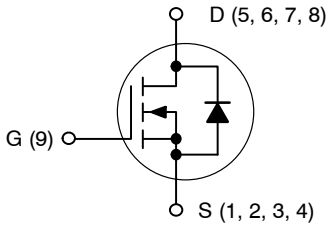
MOSFET - Power, Single N-Channel, Source Down, WDFN9

80 V, 3.6 mΩ, 107 A

Product Preview

NTTFSSH4D0N08XL

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
80 V	3.6 mΩ @ 10 V	107 A
	5.3 mΩ @ 4.5 V	



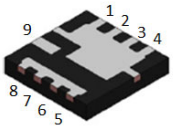
N−CHANNEL MOSFET

Features

- Advanced Source−Down Package Technology (3.3 x 3.3 mm) with Excellent Thermal Conduction
- Ultra Low $R_{DS(on)}$ to Improve System Efficiency
- Low Q_G and Capacitance to Minimize Driving and Switching Losses
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- High Switching Frequency DC−DC Conversion
- Synchronous Rectifier



WDFN9
CASE 511EB

MARKING DIAGRAM

4D0N08 = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain−to−Source Voltage		V_{DSS}	80	V
Gate−to−Source Voltage		V_{GS}	±20	V
Continuous Drain Current (Note 1)	T_C = 25°C	I_D	107	A
	T_C = 100°C		76	
Power Dissipation (Notes 1, 2)	T_C = 25°C	P_D	102	W
Pulsed Drain Current	T_C = 25°C, t_p = 10 μs	I_{DM}	419	A
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +175	°C
Continuous Source−Drain Current (Body Diode)		I_S	160	A
Single Pulse Avalanche Energy (I_{PK} = 40 A)		E_{AS}	80	mJ
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)		T_L	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.

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are valid for the particular conditions noted.
2. Surface−mounted on FR4 board using a 1 in^2 pad size, 1 oz Cu pad.
3. E_{AS} of 80 mJ is based on started T_J = 25°C, I_{AS} = 40 A, V_{GS} = 10 V, 100% avalanche tested.

This document contains information on a product under development. **onsemi** reserves the right to change or discontinue this product without notice.

THERMAL CHARACTERISTICS

Parameter	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	1.5	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	60	

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA, T_J = 25°C	80			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	I_D = 1 mA, Referenced to 25°C		32		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 80 V, T_J = 25°C			10	μA
		V_{DS} = 80 V, T_J = 125°C			250	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V			100	nA
ON CHARACTERISTICS						
Drain−to−Source On Resistance	$R_{DS(ON)}$	V_{GS} = 10 V, I_D = 23 A		3.1	3.6	mΩ
		V_{GS} = 4.5 V, I_D = 18 A		3.9	5.3	
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 115 μA, T_J = 25°C	1.5		2.1	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(TH)}/\Delta T_J$	V_{GS} = V_{DS}, I_D = 115 μA		−6		mV/°C
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 23 A		156		S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, V_{DS} = 40 V, f = 1 MHz		2520		pF
Output Capacitance	C_{OSS}			630		
Reverse Transfer Capacitance	C_{RSS}			18		
Output Charge	Q_{OSS}			47		nC
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DD} = 40 V, I_D = 23 A		19		
		V_{GS} = 10 V, V_{DD} = 40 V, I_D = 23 A		40		
Threshold Gate Charge	$Q_{G(TH)}$			4.6		
Gate−to−Source Charge	Q_{GS}			8.1		
Gate−to−Drain Charge	Q_{GD}			6.2		
Gate Plateau Voltage	V_{GP}			3.1		V
Gate Resistance	R_G	f = 1 MHz		0.4		Ω
SWITCHING CHARACTERISTICS						
Turn−On Delay Time	$t_{d(ON)}$	Resistive Load, V_{GS} = 0/10 V, V_{DD} = 40 V, I_D = 23 A, R_G = 2.5 Ω		11		ns
Rise Time	t_r			5		
Turn−Off Delay Time	$t_{d(OFF)}$			28		
Fall Time	t_f			4		
SOURCE−TO−DRAIN DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 23 A, T_J = 25°C		0.8	1.2	V
		V_{GS} = 0 V, I_S = 23 A, T_J = 125°C		0.7		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, I_S = 23 A, dI/dt = 1000 A/μs, V_{DD} = 40 V		19		ns
Charge Time	t_a			11		
Discharge Time	t_b			8		
Reverse Recovery Charge	Q_{RR}			109		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.

TYPICAL CHARACTERISTICS

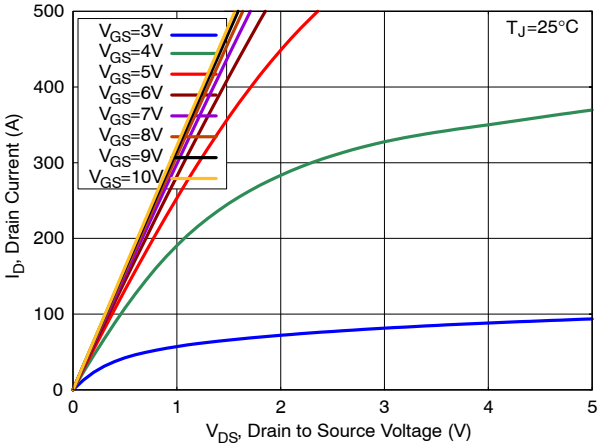


Figure 1. On−Region Characteristics

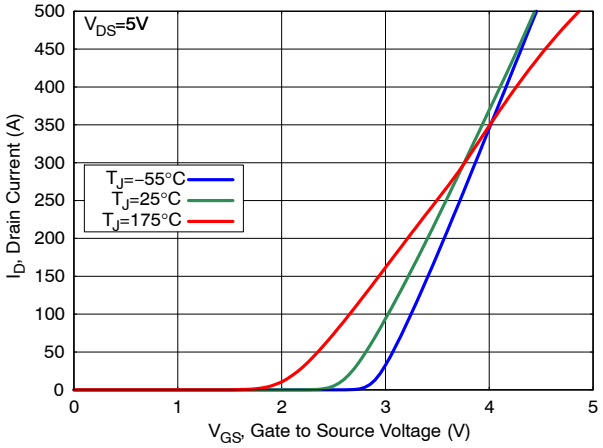


Figure 2. Transfer Characteristics

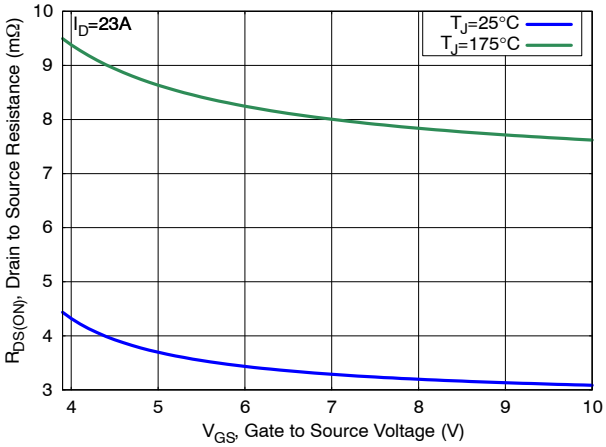


Figure 3. On−Resistance vs. Gate Voltage

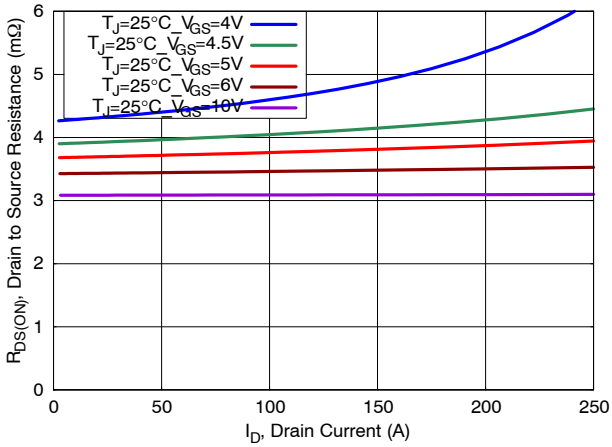


Figure 4. On−Resistance vs. Drain Current

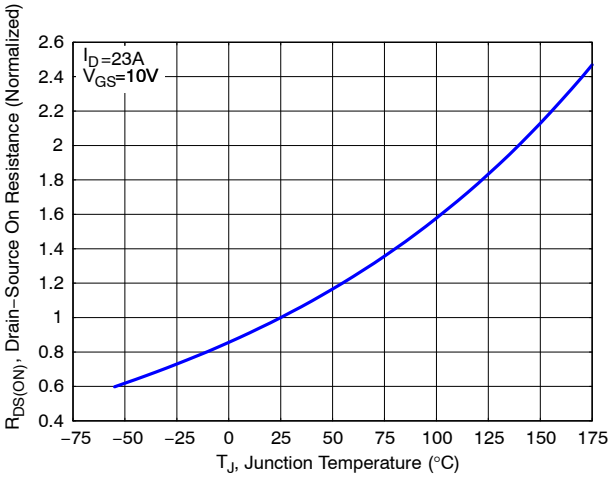


Figure 5. Normalized On−Resistance vs. Junction Temperature

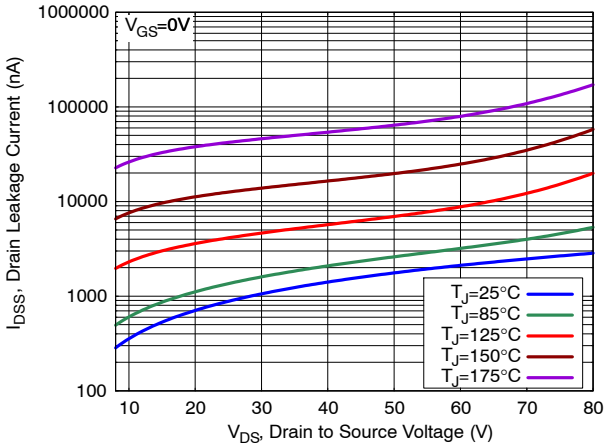


Figure 6. Drain Leakage Current vs. Drain Voltage

TYPICAL CHARACTERISTICS

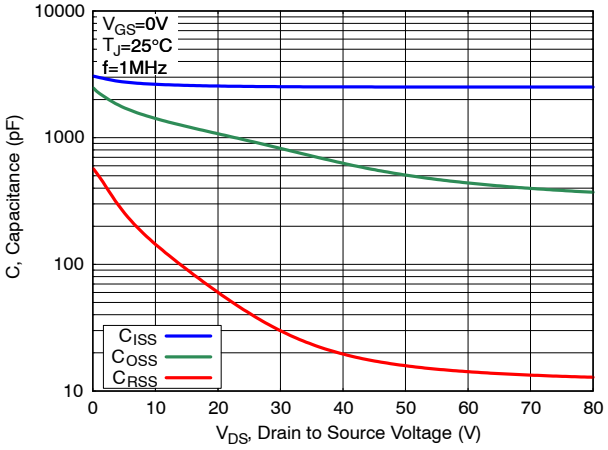


Figure 7. Capacitance Characteristics

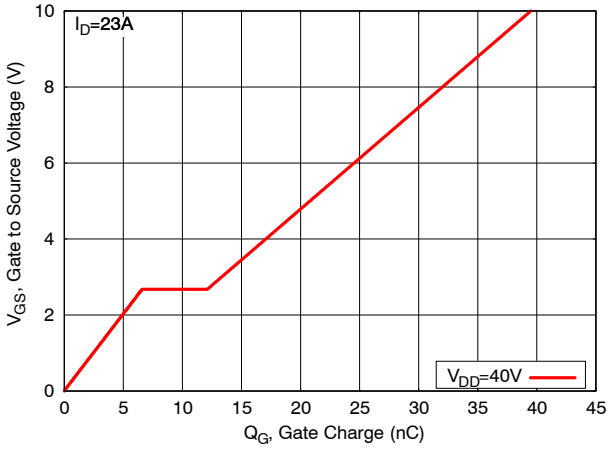


Figure 8. Gate Charge Characteristics

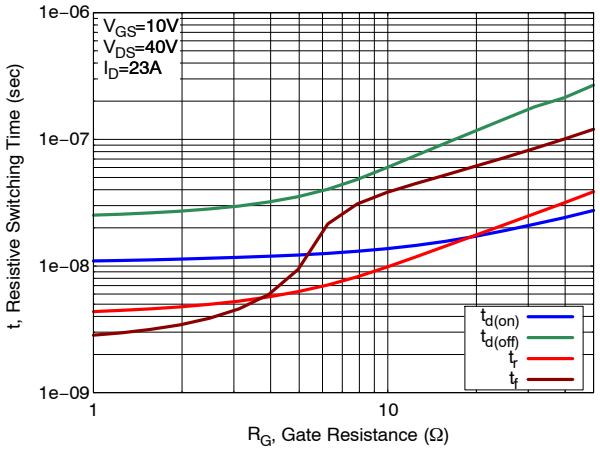


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

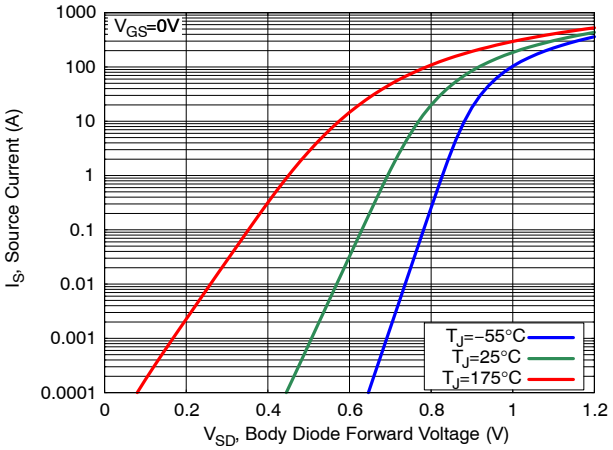


Figure 10. Diode Forward Characteristics

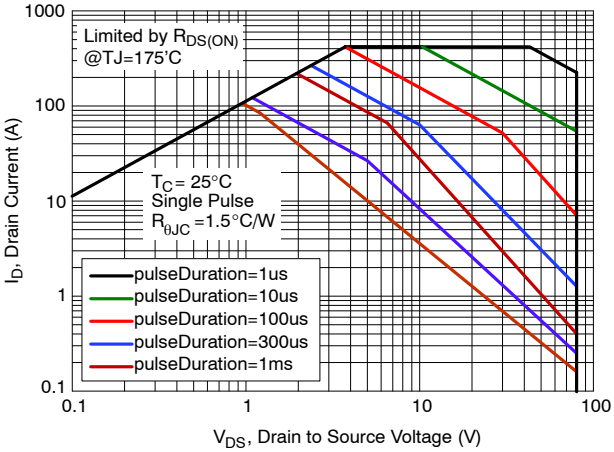


Figure 11. Safe Operating Area (SOA)

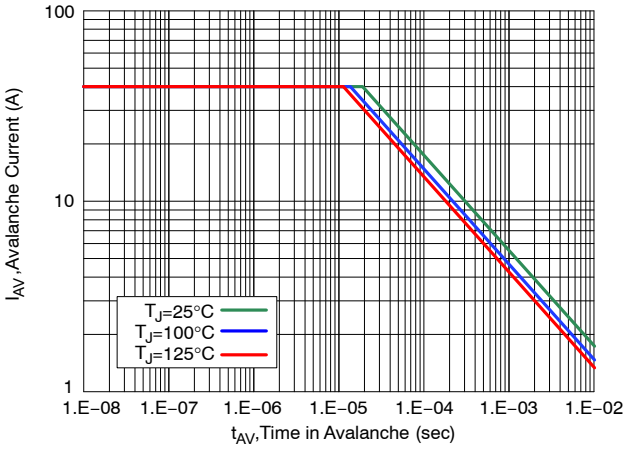


Figure 12. Avalanche Current vs. Pulse Time (UIS)

TYPICAL CHARACTERISTICS

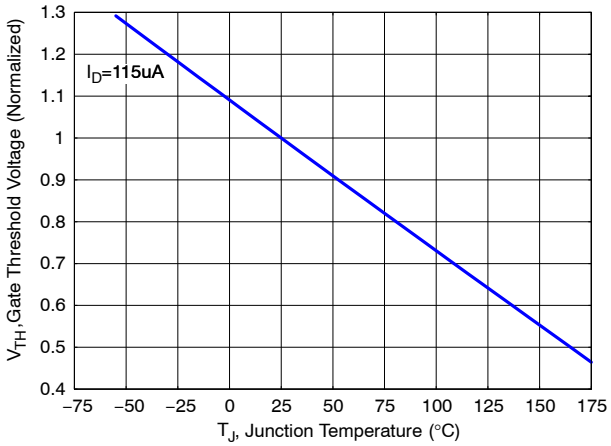


Figure 13. Gate Threshold Voltage vs. Junction Temperature

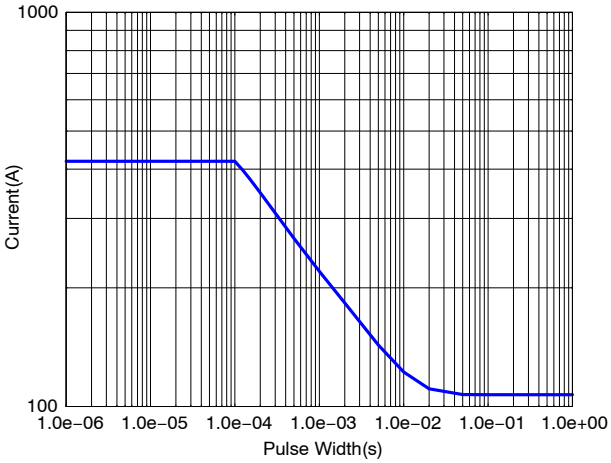


Figure 14. IDM vs. Pulse Width

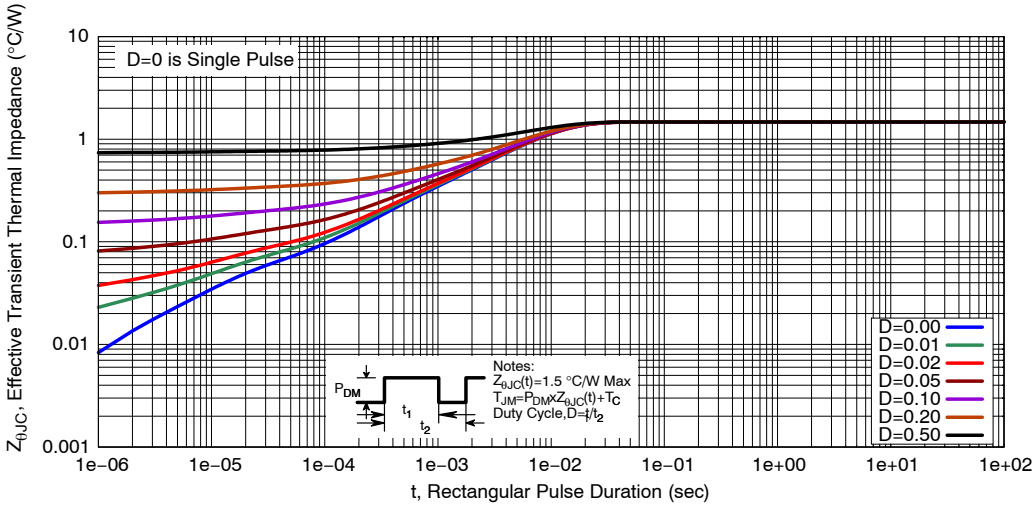


Figure 15. Transient Thermal Response

ORDERING INFORMATION

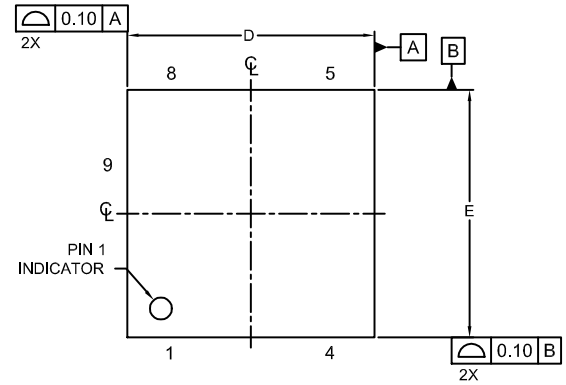
Device	Marking	Package	Shipping†
NTTFSSH4D0N08XLTWG	4D0N08	WDFN9 (Pb−Free)	3000 / Tape & Reel

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

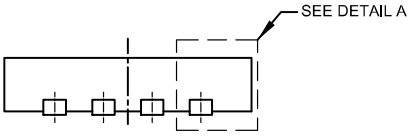
NTTFSSH4D0N08XL

PACKAGE DIMENSIONS

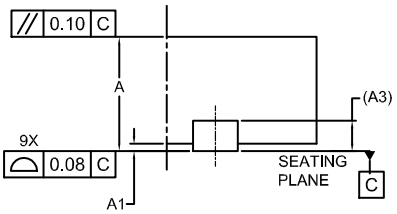
WDFN9 3.3x3.3, 0.65P
CASE 511EB
ISSUE B



TOP VIEW



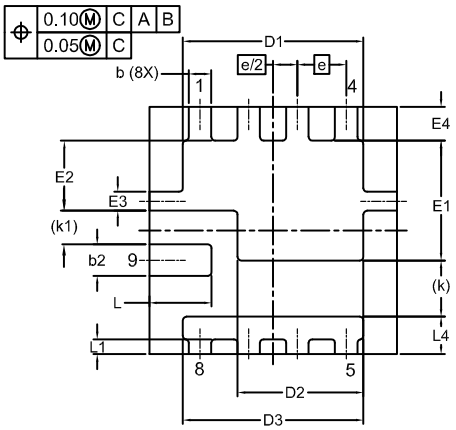
FRONT VIEW



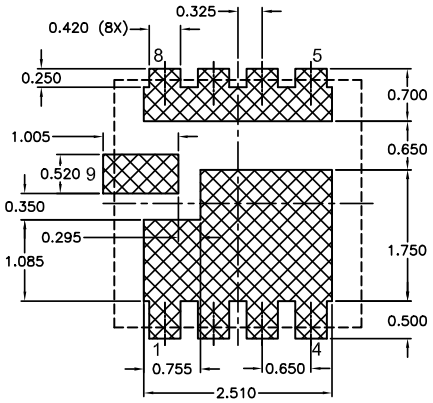
DETAIL A
SCALE: 2:1

NOTES:
1. CONTROLLING DIMENSION: MILLIMETERS
2. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
3. DIMENSIONS D1, D2, E1 AND E2 DO NOT INCLUDE MOLD FLASH.
4. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.

UNIT IN MILLIMETER			
DIM	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3		0.20 REF	
b	0.25	0.30	0.35
b2	0.37	0.42	0.47
D	3.20	3.30	3.40
D1	2.31	2.41	2.51
D2	1.58	1.68	1.78
D3	2.31	2.41	2.51
E	3.20	3.30	3.40
E1	1.50	1.60	1.70
E2	0.84	0.94	1.04
E3	0.20	0.25	0.30
E4	0.35	0.45	0.55
e		0.650 BSC	
e/2		0.325 BSC	
k		0.75 REF	
k1		0.45 REF	
L	0.73	0.83	0.93
L1	0.10	0.20	0.30
L4	0.40	0.50	0.60



BOTTOM VIEW



LAND PATTERN
RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR PB−FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

ADDITIONAL INFORMATION

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