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**“Mainline” Splice Connector
Return Loss**

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1.0 SCOPE AND DEFINITIONS

- 1.1 This document describes a procedure to measure the Return Loss characteristics of a single Mainline Splice Connector interfaced between (2) mainline cables. It implements the time domain-gating features of the network analyzers, which removes the interfaces, and far end termination from the DUT (device under test) measurement.

1.2 Definitions

Gating:

Technique for selectively removing the response of a non-perfect connector from return loss measurements.

Directivity:

The figure of merit for how well a coupler separates forward and reverse waves is directivity. The greater the directivity of the device, the better the signal separation. System directivity is the vector sum of all leakage signals appearing at the analyzer receiver input. The error contributed by directivity is independent of the characteristics of the test device and it usually produces the major ambiguity in measurements of low reflection devices.

Return Loss:

The ratio of incident signal to reflected signal, expressed in dB.

Network Analyzer:

An instrument for measuring the swept frequency response of a cable or a cable/connector combination.

2.0 EQUIPMENT

- 2.1 Vector Network Analyzer (VNA), with Time Domain capability: Agilent8753S with option – 010 (time domain), 075 (75 ohm) and S-Parameter built in or external, or equivalent.
- 2.2 Type “N” 75-Ohm Calibration Kit; Agilent-85036B, or equivalent.
- 2.3 Flexible Precision Test Cable; Agilent-85039-60013, or equivalent.
- 2.4 (2ea) 5/8-24 to “N” Precision Adapter, Return Loss, ≥ 30 dB
- 2.5 (2ea) Mainline SP100 cable, 75 ohm, length, 15 inches $\pm 1/2$ inch; cable size matches that of splice connector being tested.
- 2.6 (2ea) Mainline Pin Connectors, Return Loss, ≥ 30 dB, cable size matches that of splice connector being tested.

3.0 SET-UP

3.1 H/P ANALYZER

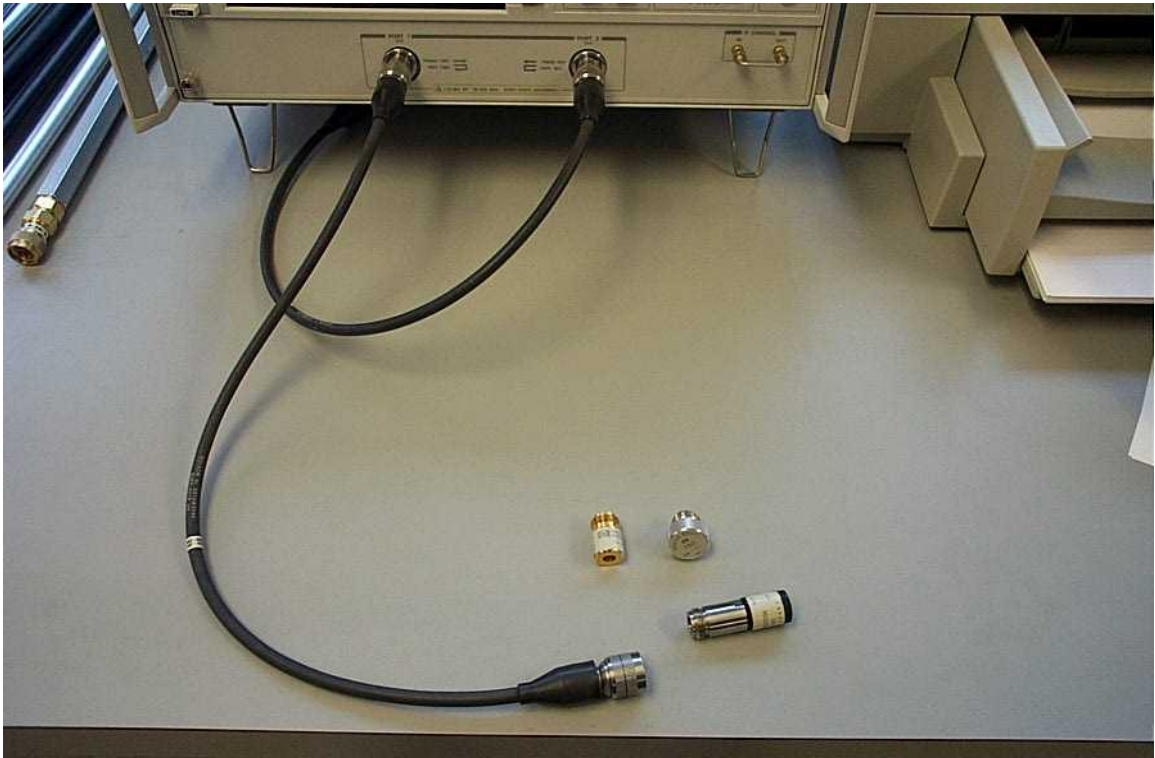
- 3.1.1 Allow equipment to warm up per manufacturers instructions.
 - Preset
 - IF Band Width = 3000 Hz
 - SYSTEM – Transform -Low Pass Step
 - Set frequency Low Pass
 - Dual Chan = ON; Split Display = ON
 - FORMAT – CH 1 = Log Magnitude; CH 2 = Real
 - START = 5 MHz; STOP = 3 GHz
 - Number of Points = 801
 - Set CH1 – CH2 to S11
 - CH 1 –Transform = OFF; Gate Start = 4.671 ns; Gate Stop = 6.451 ns (actual settings depend on the length of input line)

(Note: Wait to turn gate on until after calibration is completed and the first connection made. This will let you see the frequency response of the open/short/load standards of the test set up without gating. (Gating can make it difficult to tell if a standard is connected correctly during calibration).

- CH 2 –Transform, Low Pass Step, Transform = ON; START = 0 ns; STOP = 15 ns; Gate Shape = Normal
- Scale/Div – CH 1 = 10 dB; CH 2 = 5 Mu

- 3.1.2 Install flexible precision test cable to port 1.

- 3.1.3 Perform an S11 – 1 PORT calibration at the end of the flexible cable with applicable test adapters included. Use OPEN, SHORT and the same LOAD to be used during the test. See Fig. 1.



Calibration Set up

Fig. 1

3.2 DUT Connections

- 3.2.1 Connect all interfaces required to adapt the near end of the first mainline cable to the flexible cable connected to port 1, as shown in Fig. 2.