

MOSFET – N-Channel POWERTRENCH®

100 V, 39 A, 14.8 mΩ

FDMS3662

Description

This N-Channel MOSFET is produced using onsemi’s advanced POWERTRENCH process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

- Max $R_{DS(on)}$ = 14.8 mΩ at $V_{GS} = 10\text{ V}$, $I_D = 8.9\text{ A}$
- Advanced Package and Silicon combination for low $R_{DS(on)}$
- Lowers Switching Noise/EMI
- MSL1 Robust Package Design
- 100% UIL Tested
- These Device is Pb-Free and RoHS Compliant

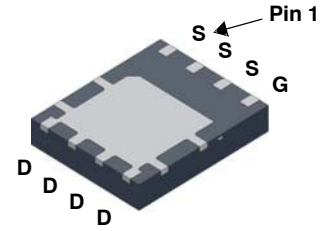
Typical Applications

- DC-DC Conversion

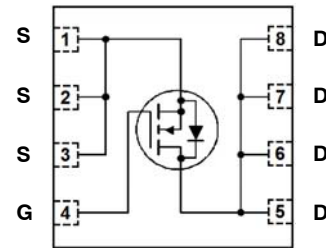
ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Unit
V_{DS}	Drain to Source Voltage	100	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current		A
	- Continuous $T_C = 25^\circ\text{C}$	39	
	- Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	8.9	
	- Pulsed	90	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	384	mJ
P_D	Power Dissipation $T_C = 25^\circ\text{C}$	104	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	2.5	
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	°C

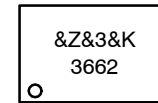
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



PQFN8 5X6, 1.27P
 CASE 483AE



MARKING DIAGRAM



- &Z = Assembly Plant Code
- &3 = Numeric Date Code
- &K = 2-Digit Lot Code
- 3662 = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping†
FDMS3662	PQFN-8 (Pb-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 Specifications Brochure, [BRD8011/D](#).

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	

ELECTRICAL CHARACTERISTICS $T_J = 25^\circ\text{C}$ unless otherwise noted

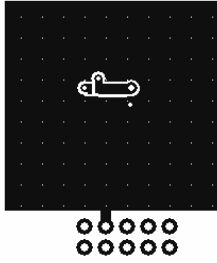
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}$, $V_{GS} = 0 \text{ V}$	100	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C	–	74	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 0 \text{ V}$, $V_{GS} = 80 \text{ V}$	–	–	1	μA
I_{GSS}	Gate to Source 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	3.5	4.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 380 \mu\text{A}$, Referenced to 25°C	–	–10.8	–	mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = 10 \text{ V}$, $I_D = 8.9 \text{ A}$ $V_{GS} = 10 \text{ V}$, $I_D = 8.9 \text{ A}$, $T_J = 125^\circ\text{C}$	–	11.4 19.0	14.8 24.7	m Ω
g_{FS}	Forward Transconductance	$V_{DD} = 10 \text{ V}$, $I_D = 8.9 \text{ A}$	–	37	–	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 50 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	–	3470	4620	pF
C_{oss}	Output Capacitance		–	245	325	pF
C_{rss}	Reverse Transfer Capacitance		–	110	165	pF
R_g	Gate Resistance	$f = 1 \text{ MHz}$	–	1.4	–	Ω
Switching Characteristics						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = 50 \text{ V}$, $I_D = 8.9 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GEN} = 6 \Omega$	–	25	40	ns
t_r	Rise Time		–	15	26	ns
$t_{d(off)}$	Turn–Off Delay Time		–	32	52	ns
t_f	Fall Time		–	6	10	ns
Q_g	Total Gate Charge at 10 V	$V_{DD} = 50 \text{ V}$, $I_D = 8.9 \text{ A}$	–	54	75	nC
Q_{gs}	Gate to Source Charge		–	18	–	nC
Q_{gd}	Gate to Drain “Miller” Charge		–	18	–	nC
Drain–Source Diode Characteristics and Maximum Ratings						
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}$, $I_S = 8.9 \text{ A}$ (Note 2)	–	0.8	1.3	V
		$V_{GS} = 0 \text{ V}$, $I_S = 2.1 \text{ A}$ (Note 2)	–	0.7	1.2	
t_{rr}	Reverse Recovery Time	$I_F = 8.9 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$	–	45	73	ns
Q_{rr}	Reverse Recovery Charge		–	71	115	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.

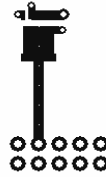
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NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in² 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 in² pad of 2 oz copper.



b).125 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$
3. Starting $T_J = 25^\circ\text{C}$, $L = 3 \text{ mH}$, $I_{AS} = 16 \text{ A}$, $V_{DD} = 100 \text{ V}$, $V_{GS} = 10 \text{ V}$.

TYPICAL CHARACTERISTICS $T_c = 25^\circ\text{C}$ unless otherwise noted

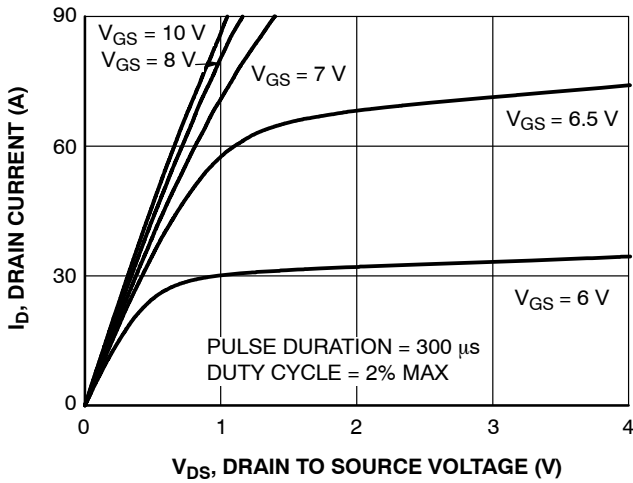


Figure 1. On-Region Characteristics

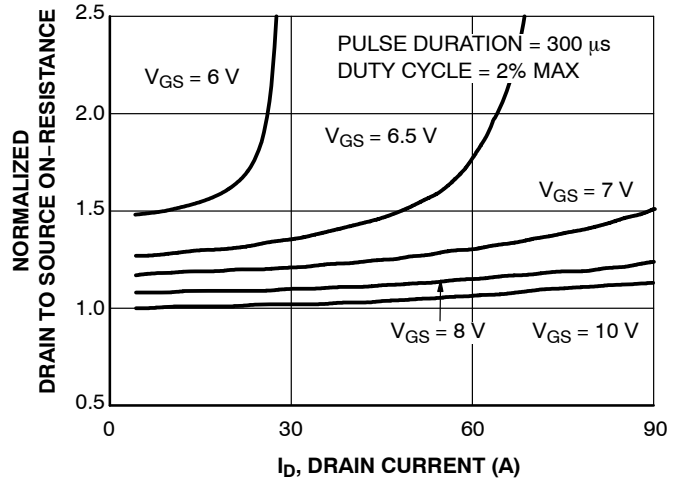


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

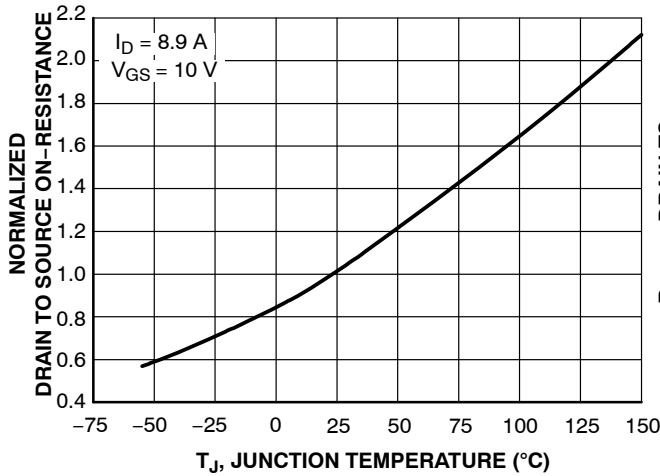


Figure 3. Normalized On-Resistance vs Junction Temperature

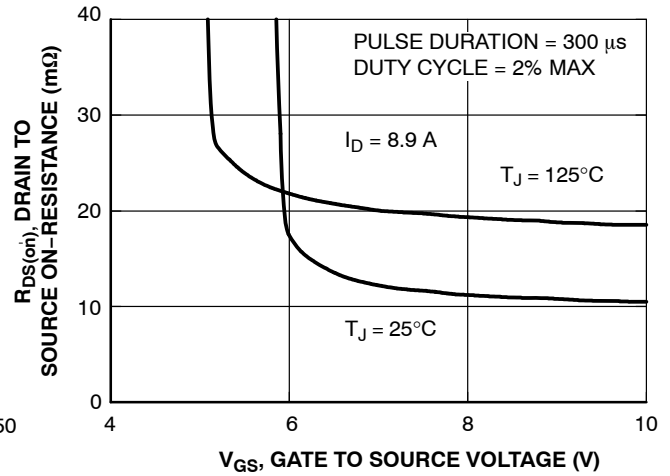


Figure 4. On-Resistance vs Gate to Source Voltage

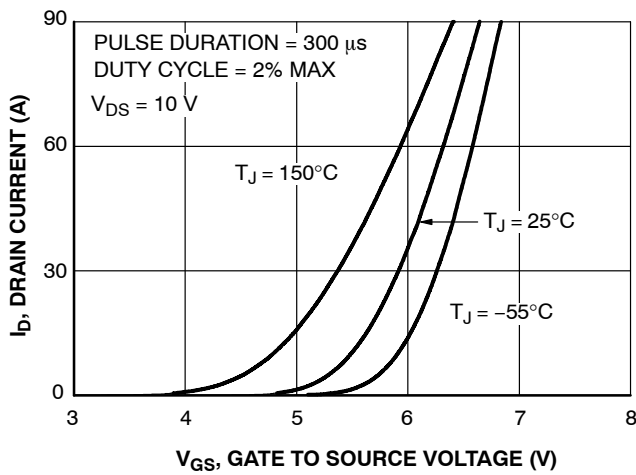


Figure 5. Transfer Characteristics

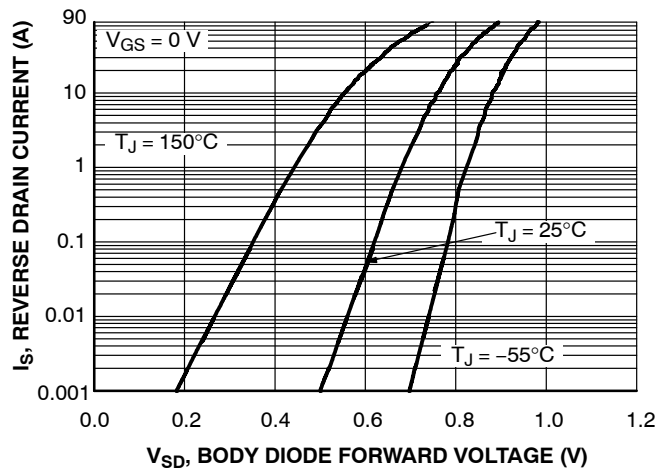


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

TYPICAL CHARACTERISTICS $T_c = 25^\circ\text{C}$ unless otherwise noted (CONTINUED)

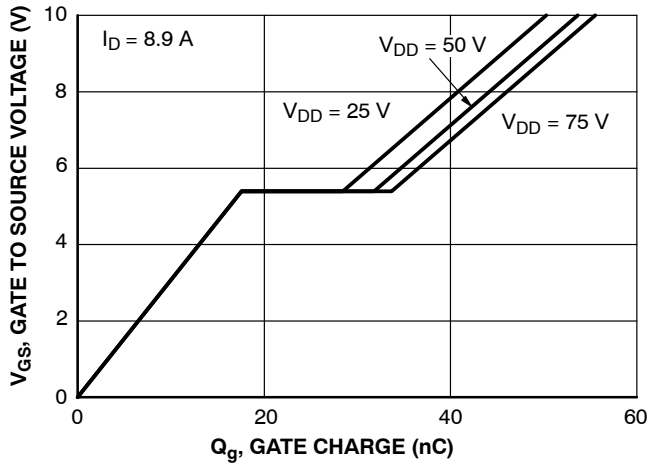


Figure 7. Gate Charge Characteristics

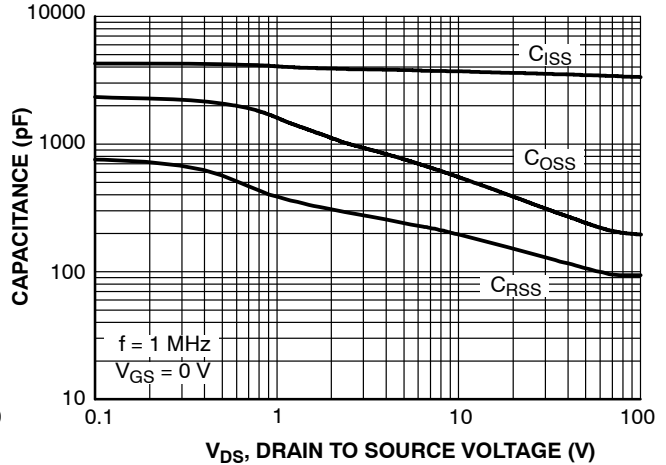


Figure 8. Capacitance vs Drain to Source Voltage

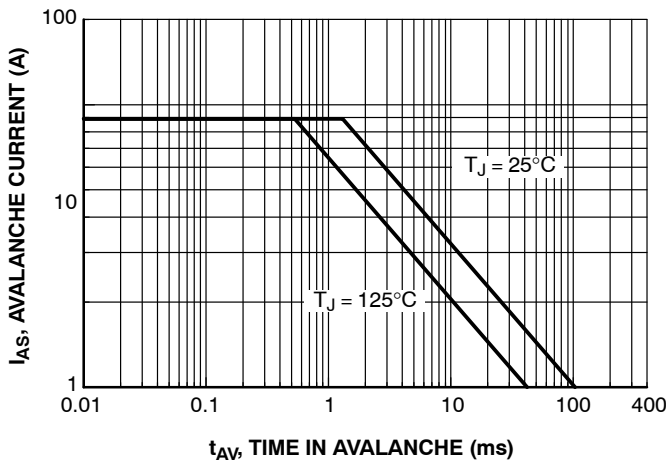


Figure 9. Unclamped Inductive Switching Capability

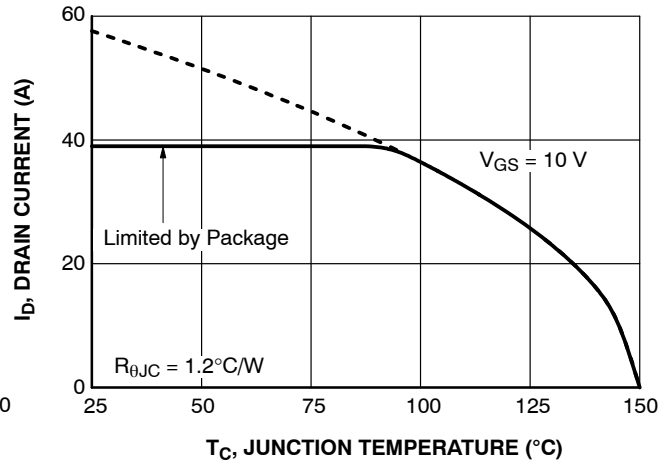


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

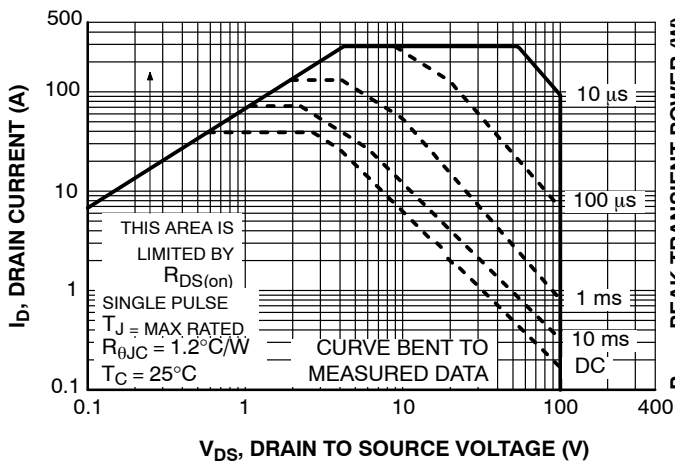


Figure 11. Forward Bias Safe Operating Area

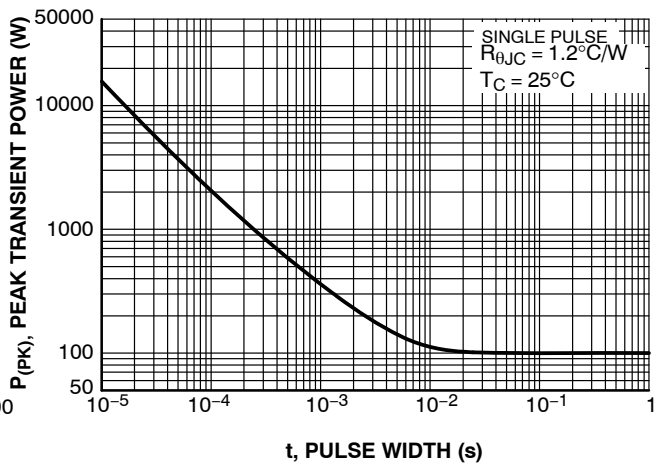


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS $T_c = 25\text{ }^\circ\text{C}$ unless otherwise noted (CONTINUED)

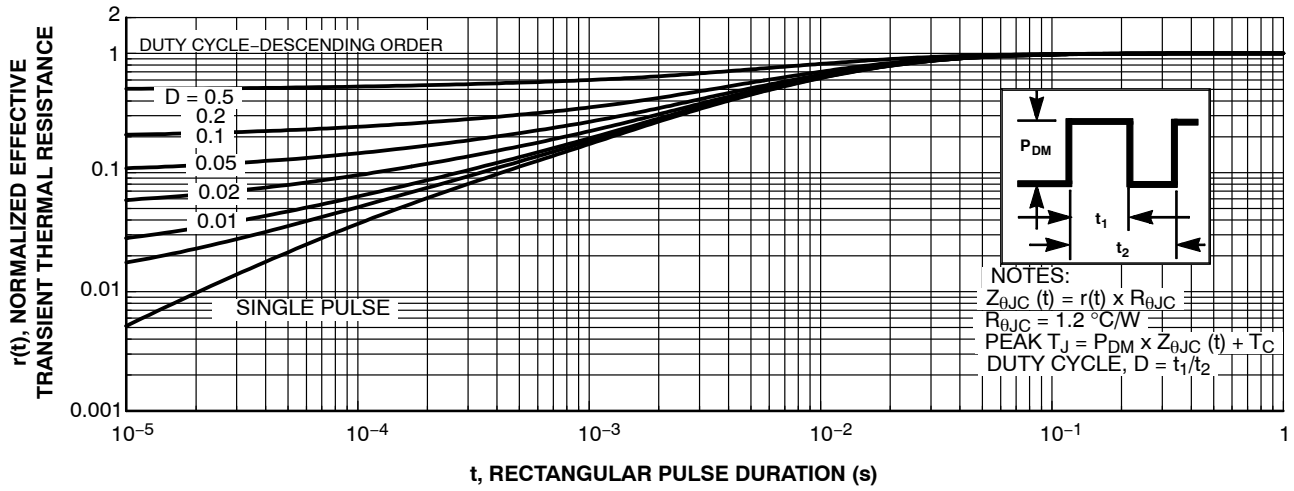
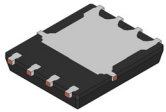


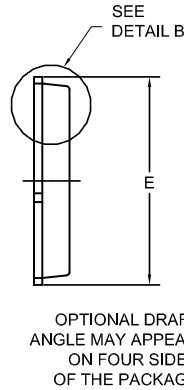
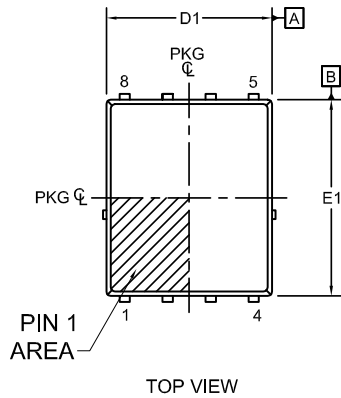
Figure 13. Transient Thermal Response Curve

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



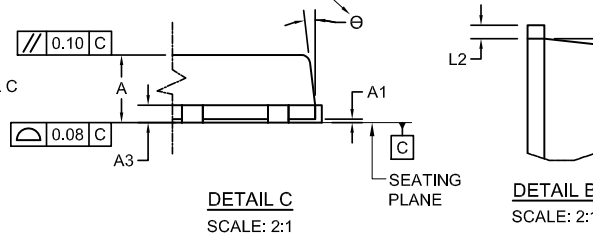
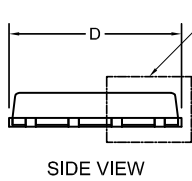
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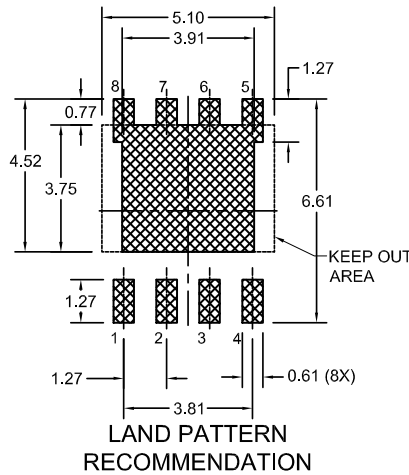
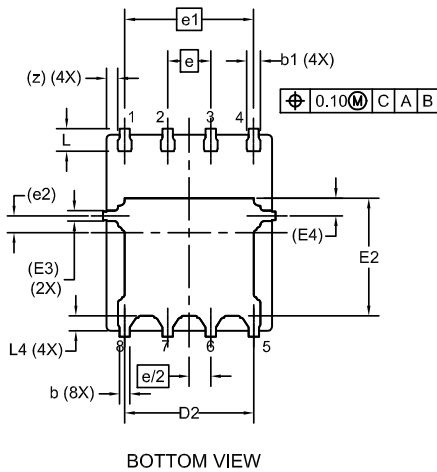


NOTES:

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.

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