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

September 2008

IRF830B/IRFS830B

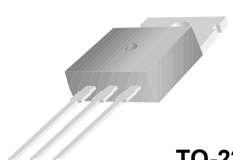
500V N-Channel MOSFET

General Description

These N-Channel enhancement mode power field effect transistors are produced using Mos-Tech's proprietary, planar, 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. These devices are well suited for high efficiency switch mode power supplies, power factor correction and electronic lamp ballasts based on half bridge.

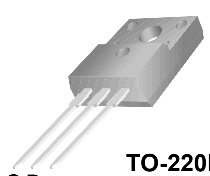
Features

- 4.5A, 500V, $R_{DS(on)}$ = 1.35Ω @V_{GS} = 10 V
- Low gate charge (typical 41 C)
- Low Crss (typical 10 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



G D S

TO-220
IRF Series



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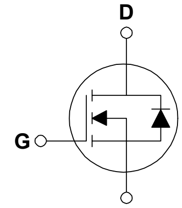
TO-220F
IRFS Series



Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		IRF830B	IRFS830B	Units
V_{DSS}	Drain-Source Voltage		500		V
I_D	Drain Current - Continuous (T_C = 25°C)		4.5	4.0	A
	- Continuous (T_C = 100°C)		2.9	2.3	A
I_{DM}	Drain Current - Pulsed	(Note 1)	32	32	A
V_{GSS}	Gate-Source Voltage		± 30		V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	290		mJ
I_{AR}	Avalanche Current	(Note 1)	4.5		A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	13.4		mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	3.5		V/ns
P_D	Power Dissipation (T_C = 25°C)		100	33	W
	- Derate above 25°C		0.8	0.4	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150		°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300		°C

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	IRF830B	IRFS830B	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case Max.	1.25	0.87	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Max.	62.5	62.5	°C/W

Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	500	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	--	0.55	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 500 V, V_{GS} = 0 V	--	--	10	μA
		V_{DS} = 400 V, T_C = 125°C	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 3.0 A	--	1.35	1.5	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 3.0 A (Note 4)	--	7.3	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	610	820	pF
C_{oss}	Output Capacitance		--	120	190	pF
C_{rss}	Reverse Transfer Capacitance		--	10	22	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 250 V, I_D = 4.0 A, R_G = 25 Ω (Note 4, 5)	--	11.5	15	ns
t_r	Turn-On Rise Time		--	8	14	ns
$t_{d(off)}$	Turn-Off Delay Time		--	7	9	ns
t_f	Turn-Off Fall Time		--	5	6	ns
Q_g	Total Gate Charge	V_{DS} = 400 V, I_D = 4.0 A, V_{GS} = 10 V (Note 4, 5)	--	22	27	nC
Q_{gs}	Gate-Source Charge		--	7.2		nC
Q_{gd}	Gate-Drain Charge		--	8		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	4.5	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	8	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 4.0 A	--	--	1.6	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 4.0 A, dI_F / dt = 100 A/μs (Note 4)	--	435		ns
Q_{rr}	Reverse Recovery Charge		--	3.3		μC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 9.0mH, I_{AS} = 4.0A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 4.0A, 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

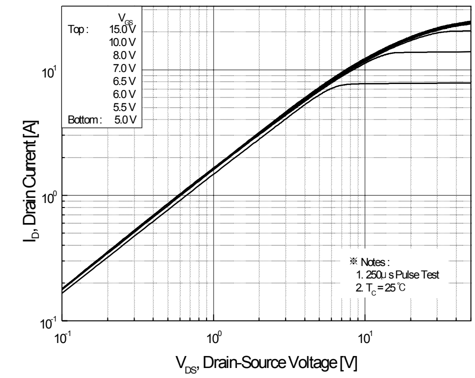


Figure 1. On-Region Characteristics

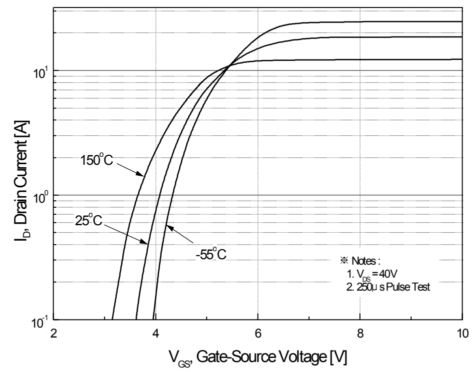


Figure 2. Transfer Characteristics

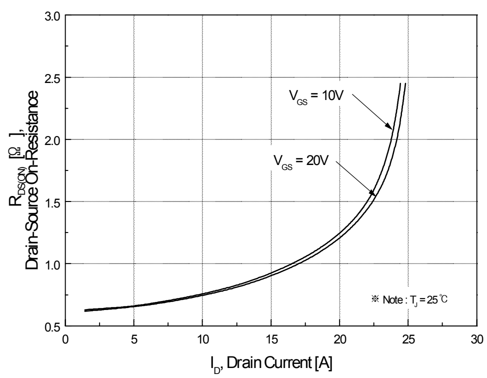


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

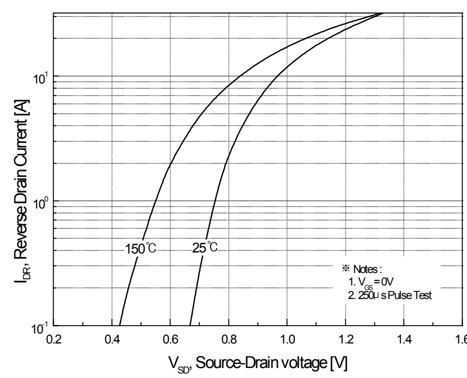


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

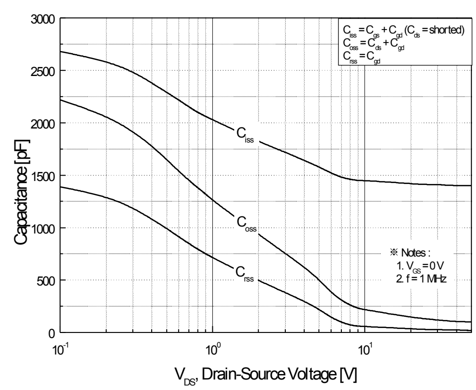


Figure 5. Capacitance Characteristics

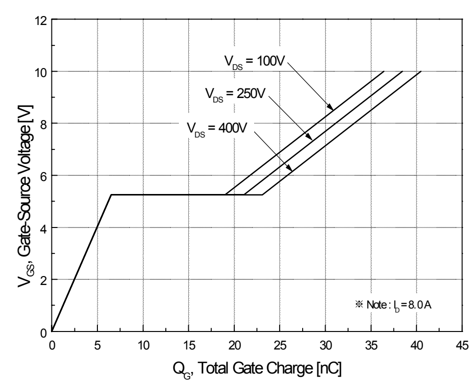


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

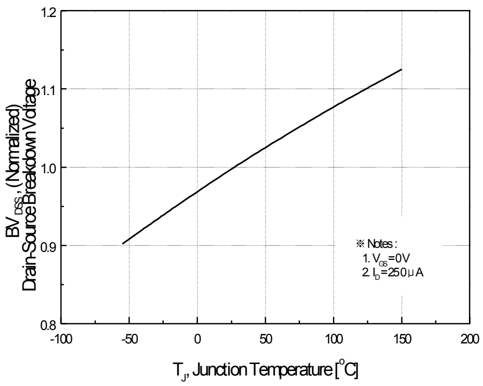


Figure 7. Breakdown Voltage Variation vs Temperature

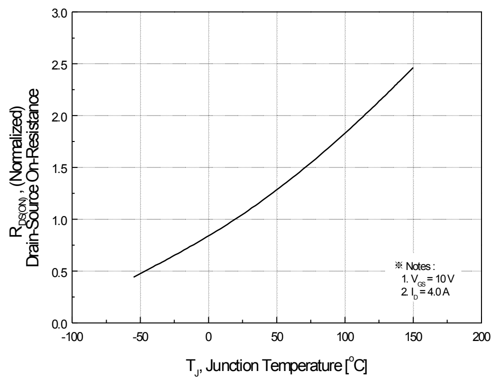


Figure 8. On-Resistance Variation vs Temperature

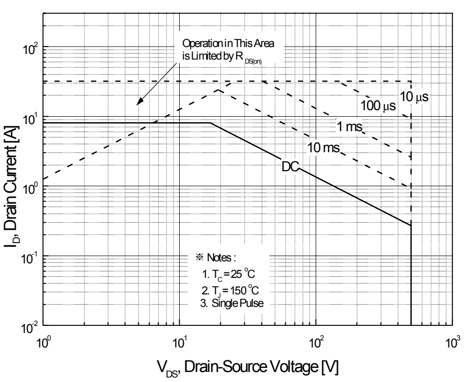


Figure 9-1. Maximum Safe Operating Area for IRF830B

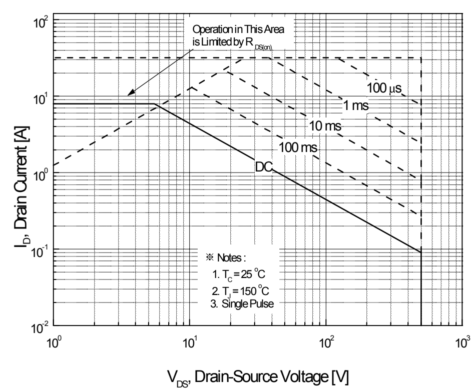


Figure 9-2. Maximum Safe Operating Area for IRFS830B

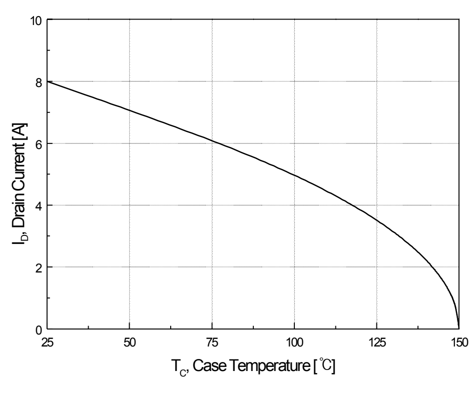


Figure 10. Maximum Drain Current vs Case Temperature

Typical Characteristics (Continued)

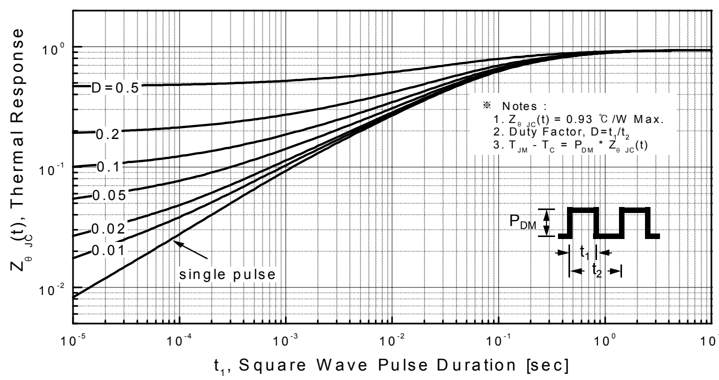


Figure 11-1. Transient Thermal Response Curve for IRF830B

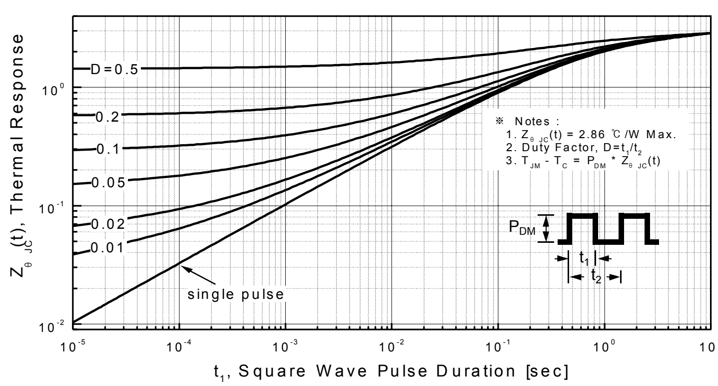
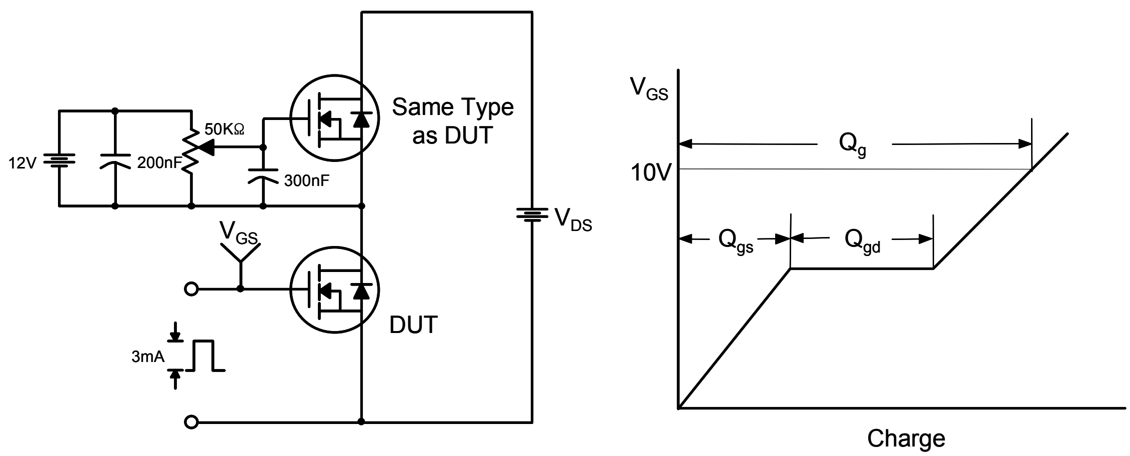
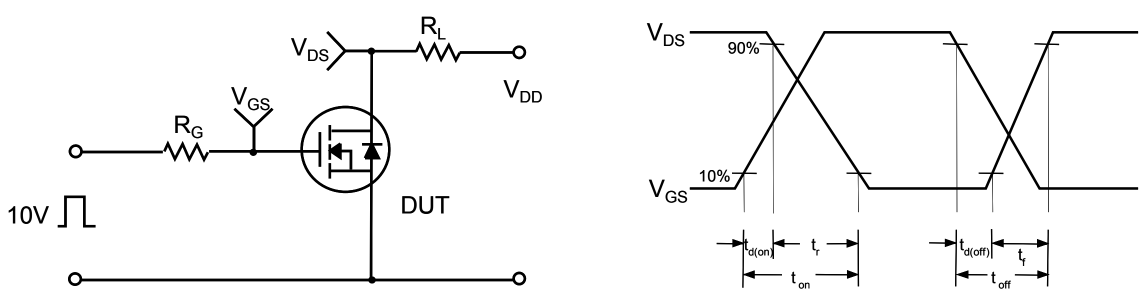


Figure 11-2. Transient Thermal Response Curve for IRFS830B

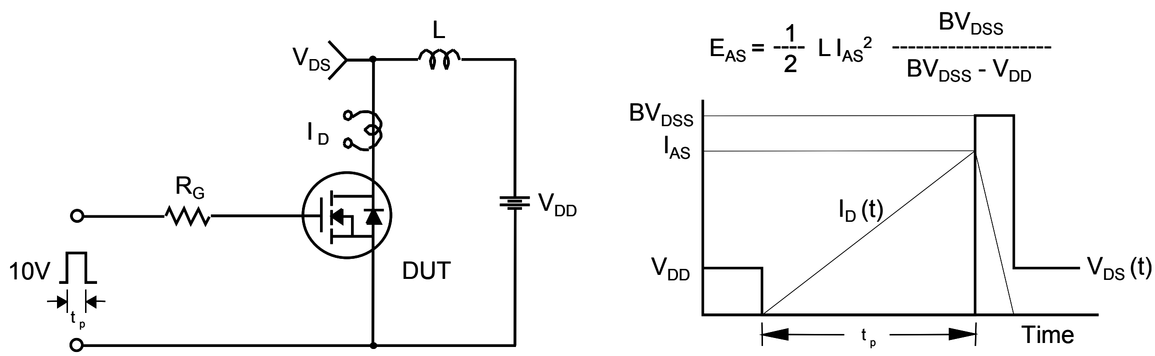
Gate Charge Test Circuit & Waveform

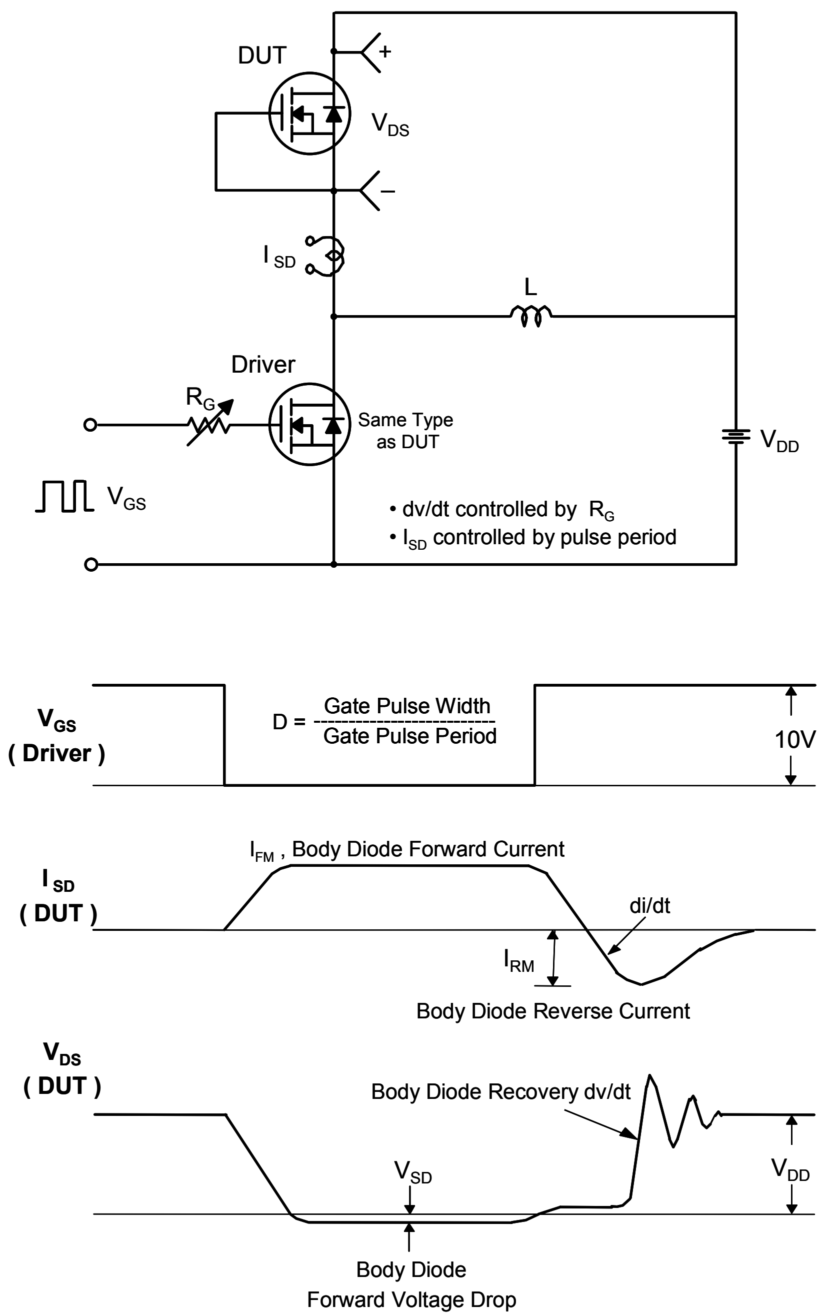


Resistive Switching Test Circuit & Waveforms

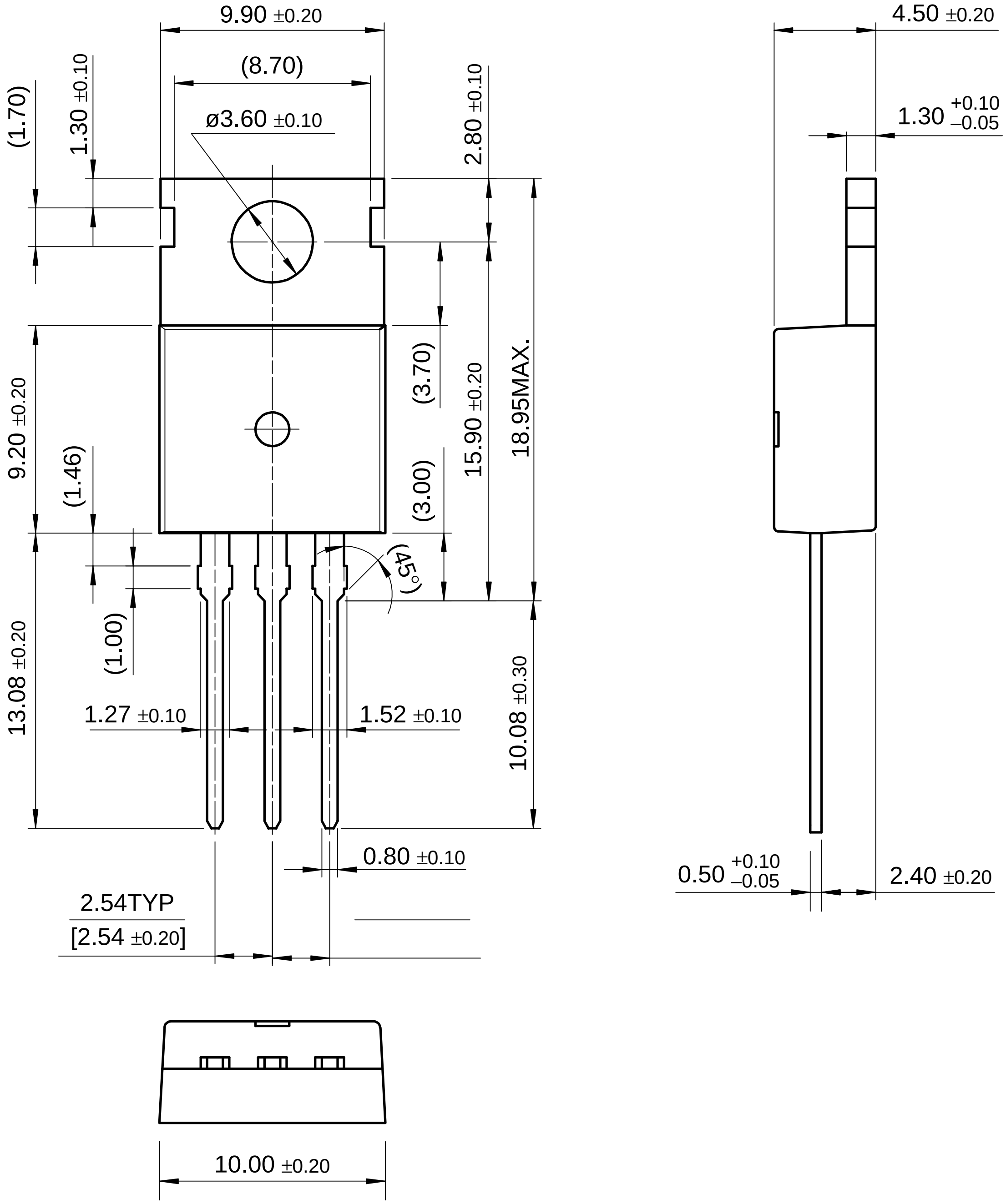


Unclamped Inductive Switching Test Circuit & Waveforms

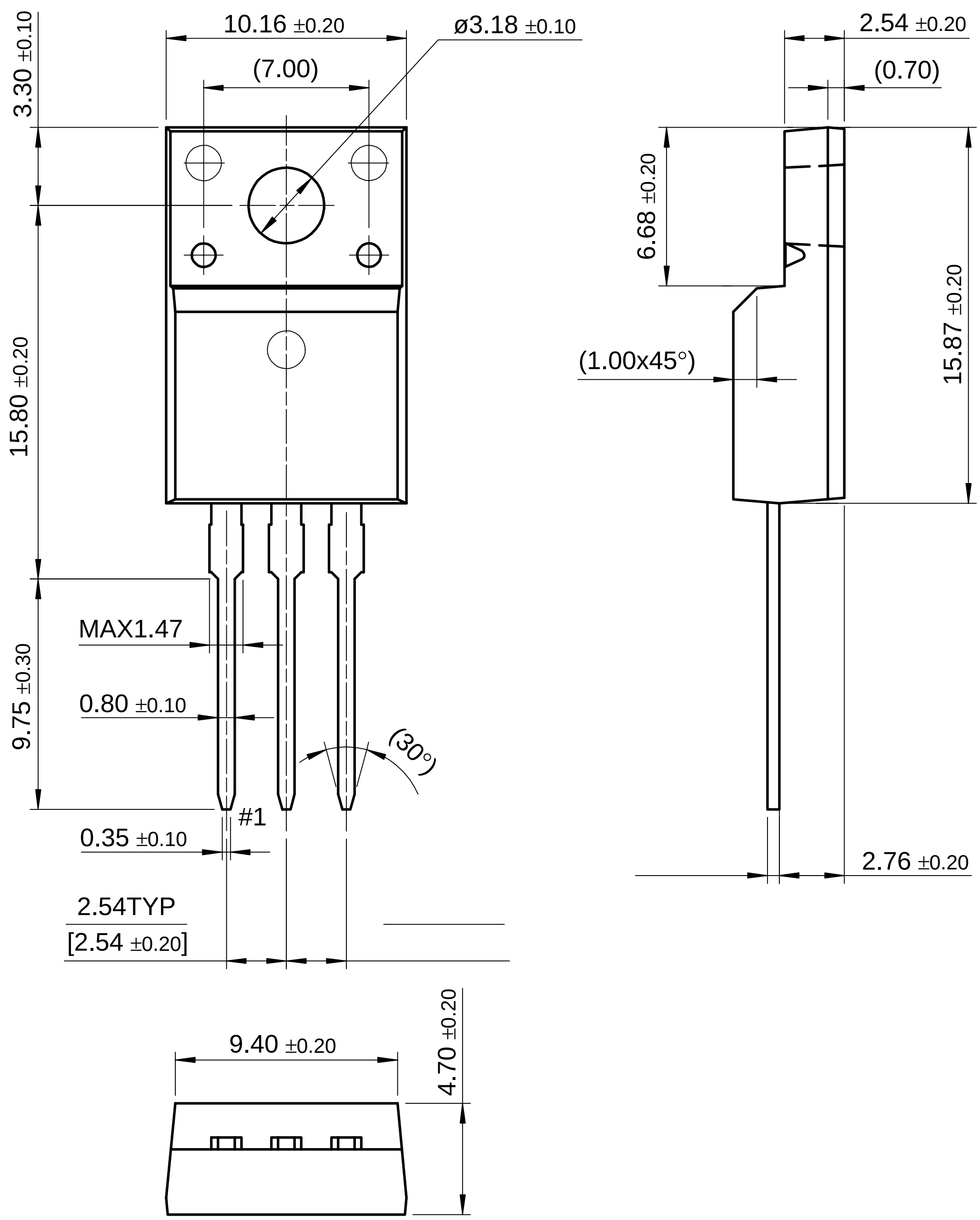



DUT
+
VDS
–
I SD
L
Driver
RG
Same Type
as DUT
VDD
VGS
• dv/dt controlled by RG
• ISD controlled by pulse period
VGS
(Driver)
D = Gate Pulse Width / Gate Pulse Period
10V
IFM , Body Diode Forward Current
I SD
(DUT)
di/dt
IRM
Body Diode Reverse Current
VDS
(DUT)
Body Diode Recovery dv/dt
VSD
VDD
Body Diode
Forward Voltage Drop

Peak Diode Recovery dv/dt Test Circuit & Waveforms



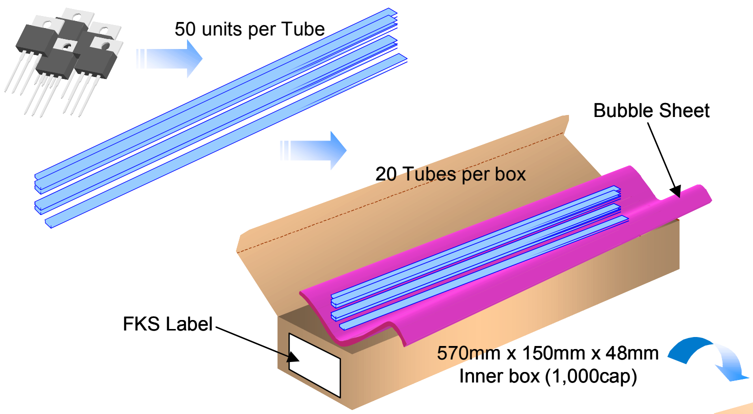
Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO-220 Short Lead Tube Packing Data

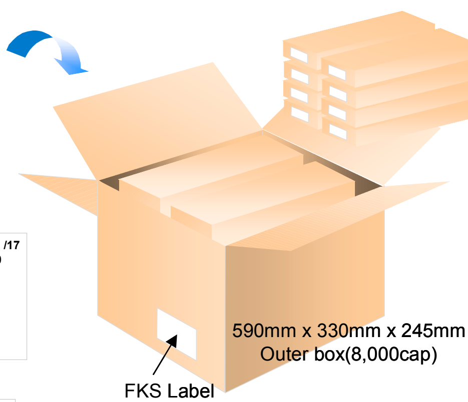
Mos-Tech Semiconductor Co.,LTD.

TO-220 Short Lead Tube Packing Configuration: Figure 1.0



Packaging Description:

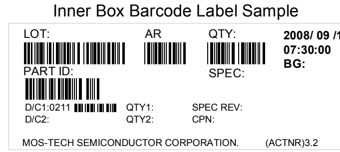
TO-220 parts are shipped normally in tube. The tube is made of PVC plastic treated with anti-static agent.These tubes in standard option are placed inside a dissipative plastic bubble sheet, barcode labeled, and placed inside a box made of recyclable corrugated paper. One box contains twenty tubes maximum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



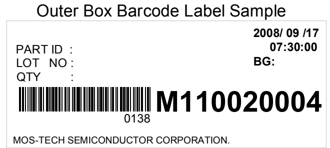
TO-220 Short Lead Packaging Information: Figure 2.0

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

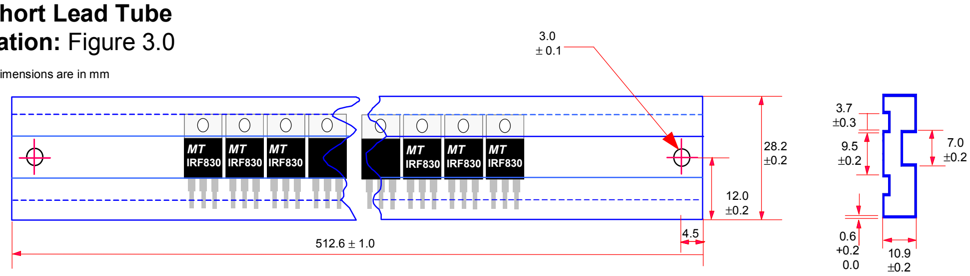


Outer Box Barcode Label Sample



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.