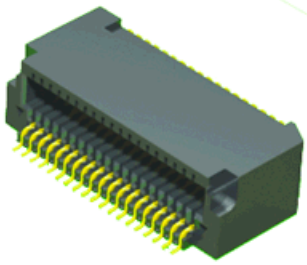
Shielding Effectiveness Report

EPLSP-031-1000

Mates with

ERI8-031-S-D-RA and ERI8-31-S-D-RA



Description:
EPLSP I/O Cable Assemblies

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Report Revision: 9/11/2012

Series: EPLSP/ERI8 I/O System
Description: Rugged Latching High Speed System

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Product Overview

The EPLSP series cable assembly is available in 2 configurations - 19 positions/row supporting 8 differential pairs and 31 positions/row supporting differential 16 pairs. The EPLSP cable assembly is available with 32 AWG low skew cable. The EPLSP cable was tested using an ERC cage, which shields the connector and provide a low impedance cable termination to chassis.

Shielded Room Noise Floor Verification

Prior to performing shielding effectiveness (SE) testing of a particular sample, it is important to establish the noise floor of the anechoic test chamber by measuring the SE of the receive line while terminated at the bulkhead connector with a precision short. The difference between this measurement and that of an "in-band" antenna (per IEC 6100-4-21) is the maximum dynamic range of the measurement system. Any sample that has a shielding effectiveness greater than the dynamic range will therefore not be adequately characterized. Figure 1 and show the dynamic range of the measurement system.

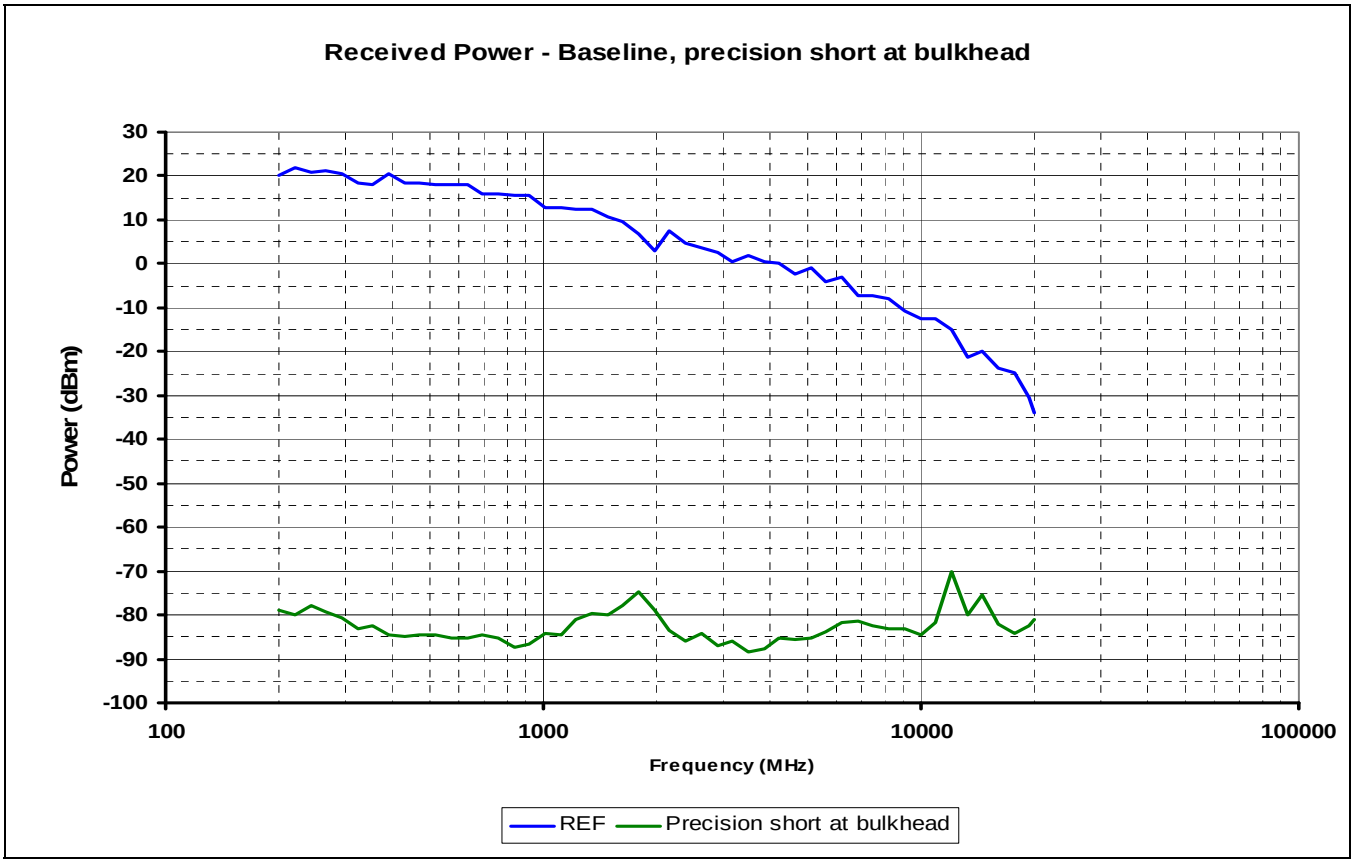

Figure 1. Components of Shielding Dynamic Range

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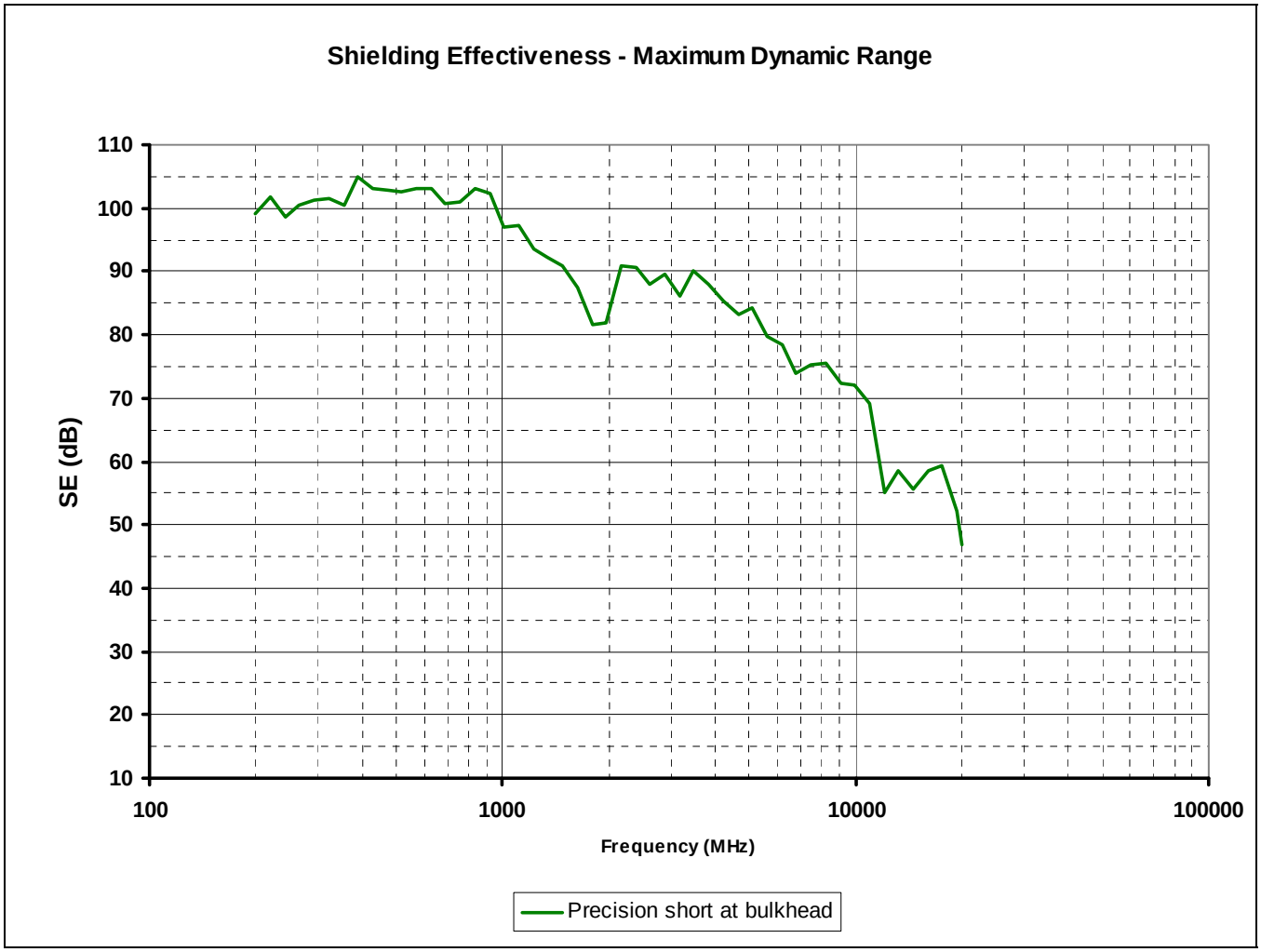

Figure 2. Shielding Effectiveness Dynamic Range

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Shielding Effectiveness Summary Data

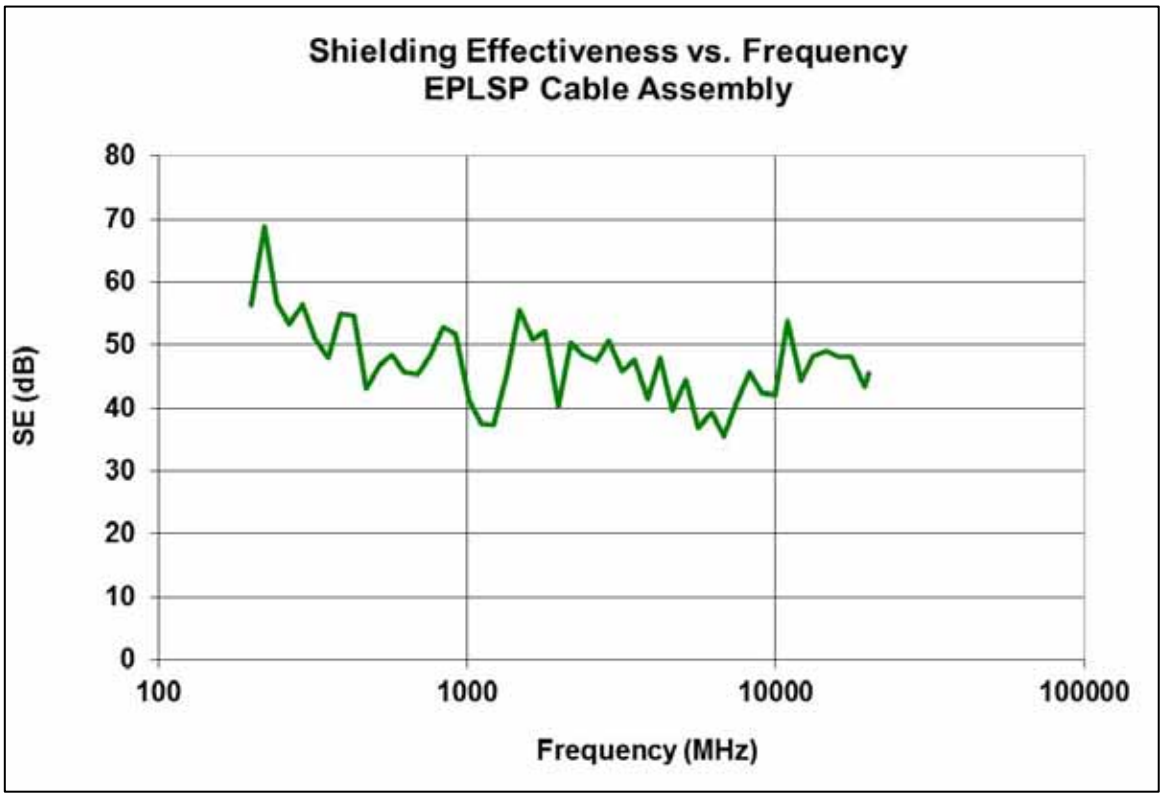

Figure 3. EPLSP Shielding Effectiveness per IEC 61000-4-21 Test Method

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Characterization Details

This report presents data that characterizes the SE of a cable assembly in a controlled printed circuit board (PCB) environment. All efforts are made to reveal typical responses inherent to the system under test (SUT).

In this report, the SUT includes the cable assembly and mating connectors. The mating connectors are attached to test boards constructed with Samtec recommended footprints and routing practices. The mating connector to chassis panel interface is critical to shielding performance and every attempt was made to mimic typical installation practices. Where available, recommended chassis panel cutout dimensions were used and the mating connector typically penetrates this panel cutout. Connection between the panel and the mating connector relies on mating connector features such as flanges or EMI gaskets when specified on the mating connector drawing.

Common Mode Signals

IEC 61000-4-21 does not specifically address fixturing aspects of high-speed differential cable assemblies. For this test a power divider is use to combine the received signal from each wire of a single differential pair in the cable assembly. This is referred to as the common mode response or common mode shielding effectiveness.

Product and Test System Descriptions

Product Description

The product test sample was a 1-meter long EPLSP cable assembly. The raw cable is terminated by soldering a small transition PCB (termination board) at each end. Each termination board has an EPLSP connector soldered to it. Each cable assembly was tested by mating it to an ERI8 test board connector. The actual part numbers that were tested are shown in Table 1, which also identifies End 1 and End 2 of the assembly.

Length	Part Number	End 1	End 2
1000mm	EPLSP-031-1000	EPLSP	EPLSP

Test System Description

All measurements were performed using the test boards, which include the mating ERI8 connectors and ERC cages. The test boards have trace lengths of 6 inches and provide for the interconnection to the cable assemblies by use of replaceable SMA connectors. The test boards are mounted inside a well-shielded box, which isolates fixture noise from the cable assembly radiation. The shielded box has a panel, which serves as the cable assembly's shield termination mechanism for the cable, ERI8 connector and ERC cage.

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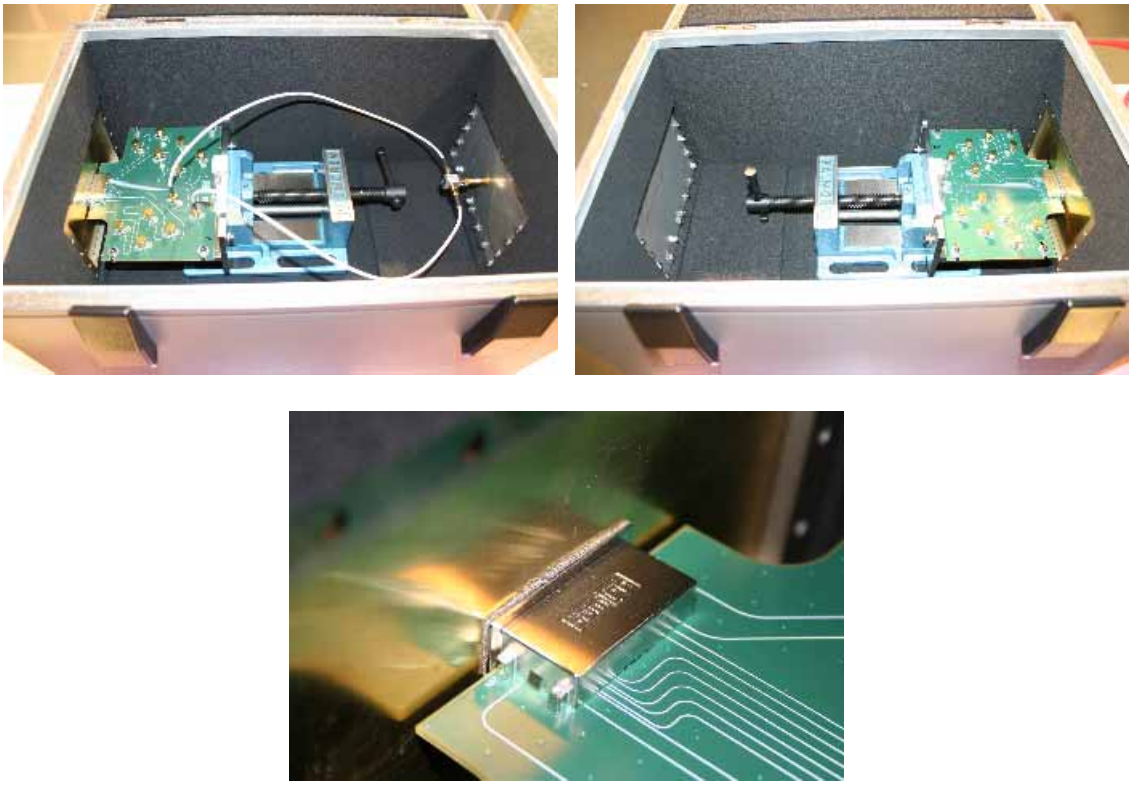

Figure 4. EPLSP Test Boards Inside Isolation Box

The cable terminations had a pre-determined signal-to-ground configuration. The respective signal line numbers are shown in Table 2 below.

TABLE 2 -31 POSITION																					
PAIR 1		PAIR 2		PAIR 3		PAIR 4		PAIR 5		PAIR 6		PAIR 7		PAIR 8		PAIR 9		(PCB PAIR)			
P4+	P4-	P5+	P5-	P6+	P6-	P2+	P2-	P7+	P7-	P3+	P3-	P8+	P8-	P9+	P9-	P1+	P1-	(CABLE PAIR)			
POS	NEG	POS	NEG	POS	NEG	POS	NEG	POS	NEG	POS	NEG	POS	NEG	POS	NEG	POS	NEG				
POS	NEG	POS	NEG	POS	NEG	POS	NEG	POS	NEG	POS	NEG	POS	NEG	POS	NEG	GREEN	BLUE	ORANGE	PURPLE	WHITE	
P4+	P4-	P5+	P5-	P6+	P6-	P3+	P3-	P1+	P1-	P7+	P7-	P8+	P8-	P9+	P9-	1	2	3	4	5	
PAIR 10		PAIR 11		PAIR 12		PAIR 13		PAIR 14		PAIR 15		PAIR 16		PAIR 17		DISCRETES					

Table 2: ERI8 pin mapping and respective signal line numbers

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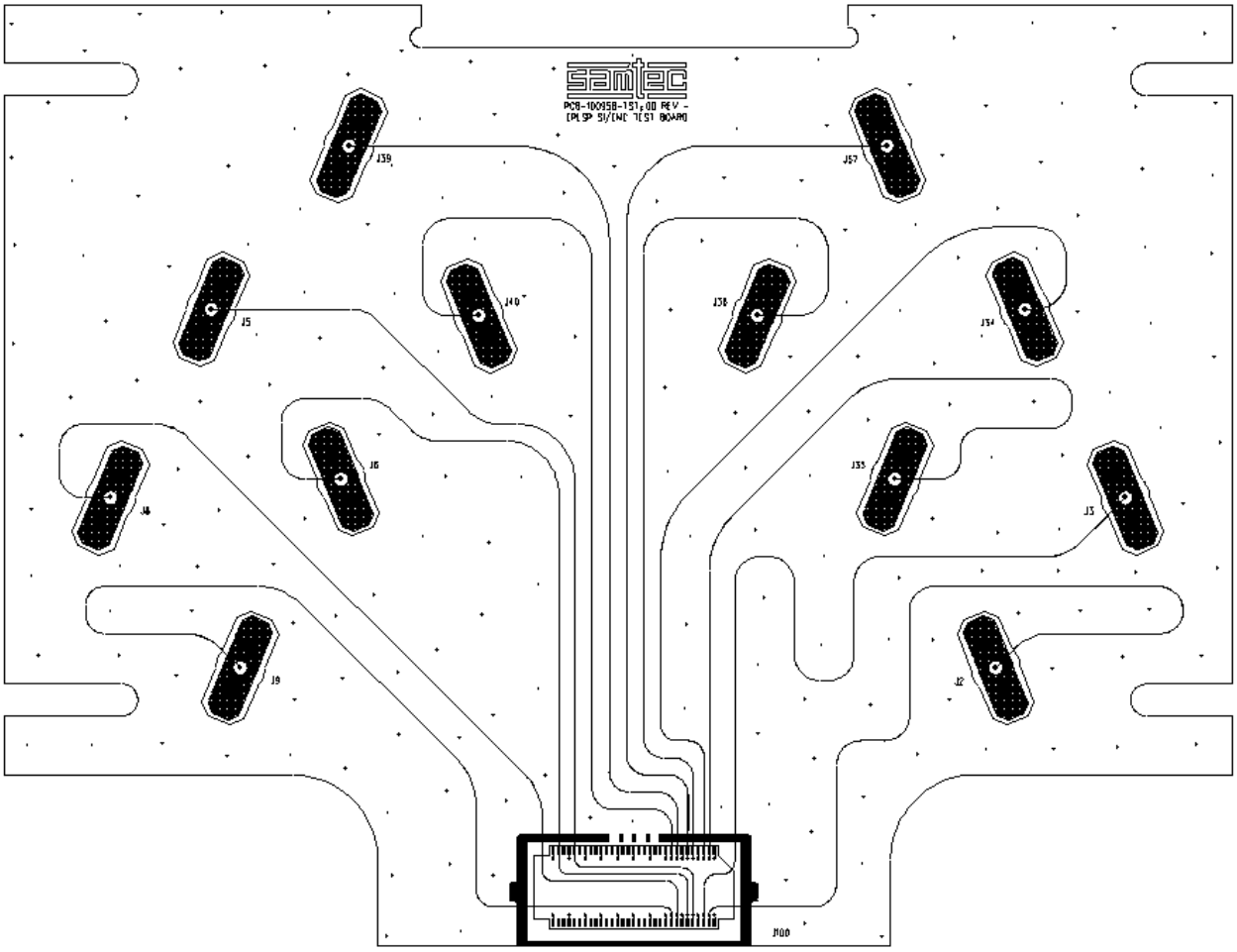
The test boards are pictured below.



PCB-100950-TST-01 EPLSP Cable Test Board Design

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Appendix A– Test and Measurement Setup

The Mode Stirred Chamber Method is documented in IEC 61000-4-21 and was used in this testing. The method relies on exposing a device to electromagnetic energy in a large resonant cavity (shielded room). An electrically large tuner perturbs the boundary conditions of the cavity resulting in different standing wave patterns and a randomized excitation of the device. Multiple device measurements are made at different tuner positions and the results are averaged. Shielding effectiveness is defined to be relative to an in-band reference antenna for IEC 61000-4-21. If the shielding effectiveness is 20 dB, it means that the received power with the sample in place is 20 dB lower than the received power when a reference antenna is in place. A log periodic antenna serves as the reference from 200 MHz to 2 GHz, and a double-ridge guide horn antenna is the reference from 2 GHz to 20 GHz. This method has a practical high frequency limit determined by the instrumentation used, in this case 20 GHz. The low frequency limit is determined by the size of the chamber, which in this case is 200 MHz. The system used for this testing is a SMART 200 system by ETS-Lindgren and is shown in Figure 4.

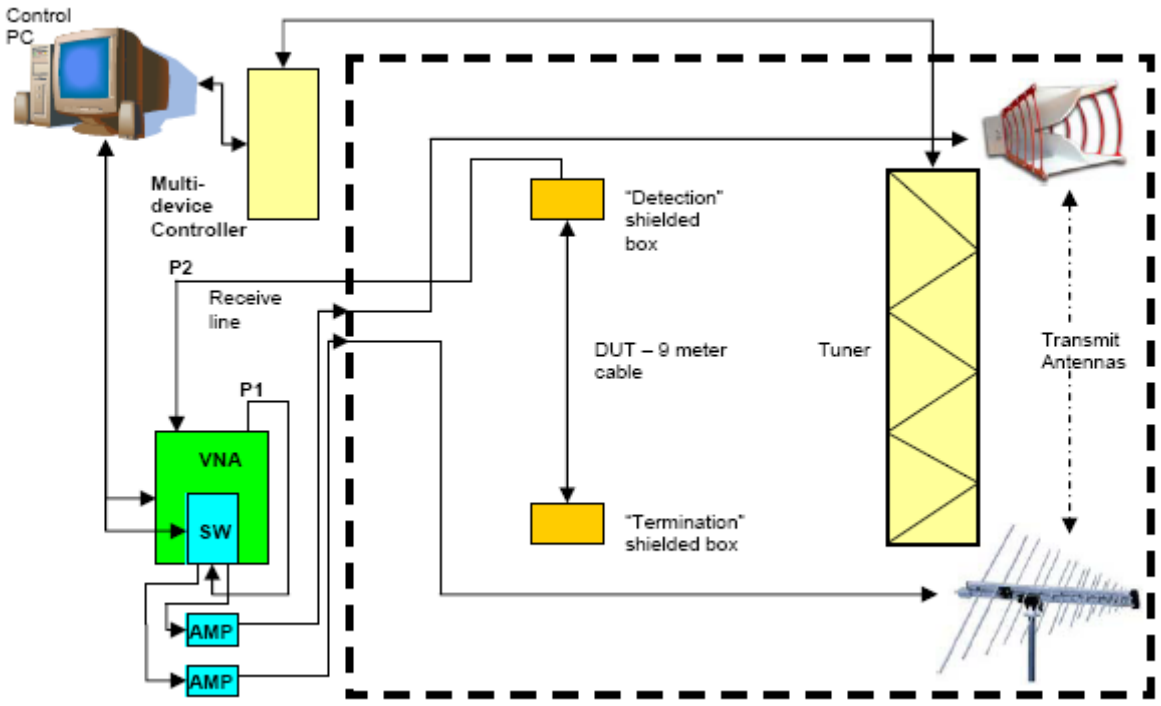

Figure 4: Mode Stirred Chamber Method

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ETS/Lindgren 2090 Multi-Device Controller and HP Vector Network Analyzer

Shielding Effectiveness Test Setup

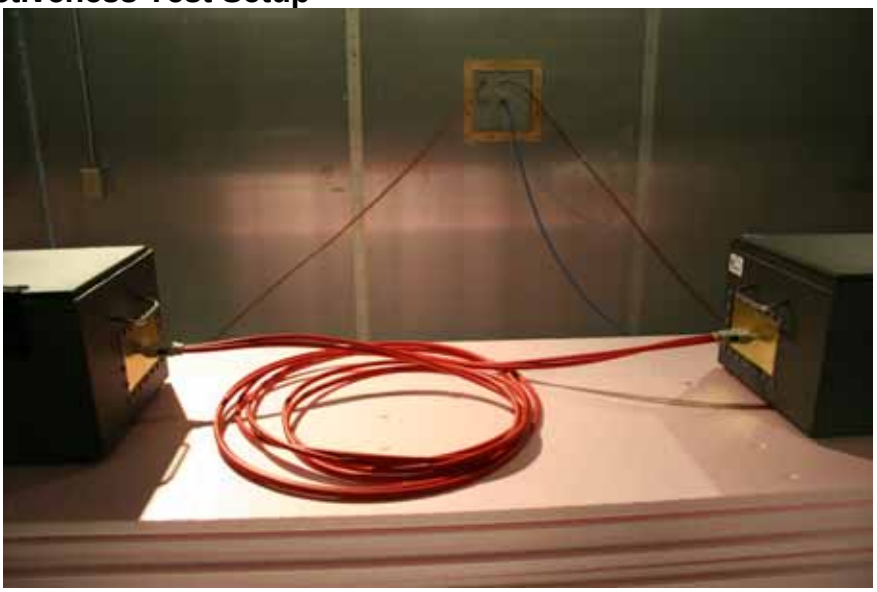

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*Photo above is representative of Typical EPSLP cable assembly but may not be the exact product tested

Test Instruments

QTY	Description
1	ETS/Lindgren Smart200 Reverberation Chamber
1	ETS/Lindgren 2090 Multi-Device Controller w/ Smart IMM Software
1	HP8720ES 50 MHz – 20 GHz Vector Network Analyzer

Measurement Station Accessories

QTY	Description
1	Agilent 3499B Switch Controller
1	Agilent 8762C Coaxial Switch (DC – 26.5 GHz)
1	Mini-Circuits ZHL – 42W Coaxial Amplifier (10 MHz – 4.2 GHz, +30 dB gain)
1	Microwave Power L0218-30 Wideband Amplifier (2–18 GHz, +30 dB gain)
1	Weinschel Model 1515-1 Broadband Resistive Power Divider (DC-18 GHz)
2	Ramsey Electronics STE3300 RF Shielded Test Fixture

Test Cables & Adapters

QTY	Description
1	Pasternack Enterprises 2.9mm Semi-Rigid (.141) 8” Cable Assemblies (4)
1	Tektronix 1 Meter Module Extenders (2)