MT3205AF

N-Channel Power MOSFET
60V, 75A, 5.5mΩ

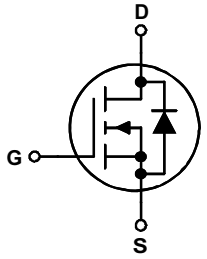
MT Semiconductor®

http://www.mtsemi.com

General Description

This N-channel MOSFET is produced using MOS-TECH Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

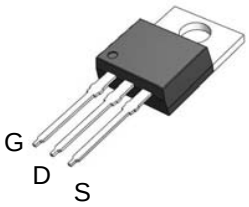
Simplified Schematic



Features

- $R_{DS(on)}$ = 5.5mΩ(Typ.)@ V_{GS}= 10V, I_D= 30A
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability
- RoHS compliant

MARKING DIAGRAM & PIN ASSIGNMENT



TO-220FB-3L

Applications

- Power Management in Inverter system
- Synchronous Rectification

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			±25	V
I_D	Drain Current	-Continuous (T_C = 25°C)	(Note 1)	75	A
I_{DM}	Drain Current	- Pulsed		150	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	320	mJ
P_D	Power Dissipation	(T_C = 25°C)		180	W
		- Derate above 25°C		1.0	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range			-55 to +175	°C

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.7	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	35	

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

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT3205AF	MT3205AF	TO-220	-	-	50units

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	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 48V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 48V, T_C = 85 °C	-	-	30	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±25V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	VGS = VDS, ID = 250μA	2	3	4	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 30 A	-	5.5	6.5	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 30V, V_{GS} = 0V f = 1MHz	-	3800	4560	pF
C_{oss}	Output Capacitance		-	430	-	pF
C_{rss}	Reverse Transfer Capacitance		-	190	-	pF
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	1	-	Ω
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{GS} = 10V; V_{DS} = 48V, I_D = 30A, I_g = 1mA	-	68	88	nC
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 4.5V; V_{DS} = 48V, I_D = 30A, I_g = 1mA	-	33		nC
Q_{gs}	Gate to Source Gate Charge	V_{DS} = 48V, I_D = 30A, I_g = 1mA	-	15	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	18	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	19	-	nC
Switching Characteristics						
t_{ON}	Turn-On Time	V_{DS} = 30V, I_D = 30A, V_{GS} = 10V, R_{GEN} = 3.0Ω	-	99	137	ns
$t_{d(on)}$	Turn-On Delay Time		-	18	-	ns
t_r	Turn-On Rise Time		-	35	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	47	73	ns
t_f	Turn-Off Fall Time		-	19	49	ns
t_{OFF}	Turn-Off Time		-	67	89	ns
Drain-Source Diode Characteristics						
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 30A	-	-	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 30A, dI_F/dt = 100A/μs	-	49	-	ns
Q_{rr}	Reverse Recovery Charge		-	78	-	nC

Notes:

1: Calculated continuous current based on maximum allowable junction temperature. Package limited to 75A continuous, see Figure 9.

Typical Performance Characteristics

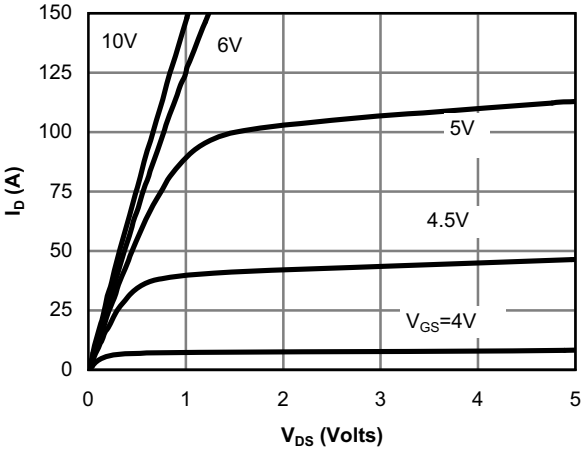


Figure 1: On-Region Characteristics

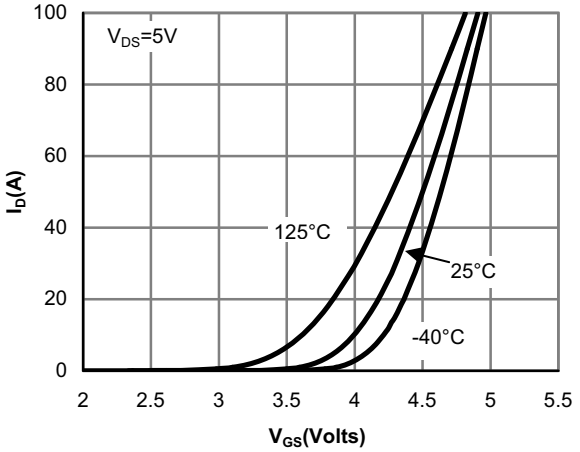


Figure 2: Transfer Characteristics

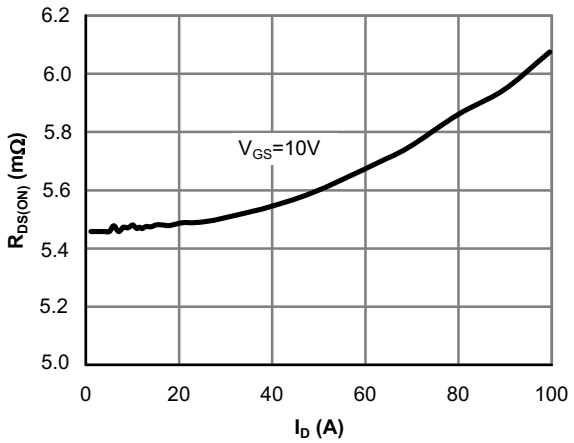


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

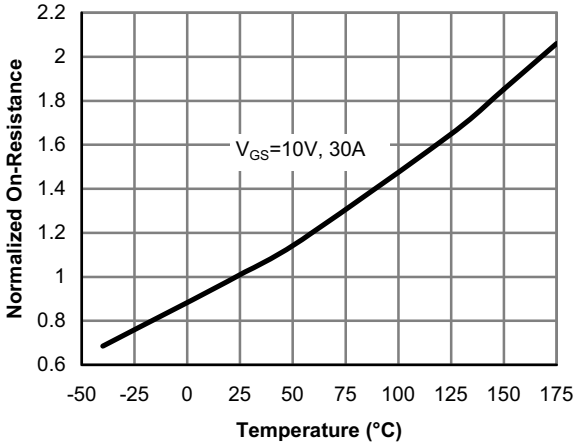


Figure 4: On-Resistance vs. Junction Temperature

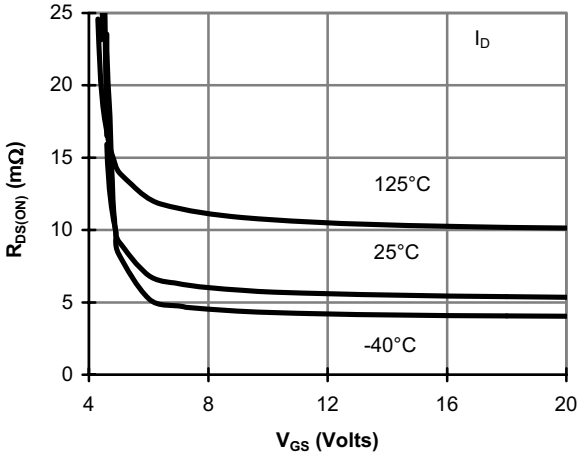


Figure 5: On-Resistance vs. Gate-Source Voltage

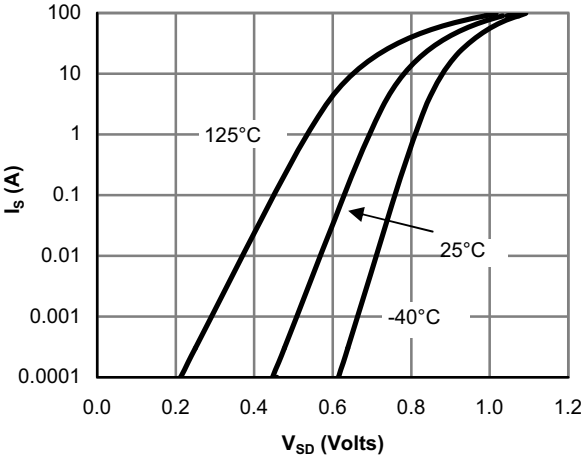


Figure 6: Body-Diode Characteristics

Typical Performance Characteristics (Continued)

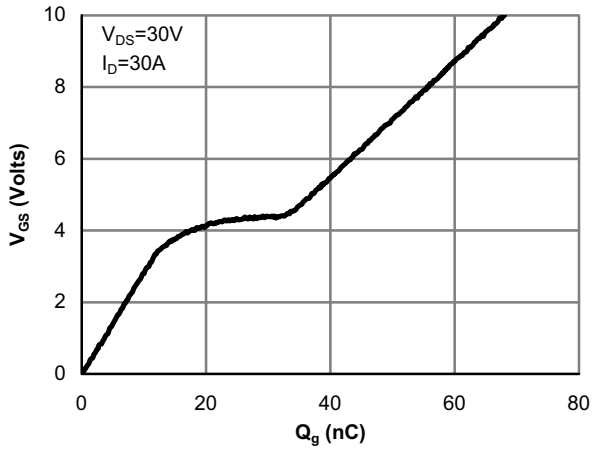


Figure 7: Gate-Charge Characteristics

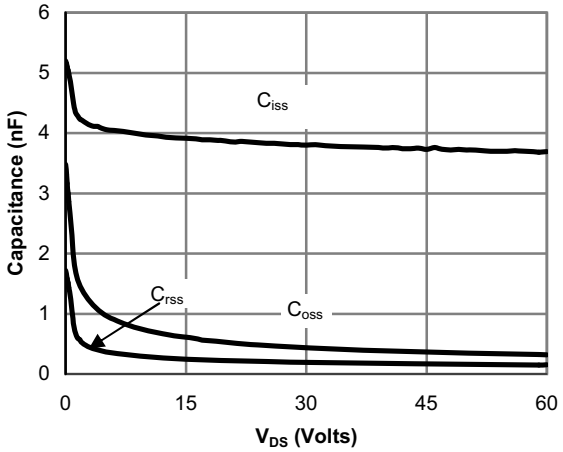


Figure 8: Capacitance Characteristics

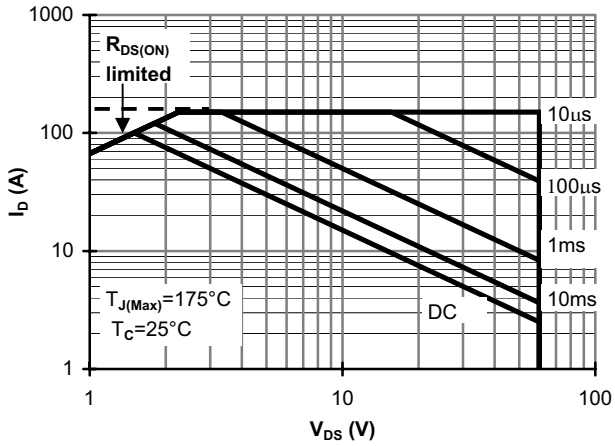


Figure 9: Maximun Forward Biased Safe Operating Area (Note F)

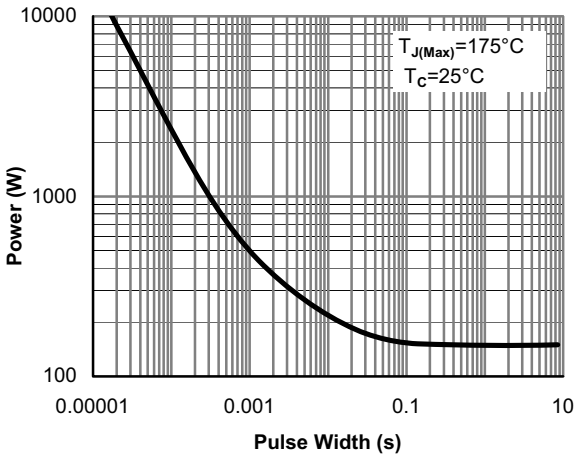


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

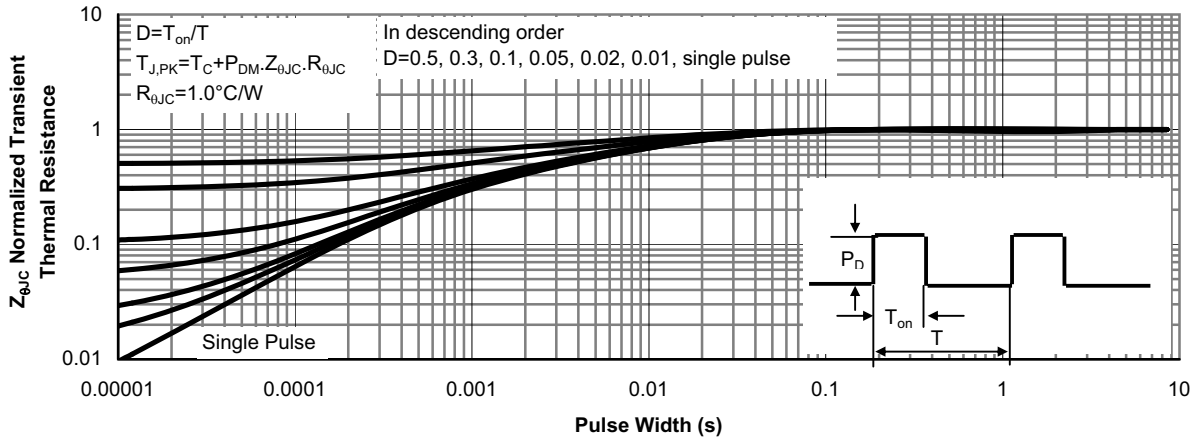
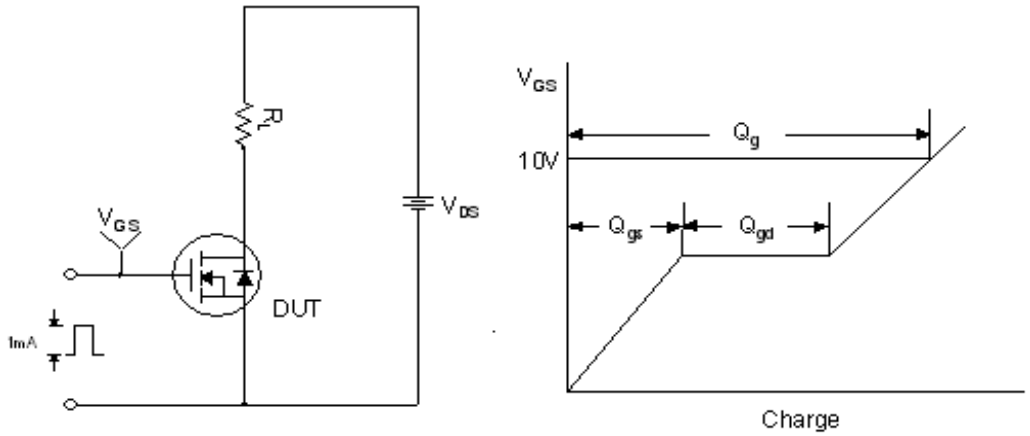
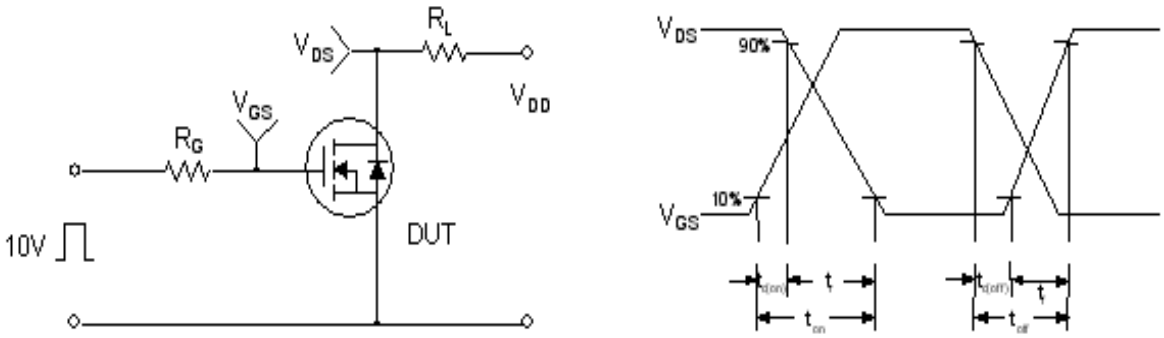


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

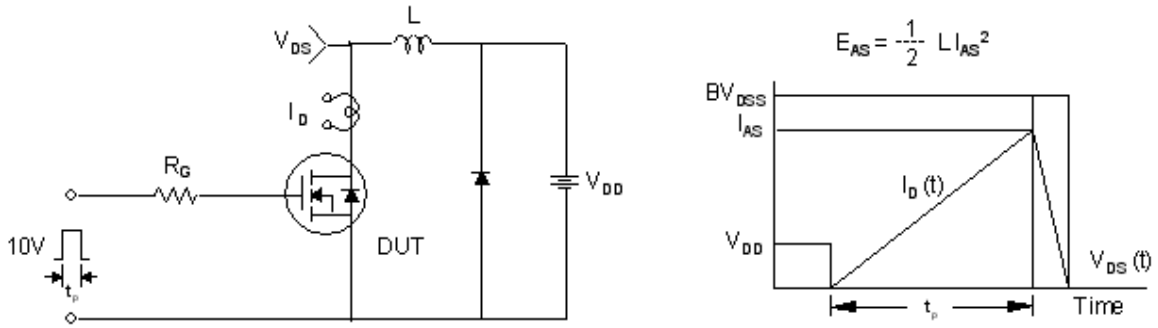
Gate Charge Test Circuit & Waveform



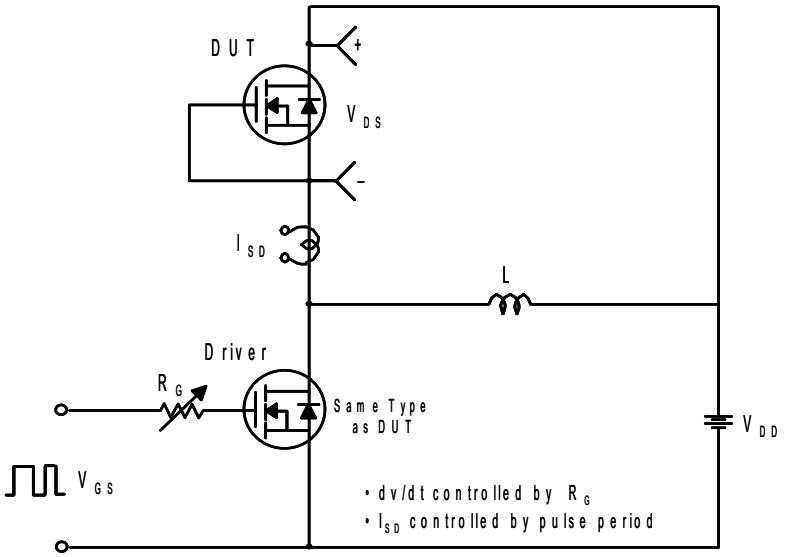
Resistive Switching Test Circuit & Waveforms

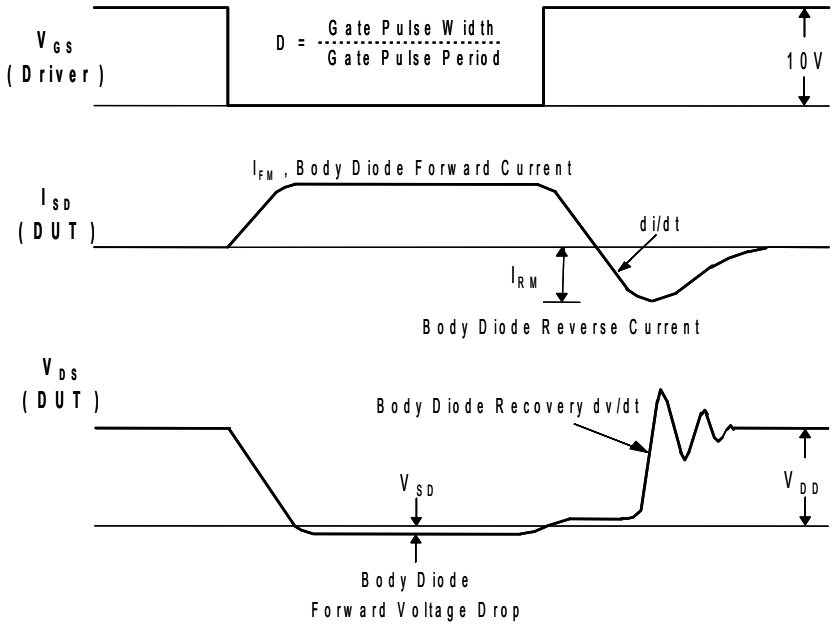


Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms





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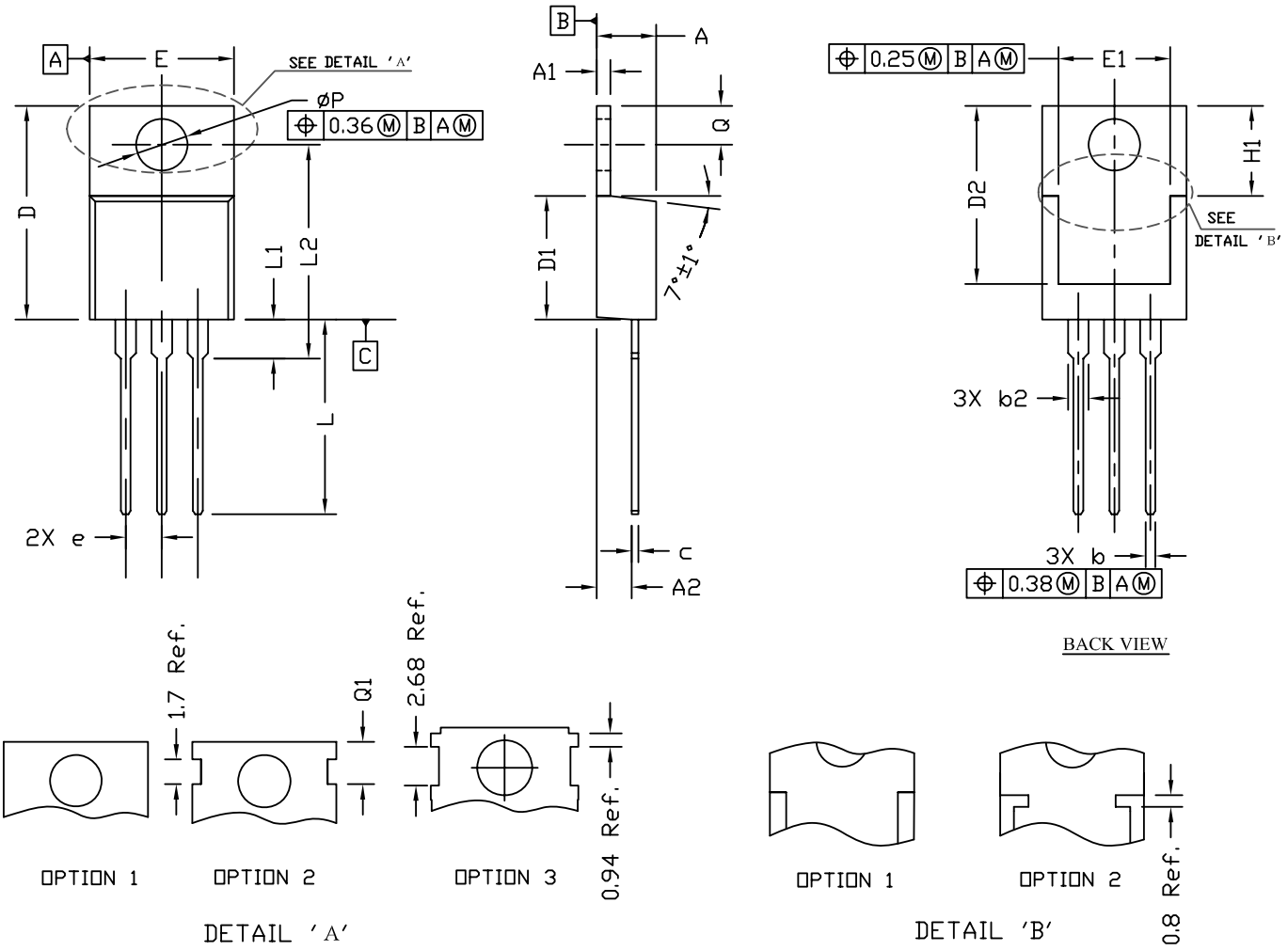
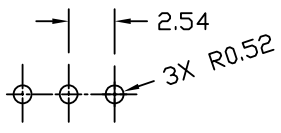
TO220 PACKAGE OUTLINE



RECOMMENDATION OF HOLE PATTERN



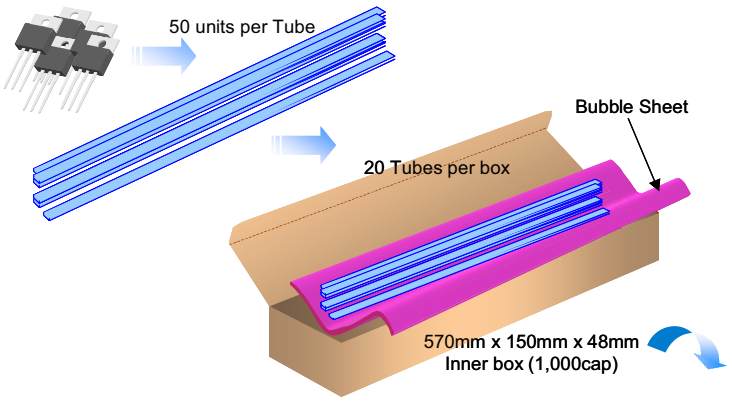
UNIT: mm

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.
2. TOLERANCE 0.100 MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

TO-220 Short Lead Tube Packing Data

TO-220 Short Lead Tube Packing Configuration: Figure 1.0



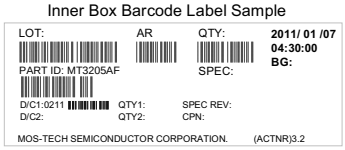
Packaging Description:

TO-220 parts are shipped normally in tube. The tube is made of PVC plastic treated with anti-static agent.These tubes in standard option are placed inside a dissipative plastic bubble sheet, barcode labeled, and placed inside a box made of recyclable corrugated paper. One box contains twenty tubes maximum (see fig. 1.0). And one or several of these boxes are replaced inside a labeled shipping box which comes in different sizes depending on the number of parts shipped. The units in this option are placed inside a small box laid with anti-static bubble sheet. These larger boxes then will be placed finally inside a labeled shipping box which still comes in different sizes depending on the number of units shipped.

TO-220 Short Lead Packaging Information: Figure 2.0

TO-220 Packaging Information	
Packaging Option	Standard (no flow code)
Packaging type	Rail/Tube
Qty per Tube/ Inner Box	50
Inner Box Dimension (mm)	570x150x48
Max qty per Box	1,000
Outer Box Dimension (mm)	590x330x245
Max qty per Box	8,000
Weight per unit (gm)	1.9588
Note/Comments	

Inner Box Barcode Label Sample



Outer Box Barcode Label Sample

TO-220 Short Lead Tube Configuration: Figure 3.0

Note: All dimensions are in mm