FAIRCHILD
SEMICONDUCTOR®

November 2013

FDMS030N06B

N-Channel PowerTrench® MOSFET

60 V, 100 A, 3 mΩ

Features

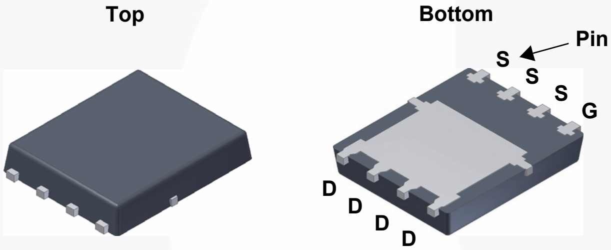
- $R_{DS(on)}$ = 2.4 mΩ (Typ.) @ V_{GS} = 10 V, I_D = 50 A
- Advanced Package and Silicon Combination for Low $R_{DS(on)}$ and High Efficiency
- Fast Switching Speed
- 100% UIL Tested
- RoHS Compliant

Description

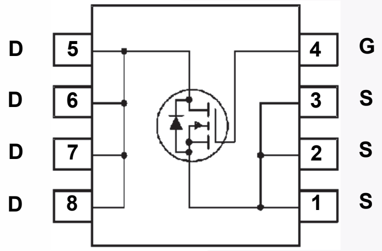
This N-Channel MOSFET is produced using Fairchild Semiconductor's advance PowerTrench® process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor drives and Uninterruptible Power Supplies
- Renewable system



Power 56



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

Symbol	Parameter		FDMS030N06B	Unit
V_{DSS}	Drain to Source Voltage		60	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	- Continuous (T_C = 25°C) (Note1)	100	A
		- Continuous (T_A = 25°C) (Note 2a)	22.1	
I_{DM}	Drain Current	- Pulsed (Note 3)	400	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 4)	248	mJ
P_D	Power Dissipation	(T_C = 25°C)	104	W
		(T_A = 25°C) (Note 2a)	2.5	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	FDMS030N06B	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max. (Note 2a)	50	

Package Marking and Ordering Information

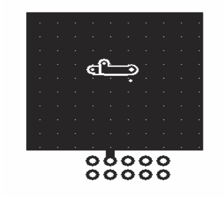
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS030N06B	FDMS030N06B	Power 56	13 ”	12 mm	3000 units

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

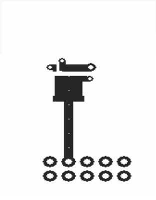
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0V	60	-	-	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	-	0.03	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 48 V, V_{GS} = 0 V	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	2.5	3.3	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 50 A	-	2.4	3.0	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 50 A	-	119	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 30 V, V_{GS} = 0 V f = 1 MHz	-	5685	7560	pF
C_{oss}	Output Capacitance		-	1720	2290	pF
C_{rss}	Reverse Transfer Capacitance		-	59	-	pF
C_{oss}(er)	Engry Releted Output Capacitance	V_{DS} = 30 V, V_{GS} = 0 V	-	2504	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 30 V, I_D = 50 A V_{GS} = 0 V to 10 V (Note 5)	-	75	-	nC
Q_{gs}	Gate to Source Gate Charge		-	30	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	14	-	nC
$V_{plateau}$	Gate Plateau Volatge		-	5.4	-	V
Q_{sync}	Total Gate Charge Sync.	V_{DS} = 0 V, I_D = 50 A	-	66.2	-	nC
Q_{oss}	Output Charge	V_{DS} = 30 V, V_{GS} = 0 V	-	174	-	nC
ESR	Equivalent Series Resistance	f = 1 MHz	-	1.05	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30 V, I_D = 50 A V_{GS} = 10 V, R_G = 4.7 Ω (Note 5)	-	39	88	ns
t_r	Turn-On Rise Time		-	20	50	ns
$t_{d(off)}$	Turn-Off Delay Time		-	52	114	ns
t_f	Turn-Off Fall Time		-	16	42	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	100	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	400	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 50 A	-	-	1.25	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_{SD} = 50 A dI_F/dt = 100 A/μs	-	71	-	ns
Q_{rr}	Reverse Recovery Charge		-	85	-	nC

Notes:

1. Silicon limited I_D rating = 147 A.
2. $R_{\theta JA}$ is determined with the device mounted on a 1in^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. 50 °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.

3. Repetitive rating: pulse-width limited by maximum junction temperature.
4. L = 0.3 mH, I_{AS} = 40.7 A, V_{DD} = 50 V, V_{GS} = 10 V, starting T_J = 25°C.
5. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

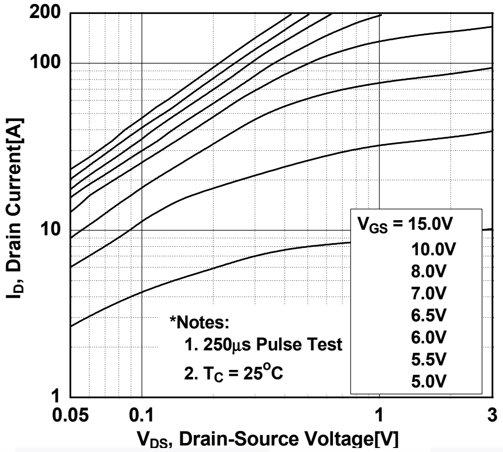


Figure 2. Transfer Characteristics

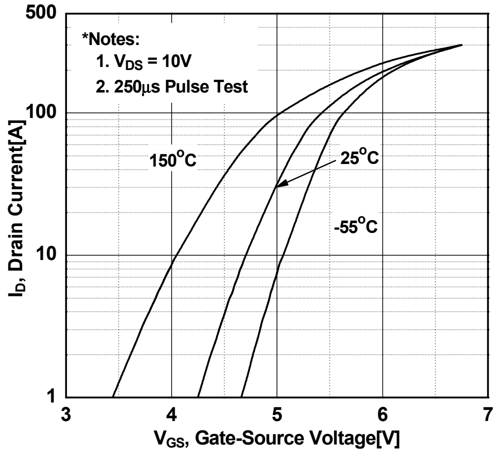


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

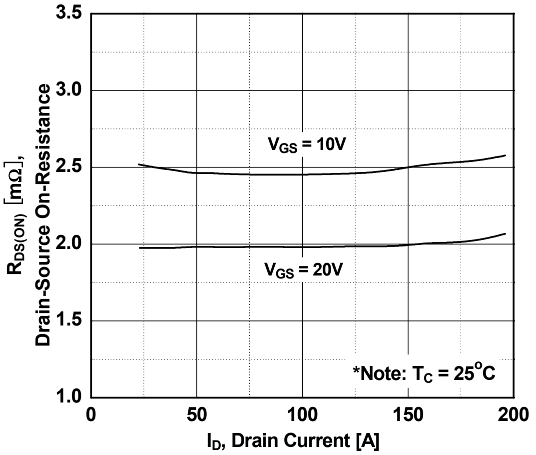


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

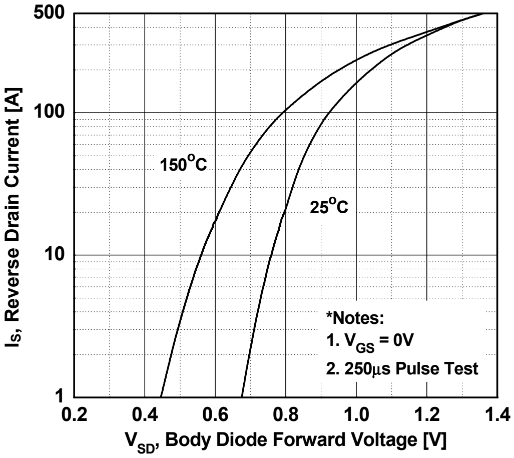


Figure 5. Capacitance Characteristics

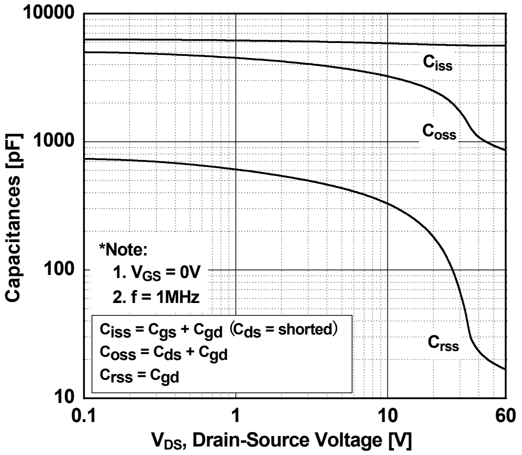
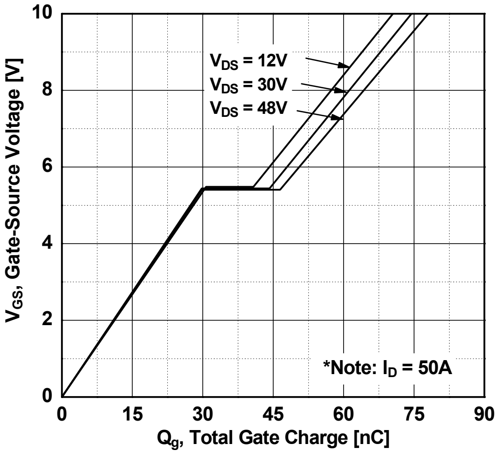


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

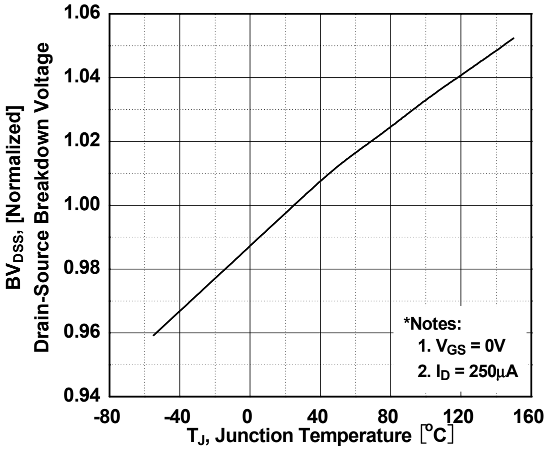


Figure 8. On-Resistance Variation vs. Temperature

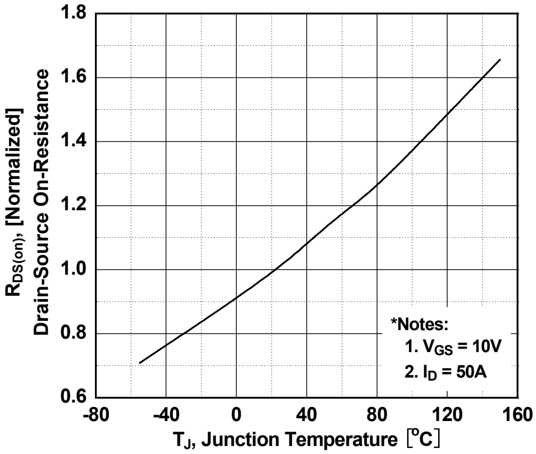


Figure 9. Maximum Safe Operating Area

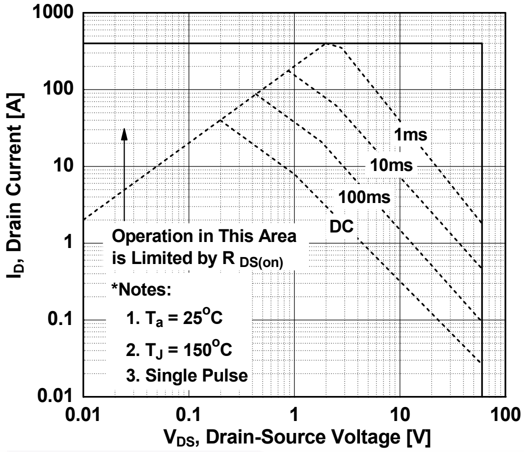


Figure 10. Maximum Drain Current vs. Case Temperature

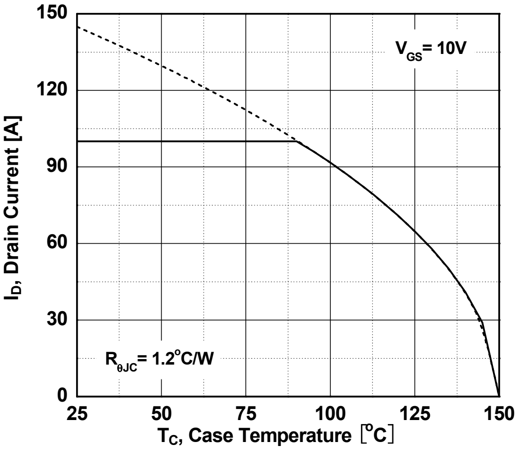


Figure 11. Eoss vs. Drain to Source Voltage

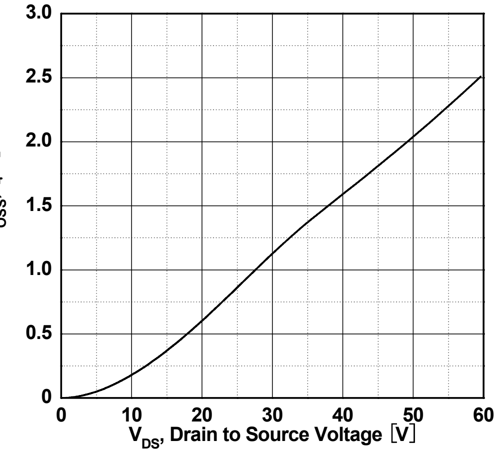
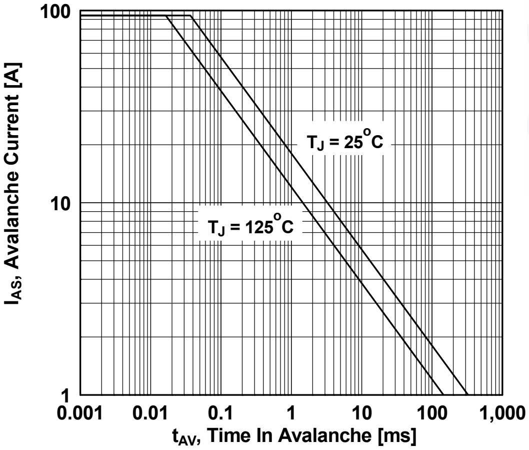
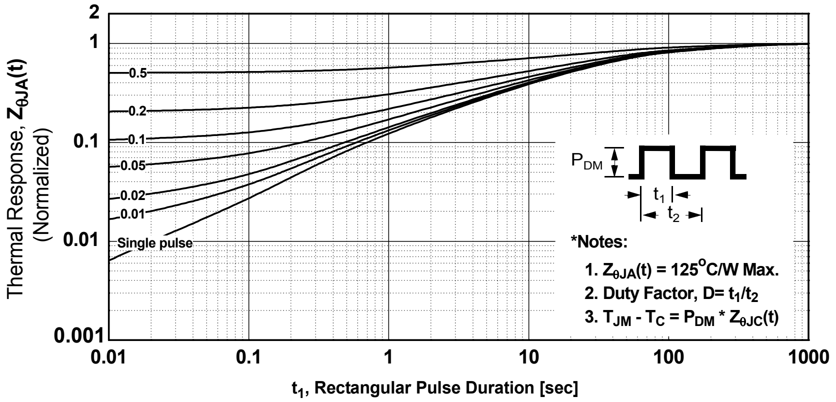


Figure 12. Unclamped Inductive Switching Capability



Typical Performance Characteristics (Continued)

Figure 13. Transient Thermal Response Curve



***Notes:**

1. $Z_{\theta JA}(t) = 125^{o}C/W$ Max.
2. Duty Factor, $D = t_1/t_2$
3. $T_{JM} - T_C = P_{DM} * Z_{\theta JC}(t)$

Figure 14. Gate Charge Test Circuit & Waveform

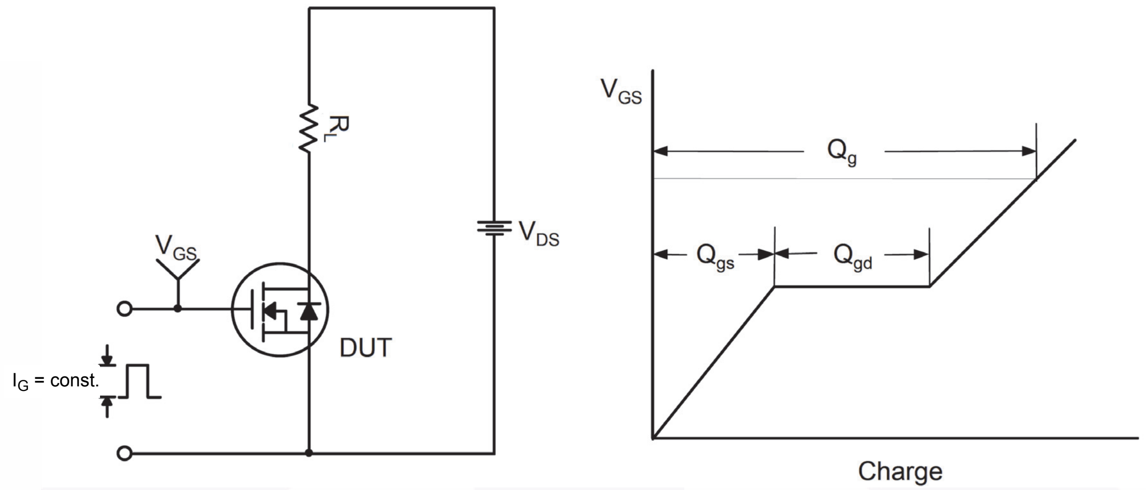


Figure 15. Resistive Switching Test Circuit & Waveforms

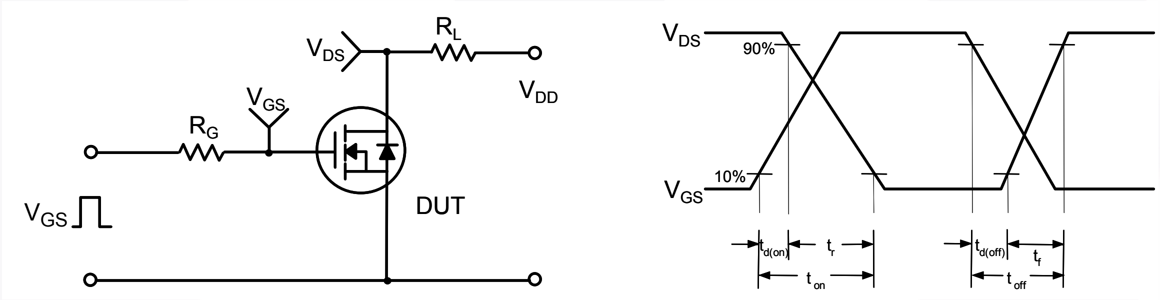


Figure 16. Unclamped Inductive Switching Test Circuit & Waveforms

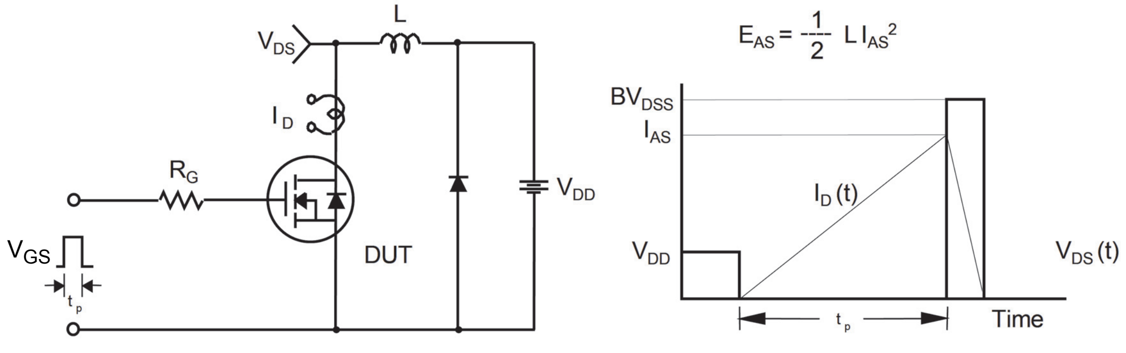


Figure 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms

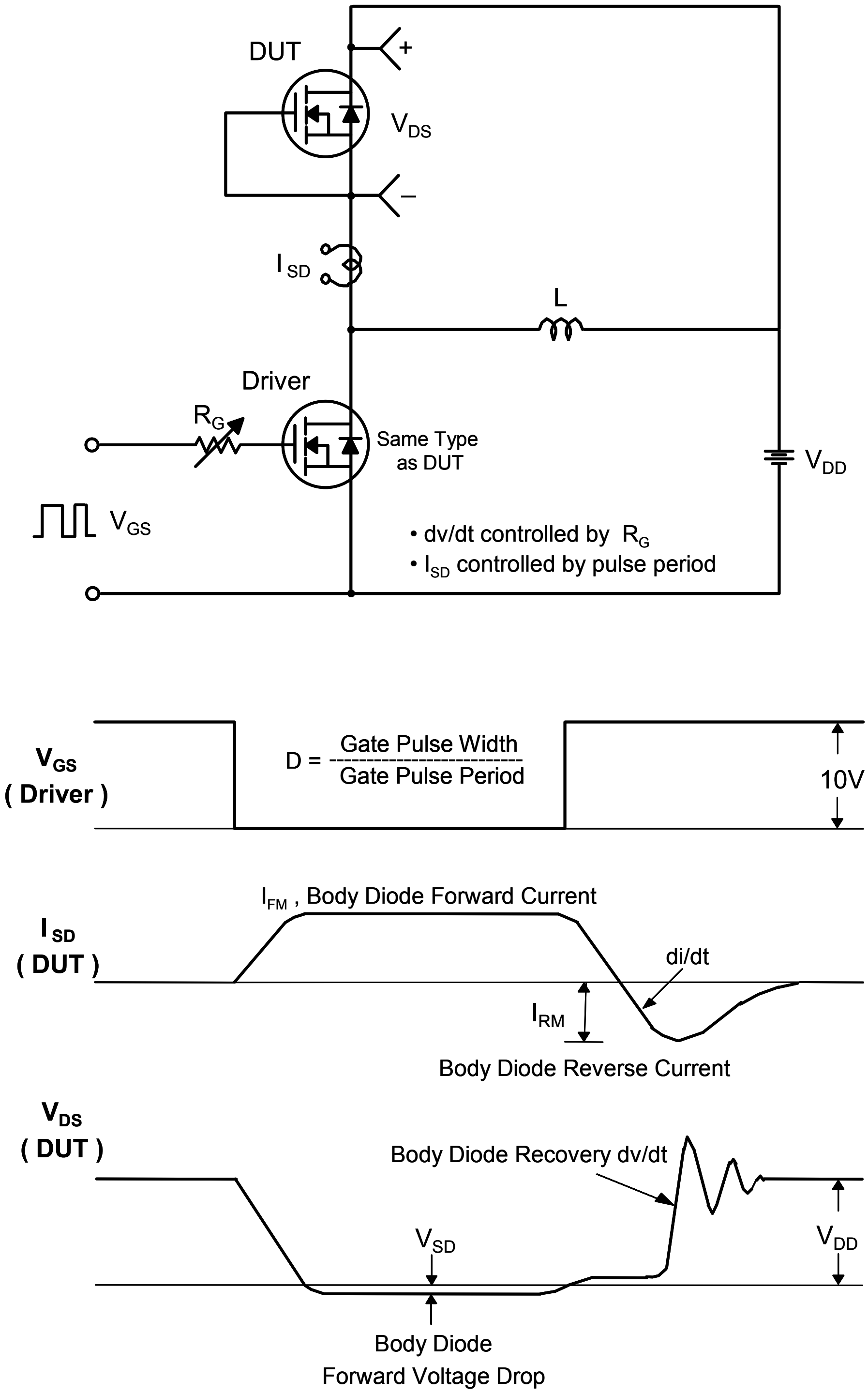
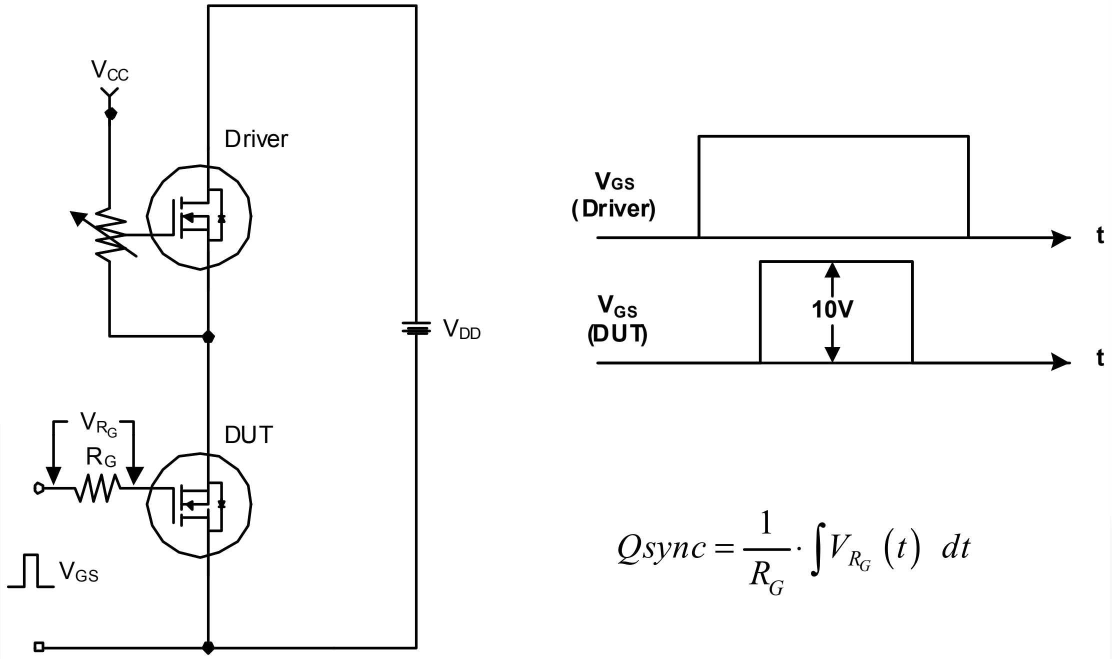
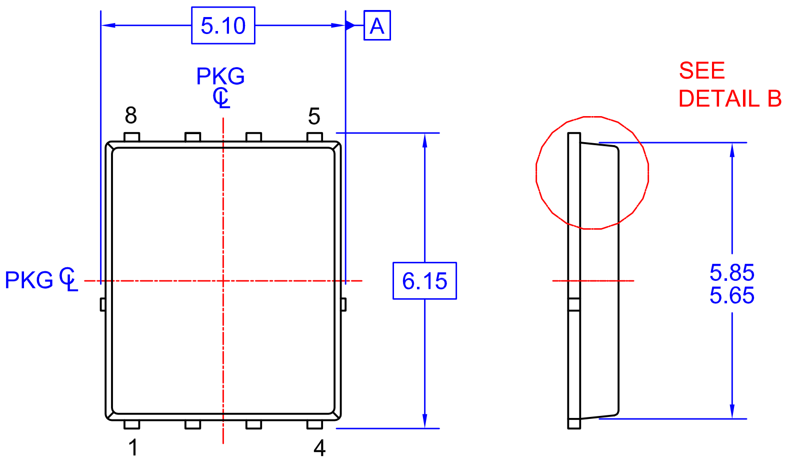


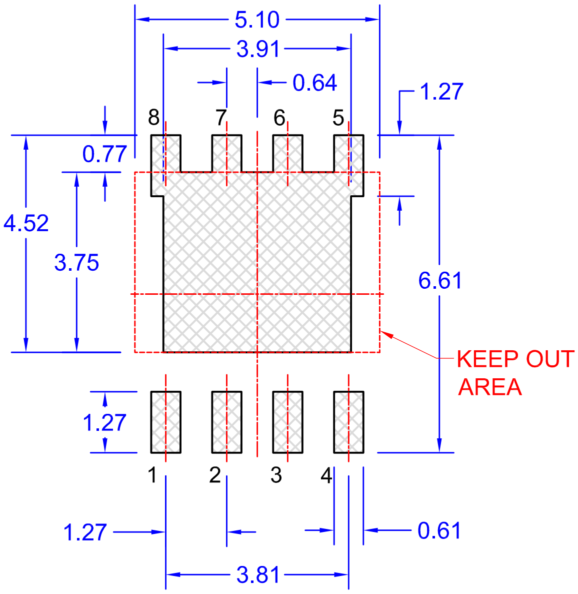
Figure 18. Total Gate Charge Qsync. Test Circuit & Waveforms



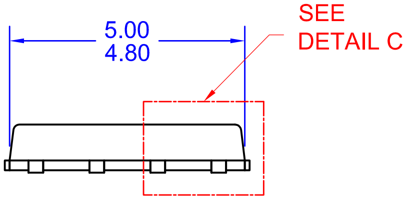
$$Qsync = \frac{1}{R_G} \cdot \int V_{R_G}\left(t\right)\ dt$$



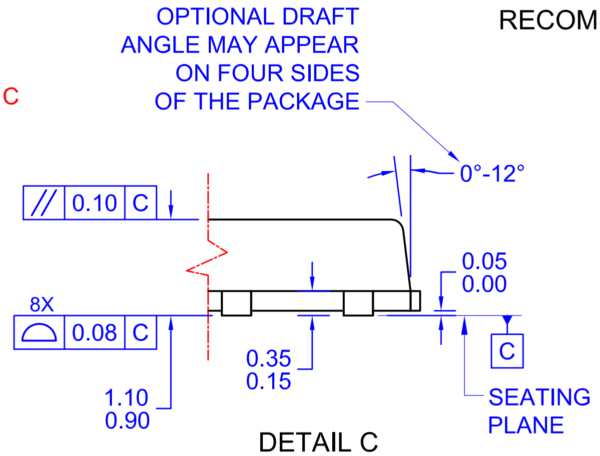
TOP VIEW



LAND PATTERN RECOMMENDATION

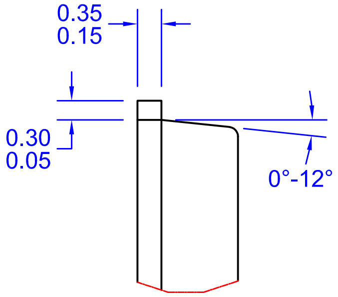


SIDE VIEW



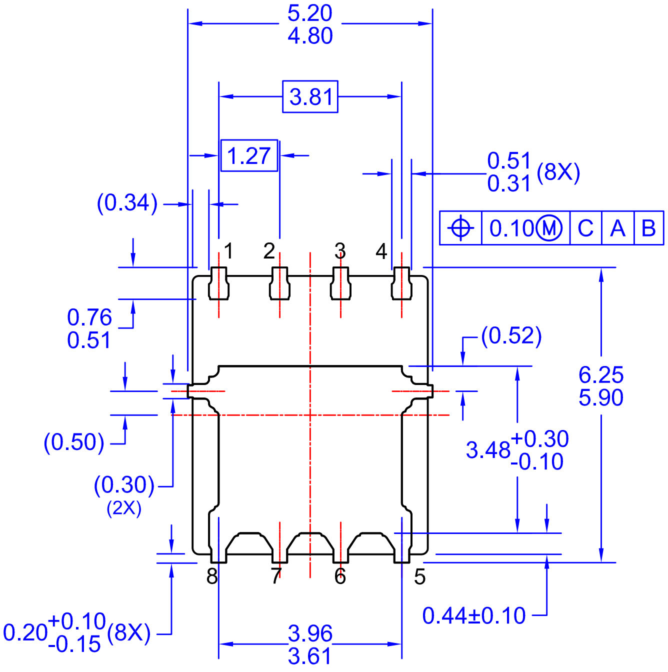
DETAIL C

SCALE: 2:1



DETAIL B

SCALE: 2:1



BOTTOM VIEW

NOTES: UNLESS OTHERWISE SPECIFIED

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D. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.

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