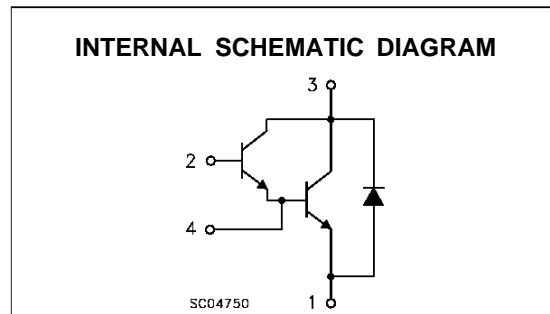
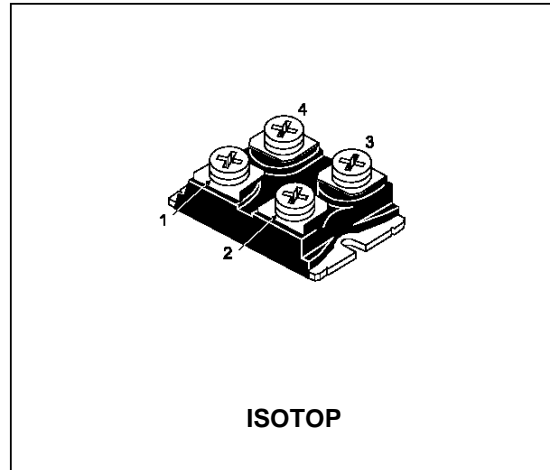


NPN DARLINGTON POWER MODULE

- 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

ESM3045DV

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}			1.5	mA
		V _{CE} = V _{CEV} T _j = 100 °C			17	mA
I _{CEV} #	Collector Cut-off Current (V _{BE} = -5)	V _{CE} = V _{CEV}			1	mA
		V _{CE} = V _{CEV} T _j = 100 °C			12	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		1.2		V
		I _C = 15 A I _B = 0.3 A T _j = 100 °C		1.3	2	V
		I _C = 20 A I _B = 1.2 A		1.4		V
		I _C = 20 A I _B = 1.2 A T _j = 100 °C		1.6	2	V
V _{BE(sat)} *	Base-Emitter Saturation Voltage	I _C = 20 A I _B = 1.2 A		2.1		V
		I _C = 20 A I _B = 1.2 A T _j = 100 °C		2.1	3	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	Storage 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	4	μs
t _f	Fall Time			0.15	0.4	μs
t _c	Cross-over Time			0.5	1.2	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

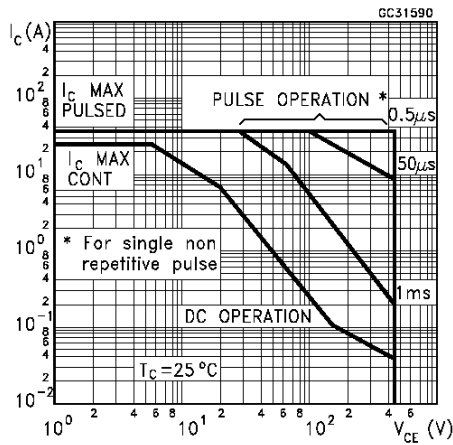
* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

See test circuits in databook introduction

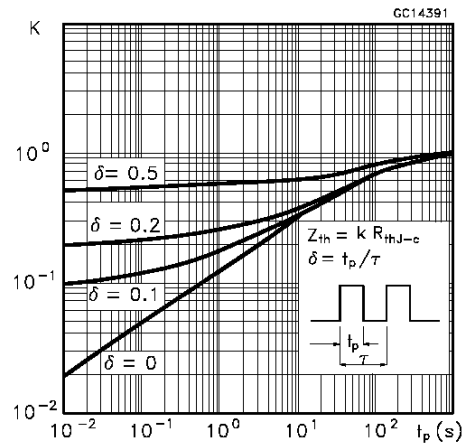
To evaluate the conduction losses of the diode use the following equations:

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

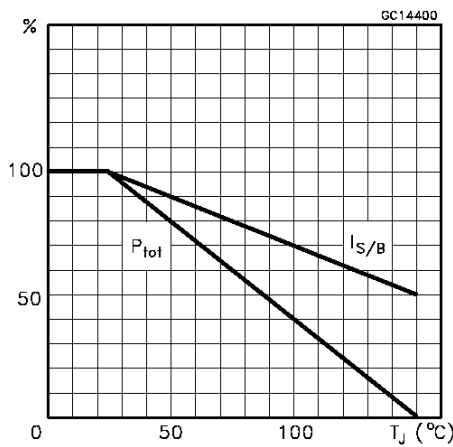
Safe Operating Areas



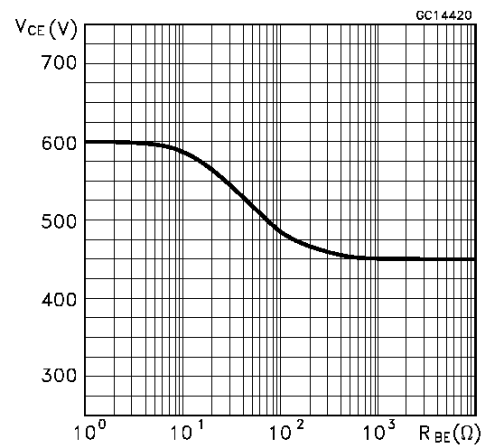
Thermal Impedance



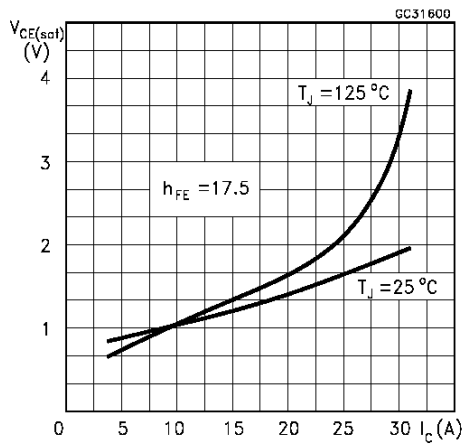
Derating Curve



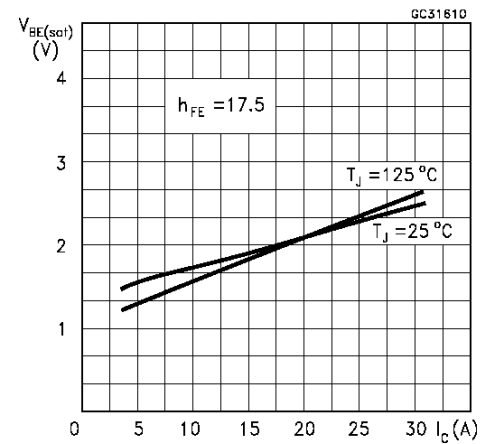
Collector-emitter Voltage Versus base-emitter Resistance



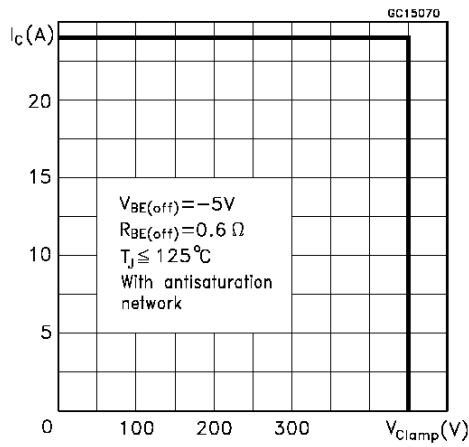
Collector Emitter Saturation Voltage



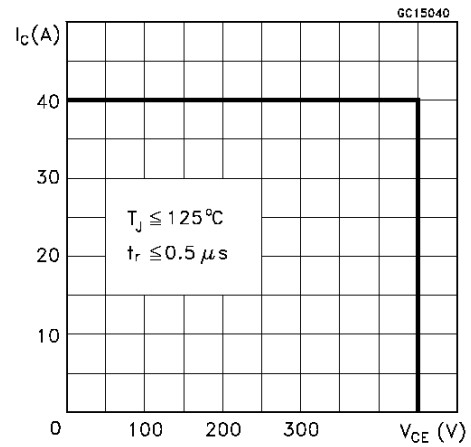
Base-Emitter Saturation Voltage



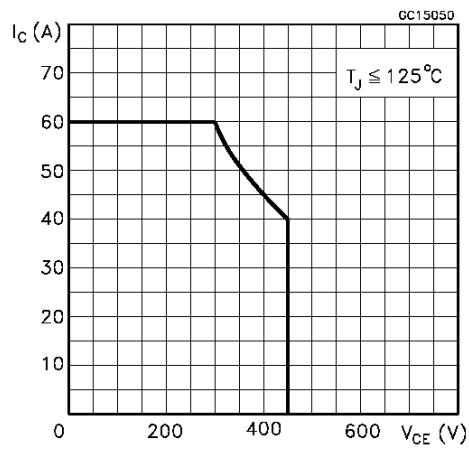
Reverse Biased SOA



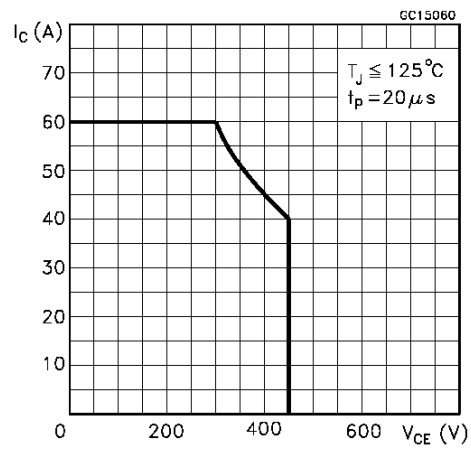
Foward Biased SOA



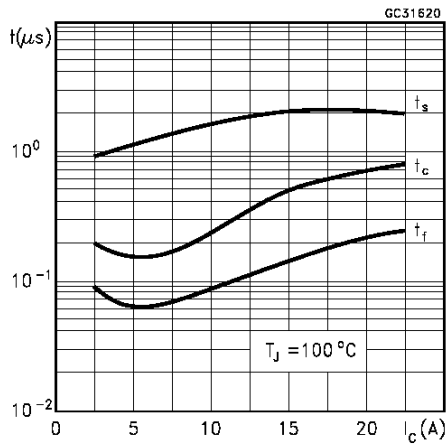
Reverse Biased AOA



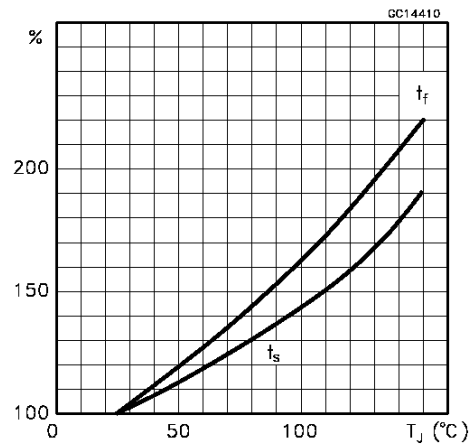
Forward Biased AOA



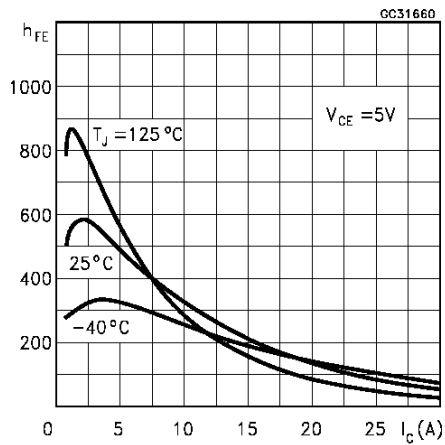
Switching Times Inductive Load



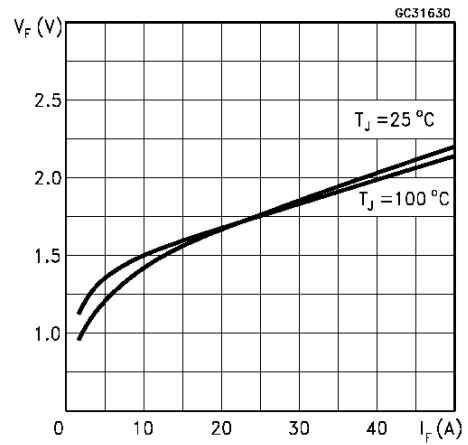
Switching Times Inductive Load Versus Temperature



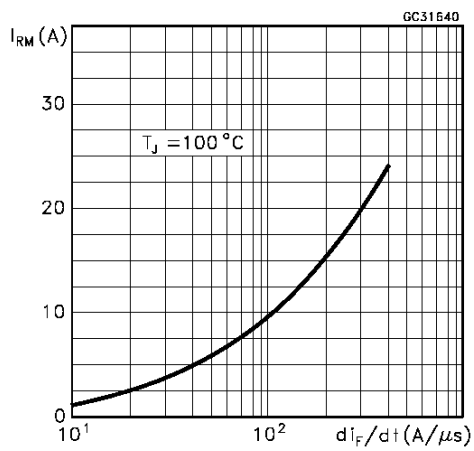
Dc Current Gain



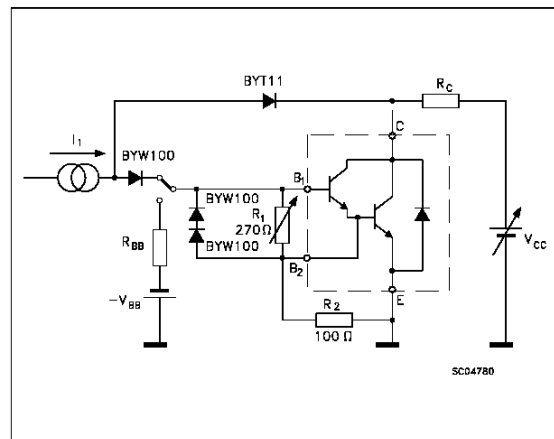
Typical V_F Versus I_F



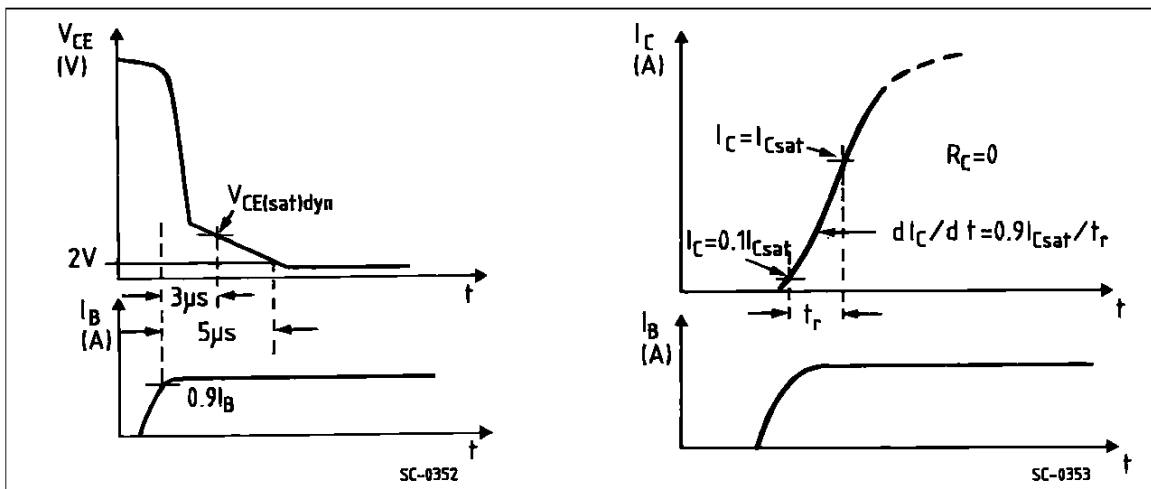
Peak Reverse Current Versus di_F/dt



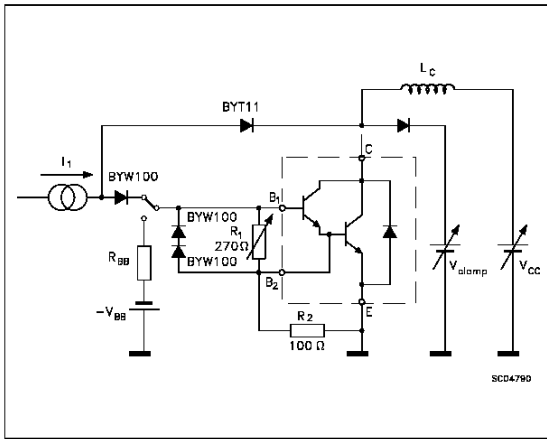
Turn-on Switching Test Circuit



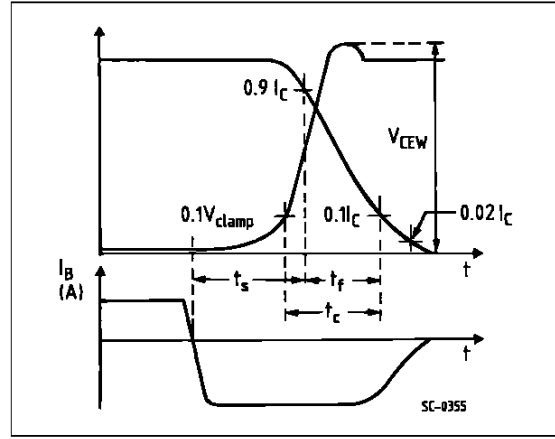
Turn-on Switching Waveforms



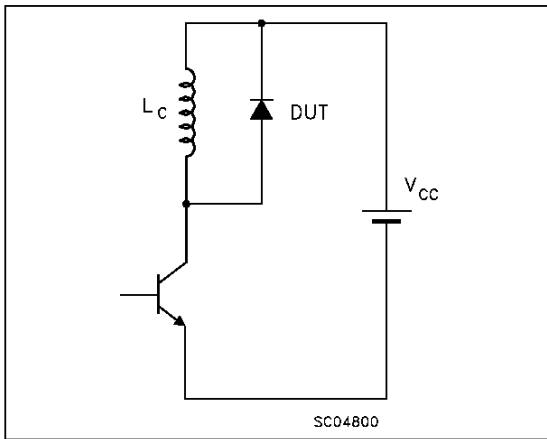
Turn-on Switching Test Circuit



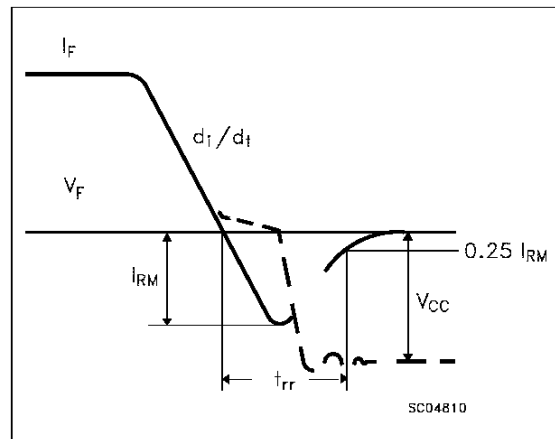
Turn-off Switching Waveforms



Turn-off Switching Test Circuit of Diode

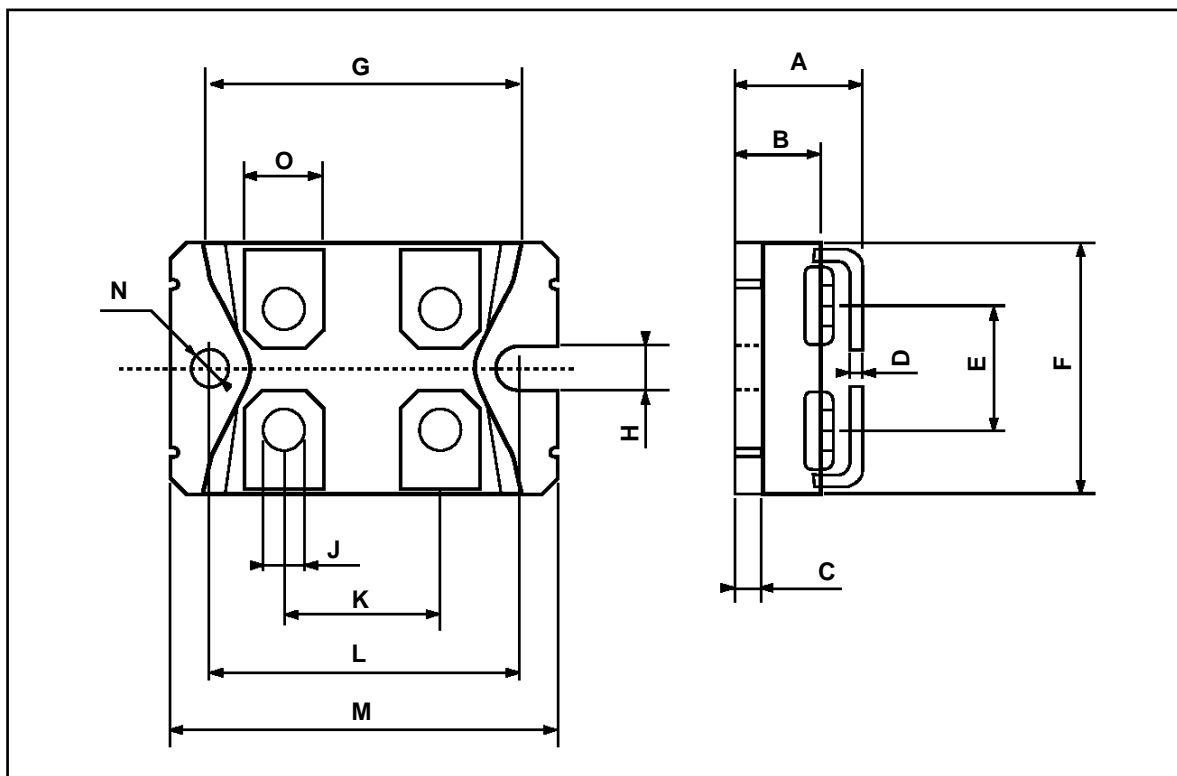


Turn-off Switching Waveform of Diode



ISOTOP MECHANICAL DATA

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