MT3250

N-Channel Power MOSFET

50V, 120A, 4.8mΩ

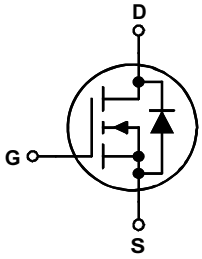
MT Semiconductor®

http://www.mtsemi.com

Features

- $R_{DS(on)}$ =4.8mΩ (Typ.)@ V_{GS} = 10V, I_D=60A
- High performance trench technology for extermly low RDS(on)
- High power and current handing capability
- RoHS compliant

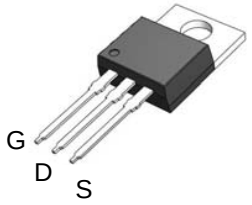
Simplified Schematic



Applications

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

MARKING DIAGRAM & PIN ASSIGNMENT



TO-220FB-3L

Absolute Maximum Ratings (T_A = 25℃ unless otherwise noted)

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage		50	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	- Continuous (T_C = 25°C, Silicon Limited) - Continuous (T_C = 100°C, Silicon Limited) - Continuous (T_C = 25°C, Package Limited)	120* 90* 35	A
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°C)	206	W
		- Derate above 25°C	2.04	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +125	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		150	°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	°C/W
$R_{\theta CS}$	Thermal Resistance, Case to Sink (Typ.)	0.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	69.5	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package			
MT3250	MT3250	TO-220	N/A	N/A	50units

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Conditions		Min	Typ	Max	Units
Off Characteristics							
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μ		50			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 32V		--	--	1	μA
		V_{GS} = 0V	T_C = 150°C	--	--	250	μA
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20V		--	--	±100	nA
On Characteristics							
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA		0.8	1.2	1.4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance						mΩ
		V_{GS} = 10V, I_D = 60A		--	4.8	5.5	
Dynamic Characteristics							
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz		--	2810	--	pF
C_{oss}	Output Capacitance			--	580	--	pF
C_{rss}	Reverse Transfer Capacitance			--	270	--	pF
R_G	Gate Resistance	V_{GS} = 0.5V, f = 1MHz		--	1.1	--	Ω
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V	V_{DD} = 20V	--	345	--	nC
$Q_{g(2)}$	Threshold Gate Charge	V_{GS} = 0V to 2V	I_D = 80A	--	32.5	--	nC
Q_{gs}	Gate to Source Gate Charge		I_g = 1.0mA	--	49	--	nC
Q_{gs2}	Gate Charge Threshold to Plateau			--	16.5	--	nC
Q_{gd}	Gate to Drain “Miller” Charge			--	74	--	nC
Switching Characteristics (V_{GS} = 10V)							
t_{ON}	Turn-On Time	V_{DD} = 20V,I_D = 80A V_{GS} = 10V, R_{GEN} = 7Ω		--	175	360	ns
$t_{d(on)}$	Turn-On Delay Time			--	43	95	ns
t_r	Rise Time			--	130	275	ns
$t_{d(off)}$	Turn-Off Delay Time			--	435	875	ns
t_f	Fall Time			--	290	590	ns
t_{OFF}	Turn-Off Time			--	730	1470	ns
Drain-Source Diode Characteristics and Maximum Ratings							
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 80A		--	0.8	1.30	V
		I_{SD} = 40A		--	--	1.0	V
t_{rr}	Reverse Recovery Time	I_{SD} = 75A, dI_{SD}/dt = 100A/μs		--	59	--	ns
Q_{RR}	Reverse Recovery Charge	I_{SD} = 75A, dI_{SD}/dt = 100A/μs		--	77	--	nC

NOTES:

1: Pulse width limited by maximum junction temperature.

2: Starting T_J = 25°C, L = 1mH, I_{AS} = 58A, V_{DD} = 36V, V_{GS} = 10V.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

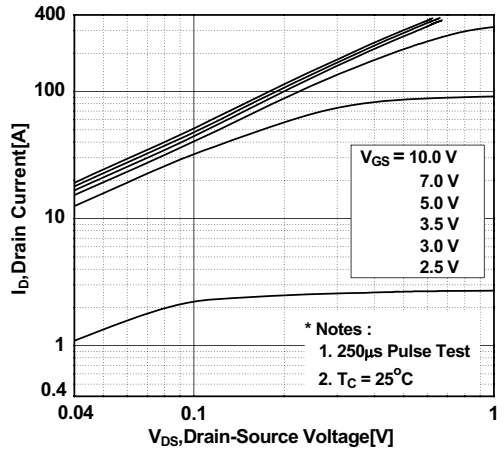


Figure 2. Transfer Characteristics

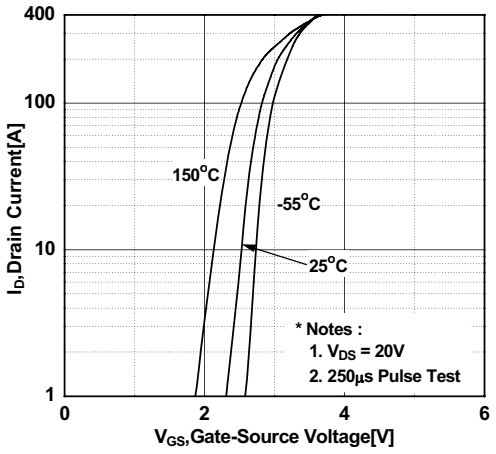


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

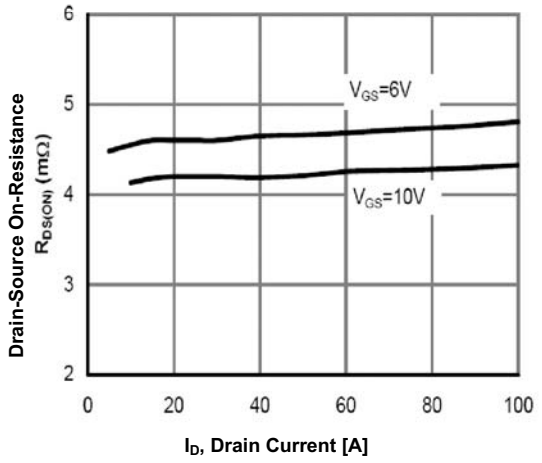


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue

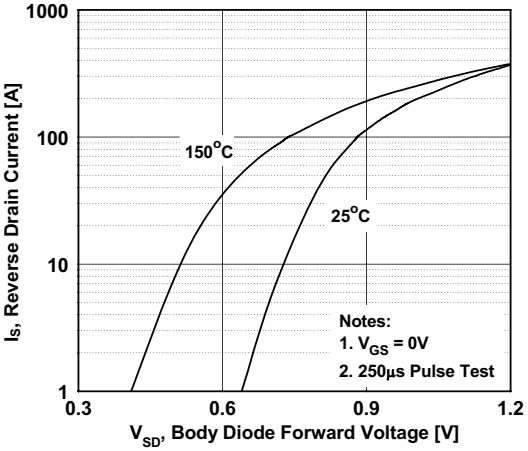


Figure 5. Capacitance Characteristics

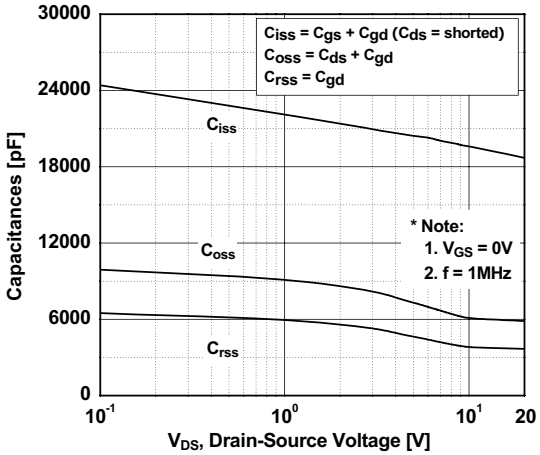
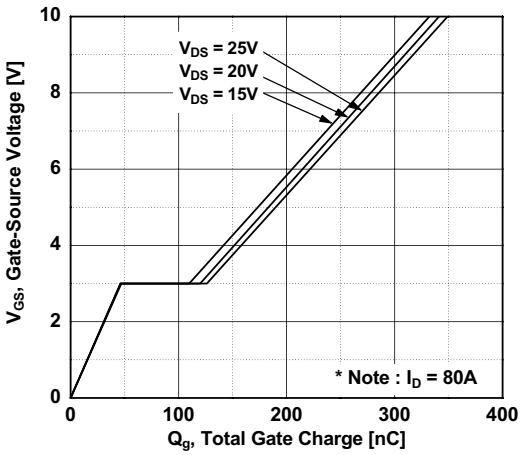


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

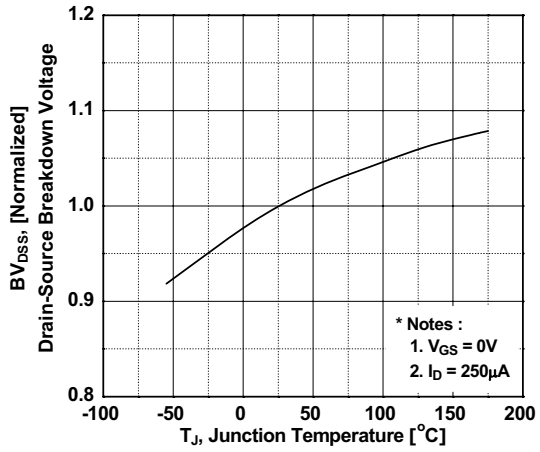


Figure 8. On-Resistance Variation vs. Temperature

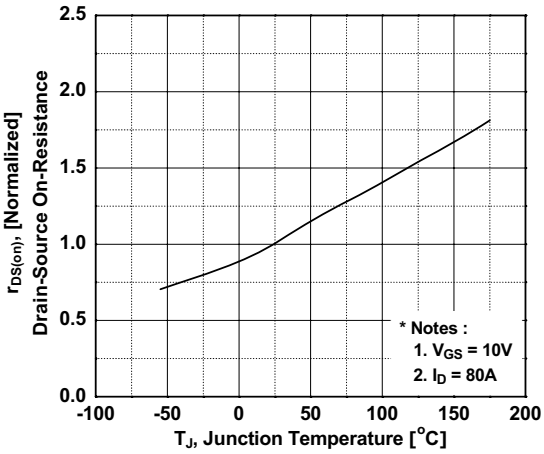


Figure 9. Unclamped Inductive Switching Capability

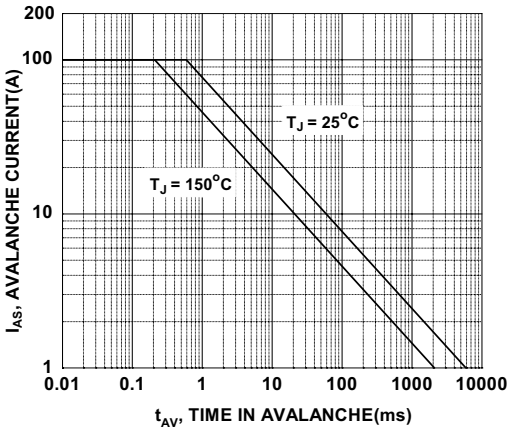


Figure 10. Safe Operating Area

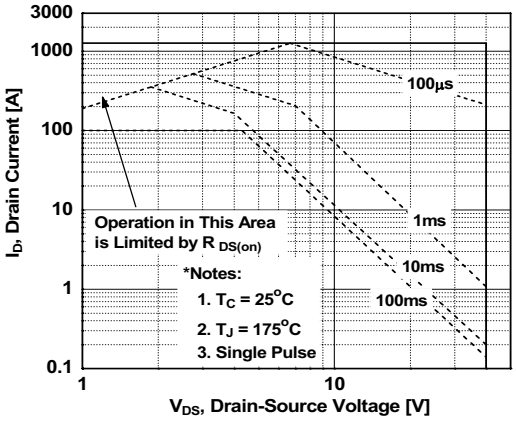
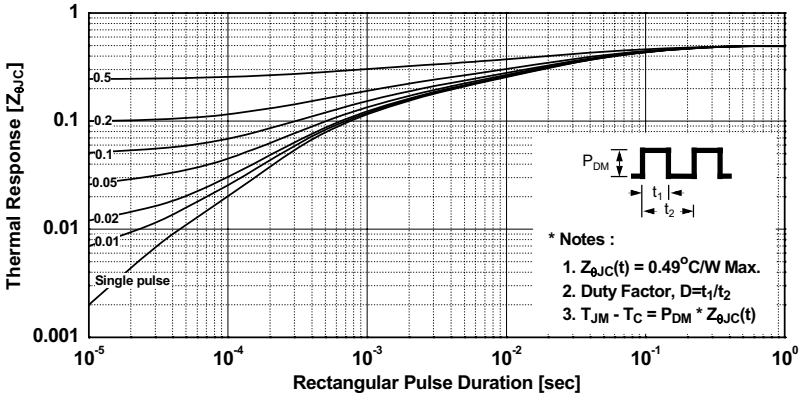
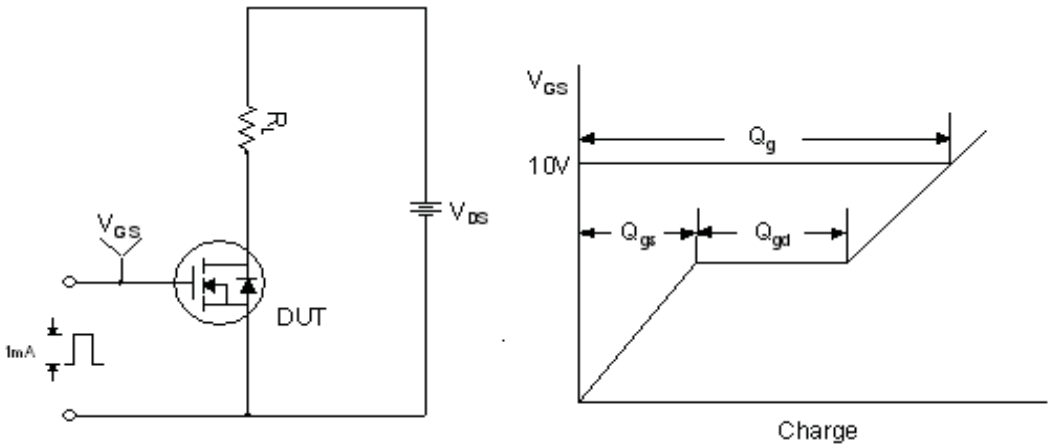


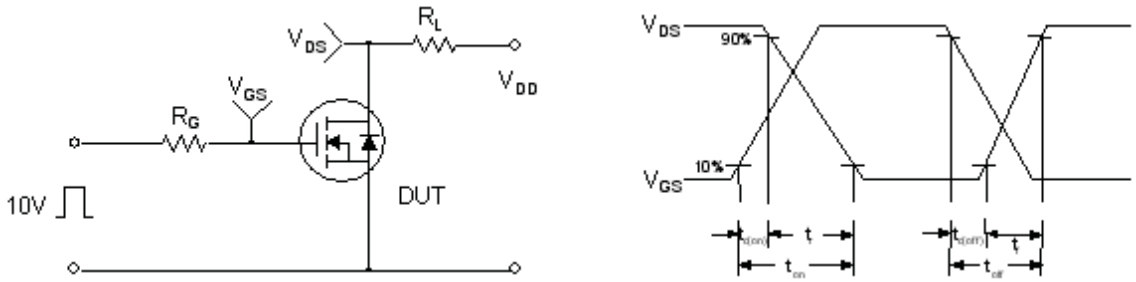
Figure 11. Transient Thermal Response Curve



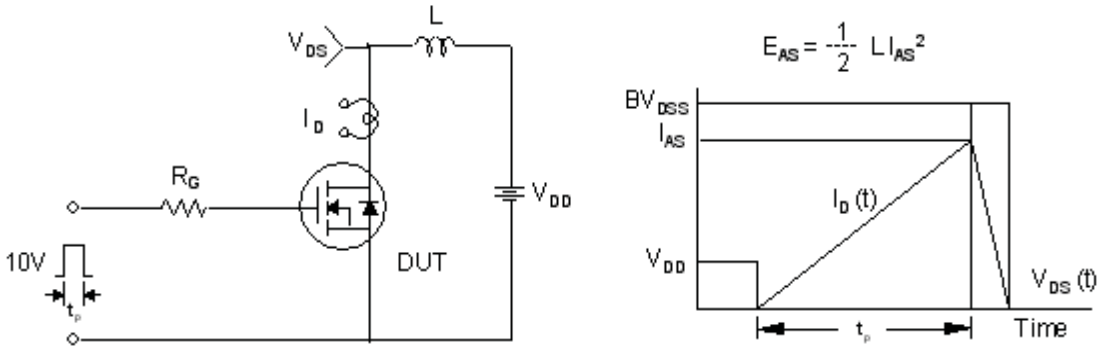
Gate Charge Test Circuit & Waveform



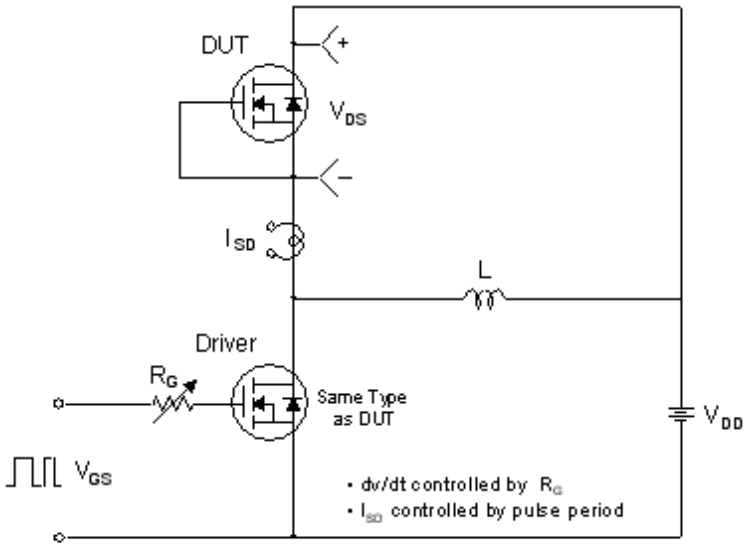
Resistive Switching Test Circuit & Waveforms

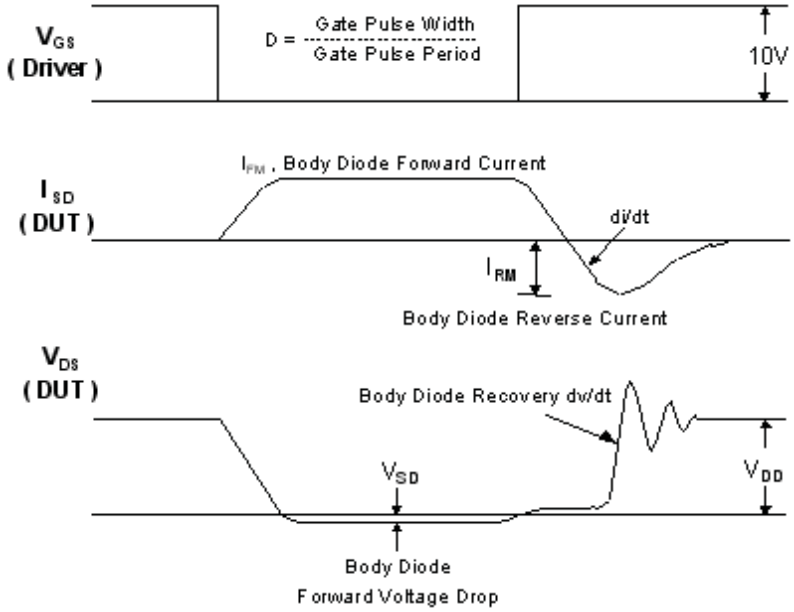


Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms





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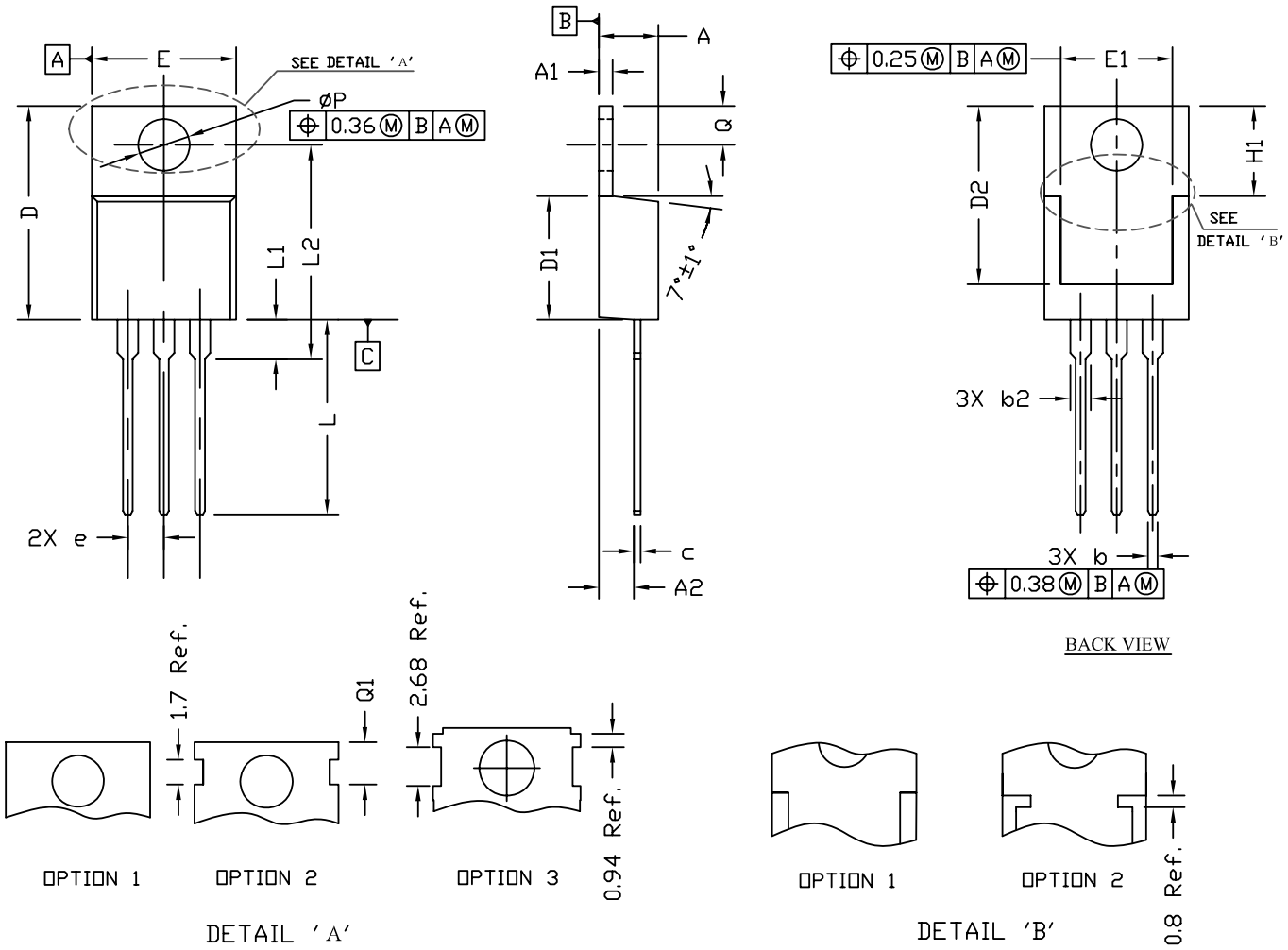
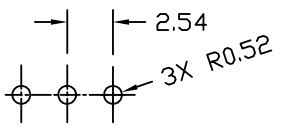
TO220 PACKAGE OUTLINE



RECOMMENDATION OF HOLE PATTERN



UNIT: mm

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
øP	3.50	3.84	3.89	0.138	0.151	0.153
Q1	2.70	---	2.90	0.106	---	0.114

NOTE
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH SHOULD BE LESS THAN 6 MIL.
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Keep safety first in your circuit designs!

1. MOS-TECH Semiconductor Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.