Differential CW Noise Test Setup & Procedure for 1000BASE-T1

Norfolk, VA

May 2014
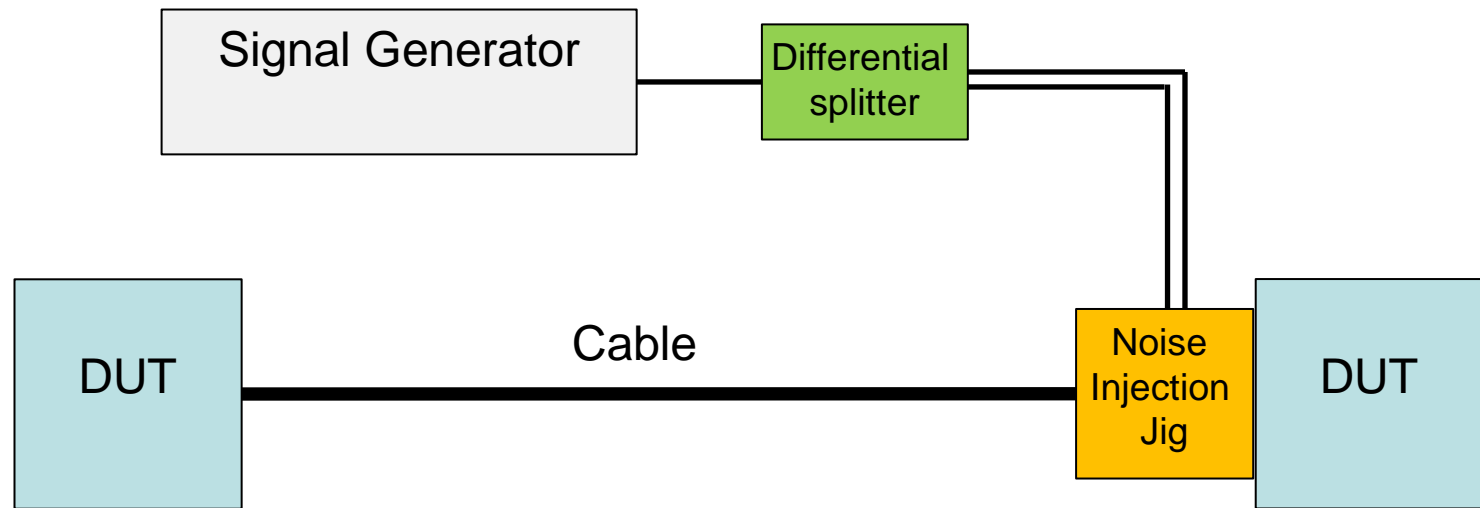
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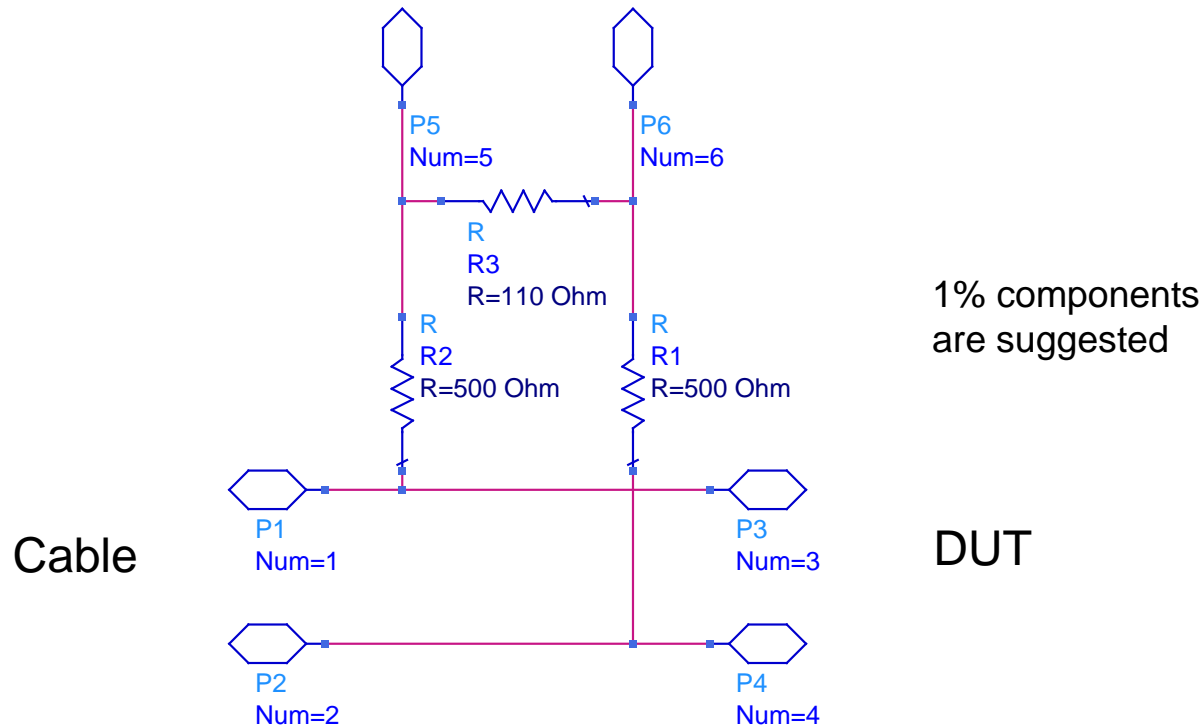Broadcom Corporation

Foreword

- A test is defined to assess the differential CW noise performance of 1000BASE-T1 devices.

- The test is defined as a requirement for IEEE compliance and to serve as a pre-qualification to CW noise immunity tests in Automotive applications.

- The test set up and noise injection circuit are provided.

- Test procedure and requirements are discussed.

- The set up may also be used for transient noise tests (TBD).
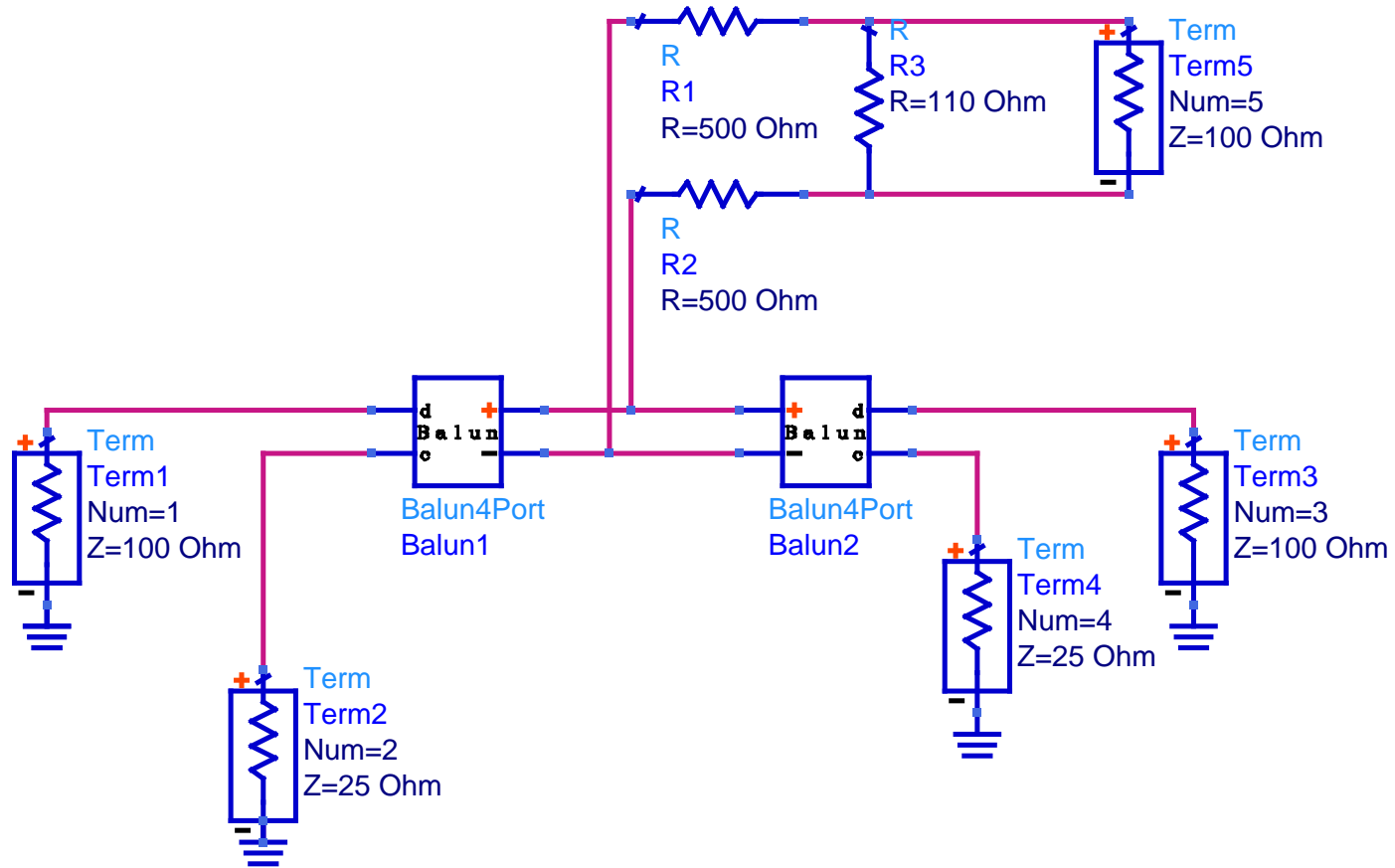
CW Noise Test Set up

Differential Noise Injection Jig

Differential 100Ohm, 4Vpp[1]
noise source

P5
Num=5

P6
Num=6

R
R3
R=110 Ohm

R
R2
R=500 Ohm

R
R1
R=500 Ohm

1% components
are suggested

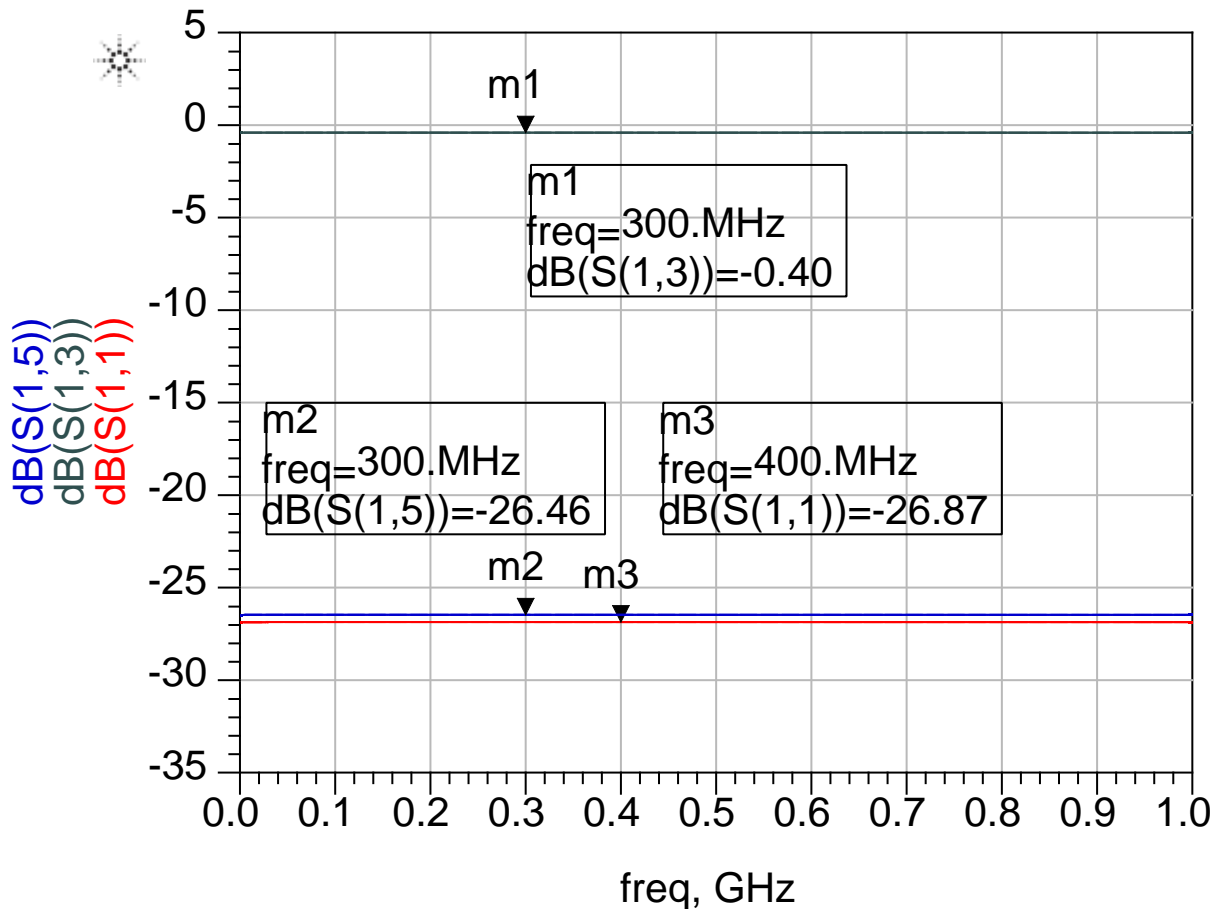P1
Num=1

P3
Num=3

Cable

DUT

P2
Num=2

P4
Num=4

1. This is +13dBm for CW noise. 4Vpp is for 2m cable, 2Vpp is applied for any other cable configurations.

ADS model for Noise Injection JIG analysis

Noise Injection JIG analysis, Ideal Termination

Insertion Loss = 0.40dB

Return Loss = 26.87dB

Noise Coupling = 26.46dB

The chart shows:
- m1: freq=300.MHz, dB(S(1,3))=-0.40
- m2: freq=300.MHz, dB(S(1,5))=-26.46
- m3: freq=400.MHz, dB(S(1,1))=-26.87

Y-axis: dB(S(1,5)), dB(S(1,3)), dB(S(1,1))
X-axis: freq, GHz

- No significant change with up to 5% component variation is seen

Noise Injection JIG analysis with measured model of channel
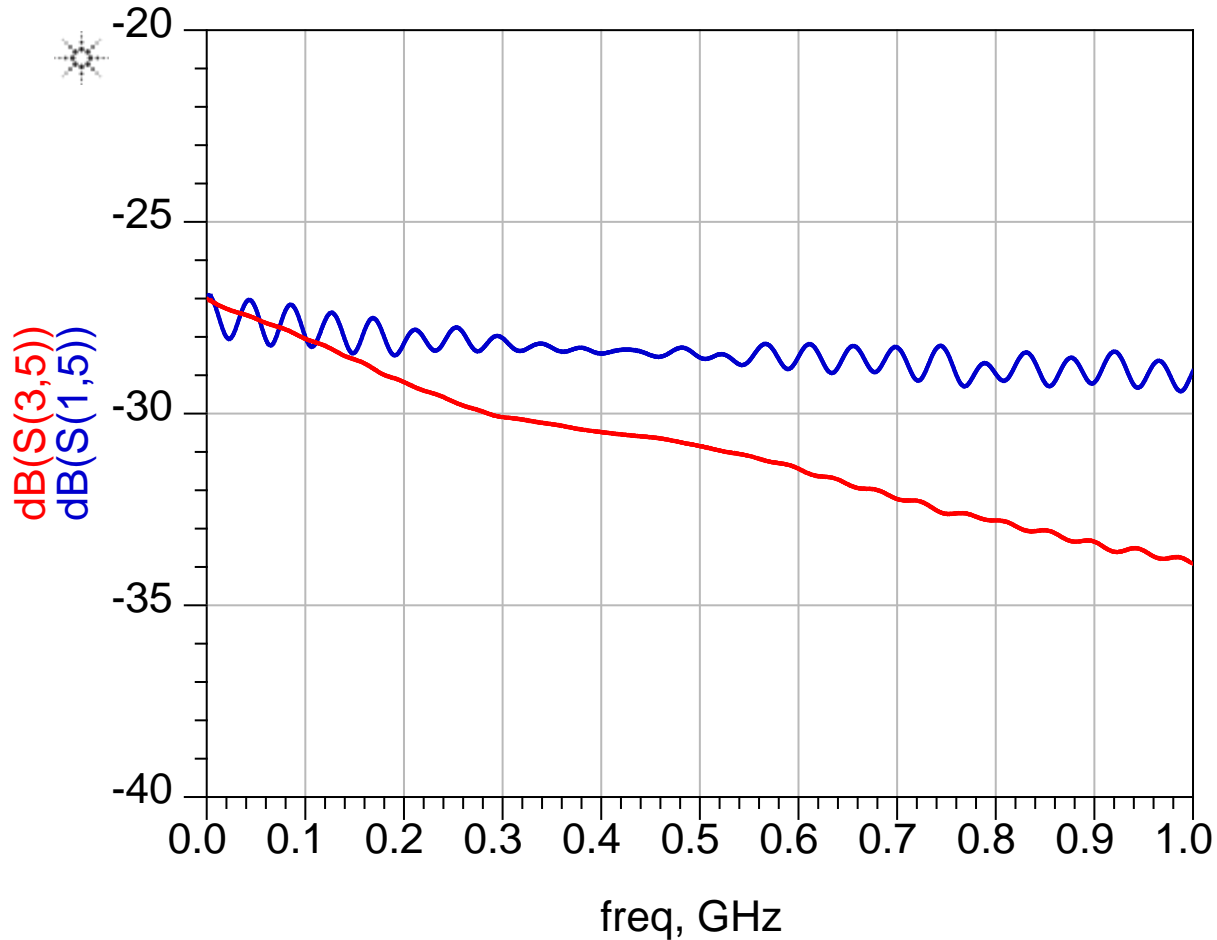
Noise coupling is shown at two sides of a link with a 2m Cable, CMC and termination resistors included in analysis.

Test procedure and requirements

- CW noise with constant amplitude as well as 80% AM (1KHz)
- Differential noise magnitude up to 200mVpp at MDI for 2m cable and no in line connector.
- Differential noise magnitude of at least 100mVpp at MDI for any cable configuration with/without in line connectors.
- Frequency sweep range of 1 to 1000MHz (resolution TBD)
- Random frequency sweep test (TBD)
- BER < 1e-10
- Test for Link Up requirement (TBD)
- 2 seconds dwelling in each frequency
- Noise ramp up and down larger than 10uS
- Noise Injection jig with less than 0.5dB IL and more than 25dB RL