



# SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.  
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

## FCC RADIO TEST REPORT

Applicant's company	Hewlett-Packard Company
Applicant Address	3000 Hanover Street Palo Alto, California 94304 U.S.A.
FCC ID	B94MRLBB1402
Manufacturer's company	Joy Technology (ShenZhen) Corporation
Manufacturer Address	Building A,B,C,D, HengKeng Ind., Shangpai, Shangwu,Aiqun Rd., Shiyan Town,Shenzhen 518135 China

Product Name	802.11n WLAN Radio
Brand Name	HP
Model No.	MRLBB-1402
Product No.	5066-3785
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Jun. 11, 2014
Final Test Date	Jul. 30, 2014
Submission Type	Original Equipment

### Statement

Test result included in this report is for the IEEE 802.11n and IEEE 802.11b/g 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 v03r02 and KDB 662911 D01 v02r01.

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



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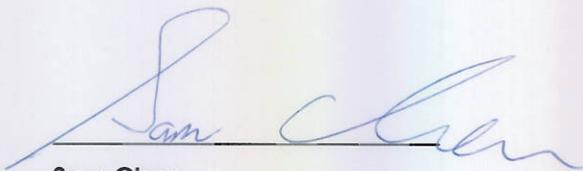
## History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR410910-04	Rev. 01	Initial issue of report	Aug. 15, 2014

## 1. CERTIFICATE OF COMPLIANCE

Product Name : 802.11n WLAN Radio  
Brand Name : HP  
Model No. : MRLBB-1402  
Product No. : 5066-3785  
Applicant : Hewlett-Packard Company  
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. 11, 2014 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



Sam Chen

SPORTON INTERNATIONAL INC.

## 2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	Rule Section	Description of Test	Result	Under Limit
4.1	15.207	AC Power Line Conducted Emissions	Complies	14.83 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	2.90 dB
4.3	15.247(e)	Power Spectral Density	Complies	1.53 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	0.39 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.04 dB
4.7	15.203	Antenna Requirements	Complies	-

### 3. GENERAL INFORMATION

#### 3.1. Product Details

##### IEEE 802.11n

Items	Description
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	see the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11 for 20MHz bandwidth ; 7 for 40MHz bandwidth
Channel Band Width (99%)	MCS0 (HT20): 18.08 MHz ; MCS0 (HT40): 36.32 MHz
Maximum Conducted Output Power	MCS0 (HT20): 24.69 dBm ; MCS0 (HT40): 19.62 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

##### IEEE 802.11b/g

Items	Description
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11g
Data Modulation	DSSS (BPSK / QPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11
Channel Band Width (99%)	11b: 10.16 MHz ; 11g: 16.72 MHz
Maximum Conducted Output Power	11b: 27.10 dBm ; 11g: 24.72 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Beamforming Function	<input type="checkbox"/> With beamforming	<input checked="" type="checkbox"/> Without beamforming

### Antenna and Band width

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

### IEEE 11n Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	3	MCS 0-23
802.11n (HT40)	3	MCS 0-23

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput).  
Then EUT support HT20 and HT40.

Note 2: Modulation modes consist of below configuration: HT20/HT40: IEEE 802.11n

## 3.2. Accessories

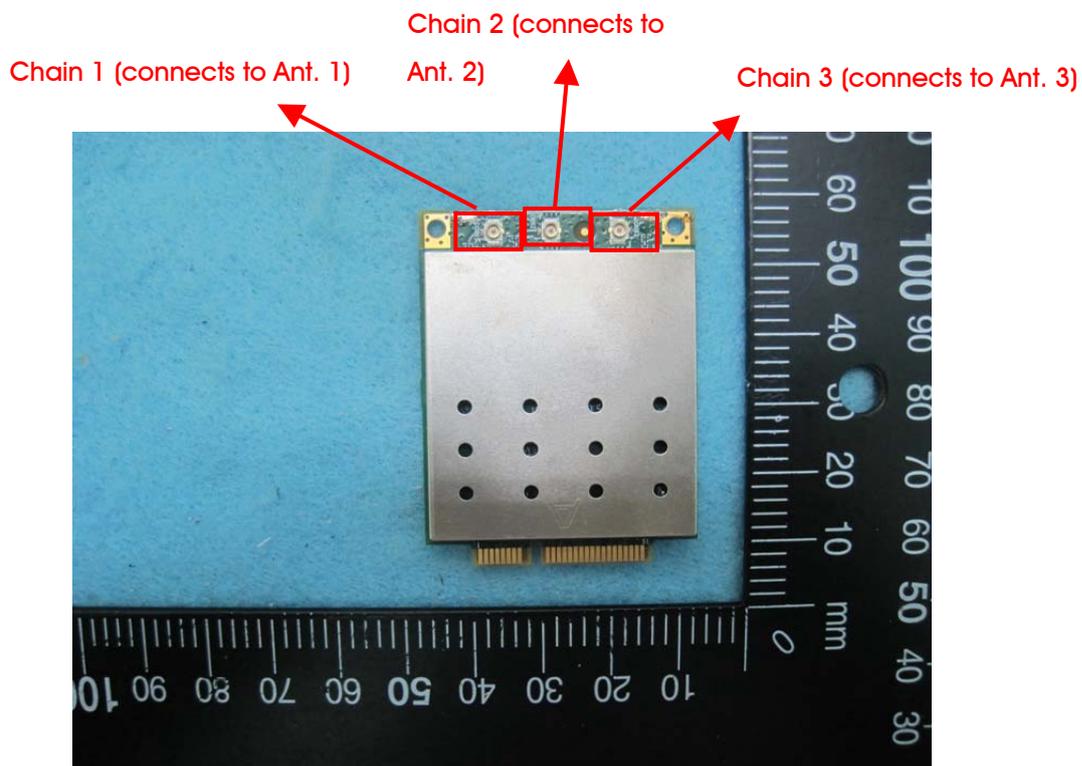
N/A

### 3.3. Table for Filed Antenna

Ant.	Brand	Part Number	Antenna Type	Connector	Gain (dBi)
1	M.gear	120300000097A	PCB Antenna	I-PEX	5.4
2	M.gear	120300000097A	PCB Antenna	I-PEX	5.4
3	M.gear	120300000097A	PCB Antenna	I-PEX	5.4

Note: The EUT has three antennas (3TX, 3RX).

Chain 1, Chain 2 and Chain 3 can be used as transmitting/receiving antennas.



### 3.4. Table for Carrier Frequencies

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	-	-

### 3.5. Table for Test Modes

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

Test Items	Mode	Data Rate	Channel	Chain
AC Power Line Conducted Emissions	CTX	-	-	-
Maximum Conducted Output Power	802.11n HT20	MCS0	1/6/11	1+2+3
	802.11n HT40	MCS0	3/6/9	1+2+3
	11b/BPSK	1 Mbps	1/6/11	1+2+3
	11g/BPSK	6 Mbps	1/6/11	1+2+3
Power Spectral Density	802.11n HT20	MCS0	1/6/11	1+2+3
	802.11n HT40	MCS0	3/6/9	1+2+3
	11b/BPSK	1 Mbps	1/6/11	1+2+3
	11g/BPSK	6 Mbps	1/6/11	1+2+3
6dB Spectrum Bandwidth	802.11n HT20	MCS0	1/6/11	1+2+3
	802.11n HT40	MCS0	3/6/9	1+2+3
	11b/BPSK	1 Mbps	1/6/11	1+2+3
	11g/BPSK	6 Mbps	1/6/11	1+2+3
Radiated Emissions 9kHz~1GHz	CTX	-	-	-
Radiated Emissions 1GHz~10 <sup>th</sup> Harmonic	802.11n HT20	MCS0	1/6/11	1+2+3
	802.11n HT40	MCS0	3/6/9	1+2+3
	11b/BPSK	1 Mbps	1/6/11	1+2+3
	11g/BPSK	6 Mbps	1/6/11	1+2+3
Band Edge Emissions	802.11n HT20	MCS0	1/6/11	1+2+3
	802.11n HT40	MCS0	3/6/9	1+2+3
	11b/BPSK	1 Mbps	1/6/11	1+2+3
	11g/BPSK	6 Mbps	1/6/11	1+2+3

The following test modes were performed for all tests:

**For Conducted Emission test:**

Mode 1. CTX

**For Radiated Emission test:**

Mode 1. CTX

### 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
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D
TH01-CB	OVEN Room	Hsin Chu	-	-

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

### 3.7. Table for Supporting Units

For Test Site No: 03CH01-CB & TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6220	DoC
Test Fixture	ACCTON	AC46074246	N/A

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC
Test Fixture	ACCTON	AC46074246	N/A

### 3.8. 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 802.11n

Test Software Version	ART2-GUI VER2.3		
Frequency	2412 MHz	2437 MHz	2462 MHz
MCS0 HT20	12.5	19	13.5
Frequency	2422 MHz	2437 MHz	2452 MHz
MCS0 HT40	11	13.5	11

#### Power Parameters of IEEE 802.11b/g

Test Software Version	ART2-GUI VER2.3		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	18	22	18
IEEE 802.11g	13	19	14

### 3.9. EUT Operation during Test

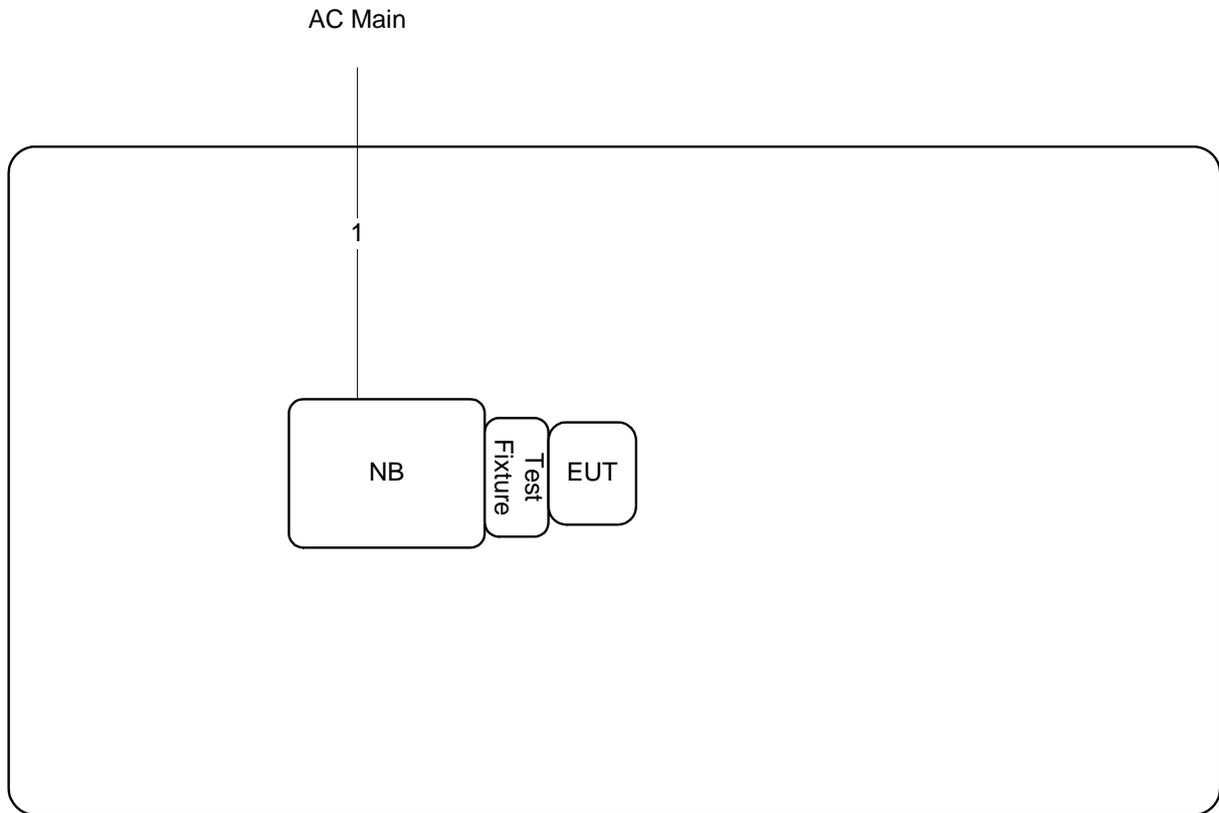
The EUT was programmed to be in continuously transmitting mode.

### 3.10. Duty Cycle

Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	1/T Minimum VBW (kHz)
802.11n MCS0 HT20	1.280	1.325	96.60	0.78
802.11n MCS0 HT40	0.640	0.670	95.52	1.56
802.11b	8.220	8.240	99.76	0.01
802.11g	1.370	1.415	96.82	0.73

### 3.11. Test Configurations

#### 3.11.1. AC Power Line Conduction Emissions and Radiation Emissions Test Configuration



Item	Connection	Shielded	Length(m)
1	Power cable	No	2.6m

## 4. TEST RESULT

### 4.1. AC Power Line Conducted Emissions Measurement

#### 4.1.1. Limit

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

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

#### 4.1.2. Measuring Instruments and Setting

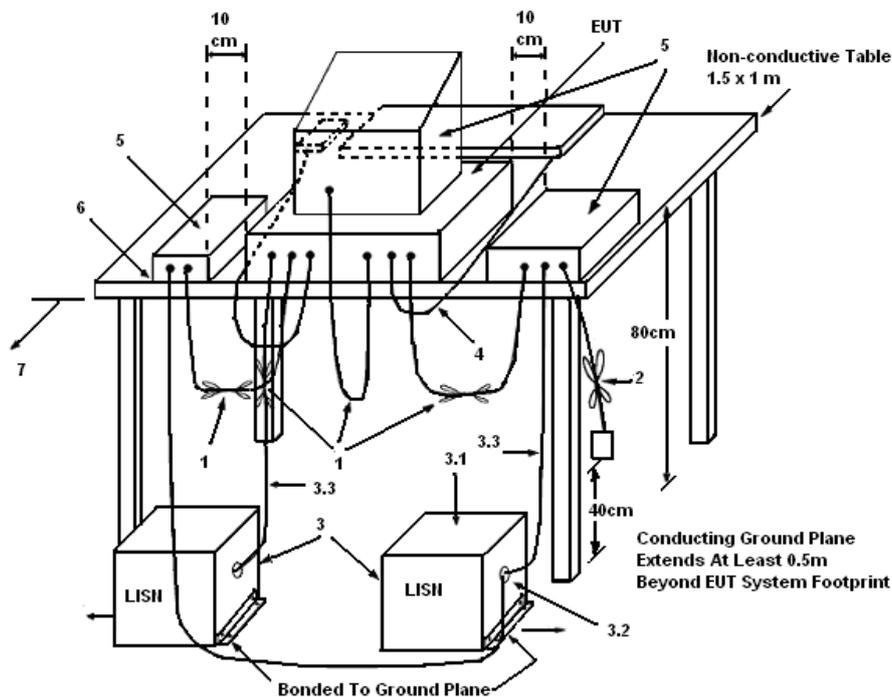
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

#### 4.1.3. Test Procedures

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

#### 4.1.4. Test Setup Layout



#### LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50  $\Omega$ . LISN can be placed on top of, or immediately beneath, reference ground plane.
  - (3.1) All other equipment powered from additional LISN(s).
  - (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
  - (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

#### 4.1.5. Test Deviation

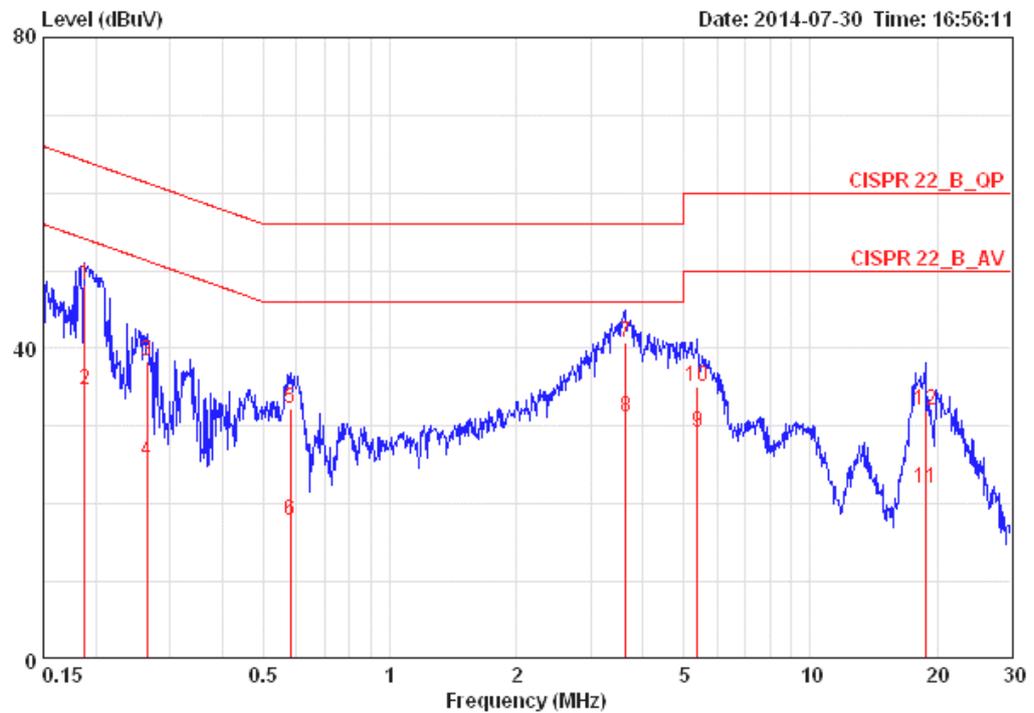
There is no deviation with the original standard.

#### 4.1.6. EUT Operation during Test

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

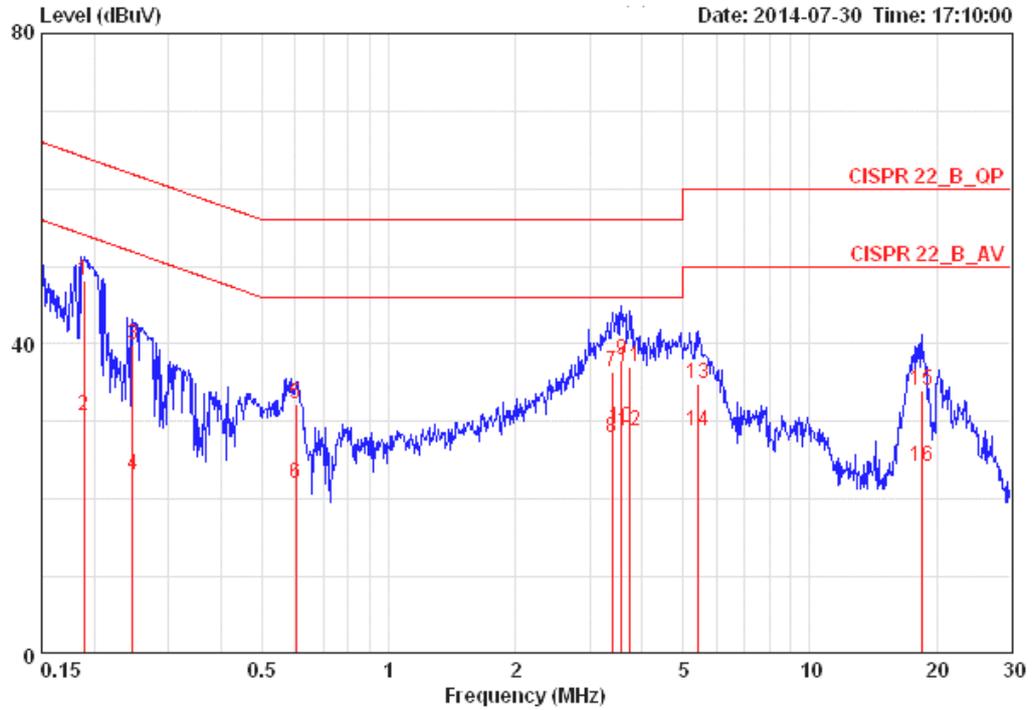
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	25°C	Humidity	52%
Test Engineer	Parody Lin	Phase	Line
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over	Limit	LISN	Read	Cable		
	MHz	dBuV	dB	dBuV	dB	dBuV	dB	Pol/Phase	Remark
1	0.18838	48.07	-16.03	64.11	0.10	47.81	0.16	LINE	QP
2	0.18838	34.69	-19.41	54.11	0.10	34.43	0.16	LINE	AVERAGE
3	0.26442	38.31	-22.98	61.29	0.10	38.04	0.17	LINE	QP
4	0.26442	25.42	-25.87	51.29	0.10	25.15	0.17	LINE	AVERAGE
5	0.57923	32.36	-23.64	56.00	0.11	32.06	0.19	LINE	QP
6	0.57923	17.84	-28.16	46.00	0.11	17.54	0.19	LINE	AVERAGE
7	3.642	40.72	-15.28	56.00	0.20	40.22	0.29	LINE	QP
8	3.642	31.17	-14.83	46.00	0.20	30.67	0.29	LINE	AVERAGE
9	5.390	29.12	-20.88	50.00	0.25	28.54	0.33	LINE	AVERAGE
10	5.390	35.07	-24.93	60.00	0.25	34.49	0.33	LINE	QP
11	18.721	22.06	-27.94	50.00	0.47	21.10	0.50	LINE	AVERAGE
12	18.721	32.09	-27.91	60.00	0.47	31.13	0.50	LINE	QP

Temperature	25°C	Humidity	52%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.18938	48.19	-15.87	64.06	0.09	47.94	0.16	NEUTRAL	QP
2	0.18938	30.67	-23.39	54.06	0.09	30.42	0.16	NEUTRAL	AVERAGE
3	0.24682	39.82	-22.04	61.86	0.09	39.56	0.17	NEUTRAL	QP
4	0.24682	23.21	-28.65	51.86	0.09	22.95	0.17	NEUTRAL	AVERAGE
5	0.60112	32.21	-23.79	56.00	0.10	31.92	0.19	NEUTRAL	QP
6	0.60112	22.10	-23.90	46.00	0.10	21.81	0.19	NEUTRAL	AVERAGE
7	3.399	36.37	-19.63	56.00	0.18	35.90	0.29	NEUTRAL	QP
8	3.399	27.80	-18.20	46.00	0.18	27.33	0.29	NEUTRAL	AVERAGE
9	3.565	37.86	-18.14	56.00	0.18	37.39	0.29	NEUTRAL	QP
10	3.565	29.13	-16.87	46.00	0.18	28.66	0.29	NEUTRAL	AVERAGE
11	3.740	36.96	-19.04	56.00	0.18	36.48	0.29	NEUTRAL	QP
12	3.740	28.74	-17.26	46.00	0.18	28.26	0.29	NEUTRAL	AVERAGE
13	5.447	34.95	-25.05	60.00	0.23	34.39	0.33	NEUTRAL	QP
14	5.447	28.67	-21.33	50.00	0.23	28.11	0.33	NEUTRAL	AVERAGE
15	18.426	33.92	-26.08	60.00	0.43	33.00	0.49	NEUTRAL	QP
16	18.426	24.20	-25.80	50.00	0.43	23.28	0.49	NEUTRAL	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss.

## 4.2. Maximum Conducted Output Power Measurement

### 4.2.1. Limit

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

### 4.2.2. Measuring Instruments and Setting

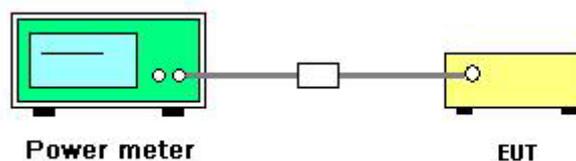
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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

### 4.2.3. Test Procedures

1. Test procedures refer KDB 558074 D01 v03r02 section 9.2.3.2 Measurement using a power meter (PM).
2. Multiple antenna systems was performed in accordance with KDB 662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
3. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

### 4.2.4. Test Setup Layout



### 4.2.5. Test Deviation

There is no deviation with the original standard.

### 4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 4.2.7. Test Result of Maximum Conducted Output Power

Temperature	26°C	Humidity	63%
Test Engineer	Jim Huang	Configurations	IEEE 802.11n
Test Date	Jul. 28, 2014		

##### Configuration IEEE 802.11n MCS0 HT20

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
1	2412 MHz	14.37	13.85	13.71	18.76	30.00	Complies
6	2437 MHz	20.41	19.40	19.89	24.69	30.00	Complies
11	2462 MHz	15.42	14.73	14.69	19.73	30.00	Complies

##### Configuration IEEE 802.11n MCS0 HT40

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
3	2422 MHz	12.97	12.68	12.74	17.57	30.00	Complies
6	2437 MHz	15.39	14.39	14.70	19.62	30.00	Complies
9	2452 MHz	12.78	11.35	11.48	16.69	30.00	Complies

<b>Temperature</b>	26°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Jim Huang	<b>Configurations</b>	IEEE 802.11b/g
<b>Test Date</b>	Jul. 28, 2014		

**Configuration IEEE 802.11b**

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
1	2412 MHz	19.98	19.32	19.28	24.31	30.00	Complies
6	2437 MHz	22.73	22.58	21.60	27.10	30.00	Complies
11	2462 MHz	19.70	19.24	19.47	24.25	30.00	Complies

**Configuration IEEE 802.11g**

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
1	2412 MHz	14.99	14.51	14.47	19.43	30.00	Complies
6	2437 MHz	20.30	19.69	19.84	24.72	30.00	Complies
11	2462 MHz	15.73	14.70	15.22	20.01	30.00	Complies

### 4.3. Power Spectral Density Measurement

#### 4.3.1. Limit

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

#### 4.3.2. Measuring Instruments and Setting

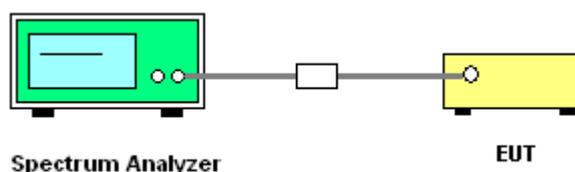
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS channel bandwidth.
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100\text{kHz}$
VBW	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple

#### 4.3.3. Test Procedures

1. Test was performed in accordance with KDB 558074 D01 v03r02 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - 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  $\geq 2 \times \text{span}/\text{RBW}$  (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  $\leq 8 \text{ dBm}$ .

#### 4.3.4. Test Setup Layout



#### 4.3.5. Test Deviation

There is no deviation with the original standard.

#### 4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 4.3.7. Test Result of Power Spectral Density

Temperature	26°C	Humidity	63%
Test Engineer	Jim Huang	Configurations	IEEE 802.11n

##### Configuration IEEE 802.11n MCS0 HT20

Channel	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Total		
1	2412 MHz	-12.60	-5.11	-13.70	-3.92	3.83	Complies
6	2437 MHz	-6.28	-7.74	-6.66	-2.08	3.83	Complies
11	2462 MHz	-10.63	-12.72	-12.49	-7.07	3.83	Complies

Note:  $Directional\ gain = G_{ANT} + 10 \log(N_{ANT}/N_{SS}) = 10.17\text{dBi} > 6\text{dBi}$ , So Power Density Limit =  $8 - (10.17 - 6) = 3.83\text{dBm}/3\text{KHz}$

##### Configuration IEEE 802.11n MCS0 HT40

Channel	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Total		
3	2422 MHz	-15.52	-16.87	-16.80	-11.58	3.83	Complies
6	2437 MHz	-13.14	-14.63	-14.55	-9.28	3.83	Complies
9	2452 MHz	-16.23	-17.05	-18.26	-12.33	3.83	Complies

Note:  $Directional\ gain = G_{ANT} + 10 \log(N_{ANT}/N_{SS}) = 10.17\text{dBi} > 6\text{dBi}$ , So Power Density Limit =  $8 - (10.17 - 6) = 3.83\text{dBm}/3\text{KHz}$

Temperature	26°C	Humidity	63%
Test Engineer	Jim Huang	Configurations	IEEE 802.11b/g

**Configuration IEEE 802.11b**

Channel	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Total		
1	2412 MHz	-5.53	-5.05	-6.30	-0.83	3.83	Complies
6	2437 MHz	-2.03	-3.19	-2.29	2.30	3.83	Complies
11	2462 MHz	-5.05	-5.59	-5.51	-0.61	3.83	Complies

Note:  $Directional\ gain = G_{ANT} + 10 \log(N_{ANT}/N_{SS}) = 10.17\text{dBi} > 6\text{dBi}$ , So Power Density Limit =  $8 - (10.17 - 6) = 3.83\text{dBm}/3\text{KHz}$

**Configuration IEEE 802.11g**

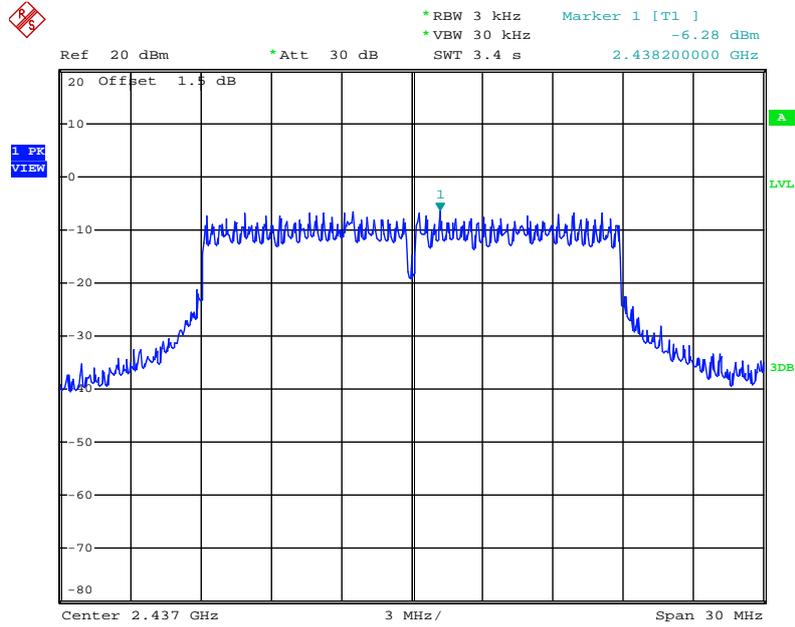
Channel	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Total		
1	2412 MHz	-11.16	-11.81	-11.71	-6.78	3.83	Complies
6	2437 MHz	-5.46	-6.94	-5.74	-1.23	3.83	Complies
11	2462 MHz	-10.42	-11.01	-10.98	-6.02	3.83	Complies

Note:  $Directional\ gain = G_{ANT} + 10 \log(N_{ANT}/N_{SS}) = 10.17\text{dBi} > 6\text{dBi}$ , So Power Density Limit =  $8 - (10.17 - 6) = 3.83\text{dBm}/3\text{KHz}$

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

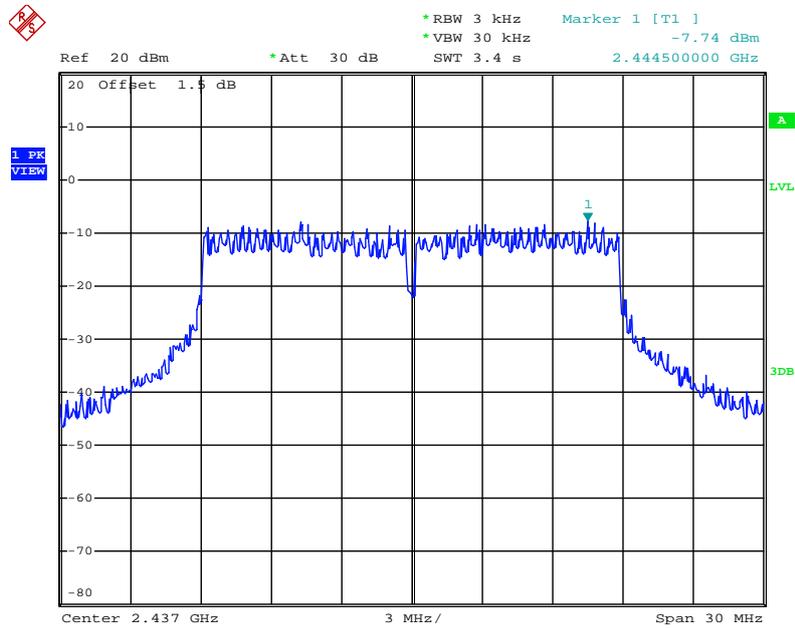
For plots, only the channel with worse result was shown.

**Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Chain 1**



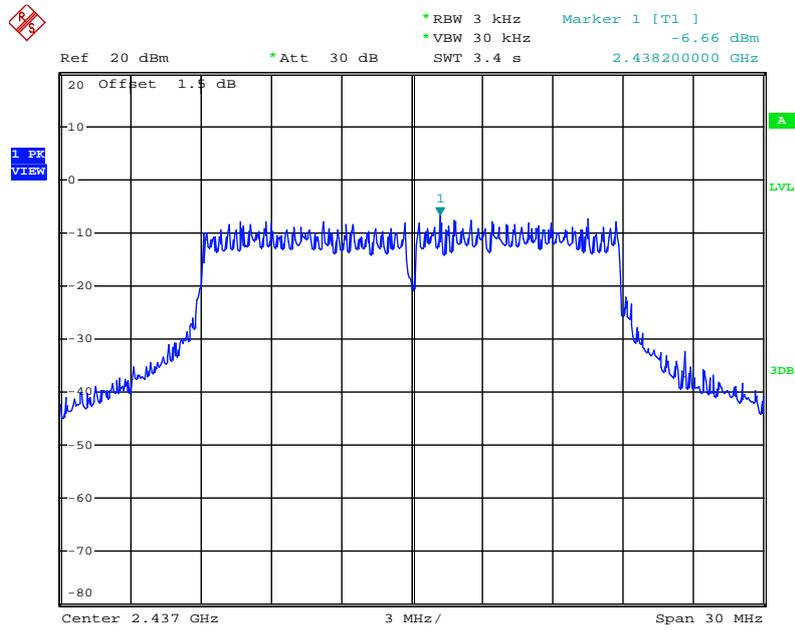
Date: 28.JUL.2014 20:20:40

**Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Chain 2**



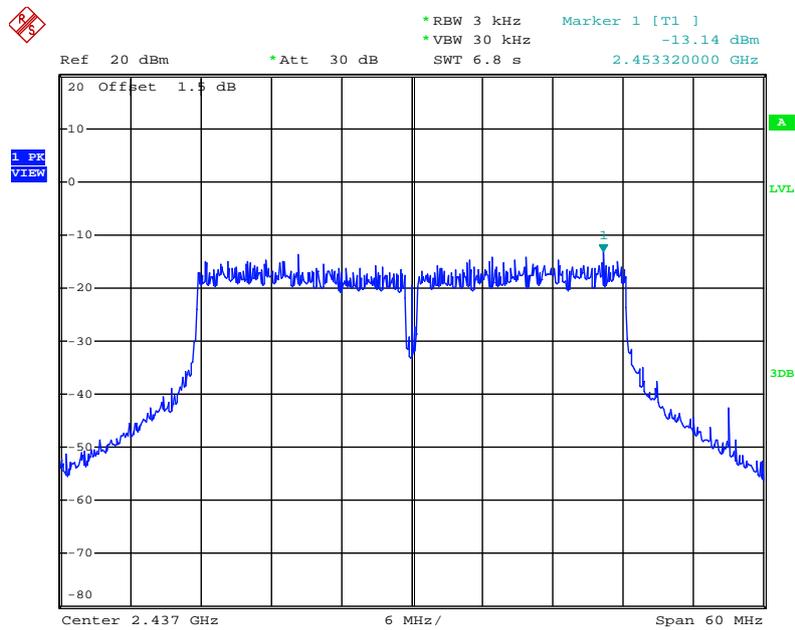
Date: 28.JUL.2014 20:20:01

### Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Chain 3



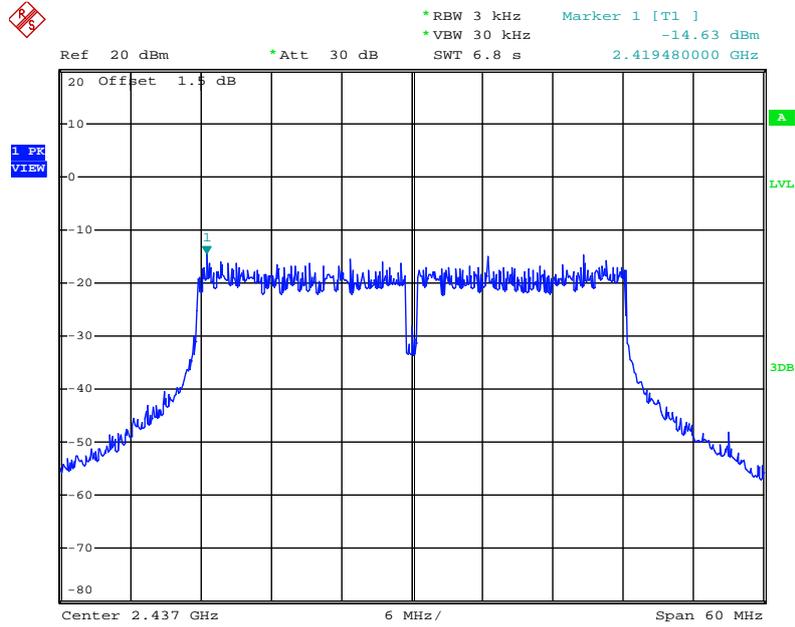
Date: 28.JUL.2014 20:19:24

### Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / 2437 MHz / Chain 1



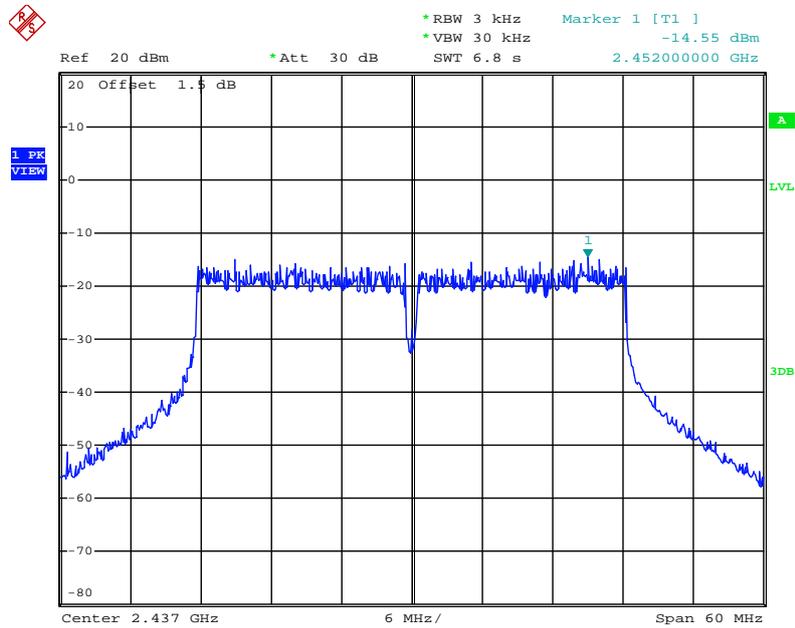
Date: 28.JUL.2014 20:26:47

**Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / 2437 MHz / Chain 2**



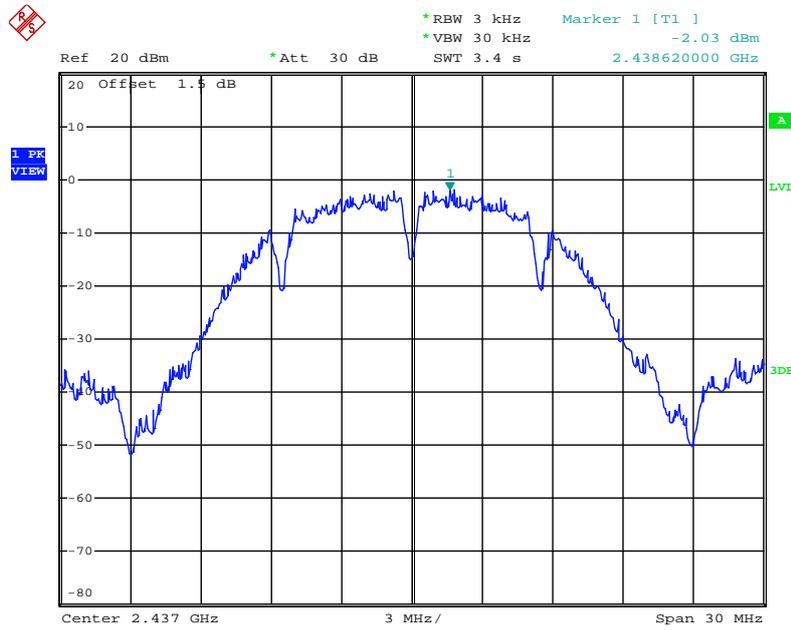
Date: 28.JUL.2014 20:27:32

**Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / 2437 MHz / Chain 3**



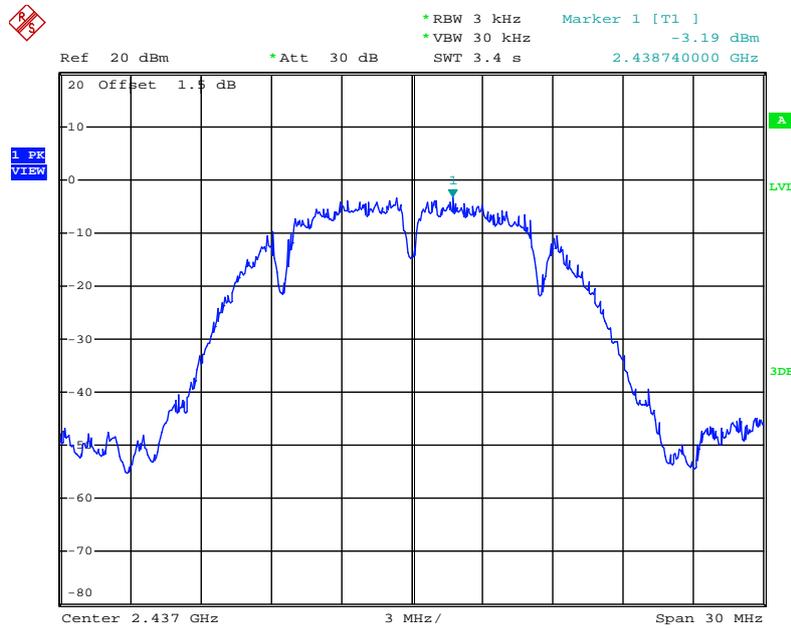
Date: 28.JUL.2014 20:28:25

**Power Density Plot on Configuration IEEE 802.11b / 2437 MHz / Chain 1**



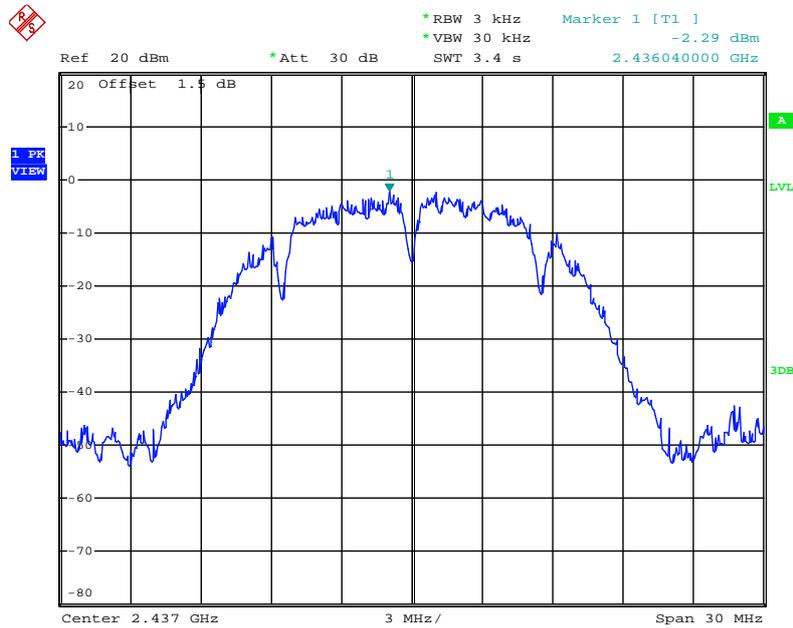
Date: 28.JUL.2014 20:05:10

**Power Density Plot on Configuration IEEE 802.11b / 2437 MHz / Chain 2**



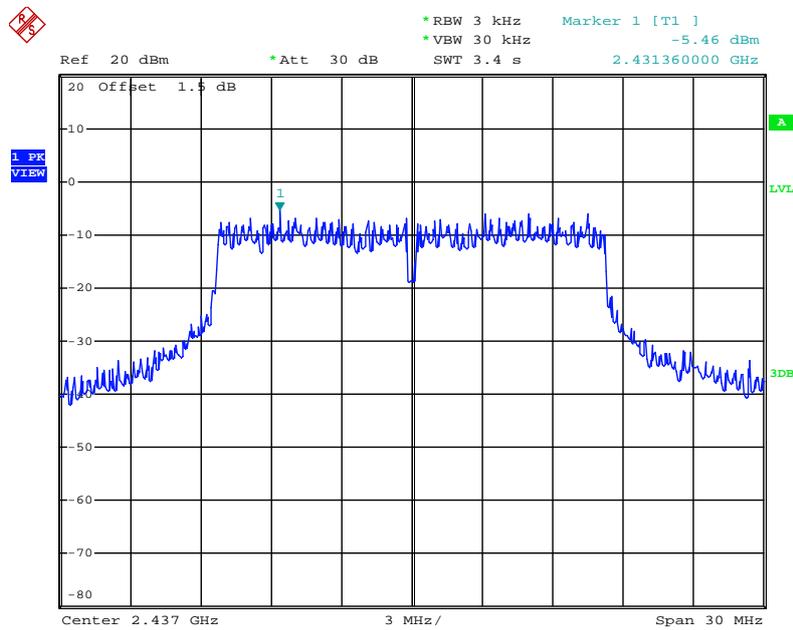
Date: 28.JUL.2014 20:04:15

### Power Density Plot on Configuration IEEE 802.11b / 2437 MHz / Chain 3



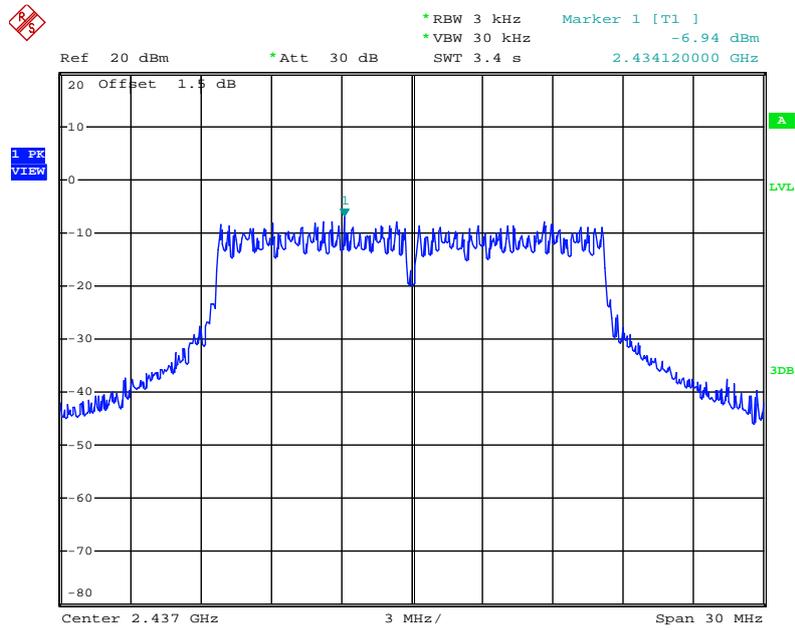
Date: 28.JUL.2014 20:03:36

### Power Density Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 1



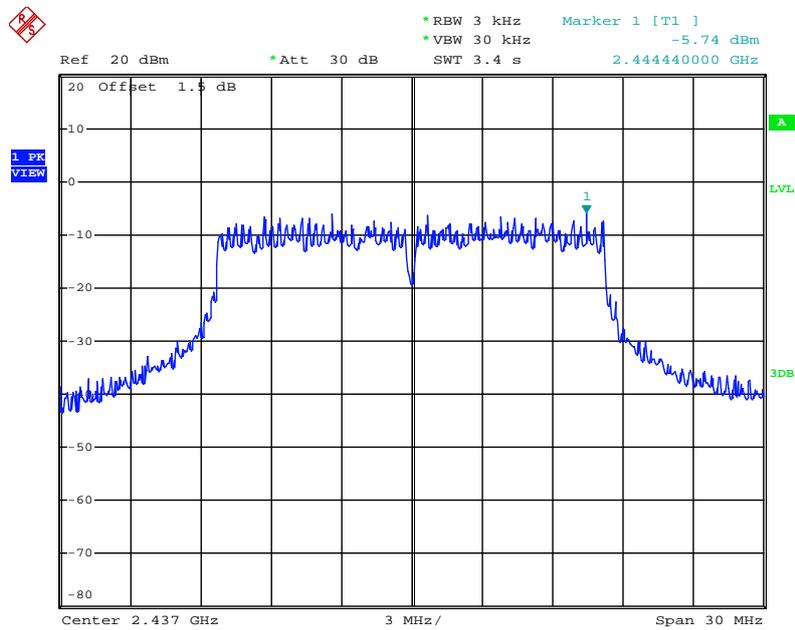
Date: 28.JUL.2014 20:11:54

### Power Density Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 2



Date: 28.JUL.2014 20:12:30

### Power Density Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 3



Date: 28.JUL.2014 20:13:13

## 4.4. 6dB Spectrum Bandwidth Measurement

### 4.4.1. Limit

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

### 4.4.2. Measuring Instruments and Setting

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

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RBW	100kHz
VBW	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 4.4.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB 558074 D01 v03r02 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 8.0 DTS bandwidth= $\Rightarrow$  8.1 Option 1.
3. Multiple antenna system was performed in accordance with KDB 662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. Measured the spectrum width with power higher than 6dB below carrier.

### 4.4.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

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

### 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 6dB Spectrum Bandwidth

<b>Temperature</b>	26°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Jim Huang	<b>Configurations</b>	IEEE 802.11n

##### Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	15.36	18.00	500	Complies
6	2437 MHz	15.12	18.08	500	Complies
11	2462 MHz	17.60	18.00	500	Complies

##### Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	35.68	36.32	500	Complies
6	2437 MHz	35.84	36.32	500	Complies
9	2452 MHz	35.68	36.16	500	Complies

<b>Temperature</b>	26°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Jim Huang	<b>Configurations</b>	IEEE 802.11b/g

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	6.56	10.16	500	Complies
6	2437 MHz	7.12	9.92	500	Complies
11	2462 MHz	7.04	9.76	500	Complies

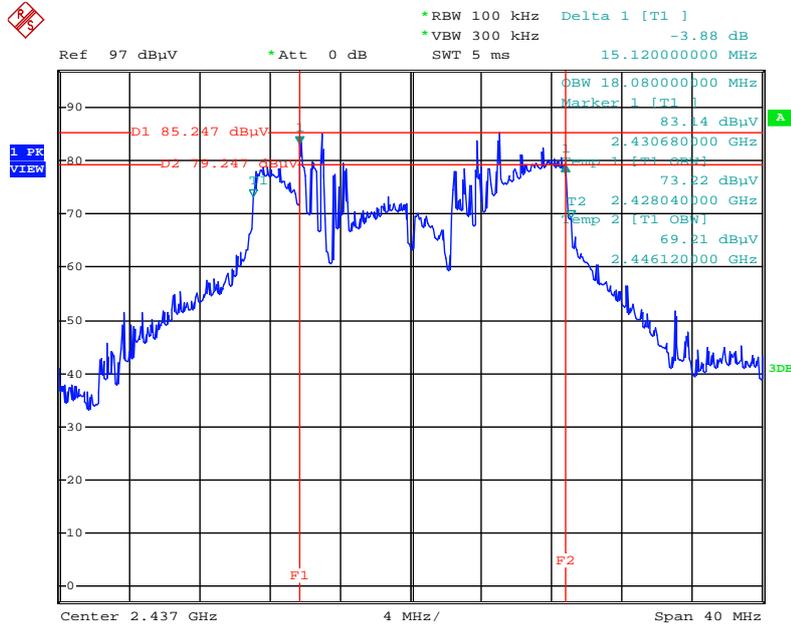
**Configuration IEEE 802.11g / Chain 1 + Chain 2 + Chain 3**

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.56	16.64	500	Complies
6	2437 MHz	16.08	16.72	500	Complies
11	2462 MHz	16.40	16.64	500	Complies

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

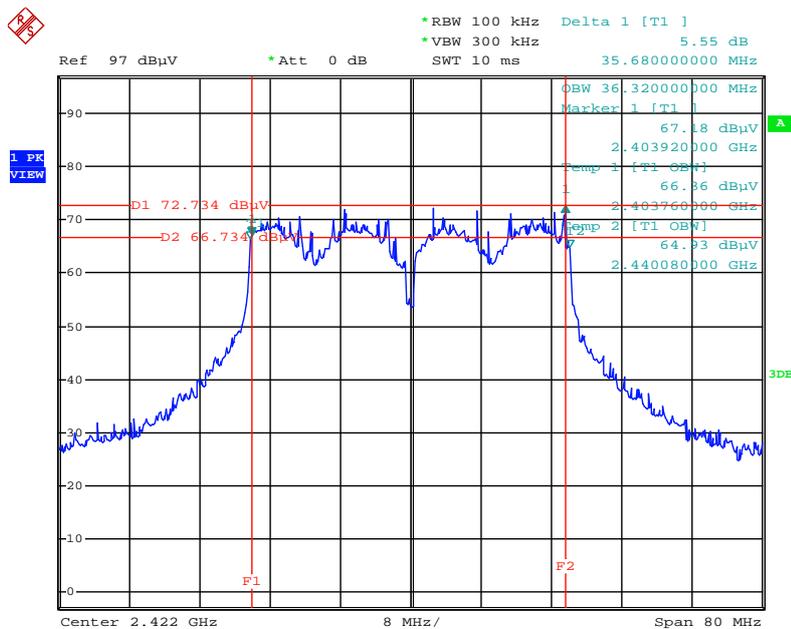
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Chain 1 + Chain 2 + Chain 3



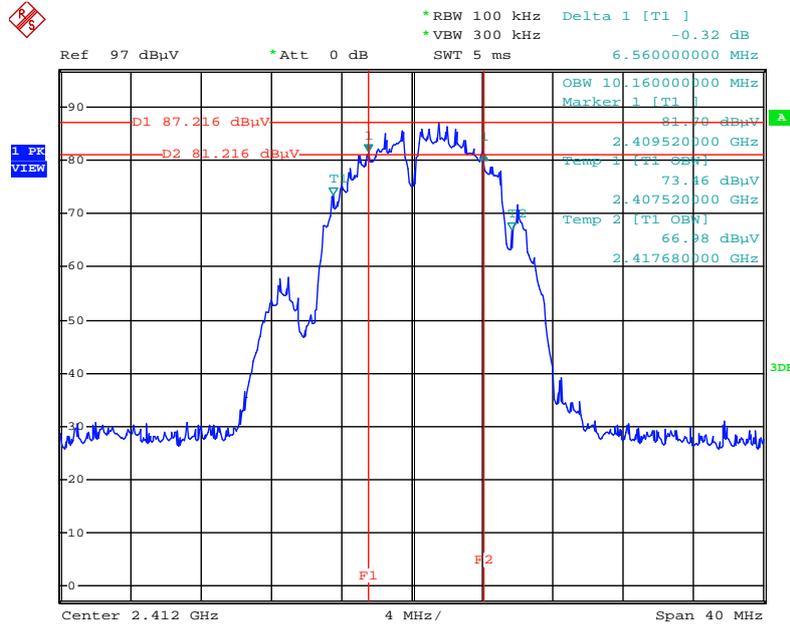
Date: 28.JUL.2014 20:41:36

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / 2422 MHz / Chain 1 + Chain 2 + Chain 3



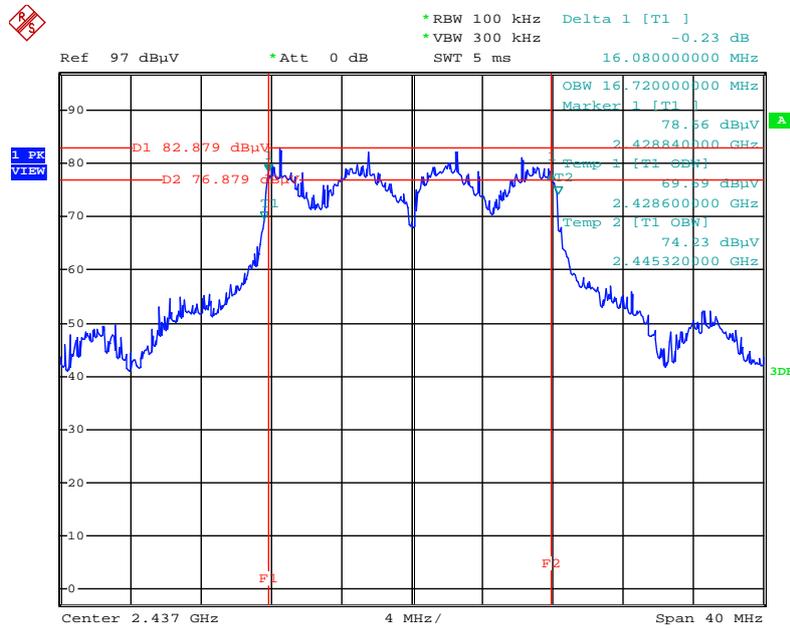
Date: 28.JUL.2014 20:39:06

6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2412 MHz / Chain 1 + Chain 2 + Chain 3



Date: 28.JUL.2014 20:44:18

6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 1 + Chain 2 + Chain 3



Date: 28.JUL.2014 20:48:03

## 4.5. Radiated Emissions Measurement

### 4.5.1. Limit

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

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

### 4.5.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, Please refer to section 3.10 for Average
RBW / VBW (Emission in non-restricted band)	100kHz / 300kHz for peak

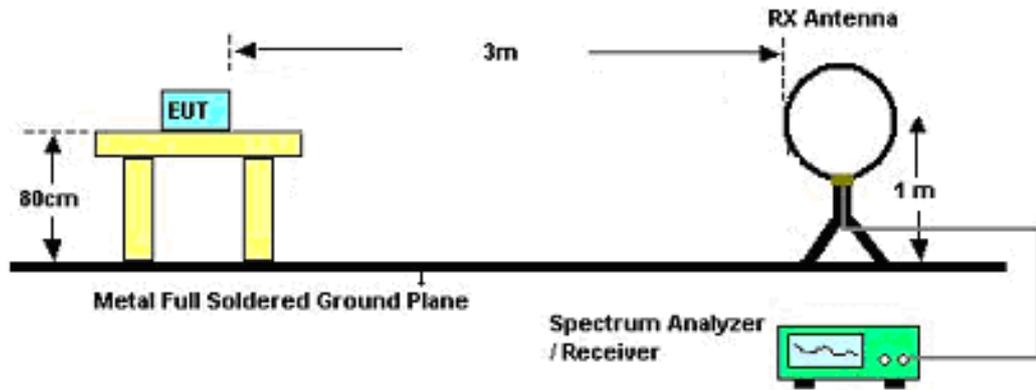
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

### 4.5.3. Test Procedures

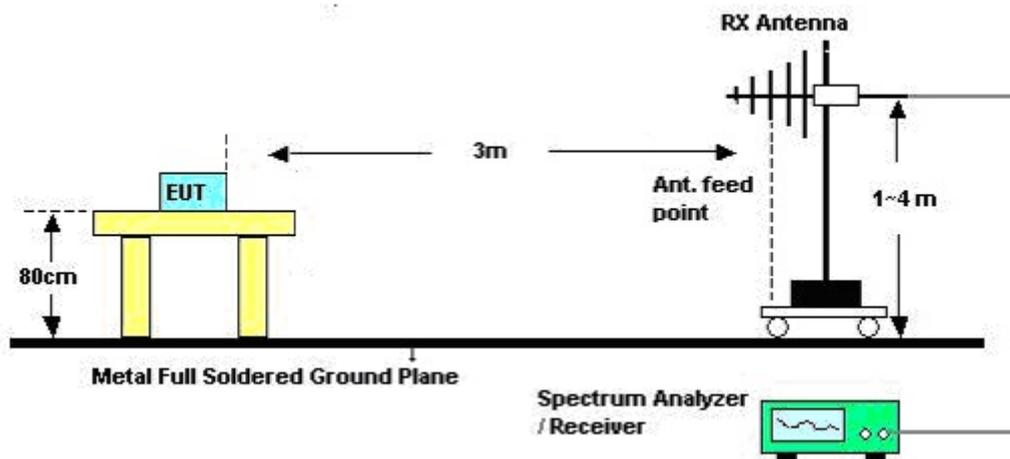
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. 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.
8. 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.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

#### 4.5.4. Test Setup Layout

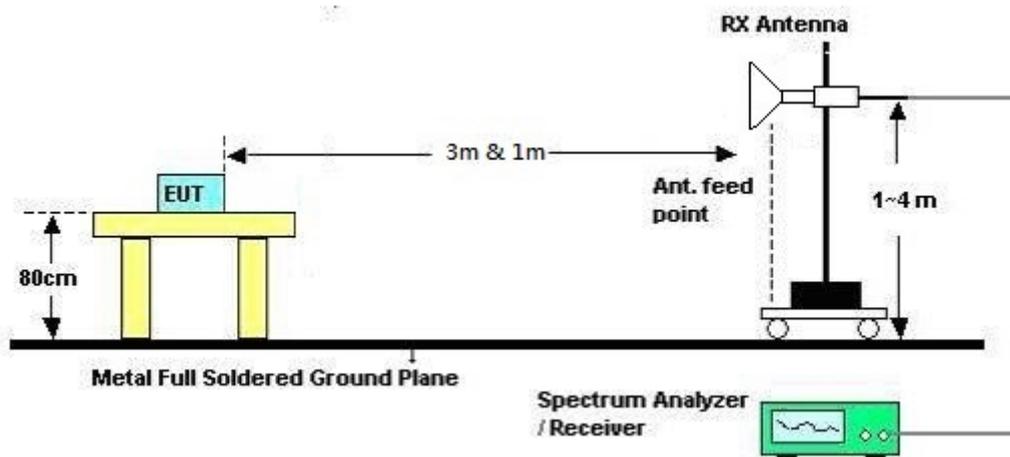
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



#### **4.5.5. Test Deviation**

There is no deviation with the original standard.

#### **4.5.6. EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.

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

Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	CTX
Test Date	Jul. 29, 2014	Test Mode	Mode 1

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

**Note:**

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

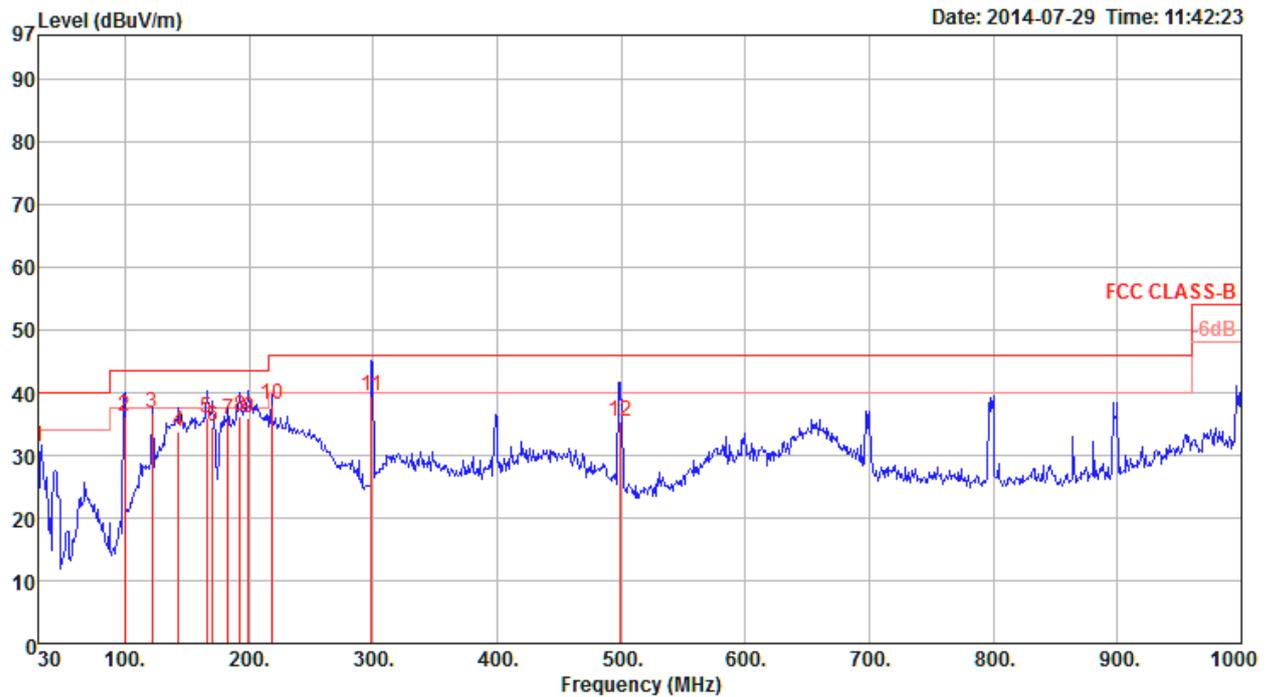
Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);

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

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

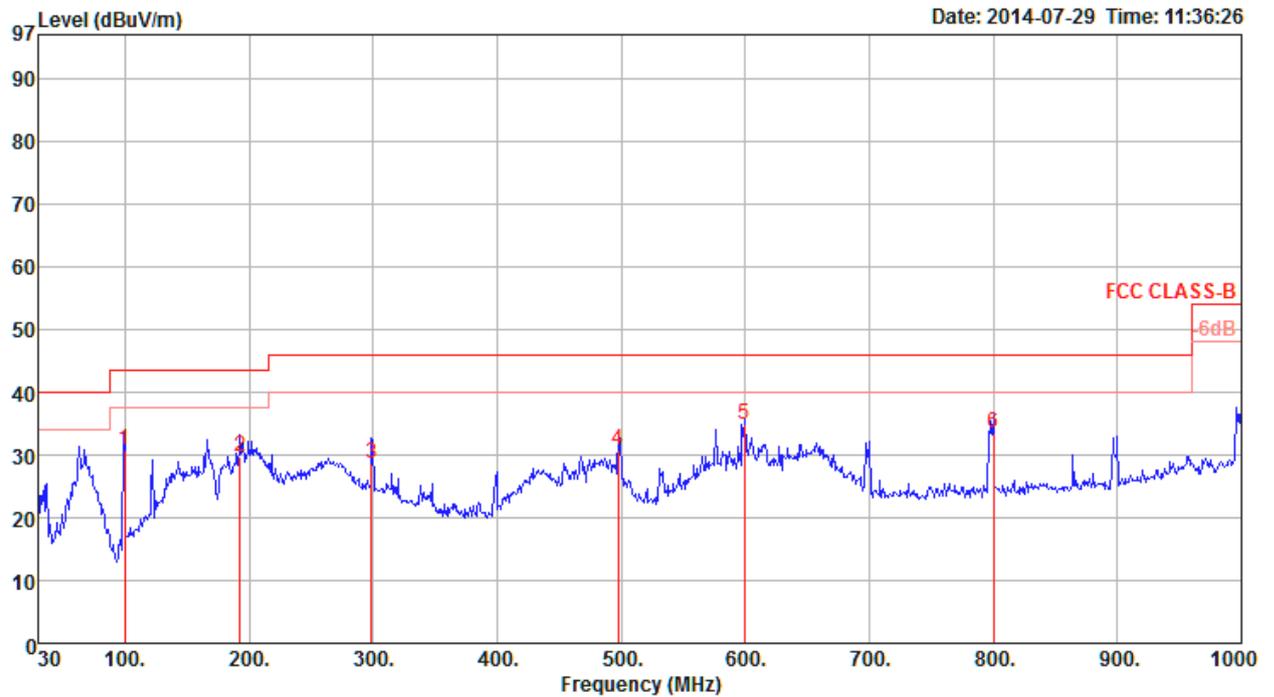
Temperature	23°C	Humidity	61%
Test Engineer	Magic Lai	Configurations	CTX
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Pol/Phase	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	30.00	31.36	40.00	-8.64	39.03	0.40	19.90	27.97	HORIZONTAL	100	324 QP
2	99.84	36.26	43.50	-7.24	51.85	0.83	11.40	27.82	HORIZONTAL	200	151 QP
3	122.15	36.84	43.50	-6.66	50.99	0.93	12.60	27.68	HORIZONTAL	115	185 QP
4	143.49	33.71	43.50	-9.79	48.57	1.03	11.65	27.54	HORIZONTAL	100	117 QP
5	165.80	35.83	43.50	-7.67	51.58	1.14	10.52	27.41	HORIZONTAL	200	356 QP
6	170.65	34.70	43.50	-8.80	50.58	1.16	10.37	27.41	HORIZONTAL	127	194 QP
7	183.26	35.78	43.50	-7.72	51.85	1.23	10.07	27.37	HORIZONTAL	100	245 QP
8	192.96	36.16	43.50	-7.34	52.08	1.25	10.12	27.29	HORIZONTAL	100	172 QP
9	199.75	35.89	43.50	-7.61	51.47	1.27	10.40	27.25	HORIZONTAL	184	278 QP
10	218.18	37.99	46.00	-8.01	52.97	1.32	10.82	27.12	HORIZONTAL	145	293 QP
11	298.69	39.42	46.00	-6.58	50.73	1.60	13.92	26.83	HORIZONTAL	100	295 QP
12	499.48	35.45	46.00	-10.55	43.49	2.10	17.79	27.93	HORIZONTAL	182	293 QP

**Vertical**



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	99.84	30.76	43.50	-12.74	46.35	0.83	11.40	27.82	127	187	QP
2	192.96	29.75	43.50	-13.75	45.67	1.25	10.12	27.29	100	259	QP
3	298.69	28.56	46.00	-17.44	39.87	1.60	13.92	26.83	154	54	QP
4	497.54	30.87	46.00	-15.13	38.94	2.10	17.76	27.93	189	85	QP
5	599.39	34.77	46.00	-11.23	40.43	2.36	19.59	27.61	100	308	QP
6	800.18	33.63	46.00	-12.37	36.59	2.73	21.20	26.89	100	25	QP

**Note:**

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

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

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

#### 4.5.9. Results for Radiated Emissions (1GHz~10<sup>th</sup> Harmonic)

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11n MCS0 HT20 CH 1 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

##### Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4832.48	33.80	54.00	-20.20	30.63	5.70	32.77	35.30	100	103	HORIZONTAL	Average
2	4833.64	44.67	74.00	-29.33	41.50	5.70	32.77	35.30	100	103	HORIZONTAL	Peak

##### Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4825.26	34.03	54.00	-19.97	30.87	5.69	32.77	35.30	100	12	VERTICAL	Average
2	4830.12	46.52	74.00	-27.48	43.36	5.69	32.77	35.30	100	12	VERTICAL	Peak

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11n MCS0 HT20 CH 6 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

### Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4875.76	34.34	54.00	-19.66	31.11	5.75	32.80	35.32	100	238	HORIZONTAL Average
2	4879.20	45.02	74.00	-28.98	41.79	5.75	32.80	35.32	100	238	HORIZONTAL Peak
3	7305.36	49.68	74.00	-24.32	40.87	7.05	37.12	35.36	100	290	HORIZONTAL Peak
4	7316.68	39.16	54.00	-14.84	30.33	7.06	37.13	35.36	100	290	HORIZONTAL Average

### Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4870.14	45.29	74.00	-28.71	42.06	5.74	32.80	35.31	100	335	VERTICAL Peak
2	4875.26	34.21	54.00	-19.79	30.98	5.75	32.80	35.32	100	335	VERTICAL Average
3	7305.66	39.19	54.00	-14.81	30.38	7.05	37.12	35.36	100	290	VERTICAL Average
4	7318.84	49.59	74.00	-24.41	40.76	7.06	37.13	35.36	100	290	VERTICAL Peak

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11n MCS0 HT20 CH 11 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

### Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4921.10	45.14	74.00	-28.86	41.84	5.80	32.83	35.33	100	137	HORIZONTAL Peak
2	4924.42	34.39	54.00	-19.61	31.07	5.81	32.84	35.33	100	137	HORIZONTAL Average
3	7377.86	50.74	74.00	-23.26	41.83	7.08	37.15	35.32	100	78	HORIZONTAL Peak
4	7380.18	38.62	54.00	-15.38	29.70	7.08	37.16	35.32	100	78	HORIZONTAL Average

### Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4928.36	45.73	74.00	-28.27	42.41	5.81	32.84	35.33	100	181	VERTICAL Peak
2	4933.12	34.16	54.00	-19.84	30.84	5.82	32.84	35.34	100	181	VERTICAL Average
3	7380.14	38.81	54.00	-15.19	29.89	7.08	37.16	35.32	100	128	VERTICAL Average
4	7381.26	49.95	74.00	-24.05	41.03	7.08	37.16	35.32	100	128	VERTICAL Peak

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11n MCS0 HT40 CH 3 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

### Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4837.06	33.51	54.00	-20.49	30.34	5.70	32.77	35.30	100	86	HORIZONTAL Average
2	4845.76	44.99	74.00	-29.01	41.80	5.71	32.78	35.30	100	86	HORIZONTAL Peak
3	7259.88	49.94	74.00	-24.06	41.18	7.04	37.11	35.39	100	158	HORIZONTAL Peak
4	7267.90	40.04	54.00	-13.96	31.27	7.04	37.11	35.38	100	158	HORIZONTAL Average

### Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4834.60	33.66	54.00	-20.34	30.49	5.70	32.77	35.30	100	306	VERTICAL Average
2	4842.10	44.03	74.00	-29.97	40.84	5.71	32.78	35.30	100	306	VERTICAL Peak
3	7256.22	39.16	54.00	-14.84	30.41	7.03	37.11	35.39	100	272	VERTICAL Average
4	7263.18	50.58	74.00	-23.42	41.82	7.04	37.11	35.39	100	272	VERTICAL Peak

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11n MCS0 HT40 CH 6 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

### Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4868.40	44.34	74.00	-29.66	41.11	5.74	32.80	35.31	100	104	HORIZONTAL Peak
2	4870.42	33.84	54.00	-20.16	30.61	5.74	32.80	35.31	100	104	HORIZONTAL Average
3	7314.08	50.74	74.00	-23.26	41.92	7.06	37.12	35.36	100	138	HORIZONTAL Peak
4	7314.38	38.88	54.00	-15.12	30.06	7.06	37.12	35.36	100	138	HORIZONTAL Average

### Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4875.96	45.23	74.00	-28.77	42.00	5.75	32.80	35.32	100	254	VERTICAL Peak
2	4882.56	33.91	54.00	-20.09	30.66	5.76	32.81	35.32	100	254	VERTICAL Average
3	7303.16	49.63	74.00	-24.37	40.82	7.05	37.12	35.36	100	164	VERTICAL Peak
4	7315.14	39.04	54.00	-14.96	30.22	7.06	37.12	35.36	100	164	VERTICAL Average

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11n MCS0 HT40 CH 9 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

#### Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4895.68	33.75	54.00	-20.25	30.48	5.77	32.82	35.32	100	172	HORIZONTAL Average
2	4900.18	44.20	74.00	-29.80	40.92	5.78	32.82	35.32	100	172	HORIZONTAL Peak
3	7353.24	38.73	54.00	-15.27	29.86	7.07	37.14	35.34	100	206	HORIZONTAL Average
4	7358.46	50.04	74.00	-23.96	41.15	7.07	37.15	35.33	100	206	HORIZONTAL Peak

#### Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4894.86	33.83	54.00	-20.17	30.57	5.77	32.81	35.32	100	358	VERTICAL Average
2	4896.48	44.74	74.00	-29.26	41.47	5.77	32.82	35.32	100	358	VERTICAL Peak
3	7352.42	38.60	54.00	-15.40	29.73	7.07	37.14	35.34	100	290	VERTICAL Average
4	7356.18	49.89	74.00	-24.11	41.01	7.07	37.14	35.33	100	290	VERTICAL Peak

#### Note:

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

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

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

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11b CH 1 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

### Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4823.86	53.50	74.00	-20.50	50.35	5.69	32.76	35.30	185	341	HORIZONTAL Peak
2	4824.00	50.52	54.00	-3.48	47.37	5.69	32.76	35.30	185	341	HORIZONTAL Average
3	12059.18	51.17	54.00	-2.83	38.03	9.15	38.76	34.77	100	277	HORIZONTAL Average
4	12060.86	58.74	74.00	-15.26	45.60	9.15	38.76	34.77	100	277	HORIZONTAL Peak
5	14471.88	52.14	54.00	-1.86	34.65	10.67	40.00	33.18	105	280	HORIZONTAL Average
6	14472.12	60.47	74.00	-13.53	42.98	10.67	40.00	33.18	105	280	HORIZONTAL Peak

### Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4823.98	42.57	54.00	-11.43	39.42	5.69	32.76	35.30	100	117	VERTICAL Average
2	4824.32	44.90	74.00	-29.10	41.75	5.69	32.76	35.30	100	117	VERTICAL Peak
3	12056.22	58.78	74.00	-15.22	45.65	9.15	38.76	34.78	101	226	VERTICAL Peak
4	12056.64	52.21	54.00	-1.79	39.08	9.15	38.76	34.78	101	226	VERTICAL Average
5	14471.79	62.38	74.00	-11.62	44.89	10.67	40.00	33.18	105	225	VERTICAL Peak
6	14471.87	53.61	54.00	-0.39	36.12	10.67	40.00	33.18	105	225	VERTICAL Average

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11b CH 6 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

### Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4873.99	46.34	54.00	-7.66	43.10	5.75	32.80	35.31	100	250	HORIZONTAL	Average
2	4874.09	53.81	74.00	-20.19	50.57	5.75	32.80	35.31	100	250	HORIZONTAL	Peak
3	7310.08	50.54	74.00	-23.46	41.72	7.06	37.12	35.36	100	341	HORIZONTAL	Peak
4	7311.85	38.44	54.00	-15.56	29.62	7.06	37.12	35.36	100	341	HORIZONTAL	Average
5	12182.64	58.89	74.00	-15.11	45.75	9.18	38.59	34.63	100	270	HORIZONTAL	Peak
6	12183.82	51.88	54.00	-2.12	38.74	9.18	38.59	34.63	100	270	HORIZONTAL	Average
7	14617.34	60.14	74.00	-13.86	42.95	10.65	39.90	33.36	100	260	HORIZONTAL	Peak
8	14629.86	50.09	54.00	-3.91	32.93	10.64	39.90	33.38	100	260	HORIZONTAL	Average

### Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4873.94	50.70	54.00	-3.30	47.46	5.75	32.80	35.31	100	199	VERTICAL	Average
2	4874.15	58.84	74.00	-15.16	55.60	5.75	32.80	35.31	100	199	VERTICAL	Peak
3	7311.59	50.19	74.00	-23.81	41.37	7.06	37.12	35.36	100	139	VERTICAL	Peak
4	7311.74	39.23	54.00	-14.77	30.41	7.06	37.12	35.36	100	139	VERTICAL	Average
5	12183.76	58.06	74.00	-15.94	44.92	9.18	38.59	34.63	101	27	VERTICAL	Peak
6	12184.13	52.40	54.00	-1.60	39.26	9.18	38.59	34.63	101	27	VERTICAL	Average
7	14621.80	51.18	54.00	-2.82	34.00	10.65	39.90	33.37	100	246	VERTICAL	Average
8	14622.12	60.36	74.00	-13.64	43.18	10.65	39.90	33.37	100	246	VERTICAL	Peak

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11b CH 11 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

### Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4923.79	48.92	74.00	-25.08	45.60	5.81	32.84	35.33	100	241 HORIZONTAL	Peak
2	4924.03	41.01	54.00	-12.99	37.69	5.81	32.84	35.33	100	241 HORIZONTAL	Average
3	7380.14	39.40	54.00	-14.60	30.48	7.08	37.16	35.32	100	250 HORIZONTAL	Average
4	7386.96	51.69	74.00	-22.31	42.76	7.09	37.16	35.32	100	250 HORIZONTAL	Peak
5	14771.98	49.57	54.00	-4.43	32.84	10.55	39.73	33.55	100	292 HORIZONTAL	Average
6	14772.77	61.04	74.00	-12.96	44.32	10.55	39.73	33.56	100	292 HORIZONTAL	Peak

### Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4923.89	49.19	74.00	-24.81	45.87	5.81	32.84	35.33	100	348 VERTICAL	Peak
2	4923.98	43.74	54.00	-10.26	40.42	5.81	32.84	35.33	100	348 VERTICAL	Average
3	7384.62	39.38	54.00	-14.62	30.45	7.09	37.16	35.32	100	248 VERTICAL	Average
4	7386.27	50.44	74.00	-23.56	41.51	7.09	37.16	35.32	100	248 VERTICAL	Peak
5	14771.83	60.90	74.00	-13.10	44.17	10.55	39.73	33.55	100	236 VERTICAL	Peak
6	14771.96	50.19	54.00	-3.81	33.46	10.55	39.73	33.55	100	236 VERTICAL	Average

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11g CH 1 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

**Horizontal**

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4816.62	45.93	74.00	-28.07	42.78	5.68	32.76	35.29	100	2 HORIZONTAL	Peak
2	4826.66	34.26	54.00	-19.74	31.10	5.69	32.77	35.30	100	2 HORIZONTAL	Average

**Vertical**

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4825.54	34.07	54.00	-19.93	30.91	5.69	32.77	35.30	100	95 VERTICAL	Average
2	4827.28	45.67	74.00	-28.33	42.51	5.69	32.77	35.30	100	95 VERTICAL	Peak

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11g CH 6 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

### Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4874.04	47.79	74.00	-26.21	44.55	5.75	32.80	35.31	100	305	HORIZONTAL Peak
2	4875.44	35.14	54.00	-18.86	31.91	5.75	32.80	35.32	100	305	HORIZONTAL Average
3	7314.20	49.71	74.00	-24.29	40.89	7.06	37.12	35.36	100	204	HORIZONTAL Peak
4	7320.04	39.93	54.00	-14.07	31.09	7.06	37.13	35.35	100	204	HORIZONTAL Average

### Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4874.90	35.13	54.00	-18.87	31.89	5.75	32.80	35.31	100	168	VERTICAL Average
2	4878.80	45.12	74.00	-28.88	41.89	5.75	32.80	35.32	100	168	VERTICAL Peak
3	7310.16	50.77	74.00	-23.23	41.95	7.06	37.12	35.36	100	108	VERTICAL Peak
4	7315.76	40.11	54.00	-13.89	31.28	7.06	37.13	35.36	100	108	VERTICAL Average

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11g CH 11 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 16, 2014		

### Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4931.66	45.19	74.00	-28.81	41.87	5.82	32.84	35.34	100	268	HORIZONTAL Peak
2	4932.74	34.36	54.00	-19.64	31.04	5.82	32.84	35.34	100	268	HORIZONTAL Average
3	7378.06	50.34	74.00	-23.66	41.43	7.08	37.15	35.32	100	202	HORIZONTAL Peak
4	7389.92	39.53	54.00	-14.47	30.59	7.09	37.16	35.31	100	202	HORIZONTAL Average

### Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4918.76	45.73	74.00	-28.27	42.43	5.80	32.83	35.33	100	156	VERTICAL Peak
2	4932.34	35.02	54.00	-18.98	31.70	5.82	32.84	35.34	100	156	VERTICAL Average
3	7376.80	39.04	54.00	-14.96	30.13	7.08	37.15	35.32	100	96	VERTICAL Average
4	7387.64	50.51	74.00	-23.49	41.58	7.09	37.16	35.32	100	96	VERTICAL Peak

### Note:

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

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

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

## 4.6. Emissions Measurement

### 4.6.1. Limit

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

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

### 4.6.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, Please refer to section 3.10 for Average
RBW / VBW (30dBc in any 100 kHz bandwidth emission)	100 kHz / 300 kHz for Peak

### 4.6.3. 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 v03r02 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.

#### **4.6.4. 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.

#### **4.6.5. Test Deviation**

There is no deviation with the original standard.

#### **4.6.6. EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.

#### 4.6.7. Test Result of Band Edge and Fundamental Emissions

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11n MCS0 HT20 CH 1, 6, 11 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 14, 2014		

##### Channel 1

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2390.00	53.44	54.00	-0.56	21.30	4.09	28.05	0.00 Average	195	83	HORIZONTAL
2	2390.00	69.40	74.00	-4.60	37.26	4.09	28.05	0.00 Peak	195	83	HORIZONTAL
3	2410.80	101.83			69.63	4.11	28.09	0.00 Average	195	83	HORIZONTAL
4	2410.80	112.96			80.76	4.11	28.09	0.00 Peak	195	83	HORIZONTAL

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

##### Channel 6

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2386.40	70.62	74.00	-3.38	38.48	4.09	28.05	0.00 Peak	102	84	HORIZONTAL
2	2390.00	53.50	54.00	-0.50	21.36	4.09	28.05	0.00 Average	102	84	HORIZONTAL
3	2431.80	107.54			75.29	4.12	28.13	0.00 Average	102	84	HORIZONTAL
4	2431.80	119.16			86.91	4.12	28.13	0.00 Peak	102	84	HORIZONTAL
5	2483.50	50.48	54.00	-3.52	18.06	4.16	28.26	0.00 Average	102	84	HORIZONTAL
6	2484.30	64.88	74.00	-9.12	32.46	4.16	28.26	0.00 Peak	102	84	HORIZONTAL

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

##### Channel 11

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2459.60	102.74			70.38	4.14	28.22	0.00 Average	186	93	HORIZONTAL
2	2460.80	114.46			82.10	4.14	28.22	0.00 Peak	186	93	HORIZONTAL
3	2483.50	53.48	54.00	-0.52	21.06	4.16	28.26	0.00 Average	186	93	HORIZONTAL
4	2483.50	72.41	74.00	-1.59	39.99	4.16	28.26	0.00 Peak	186	93	HORIZONTAL

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

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11n MCS0 HT40 CH 3, 6, 9 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 14, 2014		

### Channel 3

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2390.00	53.77	54.00	-0.23	21.63	4.09	28.05	0.00 Average	100	85	HORIZONTAL
2	2390.00	72.15	74.00	-1.85	40.01	4.09	28.05	0.00 Peak	100	85	HORIZONTAL
3	2406.00	110.13			77.93	4.11	28.09	0.00 Peak	100	85	HORIZONTAL
4	2426.80	96.43			64.18	4.12	28.13	0.00 Average	100	85	HORIZONTAL

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

### Channel 6

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2388.00	53.86	54.00	-0.14	21.72	4.09	28.05	0.00 Average	189	110	HORIZONTAL
2	2388.00	72.66	74.00	-1.34	40.52	4.09	28.05	0.00 Peak	189	110	HORIZONTAL
3	2427.40	112.60			80.35	4.12	28.13	0.00 Peak	189	110	HORIZONTAL
4	2427.80	99.62			67.37	4.12	28.13	0.00 Average	189	110	HORIZONTAL
5	2486.70	51.43	54.00	-2.57	18.97	4.16	28.30	0.00 Average	189	110	HORIZONTAL
6	2487.10	69.31	74.00	-4.69	36.85	4.16	28.30	0.00 Peak	189	110	HORIZONTAL

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

### Channel 9

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2443.60	96.73			64.42	4.13	28.18	0.00 Average	151	89	HORIZONTAL
2	2447.60	109.91			77.60	4.13	28.18	0.00 Peak	151	89	HORIZONTAL
3	2483.50	53.25	54.00	-0.75	20.83	4.16	28.26	0.00 Average	151	89	HORIZONTAL
4	2483.50	72.10	74.00	-1.90	39.68	4.16	28.26	0.00 Peak	151	89	HORIZONTAL

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

Note:

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

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

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11b CH 1, 6, 11 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 14, 2014		

**Channel 1**

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	2386.00	53.96	54.00	-0.04	21.82	4.09	28.05	0.00	Average	187	89	HORIZONTAL
2	2386.00	66.46	74.00	-7.54	34.32	4.09	28.05	0.00	Peak	187	89	HORIZONTAL
3	2414.60	117.24			85.04	4.11	28.09	0.00	Peak	187	89	HORIZONTAL
4	2414.80	113.30			81.10	4.11	28.09	0.00	Average	187	89	HORIZONTAL

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

**Channel 6**

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	2358.40	51.51	54.00	-2.49	19.47	4.07	27.97	0.00	Average	185	95	HORIZONTAL
2	2388.82	64.37	74.00	-9.63	32.23	4.09	28.05	0.00	Peak	185	95	HORIZONTAL
3	2438.57	121.01			88.70	4.13	28.18	0.00	Peak	185	95	HORIZONTAL
4	2438.60	117.33			85.02	4.13	28.18	0.00	Average	185	95	HORIZONTAL
5	2483.50	51.31	54.00	-2.69	18.89	4.16	28.26	0.00	Average	185	95	HORIZONTAL
6	2486.24	63.74	74.00	-10.26	31.28	4.16	28.30	0.00	Peak	185	95	HORIZONTAL

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

**Channel 11**

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	2383.60	53.26	54.00	-0.74	21.13	4.08	28.05	0.00	Average	154	88	HORIZONTAL
2	2384.40	64.50	74.00	-9.50	32.37	4.08	28.05	0.00	Peak	154	88	HORIZONTAL
3	2460.40	112.35			79.99	4.14	28.22	0.00	Average	154	88	HORIZONTAL
4	2464.80	113.21			80.85	4.14	28.22	0.00	Peak	154	88	HORIZONTAL
5	2483.50	50.95	54.00	-3.05	18.53	4.16	28.26	0.00	Average	154	88	HORIZONTAL
6	2483.50	63.19	74.00	-10.81	30.77	4.16	28.26	0.00	Peak	154	88	HORIZONTAL

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

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Magic Lai	<b>Configurations</b>	IEEE 802.11g CH 1, 6, 11 / Chain 1 + Chain 2 + Chain 3
<b>Test Date</b>	Jun. 14, 2014		

**Channel 1**

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	2389.22	71.52	74.00	-2.48	39.38	4.09	28.05	0.00	Peak	192	100	HORIZONTAL
2	2389.60	53.26	54.00	-0.74	21.12	4.09	28.05	0.00	Average	192	100	HORIZONTAL
3	2413.96	114.38			82.18	4.11	28.09	0.00	Peak	192	100	HORIZONTAL
4	2414.00	102.69			70.49	4.11	28.09	0.00	Average	192	100	HORIZONTAL

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

**Channel 6**

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	2388.40	69.43	74.00	-4.57	37.29	4.09	28.05	0.00	Peak	192	84	HORIZONTAL
2	2390.00	53.46	54.00	-0.54	21.32	4.09	28.05	0.00	Average	192	84	HORIZONTAL
3	2429.40	119.47			87.22	4.12	28.13	0.00	Peak	192	84	HORIZONTAL
4	2429.80	108.22			75.97	4.12	28.13	0.00	Average	192	84	HORIZONTAL
5	2483.50	51.85	54.00	-2.15	19.43	4.16	28.26	0.00	Average	192	84	HORIZONTAL
6	2483.50	66.92	74.00	-7.08	34.50	4.16	28.26	0.00	Peak	192	84	HORIZONTAL

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

**Channel 11**

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna 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	2459.60	101.73			69.37	4.14	28.22	0.00	Average	150	88	HORIZONTAL
2	2459.60	113.29			80.93	4.14	28.22	0.00	Peak	150	88	HORIZONTAL
3	2483.50	53.10	54.00	-0.90	20.68	4.16	28.26	0.00	Average	150	88	HORIZONTAL
4	2483.90	71.95	74.00	-2.05	39.53	4.16	28.26	0.00	Peak	150	88	HORIZONTAL

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

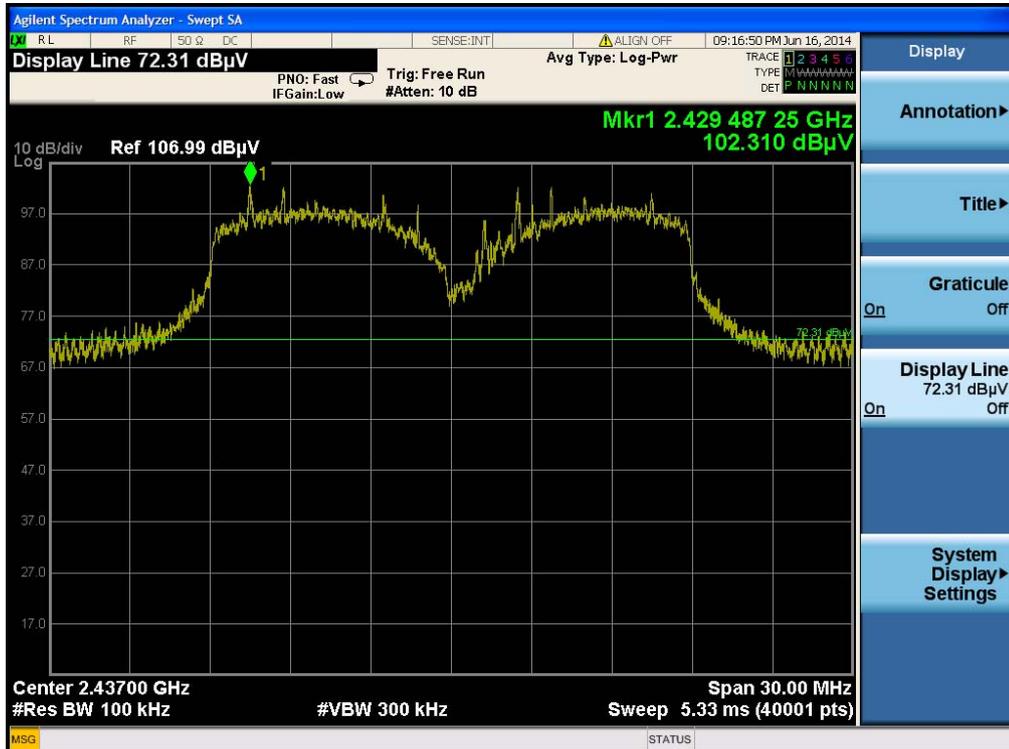
Note:

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

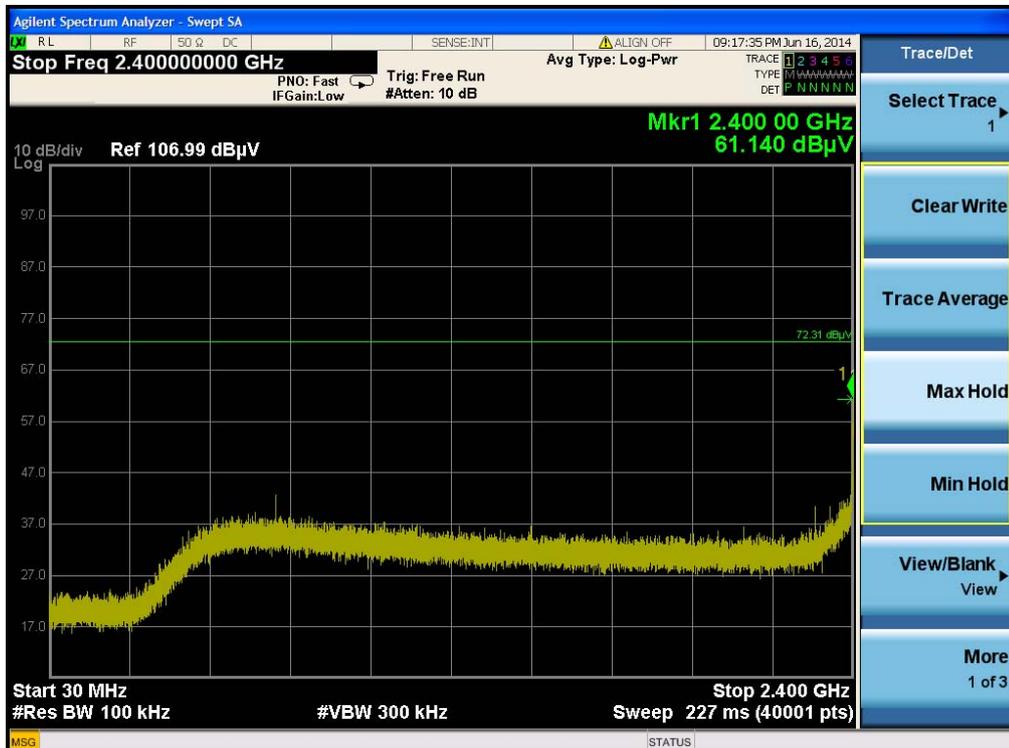
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

For Emission not in Restricted Band

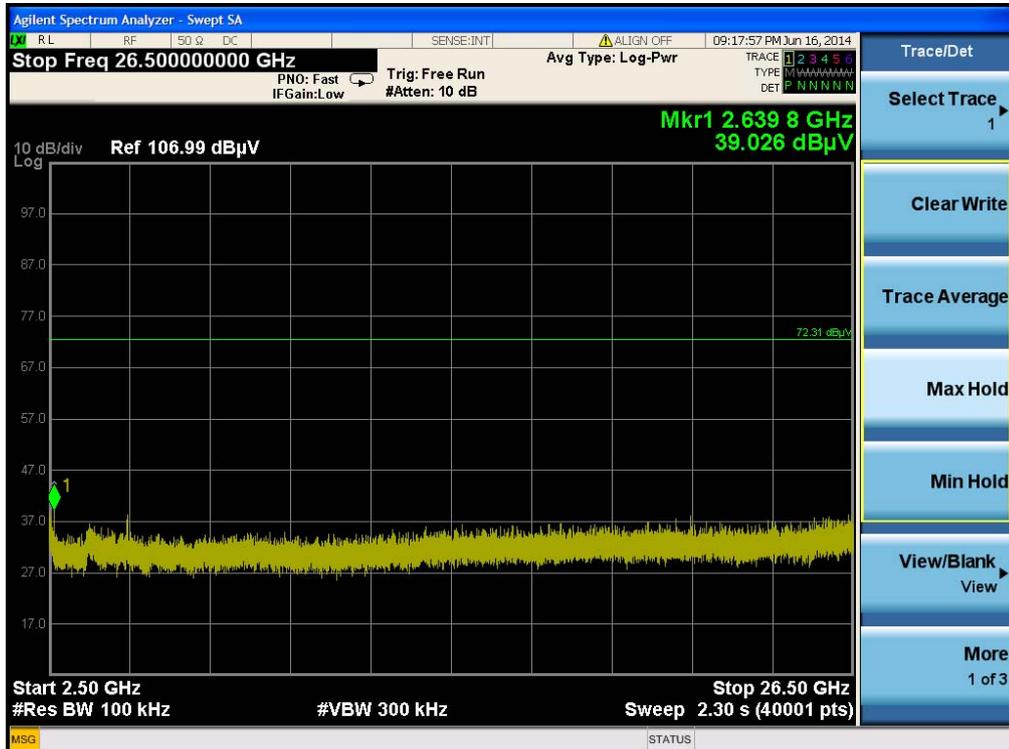
Plot on Configuration IEEE 802.11n MCS0 HT20 / Reference Level



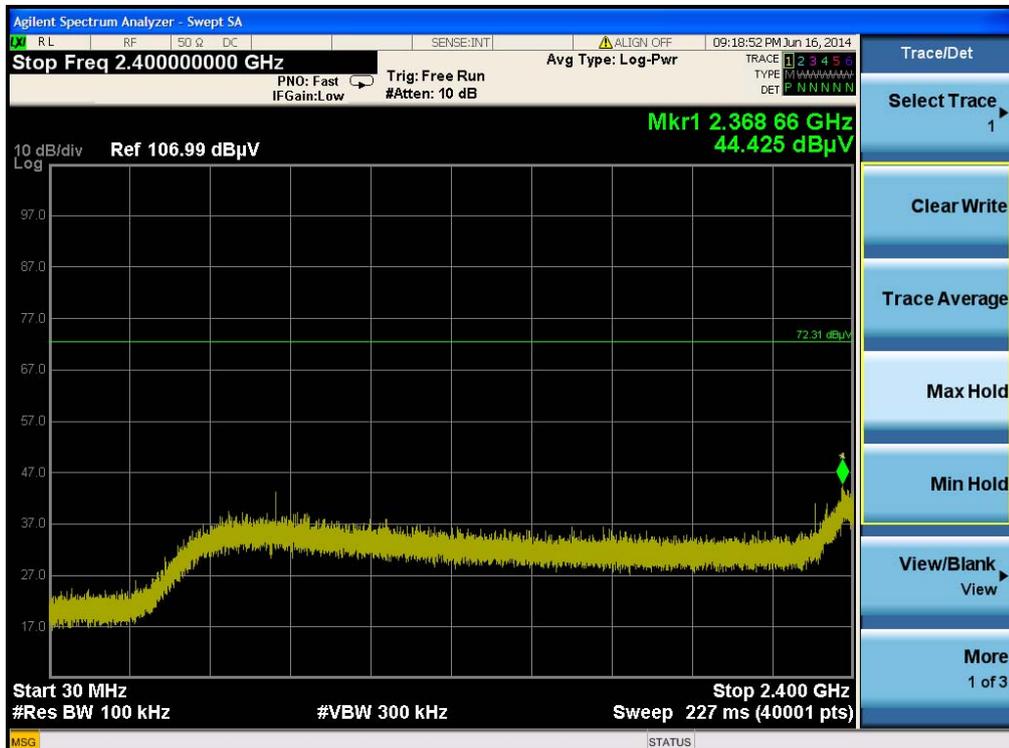
Plot on Configuration IEEE 802.11n MCS0 HT20 / CH 1 / 30MHz~2400MHz (down 30dBc)



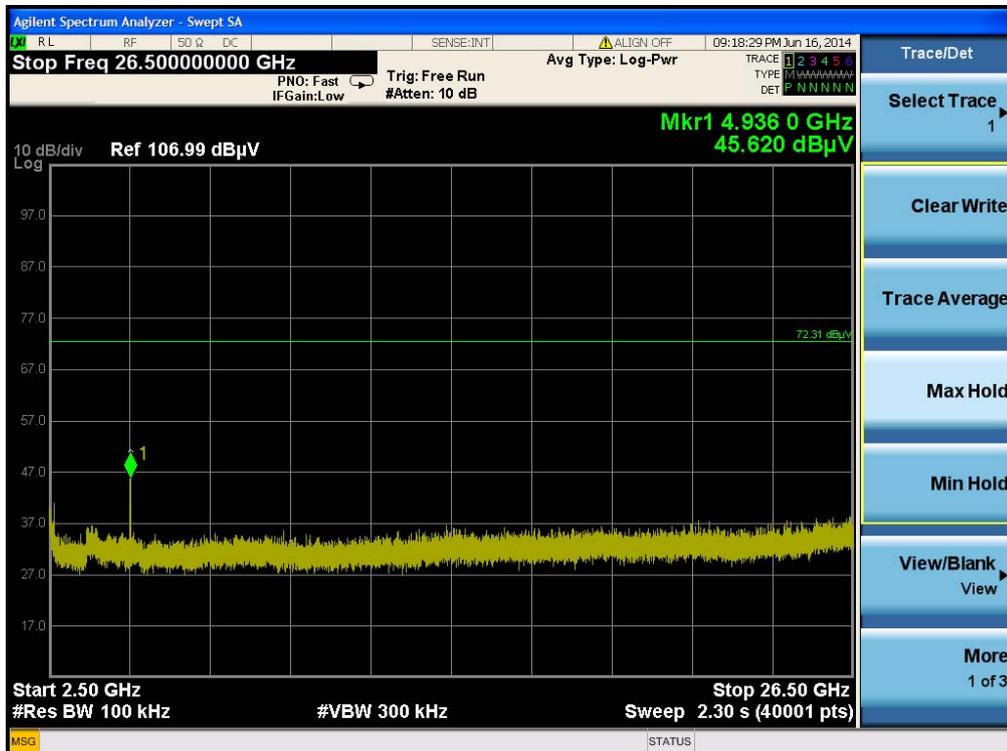
Plot on Configuration IEEE 802.11n MCS0 HT20 / CH 1 / 2500MHz~26500MHz (down 30dBc)



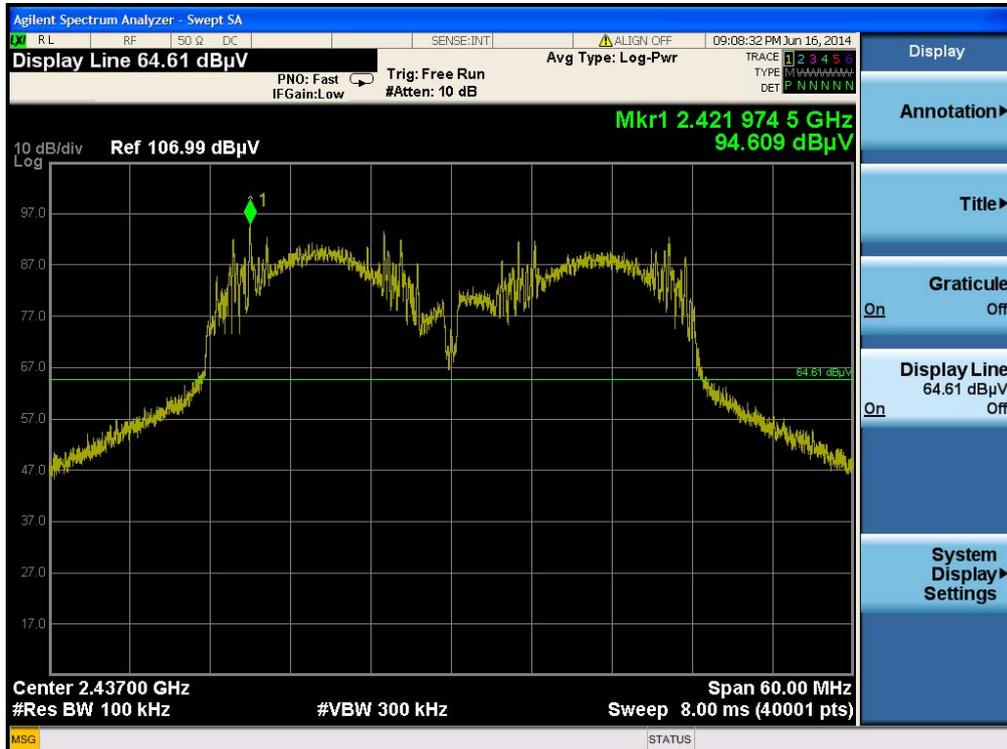
Plot on Configuration IEEE 802.11n MCS0 HT20 / CH 11 / 30MHz~2400MHz (down 30dBc)



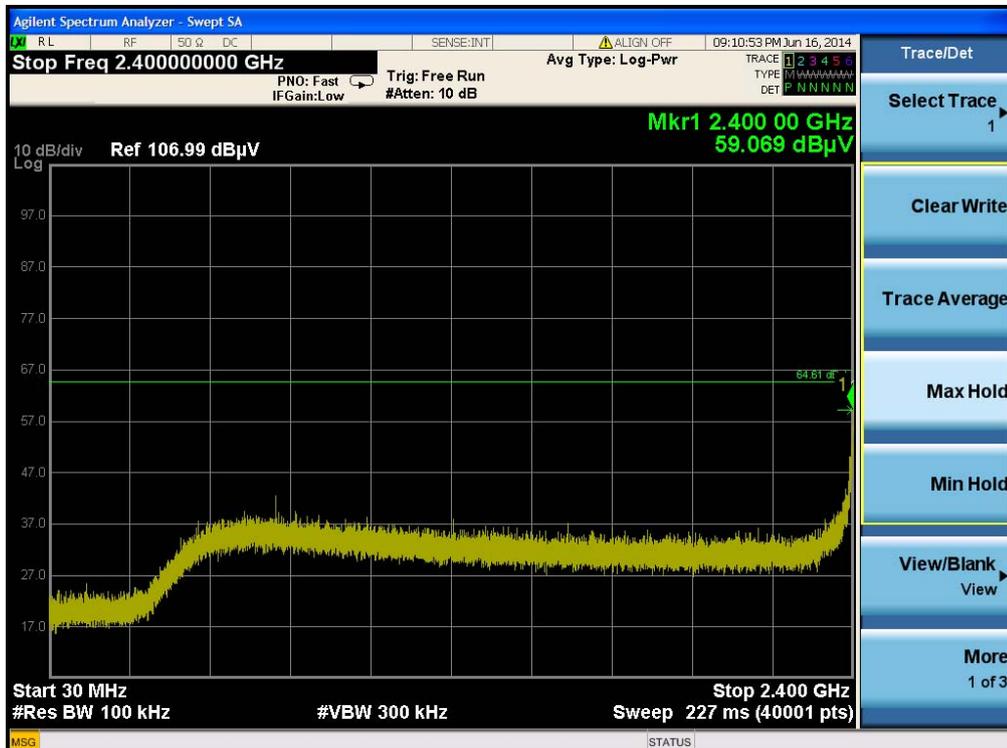
Plot on Configuration IEEE 802.11n MCS0 HT20 / CH 11 / 2500MHz~26500MHz (down 30dBc)



Plot on Configuration IEEE 802.11n MCS0 HT40 / Reference Level

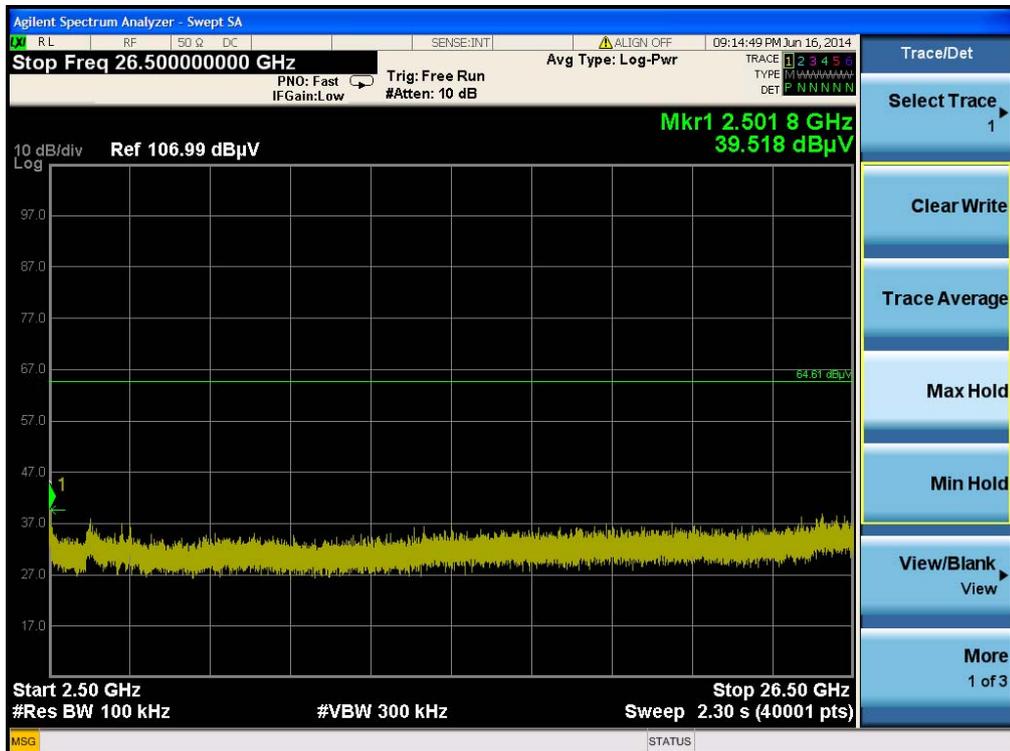


Plot on Configuration IEEE 802.11n MCS0 HT40 / CH 3 / 30MHz~2400MHz (down 30dBc)





Plot on Configuration IEEE 802.11n MCS0 HT40 / CH 9 / 2500MHz~26500MHz (down 30dBc)



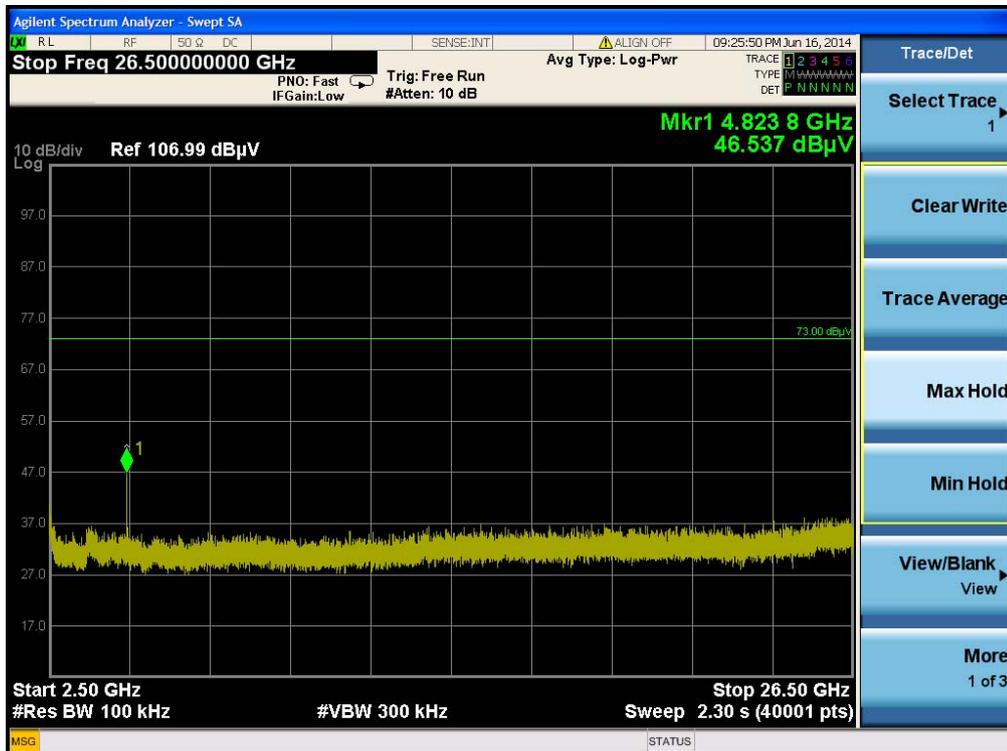
Plot on Configuration IEEE 802.11b / Reference Level



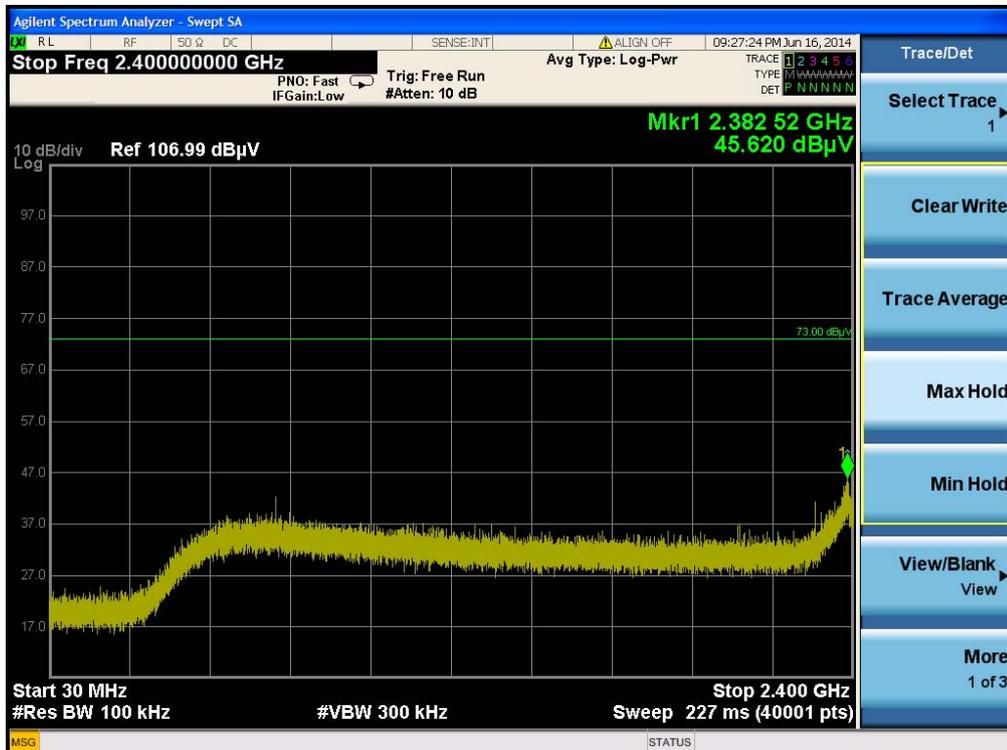
Plot on Configuration IEEE 802.11b / CH 1 / 30MHz~2400MHz (down 30dBc)



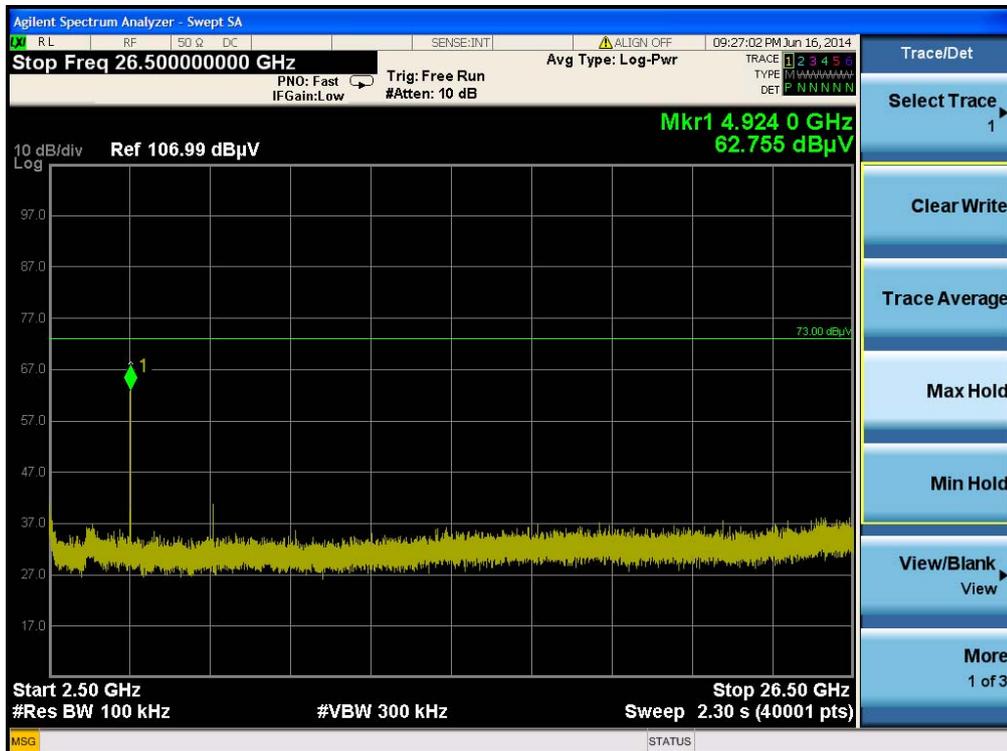
Plot on Configuration IEEE 802.11b / CH 1 / 2500MHz~26500MHz (down 30dBc)



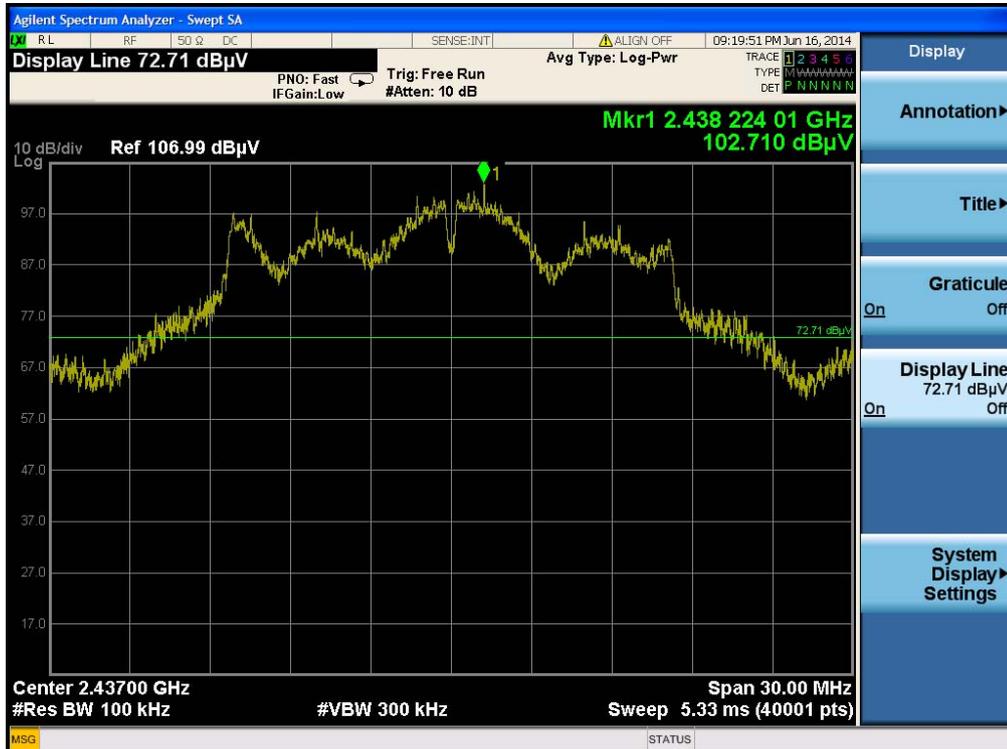
Plot on Configuration IEEE 802.11b / CH 11 / 30MHz~2400MHz (down 30dBc)



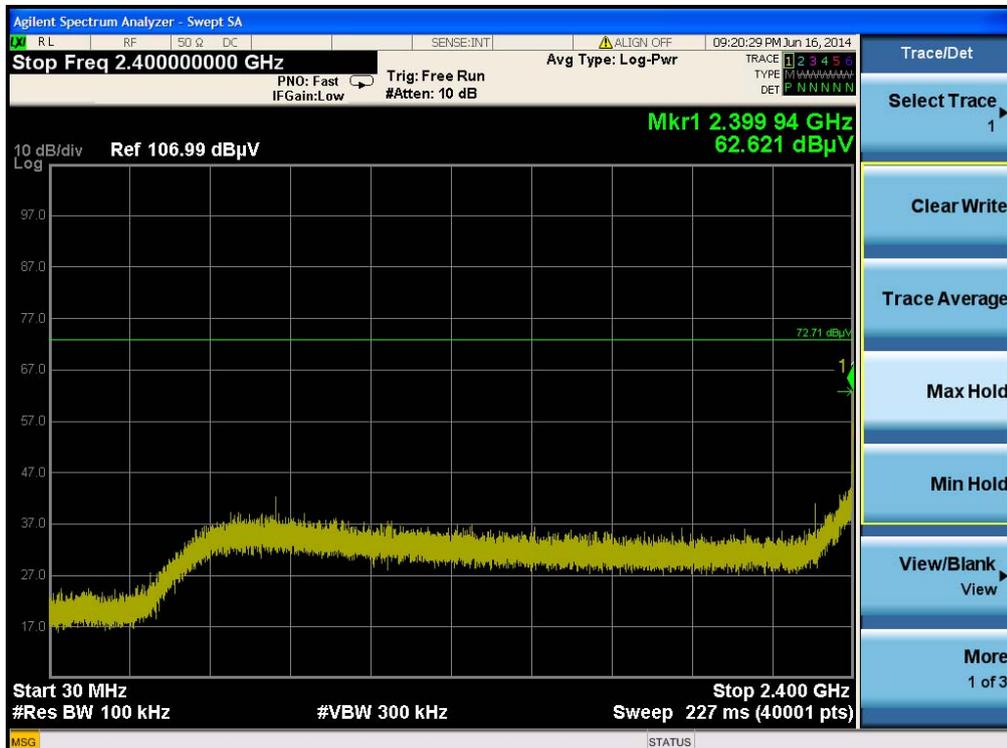
Plot on Configuration IEEE 802.11b / CH 11 / 2500MHz~26500MHz (down 30dBc)



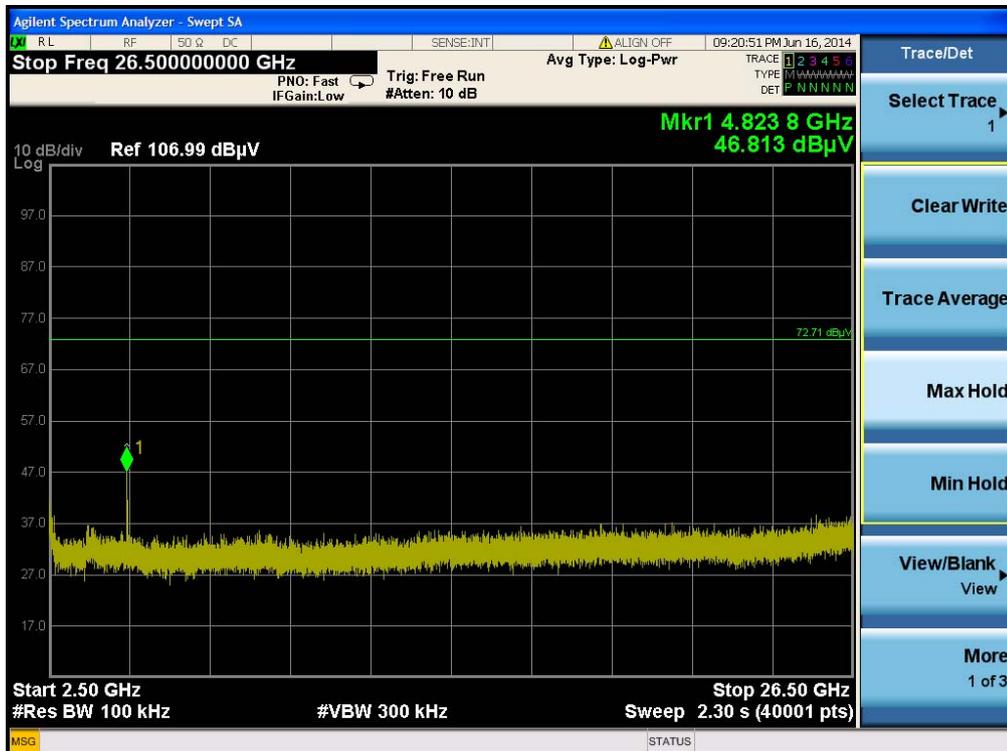
Plot on Configuration IEEE 802.11g / Reference Level



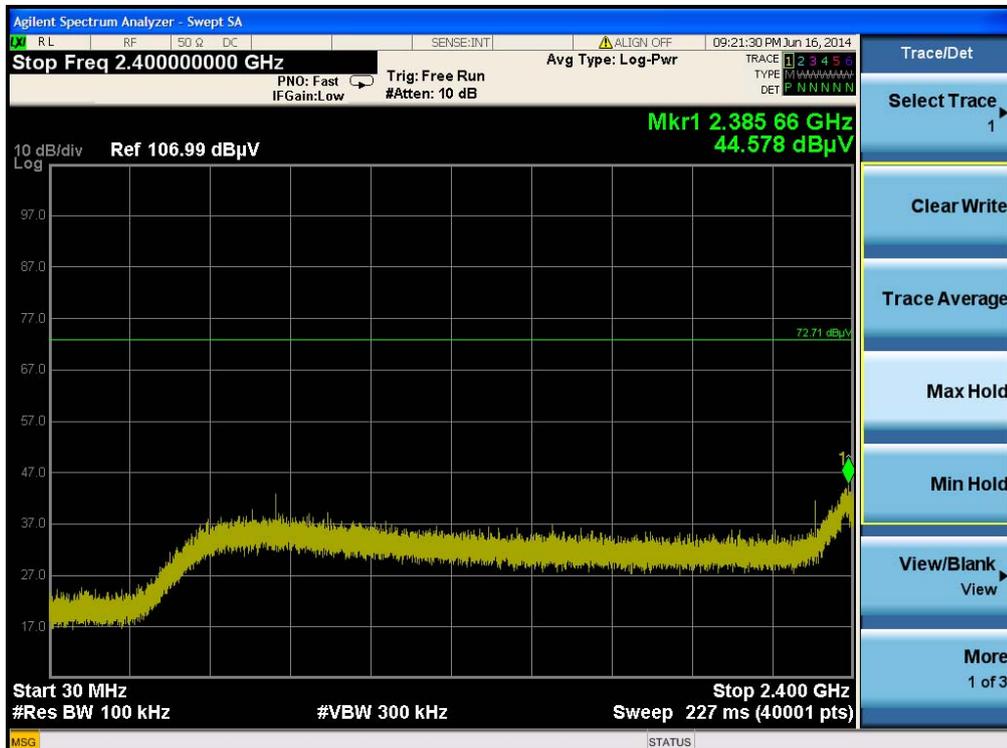
Plot on Configuration IEEE 802.11g / CH 1 / 30MHz~2400MHz (down 30dBc)



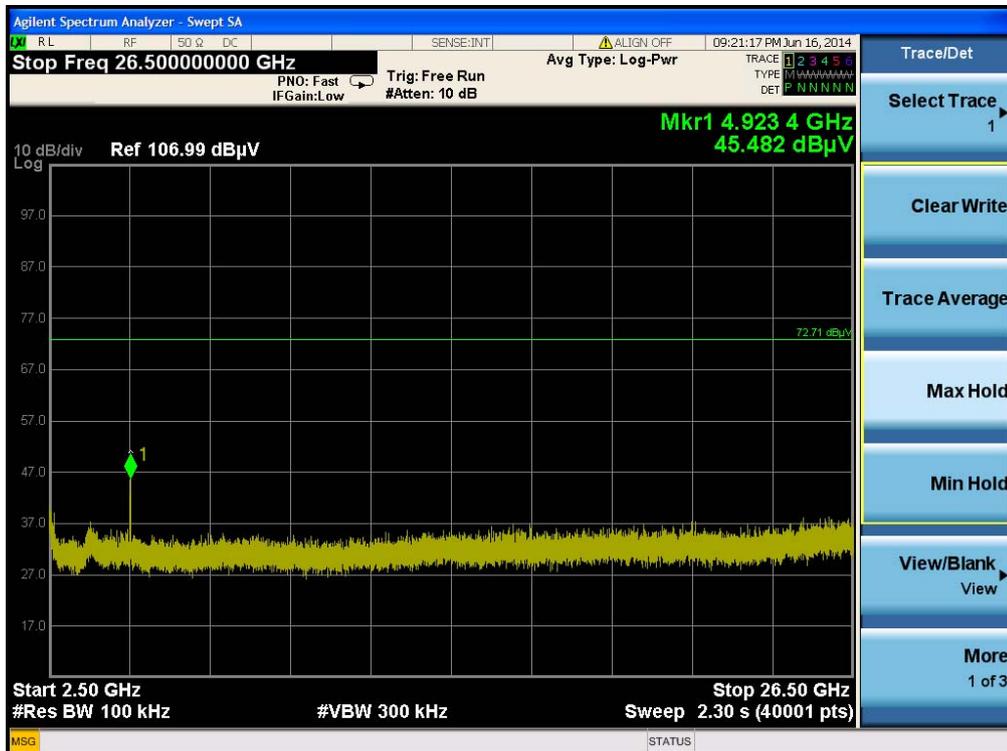
Plot on Configuration IEEE 802.11g / CH 1 / 2500MHz~26500MHz (down 30dBc)



Plot on Configuration IEEE 802.11g / CH 11 / 30MHz~2400MHz (down 30dBc)



Plot on Configuration IEEE 802.11g / CH 11 / 2500MHz~26500MHz (down 30dBc)



## 4.7. Antenna Requirements

### 4.7.1. Limit

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

### 4.7.2. Antenna Connector Construction

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

## 5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100355	9 kHz ~ 2.75 GHz	Apr. 23, 2014	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150 kHz ~ 100 MHz	Nov. 23, 2013	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 11, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150 kHz ~ 30 MHz	Dec. 04, 2013	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
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-1	N/A	1 GHz – 26.5 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 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)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%