

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

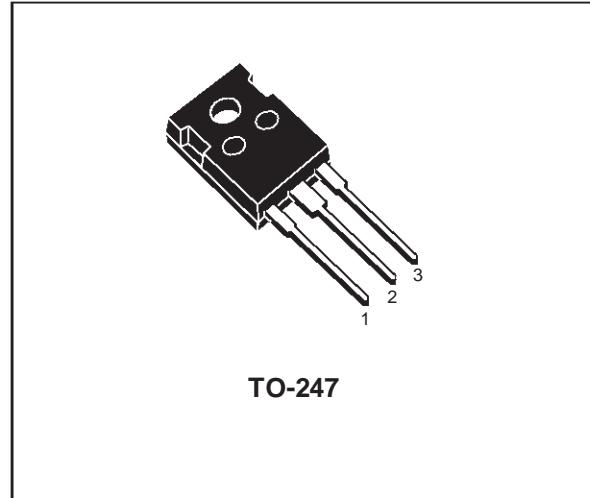
- STMicroelectronics PREFERRED SALES TYPE
- HIGH VOLTAGE CAPABILITY (> 1500 V)
- VERY HIGH SWITCHING SPEED

APPLICATIONS:

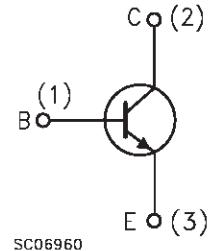
- HORIZONTAL DEFLECTION FOR HIGH-END COLOUR TV AND 19" MONITORS

DESCRIPTION

The BUW1015 is manufactured using Multiepitaxial Mesa technology for cost-effective high performance and uses a Hollow Emitter structure to enhance switching speeds.



INTERNAL SCHEMATIC DIAGRAM



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	14	A
I_{CM}	Collector Peak Current ($t_p < 5$ ms)	18	A
I_B	Base Current	8	A
I_{BM}	Base Peak Current ($t_p < 5$ ms)	11	A
P_{tot}	Total Dissipation at $T_c = 25$ °C	160	W
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

THERMAL DATA

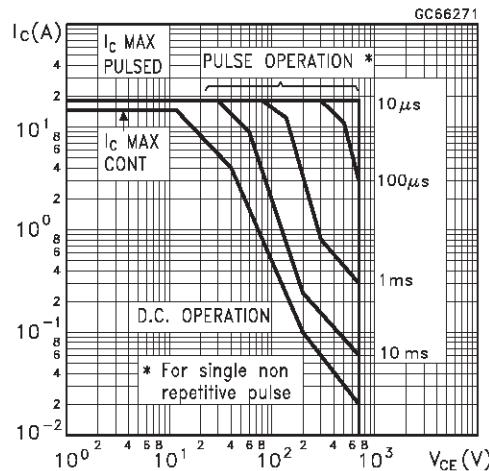
R _{thj-case}	Thermal Resistance Junction-case	Max	0.78	°C/W
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ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

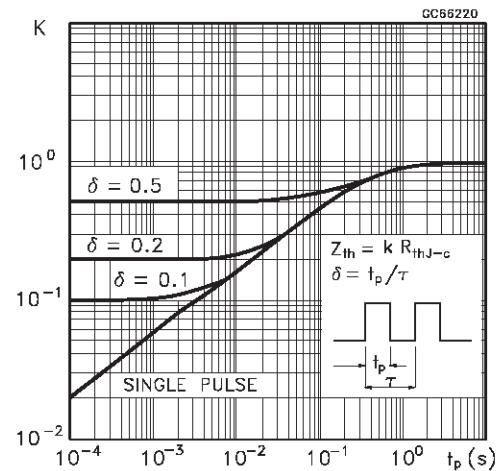
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _{CES}	Collector Cut-off Current (V _{BE} = 0)	V _{CE} = 1500 V V _{CE} = 1500 V T _j = 125 °C			0.2 2	mA mA
I _{EBO}	Emitter Cut-off Current (I _c = 0)	V _{EB} = 5 V			100	μA
V _{CEO(sus)*}	Collector-Emitter Sustaining Voltage (I _B = 0)	I _c = 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 = 10 A I _B = 2 A			1.5	V
V _{BE(sat)*}	Base-Emitter Saturation Voltage	I _c = 10 A I _B = 2 A			1.5	V
h _{FE} *	DC Current Gain	I _c = 10 A V _{CE} = 5 V I _c = 10 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 = 10 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 = 10 A f = 31250 Hz I _{B1} = 2 A I _{B2} = -6 A V _{ceflyback} = 1200 sin($\frac{\pi}{5} 10^6$)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 _{beoff} = -2 V V _{ceflyback} = 1100 sin($\frac{\pi}{5} 10^6$)t V		3.7 200		μs ns

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

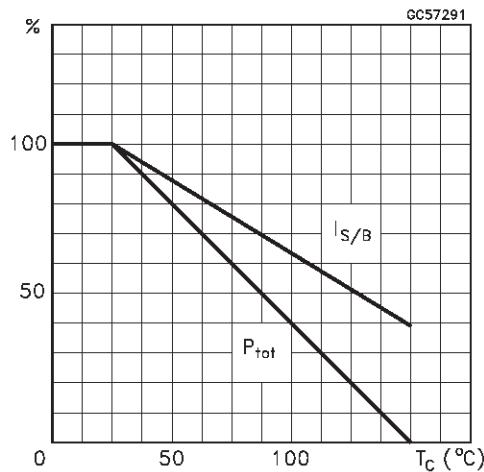
Safe Operating Area



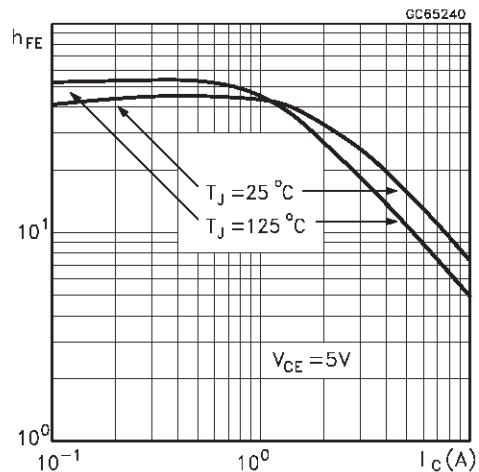
Thermal Impedance



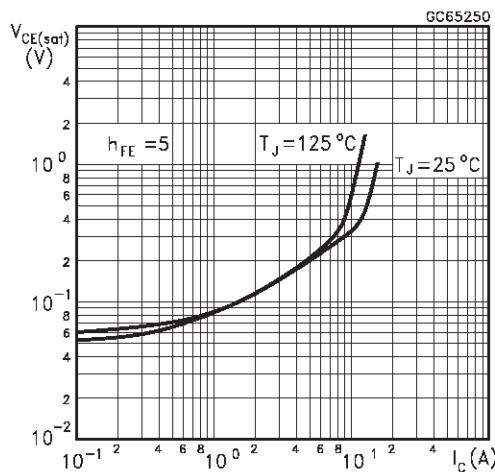
Derating Curve



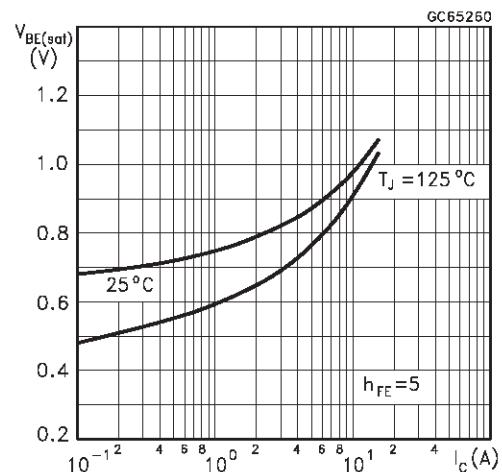
DC Current Gain



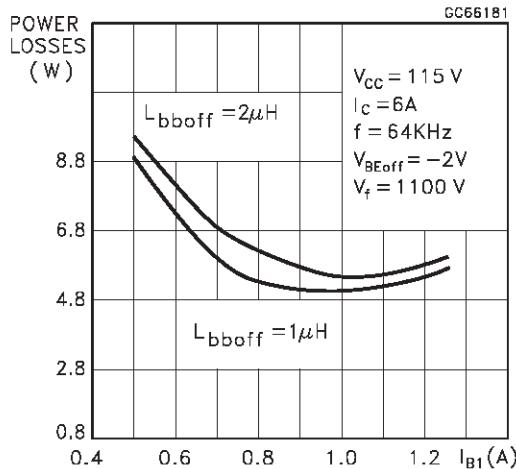
Collector Emitter Saturation Voltage



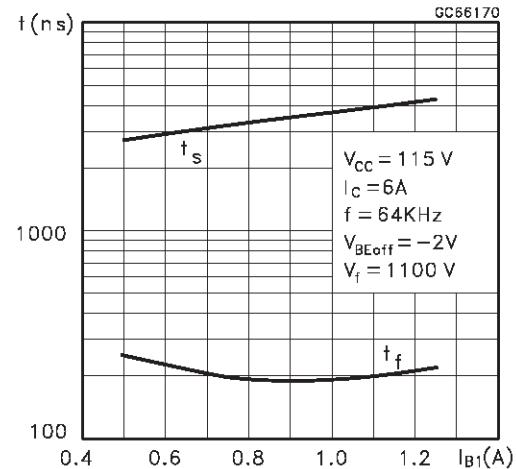
Base Emitter Saturation Voltage



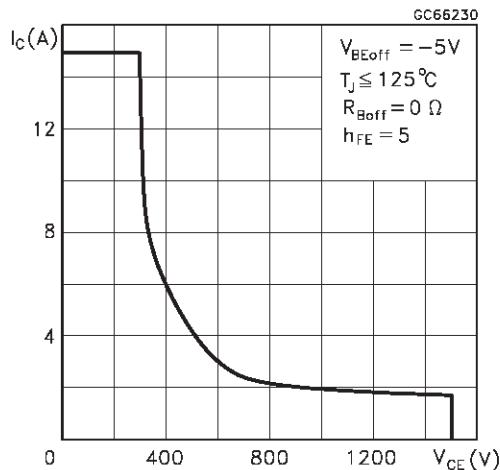
Power Losses at 64 KHz



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 $T_j = 100\ ^\circ C$ (line scan phase). On the other hand, negative base current I_{B2} must be provided to turn off 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

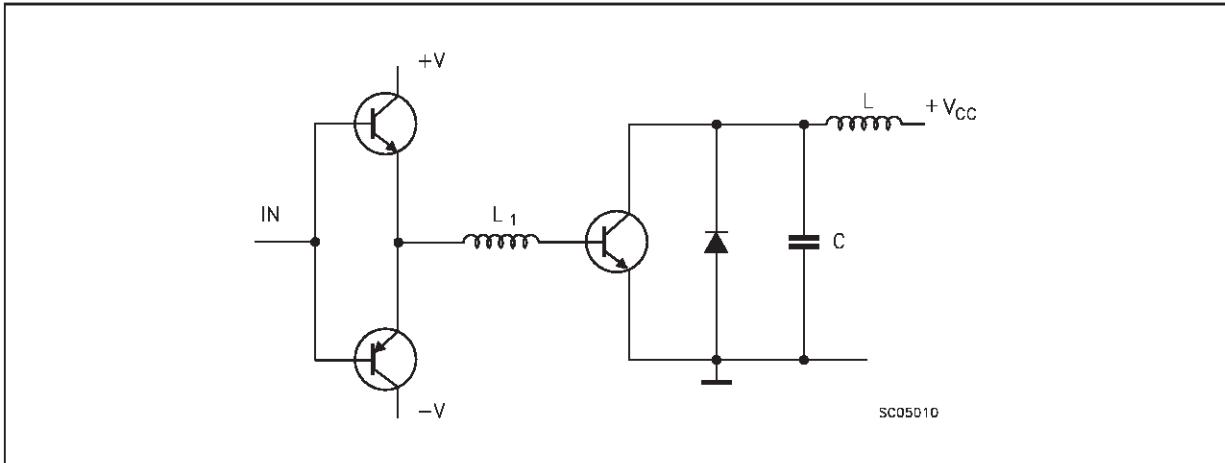
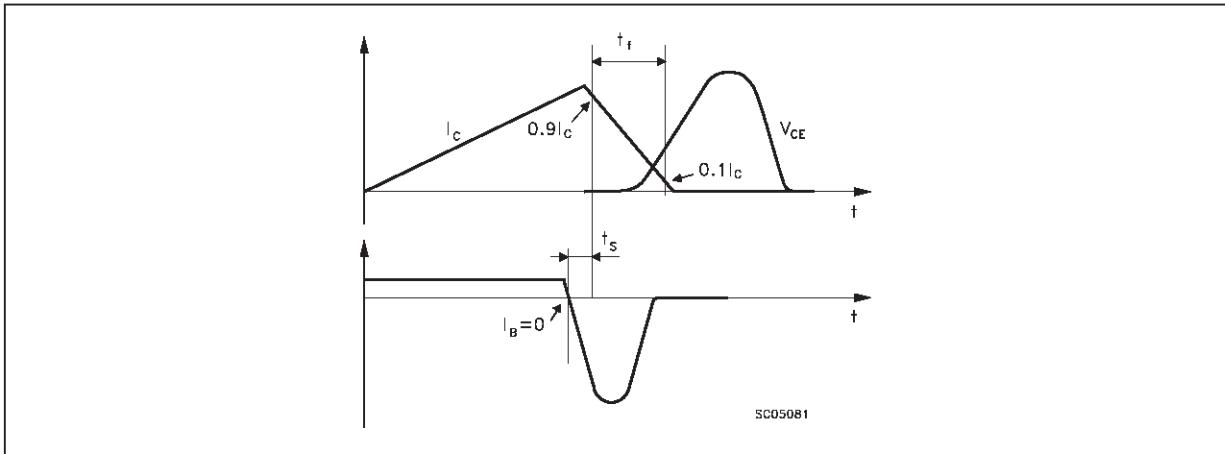
optimum drive. The test circuit is illustrated in figure 1.

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

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

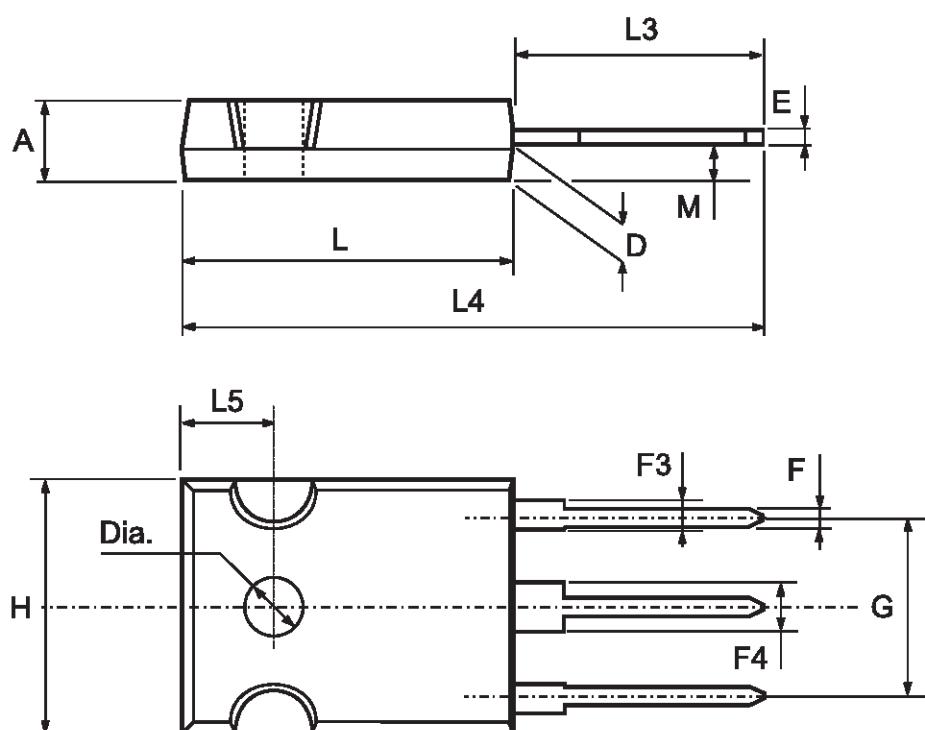
$$\omega = 2 \pi f = \frac{1}{\sqrt{L C}}$$

Where I_C = operating collector current, $V_{CE\ fly}$ = 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.
A	4.7		5.3	0.185		0.209
D	2.2		2.6	0.087		0.102
E	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	
H	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	
M	2		3	0.079		0.118



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