NTMFS4708N

Power MOSFET

30 V, 19 A, Single N−Channel, SOIC−8 FL

Features

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

Applications

- Notebooks, Graphics Cards
- DC−DC Converters
- Synchronous Rectification

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}	±20	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	11.5	A
		T_A = 85°C		8.0	
	t ≤ 10 s	T_A = 25°C		19	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	2.2	W
	t ≤ 10 s			6.25	
Continuous Drain Current (Note 2)	Steady State	T_A = 25°C	I_D	7.8	A
		T_A = 85°C		5.6	
Power Dissipation (Note 2)		T_A = 25°C	P_D	1.0	W
Pulsed Drain Current	t_p ≤ 10 μs		I_{DM}	58	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Source Current (Body Diode)			I_S	6.25	A
Single Pulse Drain−to−Source Avalanche Energy. V_{DD} = 25 V, V_{GS} = 10 V, I_{PK} = 7.0 A, L = 10 mH, R_G = 25 Ω			E_{AS}	245	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−Ambient − Steady State (Note 1)	$R_{\theta JA}$	56.5	°C/W
Junction−to−Ambient − t ≤ 10 s (Note 1)	$R_{\theta JA}$	20	
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	124	

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.

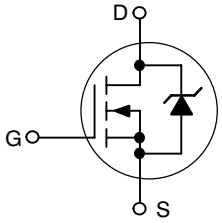
1. Surface−mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).
2. Surface−mounted on FR4 board using the minimum recommended pad size (Cu area = 0.412 in sq).

ON Semiconductor®

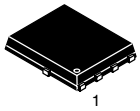
http://onsemi.com

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max
30 V	7.3 mΩ @ 10 V	19 A
	10.1 mΩ @ 4.5 V	

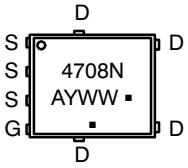
N−Channel



MARKING DIAGRAM & PIN ASSIGNMENT



SOIC−8 FLAT LEAD
CASE 488AA
STYLE 1



4708N = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NTMFS4708NT1G	SOIC−8 FL (Pb−Free)	1500 / Tape & Reel
NTMFS4708NT3G	SOIC−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 Specifications Brochure, BRD8011/D.

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	$V_{(BR)DSS}/T_J$				10		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			50	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20V				±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	$V_{GS(TH)}/T_J$				5.0		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 11.5 A			7.3	10	mΩ
		V_{GS} = 4.5 V, I_D = 9.5 A			10.1	14	
Forward Transconductance	g_{FS}	V_{DS} = 15 V, I_D = 11.5 A			23		S
CHARGES, CAPACITANCES AND GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 24 V			970		pF
Output Capacitance	C_{OSS}				440		
Reverse Transfer Capacitance	C_{RSS}				115		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 15 V; I_D = 11.5 A			10	15	nC
Threshold Gate Charge	$Q_{G(TH)}$				1.3		
Gate−to−Source Charge	Q_{GS}				2.6		
Gate−to−Drain Charge	Q_{GD}				4.8		
Gate Resistance	R_G				1.95		Ω
SWITCHING CHARACTERISTICS (Note 4)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = 10 V, V_{DD} = 15 V, I_D = 1.0 A, R_G = 3.0 Ω			6.7		ns
Rise Time	t_r				4.3		
Turn−Off Delay Time	$t_{d(off)}$				20		
Fall Time	t_f				16		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 6.25 A	T_J = 25°C		0.78	1.0	V
			T_J = 125°C		0.60		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, d_{IS}/d_t = 100 A/μs, I_S = 6.25 A			32		ns
Charge Time	t_a				15.5		
Discharge Time	t_b				16.5		
Reverse Recovery Charge	Q_{RR}				24		nC

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

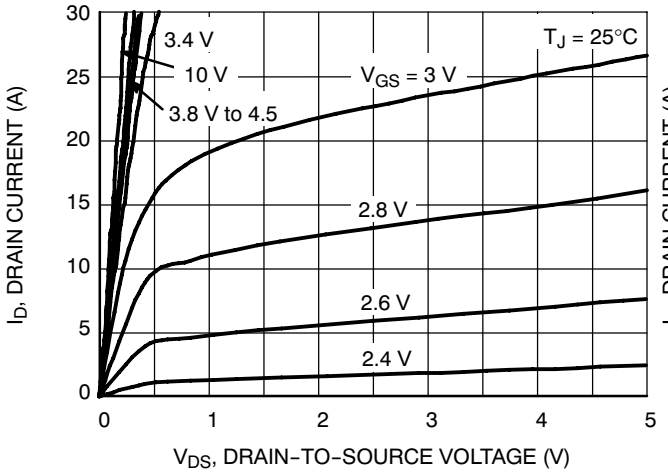


Figure 1. On−Region Characteristics

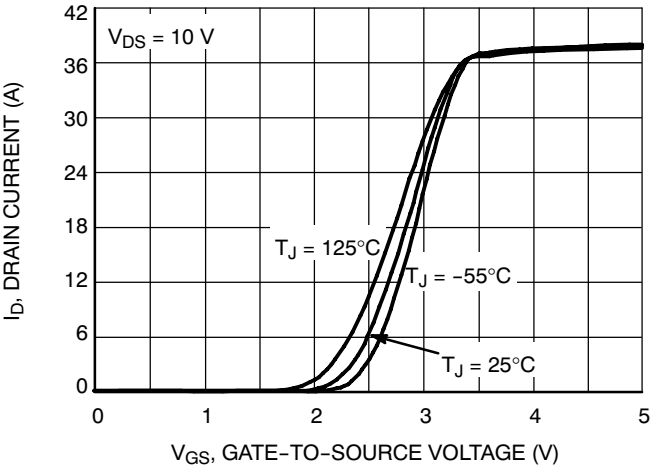


Figure 2. Transfer Characteristics

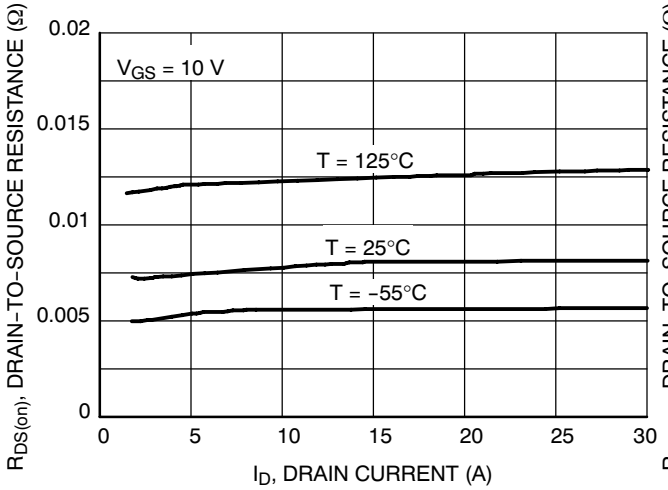


Figure 3. On−Resistance versus Drain Current and Temperature

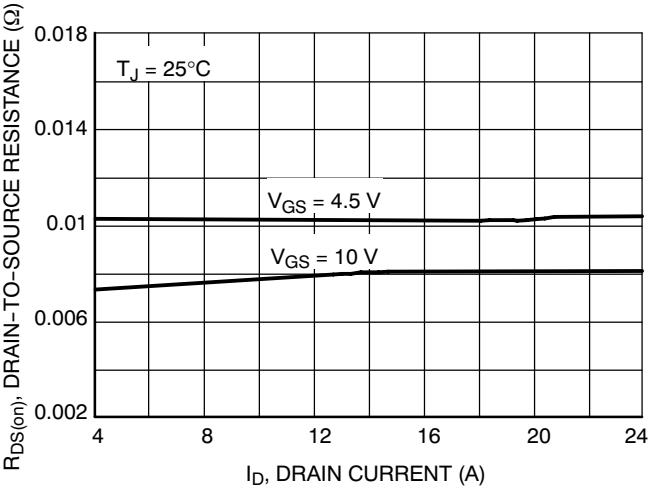


Figure 4. On−Resistance versus Drain Current and Gate Voltage

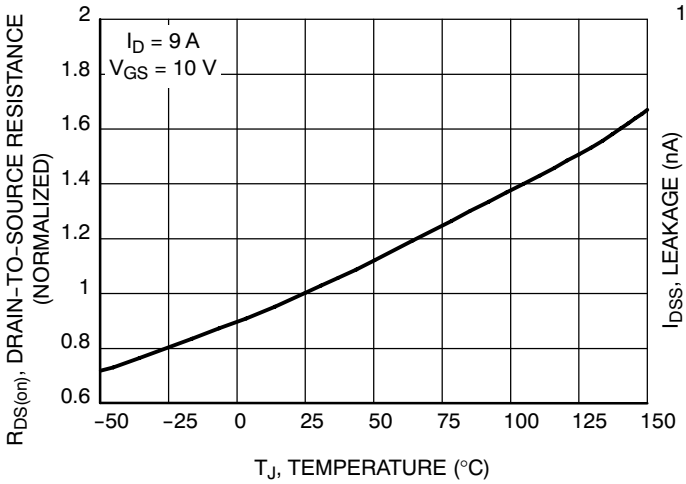


Figure 5. On−Resistance Variation with Temperature

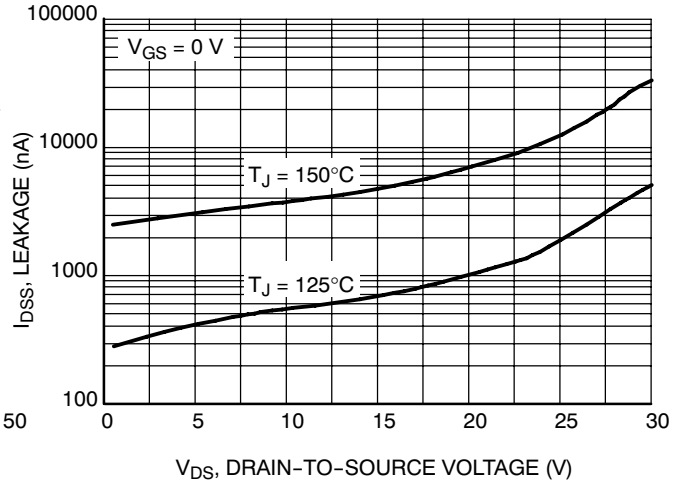


Figure 6. Drain−to−Source Leakage Current versus Voltage

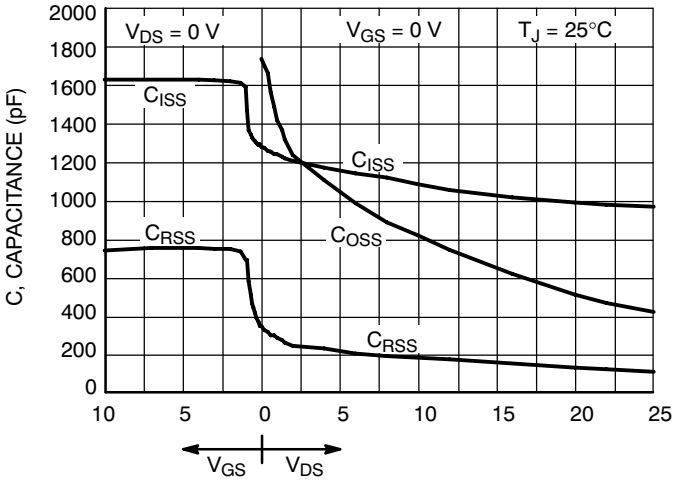


Figure 7. Capacitance Variation

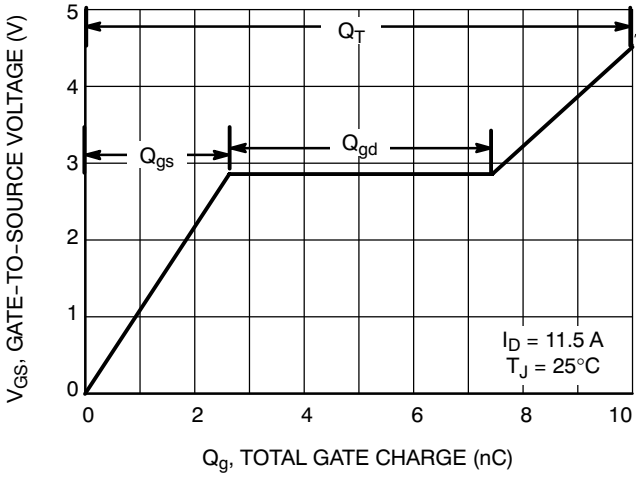


Figure 8. Gate−to−Source and Drain−to−Source Voltage versus Total Charge

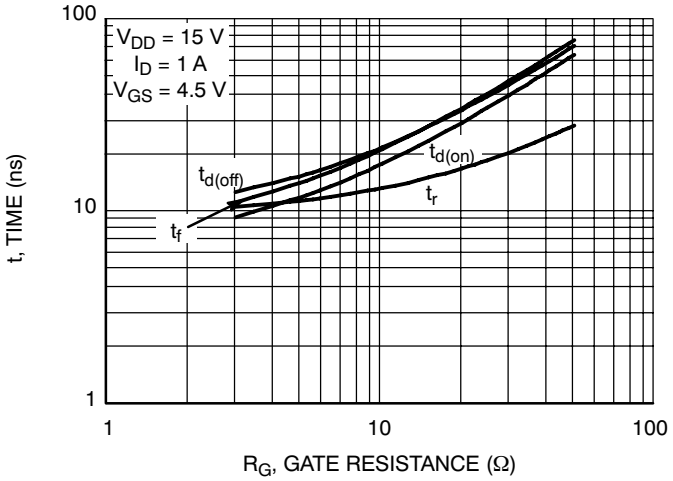


Figure 9. Resistive Switching Time Variation versus Gate Resistance

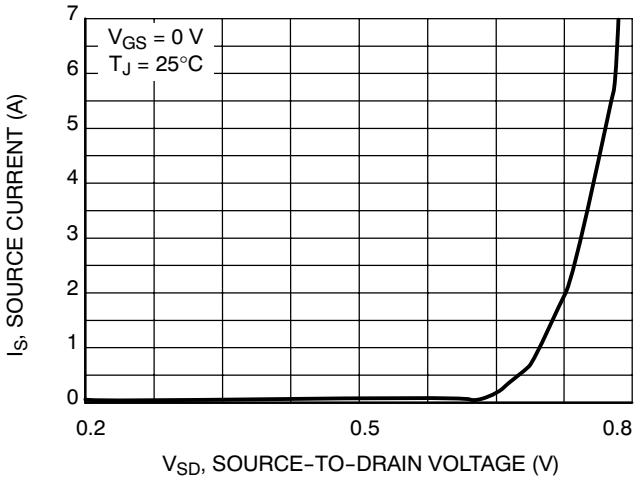


Figure 10. Diode Forward Voltage versus Current

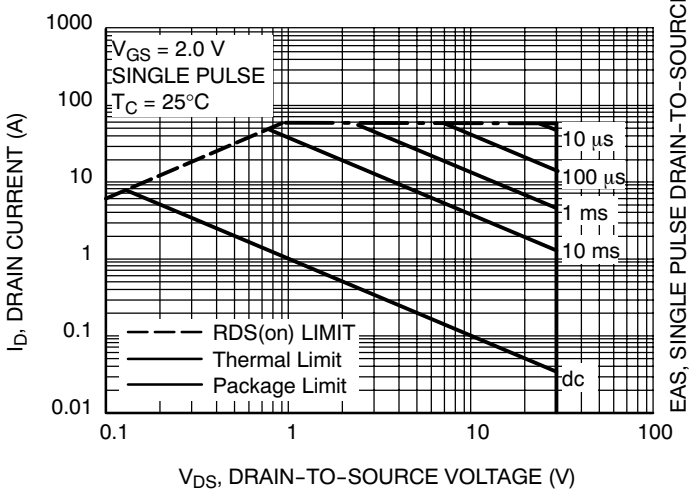


Figure 11. Maximum Rated Forward Biased Safe Operating Area

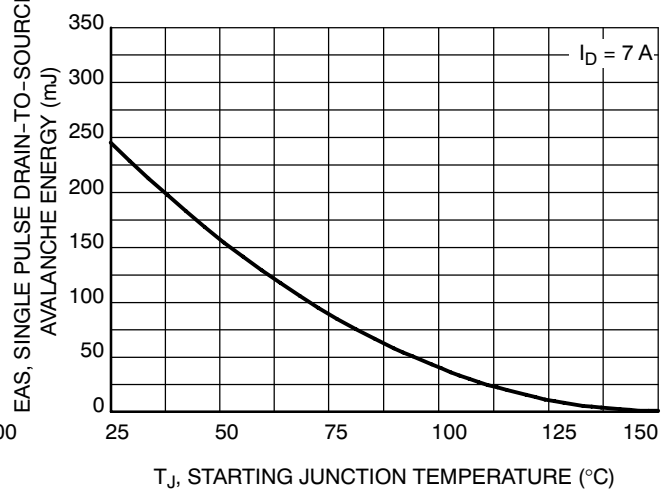
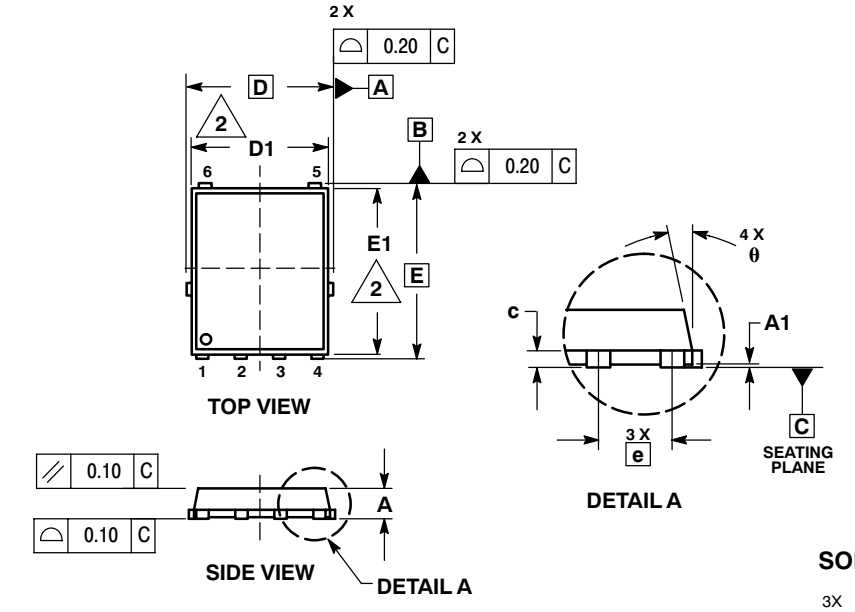
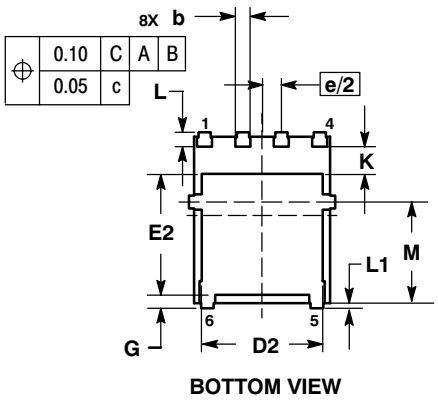


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

PACKAGE DIMENSIONS

DFN6 5x6, 1.27P (SO8 FL)
CASE 488AA−01
ISSUE C



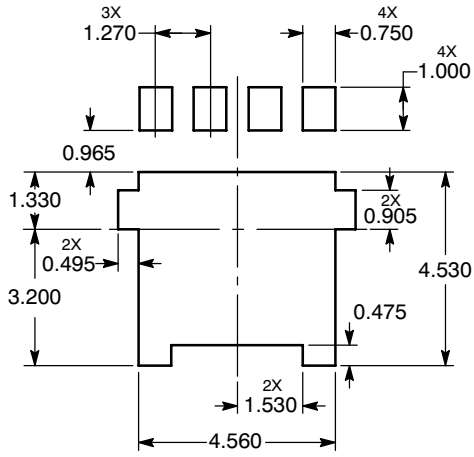


STYLE 1:
PIN 1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN

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.

	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	5.15 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	0.51	---	---
L	0.51	0.61	0.71
L1	0.05	0.17	0.20
M	3.00	3.40	3.80
θ	0 °	---	12 °

SOLDERING FOOTPRINT*



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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5773−3850

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative