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FCC RADIO TEST REPORT

Applicant's company	**Handlink Technologies, Inc.**
Applicant Address	4F, No. 3, Prosperity Rd. 1, Science-Based Industrial Park, Hsinchu 300, Taiwan, R.O.C.
FCC ID	**TWS-AP-100**
Manufacturer's company	**Abocom Systems, Inc**
Manufacturer Address	No.77, Yu-Yih Rd., Chu-Nan, Miao-Lih County 35059, Taiwan R.O.C.

Product Name	AP-100 Smart Wi-Fi Access Point
Brand Name	HANDLINK
Model Name	AP-100
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Dec. 14, 2012
Final Test Date	Dec. 25, 2012
Submission Type	Original Equipment

Statement

Test result included in this report is for the IEEE 802.11n and IEEE 802.11b/g part of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2009**, **47 CFR FCC Part 15 Subpart C**, **KDB 558074 D01 v03r01** and **KDB 662911 D01 v02**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR310506-02	Rev. 01	Initial issue of report	Sep. 30, 2013

Certificate No.: CB10209138

1. CERTIFICATE OF COMPLIANCE

Product Name	:	**AP-100 Smart Wi-Fi Access Point**
Brand Name	:	**HANDLINK**
Model Name	:	**AP-100**
Applicant	:	**Handlink Technologies, Inc.**
Test Rule Part(s)	:	**47 CFR FCC Part 15 Subpart C § 15.247**

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Dec. 14, 2012 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Sam Chen
SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	18.66 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	1.78 dB
4.3	15.247(e)	Power Spectral Density	Complies	4.45 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	1.89 dB
4.6	15.247(d)	Band Edge Emissions	Complies	1.01 dB
4.7	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter and PoE
Modulation	see the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11 for 20MHz bandwidth ; 7 for 40MHz bandwidth
Channel Band Width (99%)	MCS0 (20MHz): 17.84 MHz ; MCS0 (40MHz): 36.48 MHz
Maximum Conducted Output Power	MCS0 (20MHz): 19.61 dBm ; MCS0 (40MHz): 20.10 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11b/g

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter and PoE
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11g
Data Modulation	DSSS (BPSK / QPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11
Channel Band Width (99%)	11b: 13.52 MHz ; 11g: 16.64 MHz
Maximum Conducted Output Power	11b: 23.70 dBm ; 11g: 20.25 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Two (TX)	
Band width Mode	20 MHz	40 MHz
IEEE 802.11b	V	X
IEEE 802.11g	V	X
IEEE 802.11n	V	V

IEEE 11n Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	2	MCS 0-15
802.11n (HT40)	2	MCS 0-15
Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40. Note 2: Modulation modes consist of below configuration: HT20/HT40: IEEE 802.11n		

3.2. Accessories

Power	Brand Holder	Model	Rating
Adapter	Keen Ocean Industrial Ltd.	S09-012-0180-00660 SWP-23682-00	INPUT: 100~240Vac, 50/60Hz, 0.40A max OUTPUT: 18.0Vdc, 660mA
PoE	Abocom	FIE6POE	INPUT: 18Vdc OUTPUT: 18Vdc

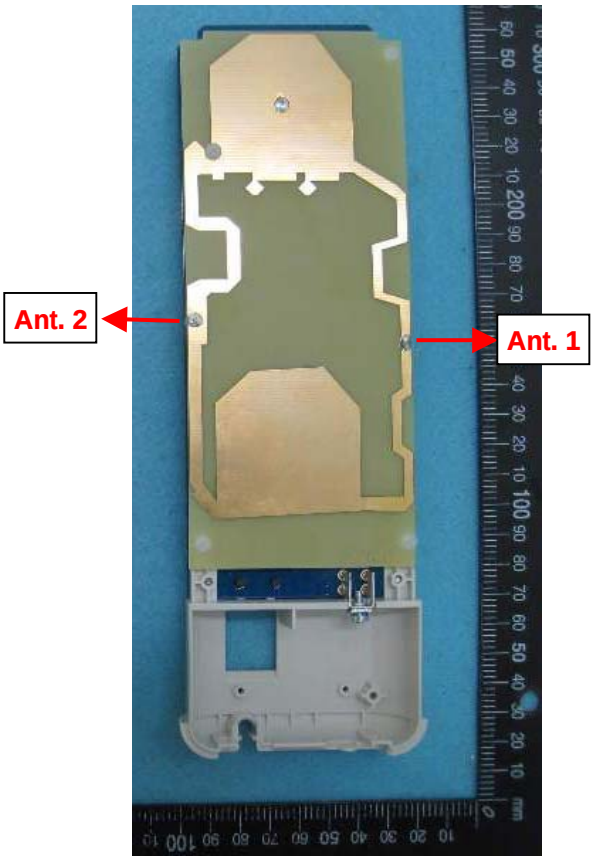
Note: There are two DDR2 of EUT. < DDR2 (Brand: EtronTech) and DDR2 (Brand: Winbond)>
After evaluating, DDR2 (Brand: EtronTech) generated the worst test result, so it was recorded in the report.

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
1	SmartAnt	ABO12-050100	Dual Polarization Directional Antenna	N/A	10.52	TX / RX Ant.
2	SmartAnt	ABO12-050100	Dual Polarization Directional Antenna	N/A	10.52	TX / RX Ant.

Note: The EUT has two antennas.

Ant. 1 & Ant. 2 could transmit/receive simultaneously.



3.4. Table for Carrier Frequencies

For IEEE 802.11b/g, use Channel 1~Channel 11.
There are two bandwidth systems for IEEE 802.11n.
For both 20MHz bandwidth systems, use Channel 1~Channel 11.
For both 40MHz bandwidth systems, use Channel 3~Channel 9.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	7	2442 MHz
	2	2417 MHz	8	2447 MHz
	3	2422 MHz	9	2452 MHz
	4	2427 MHz	10	2457 MHz
	5	2432 MHz	11	2462 MHz
	6	2437 MHz	-	-

3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	-	-	-
Maximum Conducted Output Power	802.11n 20MHz	6.5 Mbps	1/6/11	1+2
	802.11n 40MHz	13.5 Mbps	3/6/9	1+2
	11b/BPSK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2
Power Spectral Density	802.11n 20MHz	6.5 Mbps	1/6/11	1/2
	802.11n 40MHz	13.5 Mbps	3/6/9	1/2
	11b/BPSK	1 Mbps	1/6/11	1/2
	11g/BPSK	6 Mbps	1/6/11	1/2
6dB Spectrum Bandwidth	802.11n 20MHz	6.5 Mbps	1/6/11	1+2
	802.11n 40MHz	13.5 Mbps	3/6/9	1+2
	11b/BPSK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2
Radiated Emissions 9kHz~1GHz	Normal Link	-	-	-
Radiated Emissions 1GHz~10th Harmonic	802.11n 20MHz	6.5 Mbps	1/6/11	1+2
	802.11n 40MHz	13.5 Mbps	3/6/9	1+2
	11b/BPSK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2
Band Edge Emissions	802.11n 20MHz	6.5 Mbps	1/6/11	1+2
	802.11n 40MHz	13.5 Mbps	3/6/9	1+2
	11b/BPSK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D
TH01-CB	OVEN Room	Hsin Chu	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

Please refer section 6 for Test Site Address.

3.7. Table for Supporting Units

For AC Power Line Conducted Emissions test:

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6220	QDS-BRCM1005-D
Notebook	DELL	E6220	QDS-BRCM1005-D

For Radiated Emissions and Band Edge Emissions test:

Support Unit	Brand	Model	FCC ID
Notebook	DELL	D420	E2KWM3945ABG
Notebook	DELL	E6220	QDS-BRCM1005-D

For Maximum Conducted Output Power, Power Spectral Density, 6dB Spectrum Bandwidth test:

Support Unit	Brand	Model	FCC ID
Notebook	DELL	M1330	E2KWM3945ABG

3.8. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters of IEEE 802.11n

Test Software Version	ART2-GUI Version:2.3		
Frequency	2412 MHz	2437 MHz	2462 MHz
MCS0 20MHz	14.5	15.5	15.5
Frequency	2422 MHz	2437 MHz	2452 MHz
MCS0 40MHz	10.5	15.5	10

Power Parameters of IEEE 802.11b/g

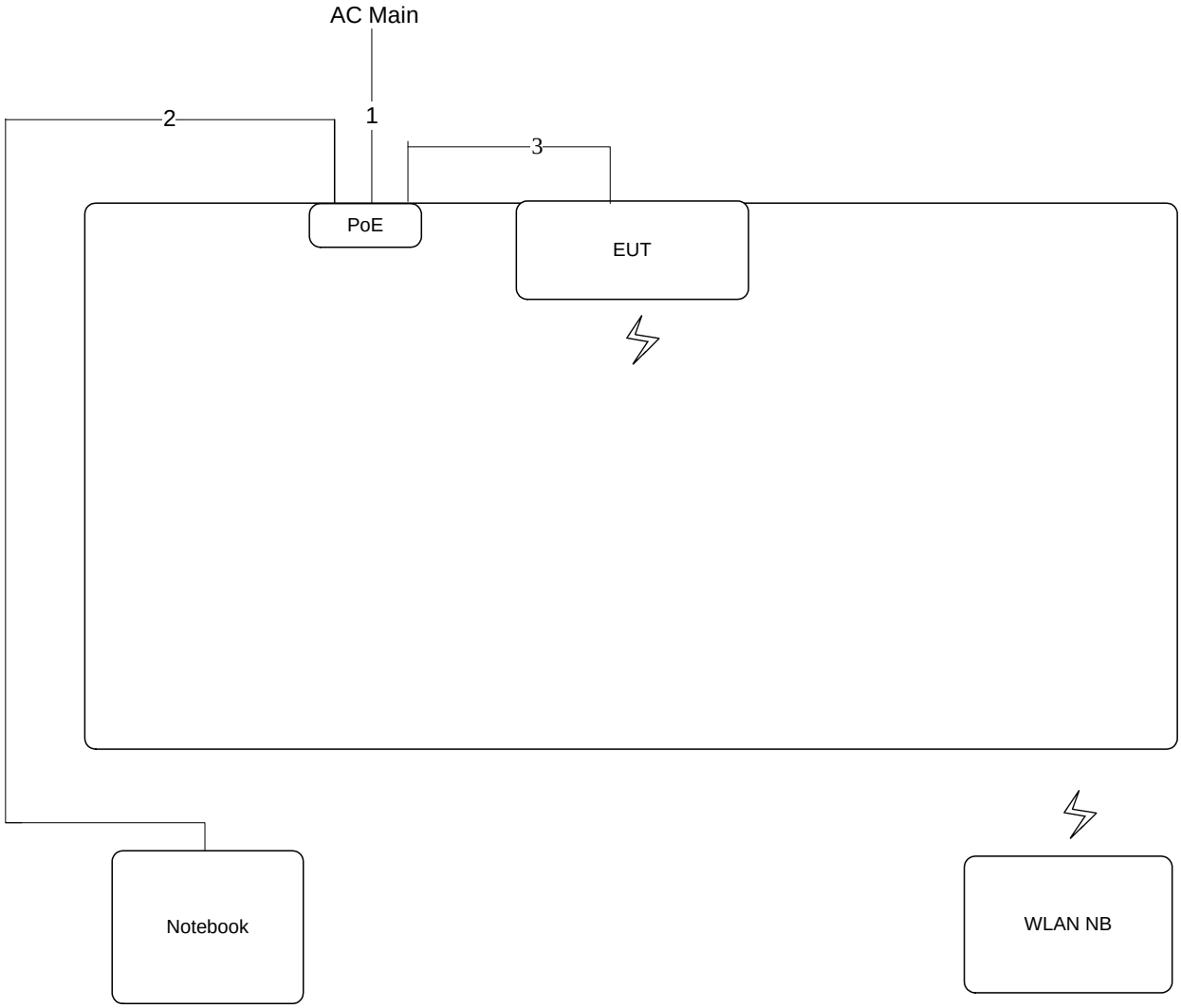
Test Software Version	ART2-GUI Version:2.3		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	17.5	18	19.5
IEEE 802.11g	14.5	15.5	16

During the test, "ART2-GUI Version:2.3" under WIN XP was executed the test program to control the EUT continuously transmit RF signal.

3.9. Test Configurations

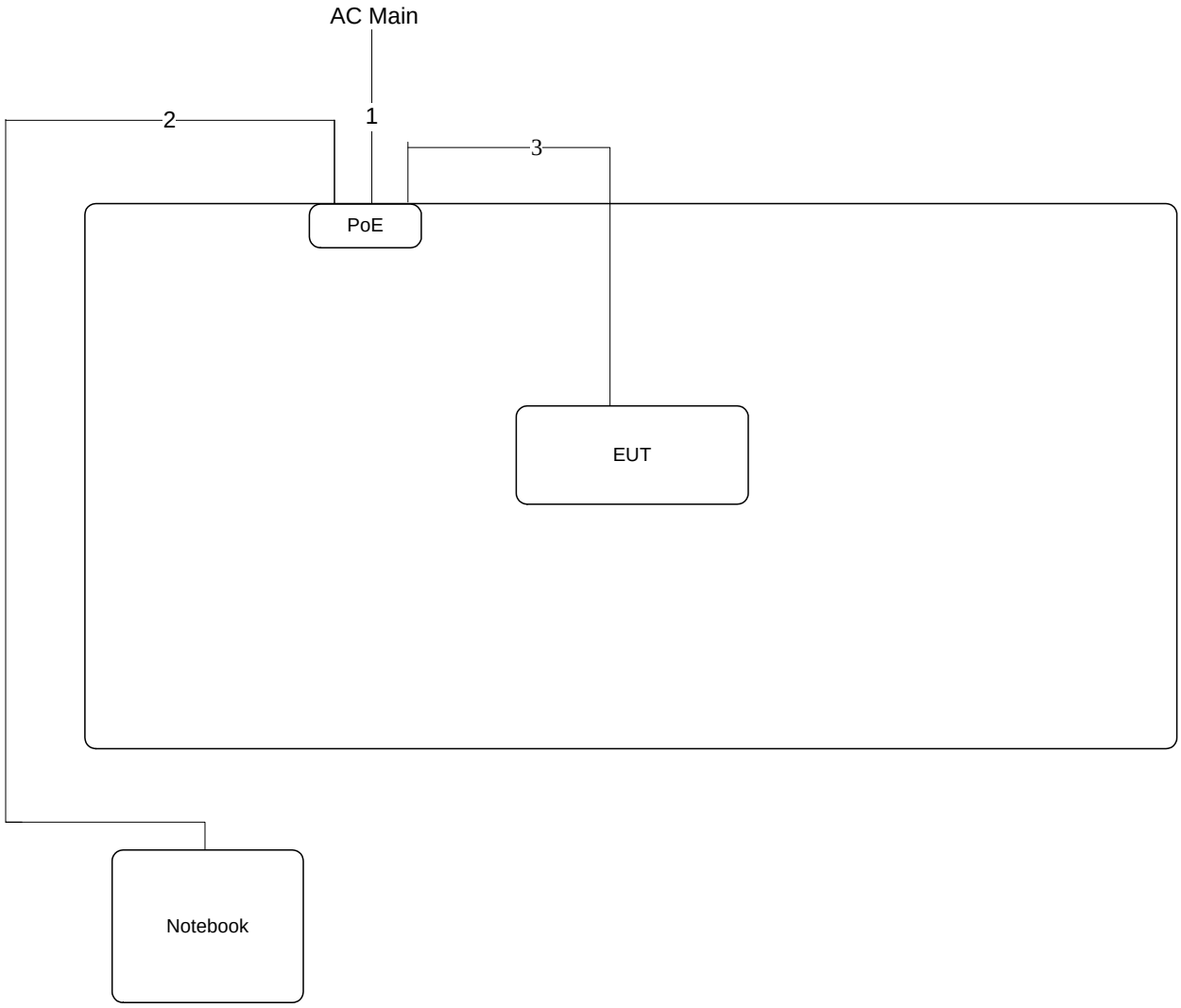
3.9.1. Radiation Emissions 30MHz~1GHz and AC Power Line Conduction Emissions

Test Configuration



Item	Connection	Shield	Length
1	Power Cable	No	1.8m
2	RJ-45 Cable	No	10m
3	RJ-45 Cable	No	1.5m

3.9.2. Radiation Emissions above 1GHz Test Configuration



Item	Connection	Shield	Length
1	Power Cable	No	1.8m
2	RJ-45 Cable	No	10m
3	RJ-45 Cable	No	1.5m

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

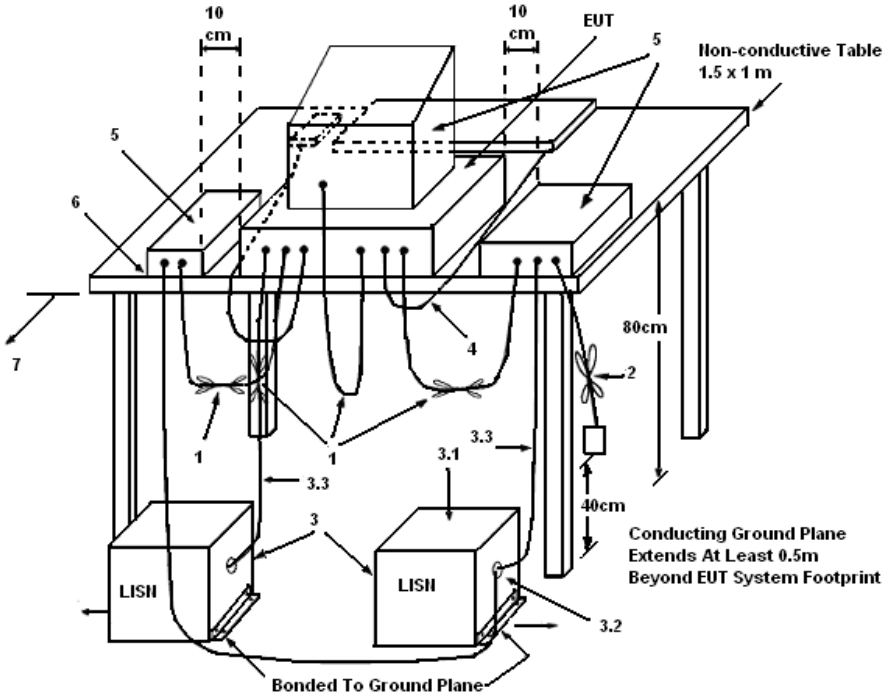
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

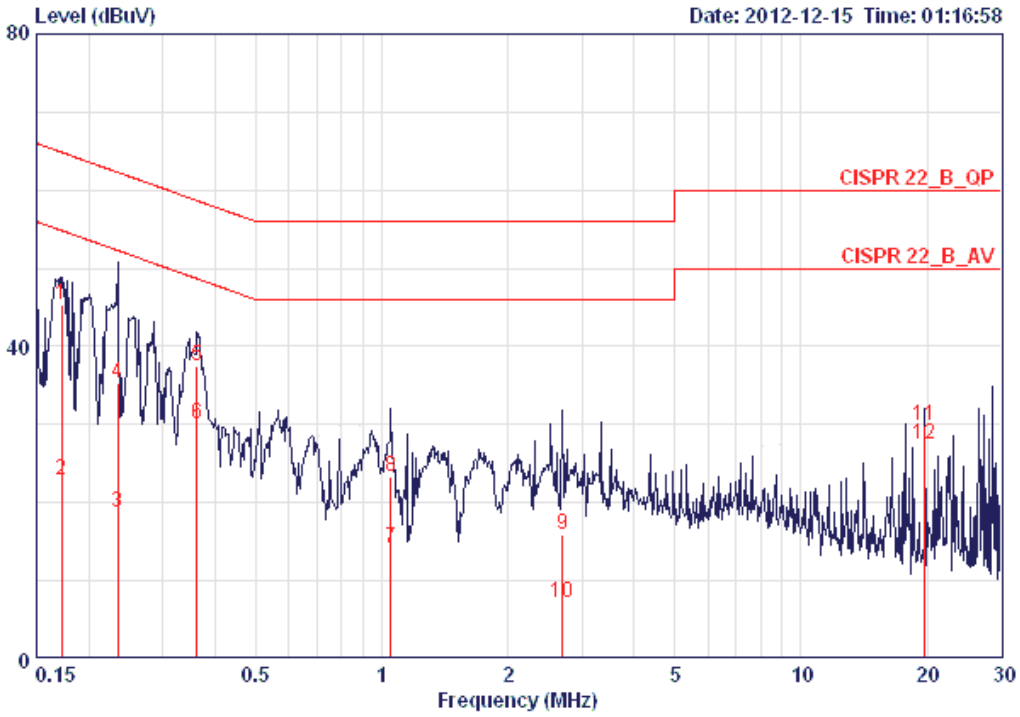
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

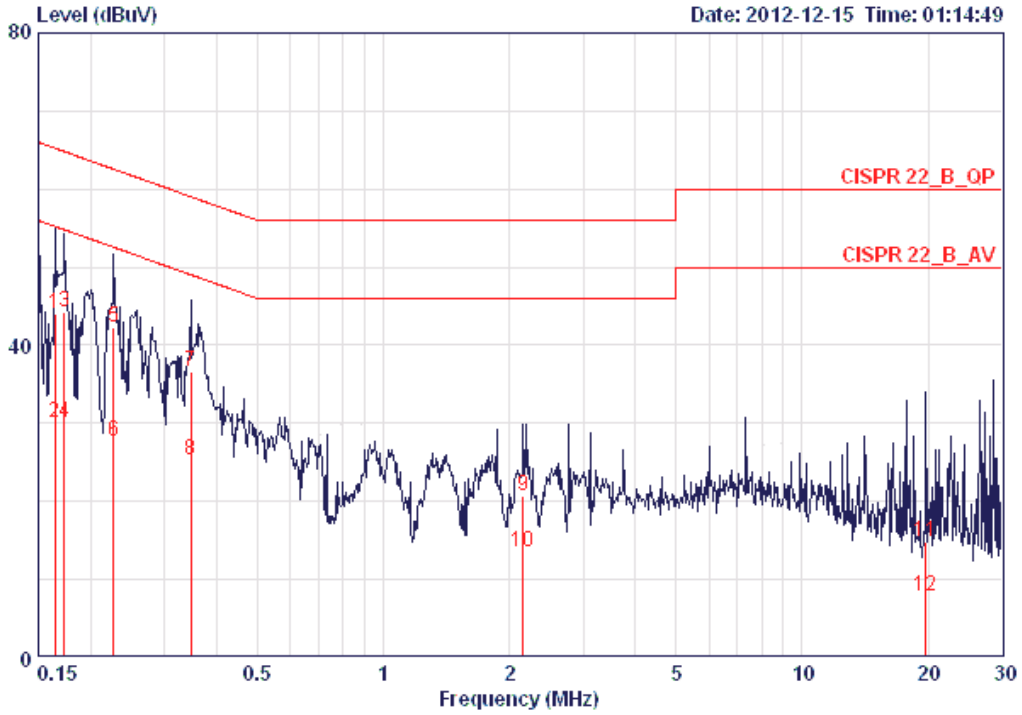
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	20℃	Humidity	63%
Test Engineer	Simon Yang	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.17215	45.25	-19.61	64.86	44.90	0.16	0.19	LINE	QP
2	0.17215	22.82	-32.04	54.86	22.47	0.16	0.19	LINE	AVERAGE
3	0.23409	18.80	-33.50	52.30	18.45	0.15	0.20	LINE	AVERAGE
4	0.23409	35.24	-27.06	62.30	34.89	0.15	0.20	LINE	QP
5	0.36146	37.54	-21.15	58.69	37.19	0.15	0.20	LINE	QP
6	0.36146	30.03	-18.66	48.69	29.68	0.15	0.20	LINE	AVERAGE
7	1.049	14.21	-31.79	46.00	13.84	0.17	0.20	LINE	AVERAGE
8	1.049	23.41	-32.59	56.00	23.04	0.17	0.20	LINE	QP
9	2.692	15.82	-40.18	56.00	15.38	0.20	0.24	LINE	QP
10	2.692	7.26	-38.74	46.00	6.82	0.20	0.24	LINE	AVERAGE
11	19.709	29.88	-30.12	60.00	28.90	0.48	0.50	LINE	QP
12	19.709	27.44	-22.56	50.00	26.46	0.48	0.50	LINE	AVERAGE

Temperature	20℃	Humidity	63%
Test Engineer	Simon Yang	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.16414	44.07	-21.19	65.25	43.80	0.08	0.19	NEUTRAL	QP
2	0.16414	30.07	-25.19	55.25	29.80	0.08	0.19	NEUTRAL	AVERAGE
3	0.17307	44.25	-20.56	64.81	43.98	0.08	0.19	NEUTRAL	QP
4	0.17307	30.15	-24.66	54.81	29.88	0.08	0.19	NEUTRAL	AVERAGE
5	0.22676	42.34	-20.23	62.57	42.06	0.08	0.20	NEUTRAL	QP
6	0.22676	27.66	-24.91	52.57	27.38	0.08	0.20	NEUTRAL	AVERAGE
7	0.34646	36.65	-22.40	59.05	36.37	0.08	0.20	NEUTRAL	QP
8	0.34646	25.27	-23.78	49.05	24.99	0.08	0.20	NEUTRAL	AVERAGE
9	2.155	20.78	-35.22	56.00	20.43	0.11	0.23	NEUTRAL	QP
10	2.155	13.55	-32.45	46.00	13.20	0.11	0.23	NEUTRAL	AVERAGE
11	19.740	14.84	-45.16	60.00	13.95	0.39	0.50	NEUTRAL	QP
12	19.740	7.76	-42.24	50.00	6.87	0.39	0.50	NEUTRAL	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

4.2.2. Measuring Instruments and Setting

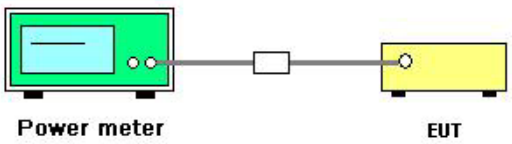
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Bandwidth	50MHz bandwidth is greater than the EUT emission bandwidth
Detector	Average

4.2.3. Test Procedures

1. Test procedures refer KDB 558074 D01 v03r01 section 9.2.2 Measurement using a power meter (PM).
2. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Maximum Conducted Output Power

Temperature	25℃	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11n
Test Date	Dec. 25, 2012		

Configuration IEEE 802.11n MCS0 20MHz / Ant. 1+ Ant. 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 1	Ant. 2			
1	2412 MHz	16.51	15.42	19.01	25.48	**Complies**
6	2437 MHz	16.62	16.58	19.61	25.48	**Complies**
11	2462 MHz	16.76	16.24	19.52	25.48	**Complies**

Note: Conducted Output Power Limit =10.52dBi >6dBi, So Limit =30-(10.52-6)=25.48 dBm.

Configuration IEEE 802.11n MCS0 40MHz / Ant. 1+ Ant. 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 1	Ant. 2			
3	2422 MHz	12.18	12.01	15.11	25.48	**Complies**
6	2437 MHz	17.11	17.07	20.10	25.48	**Complies**
9	2452 MHz	10.79	10.64	13.73	25.48	**Complies**

Note: Conducted Output Power Limit =10.52dBi >6dBi, So Limit =30-(10.52-6)=25.48 dBm.

Temperature	25℃	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11 b/g
Test Date	Dec. 25, 2012		

Configuration IEEE 802.11b / Ant. 1+ Ant. 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 1	Ant. 2			
1	2412 MHz	19.24	18.14	21.74	25.48	**Complies**
6	2437 MHz	19.27	18.68	22.00	25.48	**Complies**
11	2462 MHz	20.92	20.45	23.70	25.48	**Complies**

Note: Conducted Output Power Limit =10.52dBi >6dBi, So Limit =30-(10.52-6)=25.48 dBm.

Configuration IEEE 802.11g / Ant. 1+ Ant. 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 1	Ant. 2			
1	2412 MHz	16.41	15.58	19.03	25.48	**Complies**
6	2437 MHz	16.69	16.62	19.67	25.48	**Complies**
11	2462 MHz	17.44	17.02	20.25	25.48	**Complies**

Note: Conducted Output Power Limit =10.52dBi >6dBi, So Limit =30-(10.52-6)=25.48 dBm.

4.3. Power Spectral Density Measurement

4.3.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2. Measuring Instruments and Setting

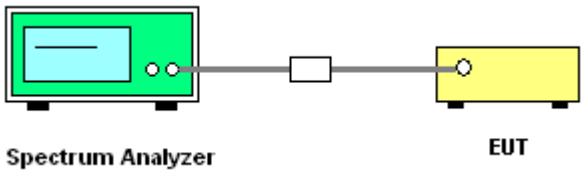
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS channel bandwidth.
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple

4.3.3. Test Procedures

1. Test procedures refer KDB 558074 D01 v03r01 section 10.2 Method PKPSD (peak PSD) and KDB 662911 D01 v02 section In-Band Power Spectral Density (PSD) Measurements option (b) Measure and sum spectral maximal across the outputs.
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW (use of a greater number of measurement points than this minimum requirement is recommended).
4. Use the peak marker function to determine the maximum level in any 3 kHz band segment within the fundamental EBW.
5. The resulting PSD level must be ≤ 8 dBm.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Power Spectral Density

Temperature	25℃	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11n

Configuration IEEE 802.11n MCS0 20MHz / Ant. 1+ Ant. 2 (2TX)

Channel	Frequency	Power Density (dBm/100kHz)		BWCF factor (100KHz to 3KHz)	Power Density (dBm/3kHz)		Single Port Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2		Ant. 1	Ant. 2		
1	2412 MHz	4.95	4.29	-15.23	-10.28	-10.94	0.47	**Complies**
6	2437 MHz	5.07	4.98	-15.23	-10.16	-10.25	0.47	**Complies**
11	2462 MHz	5.39	4.73	-15.23	-9.84	-10.50	0.47	**Complies**

Note: PSD Limit =10.52dBi >6dBi, So Limit =8-(10.52-6)-10log(2)=0.47dBm/3kHz.

Configuration IEEE 802.11n MCS0 40MHz / Ant. 1+ Ant. 2 (2TX)

Channel	Frequency	Power Density (dBm/100kHz)		BWCF factor (100KHz to 3KHz)	Power Density (dBm/3kHz)		Single Port Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2		Ant. 1	Ant. 2		
3	2422 MHz	-2.34	-1.73	-15.23	-17.57	-16.96	0.47	**Complies**
6	2437 MHz	2.63	2.78	-15.23	-12.60	-12.45	0.47	**Complies**
9	2452 MHz	-3.60	-3.65	-15.23	-18.83	-18.88	0.47	**Complies**

Note: PSD Limit =10.52dBi >6dBi, So Limit =8-(10.52-6)-10log(2)=0.47dBm/3kHz.

Temperature	25℃	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11b/g

Configuration IEEE 802.11b / Ant. 1+ Ant. 2 (2TX)

Channel	Frequency	Power Density (dBm/100kHz)		BWCF factor (100KHz to 3KHz)	Power Density (dBm/3kHz)		Single Port Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2		Ant. 1	Ant. 2		
1	2412 MHz	9.72	8.69	-15.23	-5.51	-6.54	0.47	**Complies**
6	2437 MHz	9.61	8.72	-15.23	-5.62	-6.51	0.47	**Complies**
11	2462 MHz	11.25	10.03	-15.23	-3.98	-5.20	0.47	**Complies**

Note: PSD Limit =10.52dBi >6dBi, So Limit =8-(10.52-6)-10log(2)=0.47dBm/3kHz.

Configuration IEEE 802.11g / Ant. 1+ Ant. 2 (2TX)

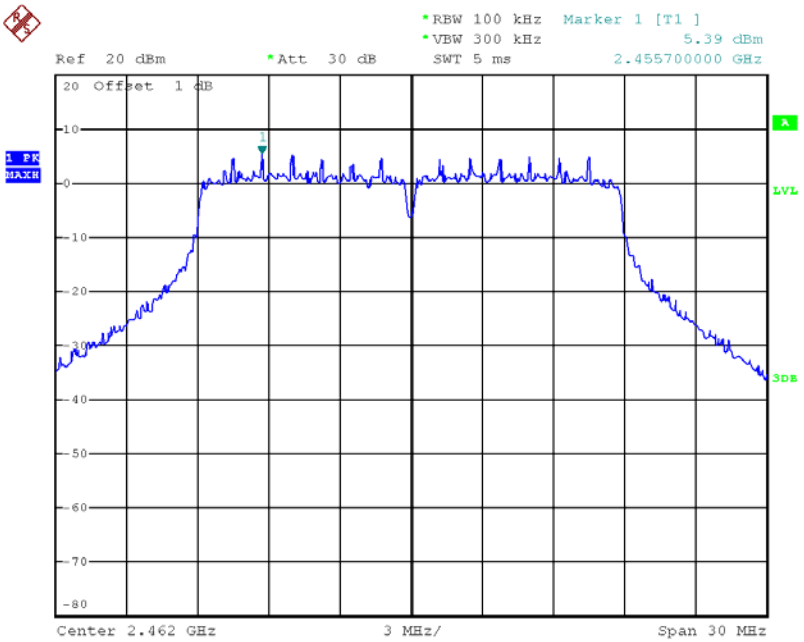
Channel	Frequency	Power Density (dBm/100kHz)		BWCF factor (100KHz to 3KHz)	Power Density (dBm/3kHz)		Single Port Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2		Ant. 1	Ant. 2		
1	2412 MHz	4.90	4.23	-10.33	-10.33	-11.00	0.47	**Complies**
6	2437 MHz	5.13	5.36	-10.10	-10.10	-9.87	0.47	**Complies**
11	2462 MHz	6.00	5.16	-9.23	-9.23	-10.07	0.47	**Complies**

Note: PSD Limit =10.52dBi >6dBi, So Limit =8-(10.52-6)-10log(2)=0.47dBm/3kHz.

Note: All the test values were listed in the report.

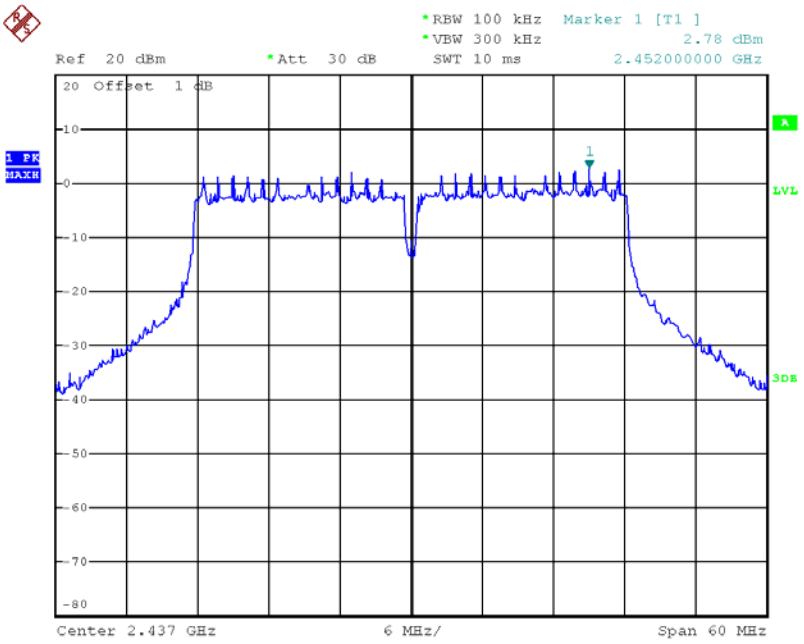
For plots, only the channel with maximum results was shown.

Power Density Plot on Configuration IEEE 802.11n MCS0 20MHz / 2462 MHz / Ant. 1 (2TX)



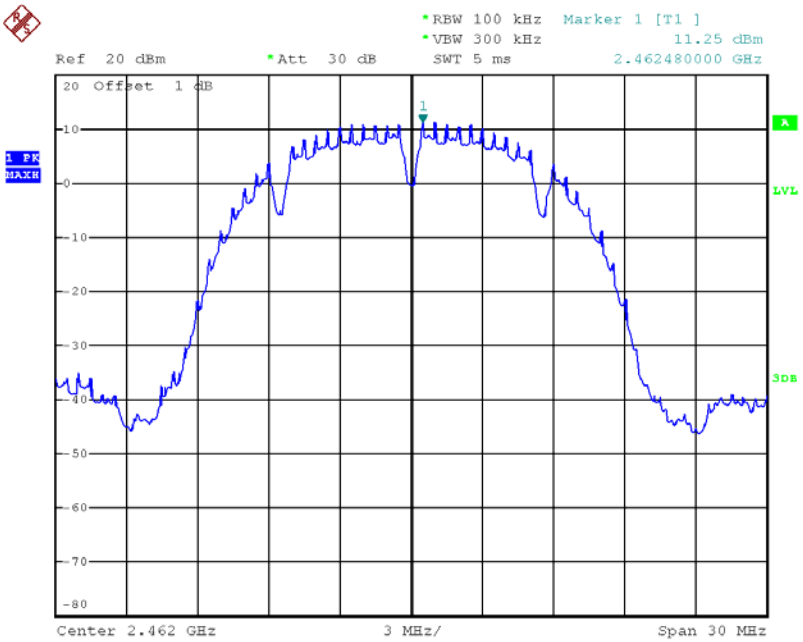
Date: 25.DEC.2012 21:49:02

Power Density Plot on Configuration IEEE 802.11n MCS0 40MHz / 2437 MHz / Ant. 2 (2TX)



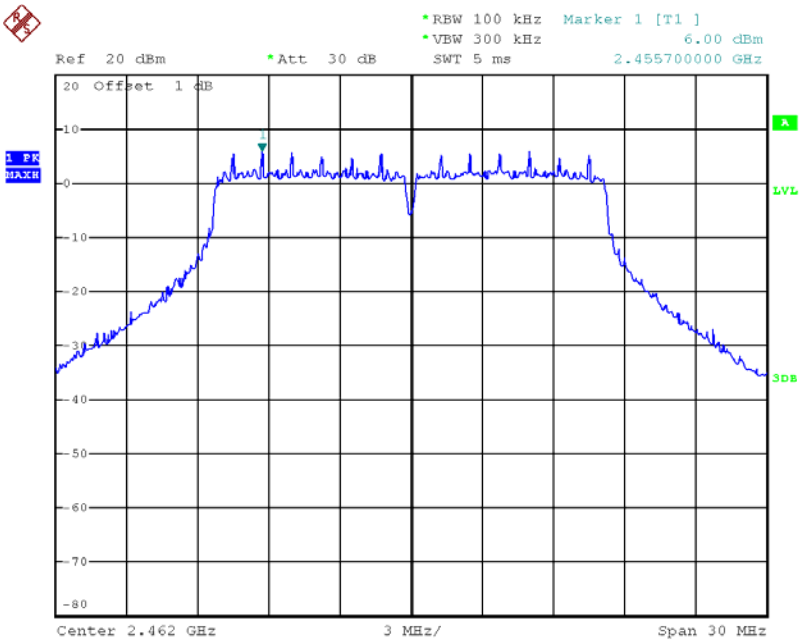
Date: 25.DEC.2012 21:54:56

Power Density Plot on Configuration IEEE 802.11b / 2462 MHz / Ant. 1 (2TX)



Date: 25.DEC.2012 21:41:30

Power Density Plot on Configuration IEEE 802.11g / 2462 MHz / Ant. 1 (2TX)



Date: 25.DEC.2012 21:44:13

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

4.4.2. Measuring Instruments and Setting

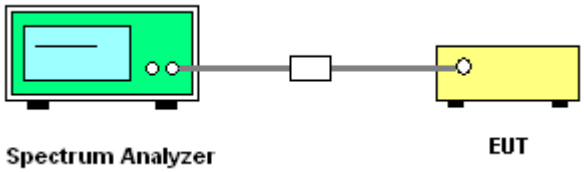
Please refer to section 5 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RBW	1-5 % or DTS BW, not exceed 100KHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB 558074 Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 5.1.1 EBW Measurement Procedure
3. Multiple antenna system was performed in accordance with KDB 662911 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. Measured the spectrum width with power higher than 6dB below carrier.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of 6dB Spectrum Bandwidth

Temperature	25℃	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11n
Test Date	Dec. 25, 2012		

Configuration IEEE 802.11n MCS0 20MHz / Ant. 1 + Ant. 2 (2TX)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.60	17.84	500	**Complies**
6	2437 MHz	15.36	17.60	500	**Complies**
11	2462 MHz	17.60	17.84	500	**Complies**

Configuration IEEE 802.11n MCS0 40MHz / Ant. 1 + Ant. 2 (2TX)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	36.48	36.48	500	**Complies**
6	2437 MHz	36.48	36.48	500	**Complies**
9	2452 MHz	36.00	36.32	500	**Complies**

Temperature	25℃	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11b/g
Test Date	Dec. 25, 2012		

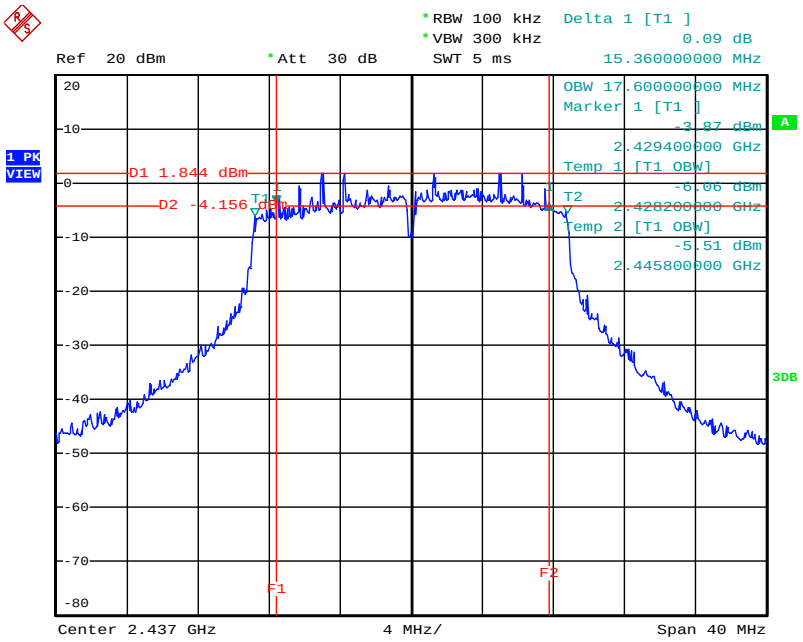
Configuration IEEE 802.11b / Ant. 1 + Ant. 2 (2TX)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	9.52	13.52	500	**Complies**
6	2437 MHz	9.52	13.52	500	**Complies**
11	2462 MHz	9.60	13.52	500	**Complies**

Configuration IEEE 802.11g / Ant. 1 + Ant. 2 (2TX)

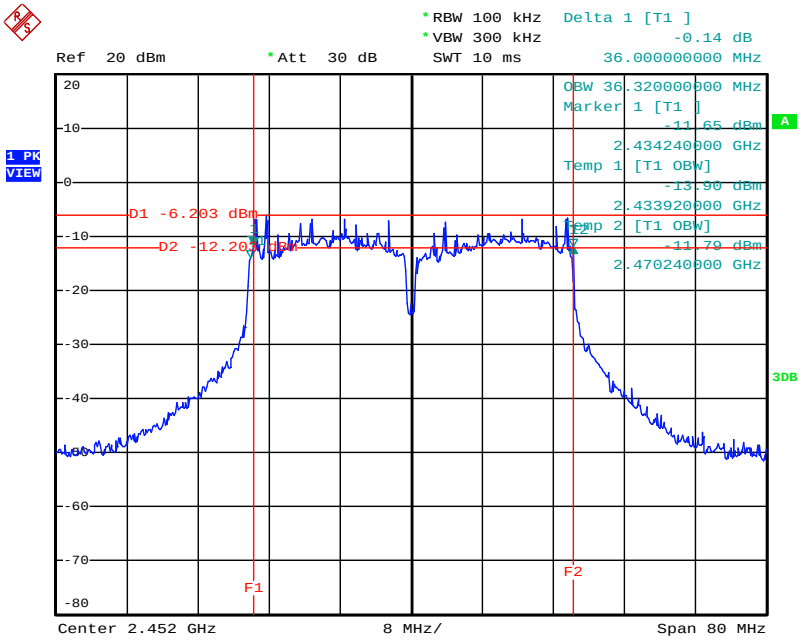
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.08	16.64	500	**Complies**
6	2437 MHz	16.32	16.56	500	**Complies**
11	2462 MHz	16.32	16.64	500	**Complies**

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / 2437 MHz / Ant. 1 + Ant. 2 (2TX)



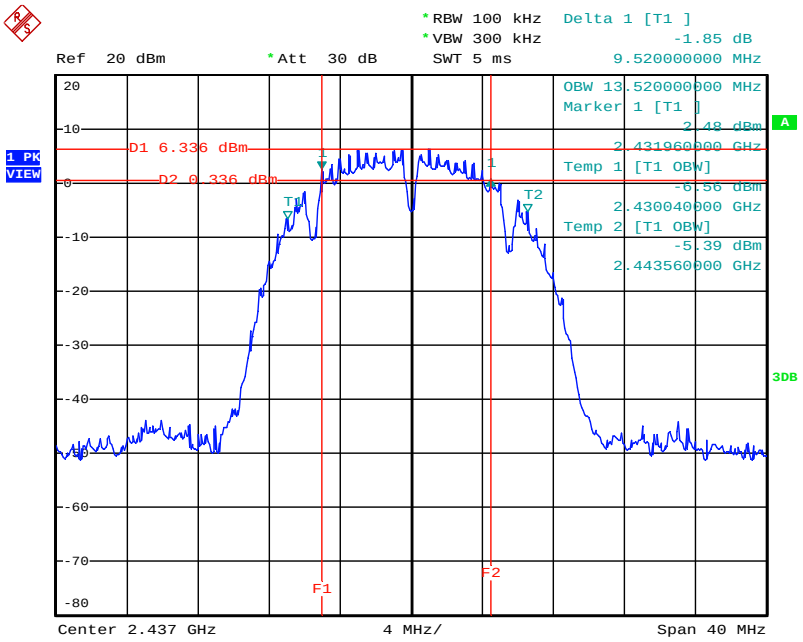
Date: 25.DEC.2012 22:29:52

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz / 2452 MHz / Ant. 1 + Ant. 2 (2TX)



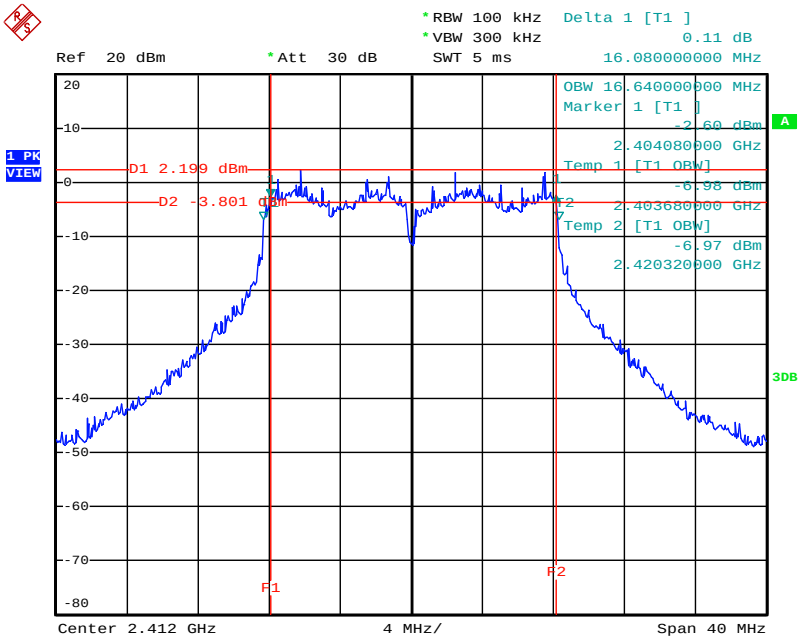
Date: 25.DEC.2012 22:32:09

6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2437 MHz / Ant. 1 + Ant. 2 (2TX)



Date: 25.DEC.2012 22:26:10

6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2412 MHz / Ant. 1 + Ant. 2 (2TX)



Date: 25.DEC.2012 22:27:39

4.5. Radiated Emissions Measurement

4.5.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.5.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10 Hz for Average
RBW / VBW (Emission in non-restricted band)	100 kHz/300 kHz for peak

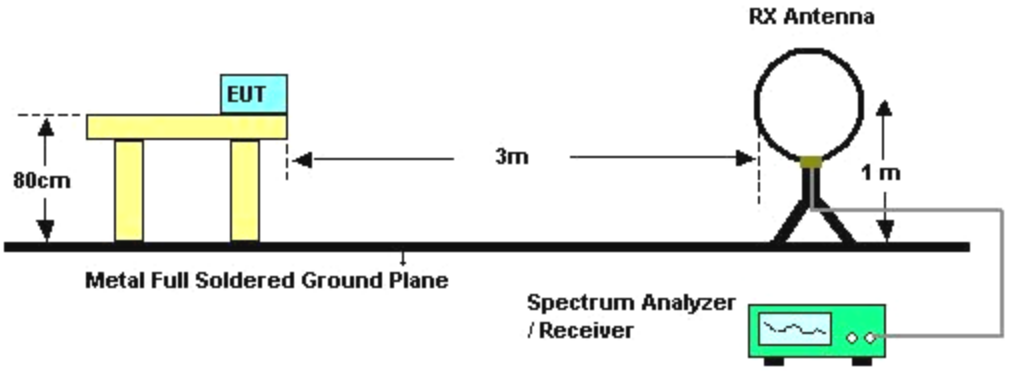
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.5.3. Test Procedures

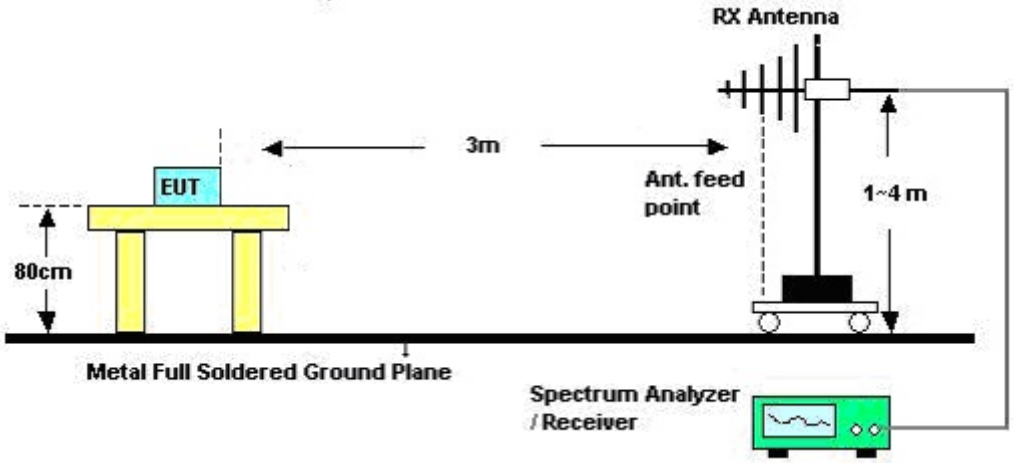
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.5.4. Test Setup Layout

For Radiated Emissions below 1GHz



For Radiated Emissions above 1GHz



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	26℃	Humidity	60%
Test Engineer	Wen Chao	Configurations	Normal Link
Test Date	Dec. 20, 2012		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

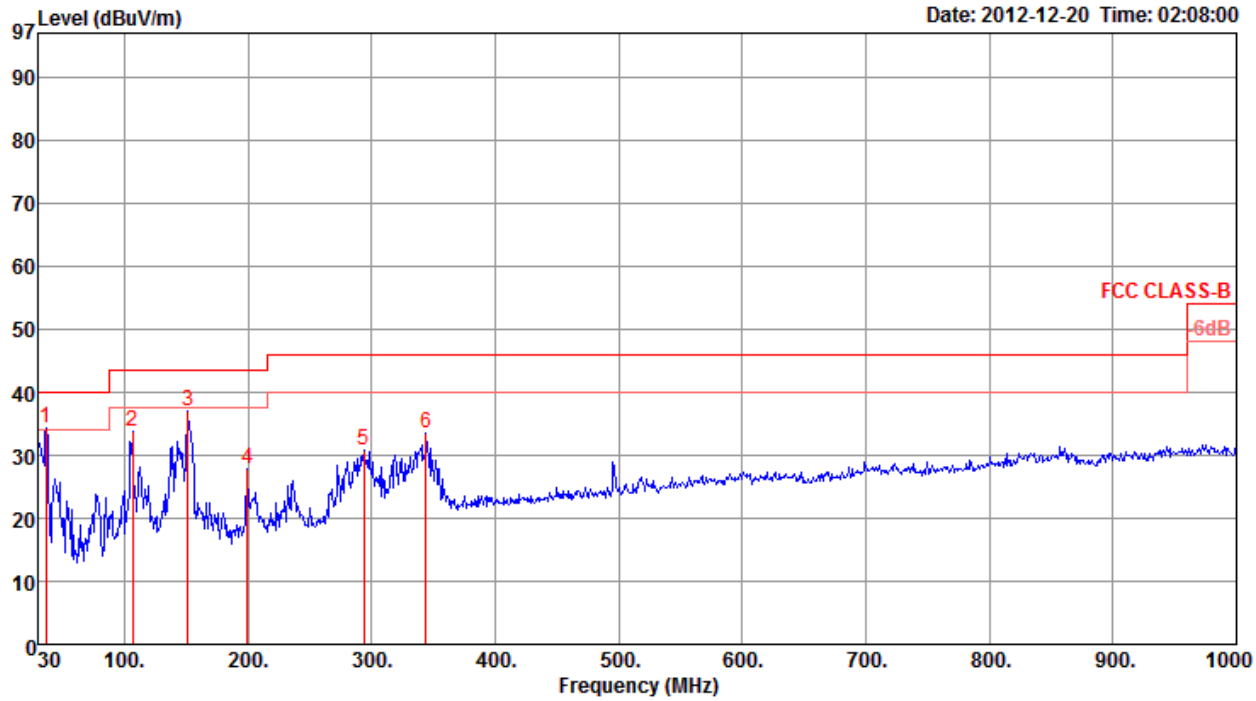
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.5.8. Results of Radiated Emissions (30MHz~1GHz)

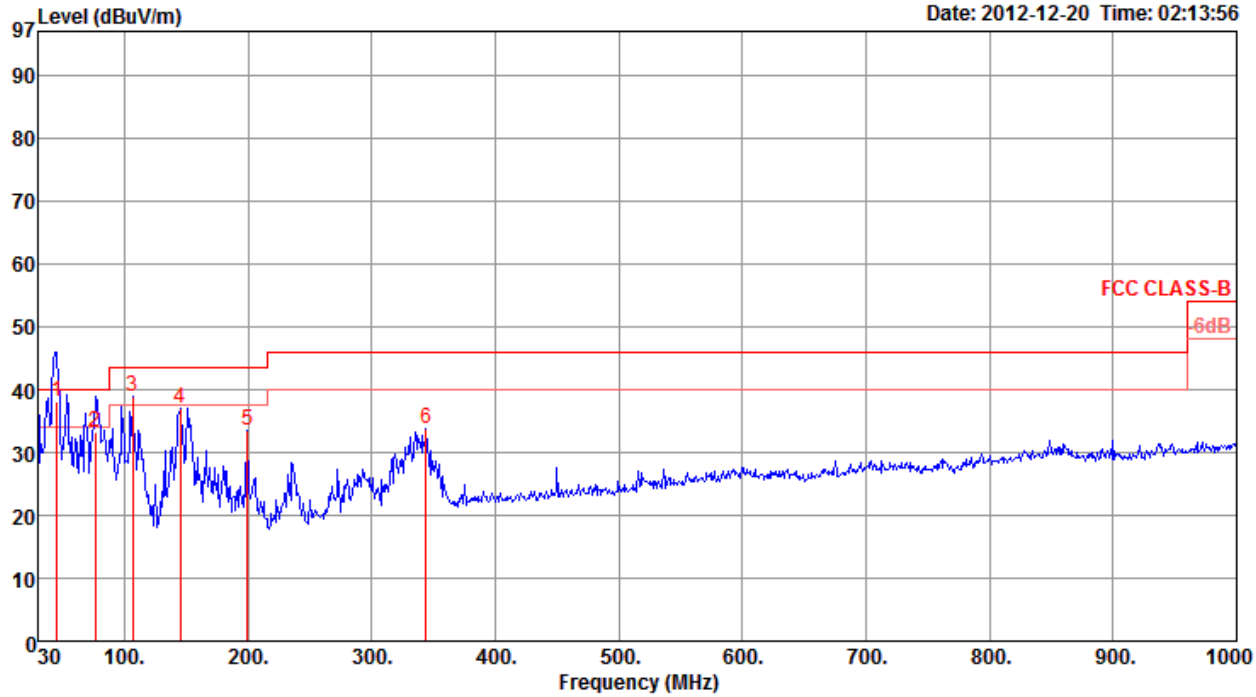
Temperature	26℃	Humidity	60%
Test Engineer	Wen Chao	Configurations	Normal Link

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	36.79	34.23	40.00	-5.77	45.66	0.95	28.00	15.62	Peak	0	400	HORIZONTAL
2	106.63	33.75	43.50	-9.75	47.72	1.55	27.76	12.24	Peak	0	400	HORIZONTAL
3	151.25	37.09	43.50	-6.41	51.64	1.80	27.49	11.14	Peak	0	400	HORIZONTAL
4	199.75	27.71	43.50	-15.79	42.47	2.09	27.25	10.40	Peak	0	400	HORIZONTAL
5	293.84	30.73	46.00	-15.27	41.25	2.52	26.84	13.80	Peak	0	400	HORIZONTAL
6	344.28	33.37	46.00	-12.63	42.51	2.77	27.04	15.13	Peak	0	400	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 q	45.57	38.11	40.00	-1.89	54.60	1.00	27.94	10.45	QP	155	100	VERTICAL
2	76.53	33.14	40.00	-6.86	52.49	1.31	27.91	7.25	QP	254	100	VERTICAL
3 p	106.63	39.02	43.50	-4.48	52.99	1.55	27.76	12.24	Peak	0	100	VERTICAL
4	145.43	36.98	43.50	-6.52	51.14	1.76	27.53	11.61	Peak	0	100	VERTICAL
5	199.75	33.53	43.50	-9.97	48.29	2.09	27.25	10.40	Peak	0	100	VERTICAL
6	344.28	33.81	46.00	-12.19	42.95	2.77	27.04	15.13	Peak	0	100	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.5.9. Results for Radiated Emissions (1GHz~10th Harmonic)

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz Ch 1 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4822.79	31.05	54.00	-22.95	28.97	4.21	34.69	32.56	Average	155	100	HORIZONTAL
2 p	4825.60	43.03	74.00	-30.97	40.95	4.21	34.69	32.56	Peak	155	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4823.27	31.28	54.00	-22.72	29.20	4.21	34.69	32.56	Average	92	100	VERTICAL
2 p	4825.09	43.58	74.00	-30.42	41.50	4.21	34.69	32.56	Peak	92	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz Ch 6 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4872.71	31.31	54.00	-22.69	29.10	4.22	34.67	32.66	Average	249	100	HORIZONTAL
2 p	4876.09	43.76	74.00	-30.24	41.55	4.22	34.67	32.66	Peak	249	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4872.91	31.26	54.00	-22.74	29.05	4.22	34.67	32.66	Average	277	100	VERTICAL
2 p	4874.68	44.09	74.00	-29.91	41.88	4.22	34.67	32.66	Peak	277	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz Ch11 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	4922.50	43.63	74.00	-30.37	41.29	4.23	34.65	32.76	Peak	105	100	HORIZONTAL
2 a	4923.79	31.44	54.00	-22.56	29.10	4.23	34.65	32.76	Average	105	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4925.25	31.37	54.00	-22.63	29.03	4.23	34.65	32.76	Average	59	100	VERTICAL
2 p	4925.36	43.23	74.00	-30.77	40.89	4.23	34.65	32.76	Peak	59	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 40MHz Ch 3 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4842.29	30.99	54.00	-23.01	28.87	4.21	34.68	32.59	Average	259	100	HORIZONTAL
2 p	4843.51	43.59	74.00	-30.41	41.47	4.21	34.68	32.59	Peak	259	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4842.27	30.84	54.00	-23.16	28.72	4.21	34.68	32.59	Average	319	100	VERTICAL
2 p	4844.87	43.09	74.00	-30.91	40.97	4.21	34.68	32.59	Peak	319	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 40MHz Ch 6 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4872.19	31.27	54.00	-22.73	29.06	4.22	34.67	32.66	Average	245	100	HORIZONTAL
2 p	4875.91	43.52	74.00	-30.48	41.31	4.22	34.67	32.66	Peak	245	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4872.61	31.29	54.00	-22.71	29.08	4.22	34.67	32.66	Average	183	100	VERTICAL
2 p	4872.72	43.32	74.00	-30.68	41.11	4.22	34.67	32.66	Peak	183	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 40MHz Ch 9 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	4903.01	43.82	74.00	-30.18	41.53	4.22	34.66	32.73	Peak	90	100	HORIZONTAL
2 a	4903.83	31.27	54.00	-22.73	28.98	4.22	34.66	32.73	Average	90	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	4904.87	43.91	74.00	-30.09	41.62	4.22	34.66	32.73	Peak	2	100	VERTICAL
2 a	4904.91	31.44	54.00	-22.56	29.15	4.22	34.66	32.73	Average	2	100	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11b CH 1 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4823.88	34.86	54.00	-19.14	32.78	4.21	34.69	32.56	Average	214	100	HORIZONTAL
2 p	4823.90	45.03	74.00	-28.97	42.95	4.21	34.69	32.56	Peak	214	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	4823.95	46.62	74.00	-27.38	44.54	4.21	34.69	32.56	Peak	37	100	VERTICAL
2 a	4823.99	37.98	54.00	-16.02	35.90	4.21	34.69	32.56	Average	37	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11b CH 6 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		4874.00	32.08	54.00	-21.92	29.87	4.22	34.67	32.66	Average	96	100	HORIZONTAL
2		4874.00	43.83	74.00	-30.17	41.62	4.22	34.67	32.66	Peak	96	100	HORIZONTAL
3	p	7306.28	48.24	74.00	-25.76	40.86	5.34	34.93	36.97	Peak	176	100	HORIZONTAL
4	a	7314.20	35.90	54.00	-18.10	28.53	5.34	34.94	36.97	Average	176	100	HORIZONTAL

Vertical

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a	4873.93	38.34	54.00	-15.66	36.13	4.22	34.67	32.66	Average	39	100	VERTICAL
2		4873.97	46.87	74.00	-27.13	44.66	4.22	34.67	32.66	Peak	39	100	VERTICAL
3	p	7311.60	48.71	74.00	-25.29	41.34	5.34	34.94	36.97	Peak	146	100	VERTICAL
4		7312.36	36.16	54.00	-17.84	28.79	5.34	34.94	36.97	Average	146	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11b CH 11 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	4923.56	31.22	54.00	-22.78	28.88	4.23	34.65	32.76	Average	75	100	HORIZONTAL
2 p	4924.49	44.77	74.00	-29.23	42.43	4.23	34.65	32.76	Peak	75	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	4923.76	47.26	74.00	-26.74	44.92	4.23	34.65	32.76	Peak	42	100	VERTICAL
2 a	4924.02	39.37	54.00	-14.63	37.03	4.23	34.65	32.76	Average	42	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11g CH 1 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	4820.82	43.80	74.00	-30.20	41.72	4.21	34.69	32.56	Peak	226	100	HORIZONTAL
2 a	4821.12	31.24	54.00	-22.76	29.16	4.21	34.69	32.56	Average	226	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	4820.50	45.06	74.00	-28.94	42.98	4.21	34.69	32.56	Peak	334	100	VERTICAL
2 a	4825.82	31.36	54.00	-22.64	29.28	4.21	34.69	32.56	Average	334	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11g CH 6 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		4869.20	43.73	74.00	-30.27	41.52	4.22	34.67	32.66	Peak	62	100	HORIZONTAL
2		4877.40	31.40	54.00	-22.60	29.19	4.22	34.67	32.66	Average	62	100	HORIZONTAL
3	p	7306.94	48.16	74.00	-25.84	40.78	5.34	34.93	36.97	Peak	123	100	HORIZONTAL
4	a	7312.32	35.74	54.00	-18.26	28.37	5.34	34.94	36.97	Average	123	100	HORIZONTAL

Vertical

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		4874.06	43.73	74.00	-30.27	41.52	4.22	34.67	32.66	Peak	7	100	VERTICAL
2		4877.78	31.43	54.00	-22.57	29.22	4.22	34.67	32.66	Average	7	100	VERTICAL
3	p	7314.84	47.32	74.00	-26.68	39.95	5.34	34.94	36.97	Peak	154	100	VERTICAL
4	a	7315.38	35.93	54.00	-18.07	28.56	5.34	34.94	36.97	Average	154	100	VERTICAL

Temperature	26℃	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11g CH 11 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	4921.96	43.63	74.00	-30.37	41.29	4.23	34.65	32.76	Peak	287	100	HORIZONTAL
2 a	4925.02	31.08	54.00	-22.92	28.74	4.23	34.65	32.76	Average	287	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	4921.52	44.07	74.00	-29.93	41.73	4.23	34.65	32.76	Peak	359	100	VERTICAL
2 a	4927.80	31.60	54.00	-22.40	29.26	4.23	34.65	32.76	Average	359	100	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.6. Band Edge Emissions Measurement

4.6.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.6.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100 KHz / 300 KHz for Peak

4.6.3. Test Procedures

1. The test procedure is the same as section 4.5.3, only the freqeuncy range investigated is limited to 100MHz around bandedges.

4.6.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	26℃	Humidity	60%
Test Engineer	Jim Huang	Configurations	IEEE 802.11n MCS0 20MHz Ch 1, 6, 11 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2360.00	52.42	54.00	-1.58	20.15	4.30	27.97	0.00	Average	197	358	HORIZONTAL
2	2360.00	63.42	74.00	-10.58	31.15	4.30	27.97	0.00	Peak	197	358	HORIZONTAL
3	2390.00	52.97	54.00	-1.03	20.58	4.34	28.05	0.00	Average	197	358	HORIZONTAL
4	2390.00	64.88	74.00	-9.12	32.49	4.34	28.05	0.00	Peak	197	358	HORIZONTAL
5	2416.40	116.56			84.11	4.36	28.09	0.00	Peak	197	358	HORIZONTAL
6	2417.20	104.72			72.23	4.36	28.13	0.00	Average	197	358	HORIZONTAL

Item 5, 6 are the fundamental frequency at 2412 MHz.

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2359.60	52.57	54.00	-1.43	20.30	4.30	27.97	0.00	Average	196	356	HORIZONTAL
2	2360.00	63.67	74.00	-10.33	31.40	4.30	27.97	0.00	Peak	196	356	HORIZONTAL
3	2439.80	117.42			84.86	4.38	28.18	0.00	Peak	196	356	HORIZONTAL
4	2441.80	104.96			72.40	4.38	28.18	0.00	Average	196	356	HORIZONTAL
5	2483.50	51.69	54.00	-2.31	19.03	4.40	28.26	0.00	Average	196	356	HORIZONTAL
6	2483.90	64.21	74.00	-9.79	31.55	4.40	28.26	0.00	Peak	196	356	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2437MHz.

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2465.60	104.75			72.13	4.40	28.22	0.00	Average	154	350	HORIZONTAL
2	2467.00	117.11			84.49	4.40	28.22	0.00	Peak	154	350	HORIZONTAL
3	2483.50	52.94	54.00	-1.06	20.28	4.40	28.26	0.00	Average	154	350	HORIZONTAL
4	2483.50	68.60	74.00	-5.40	35.94	4.40	28.26	0.00	Peak	154	350	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2462 MHz.

Temperature	26℃	Humidity	60%
Test Engineer	Jim Huang	Configurations	IEEE 802.11n MCS0 40MHz Ch 3, 6, 9 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Channel 3

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2390.00	52.65	54.00	-1.35	20.26	4.34	28.05	0.00	Average	150	314	HORIZONTAL
2	2390.00	71.30	74.00	-2.70	38.91	4.34	28.05	0.00	Peak	150	314	HORIZONTAL
3	2406.80	95.93			63.50	4.34	28.09	0.00	Average	150	314	HORIZONTAL
4	2437.60	110.69			78.13	4.38	28.18	0.00	Peak	150	314	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2422 MHz.

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2390.00	52.86	54.00	-1.14	20.47	4.34	28.05	0.00	Average	154	332	HORIZONTAL
2	2390.00	69.57	74.00	-4.43	37.18	4.34	28.05	0.00	Peak	154	332	HORIZONTAL
3	2449.80	115.23			82.67	4.38	28.18	0.00	Peak	154	332	HORIZONTAL
4	2450.60	102.55			69.99	4.38	28.18	0.00	Average	154	332	HORIZONTAL
5	2483.50	52.84	54.00	-1.16	20.18	4.40	28.26	0.00	Average	154	332	HORIZONTAL
6	2483.50	70.60	74.00	-3.40	37.94	4.40	28.26	0.00	Peak	154	332	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2437MHz.

Channel 9

	Freq	Level	Limit Line	Limit	Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2465.20	96.30			63.68	4.40	28.22	0.00	Average	151	328	HORIZONTAL
2	2465.20	108.89			76.27	4.40	28.22	0.00	Peak	151	328	HORIZONTAL
3	2483.50	52.91	54.00	-1.09	20.25	4.40	28.26	0.00	Average	151	328	HORIZONTAL
4	2483.50	72.63	74.00	-1.37	39.97	4.40	28.26	0.00	Peak	151	328	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2452 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Temperature	26℃	Humidity	60%
Test Engineer	Jim Huang	Configurations	IEEE 802.11b Ch 1, 6, 11 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2360.00	52.83	54.00	-1.17	20.56	4.30	27.97	0.00	Average	168	359	HORIZONTAL
2	2382.80	68.47	74.00	-5.53	36.14	4.32	28.01	0.00	Peak	168	359	HORIZONTAL
3	2410.00	113.34			80.91	4.34	28.09	0.00	Average	168	359	HORIZONTAL
4	2410.40	117.14			84.71	4.34	28.09	0.00	Peak	168	359	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2412 MHz.

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2359.60	52.79	54.00	-1.21	20.52	4.30	27.97	0.00	Average	191	359	HORIZONTAL
2	2359.60	64.77	74.00	-9.23	32.50	4.30	27.97	0.00	Peak	191	359	HORIZONTAL
3	2439.80	116.00			83.44	4.38	28.18	0.00	Peak	191	359	HORIZONTAL
4	2440.20	111.67			79.11	4.38	28.18	0.00	Average	191	359	HORIZONTAL
5	2500.00	51.04	54.00	-2.96	18.32	4.42	28.30	0.00	Average	191	359	HORIZONTAL
6	2500.00	62.74	74.00	-11.26	30.02	4.42	28.30	0.00	Peak	191	359	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2437MHz.

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2359.40	64.97	74.00	-9.03	32.70	4.30	27.97	0.00	Peak	193	360	HORIZONTAL
2	2359.60	52.75	54.00	-1.25	20.48	4.30	27.97	0.00	Average	193	360	HORIZONTAL
3	2459.60	118.50			85.90	4.38	28.22	0.00	Peak	193	360	HORIZONTAL
4	2460.20	114.64			82.04	4.38	28.22	0.00	Average	193	360	HORIZONTAL
5	2483.50	52.12	54.00	-1.88	19.46	4.40	28.26	0.00	Average	193	360	HORIZONTAL
6	2484.70	72.98	74.00	-1.02	40.32	4.40	28.26	0.00	Peak	193	360	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2462 MHz.

Temperature	26℃	Humidity	60%
Test Engineer	Jim Huang	Configurations	IEEE 802.11g Ch 1, 6, 11 / Ant. 1 + Ant. 2 (2TX)
Test Date	Dec. 18, 2012		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2360.00	52.61	54.00	-1.39	20.34	4.30	27.97	0.00	Average	197	356	HORIZONTAL
2	2360.00	63.95	74.00	-10.05	31.68	4.30	27.97	0.00	Peak	197	356	HORIZONTAL
3	2417.60	116.87			84.38	4.36	28.13	0.00	Peak	197	356	HORIZONTAL
4	2418.00	105.08			72.59	4.36	28.13	0.00	Average	197	356	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2412 MHz.

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2359.20	65.22	74.00	-8.78	32.95	4.30	27.97	0.00	Peak	198	354	HORIZONTAL
2	2359.99	52.60	54.00	-1.40	20.33	4.30	27.97	0.00	Average	198	354	HORIZONTAL
3	2440.20	104.73			72.17	4.38	28.18	0.00	Average	198	354	HORIZONTAL
4	2440.20	116.45			83.89	4.38	28.18	0.00	Peak	198	354	HORIZONTAL
5	2483.50	51.66	54.00	-2.34	19.00	4.40	28.26	0.00	Average	198	354	HORIZONTAL
6	2485.10	63.13	74.00	-10.87	30.43	4.40	28.30	0.00	Peak	198	354	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2437 MHz.

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2455.40	105.38			72.78	4.38	28.22	0.00	Average	197	357	HORIZONTAL
2	2455.40	117.25			84.65	4.38	28.22	0.00	Peak	197	357	HORIZONTAL
3	2483.50	52.99	54.00	-1.01	20.33	4.40	28.26	0.00	Average	197	357	HORIZONTAL
4	2483.50	65.00	74.00	-9.00	32.34	4.40	28.26	0.00	Peak	197	357	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2462 MHz.

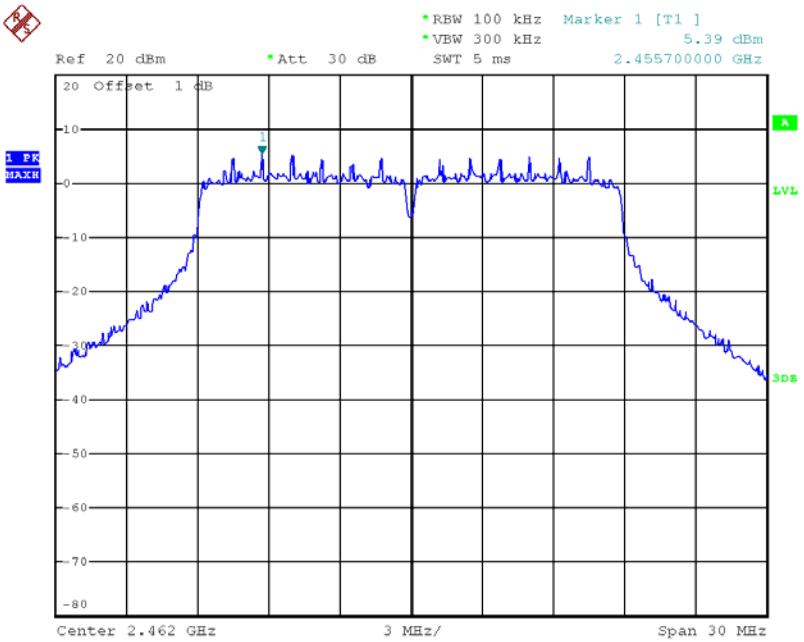
Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

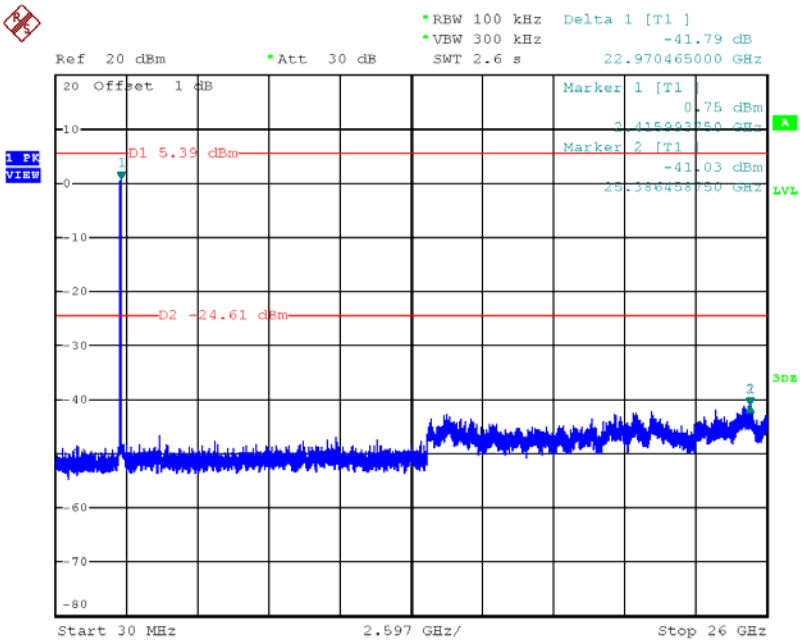
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11n MCS0 20MHz / Reference Level



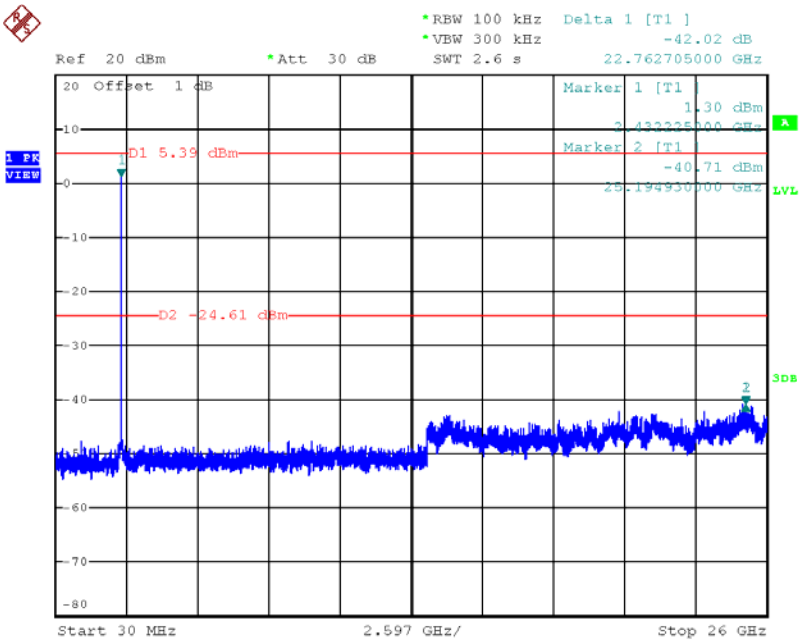
Date: 25.DEC.2012 21:49:02

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 1 (down 30dBc)



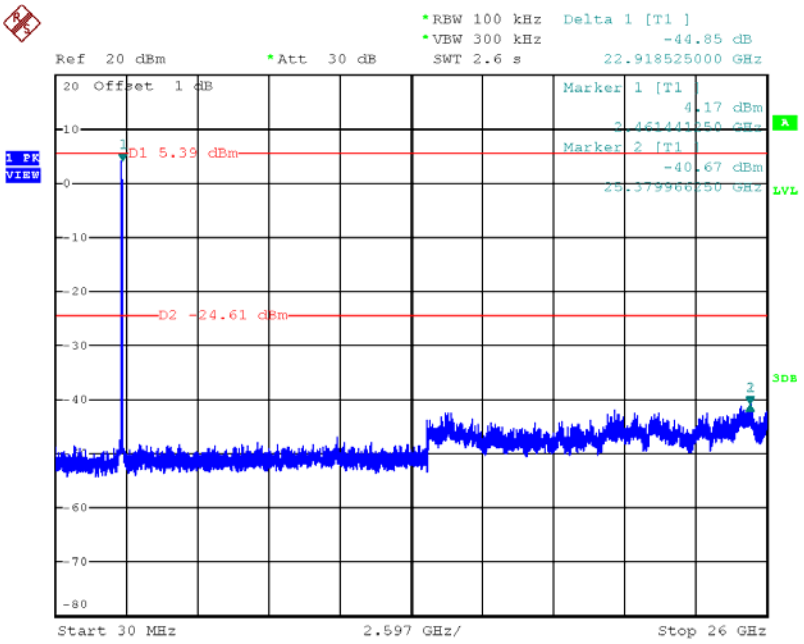
Date: 25.DEC.2012 22:16:47

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 6 (down 30dBc)



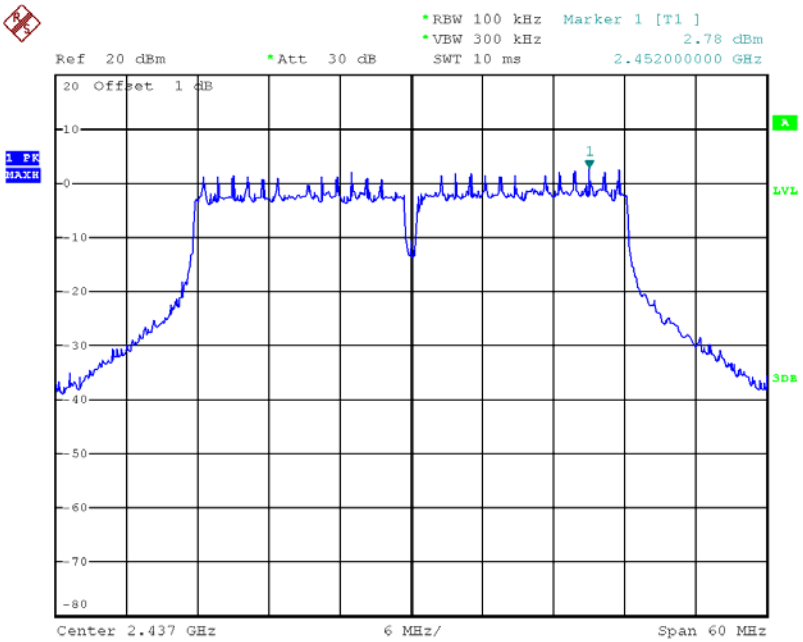
Date: 25.DEC.2012 22:17:26

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 11 (down 30dBc)



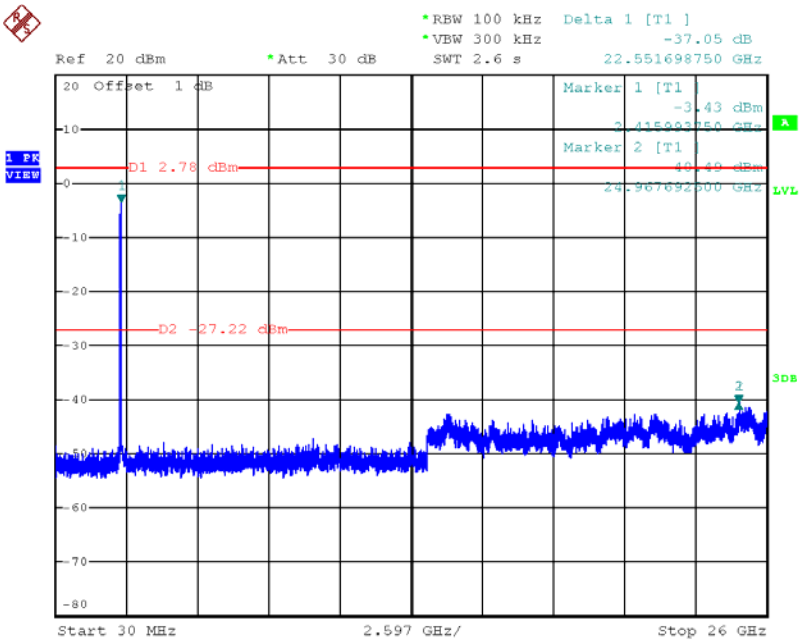
Date: 25.DEC.2012 22:18:03

Plot on Configuration IEEE 802.11n MCS0 40MHz / Reference Level



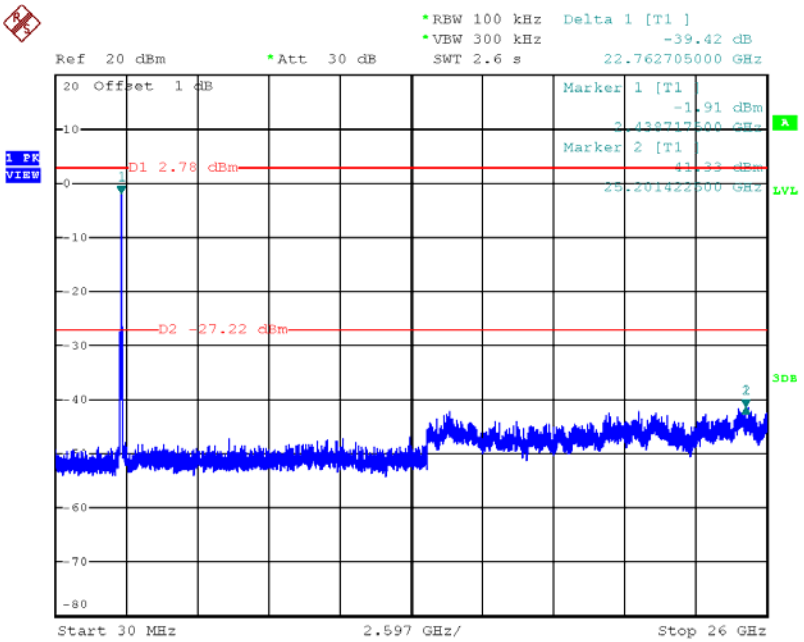
Date: 25.DEC.2012 21:54:56

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 3 (down 30dBc)



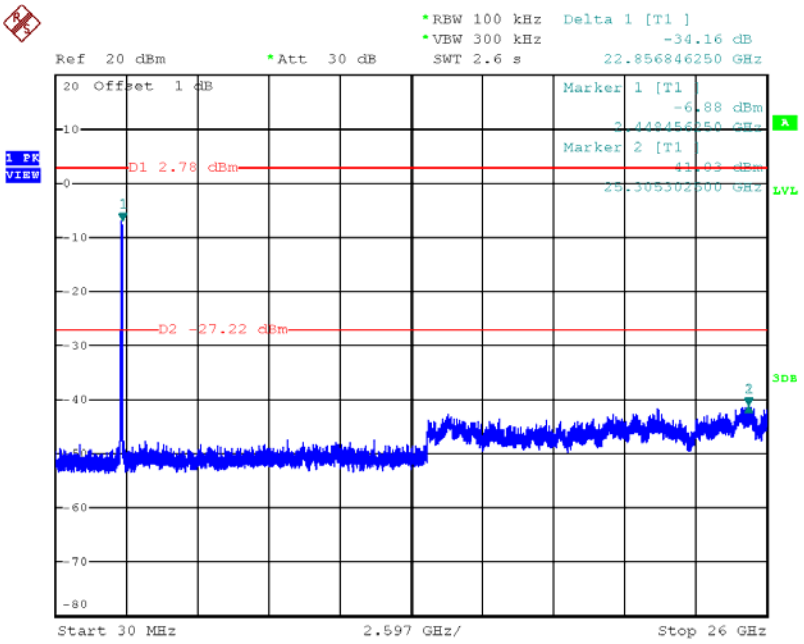
Date: 25.DEC.2012 22:19:18

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 6 (down 30dBc)



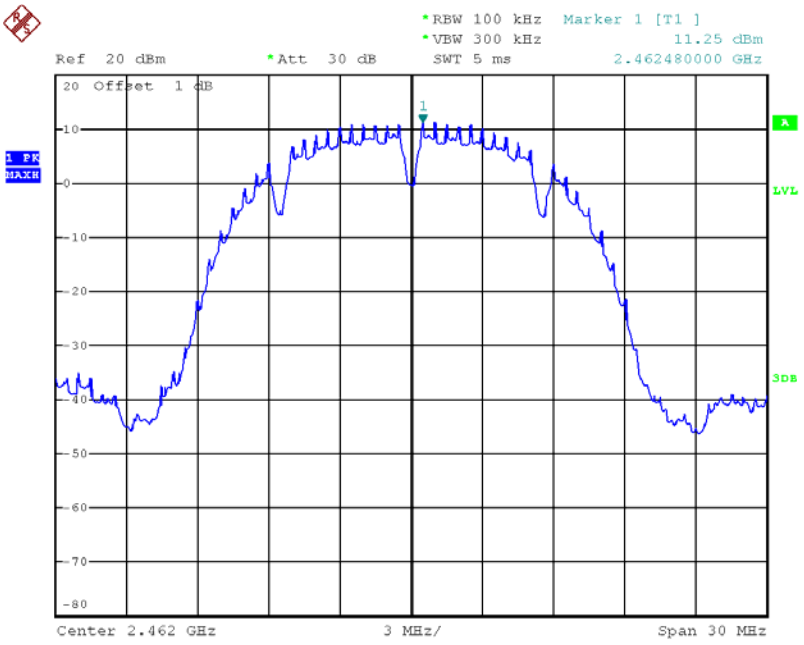
Date: 25.DEC.2012 22:19:59

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 9 (down 30dBc)



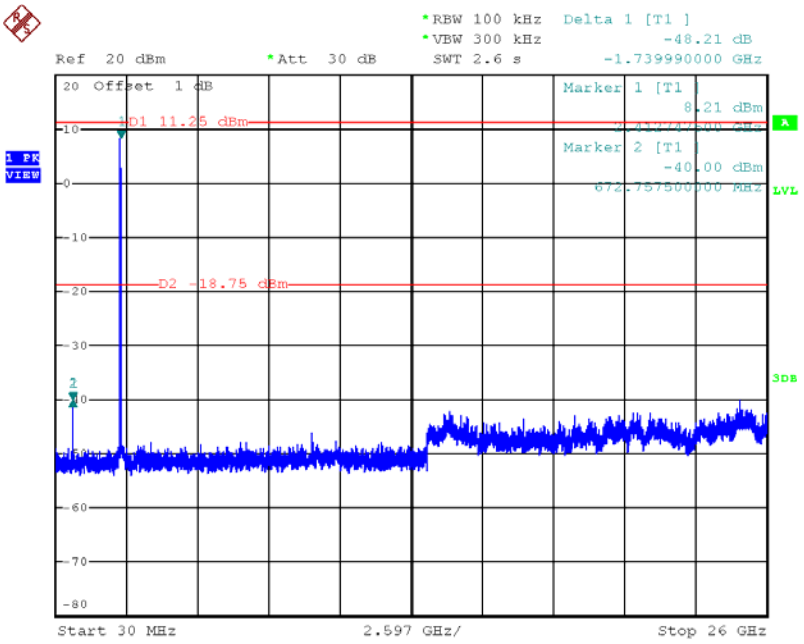
Date: 25.DEC.2012 22:20:50

Plot on Configuration IEEE 802.11b / Reference Level



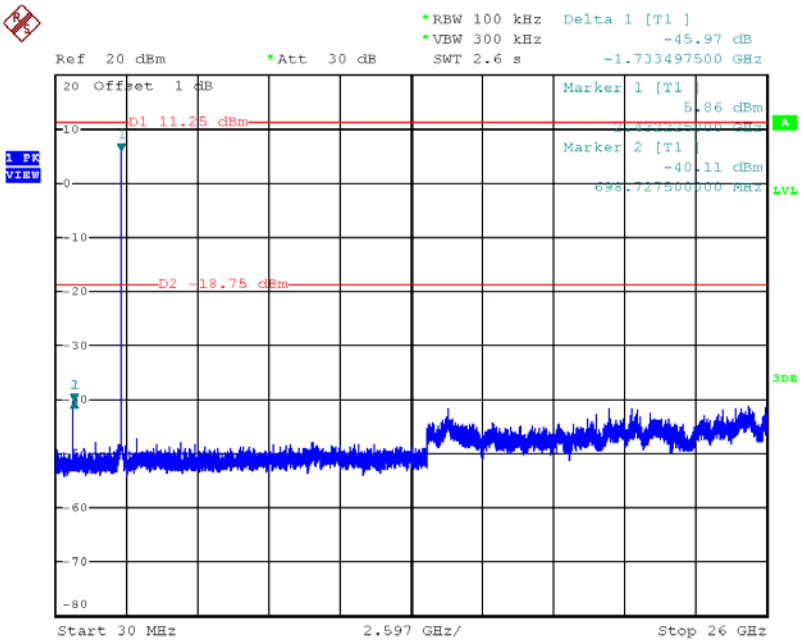
Date: 25.DEC.2012 21:41:30

Plot on Configuration IEEE 802.11b / CH 1 (down 30dBc)



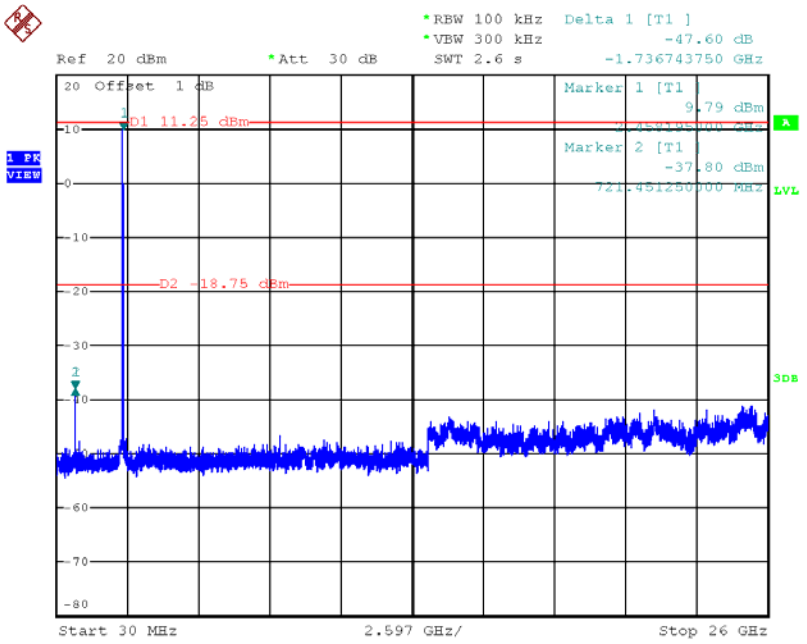
Date: 25.DEC.2012 22:11:02

Plot on Configuration IEEE 802.11b / CH 6 (down 30dBc)



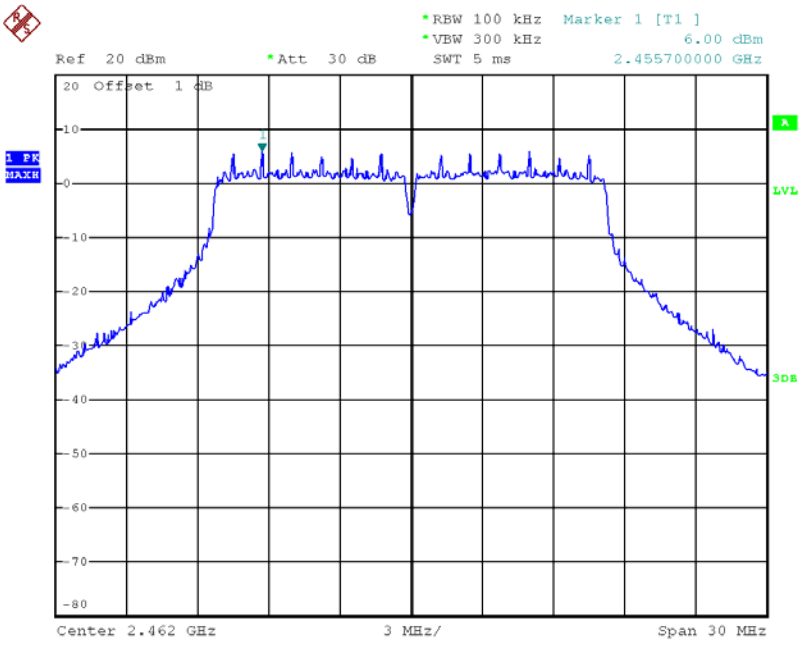
Date: 25.DEC.2012 22:11:52

Plot on Configuration IEEE 802.11b / CH 11 (down 30dBc)



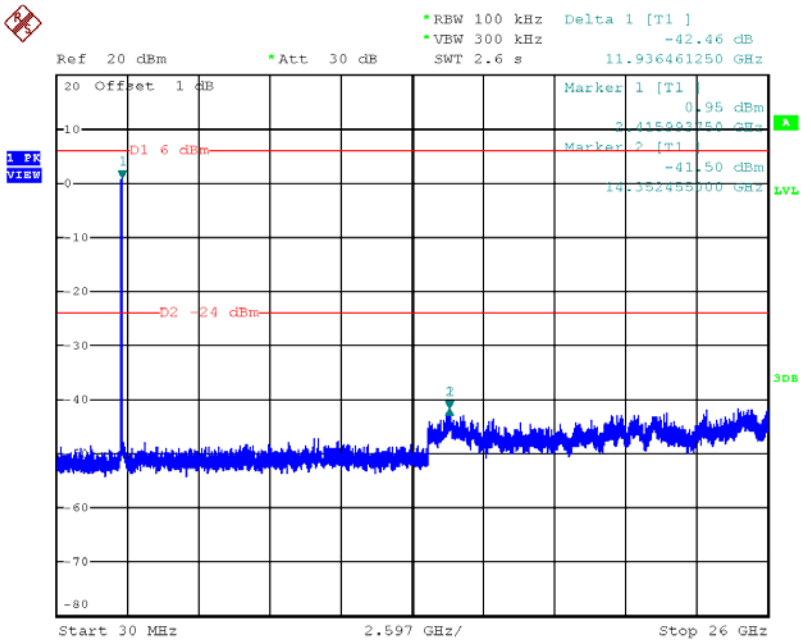
Date: 25.DEC.2012 22:12:41

Plot on Configuration IEEE 802.11g / Reference Level



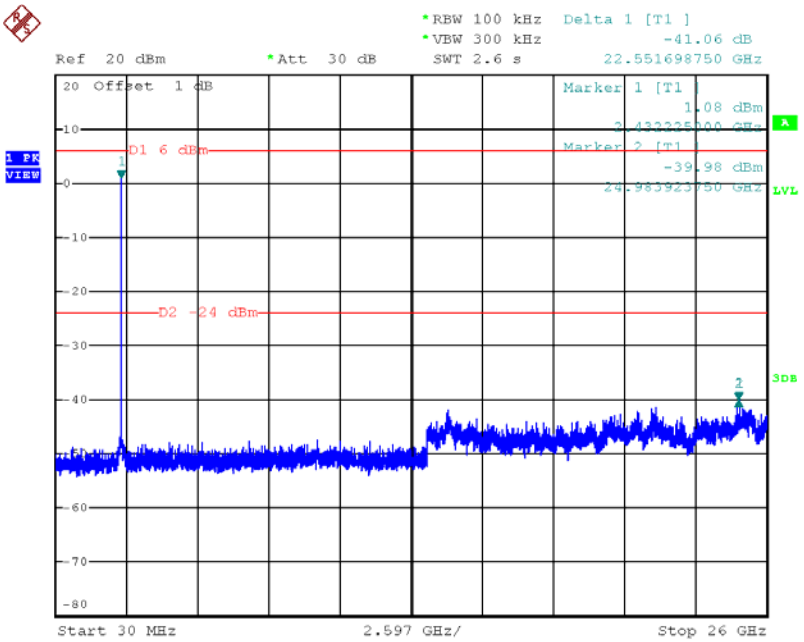
Date: 25.DEC.2012 21:44:13

Plot on Configuration IEEE 802.11g / CH 1 (down 30dBc)



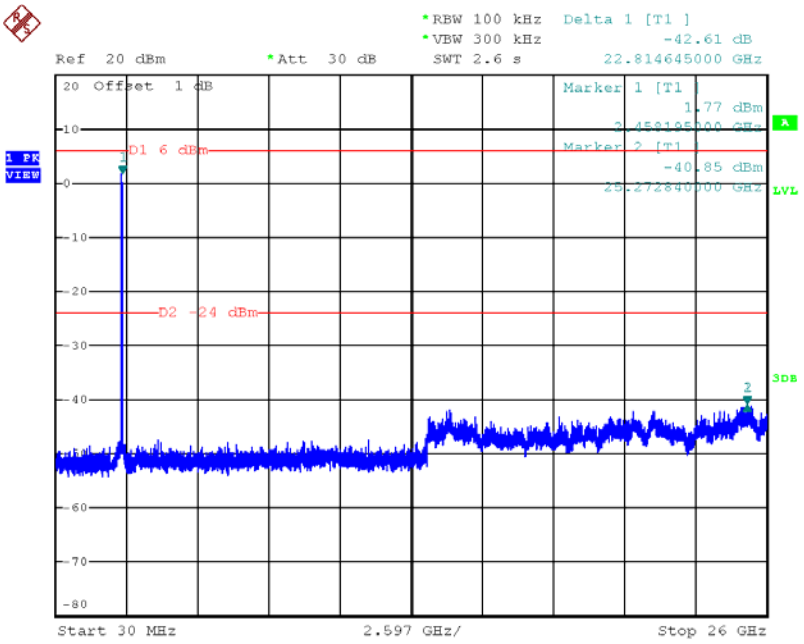
Date: 25.DEC.2012 22:13:52

Plot on Configuration IEEE 802.11g / CH 6 (down 30dBc)



Date: 25.DEC.2012 22:14:36

Plot on Configuration IEEE 802.11g / CH 11 (down 30dBc)



Date: 25.DEC.2012 22:15:12

4.7. Antenna Requirements

4.7.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.7.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100377	9kHz ~ 2.75GHz	Oct. 23, 2012	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov.26, 2012	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9kHz ~ 30MHz	Jun. 22, 2012	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 4, 2012	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-----	-----	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2012	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9KHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 20, 2012	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9KHz~40GHz	Oct. 08, 2012	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 05, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	0120A02056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Power Divider	Woken	3 Way	MDC2366	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	4 Way	0120A04056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Nov. 28, 2012	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Nov. 27, 2012	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.
*Calibration Interval of instruments listed above is two year.
N.C.R. means Non-Calibration required.

6. TEST LOCATION

SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	886-2-2696-2468
	FAX	:	886-2-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	886-3-327-3456
	FAX	:	886-3-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	886-2-2601-1640
	FAX	:	886-2-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	886-2-2631-4739
	FAX	:	886-2-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	886-2-8227-2020
	FAX	:	886-2-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	886-2-2794-8886
	FAX	:	886-2-2794-9777
JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.
	TEL	:	886-3-656-9065
	FAX	:	886-3-656-9085

7. MEASUREMENT UNCERTAINTY

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	0.026	dB	normal(k=2)	0.013
Cable loss	0.002	dB	normal(k=2)	0.001
AMN/LISN specification	1.200	dB	normal(k=2)	0.600
Mismatch Receiver VSWR 1= AMN/LISN VSWR 2=	-0.080	dB	U-shaped	0.060
Combined standard uncertainty Uc(y)				1.2
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				2.4

Uncertainty of Radiated Emission Measurement (30MHz ~ 1,000MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.173	dB	K=1	0.086
Cable loss	±0.174	dB	K=2	0.087
Antenna gain	±0.169	dB	K=2	0.084
Site imperfection	±0.433	dB	Triangular	0.214
Pre-amplifier gain	±0.366	dB	K=2	0.183
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.778
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.555

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.191	dB	K=1	0.095
Cable loss	±0.169	dB	K=2	0.084
Antenna gain	±0.191	dB	K=2	0.096
Site imperfection	±0.582	dB	Triangular	0.291
Pre-amplifier gain	±0.304	dB	K=2	0.152
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.839
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.678

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.186	dB	K=1	0.093
Cable loss	±0.167	dB	K=2	0.083
Antenna gain	±0.190	dB	K=2	0.095
Site imperfection	±0.488	dB	Triangular	0.244
Pre-amplifier gain	±0.269	dB	K=2	0.134
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.771
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.541

Uncertainty of Conducted Emission Measurement

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Cable loss	±0.038	dB	K=2	0.019
Attenuator	±0.047	dB	K=2	0.024
Power Meter specification	±0.300	dB	Triangular	0.150
Power Sensor specification	±0.300	dB	Rectangular	0.150
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				0.863
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				1.726