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FCC RADIO TEST REPORT

Applicant's company	**Aerohive Networks, Inc.**
Applicant Address	330 Gibraltar Drive, Sunnyvale, CA 94089
FCC ID	**WBV-AP3X0**
Manufacturer's company	**Accton Technology Corporation**
Manufacturer Address	1, Creation Road 3, Hsinchu Science Park , Hsinchu 30077 , Taiwan , R.O.C

Product Name	Access Point
Brand Name	Aerohive
Model No.	AP370 / AP390
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Jun. 20, 2013
Final Test Date	Sep. 16, 2013
Submission Type	Class II Change

Statement

Test result included is only for the IEEE 802.11n, IEEE 802.11b/g part and IEEE 802.11a/ac (5725 ~ 5850MHz) 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
FR362046-02AA	Rev. 01	Initial issue of report	Oct. 01, 2013

Certificate No.: CB10209169

1. CERTIFICATE OF COMPLIANCE

Product Name	:	Access Point
Brand Name	:	Aerohive
Model No.	:	AP370 / AP390
Applicant	:	Aerohive Networks, 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 Jun. 20, 2013 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

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	15.247(b)(3)	Maximum Conducted Output Power	Complies	1.14 dB
4.2	15.247(d)	Radiated Emissions	Complies	2.64 dB
4.3	15.247(d)	Band Edge Emissions	Complies	0.60 dB
4.4	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n/ac

Items	Description
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter or PoE
Modulation	see the below table for IEEE 802.11n/ac
Data Modulation	For 802.11n: OFDM (BPSK / QPSK / 16QAM / 64QAM) For 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n/ac
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	For 2.4GHz Band: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth For 5GHz Band: 5 for 20MHz bandwidth ; 2 for 40MHz bandwidth ; 1 for 80MHz bandwidth
Maximum Conducted Output Power	For EUT 1: Mode 1 / 2.4GHz Band: MCS0 (20MHz): 27.20 dBm ; MCS0 (40MHz): 21.40 dBm Mode 1 / 5GHz Band: 802.11ac MCS0, Nss1 (20MHz): 28.80 dBm ; 802.11ac MCS0, Nss1 (40MHz): 28.68 dBm ; 802.11ac MCS0, Nss1 (80MHz): 25.19 dBm For EUT 1: Mode 2 / 2.4GHz Band: MCS0 (20MHz): 26.25 dBm ; MCS0 (40MHz): 19.94 dBm Mode 2 / 5GHz Band: 802.11ac MCS0, Nss1 (20MHz): 28.83 dBm ; 802.11ac MCS0, Nss1 (40MHz): 28.63 dBm ; 802.11ac MCS0, Nss1 (80MHz): 25.39 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

802.11a/b/g

Items	Description
Product Type	WLAN (1TX, 1RX) ; WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter or PoE
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11a/g
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 / 5725 ~ 5850MHz
Channel Number	11b/g: 11 ; 11a: 5
Maximum Conducted Output Power	For EUT 1: Mode 1 / 1TX: 11b: 23.77 dBm ; 11g: 23.51 dBm ; 11a: 24.49 dBm Mode 1 / 3TX: 11b: 28.35 dBm ; 11g: 26.79 dBm ; 11a: 28.86 dBm For EUT 2: Mode 2 / 1TX: 11b: 24.87 dBm ; 11g: 22.85 dBm ; 11a: 24.71 dBm Mode 2 / 3TX: 11b: 26.11 dBm ; 11g: 25.48 dBm ; 11a: 28.86 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Single (TX)			Three (TX)		
Band width Mode	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz
IEEE 802.11a	V	X	X	V	X	X
IEEE 802.11b	V	X	X	V	X	X
IEEE 802.11g	V	X	X	V	X	X
IEEE 802.11n	X	X	X	V	V	X
IEEE 802.11ac	X	X	X	V	V	V

IEEE 11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	3	MCS 0-23
802.11n (HT40)	3	MCS 0-23
802.11ac (VHT20)	3	MCS 0-9, Nss1-3
802.11ac (VHT40)	3	MCS 0-9, Nss1-3
802.11ac (VHT80)	3	MCS 0-9, Nss1-3
Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40. Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT support VHT20, VHT40 and VHT80. Note 3: Modulation modes consist of below configuration: 11a: IEEE 802.11a, HT20/HT40: IEEE 802.11n, VHT20/VHT40/VHT80: IEEE 802.11ac		

3.2. Accessories

Power	Brand Holder	Model No.	Rating	Remark
Adapter	Powertron Electronics Corp.	PA1024-2HU	INPUT:100-240V~50-60Hz 0.6A OUTPUT:12V 2.0A, 24W Max	With a Core

3.3. Table for Class II Change

This product is an extension of original one reported under Sporton project number: 362046

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. It adds and swaps EMI components for this device in order to improve test result of radiated emission. 2. It adds two Gaskets on the shielding case of RF module.	1. Maximum Conducted Output Power. 2. Radiated Emissions (30MHz~1GHz). Radiated Emissions (1GHz~10th Harmonic): IEEE 802.11ac MCS0, Nss1 20MHz CH 165 IEEE 802.11ac MCS0, Nss1 40MHz CH 159 IEEE 802.11ac MCS0, Nss1 80MHz CH 155 IEEE 802.11b CH 11 IEEE 802.11a CH 165 3. Band Edge Emissions: IEEE 802.11n MCS0 20MHz CH 6 IEEE 802.11n MCS0 40MHz CH 6 IEEE 802.11g CH 6

3.4. Table for Filed Antenna

For EUT 1 (Model No. AP370)

Ant.	Brand	Model No.	Type	Connector	True Gain (dBi)	
					2.4GHz	5GHz
1	Accton	AC-02-PB002-004	PIFA	I-PEX	4.42	-
2	Accton	AC-02-PB002-005	PIFA	I-PEX	4.42	-
3	Accton	AC-02-PB002-006	PIFA	I-PEX	4.42	-
4	Accton	AC-02-PB001-004	PIFA	I-PEX	-	4.54
5	Accton	AC-02-PB001-005	PIFA	I-PEX	-	4.54
6	Accton	AC-02-PB001-006	PIFA	I-PEX	-	4.54

Note: Chain 1: Connect to Ant. 1, Chain 2: Connect to Ant. 2, Chain 3: Connect to Ant. 3, Chain 4: Connect to Ant. 4, Chain 5: Connect to Ant. 5, Chain 6: Connect to Ant. 6.

For EUT 2 (Model No. AP390)

Ant.	Brand	Model No.	Type	Connector	Gain (dBi)		Cable loss		True Gain (dBi)	
					2.4GHz	5GHz	2.4GHz	5GHz	2.4GHz	5GHz
1	Master Wave	98152MRSX007	Dipole	I-PEX	4	-	0.4	-	3.6	-
2	Master Wave	98152URSX002	Dipole	I-PEX	-	4	-	0.7	-	3.3

Note: Chain 1~ Chain 3: Connect to Ant. 1, Chain 4~ Chain 6: Connect to Ant. 2.

<For 2.4GHz Band:>

For IEEE 802.11b/g mode (1TX, 1RX):

Only Chain 1 could transmit/receive simultaneously.

For IEEE 802.11b/g mode (3TX, 3RX):

Chain 1, Chain 2 and Chain 3 could transmit/receive simultaneously.

For IEEE 802.11n mode (3TX, 3RX):

Chain 1, Chain 2 and Chain 3 could transmit/receive simultaneously.

<For 5GHz Band:>

For IEEE 802.11a mode (1TX, 1RX):

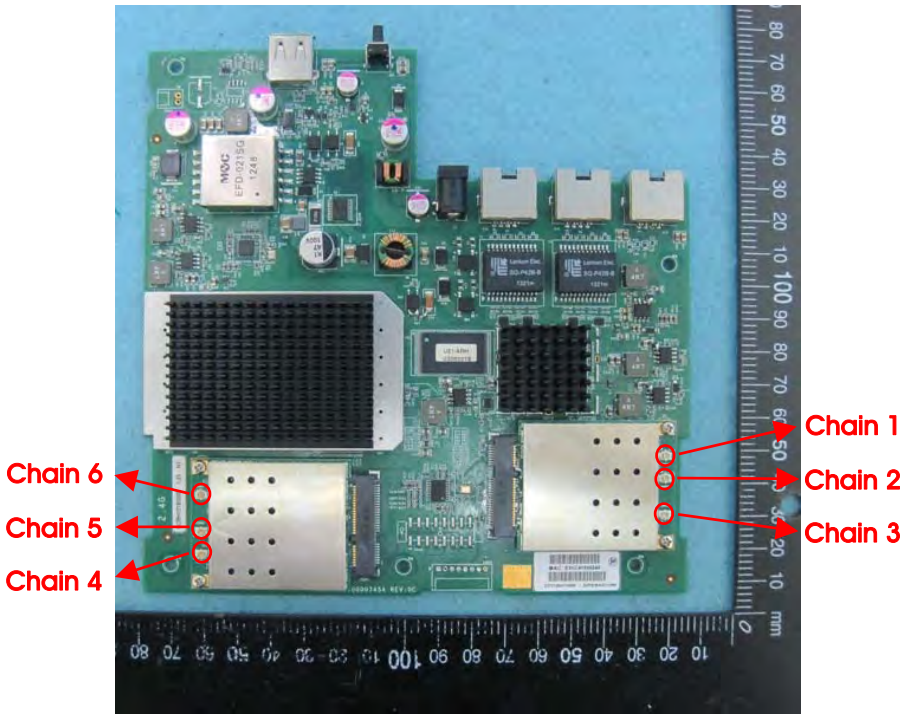
Only Chain 4 could transmit/receive simultaneously.

For IEEE 802.11a mode (3TX, 3RX):

Chain 4, Chain 5 and Chain 6 could transmit/receive simultaneously.

For IEEE 802.11n/ac mode (3TX, 3RX):

Chain 4, Chain 5 and Chain 6 could transmit/receive simultaneously.



3.5. Table for Carrier Frequencies

For 2.4GHz Band:

There are two bandwidth systems.

For 20MHz bandwidth systems, use Channel 1~Channel 11.

For 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	-	-

For 5GHz Band:

There are three bandwidth systems.

For 20MHz bandwidth systems, use Channel 149, 153, 157, 161, 165.

For 40MHz bandwidth systems, use Channel 151, 159.

For 80MHz bandwidth systems, use Channel 155.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5725~5850 MHz Band 4	149	5745 MHz	157	5785 MHz
	151	5755 MHz	159	5795 MHz
	153	5765 MHz	161	5805 MHz
	155	5775 MHz	165	5825 MHz

3.6. 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.

For 2.4GHz Band

Test Items	Mode	Data Rate	Channel	Chain
Maximum Conducted Output Power	11n 20MHz	MCS0	1/6/11	1+2+3
	11n 40MHz	MCS0	3/6/9	1+2+3
	11b/CCK	1 Mbps	1/6/11	1 1+2+3
	11g/BPSK	6 Mbps	1/6/11	1 1+2+3
Radiated Emissions Below 1GHz	Normal Link	-	-	-
Radiated Emissions Above 1GHz	11b/CCK	1 Mbps	11	1+2+3
Band Edge Emissions	11n 20MHz	MCS0	6	1+2+3
	11n 40MHz	MCS0	6	1+2+3
	11g/BPSK	6 Mbps	6	1+2+3

For 5GHz Band

Test Items	Mode	Data Rate	Channel	Chain
Maximum Conducted Output Power	11ac 20MHz	MCS0, Nss1	149/157/165	4+5+6
	11ac 40MHz	MCS0, Nss1	151/159	4+5+6
	11ac 80MHz	MCS0, Nss1	155	4+5+6
	11a/BPSK	6 Mbps	149/157/165	4 4+5+6
Radiated Emissions Below 1GHz	Normal Link	-	-	-
Radiated Emissions Above 1GHz	11ac 20MHz	MCS0, Nss1	165	4+5+6
	11ac 40MHz	MCS0, Nss1	159	4+5+6
	11ac 80MHz	MCS0, Nss1	155	4+5+6
	11a/BPSK	6 Mbps	165	4+5+6

The following test modes were performed for all tests:

For Radiated Emission below 1GHz test:

Mode 1. EUT 1 put vertically+Adapter

Mode 2. EUT 1 put horizontally+Adapter

Mode 3. EUT 1 put vertically+PoE

Mode 4. EUT 1 put horizontally+PoE

Mode 5. EUT 2 put vertically+Adapter

Mode 6. EUT 2 put horizontally+Adapter

Mode 7. EUT 2 put vertically+PoE

Mode 8. EUT 2 put horizontally+PoE

Mode 3 and Mode 7 are worst test result among Mode 1~8, and the test result of those modes are selected to record in this test report.

For Radiated Emissions above 1GHz test:

Mode 1. EUT 1 put vertically

Mode 2. EUT 1 put horizontally

Mode 3. EUT 2 put vertically

Mode 4. EUT 2 put horizontally

Mode 1 and Mode 3 are the worst case, so it was selected to record in this test report.

3.7. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.
03CH01-CB	SAC	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.

3.8. Table for Multiple List

The model numbers in the following table are all refer to the identical product.

Model No.	Antenna Type	Remark
AP370	PIFA Antenna	EUT 1
AP390	Dipole Antenna	EUT 2

3.9. Table for Supporting Units

For Radiated Emission below 1GHz:

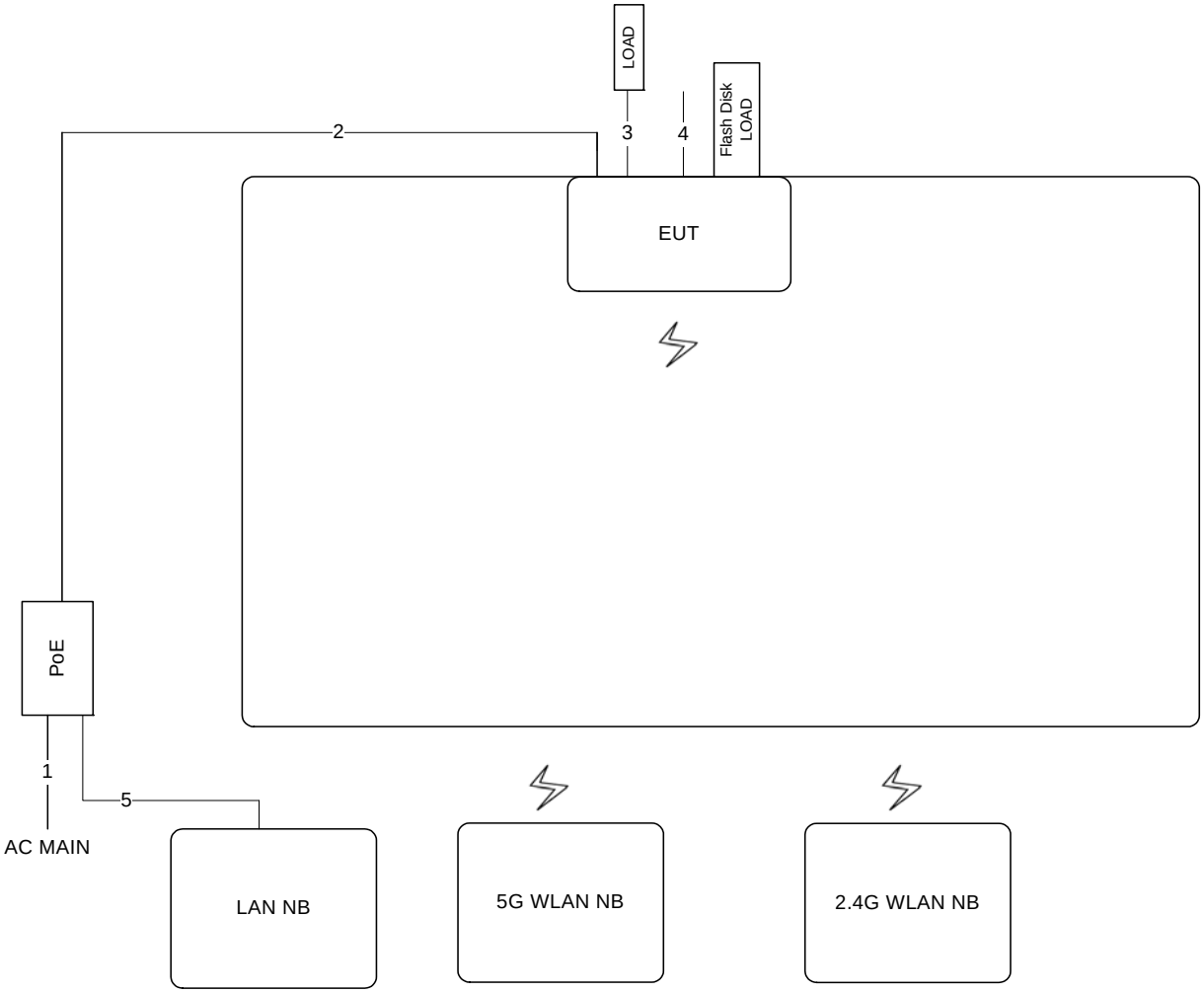
Support Unit	Brand	Model	FCC ID
NB	DELL	E6220	QDS-BRCM1049LE
NB	DELL	E6220	QDS-BRCM1049LE
NB	DELL	E6220	QDS-BRCM1049LE
Flash Disk 3.0	ADATA	C103	DoC
PoE	Powerdsine	PD-3501G/AC	N/A

For Others tests:

Support Unit	Brand	Model	FCC ID
NB	DELL	E6220	QDS-BRCM1049LE

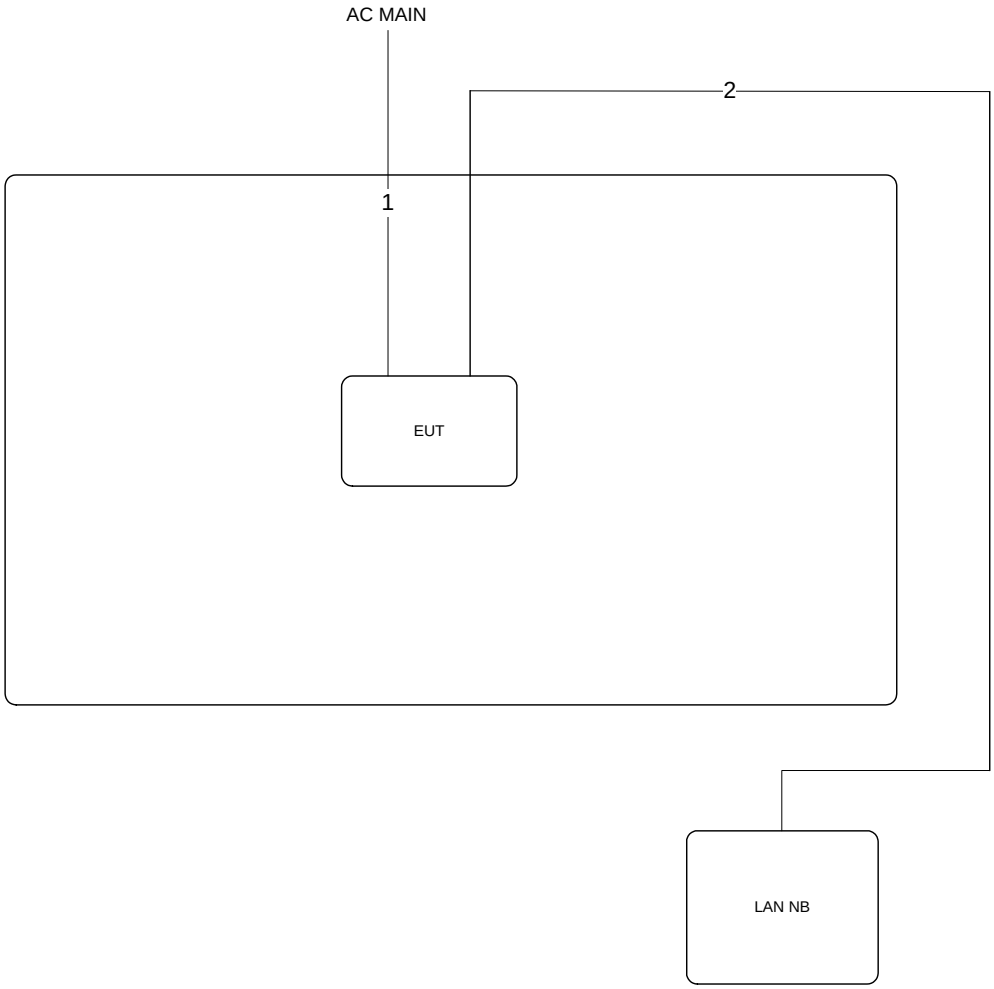
3.9.1. Radiated Emission Test Configuration

Test Configuration: below 1GHz / Test Mode: Mode 3, Mode 7



Item	Connection	Shielded	Length
1	Power cable	No	1.8m
2	RJ-45 cable	No	10m
3	RJ45 cable	No	1m
4	Console cable	No	1m
5	RJ-45 cable	No	1.5m

Test Configuration: above 1GHz / Test Mode: Mode 1, Mode 3



Item	Connection	Shielded	Length
1	Power cable	No	1.8m
2	RJ-45 cable	No	10m

4. TEST RESULT

4.1. Maximum Conducted Output Power Measurement

4.1.1. 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. Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter output power.

4.1.2. Measuring Instruments and Setting

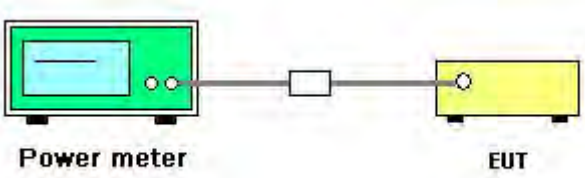
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	Average

4.1.3. 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.

4.1.4. Test Setup Layout



4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.1.7. Test Result of Maximum Conducted Output Power

Temperature	25°C	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11n/ac
Test Date	Jul. 28, 2013	Test Mode	Mode 1 (EUT 1)

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 20MHz / Chain 1+ Chain 2+ Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
1	2412 MHz	17.48	17.1	16.99	21.97	30.00	Complies
6	2437 MHz	23.01	21.8	22.38	27.20	30.00	Complies
11	2462 MHz	20.34	19.56	19.99	24.75	30.00	Complies

Configuration IEEE 802.11n MCS0 40MHz / Chain 1+ Chain 2+ Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
3	2422 MHz	14.18	13.21	13.02	18.27	30.00	Complies
6	2437 MHz	16.97	16.15	16.74	21.40	30.00	Complies
9	2452 MHz	15.45	14.04	15.28	19.74	30.00	Complies

For 5GHz Band

Configuration IEEE 802.11ac MCS0, Nss1 20MHz / Chain 4+ Chain 5+ Chain 6

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
149	5745 MHz	23.51	24.25	24.1	28.74	30.00	Complies
157	5785 MHz	23.63	24.34	24.09	28.80	30.00	Complies
165	5825 MHz	23.6	24.31	23.72	28.66	30.00	Complies

Configuration IEEE 802.11ac MCS0, Nss1 40MHz / Chain 4+ Chain 5+ Chain 6

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
151	5755 MHz	21.11	21.52	21.5	26.15	30.00	Complies
159	5795 MHz	23.64	24.17	23.9	28.68	30.00	Complies

Configuration IEEE 802.11ac MCS0, Nss1 80MHz / Chain 4+ Chain 5+ Chain 6

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
155	5775 MHz	20.16	20.81	20.27	25.19	30.00	Complies

Temperature	25°C	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11a/b/g
Test Date	Jul. 28, 2013	Test Mode	Mode 1 (EUT 1)

For 1TX

Configuration IEEE 802.11b / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	23.39	30.00	Complies
6	2437 MHz	23.62	30.00	Complies
11	2462 MHz	23.77	30.00	Complies

Configuration IEEE 802.11g / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	20.06	30.00	Complies
6	2437 MHz	23.51	30.00	Complies
11	2462 MHz	21.03	30.00	Complies

Configuration IEEE 802.11a / Chain 4

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	24.38	30.00	Complies
157	5785 MHz	24.49	30.00	Complies
165	5825 MHz	24.42	30.00	Complies

Temperature	25°C	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11a/b/g
Test Date	Jul. 28, 2013	Test Mode	Mode 1 (EUT 1)

For 3TX

Configuration IEEE 802.11b / Chain 1+ Chain 2+ Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
1	2412 MHz	16.84	16.09	15.23	20.87	30.00	Complies
6	2437 MHz	22.06	21.36	21.86	26.54	30.00	Complies
11	2462 MHz	23.98	23.04	23.67	28.35	30.00	Complies

Configuration IEEE 802.11g / Chain 1+ Chain 2+ Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
1	2412 MHz	17.69	17.15	16.98	22.06	30.00	Complies
6	2437 MHz	22.53	21.43	22.04	26.79	30.00	Complies
11	2462 MHz	20.42	19.57	19.96	24.77	30.00	Complies

Configuration IEEE 802.11a / Chain 4+ Chain 5+ Chain 6

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
149	5745 MHz	23.7	24.35	24.18	28.86	30.00	Complies
157	5785 MHz	23.69	24.37	24.14	28.85	30.00	Complies
165	5825 MHz	23.64	24.3	23.81	28.70	30.00	Complies

Temperature	25°C	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11n/ac
Test Date	Jul. 28, 2013	Test Mode	Mode 2 (EUT 2)

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 20MHz / Chain 1+ Chain 2+ Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
1	2412 MHz	15.87	15.09	15.47	20.26	30.00	Complies
6	2437 MHz	21.95	21.02	21.43	26.25	30.00	Complies
11	2462 MHz	16.24	15.28	15.36	20.42	30.00	Complies

Configuration IEEE 802.11n MCS0 40MHz / Chain 1+ Chain 2+ Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
3	2422 MHz	13.13	11.61	12.73	17.31	30.00	Complies
6	2437 MHz	15.68	14.72	15.04	19.94	30.00	Complies
9	2452 MHz	14.77	13.66	14.06	18.96	30.00	Complies

For 5GHz Band

Configuration IEEE 802.11ac MCS0, Nss1 20MHz / Chain 4+ Chain 5+ Chain 6

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
149	5745 MHz	23.90	24.02	24.26	28.83	30.00	Complies
157	5785 MHz	23.75	24.01	23.94	28.67	30.00	Complies
165	5825 MHz	23.89	23.78	23.79	28.59	30.00	Complies

Configuration IEEE 802.11ac MCS0, Nss1 40MHz / Chain 4+ Chain 5+ Chain 6

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
151	5755 MHz	21.66	21.93	22.02	26.64	30.00	Complies
159	5795 MHz	23.75	23.90	23.93	28.63	30.00	Complies

Configuration IEEE 802.11ac MCS0, Nss1 80MHz / Chain 4+ Chain 5+ Chain 6

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
155	5775 MHz	20.61	20.62	20.63	25.39	30.00	Complies

Temperature	25°C	Humidity	56%
Test Engineer	Benson Peng	Configurations	IEEE 802.11a/b/g
Test Date	Jul. 26, 2013	Test Mode	Mode 2 (EUT 2)

For 1TX

Configuration IEEE 802.11b / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	21.76	30.00	Complies
6	2437 MHz	24.87	30.00	Complies
11	2462 MHz	21.82	30.00	Complies

Configuration IEEE 802.11g / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	17.72	30.00	Complies
6	2437 MHz	22.85	30.00	Complies
11	2462 MHz	18.17	30.00	Complies

Configuration IEEE 802.11a / Chain 4

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	24.71	30.00	Complies
157	5785 MHz	24.61	30.00	Complies
165	5825 MHz	24.65	30.00	Complies

Temperature	25°C	Humidity	56%
Test Engineer	Denis Su	Configurations	IEEE 802.11a/b/g
Test Date	Jul. 28, 2013	Test Mode	Mode 2 (EUT 2)

For 3TX

Configuration IEEE 802.11b / Chain 1+ Chain 2+ Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
1	2412 MHz	16.18	14.56	15.39	20.20	30.00	Complies
6	2437 MHz	17.76	17.13	17.09	22.11	30.00	Complies
11	2462 MHz	21.67	21.22	21.12	26.11	30.00	Complies

Configuration IEEE 802.11g / Chain 1+ Chain 2+ Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
1	2412 MHz	17.63	16.98	17.57	22.17	30.00	Complies
6	2437 MHz	21.02	20.67	20.43	25.48	30.00	Complies
11	2462 MHz	17.15	16.38	16.64	21.51	30.00	Complies

Configuration IEEE 802.11a / Chain 4+ Chain 5+ Chain 6

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
149	5745 MHz	23.88	24.17	24.22	28.86	30.00	Complies
157	5785 MHz	23.82	23.92	23.96	28.67	30.00	Complies
165	5825 MHz	23.91	23.81	23.75	28.60	30.00	Complies

4.2. Radiated Emissions Measurement

4.2.1. 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

4.2.2. 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	1GHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100kHz / 300kHz for peak

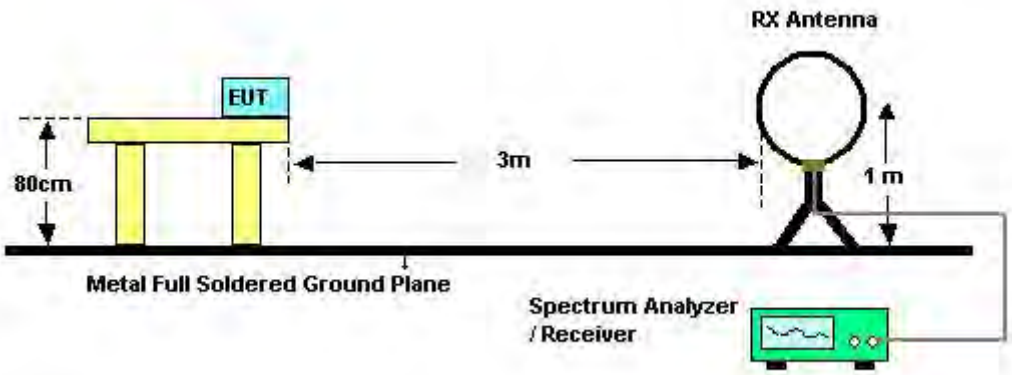
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1GHz / RBW 120kHz for QP

4.2.3. Test Procedures

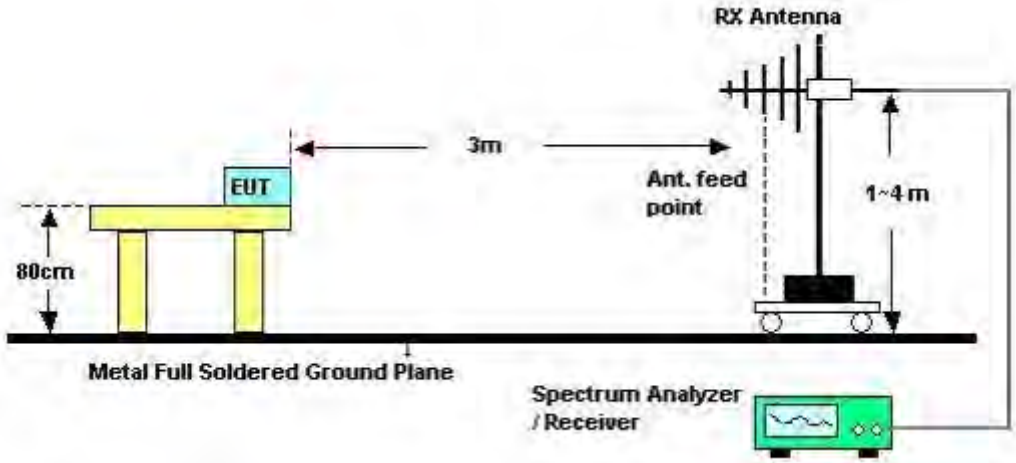
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

4.2.4. Test Setup Layout

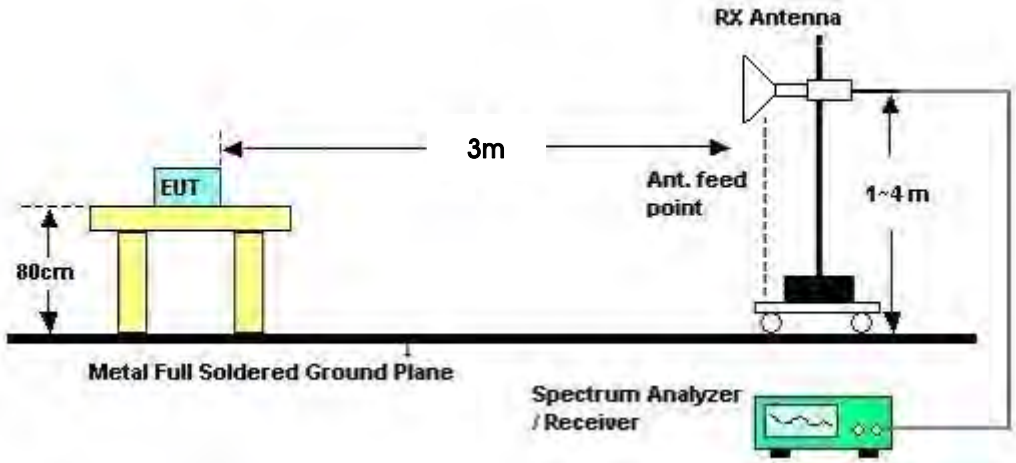
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



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

Temperature	24°C	Humidity	58%
Test Engineer	David Tseng	Configurations	Normal Link
Test Date	Sep. 16, 2013		

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

Note:

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

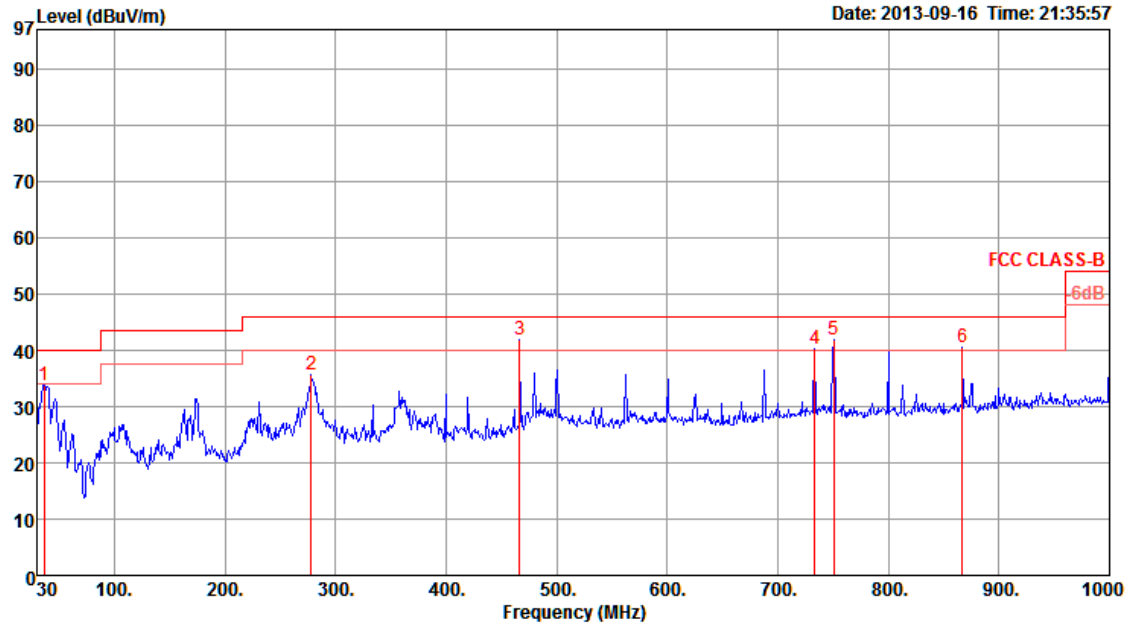
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

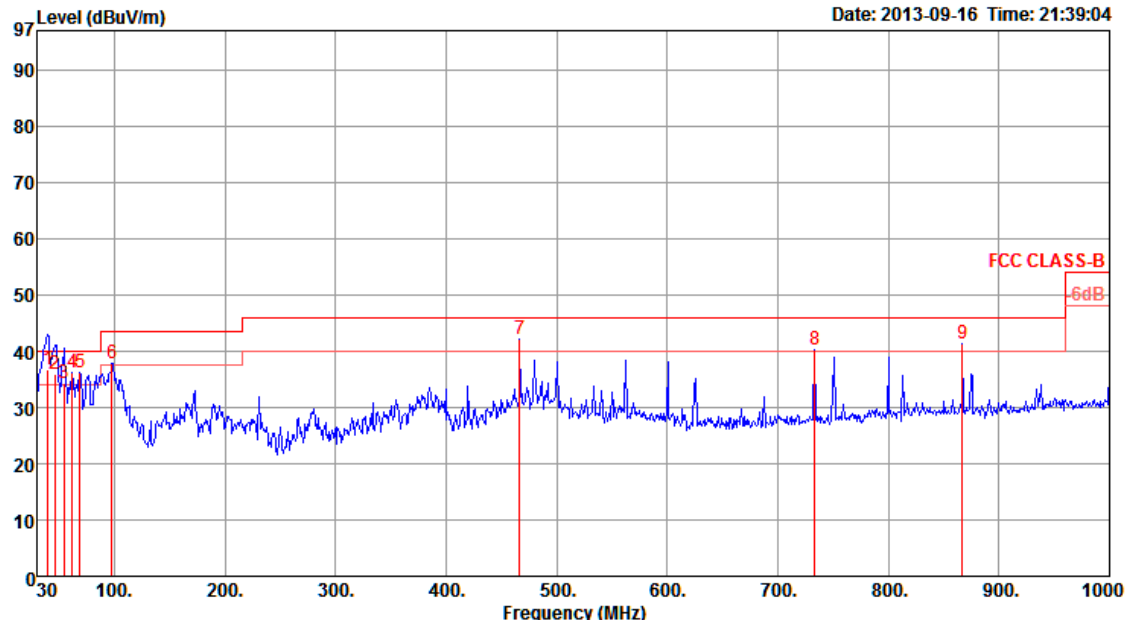
Temperature	24°C	Humidity	58%
Test Engineer	David Tseng	Configurations	Normal Link
Test Mode	Mode 3		

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	36.79	33.87	40.00	-6.13	45.30	0.95	28.00	15.62	Peak	0	400	HORIZONTAL
2	278.32	35.73	46.00	-10.27	46.61	2.52	26.88	13.48	Peak	0	400	HORIZONTAL
3	466.50	41.75	46.00	-4.25	49.06	3.29	27.86	17.26	Peak	0	400	HORIZONTAL
4	733.25	40.37	46.00	-5.63	43.16	4.19	27.11	20.13	Peak	0	400	HORIZONTAL
5	750.71	41.96	46.00	-4.04	44.66	4.21	27.12	20.21	Peak	0	400	HORIZONTAL
6	867.11	40.40	46.00	-5.60	41.49	4.49	26.88	21.30	Peak	0	400	HORIZONTAL

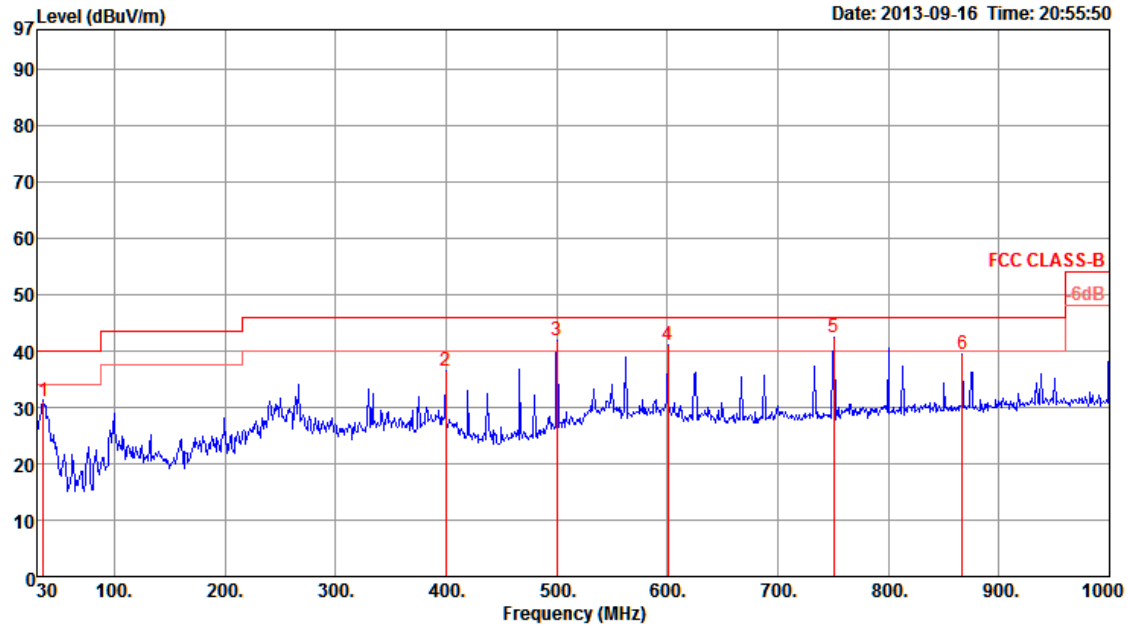
Vertical



	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	39.70	36.84	40.00	-3.16	50.14	0.99	27.99	13.70	QP	26	125	VERTICAL
2	46.49	35.88	40.00	-4.12	52.70	1.01	27.93	10.10	QP	26	125	VERTICAL
3	54.25	34.39	40.00	-5.61	53.19	1.12	27.90	7.98	QP	26	125	VERTICAL
4	62.01	36.24	40.00	-3.76	56.15	1.18	27.97	6.88	Peak	0	100	VERTICAL
5	68.80	36.18	40.00	-3.82	56.05	1.26	27.94	6.81	Peak	0	100	VERTICAL
6	97.90	37.90	43.50	-5.60	53.27	1.48	27.83	10.98	Peak	0	100	VERTICAL
7	466.50	42.17	46.00	-3.83	49.48	3.29	27.86	17.26	Peak	0	100	VERTICAL
8	733.25	40.30	46.00	-5.70	43.09	4.19	27.11	20.13	Peak	0	100	VERTICAL
9	867.11	41.28	46.00	-4.72	42.37	4.49	26.88	21.30	Peak	0	100	VERTICAL

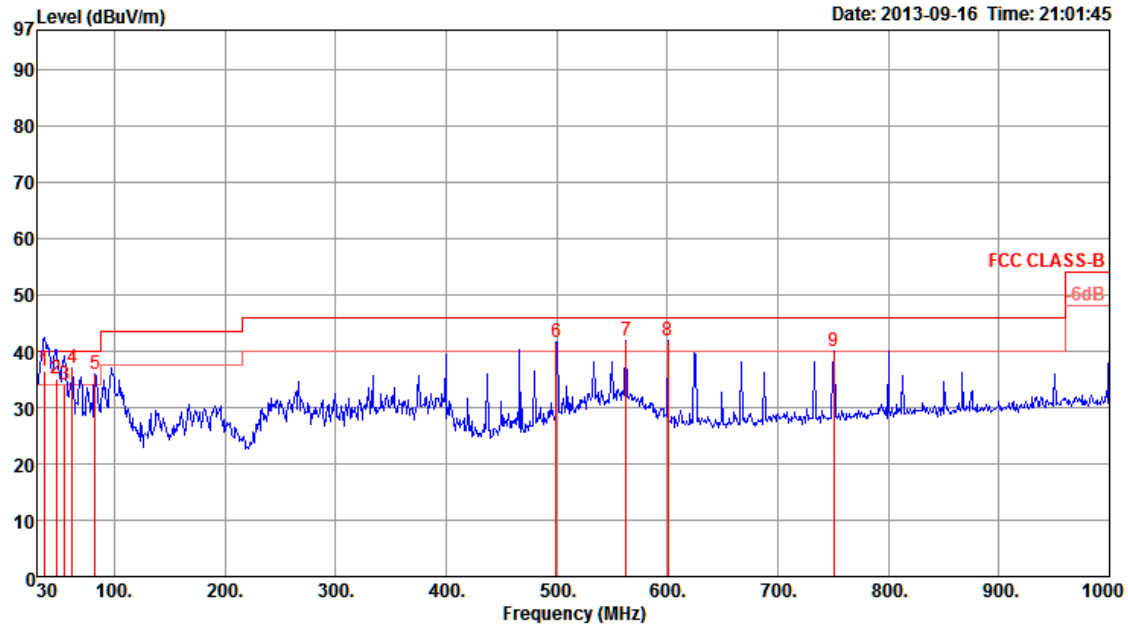
Temperature	24°C	Humidity	58%
Test Engineer	David Tseng	Configurations	Normal Link
Test Mode	Mode 7		

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	35.82	31.16	40.00	-8.84	41.97	0.93	28.00	16.26	Peak	0	400	HORIZONTAL
2	399.57	36.50	46.00	-9.50	44.47	2.99	27.46	16.50	Peak	0	400	HORIZONTAL
3	500.45	41.81	46.00	-4.19	48.56	3.38	27.93	17.80	Peak	0	400	HORIZONTAL
4	600.36	41.15	46.00	-4.85	45.72	3.73	27.60	19.30	Peak	0	400	HORIZONTAL
5	750.71	42.39	46.00	-3.61	45.09	4.21	27.12	20.21	Peak	0	400	HORIZONTAL
6	867.11	39.44	46.00	-6.56	40.53	4.49	26.88	21.30	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	36.79	36.52	40.00	-3.48	47.95	0.95	28.00	15.62	QP	192	100	VERTICAL
2	47.46	35.13	40.00	-4.87	52.29	1.02	27.93	9.75	QP	216	103	VERTICAL
3	55.22	34.13	40.00	-5.87	53.10	1.13	27.90	7.80	QP	179	100	VERTICAL
4	62.01	37.00	40.00	-3.00	56.91	1.18	27.97	6.88	Peak	0	100	VERTICAL
5	82.38	35.82	40.00	-4.18	54.50	1.36	27.90	7.86	Peak	0	100	VERTICAL
6	499.48	41.62	46.00	-4.38	48.39	3.38	27.93	17.78	Peak	0	100	VERTICAL
7	562.53	41.82	46.00	-4.18	47.12	3.59	27.81	18.92	Peak	0	100	VERTICAL
8	600.36	41.91	46.00	-4.09	46.48	3.73	27.60	19.30	Peak	0	100	VERTICAL
9	750.71	40.05	46.00	-5.95	42.75	4.21	27.12	20.21	Peak	0	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.

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

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11ac MCS0, Nss1 20MHz CH 165 / Chain 4+ Chain 5+ Chain 6
Test Date	Sep. 14, 2013	Test Mode	Mode 1 (EUT 1)

Horizontal

	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	11649.56	45.01	54.00	-8.99	36.29	5.16	38.86	35.30	Average	100	316	HORIZONTAL
2	11650.16	57.01	74.00	-16.99	48.29	5.16	38.86	35.30	Peak	100	316	HORIZONTAL

Vertical

	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	11650.96	42.26	54.00	-11.74	33.54	5.16	38.86	35.30	Average	100	318	VERTICAL
2	11651.08	54.41	74.00	-19.59	45.69	5.16	38.86	35.30	Peak	100	318	VERTICAL

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11ac MCS0, Nss1 40MHz CH 159 / Chain 4+ Chain 5+ Chain 6
Test Date	Sep. 14, 2013	Test Mode	Mode 1 (EUT 1)

Horizontal

	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	11590.24	41.92	54.00	-12.08	33.25	5.14	38.83	35.30	Average	105	315	HORIZONTAL
2	11590.48	53.99	74.00	-20.01	45.32	5.14	38.83	35.30	Peak	105	315	HORIZONTAL

Vertical

	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	11591.80	39.05	54.00	-14.95	30.38	5.14	38.83	35.30	Average	100	8	VERTICAL
2	11593.52	51.16	74.00	-22.84	42.49	5.14	38.83	35.30	Peak	100	8	VERTICAL

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11ac MCS0, Nss1 80MHz CH 155 / Chain 4+ Chain 5+ Chain 6
Test Date	Sep. 14, 2013	Test Mode	Mode 1 (EUT 1)

Horizontal

	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	11544.72	37.83	54.00	-16.17	29.19	5.13	38.81	35.30	Average	100	284	HORIZONTAL
2	11548.32	48.48	74.00	-25.52	39.84	5.13	38.81	35.30	Peak	100	360	HORIZONTAL

Vertical

	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	11549.60	50.69	74.00	-23.31	42.05	5.13	38.81	35.30	Peak	100	148	VERTICAL
2	11550.72	41.12	54.00	-12.88	32.47	5.13	38.82	35.30	Average	100	148	VERTICAL

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11b CH 11 / Chain 1+ Chain 2+ Chain 3
Test Date	Sep. 14, 2013	Test Mode	Mode 1 (EUT 1)

Horizontal

	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	4924.00	51.36	54.00	-2.64	49.76	3.35	33.26	35.01	Average	124	66	HORIZONTAL
2	4924.00	53.33	74.00	-20.67	51.73	3.35	33.26	35.01	Peak	124	66	HORIZONTAL
3	7383.48	46.83	74.00	-27.17	42.08	4.06	36.09	35.40	Peak	102	284	HORIZONTAL
4	7388.68	36.30	54.00	-17.70	31.55	4.06	36.09	35.40	Average	102	284	HORIZONTAL

Vertical

	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	4924.00	49.54	54.00	-4.46	47.94	3.35	33.26	35.01	Average	100	30	VERTICAL
2	4924.04	51.68	74.00	-22.32	50.08	3.35	33.26	35.01	Peak	100	30	VERTICAL
3	7387.00	36.15	74.00	-37.85	31.40	4.06	36.09	35.40	Peak	122	163	VERTICAL
4	7387.88	46.97	54.00	-7.03	42.22	4.06	36.09	35.40	Average	122	163	VERTICAL

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 165 / Chain 4+ Chain 5+ Chain 6
Test Date	Sep. 14, 2013	Test Mode	Mode 1 (EUT 1)

Horizontal

	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	11649.60	44.76	54.00	-9.24	36.04	5.16	38.86	35.30	Average	100	314	HORIZONTAL
2	11650.36	57.47	74.00	-16.53	48.75	5.16	38.86	35.30	Peak	100	314	HORIZONTAL

Vertical

	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	11650.28	55.47	74.00	-18.53	46.75	5.16	38.86	35.30	Peak	100	320	VERTICAL
2	11650.84	42.38	54.00	-11.62	33.66	5.16	38.86	35.30	Average	100	320	VERTICAL

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11ac MCS0, Nss1 20MHz CH 165 / Chain 4+ Chain 5+ Chain 6
Test Date	Sep. 14, 2013	Test Mode	Mode 3 (EUT 2)

Horizontal

	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	11648.40	51.17	74.00	-22.83	42.45	5.16	38.86	35.30	Peak	100	168	HORIZONTAL
2	11650.56	39.70	54.00	-14.30	30.98	5.16	38.86	35.30	Average	100	168	HORIZONTAL

Vertical

	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	11648.40	55.80	74.00	-18.20	47.08	5.16	38.86	35.30	Peak	100	78	VERTICAL
2	11648.64	43.59	54.00	-10.41	34.87	5.16	38.86	35.30	Average	100	78	VERTICAL

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11ac MCS0, Nss1 40MHz CH 159 / Chain 4+ Chain 5+ Chain 6
Test Date	Sep. 14, 2013	Test Mode	Mode 3 (EUT 2)

Horizontal

	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	11590.00	40.10	54.00	-13.90	31.43	5.14	38.83	35.30	Average	100	172	HORIZONTAL
2	11609.36	50.13	74.00	-23.87	41.44	5.15	38.84	35.30	Peak	100	172	HORIZONTAL

Vertical

	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	11589.12	52.71	74.00	-21.29	44.04	5.14	38.83	35.30	Peak	100	136	VERTICAL
2	11590.08	41.61	54.00	-12.39	32.94	5.14	38.83	35.30	Average	100	136	VERTICAL

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11ac MCS0, Nss1 80MHz CH 155 / Chain 4+ Chain 5+ Chain 6
Test Date	Sep. 14, 2013	Test Mode	Mode 3 (EUT 2)

Horizontal

	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	11550.08	48.06	74.00	-25.94	39.42	5.13	38.81	35.30	Peak	100	341	HORIZONTAL
2	11564.16	36.41	54.00	-17.59	27.76	5.13	38.82	35.30	Average	100	341	HORIZONTAL

Vertical

	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	11535.44	39.03	54.00	-14.97	30.38	5.13	38.81	35.29	Average	100	262	VERTICAL
2	11542.24	49.56	74.00	-24.44	40.92	5.13	38.81	35.30	Peak	100	262	VERTICAL

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11b CH 11 / Chain 1+ Chain 2+ Chain 3
Test Date	Sep. 14, 2013	Test Mode	Mode 3 (EUT 2)

Horizontal

	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	4923.96	50.26	74.00	-23.74	48.66	3.35	33.26	35.01	Peak	136	135	HORIZONTAL
2	4924.00	48.22	54.00	-5.78	46.62	3.35	33.26	35.01	Average	136	135	HORIZONTAL
3	7384.60	33.10	54.00	-20.90	28.35	4.06	36.09	35.40	Average	100	88	HORIZONTAL
4	7387.64	45.91	74.00	-28.09	41.16	4.06	36.09	35.40	Peak	100	88	HORIZONTAL

Vertical

	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	4924.00	51.04	54.00	-2.96	49.44	3.35	33.26	35.01	Average	100	22	VERTICAL
2	4924.04	53.53	74.00	-20.47	51.93	3.35	33.26	35.01	Peak	100	22	VERTICAL
3	7385.04	50.23	74.00	-23.77	45.48	4.06	36.09	35.40	Peak	129	79	VERTICAL
4	7385.24	42.49	54.00	-11.51	37.74	4.06	36.09	35.40	Average	129	79	VERTICAL

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11a CH 165 / Chain 4+ Chain 5+ Chain 6
Test Date	Sep. 14, 2013	Test Mode	Mode 3 (EUT 2)

Horizontal

	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	11649.20	39.34	54.00	-14.66	30.62	5.16	38.86	35.30	Average	100	223	HORIZONTAL
2	11651.92	49.90	74.00	-24.10	41.18	5.16	38.86	35.30	Peak	100	223	HORIZONTAL

Vertical

	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	11650.96	55.30	74.00	-18.70	46.58	5.16	38.86	35.30	Peak	100	81	VERTICAL
2	11651.20	43.13	54.00	-10.87	34.41	5.16	38.86	35.30	Average	100	81	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.

4.3. Emissions Measurement

4.3.1. 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

4.3.2. 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	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

4.3.3. Test Procedures

For Radiated band edges Measurement:

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

For Radiated Out of Band Emission Measurement:

1. Test was performed in accordance with KDB 558074 D01 v03r01 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10.1 Unwanted Emissions into Non-Restricted Frequency Bands Measurement Procedure
2. The radiated emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit. Only worst data of each operating mode is presented.

4.3.4. Test Setup Layout

For Radiated band edges Measurement:

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

For Radiated Out of Band Emission Measurement:

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

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 Band Edge and Fundamental Emissions

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 20MHz CH 6 / Chain 1+ Chain 2+ Chain 3
Test Date	Sep. 14, 2013	Test Mode	Mode 1 (EUT 1)

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	2388.20	64.58	74.00	-9.42	34.20	2.21	28.17	0.00	Peak	145	53	HORIZONTAL
2	2390.00	52.23	54.00	-1.77	21.84	2.22	28.17	0.00	Average	145	53	HORIZONTAL
3	2433.60	117.73			87.25	2.23	28.25	0.00	Peak	145	53	HORIZONTAL
4	2433.80	107.76			77.28	2.23	28.25	0.00	Average	145	53	HORIZONTAL
5	2484.70	50.80	54.00	-3.20	20.16	2.26	28.38	0.00	Average	145	53	HORIZONTAL
6	2484.70	61.41	74.00	-12.59	30.77	2.26	28.38	0.00	Peak	145	53	HORIZONTAL

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

Note:

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

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

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 40MHz CH 6 / Chain 1+ Chain 2+ Chain 3
Test Date	Sep. 14, 2013	Test Mode	Mode 1 (EUT 1)

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	2389.40	60.37	74.00	-13.63	29.99	2.21	28.17	0.00	Peak	141	56	HORIZONTAL
2	2390.00	48.22	54.00	-5.78	17.83	2.22	28.17	0.00	Average	141	56	HORIZONTAL
3	2423.40	108.55			78.07	2.23	28.25	0.00	Peak	141	56	HORIZONTAL
4	2424.00	99.17			68.69	2.23	28.25	0.00	Average	141	56	HORIZONTAL
5	2483.50	48.99	54.00	-5.01	18.35	2.26	28.38	0.00	Average	141	56	HORIZONTAL
6	2484.50	61.06	74.00	-12.94	30.42	2.26	28.38	0.00	Peak	141	56	HORIZONTAL

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

Note:

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

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

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11g CH 6 / Chain 1+ Chain 2+ Chain 3
Test Date	Sep. 14, 2013	Test Mode	Mode 1 (EUT 1)

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	53.04	54.00	-0.96	22.65	2.22	28.17	0.00	Average	141	53	HORIZONTAL
2	2390.00	64.71	74.00	-9.29	34.32	2.22	28.17	0.00	Peak	141	53	HORIZONTAL
3	2430.40	109.33			78.85	2.23	28.25	0.00	Average	141	53	HORIZONTAL
4	2440.80	119.51			88.98	2.24	28.29	0.00	Peak	141	53	HORIZONTAL
5	2485.70	53.40	54.00	-0.60	22.72	2.26	28.42	0.00	Average	141	53	HORIZONTAL
6	2486.10	65.85	74.00	-8.15	35.17	2.26	28.42	0.00	Peak	141	53	HORIZONTAL

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

Note:

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

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

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 20MHz CH 6 / Chain 1+ Chain 2+ Chain 3
Test Date	Sep. 14, 2013	Test Mode	Mode 3 (EUT 2)

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	2388.00	50.42	54.00	-3.58	20.04	2.21	28.17	0.00	Average	105	191	VERTICAL
2	2388.80	67.60	74.00	-6.40	37.22	2.21	28.17	0.00	Peak	105	191	VERTICAL
3	2444.60	117.07			86.54	2.24	28.29	0.00	Peak	105	191	VERTICAL
4	2445.40	106.89			76.36	2.24	28.29	0.00	Average	105	191	VERTICAL
5	2483.05	52.60	54.00	-1.40	21.97	2.26	28.37	0.00	Average	105	191	VERTICAL
6	2483.05	64.81	74.00	-9.19	34.18	2.26	28.37	0.00	Peak	105	191	VERTICAL

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

Note:

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

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

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11n MCS0 40MHz CH 6 / Chain 1+ Chain 2+ Chain 3
Test Date	Sep. 14, 2013	Test Mode	Mode 3 (EUT 2)

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	49.68	54.00	-4.32	19.29	2.22	28.17	0.00	Average	102	192	VERTICAL
2	2390.00	61.38	74.00	-12.62	30.99	2.22	28.17	0.00	Peak	102	192	VERTICAL
3	2452.20	99.49			68.92	2.24	28.33	0.00	Average	102	192	VERTICAL
4	2453.00	109.02			78.45	2.24	28.33	0.00	Peak	102	192	VERTICAL
5	2483.50	50.23	54.00	-3.77	19.60	2.26	28.37	0.00	Average	102	192	VERTICAL
6	2484.70	64.62	74.00	-9.38	33.99	2.26	28.37	0.00	Peak	102	192	VERTICAL

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

Note:

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

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

Temperature	24°C	Humidity	58%
Test Engineer	Nick Peng	Configurations	IEEE 802.11g CH 6 / Chain 1+ Chain 2+ Chain 3
Test Date	Sep. 14, 2013	Test Mode	Mode 3 (EUT 2)

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	49.57	54.00	-4.43	19.18	2.22	28.17	0.00	Average	103	188	VERTICAL
2	2390.00	64.02	74.00	-9.98	33.63	2.22	28.17	0.00	Peak	103	188	VERTICAL
3	2429.80	108.05			77.57	2.23	28.25	0.00	Average	103	188	VERTICAL
4	2429.80	118.02			87.54	2.23	28.25	0.00	Peak	103	188	VERTICAL
5	2500.30	52.45	54.00	-1.55	21.77	2.27	28.41	0.00	Average	103	188	VERTICAL
6	2500.30	65.09	74.00	-8.91	34.41	2.27	28.41	0.00	Peak	103	188	VERTICAL

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

Note:

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

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

4.4. Antenna Requirements

4.4.1. 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.

4.4.2. Antenna Connector Construction

Please refer to section 3.4 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
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Apr. 16, 2013	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, 2013	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	Apr. 12, 2013	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)
RF Power Divider	Woken	3 Way	MDC2366	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 years.
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 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