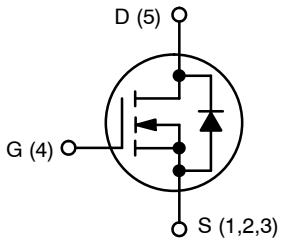
MOSFET - Power, Single N-Channel, STD Gate, SO8FL

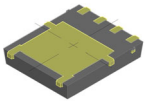
40 V, 4.7 mΩ, 66 A

NVMFWS004N04XM

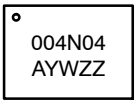
$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
40 V	4.7 mΩ @ 10 V	66 A



N−CHANNEL MOSFET



DFNW5 (SO−8FL)
CASE 507BA



004N04 = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
ZZ = Assembly Lot Code

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Small Footprint (5x6 mm) for Compact Design
- AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Motor Drive
- Battery Protection
- Synchronous Rectification

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

Parameter		Symbol	Value	Unit
Drain−to−Source Voltage		V_{DSS}	40	V
Gate−to−Source Voltage	DC	V_{GS}	±20	V
Continuous Drain Current	T_C = 25°C	I_D	66	A
	T_C = 100°C		47	
Power Dissipation	T_C = 25°C	P_D	38	W
Pulsed Drain Current	T_C = 25°C, t_p = 10 μs	I_{DM}	332	A
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)		I_S	32	A
Single Pulse Avalanche Energy (I_{PK} = 32 A)		E_{AS}	68	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.

THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction−to−Case (Note 2)	$R_{\theta JC}$	3.9	°C/W
Thermal Resistance, Junction−to−Ambient (Notes 1, 2)	$R_{\theta JA}$	42	

1. Surface−mounted on FR4 board using 650 mm^2, 2 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

ORDERING INFORMATION

Device	Package	Shipping†
NVMFWS004N04XMT1G	DFN5 (Pb−Free)	1500 / 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.

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

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	40	–	–	V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	I_D = 1 mA, Referenced to 25°C	–	15	–	mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40 V, T_J = 25°C	–	–	10	μA
		V_{DS} = 40 V, T_J = 125°C	–	–	100	
Gate−to−Source Leakage Current	I_{GSS}	V_{GS} = 20 V, V_{DS} = 0 V	–	–	100	nA
ON CHARACTERISTICS						
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 10 A, T_J = 25°C	–	4.1	4.7	mΩ
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 30 μA, T_J = 25°C	2.5	–	3.5	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(TH)}/\Delta T_J$	V_{GS} = V_{DS}, I_D = 30 μA	–	−7.29	–	mV/°C
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 10 A	–	45.5	–	S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	–	669	–	pF
Output Capacitance	C_{OSS}		–	431	–	
Reverse Transfer Capacitance	C_{RSS}		–	9.4	–	
Total Gate Charge	$Q_{G(TOT)}$	V_{DD} = 32 V, I_D = 30 A, V_{GS} = 10 V	–	10.6	–	nC
Threshold Gate Charge	$Q_{G(TH)}$		–	2.0	–	
Gate−to−Source Charge	Q_{GS}		–	3.2	–	
Gate−to−Drain Charge	Q_{GD}		–	2.1	–	
Gate−Resistance	R_G	f = 1 MHz	–	1.6	–	Ω
SWITCHING CHARACTERISTICS						
Turn−On Delay Time	$t_{d(ON)}$	Resistive Load, V_{GS} = 0/10 V, V_{DD} = 32 V, I_D = 30 A, R_G = 0 Ω	–	11.9	–	ns
Rise Time	t_r		–	4.0	–	
Turn−Off Delay Time	$t_{d(OFF)}$		–	17.2	–	
Fall Time	t_f		–	3.6	–	
SOURCE−TO−DRAIN DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	I_S = 10 A, V_{GS} = 0 V, T_J = 25°C	–	0.8	1.2	V
		I_S = 10 A, V_{GS} = 0 V, T_J = 125°C	–	0.7	–	
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, I_S = 30 A, dI/dt = 100 A/μs, V_{DD} = 32 V	–	28	–	ns
Charge Time	t_a		–	11	–	
Discharge Time	t_b		–	17	–	
Reverse Recovery Charge	Q_{RR}		–	9.5	–	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

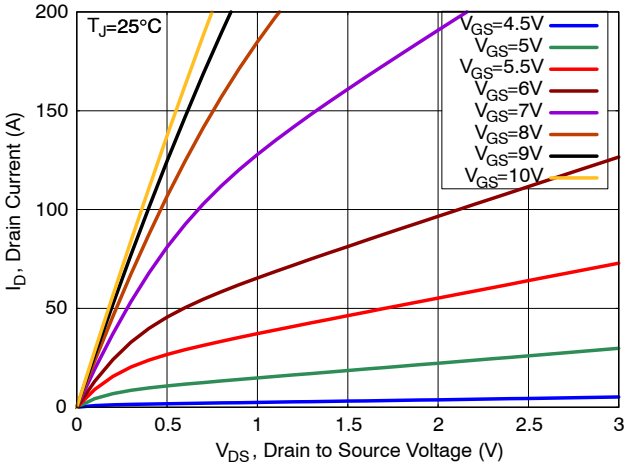


Figure 1. On−Region Characteristics

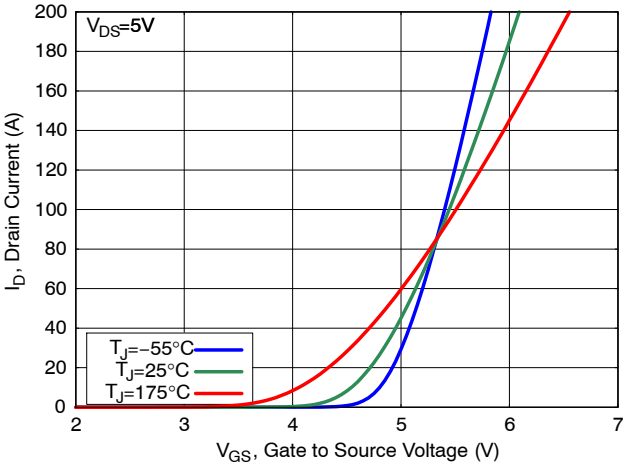


Figure 2. Transfer Characteristics

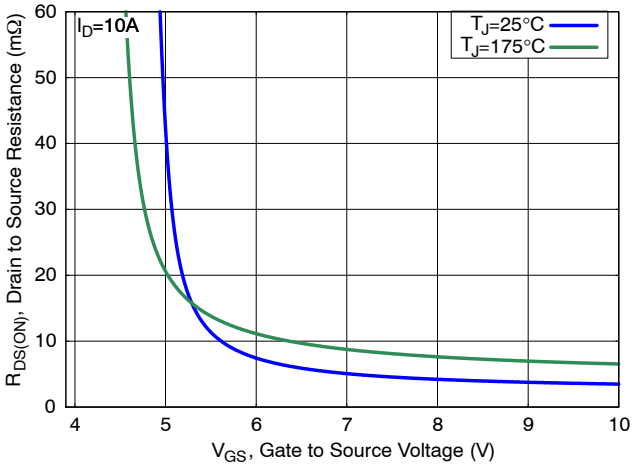


Figure 3. On−Resistance vs. Gate Voltage

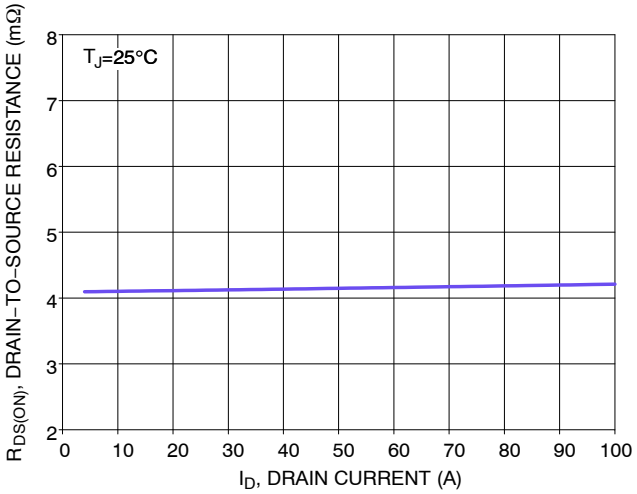


Figure 4. On−Resistance vs. Drain Current

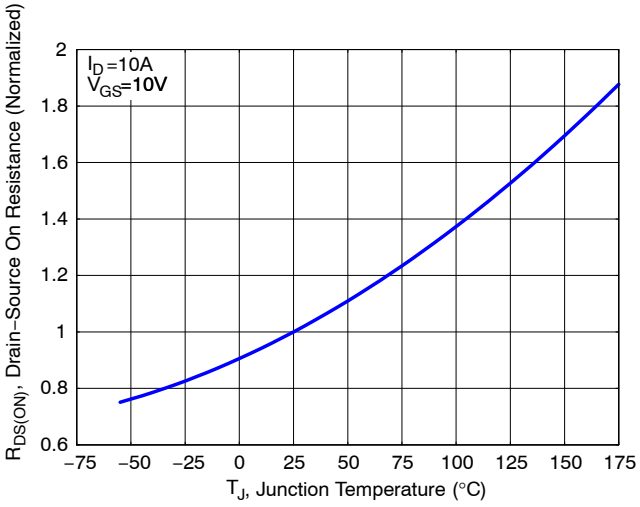


Figure 5. Normalized On−Resistance vs. Junction Temperature

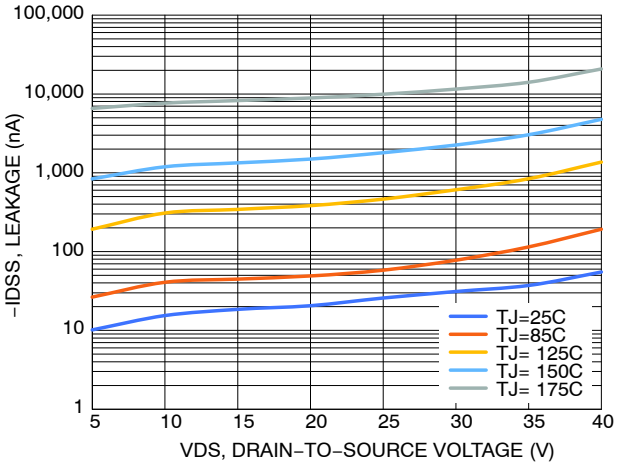


Figure 6. Drain Leakage Current vs. Drain Voltage

TYPICAL CHARACTERISTICS

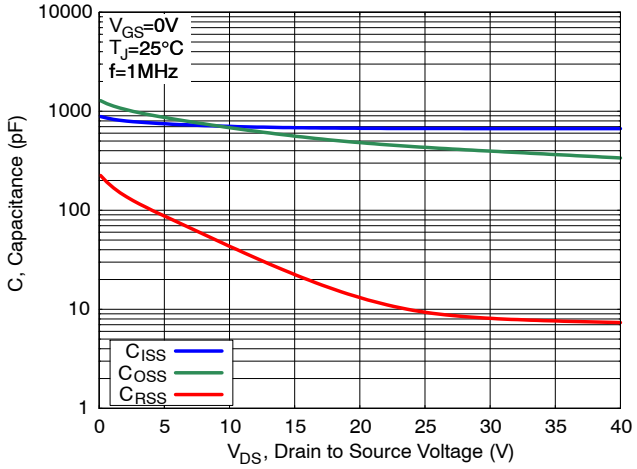


Figure 7. Capacitance Characteristics

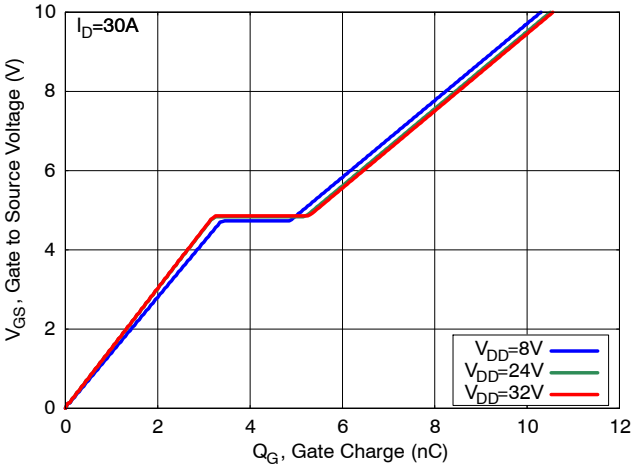


Figure 8. Gate Charge Characteristics

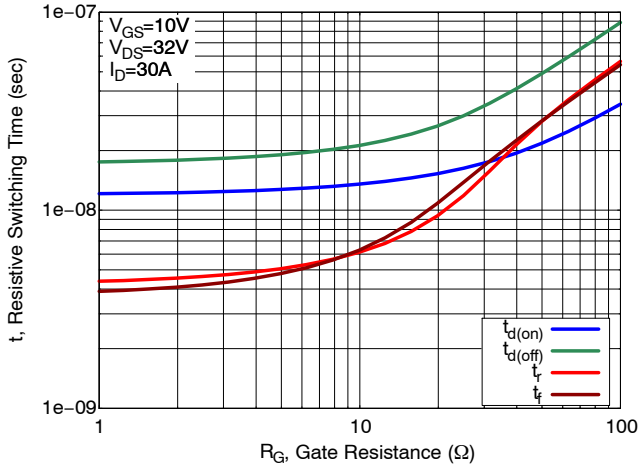


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

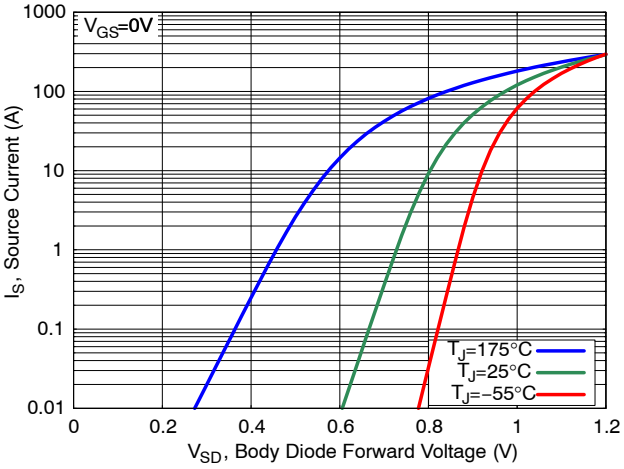


Figure 10. Diode Forward Characteristics

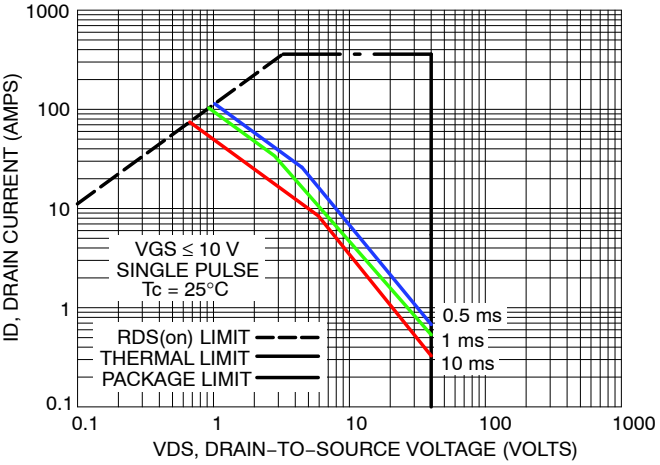


Figure 11. Safe Operating Area (SOA)

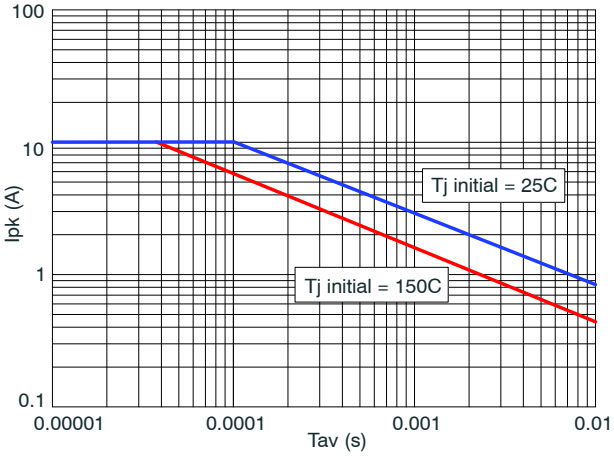


Figure 12. Avalanche Current vs. Pulse Time (UIS)

TYPICAL CHARACTERISTICS

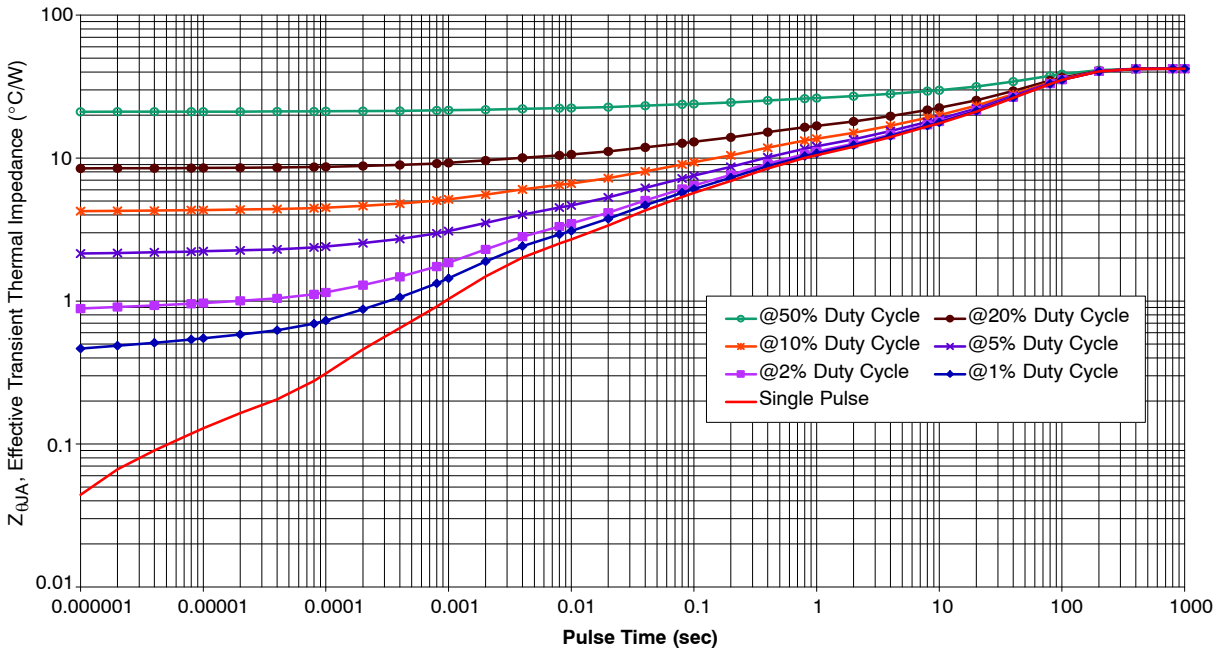
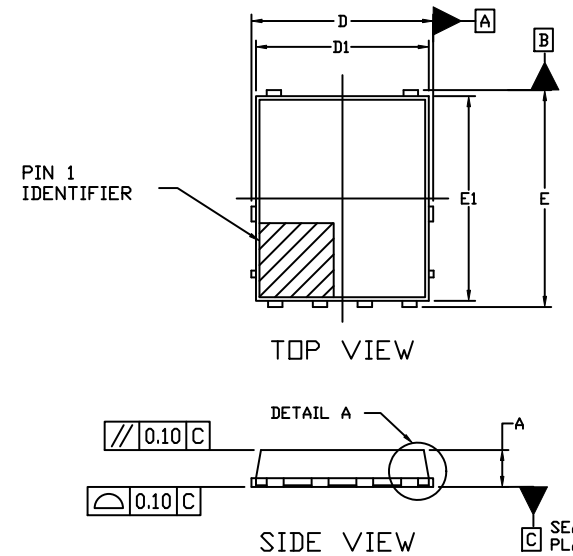
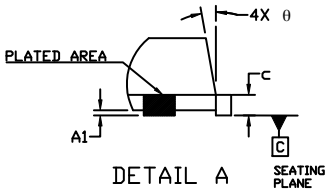


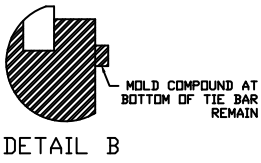
Figure 13. Transient Thermal Response

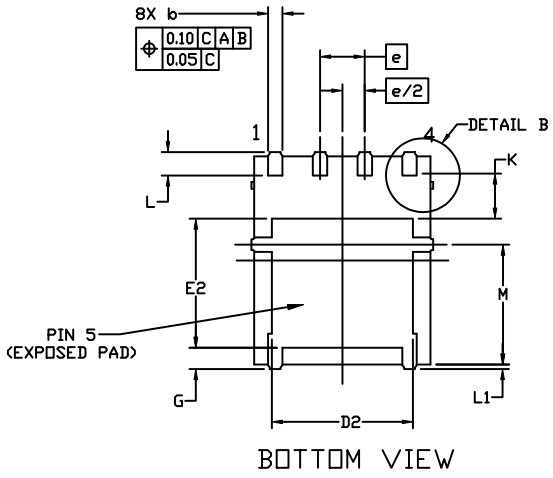
PACKAGE DIMENSIONS

DFNW5 5x6 (FULL−CUT SO8FL WF)
CASE 507BA
ISSUE A



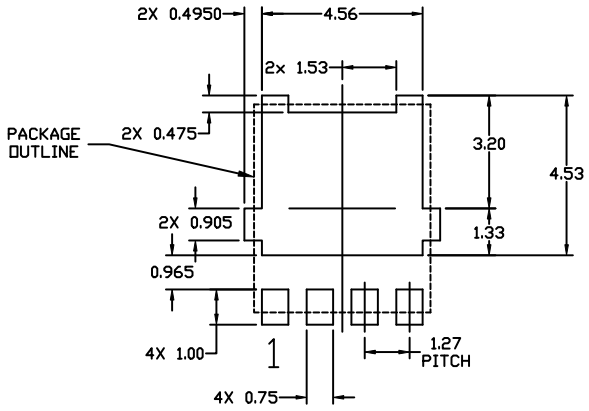






NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
4. THIS PACKAGE CONTAINS WETTABLE FLANK DESIGN FEATURES TO AID IN FILLET FORMATION ON THE LEADS DURING MOUNTING.

	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	---	0.05
b	0.33	0.41	0.51
c	0.23	0.28	0.33
D	5.00	5.15	5.30
D1	4.70	4.90	5.10
D2	3.80	4.00	4.20
E	6.00	6.15	6.30
E1	5.70	5.90	6.10
E2	3.45	3.65	3.85
e	1.27 BSC		
G	0.51	0.575	0.71
K	1.20	1.35	1.50
L	0.51	0.575	0.71
L1	0.150 REF		
M	3.00	3.40	3.80
θ	0°	---	12°



* 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

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales

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