FAIRCHILD SEMICONDUCTOR®

November 2012

FDMC15N06

N-Channel MOSFET

55V, 15A, 0.090Ω

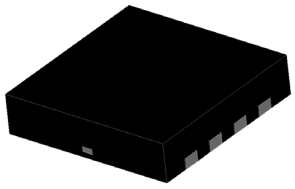
Features

- $R_{DS(on)}$ = 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



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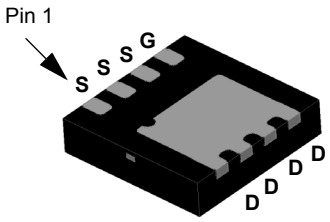

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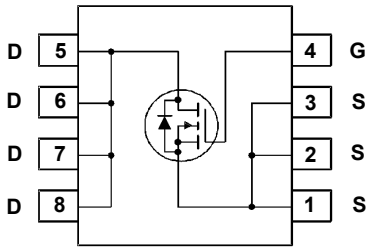


MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter			FDMC15N06	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		FDMC15N06	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max		3.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max	(Note 1a)	53	

Package Marking and Ordering Information

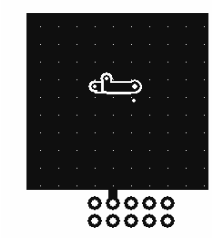
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC15N06	FDMC15N06	Power 33	13"	12mm	3000 units

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

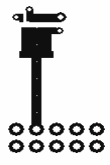
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu A$, $V_{GS} = 0V$, $T_C = 25^oC$	55	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu A$, Referenced to 25^oC	-	70	-	$V/^oC$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 50V$, $V_{GS} = 0V$	-	-	1	μA
		$V_{DS} = 45V$, $T_C = 150^oC$	-	-	250	
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20V$, $V_{DS} = 0V$	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu A$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10V$, $I_D = 15A$	-	0.075	0.090	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	$V_{DD} = 30V$, $I_D = 15A$, $R_G = 25\Omega$ (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	$V_{GS} = 0V$, $I_{SD} = 15A$, $dI_F/dt = 100A/\mu s$ (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, $I_{AS} = 8.5A$, $R_G = 25\Omega$, Starting $T_J = 25°C$

4: Essentially Independent of Operating Temperature Typical Characteristics

5: $I_{SD} \le 15A$, $di/dt \le 200A/\mu s$, $V_{DD} \le 40V$, Starting $T_J = 25°C$

Typical Performance Characteristics

Figure 1. On-Region Characteristics

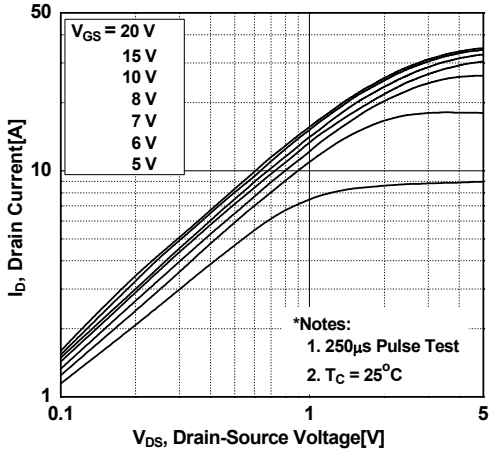


Figure 2. Transfer Characteristics

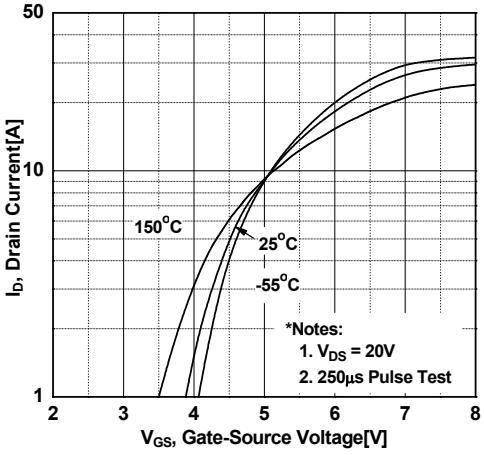


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

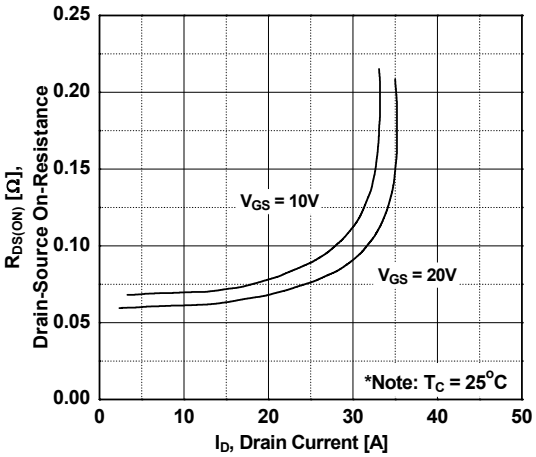


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

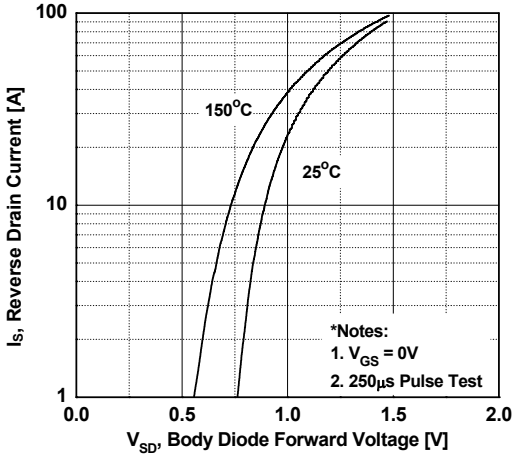


Figure 5. Capacitance Characteristics

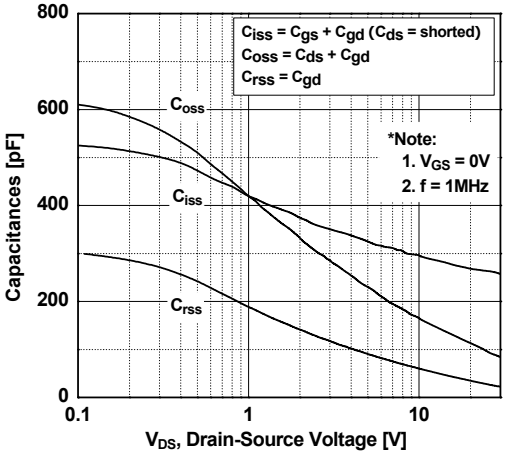
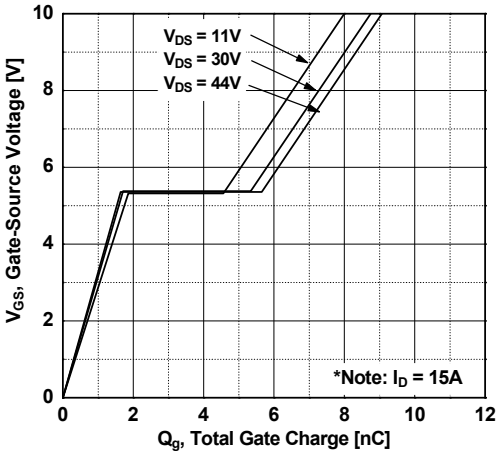


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

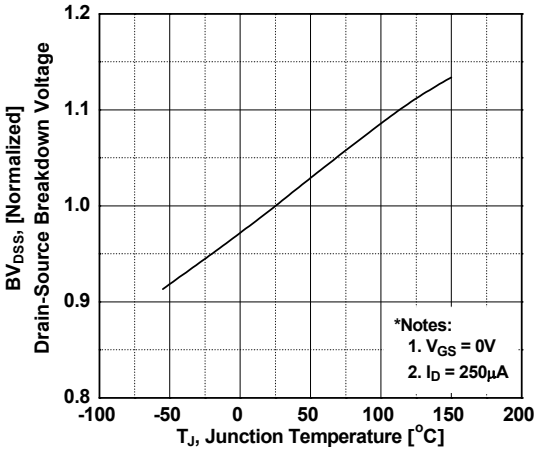


Figure 8. On-Resistance Variation vs. Temperature

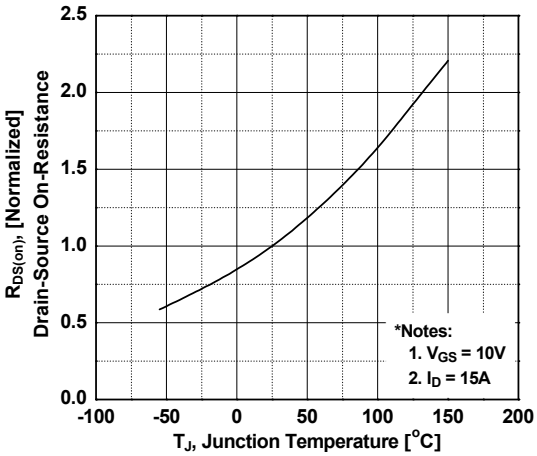


Figure 9. Maximum Safe Operating Area

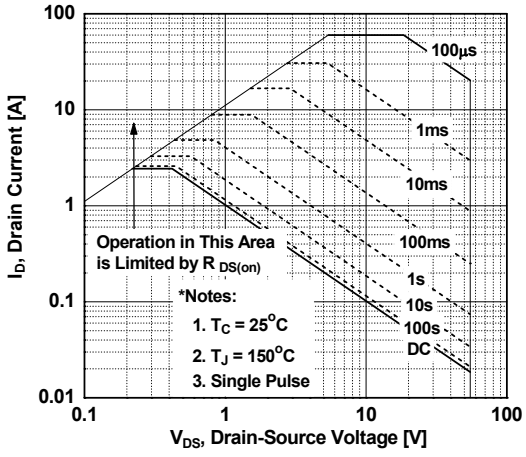


Figure 10. Maximum Drain Current vs. Case Temperature

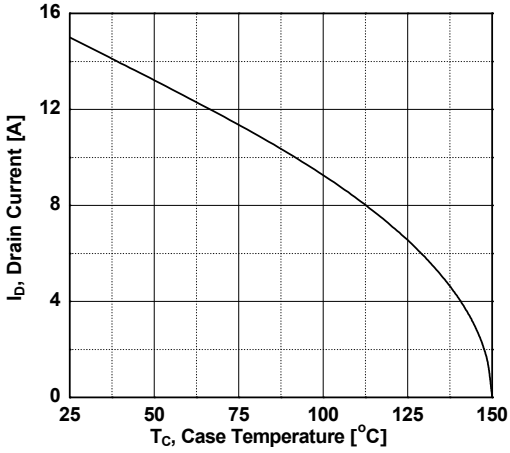
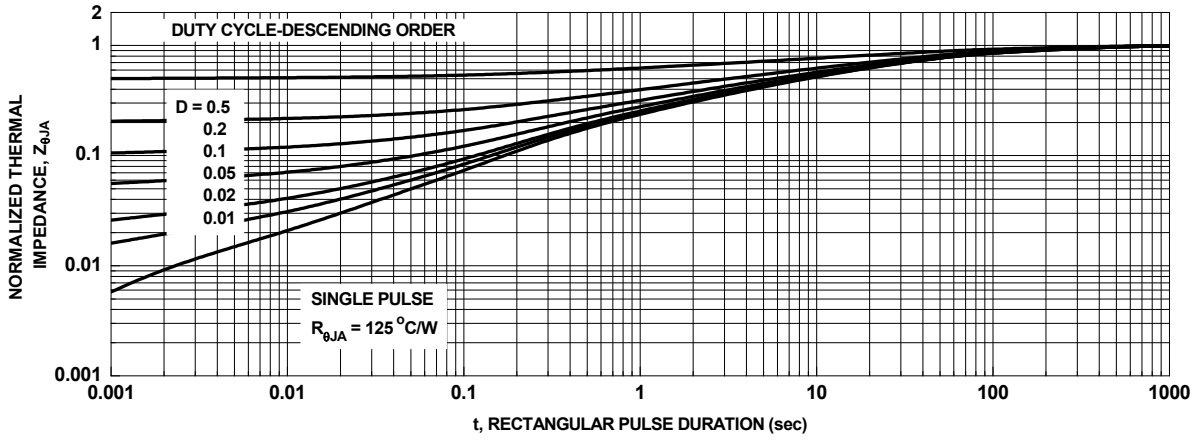
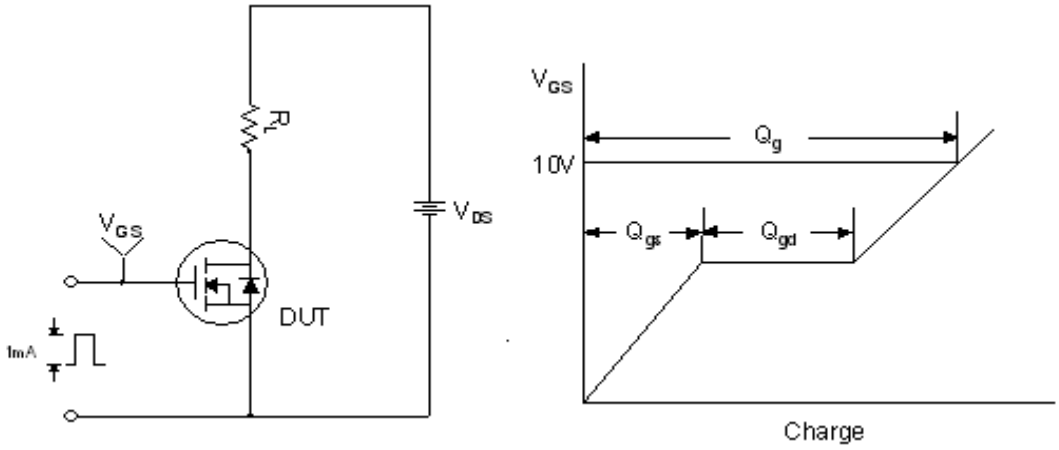


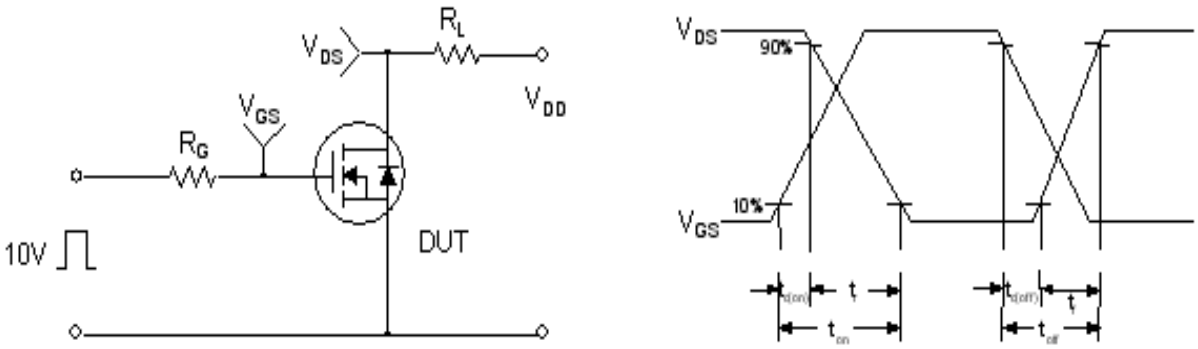
Figure 11. Transient Thermal Response Curve



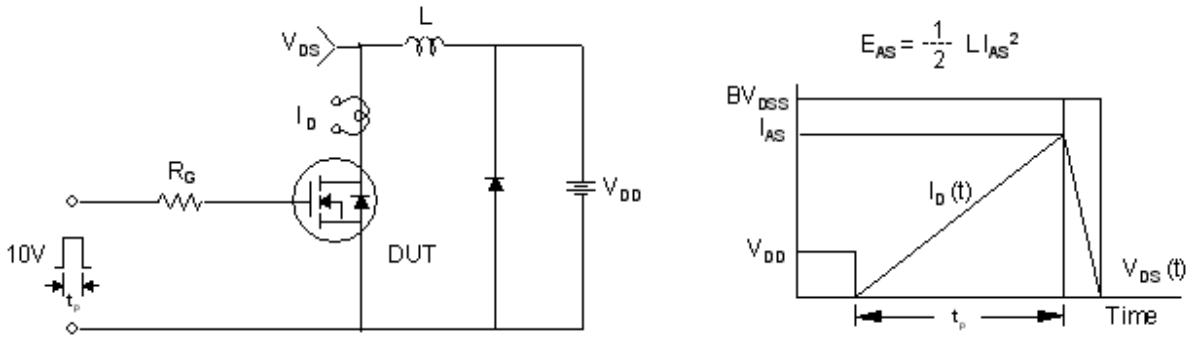
Gate Charge Test Circuit & Waveform



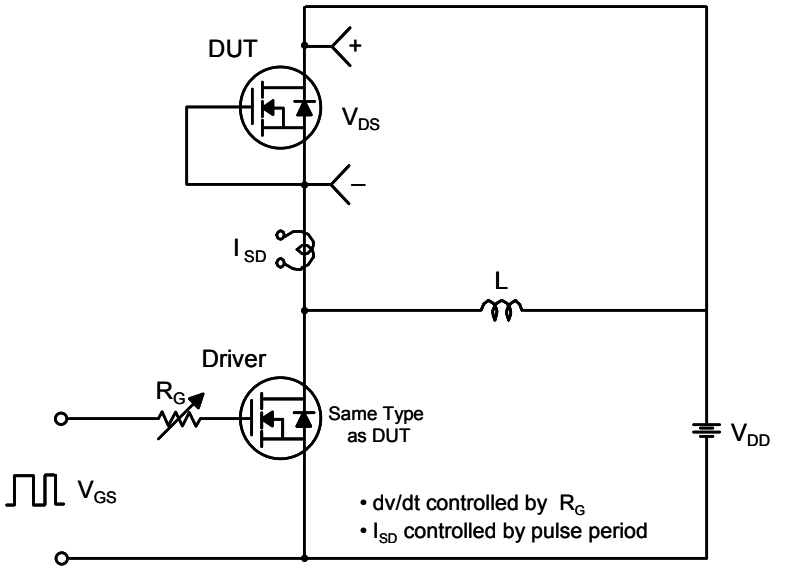
Resistive Switching Test Circuit & Waveforms

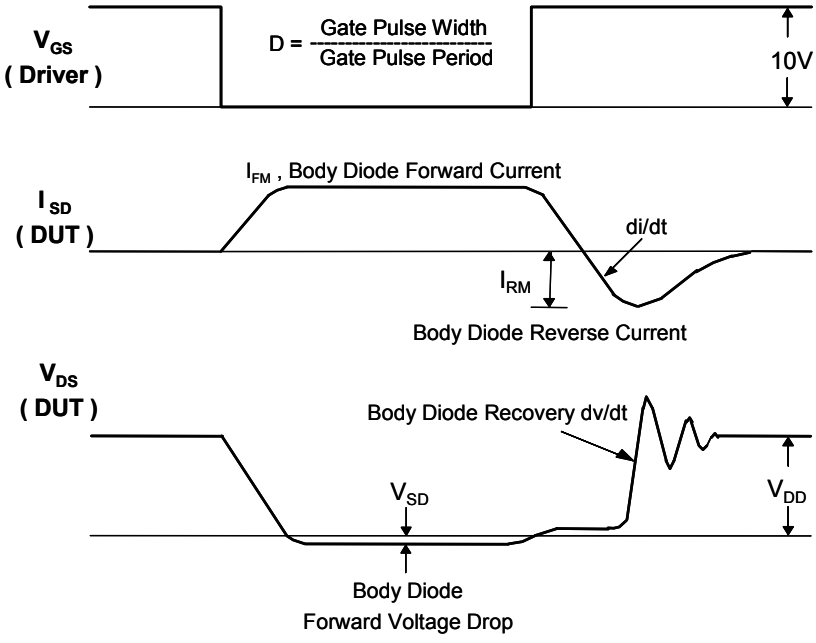


Unclamped Inductive Switching Test Circuit & Waveforms

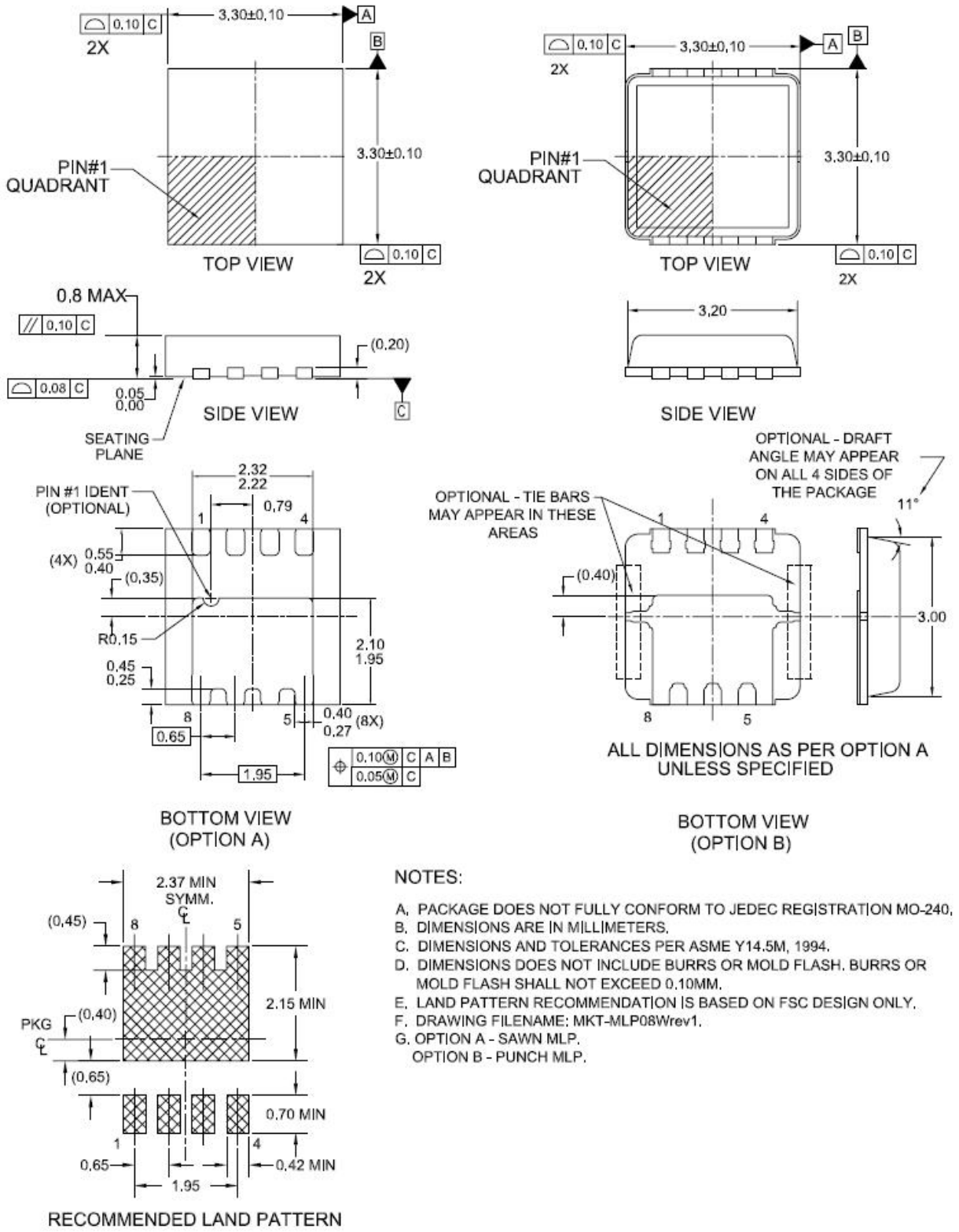


Peak Diode Recovery dv/dt Test Circuit & Waveforms





Dimensional Outline and Pad Layout



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C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
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E. LAND PATTERN RECOMMENDATION IS BASED ON FSC DESIGN ONLY.
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