NTMFS4119N

Power MOSFET
30 V, 30 A, Single N−Channel, SO−8 Flat Lead

Features
- Low $R_{DS(on)}$
- Fast Switching Times
- Low Inductance SO−8 Package
- These are Pb−Free Devices

Applications
- Notebooks, Graphics Cards
- Low Side Switch
- DC−DC

ON Semiconductor®

http://onsemi.com

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max (Note 1)
30 V	2.3 mΩ @ 10 V	30 A
	3.1 mΩ @ 4.5 V	

MARKING DIAGRAM

SO−8 FLAT LEAD
CASE 488AA
STYLE 1

```
S    D
S  4119N  D
S  AYWZZ
G    D
     D
```

4119N = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Lot Traceability

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	30	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	18	A
		T_A = 85°C		13	
	$t \leq 10$ s	T_A = 25°C		30	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	2.3	W
	$t \leq 10$ s			6.1	
Continuous Drain Current (Note 2)	Steady State	T_A = 25°C	I_D	11	A
		T_A = 85°C		8.0	
Power Dissipation (Note 2)		T_A = 25°C	P_D	0.9	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	89	A
Operating Junction and Storage Temperature			T_J, T_{stg}	−55 to 150	°C
Source Current (Body Diode)			I_S	8.0	A
Single Pulse Drain−to−Source Avalanche Energy (V_{DD} = 30 V, V_{GS} = 10 V, I_{PK} = 29 A, L = 1 mH, R_G = 25 Ω)			E_{AS}	421	mJ
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°C

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State	$R_{\theta JC}$	1.3	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	53.7	
Junction−to−Ambient − t ≤ 10 s (Note 1)	$R_{\theta JA}$	20.5	
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	138.5	

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.
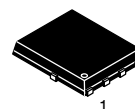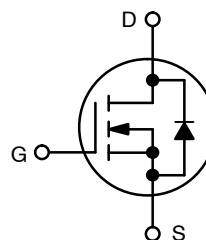1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).
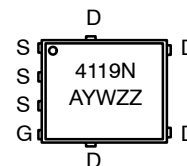2. Surface mounted on FR4 board using the minimum recommended pad size (Cu area = 0.412 in sq).

ORDERING INFORMATION

Device	Package	Shipping†
NTMFS4119NT1G	SO−8 FL (Pb−Free)	1500 / Tape & Reel
NTMFS4119NT3G	SO−8 FL (Pb−Free)	5000 / 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.

NTMFS4119N

ELECTRICAL CHARACTERISTICS ($T_J = 25°C$ unless otherwise noted)

Characteristic	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		30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				19		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0$ V, $V_{DS} = 24$ V	$T_J = 25°C$			1.0	μA
			$T_J = 125°C$			10	
Gate−to−Source Leakage Current	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = 20$ V				100	nA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$, $I_D = 250$ μA		1.0		2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				7.0		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10$ V, $I_D = 29$ A			2.3	3.5	mΩ
		$V_{GS} = 4.5$ V, $I_D = 25$ A			3.1	4.8	
Forward Transconductance	g_{FS}	$V_{DS} = 15$ V, $I_D = 10$ A			23		S
CHARGES, CAPACITANCES AND GATE RESISTANCE							
Input Capacitance	C_{ISS}	$V_{GS} = 0$ V, f = 1.0 MHz, $V_{DS} = 24$ V			4800		pF
Output Capacitance	C_{OSS}				800		
Reverse Transfer Capacitance	C_{RSS}				530		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5$ V, $V_{DS} = 15$ V, $I_D = 18$ A			36.8	60	nC
Threshold Gate Charge	$Q_{G(TH)}$				7.3		
Gate−to−Source Charge	Q_{GS}				11		
Gate−to−Drain Charge	Q_{GD}				17.4		
Gate Resistance	R_G				0.73		Ω
SWITCHING CHARACTERISTICS, V_{GS} = 4.5 V (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	$V_{GS} = 4.5$ V, $V_{DS} = 15$ V, $I_D = 1.0$ A, $R_G = 3.0$ Ω			28		ns
Rise Time	t_r				26		
Turn−Off Delay Time	$t_{d(OFF)}$				35		
Fall Time	t_f				40		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	$V_{GS} = 0$ V, $I_S = 8.0$ A	$T_J = 25°C$		0.74	1.0	V
			$T_J = 125°C$		0.56		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0$ V, $dI_S/dt = 100$ A/μs, $I_S = 8.0$ A			36.5		ns
Charge Time	t_a				19.3		
Discharge Time	t_b				19.8		
Reverse Recovery Charge	Q_{RR}				37		nC

3. Pulse Test: Pulse Width $\leq$ 300 μs, Duty Cycle $\leq$ 2%.
4. Switching characteristics are independent of operating junction temperatures.
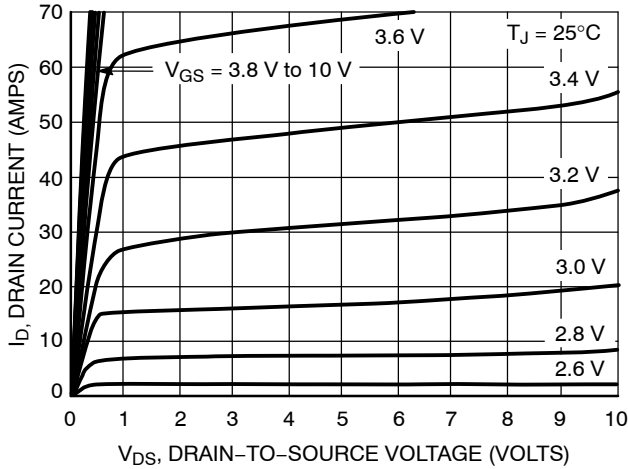
TYPICAL PERFORMANCE CURVES
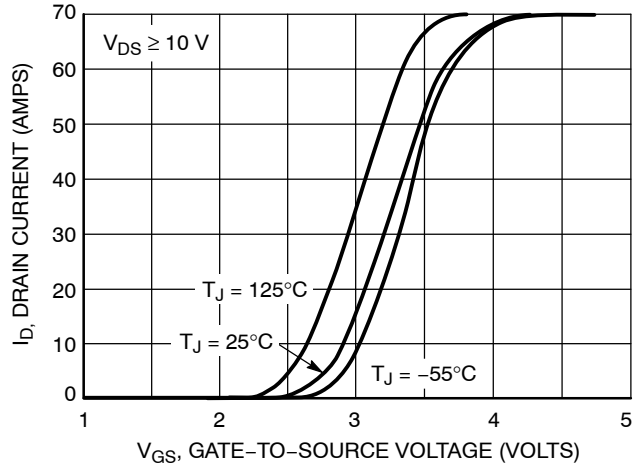
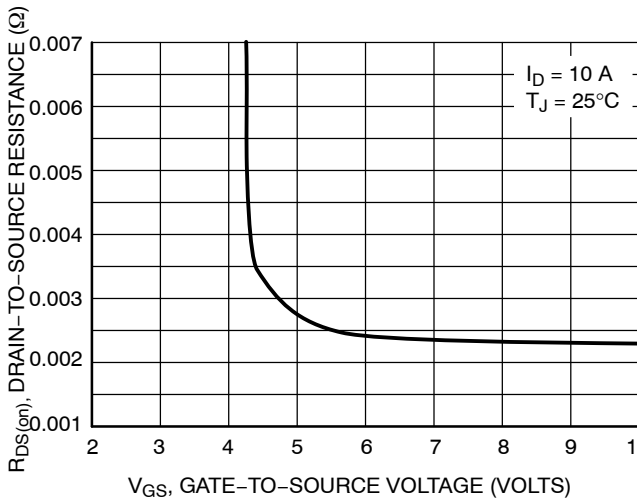**Figure 1. On−Region Characteristics**

Figure 2. Transfer Characteristics

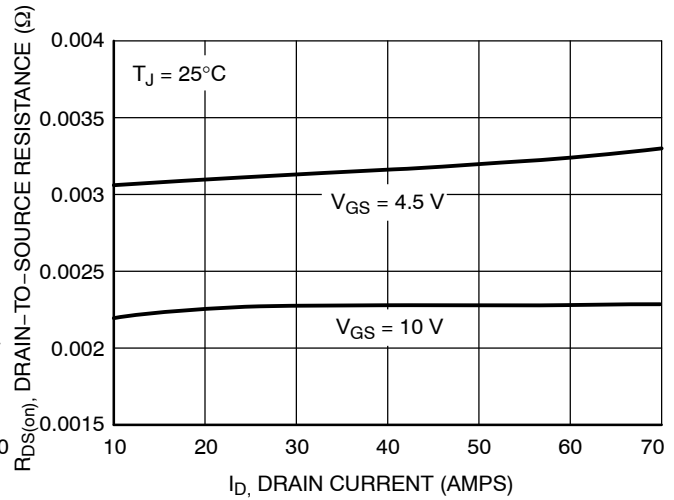**Figure 3. On−Resistance vs. Gate−to−Source Voltage**

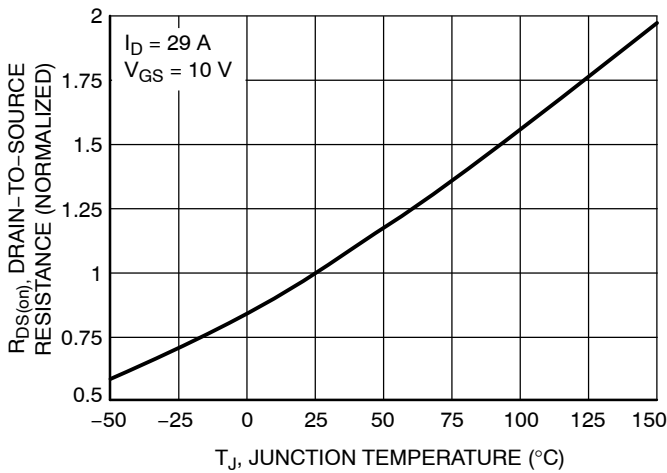**Figure 4. On−Resistance vs. Drain Current and Gate Voltage**
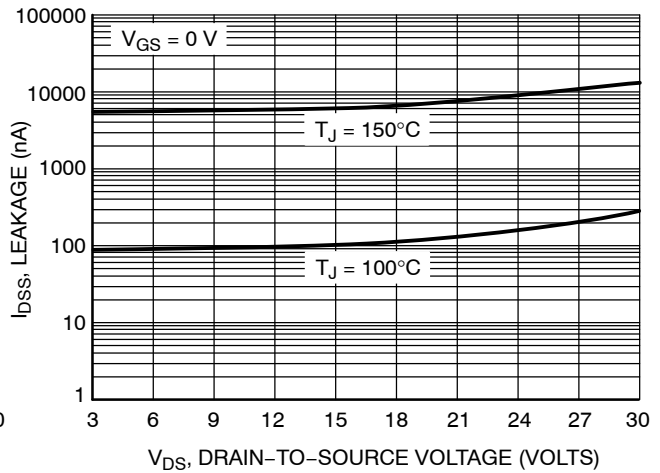
Figure 5. On−Resistance Variation with Temperature

Figure 6. Drain−to−Source Leakage Current vs. Voltage
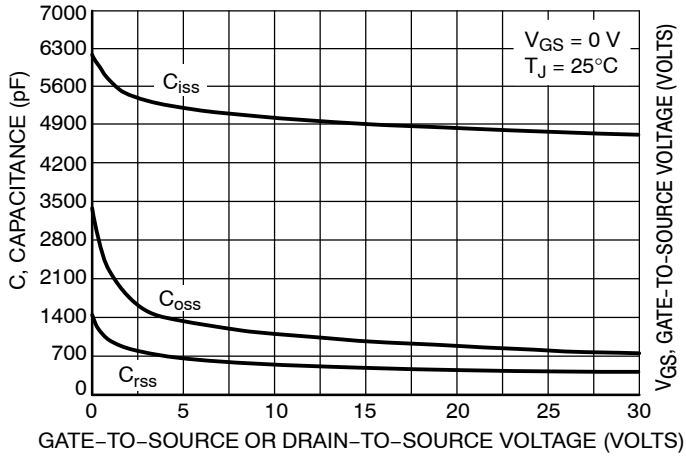
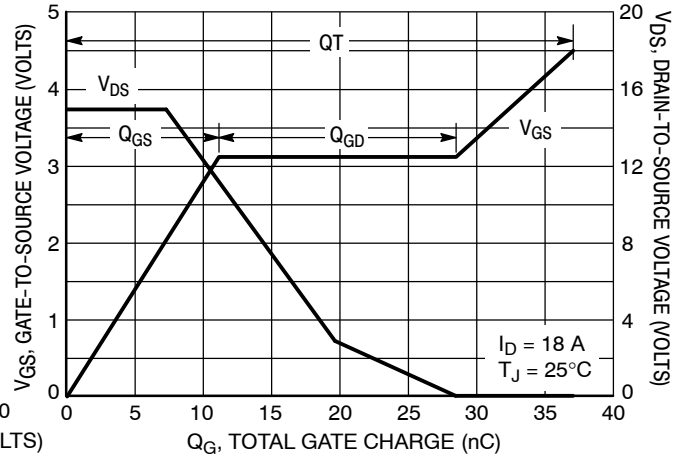## TYPICAL PERFORMANCE CURVES

Figure 7. Capacitance Variation
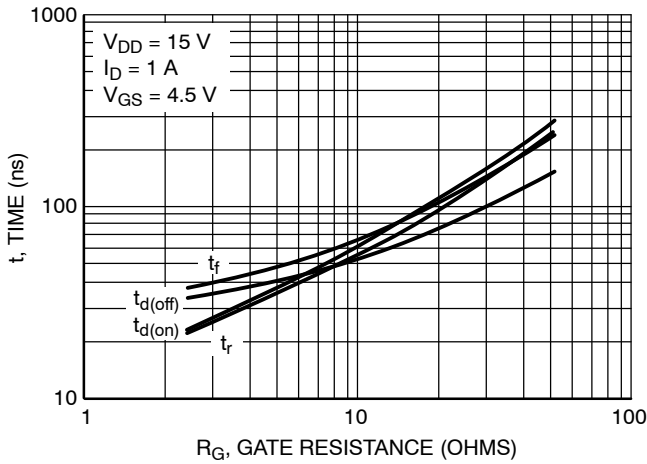
**Figure 8. Gate−To−Source and
Drain−To−Source Voltage vs. Total Charge**

**Figure 9. Resistive Switching Time
Variation vs. Gate Resistance**
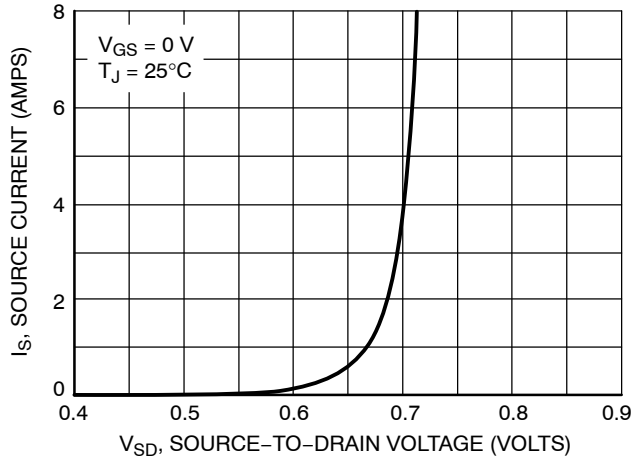
Figure 10. Diode Forward Voltage vs. Current
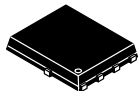
SCALE 2:1

1

DFN5 5x6, 1.27P
(SO−8FL)
CASE 488AA
ISSUE N

DATE 25 JUN 2018
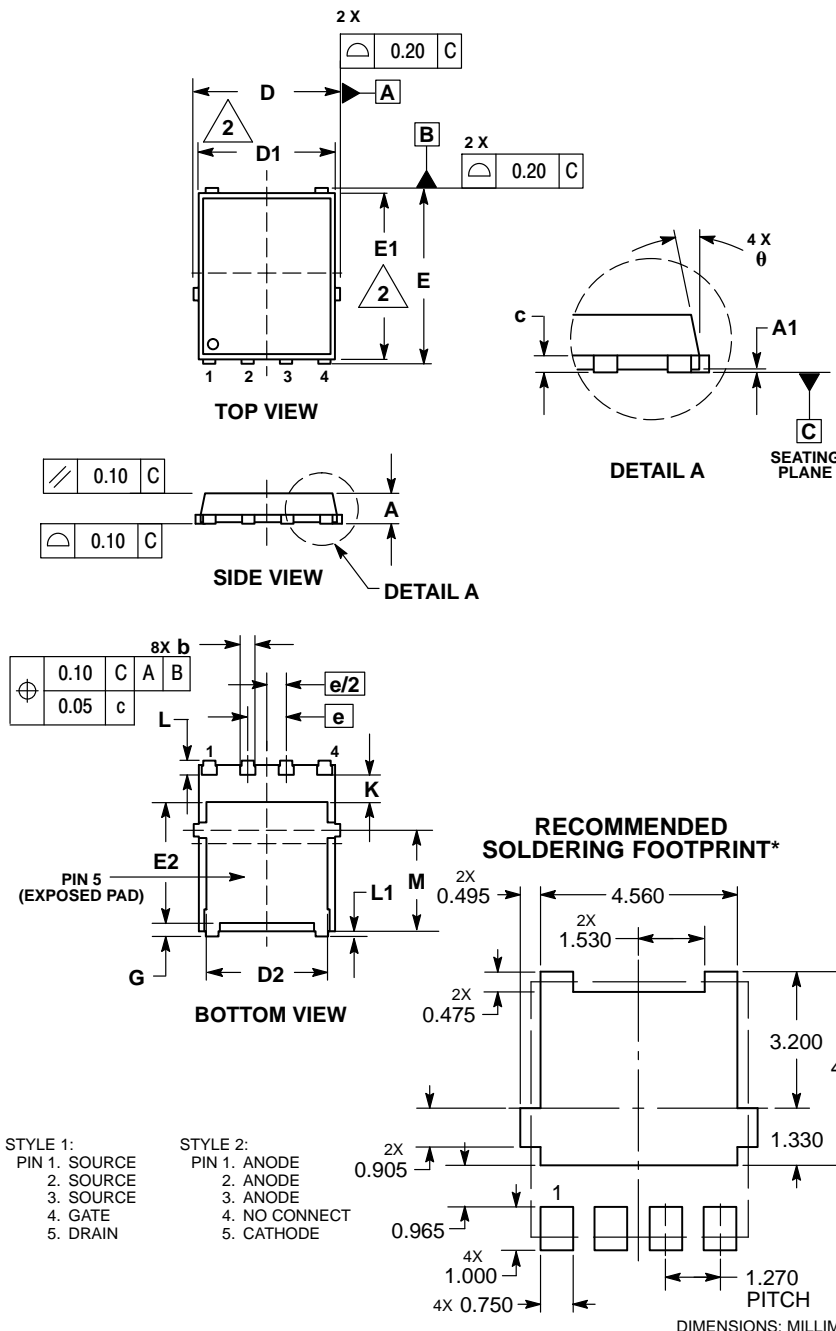
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

2 X

⌒	0.20	C

D

△2

A

D1

B

2 X

⌒	0.20	C

E1

E

△2

4 X
θ

c

A1

C

SEATING PLANE

DETAIL A

1 2 3 4

TOP VIEW

//	0.10	C

⌒	0.10	C

A

SIDE VIEW

DETAIL A

	MILLIMETERS		
DIM	**MIN**	**NOM**	**MAX**
A	0.90	1.00	1.10
A1	0.00	–––	0.05
b	0.33	0.41	0.51
c	0.23	0.28	0.33
D	5.00	5.15	5.30
D1	4.70	4.90	5.10
D2	3.80	4.00	4.20
E	6.00	6.15	6.30
E1	5.70	5.90	6.10
E2	3.45	3.65	3.85
e	1.27 BSC		
G	0.51	0.575	0.71
K	1.20	1.35	1.50
L	0.51	0.575	0.71
L1	0.125 REF		
M	3.00	3.40	3.80
θ	0 °	–––	12 °

GENERIC MARKING DIAGRAM*

1
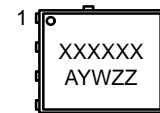
XXXXXX
AYWZZ

XXXXXX = Specific Device Code
A   = Assembly Location
Y   = Year
W   = Work Week
ZZ   = Lot Traceability

8X b

⊕	0.10	C	A	B
	0.05	c		

e/2

e

L

1   4

K

**PIN 5
(EXPOSED PAD)**

E2

L1

M

G

D2

BOTTOM VIEW

**RECOMMENDED
SOLDERING FOOTPRINT***

2X
0.495

4.560

2X
1.530

2X
0.475

3.200

4.530

1.330

2X
0.905

0.965

1

4X
1.000

4X 0.750

1.270
PITCH
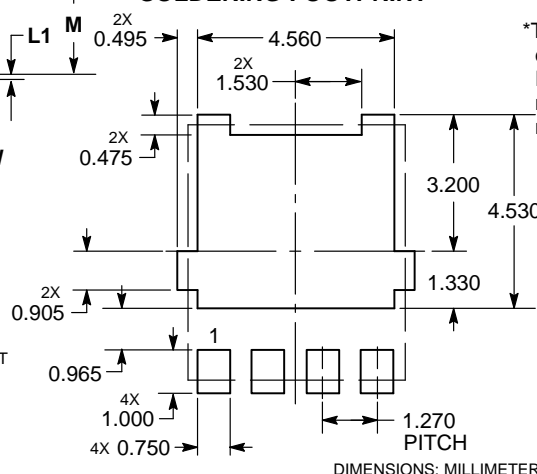
DIMENSIONS: MILLIMETERS

*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.

STYLE 1:
PIN 1. SOURCE
    2. SOURCE
    3. SOURCE
    4. GATE
    5. DRAIN

STYLE 2:
PIN 1. ANODE
    2. ANODE
    3. ANODE
    4. NO CONNECT
    5. CATHODE

*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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DESCRIPTION:	**DFN5 5x6, 1.27P (SO−8FL)**		**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

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