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August 2014

FDPF045N10A

N-Channel PowerTrench® MOSFET

100 V, 67 A, 4.5 mΩ

Features

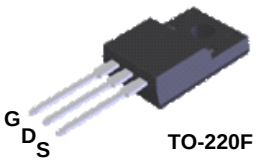
- $R_{DS(on)}$ = 3.7 mΩ (Typ.)@ V_{GS} = 10 V, I_D = 67 A
- Fast Switching Speed
- Low Gate Charge, Q_G = 57 nC(Typ.)
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

Description

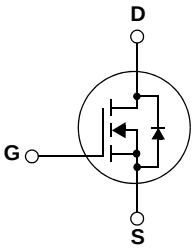
This N-Channel MOSFET is produced using Fairchild Semiconductor®'s advance PowerTrench® process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Motor drives and Uninterruptible Power Supplies
- Micro Solar Inverter



TO-220F



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted*

Symbol	Parameter			FDPF045N10A	Unit
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)		67	A
		- Continuous (T_C = 100°C)		47	
I_{DM}	Drain Current	- Pulsed	(Note 1)	268	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	637	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	6.0	V/ns
P_D	Power Dissipation	(T_C = 25°C)		43	W
		- Derate above 25°C		0.29	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range			-55 to +175	°C
T_L	Maximum Lead Temperature for Soldering,1/8" from Case for 5 Seconds			300	°C

Thermal Characteristics

Symbol	Parameter	FDPF045N10A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	3.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

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Package Marking and Ordering Information

Device Marking	Device	Package	Packing Method	Reel Size	Tape Width	Quantity
FDPF045N10A	FDPF045N10A	TO-220F	Tube	-	-	50

Electrical Characteristics $T_C = 25^oC$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	100	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	-	0.06	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 80V, 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	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 67A	-	3.7	4.5	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10V, I_D = 67A	-	127	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 50V, V_{GS} = 0V, f = 1MHz	-	3961	5270	pF
C_{oss}	Output Capacitance		-	925	1230	pF
C_{rss}	Reverse Transfer Capacitance		-	34	-	pF
C_{oss}(er)	Energy Releted Output Capacitance	V_{DS} = 50V, V_{GS} = 0V	-	1521	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{GS} = 10V, V_{DS} = 50V, I_D = 100A	-	57	74	nC
Q_{gs}	Gate to Source Gate Charge		-	17	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	8	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	13	-	nC
ESR	Equivalent Series Resistance (G-S)	f = 1MHz	-	1.9	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50V, I_D = 100A, V_{GS} = 10V, R_{GEN} = 4.7Ω (Note 4)	-	23	56	ns
t_r	Turn-On Rise Time		-	26	62	ns
$t_{d(off)}$	Turn-Off Delay Time		-	50	110	ns
t_f	Turn-Off Fall Time		-	15	40	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	67	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	268	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 67A	-	-	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, V_{DD} = 50V, I_{SD} = 100A, dI_F/dt = 100A/μs	-	75	-	ns
Q_{rr}	Reverse Recovery Charge		-	120	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 3mH, I_{AS} = 20.6A, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 100A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Essentially Independent of Operating Temperature Typical Characteristics

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Typical Performance Characteristics

Figure 1. On-Region Characteristics

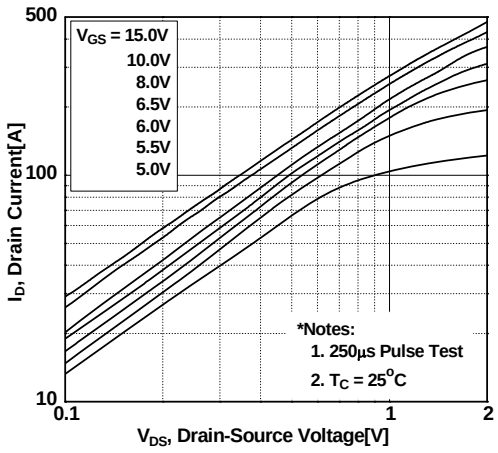


Figure 2. Transfer Characteristics

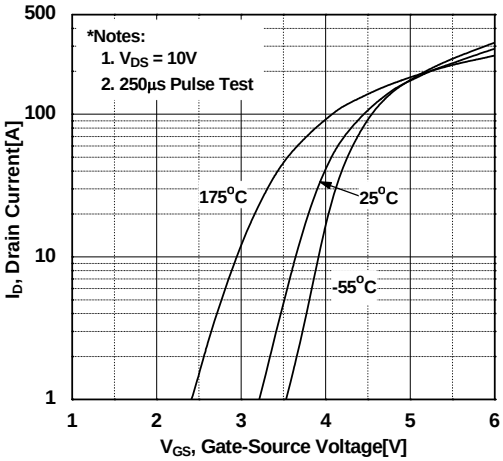


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

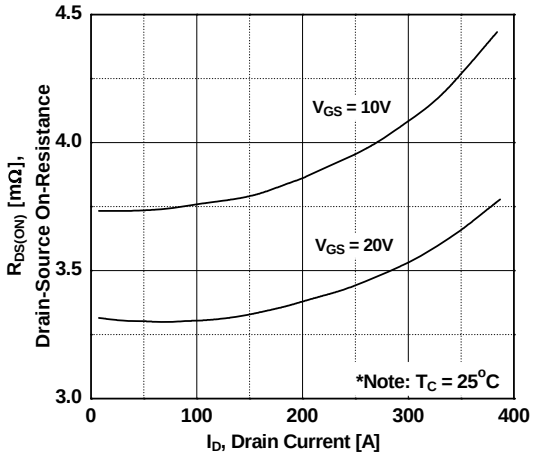


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

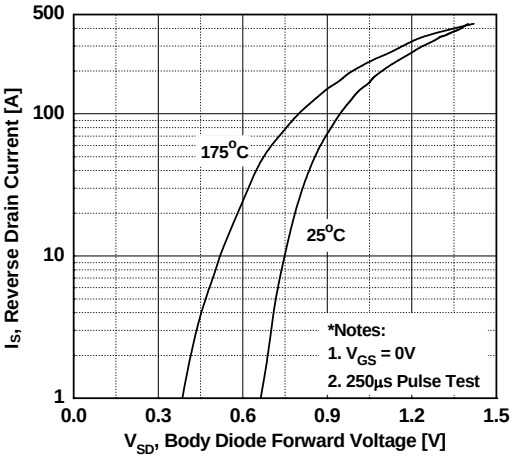


Figure 5. Capacitance Characteristics

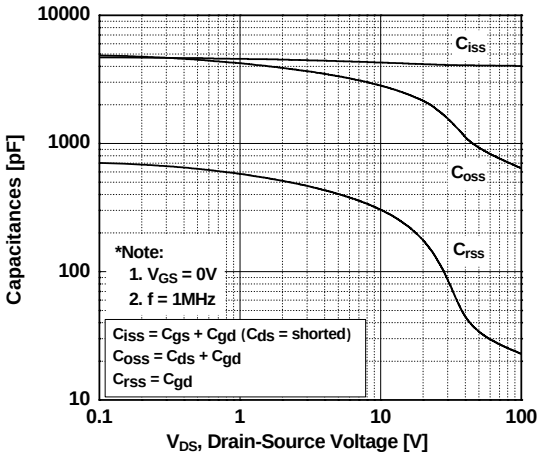
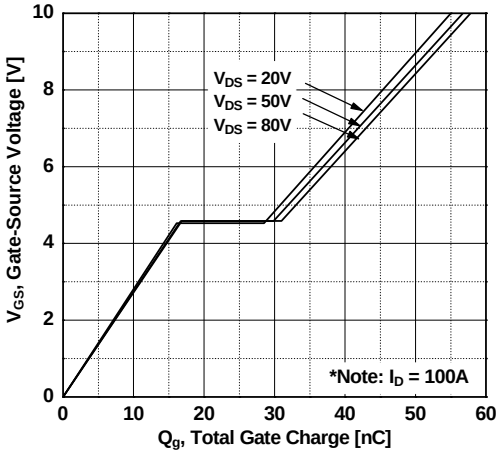


Figure 6. Gate Charge Characteristics



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Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

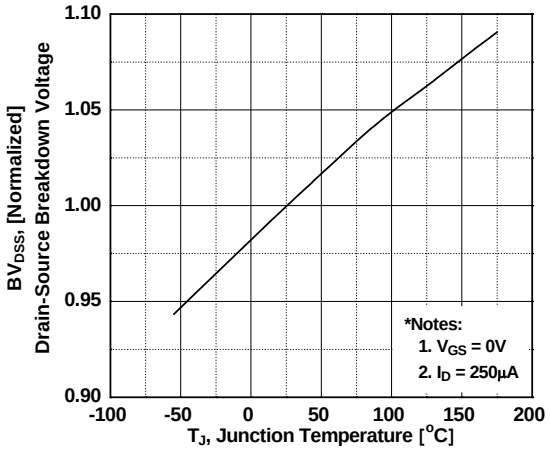


Figure 8. On-Resistance Variation vs. Temperature

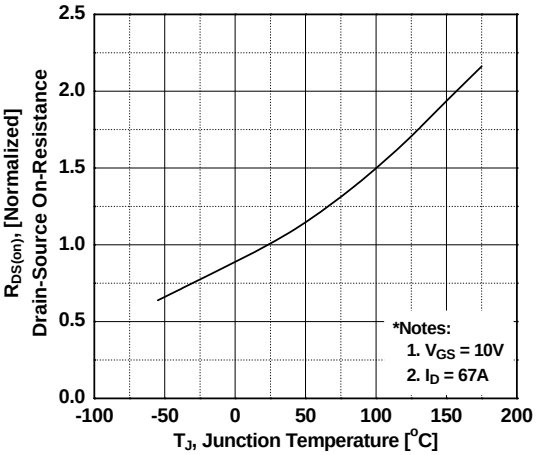


Figure 9. Maximum Safe Operating Area vs. Case Temperature

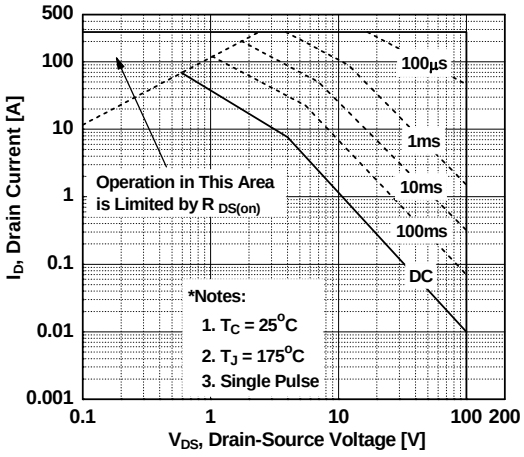


Figure 10. Maximum Drain Current

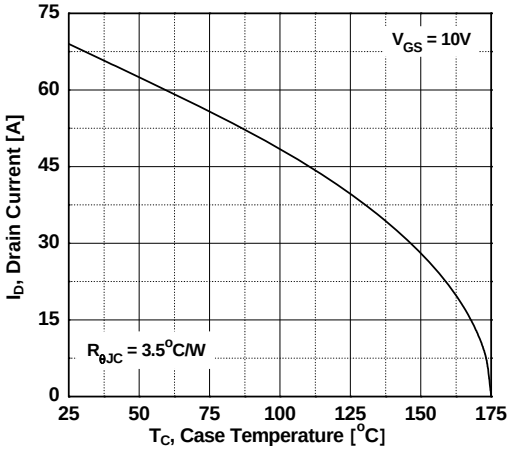
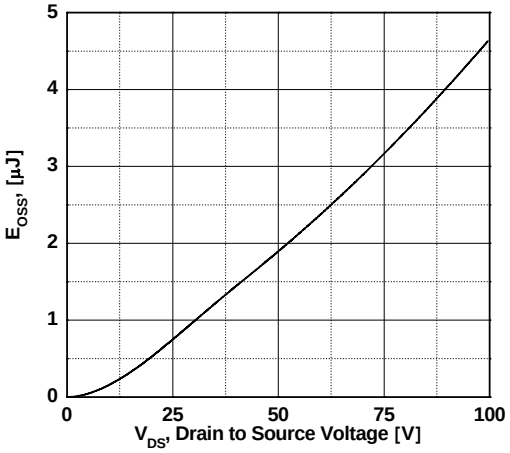


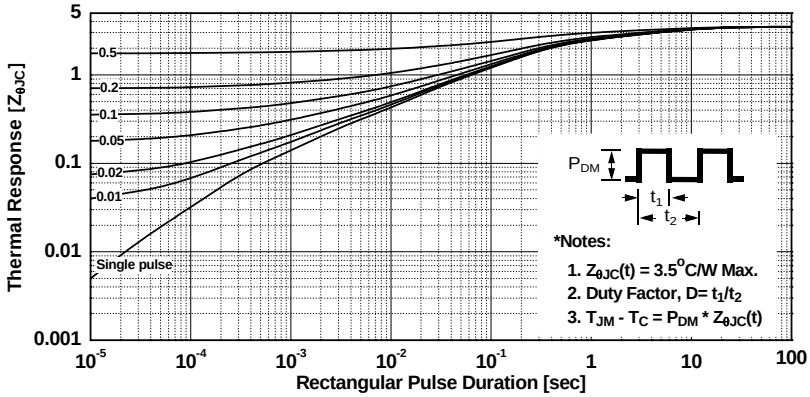
Figure 11. Eoss vs. Drain to Source Voltage



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Typical Performance Characteristics (Continued)

Figure 12. Transient Thermal Response Curve



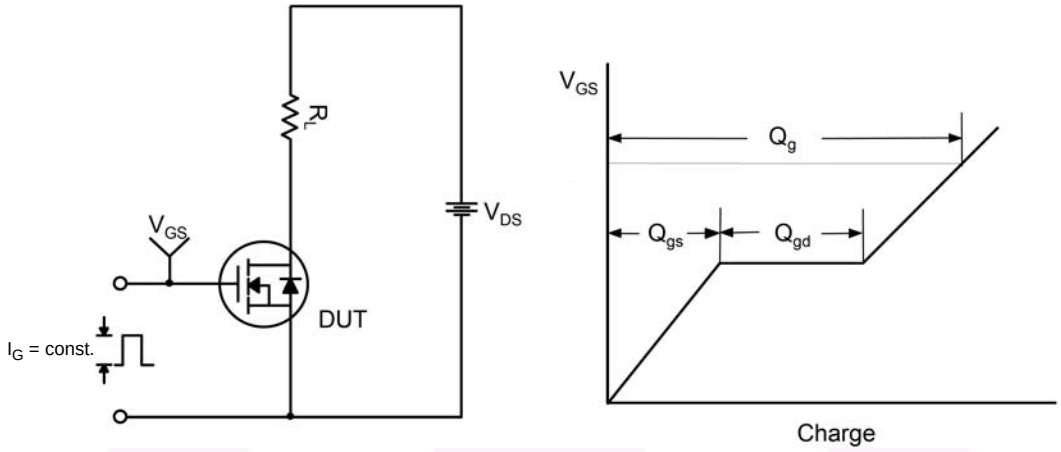


Figure 13. Gate Charge Test Circuit & Waveform

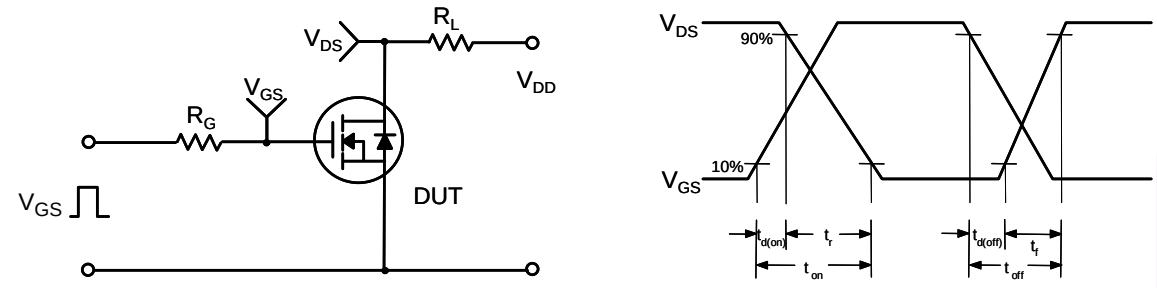


Figure 14. Resistive Switching Test Circuit & Waveforms

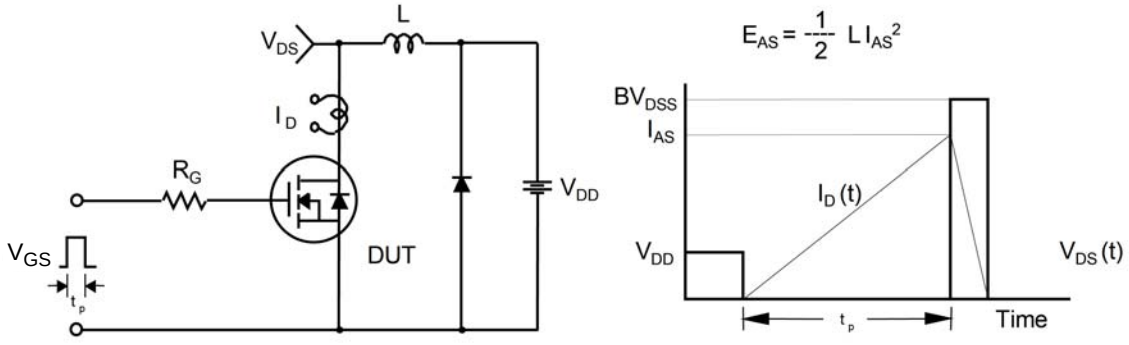


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

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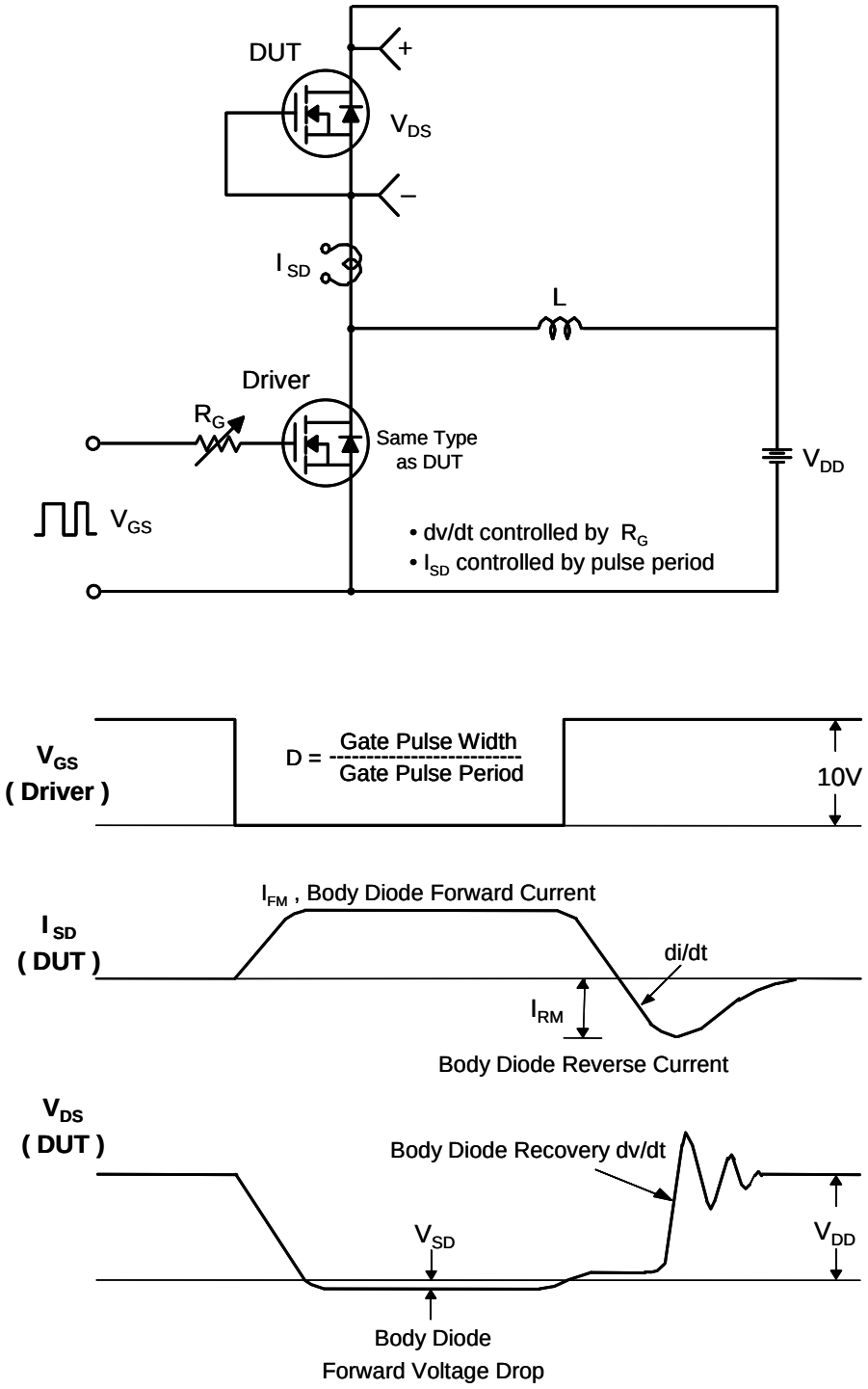


Figure 16. Unclamped Inductive Switching Test Circuit & Waveforms

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Mechanical Dimensions

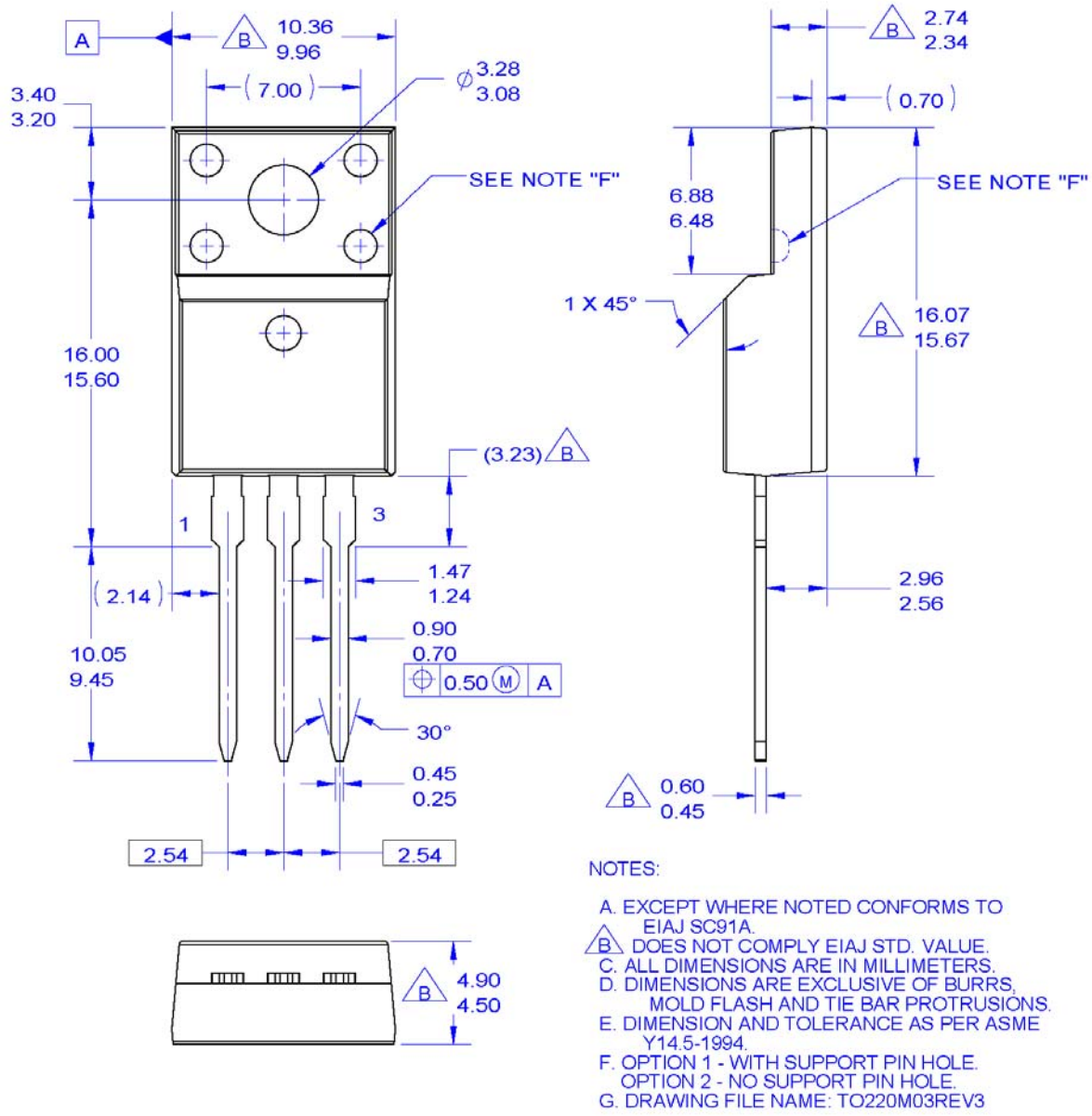


Figure 17. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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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.
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