

MOSFET - Power, Single N-Channel

100 V, 65 mΩ, 13 A

NVTFS070N10MCL

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
- NVTFS070N10MCL – 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 _{θJC} (Notes 1, 2, 3)	T _C = 25°C	I _D	13
	T _C = 100°C		9.0
Power Dissipation R _{θJC} (Notes 1, 2)	T _C = 25°C	P _D	25
	T _C = 100°C		12
Continuous Drain Current R _{θJA} (Notes 1, 2, 3)	T _A = 25°C	I _D	4.5
	T _A = 100°C		3.2
Power Dissipation R _{θJA} (Notes 1, 2)	T _A = 25°C	P _D	2.9
	T _A = 100°C		1.5
Pulsed Drain Current	T _C = 25°C, t _p = 10 μs	I _{DM}	47
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +175	°C
Single Pulse Drain-to-Source Avalanche Energy (I _{L(pk)} = 0.5 A)	E _{AS}	423	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T _L	260	°C
Source Current (Body Diode)	I _S	19	A

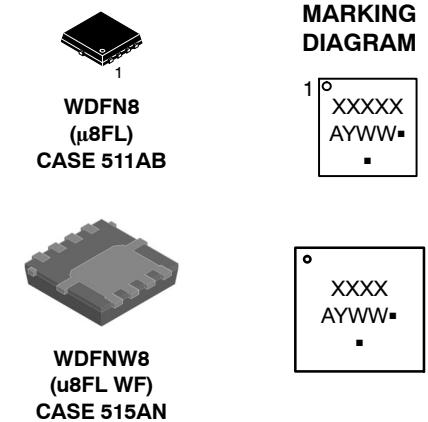
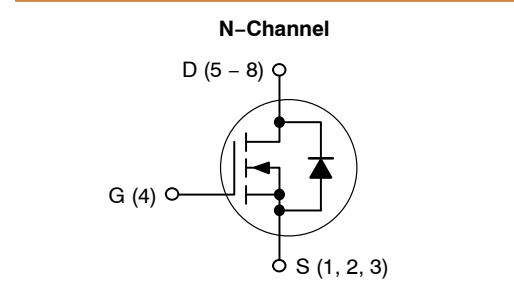
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS (Note 1)

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State (Note 2)	R _{θJC}	6.0	°C/W
Junction-to-Ambient – Steady State (Note 2)	R _{θJA}	51	

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 mm², 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

V _{(BR)DSS}	R _{DS(on)} MAX	I _D MAX
100 V	65 mΩ @ 10 V	13 A
	90 mΩ @ 4.5 V	



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

ORDERING INFORMATION

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

NVTFS070N10MCL

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
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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				67		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 4)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 15 μA		1.0		3.0	V
Threshold Temperature Coefficient	V _{GS(TH)} /T _J				-5.2		mV/°C
Drain-to-Source On Resistance	R _{DSS(on)}	V _{GS} = 10 V	I _D = 3 A		54	65	mΩ
		V _{GS} = 4.5 V	I _D = 2 A		72	90	
Forward Transconductance	g _{FS}	V _{DS} = 10 V, I _D = 3 A			11		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 50 V		305		pF
Output Capacitance	C _{OSS}			135		
Reverse Transfer Capacitance	C _{rss}			1.9		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 50 V; I _D = 2 A		2.7		nC
		V _{GS} = 10 V, V _{DS} = 50 V; I _D = 3 A		5.5		
Threshold Gate Charge	Q _{G(TH)}	V _{GS} = 10 V, V _{DS} = 50 V; I _D = 3 A		0.6		nC
Gate-to-Source Charge	Q _{GS}			1.0		
Gate-to-Drain Charge	Q _{GD}			0.6		
Plateau Voltage	V _{GP}			2.6		V

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	t _{d(ON)}	V _{GS} = 10 V, V _{DS} = 50 V, I _D = 3 A, R _G = 6 Ω		5.1		ns
Rise Time	t _r			1.3		
Turn-Off Delay Time	t _{d(OFF)}			12.1		
Fall Time	t _f			2.8		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 3 A, T _J = 25°C		0.84	1.3	V
		V _{GS} = 0 V, I _S = 3 A, T _J = 125°C		0.72		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, di/dt = 100 A/μs, I _S = 1 A		19		ns
Reverse Recovery Charge	Q _{RR}			8		nC
Charge Time	t _S			9		
Discharge Time	t _D			10		

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.

4. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

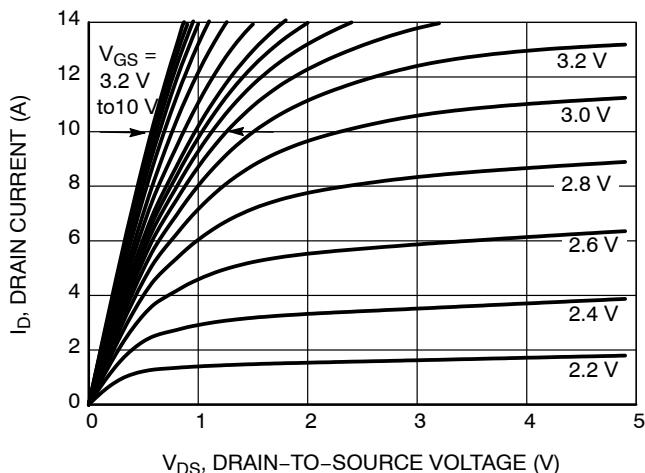


Figure 1. On-Region Characteristics

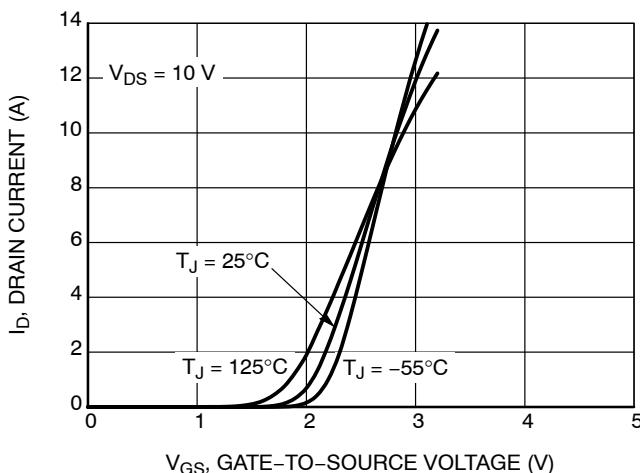


Figure 2. Transfer Characteristics

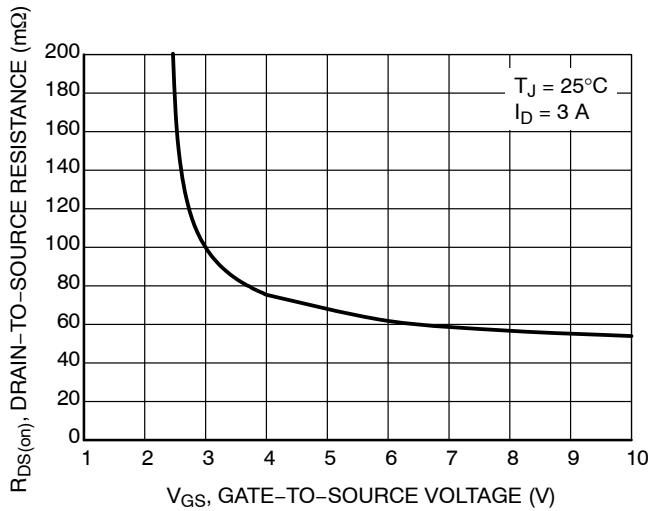


Figure 3. On-Resistance vs. Gate-to-Source Voltage

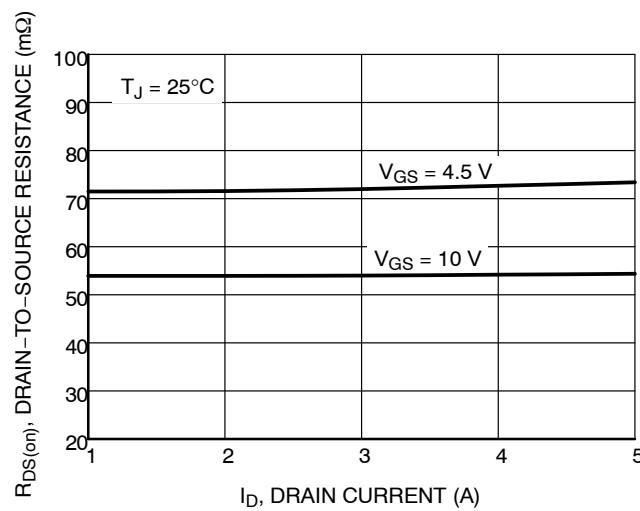


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

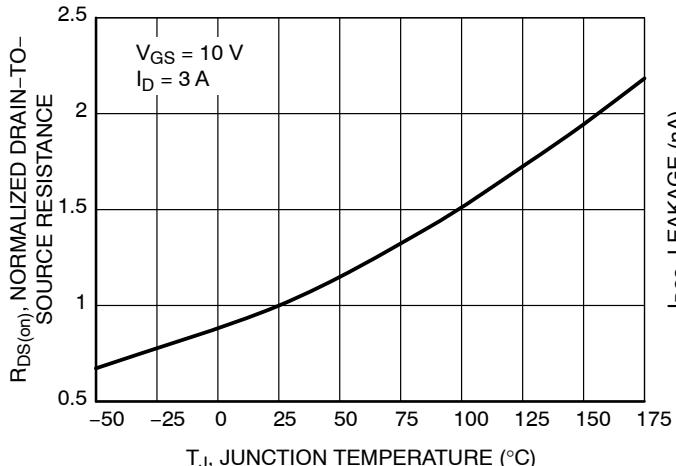


Figure 5. On-Resistance Variation with Temperature

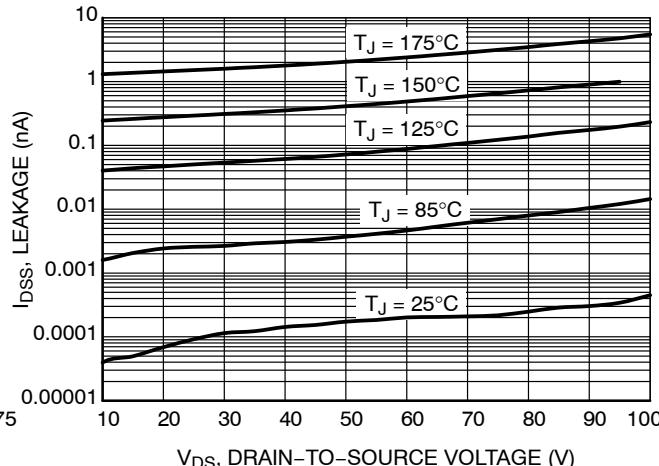


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

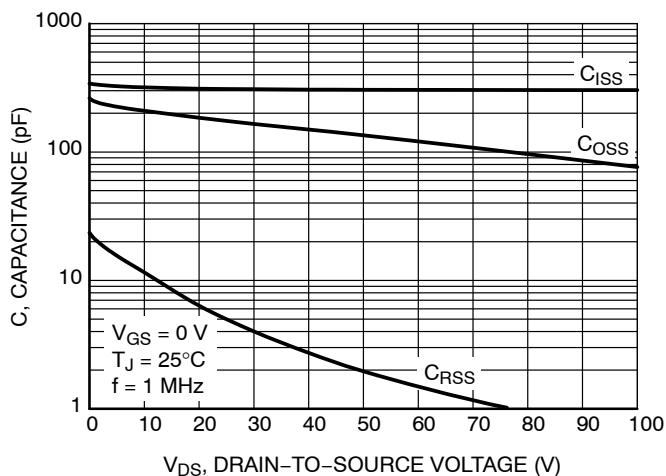


Figure 7. Capacitance Variation

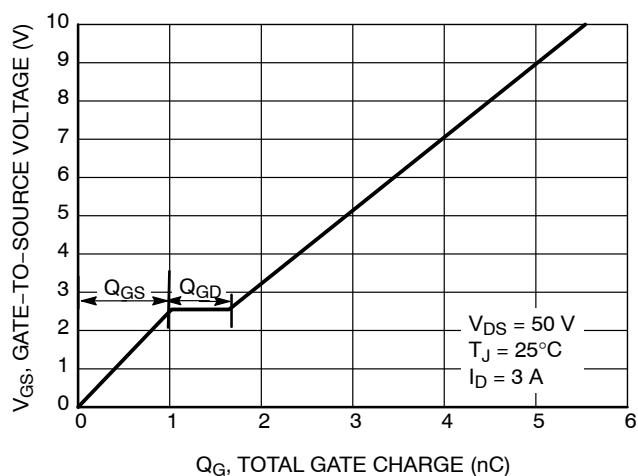


Figure 8. Gate-to-Source Voltage vs. Total Charge

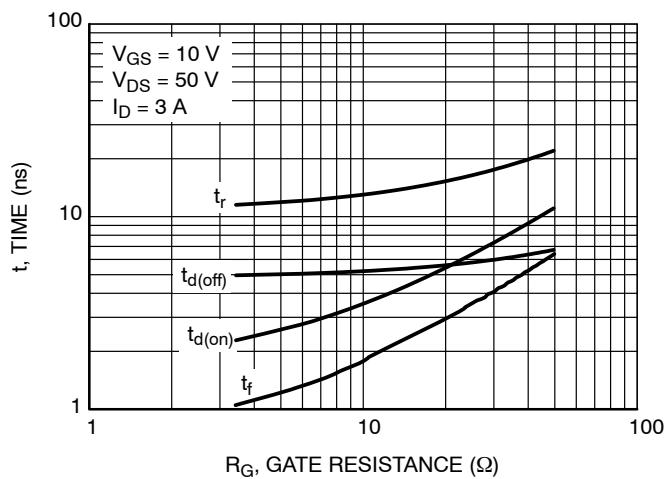


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

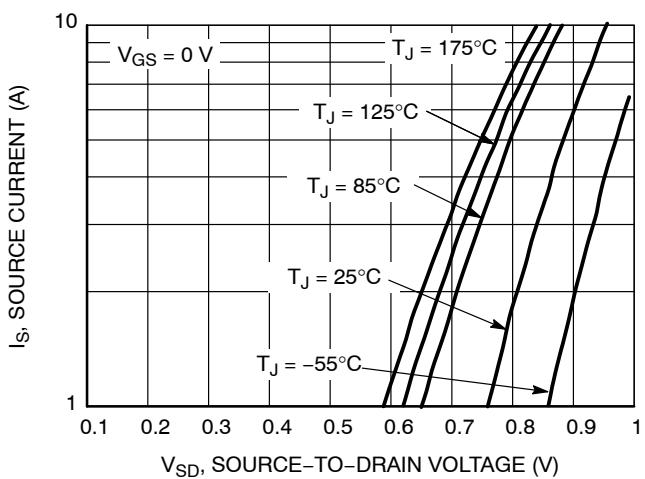


Figure 10. Diode Forward Voltage vs. Current

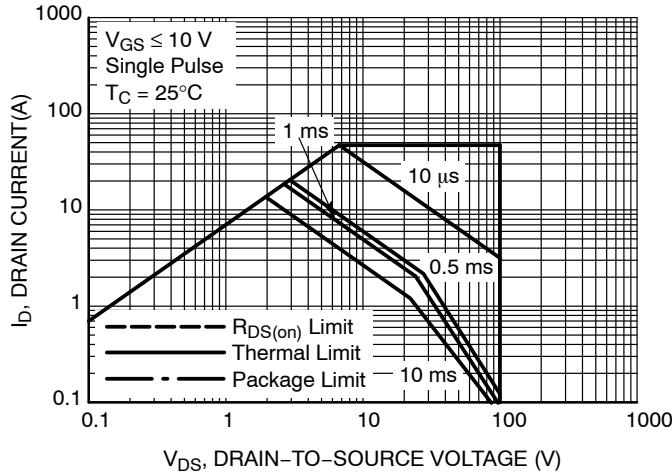


Figure 11. Maximum Rated Forward Biased Safe Operating Area

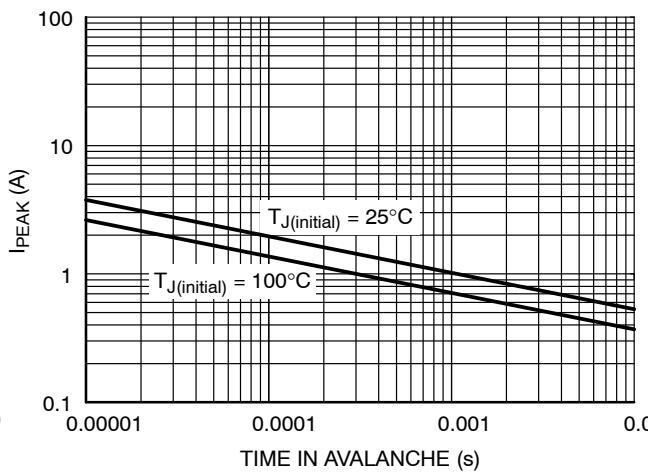


Figure 12. I_{peak} vs. Time in Avalanche

TYPICAL CHARACTERISTICS

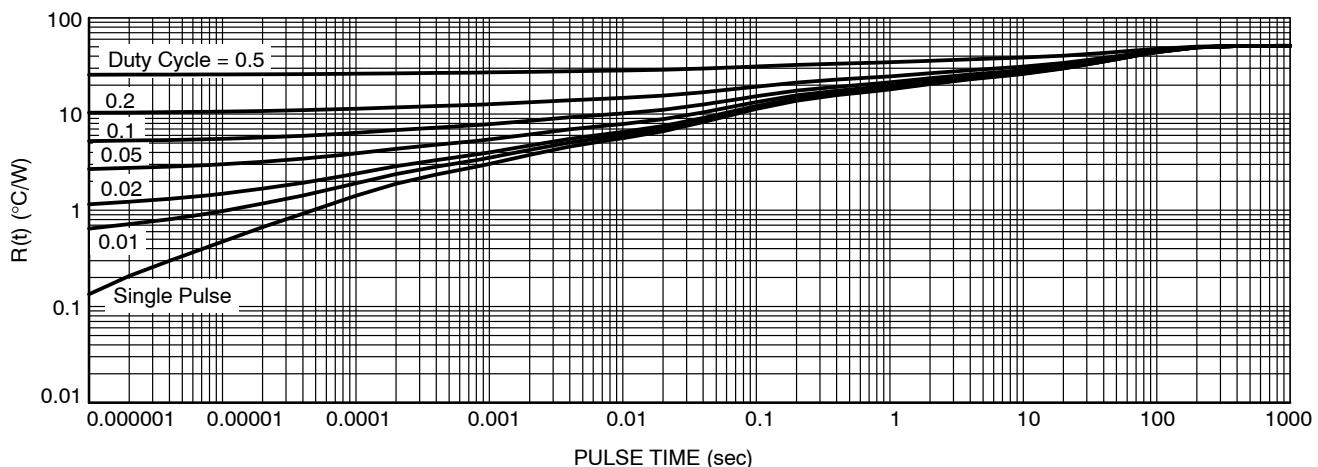


Figure 13. Thermal Characteristics

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NVTFS070N10MCLAG	70L1	WDFN8 (Pb-Free)	1500 / Tape & Reel
NVTFWS070N10MCLAG	70W1	WDFN8 (Pb-Free, Wettable Flanks)	1500 / Tape & Reel

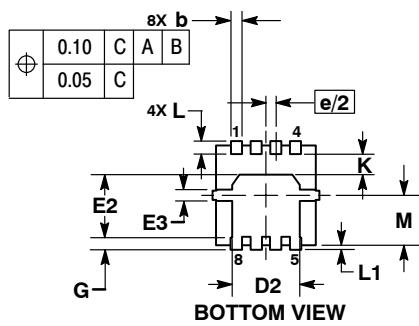
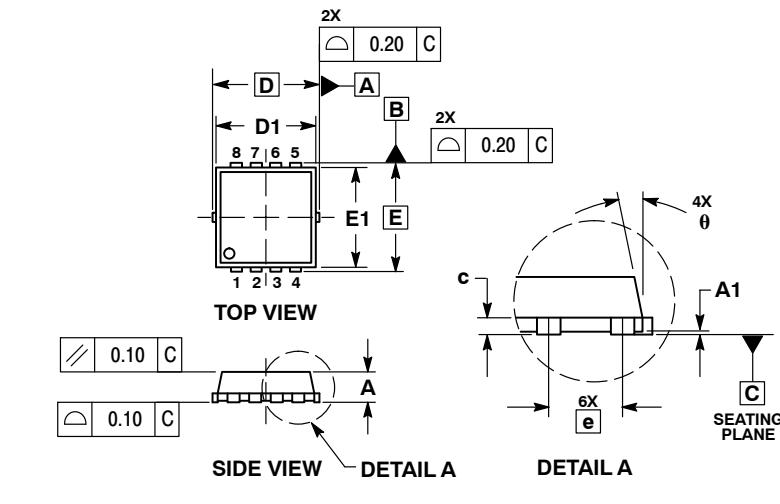
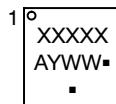
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



SCALE 2:1

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

DATE 23 APR 2012

GENERIC
MARKING DIAGRAM*

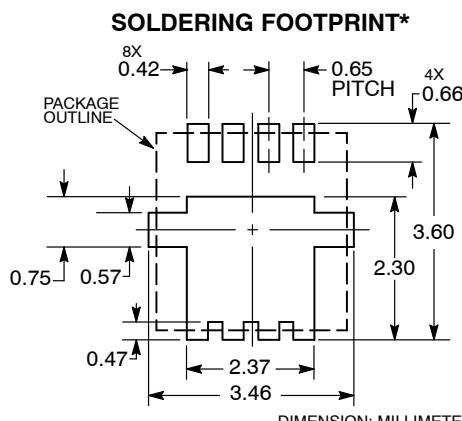
XXXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
■ = Pb-Free Package

*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. Some products may not follow the Generic Marking.

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	3.30	0.130	BSC	0.130
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	3.30	0.130	BSC	0.130
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	0.65	0.026	BSC	0.026
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



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

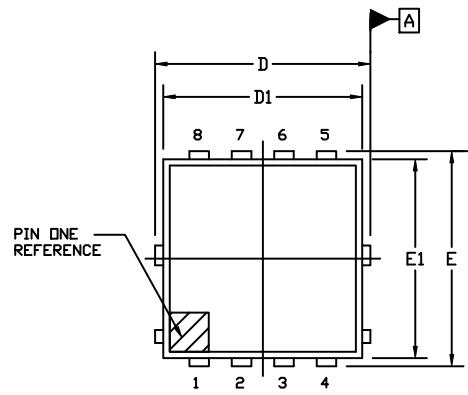
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DESCRIPTION:	WDFN8 3.3X3.3, 0.65P	PAGE 1 OF 1

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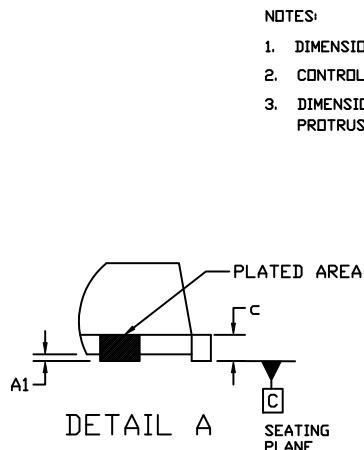


WDFNW8 3.3x3.3, 0.65P (Full-Cut μ 8FL WF)
CASE 515AN
ISSUE O

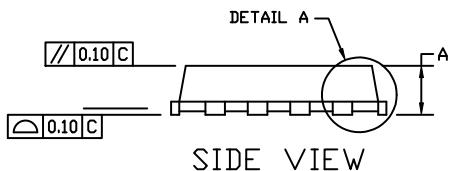
DATE 25 AUG 2020



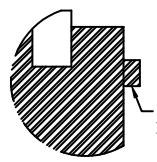
TOP VIEW



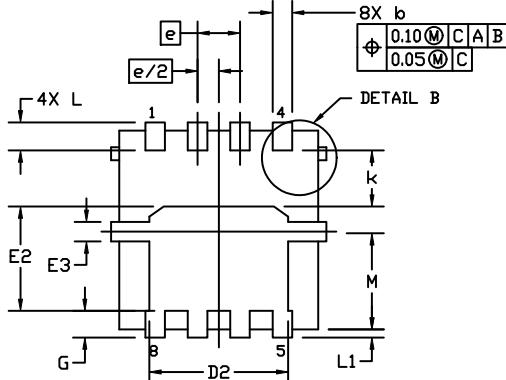
DETAIL A



SIDE VIEW

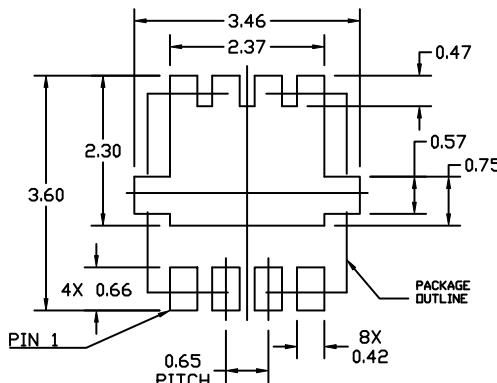


DETAIL B



BOTTOM VIEW

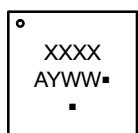
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	-----	0.05
b	0.23	0.30	0.40
c	0.15	0.20	0.25
D	3.05	3.30	3.55
D1	2.95	3.05	3.15
D2	1.98	2.11	2.24
E	3.05	3.30	3.55
E1	2.95	3.05	3.15
E2	1.47	1.60	1.73
E3	0.23	0.30	0.40
e	0.65 BSC		
G	0.30	0.41	0.51
K	0.65	0.80	0.95
L	0.30	0.43	0.59
L1	0.06	0.13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



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.

**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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