

# MOSFET - Power, Single P-Channel, $\mu$ 8FL

-30 V, 7.5 m $\Omega$ , -88.6 A

## NVTFS015P03P8Z

### Features

- Ultra Low  $R_{DS(on)}$  to Improve System Efficiency
- Advanced Package Technology in 3.3 x 3.3 mm for Space Saving and Excellent Thermal Conduction
- AEC-Q101 Qualified and PPAP Capable
- 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<sub>J</sub> = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		V <sub>DSS</sub>	-30	V	
Gate-to-Source Voltage		V <sub>GS</sub>	±25	V	
Continuous Drain Current R <sub>θJC</sub> (Notes 1, 2)	Steady State	T <sub>C</sub> = 25°C	I <sub>D</sub>	-88.6	A
		T <sub>C</sub> = 100°C		-62.6	
Power Dissipation R <sub>θJC</sub> (Notes 1, 2)		T <sub>C</sub> = 25°C	P <sub>D</sub>	88.2	W
		T <sub>C</sub> = 100°C		44.1	
Continuous Drain Current R <sub>θJA</sub> (Notes 1, 2)	Steady State	T <sub>A</sub> = 25°C	I <sub>D</sub>	-17	A
		T <sub>A</sub> = 100°C		-12	
Power Dissipation R <sub>θJA</sub> (Notes 1, 2)		T <sub>A</sub> = 25°C	P <sub>D</sub>	3.2	W
		T <sub>A</sub> = 100°C		1.6	
Pulsed Drain Current	T <sub>A</sub> = 25°C, t <sub>p</sub> = 10 μs	I <sub>DM</sub>	-353	A	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to 175	°C	
Source Current (Body Diode)		I <sub>S</sub>	73.5	A	
Single Pulse Drain to Source Avalanche Energy (I <sub>L</sub> = 8.5 A)		E <sub>AS</sub>	88	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T <sub>L</sub>	260	°C	

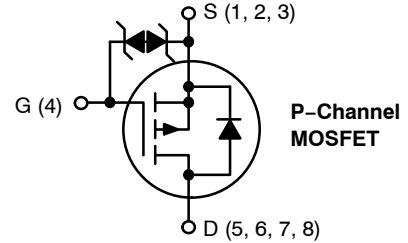
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Drain) (Note 2)	R <sub>θJC</sub>	1.7	°C/W
Junction-to-Ambient - Steady State (Note 2)	R <sub>θJA</sub>	46.4	°C/W

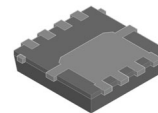
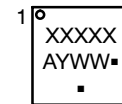
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 1 in<sup>2</sup>, 2 oz. Cu pad. Assuming a 76 mm x 76 mm x 1.6 mm board.

V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
-30 V	7.5 m $\Omega$ @ -10 V	-88.6 A
	12 m $\Omega$ @ -4.5 V	

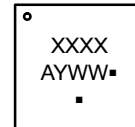


WDFN8  
( $\mu$ 8FL)  
CASE 511AB

### MARKING DIAGRAMS



WDFN8  
( $\mu$ 8FL WF)  
CASE 515AN



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

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

# NVTFS015P03P8Z

## 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> = -30 V, T <sub>J</sub> = 25°C			-10	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		6		ns
Rise Time	t <sub>r</sub>			17		
Turn-Off Delay Time	t <sub>d(off)</sub>			52		
Fall Time	t <sub>f</sub>			63		

## 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

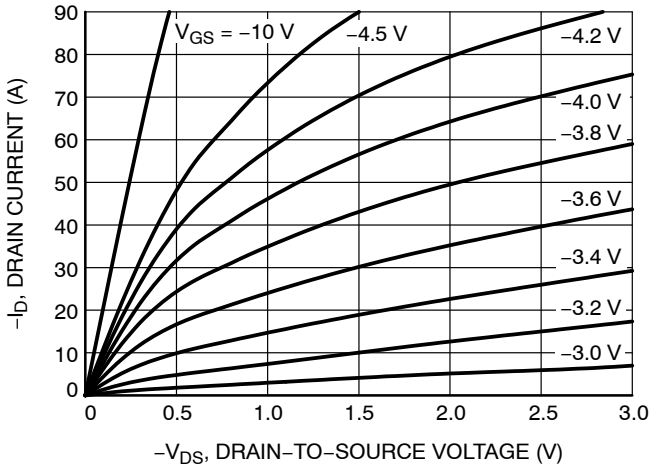


Figure 1. On-Region Characteristics

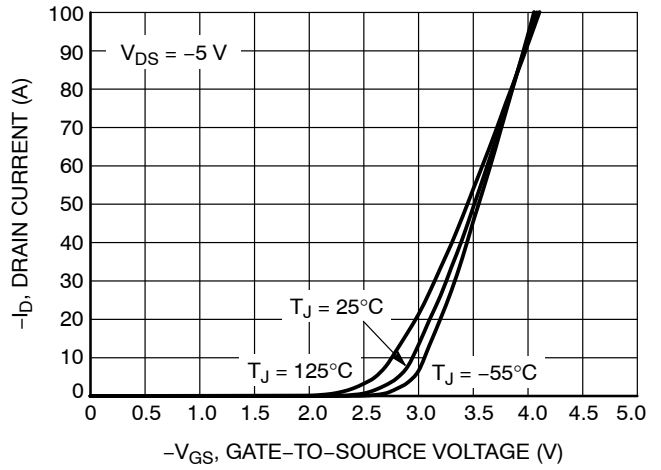


Figure 2. Transfer Characteristics

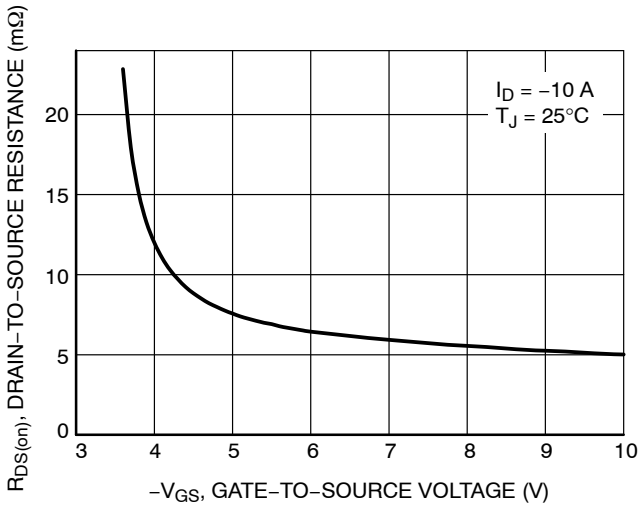


Figure 3. On-Resistance vs. Gate-to-Source Voltage

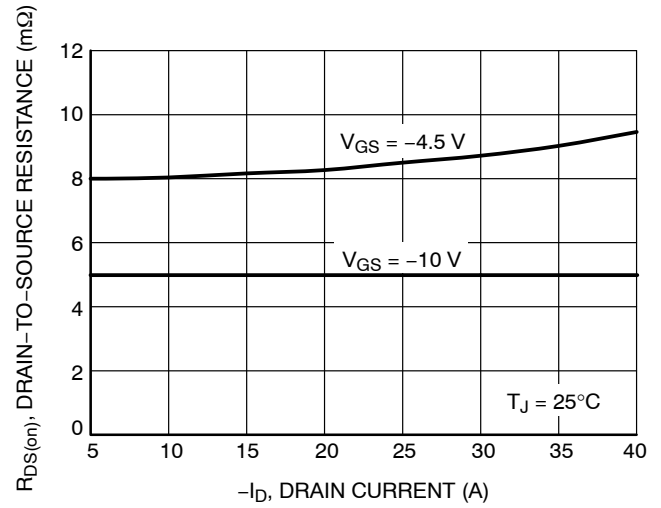


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

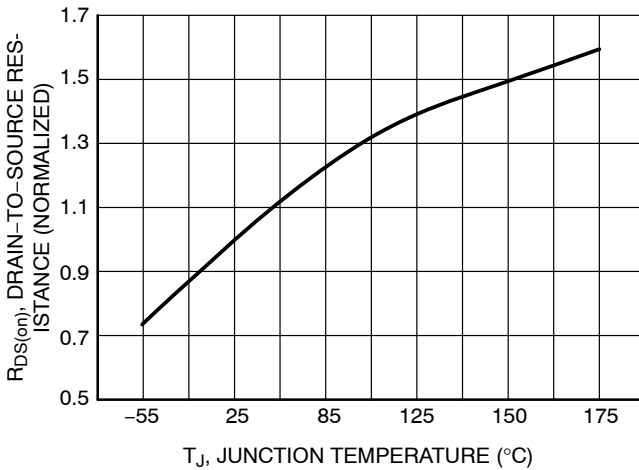


Figure 5. On-Resistance Variation with Temperature

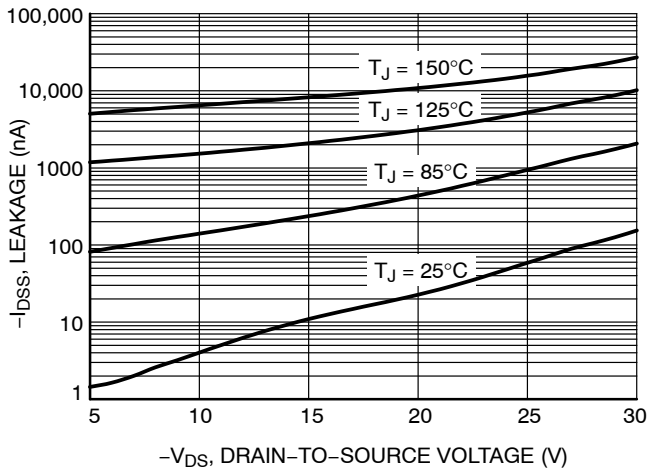


Figure 6. Drain-to-Source Leakage Current vs. Voltage

# NVTFS015P03P8Z

## TYPICAL CHARACTERISTICS

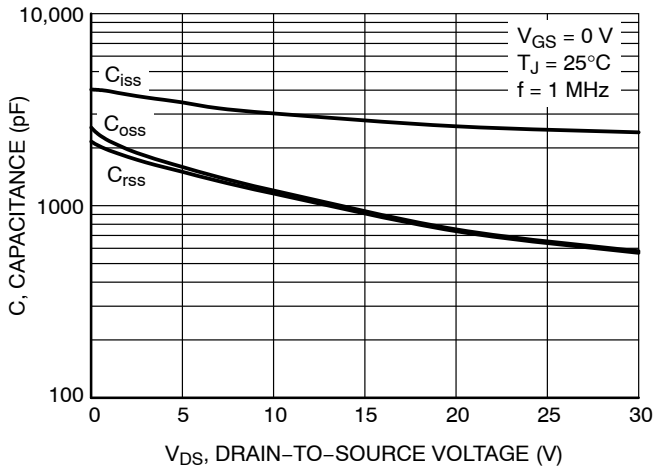


Figure 7. Capacitance Variation

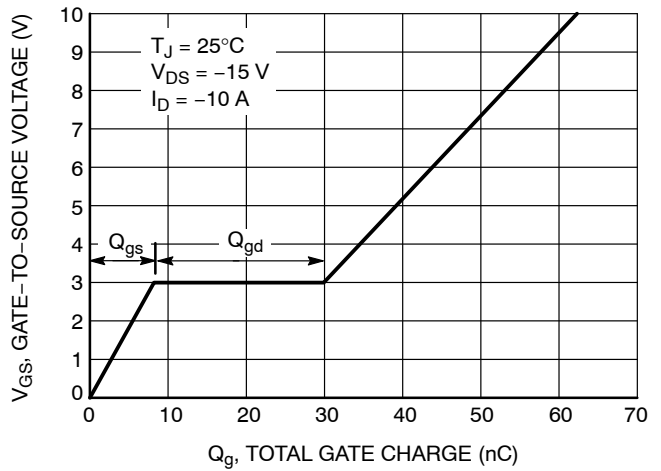


Figure 8. Gate-to-Source vs. Total Charge

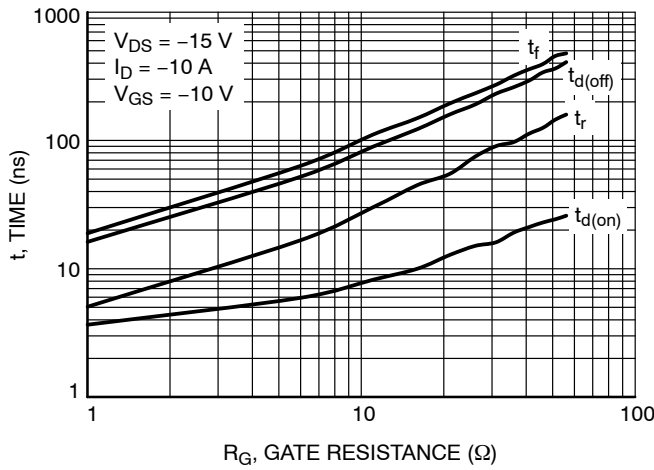


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

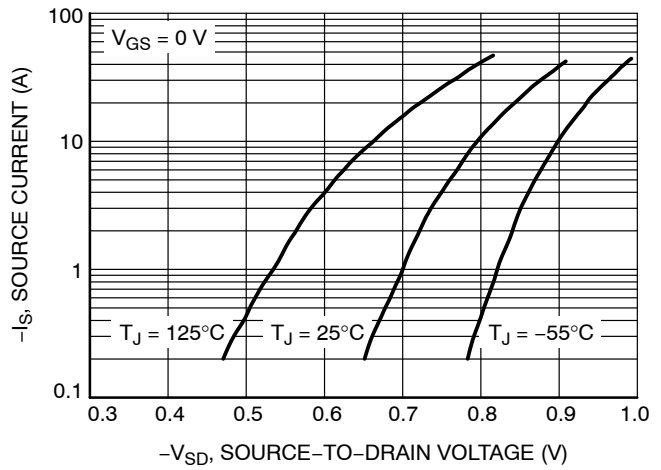


Figure 10. Diode Forward Voltage vs. Current

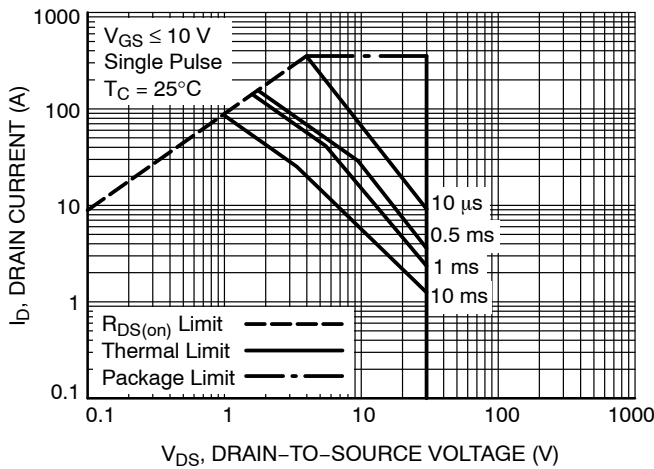


Figure 11. Maximum Rated Forward Biased Safe Operating Area

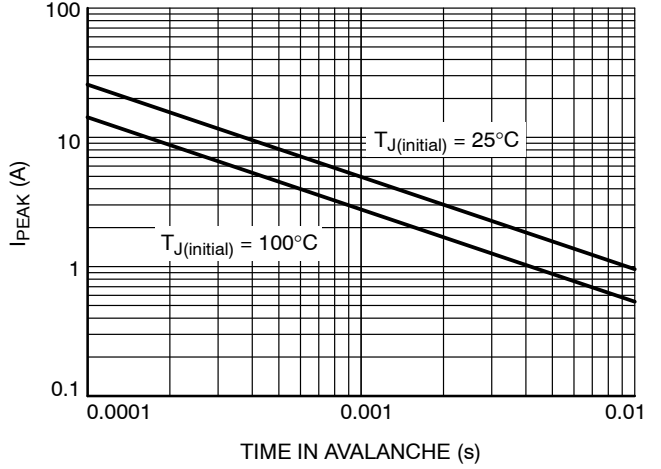


Figure 12. Maximum Drain Current vs. Time in Avalanche

# NVTFS015P03P8Z

## TYPICAL CHARACTERISTICS

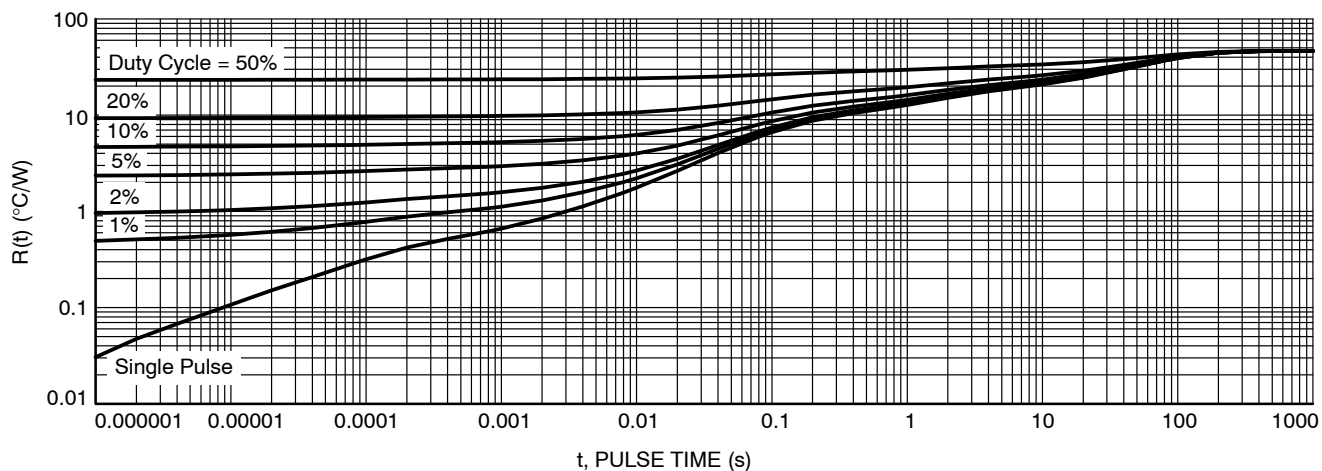


Figure 13. Thermal Response

### DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping†
NVTFS015P03P8ZTAG	15P3	WDFN8 (Pb-Free)	1500 / Tape & Reel
NVTFWS015P03P8ZTAG	15PW	WDFN8 (Pb-Free, Wettable Flanks)	1500 / Tape & Reel

†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.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

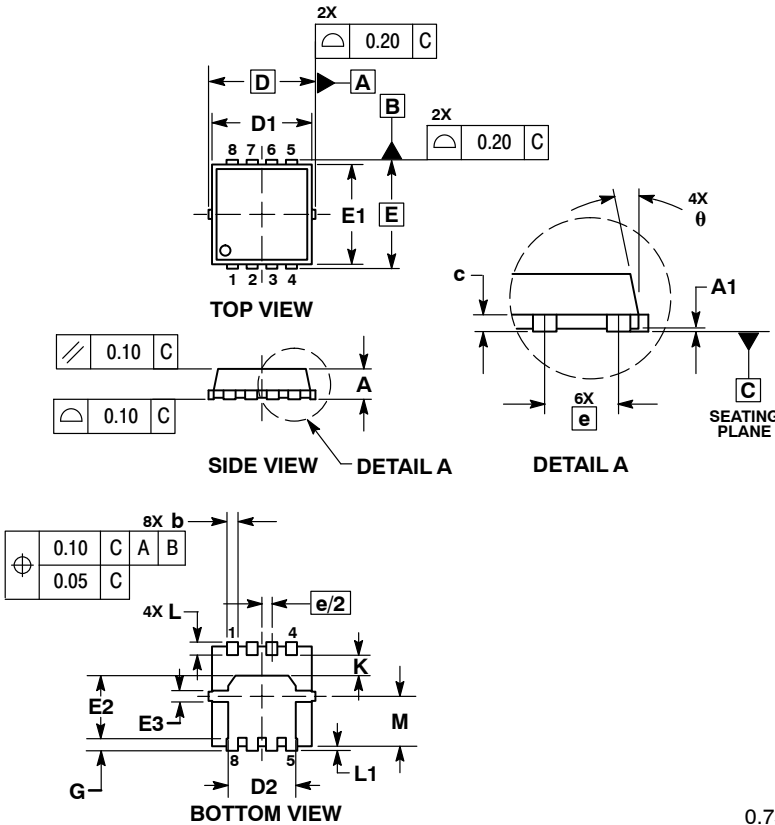
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SCALE 2:1

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

DATE 23 APR 2012

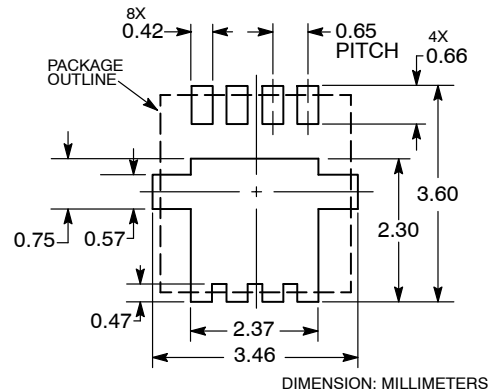


NOTES:

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.

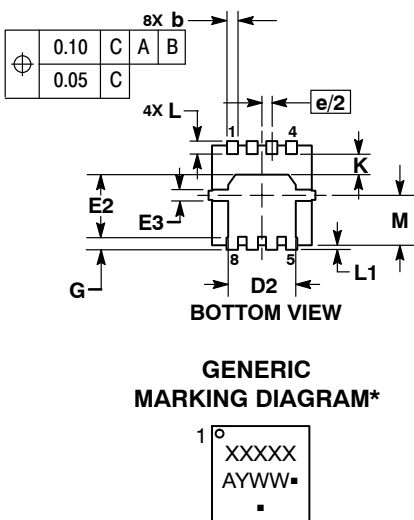
DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	---	0.05	0.000	---	0.002
b	0.23	0.30	0.40	0.009	0.012	0.016
c	0.15	0.20	0.25	0.006	0.008	0.010
D	3.30 BSC			0.130 BSC		
D1	2.95	3.05	3.15	0.116	0.120	0.124
D2	1.98	2.11	2.24	0.078	0.083	0.088
E	3.30 BSC			0.130 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°

SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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.

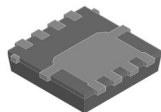
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<b>DESCRIPTION:</b>	<b>WDFN8 3.3X3.3, 0.65P</b>	<b>PAGE 1 OF 1</b>

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# MECHANICAL CASE OUTLINE

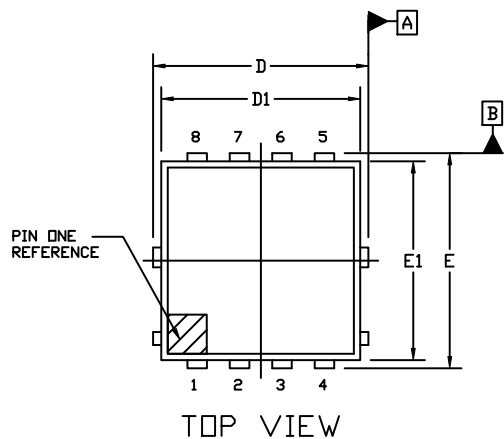
## PACKAGE DIMENSIONS

ON Semiconductor®



### WDFNW8 3.3x3.3, 0.65P (Full-Cut $\mu$ 8FL WF) CASE 515AN ISSUE O

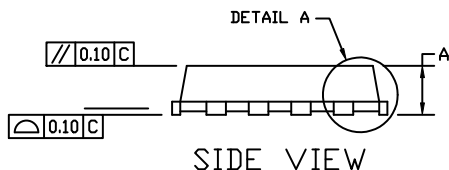
DATE 25 AUG 2020



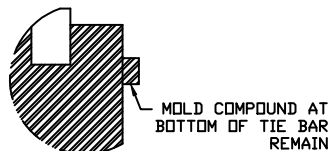
TOP VIEW



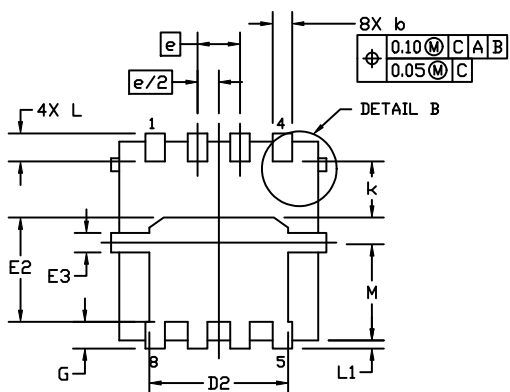
DETAIL A



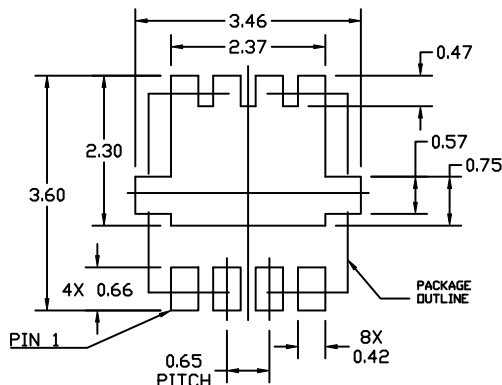
SIDE VIEW



DETAIL B



BOTTOM VIEW

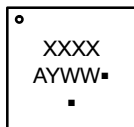


RECOMMENDED MOUNTING FOOTPRINT

\* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

DIM	MILLIMETERS		
	MIN.	NDM.	MAX.
A	0.70	0.75	0.80
A1	0.00	----	0.05
b	0.23	0.30	0.40
c	0.15	0.20	0.25
D	3.05	3.30	3.55
D1	2.95	3.05	3.15
D2	1.98	2.11	2.24
E	3.05	3.30	3.55
E1	2.95	3.05	3.15
E2	1.47	1.60	1.73
E3	0.23	0.30	0.40
e	0.65 BSC		
G	0.30	0.41	0.51
K	0.65	0.80	0.95
L	0.30	0.43	0.59
L1	0.06	0.13	0.20
M	1.40	1.50	1.60

### GENERIC MARKING DIAGRAM\*



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

(Note: Microdot may be in either location)

\*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.

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<b>DESCRIPTION:</b>	<b>WDFNW8 3.3x3.3, 0.65P (Full-Cut <math>\mu</math>8FL WF)</b>	<b>PAGE 1 OF 1</b>

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