

# NTTFS015P03P8Z

## MOSFET – Power, Single, P-Channel, $\mu$ 8FL -30 V, 7.5 m $\Omega$

### Features

- Ultra Low  $R_{DS(on)}$  to Improve System Efficiency
- Advanced Package Technology in 3.3x3.3mm for Space Saving and Excellent Thermal Conduction
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Typical Applications

- Power Load Switch
- Protection: Reverse Current, Over Voltage, and Reverse Negative Voltage
- Battery Management

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

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		$V_{DSS}$	-30	V
Gate-to-Source Voltage		$V_{GS}$	$\pm 25$	V
Continuous Drain Current $R_{\theta JC}$ (Notes 1, 2)	Steady State	$T_C = 25^\circ\text{C}$	$I_D$	-47.6
		$T_C = 85^\circ\text{C}$		-34.4
		$T_C = 25^\circ\text{C}$	$P_D$	33.8
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	-13.4
		$T_A = 85^\circ\text{C}$		-9.6
		$T_A = 25^\circ\text{C}$	$P_D$	2.66
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	$I_{DM}$	-195	A
Operating Junction and Storage Temperature		$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^\circ\text{C}$

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 RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State (Drain) (Note 2)	$R_{\theta JC}$	3.7	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	47	$^\circ\text{C}/\text{W}$

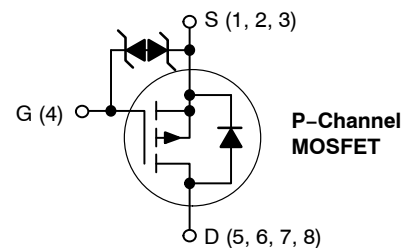
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 1 in<sup>2</sup>, 2 oz. Cu pad. Assuming a 76mm x 76mm x 1.6mm board.



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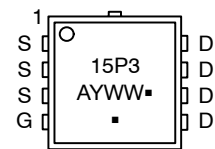
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$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$
-30 V	7.5 m $\Omega$ @ -10 V	-47.6 A
	12 m $\Omega$ @ -4.5 V	



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

### MARKING DIAGRAM



15P3 = 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†
NTTFS015P03P8ZTAG	WDFN8 (Pb-Free)	1500 / Tape & Reel
NTTFS015P03P8ZTWG	WDFN8 (Pb-Free)	3000 / 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.

# NTTFS015P03P8Z

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>	I <sub>D</sub> = -250 μA, ref to 25°C		-4.4		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = -24 V, T <sub>J</sub> = 25°C			-1.0	μA
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±25 V			±10	μA

## ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250 μA	-1.0		-3.0	V
Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>	I <sub>D</sub> = -250 μA, ref to 25°C		5.6		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -12 A		5.0	7.5	mΩ
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -10 A		8.0	12	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -5 V, I <sub>D</sub> = -10 A		77		S

## CHARGES AND CAPACITANCES

Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, f = 1.0 MHz, V <sub>DS</sub> = -15 V		2706		pF
Output Capacitance	C <sub>oss</sub>			907		
Reverse Transfer Capacitance	C <sub>rss</sub>			875		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = -4.5 V, V <sub>DS</sub> = -15 V, I <sub>D</sub> = -10 A		37		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			5.1		
Gate-to-Source Charge	Q <sub>GS</sub>			8.2		
Gate-to-Drain Charge	Q <sub>GD</sub>			21.7		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = -10 V, V <sub>DS</sub> = -15 V, I <sub>D</sub> = -10 A		62.3	105	

## SWITCHING CHARACTERISTICS, V<sub>GS</sub> = 4.5 V (Note 3)

Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = -4.5 V, V <sub>DS</sub> = -15 V, I <sub>D</sub> = -10 A, R <sub>G</sub> = 6 Ω		25		ns
Rise Time	t <sub>r</sub>			138		
Turn-Off Delay Time	t <sub>d(off)</sub>			55		
Fall Time	t <sub>f</sub>			98		

## SWITCHING CHARACTERISTICS, V<sub>GS</sub> = 10 V (Note 3)

Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = -10 V, V <sub>DS</sub> = -15 V, I <sub>D</sub> = -10 A, R <sub>G</sub> = 6 Ω		17		ns
Rise Time	t <sub>r</sub>			34		
Turn-Off Delay Time	t <sub>d(off)</sub>			99		
Fall Time	t <sub>f</sub>			97		

## DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -10 A	T <sub>J</sub> = 25°C		-0.8	-1.3	V
			T <sub>J</sub> = 125°C		-0.65		
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, di <sub>S</sub> /dt = 100 A/μs, I <sub>S</sub> = -10 A		40.7		ns	
Charge Time	t <sub>a</sub>			18.4			
Discharge Time	t <sub>b</sub>			22.3			
Reverse Recovery Charge	Q <sub>RR</sub>			29			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.

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

TYPICAL CHARACTERISTICS

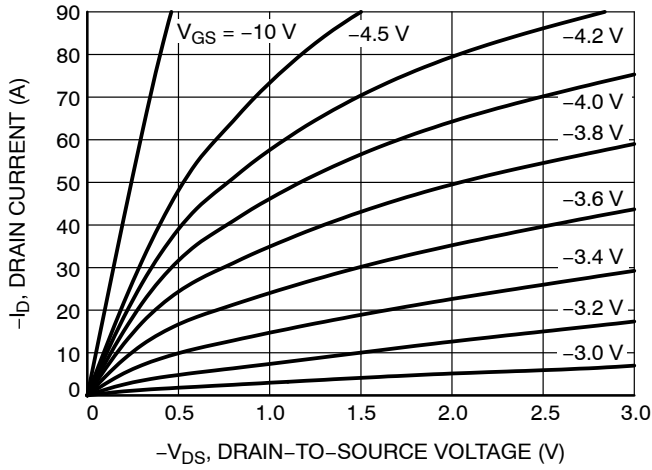


Figure 1. On-Region Characteristics

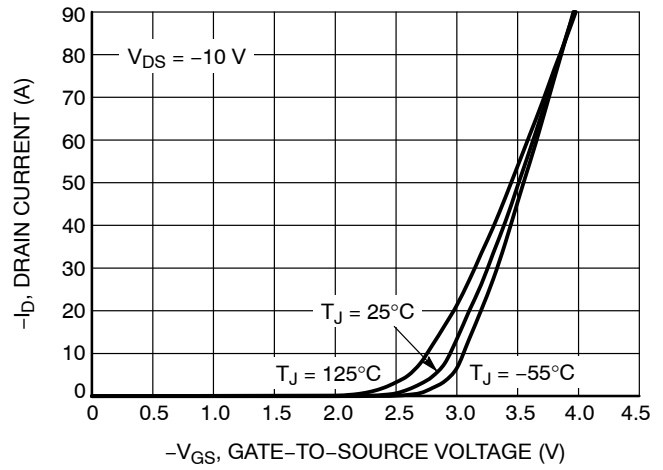


Figure 2. Transfer Characteristics

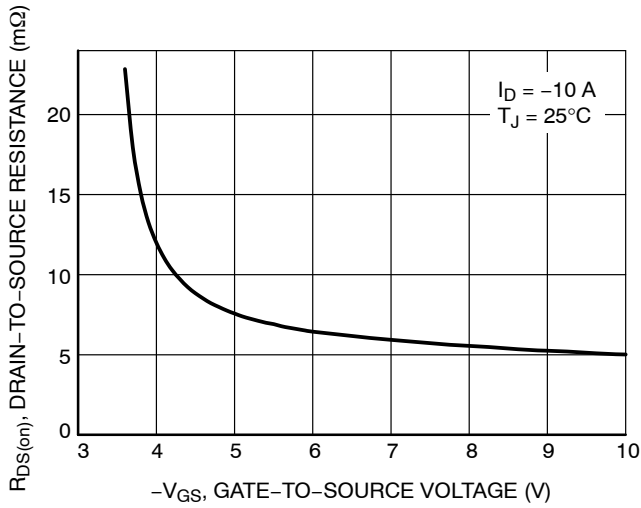


Figure 3. On-Resistance vs. Gate-to-Source Voltage

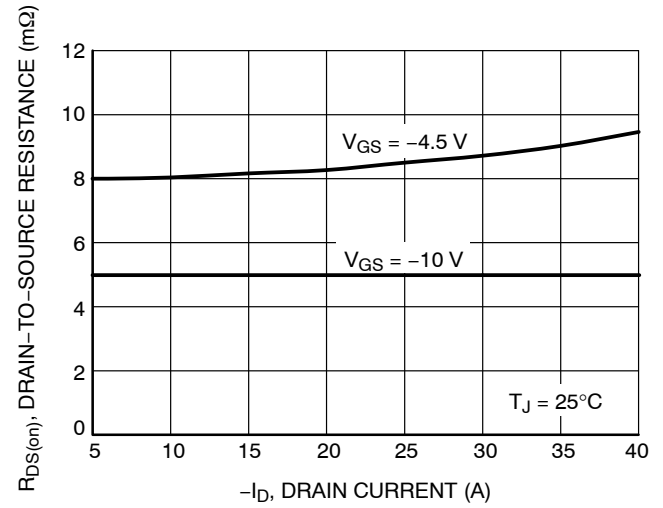


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

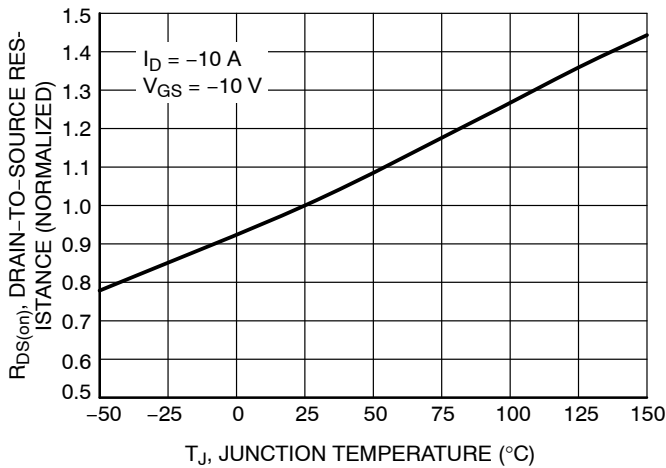


Figure 5. On-Resistance Variation with Temperature

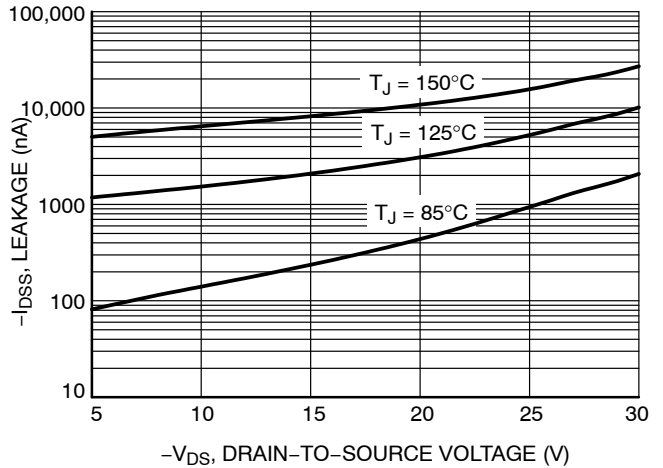


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

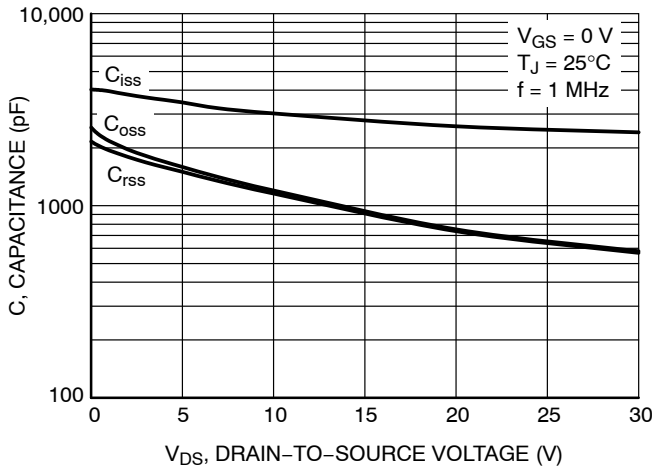


Figure 7. Capacitance Variation

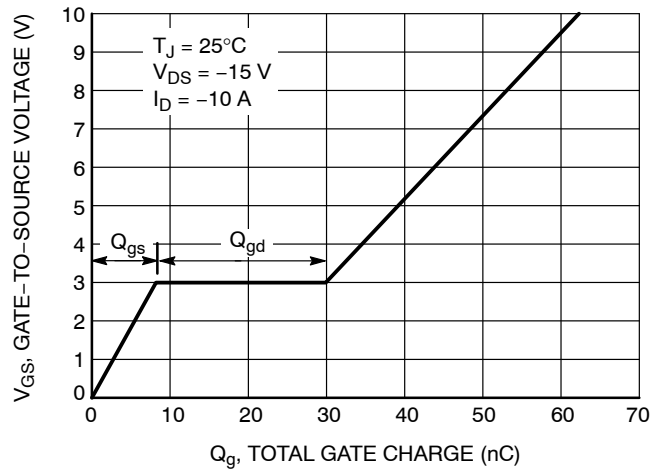


Figure 8. Gate-to-Source vs. Total Charge

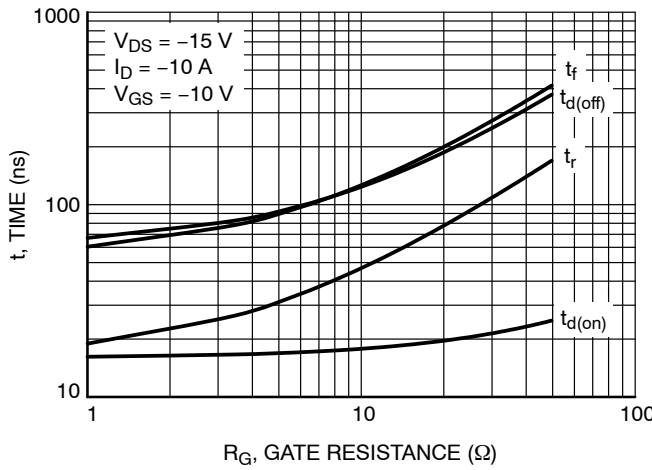


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

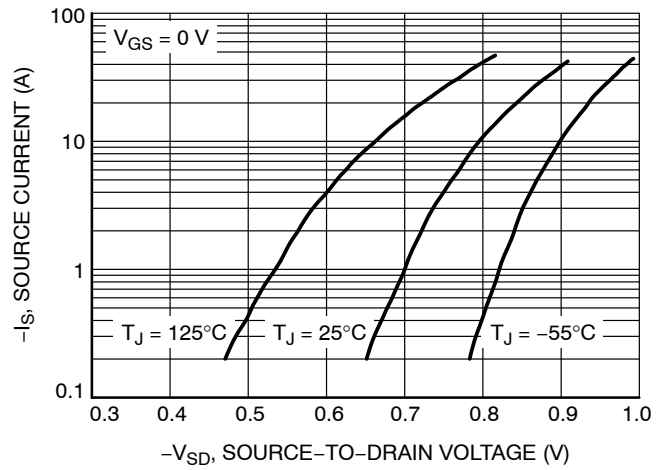


Figure 10. Diode Forward Voltage vs. Current

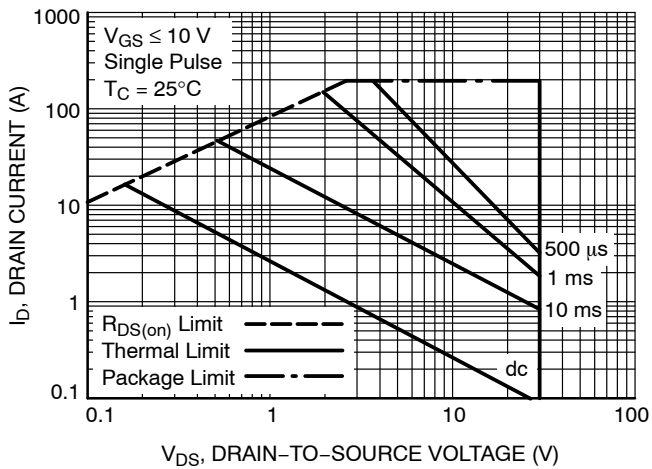


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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## TYPICAL CHARACTERISTICS

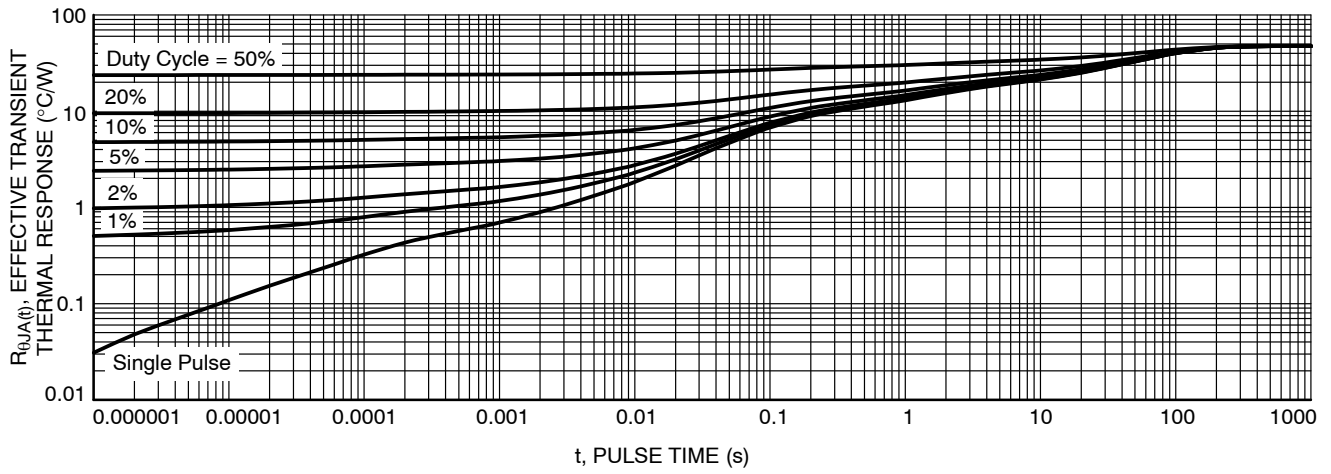


Figure 12. Thermal Response

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

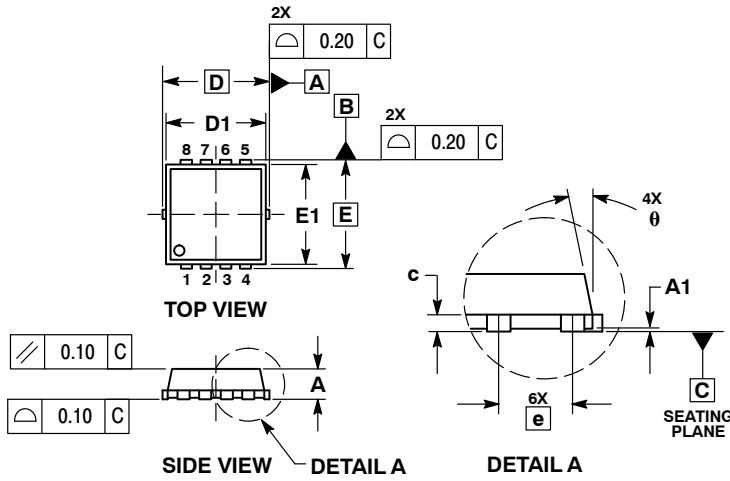
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SCALE 2:1

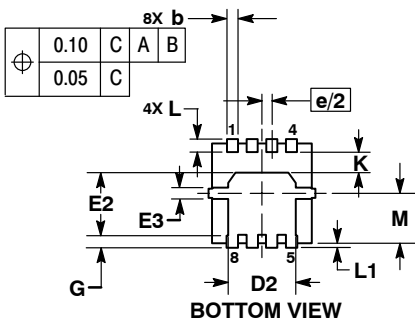
### WDFN8 3.3x3.3, 0.65P CASE 511AB ISSUE D

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°

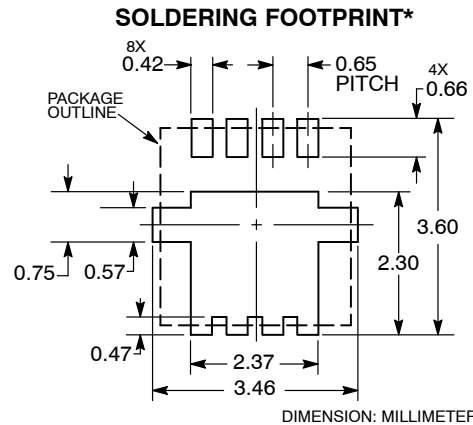


### GENERIC MARKING DIAGRAM\*



- 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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<b>DESCRIPTION:</b>	<b>WDFN8 3.3X3.3, 0.65P</b>	<b>PAGE 1 OF 1</b>

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