

# MOSFET – P-Channel, POWERTRENCH®

**-30 V, -20 A, 10 mΩ**

## FDMC6679AZ

### General Description

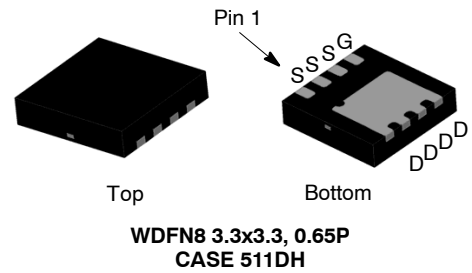
The FDMC6679AZ has been designed to minimize losses in load switch applications. Advancements in both silicon and package technologies have been combined to offer the lowest  $r_{DS(on)}$  and ESD protection.

### Features

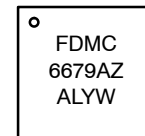
- Max  $r_{DS(on)}$  = 10 mΩ at  $V_{GS} = -10$  V,  $I_D = -11.5$  A
- Max  $r_{DS(on)}$  = 18 mΩ at  $V_{GS} = -4.5$  V,  $I_D = -8.5$  A
- HBM ESD Protection Level of 8 kV Typical (Note 3)
- Extended  $V_{GSS}$  range (-25 V) for Battery Applications
- High Performance Trench Technology for Extremely Low  $r_{DS(on)}$
- High Power and Current Handling Capability
- This Device is Pb-Free and Halide Free

### Applications

- Load Switch in Notebook and Server
- Notebook Battery Pack Power Management

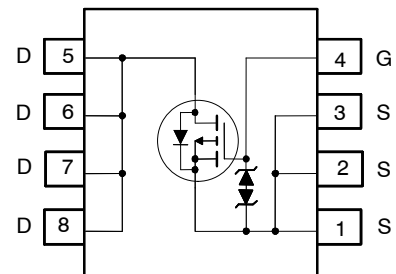


### MARKING DIAGRAM



FDMC6679AZ = Specific Device Code  
A = Assembly Location  
L = Wafer Lot Number  
YW = Assembly Start Week

### PIN ASSIGNMENT



### ORDERING INFORMATION

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

# FDMC6679AZ

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

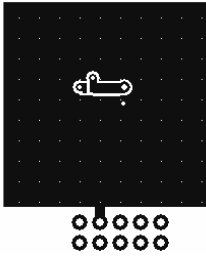
| Symbol         | Parameter  | Rating                   | Unit                     |   |       |
|----------------|--|--------------------------|--------------------------|---|-------|
| $V_{DS}$       | Drain to Source Voltage                          | -30                      | V                        |   |       |
| $V_{GS}$       | Gate to Source Voltage                           | $\pm 25$                 | V                        |   |       |
| $I_D$          | Drain Current                                    | Continuous               | $T_C = 25^\circ\text{C}$ | A |       |
|                |  | Continuous (Note 1a)     | $T_A = 25^\circ\text{C}$ |   | -11.5 |
|                |  | Pulsed                   |                          |   | -32   |
| $P_D$          | Power Dissipation                                | $T_C = 25^\circ\text{C}$ | 41                       | W |       |
|                | Power Dissipation (Note 1a)                      | $T_A = 25^\circ\text{C}$ | 2.3                      |   |       |
| $T_J, T_{STG}$ | 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

| Symbol          | Parameter   | Ratings | Unit                      |
|-----------------|---|---------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case              | 3.0     | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 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.  $53^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



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

- Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0%.
- The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

# FDMC6679AZ

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

| Symbol | Parameter | Test Conditions | 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                           |     | 29 |      | 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> = 125°C |     |    | -100 |       |
| I <sub>GSS</sub>                     | Gate to Source Leakage Current            | V <sub>GS</sub> = ±25 V, V <sub>DS</sub> = 0 V                         |     |    | ±10  | μA    |

### 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              | -1.0 | -1.8 | -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                              |      | -7   |    | mV/°C |
| r <sub>DS(on)</sub>                    | Static Drain to Source On Resistance                     | V <sub>GS</sub> = -10 V, I <sub>D</sub> = -11.5 A                         |      | 8.6  | 10 | mΩ    |
|  |  | V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -8.5 A                         |      | 12   | 18 |       |
|  |  | V <sub>GS</sub> = -10 V, I <sub>D</sub> = -11.5 A, T <sub>J</sub> = 125°C |      | 12   | 15 |       |
| g <sub>FS</sub>                        | Forward Transconductance                                 | V <sub>DS</sub> = -5 V, I <sub>D</sub> = -11.5 A                          |      | 46   |    | S     |

### DYNAMIC CHARACTERISTICS

|                  |                              |   |  |      |      |    |
|------------------|------------------------------|---|--|------|------|----|
| C <sub>iss</sub> | Input Capacitance            | V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 0 V, f = 1 MHz |  | 2985 | 3970 | pF |
| C <sub>oss</sub> | Output Capacitance           |   |  | 570  | 755  | pF |
| C <sub>rss</sub> | Reverse Transfer Capacitance |   |  | 500  | 750  | pF |

### SWITCHING CHARACTERISTICS

|                     |                               |  |  |     |     |    |
|---------------------|-------------------------------|--|--|-----|-----|----|
| t <sub>d(on)</sub>  | Turn-On Delay Time            | V <sub>DD</sub> = -15 V, I <sub>D</sub> = -11.5 A, V <sub>GS</sub> = -10 V, R <sub>GEN</sub> = 6 Ω |  | 12  | 21  | ns |
| t <sub>r</sub>      | Rise Time                     |  |  | 14  | 25  | ns |
| t <sub>d(off)</sub> | Turn-Off Delay Time           |  |  | 63  | 100 | ns |
| t <sub>f</sub>      | Fall Time                     |  |  | 46  | 73  | ns |
| Q <sub>g</sub>      | Total Gate Charge             | V <sub>GS</sub> = 0 V to -10 V, V <sub>DD</sub> = -15 V, I <sub>D</sub> = -11.5 A                  |  | 65  | 91  | nC |
|                     |                               | V <sub>GS</sub> = 0 V to -5 V, V <sub>DD</sub> = -15 V, I <sub>D</sub> = -11.5 A                   |  | 37  | 52  | nC |
| Q <sub>gs</sub>     | Gate to Source Charge         | V <sub>DD</sub> = -15 V, I <sub>D</sub> = -11.5 A  |  | 8.7 |     | nC |
| Q <sub>gd</sub>     | Gate to Drain "Miller" Charge |  |  | 17  |     | nC |

### DRAIN-SOURCE DIODE CHARACTERISTICS

|                 |                                       |  |  |      |      |    |
|-----------------|---------------------------------------|--|--|------|------|----|
| V <sub>SD</sub> | Source to Drain Diode Forward Voltage | V <sub>GS</sub> = 0 V, I <sub>S</sub> = -11.5 A (Note 2) |  | 0.83 | 1.30 | V  |
|                 |                                       | V <sub>GS</sub> = 0 V, I <sub>S</sub> = -1.6 A (Note 2)  |  | 0.71 | 1.20 |    |
| t <sub>rr</sub> | Reverse Recovery Time                 | I <sub>F</sub> = -11.5 A, di/dt = 100 A/μs               |  | 31   | 49   | ns |
| Q <sub>rr</sub> | Reverse Recovery Charge               |  |  | 16   | 28   | 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.

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

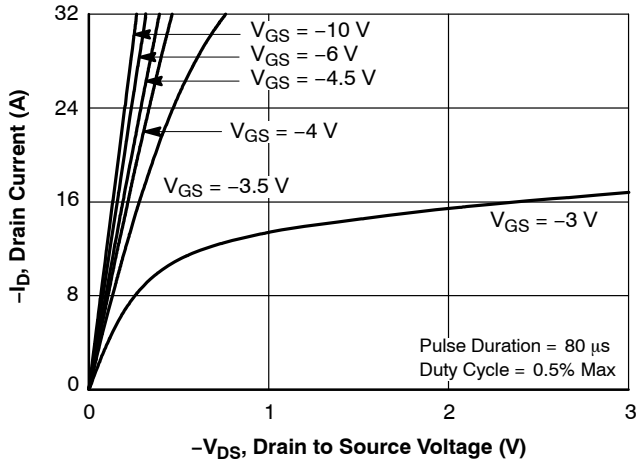


Figure 1. On Region Characteristics

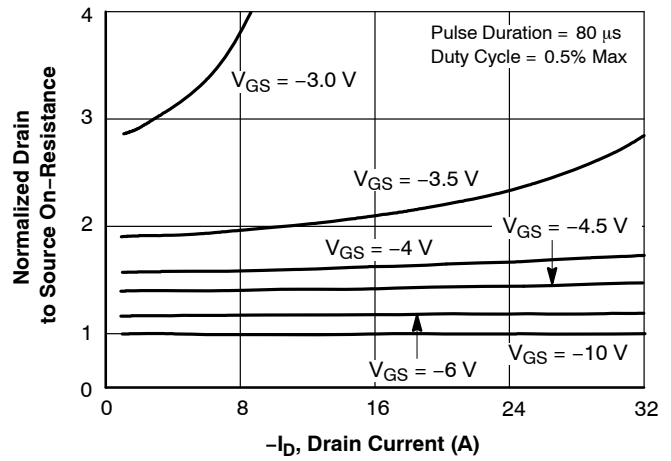


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

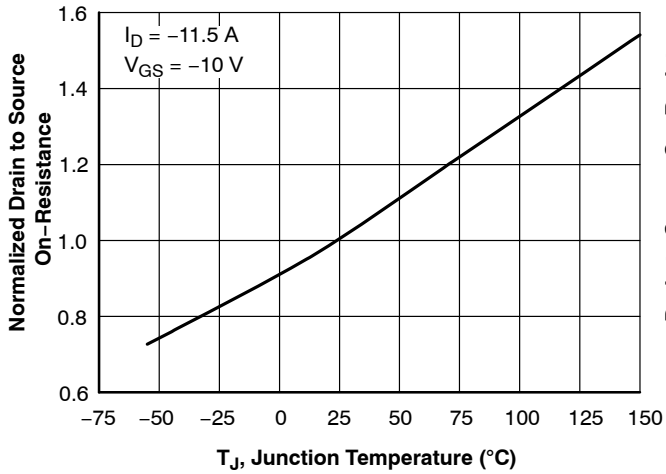


Figure 3. Normalized On Resistance vs. Junction Temperature

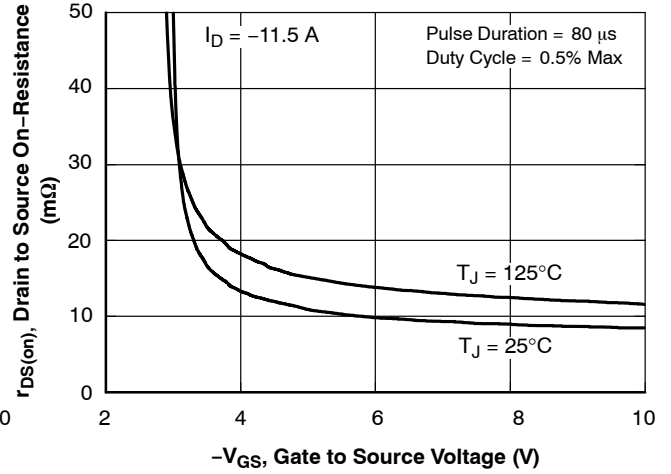


Figure 4. On-Resistance vs. Gate to Source Voltage

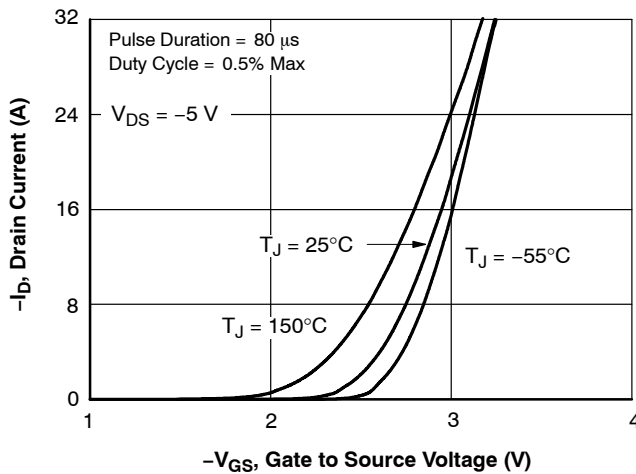


Figure 5. Transfer Characteristics

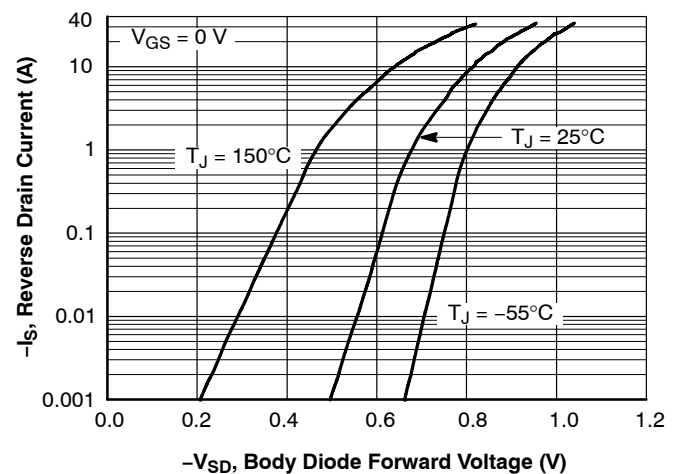


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

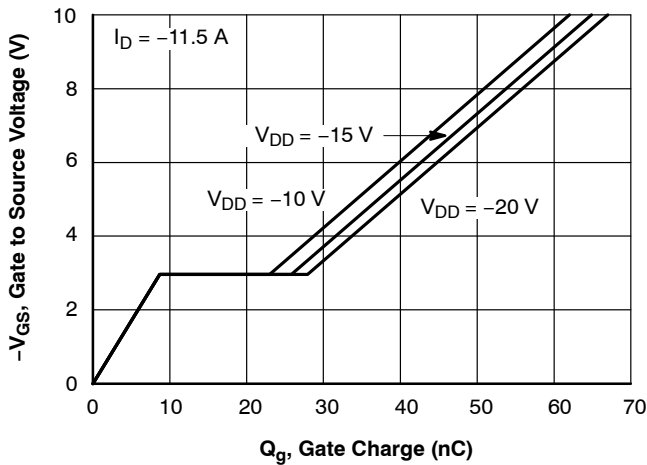


Figure 7. Gate Charge Characteristics

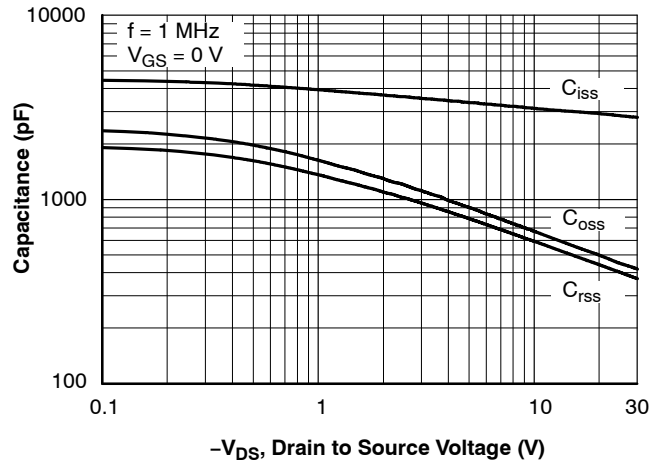


Figure 8. Capacitance vs. Drain to Source Voltage

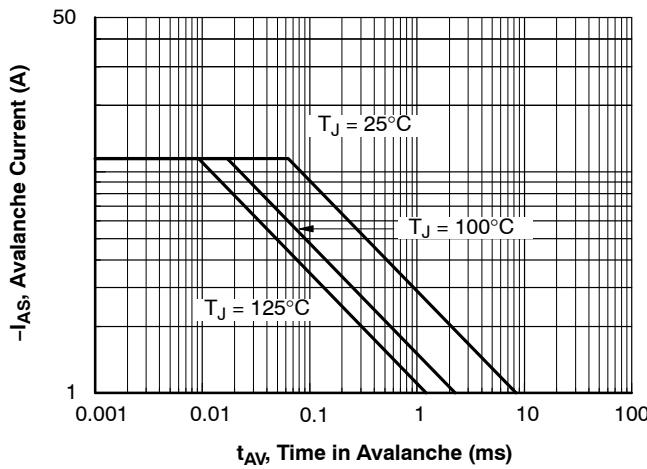


Figure 9. Unclamped Inductive Switching Capability

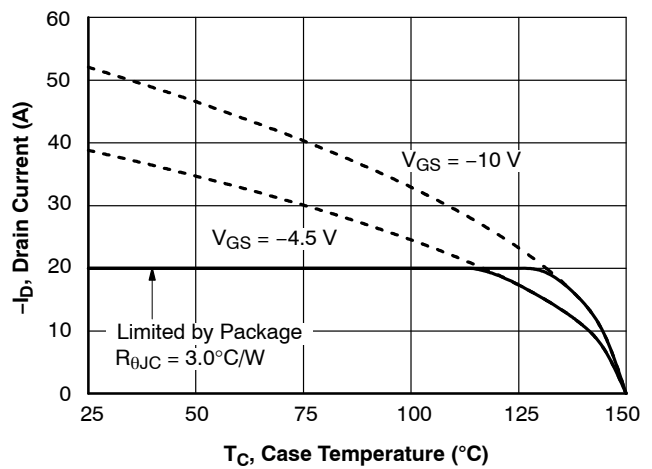


Figure 10. Maximum Continuous Drain Current vs Case Temperature

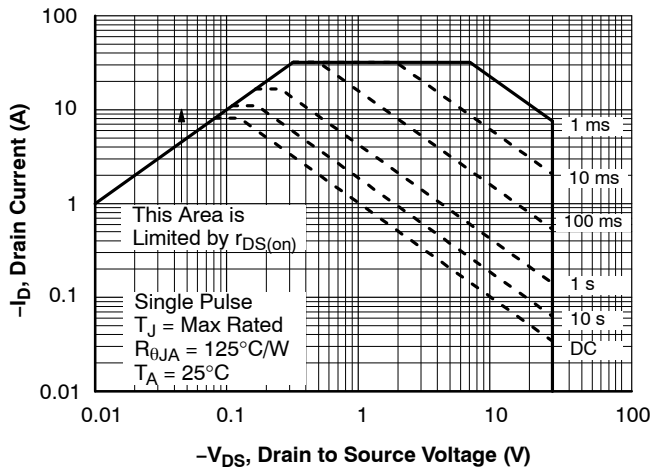


Figure 11. Forward Bias Safe Operating Area

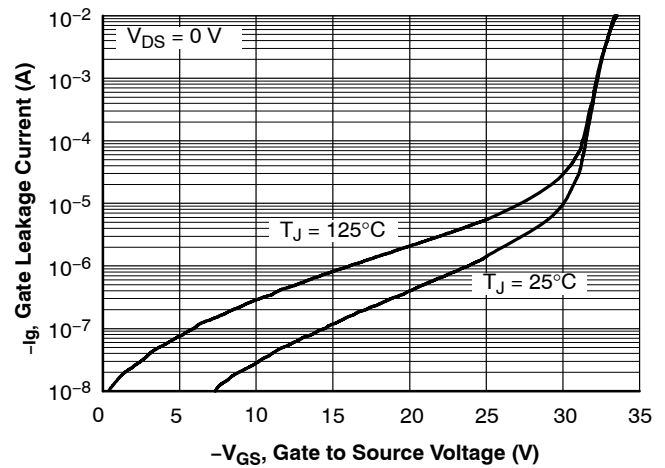


Figure 12.  $I_{gss}$  vs.  $V_{gss}$

# FDMC6679AZ

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

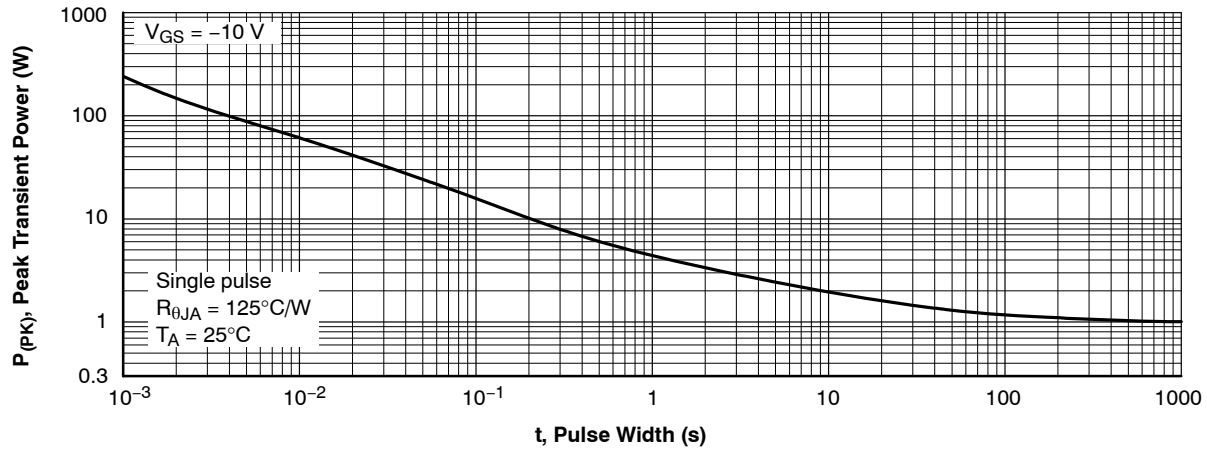


Figure 13. Single Pulse Maximum Power Dissipation

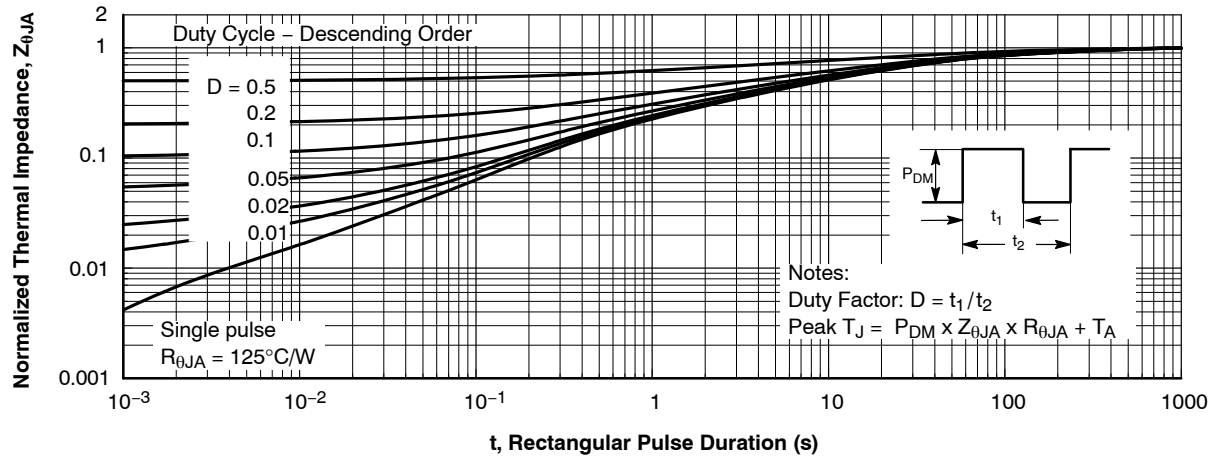


Figure 14. Junction-to-Ambient Transient Thermal Response Curve

### ORDERING INFORMATION

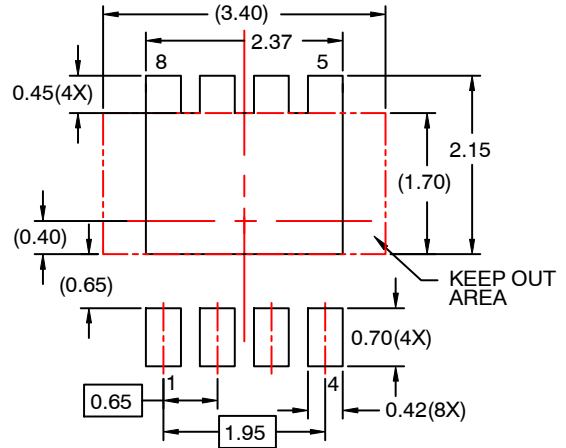
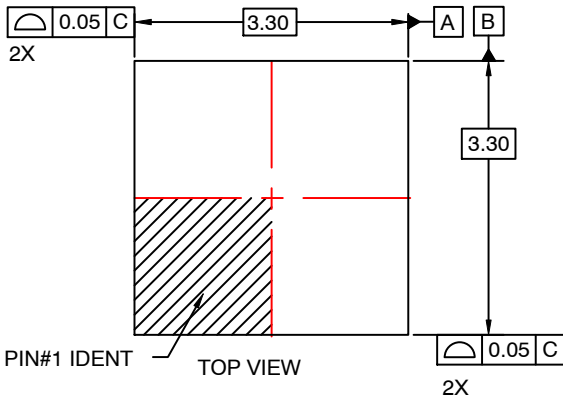
| Device     | Device Marking | Package Type                               | Shipping <sup>†</sup> |
|------------|----------------|--|-----------------------|
| FDMC6679AZ | FDMC6679AZ     | WDFN8 3.3x3.3, 0.65P, Case 511DH (Pb-Free) | 3000 / Tape & Reel    |

<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.

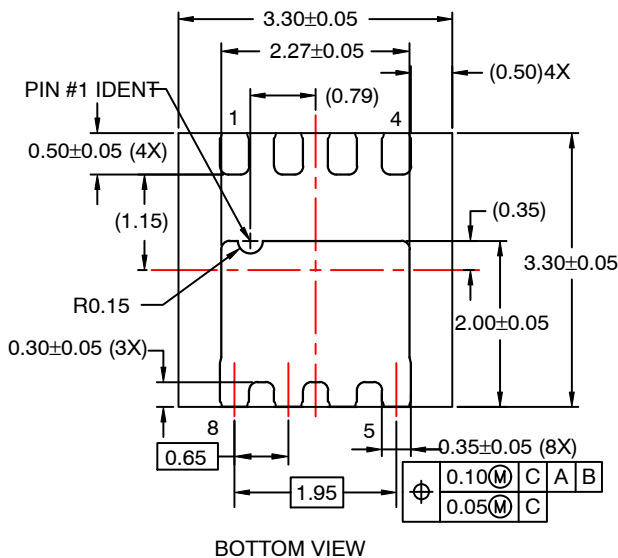
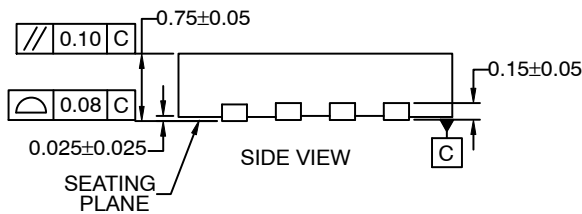
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**WDFN8 3.3x3.3, 0.65P**  
CASE 511DH  
ISSUE O

DATE 31 JUL 2016



RECOMMENDED LAND PATTERN



BOTTOM VIEW

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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