

To: T10 Technical Committee  
From: Mahbubul Bari ([bari@vitesse.com](mailto:bari@vitesse.com))  
Subject: SAS-2 Return Loss Measurement Methodology

Revision History

R0: Initial posting

Related Documents

<http://www.t10.org/ftp/t10/document.07/07-063r0.pdf>

<http://www.t10.org/ftp/t10/document.07/07-007r2.pdf>

<http://www.t10.org/ftp/t10/drafts/sas2/sas2r08.pdf>

Overview

Return loss measurement methodology.

Discussion

1) The D24.3 pattern should be used for the return loss measurements. The pattern is a non-compliant repeating bit stream.

2) SAS2r08

Section B.9 in Annex B describes S-parameter measurements. Clarification should be added to section B.9.3 on transmitter and receiver connection related to the S-parameter measurements. Will also include the derivation information from the Jenkins proposal.

VNA ports are all single-ended; the differential and common-mode properties for differential ports are calculated internal to the VNA or may mathematically derived. If using a TDNA, consult the details for the specific instrument. Four analyzer ports are required to measure the properties of two differential ports.

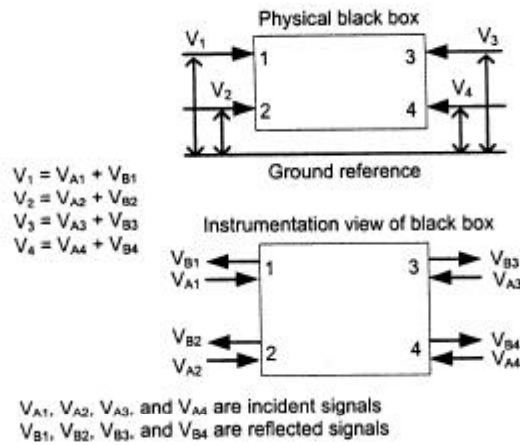


Figure B.13 — Four single-ended port or two differential port element

Figure B.14 shows the set of S-parameters for a single-ended system and for a differential system.

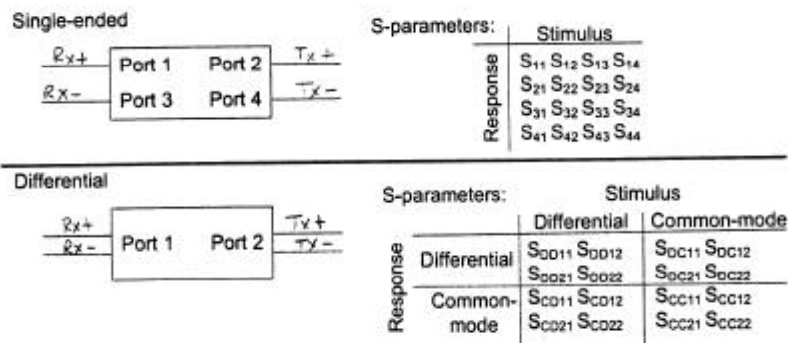


Figure B.14 — S-parameters for single-ended and differential systems

$$S_{mm} = \frac{1}{2} \begin{bmatrix} \text{SDD11} & \text{SDC11} \\ \text{SCD11} & \text{SCC11} \end{bmatrix}$$

$S_{11} - S_{13} - S_{31} + S_{33}$	$S_{12} - S_{14} - S_{32} + S_{34}$	$S_{11} + S_{13} - S_{31} - S_{33}$	$S_{12} + S_{14} - S_{32} - S_{34}$
$S_{21} - S_{23} - S_{41} + S_{43}$	$S_{22} - S_{24} - S_{42} + S_{44}$	$S_{21} + S_{23} - S_{41} - S_{43}$	$S_{22} + S_{24} - S_{42} - S_{44}$
$S_{11} - S_{13} + S_{31} - S_{33}$	$S_{12} - S_{14} + S_{32} - S_{34}$	$S_{11} + S_{13} + S_{31} + S_{33}$	$S_{12} + S_{14} + S_{32} + S_{34}$
$S_{21} - S_{23} + S_{41} - S_{43}$	$S_{22} - S_{24} + S_{42} - S_{44}$	$S_{21} + S_{23} + S_{41} + S_{43}$	$S_{22} + S_{24} + S_{42} + S_{44}$