



# BU941ZP BU941ZPFI

## HIGH VOLTAGE IGNITION COIL DRIVER NPN POWER DARLINGTON TRANSISTORS

- VERY RUGGED BIPOLAR TECHNOLOGY
- BUILT IN CLAMPING ZENER
- HIGH OPERATING JUNCTION TEMPERATURE
- FULLY INSULATED PACKAGE (U.L. COMPLIANT) FOR EASY MOUNTING

### APPLICATION

- HIGH RUGGEDNESS ELECTRONIC IGNITIONS

### DESCRIPTION

The devices are bipolar Darlington transistors manufactured using Multi-Epitaxial Planar technology. They have been properly designed to be used in Automotive environment as electronic ignition power actuators.

Figure 1: Package

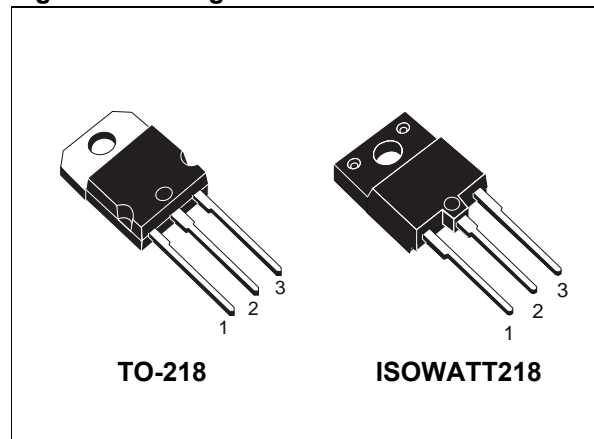


Figure 2: Internal Schematic Diagram

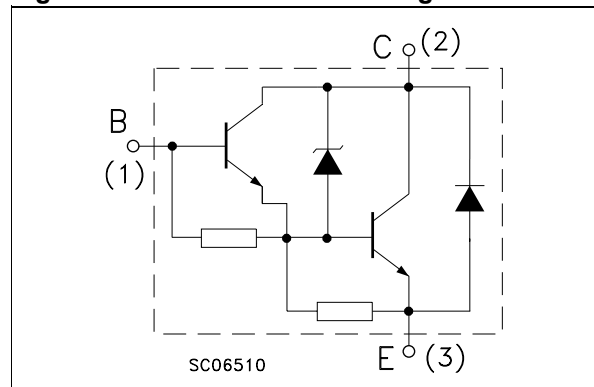


Table 1: Order Code

Part Number	Marking	Package	Packaging
BU941ZP	BU941ZP	TO-218	TUBE
BU941ZFI	BU941ZPFI	ISOWATT218	TUBE

**Table 2: Absolute Maximum Ratings**

Symbol	Parameter	Value		Unit
		BU941ZP	BU941ZPFI	Unit
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	350		V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	5		V
$I_C$	Collector Current	15		A
$I_{CM}$	Collector Peak Current ( $t_p < 5\text{ms}$ )	30		A
$I_B$	Base Current	1		A
$I_{BM}$	Base Peak Current ( $t_p < 5\text{ms}$ )	5		A
$P_{tot}$	Total Dissipation at $T_C = 25\text{ }^\circ\text{C}$	155	65	W
$V_{isol}$	Insulation Withstand Voltage (RMS) from All Three Leads to External Heatsink	2500		V
$T_{stg}$	Storage Temperature	-65 to 175	-65 to 175	$^\circ\text{C}$
$T_J$	Max. Operating Junction Temperature	175	175	$^\circ\text{C}$

**Table 3: Thermal Data**

		TO-218	ISOWATT218	Unit
$R_{thj-case}$	Thermal Resistance Junction-Case Max	0.97	2.3	$^\circ\text{C/W}$

**Table 4: Electrical Characteristics ( $T_{case} = 25\text{ }^\circ\text{C}$  unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CEO}$	Collector Cut-off Current ( $I_B = 0$ )	$V_{CE} = 300\text{ V}$			100	$\mu\text{A}$
		$V_{CE} = 300\text{ V}$ $T_J = 125\text{ }^\circ\text{C}$			0.5	mA
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 5\text{ V}$			20	mA
$V_{CL}^*$	Clamping Voltage	$I_C = 100\text{ mA}$	350		500	V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 8\text{ A}$ $I_B = 100\text{ mA}$			1.8	V
		$I_C = 10\text{ A}$ $I_B = 250\text{ mA}$			1.8	V
		$I_C = 12\text{ A}$ $I_B = 300\text{ mA}$			2	V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 8\text{ A}$ $I_B = 100\text{ mA}$			2.2	V
		$I_C = 10\text{ A}$ $I_B = 250\text{ mA}$			2.5	V
		$I_C = 12\text{ A}$ $I_B = 300\text{ mA}$			2.7	V
$h_{FE}^*$	DC Current Gain	$I_C = 5\text{ A}$ $V_{CE} = 10\text{ V}$	300			
	Functional Test	$V_{CC} = 24\text{ V}$ $L = 7\text{ mH}$ (see fig. 12)	10			A
$t_s$ $t_f$	INDUCTIVE LOAD Storage Time Fall Time	$V_{CC} = 12\text{ V}$ $L = 7\text{ mH}$ $V_{BE(off)} = 0\text{ V}$ $R_{BE} = 47\text{ }\Omega$		15		$\mu\text{s}$
		$V_{Clamp} = 300\text{ V}$ $I_C = 7\text{ A}$ $I_B = 70\text{ mA}$ (see fig. 14)		0.5		$\mu\text{s}$
$V_F$	Diode Forward Voltage	$I_F = 10\text{ V}$			2.5	V

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

Figure 3: Safe Operating Area

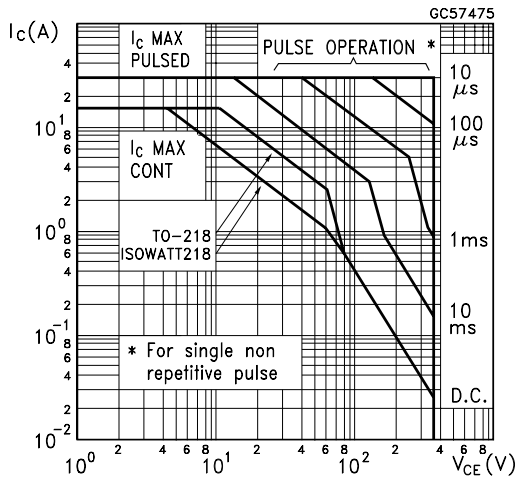


Figure 4: DC Current Gain

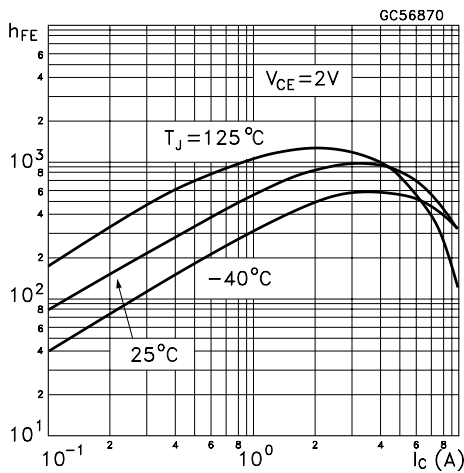


Figure 5: Collector-Emitter Saturation Voltage

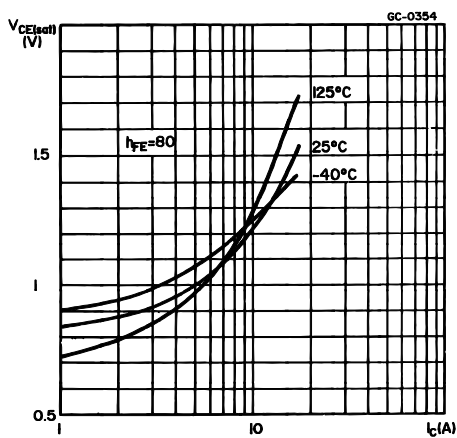


Figure 6: Derating Curves

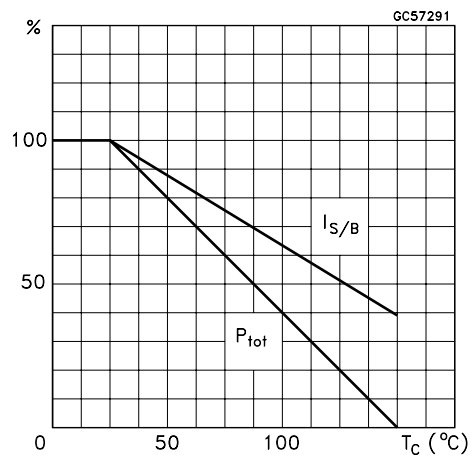


Figure 7: DC Current Gain

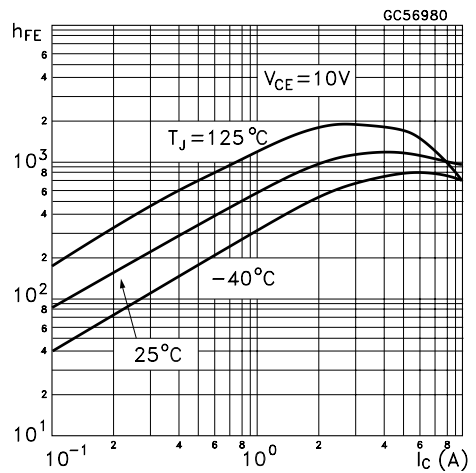


Figure 8: Collector-Emitter Saturation Voltage

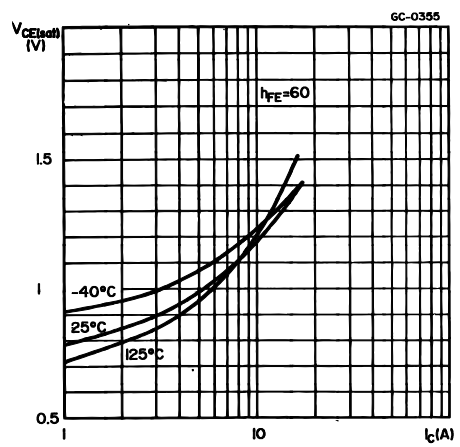


Figure 9: Base-Emitter Saturation Voltage

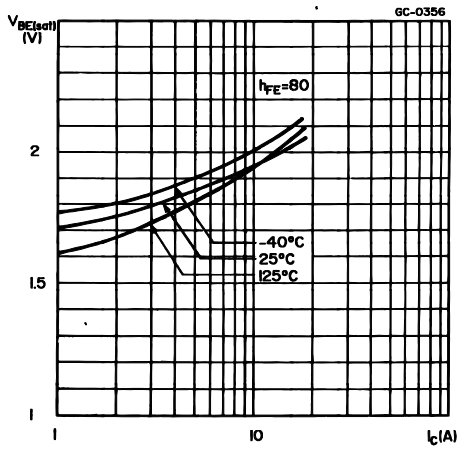


Figure 11: Base-Emitter Saturation Voltage

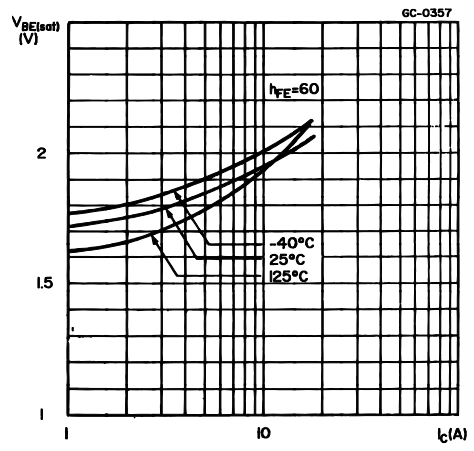


Figure 10: Collector-Emitter Saturation Voltage

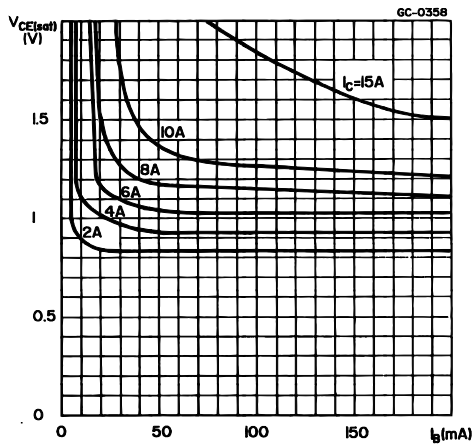


Figure 12: Functional Test Circuit

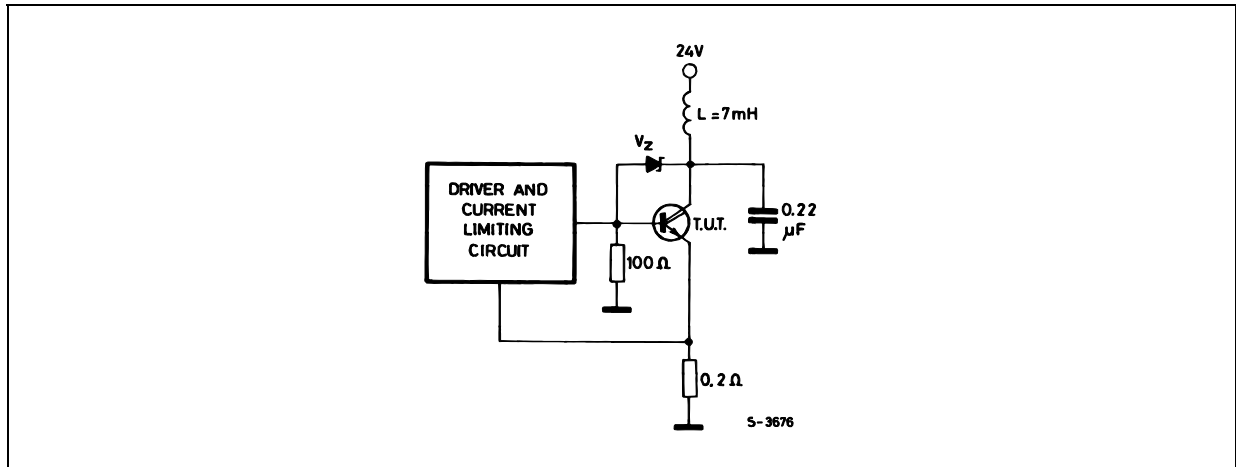


Figure 13: Functional Test Waveforms

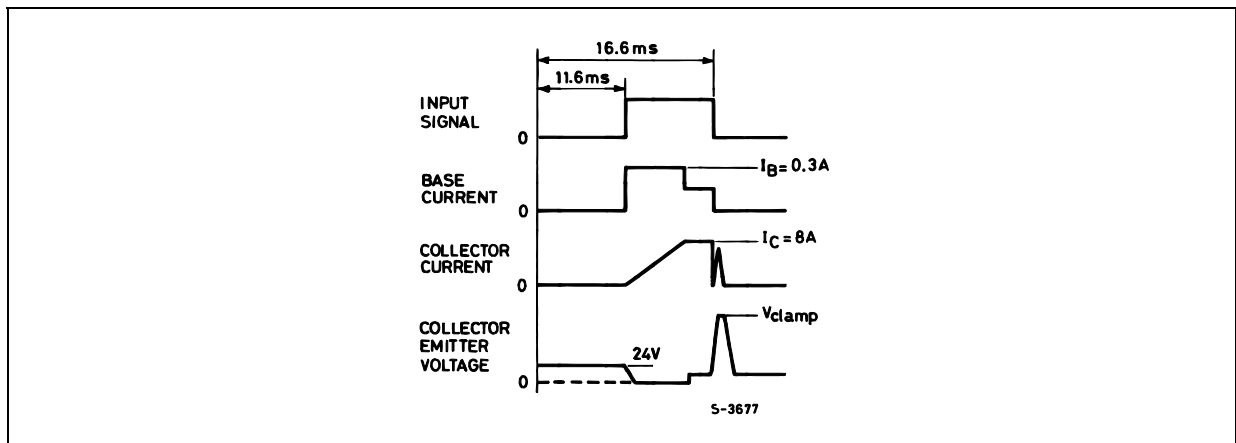
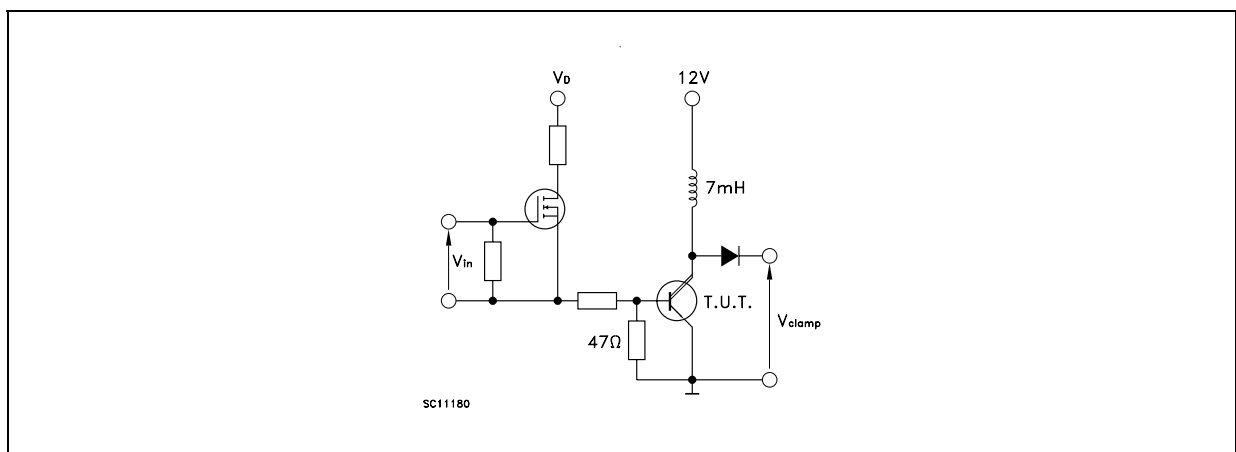
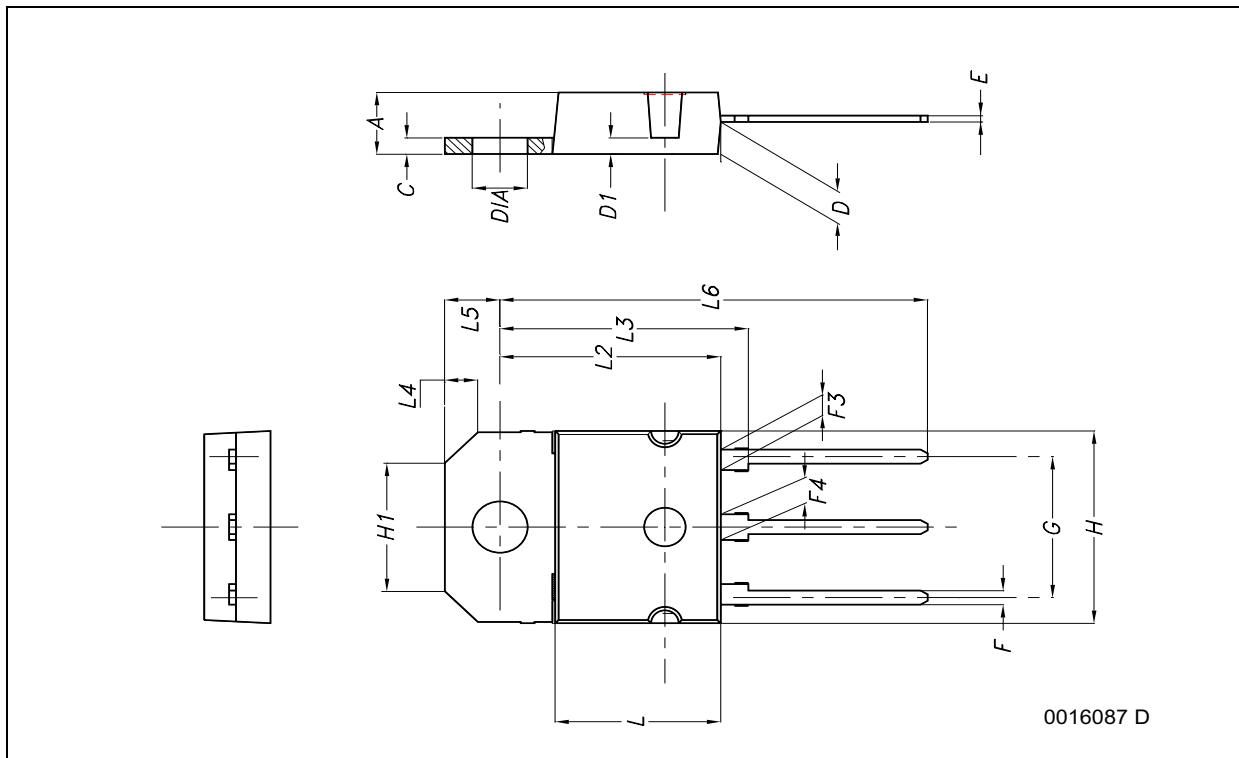


Figure 14: Switching Time Test Circuit



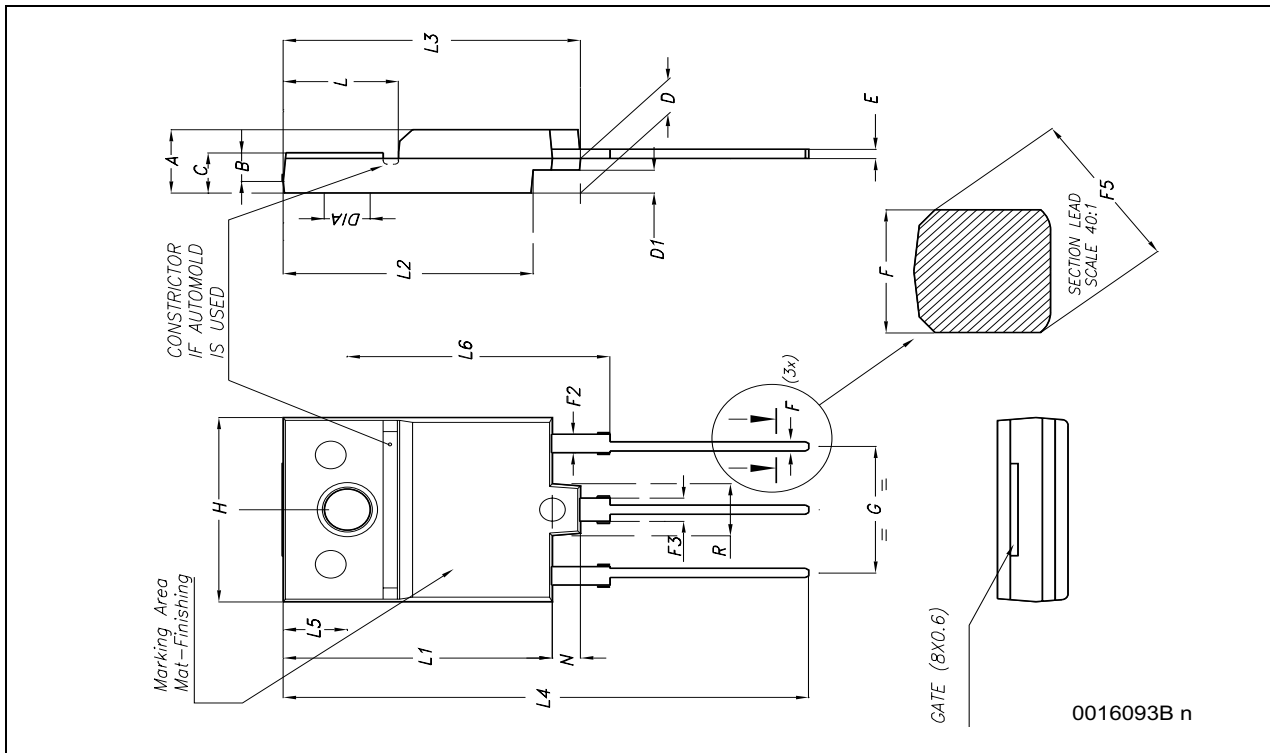
**TO-218 (SOT-93) MECHANICAL DATA**

DIM.	mm.		
	MIN.	TYP	MAX.
A	4.70		4.90
C	1.17		1.37
D		2.50	
D1		1.27	
E	0.50		0.78
F	1.10		1.30
F3		1.75	
F4		2.10	
G	10.80		11.10
H	14.70		15.20
H1		10.00	
L			12.20
L2			16.20
L3		18.00	
L4		2.40	
L5	3.95		4.15
L6		31.00	
Dia	4.00		4.10



**ISOWATT218 (option "B") MECHANICAL DATA**

DIM.	mm.		
	MIN.	TYP	MAX.
A	5.35		5.65
B		2.5	
C	3.30		3.80
D	2.90		3.10
D1	1.88		2.08
E	0.75		0.95
F	0.75		0.95
F2	1.50		1.85
F3	1.90		2.20
F5			1.10
G	10.80		11.20
H	15.80		16.20
L		9	
L1	20.80		21.20
L2	19.10		19.90
L3	22.80		23.60
L4	40.50		42.50
L5	4.85		5.25
L6	20.25		20.75
N	2.0		2.40
R		4.6	
Dia	3.50		3.70



**Table 5: Revision History**

<b>Date</b>	<b>Release</b>	<b>Change Designator</b>
22-Apr-2002	4	Fourth Release
09-Sep-2004	5	Fifth Release
03-Feb-2005	6	Mechanical Data has been updated



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