



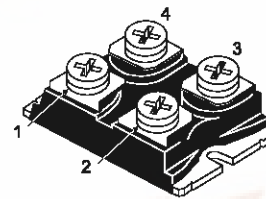
ESM6045AV

NPN DARLINGTON POWER MODULE

- HIGH CURRENT POWER BIPOLAR MODULE
- VERY LOW R_{th} JUNCTION CASE
- SPECIFIED ACCIDENTAL OVERLOAD AREAS
- ISOLATED CASE (2500V RMS)
- EASY TO MOUNT
- LOW INTERNAL PARASITIC INDUCTANCE

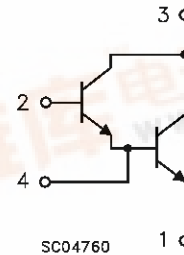
INDUSTRIAL APPLICATIONS:

- MOTOR CONTROL
- SMPS & UPS
- WELDING EQUIPMENT



ISOTOP

INTERNAL SCHEMATIC DIAGRAM



SC04760

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CEV}	Collector-Emitter Voltage ($V_{BE} = -5\text{ V}$)	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	72	A
I_{CM}	Collector Peak Current ($t_p = 10\text{ ms}$)	108	A
I_B	Base Current	8	A
I_{BM}	Base Peak Current ($t_p = 10\text{ ms}$)	16	A
P_{tot}	Total Dissipation at $T_c = 25\text{ }^\circ\text{C}$	250	W
T_{stg}	Storage Temperature	-55 to 150	$^\circ\text{C}$
T_j	Max. Operating Junction Temperature	150	$^\circ\text{C}$
V_{ISO}	Insulation Withstand Voltage (AC-RMS)	2500	$^\circ\text{C}$

ESM6045AV

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case	Max	0.5	$^{\circ}\text{C/W}$
R_{thc-h}	Thermal Resistance Case-heatsink With Conductive Grease Applied	Max	0.05	$^{\circ}\text{C/W}$

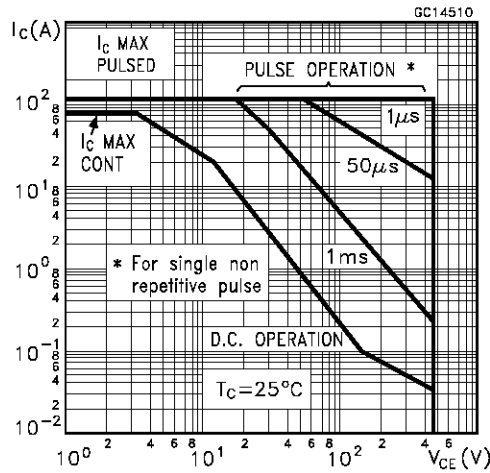
ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CER} \#$	Collector Cut-off Current ($R_{BE} = 5 \Omega$)	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV} \quad T_j = 100^{\circ}\text{C}$			1.5 22	mA mA
$I_{CEV} \#$	Collector Cut-off Current ($V_{BE} = -5$)	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV} \quad T_j = 100^{\circ}\text{C}$			1 15	mA mA
$I_{EBO} \#$	Emitter Cut-off Current ($I_C = 0$)	$V_{EB} = 5 \text{ V}$			1	mA
$V_{CEO(SUS)}^*$	Collector-Emitter Sustaining Voltage	$I_C = 0.2 \text{ A} \quad L = 25 \text{ mH}$ $V_{clamp} = 450 \text{ V}$	450			V
h_{FE}^*	DC Current Gain	$I_C = 60 \text{ A} \quad V_{CE} = 5 \text{ V}$		150		
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 50 \text{ A} \quad I_B = 1 \text{ A}$ $I_C = 50 \text{ A} \quad I_B = 1 \text{ A} \quad T_j = 100^{\circ}\text{C}$ $I_C = 60 \text{ A} \quad I_B = 2.4 \text{ A}$ $I_C = 60 \text{ A} \quad I_B = 2.4 \text{ A} \quad T_j = 100^{\circ}\text{C}$		1.2 1.6 1.3 1.55	2 2	V V V V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 60 \text{ A} \quad I_B = 2.4 \text{ A}$ $I_C = 60 \text{ A} \quad I_B = 2.4 \text{ A} \quad T_j = 100^{\circ}\text{C}$		2.1 2.15	3	V V
di_C/dt	Rate of Rise of On-state Collector	$V_{CC} = 300 \text{ V} \quad R_C = 0 \quad t_p = 3 \mu\text{s}$ $I_{B1} = 3.6 \text{ A} \quad T_j = 100^{\circ}\text{C}$	450	500		A/ μs
$V_{CE(3 \mu\text{s})}^{\bullet}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 \text{ V} \quad R_C = 5 \Omega$ $I_{B1} = 3.6 \text{ A} \quad T_j = 100^{\circ}\text{C}$		4	7	V
$V_{CE(5 \mu\text{s})}^{\bullet}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 \text{ V} \quad R_C = 5 \Omega$ $I_{B1} = 3.6 \text{ A} \quad T_j = 100^{\circ}\text{C}$		2.5	4	V
t_s t_f t_c	Storage Time Fall Time Cross-over Time	$I_C = 60 \text{ A} \quad V_{CC} = 50 \text{ V}$ $V_{BB} = -5 \text{ V} \quad R_{BB} = 0.3 \Omega$ $V_{clamp} = 450 \text{ V} \quad I_{B1} = 2.4 \text{ A}$ $L = 0.04 \text{ mH} \quad T_j = 100^{\circ}\text{C}$		4.6 0.4 1.2	6 0.6 2	μs μs μs
V_{CEW}	Maximum Collector Emitter Voltage Without Snubber	$I_{C\text{Woff}} = 72 \text{ A} \quad I_{B1} = 2.4 \text{ A}$ $V_{BB} = -5 \text{ V} \quad V_{CC} = 50 \text{ V}$ $L = 35 \mu\text{H} \quad R_{BB} = 0.3 \Omega$ $T_j = 125^{\circ}\text{C}$	450			V

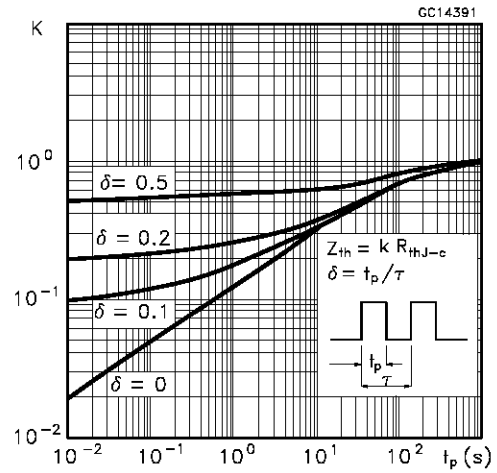
* Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

See test circuits in databook introduction

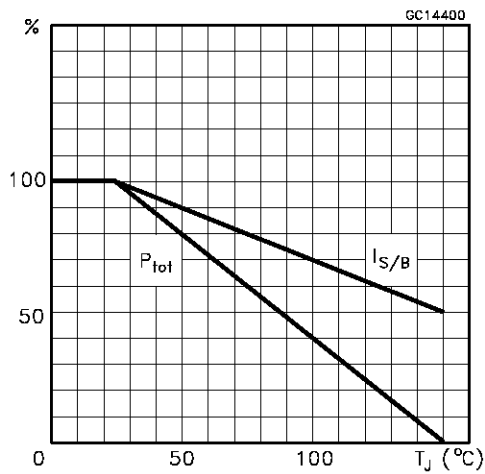
Safe Operating Areas



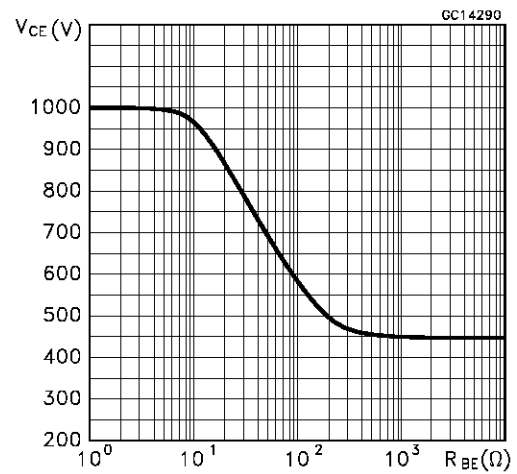
Thermal Impedance



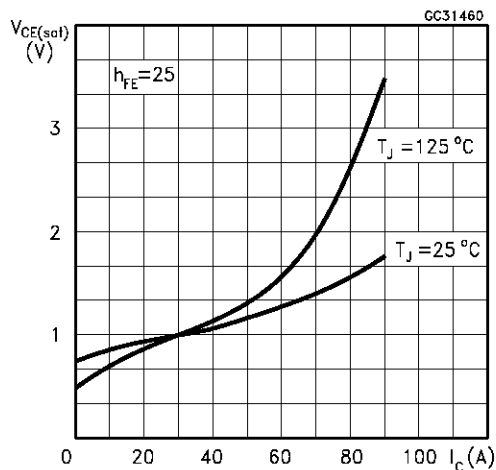
Derating Curve



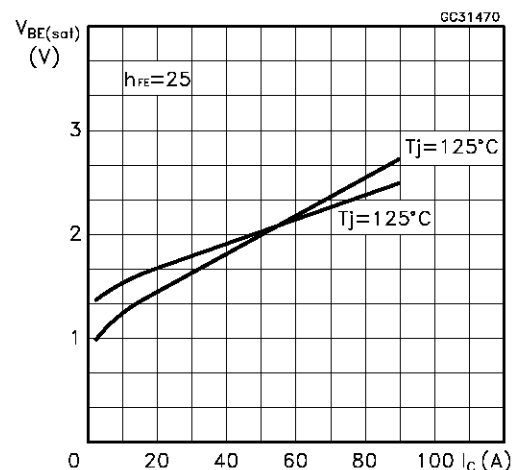
Collector-emitter Voltage Versus base-emitter Resistance



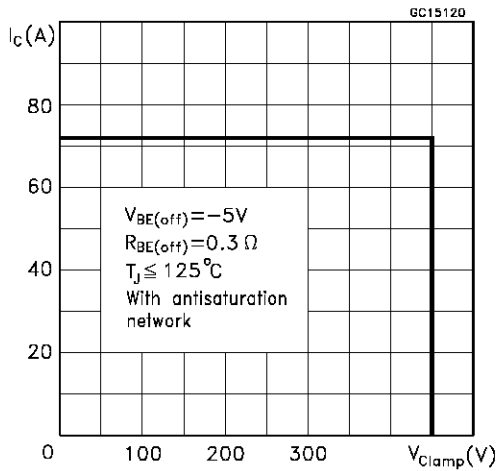
Collector Emitter Saturation Voltage



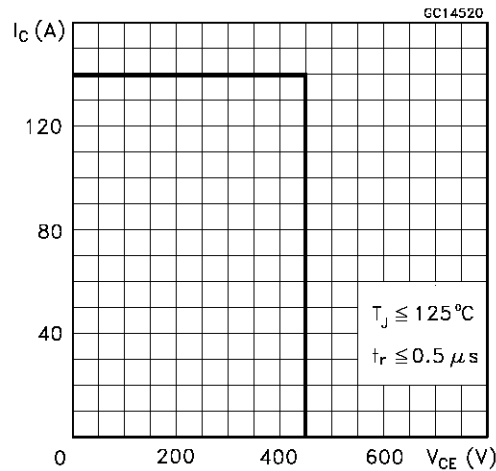
Base-Emitter Saturation Voltage



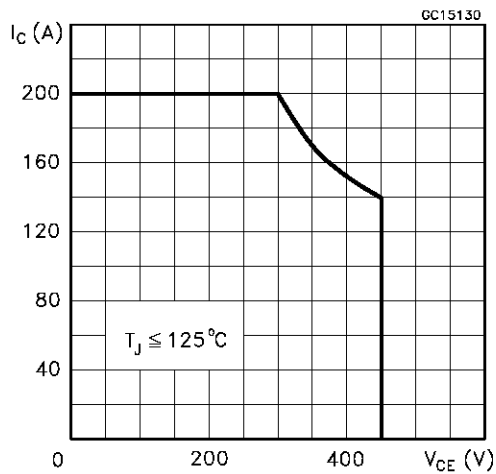
Reverse Biased SOA



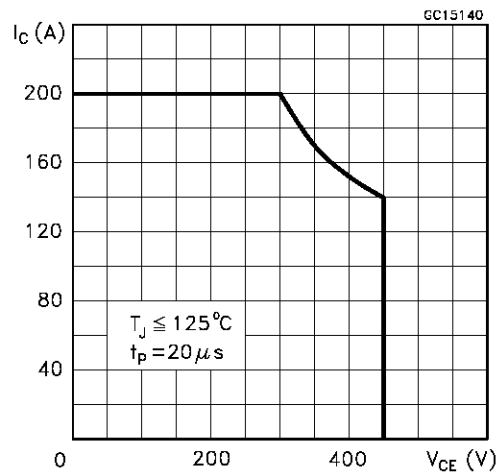
Foward Biased SOA



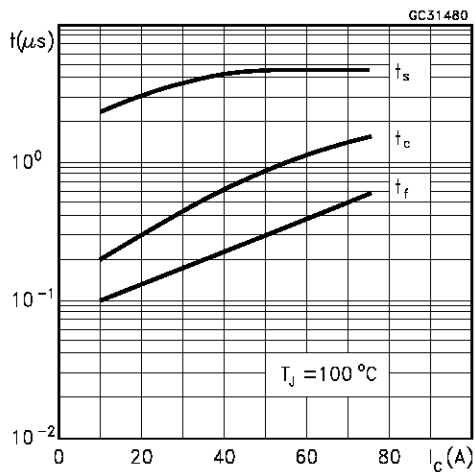
Reverse Biased AOA



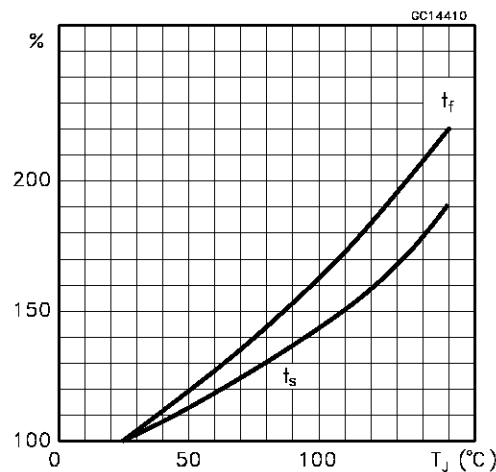
Forward Biased AOA



Switching Times Inductive Load

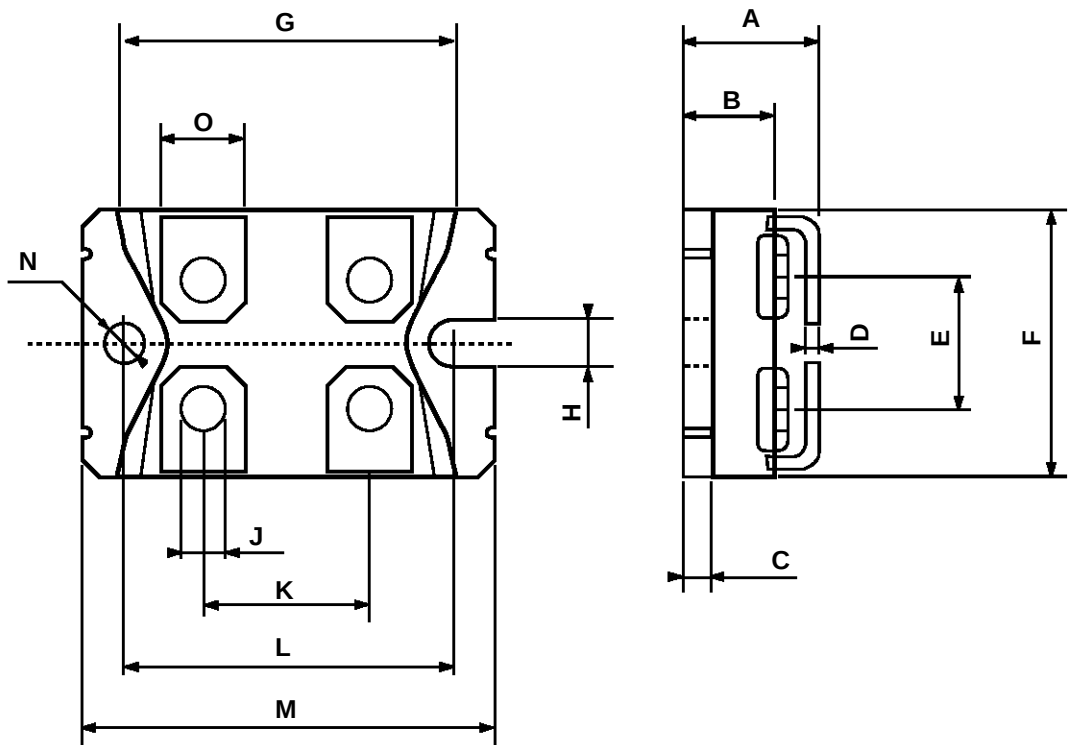


Switching Times Inductive Load Versus Temperature



ISOTOP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.8		12.2	0.466		0.480
B	8.9		9.1	0.350		0.358
C	1.95		2.05	0.076		0.080
D	0.75		0.85	0.029		0.033
E	12.6		12.8	0.496		0.503
F	25.15		25.5	0.990		1.003
G	31.5		31.7	1.240		1.248
H	4			0.157		
J	4.1		4.3	0.161		0.169
K	14.9		15.1	0.586		0.594
L	30.1		30.3	1.185		1.193
M	37.8		38.2	1.488		1.503
N	4			0.157		
O	7.8		8.2	0.307		0.322



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