

MOSFET – N-Channel, POWERTRENCH®

100 V, 4.4 A, 60 mΩ

FDM3622

General 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 low gate charge for superior switching performance.

Features

- Max $r_{DS(on)}$ = 60 mΩ at $V_{GS} = 10$ V, $I_D = 4.4$ A
- Max $r_{DS(on)}$ = 80 mΩ at $V_{GS} = 6.0$ V, $I_D = 3.8$ A
- Low Miller Charge
- Low QRR Body Diode
- Optimized efficiency at high frequencies
- UIS Capability (Single Pulse and Repetitive Pulse)
- This Device is Pb-Free, Halide Free and is RoHS Compliant

MOSFET MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

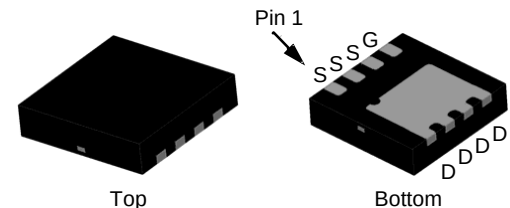
Symbol	Parameter	Ratings	Unit
V_{DS}	Drain to Source Voltage	100	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current – Continuous (Note 1a) – Pulsed	4.4 20	A
E_{AS}	Single Pulse Avalanche Energy (Note 3)	54	mJ
P_D	Power Dissipation (Note 1a) (Note 1b)	2.1 0.9	W
T_J, T_{STG}	Operating and Storage 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 ($T_A = 25^\circ\text{C}$, unless otherwise noted)

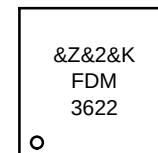
Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	3.0	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	60	

V_{DS}	$r_{DS(on)}$ MAX	I_D MAX
100 V	60 mΩ @ 10 V	4.4 A
	80 mΩ @ 6.0 V	



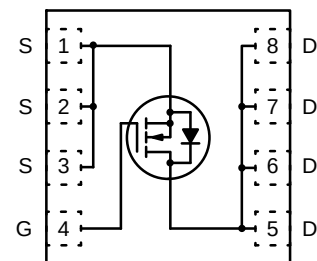
WDFN8 3.3x3.3, 0.65P
(MLP 3x3)
CASE 511DH

MARKING DIAGRAM



&Z = Assembly Plant Code
 &2 = 2-Digit Date Code
 &K = 2-Digits Lot Run Traceability Code
 FDM3622 = Specific Device Code

PIN ASSIGNMENT



ORDERING INFORMATION

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

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

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

OFF CHARACTERISTICS

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\ \mu\text{A}$, $V_{GS} = 0\ \text{V}$	100	–	–	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 80\ \text{V}$, $V_{GS} = 0\ \text{V}$	–	–	1	μA
		$V_{DS} = 80\ \text{V}$, $V_{GS} = 0\ \text{V}$, $T_J = 100^\circ\text{C}$	–	–	250	
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	–	4	V
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\ \text{V}$, $I_D = 4.4\ \text{A}$	–	44	60	$\text{m}\Omega$
		$V_{GS} = 6.0\ \text{V}$, $I_D = 3.8\ \text{A}$	–	56	80	
		$V_{GS} = 10\ \text{V}$, $I_D = 4.4\ \text{A}$, $T_J = 150^\circ\text{C}$	–	92	120	

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 25\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	–	820	1090	pF
C_{oss}	Output Capacitance		–	125	170	pF
C_{rss}	Reverse Transfer Capacitance		–	35	55	pF
R_g	Gate Resistance	$V_{DS} = 15\ \text{mV}$, $f = 1\ \text{MHz}$	0.1	3.1	6.2	Ω

SWITCHING CHARACTERISTICS

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\ \text{V}$, $I_D = 4.4\ \text{A}$, $V_{GS} = 10\ \text{V}$, $R_{GEN} = 24\ \Omega$	–	11	20	ns
t_r	Rise Time		–	25	40	ns
$t_{d(off)}$	Turn-Off Delay Time		–	35	56	ns
t_f	Fall Time		–	26	42	ns
Q_g	Total Gate Charge	$V_{GS} = 10\ \text{V}$, $V_{DD} = 50\ \text{V}$, $I_D = 4.4\ \text{A}$	–	13	17	nC
Q_{gs}	Gate to Source Gate Charge		–	3.6	–	nC
Q_{gd}	Gate to Drain "Miller" Charge		–	3.4	–	nC

DRAIN-SOURCE CHARACTERISTICS

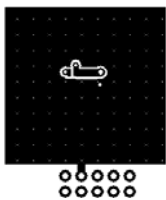
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\ \text{V}$, $I_S = 4.4\ \text{A}$	–	–	1.25	V
		$V_{GS} = 0\ \text{V}$, $I_S = 2.2\ \text{A}$	–	–	1.0	V
t_{rr}	Reverse Recovery Time	$I_F = 4.4\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$	–	–	56	ns
Q_{rr}	Reverse Recovery Charge		–	–	108	nC

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.

- $R_{\theta JA}$ is determined with the device mounted on a 1 in² oz copper pad on a 1.5x1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.

(a) $R_{\theta JA} = 60^\circ\text{C/W}$ when mounted on a 1 in² pad of 2 oz copper, 1.5"x1.5"x0.062" thick PCB.

(b) $R_{\theta JA} = 135^\circ\text{C/W}$ when mounted on a minimum pad of 2 oz copper.



a. 60°C/W when mounted on a 1 in² pad of 2 oz copper.



b. 135°C/W when mounted on a minimum pad of 2 oz copper.

- Pulse Test: Pulse Width < 300 μs , Duty cycle < 2.0%.

- E_{AS} of 54 mJ is based on starting $T_J = 25^\circ\text{C}$; N-ch: $L = 3\ \text{mH}$, $I_{AS} = 6\ \text{A}$, $V_{DD} = 100\ \text{V}$, $V_{GS} = 10\ \text{V}$.

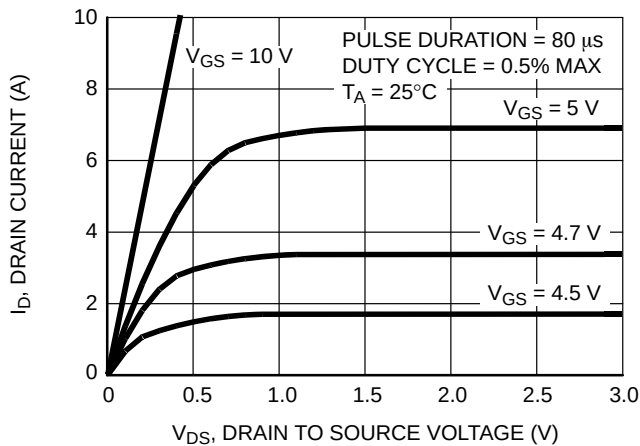
TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise noted)

Figure 1. On-Region Characteristics

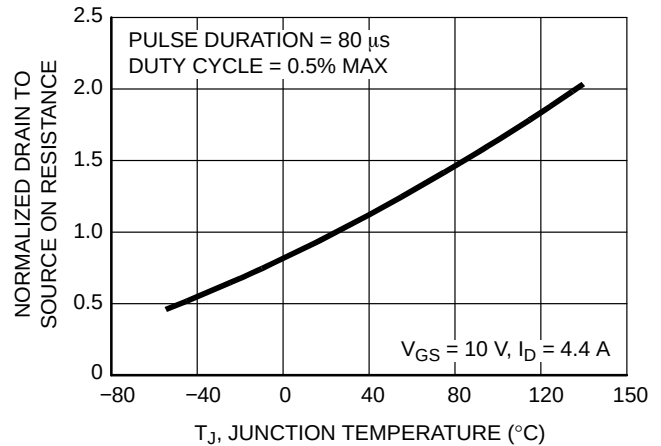


Figure 2. Normalized On-Resistance vs. Junction Temperature

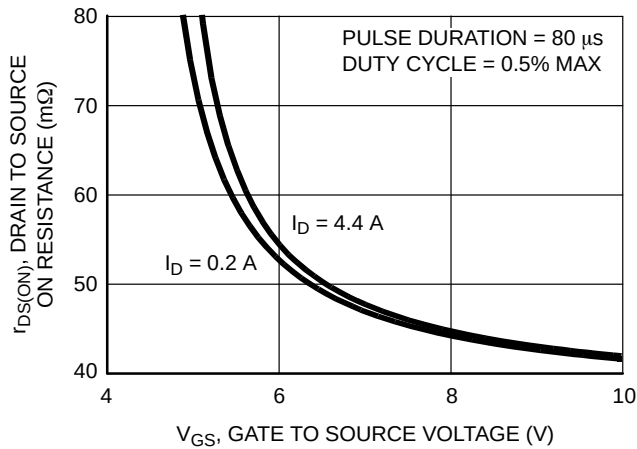


Figure 3. On-Resistance vs. Gate to Source Voltage

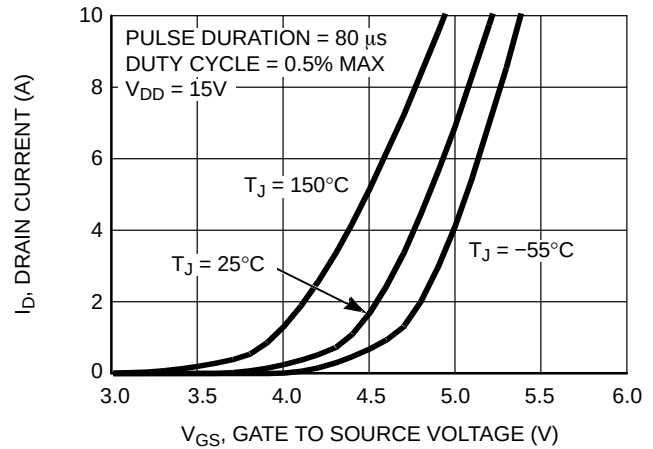


Figure 4. Transfer Characteristics

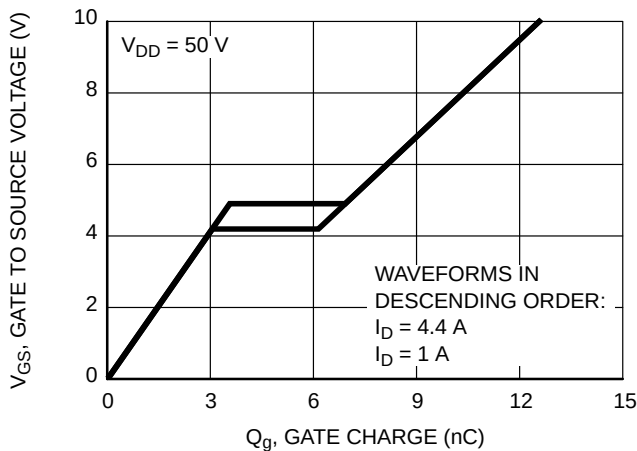


Figure 5. Gate Charge Characteristics

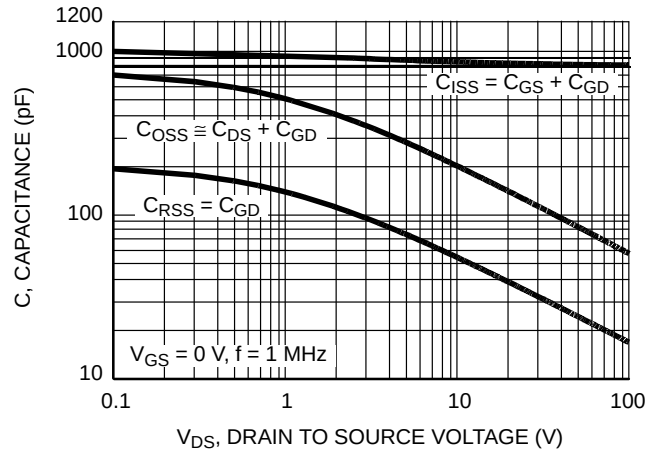


Figure 6. Capacitance vs. Drain to Source Voltage

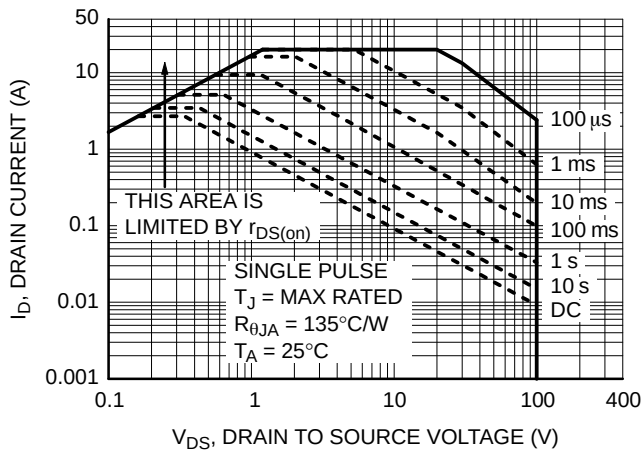
TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise noted) (continued)

Figure 7. Forward Bias Safe Operating Area

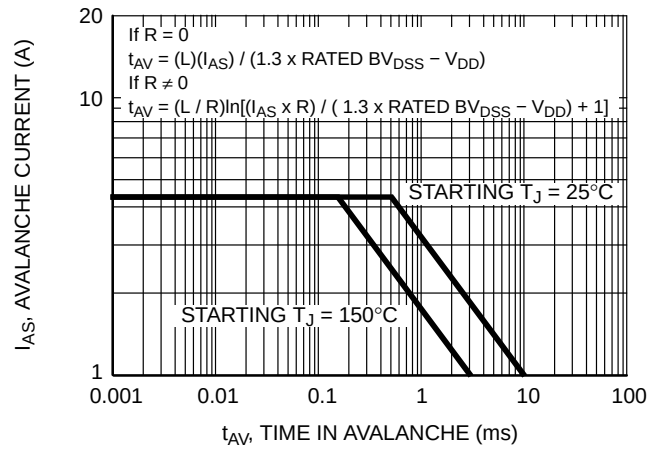


Figure 8. Uncalamped Inductive Switching Capability

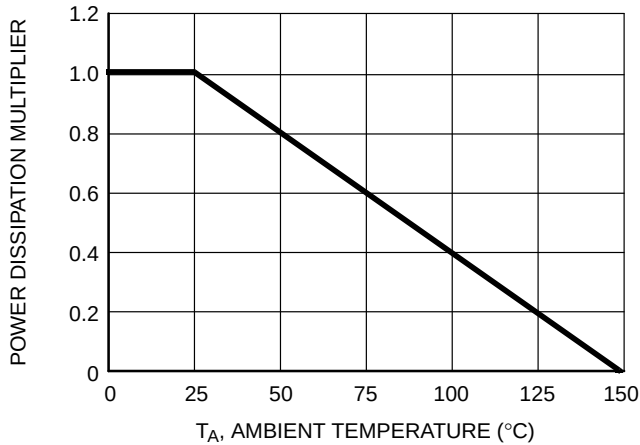


Figure 9. Normalized Power Dissipation vs. Ambient Temperature

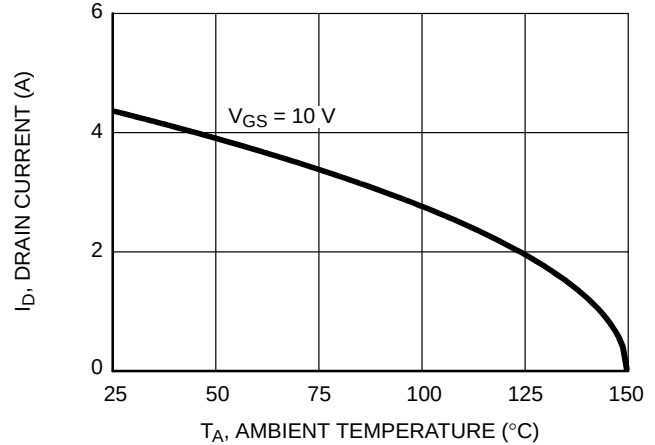


Figure 10. Maximum Continuous Drain Current vs. Ambient Temperature

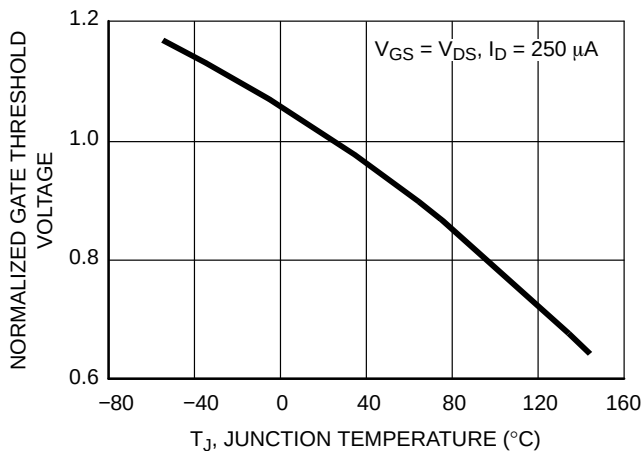


Figure 11. Normalized Gate Threshold Voltage vs. Junction Temperature

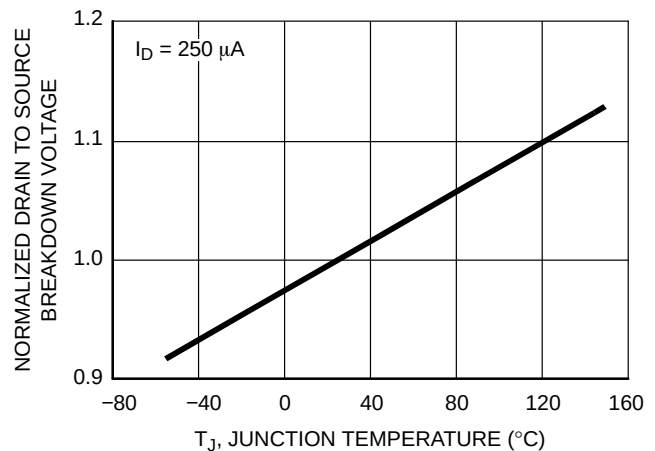


Figure 12. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

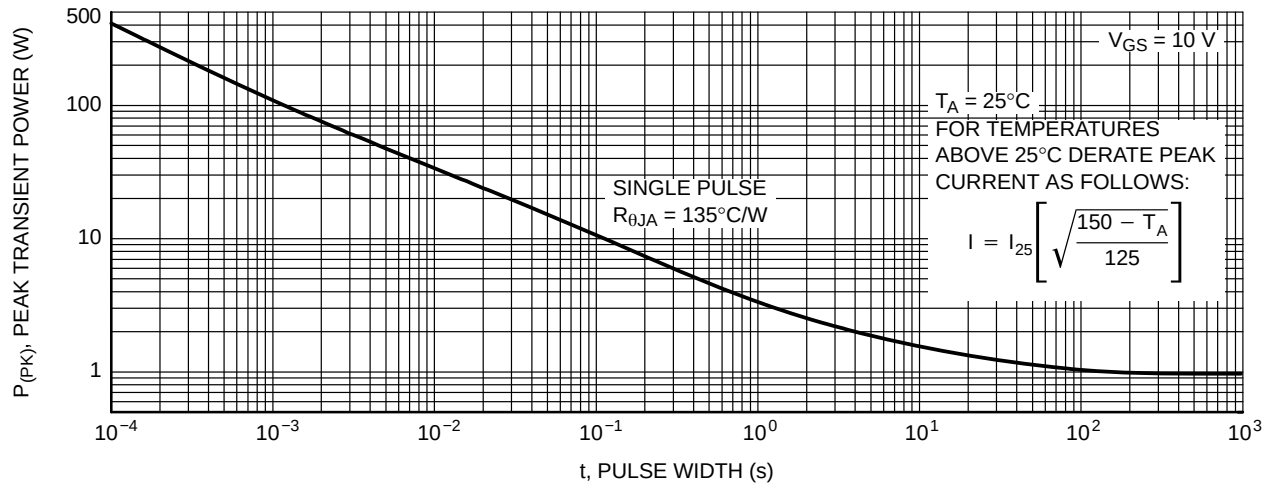
TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise noted) (continued)

Figure 13. Peak Current Capability

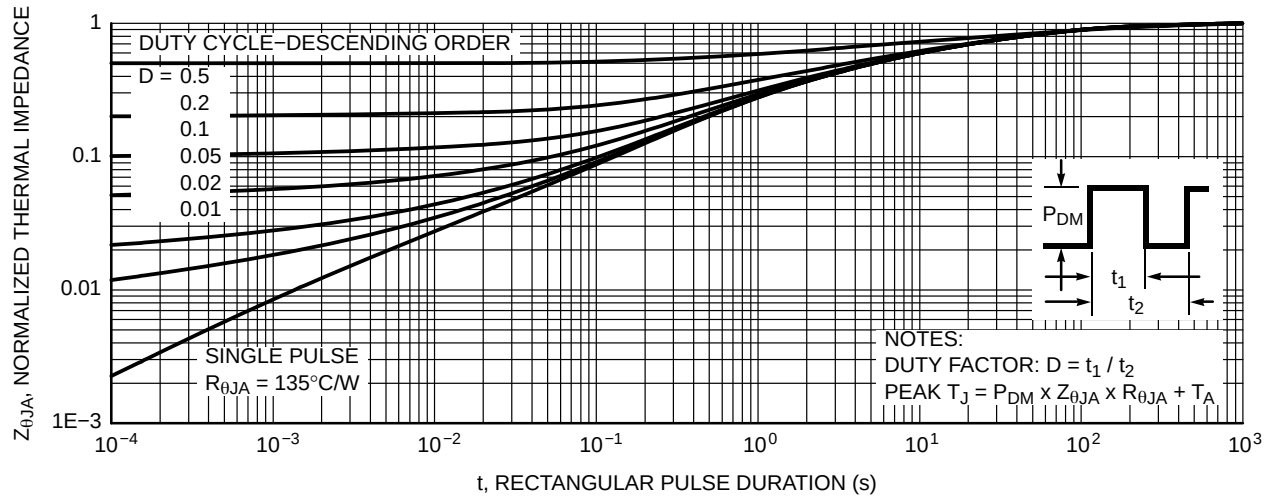


Figure 14. Transient Thermal Response Curve

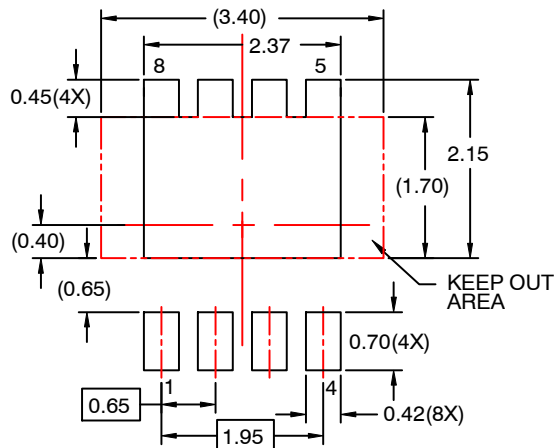
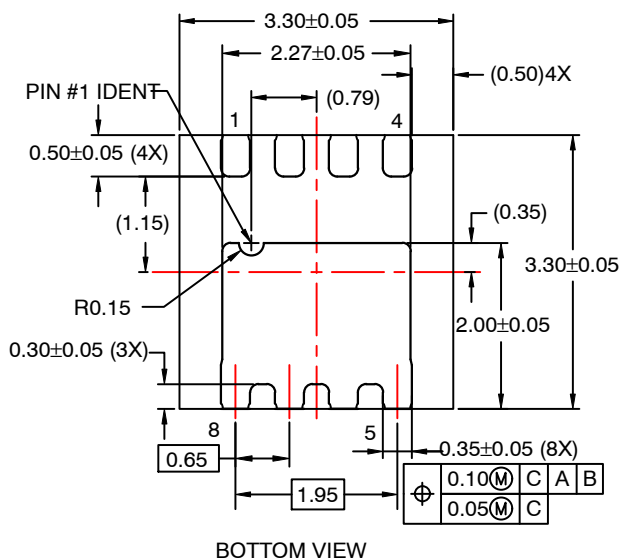
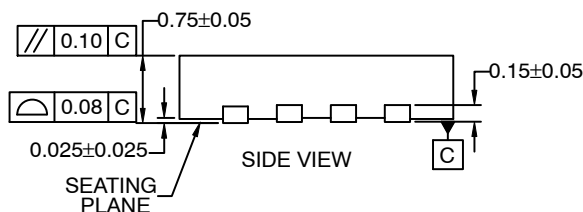
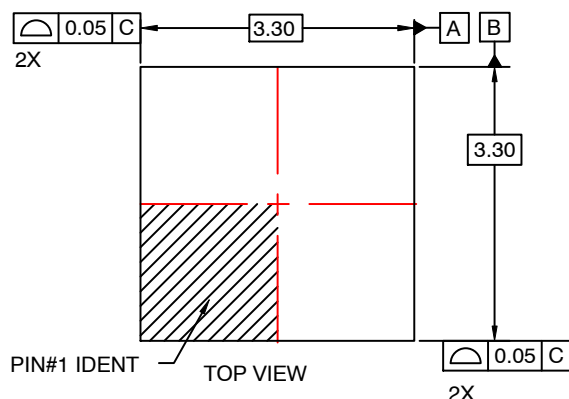
PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Reel Size	Tape Width	Shipping [†]
FDM3622	FDM3622	WDFN8 3.3x3.3, 0.65P (MLP 3x3) (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.

WDFN8 3.3x3.3, 0.65P
CASE 511DH
ISSUE O

DATE 31 JUL 2016



RECOMMENDED LAND PATTERN

NOTES:

- A. DOES NOT CONFORM TO JEDEC REGISTRATION MO-229
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.

DOCUMENT NUMBER:	98AON13625G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	WDFN8 3.3X3.3, 0.65P	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