

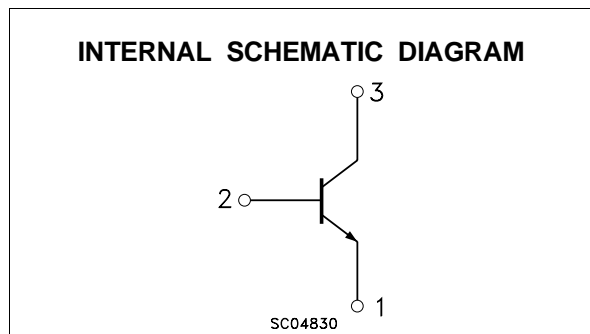
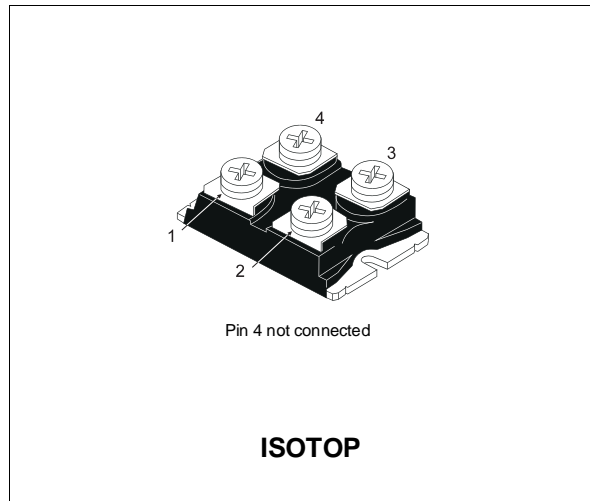


## NPN TRANSISTOR POWER MODULE

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

### INDUSTRIAL APPLICATIONS:

- MOTOR CONTROL
- SMPS & UPS
- WELDING EQUIPMENT



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CEV}$	Collector-Emitter Voltage ( $V_{BE} = -5$ 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	50	A
$I_{CM}$	Collector Peak Current ( $t_p = 10$ ms)	75	A
$I_B$	Base Current	10	A
$I_{BM}$	Base Peak Current ( $t_p = 10$ ms)	16	A
$P_{tot}$	Total Dissipation at $T_C = 25$ °C	250	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**

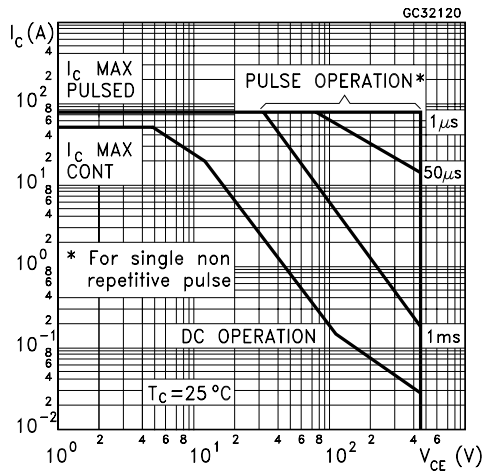
$R_{thj-case}$	Thermal Resistance Junction-case	Max	0.5	$^{\circ}C/W$
$R_{thc-h}$	Thermal Resistance Case-heatsink With Conductive Grease Applied	Max	0.05	$^{\circ}C/W$

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

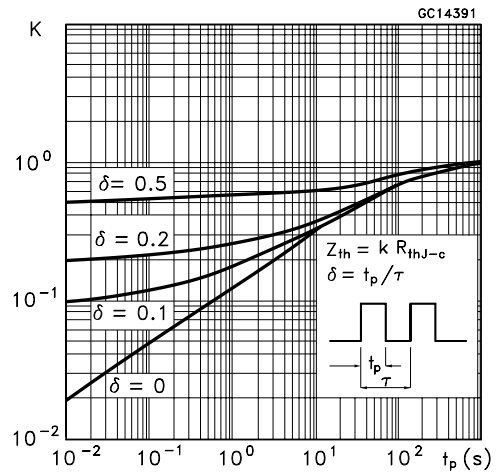
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CER}$	Collector Cut-off Current ( $R_{BE} = 5 \Omega$ )	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV} \quad T_j = 100^{\circ}C$			0.4 2	mA mA
$I_{CEV}$	Collector Cut-off Current ( $V_{BE} = -5V$ )	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV} \quad T_j = 100^{\circ}C$			0.4 2	mA mA
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 5 V$			2	mA
$V_{CEO(sus)*}$	Collector-Emitter Sustaining Voltage	$I_C = 0.2 A \quad L = 25 mH$ $V_{clamp} = 450 V$	450			V
$h_{FE*}$	DC Current Gain	$I_C = 32 A \quad V_{CE} = 5 V$		12		
$V_{CE(sat)*}$	Collector-Emitter Saturation Voltage	$I_C = 32 A \quad I_B = 6.4 A$ $I_C = 32 A \quad I_B = 6.4 A \quad T_j = 100^{\circ}C$		0.35 0.6	1.2 2	V V
$V_{BE(sat)*}$	Base-Emitter Saturation Voltage	$I_C = 32 A \quad I_B = 6.4 A$ $I_C = 32 A \quad I_B = 6.4 A \quad T_j = 100^{\circ}C$		1 0.9	1.5 1.5	V V
$di_c/dt$	Rate of Rise of On-state Collector	$V_{CC} = 300 V \quad R_C = 0 \quad t_p = 3 \mu s$ $I_{B1} = 9.6 A \quad T_j = 100^{\circ}C$	160	210		A/ $\mu s$
$V_{CE(3 \mu s)}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 V \quad R_C = 9.3 \Omega$ $I_{B1} = 9.6 A \quad T_j = 100^{\circ}C$		4.5	8	V
$V_{CE(5 \mu s)}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 V \quad R_C = 9.3 \Omega$ $I_{B1} = 9.6 A \quad T_j = 100^{\circ}C$		2.5	4	V
$t_s$	Storage Time	$I_C = 32 A \quad V_{CC} = 50 V$		2.2	4.5	$\mu s$
$t_f$	Fall Time	$V_{BB} = -5 V \quad R_{BB} = 0.39 \Omega$		0.2	0.4	$\mu s$
$t_c$	Cross-over Time	$V_{clamp} = 450 V \quad I_{B1} = 6.4 A$ $L = 78 \mu H \quad T_j = 100^{\circ}C$		0.45	0.7	$\mu s$
$V_{CEW}$	Maximum Collector Emitter Voltage Without Snubber	$I_{C\text{Woff}} = 48 A \quad I_{B1} = 6.4 A$ $V_{BB} = -5 V \quad V_{CC} = 50 V$ $L = 52 \mu H \quad R_{BB} = 0.39 \Omega$ $T_j = 125^{\circ}C$	450			V

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

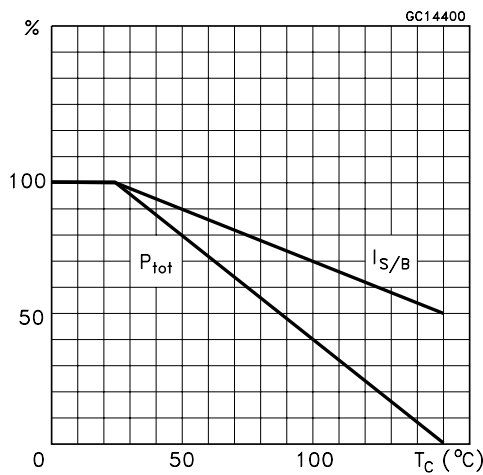
Safe Operating Areas



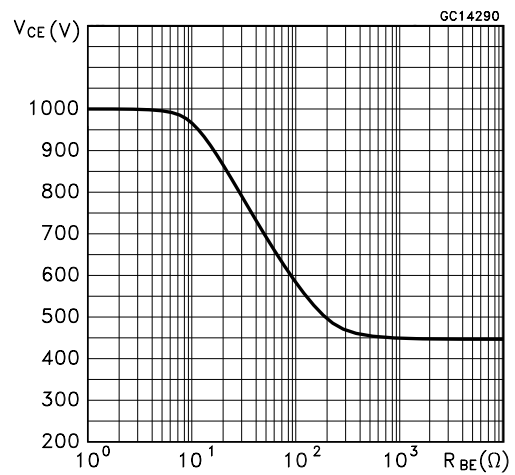
Thermal Impedance



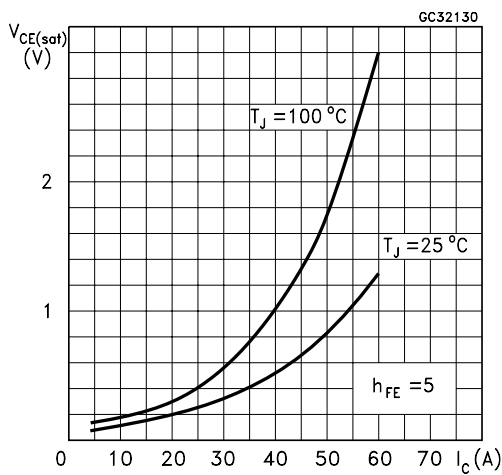
Derating Curve



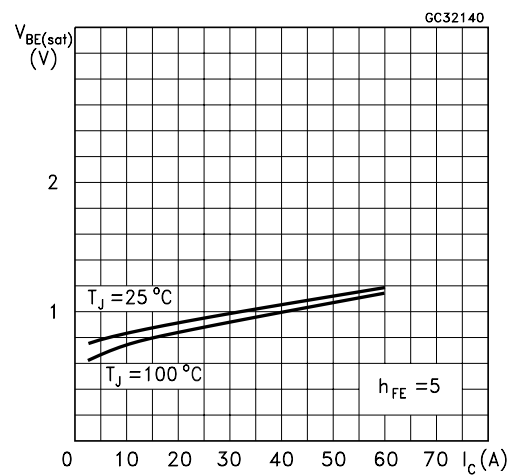
Collector Emitter Voltage Versus Base Emitter Resistance



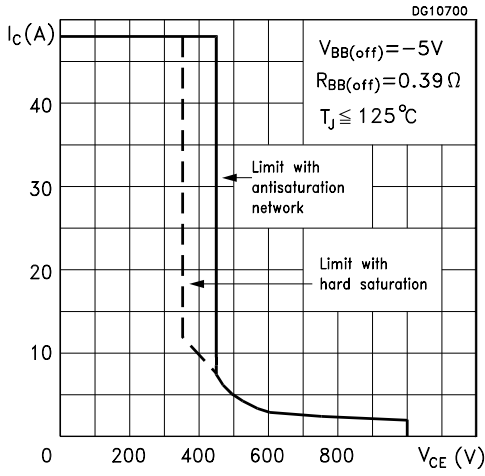
Collector Emitter Saturation Voltage



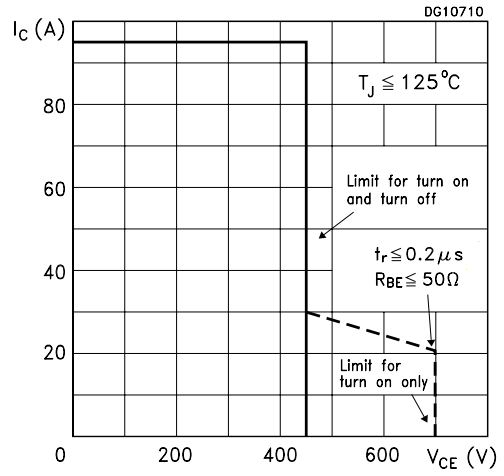
Base Emitter Saturation Voltage



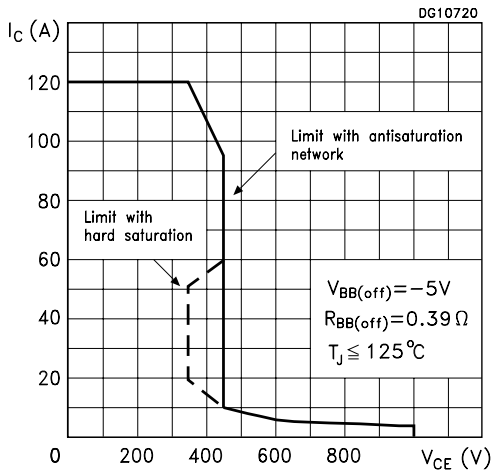
Reverse Biased SOA



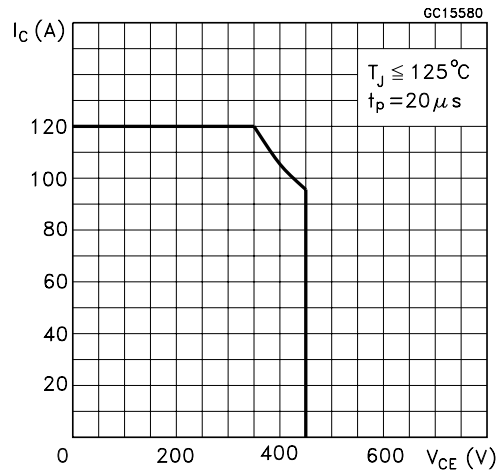
Forward Biased SOA



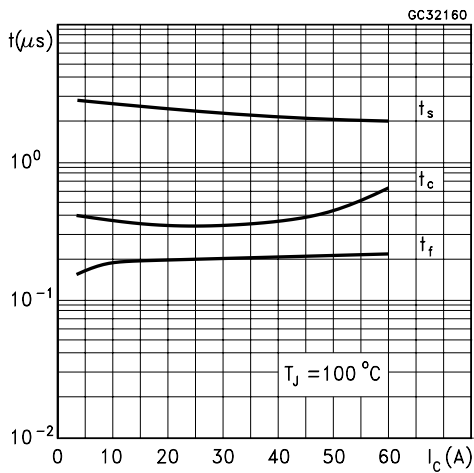
Reverse Biased AOA



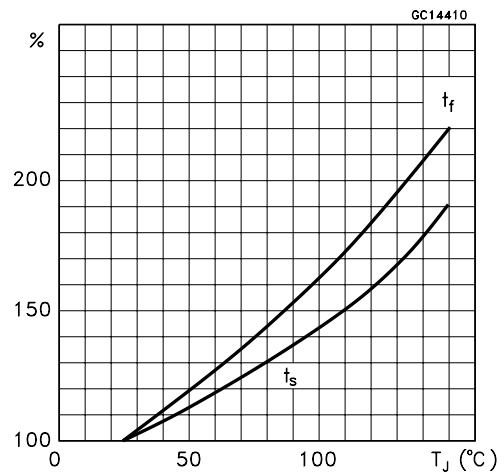
Forward Biased AOA



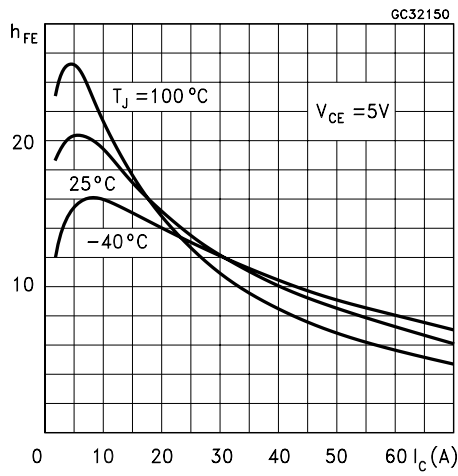
Switching Times Inductive Load



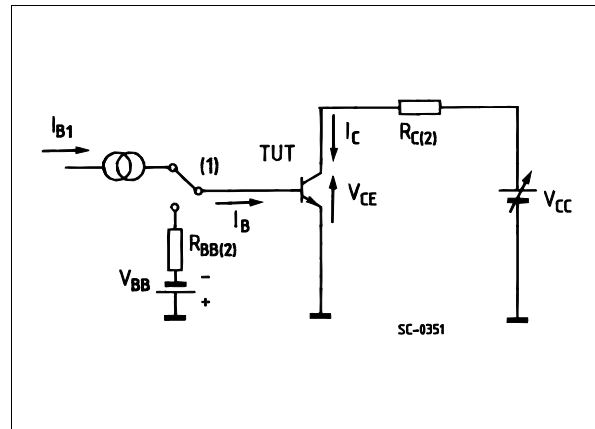
Switching Times Inductive Load Versus Temperature



Dc Current Gain

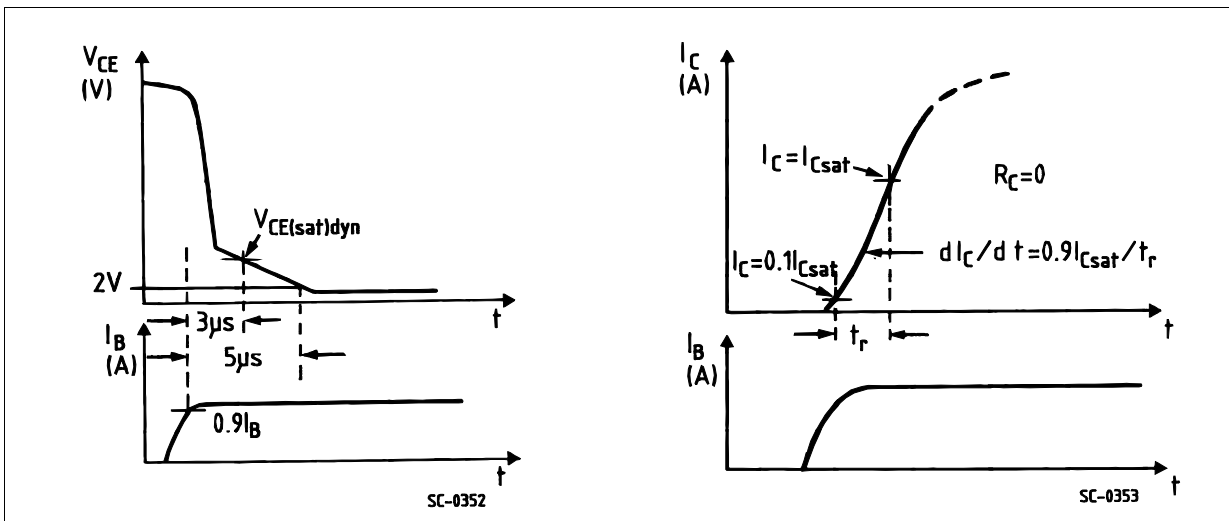


Turn-on Switching Test Circuit

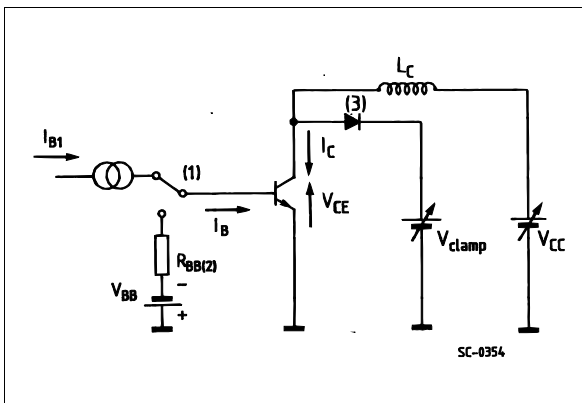


(1) Fast electronics switch (2) Non-inductive load

Turn-on Switching Waveforms

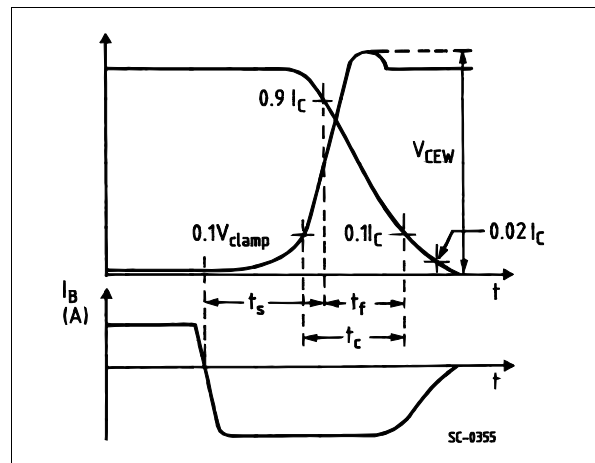


Turn-off Switching Test Circuit



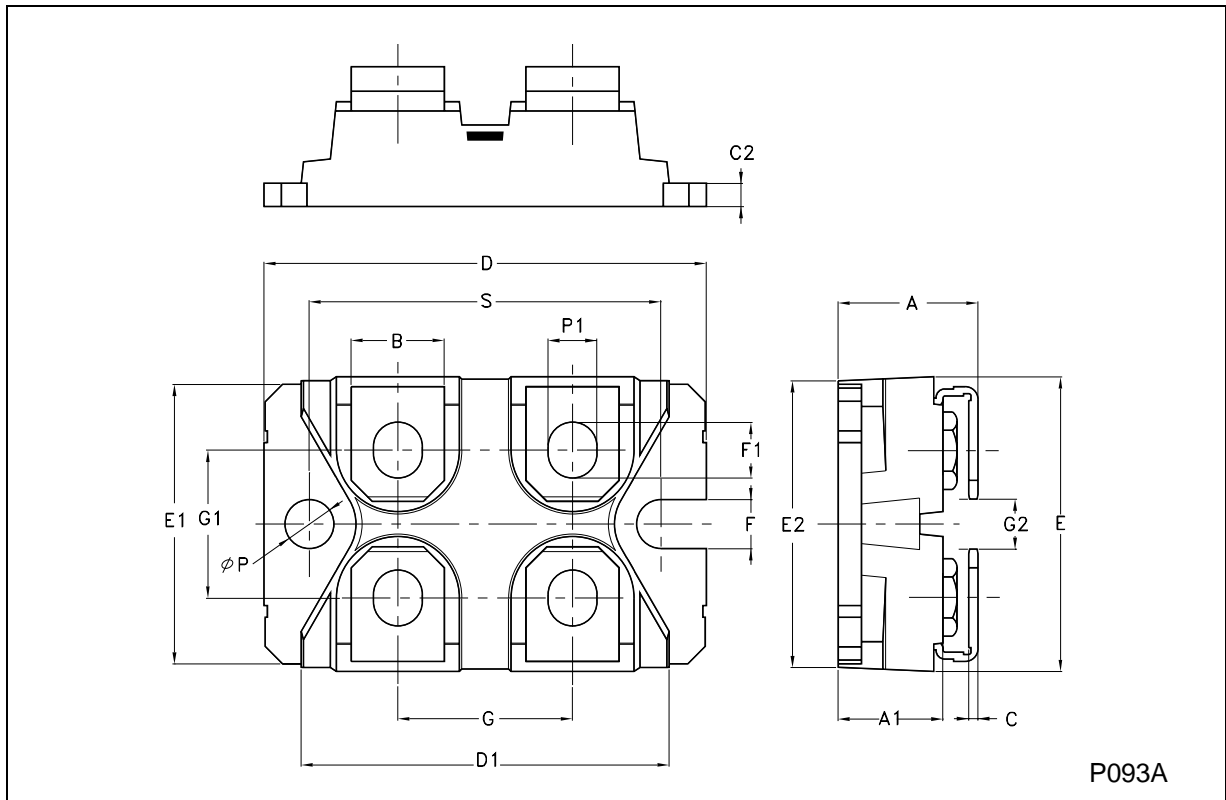
(1) Fast electronic switch (2) Non-inductive load (3) Fast recovery rectifier

Turn-off Switching Waveforms



**ISOTOP MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.8		12.2	0.465		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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