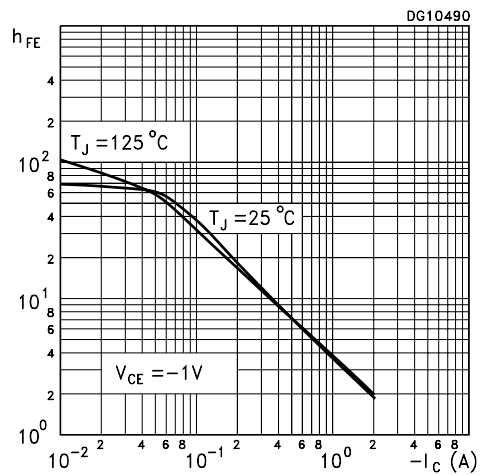
Derating Curve



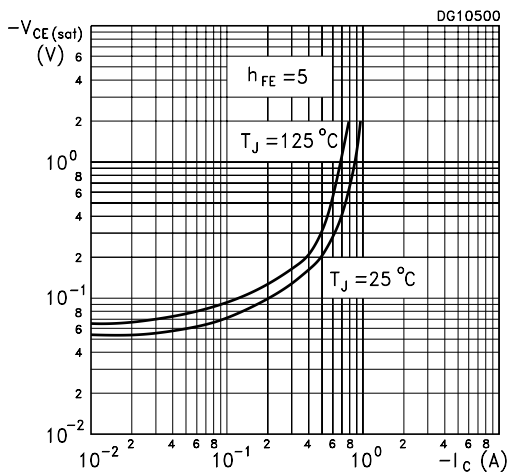
DC Current Gain



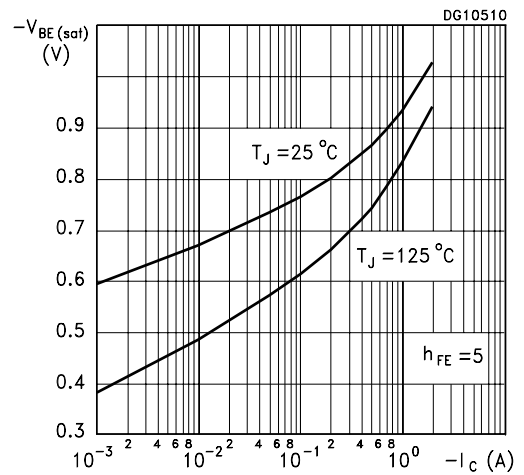
DC Current Gain



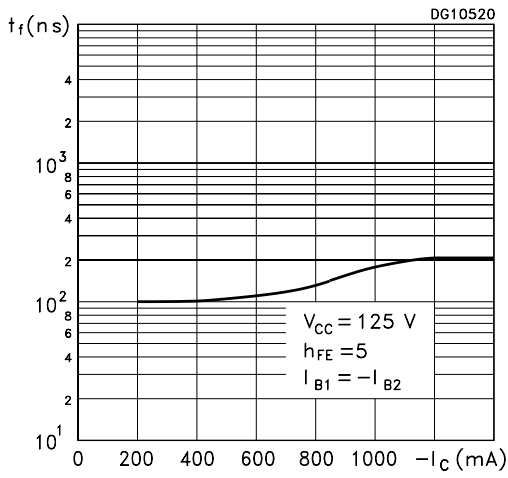
Collector Emitter Saturation Voltage



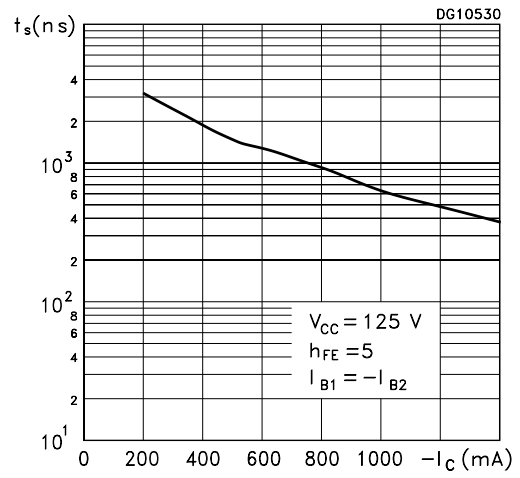
Base Emitter Saturation Voltage



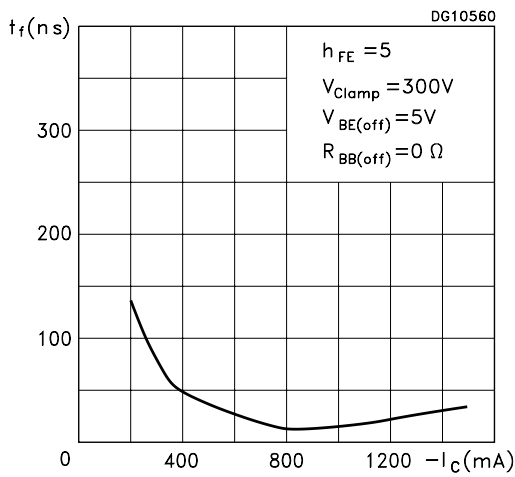
Resistive Fall Time



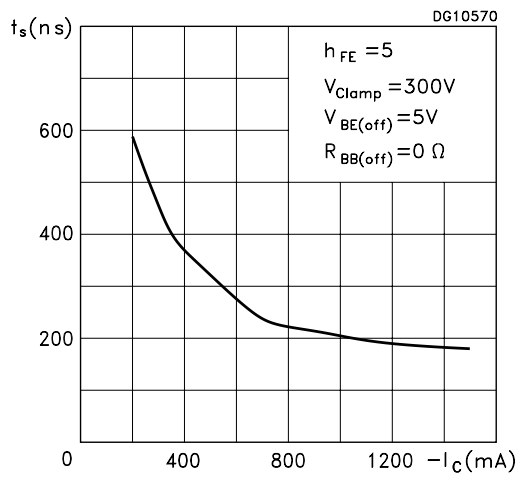
Resistive Storage Time



Inductive Fall Time



Inductive Storage Time



Reverse Biased SOA

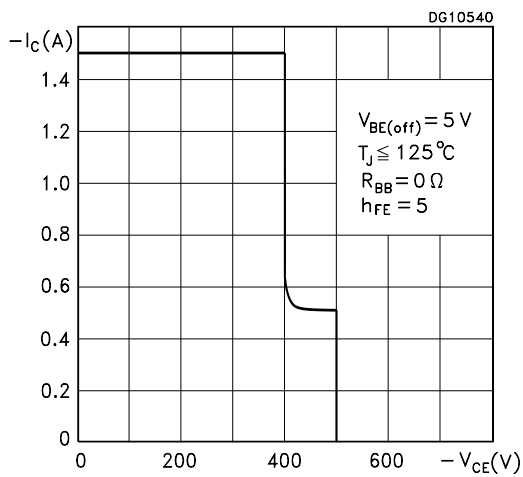


Figure 1: Inductive Load Switching Test Circuit.

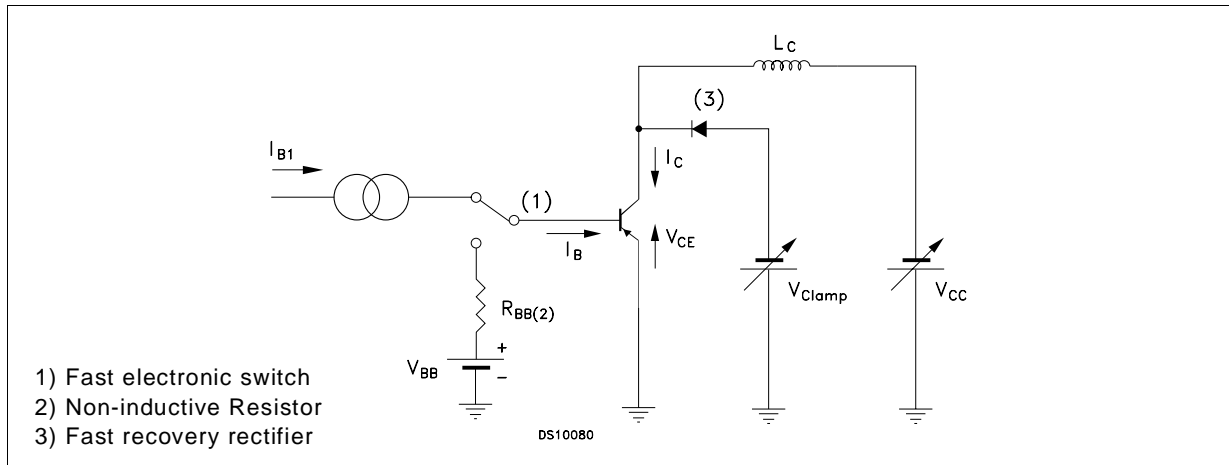
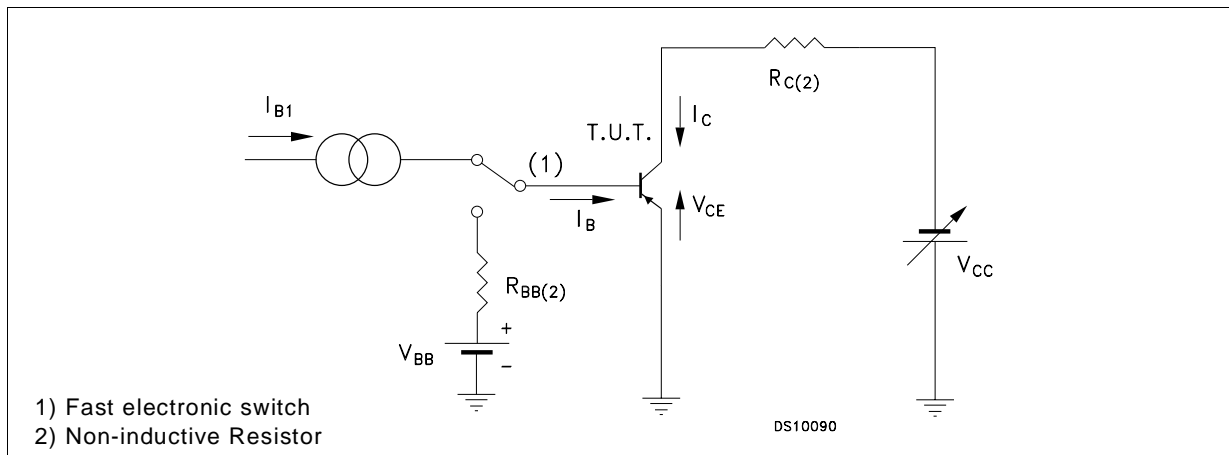
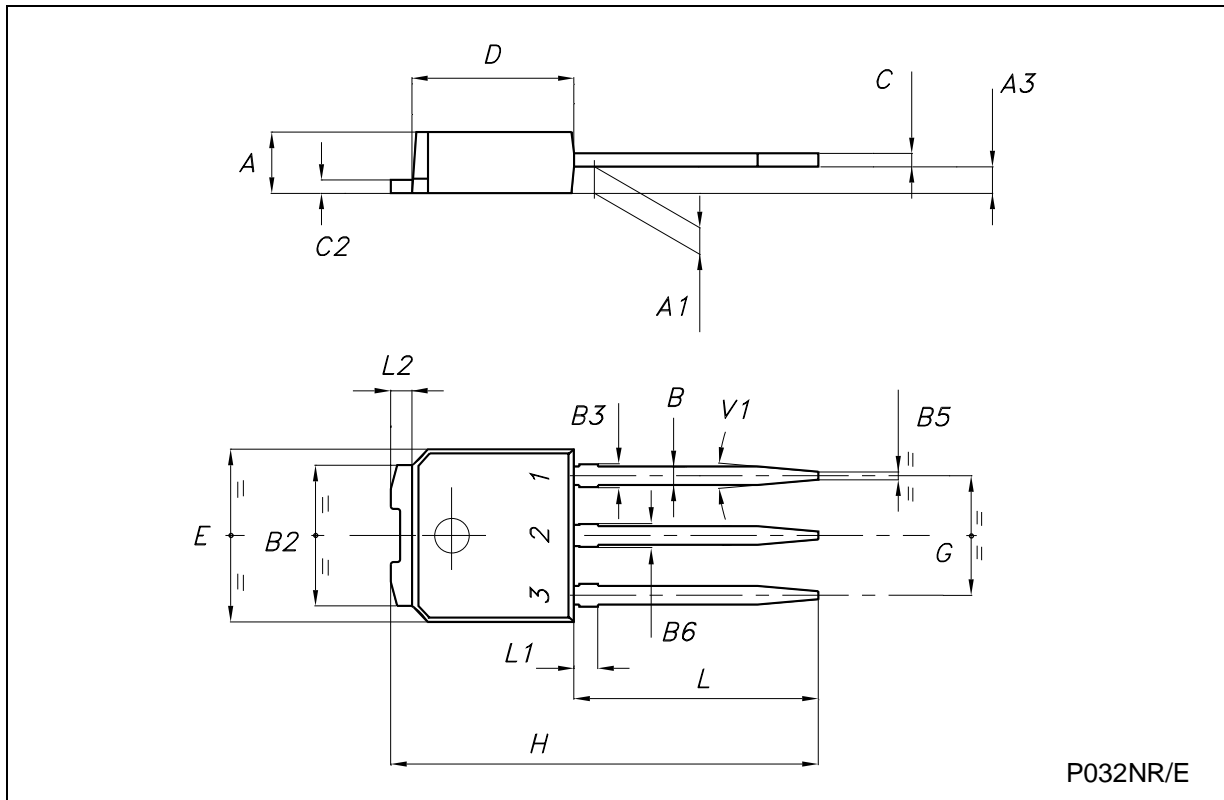


Figure 2: Resistive Load Switching Test Circuit.



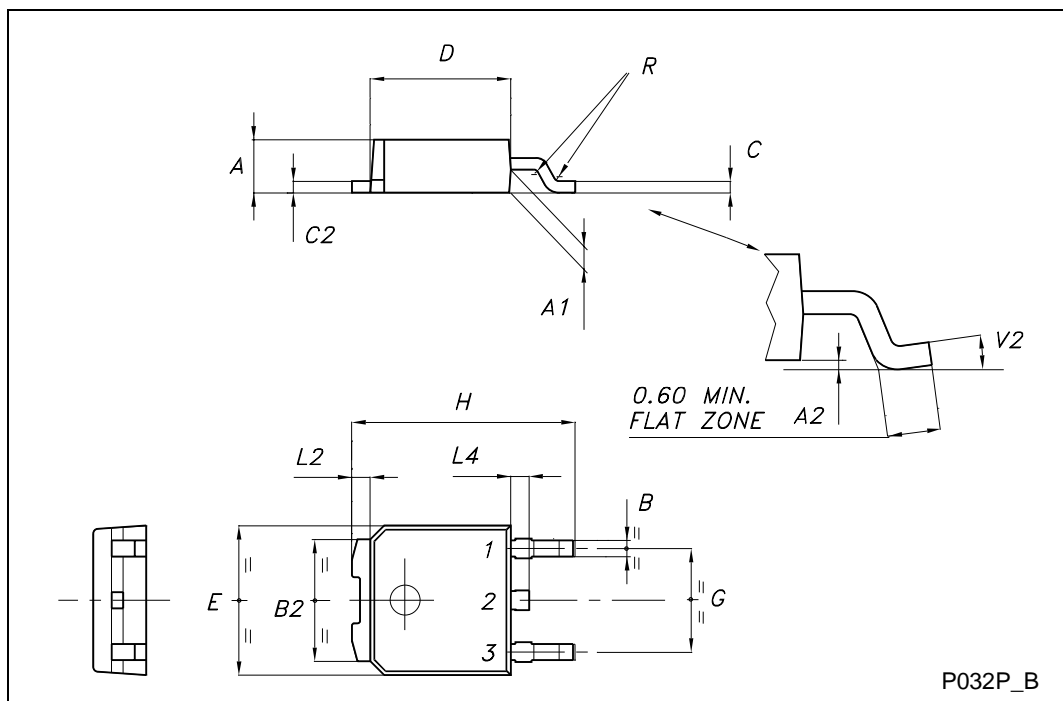
TO-251 (IPAK) MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|-------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 2.20 | | 2.40 | 0.087 | | 0.094 |
| A1 | 0.90 | | 1.10 | 0.035 | | 0.043 |
| A3 | 0.70 | | 1.30 | 0.028 | | 0.051 |
| B | 0.64 | | 0.90 | 0.025 | | 0.035 |
| B2 | 5.20 | | 5.40 | 0.204 | | 0.213 |
| B3 | | | 0.85 | | | 0.033 |
| B5 | | 0.30 | | | 0.012 | |
| B6 | | | 0.95 | | | 0.037 |
| C | 0.45 | | 0.60 | 0.018 | | 0.024 |
| C2 | 0.48 | | 0.60 | 0.019 | | 0.024 |
| D | 6.00 | | 6.20 | 0.237 | | 0.244 |
| E | 6.40 | | 6.60 | 0.252 | | 0.260 |
| G | 4.40 | | 4.60 | 0.173 | | 0.181 |
| H | 15.90 | | 16.30 | 0.626 | | 0.642 |
| L | 9.00 | | 9.40 | 0.354 | | 0.370 |
| L1 | 0.80 | | 1.20 | 0.031 | | 0.047 |
| L2 | | 0.80 | 1.00 | | 0.031 | 0.039 |
| V1 | | 10° | | | 10° | |



TO-252 (DPAK) MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 2.20 | | 2.40 | 0.087 | | 0.094 |
| A1 | 0.90 | | 1.10 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.64 | | 0.90 | 0.025 | | 0.035 |
| B2 | 5.20 | | 5.40 | 0.204 | | 0.213 |
| C | 0.45 | | 0.60 | 0.018 | | 0.024 |
| C2 | 0.48 | | 0.60 | 0.019 | | 0.024 |
| D | 6.00 | | 6.20 | 0.236 | | 0.244 |
| E | 6.40 | | 6.60 | 0.252 | | 0.260 |
| G | 4.40 | | 4.60 | 0.173 | | 0.181 |
| H | 9.35 | | 10.10 | 0.368 | | 0.398 |
| L2 | | 0.8 | | | 0.031 | |
| L4 | 0.60 | | 1.00 | 0.024 | | 0.039 |
| V2 | 0° | | 8° | 0° | | 0° |



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