

MC74VHC14

Hex Schmitt Inverter

The MC74VHC14 is an advanced high speed CMOS Schmitt inverter fabricated with silicon gate CMOS technology. It achieves high speed operation similar to equivalent Bipolar Schottky TTL while maintaining CMOS low power dissipation.

Pin configuration and function are the same as the MC74VHC04 but the inputs have hysteresis and, with its Schmitt trigger function, the VHC14 can be used as a line receiver which will receive slow input signals.

The internal circuit is composed of three stages, including a buffer output which provides high noise immunity and stable output. The inputs tolerate voltages up to 7.0 V, allowing the interface of 5.0 V systems to 3.0 V systems.

Features

- High Speed: $t_{PD} = 5.5 \text{ ns}$ (Typ) at $V_{CC} = 5.0 \text{ V}$
- Low Power Dissipation: $I_{CC} = 2.0 \mu\text{A}$ (Max) at $T_A = 25^\circ\text{C}$
- High Noise Immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$
- Power Down Protection Provided on Inputs
- Balanced Propagation Delays
- Designed for 2.0 V to 5.5 V Operating Range
- Low Noise: $V_{OLP} = 0.8 \text{ V}$ (Max)
- Pin and Function Compatible with Other Standard Logic Families
- Latchup Performance Exceeds 300 mA
- ESD Performance: Human Body Model > 2000 V;
Machine Model > 200 V
- Chip Complexity: 60 FETs or 15 Equivalent Gates
- These Devices are Pb-Free and are RoHS Compliant

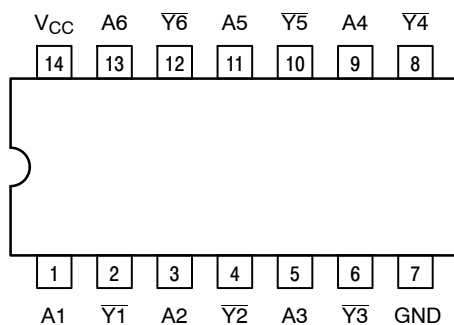


Figure 1. 14-Lead Pinout (Top View)



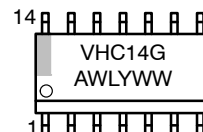
ON Semiconductor®

<http://onsemi.com>

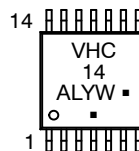
MARKING DIAGRAMS



SOIC-14
D SUFFIX
CASE 751A



TSSOP
DT SUFFIX
CASE 948G



A = Assembly Location
WL, L = Wafer Lot
Y = Year
WW, W = Work Week
G or ■ = Pb-Free Package
(Note: Microdot may be in either location)

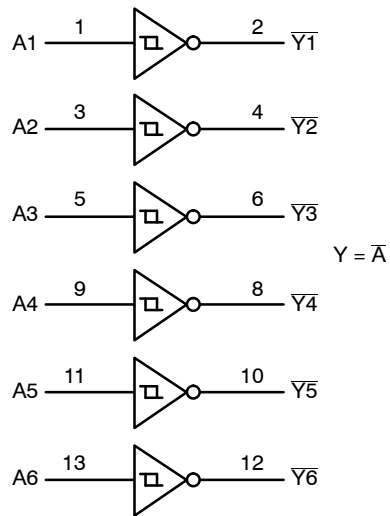
FUNCTION TABLE

Inputs	Outputs
A	Y
L	H
H	L

ORDERING INFORMATION

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

MC74VHC14



This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{in} and V_{out} should be constrained to the range $GND \leq (V_{in} \text{ or } V_{out}) \leq V_{CC}$. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

Figure 2. Logic Diagram

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	-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
P_D	Power Dissipation in Still Air	SOIC TSSOP 200 180	mW
T_{STG}	Storage Temperature Range	-65 to +150	$^{\circ}\text{C}$
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 1) Machine Model (Note 2) Charged Device Model (Note 3) >2000 >200 N/A	V
$I_{LATCHUP}$	Latchup Performance	Above V_{CC} and Below GND at 125 $^{\circ}\text{C}$ (Note 4) ± 300	mA
θ_{JA}	Thermal Resistance, Junction-to-Ambient	SOIC TSSOP 143 164	$^{\circ}\text{C/W}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, 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	Characteristics	Min	Max	Unit
V_{CC}	DC Supply Voltage	2.0	5.5	V
V_{IN}	DC Input Voltage	0	5.5	V
V_{OUT}	DC Output Voltage	0	V_{CC}	V
T_A	Operating Temperature Range, All Package Types	-55	125	$^{\circ}\text{C}$
t_r, t_f	Input Rise or Fall Time	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	No limit No limit	ns/V

MC74VHC14

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V _{CC} V	T _A = 25°C			-55°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
V _{T+}	Positive Threshold Voltage (Figure 5)		3.0 4.5 5.5			2.20 3.15 3.85		2.20 3.15 3.85	V
V _{T-}	Negative Threshold Voltage (Figure 5)		3.0 4.5 6.0	0.9 1.35 1.65			0.90 1.35 1.65		V
V _H	Hysteresis Voltage (Figure 5)		3.0 4.5 5.5	0.30 0.40 0.50		1.20 1.40 1.60	0.30 0.40 0.50	1.20 1.40 1.60	V
V _{OH}	Minimum High-Level Output Voltage	V _{in} = V _{IH} or V _{IL} I _{OH} = - 50 μA	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5		1.9 2.9 4.4		V
		V _{in} = V _{IH} or V _{IL} I _{OH} = - 4 mA I _{OH} = - 8 mA	3.0 4.5	2.58 3.94			2.48 3.80		
V _{OL}	Maximum Low-Level Output Voltage	V _{in} = V _{IH} or V _{IL} I _{OL} = 50 μA	2.0 3.0 4.5		0.0 0.0 0.0	0.1 0.1 0.1		0.1 0.1 0.1	V
		V _{in} = V _{IH} or V _{IL} I _{OL} = 4 mA I _{OL} = 8 mA	3.0 4.5			0.36 0.36		0.44 0.44	
I _{in}	Maximum Input Leakage Current	V _{in} = 5.5 V or GND	0 to 5.5			± 0.1		± 1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{in} = V _{CC} or GND	5.5			2.0		20.0	μA

AC ELECTRICAL CHARACTERISTICS (Input t_r = t_f = 3.0 ns)

Symbol	Parameter	Test Conditions	T _A = 25°C			-55°C ≤ T _A ≤ 125°C		Unit
			Min	Typ	Max	Min	Max	
t _{PLH} , t _{PHL}	Maximum Propagation Delay, A or B to Y	V _{CC} = 3.3 ± 0.3 V C _L = 15 pF C _L = 50 pF		8.3 10.8	12.8 16.3	1.0 1.0	15.0 18.5	ns
		V _{CC} = 5.0 ± 0.5 V C _L = 15 pF C _L = 50 pF		5.5 7.0	8.6 10.6	1.0 1.0	10.0 12.0	
C _{in}	Maximum Input Capacitance			4	10		10	pF

C _{PD}	Power Dissipation Capacitance (Note 5)	Typical @ 25°C, V _{CC} = 5.0 V	pF
		21	

5. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in} + I_{CC}/6 (per buffer). C_{PD} is used to determine the no-load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.

NOISE CHARACTERISTICS (Input t_r = t_f = 3.0 ns, C_L = 50 pF, V_{CC} = 5.0 V)

Symbol	Characteristic	T _A = 25°C		Unit
		Typ	Max	
V _{OLP}	Quiet Output Maximum Dynamic V _{OL}	0.4	0.8	V
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}	-0.4	-0.8	V
V _{IHD}	Minimum High Level Dynamic Input Voltage		3.5	V
V _{ILD}	Maximum Low Level Dynamic Input Voltage		1.5	V

MC74VHC14

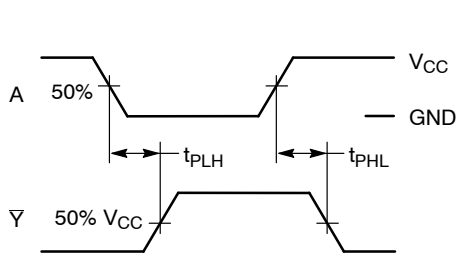
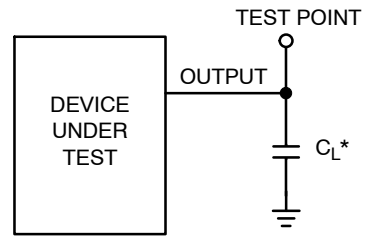


Figure 3. Switching Waveforms



*Includes all probe and jig capacitance

Figure 4. Test Circuit

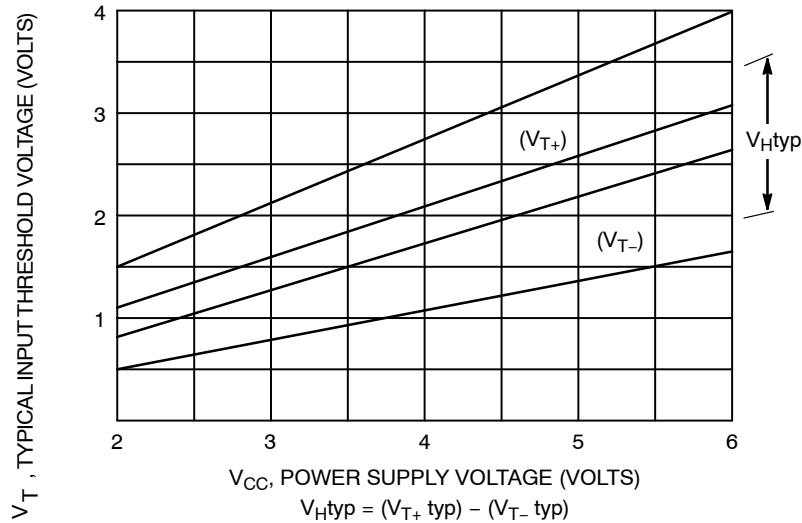


Figure 5. Typical Input Threshold, V_{T+} , V_{T-} versus Power Supply Voltage

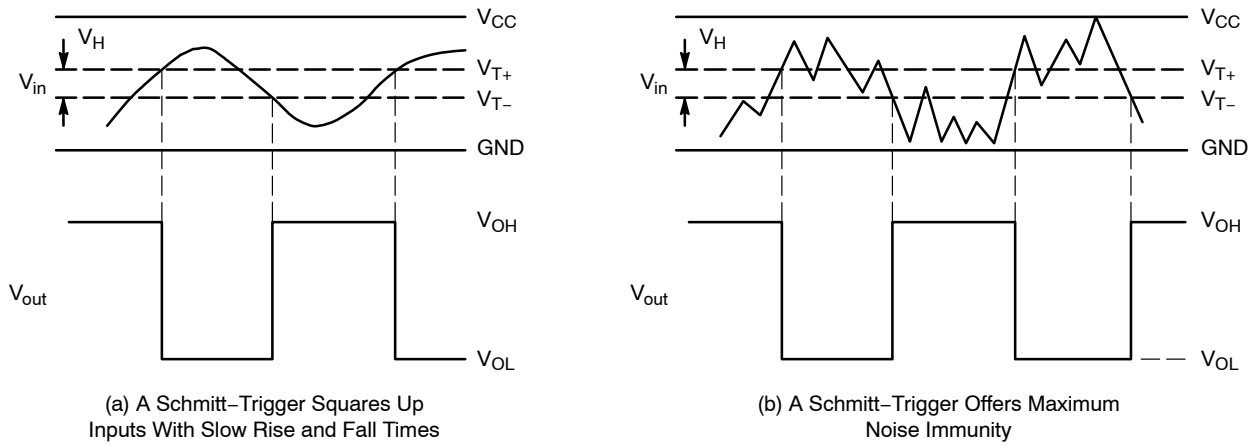


Figure 6. Typical Schmitt-Trigger Applications

MC74VHC14

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74VHC14DG	SOIC-14 (Pb-Free)	55 Units / Rail
MC74VHC14DR2G	SOIC-14 (Pb-Free)	2500 / Tape & Reel
MC74VHC14DTG	TSSOP-14*	96 Units / Rail
MC74VHC14DTR2G	TSSOP-14*	2500 / Tape & Reel

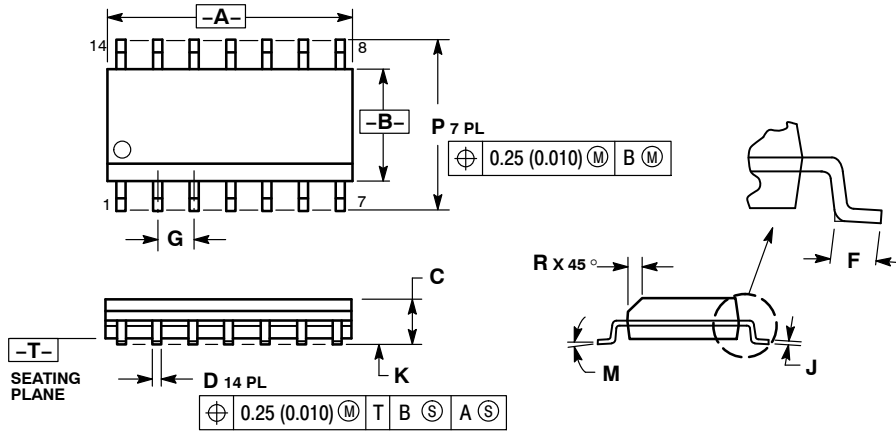
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*This package is inherently Pb-Free.

MC74VHC14

PACKAGE DIMENSIONS

SOIC-14
CASE 751A-03
ISSUE J

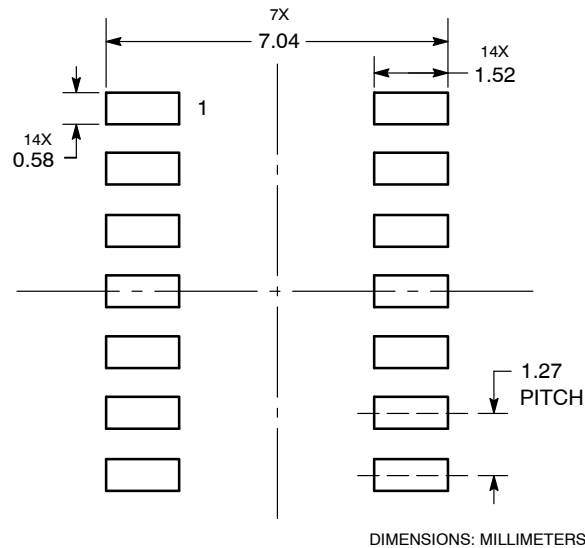


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

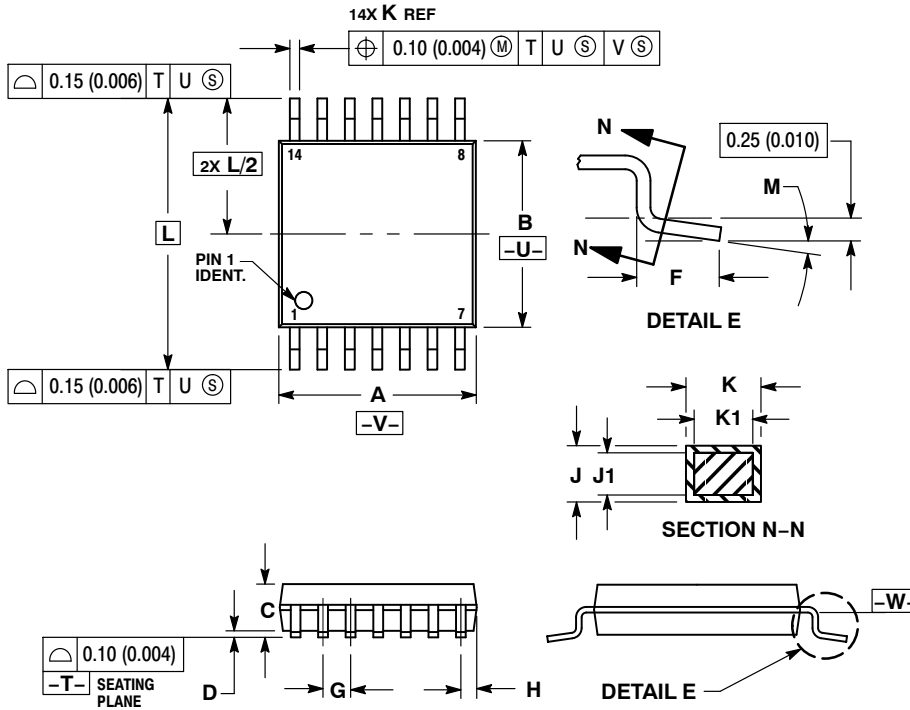
SOLDERING FOOTPRINT



MC74VHC14

PACKAGE DIMENSIONS

TSSOP-14 CASE 948G-01 ISSUE B

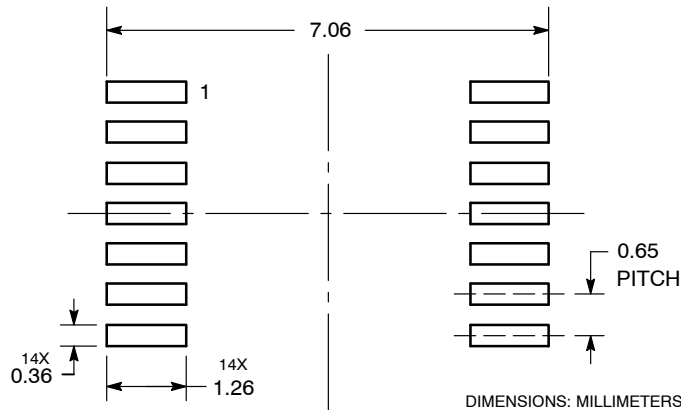


NOTES:

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



ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC 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
P.O. Box 5163, Denver, Colorado 80217 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

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: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

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

For additional information, please contact your local
Sales Representative

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9