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April 1st, 2010
Renesas Electronics Corporation

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Technical Note

S PARAMETER MEASUREMENT CONDITIONS

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CONTENTS

1. OVERVIEW

This document explains how to measure the S parameter data of switch IC products of NEC Compound Semiconductor Devices, Ltd.

2. MEASURING INSTRUMENTS AND MANUFACTURERS

- Network analyzer : 8720D (Agilent Technologies)
- Calibration kit : 85052B (Agilent Technologies)
- DC power supply : TR6143 (Advantest), × 2

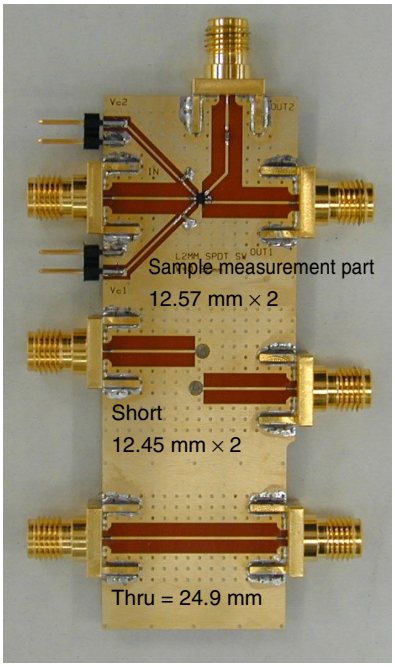
3. MEASUREMENT CONDITIONS

- Calibration method : Full 2-port calibration (Thru, Short, Open, Load)
- Frequency range : 100 MHz to 3.1 GHz
- Measurement point : 10 MHz step
- Port power : Port 1 = 0 dBm/Port 2 = 0 dBm
- V_{DD}/V_{cont} voltage : TYP. values shown in the Recommended Operating Range of respective product data sheet are used.
- Measurement pin : Measures ON and OFF states of INPUT-OUTPUT1 pins.
- Vacant pin : OUTPUT2 pin is terminated by using Load of the 85052B calibration kit.

4. TEST BOARD AND MATERIALS

- Test board : Original board of NEC Compound Semiconductor Devices
  - : Material Matsushita Electric Works, Ltd. (R-4775, 0.2 mm thick)
  - : Pattern material Copper film/gold plating
  - : Micro strip line
  - : Length Thru 24.9 mm
    Short INPUT = 12.45 mm
    OUTPUT = 12.45 mm
    Sample measurement part
    INPUT = 12.57 mm
    OUTPUT = 12.57 mm
  - : Width 0.32 mm

Original board of
NEC Compound Semiconductor Devices



- Materials : RF connector Waka Manufacturing Co., Ltd. (WK72475)
  - : DC cut capacitor[Note] Murata Manufacturing Co., Ltd. (GRM15 series)
  - : Bypass capacitor Murata Manufacturing Co., Ltd. (GRM1552C1H102JA01)
  - : DC pin Hirose Electric Co., Ltd. (A2-2PA-2.54DSA)

Note The capacitance shown in the Evaluation Circuit Diagram of respective product data sheet is used.

5. PROCEDURE

The S parameter is measured with two ports by using a network analyzer and a test board.

Therefore, the data that can be supplied is in the S2P format in the ON and OFF states between the INPUT and OUTPUT1 pins.

<1> Measure the through line of the test board in the direct coordinate format (Log MAG) by using the network analyzer.

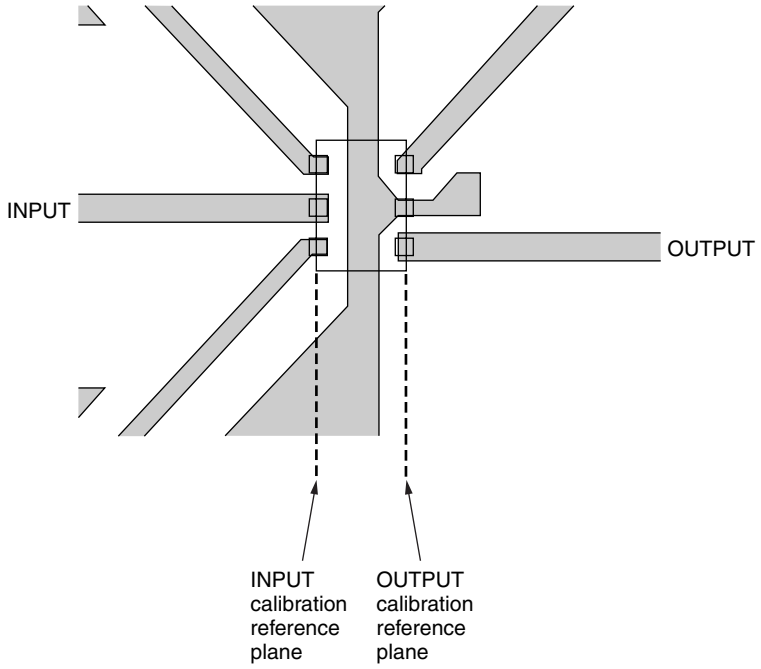
<2> The electrical length must be adjusted to accurately measure the phase of the sample. A short line is provided with this test board to adjust the phase, and this line is used to correct the electrical length.

<3> With the electrical length corrected, measure the S parameter data of the sample with the polar coordinate format (MAG/ANG).

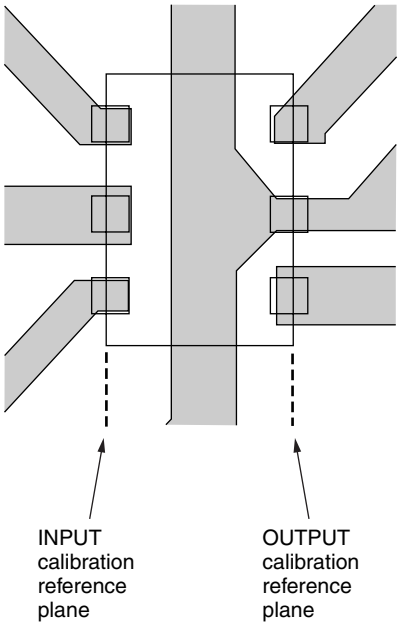
<4> By correcting the S parameter data (MAG) of the sample with the data obtained in <1>, the MAG/ANG of the sample itself can be obtained.

6. CALIBRATION REFERENCE PLANE

The calibration reference planes for this test board are at the following positions.



Expanded view of sample



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