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FCC RADIO TEST REPORT

Applicant's company	**Key ASIC Inc.**
Applicant Address	6F, No.9, Park Avenue II, Science Park, Hsin-Chu, 300 Taiwan
FCC ID	**2AEG2FCKD01U3200401**
Manufacturer's company	**Key ASIC Inc.**
Manufacturer Address	6F, No.9, Park Avenue II, Science Park, Hsin-Chu, 300 Taiwan

Product Name	Kdrive
Brand Name	KeyASIC
Model No.	KD01U32004-01
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Sep. 15, 2015
Final Test Date	Oct. 20, 2015
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 C63.10-2013**, **47 CFR FCC Part 15 Subpart C**, **KDB558074 D01 v03r03**.

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

Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR591601	Rev. 01	Initial issue of report	Oct. 30, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	Kdrive
Brand Name	:	KeyASIC
Model No.	:	KD01U32004-01
Applicant	:	Key ASIC Inc.
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Sep. 15, 2015 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Sam Chen

Sam Chen

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	17.50 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	20.41 dB
4.3	15.247(e)	Power Spectral Density	Complies	21.08 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	3.26 dB
4.6	15.247(d)	Band Edge Emissions	Complies	11.61 dB
4.7	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (1TX, 1RX)
Radio Type	Intentional Transceiver
Power Type	From battery or host system
Modulation	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n: see the below table
Data Modulation	IEEE 802.11b: DSSS (BPSK / QPSK / CCK) IEEE 802.11g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	IEEE 802.11b: DSSS (1/ 2/ 5.5/11) IEEE 802.11g: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n: see the below table
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11 for 20MHz bandwidth
Channel Band Width (99%)	IEEE 802.11b: 12.94 MHz IEEE 802.11g: 16.50 MHz IEEE 802.11n MCS0 (HT20): 17.54 MHz
Maximum Conducted Output Power	IEEE 802.11b: 9.59 dBm IEEE 802.11g: 9.56 dBm IEEE 802.11n MCS0 (HT20): 9.56 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Beamforming Function	☐ With beamforming	☒ Without beamforming

Antenna and Band width

Antenna	Single (TX)
Band width Mode	20 MHz
IEEE 802.11b	V
IEEE 802.11g	V
IEEE 802.11n	V

IEEE 11n Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	1	MCS 0-7
Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT supports HT20. Note 2: Modulation modes consist of below configuration: HT20: IEEE 802.11n		

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Ant.	Brand Holder	Part Number	Antenna Type	Connector	Gain (dBi)
1	Unictron Technologies Corporation	H2U34WGTQW0100	Chip Antenna	N/A	2.5

Note: Only Ant.1 can be used as transmitting/receiving antenna.

3.4. Table for Carrier Frequencies

There is one bandwidth system.

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

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	Ant.
AC Power Line Conducted Emissions	Normal Link	-	-	-
Maximum Conducted Output Power	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
	11n HT20	MCS0	1/6/11	1
Power Spectral Density	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
	11n HT20	MCS0	1/6/11	1
6dB Spectrum Bandwidth	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
	11n HT20	MCS0	1/6/11	1
Radiated Emissions 9kHz~1GHz	Normal Link	-	-	-
Radiated Emissions 1GHz~10th Harmonic	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
	11n HT20	MCS0	1/6/11	1
Band Edge Emissions	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
	11n HT20	MCS0	1/6/11	1

Note: The EUT supports 20MHz only.

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. Storage function with USB cable link to NB (power by host system)

For Radiated Emission test<Below 1GHz>:

Mode 1. EUT X axis + AP function with storage function + power by battery

Mode 2. EUT Y axis + AP function with storage function + power by battery

Mode 3. EUT Z axis + AP function with storage function + power by battery

Mode 3 has been evaluated to be the worst case among Mode 1~3, thus measurement for Mode 4 will follow this same test mode.

Mode 4. EUT Z axis + storage function with USB cable link to NB (power by host system)

Mode 4 is the worst case, so it was selected to record in this test report.

For Radiated Emission test<Above 1GHz>:

The EUT for Radiated emission test was performed at X axis, Y axis and Z axis position and the worst case was found from Y axis. So the measurement will follow this same test configuration.

Mode 1. EUT Y axis

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 Multiple Listing

The difference for each EUT is shown as below:

Brand Name	Brand Name	Model Name	Color
EUT 1	KeyASIC	KD01U32004-01	Pink
EUT 2			Yellow

Note: The difference between EUT 1 and EUT 2 is only color, there is only EUT 1 tested and recorded in this report.

3.8. Table for Supporting Units

For Test Site No: 03CH01-CB (Above 1GHz) and TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC
Fixture	Keyasic	Keyasic RF01	N/A

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

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC
SD Card	Apacer	SD Card	N/A
Mouse	HP	FM100	DoC
Earphone	SHYARO CHI	MIC-04	N/A

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC
Earphone	e-Power	S90W	N/A
Mouse	Logitech	M-U0026	DoC
SD Card	KingSton	C08G TA/WAN	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.

Test Software Version	Hyper Terminal		
Mode	Test Frequency (MHz)		
	NCB: 20MHz		
	2412 MHz	2437 MHz	2462 MHz
802.11b	34	32	32
802.11g	32	30	30
802.11n MCS0 HT20	33	30	30

3.10. EUT Operation during Test

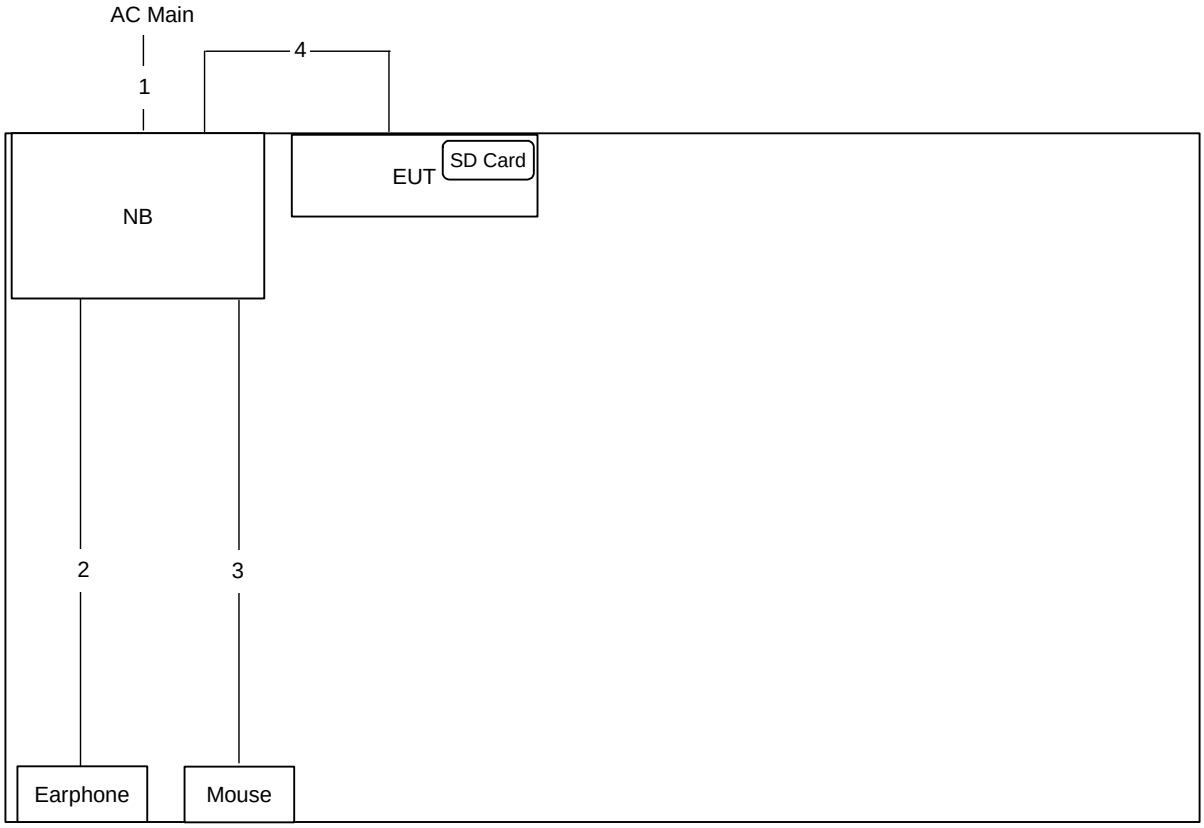
The EUT was programmed to be in continuously transmitting mode.

3.11. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11b	1.000	1.000	100.00%	0.00	0.01
802.11g	2.070	2.090	99.04%	0.04	0.01
802.11n MCS0 HT20	1.915	1.945	98.46%	0.07	0.01

3.12. Test Configurations

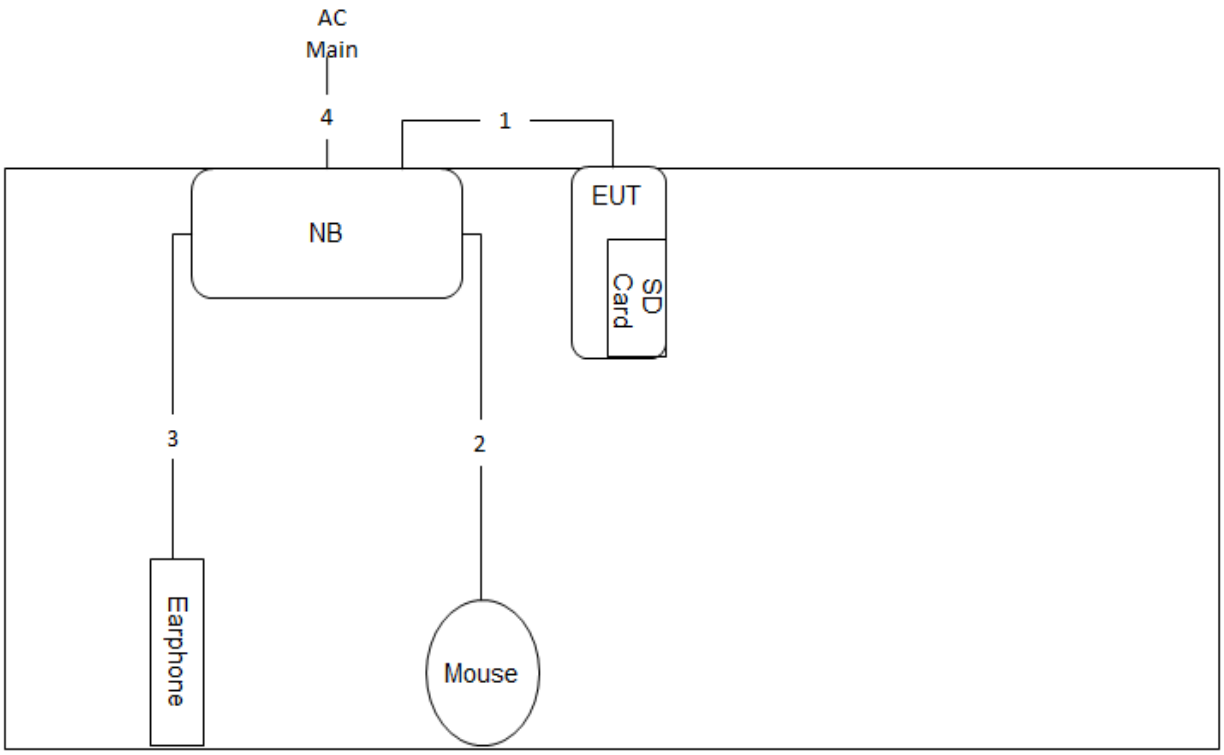
3.12.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length (m)
1	Power cable	No	2.6
2	Audio cable	No	1.4
3	USB cable	Yes	1.8
4	USB to Micro cable	Yes	0.3

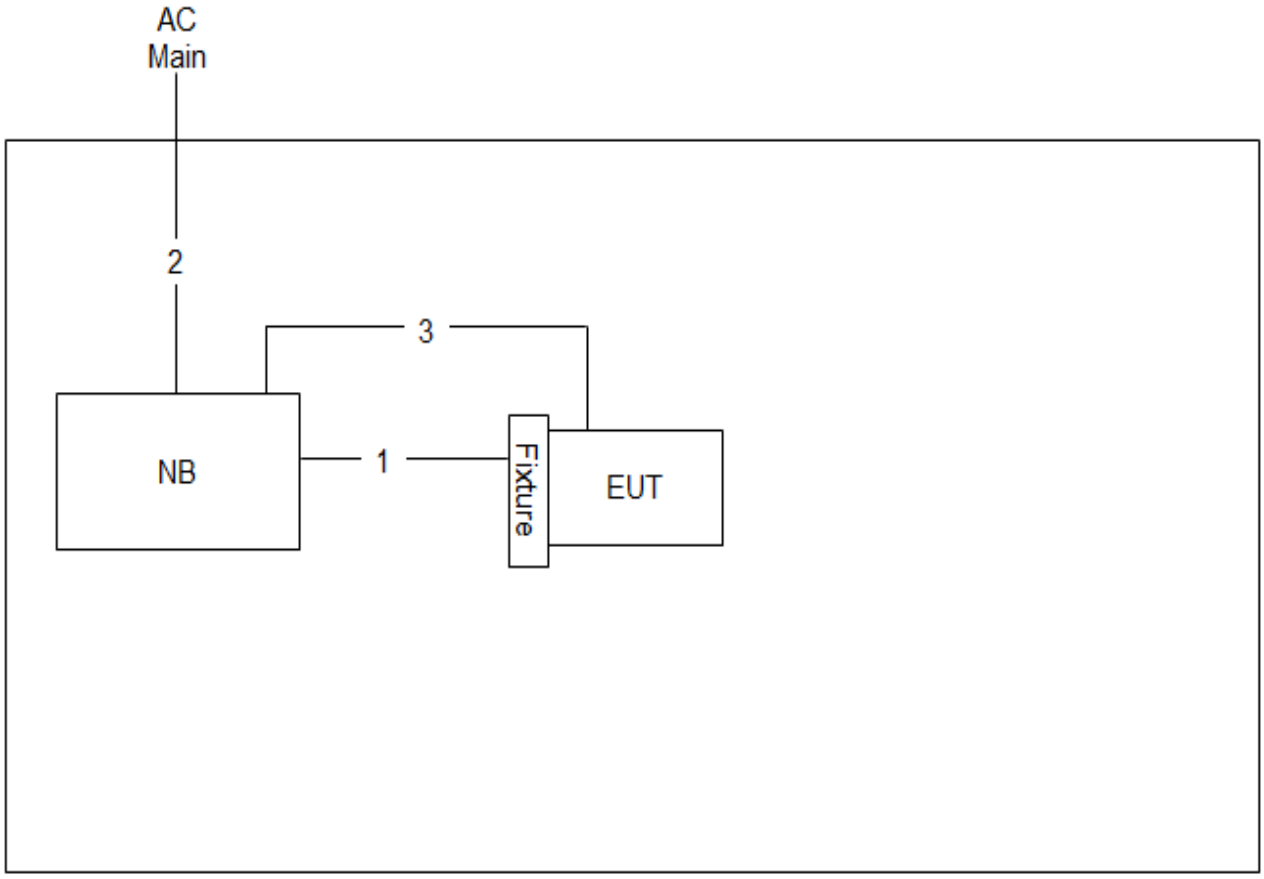
3.12.2. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz



Item	Connection	Shielded	Length (m)
1	USB cable	Yes	0.3
2	USB cable	Yes	1.8
3	Audio cable	No	1.4
4	Power cable	No	2.6

Test Configuration: above 1GHz



Item	Connection	Shielded	Length (m)
1	USB cable	Yes	1.8
2	Power cable	No	2.6
3	USB cable	Yes	0.3

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

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

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

4.1.2. Measuring Instruments and Setting

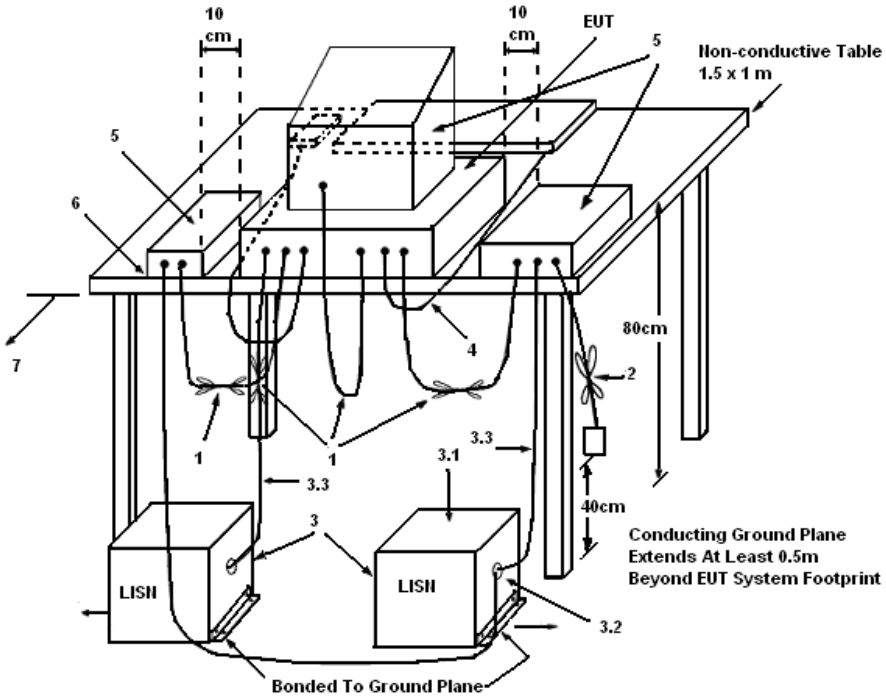
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

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

4.1.4. Test Setup Layout



LEGEND:

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

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

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

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

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

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

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

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

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

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

4.1.5. Test Deviation

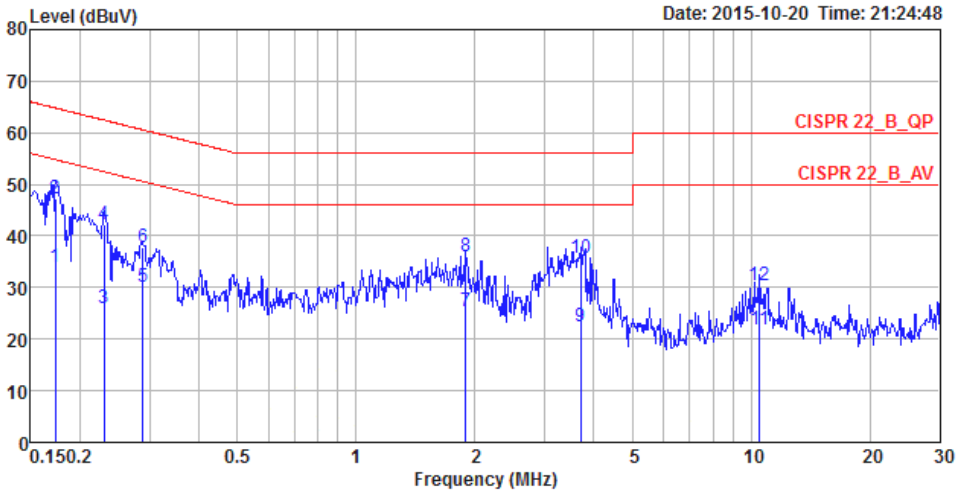
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

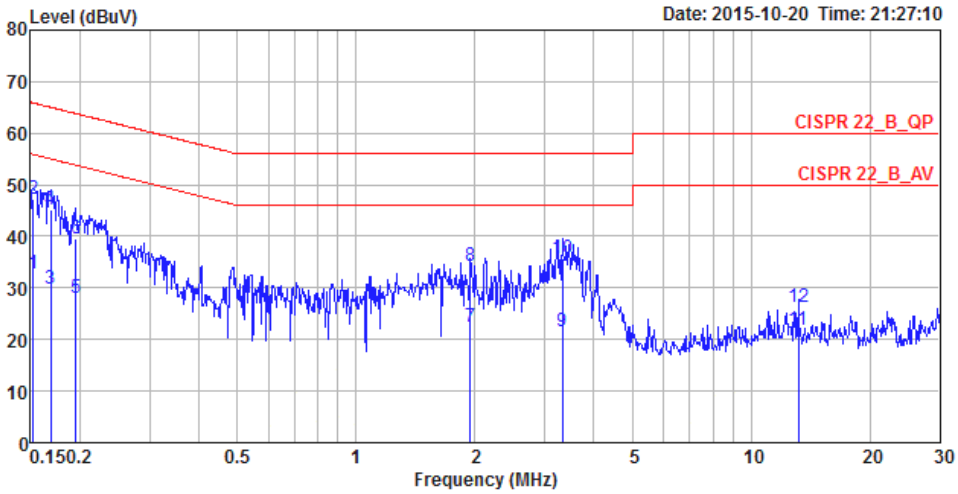
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23°C	Humidity	60%
Test Engineer	Deven Huang	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1731	33.97	-20.84	54.81	24.02	9.93	0.02	LINE	Average
2	0.1731	47.31	-17.50	64.81	37.36	9.93	0.02	LINE	QP
3	0.2304	25.92	-26.52	52.44	15.96	9.93	0.03	LINE	Average
4	0.2304	42.10	-20.34	62.44	32.14	9.93	0.03	LINE	QP
5	0.2878	30.23	-20.36	50.59	20.26	9.93	0.04	LINE	Average
6	0.2878	37.79	-22.80	60.59	27.82	9.93	0.04	LINE	QP
7	1.8979	25.50	-20.50	46.00	15.45	9.99	0.06	LINE	Average
8	1.8979	36.09	-19.91	56.00	26.04	9.99	0.06	LINE	QP
9	3.7001	22.53	-23.47	46.00	12.45	10.02	0.06	LINE	Average
10	3.7001	35.78	-20.22	56.00	25.70	10.02	0.06	LINE	QP
11	10.5079	21.89	-28.11	50.00	11.45	10.20	0.24	LINE	Average
12	10.5079	30.54	-29.46	60.00	20.10	10.20	0.24	LINE	QP

Temperature	23°C	Humidity	60%
Test Engineer	Deven Huang	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1524	32.88	-22.99	55.87	23.08	9.78	0.02	NEUTRAL	Average
2	0.1524	47.20	-18.67	65.87	37.40	9.78	0.02	NEUTRAL	QP
3	0.1685	29.88	-25.15	55.03	20.08	9.78	0.02	NEUTRAL	Average
4	0.1685	45.26	-19.77	65.03	35.46	9.78	0.02	NEUTRAL	QP
5	0.1955	27.95	-25.85	53.80	18.14	9.79	0.02	NEUTRAL	Average
6	0.1955	39.61	-24.19	63.80	29.80	9.79	0.02	NEUTRAL	QP
7	1.9489	22.35	-23.65	46.00	12.45	9.84	0.06	NEUTRAL	Average
8	1.9489	34.14	-21.86	56.00	24.24	9.84	0.06	NEUTRAL	QP
9	3.3281	21.49	-24.51	46.00	11.57	9.86	0.06	NEUTRAL	Average
10	3.3281	35.76	-20.24	56.00	25.84	9.86	0.06	NEUTRAL	QP
11	13.1966	21.90	-28.10	50.00	11.57	10.08	0.25	NEUTRAL	Average
12	13.1966	26.31	-33.69	60.00	15.98	10.08	0.25	NEUTRAL	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

The limit for output power is 30dBm.

4.2.2. Measuring Instruments and Setting

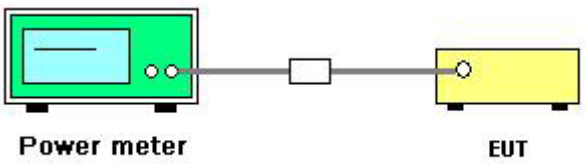
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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 KDB558074 D01 v03r03 section 9.2.3.2 Measurement using a power meter (PM).
2. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Maximum Conducted Output Power

Temperature	25°C	Humidity	51%
Test Engineer	Kenneth Huang	Test Date	Oct. 12, 2015

Mode	Frequency	Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
802.11b	2412 MHz	9.59	30.00	Complies
	2437 MHz	9.56	30.00	Complies
	2462 MHz	9.55	30.00	Complies
802.11g	2412 MHz	9.56	30.00	Complies
	2437 MHz	9.51	30.00	Complies
	2462 MHz	9.56	30.00	Complies
802.11n MCS0 HT20	2412 MHz	9.41	30.00	Complies
	2437 MHz	9.51	30.00	Complies
	2462 MHz	9.56	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

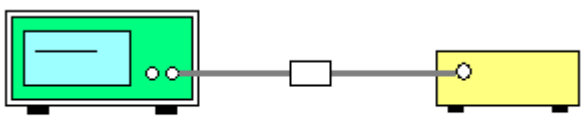
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.3.3. Test Procedures

1. Test was performed in accordance with KDB558074 D01 v03r03 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 10.2 Method PKPSD (peak PSD).
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW (use of a greater number of measurement points than this minimum requirement is recommended).
4. Use the peak marker function to determine the maximum level in any 3 kHz band segment within the fundamental EBW.
5. The resulting PSD level must be ≤ 8 dBm.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Power Spectral Density

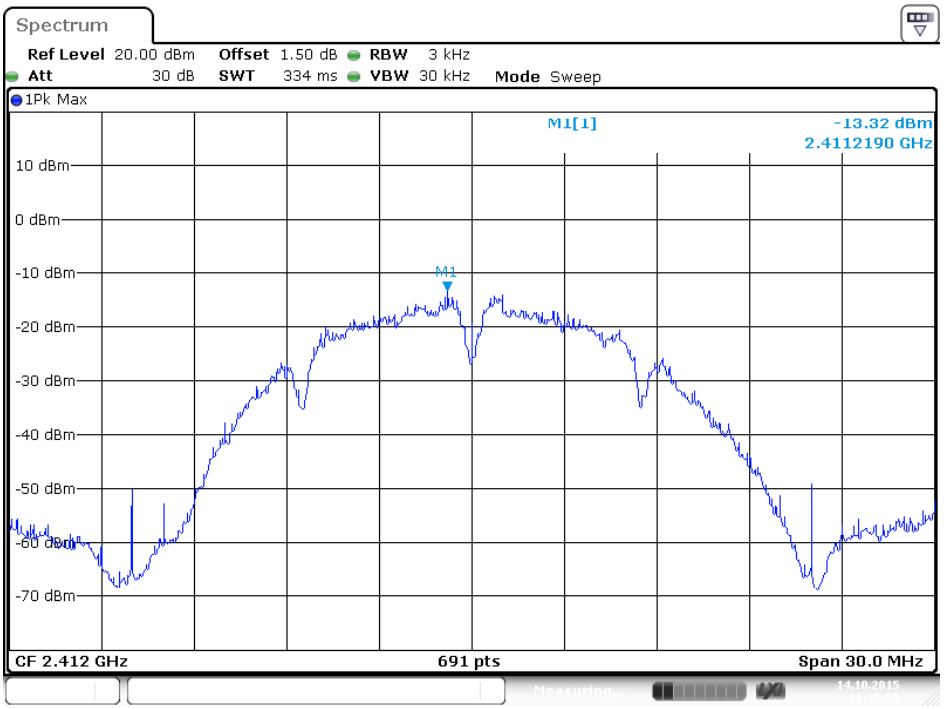
Temperature	25°C	Humidity	51%
Test Engineer	Kenneth Huang		

Mode	Frequency	Total Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
802.11b	2412 MHz	-13.32	8.00	Complies
	2437 MHz	-13.93	8.00	Complies
	2462 MHz	-13.59	8.00	Complies
802.11g	2412 MHz	-16.25	8.00	Complies
	2437 MHz	-16.41	8.00	Complies
	2462 MHz	-15.44	8.00	Complies
802.11n MCS0 HT20	2412 MHz	-16.01	8.00	Complies
	2437 MHz	-15.40	8.00	Complies
	2462 MHz	-13.08	8.00	Complies

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

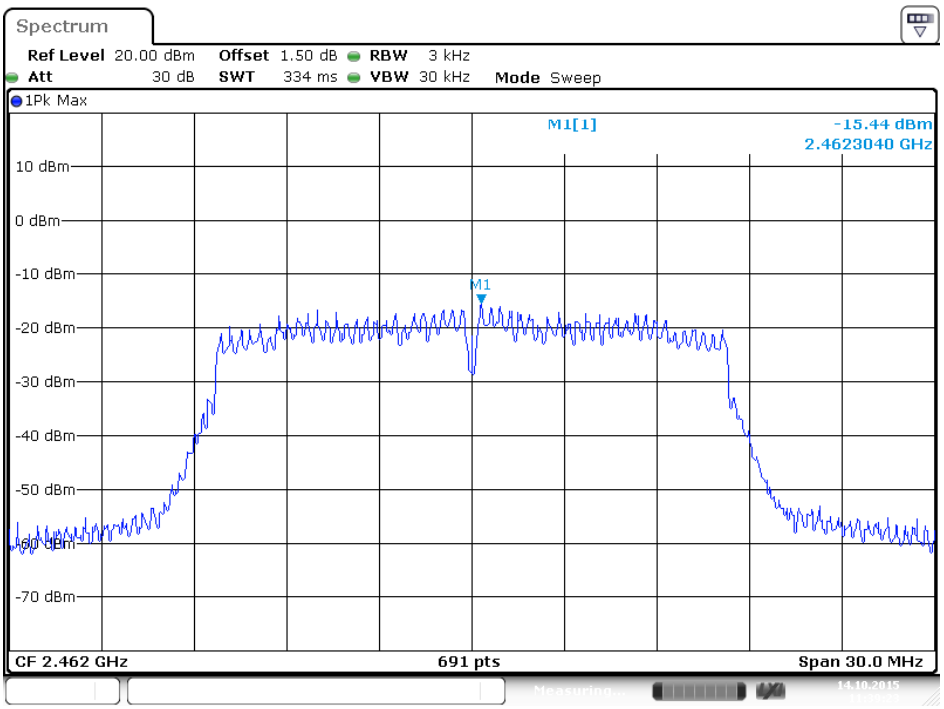
For plots, only the channel with worse result was shown.

Power Density Plot on Configuration IEEE 802.11b / 2412 MHz / Ant. 1



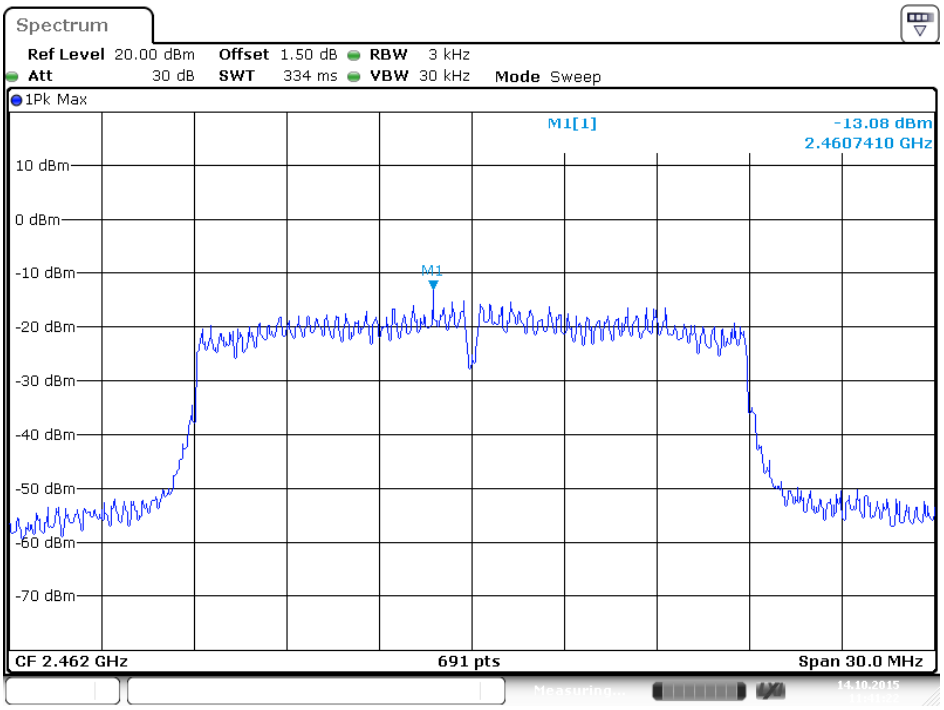
Date: 14.OCT.2015 11:35:55

Power Density Plot on Configuration IEEE 802.11g / 2462 MHz / Ant. 1



Date: 14.OCT.2015 11:39:23

Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / 2462 MHz / Ant. 1



Date: 14.OCT.2015 11:41:22

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.

6dB Spectrum Bandwidth	
Spectrum Parameters	**Setting**
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RBW	100kHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto
99% Occupied Bandwidth	
Spectrum Parameters	**Setting**
Span	1.5 times to 5.0 times the OBW
RBW	1 % to 5 % of the OBW
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold

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 KDB558074 D01 v03r03 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 8.0 DTS bandwidth=> 8.1 Option 1.
3. 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

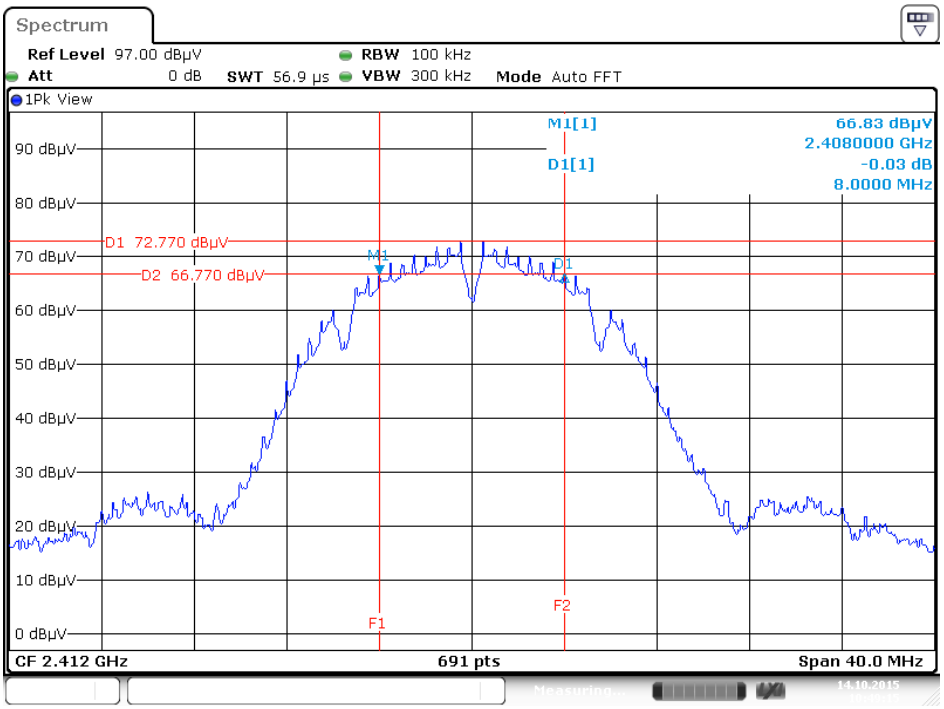
Temperature	25℃	Humidity	51%
Test Engineer	Kenneth Huang		

Mode	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11b	2412 MHz	8.00	12.94	500	Complies
	2437 MHz	9.04	12.76	500	Complies
	2462 MHz	8.12	12.76	500	Complies
802.11g	2412 MHz	16.35	16.41	500	Complies
	2437 MHz	13.80	16.50	500	Complies
	2462 MHz	15.88	16.50	500	Complies
802.11n MCS0 HT20	2412 MHz	16.06	17.54	500	Complies
	2437 MHz	15.94	17.45	500	Complies
	2462 MHz	17.57	17.45	500	Complies

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

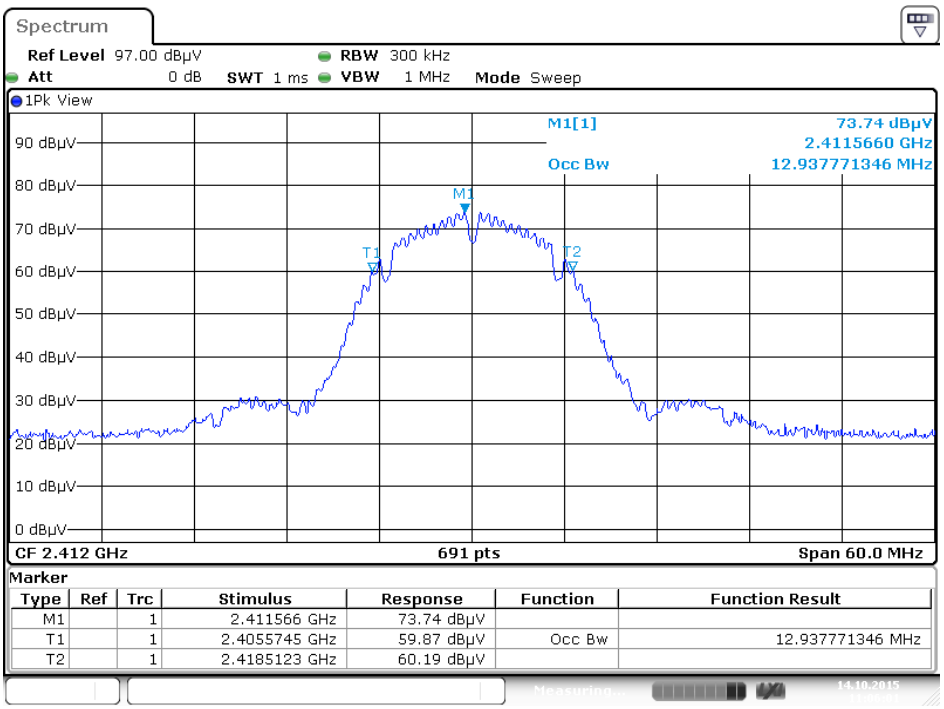
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2412 MHz / Ant. 1



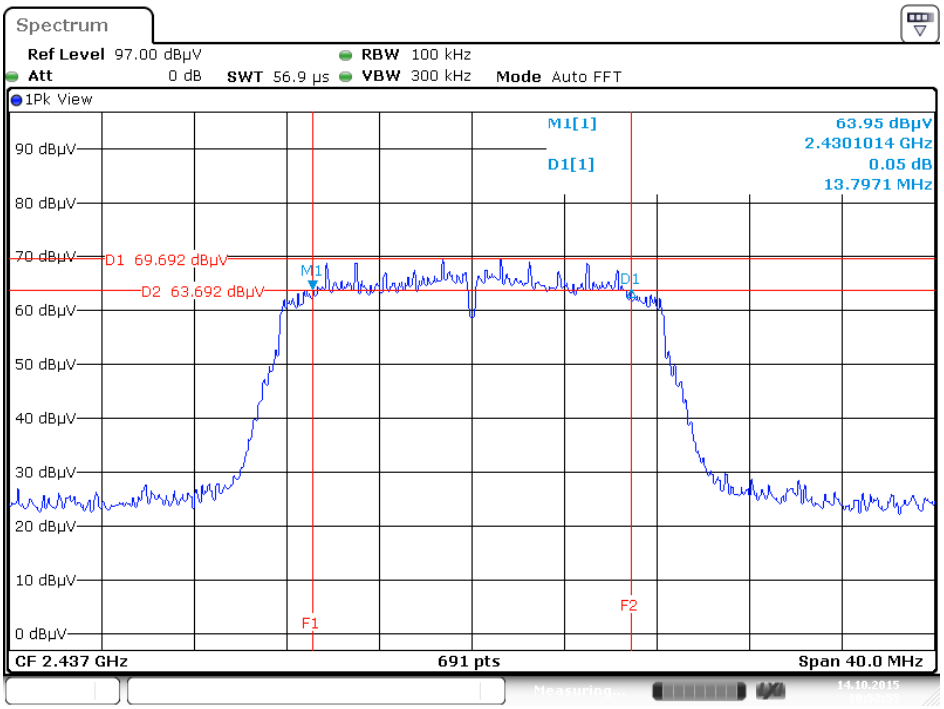
Date: 14.OCT.2015 10:49:15

99% Occupied Bandwidth Plot on Configuration IEEE 802.11b / 2412 MHz / Ant. 1



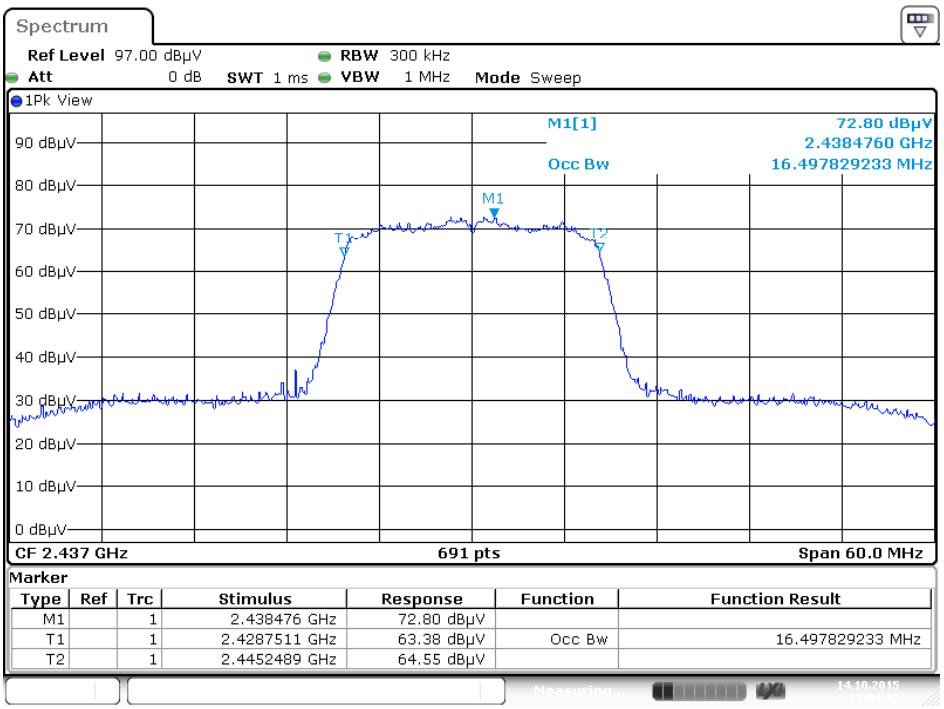
Date: 14.OCT.2015 11:06:01

6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz / Ant. 1



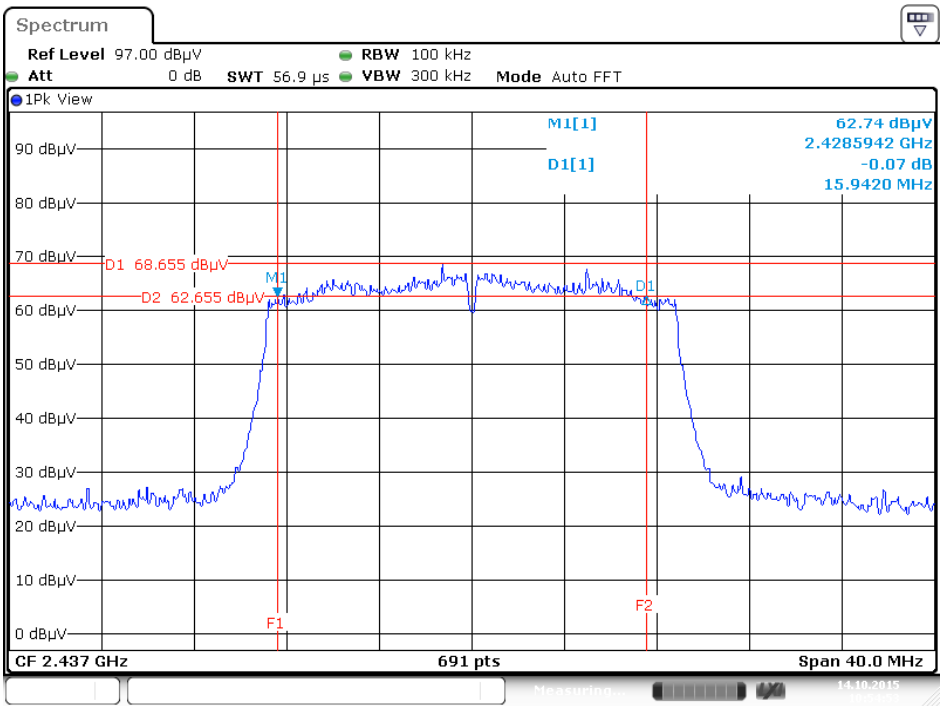
Date: 14.OCT.2015 10:52:56

99% Occupied Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz / Ant. 1



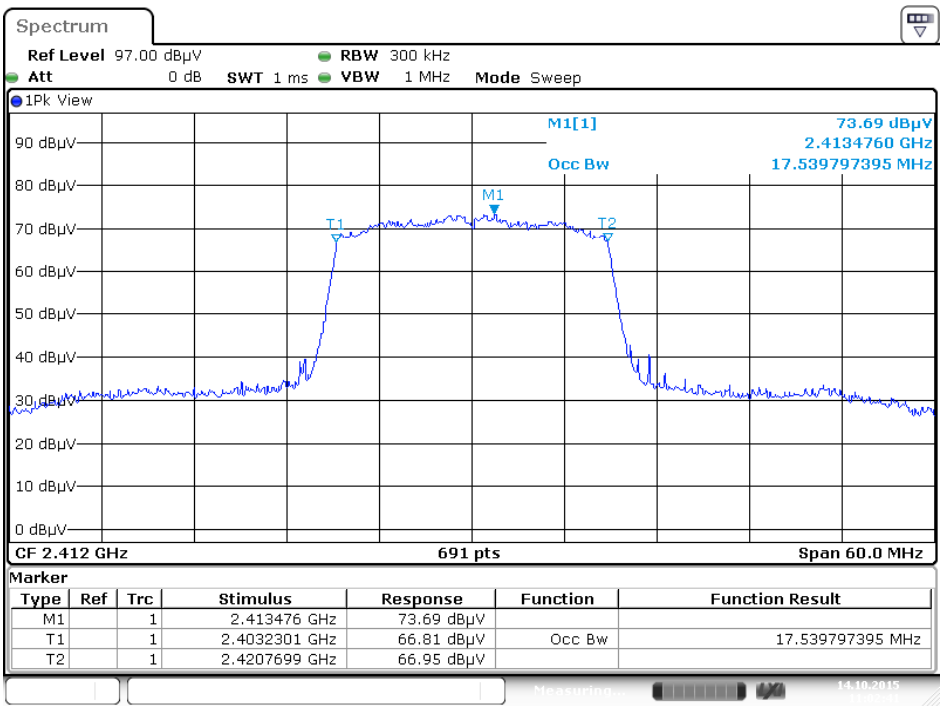
Date: 14.OCT.2015 11:04:33

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Ant. 1



Date: 14.OCT.2015 10:54:54

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / 2412 MHz / Ant. 1



Date: 14.OCT.2015 11:02:41

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, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	100kHz / 300kHz for peak

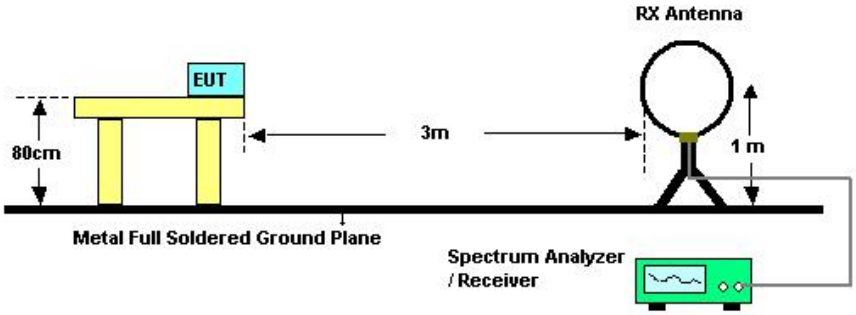
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.5.3. Test Procedures

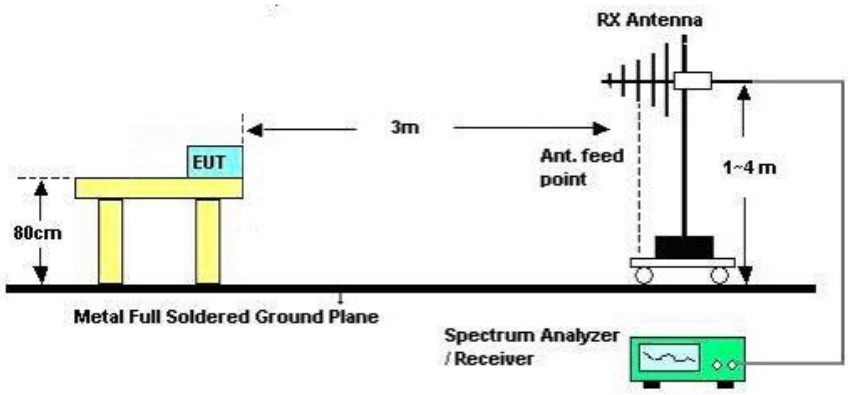
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting 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 1/T 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

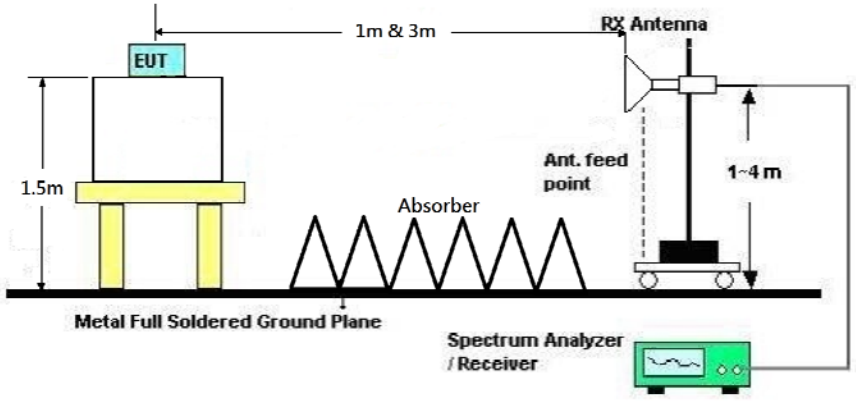
For Radiated Emissions: 9kHz ~30MHz



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	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	Normal Link / Mode 4
Test Date	Sep. 15, 2015		

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

Note:

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

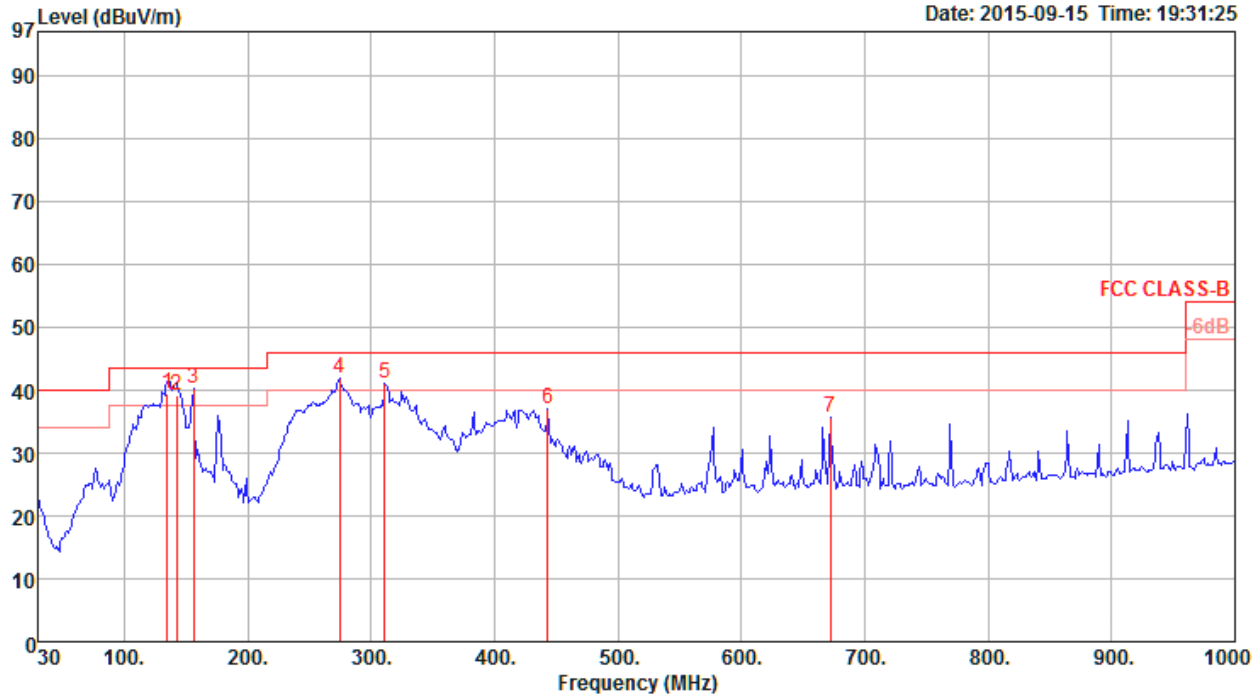
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

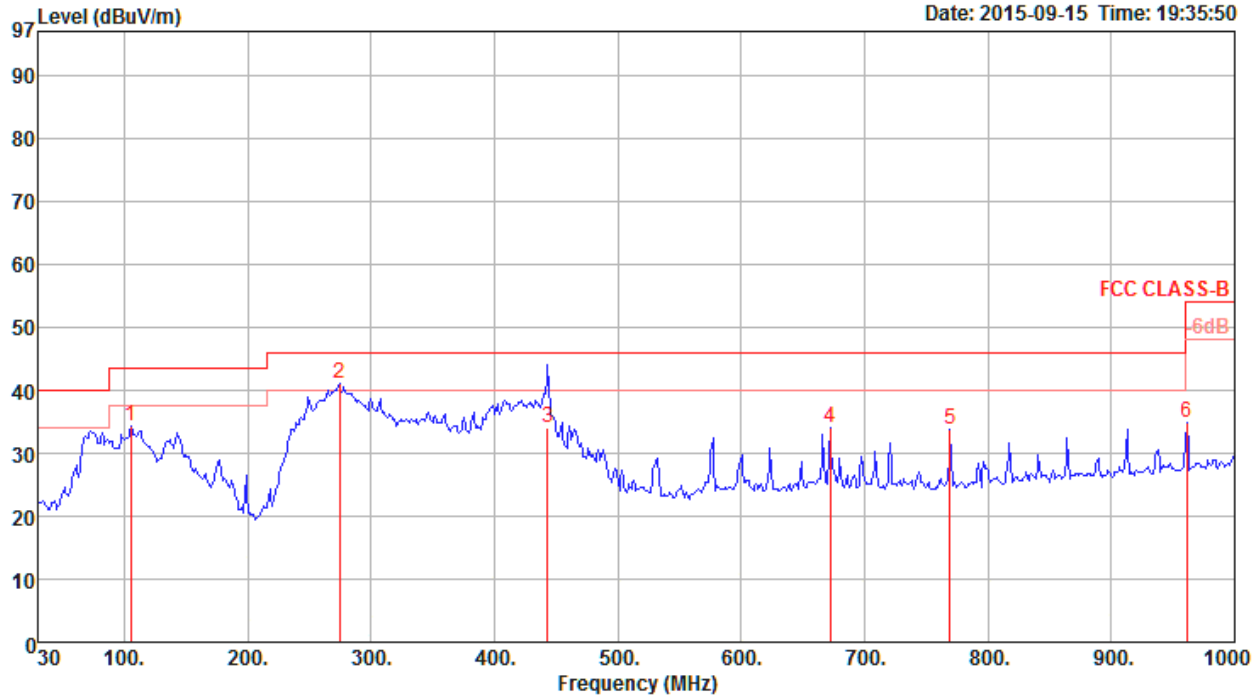
Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	Normal Link / Mode 4

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	134.76	39.51	43.50	-3.99	55.18	1.00	12.45	29.12	200	185	QP	HORIZONTAL
2	142.52	39.11	43.50	-4.39	55.33	1.01	11.85	29.08	180	187	QP	HORIZONTAL
3	156.10	40.24	43.50	-3.26	57.30	1.06	10.90	29.02	360	400	Peak	HORIZONTAL
4	274.44	41.89	46.00	-4.11	55.54	1.36	13.45	28.46	360	400	Peak	HORIZONTAL
5	311.30	41.03	46.00	-4.97	53.79	1.43	14.22	28.41	360	400	Peak	HORIZONTAL
6	443.22	36.93	46.00	-9.07	47.38	1.72	17.03	29.20	360	400	Peak	HORIZONTAL
7	672.14	35.58	46.00	-10.42	42.61	2.08	19.87	28.98	360	400	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	105.66	34.36	43.50	-9.14	50.63	0.89	12.08	29.24	0	100	Peak	VERTICAL
2	274.44	41.00	46.00	-5.00	54.65	1.36	13.45	28.46	0	100	Peak	VERTICAL
3	443.22	34.06	46.00	-11.94	44.51	1.72	17.03	29.20	183	102	QP	VERTICAL
4	672.14	34.16	46.00	-11.84	41.19	2.08	19.87	28.98	0	100	Peak	VERTICAL
5	769.14	33.79	46.00	-12.21	39.96	2.24	20.29	28.70	0	100	Peak	VERTICAL
6	961.20	34.74	54.00	-19.26	37.66	2.47	22.14	27.53	0	100	Peak	VERTICAL

Note:

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

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

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

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

Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11b CH 1 / Ant. 1
Test Date	Oct. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4822.39	37.12	54.00	-16.88	30.44	6.18	34.23	33.73	100	276	Average	HORIZONTAL
2	4823.88	51.13	74.00	-22.87	44.45	6.18	34.23	33.73	100	276	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4821.19	48.00	74.00	-26.00	41.32	6.18	34.23	33.73	100	9	Peak	VERTICAL
2	4825.95	37.25	54.00	-16.75	30.56	6.19	34.23	33.73	100	9	Average	VERTICAL

Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11b CH 6 / Ant. 1
Test Date	Oct. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4850.36	47.38	74.00	-26.62	40.65	6.20	34.24	33.71	100	53	Peak	HORIZONTAL
2	4852.82	36.51	54.00	-17.49	29.78	6.20	34.24	33.71	100	53	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Limit	Level	Loss	Factor	Factor	/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4844.21	36.74	54.00	-17.26	30.02	6.20	34.24	33.72	100	107	Average	VERTICAL
2	4850.33	47.96	74.00	-26.04	41.23	6.20	34.24	33.71	100	107	Peak	VERTICAL

Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11b CH 11 / Ant. 1
Test Date	Oct. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4871.70	37.42	54.00	-16.58	30.66	6.22	34.25	33.71	100	207	Average	HORIZONTAL
2	4878.52	49.42	74.00	-24.58	42.65	6.22	34.25	33.70	104	207	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4873.20	47.76	74.00	-26.24	41.00	6.22	34.25	33.71	173	317	Peak	VERTICAL
2	4875.69	37.13	54.00	-16.87	30.37	6.22	34.25	33.71	173	317	Average	VERTICAL

Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11g CH 1 / Ant. 1
Test Date	Oct. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4824.49	47.53	74.00	-26.47	40.85	6.18	34.23	33.73	142	295	Peak	HORIZONTAL
2	4825.77	37.00	54.00	-17.00	30.31	6.19	34.23	33.73	142	295	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4821.35	47.53	74.00	-26.47	40.85	6.18	34.23	33.73	119	269	Peak	VERTICAL
2	4823.91	36.93	54.00	-17.07	30.25	6.18	34.23	33.73	119	269	Average	VERTICAL

Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11g CH 6 / Ant. 1
Test Date	Oct. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4853.53	47.04	74.00	-26.96	40.30	6.21	34.24	33.71	175	253	Peak	HORIZONTAL
2	4853.65	37.96	54.00	-16.04	31.22	6.21	34.24	33.71	175	253	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4844.82	47.00	74.00	-27.00	40.28	6.20	34.24	33.72	154	193	Peak	VERTICAL
2	4853.89	36.66	54.00	-17.34	29.92	6.21	34.24	33.71	154	193	Average	VERTICAL

Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11g CH 11 / Ant. 1
Test Date	Oct. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4875.84	37.28	54.00	-16.72	30.52	6.22	34.25	33.71	126	304	Average	HORIZONTAL
2	4878.99	47.97	74.00	-26.03	41.20	6.22	34.25	33.70	126	304	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4875.30	37.17	54.00	-16.83	30.41	6.22	34.25	33.71	112	302	Average	VERTICAL
2	4876.95	49.02	74.00	-24.98	42.25	6.22	34.25	33.70	112	302	Peak	VERTICAL

Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11n MCS0 HT20 CH 1 / Ant. 1
Test Date	Oct. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4820.18	48.30	74.00	-25.70	41.62	6.18	34.23	33.73	102	313	Peak	HORIZONTAL
2	4823.20	37.09	54.00	-16.91	30.41	6.18	34.23	33.73	102	313	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4820.04	47.42	74.00	-26.58	40.74	6.18	34.23	33.73	106	340	Peak	VERTICAL
2	4821.09	37.13	54.00	-16.87	30.45	6.18	34.23	33.73	106	340	Average	VERTICAL

Temperature	23.4℃	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11n MCS0 HT20 CH 6 / Ant. 1
Test Date	Oct. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4851.58	36.47	54.00	-17.53	29.74	6.20	34.24	33.71	252	244	Average	HORIZONTAL
2	4851.82	47.48	74.00	-26.52	40.75	6.20	34.24	33.71	252	244	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4845.73	36.52	54.00	-17.48	29.79	6.20	34.24	33.71	222	126	Average	VERTICAL
2	4849.00	48.09	74.00	-25.91	41.36	6.20	34.24	33.71	255	126	Peak	VERTICAL

Temperature	23.4℃	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11n MCS0 HT20 CH 11 / Ant. 1
Test Date	Oct. 16, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4873.75	49.24	74.00	-24.76	42.48	6.22	34.25	33.71	208	131	Peak	HORIZONTAL
2	4876.68	37.36	54.00	-16.64	30.60	6.22	34.25	33.71	208	131	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4873.19	47.80	74.00	-26.20	41.04	6.22	34.25	33.71	208	161	Peak	VERTICAL
2	4876.74	37.46	54.00	-16.54	30.70	6.22	34.25	33.71	208	161	Average	VERTICAL

Note:

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

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

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

4.6. Emissions Measurement

4.6.1. Limit

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

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

4.6.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T 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.

For Radiated Out of Band Emission Measurement:

1. Test was performed in accordance with KDB558074 D01 v03r03 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.

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

Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11b CH 1, 6, 11 / Ant. 1
Test Date	Oct. 15, 2015		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.13	50.32	74.00	-23.68	13.40	4.51	32.41	0.00	184	95	Peak	VERTICAL
2	2390.00	38.08	54.00	-15.92	1.16	4.51	32.41	0.00	184	95	Average	VERTICAL
3 0	2412.87	91.00			54.04	4.52	32.44	0.00	184	95	Average	VERTICAL
4 0	2413.16	93.74			56.78	4.52	32.44	0.00	184	95	Peak	VERTICAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.42	50.59	74.00	-23.41	13.67	4.51	32.41	0.00	184	95	Peak	VERTICAL
2	2390.00	38.06	54.00	-15.94	1.14	4.51	32.41	0.00	184	95	Average	VERTICAL
3 0	2436.13	91.14			54.12	4.54	32.48	0.00	184	95	Average	VERTICAL
4 0	2436.42	94.02			57.00	4.54	32.48	0.00	184	95	Peak	VERTICAL
5	2483.50	38.80	54.00	-15.20	1.67	4.56	32.57	0.00	184	95	Average	VERTICAL
6	2483.79	51.52	74.00	-22.48	14.39	4.56	32.57	0.00	184	95	Peak	VERTICAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 0	2461.42	93.44			56.35	4.55	32.54	0.00	184	95	Average	VERTICAL
2 0	2461.42	96.17			59.08	4.55	32.54	0.00	184	95	Peak	VERTICAL
3	2483.50	39.07	54.00	-14.93	1.94	4.56	32.57	0.00	184	95	Average	VERTICAL
4	2483.79	51.18	74.00	-22.82	14.05	4.56	32.57	0.00	184	95	Peak	VERTICAL

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

Temperature	23.4°C	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11g CH 1, 6, 11 / Ant. 1
Test Date	Oct. 15, 2015		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.42	52.76	74.00	-21.24	15.84	4.51	32.41	0.00	184	95	Peak	HORIZONTAL
2	2390.00	40.33	54.00	-13.67	3.41	4.51	32.41	0.00	184	95	Average	HORIZONTAL
3 0	2412.00	96.90			59.94	4.52	32.44	0.00	184	95	Peak	HORIZONTAL
4 0	2412.87	86.09			49.13	4.52	32.44	0.00	184	95	Average	HORIZONTAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.42	49.79	74.00	-24.21	12.87	4.51	32.41	0.00	184	95	Peak	VERTICAL
2	2390.00	38.88	54.00	-15.12	1.96	4.51	32.41	0.00	184	95	Average	VERTICAL
3 0	2430.92	68.92			31.91	4.53	32.48	0.00	184	95	Average	VERTICAL
4 0	2431.21	78.09			41.08	4.53	32.48	0.00	184	95	Peak	VERTICAL
5	2483.50	38.99	54.00	-15.01	1.86	4.56	32.57	0.00	184	95	Average	VERTICAL
6	2483.50	49.58	74.00	-24.42	12.45	4.56	32.57	0.00	184	95	Peak	VERTICAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 0	2462.58	87.84			50.75	4.55	32.54	0.00	184	95	Average	VERTICAL
2 0	2462.58	98.94			61.85	4.55	32.54	0.00	184	95	Peak	VERTICAL
3	2483.50	42.39	54.00	-11.61	5.26	4.56	32.57	0.00	184	95	Average	VERTICAL
4	2484.08	55.84	74.00	-18.16	18.71	4.56	32.57	0.00	184	95	Peak	VERTICAL

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

Temperature	23.4℃	Humidity	62%
Test Engineer	Charlie Cheng, YC Chen	Configurations	IEEE 802.11n MCS0 HT20 CH 1, 6, 11 / Ant. 1
Test Date	Oct. 15, 2015		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2390.00	40.06	54.00	-13.94	3.14	4.51	32.41	0.00	184	95	Average	VERTICAL
2	2390.00	51.57	74.00	-22.43	14.65	4.51	32.41	0.00	184	95	Peak	VERTICAL
3 0	2412.87	85.83			48.87	4.52	32.44	0.00	184	95	Average	VERTICAL
4 0	2413.45	96.64			59.68	4.52	32.44	0.00	184	95	Peak	VERTICAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.42	51.10	74.00	-22.90	14.18	4.51	32.41	0.00	155	360	Peak	HORIZONTAL
2	2390.00	38.57	54.00	-15.43	1.65	4.51	32.41	0.00	155	360	Average	HORIZONTAL
3 0	2436.42	81.27			44.25	4.54	32.48	0.00	155	360	Average	HORIZONTAL
4 0	2436.71	91.38			54.33	4.54	32.51	0.00	155	360	Peak	HORIZONTAL
5	2483.50	39.42	54.00	-14.58	2.29	4.56	32.57	0.00	155	360	Average	HORIZONTAL
6	2483.50	48.65	74.00	-25.35	11.52	4.56	32.57	0.00	155	360	Peak	HORIZONTAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 0	2460.84	91.80			54.71	4.55	32.54	0.00	155	0	Peak	HORIZONTAL
2 0	2461.42	80.43			43.34	4.55	32.54	0.00	155	0	Average	HORIZONTAL
3	2483.50	40.23	54.00	-13.77	3.10	4.56	32.57	0.00	155	0	Average	HORIZONTAL
4	2484.37	53.82	74.00	-20.18	16.69	4.56	32.57	0.00	155	0	Peak	HORIZONTAL

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

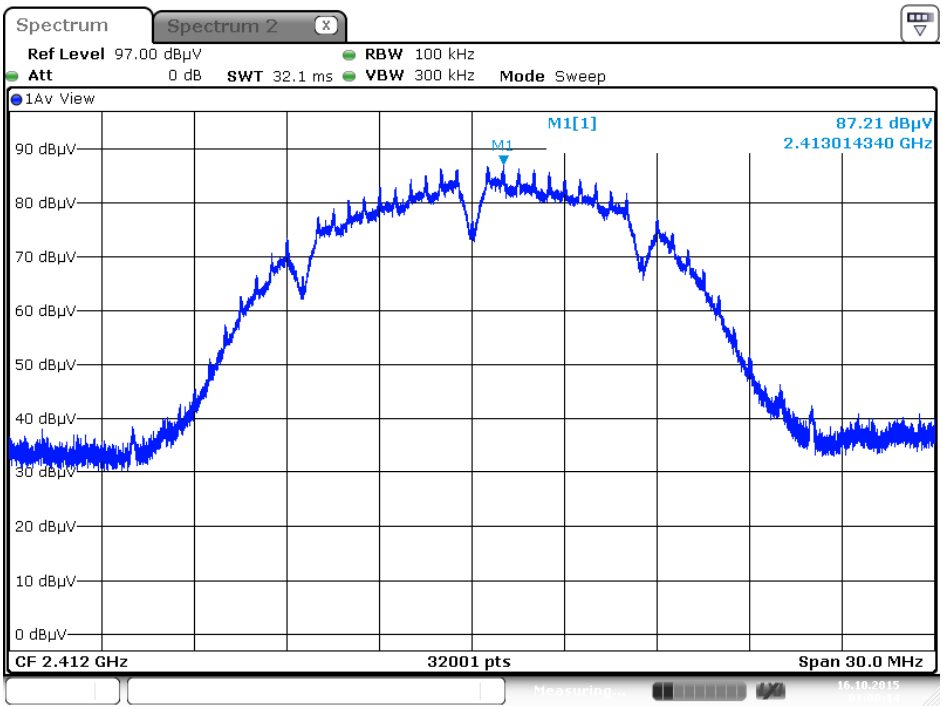
Note:

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

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

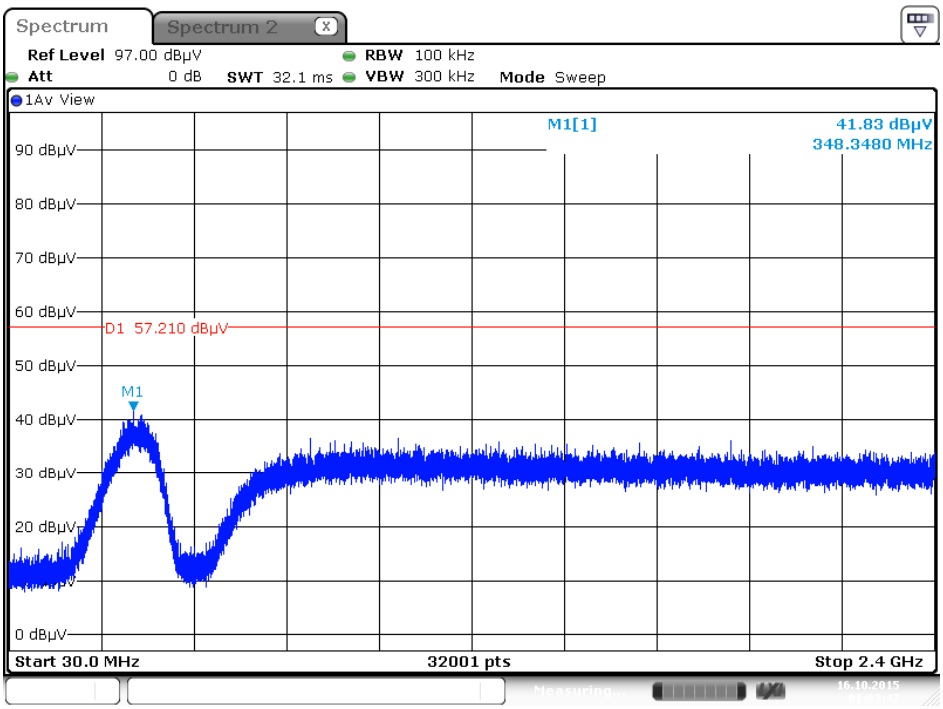
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11b / Reference Level



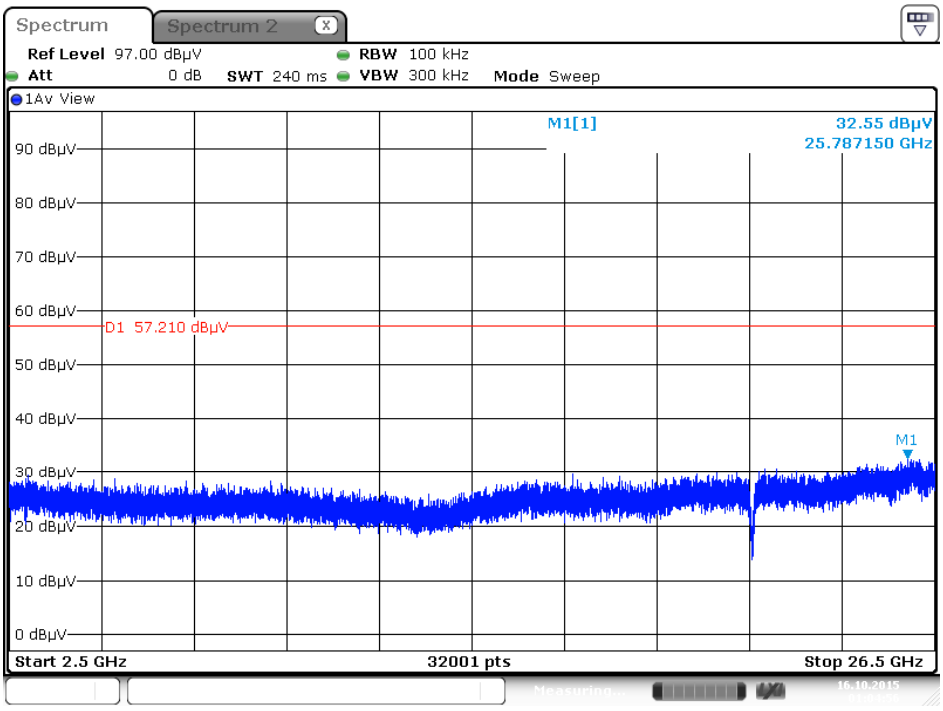
Date: 16.OCT.2015 01:00:14

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



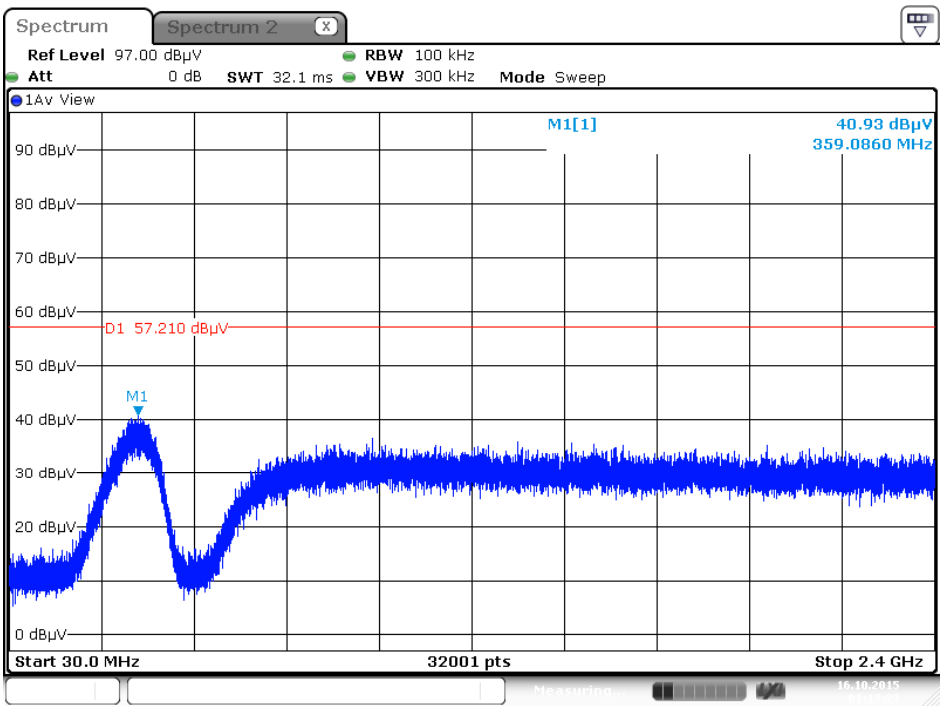
Date: 16.OCT.2015 01:03:47

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



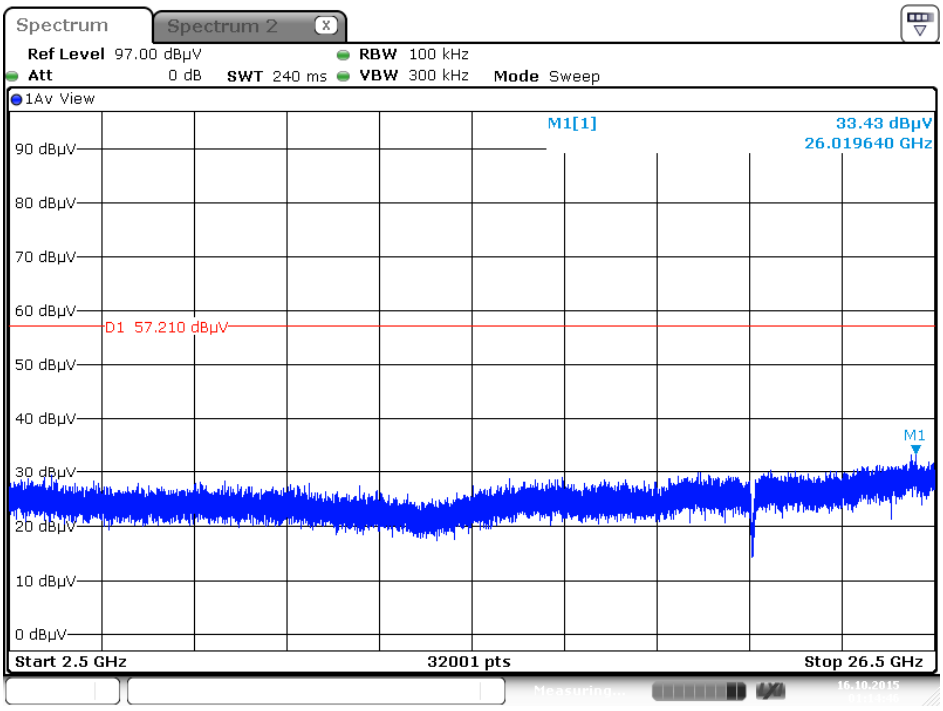
Date: 16.OCT.2015 01:04:56

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

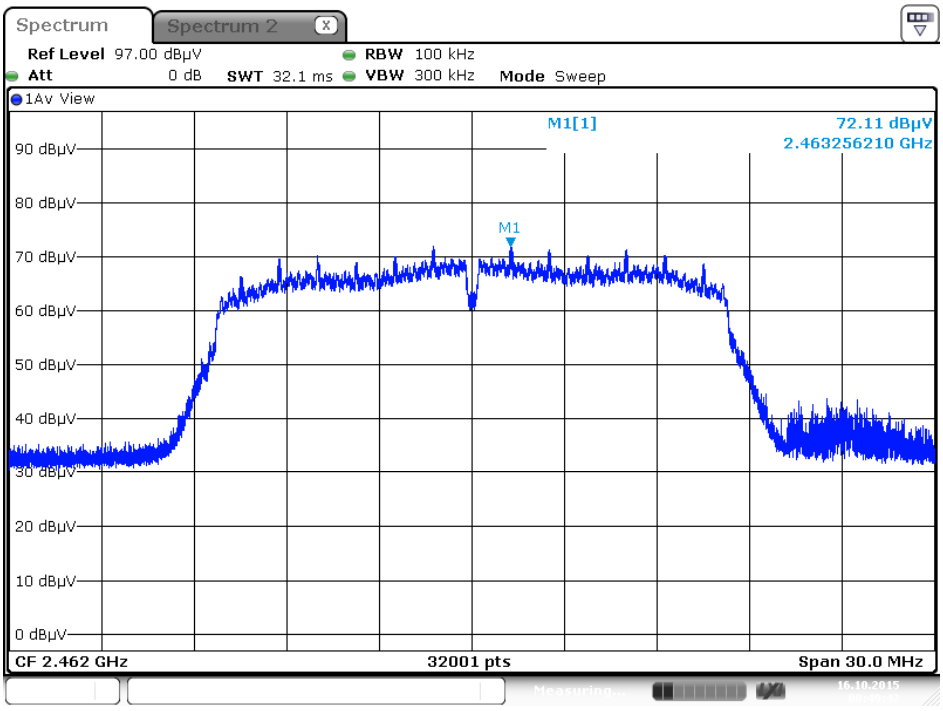


Date: 16.OCT.2015 01:13:23

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

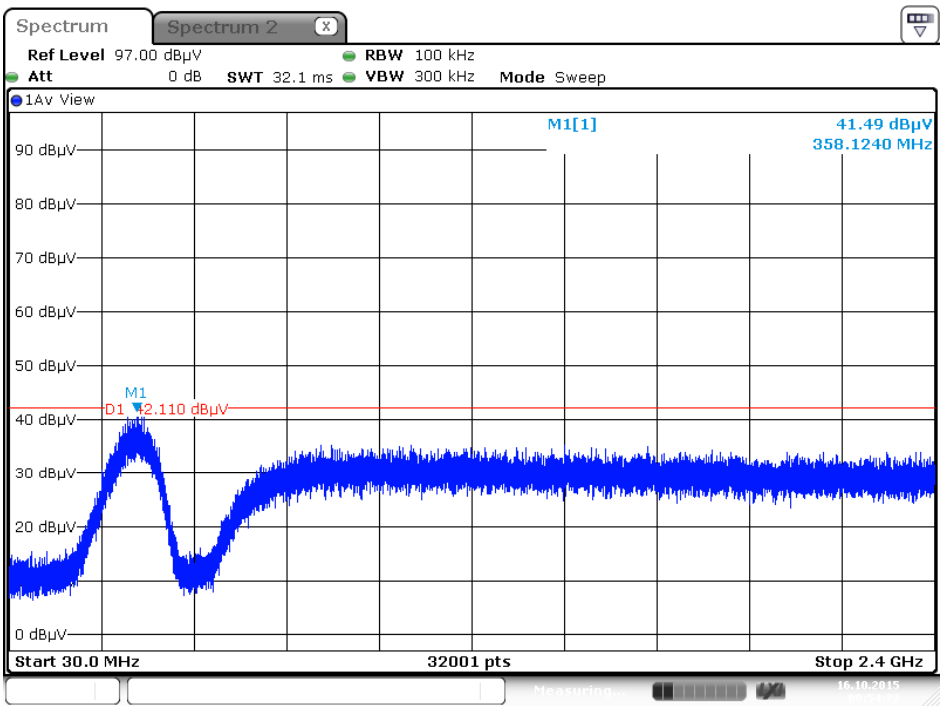


Plot on Configuration IEEE 802.11g / Reference Level



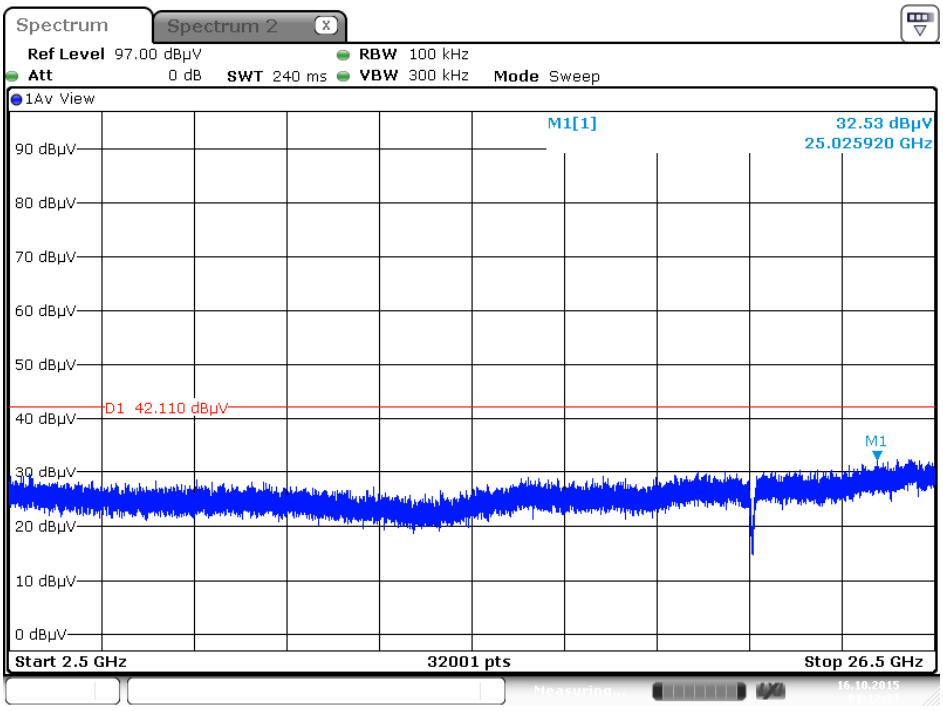
Date: 16.OCT.2015 00:49:42

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



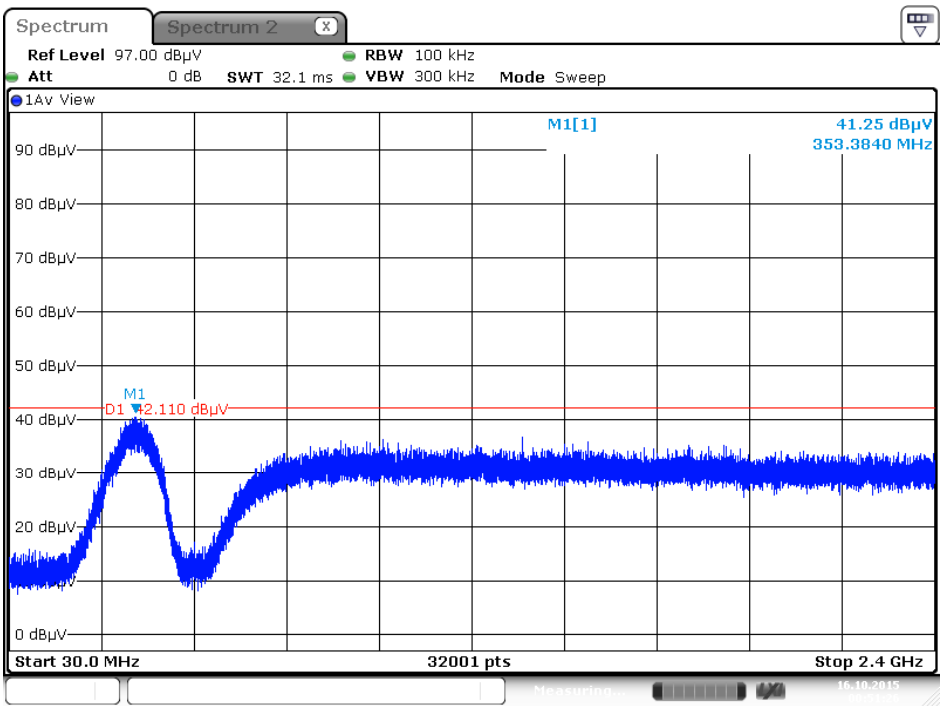
Date: 16.OCT.2015 00:54:22

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



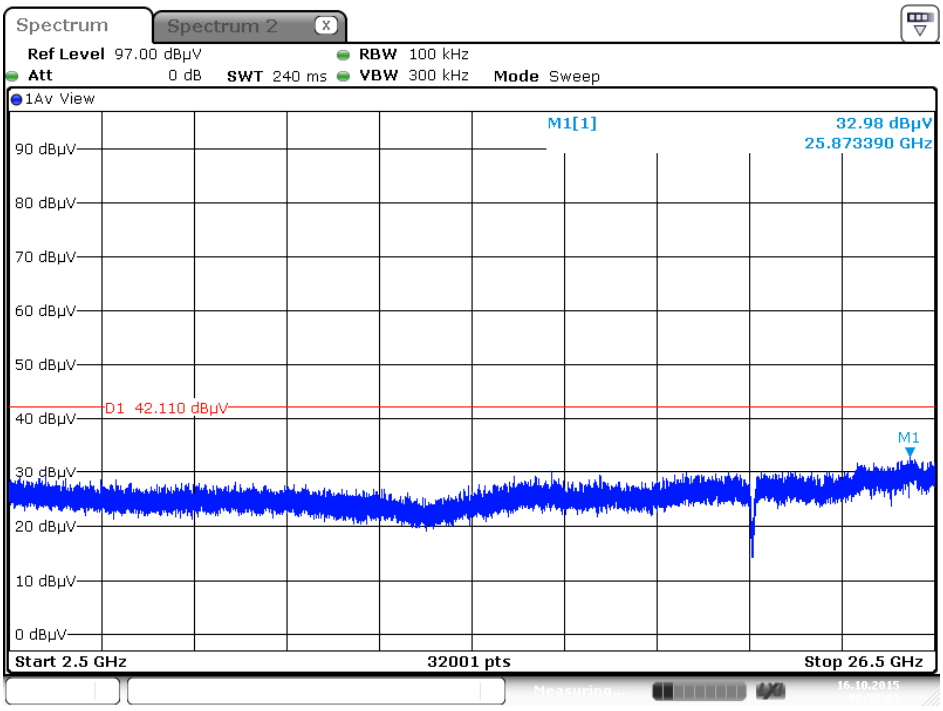
Date: 16.OCT.2015 01:12:23

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



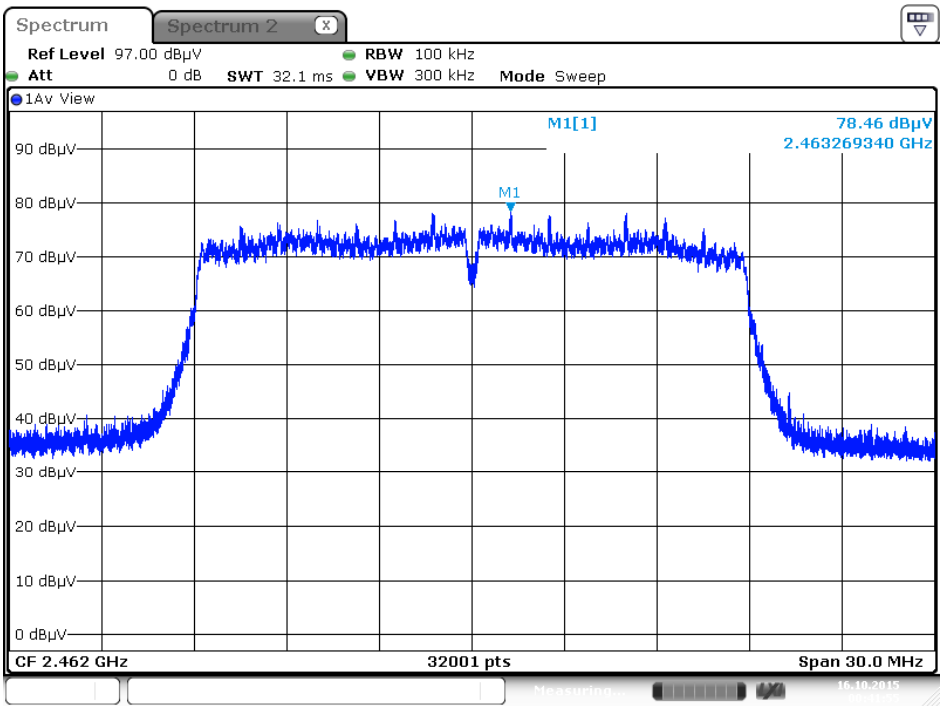
Date: 16.OCT.2015 00:51:26

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



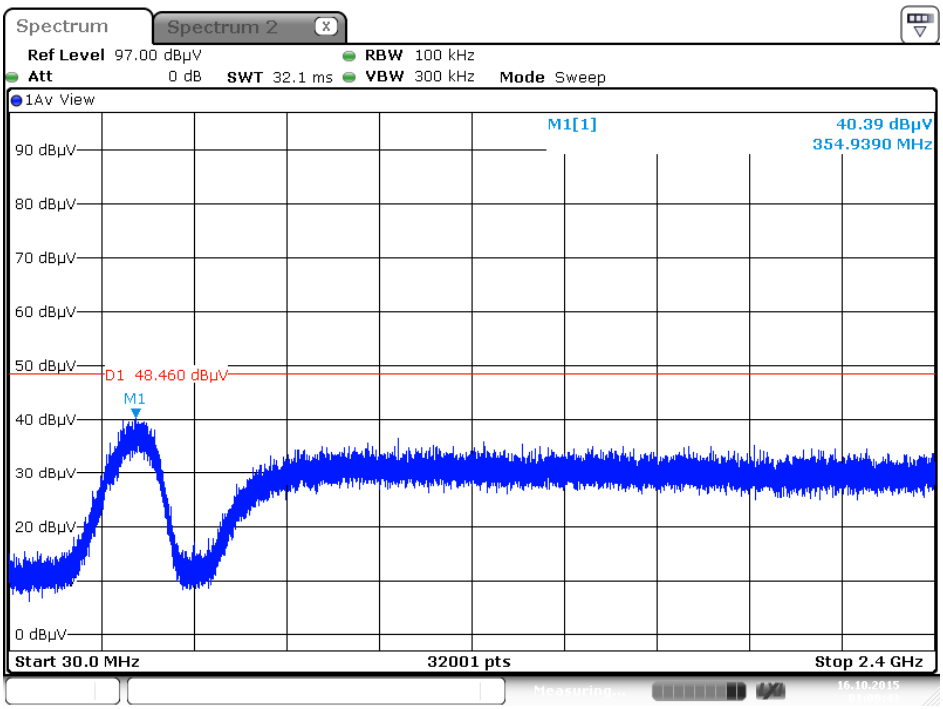
Date: 16.OCT.2015 00:52:03

Plot on Configuration IEEE 802.11n MCS0 HT20 / Reference Level



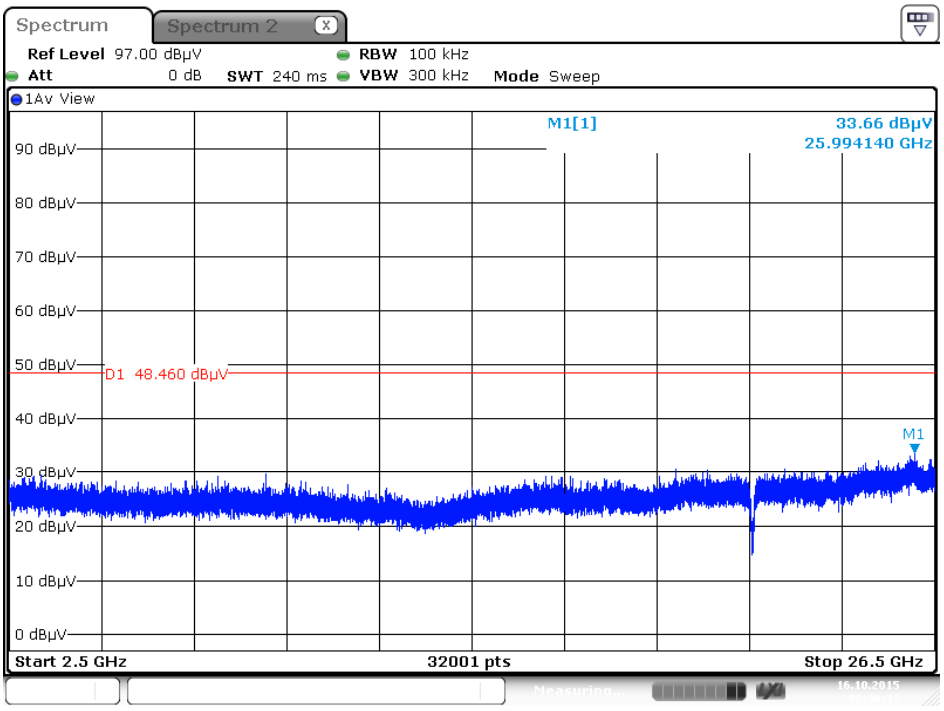
Date: 16.OCT.2015 00:41:55

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



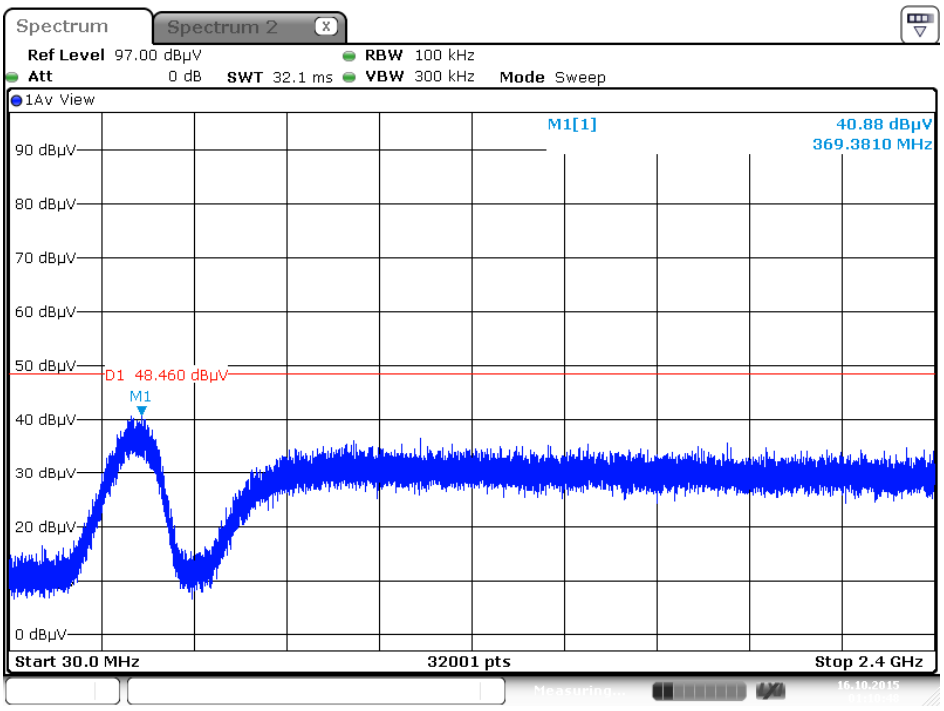
Date: 16.OCT.2015 01:09:43

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



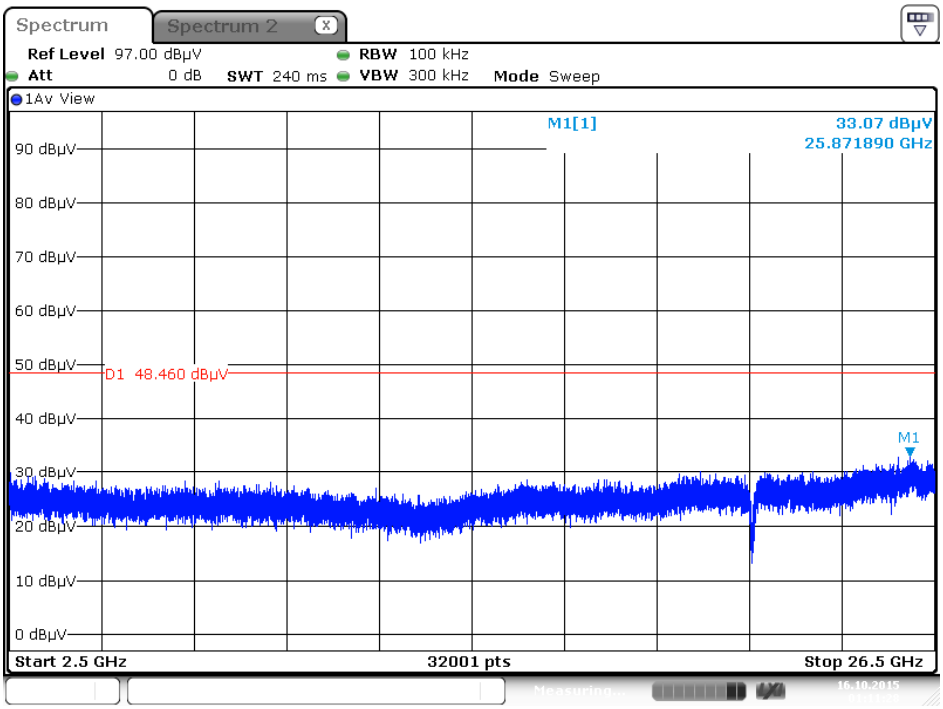
Date: 16.OCT.2015 00:46:33

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



Date: 16.OCT.2015 01:10:48

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



Date: 16.OCT.2015 01:11:29

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	9kHz ~ 2.75GHz	Apr. 22, 2015	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 02, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 02, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 03, 2014	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 06, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 12, 2015	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 25, 2014	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 06, 2014	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 12, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 03, 2014	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)	3.2 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%