



# ST13005 STB13005-1

## HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTORS

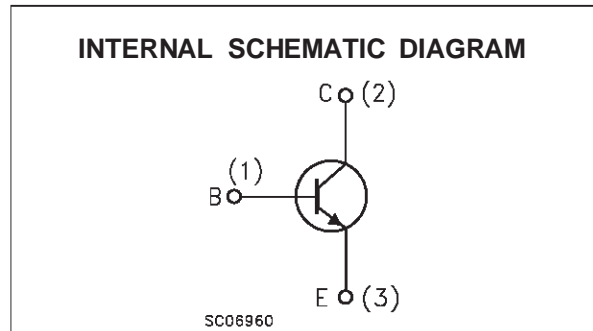
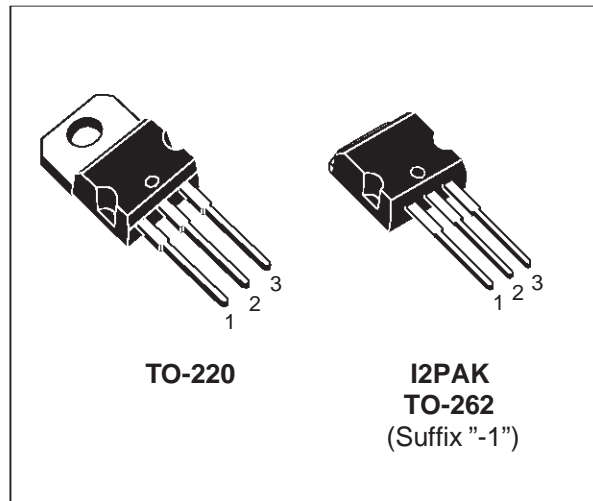
- MEDIUM VOLTAGE CAPABILITY
- NPN TRANSISTOR
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- THROUGH-HOLE I2PAK (TO-262) POWER PACKAGE IN TUBE (SUFFIX "-1")

### 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.



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		ST13005	STB13005-1	
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	700		V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	400		V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	9		V
$I_C$	Collector Current	4		A
$I_{CM}$	Collector Peak Current ( $t_p < 5$ ms)	8		A
$I_B$	Base Current	2		A
$I_{BM}$	Base Peak Current ( $t_p < 5$ ms)	4		A
$P_{tot}$	Total Dissipation at $T_c = 25$ °C	75		W
$T_{stg}$	Storage Temperature	-65 to 150		°C

**THERMAL DATA**

			<b>TO-220 I2PAK</b>	
$R_{thj-case}$	Thermal Resistance Junction-case	Max	1.67	$^{\circ}\text{C}/\text{W}$

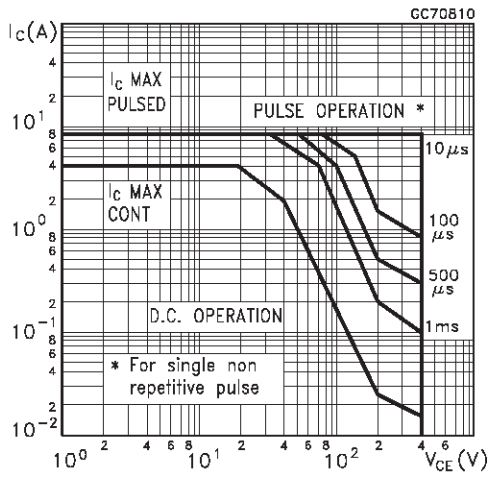
**ELECTRICAL CHARACTERISTICS** ( $T_{case} = 25^{\circ}\text{C}$  unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CEV}$	Collector Cut-off Current ( $V_{BE} = -1.5\text{V}$ )	$V_{CE} = 700\text{V}$			1	mA
		$V_{CE} = 700\text{V}$ $T_{case} = 100^{\circ}\text{C}$			5	mA
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 9\text{V}$			1	mA
$V_{CEO(sus)*}$	Collector-Emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 10\text{mA}$	400			V
$V_{CE(sat)*}$	Collector-Emitter Saturation Voltage	$I_C = 1\text{A}$ $I_B = 0.2\text{A}$			0.5	V
		$I_C = 2\text{A}$ $I_B = 0.5\text{A}$			0.6	V
		$I_C = 4\text{A}$ $I_B = 1\text{A}$			1	
$V_{BE(sat)*}$	Base-Emitter Saturation Voltage	$I_C = 1\text{A}$ $I_B = 0.2\text{A}$			1.2	V
		$I_C = 2\text{A}$ $I_B = 0.5\text{A}$			1.6	V
$h_{FE}$	DC Current Gain	$I_C = 1\text{A}$ $V_{CE} = 5\text{V}$				
		Group A	15		32	
		Group B	27		45	
		$I_C = 2\text{A}$ $V_{CE} = 5\text{V}$	8		40	
$t_s$ $t_f$	RESISTIVE LOAD Storage Time Fall Time	$I_C = 2\text{A}$	1.5		3.0	$\mu\text{s}$
		$I_{B1} = -I_{B2} = 0.4\text{A}$ $V_{CC} = 125\text{V}$ $T_p = 30\mu\text{s}$		0.2		$\mu\text{s}$

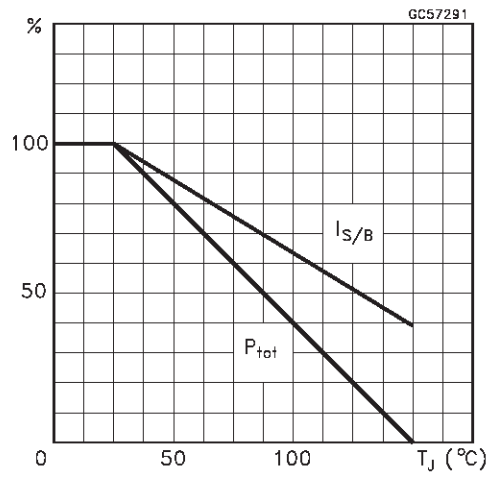
\* Pulsed: Pulse duration = 300 $\mu\text{s}$ , duty cycle = 1.5 %

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.

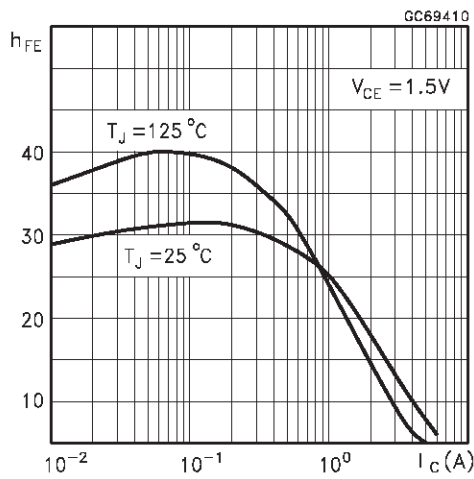
Safe Operating Areas



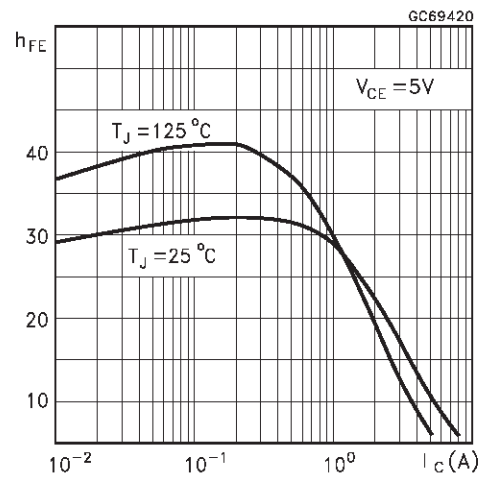
Derating Curve



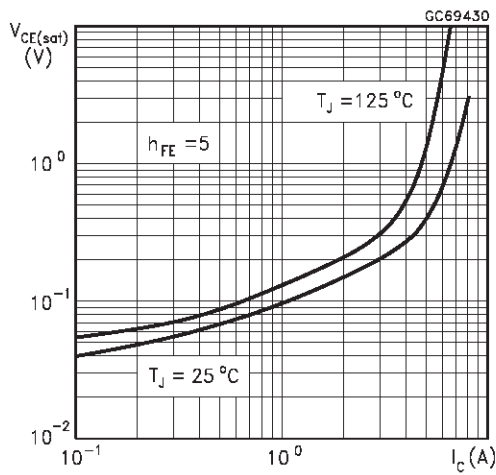
DC Current Gain



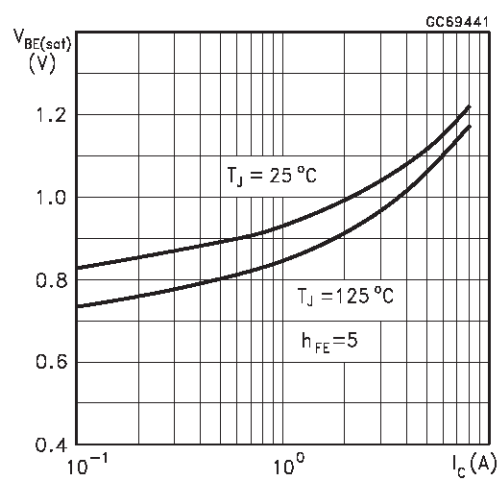
DC Current Gain



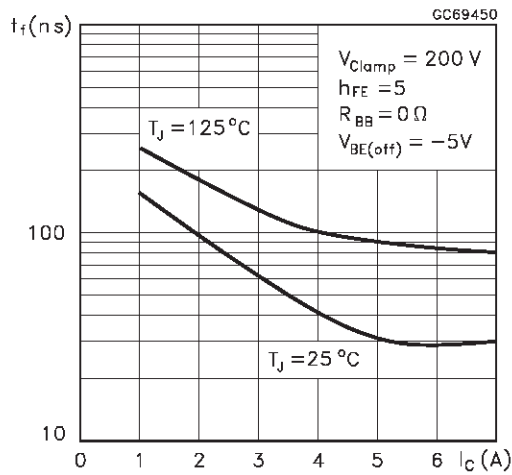
Collector Emitter Saturation Voltage



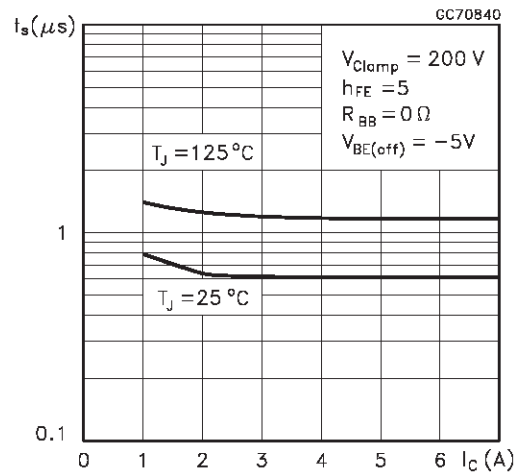
Base Emitter Saturation Voltage



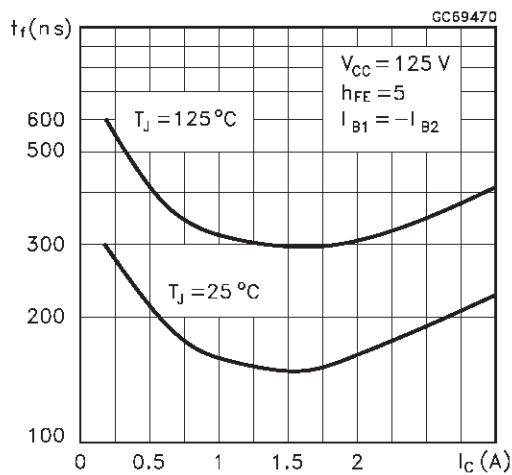
Inductive Fall Time



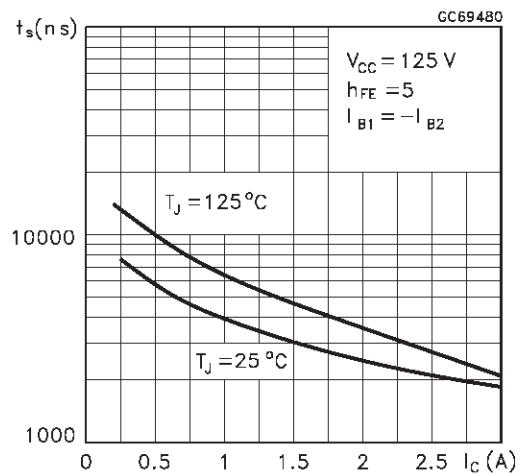
Inductive Storage Time



Resistive Fall Time



Resistive Load Storage Time



Reverse Biased SOA

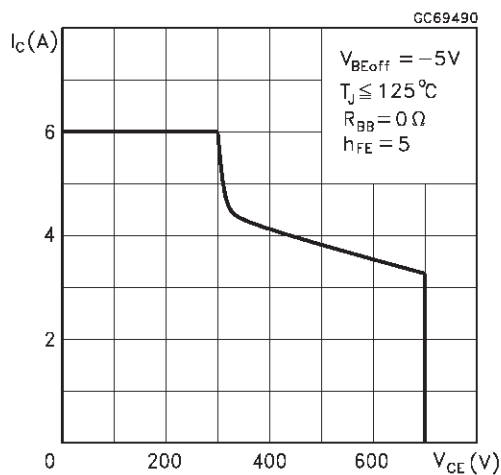


Figure 1: Inductive Load Switching Test Circuit.

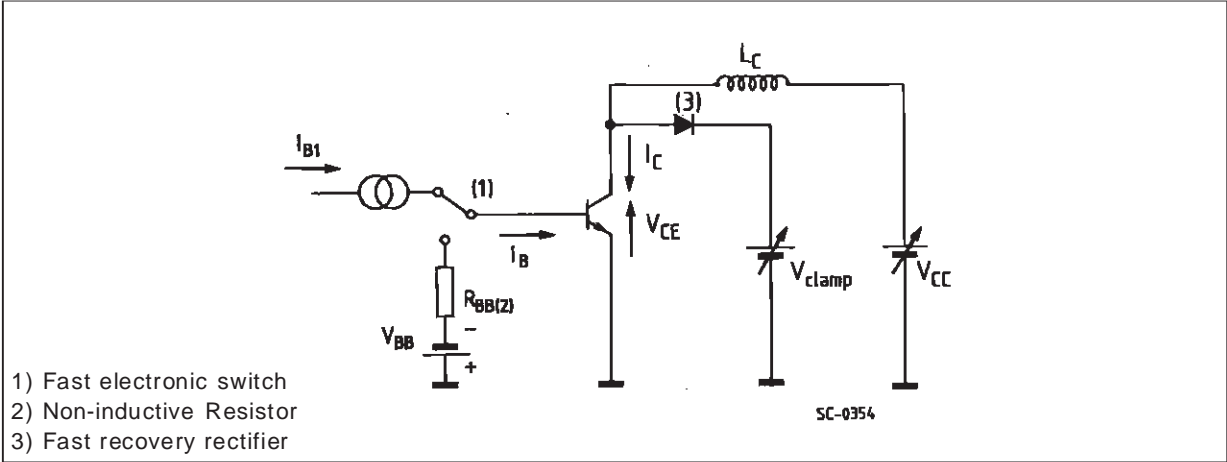
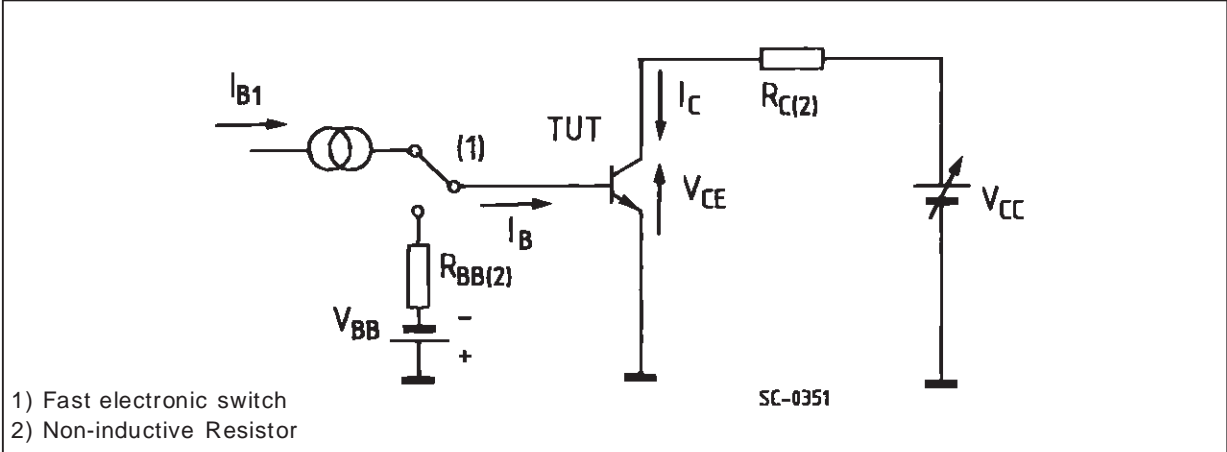
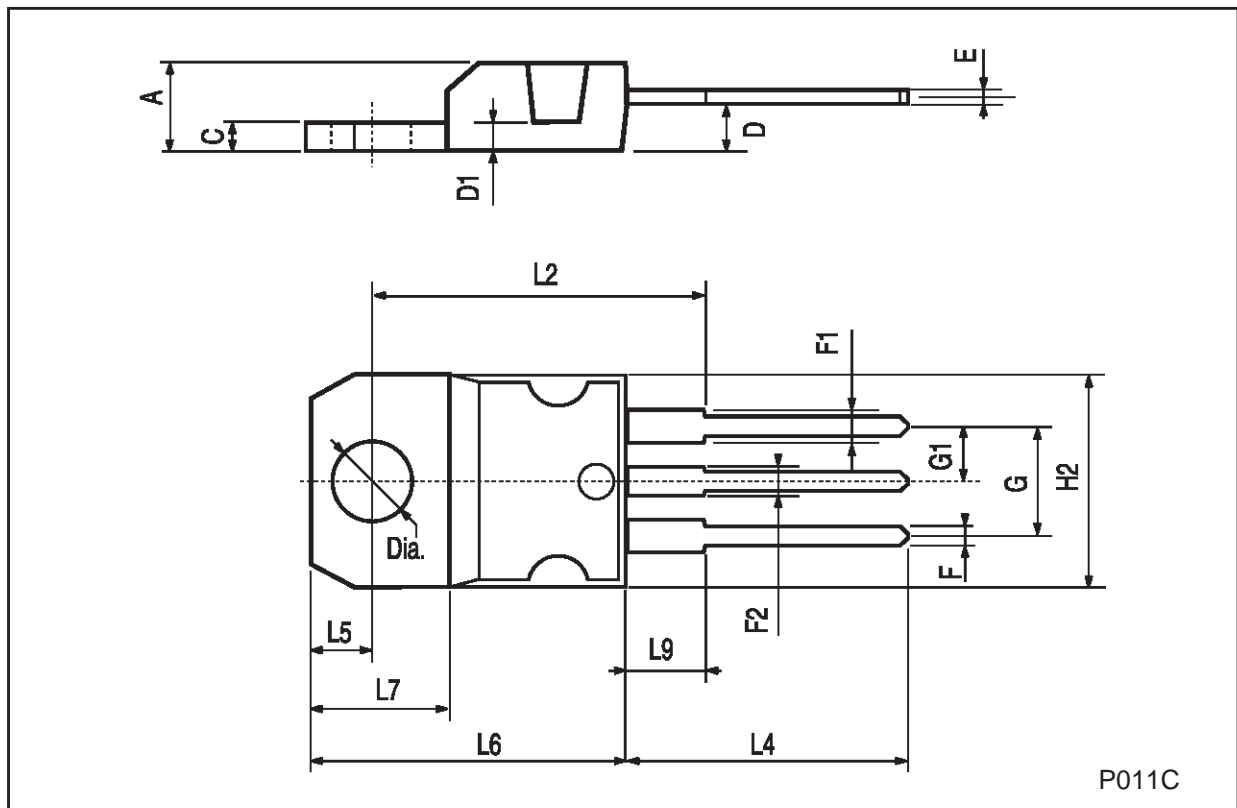


Figure 2: Resistive Load Switching Test Circuit.



**TO-220 MECHANICAL DATA**

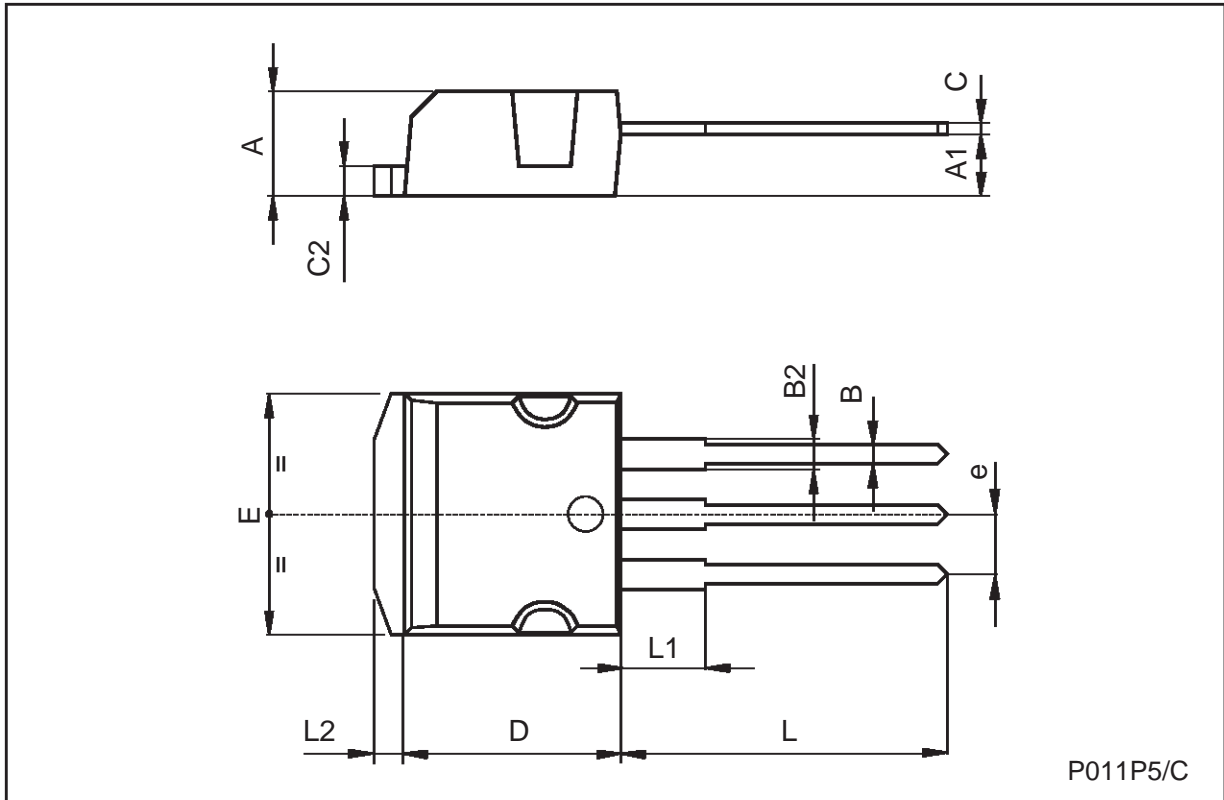
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



P011C

**TO-262 (I2PAK) MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.3		4.6	0.169		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B1	1.2		1.38	0.047		0.054
B2	1.25		1.4	0.049		0.055
C	0.45		0.6	0.017		0.023
C2	1.21		1.36	0.047		0.053
D	8.95		9.35	0.352		0.368
e	2.44		2.64	0.096		0.104
E	10		10.28	0.393		0.404
L	13.2		13.5	0.519		0.531
L1	3.48		3.78	0.137		0.149
L2	1.27		1.4	0.050		0.055



P011P5/C

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