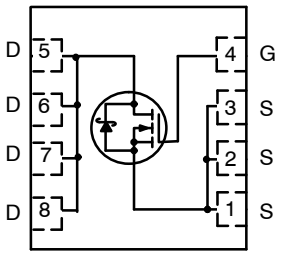
MOSFET – N-Channel, POWERTRENCH®, SyncFET™

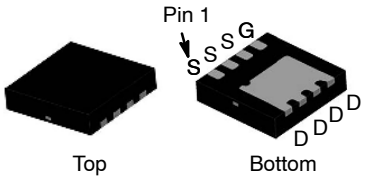
30 V, 14.8 A, 6.0 mΩ

FDMC7672S

V_{DS}	$R_{DS(ON)}$ MAX	I_D MAX
30 V	6.0 mΩ @ 10 V	14.8 A
	7.1 mΩ @ 4.5 V	



N-CHANNEL MOSFET



WDFN8 3.3 × 3.3, 0.65P
CASE 511DQ
(Option A)

General Description

This FDMC7672S is produced using **onsemi**'s advanced POWERTRENCH process that has been especially tailored to minimize the on−state resistance. This device is well suited for Power Management and load switching applications common in Notebook Computers and Portable Battery packs.

Features

- Max $R_{DS(on)}$ = 6.0 mΩ at V_{GS} = 10 V, I_D = 14.8 A
- Max $R_{DS(on)}$ = 7.1 mΩ at V_{GS} = 4.5 V, I_D = 12.4 A
- High Performance Technology for Extremely Low $R_{DS(on)}$
- Pb−Free, Halide Free and RoHS Compliant

Applications

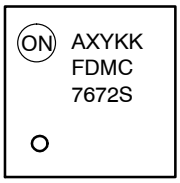
- DC−DC Buck Converters
- Notebook Battery Power Management
- Load Switch in Notebook

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current: Continuous, T_C = 25°C Continuous, T_A = 25°C (Note 1a) Pulsed	 18 14.8 45	A
E_{AS}	Single Pulse Avalanche Energy (Note 3)	60	mJ
P_D	Power Dissipation: T_C = 25°C T_A = 25°C (Note 1a)	 36 2.3	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	−55 to +150	°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.

MARKING DIAGRAM



A = Assembly Location
XY = 2−Digit Date Code
KK = 2−Digit Lot Run Traceability Code
FDMC7672S = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping†
FDMC7672S	WDFN8 (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.

THERMAL CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 1 mA, V_{GS} = 0 V	30	–	–	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 10 mA, referenced to 25°C	–	12	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V	–	–	1	mA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = 20 V, V_{DS} = 0 V	–	–	100	nA
ON CHARACTERISTICS (Note 2)						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 1 mA	1.2	1.6	3.0	V
$\Delta V_{GS(th)}/\Delta T_J$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 10 mA, referenced to 25°C	–	–6	–	mV/°C
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 14.8 A	–	5.0	6.0	mΩ
		V_{GS} = 4.5 V, I_D = 12.4 A	–	6.1	7.1	
		V_{GS} = 10 V, I_D = 14.8 A, T_J = 125°C	–	5.9	9.0	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 14.8 A	–	78	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz	–	1895	2520	pF
C_{oss}	Output Capacitance		–	770	1025	pF
C_{rss}	Reverse Transfer Capacitance		–	85	130	pF
R_g	Gate Resistance	f = 1 MHz	–	1.2	3.2	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15 V, I_D = 14.8 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	11	21	ns
t_r	Rise Time		–	4	10	ns
$t_{d(off)}$	Turn-Off Delay Time		–	26	42	ns
t_f	Fall Time		–	3	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 15 V, I_D = 14.8 A	–	30	42	nC
		V_{GS} = 0 V to 4.5 V, V_{DD} = 15 V, I_D = 14.8 A	–	14	20	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 15 V, I_D = 14.8 A	–	5.3	–	nC
Q_{gd}	Gate to Drain “Miller” Charge	V_{DD} = 15 V, I_D = 14.8 A	–	4.0	–	nC

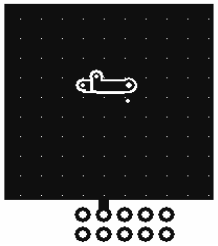
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 14.8 A (Note 2)	–	0.8	1.3	V
		V_{GS} = 0 V, I_S = 1.9 A (Note 2)	–	0.5	1.2	
t_{rr}	Reverse Recovery Time	I_F = 14.8 A, di/dt = 300 A/μs	–	29	45	ns
Q_{rr}	Reverse Recovery Charge		–	28	44	nC

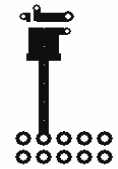
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. E_{AS} of 60 mJ is based on starting T_J = 25°C, L = 1 mH, I_{AS} = 11 A, V_{DD} = 27 V, V_{GS} = 10 V. 100% test at L = 3 mH, I_{AS} = 4.8 A.

TYPICAL CHARACTERISTICS

(T_J = 25°C unless otherwise noted)

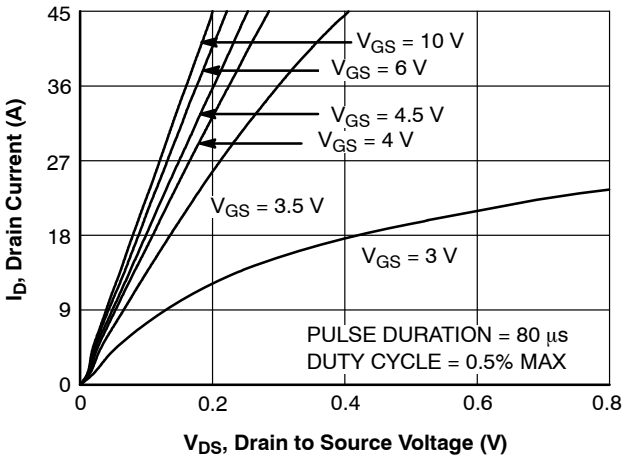


Figure 1. On−Region Characteristics

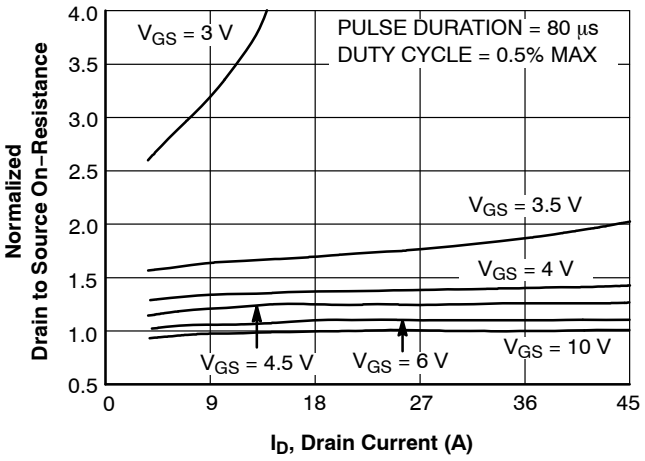


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

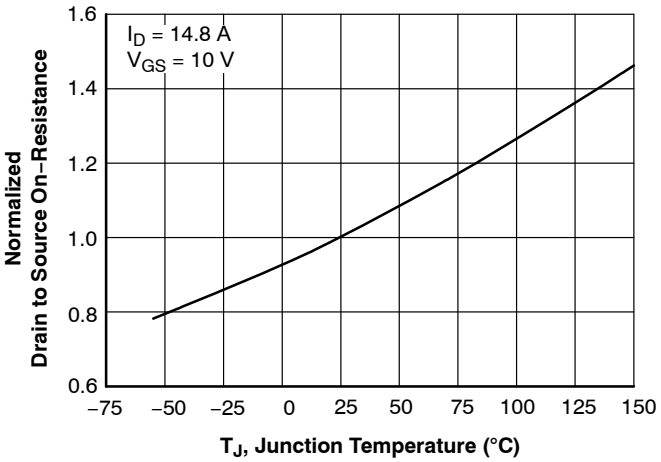


Figure 3. Normalized On−Resistance vs. Junction Temperature

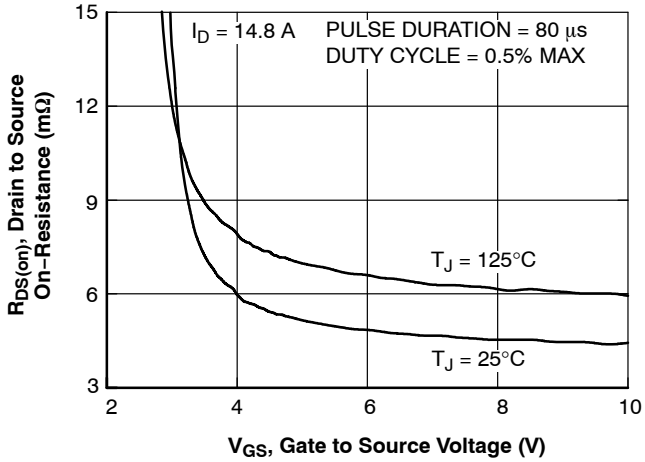


Figure 4. On−Resistance vs. Gate to Source Voltage

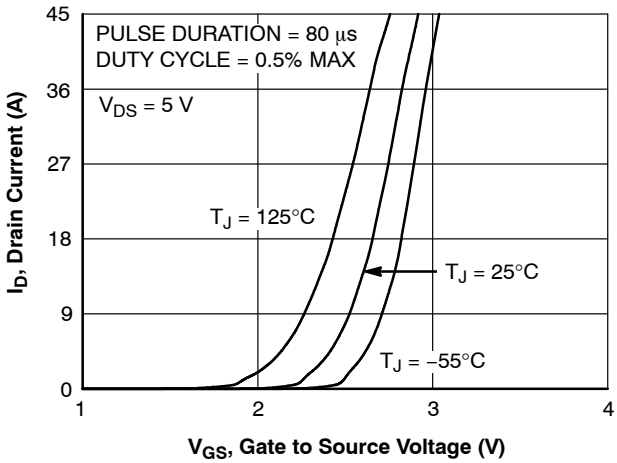


Figure 5. Transfer Characteristics

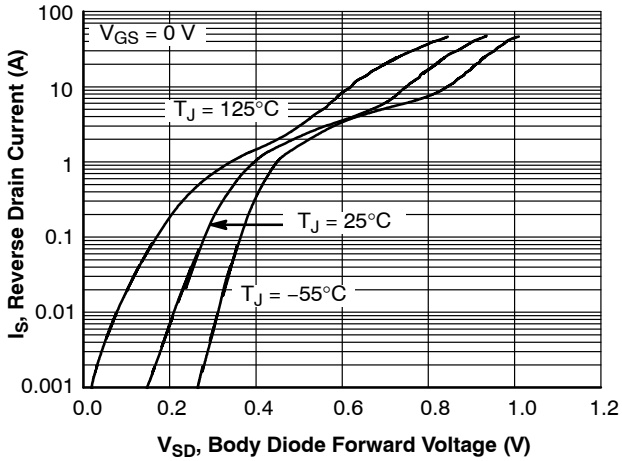


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

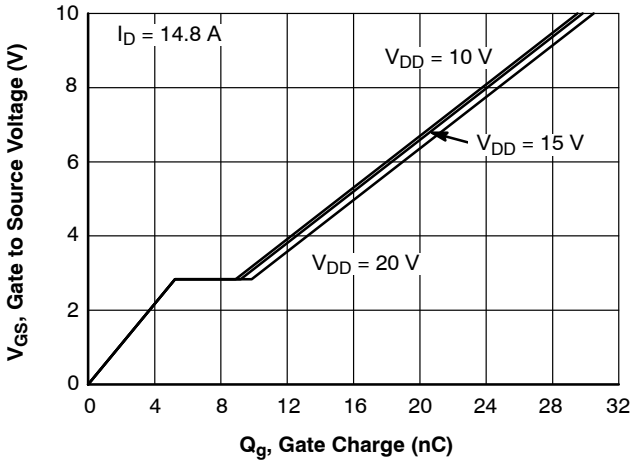


Figure 7. Gate Charge Characteristics

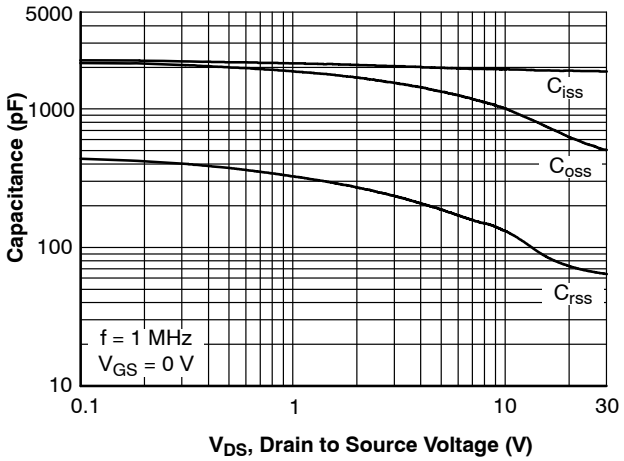


Figure 8. Capacitance vs. Drain to Source Voltage

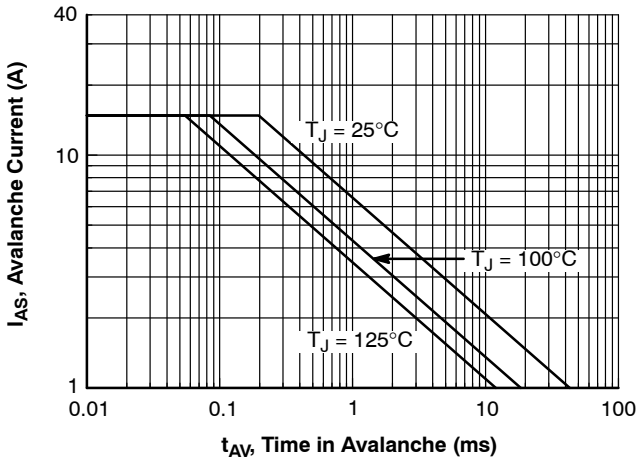


Figure 9. Unclamped Inductive Switching Capability

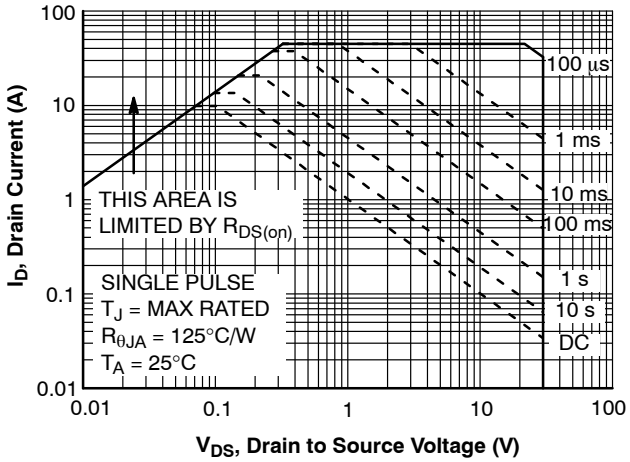


Figure 10. Forward Bias Safe Operating Area

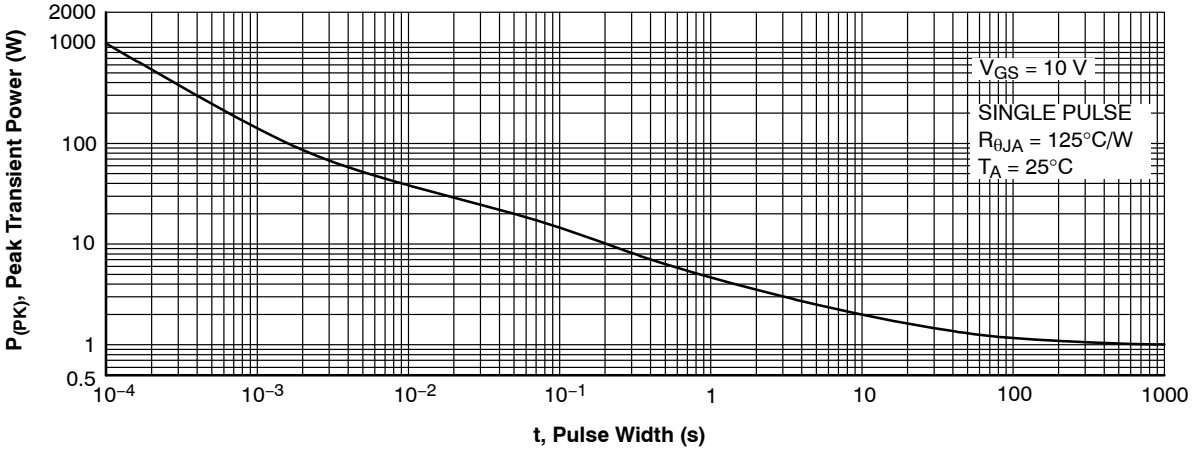


Figure 11. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

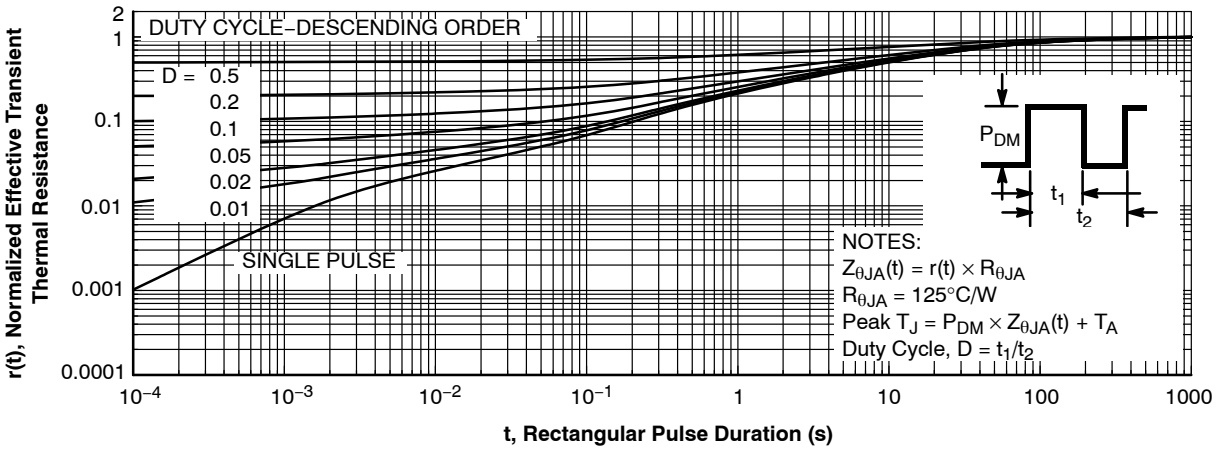


Figure 12. Junction−to−Ambient Transient Thermal Response Curve

TYPICAL CHARACTERISTICS (continued)

SyncFET Schottky Body Diode Characteristics

onsemi's SyncFET process embeds a Schottky diode in parallel with POWERTRENCH MOSFET. This diode exhibits similar characteristics to a discrete external Schottky diode in parallel with a MOSFET. Figure 13 shows the reverse recovery characteristic of the FDMC7672S.

Schottky barrier diodes exhibit significant leakage at high temperature and high reverse voltage. This will increase the power in the device.

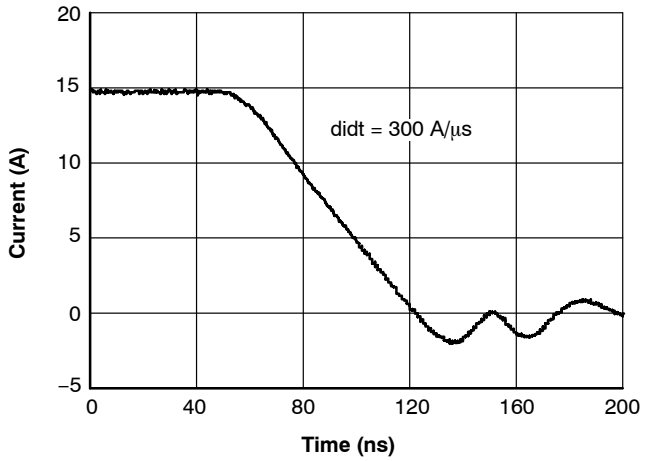


Figure 13. SyncFET Body Diode Reverse Recovery Characteristics

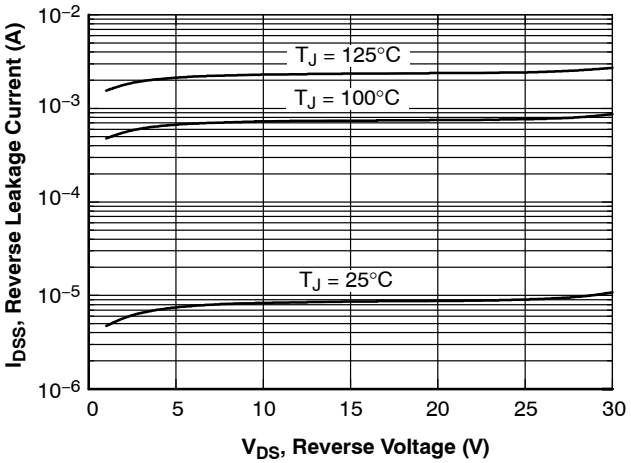


Figure 14. SyncFET Body Diode Reverse Leakage vs. Drain−Source Voltage

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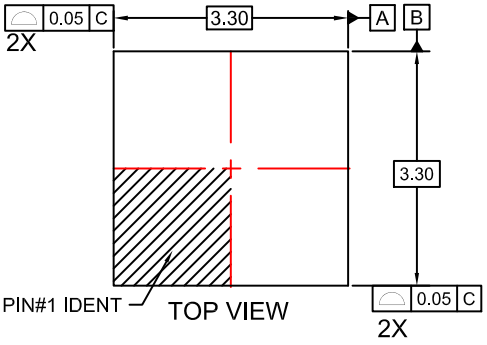

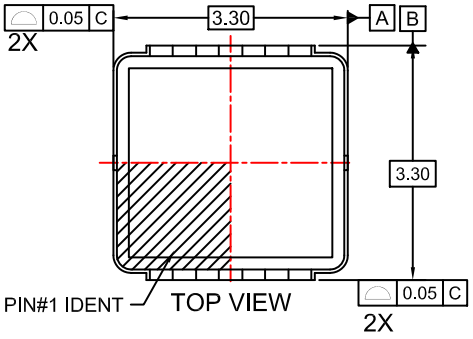

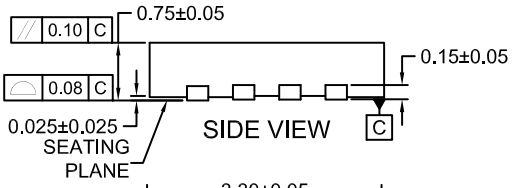

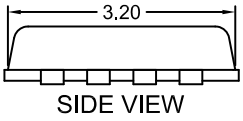

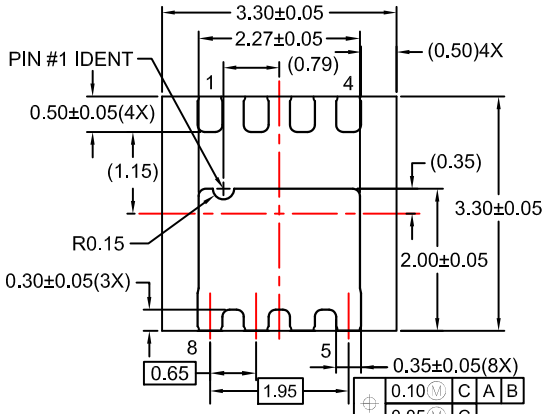

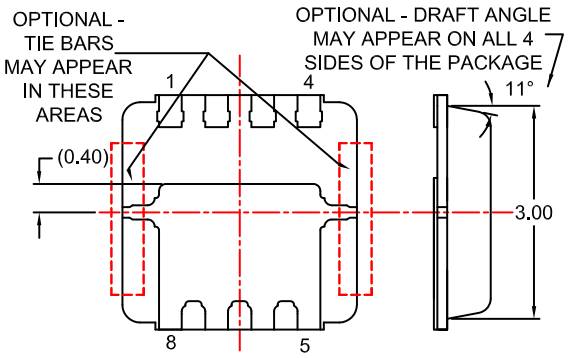

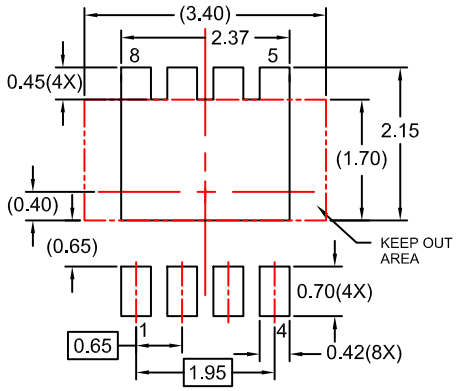

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WDFN8 3.3x3.3, 0.65P
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ISSUE O

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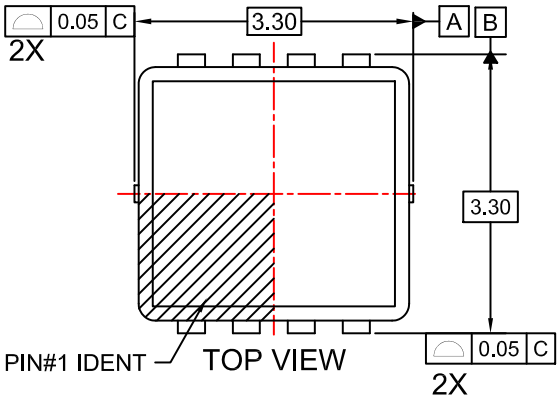
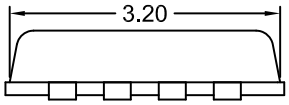
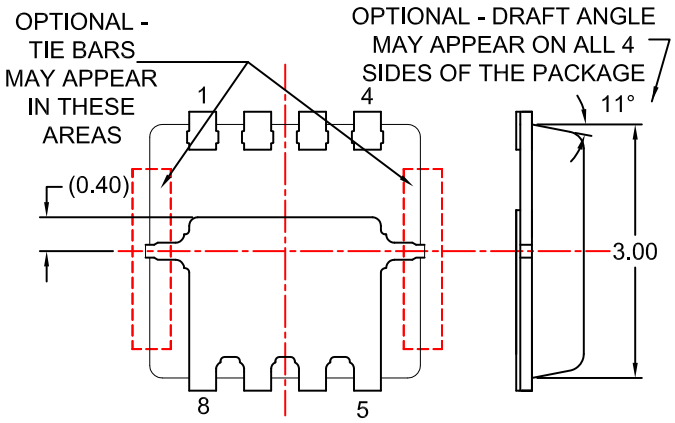




SIDE VIEW



ALL DIMENSIONS AS PER OPTION A
UNLESS SPECIFIED

BOTTOM VIEW
(OPTION C)

NOTES:

A. PACKAGE DOES NOT FULLY CONFORM TO JEDEC REGISTRATION MO-240.
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN
E. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. BURRS OR MOLD FLASH SHALL NOT EXCEED 0.10MM.

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