

# MT3250B

## N-Channel Power MOSFET 50V, 120A, 4.8mΩ



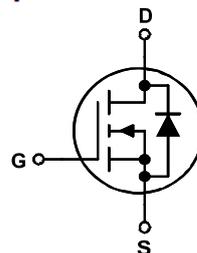
**MT Semiconductor®**

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### Features

- $R_{DS(on)} = 4.8m\Omega$  (Typ.) @  $V_{GS} = 10V$ ,  $I_D = 60A$
- High performance trench technology for extremely low  $R_{DS(on)}$
- High power and current handling capability
- RoHS compliant

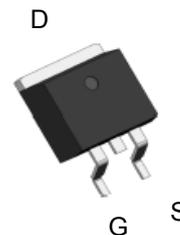
### Simplified Schematic



### Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

### MARKING DIAGRAM & PIN ASSIGNMENT



TO-263-2L

### Absolute Maximum Ratings ( $T_A = 25^\circ C$ unless otherwise noted)

Symbol	Parameter		Ratings	Units
$V_{DSS}$	Drain to Source Voltage		50	V
$V_{GSS}$	Gate to Source Voltage		$\pm 20$	V
$I_D$	Drain Current	- Continuous ( $T_C = 25^\circ C$ , Silicon Limited)	120*	A
		- Continuous ( $T_C = 100^\circ C$ , Silicon Limited)	90*	
		- Continuous ( $T_C = 25^\circ C$ , Package Limited)	35	
$I_{DM}$	Drain Current	- Pulsed (Note 1)	480	A
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)		570	mJ
$P_D$	Power Dissipation	( $T_C = 25^\circ C$ )	206	W
		- Derate above $25^\circ C$	2.04	W/ $^\circ C$
$T_J, T_{STG}$	Operating and Storage Temperature Range		-55 to +125	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		150	$^\circ C$

\*Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 100A.

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.79	$^\circ C/W$
$R_{\theta CS}$	Thermal Resistance, Case to Sink (Typ.)	0.8	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	69.5	$^\circ C/W$

## Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT3250B	MT3250B	TO-263-2L	/	/	50units

## Electrical Characteristics T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
<b>Off Characteristics</b>							
B <sub>V</sub> DSS	Drain to Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	50			V	
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 32V	--	--	1	μA	
		V <sub>GS</sub> = 0V, T <sub>C</sub> = 150°C	--	--	250	μA	
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>GS</sub> = ±20V	--	--	±100	nA	
<b>On Characteristics</b>							
V <sub>GS(th)</sub>	Gate to Source Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	0.8	1.2	1.4	V	
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 60A	--	4.8	5.5	mΩ	
<b>Dynamic Characteristics</b>							
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz	--	2810	--	pF	
C <sub>oss</sub>	Output Capacitance		--	580	--	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance		--	270	--	pF	
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> = 0.5V, f = 1MHz	--	1.1	--	Ω	
Q <sub>g(tot)</sub>	Total Gate Charge at 10V	V <sub>GS</sub> = 0V to 10V	V <sub>DD</sub> = 20V I <sub>D</sub> = 80A I <sub>g</sub> = 1.0mA	--	345	--	nC
Q <sub>g(2)</sub>	Threshold Gate Charge	V <sub>GS</sub> = 0V to 2V		--	32.5	--	nC
Q <sub>gs</sub>	Gate to Source Gate Charge			--	49	--	nC
Q <sub>gs2</sub>	Gate Charge Threshold to Plateau			--	16.5	--	nC
Q <sub>gd</sub>	Gate to Drain "Miller" Charge			--	74	--	nC
<b>Switching Characteristics (V<sub>GS</sub> = 10V)</b>							
t <sub>ON</sub>	Turn-On Time	V <sub>DD</sub> = 20V, I <sub>D</sub> = 80A V <sub>GS</sub> = 10V, R <sub>GEN</sub> = 7Ω	--	175	360	ns	
t <sub>d(on)</sub>	Turn-On Delay Time		--	43	95	ns	
t <sub>r</sub>	Rise Time		--	130	275	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time		--	435	875	ns	
t <sub>f</sub>	Fall Time		--	290	590	ns	
t <sub>OFF</sub>	Turn-Off Time		--	730	1470	ns	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>							
V <sub>SD</sub>	Source to Drain Diode Voltage	I <sub>SD</sub> = 80A	--	0.8	1.30	V	
		I <sub>SD</sub> = 40A	--	--	1.0	V	
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> = 75A, dI <sub>SD</sub> /dt = 100A/μs	--	59	--	ns	
Q <sub>RR</sub>	Reverse Recovery Charge	I <sub>SD</sub> = 75A, dI <sub>SD</sub> /dt = 100A/μs	--	77	--	nC	

## NOTES:

- 1: Pulse width limited by maximum junction temperature.
- 2: Starting T<sub>J</sub> = 25°C, L = 1mH, I<sub>AS</sub> = 58A, V<sub>DD</sub> = 36V, V<sub>GS</sub> = 10V.

## Typical Performance Characteristics

Figure 1. On-Region Characteristics

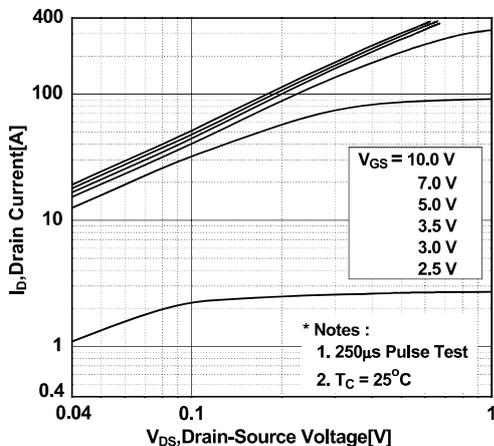


Figure 2. Transfer Characteristics

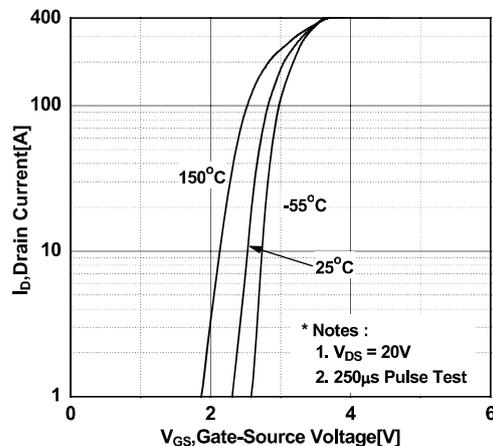


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

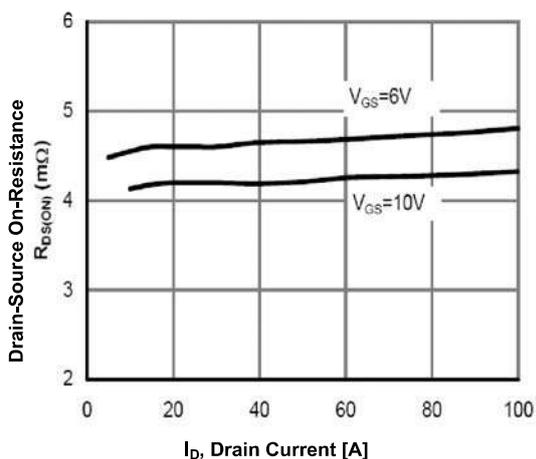


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

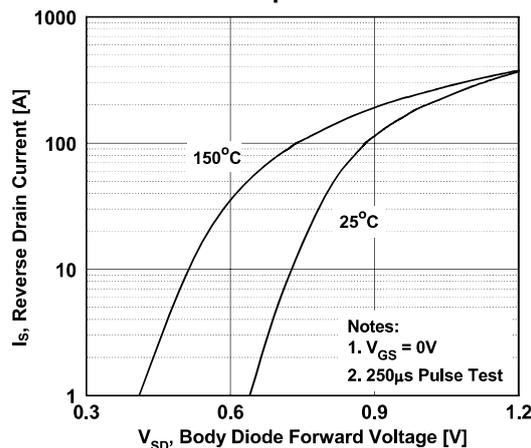


Figure 5. Capacitance Characteristics

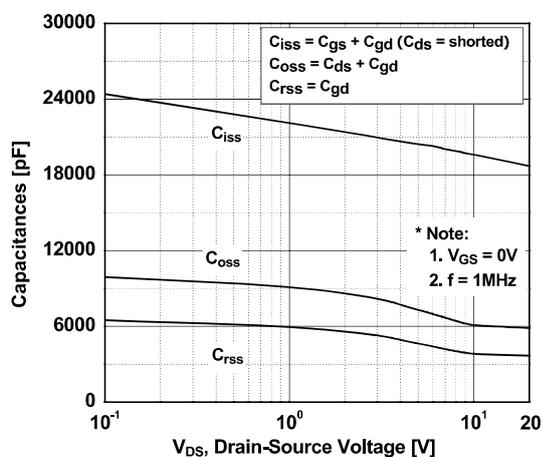
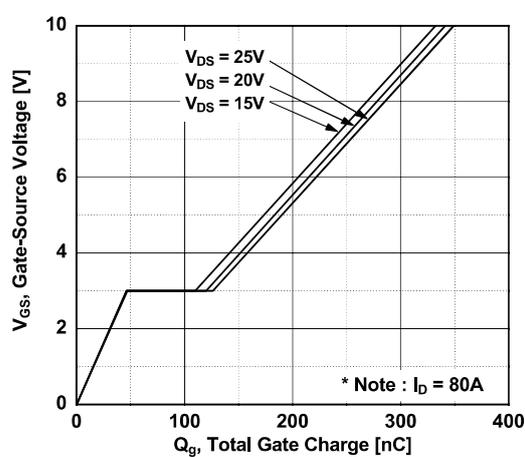


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

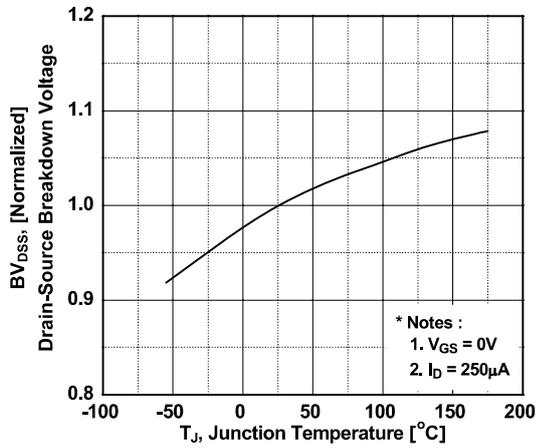


Figure 8. On-Resistance Variation vs. Temperature

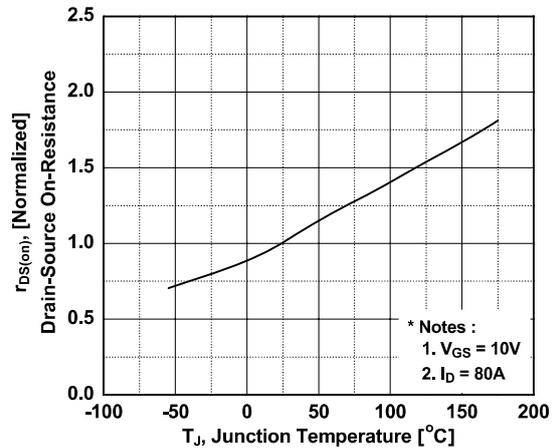


Figure 9. Unclamped Inductive Switching Capability

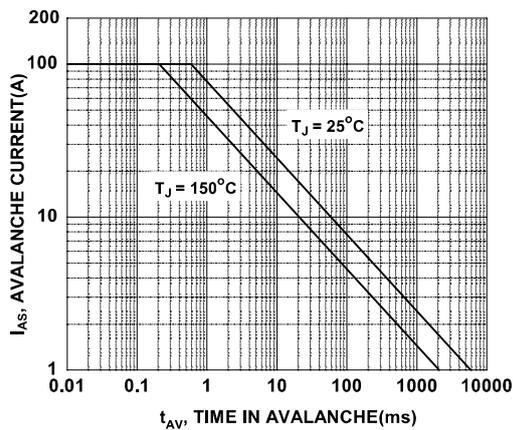


Figure 10. Safe Operating Area

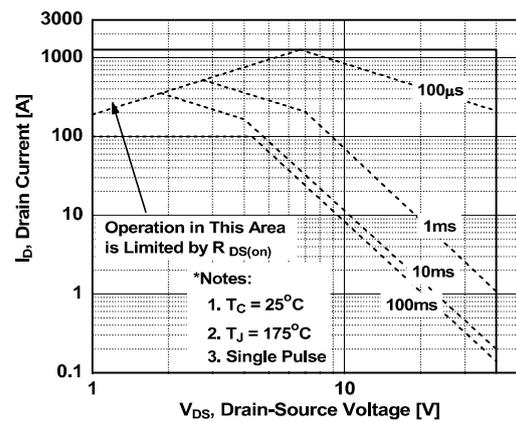
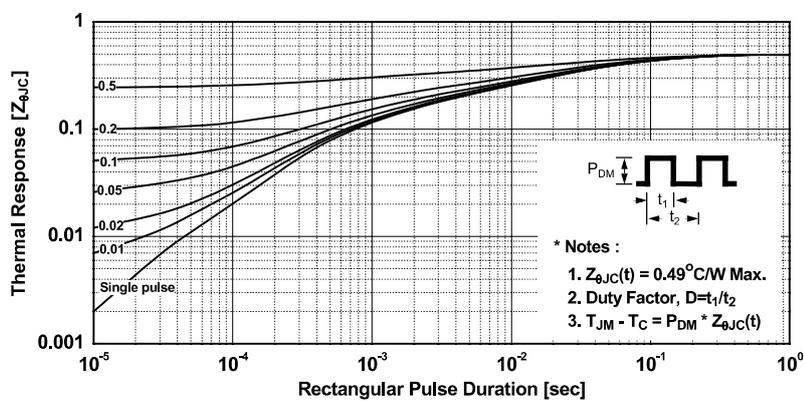
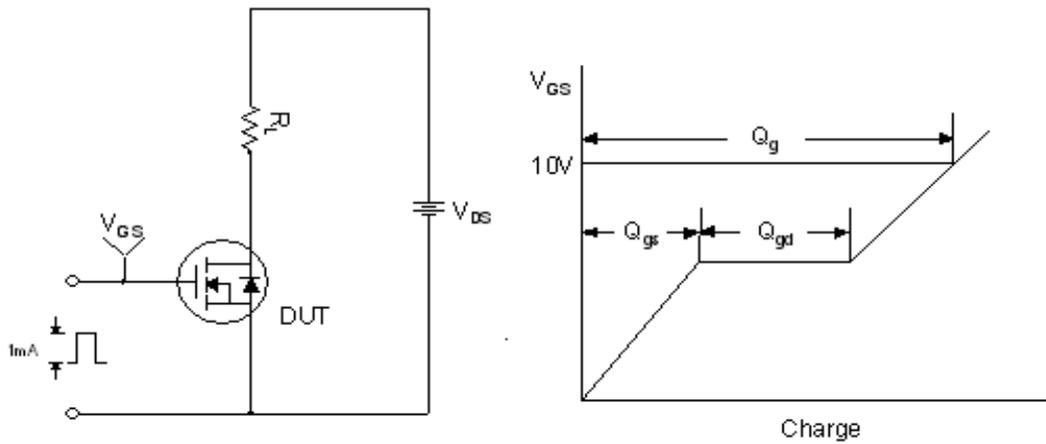


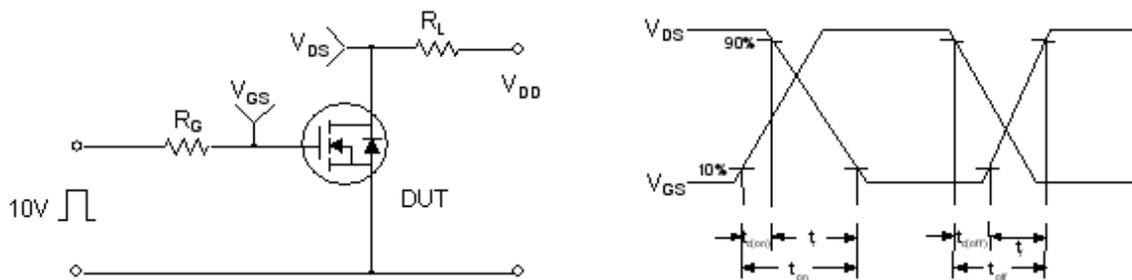
Figure 11. Transient Thermal Response Curve



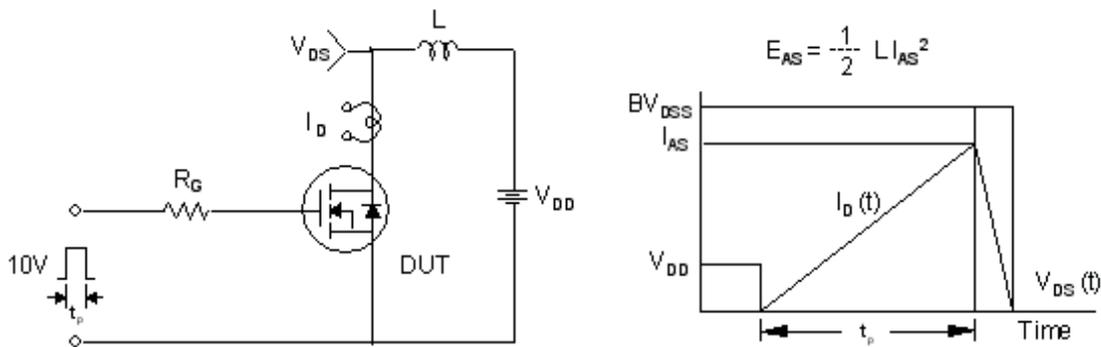
**Gate Charge Test Circuit & Waveform**



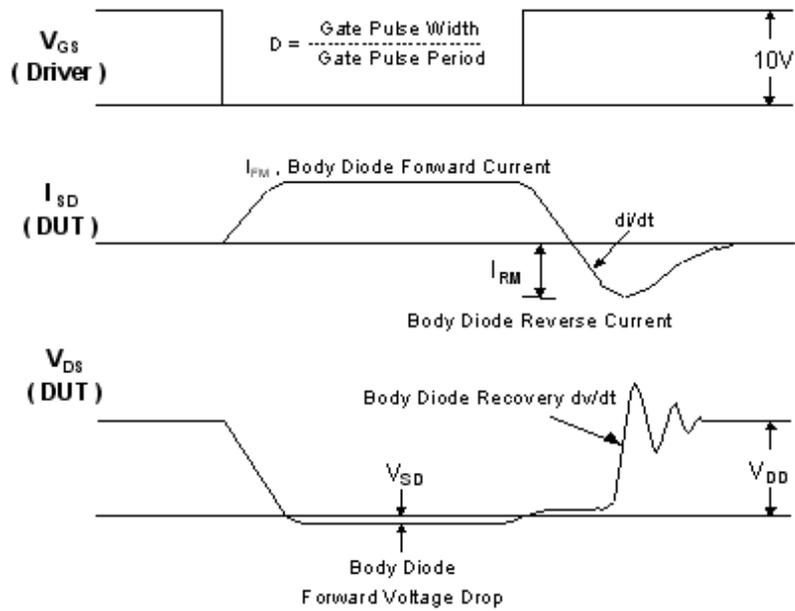
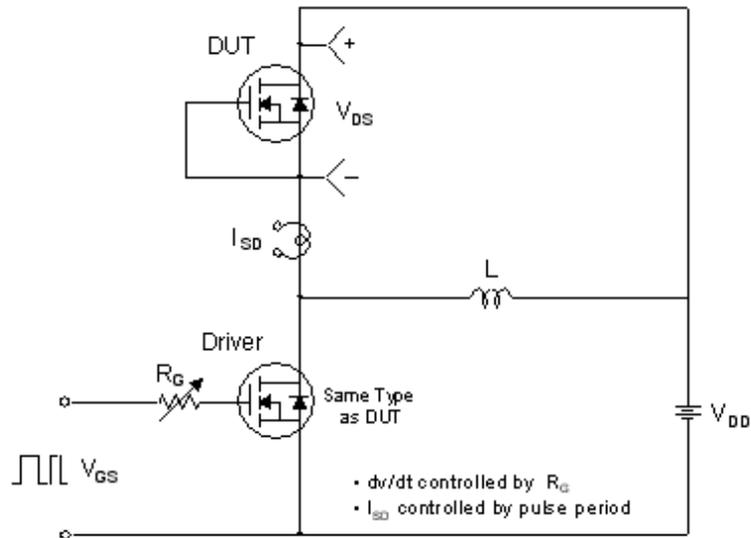
**Resistive Switching Test Circuit & Waveforms**



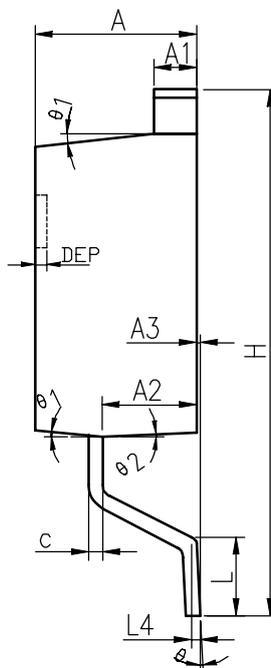
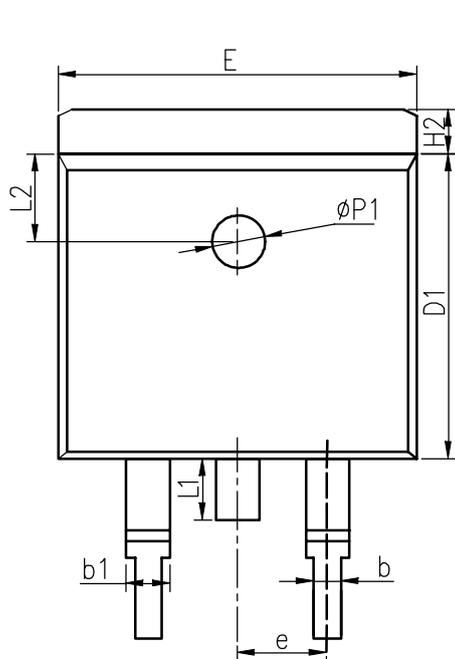
**Unclamped Inductive Switching Test Circuit & Waveforms**



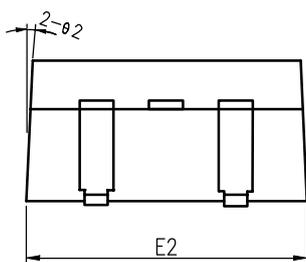
Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO-263-2L



COMMON DIMENSIONS



SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.22	1.27	1.32	0.048	0.050	0.052
A2	2.59	2.69	2.79	0.102	0.106	0.110
A3	0.00	0.10	0.20	0.000	0.004	0.008
b	0.77	0.813	0.90	0.030	0.032	0.035
b1	1.20	1.270	1.36	0.047	0.050	0.054
c	0.34	0.381	0.47	0.013	0.015	0.019
D1	8.60	8.70	8.80	0.339	0.343	0.346
E	10.00	10.16	10.26	0.394	0.400	0.404
E2	10.00	10.10	10.20	0.394	0.398	0.402
e	2.54 BSC			0.100 BSC		
H	14.70	15.10	15.50	0.579	0.594	0.610
H2	1.17	1.27	1.40	0.046	0.050	0.055
L	2.00	2.30	2.60	0.079	0.091	0.102
L1	1.45	1.55	1.70	0.057	0.061	0.067
L2	2.50 REF			0.098 REF		
L4	0.25 BSC			0.010 BSC		
	0°	5°	8°	0°	5°	8°
1	5°	7°	9°	5°	7°	9°
2	1°	3°	5°	1°	3°	5°
$\phi P1$	1.40	1.50	1.60	0.055	0.059	0.063
DEP	0.05	0.10	0.20	0.002	0.004	0.008

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