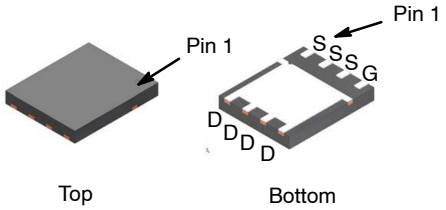
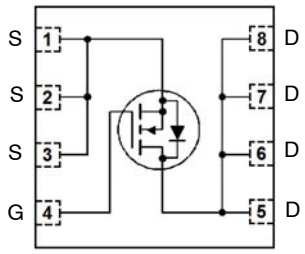
MOSFET – N-Channel, Shielded Gate, POWERTRENCH®

150 V, 62 A, 12.4 mΩ

FDMS86255



PQFN8 5X6, 1.27P
CASE 483AG



Description

This N−Channel MOSFET is produced using **onsemi** advanced POWERTRENCH process that incorporates Shielded Gate technology. This process has been optimized for the on−state resistance and yet maintain superior switching performance.

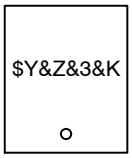
Features

- Shielded Gate MOSFET Technology
- Max $R_{DS(on)}$ = 12.4 mΩ at V_{GS} = 10 V, I_D = 10 A
- Max $R_{DS(on)}$ = 15.5 mΩ at V_{GS} = 6 V, I_D = 8 A
- Advanced Package and Silicon Combination for Low $R_{DS(on)}$ and High Efficiency
- Next Generation Enhanced Body Diode Technology, Engineered for Soft Recovery
- MSL1 Robust Package Design
- 100% UIL Tested
- RoHS Compliant
- These Device is Halogen Free

Applications

- OringFET / Load Switching
- Synchronous Rectification
- DC−DC Conversion

MARKING DIAGRAM



$Y	= Logo
&Z	= Assembly Location
&3	= Date Code (Year and Week)
&K	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

© Semiconductor Components Industries, LLC, 2002

MOSFET MAXIMUM RATINGS T_A = 25 °C unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{DS}	Drain to Source Voltage	150	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current Continuous, T_C = 25°C	62	A
	Continuous, T_A = 25°C (Note 1a)	10	
	Pulsed (Note 4)	271	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	541	mJ
P_D	Power Dissipation, T_C = 25°C	113	W
	Power Dissipation, T_A = 25°C (Note 1a)	2.7	
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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.1	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	45	

ELECTRICAL CHARACTERISTICS T_A = 25°C unless otherwise noted

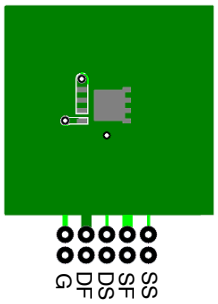
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	150	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C	–	109	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 120 V, V_{GS} = 0 V	–	–	1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V	–	–	±100	nA
ON CHARACTERISTICS						
VGS(th)	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	2.0	3.0	4.0	V
$\frac{\Delta VGS(th)}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C	–	−11	–	mV/°C
$R_{DS(ON)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 10 A	–	9.5	12.4	mΩ
		V_{GS} = 6 V, I_D = 8 A	–	11.5	15.5	
		V_{GS} = 10 V, I_D = 10 A, T_J = 125°C	–	19	25	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 10 A	–	35	–	S
DYNAMIC CHARACTERISTICS						
C_{ISS}	Input Capacitance	V_{DS} = 75 V, V_{GS} = 0 V, f = 1 MHz	–	3200	4480	pF
C_{OOS}	Output Capacitance		–	291	410	pF
Crss	Reverse Transfer Capacitance		–	11	20	pF
R_g	Gate Resistance		0.1	0.7	2.1	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 75 V, I_D = 10 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	21	34	ns
t_r	Rise Time		–	4.5	10	ns
$t_{d(off)}$	Turn−Off Delay Time		–	28	45	ns
t_f	Fall Time		–	6.2	12	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 75 V, I_D = 10 A	–	45	63	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 6 V; V_{DD} = 75 V, I_D = 10 A	–	29	41	nC

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

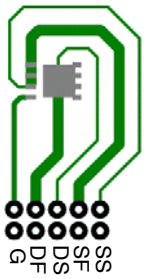
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
SWITCHING CHARACTERISTICS						
Qgs	Gate to Source Charge		–	14	–	nC
Qgd	Gate to Drain “Miller” Charge		–	8.8	–	nC
DRAIN−SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 1.9 A (Note 2)	–	0.7	1.2	V
		V_{GS} = 0 V, I_S = 10 A (Note 2)	–	0.8	1.3	
t_{rr}	Reverse Recovery Time	I_F = 10 A, di/dt = 100 A/μs	–	87	139	ns
Q_{rr}	Reverse Recovery Charge		–	165	264	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.

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. 45°C/W when mounted on a 1 in^2 pad of 2 oz copper.



b. 115°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 541 mJ is based on starting T_J = 25 °C, L = 3 mH, I_{AS} = 19 A, V_{DD} = 150 V, V_{GS} = 10 V. 100% tested at L = 0.1 mH, I_{AS} = 60 A.
4. Pulse Id refers to Figure.11 Forward Bias Safe Operation Area.

TYPICAL CHARACTERISTICS T_J = 25°C unless otherwise noted

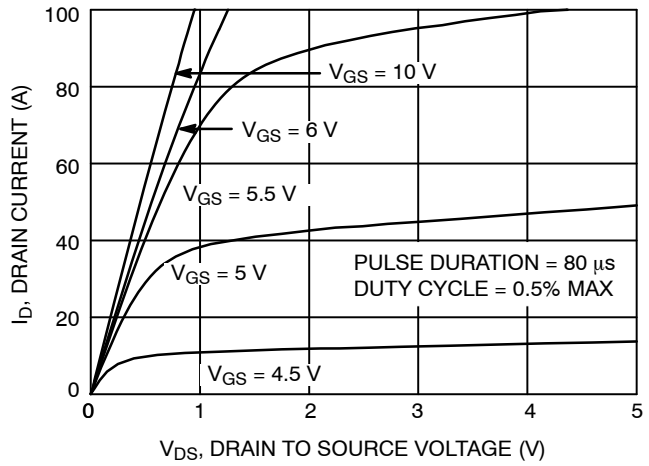


Figure 1. On−Region Characteristics

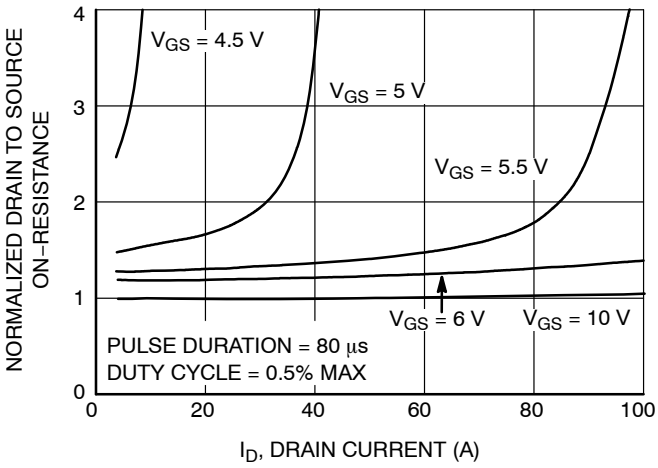


Figure 2. Normalized On−Resistance vs Drain Current and Gate Voltage

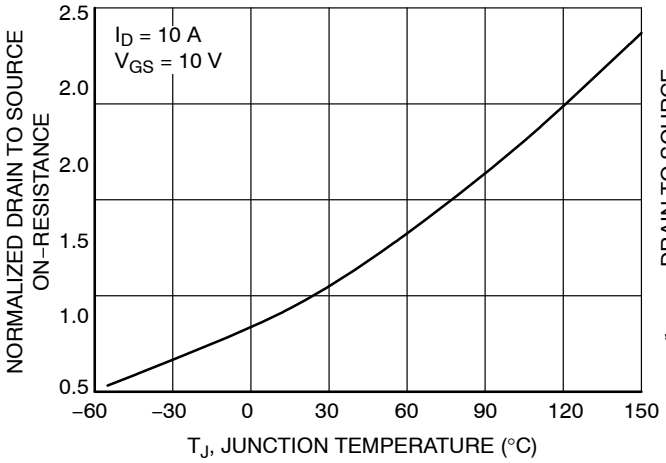


Figure 3. Normalized On−Resistance vs Junction Temperature

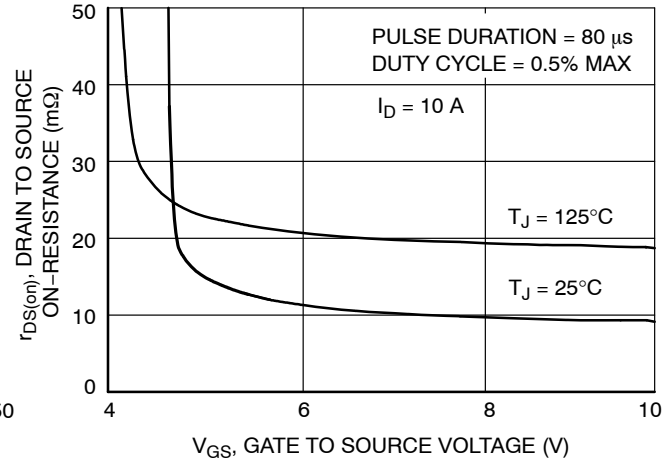


Figure 4. On−Resistance vs Gate to Source Voltage

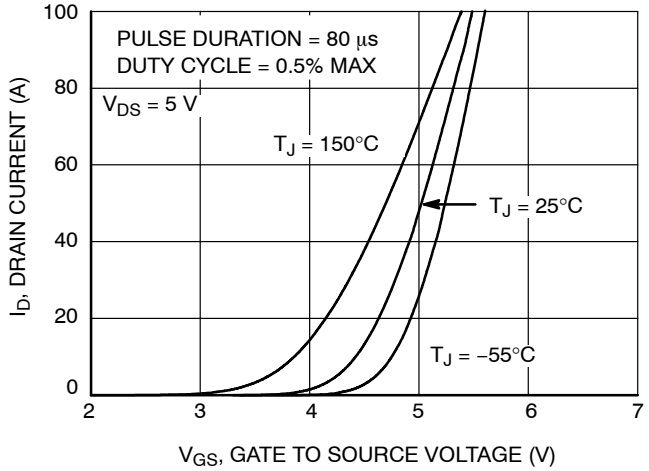


Figure 5. Transfer Characteristics

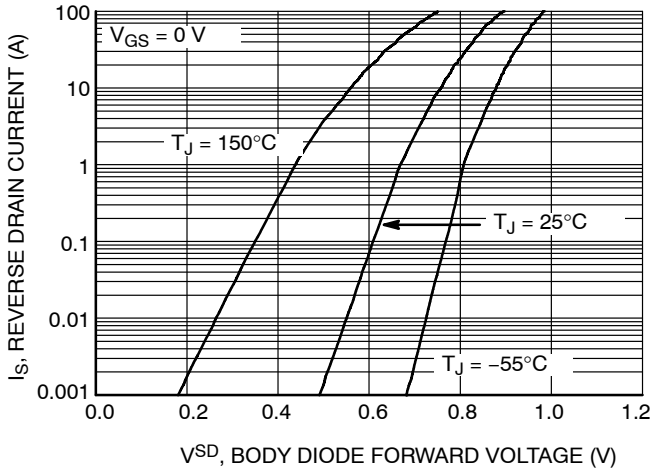


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

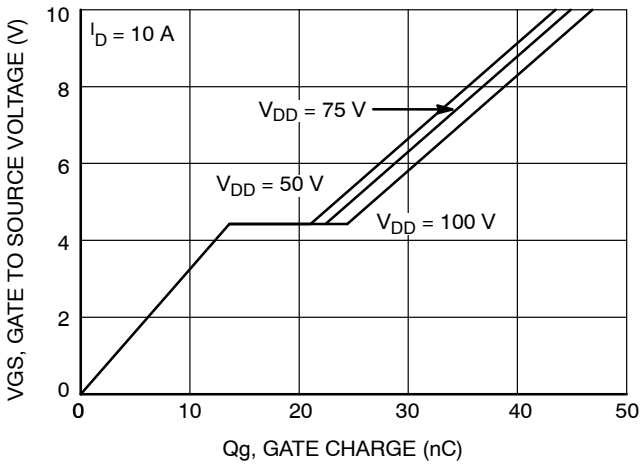


Figure 7. Gate Charge Characteristics

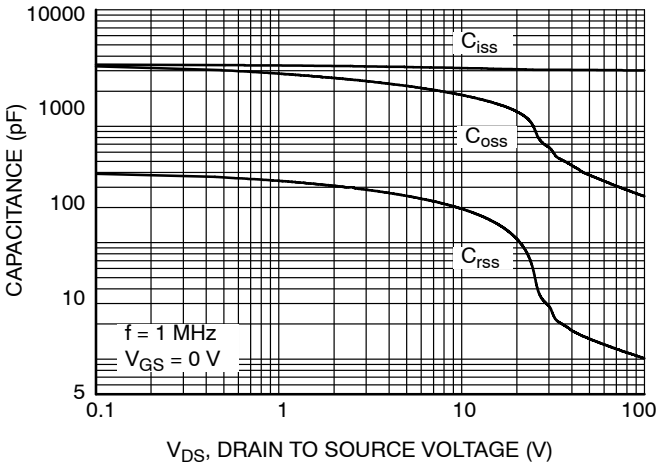


Figure 8. Capacitance vs Drain to Source Voltage

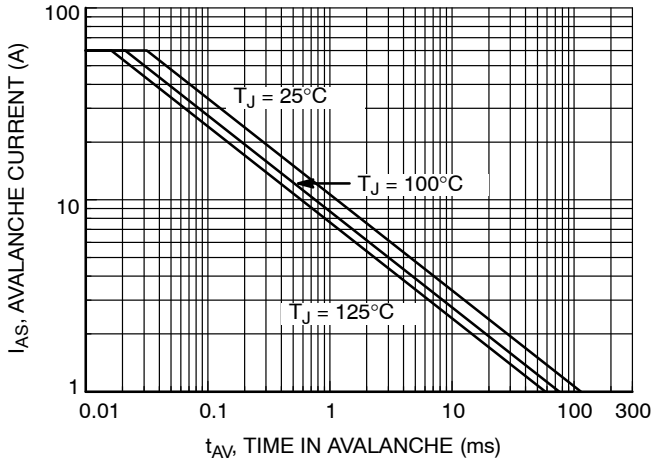


Figure 9. Unclamped Inductive Switching Capability

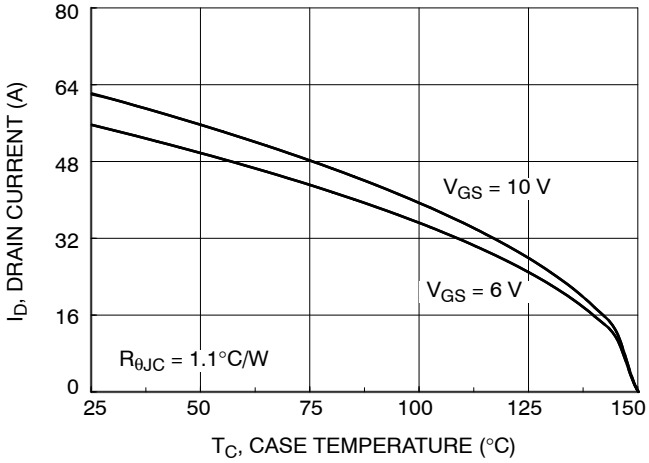


Figure 10. Maximum Continuous Drain Current vs Case Temperature

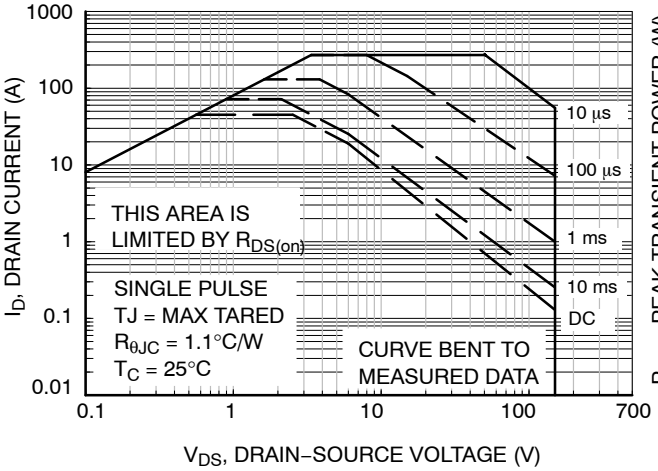


Figure 11. Forward Bias Safe Operating Area

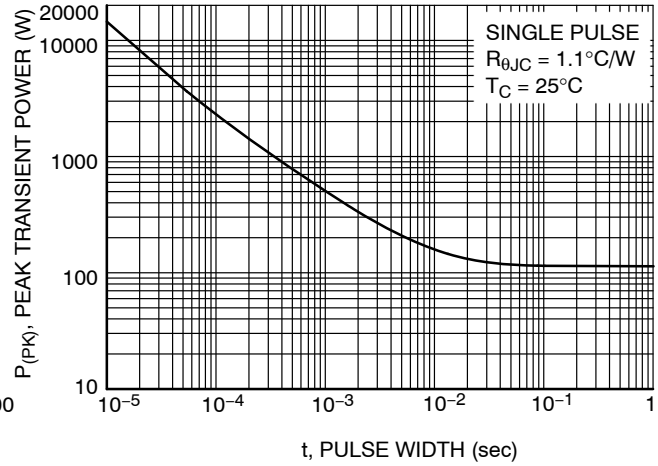


Figure 12. Single Pulse Maximum Power Dissipation

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

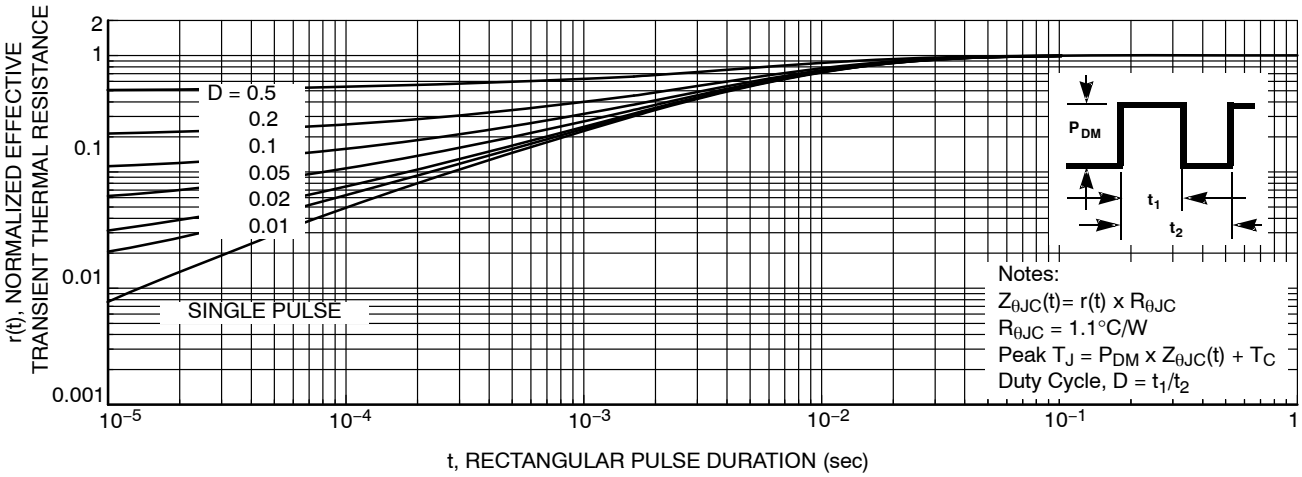


Figure 13. Transient Thermal Response Curve

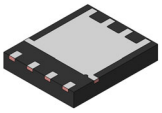
ORDERING INFORMATION

Device Marking	Device	Package	Reel Size	Tape Width	Shipping†
FDMS86255	FDMS86255	PQFN8 (Halogen Free)	13”	12 mm	3000 / Tape and 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.

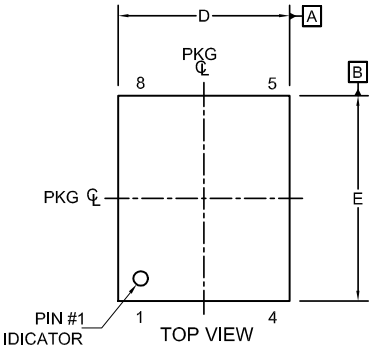
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

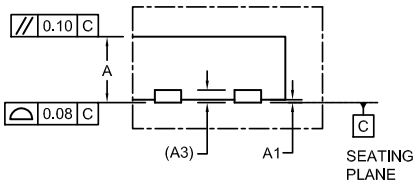
ON Semiconductor®



PQFN8 5X6, 1.27P
CASE 483AG
ISSUE A

DATE 25 JUN 2021

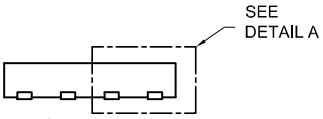




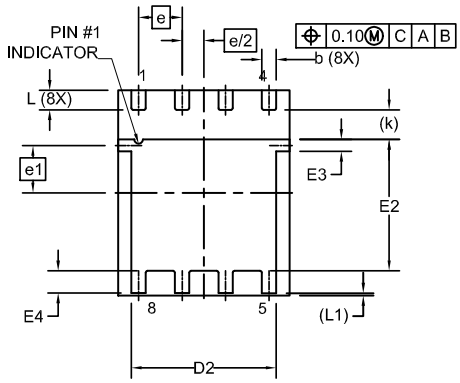
DETAIL A
SCALE: 2:1

NOTES:

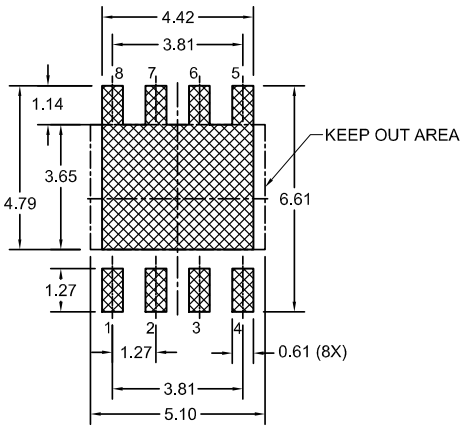
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED 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.



SIDE VIEW



BOTTOM VIEW



LAND PATTERN
RECOMMENDATION

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

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	-	0.05
A3	0.20 REF		
b	0.37	0.42	0.47
D	4.90	5.00	5.10
D2	4.13	4.23	4.33
E	5.90	6.00	6.10
E2	3.74	3.84	3.94
E3	0.25	0.35	0.45
E4	0.60	0.70	0.80
e	1.27 BSC		
e/2	0.635 BSC		
e1	1.31 BSC		
k	0.86 REF		
L	0.47	0.57	0.67
L1	0.08REF		

DOCUMENT NUMBER:	**98AON13657G**	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**

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor 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