MOS-TECH Semiconductor Co.,LTD
臺灣茂鈿半導體股份有限公司

Mar 2010

MT3205

N-Channel Power® MOSFET

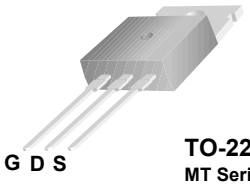
55V, 110A, 7.2mΩ

Features

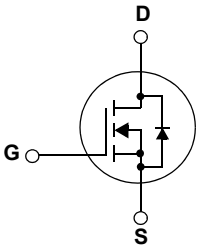
- $R_{DS(on)}$ = 6.1mΩ (Typ.)@ V_{GS} = 10V, I_D = 59A
- High performance trench technology for extermly low $R_{DS(on)}$
- High power and current handing capability
- RoHS compliant

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.



TO-220
MT Series



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DSS}	Drain to Source Voltage			55	V
V_{GSS}	Gate to Source Voltage			±20	V
I_D	Drain Current	-Continuous (T_C = 25°C)	(Note 1)	110	A
I_{DM}	Drain Current	- Pulsed		390	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	365	mJ
P_D	Power Dissipation	(T_C = 25°C)		250	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	0.75	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	40	

Package Marking and Ordering Information $T_C = 25^oC$ unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT3205	MT3205	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, $T_J = 25^oC$	55	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 44V, V_{GS} = 0V	-	-	25	μA
		V_{DS} = 44V, $T_C = 150^oC$	-	-	250	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	VGS = VDS, ID = 250μA	2		4	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 59A	-	6.1	7.2	mΩ
		V_{GS} = 10V, I_D = 59A $T_J = 175^oC$	-	12	-	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V f = 1MHz	-	2810	3730	pF
C_{oss}	Output Capacitance		-	450	630	pF
C_{rss}	Reverse Transfer Capacitance		-	250	375	pF
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	3	4	5	Ω
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	93	120	nC
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 0V to 2V; V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	25.5	33	nC
Q_{gs}	Gate to Source Gate Charge	V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	35	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau	V_{DS} = 44V, I_D = 59A, I_g = 1mA		9.5	-	nC
Q_{gd}	Gate to Drain “Miller” Charge	V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	32	-	nC
Switching Characteristics						
t_{ON}	Turn-On Time	V_{DD} = 28V, I_D = 59A V_{GS} = 10V, R_{GEN} = 2.5Ω	-	97	110	ns
$t_{d(on)}$	Turn-On Delay Time		-	13	25	ns
t_r	Turn-On Rise Time		-	107	205	ns
$t_{d(off)}$	Turn-Off Delay Time		-	42	60	ns
t_f	Turn-Off Fall Time		-	18	46	ns
t_{OFF}	Turn-Off Time		-	60	83	ns
Drain-Source Diode Characteristics						
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 59A	-	-	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 59A dI_F/dt = 100A/μs	-	43.3	-	ns
Q_{rr}	Reverse Recovery Charge		-	70.8	-	nC

Notes:
1: Calculated continuous current based on maximum allowable junction temperature. Package limited to 75A continuous, see Figure 9.
2: L = 0.21mH, I_{AS} = 59A, V_{DD} = 50V, V_{GS} = 10V, R_G = 25Ω, Starting $T_J = 25^oC$

Typical Performance Characteristics

Figure 1. On-Region Characteristics

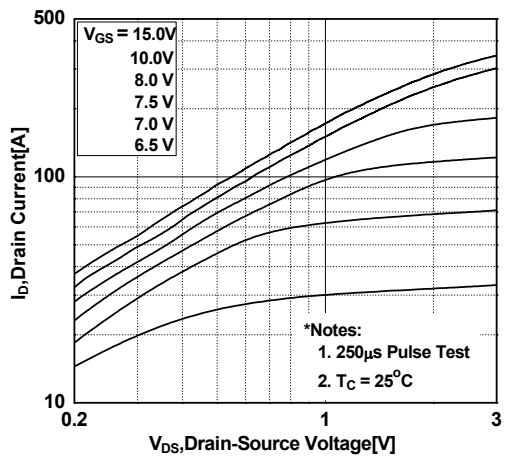


Figure 2. Transfer Characteristics

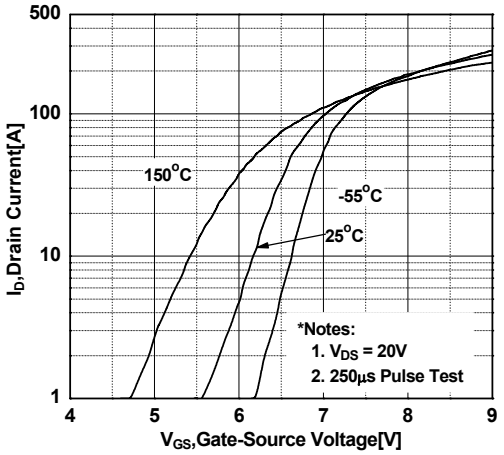


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

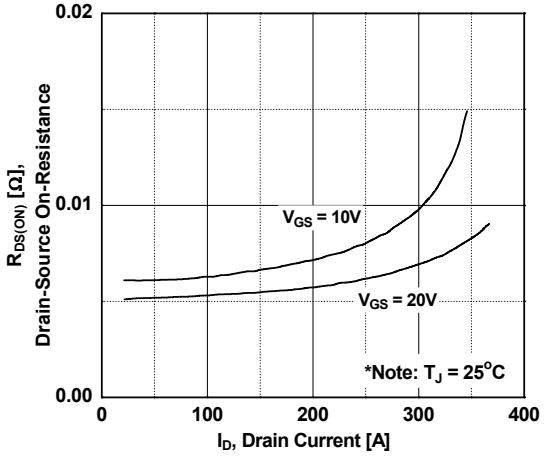


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

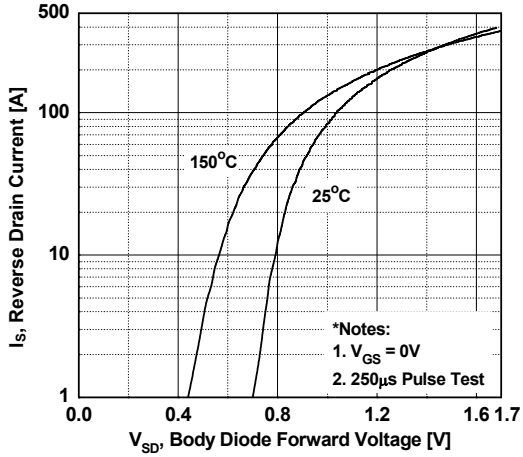


Figure 5. Capacitance Characteristics

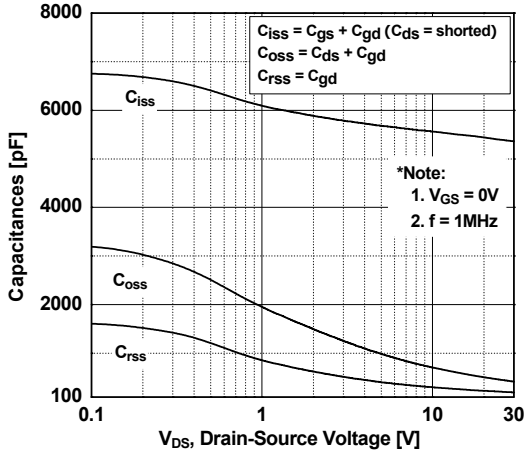
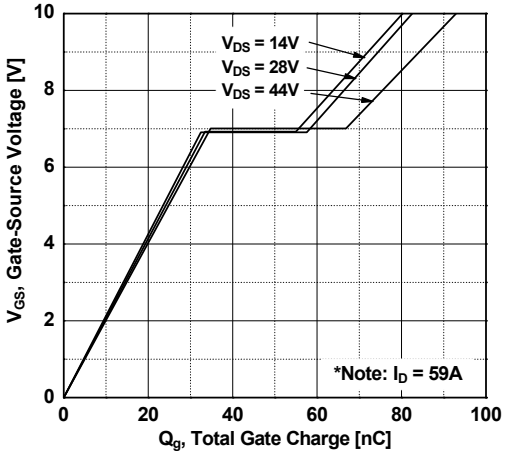


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

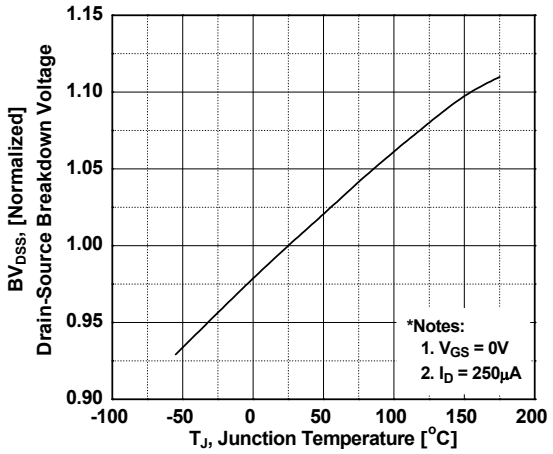


Figure 8. On-Resistance Variation vs. Temperature

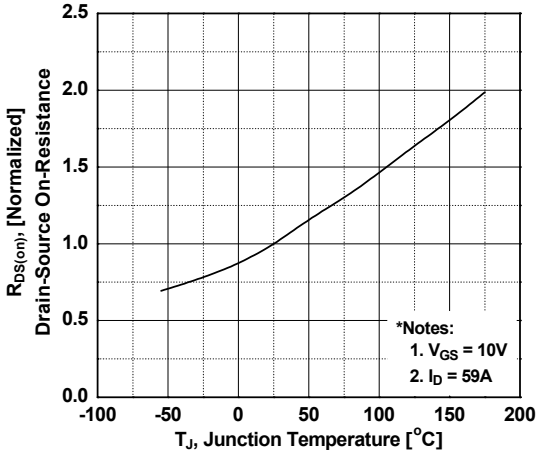


Figure 9. Maximum Safe Operating Area

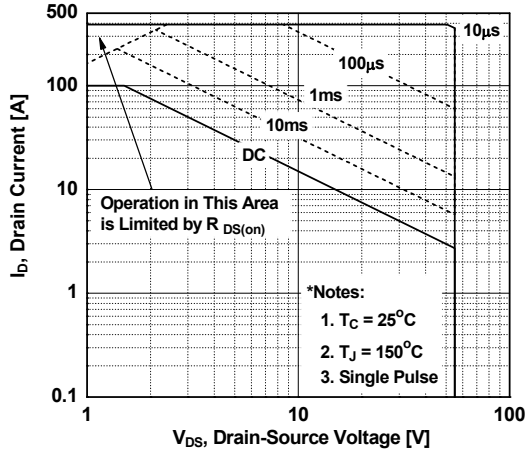


Figure 10. Maximum Drain Current vs. Case Temperature

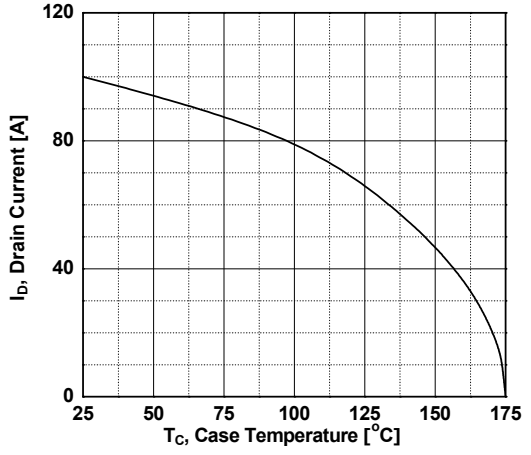
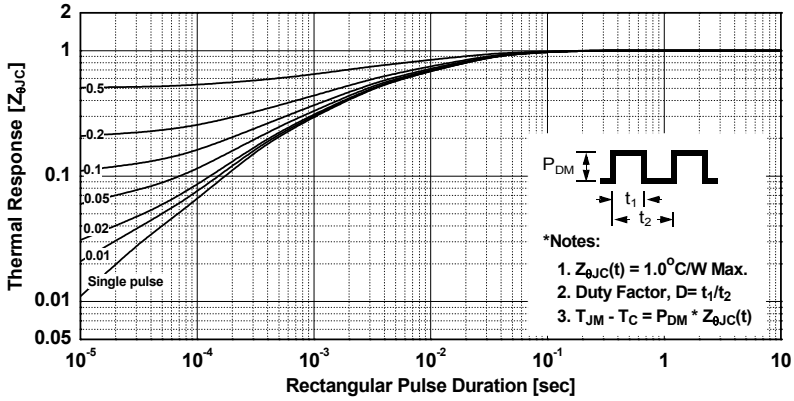
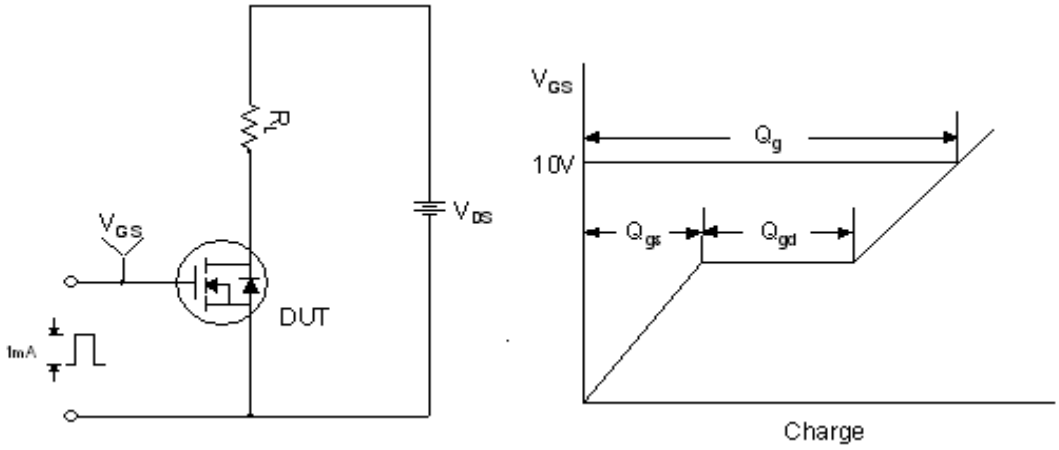


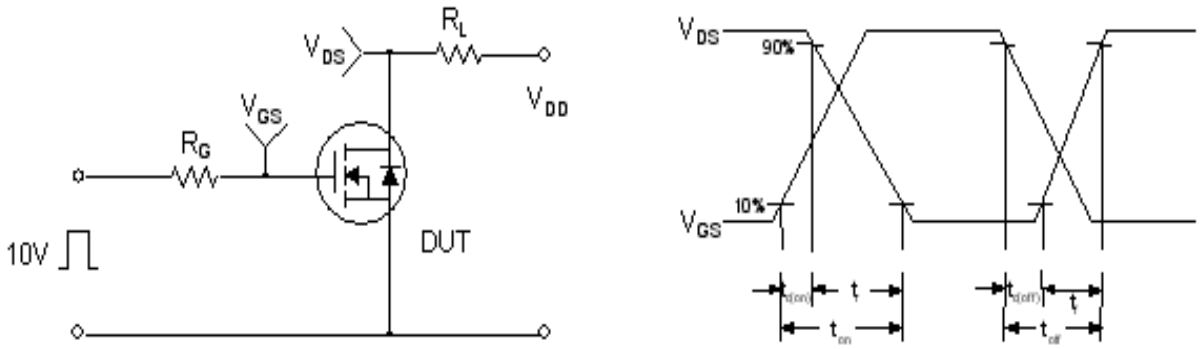
Figure 11. Transient Thermal Response Curve



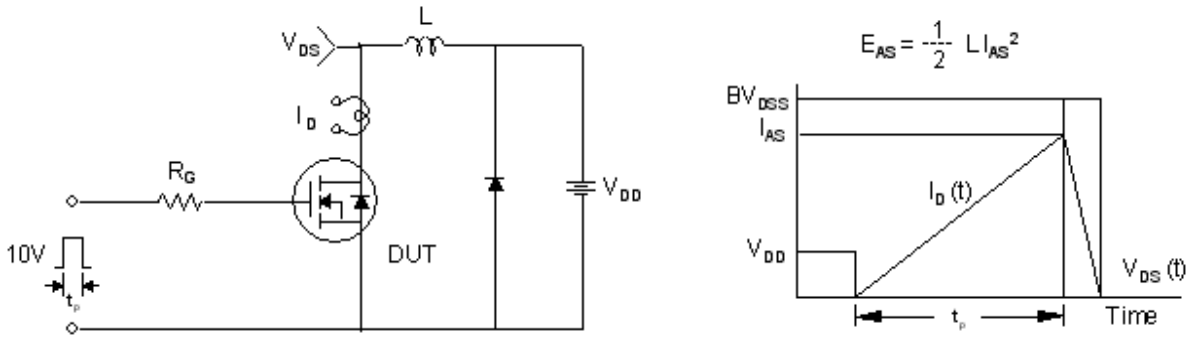
Gate Charge Test Circuit & Waveform



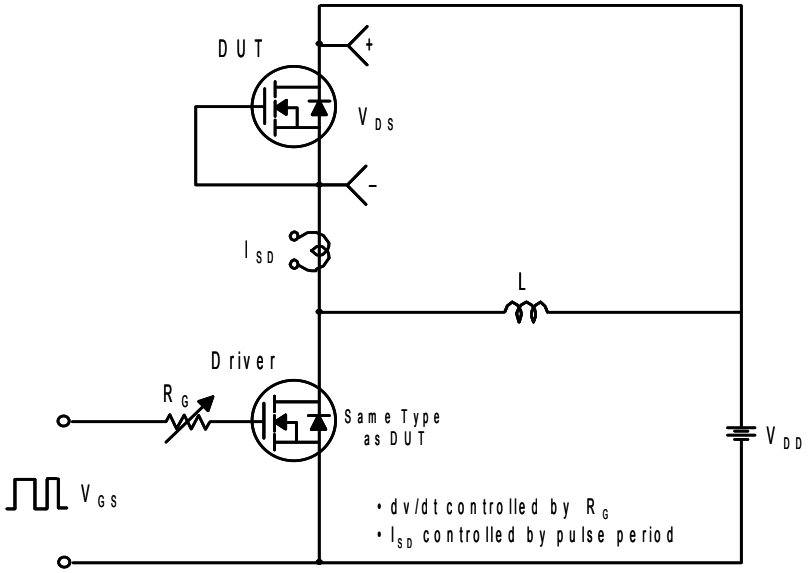
Resistive Switching Test Circuit & Waveforms

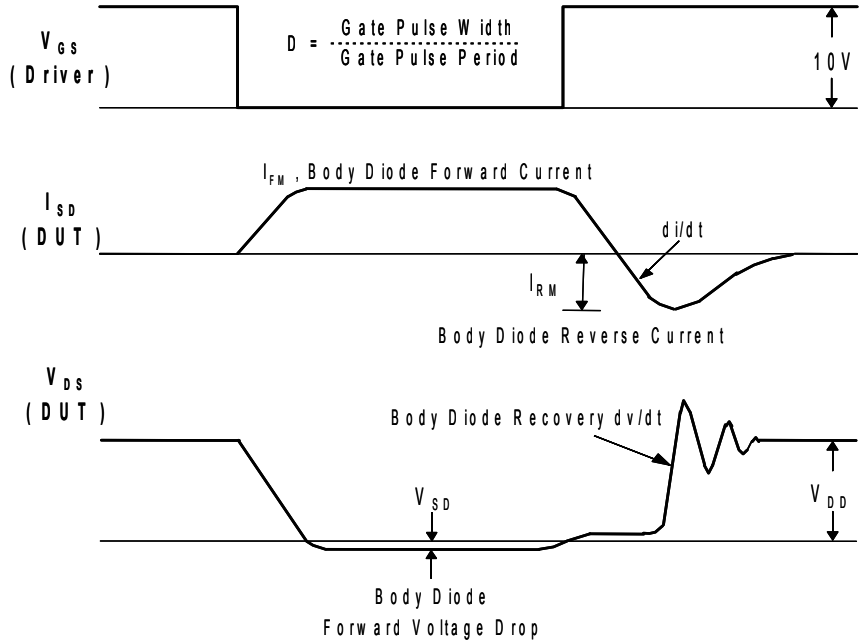


Unclamped Inductive Switching Test Circuit & Waveforms



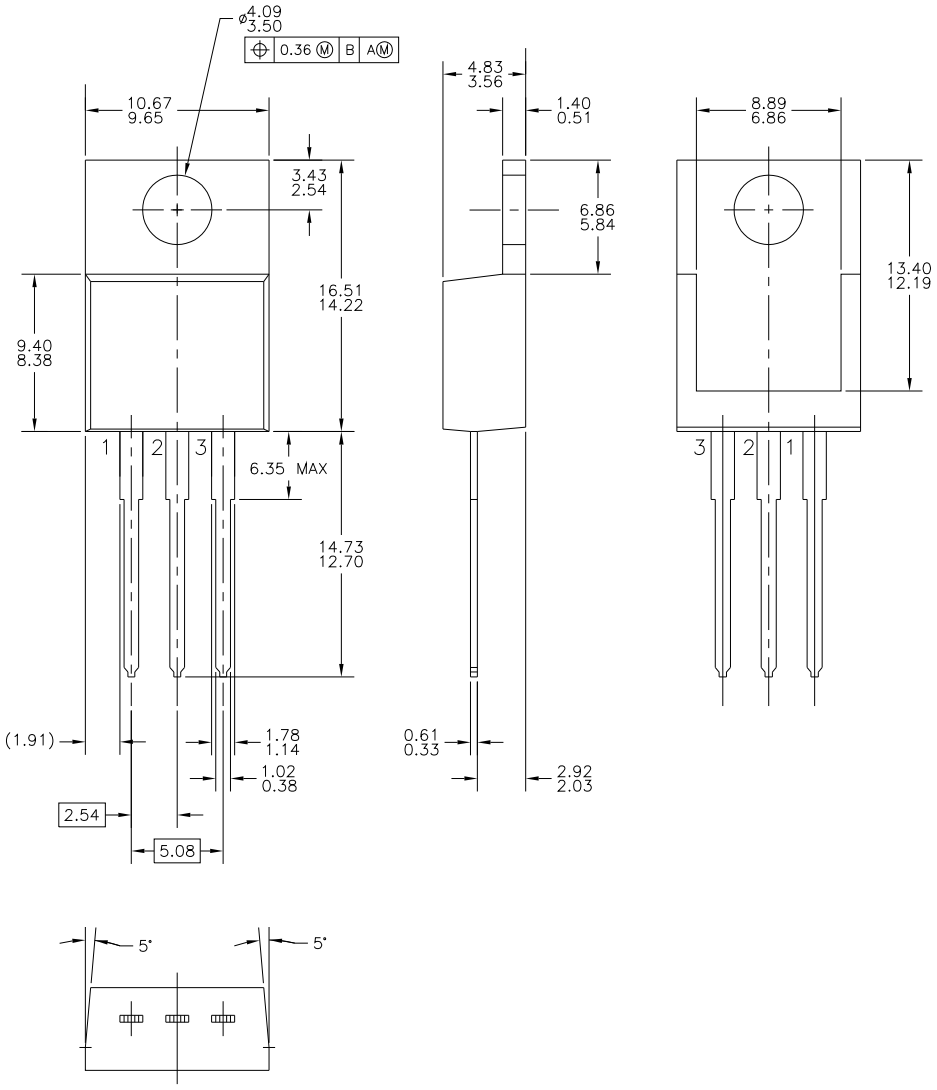
Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions

TO-220



TO-220 Short Lead Tube Packing Data

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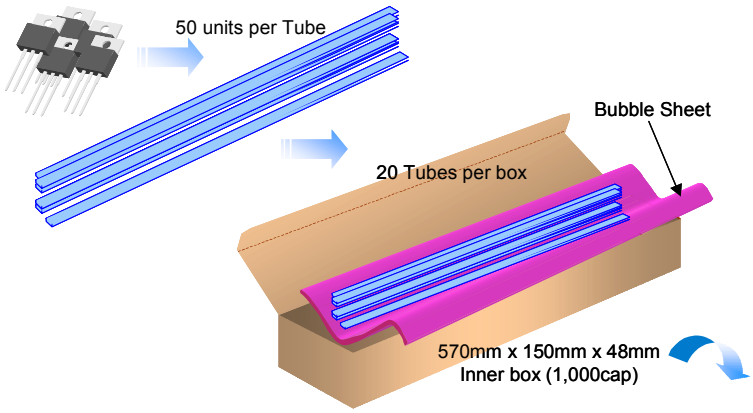
Mos-Tech Semiconductor Co.,LTD.

TO-220 Short Lead Tube Packing Configuration: Figure 1.0



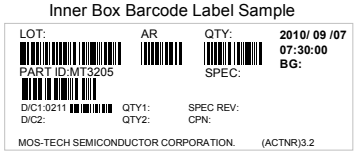
Packaging Description:

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 placed 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.

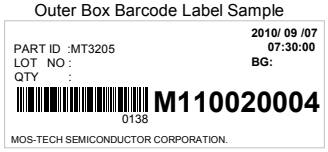
TO-220 Short Lead Packaging Information: Figure 2.0

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

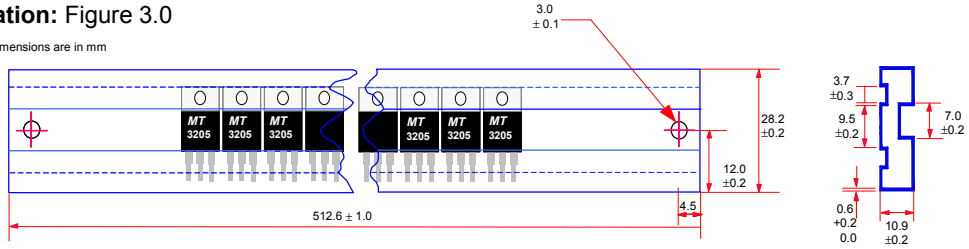


Outer Box Barcode Label Sample



TO-220 Short Lead Tube Configuration: Figure 3.0

Note: All dimensions are in mm



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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.