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NTMFS4847N

[MOSFET](http://onsemi.com) – Power, Single, N-Channel, SO-8FL
30 V, 85 A

ON Semiconductor®

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- Thermally Enhanced SO−8 Package
- These are Pb−Free Devices

Applications

- Refer to Application Note AND8195/D
- CPU Power Delivery
- DC−DC Converters
- Low Side Switching

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
30 V	4.1 mΩ @ 10 V	85 A
	6.2 mΩ @ 4.5 V	

N−CHANNEL MOSFET

D (5,6)

G (4)

S (1,2,3)
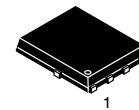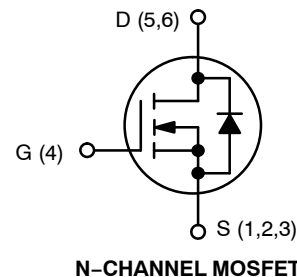
SO−8 FLAT LEAD CASE 488AA STYLE 1

MARKING DIAGRAM


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4847N
AYWZZ
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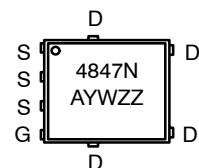
A	= Assembly Location
Y	= Year
W	= Work Week
ZZ	= Lot Traceability

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	30	V
Gate−to−Source Voltage			V_{GS}	±16	V
Continuous Drain Current $R_{\theta JA}$ (Note 1)	Steady State	T_A = 25°C	I_D	18	A
		T_A = 85°C		13	
Power Dissipation $R_{\theta JA}$ (Note 1)		T_A = 25°C	P_D	2.21	W
Continuous Drain Current $R_{\theta JA} \leq$ 10 sec		T_A = 25°C	I_D	29.5	A
		T_A = 85°C		21	
Power Dissipation $R_{\theta JA}$, t ≤ 10 sec		T_A = 25°C	P_D	5.8	W
Continuous Drain Current $R_{\theta JA}$ (Note 2)		T_A = 25°C	I_D	11.5	A
		T_A = 85°C		8.2	
Power Dissipation $R_{\theta JA}$ (Note 2)		T_A = 25°C	P_D	0.88	W
Continuous Drain Current $R_{\theta JC}$ (Note 1)		T_C = 25°C	I_D	85	A
		T_C = 85°C		61	
Power Dissipation $R_{\theta JC}$ (Note 1)		T_C = 25°C	P_D	48.1	W
Pulsed Drain Current	t_p=10μs	T_A = 25°C	I_{DM}	170	A
Current limited by package		T_A = 25°C	$I_{Dmaxpkg}$	100	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to +150	°C
Source Current (Body Diode)			I_S	48	A
Drain to Source dV/dt			dV/dt	6	V/ns

ORDERING INFORMATION

Device	Package	Shipping†
NTMFS4847NT1G	SO−8FL (Pb−Free)	1500 / Tape & Reel
NTMFS4847NT3G	SO−8FL (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 Specifications Brochure, BRD8011/D.

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

Parameter	Symbol	Value	Unit
Single Pulse Drain−to−Source Avalanche Energy (V_{DD} = 50 V, V_{GS} = 10 V, I_L = 33 A_{pk}, L = 0.3 mH, R_G = 25 Ω)	EAS	163	mJ
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.

NTMFS4847N

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case (Drain)	$R_{\theta JC}$	2.6	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	56.6	
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	142	
Junction−to−Ambient − t ≤ 10 sec	$R_{\theta JA}$	21.6	

1. Surface−mounted on FR4 board using 1 sq−in pad, 1 oz Cu.
2. Surface−mounted on FR4 board using the minimum recommended pad size.

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

Parameter	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	$V_{(BR)DSS}/T_J$				25		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 24 V	T_J = 25 °C			1	μA
			T_J = 125°C			10	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±16 V				±100	nA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.45	1.8	2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				5.2		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V to 11.5 V	I_D = 30 A		3.2	4.1	mΩ
			I_D = 15 A		3.2		
		V_{GS} = 4.5 V	I_D = 30 A		5.0	6.2	
			I_D = 15 A		5.0		
Forward Transconductance	g_{FS}	V_{DS} = 1.5 V, I_D = 30 A			74		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 12 V			2614		pF
Output Capacitance	C_{OSS}				466		
Reverse Transfer Capacitance	C_{RSS}				241		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 15 V; I_D = 30 A			19.2	28	nC
Threshold Gate Charge	$Q_{G(TH)}$				1.6		
Gate−to−Source Charge	Q_{GS}				7.3		
Gate−to−Drain Charge	Q_{GD}				6.1		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 11.5 V, V_{DS} = 15 V, I_D = 30 A			43.8		nC
SWITCHING CHARACTERISTICS (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DS} = 15 V, I_D = 15 A, R_G = 3.0 Ω			17.7		ns
Rise Time	t_r				53		
Turn−Off Delay Time	$t_{d(OFF)}$				21		
Fall Time	t_f				8.7		

3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 11.5 V, V_{DS} = 15 V, I_D = 15 A, R_G = 3.0 Ω			10.5		ns
Rise Time	t_r				20.8		
Turn−Off Delay Time	$t_{d(OFF)}$				28.1		
Fall Time	t_f				6.5		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 30 A	T_J = 25°C		0.8	1.0	V
			T_J = 125°C		0.7		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 30 A			15.4		ns
Charge Time	t_a				8.2		
Discharge Time	t_b				7.2		
Reverse Recovery Charge	Q_{RR}				6.0		nC
PACKAGE PARASITIC VALUES							
Source Inductance	L_S	T_A = 25°C			0.93		nH
Drain Inductance	L_D				0.005		
Gate Inductance	L_G				1.84		
Gate Resistance	R_G				0.9		Ω

3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS
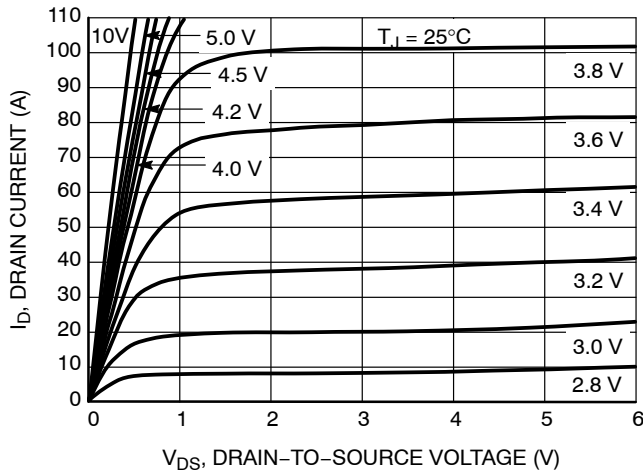
Figure 1. On−Region Characteristics
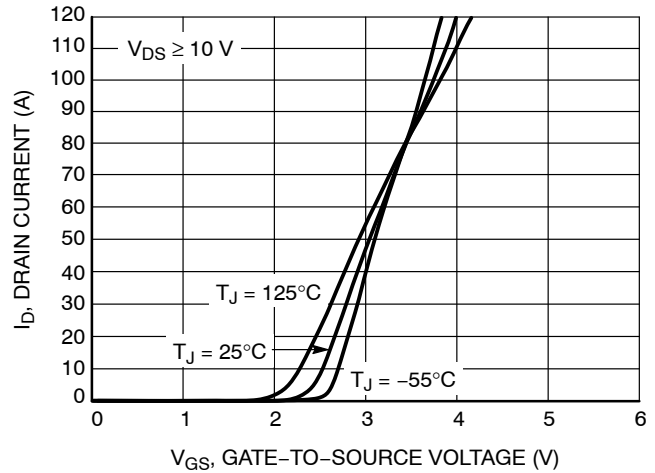
Figure 2. Transfer Characteristics

TYPICAL CHARACTERISTICS
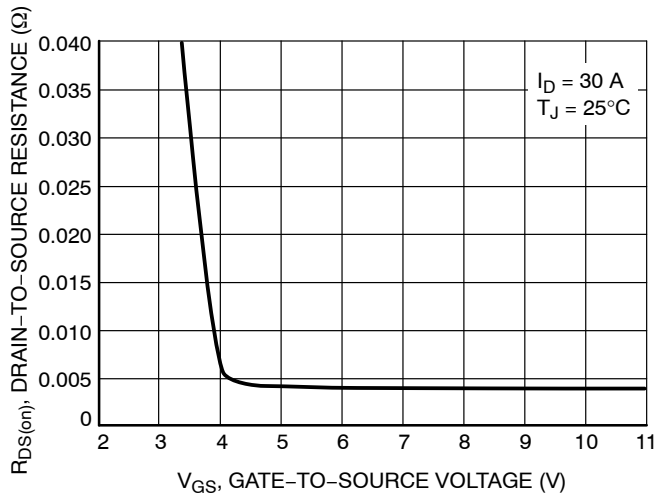
Figure 3. On−Resistance vs. Gate−to−Source Voltage
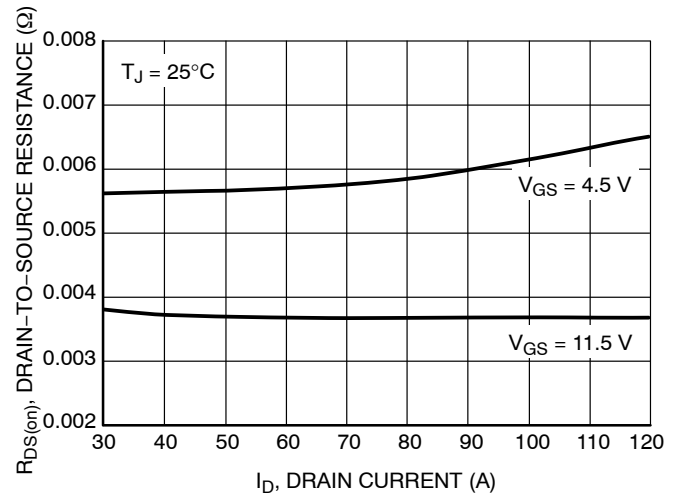
Figure 4. On−Resistance vs. Drain Current and Gate Voltage
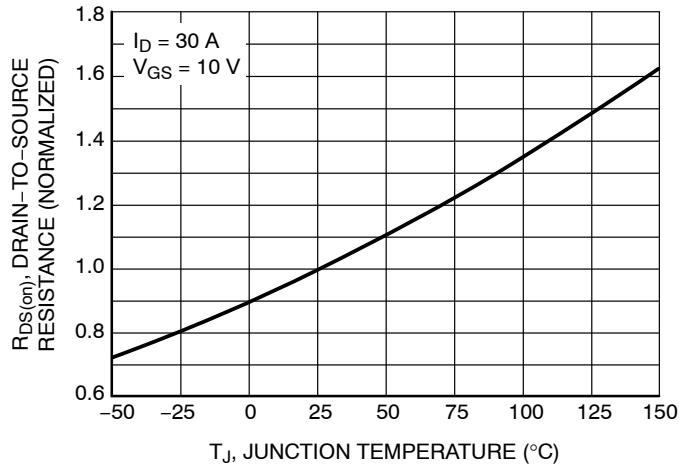
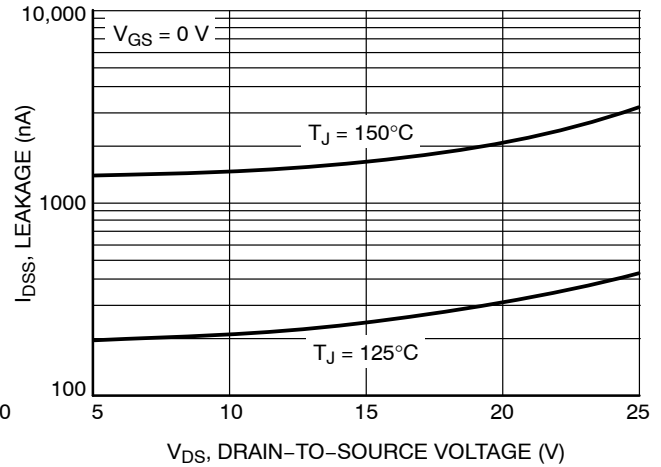**Figure 5. On−Resistance Variation with Temperature**

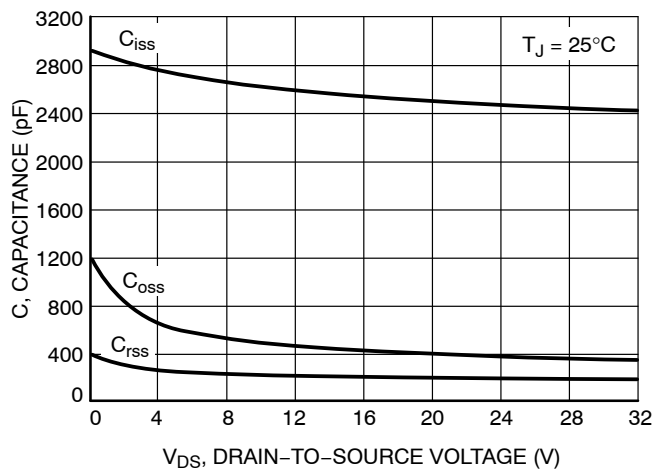**Figure 6. Drain−to−Source Leakage Current vs. Voltage**
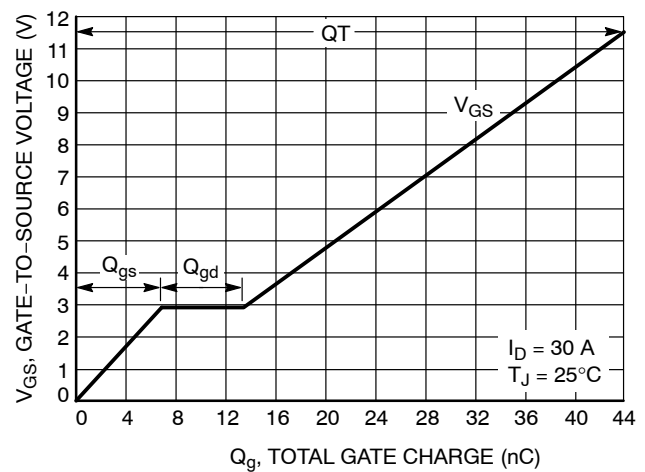

Figure 7. Capacitance Variation

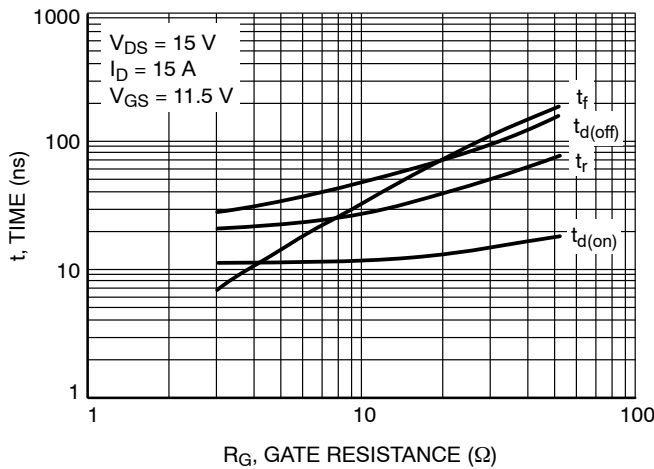**Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge**

TYPICAL CHARACTERISTICS

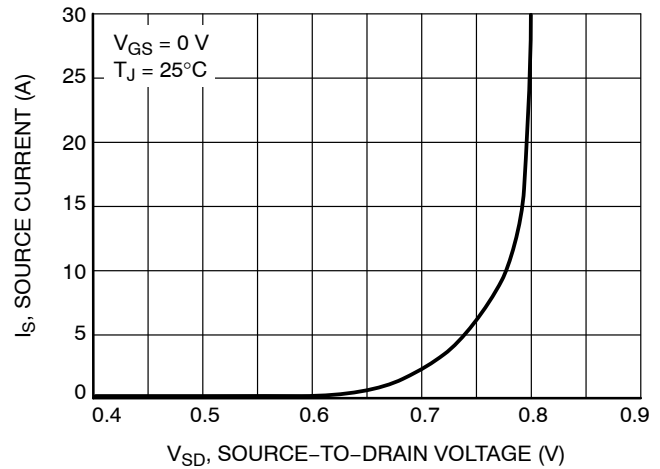**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**

Figure 10. Diode Forward Voltage vs. Current
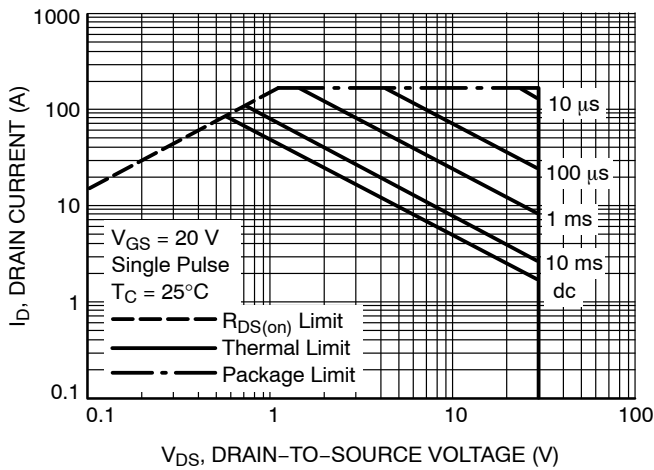
Figure 11. Maximum Rated Forward Biased Safe Operating Area
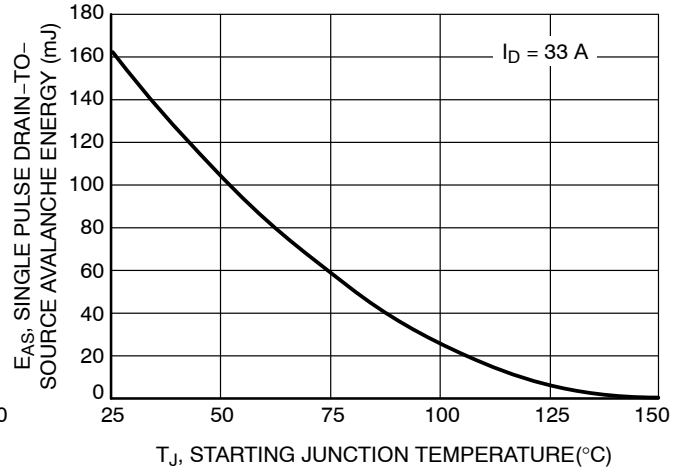
Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature
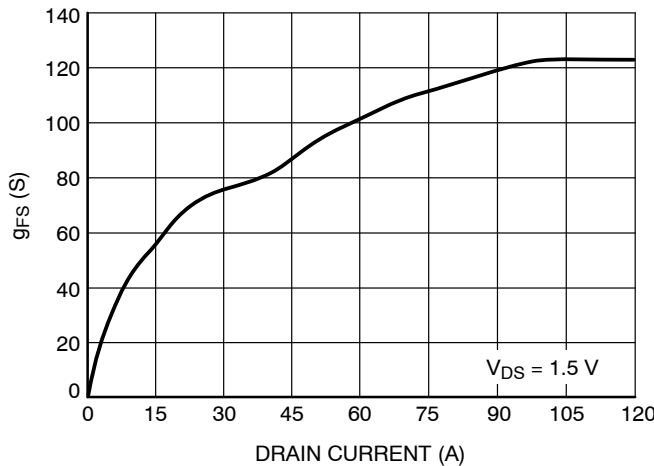
Figure 13. g_{FS} vs. Drain Current
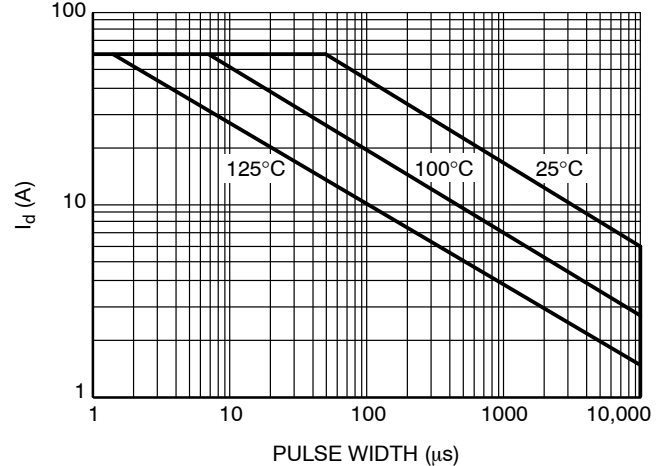
Figure 14. I_d vs. Pulse Width

NTMFS4847N

PACKAGE DIMENSIONS

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

TOP VIEW

SIDE VIEW

DETAIL A

DETAIL A

BOTTOM VIEW

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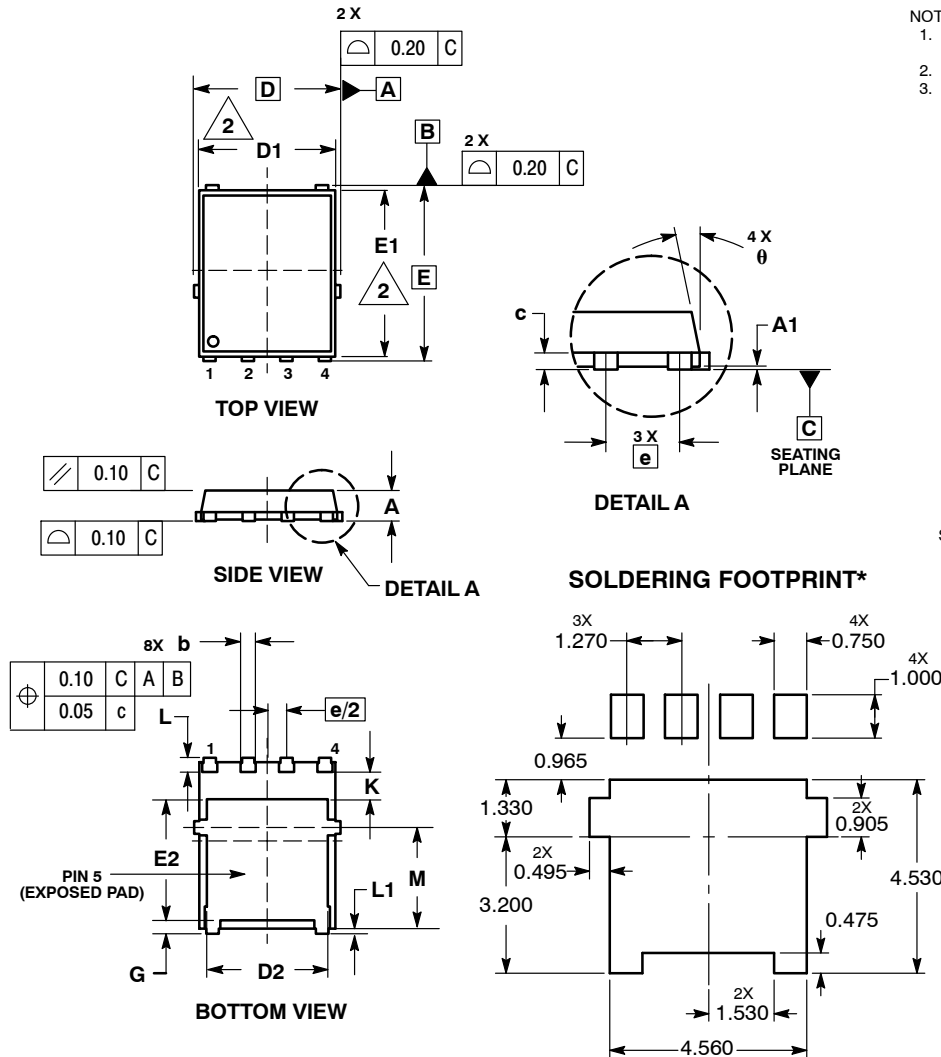
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

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.

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