

# MOSFET – Dual, N-Channel, POWERTRENCH®

**30 V, 4.8 A, 40 mΩ**

## FDMB3800N

### General Description

These N-Channel Logic Level MOSFETs are produced using onsemi's advanced POWERTRENCH process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

These devices are well suited for low voltage and battery powered applications where low in-line power loss and fast switching are required.

### Features

- Max  $r_{DS(on)}$  = 40 mΩ at  $V_{GS} = 10$  V,  $I_D = 4.8$  A
- Max  $r_{DS(on)}$  = 51 mΩ at  $V_{GS} = 4.5$  V,  $I_D = 4.3$  A
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $r_{DS(on)}$
- High Power and Current Handling Capability
- This Device is Pb-Free, Halide Free and is RoHS Compliant

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

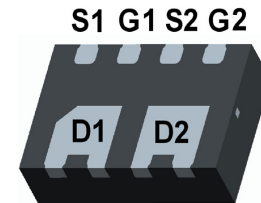
| Symbol         | Parameter                                                                                     | Ratings         | Unit             |
|----------------|-----------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DS}$       | Drain to Source Voltage                                                                       | 30              | V                |
| $V_{GS}$       | Gate to Source Voltage                                                                        | $\pm 20$        | V                |
| $I_D$          | Drain Current<br>– Continuous $T_A = 25^\circ\text{C}$ (Note 1a)<br>– Pulsed                  | 4.8<br>9        | A                |
| $P_D$          | Power Dissipation<br>$T_A = 25^\circ\text{C}$ (Note 1a)<br>$T_A = 25^\circ\text{C}$ (Note 1b) | 1.6<br>0.75     | 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)

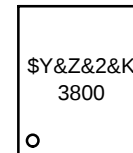
| Symbol          | Parameter                                         | Ratings | Unit               |
|-----------------|---------------------------------------------------|---------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 80      | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1b) | 165     |                    |

| $V_{DS}$ | $r_{DS(on)}$ MAX | $I_D$ MAX |
|----------|------------------|-----------|
| 30 V     | 40 mΩ @ 4.8 V    | 4.8 A     |
|          | 51 mΩ @ 4.3 V    |           |



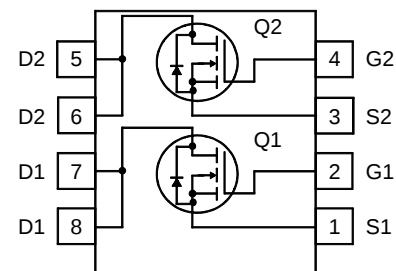
WDFN8 3x1.9, 0.65P  
(MicroFET 3x1.9)  
CASE 511CW

### MARKING DIAGRAM



\$Y = Logo  
 &Z = Assembly Plant Code  
 &2 = 2-Digit Date Code  
 &K = 2-Digits Lot Run Traceability Code  
 3800 = Specific Device Code

### PIN ASSIGNMENT



### ORDERING INFORMATION

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

# FDMB3800N

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

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

### OFF CHARACTERISTICS

|                                      |                                           |                                                                      |    |    |      |       |
|--------------------------------------|-------------------------------------------|----------------------------------------------------------------------|----|----|------|-------|
| BV <sub>DSS</sub>                    | Drain to Source Breakdown Voltage         | I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V                       | 30 | –  | –    | V     |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | I <sub>D</sub> = 250 μA, referenced to 25°C                          | –  | 24 | –    | mV/°C |
| I <sub>DSS</sub>                     | Zero Gate Voltage Drain Current           | V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V                        | –  | –  | 1    | μA    |
|                                      |                                           | V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C | –  | –  | 10   |       |
| I <sub>GSS</sub>                     | Gate to Source Leakage Current            | V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V                       | –  | –  | ±100 | nA    |

### ON CHARACTERISTICS

|                                        |                                                          |                                                                        |   |     |    |       |
|----------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------|---|-----|----|-------|
| V <sub>GS(th)</sub>                    | Gate to Source Threshold Voltage                         | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA            | 1 | 1.9 | 3  | V     |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | I <sub>D</sub> = 250 μA, referenced to 25°C                            | – | –4  | –  | mV/°C |
| r <sub>DS(on)</sub>                    | Drain to Source On Resistance                            | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.8 A                         | – | 32  | 40 | mΩ    |
|                                        |                                                          | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 4.3 A                        | – | 41  | 51 |       |
|                                        |                                                          | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.8 A, T <sub>J</sub> = 125°C | – | 43  | 61 |       |
| g <sub>FS</sub>                        | Forward Transconductance                                 | V <sub>DS</sub> = 5 V, I <sub>D</sub> = 4.8 A                          | – | 14  | –  | S     |

### DYNAMIC CHARACTERISTICS

|                  |                              |                                                          |   |     |     |    |
|------------------|------------------------------|----------------------------------------------------------|---|-----|-----|----|
| C <sub>iss</sub> | Input Capacitance            | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz | – | 350 | 465 | pF |
| C <sub>oss</sub> | Output Capacitance           |                                                          | – | 90  | 120 | pF |
| C <sub>rss</sub> | Reverse Transfer Capacitance |                                                          | – | 40  | 60  | pF |
| R <sub>g</sub>   | Gate Resistance              | f = 1 MHz                                                | – | 3   | –   | Ω  |

### SWITCHING CHARACTERISTICS

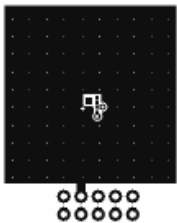
|                     |                               |                                                                                              |   |     |     |    |
|---------------------|-------------------------------|----------------------------------------------------------------------------------------------|---|-----|-----|----|
| t <sub>d(on)</sub>  | Turn-On Delay Time            | V <sub>DD</sub> = 15 V, I <sub>D</sub> = 1 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6 Ω | – | 8   | 16  | ns |
| t <sub>r</sub>      | Rise Time                     |                                                                                              | – | 5   | 10  | ns |
| t <sub>d(off)</sub> | Turn-Off Delay Time           |                                                                                              | – | 21  | 34  | ns |
| t <sub>f</sub>      | Fall Time                     |                                                                                              | – | 2   | 10  | ns |
| Q <sub>g(TOT)</sub> | Total Gate Charge at 5 V      | V <sub>GS</sub> = 0 V to 5 V, V <sub>DD</sub> = 15 V, I <sub>D</sub> = 7.5 A                 | – | 4   | 5.6 | nC |
| Q <sub>gs</sub>     | Gate to Source Gate Charge    | V <sub>DD</sub> = 15 V, I <sub>D</sub> = 7.5 A                                               | – | 1.0 | –   | nC |
| Q <sub>gd</sub>     | Gate to Drain “Miller” Charge |                                                                                              | – | 1.5 | –   | nC |

### DRAIN-SOURCE CHARACTERISTICS

|                 |                                                         |                                                         |   |     |      |    |
|-----------------|---------------------------------------------------------|---------------------------------------------------------|---|-----|------|----|
| I <sub>S</sub>  | Maximum Continuous Drain – Source Diode Forward Current |                                                         | – | –   | 1.25 | A  |
| V <sub>SD</sub> | Source to Drain Diode Forward Voltage                   | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 1.25 A (Note 2) | – | 0.8 | 1.2  | V  |
| t <sub>rr</sub> | Reverse Recovery Time                                   | I <sub>F</sub> = 4.8 A, di/dt = 100 A/μs                | – | 17  | –    | ns |
| Q <sub>rr</sub> | Reverse Recovery Charge                                 |                                                         | – | 7   | –    | 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<sub>θJA</sub> 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<sub>θJC</sub> is guaranteed by design while R<sub>θCA</sub> is determined by the user's board design.



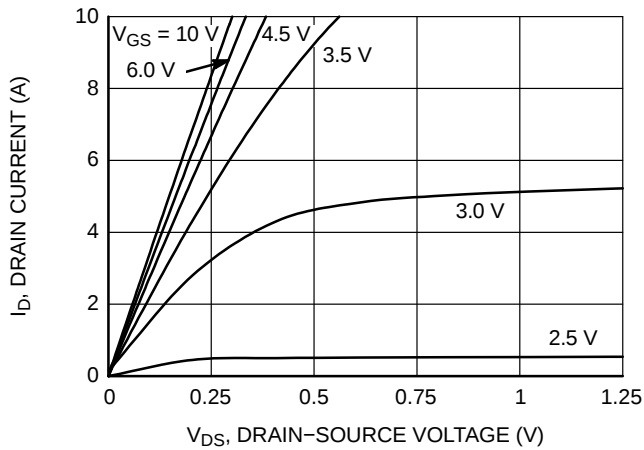
- a. 80°C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



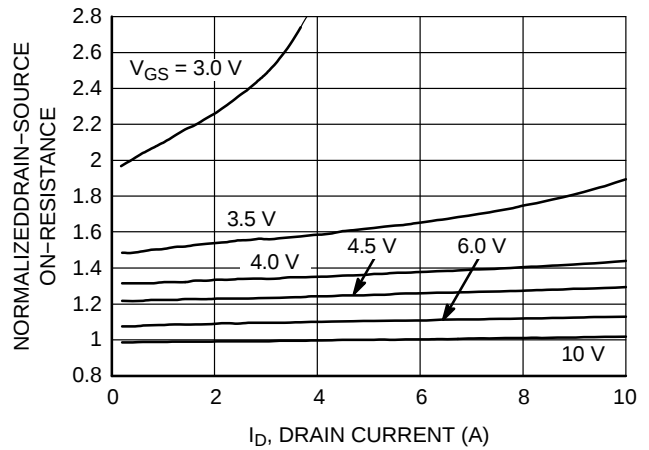
- b. 165°C/W when mounted on a minimum pad of 2 oz copper

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

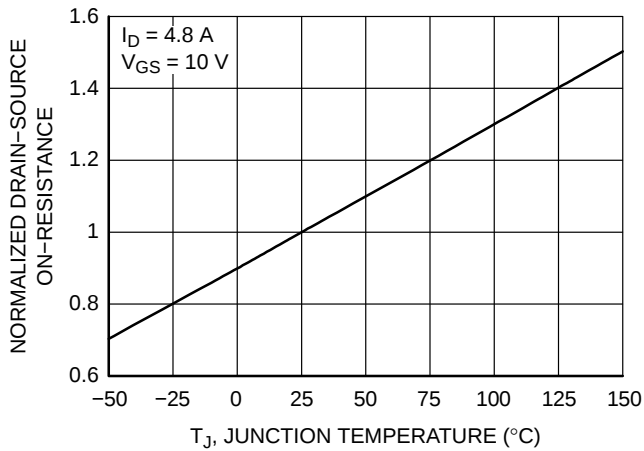
**TYPICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)



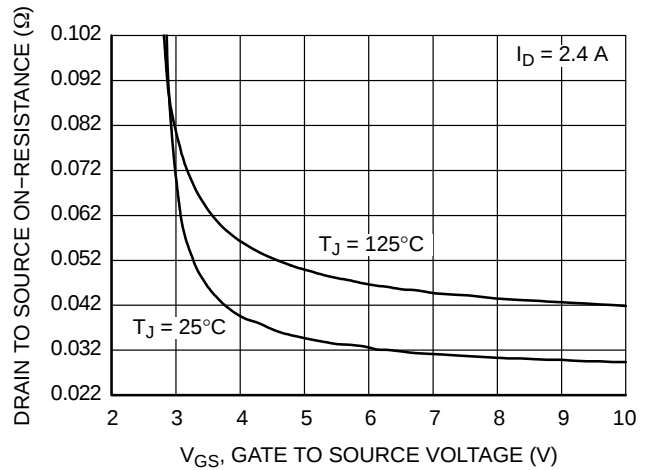
**Figure 1. On Region Characteristics**



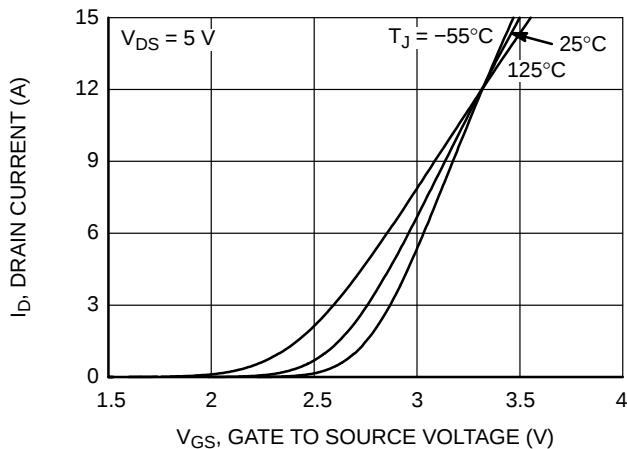
**Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage**



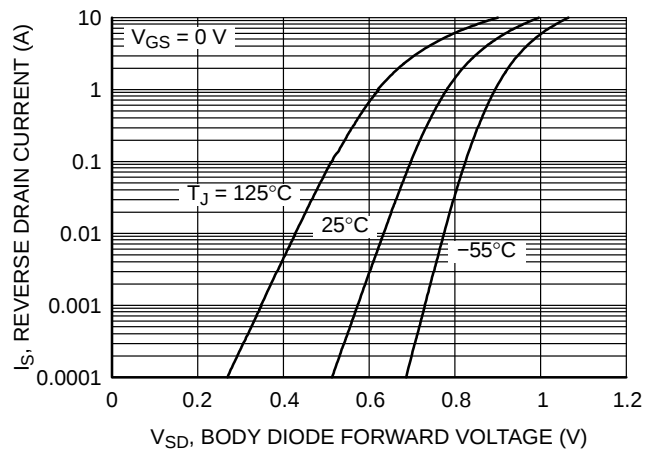
**Figure 3. Normalized On-Resistance vs. Junction Temperature**



**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)

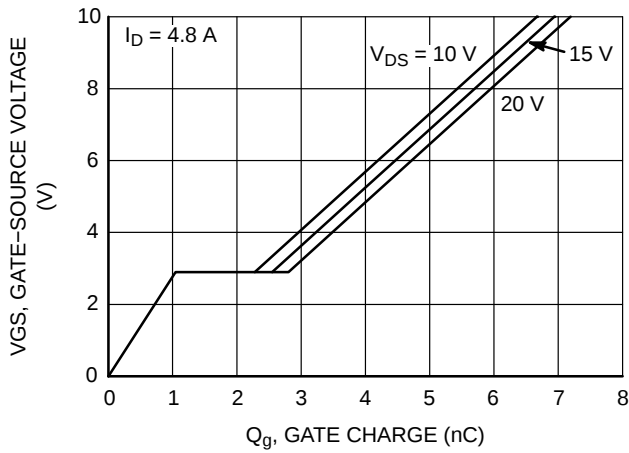


Figure 7. Gate Charge Characteristics

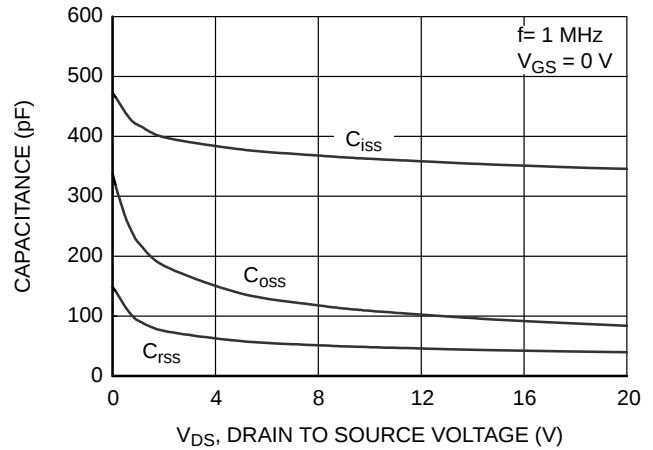


Figure 8. Capacitance vs. Drain to Source Voltage

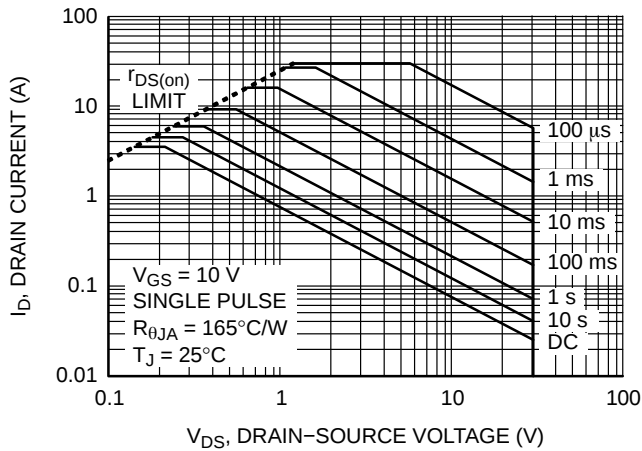


Figure 9. Forward Bias Safe Operating Area

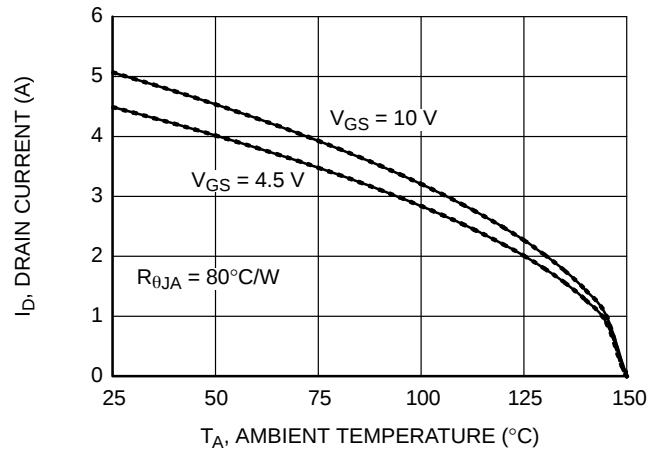


Figure 10. Maximum Continuous Drain Current vs. Ambient Temperature

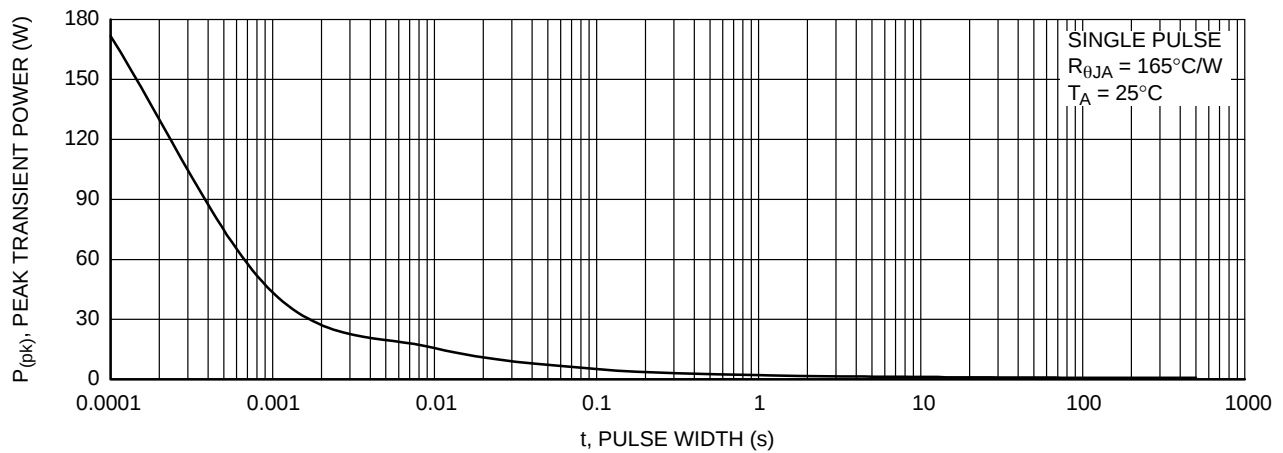


Figure 11. Single Pulse Maximum Power Dissipation

# FDMB3800N

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

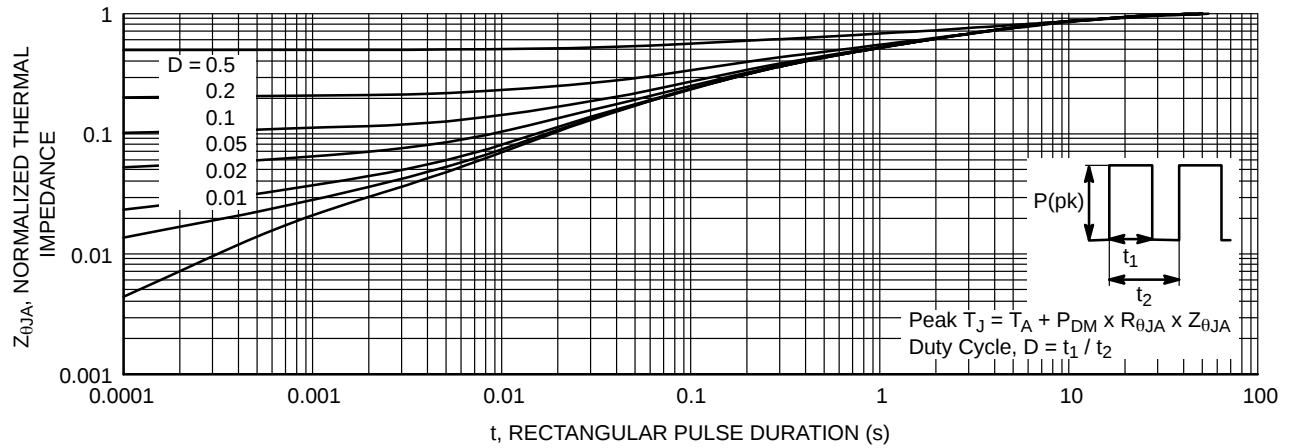


Figure 12. Transient Thermal Response Curve

### PACKAGE MARKING AND ORDERING INFORMATION

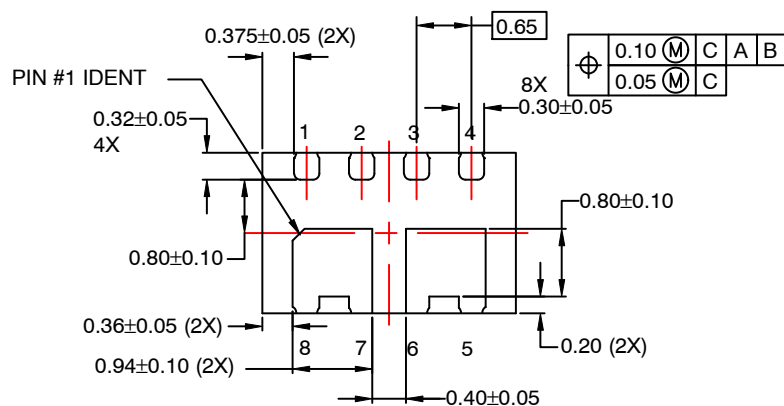
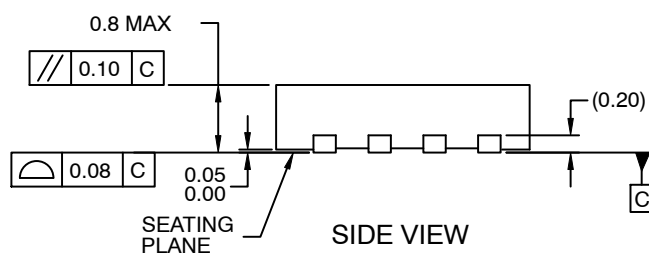
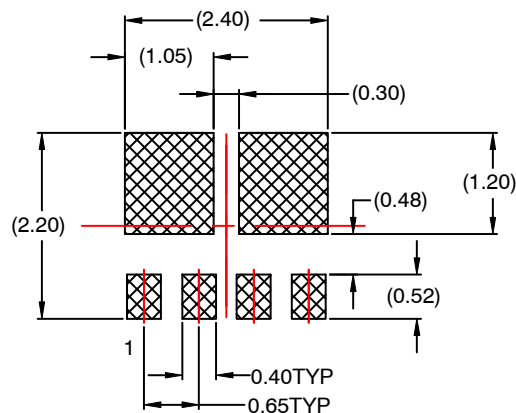
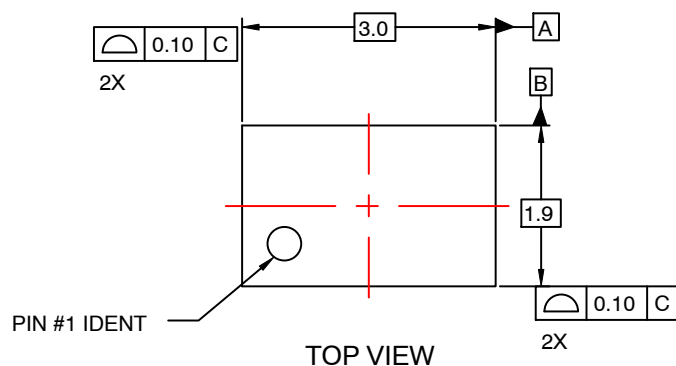
| Device    | Device Marking | Package                                                          | Reel Size | Tape Width | Shipping <sup>†</sup> |
|-----------|----------------|------------------------------------------------------------------|-----------|------------|-----------------------|
| FDMB3800N | 3800           | WDFN8 3x1.9, 0.65P<br>(MicroFET 3x1.9)<br>(Pb-Free, Halide Free) | 7"        | 8 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.

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**WDFN8 3x1.9, 0.65P**  
CASE 511CW  
ISSUE 0

DATE 31 JUL 2016



NOTES:

**A. DOES NOT FULLY CONFORM TO  
JEDED REGISTRATION MO-229.**

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER  
ASME Y14.5M, 2009.

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