

NTLJS4114N

Power MOSFET

30 V, 7.8 A, μ Cool™ Single N-Channel,
2x2 mm WDFN Package

Features

- WDFN Package Provides Exposed Drain Pad for Excellent Thermal Conduction
- 2x2 mm Footprint Same as SC-88
- Lowest $R_{DS(on)}$ in 2x2 mm Package
- 1.8 V $R_{DS(on)}$ Rating for Operation at Low Voltage Logic Level Gate Drive
- Low Profile (< 0.8 mm) for Easy Fit in Thin Environments
- This is a Pb-Free Device

Applications

- DC-DC Conversion
- Boost Circuits for LED Backlights
- Optimized for Battery and Load Management Applications in Portable Equipment such as, Cell Phones, PDA's, Media Players, etc.
- Low Side Load Switch for Noisy Environment

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V _{DSS}	30	V
Gate-to-Source Voltage			V _{GS}	±12	V
Continuous Drain Current (Note 1)	Steady State	T _A = 25°C	I _D	6.0	A
		T _A = 85°C		4.4	
	t ≤ 5 s	T _A = 25°C		7.8	
Power Dissipation (Note 1)	Steady State	T _A = 25°C	P _D	1.92	W
	t ≤ 5 s			3.3	
Continuous Drain Current (Note 2)	Steady State	T _A = 25°C	I _D	3.6	A
		T _A = 85°C		2.6	
Power Dissipation (Note 2)	Steady State	T _A = 25°C	P _D	0.70	W
Pulsed Drain Current		t _p = 10 μs		I _{DM}	
Operating Junction and Storage Temperature			T _J , T _{STG}	-55 to 150	°C
Source Current (Body Diode) (Note 2)			I _S	3.0	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T _L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

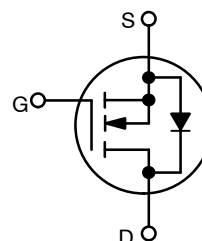
1. Surface Mounted on FR4 Board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).
2. Surface Mounted on FR4 Board using the minimum recommended pad size of 30 mm², 2 oz Cu.



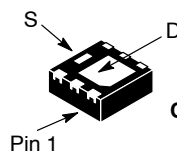
ON Semiconductor®

<http://onsemi.com>

$V_{(BR)DS}$	$R_{DS(on)}$ MAX	I_D MAX (Note 1)
30 V	35 m Ω @ 4.5 V	7.8 A
	45 m Ω @ 2.5 V	
	55 m Ω @ 1.8 V	

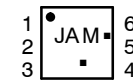


N-CHANNEL MOSFET



WDFN6
CASE 506AP
STYLE 1

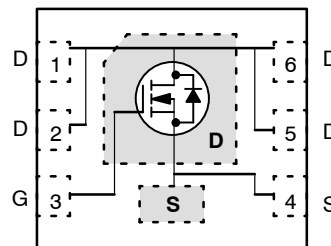
MARKING DIAGRAM



JA = Specific Device Code
M = Date Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

Device	Package	Shipping†
NTLJS4114NT1G	WDFN6 (Pb-Free)	3000/Tape & Reel
NTLJS4114NTAG	WDFN6 (Pb-Free)	3000/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.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	65	$^{\circ}\text{C/W}$
Junction-to-Ambient – $t \leq 5$ s (Note 3)	$R_{\theta JA}$	38	
Junction-to-Ambient – Steady State Min Pad (Note 4)	$R_{\theta JA}$	180	

3. Surface Mounted on FR4 Board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).

4. Surface Mounted on FR4 Board using the minimum recommended pad size (30 mm², 2 oz Cu).

MOSFET ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 250\text{ }\mu\text{A}$, Ref to 25°C		20		mV/ $^{\circ}\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$	$T_J = 25^{\circ}\text{C}$		1.0	μA
			$T_J = 85^{\circ}\text{C}$		10	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 5)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	0.4	0.55	1.0	V
Negative Gate Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.18		mV/ $^{\circ}\text{C}$
Drain-to-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 2.0\text{ A}$		20.3	35	m Ω
		$V_{GS} = 2.5\text{ V}, I_D = 2.0\text{ A}$		25.8	45	
		$V_{GS} = 1.8\text{ V}, I_D = 1.8\text{ A}$		35.2	55	
Forward Transconductance	g_{FS}	$V_{DS} = 16\text{ V}, I_D = 2.0\text{ A}$		8		S

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 15\text{ V}$		650		pF
Output Capacitance	C_{OSS}			115.5		
Reverse Transfer Capacitance	C_{RSS}			70		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 2.0\text{ A}$		8.5	13	nC
Threshold Gate Charge	$Q_{G(TH)}$			0.6		
Gate-to-Source Charge	Q_{GS}			0.9		
Gate-to-Drain Charge	Q_{GD}			2.1		
Gate Resistance	R_G			3.0		Ω

SWITCHING CHARACTERISTICS (Note 6)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 4.5\text{ V}, V_{DD} = 15\text{ V}, I_D = 2.0\text{ A}, R_G = 3.0\text{ }\Omega$		5		ns
Rise Time	t_r			9		
Turn-Off Delay Time	$t_{d(OFF)}$			20		
Fall Time	t_f			4		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Recovery Voltage	V _{SD}	V _{GS} = 0 V, I _S = 2.0 A	T _J = 25°C		0.71	1.2	V
			T _J = 85°C		0.58		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _{SD} /d _t = 100 A/μs, I _S = 1.0 A			14	35	ns
Charge Time	t _a				8.0		
Discharge Time	t _b				6.0		
Reverse Recovery Time	Q _{RR}				5.0		nC

5. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

6. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

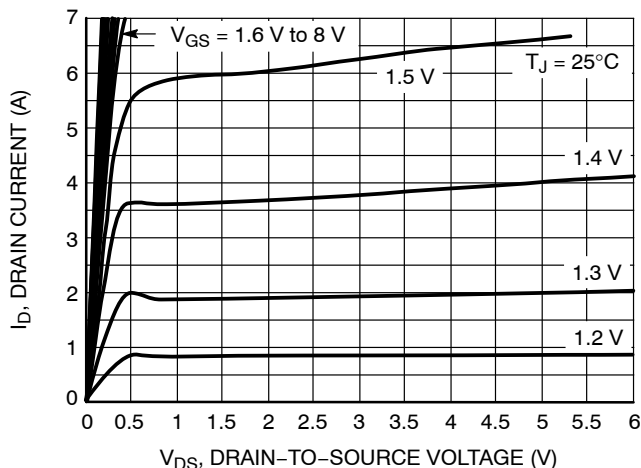


Figure 1. On-Region Characteristics

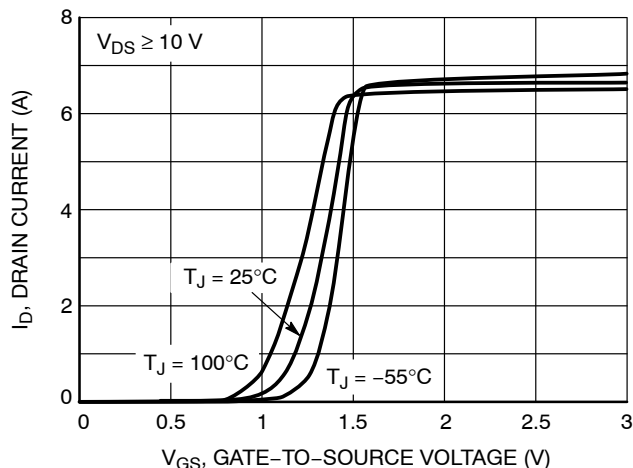


Figure 2. Transfer Characteristics

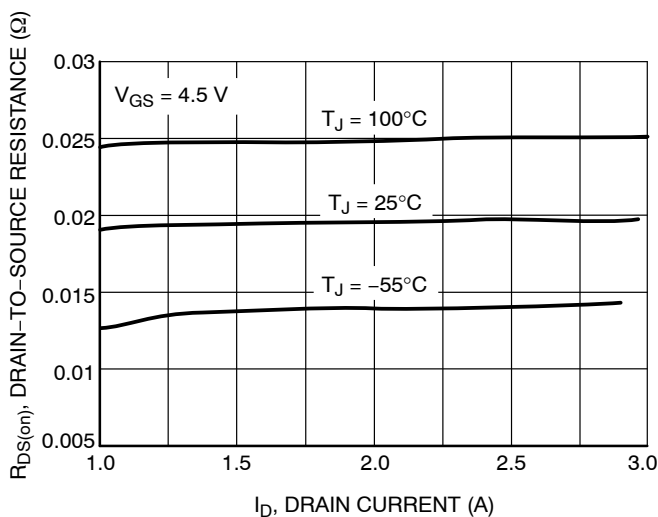


Figure 3. On-Resistance versus Drain Current

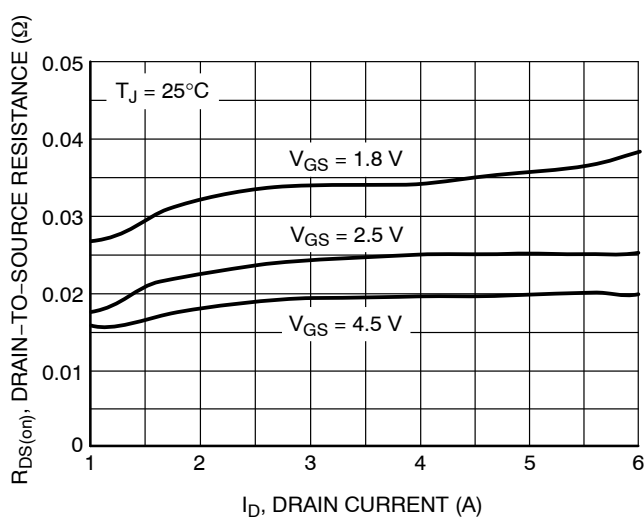


Figure 4. On-Resistance versus Drain Current and Gate Voltage

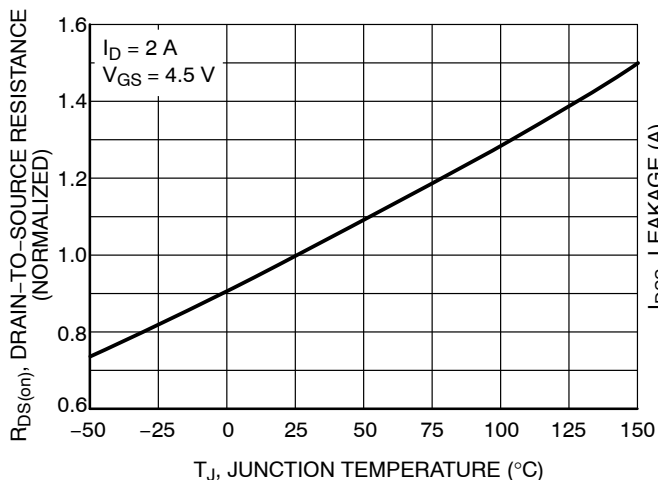


Figure 5. On-Resistance Variation with Temperature

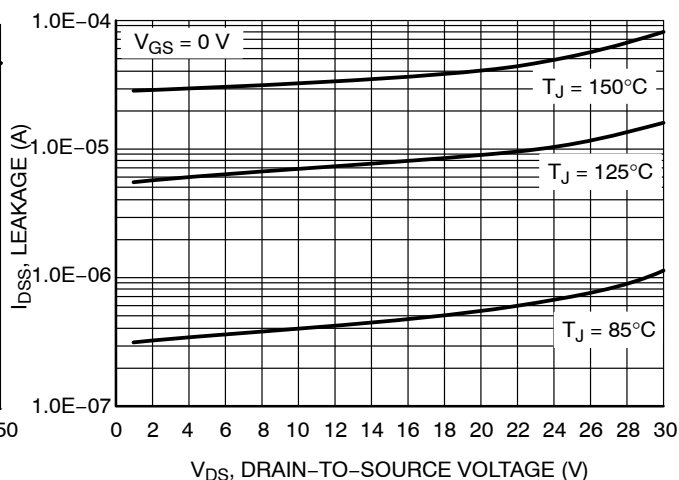


Figure 6. Drain-to-Source Leakage Current versus Voltage

TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

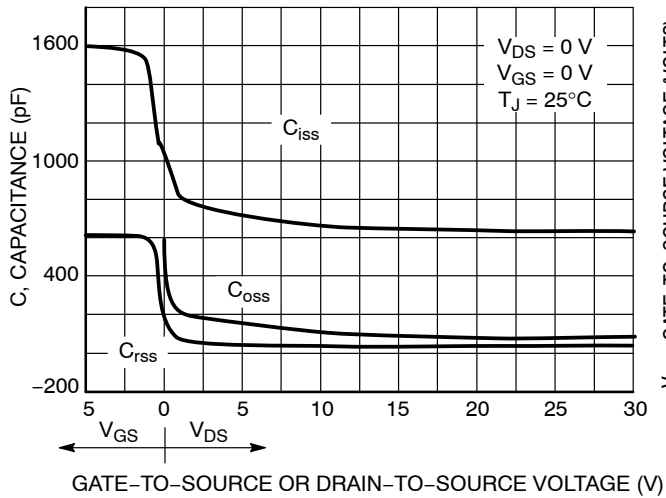


Figure 7. Capacitance Variation

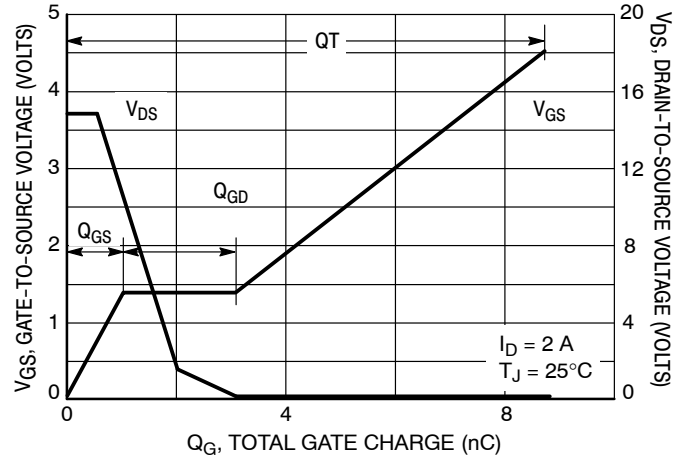


Figure 8. Gate-To-Source and Drain-To-Source Voltage versus Total Charge

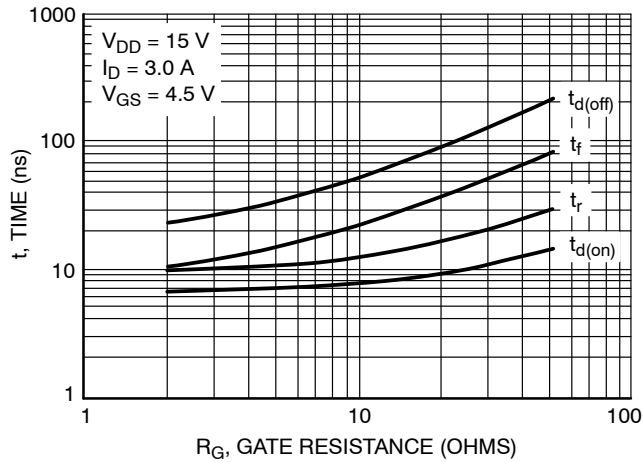


Figure 9. Resistive Switching Time Variation versus Gate Resistance

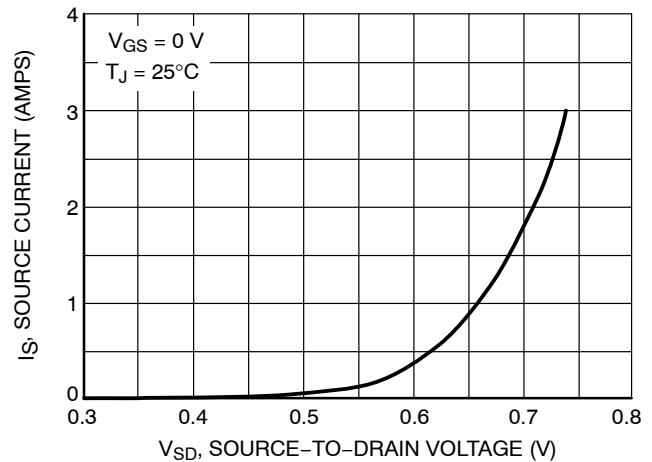


Figure 10. Diode Forward Voltage versus Current

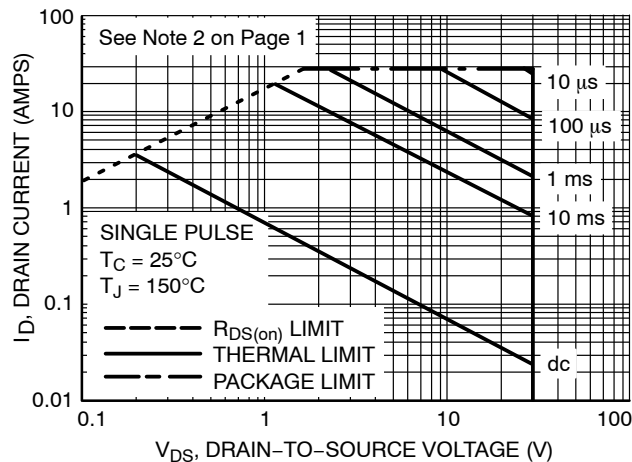


Figure 11. Maximum Rated Forward Biased Safe Operating Area

NTLJS4114N

TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

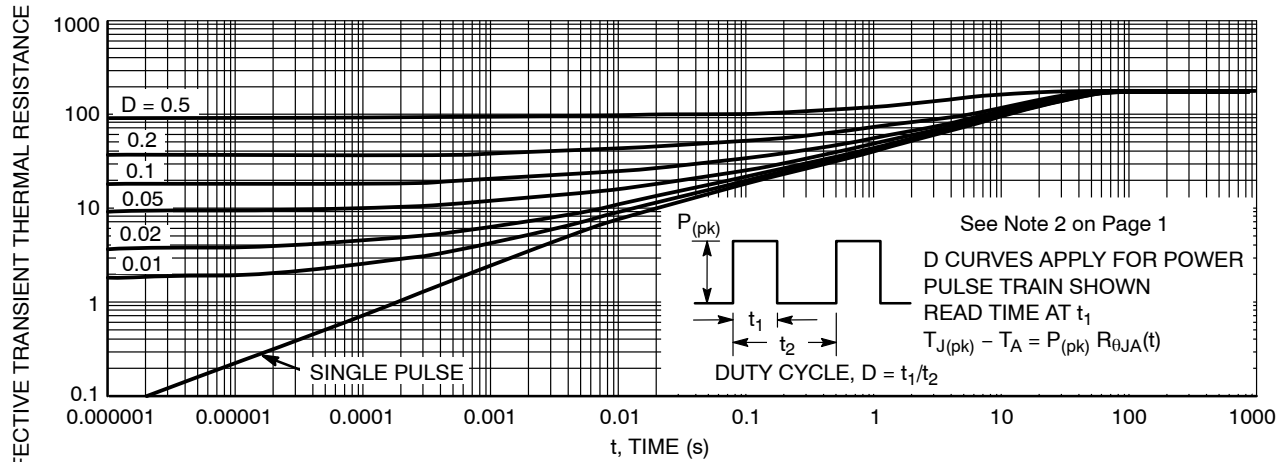


Figure 12. Thermal Response

PACKAGE DIMENSIONS

Figure 1 shows the bottom view of the connector with the following dimensions and features:

- Dimensions:** D (Overall Width), E (Overall Height), E2 (Height of Central Section), D2 (Width of Central Section), L2 (Distance from Pin 1 to Pin 3), J, J1 (Distances from Pin 1 to Pin 6 and Pin 4), K (Distance from Pin 6 to Pin 4), L (Distance from Pin 1 to Pin 6), and e (Hole Diameter for 4X holes).
- Features:**
 - PIN ONE REFERENCE:** A shaded rectangular area.
 - SEATING PLANE:** Indicated by a triangle pointing to the bottom surface.
 - Holes:**
 - 2X holes with diameters 0.10 and C.
 - 7X holes with diameters 0.08 and C.
 - 4X holes with diameter e.
 - 6X holes with diameters 0.10 and 0.05.
 - Positional Tolerances:** A, B, A3, A1, L2, J, J1, K, and NOTE 3, NOTE 5.

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION B APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. CENTER TERMINAL LEAD IS OPTIONAL. TERMINAL LEAD IS CONNECTED TO TERMINAL LEAD # 4.
6. PINS 1, 2, 5 AND 6 ARE TIED TO THE FLAG.

PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DBAIN

DIM	MILLIMETERS	
	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A3	0.20 REF	
b	0.25	0.35
b1	0.51	0.61
D	2.00 BSC	
D2	1.00	1.20
E	2.00 BSC	
E2	1.10	1.30
e	0.65 BSC	
K	0.15 REF	
L	0.20	0.30
L2	0.20	0.30
J	0.27 REF	
J1	0.65 REF	

*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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