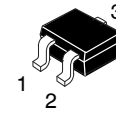


# RF Transistor

10 V, 70 mA,  $f_T = 7$  GHz, NPN Single MCP

## 2SC5226A



SC-70 / MCP3  
CASE 419AJ

### Features

- Low-noise:  $NF = 1.0$  dB Typ ( $f = 1$  GHz)
- High Gain:  $|S_{21e}|^2 = 12$  dB Typ ( $f = 1$  GHz)
- High Cut-off Frequency:  $f_T = 7$  GHz Typ
- This is a Pb-Free Device

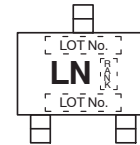
### Specifications

#### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-to-Base Voltage	20	V
$V_{CEO}$	Collector-to-Emitter Voltage	10	V
$V_{EBO}$	Emitter-to-Base Voltage	2	V
$I_C$	Collector Current	70	mA
$P_C$	Collector Dissipation	150	mW
$T_j$	Junction Temperature	150	$^\circ\text{C}$
$T_{stg}$	Storage Temperature	-55 to +150	$^\circ\text{C}$

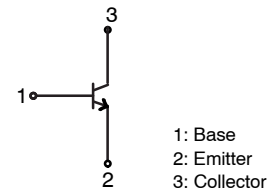
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### MARKING DIAGRAM



LN = Specific Device Code

### ELECTRICAL CONNECTION



### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
2SC5226A-4-TL-E	MCP3 (Pb-Free)	3,000 / Tape & Reel
2SC5226A-5-TL-E	MCP3 (Pb-Free)	3,000 / Tape & Reel

<sup>†</sup>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](#).

## 2SC5226A

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Collector Cutoff Current	I <sub>CBO</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 A	–	–	1.0	μA
Emitter Cutoff Current	I <sub>EBO</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0 A	–	–	10	μA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 20 mA	60*	–	270*	
Gain–Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 20 mA	5	7	–	GHz
Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> = 10 V, f = 1 MHz	–	0.75	1.2	pF
Reverse Transfer Capacitance	C <sub>re</sub>		–	0.5	–	pF
Forward Transfer Gain	S <sub>21e</sub>   <sup>2</sup> <sub>1</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 20 mA, f = 1 GHz	9	12	–	dB
	S <sub>21e</sub>   <sup>2</sup> <sub>2</sub>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 3 mA, f = 1 GHz	–	8	–	dB
Noise Figure	NF	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 7 mA, f = 1 GHz	–	1.0	1.8	dB

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.

\* The 2SC5226A is classified by 20 mA h<sub>FE</sub> as follows:

Rank	3	4	5
h <sub>FE</sub>	60 to 120	90 to 180	135 to 270

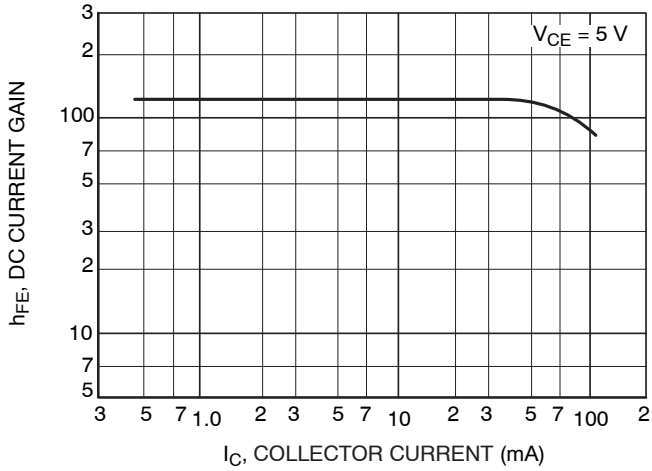


Figure 1.  $h_{FE} - I_C$

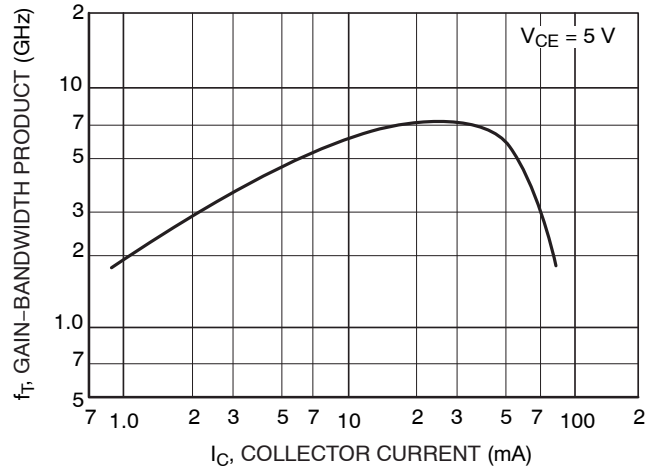


Figure 2.  $f_T - I_C$

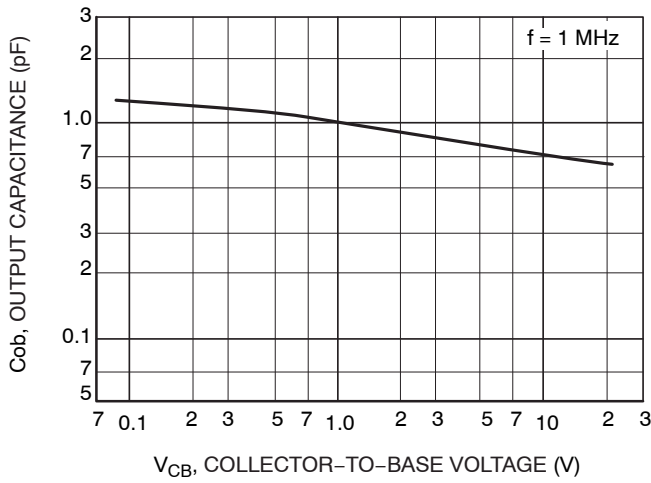


Figure 3.  $C_{ob} - V_{CB}$

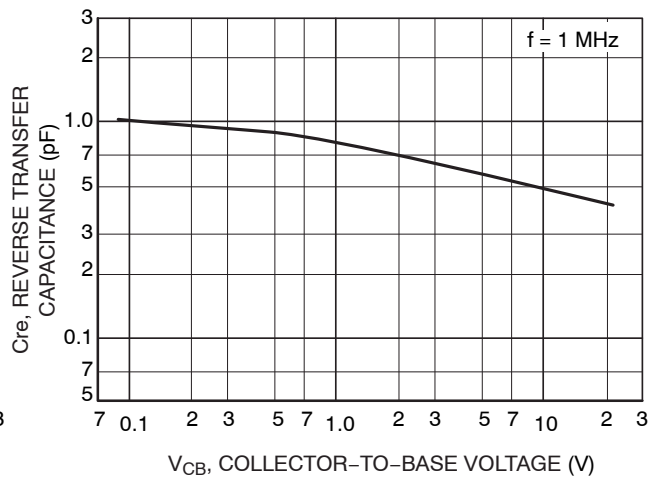


Figure 4.  $C_{re} - V_{CB}$

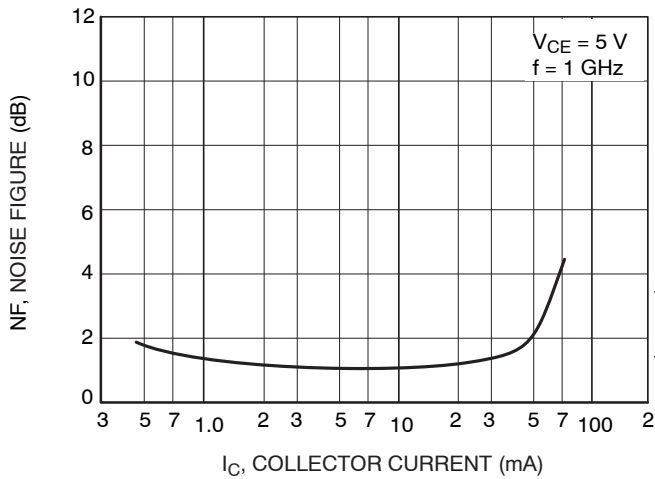


Figure 5.  $NF - I_C$

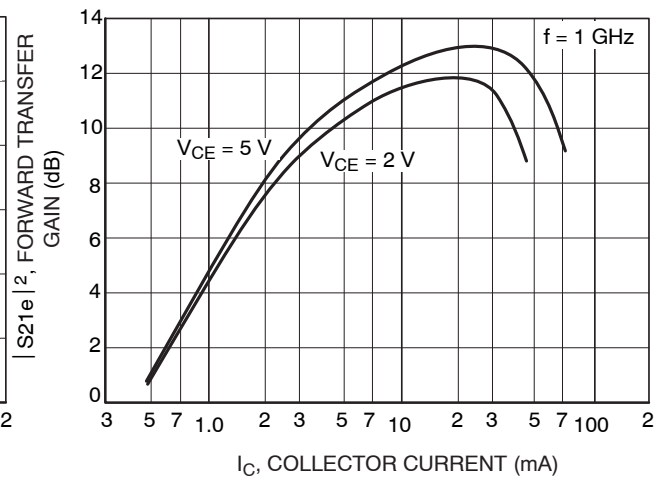
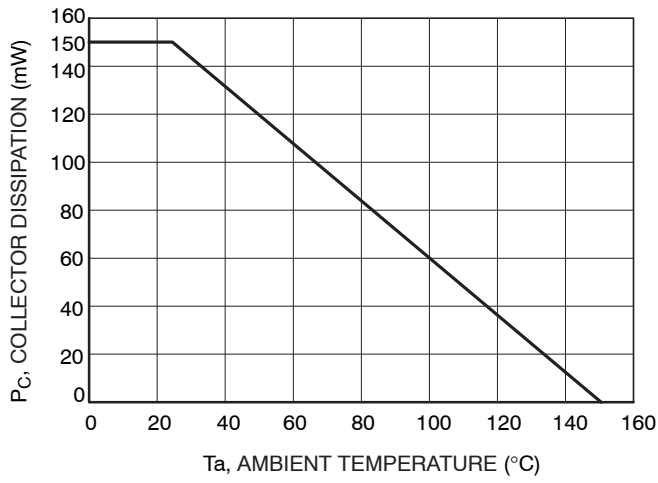
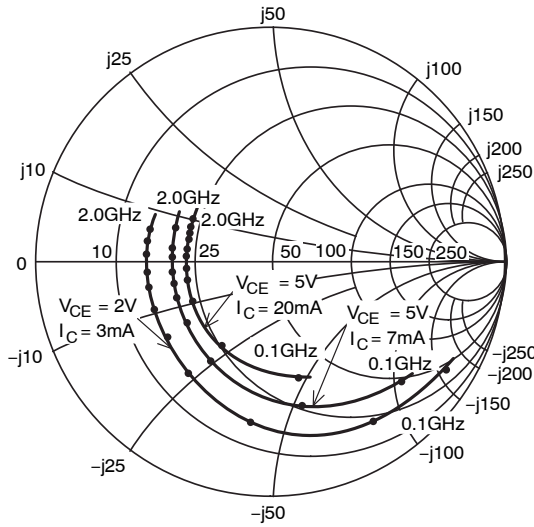


Figure 6.  $|S_{21e}|^2 - I_C$

# 2SC5226A

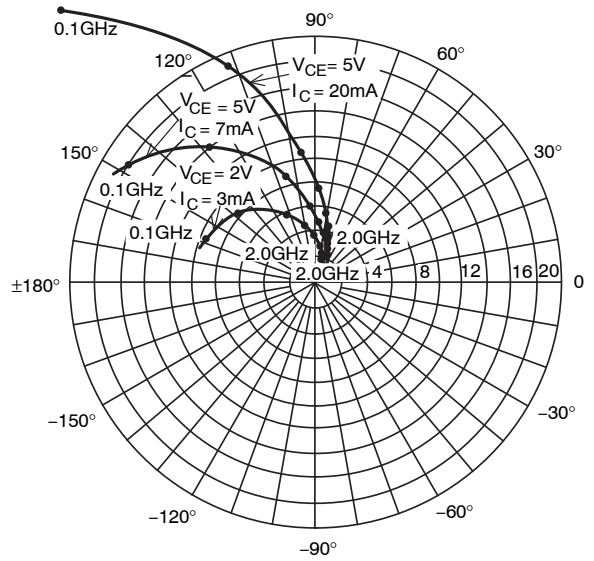


**Figure 7.  $P_C - T_a$**



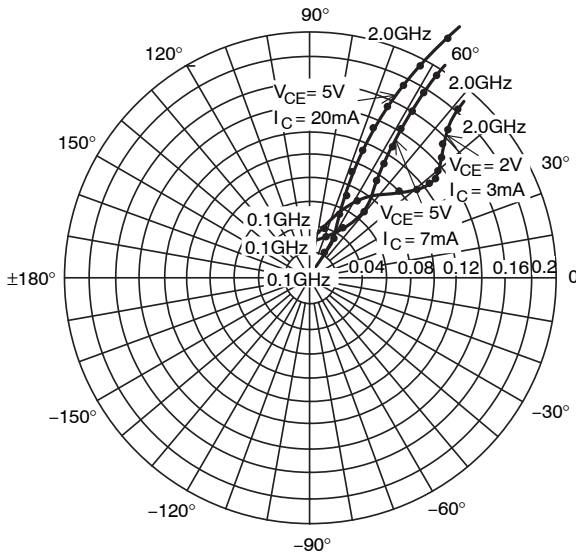
f = 100 MHz, 200 MHz to 2000 MHz (200 MHz Step)

Figure 8.



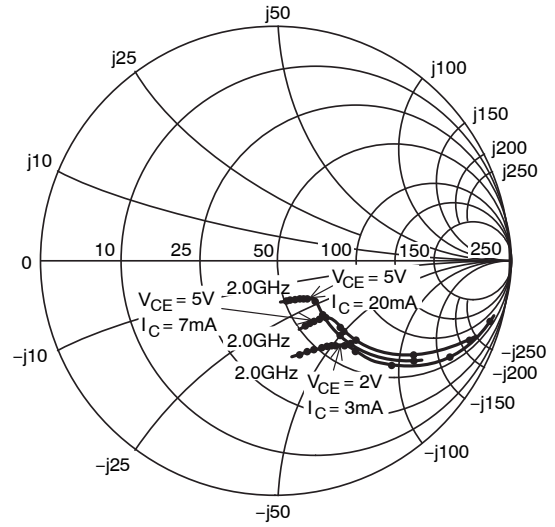
f = 100 MHz, 200 MHz to 2000 MHz (200 MHz Step)

Figure 9.



f = 100 MHz, 200 MHz to 2000 MHz (200 MHz Step)

Figure 10.



f = 100 MHz, 200 MHz to 2000 MHz (200 MHz Step)

Figure 11.

## 2SC5226A

### S Parameters (Common Emitter)

$V_{CE} = 5\text{ V}$ ,  $I_C = 7\text{ mA}$ ,  $Z_O = 50\ \Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.720	-46.0	17.973	148.5	0.030	68.5	0.880	-23.6
200	0.612	-80.9	13.927	127.3	0.047	57.1	0.697	-37.6
400	0.497	-121.3	8.656	105.0	0.066	51.3	0.479	-47.6
600	0.456	-143.5	6.080	92.8	0.079	52.9	0.382	-50.5
800	0.440	-157.6	4.725	84.3	0.094	55.4	0.339	-51.8
1000	0.436	-167.5	3.864	77.0	0.110	56.8	0.323	-53.4
1200	0.434	-176.1	3.258	70.3	0.126	57.9	0.312	-55.8
1400	0.433	176.6	2.847	64.5	0.143	58.4	0.304	-58.3
1600	0.433	170.9	2.329	57.4	0.160	58.9	0.296	-62.0
1800	0.434	165.0	2.252	54.2	0.178	58.6	0.293	-65.0
2000	0.439	159.6	2.057	49.2	0.197	58.1	0.294	-68.1

$V_{CE} = 5\text{ V}$ ,  $I_C = 20\text{ mA}$ ,  $Z_O = 50\ \Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.481	-78.8	29.795	132.9	0.022	63.9	0.707	-38.2
200	0.420	-119.2	19.008	112.2	0.033	60.8	0.470	-51.1
400	0.391	-151.6	10.416	95.4	0.052	64.7	0.296	-55.3
600	0.386	-166.4	7.084	86.6	0.071	67.2	0.236	-56.1
800	0.381	-175.9	5.407	80.1	0.092	68.4	0.213	-56.6
1000	0.382	178.2	4.401	74.1	0.114	67.8	0.208	-57.9
1200	0.385	172.1	3.701	68.5	0.134	66.8	0.204	-60.7
1400	0.388	166.7	3.217	63.6	0.156	65.6	0.202	-63.5
1600	0.390	162.1	2.839	58.8	0.176	64.0	0.199	-67.9
1800	0.391	156.7	2.534	54.3	0.197	62.4	0.197	-71.2
2000	0.394	152.1	2.319	50.1	0.219	60.6	0.197	-74.2

$V_{CE} = 2\text{ V}$ ,  $I_C = 3\text{ mA}$ ,  $Z_O = 50\ \Omega$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.858	-32.4	9.413	157.2	0.040	72.6	0.945	-16.5
200	0.782	-60.7	8.187	138.5	0.070	59.2	0.833	-29.3
400	0.653	-101.1	5.855	113.8	0.101	44.5	0.637	-43.2
600	0.588	-126.5	4.337	98.4	0.114	39.1	0.515	-50.0
800	0.557	-143.7	3.444	87.7	0.122	38.0	0.454	-53.8
1000	0.543	-156.3	2.871	78.5	0.130	38.6	0.426	-57.1
1200	0.536	-166.8	2.446	70.5	0.137	40.3	0.407	-60.3
1400	0.533	-175.5	2.145	63.5	0.146	42.5	0.393	-63.8
1600	0.527	177.0	1.904	57.1	0.155	45.0	0.382	-68.0
1800	0.525	170.3	1.714	51.7	0.168	47.3	0.379	-72.0
2000	0.528	163.8	1.564	45.9	0.183	49.2	0.378	-75.8

Land Pattern Example

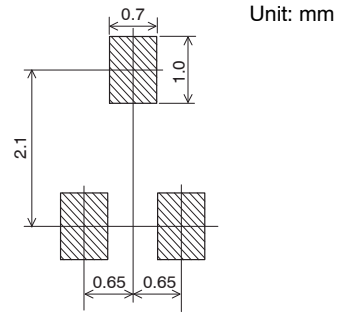
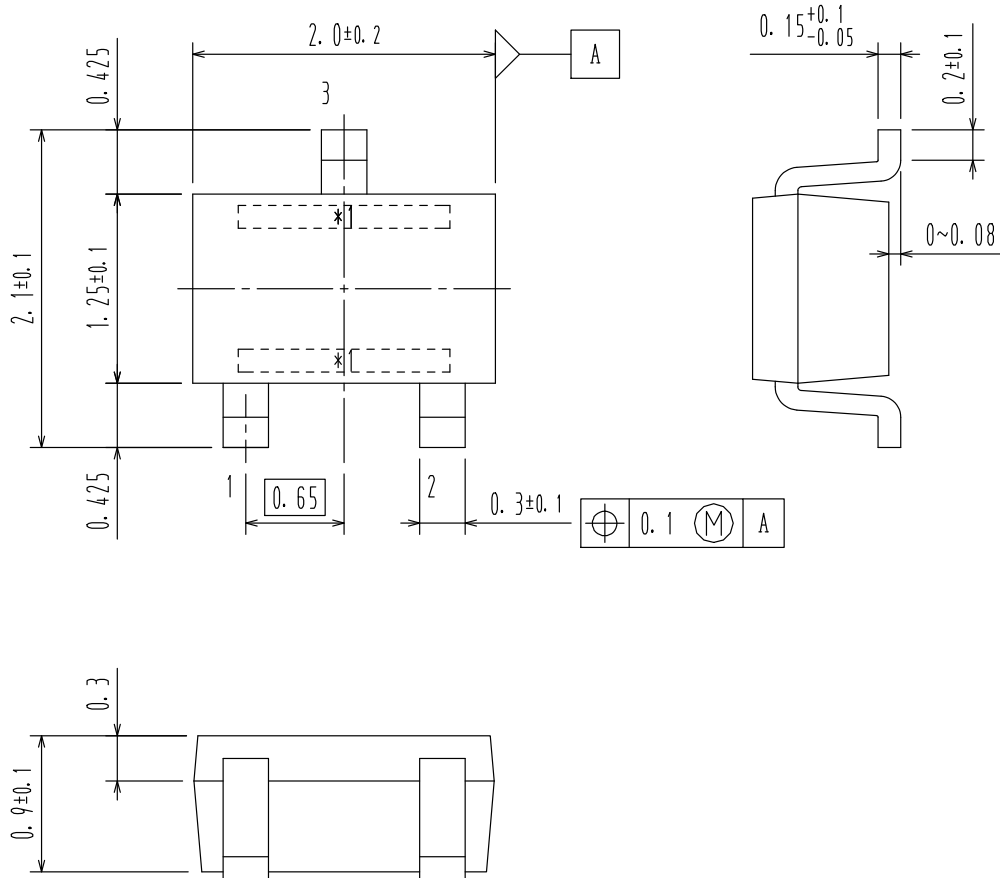


Figure 12. Land Pattern Example

**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

**SC-70 / MCP3**  
**CASE 419AJ**  
**ISSUE O**

DATE 30 NOV 2011



<b>DOCUMENT NUMBER:</b>	<b>98AON65442E</b>	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
<b>DESCRIPTION:</b>	<b>SC-70 / MCP3</b>	<b>PAGE 1 OF 1</b>

ON Semiconductor and **ON** are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. 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. ON Semiconductor 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](http://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](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at [www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)