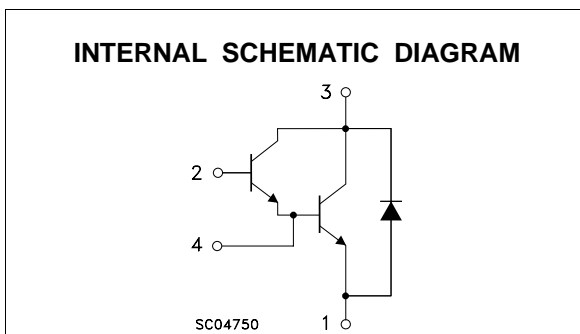
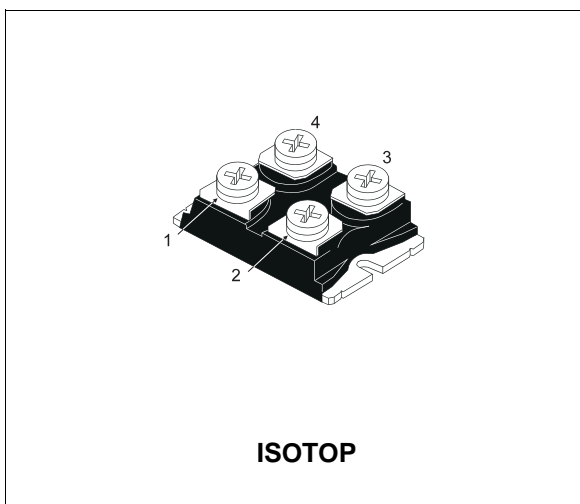


NPN DARLINGTON POWER MODULE

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

INDUSTRIAL APPLICATIONS:

- MOTOR CONTROL
- SMPS & UPS
- DC/DC & DC/AC CONVERTERS
- WELDING EQUIPMENT



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CEV}	Collector-Emitter Voltage ($V_{BE} = -5$ V)	600	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	24	A
I_{CM}	Collector Peak Current ($t_p = 10$ ms)	36	A
I_B	Base Current	2.5	A
I_{BM}	Base Peak Current ($t_p = 10$ ms)	5	A
P_{tot}	Total Dissipation at $T_c = 25$ °C	125	W
T_{stg}	Storage Temperature	-55 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C
V_{ISO}	Insulation Withstand Voltage (AC-RMS)	2500	°C

THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case (transistor)	Max	1	°C/W
R _{thj-case}	Thermal Resistance Junction-case (diode)	Max	2	°C/W
R _{thc-h}	Thermal Resistance Case-heatsink With Conductive Grease Applied	Max	0.05	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _{CER} #	Collector Cut-off Current (R _{BE} = 5 Ω)	V _{CE} = V _{CEV} V _{CE} = V _{CEV} T _j = 100 °C			1.5 17	mA mA
I _{CEV} #	Collector Cut-off Current (V _{BE} = -5)	V _{CE} = V _{CEV} V _{CE} = V _{CEV} T _j = 100 °C			1 12	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 _C = 0.2 A L = 25 mH V _{clamp} = 450 V	450			V
h _{FE} *	DC Current Gain	I _C = 20 A V _{CE} = 5 V		120		
V _{CE(sat)} *	Collector-Emitter Saturation Voltage	I _C = 15 A I _B = 0.3 A I _C = 15 A I _B = 0.3 A T _j = 100 °C I _C = 20 A I _B = 1.2 A I _C = 20 A I _B = 1.2 A T _j = 100 °C		1.2 1.3 1.4 1.6	2 2	V V V V
V _{BE(sat)} *	Base-Emitter Saturation Voltage	I _C = 20 A I _B = 1.2 A I _C = 20 A I _B = 1.2 A T _j = 100 °C		2.1 2.1	3	V V
di _C /dt	Rate of Rise of On-state Collector	V _{CC} = 300 V R _C = 0 t _p = 3 μs I _{B1} = 0.45 A T _j = 100 °C	125	160		A/μs
V _{CE(3 μs)} •	Collector-Emitter Dynamic Voltage	V _{CC} = 300 V R _C = 20 Ω I _{B1} = 0.45 A T _j = 100 °C		4.5	8	V
V _{CE(5 μs)} •	Collector-Emitter Dynamic Voltage	V _{CC} = 300 V R _C = 20 Ω I _{B1} = 0.45 A T _j = 100 °C		2.5	4.5	V
t _s t _f t _c	Storage Time Fall Time Cross-over Time	I _C = 15 A V _{CC} = 50 V V _{BB} = -5 V R _{BB} = 0.6 Ω V _{clamp} = 450 V I _{B1} = 0.3 A L = 0.17 mH T _j = 100 °C		2.1 0.15 0.5	4 0.4 1.2	μs μs μs
V _{CEW}	Maximum Collector Emitter Voltage Without Snubber	I _{CWoff} = 24 A I _{B1} = 1.2 A V _{BB} = -5 V V _{CC} = 50 V L = 0.1 mH R _{BB} = 0.6 Ω T _j = 125 °C	450			V
V _F *	Diode Forward Voltage	I _F = 20 A T _j = 100 °C		1.7	2	V
I _{RM}	Reverse Recovery Current	V _{CC} = 200 V I _F = 20 A di _F /dt = -125 A/μs L < 0.05 μH T _j = 100 °C		11	14	A

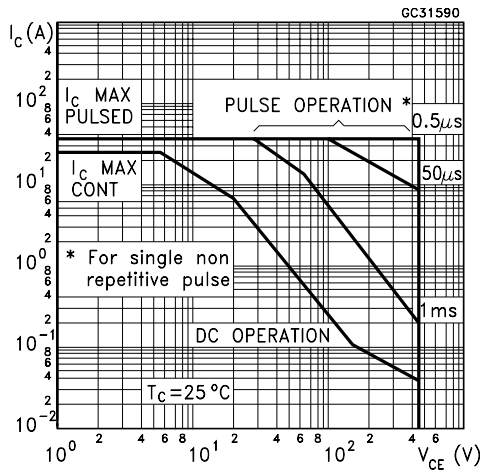
* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

See test circuits in databook introduction

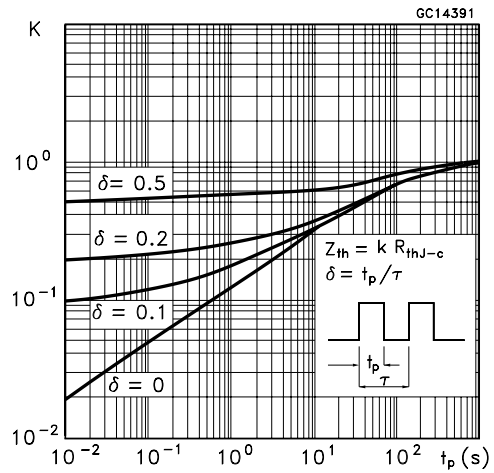
To evaluate the conduction losses of the diode use the following equations:

$$V_F = 1.47 + 0.0026 I_F \quad P = 1.47 I_{F(AV)} + 0.0026 I_{F(RMS)}^2$$

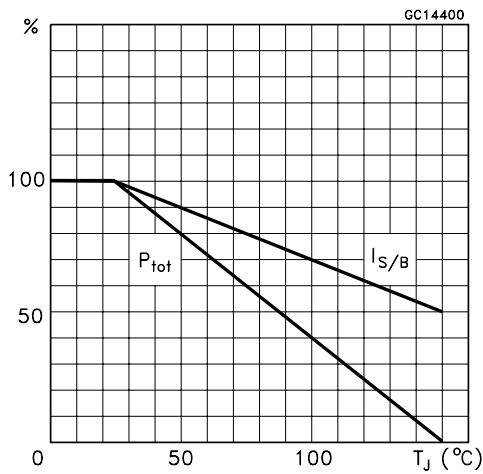
Safe Operating Areas



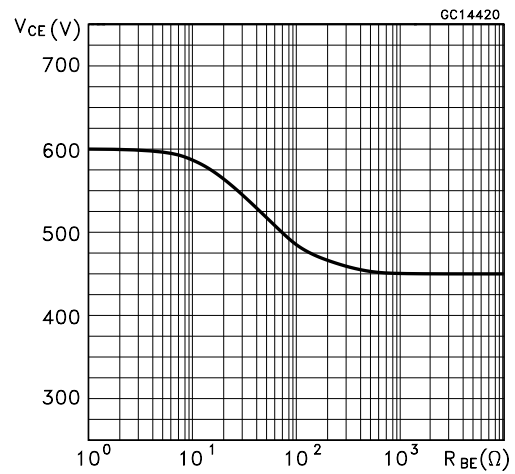
Thermal Impedance



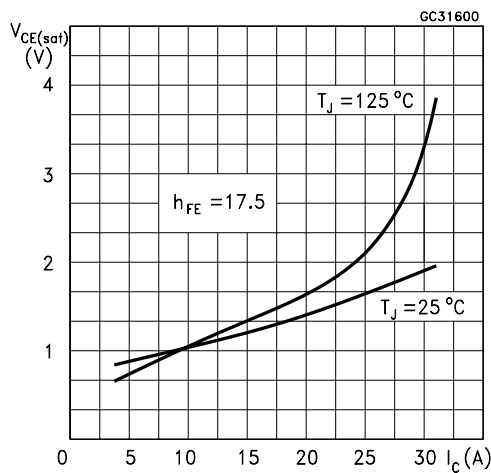
Derating Curve



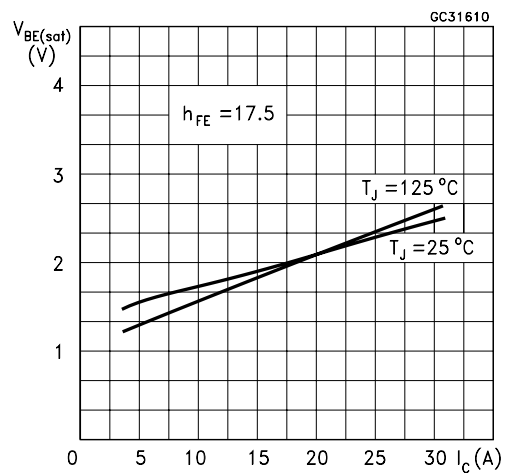
Collector-emitter Voltage Versus base-emitter Resistance



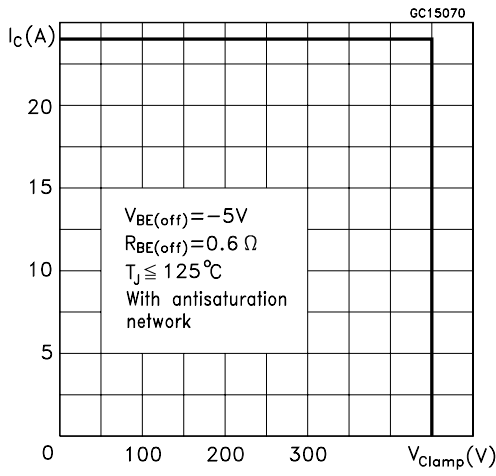
Collector Emitter Saturation Voltage



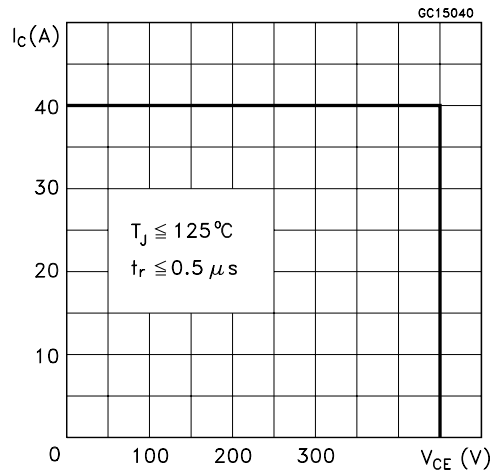
Base-Emitter Saturation Voltage



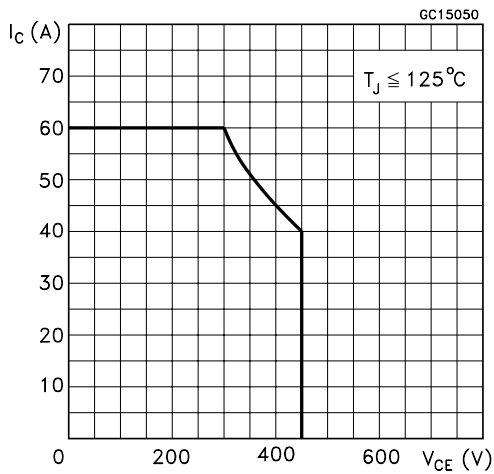
Reverse Biased SOA



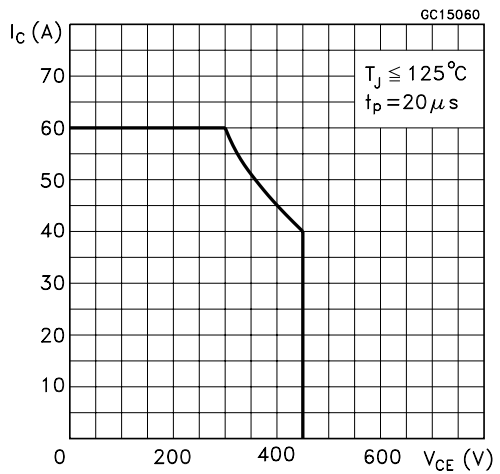
Forward Biased SOA



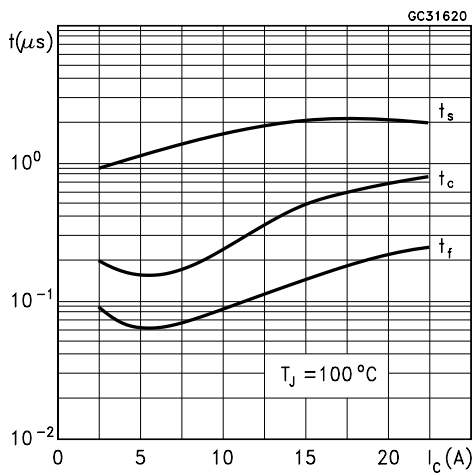
Reverse Biased AOA



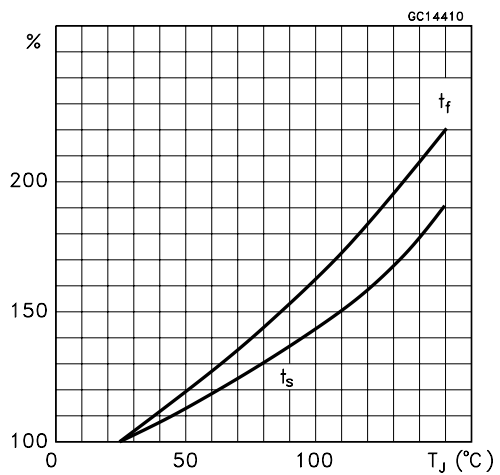
Forward Biased AOA



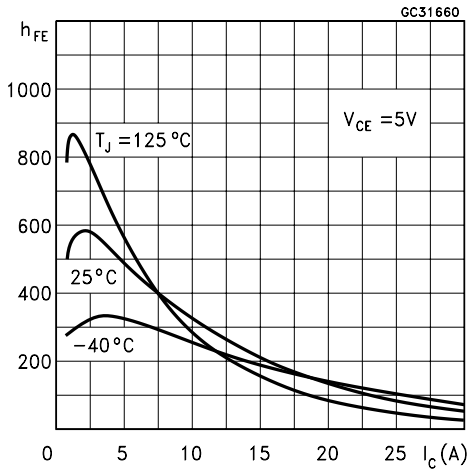
Switching Times Inductive Load



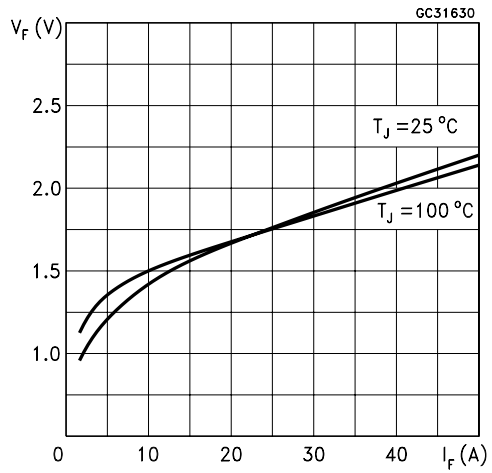
Switching Times Inductive Load Versus Temperature



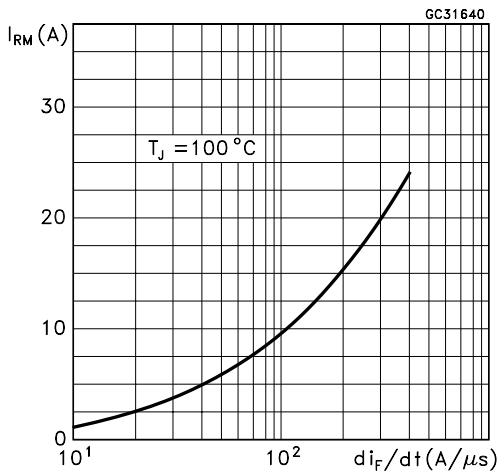
Dc Current Gain



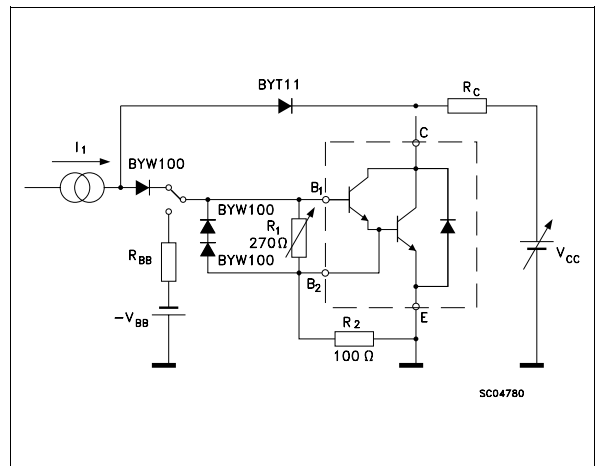
Typical VF Versus IF



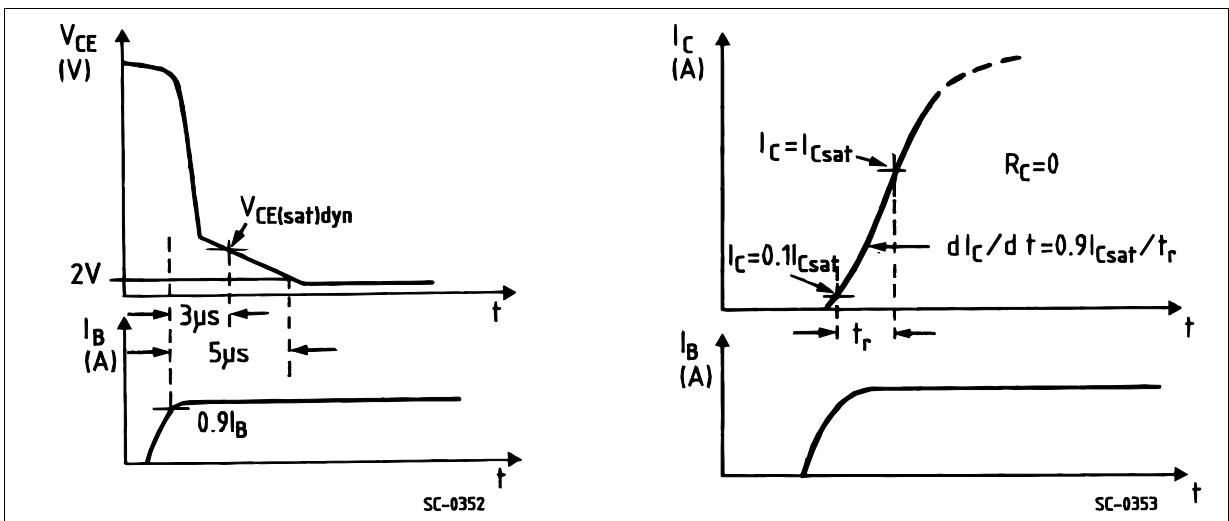
Peak Reverse Current Versus diF/dt



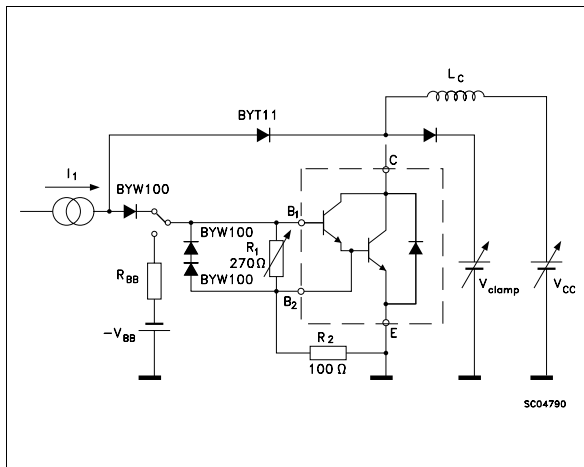
Turn-on Switching Test Circuit



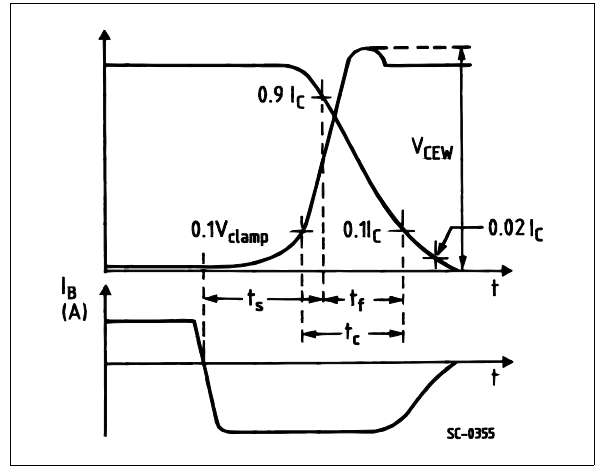
Turn-on Switching Waveforms



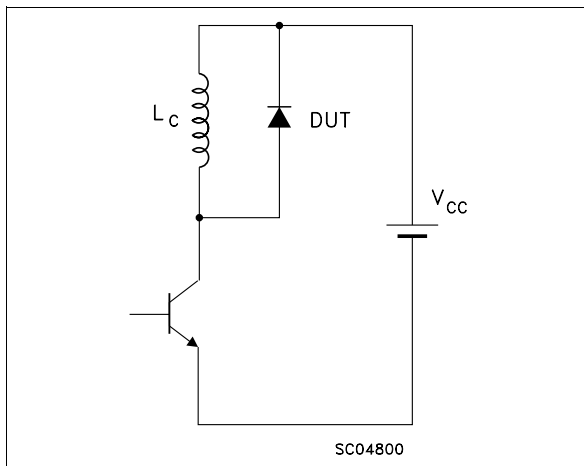
Turn-on Switching Test Circuit



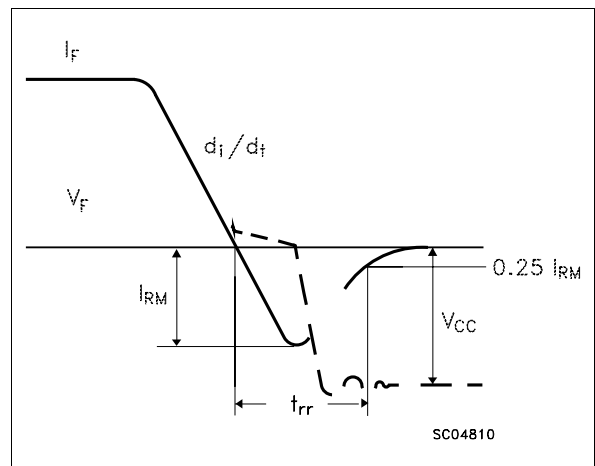
Turn-off Switching Waveforms



Turn-off Switching Test Circuit of Diode

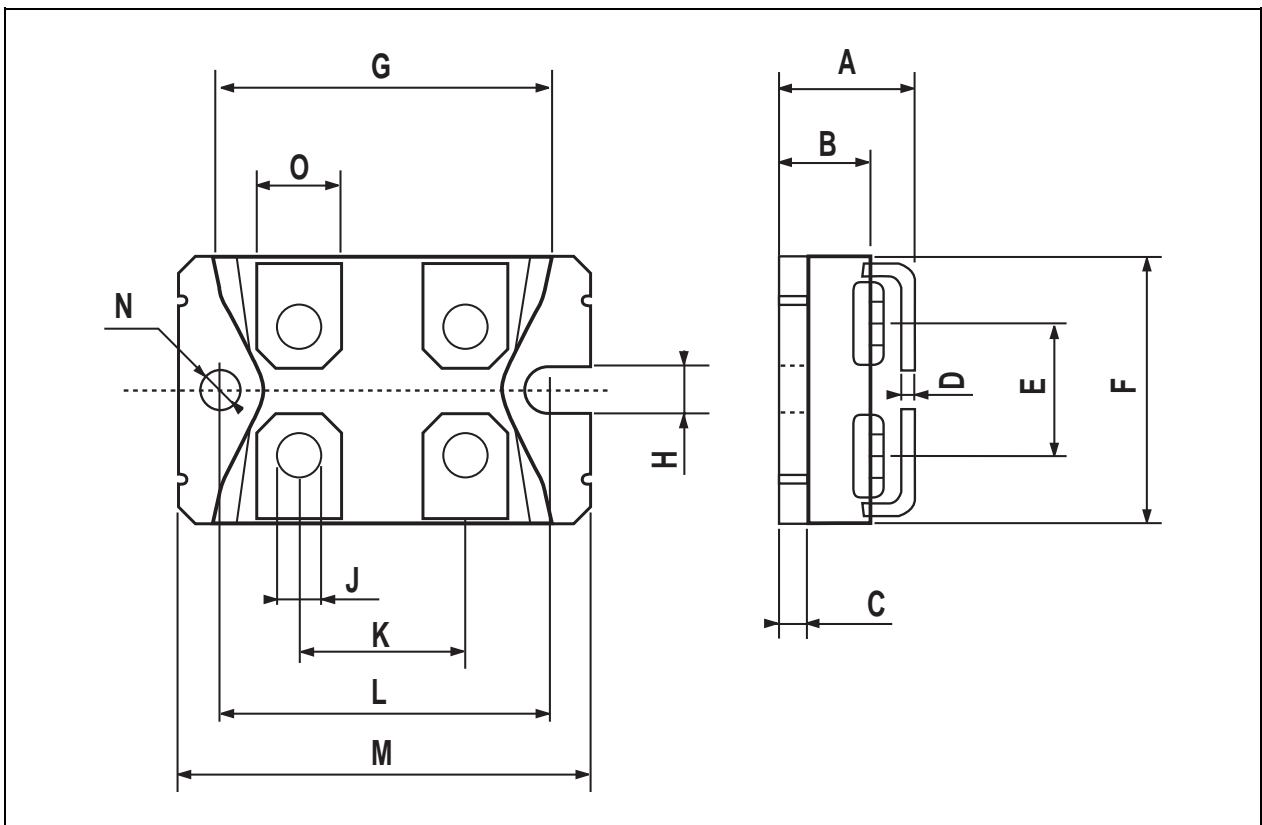


Turn-off Switching Waveform of Diode



ISOTOP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.8		12.2	0.466		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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