

MC74VHC244

Octal Bus Buffer

The MC74VHC244 is an advanced high speed CMOS octal bus buffer fabricated with silicon gate CMOS technology.

The MC74VHC244 is a noninverting 3-state buffer, and has two active-low output enables. This device is designed to be used with 3-state memory address drivers, 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 V, allowing the interface of 5 V systems to 3 V systems.

- High Speed: $t_{PD} = 3.9 \text{ ns}$ (Typ) at $V_{CC} = 5 \text{ V}$
- Low Power Dissipation: $I_{CC} = 4 \mu\text{A}$ (Max) at $T_A = 25^\circ\text{C}$
- High Noise Immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$
- Power Down Protection Provided on Inputs
- Balanced Propagation Delays
- Designed for 2 V to 5.5 V Operating Range
- Low Noise: $V_{OLP} = 0.9 \text{ V}$ (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: 136 FETs
- 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

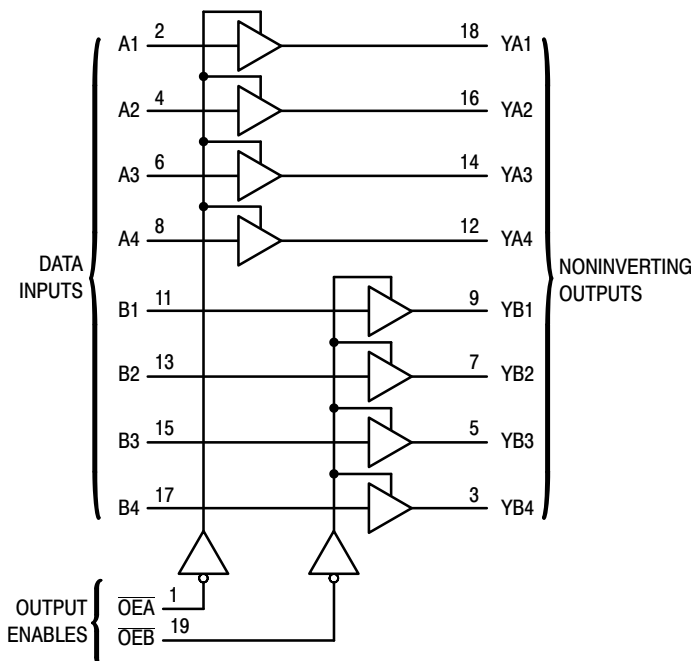


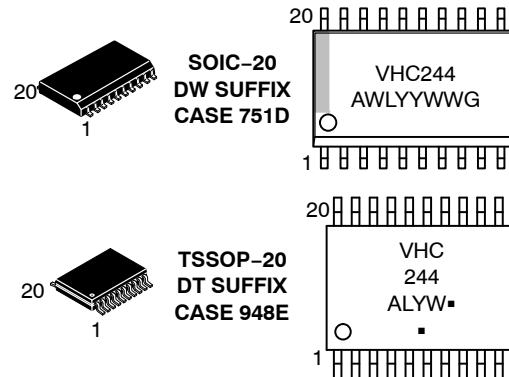
Figure 1. Logic Diagram



ON Semiconductor™

<http://onsemi.com>

MARKING DIAGRAMS



VHC244 = Specific Device Code
 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)

PIN ASSIGNMENT

OE A	1	20	V_{CC}
A1	2	19	$\overline{OE} B$
YB4	3	18	YA1
A2	4	17	B4
YB3	5	16	YA2
A3	6	15	B3
YB2	7	14	YA3
A4	8	13	B2
YB1	9	12	YA4
GND	10	11	B1

ORDERING INFORMATION

See detailed ordering and shipping information in the Ordering Information Table on page 2 of this data sheet.

MC74VHC244

FUNCTION TABLE

INPUTS		OUTPUTS
\overline{OEA} , \overline{OEB}	A, B	YA, YB
L	L	L
L	H	H
H	X	Z

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74VHC244DWR2G	SOIC-20 WB (Pb-Free)	1000/Tape & Reel
MC74VHC244DTG	TSSOP-20 (Pb-Free)	75 Units/Rail
MC74VHC244DTR2G		2500/Tape & Reel
NLV74VHC244DTR2G*		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.

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

MAXIMUM RATINGS (Note 1)

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 500 450	mW
T_{STG}	Storage Temperature Range	-65 to +150	°C
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4) >2000 >200 >2000	V
$I_{LATCHUP}$	Latchup Performance	Above V_{CC} and Below GND at 125°C (Note 5)	± 300 mA
θ_{JA}	Thermal Resistance, Junction-to-Ambient	SOIC TSSOP 96 128	°C/W

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

MC74VHC244

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	°C
t_r, t_f	Input Rise or Fall Time			ns/V
			$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$	0
			$V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$	100
				20

DEVICE JUNCTION TEMPERATURE VERSUS TIME TO 0.1% BOND FAILURES

Junction Temperature °C	Time, Hours	Time, Years
80	1,032,200	117.8
90	419,300	47.9
100	178,700	20.4
110	79,600	9.4
120	37,000	4.2
130	17,800	2.0
140	8,900	1.0

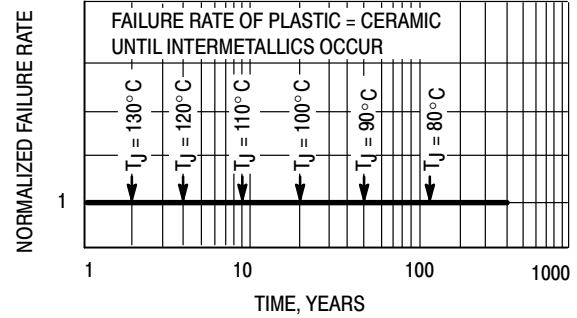


Figure 2. Failure Rate vs. Time Junction Temperature

DC CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Condition	V_{CC} (V)	$T_A = 25^\circ\text{C}$			$T_A \leq 85^\circ\text{C}$		$-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V_{IH}	Minimum High-Level Input Voltage		2.0 3.0 to 5.5	1.5 V_{CCX} 0.7			1.5 V_{CCX} 0.7	1.5 V_{CCX} 0.7	1.5 V_{CCX} 0.7		V
V_{IL}	Maximum Low-Level Input Voltage		2.0 3.0 to 5.5			0.5 V_{CCX} 0.3		0.5 V_{CCX} 0.3		0.5 V_{CCX} 0.3	V
V_{OH}	Maximum High-Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL} $I_{OH} = -50\ \mu\text{A}$	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5		1.9 2.9 4.4		1.9 2.9 4.4		V
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OH} = -4\ \text{mA}$ $I_{OH} = -8\ \text{mA}$	3.0 4.5	2.58 3.94			2.48 3.8		2.34 3.66		
V_{OL}	Maximum Low-Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL} $I_{OL} = 50\ \mu\text{A}$	2.0 3.0 4.5		0.0 0.0 0.0	0.1 0.1 0.1		0.1 0.1 0.1		0.1 0.1 0.1	V
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OH} = 4\ \text{mA}$ $I_{OH} = 8\ \text{mA}$	3.0 4.5			0.36 0.36		0.44 0.44		0.52 0.52	
I_{IN}	Input Leakage Current	$V_{IN} = 5.5\ \text{V}$ or GND	0 to 5.5			± 0.1		± 1.0		± 1.0	μA
I_{OZ}	Maximum 3-State Leakage Current	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND	5.5			± 0.25		± 2.5		± 2.5	μA
I_{CC}	Maximum Quiescent Supply Current (per package)	$V_{IN} = V_{CC}$ or GND	5.5			4.0		40.0		40.0	μA

MC74VHC244

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

Symbol	Parameter	Test Conditions	$T_A = 25^\circ\text{C}$			$T_A \leq 85^\circ\text{C}$		$-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_{PLH} , t_{PHL}	Maximum Propagation Delay, A to YA or B to YB	$V_{CC} = 3.3 \pm 0.3$ V $C_L = 15$ pF		5.8	8.4	1.0	10.0	1.0	11.0	ns
		$C_L = 50$ pF		8.3	11.9	1.0	13.5	1.0	14.5	
		$V_{CC} = 5.0 \pm 0.5$ V $C_L = 15$ pF		3.9	5.5	1.0	6.5	1.0	7.5	
		$C_L = 50$ pF		5.4	7.5	1.0	8.5	1.0	9.5	
t_{PZL} , t_{PZH}	Output Enable Time $\overline{OE}A$ to YA or $\overline{OE}B$ to YB	$V_{CC} = 3.3 \pm 0.3$ V $C_L = 15$ pF		6.6	10.6	1.0	12.5	1.0	13.5	ns
		$R_L = 1$ k Ω $C_L = 50$ pF		9.1	14.1	1.0	16.0	1.0	17.0	
		$V_{CC} = 5.0 \pm 0.5$ V $C_L = 15$ pF		4.7	7.3	1.0	8.5	1.0	9.5	
		$R_L = 1$ k Ω $C_L = 50$ pF		6.2	9.3	1.0	10.5	1.0	11.5	
t_{PLZ} , t_{PHZ}	Output Disable Time $\overline{OE}A$ to YA or $\overline{OE}B$ to YB	$V_{CC} = 3.3 \pm 0.3$ V $C_L = 50$ pF		10.3	14.0	1.0	16.0	1.0	17.0	ns
		$R_L = 1$ k Ω								
		$V_{CC} = 5.0 \pm 0.5$ V $C_L = 50$ pF		6.7	9.2	1.0	10.5	1.0	11.5	
		$R_L = 1$ k Ω								
t_{OSLH} , t_{OSHL}	Output to Output Skew	$V_{CC} = 3.3 \pm 0.3$ V $C_L = 50$ pF (Note 6)			1.5		1.5		1.5	ns
		$V_{CC} = 5.0 \pm 0.5$ V $C_L = 50$ pF (Note 6)			1.0		1.0		1.5	
C_{in}	Maximum Input Capacitance			4	10		10		10	pF
C_{out}	Maximum Three-State Output Capacitance (Output in High-Impedance State)			6						pF

C_{PD}	Power Dissipation Capacitance (Note 7)	Typical @ 25°C, $V_{CC} = 5.0$ V		pF
		19		

6. Parameter guaranteed by design. $t_{OSLH} = |t_{PLHm} - t_{PLHn}|$, $t_{OSHL} = |t_{PHLm} - t_{PHLn}|$.

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: $I_{CC(OPR)} = C_{PD} \cdot V_{CC} \cdot f_{in} + I_{CC}/8$ (per bit). C_{PD} is used to determine the no-load dynamic power consumption; $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$.

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

Symbol	Parameter	$T_A = 25^\circ\text{C}$		Unit
		Typ	Max	
V_{OLP}	Quiet Output Maximum Dynamic V_{OL}	0.6	0.9	V
V_{OLV}	Quiet Output Minimum Dynamic V_{OL}	-0.6	-0.9	V
V_{IHD}	Minimum High Level Dynamic Input Voltage		3.5	V
V_{ILD}	Maximum Low Level Dynamic Input Voltage		1.5	V

MC74VHC244

SWITCHING WAVEFORMS

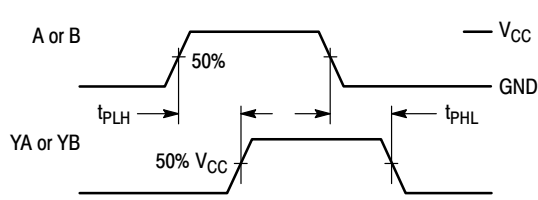


Figure 3. Switching Waveform

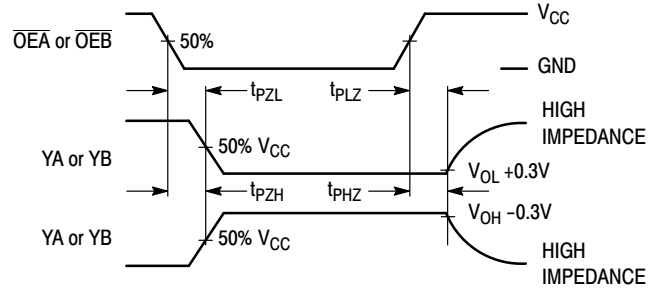
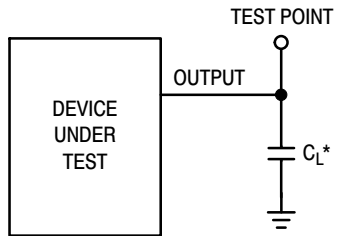


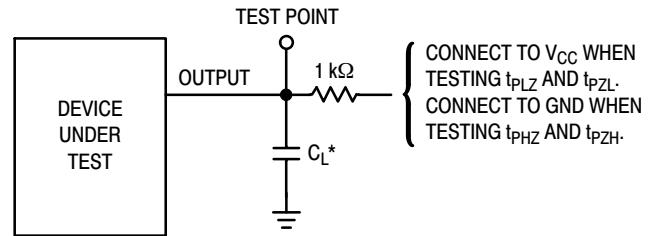
Figure 4. Switching Waveform

TEST CIRCUITS



*Includes all probe and jig capacitance

Figure 5. Test Circuit



*Includes all probe and jig capacitance

Figure 6. Test Circuit

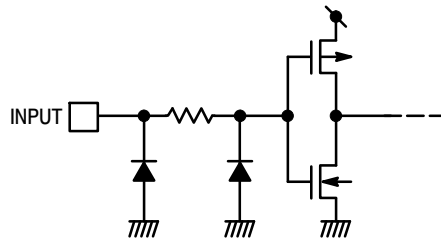
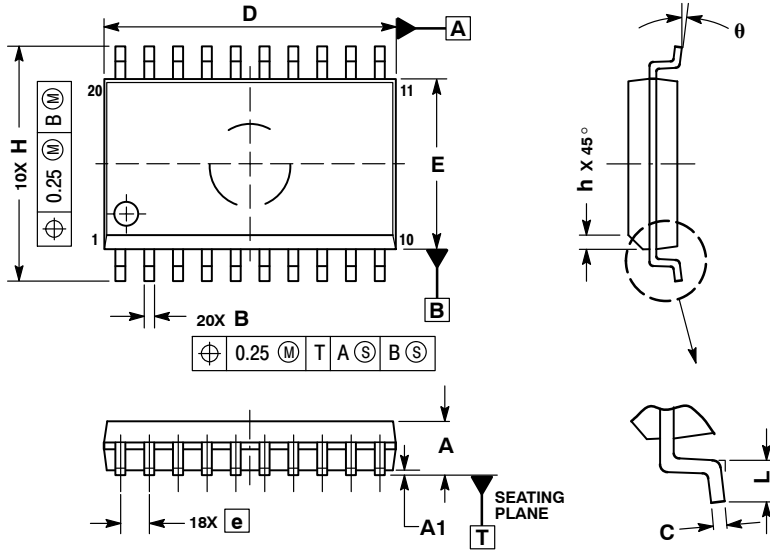


Figure 7. Input Equivalent Circuit

MC74VHC244

PACKAGE DIMENSIONS

SOIC-20 WB
DW SUFFIX
CASE 751D-05
ISSUE G



NOTES:

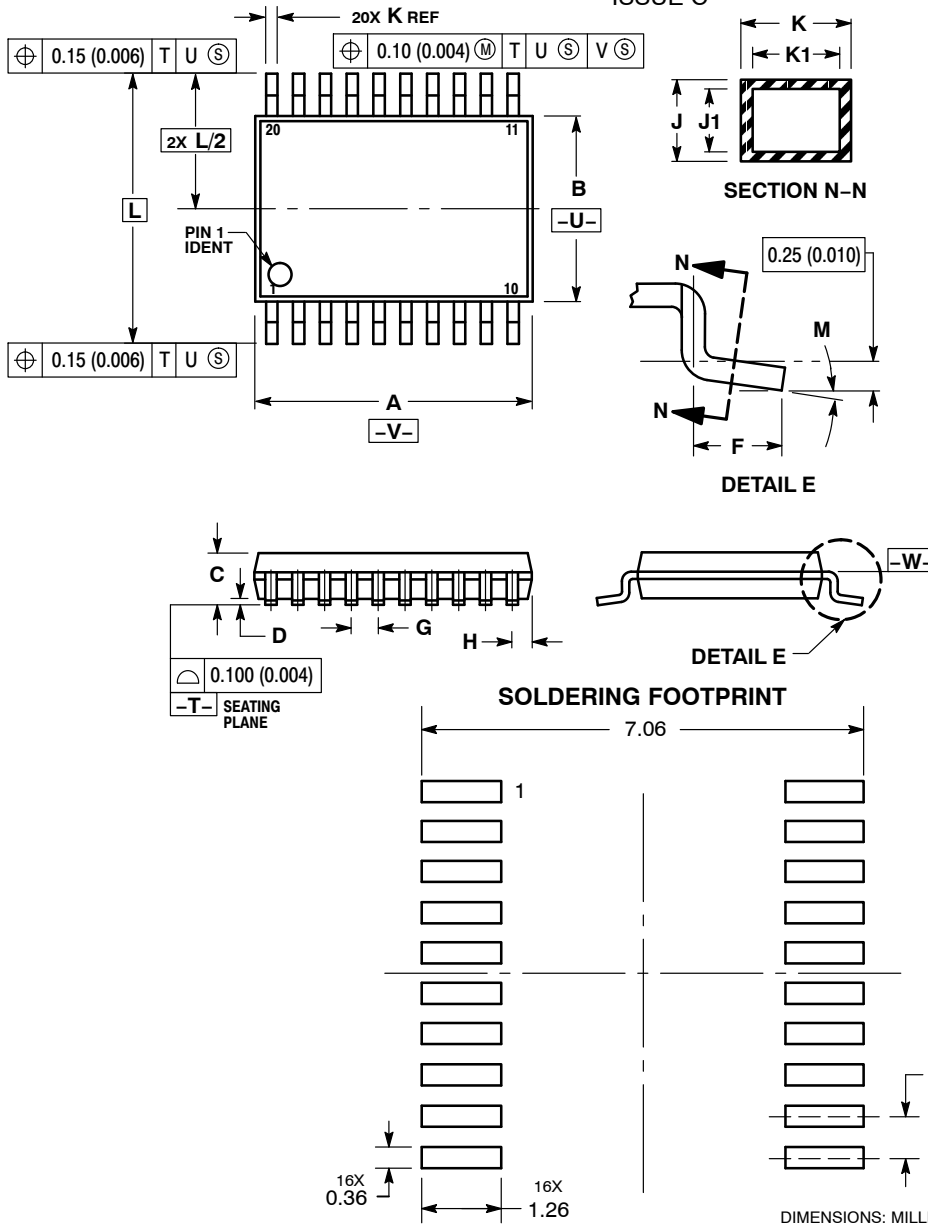
1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	12.65	12.95
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
θ	0°	7°

MC74VHC244

PACKAGE DIMENSIONS

TSSOP-20
CASE 948E-02
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	6.40	6.60	0.252	0.260
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	0.27	0.37	0.011	0.015
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°

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. 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: 81-3-5817-1050

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

For additional information, please contact your local Sales Representative

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А