

# MOSFET – N-Channel, Shielded Gate, POWER trench®

100 V, 16 A, 56 mΩ

## FDMC8622

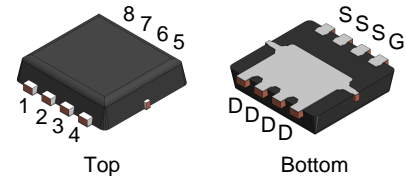
### General Description

This N-Channel MOSFET is produced using onsemi's advanced POWER trench process that incorporates Shielded Gate technology. This process has been optimized for  $r_{DS(on)}$ , switching performance and ruggedness.

### Features

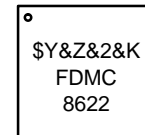
- Shielded Gate MOSFET Technology
- Max  $r_{DS(on)}$  = 56 mΩ at  $V_{GS} = 10$  V,  $I_D = 4$  A
- Max  $r_{DS(on)}$  = 90 mΩ at  $V_{GS} = 6$  V,  $I_D = 3$  A
- High Performance Trench Technology for Extremely Low  $r_{DS(on)}$
- High Power and Current Handling Capability in a Widely Used Surface Mount Package
- 100% UIL Tested
- This Device is Pb-Free and is ROHS Compliant

| $V_{DS}$ | $r_{DS(on)}$ MAX | $I_D$ MAX |
|----------|------------------|-----------|
| 100 V    | 56 mΩ @ 10 V     | 16 A      |
|          | 90 mΩ @ 6 V      |           |



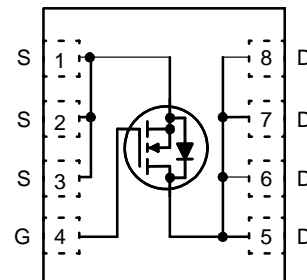
WDFN8 3.3x3.3, 0.65P  
(MLP 3.3x3.3)  
CASE 511DR

### MARKING DIAGRAM



\$Y = Logo  
&Z = Assembly Plant Code  
&2 = 2-Digit Date Code Format  
&K = 2-Digits Lot Run Traceability Code  
FDMC8622 = Device Code

### PIN ASSIGNMENT



### ORDERING INFORMATION

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

## 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                           |                      | $\pm 20$                 | V                |
| $I_D$          | Drain Current                                    | Continuous           | $T_C = 25^\circ\text{C}$ | A                |
|                |  | Continuous (Note 3a) | $T_A = 25^\circ\text{C}$ |                  |
|                |  | Pulsed (Note 2)      |                          |                  |
| $E_{AS}$       | Single Pulse Avalanche Energy (Note 1)           |                      | 37                       | mJ               |
| $P_D$          | Power Dissipation                                |                      | $T_C = 25^\circ\text{C}$ | W                |
|                | Power Dissipation (Note 3a)                      |                      | $T_A = 25^\circ\text{C}$ |                  |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range |                      | $-55$ to $+150$          | $^\circ\text{C}$ |

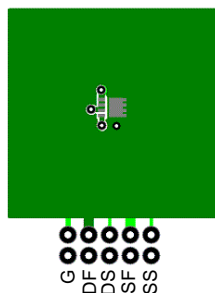
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- Starting  $T_J = 25^\circ\text{C}$ ; N-ch:  $L = 3.0$  mH,  $I_{AS} = 5.0$  A,  $V_{DD} = 100$  V,  $V_{GS} = 10$  V.
- Pulse  $I_D$  refers to Figure 11. Forward Bias Safe Operation Area.

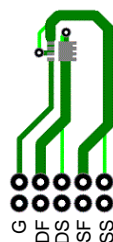
## THERMAL CHARACTERISTICS

| Symbol          | Parameter   | Ratings | Unit               |
|-----------------|---|---------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case (Note 3)     | 4.0     | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 3a) | 53      |                    |

- $R_{\theta JA}$  is determined with the device mounted on a 1 in<sup>2</sup> 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.  $53^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b.  $125^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper

**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 $25^\circ\text{C}$ | –   | 69 | –         | mV/ $^\circ\text{C}$ |
| $I_{DSS}$                            | Zero Gate Voltage Drain Current           | $V_{DS} = 80\ \text{V}$ , $V_{GS} = 0\ \text{V}$            | –   | –  | 1         | $\mu\text{A}$        |
| $I_{GSS}$                            | Gate to Source Leakage Current            | $V_{GS} = \pm 20\ \text{V}$ , $V_{DS} = 0\ \text{V}$        | –   | –  | $\pm 100$ | nA                   |

**ON CHARACTERISTICS**

|  |  |   |   |      |    |                      |
|--|--|---|---|------|----|----------------------|
| $V_{GS(th)}$                           | Gate to Source Threshold Voltage                         | $V_{GS} = V_{DS}$ , $I_D = 250\ \mu\text{A}$                              | 2 | 2.9  | 4  | V                    |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D = 250\ \mu\text{A}$ , referenced to $25^\circ\text{C}$               | – | –9   | –  | mV/ $^\circ\text{C}$ |
| $r_{DS(on)}$                           | Static Drain to Source On Resistance                     | $V_{GS} = 10\ \text{V}$ , $I_D = 4\ \text{A}$                             | – | 43.7 | 56 | m $\Omega$           |
|  |  | $V_{GS} = 6\ \text{V}$ , $I_D = 3\ \text{A}$                              | – | 59.9 | 90 |                      |
|  |  | $V_{GS} = 10\ \text{V}$ , $I_D = 4\ \text{A}$ , $T_J = 125^\circ\text{C}$ | – | 76.4 | 98 |                      |
| $g_{FS}$                               | Forward Transconductance                                 | $V_{DS} = 10\ \text{V}$ , $I_D = 4\ \text{A}$                             | – | 8.9  | –  | S                    |

**DYNAMIC CHARACTERISTICS**

|           |                              |  |   |      |     |          |
|-----------|------------------------------|--|---|------|-----|----------|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 50\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $f = 1\ \text{MHz}$ | – | 302  | 402 | pF       |
| $C_{oss}$ | Output Capacitance           |  | – | 72.5 | 96  | pF       |
| $C_{rss}$ | Reverse Transfer Capacitance |  | – | 4.2  | 6   | pF       |
| $R_g$     | Gate Resistance              |  | – | 1.0  | –   | $\Omega$ |

**SWITCHING CHARACTERISTICS**

|              |                               |   |   |      |     |    |
|--------------|-------------------------------|---|---|------|-----|----|
| $t_{d(on)}$  | Turn-On Delay Time            | $V_{DD} = 50\ \text{V}$ , $I_D = 4\ \text{A}$ , $V_{GS} = 10\ \text{V}$ , $R_{GEN} = 6\ \Omega$ | – | 5.9  | 12  | ns |
| $t_r$        | Rise Time                     |   | – | 1.6  | 10  | ns |
| $t_{d(off)}$ | Turn-Off Delay Time           |   | – | 10.2 | 18  | ns |
| $t_f$        | Fall Time                     |   | – | 2.2  | 10  | ns |
| $Q_{g(TOT)}$ | Total Gate Charge             | $V_{GS} = 0\ \text{V}$ to $10\ \text{V}$ , $V_{DD} = 50\ \text{V}$ , $I_D = 4\ \text{A}$        | – | 5.2  | 7.3 | nC |
| $Q_{g(TOT)}$ | Total Gate Charge             | $V_{GS} = 0\ \text{V}$ to $5\ \text{V}$ , $V_{DD} = 50\ \text{V}$ , $I_D = 4\ \text{A}$         | – | 3.0  | 4.1 | nC |
| $Q_{gs}$     | Total Gate Charge             | $V_{DD} = 50\ \text{V}$ , $I_D = 4\ \text{A}$   | – | 1.4  | –   | nC |
| $Q_{gd}$     | Gate to Drain "Miller" Charge |   | – | 1.4  | –   | nC |

**DRAIN-SOURCE DIODE CHARACTERISTICS**

|          |                                       |   |   |     |     |    |
|----------|---------------------------------------|---|---|-----|-----|----|
| $V_{SD}$ | Source to Drain Diode Forward Voltage | $V_{GS} = 0\ \text{V}$ , $I_S = 4\ \text{A}$ (Note 4)     | – | 0.8 | 1.3 | V  |
|          |                                       | $V_{GS} = 0\ \text{V}$ , $I_S = 1.7\ \text{A}$ (Note 4)   | – | 0.8 | 1.2 |    |
| $t_{rr}$ | Reverse Recovery Time                 | $I_F = 4\ \text{A}$ , $di/dt = 100\ \text{A}/\mu\text{s}$ | – | 36  | 57  | ns |
| $Q_{rr}$ | Reverse Recovery Charge               |   | – | 28  | 45  | 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.

4. Pulse Test: Pulse Width  $< 300\ \mu\text{s}$ , Duty cycle  $< 2.0\%$ .

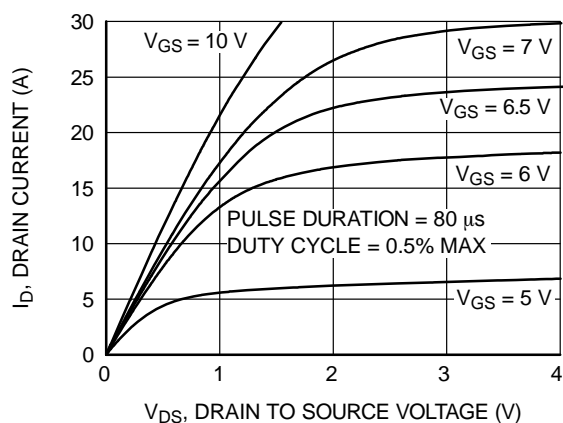
TYPICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

Figure 1. On Region Characteristics

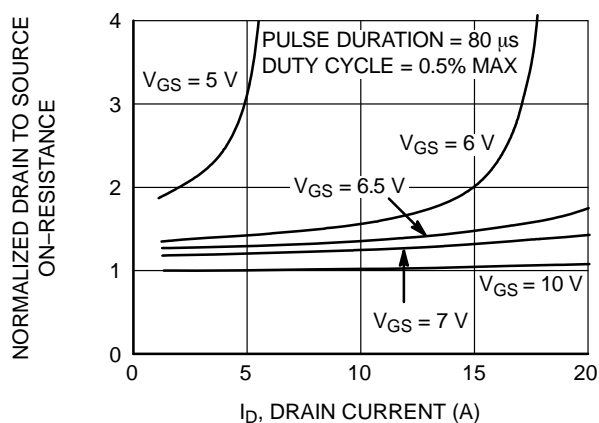


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

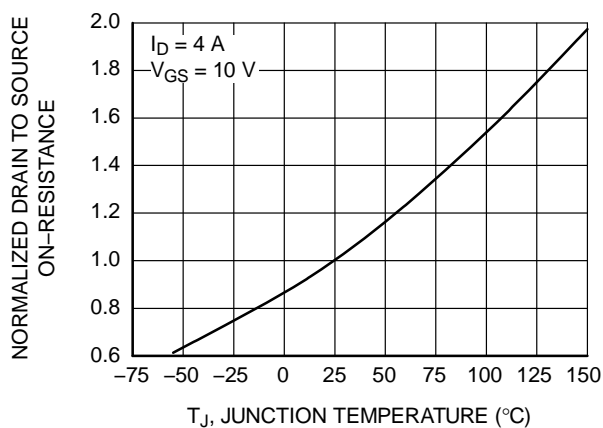


Figure 3. Normalized On-Resistance vs. Junction Temperature

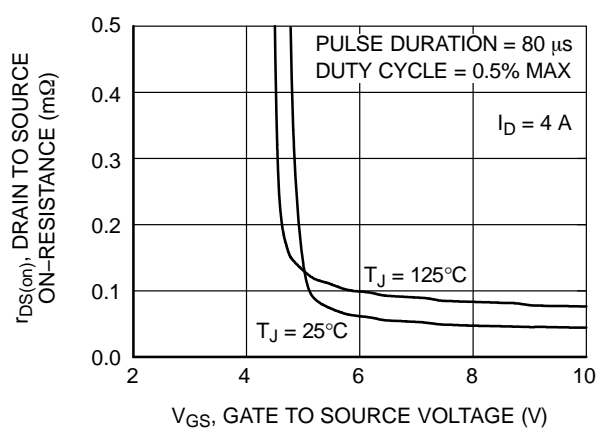


Figure 4. On-Resistance vs. Gate to Source Voltage

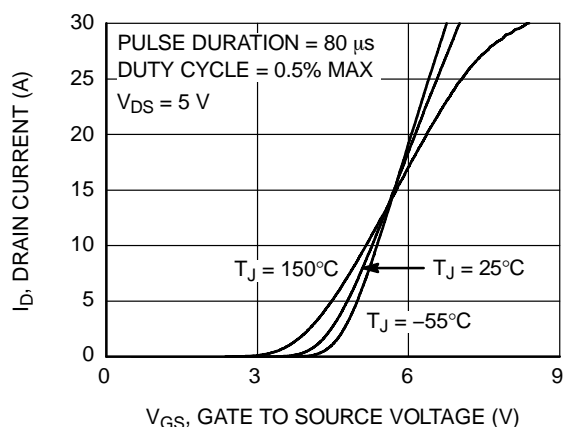


Figure 5. Transfer Characteristics

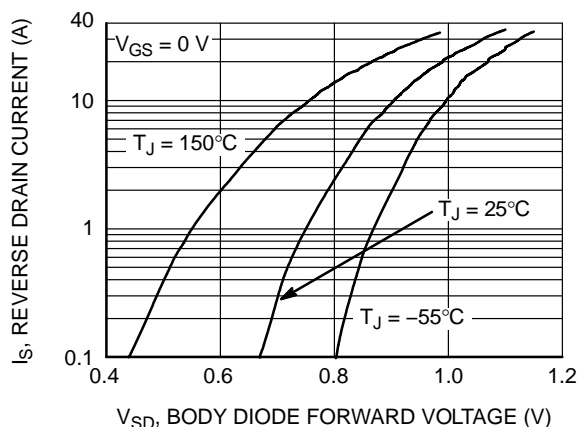


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

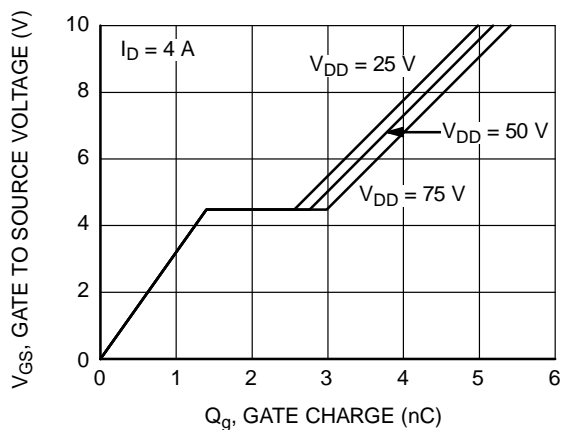
TYPICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$  unless otherwise noted) (continued)

Figure 7. Gate Charge Characteristics

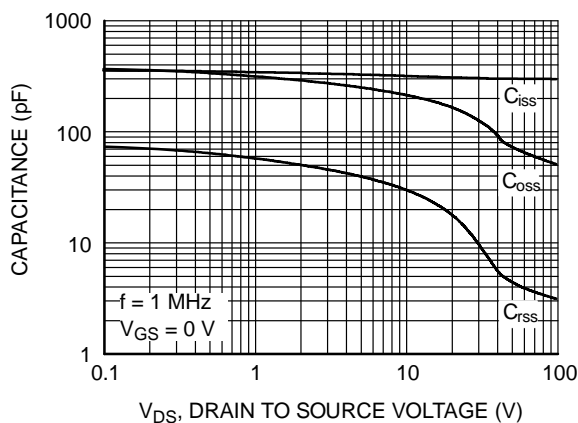


Figure 8. Capacitance vs. Drain to Source Voltage

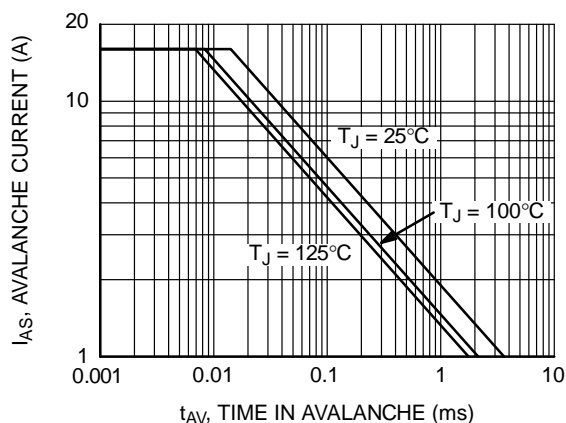


Figure 9. Unclamped Inductive Switching Capability

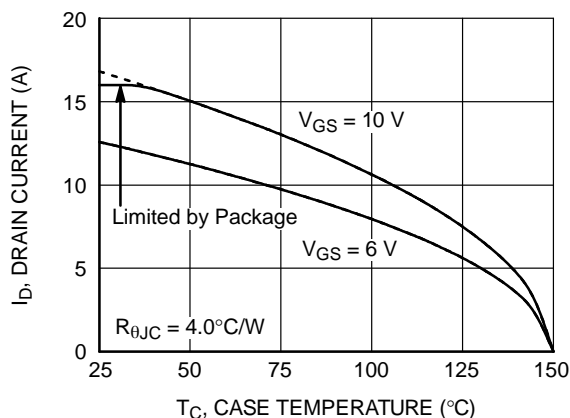


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

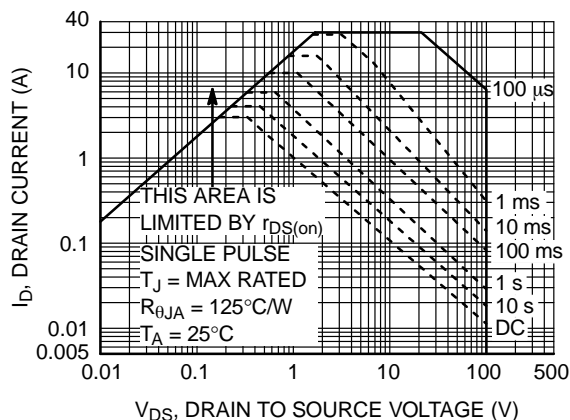


Figure 11. Forward Bias Safe Operating Area

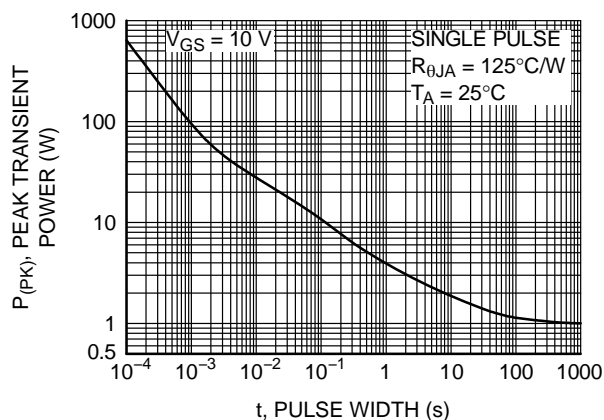


Figure 12. Single Pulse Maximum Power Dissipation

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

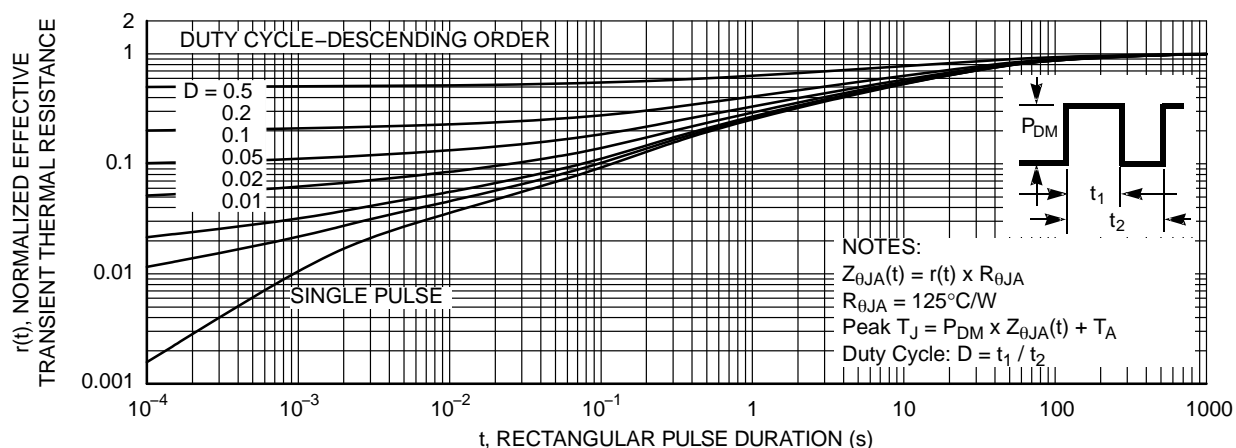
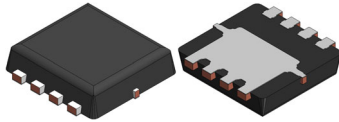


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

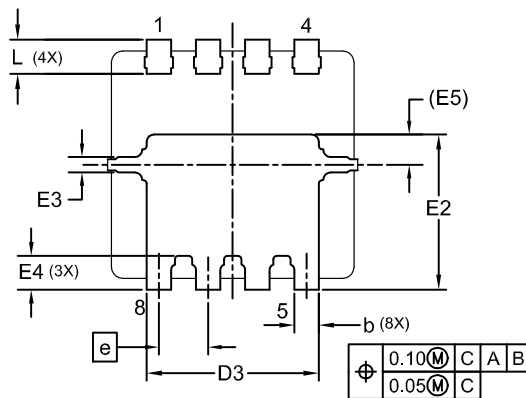
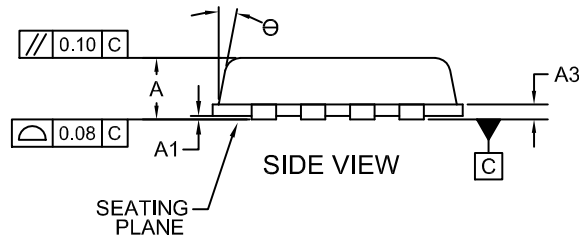
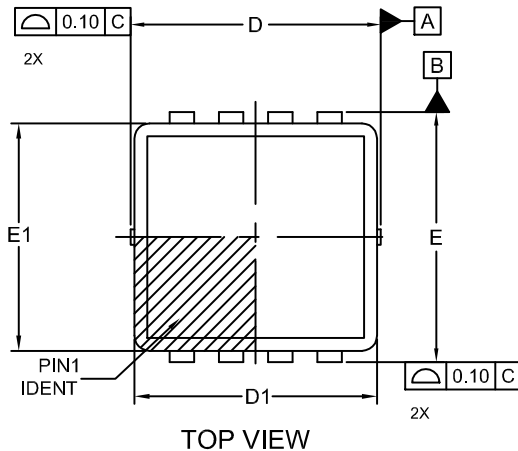
PACKAGE MARKING AND ORDERING INFORMATION

| Device   | Device Marking | Package Type                                       | Reel Size | Tape Width | Shipping <sup>†</sup> |
|----------|----------------|--|-----------|------------|-----------------------|
| FDMC8622 | FDMC8622       | WDFN8 3.3x3.3, 0.65P<br>(MLP 3.3x3.3)<br>(Pb-Free) | 13"       | 12 mm      | 3000 / Tape & Reel    |

<sup>†</sup>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.

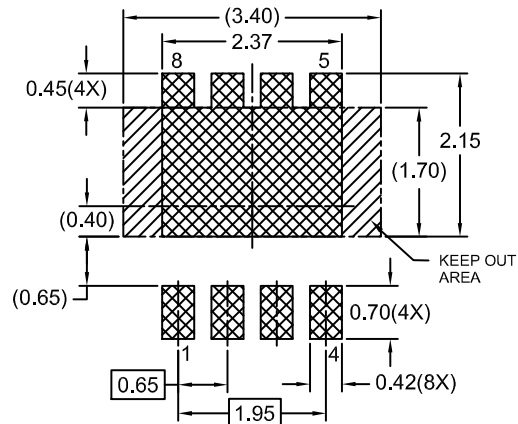

**WDFN8 3.3x3.3, 0.65P**  
**CASE 511DR**  
**ISSUE B**

DATE 02 FEB 2022

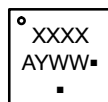

**NOTES:**

- A. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.  
B. SEATING PLANE IS DEFINED BY TERMINAL TIPS ONLY  
C. BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH PROTRUSIONS NOR GATE BURRS. MOLD FLASH PROTRUSION OR GATE BURR DOES NOT EXCEED 0.150MM.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN         | NOM  | MAX  |
| A   | 0.70        | 0.75 | 0.80 |
| A1  | 0.00        | -    | 0.05 |
| A3  | 0.15        | 0.20 | 0.25 |
| b   | 0.27        | 0.32 | 0.37 |
| D   | 3.20        | 3.30 | 3.40 |
| D1  | 3.10        | 3.20 | 3.30 |
| D3  | 2.17        | 2.27 | 2.37 |
| E   | 3.20        | 3.30 | 3.40 |
| E1  | 2.90        | 3.00 | 3.10 |
| E2  | 1.95        | 2.05 | 2.15 |
| E3  | 0.15        | 0.20 | 0.25 |
| E4  | 0.30        | 0.40 | 0.50 |
| E5  | 0.40 REF    |      |      |
| e   | 0.65 BSC    |      |      |
| L   | 0.30        | 0.40 | 0.50 |
| Θ   | 0°          | -    | 12°  |


**RECOMMENDED LAND PATTERN**

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

**GENERIC MARKING DIAGRAM\***


XXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

|                         |                             |   |
|-------------------------|-----------------------------|---|
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| <b>DESCRIPTION:</b>     | <b>WDFN8 3.3x3.3, 0.65P</b> | <b>PAGE 1 OF 1</b>  |

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