

# MOSFET - Power, Single P-Channel, WDFN8

## -30 V, 3.8 mΩ, -96 A

### NTTFS008P03P8Z

#### 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	$T_C = 25^\circ\text{C}$	$I_D$ -96	A
		$T_C = 85^\circ\text{C}$	-69	
Power Dissipation $R_{\theta JC}$ (Notes 1, 2)		$T_C = 25^\circ\text{C}$	$P_D$ 50	W
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$ -22	A
		$T_A = 85^\circ\text{C}$	-16	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)		$T_A = 25^\circ\text{C}$	$P_D$ 2.36	W
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	$I_{DM}$	-418	A
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	$T_L$	260	$^\circ\text{C}$	

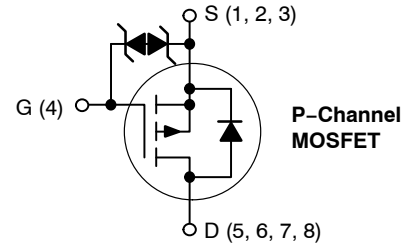
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### THERMAL RESISTANCE MAXIMUM RATINGS

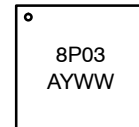
Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Drain) (Note 2)	$R_{\theta JC}$	2.5	$^\circ\text{C}/\text{W}$
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	47	$^\circ\text{C}/\text{W}$

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.

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$
-30 V	3.8 mΩ @ -10 V	-96 A
	6.5 mΩ @ -4.5 V	



#### MARKING DIAGRAM



8P03 = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week

#### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NTTFS008P03P8Z	WDFN8 (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 Specification Brochure, BRD8011/D.

# NTTFS008P03P8Z

## 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		-8		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		5.9		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -18 A		2.5	3.8	mΩ
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -14 A		4.3	6.5	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -5 V, I <sub>D</sub> = -14 A		74		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		5600		pF
Output Capacitance	C <sub>oss</sub>			1940		
Reverse Transfer Capacitance	C <sub>rss</sub>			1890		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = -10 V, V <sub>DS</sub> = -15 V, I <sub>D</sub> = -14 A		134		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			3		
Gate-to-Source Charge	Q <sub>GS</sub>			15		
Gate-to-Drain Charge	Q <sub>GD</sub>			51		
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> = -14 A		82		

## 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> = -14 A, R <sub>G</sub> = 6 Ω		49		ns
Rise Time	t <sub>r</sub>			248		
Turn-Off Delay Time	t <sub>d(off)</sub>			95		
Fall Time	t <sub>f</sub>			187		

## 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> = -14 A, R <sub>G</sub> = 6 Ω		19		ns
Rise Time	t <sub>r</sub>			53		
Turn-Off Delay Time	t <sub>d(off)</sub>			201		
Fall Time	t <sub>f</sub>			177		

## DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -14 A	T <sub>J</sub> = 25°C	-0.77	-1.3	V
			T <sub>J</sub> = 125°C	-0.63		
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> = -14 A		52		ns
Charge Time	t <sub>a</sub>			21		
Discharge Time	t <sub>b</sub>			30		
Reverse Recovery Charge	Q <sub>RR</sub>			31		

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

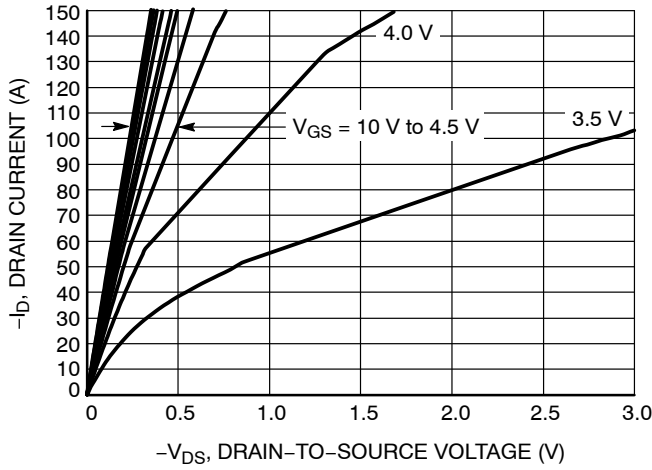


Figure 1. On-Region Characteristics

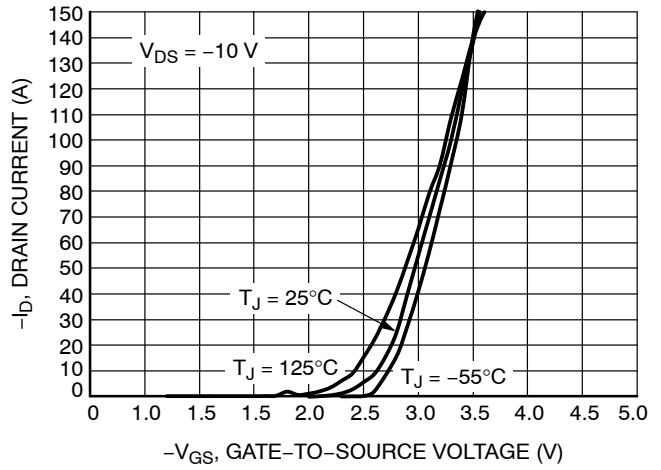


Figure 2. Transfer Characteristics

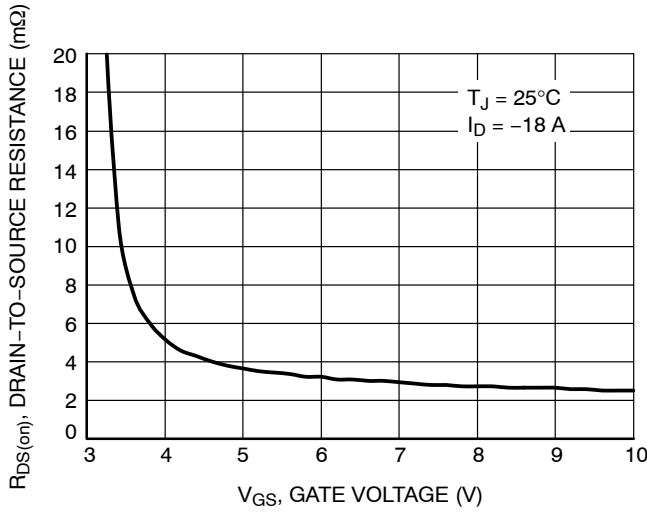


Figure 3. On-Resistance vs. Gate-to-Source Voltage

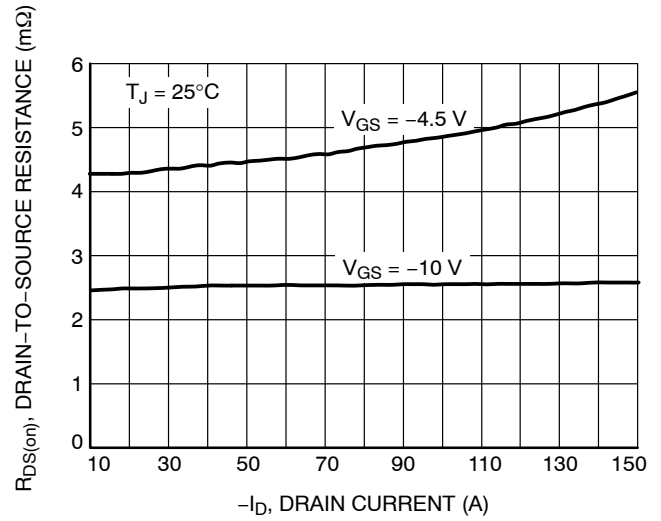


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

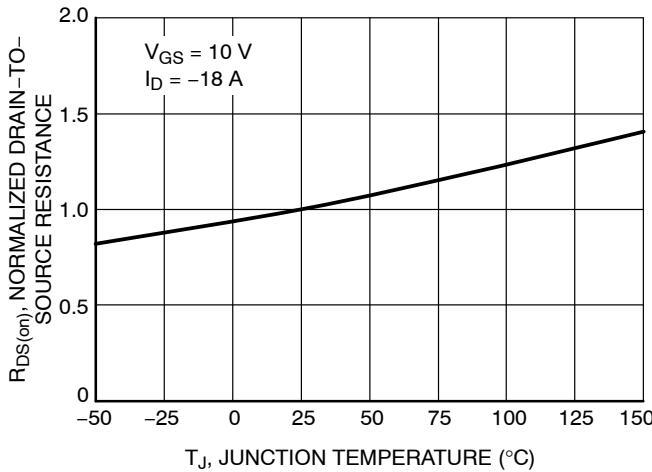


Figure 5. On-Resistance Variation with Temperature

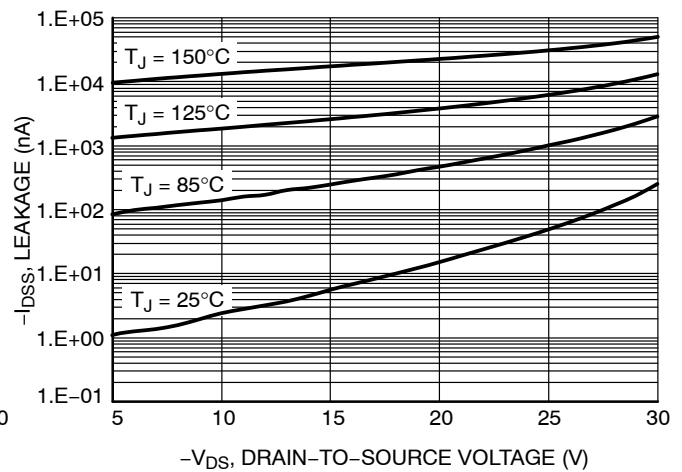


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

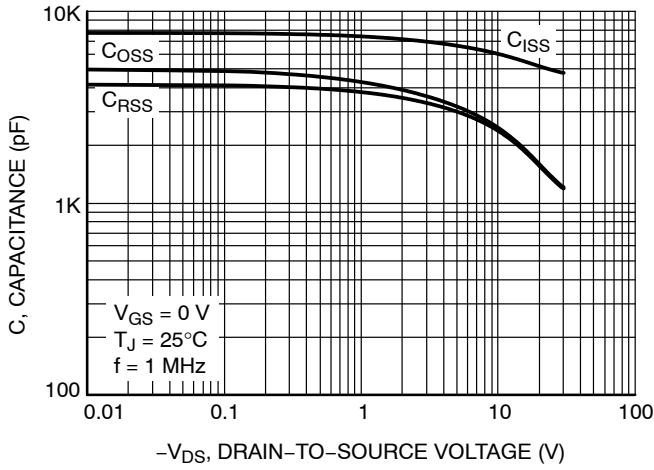


Figure 7. Capacitance Variation

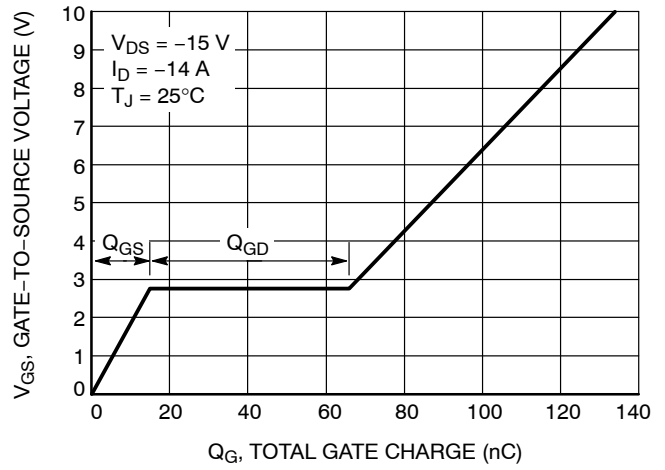


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

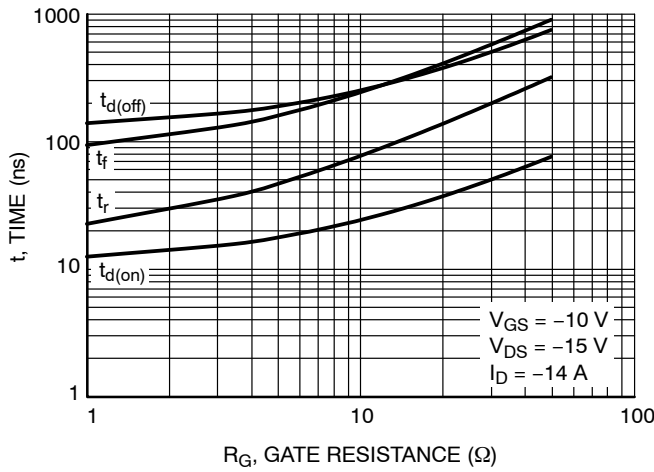


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

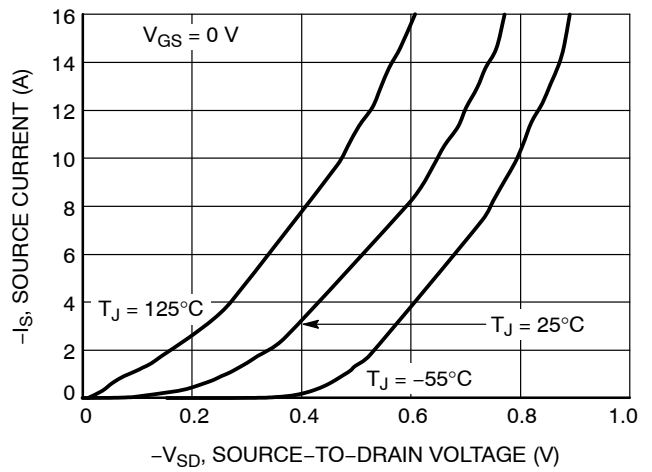


Figure 10. Diode Forward Voltage vs. Current

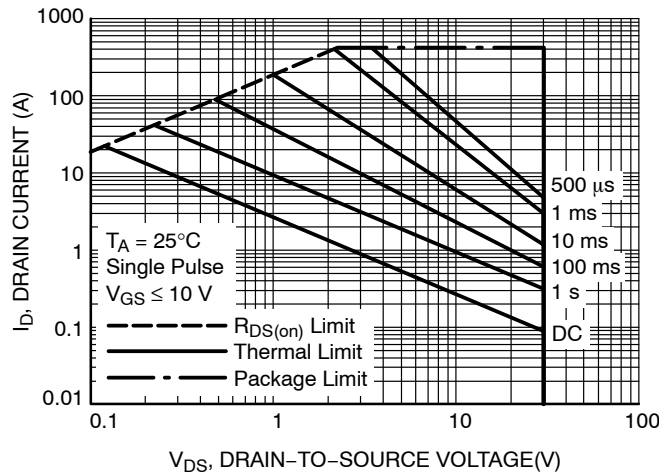


Figure 11. Safe Operating Area

# NTTFS008P03P8Z

## TYPICAL CHARACTERISTICS

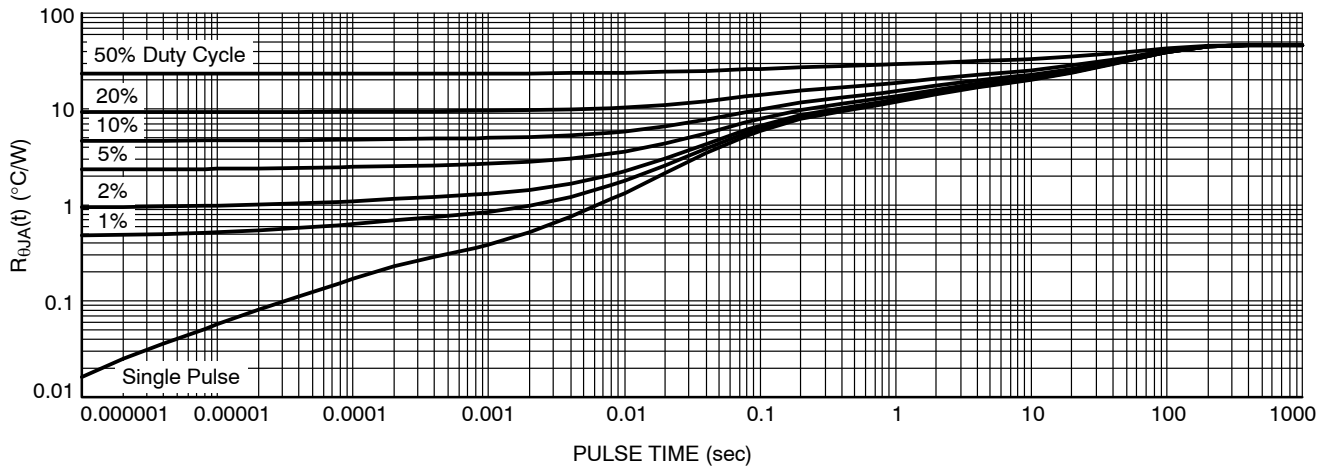
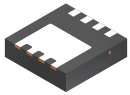


Figure 12. Thermal Characteristics

# MECHANICAL CASE OUTLINE

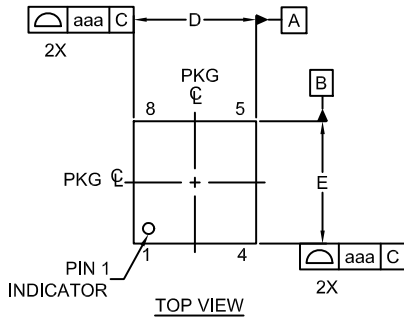
## PACKAGE DIMENSIONS

ON Semiconductor®

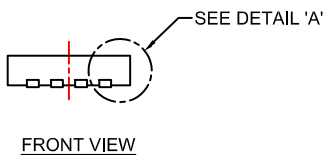


**WDFN8 3.3X3.3, 0.65P**  
**CASE 483AW**  
**ISSUE A**

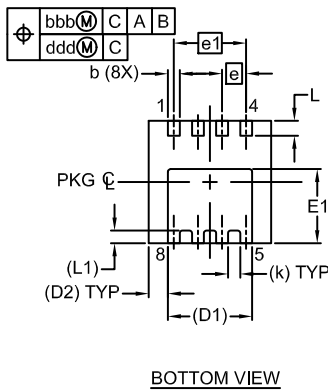
DATE 10 SEP 2019



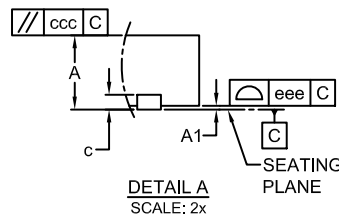
TOP VIEW



FRONT VIEW

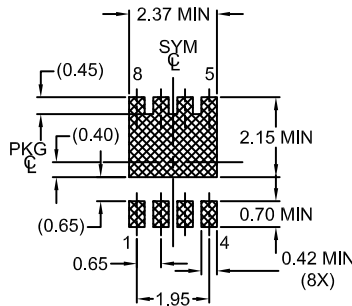


BOTTOM VIEW



DETAIL A  
SCALE: 2x

### LAND PATTERN RECOMMENDATION\*



### NOTES:

1. CONTROLLING DIMENSION: MILLIMETERS.
2. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
4. SEATING PLANE IS DEFINED BY THE TERMINALS. 'A1' IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	-	-	0.05
b	0.27	0.32	0.37
c	0.15	0.20	0.25
D	3.20	3.30	3.40
D1	2.27 REF		
D2	0.52 REF		
E	3.20	3.30	3.40
E1	1.85	1.95	2.05
e	0.65 BSC		
e1	1.95 BSC		
k	0.33 REF		
L	0.30	0.40	0.50
L1	0.34 REF		
aaa	0.10		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.05		

\*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\*



XXXX = Specific Device Code  
 A = Assembly Location  
 Y = Year  
 WW = Work Week

\*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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