



BUL312FP

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

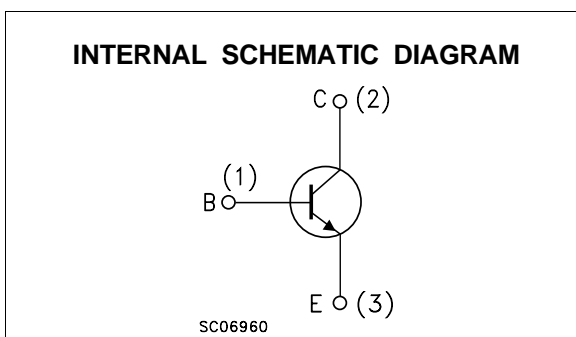
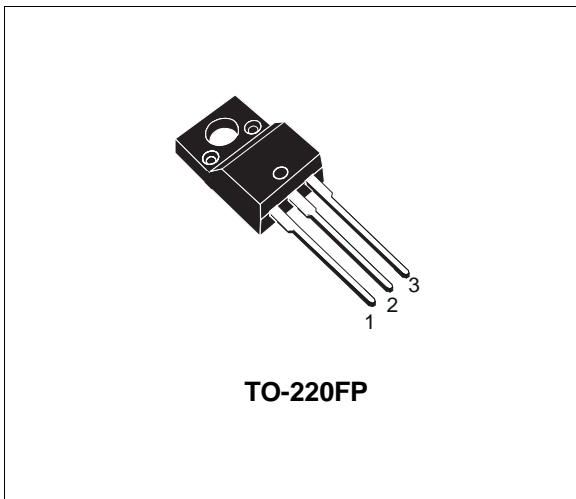
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERIZED AT 125°C
- LARGE RBSOA
- FULLY INSULATED PACKAGE (U.L. COMPLIANT) FOR EASY MOUNTING

APPLICATIONS

- HORIZONTAL DEFLECTION FOR TV
- SMPS
- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING

DESCRIPTION

The BUL312FP is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capability. It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA.



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|------------|--|------------|------|
| V_{CES} | Collector-Emitter Voltage ($V_{BE} = 0$) | 1150 | V |
| V_{CEO} | Collector-Emitter Voltage ($I_B = 0$) | 500 | V |
| V_{EBO} | Emitter-Base Voltage ($I_C = 0$) | 9 | V |
| I_C | Collector Current | 5 | A |
| I_{CM} | Collector Peak Current ($t_p < 5$ ms) | 10 | A |
| I_B | Base Current | 3 | A |
| I_{BM} | Base Peak Current ($t_p < 5$ ms) | 4 | A |
| P_{tot} | Total Dissipation at $T_c = 25$ °C | 36 | W |
| V_{isol} | Insulation Withstand Voltage (RMS) from All Three Leads to External Heatsink | 1500 | V |
| T_{stg} | Storage Temperature | -65 to 150 | °C |
| T_j | Max. Operating Junction Temperature | 150 | °C |

THERMAL DATA

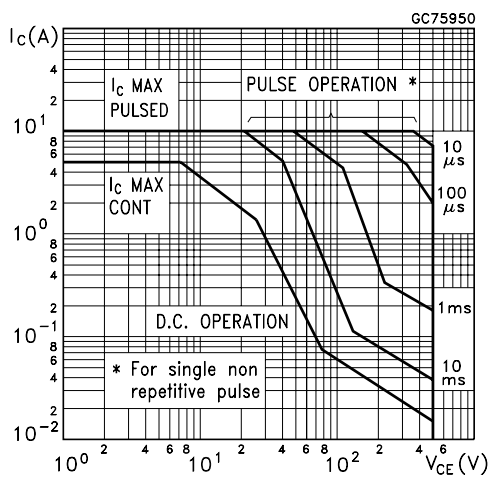
| | | | | |
|----------------|-------------------------------------|-----|------|---------------|
| $R_{thj-case}$ | Thermal Resistance Junction-Case | Max | 3.5 | $^{\circ}C/W$ |
| $R_{thj-amb}$ | Thermal Resistance Junction-Ambient | Max | 62.5 | $^{\circ}C/W$ |

ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}C$ unless otherwise specified)

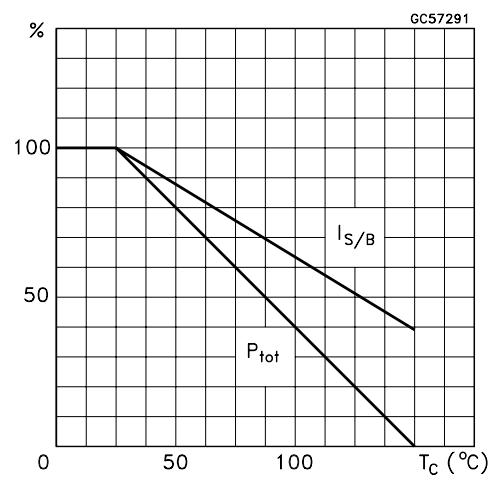
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|--------|------------|-------------------|---------------|
| I_{CES} | Collector Cut-off Current ($V_{BE} = 0$) | $V_{CE} = 1150 V$ $V_{CE} = 1150 V \quad T_j = 125^{\circ}C$ | | | 1 2 | mA mA |
| I_{CEO} | Collector Cut-off Current ($I_B = 0$) | $V_{CE} = 500 V$ | | | 250 | μA |
| $V_{CEO(sus)*}$ | Collector-Emitter Sustaining Voltage ($I_B = 0$) | $I_C = 100 mA \quad L = 25 mH$ | 500 | | | V |
| V_{EBO} | Emitter-Base Voltage ($I_C = 0$) | $I_E = 10 mA$ | 10 | | | V |
| $V_{CE(sat)*}$ | Collector-Emitter Saturation Voltage | $I_C = 1 A \quad I_B = 0.2 A$ $I_C = 2 A \quad I_B = 0.4 A$ $I_C = 3 A \quad I_B = 0.6 A$ | | | 0.5 0.7 1.1 | V V V |
| $V_{BE(sat)*}$ | Base-Emitter Saturation Voltage | $I_C = 1 A \quad I_B = 0.2 A$ $I_C = 2 A \quad I_B = 0.4 A$ $I_C = 3 A \quad I_B = 0.6 A$ | | | 1 1.1 1.2 | V V V |
| h_{FE*} | DC Current Gain | $I_C = 10 mA \quad V_{CE} = 5 V$ $I_C = 3 A \quad V_{CE} = 2.5 V$ | 8 8 | | 13.5 | |
| t_s t_f | INDUCTIVE LOAD Storage Time Fall Time | $I_C = 2 A \quad I_{B1} = 0.4 A$ $V_{BE(off)} = -5 V \quad R_{BB} = 0 \Omega$ $V_{CL} = 250 V \quad L = 200 \mu H$ (see fig. 1) | | 1.2 80 | 1.9 160 | μs ns |
| t_s t_f | INDUCTIVE LOAD Storage Time Fall Time | $I_C = 2 A \quad I_{B1} = 0.4 A$ $V_{BE(off)} = -5 V \quad R_{BB} = 0 \Omega$ $V_{CL} = 250 V \quad L = 200 \mu H$ $T_j = 125^{\circ}C$ (see fig. 1) | | 1.8 150 | | μs ns |

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

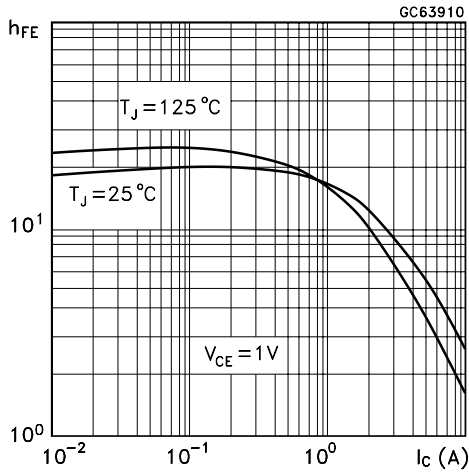
Safe Operating Areas



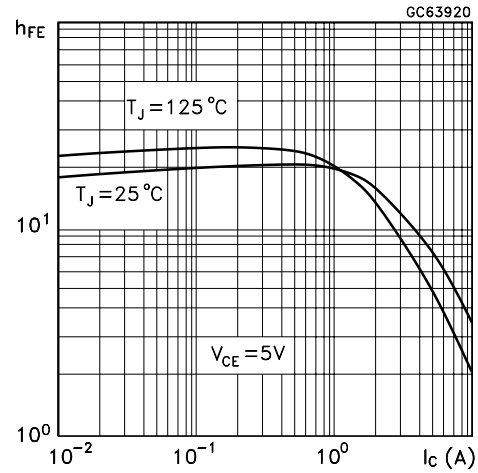
Derating Curve



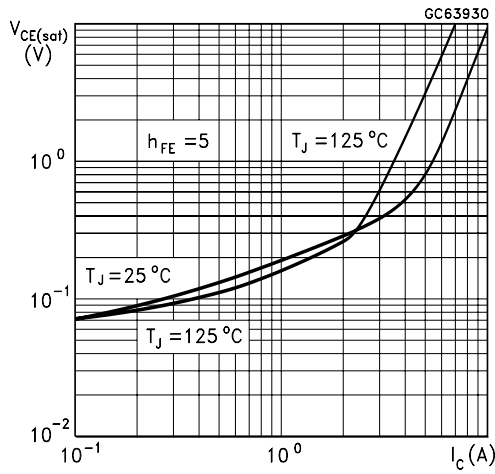
DC Current Gain



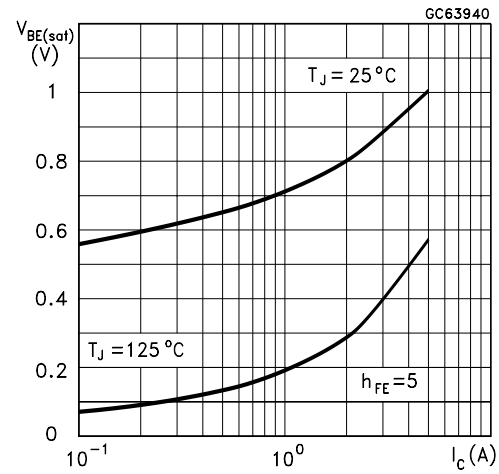
DC Current Gain



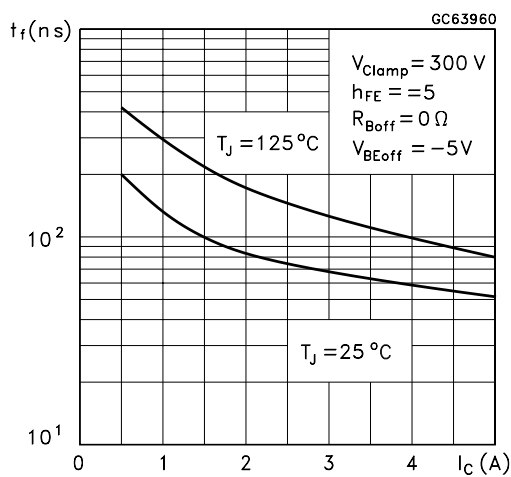
Collector Emitter Saturation Voltage



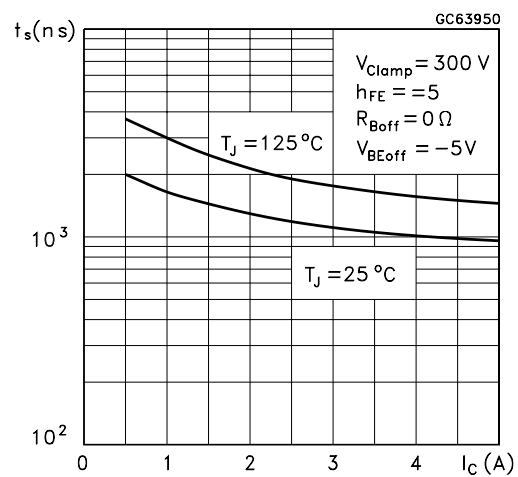
Base Emitter Saturation Voltage



Inductive Fall Time



Inductive Storage Time



Reverse Biased SOA

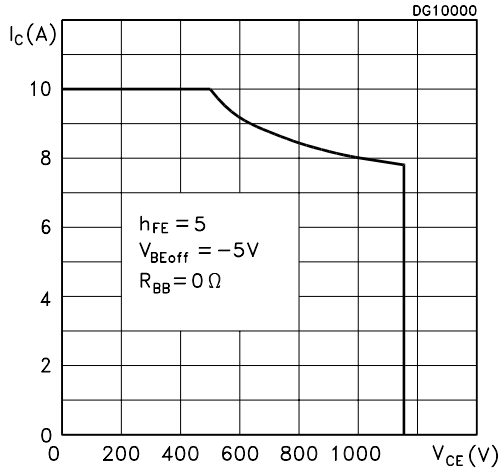
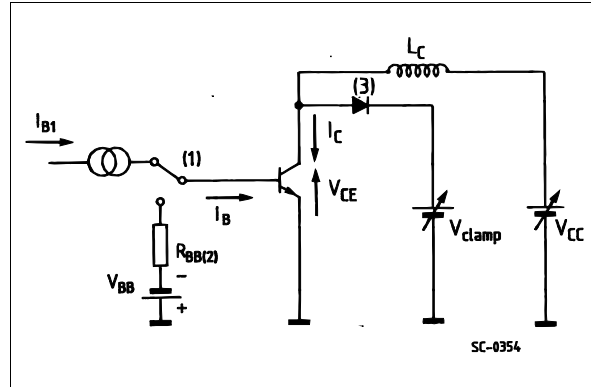


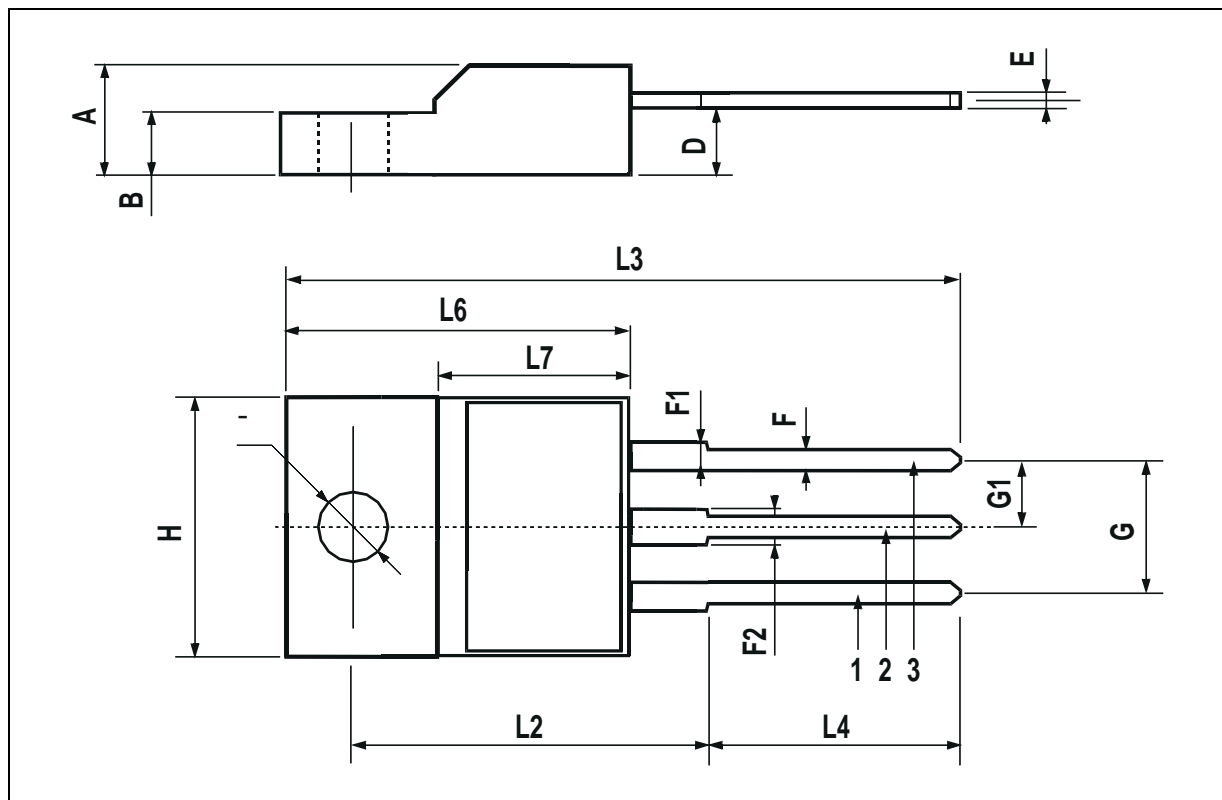
Figure 1: Inductive Load Switching Test Circuit



- (1) Fast electronic switch
- (2) Non-inductive Resistor
- (3) Fast recovery rectifier

TO-220FP MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.4 | | 4.6 | 0.173 | | 0.181 |
| B | 2.5 | | 2.7 | 0.098 | | 0.106 |
| D | 2.5 | | 2.75 | 0.098 | | 0.108 |
| E | 0.45 | | 0.7 | 0.017 | | 0.027 |
| F | 0.75 | | 1 | 0.030 | | 0.039 |
| F1 | 1.15 | | 1.7 | 0.045 | | 0.067 |
| F2 | 1.15 | | 1.7 | 0.045 | | 0.067 |
| G | 4.95 | | 5.2 | 0.195 | | 0.204 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H | 10 | | 10.4 | 0.393 | | 0.409 |
| L2 | | 16 | | | 0.630 | |
| L3 | 28.6 | | 30.6 | 1.126 | | 1.204 |
| L4 | 9.8 | | 10.6 | 0.385 | | 0.417 |
| L6 | 15.9 | | 16.4 | 0.626 | | 0.645 |
| L7 | 9 | | 9.3 | 0.354 | | 0.366 |
| Ø | 3 | | 3.2 | 0.118 | | 0.126 |



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