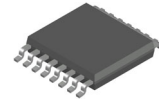
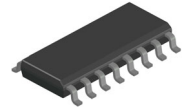


Dual 2-to-4 Decoder/Demultiplexer

74VHC139



TSSOP-16,
CASE 948AH



SOIC-16,
CASE 751BG

General Description

The VHC139 is an advanced high speed CMOS Dual 2-to-4 Decoder/Demultiplexer fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.

The active LOW enable input can be used for gating or it can be used as a data input for demultiplexing applications. When the enable input is held HIGH, all four outputs are fixed at a HIGH logic level independent of the other inputs. An input protection circuit ensures that 0 V to 5.5 V can be applied to the input pins without regard to the supply voltage.

This device can be used to interface 5 V to 3 V systems and two supply systems such as battery back up. This circuit prevents device destruction due to mismatched supply and input voltages.

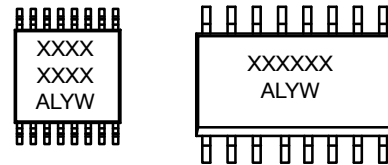
Features

- High Speed: $t_{PD} = 5.0 \text{ ns}$ (typ.) at $T_A = 25^\circ\text{C}$
- Low Power Dissipation: $I_{CC} = 4 \mu\text{A}$ (Max.) at $T_A = 25^\circ\text{C}$
- High Noise Immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (min.)
- Power Down Protection is Provided on All Inputs
- Pin and Function Compatible with 74HC139
- Pb-Free, Halogen Free/BFR Free and RoHS Compliant

TRUTH TABLE

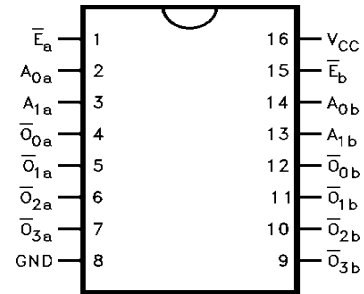
Inputs			Outputs			
\bar{E}	A_0	A_1	\bar{O}_0	\bar{O}_1	\bar{O}_2	\bar{O}_3
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	H	L	H	L	H	H
L	L	H	H	H	L	H
L	H	H	H	H	H	L

MARKING DIAGRAM



XXXXXXX = Specific Device Code
 A = Assembly Location
 L = Wafer Lot
 Y = Year
 WW,W = Work Week

CONNECTION DIAGRAM



PIN DESCRIPTION

Pin Names	Description
A_0, A_1	Address Inputs
\bar{E}	Enable Inputs
$\bar{O}_0-\bar{O}_3$	Enable Inputs

ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit	
V _{CC}	DC Supply Voltage	-0.5 to + 6.5	V	
V _I	DC Input Voltage	-0.5 to + 6.5	V	
V _{OUT}	DC Output Voltage	-0.5 V to V _{CC} + 0.5	V	
I _{IN}	DC Input Current, Per pin	±20	mA	
I _{OUT}	DC Output Current, Per pin	±25	mA	
I _{CC}	DC Supply Current Current, V _{CC} and GND Per pins	±75	mA	
I _{IK}	Input Clamp Current	-20	mA	
I _{OK}	Output Clamp Current	±20	°C	
T _{STG}	Storage Temperature Range	-65 to +150	°C	
T _L	Lead Temperature, 1 mm from Case for 10 secs	260	°C	
T _J	Junction Temperature Under Bias	+150	°C	
θ _{JA}	Thermal Resistance (Note 2)	SOIC-16 QFN16 TSSOP-16	126 118 159	°CW
P _D	Power Dissipation in Still Air at 25°C	SOIC-16 QFN16 TSSOP-16	995 1062 787	mW
MSL	Moisture Sensitivity	Level 1	-	
F _R	Flammability Rating (Note 2)	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.139 in	-
V _{ESD}	ESD Withstand Voltage (Note 3)	Human Body Model Charged Device Model	2000 N/A	V

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. Applicable to devices with outputs that may be tri-stated.
2. Measured with minimum pad spacing on an FR4 board, using 76mm-by-114mm, 2-ounce copper trace no air flow per JESD51-7.
3. HBM tested to EIA / JESD22-A114-A. CDM tested to JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued.

RECOMMENDED OPERATING CONDITIONS (Note 3)

Symbol	Parameter	Min.	Max.	Unit
V _{CC}	DC Supply Voltage	2.0	5.5	V
V _{IN}	DC Input Voltage (Note 4)	0	5.5	V
V _{OUT}	DC Output Voltage (Note 4)	0	V _{CC}	V
T _A	Operating Temperature	-40	+85	°C
t _r ,t _f	Input Rise or Fall Rate	V _{CC} = 3.0 V to 3.6 V V _{CC} = 4.5 V to 5.5 V	0 100 20	ns/V

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.

74VHC139

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = 25°C			T _A = -40°C to +85°C		Unit	
				Min	Typ	Max	Min	Max		
V _{IH}	HIGH Level Input Voltage		2.0	1.50	-	-	1.50	-	V	
			3.0-5.5	0.7 V _{CC}	-	-	0.7 V _{CC}	-		
V _{IL}	LOW Level Input Voltage		2.0	-	-	0.50	-	0.50	V	
			3.0-5.5	-	-	0.3 V _{CC}	-	0.3 V _{CC}		
V _{OH}	HIGH Level Output Voltage	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50 μA	2.0	1.9	2.0	-	1.9	-	V
				3.0	2.9	3.0	-	2.9	-	
				4.5	4.4	4.5	-	4.4	-	
			I _{OH} = -4 mA	3.0	2.58	-	-	2.48	-	
			I _{OH} = -8 mA	4.5	3.94	-	-	3.80	-	
V _{OL}	LOW Level Output Voltage	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 50 μA	2.0	-	0.0	0.1	-	0.1	V
				3.0	-	0.0	0.1	-	0.1	
				4.5	-	0.0	0.1	-	0.1	
			I _{OL} = 4 mA	3.0	-	-	0.36	-	0.44	
			I _{OL} = 8 mA	4.5	-	-	0.36	-	0.44	
I _{IN}	Input Leakage Current	V _{IN} = 5.5 V or GND	0-5.5	-	-	±0.1	-	±1.0	μA	
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5	-	-	40.0	-	40.0	μA	

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = 25°C			T _A = -40°C to +85°C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay	C _L = 15 pF	3.3 ±0.3	-	7.2	11.0	1.0	13.0	ns
		C _L = 50 pF		-	9.7	14.5	1.0	16.5	
t _{PHL}	A _n to \bar{O}_n	C _L = 15 pF	5.0 ±0.5	-	5.0	7.2	1.0	8.5	ns
		C _L = 50 pF		-	6.5	9.2	1.0	10.5	
t _{PLH}	Propagation Delay	C _L = 15 pF	3.3 ±0.3	-	6.4	9.2	1.0	11.0	ns
		C _L = 50 pF		-	8.9	12.7	1.0	14.5	
t _{PHL}	E _n to \bar{O}_n	C _L = 15 pF	5.0 ±0.5	-	4.4	6.3	1.0	7.5	ns
		C _L = 50 pF		-	5.9	8.3	1.0	9.5	
C _{IN}	Input Capacitance	V _{CC} = Open	-	-	4	10	-	10	pF
C _{PD}	Power Dissipation Capacitance	(Note 3)	-	-	26	-	-	-	pF

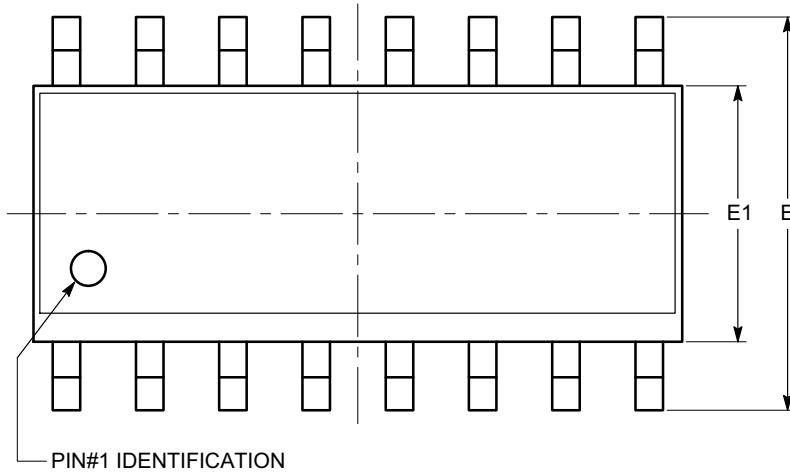
ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
74VHC139MX	VHC139	SOIC-16	2,500 Units / Tape & Reel
74VHC139MTCX	VHC 139	TSSOP-16	2,500 Units / 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](#).

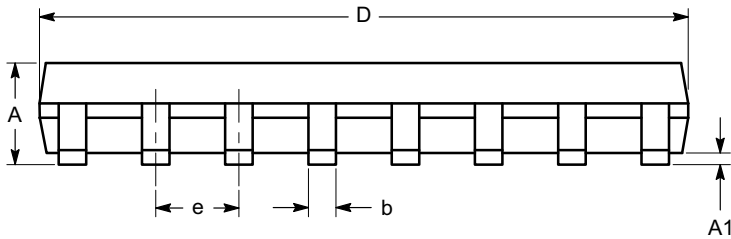
SOIC-16, 150 mils
CASE 751BG
ISSUE O

DATE 19 DEC 2008

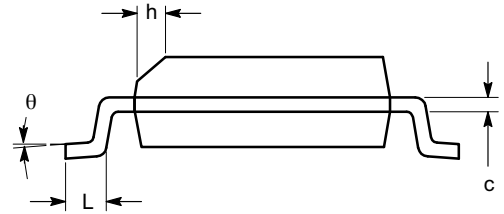


SYMBOL	MIN	NOM	MAX
A	1.35		1.75
A1	0.10		0.25
b	0.33		0.51
c	0.19		0.25
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
h	0.25		0.50
L	0.40		1.27
θ	0°		8°

TOP VIEW



SIDE VIEW



END VIEW

Notes:

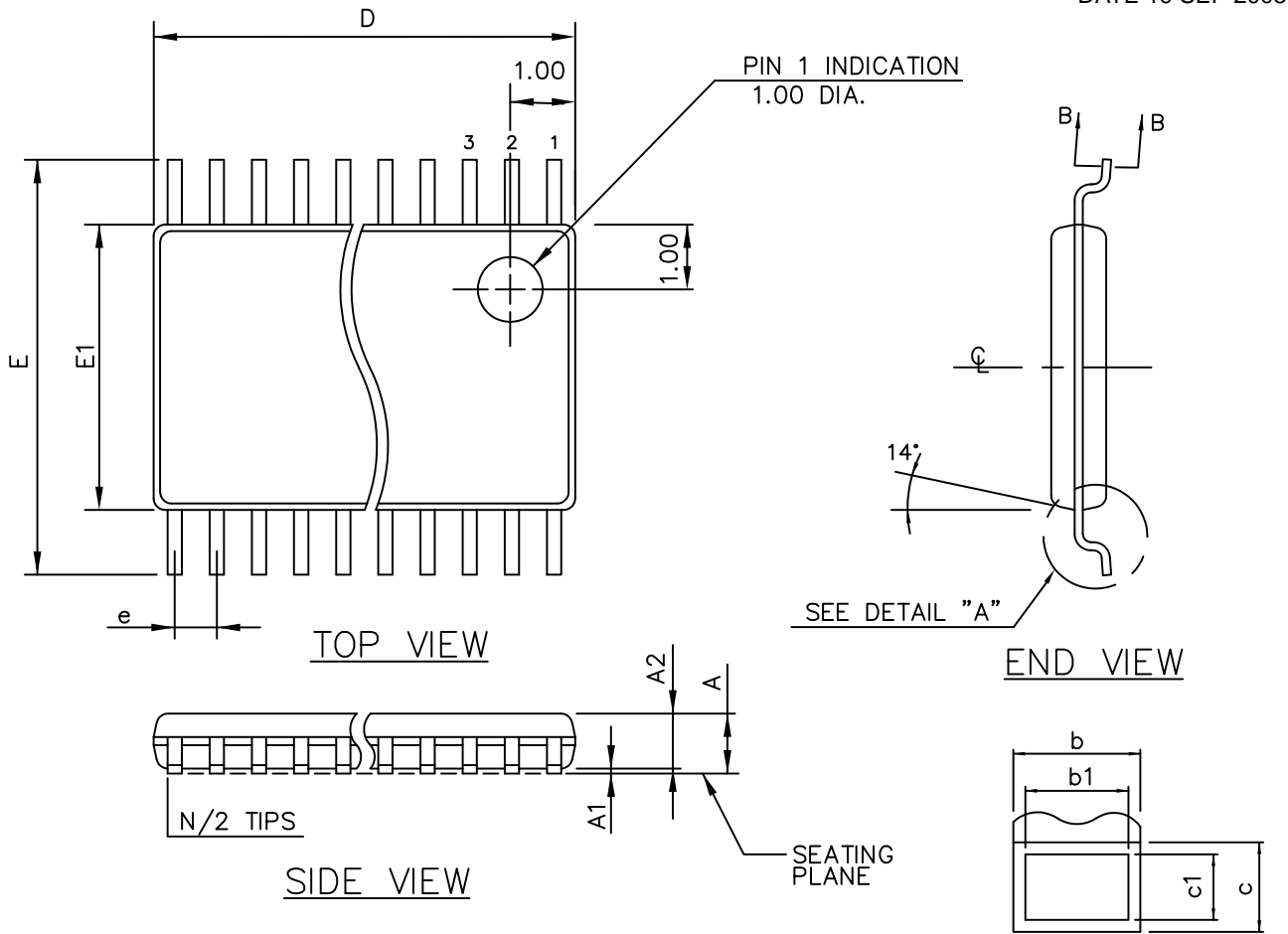
- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MS-012.

DOCUMENT NUMBER:	98AON34275E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOIC-16, 150 mils	PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the 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. onsemi does not convey any license under its patent rights nor the rights of others.

TSSOP 16
CASE 948AH
ISSUE O

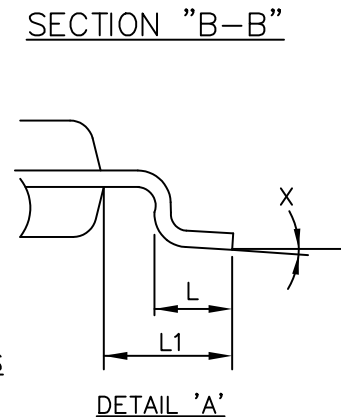
DATE 19 SEP 2008



THIS TABLE FOR 0.65mm PITCH

SYMBOL	COMMON DIMENSIONS			NOTE VARIATIONS	D	N
	MIN.	NOM.	MAX.			
A	—	—	1.10	AA/AAT	3.00 BSC	8
A ₁	0.05	—	0.15	AB-1/ABT	5.00 BSC	14
A ₂	0.85	0.90	0.95	AB/ABT	5.00 BSC	16
b	0.19	—	0.30	AD/ADT	7.80 BSC	24
b1	0.19	0.22	0.25			
c	0.09	—	0.20			
c1	0.09	0.127	0.16			
D	SEE VARIATIONS					
E1	4.30	4.40	4.50			
e	0.65 BSC					
E	6.40 BSC					
L	0.50	0.60	0.70			
L1	1.00 REF					
N	SEE VARIATIONS					
X	0°	—	8°			

ALL DIMENSIONS IN MILLIMETERS



MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15mm ON D PER SIDE

DOCUMENT NUMBER:	98AON34923E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TSSOP 16	PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the 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. onsemi 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. **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
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales