

# NB4N527SMNEVB

## Evaluation Board User's Manual for NB4N527S



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### 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.

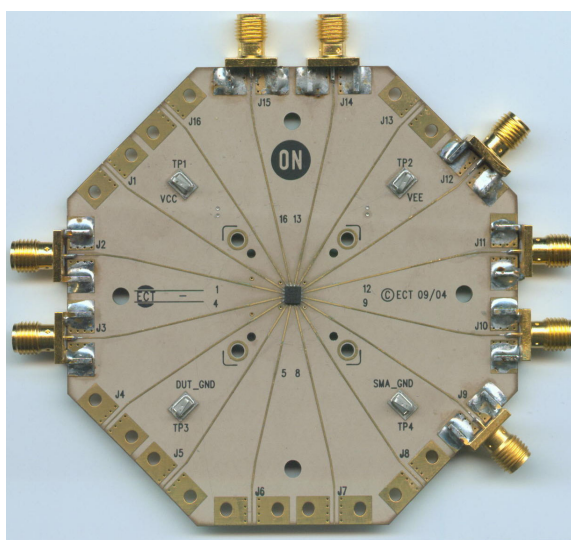
This evaluation board manual contains:

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

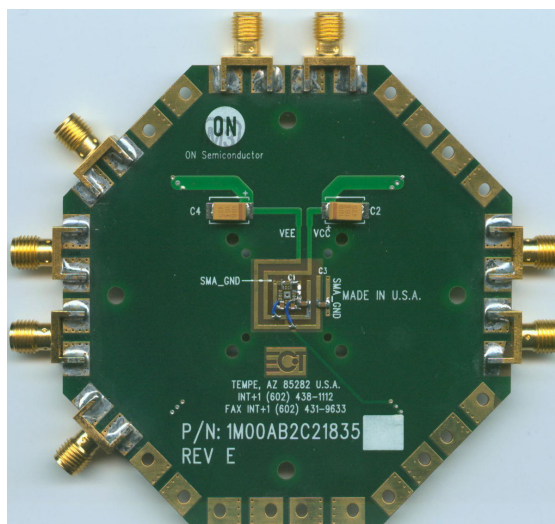
This manual should be used in conjunction with the NB4N527S device data sheet, which contains full technical details on the device specifications and operation.

#### 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

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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).

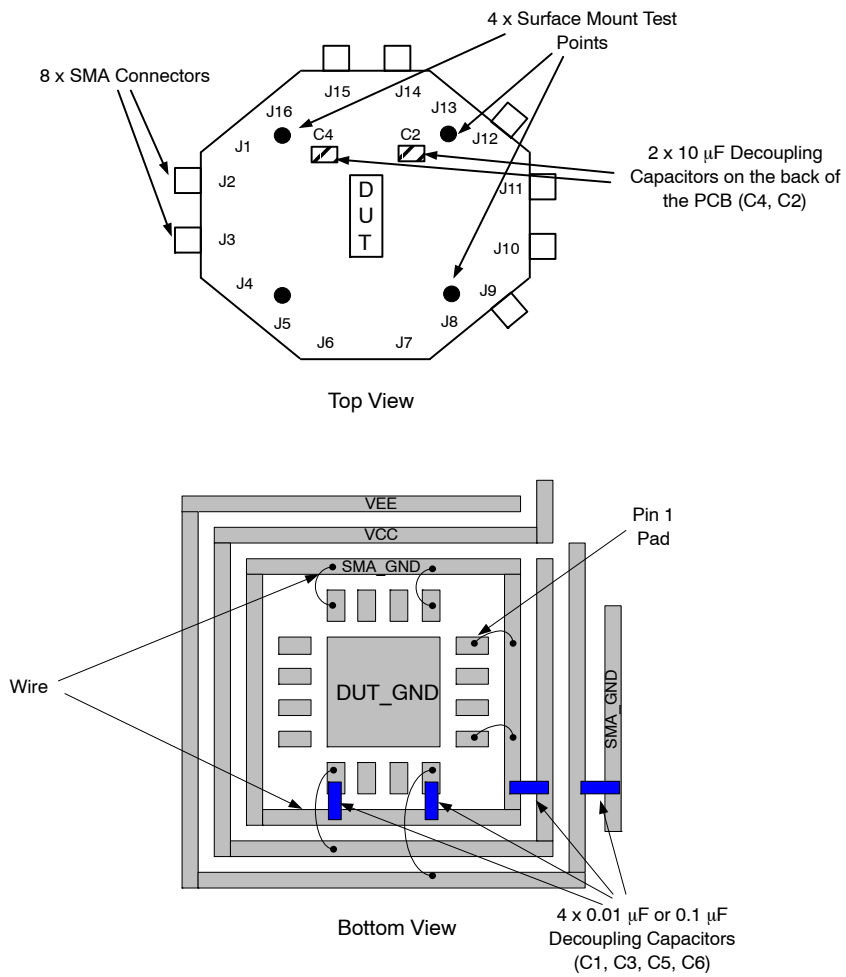
## Board Components Configuration

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

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**Figure 3. Components Placement**

# NB4N527SMNEVB

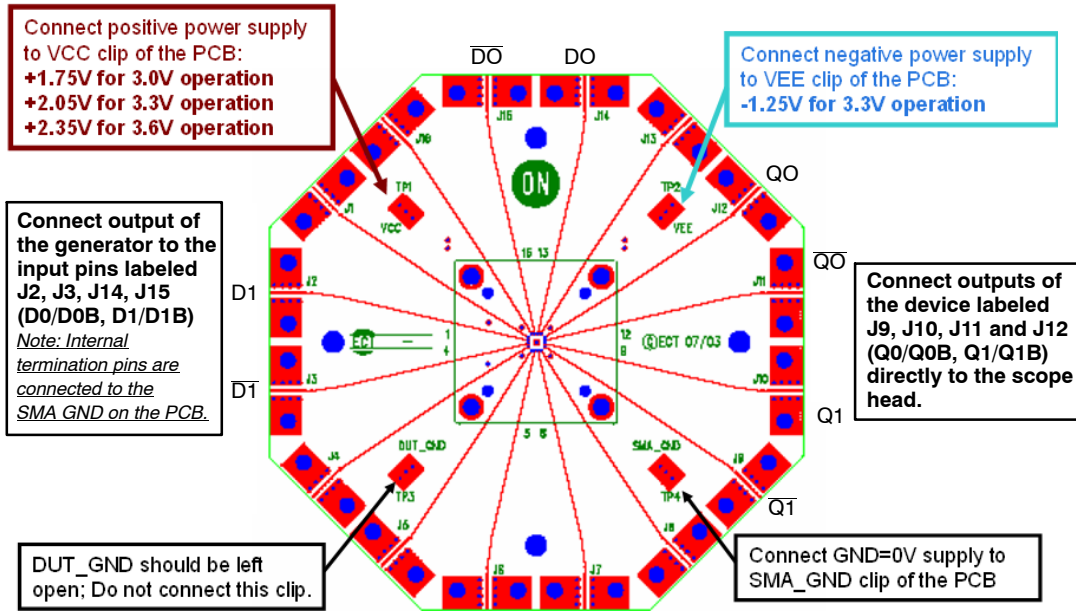


Figure 4. Lab Setup for NB4N527S

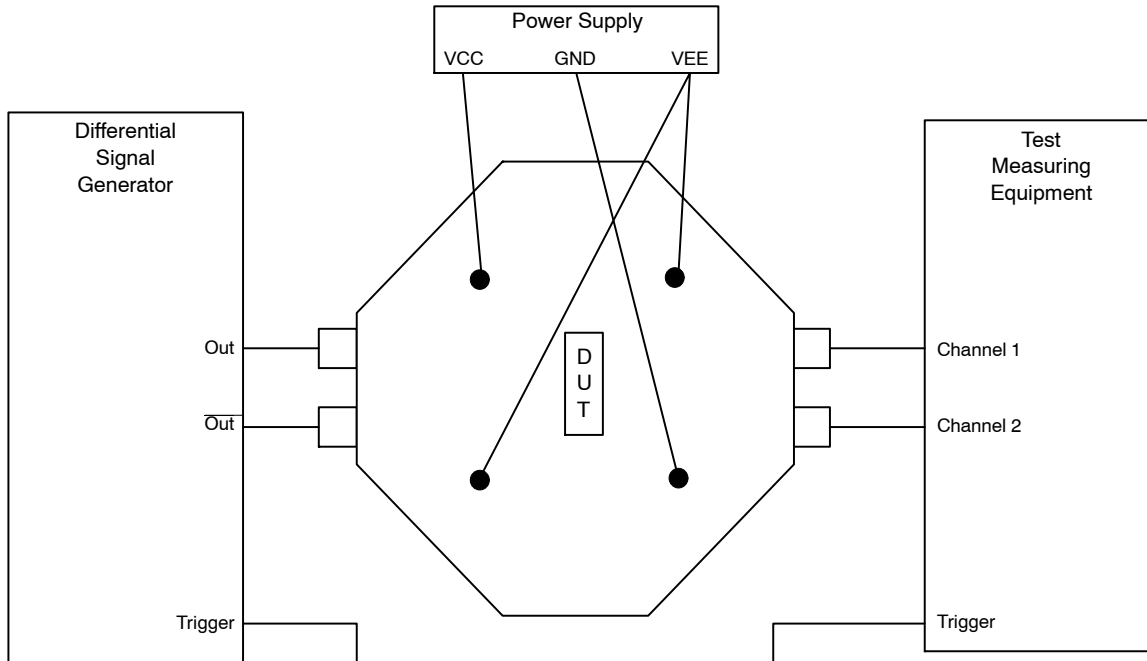


Figure 5. Simplified Equipment Lab Setup Block Diagram

1. Connect appropriate power supplies to  $V_{CC}$ ,  $V_{EE}$ , 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  $\Omega$  termination.

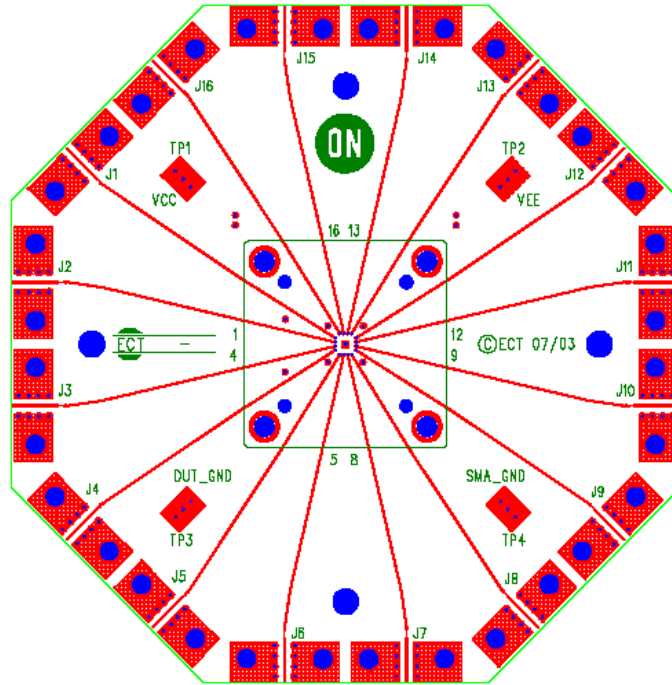
# NB4N527SMNEVB

**Table 3. Bill of Materials**

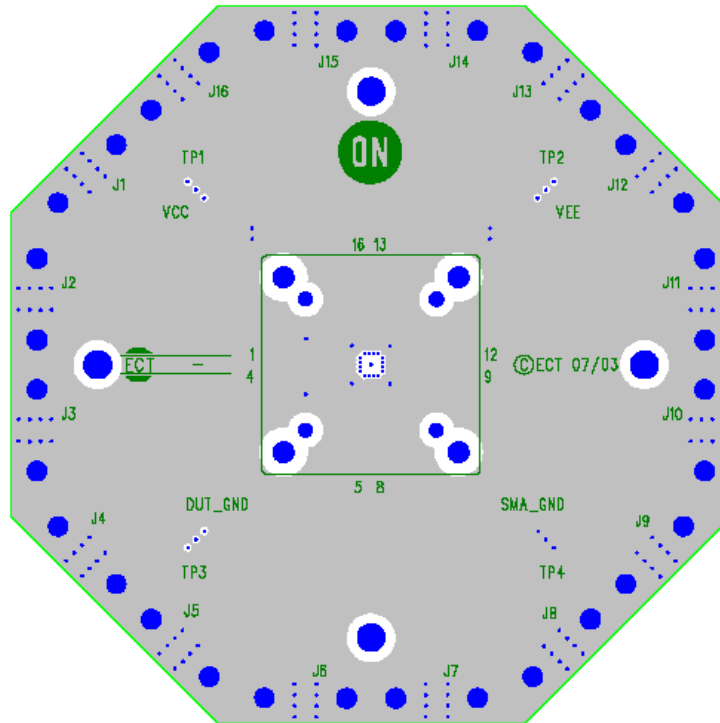
Components	Manufacturer	Description	Part Number	Qty.	Web Site
SMA Connector	Johnson* Rosenberger	SMA Connector, Side Launch, Gold Plated	142-0701-851 32K243-40ME3	8	<a href="http://www.johnsoncomponents.com">http://www.johnsoncomponents.com</a> <a href="http://www.rosenbergerna.com">http://www.rosenbergerna.com</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)

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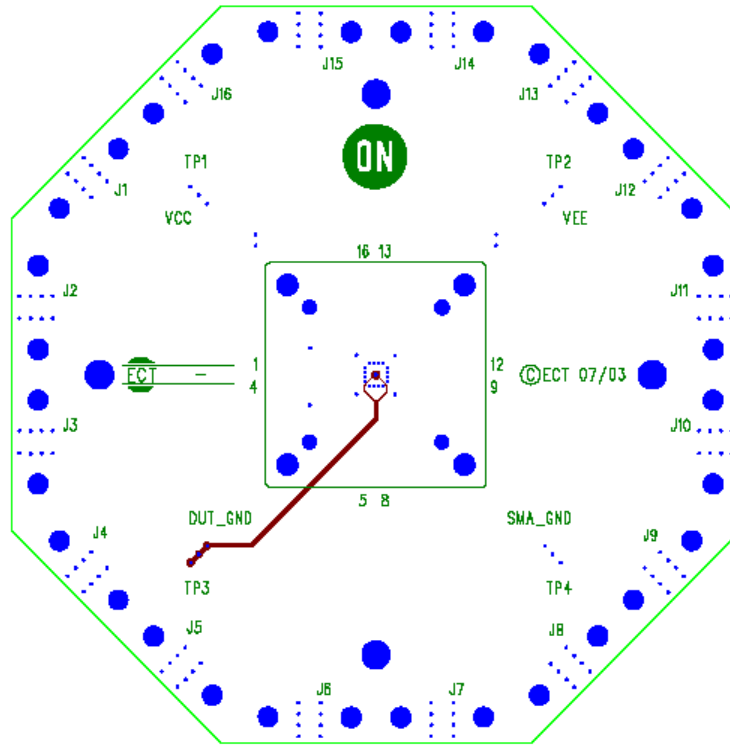
Top Layer



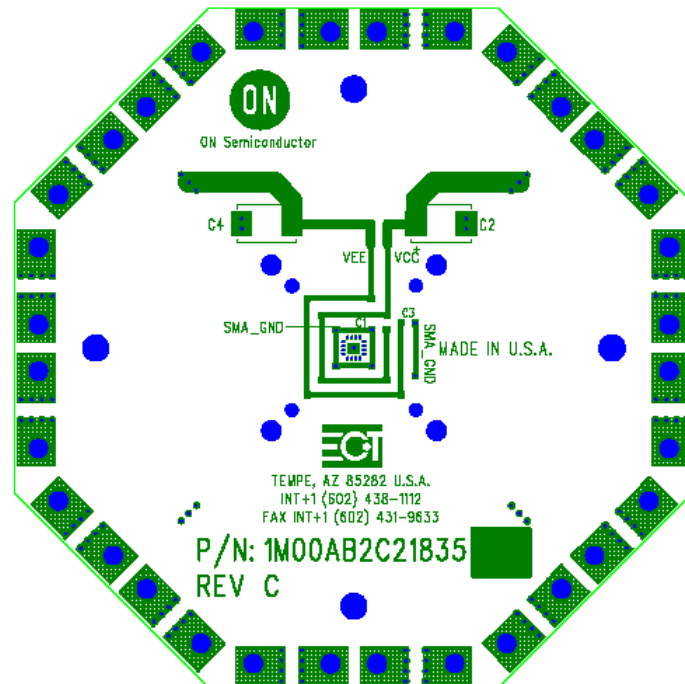
Second Layer (SMA\_GND Plane)

Figure 6. Gerber Files

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Third Layer (DUT\_GND Trace)



Bottom Layer

Figure 7. Gerber Files

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