

MOSFET – N-Channel, POWERTRENCH®

60 V, 100 A, 3 Ω

FDMS030N06B

Description

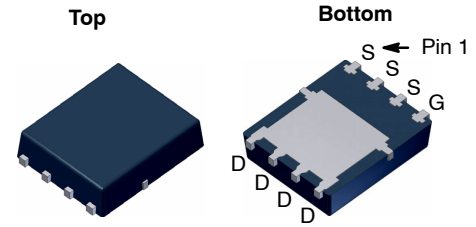
This N-Channel MOSFET is produced using onsemi's advance POWERTRENCH process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Features

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

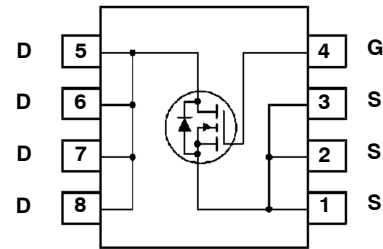
Applications

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

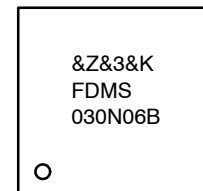


PQFN8 5 × 6, 1.27P
 (Power 56)
 CASE 483AE

PIN CONNECTIONS



MARKING DIAGRAM



- &Z = Assembly Plant Code
- &3 = 3-Digit Date Code
- &K = 2-Digit Lot Run Traceability Code
- FDMS030N06B = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping†
FDMS030N06B	PQFN8 (Pb-Free, Halide Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, [BRD8011/D](#).

FDMS030N06B

MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ 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 (Note 1)	$T_C = 25^\circ\text{C}$	100	A
		Continuous (Note 2a)	$T_A = 25^\circ\text{C}$	22.1	
I_{DM}	Drain Current	Pulsed (Note 3)		400	
E_{AS}	Single Pulse Avalanche Energy (Note 4)			248	mJ
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$		104	W
		$T_A = 25^\circ\text{C}$ (Note 2a)		2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
--------	-----------	----------------	-----	-----	-----	------

OFF CHARACTERISTICS

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	60	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C	-	0.03	-	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 48 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$	-	-	± 100	nA

ON CHARACTERISTICS

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	2.5	3.3	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 50 \text{ A}$	-	2.4	3.0	$\text{m}\Omega$
gFS	Forward Transconductance	$V_{DS} = 10 \text{ V}, I_D = 50 \text{ A}$	-	119	-	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	-	5685	7560	pF
C_{oss}	Output Capacitance		-	1720	2290	pF
C_{rss}	Reverse Transfer Capacitance		-	59	-	pF
$C_{oss(er)}$	Energy Related Output Capacitance	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$	-	2504	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	$V_{DS} = 30 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 0 \text{ V to } 10 \text{ V}$ (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 Voltage		-	5.4	-	V
Q_{sync}	Total Gate Charge Sync	$V_{DS} = 0 \text{ V}, I_D = 50 \text{ A}$	-	66.2	-	nC
Q_{oss}	Output Charge	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$	-	174	-	nC
ESR	Equivalent Series Resistance	$f = 1 \text{ MHz}$	-	1.05	-	Ω

FDMS030N06B

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted) (continued)

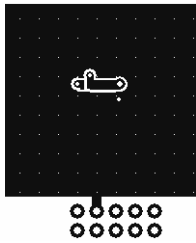
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{ V}$, $I_D = 50\text{ A}$, $V_{GS} = 10\text{ V}$, $R_{GEN} = 4.7\ \Omega$ (Note 5)	-	39	88	ns
t_r	Turn-On Rise Time		-	20	50	ns
$t_{d(off)}$	Turn-Off Delay Time		-	52	114	ns
t_f	Turn-Off Fall Time		-	16	42	ns

DRAIN-SOURCE DIODE CHARACTERISTICS

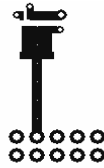
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	100	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	400	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_{SD} = 50\text{ A}$	-	-	1.25	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}$, $I_{SD} = 50\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$	-	71	-	ns
Q_{rr}	Reverse Recovery Charge		-	85	-	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

- Silicon limited I_D rating = 147 A.
- $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 × 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) $50^\circ\text{C}/\text{W}$ when mounted on a 1 in² pad of 2 oz copper.



- b) $125^\circ\text{C}/\text{W}$ when mounted on a minimum pad of 2 oz copper.

- Repetitive rating: pulse-width limited by maximum junction temperature.
- $L = 0.3\text{ mH}$, $I_{AS} = 40\text{ A}$, $V_{DD} = 50\text{ V}$, $V_{GS} = 10\text{ V}$, starting $T_J = 25^\circ\text{C}$.
- Essentially independent of operating temperature typical characteristics.

TYPICAL PERFORMANCE CHARACTERISTICS

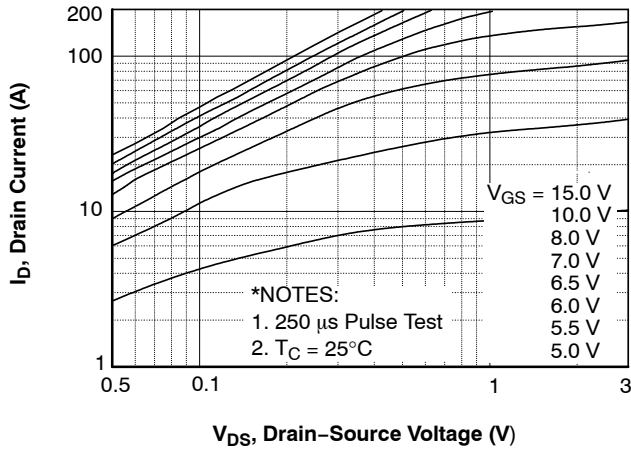


Figure 1. On-Region Characteristics

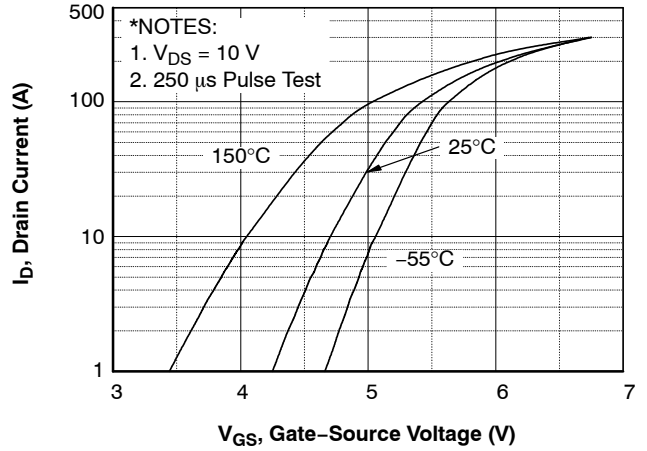


Figure 2. Transfer Characteristics

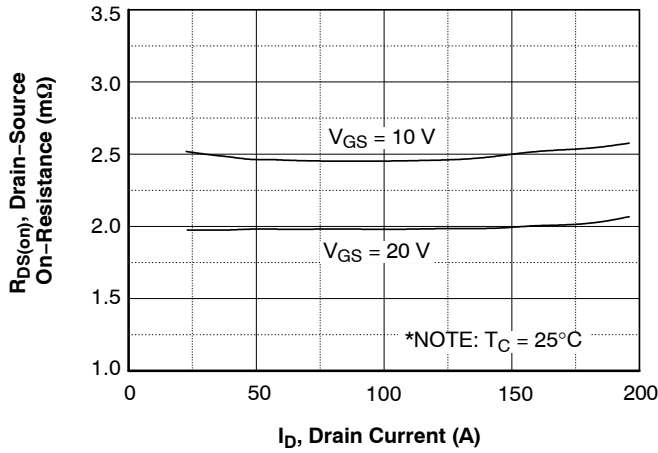


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

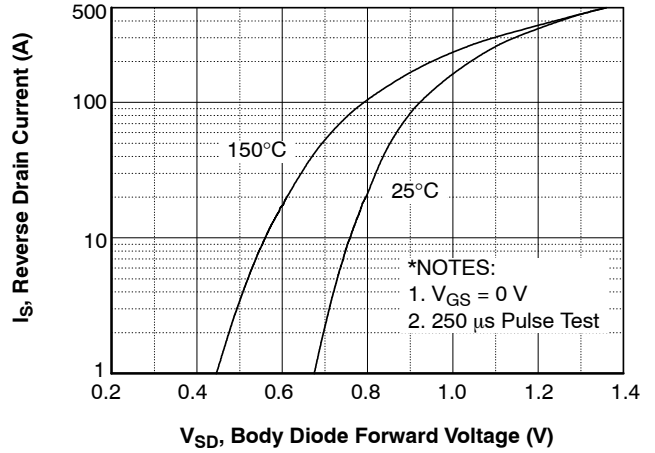


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

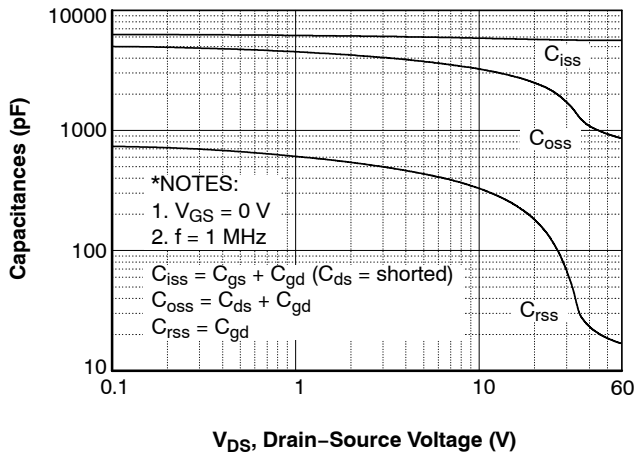


Figure 5. Capacitance Characteristics

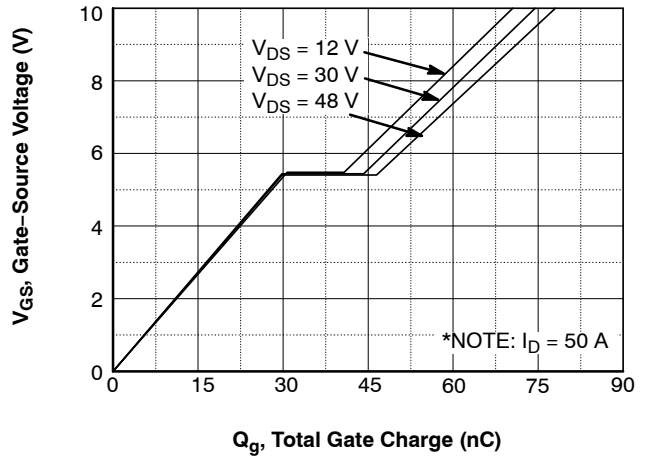


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

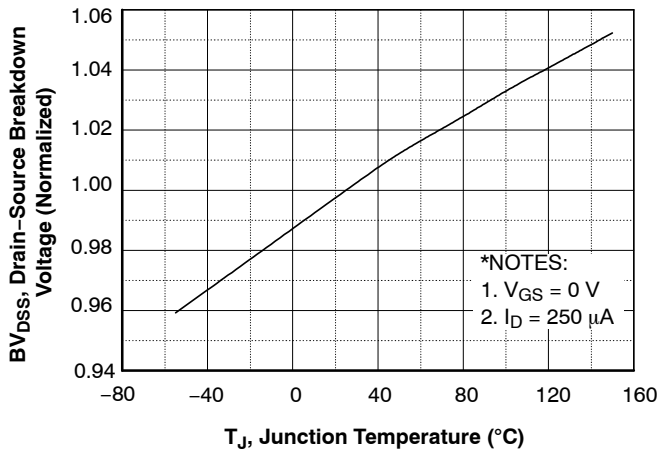


Figure 7. Breakdown Voltage Variation vs. Temperature

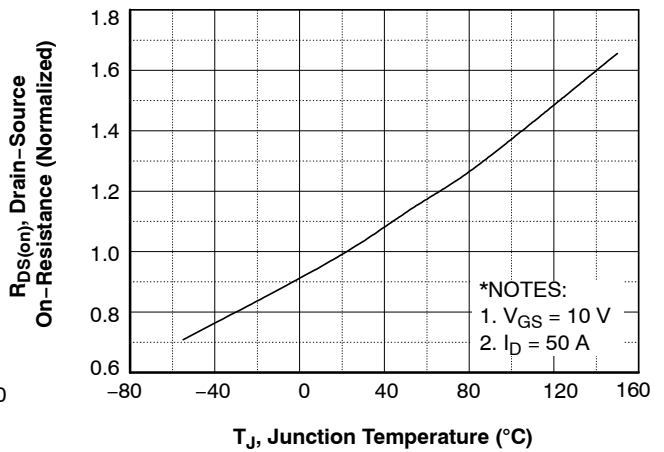


Figure 8. On-Resistance Variation vs. Temperature

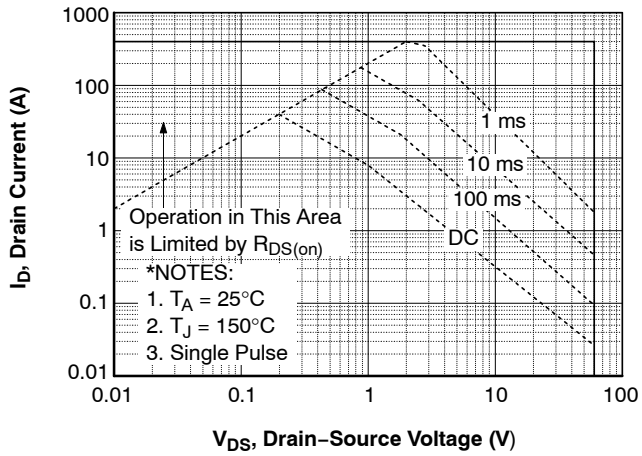


Figure 9. Maximum Safe Operating Area

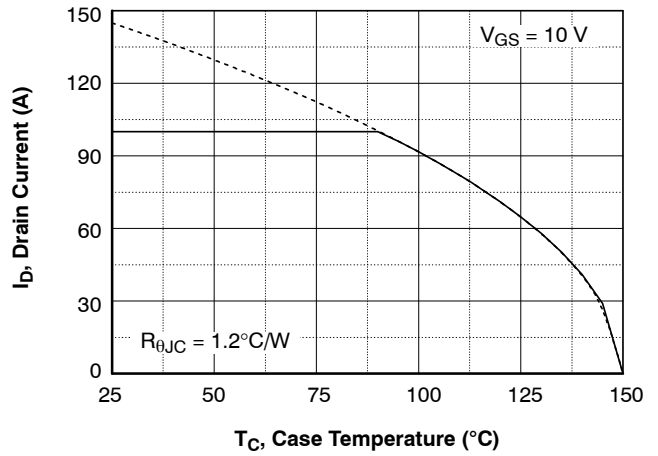


Figure 10. Maximum Drain Current vs. Case Temperature

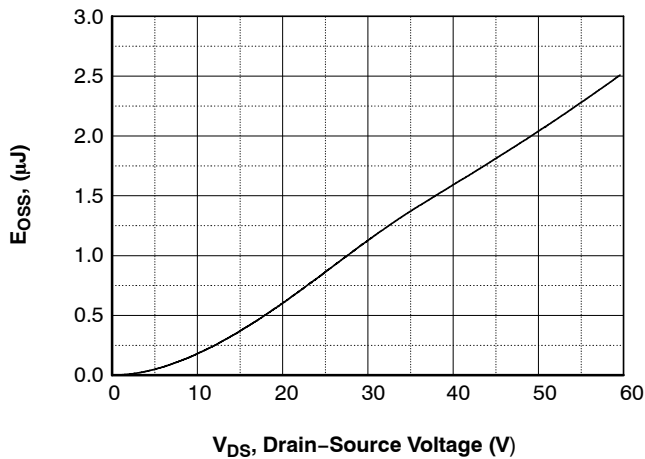


Figure 11. E_{oss} vs. Drain to Source Voltage

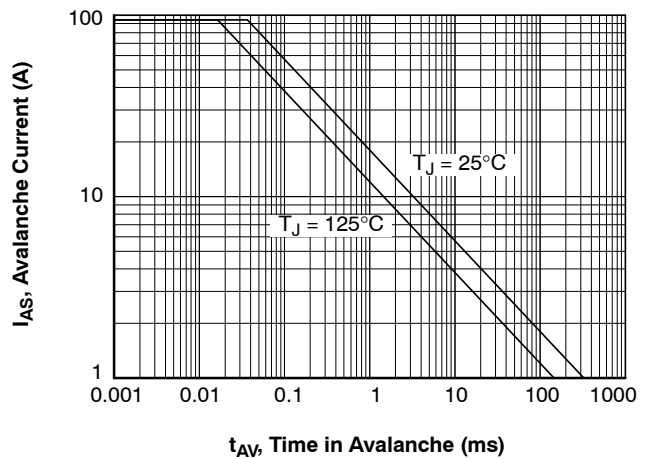


Figure 12. Unclamped Inductive Switching Capability

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

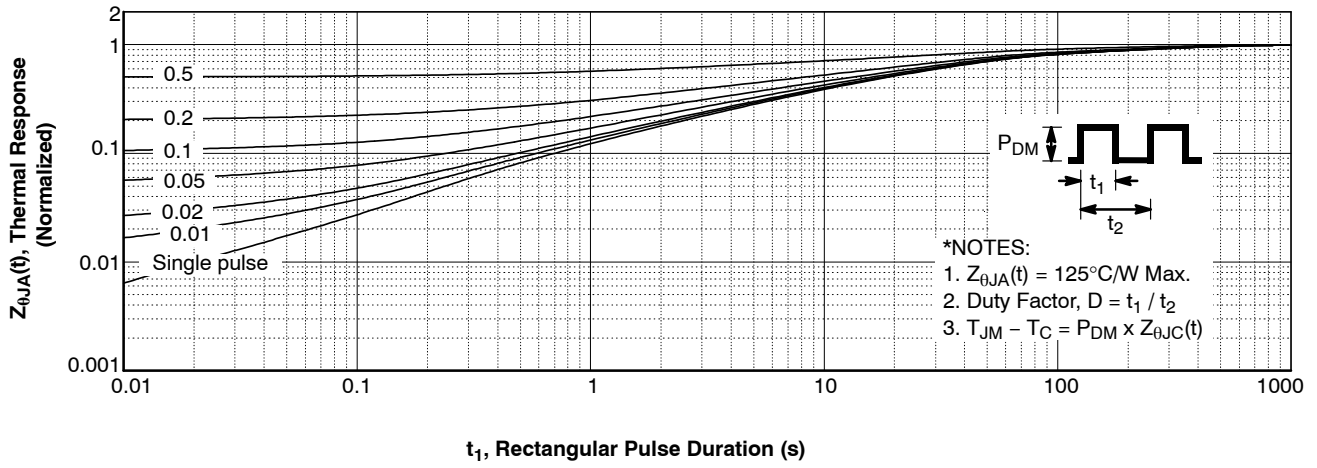


Figure 13. Transient Thermal Response Curve

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

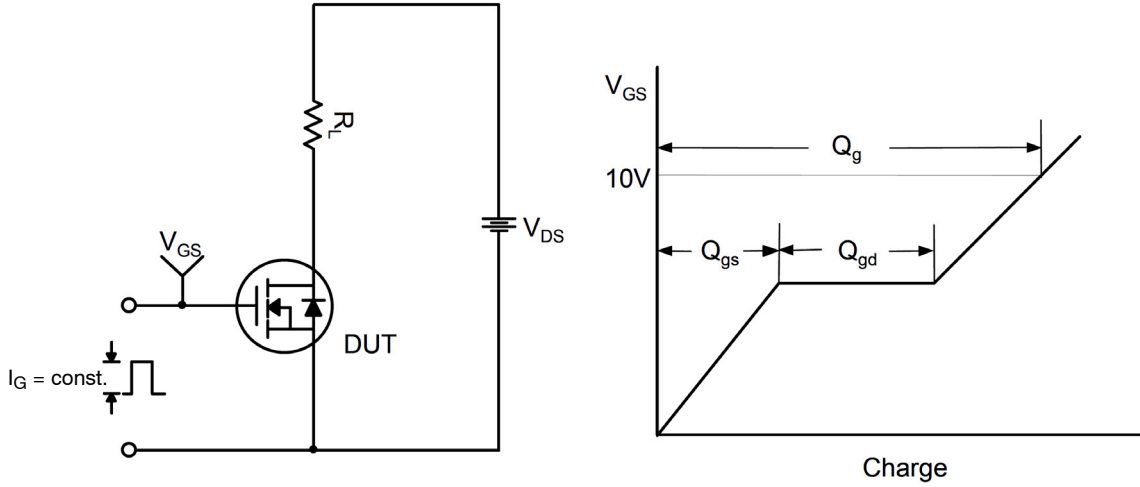


Figure 14. Gate Charge Test Circuit & Waveform

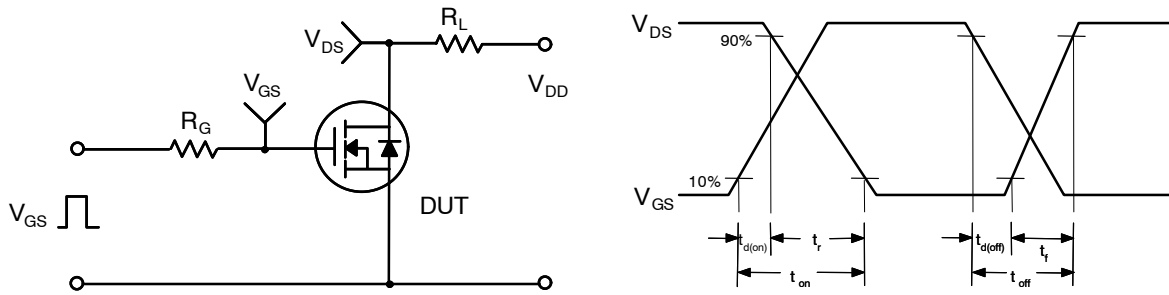


Figure 15. Resistive Switching Test Circuit & Waveforms

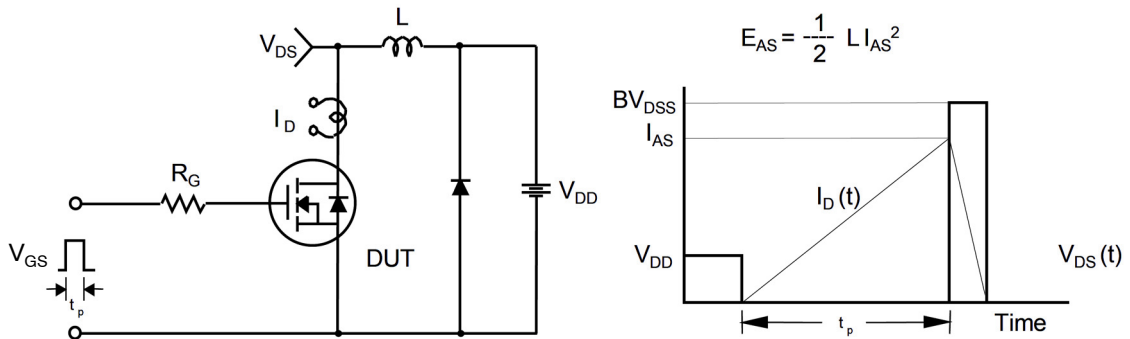


Figure 16. Unclamped Inductive Switching Test Circuit & Waveforms

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

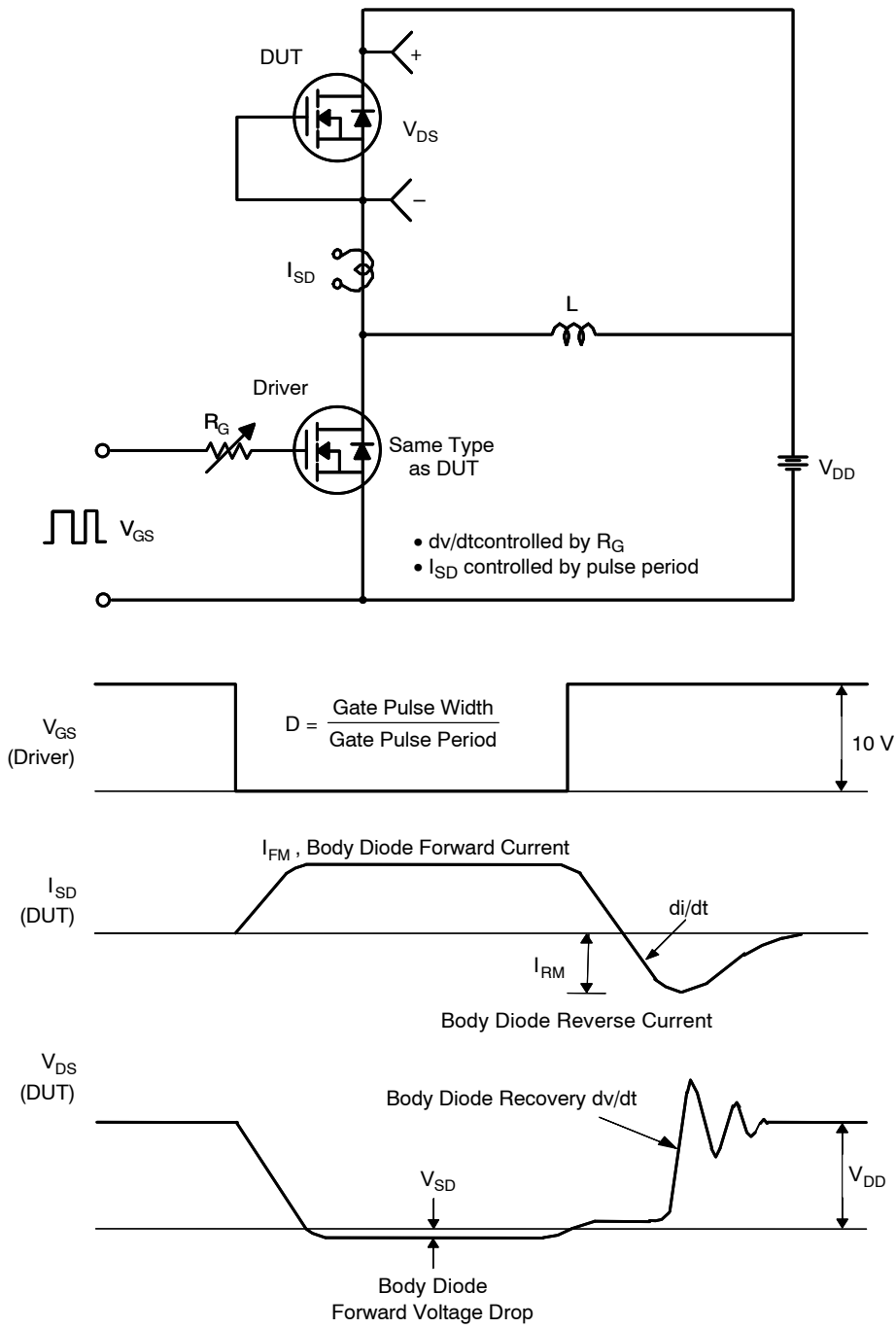


Figure 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

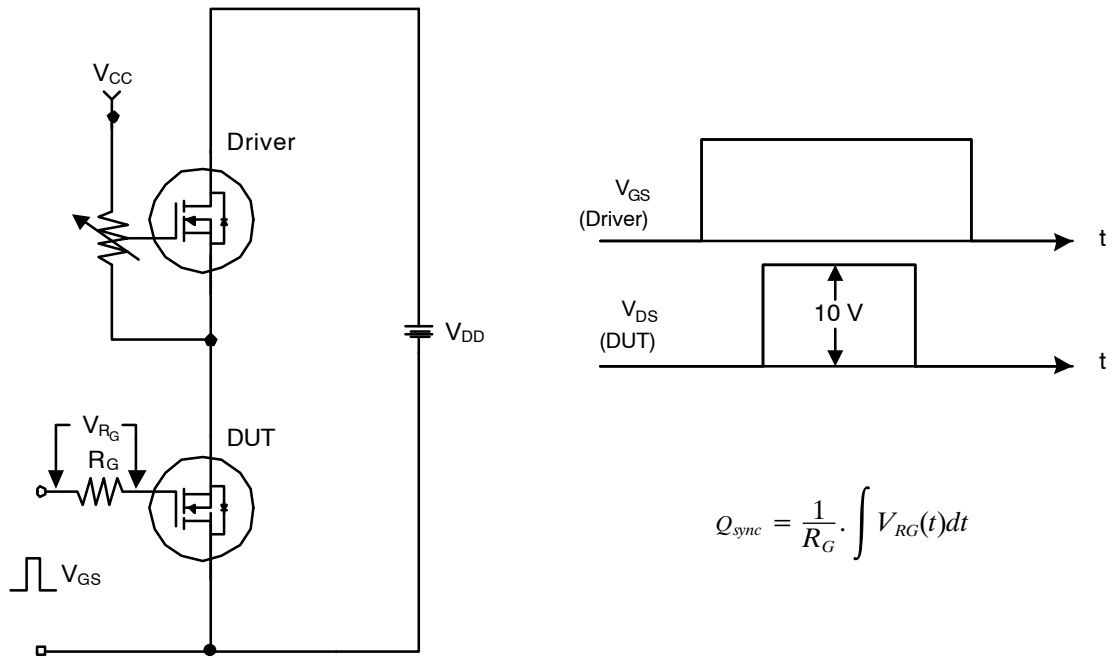
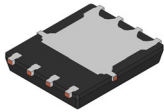


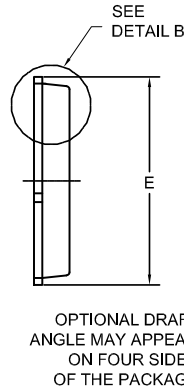
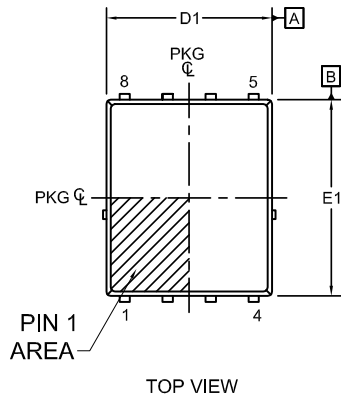
Figure 18. Total Gate Charge Q_{sync} . Test Circuit & Waveforms

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



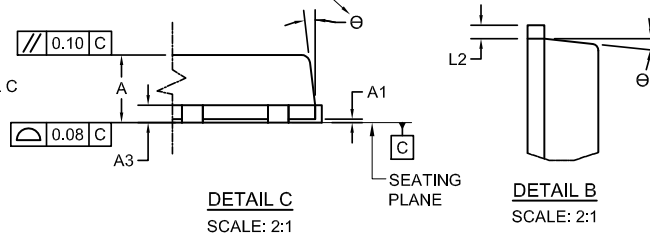
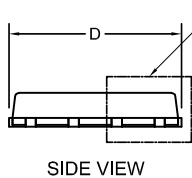
PQFN8 5X6, 1.27P
CASE 483AE
ISSUE C

DATE 21 JAN 2022

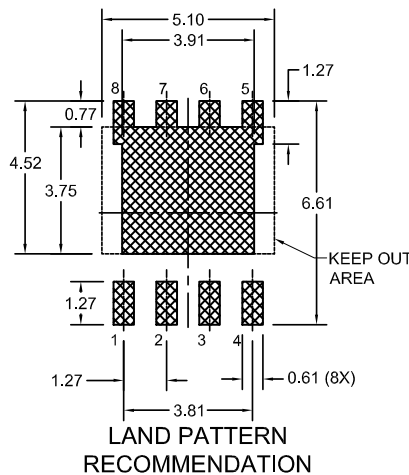
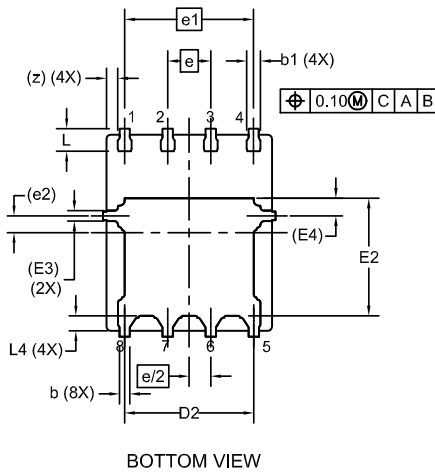


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
6. IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	-	0.05
b	0.21	0.31	0.41
b1	0.31	0.41	0.51
A3	0.15	0.25	0.35
D	4.90	5.00	5.20
D1	4.80	4.90	5.00
D2	3.61	3.82	3.96
E	5.90	6.15	6.25
E1	5.70	5.80	5.90
E2	3.38	3.48	3.78
E3	0.30 REF		
E4	0.52 REF		
e	1.27 BSC		
e/2	0.635 BSC		
e1	3.81 BSC		
e2	0.50 REF		
L	0.51	0.66	0.76
L2	0.05	0.18	0.30
L4	0.34	0.44	0.54
z	0.34 REF		
θ	0°	-	12°



*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

DOCUMENT NUMBER:	98AON13655G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	PQFN8 5X6, 1.27P	PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales