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®

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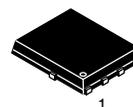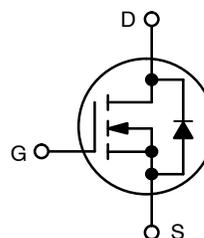
MARKING DIAGRAM

SO−8 FLAT LEAD CASE 488AA STYLE 1

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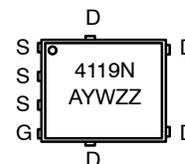
4119N = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Lot Traceability

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 ≤ 10 s	T_A = 25°C		30	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	2.3	W
	t ≤ 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	$R_{θJC}$	1.3	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{θJA}$	53.7	
Junction−to−Ambient − t ≤ 10 s (Note 1)	$R_{θJA}$	20.5	
Junction−to−Ambient − Steady State (Note 2)	$R_{θJA}$	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 ≤ 300 μs, Duty Cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES
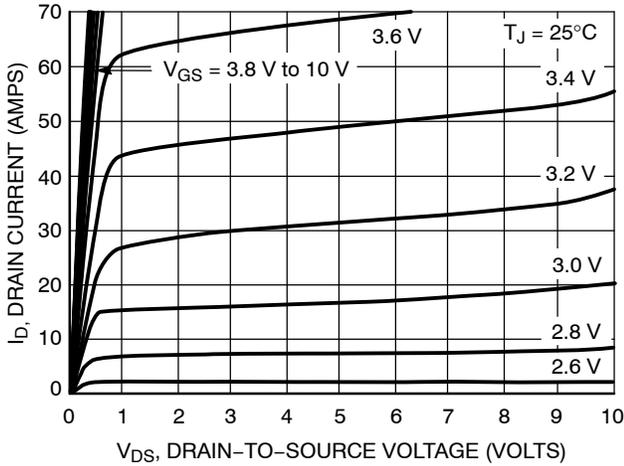
Figure 1. On−Region Characteristics
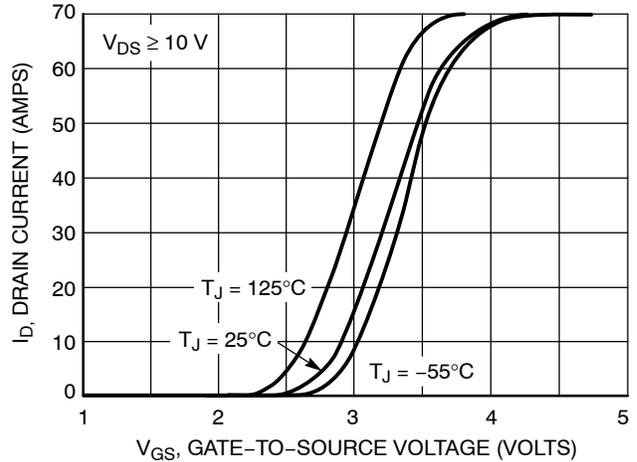

Figure 2. Transfer Characteristics
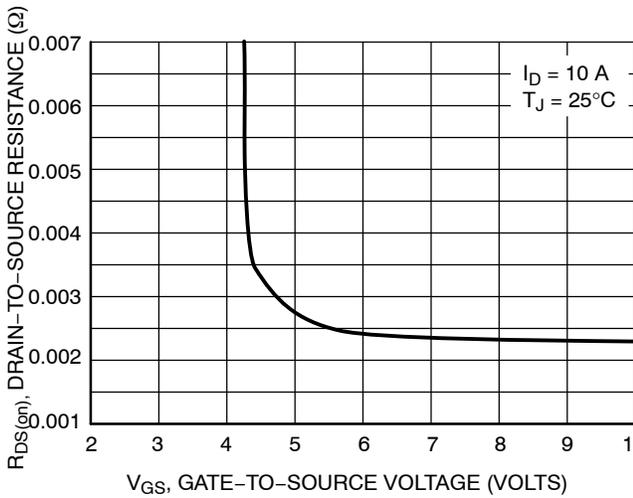
Figure 3. On−Resistance vs. Gate−to−Source Voltage
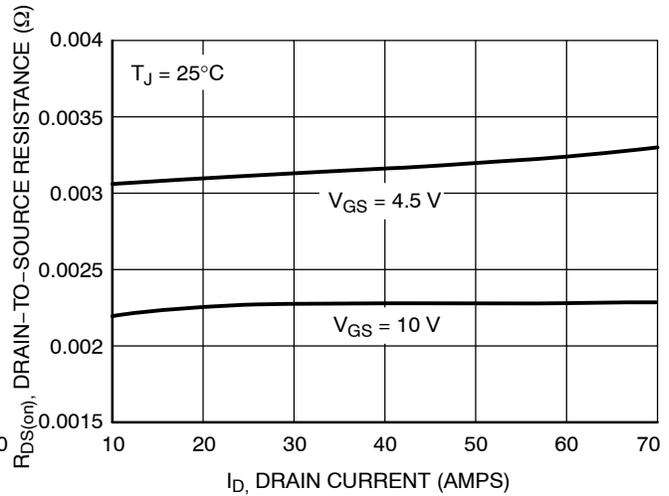
Figure 4. On−Resistance vs. Drain Current and Gate Voltage
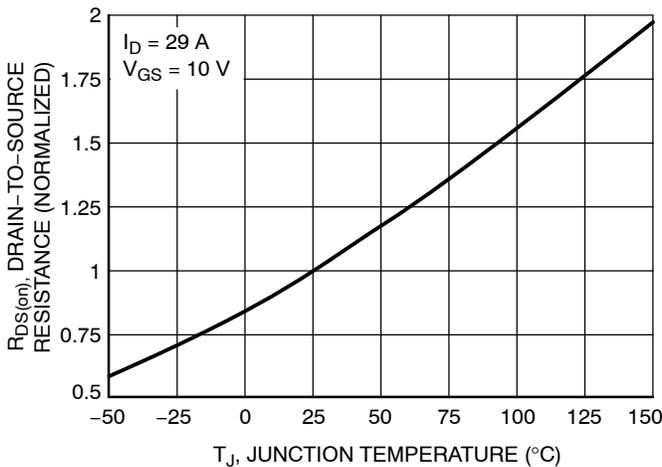

Figure 5. On−Resistance Variation with Temperature
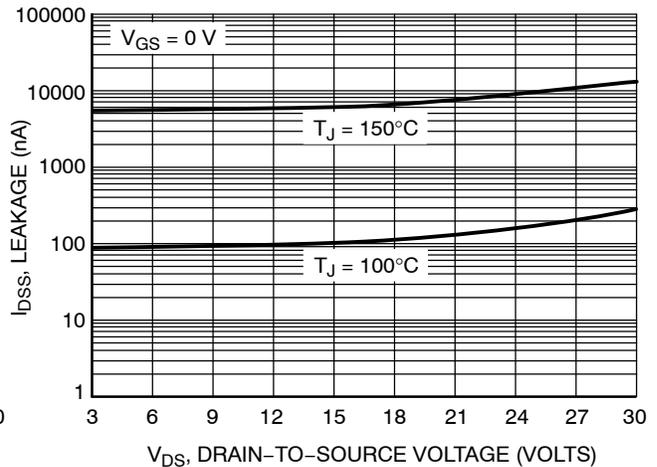
Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES
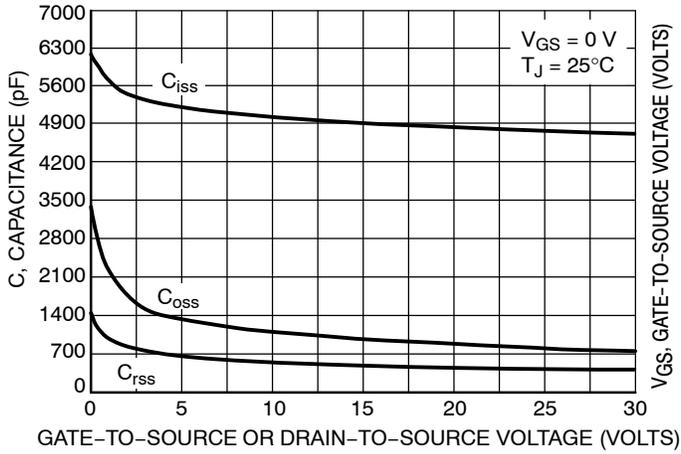
Figure 7. Capacitance Variation
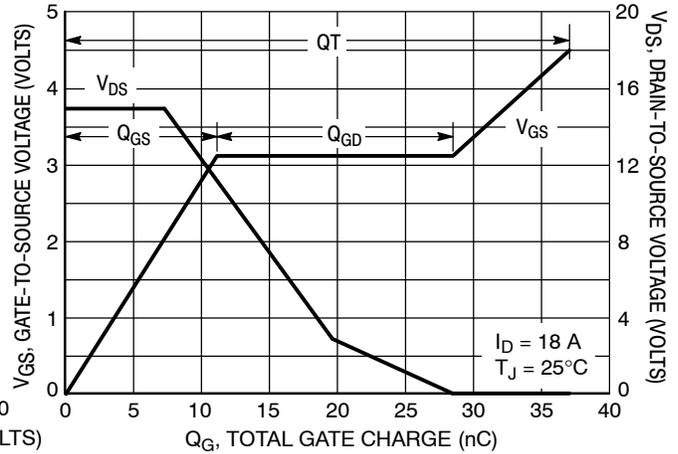
**Figure 8. Gate–To–Source and Drain–To–Source Voltage vs. Total Charge**
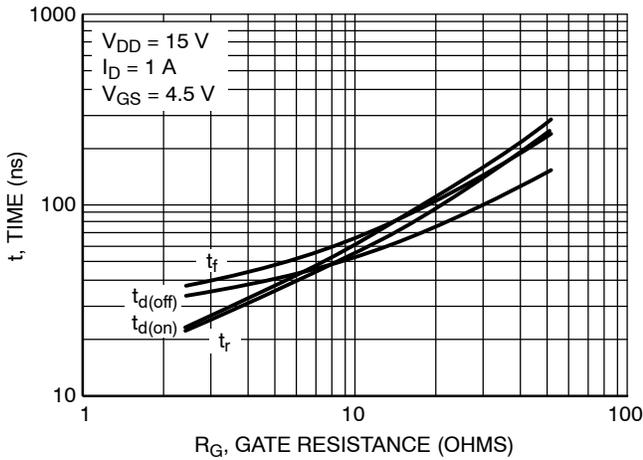
**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**
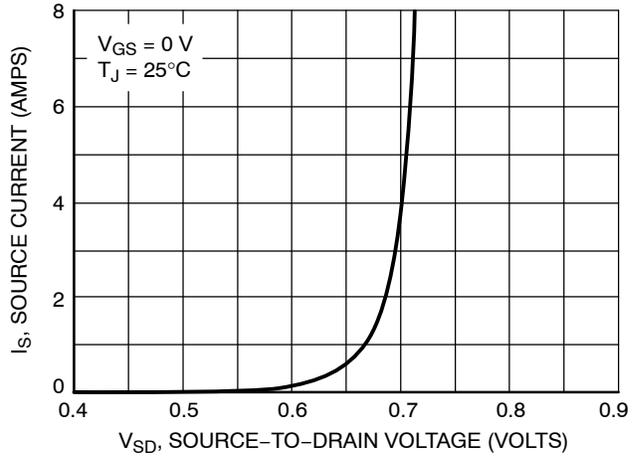
Figure 10. Diode Forward Voltage vs. Current

NTMFS4119N

PACKAGE DIMENSIONS

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

TOP VIEW

SIDE VIEW

DETAIL A

BOTTOM VIEW

PIN 5
(EXPOSED PAD)

SOLDERING FOOTPRINT*

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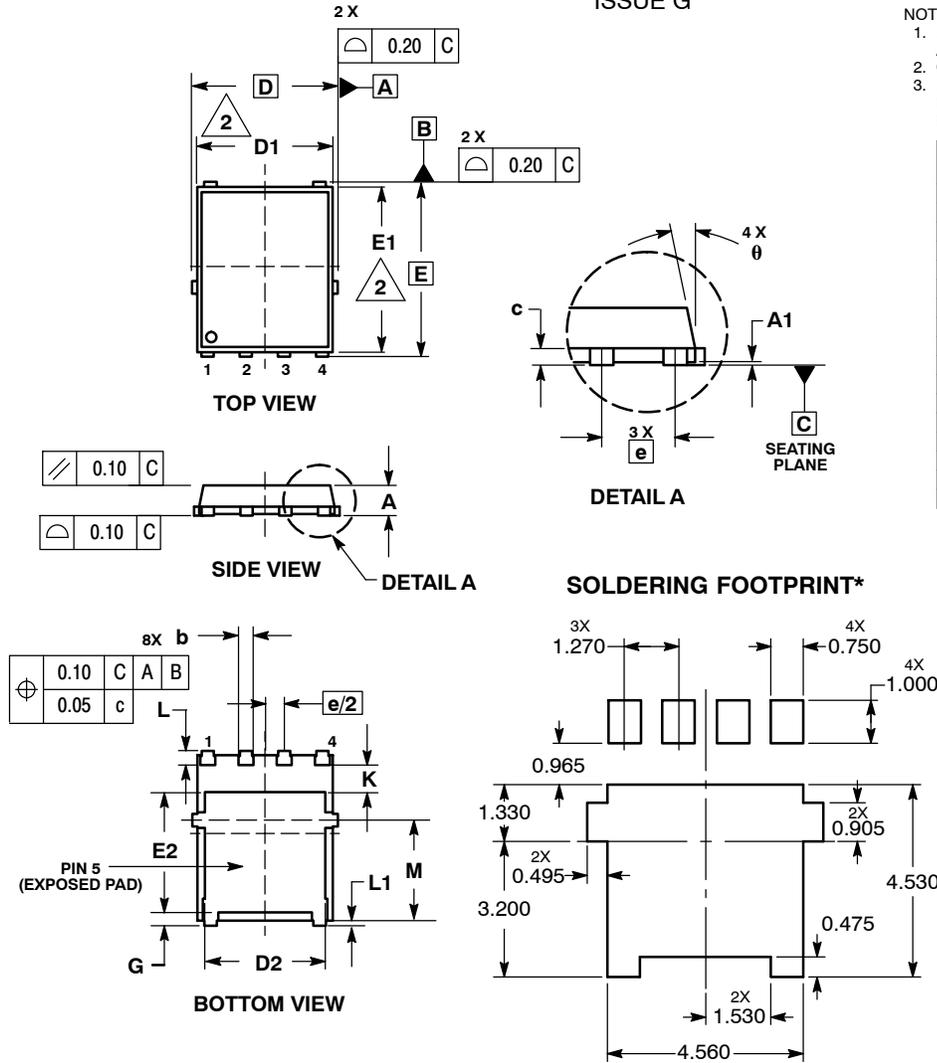
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

DIM	MILLIMETERS		
	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	5.15 BSC		
D1	4.50	4.90	5.10
D2	3.50	---	4.22
E	6.15 BSC		
E1	5.50	5.80	6.10
E2	3.45	---	4.30
e	1.27 BSC		
G	0.51	0.61	0.71
K	1.20	1.35	1.50
L	0.51	0.61	0.71
L1	0.05	0.17	0.20
M	3.00	3.40	3.80
θ	0 °	---	12 °

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

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