20 V, 1.0 A, Low $V_{CE(sat)}$ NPN Transistor

NSS20101J, NSV20101J

onsemi's e^2PowerEdge family of low $V_{CE(sat)}$ transistors are miniature surface mount devices featuring ultra low saturation voltage ($V_{CE(sat)}$) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

Typical applications are DC−DC converters and power management in portable and battery powered products such as cellular and cordless phones, PDAs, computers, printers, digital cameras and MP3 players. Other applications are low voltage motor controls in mass storage products such as disc drives and tape drives. In the automotive industry they can be used in air bag deployment and in the instrument cluster. The high current gain allows e^2PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

Features

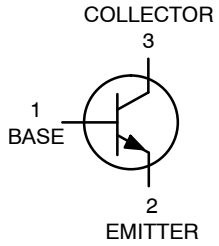
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free and are RoHS Compliant*

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

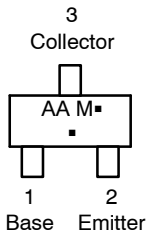
20 VOLTS, 1.0 AMPS NPN LOW $V_{CE(sat)}$ TRANSISTOR



SC−89
CASE 463C
STYLE 1



MARKING DIAGRAM



AA = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
NSS20101JT1G	SC−89 (Pb−Free)	3,000 / Tape & Reel

DISCONTINUED (Note 1)

NSV20101JT1G	SC−89 (Pb−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.

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

© Semiconductor Components Industries, LLC, 2013

Downloaded from Arrow.com.

MAXIMUM RATINGS (T_A = 25°C)

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V_{CEO}	20	Vdc
Collector-Base Voltage	V_{CBO}	40	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Collector Current – Continuous	I_C	1.0	A
Collector Current – Peak	I_{CM}	2.0	A
Electrostatic Discharge	ESD	HBM Class 3B MM Class 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 CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D (Note 2)	 255 2.0	 mW mW/°C
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$ (Note 2)	 490	°C/W
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D (Note 3)	 300 2.4	 mW mW/°C
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$ (Note 3)	 415	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	–55 to +150	°C

2. FR–4 @ 100 mm^2, 1 oz. copper traces.
3. FR–4 @ 500 mm^2, 1 oz. copper traces.

Downloaded from Arrow.com.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage (I_C = 10 mAdc, I_B = 0)	$V_{(BR)CEO}$	20			Vdc
Collector – Base Breakdown Voltage (I_C = 0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	40			Vdc
Emitter – Base Breakdown Voltage (I_E = 0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	6.0			Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}			0.1	μAdc
Emitter Cutoff Current (V_{EB} = 5.0 Vdc)	I_{EBO}			0.1	μAdc
ON CHARACTERISTICS					
DC Current Gain (Note 4) (I_C = 10 mA, V_{CE} = 2.0 V) (I_C = 100 mA, V_{CE} = 2.0 V) (I_C = 500 mA, V_{CE} = 2.0 V) (I_C = 1.0 A, V_{CE} = 2.0 V)	h_{FE}	200 200 150 100		500	
Collector – Emitter Saturation Voltage (Note 4) (I_C = 10 mA, I_B = 0.5 mA) (I_C = 0.10 A, I_B = 0.010 A) (I_C = 0.5 A, I_B = 0.050 A) (I_C = 1.0 A, I_B = 0.1 A)	$V_{CE(sat)}$			0.015 0.040 0.115 0.220	V
Base – Emitter Saturation Voltage (Note 4) (I_C = 0.5 A, I_B = 50 mA)	$V_{BE(sat)}$			1.1	V
Base – Emitter Turn–on Voltage (Note 4) (I_C = 0.5 A, V_{CE} = 2.0 V)	$V_{BE(on)}$			0.90	V
Cutoff Frequency (I_C = 100 mA, V_{CE} = 2.0 V, f = 100 MHz)	f_T		350		MHz
Input Capacitance (V_{EB} = 0.5 V, f = 1.0 MHz)	Cibo		40		pF
Output Capacitance (V_{CB} = 4.0 V, f = 1.0 MHz)	Cobo		6		pF

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. Pulsed Condition: Pulse Width = 300 msec, Duty Cycle ≤ 2%.

TYPICAL CHARACTERISTICS

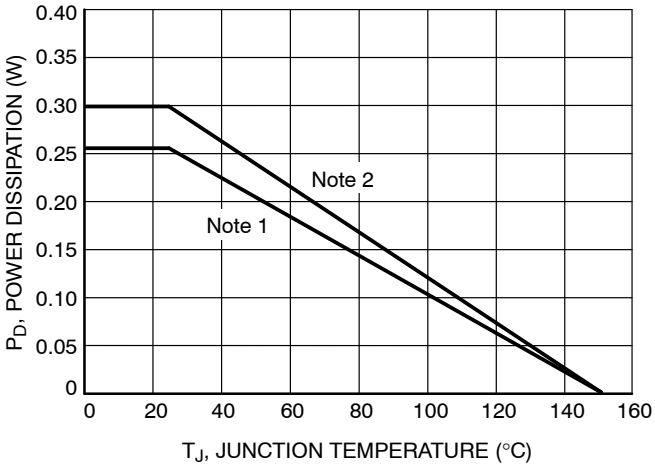


Figure 1. Power Derating

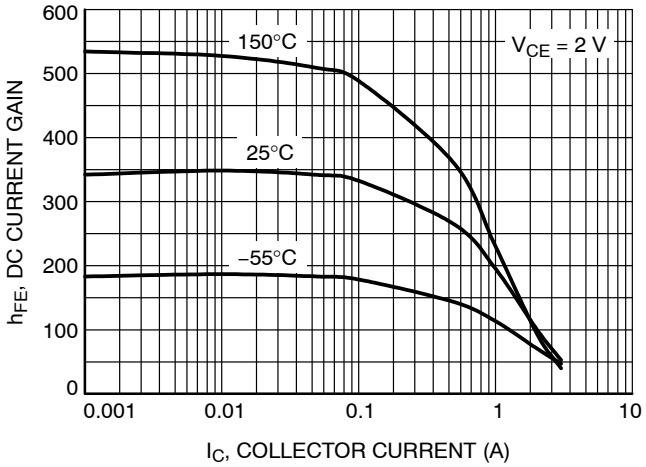


Figure 2. DC Current Gain

Downloaded from Arrow.com.

TYPICAL CHARACTERISTICS

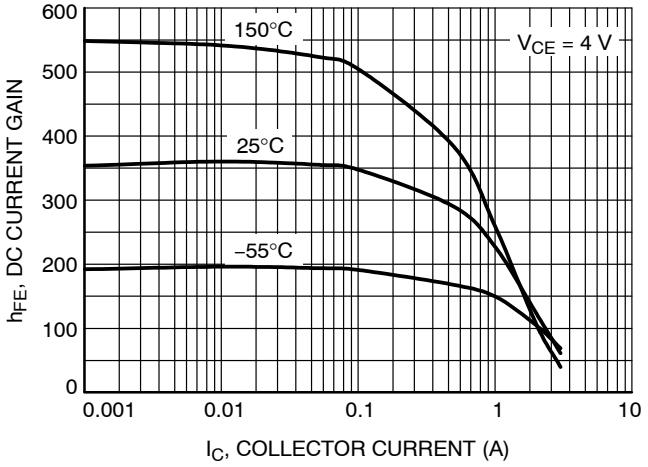


Figure 3. DC Current Gain

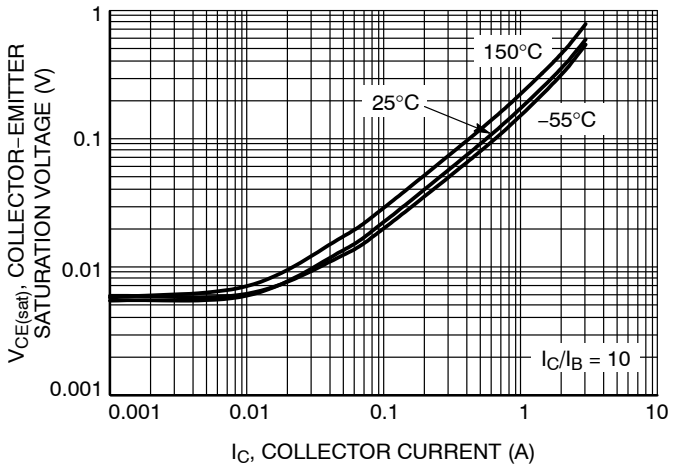


Figure 4. Collector−Emitter Saturation Voltage

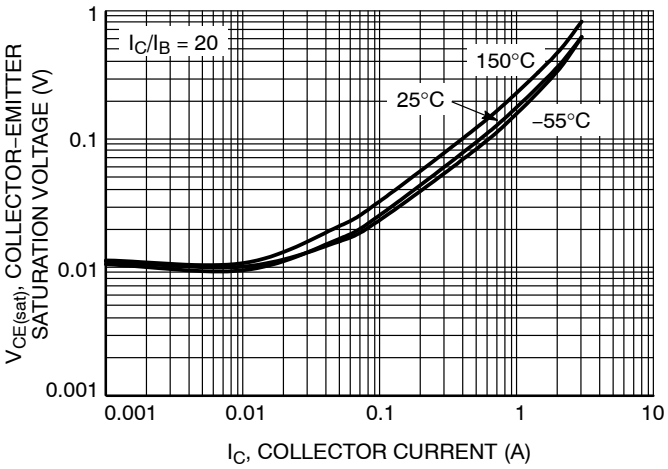


Figure 5. Collector−Emitter Saturation Voltage

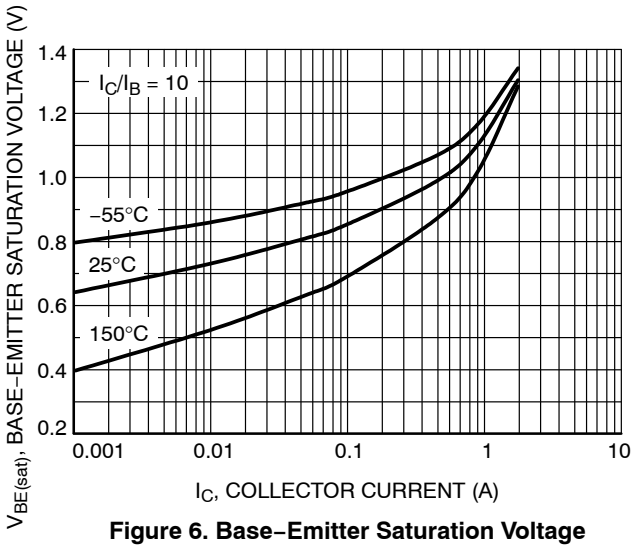


Figure 6. Base−Emitter Saturation Voltage

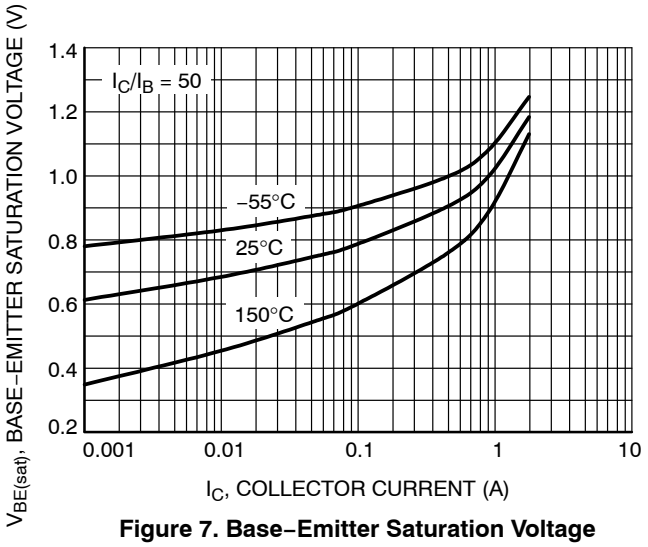


Figure 7. Base−Emitter Saturation Voltage

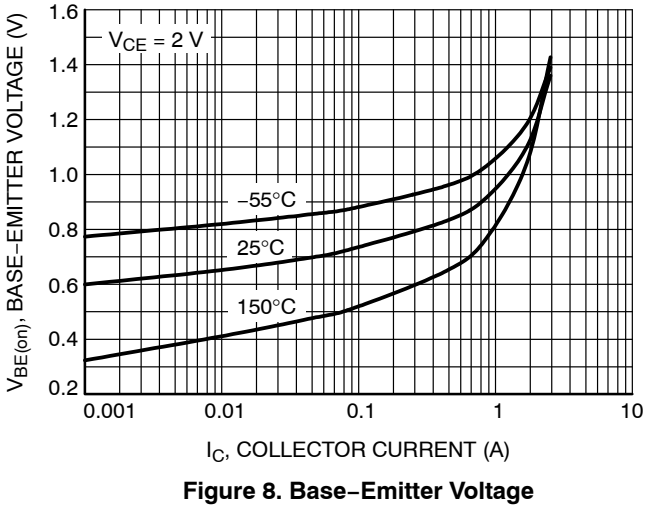


Figure 8. Base−Emitter Voltage

Downloaded from Arrow.com.

TYPICAL CHARACTERISTICS

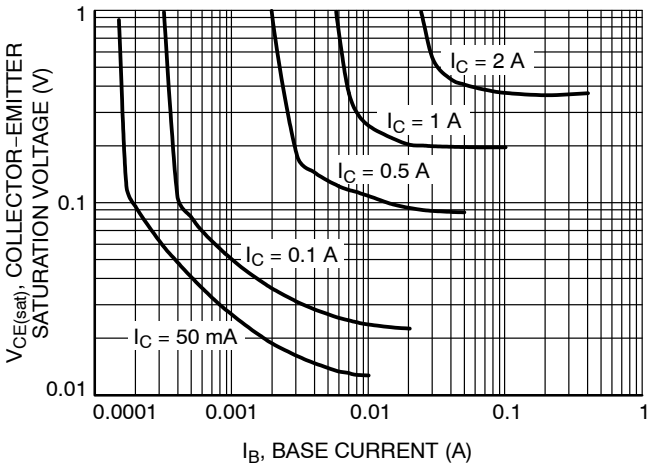


Figure 9. Saturation Region

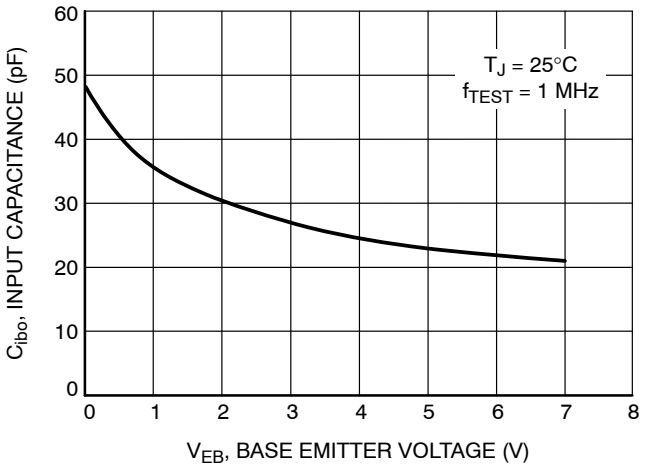


Figure 10. Input Capacitance

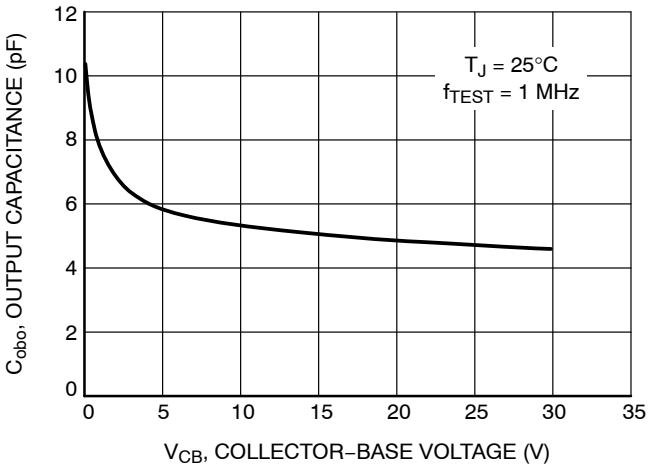


Figure 11. Output Capacitance

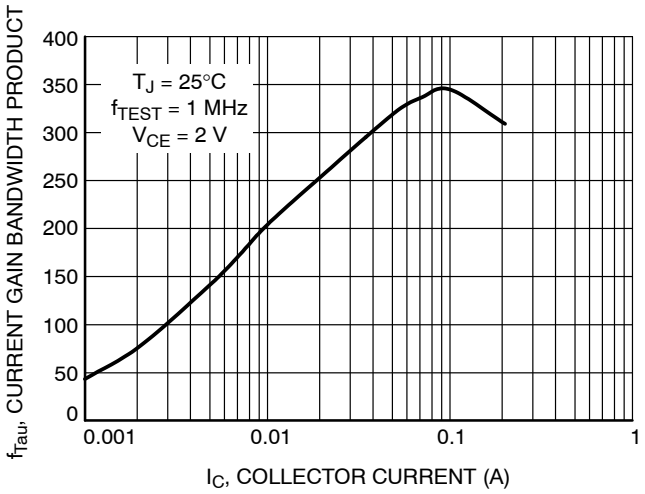


Figure 12. Current Gain Bandwidth Product

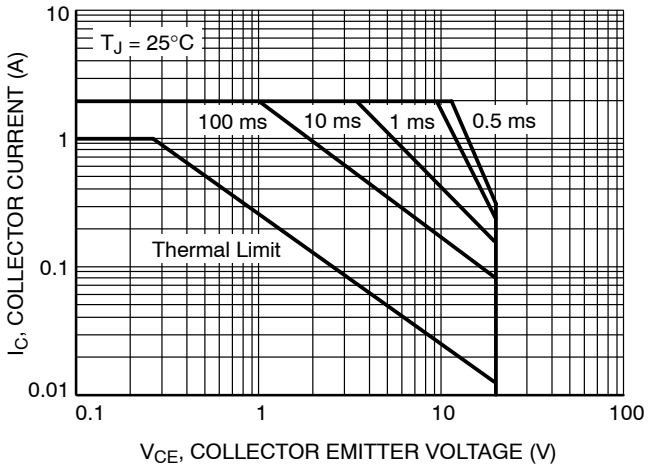
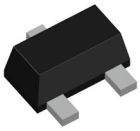


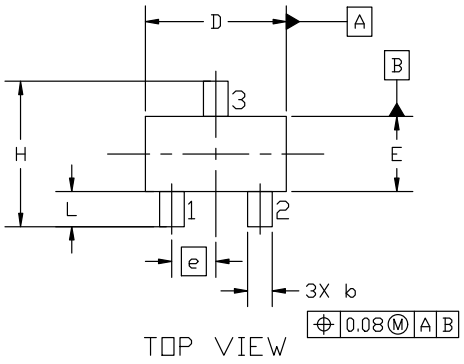
Figure 13. Safe Operating Area

Downloaded from Arrow.com.

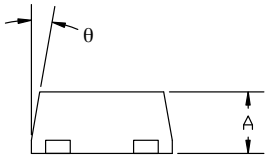


SC−89 3−LEAD, 1.60x0.85x0.70, 0.50P
CASE 463C
ISSUE D

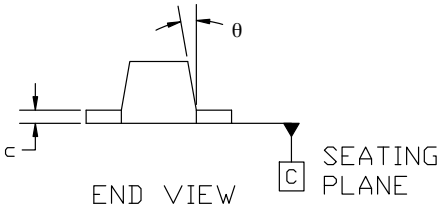
DATE 20 FEB 2024



TOP VIEW



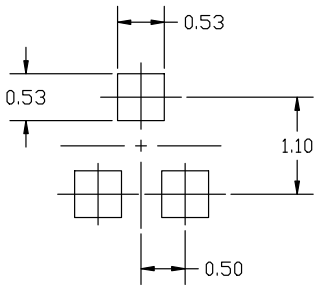
SIDE VIEW



END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

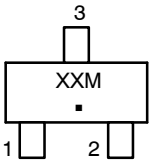
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.60	0.70	0.80
b	0.23	0.28	0.33
c	0.10	0.15	0.20
D	1.50	1.60	1.70
E	0.75	0.85	0.95
e	0.50 BSC		
H	1.50	1.60	1.70
L	0.30	0.40	0.50
θ	---	---	10°



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.

GENERIC MARKING DIAGRAM*



XX = 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.

STYLE 1:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 2:
PIN 1. ANODE
2. N/C
3. CATHODE

STYLE 3:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

DOCUMENT NUMBER:	**98AON11472D**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.	
DESCRIPTION:	**SC−89 3−LEAD, 1.60x0.85x0.70, 0.50P**		**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.

Downloaded from Arrow.com.

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

◊

Downloaded from Arrow.com.