



**FCC  
Test Report  
For  
Plextek  
Two Way Communicating Smart Meter  
Ampy 5252**

Report Number 04-254A/3641/1/08  
Supersedes Report Number 04-254/3641/1/08  
Report Produced by: -

***R.N. Electronics Ltd.***

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## 2. Summary of Test Results

The Ampy 5252 was tested to the following standards: -

### FCC Part 15C (effective date October, 2007); Class DSS 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. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of equipment not meeting the intentions of the standard, particularly under different conditions to those during testing.

Title	Reference	Results
1. Conducted Emissions	FCC Part 15C §15.207	PASSED
2. Radiated Emissions	FCC Part 15C §15.205, §15.209, §15.247(d)	PASSED
3. Modulation Bandwidth	FCC Part 15C §15.215(c), §15.247(a)(1)	PASSED
4. Intentional Radiator Field Strength	FCC Part 15C §15.247(b)(2)	PASSED
5. Duty Cycle	FCC Part 15C §15.247(a)(1)(i)	PASSED
6. No. of hopping channels	FCC Part 15C §15.247(a)(1)(i)	PASSED
7. Frequency separation	FCC Part 15C §15.247(a)(1)(i)	PASSED

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: 24/04/08

Test Engineer:  
Peter Finley

Approved By:  
Paul Darragh

Customer Representative:

### **3. Information about Equipment Under Test**

#### **3.1 Equipment Specification**

Applicant	Plextek Ltd London Road Great Chesterford Essex CB10 1NY
Manufacturer/Brand Name	Ampy metering Ltd
Full name of EUT	Ampy 5252
Model Number of EUT	Not Available
Serial Number of EUT	5252A02604-010208 including 6R535(Radio)
FCC ID (if applicable):	U3R-5252-01
Date when equipment was received by RN Electronics Limited	24/04/08
Date of test:	24/04/08
Customer order number:	P000058841
A visual description of EUT is as follows:	A large light grey metallic enclosure with a raised circular section on the front housing incorporating an LCD display. A mains connector block is situated on the top right hand side.
The main function of the EUT is:	To monitor the consumption of electricity used and relay the information over a radio link.
Antenna:	Integral

#### Equipment Under Test Information specification:

Height	400mm
Width	280mm
Depth	220mm
Weight	7.25kg
Voltage	230V AC
Current required from above voltage source	2.5A
Highest Frequencies used / generated	919.625 MHz

Purpose of Test:	To demonstrate compliance with FCC OET rules for unlicensed intentional radiators.
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#### Modes of operation:

The device is capable of two transmit and receive modes. Spread spectrum operation under 15.247 is used for communications with a base station. A low power (LCC) mode is used for communications peer-to-peer, i.e. with other metering stations. Results for the device operating in the LCC mode, which comes under a different sub-part of the FCC rules are contained in R.N. Electronics Ltd. test report # 04-258/3641/2/08.

Channel arrangements:

For FHSS within the 902 - 928 MHz band, operation is possible in any one of 6 sub-bands, each made up of 59 hopping channels.

Bottom FHSS = 910.5 MHz, Top FHSS = 919.575 MHz

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 June 2008

#### **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 placed on a wooden table 0.8m above the ground plane and connected to a LISN via a 1m mains cable.

The EUT was operated in the High Power Frequency Hopping and Receive modes.

##### **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. Measurements were made on the live and neutral conductors using both average and quasi-peak detection. At least 6 signals within 20dB and/or all signals within 10dB of the limit were investigated.

Tests were performed using Test Site F.

### **5.1.2 Test results**

Temperature of test Environment: 18°C

Analyser plots for the Quasi-Peak / Average values as applicable and a table of signals 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, 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 operated in the High Power Frequency Hopping and Receive modes.

#### **5.2.1.2 Test Procedure**

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

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.

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 or OATS.

#### **Test Environment: M**

Temperature: 18°C

Humidity: 45%

Analyser plots for the Quasi-Peak / Average values as applicable and any table of signals can be found in Section 6.2 of this report.

Note the limits shown on the plots and in the tables are all referenced to §15.209. The limits for §15.209 are more severe than §15.247(d), but nevertheless apply in the restricted bands of §15.205.

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

#### **5.2.2.1 Test Equipment used**

E1, TMS933,TMS938,TMS81E268,E3,TMS82,E328,E319,E239,E238,N438,E242

See Section 10 for more details



## 5.3 Intentional Radiator Field Strength

### 5.3.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.247)

Test Method: FCC Part 15C, Reference (15.247)

#### 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 EUT was operated in the High Power Frequency Hopping mode. The supply to the EUT was varied greater than the required +/- 15%.

#### 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. The equipment was rotated 360° and the antenna scanned 1 – 4 metres in both horizontal and vertical polarisations to record the worst case emissions.

### 5.3.2 Test results

Tests were performed using Test Site .

#### Test Environment: M

Temperature: 18°C

Humidity: 48 %

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

The maximised field strength measured in Frequency Hopping (FHSS) mode was:

Antenna Horizontal:

Conditions AC Supply (Vrms)	Fundamental Field Strength	
	Bottom Channel (dBµV/m)	Top Channel (dBµV/m)
176	118.0	116.0
230	117.9	116.1
270	117.9	116.0

Antenna Vertical:

Conditions AC Supply (Vrms)	Fundamental Field Strength	
	Bottom Channel (dB $\mu$ V/m)	Top Channel (dB $\mu$ V/m)
176	119.9	117.9
230	120.1	118.0
270	119.8	118.0

Effect of power supply variation was negligible.

Limit §15.247(b)(2) : 1 Watt (125dB $\mu$ V/m EIRP @ 3m.).

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

#### 5.3.2.1 Test Equipment used

E1,TMS933,TMS938

See Section 10 for more details

## **5.4 Duty Cycle**

### **5.4.1 Test Methods**

Test Requirements FCC Part 15C, Reference (15.247)

Test Method: FCC Public Notice **DA 00-705**

#### **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. The EUT was operated in the High Power Frequency Hopping mode.

#### **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: 18°C

Analyser plots for the dwell time and duty cycle can be found in Section 6.4 of this report.

The dwell time measured was 400ms.

Manufacturer declares a total of 59 channels used in the hopping subset at random. If each channel is used once before a channel can be occupied for a second time and without allowing for any delay between successive dwells, this gives a total time of 23.6 seconds between any two occupancies of the same channel.

Limits §15.247(a)(1)(i):

Time of occupancy = Not greater than 0.4 seconds within a 20 second period.

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

#### **5.4.2.1 Test Equipment used**

E1,TMS933,TMS938

See Section 10 for more details.

## **5.5 20dB Bandwidth**

### **5.5.1 Test Methods**

Test Requirements

FCC Part 15C, Reference (15.247)

Test Method:

FCC Public Notice **DA 00-705**

#### **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.  
The EUT was operated in the High Power Frequency Hopping mode.

#### **5.5.1.2 Test Procedure**

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. After completing the bandwidth measurement, the hopping function of the EUT was enabled to capture any emissions at the band-edge.

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: 18°C

Analyser plots for the 20dB bandwidth and band-edge measurements can be found in Section 6.5 of this report.

20dB Bandwidth Measurements:

<b>Bottom Channel</b>	<b>Top Channel</b>
1001 Hz	888 Hz

Limits §15.247(a)(1)(i): less than 250kHz.

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

#### **5.5.2.1 Test Equipment used**

E1,TMS933,TMS938

See Section 10 for more details.

## **5.6 Number of Hopping channels**

### **5.6.1 Test Methods**

Test Requirements FCC Part 15C, Reference (15.247)

Test Method: FCC Public Notice **DA 00-705**

#### **5.6.1.1 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 operated in the High Power Frequency Hopping mode.

#### **5.6.1.2 Test Procedure**

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

### **5.6.2 Test results**

Tests were performed using Test Site M.

Temperature of test Environment: 18°C

Number of channels counted in sub-band 3 was **59**.

Analyser plots can be found in Section 6.6 of this report.

Limit §15.247(a)(1)(i): for equipment with 20dB bandwidth < 250kHz, minimum of 50 channels.

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

#### **5.6.2.1 Test Equipment used**

E1, TMS933, TMS938

See Section 10 for more details.

## **5.7 Carrier Frequency Separation**

### **5.7.1 Test Methods**

Test Requirements FCC Part 15C, Reference (15.247)

Test Method: FCC Public Notice **DA 00-705**

#### **5.7.1.1 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 operated in the High Power Frequency Hopping mode.

#### **5.7.1.2 Test Procedure**

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

### **5.7.2 Test results**

Tests were performed using Test Site M.

Temperature of test Environment: 18°C

Frequency separation measured **25 KHz**.

Analyser plots can be found in Section 6.7 of this report.

Limit §15.247(a)(1): minimum of 25kHz.

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

#### **5.7.2.1 Test Equipment used**

E1, TMS933, TMS938

See Section 10 for more details

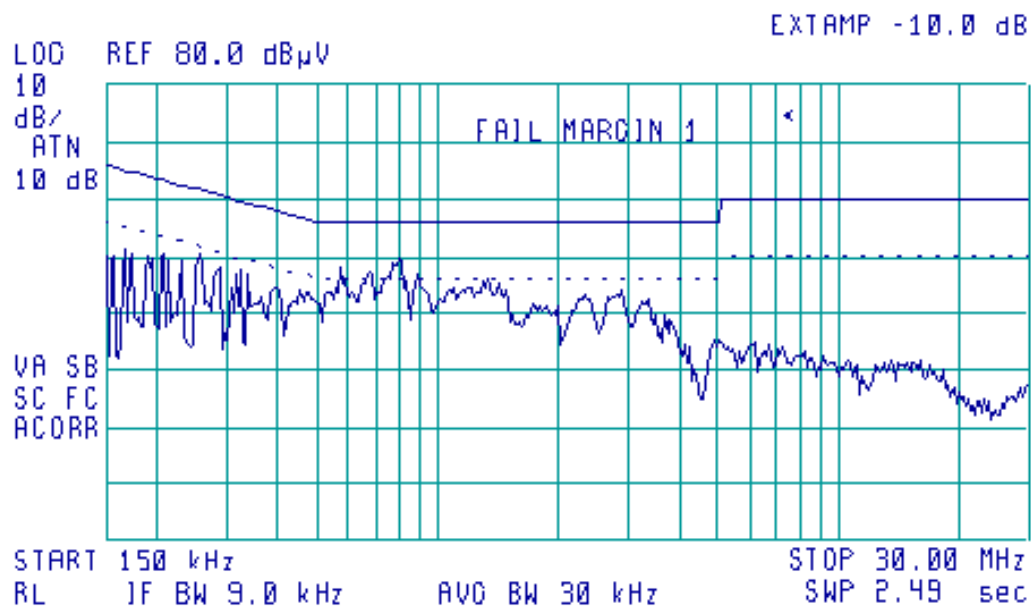
## 6. Plots and Results

### 6.1 Conducted Emissions



11:11:14 JUL 23, 2003 11:13:07 JUL 23, 2003

ACTV DET: PEAK  
MEAS DET: PEAK QP



## Quasi-peak values of mains live feed High Power Frequency Hopping Mode

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

(Any peaks within 10dB of the limit line have been calculated and appear in the table on following page of this report)

**Table of signals within 10dB of the limit line for Quasi-Peak Live**

Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	QP Amp (dBuV)	QP - Lim1 (dB)
1	0.549171	43.65	-12.35	42.82	-13.18
2	0.603190	41.44	-14.56	40.91	-15.09
3	0.607750	46.40	-9.60	43.05	-12.95
4	0.677840	38.49	-17.51	44.41	-11.59
5	0.681663	49.38	-6.62	46.20	-9.80
6	0.684635	49.27	-6.73	46.32	-9.68
7	0.684861	49.81	-6.19	46.28	-9.72
8	0.795015	50.22	-5.78	47.43	-8.57
9	0.815531	40.87	-15.13	39.83	-16.17
10	0.816088	51.44	-4.56	48.43	-7.57
11	0.819545	40.75	-15.25	47.13	-8.87
12	0.848143	48.18	-7.82	44.95	-11.05
13	1.371560	47.12	-8.88	44.05	-11.95
14	1.436085	47.22	-8.78	42.94	-13.06

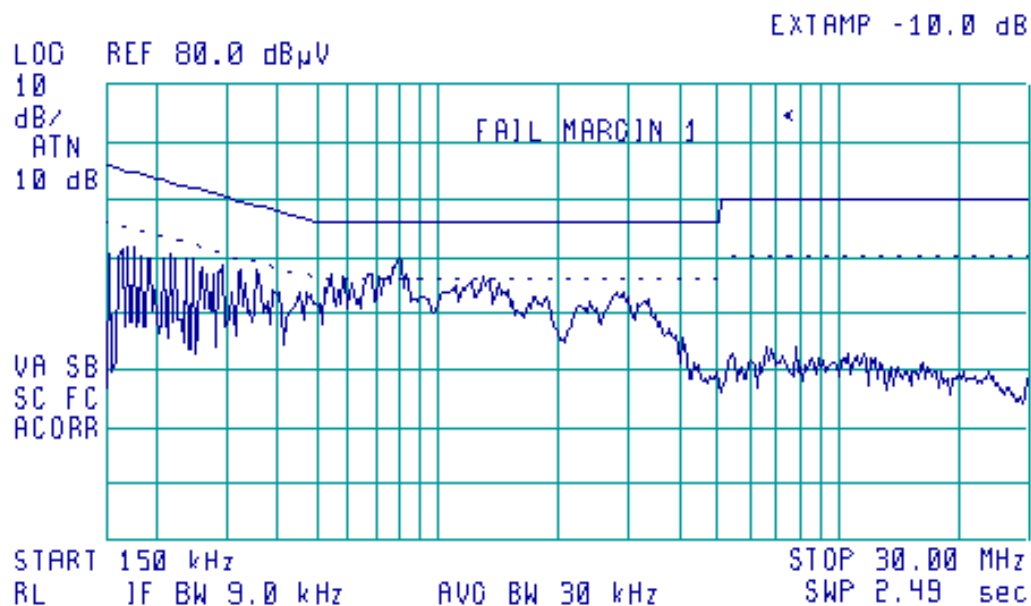
**Measurement Uncertainty of  $\pm 3.6$ dB Applies**





11:11:14 JUL 23, 2003 11:13:07 JUL 23, 2003

ACTV DET: PEAK  
MEAS DET: PEAK QP



## Quasi-peak values of mains neutral feed

### High Power Frequency Hopping Mode

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

(Any peaks within 10dB of the limit line have been calculated and appear in the table on following page of this report)

**Table of signals within 10dB of the limit line for Quasi-peak Neutral**

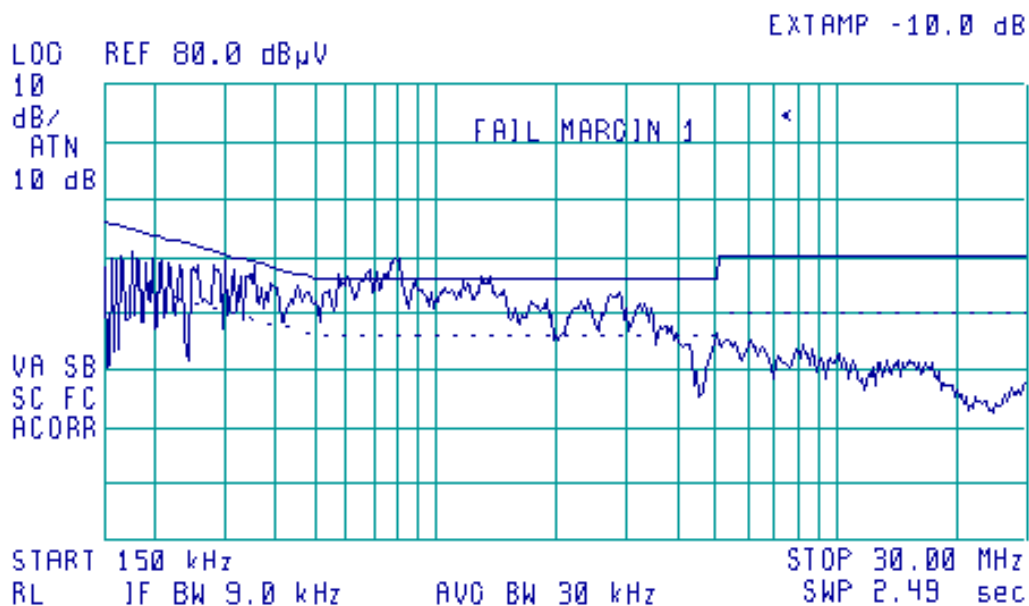
Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	QP Amp (dBuV)	QP - Lim1 (dB)
1	0.542319	46.33	-9.67	43.10	-12.90
2	0.586017	44.49	-11.51	36.51	-19.49
3	0.685316	48.62	-7.38	45.87	-10.13
4	0.809716	50.60	-5.40	47.92	-8.08
5	0.816417	51.02	-4.98	48.38	-7.62
6	0.817808	50.21	-5.79	48.29	-7.71
7	0.818466	41.27	-14.73	45.40	-10.60
8	0.849154	48.35	-7.65	45.19	-10.81
9	1.344500	47.25	-8.75	44.05	-11.95
10	1.372313	47.22	-8.78	44.08	-11.92

**Measurement Uncertainty of  $\pm 3.6$ dB Applies**



11:11:14 JUL 23, 2003 11:13:07 JUL 23, 2003

ACTV DET: PEAK  
MEAS DET: PEAK AVG



## Average values of mains live feed

### High Power Frequency Hopping Mode

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

(Any peaks within 10dB of the limit line have been calculated and appear in the table on following page of this report)

**Table of signals for Average Live**

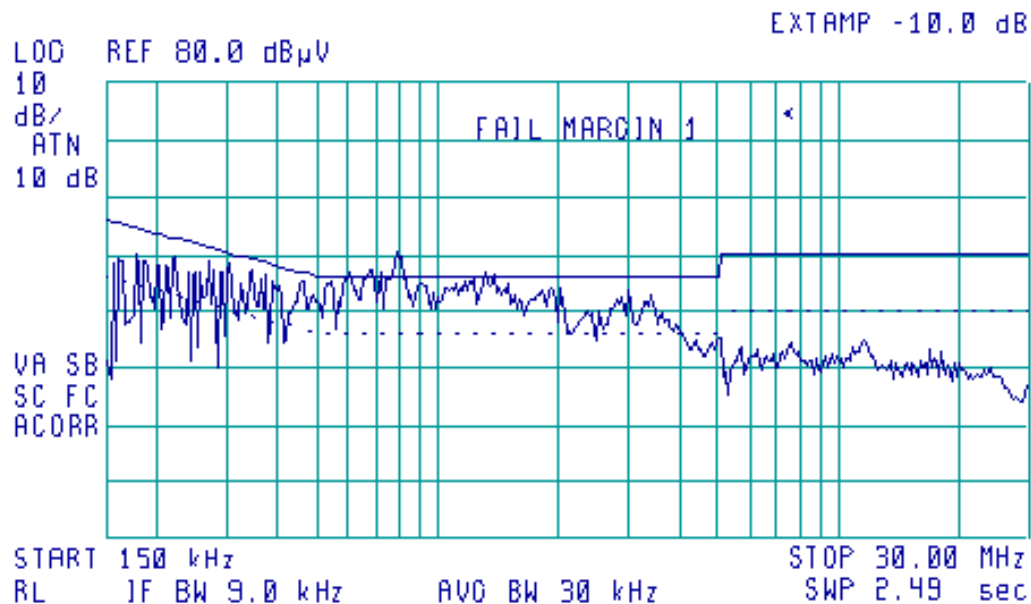
Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	Avg Amp (dBuV)	Avg - Lim1 (dB)
1	0.228906	48.37	-4.17	34.26	-18.28
2	0.268539	51.56	0.33	37.65	-13.58
3	0.309955	50.50	0.52	32.70	-17.28
4	0.352699	47.67	-1.29	31.48	-17.48
5	0.395250	45.85	-2.11	34.58	-13.38
6	0.459179	46.44	-0.32	33.20	-13.56
7	0.529865	40.12	-5.88	35.13	-10.87
8	0.550426	47.55	1.55	32.47	-13.53
9	0.587451	48.05	2.05	35.54	-10.46
10	0.611446	39.43	-6.57	31.58	-14.42
11	0.662464	47.18	1.18	35.53	-10.47
12	0.679290	48.04	2.04	37.30	-8.70
13	0.762301	47.48	1.48	36.70	-9.30
14	0.785604	49.95	3.95	36.09	-9.91
15	0.810103	51.17	5.17	34.30	-11.70
16	0.819161	50.35	4.35	39.28	-6.72
17	0.906810	42.51	-3.49	35.46	-10.54
18	0.917411	47.54	1.54	35.55	-10.45
19	0.922119	38.19	-7.81	34.99	-11.01
20	0.953486	44.64	-1.36	32.68	-13.32
21	1.079845	36.66	-9.34	32.47	-13.53
22	1.101185	44.54	-1.46	34.01	-11.99
23	1.112405	45.51	-0.49	33.27	-12.73
24	1.117420	38.65	-7.35	33.71	-12.29
25	1.147250	44.32	-1.68	32.86	-13.14
26	1.177000	46.00	0.00	34.00	-12.00
27	1.209340	38.65	-7.35	33.44	-12.56
28	1.310695	46.88	0.88	34.89	-11.11
29	1.341335	45.66	-0.34	33.89	-12.11
30	1.372475	30.30	-15.70	36.26	-9.74
31	1.459665	45.00	-1.00	34.49	-11.51
32	1.504940	46.26	0.26	33.70	-12.30
33	1.576820	37.65	-8.35	30.28	-15.72
34	1.909250	43.91	-2.09	30.58	-15.42
35	1.898370	43.93	-2.07	31.19	-14.81

**Measurement Uncertainty of  $\pm 3.6$ dB Applies**



11:11:14 JUL 23, 2003 11:13:07 JUL 23, 2003

ACTV DET: PEAK  
MEAS DET: PEAK AVG



## Average values of mains neutral 230VAC 60Hz feed High Power Frequency Hopping Mode

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

(Any peaks within 10dB of the limit line have been calculated and appear in the table on following page of this report)

**Table of signals for Average Neutral**

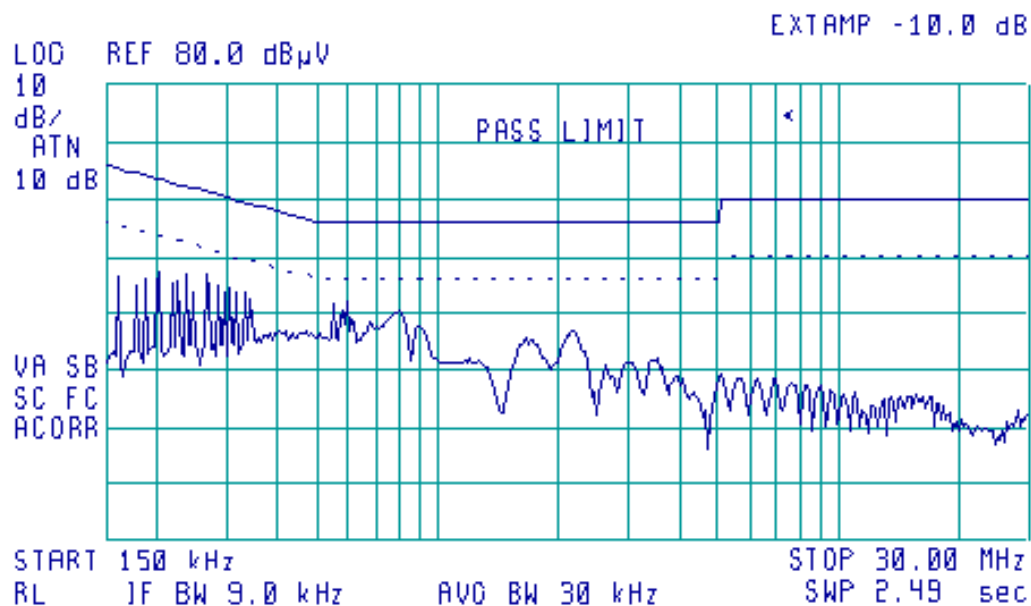
Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	Avg Amp (dBuV)	Avg - Lim1 (dB)
1	0.362931	47.51	-1.21	34.50	-14.22
2	0.409900	45.49	-2.19	36.66	-11.02
3	0.413750	44.76	-2.85	33.38	-14.23
4	0.437450	41.64	-5.53	31.83	-15.34
5	0.440825	36.32	-10.79	33.37	-13.74
6	0.493290	38.14	-7.99	28.93	-17.20
7	0.529270	46.10	0.10	33.33	-12.67
8	0.535428	47.89	1.89	35.23	-10.77
9	0.543483	42.04	-3.96	29.45	-16.55
10	0.550105	49.53	3.53	33.37	-12.63
11	0.578125	47.23	1.23	33.29	-12.71
12	0.589125	47.84	1.84	35.76	-10.24
13	0.615728	46.74	0.74	30.96	-15.04
14	0.661145	47.14	1.14	34.07	-11.93
15	0.670125	42.42	-3.58	28.52	-17.48
16	0.674225	48.54	2.54	36.60	-9.40
17	0.684745	49.38	3.38	37.34	-8.66
18	0.726515	47.49	1.49	35.39	-10.61
19	0.729645	41.47	-4.53	35.14	-10.86
20	0.769683	47.38	1.38	36.97	-9.03
21	0.802090	51.12	5.12	38.46	-7.54
22	0.811800	51.30	5.30	39.08	-6.92
23	0.821483	50.38	4.38	39.22	-6.78
24	0.851435	48.04	2.04	36.64	-9.36
25	0.890275	43.12	-2.88	32.32	-13.68
26	0.917858	45.49	-0.51	33.32	-12.68
27	0.925470	45.57	-0.43	32.84	-13.16
28	0.931618	35.47	-10.53	32.95	-13.05
29	0.951263	44.88	-1.12	31.28	-14.72
30	0.984173	44.37	-1.63	32.54	-13.46
31	1.076555	33.60	-12.40	27.09	-18.91
32	1.086530	44.67	-1.33	32.36	-13.64
33	1.145300	44.22	-1.78	32.75	-13.25
34	1.312605	46.98	0.98	35.04	-10.96
35	1.317995	47.06	1.06	35.78	-10.22
36	1.444300	27.09	-18.91	33.79	-12.21
37	1.519085	45.58	-0.42	32.45	-13.55
38	1.572975	44.00	-2.00	30.64	-15.36
39	1.670500	41.30	-4.70	29.74	-16.26
40	1.849650	44.54	-1.46	32.29	-13.71
41	1.914670	44.74	-1.26	30.92	-15.08

**Measurement Uncertainty of  $\pm 3.6$ dB Applies**



11:11:14 JUL 23, 2003 11:13:07 JUL 23, 2003

ACTV DET: PEAK  
MEAS DET: PEAK QP



## Quasi-peak values of mains live feed

### RX Mode

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

(Any peaks within 10dB of the limit line have been calculated and appear in the table on following page of this report)

**Table of signals within 10dB of the limit line for Quasi-Peak Live**

Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	QP Amp (dBuV)	QP - Lim1 (dB)
1	0.162969	46.96	-18.41	38.91	-26.46
2	0.191719	46.69	-17.28	38.76	-25.21
3	0.204875	47.65	-15.82	39.11	-24.36
4	0.230656	48.02	-14.45	38.72	-23.75
5	0.248625	47.54	-14.29	38.41	-23.42
6	0.279031	45.85	-15.06	37.52	-23.39
7	0.300469	45.72	-14.54	37.25	-23.01
8	0.314688	46.62	-13.24	37.45	-22.41
9	0.336219	45.28	-14.07	37.03	-22.32
10	0.355281	45.67	-13.23	35.98	-22.92

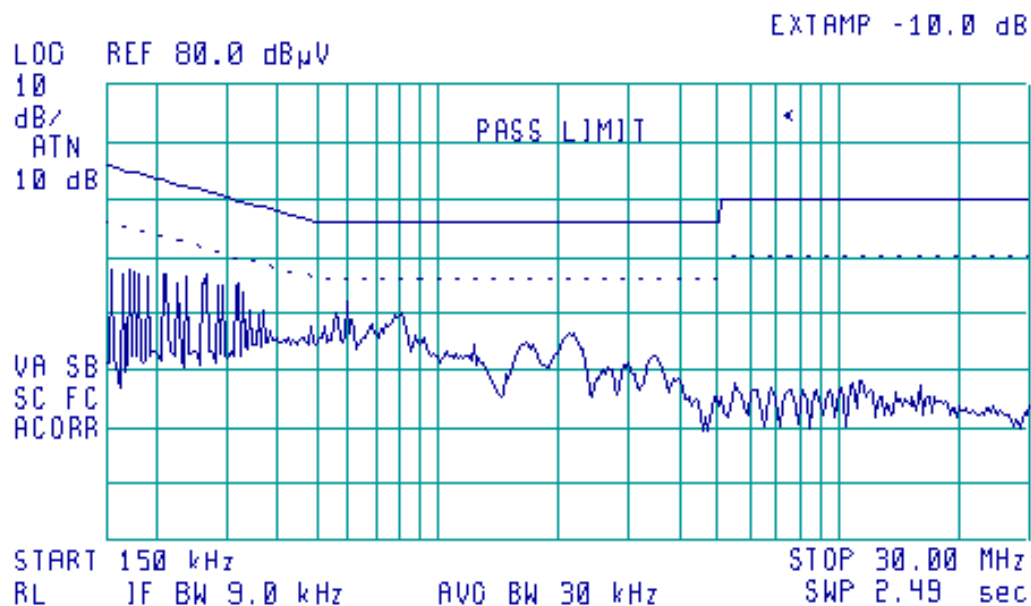
**Measurement Uncertainty of  $\pm 3.6$ dB Applies**





11:11:14 JUL 23, 2003 11:13:07 JUL 23, 2003

ACTV DET: PEAK  
MEAS DET: PEAK QP



## Quasi-peak values of mains neutral feed RX Mode

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

(Any peaks within 10dB of the limit line have been calculated and appear in the table on following page of this report)

**Table of signals within 10dB of the limit line for Quasi-peak Neutral**

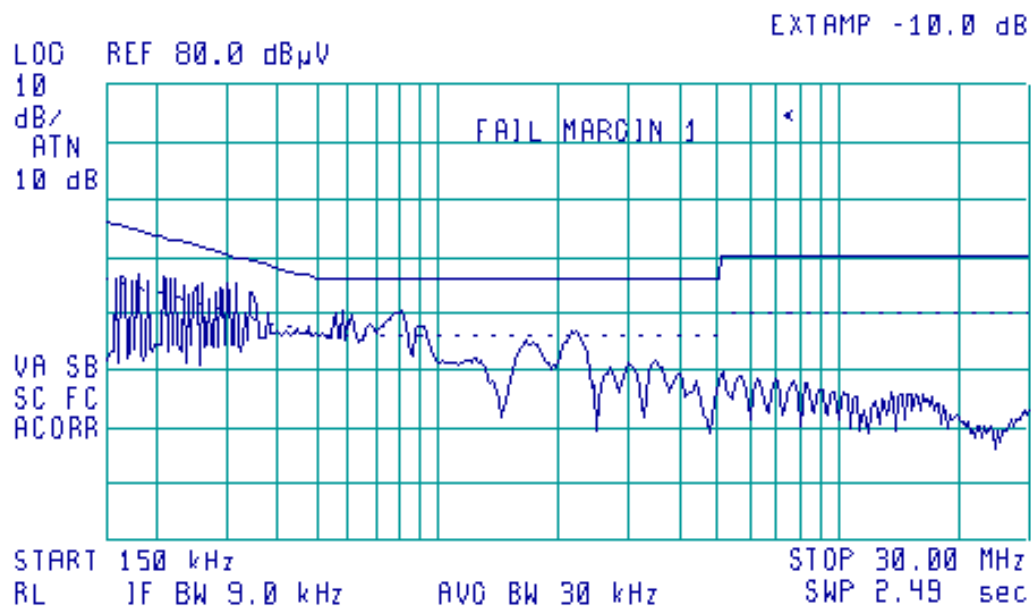
Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	QP Amp (dBuV)	QP - Lim1 (dB)
1	0.157938	48.44	-17.17	39.74	-25.87
2	0.165750	47.83	-17.40	39.27	-25.96
3	0.185469	47.41	-16.86	39.15	-25.12
4	0.201281	48.42	-15.18	39.60	-24.00
5	0.202938	48.52	-15.02	39.33	-24.21
6	0.226375	48.15	-14.49	38.83	-23.81
7	0.263469	47.47	-13.91	38.32	-23.06
8	0.288094	46.92	-13.71	37.38	-23.25
9	0.292969	46.85	-13.64	37.91	-22.58
10	0.307781	46.28	-13.76	37.50	-22.54
11	0.349375	44.75	-14.29	35.87	-23.17
12	0.361375	44.65	-14.10	35.50	-23.25
13	0.375188	41.68	-16.74	34.55	-23.87

**Measurement Uncertainty of  $\pm 3.6$ dB Applies**



11:11:14 JUL 23, 2003 11:13:07 JUL 23, 2003

ACTV DET: PEAK  
MEAS DET: PEAK AVG



## Average values of mains live feed RX Mode

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

(Any peaks within 10dB of the limit line have been calculated and appear in the table on following page of this report)

**Table of signals for Average Live**

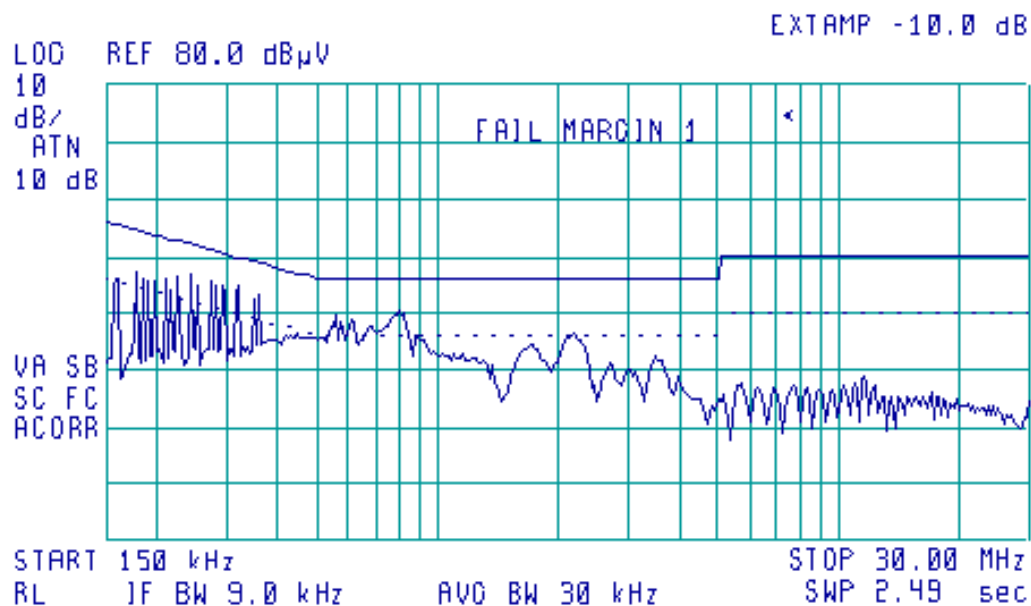
Signal	Freq (MHz)	Peak Amp (dBuV)	Peak - Lim1 (dB)	Avg Amp (dBuV)	Avg - Lim1 (dB)
1	0.178150	47.41	-7.22	30.48	-24.15
2	0.226303	47.76	-4.88	29.61	-23.03
3	0.263539	47.01	-4.37	24.80	-26.58
4	0.337698	46.45	-2.87	29.82	-19.50
5	0.597333	44.33	-1.67	30.39	-15.61
6	0.805359	40.99	-5.01	33.55	-12.45
7	0.918998	39.36	-6.64	31.57	-14.43
8	2.186000	37.54	-8.46	31.84	-14.16

**Measurement Uncertainty of  $\pm 3.6$ dB Applies**



11:11:14 JUL 23, 2003 11:13:07 JUL 23, 2003

ACTV DET: PEAK  
MEAS DET: PEAK AVG



## Average values of mains neutral feed RX Mode

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

(Any peaks within 10dB 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	0.156124	47.70	-8.00	29.82	-25.88
2	0.226406	47.91	-4.73	28.74	-23.90
3	0.228425	47.73	-4.83	28.23	-24.33
4	0.277241	46.34	-4.62	23.58	-27.38
5	0.316186	45.30	-4.53	28.55	-21.28
6	0.571204	43.64	-2.36	29.88	-16.12
7	0.597400	43.35	-2.65	30.32	-15.68
8	0.821361	40.92	-5.08	34.56	-11.44
9	2.214068	37.79	-8.21	30.32	-15.68

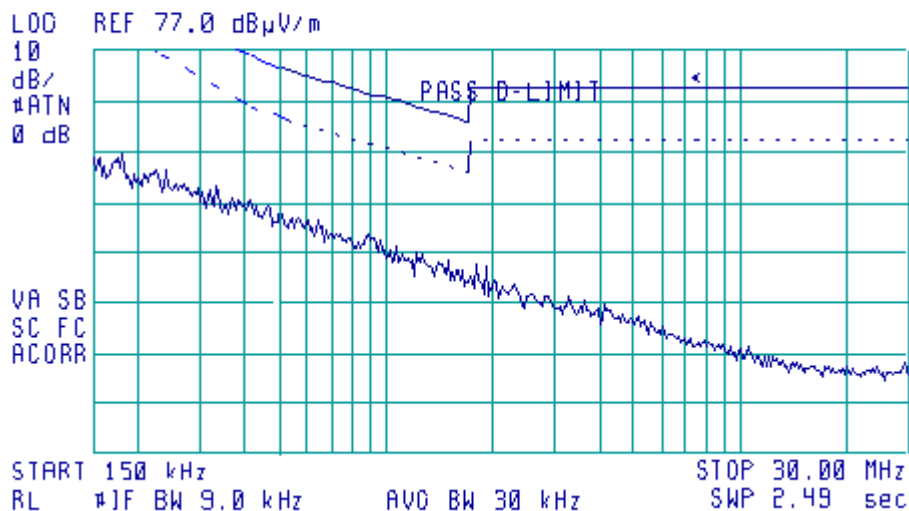
Measurement Uncertainty of  $\pm 3.6\text{dB}$  Applies

## 6.2 Radiated Emissions



11:45:03 JUL 25, 2003 12:28:17 SEP 11, 2003

ACTV DET: PEAK  
MEAS DET: PEAK QP



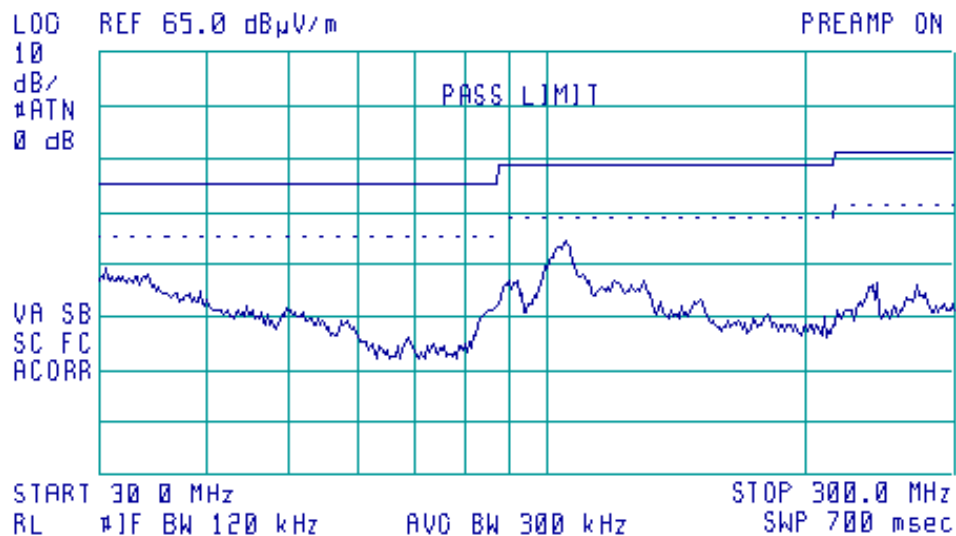
### Quasi-Peak Values 9kHz to 30MHz.

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



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK  
MEAS DET: PEAK QP



## High Power Frequency Hopping Mode

### 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

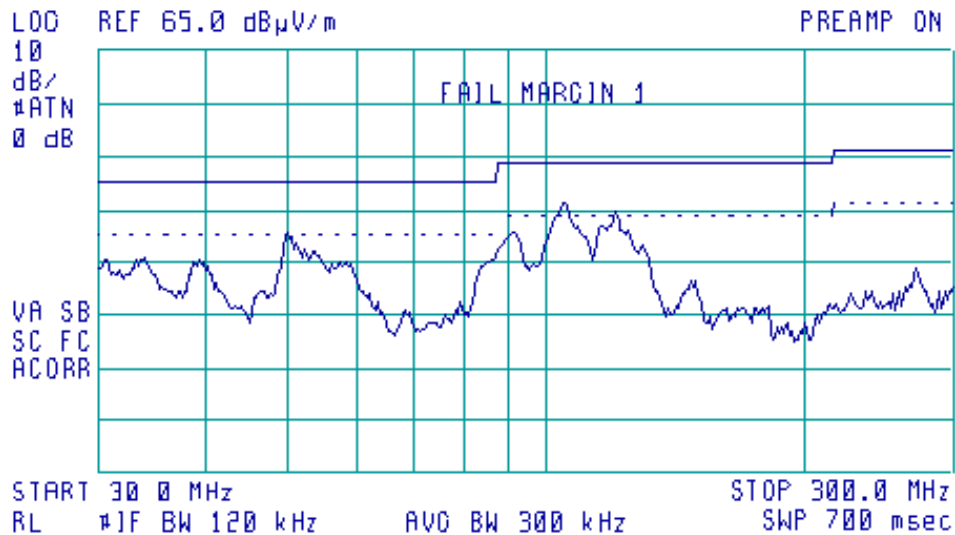
**Measurement Uncertainty of  $\pm 5.2$ dB Applies**



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK

MEAS DET: PEAK QP



## High Power Frequency Hopping Mode

### 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**

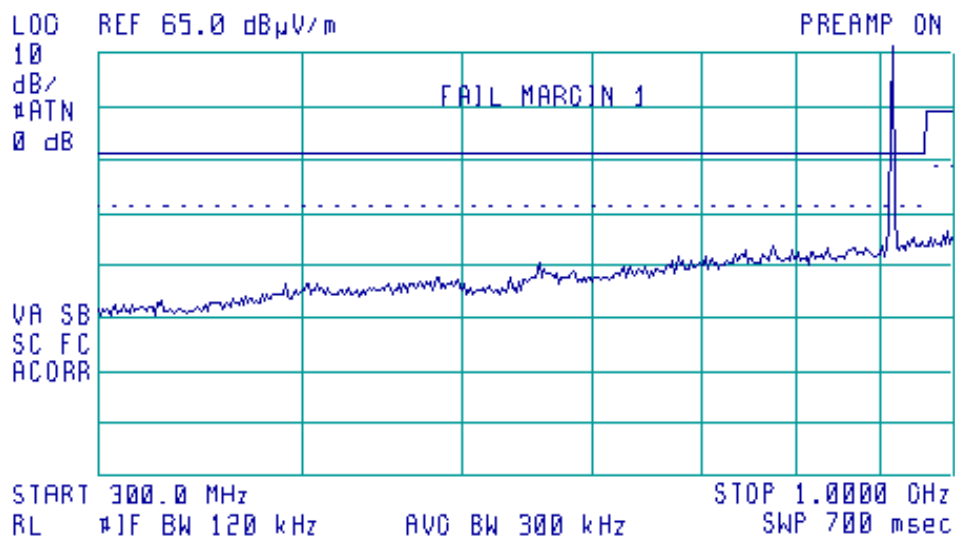
Signal	Freq (MHz)	Peak Amp (dBuV/m)	Peak - Lim1 (dB)	QP Amp (dBuV/m)	QP - Lim1 (dB)
1	39.572738	27.52	-12.48	22.36	-17.64
2	50.400000	31.06	-8.94	26.81	-13.19
3	55.281488	25.71	-14.29	22.02	-17.98
4	92.475000	30.49	-13.01	25.15	-18.35
5	106.075000	35.63	-7.87	31.44	-12.06
6	121.375000	34.29	-9.21	31.04	-12.46

**Measurement Uncertainty of  $\pm 5.2$ dB Applies**



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK  
MEAS DET: PEAK QP



## High Power Frequency Hopping Mode 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	915.000000			117.07	-7.93 <sup>1</sup>

**Measurement Uncertainty of  $\pm 5.2$ dB Applies**

---

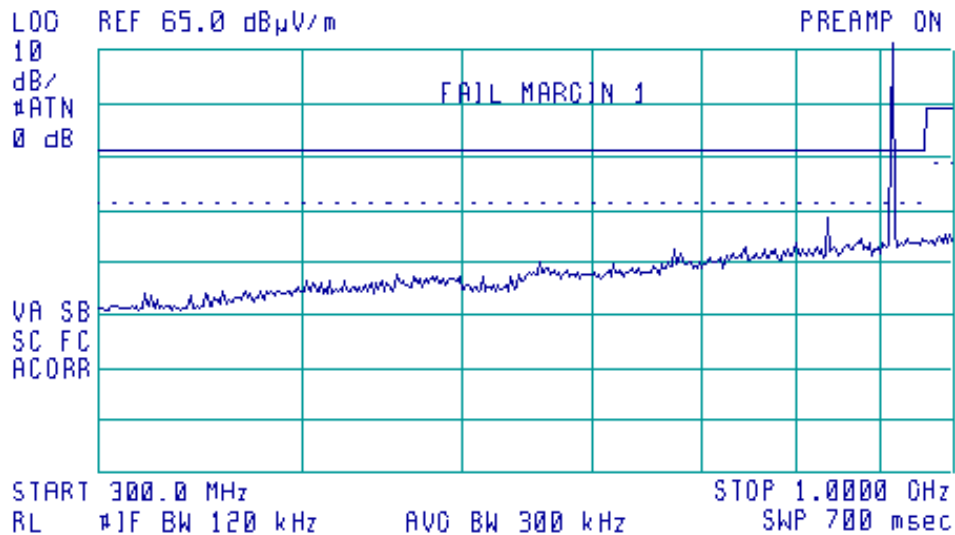
<sup>1</sup> Fundamental Emission



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK

MEAS DET: PEAK QP



## High Power Frequency Hopping Mode

### 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)

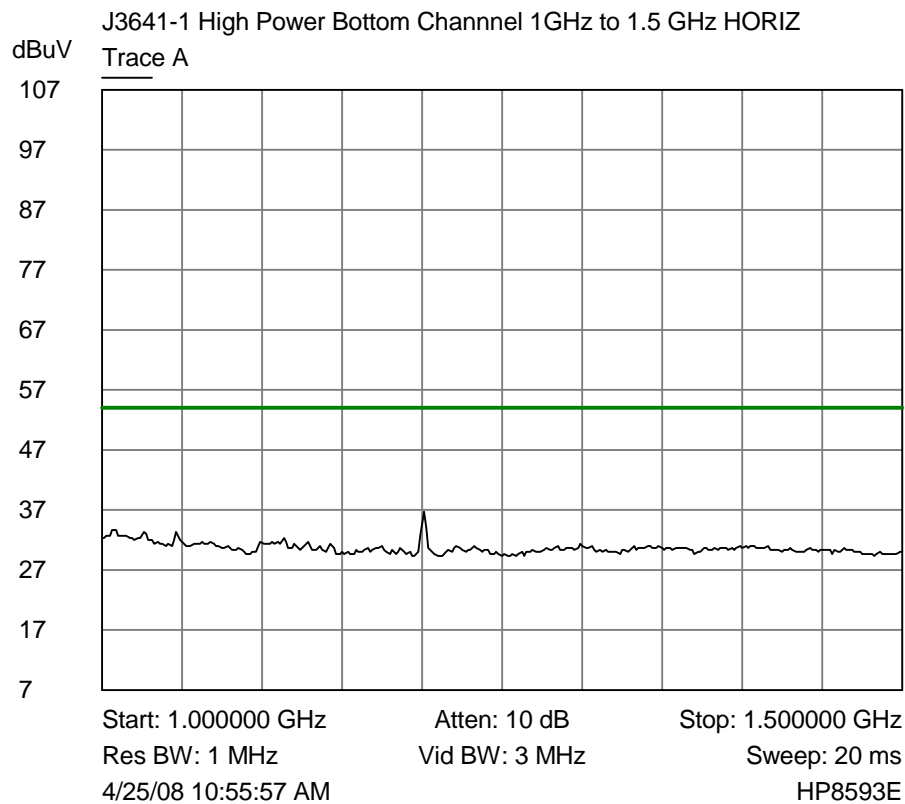
**Table of signals within 20dB of the limit line for Quasi-peak Vertical**

Signal	Freq (MHz)	Peak Amp (dBuV/m)	Peak - Lim1 (dB)	QP Amp (dBuV/m)	QP - Lim1 (dB)
1	837.170850	37.71	-8.29	35.13	-10.87
2	915.000000			119.09	-5.91 <sup>2</sup>

**Measurement Uncertainty of  $\pm 5.2$ dB Applies**

---

<sup>2</sup> Fundamental Emission

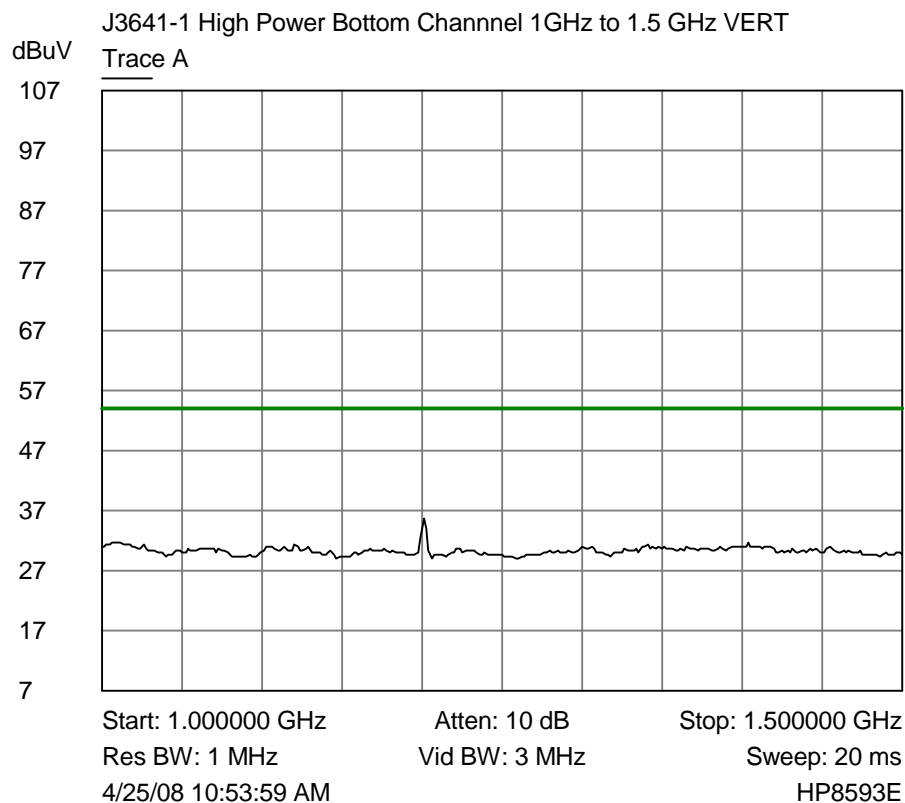


# High Power

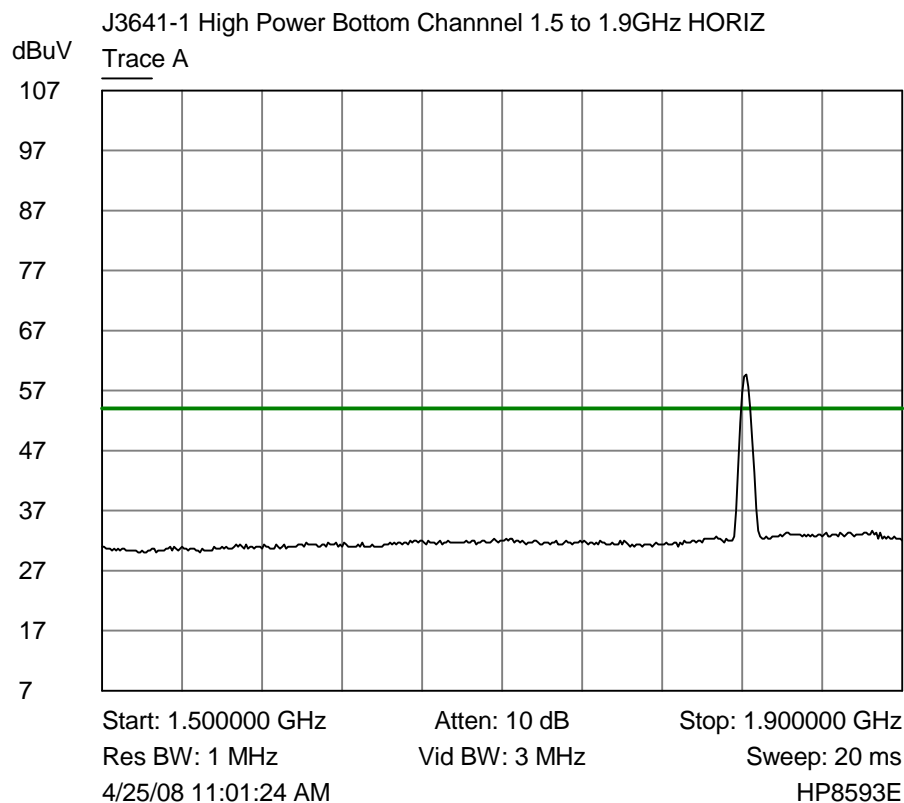
## Average Values of 1GHz to 1.5GHz.

### Horizontal Polarisation





**High Power**  
**Average Values of 1GHz to 1.5GHz.**  
**Vertical Polarisation**

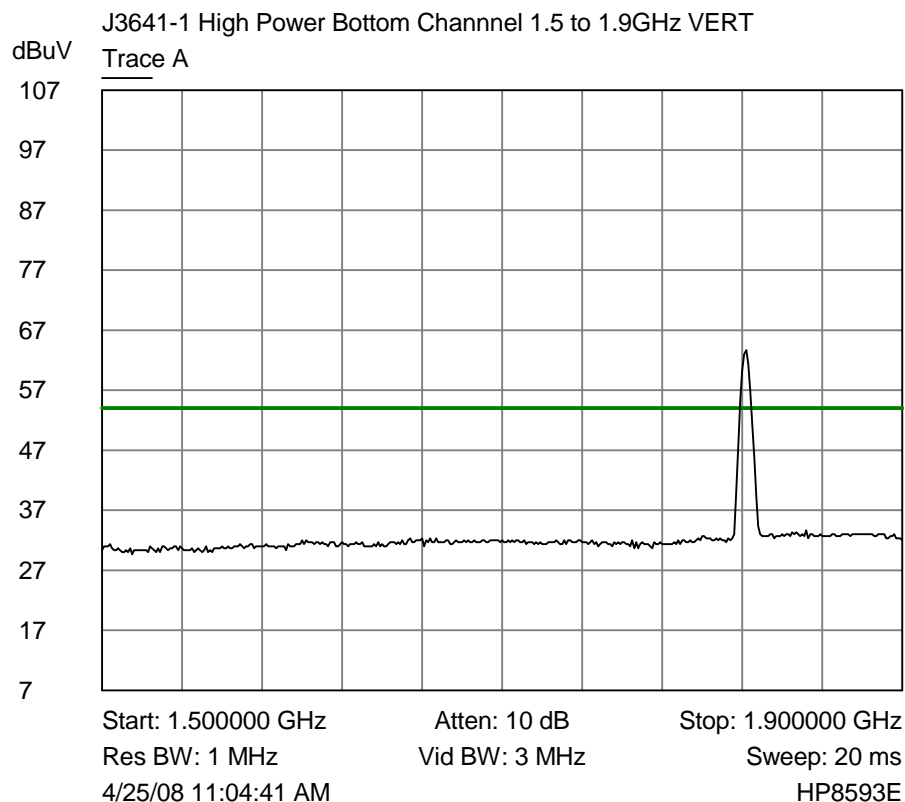


N.b. although emission shown breaks the 15.209 limit illustrated, it is not in a restricted band of 15.205 and therefore can apply the 15.247(d) Limit instead of 20dB below maximum intentional level as measured in 100kHz RBW = 98dB $\mu$ V.

## High Power

### Average Values of 1.5 – 1.9 GHz.

### Horizontal Polarisation



N.b. although emission shown breaks the 15.209 limit illustrated, it is not in a restricted band of 15.205 and therefore can apply the 15.247(d) Limit instead of 20dB below maximum intentional level as measured in 100kHz RBW = 100dBμV.

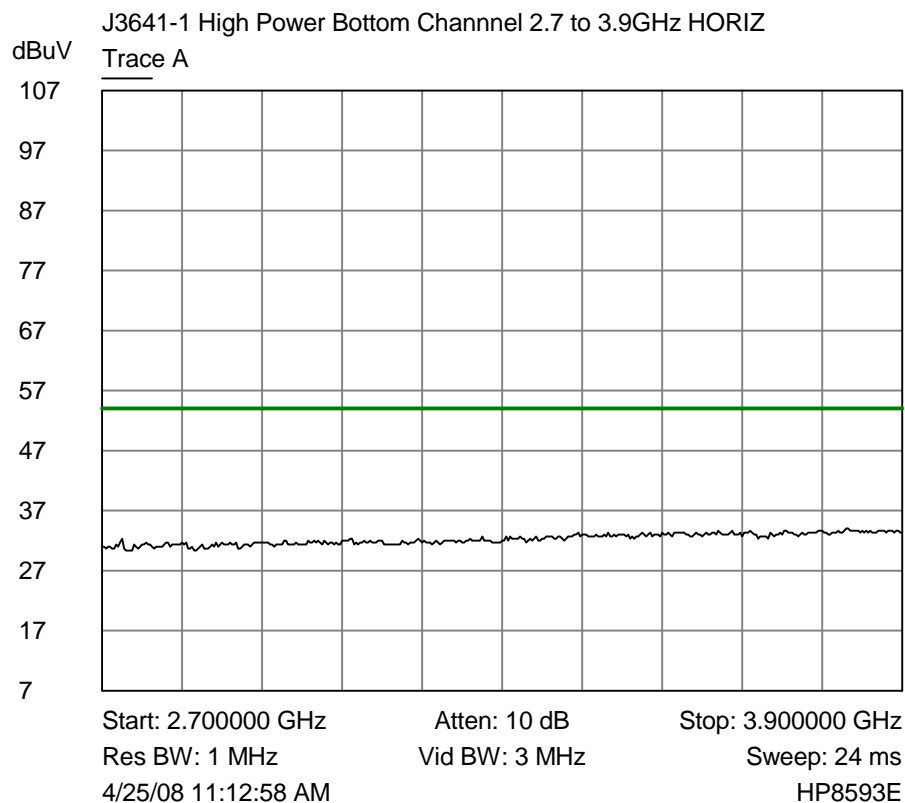
## High Power Average Values of 1.5 - 1.9 GHz. Vertical Polarisation



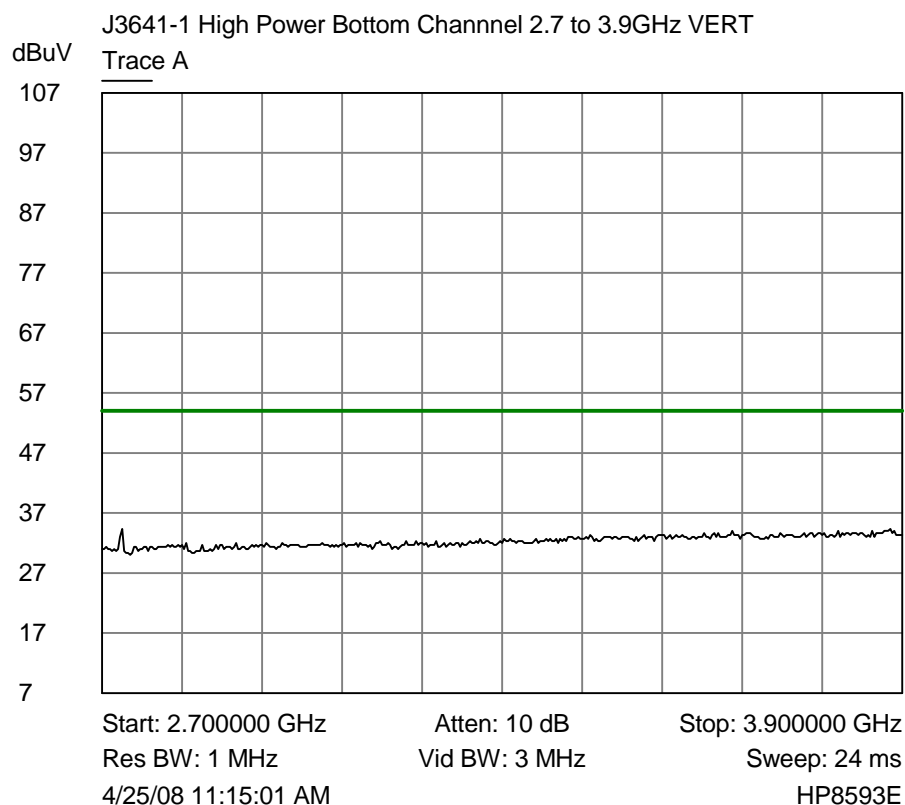
**High Power**  
**Average Values of 1.9 to 2.7 GHz.**  
**Horizontal Polarisation**



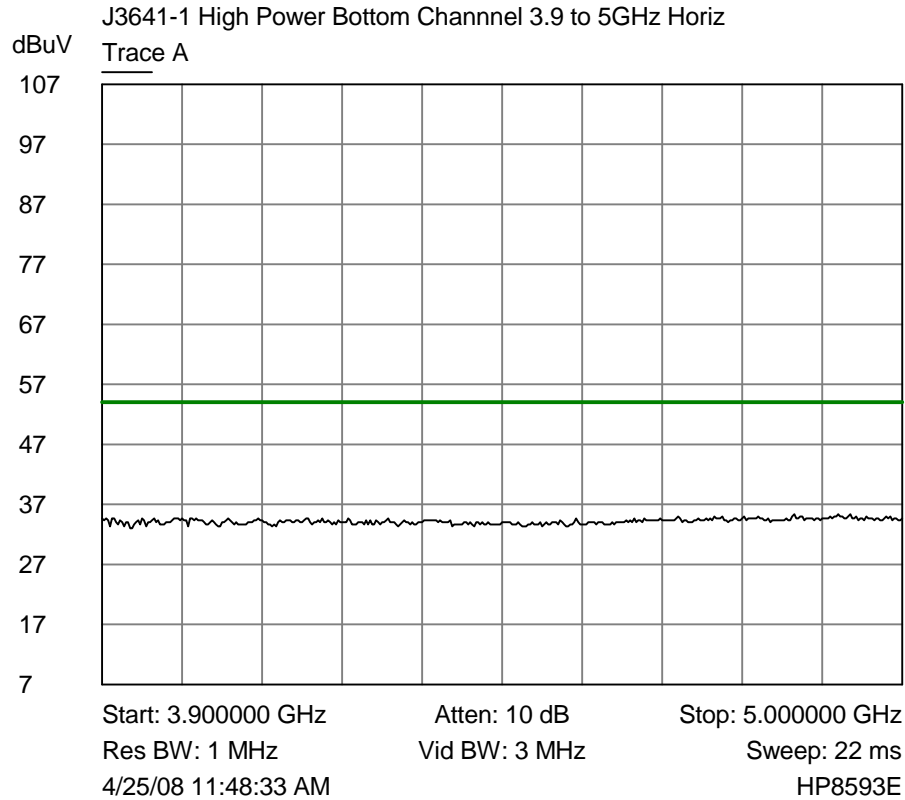
**High Power**  
**Average Values of 1.9 to 2.7 GHz.**  
**Vertical Polarisation**



**High Power**  
**Average Values of 2.7 – 3.9 GHz.**  
**Horizontal Polarisation**



## High Power Average Values of 2.7 – 3.9 GHz. Vertical Polarisation

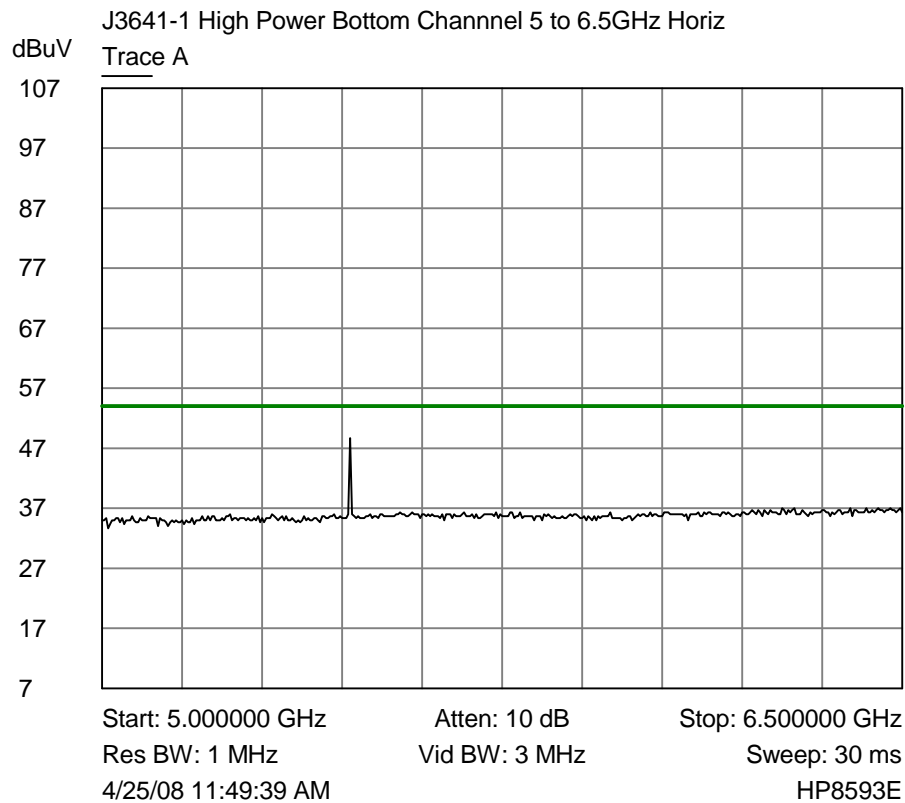


**High Power**  
**Average Values of 3.9 - 5 GHz.**  
**Horizontal Polarisation**





**High Power**  
**Average Values of 3.9 - 5 GHz.**  
**Vertical Polarisation**



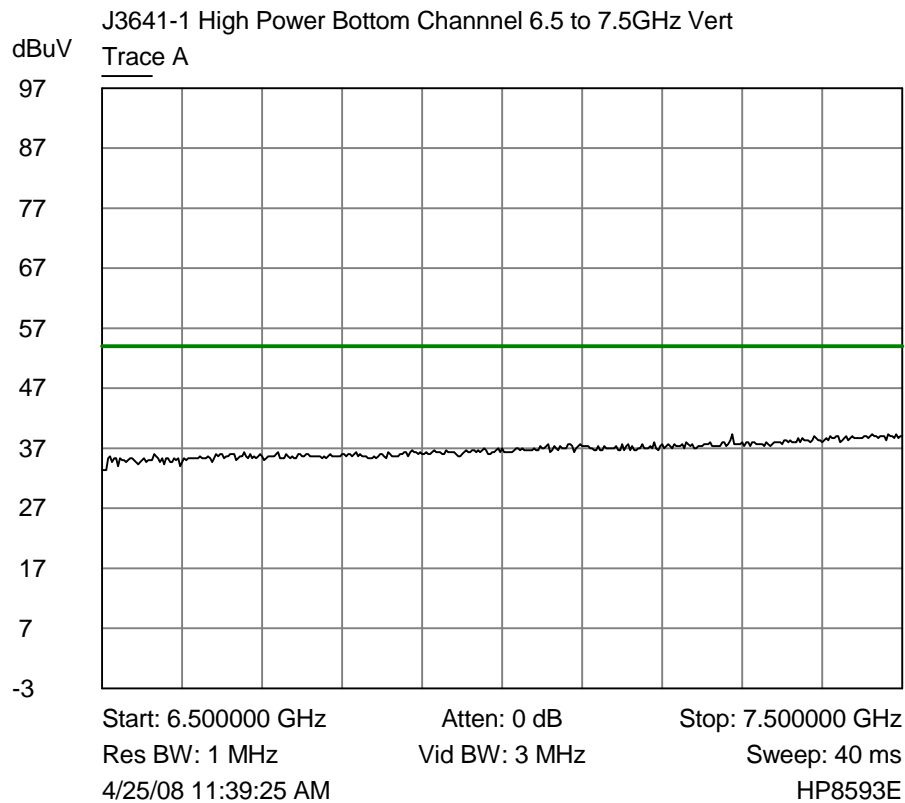
**High Power**  
**Average Values of 5 – 6.5 GHz.**  
**Horizontal Polarisation**



**High Power**  
**Average Values of 5 – 6.5 GHz.**  
**Vertical Polarisation**



**High Power**  
**Average Values of 6.5 – 7.5 GHz.**  
**Horizontal Polarisation**



**High Power**  
**Average Values of 6.5 – 7.5 GHz.**  
**Vertical Polarisation**



**High Power**  
**Average Values of 7.5 – 9.5 GHz.**  
**Horizontal Polarisation**



## High Power Average Values of 7.5 – 9.5 GHz. Vertical Polarisation

**Table of signals Between 1GHz and 9.5GHz**

All worst case on the bottom channel :

Frequency/GHz	Vertical/dBuV	Horizontal/dBuV
1.20075	35.68	36.53
1.82200	63.54	59.64
2.73000	40.32	38.27
4.55175	43.64	-
5.46500	44.55	48.83

### 6.3 Fundamental Emissions



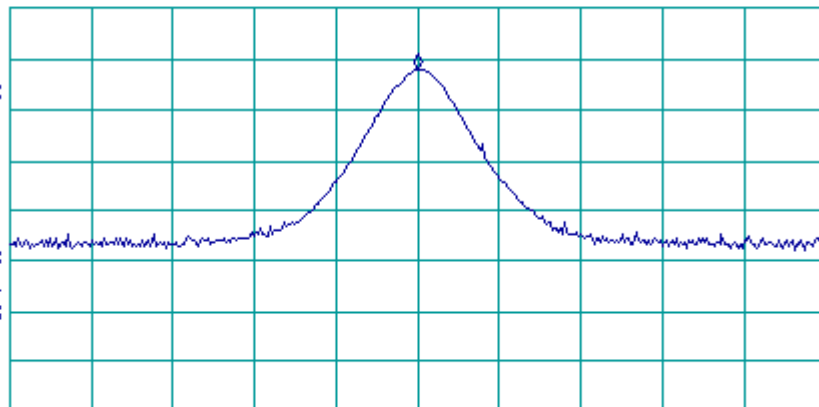
11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK  
MEAS DET: PEAK QP  
MKR 910.500 MHz  
117.87 dB $\mu$ V/m

LOO REF 130.0 dB $\mu$ V/m

10  
dB/  
#ATN  
50 dB

VA SB  
SC FC  
ACORR



CENTER 910.500 MHz  
RL #1F BW 100 kHz AVO BW 300 kHz SPAN 2.000 MHz  
#SWP 700 msec

HIGH Power Horiz BOT Chan 230V 60Hz



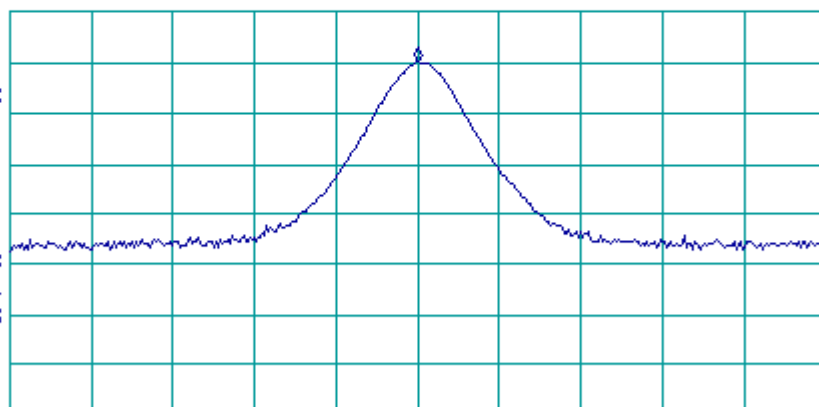
11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK  
MEAS DET: PEAK QP  
MKR 910.500 MHz  
120.12 dB $\mu$ V/m

LOO REF 130.0 dB $\mu$ V/m

10  
dB/  
#ATN  
50 dB

VA SB  
SC FC  
ACORR



CENTER 910.500 MHz  
RL #1F BW 100 kHz AVO BW 300 kHz SPAN 2.000 MHz  
#SWP 700 msec

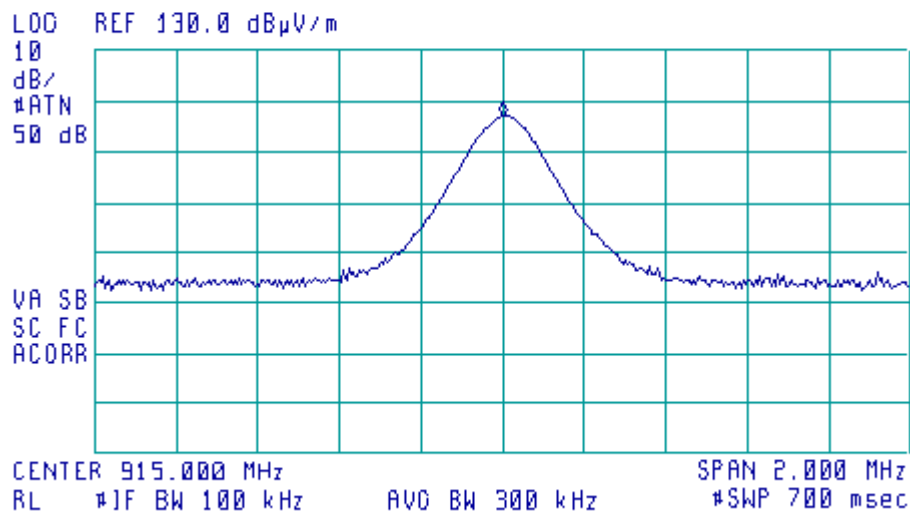
HIGH Power VERT BOT Chan 230V 60Hz





11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK  
MEAS DET: PEAK QP  
MKR 915.000 MHz  
117.07 dB $\mu$ V/m

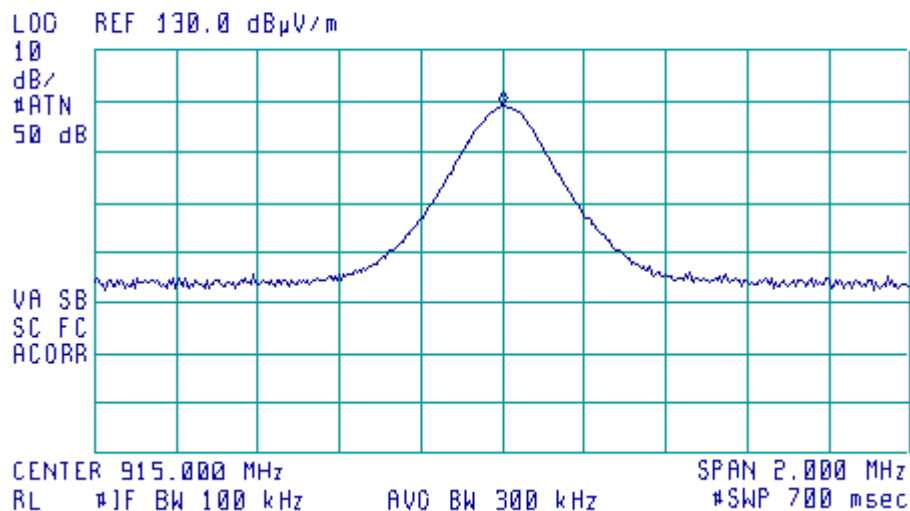


HIGH Power Horiz MID Chan 230V 60Hz



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK  
MEAS DET: PEAK QP  
MKR 915.000 MHz  
119.09 dB $\mu$ V/m

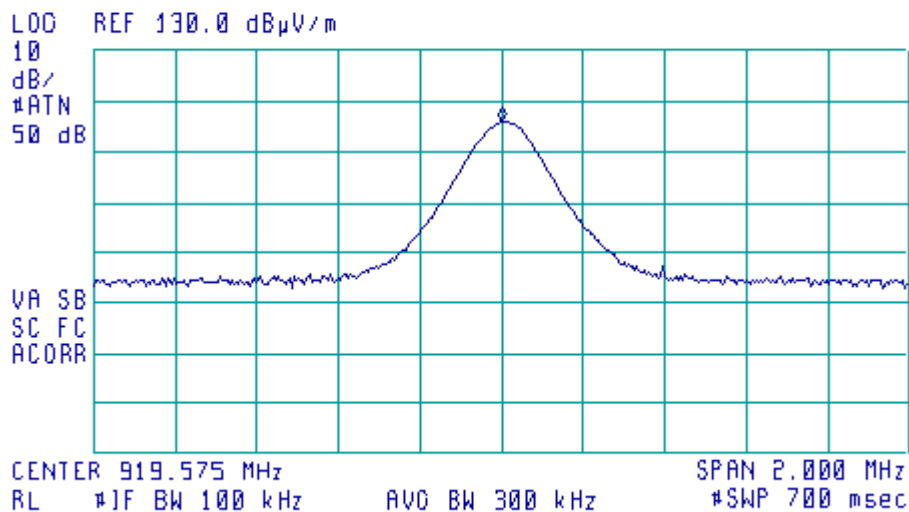


HIGH Power VERT MID Chan 230V 60Hz



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK  
MEAS DET: PEAK QP  
MKR 919.575 MHz  
116.07 dB $\mu$ V/m

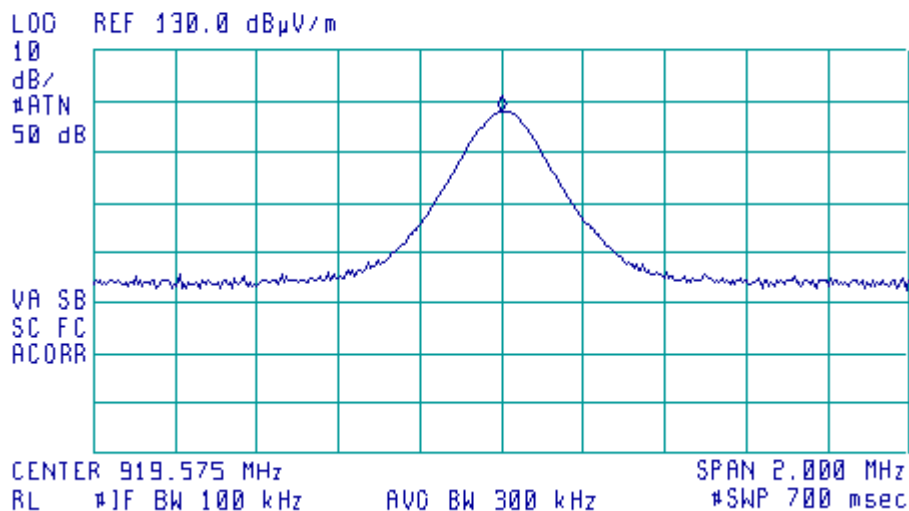


HIGH Power Horiz TOP Chan 230V 60Hz



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK  
MEAS DET: PEAK QP  
MKR 919.575 MHz  
117.95 dB $\mu$ V/m



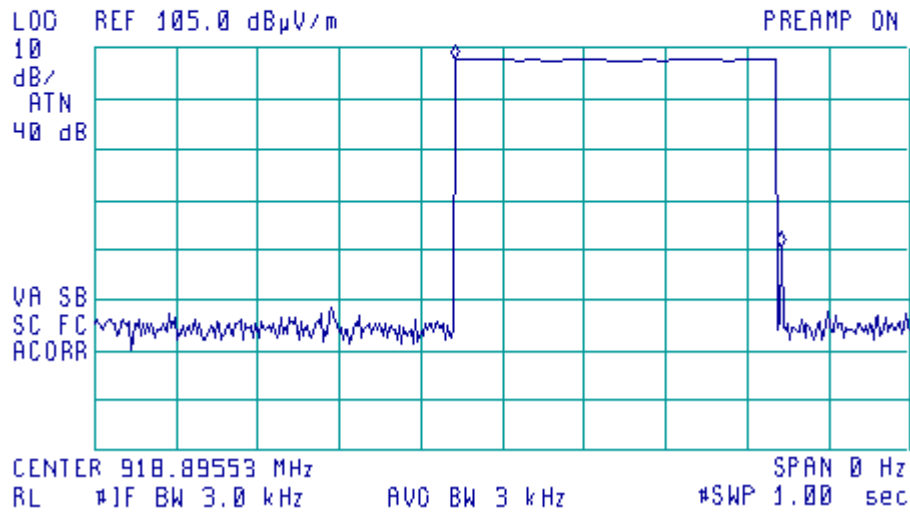
HIGH Power Vert TOP Chan 230V 60Hz

## 6.4 Duty Cycle



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

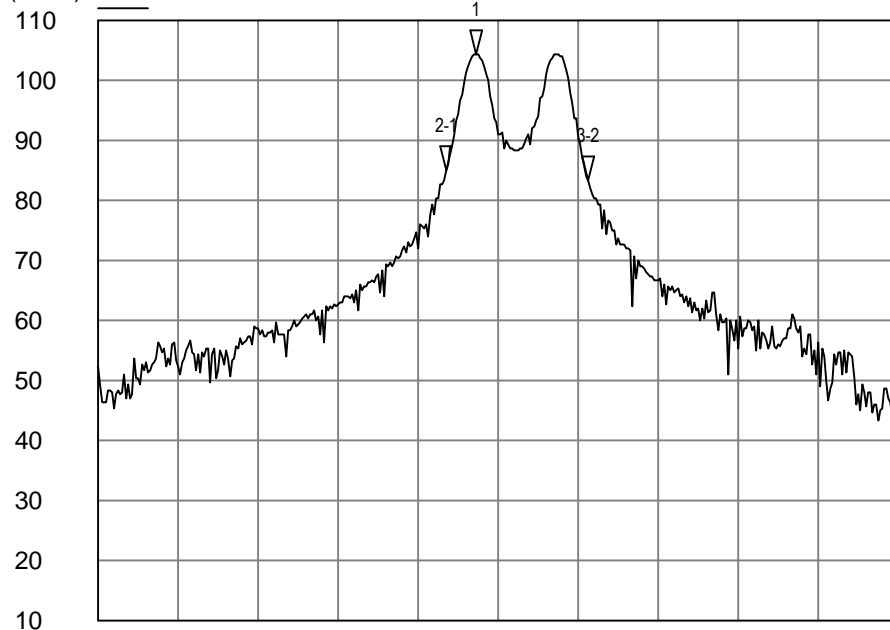
ACTV DET: PEAK  
MEAS DET: PEAK QP  
MKRΔ 400.00 msec  
-37.37 dB



## 6.5 20dB Bandwidth

dB J3641-1 20dB BW

(uV/m) Trace A



- 1 Trace A  
▽ 910.495363 MHz  
104.3700 dB(uV/m)
- 2-1 Trace A  
▽ -188.000000 Hz  
-19.3500 dB
- 3-2 Trace A  
▽ 888.000000 Hz  
-1.8200 dB

Start: 910.493000 MHz

Atten: 40 dB

Stop: 910.498000 MHz

Res BW: 100 Hz

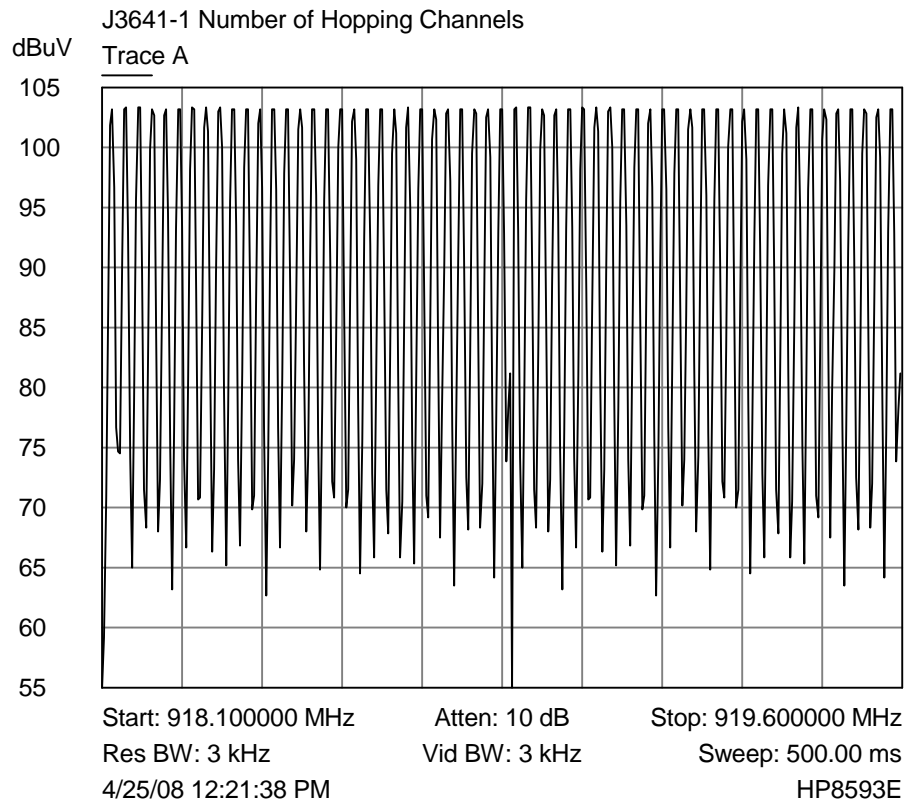
Vid BW: 100 Hz

Sweep: 3 s

4/25/08 12:21:38 PM

HP8542E

## 6.6 Number of Hopping channels



## 6.7 Carrier Frequency Separation



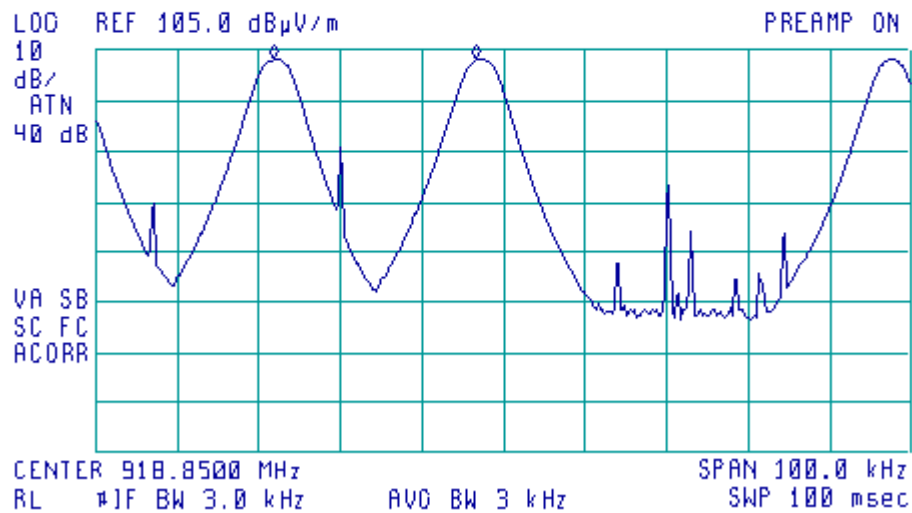
11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK

MEAS DET: PEAK QP

MKRΔ 25.0 kHz

-.03 dB



## 6.7 Band Edge Emission Plot



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK

MEAS DET: PEAK OP

MKR 910.56 MHz

119.20 dB $\mu$ V/m

LOO REF 122.0 dB $\mu$ V/m

10

dB/

#ATN

40 dB

VA SB

SC FC

ACORR

START 900.00 MHz

RL #1F BW 3.0 kHz

AVO BW 3 kHz

STOP 911.00 MHz

#SWP 4.00 sec



11:45:03 JUL 25, 2003 12:35:11 JAN 29, 2004

ACTV DET: PEAK

MEAS DET: PEAK OP

MKR 919.63 MHz

117.60 dB $\mu$ V/m

LOO REF 122.0 dB $\mu$ V/m

10

dB/

#ATN

40 dB

MA SB

SC FC

ACORR

START 919.00 MHz

RT #1F BW 3.0 kHz

AVO BW 3 kHz

STOP 930.00 MHz

SWP 3.67 sec

## **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.

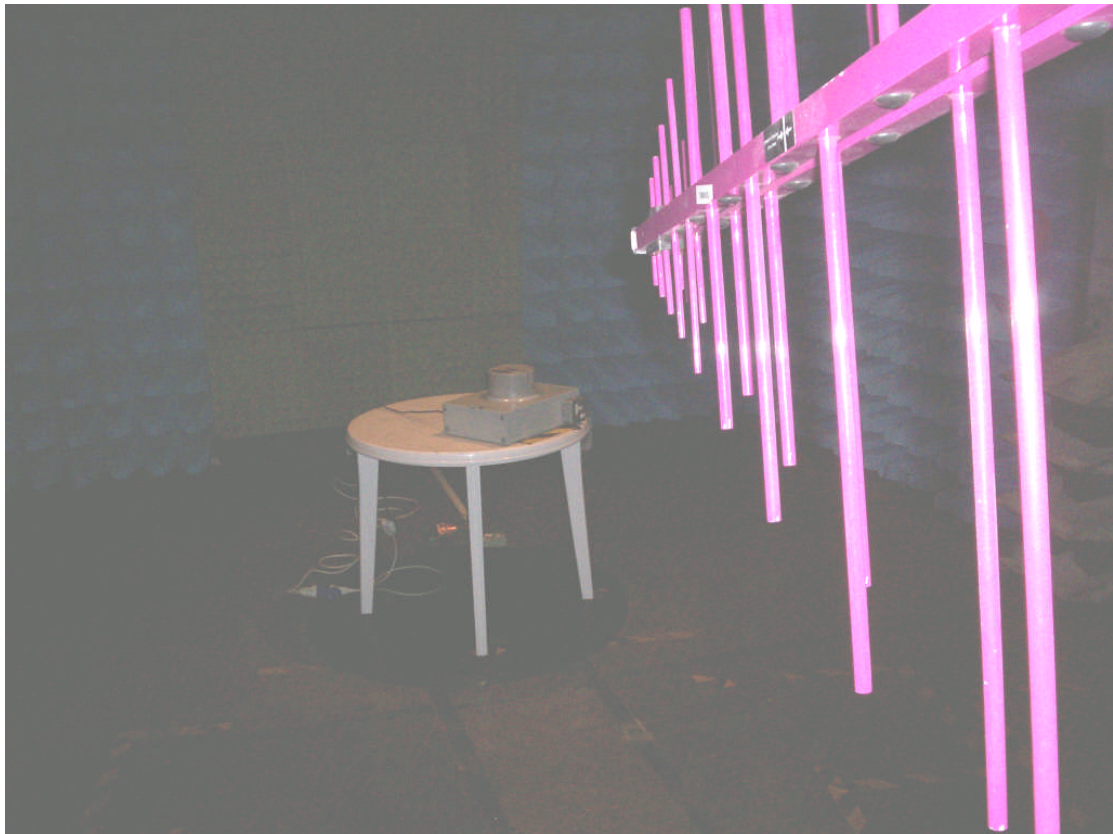
### **7.2 Explanation of limit line calculations for radiated measurements**

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:

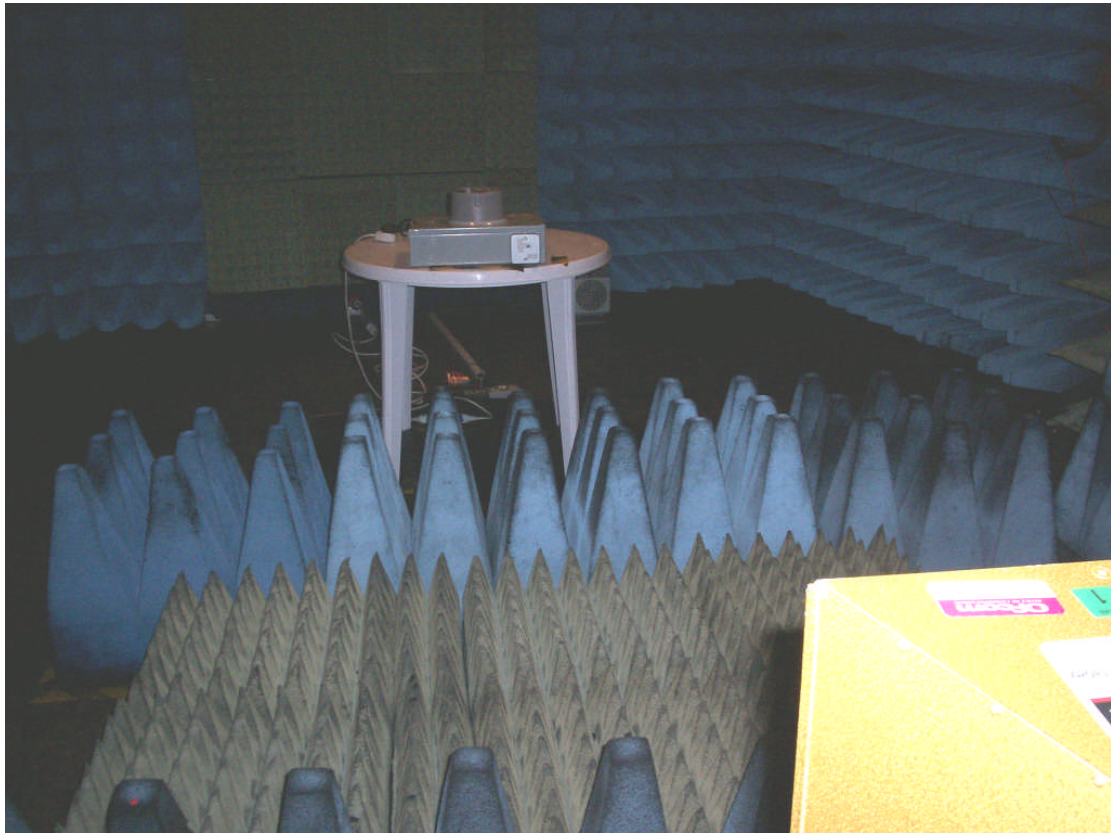
- (a) limit of 500 μV/m equates to  $20.\log(500) = 54 \text{ dB } \mu\text{V/m}$ .
- (b) limit of 300 μV/m at 10m equates to  $20.\log(300 \cdot 10/3) = 60 \text{ dB } \mu\text{V/m at 3m}$



## 8. Photographs



**Photograph of the EUT as viewed from in front of the antenna, site M 30MHz - 1GHz.**



**Photograph of the EUT as viewed from in front of  
the antenna, site M above 1GHz.**

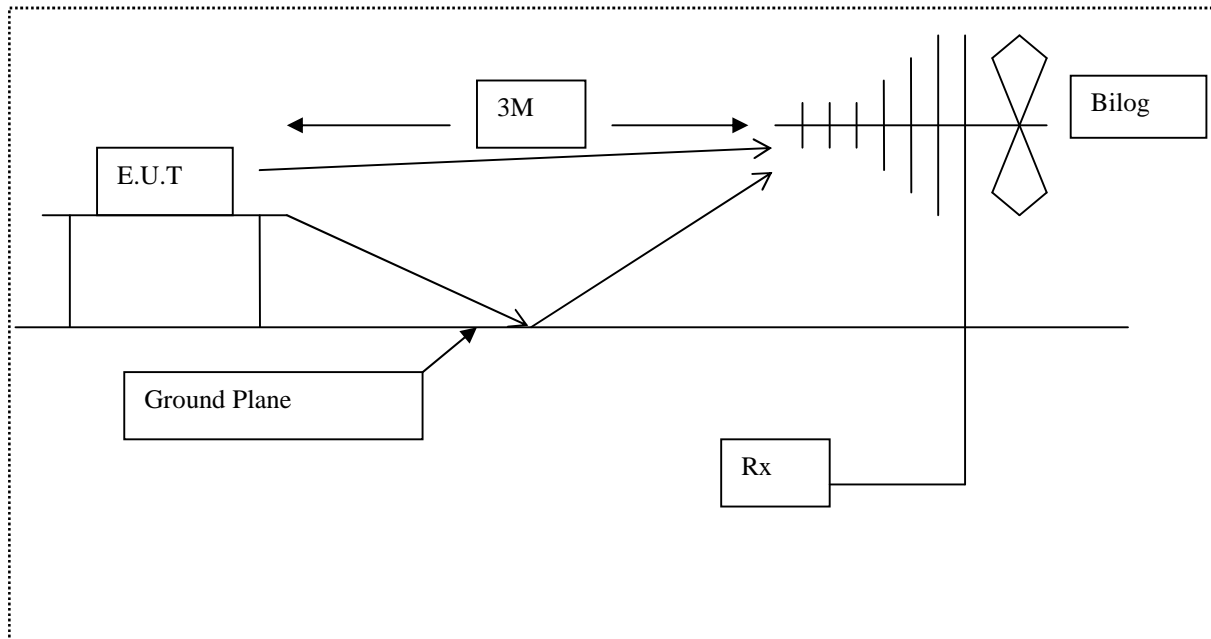


Diagram of the radiated emissions test setup.



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

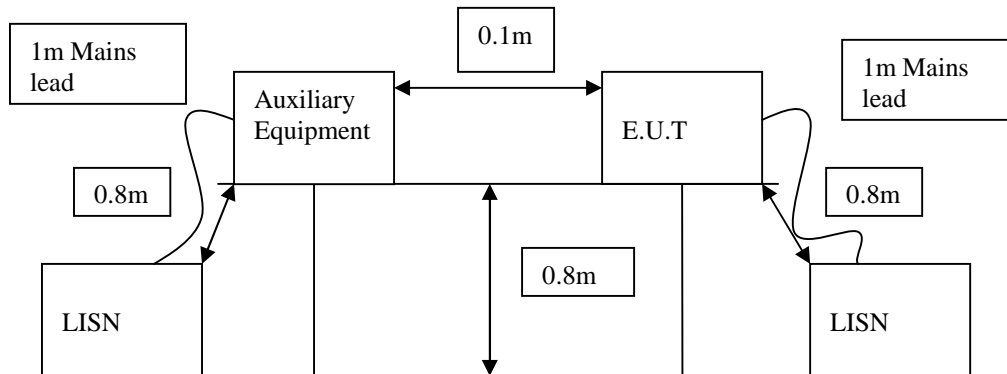
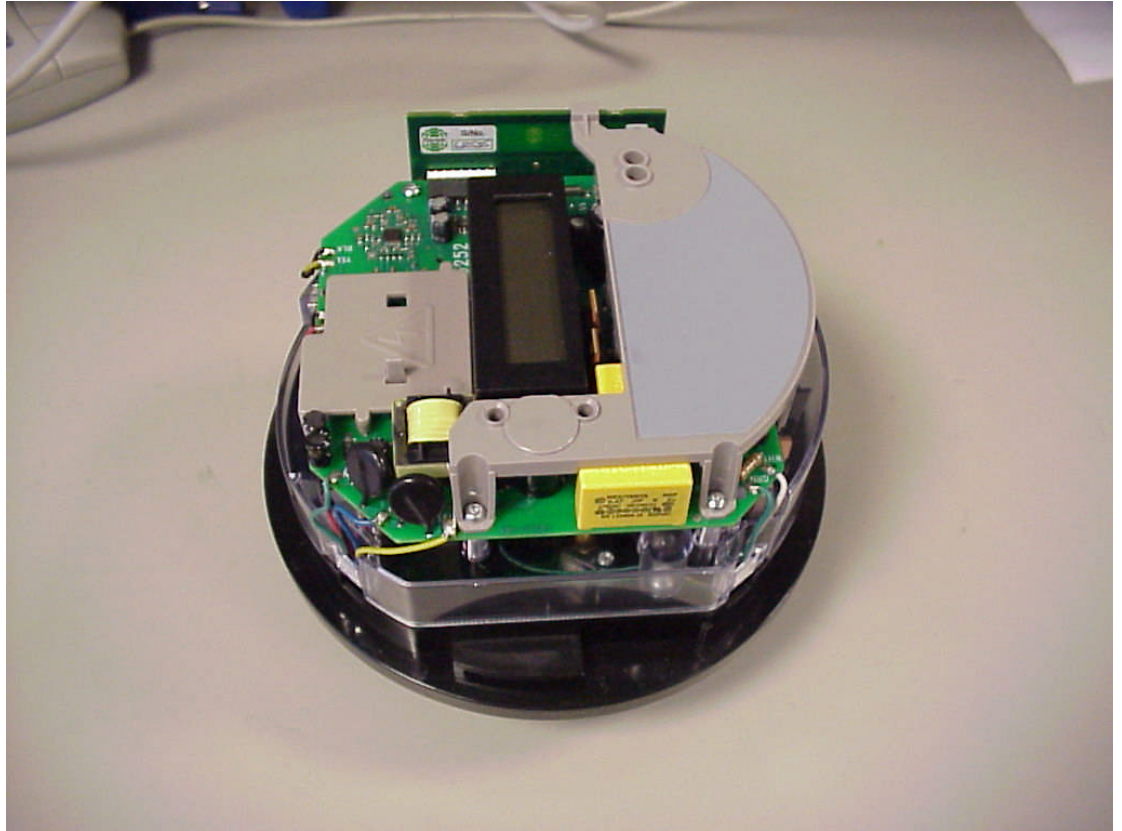


Diagram of the conducted emissions test setup.

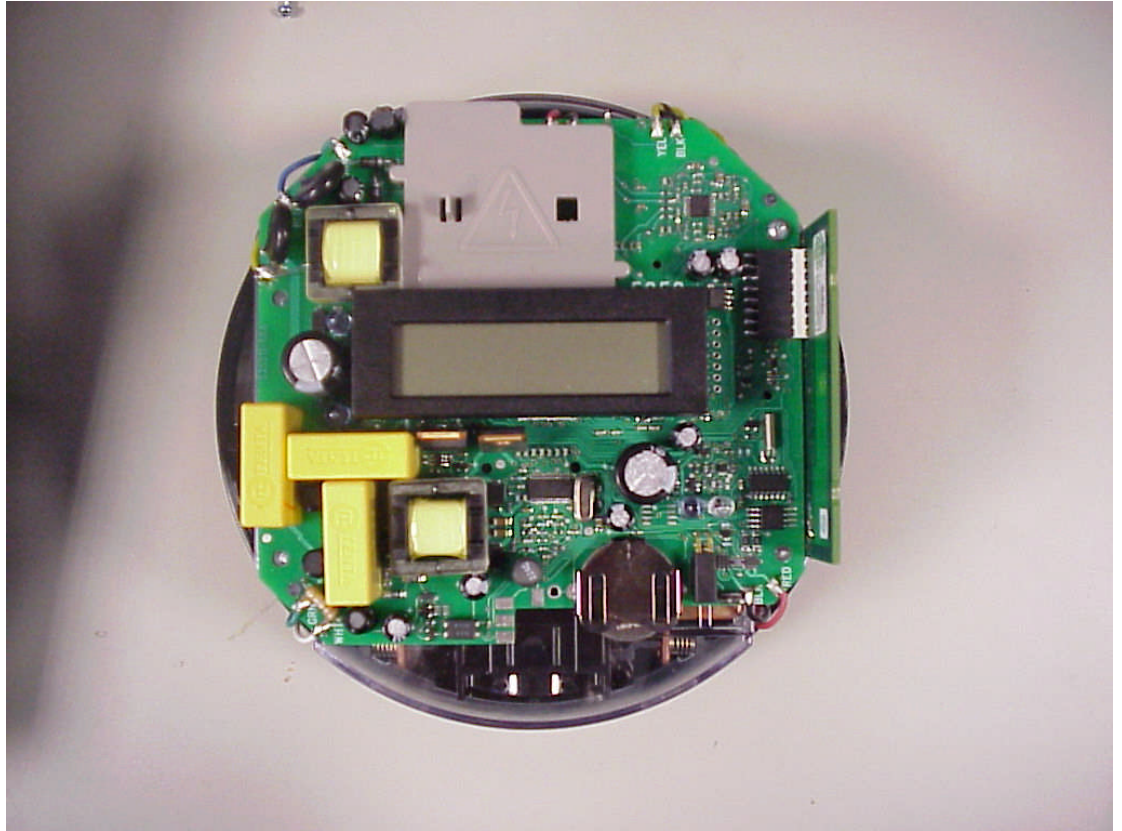




**Identifying Photograph of EUT**

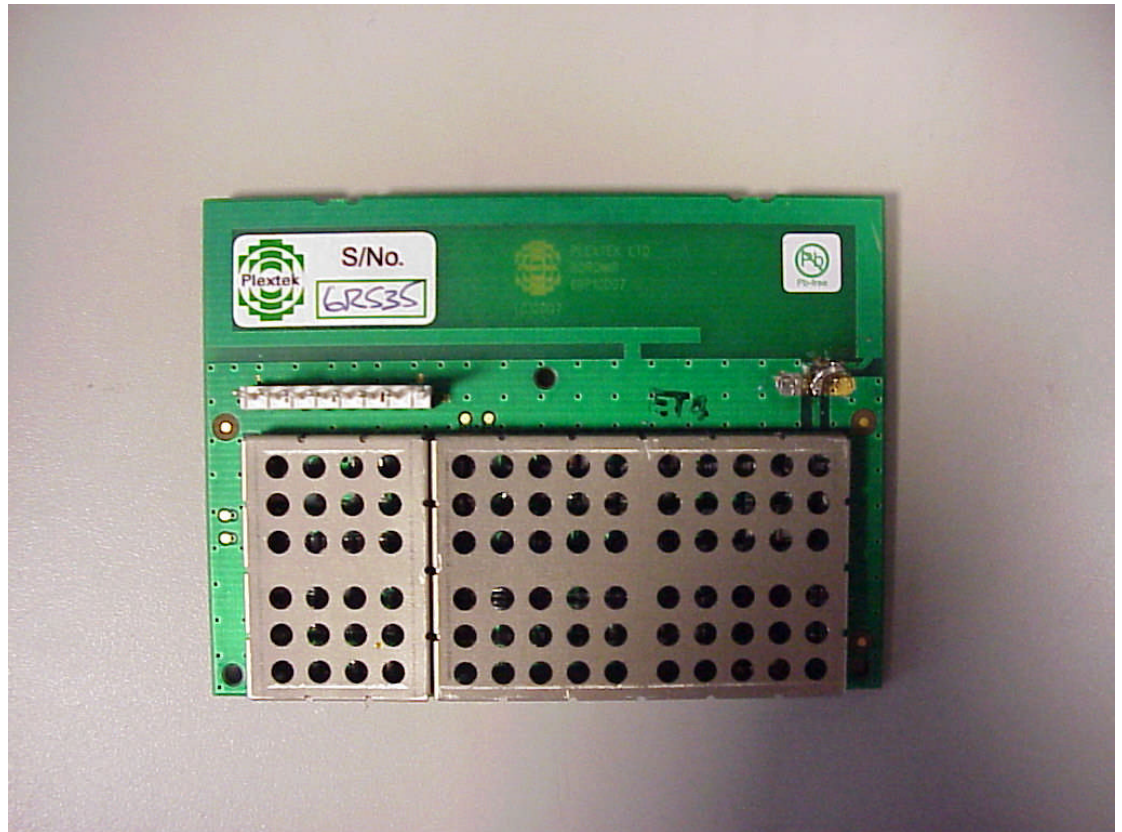


**Internal Photograph of EUT controller**

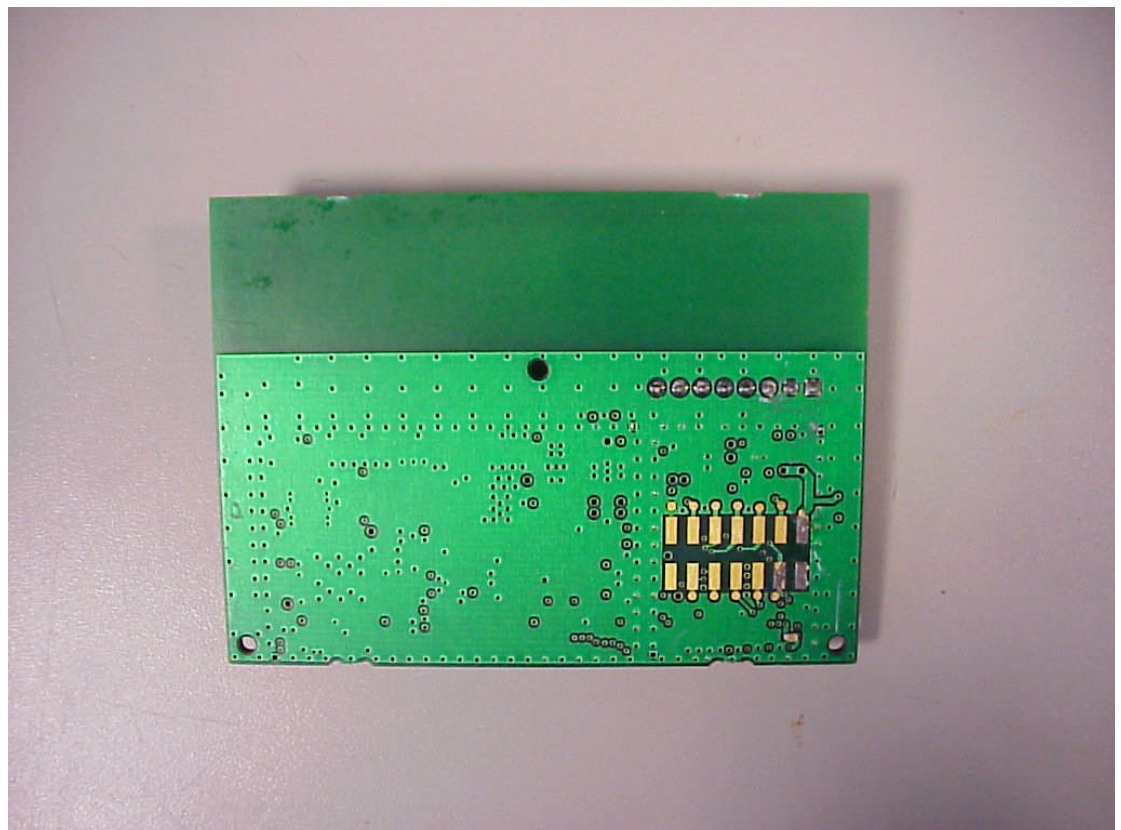
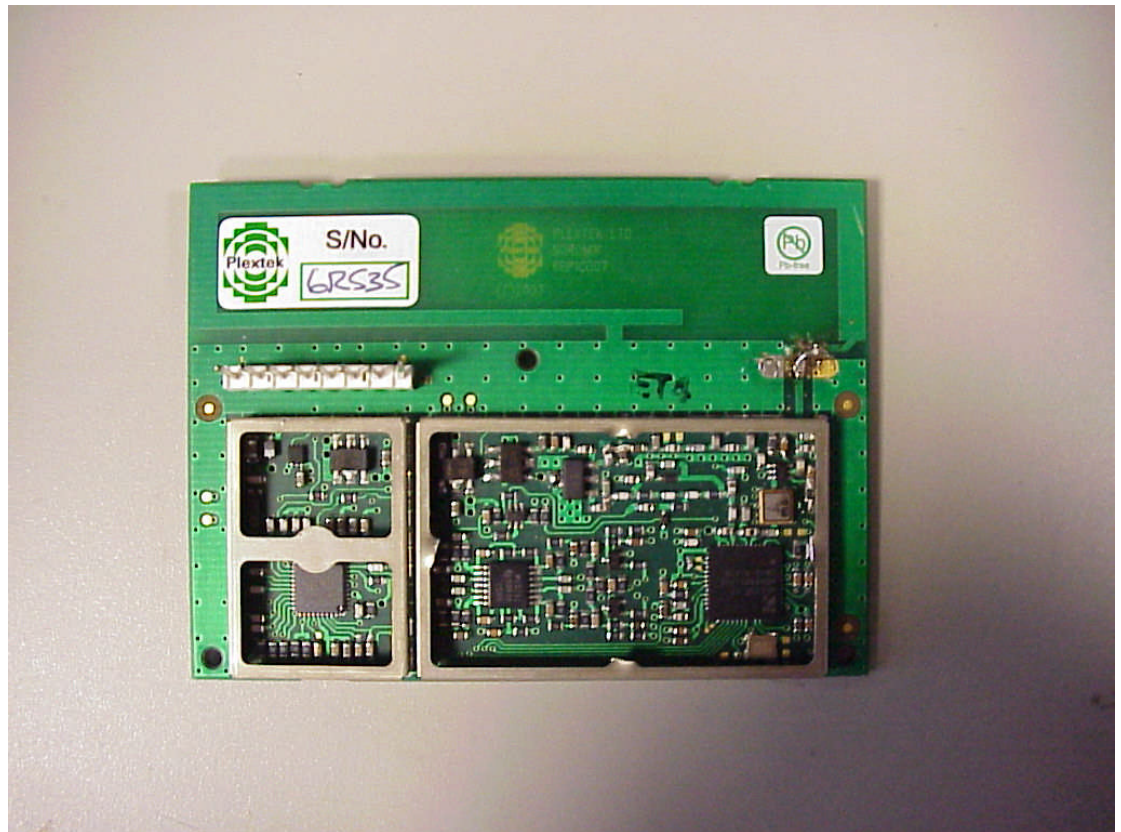


**Internal Photograph of EUT Radio**





**PCB Photograph of EUT RF module**



## PCB Photograph of EUT RF module

## 9. Signal Leads

Port Name	Cable Type
Mains Input	3 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	Date Calibrated	Period
E1	HP8542E	EMI Receiver & RF Filter	Hewlett Packard	13-Nov-07	12
E10	MN2050	LISN 13A	Chase	04-Sep-07	12
E238	FC5343A	2.7 - 5.0 GHz BPF	IFR	N/A	N/A
E239	H-34-2720-01	2.0 - 2.9 GHz BPF	Marconi	N/A	N/A
E242	22102	Bandpass filter 7.8 - 16 GHz	Merimec	N/A	N/A
E268	BHA 9118	1-18 GHz Horn Antenna	Schaffner	26-May-06	60
E3	HP8593E	Spectrum Analyser	Hewlett Packard	20-Sep-06	24
E319	H-34-2720-01	Transmit Filter 1.5-2.0 GHz	The Marconi Company Ltd	N/A	N/A
E328	564230-001	Notch Filter 915 MHz	BRF	N/A	N/A
E35	HP11947A	Transient Limiter + 10dB Atten.	Hewlett Packard	18-Jan-08	6
N438	3513 172 1208	3.9 - 7.5 GHz BPF	MEL	N/A	N/A
TMS81	6502	Active Loop Antenna	EMCO	11-Dec-07	24
TMS82	8449B	Pre Amplifier 1 - 26 GHz	Agilent	26-Oct-07	12
TMS933	CBL6141A	Bilog Antenna 30MHz - 2GHz	York EMC	10-Sep-07	36
TMS938	NSG1007	3kV AC Power Source	Schaffner	12-Feb-08	24

**11. Auxiliary equipment**

**11.1 Auxiliary equipment supplied by Plextek 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**

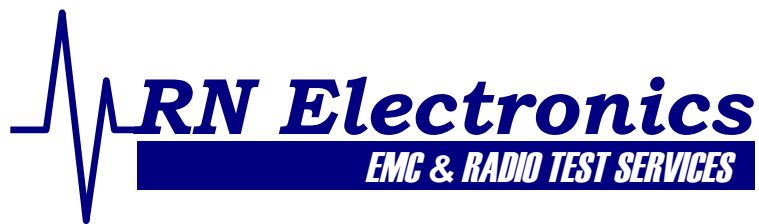
In order for the EUT to produce the results shown within this report the following modifications, if any, were implemented.

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:

Not applicable.  
Device to be Certified.



## Certificate of Test

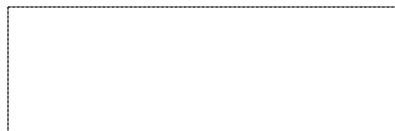
The equipment noted below has been tested by **R.N. Electronics Limited** and conforms with the relevant subpart of FCC part 15, subject to deviations as detailed in this report.

*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:	Ampy 5252
Model Number(s):	Not Available
Unique Serial Number(s):	5252A02604-010208 including 6R535(Radio)
Manufacturer:	Ampy Metering Ltd
Applicant:	Plextek Ltd
Customer Purchase Order Number:	P000058841
R.N. Electronics Limited Report Number:	04-254A/3641/1/08 and 04-258/3641/2/08
Test Standards:	FCC Part 15C: effective date October 2007 Class <b>DSS</b> Intentional Radiator and Class <b>DXX</b> Intentional Radiator
Date:	24/04/08

For and on behalf of  
R.N. Electronics Limited

Signature:



**QMF21 – 8: FCC PART 15C: RNE ISSUE 03: - JUL 07**