



BUH1215

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- STMicroelectronics PREFERRED SALESTYPE
- HIGH VOLTAGE CAPABILITY
- VERY HIGH SWITCHING SPEED

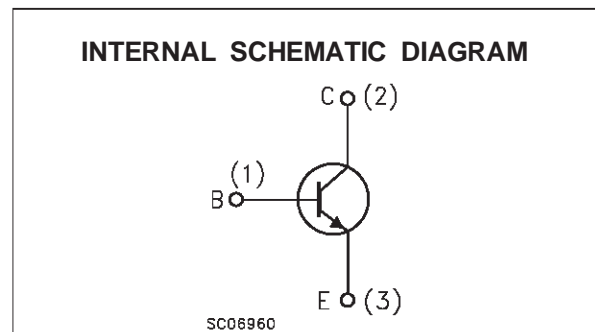
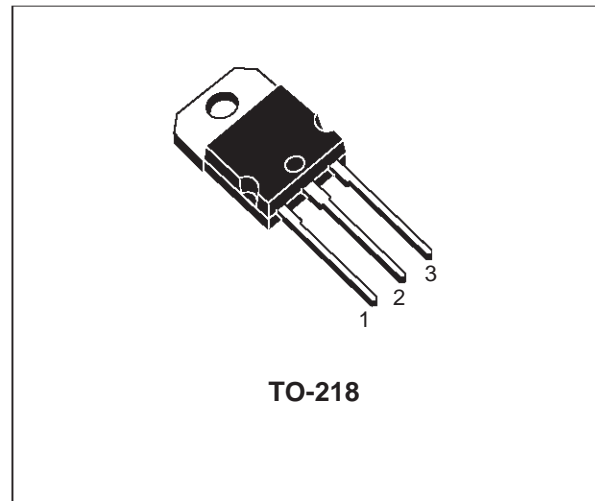
APPLICATIONS:

- HORIZONTAL DEFLECTION FOR COLOUR TV AND MONITORS

DESCRIPTION

The BUH1215 is manufactured using Multi-epitaxial Mesa technology for cost-effective high performance and uses a Hollow Emitter structure to enhance switching speeds.

The BUH series is designed for use in horizontal deflection circuits in televisions and monitors.



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------|---|------------|------|
| V_{CBO} | Collector-Base Voltage ($I_E = 0$) | 1500 | V |
| V_{CEO} | Collector-Emitter Voltage ($I_B = 0$) | 700 | V |
| V_{EBO} | Emitter-Base Voltage ($I_C = 0$) | 10 | V |
| I_C | Collector Current | 16 | A |
| I_{CM} | Collector Peak Current ($t_p < 5$ ms) | 22 | A |
| I_B | Base Current | 9 | A |
| I_{BM} | Base Peak Current ($t_p < 5$ ms) | 12 | A |
| P_{tot} | Total Dissipation at $T_c = 25$ °C | 200 | W |
| T_{stg} | Storage Temperature | -65 to 150 | °C |
| T_j | Max. Operating Junction Temperature | 150 | °C |

THERMAL DATA

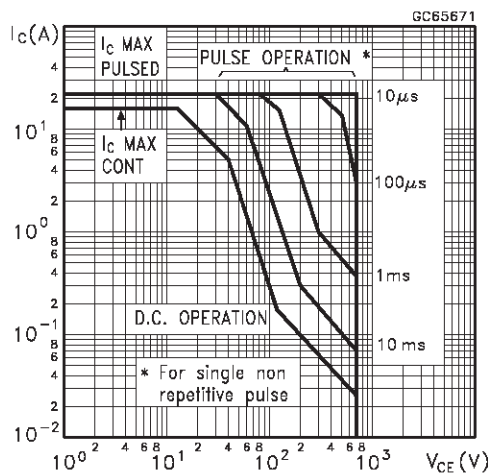
| | | | | |
|-----------------------|----------------------------------|-----|------|------|
| R _{thj-case} | Thermal Resistance Junction-case | Max | 0.63 | °C/W |
|-----------------------|----------------------------------|-----|------|------|

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

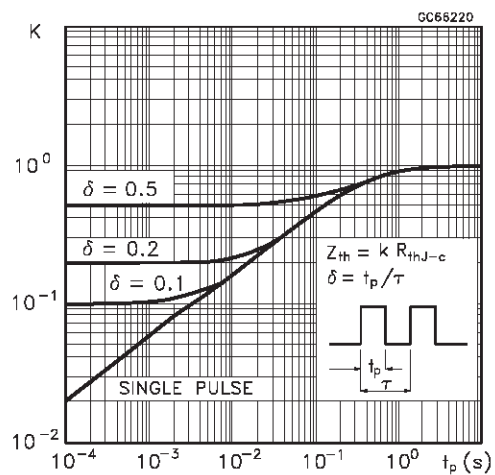
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|---|---|--------|------------|----------|----------|
| I _{CES} | Collector Cut-off Current (V _{BE} = 0) | V _{CE} = 1500 V V _{CE} = 1500 V T _j = 125 °C | | | 0.2 2 | mA mA |
| I _{EBO} | Emitter Cut-off Current (I _C = 0) | V _{EB} = 5 V | | | 100 | μA |
| V _{CEO(sus)} | Collector-Emitter Sustaining Voltage | I _C = 100 mA | 700 | | | V |
| V _{EBO} | Emitter-Base Voltage (I _C = 0) | I _E = 10 mA | 10 | | | V |
| V _{CE(sat)*} | Collector-Emitter Saturation Voltage | I _C = 12 A I _B = 2.4 A | | | 1.5 | V |
| V _{BE(sat)*} | Base-Emitter Saturation Voltage | I _C = 12 A I _B = 2.4 A | | | 1.5 | V |
| h _{FE*} | DC Current Gain | I _C = 12 A V _{CE} = 5 V I _C = 12 A V _{CE} = 5 V T _j = 100 °C | 7 5 | 10 | 14 | |
| t _s t _f | RESISTIVE LOAD Storage Time Fall Time | V _{CC} = 400 V I _C = 12 A I _{B1} = 2 A I _{B2} = -6 A | | 1.5 110 | | μs ns |
| t _s t _f | INDUCTIVE LOAD Storage Time Fall Time | I _C = 12 A f = 31250 Hz I _{B1} = 2 A I _{B2} = -1.5 A V _{ceflyback} = 1050 sin(π/5 10 ⁶) t V | | 4 220 | | μs ns |
| t _s t _f | INDUCTIVE LOAD Storage Time Fall Time | I _C = 6 A f = 64 KHz I _{B1} = 1 A V _{BE(off)} = -2 A V _{ceflyback} = 1200 sin(π/5 10 ⁶) t V | | 3.5 180 | | μs ns |

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

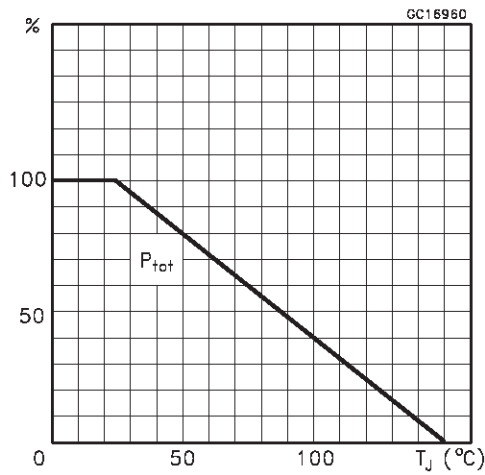
Safe Operating Area



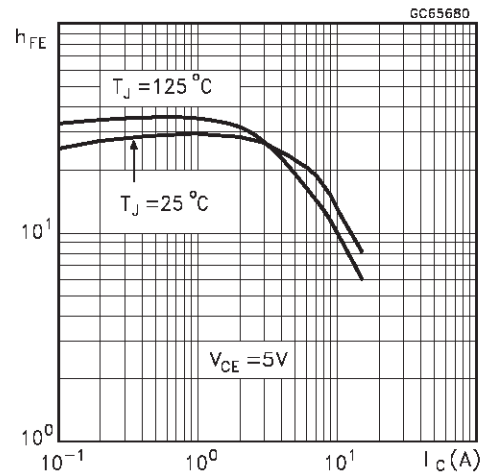
Thermal Impedance



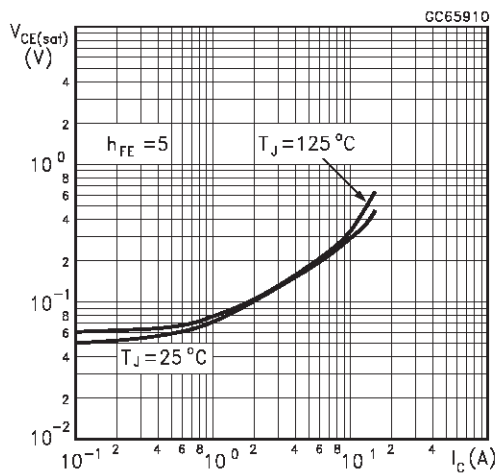
Derating Curve



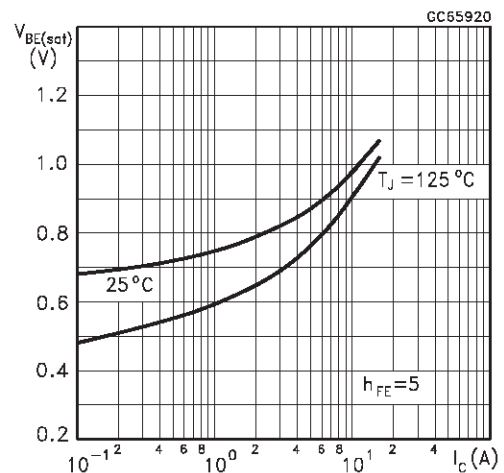
DC Current Gain



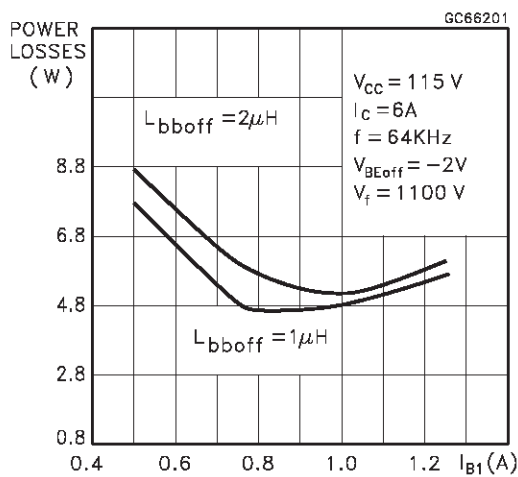
Collector Emitter Saturation Voltage



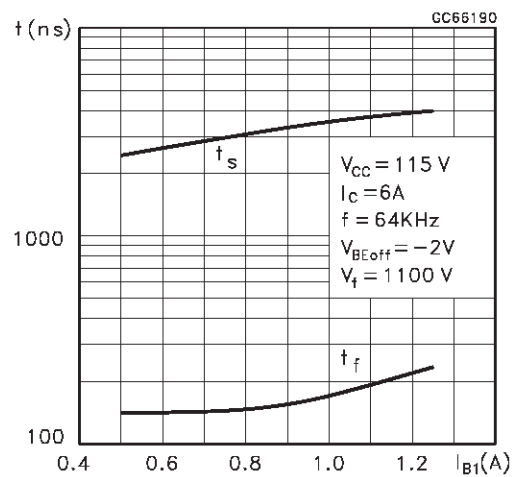
Base Emitter Saturation Voltage



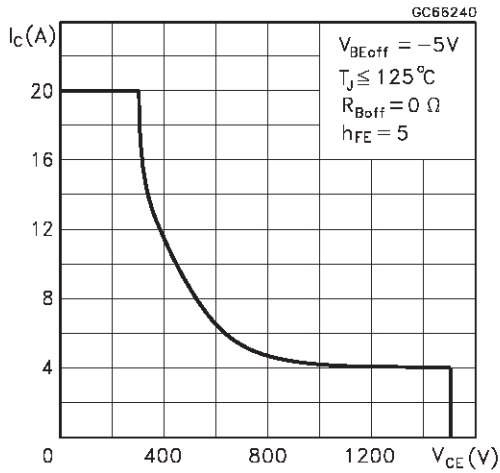
Power Losses at 64 KHz



Switching Time Inductive Load at 64 KHz (see figure 2)



Reverse Biased SOA



BASE DRIVE INFORMATION

In order to saturate the power switch and reduce conduction losses, adequate direct base current I_{B1} has to be provided for the lowest gain h_{FE} at $100^\circ C$ (line scan phase). On the other hand, negative base current I_{B2} must be provided the transistor to turn off (retrace phase).

Most of the dissipation, especially in the deflection application, occurs at switch-off so it is essential to determine the value of I_{B2} which minimizes power losses, fall time t_f and, consequently, T_j . A new set of curves have been defined to give total power losses, t_s and t_f as a function of I_{B1} at 64 KHz scanning frequencies for

choosing the optimum negative drive. The test circuit is illustrated in figure 1.

The values of L and C are calculated from the following equations:

$$\frac{1}{2} L (I_C)^2 = \frac{1}{2} C (V_{CEfly})^2$$

$$\omega = 2 \pi f = \frac{1}{\sqrt{LC}}$$

Where I_C = operating collector current, V_{CEfly} = flyback voltage, f = frequency of oscillation during retrace.

Figure 1: Inductive Load Switching Test Circuits.

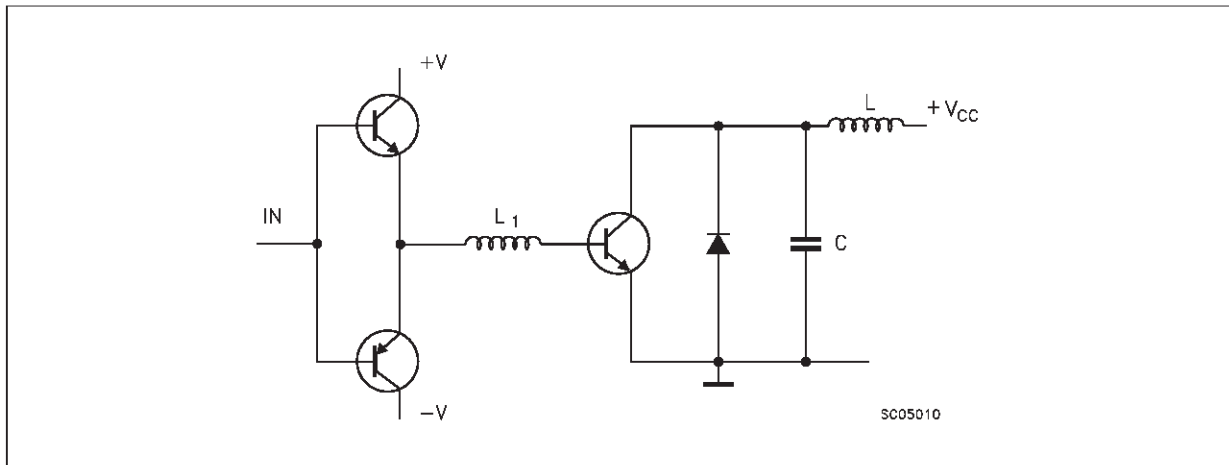
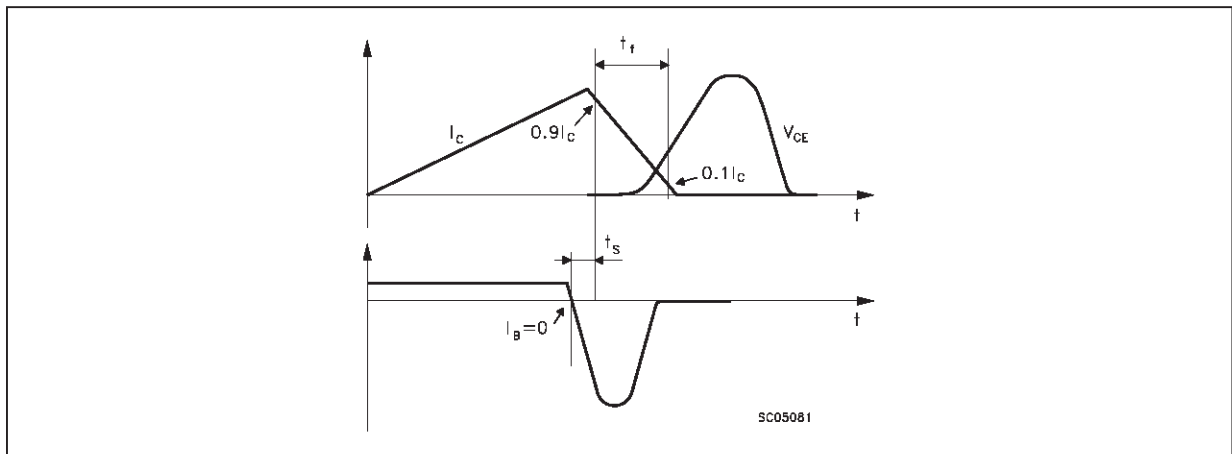
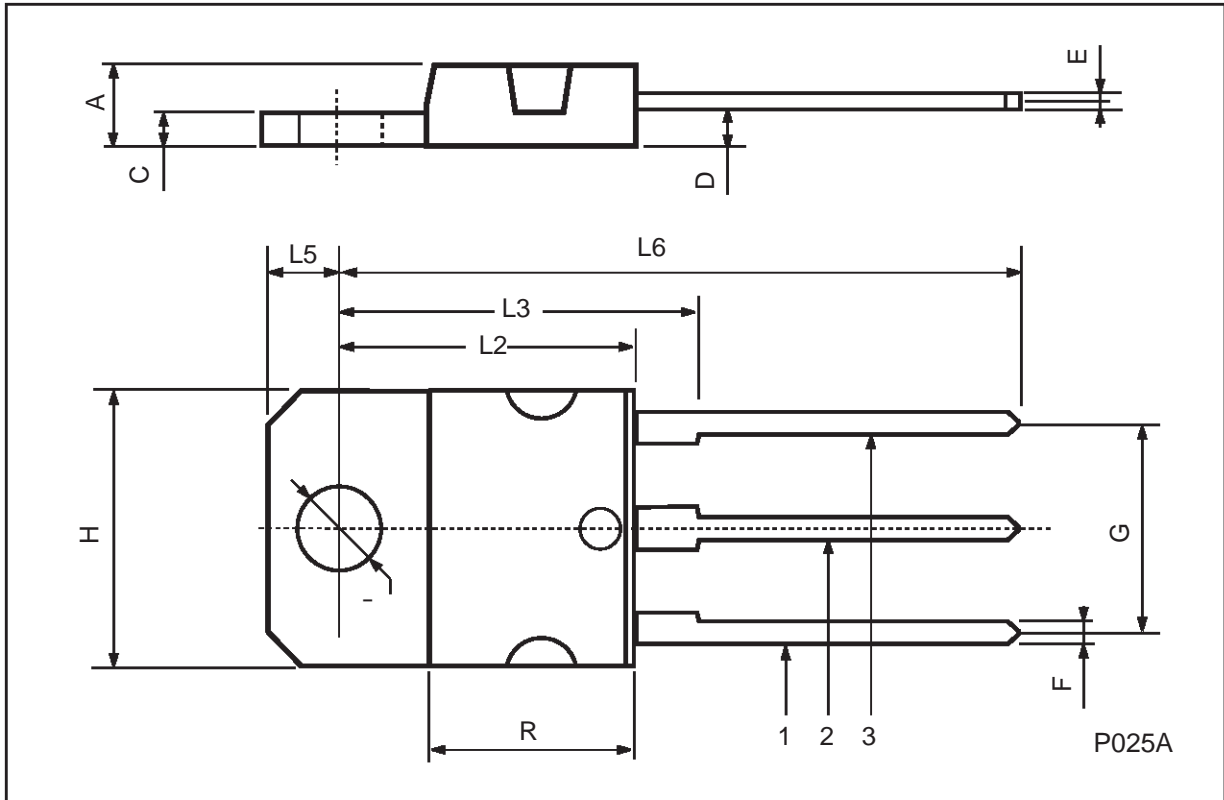


Figure 2: Switching Waveforms in a Deflection Circuit



TO-218 (SOT-93) MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.7 | | 4.9 | 0.185 | | 0.193 |
| C | 1.17 | | 1.37 | 0.046 | | 0.054 |
| D | | 2.5 | | | 0.098 | |
| E | 0.5 | | 0.78 | 0.019 | | 0.030 |
| F | 1.1 | | 1.3 | 0.043 | | 0.051 |
| G | 10.8 | | 11.1 | 0.425 | | 0.437 |
| H | 14.7 | | 15.2 | 0.578 | | 0.598 |
| L2 | - | | 16.2 | - | | 0.637 |
| L3 | | 18 | | | 0.708 | |
| L5 | 3.95 | | 4.15 | 0.155 | | 0.163 |
| L6 | | 31 | | | 1.220 | |
| R | - | | 12.2 | - | | 0.480 |
| Ø | 4 | | 4.1 | 0.157 | | 0.161 |



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