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

Feb 2010

MT3710

N-Channel Power® MOSFET

100V, 57A, 12mΩ

Features

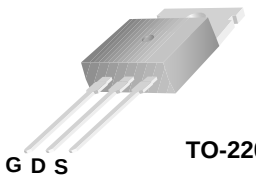
- $R_{DS(on)}$ = 12mΩ (Typ.) @ V_{GS} = 10V, I_D = 49A
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low $R_{DS(on)}$
- High power and current handling capability
- RoHS compliant

General Description

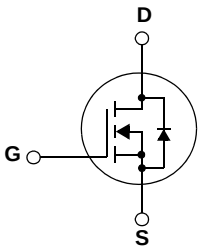
This N-Channel MOSFET is produced using MOS-TECH Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Application

- DC to DC convertors / Synchronous Rectification



TO-220



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage		100	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	-Continuous (T_C = 25°C)	57	A
		-Continuous (T_C = 100°C)	40	A
I_{DM}	Drain Current	- Pulsed (Note 1)	228	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	132	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	7.5	V/ns
P_D	Power Dissipation	(T_C = 25°C)	110	W
		- Derate above 25°C	0.88	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	°C

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.13	°C/W
$R_{\theta CS}$	Thermal Resistance, Case to Sink Typ.	0.5	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

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

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT3710	MT3710	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_C= 25°C	100	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	-	0.1	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 100V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 100V, V_{GS} = 0V, T_C = 150°C	-	-	500	
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	2.5	-	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 49A	-	11	12	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 20V, I_D = 49A (Note 4)	-	156	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	3580	4760	pF
C_{oss}	Output Capacitance		-	340	450	pF
C_{rss}	Reverse Transfer Capacitance		-	140	210	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50V, I_D = 49A, V_{GS} = 10V, R_{GEN} = 25Ω (Note 4, 5)	-	47	104	ns
t_r	Turn-On Rise Time		-	164	338	ns
$t_{d(off)}$	Turn-Off Delay Time		-	86	182	ns
t_f	Turn-Off Fall Time		-	83	176	ns
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 80V, I_D = 49A, V_{GS} = 10V (Note 4, 5)	-	53	69	nC
Q_{gs}	Gate to Source Gate Charge		-	19	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	15	-	nC
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	57	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	228	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 49A	-	-	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 49A, dI_F/dt = 100A/μs (Note 4)	-	41	-	ns
Q_{rr}	Reverse Recovery Charge		-	70	-	nC

Notes:
1: Repetitive Rating: Pulse width limited by maximum junction temperature
2: L = 0.11mH, I_{AS} = 49A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3: I_{SD} ≤ 49A, 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

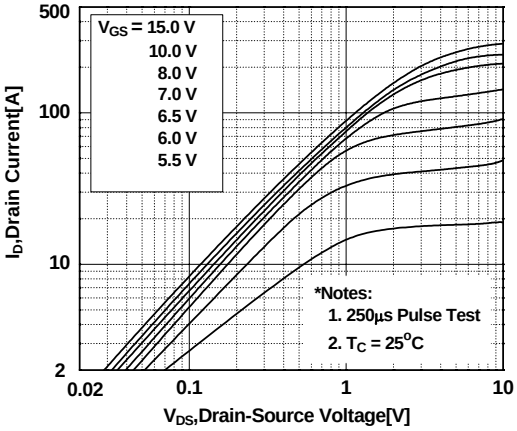


Figure 2. Transfer Characteristics

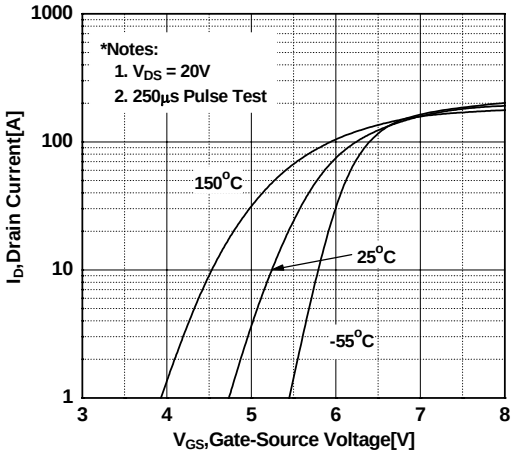


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

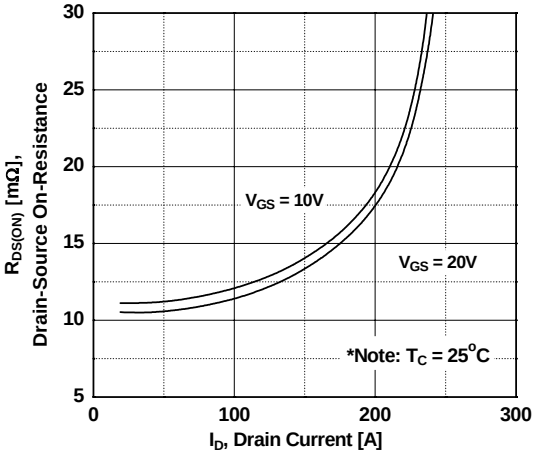


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

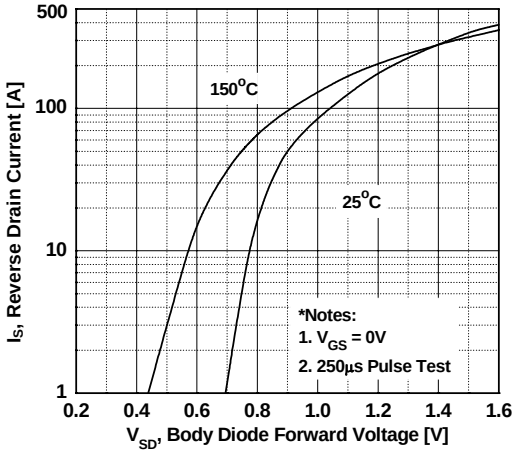


Figure 5. Capacitance Characteristics

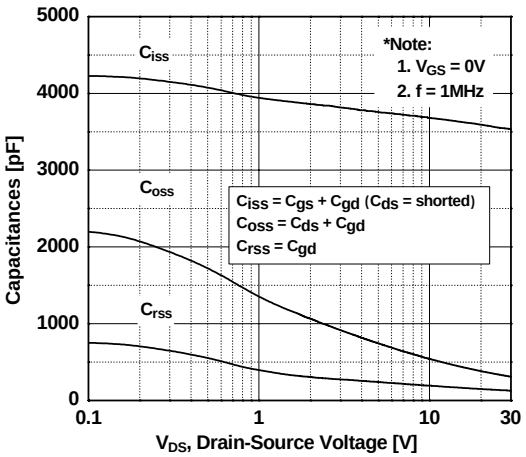
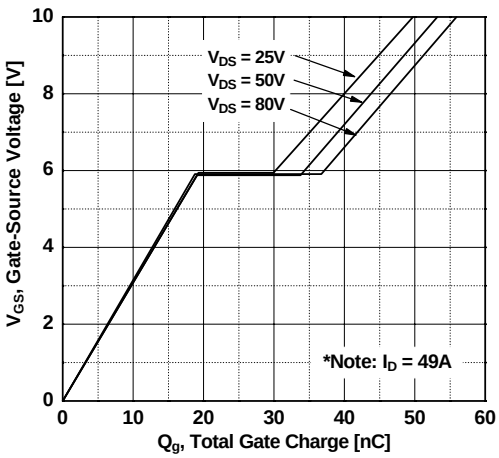


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

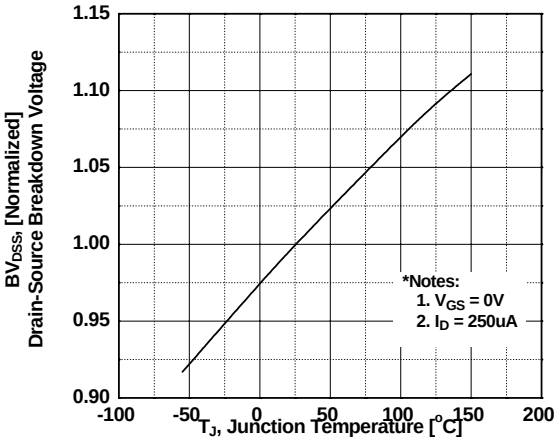


Figure 8. On-Resistance Variation vs. Temperature

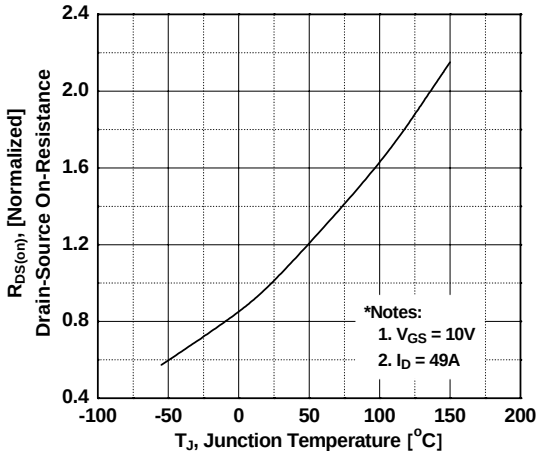


Figure 9. Maximum Safe Operating Area

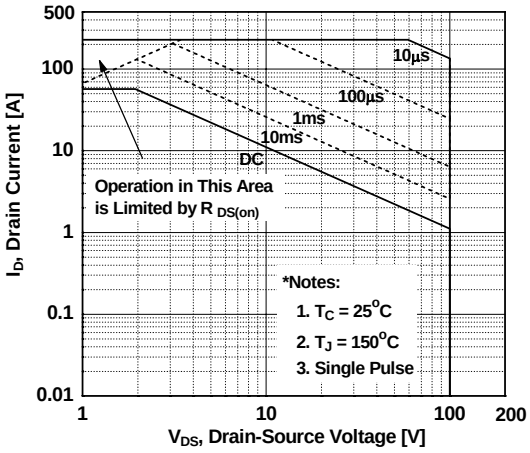


Figure 10. Maximum Drain Current vs. Case Temperature

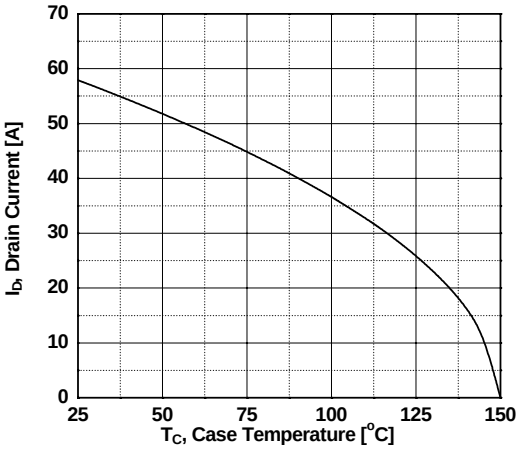
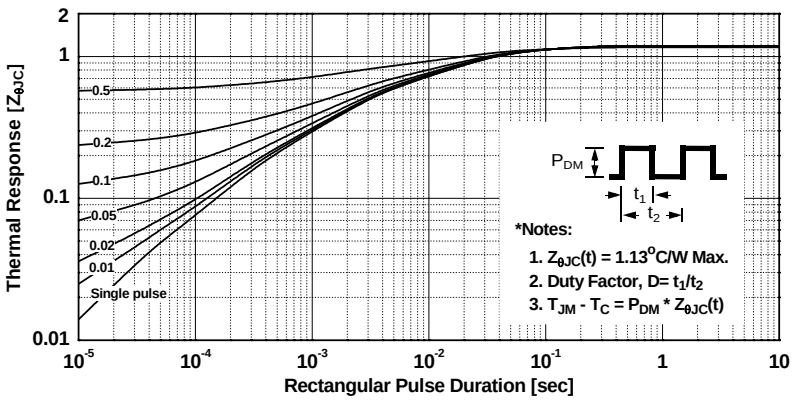
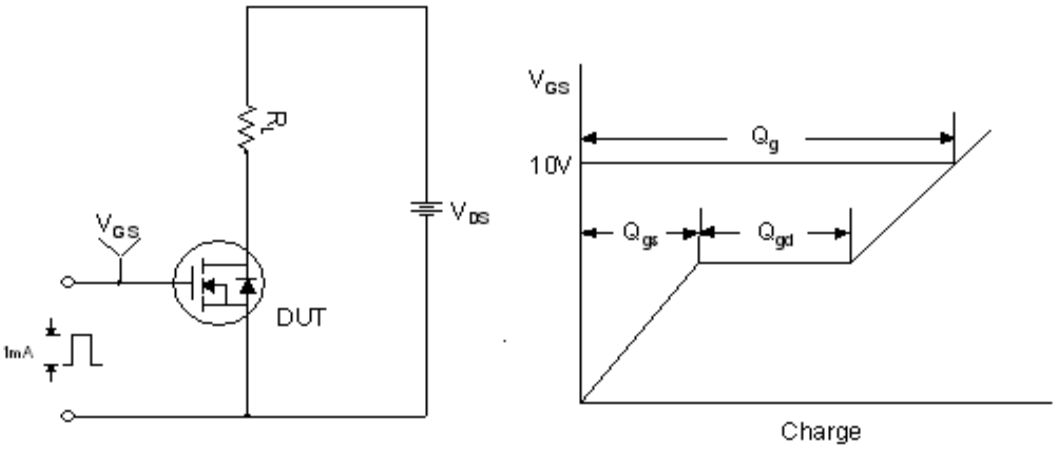


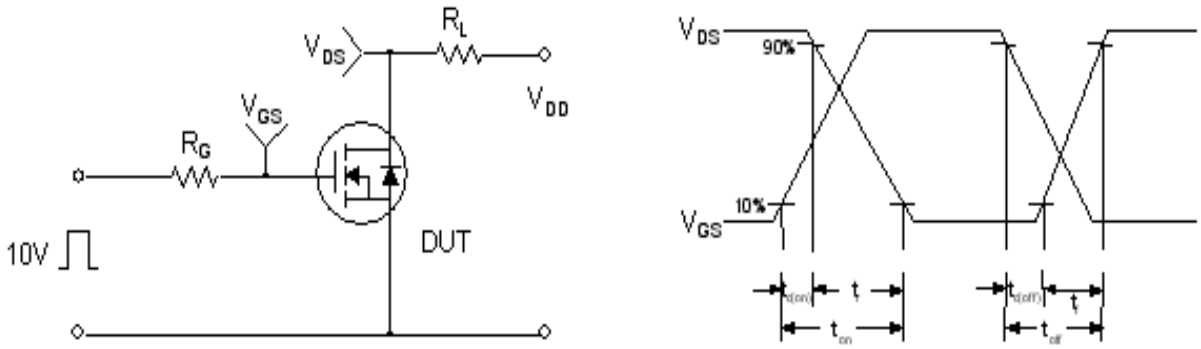
Figure 11. Transient Thermal Response Curve



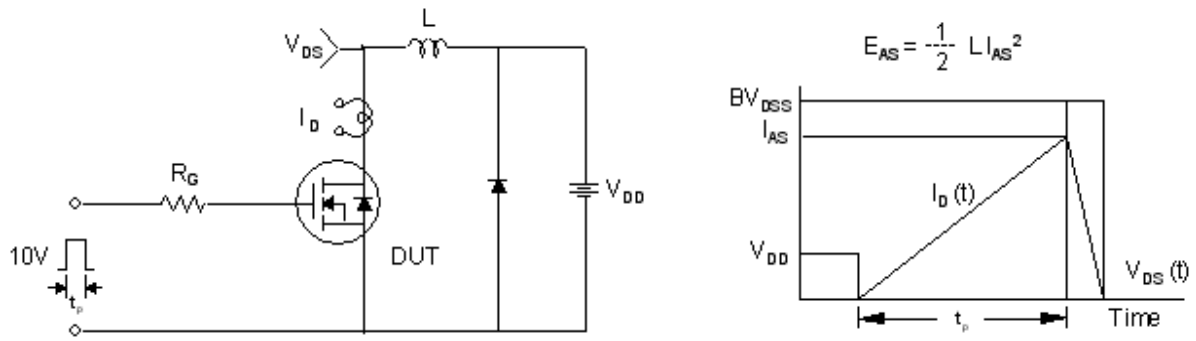
Gate Charge Test Circuit & Waveform



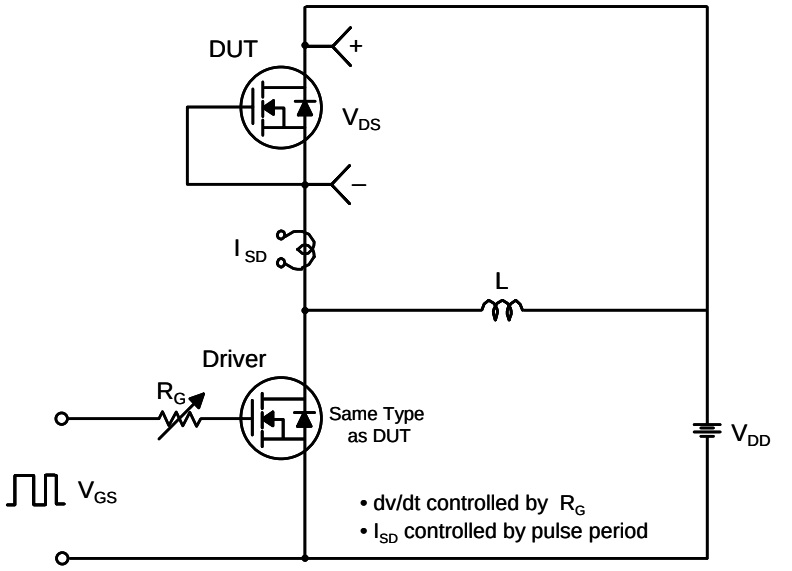
Resistive Switching Test Circuit & Waveforms

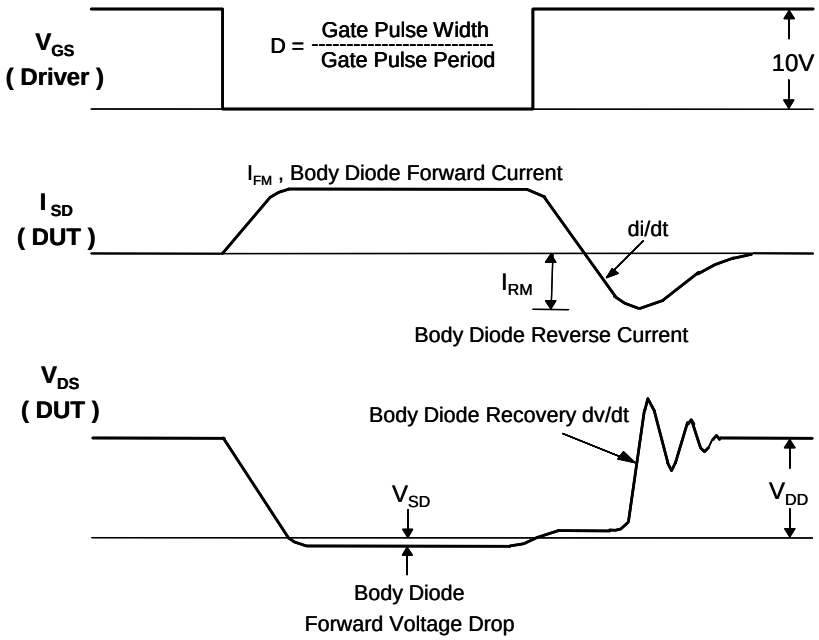


Unclamped Inductive Switching Test Circuit & Waveforms



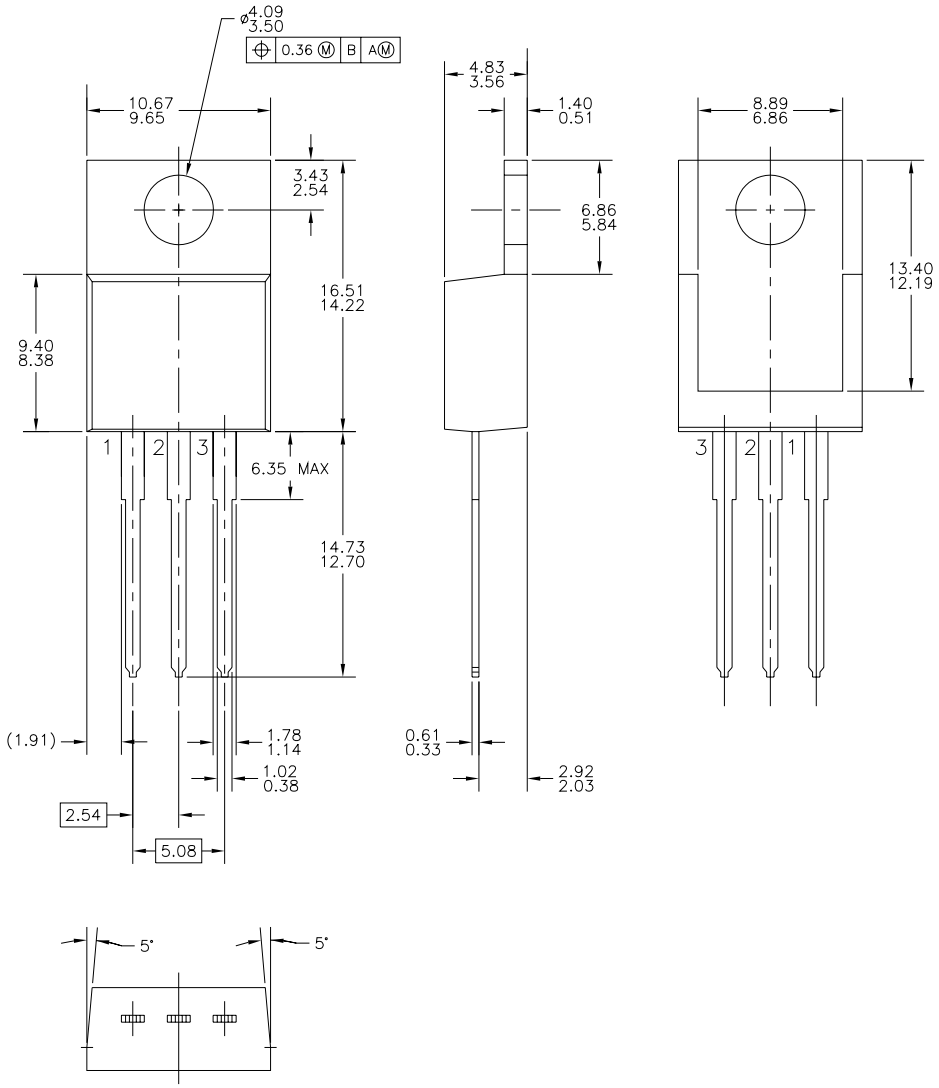
Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions

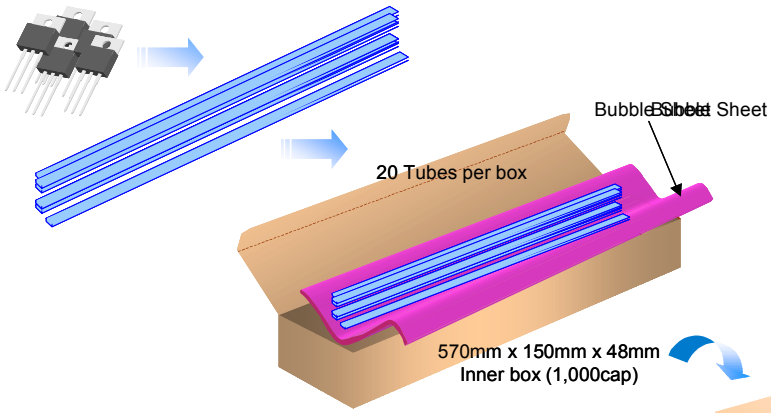
TO-220



Dimensions in Millimeters

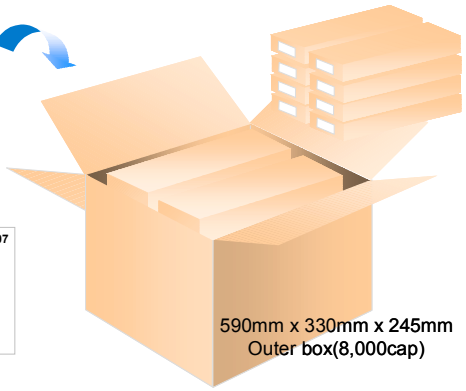
TO-220 Short Lead Tube Packing Data

TO-220 Short Lead Tube Packing Configuration: Figure 1.0



Packaging Description:

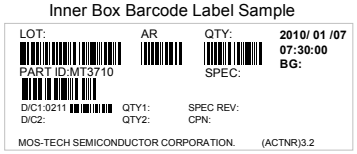
TO-220 parts are shipped normally in tube. The tube is made of PVC plastic treated with anti-static agent.These tubes in standard option are placed inside a dissipative plastic bubble sheet, barcode labeled, and placed inside a box made of recyclable corrugated paper. One box contains twenty tubes maximum (see fig. 1.0). And one or several of these boxes are 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	

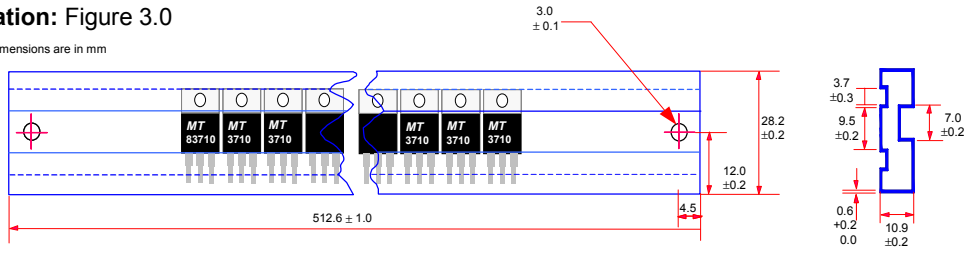
Inner Box Barcode Label Sample



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.