

NDT02N60Z

N-Channel Power MOSFET 600 V, 8.0 Ω

Features

- 100% Avalanche Tested
- Extremely High dv/dt Capability
- Gate Charge Minimized
- Zener-protected
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	600	V
Gate-to-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current $R_{\theta JA}$ Steady State, $T_C = 25^\circ\text{C}$	I_D	0.3	A
Continuous Drain Current $R_{\theta JA}$ Steady State, $T_C = 100^\circ\text{C}$	I_D	0.21	A
Power Dissipation – $R_{\theta JA}$ Steady State, $T_C = 25^\circ\text{C}$	P_D	2.0	W
Pulsed Drain Current	I_{DM}	5	A
Continuous Source Current (Body Diode)	I_S	2.2	A
Single Pulse Drain-to-Source Avalanche Energy ($I_D = 1.4$ A)	EAS	38	mJ
Peak Diode Recovery (Note 1)	dV/dt	4.5	V/ns
Maximum Temperature for Soldering Leads	T_L	260	$^\circ\text{C}$
Operating Junction and Storage Temperature	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

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.

1. $I_S < 2.2$ A, $di/dt \leq 200$ A/ μs , $V_{DD} \leq BV_{DSS}$, $T_J = +150^\circ\text{C}$

THERMAL RESISTANCE

Parameter	Symbol	Value	Unit
Junction-to-Ambient Steady State NDT02N60Z (Note 2) NDT02N60Z (Note 3)	$R_{\theta JA}$	61 148	$^\circ\text{C/W}$

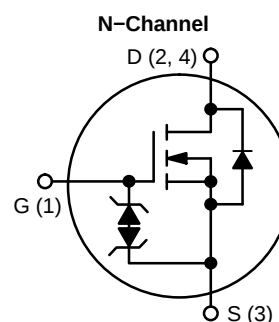
2. Surface mounted on FR4 board using 1" sq. pad size (Cu area = 1.127" sq. [2 oz] including traces)
3. Surface-mounted on FR4 board using minimum recommended pad size (Cu area = 0.026" sq. [2 oz]).



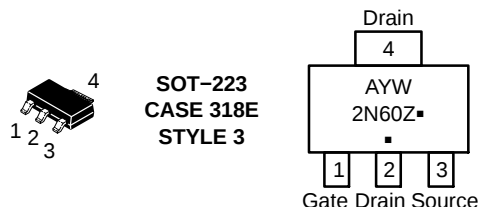
ON Semiconductor®

<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$
600 V	8.0 Ω @ 10 V



MARKING DIAGRAM



A = Assembly Location
Y = Year
W = Work Week
2N60Z = Specific Device Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

NDT02N60Z

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

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
----------------	--------	-----------------	-----	-----	-----	------

OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 1 mA	600			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J	Reference to 25°C, I _D = 1 mA		605		mV/°C
Drain-to-Source Leakage Current	I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V	T _J = 25°C		1	μA
			T _J = 125°C		50	
Gate-to-Source Leakage Current	I _{GSS}	V _{GS} = ±20 V			±10	μA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D = 50 μA	3.0	3.9	4.5	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J	Reference to 25°C, I _D = 50 μA		10.2		mV/°C
Static Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 0.7 A		5.9	8.0	Ω
Forward Transconductance	g _{FS}	V _{DS} = 15 V, I _D = 0.7 A		1.3		S

DYNAMIC CHARACTERISTICS

Input Capacitance (Note 5)	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz		170		pF
Output Capacitance (Note 5)	C _{oss}			22		
Reverse Transfer Capacitance (Note 5)	C _{rss}			4.8		
Effective output capacitance, energy related (Note 7)	C _{o(er)}	V _{GS} = 0 V, V _{DS} = 0 to 480 V		7.8		
Effective output capacitance, time related (Note 8)	C _{o(tr)}	I _D = constant, V _{GS} = 0 V, V _{DS} = 0 to 480 V		12.4		
Total Gate Charge (Note 5)	Q _g	V _{DS} = 300 V, I _D = 1.6 A, V _{GS} = 10 V		7.4		nC
Gate-to-Source Charge (Note 5)	Q _{gs}			1.8		
Gate-to-Drain ("Miller") Charge (Note 5)	Q _{gd}			3.8		
Plateau Voltage	V _{GP}			6.4		V
Gate Resistance	R _g			11.5		Ω

RESISTIVE SWITCHING CHARACTERISTICS (Note 6)

Turn-on Delay Time	t _{d(on)}	V _{DD} = 300 V, I _D = 1.6 A, V _{GS} = 10 V, R _G = 0 Ω		10		ns
Rise Time	t _r			6		
Turn-off Delay Time	t _{d(off)}			14		
Fall Time	t _f			8		

SOURCE-DRAIN DIODE CHARACTERISTICS

Diode Forward Voltage	V _{SD}	I _S = 1.6 A, V _{GS} = 0 V	T _J = 25°C		0.9	1.2	V
			T _J = 100°C		0.8		
Reverse Recovery Time	t _{rr}	V _{GS} = 0 V, V _{DD} = 30 V, I _S = 1.6 A, dI/dt = 100 A/μs		230		ns	
Charge Time	t _a			50			
Discharge Time	t _b			180			
Reverse Recovery Charge	Q _{rr}			495		nC	

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.

4. Pulse Width ≤ 380 μs, Duty Cycle ≤ 2%.

5. Guaranteed by design.

6. Switching characteristics are independent of operating junction temperatures.

7. C_{o(er)} is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{(BR)DSS}

8. C_{o(tr)} is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{(BR)DSS}

TYPICAL CHARACTERISTICS

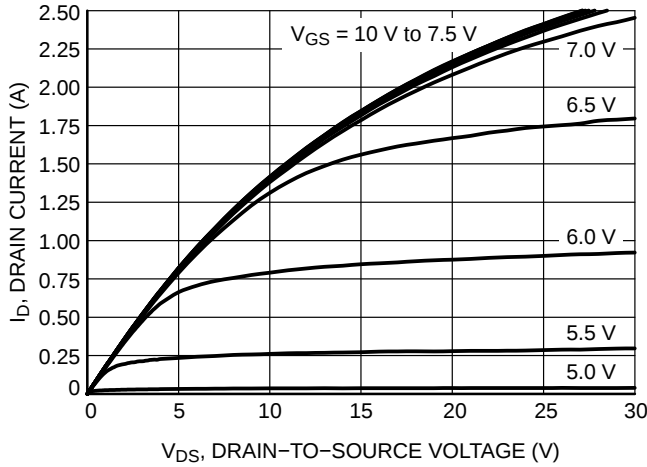


Figure 1. On-Region Characteristics

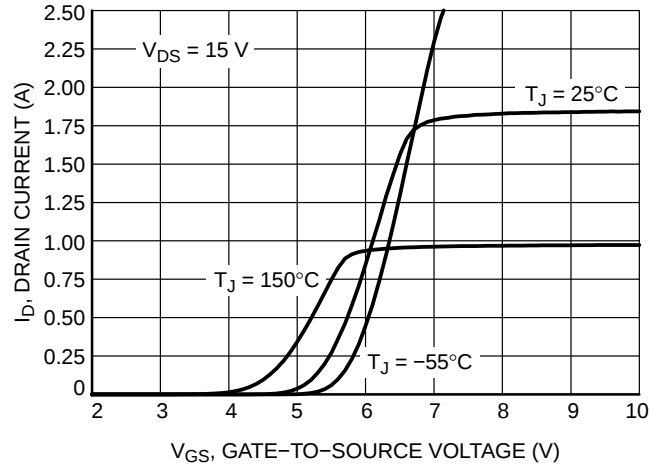


Figure 2. Transfer Characteristics

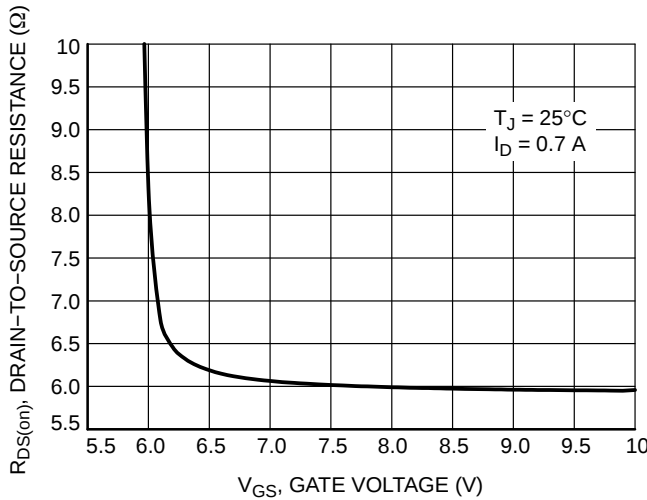


Figure 3. On-Resistance vs. Gate-to-Source Voltage

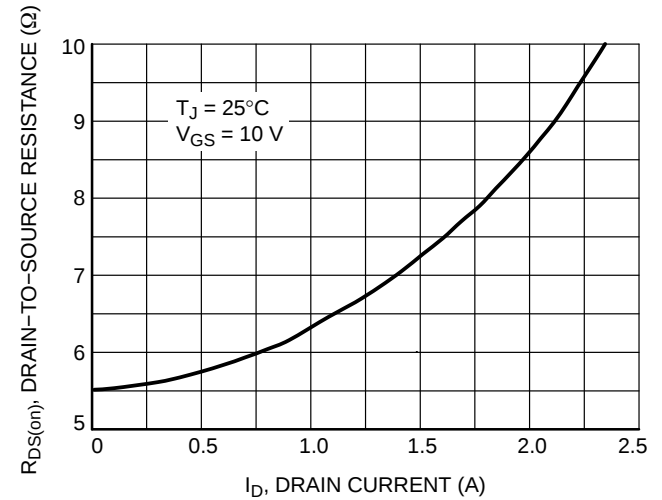


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

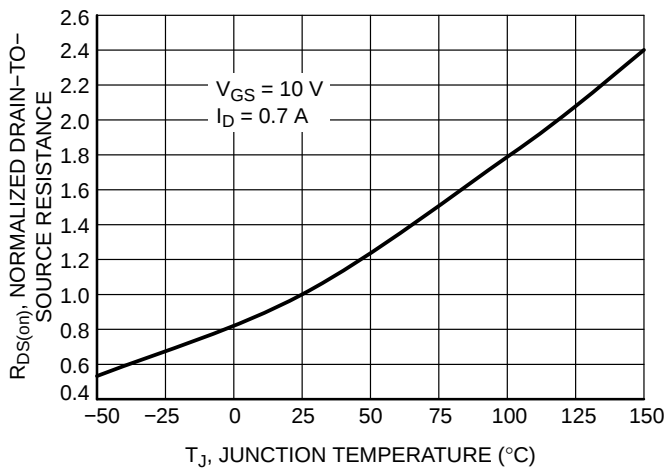


Figure 5. On-Resistance Variation with Temperature

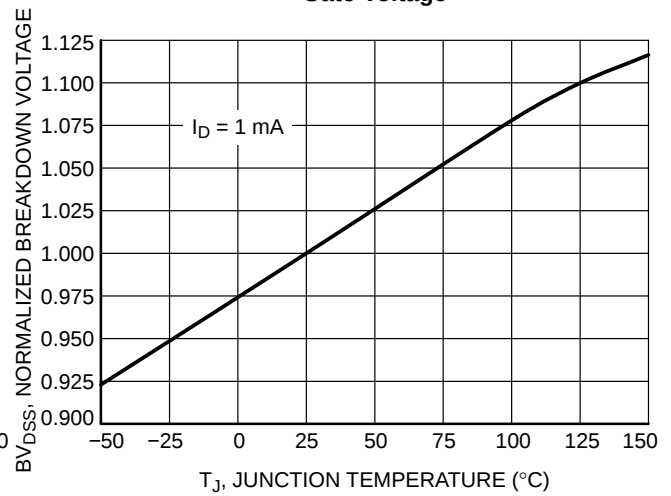


Figure 6. Breakdown Voltage Variation with Temperature

TYPICAL CHARACTERISTICS

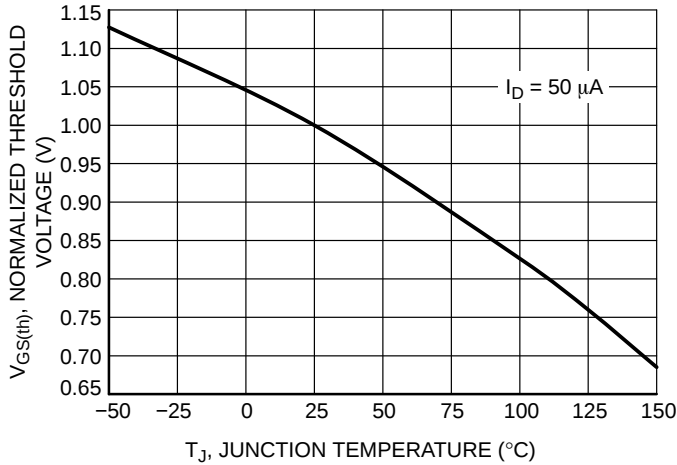


Figure 7. Threshold Voltage Variation with Temperature

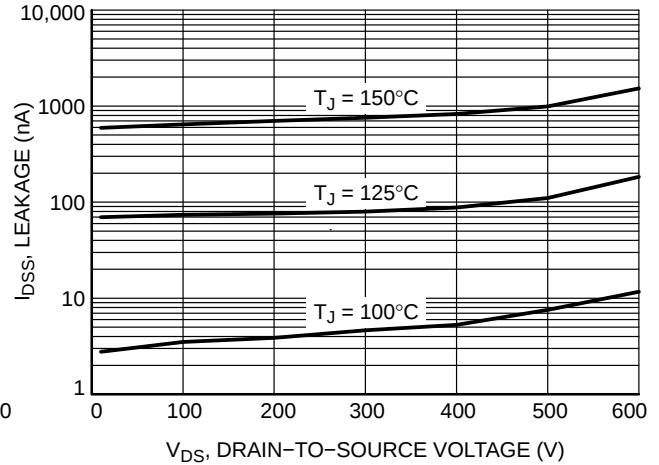


Figure 8. Drain-to-Source Leakage Current vs. Voltage

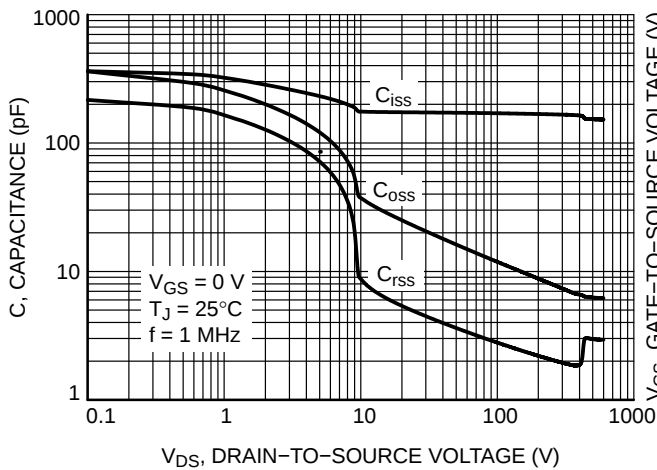


Figure 9. Capacitance Variation

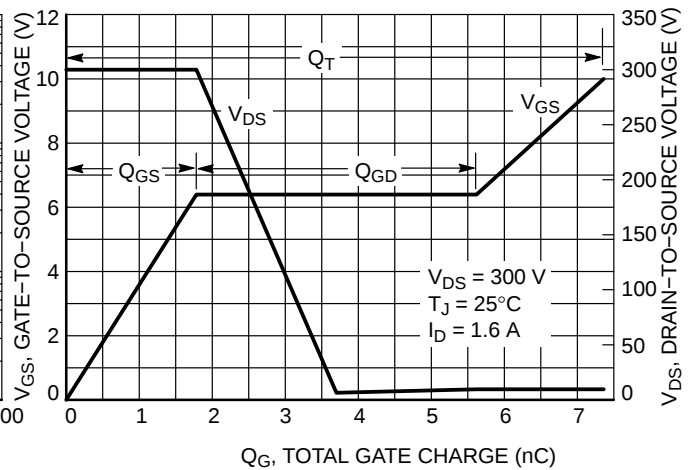


Figure 10. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

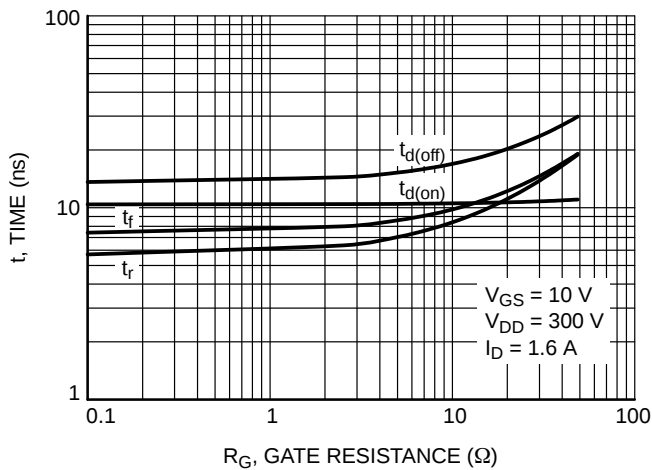


Figure 11. Resistive Switching Time Variation vs. Gate Resistance

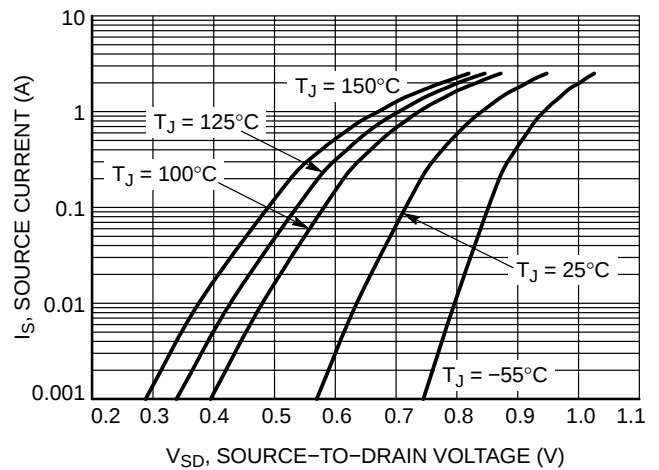


Figure 12. Diode Forward Voltage vs. Current

TYPICAL CHARACTERISTICS

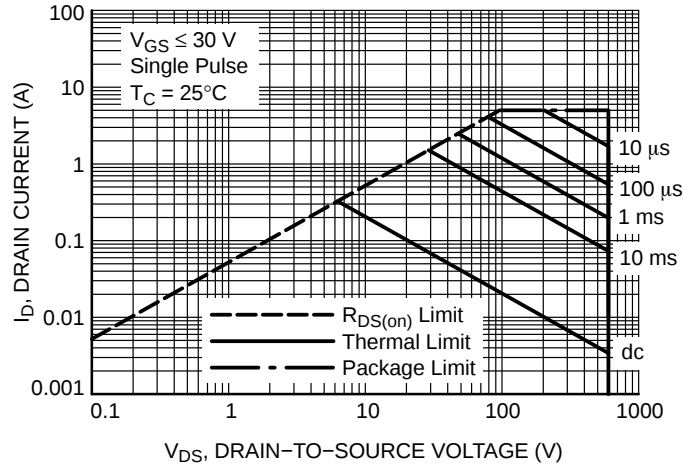


Figure 13. Maximum Rated Forward Biased Safe Operating Area

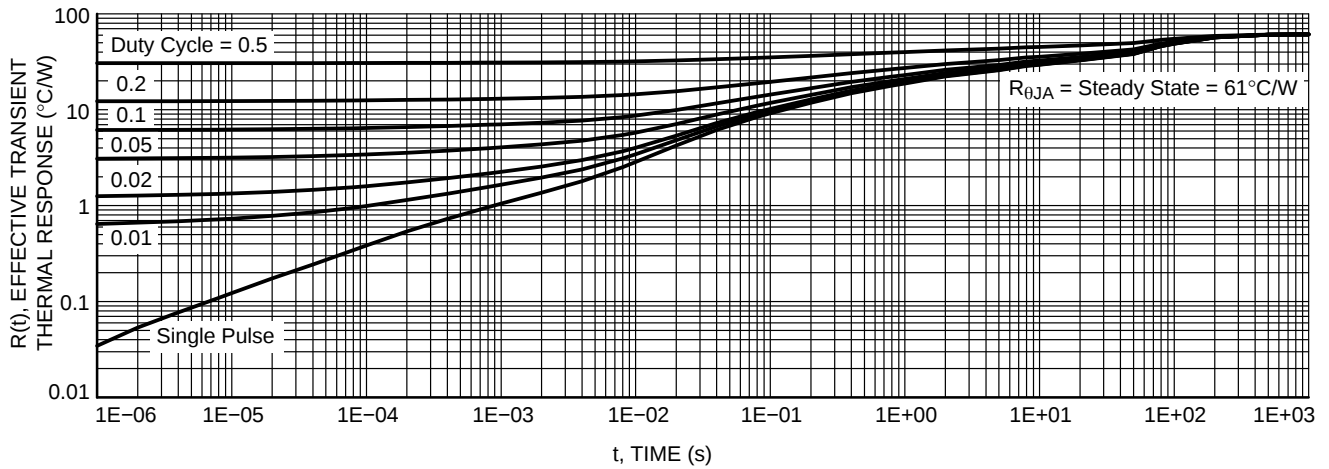


Figure 14. Thermal Impedance (Junction-to-Ambient)

ORDERING INFORMATION

Device	Package	Shipping [†]
NDT02N60ZT1G	SOT-223 (Pb-Free, Halogen Free)	1000 / Tape & Reel
NDT02N60ZT3G		4000 / 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.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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 **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** 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 **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales