

MGSF1N03L, MVGSF1N03L

MOSFET – Single, N-Channel, SOT-23 30 V, 2.1 A

These miniature surface mount MOSFETs low $R_{DS(on)}$ assure minimal power loss and conserve energy, making these devices ideal for use in space sensitive power management circuitry. Typical applications are dc-dc converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

Features

- Low $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
- Miniature SOT-23 Surface Mount Package Saves Board Space
- MV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

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

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		V_{DS}	30	V	
Gate-to-Source Voltage		V_{GS}	± 20	V	
Continuous Drain Current $R_{\theta JL}$	Steady State	$T_A = 25^\circ\text{C}$	I_D	2.1	A
			$T_A = 85^\circ\text{C}$	1.5	
Power Dissipation $R_{\theta JL}$	Steady State	$T_A = 25^\circ\text{C}$	P_D	0.69	W
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	I_D	1.6	A
			$T_A = 85^\circ\text{C}$	1.2	
Power Dissipation (Note 1)		$T_A = 25^\circ\text{C}$	P_D	0.42	W
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	I_{DM}	6.0	A	
ESD Capability (Note 3)	$C = 100 \text{ pF}$, $R_S = 1500 \Omega$	ESD	125	V	
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$	
Source Current (Body Diode)		I_S	2.1	A	
Lead Temperature for Soldering Purposes (1/8" from case for 10 sec)		T_L	260	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Foot – Steady State	$R_{\theta JL}$	180	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	300	
Junction-to-Ambient – $t < 10 \text{ s}$ (Note 1)	$R_{\theta JA}$	250	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	400	

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 650 mm^2 , 1 oz. Cu pad size.
2. Surface-mounted on FR4 board using 50 mm^2 , 1 oz. Cu pad size.
3. ESD Rating Information: HBM Class 0.

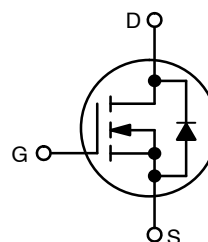


ON Semiconductor®

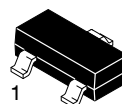
www.onsemi.com

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
30 V	80 m Ω @ 10 V	2.1 A
	125 m Ω @ 4.5 V	

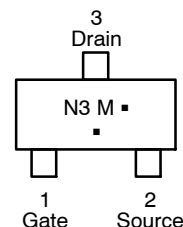
N-Channel



MARKING DIAGRAM/ PIN ASSIGNMENT



SOT-23
CASE 318
STYLE 21



N3 = Specific Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or overbar may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
MGSF1N03LT1G	SOT-23 Pb-Free	3000 / Tape & Reel
MGSF1N03LT3G	SOT-23 (Pb-Free)	10000 / Tape & Reel
MVGSF1N03LT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

MGSF1N03L, MVGSF1N03L

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 10\ \mu\text{Adc}$)	$V_{(BR)DSS}$	30	-	-	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 30\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 30\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	I_{DSS}	-	-	1.0 10	μAdc
Gate-Body Leakage Current ($V_{GS} = \pm 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	-	-	± 100	nAdc

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{Adc}$)	$V_{GS(th)}$	1.0	1.7	2.4	Vdc
Static Drain-to-Source On-Resistance ($V_{GS} = 10\text{ Vdc}$, $I_D = 1.2\text{ Adc}$) ($V_{GS} = 4.5\text{ Vdc}$, $I_D = 1.0\text{ Adc}$)	$r_{DS(on)}$	-	0.08 0.125	0.10 0.145	Ω

DYNAMIC CHARACTERISTICS

Input Capacitance	($V_{DS} = 5.0\text{ Vdc}$)	C_{iss}	-	140	-	pF
Output Capacitance	($V_{DS} = 5.0\text{ Vdc}$)	C_{oss}	-	100	-	
Transfer Capacitance	($V_{DG} = 5.0\text{ Vdc}$)	C_{rss}	-	40	-	

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	(V _{DD} = 15 Vdc, I _D = 1.0 Adc, R _L = 50 Ω)	$t_{d(on)}$	-	2.5	-	ns
Rise Time		t_r	-	1.0	-	
Turn-Off Delay Time		$t_{d(off)}$	-	16	-	
Fall Time		t_f	-	8.0	-	
Gate Charge (See Figure 6)		Q_T	-	6000	-	pC

SOURCE-DRAIN DIODE CHARACTERISTICS

Continuous Current	I_S	-	-	0.6	A
Pulsed Current	I_{SM}	-	-	0.75	
Forward Voltage (Note 5)	V_{SD}	-	0.8	-	V

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 Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.

5. Switching characteristics are independent of operating junction temperature.

MGSF1N03L, MVGSF1N03L

TYPICAL ELECTRICAL CHARACTERISTICS

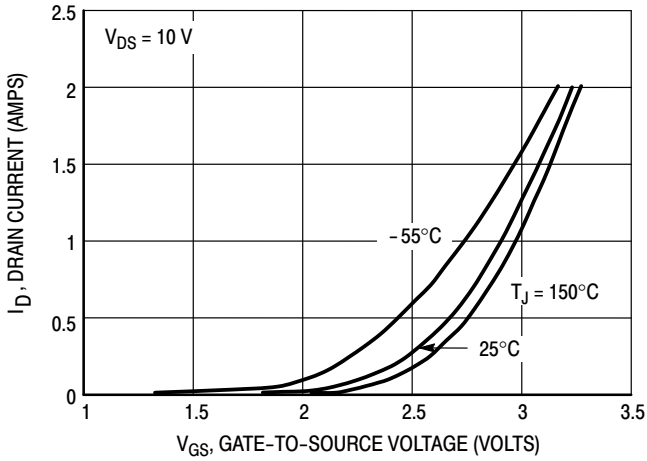


Figure 1. Transfer Characteristics

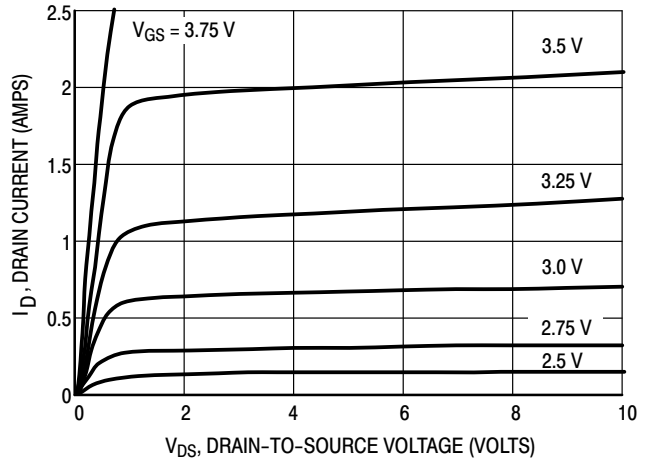


Figure 2. On-Region Characteristics

TYPICAL ELECTRICAL CHARACTERISTICS

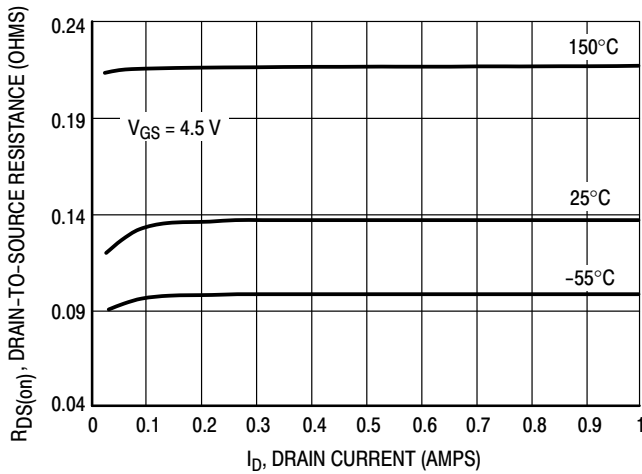


Figure 3. On-Resistance versus Drain Current

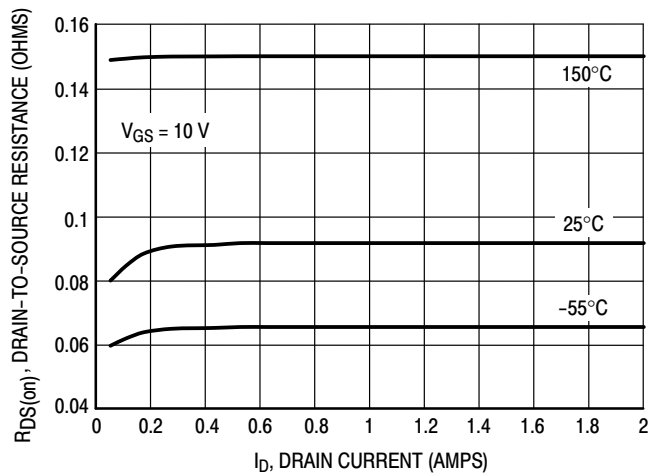


Figure 4. On-Resistance versus Drain Current

MGSF1N03L, MVGSF1N03L

TYPICAL ELECTRICAL CHARACTERISTICS

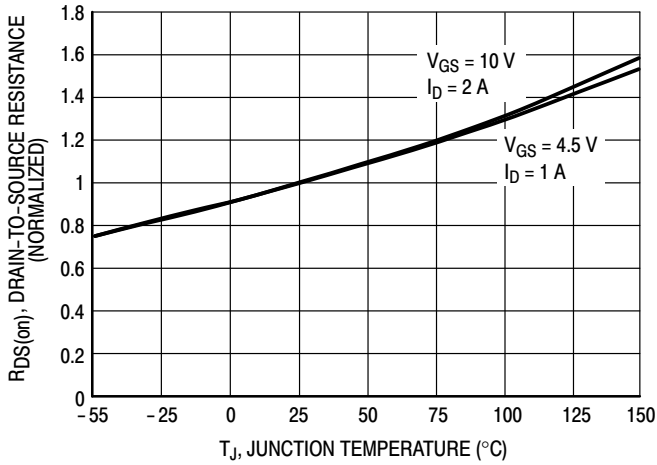


Figure 5. On-Resistance Variation with Temperature

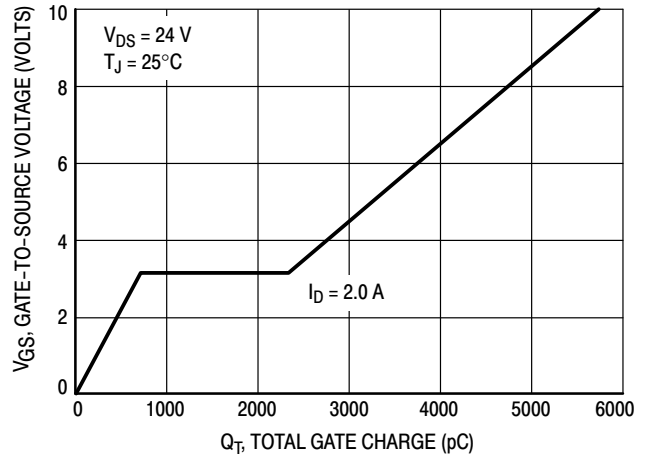


Figure 6. Gate Charge

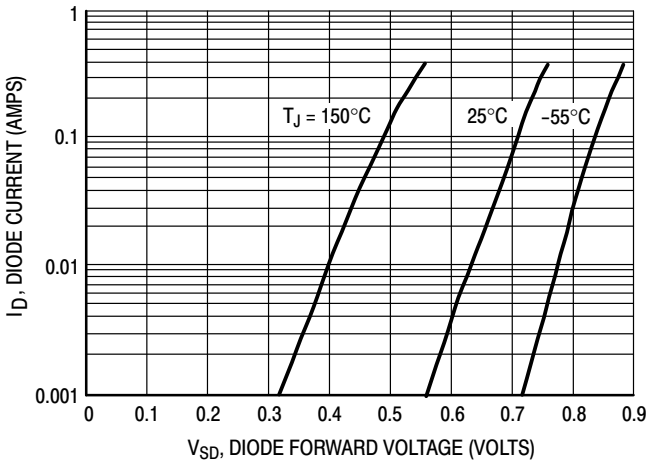


Figure 7. Body Diode Forward Voltage

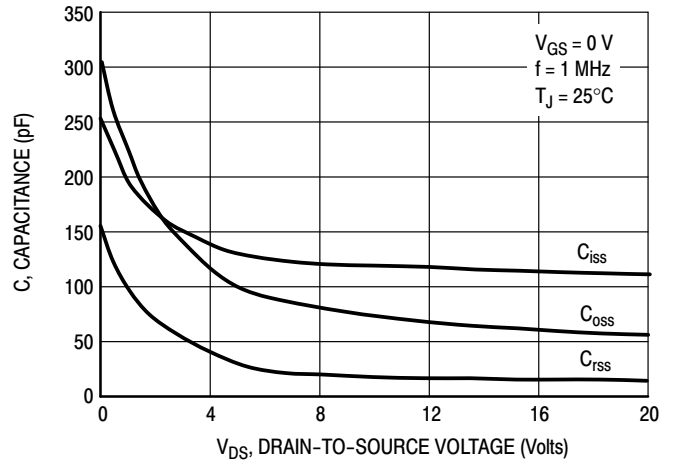


Figure 8. Capacitance

MGSF1N03L, MVGSF1N03L

TYPICAL ELECTRICAL CHARACTERISTICS

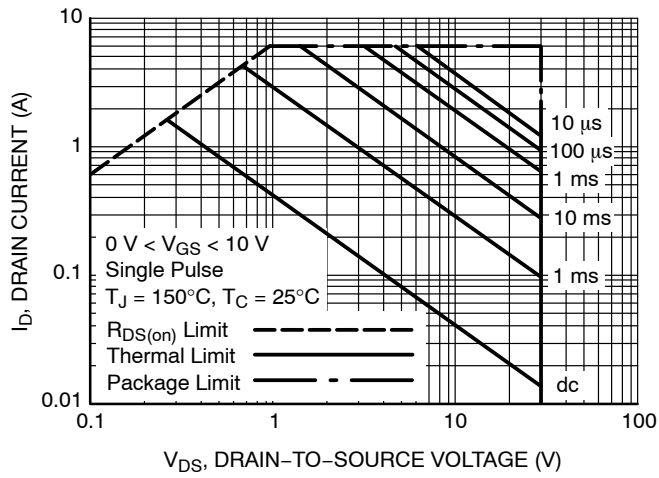


Figure 9. Maximum Rated Forward Biased Safe Operating Area

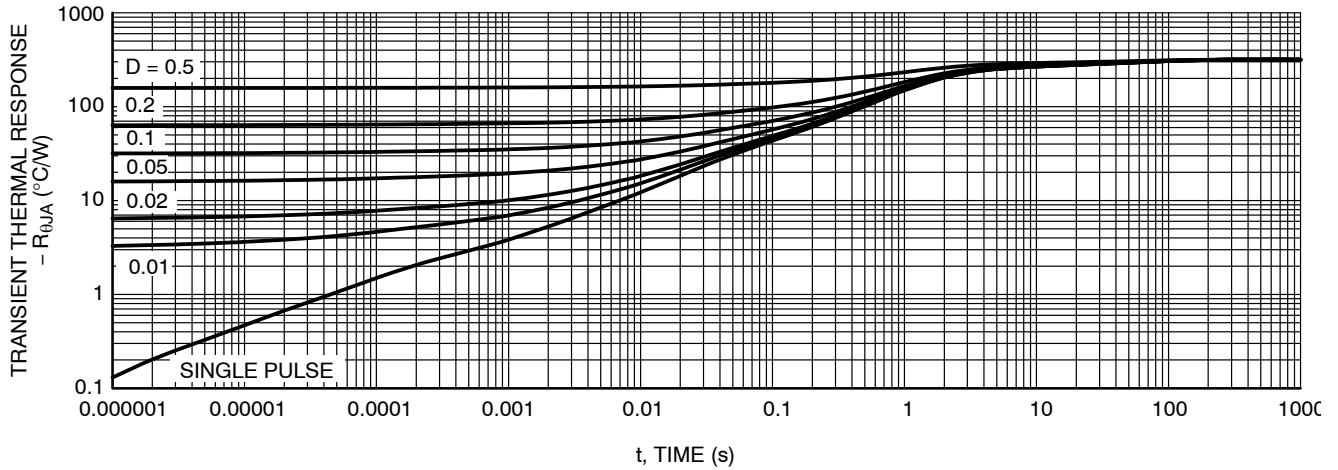


Figure 10. Thermal Response

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SOT-23 (TO-236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

SCALE 4:1



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H _E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	---	10°	0°	---	10°

GENERIC MARKING DIAGRAM*



- XXX = Specific Device Code
- M = Date Code
- = Pb-Free Package

*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.



RECOMMENDED MOUNTING 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.

STYLES ON PAGE 2

DOCUMENT NUMBER:	98ASB42226B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOT-23 (TO-236)	PAGE 1 OF 2

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.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



SOT-23 (TO-236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

- | | | | | | |
|---|---|---|---|---|---|
| STYLE 1 THRU 5:
CANCELLED | STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR | STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR | STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE | | |
| STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE | STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE | STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE-ANODE | STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE | STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE | STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE |
| STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE | STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE | STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE | STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE | STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE-ANODE | STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE |
| STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN | STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT | STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE | STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE | STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE | STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION |
| STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE | STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE | | | | |

DOCUMENT NUMBER:	98ASB42226B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOT-23 (TO-236)	PAGE 2 OF 2

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