

# NSVF5490SK

## Product Preview

# RF Transistor for Low Noise Amplifier

## 20 V, 30 mA, $f_T = 8$ GHz typ. RF Transistor

This RF transistor is designed for RF amplifier applications. SSFP package is contribute to down size of application because it is small surface mount package. This RF transistor is AEC-Q101 qualified and PPAP capable for automotive applications.

### Features

- Low-noise Use:  $NF = 0.9$  dB typ. ( $f = 1$  GHz)
- High Cut-off Frequency:  $f_T = 8$  GHz typ. ( $V_{CE} = 5$  V)
- High Gain:  $|S_{21e}|^2 = 10$  dB typ. ( $f = 1.5$  GHz)
- Low-voltage, Low-current Operation ( $V_{CE} = 1$  V,  $I_C = 1$  mA)  
 $f_T = 3.5$  GHz typ.  
 $|S_{21e}|^2 = 5.5$  dB typ. ( $f = 1.5$  GHz)
- SSFP Package is Pin-compatible with SOT-623
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Typical Applications

- RF Amplifier for RKE
- RF Amplifier for ADAS
- RF Amplifier for Remote Engine Starter

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.



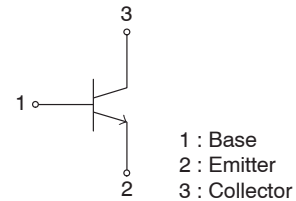
ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

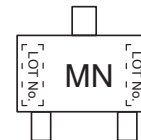


SOT-623 / SSFP  
CASE 631AC

### ELECTRICAL CONNECTION NPN



### MARKING DIAGRAM



MN = Specific Device Code

### ORDERING INFORMATION

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

# NSVF5490SK

## SPECIFICATIONS

### ABSOLUTE MAXIMUM RATINGS at Ta = 25°C

Parameter	Symbol	Value	Unit
Collector to Base Voltage	$V_{CBO}$	20	V
Collector to Emitter Voltage	$V_{CEO}$	10	V
Emitter to Base Voltage	$V_{EBO}$	1.5	V
Collector Current	$I_C$	30	mA
Collector Dissipation	$P_C$	100	mW
Operating Junction and Storage Temperature	$T_j, T_{stg}$	-55 to +150	°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.

### ELECTRICAL CHARACTERISTICS at Ta = 25°C

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = 10\text{ V}, I_E = 0\text{ A}$			1.0	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 1\text{ V}, I_C = 0\text{ A}$			10	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	90		200	
Gain-Bandwidth Product	$f_T1$	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	5	8		GHz
	$f_T2$	$V_{CE} = 1\text{ V}, I_C = 1\text{ mA}$		3.5		GHz
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{ V}, f = 1\text{ MHz}$		0.45	0.7	pF
Reverse Transfer Capacitance	$C_{re}$			0.3		pF
Forward Transfer Gain	$ S_{21e} ^2_1$	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}, f = 1.5\text{ GHz}$	8	10		dB
	$ S_{21e} ^2_2$	$V_{CE} = 1\text{ V}, I_C = 1\text{ mA}, f = 1.5\text{ GHz}$		5.5		dB
Noise Figure	NF1	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, f = 1.5\text{ GHz}$		1.4	3.0	dB
	NF2	$V_{CE} = 2\text{ V}, I_C = 3\text{ mA}, f = 1\text{ GHz}$		0.9		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.

1. Pay attention to handling since it is liable to be affected by static electricity due to the high-frequency process adopted.

TYPICAL CHARACTERISTICS

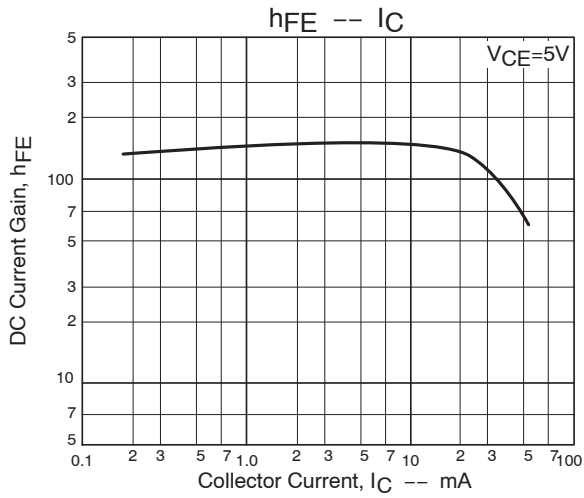


Figure 1.

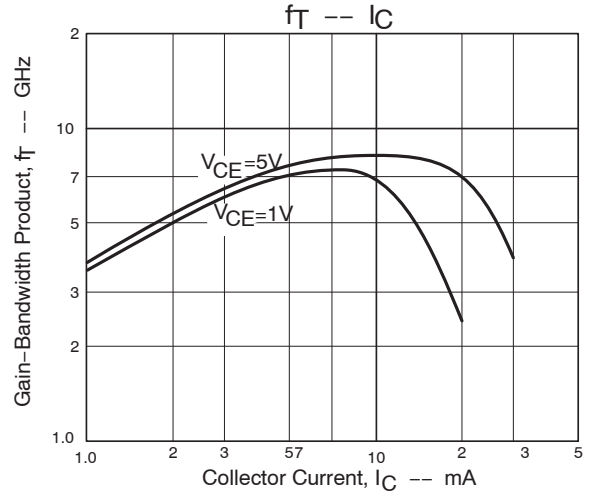


Figure 2.

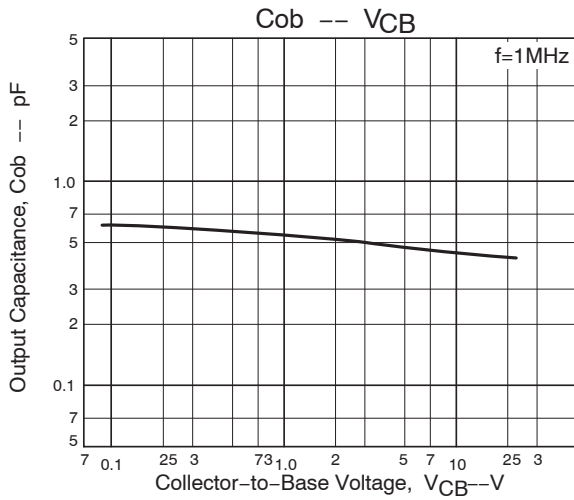


Figure 3.

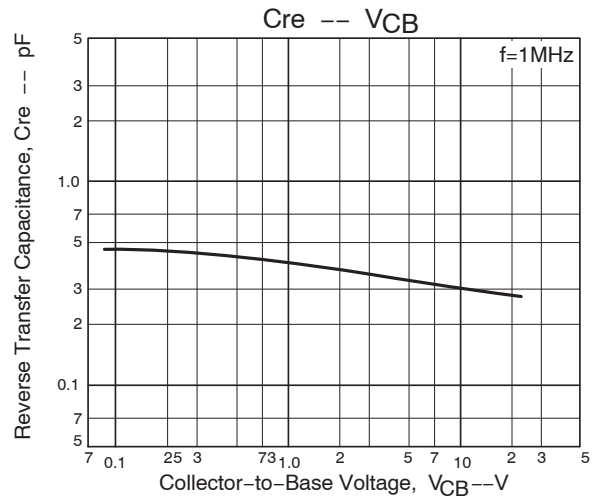


Figure 4.

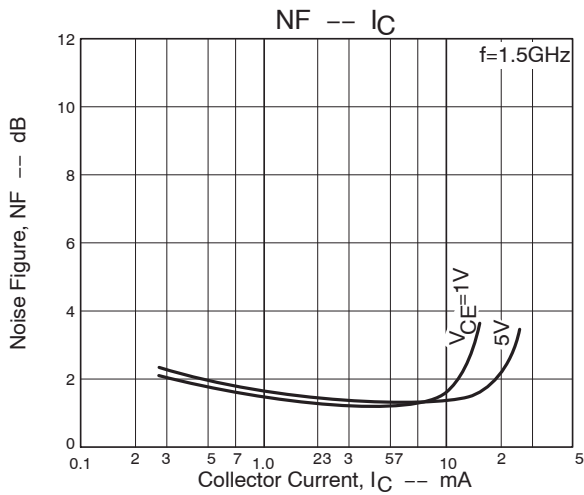


Figure 5.

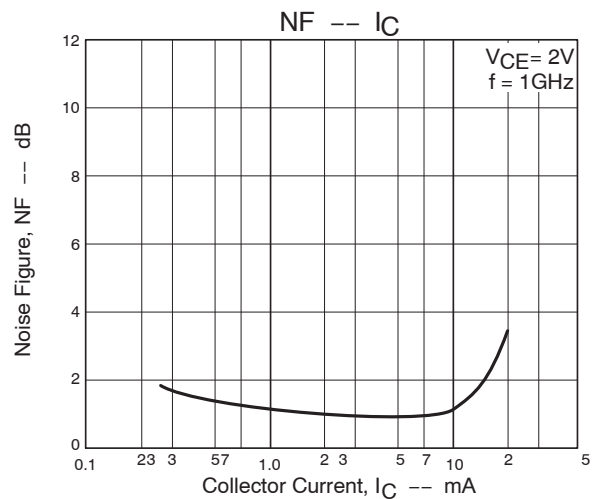


Figure 6.

# NSVF5490SK

## TYPICAL CHARACTERISTICS

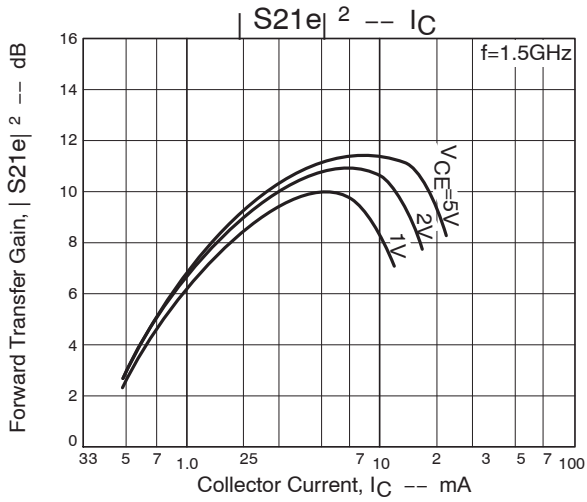


Figure 7.

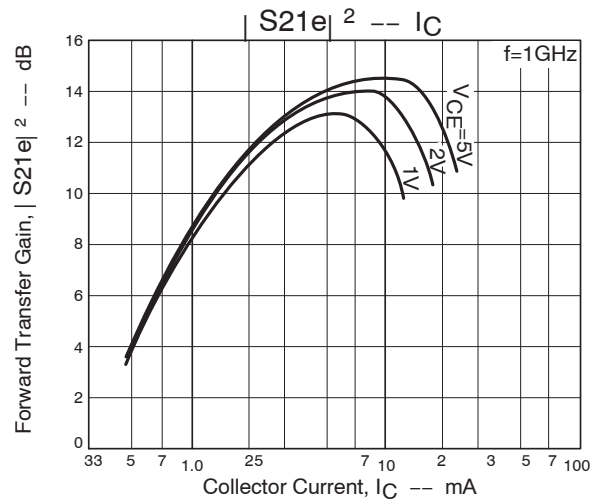


Figure 8.

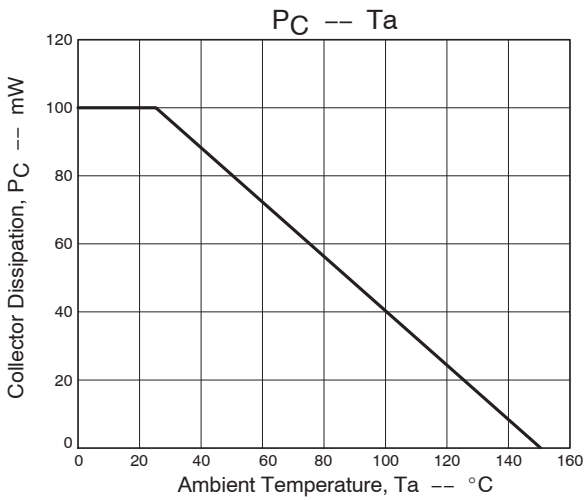


Figure 9.

### S PARAMETERS (COMMON EMITTER)

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
$V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, Z_0 = 50\ \Omega$								
200	0.782	-37.1	12.043	148.4	0.038	69.7	0.889	-19.5
400	0.623	-65.4	9.431	126.6	0.057	60.8	0.758	-28.3
600	0.502	-85.6	7.415	112.2	0.072	56.5	0.646	-33.3
800	0.420	-102.4	6.000	101.5	0.083	55.2	0.577	-35.9
1000	0.369	-114.7	5.025	93.6	0.094	55.1	0.538	-37.6
1200	0.339	-127.2	4.323	86.7	0.105	55.6	0.513	-38.7
1400	0.311	-137.2	3.785	80.6	0.115	55.6	0.490	-39.7
1600	0.296	-144.9	3.391	75.3	0.127	56.7	0.480	-41.3
1800	0.285	-156.5	3.018	70.1	0.139	56.4	0.466	-43.5
2000	0.277	-164.2	2.767	65.7	0.150	56.7	0.460	-45.5

# NSVF5490SK

## S PARAMETERS (COMMON EMITTER)

Freq (MHz)	S11	∠S11	S21	∠S21	S12	∠S12	S22	∠S22
------------	-----	------	-----	------	-----	------	-----	------

$V_{CE} = 5\text{ V}$ ,  $I_C = 10\text{ mA}$ ,  $Z_O = 50\ \Omega$

200	0.641	-52.7	16.527	137.8	0.031	67.4	0.820	-22.9
400	0.468	-85.4	11.299	115.7	0.048	60.5	0.643	-30.2
600	0.377	-106.6	8.303	103.1	0.060	60.0	0.549	-32.2
800	0.321	-124.1	6.502	94.0	0.072	60.9	0.499	-33.2
1000	0.293	-136.1	5.342	87.4	0.084	61.9	0.477	-33.9
1200	0.280	-146.7	4.546	81.4	0.097	62.7	0.462	-35.0
1400	0.266	-156.6	3.947	76.4	0.108	63.0	0.449	-36.2
1600	0.263	-163.2	3.527	71.4	0.123	63.7	0.444	-37.8
1800	0.263	-173.5	3.121	67.0	0.136	62.8	0.435	-39.9
2000	0.264	-179.8	2.864	62.8	0.150	62.4	0.434	-42.4

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

200	0.851	-30.4	8.644	154.1	0.042	73.0	0.937	-16.4
400	0.724	-55.7	7.310	133.8	0.073	61.3	0.820	-27.9
600	0.612	-76.1	6.083	118.6	0.093	54.2	0.709	-35.7
800	0.521	-93.0	5.085	106.9	0.107	50.4	0.628	-40.4
1000	0.461	-106.1	4.343	98.1	0.118	48.3	0.572	-43.7
1200	0.423	-118.6	3.806	90.0	0.128	47.5	0.536	-45.8
1400	0.382	-129.4	3.349	83.3	0.137	46.9	0.506	-47.3
1600	0.366	-138.0	3.036	77.5	0.147	47.4	0.485	-49.5
1800	0.341	-148.8	2.685	71.7	0.157	47.2	0.463	-51.9
2000	0.333	-157.7	2.479	66.7	0.167	47.6	0.453	-54.1

$V_{CE} = 1\text{ V}$ ,  $I_C = 1\text{ mA}$ ,  $Z_O = 50\ \Omega$

200	0.945	-18.7	3.431	162.9	0.053	78.1	0.982	-10.3
400	0.892	-36.9	3.263	147.1	0.099	66.9	0.939	-19.7
600	0.826	-52.9	3.004	133.2	0.136	57.5	0.879	-27.7
800	0.754	-67.9	2.765	120.4	0.164	49.7	0.815	-34.8
1000	0.691	-81.1	2.539	109.9	0.184	43.4	0.758	-40.0
1200	0.639	-94.3	2.366	99.8	0.199	38.4	0.727	-44.3
1400	0.589	-104.9	2.143	91.2	0.207	34.1	0.683	-47.8
1600	0.558	-114.1	1.969	83.6	0.213	31.7	0.653	-51.4
1800	0.522	-124.4	1.797	76.2	0.218	28.7	0.621	-54.9
2000	0.490	-134.9	1.701	69.7	0.219	27.0	0.601	-58.1

## ORDERING INFORMATION

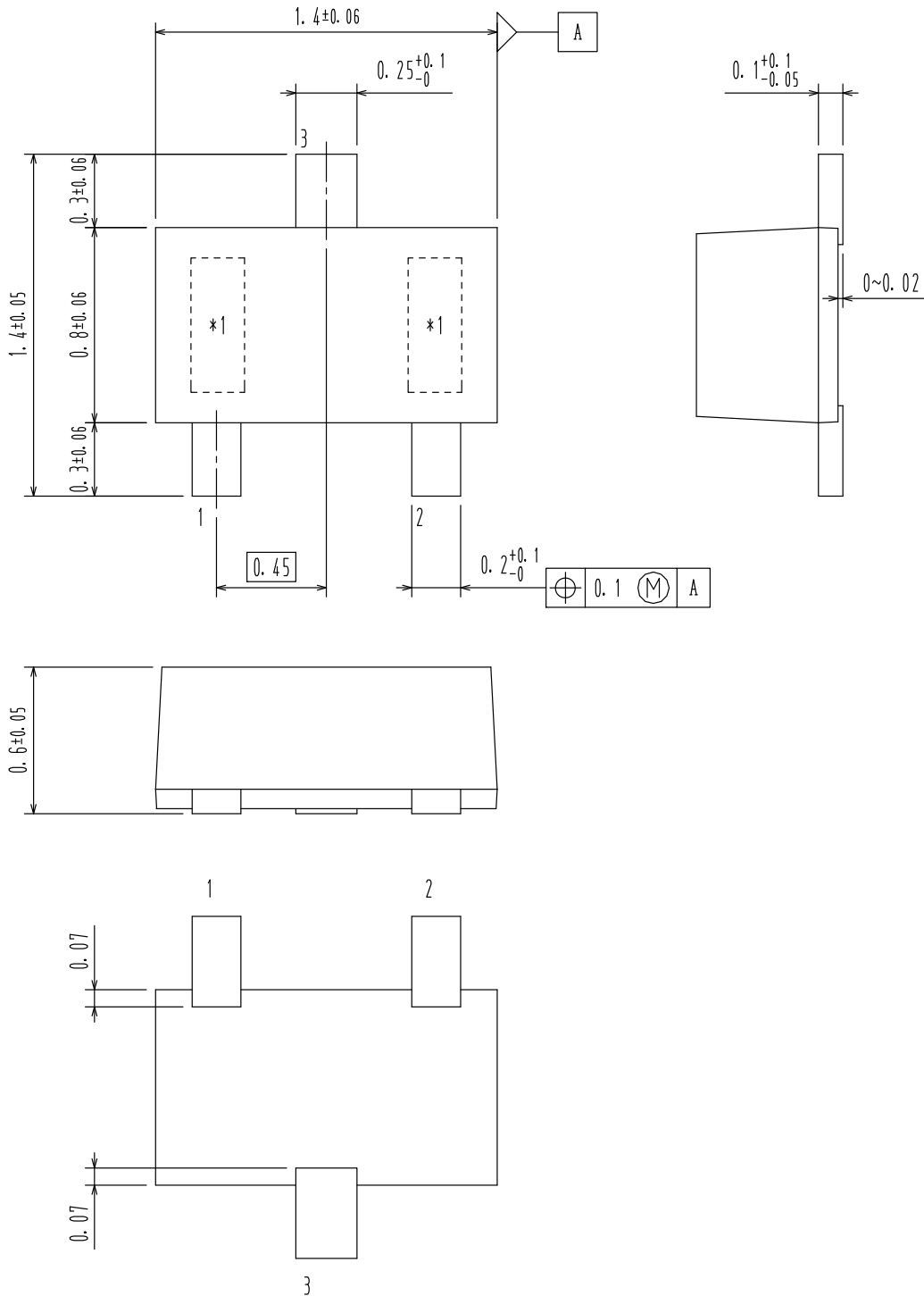
Device	Marking	Package	Shipping†
NSVF5490SKT3G	MN	SOT-623 / SSFP (Pb-Free / Halogen Free)	8,000 / Tape & Reel

†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

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

**SOT-623 / SSFP**  
**CASE 631AC**  
**ISSUE 0**

DATE 29 FEB 2012



<b>DOCUMENT NUMBER:</b>	<b>98AON67431E</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>STATUS:</b>	<b>ON SEMICONDUCTOR STANDARD</b>	
<b>NEW STANDARD:</b>		
<b>DESCRIPTION:</b>	<b>SOT-623 / SSFP</b>	<b>PAGE 1 OF 2</b>



ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor'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). 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. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor 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 ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative