MOSFET - Power, Single N-Channel

100 V, 26 mΩ, 28 A

NVTFS027N10MCL

Features

- Small Footprint (3.3 x 3.3 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- NVTFWS027N10MCL − Wettable Flanks Product
- AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free and are RoHS Compliant

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	100	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	I_D	28	A
		T_C = 100°C		20	
Power Dissipation $R_{\theta JC}$ (Note 1)		T_C = 25°C	P_D	46	W
		T_C = 100°C		23	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_A = 25°C	I_D	7.4	A
		T_A = 100°C		5.2	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)		T_A = 25°C	P_D	3.1	W
		T_A = 100°C		1.6	
Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		I_{DM}	119	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	35	A
Single Pulse Drain−to−Source Avalanche Energy ($I_{L(pk)}$ = 1.3 A)			E_{AS}	414	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 RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State (Note 1)	$R_{\theta JC}$	3.3	°C/W
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	47.7	

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 650 mm^2, 2 oz. Cu pad.

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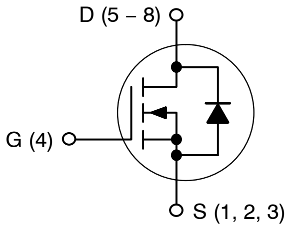
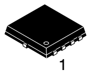
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
100 V	26 mΩ @ 10 V	28 A
	35 mΩ @ 4.5 V	

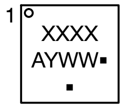
N−Channel

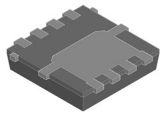




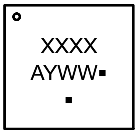
WDFN8
(μ8FL)
CASE 511AB

MARKING DIAGRAMS





WDFNW8
(μ8FL WF)
CASE 515AN



XXXX = 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.

February, 2021 − Rev. 0

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	100			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			53		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 100 V, T_J = 25°C			1.0	μA
		T_J = 125°C			100	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V			100	nA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 38 μA	1		3	V
Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			−6		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 7 A		21	26	mΩ
		V_{GS} = 4.5 V, I_D = 5 A		28	35	
Forward Transconductance	g_{FS}	V_{DS} = 10 V, I_D = 7 A		25		S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 50 V		800		pF
Output Capacitance	C_{OSS}			300		
Reverse Transfer Capacitance	C_{RSS}			4		
Gate Resistance	R_G			0.41		Ω
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 50 V; I_D = 7 A		5.5		nC
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 50 V; I_D = 7 A		11.5		
Threshold Gate Charge	$Q_{G(TH)}$	V_{GS} = 10 V, V_{DS} = 50 V; I_D = 7 A		1.3		nC
Gate−to−Source Charge	Q_{GS}			2.1		
Gate−to−Drain Charge	Q_{GD}			1.2		
Plateau Voltage	V_{GP}			2.5		V
SWITCHING CHARACTERISTICS (Note 4)						
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 50 V, I_D = 7 A		7.4		ns
Rise Time	t_r			2		
Turn−Off Delay Time	$t_{d(OFF)}$			19		
Fall Time	t_f			2.9		
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 7 A, T_J = 25°C		0.84	1.3	V
		V_{GS} = 0 V, I_S = 7 A, T_J = 125°C		0.73		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 3 A		28		ns
Reverse Recovery Charge	Q_{RR}			17		nC
Charge Time	t_a			13.9		ns
Discharge Time	t_b			14.2		ns

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%.
4. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

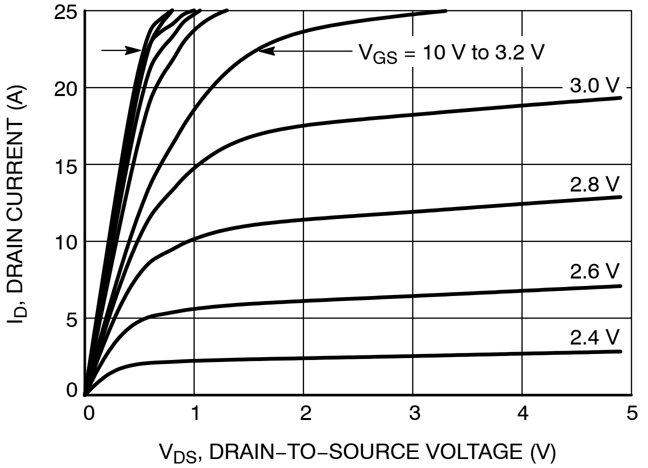


Figure 1. On−Region Characteristics

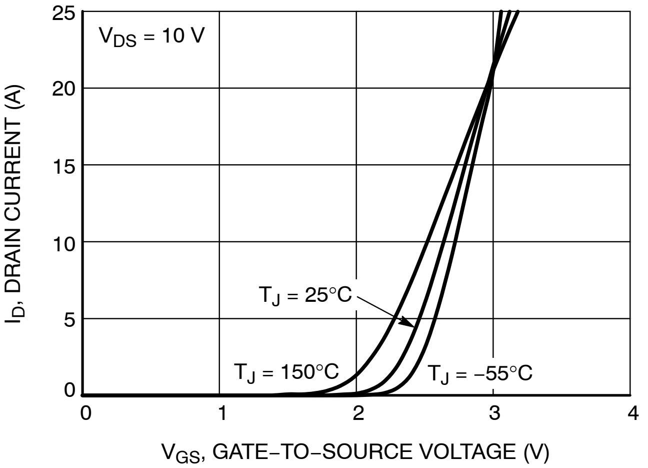


Figure 2. Transfer Characteristics

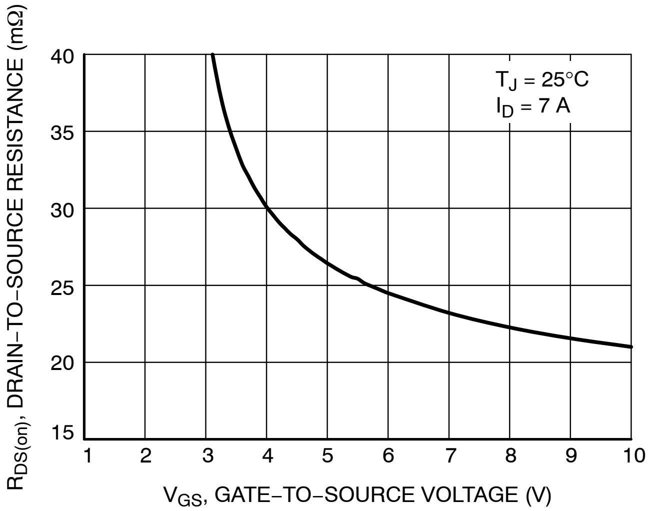


Figure 3. On−Resistance vs. Gate−to−Source Voltage

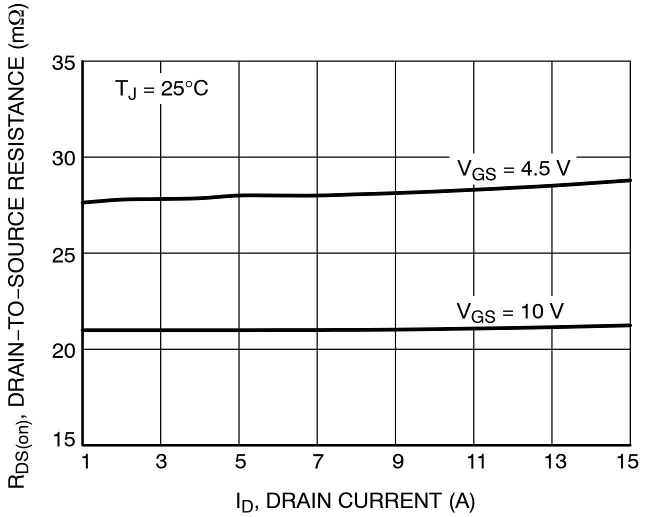


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

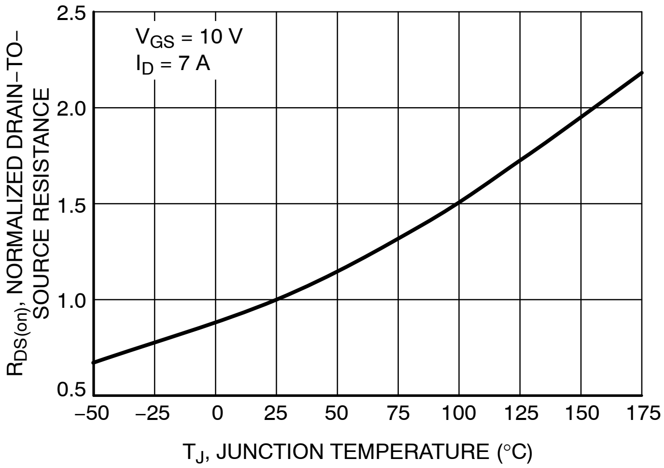


Figure 5. On−Resistance Variation with Temperature

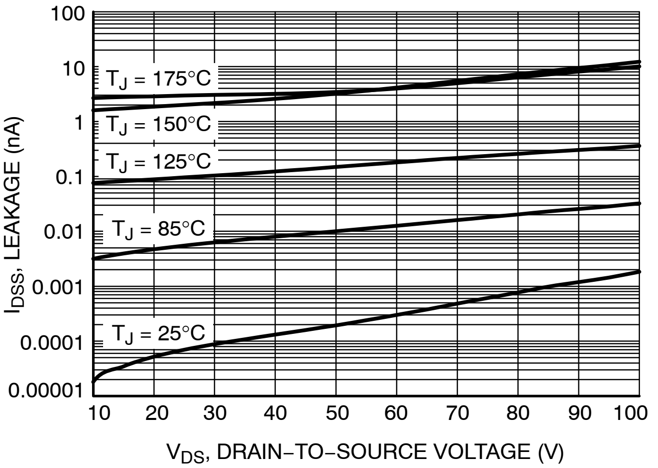


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

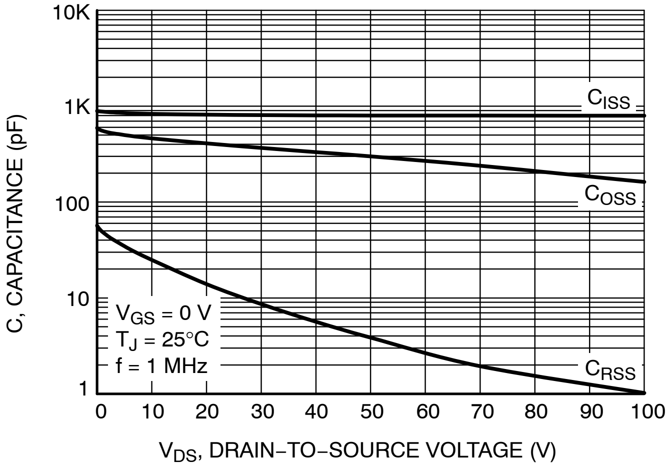


Figure 7. Capacitance Variation

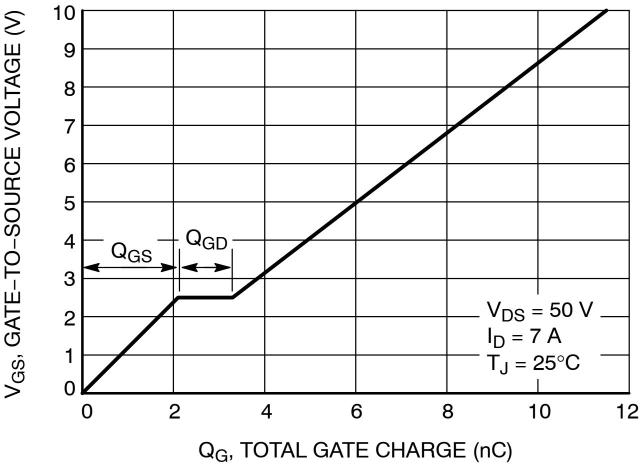


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

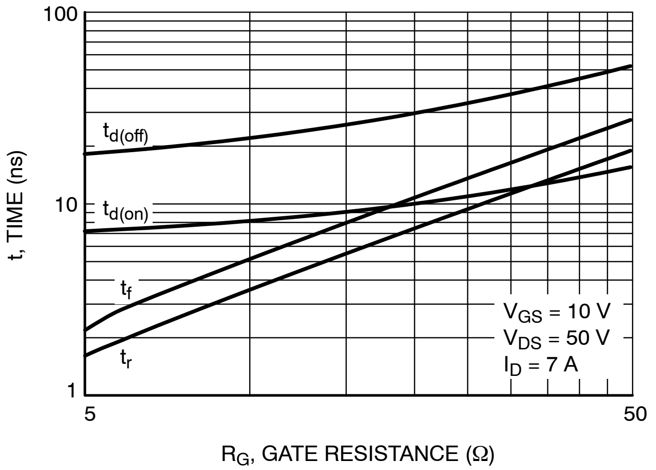


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

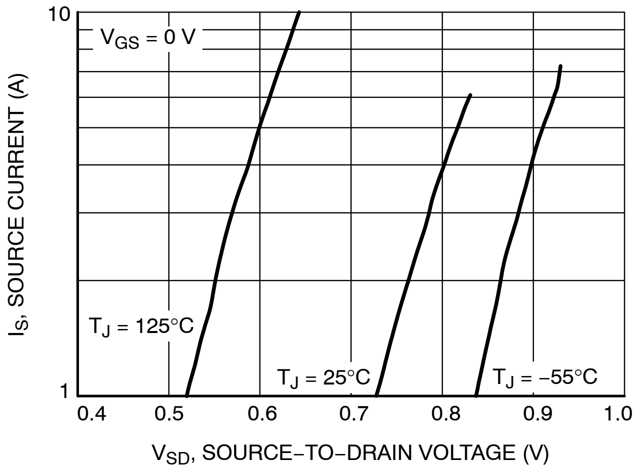


Figure 10. Diode Forward Voltage vs. Current

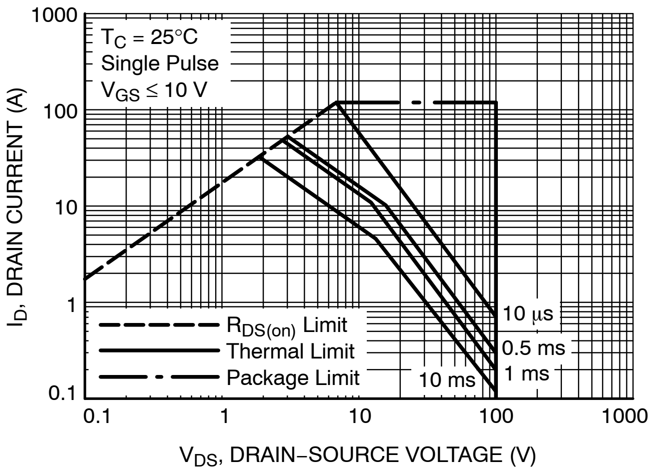


Figure 11. Safe Operating Area

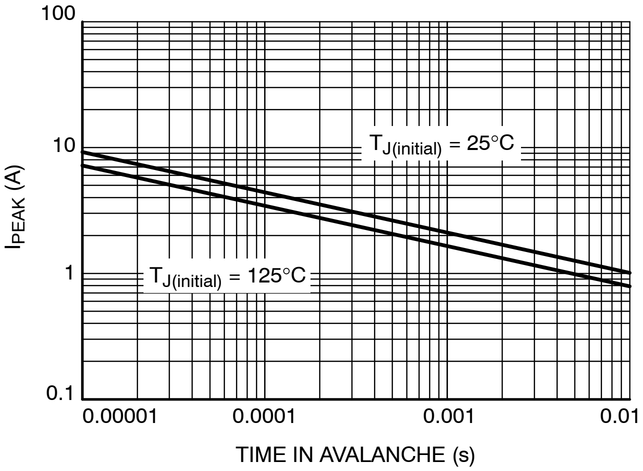


Figure 12. Maximum Drain Current vs. Time in Avalanche

TYPICAL CHARACTERISTICS

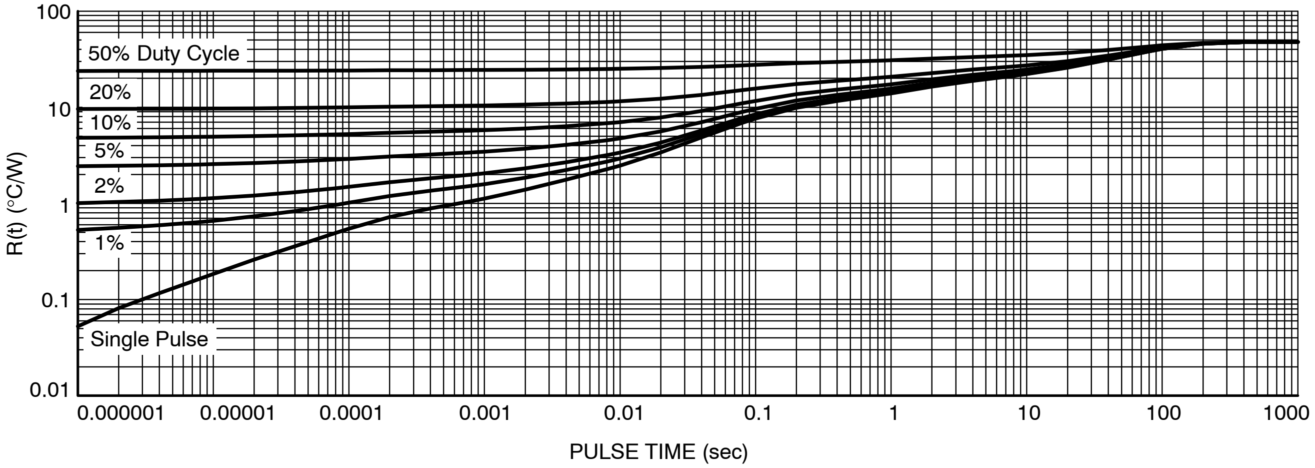


Figure 13. Thermal Response

DEVICE ORDERING INFORMATION

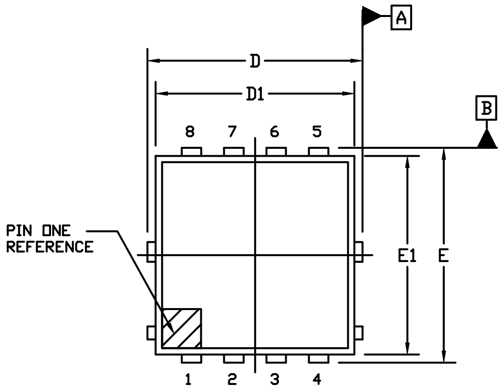
Device	Marking	Package	Shipping†
NVTFS027N10MCLTAG	27L1	WDFN8 (Pb−Free)	1500 / Tape & Reel
NVTFWS027N10MCLTAG	27W1	WDFN8 (Pb−Free, Wettable Flanks)	1500 / Tape & Reel

†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.

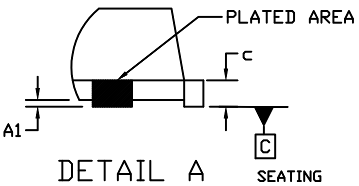
PACKAGE DIMENSIONS

WDFNW8 3.3x3.3, 0.65P (Full−Cut μ8FL WF)

CASE 515AN
ISSUE O



TOP VIEW

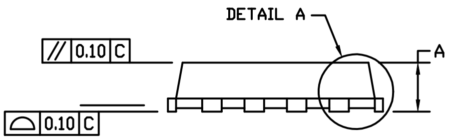


DETAIL A

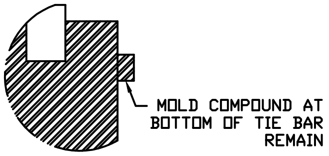
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

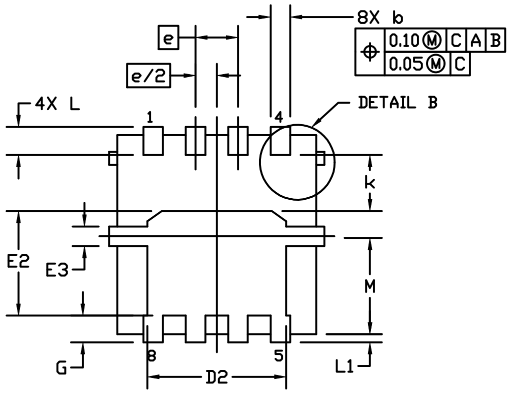
DIM	MILLIMETERS MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	----	0.05
b	0.23	0.30	0.40
c	0.15	0.20	0.25
D	3.05	3.30	3.55
D1	2.95	3.05	3.15
D2	1.98	2.11	2.24
E	3.05	3.30	3.55
E1	2.95	3.05	3.15
E2	1.47	1.60	1.73
E3	0.23	0.30	0.40
e	0.65 BSC		
G	0.30	0.41	0.51
K	0.65	0.80	0.95
L	0.30	0.43	0.59
L1	0.06	0.13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



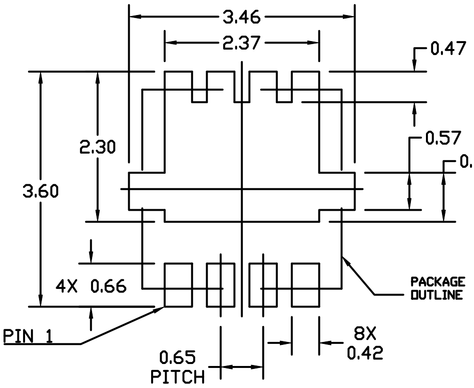
SIDE VIEW



DETAIL B



BOTTOM VIEW



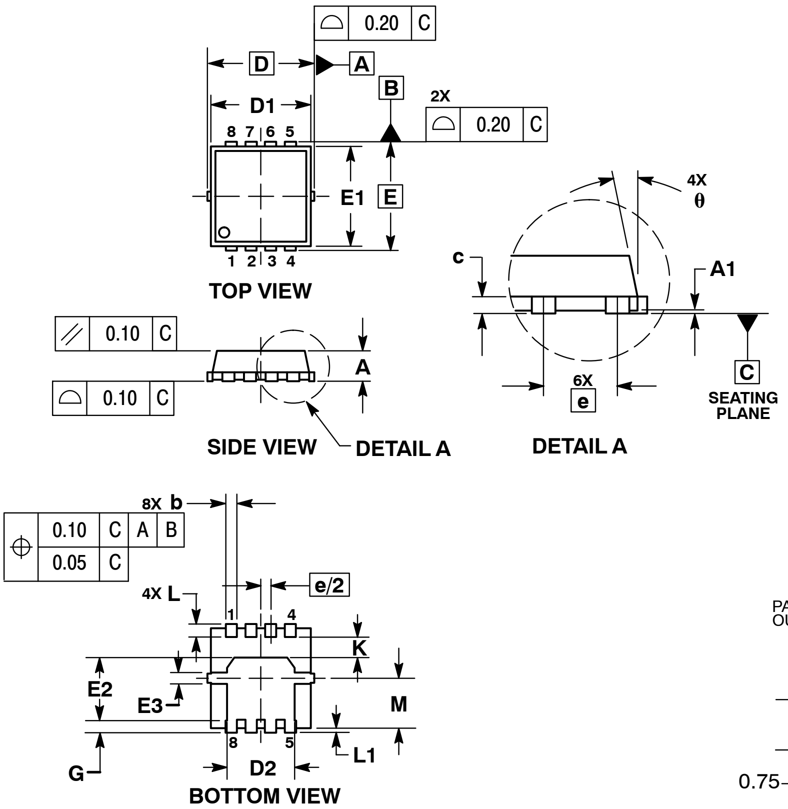
RECOMMENDED MOUNTING FOOTPRINT

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

PACKAGE DIMENSIONS

WDFN8 3.3x3.3, 0.65P

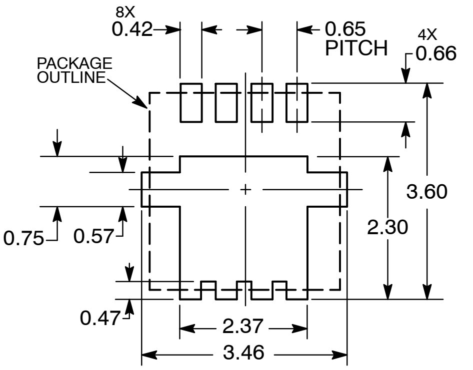
CASE 511AB
ISSUE D



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*



DIMENSION: MILLIMETERS

*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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