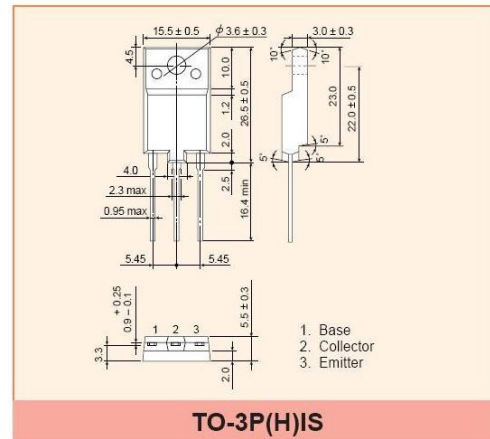


## HIGH VOLTAGE FAST-SWITCHING NPN POWER DARLINGTON

- NPN MONOLITHIC DARLINGTON WITH INTEGRATED FREE-WHEELING DIODE
- HIGH VOLTAGE CAPABILITY ( $> 1400\text{ V}$ )
- HIGH DC CURRENT GAIN (TYP. 150)
- LOW BASE-DRIVE REQUIREMENTS

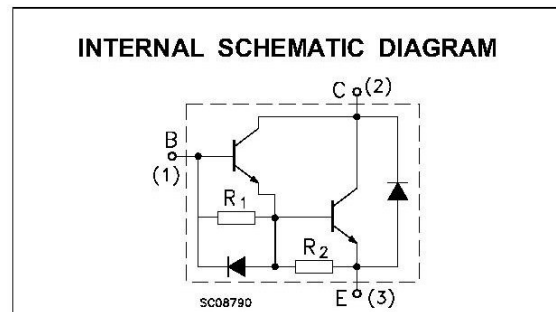
### APPLICATIONS

- TV



### DESCRIPTION

The BU808DFI is a NPN transistor in monolithic Darlington configuration. It is cost-effective high performance.



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage ( $I_E = 0$ )	1400	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	700	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	5	V
$I_C$	Collector Current	8	A
$I_{CM}$	Collector Peak Current ( $t_p < 5\text{ ms}$ )	10	A
$I_B$	Base Current	3	A
$I_{BM}$	Base Peak Current ( $t_p < 5\text{ ms}$ )	6	A
$P_{tot}$	Total Dissipation at $T_c = 25\text{ }^\circ\text{C}$	52	W
$T_{stg}$	Storage Temperature	-65 to 150	$^\circ\text{C}$
$T_j$	Max. Operating Junction Temperature	150	$^\circ\text{C}$

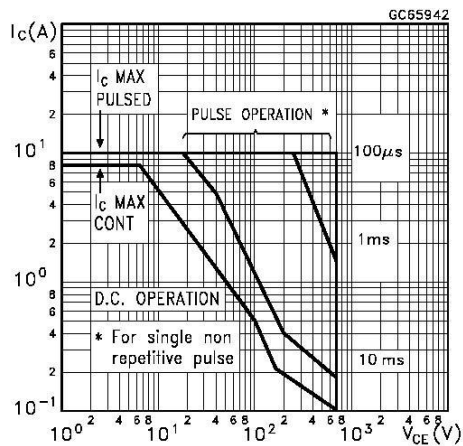
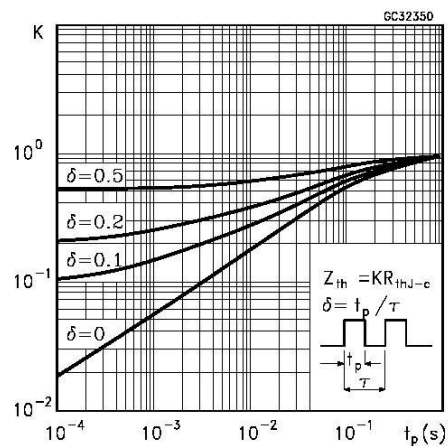
**THERMAL DATA**

$R_{thj-case}$	Thermal Resistance Junction-case	Max	2.4	$^{\circ}C/W$
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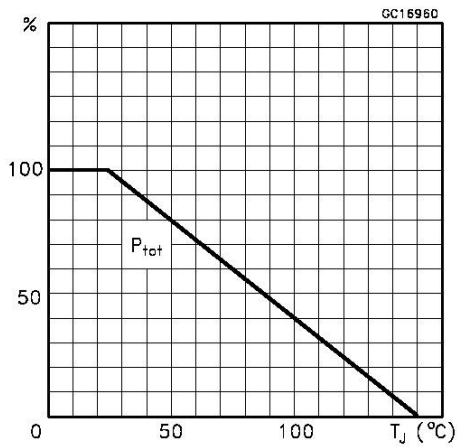
**ELECTRICAL CHARACTERISTICS** ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CES}$	Collector Cut-off Current ( $V_{BE} = 0$ )	$V_{CE} = 1400 V$			400	$\mu A$
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 5 V$			100	mA
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 5 A$ $I_B = 0.5 A$			1.6	V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 5 A$ $I_B = 0.5 A$			2.1	V
$h_{FE}^*$	DC Current Gain	$I_C = 5 A$ $V_{CE} = 5 V$ $I_C = 5 A$ $V_{CE} = 5 V$ $T_j = 100^{\circ}C$	60 20		230	
$t_s$ $t_f$	INDUCTIVE LOAD Storage Time Fall Time	$V_{CC} = 150 V$ $I_C = 5 A$ $I_{B1} = 0.5 A$ $V_{BEoff} = -5 V$			3 0.8	$\mu s$ $\mu s$
$t_s$ $t_f$	INDUCTIVE LOAD Storage Time Fall Time	$V_{CC} = 150 V$ $I_C = 5 A$ $I_{B1} = 0.5 A$ $V_{BEoff} = -5 V$ $T_j = 100^{\circ}C$		2 0.8		$\mu s$ $\mu s$
$V_F$	Diode Forward Voltage	$I_F = 5 A$			3	V

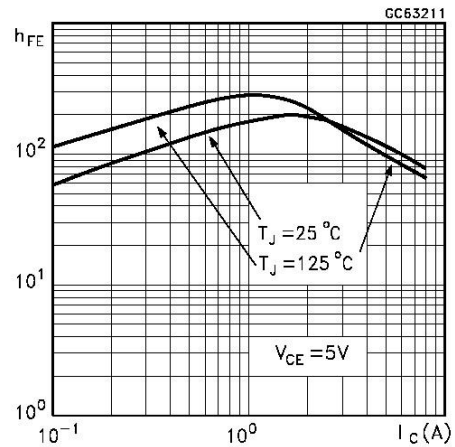
\* Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %

**Safe Operating Area**

**Thermal Impedance**


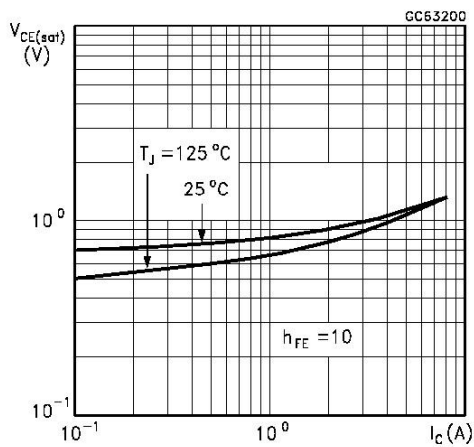
Derating Curve



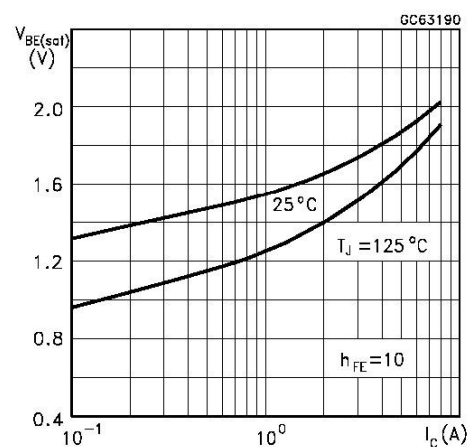
DC Current Gain



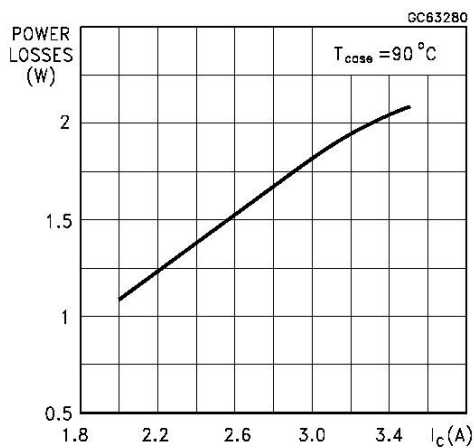
Collector Emitter Saturation Voltage



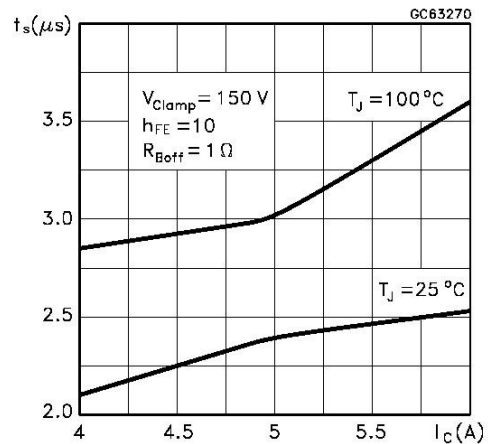
Base Emitter Saturation Voltage



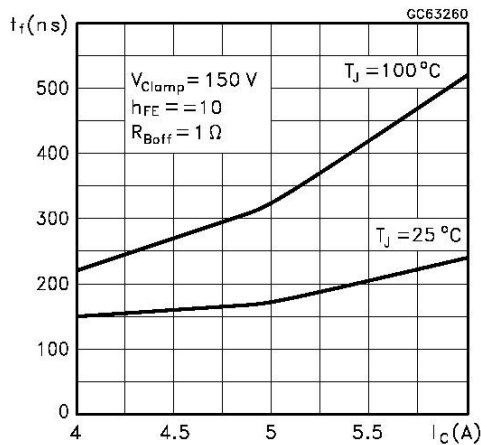
Power Losses at 16 KHz



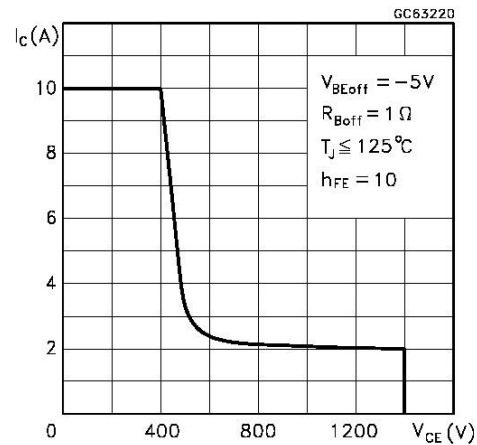
Switching Time Inductive Load at 16KHz



Switching Time Inductive Load at 16KHZ



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 °C (line scan phase). On the other hand, negative base current  $I_{B2}$  must be provided to turn off the power transistor (retrace phase).

Most of the dissipation, in the deflection application, occurs at switch-off. Therefore 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  $I_{B2}$  at both 16 KHz scanning frequencies for choosing the optimum negative

drive. The test circuit is illustrated in figure 1.

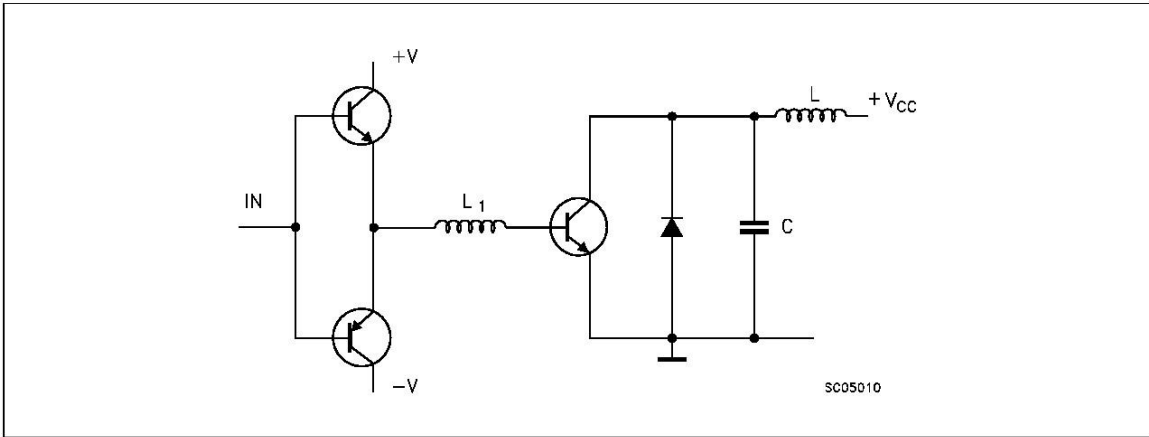
Inductance  $L_1$  serves to control the slope of the negative base current  $I_{B2}$  to recombine the excess carrier in the collector when base current is still present, this would avoid any tailing phenomenon in the collector current.

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

$$\frac{1}{2} L (I_C)^2 = \frac{1}{2} C (V_{CEfly})^2 \quad \omega = 2 \pi f = \frac{1}{\sqrt{LC}}$$

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

