

# MOSFET – P-Channel, POWERTRENCH®

**-30 V, -20 A, 14.4 mΩ**

## FDMC6675BZ

### Description

The FDMC6675BZ 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.

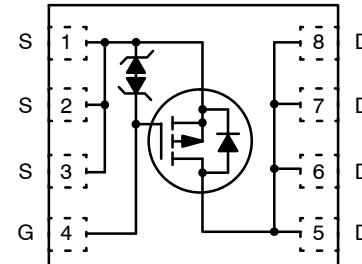
### Features

- Max  $R_{DS(on)}$  = 14.4 mΩ at  $V_{GS} = -10$  V,  $I_D = -9.5$  A
- Max  $R_{DS(on)}$  = 27.0 mΩ at  $V_{GS} = -4.5$  V,  $I_D = -6.9$  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
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

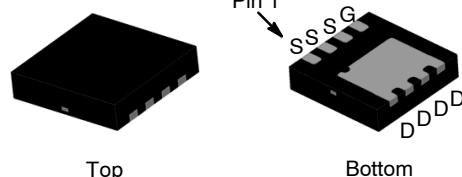
### Typical Applications

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

$V_{DS}$	$R_{DS(on) \text{ MAX}}$	$I_D \text{ MAX}$
-30 V	14.4 mΩ @ -10 V	-20 A

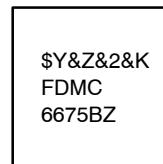


P-Channel



WDFN8 3.3x3.3, 0.65P  
CASE 511DR

### MARKING DIAGRAM



\$Y	= onsemi Logo
&Z	= Assembly Plant Code
&2	= Numeric Date Code
&K	= Lot Code
FDMC6675BZ	= Specific Device Code

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

# FDMC6675BZ

## MOSFET MAXIMUM RATINGS (T<sub>A</sub> = 25°C, Unless otherwise specified)

Symbol	Parameter	Ratings	Unit
V <sub>DS</sub>	Drain to Source Voltage	-30	V
V <sub>GS</sub>	Gate to Source Voltage	±25	V
I <sub>D</sub>	Drain Current –Continuous (Package Limited) T <sub>C</sub> = 25°C	-20	A
	–Continuous (Silicon Limited) T <sub>C</sub> = 25°C	-40	
	–Continuous T <sub>A</sub> = 25°C (Note 1a)	-9.5	
	–Pulsed	-32	
P <sub>D</sub>	Power Dissipation T <sub>C</sub> = 25°C	36	W
	Power Dissipation T <sub>A</sub> = 25°C (Note 1a)	2.3	
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Temperature Range	-55 to +150	°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 <sub>θJC</sub>	Thermal Resistance, Junction to Case	3.4	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient (Note 1a)	53	

## PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Reel Size	Tape Width	Shipping (Qty / Packing) <sup>†</sup>
FDMC6675BZ	FDMC6675BZ	WDFN8 3.3x3.3, 0.65P (MLP) (Pb-Free/Halogen 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.

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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### 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
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = -250 μA, referenced to 25°C	–	-20	–	mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -24 V, V <sub>GS</sub> = 0 V V <sub>DS</sub> = -24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125°C	– –	– –	-1 -100	μA
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	-1.9	-3.0	V
ΔV <sub>GS(th)</sub> / ΔT <sub>J</sub>	Gate to Source Threshold Voltage Temperature Coefficient	I <sub>D</sub> = -250 μA, referenced to 25°C	–	6.0	–	mV/°C
R <sub>DS(on)</sub>	Static Drain to Source On Resistance	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -9.5 A	–	10.7	14.4	mΩ
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -6.9 A	–	17.4	27.0	
		V <sub>GS</sub> = -10 V, I <sub>D</sub> = -9.5 A, T <sub>J</sub> = 125°C	–	15.2	20.5	
g <sub>FS</sub>	Forward Transconductance	V <sub>DD</sub> = -5 V, I <sub>D</sub> = -9.5 A	–	28	–	S

# FDMC6675BZ

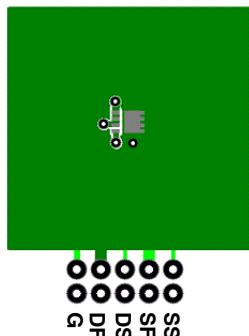
ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$  unless otherwise noted) (continued)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>DYNAMIC CHARACTERISTICS</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = -15\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$	-	2154	2865	pF
$C_{oss}$	Output Capacitance		-	392	525	pF
$C_{rss}$	Reverse Transfer Capacitance		-	349	525	pF
<b>SWITCHING CHARACTERISTICS</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -15\text{ V}$ , $I_D = -9.5\text{ A}$ , $V_{GS} = -10\text{ V}$ , $R_{GEN} = 6\ \Omega$	-	11	20	ns
$t_r$	Rise Time		-	10	20	
$t_{d(off)}$	Turn-off Delay Time		-	44	71	
$t_f$	Fall Time		-	26	42	
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0\text{V}$ to $-10\text{ V}$ , $V_{DD} = -15\text{ V}$ , $I_D = -9.5\text{ A}$	-	46	65	nC
	Total Gate Charge	$V_{GS} = 0\text{V}$ to $-5\text{ V}$ , $V_{DD} = -15\text{ V}$ , $I_D = -9.5\text{ A}$	-	26	37	nC
$Q_{gs}$	Gate to Source Charge	$V_{DD} = -15\text{ V}$ , $I_D = -9.5\text{ A}$	-	6.4	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge	$V_{DD} = -15\text{ V}$ , $I_D = -9.5\text{ A}$	-	13	-	nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = -9.5\text{ A}$ (Note 2)	-	-0.89	-1.3	V
		$V_{GS} = 0\text{ V}$ , $I_S = -1.6\text{ A}$ (Note 2)	-	-0.73	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = -9.5\text{ A}$ , $dI/dt = 100\text{ A}/\mu\text{s}$	-	24	38	ns
			-	15	27	nC

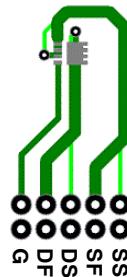
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## NOTES:

1.  $R_{\theta JA}$  is determined with the device mounted on a 1 in<sup>2</sup> pad 2 oz copper pad on a 1.5 × 1.5 in. board of FR-4 material.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  determined by the user's board design.



a) 53°C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b) 125°C/W when mounted on a minimum pad

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

## TYPICAL CHARACTERISTICS

( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

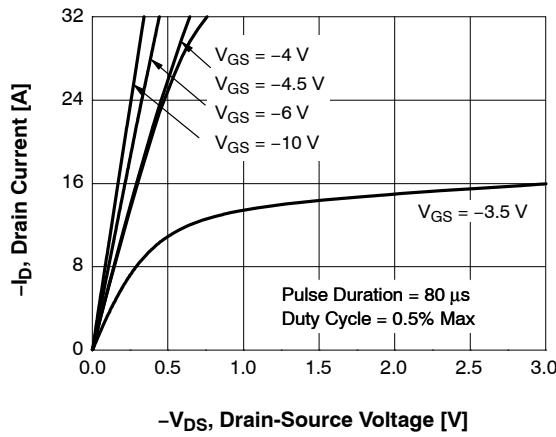


Figure 1. On-Region Characteristics

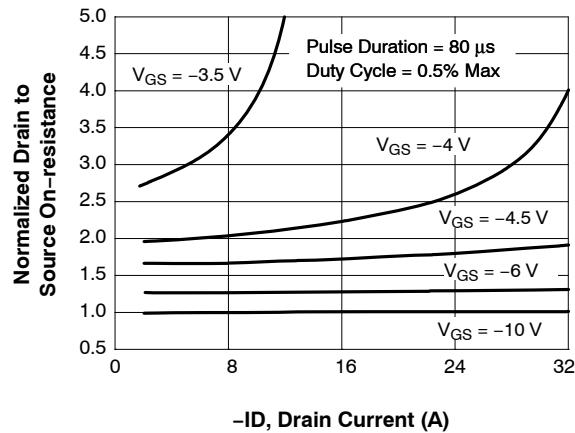


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

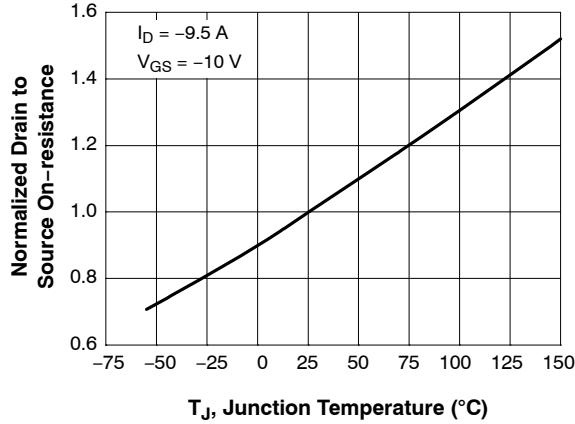


Figure 3. Normalized On Resistance vs Junction Temperature

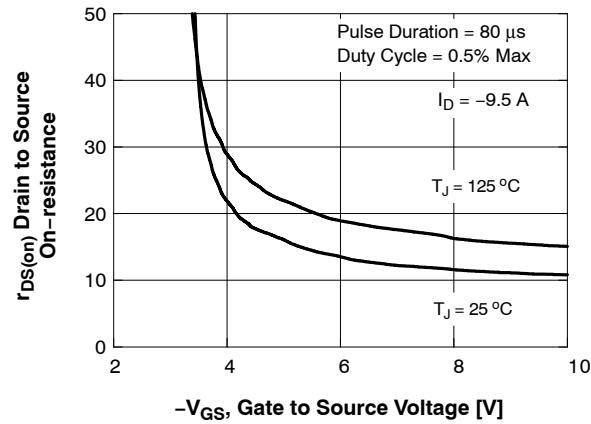


Figure 4. On-Resistance vs Gate to Source Voltage

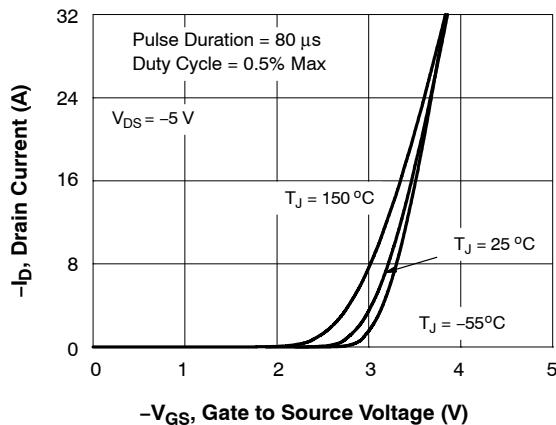


Figure 5. Transfer Characteristics

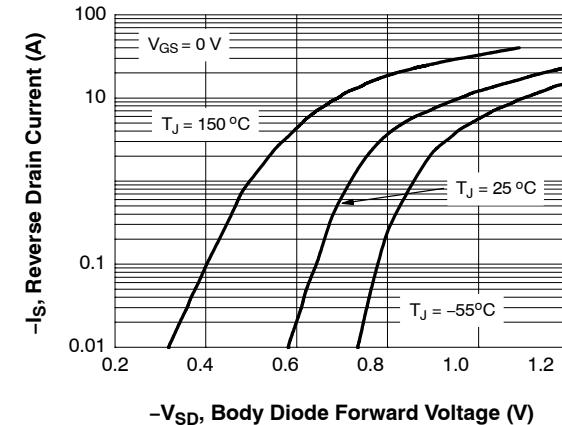
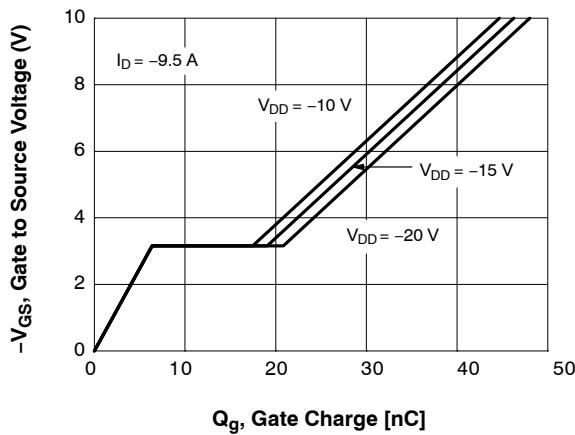


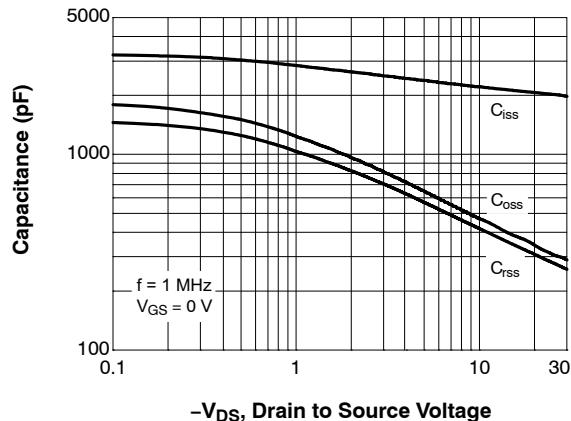
Figure 6. Source to Drain Diode Forward Voltage vs Source Current

**TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)**

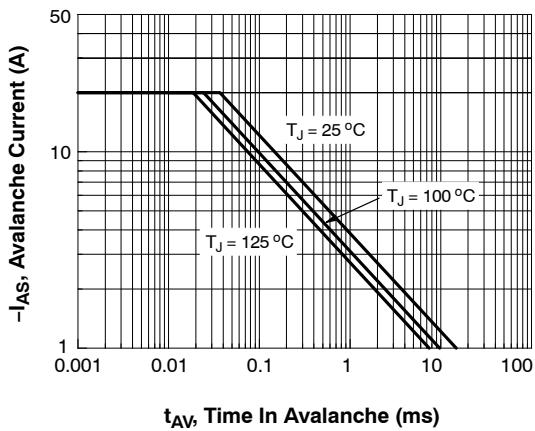
( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)



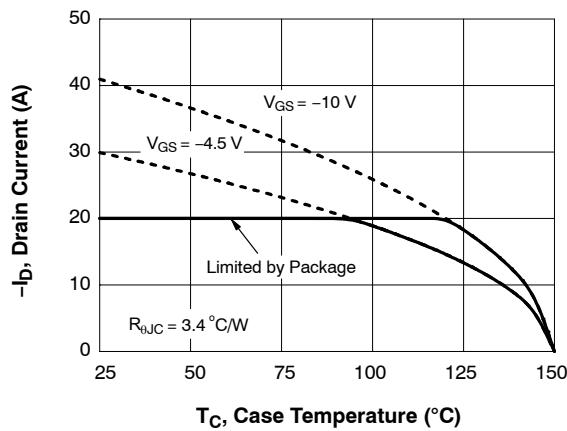
**Figure 7. Gate Charge Characteristics**



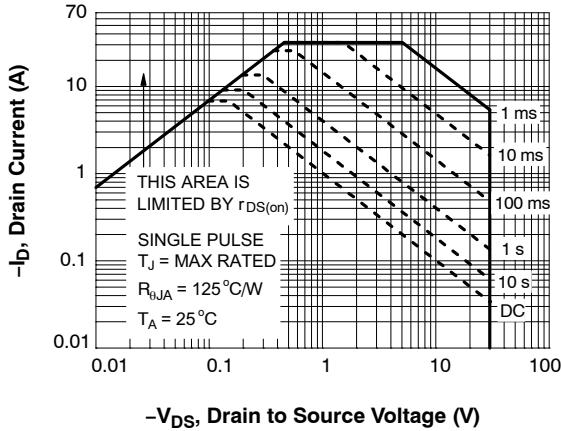
**Figure 8. Capacitance vs Drain to Source Voltage**



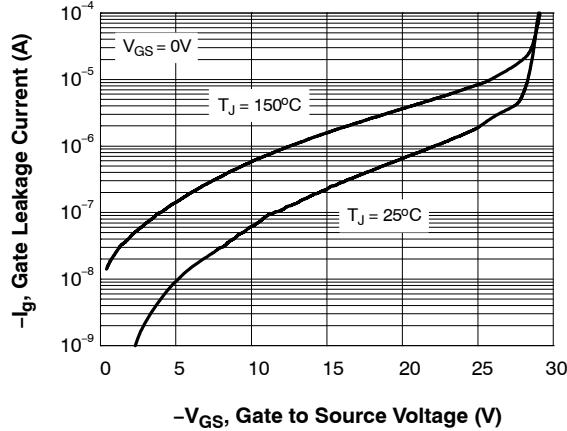
**Figure 9. Unclamped Inductive Switching Capability**



**Figure 10. Maximum Continuous Drain Current vs Case Temperature**



**Figure 11. Forward Bias Safe Operating Area**



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

# FDMC6675BZ

## TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

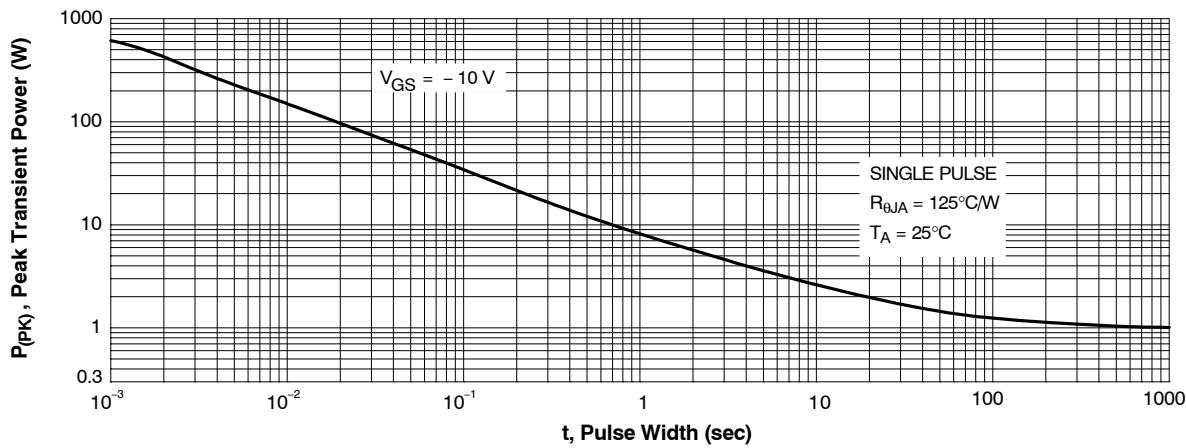


Figure 13. Single Pulse Maximum Power Dissipation

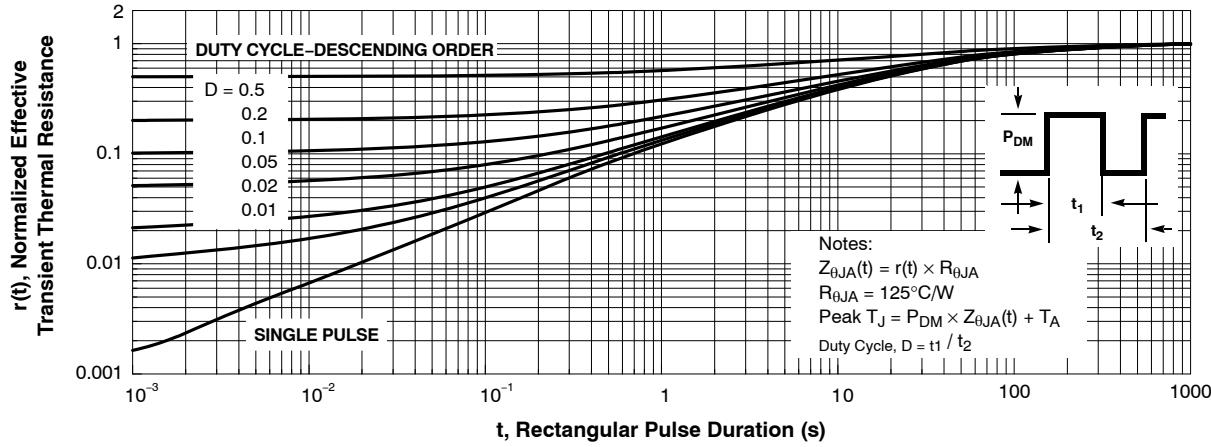
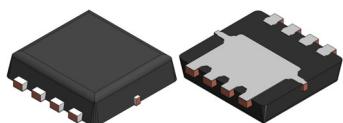


Figure 14. Junction-to-Ambient Transient Thermal Response Curve

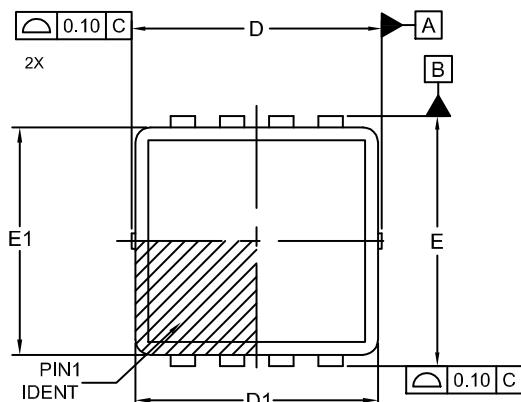
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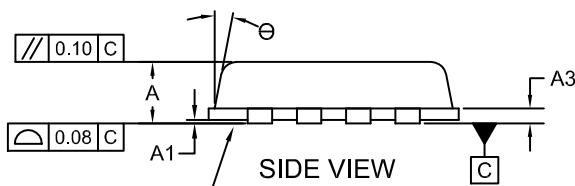
## WDFN8 3.3x3.3, 0.65P

CASE 511DR  
ISSUE B

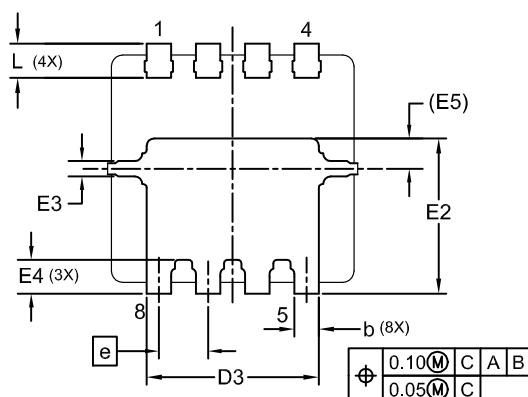
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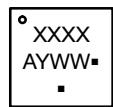
TOP VIEW



SIDE VIEW



BOTTOM VIEW

GENERIC  
MARKING DIAGRAM\*

(Note: Microdot may be in either location)

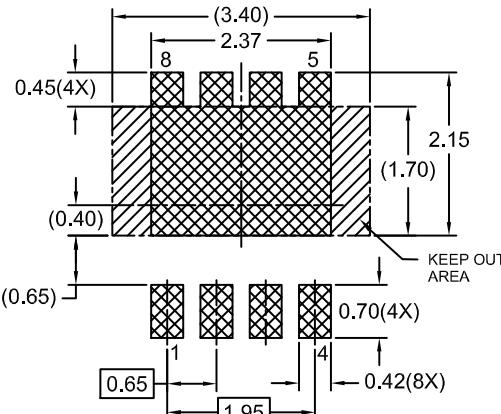
XXXX = Specific Device Code  
 A = Assembly Location  
 Y = Year  
 WW = Work Week  
 □ = Pb-Free Package

\*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.

## 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.

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