

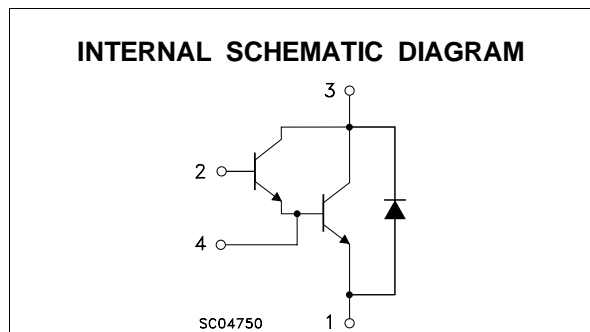
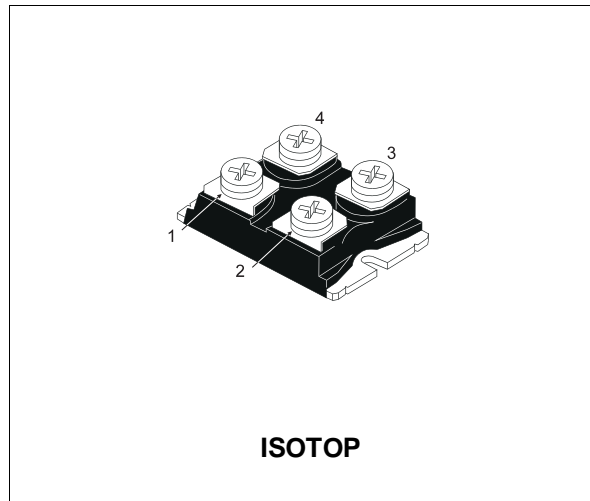


## NPN DARLINGTON POWER MODULE

- HIGH CURRENT POWER BIPOLAR MODULE
- VERY LOW  $R_{th}$  JUNCTION TO CASE
- SPECIFIED ACCIDENTAL OVERLOAD AREAS
- ULTRAFAST FREEWHEELING DIODE
- FULLY INSULATED PACKAGE (UL COMPLIANT)
- EASY TO MOUNT
- LOW INTERNAL PARASITIC INDUCTANCE

### INDUSTRIAL APPLICATIONS:

- MOTOR CONTROL
- UPS
- DC/DC & DC/AC CONVERTERS



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CEV}$	Collector-Emitter Voltage ( $V_{BE} = -5$ V)	150	V
$V_{CEO(sus)}$	Collector-Emitter Voltage ( $I_B = 0$ )	120	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	7	V
$I_C$	Collector Current	120	A
$I_{CM}$	Collector Peak Current ( $t_p = 10$ ms)	180	A
$I_B$	Base Current	2	A
$I_{BM}$	Base Peak Current ( $t_p = 10$ ms)	4	A
$P_{tot}$	Total Dissipation at $T_c = 25$ °C	175	W
$V_{isol}$	Insulation Withstand Voltage (RMS) from All Four Terminals to External Heatsink	2500	V
$T_{stg}$	Storage Temperature	-55 to 150	°C
$T_j$	Max. Operating Junction Temperature	150	°C

**THERMAL DATA**

R <sub>thj-case</sub>	Thermal Resistance Junction-case (transistor)	Max	0.7	°C/W
R <sub>thj-case</sub>	Thermal Resistance Junction-case (diode)	Max	0.9	°C/W
R <sub>thc-h</sub>	Thermal Resistance Case-heatsink With Conductive Grease Applied	Max	0.05	°C/W

**ELECTRICAL CHARACTERISTICS** (T<sub>case</sub> = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CER</sub> #	Collector Cut-off Current (R <sub>BE</sub> = 5 Ω)	V <sub>CE</sub> = V <sub>CEV</sub> V <sub>CE</sub> = V <sub>CEV</sub> T <sub>j</sub> = 100 °C			1.5 10	mA mA
I <sub>CEV</sub> #	Collector Cut-off Current (V <sub>BE</sub> = -5V)	V <sub>CE</sub> = V <sub>CEV</sub> V <sub>CE</sub> = V <sub>CEV</sub> T <sub>j</sub> = 100 °C			1 7	mA mA
I <sub>EBO</sub> #	Emitter Cut-off Current (I <sub>C</sub> = 0)	V <sub>EB</sub> = 5 V			1	mA
V <sub>CEO(SUS)</sub> *	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 5 A L = 15 mH V <sub>clamp</sub> = 125 V	125			V
h <sub>FE</sub> *	DC Current Gain	I <sub>C</sub> = 100 A V <sub>CE</sub> = 5 V		1200		
V <sub>CE(sat)</sub> *	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 70 A I <sub>B</sub> = 0.25 A I <sub>C</sub> = 70 A I <sub>B</sub> = 0.25 A T <sub>j</sub> = 100 °C I <sub>C</sub> = 100 A I <sub>B</sub> = 1 A I <sub>C</sub> = 100 A I <sub>B</sub> = 1 A T <sub>j</sub> = 100 °C		1.25 1.35 1.5 1.65	1.5	V V V V
V <sub>BE(sat)</sub> *	Base-Emitter Saturation Voltage	I <sub>C</sub> = 100 A I <sub>B</sub> = 1 A I <sub>C</sub> = 100 A I <sub>B</sub> = 1 A T <sub>j</sub> = 100 °C		2.3 2.35	3	V V
di <sub>C</sub> /dt	Rate of Rise of On-state Collector	V <sub>CC</sub> = 90 V R <sub>C</sub> = 0 t <sub>p</sub> = 3 μs I <sub>B1</sub> = 0.5 A T <sub>j</sub> = 100 °C	200	230		A/μs
V <sub>CE(3 μs)</sub> **	Collector-Emitter Dynamic Voltage	V <sub>CC</sub> = 90 V R <sub>C</sub> = 1.3 Ω I <sub>B1</sub> = 0.5 A T <sub>j</sub> = 100 °C		2	3	V
V <sub>CE(5 μs)</sub> **	Collector-Emitter Dynamic Voltage	V <sub>CC</sub> = 90 V R <sub>C</sub> = 1.3 Ω I <sub>B1</sub> = 0.5 A T <sub>j</sub> = 100 °C		1.8	2.5	V
t <sub>s</sub> t <sub>f</sub> t <sub>c</sub>	Storage Time Fall Time Cross-over Time	I <sub>C</sub> = 70 A V <sub>CC</sub> = 90 V V <sub>BB</sub> = -5 V R <sub>BB</sub> = Ω V <sub>clamp</sub> = 125 V I <sub>B1</sub> = 0.25 A L = 60 μH T <sub>j</sub> = 100 °C		0.9 0.15 0.3	2 0.3 0.6	μs μs μs
V <sub>CEW</sub>	Maximum Collector Emitter Voltage Without Snubber	I <sub>CWoff</sub> = 120 A I <sub>B1</sub> = 1A V <sub>BB</sub> = -5 V V <sub>CC</sub> = 90 V L = 60 μH R <sub>BB</sub> = 1.25 Ω T <sub>j</sub> = 125 °C	125			V
V <sub>F</sub> *	Diode Forward Voltage	I <sub>F</sub> = 100 A T <sub>j</sub> = 100 °C		0.92	1	V
I <sub>RM</sub>	Reverse Recovery Current	V <sub>CC</sub> = 125 V I <sub>F</sub> = 100 A di <sub>F</sub> /dt = -200 A/μs L < 0.05 μH T <sub>j</sub> = 100 °C		10	14	A

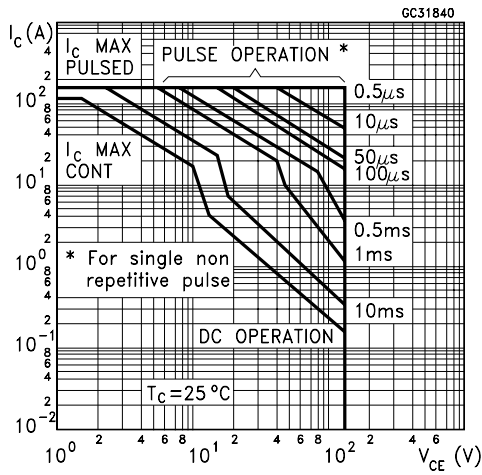
\* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

# See test circuits in databook introduction

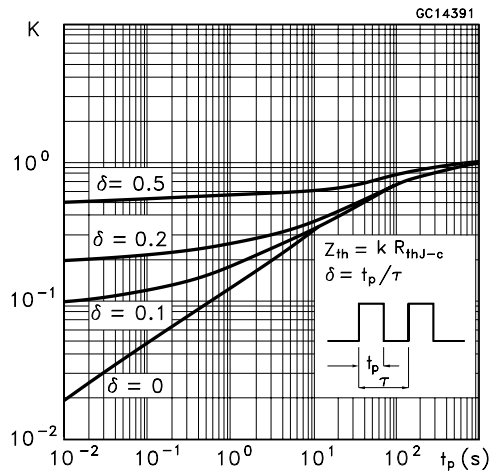
To evaluate the conduction losses of the diode use the following equations:

$$V_F = 0.66 + 0.0034 I_F \quad P = 0.66 I_{F(AV)} + 0.0034 I_{F(RMS)}^2$$

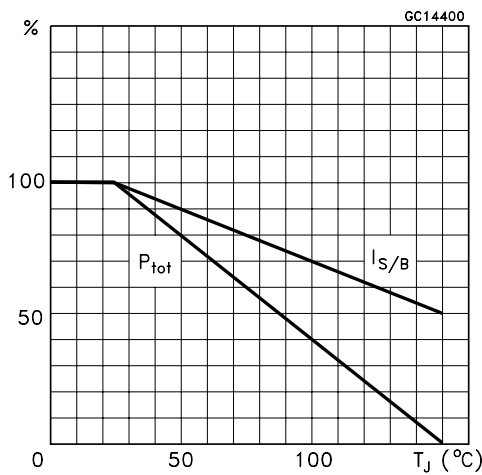
Safe Operating Areas



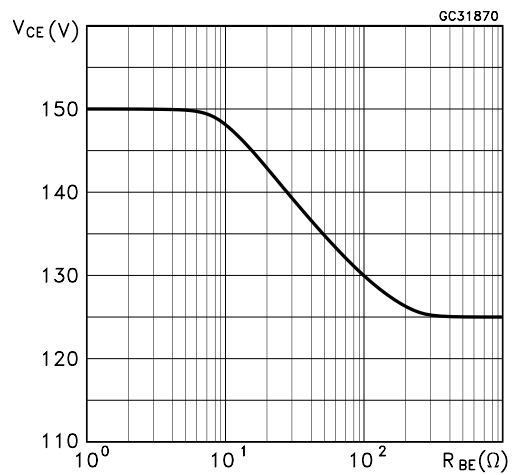
Thermal Impedance



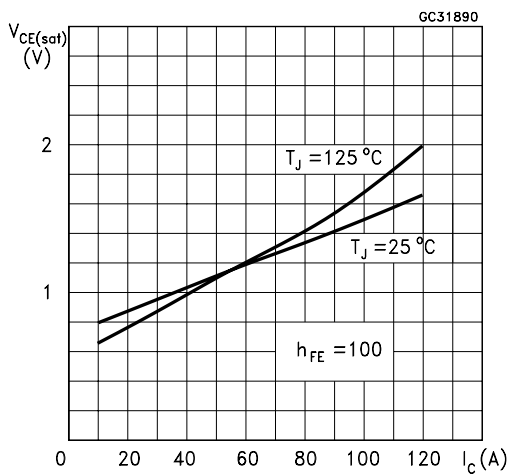
Derating Curve



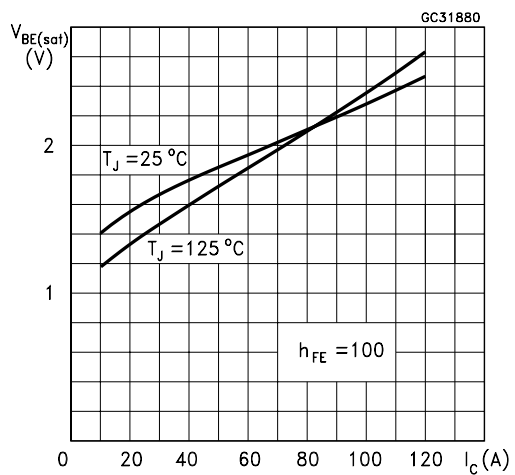
Collector-emitter Voltage Versus base-emitter Resistance



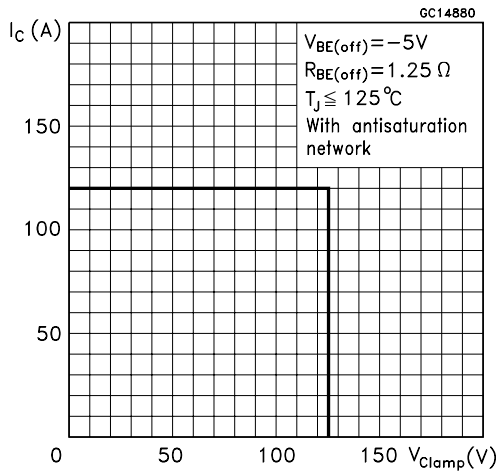
Collector Emitter Saturation Voltage



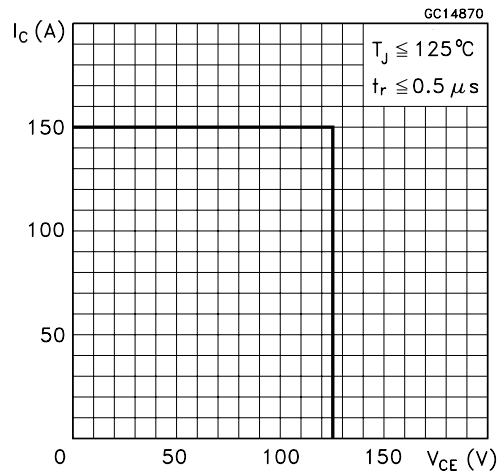
Base-Emitter Saturation Voltage



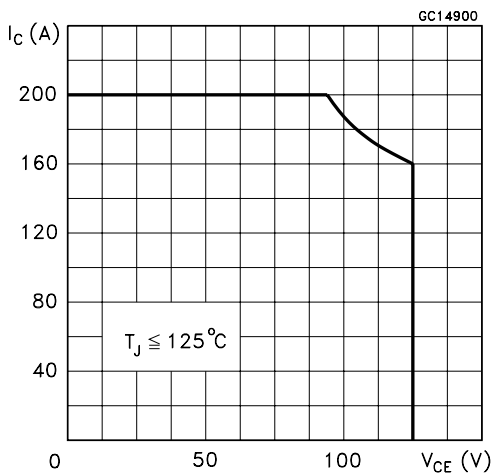
Reverse Biased SOA



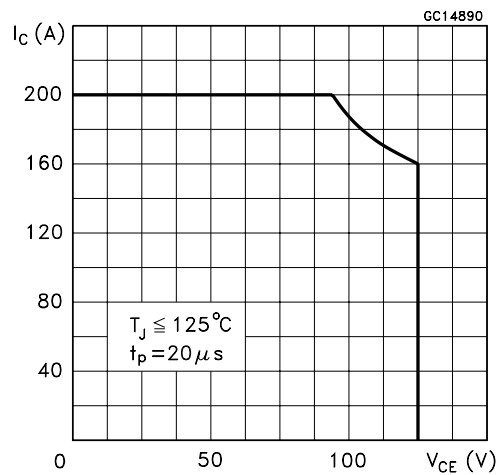
Forward Biased SOA



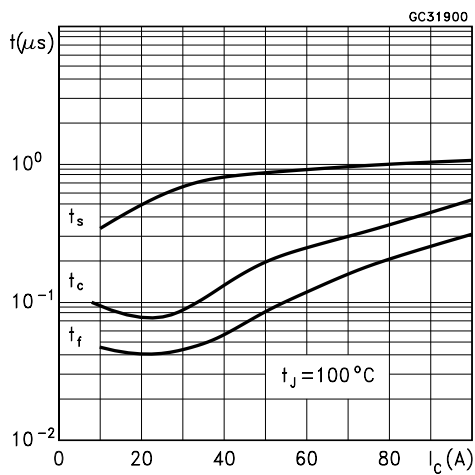
Reverse Biased AOA



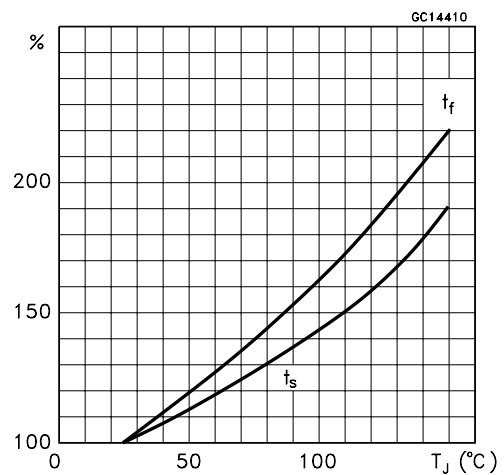
Forward Biased AOA



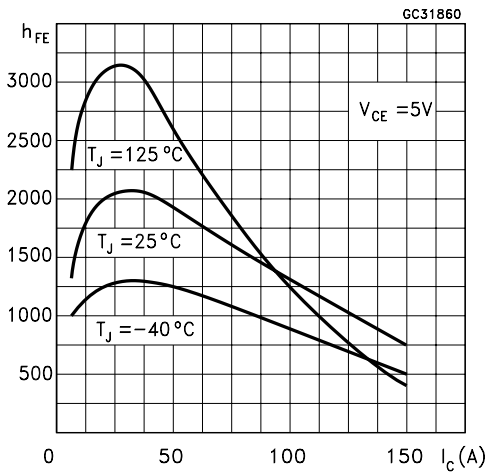
Switching Times Inductive Load



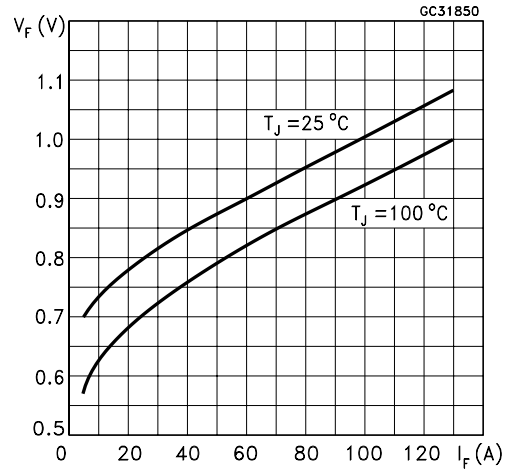
Switching Times Inductive Load Versus Temperature



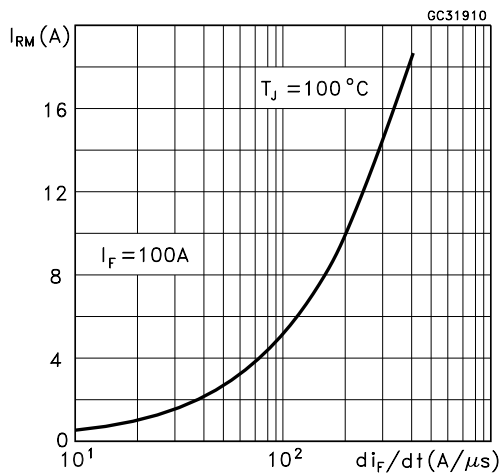
Dc Current Gain



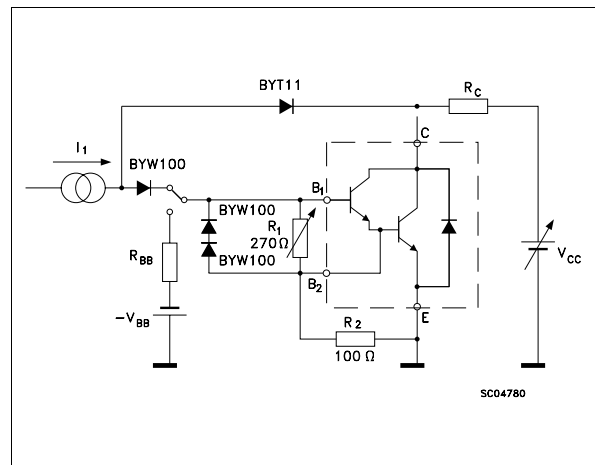
Typical  $V_F$  Versus  $I_F$



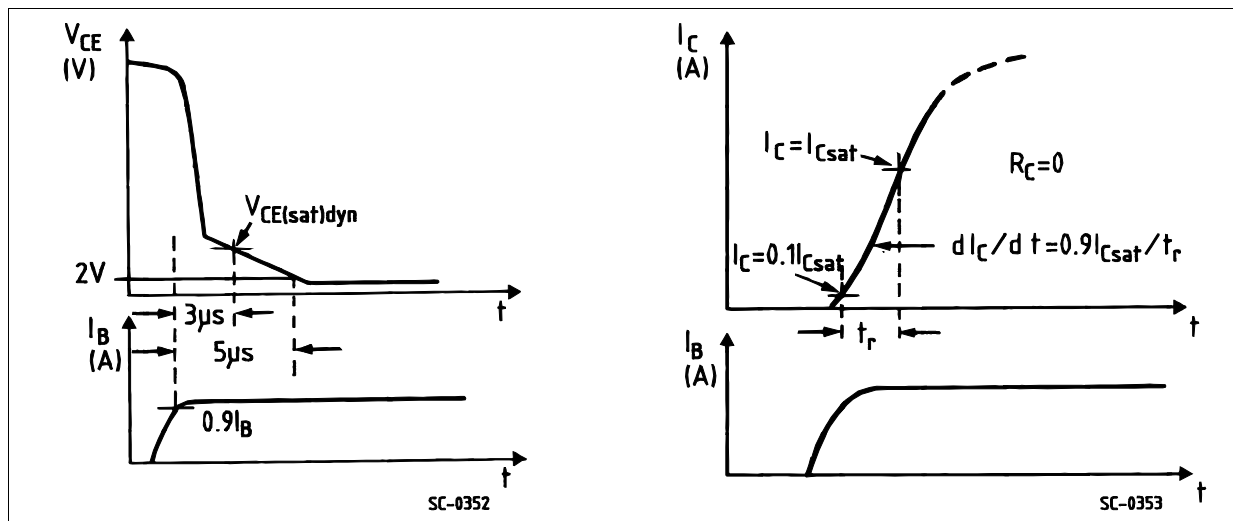
Peak Reverse Current Versus  $di_F/dt$



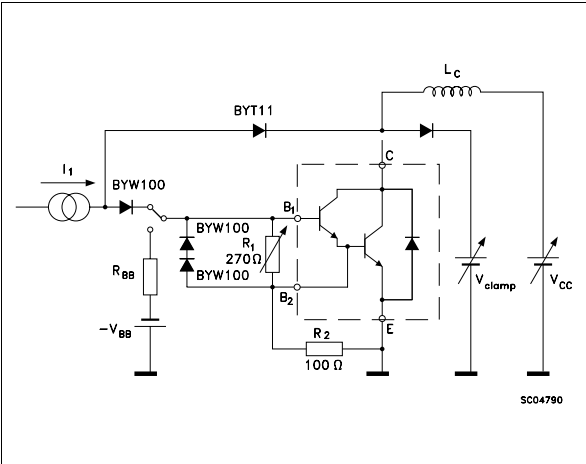
Turn-on Switching Test Circuit



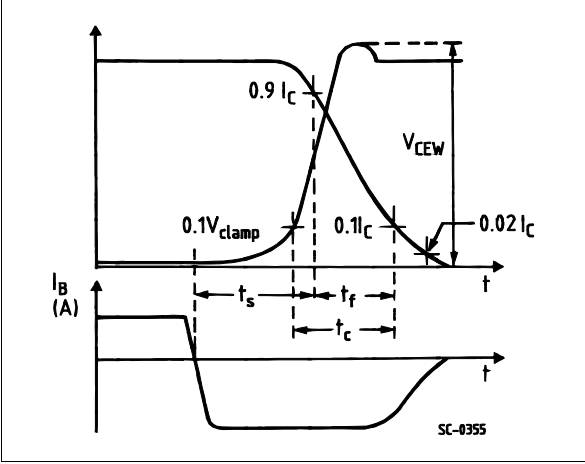
Turn-on Switching Waveforms



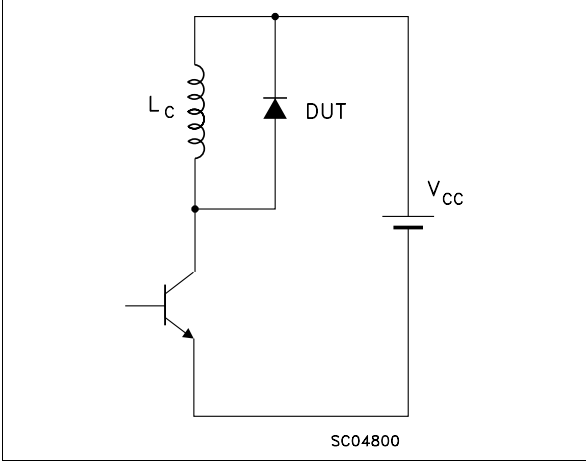
Turn-on Switching Test Circuit



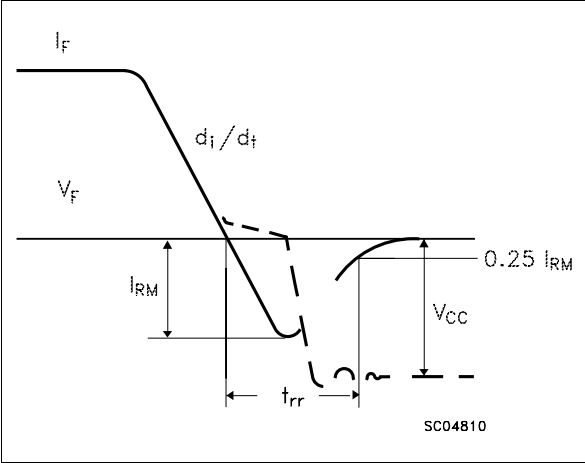
Turn-off Switching Waveforms



Turn-off Switching Test Circuit of Diode

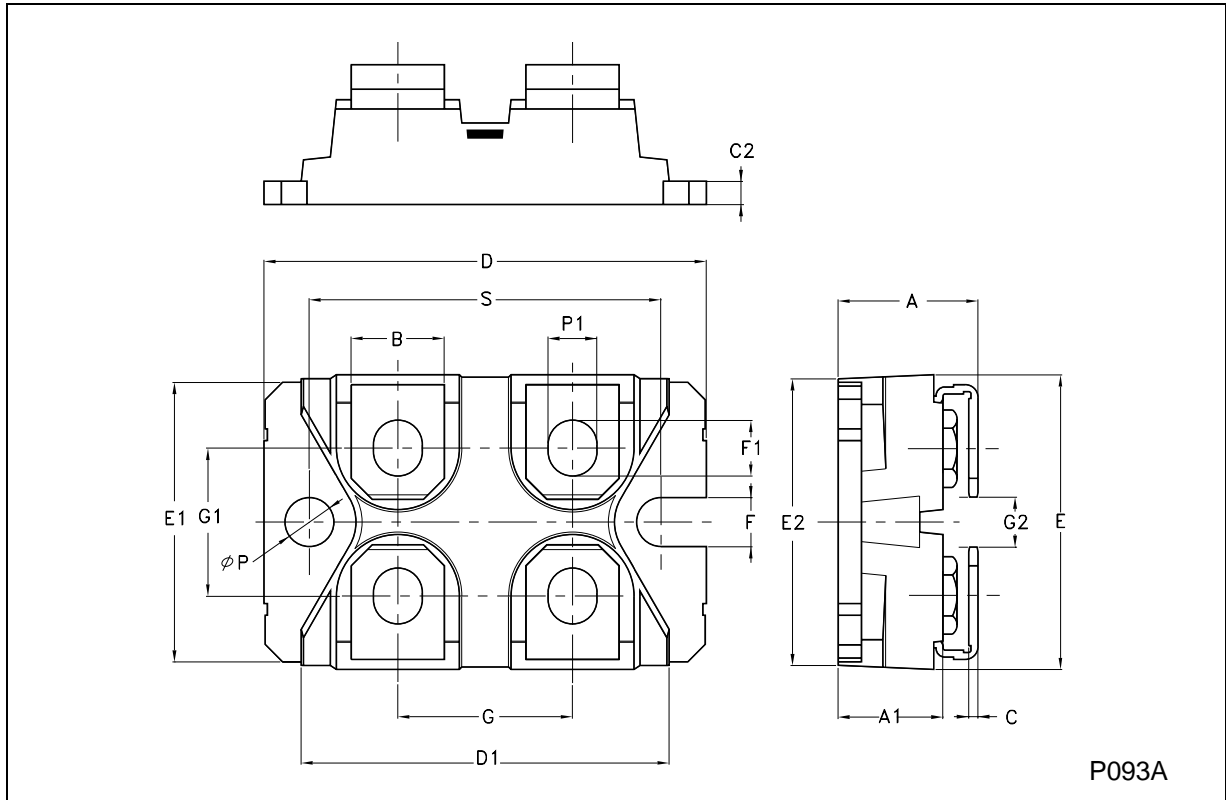


Turn-off Switching Waveform of Diode



**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



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