

# NTTFS3A08PZ

## Power MOSFET

-20 V, -15 A, Single P-Channel,  $\mu$ 8FL

### Features

- Ultra Low  $R_{DS(on)}$  to Minimize Conduction Losses
- $\mu$ 8FL 3.3 x 3.3 x 0.8 mm for Space Saving and Excellent Thermal Conduction
- ESD Protection Level of 5 kV per JESD22-A114
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Battery Switch
- High Side Load Switch
- Optimized for Power Management Applications for Portable Products such as Media Tablets, Ultrabook PCs and Cellphones

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Value	Unit	
Drain-to-Source Voltage	$V_{DSS}$	-20	V	
Gate-to-Source Voltage	$V_{GS}$	$\pm 8$	V	
Continuous Drain Current $R_{\theta JA}$ (Note 1)		$T_A = 25^\circ\text{C}$	-15	A
		$T_A = 85^\circ\text{C}$	-11	
Power Dissipation $R_{\theta JA}$ (Note 1)	$P_D$	2.3	W	
Continuous Drain Current $R_{\theta JA} \leq 10$ s (Note 1)		$T_A = 25^\circ\text{C}$	-22	A
		$T_A = 85^\circ\text{C}$	-16	
Power Dissipation $R_{\theta JA} \leq 10$ s (Note 1)	$P_D$	4.9	W	
Continuous Drain Current $R_{\theta JA}$ (Note 2)		$T_A = 25^\circ\text{C}$	-9	A
		$T_A = 85^\circ\text{C}$	-7	
Power Dissipation $R_{\theta JA}$ (Note 2)	$P_D$	0.84	W	
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	$I_{DM}$	-46	A
Operating Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$	
ESD (HBM, JESD22-A114)	$V_{ESD}$	5000	V	
Source Current (Body Diode)	$I_S$	-3	A	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	$T_L$	260	$^\circ\text{C}$	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Surface-mounted on FR4 board using 1 sq-in pad, 1 oz Cu.
2. Surface-mounted on FR4 board using the minimum recommended pad size.

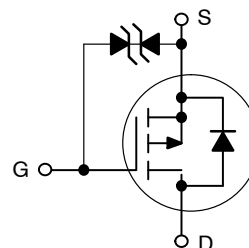


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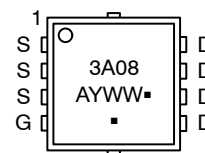
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	$I_D$ MAX
-20 V	6.7 m $\Omega$ @ -4.5 V	-15 A
	9.0 m $\Omega$ @ -2.5 V	

### P-Channel MOSFET



WDFN8  
( $\mu$ 8FL)  
CASE 511AB

### MARKING DIAGRAM



3A08 = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

Device	Package	Shipping†
NTTFS3A08PZTAG	WDFN8 (Pb-Free)	1500 / Tape & Reel
NTTFS3A08PZTWG	WDFN8 (Pb-Free)	5000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# NTTFS3A08PZ

## THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	55	°C/W
Junction-to-Ambient – Steady State (Note 4)	$R_{\theta JA}$	148	
Junction-to-Ambient – ( $t \leq 10$ s) (Note 3)	$R_{\theta JA}$	26	

3. Surface-mounted on FR4 board using 1 sq-in pad, 1 oz Cu.

4. Surface-mounted on FR4 board using the minimum recommended pad size (40 mm<sup>2</sup>, 1 oz. Cu).

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	-20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			6		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = -16\text{ V}$ $T_J = 25^\circ\text{C}$			-1	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			$\pm 5$	$\mu\text{A}$

### ON CHARACTERISTICS (Note 5)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\ \mu\text{A}$	-0.4		-1.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.3		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -12\text{ A}$		4.9	6.7	m $\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -10\text{ A}$		6.9	9.0	
Forward Transconductance	$g_{FS}$	$V_{DS} = -1.5\text{ V}, I_D = -8\text{ A}$		62		S

### CHARGES AND CAPACITANCES

Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = -10\text{ V}$		5000		pF
Output Capacitance	$C_{oss}$			600		
Reverse Transfer Capacitance	$C_{rss}$			540		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -10\text{ V}, I_D = -8\text{ A}$		56		nC
Threshold Gate Charge	$Q_{G(TH)}$			2.0		
Gate-to-Source Charge	$Q_{GS}$			6.5		
Gate-to-Drain Charge	$Q_{GD}$			15.4		

### SWITCHING CHARACTERISTICS (Note 6)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -10\text{ V}, I_D = -8\text{ A}, R_G = 6.0\ \Omega$		13		ns
Rise Time	$t_r$			60		
Turn-Off Delay Time	$t_{d(off)}$			250		
Fall Time	$t_f$			170		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = -3\text{ A}$ $T_J = 25^\circ\text{C}$		-0.65	-1.0	V
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, I_S = -6\text{ A}$		207		ns
Charge Time	$t_a$			45		
Discharge Time	$t_b$			162		
Reverse Recovery Charge	$Q_{RR}$			234		

5. Pulse Test: pulse width = 300  $\mu\text{s}$ , duty cycle  $\leq 2\%$ .

6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

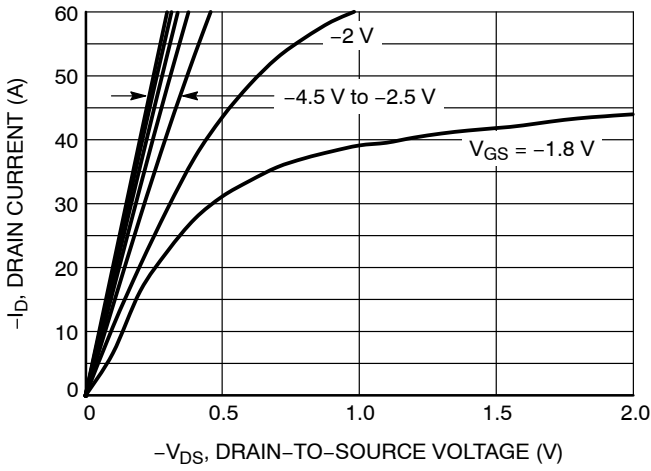


Figure 1. On-Region Characteristics

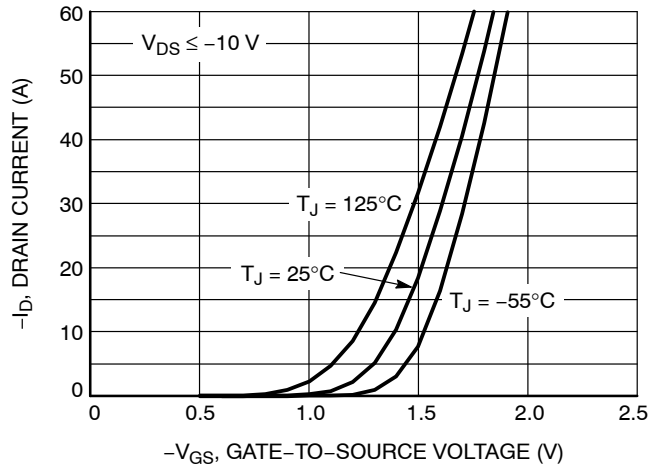


Figure 2. Transfer Characteristics

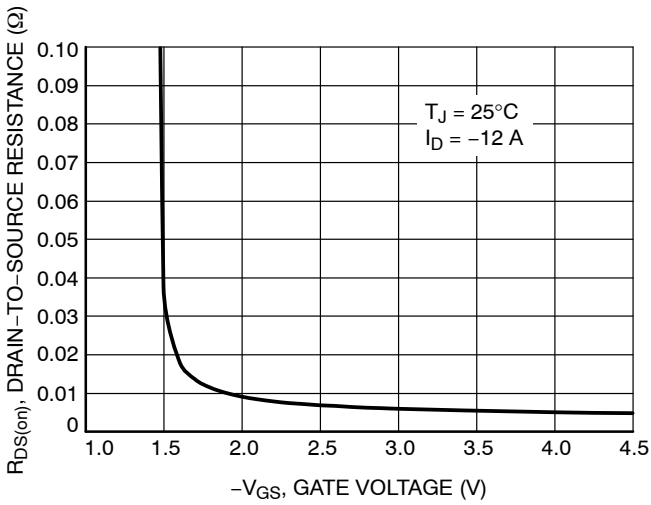


Figure 3. On-Resistance vs. Gate-to-Source Voltage

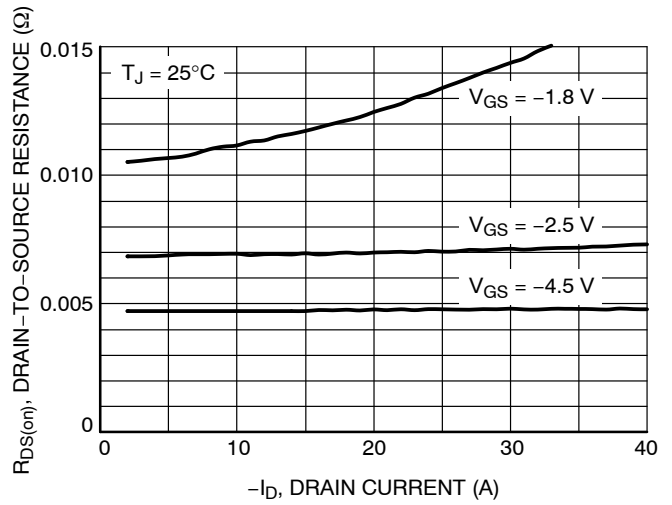


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

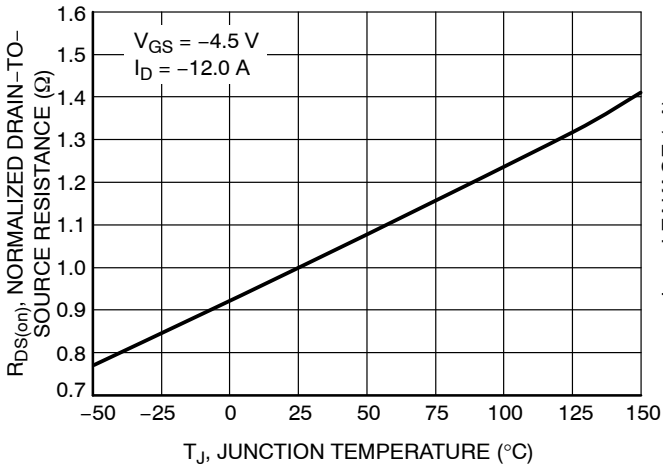


Figure 5. On-Resistance Variation with Temperature

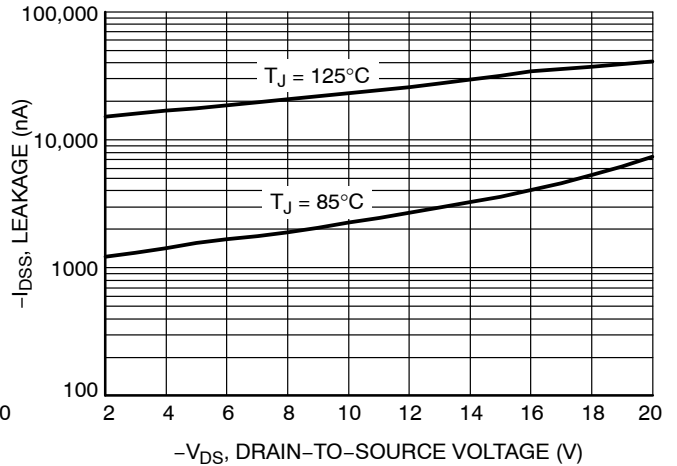


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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## TYPICAL CHARACTERISTICS

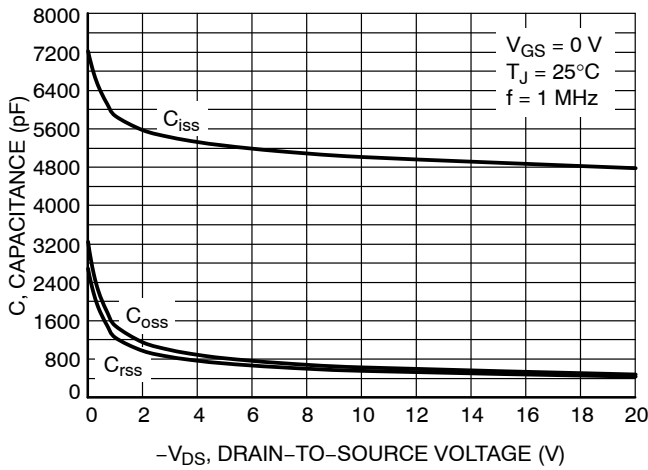


Figure 7. Capacitance Variation

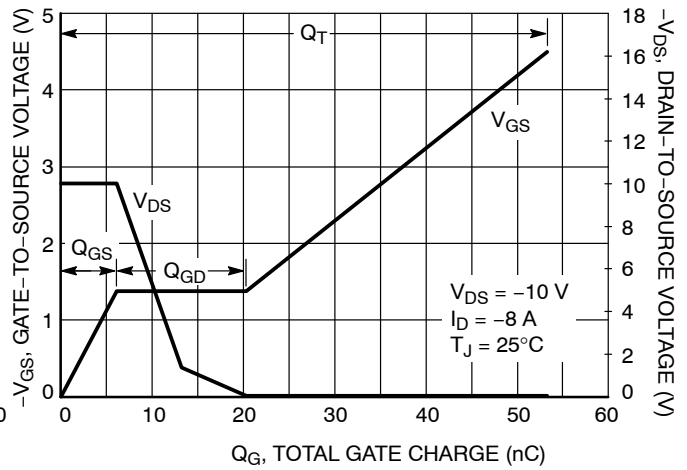


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

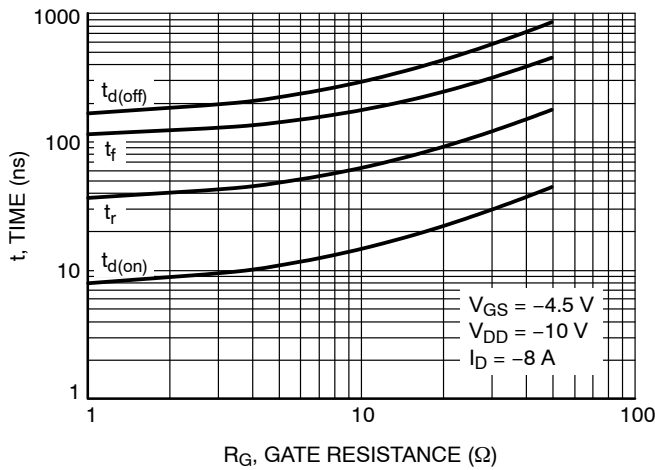


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

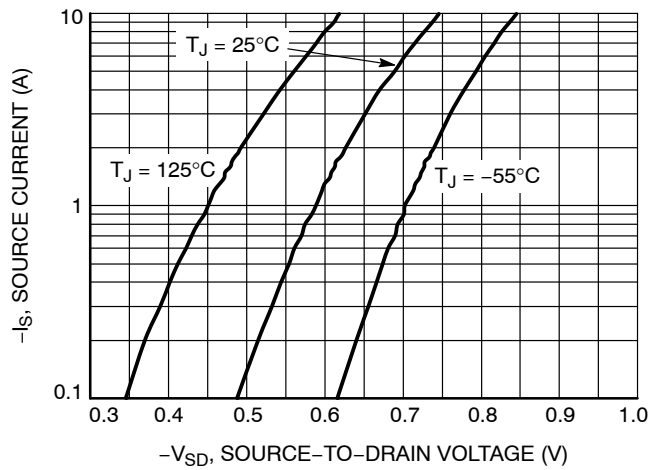


Figure 10. Diode Forward Voltage vs. Current

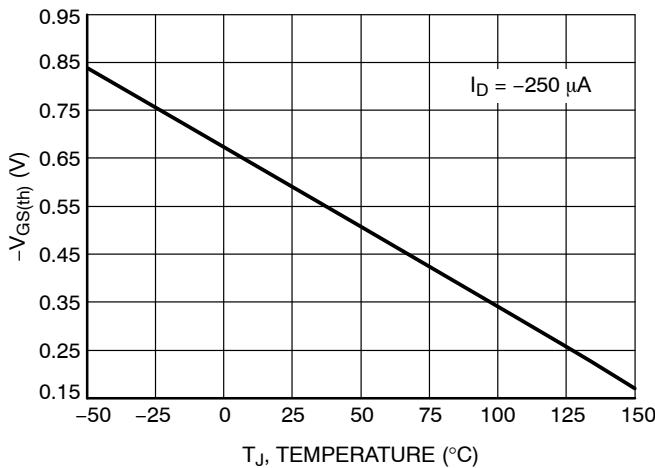


Figure 11. Threshold Voltage

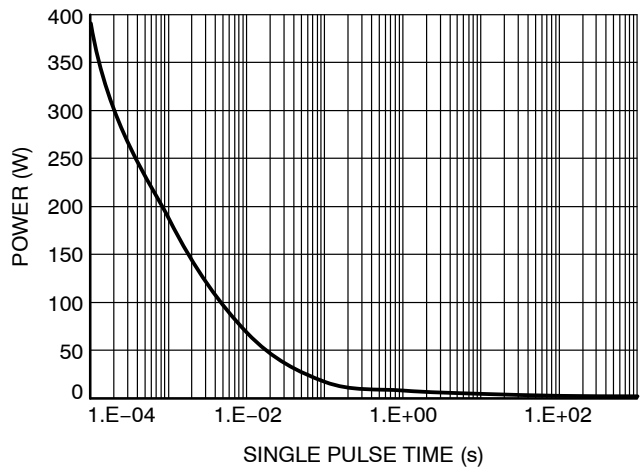
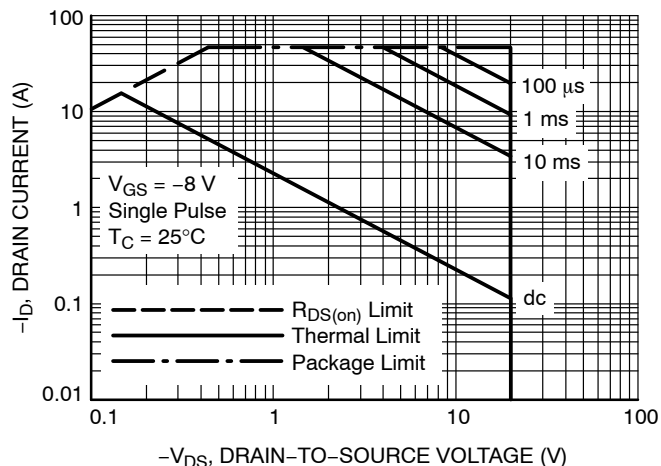


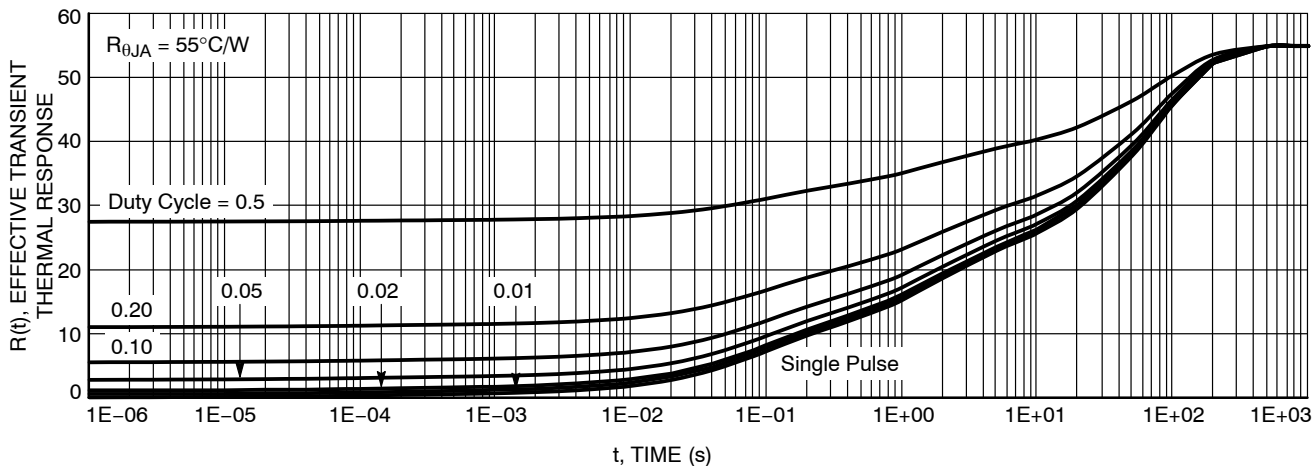
Figure 12. Single Pulse Maximum Power Dissipation

# NTTFS3A08PZ

## TYPICAL CHARACTERISTICS



**Figure 13. Maximum Rated Forward Biased Safe Operating Area**



**Figure 14. FET Thermal Response**

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

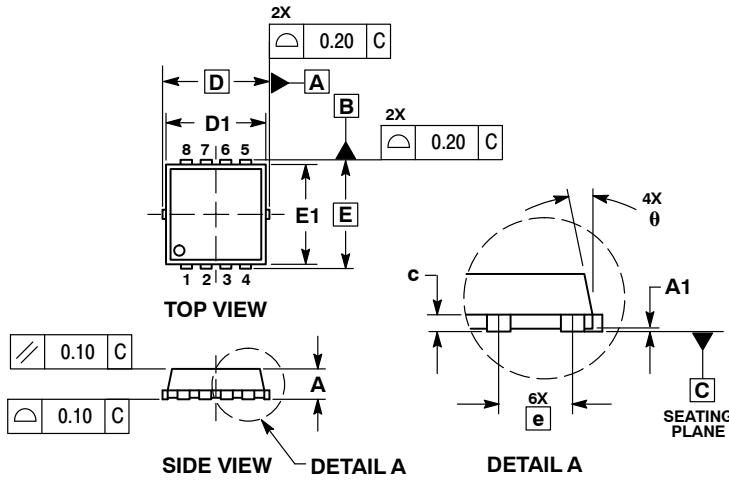
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SCALE 2:1

### WDFN8 3.3x3.3, 0.65P CASE 511AB ISSUE D

DATE 23 APR 2012



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	---	0.05	0.000	---	0.002
b	0.23	0.30	0.40	0.009	0.012	0.016
c	0.15	0.20	0.25	0.006	0.008	0.010
D	3.30 BSC			0.130 BSC		
D1	2.95	3.05	3.15	0.116	0.120	0.124
D2	1.98	2.11	2.24	0.078	0.083	0.088
E	3.30 BSC			0.130 BSC		
E1	2.95	3.05	3.15	0.116	0.120	0.124
E2	1.47	1.60	1.73	0.058	0.063	0.068
E3	0.23	0.30	0.40	0.009	0.012	0.016
e	0.65 BSC			0.026 BSC		
G	0.30	0.41	0.51	0.012	0.016	0.020
K	0.65	0.80	0.95	0.026	0.032	0.037
L	0.30	0.43	0.56	0.012	0.017	0.022
L1	0.06	0.13	0.20	0.002	0.005	0.008
M	1.40	1.50	1.60	0.055	0.059	0.063
θ	0°	---	12°	0°	---	12°



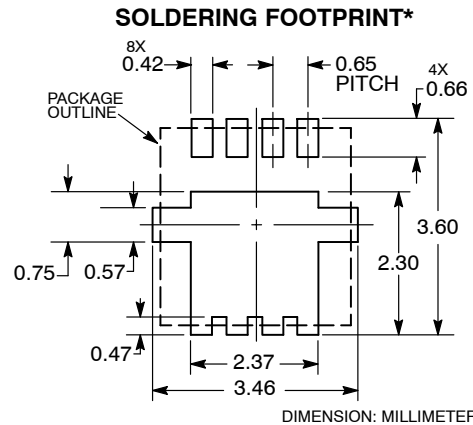
#### GENERIC MARKING DIAGRAM\*



- XXXXX = 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.



\*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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