

# 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)

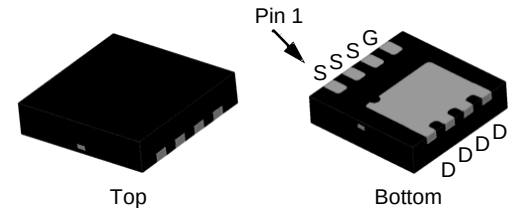
| Symbol         | Parameter                                           | Ratings         | Unit             |
|----------------|-----------------------------------------------------|-----------------|------------------|
| $V_{DS}$       | Drain to Source Voltage                             | 100             | V                |
| $V_{GS}$       | Gate to Source Voltage                              | $\pm 20$        | V                |
| $I_D$          | Drain Current<br>– Continuous (Note 1a)<br>– Pulsed | 4.4<br>20       | A                |
| $E_{AS}$       | Single Pulse Avalanche Energy (Note 3)              | 54              | mJ               |
| $P_D$          | Power Dissipation<br>(Note 1a)<br>(Note 1b)         | 2.1<br>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)

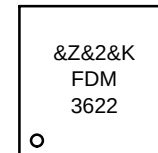
| Symbol          | Parameter                                            | Ratings | Unit                      |
|-----------------|------------------------------------------------------|---------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case<br>(Note 1)     |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



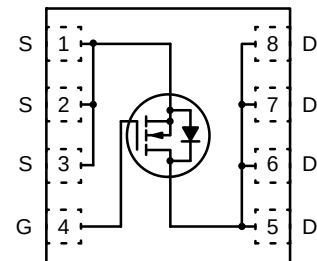
WDFN8 3.3x3.3, 0.65P  
(MLP 3x3)  
CASE 511DH

### 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         | $\mu\text{A}$ |
|            |                                   | $V_{DS} = 80\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $T_J = 100^\circ\text{C}$ | –   | – | 250       |               |
| $I_{GSS}$  | Gate to Source Leakage Current    | $V_{GS} = \pm 20\ \text{V}$ , $V_{DS} = 0\ \text{V}$                         | –   | – | $\pm 100$ | 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  | $\Omega$ |

**SWITCHING CHARACTERISTICS**

|              |                               |                                                                                                       |   |     |    |    |
|--------------|-------------------------------|-------------------------------------------------------------------------------------------------------|---|-----|----|----|
| $t_{d(on)}$  | Turn-On Delay Time            | $V_{DD} = 50\ \text{V}$ , $I_D = 4.4\ \text{A}$ , $V_{GS} = 10\ \text{V}$ ,<br>$R_{GEN} = 24\ \Omega$ | – | 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**

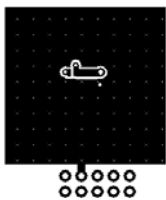
|          |                                       |                                                             |   |   |      |    |
|----------|---------------------------------------|-------------------------------------------------------------|---|---|------|----|
| $V_{SD}$ | Source to Drain Diode 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 in<sup>2</sup> 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)  $R_{\theta JA} = 60^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper, 1.5'x1.5'x0.062' thick PCB.

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



a.  $60^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



b.  $135^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper.

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

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

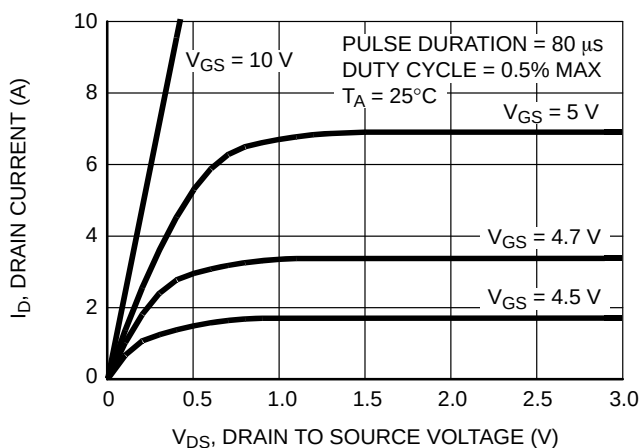
TYPICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)

Figure 1. On-Region Characteristics

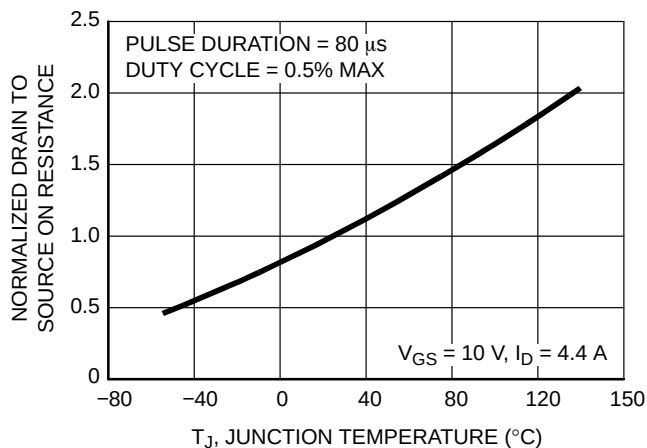


Figure 2. Normalized On-Resistance vs. Junction Temperature

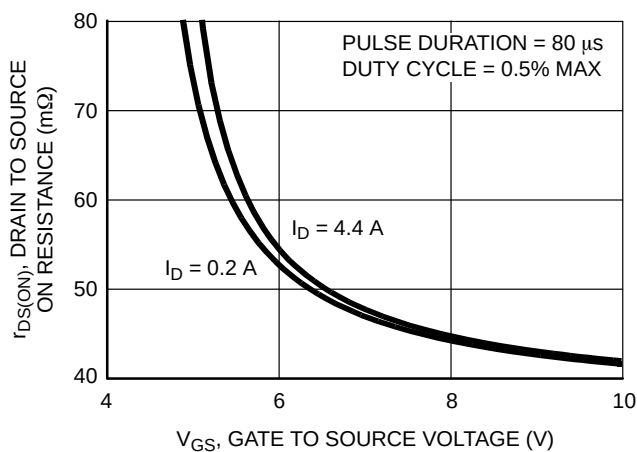


Figure 3. On-Resistance vs. Gate to Source Voltage

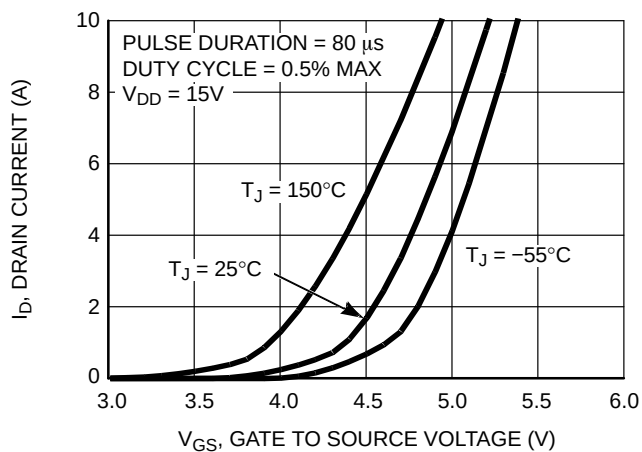


Figure 4. Transfer Characteristics

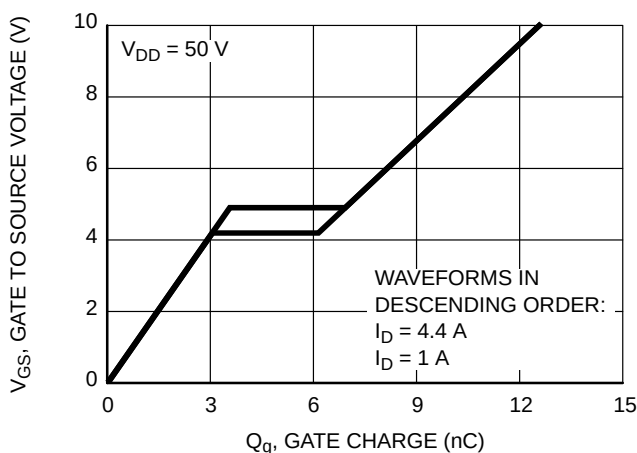


Figure 5. Gate Charge Characteristics

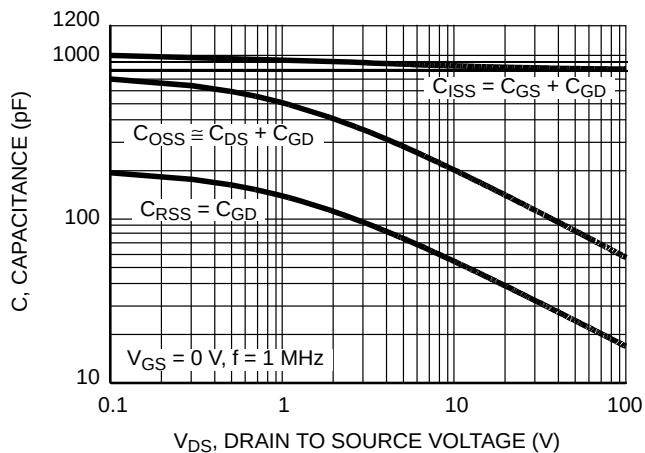


Figure 6. Capacitance vs. Drain to Source Voltage

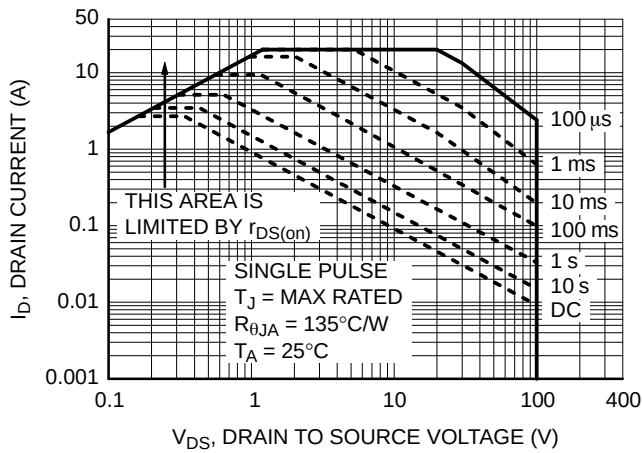
TYPICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise noted) (continued)

Figure 7. Forward Bias Safe Operating Area

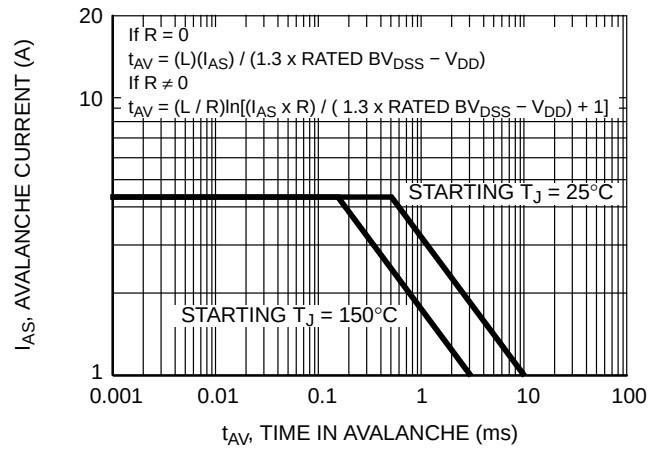


Figure 8. Uncalamped Inductive Switching Capability

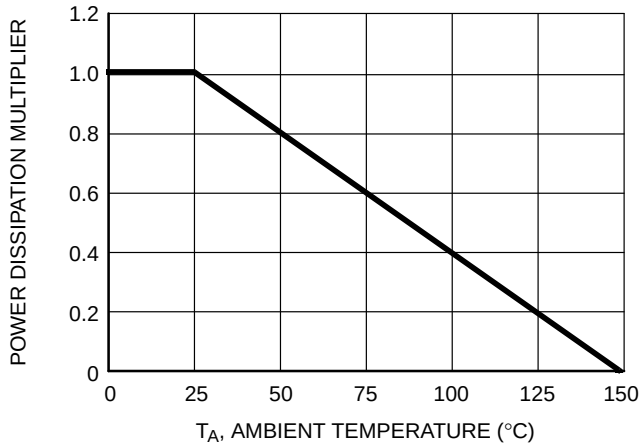


Figure 9. Normalized Power Dissipation vs. Ambient Temperature

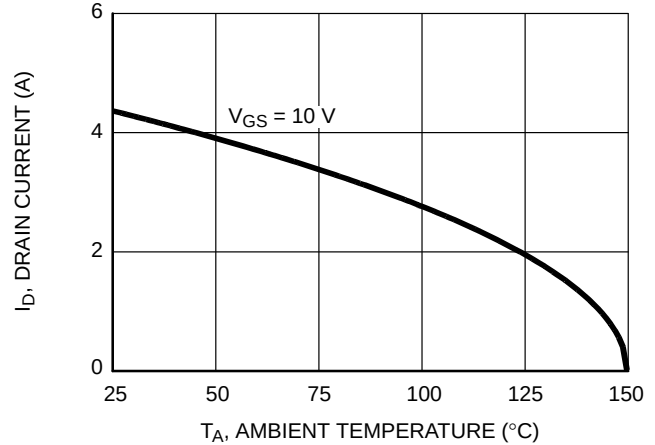


Figure 10. Maximum Continuous Drain Current vs. Ambient Temperature

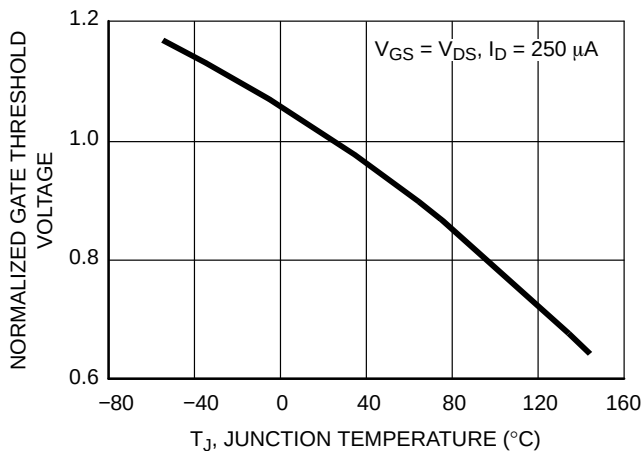


Figure 11. Normalized Gate Threshold Voltage vs. Junction Temperature

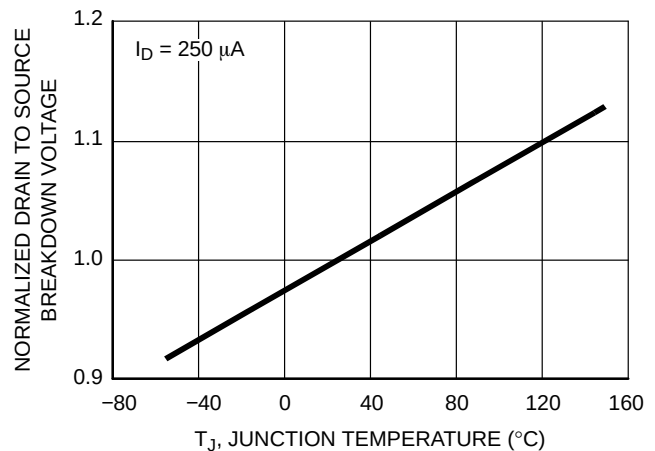


Figure 12. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

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

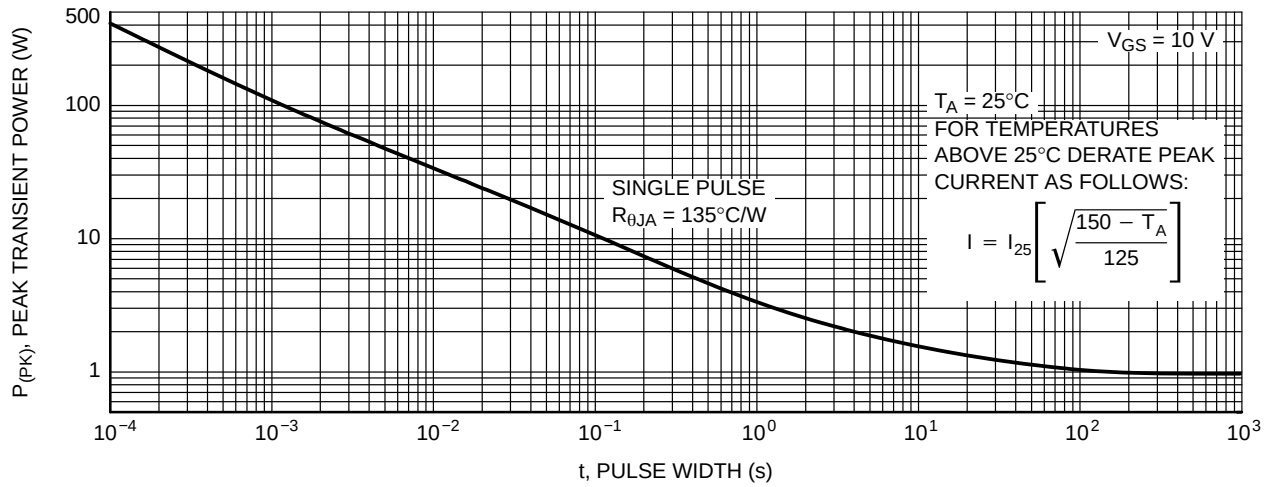


Figure 13. Peak Current Capability

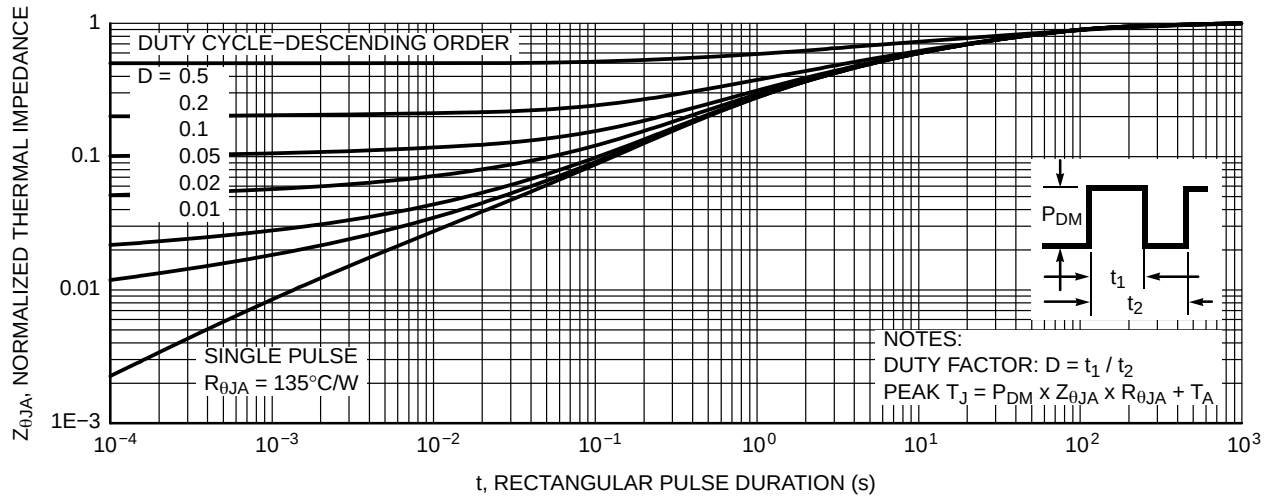


Figure 14. Transient Thermal Response Curve

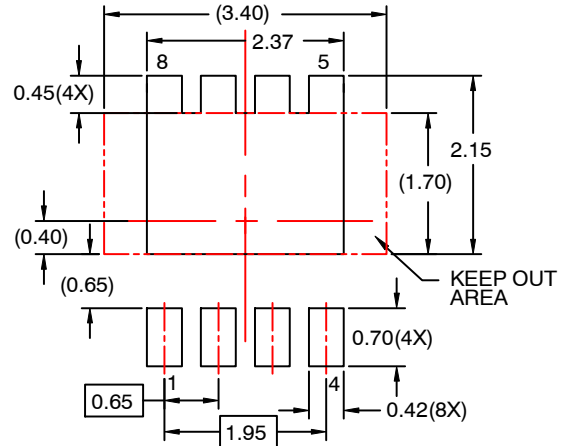
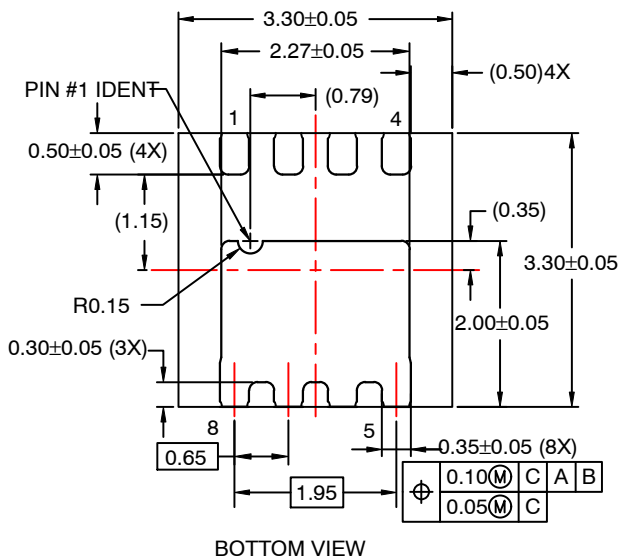
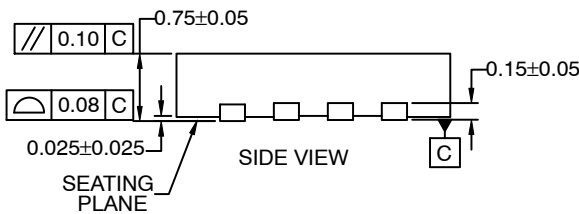
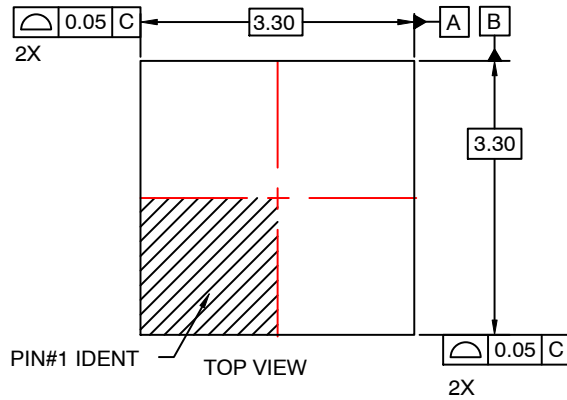
PACKAGE MARKING AND ORDERING INFORMATION

| Device  | Device Marking | Package                                                     | Reel Size | Tape Width | Shipping <sup>†</sup> |
|---------|----------------|-------------------------------------------------------------|-----------|------------|-----------------------|
| FDM3622 | FDM3622        | WDFN8 3.3x3.3, 0.65P<br>(MLP 3x3)<br>(Pb-Free, Halide 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 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.

|                         |                             |                                                                                                                                                                                  |
|-------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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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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