FCC
Test Report
for
Wireless Data Terminal
NRT202

Report Number 07-190/3228/2/07A
Report Produced by: -

R.N. Electronics Ltd.
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1. Contents

2. Summary of Test Results

The Wireless Data Terminal NRT202 was tested to the following standards: -

FCC Part 15C (effective date October 7, 2006); Class DXT Intentional Radiator

Any compliance statements are made reliant on the modes of operation as instructed to us by the Manufacturer based on their specific knowledge of the application and functionality of the equipment tested.

Title	Reference	Results
1. Conducted Emissions	FCC Part 15C §15.207	PASSED
2. Radiated Emissions	FCC Part 15C §15.205, §15.209, §15.249(a) and §15.249(d)	PASSED
3. Modulation Bandwidth	FCC Part 15C §15.215(c)	PASSED
4. Intentional Radiator Field Strength	FCC Part 15C §15.249(a)	PASSED
5. Frequency Tolerance	FCC Part 15C §15.249(b)	NOT APPLICABLE[1]

[1] No specification requirement for this type of equipment. Test only applicable to point-to-point equipment.

This report relates to the equipment tested as identified by a unique serial number and 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.

Date of Test: 22/Nov/06

Test Engineer: Daniel Sims — Digitally signed by Daniel Sims, DN: CN = Daniel Sims, C = GB, O = RN Electronics, Date: 2007.08.15 12:53:43 +01'00'

Approved By: Paul Darragh — Digitally signed by Paul Darragh, DN: CN = Paul Darragh, C = GB, OU = RN Electronics, Date: 2007.08.15 12:04:02 +01'00'

Customer Representative:

3. Information about Equipment Under Test

Applicant	Maynetronics Ltd Oak Cottage Ashey Road Ashey Isle of Wight PO33 4BD
Manufacturer/Brand Name	Maynetronics Ltd
Full name of EUT	Wireless Data Terminal
Model Number of EUT	NRT202
Serial Number of EUT	5827
FCC ID (if applicable):	OOANRT202
Date when equipment was received by RN Electronics Limited	16/Nov/06
Date of test:	22/Nov/06
Customer order number:	2006-179
A visual description of EUT is as follows:	A small rectangular black plastic hand held unit, with key pad and LCD display
The main function of the EUT is:	Allow manual data entry and be polled from a base station for data updates
Antenna:	Integral

Equipment Under Test Information specification:

Height	120 mm
Width	70 mm
Depth	23 mm
Weight	0.2 kg
Voltage	2.4 V dc
Current required from above voltage source	100 mA
Highest Frequencies used / generated	915 MHz

Modes of operation:

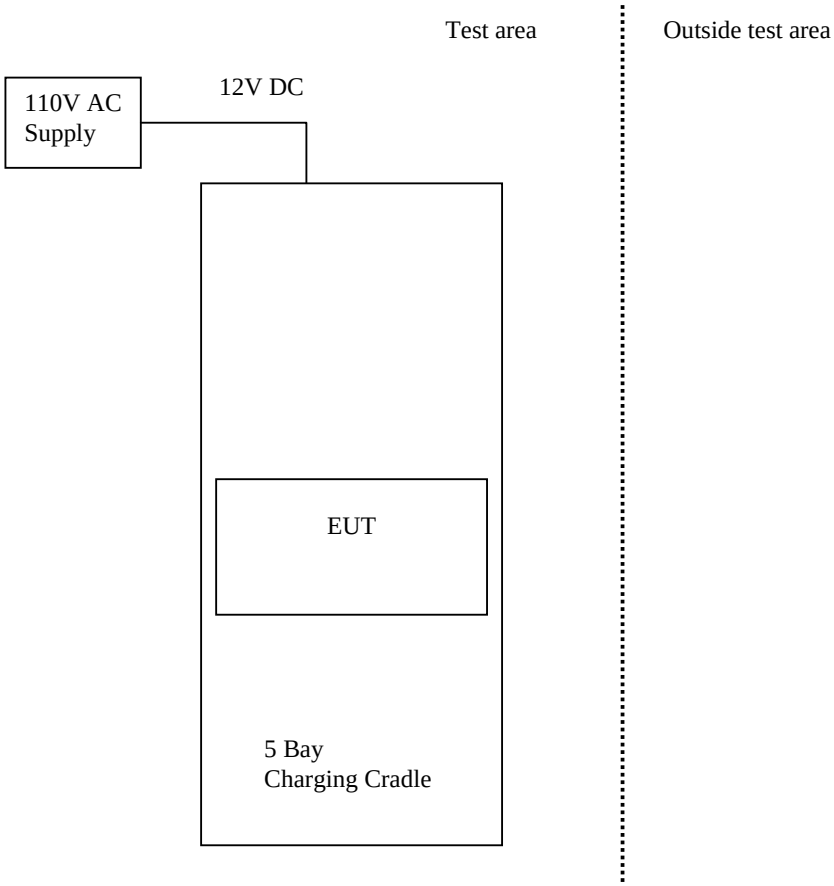
Mode	Description of mode	Used for Testing
Transmit	Permanent Transmit Test Mode	YES
Receive	Continuous Receive Mode	YES

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

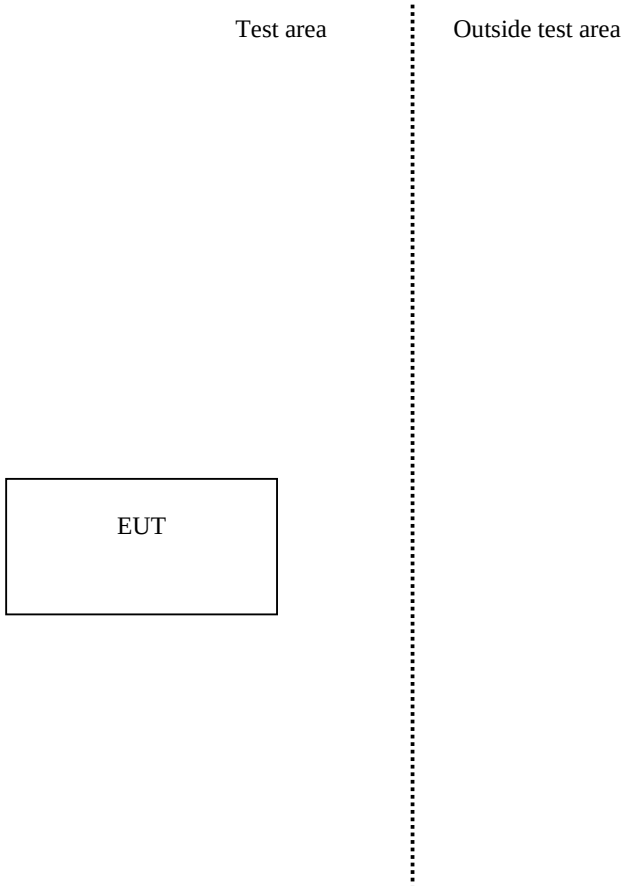
Any modifications made to the **EUT**, whilst under test, can be found in Section 12.

This report was printed on: 15 August 2007

3.1 Configuration Diagram



EUT in Charging / use configuration. EUT was placed in end bay; there was no discernable difference between bays. Only one unit was placed in the charging cradle at the request of the manufacturer. The manufacturer declared this to be worst case for emissions.



EUT in Stand alone configuration (battery powered).

4. Specifications

The tests were performed by RN Electronics Engineer Peter Finley who set up the tests, the test equipment, and operated it in accordance with the ***R.N. Electronics Ltd*** procedures manual, FCC Part 15 and those specifications incorporated by reference into 47CFR15 (e.g. ANSI C63.4-2003).

R.N. Electronics Ltd sites M and OATS are listed with the FCC. Registration Number 293246

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.
The EUT was tested in **Transmit** mode for worst case 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

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

Temperature of test Environment: 22°C

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 6.1 of this report.

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

5.1.2.1 Test Equipment used

E1, E10, E35, TMS937, TMS938

See Section 10 for more details.

5.2 Radiated Emissions

5.2.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.209)

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.
The EUT was tested in the charging cradle and in stand-alone configurations for worst case emissions.

5.2.1.2 Test Procedure

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

30MHz - 1GHz, measurements were made on a site 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.

Above 1GHz, measurements were made in a semi-anechoic chamber with appropriate absorbing material for use in this range. The antenna was placed 1m above the ground in line with the EUT, which was rotated through 360° to record the worst case emissions.

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 below 1GHz and B above 1GHz. Worst case emissions were found in the charging configuration.

Test Environment: M & B

Temperature: 21-22°C Humidity: 43%

Analyser plots for the Quasi-Peak / Average values as applicable and any 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

E1, TMS933, E3, TMS82, E268, E238, E239, E242, N438, 915MHz Notch Filter

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(a))

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

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 worst case (most field strength observable) emissions the EUT was tested in the stand alone configuration.

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.

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: Temperature: 21°C Humidity: 43%

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

The maximised field strength measured was 93.85 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

E3, TMS933, TMS907

See Section 10 for more details

5.4 Frequency Tolerance

This test was not performed as there are no specified limits for this type of equipment. Test only applicable to point-to-point equipment.

5.5 Modulation Bandwidth (Band Edges)

5.5.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.215(c))

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

5.5.1.1 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.
For worst case (most field strength observable) emissions the EUT was tested in the stand alone configuration.

5.5.1.2 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.

5.5.2 Test results

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

Temperature of test Environment: 21°C

Analyser plots for the 20dB bandwidth can be found in Section 6.4 of this report.
20dB bandwidth:

914.9075 MHz to 915.06625 MHz = 0.15875 MHz.

Designated band: 902 - 928 MHz.

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

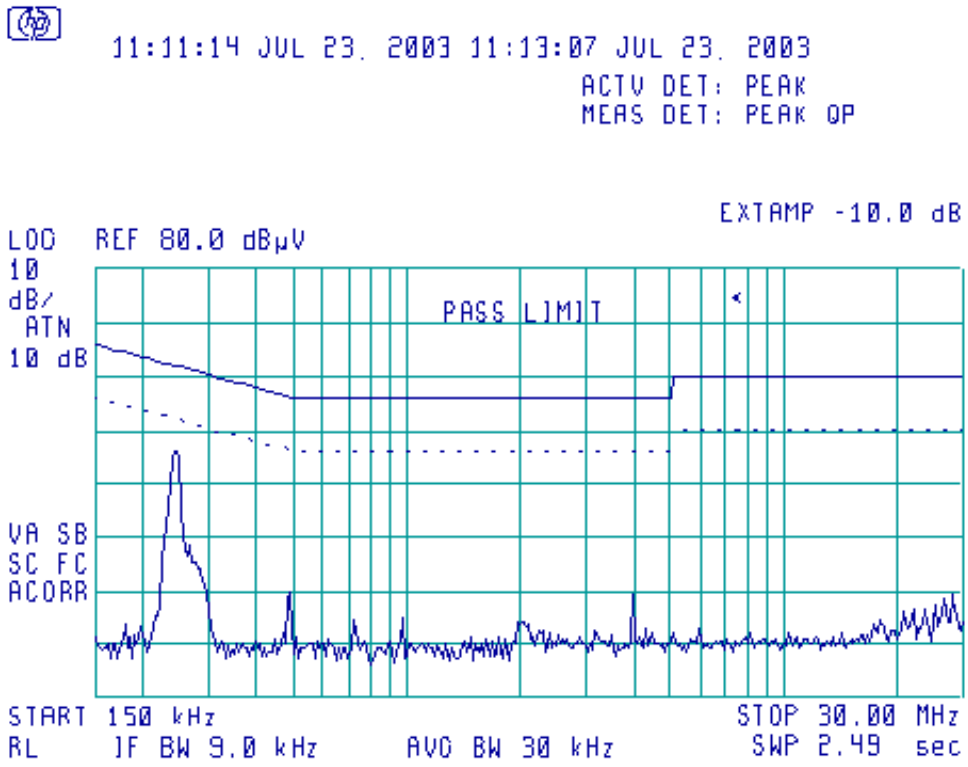
5.5.2.1 Test Equipment used

E3, TMS933, TMS907

See Section 10 for more details.

6. Plots and Results

6.1 Conducted Emissions



Quasi-peak values of mains live feed

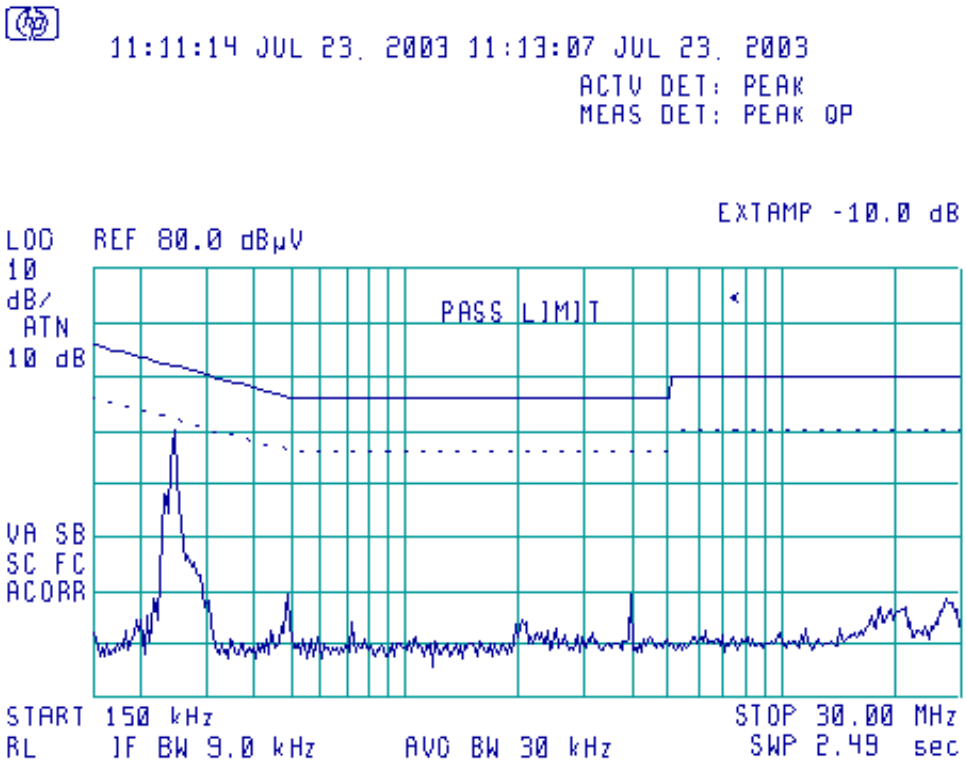
The plot shows a swept response of peak values using the quasi-peak limit line

(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 Live

Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	QP Amp (dBuV)	QP - Lim1 (dB)
1	0.244840	52.27	-9.67	48.24	-13.70
2	0.249838	48.44	-13.35	44.06	-17.73
3	0.250675	47.69	-14.08	42.25	-19.52
4	0.251063	47.60	-14.16	41.40	-20.36

Measurement Uncertainty of ± 3.6dB Applies



Quasi-peak values of mains neutral feed

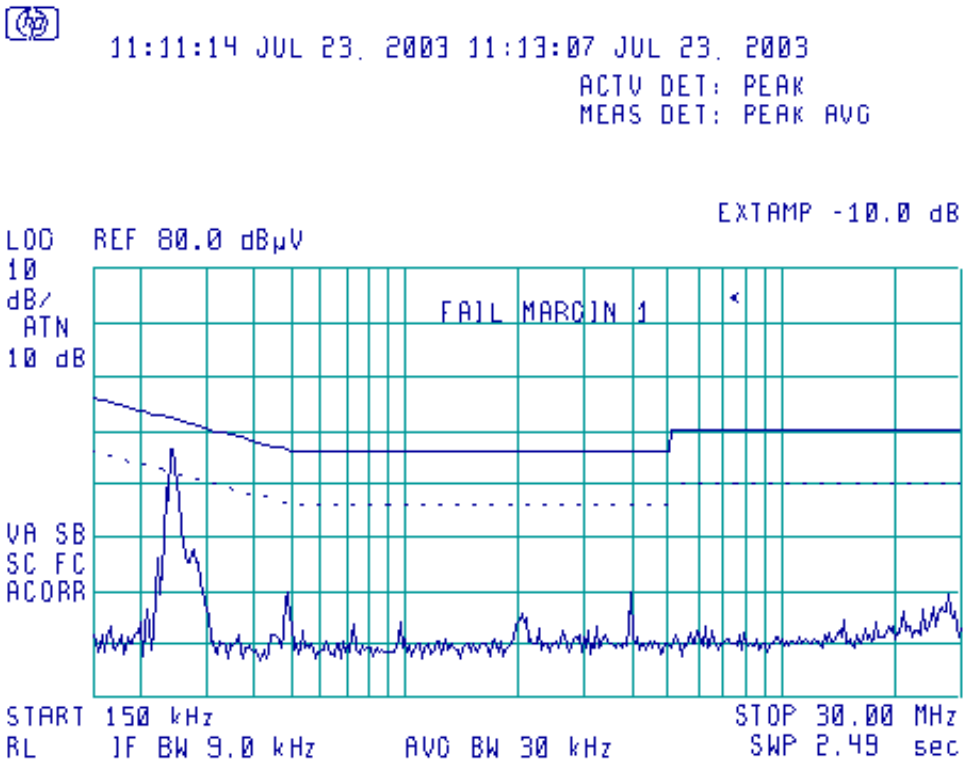
The plot shows a swept response of peak values using the quasi-peak limit line

(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 Neutral

Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	QP Amp (dBuV)	QP - Lim1 (dB)
1	0.243830	51.59	-10.38	47.45	-14.52
2	0.245533	51.98	-9.94	48.50	-13.42
3	0.247150	51.88	-9.99	48.17	-13.70
4	0.252650	44.70	-17.01	38.03	-23.68

Measurement Uncertainty of ± 3.6dB Applies



Average values of mains live feed

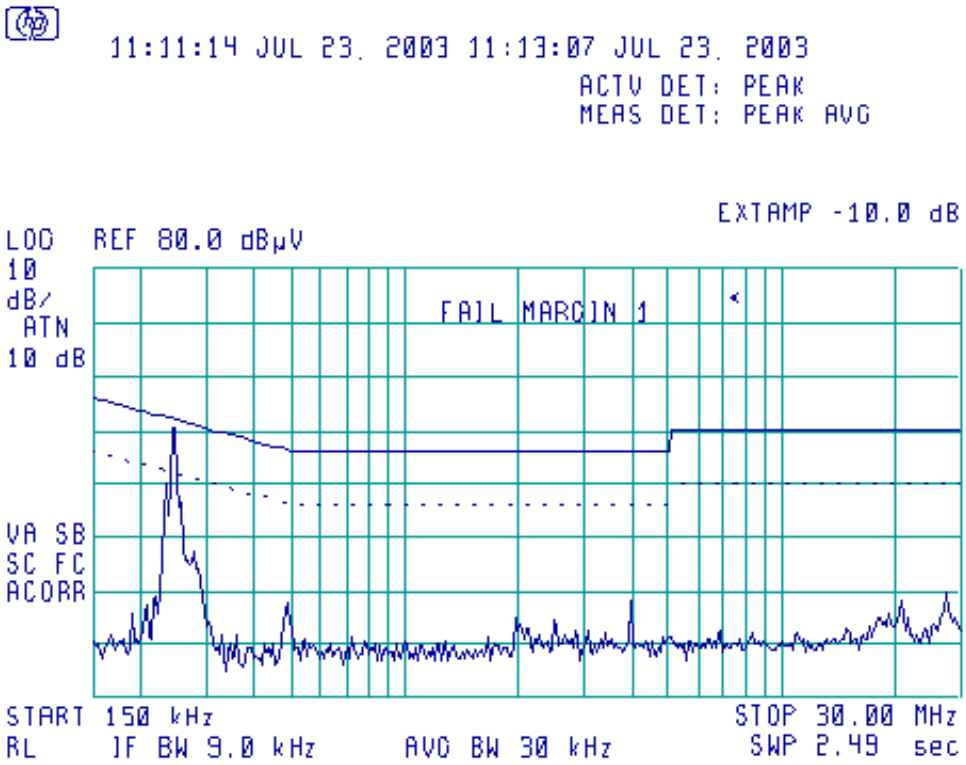
The plot shows a swept response of peak values using the average limit line

(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 for Average Live

Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	Avg Amp (dBuV)	Avg - Lim1 (dB)
1	0.237800	42.11	-10.09	27.35	-24.85
2	0.245975	52.28	0.37	42.85	-9.06
3	0.251175	46.65	-5.10	35.23	-16.52
4	0.252488	45.26	-6.45	31.98	-19.73
5	0.255513	41.49	-10.13	23.99	-27.63

Measurement Uncertainty of ± 3.6dB Applies



Average values of mains neutral feed

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

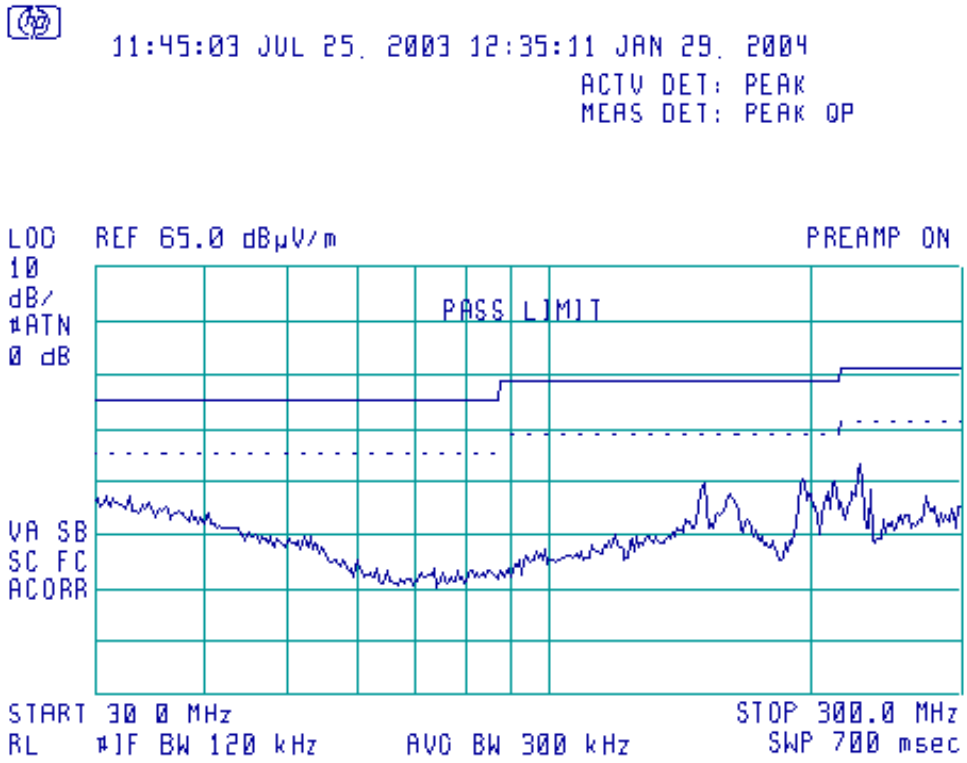
(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

Table of signals for Average Neutral

Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	Avg Amp (dBuV)	Avg - Lim1 (dB)
1	0.248700	50.42	-1.41	40.64	-11.19
2	0.252313	46.23	-5.49	32.22	-19.50
3	0.255238	41.44	-10.19	24.60	-27.03
4	0.256250	43.23	-8.37	20.92	-30.68
5	0.258975	39.27	-12.25	16.73	-34.79
6	0.261213	37.68	-13.77	13.38	-38.07

Measurement Uncertainty of ± 3.6dB Applies

6.2 Radiated Emissions



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

Horizontal Polarisation Transmit Mode

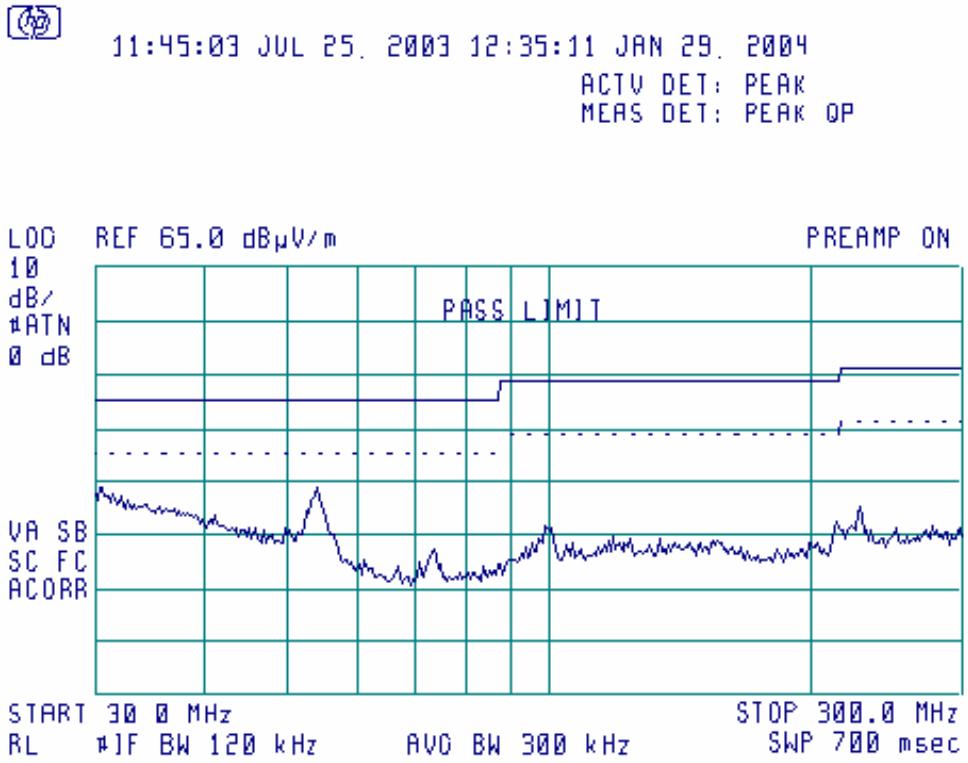
The plot shows a swept response of peak values using the quasi-peak limit line

(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	151.736900	26.14	-17.36	22.58	-20.92
2	162.291605	24.84	-18.66	20.76	-22.74
3	195.850000	26.84	-16.66	23.87	-19.63
4	213.800000	27.17	-16.33	24.26	-19.24
5	227.400000	28.64	-17.36	25.67	-20.33
6	309.718500	25.42	-20.58	21.71	-24.29

Measurement Uncertainty of ± 5.2dB Applies



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

Vertical Polarisation Transmit Mode

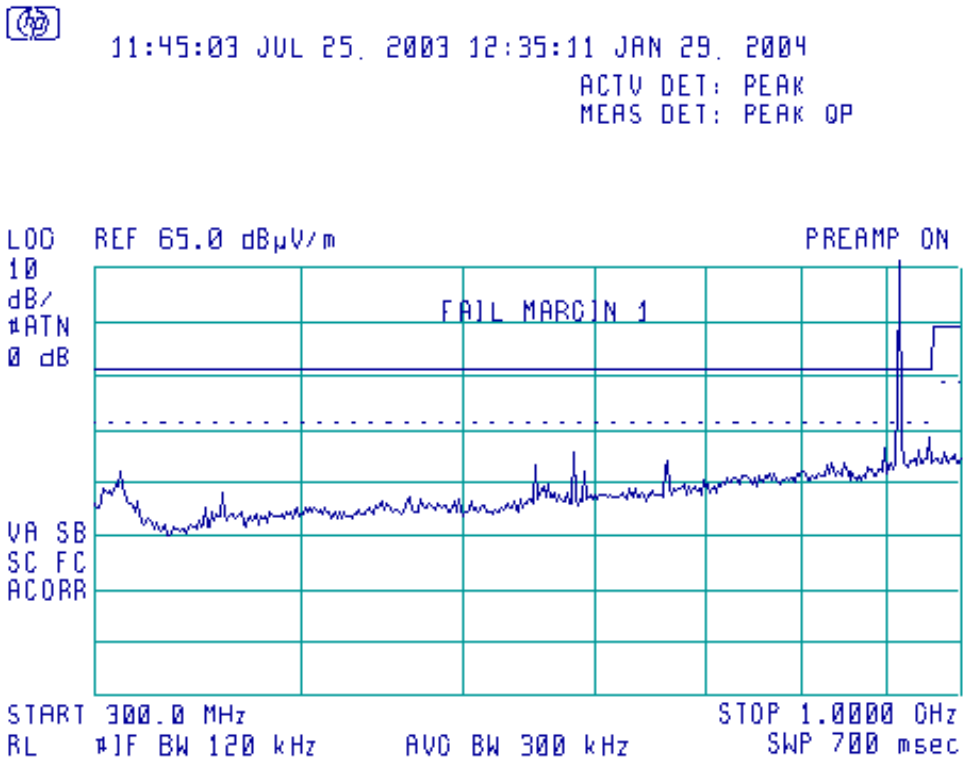
The plot shows a swept response of peak values using the quasi-peak limit line

(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	52.985888	23.50	-16.50	19.05	-20.95
2	73.696800	16.97	-23.03	12.83	-27.17
3	99.317363	20.16	-23.34	14.82	-28.68
4	226.506488	21.62	-24.38	17.57	-28.43

Measurement Uncertainty of ± 5.2dB Applies



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

Horizontal Polarisation Transmit Mode

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

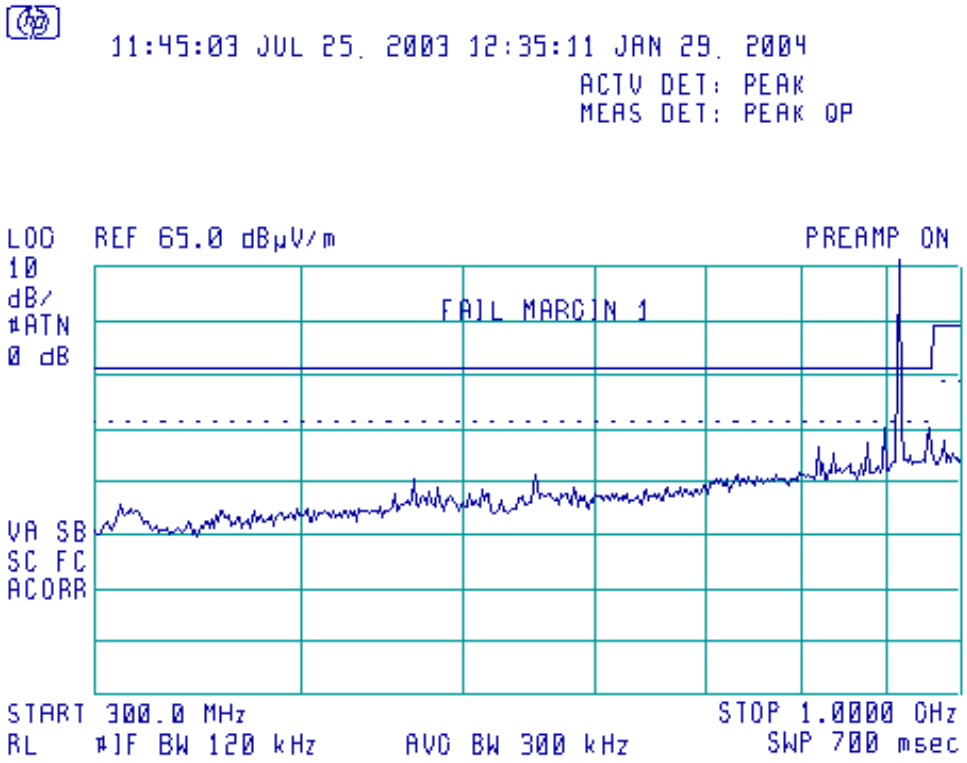
(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

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	312.030519	29.50	-16.50	26.66	-19.34
2	555.024119	31.82	-14.18	28.75	-17.25
3	585.042669	31.64	-14.36	29.16	-16.84
4	585.032038	31.34	-14.66	28.76	-17.24
5	663.050238	31.57	-14.43	28.56	-17.44
6	915.000000	87.40	43.4	87.38	43.38[1]
7	954.020519	36.64	-9.36	32.91	-13.09

Measurement Uncertainty of ± 5.2dB Applies

[1] Fundamental emission. Refer to intentional radiator field strength results.



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

Vertical Polarisation Transmit Mode

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

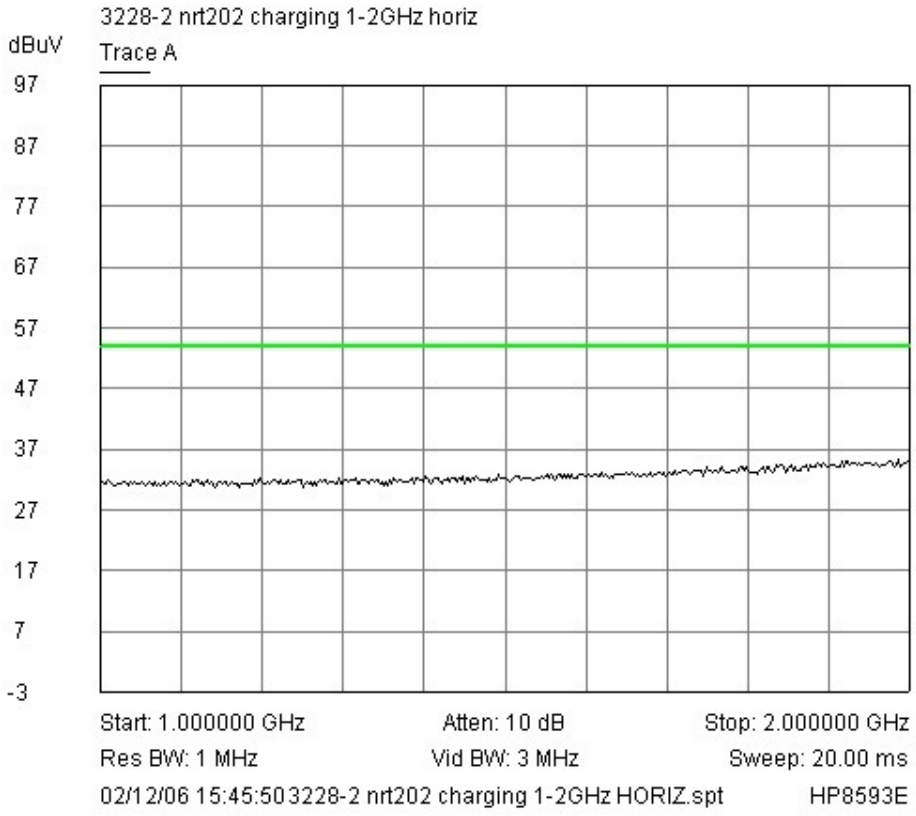
(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

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

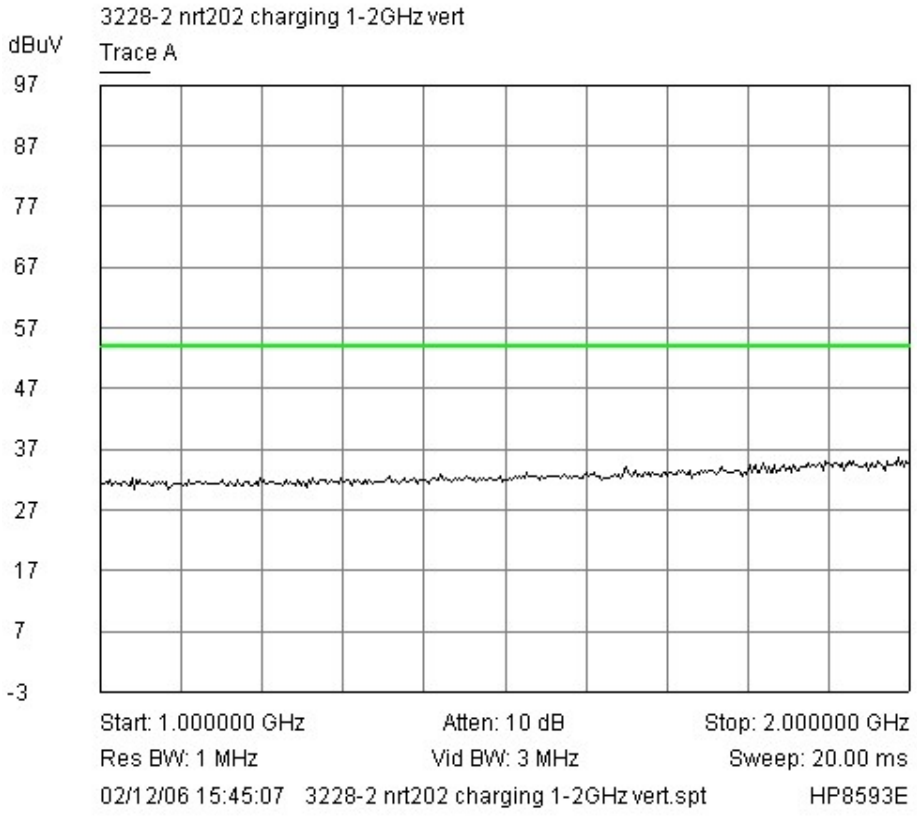
Signal	Freq (MHz)	Peak Amp (dBuV/m)	Peak - Lim1 (dB)	QP Amp (dBuV/m)	QP - Lim1 (dB)
1	476.966038	28.49	-17.51	24.59	-21.41
2	819.062894	33.90	-12.10	30.84	-15.16
3	837.034188	34.36	-11.64	31.14	-14.86
4	875.997950	34.68	-11.32	31.32	-14.68
5	915.07	93.9	40.9	93.85	40.85[2]
6	954.026006	37.79	-8.21	33.66	-12.34
7	975.078506	36.18	-17.82	32.84	-21.16

Measurement Uncertainty of ± 5.2dB Applies

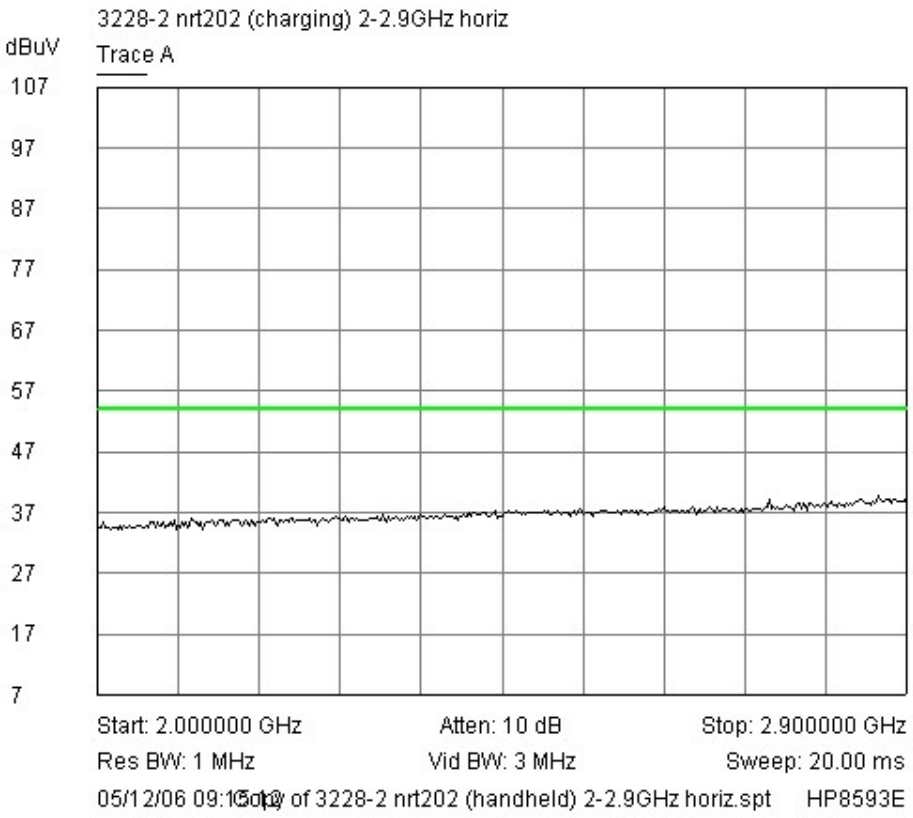
[2] Fundamental emission. Refer to intentional radiator field strength results.



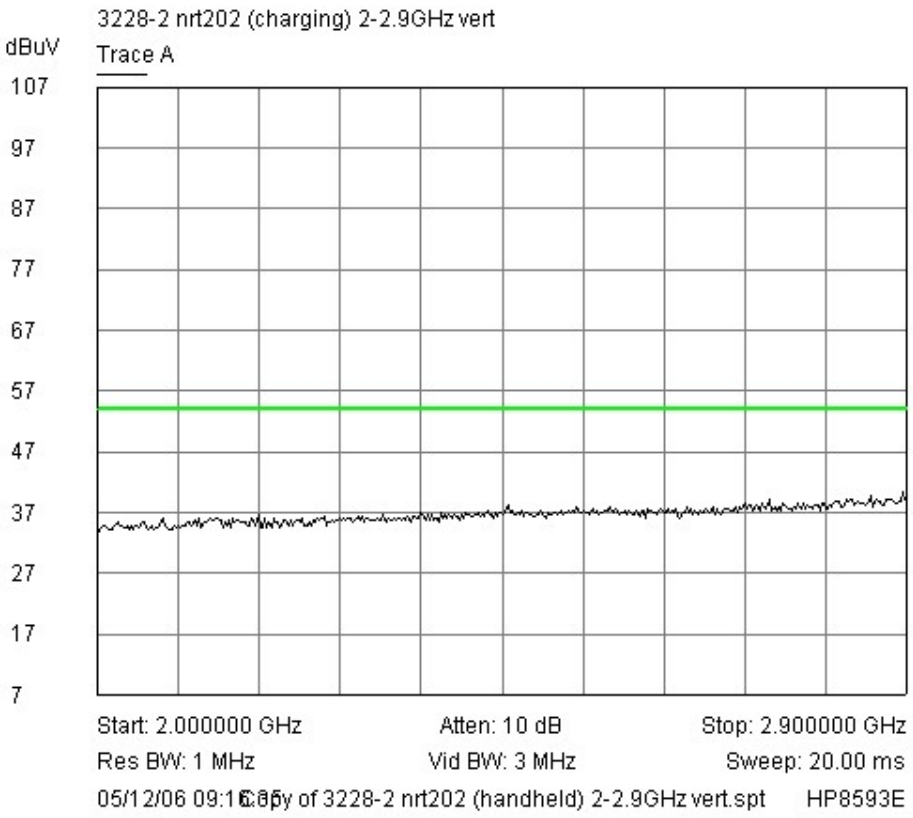
Average Values of 1 to 2GHz.
Horizontal Polarisation



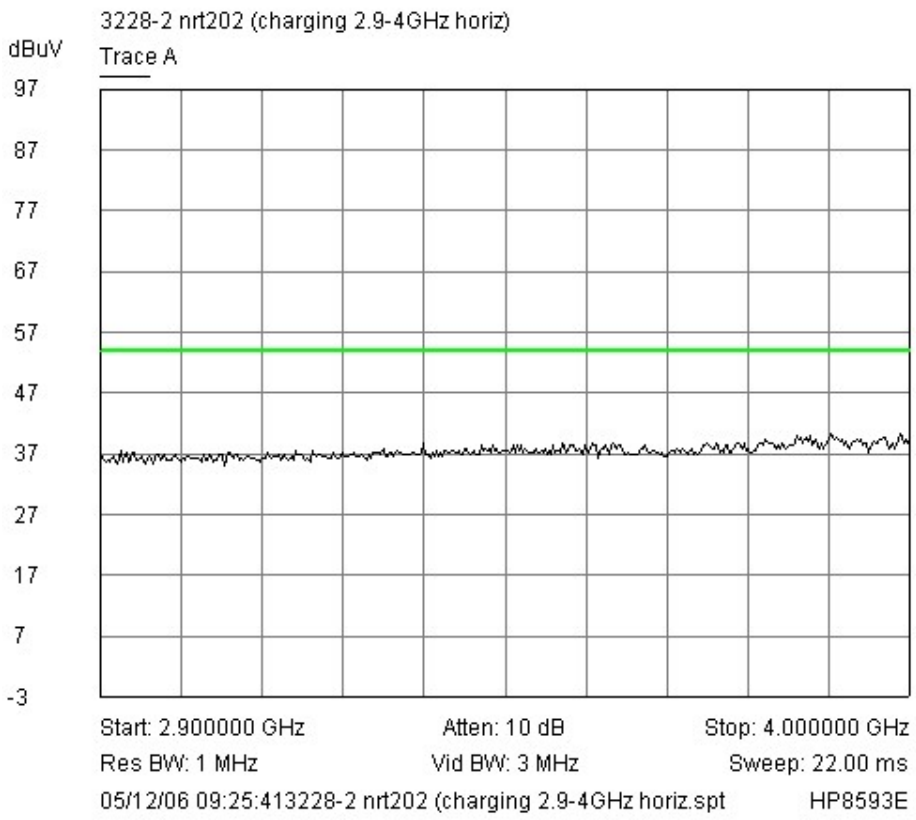
Average Values of 1 to 2GHz.
Vertical Polarisation



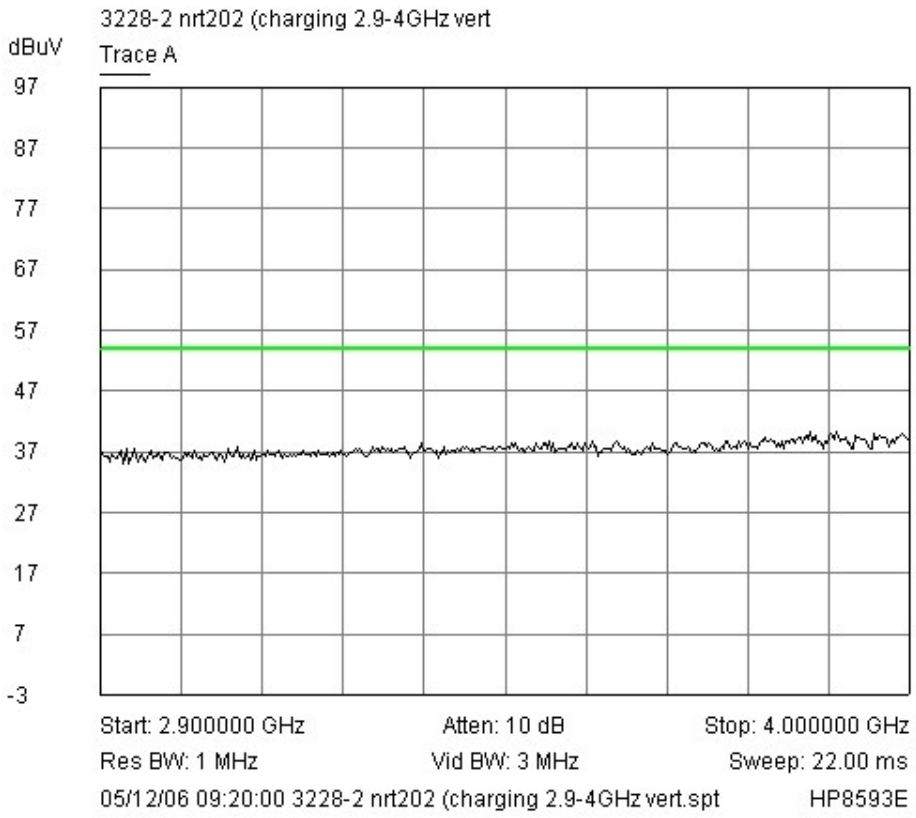
Average Values of 2 – 2.9 GHz.
Horizontal Polarisation



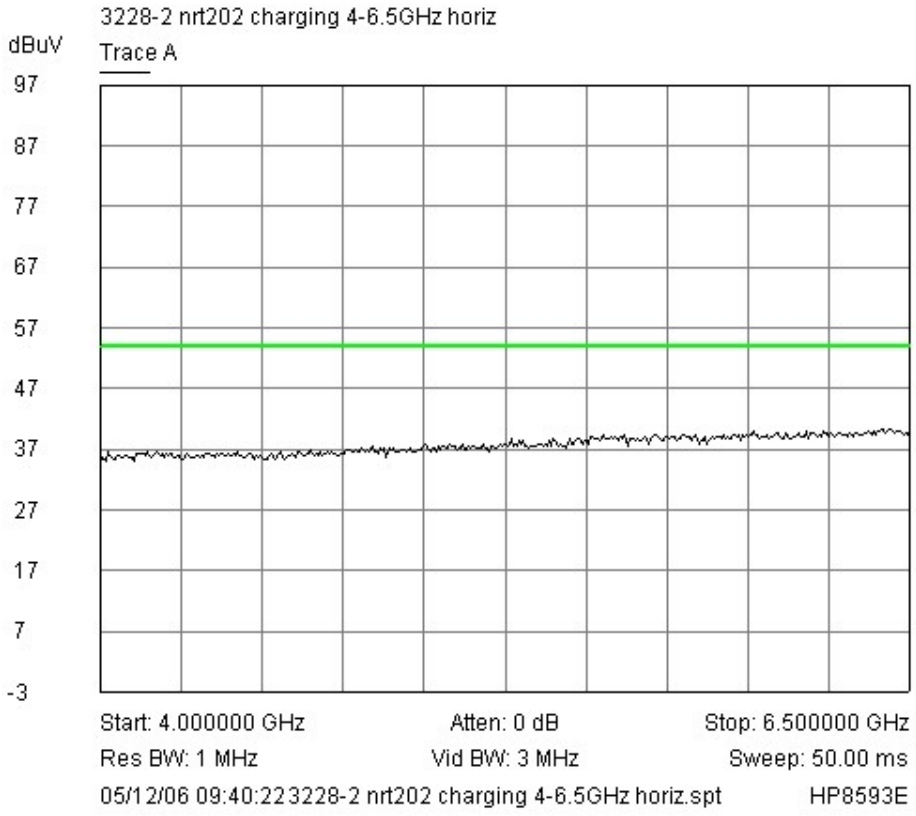
Average Values of 2 - 2.9 GHz.
Vertical Polarisation



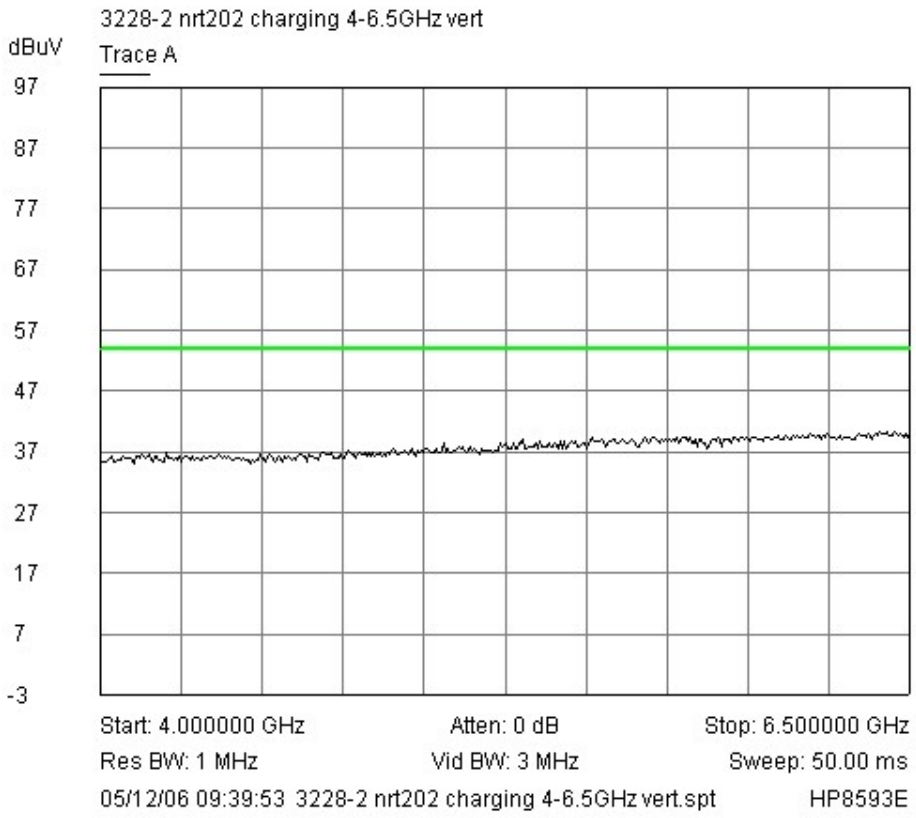
Average Values of 2.9 to 4 GHz.
Horizontal Polarisation



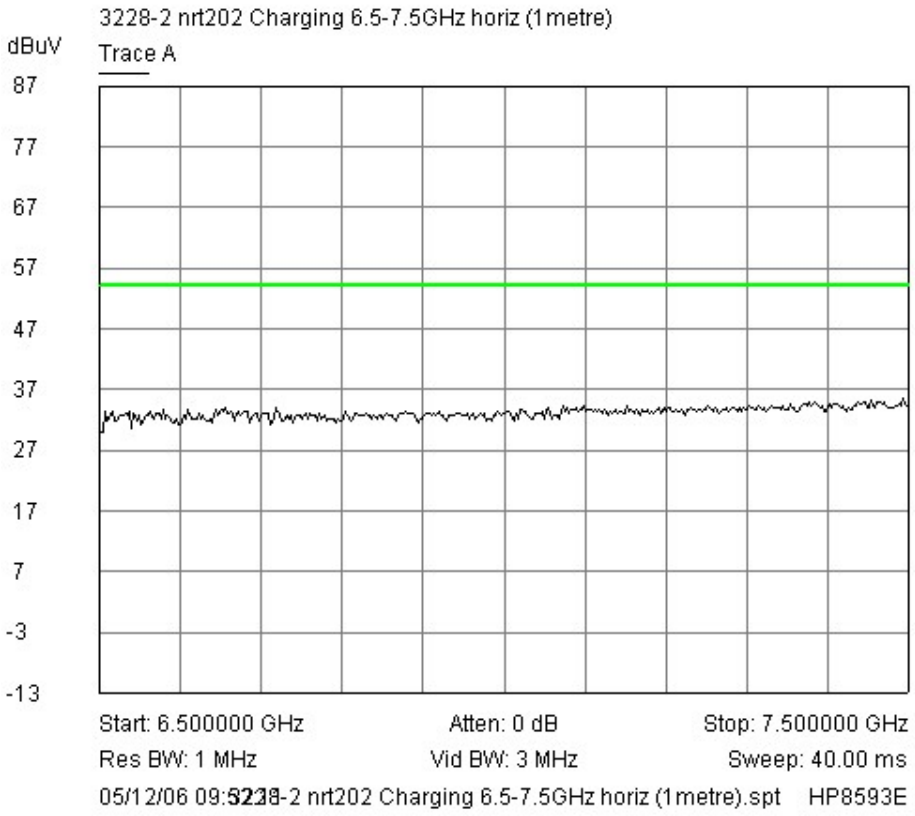
Average Values of 2.9 to 4 GHz.
Vertical Polarisation



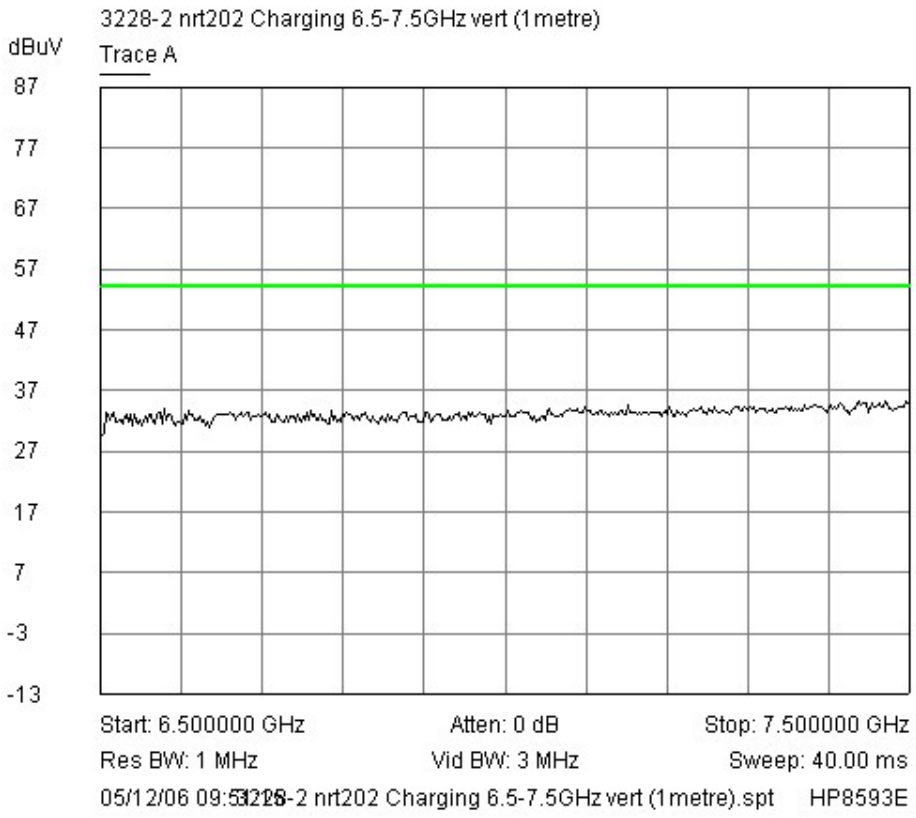
Average Values of 4 – 6.5 GHz.
Horizontal Polarisation



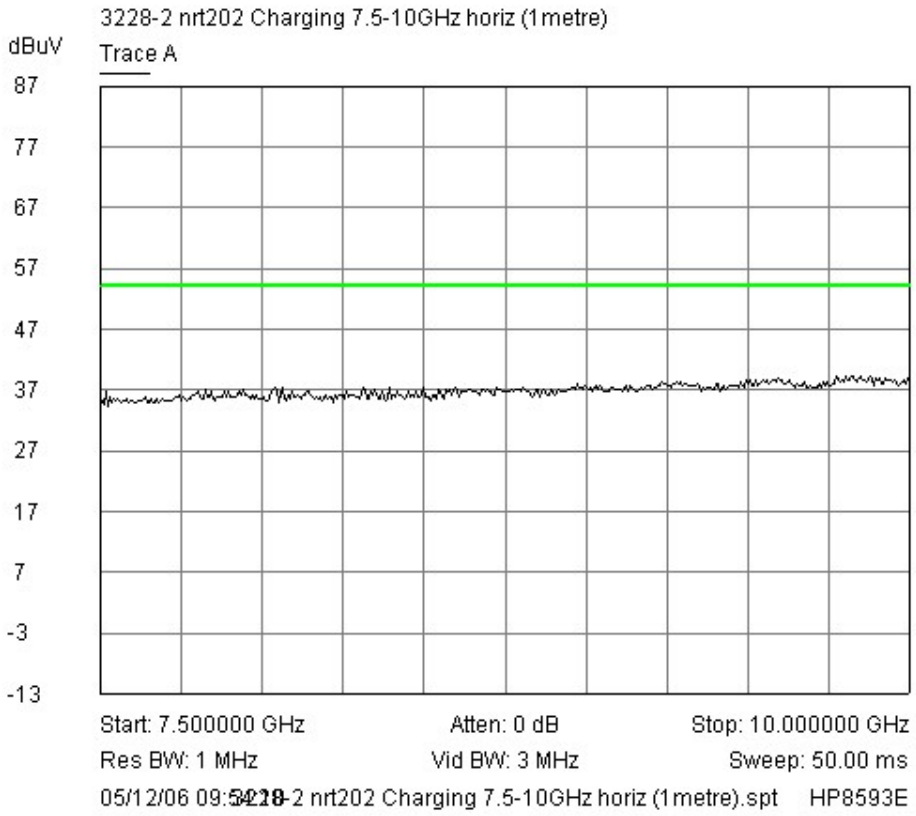
Average Values of 4 – 6.5 GHz.
Vertical Polarisation



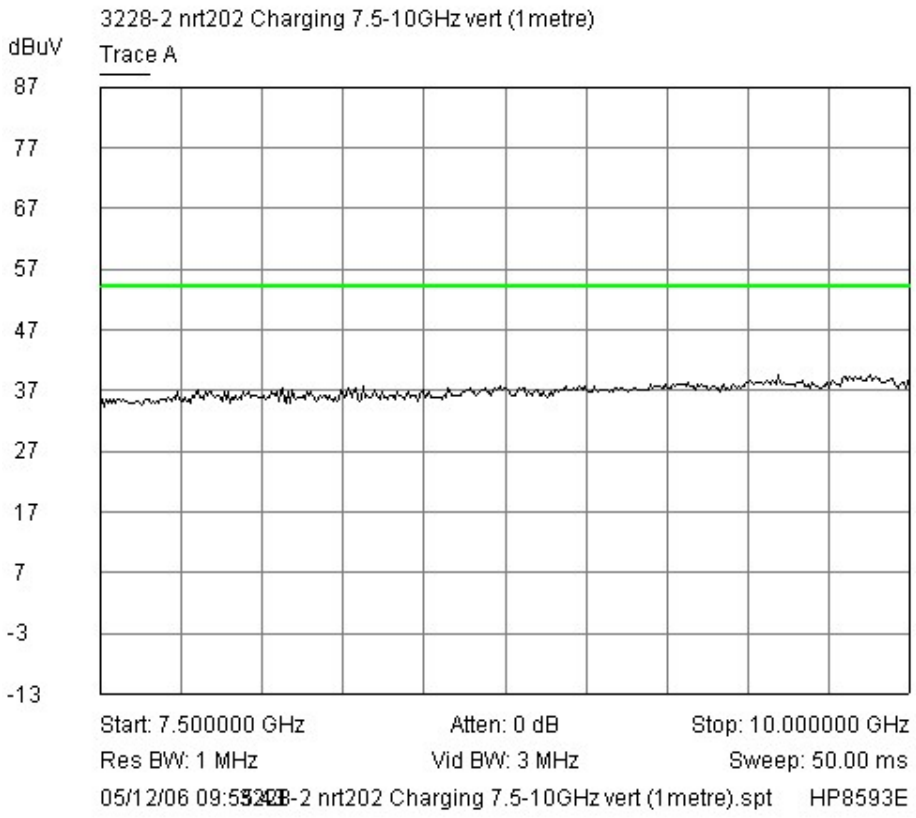
Average Values of 6.5 - 7.5 GHz.
Horizontal Polarisation



Average Values of 6.5 - 7.5 GHz.
Vertical Polarisation

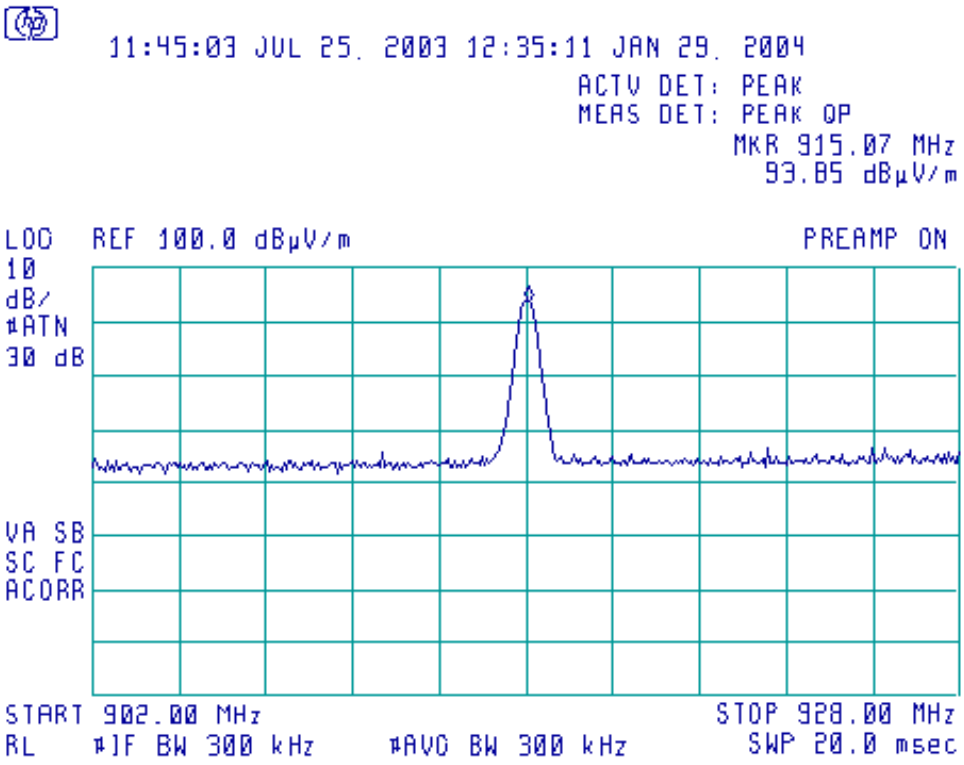


Average Values of 7.5 – 10 GHz.
Horizontal Polarisation

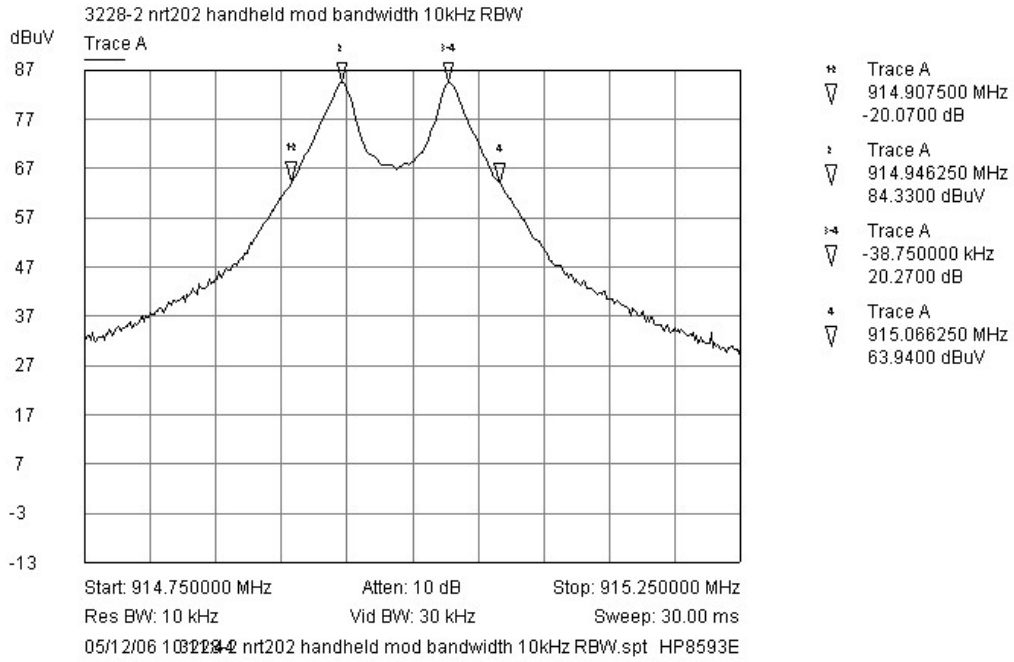


Average Values of 7.5 – 10 GHz.
Vertical Polarisation

6.3 Intentional Radiator Field Strength



6.4 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 in cradle as viewed from in front of the antenna, site M.

Emissions below 1GHz

Photograph of the stand-alone EUT as viewed from in front of the antenna, site B.
Emissions Above 1GHz

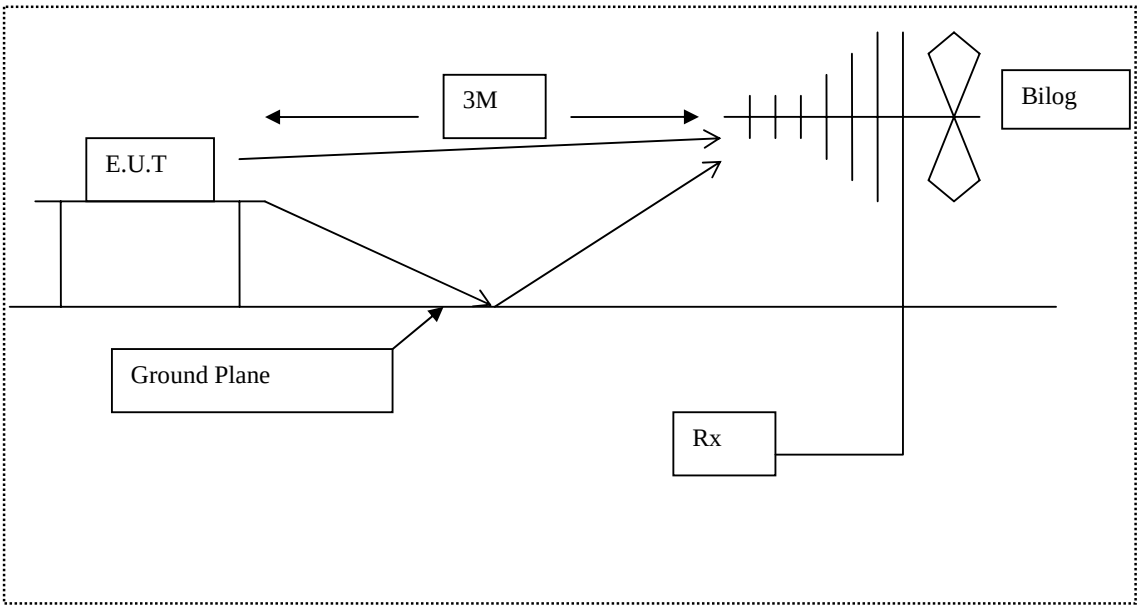


Diagram of the radiated emissions test setup.

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

Identifying Photograph of the Wireless Data Terminal NRT202

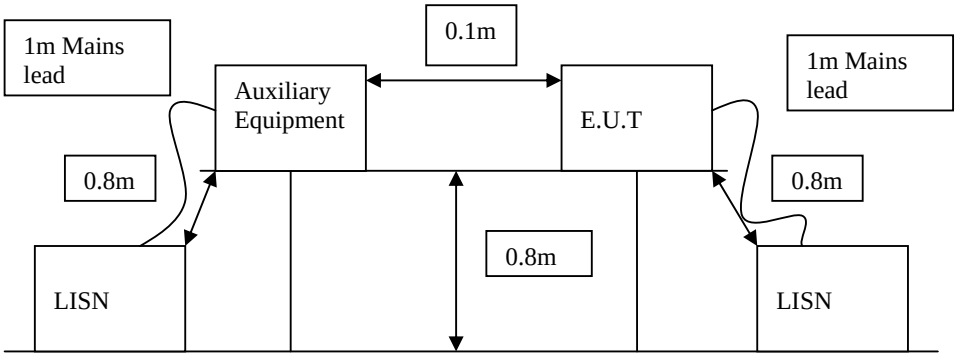


Diagram of the conducted emissions test setup.

9. Signal Leads

Port Name	Cable Type
AC Mains to DC	3 Core Mains to 2 Core

10. Test Equipment Calibration list

The following table lists the test equipment used, last calibration date and calibration interval. All test equipment used has been maintained within the calibration requirements of ***R.N. Electronics Ltd.*** test facility quality system. Calibration intervals are regularly reviewed dependent on equipment manufacturer's recommendations and actual usage of the equipment.

RNNo	Model	Description	Manufacturer	Last Calibration	Interval
E1	HP8542E	EMI Receiver & RF Filter	Hewlett Packard	31st October 2006	1 Year
E10	MN2050	LISN 13A	Chase	15th May 2006	1 Year
E238	FC5343A	2.7 - 5.0 GHz BPF	IFR	Not Applicable	N/A
E239	H-34-2720-01	2.0 - 2.9 GHz BPF	Marconi	Not Applicable	N/A
E242	22102	Bandpass filter 7.8 - 16 GHz	Merimec	Not Applicable	N/A
E268	BHA 9118	1-18 GHz Horn Antenna	Schaffner	26th May 2006	3 Years
E3	HP8593E	Spectrum Analyser	Hewlett Packard	20th Sept 2006	2 Years
E35	HP11947A	Transient Limiter + 10dB Atten.	Hewlett Packard	13th July 2006	6 Months
N438	3513 172 1208	3.9 - 7.5 GHz BPF	MEL	Not Applicable	N/A
TMS82	8449B	Pre Amplifier 1 - 26 GHz	Agilent	17th October 2006	1 Year
TMS907	TH200	ThermoHygrometer	RS Components	31st October 2006	2 Years
TMS933	CBL6141A	Bilog Antenna 30MHz - 2GHz	York EMC	17th August 2006	2 Years
TMS937	CCN1000	Mains Flicker	Schaffner	7th June 2006	2 Years
TMS938	NSG1007	3kV AC Power Source	Schaffner	7th June 2006	2 Years

11. Auxiliary equipment

11.1 Auxiliary equipment supplied by Maynetronics Ltd

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

Manufacturer	Description	Model Number	Serial Number
EB2	5 Rack Charger Housing	CB2NEW	-
EM5	110V AC to 12V DC Power Supply	9090	-

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.

The EUT was reprogrammed to reduce the fundamental emission to an acceptable level.

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:

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:	Wireless Data Terminal
Model Number(s):	NRT202
Unique Serial Number(s):	5827
Manufacturer:	Maynetronics
Customer Purchase Order Number:	2006-179
R.N. Electronics Limited Report Number:	07-190/3228/2/07A
Test Standards:	FCC 47CFR Part 15C: October 2006 DXT Intentional Radiator
Date:	22/Nov/06

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: 2007.08.15 12:03:49 +01'00'

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