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FAIRCHILD SEMICONDUCTOR®

November 2013

FDD7N60NZ / FDU7N60NZTU

N-Channel UniFET^{TM} II MOSFET

600 V, 5.5 A, 1.25 Ω

Features

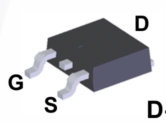
- $R_{DS(on)}$ = 1.05 Ω (Typ.) @ V_{GS} = 10 V, I_D = 2.75 A
- Low Gate Charge (Typ. 13 nC)
- Low C_{rss} (Typ. 7 pF)
- 100% Avalanche Tested
- Improved dv/dt Capability
- ESD Improved Capability
- RoHS Compliant

Applications

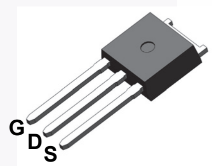
- Lighting
- Uninterruptible Power Supply

Description

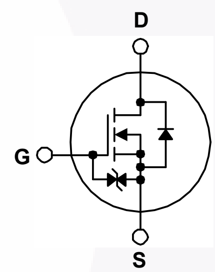
UniFET^{TM} II MOSFET is Fairchild Semiconductor's high voltage MOSFET family based on advanced planar stripe and DMOS technology. This advanced MOSFET family has the smallest on-state resistance among the planar MOSFET, and also provides superior switching performance and higher avalanche energy strength. In addition, internal gate-source ESD diode allows UniFET^{TM} II MOSFET to withstand over 2kV HBM surge stress. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.



D-PAK



I-PAK



MOSFET Maximum Ratings T_C = 25^{o}C unless otherwise noted.

Symbol	Parameter			FDD7N60NZTM/ FDU7N60NZTU	Unit
V_{DSS}	Drain to Source Voltage			600	V
V_{GSS}	Gate to Source Voltage			±25	V
I_D	Drain Current	- Continuous (T_C = 25^{o}C)		5.5	A
		- Continuous (T_C = 100^{o}C)		3.3	
I_{DM}	Drain Current	- Pulsed	(Note 1)	22	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	347	mJ
I_{AR}	Avalanche Current		(Note 1)	5.5	A
E_{AR}	Repetitive Avalanche Energy		(Note 1)	12.5	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	10	V/ns
P_D	Power Dissipation	(T_C = 25^{o}C)		90	W
		- Derate Above 25^{o}C		0.7	W/^{o}C
T_J, T_{STG}	Operating and Storage Temperature Range			-55 to +150	^{o}C
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds			300	^{o}C

Thermal Characteristics

Symbol	Parameter	FDD7N60NZTM/ FDU7N60NZTU	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.4	^{o}C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	90	

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDD7N60NZTM	FDD7N60NZ	DPAK	Tape and Reel	330 mm	16 mm	2500 units
FDU7N60NZTU	FDU7N60NZ	IPAK	Tube	N/A	N/A	75 units

Electrical Characteristics T_C = 25^{o}C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V, T_J = 25^{o}C	600	-	-	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25^{o}C	-	0.6	-	V/^{o}C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V, V_{GS} = 0 V	-	-	50	μA
		V_{DS} = 480 V, T_C = 125^{o}C	-	-	100	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±25 V, V_{DS} = 0 V	-	-	±10	μA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	3.0	-	5.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 2.75 A	-	1.05	1.25	Ω
g_{FS}	Forward Transconductance	V_{DS} = 20 V, I_D = 2.75 A	-	7.3	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	-	550	730	pF
C_{oss}	Output Capacitance		-	70	90	pF
C_{rss}	Reverse Transfer Capacitance		-	7	10	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 400 V, I_D = 5.5 A, V_{GS} = 10 V (Note 4)	-	13	17	nC
Q_{gs}	Gate to Source Gate Charge		-	3	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	5.6	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 250 V, I_D = 5.5 A, V_{GS} = 10 V, R_G = 25 Ω (Note 4)	-	17.5	45	ns
t_r	Turn-On Rise Time		-	30	70	ns
$t_{d(off)}$	Turn-Off Delay Time		-	40	90	ns
t_f	Turn-Off Fall Time		-	25	60	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	5.5	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	22	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 5.5 A	-	-	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_{SD} = 5.5 A, dI_F/dt = 100 A/μs	-	250	-	ns
Q_{rr}	Reverse Recovery Charge		-	1.4	-	μC

Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. L = 23 mH, I_{AS} = 5.5 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 5.5 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

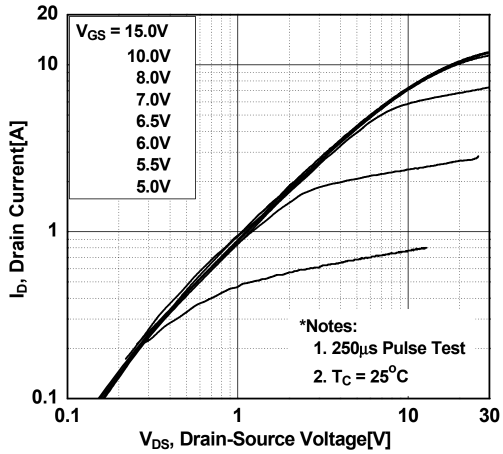


Figure 2. Transfer Characteristics

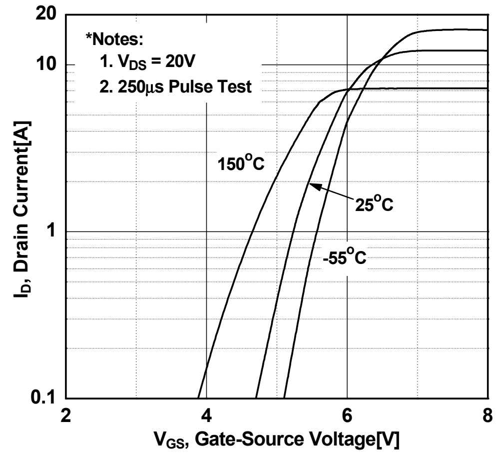


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

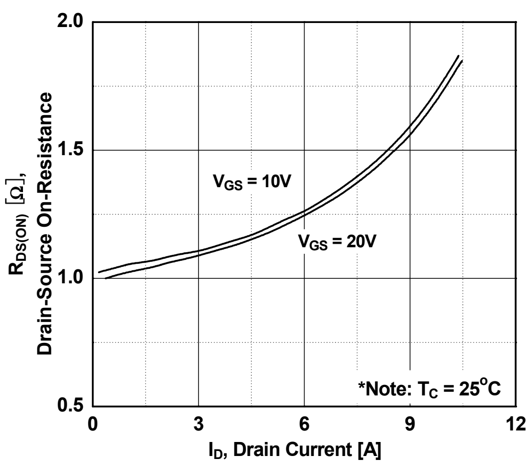


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

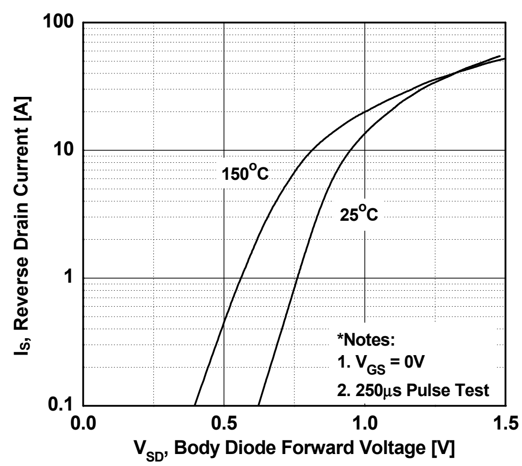


Figure 5. Capacitance Characteristics

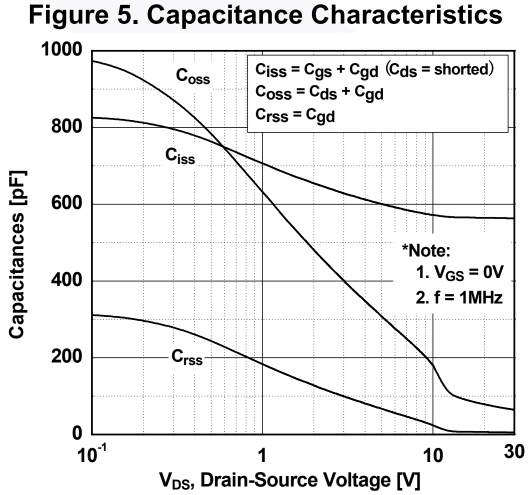
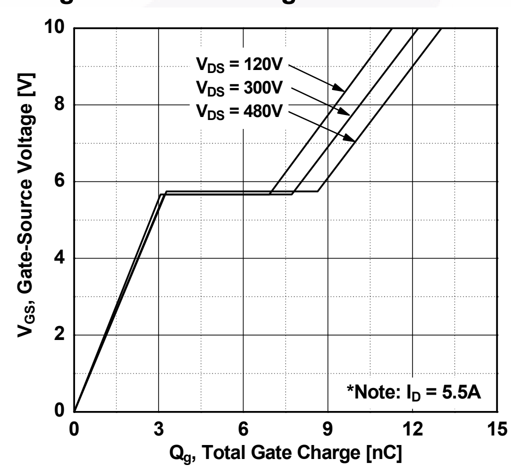


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

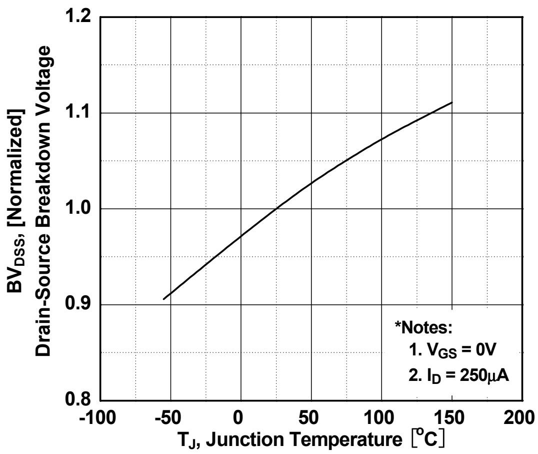


Figure 8. On-Resistance Variation vs. Temperature

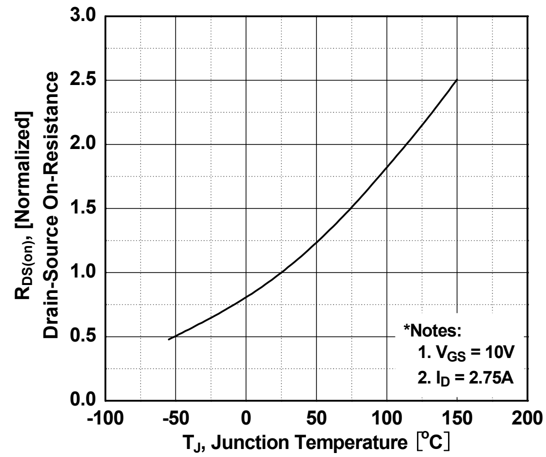


Figure 9. Maximum Safe Operating Area

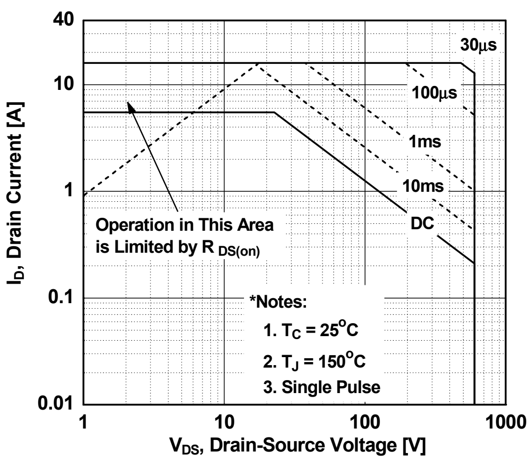


Figure 10. Maximum Drain Current vs. Case Temperature

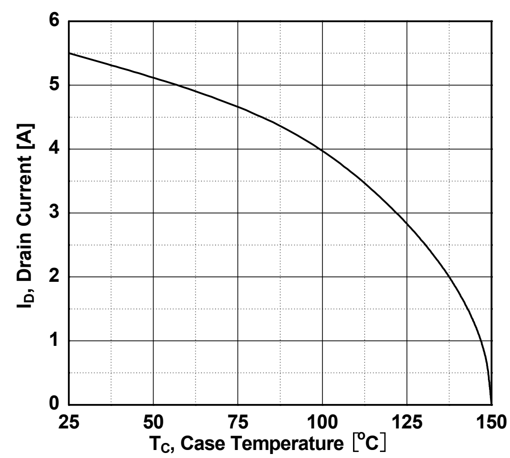
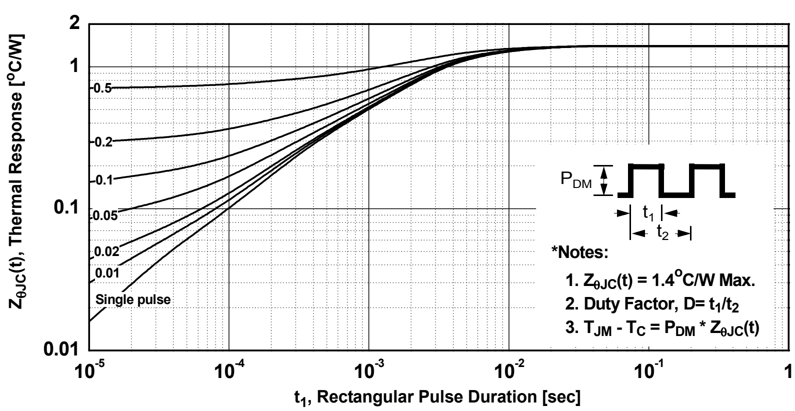


Figure 11. Transient Thermal Response Curve



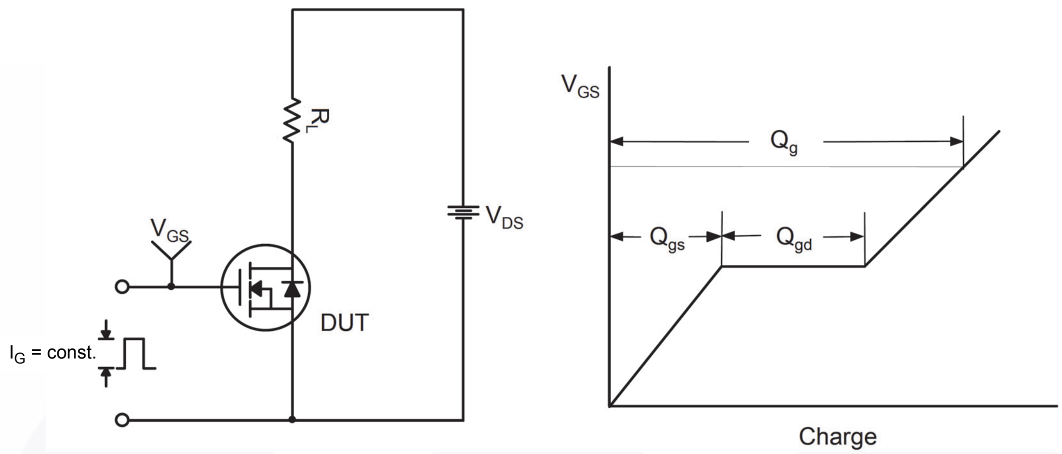


Figure 12. Gate Charge Test Circuit & Waveform

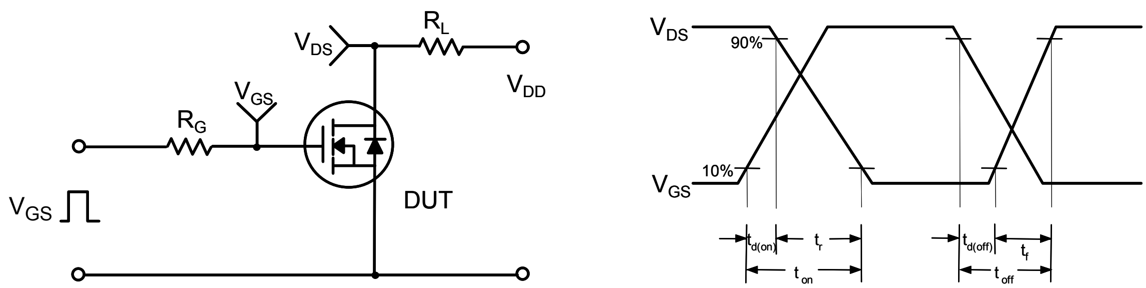


Figure 13. Resistive Switching Test Circuit & Waveforms

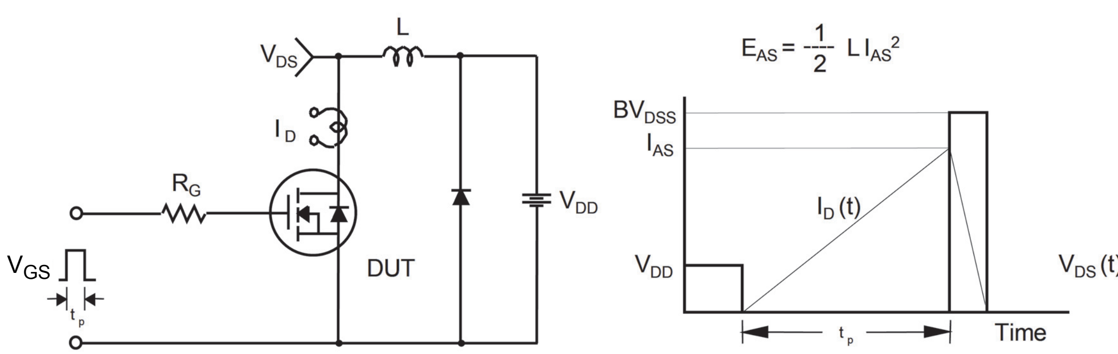


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

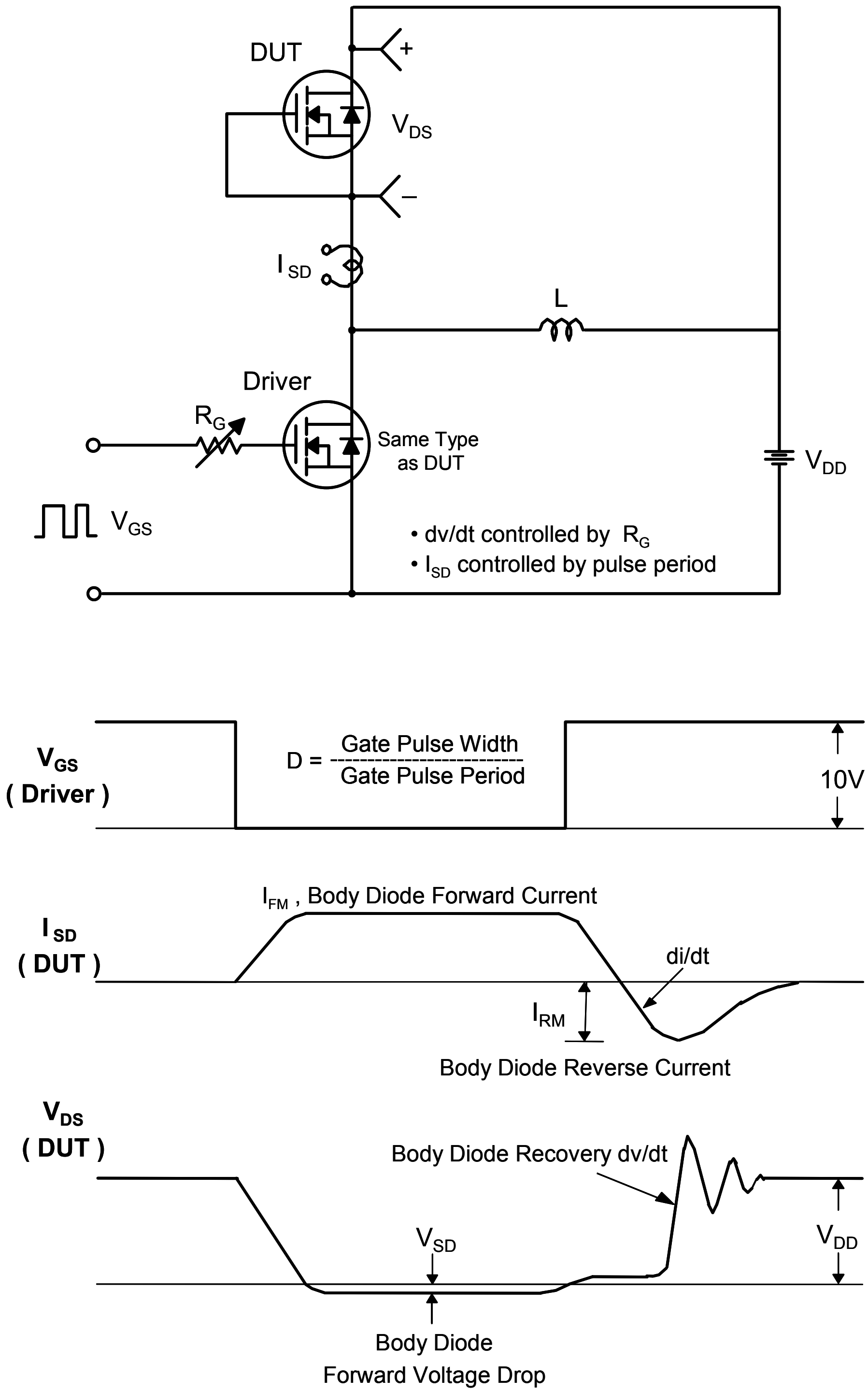


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

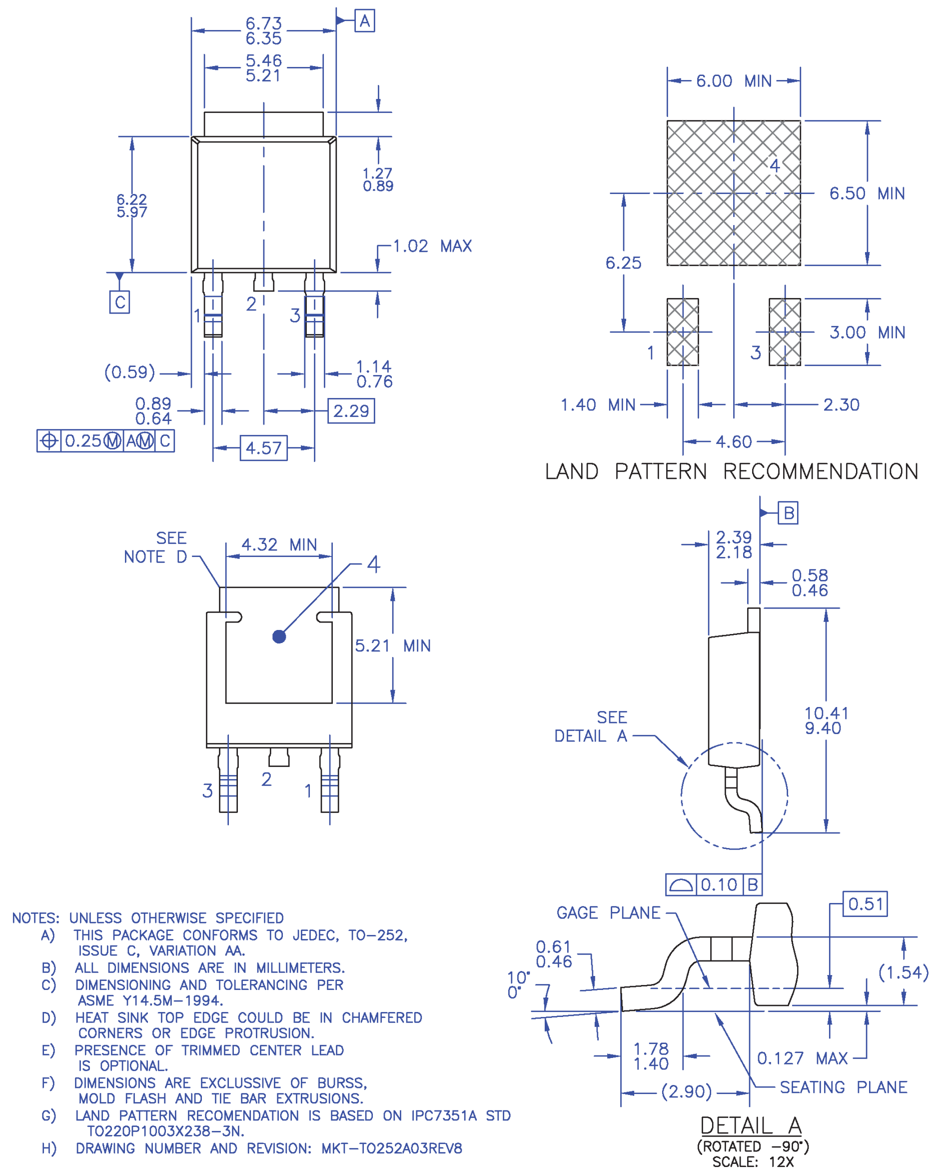


Figure 16. TO252 (D-PAK), Molded, 3-Lead, Option AA&AB

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Mechanical Dimensions

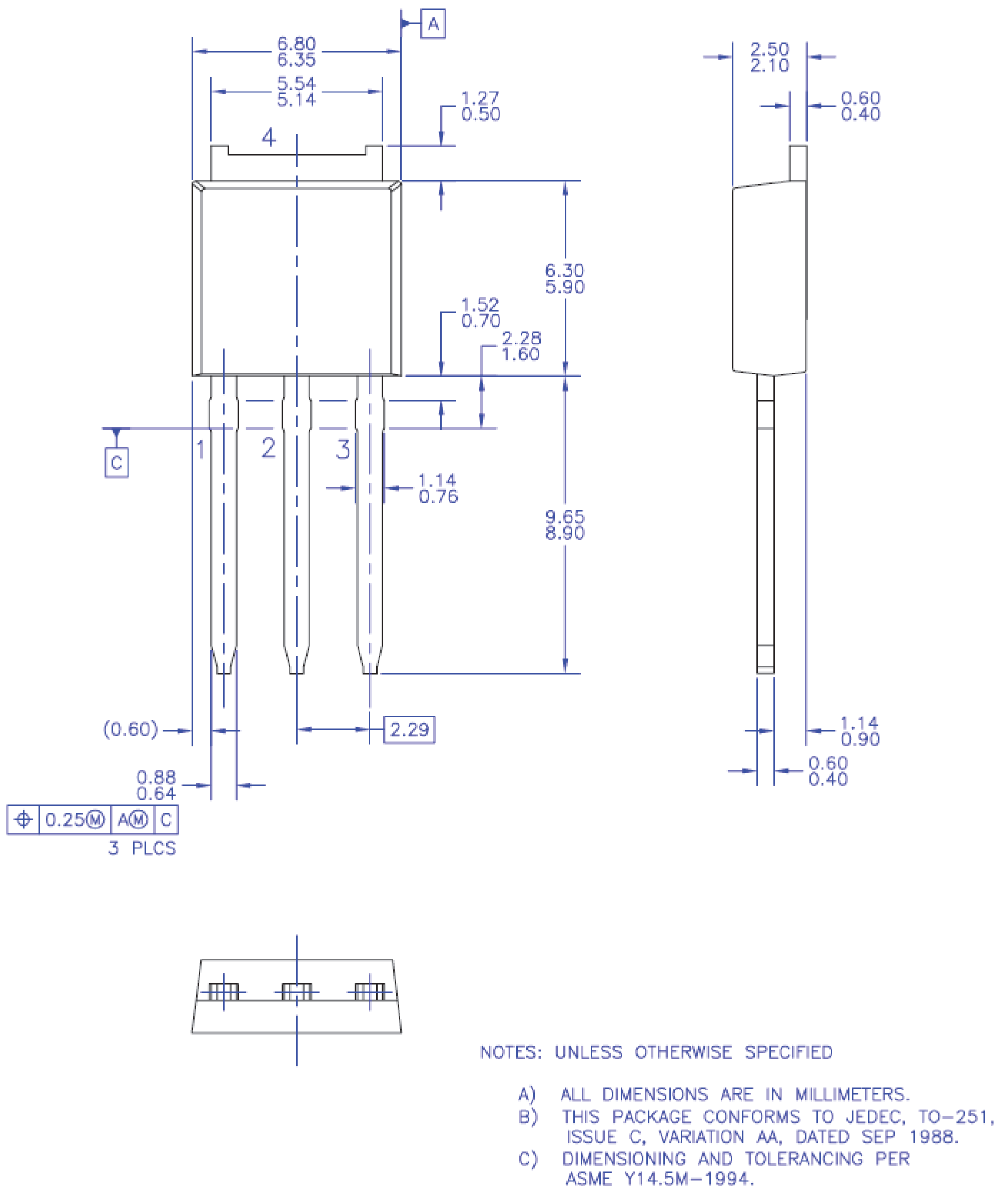

Figure 17. TO-251 (I-PAK), Molded, 3-Lead, Option AA

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Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I66

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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

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