FAIRCHILD SEMICONDUCTOR®

July 2009

FDMC15N06

N-Channel MOSFET

55V, 15A, 0.090Ω

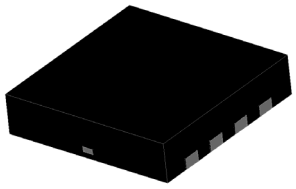
Features

- $R_{DS(on)}$ = 0.075Ω (Typ.)@ V_{GS} = 10V, I_D = 15A
- 100% Avalanche Tested
- RoHS Compliant

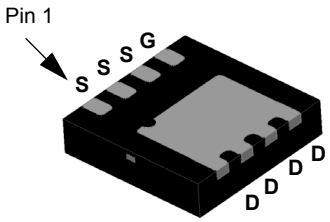
Description

These N-Channel power MOSFETs are manufactured using the innovative UltraFET process. This advanced process technology achieves the lowest possible on-resistance per silicon area, resulting in outstanding performance.This device is capable of withstanding high energy in the avalanche mode and the diode exhibits very low reverse recovery time and stored charge. It was designed for use in applications where power efficiency is important, such as switching regulators, switching converters, motor drivers, relay drivers, lowvoltage bus switches, and power management in portable and battery-operated products.

Top



Bottom



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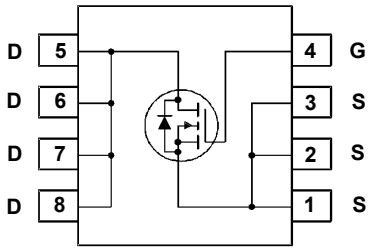


MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

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)	15	A
		-Continuous (T_C = 100°C)	9	
		- Continuous (T_A = 25°C) (Note 1a)	2.4	A
I_{DM}	Drain Current	- Pulsed (Note 2)	60	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 3)	36	mJ
I_{AR}	Avalanche Current		15	A
E_{AR}	Repetitive Avalanche Energy		3.5	mJ
P_D	Power Dissipation	(T_C = 25°C)	35	W
		(T_A = 25°C)	2.3	W
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	3.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	53	

Package Marking and Ordering Information

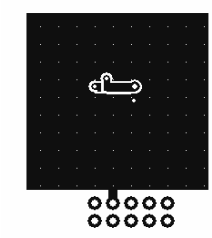
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC15N06	FDMC15N06	Power 33	13"	12mm	3000 units

Electrical Characteristics T_C = 25°C unless otherwise noted

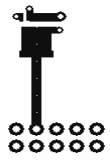
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V, T_C = 25°C	55	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	-	70	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 50V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 45V, T_C = 150°C	-	-	250	
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 = 15A	-	0.75	0.90	Ω
g_{FS}	Forward Transconductance	V_{DS} = 20V, I_D = 15A	-	5	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V f = 1MHz	-	265	350	pF
C_{oss}	Output Capacitance		-	97	130	pF
C_{rss}	Reverse Transfer Capacitance		-	28	42	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 30V,I_D = 15A V_{GS} = 10V (Note 4)	-	8.8	11.5	nC
Q_{gs}	Gate to Source Gate Charge		-	1.7	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	3.6	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30V, I_D = 15A R_G = 25Ω (Note 4)	-	9.5	29	ns
t_r	Turn-On Rise Time		-	36.5	83	ns
$t_{d(off)}$	Turn-Off Delay Time		-	22.5	55	ns
t_f	Turn-Off Fall Time		-	22	54	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	15	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	60	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 15A	-	-	1.25	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 15A dI_F/dt = 100A/μs (Note 5)	-	30	-	ns
Q_{rr}	Reverse Recovery Charge		-	35	-	nC

Notes:

1: $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 53 °C/W when mounted on a 1 in^2 pad of 2 oz copper



b.125 °C/W when mounted on a minimum pad of 2 oz copper

2: Repetitive Rating: Pulse width limited by maximum junction temperature

3: L = 1mH, I_{AS} = 8.5A, R_G = 25Ω, Starting T_J = 25°C

4: Essentially Independent of Operating Temperature Typical Characteristics

5: I_{SD} ≤ 15A, di/dt ≤ 200A/μs, V_{DD} ≤ 40V, Starting T_J = 25°C

Typical Performance Characteristics

Figure 1. On-Region Characteristics

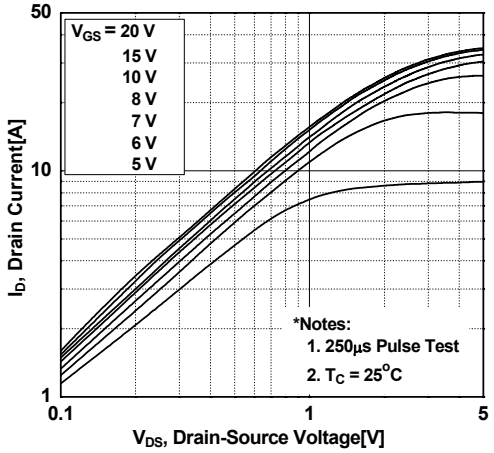


Figure 2. Transfer Characteristics

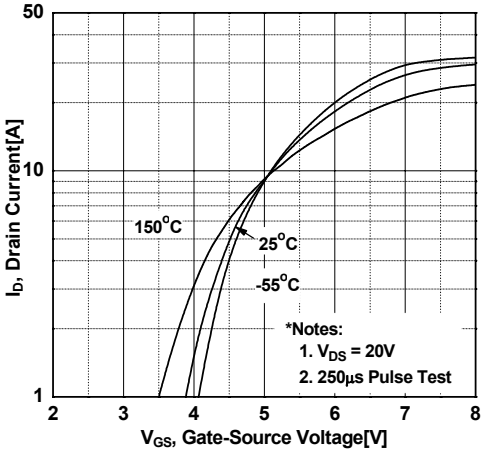


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

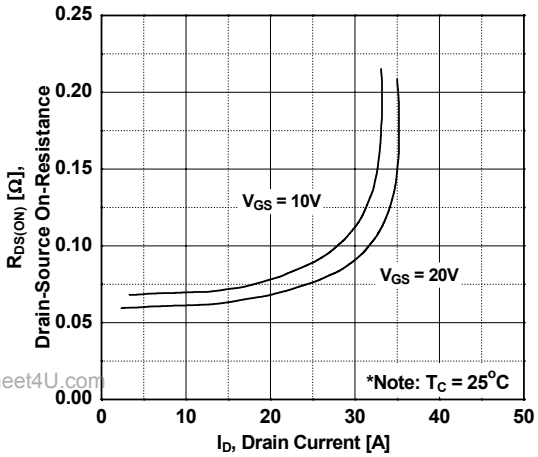


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

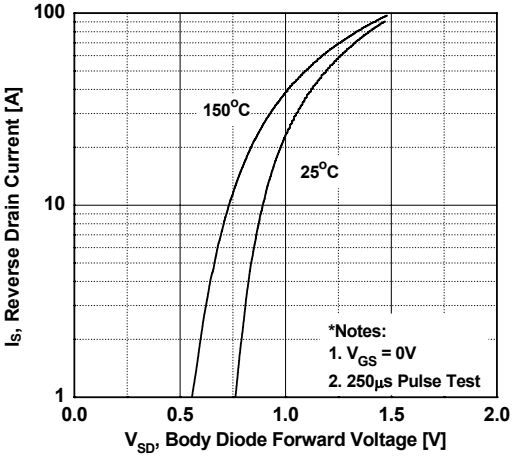


Figure 5. Capacitance Characteristics

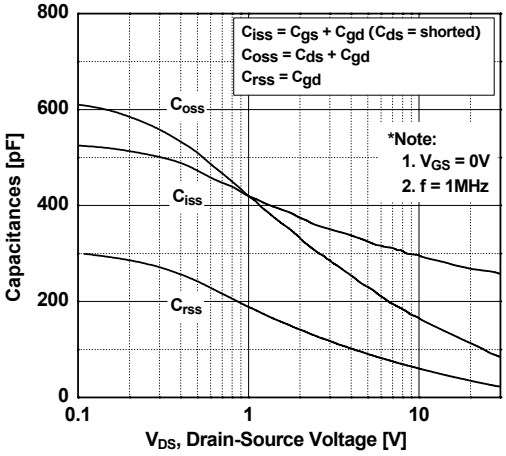
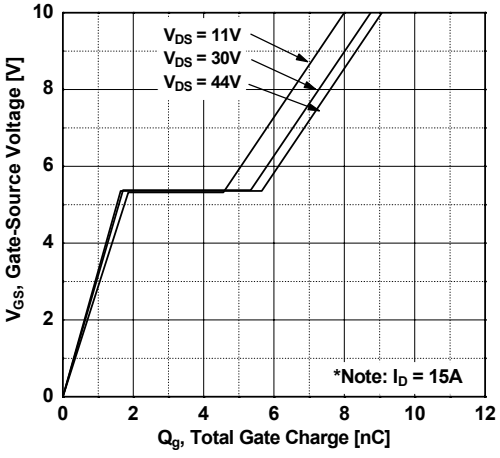


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

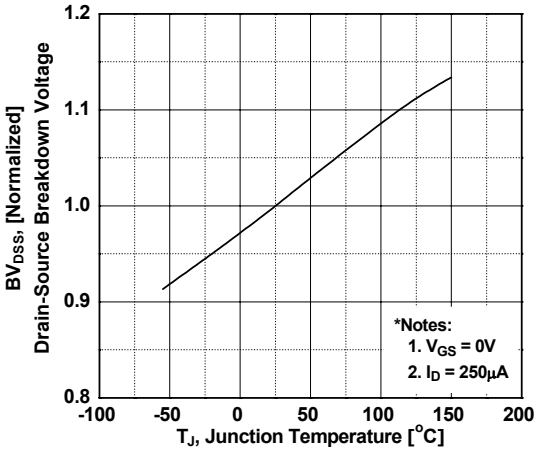


Figure 8. On-Resistance Variation vs. Temperature

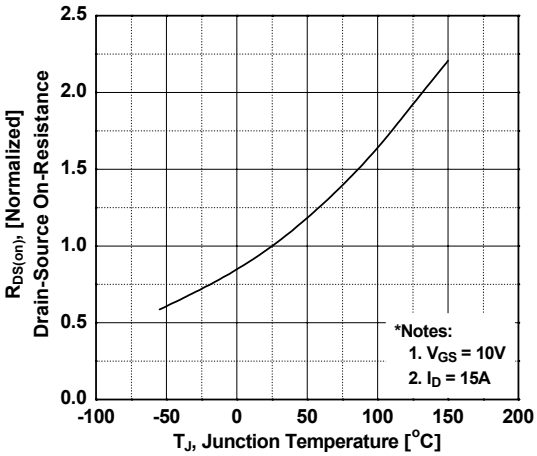


Figure 9. Maximum Safe Operating Area

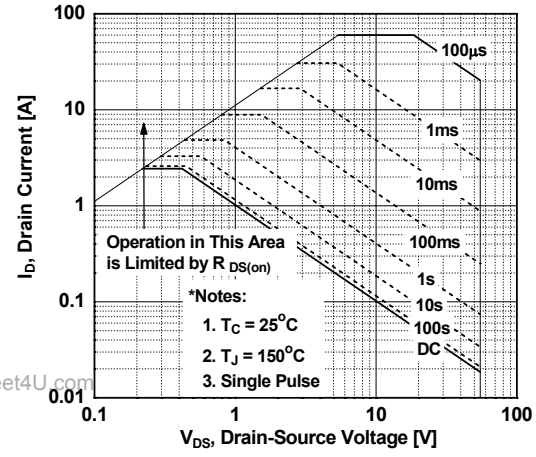


Figure 10. Maximum Drain Current vs. Case Temperature

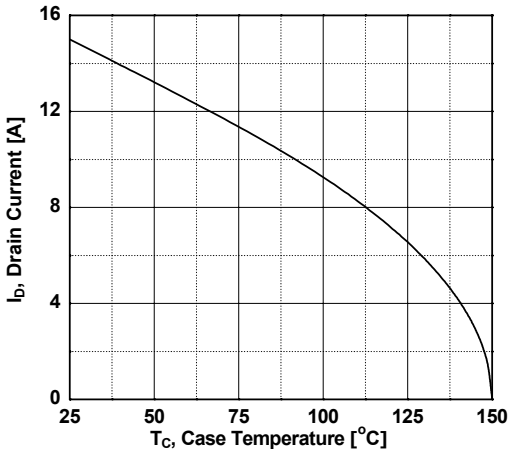
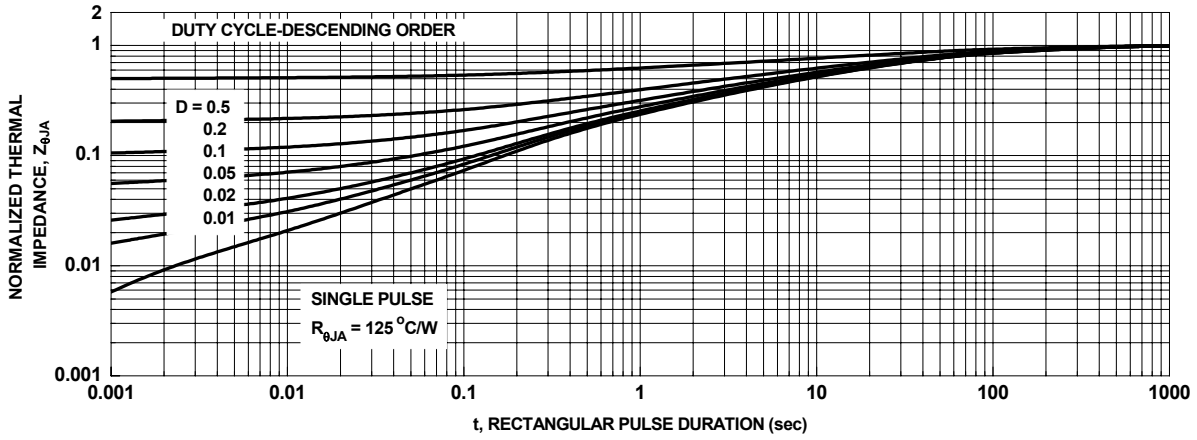
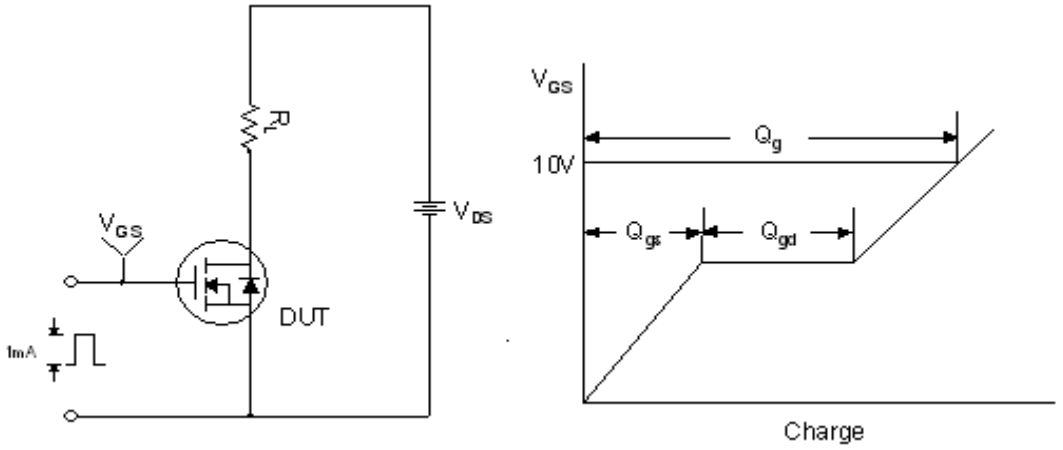


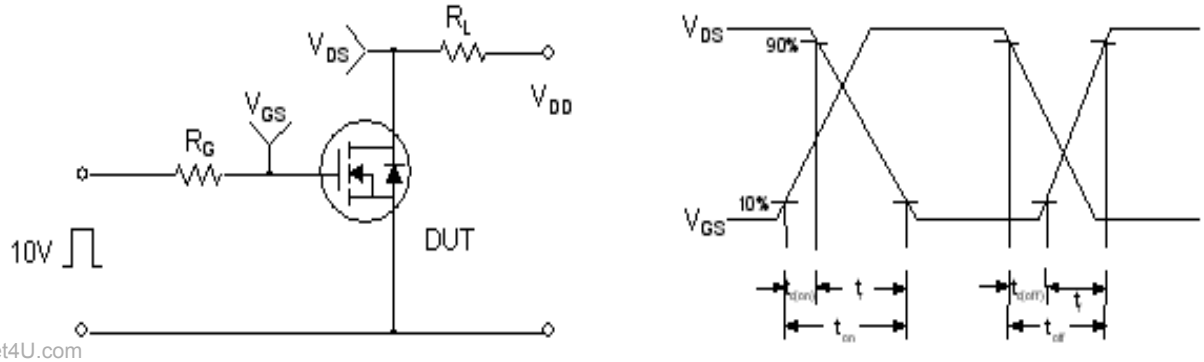
Figure 11. Transient Thermal Response Curve



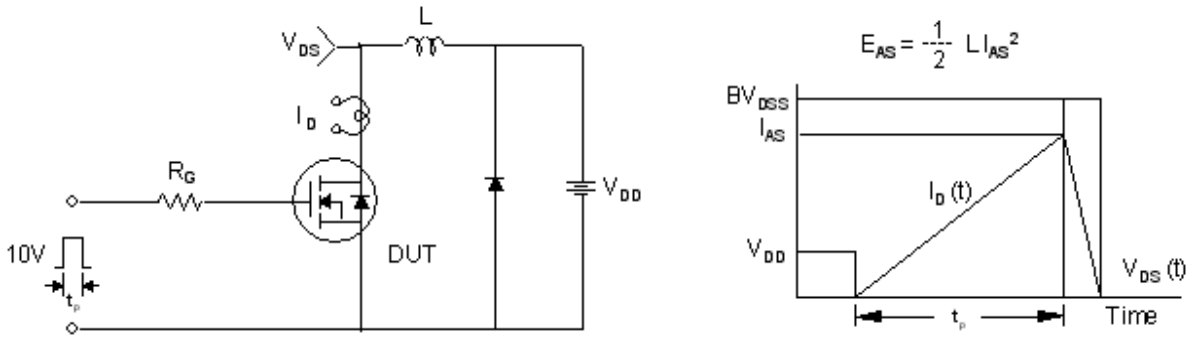
Gate Charge Test Circuit & Waveform



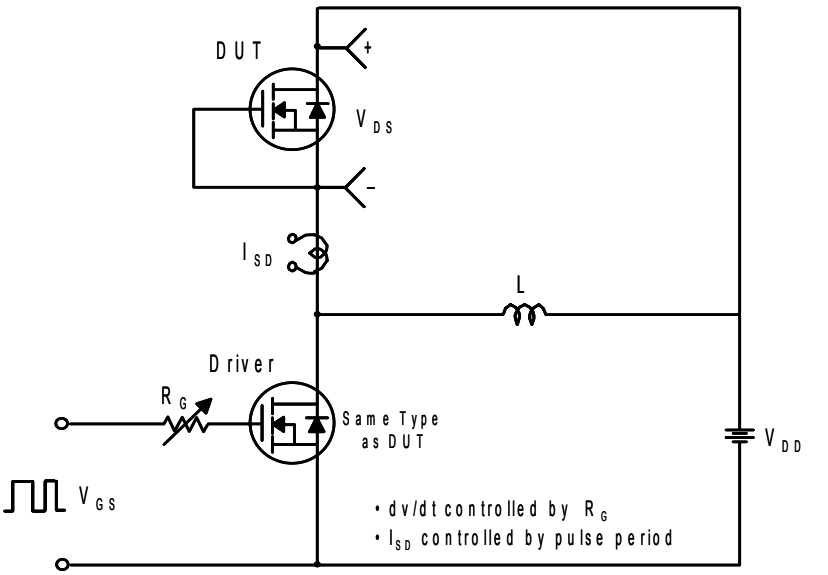
Resistive Switching Test Circuit & Waveforms

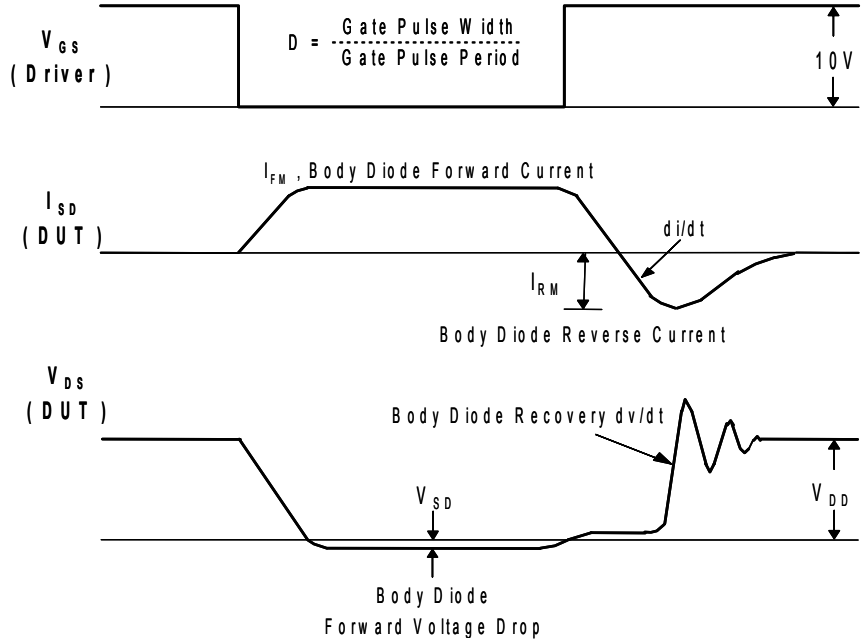


Unclamped Inductive Switching Test Circuit & Waveforms

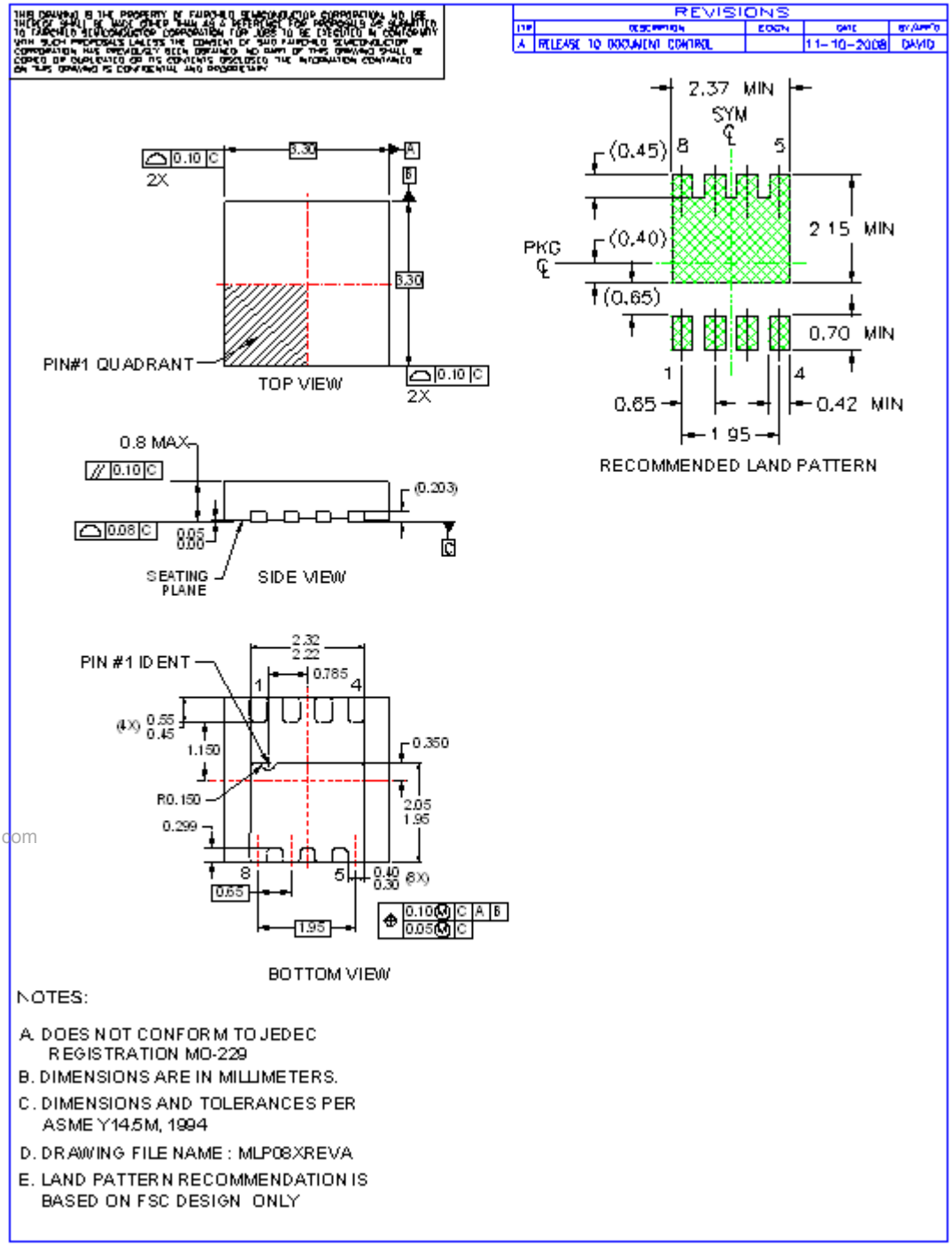


Peak Diode Recovery dv/dt Test Circuit & Waveforms





Dimensional Outline and Pad Layout



NOTES:

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B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

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