



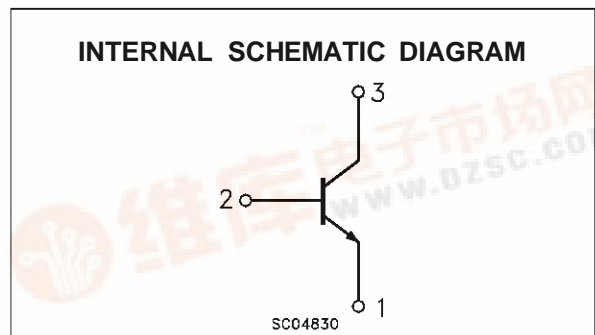
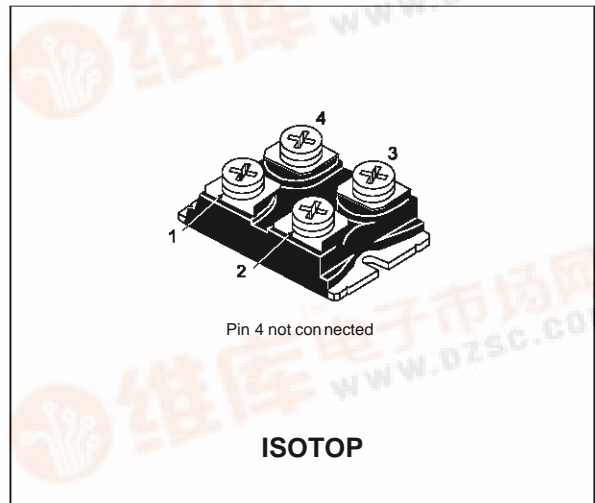
**BUT30V**

**NPN TRANSISTOR POWER MODULE**

- NPN TRANSISTOR
- 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

**APPLICATIONS:**

- MOTOR CONTROL
- SMPS & UPS
- WELDING EQUIPMENT



**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_{CEV}$	Collector-Emitter Voltage ( $V_{BE} = -5\text{ V}$ )	200	V
$V_{CEO(sus)}$	Collector-Emitter Voltage ( $I_B = 0$ )	125	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	7	V
$I_C$	Collector Current	100	A
$I_{CM}$	Collector Peak Current ( $t_p = 10\text{ ms}$ )	150	A
$I_B$	Base Current	20	A
$I_{BM}$	Base Peak Current ( $t_p = 10\text{ ms}$ )	30	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	V

## BUT30V

### THERMAL DATA

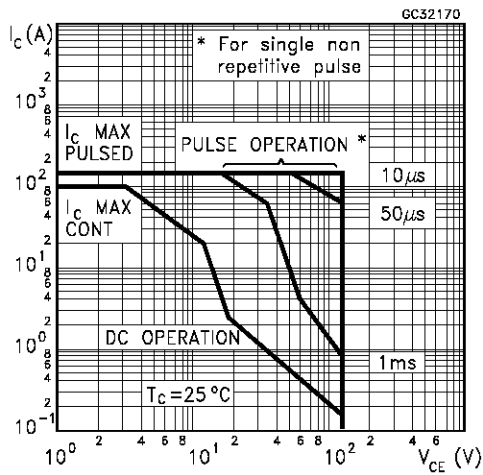
$R_{thj-case}$	Thermal Resistance Junction-case	Max	0.5	$^{\circ}C/W$
$R_{thc-h}$	Thermal Resistance Case-heatsink With Conductive Grease Applied	Max	0.05	$^{\circ}C/W$

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

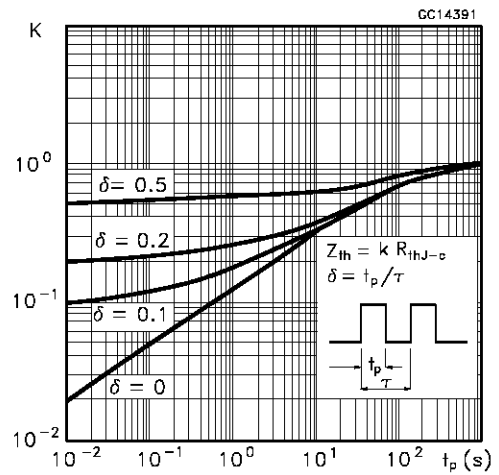
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CER}$	Collector Cut-off Current ( $R_{BE} = 5 \Omega$ )	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV}$ $T_j = 100^{\circ}C$			1 5	mA mA
$I_{CEV}$	Collector Cut-off Current ( $V_{BE} = -5V$ )	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV}$ $T_j = 100^{\circ}C$			1 4	mA mA
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 5 V$			1	mA
$V_{CEO(SUS)}^*$	Collector-Emitter Sustaining Voltage	$I_C = 0.2 A$ $L = 25 mH$ $V_{clamp} = 125 V$	125			V
$h_{FE}^*$	DC Current Gain	$I_C = 100 A$ $V_{CE} = 5 V$		27		
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 50 A$ $I_B = 2.5 A$ $I_C = 50 A$ $I_B = 2.5 A$ $T_j = 100^{\circ}C$ $I_C = 100 A$ $I_B = 10 A$ $I_C = 100 A$ $I_B = 10 A$ $T_j = 100^{\circ}C$		0.45 0.55 0.7 0.9	0.9 1.2 0.9 1.5	V V V V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 50 A$ $I_B = 2.5 A$ $I_C = 50 A$ $I_B = 2.5 A$ $T_j = 100^{\circ}C$ $I_C = 100 A$ $I_B = 10 A$ $I_C = 100 A$ $I_B = 10 A$ $T_j = 100^{\circ}C$		1.15 1.1 1.45 1.55	1.4 1.4 1.8 1.9	V V V V
$di_c/dt$	Rate of Rise of On-state Collector	$V_{CC} = 300 V$ $R_C = 0$ $t_p = 3 \mu s$ $I_{B1} = 15 A$ $T_j = 100^{\circ}C$	270	350		A/ $\mu s$
$V_{CE(3 \mu s)}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 V$ $R_C = 1 \Omega$ $I_{B1} = 15 A$ $T_j = 100^{\circ}C$		2.7	3.5	V
$V_{CE(5 \mu s)}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 V$ $R_C = 1 \Omega$ $I_{B1} = 15 A$ $T_j = 100^{\circ}C$		2	2.5	V
$t_s$	Storage Time	$I_C = 100 A$ $V_{CC} = 90 V$		1	2	$\mu s$
$t_f$	Fall Time	$V_{BB} = -5 V$ $R_{BB} = 0.47 \Omega$		0.1	0.2	$\mu s$
$t_c$	Cross-over Time	$V_{clamp} = 125 V$ $I_{B1} = 10 A$ $L = 45 \mu H$ $T_j = 100^{\circ}C$		0.2	0.35	$\mu s$
$V_{CEW}$	Maximum Collector Emitter Voltage Without Snubber	$I_{Cwoff} = 150 A$ $I_{B1} = 10 A$ $V_{BB} = -5 V$ $V_{CC} = 90 V$ $L = 30 \mu H$ $R_{BB} = 0.5 \Omega$ $T_j = 125^{\circ}C$	125			V

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

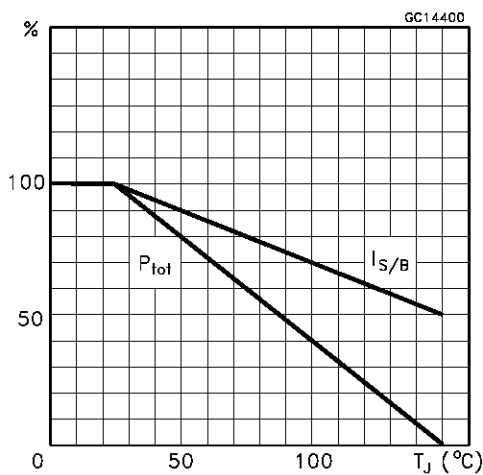
Safe Operating Areas



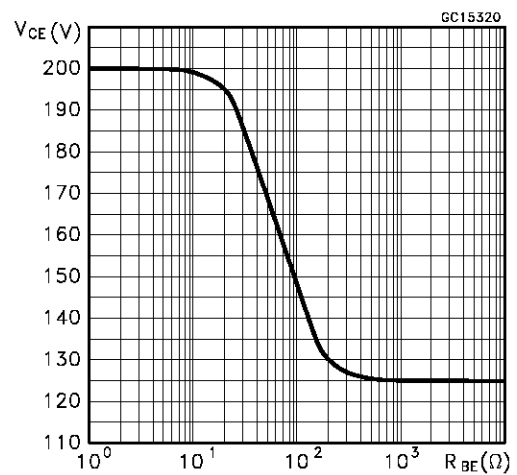
Thermal Impedance



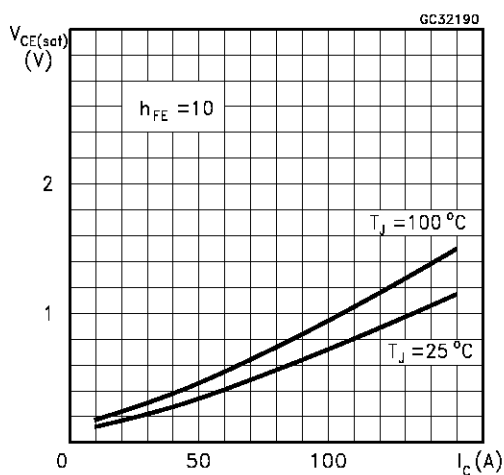
Derating Curve



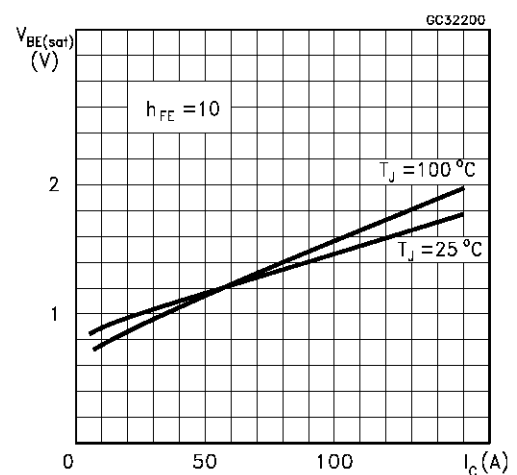
Collector-emitter Voltage Versus base-emitter Resistance



Collector Emitter Saturation Voltage

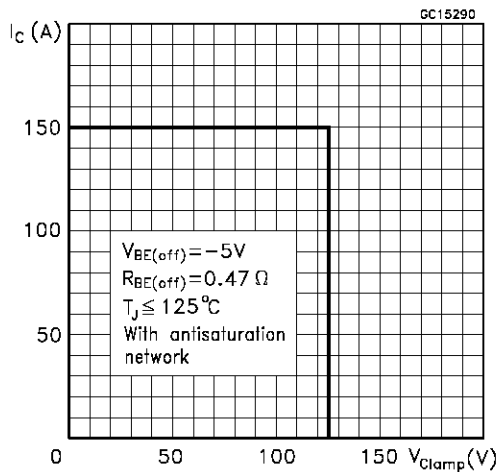


Base-Emitter Saturation Voltage

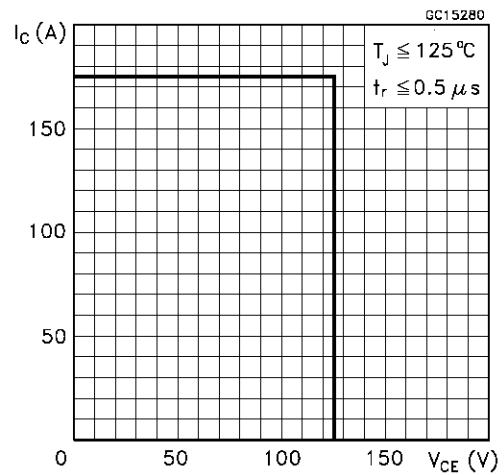


# BUT30V

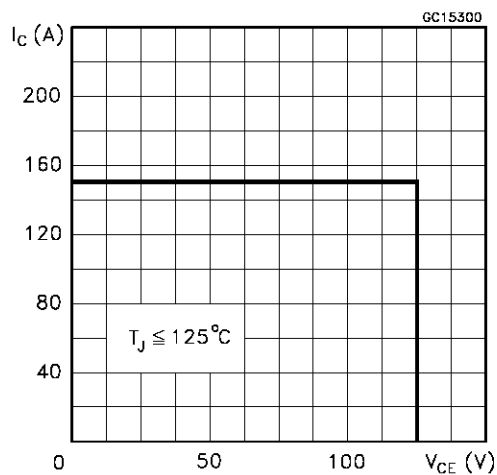
Reverse Biased SOA



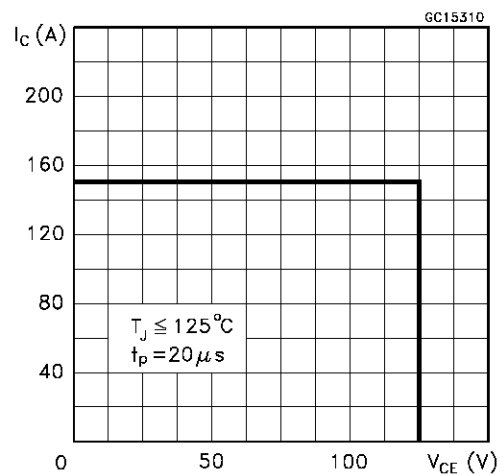
Foward Biased SOA



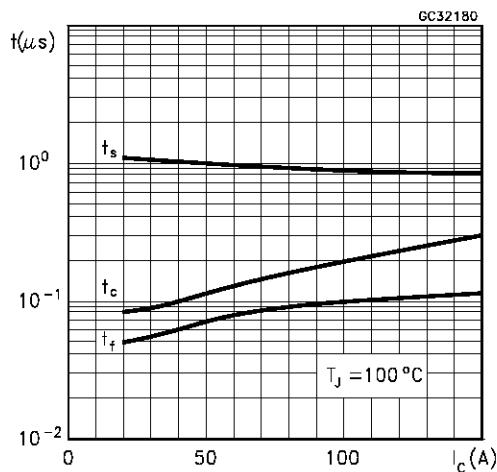
Reverse Biased AOA



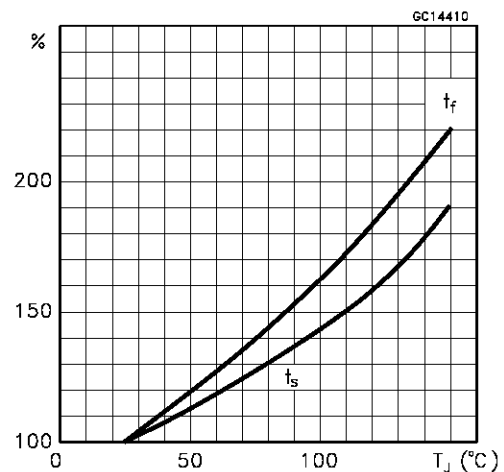
Forward Biased AOA



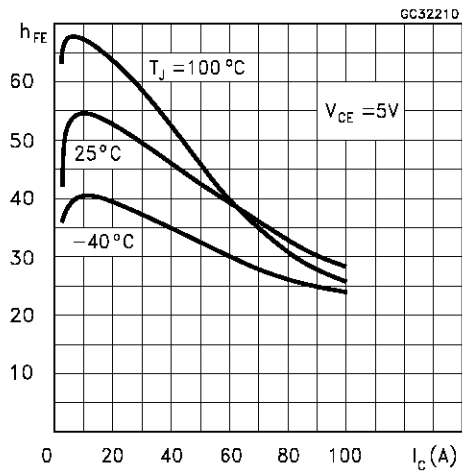
Switching Times Inductive Load



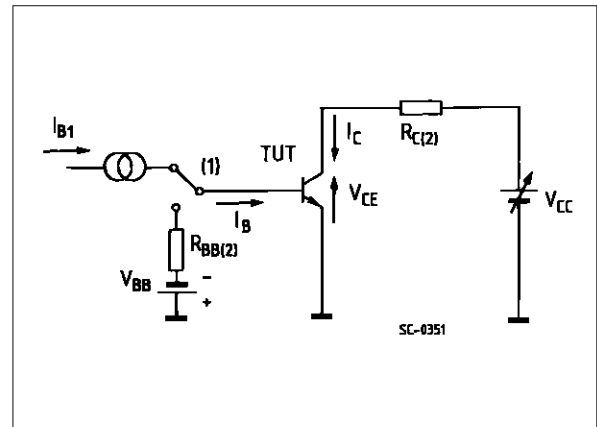
Switching Times Inductive Load Versus Temperature



Dc Current Gain

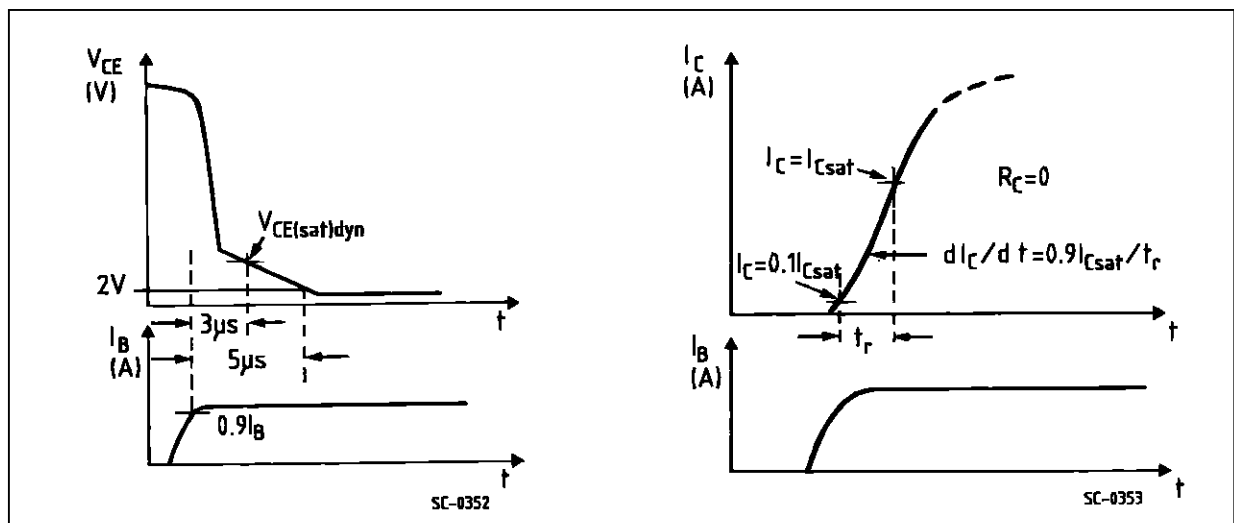


Turn-on Switching Test Circuit

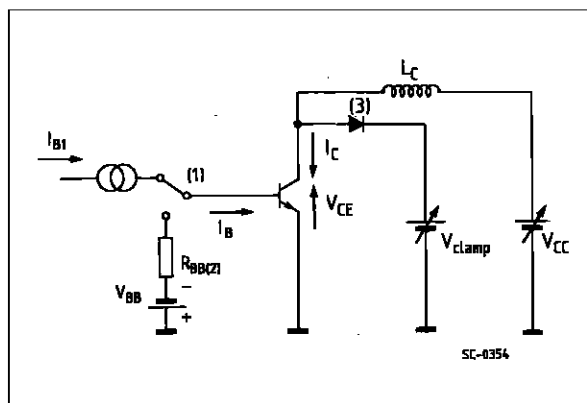


(1) Fast electronic switch (2) Non-inductive load

Turn-on Switching Waveforms

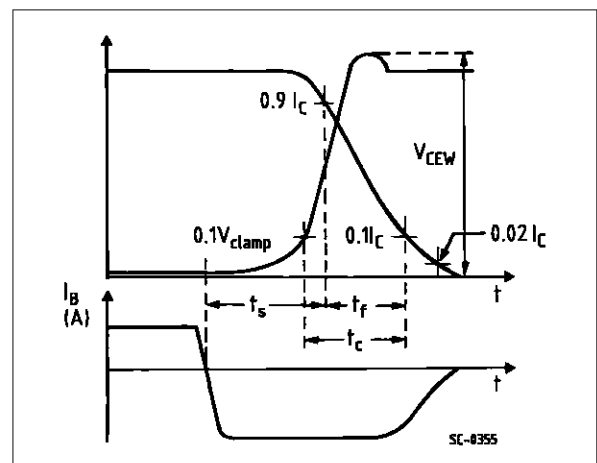


Turn-off Switching Test Circuit



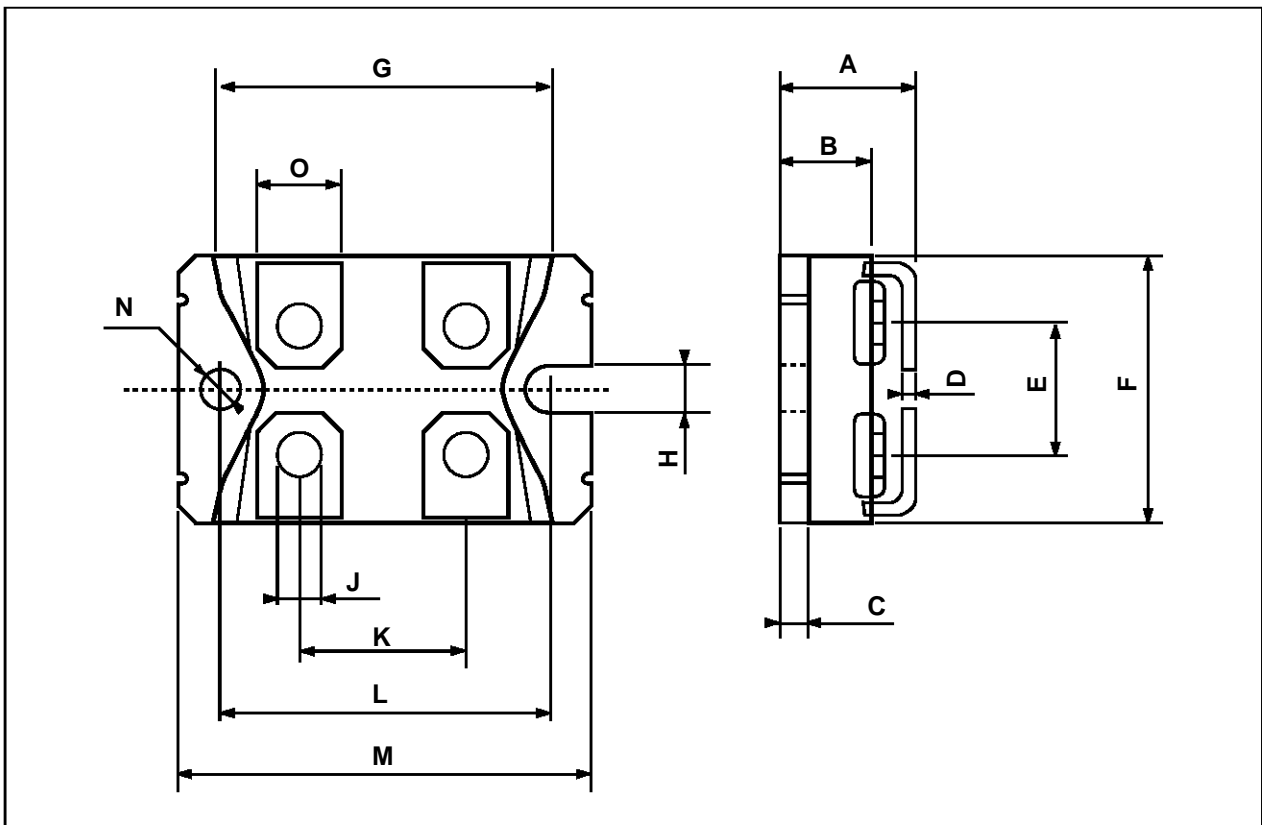
(1) Fast electronic switch (2) Non-inductive load (3) Fast recovery rectifier

Turn-off Switching Waveforms



**ISOTOP MECHANICAL DATA**

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