NB7L32MMNEVB

NB7L32M Evaluation Board User's Manual

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EVAL BOARD USER'S MANUAL

Description

This document describes the NB7L32M evaluation board and the appropriate lab test setups (See Figure 1). It should be used in conjunction with the NB7L32M data sheet which contains full technical details on the device specification and operation.

The evaluation board is designed to facilitate a quick evaluation of the NB7L32M GigaComm™ Clock Driver. The NB7L32M is designed to support the distribution of clock/data signals at high operating frequencies and produces two equal differential clock/data outputs from a single input clock/data. The Current Mode Logic (CML) output ensures minimal noise and fast switching edges.

The evaluation board is implemented in two layers for higher performance.

Board Lay−up

The board is implemented in two layers and provides a high bandwidth 50 Ω controlled impedance environment for higher performance. The first layer or primary trace layer is 5 mils thick Rogers RO6002 material, which is engineered to have equal electrical length on all signal traces from the NB7L32M device to the sense output. The second layer is 32 mils thick copper ground plane.

What measurements can you expect to make?

With this evaluation board, the following measurements could be performed in single−ended or differential modes of operation:

- Jitter
- Output Skew
- Gain/Return Loss
- Eye Pattern Generation
- Frequency Performance
- Output Rise and Fall Time
- V_{CMR} (Common Mode Range)

This Evaluation Board User's Manual Contains:

- Information on NB7L32MMNEVB Evaluation Board
- Appropriate Lab Setup
- Bill of Materials

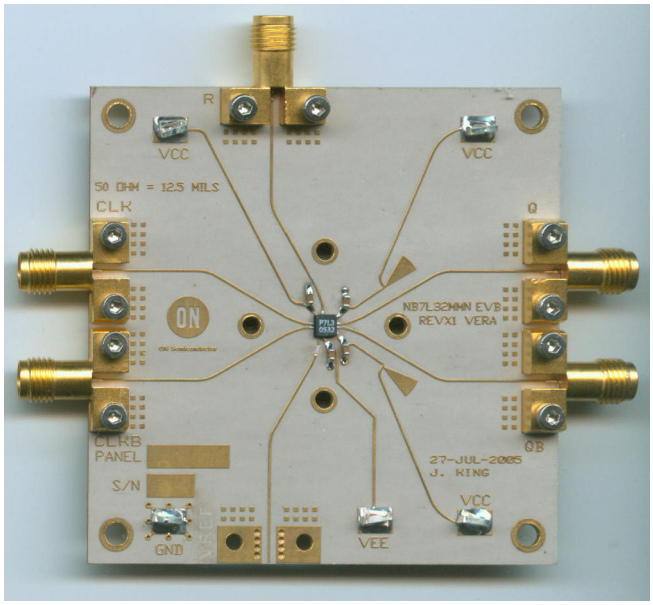


Figure 1. NB7L32M Evaluation Board

SETUP FOR TIME DOMAIN MEASUREMENTS

Table 1. BASIC EQUIPMENT

Description	Example Equipment (Note 1)	Qty.
Power Supply with 2 outputs	HP6624A	1
Oscilloscope	TDS8200 or TDS8000	1
Differential Signal Generator	HP 8133A, Advantest D3186	1
Matched high speed cables with SMA connectors	Storm, Semflex	4
Power Supply cables with clips		5

1. Equipment used to generate example measurements within this document.

Setup

Step 1: Connect Power

1a: Two power levels must be provided to the board for V_{CC}, V_{EE}, and GND via the surface mount clips.

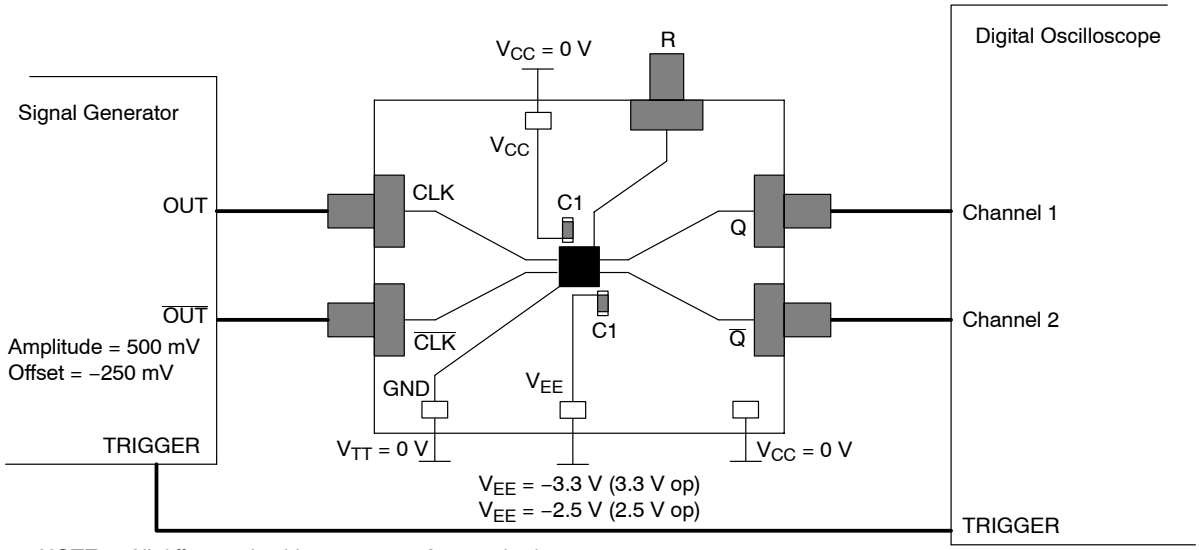
Table 2. POWER SUPPLY CONNECTIONS

3.3 V Setup	2.5 V Setup
V_{CC} = 0 V	V_{CC} = 0 V
GND = 0 V	GND = 0 V
V_{EE} = −3.3 V	V_{EE} = −2.5 V

Step 2: Connect Inputs

For Differential Mode (3.3 V and 2.5 V operation)

2a: Connect the differential output of the generator to the differential input of the device (CLK and $\overline{CLK}$).



NOTE: All differential cable pairs ***must be*** matched.
All V_{CC} pins have to be connected for proper device operation.

Figure 2. NB7L32M Board Setup − Time Domain (Differential Mode)

Setup (continued)

Step 3: Setup Input Signals

3a: Set the signal generator amplitude to 400 mV.

NOTE: The signal generator amplitude can vary from 75 mV to 900 mV to produce a 400 mV DUT output.

3b: Set the signal generator offset to −200 mV (the center of a nominal NCML output).

NOTE: The V_{CMR} (Input Common Mode Range) allows the signal generator offset to vary as long as V_{TH} is within the V_{CMR} range. Refer to the device data sheet for further information.

Set the generator output for a PRBS data signal, or for a square wave clock signal with a 50% duty cycle.

Step 4: Connect Output Signals

4a: Connect the outputs of the device (Q0, Q1, …) to the oscilloscope. The oscilloscope sampling head must have internal 50 Ω termination to ground.

NOTE: Where a single output is being used, the unconnected output for the pair ***must be*** terminated to V_{CC} through a 50 Ω resistor for best operation. Unused pairs may be left unconnected.

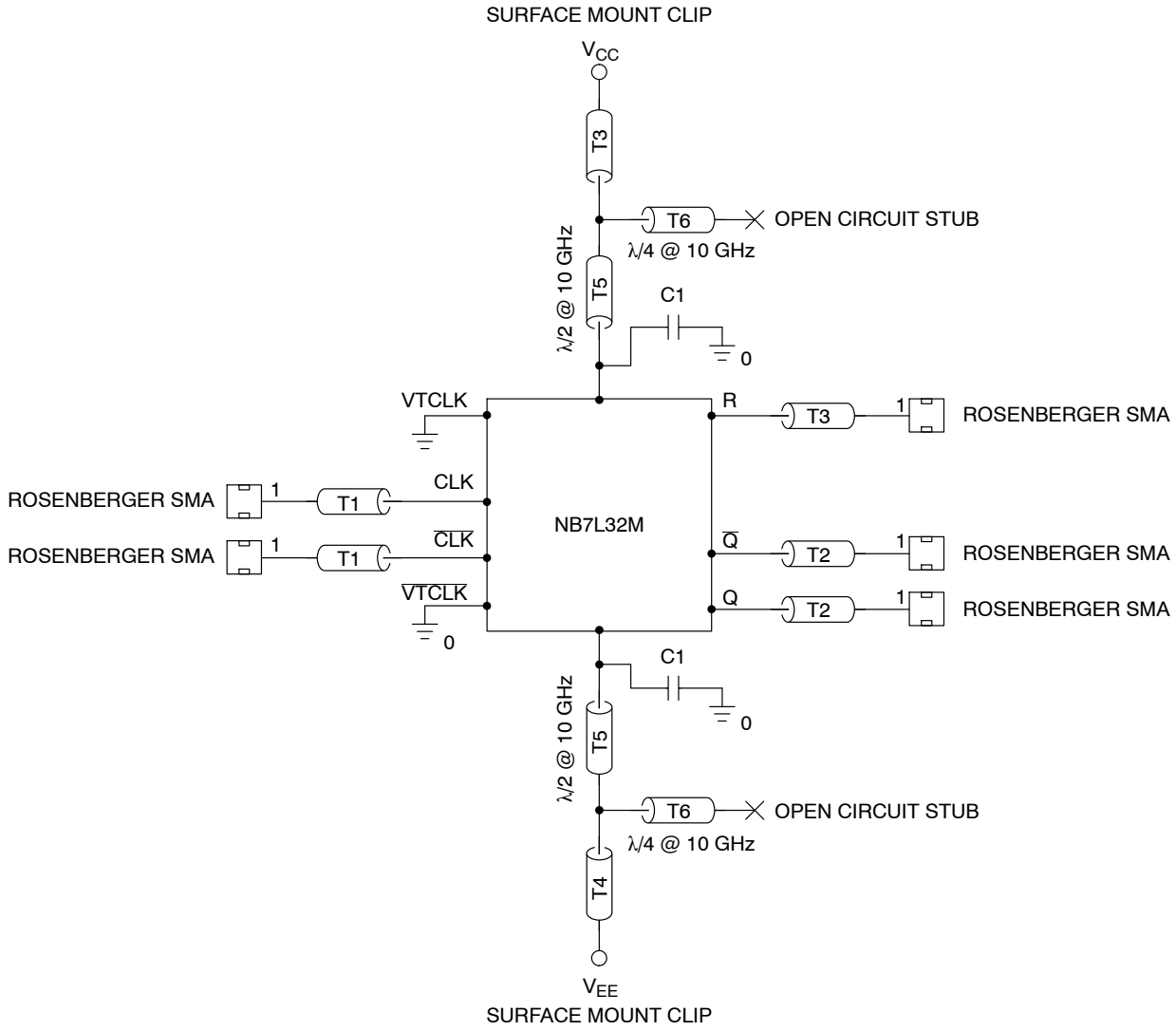
MORE INFORMATION ABOUT EVALUATION BOARD

Design Considerations for >10 GHz operation

While the NB7L32M is specified to operate at 10 GHz, this evaluation board is designed to support operating frequencies up to 20 GHz.

The following considerations played a key role to ensure this evaluation board achieves high−end microwave performance:

- Optimal SMA connector launch
- Minimal insertion loss and signal dispersion
- Accurate Transmission line matching (50 Ω)
- Distributed effects while bypassing and noise filtering



NOTE: C1 = Decoupling cap and Tx = 50 Ω Transmission line

Figure 3. Evaluation Board Schematic

Table 3. BILL OF MATERIALS

Part No	Qty	Description	Manufacturer	WEB address
NB7L32MMN	1	2.5 V / 3.3 V, 14 GHz ÷ 2 Clock Divider with CML output and Internal Termination	ON Semiconductor	http://www.onsemi.com/NB7L32M
32K243−40ME3	5	Gold plated connector	Rosenberger	http://www.rosenberger.de
CO6BLBB2X5UX	4	2 MHz – 30 GHz capacitor	Dielectric Laboratories	http://www.dilabs.com
5016	5	Test point – Anvll	Keystone*	http://www.newark.com http://www.digikey.com

*Components are available through distribution.

Table 4. BOARD MATERIAL

Material	Thickness
Rogers 6002	5.0 mil
Copper Plating	32 mil

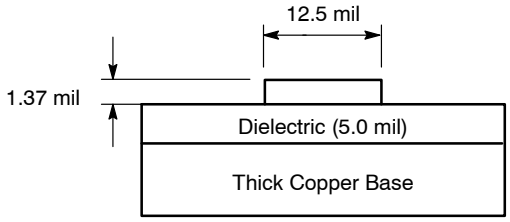


Figure 4. Board Stack−up

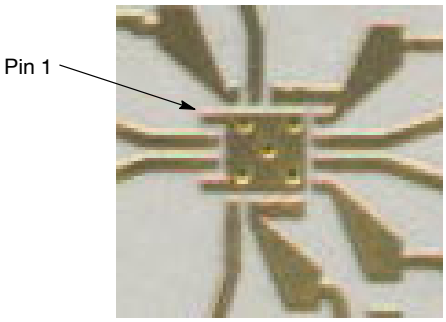
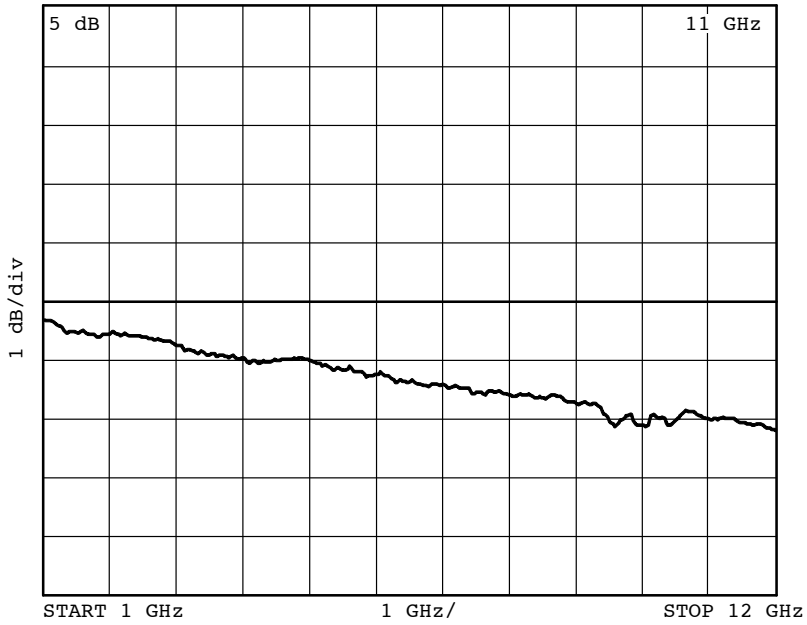


Figure 5. Layout Mask for NB7L32M



NOTE: The insertion loss curve can be used to calibrate out board loss if testing under small signal conditions.

Figure 6. Insertion Loss

ADDITIONAL EVALUATION BOARD INFORMATION

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In all cases, the most up−to−date information can be found on our website.

- Sample orders for devices and boards
- New Product updates
- Literature download/order
- IBIS and Spice models

References

NB7L32M/D Data Sheet.

AND8077/D, Application Note, *GigaComm™ (SiGe) SPICE Modeling Kit.*

AND8075/D, Application Note, *Board Mounting Considerations for the FCBGA Packages.*

BRD8017/D, Brochure, *Clock and Data Management Solutions.*

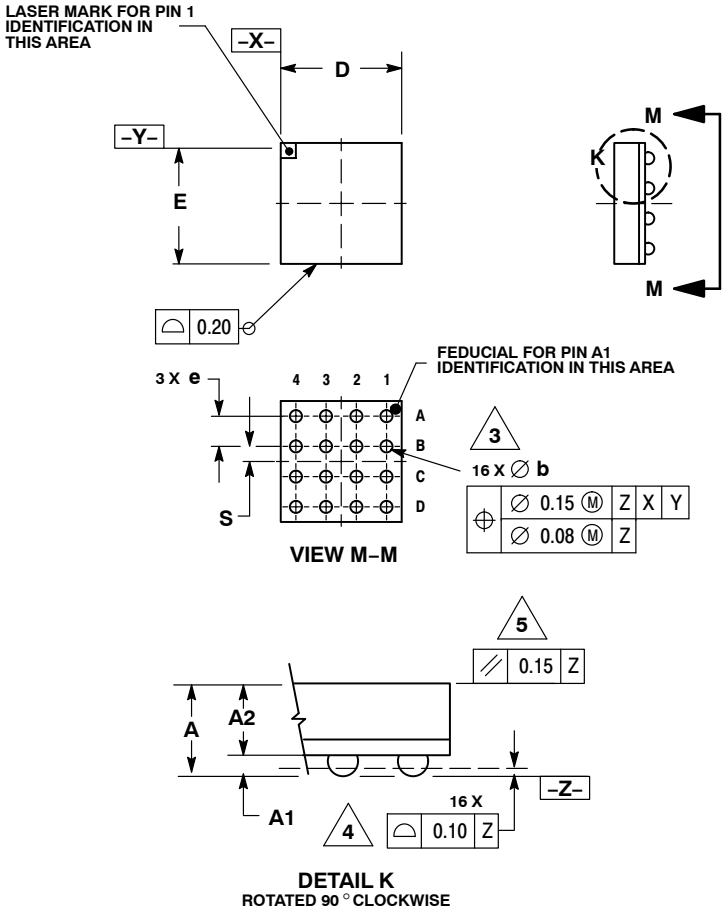
ORDERING INFORMATION

Device	Package	Shipping†
NB7L32MMNG	QFN−16 (Pb−Free)	123 Units / Rail
NB7L32MMNR2G	QFN−16 (Pb−Free)	3000 / 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.

PACKAGE DIMENSIONS

FCBGA−16
BA SUFFIX
PLASTIC 4X4 (mm) BGA FLIP CHIP PACKAGE
CASE 489−01
ISSUE O



NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSION b IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO DATUM PLANE Z.
4. DATUM Z (SEATING PLANE) IS DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.
5. PARALLELISM MEASUREMENT SHALL EXCLUDE ANY EFFECT OF MARK ON TOP SURFACE OF PACKAGE.

	MILLIMETERS	
DIM	MIN	MAX
A	1.40 MAX	
A1	0.25	0.35
A2	1.20 REF	
b	0.30	0.50
D	4.00 BSC	
E	4.00 BSC	
e	1.00 BSC	
S	0.50 BSC	

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