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FCC RADIO TEST REPORT

Applicant's company	**Broadcom Corporation**
Applicant Address	190 Mathilda Place Sunnyvale CA 94086 U.S.A.
FCC ID	**QDS-BRCM1075**
Manufacturer's company	**Broadcom Corporation**
Manufacturer Address	190 Mathilda Place Sunnyvale CA 94086 U.S.A.

Product Name	Broadcom 802.11a/b/g/n/ac WLAN + Bluetooth 4.0 NGFF2230 Mini Card
Brand Name	Broadcom
Model No.	BCM943162ZP
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Dec. 25, 2013
Final Test Date	Apr. 29, 2014
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 C63.4-2003**, **47 CFR FCC Part 15 Subpart C**, **KDB 558074 D01 v03r01** and **KDB 662911 D01 v02r01**.

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
FR3D2546-02AA	Rev. 01	Initial issue of report	Apr. 30, 2014
FR3D2546-02AA	Rev. 02	Revising the model name of antenna to "PCA-4077-25GC1-A1" from "PCA-4077-25GC1-A1-RT".	May 05, 2014

Certificate No.: CB10304126

1. CERTIFICATE OF COMPLIANCE

Product Name	:	Broadcom 802.11a/b/g/n/ac WLAN + Bluetooth 4.0 NGFF2230 Mini Card
Brand Name	:	Broadcom
Model No.	:	BCM943162ZP
Applicant	:	Broadcom Corporation
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. 25, 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

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	9.46 dB
4.2	15.247(e)	Power Spectral Density	Complies	12.34 dB
4.3	15.247(d)	Radiated Emissions	Complies	0.31 dB
4.4	15.247(d)	Band Edge Emissions	Complies	-
4.5	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n/ac

Items	Description
Product Type	WLAN (1TX, 1RX)
Radio Type	Intentional Transceiver
Power Type	From host system
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
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)
Radio Type	Intentional Transceiver
Power Type	From host system
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
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna and Band width

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

IEEE 11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	1	MCS0-7
802.11n (HT40)	1	MCS0-7
802.11ac (VHT20)	1	MCS 0-9/Nss1
802.11ac (VHT40)	1	MCS 0-9/Nss1
802.11ac (VHT80)	1	MCS 0-9/Nss1

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

N/A

3.3. Table for Filed Antenna

Set	Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)				
						2.4GHz	5GHz B1	5GHz B2	5GHz B3	5GHz B4
1	1	MAG.LAYERS	PCA-4077-25GC1-A1	WLAN/BT antenna	IPEX A13	3.33	5.85	5.85	6.21	6.21
	2	MAG.LAYERS	PCA-4077-25GC1-A1	WLAN/BT antenna	IPEX A13	3.33	5.85	5.85	6.21	6.21

Note1: The each set has two antennas.

For 2.4GHz:

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

The EUT supports the antenna with TX/RX diversity function.

Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna, but only one antenna can be used as transmitting/receiving antenna at the same time.

Chain 1 generated the worst case than Chain 2, so it tested and recorded in the report.

For 5GHz:

For IEEE 802.11a/n/ac mode (1TX/1RX)

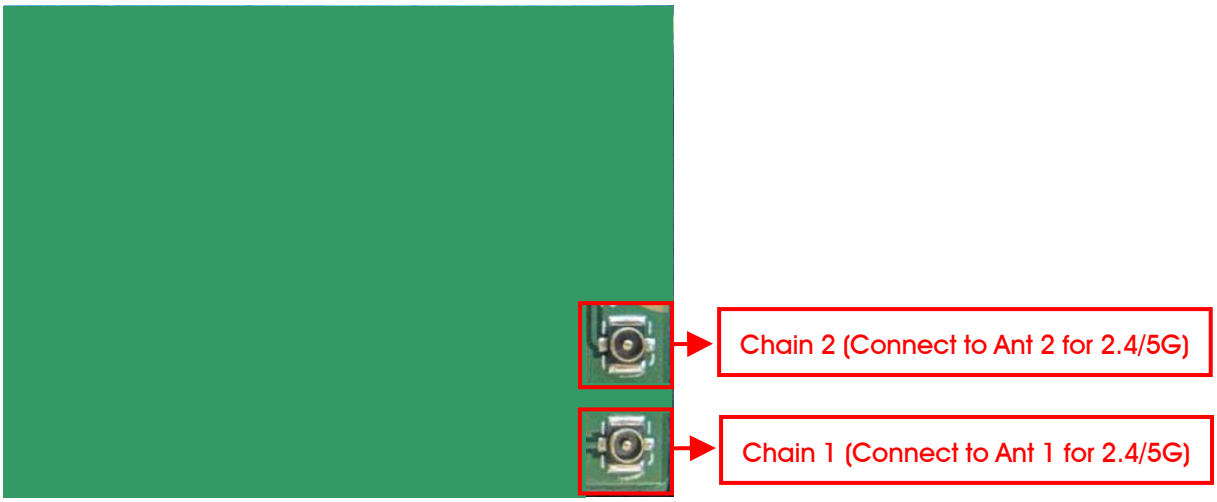
The EUT supports the antenna with TX/RX diversity function.

Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna, but only one antenna can be used as transmitting/receiving antenna at the same time.

Chain 1 generated the worst case than Chain 2, so it tested and recorded in the report.

For Bluetooth mode (1TX/1RX)

Only Chain 1 can be used as transmitting/receiving antenna.



3.4. 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

3.5. 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.

For 2.4GHz Band:

Test Items	Mode	Data Rate	Channel	Chain
Radiated Emissions Below 1GHz	Normal Link	-	-	-

For 5GHz Band:

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

Note: VHT20/VHT40 covers HT20/HT40, due to same modulation.

The following test modes were performed for all tests:

For Radiated Emission Below 1GHz test:

Mode 1. Normal Link -2.4GHz WLAN function + Bluetooth function

Mode 2. Normal Link -5GHz WLAN function + Bluetooth function

Mode 2 is the worst case, so it was selected to record in this test report.

For Radiated Emission Above 1GHz test:

Mode 1. CTX-EUT

3.6. Table for Testing Locations

Test Site Location				
Address:	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			
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).

3.7. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR3D2546AA

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

Modifications	Performance Checking
1. Adding a new antenna (Brand: MAG. LAYERS, Model No.: PCA-4077-25GC1-A1) for this device. 2. The application of this module increases to portable host equipment. The module is limited to use the new antenna (Brand: MAG. LAYERS, Model No.: PCA-4077-25GC1-A1) when it is defined as portable device.	2.4G: 1. Radiated Emissions Below 1GHz 5G: 1. Output Power Measurement 2. Power Spectral Density Measurement 3. Radiated Emissions 4. Band Edge

Note: New antenna and original antenna are the same type, but the gain of new antenna is higher than the original one in 5GHz. Thus, we checked the test items above.

3.8. Table for Supporting Units

For Test Site No: 03CH01-CB (Below 1GHz)

Support Unit	Brand	Model	FCC ID
Wireless AP	Planex	GW-AP54SGX	N/A
NB	DELL	E6220	DoC
NB	DELL	E6430	DoC
Mouse	Logitech	M-U0026	DoC
Earphone	SHYARO CHI	MIC-04	N/A
Test fixture*2	Broadcom	BCM9NGFF2EC_1	N/A
Broadcom 802.11a/b/g/n/ac WLAN + Bluetooth 4.0 NGFF2230 Mini Card (Device)	Broadcom	BCM943162ZP	QDS-BRCM1075

For Test Site No: 03CH01-CB (Above 1GHz)

Support Unit	Brand	Model	FCC ID
NB	DELL	E6220	DoC
Test fixture	Broadcom	BCM9NGFF2EC_1	N/A

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6510	N/A
Test fixture	Broadcom	BCM9NGFF2EC_1	N/A

3.9. Table for Parameters of Test Software Setting

During testing, Channel and 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 802.11ac MCS0/Nss1 20MHz

Test Software Version	MTOOL 2.0.1.5		
Frequency	5745 MHz	5785 MHz	5825 MHz
MCS0/Nss1 20MHz	83	86	86

Power Parameters of IEEE 802.11ac MCS0/Nss1 40MHz

Test Software Version	MTOOL 2.0.1.5	
Frequency	5755 MHz	5795 MHz
MCS0/Nss1 40MHz	78	86

Power Parameters of IEEE 802.11ac MCS0/Nss1 80MHz

Test Software Version	MTOOL 2.0.1.5
Frequency	5775 MHz
MCS0/Nss1 80MHz	74

Power Parameters of IEEE 802.11a

Test Software Version	MTOOL 2.0.1.5		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	85	85	86

3.10. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

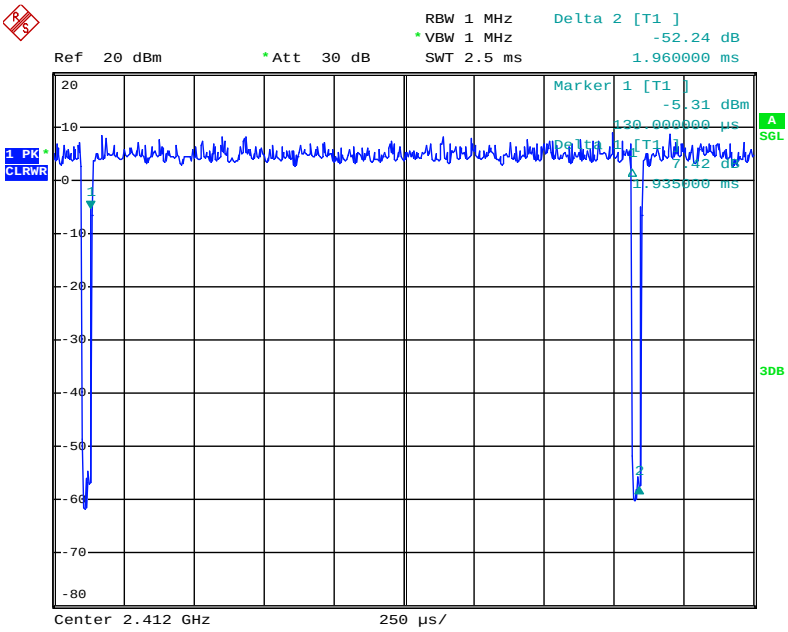
3.11. Test Signal Duty Cycle

Band	Mode	TX-on (ms)	TX-on+TX-off (ms)	TX-on/(TX-on+TX-off)x100= Duty cycle (%)
2.4G	802.11n MCS0 20MHz	1.935	1.96	98.72
	802.11n MCS0 40MHz	0.95	0.975	97.44
	802.11b	10	10	100
	802.11g	2.08	2.103	98.91
5G	802.11ac MCS0/Nss1 20MHz	1.94	1.965	98.73
	802.11ac MCS0/Nss1 40MHz	0.96	0.985	97.46
	802.11ac MCS0/Nss1 80MHz	0.46	0.485	94.85
	802.11a	2.075	2.1	98.81

3.12. Plots of Duty Cycle

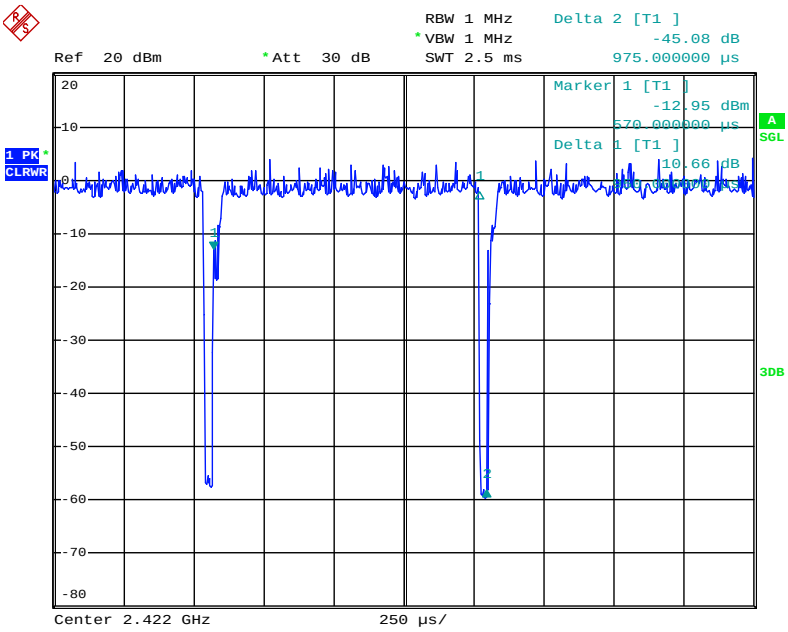
For 2.4GHz Band:

IEEE 802.11n MCS0 20MHz



Date: 22.JAN.2014 21:17:22

IEEE 802.11n MCS0 40MHz



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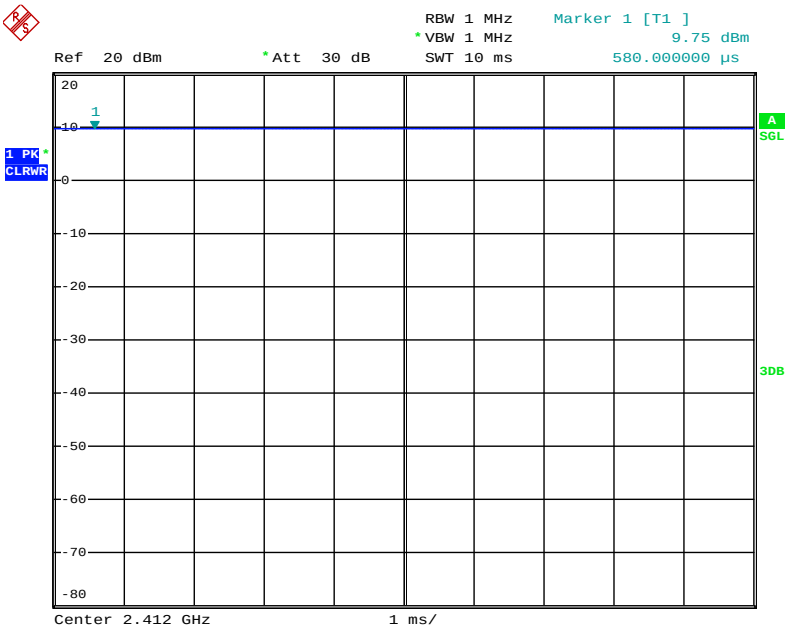
IEEE 802.11b



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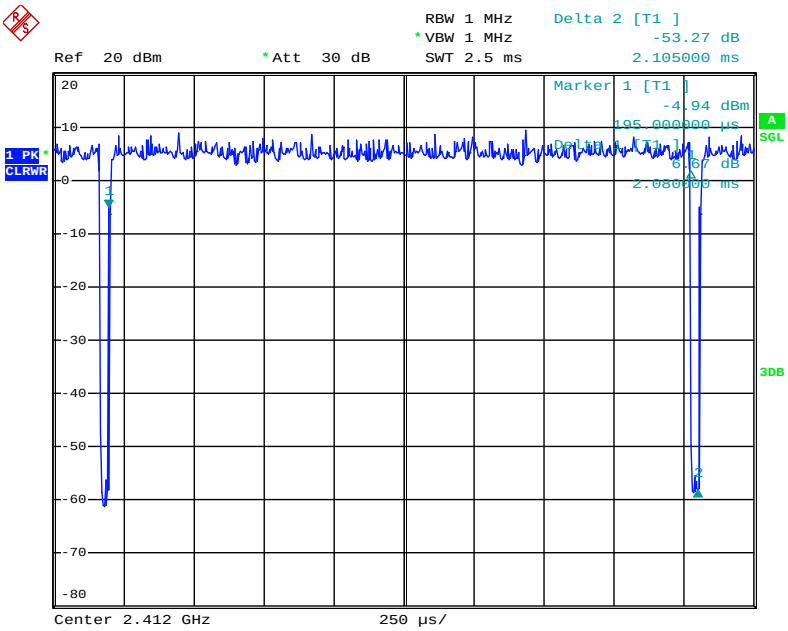
IEEE 802.11g



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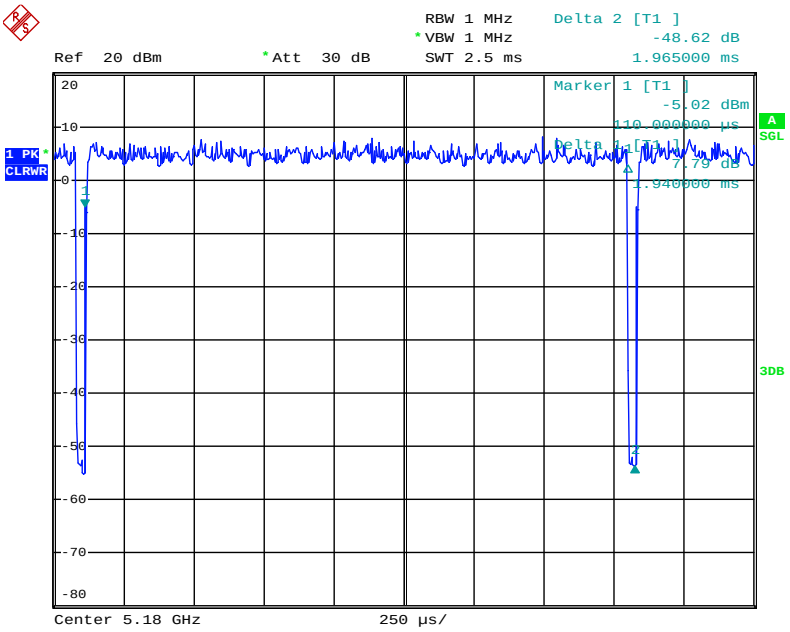
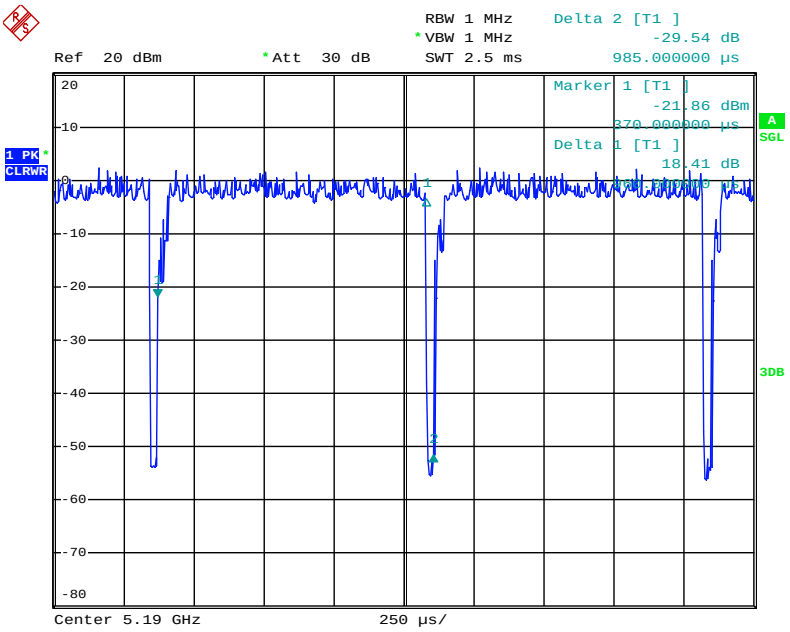
For 5GHz Band:

IEEE 802.11ac MCS0/Nss1 20MHz



Date: 22.JAN.2014 23:39:56

IEEE 802.11ac MCS0/Nss1 40MHz



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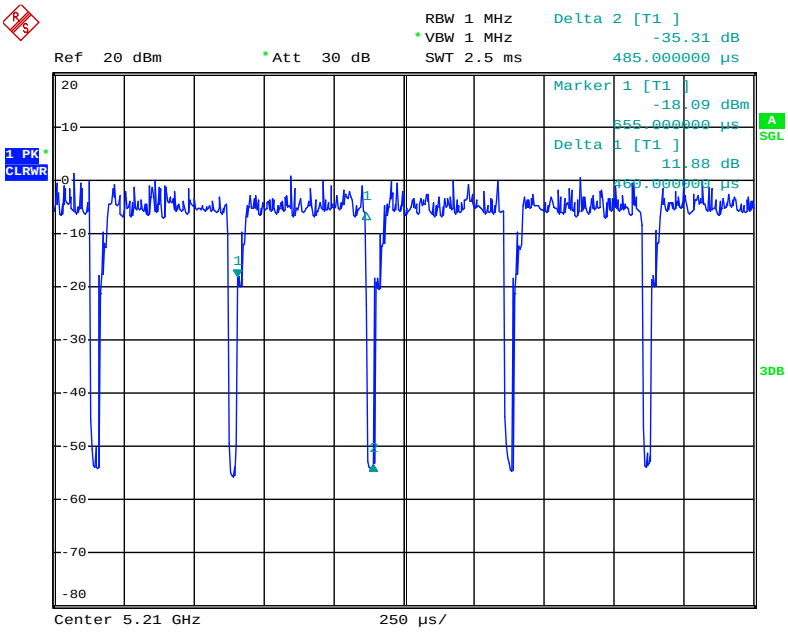
IEEE 802.11ac MCS0/Nss1 80MHz



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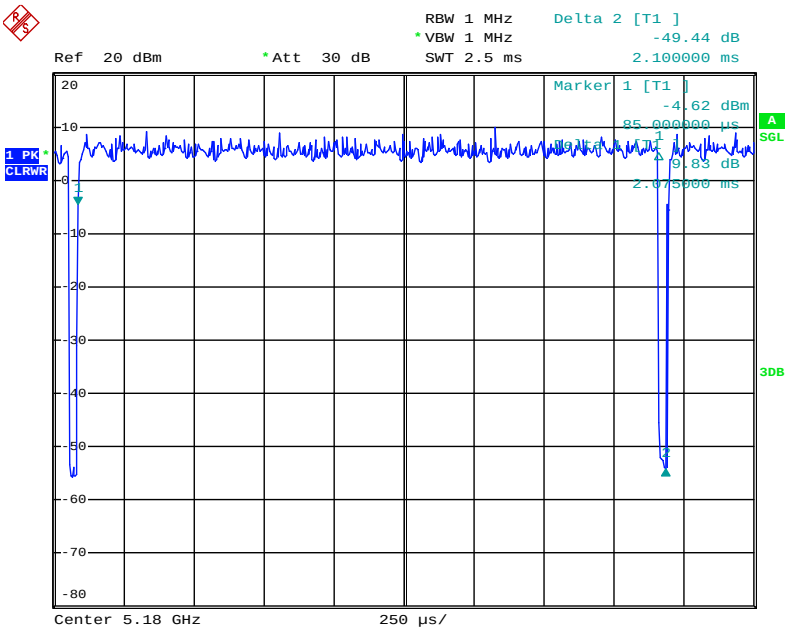
IEEE 802.11a



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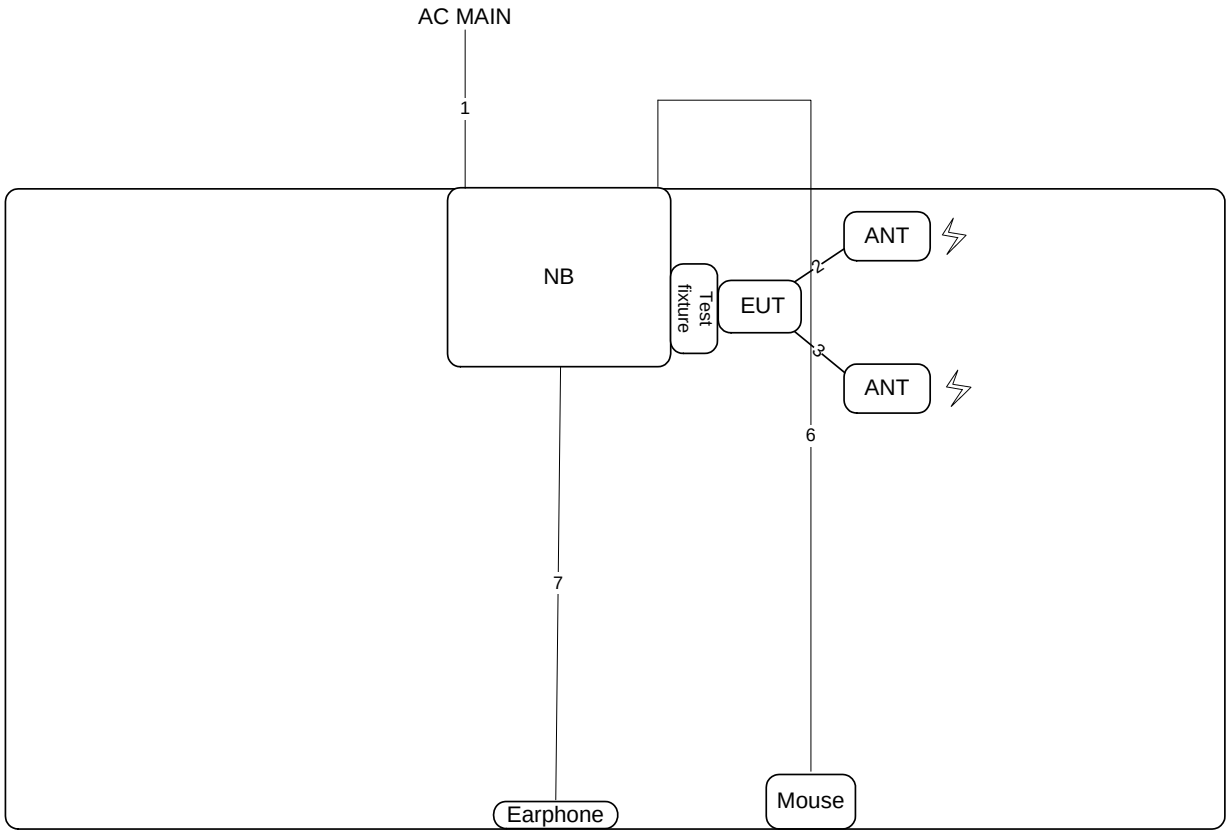
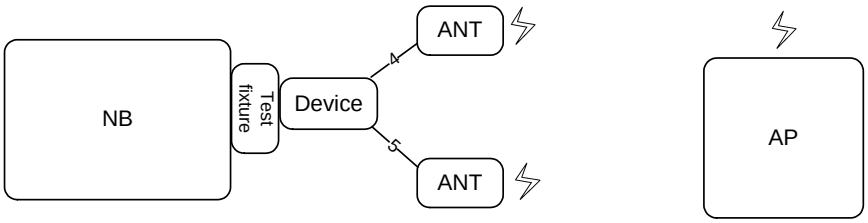
3.13. Test Configurations

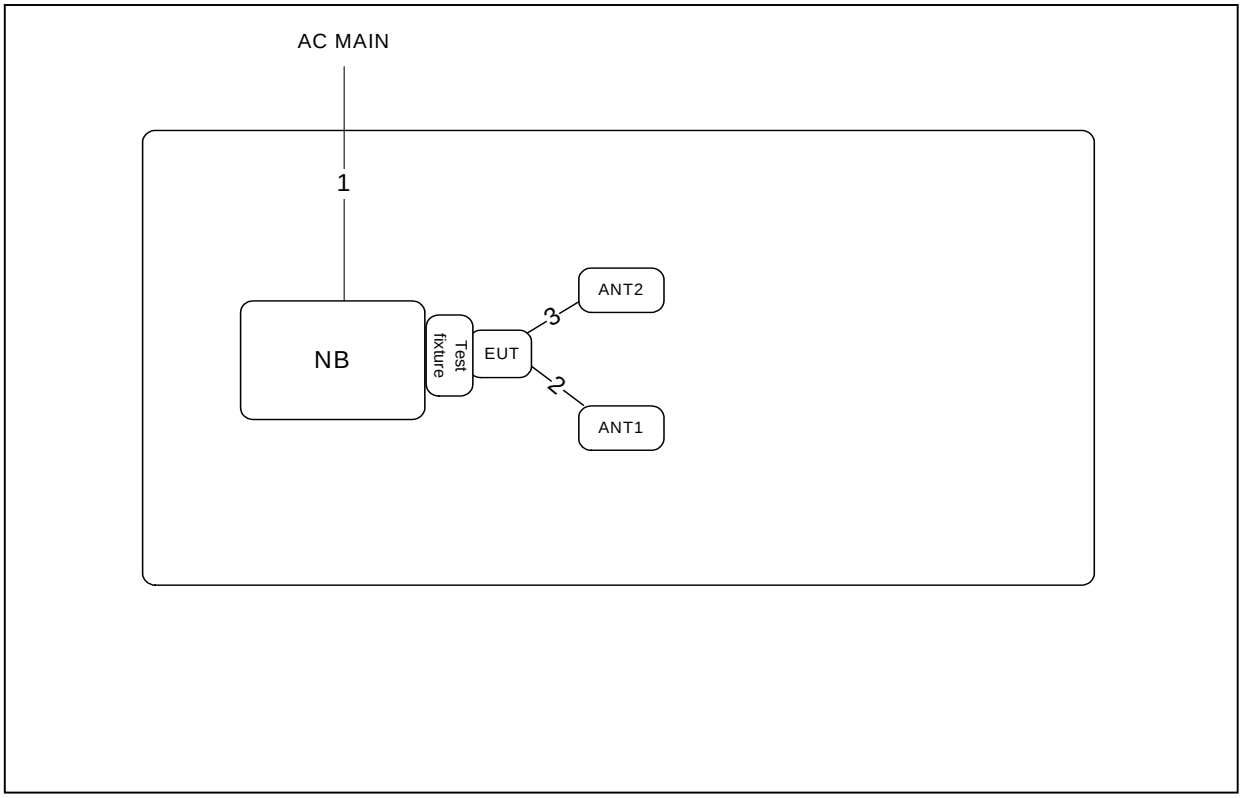
3.13.1. Radiation Emissions Below 1GHz Test Configuration





Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	ANT cable	Yes	0.2m
3	ANT cable	Yes	0.2m
4	ANT cable	Yes	0.2m
5	ANT cable	Yes	0.2m
6	USB cable	Yes	1.8m
7	Audio cable	No	1.1m

3.13.2. Radiation Emissions Above 1GHz Test Configuration



Item	Connection	Shielded	Length
1	Power Cable	No	2.6m
2	ANT cable	Yes	0.2m
3	ANT cable	Yes	0.2m

4. TEST RESULT

4.1. Maximum Conducted Output Power Measurement

4.1.1. Limit

For 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

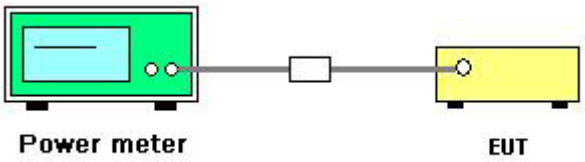
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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	20°C	Humidity	53%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac
Test Date	Apr. 28, 2014		

Configuration IEEE 802.11ac MCS0/Nss1 20MHz / Chain 1

Channel	Frequency	Duty Factor (dB)	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	0.06	19.56	29.79	Complies
157	5785 MHz		20.21	29.79	Complies
165	5825 MHz		20.29	29.79	Complies

Note: ANT gain= 6.21dBi >6dBi, so limit = 30 - (6.21- 6) = 29.79dBm

Configuration IEEE 802.11ac MCS0/Nss1 40MHz / Chain 1

Channel	Frequency	Duty Factor (dB)	Conducted Power (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	0.11	18.45	29.79	Complies
159	5795 MHz		20.25	29.79	Complies

Note: ANT gain= 6.21dBi >6dBi, so limit = 30 - (6.21- 6) = 29.79dBm

Configuration IEEE 802.11ac MCS0/Nss1 80MHz / Chain 1

Channel	Frequency	Duty Factor (dB)	Conducted Power (dBm)	Max. Limit (dBm)	Result
155	5775 MHz	0.23	16.45	29.79	Complies

Note: ANT gain= 6.21dBi >6dBi, so limit = 30 - (6.21- 6) = 29.79dBm

Temperature	20°C	Humidity	53%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a
Test Date	Apr. 28, 2014		

Configuration IEEE 802.11a / Chain 1

Channel	Frequency	Duty Factor (dB)	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	0.05	20.21	29.79	Complies
157	5785 MHz		20.33	29.79	Complies
165	5825 MHz		20.16	29.79	Complies

Note: ANT gain = 6.21dBi >6dBi, so limit = 30 - (6.21- 6) = 29.79dBm

4.2. Power Spectral Density Measurement

4.2.1. Limit

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

4.2.2. Measuring Instruments and Setting

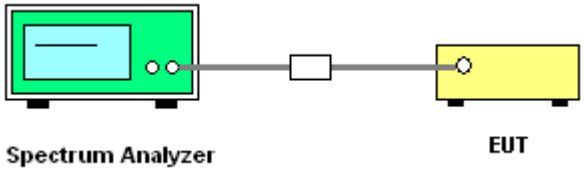
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS channel bandwidth.
RBW	3 kHz ≤ RBW ≤ 100kHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple

4.2.3. Test Procedures

1. Test procedures refer KDB 558074 D01 v03r01 section 10.2 Method PKPSD (peak PSD) and KDB 662911 D01 v02r01 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.

4.2.4. 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 Power Spectral Density

Temperature	20°C	Humidity	53%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac

Configuration IEEE 802.11ac MCS0/Nss1 20MHz / Chain 1

Channel	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
149	5745 MHz	-6.03	7.79	Complies
157	5785 MHz	-4.79	7.79	Complies
165	5825 MHz	-5.93	7.79	Complies

Note: ANT Gain=6.21dBi> 6dBi, so the conducted power Density limit =8-(6.21dBi-6)=7.79dBm/3kHz

Configuration IEEE 802.11ac MCS0/Nss1 40MHz / Chain 1

Channel	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
151	5755 MHz	-9.97	7.79	Complies
159	5795 MHz	-8.67	7.79	Complies

Note: ANT Gain=6.21dBi> 6dBi, so the conducted power Density limit =8-(6.21dBi-6)=7.79dBm/3kHz

Configuration IEEE 802.11ac MCS0/Nss1 80MHz / Chain 1

Channel	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
155	5775 MHz	-14.77	7.79	Complies

Note: ANT Gain=6.21dBi> 6dBi, so the conducted power Density limit =8-(6.21dBi-6)=7.79dBm/3kHz

Temperature	20°C	Humidity	53%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a

Configuration IEEE 802.11a/ Chain 1

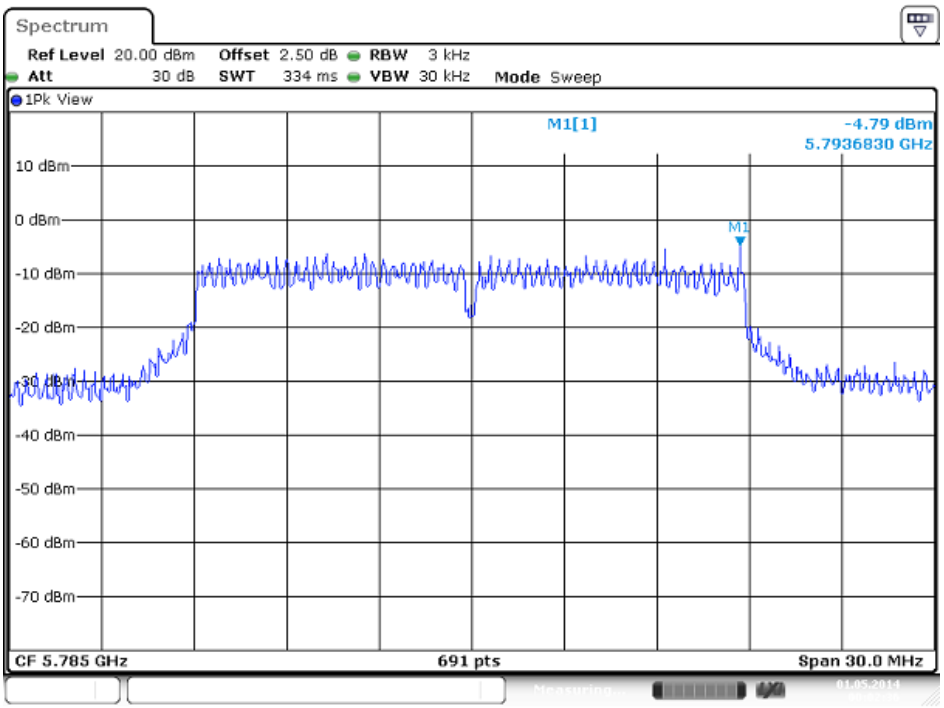
Channel	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
149	5745 MHz	-5.26	7.79	Complies
157	5785 MHz	-5.84	7.79	Complies
165	5825 MHz	-4.55	7.79	Complies

Note: ANT Gain=6.21dBi> 6dBi, so the conducted power Density limit =8-(6.21dBi-6)=7.79dBm/3kHz

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

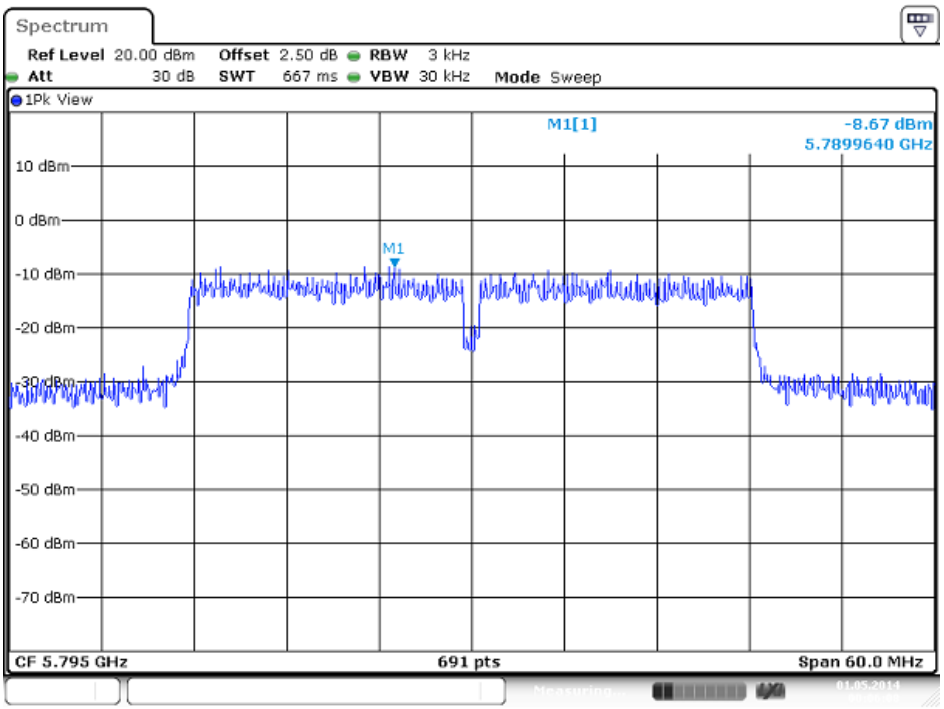
For plots, only the channel with worse result was shown.

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 20MHz / 5785 MHz / Chain 1



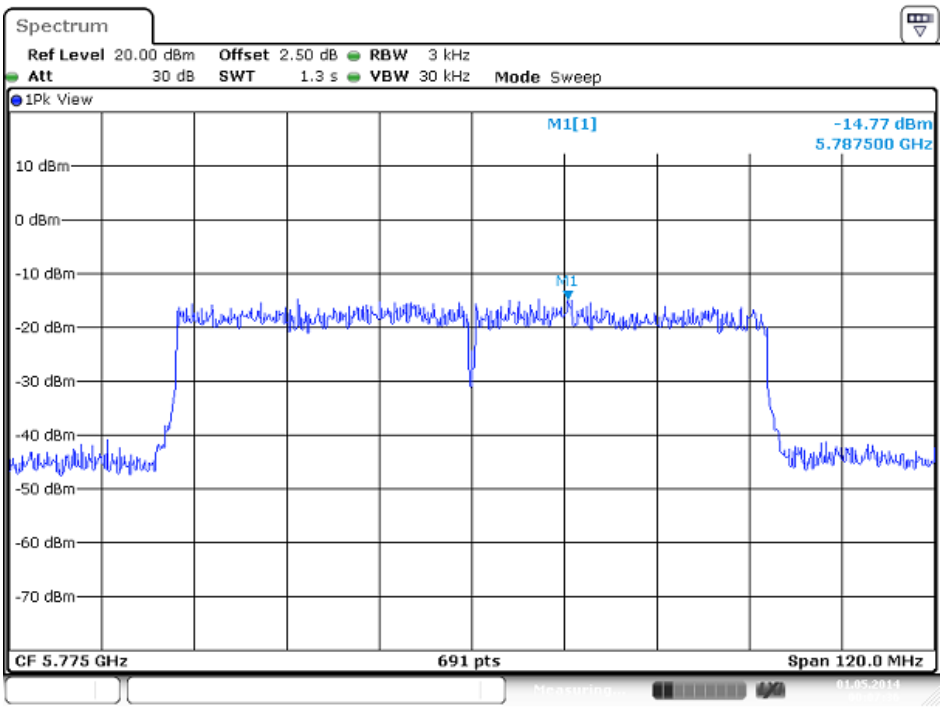
Date 29.APR.2014 00:02:36

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 40MHz / 5795 MHz / Chain 1



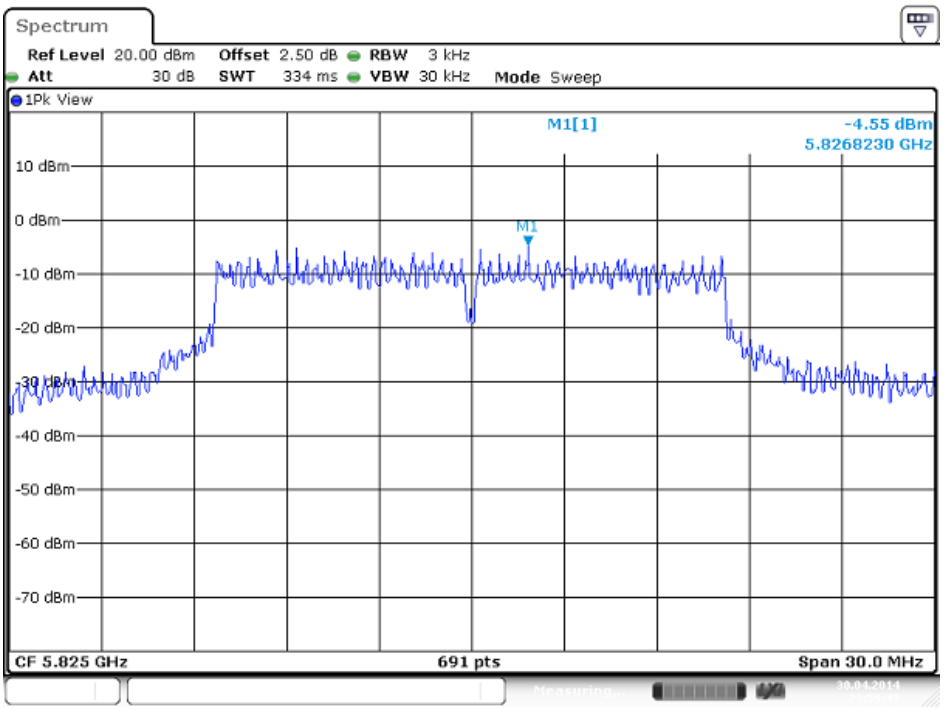
Date 29.APR.2014 00:06:08

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 80MHz / 5775 MHz / Chain 1



Date 29.APR.2014 00:07:37

Power Density Plot on Configuration IEEE 802.11a / 5825 MHz / Chain 1



Date: 28.APR.2014 23:59:47

4.3. Radiated 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 spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, Please refer to below table for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for Peak

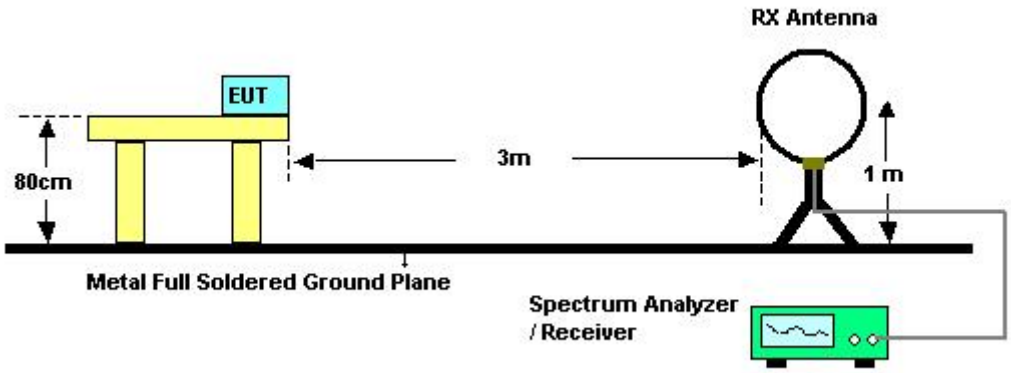
Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	1/T Minimum VBW (kHz)
802.11a	2.075	2.100	98.81%	0.01
802.11ac VHT20	1.940	1.965	98.73%	0.01
802.11ac VHT40	0.960	0.985	97.46%	1.04
802.11ac VHT80	0.460	0.485	94.85%	2.17

4.3.3. Test Procedures

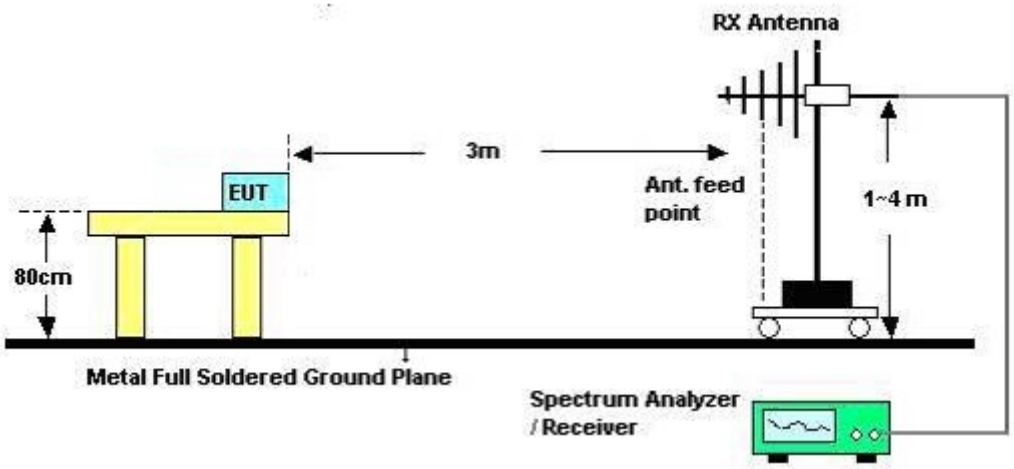
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

4.3.4. Test Setup Layout

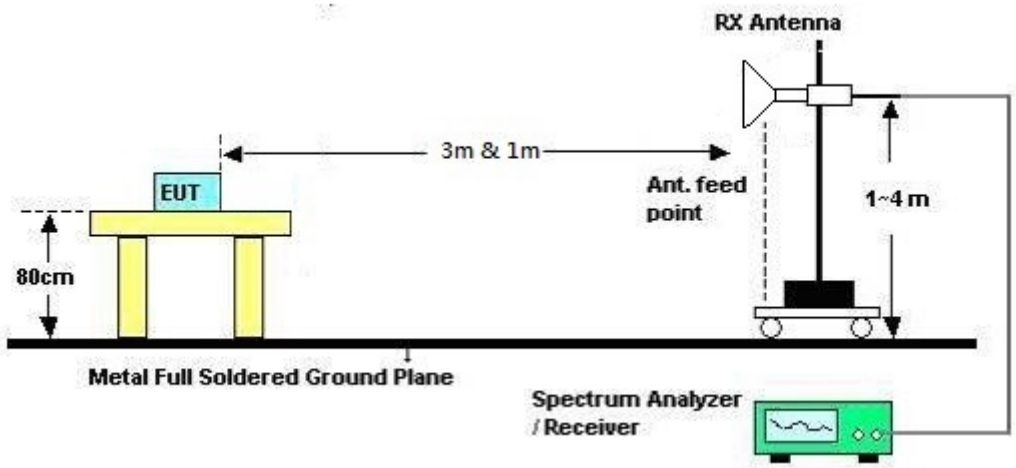
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



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

Temperature	21°C	Humidity	61%
Test Engineer	YC Chen	Configurations	Normal Link
Test Date	Apr. 18, 2014	Test Mode	Mode 2

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.

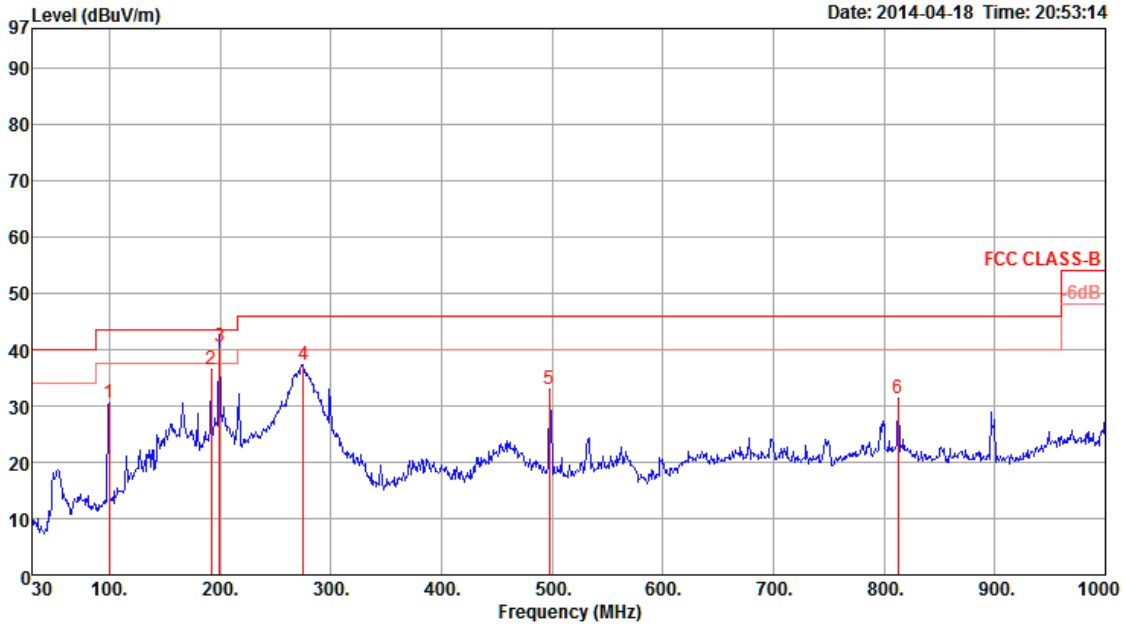
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

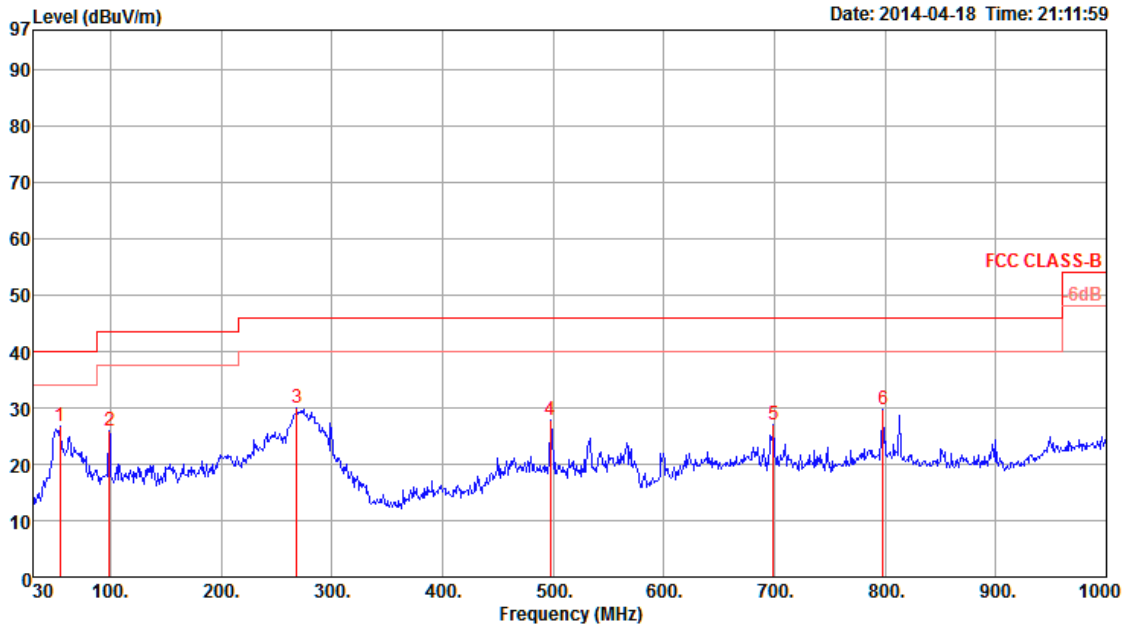
Temperature	21°C	Humidity	61%
Test Engineer	YC Chen	Configurations	Normal Link
Test Mode	Mode 2		

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	99.84	30.41	43.50	-13.09	52.27	1.50	11.40	27.82	Peak	0	100	HORIZONTAL
2	191.99	36.38	43.50	-7.12	56.24	2.06	10.08	27.30	Peak	0	100	HORIZONTAL
3	199.75	40.44	43.50	-3.06	58.70	2.09	10.40	27.25	QP	252	100	HORIZONTAL
4	275.41	37.35	46.00	-8.65	54.11	2.51	13.85	26.89	Peak	0	100	HORIZONTAL
5	497.54	33.04	46.00	-12.96	46.84	3.37	17.76	27.93	Peak	0	100	HORIZONTAL
6	812.79	31.35	46.00	-14.65	39.21	4.38	21.30	26.89	Peak	0	100	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	54.25	26.71	40.00	-13.29	52.39	1.12	8.00	27.90	Peak	360	400	VERTICAL
2	98.87	25.84	43.50	-17.66	47.93	1.49	11.20	27.82	Peak	360	400	VERTICAL
3	268.62	30.07	46.00	-15.93	47.03	2.48	13.91	26.90	Peak	360	400	VERTICAL
4	497.54	27.74	46.00	-18.26	41.54	3.37	17.76	27.93	Peak	360	400	VERTICAL
5	699.30	26.99	46.00	-19.01	36.94	4.16	19.90	27.09	Peak	360	400	VERTICAL
6	798.24	29.85	46.00	-16.15	37.42	4.35	21.18	26.90	Peak	360	400	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.

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

Temperature	21°C	Humidity	61%
Test Engineer	YC Chen	Configurations	IEEE 802.11ac MCS0/Nss1 20MHz CH 149 / Chain 1
Test Date	Apr. 16, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11489.16	44.87	54.00	-9.13	34.49	6.74	38.30	34.66	Average	33	100	HORIZONTAL
2	11490.62	58.50	74.00	-15.50	48.12	6.74	38.30	34.66	Peak	33	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11488.14	53.47	54.00	-0.53	43.09	6.74	38.30	34.66	Average	36	100	VERTICAL
2	11489.82	67.78	74.00	-6.22	57.40	6.74	38.30	34.66	Peak	36	100	VERTICAL

Temperature	21℃	Humidity	61%
Test Engineer	YC Chen	Configurations	IEEE 802.11ac MCS0/Nss1 20MHz CH 157 / Chain 1
Test Date	Apr. 16, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11572.48	60.82	74.00	-13.18	50.41	6.77	38.33	34.69	Peak	63	107	HORIZONTAL
2	11574.42	47.37	54.00	-6.63	36.96	6.77	38.33	34.69	Average	63	107	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11570.96	51.73	54.00	-2.27	41.32	6.77	38.33	34.69	Average	325	100	VERTICAL
2	11573.08	67.24	74.00	-6.76	56.83	6.77	38.33	34.69	Peak	325	100	VERTICAL

Temperature	21℃	Humidity	61%
Test Engineer	YC Chen	Configurations	IEEE 802.11ac MCS0/Nss1 20MHz CH 165 / Chain 1
Test Date	Apr. 16, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11649.60	47.48	54.00	-6.52	37.04	6.80	38.36	34.72	Average	347	100	HORIZONTAL
2	11652.44	59.67	74.00	-14.33	49.23	6.80	38.36	34.72	Peak	347	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11648.58	52.35	54.00	-1.65	41.91	6.80	38.36	34.72	Average	331	100	VERTICAL
2	11648.60	67.51	74.00	-6.49	57.07	6.80	38.36	34.72	Peak	331	100	VERTICAL

Temperature	21℃	Humidity	61%
Test Engineer	YC Chen	Configurations	IEEE 802.11ac MCS0/Nss1 40MHz CH 151 / Chain 1
Test Date	Apr. 16, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11508.80	43.70	54.00	-10.30	33.31	6.75	38.30	34.66	Average	294	100	HORIZONTAL
2	11510.74	56.77	74.00	-17.23	46.38	6.75	38.30	34.66	Peak	294	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11510.34	51.84	54.00	-2.16	41.45	6.75	38.30	34.66	Average	35	100	VERTICAL
2	11511.62	65.76	74.00	-8.24	55.37	6.75	38.30	34.66	Peak	35	100	VERTICAL

Temperature	21℃	Humidity	61%
Test Engineer	YC Chen	Configurations	IEEE 802.11ac MCS0/Nss1 40MHz CH 159 / Chain 1
Test Date	Apr. 16, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11586.44	57.50	74.00	-16.50	47.08	6.78	38.33	34.69	Peak	64	100	HORIZONTAL
2	11590.84	44.33	54.00	-9.67	33.91	6.78	38.33	34.69	Average	64	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11590.46	50.72	54.00	-3.28	40.30	6.78	38.33	34.69	Average	329	100	VERTICAL
2	11594.06	63.65	74.00	-10.35	53.23	6.78	38.33	34.69	Peak	329	100	VERTICAL

Temperature	21℃	Humidity	61%
Test Engineer	YC Chen	Configurations	IEEE 802.11ac MCS0/Nss1 80MHz CH 155 / Chain 1
Test Date	Apr. 16, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11549.54	42.29	54.00	-11.71	31.88	6.77	38.32	34.68	Average	297	100	HORIZONTAL
2	11554.56	51.33	74.00	-22.67	40.92	6.77	38.32	34.68	Peak	297	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11545.64	59.57	74.00	-14.43	49.18	6.76	38.31	34.68	Peak	326	100	VERTICAL
2	11549.36	46.83	54.00	-7.17	36.42	6.77	38.32	34.68	Average	326	100	VERTICAL

Temperature	21°C	Humidity	61%
Test Engineer	YC Chen	Configurations	IEEE 802.11a CH 149 / Chain 1
Test Date	Apr. 16, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11487.96	45.43	54.00	-8.57	35.05	6.74	38.30	34.66	Average	289	100	HORIZONTAL
2	11490.26	58.80	74.00	-15.20	48.42	6.74	38.30	34.66	Peak	289	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11490.30	53.69	54.00	-0.31	43.31	6.74	38.30	34.66	Average	328	100	VERTICAL
2	11490.42	68.58	74.00	-5.42	58.20	6.74	38.30	34.66	Peak	328	100	VERTICAL

Temperature	21°C	Humidity	61%
Test Engineer	YC Chen	Configurations	IEEE 802.11a CH 157 / Chain 1
Test Date	Apr. 16, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11569.24	45.05	54.00	-8.95	34.63	6.77	38.33	34.68	Average	299	100	HORIZONTAL
2	11570.26	56.93	74.00	-17.07	46.52	6.77	38.33	34.69	Peak	299	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11570.30	67.03	74.00	-6.97	56.62	6.77	38.33	34.69	Peak	334	100	VERTICAL
2	11571.38	52.48	54.00	-1.52	42.07	6.77	38.33	34.69	Average	334	100	VERTICAL

Temperature	21℃	Humidity	61%
Test Engineer	YC Chen	Configurations	IEEE 802.11a CH 165 / Chain 1
Test Date	Apr. 16, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11650.22	60.96	74.00	-13.04	50.52	6.80	38.36	34.72	Peak	66	100	HORIZONTAL
2	11652.54	47.34	54.00	-6.66	36.90	6.80	38.36	34.72	Average	66	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	11650.46	67.24	74.00	-6.76	56.80	6.80	38.36	34.72	Peak	155	100	VERTICAL
2	11651.34	52.55	54.00	-1.45	42.11	6.80	38.36	34.72	Average	155	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.

4.4. Emissions Measurement

4.4.1. 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

4.4.2. 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 Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, Please refer to below table for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for Peak

Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	1/T Minimum VBW (kHz)
802.11a	2.075	2.100	98.81%	0.01
802.11ac VHT20	1.940	1.965	98.73%	0.01
802.11ac VHT40	0.960	0.985	97.46%	1.04
802.11ac VHT80	0.460	0.485	94.85%	2.17

4.4.3. Test Procedures

For Radiated band edges Measurement:

1. The test procedure is the same as section 4.3.3, 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.

4.4.4. Test Setup Layout

For Radiated band edges Measurement:

This test setup layout is the same as that shown in section 4.3.4.

For Radiated Out of Band Emission Measurement:

This test setup layout is the same as that shown in section 4.3.4.

4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

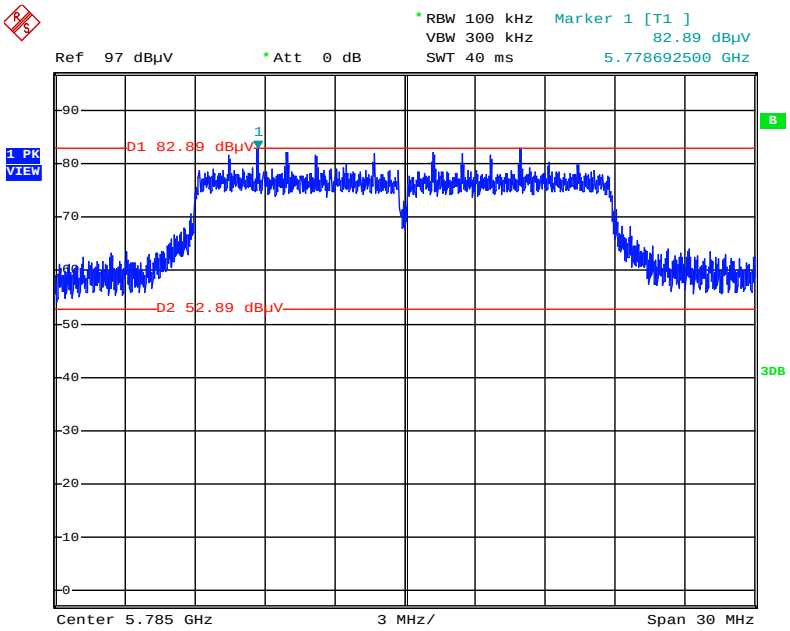
The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Band Edge and Fundamental Emissions

Temperature	21°C	Humidity	61%
Test Engineer	YC Chen		

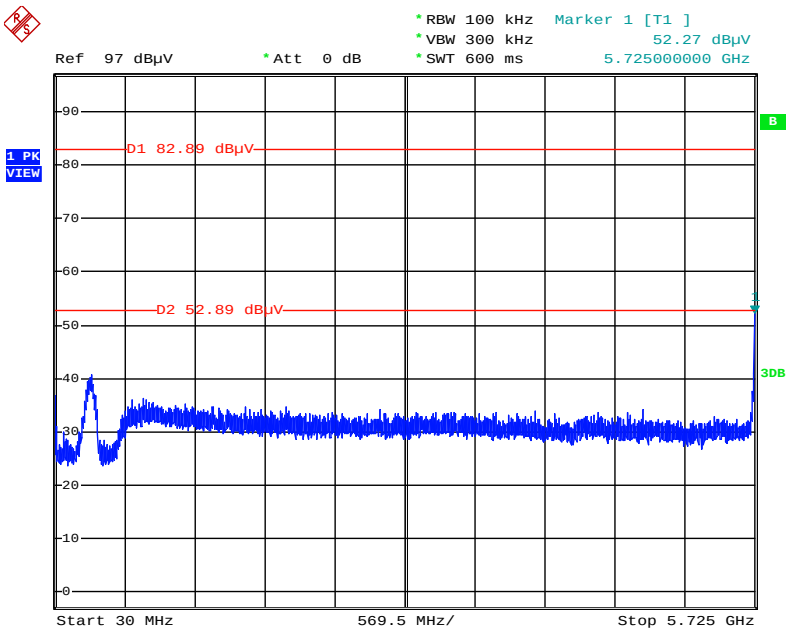
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11ac MCS0/Nss1 20MHz / Reference Level



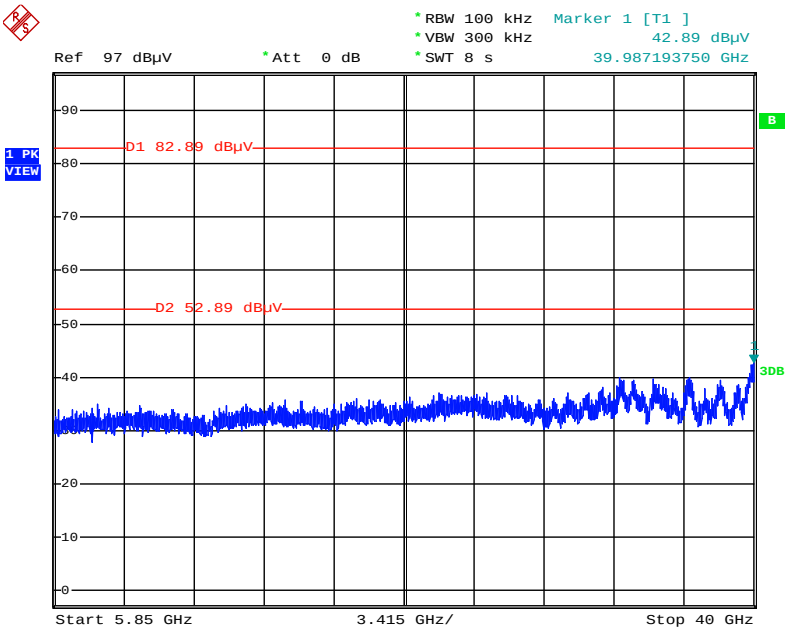
Date: 16.APR.2014 04:11:07

Plot on Configuration IEEE 802.11ac MCS0/Nss1 20MHz / CH 149 / 30MHz~5725MHz (down 30dBc)



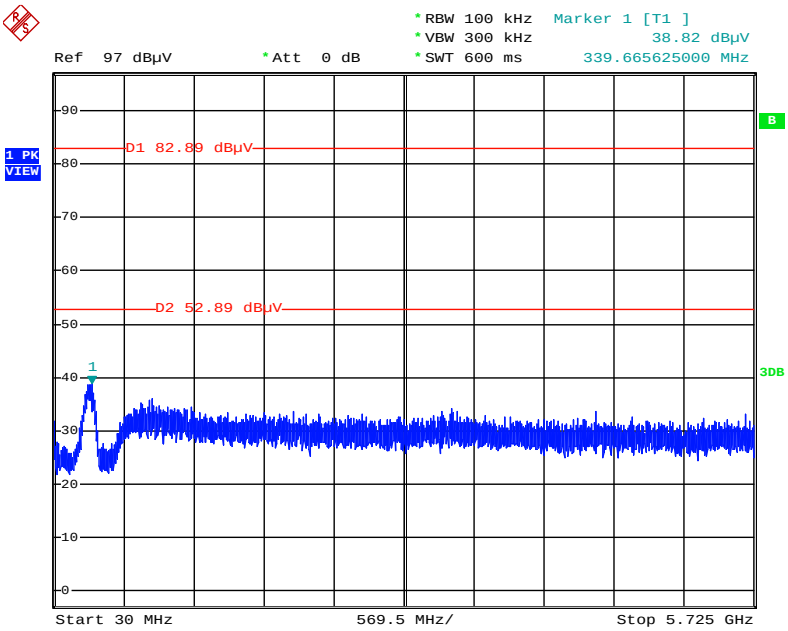
Date: 16.APR.2014 04:12:32

Plot on Configuration IEEE 802.11ac MCS0/Nss1 20MHz / CH 149 / 5850MHz~40000MHz (down 30dBc)



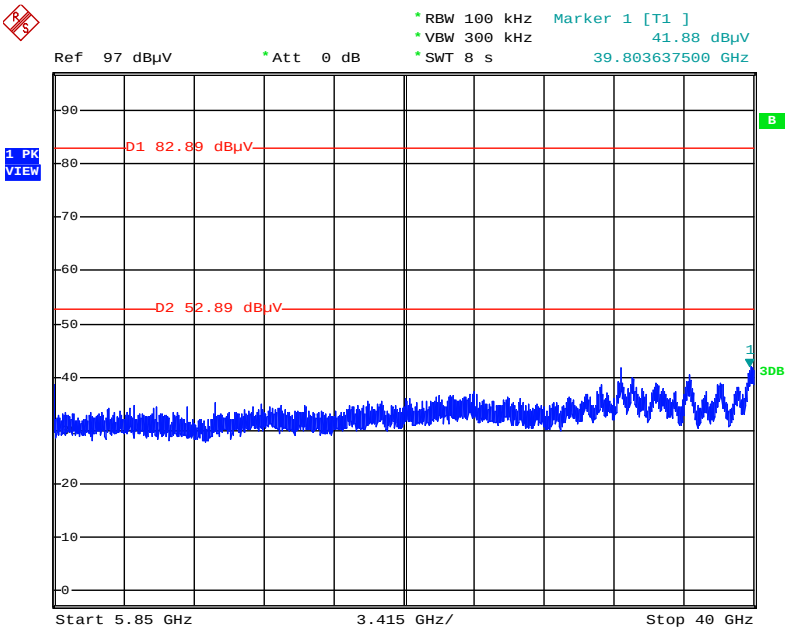
Date: 16.APR.2014 04:13:52

Plot on Configuration IEEE 802.11ac MCS0/Nss1 20MHz / CH 165 / 30MHz~5725MHz (down 30dBc)



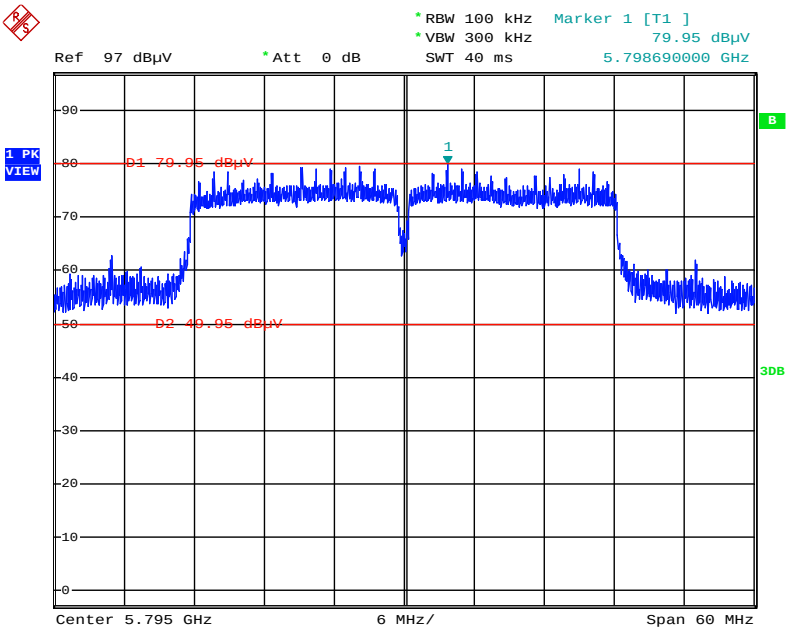
Date: 16.APR.2014 04:15:00

Plot on Configuration IEEE 802.11ac MCS0/Nss1 20MHz / CH 165 / 5850MHz~40000MHz (down 30dBc)



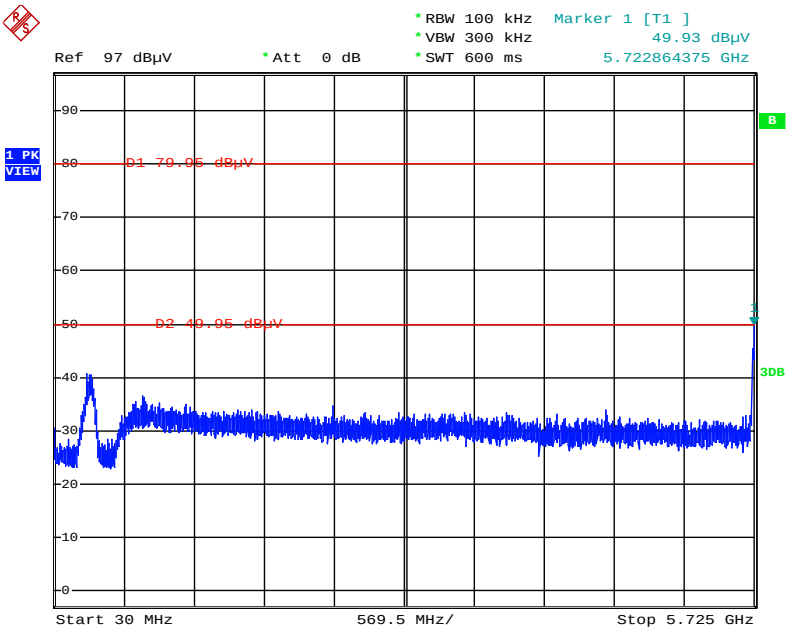
Date: 16.APR.2014 04:14:24

Plot on Configuration IEEE 802.11ac MCS0/Nss1 40MHz / Reference Level



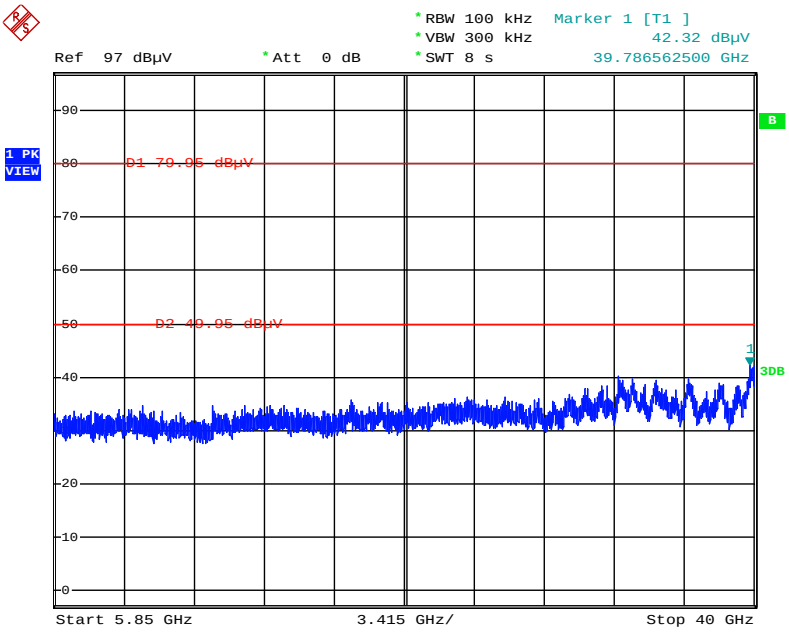
Date: 16.APR.2014 04:01:21

Plot on Configuration IEEE 802.11ac MCS0/Nss1 40MHz / CH 151 / 30MHz~5725MHz (down 30dBc)



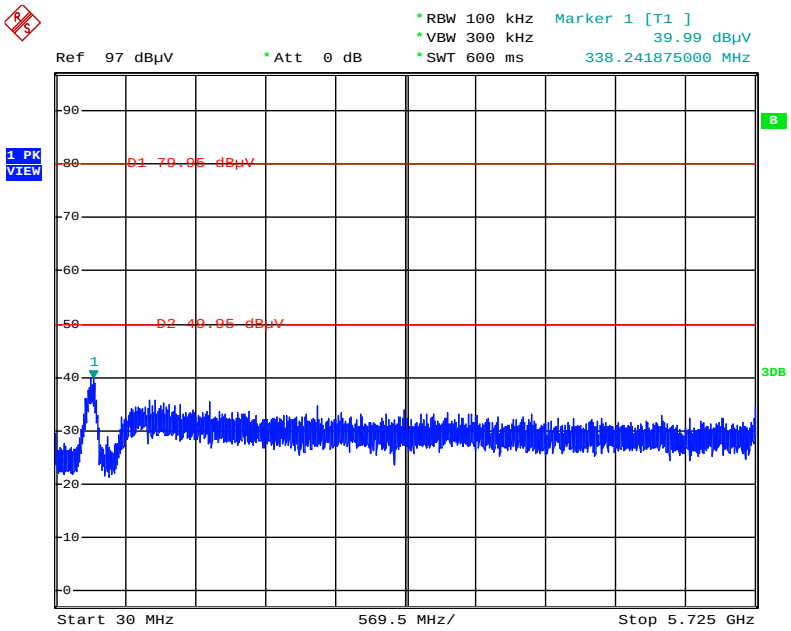
Date: 16.APR.2014 04:05:10

Plot on Configuration IEEE 802.11ac MCS0/Nss1 40MHz / CH 151 / 5850MHz~40000MHz (down 30dBc)



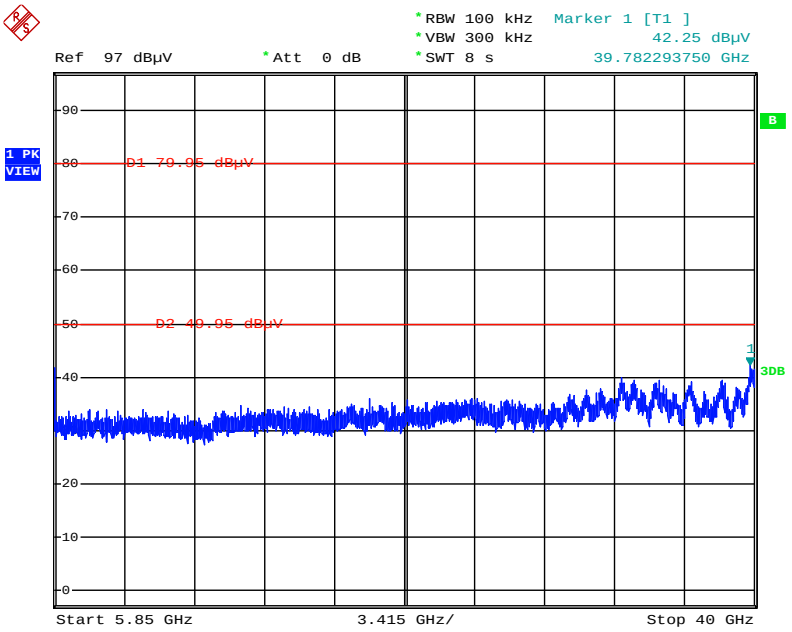
Date: 16.APR.2014 04:04:00

Plot on Configuration IEEE 802.11ac MCS0/Nss1 40MHz / CH 159 / 30MHz~5725MHz (down 30dBc)



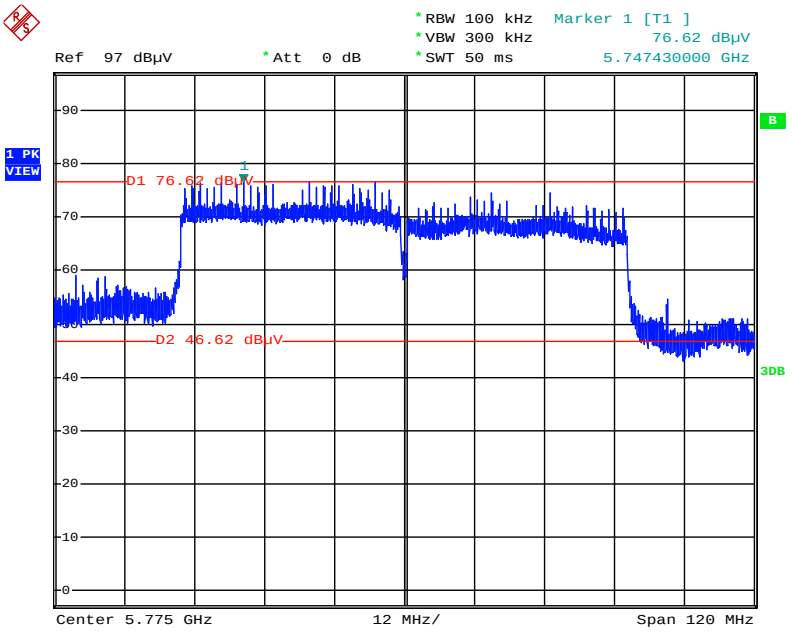
Date: 16.APR.2014 04:02:14

Plot on Configuration IEEE 802.11ac MCS0/Nss1 40MHz / CH 159 / 5850MHz~40000MHz (down 30dBc)



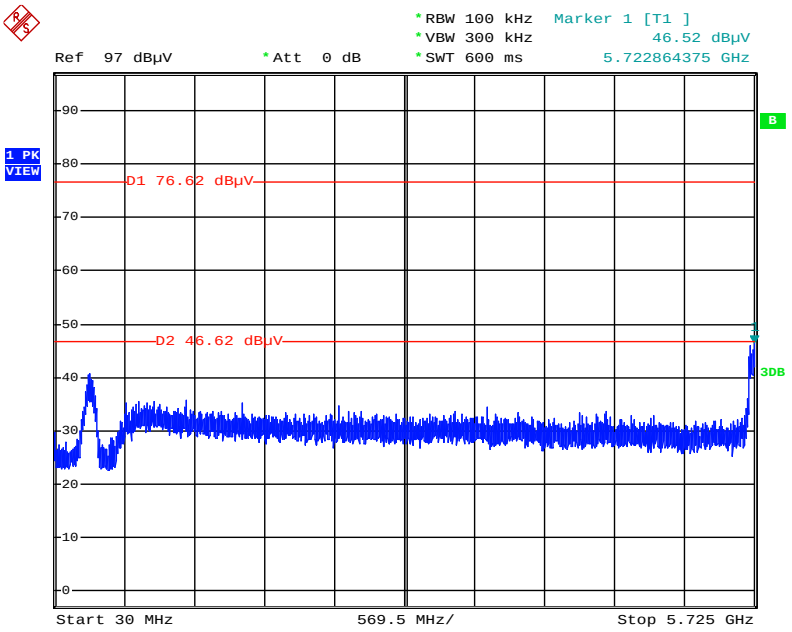
Date: 16.APR.2014 04:03:05

Plot on Configuration IEEE 802.11ac MCS0/Nss1 80MHz / Reference Level



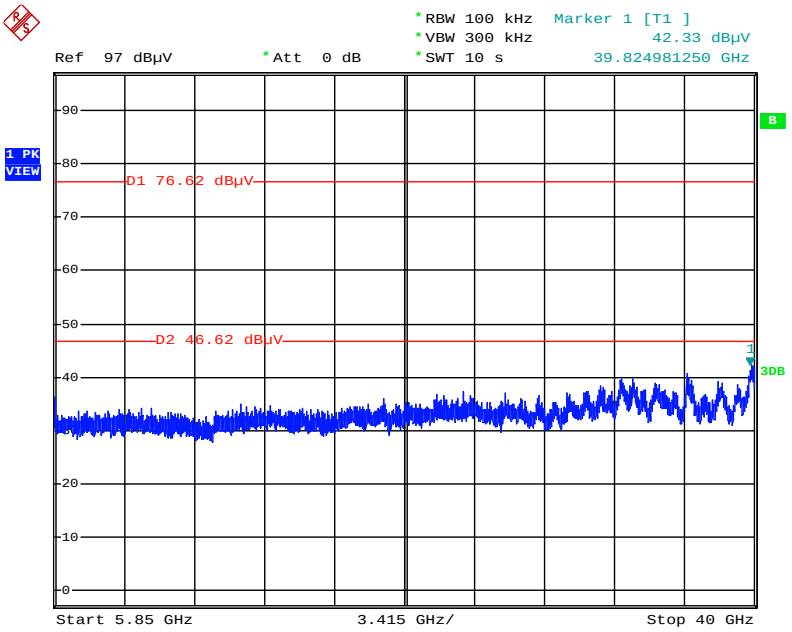
Date: 16.APR.2014 03:52:05

Plot on Configuration IEEE 802.11ac MCS0/Nss1 80MHz / CH 155 / 30MHz~5725MHz (down 30dBc)



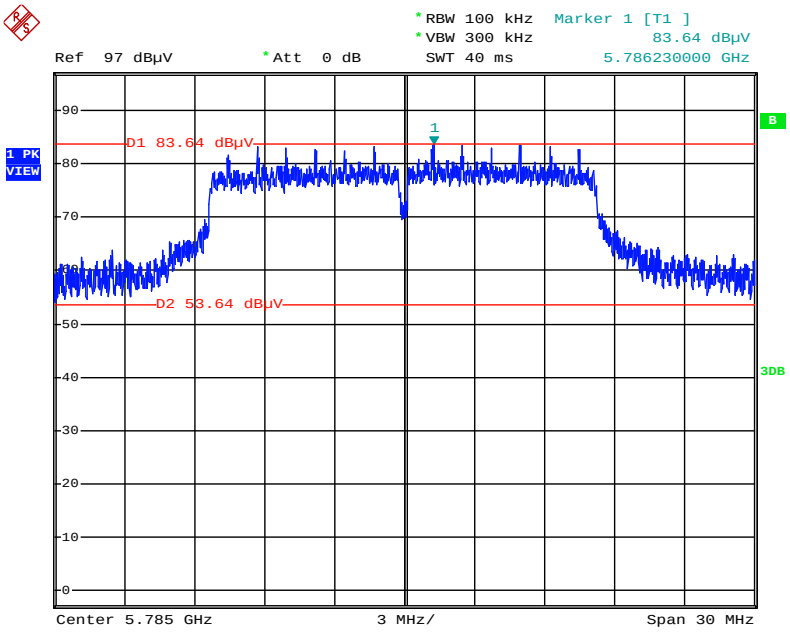
Date: 16.APR.2014 03:54:26

Plot on Configuration IEEE 802.11ac MCS0/Nss1 80MHz / CH 155 / 5850MHz~40000MHz (down 30dBc)



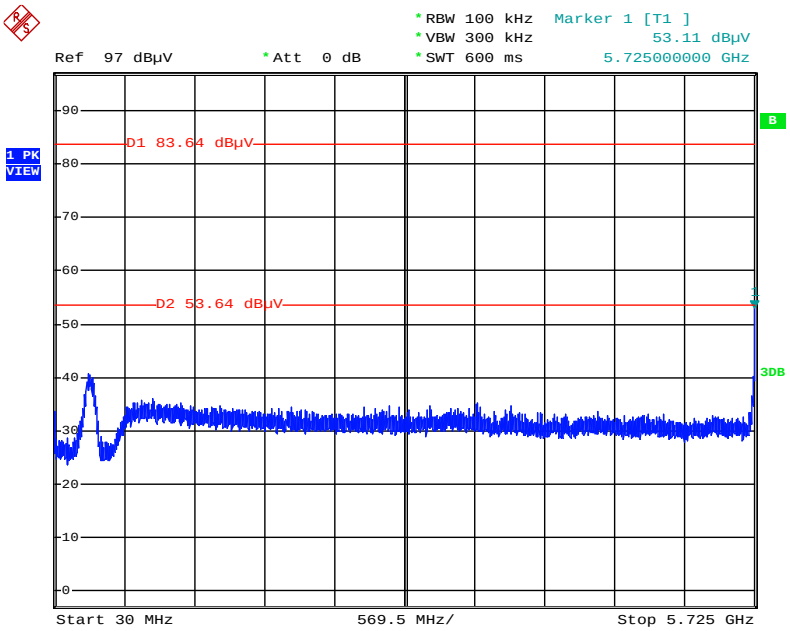
Date: 16.APR.2014 03:56:27

Plot on Configuration IEEE 802.11a / Reference Level



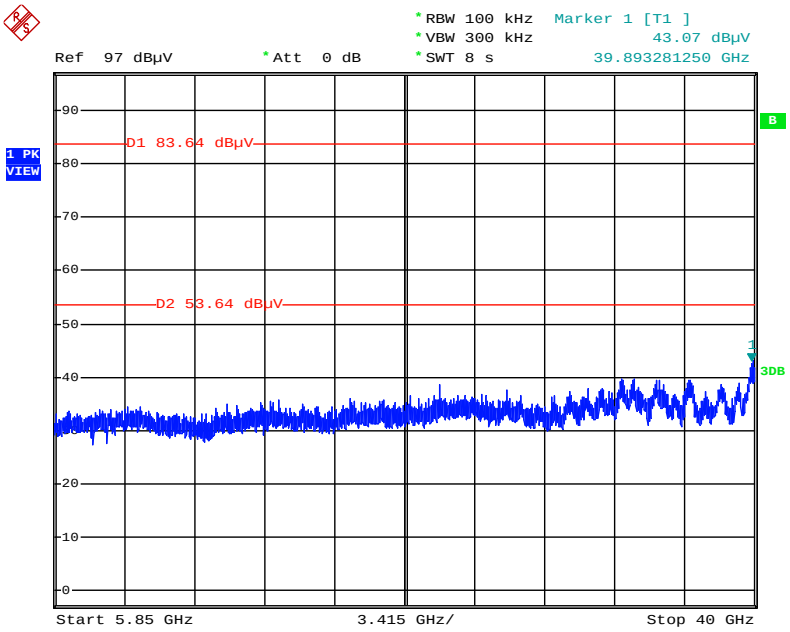
Date: 16.APR.2014 04:18:25

Plot on Configuration IEEE 802.11a / CH 149 / 30MHz~5725MHz (down 30dBc)



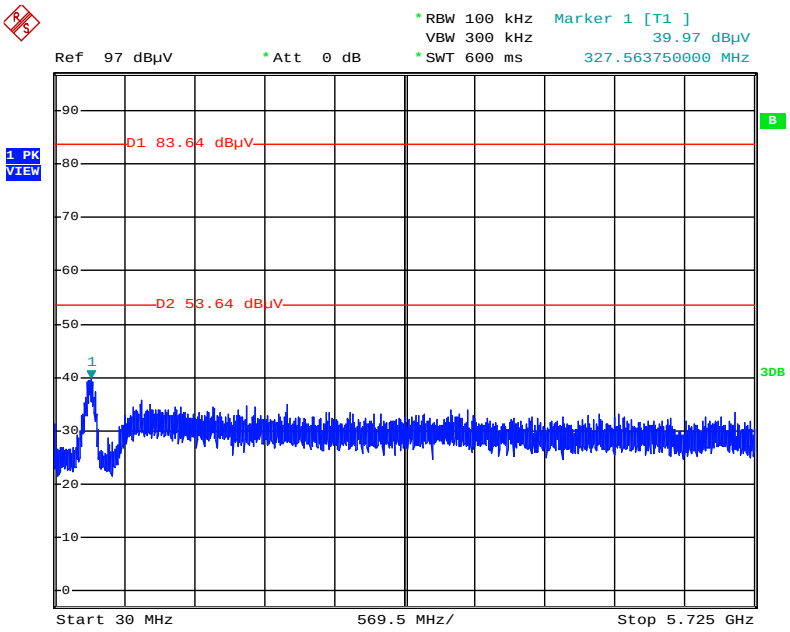
Date: 16.APR.2014 04:19:44

Plot on Configuration IEEE 802.11a / CH 149 / 5850MHz~40000MHz (down 30dBc)



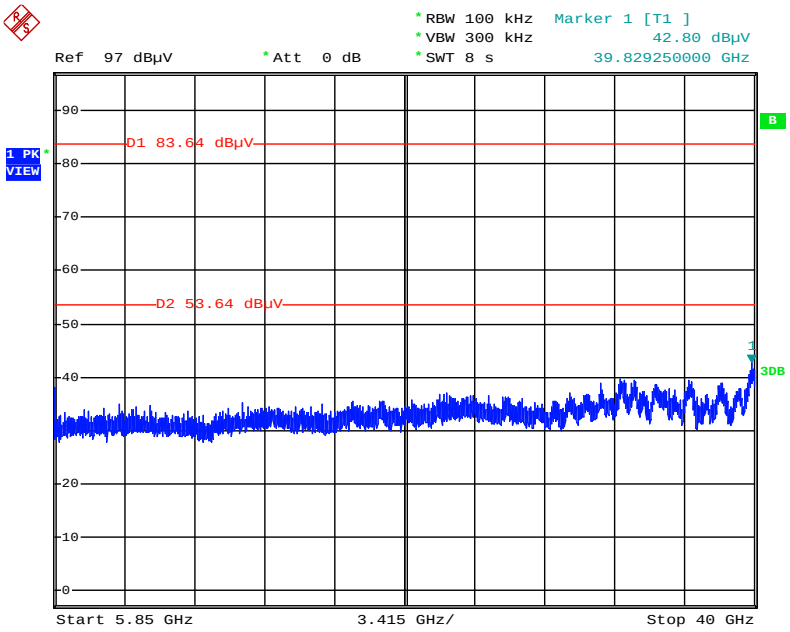
Date: 16.APR.2014 04:20:28

Plot on Configuration IEEE 802.11a / CH 165 / 30MHz~5725MHz (down 30dBc)



Date: 16.APR.2014 04:21:47

Plot on Configuration IEEE 802.11a / CH 165 / 5850MHz~40000MHz (down 30dBc)



Date: 16.APR.2014 04:21:09

4.5. Antenna Requirements

4.5.1. 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.

4.5.2. 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
BILOG ANTENNA	Schaffner	CBL6112D	2888	20MHz ~ 2GHz	Jan. 15, 2014	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. 01, 2013	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Dec. 17, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 12, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Oct. 23, 2013	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100019	9kHz~40GHz	Dec. 02, 2013	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Dec. 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. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 04, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 18, 2013	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. 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