

MOSFET - Power, Single N-Channel, STD Gate, μ 8FL 40 V, 1.43 m Ω , 178 A

NVTFWS1D3N04XM

Features

- Low R_{DS(on)} to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Small Footprint (3.3 x 3.3 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	V _{GS}	± 20	V
Continuous Drain Current	T _C = 25°C	I _D	A
	T _C = 100°C	126	
Power Dissipation	T _A = 25°C	P _D	W
Pulsed Drain Current	T _C = 25°C, t _p = 10 μ s	I _{DM}	895
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +175	°C
Source Current (Body Diode)	I _S	71	A
Single Pulse Avalanche Energy (I _{LPK} = 17.2 A)	E _{AS}	281	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.

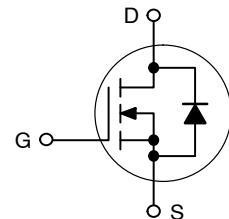
THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Note 2)	R _{θJC}	1.8	°C/W
Thermal Resistance, Junction-to-Ambient (Notes 1, 2)	R _{θJA}	46.4	

1. Surface mounted on FR4 board using 650 mm², 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.

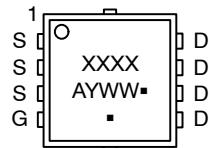
V _{(BR)DSS}	R _{DS(on)} TYP	I _D MAX
40 V	1.43 m Ω @ 10 V	178 A

N-CHANNEL MOSFET



WDFN8
(μ 8FL)
CASE 515AP

MARKING DIAGRAM



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 and shipping information on page 5 of this data sheet.

NVTFWS1D3N04XM

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	ΔV _{(BR)DSS} / ΔT _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	–	–	1	μA
		V _{DS} = 40 V, T _J = 125°C	–	–	100	μA
Gate-to-Source Leakage Current	I _{GS}	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 = 20 A, T _J = 25°C	–	1.24	1.43	mΩ
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = 90 μA, T _J = 25°C	2.5	3	3.5	V
Gate Threshold Voltage Temperature Coefficient	ΔV _{GS(th)} / ΔT _J	V _{GS} = V _{DS} , I _D = 90 μA	–	–7.34	–	mV/°C
Forward Transconductance	g _{FS}	V _{DS} = 5 V, I _D = 20 A	–	103	–	S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz	–	2288	–	pF
Output Capacitance	C _{OSS}		–	1449	–	
Reverse Transfer Capacitance	C _{RSS}		–	22	–	
Total Gate Charge	Q _{G(tot)}	V _{DD} = 32 V, I _D = 50 A, V _{GS} = 10 V	–	36	–	nC
Threshold Gate Charge	Q _{G(th)}		–	7	–	
Gate-to-Source Charge	Q _{GS}		–	11	–	
Gate-to-Drain Charge	Q _{GD}		–	7	–	
Gate Resistance	R _G	f = 1 MHz	–	0.7	–	Ω
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(on)}	V _{GS} = 0/10 V, I _D = 50 A, V _{DD} = 32 V, R _G = 0 Ω	–	21	–	ns
Rise Time	t _r		–	8	–	
Turn-Off Delay Time	t _{d(off)}		–	34	–	
Fall Time	t _f		–	8	–	
SOURCE-TO-DRAIN DIODE CHARACTERISTICS						
Forward Diode Voltage	V _{SD}	I _S = 20 A, V _{GS} = 0 V, T _J = 25°C	–	0.79	1.2	V
		I _S = 20 A, V _{GS} = 0 V, T _J = 125°C	–	0.64	–	
Reverse Recovery Time	t _{rr}	V _{GS} = 0 V, I _S = 50 A, dI/dt = 100 A/μs, V _{DD} = 32 V	–	48	–	ns
Charge Time	t _a		–	20	–	
Discharge Time	t _b		–	28	–	
Reverse Recovery Charge	Q _{RR}		–	48	–	

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 PERFORMANCE CHARACTERISTICS

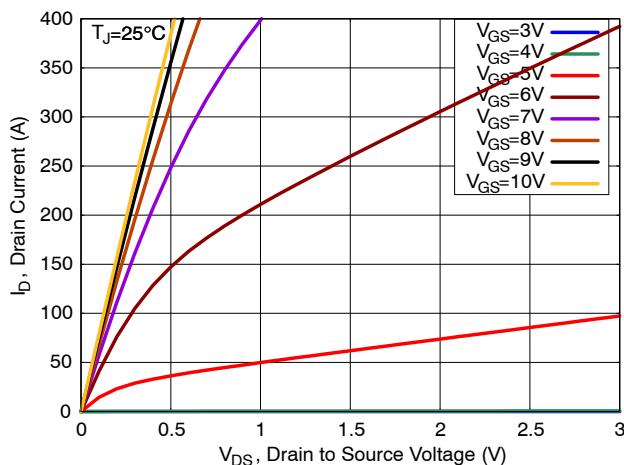


Figure 1. On-Region Characteristics

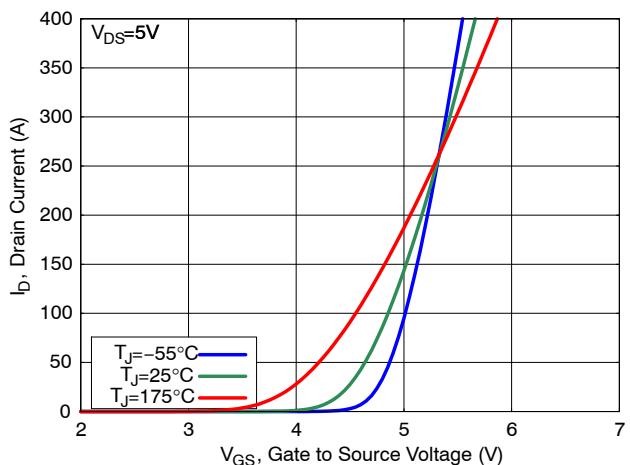


Figure 2. Transfer Characteristics

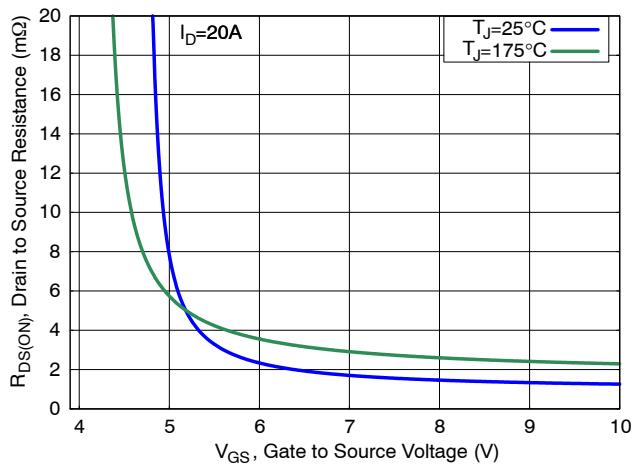


Figure 3. On-Resistance vs. Gate Voltage

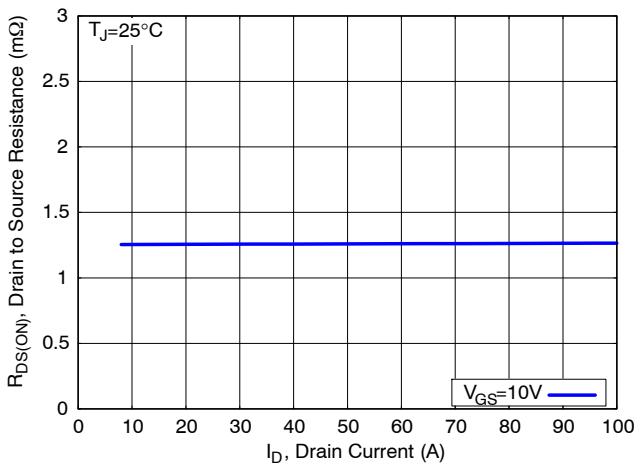


Figure 4. On-Resistance vs. Drain Current

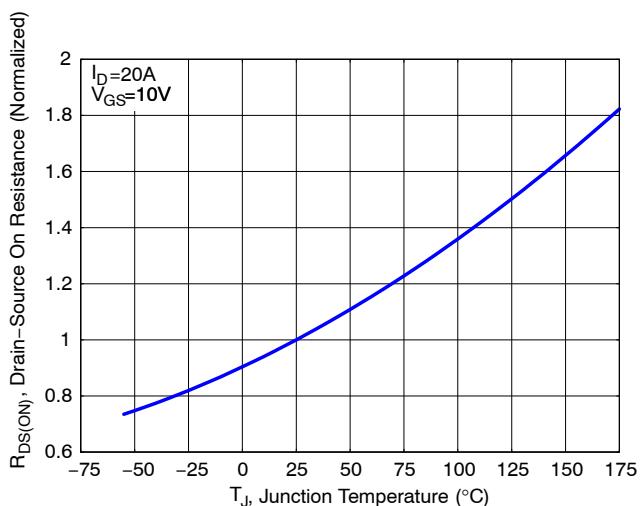


Figure 5. Normalized ON Resistance vs. Junction Temperature

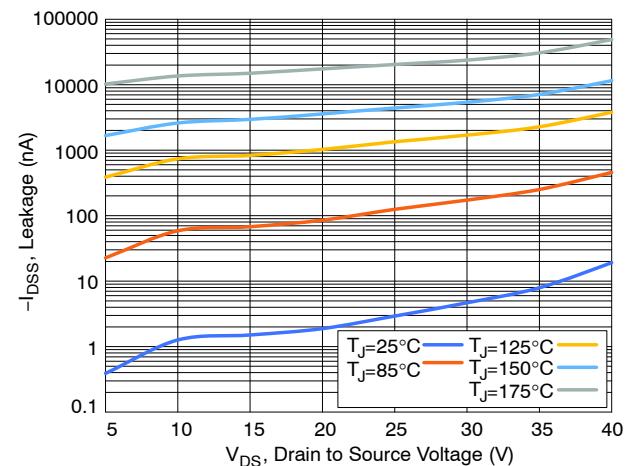
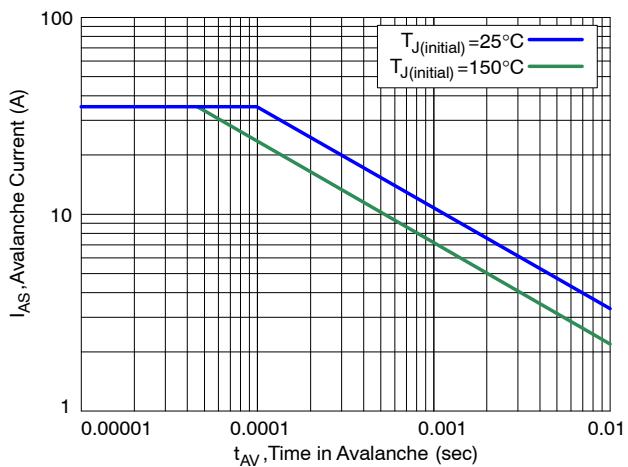
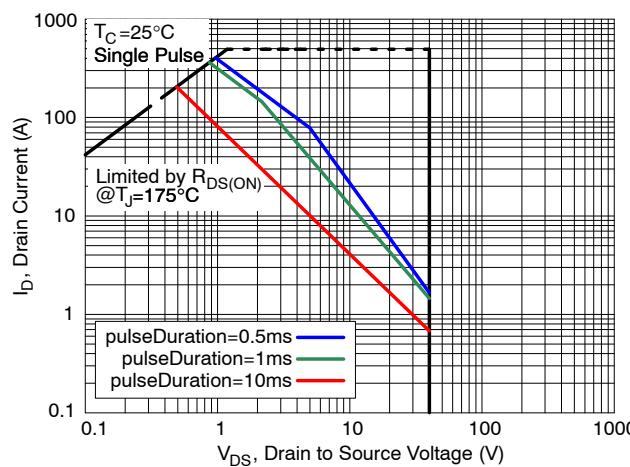
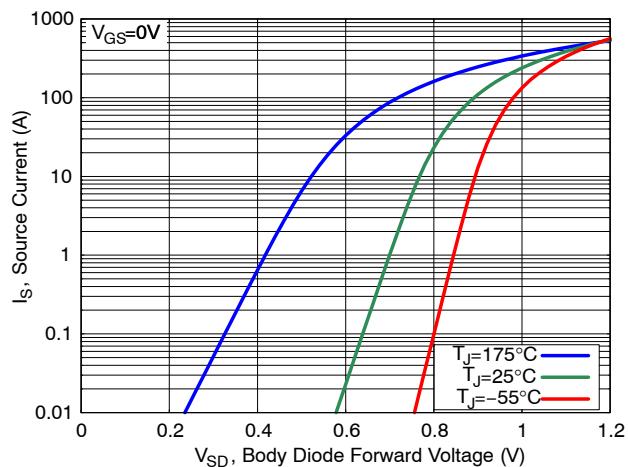
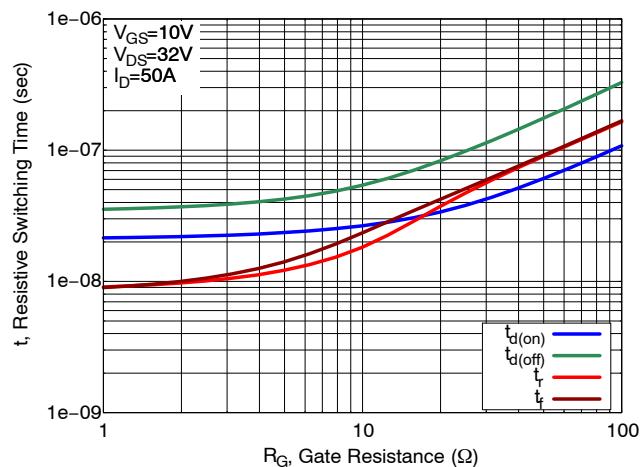
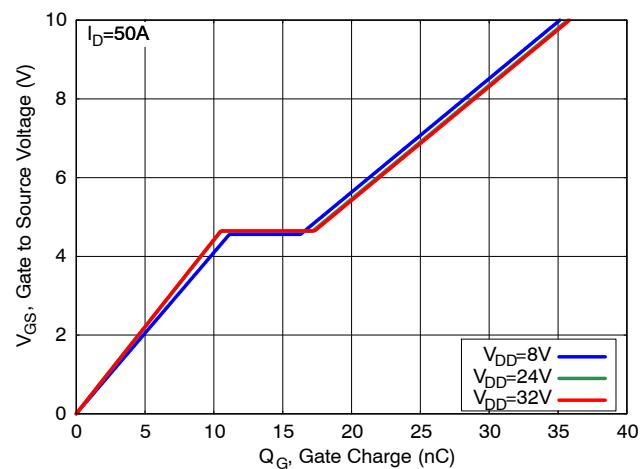
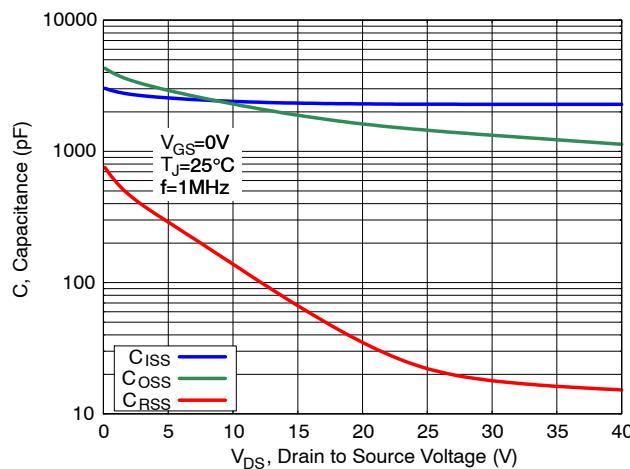


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CHARACTERISTICS



NVTFWS1D3N04XM

TYPICAL PERFORMANCE CHARACTERISTICS

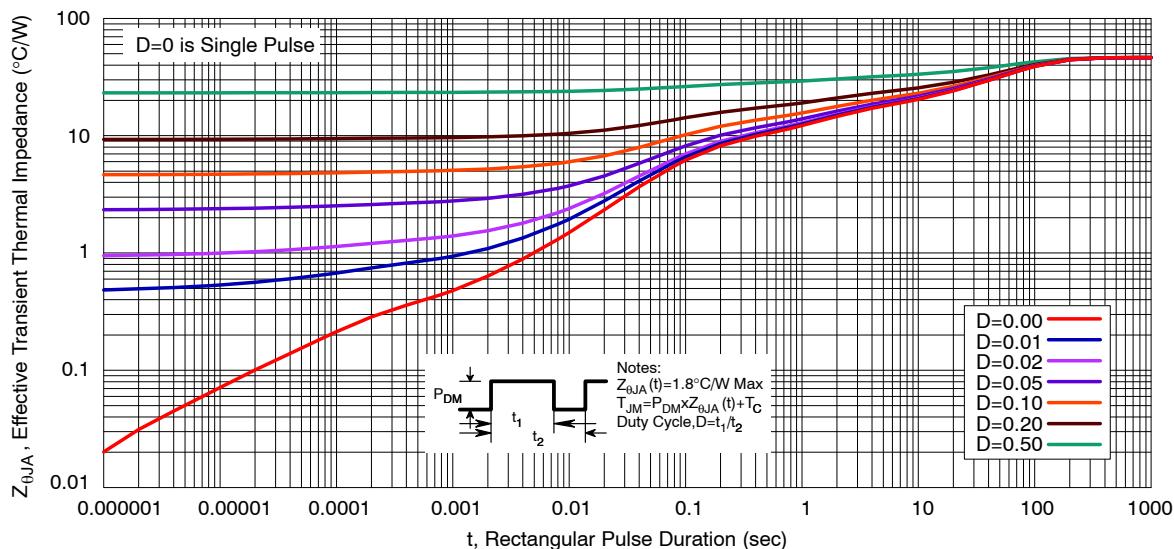
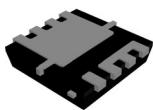


Figure 13. Transient Thermal Response

PACKAGE MARKING AND ORDERING INFORMATION

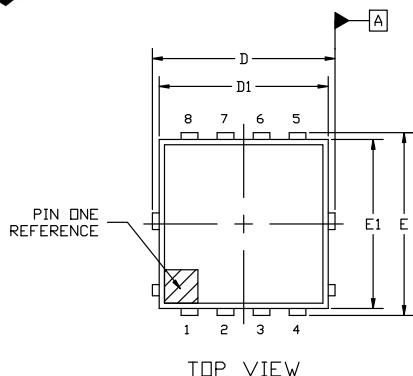
Part Number	Top Marking	Package	Packing Method	Reel Size	Tape Width	Quantity
NVTFWS1D3N04XMTAG	1D3W	WDFN8	Tape & Reel	N/A	N/A	1500 Units



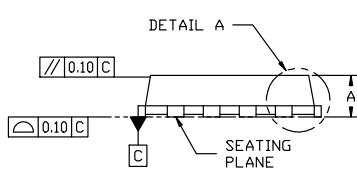
WDFNW8 3.30x3.30x0.75, 0.65P

CASE 515AP
ISSUE A

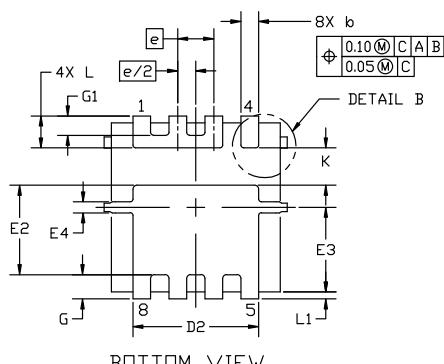
DATE 07 NOV 2023



TOP VIEW



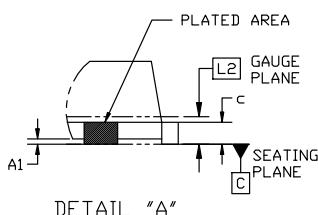
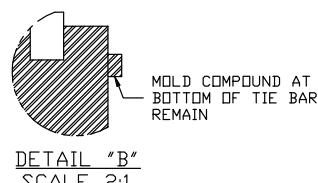
SIDE VIEW



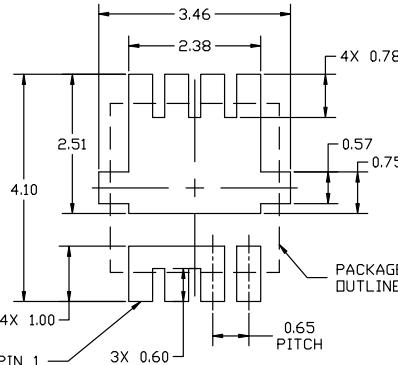
BOTTOM VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSION ARE IN MILLIMETERS.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
4. FULL-CUT uF/F FUSED WF.

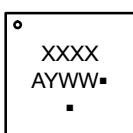
DETAIL "A"
SCALE 2:1DETAIL "B"
SCALE 2:1

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	-----	0.05
b	0.23	0.33	0.43
c	0.15	0.20	0.25
D	3.20	3.30	3.40
D1	2.95	3.13	3.30
D2	1.98	2.20	2.40
E	3.20	3.30	3.40
E1	2.80	3.00	3.15
E2	1.40	1.60	1.80
E3	1.35	1.50	1.60
E4	0.15	0.25	0.40
e	0.65 BSC		
G	0.30	0.43	0.55
G1	0.25	0.35	0.45
K	0.55	0.75	0.95
L	0.35	0.52	0.65
L1	0.06	0.15	0.30
L2	0.25 BSC		



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

*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.

(Note: Microdot may be in either location)

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DESCRIPTION:	WDFNW8 3.30x3.30x0.75, 0.65P	PAGE 1 OF 1

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