

MT3202

60V N-Channel MOSFET

60V, 65A, 0.016Ω

General Description

These N-Channel enhancement mode power field effect transistors are produced using Mos-tech's proprietary, planar stripe, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

Features

- $R_{DS(ON)} = 0.016\Omega$, $V_{GS} = 10V$, $I_D = 32.5A$
- Low gate charge (typical 167nC)
- Low C_{rss} (typical 43pF)
- Fast switching
- Improved dv/dt capability

Applications

- High efficient switched mode power supplier
- Power factor correction
- Car audio
- Electronic lamp ballast based on half bridge topology

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

Symbol	Parameter	MT3202	Units
V_{DSS}	Drain-Source Voltage	60	V
I_D	Drain Current - Continuous ($T_C = 25^\circ C$) - Continuous ($T_C = 100^\circ C$)	65	A
		40	A
I_{DM}	Drain Current - Pulsed (Note 1)	240	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	400	mJ
I_{AR}	Avalanche Current (Note 1)	65	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	12.5	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.6	V/ns
P_D	Power Dissipation ($T_C = 25^\circ C$)	137	W
	- Derate above $25^\circ C$	1.09	W/ $^\circ C$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ C$

Thermal Characteristics

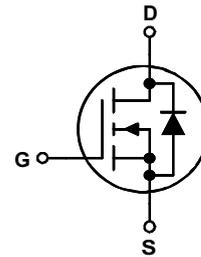
Symbol	Parameter	MT3202	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.96	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	65.5	$^\circ C/W$



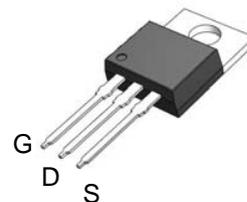
MT Semiconductor®

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Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



TO-220FB-3L

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT3202	MT3202	TO-220	--	--	50

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units	
Off Characteristics							
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	60	--	--	V	
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C	--	0.5	--	V/°C	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 60 V, V _{GS} = 0 V	--	--	1	μA	
		V _{DS} = 48 V, T _C = 125°C	--	--	10	μA	
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 20 V, V _{DS} = 0 V	--	--	100	nA	
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -20 V, V _{DS} = 0 V	--	--	-100	nA	
On Characteristics							
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	2.0	--	4.0	V	
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 32.5 A	--	0.016	0.019	Ω	
g _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 32.5 A (Note 4)	--	35	--	S	
Dynamic Characteristics							
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	1790	2190	pF	
C _{oss}	Output Capacitance		--	482	625	pF	
C _{rss}	Reverse Transfer Capacitance		--	43	55	pF	
Switching Characteristics							
t _{d(on)}	Turn-On Delay Time	V _{DD} = 30 V, I _D = 65A, R _G = 25 Ω	--	26	59	ns	
t _r	Turn-On Rise Time		--	96	208	ns	
t _{d(off)}	Turn-Off Delay Time		(Note 4, 5)	--	99	214	ns
t _f	Turn-Off Fall Time		--	55	117	ns	
Q _g	Total Gate Charge	V _{DS} = 48 V, I _D = 65A, V _{GS} = 10 V	--	33	43	nC	
Q _{gs}	Gate-Source Charge		--	10	--	nC	
Q _{gd}	Gate-Drain Charge		(Note 4, 5)	--	11	--	nC
Drain-Source Diode Characteristics and Maximum Ratings							
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	65	A	
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	240	A	
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 65 A	--	--	1.4	V	
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 65 A, dI _F / dt = 100 A/μs	--	62	--	ns	
Q _{rr}	Reverse Recovery Charge		(Note 4)	--	132	--	nC

NOTES:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 47μH, I_{AS} = 65A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 65A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1. On-Region Characteristics

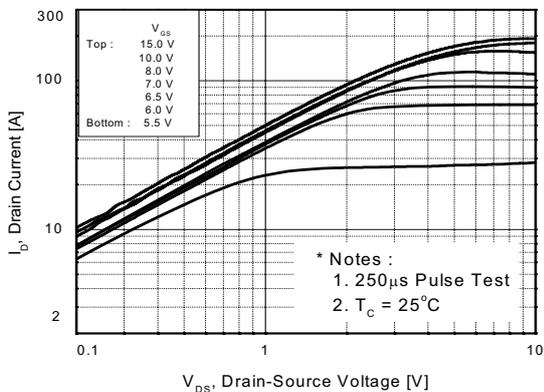


Figure 2. Transfer Characteristics

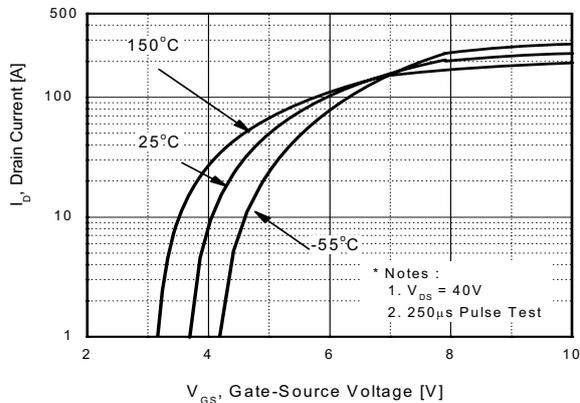


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

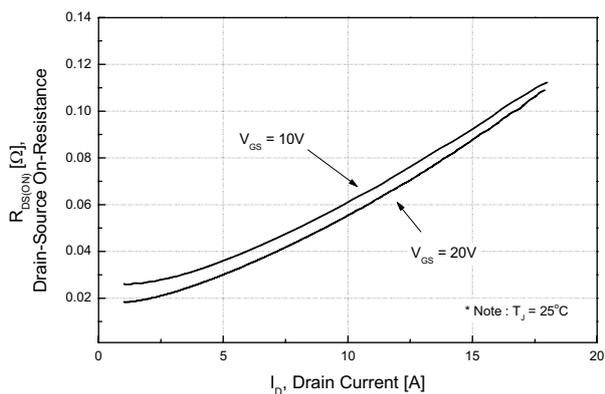


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

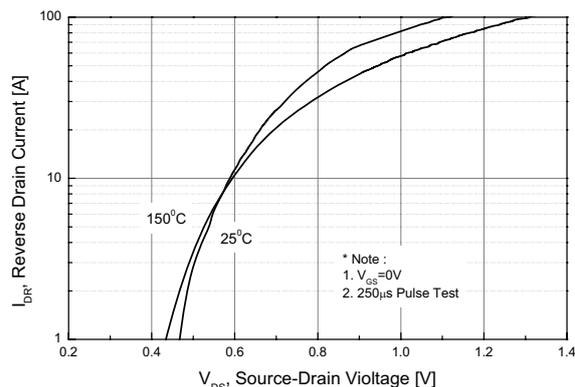


Figure 5. Capacitance Characteristics

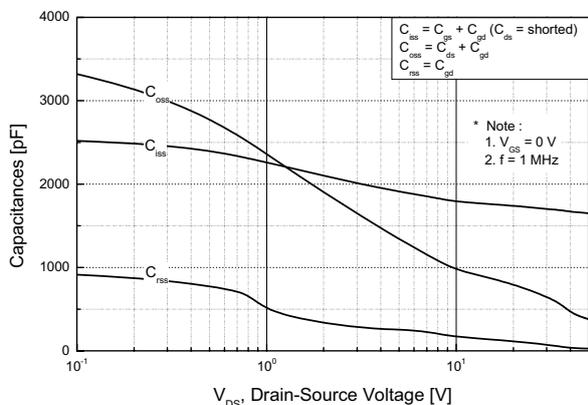
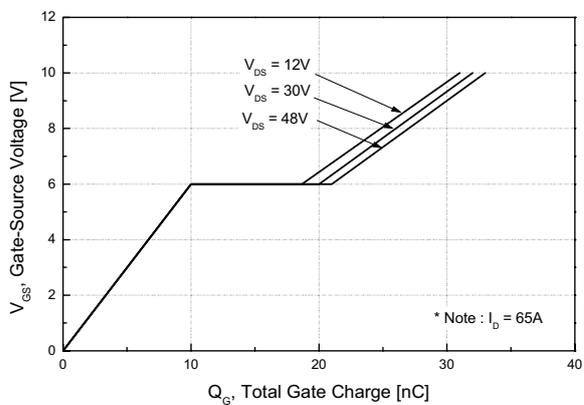


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

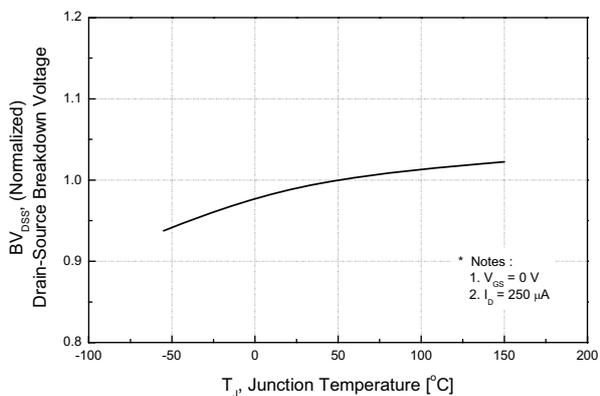


Figure 8. On-Resistance Variation vs. Temperature

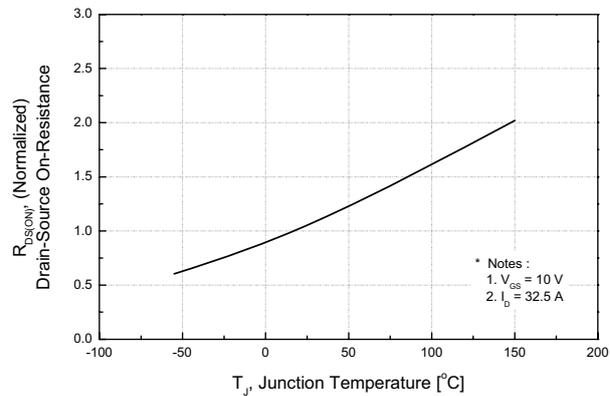


Figure 9. Maximum Safe Operating Area

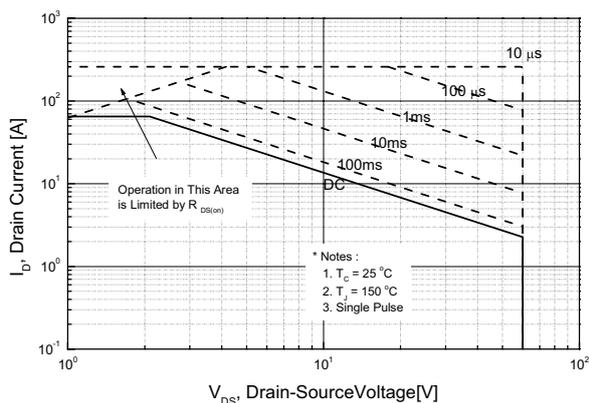


Figure 10. Maximum Drain Current vs. Case Temperature

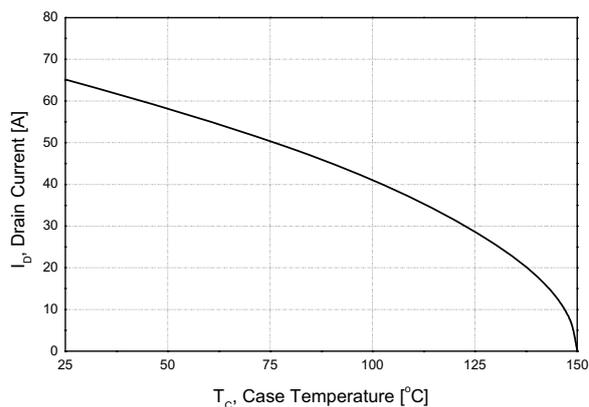
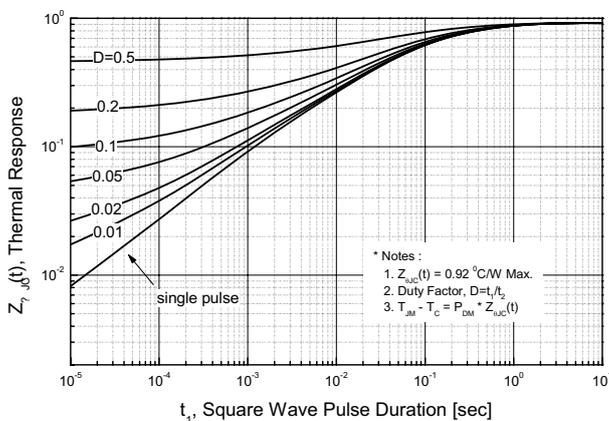
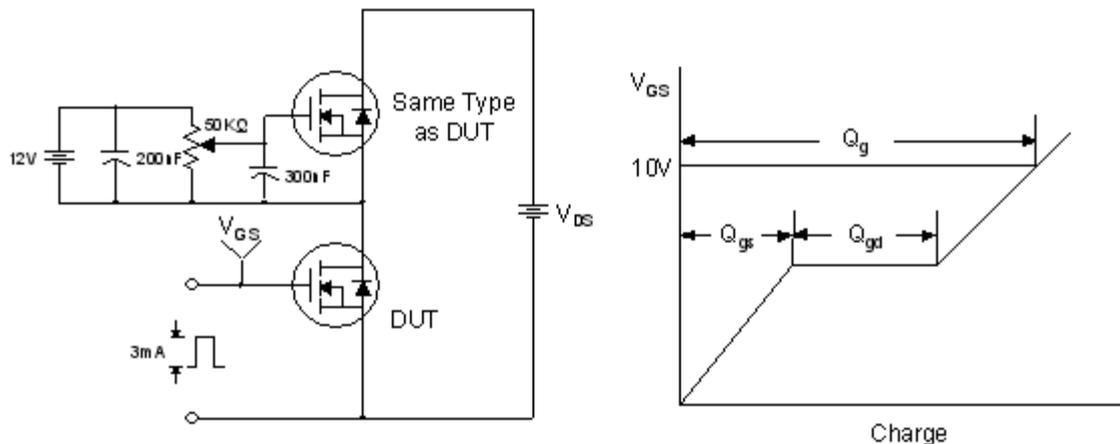


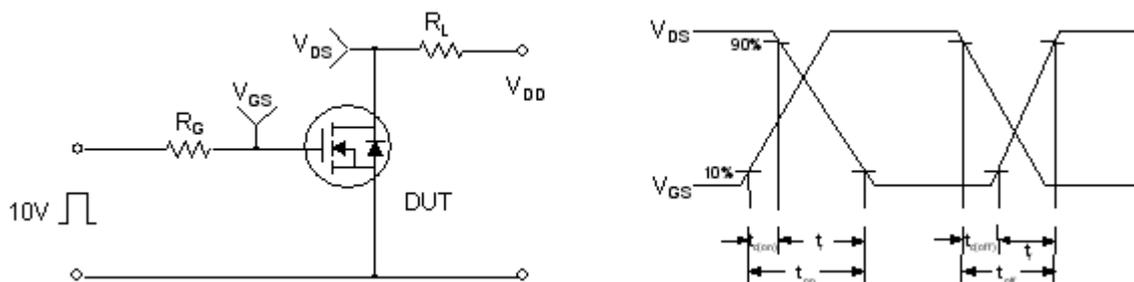
Figure 11. Transient Thermal Response Curve



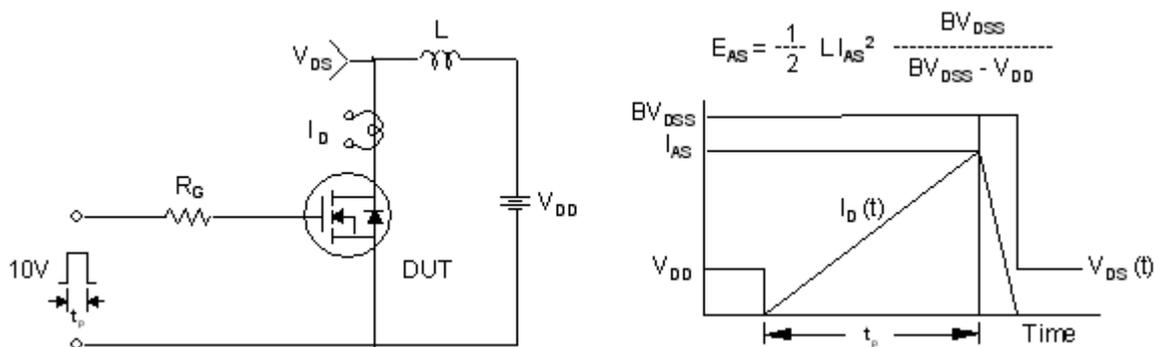
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

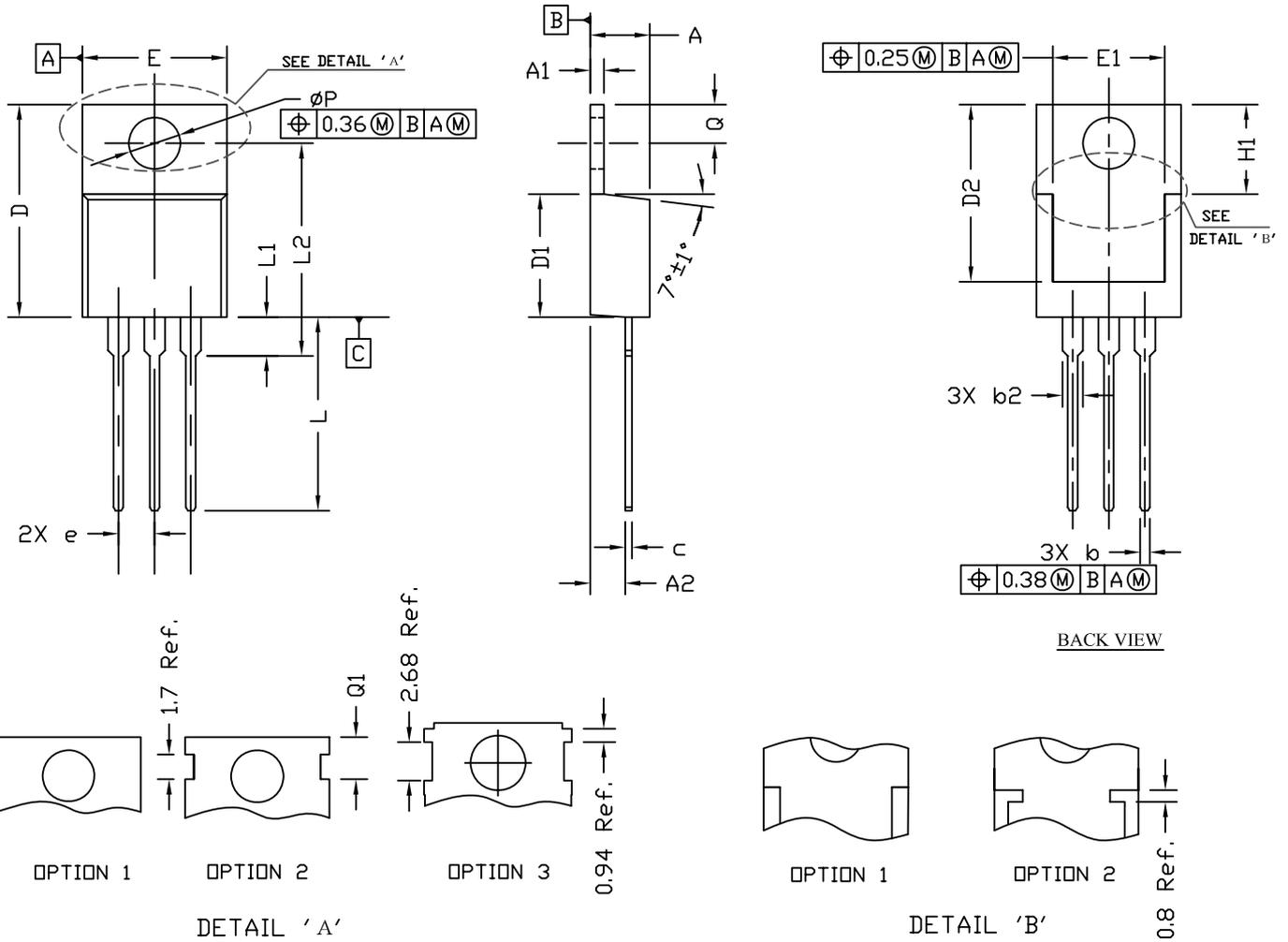


Unclamped Inductive Switching Test Circuit & Waveforms

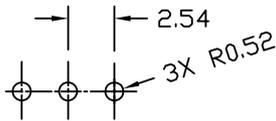


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Version	L

TO220 PACKAGE OUTLINE



RECOMMENDATION OF HOLE PATTERN



UNIT: mm

NOTE

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH SHOULD BE LESS THAN 6 MIL.
2. TOLERANCE 0.100 MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.30	4.45	4.72	0.169	0.175	0.186
A1	1.15	1.27	1.40	0.045	0.050	0.055
A2	2.20	2.67	2.90	0.087	0.105	0.114
b	0.69	0.81	0.95	0.027	0.032	0.037
b2	1.17	1.37	1.45	0.046	0.050	0.068
c	0.36	0.38	0.60	0.014	0.015	0.024
D	14.50	15.44	15.80	0.571	0.608	0.622
D1	8.59	9.14	9.65	0.338	0.360	0.380
D2	11.43	11.73	12.48	0.450	0.462	0.491
e	2.54 BSC			0.100 BSC.		
E	9.66	10.03	10.54	0.380	0.395	0.415
E1	6.22	---	---	0.245	---	---
H1	6.10	6.30	6.50	0.240	0.248	0.256
L	12.27	12.82	14.27	0.483	0.505	0.562
L1	2.47	---	3.90	0.097	---	0.154
L2	---	---	16.70	---	---	0.657
Q	2.59	2.74	2.89	0.102	0.108	0.114
ϕP	3.50	3.84	3.89	0.138	0.151	0.153
Q1	2.70	---	2.90	0.106	---	0.114

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