

# **EMC TEST REPORT**

**Report No. : EME-060005**

**Model No. : HL-11G**

**Issued Date : Jan. 10, 2006**

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**Test By : Intertek Testing Services Taiwan Ltd.  
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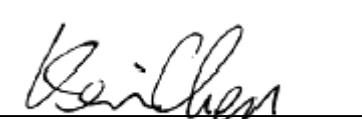
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Project Engineer



Jerry Liu

Reviewed By



Kevin Chen

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FCC ID. :TWS-HL-11G

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### Summary of Tests

**11g mini-PCI Module -Model: HL-11G**  
**FCC ID: TWS-HL-11G**

Test	Reference	Results
Minimum 6dB Bandwidth test	15.247(a)(2)	Complies
Maximum Output Power test	15.247(b)	Complies
Radiated Spurious Emission test	15.205, 15.209	Complies
Power Spectrum Density test	15.247(e)	Complies
Emission on the Band Edge test	15.247(d)	Complies
AC Power Line Conducted Emission test	15.207	Complies

## 1. General information

### 1.1 Identification of the EUT

Applicant : Handlink Technologies Inc.  
Product : 11g mini-PCI Module  
Model No. : HL-11G  
FCC ID. : TWS-HL-11G  
Frequency Range : 2412MHz ~ 2462 MHz  
Channel Number : 11 channel  
Frequency of Each Channel : 2412MHz, 2417MHz, 2422MHz, 2427MHz, 2432MHz, 2437MHz, 2442MHz, 2447MHz, 2452MHz, 2457MHz, 2462MHz  
Type of Modulation : DSSS, OFDM  
Rated Power : 3.3Vdc from Notebook  
Power Cord : N/A  
Sample Received : Dec. 30, 2005  
Test Date(s) : Dec. 30, 2005 ~ Jan. 6, 2005

A FCC DoC report has been generated for the client.

### 1.2 Additional information about the EUT

The EUT is an 11g mini-PCI Module, and was defined as information technology equipment.

The EUT meets special requirements for full modular approval on FCC Public Notice DA 00-1407 and the device is only for OEM integrator, please refer the test result in this report.

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

### 1.3 Antenna description

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 2dBi max

Antenna Type : Dipole antenna

Connector Type : Reverse SMA

### 1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Notebook	DELL	PP05L	CN-5G5152-48643-498-6810	FCC DoC Approved
Printer	HP	DeskJet 400	TH86I1K30S	FCC DoC Approved
Modem	LEMEL	MD-56KVT-100	00V230A00078422	ARSCM560S
Wireless AP	SMC	SMC2655W	S25028NU05021	FCC DoC Approved

## **2. Test specifications**

### **2.1 Test standard**

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section § 15.205, §15.207, §15.209, §15.247 and ANSI C63.4/2003.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

### **2.2 Operation mode**

The EUT was operating in continuously transmitting status during all the tests except conducted emission test during which the EUT was tested in normal operating mode with AP.

**2.3 Test equipment**

Equipment	Brand	Frequency range	Model No.	Intertek ID No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	EC303	04/17/2006
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	EC317	08/07/2006
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/24/2006
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	11/01/2006
Horn Antenna	SCHWARZBECK	1GHz~18GHz	BBHA 9120 D	EC371	12/22/2007
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	EC351	07/08/2007
Bilog Antenna	SCHWARZBECK	25MHz~2GHz	VULB 9168	EC347	12/23/2007
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	12/29/2006
Pre-Amplifier	MITEQ	26GHz~40GHz	828825	EC374	01/28/2006
Wideband Peak Power Meter/ Sensor	Anritsu	100MHz~18GHz	ML2497A/ MA2491A	EC396	11/10/2006
Controller	HDGmbH	N/A	CM 100	EP346	N/A
Antenna Tower	HDGmbH	N/A	MA 240	EP347	N/A
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	01/13/2006

Note: 1. The above equipments are within the valid calibration period.  
2. The test antennas (receiving antenna) are calibration per 3 years.

### 3. Minimum 6dB Bandwidth test

#### 3.1 Operating environment

Temperature: 23  
Relative Humidity: 53 %  
Atmospheric Pressure: 1023 hPa

#### 3.2 Test setup & procedure

The minimum 6dB bandwidth per FCC §15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz, and the SPAN>>RBW. The test was performed at 3 channels (lowest, middle and highest channel). The minimum 6-dB modulation bandwidth is in the following Table.

#### 3.3 Measured data of Minimum 6dB Bandwidth test results

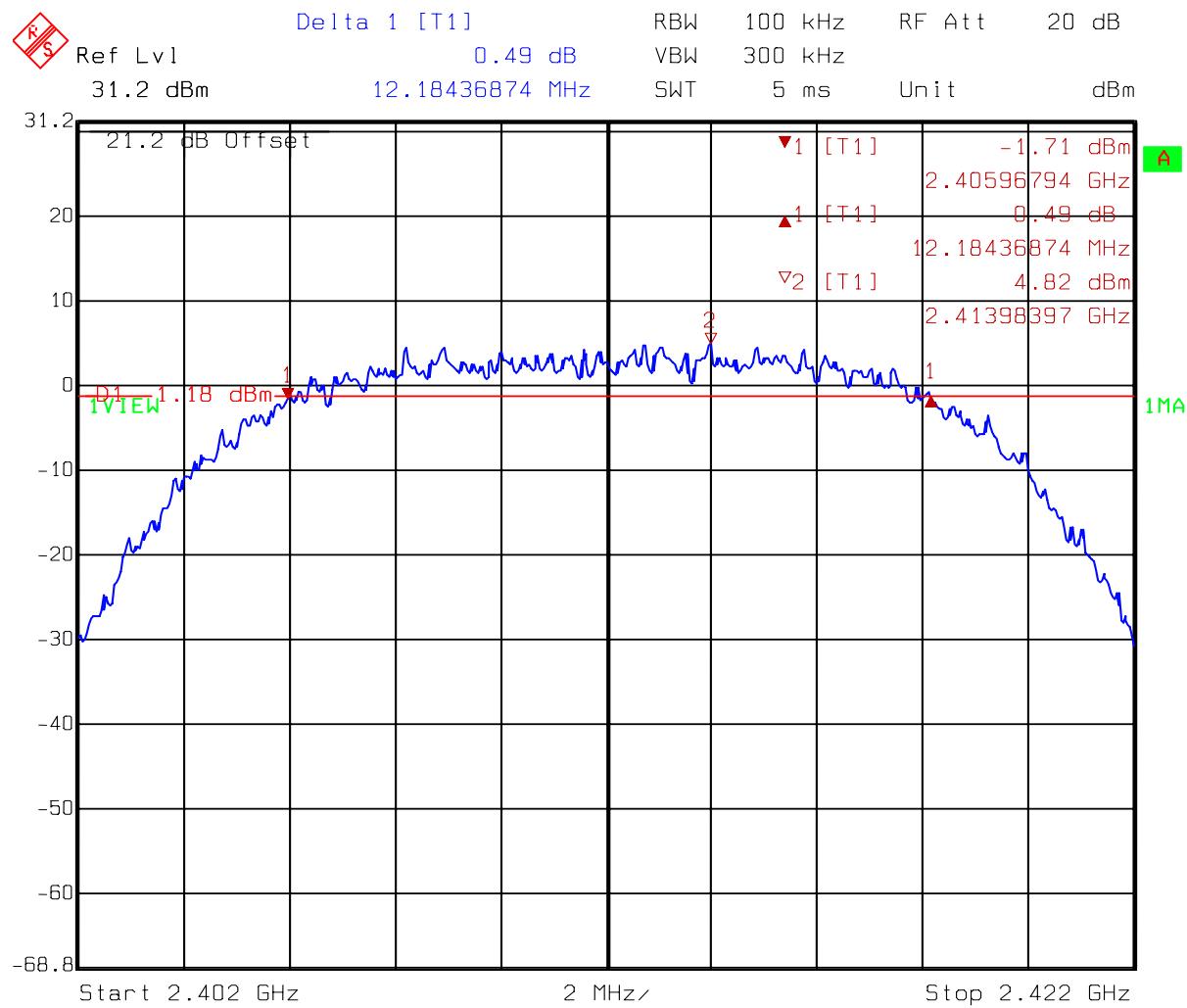
##### Test Mode: 802.11b (DSSS Modulation) operating mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
1 (lowest)	2412	12.18436874	> 500kHz
6 (middle)	2437	12.22444890	> 500kHz
11 (highest)	2462	12.34468938	> 500kHz

##### Test Mode: 802.11g (OFDM Modulation) operating mode

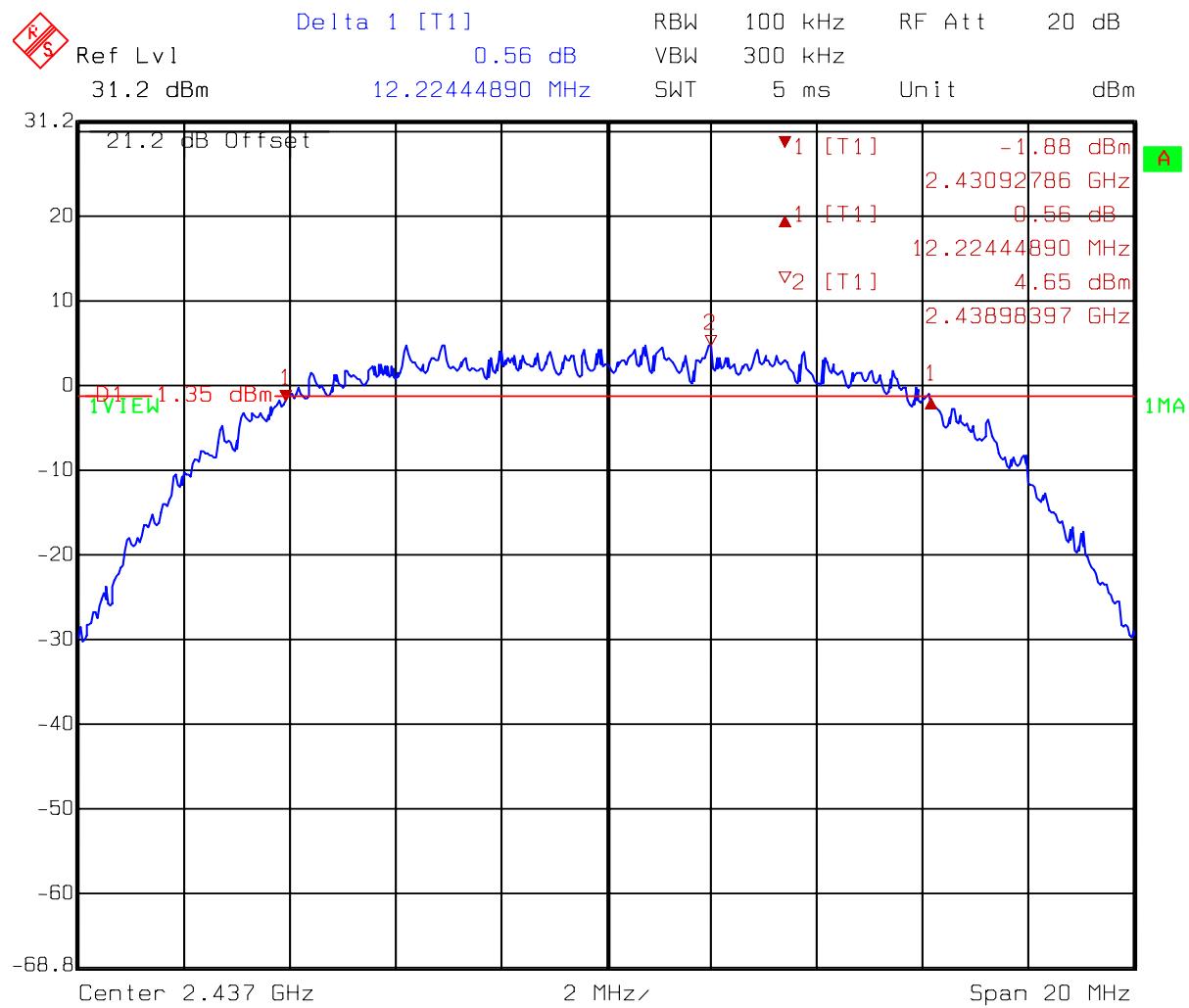
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
1 (lowest)	2412	16.59318637	> 500kHz
6 (middle)	2437	16.55310621	> 500kHz
11 (highest)	2462	16.55310621	> 500kHz

Please see the plot below.

**Test Mode: 802.11b(DSSS Modulation) operating mode**


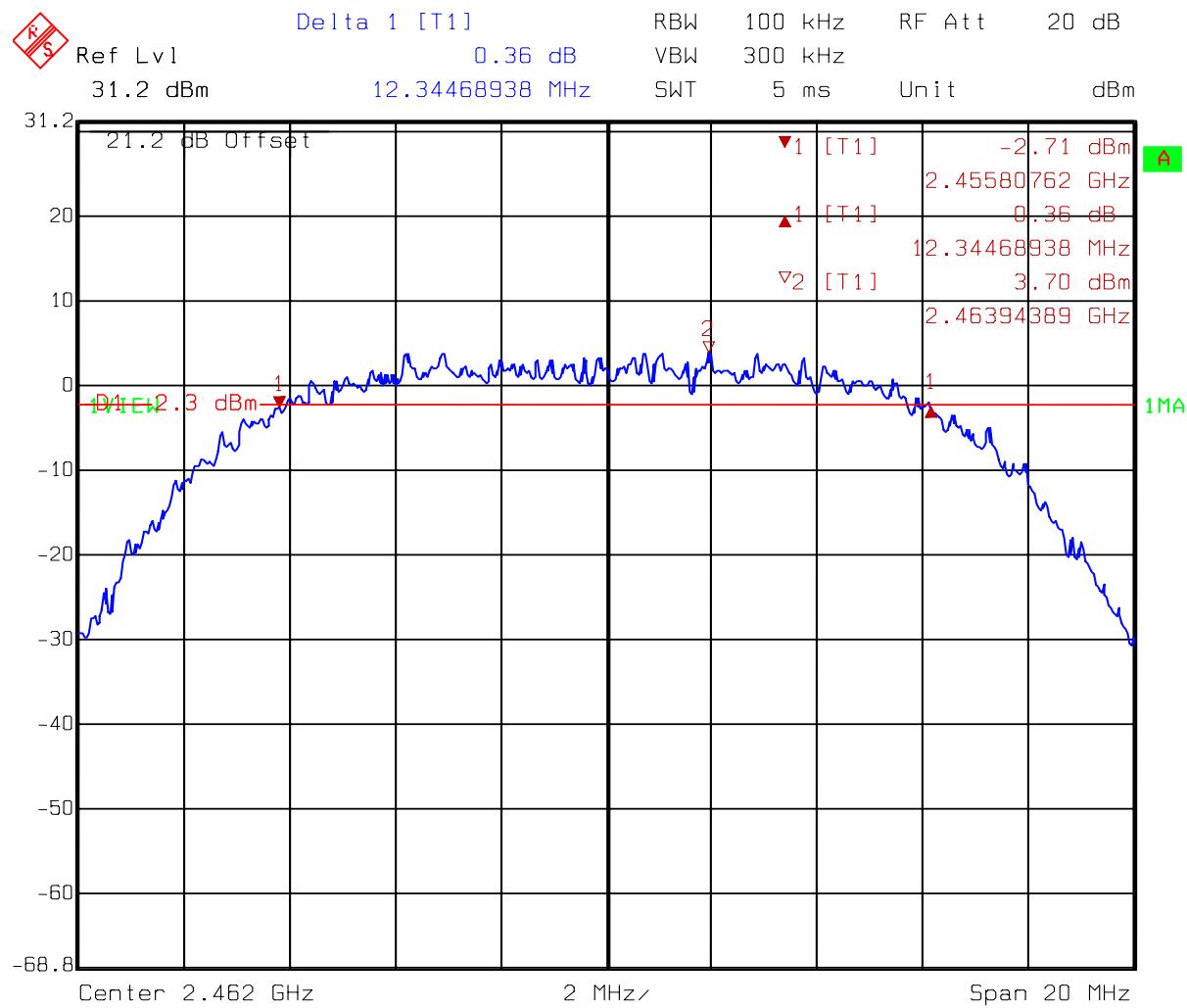
Comment A: 6dB Bandwidth  
802.11b CH1

Date: 04.JAN.2006 15:56:53



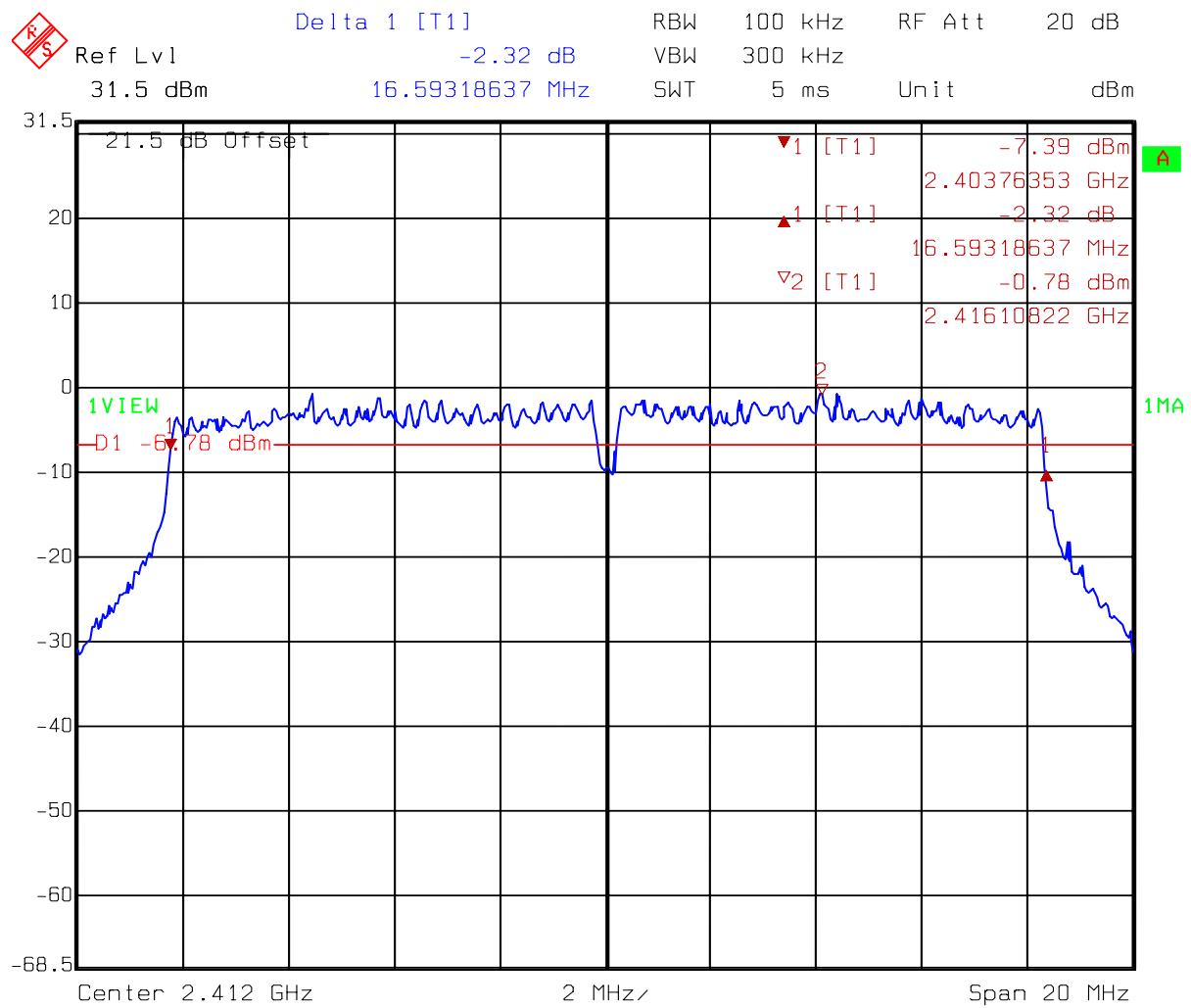
Comment A: 6dB Bandwidth  
802.11b CH6

Date: 04.JAN.2006 15:58:24

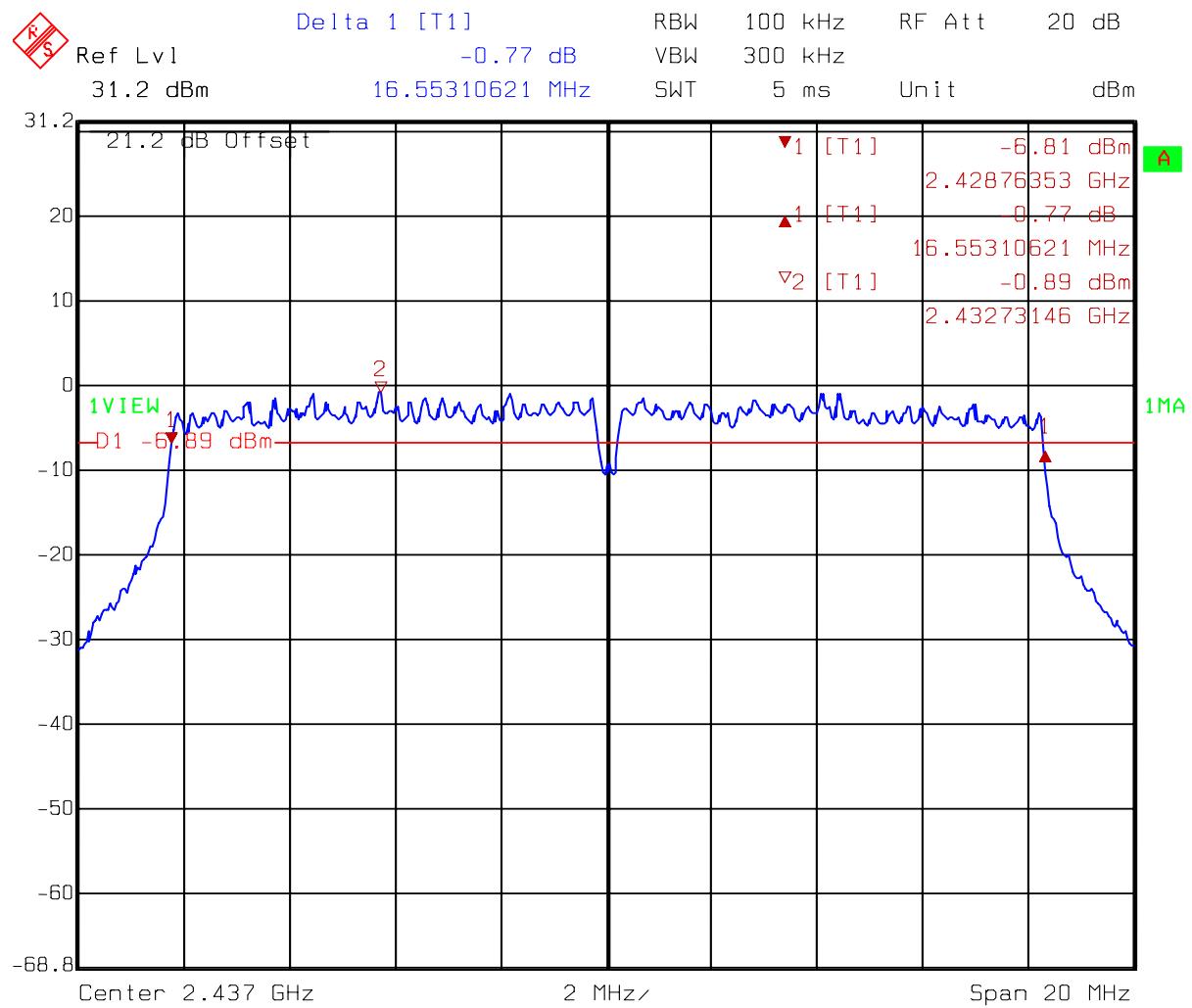


Comment A: 6dB Bandwidth  
802.11b CH11

Date: 04.JAN.2006 15:59:28

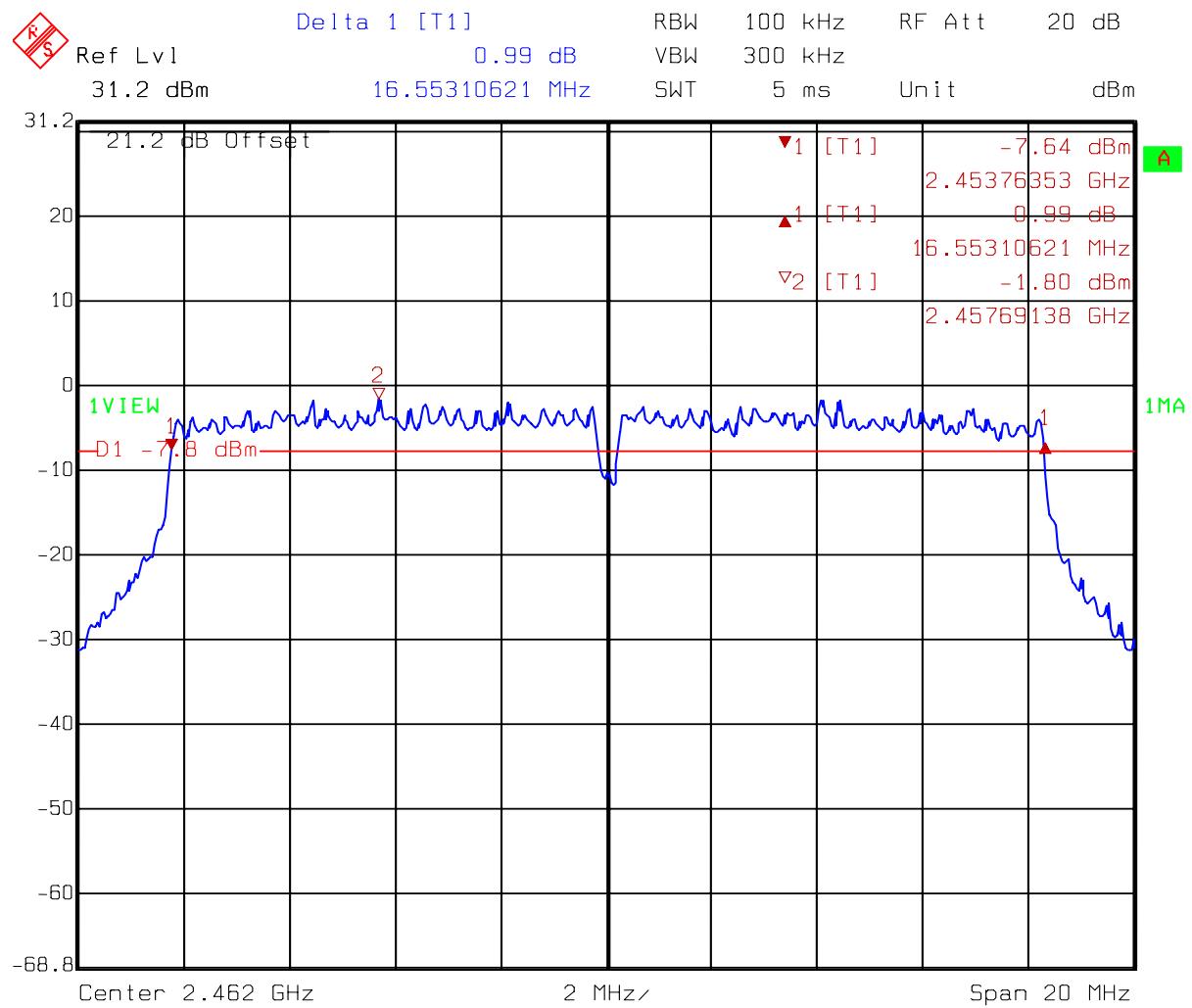
**Test Mode: 802.11g(OFDM Modulation) operating mode**


Comment A: 6dB Bandwidth  
802.11g CH1  
Date: 04.JAN.2006 16:00:47



Comment A: 6dB Bandwidth  
802.11g CH6

Date: 04.JAN.2006 16:01:50



Comment A: 6dB Bandwidth  
802.11g CH11

Date: 04.JAN.2006 16:02:48

## 4. Maximum Output Power test

### 4.1 Operating environment

Temperature: 25  
 Relative Humidity: 55 %  
 Atmospheric Pressure: 1023 hPa

### 4.2 Test setup & procedure

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to peak power meter via power sensor. Power was read directly and cable loss correction (1.2 dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

### 4.3 Measured data of Maximum Output Power test results

#### Test Mode: 802.11b (DSSS Modulation) operating mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (dBm)
				(dBm)	(mW)	
1 (lowest)	2412	1.2	17.25	18.45	69.98	30
6 (middle)	2437	1.2	17.42	18.62	72.78	30
11 (highest)	2462	1.2	16.52	17.72	59.16	30

Remark:

Conducted Peak Output Power = Reading + C.L.

#### Test Mode: 802.11g (OFDM Modulation) operating mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (dBm)
				(dBm)	(mW)	
1 (lowest)	2412	1.2	19.73	20.93	123.88	30
6 (middle)	2437	1.2	19.76	20.96	124.74	30
11 (highest)	2462	1.2	19.32	20.52	112.72	30

Remark:

Conducted Peak Output Power = Reading + C.L.

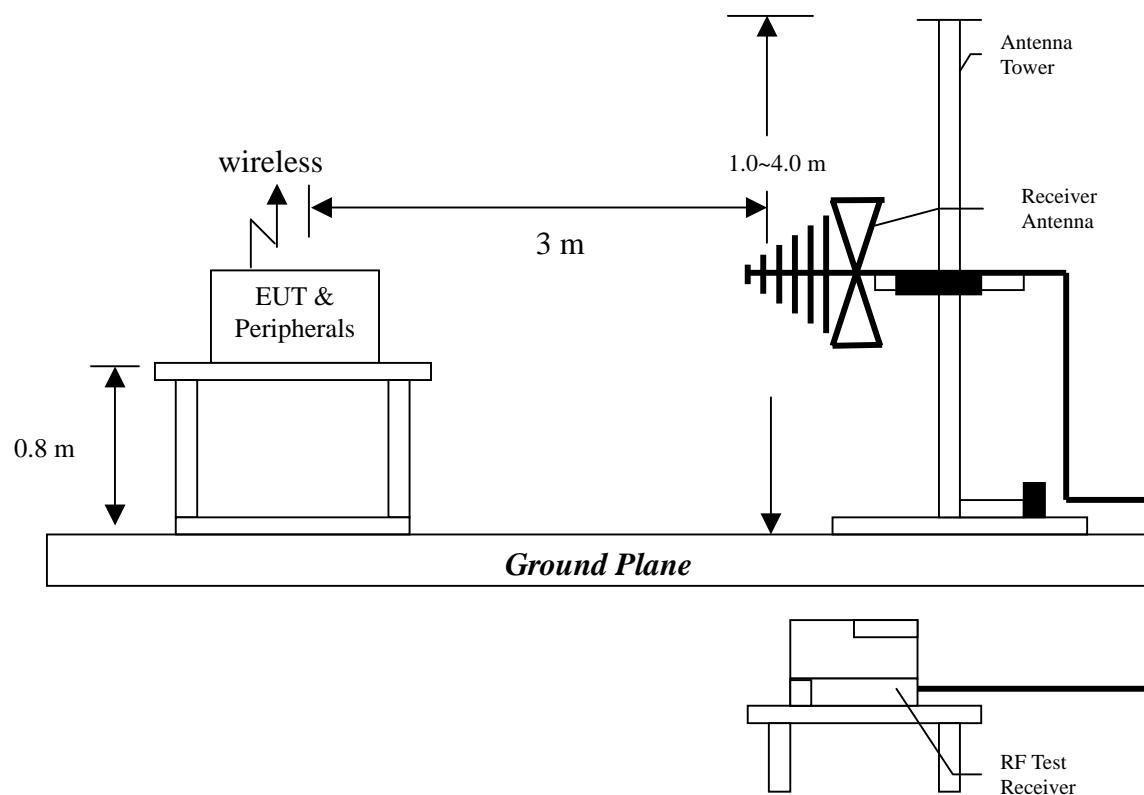
## 5. Radiated Emission test

### 5.1 Operating environment

Temperature: 23  
 Relative Humidity: 55 %  
 Atmospheric Pressure: 1023 hPa

### 5.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were investigated over the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meter reading using inverse scaling with distance.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

### 5.3 Emission limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dB $\mu$ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is 4.98 dB.

**5.4 Radiated spurious emission test data****The radiated spurious emissions at**

Frequency(MHz)	Margin
165.800	-3.86
198.780	-4.79
297.720	-4.13
165.800	-4.00
231.760	-4.70
264.740	-2.72
330.700	-1.04
6432	-1.88
6480	-2.18
6432	-1.48
6480	-3.93

**are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.**

#### 5.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under 802.11b continuously transmitting mode. Channel 1, 6, 11 were verified. The worst case occurred at 802.11b Tx channel 1.

EUT : HL-11G  
 Worst Case : 802.11b Tx at channel 1

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
V	99.840	QP	7.38	26.80	34.18	43.50	-9.33	100	330
V	165.800	QP	15.70	17.29	32.99	43.50	-10.51	100	161
V	231.760	QP	12.18	20.60	32.78	46.00	-13.22	100	89
V	266.680	QP	12.76	22.43	35.19	46.00	-10.81	102	74
V	297.720	QP	13.95	16.54	30.49	46.00	-15.51	102	323
V	466.500	QP	17.68	16.31	33.99	46.00	-12.01	171	141
H	97.900	QP	7.93	26.97	34.90	43.50	-8.61	400	137
H	132.820	QP	12.32	24.77	37.09	43.50	-6.41	400	359
H	165.800	QP	13.84	25.81	39.65	43.50	-3.86	400	220
H	198.780	QP	11.27	27.45	38.72	43.50	-4.79	400	187
H	297.720	QP	14.17	27.71	41.88	46.00	-4.13	357	360
H	466.500	QP	18.16	18.51	36.67	46.00	-9.33	198	307

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

The test was performed on EUT under 802.11g continuously transmitting mode. Channel 1, 6, 11 were verified. The worst case occurred at 802.11g Tx channel 1.

EUT : HL-11G  
 Worst Case : 802.11g Tx at channel 1

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
V	64.920	QP	12.23	18.26	30.49	40.00	-9.51	100	56
V	99.840	QP	7.38	25.79	33.17	43.50	-10.34	100	40
V	165.800	QP	15.70	16.77	32.47	43.50	-11.03	100	246
V	231.760	QP	12.18	20.79	32.97	46.00	-13.03	100	163
V	264.740	QP	12.76	22.23	34.99	46.00	-11.01	102	202
V	330.700	QP	14.98	25.40	40.38	46.00	-5.62	105	49
H	165.800	QP	13.84	25.67	39.51	43.50	-4.00	400	179
H	198.780	QP	11.27	27.03	38.30	43.50	-5.21	400	353
H	231.760	QP	11.74	29.56	41.30	46.00	-4.70	400	307
H	264.740	QP	12.88	30.40	43.28	46.00	-2.72	365	192
H	297.720	QP	14.17	26.84	41.01	46.00	-5.00	350	104
H	330.700	QP	14.40	30.57	44.97	46.00	-1.04	286	179

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

### 5.4.2 Measurement results: frequency above 1GHz

#### Test Mode: 802.11b (DSSS Modulation) operating mode

EUT : HL-11G

Test Condition : 802.11b Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Ant. high (cm)	Turn Table angle (degree)
6432	PK	V	36.65	40.87	47.9	52.12	54	-1.88	115	285

#### Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:

1GHz-3GHz: 20dBuV  
3GHz-14GHz: 27dBuV  
14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV  
3GHz-14GHz: 16dBuV  
14GHz-26.5GHz: 28dBuV

EUT : HL-11G  
 Test Condition : 802.11b Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Ant. high (cm)	Turn Table angle (degree)
3240	PK	V	35.54	34.62	46.18	45.26	54	-8.74	124	295
6480	PK	V	36.65	40.87	47.6	51.82	54	-2.18	124	288

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV  
 3GHz-14GHz: 27dBuV  
 14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV  
 3GHz-14GHz: 16dBuV  
 14GHz-26.5GHz: 28dBuV

EUT : HL-11G  
 Test Condition : 802.11b Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Ant. high (cm)	Turn Table angle (degree)
3296	PK	V	35.54	34.62	46.76	45.84	54	-8.16	150	265
6592	PK	V	36.58	42.96	42.3	48.68	54	-5.32	112	312

## Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV  
 3GHz-14GHz: 27dBuV  
 14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV  
 3GHz-14GHz: 16dBuV  
 14GHz-26.5GHz: 28dBuV

**Test Mode: 802.11g (OFDM Modulation) operating mode**

EUT : HL-11G

Test Condition : 802.11g Tx at channel 1

Frequency (MHz)	Spectrum Analyzer	Antenna Polariz.	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Ant. high (cm)	Turn Table angle (degree)
3216	PK	V	35.54	34.62	45.51	44.59	54	-9.41	112	266
6432	PK	V	36.65	40.87	48.3	52.52	54	-1.48	115	273

**Remark:**

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:

1GHz-3GHz: 20dBuV  
 3GHz-14GHz: 27dBuV  
 14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV  
 3GHz-14GHz: 16dBuV  
 14GHz-26.5GHz: 28dBuV

EUT : HL-11G  
 Test Condition : 802.11g Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Ant. high (cm)	Turn Table angle (degree)
3240	PK	V	35.54	34.62	45.27	44.35	54	-9.65	115	265
6480	PK	V	36.65	40.87	45.85	50.07	54	-3.93	110	277

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV  
 3GHz-14GHz: 27dBuV  
 14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV  
 3GHz-14GHz: 16dBuV  
 14GHz-26.5GHz: 28dBuV

EUT : HL-11G  
 Test Condition : 802.11g Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Ant. high (cm)	Turn Table angle (degree)
3296	PK	V	35.54	34.62	47.11	46.19	54	-7.81	110	320
6592	AV	V	36.58	42.96	42.45	48.83	54	-5.17	110	316

## Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV  
 3GHz-14GHz: 27dBuV  
 14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV  
 3GHz-14GHz: 16dBuV  
 14GHz-26.5GHz: 28dBuV

## 6. Power Spectrum Density test

### 6.1 Operating environment

Temperature: 22  
Relative Humidity: 50 %  
Atmospheric Pressure 1023 hPa

### 6.2 Test setup & procedure

The power spectrum density per FCC §15.247(e) was measured from the antenna port of the EUT using a 50ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 10kHz, a span of 1.5 MHz, and the sweep time set at 500 seconds. Power Density was read directly added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel). The Power Spectral Density measured result is in the following table.

### 6.3 Measured data of Power Spectrum Density test results

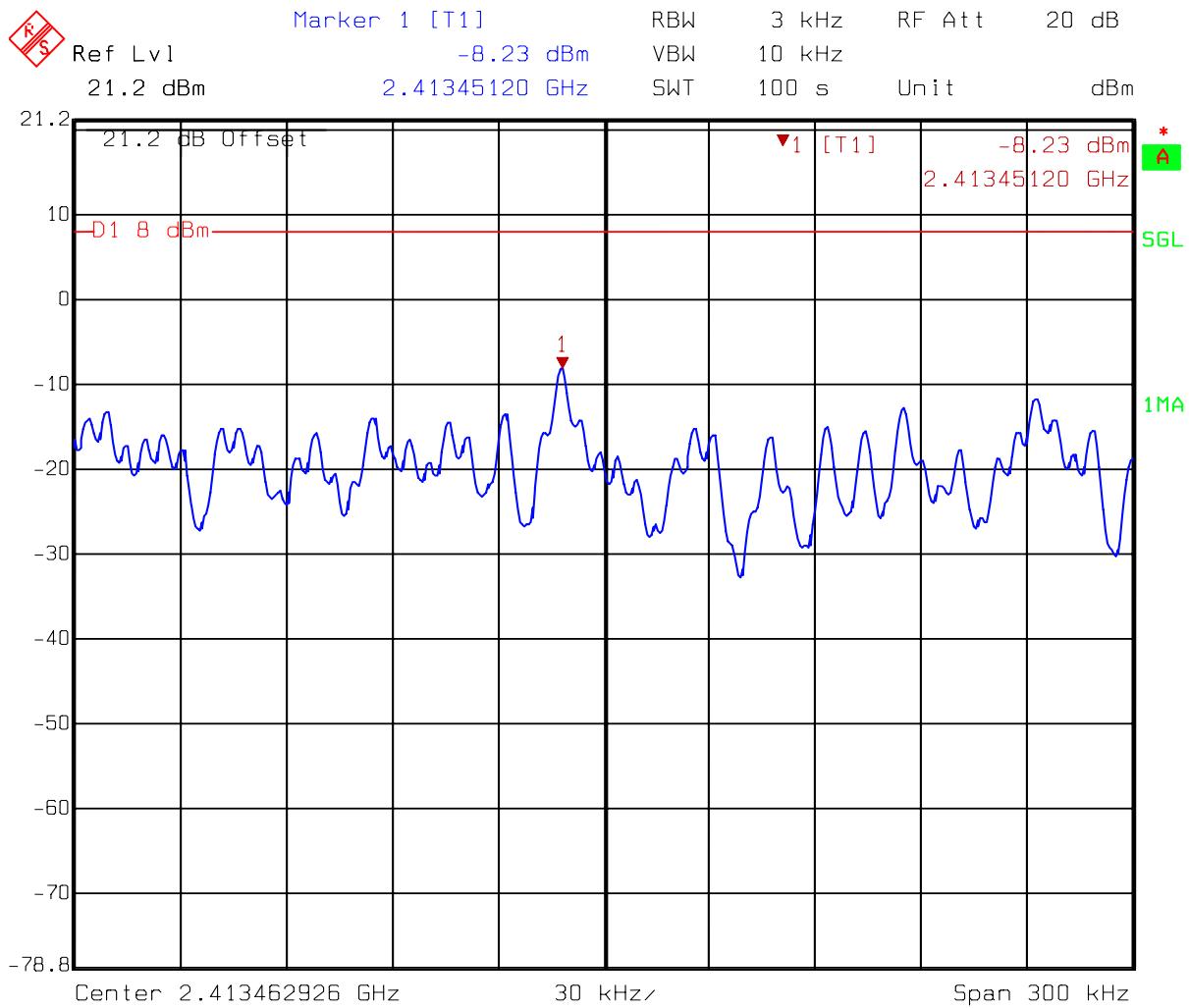
#### Test Mode: 802.11b (DSSS Modulation) operating mode

Channel	Frequency (MHz)	Power spectrum density (dBm)	Limit (dBm)
1 (lowest)	2412	-8.23	8
6 (middle)	2437	-8.17	8
11 (highest)	2462	-9.14	8

#### Test Mode: 802.11g (OFDM Modulation) operating mode

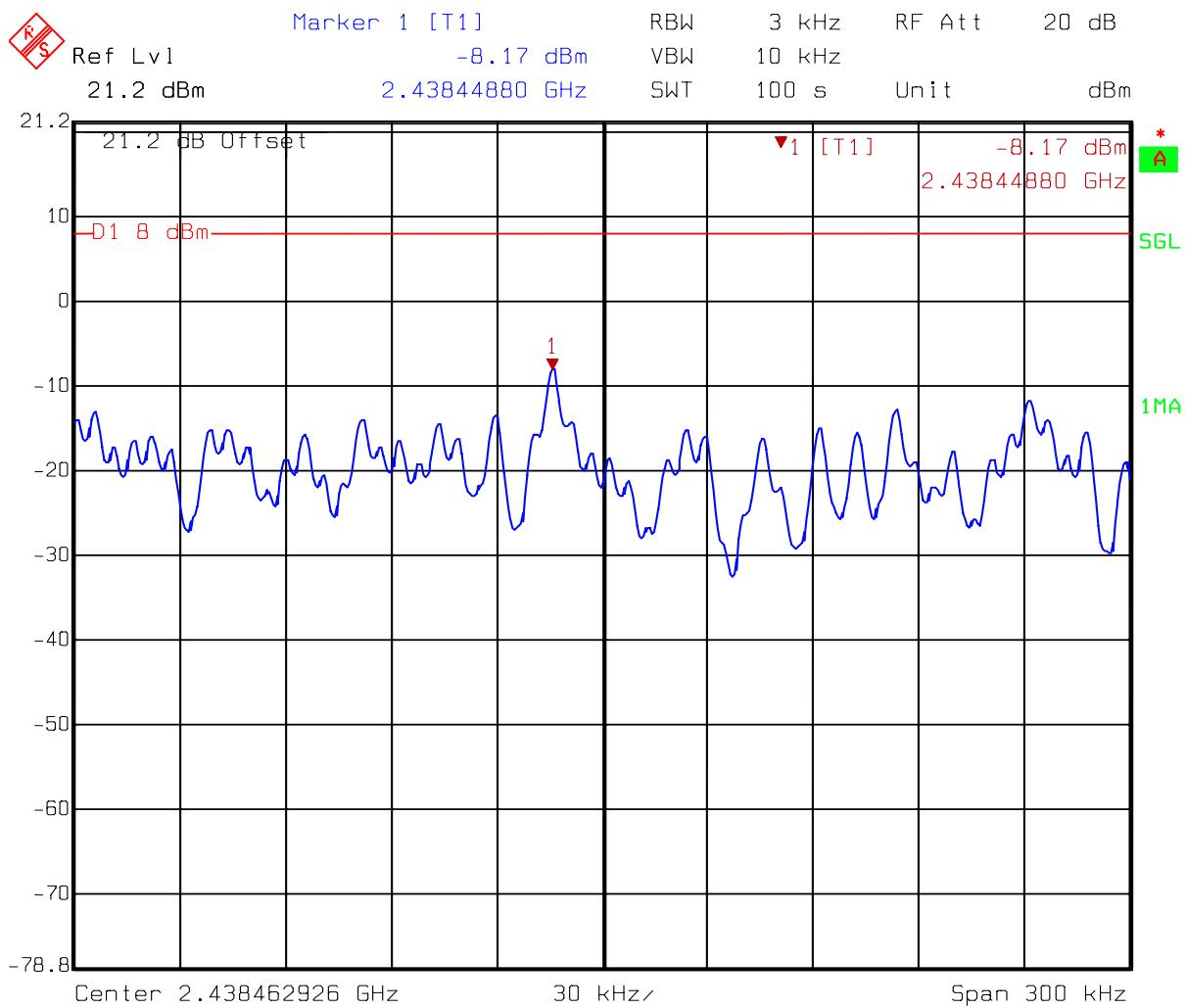
Channel	Frequency (MHz)	Power spectrum density (dBm)	Limit (dBm)
1 (lowest)	2412	-14.60	8
6 (middle)	2437	-14.71	8
11 (highest)	2462	-15.70	8

Please see the plot below.

**Test Mode: 802.11b (DSSS Modulation) operating mode**


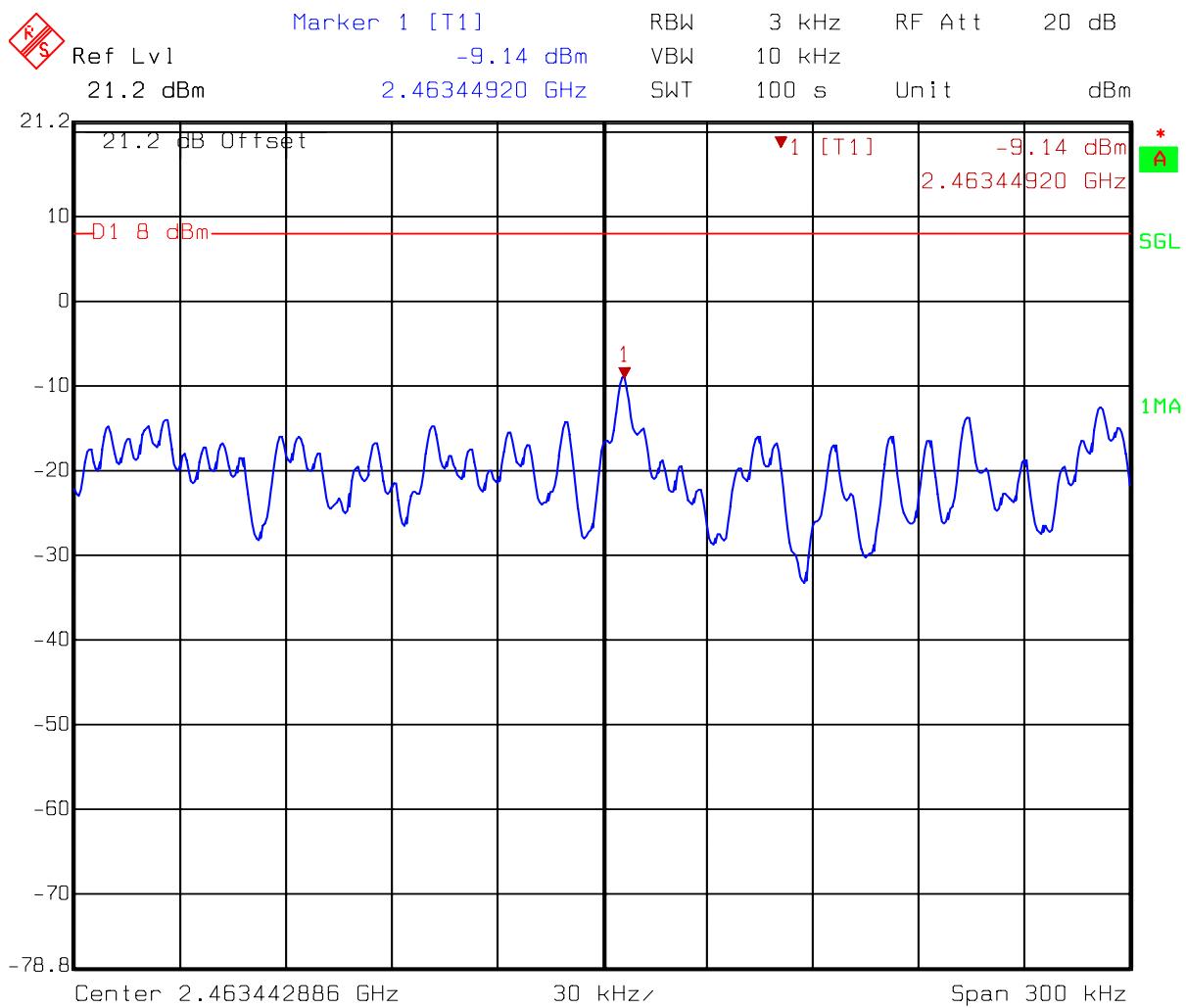
Comment A: Power Spectral Density  
 802.11b CH1

Date: 04.JAN.2006 13:36:51



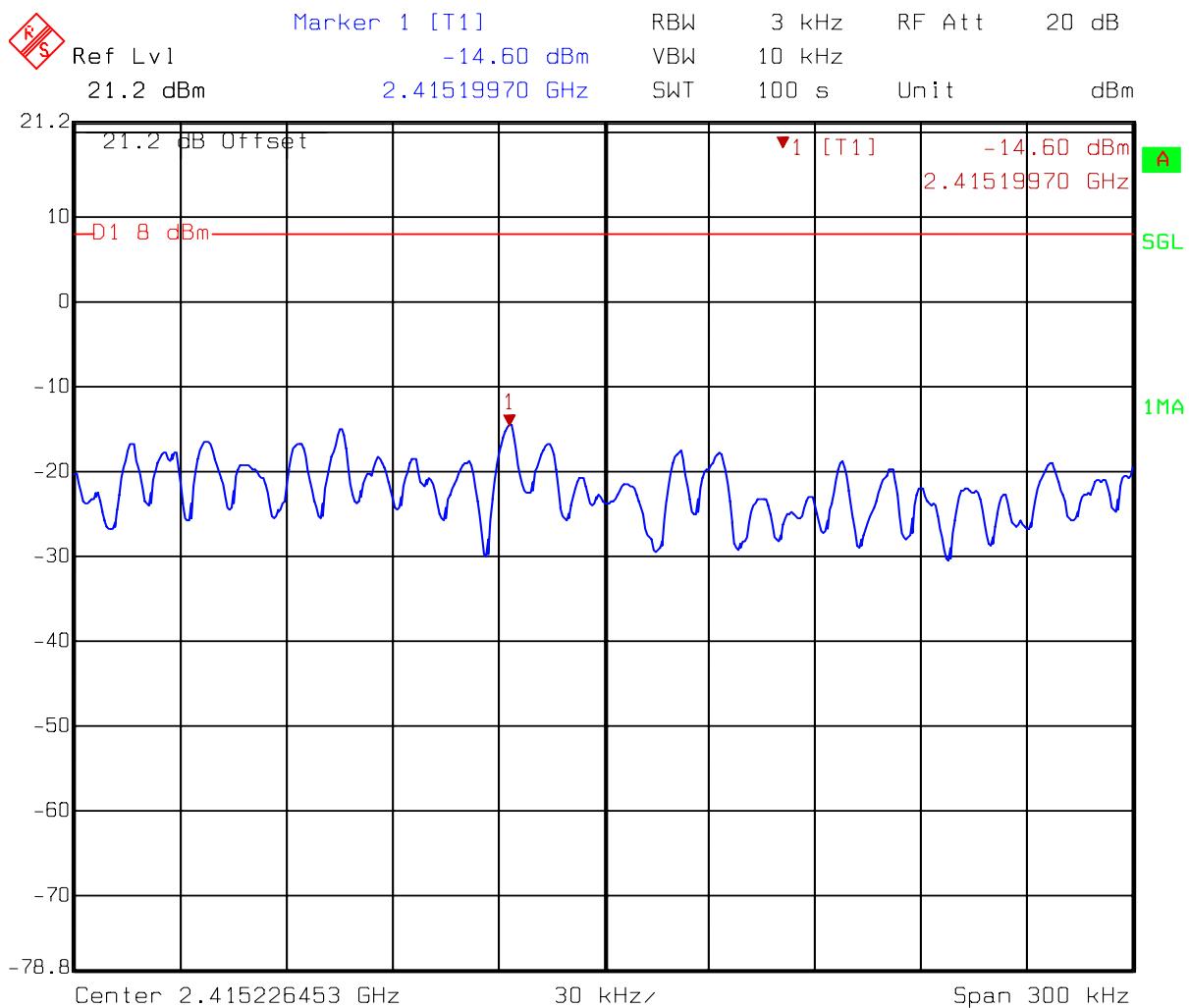
Comment A: Power Spectral Density  
802.11b CH6

Date: 04.JAN.2006 13:39:48



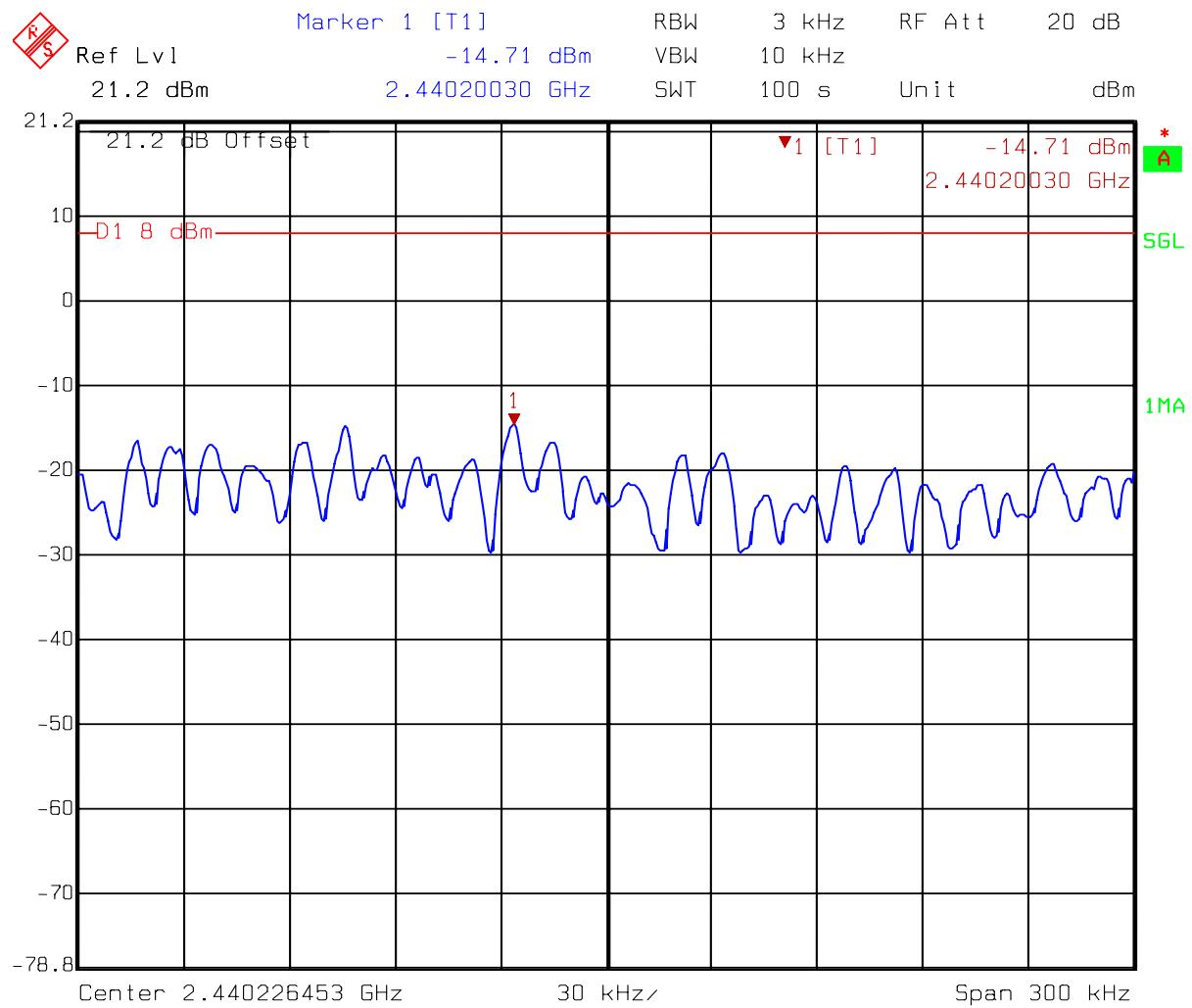
Comment A: Power Spectral Density  
802.11b CH11

Date: 04.JAN.2006 13:42:52

**Test Mode: 802.11g (OFDM Modulation) operating mode**


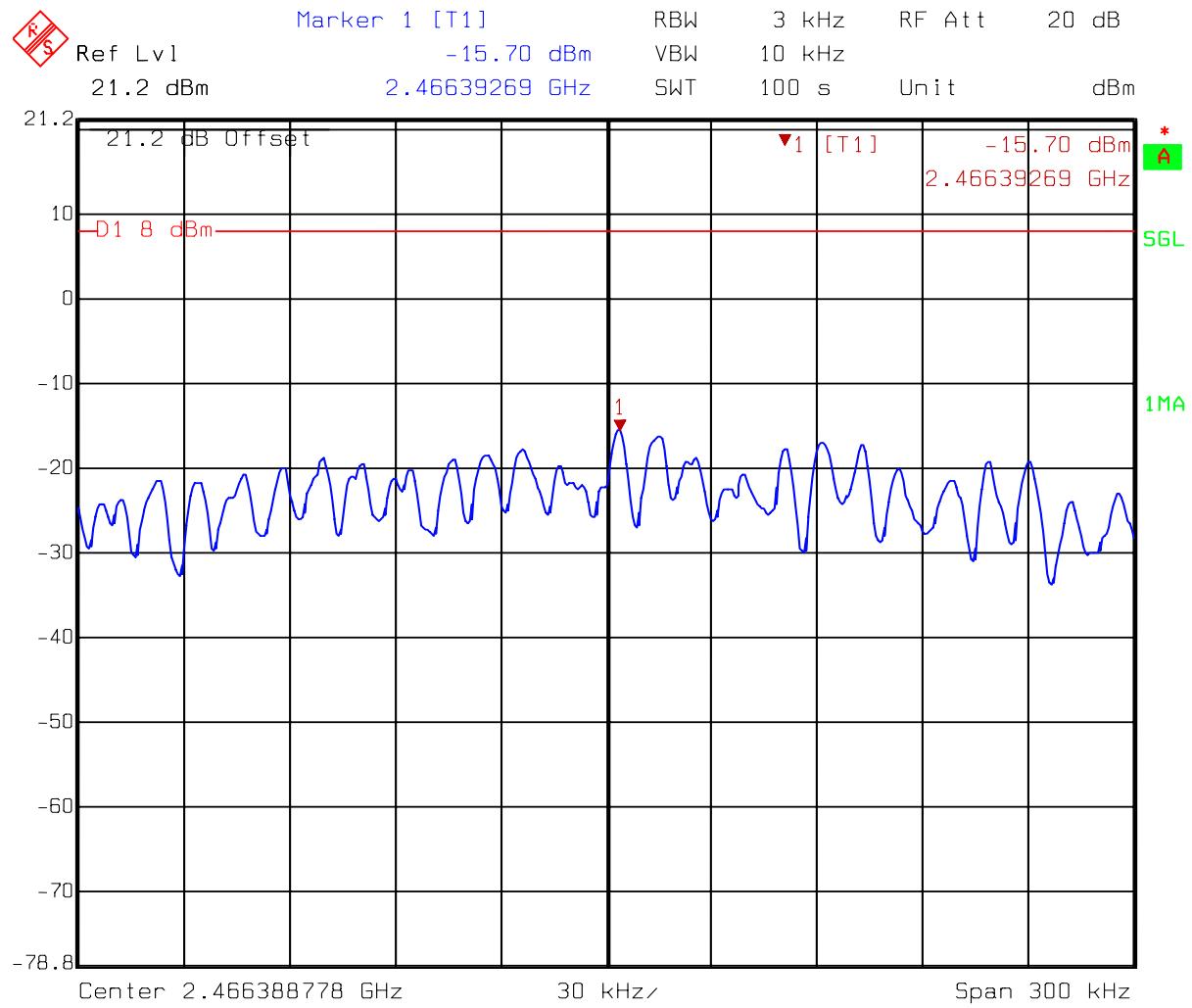
Comment A: Power Spectral Density  
802.11g CH1

Date: 04.JAN.2006 13:45:35



Comment A: Power Spectral Density  
802.11g CH6

Date: 04.JAN.2006 13:48:25



Comment A: Power Spectral Density  
802.11g CH11

Date: 04.JAN.2006 13:52:02

## 7. Emission on the band edge

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

### 7.1 Operating environment

Temperature: 25  
Relative Humidity: 60 %  
Atmospheric Pressure 1023 hPa

### 7.2 Test setup & procedure

The output of EUT was connected to spectrum analyzer via a 50ohm cable.

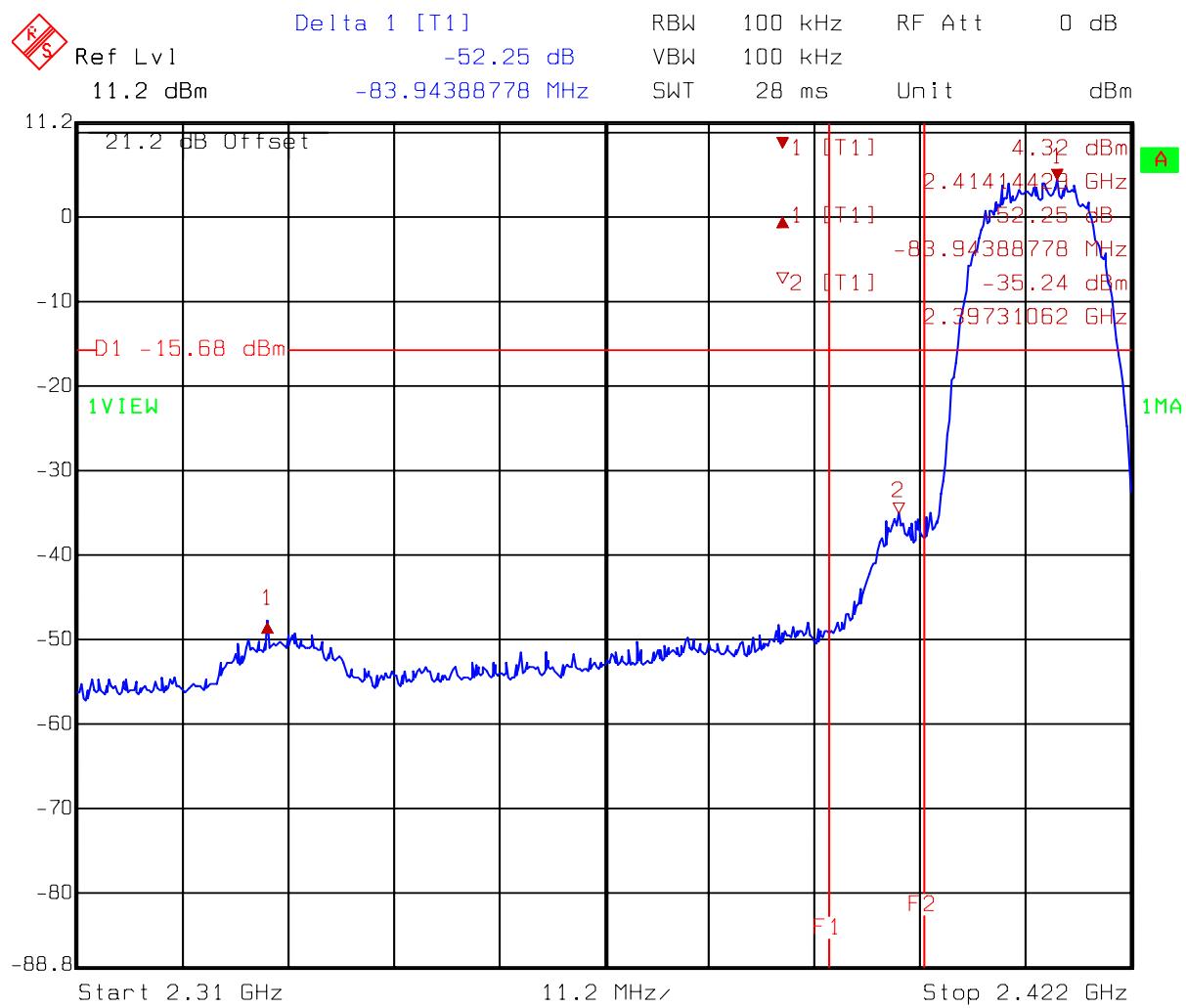
The setting of spectrum analyzer is:

Peak: RBW = 100kHz ; VBW = 100kHz  
Average: RBW = 1MHz ; VBW = 10Hz

## 7.3 Test Result

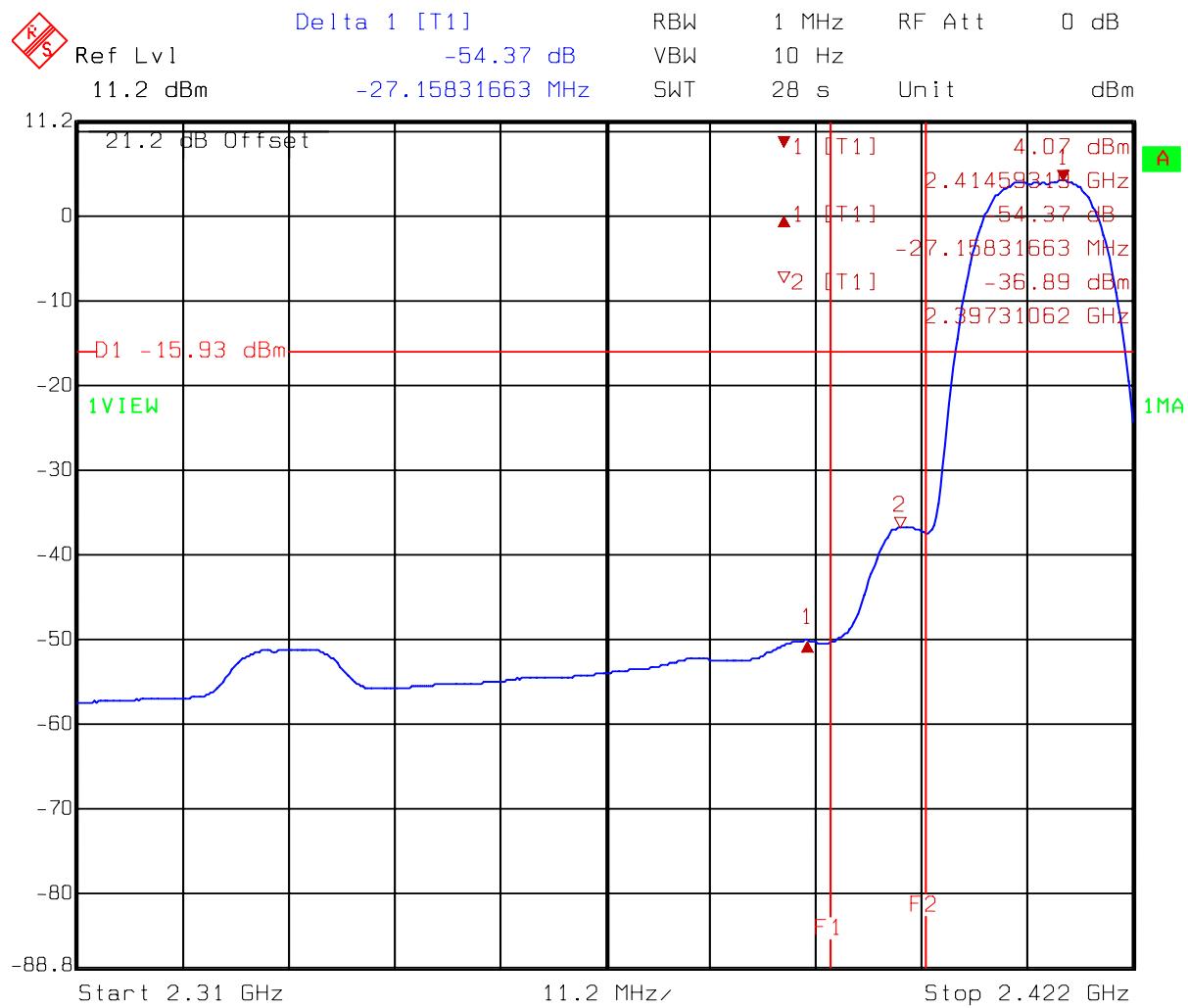
### 7.3.1 Conducted Method

#### Test Mode: 802.11b(DSSS Modulation) operating mode



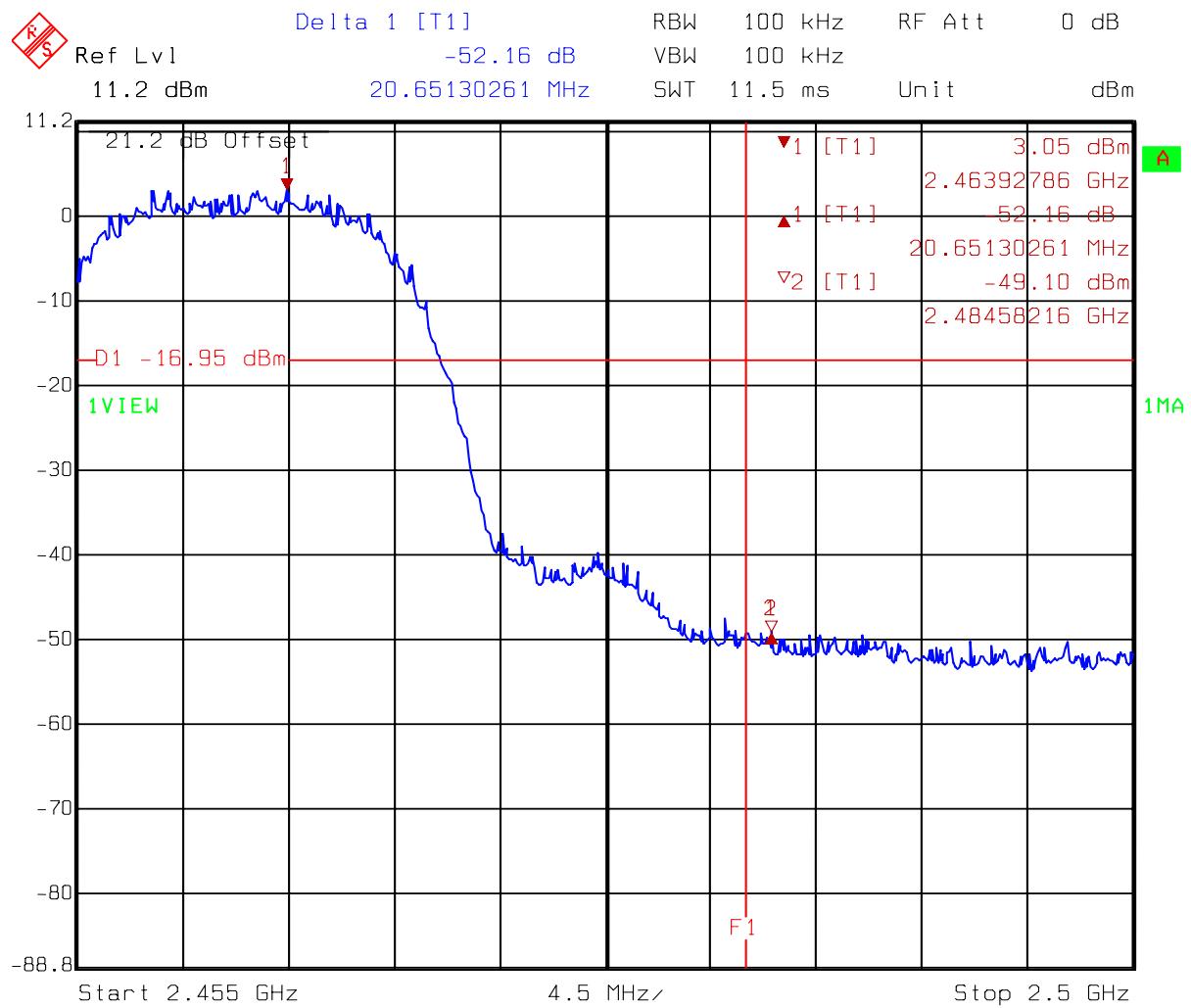
Comment A: Band-edge test at low channel (PK detector)  
802.11b F1=2390MHz F2=2400MHz

Date: 04.JAN.2006 15:39:46



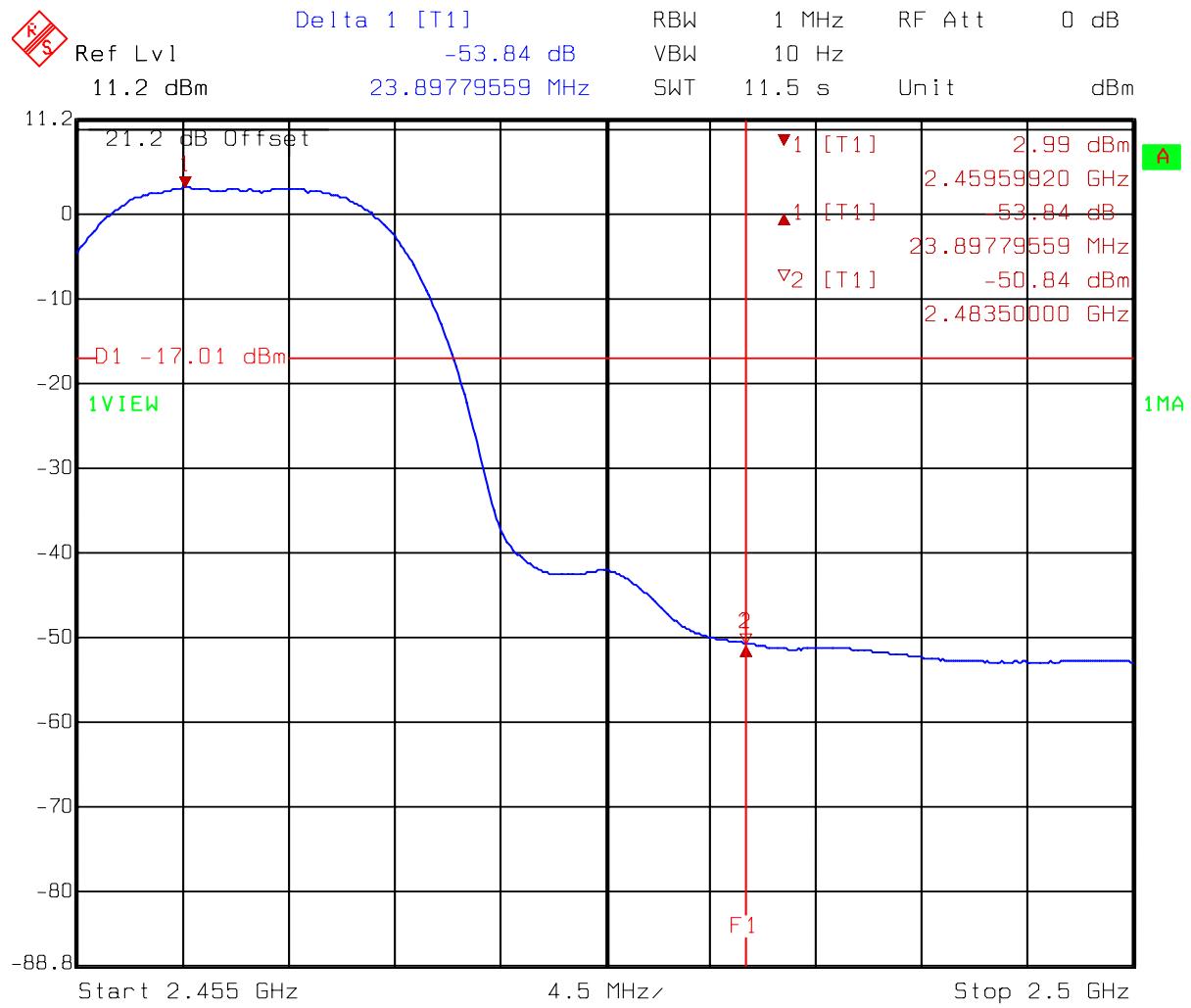
Comment A: Band-edge test at low channel (AV detector)  
802.11b F1=2390MHz F2=2400MHz

Date: 04.JAN.2006 15:41:47



Comment A: Band-edge test at high channel (PK detector)  
802.11b F1=2483.5MHz

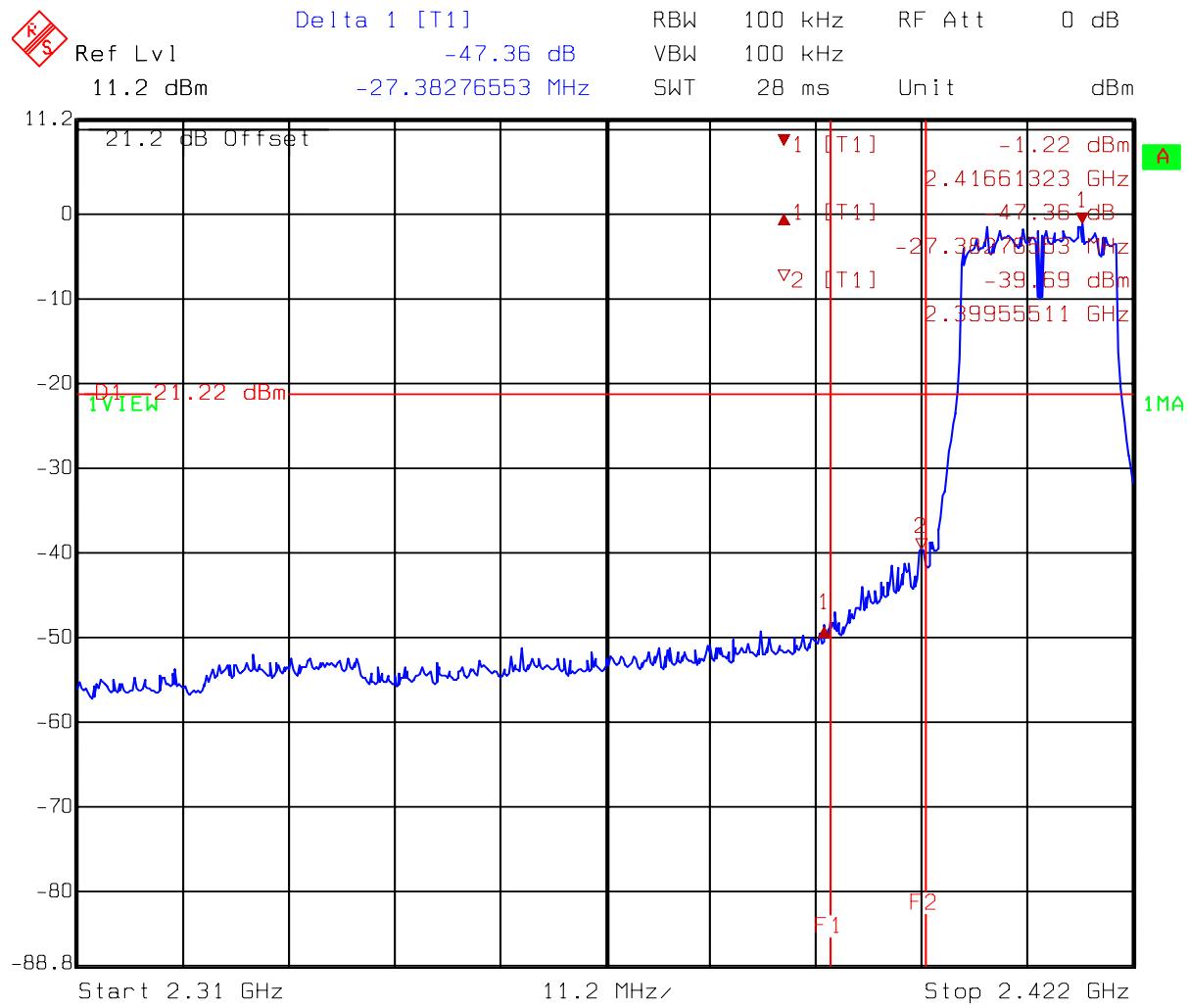
Date: 04.JAN.2006 15:43:39



Comment A: Band-edge test at high channel (AV detector)  
802.11b F1=2483.5MHz

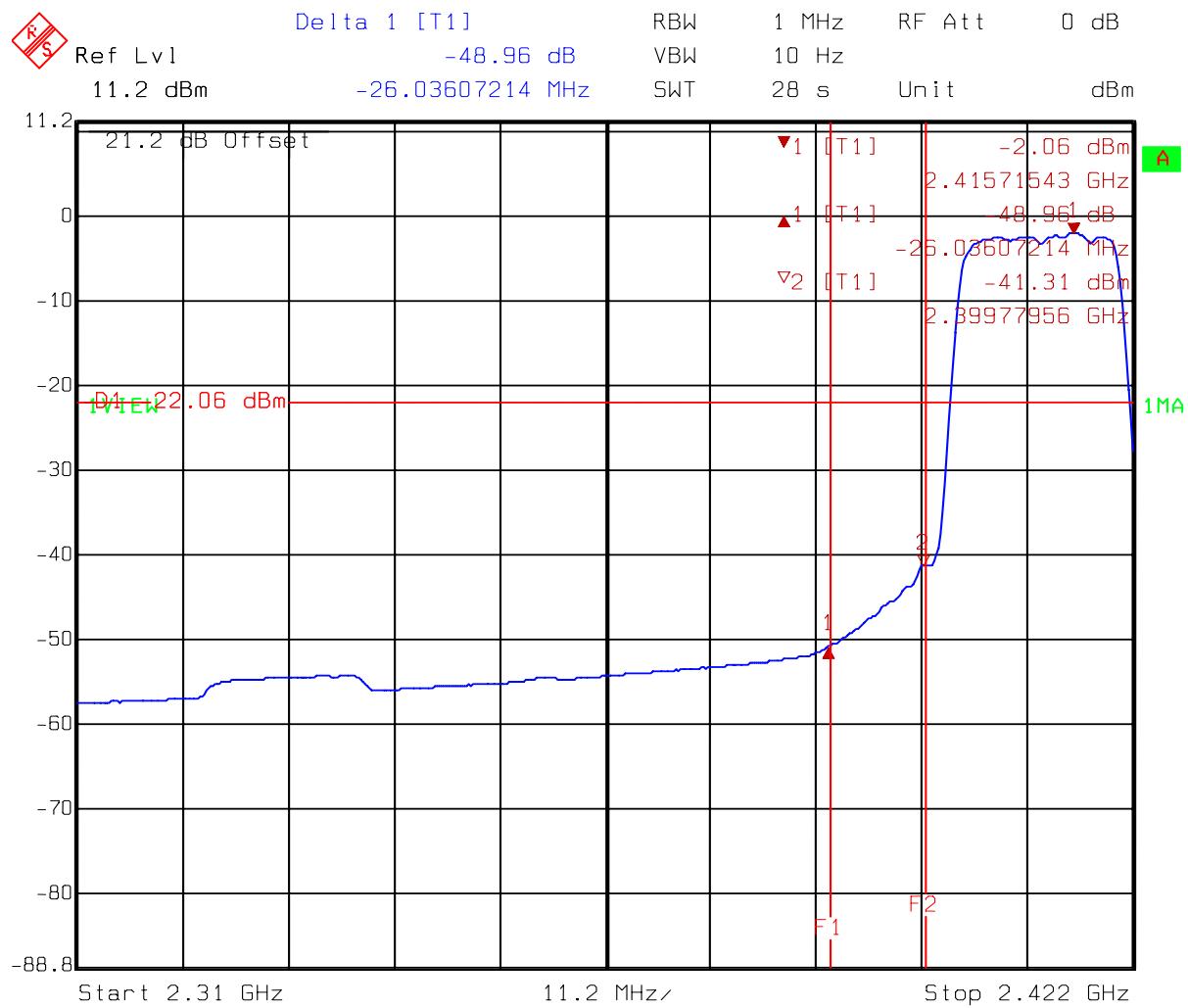
Date: 04.JAN.2006 15:45:53

**Test Mode: 802.11g(OFDM Modulation) operating mode**



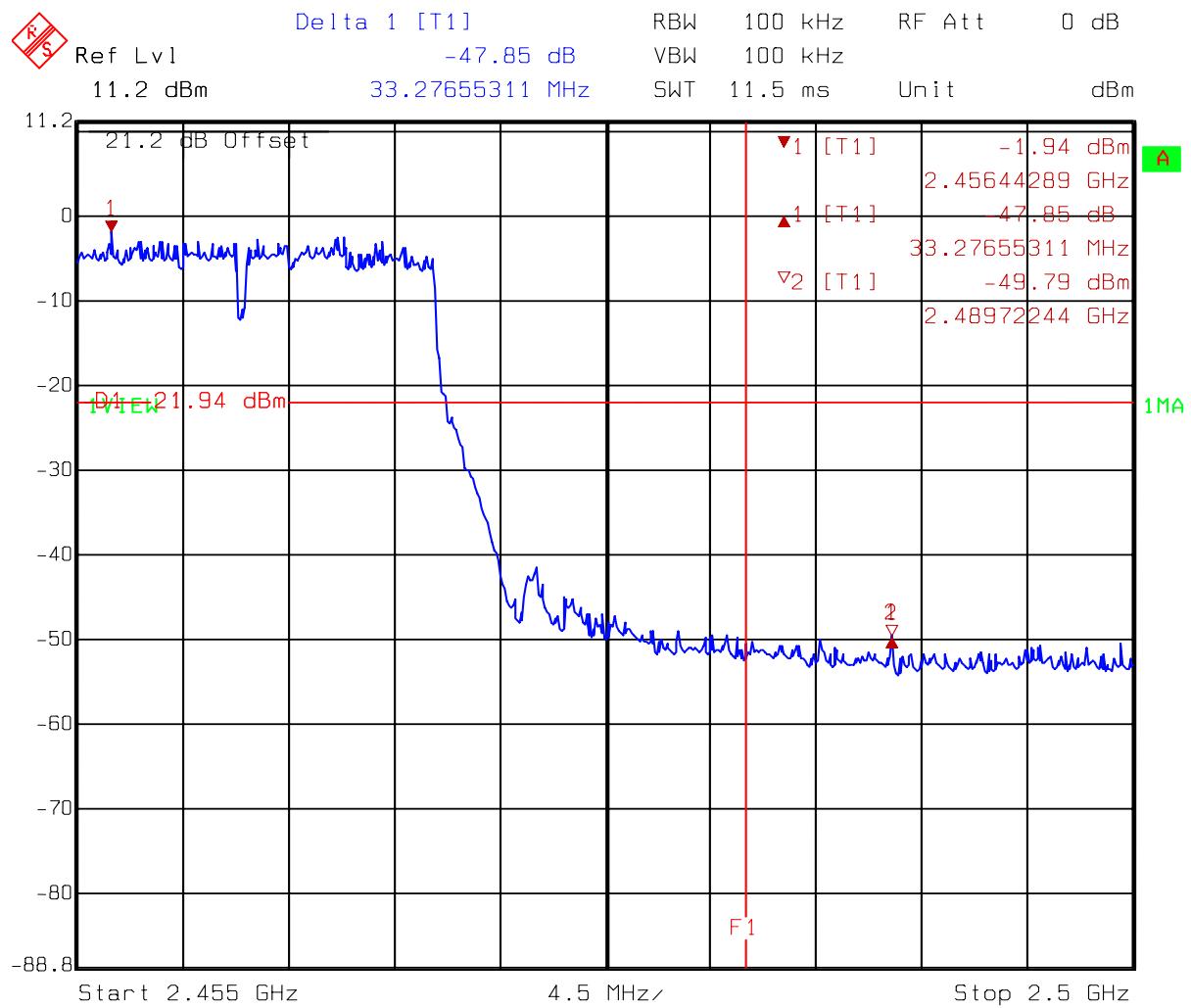
Comment A: Band-edge test at low channel (PK detector)  
802.11g F1=2390MHz F2=2400MHz

Date: 04.JAN.2006 15:48:00



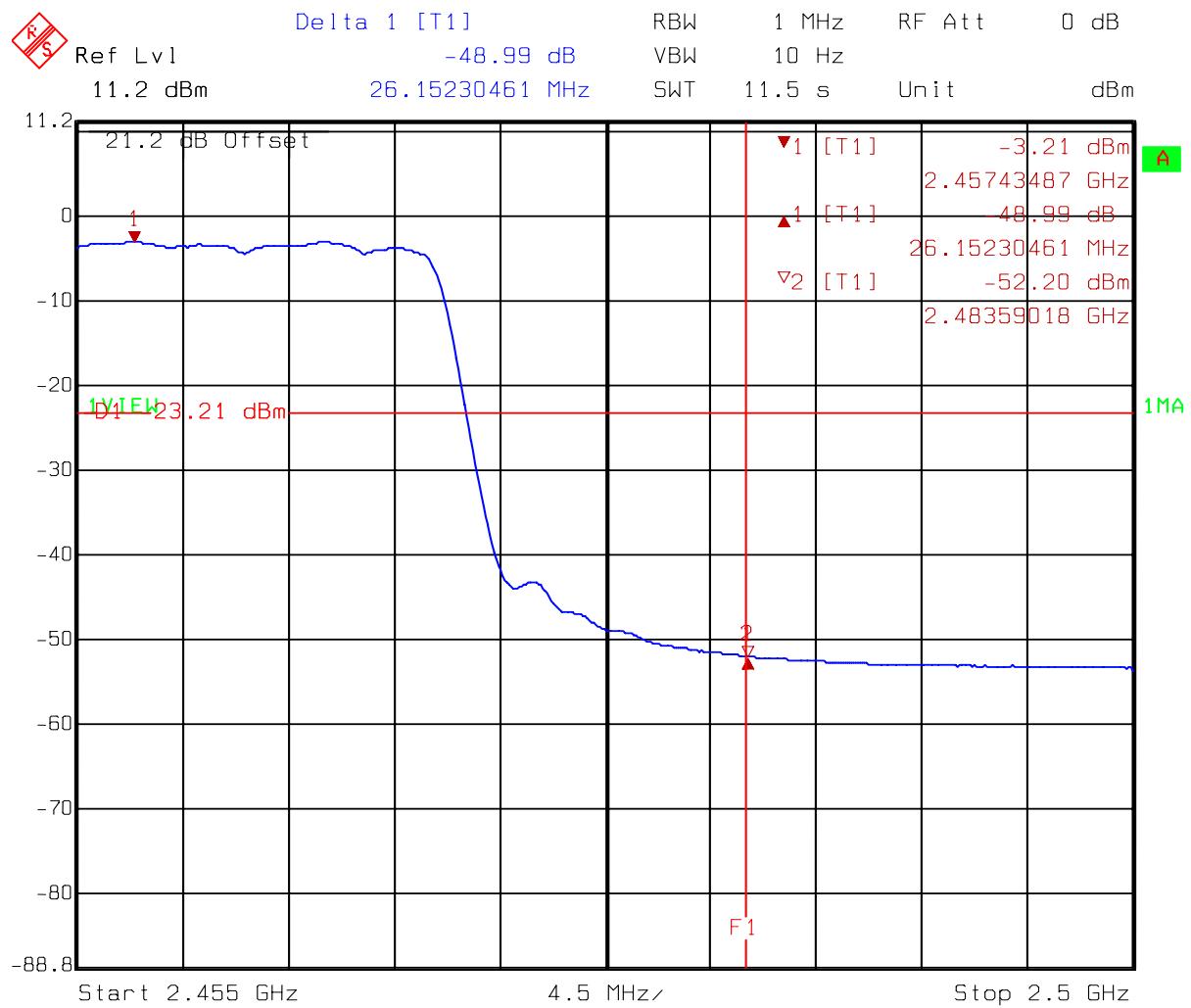
Comment A: Band-edge test at low channel (AV detector)  
802.11g F1=2390MHz F2=2400MHz

Date: 04.JAN.2006 15:52:22



Comment A: Band-edge test at high channel (PK detector)  
802.11g F1=2483.5MHz

Date: 04.JAN.2006 15:53:31



Comment A: Band-edge test at high channel (AV detector)  
802.11g F1=2483.5MHz

Date: 04.JAN.2006 15:54:39

### 7.3.2 Radiated Method

#### Test Mode: 802.11b(DSSS Modulation) operating mode

Channel	Detector	Radiated Method	Conducted Method	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
		Max. Field Strength of Fundamental @3m (dBuV/m)	Between Carrier Max. Power and Local Max. Emission in Restrict Band (dBc)			
		A	B			
1 (lowest)	PK	113.35	52.25	61.1	74	-12.9
	AV	105.51	54.37	51.14	54	-2.86
11 (highest)	PK	112.32	52.16	60.16	74	-13.84
	AV	104.74	53.84	50.9	54	-3.1

Remark: 1.  $C = A - B$

2.  $E = C - D$

#### Test Mode: 802.11g(OFDM Modulation) operating mode

Channel	Detector	Radiated Method	Conducted Method	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
		Max. Field Strength of Fundamental @3m (dBuV/m)	Between Carrier Max. Power and Local Max. Emission in Restrict Band (dBc)			
		A	B			
1 (lowest)	PK	110.44	47.36	63.08	74	-10.92
	AV	99.35	48.96	50.39	54	-3.61
11 (highest)	PK	109.43	47.85	61.58	74	-12.42
	AV	98.7	48.99	49.71	54	-4.29

Remark: 1.  $C = A - B$

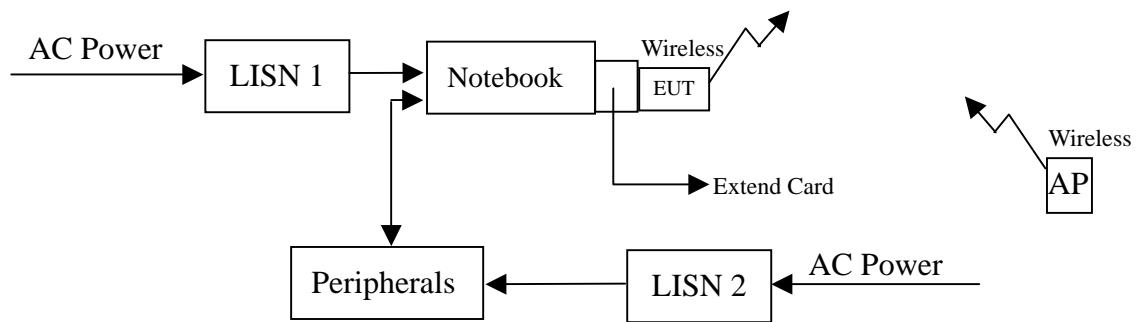
2.  $E = C - D$

## 8. Power Line Conducted Emission test §FCC 15.207

### 8.1 Operating environment

Temperature: 22  
Relative Humidity: 53 %  
Atmospheric Pressure 1023 hPa

### 8.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement. The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

**8.3 Emission limit**

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

\*Decreases with the logarithm of the frequency.

**8.4 Uncertainty of Conducted Emission**

Expanded uncertainty (k=2) of conducted emission measurement is  $\pm 2.6$  dB.

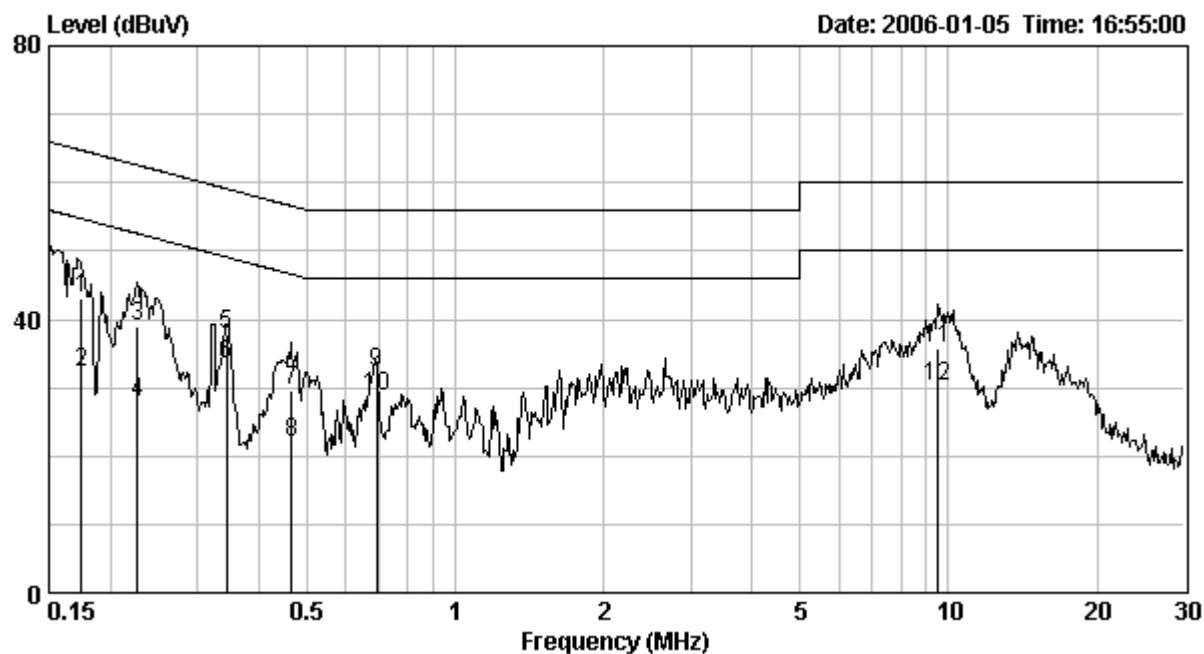
**8.5 Power Line Conducted Emission test data**

Phase : Line  
EUT : HL-11G  
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB)	
-----	-----	-----	-----	-----	-----	Qp	Av
0.175	0.10	43.20	64.74	32.22	54.74	-21.54	-22.52
0.227	0.10	38.99	62.56	27.87	52.56	-23.57	-24.69
0.344	0.10	37.82	59.12	33.50	49.12	-21.30	-15.62
0.465	0.10	29.67	56.60	21.99	46.60	-26.93	-24.61
0.693	0.10	32.15	56.00	28.72	46.00	-23.85	-17.28
9.529	0.38	35.67	60.00	30.31	50.00	-24.33	-19.69

Remark:

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase : Neutral  
EUT : HL-11G  
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB)	
-----	-----	-----	-----	-----	-----	Qp	Av
0.175	0.10	39.85	64.74	29.42	54.74	-24.89	-25.32
0.222	0.10	39.00	62.76	27.09	52.76	-23.76	-25.67
0.344	0.10	37.88	59.12	35.44	49.12	-21.24	-13.68
0.447	0.10	30.25	56.93	21.47	46.93	-26.68	-25.46
0.690	0.10	32.51	56.00	31.04	46.00	-23.49	-14.96
9.529	0.20	35.92	60.00	30.43	50.00	-24.08	-19.57

Remark:

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)

