

RF TECHNOLOGY DIVISION

**Wideband Peak Level Measurements  
on SPRscan with USA 250 MHz  
Antenna Variant**

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## 1. Introduction

This document records the test method and results of wideband time domain tests on an ERA Technology Ltd US variant 250 MHz SPRscan Ground Probing Radar System. This unit has been modified to comply with FCC 47 CFR 15.209 emission limits and the requirements of the US Department of Commerce NTIA.

These tests are in response to the request by the NTIA for wideband peak measurements above 1 GHz.

## 2. Test Method

RF time domain emissions were measured with a high speed oscilloscope using a double ridged horn antenna 1 m off the ground. A wideband preamplifier was used to boost the measurement antenna signal level to bring it into the oscilloscope measurement range. Triggering of the oscilloscope was achieved via a 20dB attenuator connected to the transmit pulse reference output of the Head Electronics over a 4 m coaxial cable. The antenna height was set to a predetermined maximum.

Testing was conducted at a range of 3 m on an open area test site as shown in figure 1 using both horizontal and vertical polarisations.

The equipment under test was positioned on the ground just off the metal ground plane

In order to reduce the effect of interference, the signal was averaged 2048 times before plotting.

Since the oscilloscope was incapable of acquiring a signal less than 21 ns after triggering, it was necessary to introduce a delay equal to the time between pulses i.e. 1  $\mu$ s.

No filter was available to limit the bandwidth of signal acquisition. Practically this resulted in a measurement bandwidth, limited by the horn antenna, of 1 GHz to 18 GHz.



**Figure 1 Test setup**

### 3. Equipment Used

The following equipment was used for testing:

Item	Part	Identity
Double ridged horn	Emco 3115	ID A895A
Tripod	Stoddart Radio Aircraft Co	ID A347A
Coaxial cable	ERA Ltd	ID B159B
Preamp	ERA Ltd WBA3-4-06G20N	ID C122C
Oscilloscope display	HP 54120B	Serial 2734A00963
4 Ch test set	HP 54121A	Serial 2802A00968

## 4. Calibration Factors

The following calibration factors apply to the antenna A895A.

Frequency/MHz	Attenuation/dB
1000	24
1500	24.8
2000	27.6
2500	28.7
3000	30.9
3500	31.3
4000	32.9

The following calibration factors apply to the cable B159B.

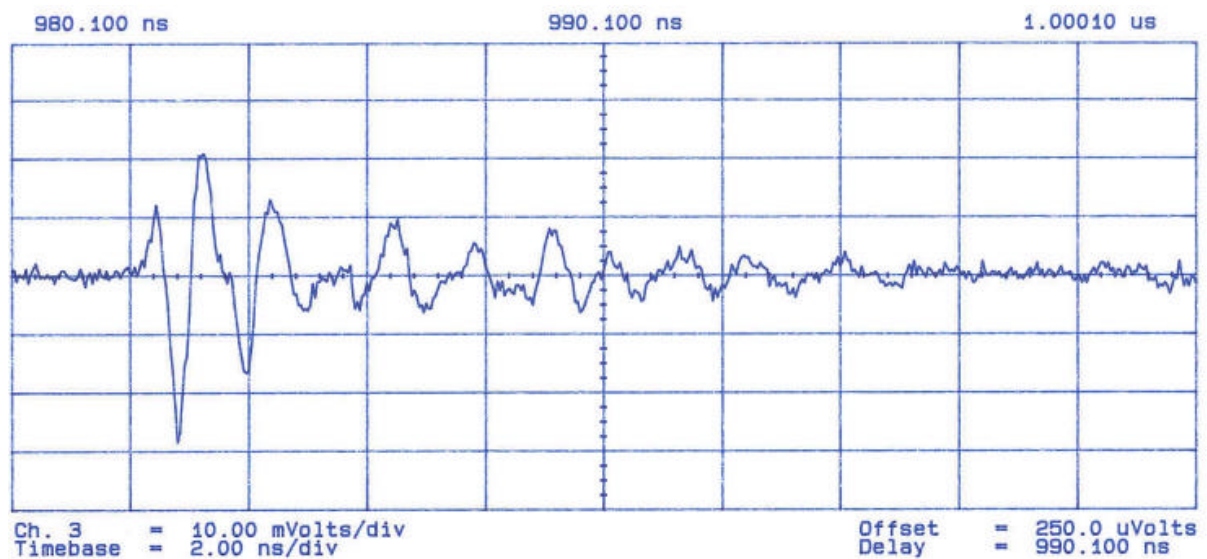
Frequency/MHz	Attenuation/dB
1000	1
1500	1.4
2000	1.6
2500	1.7
3000	2.2
3500	2.4
4000	2.7

The amplifier C122C has a gain of 29dB from 100kHz to 18GHz

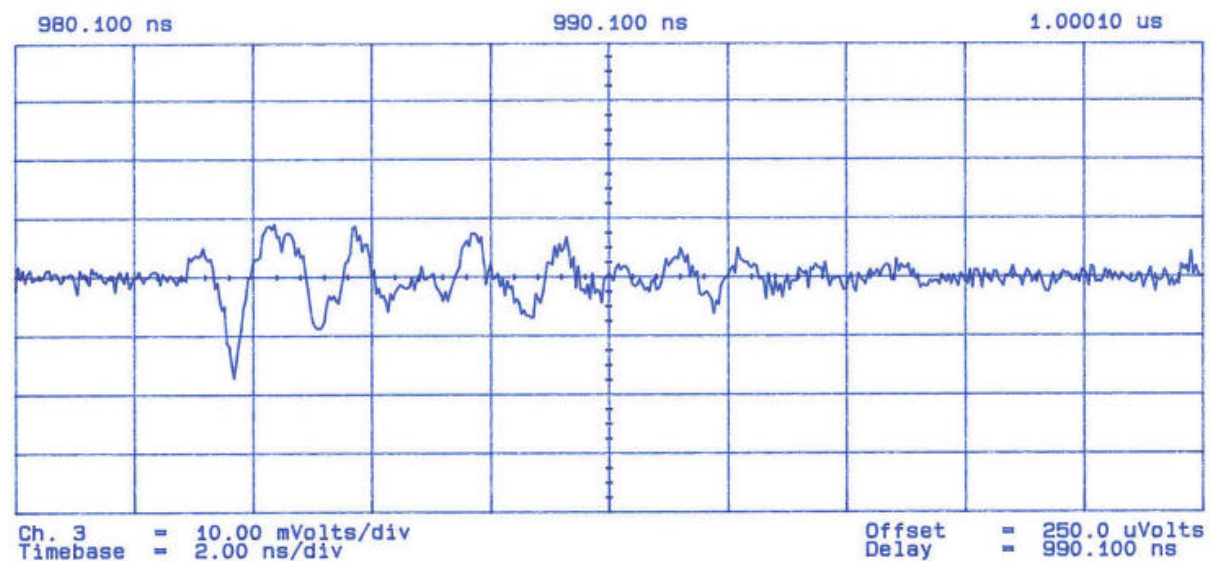
## 5. Results

Figures 3 and 4 show the measurement results for vertical and horizontal polarisation respectively.

Taking into account the approximate frequency derived from the waveform (1 GHz), the antenna and cable calibration factors at this frequency and the pre-amplifier gain a – 4 dB overall calibration factor is obtained. This gives a peak measurement of 17.6 mV/m with vertical polarisation and 10.1 mV/m with horizontal polarisation for a measurement distance of 3 m.



**Figure 2 Vertical Polarisation**



**Figure 3 Horizontal Polarization**