

MOSFET – Power, Single N-Channel, DUAL COOL®

40 V, 0.78 mΩ, 310 A

NTMFSC0D8N04XM

Features

- Dual Sided Cooling Package
- Latest 40 V Power MOSFET Technology for Motor Drive Applications
- Extreme Lower On-Resistance to Minimize Conduction Losses
- Lower Gate Charge to Minimize Gate Driving and Switching Losses
- Soft Body Diode Reverse Recovery
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

Applications

- Motor Drive
- ORing FET
- Battery Protection

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

Symbol	Parameter		Value	Unit
V _{DSS}	Drain-to-Source Voltage		40	V
V _{GS}	Gate-to-Source Voltage	DC	±20	V
I _D	Continuous Drain Current (Note 2)	T _C = 25 °C	310	A
		T _C = 100 °C	219	
P _D	Power Dissipation (Note 2)	T _C = 25 °C	135	W
I _{DM}	Pulsed Drain Current	T _C = 25 °C, t _p = 10 μs	1463	A
T _J , T _{stg}	Operating Junction and Storage Temperature Range		–55 to +175	°C
I _S	Continuous Source-Drain Current (Body Diode)		150	A
E _{AS}	Single Pulse Avalanche Energy (I _{PK} = 69 A)		248	mJ
T _L	Lead Temperature Soldering Purposes (1/8" from case for 10 s)		260	°C

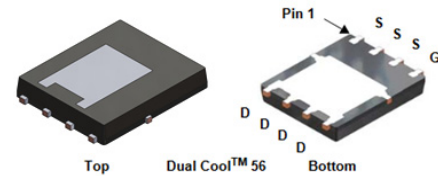
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface-mounted on FR4 board using 1 in² pad size, 1 oz Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

THERMAL CHARACTERISTICS

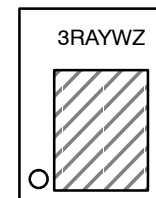
Symbol	Parameter	Max	Unit
R _{θJC}	Junction-to-Case (Bottom) – Steady State (Note 2)	1.1	°C/W
R _{θJC}	Junction-to-Case (Top) – Steady State (Note 2)	1.7	
R _{θJA}	Junction-to-Ambient – Steady State (Notes 1, 2)	39	

V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX
40 V	0.78 mΩ @ 10 V	310 A



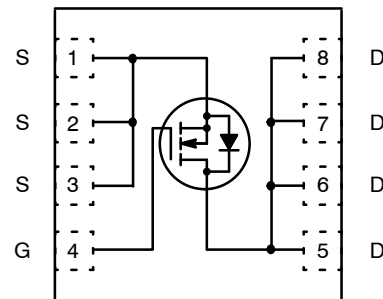
DFN8 5x6
CASE 506EG

MARKING DIAGRAM



3R = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
Z = Assembly Lot Code

N-Channel MOSFET



ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

NTMFSC0D8N04XM

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

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

OFF CHARACTERISTICS

V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 1 mA	40			V
ΔV _{(BR)DSS} /ΔT _J	Drain-to-Source Breakdown Voltage Temperature Coefficient	I _D = 1 mA, Referenced to 25 °C		15		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 40 V, T _J = 25 °C			10	μA
		V _{DS} = 40 V, T _J = 125 °C			100	
I _{GSS}	Gate-to-Source Leakage Current	V _{DS} = 0 V, V _{GS} = 20 V			100	nA

ON CHARACTERISTICS (Note 3)

R _{DS(on)}	Drain-to-Source On Resistance	V _{GS} = 10 V, I _D = 50 A		0.63	0.78	mΩ
		V _{GS} = 7 V, I _D = 50 A		0.86	1.25	
V _{GS(TH)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 180 μA	2.5	3.0	3.5	V
ΔV _{GS(TH)} /ΔT _J	Gate Threshold Voltage Temperature Coefficient	V _{GS} = V _{DS} , I _D = 180 μA		-7		mV/°C
g _{FS}	Forward Trans-conductance	V _{DS} = 5 V, I _D = 50 A		244		S

CHARGES & CAPACITANCES

C _{ISS}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz		4651		pF
C _{OSS}	Output Capacitance			3319		
C _{RSS}	Reverse Transfer Capacitance			69		
Q _{OSS}	Output Charge			100		
Q _{G(TOT)}	Total Gate Charge	V _{GS} = 10 V, V _{DD} = 20 V, I _D = 50 A		72		nC
Q _{G(TH)}	Threshold Gate Charge			14		
Q _{GS}	Gate-to-Source Charge			21		
Q _{GD}	Gate-to-Drain Charge			13		
V _{GP}	Gate Plateau Voltage			4.5		V
R _G	Gate Resistance	f = 1 MHz		0.65	1.2	Ω

SWITCHING CHARACTERISTICS (Note 3)

t _{d(ON)}	Turn-On Delay Time	Resistive Load V _{GS} = 0/10 V, V _{DD} = 20 V, I _D = 50 A, R _G = 2.5 Ω		28		ns
t _r	Rise Time			10		
t _{d(OFF)}	Turn-Off Delay Time			45		
t _f	Fall Time			9.5		

SOURCE-TO-DRAIN DIODE CHARACTERISTICS

V _{SD}	Forward Diode Voltage	V _{GS} = 0 V, I _S = 50 A, T _J = 25 °C		0.81	1.2	V
		V _{GS} = 0 V, I _S = 50 A, T _J = 125 °C		0.66	1.0	
t _{RR}	Reverse Recovery Time	V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 50 A, V _{DD} = 50 V		69		ns
t _a	Charge Time			36		
t _b	Discharge Time			33		
Q _{RR}	Reverse Recovery Charge			144		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.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

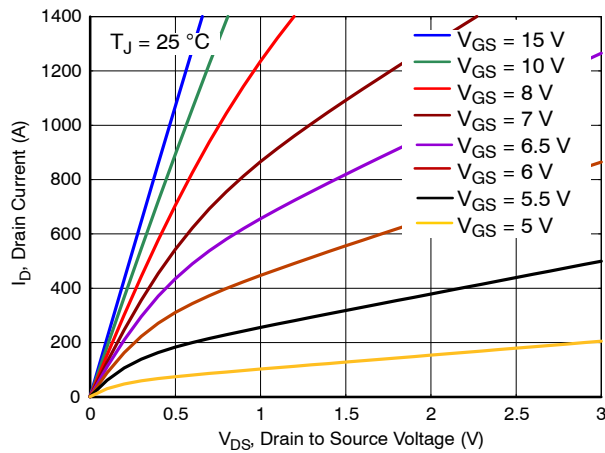


Figure 1. On-Region Characteristics

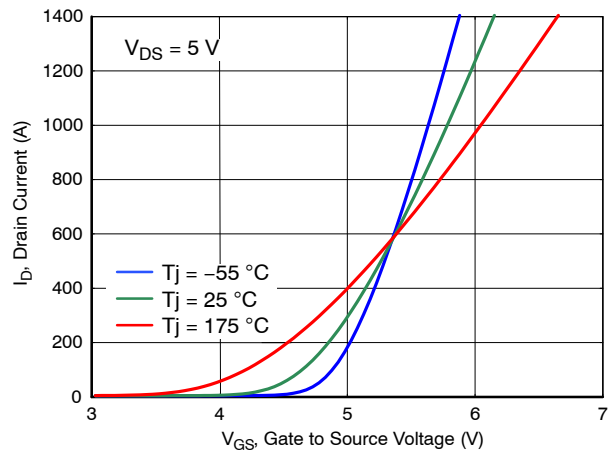


Figure 2. Transfer Characteristics

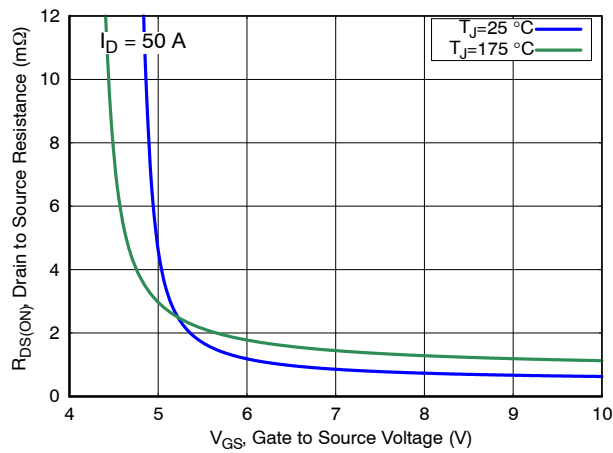


Figure 3. On-Resistance vs. Gate Voltage

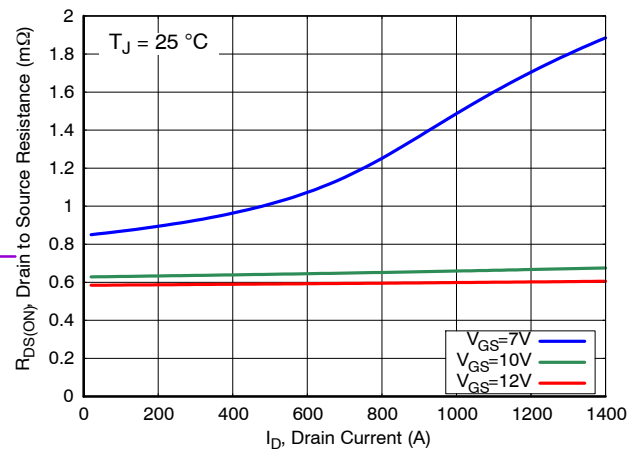


Figure 4. On-Resistance vs. Drain Current

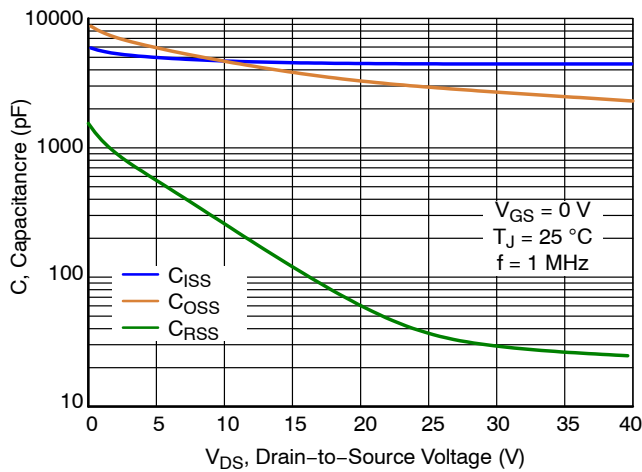


Figure 5. Capacitance Characteristics

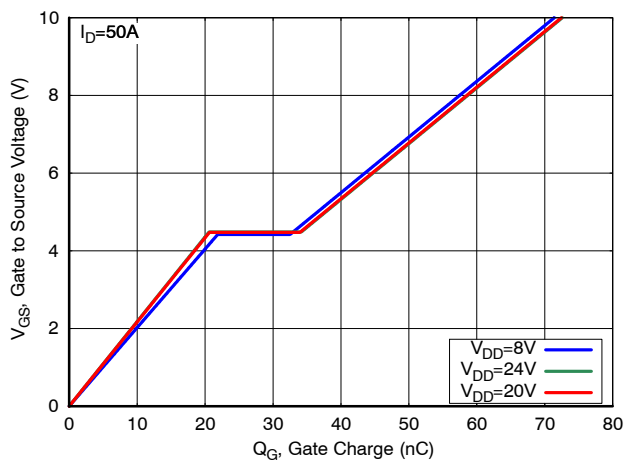


Figure 6. Gate Charge Characteristics

TYPICAL CHARACTERISTICS

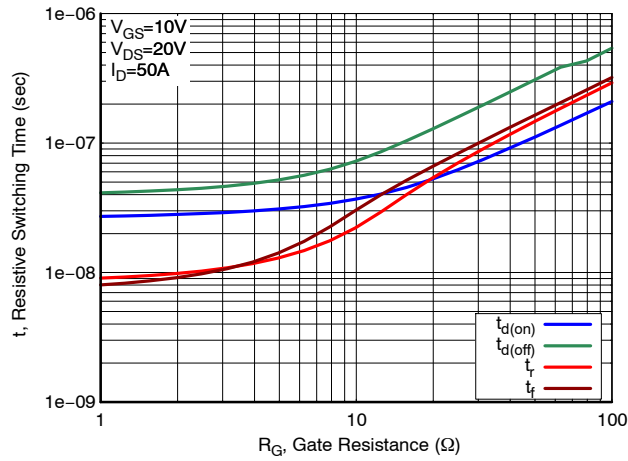


Figure 7. Resistive Switching Time Variation vs. Gate Resistance

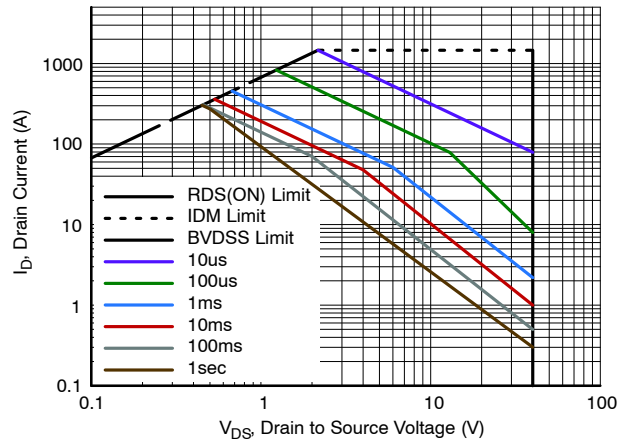


Figure 8. Safe Operating Area (SOA)

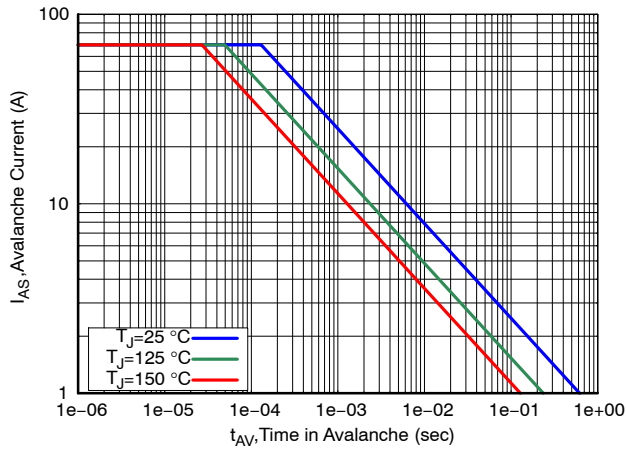


Figure 9. Avalanche Current vs Pulse Time (UIS)

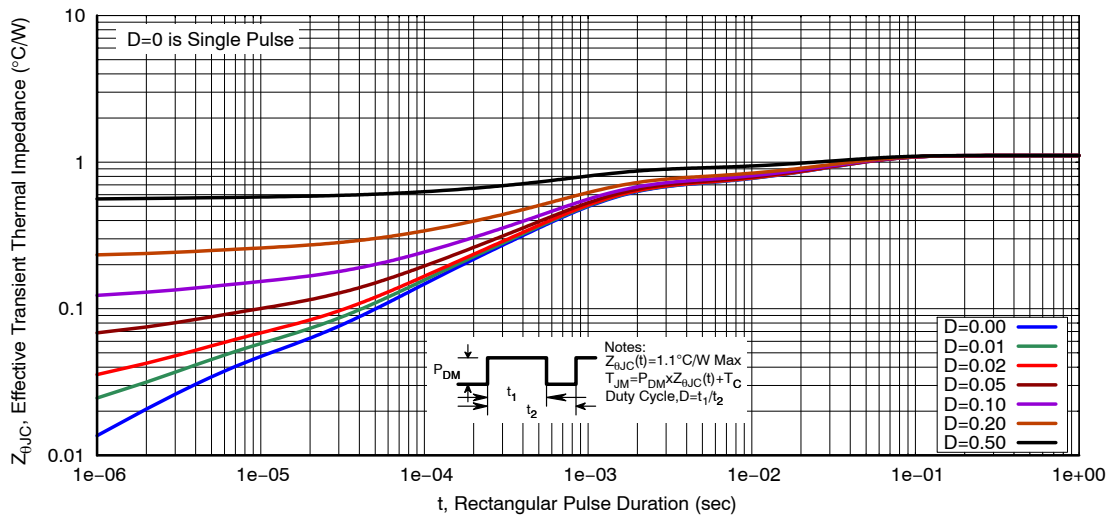


Figure 10. Transient Thermal Response

NTMFSC0D8N04XM

ORDERING INFORMATION

Device	Device Marking	Package	Shipping [†]
NTMFSC0D8N04XMTWG	3R	DFN8 5x6 (Pb-Free/Halogen Free)	3,000 / 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](#).

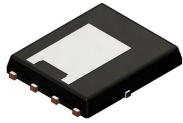
DUAL COOL is a registered trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries.

NTMFSC0D8N04XM

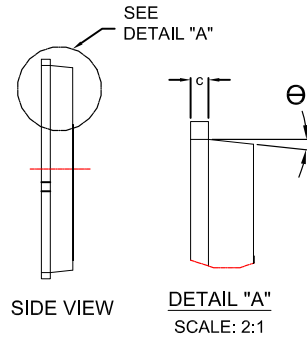
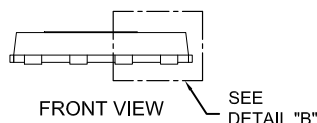
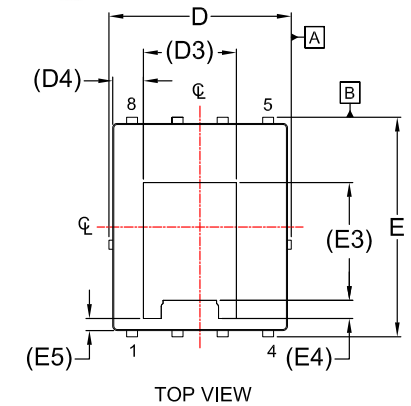
REVISION HISTORY

Revision	Description of Changes	Date
2	Revision to add figure in the existing datasheet.	8/27/2025

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

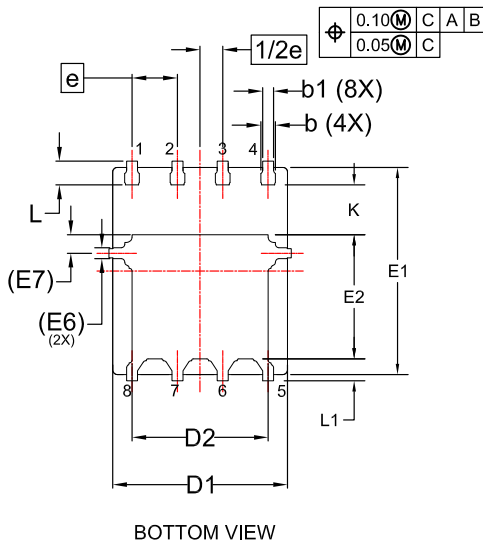
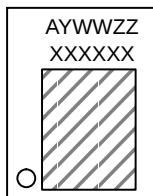

DFN8 5x6.15, 1.27P, DUAL COOL
CASE 506EG
ISSUE D

DATE 25 AUG 2020



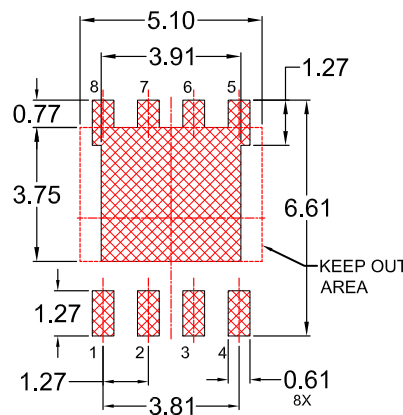
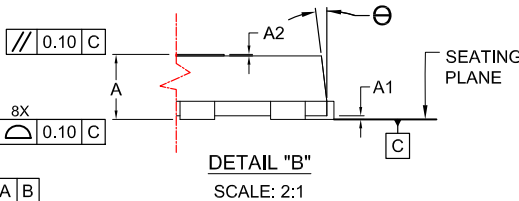
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.


GENERIC MARKING DIAGRAM*


XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.



*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.85	0.90	0.95
A1	-	-	0.05
A2	-	-	0.05
b	0.31	0.41	0.51
b1	0.21	0.31	0.41
c	0.20	0.25	0.30
D	4.90	5.00	5.10
D1	4.80	4.90	5.00
D2	3.67	3.82	3.97
D3	2.60 REF		
D4	0.86 REF		
E	6.05	6.15	6.25
E1	5.70	5.80	5.90
E2	3.38	3.48	3.58
E3	3.30 REF		
E4	0.50 REF		
E5	0.34 REF		
E6	0.30 REF		
E7	0.52 REF		
e	1.27 BSC		
1/2e	0.635 BSC		
K	1.30	1.40	1.50
L	0.56	0.66	0.76
L1	0.52	0.62	0.72
Θ	0°	---	12°

DOCUMENT NUMBER:	98AON84257G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	DFN8 5x6.15, 1.27P, DUAL COOL	PAGE 1 OF 1

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the 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. onsemi does not convey any license under its patent rights nor the rights of others.

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