FCC
Test Report
for
TEK377A USA Sender
17-5241

Report Number 09-654/2904/3/05
Report Produced by: -

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1. Contents

2. Summary of Test Results

The TEK377A USA Sender 17-5241 was tested to the following standards: -

FCC Part 15C (effective date March 11, 2005); Class DXX Intentional Radiator

Title	Reference	Results
1. Conducted Emissions	FCC Part 15C §15.207	NOT APPLICABLE
2. Radiated Emissions	FCC Part 15C §15.205, §15.209 & §15.249	PASSED
3. Modulation Bandwidth	FCC Part 15C §15.215(c), §15.249	PASSED
4. Intentional Radiator Field Strength	FCC Part 15C §15.249	PASSED
5. Frequency Tolerance		NOT APPLICABLE
6. Duty Cycle		NOT APPLICABLE
7. Power Spectral Density		NOT APPLICABLE
8. Frequency separation		NOT APPLICABLE
9. No. of hopping channels		NOT APPLICABLE
10. Input power		NOT APPLICABLE
11. Sweep repetition rate		NOT APPLICABLE

Date of Test: 18th & 29th September 2005

Test Engineer: Daniel Sims — Digitally signed by Daniel Sims DN: CN = Daniel Sims, C = GB, O = RN Electronics Date: 2005.10.26 08:41:35 +01'00'

Approved By: Paul Darragh — Digitally signed by Paul Darragh DN: CN = Paul Darragh, C = GB, OU = RN Electronics Date: 2005.10.25 09:36:37 +01'00'

Customer Representative:

3. Information about Equipment Under Test

Manufacture of EUT	Tekelek Europe Ltd Bay 118 Shannon Free Zone Shannon County Clare IRELAND
Full name of EUT	TEK377A USA Sender
Model Number of EUT	17-5241
Serial Number of EUT	05 & 08
FCC ID (if applicable):	S6T-377A **n.b. Equipment has been previously certified. This report is with respect to an application for a permissive change to the identified equipment.**
Date when equipment was received by RN Electronics Limited	15th August 2005
Date of test:	18th August & 29th September 2005
Customer order number:	TE-6930
A visual description of EUT is as follows:	Small plastic rocket shaped enclosure with two screw fixings & sensor aperture on underside.
The main function of the EUT is:	Transmits data relating to fluid levels in a tank to remote receiver.
Antenna:	Integral

Equipment Under Test Information specification:

Height	140mm
Width	40mm
Depth	70mm
Weight	0.1kg
Voltage	3 V DC (Battery Powered)
Current required from above voltage source	< 0.01A
Highest Frequencies used / generated	914.5MHz TX Frequency

Description of ancillary equipment connected to the equipment under test, for the purpose of tests, can be found in Section 11.

Any modifications made to the **EUT**, whilst under test, can be found in Section 12.

This report was printed on: 25 October 2005

4. Specifications

The tests were performed by RN Electronics Engineer Daniel Sims who set up the tests, the test equipment, and operated it in accordance with the ***R.N. Electronics Ltd*** procedures manual and FCC Part 15.

5. Tests, Methods and Results

5.1 Conducted Emissions

5.1.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.207)

Test Method: FCC Part 15C, Reference (15.207)

5.1.1.1 Configuration of EUT

The EUT was connected to the LISN, and operated in the mode found to produce the highest emissions.

5.1.1.2 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted in the 'Test Equipment' Section. The equipment under test was powered via a mains LISN with a mains lead of 1 metre. Any excess mains lead was placed in a 400mm bundle. At least 6 signals within 20dB and all signals within 10dB of the limit were investigated.

5.1.2 Test results

These results show that the **EUT** was **NOT APPLICABLE** to this test as it was battery powered.

5.1.2.1 Test Equipment used

None.

5.2 Radiated Emissions

5.2.1 Test Methods

Test Requirements	FCC Part 15C, Reference (15.209, 15.205)
Test Method:	FCC Part 15C, Reference (15.209)

5.2.1.1 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The EUT was rotated in all three orthogonal planes. For the purpose of test a CW mode transmitter was used (normally transmissions occurs in 30ms once an hour).

5.2.1.2 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.

Above 30MHz, measurements were made in a semi-anechoic chamber (pre-scan) with final measurements on an OATS. Test sites ‘M’ and 'OATS' have been listed with the FCC. The equipment was rotated 360° and the antenna scanned 1 – 4 metres in both horizontal and vertical polarisations to record the worst case emissions.

Below 30MHz, measurements were made in a semi-anechoic chamber (pre-scan) with final measurements on an OATS without a ground plane. The antenna was placed 1m above the ground. The equipment and the antenna were rotated 360° to record the worst case emissions.

Radiated Emissions testing was performed with a new battery.

At least 6 signals within 20dB and all signals within 10dB of the limit were investigated.

5.2.2 Test results

Tests were performed using Test Site **M.**

Test Environment:

M	Temperature: 18°C	Humidity: 58%

Analyser plots for the Quasi-Peak / Average values as applicable and a table of signals within 20dB of the limit line can be found in Section 6.2 of this report.

These show that the **EUT** has PASSED this test.

5.2.2.1 Test Equipment used

E226, TMS933, E136, E3, TMS82,

See Section 10 for more details

5.3 Intentional Radiator Field Strength

5.3.1 Test Methods

Test Requirements	FCC Part 15C, Reference (15.249)
Test Method:	FCC Part 15C, Reference (15.249)

5.3.1.1 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The antenna was scanned 1-4m in height in both Horizontal and Vertical polarisations. The EUT was rotated in all three orthogonal planes. For the purpose of test a CW mode transmitter was used (normally transmissions occurs in 30ms once an hour).

5.3.1.2 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.

Measurements were made in a semi-anechoic chamber and/ or on an OATS.

Both the equipment and the antenna were rotated 360° to record the maximised emission.

5.3.2 Test results

Tests were performed using Test Site **M.**

Test Environment:
M Temperature: 17°C Humidity: 50 %

Any Analyser plots can be found in Section 6.3 of this report.

The maximised field strength measured was 91.28 dBuV/m @ 3M.
Limits = 50mV/m = 94dBuV/m @ 3M.

These results show that the EUT has **PASSED** this test.

5.3.2.1 Test Equipment used

E226, E3, TMS933

See Section 10 for more details

5.4 20dB Bandwidth

5.4.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.215)

Test Method: FCC Part 15C, Reference (15.215)

5.4.1.1 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres.

5.4.1.2 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.

Measurements were made in a semi-anechoic chamber.

Test site 'M' has been listed with the FCC.

5.4.2 Test results

Tests were performed using Test Site **M**.

Temperature of test Environment: 17°C

Analyser plots for the 20dB bandwidth can be found in Section 6.3 of this report.

	Channel Frequency
	914.50000 MHz
20dB Bandwidth	275 kHz

These results show that the **EUT** has **PASSED** this test.

5.4.2.1 Test Equipment used

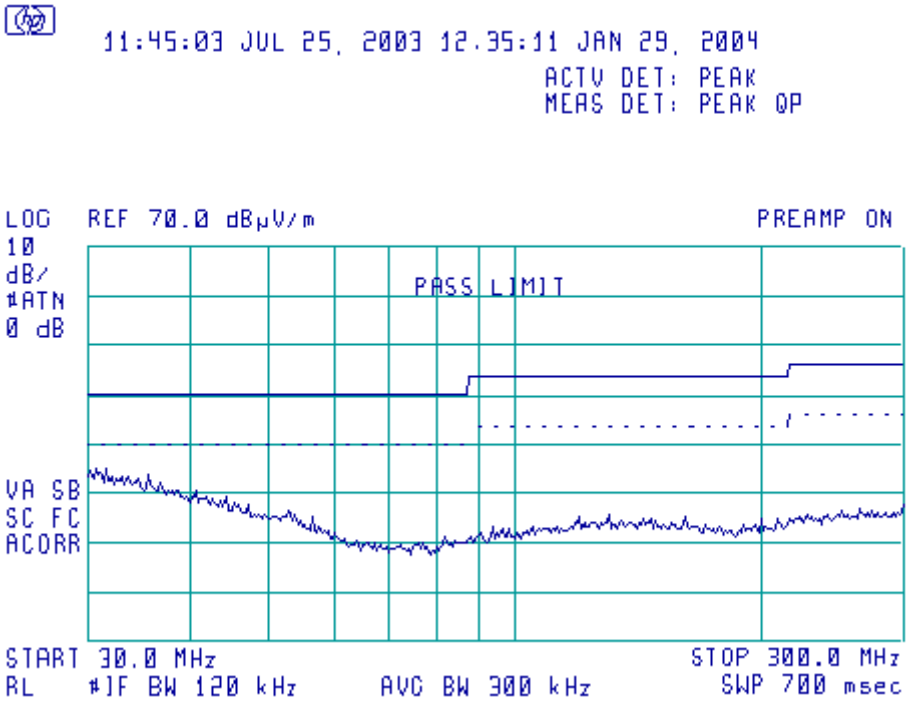
E3, E136, TMS82, TMS933

See Section 10 for more details.

6. Plots and Results
6.1 Conducted Emissions

NOT APPLICABLE

6.2 Radiated Emissions



Quasi-Peak Values of 30 MHz. to 300 MHz.

Horizontal Polarisation

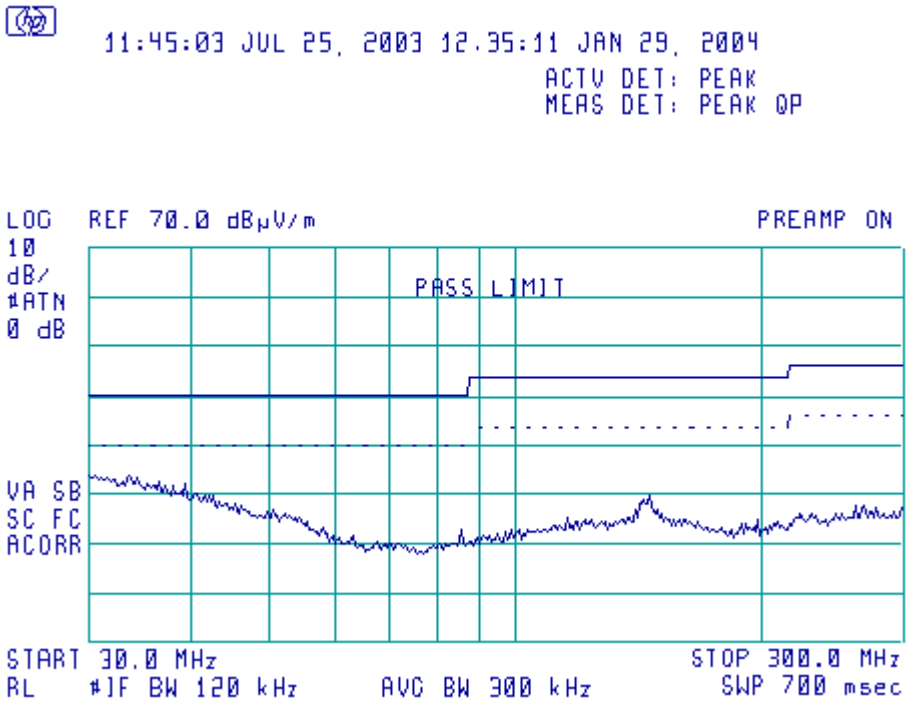
The plot shows a swept response of peak values using the quasi-peak limit line

(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

Table of signals within 20dB of the limit line for Quasi-Peak Horizontal

NONE.

Measurement Uncertainty of ± 5.2dB Applies



Quasi-Peak Values of 30 MHz. to 300 MHz.

Vertical Polarisation

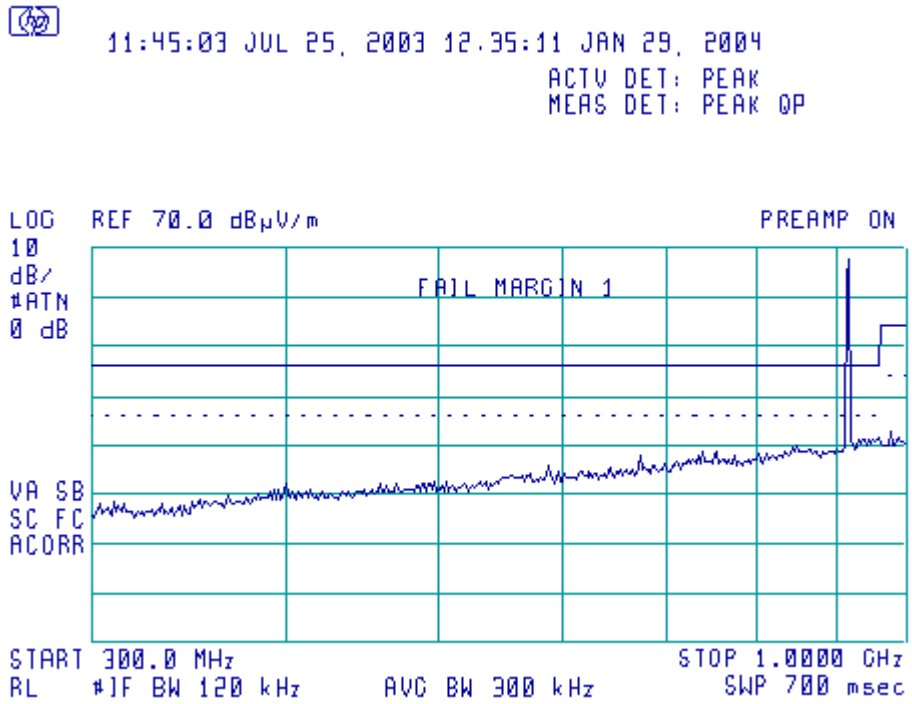
The plot shows a swept response of peak values using the quasi-peak limit line

(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

Table of signals within 20dB of the limit line for Quasi-peak Vertical

NONE.

Measurement Uncertainty of ± 5.2dB Applies



Quasi-Peak Values of 300 MHz. to 1 GHz.

Horizontal Polarisation

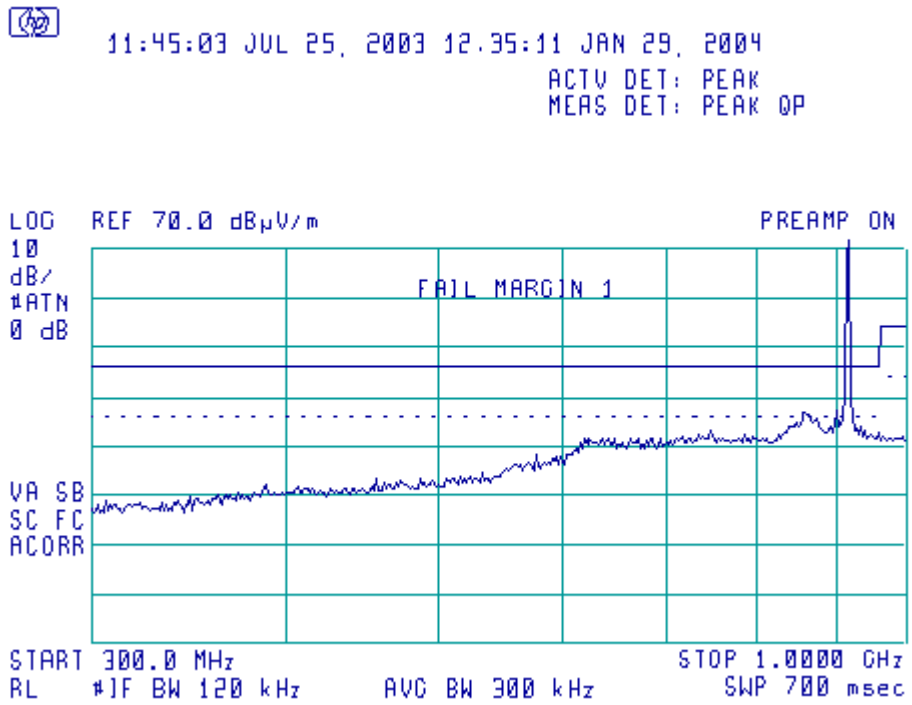
The plot shows a swept response of peak values using the quasi-peak limit line

(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

Table of signals within 20dB of the limit line for Quasi-Peak Horizontal

Signal	Freq (MHz)	Peak Amp (dBuV/m)	Peak - Lim1 (dB)	QP Amp (dBuV/m)	QP - Lim1 (dB)
1	914.515577	69.79	23.79	69.68	23.68

Measurement Uncertainty of ± 5.2dB Applies



Quasi-Peak Values of 300 MHz. to 1 GHz.

Vertical Polarisation

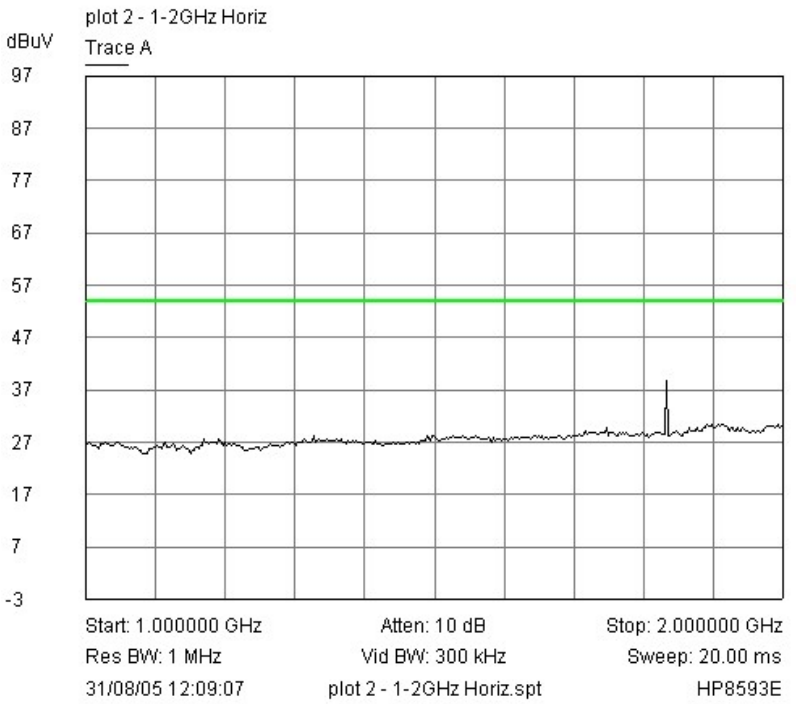
The plot shows a swept response of peak values using the quasi-peak limit line

(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

Table of signals within 20dB of the limit line for Quasi-peak Vertical

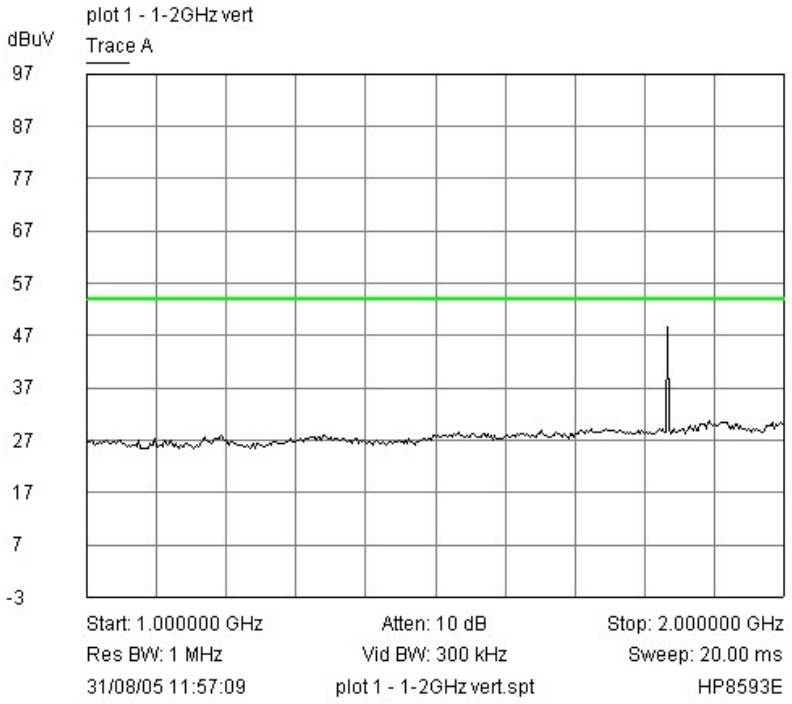
Signal	Freq (MHz)	Peak Amp (dBuV/m)	Peak - Lim1 (dB)	QP Amp (dBuV/m)	QP - Lim1 (dB)
1	854.124738	35.50	-10.50	30.14	-15.86
2	910.204575	39.45	-6.55	34.15	-11.85
3	914.517650	83.31	37.31	83.10	37.10

Measurement Uncertainty of ± 5.2dB Applies



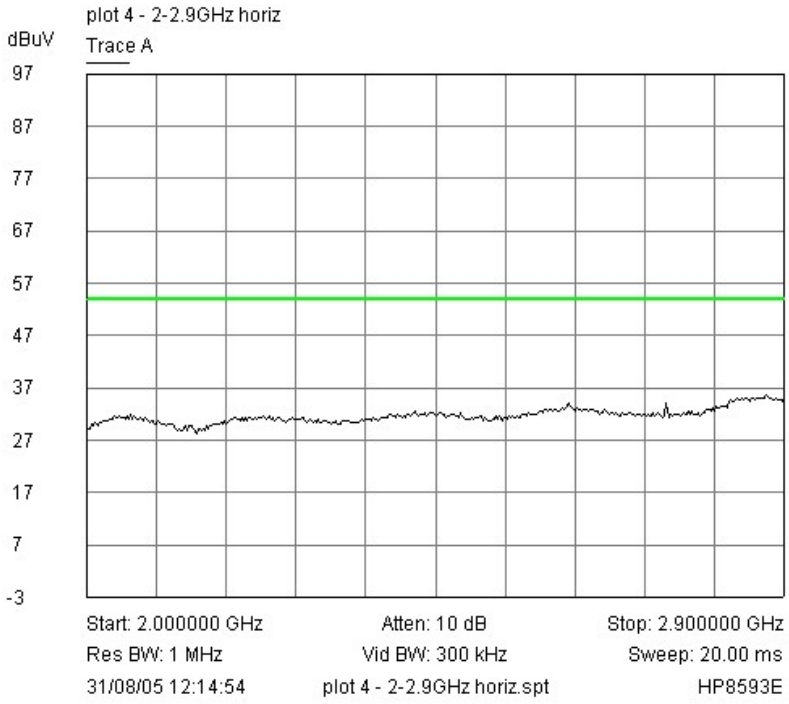
Average Values of 1 to 2GHz.

Horizontal Polarisation

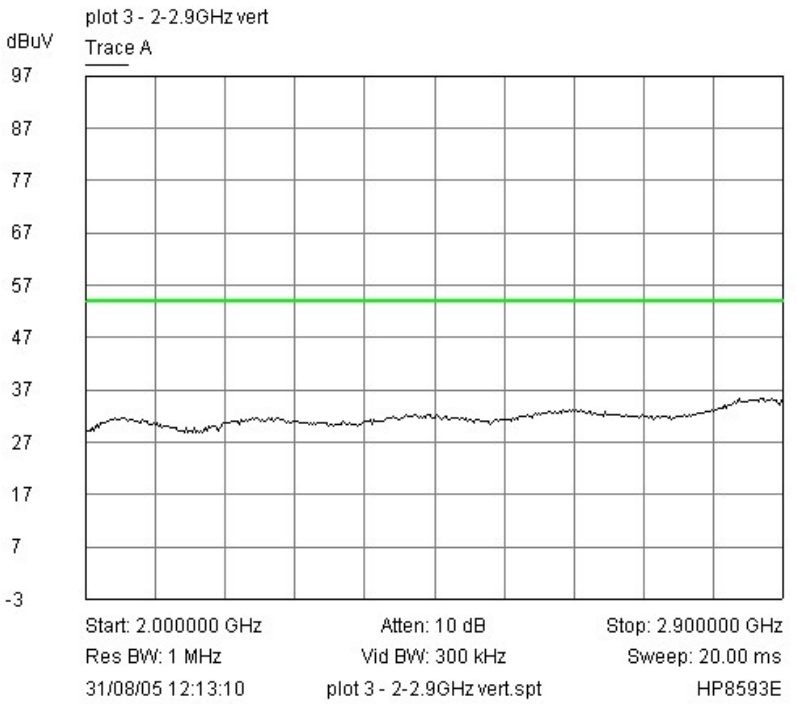


Average Values of 1 to 2GHz.

Vertical Polarisation

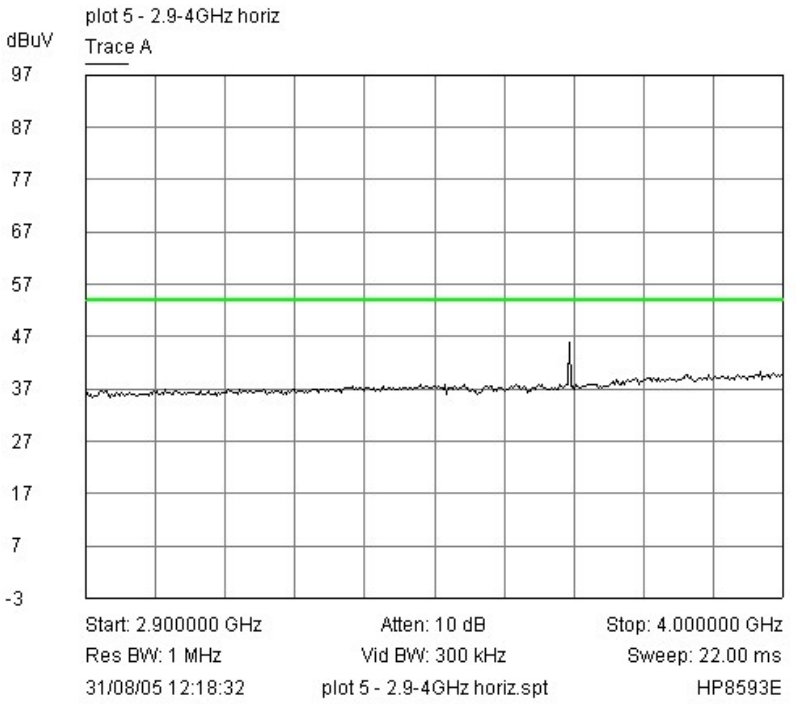


Average Values of 2 – 2.9 GHz.
Horizontal Polarisation

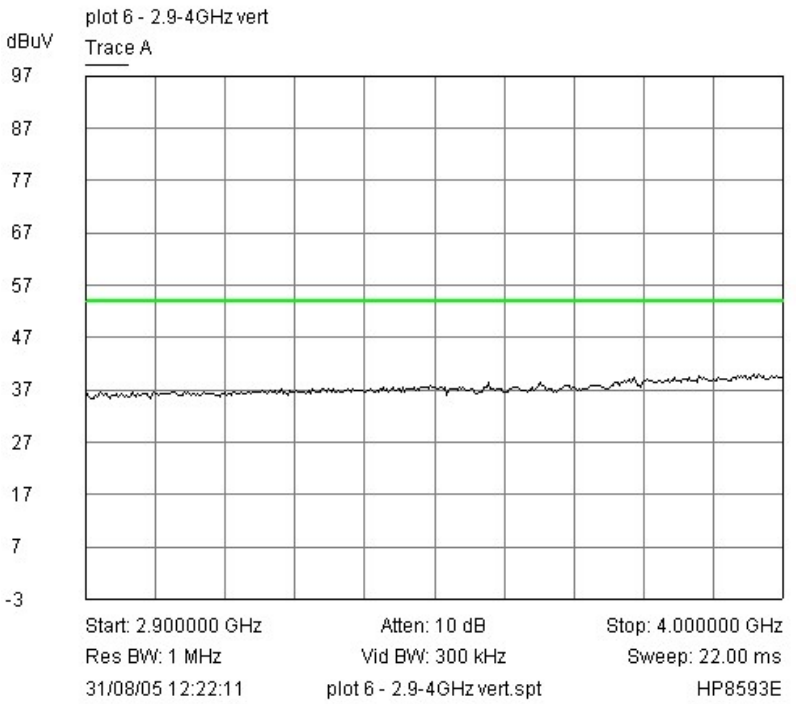


Average Values of 2 - 2.9 GHz.

Vertical Polarisation

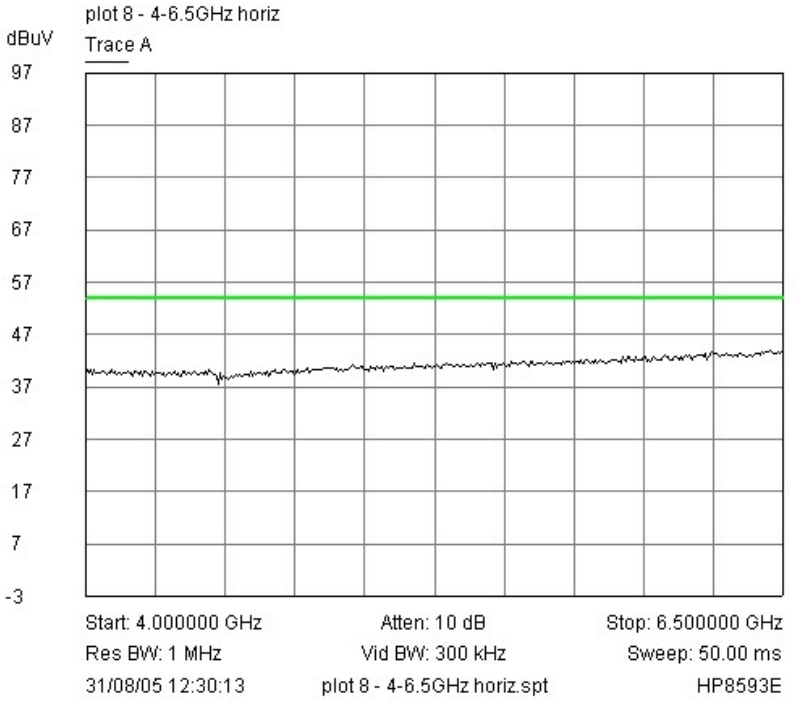


Average Values of 2.9 to 4 GHz.
Horizontal Polarisation



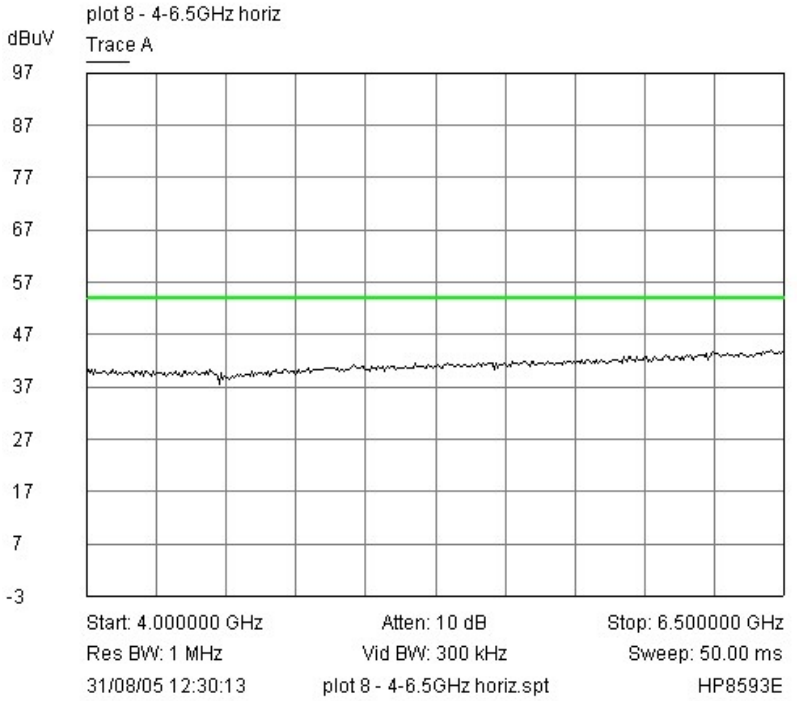
Average Values of 2.9 to 4 GHz.

Vertical Polarisation



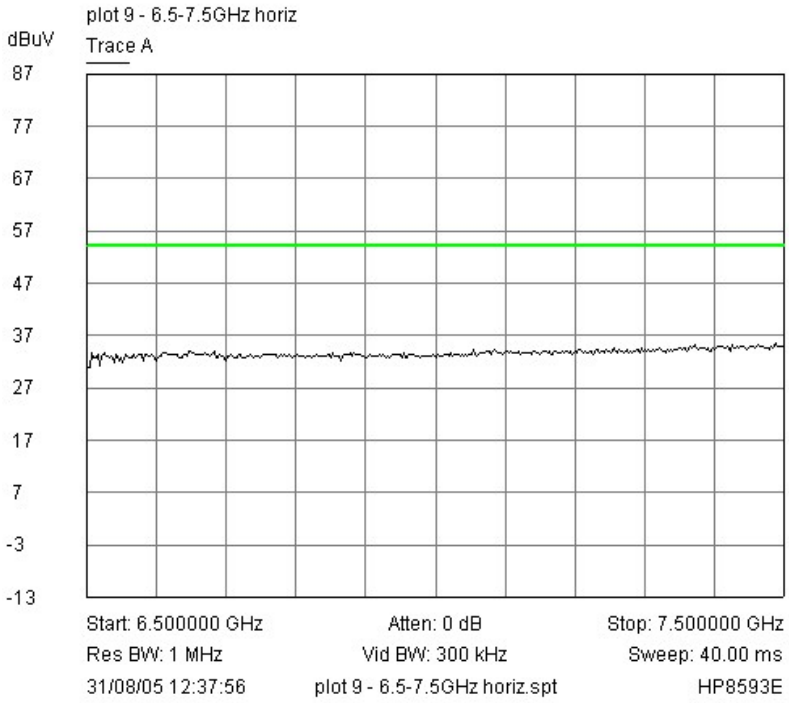
Average Values of 4 – 6.5 GHz.

Horizontal Polarisation

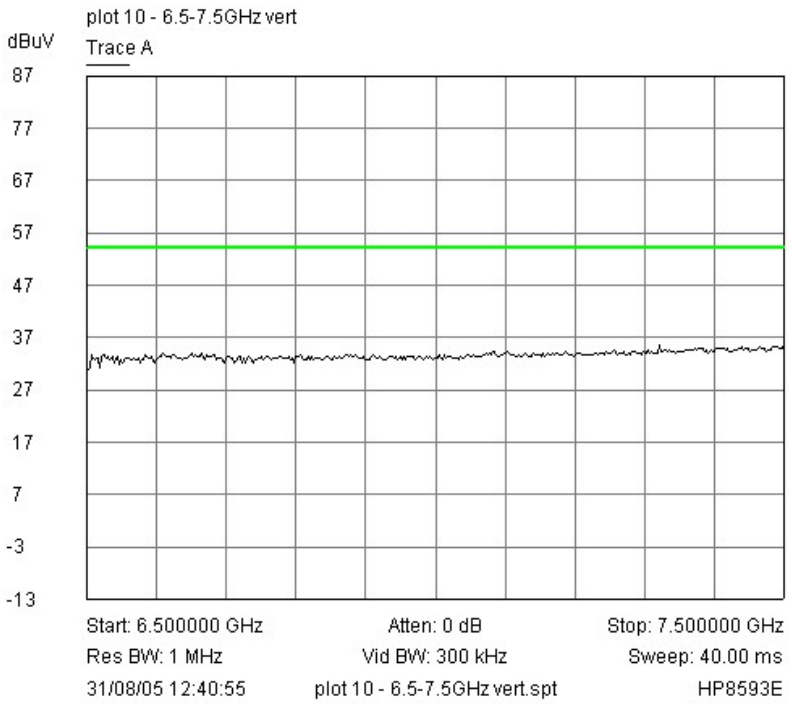


Average Values of 4 – 6.5 GHz.

Vertical Polarisation

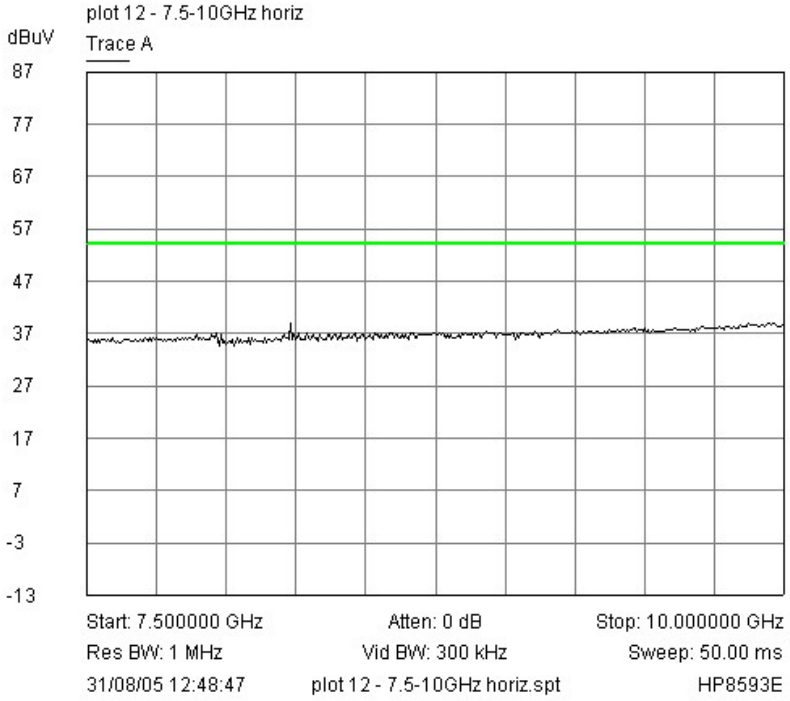


Average Values of 6.5 - 7.5 GHz.
Horizontal Polarisation

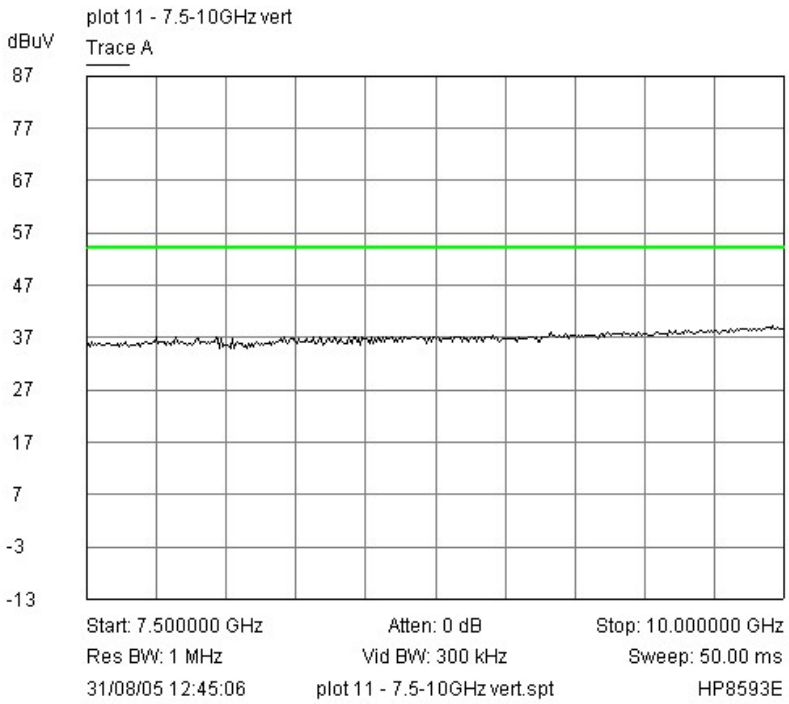


Average Values of 6.5 - 7.5 GHz.

Vertical Polarisation



Average Values of 7.5 – 10 GHz.
Horizontal Polarisation



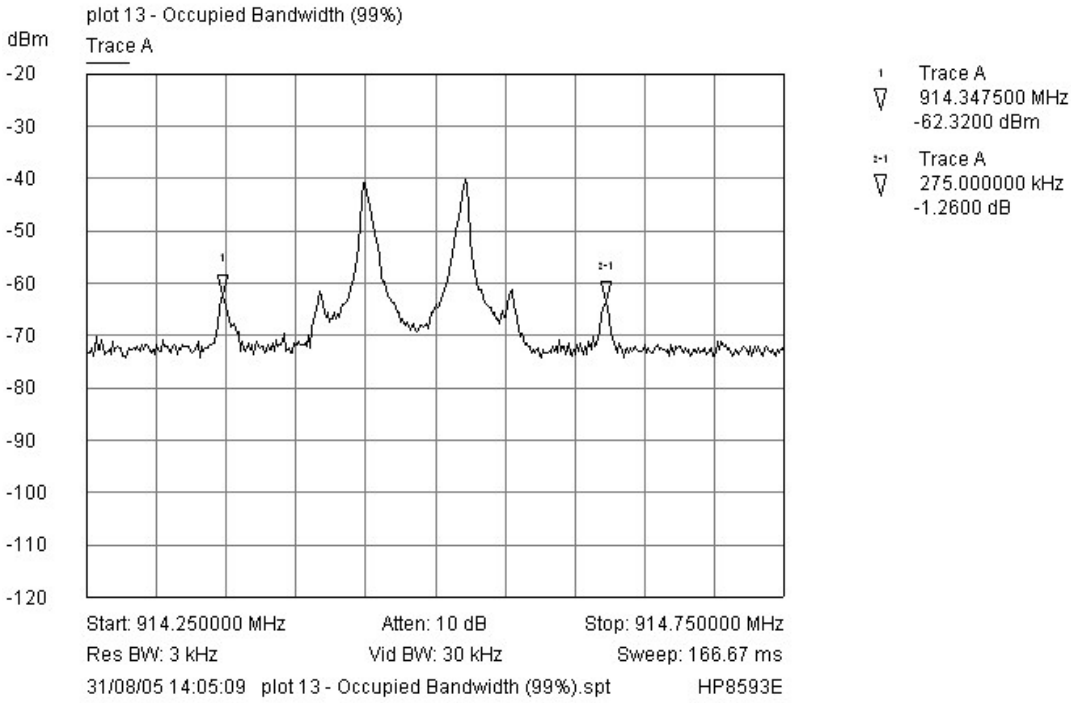
Average Values of 7.5 – 10 GHz.

Vertical Polarisation

Table of signals above 1GHz

Frequency MHz	Polarisation of Measuring Antenna	Level Measured (dBuV)	Limit (dBuV)	Level under limit (dBuV)
1829	Vertical	48.57	54	-5.43
1829	Horizontal	38.78	54	-15.22
2743	Horizontal	33.91	54	-20.09
3658	Horizontal	45.90	54	-8.10
7320	Vertical	35.51	54	-18.49
8230	Horizontal	38.87	54	-15.13

6.3 Fundamental Emissions
Modulation Bandwidth



7 Explanatory Notes

7.1 Explanation of FAIL LIMIT 1 Statement

The **FAIL MARGIN 1** statement(s) may appear on the graphical plots when the receiver used to measure your equipment detects a signal that exceeds the dashed line. This does not mean that the **EUT**, has failed the test only that the 10 dB calculation margin set, has been exceeded on a peak measurement.

Following the indication that the margin has been exceeded, measurements are made at the frequency (ies) of the peaks. These peaks have been calculated to either Quasi Peak or Average Peak dependant on the test. A table of results has been printed on the reverse of the page. This table looks similar to the one illustrated below: -

Signal Number	Frequency (MHz)	Peak (dBµV)	PK Delta L 1 (dB)	Avg (dBµV)	Av Delta L 1 (dB)
1	12345.0000	12.9	-2.5	10.2	-5.2

The First column, labelled Signal Number, is a number that the receiver has given to each signal, which has been calculated.

Column Two, labelled Frequency (MHz), is the frequency of the signal received.

Column Three, labelled Peak (dBµV), (can also be labelled, in the case of Quasi Peak, Peak dBµV/m) is the Level that was received at peak amount in dB above 1µV.

Column Four, labelled PK Delta L1 (dB), is the same level as Column three but is given in a level relative to the limit line required.

Column Five, labelled AVG (dBµV), (can also be labelled, in the case of Quasi Peak, QP dBµV/m) when undertaking a Quasi peak test, This is the Average or Quasi peak calculation results given in dBµV or dBµV/m above 1µV.

Column Six, labelled AV Delta L 1 (dB), (can also be labelled, in the case of Quasi Peak, QP Delta L 1 (dB)) is the Average or Quasi Peak calculation relevant to the limit line. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

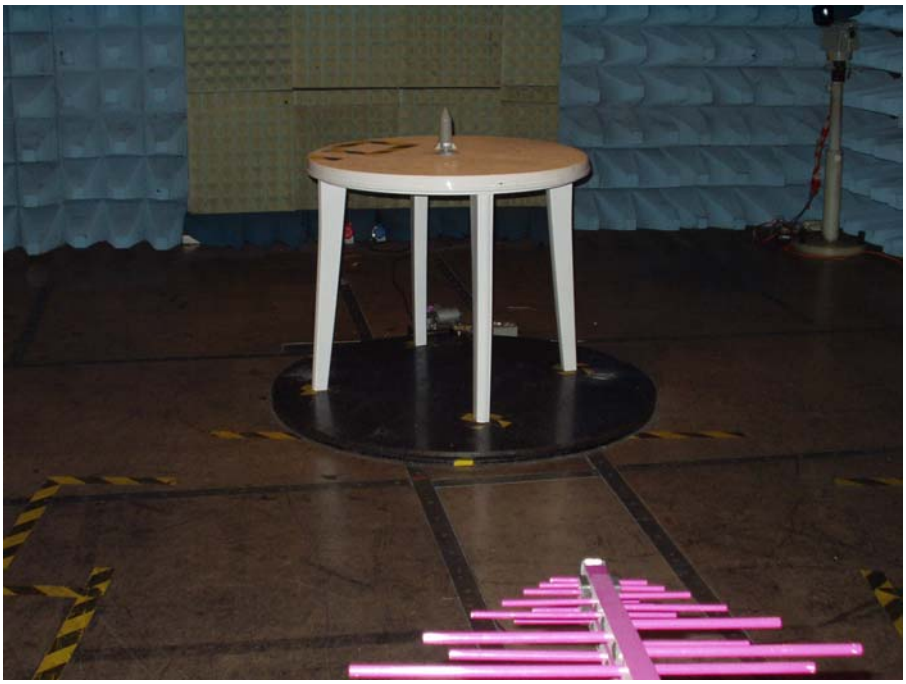
7.2 Explanation of limit line calculations for radiated measurements

The limits given in the test standard are normally expressed as absolute values (e.g. in µV/m at a specified distance), whereas the measured values are expressed as peak, quasi peak or average values in dBµV/m referenced to the measuring instrument inputs. RN Electronics calibrate the test set-up to account for any path losses, antenna gains, etc. so that the value read at the receiver relates directly to the absolute value required, except that it is expressed in dB relative to one microVolt and may need to take account of any alternative measuring distance used. Examples:

(a) limit of 500 µV/m equates to 20.log (500) = 54 dB µV/m.

(b) limit of 300 µV/m at 10m equates to 20.log (300 . 10/3) = 60 dB µV/m at 3m

8. Photographs



Photograph of the EUT as viewed from in front of the antenna, site M.

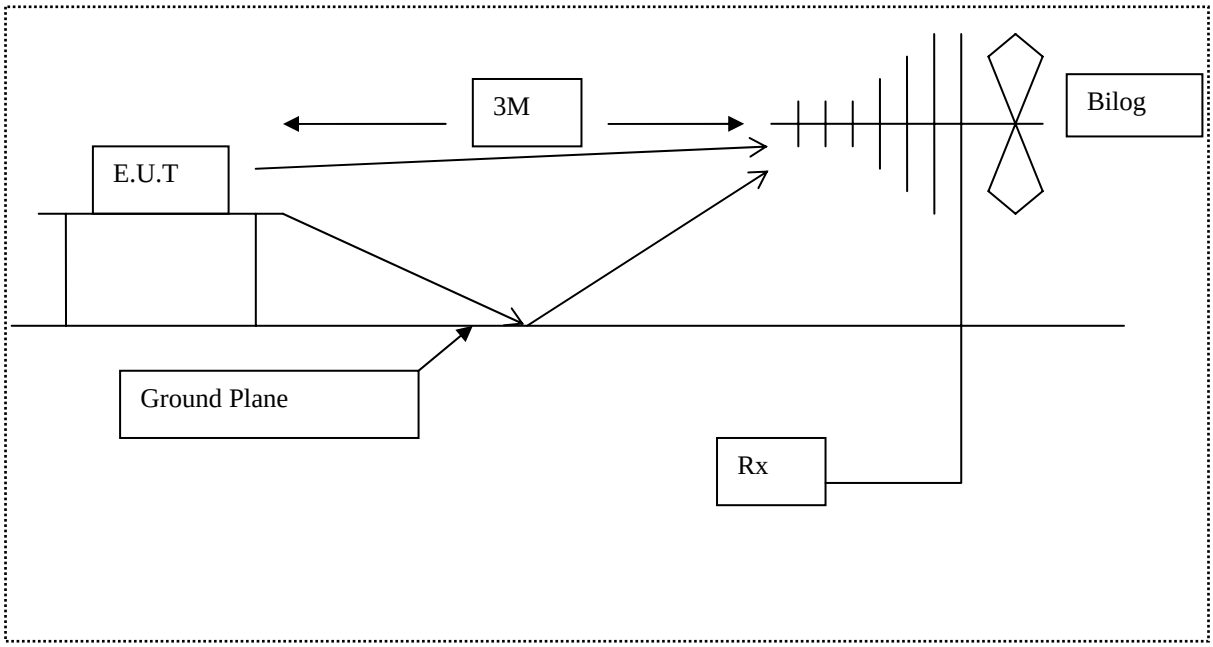


Diagram of the radiated emissions test setup.

NONE - NOT APPLICABLE

Photograph of the EUT as viewed from screened room (conducted emissions)

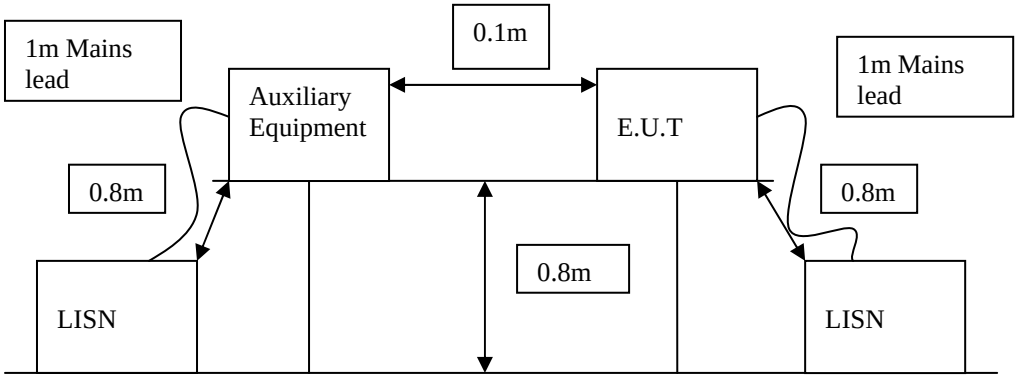


Diagram of the conducted emissions test setup.

9. Signal Leads

NONE

10. Test Equipment Calibration list

The Following is a list of the test equipment currently in use at ***R.N. Electronics Ltd.*** EMC test facility. In line with our procedures, to meet the requirements of ISO 9001, the equipment used will be within calibration for the period during which testing was carried out.

RNNo	Model	Description	Manufacturer
E136	3105	Horn Antenna	EMCO
E226	8546A	EMI Receiver	Hewlett Packard
E238	FC5343A	2.7 - 5.0 GHz BPF	IFR
E239	H-34-2720-01	2.0 - 2.9 GHz BPF	Marconi
E242	22102	Bandpass filter 7.8 - 16 GHz	Merimec
E243	601A/90AC46-1C	Bandpass filter 7 - 12.5 GHz	RN
E3	HP8593E	Spectrum Analyser	Hewlett Packard
N438	3513 172 1208	3.9 - 7.5 GHz BPF	MEL
TMS82	8449B	Pre Amplifier 1 - 26 GHz	Agilent
TMS933	CBL6141A	Bilog Antenna 30MHz - 2GHz	York EMC

11. Auxiliary equipment

11.1 Auxiliary equipment supplied by Tekelek Europe Ltd

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

NONE.

11.2 Auxiliary equipment supplied by RN Electronics Limited

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

NONE.

12. Modifications

In order for the EUT to produce the results shown within this report the following modifications, if any, were implemented.

NONE.

13. Compliance information

Products subject to the Declaration of Conformity procedure are required to be supplied with a compliance information statement. A copy of this statement may be included here:

CERTIFIED

RN Electronics
EMC & RADIO TEST SERVICES

Certificate of Test

The equipment noted below has been tested by ***R.N. Electronics Limited*** and conforms with the relevant subpart of FCC part 15, subject to deviations as detailed in this report.

This certificate relates to the equipment, as identified by unique serial number(s) and further detailed in the referenced report, in the condition(s) at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed. Furthermore, this is a certificate of test only and should not be confused with an equipment authorisation.

Equipment:	TEK377A USA Sender
Model Number(s):	17-5241
Unique Serial Number(s):	05 & 08
Manufacturer:	Tekelek Europe Ltd
Customer Purchase Order Number:	TE-6930
R.N. Electronics Limited Report Number:	09-654/2904/3/05
Test Standards:	FCC Part 15C: effective date March 11th 2005 Class DXX Intentional Radiator
Date:	18th & 29th September 2005

For and on behalf of
R.N. Electronics Limited

Signature: Paul Darragh

Digitally signed by Paul Darragh
DN: CN = Paul Darragh, C = GB, OU = RN Electronics
Date: 2005.10.25 09:36:26 +01'00'

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