

MC74VHCT14A

Hex Schmitt Inverter

The MC74VHCT14A 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 MC74VHCT04A, but the inputs have hysteresis and, with its Schmitt trigger function, the VHCT14A can be used as a line receiver which will receive slow input signals.

The VHCT inputs are compatible with TTL levels. This device can be used as a level converter for interfacing 3.3 V to 5.0 V, because it has full 5.0 V CMOS level output swings.

The VHCT14A input structures provide protection when voltages between 0 V and 5.5 V are applied, regardless of the supply voltage. The output structures also provide protection when $V_{CC} = 0$ V. These input and output structures help prevent device destruction caused by supply voltage – input/output voltage mismatch, battery backup, hot insertion, etc.

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

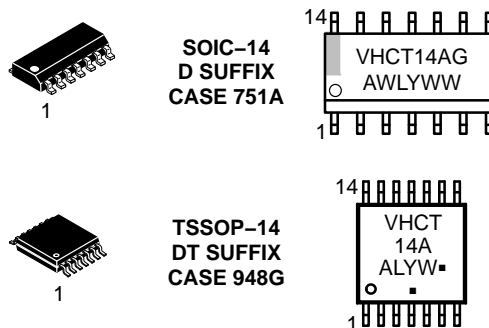
- High Speed: $t_{PD} = 5.5$ ns (Typ) at $V_{CC} = 5.0$ V
- Low Power Dissipation: $I_{CC} = 2.0$ μ A (Max) at $T_A = 25^\circ$ C
- TTL-Compatible Inputs: $V_{IL} = 0.8$ V; $V_{IH} = 2.0$ V
- Power Down Protection Provided on Inputs
- Balanced Propagation Delays
- Designed for 2.0 V to 5.5 V Operating Range
- Low Noise: $V_{OLP} = 0.8$ V (Max)
- Pin and Function Compatible with Other Standard Logic Families
- Chip Complexity: 60 FETs or 15 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 and are RoHS Compliant



ON Semiconductor®

www.onsemi.com

MARKING DIAGRAMS



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

FUNCTION TABLE

Inputs	Outputs
A	\bar{Y}
L	H
H	L

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

MC74VHCT14A

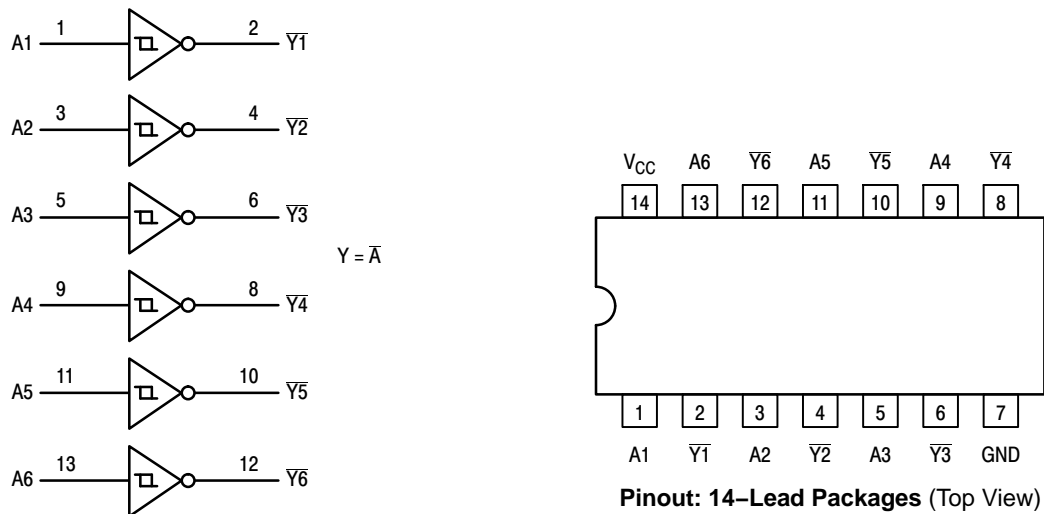


Figure 1. Logic Diagram

MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
DC Supply Voltage	V_{CC}	-0.5 to +7.0	V
DC Input Voltage	V_{IN}	-0.5 to +7.0	V
DC Output Voltage	Output in HIGH or LOW State (Note 1) V_{OUT}	-0.5 to $V_{CC} + 0.5$ V	V
$V_{CC} = 0$ V	V_{OUT}	-0.5 to 7.0	V
DC Input Diode Current	I_{IK}	-20	mA
DC Output Diode Current	I_{OK}	± 20	mA
DC Output Source/Sink Current	I_O	± 25	mA
DC Supply Current per Supply Pin	I_{CC}	± 50	mA
DC Ground Current per Ground Pin	I_{GND}	± 50	mA
Storage Temperature Range	T_{STG}	-65 to +150	$^{\circ}\text{C}$
Lead Temperature, 1 mm from Case for 10 Seconds	T_L	260	$^{\circ}\text{C}$
Junction Temperature under Bias	T_J	+150	$^{\circ}\text{C}$
Thermal Resistance	SOIC TSSOP θ_{JA}	125 170	$^{\circ}\text{C}/\text{W}$
Power Dissipation in Still Air	SOIC TSSOP P_D	500 450	mW
ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4) V_{ESD}	>2000 >200 2000	V
Latchup Performance	Above V_{CC} and Below GND at 85 $^{\circ}\text{C}$ (Note 5) $I_{Latchup}$	± 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.

- I_O absolute maximum rating must be observed.
- Tested to EIA/JESD22-A114-A.
- Tested to EIA/JESD22-A115-A.
- Tested to JESD22-C101-A.
- Tested to EIA/JESD78.

MC74VHCT14A

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V _{CC}	4.5	5.5	V
Input Voltage	V _I	0	5.5	V
Output Voltage (Note 6)	V _O	0	V _{CC}	V
V _{CC} = 0 V	V _O	0	5.5	V
Operating Free-Air Temperature	T _A	-55	+125	°C

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.

6. I_O absolute maximum rating must be observed.

DC ELECTRICAL CHARACTERISTICS

Parameter	Test Conditions	Symbol	V _{CC} V	T _A = 25°C			T _A ≤ 85°C		T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
Positive Threshold Voltage		V _{T+}	4.5 5.5			1.9 2.1		1.9 2.1		1.9 2.1	V
Negative Threshold Voltage		V _{T-}	4.5 5.5	0.5 0.6			0.5 0.6		0.5 0.6		V
Hysteresis Voltage		V _H	4.5 5.5	0.40 0.40		1.40 1.50	0.40 0.40	1.40 1.50	0.40 0.40	1.40 1.50	V
Minimum High-Level Output Voltage I _{OH} = -50 μA	V _{IN} = V _{IH} or V _{IL} I _{OH} = -50 μA	V _{OH}	4.5	4.4	4.5		4.4		4.4		V
	I _{OH} = -8.0 mA		5.5	3.94			3.80		3.66		
Maximum Low-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OL} = 50 μA	V _{OL}	4.5		0.0	0.1		0.1		0.1	V
	I _{OL} = 8.0 mA		5.5			0.36		0.44		0.52	
Maximum Input Leakage Current	V _{IN} = 5.5 V or GND	I _{IN}	0 to 5.5			±0.1		±1.0		±1.0	μA
Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND	I _{CC}	5.5			2.0		20		40	μA
Quiescent Supply Current	Input: V _{IN} = 3.4 V	I _{CC(T)}	5.5			1.35		1.50		1.65	mA
Output Leakage Current	V _{OUT} = 5.5 V	I _{OFF}	0.0			0.5		5.0		10	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.

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

Parameter	Test Conditions	Symbol	T _A = 25°C			T _A ≤ 85°C		T _A ≤ 125°C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
Maximum Propagation Delay, A to Y	V _{CC} = 5.0 ± 0.5 V C _L = 15 pF C _L = 50 pF	t _{PLH} , t _{PHL}		5.5 7.0	7.6 9.6	1.0 1.0	9.0 11.0	1.0 1.0	11.5 13.5	ns
Maximum Input Capacitance		C _{IN}		2.0	10		10		10	pF
Power Dissipation Capacitance (Note 7)		C _{PD}	Typical @ 25°C, V _{CC} = 5.0 V							pF
			11							

7. 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)

Characteristic	Symbol	T _A = 25°C		Unit
		Typ	Max	
Quiet Output Maximum Dynamic V _{OL}	V _{OLP}	0.8	1.0	V
Quiet Output Minimum Dynamic V _{OL}	V _{OLV}	-0.8	-1.0	V
Minimum High Level Dynamic Input Voltage	V _{IHD}		2.0	V
Maximum Low Level Dynamic Input Voltage	V _{ILD}		0.8	V

MC74VHCT14A

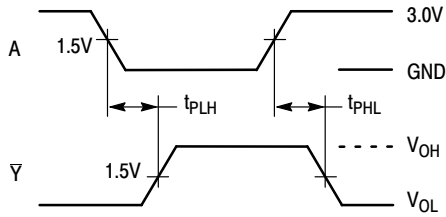
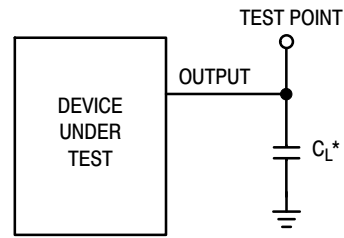


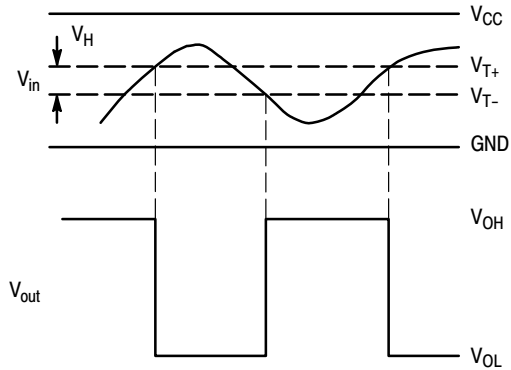
Figure 2. Switching Waveforms



*Includes all probe and jig capacitance

Figure 3. Test Circuit

(a) A Schmitt-Trigger Squares Up Inputs With Slow Rise and Fall Times



(b) A Schmitt-Trigger Offers Maximum Noise Immunity

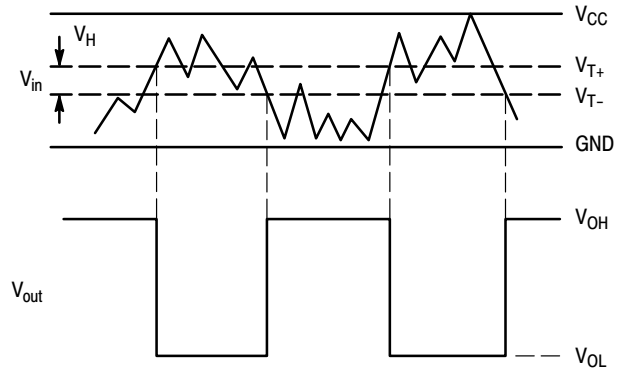


Figure 4. Typical Schmitt-Trigger Applications

ORDERING INFORMATION

Device	Package	Shipping†
MC74VHCT14ADR2G	SOIC-14 (Pb-Free)	2500 / Tape & Reel
NLV74VHCT14DR2G*		
MC74VHCT14ADTR2G	TSSOP-14 (Pb-Free)	
NLV74VHCT14ADTR2G*		

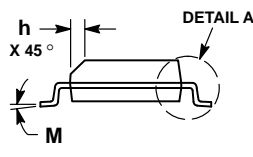
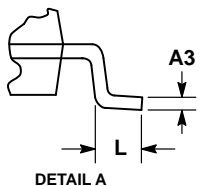
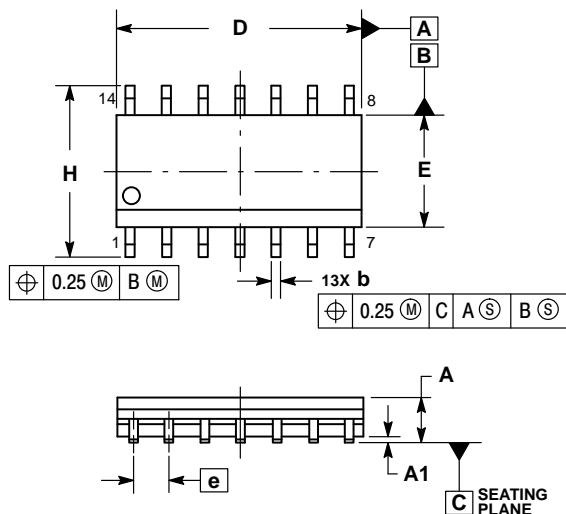
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

MC74VHCT14A

PACKAGE DIMENSIONS

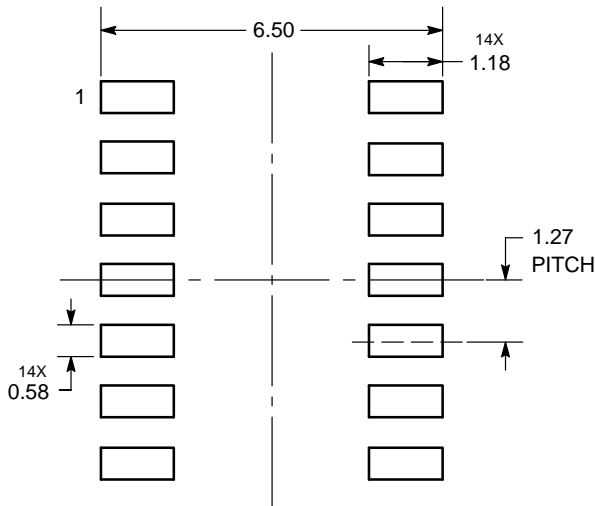
SOIC-14
CASE 751A-03
ISSUE K



- 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*



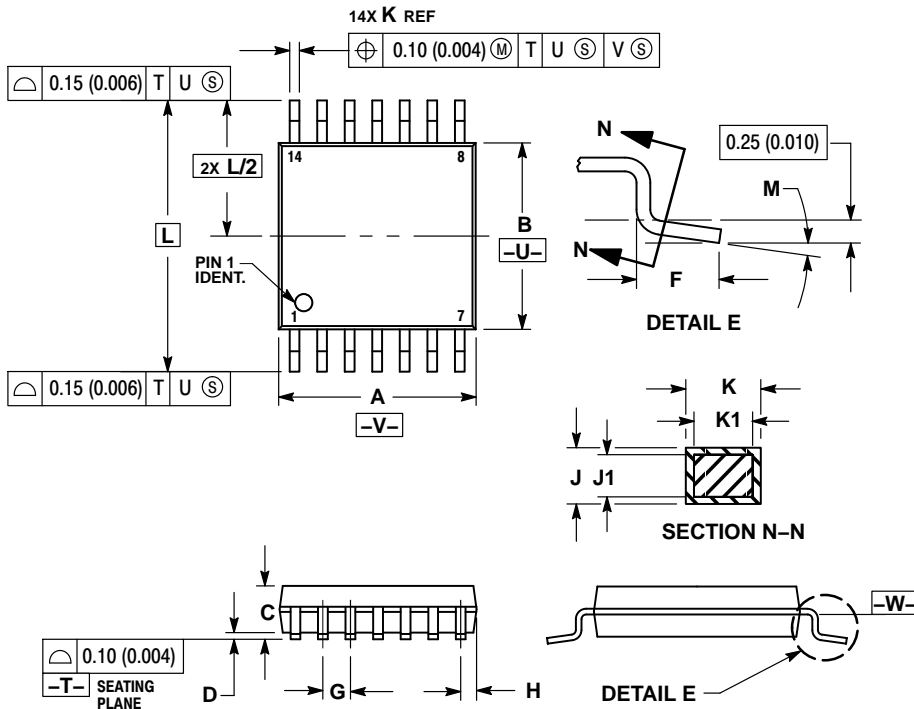
DIMENSIONS: MILLIMETERS

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

MC74VHCT14A

PACKAGE DIMENSIONS

TSSOP-14
CASE 948G
ISSUE B

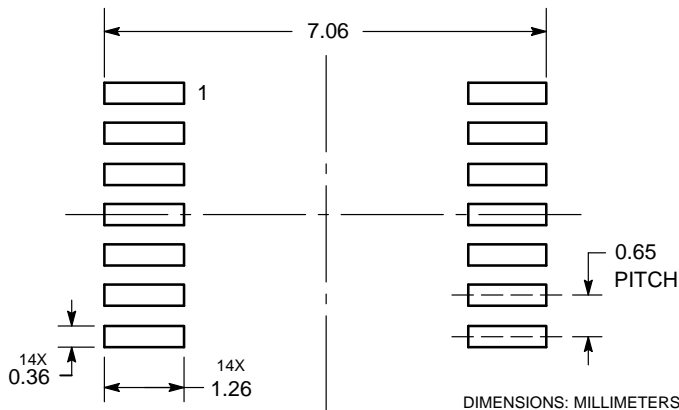


NOTES:

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 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-Marketing.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

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

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

For additional information, please contact your local Sales Representative



Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литера Н,
помещение 100-Н Офис 331