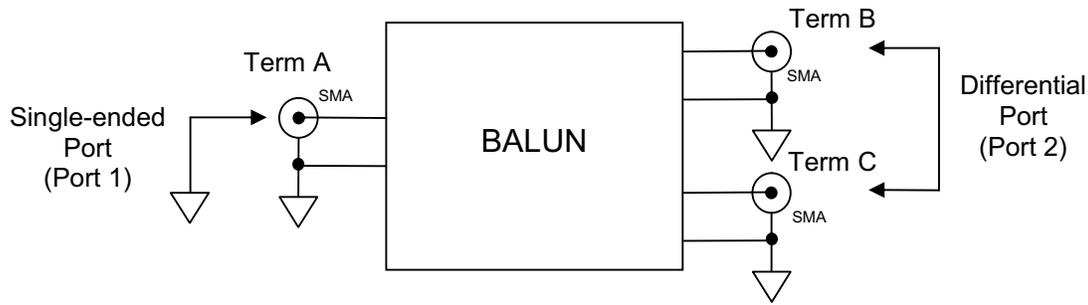# Appendix - Explanation of measurements

1. Port nomenclature

There are three single-ended or unbalanced physical ports, called Terminal A, B and C, each fitted with a female SMA connector. Terminal A is the single-ended Port 1, while Terminal B and Terminal C constitute the balanced or differential Port 2. In addition, three different modes are available in this configuration (differential d, common c and single ended s), which will be noted as follows,

S, output mode, input mode, output port, input port

As an example, the unbalanced port reflection coefficient would be $S_{ss}11$, the balanced port reflection coefficient $S_{dd}22$, and the forward gain $S_{ds}21$.

2. VSWR at all ports

The VSWR will be measured with respect to a 50 ohm characteristic impedance at the unbalanced port, and with respect to the characteristic impedance resulting from the participant's claimed transformation ratio at the balanced port.

3. Insertion loss

The insertion loss will be calculated as

$$IL = -10\log\left|S_{ds}21\right|^2$$

4. Common mode rejection ratio (CMRR)

The CMRR will be calculated as

$$CMRR = \frac{S_{ds}21}{S_{cs}21} \qquad \text{and} \qquad CMRR = \frac{S_{sd}12}{S_{sc}12}$$

5. Imbalance

If the differential Port 2 is treated as two individual singled ended ports (Terminals B and C), the imbalance is the ratio between the signal available at Terminal B and Terminal C, both with respect to the signal incident at Terminal A. It is calculated as

$$imbalance = -\frac{S_{ss}BA}{S_{ss}CA}$$