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## STD13003

# HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- REVERSE PINS OUT Vs STANDARD IPAK (TO-251) / DPAK (TO-252) PACKAGES
- MEDIUM VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- SURFACE-MOUNTING DPAK (TO-252) POWER PACKAGE IN TAPE & REEL (Suffix "T4")
- THROUGH-HOLE IPAK (TO-251) POWER PACKAGE IN TUBE (Suffix "-1")

### APPLICATIONS:

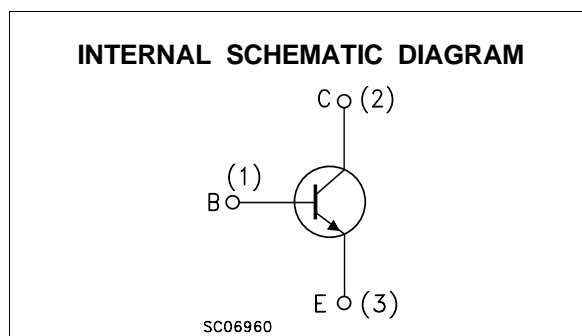
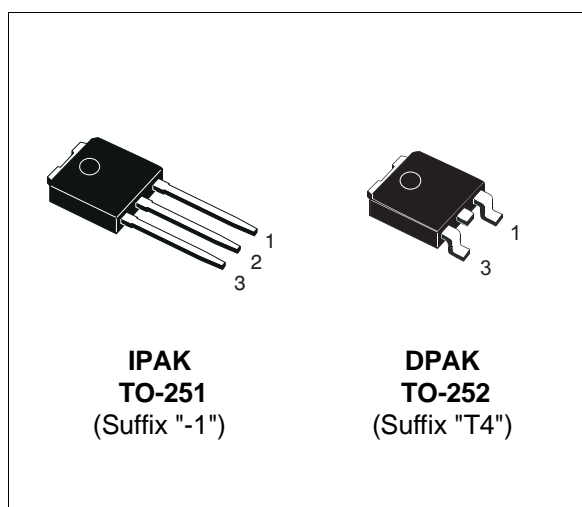
- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- SWITCH MODE POWER SUPPLIES

### DESCRIPTION

The device is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and medium voltage capability.

It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA.

The device is designed for use in lighting applications and low cost switch-mode power supplies.



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	700	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	400	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0, I_B = 0.75 \text{ A}, t_p < 10 \mu\text{s}, T_j < 150^\circ\text{C}$ )	$BV_{EBO}$	V
$I_C$	Collector Current	1.5	A
$I_{CM}$	Collector Peak Current ( $t_p < 5 \text{ ms}$ )	3	A
$I_B$	Base Current	0.75	A
$I_{BM}$	Base Peak Current ( $t_p < 5 \text{ ms}$ )	1.5	A
$P_{tot}$	Total Dissipation at $T_c = 25^\circ\text{C}$	20	W
$T_{stg}$	Storage Temperature	-65 to 150	$^\circ\text{C}$
$T_j$	Max. Operating Junction Temperature	150	$^\circ\text{C}$

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### THERMAL DATA

R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	6.25	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient	Max	100	°C/W

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

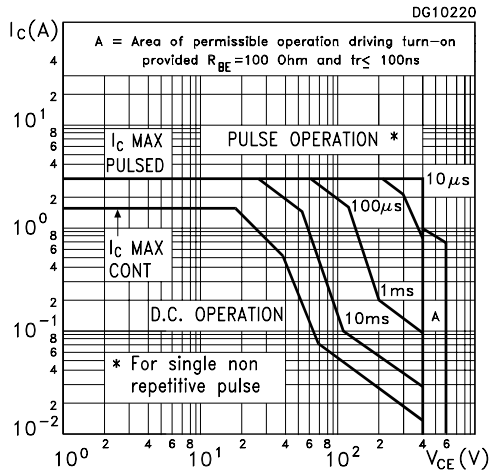
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CEV</sub>	Collector Cut-off Current (V <sub>BE</sub> = -1.5V)	V <sub>CE</sub> = 700V V <sub>CE</sub> = 700V T <sub>j</sub> = 125°C			1 5	mA mA
BV <sub>EBO</sub>	Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	9		18	V
V <sub>CEO(sus)</sub> *	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 10 mA L = 25 mH	400			V
V <sub>CE(sat)</sub> *	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 0.5 A I <sub>C</sub> = 1 A I <sub>C</sub> = 1.5 A			0.5 1 3	V V V
V <sub>BE(sat)</sub> *	Base-Emitter Saturation Voltage	I <sub>C</sub> = 0.5 A I <sub>C</sub> = 1 A			1 1.2	V V
h <sub>FE</sub> *	DC Current Gain	I <sub>C</sub> = 0.5 A Group A Group B I <sub>C</sub> = 1 A			20 35 25	
t <sub>r</sub> t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Rise Time Storage Time Fall Time	I <sub>C</sub> = 1 A I <sub>B1</sub> = 0.2 A T <sub>p</sub> = 25 μs			1 4 0.7	μs μs μs
t <sub>s</sub>	INDUCTIVE LOAD Storage Time	I <sub>C</sub> = 1 A V <sub>BE</sub> = -5 V V <sub>clamp</sub> = 300 V		0.8		μs

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

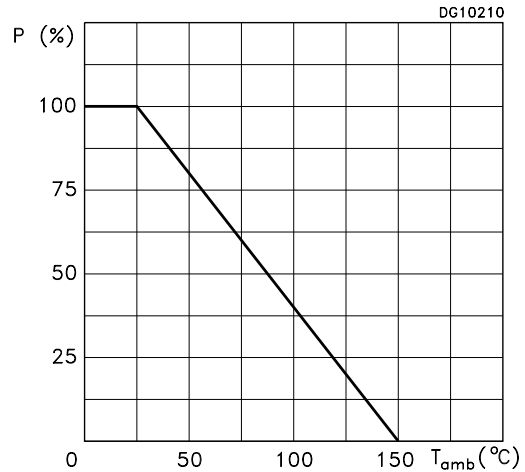
Note : Product is pre-selected in DC current gain (GROUP A and GROUP B). STMicroelectronics reserves the right to ship either groups according to production availability. Please contact your nearest STMicroelectronics sales office for delivery details.

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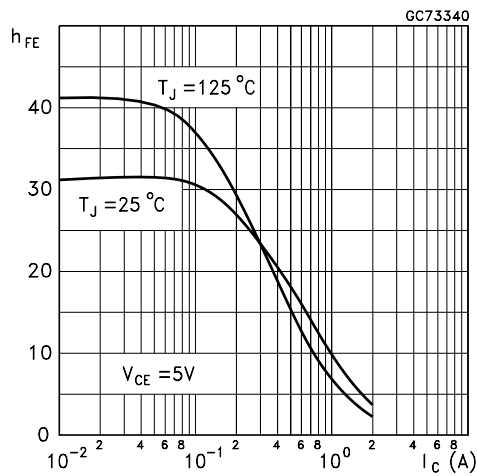
**Safe Operating Areas**



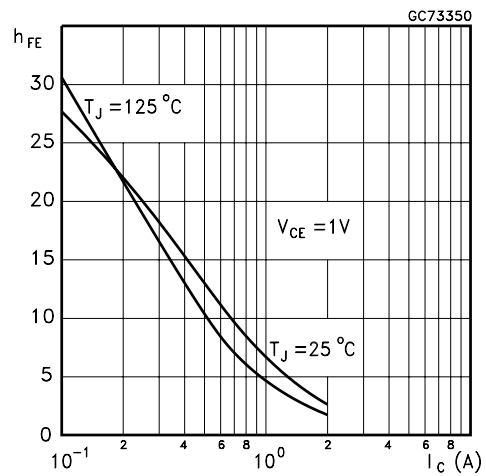
**Derating Curve**



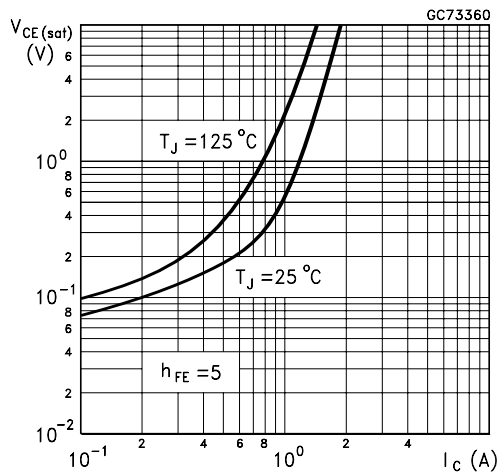
**DC Current Gain**



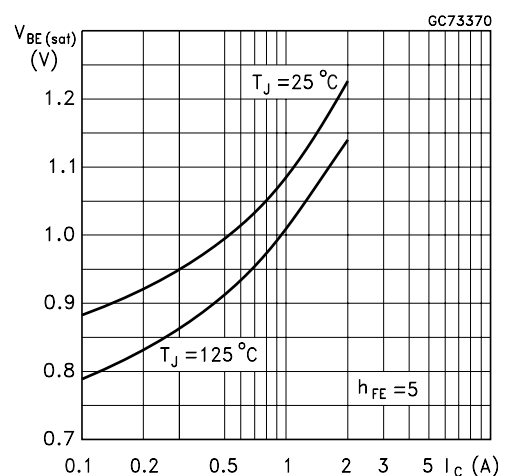
**DC Current Gain**



**Collector Emitter Saturation Voltage**

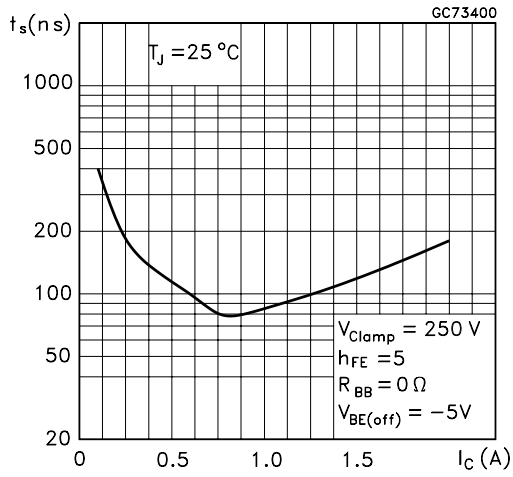


**Base Emitter Saturation Voltage**

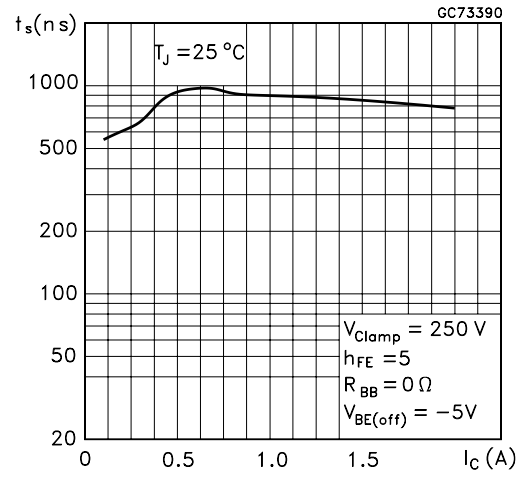


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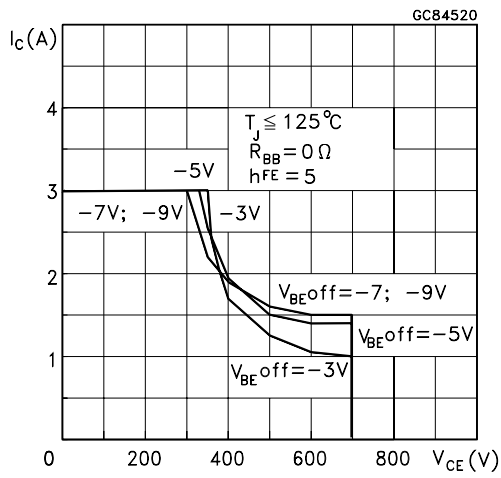
**Inductive Fall Time**



**Inductive Storage Time**

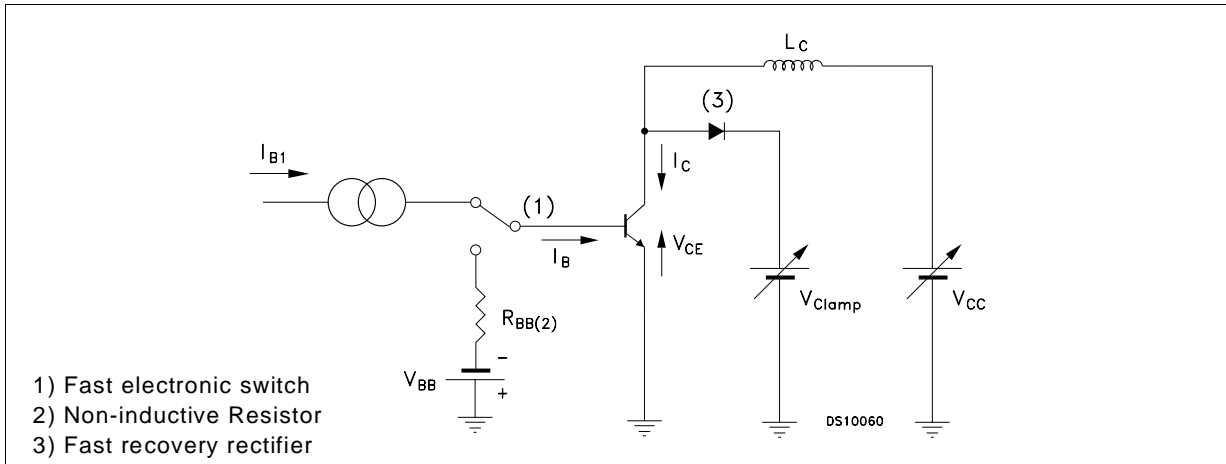


**Reverse Biased SOA**

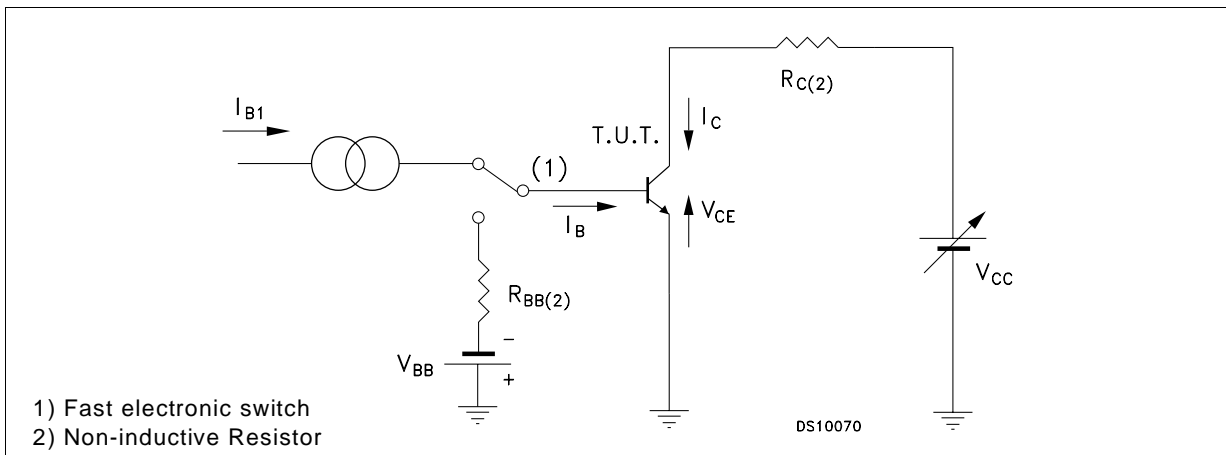


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**Figure 1: Inductive Load Switching Test Circuit.**



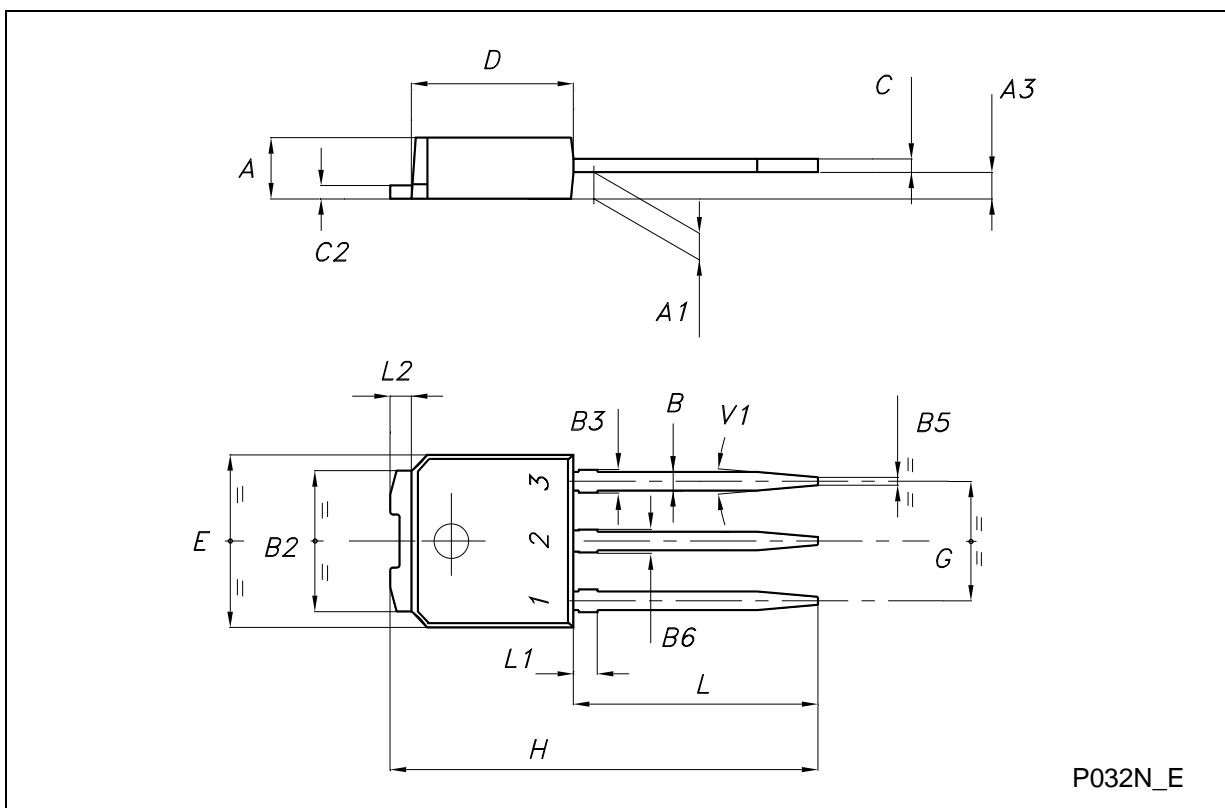
**Figure 2: Resistive Load Switching Test Circuit.**



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**TO-251 (IPAK) MECHANICAL DATA**

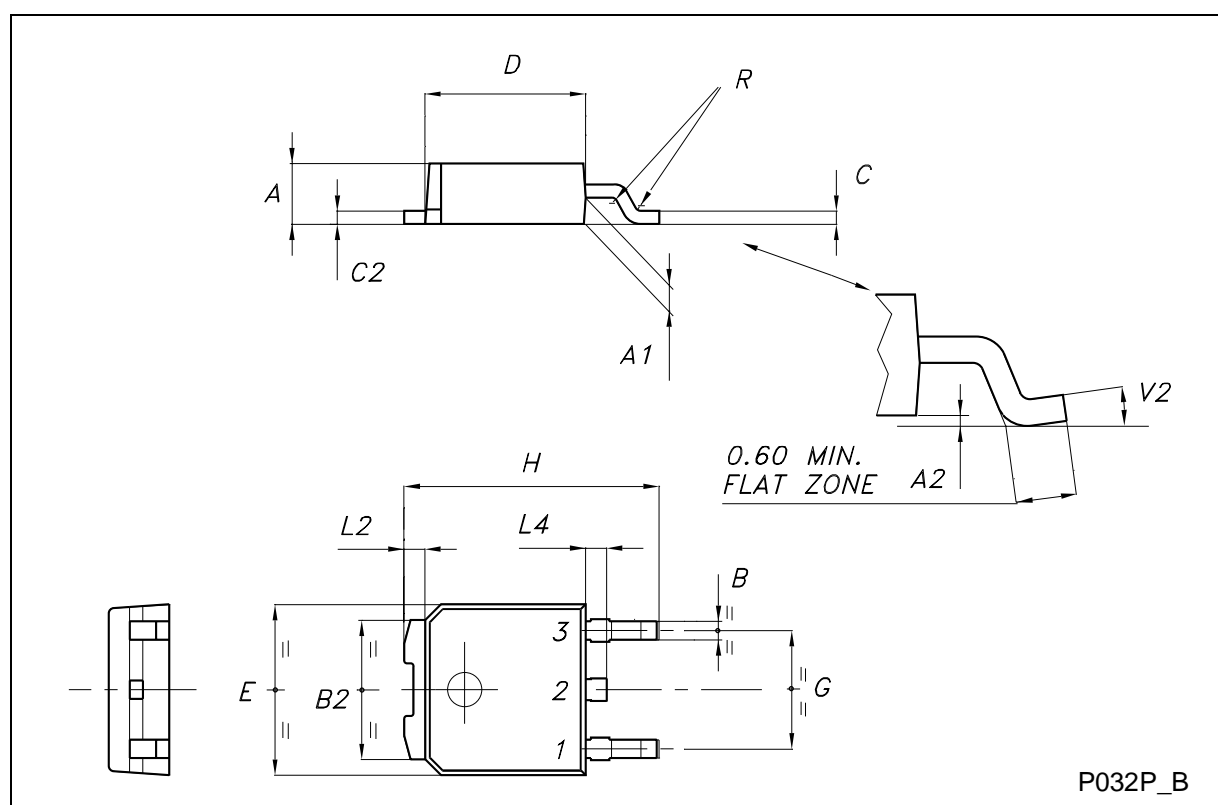
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A3	0.70		1.30	0.028		0.051
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
B3			0.85			0.033
B5		0.30			0.012	
B6			0.95			0.037
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.237		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	15.90		16.30	0.626		0.642
L	9.00		9.40	0.354		0.370
L1	0.80		1.20	0.031		0.047
L2		0.80	1.00		0.031	0.039
V1		10°			10°	



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**TO-252 (DPAK) MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0°		8°	0°		0°





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