MC74HC1G02

Single 2-Input NOR Gate

The MC74HC1G02 is a high speed CMOS 2−input NOR gate fabricated with silicon gate CMOS technology.

The internal circuit is composed of multiple stages, including a buffer output which provides high noise immunity and stable output.

The MC74HC1G02 output drive current is 1/2 compared to MC74HC series.

Features

- High Speed: t_{PD} = 7 ns (Typ) at V_{CC} = 5 V
- Low Power Dissipation: I_{CC} = 1 μA (Max) at T_A = 25°C
- High Noise Immunity
- Balanced Propagation Delays ($t_{pLH} = t_{pHL}$)
- Symmetrical Output Impedance ($I_{OH} = I_{OL}$ = 2 mA)
- Chip Complexity: < 100 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, Halogen Free/BFR Free and are RoHS Compliant

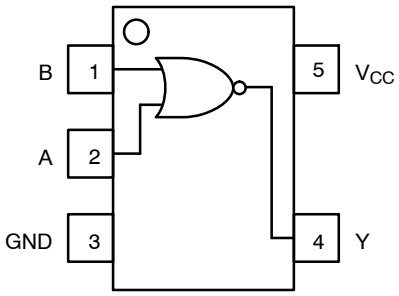

Figure 1. Pinout

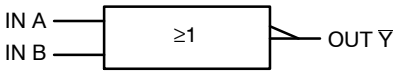

Figure 2. Logic Symbol

PIN ASSIGNMENT	
1	B
2	A
3	GND
4	Y
5	V_{CC}

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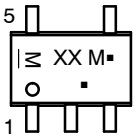
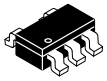
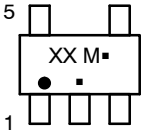
MARKING DIAGRAMS

SC−88A
DF SUFFIX
CASE 419A





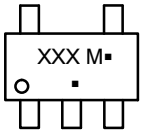
TSOP−5
DT SUFFIX
CASE 483



XX = Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)
*Date Code orientation and/or position may vary depending upon manufacturing location.

SC−74A
DBV SUFFIX
CASE 318BQ



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

FUNCTION TABLE

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

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 6 of this data

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage	SC−88A (NLV), TSOP−5 SC−88A, SC−74A	−0.5 to +7.0 −0.5 to +6.5	V
V_{IN}	DC Input Voltage		−0.5 to V_{CC} +0.5	V
V_{OUT}	DC Output Voltage		−0.5 to V_{CC} +0.5	V
I_{IK}	DC Input Diode Current		±20	mA
I_{OK}	DC Output Diode Current		±20	mA
I_{OUT}	DC Output Source/Sink Current		±12.5	mA
I_{CC} or I_{GND}	DC Supply Current per Supply Pin or Ground Pin		±25	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
θ_{JA}	Thermal Resistance (Note 1)	SC70−5/SC−88A/SOT−353 SOT23−5/TSOP−5/SC59−5 SC−74A	659 555 555	°C/W
P_D	Power Dissipation in Still Air at 85°C	SC70−5/SC−88A/SOT−353 SOT23−5/TSOP−5/SC59−5 SC−74A	190 225 225	mW
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V−0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage (Note 2)	Human Body Model Charged Device Model	2000 1000	V
$I_{LATCHUP}$	Latchup Performance (Note 3)	SC−88A (NLV), SOT−23 SC−88A, SC−74A	±500 ±100	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. Measured with minimum pad spacing on an FR4 board, using 10 mm−by−1 inch, 20 ounce copper trace with no air flow.
2. HBM tested to ANSI/ESDA/JEDEC JS−001−2017. CDM tested to JESD22−C101−F. JEDEC recommends that ESD qualification to EIA/JESD22−A115A (Machine Model) be discontinued per JEDEC/JEP172A.
3. Tested to EIA/JESD78 Class II.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage		2.0	6.0	V
V_{IN}	DC Input Voltage		0.0	V_{CC}	V
V_{OUT}	DC Output Voltage		0.0	V_{CC}	V
T_A	Operating Temperature Range		−55	+125	°C
t_r , t_f	Input Rise and Fall Time	SC−88A (NLV), TSOP−5			ns/V
		V_{CC} = 2.0 V	0	1000	
		V_{CC} = 3.0 V	0	600	
		V_{CC} = 4.5 V	0	500	
		V_{CC} = 6.0 V	0	400	
	Input Rise and Fall Time	SC−88A, SC−74A			
		V_{CC} = 1.65 V to 1.95 V	0	20	
		V_{CC} = 2.3 V to 2.7 V	0	20	
		V_{CC} = 3.0 V to 3.6 V	0	10	
		V_{CC} = 4.5 V to 6.0 V	0	5	

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.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V_{CC}	T_A = 25°C			−40°C ≤ T_A ≤ 85°C		−55°C ≤ T_A ≤ 125°C		Unit
			(V)	Min	Typ	Max	Min	Max	Min	Max	
V_{IH}	High−Level Input Voltage		2.0	1.5	–	–	1.5	–	1.5	–	V
			3.0	2.1	–	–	2.1	–	2.1	–	
			4.5	3.15	–	–	3.15	–	3.15	–	
			6.0	4.20	–	–	4.20	–	4.20	–	
V_{IL}	Low−Level Input Voltage		2.0	–	–	0.5	–	0.5	–	0.5	V
			3.0	–	–	0.9	–	0.9	–	0.9	
			4.5	–	–	1.35	–	1.35	–	1.35	
			6.0	–	–	1.80	–	1.80	–	1.80	
V_{OH}	High−Level Output Voltage	V_{IN} = V_{IH} or V_{IL} I_{OH} = −20 μA	2.0	1.9	2.0	–	1.9	–	1.9	–	V
			3.0	2.9	3.0	–	2.9	–	2.9	–	
			4.5	4.4	4.5	–	4.4	–	4.4	–	
			6.0	5.9	6.0	–	5.9	–	5.9	–	
		V_{IN} = V_{IH} or V_{IL} I_{OH} = −2 mA I_{OH} = −2.6 mA	4.5	4.18	4.31	–	4.13	–	4.08	–	
			6.0	5.68	5.80	–	5.63	–	5.58	–	
V_{OL}	Low−Level Output Voltage	V_{IN} = V_{IH} or V_{IL} I_{OL} = 20 μA	2.0	–	0.0	0.1	–	0.1	–	0.1	V
			3.0	–	0.0	0.1	–	0.1	–	0.1	
			4.5	–	0.0	0.1	–	0.1	–	0.1	
			6.0	–	0.0	0.1	–	0.1	–	0.1	
		V_{IN} = V_{IH} or V_{IL} I_{OL} = 2 mA I_{OL} = 2.6 mA	4.5	–	0.17	0.26	–	0.33	–	0.40	
			6.0	–	0.18	0.26	–	0.33	–	0.40	
I_{IN}	Input Leakage Current	V_{IN} = 6.0 V or GND	6.0	–	–	±0.1 *	–	±1.0	–	±1.0	μA
I_{CC}	Quiescent Supply Current	V_{IN} = V_{CC} or GND	6.0	–	–	1.0	–	10	–	40	μA

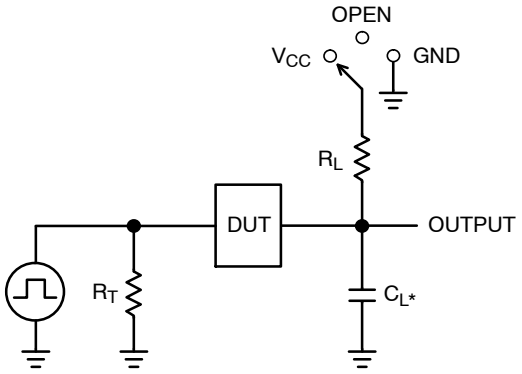
*Guaranteed by design.

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 6.0$ ns)

Symbol	Parameter	Test Conditions	$T_A = 25°C$			$-40°C \le T_A \le 85°C$		$-55°C \le T_A \le 125°C$		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}, t_{PHL}	Propagation Delay, Input A or B to $\overline{Y}$	V_{CC} = 5.0 V C_L = 15 pF	–	3.5	15	–	20	–	25	ns
		V_{CC} = 2.0 V C_L = 50 pF	–	20	100	–	125	–	155	
		V_{CC} = 3.0 V	–	11	27	–	35	–	90	
		V_{CC} = 4.5 V	–	8	20	–	25	–	35	
		V_{CC} = 6.0 V	–	7	17	–	21	–	26	
t_{TLH}, t_{THL}	Output Transition Time	V_{CC} = 5.0 V C_L = 15 pF	–	3	10	–	15	–	20	ns
		V_{CC} = 2.0 V C_L = 50 pF	–	25	125	–	155	–	200	
		V_{CC} = 3.0 V	–	16	35	–	45	–	60	
		V_{CC} = 4.5 V	–	11	25	–	31	–	38	
		V_{CC} = 6.0 V	–	9	21	–	26	–	32	
C_{IN}	Input Capacitance		–	5	10	–	10	–	10	pF

		Typical @ 25°C, V_{CC} = 5.0 V	
C_{PD}	Power Dissipation Capacitance (Note 4)	10	pF

4. 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: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. C_{PD} is used to determine the no−load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.



Test	Switch Position	C_L, pF	R_L, Ω
t_{PLH} / t_{PHL}	Open	See AC Characteristics Table	X
t_{TLH} / t_{THL} (Note 5)	Open		X
t_{PLZ} / t_{PZL}	V_{CC}		1 k
t_{PHZ} / t_{PZH}	GND		1 k

X – Don't Care

*C_L includes probe and jig capacitance
R_T is Z_{OUT} of pulse generator (typically 50 W)
f = 1 MHz

Figure 3. Test Circuit

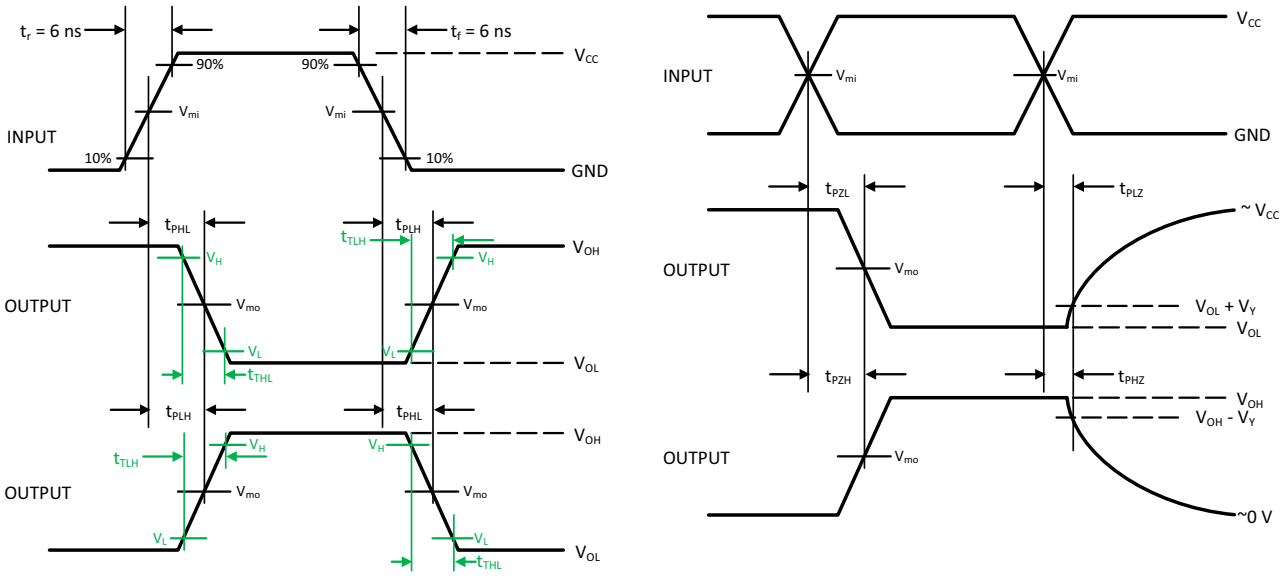


Figure 4. Switching Waveforms

V_{CC}, V	V_{mi}, V	V_{mo}, V		V_L, V	V_H, V	V_Y, V
		t_{PLH}, t_{PHL}	t_{PZL}, t_{PLZ}, t_{PZH}, t_{PHZ}			
3.0 to 3.6	V_{CC}/2	(V_{OH} – V_{OL})/2	V_{CC}/2	V_{OL} + 0.1 (V_{OH} – V_{OL})	V_{OL} + 0.9 (V_{OH} – V_{OL})	0.3
4.5 to 5.5	V_{CC}/2	(V_{OH} – V_{OL})/2	V_{CC}/2	V_{OL} + 0.1 (V_{OH} – V_{OL})	V_{OL} + 0.9 (V_{OH} – V_{OL})	0.3

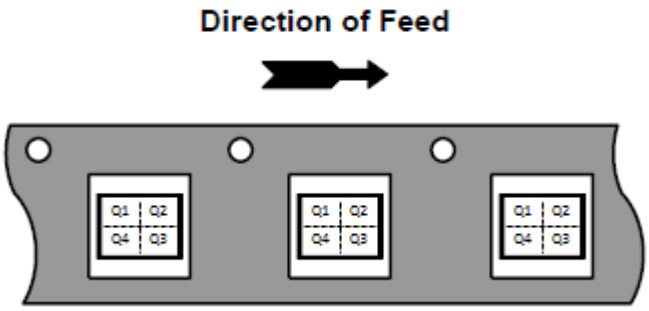
5. t_{TLH} and t_{THL} are measured from 10% to 90% of (V_{OH} – V_{OL}), and 90% to 10% of (V_{OH} – V_{OL}), respectively.

ORDERING INFORMATION

Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping†
MC74HC1G02DFT2G	SC−88A	H3	Q4	3000 / Tape & Reel
NLVHC1G02DFT2G*	SC−88A	H3	Q4	3000 / Tape & Reel
MC74HC1G02DTT1G	TSOP−5	H3	Q4	3000 / Tape & Reel
MC74HC1G02DBVT1G (In Development)	SC−74A	TBD	Q4	3000 / Tape & Reel

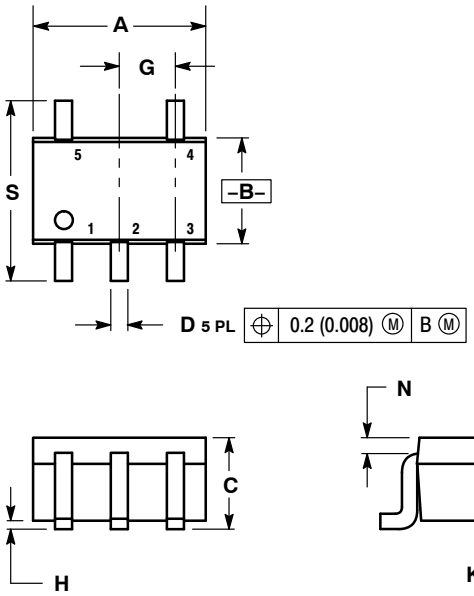
†For complete information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.
*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable.

Pin 1 Orientation in Tape and Reel



PACKAGE DIMENSIONS

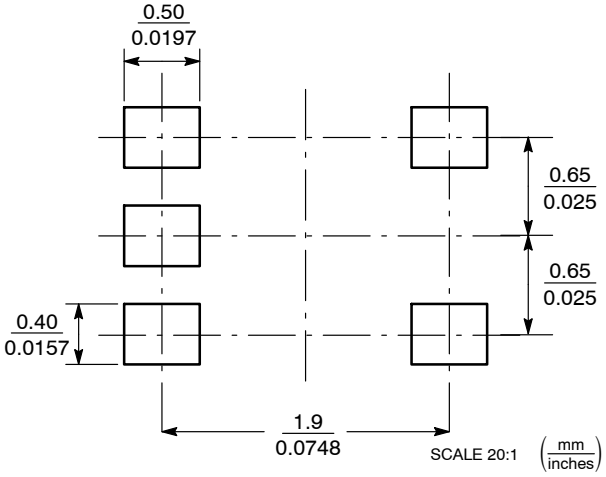
SC−88A (SC−70−5/SOT−353)
CASE 419A−02
ISSUE L



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A−01 OBSOLETE. NEW STANDARD 419A−02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

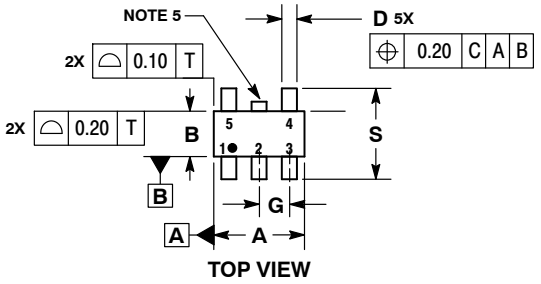
	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

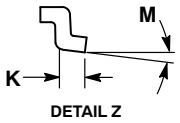
SOLDER FOOTPRINT

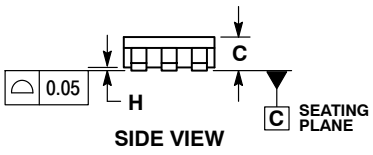


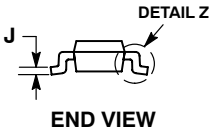
PACKAGE DIMENSIONS

TSOP−5
CASE 483
ISSUE M





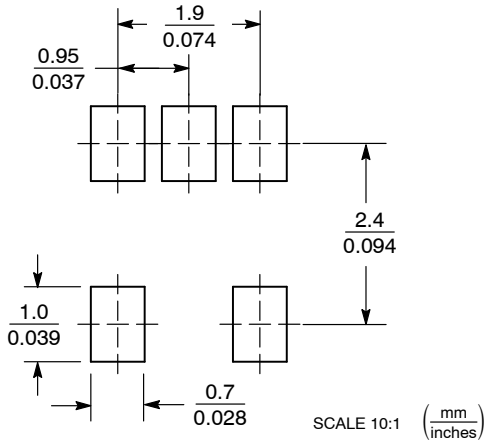




NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSION A.
5. OPTIONAL CONSTRUCTION: AN ADDITIONAL TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

	MILLIMETERS	
DIM	MIN	MAX
A	2.85	3.15
B	1.35	1.65
C	0.90	1.10
D	0.25	0.50
G	0.95 BSC	
H	0.01	0.10
J	0.10	0.26
K	0.20	0.60
M	0 °	10 °
S	2.50	3.00

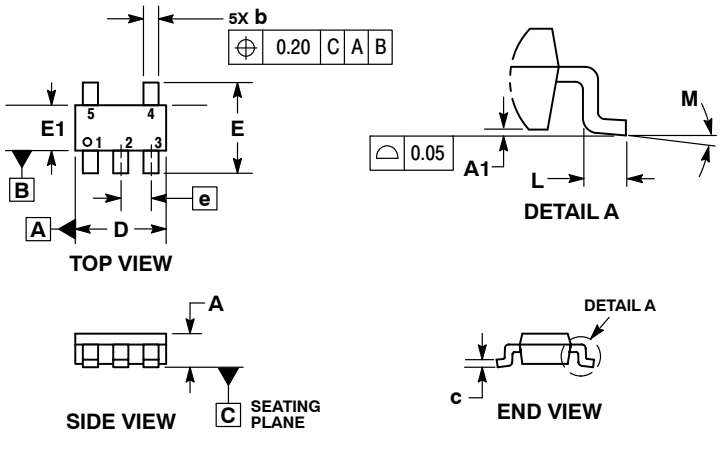
SOLDERING FOOTPRINT*



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

PACKAGE DIMENSIONS

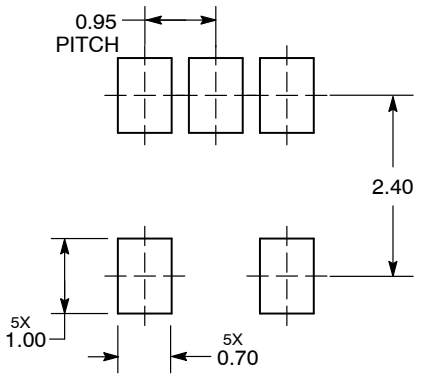
SC−74A
CASE 318BQ
ISSUE B



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE.

	MILLIMETERS	
DIM	MIN	MAX
A	0.90	1.10
A1	0.01	0.10
b	0.25	0.50
c	0.10	0.26
D	2.85	3.15
E	2.50	3.00
E1	1.35	1.65
e	0.95 BSC	
L	0.20	0.60
M	0 °	10 °

RECOMMENDED 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.

PUBLICATION ORDERING INFORMATION

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OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

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.);

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