

# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Numerex Corp  
Digi Cell Anynet

To: FCC Part 15 107 and Part 15.109

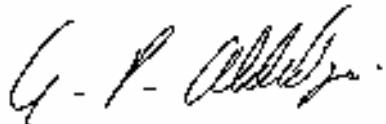
**Test Report Serial No:**  
RFI/EMCE2/RP72605JD07A

**Supersedes Test Report Serial No:**  
RFI/EMCE1/RP72605JD07A

This Test Report Is Issued Under The Authority  
Of Andrew Coombes, EMC Service Leader:



Tested By: Giles Aldridge



Checked By: Claire Ashman



Report Copy No: PDF01

Issue Date: 08 August 2007

Test Dates: 21 June 2007 to 22 June 2007

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields. This report may be copied in full. The results in this report apply only to the sample(s) tested.

**Test Of:** **Numerex Corp**  
**Digi Cell Anynet**  
**To:** **FCC Part 15 107 and Part 15.109**

---

This page has been left intentionally blank.

Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

---

## **Table of Contents**

1. Client Information.....	4
2. Equipment Under Test (EUT) .....	5
3. Test Specification, Methods and Procedures.....	7
4. Deviations from the Test Specification .....	8
5. Operation of the EUT during Testing .....	9
6. Summary of Test Results .....	10
7. Measurements, Examinations and Derived Results .....	11
8. Measurement Uncertainty .....	20
Appendix 1. Test Equipment Used .....	21
Appendix 2. Measurement Methods .....	23
Appendix 3. Test Configuration Drawings.....	25
Appendix 4. Graphical Test Results .....	29
Appendix 5. Photographs of EUT .....	44

**Test Of:** **Numerex Corp**  
**Digi Cell Anynet**  
**To:** **FCC Part 15 107 and Part 15.109**

---

## **1. Client Information**

<b>Company Name:</b>	Numerex Corp
<b>Address:</b>	1600 Parkwood Circle Suite 200 Atlanta GA 30339 USA
<b>Contact Name:</b>	Mr E Jansson

**Test Of:** Numerex Corp  
Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

## **2. Equipment Under Test (EUT)**

The following information (with the exception of the date of receipt) has been supplied by the client:

### **2.1. Identification of Equipment Under Test (EUT)**

<b>Description:</b>	Network Access Module
<b>Brand Name:</b>	Uplink
<b>Model Name or Number:</b>	Digi Cell Anynet
<b>Serial Number:</b>	1010081265
<b>FCC ID Number:</b>	TWV002557X
<b>Country of Manufacture:</b>	Japan
<b>Date of Receipt:</b>	21 June 2007

### **2.2. Accessories**

No accessories were supplied with the EUT.

### **2.3. Description of EUT**

The equipment under test is a Network Access Module. For the purpose of these tests, the device was tested in idle mode, under the requirements for unintentional radiators.

### **2.4. Modifications Incorporated in the EUT**

During the course of testing the EUT was not modified.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

## **2.5. Additional Information Related to Testing**

<b>Equipment Category:</b>	GSM 850 / GSM 1900
<b>Dimensions:</b>	13 x 11 x 3 cm (excluding antenna)
<b>Transmit Output Power Characteristics:</b>	GSM 850: +33 dBm GSM 1900: +30 dBm
<b>Alignment Range:</b>	
<b>Transmitter</b>	GSM 850: 824 to 849 MHz GSM 1900: 1850 to 1910 MHz
<b>Receiver</b>	GSM 850: 869 to 894 MHz GSM 1900: 1930 to 1990 MHz
<b>Allocated (Test) Frequency:</b>	
<b>Transmitter</b>	GSM 850: 190 (836.6 MHz) GSM 1900: 660 (1879.8 MHz)
<b>Receiver</b>	GSM 850: 190 (881.6 MHz) GSM 1900: 660 (1959.8 MHz)
<b>Power Supply Requirement:</b>	
<b>DC Supply (Volts)</b>	12V, via a 110V 60Hz AC supply
<b>Intended Operating Environment:</b>	Commercial Light Industry
<b>Cycle Time:</b>	Less than 1 second

## **2.6. Port Identification**

Port	Description	Type	Applicable
1	Enclosure	-	Yes
2	DC Input	2 Core, 2m	Yes (tested at AC supply input)
3	Output 1	2 Pin	No
4	Output 2	2 Pin	No
5	Input 1	2 Pin	No
6	Input 2	2 Pin	No
7	Input 3	2 Pin	No
8	Input 4	2 Pin	No
9	Serial	6 Pin, 1m	No

## **2.7. Support Equipment**

No support equipment was used to exercise the EUT during testing.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

### **3. Test Specification, Methods and Procedures**

#### **3.1. Test Specification**

Reference:	FCC Part 15: 2001 Class B
Title:	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices: Digital Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of verification.

#### **3.2. Methods and Procedures**

The methods and procedures used were as detailed in:

ANSI C63.2 (1996)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2003)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (2004)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (2005)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1-1 (2004)

Title: Specification for radio disturbance and immunity measuring apparatus and methods. Part 1. Radio disturbance and immunity measuring apparatus – Measuring Apparatus.

CISPR 16-1-4 (2005)

Title: Specification for radio disturbance and immunity measuring apparatus and methods. Part 1. Radio disturbance and immunity measuring apparatus – Radiated Disturbances.

#### **3.3. Definition of Measurement Equipment**

The measurement equipment used complied with the requirements of the standards referenced in the methods & procedures section above. Appendix 1 contains a list of the test equipment used.

Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

---

#### **4. Deviations from the Test Specification**

There were no deviations from the test specification.

Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

---

## **5. Operation of the EUT during Testing**

### **5.1. Operating Modes**

The EUT was tested in the following operating mode(s):

GSM 850 Idle and GSM 1900 Idle modes.

The reason for choosing this configuration was that it has been defined by the customer as being typical of normal use and likely to be a worst case with regard to EMC.

### **5.2. Configuration and Peripherals**

The EUT was tested in the following configuration(s):

Powered via 12 V DC, with the serial port terminated into a laptop. An RF air link to was established to the test set.

Please refer to Appendix 2 for a schematic drawing of the test configuration, drawing number DRG\72605JD07A\001.

**Test Of:** Numerex Corp  
Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

## **6. Summary of Test Results**

<b>Range of Measurements</b>	<b>Specification Reference</b>	<b>Port Type</b>	<b>Compliance Status</b>
Conducted Emissions (0.15 MHz to 30 MHz)	FCC Part 15.107, Class B	AC Mains Input	Complied
Radiated Emissions (30 MHz to 1000 MHz)	FCC Part 15.109, Class B	Enclosure	Complied
Radiated Emissions (1 GHz to 10 GHz)	FCC Part 15.109, Class B	Enclosure	Complied

### **6.1. Location of Tests**

All the measurements described in this report were performed at the premises of RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ.

Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

---

## **7. Measurements, Examinations and Derived Results**

### **7.1. General Comments**

This section contains test results only.

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to section 8 for details of measurement uncertainties.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

## **7.2. Test Results**

### **7.2.1. AC Mains Conducted Emissions - Quasi Peak Detector Measurements on Live and Neutral Lines – GSM 850 Idle Mode**

7.2.1.1. Plots of the initial scans can be found in Appendix 3.

7.2.1.2. The following table lists frequencies at which emissions were measured using a quasi peak detector:

#### **Test Summary:**

Port:	AC Mains Input
Basic Standard:	FCC Part 15.107 Class B

#### **Environmental Conditions:**

Temperature Variation (°C):	20 to 21
Relative Humidity Variation (%):	55 to 54
Atmospheric Pressure Variation (mb):	993 to 993

#### **Results:**

Frequency (MHz)	Line	Quasi Peak Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Note(s)	Result
See Note Below						

#### **Note(s):**

1. All emissions recorded on the pre-scan, which was carried out using peak and average detectors (the blue line on the graph denotes the peak detector, the green denotes the average), were at least 20 dB below the average limit. Therefore no further measurements were made.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

**7.2.2. AC Mains Conducted Emissions - Average Detector Measurements on Live and Neutral Lines – GSM 850 Idle Mode**

7.2.2.1. Following the initial scans and quasi peak measurements, further measurements were made at the relevant frequencies using an average detector. The measured levels were as follows:

**Test Summary:**

Port:	AC Mains Input
Basic Standard:	FCC Part 15.107 Class B

**Environmental Conditions:**

Temperature Variation (°C):	20 to 21
Relative Humidity Variation (%):	55 to 54
Atmospheric Pressure Variation (mb):	993 to 993

**Results:**

Frequency (MHz)	Line	Average Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Note(s)	Result
See Note Below						

**Note(s):**

1. All emissions recorded on the pre-scan, which was carried out using peak and average detectors (the blue line on the graph denotes the peak detector, the green denotes the average), were at least 20 dB below the average limit. Therefore no further measurements were made.

**Test Of:** Numerex Corp  
 Digi Cell AnyNet  
**To:** FCC Part 15 107 and Part 15.109

---

**7.2.3. AC Mains Conducted Emissions - Quasi Peak Detector Measurements on Live and Neutral Lines – GSM 1900 Idle Mode**

7.2.3.1. Plots of the initial scans can be found in Appendix 3.

7.2.3.2. The following table lists frequencies at which emissions were measured using a quasi peak detector:

**Test Summary:**

Port:	AC Mains Input
Basic Standard:	FCC Part 15.107 Class B

**Environmental Conditions:**

Temperature Variation (°C):	20 to 21
Relative Humidity Variation (%):	55 to 54
Atmospheric Pressure Variation (mb):	993 to 993

**Results:**

Frequency (MHz)	Line	Quasi Peak Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Note(s)	Result
See Note Below						

**Note(s):**

1. All emissions recorded on the pre-scan, which was carried out using peak and average detectors (the blue line on the graph denotes the peak detector, the green denotes the average), were at least 20 dB below the average limit. Therefore no further measurements were made.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

**7.2.4. AC Mains Conducted Emissions - Average Detector Measurements on Live and Neutral Lines – GSM 1900 Idle Mode**

7.2.4.1. Following the initial scans and quasi peak measurements, further measurements were made at the relevant frequencies using an average detector. The measured levels were as follows:

**Test Summary:**

Port:	AC Mains Input
Basic Standard:	FCC Part 15.107 Class B

**Environmental Conditions:**

Temperature Variation (°C):	20 to 21
Relative Humidity Variation (%):	55 to 54
Atmospheric Pressure Variation (mb):	993 to 993

**Results:**

Frequency (MHz)	Line	Average Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Note(s)	Result
See Note Below						

**Note(s):**

1. All emissions recorded on the pre-scan, which was carried out using peak and average detectors (the blue line on the graph denotes the peak detector, the green denotes the average), were at least 20 dB below the average limit. Therefore no further measurements were made.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

**7.2.5. Radiated Emissions - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz) –  
 GSM 850 Idle Mode**

7.2.5.1. Plots of the initial scans can be found in Appendix 3.

7.2.5.2. The following table lists frequencies at which emissions were measured using a quasi peak detector, at a test measurement distance of 3 metres:

**Test Summary:**

<b>Port:</b>	Enclosure
<b>Basic Standard:</b>	FCC Part 15.109 Class B

**Environmental Conditions:**

<b>Temperature Variation (°C):</b>	27 to 27
<b>Relative Humidity Variation (%):</b>	42 to 42
<b>Atmospheric Pressure Variation (mb):</b>	993 to 993

**Results:**

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Note(s)	Result
60.352	Vertical	9.8	40.0	30.2	-	Complied
60.352	Horizontal	8.6	40.0	31.4	-	Complied
67.692	Vertical	10.2	40.0	29.8	-	Complied
67.692	Horizontal	7.7	40.0	32.3	-	Complied
76.664	Vertical	9.8	40.0	30.2	-	Complied
76.664	Horizontal	9.0	40.0	31.0	-	Complied
121.987	Vertical	20.1	43.5	23.4	-	Complied
121.987	Horizontal	14.7	43.5	18.8	-	Complied
131.299	Vertical	15.1	43.5	28.4	-	Complied
131.299	Horizontal	15.1	43.5	28.4	-	Complied
182.494	Vertical	13.1	43.5	30.4	-	Complied
182.494	Horizontal	12.9	43.5	30.6	-	Complied

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

**7.2.6. Radiated Emissions - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz) –  
 GSM 1900 Idle Mode**

7.2.6.1. Plots of the initial scans can be found in Appendix 3.

7.2.6.2. The following table lists frequencies at which emissions were measured using a quasi peak detector, at a test measurement distance of 3 metres:

**Test Summary:**

Port:	Enclosure
Basic Standard:	FCC Part 15.109 Class B

**Environmental Conditions:**

Temperature Variation (°C):	27 to 27
Relative Humidity Variation (%):	42 to 42
Atmospheric Pressure Variation (mb):	993 to 993

**Results:**

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Note(s)	Result
60.352	Vertical	9.8	40.0	30.2	-	Complied
60.352	Horizontal	8.6	40.0	31.4	-	Complied
67.692	Vertical	10.2	40.0	29.8	-	Complied
67.692	Horizontal	7.7	40.0	32.3	-	Complied
76.664	Vertical	9.8	40.0	30.2	-	Complied
76.664	Horizontal	9.0	40.0	31.0	-	Complied
121.987	Vertical	20.1	43.5	23.4	-	Complied
121.987	Horizontal	14.7	43.5	18.8	-	Complied
131.299	Vertical	15.1	43.5	28.4	-	Complied
131.299	Horizontal	15.1	43.5	28.4	-	Complied
182.494	Vertical	13.1	43.5	30.4	-	Complied
182.494	Horizontal	12.9	43.5	30.6	-	Complied

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

**7.2.7. Radiated Emissions - Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz) –  
 GSM 850 Idle Mode**

7.2.7.1. Plots of the initial scans can be found in Appendix 3.

7.2.7.2. The highest operating frequency in the EUT was 1990 MHz, therefore measurements were performed to a frequency of 10 GHz.

7.2.7.3. The following table lists frequencies at which emissions were measured using a quasi peak detector, at a test measurement distance of 3 metres:

**Test Summary:**

Port:	Enclosure
Basic Standard:	FCC Part 15.109 Class B

**Environmental Conditions:**

Temperature Variation (°C):	18 to 18
Relative Humidity Variation (%):	72 to 72
Atmospheric Pressure Variation (mb):	993 to 993

**Results:**

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Note(s)	Result
See Note Below						

**Note(s):**

1. No emissions were recorded on the pre-scans, which were carried out using a peak detector. Therefore no further measurements were made.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

**7.2.8. Radiated Emissions - Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz) –  
 GSM 1900 Idle Mode**

7.2.8.1. Plots of the initial scans can be found in Appendix 3.

7.2.8.2. The highest operating frequency in the EUT was 1990 MHz, therefore measurements were performed to a frequency of 10 GHz.

7.2.8.3. The following table lists frequencies at which emissions were measured using a quasi peak detector, at a test measurement distance of 3 metres:

**Test Summary:**

Port:	Enclosure
Basic Standard:	FCC Part 15.109 Class B

**Environmental Conditions:**

Temperature Variation (°C):	18 to 18
Relative Humidity Variation (%):	72 to 72
Atmospheric Pressure Variation (mb):	993 to 993

**Results:**

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Note(s)	Result
See Note Below						

**Note(s):**

1. No emissions were recorded on the pre-scans, which were carried out using a peak detector. Therefore no further measurements were made.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

## **8. Measurement Uncertainty**

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level</b>	<b>Calculated Uncertainty</b>
Radiated Emissions	30 to 1000 MHz	95%	± 4.54 dB
Radiated Emissions	1 to 2 GHz	95%	± 4.76 dB
Radiated Emissions	2 to 4 GHz	95%	± 4.76 dB
Radiated Emissions	4 to 6 GHz	95%	± 4.74 dB
Radiated Emissions	6 to 8 GHz	95%	± 4.76 dB
Radiated Emissions	8 to 12 GHz	95%	± 4.79 dB
Conducted Emissions AC (and DC) Lines	150 kHz to 30 MHz	95%	± 3.66 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Where it has been necessary to perform measurements using the substitution method, it has not been possible to calculate an uncertainty for this measurement. Due to the complex effects on the emissions levels measured within a screened room with either a signal source or the equipment under test, the calculation of a general measurement uncertainty for this process would be unrepresentative for all possible measured results.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

### Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A067	Line Impedance Stabilization Network	Rohde & Schwarz	ESH3-Z5	890603/002	23 Apr 2007	12
A1516	Universal Radio Communications Tester	Rohde & Schwarz	CMU200	1100.0008.02	Calibration not required	3
A1534	Preamplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	12
A1817	Horn Antenna	EMCO	3115	00075694	No Details	12
A1828	N-Type Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100669	No Details	12
A253	WG 12 Microwave Horn	Flann Microwave	12240-20	128	17 Nov 2006	36
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139	17 Nov 2006	36
A255	WG 16 Microwave Horn	Flann Microwave	16240-20	519	17 Nov 2006	36
A259	Bi-log Antenna	Chase	CBL6111	1513	13 Mar 2007	12
A490	Bi-log Antenna	Chase	CBL6111A	1590	25 Jan 2007	12
C1083	Cable	Rosenberger	001	2799	22 Apr 2007	12
C1165	Cable	Rosenberger Micro-Coax	FA210A1020 007070	43189-1	05 Jun 2007	12
C1167	Cable	Rosenberger Micro-Coax	FA210A1030 007070	43190-01	05 Jun 2007	12
C1262	Cable	Rosenberger	FA210A0075 008080	49356-2	22 Apr 2007	12
C1265	Cable	Rosenberger	FA210A1020 007070	49317-01	22 Apr 2007	12
C341	Cable	Andrews	None	None	22 Apr 2007	12
C371	Cable	Rosenberger	UFA 210A-0-1182-70x70	97A1397	22 Apr 2007	12

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

**Test Equipment Used (Continued)**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
C375	Cable	Rosenberger	RG400	None	22 Apr 2007	12
C454	Cable	Rosenberger	RG142XX-001-RFIB	C454-10081998	22 Apr 2007	12
C461	Cable	Rosenberger	UFA210A-1-1182-704704	98H0305	22 Apr 2007	12
C468	Cable	Rosenberger	UFA210A-1-3937-504504	98L0440	22 Apr 2007	12
M044	ESVP Receiver	Rohde & Schwarz	ESVP	891 845/026	06 Mar 2007	12
M1180	Thermo-Hygrometer	RS	212-124	N/A	19 Apr 2007	12
M1242	Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986_022	08 Sep 2006	12
M1273	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100275	20 Feb 2007	12
M1391	Thermo Hygrometer	Oregon Scientific	BAR629HGU	N/A	23 Oct 2006	12
S0520	Power Supply	GW instek	GPC-3030	E835141	Calibrated before use	12
S202	3m Open Area Test Site	RFI	2	S202-15011990	17 Nov 2006	12
S209	Emissions Screened Room	RFI	9		Not applicable	12

**NB** In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

## **Appendix 2. Measurement Methods**

### **A2.1. AC Mains Conducted Emissions**

A2.1.1. AC mains conducted emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

A2.1.2. The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane and with the EUT powered via a 60 Hz AC mains supply.

A2.1.3. Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

A2.1.4. Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

A2.1.5. The test equipment settings for conducted emissions measurements were as follows:

<b>Receiver Function</b>	<b>Initial Scan</b>	<b>Final Measurements</b>
Detector Type:	Peak	Quasi-Peak (CISPR)*
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz	9 kHz
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

\* In some instances an Average detector function may also have been used.

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

## **A2.2. Radiated Emissions**

A2.2.1. Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

A2.2.2. Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

A2.2.3. The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested on the open area test site, at the appropriate distance, using a measuring receivers with a Quasi-Peak detector (below 1000 MHz), where applicable, for measurements above 1000 MHz average and peak detectors were used.

A2.2.4. For the main (final) measurements the EUT was arranged on a non-conducting table on an open area test site, as detailed in the specification.

A2.2.5. All measurements on the open area test site were performed using broadband antennas.

A2.2.6. On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

A2.2.7. The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements Below 1GHz	Final Measurements Above 1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	100 kHz	120 kHz	1 MHz
Amplitude Range:	60 dB	20 dB	20 dB (typical)
Measurement Time:	Not applicable	> 1 s	> 1 s
Observation Time:	Not applicable	> 15 s	> 15 s
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

**Test Of:** Numerex Corp  
Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

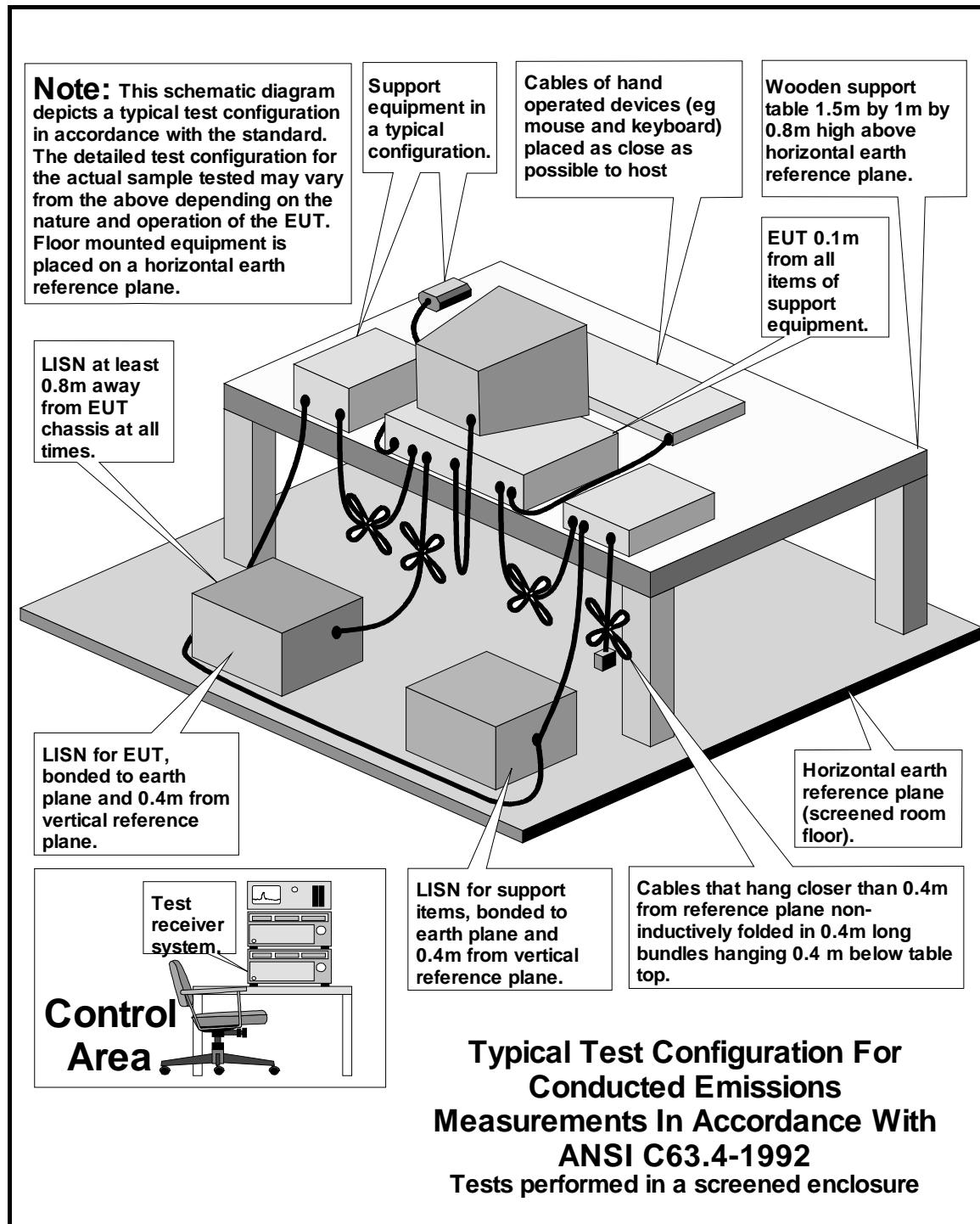
### **Appendix 3. Test Configuration Drawings**

This appendix contains the following drawings:

<b>Drawing Reference Number</b>	<b>Title</b>
DRG\72605JD07A\EMICON	Test configuration for measurement of conducted emissions.
DRG\72605JD07A\EMIRAD	Test configuration for measurement of radiated emissions.
DRG\72605JD07A\001	Schematic diagram of the EUT, support equipment and interconnecting cables used for the test.

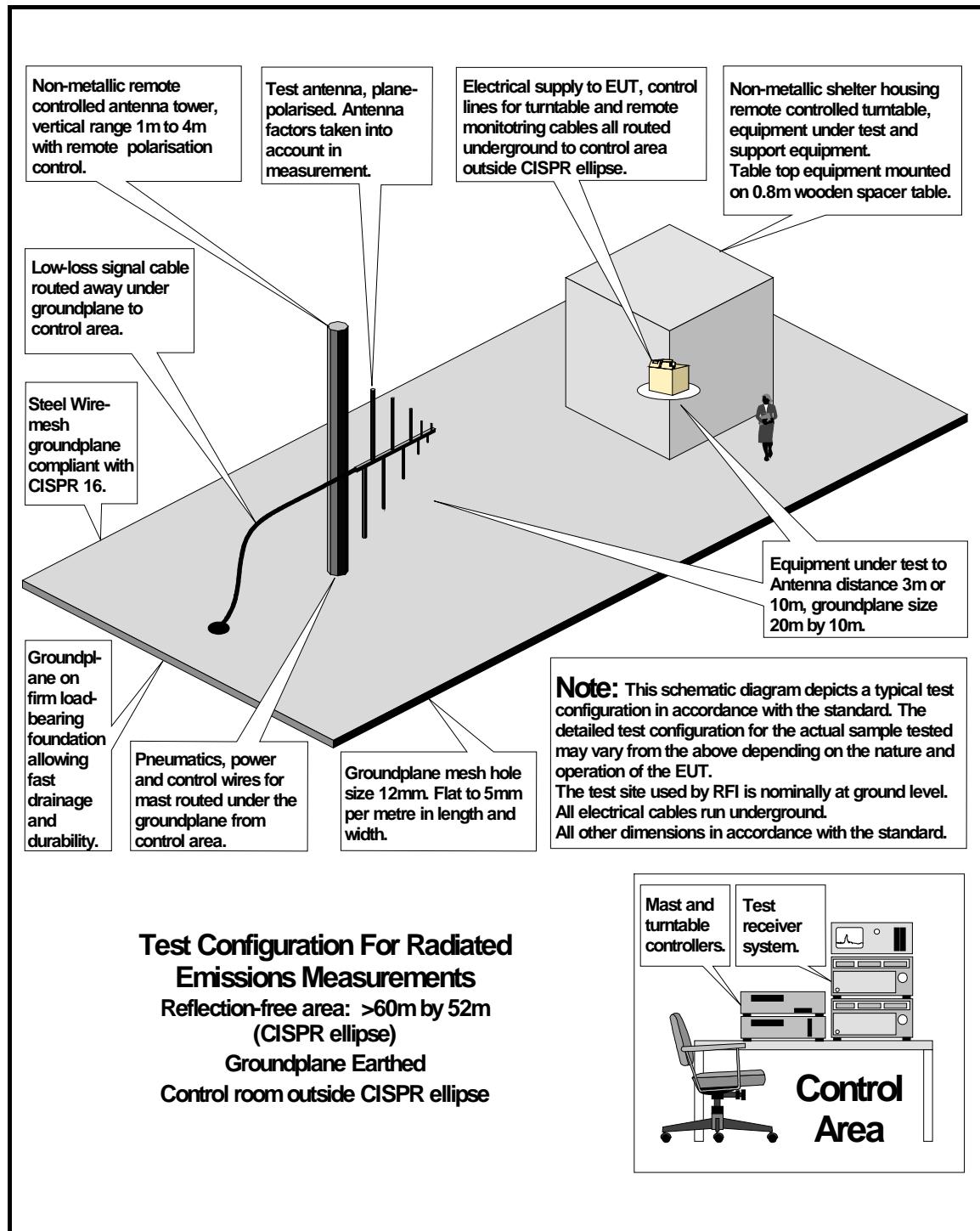
**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

DRG\72605JD07A\EMICON



**Test Of:** Numerex Corp  
 Digi Cell AnyNet  
**To:** FCC Part 15 107 and Part 15.109

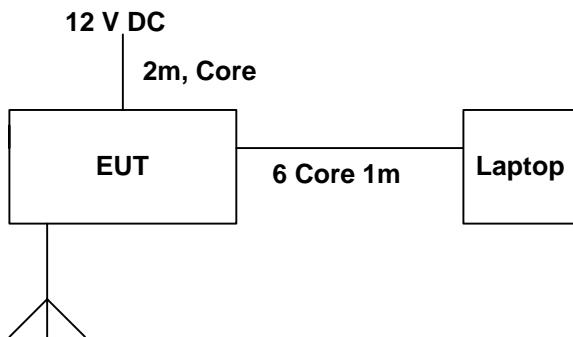
DRG\72605JD07A\EMIRAD



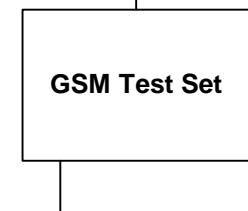
Test Of: Numerex Corp  
Digi Cell AnyNet  
To: FCC Part 15 107 and Part 15.109

DRG\72605JD07A\001

## Configuration of EUT and Local Support Equipment



RF Air Link



230 V AC Mains

## Configuration of Remote Support Equipment

**Test Of:** Numerex Corp  
 Digi Cell Anynet  
**To:** FCC Part 15 107 and Part 15.109

---

## **Appendix 4. Graphical Test Results**

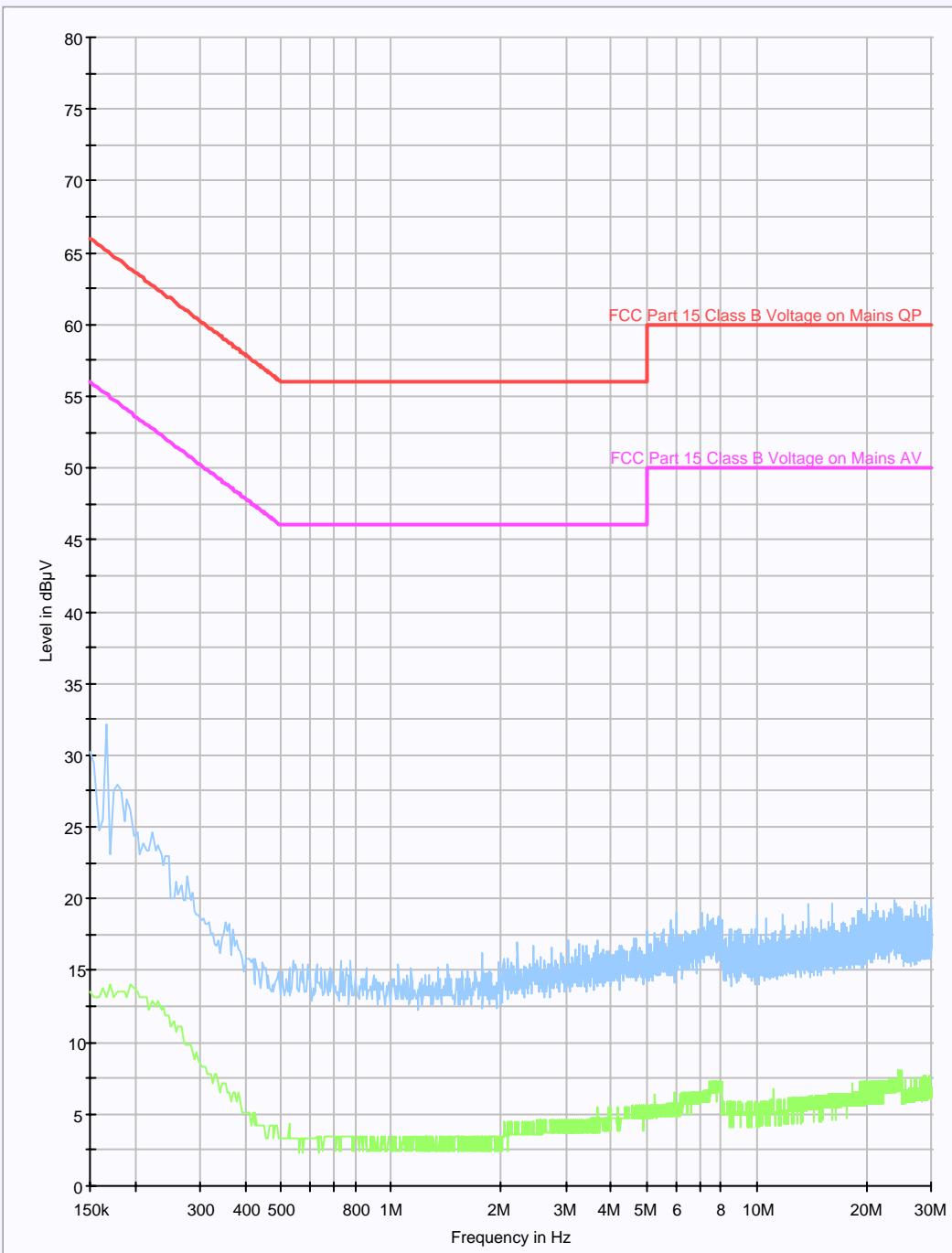
This Appendix contains the following graphs:

<b>Graph Reference Number</b>	<b>Title</b>
GPH\72605JD07A\001	Conducted Emissions Pre-Scan (0.15 MHz to 30.0 MHz) – GSM 850 Idle Mode
GPH\72605JD07A\002	Conducted Emissions Pre-Scan (0.15 MHz to 30.0 MHz) – GSM 1900 Idle Mode
GPH\72605JD07A\003	Radiated Emissions Pre-Scan (30.0 MHz to 1000.0 MHz) – GSM 850 Idle Mode
GPH\72605JD07A\004	Radiated Emissions Pre-Scan (1 GHz to 2 GHz) – GSM 850 Idle Mode
GPH\72605JD07A\005	Radiated Emissions Pre-Scan (2 GHz to 4 GHz) – GSM 850 Idle Mode
GPH\72605JD07A\006	Radiated Emissions Pre-Scan (4 GHz to 6 GHz) – GSM 850 Idle Mode
GPH\72605JD07A\007	Radiated Emissions Pre-Scan (6 GHz to 8 GHz) – GSM 850 Idle Mode
GPH\72605JD07A\008	Radiated Emissions Pre-Scan (8 GHz to 10 GHz) – GSM 850 Idle Mode
GPH\72605JD07A\009	Radiated Emissions Pre-Scan (30.0 MHz to 1000.0 MHz) – GSM 1900 Idle Mode
GPH\72605JD07A\010	Radiated Emissions Pre-Scan (1 GHz to 2 GHz) – GSM 1900 Idle Mode
GPH\72605JD07A\011	Radiated Emissions Pre-Scan (2 GHz to 4 GHz) – GSM 1900 Idle Mode
GPH\72605JD07A\012	Radiated Emissions Pre-Scan (4 GHz to 6 GHz) – GSM 1900 Idle Mode
GPH\72605JD07A\013	Radiated Emissions Pre-Scan (6 GHz to 8 GHz) – GSM 1900 Idle Mode
GPH\72605JD07A\014	Radiated Emissions Pre-Scan (8 GHz to 10 GHz) – GSM 1900 Idle Mode

Test Of: **Numerex Corp**  
**Digi Cell Anynet**  
To: **FCC Part 15 107 and Part 15.109**

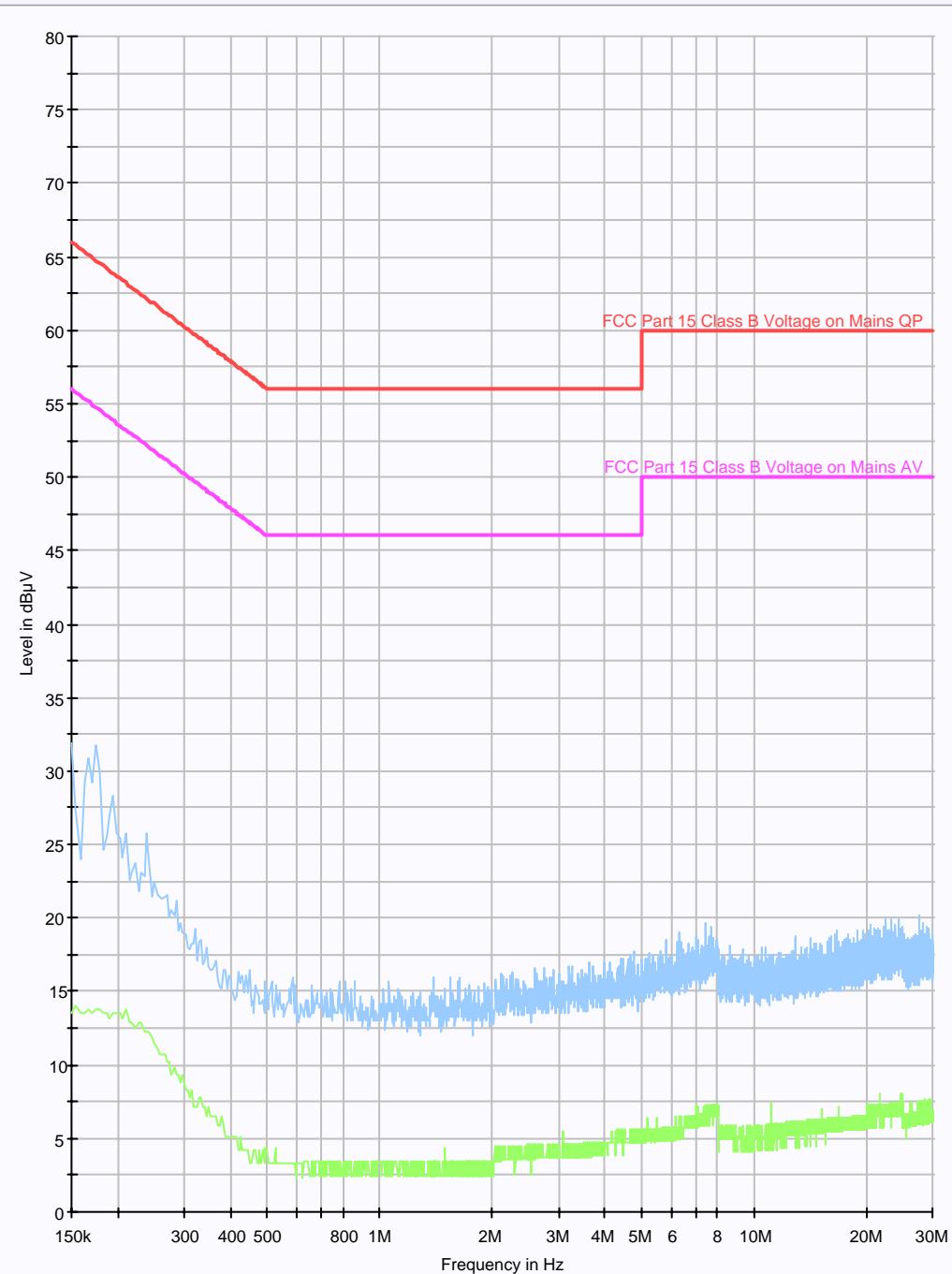
---

**GPH\72605JD07A\001**  
**Conducted Emissions Pre-Scan**  
**(0.15 MHz to 30.0 MHz) – GSM 850 Idle Mode**



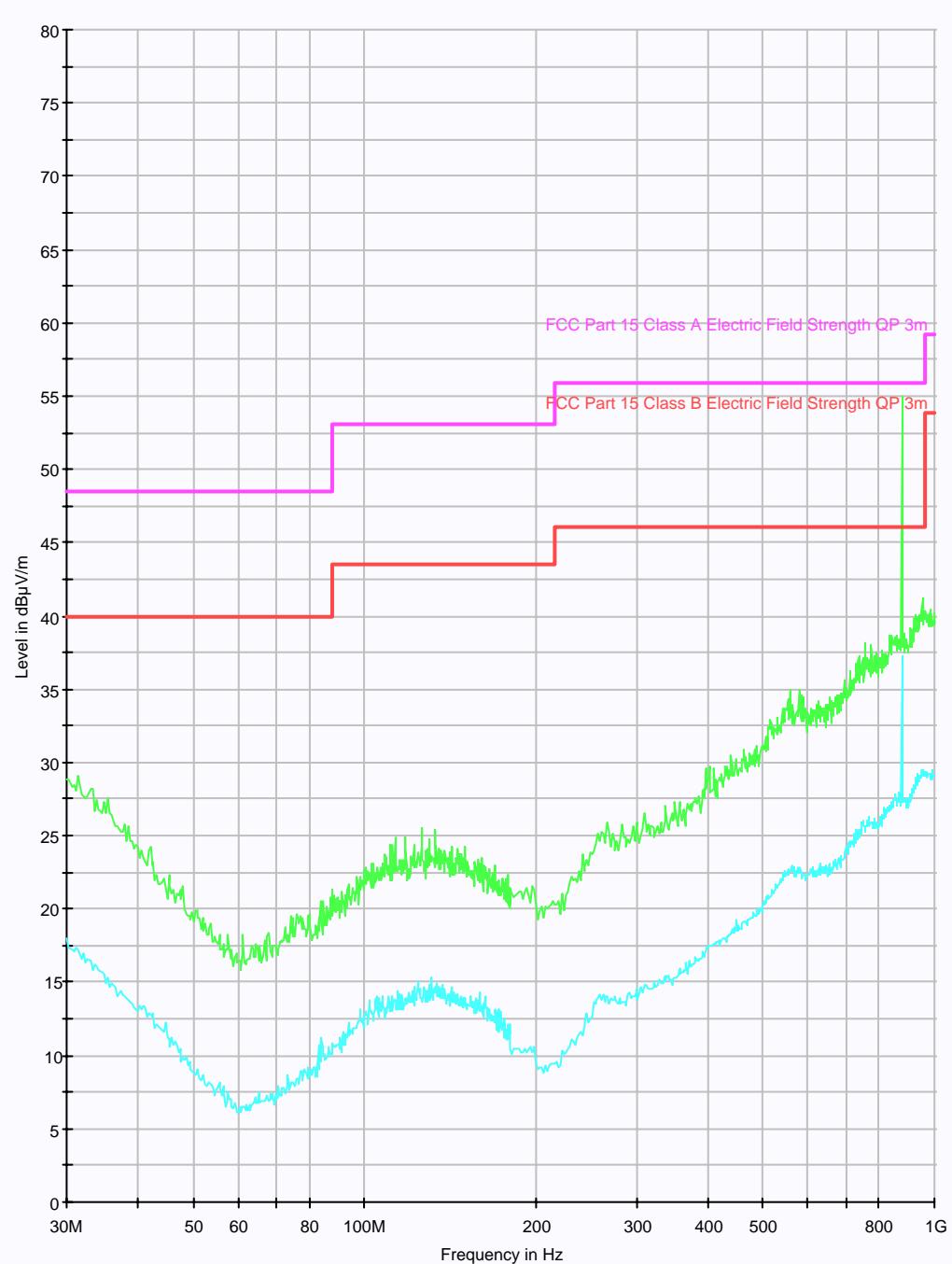
Test Of: **Numerex Corp**  
**Digi Cell Anynet**  
To: **FCC Part 15 107 and Part 15.109**

**GPH\72605JD07A\002**  
**Conducted Emissions Pre-Scan**  
**(0.15 MHz to 30.0 MHz) – GSM 1900 Idle Mode**



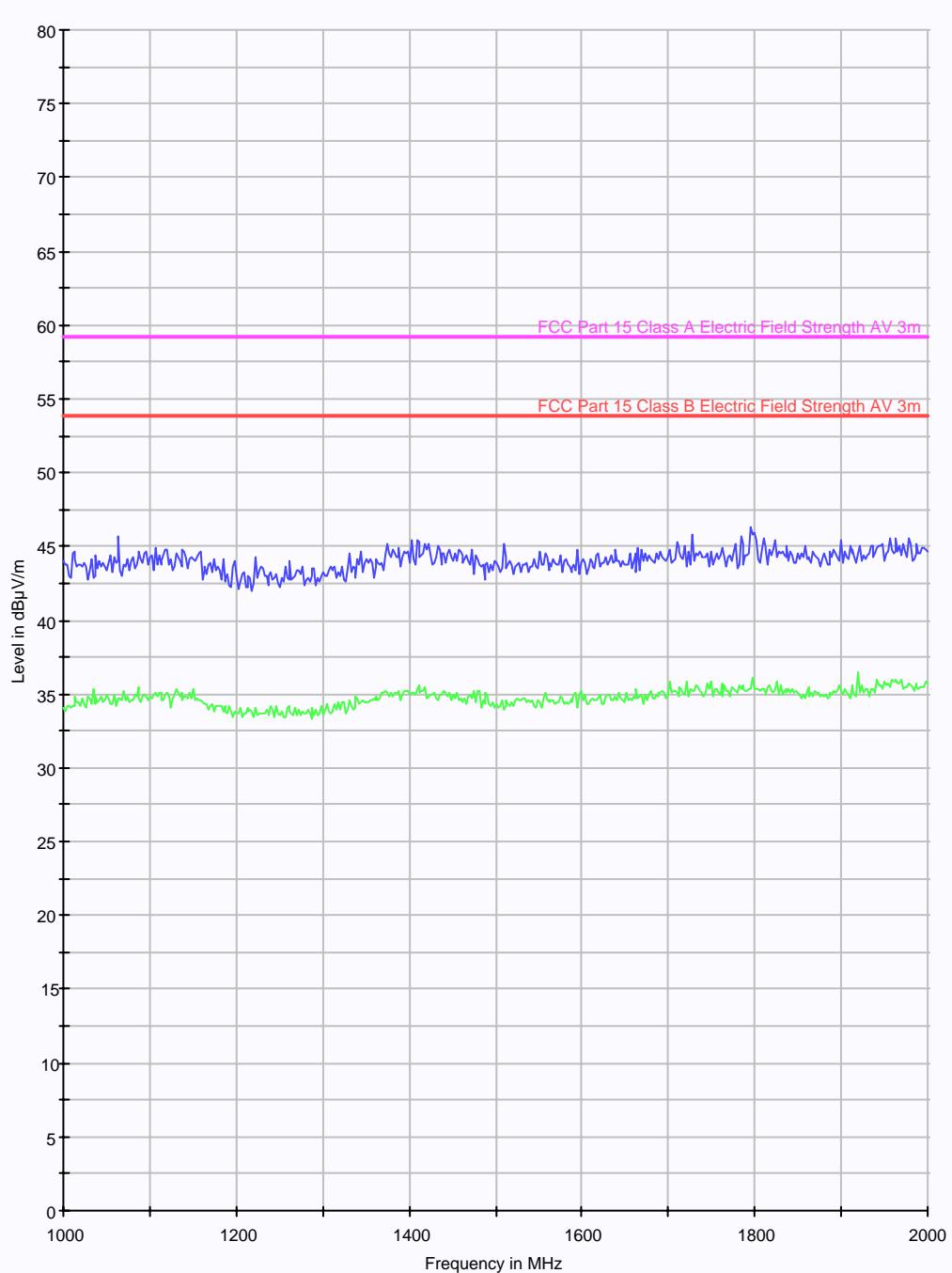
Test Of: **Numerex Corp**  
**Digi Cell AnyNet**  
To: **FCC Part 15 107 and Part 15.109**

**GPH\72605JD07A\003**  
**Radiated Emissions Pre-Scan**  
**(30.0 MHz to 1000.0 MHz) – GSM 850 Idle Mode**



Test Of: **Numerex Corp**  
**Digi Cell AnyNet**  
To: **FCC Part 15 107 and Part 15.109**

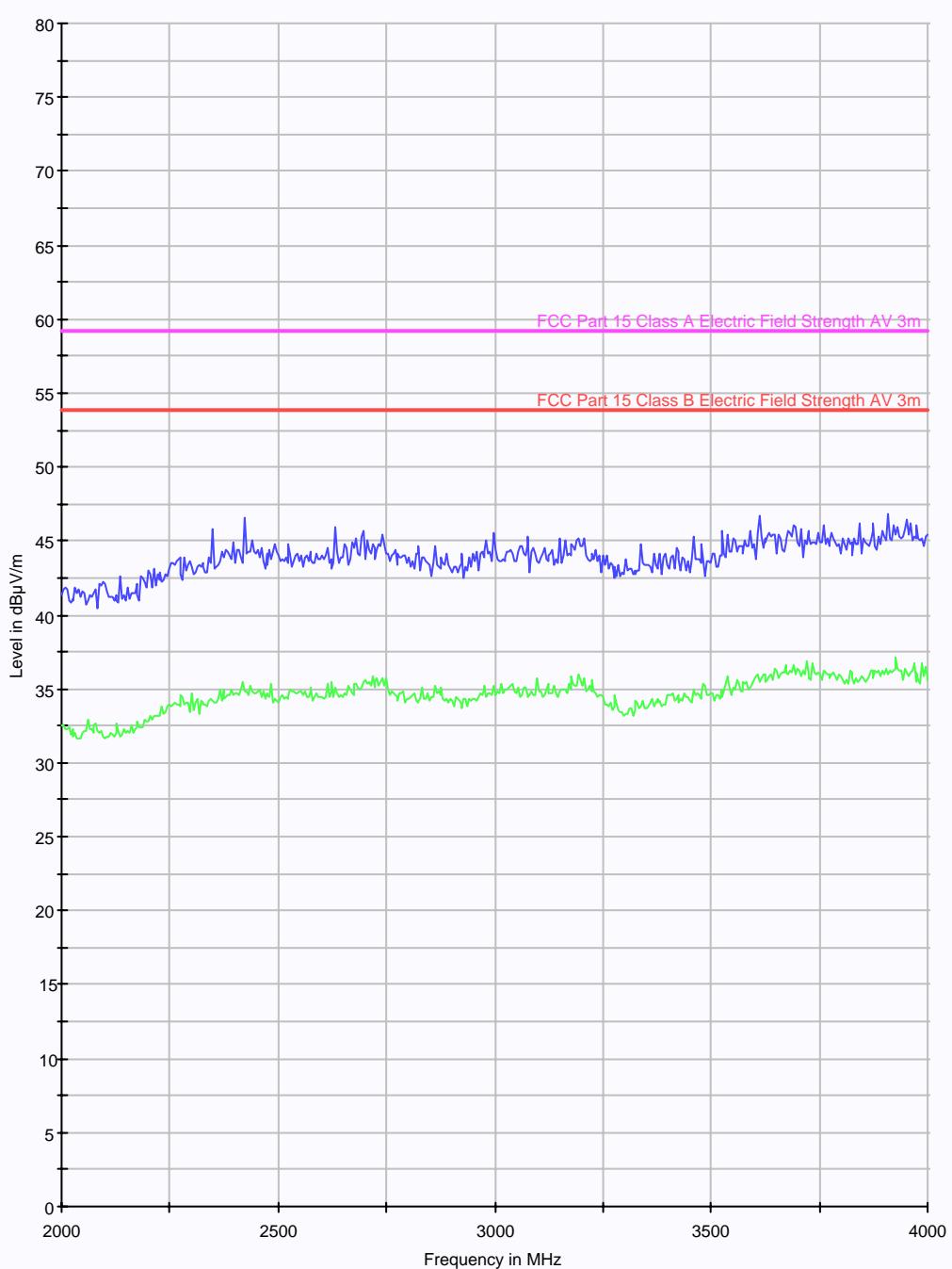
**GPH\72605JD07A\004**  
**Radiated Emissions Pre-Scan**  
**(1 GHz to 2 GHz) – GSM 850 Idle Mode**



Test Of: **Numerex Corp**  
**Digi Cell AnyNet**  
To: **FCC Part 15 107 and Part 15.109**

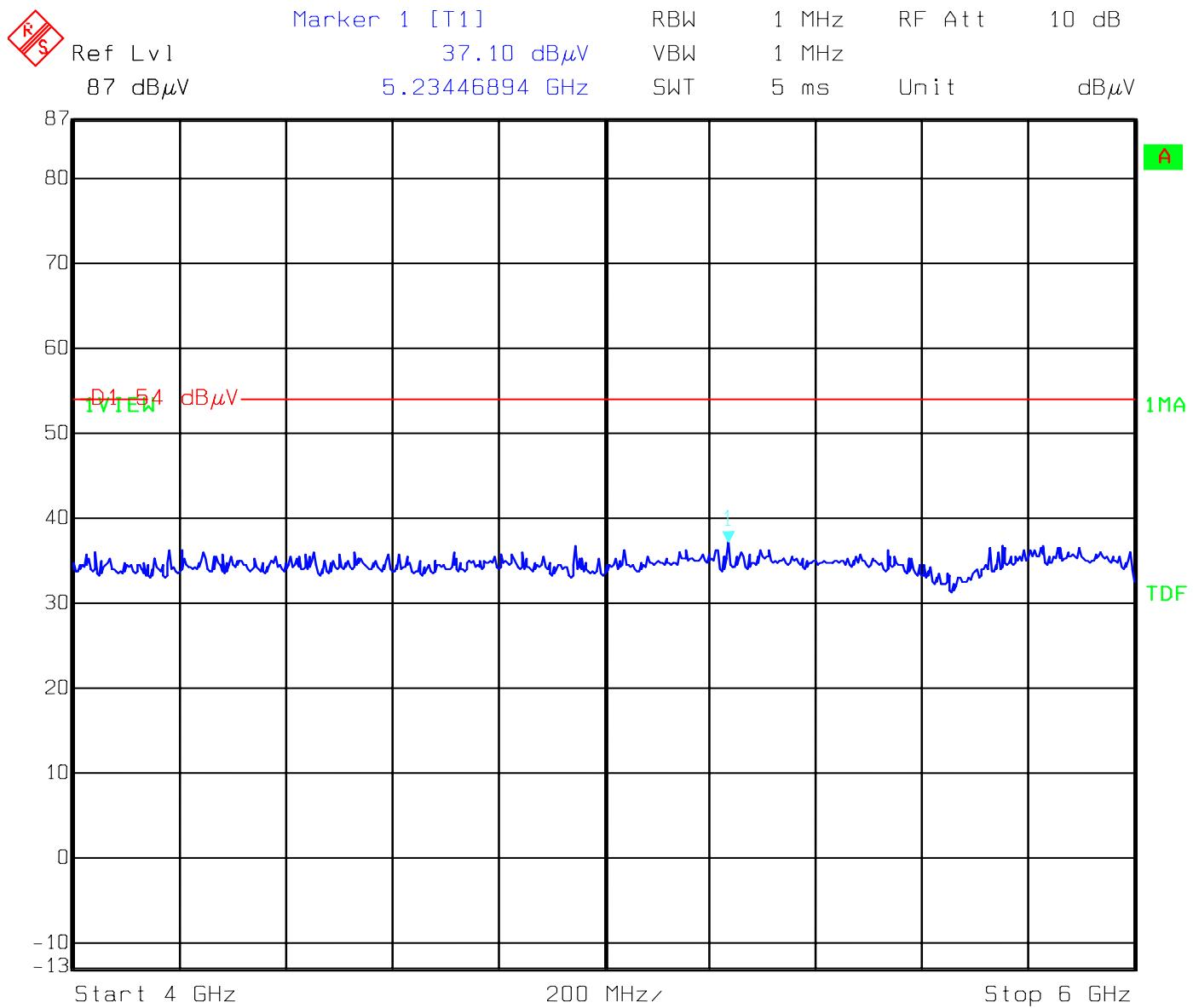
---

**GPH\72605JD07A\005**  
**Radiated Emissions Pre-Scan**  
**(2 GHz to 4 GHz) – GSM 850 Idle Mode**



Test Of: Numerex Corp  
Digi Cell AnyNet  
To: FCC Part 15 107 and Part 15.109

**GPH\72605JD07A\006**  
**Radiated Emissions Pre-Scan**  
**(4 GHz to 6 GHz) – GSM 850 Idle Mode**



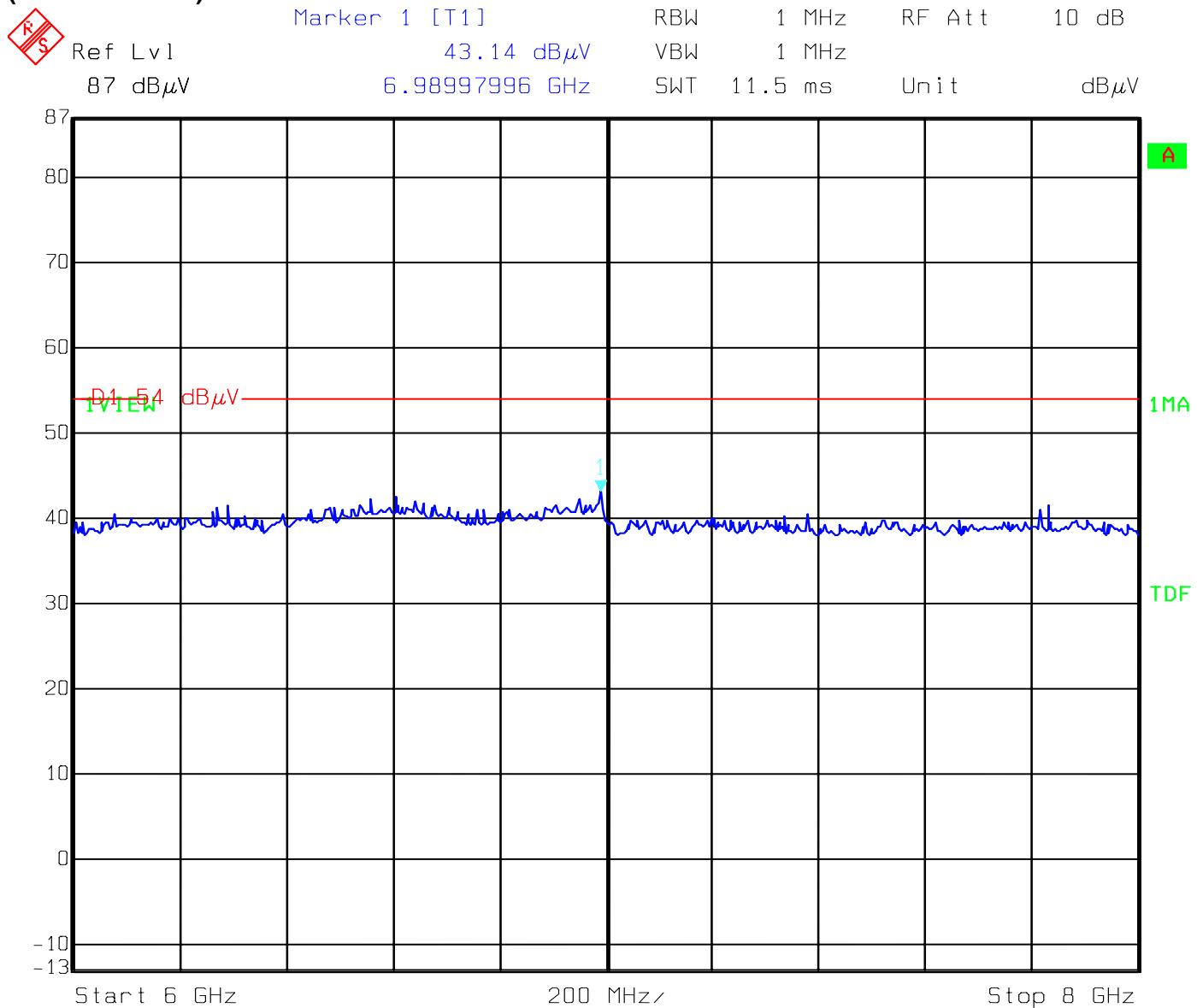
Date: 22.JUN.2007 15:50:24

Test Of: Numerex Corp  
Digi Cell AnyNet  
To: FCC Part 15 107 and Part 15.109

GPH\72605JD07A\007

Radiated Emissions Pre-Scan

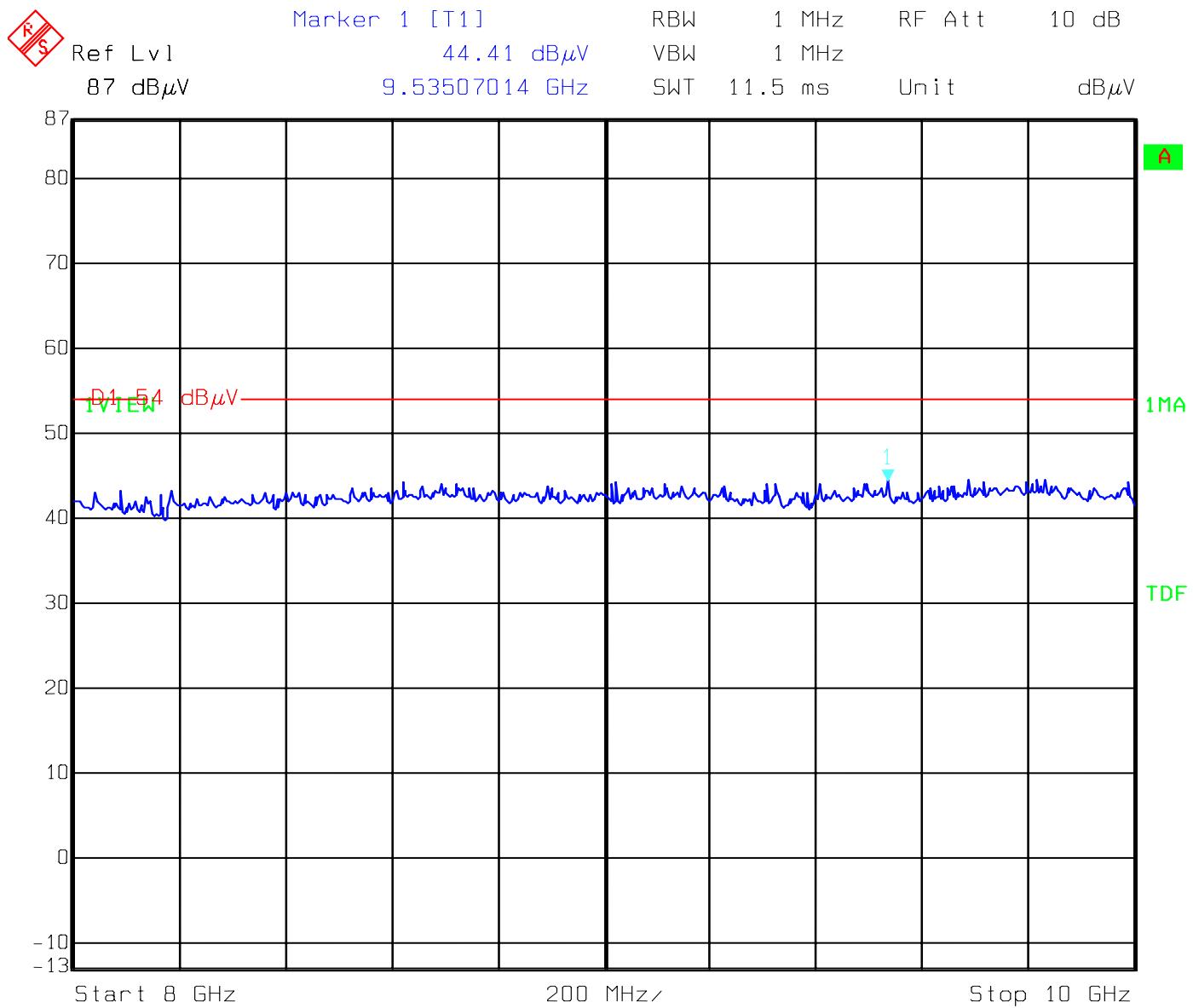
(6 GHz to 8 GHz) – GSM 850 Idle Mode



Date: 22.JUN.2007 15:39:33

Test Of: Numerex Corp  
Digi Cell AnyNet  
To: FCC Part 15 107 and Part 15.109

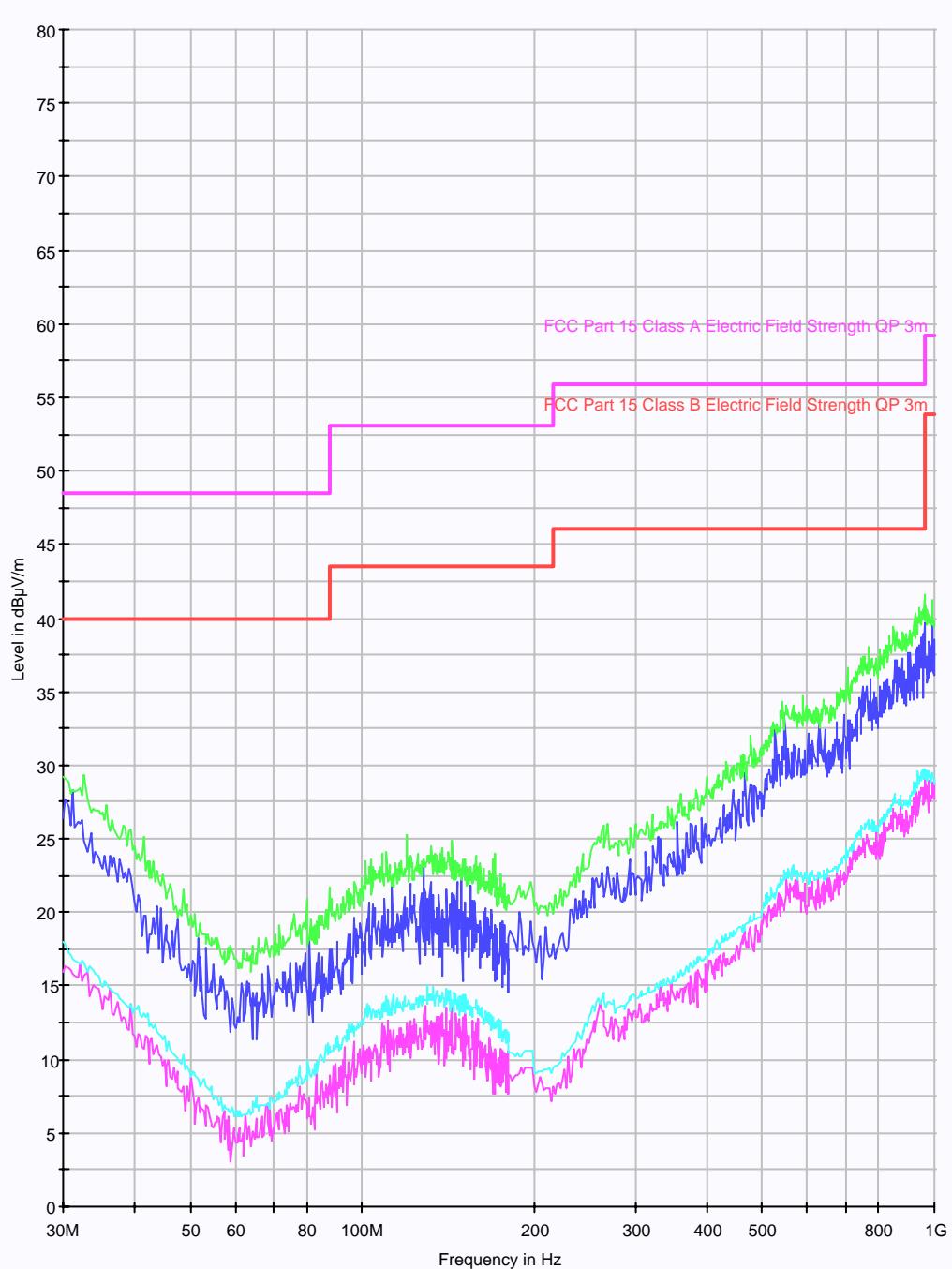
**GPH\72605JD07A\008**  
**Radiated Emissions Pre-Scan**  
**(8 GHz to 10 GHz) – GSM 850 Idle Mode**



Date: 22.JUN.2007 15:37:08

Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

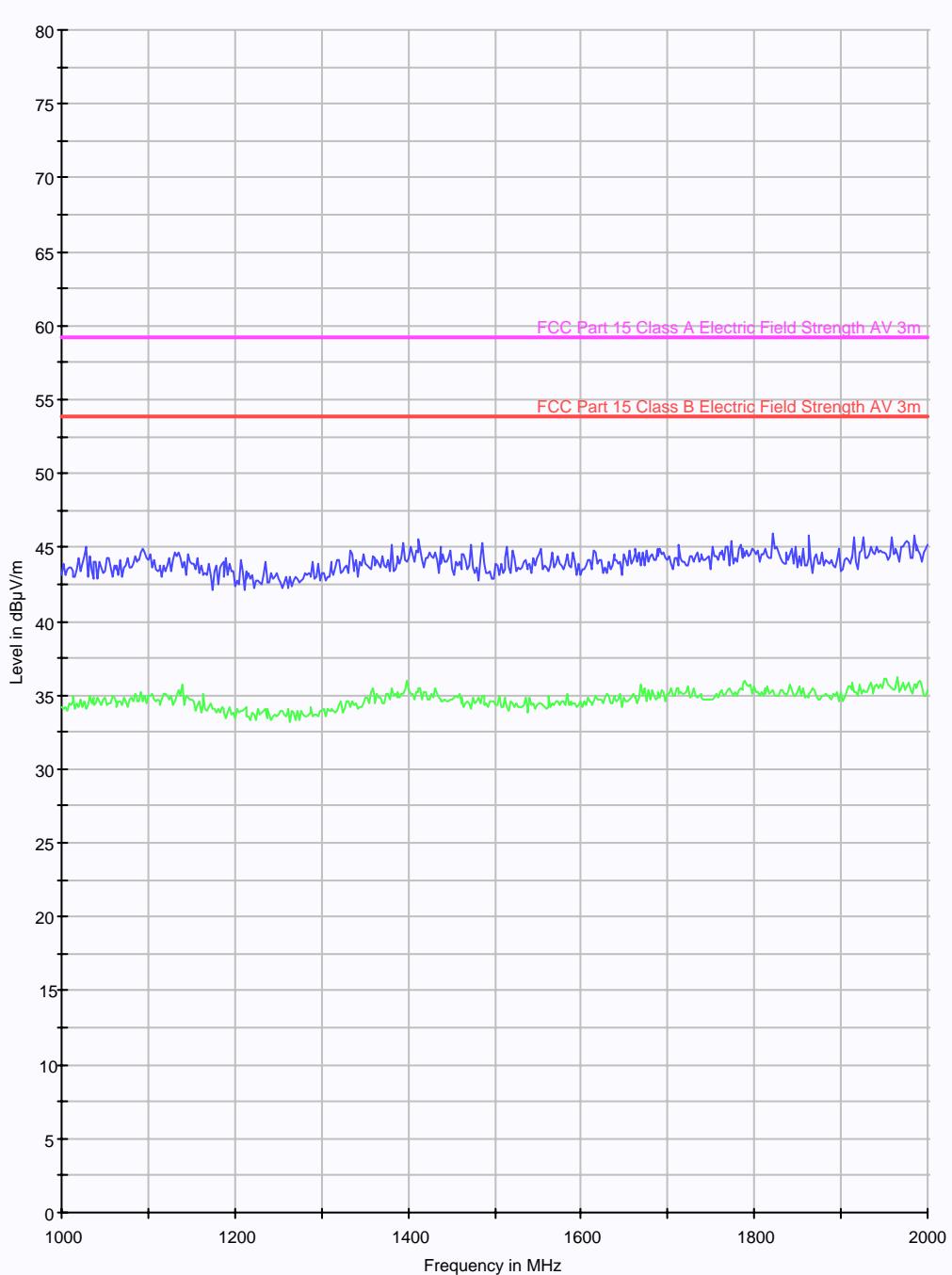
**GPH\72605JD07A\009**  
**Radiated Emissions Pre-Scan**  
**(30.0 MHz to 1000.0 MHz) – GSM 1900 Idle Mode**



Test Of: **Numerex Corp**  
**Digi Cell AnyNet**  
To: **FCC Part 15 107 and Part 15.109**

---

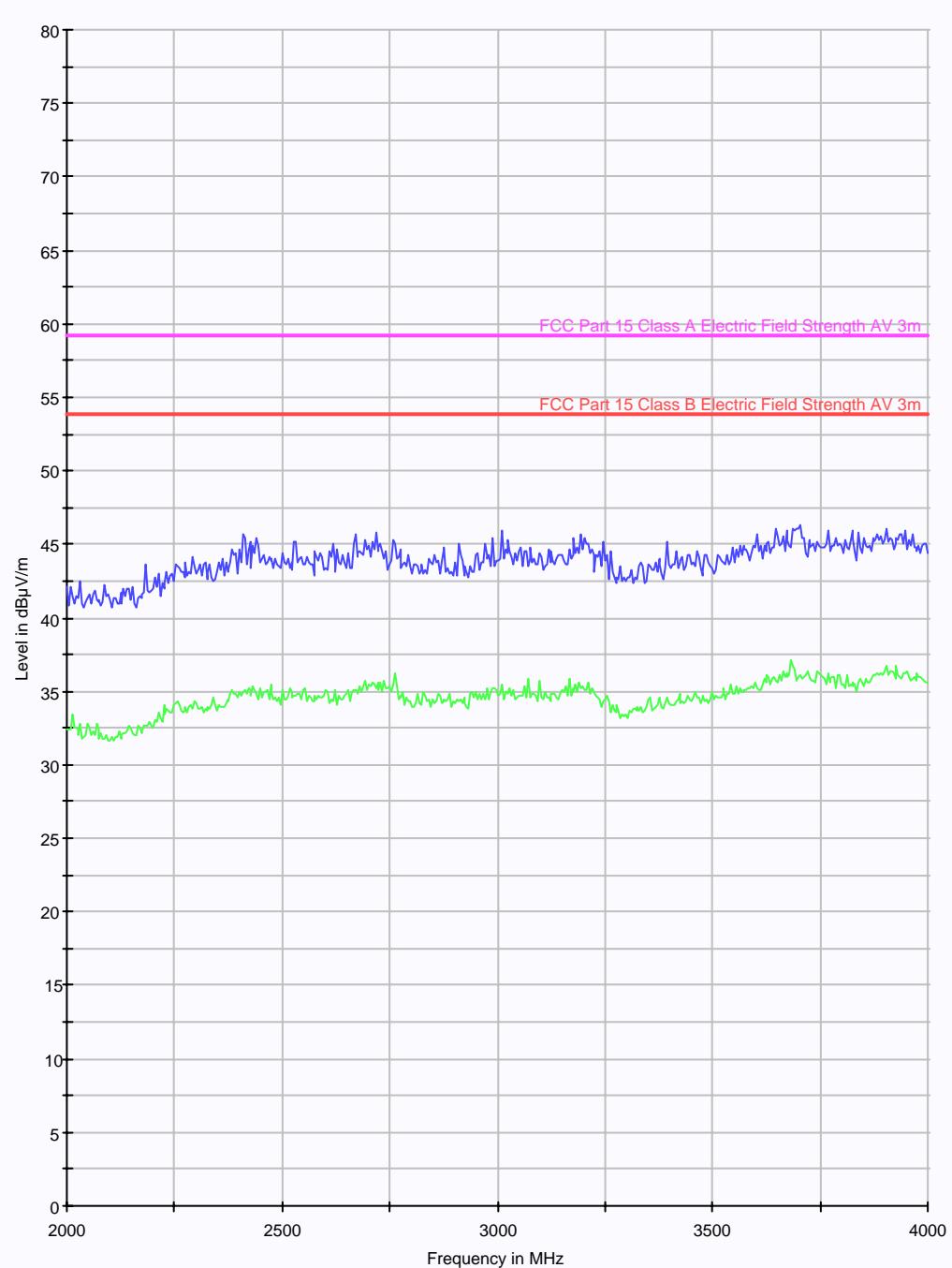
**GPH\72605JD07A\010**  
**Radiated Emissions Pre-Scan**  
**(1 GHz to 2 GHz) – GSM 1900 Idle Mode**



Test Of: **Numerex Corp**  
**Digi Cell AnyNet**  
To: **FCC Part 15 107 and Part 15.109**

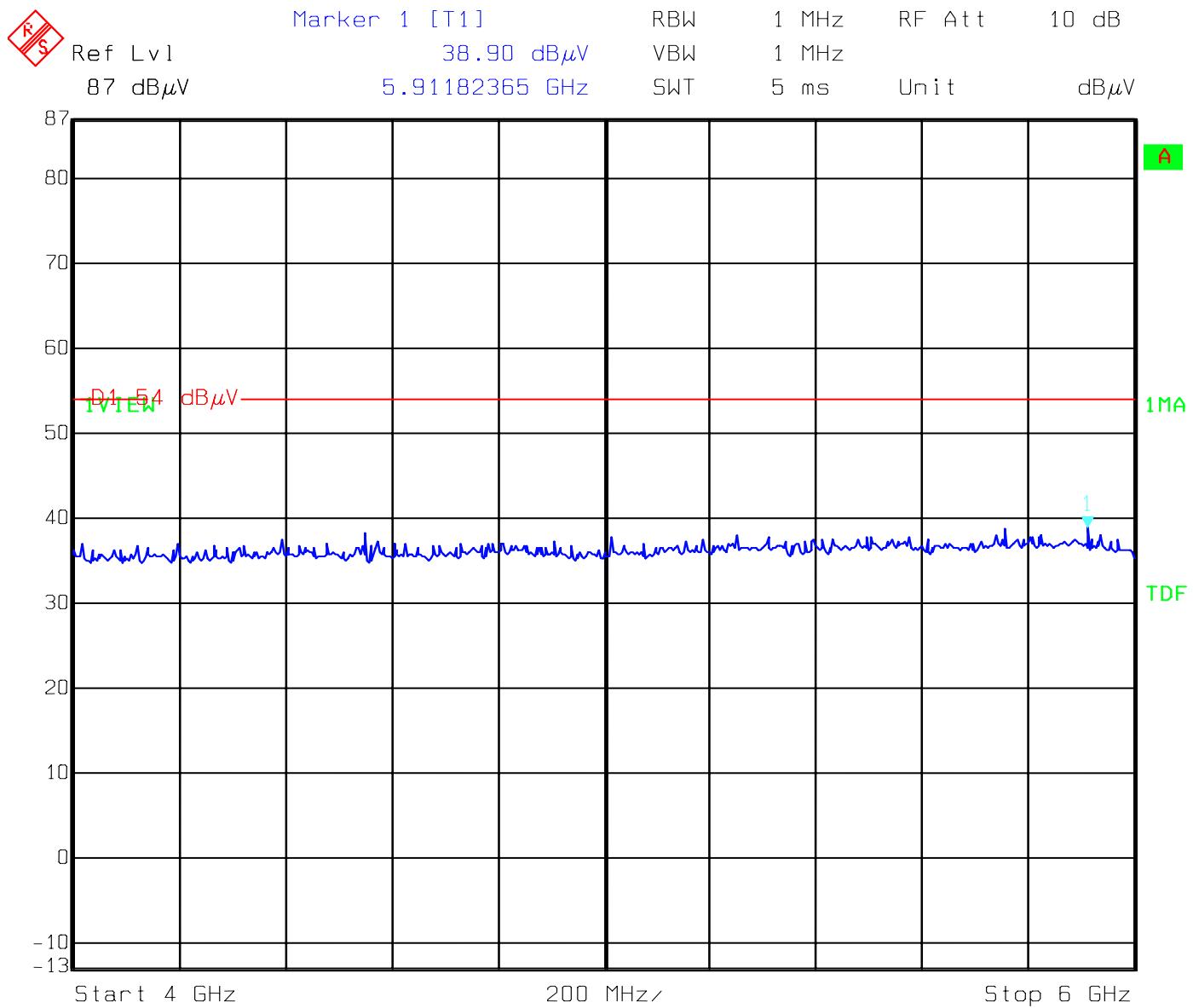
---

**GPH\72605JD07A\011**  
**Radiated Emissions Pre-Scan**  
**(4 GHz to 6 GHz) – GSM 1900 Idle Mode**



Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

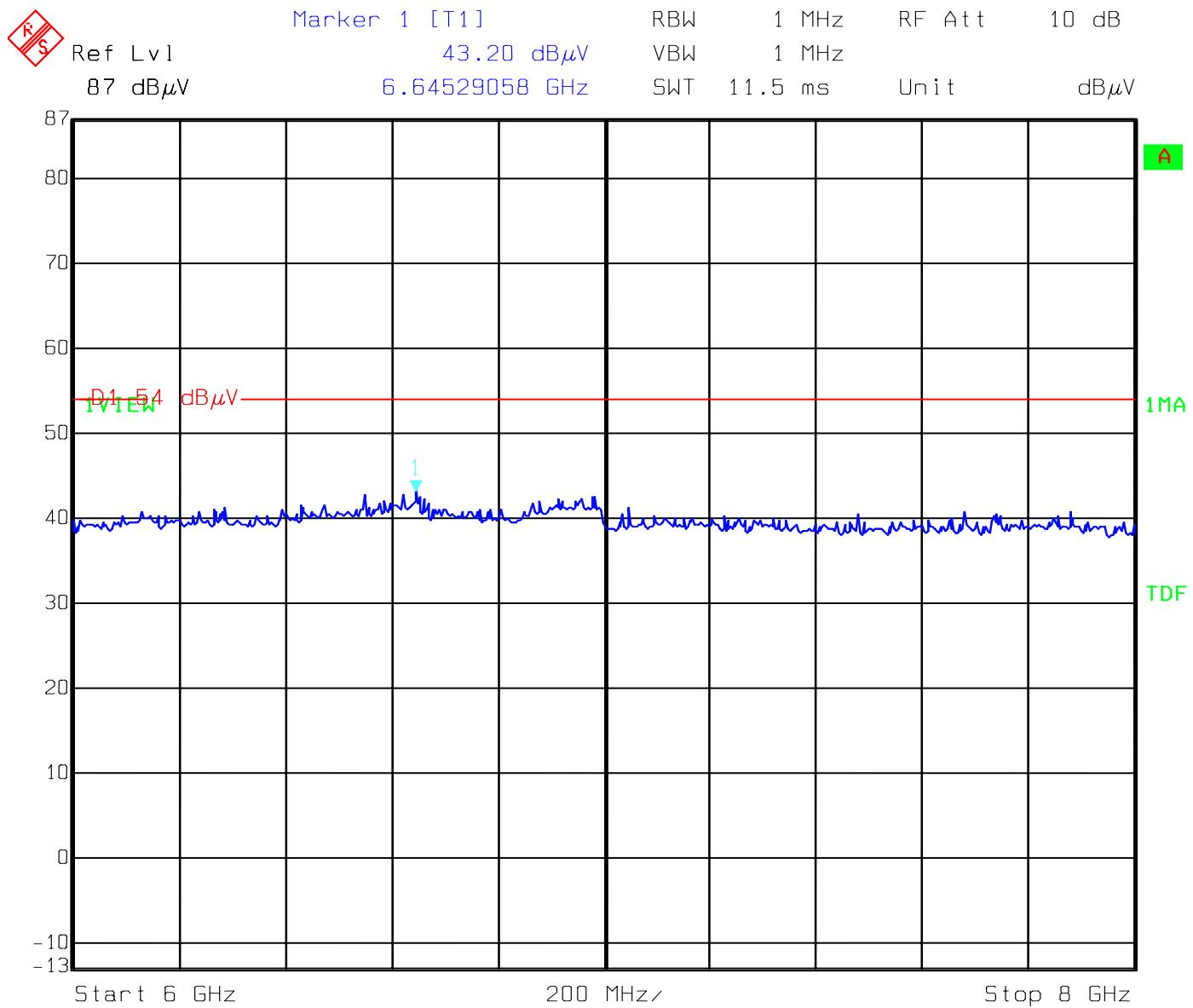
**GPH\72605JD07A\012**  
**Radiated Emissions Pre-Scan**  
**(4 GHz to 6 GHz) – GSM 1900 Idle Mode**



Date: 22.JUN.2007 15:28:08

Test Of: Numerex Corp  
Digi Cell AnyNet  
To: FCC Part 15 107 and Part 15.109

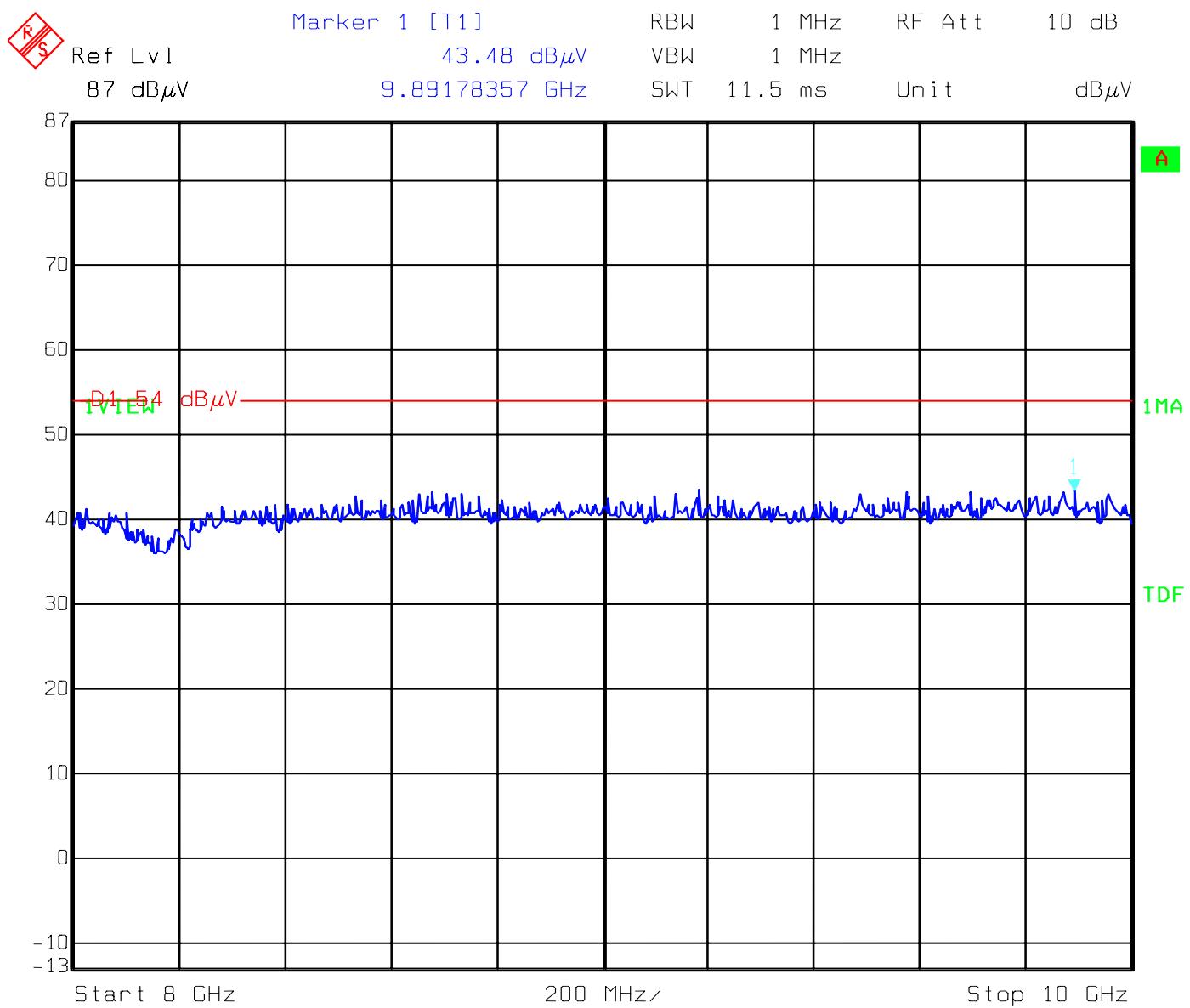
GPH\72605JD07A\013  
Radiated Emissions Pre-Scan  
(6 GHz to 8 GHz) – GSM 1900 Idle Mode



Date: 22.JUN.2007 15:31:43

Test Of: Numerex Corp  
Digi Cell AnyNet  
To: FCC Part 15 107 and Part 15.109

GPH\72605JD07A\014  
Radiated Emissions Pre-Scan  
(8 GHz to 10 GHz) – GSM 1900 Idle Mode



Date: 22.JUN.2007 15:34:56

**Test Of:** **Numerex Corp**  
**Digi Cell Anynet**  
**To:** **FCC Part 15 107 and Part 15.109**

---

## **Appendix 5. Photographs of EUT**

This Appendix contains the following photographs:

<b>Photo Reference Number</b>	<b>Title</b>
PHT/72605/001	View of conducted emissions (1)
PHT/72605/002	View of conducted emissions (2)
PHT/72605/003	View of conducted emissions (3)
PHT/72605/004	View of Radiated Emissions

Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

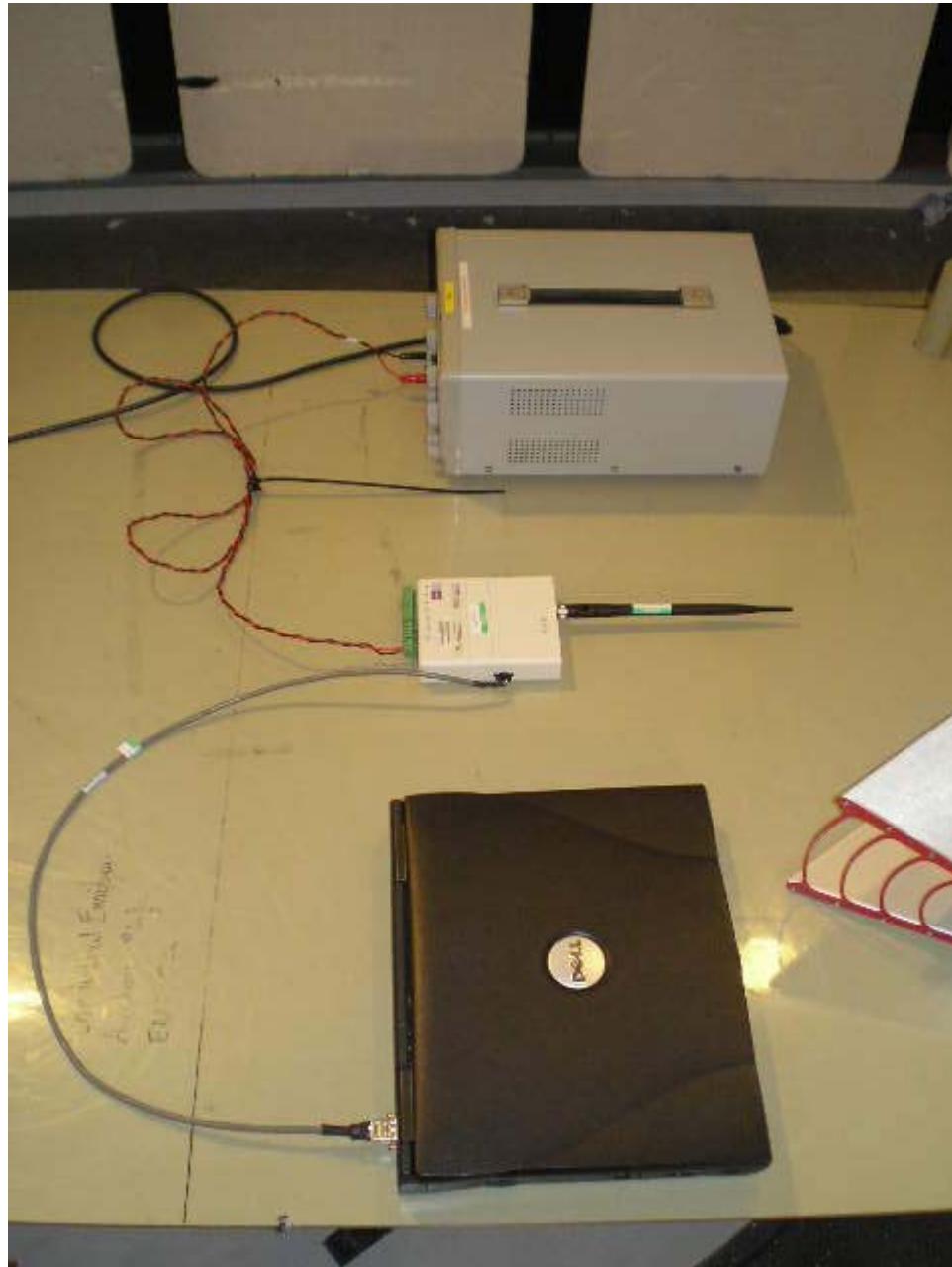
---

PHT/72605/001: View of conducted emissions (1)



Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

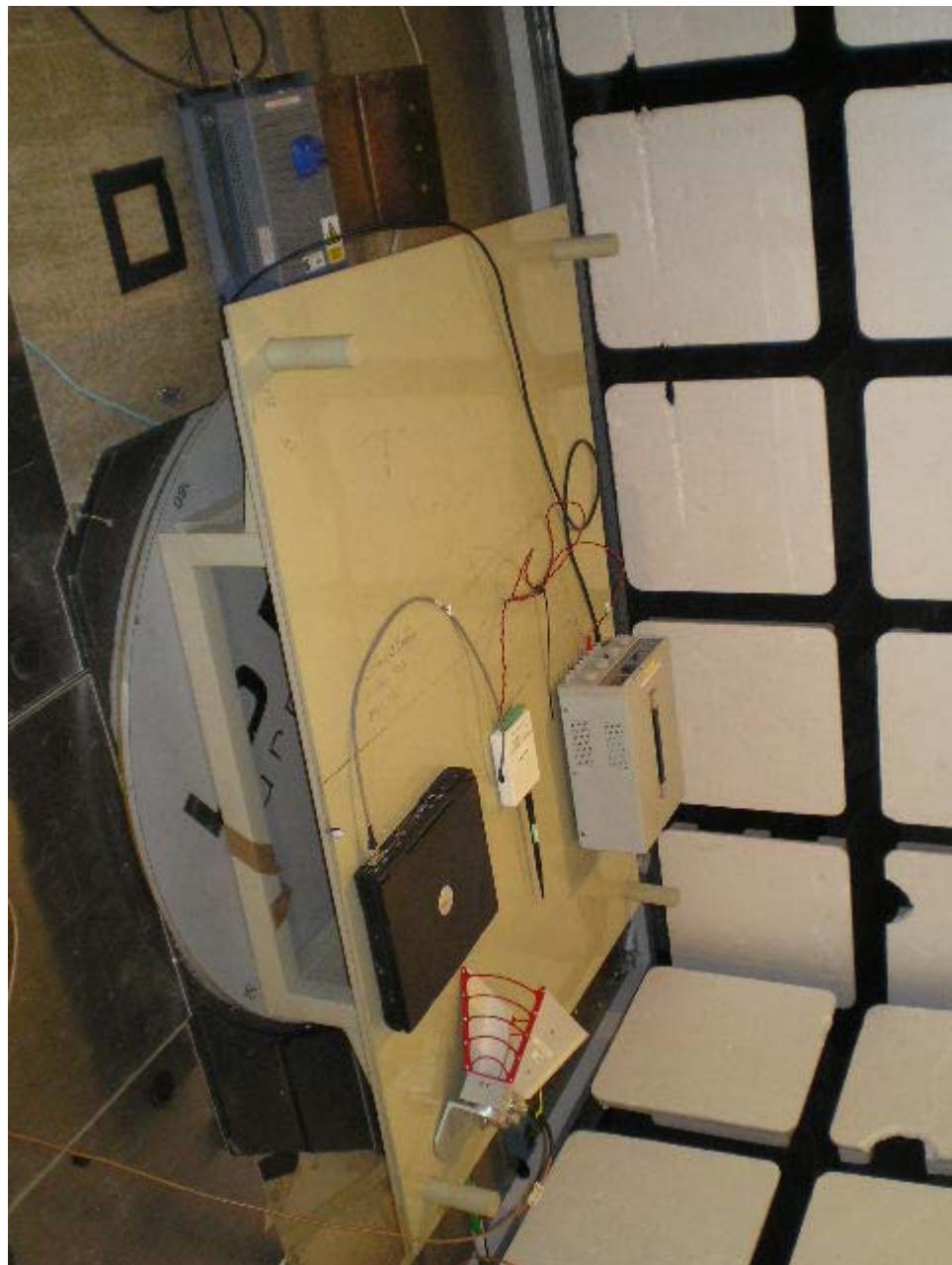
**PHT/72605/002: View of conducted emissions (2)**



Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

---

**PHT/72605/003: View of conducted emissions (3)**



Test Of: Numerex Corp  
Digi Cell Anynet  
To: FCC Part 15 107 and Part 15.109

---

PHT/72605/004: View of radiated emissions

