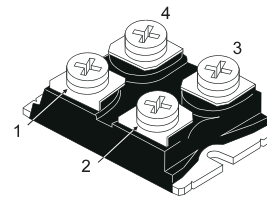
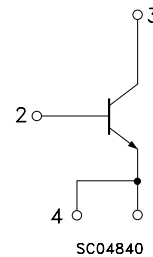


## NPN TRANSISTOR POWER MODULE

- EASY TO DRIVE TECHNOLOGY (ETD)
- HIGH CURRENT POWER BIPOLAR MODULE
- VERY LOW  $R_{th}$  JUNCTION CASE
- SPECIFIED ACCIDENTAL OVERLOAD AREAS
- FULLY INSULATED PACKAGE (U.L. COMPLIANT) FOR EASY MOUNTING
- LOW INTERNAL PARASITIC INDUCTANCE

**APPLICATIONS:**

- MOTOR CONTROL
- SMPS & UPS
- WELDING EQUIPMENT


**ISOTOP**
**INTERNAL SCHEMATIC DIAGRAM**

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_{CEV}$	Collector-Emitter Voltage ( $V_{BE} = -5$ V)	1000	V
$V_{CEO(sus)}$	Collector-Emitter Voltage ( $I_B = 0$ )	450	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	7	V
$I_C$	Collector Current	80	A
$I_{CM}$	Collector Peak Current ( $t_p = 10$ ms)	160	A
$I_B$	Base Current	18	A
$I_{BM}$	Base Peak Current ( $t_p = 10$ ms)	27	A
$P_{tot}$	Total Dissipation at $T_c = 25$ °C	270	W
$V_{isol}$	Insulation Withstand Voltage (RMS) from All Four Terminals to External Heatsink	2500	
$T_{stg}$	Storage Temperature	-65 to 150	°C
$T_j$	Max Operation Junction Temperature	150	°C

## BUF460AV

### THERMAL DATA

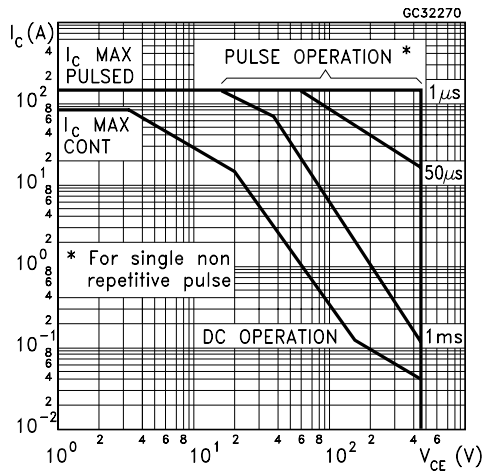
$R_{thj-case}$	Thermal Resistance Junction-case	Max	0.41	°C/W
$R_{thc-h}$	Thermal Resistance Case- heatsink With Conductive Grease Applied	Max	0.05	°C/W

### ELECTRICAL CHARACTERISTICS ( $T_{case} = 25\text{ °C}$ unless otherwise specified)

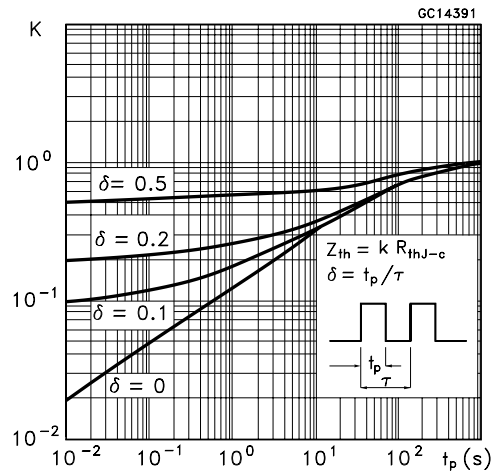
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CER}$	Collector Cut-off Current ( $R_{BE} = 5\ \Omega$ )	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV}$ $T_j = 100\text{ °C}$			0.2 2	mA mA
$I_{CEV}$	Collector Cut-off Current ( $V_{BE} = -1.5V$ )	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV}$ $T_j = 100\text{ °C}$			0.2 2	mA mA
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 5\ V$			1	mA
$V_{CEO(sus)}^*$	Collector-Emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 0.2\ A$ $L = 25\ mH$ $V_{clamp} = 450\ V$	450			V
$h_{FE}^*$	DC Current Gain	$I_C = 60\ A$ $V_{CE} = 5\ V$		15		
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 30\ A$ $I_B = 3\ A$ $I_C = 30\ A$ $I_B = 3\ A$ $T_j = 100\text{ °C}$ $I_C = 60\ A$ $I_B = 12\ A$ $I_C = 60\ A$ $I_B = 12\ A$ $T_j = 100\text{ °C}$		0.35 0.5	2 2	V V V V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 60\ A$ $I_B = 12\ A$ $I_C = 60\ A$ $I_B = 12\ A$ $T_j = 100\text{ °C}$		1.1	1.5	V V
$di_c/dt$	Rate of Rise of On-state Collector	$V_{CC} = 300\ V$ $R_C = 0$ $t_p = 3\ \mu s$ $I_{B1} = 18\ A$ $T_j = 100\text{ °C}$	150			A/ $\mu s$
$V_{CE(3\ \mu s)}^*$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300\ V$ $R_C = 30\ \Omega$ $I_{B1} = 18\ A$ $T_j = 100\text{ °C}$		4	6	V
$V_{CE(5\ \mu s)}^*$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300\ V$ $R_C = 30\ \Omega$ $I_{B1} = 18\ A$ $T_j = 100\text{ °C}$		2	3	V
$t_s$	Storage Time	$I_C = 30\ A$ $V_{CC} = 50\ V$		4.5	5	$\mu s$
$t_f$	Fall Time	$V_{BB} = -5\ V$ $R_{BB} = 0.2\ \Omega$		0.1	0.2	$\mu s$
$t_c$	Cross-over Time	$V_{clamp} = 400\ V$ $I_{B1} = 3\ A$ $L = 25\ \mu H$ $T_j = 100\text{ °C}$		0.3	5	$\mu s$
$V_{CEW}$	Maximum Collector Emitter Voltage Without Snubber	$I_{C\ woff} = 80\ A$ $I_{B1} = 16\ A$ $V_{BB} = -5\ V$ $V_{CC} = 50\ V$ $L = 80\ \mu H$ $R_{BB} = 0.2\ \Omega$ $T_j = 125\text{ °C}$	400			V

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

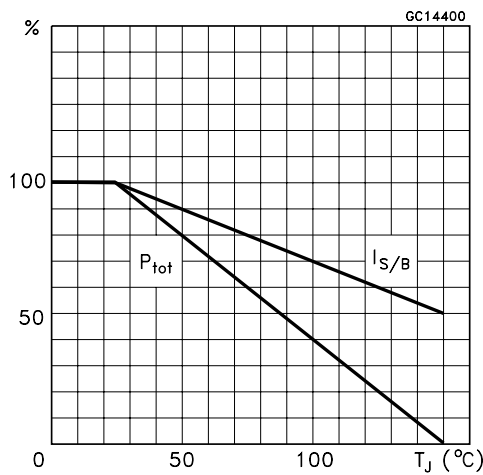
Safe Operating Area



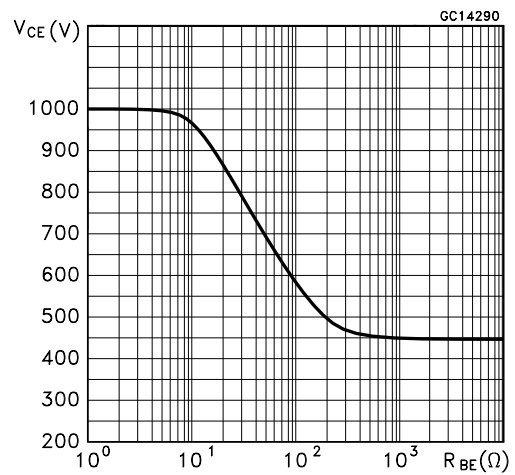
Thermal Impedance



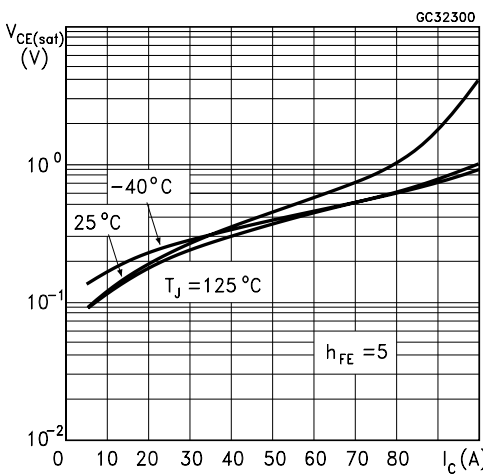
Derating Curve



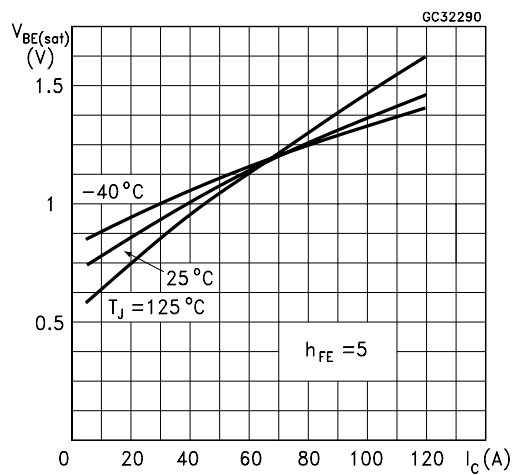
Collector-Emitter Voltage Versus Base-Emitter Resistance



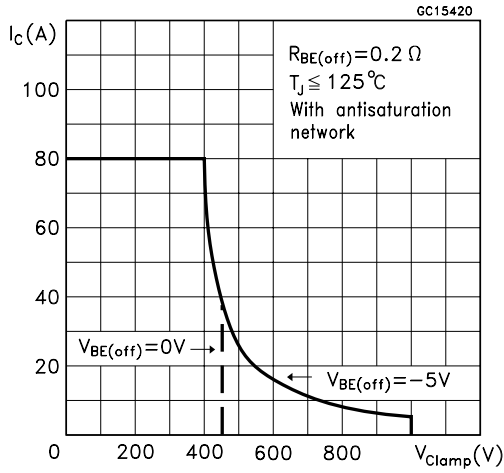
Collector-Emitter Saturation Voltage



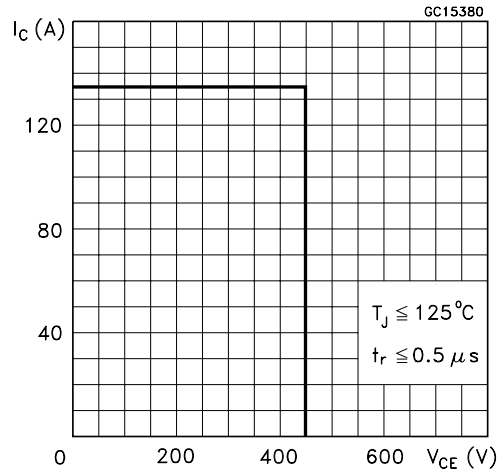
Base-Emitter Saturation Voltage



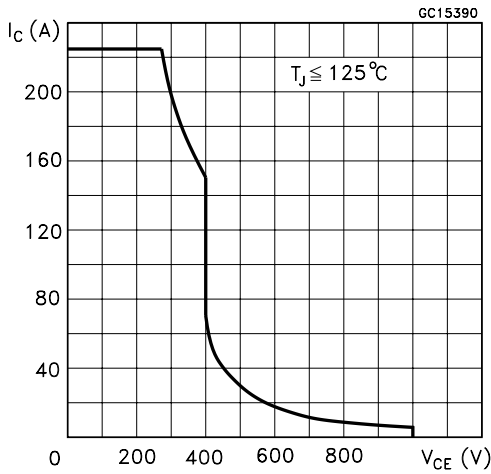
Reverse Biased SOA



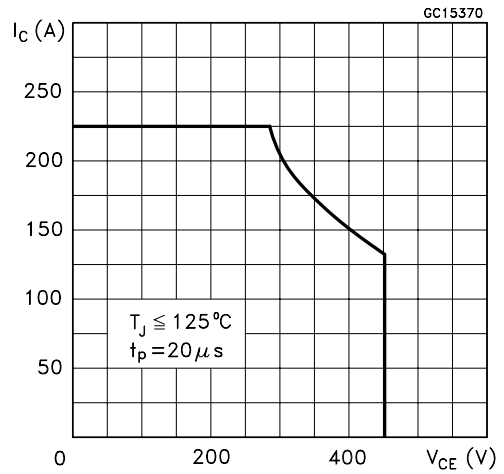
Forward Biased SOA



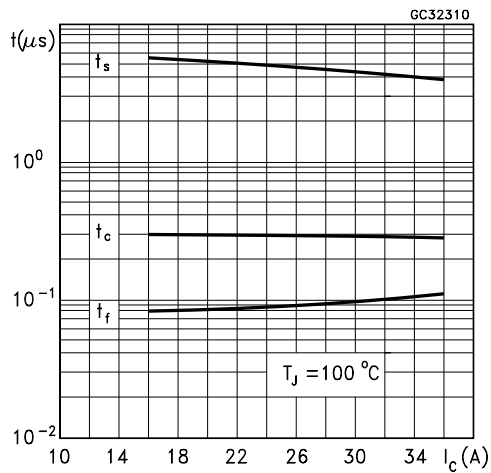
Reverse Biased SOA



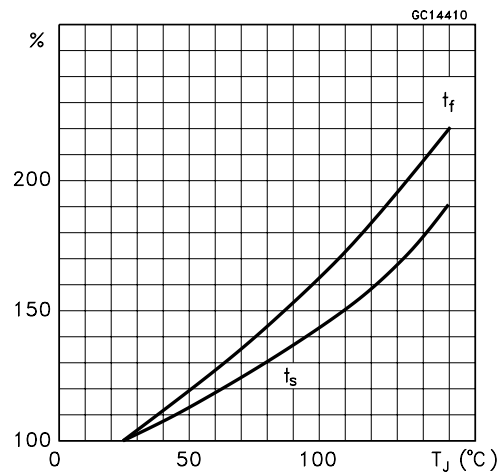
Forward Biased SOA



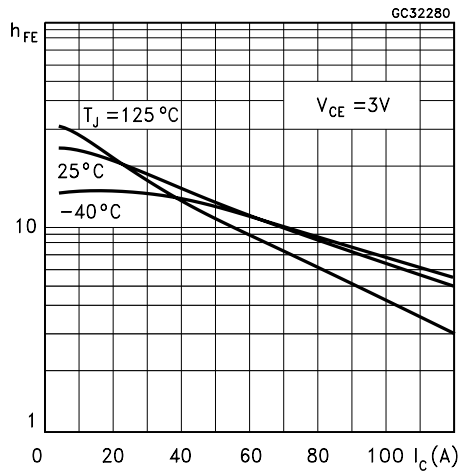
Switching Time Inductive Load



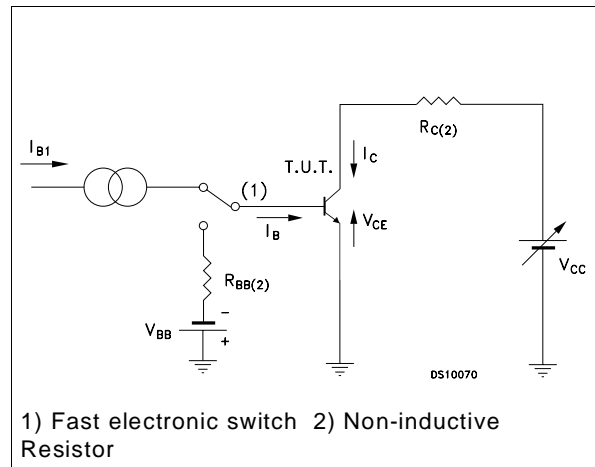
Switching Time Inductive Load Versus Temperature



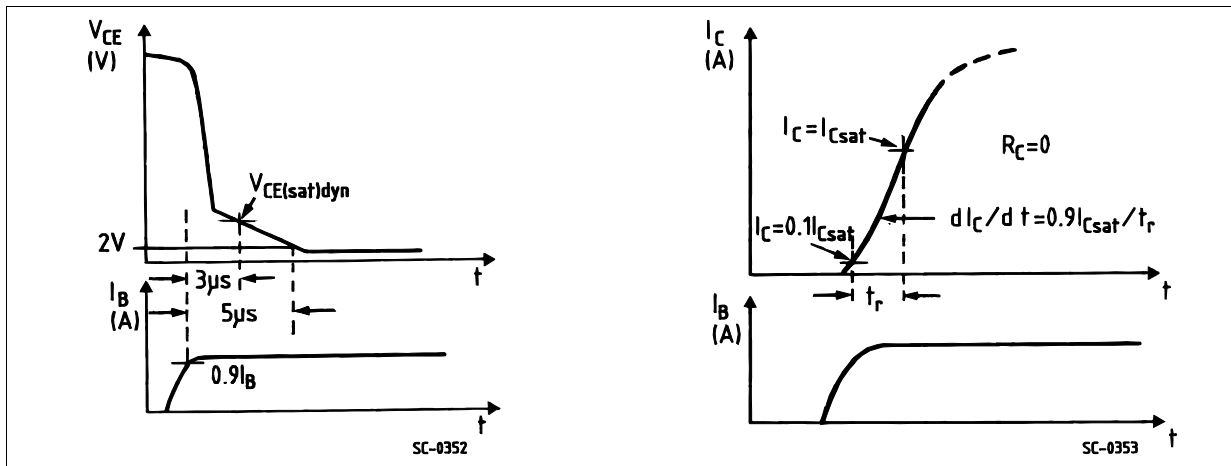
DC Current Gain



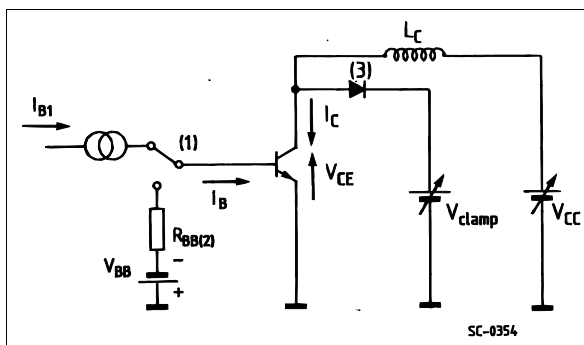
Turn-off Switching Test Circuit



Turn-on Switching Waveforms.

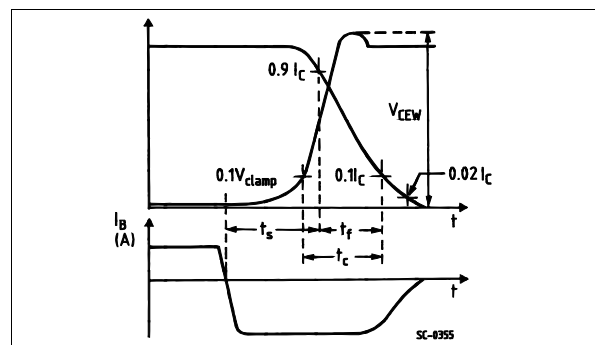


Turn-off Switching Test Circuit



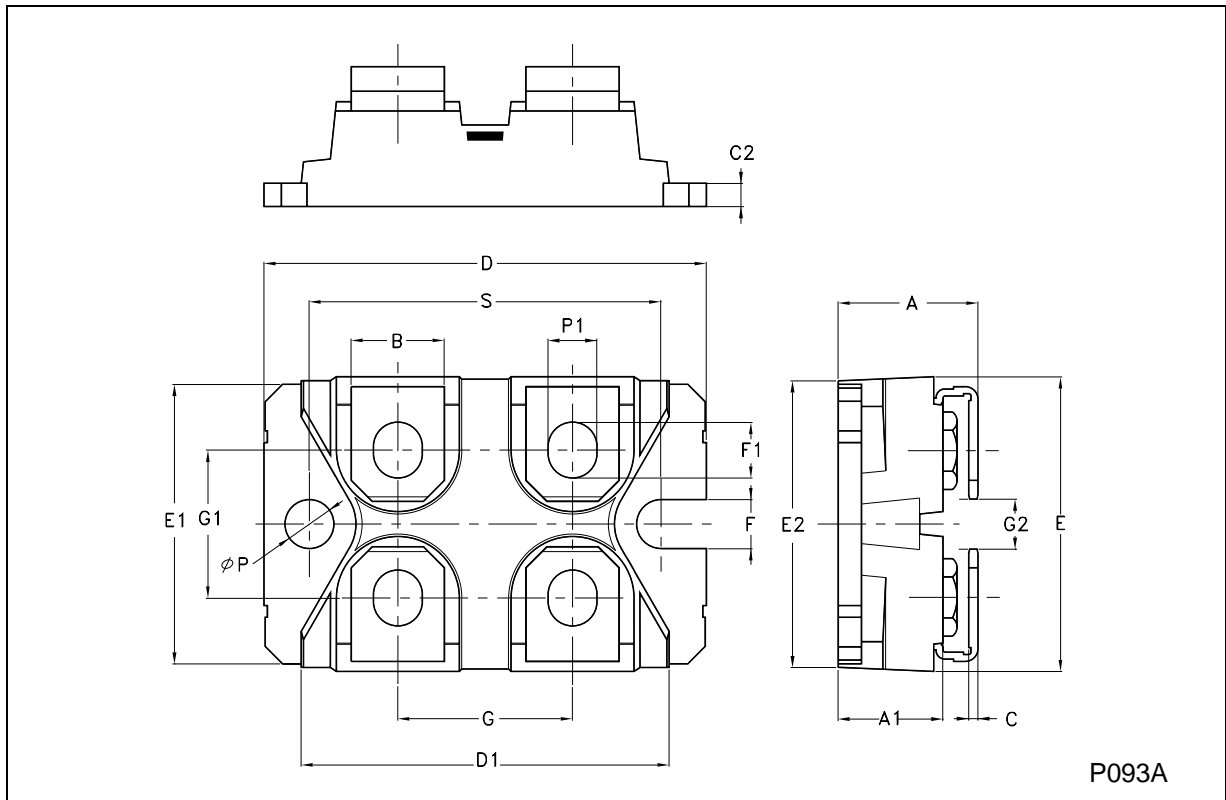
- 1) Fast electronic switch
- 2) Non-inductive Resistor
- 3) Fast recovery rectifier

Turn-off Switching Waveforms.



**ISOTOP MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.8		12.2	0.465		0.480
A1	8.9		9.1	0.350		0.358
B	7.8		8.2	0.307		0.322
C	0.75		0.85	0.029		0.033
C2	1.95		2.05	0.076		0.080
D	37.8		38.2	1.488		1.503
D1	31.5		31.7	1.240		1.248
E	25.15		25.5	0.990		1.003
E1	23.85		24.15	0.938		0.950
E2		24.8			0.976	
G	14.9		15.1	0.586		0.594
G1	12.6		12.8	0.496		0.503
G2	3.5		4.3	0.137		1.169
F	4.1		4.3	0.161		0.169
F1	4.6		5	0.181		0.196
P	4		4.3	0.157		0.169
P1	4		4.4	0.157		0.173
S	30.1		30.3	1.185		1.193



P093A

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