

# MC74HCT132A

## Quad 2-Input NAND Gate with Schmitt-Trigger Inputs with LSTTL Compatible Inputs

### High-Performance Silicon-Gate CMOS

The MC74HCT132A is identical in pinout to the LS132. The device inputs are compatible with standard CMOS outputs; with pull-up resistors, they are compatible with LSTTL outputs.

The MC74HCT132A can be used to enhance noise immunity or to square up slowly changing waveforms.

#### Features

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0  $\mu$ A
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance with the Requirements as Defined by JEDEC Standard No. 7A
- Chip Complexity: 72 FETs or 18 Equivalent Gates
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

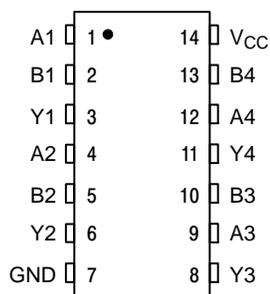


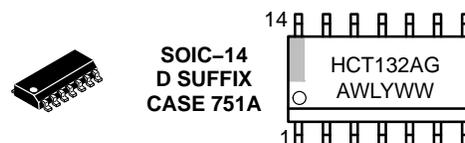
Figure 1. Pin Assignment



ON Semiconductor®

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

#### MARKING DIAGRAMS



A = Assembly Location  
 WL, L = Wafer Lot  
 Y = Year  
 WW, W = Work Week  
 G or  $\blacksquare$  = Pb-Free Package

(Note: Microdot may be in either location)

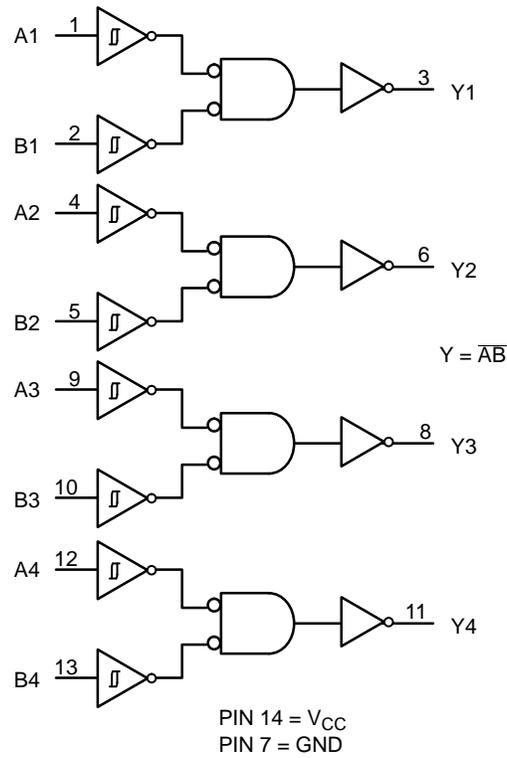
#### FUNCTION TABLE

Inputs		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

## MC74HCT132A



**Figure 2. Logic Diagram**

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MC74HCT132ADG	SOIC-14 (Pb-Free)	55 Units / Rail
MC74HCT132ADR2G		2500 / Tape & Reel
NLV74HCT132ADR2G*		2500 / Tape & Reel
MC74HCT132ADTR2G	TSSOP-14 (Pb-Free)	2500 / Tape & Reel
NLVHCT132ADTR2G*		2500 / 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 Specifications Brochure, BRD8011/D.

\*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

# MC74HCT132A

## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	Positive DC Supply Voltage	- 0.5 to + 7.0	V
$V_{IN}$	Digital Input Voltage	- 0.5 to + 7.0	V
$V_{OUT}$	DC Output Voltage Output in 3-State High or Low State	- 0.5 to + 7.0 - 0.5 to $V_{CC}$ + 0.5	V
$I_{IK}$	Input Diode Current	- 20	mA
$I_{OK}$	Output Diode Current	± 20	mA
$I_{OUT}$	DC Output Current, per Pin	± 25	mA
$I_{CC}$	DC Supply Current, $V_{CC}$ and GND Pins	± 75	mA
$I_{GND}$	DC Ground Current per Ground Pin	± 75	mA
$T_{STG}$	Storage Temperature Range	- 65 to + 150	°C
$T_L$	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
$T_J$	Junction Temperature Under Bias	+ 150	°C
$\theta_{JA}$	Thermal Resistance 14-SOIC 14-TSSOP	125 170	°C/W
$P_D$	Power Dissipation in Still Air at 85°C SOIC TSSOP	500 450	mW
MSL	Moisture Sensitivity	Level 1	
$F_R$	Flammability Rating Oxygen Index: 30% – 35%	UL 94 V0 @ 0.125 in	
$V_{ESD}$	ESD Withstand Voltage Human Body Model (Note 1) Machine Model (Note 2) Charged Device Model (Note 3)	> 2000 > 100 > 500	V
$I_{Latch-Up}$	Latch-Up Performance Above $V_{CC}$ and Below GND at 85°C (Note 4)	± 300	mA

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. Tested to EIA/JESD22-A114-A.
2. Tested to EIA/JESD22-A115-A.
3. Tested to JESD22-C101-A.
4. Tested to EIA/JESD78.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
$V_{CC}$	DC Supply Voltage (Referenced to GND)	2.0	6.0	V
$V_{IN}, V_{OUT}$	DC Input Voltage, Output Voltage (Referenced to GND)	0	$V_{CC}$	V
$T_A$	Operating Temperature, All Package Types	- 55	+ 125	°C
$t_r, t_f$	Input Rise and Fall Time (Figure 3)	-	No Limit (Note 5)	ns

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

5. When  $V_{IN} \sim 0.5 V_{CC}$ ,  $I_{CC} \gg$  quiescent current.
6. Unused inputs may not be left open. All inputs must be tied to a high-logic voltage level or a low-logic input voltage level.

# MC74HCT132A

## DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Test Conditions	V <sub>CC</sub> V	Guaranteed Limit			Unit
				-55°C to 25°C	≤ 85°C	≤ 125°C	
V <sub>T+</sub> max	Maximum Positive-Going Input Threshold Voltage	V <sub>OUT</sub> = 0.1 V  I <sub>OUT</sub>   ≤ 20 μA	4.5 5.5	1.9 2.1	1.9 2.1	1.9 2.1	V
V <sub>T+</sub> min	Minimum Positive-Going Input Threshold Voltage	V <sub>OUT</sub> = 0.1 V  I <sub>OUT</sub>   ≤ 20 μA	4.5 5.5	1.2 1.4	1.2 1.4	1.2 1.4	V
V <sub>T-</sub> max	Maximum Negative-Going Input Threshold Voltage	V <sub>OUT</sub> = V <sub>CC</sub> - 0.1 V  I <sub>OUT</sub>   ≤ 20 μA	4.5 5.5	1.2 1.4	1.2 1.4	1.2 1.4	V
V <sub>T-</sub> min	Minimum Negative-Going Input Threshold Voltage	V <sub>OUT</sub> = V <sub>CC</sub> - 0.1 V  I <sub>OUT</sub>   ≤ 20 μA	4.5 5.5	0.5 0.6	0.5 0.6	0.5 0.6	V
V <sub>H</sub> min (Note 7)	Minimum Hysteresis Voltage	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V  I <sub>OUT</sub>   ≤ 20 μA	4.5 5.5	0.4 0.4	0.4 0.4	0.4 0.4	V
V <sub>OH</sub>	Minimum High-Level Output Voltage	V <sub>IN</sub> ≤ V <sub>T-</sub> min or V <sub>T+</sub> max  I <sub>OUT</sub>   ≤ 20 μA	4.5 5.5	4.4 5.4	4.4 5.4	4.4 5.4	V
		V <sub>IN</sub> ≤ -V <sub>T-</sub> min or V <sub>T+</sub> max  I <sub>OUT</sub>   ≤ 4.0 mA	4.5	3.98	3.84	3.7	
V <sub>OL</sub>	Maximum Low-Level Output Voltage	V <sub>IN</sub> ≥ V <sub>T+</sub> max  I <sub>OUT</sub>   ≤ 20 μA	4.5 5.5	0.1 0.1	0.1 0.1	0.1 0.1	V
		V <sub>IN</sub> ≥ V <sub>T+</sub> max  I <sub>OUT</sub>   ≤ 4.0 mA	4.5	0.26	0.33	0.4	
I <sub>IN</sub>	Maximum Input Leakage Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	±0.1	±1.0	±1.0	μA
I <sub>CC</sub>	Maximum Quiescent Supply Current (per Package)	V <sub>IN</sub> = V <sub>CC</sub> or GND I <sub>OUT</sub> = 0 μA	5.5	1.0	10	40	μA

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.

7. V<sub>H</sub>min > (V<sub>T+</sub>min) - (V<sub>T-</sub>max); V<sub>H</sub>max = (V<sub>T+</sub>max) + (V<sub>T-</sub>min).

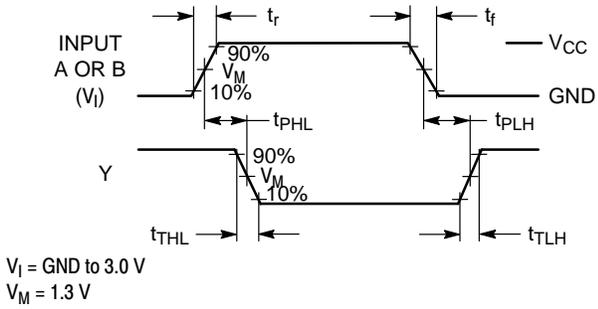
## AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6.0 ns, V<sub>CC</sub> = 5.0 V ± 10%)

Symbol	Parameter	V <sub>CC</sub> V	Guaranteed Limit			Unit
			-55°C to 25°C	≤ 85°C	≤ 125°C	
t <sub>PLH</sub> , t <sub>PHL</sub>	Maximum Propagation Delay, Input A or B to Output Y (Figures 3 and 4)	5.0	25	31	38	ns
t <sub>TLH</sub> , t <sub>THL</sub>	Maximum Output Transition Time, Any Output (Figures 3 and 4)	5.0	15	19	22	ns
C <sub>in</sub>	Maximum Input Capacitance	—	10	10	10	pF

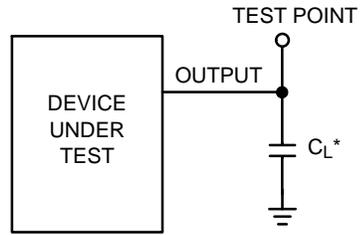
C <sub>PD</sub>	Power Dissipation Capacitance (per Gate) (Note 8)	Typical @ 25°C, V <sub>CC</sub> = 5.0 V			pF
		24			

8. Used to determine the no-load dynamic power consumption: P<sub>D</sub> = C<sub>PD</sub> V<sub>CC</sub><sup>2</sup>f + I<sub>CC</sub> V<sub>CC</sub>.

# MC74HCT132A

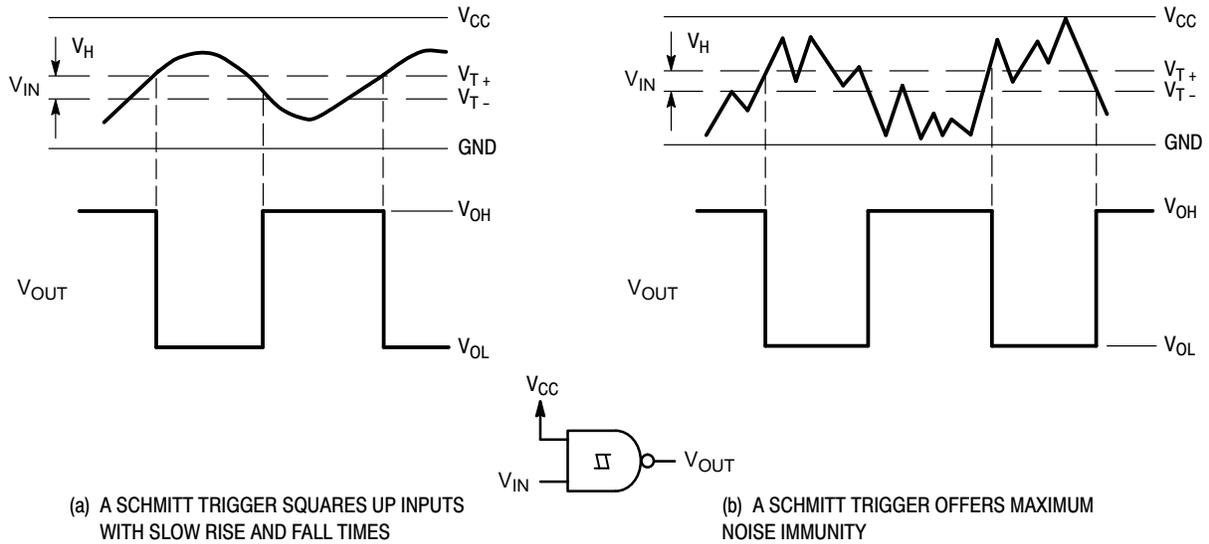


**Figure 3. Switching Waveforms**



\*Includes all probe and jig capacitance

**Figure 4. Test Circuit**

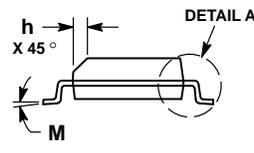
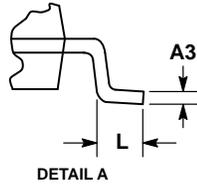
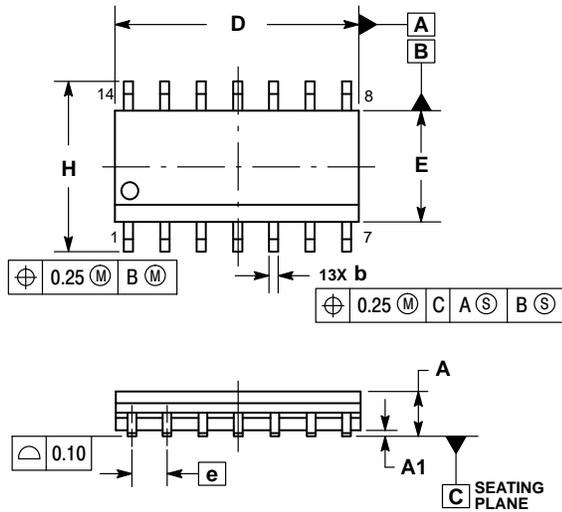


**Figure 5. Typical Schmitt-Trigger Applications**

# MC74HCT132A

## PACKAGE DIMENSIONS

SOIC-14 NB  
CASE 751A-03  
ISSUE L

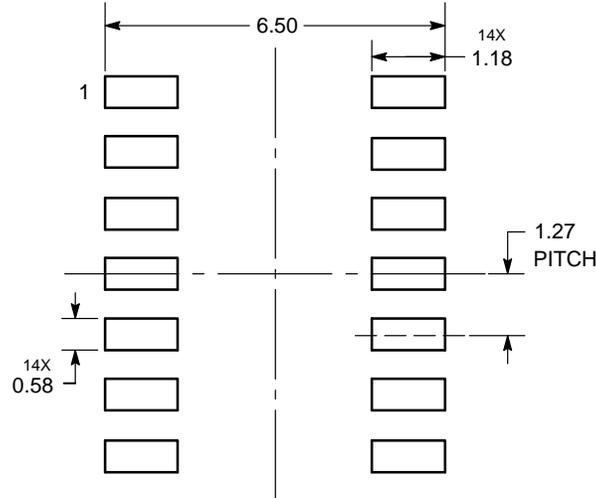


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.054	0.068
A1	0.10	0.25	0.004	0.010
A3	0.19	0.25	0.008	0.010
b	0.35	0.49	0.014	0.019
D	8.55	8.75	0.337	0.344
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.019
L	0.40	1.25	0.016	0.049
M	0°	7°	0°	7°

### SOLDERING FOOTPRINT\*



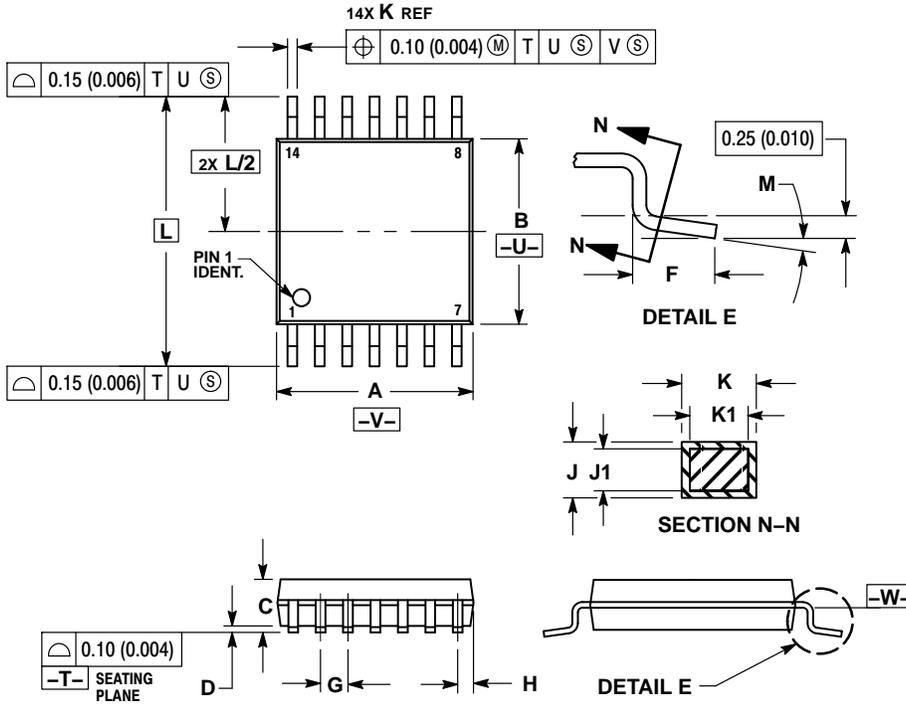
DIMENSIONS: MILLIMETERS

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

# MC74HCT132A

## PACKAGE DIMENSIONS

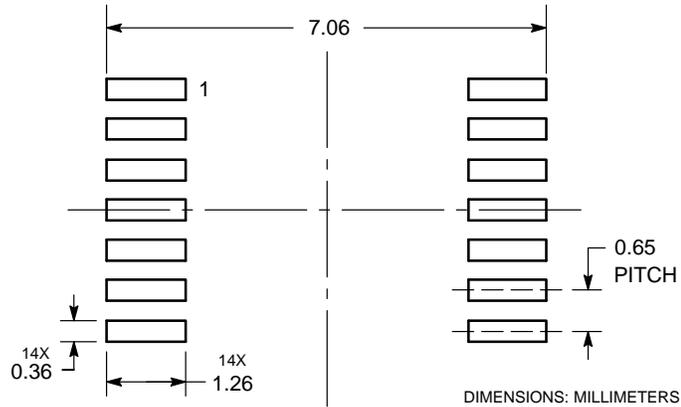
TSSOP-14 WB  
CASE 948G  
ISSUE C



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
  5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
  6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
  7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.90	5.10	0.193	0.200
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.50	0.60	0.020	0.024
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

### SOLDERING 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.

# MC74HCT132A

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  
**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**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