

NTNS41006PZ

MOSFET – Single, P-Channel, Small Signal, XLLGA3, 0.62 x 0.62 x 0.4 mm -30 V, -130 mA

Features

- Single P-Channel MOSFET
- Ultra Small and Thin Package (0.62 x 0.62 x 0.4 mm)
- Low $R_{DS(on)}$ Solution in 0.62 x 0.62 mm Package
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Small Signal Load Switch
- Analog Switch
- High Speed Interfacing
- Optimized for Power Management in Ultra Portable Products

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

Parameter			Symbol	Value	Units
Drain-to-Source Voltage			V_{DSS}	-30	V
Gate-to-Source Voltage			V_{GS}	± 20	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	I_D	-137	mA
		$T_A = 85^\circ\text{C}$		-99	
	$t \leq 5\text{ s}$	$T_A = 25^\circ\text{C}$		-148	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	P_D	121	mW
		$T_A = 25^\circ\text{C}$		140	
	$t \leq 5\text{ s}$	$T_A = 25^\circ\text{C}$			
Pulsed Drain Current		$t_p = 10\text{ }\mu\text{s}$	I_{DM}	-550	mA
Operating Junction and Storage Temperature			T_J, T_{STG}	-55 to 150	$^\circ\text{C}$
Source Current (Body Diode)			I_S	-137	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Units
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	1035	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – $t \leq 5\text{ s}$ (Note 1)	$R_{\theta JA}$	895	

1. Surface Mounted on FR4 Board using the minimum recommended pad size, (or 2 mm^2), 1 oz Cu.
2. Pulse Test: pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.



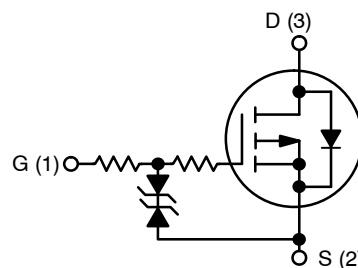
ON Semiconductor®

www.onsemi.com

MOSFET

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
-30 V	4.0 Ω @ -10 V	-130 mA
	7.0 Ω @ -4.5 V	

P-Channel MOSFET



MARKING DIAGRAM



XLLGA3
CASE 713AA



J = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
NTNS41006PZTCG	XLLGA3 (Pb-Free)	8000 / 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.

NTNS41006PZ

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
-----------	--------	----------------	-----	-----	-----	-------

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	I _D = -250 μA, ref to 25°C		32		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = -24 V			-1.0	μA
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±12 V			±2.0	μA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = -250 μA	-1.0		-3.0	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			4.0		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = -10 V, I _D = -100 mA		2.1	4.0	Ω
		V _{GS} = -4.5 V, I _D = -50 mA		3.3	7.0	
Forward Transconductance	g _{FS}	V _{DS} = -5 V, I _D = -50 mA		0.14		S
Source-Drain Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = -50 mA		-0.8	-1.0	V

CHARGES & CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 10 kHz, V _{DS} = -15 V		9.1		pF
Output Capacitance	C _{OSS}			3.2		
Reverse Transfer Capacitance	C _{RSS}			1.9		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = -10 V, V _{DS} = -15 V, I _D = -100 mA		1.4		nC
Total Gate Charge	Q _{G(TOT)}	V _{GS} = -4.5 V, V _{DS} = -15 V, I _D = -100 mA		0.7		nC
Threshold Gate Charge	Q _{G(TH)}			0.3		
Gate-to-Source Charge	Q _{GS}			0.4		
Gate-to-Drain Charge	Q _{GD}			0.1		

SWITCHING CHARACTERISTICS, V_{GS} = -10 V (Note 3)

Turn-On Delay Time	t _{d(ON)}	V _{GS} = -10 V, V _{DD} = -15 V, I _D = -100 mA, R _G = 2 Ω		22.5		ns
Rise Time	t _r			33.1		
Turn-Off Delay Time	t _{d(OFF)}			178.9		
Fall Time	t _f			101.3		

SWITCHING CHARACTERISTICS, V_{GS} = -4.5 V (Note 3)

Turn-On Delay Time	t _{d(ON)}	V _{GS} = -4.5 V, V _{DD} = -15 V, I _D = -100 mA, R _G = 2 Ω		58.7		ns
Rise Time	t _r			137.3		
Turn-Off Delay Time	t _{d(OFF)}			78.6		
Fall Time	t _f			99.7		

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

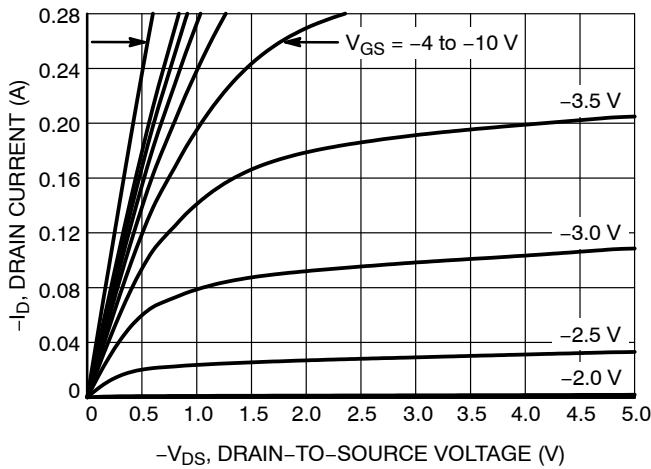


Figure 1. On-Region Characteristics

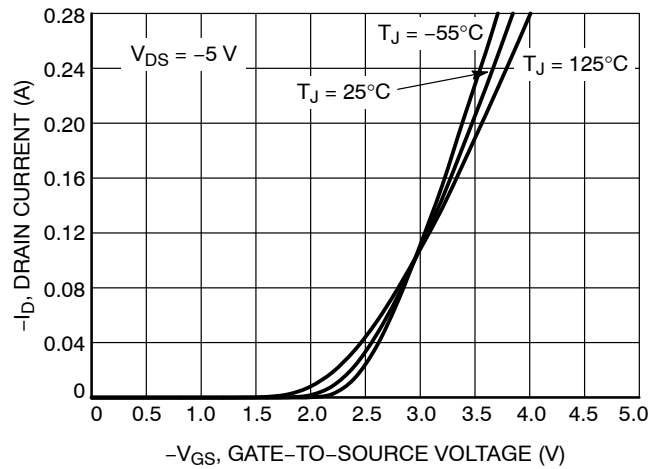


Figure 2. Transfer Characteristics

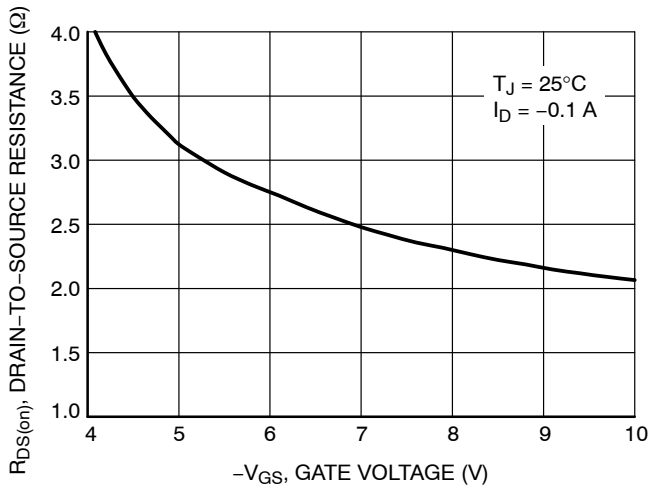


Figure 3. On-Resistance vs. Gate-to-Source Voltage

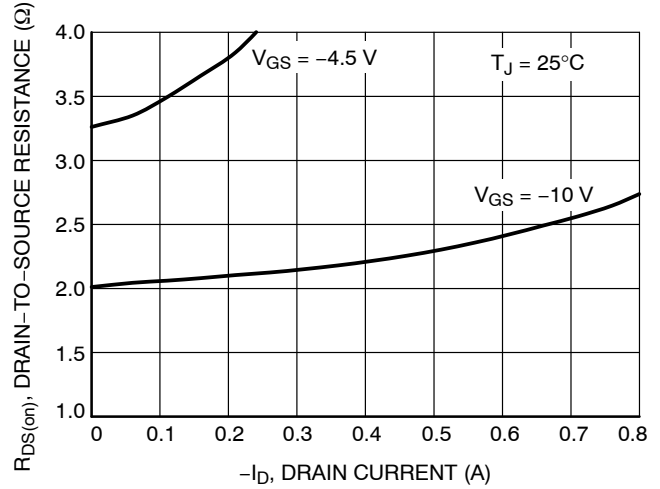


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

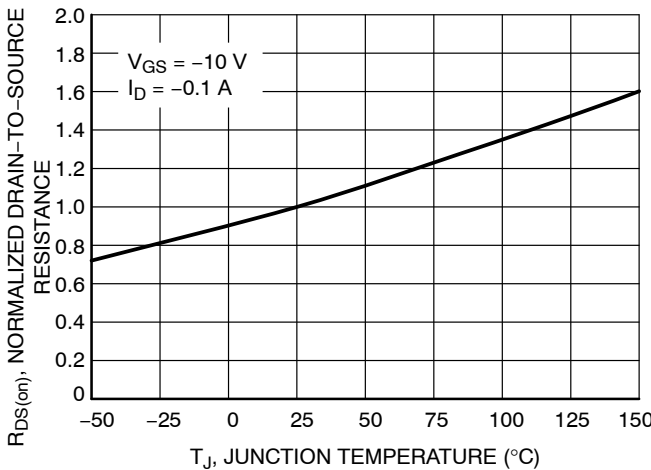


Figure 5. On-Resistance Variation with Temperature

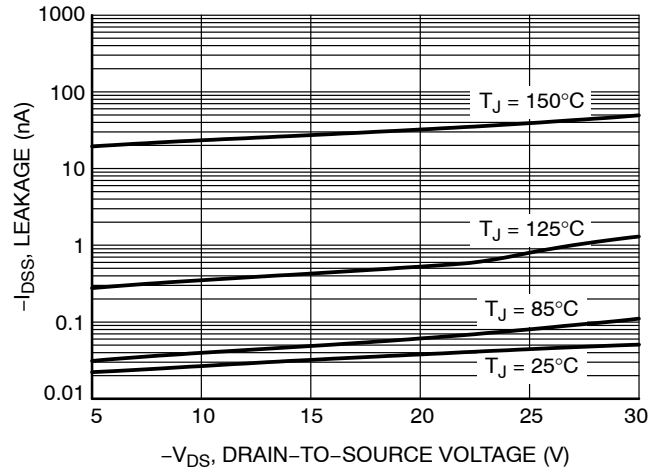


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

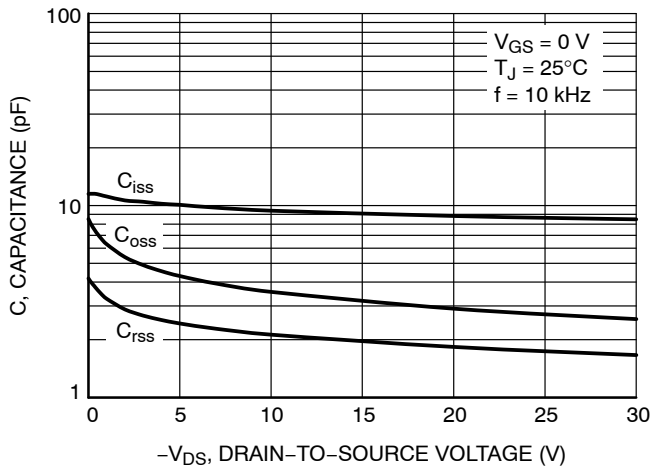


Figure 7. Capacitance Variation

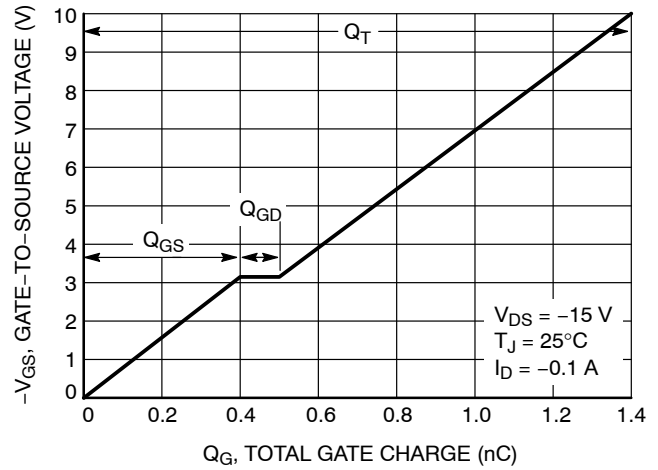


Figure 8. Gate-to-Source vs. Total Charge

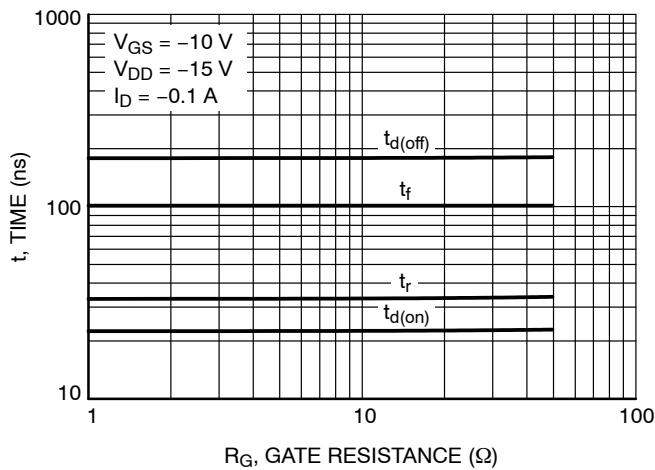


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

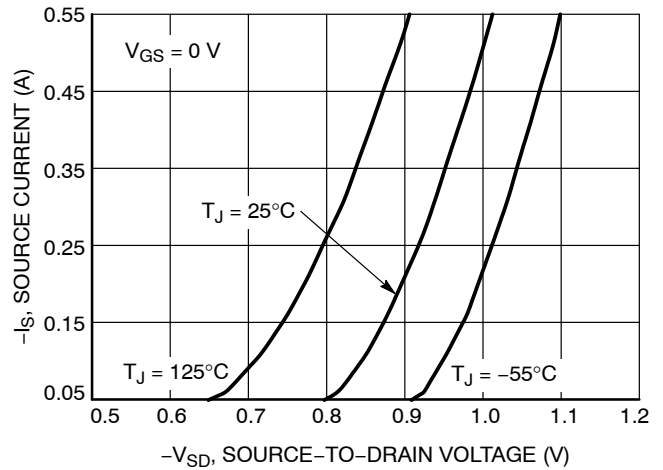


Figure 10. Diode Forward Voltage vs. Current

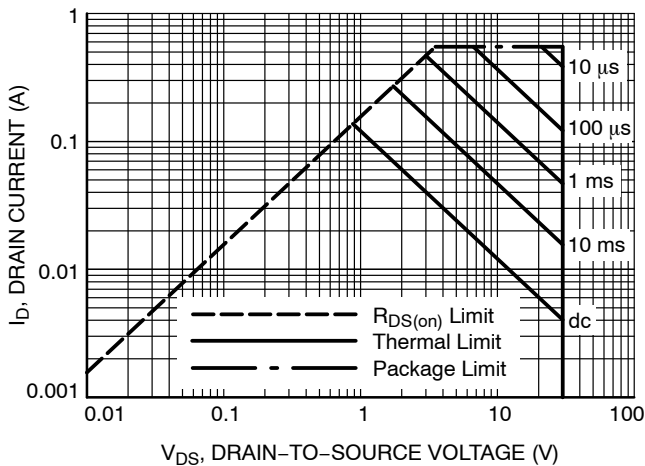


Figure 11. Maximum Rated Forward Biased Safe Operating Area

NTNS41006PZ

TYPICAL CHARACTERISTICS

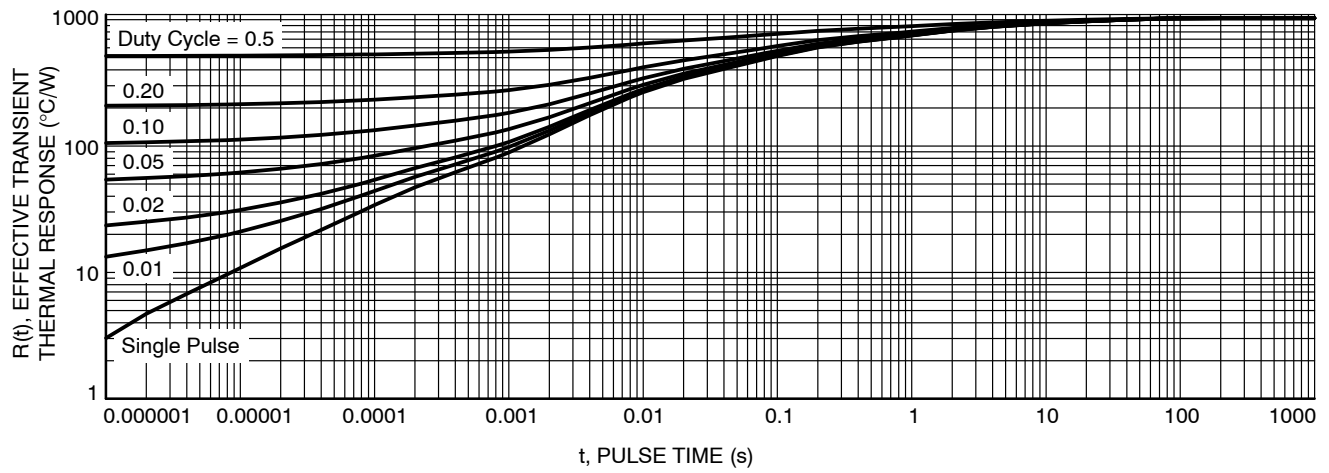
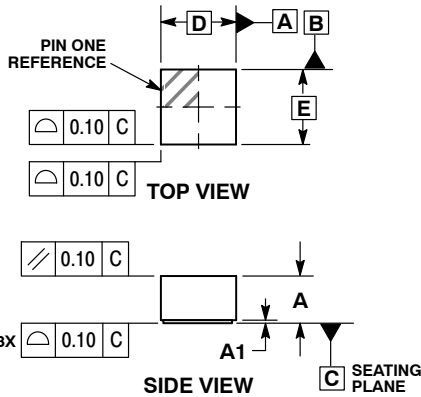


Figure 12. FET Thermal Response

NTNS41006PZ

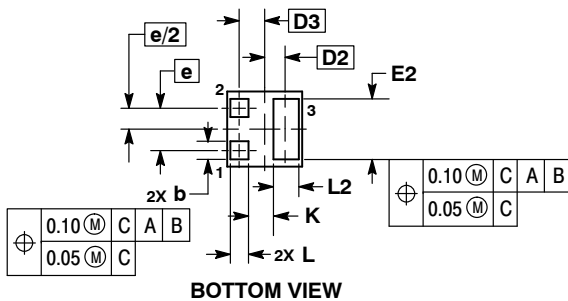
PACKAGE DIMENSIONS

XLLGA3, 0.62x0.62, 0.35P
CASE 713AA
ISSUE B

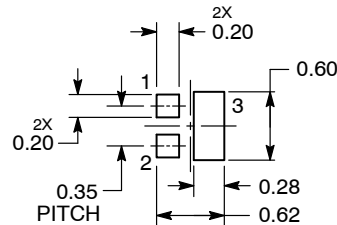


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.

MILLIMETERS		
DIM	MIN	MAX
A	0.340	0.440
A1	0.000	0.030
b	0.100	0.200
D	0.620 BSC	
D2	0.175 BSC	
D3	0.205 BSC	
E	0.620 BSC	
E2	0.400	0.600
e	0.350 BSC	
K	0.200 REF	
L	0.090	0.210
L2	0.110	0.310



MINIMUM RECOMMENDED SOLDER FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marketing.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 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: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

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

For additional information, please contact your local Sales Representative