

MOSFET - Power, Single N-Channel, STD Gate, u8FL

40 V, 2.85 mΩ, 98 A

NVTFWS003N04XM

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 ($T_J = 25^\circ\text{C}$ 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	$T_C = 25^{\circ}\text{C}$	I_D	98	A
	$T_C = 100^{\circ}\text{C}$		69	
Power Dissipation	$T_C = 25^{\circ}\text{C}$	P_D	52	W
Pulsed Drain Current	$T_C = 25^{\circ}\text{C}$ $t_p = 10\text{ }\mu\text{s}$	I_D	570	A
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	$^{\circ}\text{C}$
Continuous Source-Drain Current (Body Diode)		I_S	66	A
Single Pulse Avalanche Energy ($I_{PK} = 5\text{ A}$)		E_{AS}	168	mJ
Lead Temperature for Soldering Purposes		T_L	260	$^{\circ}\text{C}$

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.

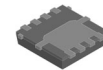
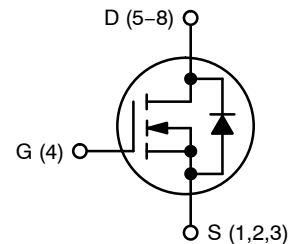
THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.9	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	48	

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.

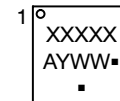
$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
40 V	2.85 mΩ @ 10 V	98 A

N-CHANNEL MOSFET



WDFNw8
(Full-Cut $\mu 8\text{FL}$ WF)
CASE 515AN

MARKING DIAGRAM



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

ORDERING INFORMATION

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

NVTFWS003N04XM

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
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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	–	–	20	
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 = 8 A, T _J = 25°C	–	2.4	2.85	mΩ
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 40 μA, T _J = 25°C	2.5		3.5	V
Gate Threshold Voltage Temperature Coefficient	ΔV _{GS(TH)} /ΔT _J	V _{GS} = V _{DS} , I _D = 40 μA	–	7	–	mV/°C
Forward Transconductance	g _{FS}	V _{DS} = 5 V, I _D = 8 A	–	44	–	S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C _{ISS}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	–	1042	–	pF
Output Capacitance	C _{OSS}		–	675	–	
Reverse Transfer Capacitance	C _{RSS}		–	14	–	
Total Gate Charge	Q _{G(TOT)}	V _{DD} = 32 V, I _D = 8 A, V _{GS} = 10 V	–	16	–	nC
Threshold Gate Charge	Q _{G(TH)}		–	3	–	
Gate-to-Source Charge	Q _{GS}		–	5	–	
Gate-to-Drain Charge	Q _{GD}		–	3	–	
Gate Resistance	R _G	f = 1 MHz	–	0.9	–	Ω

SWITCHING CHARACTERISTICS

Turn-On Delay Time	t _{d(ON)}	Resistive Load, V _{GS} = 10 V, V _{DD} = 32 V, I _D = 8 A, R _G = 0 Ω	–	6	–	ns
Rise Time	t _r		–	9	–	
Turn-Off Delay Time	t _{d(OFF)}		–	9	–	
Fall Time	t _f		–	10	–	

SOURCE-TO-DRAIN DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	I _S = 8 A, V _{GS} = 0 V, T _J = 25°C	–	0.78	1.2	V
		I _S = 8 A, V _{GS} = 0 V, T _J = 125°C	–	0.62	–	
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, I _S = 8 A, di/dt = 100 A/μs, V _{DD} = 32 V	–	59	–	ns
Charge Time	t _a		–	11	–	
Discharge Time	t _b		–	47	–	
Reverse Recovery Charge	Q _{RR}		–	24	–	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

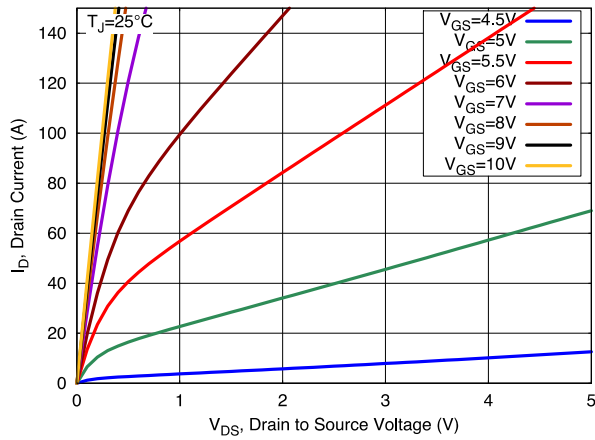


Figure 1. On-Region Characteristics

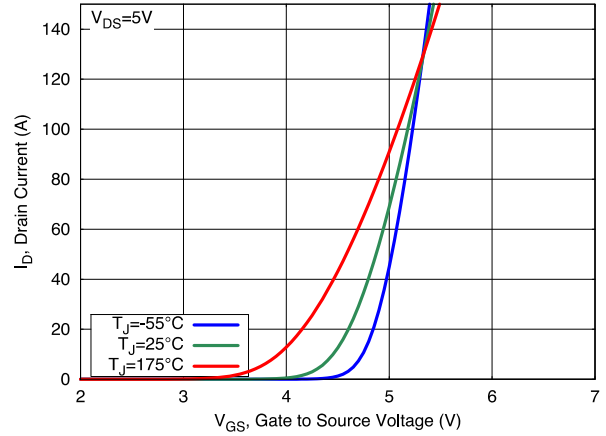


Figure 2. Transfer Characteristics

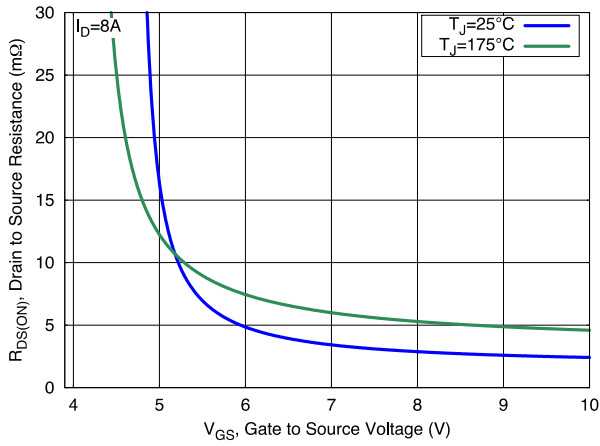


Figure 3. On-Resistance vs. Gate Voltage

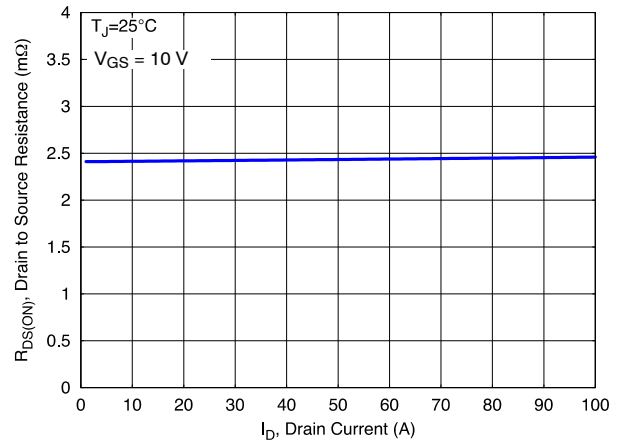


Figure 4. On-Resistance vs. Drain Current

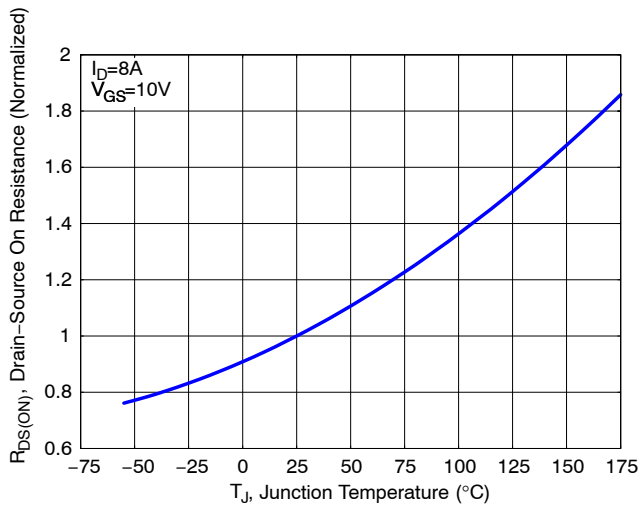


Figure 5. Normalized ON Resistance vs. Junction Temperature

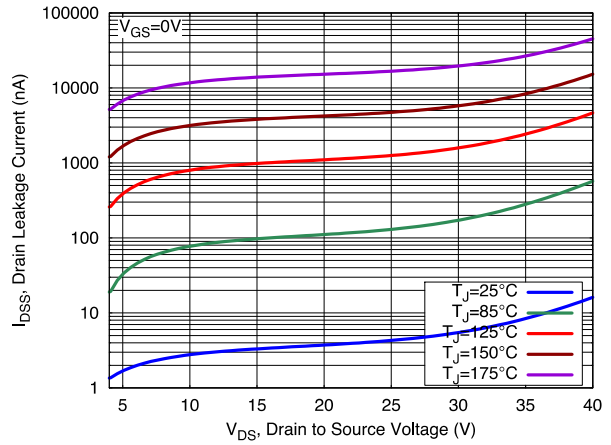


Figure 6. Drain Leakage Current vs. Drain Voltage

TYPICAL CHARACTERISTICS

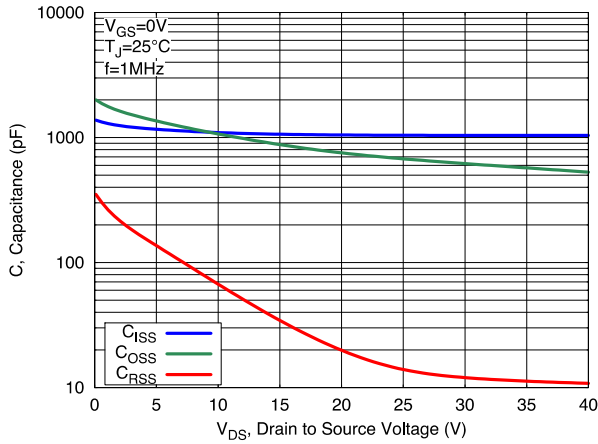


Figure 7. Capacitance Characteristics

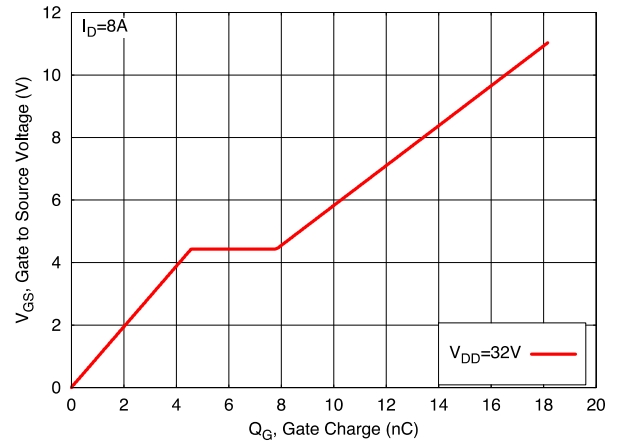


Figure 8. Gate Charge Characteristics

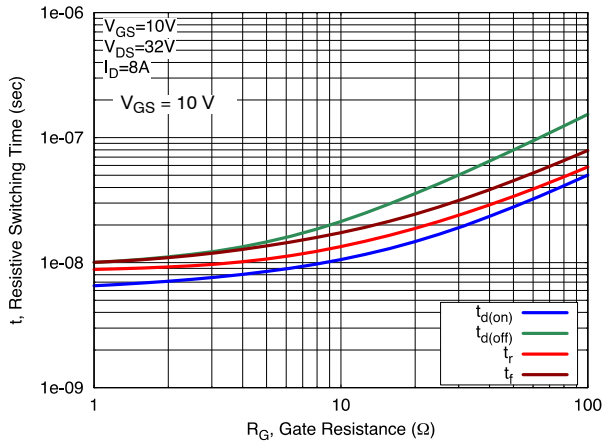


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

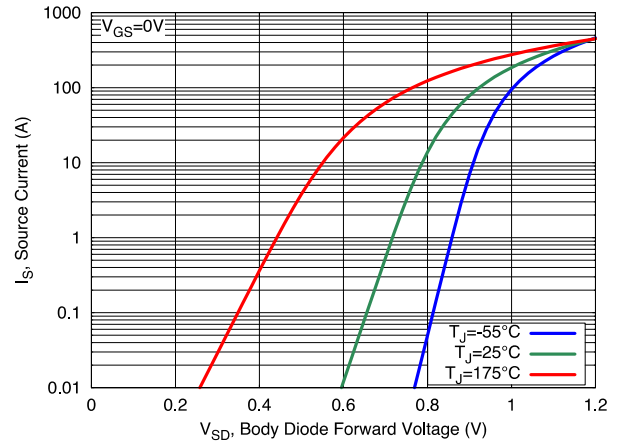


Figure 10. Diode Forward Characteristics

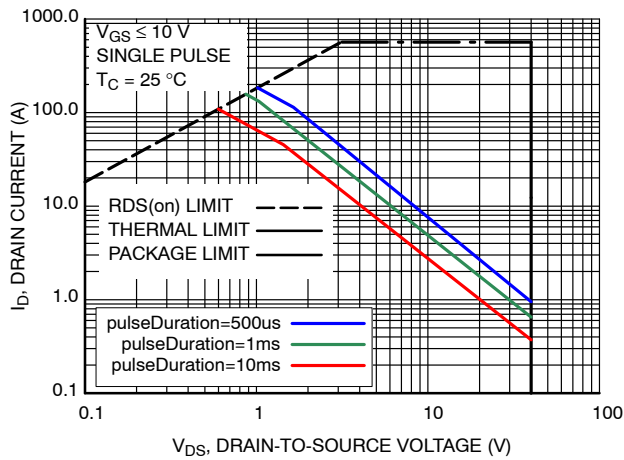


Figure 11. Safe Operating Area (SOA)

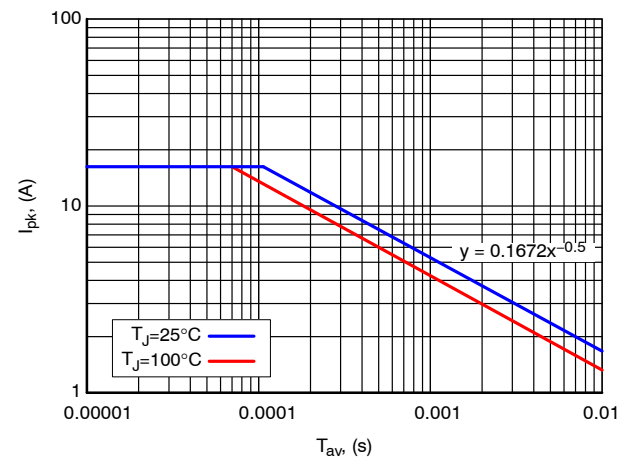


Figure 12. Avalanche Current vs Pulse Time (UIS)

TYPICAL CHARACTERISTICS

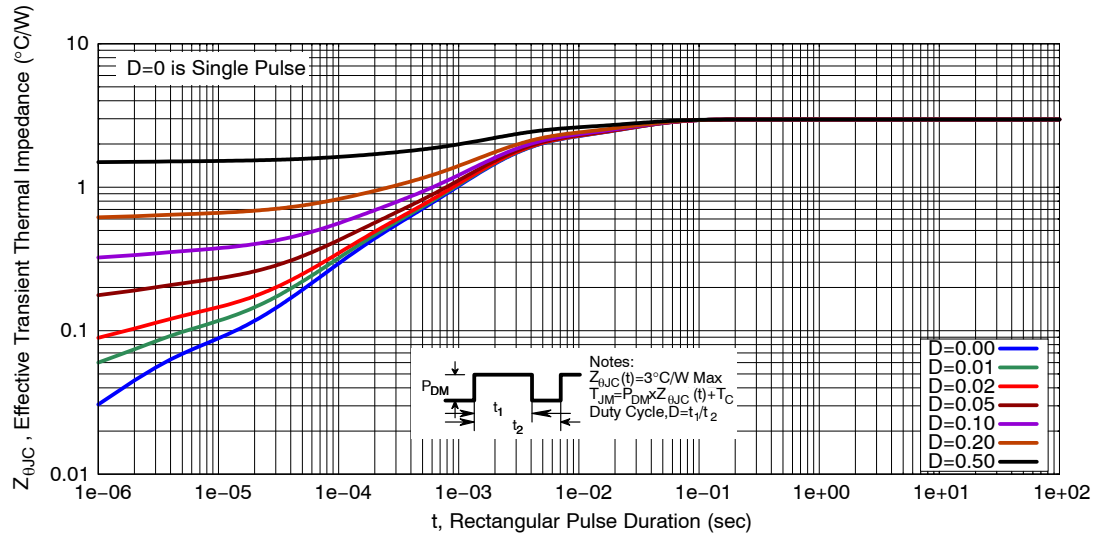


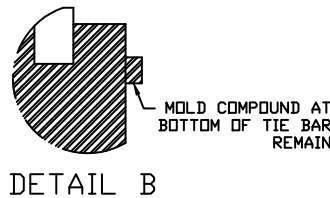
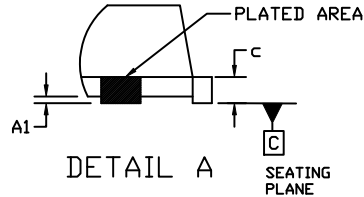
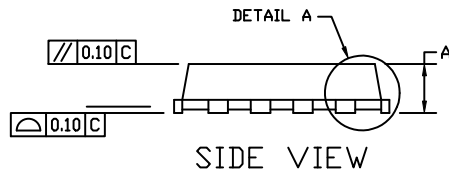
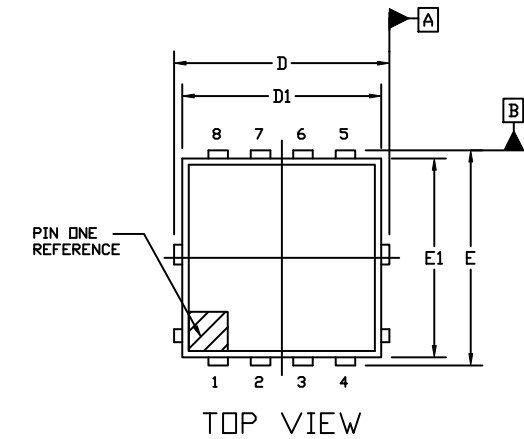
Figure 13. Transient Thermal Response

ORDERING INFORMATION

Device	Marking	Package Type	Shipping†
NVTFWS003N04XMTAG	003W	WDFN8 (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 Specifications Brochure, [BRD8011/D](#).

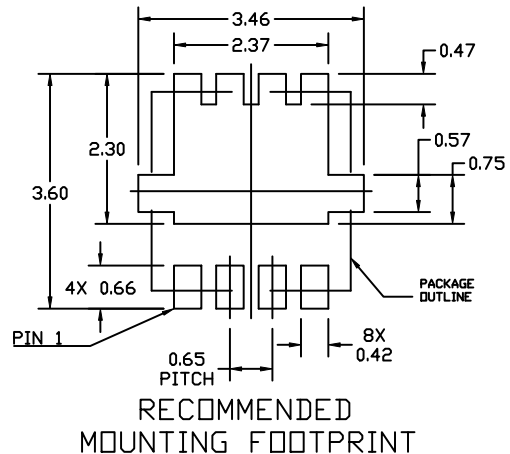
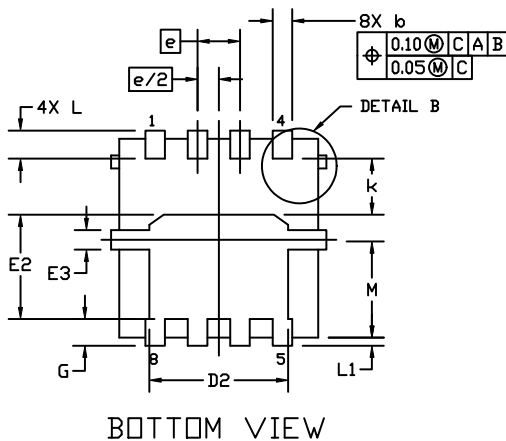
PACKAGE DIMENSIONS

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

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



- * 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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