

BUW1215

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

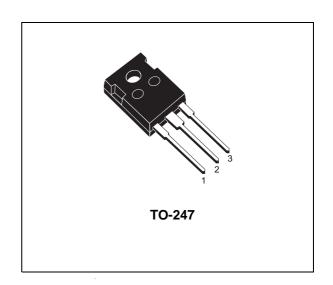
- STMicroelectronics PREFERRED SALESTYPE
- HIGH VOLTAGE CAPABILITY (> 1500 V)
- VERY HIGH SWITCHING SPEED

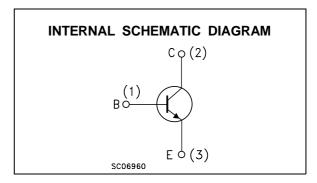
APPLICATIONS:

 HORIZONTAL DEFLECTION FOR HIGH-END COLOUR TV AND 21" MONITORS

DESCRIPTION

The BUW1215 is manufactured using Multiepitaxial Mesa technology for cost-effective high performance and uses a Hollow Emitter structure to enhance switching speeds.





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
Ic	Collector Current	16	А
I _{CM}	Collector Peak Current (t _p < 5 ms)	22	А
Ι _Β	Base Current	9	А
I _{BM}	Base Peak Current (t _p < 5 ms)	12	А
P _{tot}	Total Dissipation at T _c = 25 °C	200	W
T _{stg}	Storage Temperature	-65 to 150	°C
Tj	Max. Operating Junction Temperature	150	°C

February 2002

BUW1215

THERMAL DATA

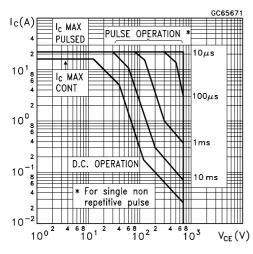
R _{thj-case} Thermal Resistance Junction-case	Max	0.63	°C/W
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ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

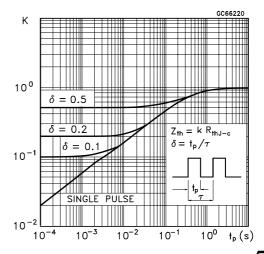
Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
I _{CES}	Collector Cut-off Current (V _{BE} = 0)	$V_{CE} = 1500 \text{ V}$ $V_{CE} = 1500 \text{ V}$ $T_j = 125 ^{\circ}\text{C}$			0.2 2	mA mA
I _{EBO}	Emitter Cut-off Current (I _C = 0)	V _{EB} = 5 V			100	μΑ
V _{CEO(sus)} *	Collector-Emitter Sustaining Voltage (I _B = 0)	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	$I_{C} = 12 \text{ A}$ $V_{CE} = 5 \text{ V}$ $I_{C} = 12 \text{ A}$ $V_{CE} = 5 \text{ V}$ $T_{j} = 100 ^{\circ}\text{C}$	7 5	10	14	
t _s	RESISTIVE LOAD Storage Time Fall Time	$V_{CC} = 400 \text{ V}$ $I_{C} = 12 \text{ A}$ $I_{B1} = 2 \text{ A}$ $I_{B2} = -6 \text{ A}$		1.5 110		μs ns
t _s t _f	INDUCTIVE LOAD Storage Time Fall Time	$\begin{aligned} &I_{C} = 12 \text{ A} & f = 31250 \text{ Hz} \\ &I_{B1} = 2 \text{ A} & I_{B2} = -1.5 \text{ A} \\ &V_{ceflyback} = 1050 \sin\!\left(\!\frac{\pi}{5}10^{6}\right)\!t & V \end{aligned}$		4 220		μs ns
t _s	INDUCTIVE LOAD Storage Time Fall Time	$\begin{array}{lll} I_{C} = 6 \text{ A} & f = 64 \text{ KHz} \\ I_{B1} = 1 \text{ A} & V_{BE(off)} = -2 \text{ A} \\ V_{ceflyback} = 1200 \sin\!\left(\!\frac{\pi}{5}10^{6}\!\right)\!t & V \end{array}$		3.5 180		μs ns

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

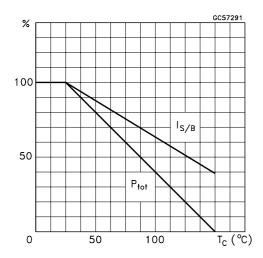
Safe Operating Area



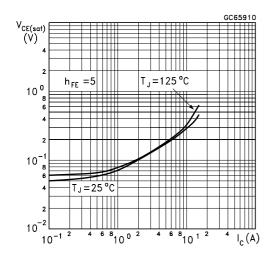
Thermal Impedance



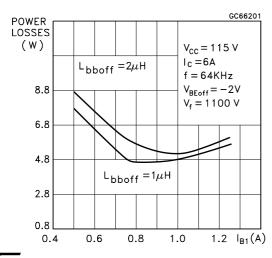
Derating Curve



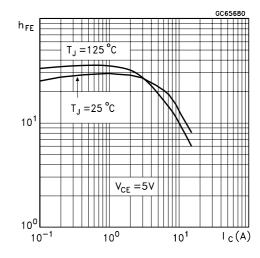
Collector Emitter Saturation Voltage



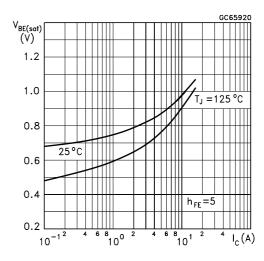
Power Losses at 64 KHz



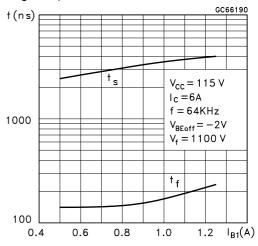
DC Current Gain



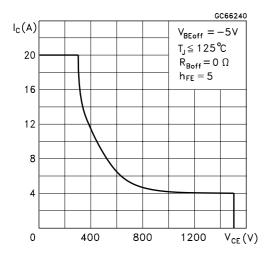
Base Emitter Saturation Voltage



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 $l_{\rm B2}$ which minimizes power losses, fall time $t_{\rm f}$ and, consequently, $T_{\rm j}$. A new set of curves have been defined to give total power losses, $t_{\rm s}$ and $t_{\rm f}$ as a function of $l_{\rm B1}$ 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 Circuit.

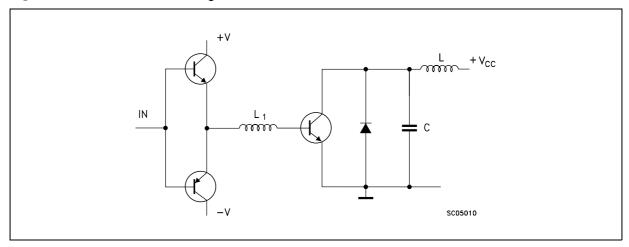
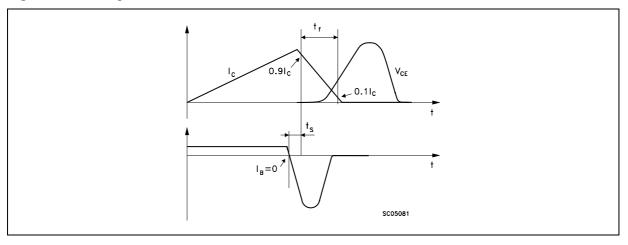
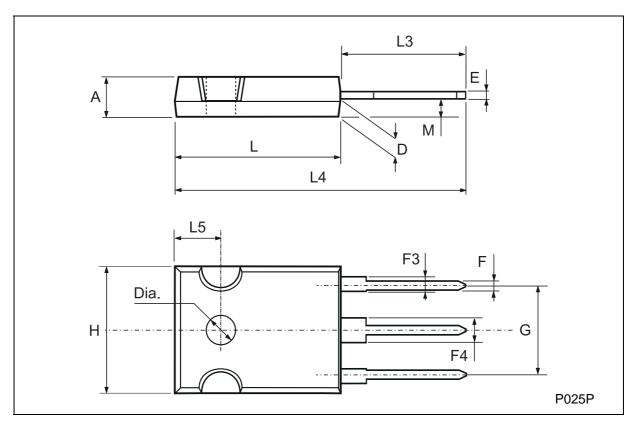


Figure 2: Switching Waveforms in a Deflection Circuit



TO-247 MECHANICAL DATA

DIM.	mm		inch			
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
А	4.7		5.3	0.185		0.209
D	2.2		2.6	0.087		0.102
Е	0.4		0.8	0.016		0.031
F	1		1.4	0.039		0.055
F3	2		2.4	0.079		0.094
F4	3		3.4	0.118		0.134
G		10.9			0.429	
Н	15.3		15.9	0.602		0.626
L	19.7		20.3	0.776		0.779
L3	14.2		14.8	0.559		0.582
L4		34.6			1.362	
L5		5.5			0.217	
М	2		3	0.079		0.118



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