MT3207

60V N-Channel MOSFET

60V, 70A, 8.5m Ω

MT Semiconductor®

http://www.mtsemi.com

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.

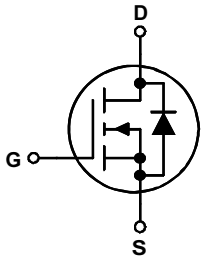
Features

- $R_{DS(ON)}$ = 8.5mΩ (Typ) , V_{GS} = 10V, I_D = 40A
- Low gate charge(typical 57nC)
- Low Crss (typical 145pF)
- Fast switching
- Improved dv/dt capability
- Rohs compliant

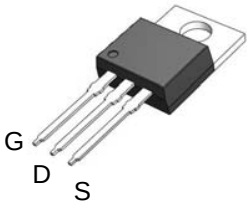
Applications

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

Simplified Schematic



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			60	V
V_{GSS}	Gate to Source Voltage			±20	V
I_D	Drain Current	-Continuous (T_C = 25°C)		70	A
		-Continuous (T_C = 100°C)		65	
I_{DM}	Drain Current	- Pulsed	(Note 1)	320	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	480	mJ
I_{AR}	Avalanche Current		(Note 1)	80	A
E_{AR}	Repetitive Avalanche Energy		(Note 1)	17.6	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	4.5	V/ns
P_D	Power Dissipation	(T_C = 25°C)		176	W
		- Derate above 25°C		1.17	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range			-55 to +175	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds			300	°C

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.85	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

Package Marking and Ordering Information T_C = 25°C unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT3207	MT3207	TO-220	-	-	50

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V, T_J = 25°C	60	-	-	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	-	0.075	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 48V, T_C = 150°C	-	-	10	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 40A	-	8.5	9	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 25V, I_D = 40A (Note 4)	-	67	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V f = 1MHz	-	2450	3190	pF
C_{oss}	Output Capacitance		-	910	1190	pF
C_{rss}	Reverse Transfer Capacitance		-	145	190	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30V, I_D = 70A R_G = 25Ω (Note 4, 5)	-	32	75	ns
t_r	Turn-On Rise Time		-	259	528	ns
$t_{d(off)}$	Turn-Off Delay Time		-	136	282	ns
t_f	Turn-Off Fall Time		-	113	236	ns
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 48V, I_D = 70A V_{GS} = 10V (Note 4, 5)	-	57	74	nC
Q_{gs}	Gate to Source Gate Charge		-	15	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	24	-	nC
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	70	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	220	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 70A	-	-	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 70A dI_F/dt = 100A/μs (Note 4)	-	64	-	ns
Q_{rr}	Reverse Recovery Charge		-	127	-	nC

Notes:
1: Repetitive Rating: Pulse width limited by maximum junction temperature
2: L = 0.15mH, I_{AS} = 80A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3: I_{SD} ≤ 80A, 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 Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

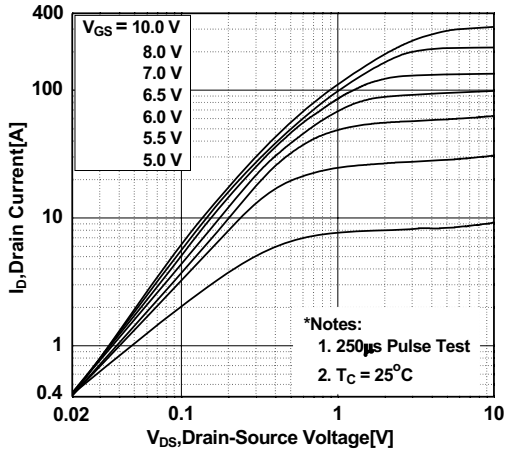


Figure 2. Transfer Characteristics

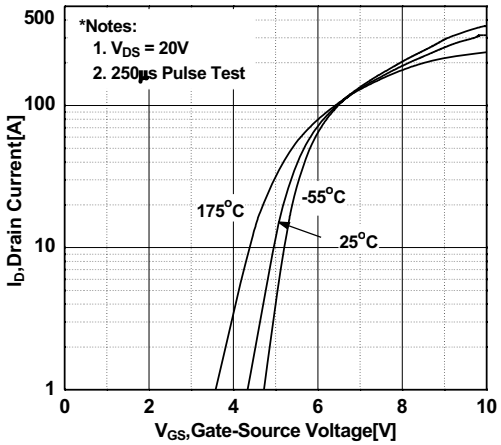


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

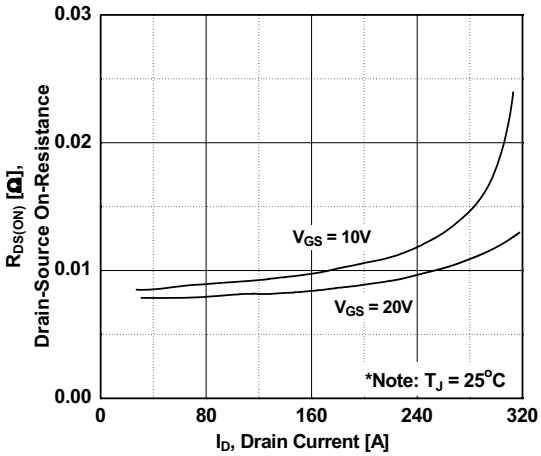


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

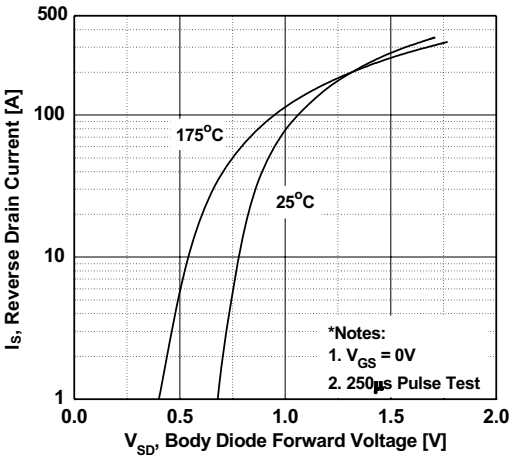


Figure 5. Capacitance Characteristics

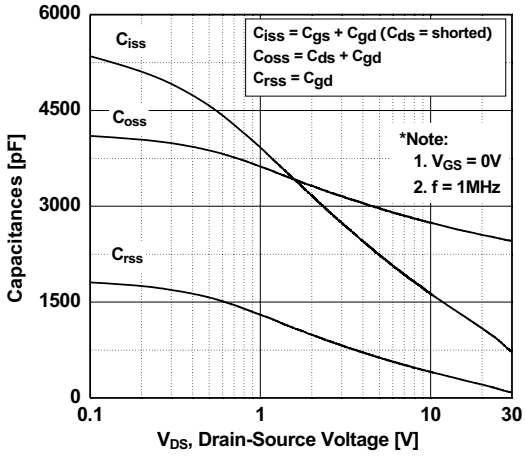
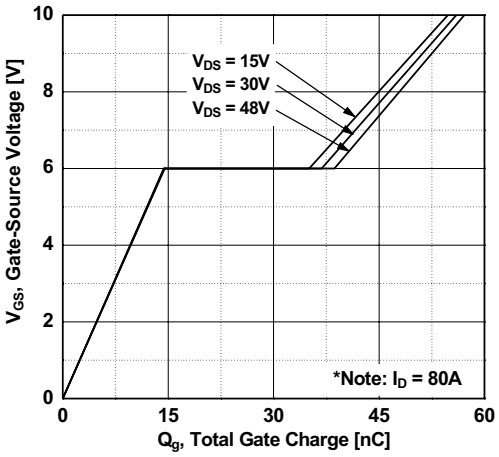


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

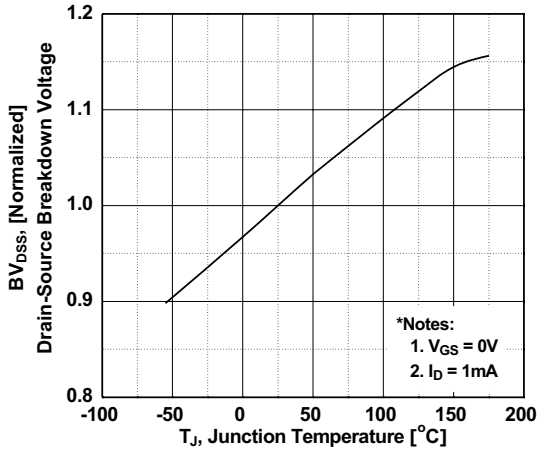


Figure 8. On-Resistance Variation vs. Temperature

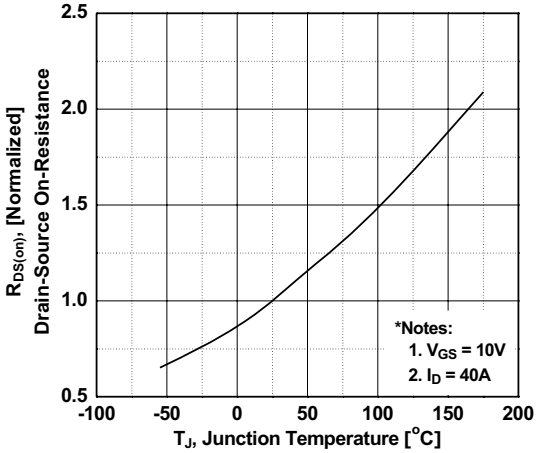


Figure 9. Maximum Safe Operating Area

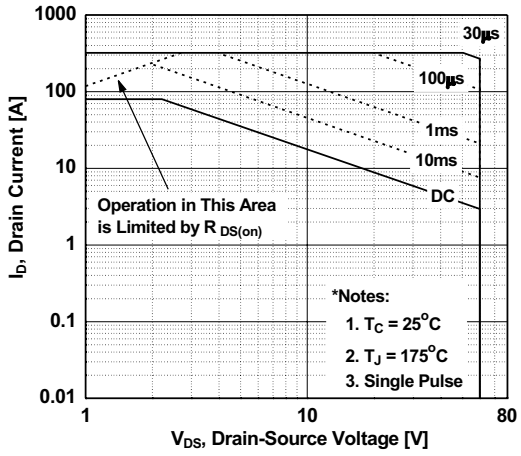


Figure 10. Maximum Drain Current vs. Case Temperature

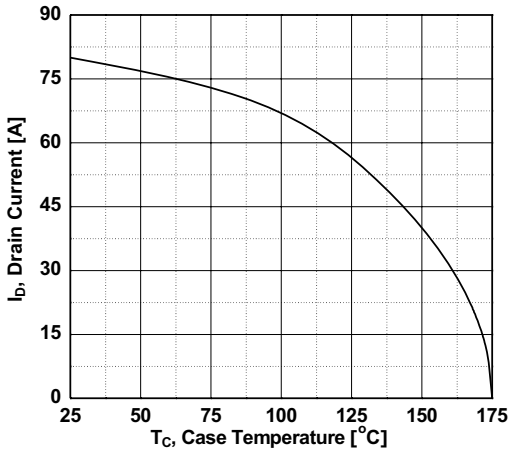
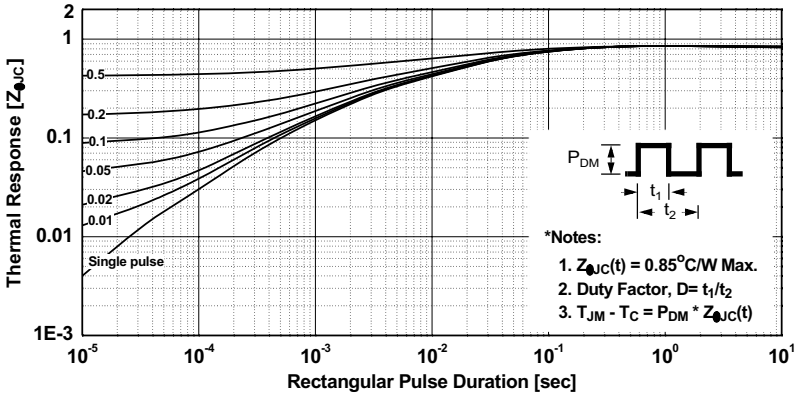
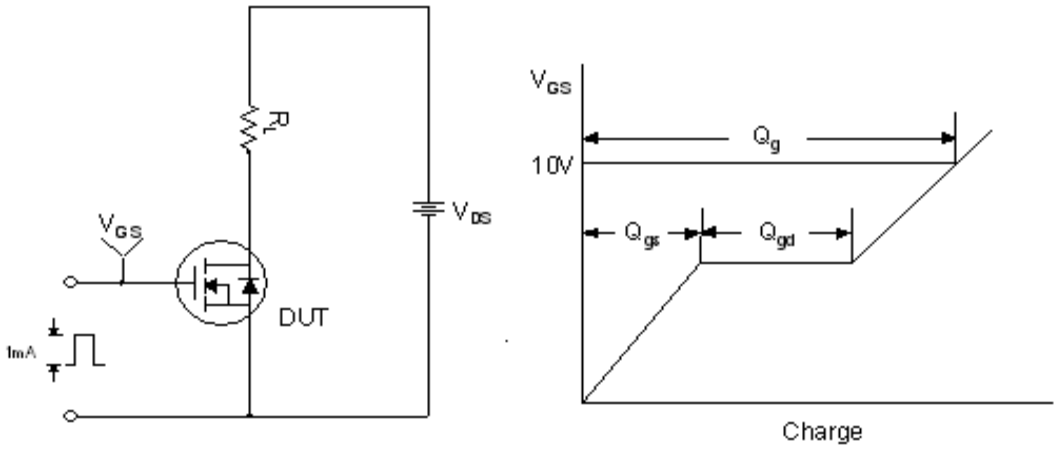


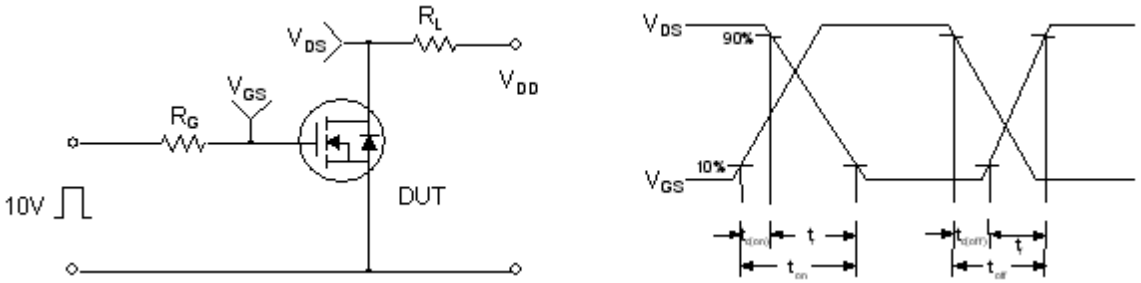
Figure 11. Transient Thermal Response Curve



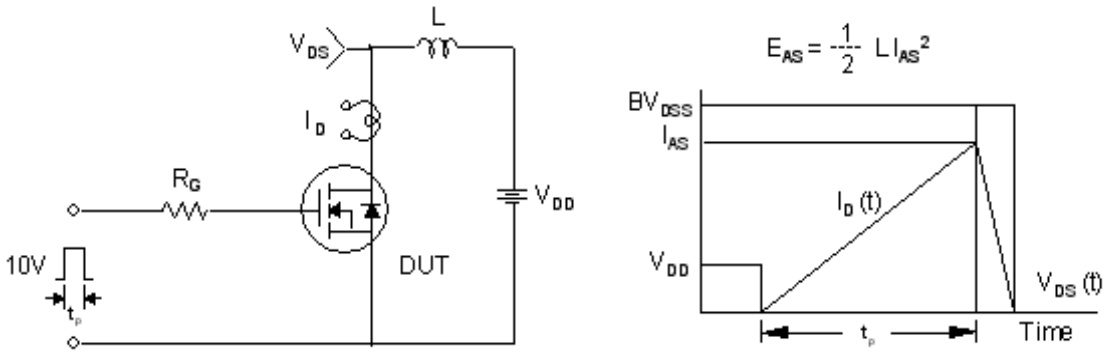
Gate Charge Test Circuit & Waveform



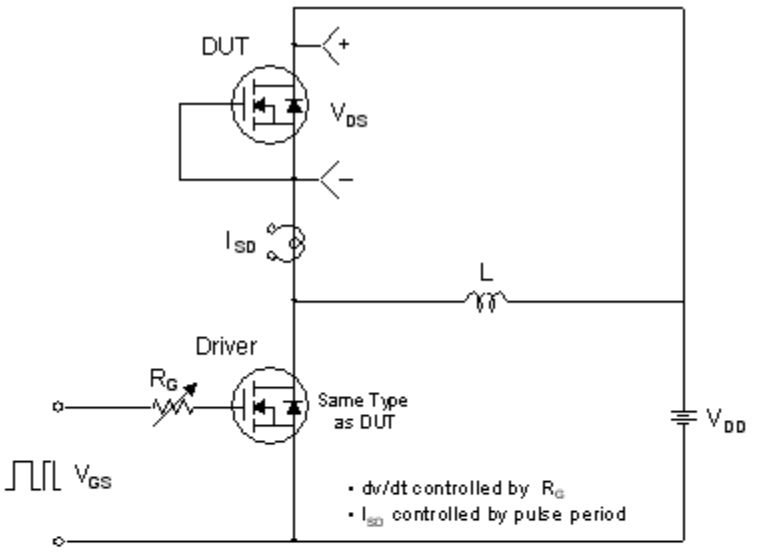
Resistive Switching Test Circuit & Waveforms

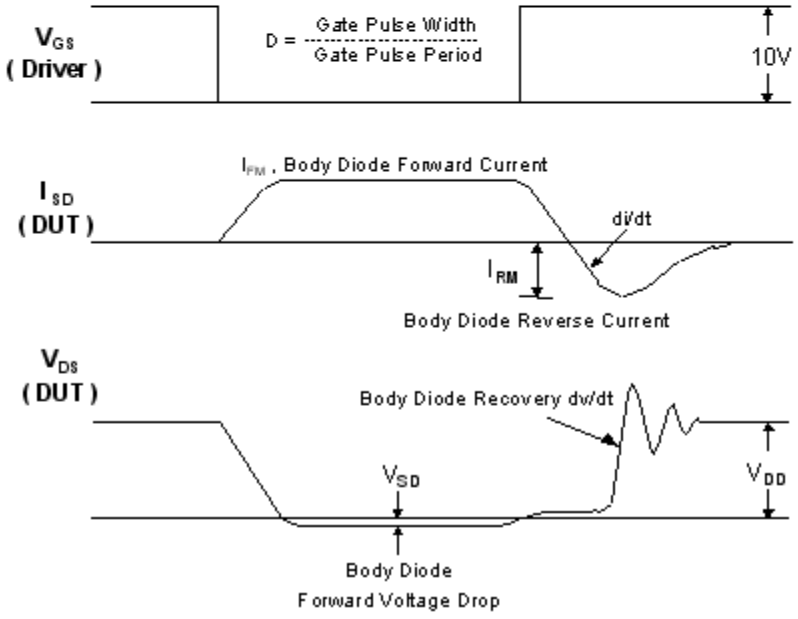


Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms





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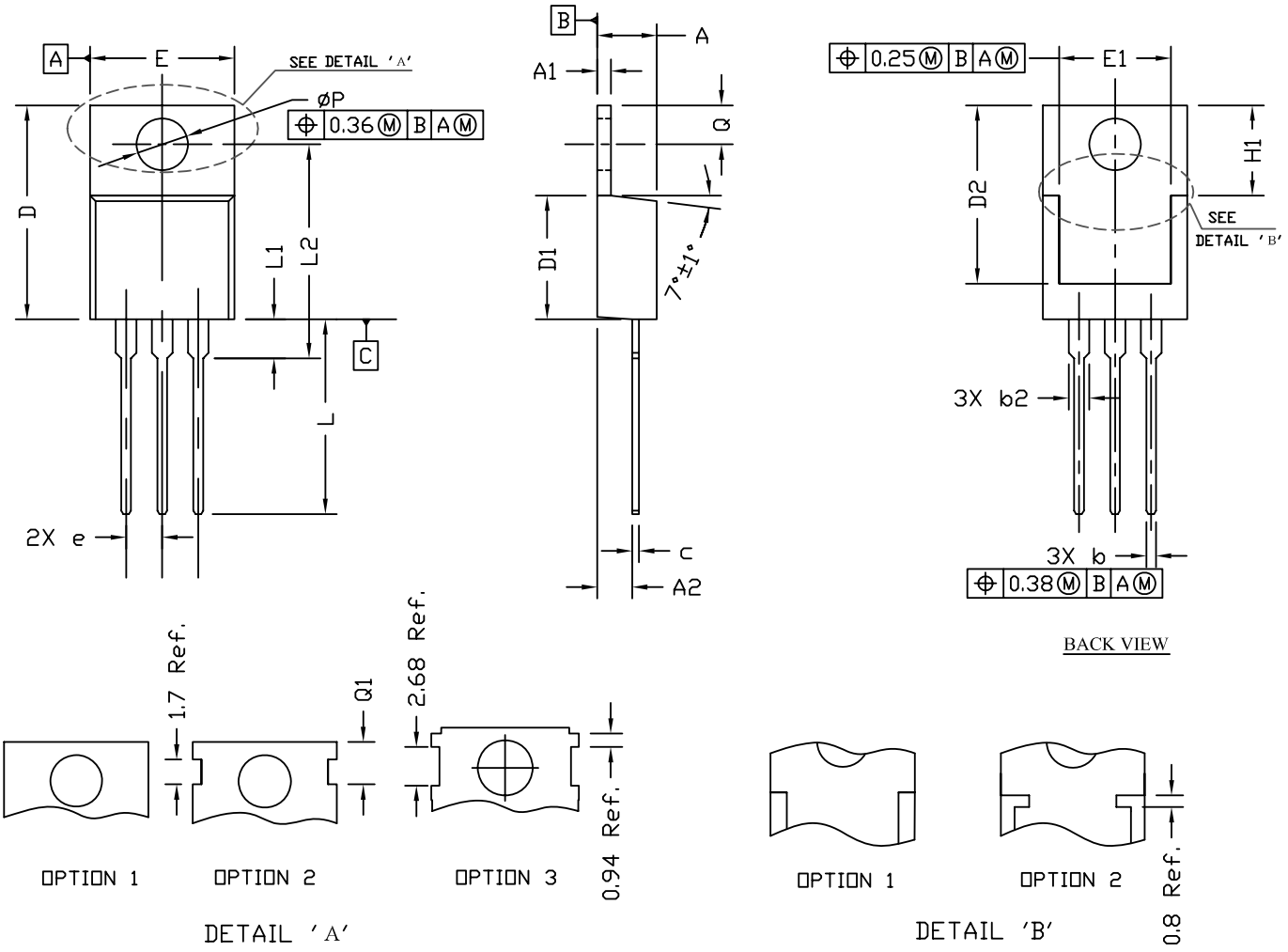
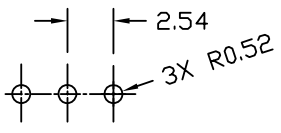
TO220 PACKAGE OUTLINE



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

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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.