

A5530 Ground Mat Antenna Revision

SMA-SMB Adapter Inclusion

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1 INTRODUCTION

This document contains loss measurements for SMA and SMB connectors and adapters. Times-7 A5530 ground mat antenna requires a snap on connector between the antenna's pigtail and the extension lead that connects the RFID reader.

The SMA terminated cable gets damaged when the mat antenna is pulled by the cable in the field. With a snap on connector (SMB) we would potentially avoid damaging the cable as the SMB connector dismantles first before the cable is damaged when force is applied while pulling.

This documentation includes test results for the existing cable configuration (SMA to SMA) and the results for proposed SMA to SMB adapter configuration.

2 VECTOR NETWORK ANALYSER CALIBRATION

HP 8753D Vector Network Analyser (VNA) was used to perform the return loss and insertion loss measurements. The VNA's ports were terminated with SMA male ports (as shown in Fig.1) and a SMA calibration kit was used to perform a full 2-port calibration viz., open, short, load and thru for 800 MHz to 1000 MHz frequency span. Isolation was omitted as the device under test (DUT) do not have high insertion loss (in the range of ca. -120 dB). The test cables were plugged in directly to the VNA's ports for loss measurements.

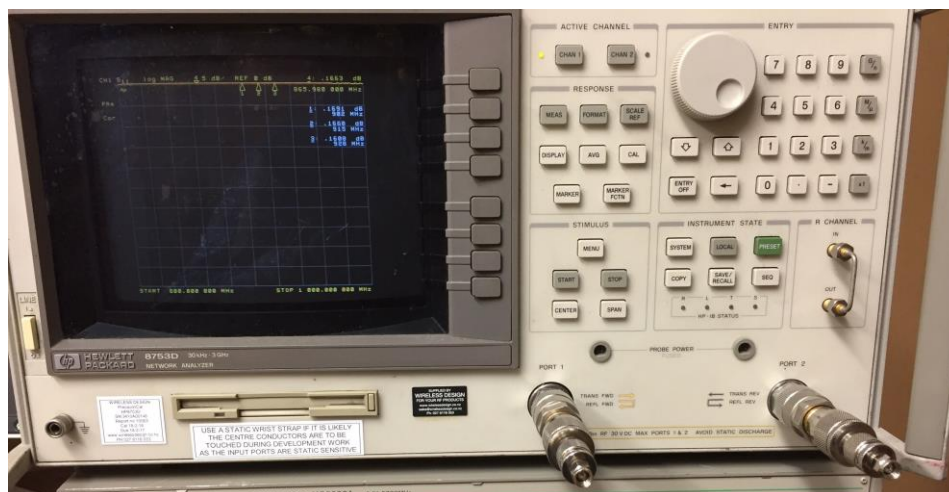


Fig.1 HP 8753D VNA

3 SMA-SMA CONNECTOR MEASUREMENTS

A5530 ground mat antenna has a 300mm long pigtail terminated with SMA Female Jack connector. All versions including vertically, horizontally and circularly polarised mats bear this connector. The vertically polarised mat has a LMR-195 cable (Fig.2) whereas the horizontally and circularly polarised mat has a RG-316 cable (Fig.3). The extension lead that connects the A5530's pigtail and the RFID reader will have SMA Male Plug as shown in Fig.4 and Fig.5.



Fig.2 LMR-195 Cable with SMA Female Jack – A5530V's Pigtail



Fig.3 RG 316 Cable with SMA Female Jack – A5530H and A5530C's Pigtail

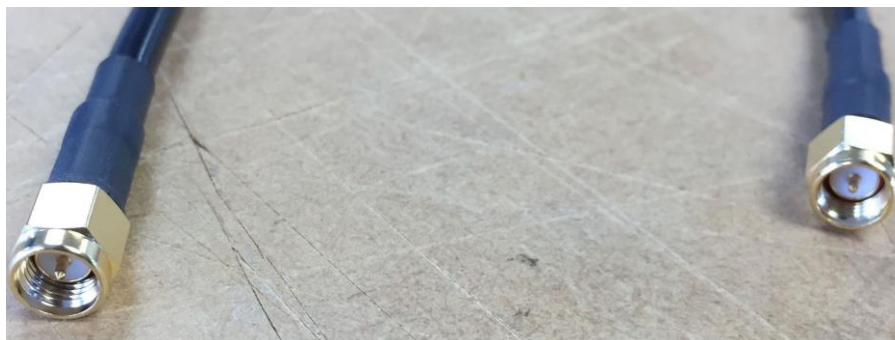


Fig.4 LMR-195 Cable with SMA Male Plug – Extension Lead



Fig.5 RG-316 Cable with SMA Male Plug – Extension Lead

These cables were connected as shown in Fig.6 and Fig.7 to measure the return loss and insertion loss.



Fig.6 Connected LMR-195 cable

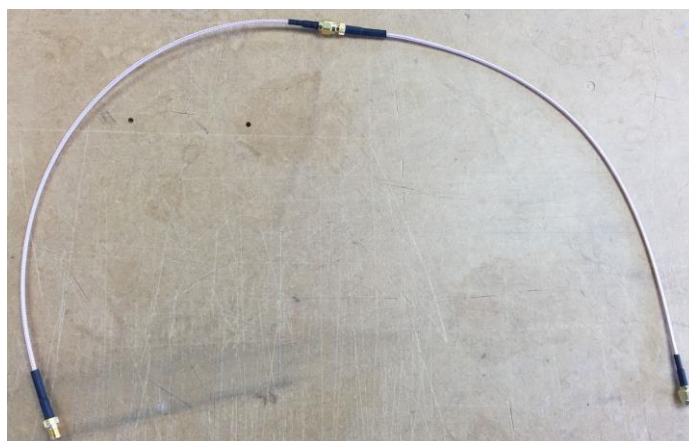


Fig.7 Connected RG-316 Cable

LMR-195 Measurements:

Fig.8 and Fig.9 show the return loss and insertion loss measurements between 800MHz to 1000 MHz. The return loss was good as the cable was terminated to 50 Ohm VNA port. The insertion loss was found to be ~0.3 dB over ETSI and FCC frequencies.

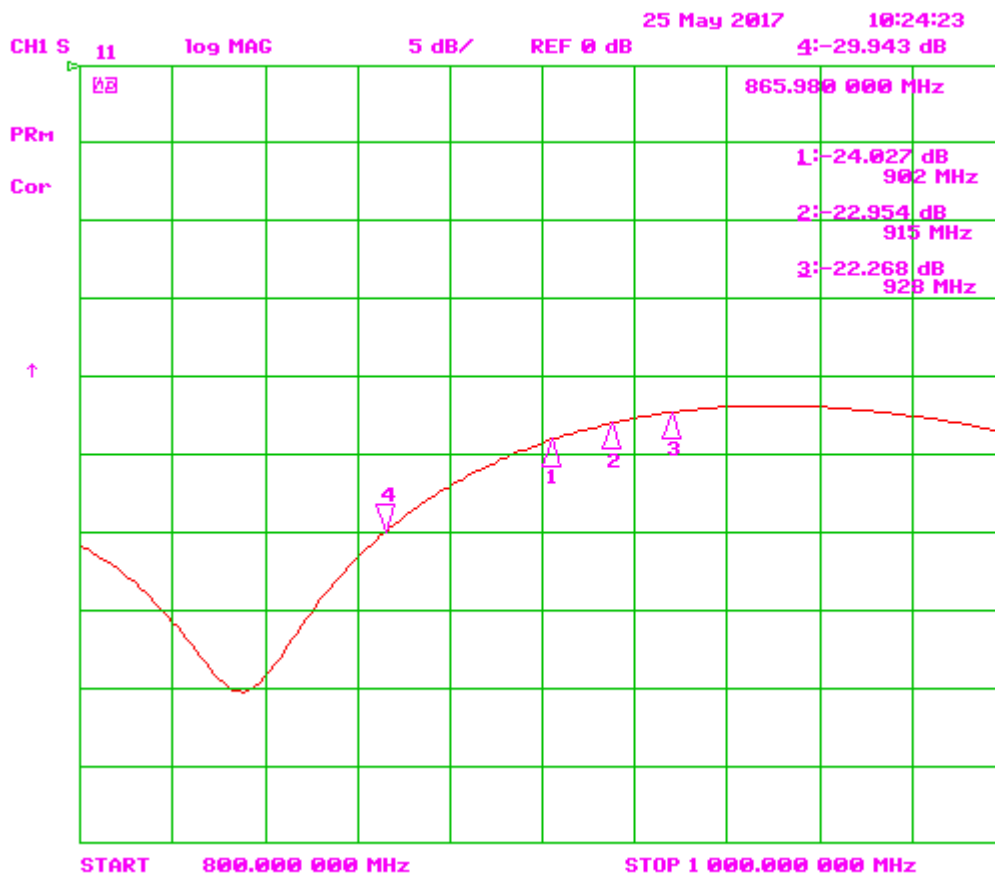


Fig.8 LMR-195 SMA Termination – Return Loss

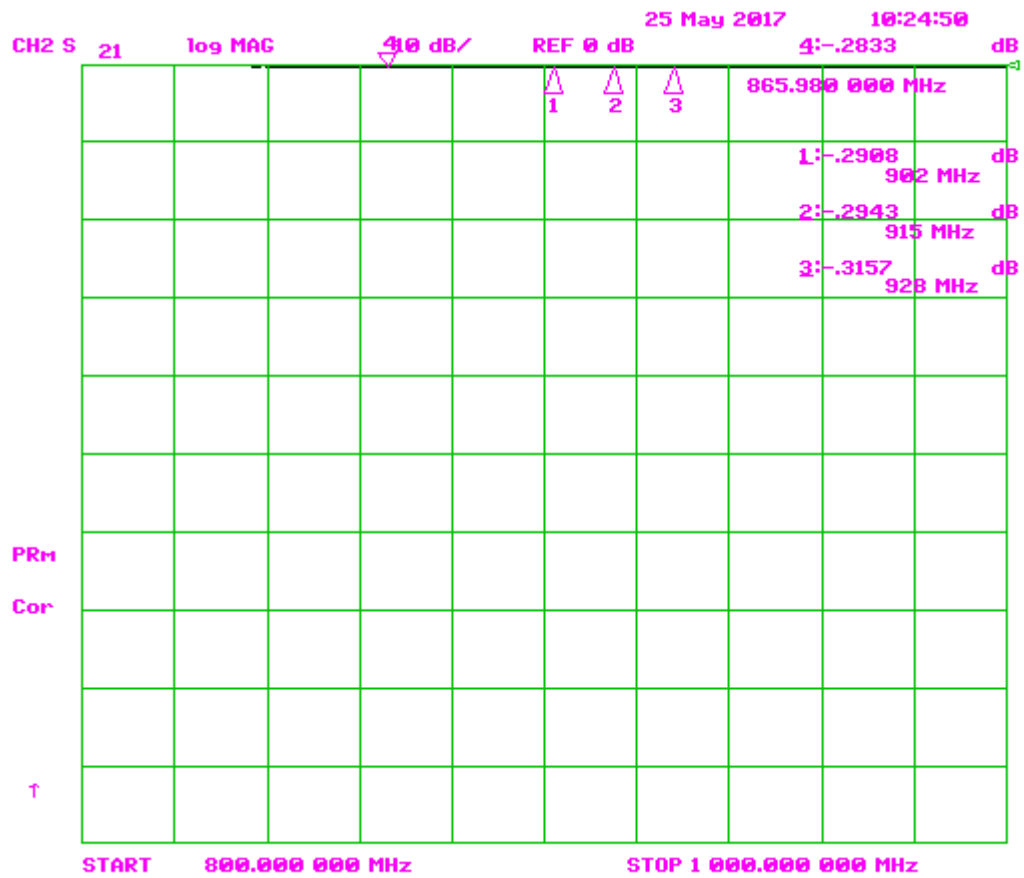


Fig.9 LMR-195 SMA Termination – Insertion Loss

Fig.10 and Fig.11 show the return loss and insertion loss measurements between 800MHz to 1000 MHz. The return loss was good as the cable was terminated to 50 Ohm VNA port. The insertion loss was found to be ~0.45 dB over ETSI and FCC frequencies.

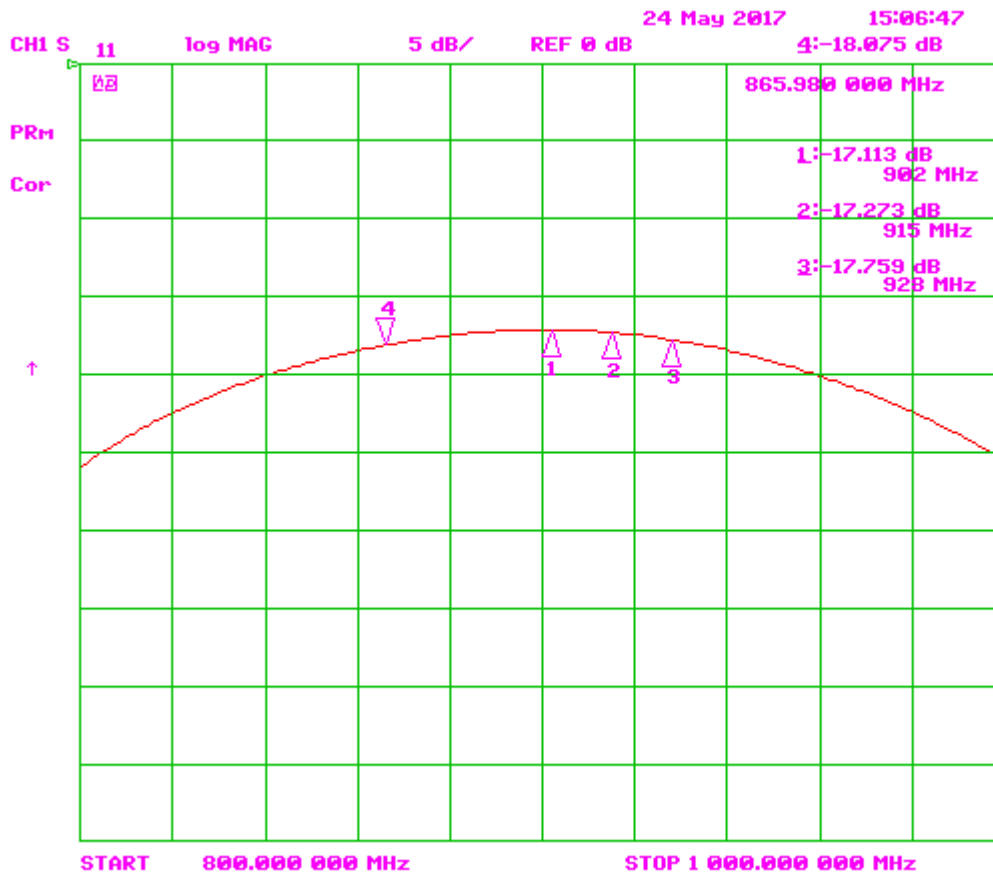


Fig.10 RG-316 SMA Termination – Return Loss

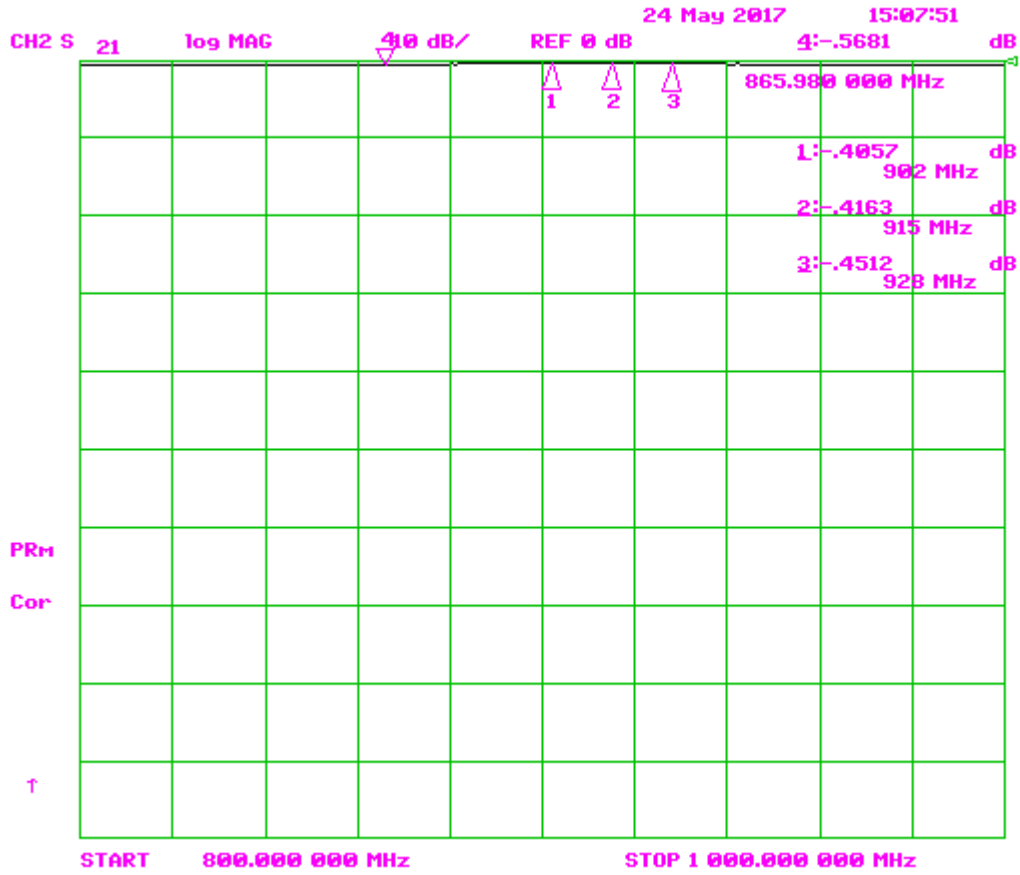


Fig.11 RG-316 SMA Termination – Insertion Loss

4 SMA-SMB ADAPTER MEASUREMENTS

A SMA-SMB adapter was suggested to go in between the antenna's pigtail and the extension lead such that the SMB connector dismantles when the cable is pulled. Fig.12 shows the SMB adapter with the SMA Female Jack and SMA Male Plug. Fig.13 shows the details of a SMA Plug and Jack.



Fig.12 SMA – SMB Adapter



Fig.13 SMA Plug and Jack

LMR-195 and RG-316 cables were connected using this adapter and measurements were repeated to find out the losses introduced by the adapter (Fig.14 and Fig.15).



Fig.14 LMR-195 Cable connected using an adapter

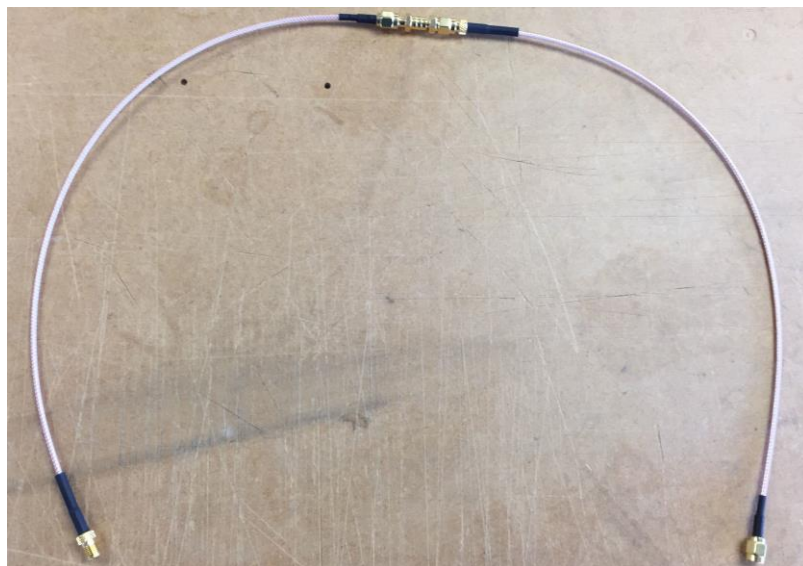


Fig.15 RG-316 Cable connected using an adapter

LMR-195 Measurements:

Fig.16 and Fig.17 show the return loss and insertion loss measurements between 800MHz to 1000 MHz.

The return loss was good as the cable was terminated to 50 Ohm VNA port.

The insertion loss was found to be ~0.5 dB over ETSI and FCC frequencies.

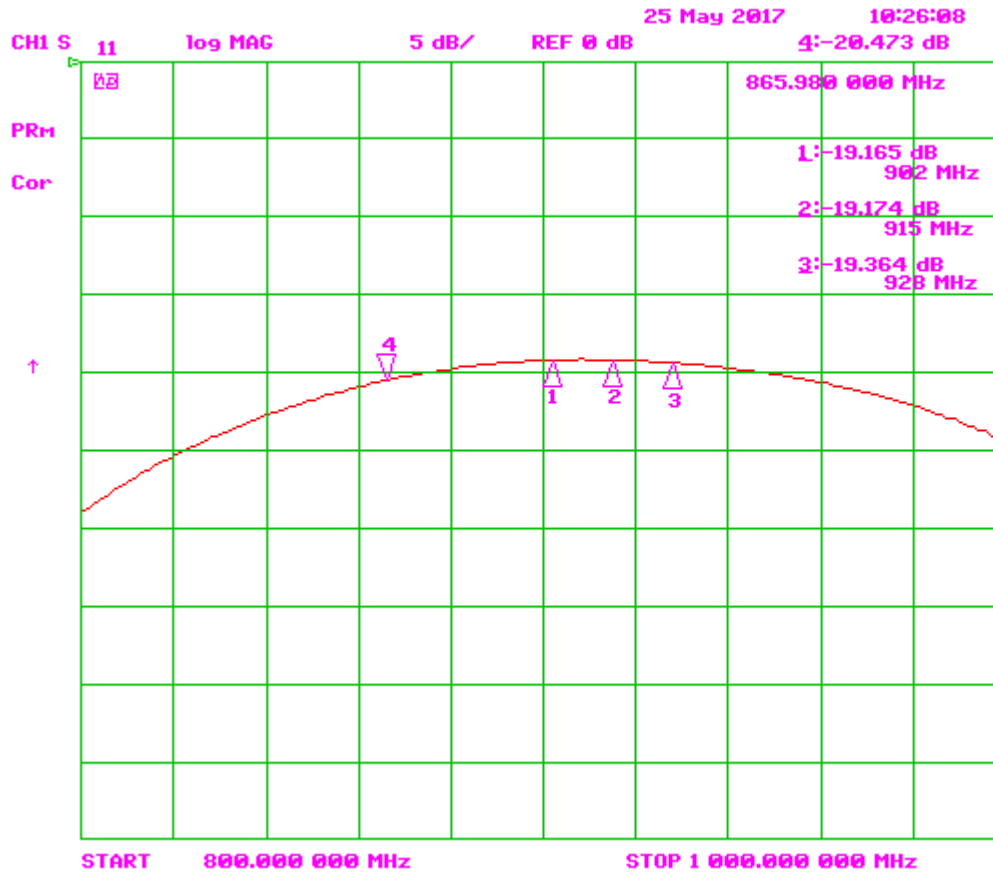


Fig.16 LMR-195 Adapter – Return Loss

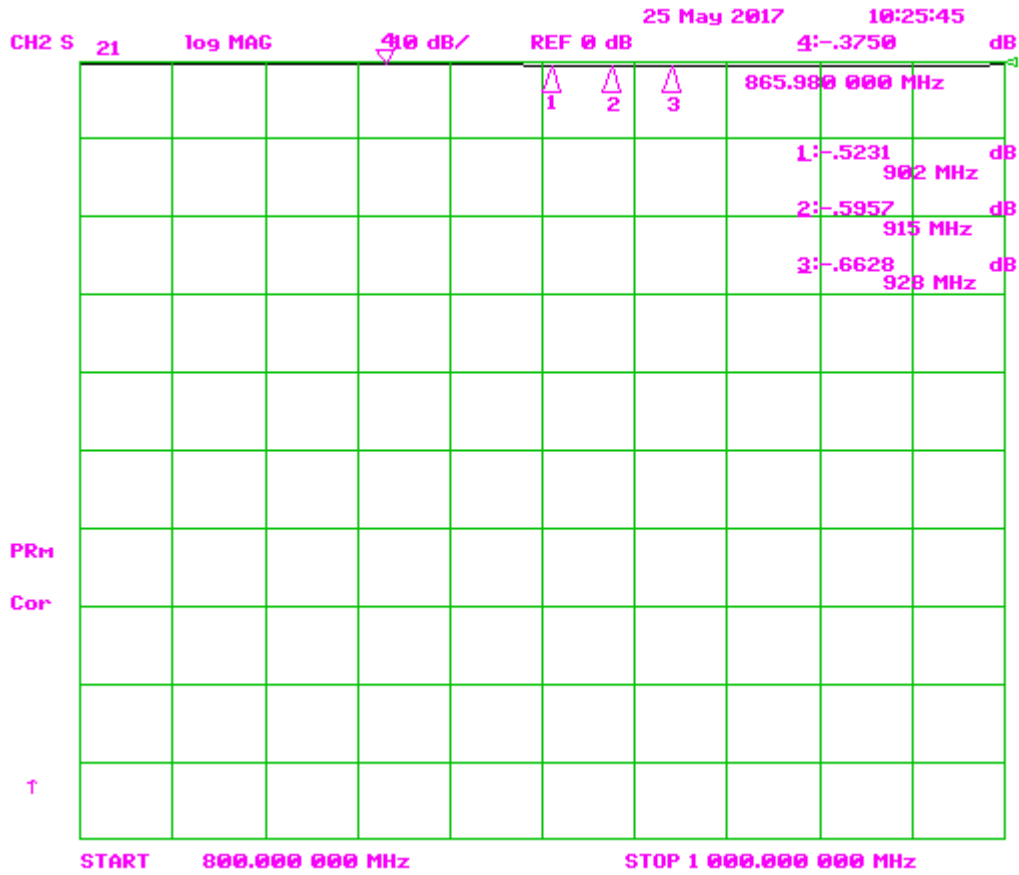


Fig.17 LMR-195 Adapter – Insertion Loss

RG-316 Measurements:

Fig.18 and Fig.19 show the return loss and insertion loss measurements between 800MHz to 1000 MHz.

The return loss was good as the cable was terminated to 50 Ohm VNA port.

The insertion loss was found to be ~0.6 dB over ETSI and FCC frequencies.

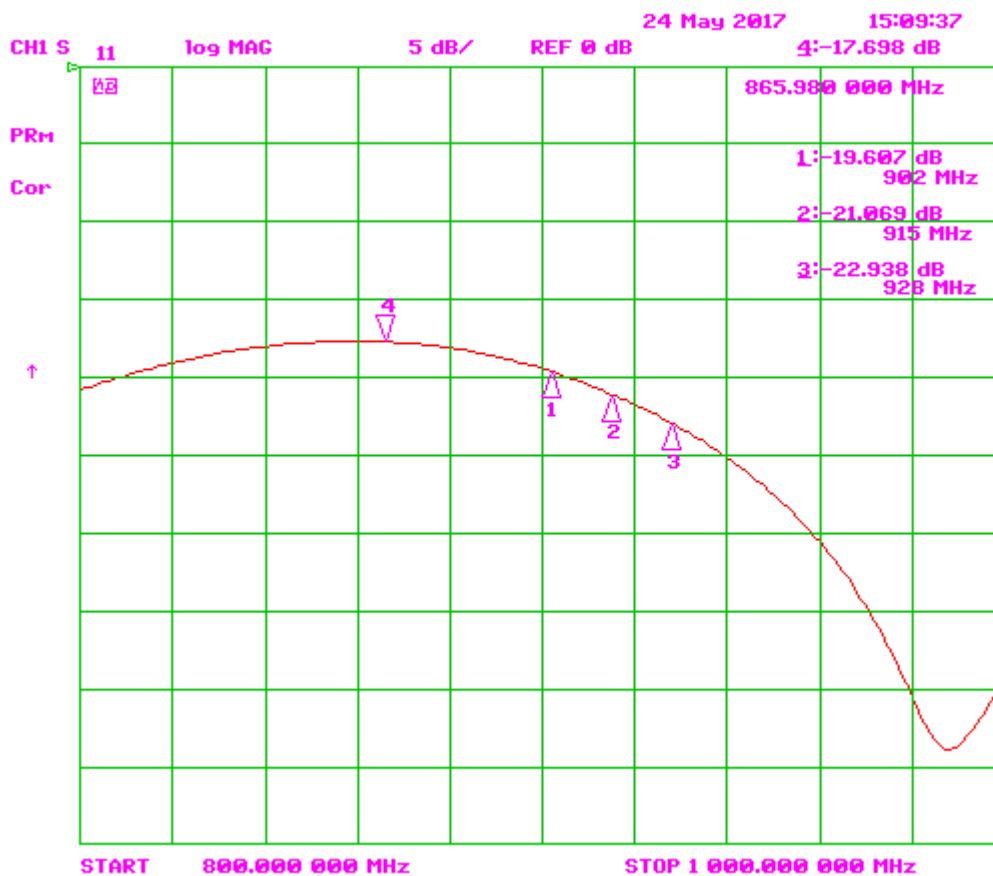


Fig.18 RG-316 Adapter – Return Loss

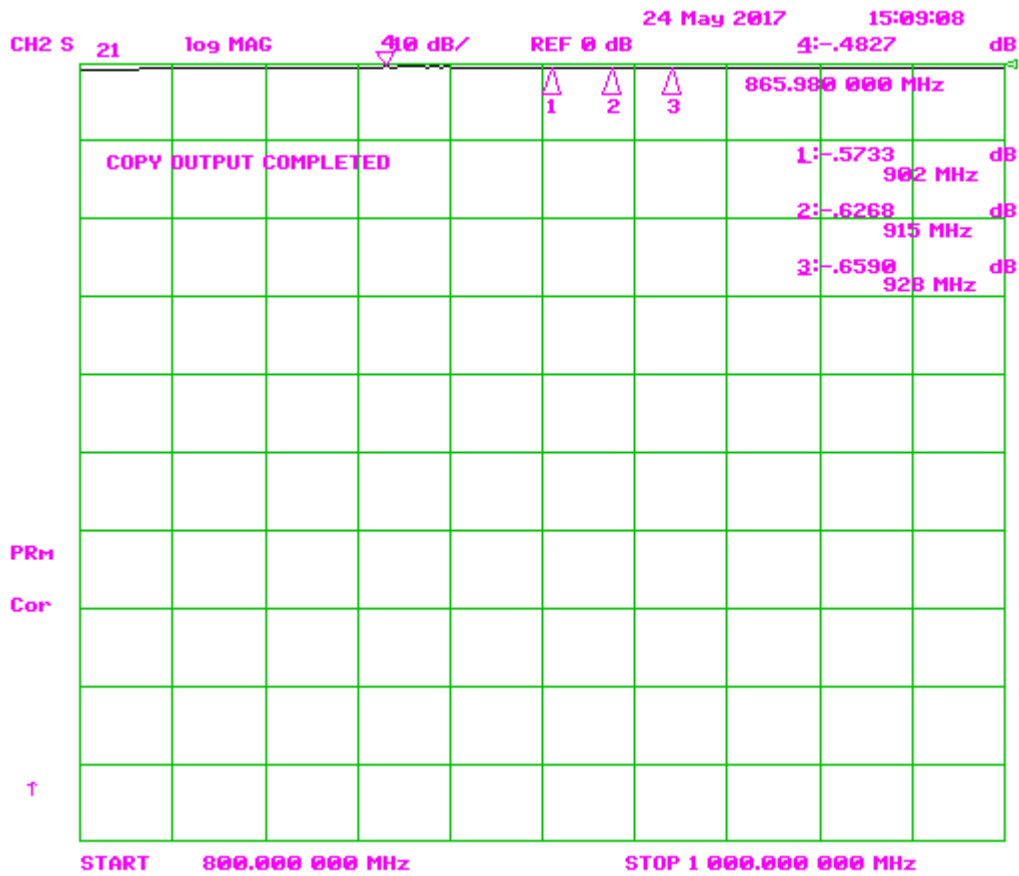


Fig.19 RG-316 Adapter – Insertion Loss

5 CONCLUSION

The SMA-SMB adapter was tested against the traditional SMA connection and its loss was measured to be ~0.2 dB over ETSI (865 MHz to 868 MHz) and FCC (902 MHz to 928 MHz) RFID frequencies. This ~0.2 dB loss is acceptable for RFID use case. The following adapters will be used for revised A5530 ground mat antennas;

<http://www.rfsupplier.com/adapter-jack-plug-straight-p-276.html>

<http://www.rfsupplier.com/adapter-plug-jack-straight-gold-pleated-p-1739.html>