

NB2305A

3.3 V Zero Delay Clock Buffer

The NB2305A is a versatile, 3.3 V zero delay buffer designed to distribute high-speed clocks. It accepts one reference input and drives out five low-skew clocks. It is available in a 8 pin package.

The -1H version of the NB2305A operates at up to 133 MHz, and has higher drive than the -1 devices. All parts have on-chip PLL's that lock to an input clock on the REF pin. The PLL feedback is on-chip and is obtained from the CLKOUT pad.

Multiple NB2305A devices can accept the same input clock and distribute it. In this case the skew between the outputs of the two devices is guaranteed to be less than 700 ps.

All outputs have less than 200 ps of cycle-to-cycle jitter. The input and output propagation delay is guaranteed to be less than 350 ps, and the output to output skew is guaranteed to be less than 250 ps.

The NB2305A is available in two different configurations, as shown in the ordering information table. The NB2305A1 is the base part. The NB2305Ax1H* is the high drive version of the -1 and its rise and fall times are much faster than -1 part.

Features

- 15 MHz to 133 MHz Operating Range, Compatible with CPU and PCI Bus Frequencies
- Zero Input - Output Propagation Delay
- Multiple Low-Skew Outputs
- Output-Output Skew Less than 250 ps
- Device-Device Skew Less than 700 ps
- One Input Drives 5 Outputs
- Less than 200 ps Cycle-to-Cycle Jitter is Compatible with Pentium® Based Systems
- Available in 8 Pin, 150 mil SOIC Package and 8 Pin TSSOP 4.4 mm
- 3.3 V Operation, Advanced 0.35 μ CMOS Technology
- These are Pb-Free Devices



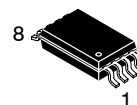
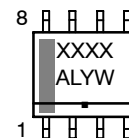
ON Semiconductor®

<http://onsemi.com>

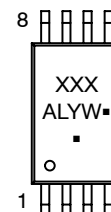
MARKING DIAGRAMS*



SOIC-8
D SUFFIX
CASE 751



TSSOP-8
DT SUFFIX
CASE 948J



XXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb-Free Package
(Note: Microdot may be in either location)

*For additional marking information, refer to Application Note AND8002/D.

ORDERING INFORMATION

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

*x = C for Commercial; I for Industrial.

NB2305A

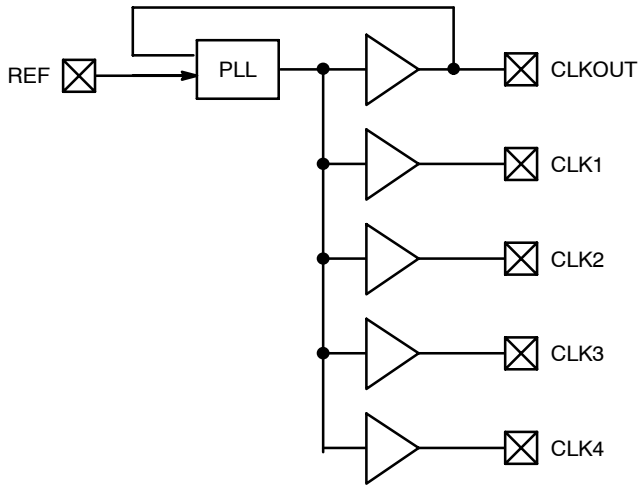


Figure 1. Block Diagram

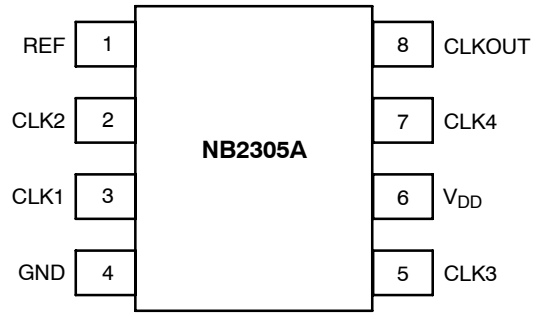


Figure 2. Pin Configuration

Table 1. PIN DESCRIPTION

| Pin # | Pin Name | Description |
|-------|-----------------|-------------------------------------------------------|
| 1 | REF (Note1) | Input reference frequency, 5 V tolerant input. |
| 2 | CLK2 (Note 2) | Buffered clock output. |
| 3 | CLK1 (Note 2) | Buffered clock output. |
| 4 | GND | Ground. |
| 5 | CLK3 (Note 2) | Buffered clock output. |
| 6 | V _{DD} | 3.3 V supply. |
| 7 | CLK4 (Note 2) | Buffered clock output. |
| 8 | CLKOUT (Note 2) | Buffered clock output, internal feedback on this pin. |

1. Weak pulldown.
2. Weak pulldown on all outputs.

NB2305A

Table 2. MAXIMUM RATINGS

| Parameter | Min | Max | Unit |
|---------------------------------------------------------|------|----------------|------|
| Supply Voltage to Ground Potential | -0.5 | +7.0 | V |
| DC Input Voltage (Except REF) | -0.5 | $V_{DD} + 0.5$ | V |
| DC Input Voltage (REF) | -0.5 | 7 | V |
| Storage Temperature | -65 | +150 | °C |
| Maximum Soldering Temperature (10 sec) | | 260 | °C |
| Junction Temperature | | 150 | °C |
| Static Discharge Voltage (per MIL-STD-883, Method 3015) | | >2000 | V |

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.

Table 3. OPERATING CONDITIONS FOR COMMERCIAL AND INDUSTRIAL TEMPERATURE DEVICES

| Parameter | Description | Min | Max | Unit |
|-----------|---------------------------------------------|--------------------------|---------------|------|
| V_{DD} | Supply Voltage | 3.0 | 3.6 | V |
| T_A | Operating Temperature (Ambient Temperature) | Commercial Industrial | 0 70 85 | °C |
| C_L | Load Capacitance, below 100 MHz | | 30 | pF |
| C_L | Load Capacitance, from 100 MHz to 133 MHz | | 10 | pF |
| C_{IN} | Input Capacitance | | 7 | pF |

Table 4. ELECTRICAL CHARACTERISTICS FOR COMMERCIAL AND INDUSTRIAL TEMPERATURE DEVICES

| Parameter | Description | Test Conditions | Min | Max | Unit |
|-----------|----------------------------------|---------------------------------------------------------------------------------------------------------|-----|----------------|---------------|
| V_{IL} | Input LOW Voltage (Note 3) | | | 0.8 | V |
| V_{IH} | Input HIGH Voltage (Note 3) | | 2.0 | | V |
| I_{IL} | Input LOW Current | $V_{IN} = 0\text{ V}$ | | 50 | μA |
| I_{IH} | Input HIGH Current | $V_{IN} = V_{DD}$ | | 100 | μA |
| V_{OL} | Output LOW Voltage | $I_{OL} = 8\text{ mA (-1)}$ $I_{OL} = 12\text{ mA (-1H)}$ | | 0.4 | V |
| V_{OH} | Output HIGH Voltage | $I_{OH} = -8\text{ mA (-1)}$ $I_{OH} = -12\text{ mA (-1H)}$ | 2.4 | | V |
| I_{DD} | Supply Current (Commercial Temp) | Unloaded outputs at 66.67 MHz, Select inputs at V_{DD} | | 34 | mA |
| I_{DD} | Supply Current (Industrial Temp) | Unloaded outputs at 100 MHz 66.67 MHz 33 MHz Select inputs at V_{DD} or GND, at Room Temp | | 50 34 19 | mA |

3. REF input has a threshold voltage of $V_{DD}/2$.

NB2305A

Table 5. SWITCHING CHARACTERISTICS (Commercial and Industrial) (Note 4)

| Parameter | Description | Test Conditions | Min | Typ | Max | Unit |
|-------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------|----------|----------|---------------|------|
| 1/t ₁ | Output Frequency | 30 pF load 10 pF load | 15 15 | | 100 133.33 | MHz |
| 1/t ₁ | Duty Cycle = (t ₂ / t ₁) * 100 (-1, -1H) (-1H) | Measured at 1.4 V, F _{OUT} = 66.67 MHz < 50 MHz | 40 45 | 50 50 | 60 55 | % |
| t ₃ | Output Rise Time (-1) (-1H) | Measured between 0.8 V and 2.0 V | | | 2.5 1.5 | ns |
| t ₄ | Output Fall Time (-1) (-1H) | Measured between 2.0 V and 0.8 V | | | 2.5 1.5 | ns |
| t ₅ | Output-to-Output Skew | All outputs equally loaded | | | 250 | ps |
| t ₆ | Delay, REF Rising Edge to CLKOUT Rising Edge | Measured at V _{DD} /2 | | 0 | ±350 | ps |
| t ₇ | Device-to-Device Skew | Measured at V _{DD} /2 on the CLKOUT pins of the device | | 0 | 700 | ps |
| t _J | Cycle-to-Cycle Jitter | Measured at 66.67 MHz, loaded outputs | | | 200 | ps |
| t _{LOCK} | PLL Lock Time | Stable power supply, valid clock presented on REF pin | | | 1.0 | ms |
| t _{r_in} | REF Input Rise Time | Measured between 0.8 V to 2.0 V | | | 1.0 | ns |
| t _{f_in} | REF Input Rise Fall Time | Measured between 2.0 V to 0.8 V | | | 1.0 | ns |

4. All parameters specified with loaded outputs.

Zero Delay and Skew Control

All outputs should be uniformly loaded to achieve Zero Delay between input and output. Since the CLKOUT pin is the internal feedback to the PLL, its relative loading can adjust the input-output delay.

For applications requiring zero input-output delay, all outputs, including CLKOUT, must be equally loaded. Even if CLKOUT is not used, it must have a capacitive load equal to that on other outputs, for obtaining zero-input-output delay.

SWITCHING WAVEFORMS

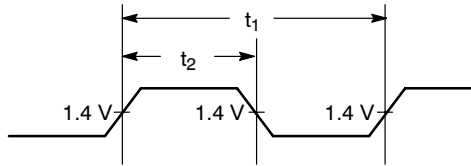


Figure 3. Duty Cycle Timing

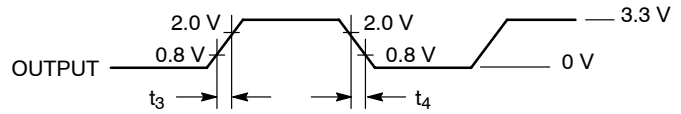


Figure 4. All Outputs Rise/Fall Time

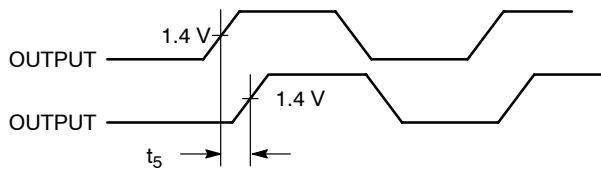


Figure 5. Output - Output Skew

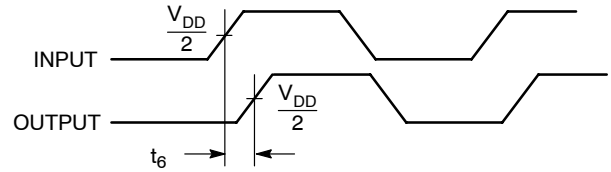


Figure 6. Input - Output Propagation Delay

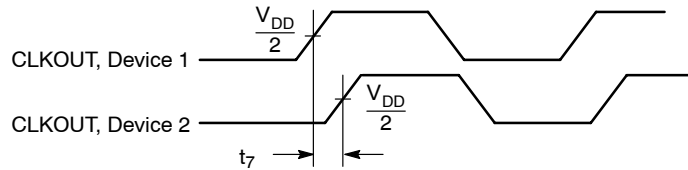


Figure 7. Device - Device Skew

NB2305A

TEST CIRCUITS

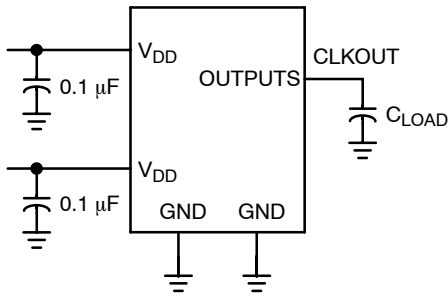


Figure 8. Test Circuit #1

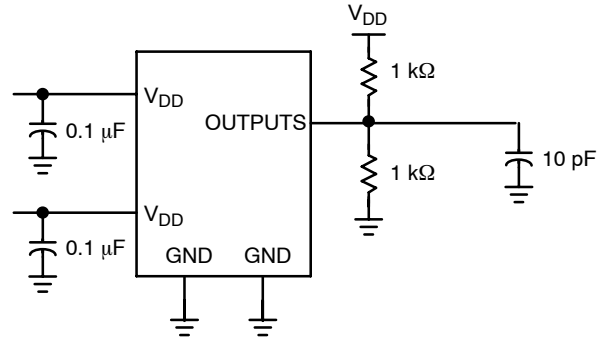


Figure 9. Test Circuit #2
For parameter t_b (output slew rate) on -1H devices

ORDERING INFORMATION

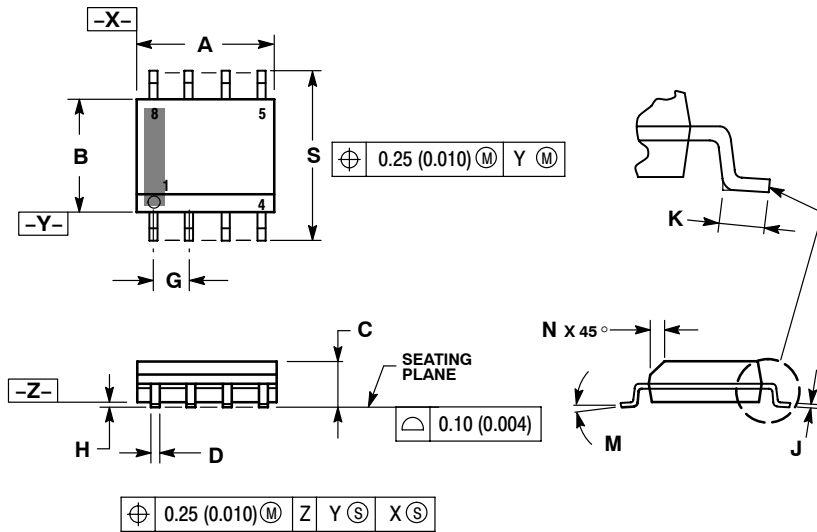
| Device | Marking | Operating Range | Package | Shipping [†] | Availability |
|-----------------|---------|-----------------|-------------------|-----------------------|--------------|
| NB2305AC1DG | 5C1 | Commercial | SOIC-8 (Pb-Free) | 98 Units / Rail | Now |
| NB2305AC1DR2G | 5C1 | Commercial | SOIC-8 (Pb-Free) | 2500 Tape & Reel | Now |
| NB2305AI1DG | 5I1 | Industrial | SOIC-8 (Pb-Free) | 98 Units / Rail | Now |
| NB2305AI1DR2G | 5I1 | Industrial | SOIC-8 (Pb-Free) | 2500 Tape & Reel | Now |
| NB2305AC1HDG | 5C1H | Commercial | SOIC-8 (Pb-Free) | 98 Units / Rail | Now |
| NB2305AC1HDR2G | 5C1H | Commercial | SOIC-8 (Pb-Free) | 2500 Tape & Reel | Now |
| NB2305AI1HDG | 5I1H | Industrial | SOIC-8 (Pb-Free) | 98 Units / Rail | Now |
| NB2305AI1HDR2G | 5I1H | Industrial | SOIC-8 (Pb-Free) | 2500 Tape & Reel | Now |
| NB2305AC1DTG | 5C1 | Commercial | TSSOP-8 (Pb-Free) | 100 Units / Rail | Now |
| NB2305AC1DTR2G | 5C1 | Commercial | TSSOP-8 (Pb-Free) | 2500 Tape & Reel | Now |
| NB2305AI1DTG | 5I1 | Industrial | TSSOP-8 (Pb-Free) | 100 Units / Rail | Now |
| NB2305AI1DTR2G | 5I1 | Industrial | TSSOP-8 (Pb-Free) | 2500 Tape & Reel | Now |
| NB2305AC1HDTG | 5C1H | Commercial | TSSOP-8 (Pb-Free) | 100 Units / Rail | Now |
| NB2305AC1HDTR2G | 5C1H | Commercial | TSSOP-8 (Pb-Free) | 2500 Tape & Reel | Now |
| NB2305AI1HDTG | 5I1H | Industrial | TSSOP-8 (Pb-Free) | 100 Units / Rail | Now |
| NB2305AI1HDTR2G | 5I1H | Industrial | TSSOP-8 (Pb-Free) | 2500 Tape & Reel | Now |

[†]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.

NB2305A

PACKAGE DIMENSIONS

SOIC-8 NB
CASE 751-07
ISSUE AG

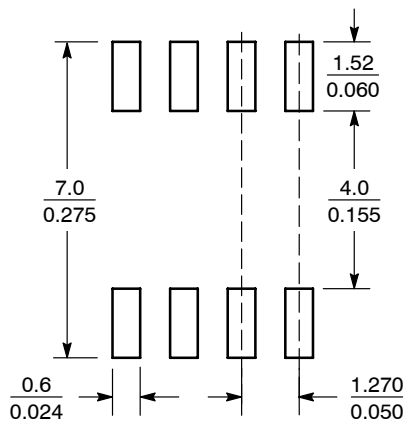


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION 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.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.197 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.053 | 0.069 |
| D | 0.33 | 0.51 | 0.013 | 0.020 |
| G | 1.27 BSC | | 0.050 BSC | |
| H | 0.10 | 0.25 | 0.004 | 0.010 |
| J | 0.19 | 0.25 | 0.007 | 0.010 |
| K | 0.40 | 1.27 | 0.016 | 0.050 |
| M | 0° 8° | | 0° 8° | |
| N | 0.25 | 0.50 | 0.010 | 0.020 |
| S | 5.80 | 6.20 | 0.228 | 0.244 |

SOLDERING FOOTPRINT*



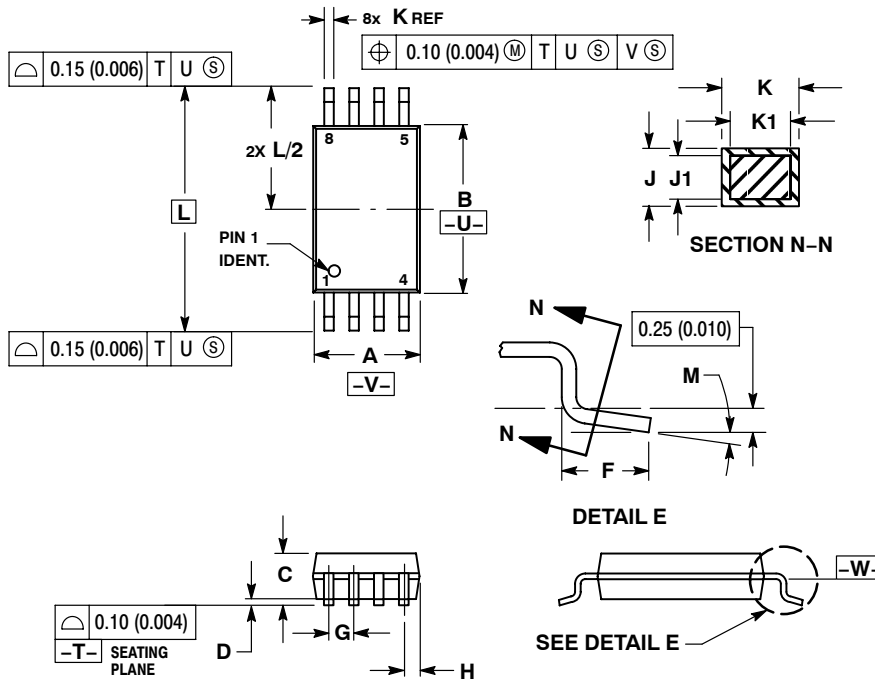
SCALE 6:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

NB2305A

PACKAGE DIMENSIONS

TSSOP-8
CASE 948J-01
ISSUE A



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 -V-.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 2.90 | 3.10 | 0.114 | 0.122 |
| 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° |

Pentium is a registered trademark of Intel Corporation.
Licensed under US patent Nos 5,488,627, 6,646,463 and 5,631,920.

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

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