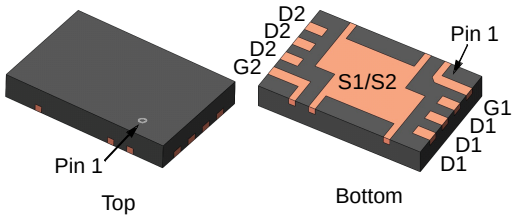
MOSFET – Dual, N-Channel, POWERTRENCH®

40 V, 87 A, 2.6 mΩ

FDMD8440L

V_{DS}	$r_{DS(on)}$ MAX	I_D MAX
40 V	2.6 mΩ @ 10 V	87 A
	3.8 mΩ @ 4.5 V	



PQFN8 3.3X5, 0.65P
(Power 3.3 x 5)
CASE 483AU

General Description

This package integrates two N−Channel devices connected internally in common−source configuration. This enables very low package parasitics and optimized thermal path to the common source pad on the bottom. It provides a very small footprint (3.3 x 5 mm) for higher power density.

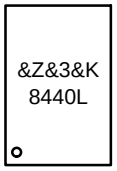
Features

- Max $r_{DS(on)}$ = 2.6 mΩ at V_{GS} = 10 V, I_D = 21 A
- Max $r_{DS(on)}$ = 3.8 mΩ at V_{GS} = 4.5 V, I_D = 17 A
- Ideal for Flexible Layout in Secondary Side Synchronous Rectification
- 100% UIL Tested
- This Device is Pb−Free, Halide Free and is RoHS Compliant

Applications

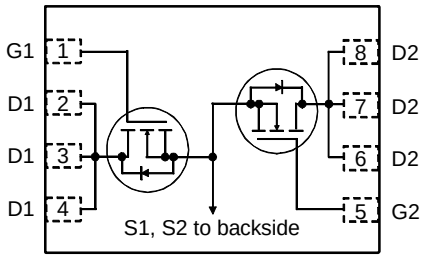
- Isolated DC−DC Synchronous Rectifiers
- Common Ground Load Switches

MARKING DIAGRAM



&Z = Assembly Plant Code
&3 = 3−Digit Date Code
&K = 2−Digits Lot Run Traceability Code
8440L = Device Code

PIN ASSIGNMENT



ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

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

Symbol	Parameter	Ratings	Unit
V_{DS}	Drain to Source Voltage	40	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current − Continuous T_C = 25°C (Note 5) − Continuous T_C = 100°C (Note 5) − Continuous T_A = 25°C (Note 1a) − Pulsed (Note 4)	 87 55 21 521	A
E_{AS}	Single Pulse Avalanche Energy (Note 3)	265	mJ
P_D	Power Dissipation T_C = 25°C T_A = 25°C (Note 1a)	 33 2.1	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.

THERMAL CHARACTERISTICS (T_A = 25°C, unless otherwise noted)

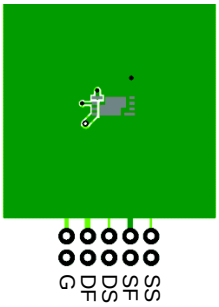
Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	60	

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

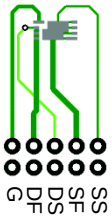
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	40	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C	–	22	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 32 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						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	1.0	1.7	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C	–	−6	–	mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 21 A	–	1.8	2.6	mΩ
		V_{GS} = 4.5 V, I_D = 17 A	–	2.6	3.8	
		V_{GS} = 10 V, I_D = 21 A, T_J = 125°C	–	2.8	4.1	
g_{FS}	Forward Transconductance	V_{DD} = 5 V, I_D = 21 A	–	111	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz	–	2965	4150	pF
C_{oss}	Output Capacitance		–	875	1225	pF
C_{rss}	Reverse Transfer Capacitance		–	40	70	pF
R_g	Gate Resistance		0.1	1.6	3.2	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 20 V, I_D = 21 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	12	21	ns
t_r	Rise Time		–	7	14	ns
$t_{d(off)}$	Turn−Off Delay Time		–	34	54	ns
t_f	Fall Time		–	7	14	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 20 V, I_D = 21 A	–	44	62	nC
	Total Gate Charge	V_{GS} = 0 V to 4.5 V, V_{DD} = 20 V, I_D = 21 A	–	21	35	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 20 V, I_D = 21 A	–	9	–	nC
Q_{gd}	Gate to Drain “Miller” Charge		–	7	–	nC
DRAIN−SOURCE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 21 A (Note 2)	–	0.8	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 21 A, di/dt = 100 A/μs	–	41	66	ns
Q_{rr}	Reverse Recovery Charge		–	22	35	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. 60°C/W when mounted on a 1 in^2 pad of 2 oz copper



b. 160°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 216 mJ is based on starting T_J = 25°C, L = 3 mH, I_{AS} = 12 A, V_{DD} = 40 V, V_{GS} = 10 V. 100% tested at L = 0.1 mH, I_{AS} = 40 A.
4. Pulse Id refers to Figure 11. Forward Bias Safe Operation Area.
5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro−mechanical application board design.

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

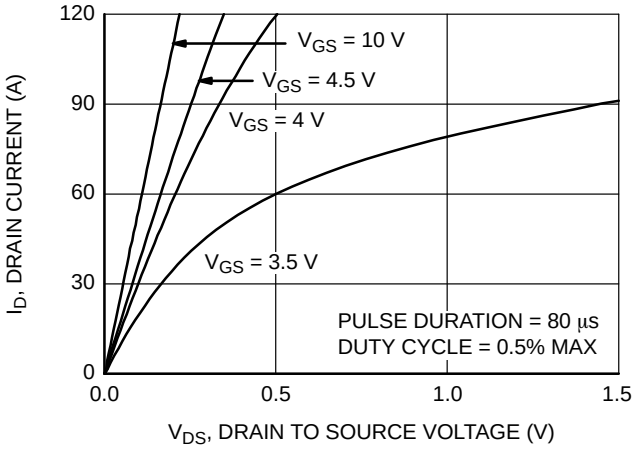


Figure 1. On−Region Characteristics

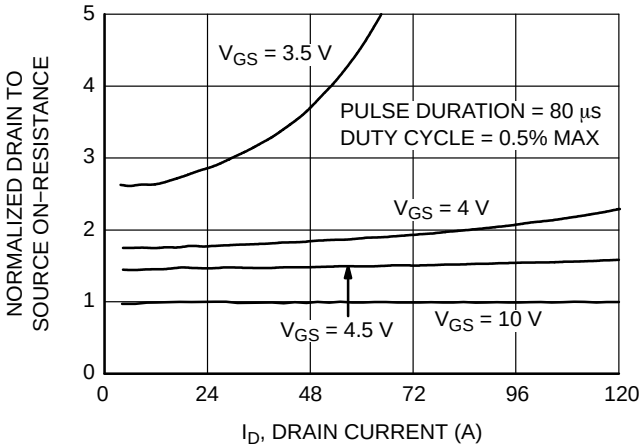


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

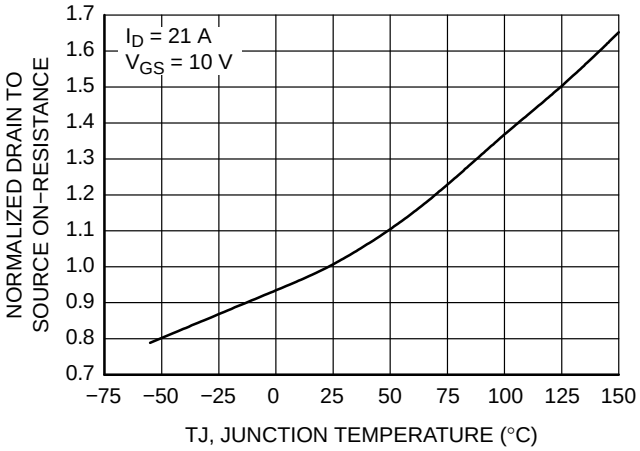


Figure 3. Normalized On Resistance vs. Junction Temperature

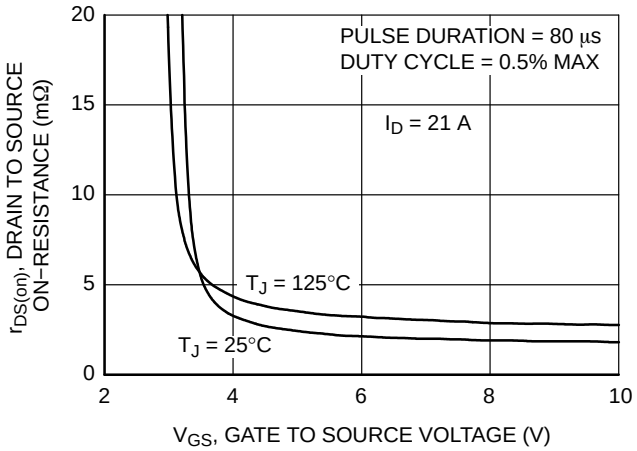


Figure 4. On Resistance vs. Gate to Source Voltage

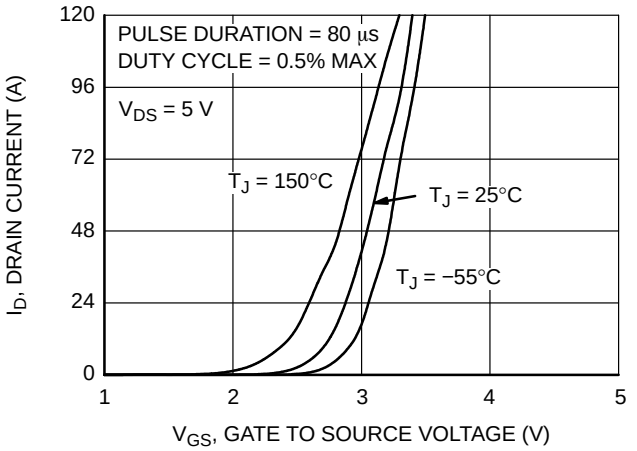


Figure 5. Transfer Characteristics

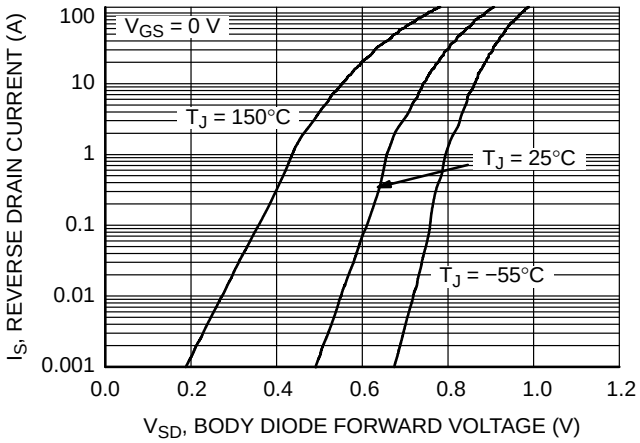


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

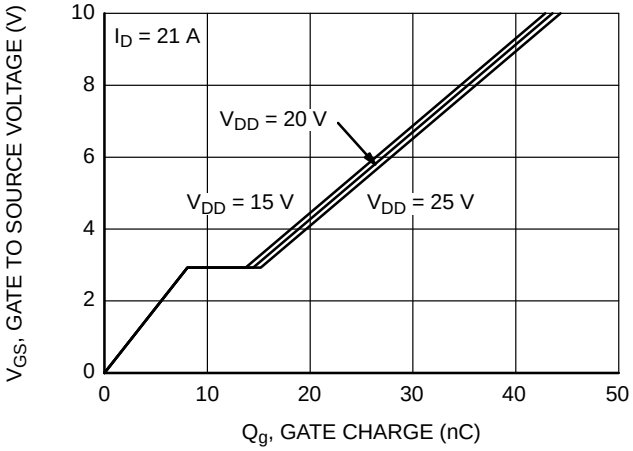


Figure 7. Gate Charge Characteristics

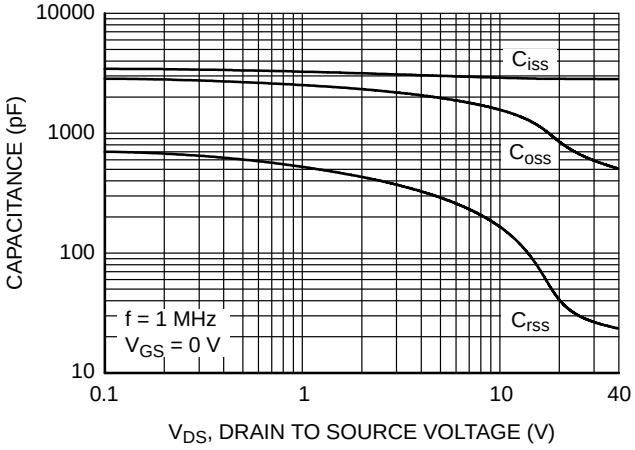


Figure 8. Capacitance vs. Drain to Source Voltage

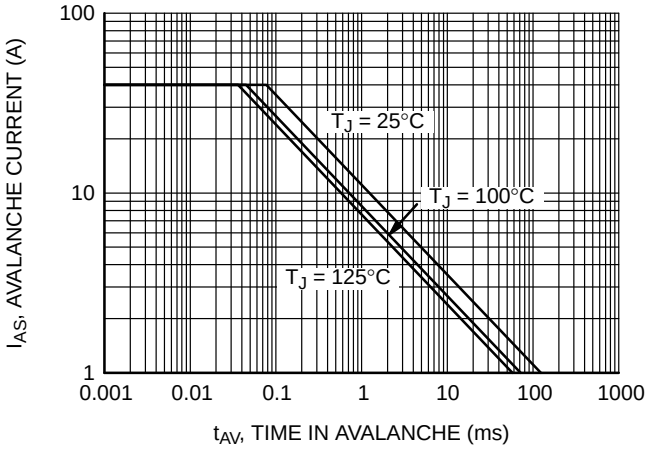


Figure 9. Unclamped Inductive Switching Capability

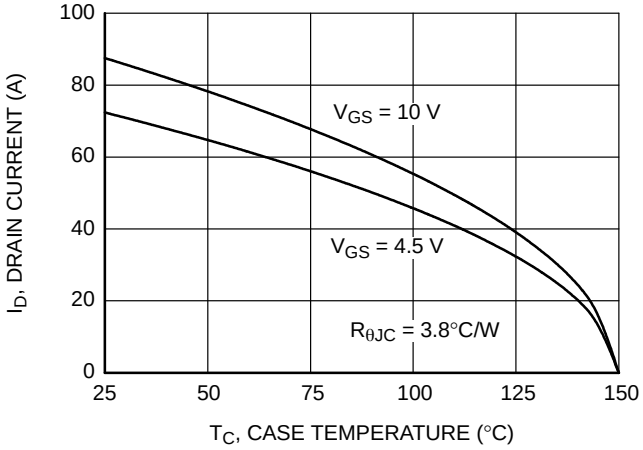


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

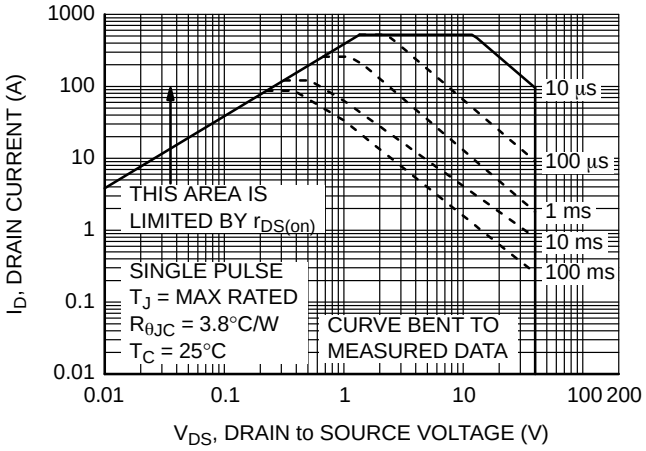


Figure 11. Forward Bias Safe Operating Area

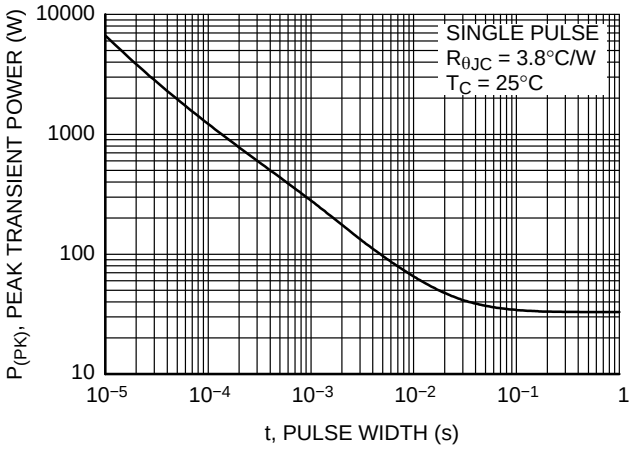


Figure 12. Single Pulse Maximum Power Dissipation

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

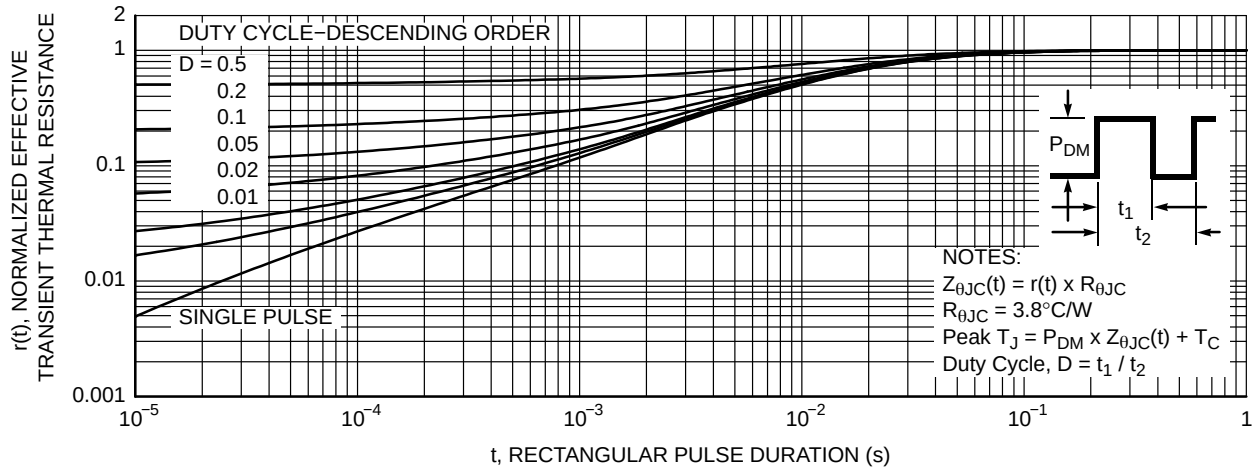


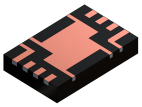
Figure 13. Junction−to−Case Transient Thermal Response Curve

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Reel Size	Tape Width	Shipping†
FDMD8440L	8440L	PQFN8 3.3X5, 0.65P (Power 3.3 x 5) (Pb−Free, Halide Free)	13”	12 mm	3000 / Tape & Reel

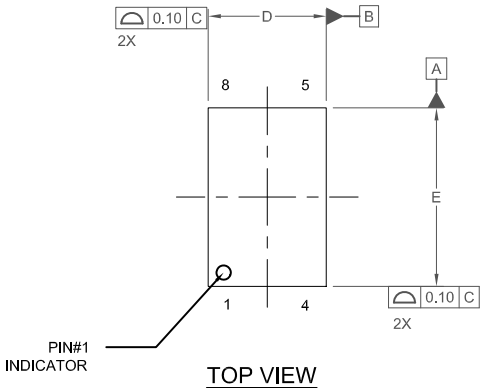
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

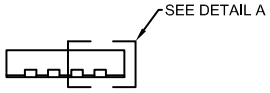


PQFN8 3.30x5.00x0.75, 0.65P
CASE 483AU
ISSUE B

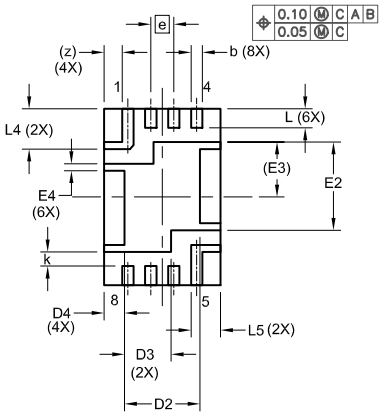
DATE 19 APR 2024



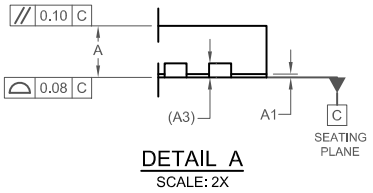
TOP VIEW



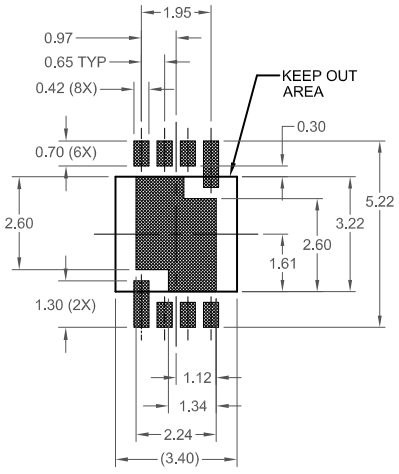
FRONT VIEW



BOTTOM VIEW



DETAIL A
SCALE: 2X



RECOMMENDED LAND PAD

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

NOTES: UNLESS OTHERWISE SPECIFIED
A) DOES NOT FULLY CONFORM TO JEDEC REGISTRATION, MO229 DATED 8/2012.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	-	0.05
A3	0.20 REF		
b	0.27	0.32	0.37
D	3.20	3.30	3.40
D2	2.04	2.14	2.24
D3	1.22	1.32	1.42
D4	0.48	0.58	0.68
E	4.90	5.00	5.10
E2	2.40	2.50	2.60
E3	1.56 REF		
E4	0.10	0.20	0.30
e	0.65 BSC		
k	0.30	0.40	0.50
L	0.44	0.54	0.64
L4	1.04	1.14	1.24
L5	0.75	0.85	0.95
z	0.51 REF		

DOCUMENT NUMBER:	**98AON13669G**	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 3.30x5.00x0.75, 0.65P**	**PAGE 1 OF 1**

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