

# NB4N527SMNEVB

## Evaluation Board User's Manual for NB4N527S



ON Semiconductor®

<http://onsemi.com>

### EVAL BOARD USER'S MANUAL

#### INTRODUCTION

ON Semiconductor has developed an evaluation board for the NB4N527S device as a convenience for the customers interested in performing their own device engineering assessment. This board provides a high bandwidth 50  $\Omega$  controlled impedance environment. The pictures in Figure 1 show the top and bottom view of the evaluation board, which can be configured in several different ways.

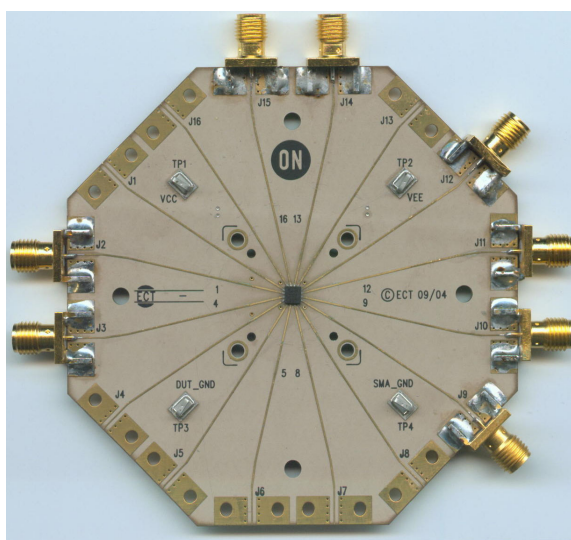
This evaluation board manual contains:

- Information on 16-lead QFN Evaluation Board
- Assembly Instructions
- Appropriate Lab Setup
- Bill of Materials

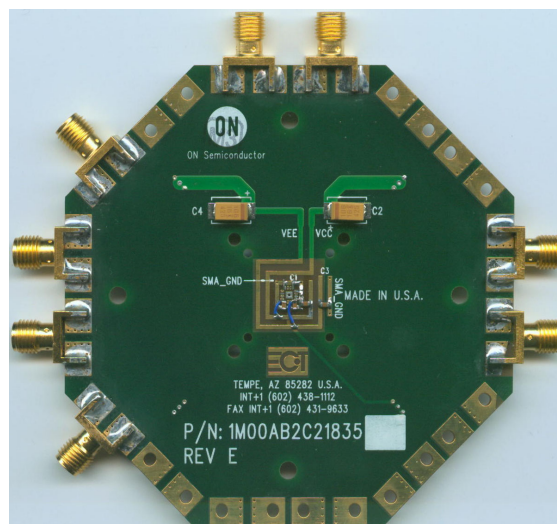
This manual should be used in conjunction with the NB4N527S device data sheet, which contains full technical details on the device specifications and operation.

#### Board Lay-Up

The 16-lead QFN evaluation board is implemented in four layers with split (dual) power supplies (Figure 2, Evaluation Board Lay-up). For standard lab setup, a split (dual) power supply is essential to enable the 50  $\Omega$  internal impedance in the oscilloscope as a device termination. The first layer or primary trace layer is 0.005, thick Rogers RO6002 material, which is designed to have equal electrical length on all signal traces from the device under the test (DUT) to the sense output. The second layer is the 1.0 oz. copper ground plane. The FR4 dielectric material is placed between the second and third layer, and between the third and fourth layer. The third layer is also a 1.0 oz copper ground plane. The fourth layer is the secondary trace layer.



Top View



Bottom View

Figure 1. Top and Bottom View of the 16 QFN Evaluation Board

# NB4N527SMNEVB

Top / DUT Side	Rogers 6002 1/2 OZ Copper	T <sub>w</sub> =	0.022
	Dielectric=	0.010	
GND	Rogers 6002 1 OZ Copper		
	Min. Adjust	0.025	
SIGNAL DUT GND	FR4 1 OZ Copper		
	Dielectric=	0.010	
Bottom / Tester Side	FR4 1/2 OZ Copper		

Figure 2. Evaluation Board Lay-up

## Connecting Power and Ground Planes

Top side of the evaluation board has the four surfaces mount test point clips labeled V<sub>CC</sub>, V<sub>EE</sub>, SMA\_GND, and DUT\_GND. DUT\_GND is connected to the exposed flag of the QFN package. For proper operation, the exposed flag is recommended to be **ELECTRICALLY** left floating or tied

to V<sub>EE</sub>, but must be **THERMALLY** connected to a sufficient heat conduit such as a thermal plane. Exact supply voltage values that need to be applied can be found in Table 1 and Figures 4 and 5.

Table 1. Power Supply Levels

Power Supply Span	V <sub>CC</sub>	V <sub>EE</sub>	SMA_GND	DUT_GND
3.0 V	1.75 V	-1.25 V	0 V	Float or V <sub>EE</sub>
3.3 V	2.05 V	-1.25 V	0 V	Float or V <sub>EE</sub>
3.6 V	2.35 V	-1.25 V	0 V	Float or V <sub>EE</sub>

## Stimulus (Generator) Termination

All ECL outputs need to be terminated to V<sub>TT</sub> (V<sub>TT</sub> = V<sub>CC</sub> - 2.0 V = GND) via a 50 Ω resistor. The current board design utilizes the internal resistors and the V<sub>TDX</sub> pins are wired to ground. (More information on termination is provided in AN8020). If evaluation does not require use of internal termination resistors, 0402 chip resistor pads are provided on the bottom side of the evaluation board. The jumper wires of the V<sub>TDX</sub> pin pads should be removed (J1, J4, J13 and J15 to SMA\_GND jumper). Solder the chip resistors to the bottom side of the board between the appropriate input of the device pin pads and the ground pads (for split power supply setup).

Likewise for CML outputs, CML stimulus signal need to be terminated to V<sub>CC</sub> via a 50 Ω resistor. If internal resistors are used, the V<sub>TDX</sub> pin pads should be wired to V<sub>CC</sub>. To accomplish this configuration, the jumper wire has to be moved from SMA\_GND ring to V<sub>CC</sub> ring on the bottom of the board.

For the LVDS configuration, V<sub>TDX</sub> pin pads of the D0 or D1 input has to be shorted to form 100 Ω across differential lines. This configuration is accomplished by moving the jumper wire from SMA\_GND ring to complementary V<sub>TDX</sub> pin pad (example: VTD0 and VTD0b for D0 input and VTD1 and VTD1b for D1 input).

## DUT Termination

For standard lab setup and test, a split (dual) power supply is required enabling the 50 Ω internal impedance in the oscilloscope to be used as a termination of the signals (in split power supply setup SMA\_GND is the system ground, V<sub>CC</sub> is varied, and V<sub>EE</sub> is -1.25 V; see Table 1, Power Supply Levels).

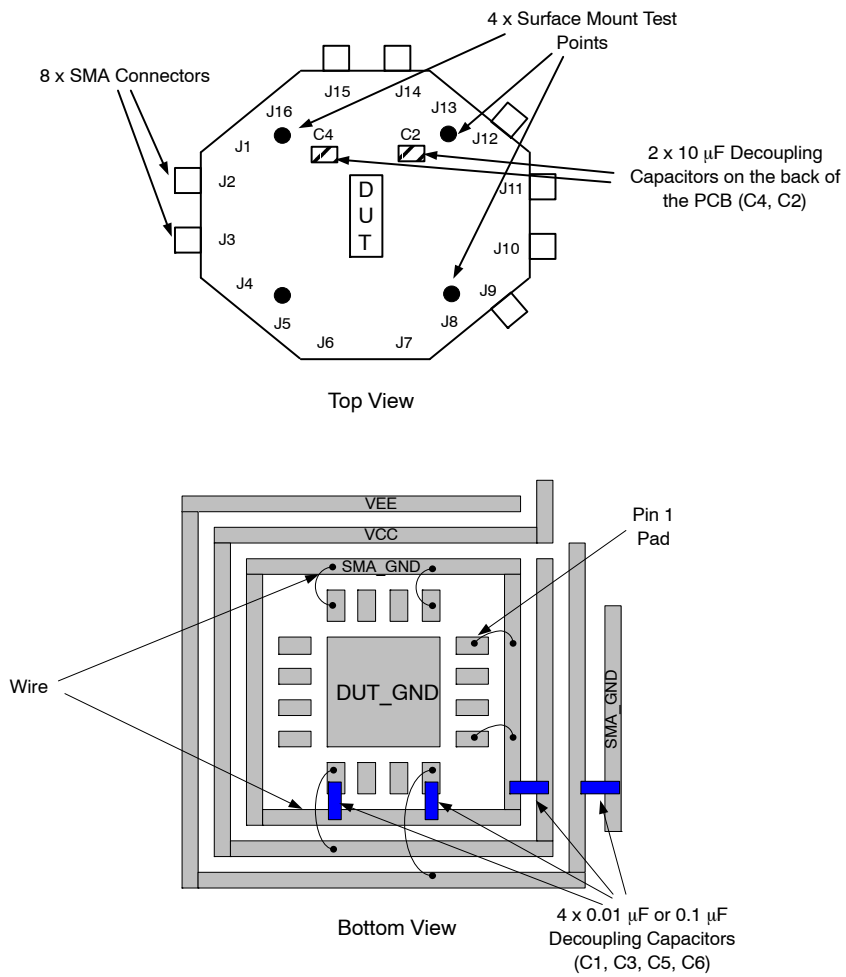
## Board Components Configuration

The NB4N527SMNEVB evaluation board requires eight side SMA connectors. Placement locations are described in Table 2 and Figure 3.

Table 2. SMA Connectors and Jumpers Placement

Device	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12	J13	J14	J15	J16
Pin #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Connector	No	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No	Yes	Yes	No
Wire	SMA_GND	No	No	SMA_GND	V <sub>EE</sub>	No	No	V <sub>CC</sub>	No	No	No	No	SMA_GND	No	No	SMA_GND

# NB4N527SMNEVB



**Figure 3. Components Placement**

# NB4N527SMNEVB

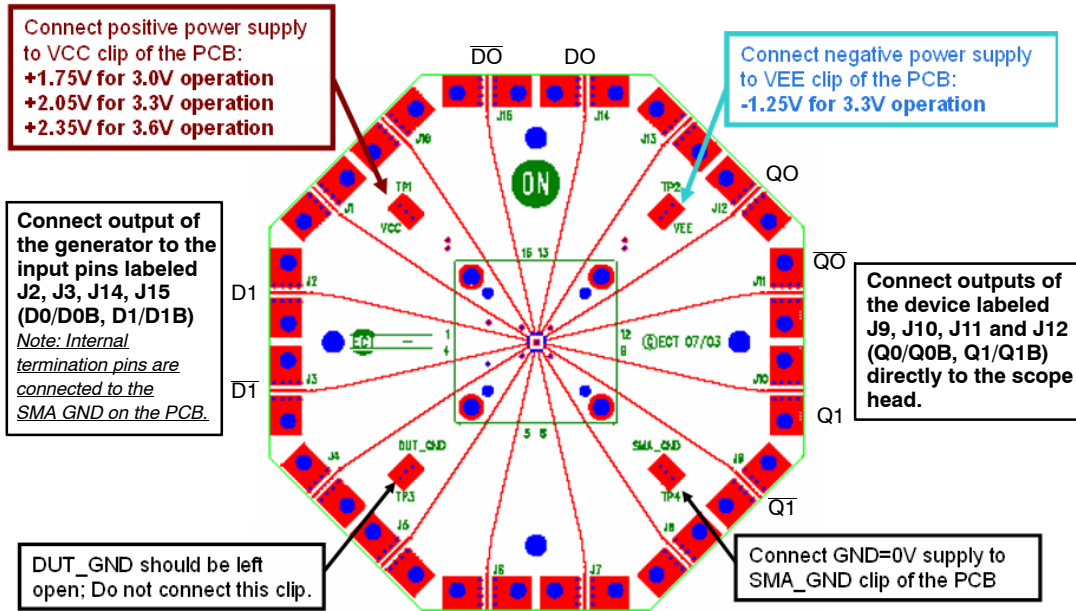


Figure 4. Lab Setup for NB4N527S

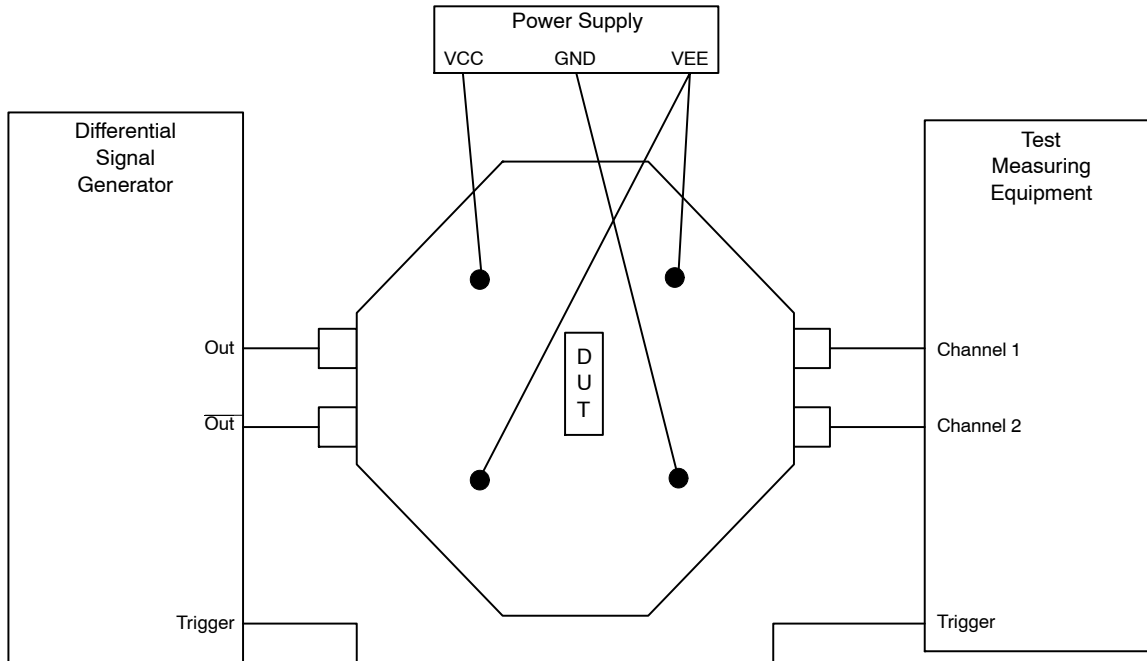


Figure 5. Simplified Equipment Lab Setup Block Diagram

1. Connect appropriate power supplies to V<sub>CC</sub>, V<sub>EE</sub>, SMA\_GND, and SMA\_DUT.
2. Connect a signal generator to the input SMA connectors. Setup input signal according to the device data sheet.

3. Connect a test measurement device on the device output SMA connectors.
- NOTE: The test measurement device must contain 50 Ω termination.

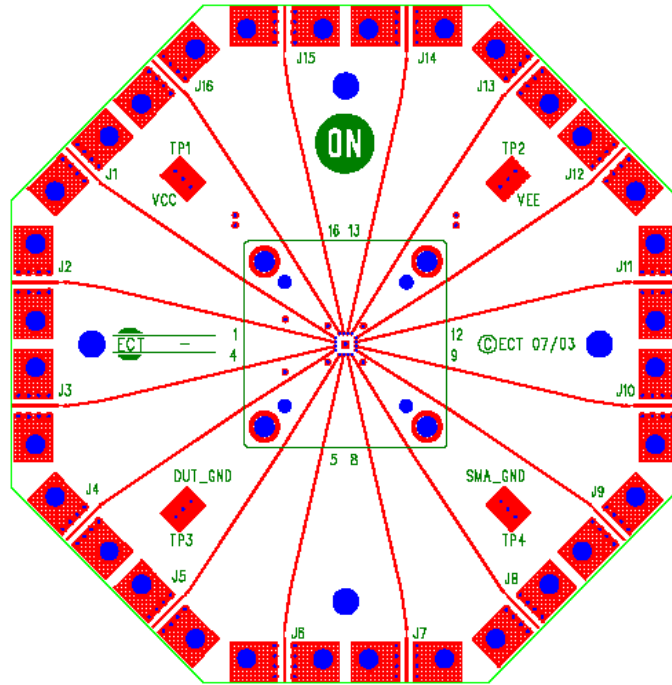
# NB4N527SMNEVB

**Table 3. Bill of Materials**

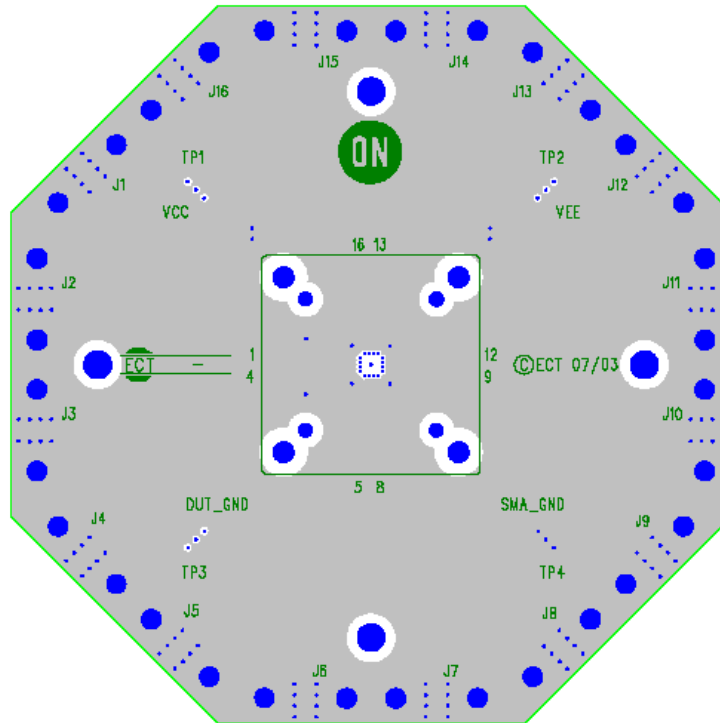
Components	Manufacturer	Description	Part Number	Qty.	Web Site
SMA Connector	Johnson* Rosenberger	SMA Connector, Side Launch, Gold Plated	142-0701-851 32K243-40ME3	8	<a href="http://www.johnsoncomponents.com">http://www.johnsoncomponents.com</a> <a href="http://www.rosenbergerna.com">http://www.rosenbergerna.com</a>
Surface Mount Test Points	Keystone*	SMT Miniature Test Point	5015	4	<a href="http://www.keyelco.com">http://www.keyelco.com</a>
Chip Capacitor	AVC Corporation*	0603 0.01 $\mu$ F $\pm$ 10% 10 $\mu$ F $\pm$ 10%	06035C103KAT2A	4	<a href="http://www.avxcorp.com">http://www.avxcorp.com</a>
			T491C106K016AS	2	
Chip Resistor	Panasonic*	0402 50 $\Omega$ $\pm$ 1% Precision Thick Film Chip Resistor	ERJ-2RKF49R9X	Optional**	<a href="http://www.panasonic.com">http://www.panasonic.com</a>
Evaluation Board	ON Semiconductor	QFN 16 Evaluation Board	ECLQFN16EVB	1	<a href="http://www.onsemi.com">http://www.onsemi.com</a>
Device Samples	ON Semiconductor	QFN 16 Package Device	NB4N527SMN	1	<a href="http://www.onsemi.com">http://www.onsemi.com</a>

\*Components are available through most distributors, i.e. [www.newark.com](http://www.newark.com), [www.digikey.com](http://www.digikey.com)

# NB4N527SMNEVB



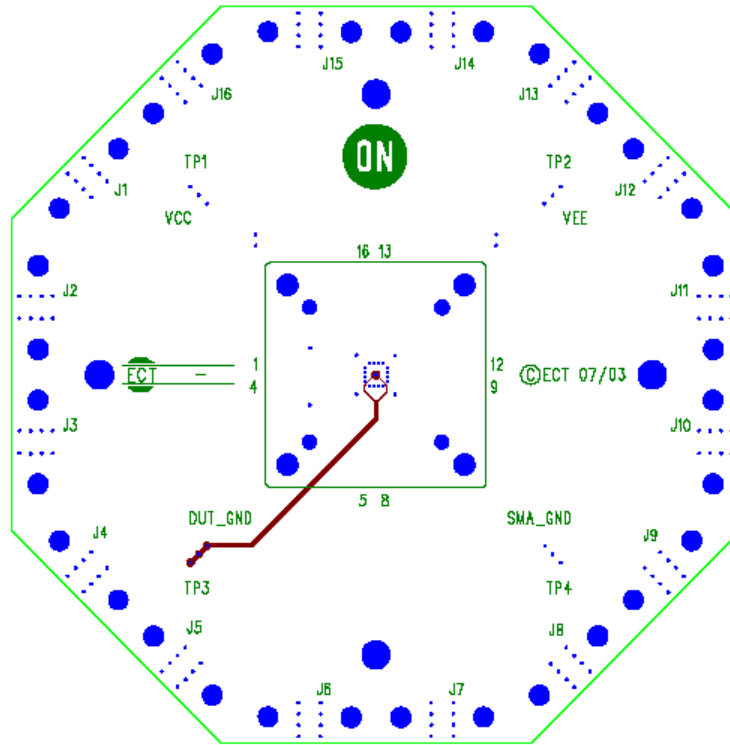
Top Layer



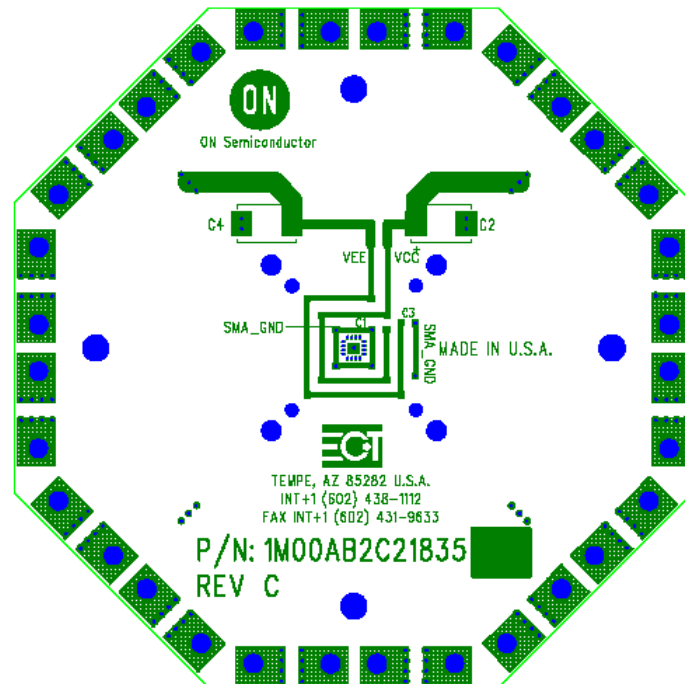
Second Layer (SMA\_GND Plane)

Figure 6. Gerber Files

# NB4N527SMNEVB



Third Layer (DUT\_GND Trace)



Bottom Layer

Figure 7. Gerber Files

ON Semiconductor and the ON Semiconductor logo 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-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). 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.

The evaluation board/kit (research and development board/kit) (hereinafter the "board") is not a finished product and is as such not available for sale to consumers. The board is only intended for research, development, demonstration and evaluation purposes and should as such only be used in laboratory/development areas by persons with an engineering/technical training and familiar with the risks associated with handling electrical/mechanical components, systems and subsystems. This person assumes full responsibility/liability for proper and safe handling. Any other use, resale or redistribution for any other purpose is strictly prohibited.

The board is delivered "AS IS" and without warranty of any kind including, but not limited to, that the board is production-worthy, that the functions contained in the board will meet your requirements, or that the operation of the board will be uninterrupted or error free. ON Semiconductor expressly disclaims all warranties, express, implied or otherwise, including without limitation, warranties of fitness for a particular purpose and non-infringement of intellectual property rights.

ON Semiconductor reserves the right to make changes without further notice to any board.

You are responsible for determining whether the board will be suitable for your intended use or application or will achieve your intended results. Prior to using or distributing any systems that have been evaluated, designed or tested using the board, you agree to test and validate your design to confirm the functionality for your application. Any technical, applications or design information or advice, quality characterization, reliability data or other services provided by ON Semiconductor shall not constitute any representation or warranty by ON Semiconductor, and no additional obligations or liabilities shall arise from ON Semiconductor having provided such information or services.

The boards are not designed, intended, or authorized for use in life support systems, or any FDA Class 3 medical devices or medical devices with a similar or equivalent classification in a foreign jurisdiction, or any devices intended for implantation in the human body. Should you purchase or use the board for any such unintended or unauthorized application, you 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 board.

This evaluation board/kit does not fall within the scope of the European Union directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and may not meet the technical requirements of these or other related directives.

**FCC WARNING** – This evaluation board/kit is intended for use for engineering development, demonstration, or evaluation purposes only and is not considered by ON Semiconductor to be a finished end product fit for general consumer use. It may generate, use, or radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment may cause interference with radio communications, in which case the user shall be responsible, at its expense, to take whatever measures may be required to correct this interference.

ON Semiconductor does not convey any license under its patent rights nor the rights of others.

**LIMITATIONS OF LIABILITY:** ON Semiconductor shall not be liable for any special, consequential, incidental, indirect or punitive damages, including, but not limited to the costs of requalification, delay, loss of profits or goodwill, arising out of or in connection with the board, even if ON Semiconductor is advised of the possibility of such damages. In no event shall ON Semiconductor's aggregate liability from any obligation arising out of or in connection with the board, under any theory of liability, exceed the purchase price paid for the board, if any.

For more information and documentation, please visit [www.onsemi.com](http://www.onsemi.com).

---

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Email Requests to: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

### TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

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](mailto:ocean@oceanchips.ru)

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

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