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FCC RADIO TEST REPORT

Applicant's company	D-Link Corporation
Applicant Address	No.289, Sinhu 3rd Rd., Neihu District, Taipei City 114, Taiwan, R.O.C.
FCC ID	KA2AP2230A1

Product Name	High Power Wireless PoE Access Point
Brand Name	D-Link
Model No.	DAP-2230
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Apr. 13, 2015
Final Test Date	Jun. 08, 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 2009, 47 CFR FCC Part 15 Subpart C, KDB 558074 D01 v03r03 and KDB 662911 D01 v02r01.**

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

Note: Using 1.5m table as an alternative was permitted by the FCC per TCBC conference call of Dec. 2, 2014.



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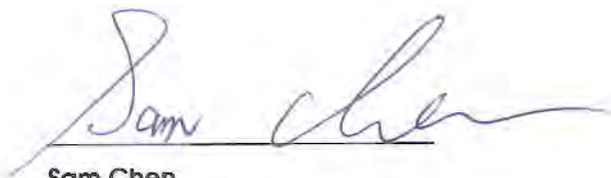
History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR560101	Rev. 01	Initial issue of report	Jun. 29, 2015
FR560101	Rev. 02	Changing brand names for adapter 1 and adapter 2.	Jul. 01, 2015

1. VERIFICATION OF COMPLIANCE

Product Name : High Power Wireless PoE Access Point
Brand Name : D-Link
Model No. : DAP-2230
Applicant : D-Link Corporation
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Apr. 13, 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

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	11.40 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	0.16 dB
4.3	15.247(e)	Power Spectral Density	Complies	1.66 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	3.01 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.11 dB
4.7	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
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 ; 7 for 40MHz bandwidth
Channel Band Width (99%)	IEEE 802.11b: 12.16 MHz IEEE 802.11g: 16.50 MHz IEEE 802.11n MCS0 (HT20): 17.71 MHz IEEE 802.11n MCS0 (HT40): 36.61 MHz
Maximum Conducted Output Power	IEEE 802.11b: 29.84 dBm IEEE 802.11g: 28.57 dBm IEEE 802.11n MCS0 (HT20): 29.48 dBm IEEE 802.11n MCS0 (HT40): 26.58 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	Two (TX)	
Band width Mode	20 MHz	40 MHz
IEEE 802.11b	V	X
IEEE 802.11g	V	X
IEEE 802.11n	V	V

IEEE 11n Spec.

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

3.2. Accessories

Power	Brand	Model	Rating
Adapter 1	CWT	2AAJ012F US	INPUT: 100-240V, 50/60Hz, 0.35A OUTPUT: 12.0V, 1.0A
Adapter 2	LEI	MU12AR120100-A1	INPUT: 100-240V, 50/60Hz, 0.3A OUTPUT: 12.0V, 1.0A
Other			
Wall-mounted rack*1			

3.3. Table for Filed Antenna

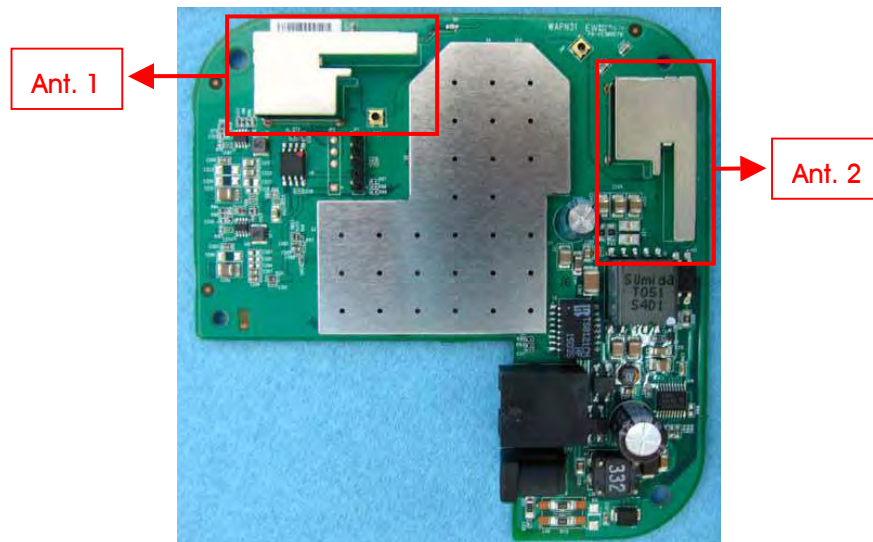
Ant.	Brand Holder	Model Name	Antenna Type	Connector	Gain (dBi)
1	HL TECHNOLOGY	-	PIFA Antenna	N/A	3.10
2	HL TECHNOLOGY	-	PIFA Antenna	N/A	2.13

Note: The EUT has two antennas.

For IEEE 802.11b/g/n mode:

Ant.1 and Ant.2 can be used as transmitting/receiving antenna.

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



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	Antenna
AC Power Line Conducted Emissions	Normal Link	-	-	-
Maximum Conducted Output Power	11b/CCK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2
Power Spectral Density	11b/CCK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2
6dB Spectrum Bandwidth	11b/CCK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2
Radiated Emissions 9kHz~1GHz	Normal Link	-	-	-
Radiated Emissions 1GHz~10 th Harmonic	11b/CCK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2
Band Edge Emissions	11b/CCK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. Normal Link – EUT + Adapter 1

Mode 2. Normal Link – EUT + Adapter 2

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

For Radiated Emission test (Below 1GHz):

Mode 1. Normal Link – Place EUT in X axis + Adapter 1

Mode 2. Normal Link – Place EUT in Y axis + Adapter 1

Mode 1 has been evaluated to be the worst case between Mode 1~2, thus measurement for Mode 3 will follow this same test mode.

Mode 3. Normal Link – Place EUT in X axis + Adapter 2

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

For Radiated Emission test (Above 1GHz):

The EUT was performed at X axis, Y axis and Z axis position. The worst case was found at Y axis, so it was selected to perform test and its test result was written in the report.

Mode 1. CTX - Place EUT in 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 Supporting Units

For Test Site No: 03CH01-CB

For Radiated Emission test (Below 1GHz):

Support Unit	Brand	Model	FCC ID
Notebook*2	DELL	E4300	DoC

For Radiated Emission test (Above 1GHz):

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
Notebook*2	DELL	E6430	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC

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.

Test Software Version	art2_ver_4_9_815					
Mode	Test Frequency (MHz)					
	NCB: 20MHz			NCB: 40MHz		
	2412 MHz	2437 MHz	2462 MHz	2422 MHz	2437 MHz	2452 MHz
802.11b	24.5	26	26	-	-	-
802.11g	22	24.5	22.5	-	-	-
802.11n MCS0 HT20	20.5	26	22	-	-	-
802.11n MCS0 HT40	-	-	-	17.5	22.5	19

3.9. EUT Operation during Test

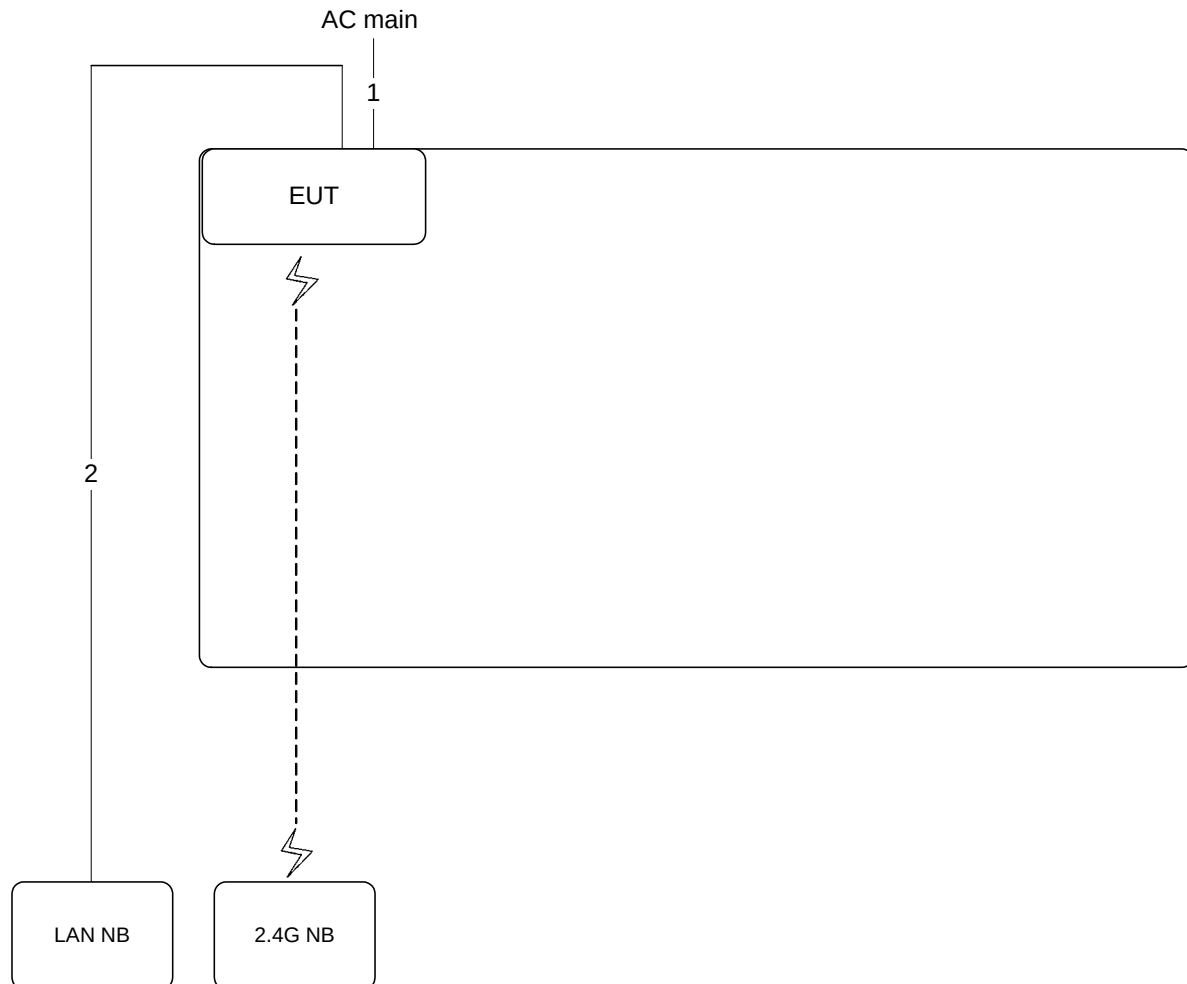
The EUT was programmed to be in continuously transmitting mode.

3.10. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11b	1.000	1.000	100.00	0.00	0.01
802.11g	2.019	2.083	96.93	0.14	0.50
802.11n MCS0 HT20	1.871	1.943	96.29	0.16	0.53
802.11n MCS0 HT40	0.901	0.969	92.98	0.32	1.11

3.11. Test Configurations

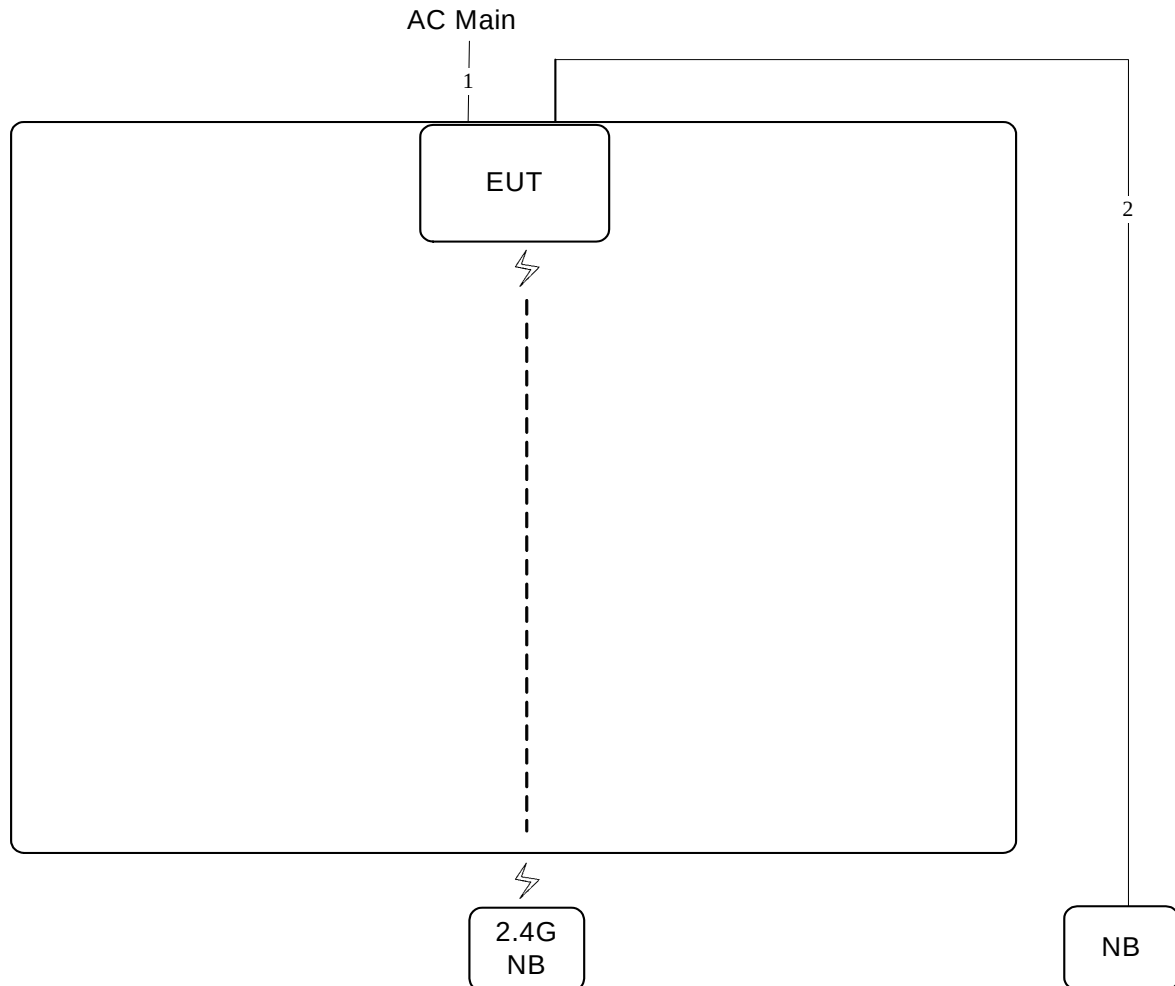
3.11.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	1.2m
2	RJ-45 cable	No	10m

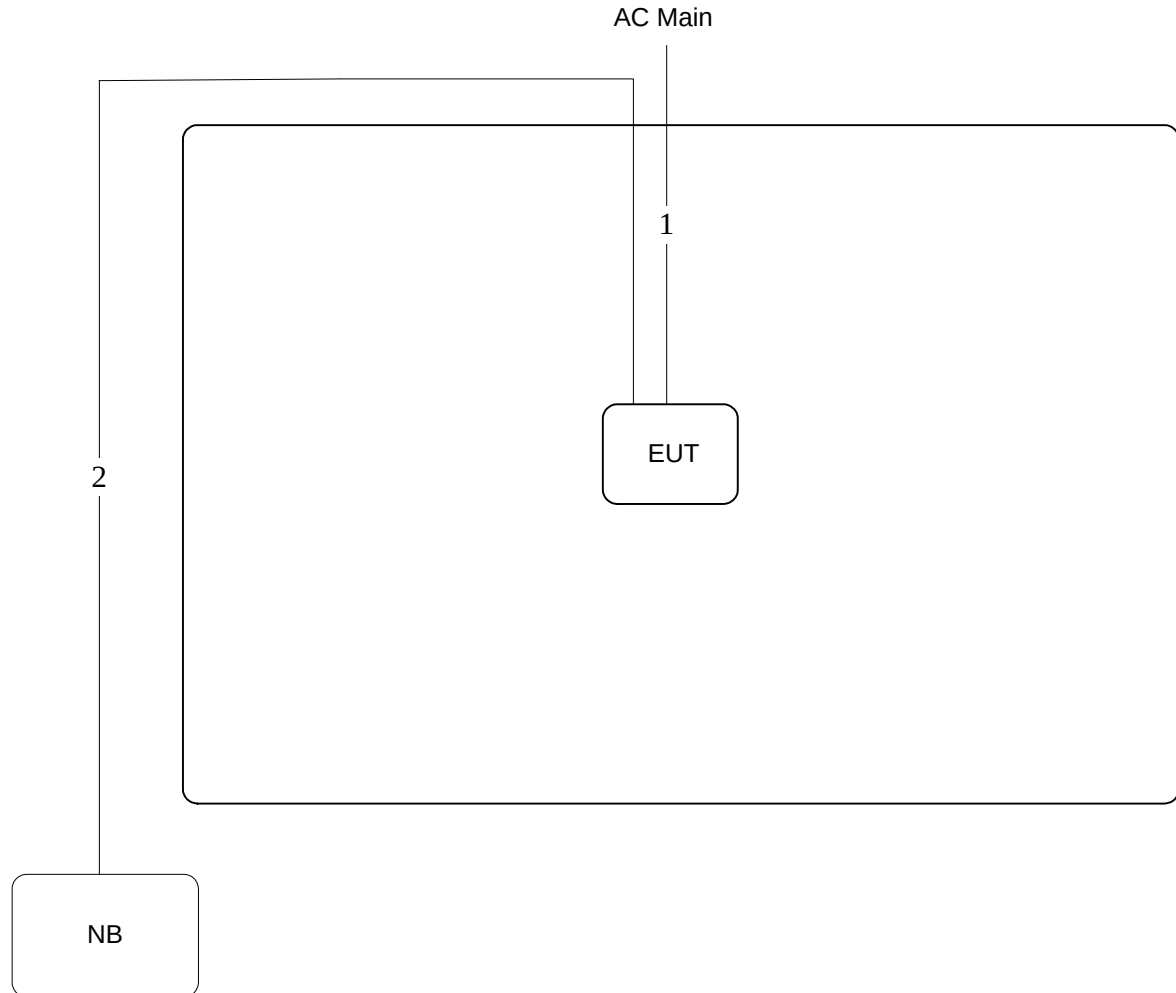
3.11.2. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz



Item	Connection	Shielded	Length
1	Power cable	No	1.2m
2	RJ-45 cable	No	10m

Test Configuration: above 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	1.2m
2	RJ-45 cable	No	10m

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

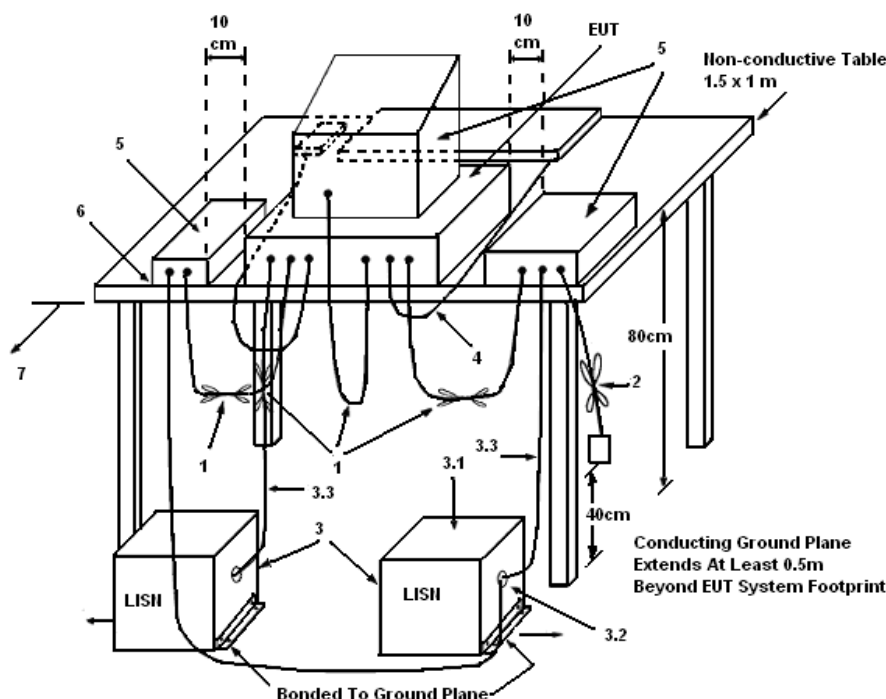
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

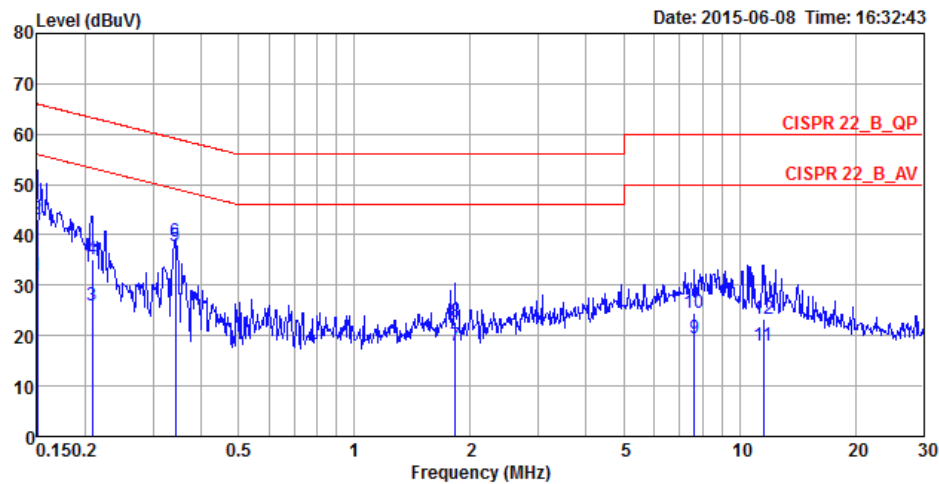
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

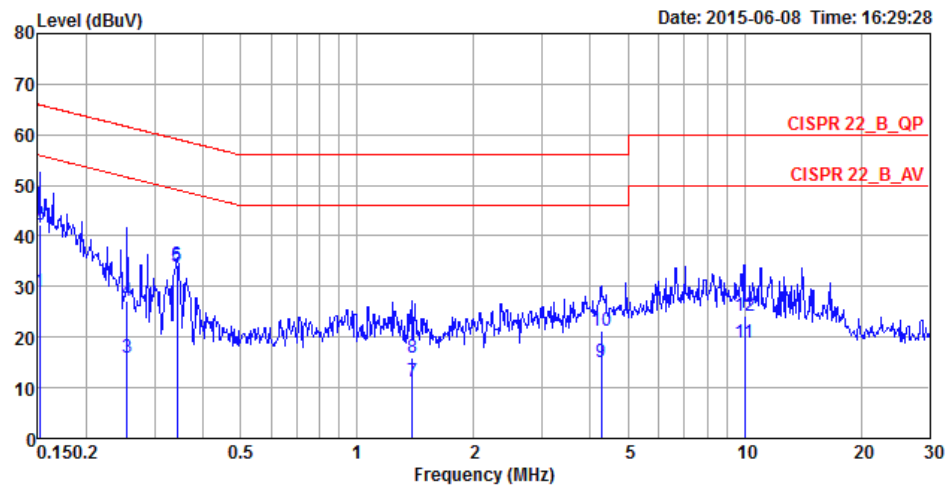
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23°C	Humidity	65%
Test Engineer	Deven Huang	Phase	Line
Configuration	Normal Link	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1500	31.94	-24.06	56.00	21.99	9.93	0.02	LINE	Average
2	0.1500	43.02	-22.98	66.00	33.07	9.93	0.02	LINE	QP
3	0.2083	26.11	-27.16	53.27	16.16	9.93	0.02	LINE	Average
4	0.2083	35.17	-28.10	63.27	25.22	9.93	0.02	LINE	QP
5	0.3428	37.73	-11.40	49.13	27.76	9.93	0.04	LINE	Average
6	0.3428	38.56	-20.57	59.13	28.59	9.93	0.04	LINE	QP
7	1.8288	17.89	-28.11	46.00	7.84	9.99	0.06	LINE	Average
8	1.8288	22.68	-33.32	56.00	12.63	9.99	0.06	LINE	QP
9	7.6464	19.41	-30.59	50.00	9.12	10.13	0.16	LINE	Average
10	7.6464	24.59	-35.41	60.00	14.30	10.13	0.16	LINE	QP
11	11.5594	18.07	-31.93	50.00	7.59	10.23	0.25	LINE	Average
12	11.5594	23.19	-36.81	60.00	12.71	10.23	0.25	LINE	QP

Temperature	23°C	Humidity	65%
Test Engineer	Deven Huang	Phase	Neutral
Configuration	Normal Link	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1516	28.91	-27.00	55.91	19.11	9.78	0.02	NEUTRAL	Average
2	0.1516	42.16	-23.75	65.91	32.36	9.78	0.02	NEUTRAL	QP
3	0.2548	15.85	-35.75	51.60	6.03	9.79	0.03	NEUTRAL	Average
4	0.2548	27.21	-34.39	61.60	17.39	9.79	0.03	NEUTRAL	QP
5	0.3428	33.92	-15.21	49.13	24.09	9.79	0.04	NEUTRAL	Average
6	0.3428	34.11	-25.02	59.13	24.28	9.79	0.04	NEUTRAL	QP
7	1.3884	11.23	-34.77	46.00	1.36	9.82	0.05	NEUTRAL	Average
8	1.3884	16.05	-39.95	56.00	6.18	9.82	0.05	NEUTRAL	QP
9	4.2692	15.13	-30.87	46.00	5.17	9.88	0.08	NEUTRAL	Average
10	4.2692	21.12	-34.88	56.00	11.16	9.88	0.08	NEUTRAL	QP
11	10.0186	18.92	-31.08	50.00	8.67	10.01	0.24	NEUTRAL	Average
12	10.0186	24.17	-35.83	60.00	13.92	10.01	0.24	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

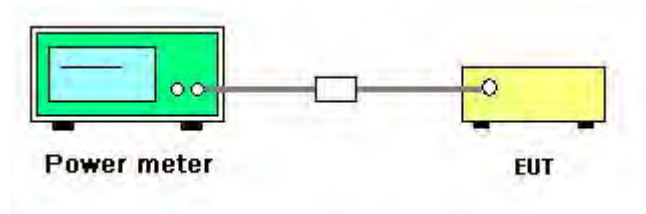
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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 KDB 558074 D01 v03r03 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	24°C	Humidity	45%
Test Engineer	Andy Tsai	Test Date	May 29, 2015

Mode	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Antenna 1	Antenna 2	Total		
802.11b	2412 MHz	25.44	25.80	28.63	30.00	Complies
	2437 MHz	26.90	26.45	29.69	30.00	Complies
	2462 MHz	27.01	26.65	29.84	30.00	Complies
802.11g	2412 MHz	23.49	23.14	26.33	30.00	Complies
	2437 MHz	25.61	25.50	28.57	30.00	Complies
	2462 MHz	24.11	23.35	26.76	30.00	Complies
802.11n MCS0 HT20	2412 MHz	21.27	20.82	24.06	30.00	Complies
	2437 MHz	26.67	26.25	29.48	30.00	Complies
	2462 MHz	23.15	22.28	25.75	30.00	Complies
802.11n MCS0 HT40	2422 MHz	19.20	18.25	21.76	30.00	Complies
	2437 MHz	24.36	22.60	26.58	30.00	Complies
	2452 MHz	20.96	19.35	23.24	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

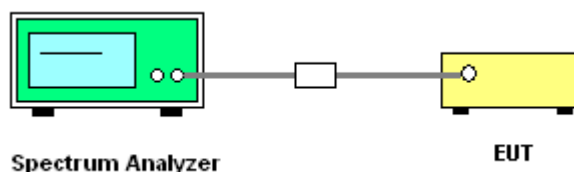
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 v03r03 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 $\geq 2 \times \text{span/RBW}$ (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

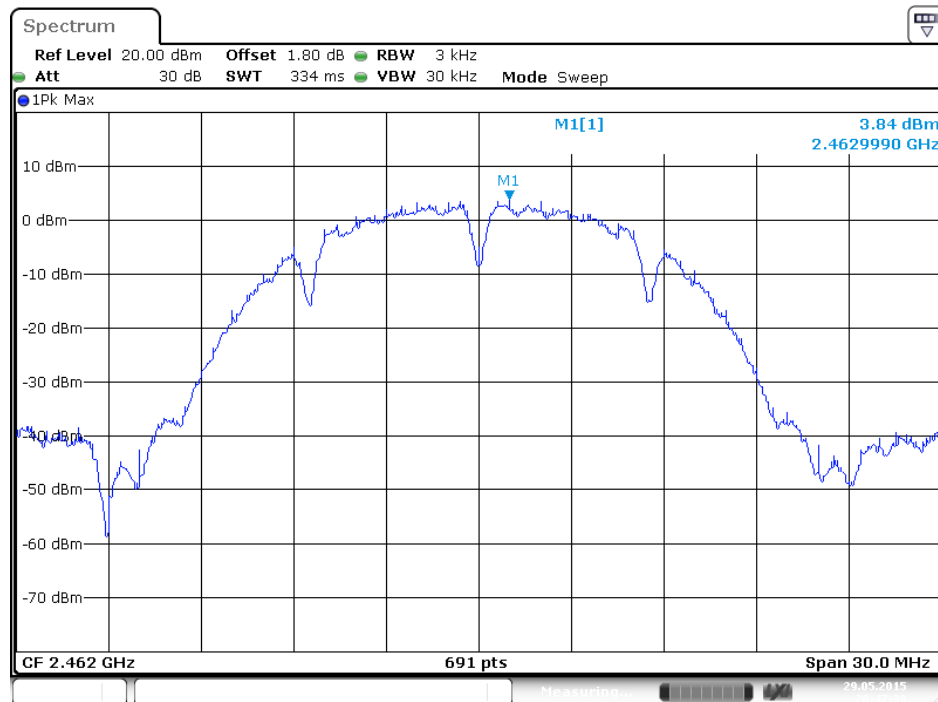
Temperature	24°C	Humidity	45%
Test Engineer	Andy Tsai		

Mode	Frequency	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
		Antenna 1	Antenna 2	Total		
802.11b	2412 MHz	2.26	1.39	4.86	8.00	Complies
	2437 MHz	3.24	2.53	5.91	8.00	Complies
	2462 MHz	3.84	2.75	6.34	8.00	Complies
802.11g	2412 MHz	-0.12	-1.57	2.23	8.00	Complies
	2437 MHz	1.24	1.11	4.19	8.00	Complies
	2462 MHz	-0.38	-0.69	2.48	8.00	Complies
802.11n MCS0 HT20	2412 MHz	-2.23	-2.27	0.76	8.00	Complies
	2437 MHz	1.68	1.71	4.71	8.00	Complies
	2462 MHz	-1.48	-3.70	0.56	8.00	Complies
802.11n MCS0 HT40	2422 MHz	-7.19	-8.97	-4.98	8.00	Complies
	2437 MHz	-3.51	-4.43	-0.94	8.00	Complies
	2452 MHz	-7.08	-8.13	-4.56	8.00	Complies

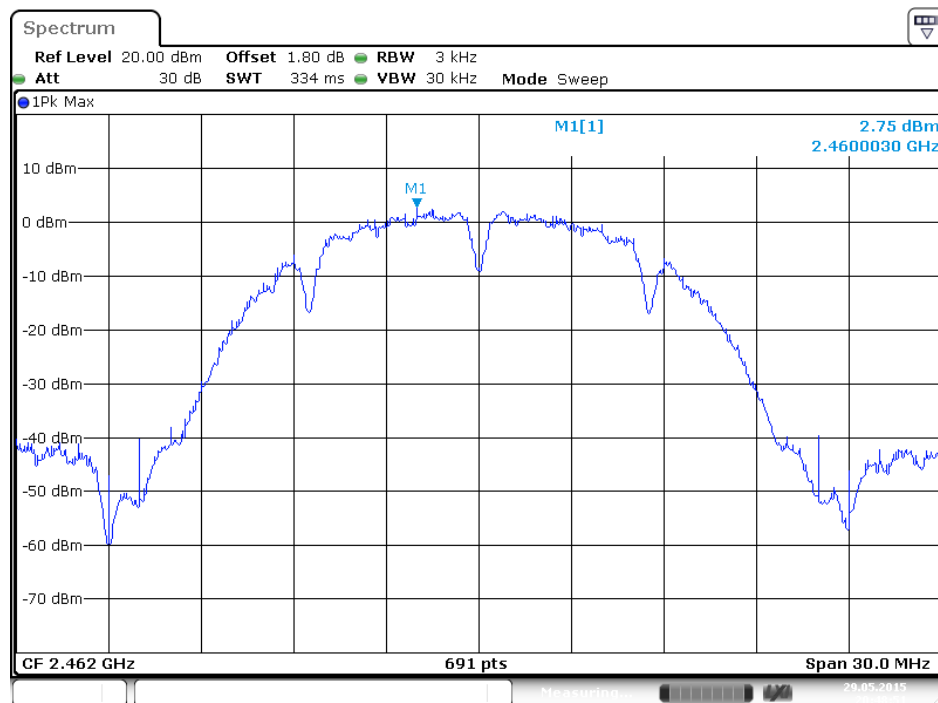
Note: All the test values were listed in the report.

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

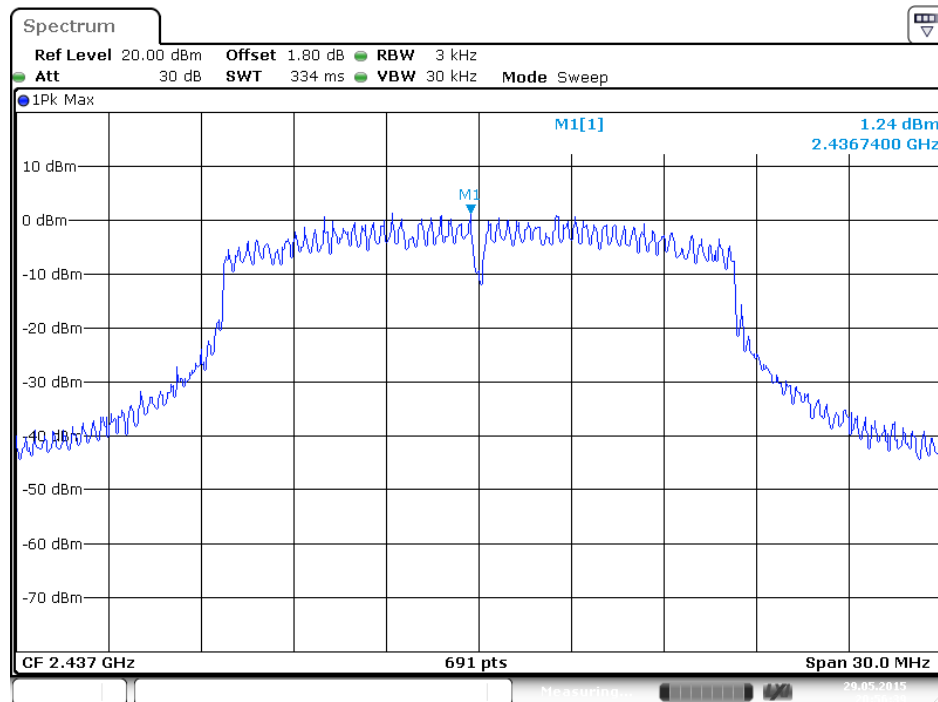
Power Density Plot on Configuration IEEE 802.11b / 2462 MHz / Antenna 1



Power Density Plot on Configuration IEEE 802.11b / 2462 MHz / Antenna 2

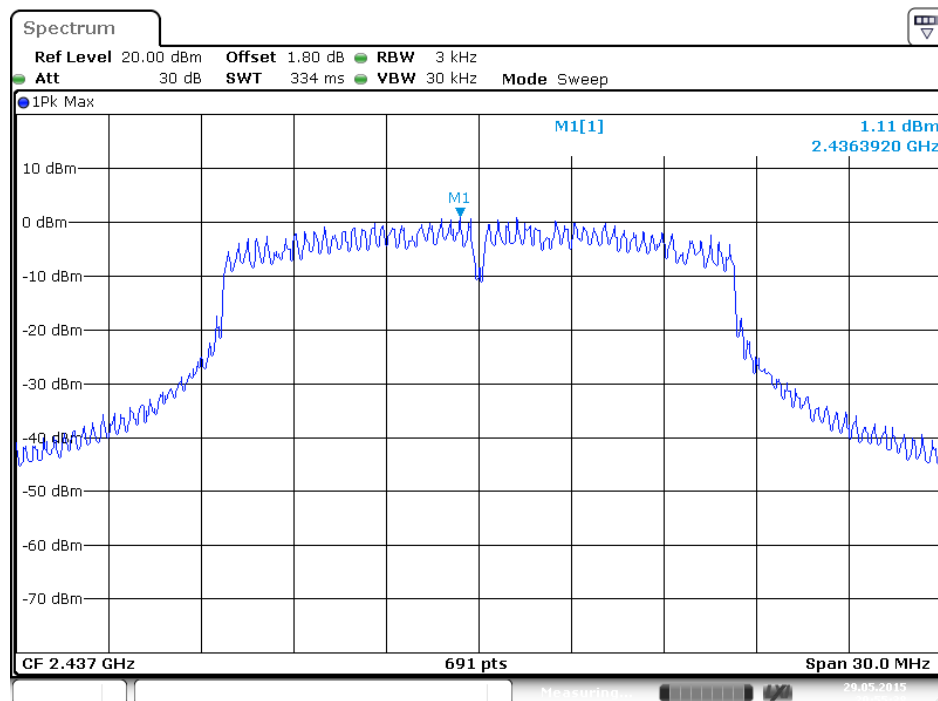


Power Density Plot on Configuration IEEE 802.11g / 2437 MHz / Antenna 1



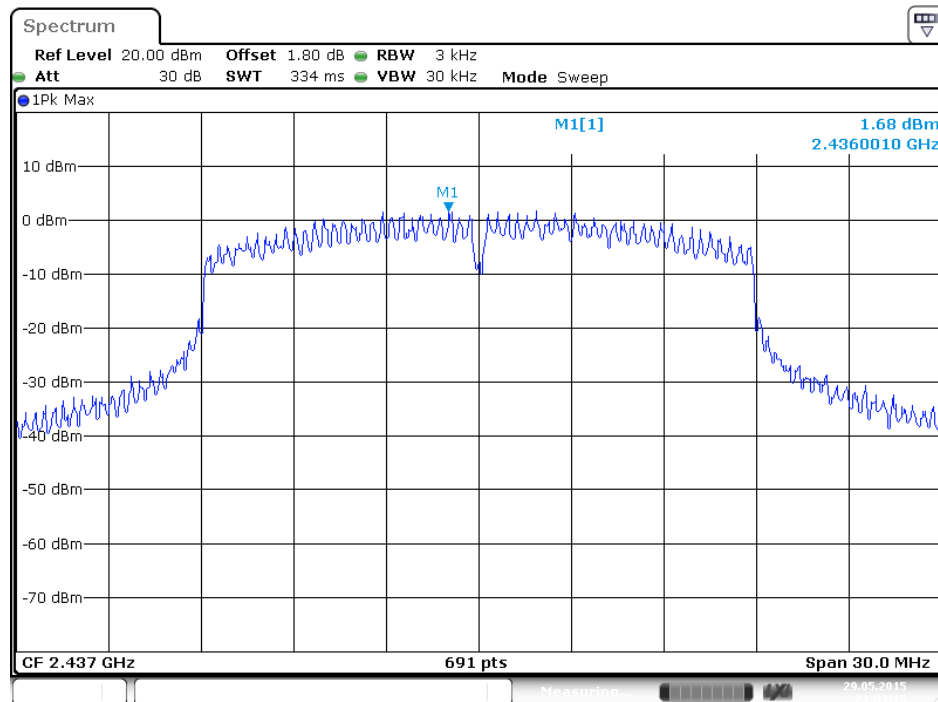
Date: 29.MAY.2015 20:56:40

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



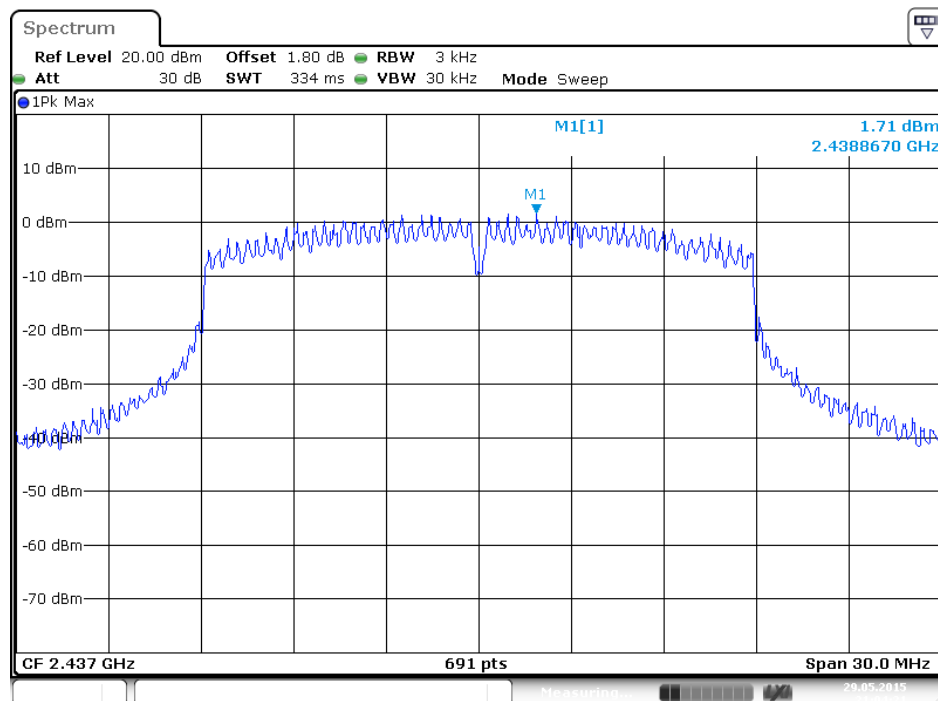
Date: 29.MAY.2015 20:55:38

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



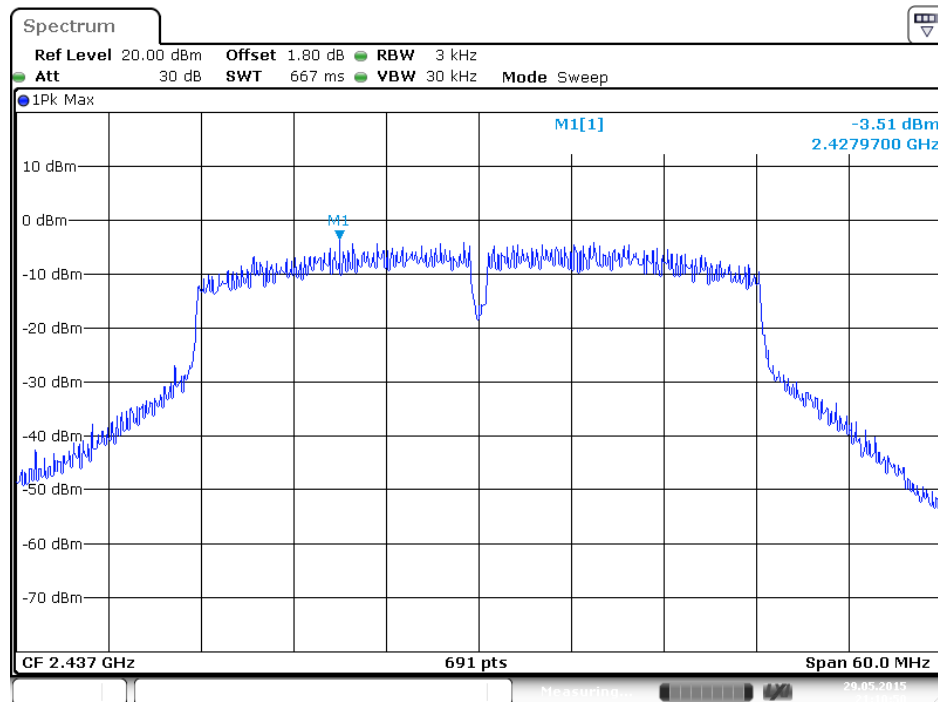
Date: 29.MAY.2015 21:03:16

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



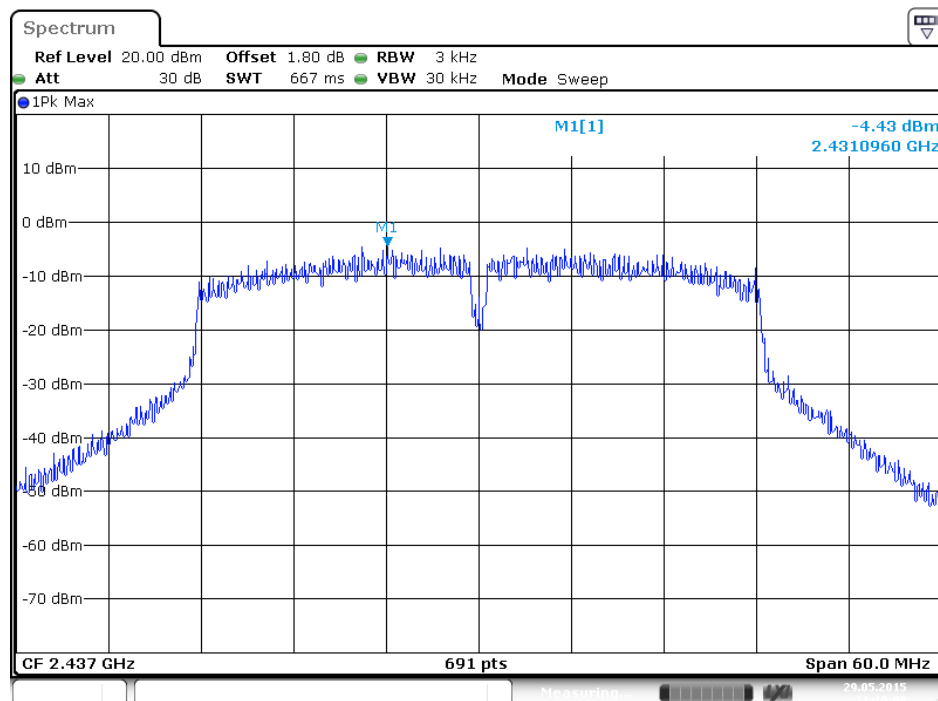
Date: 29.MAY.2015 21:04:21

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



Date: 29.MAY.2015 21:10:51

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



Date: 29.MAY.2015 21:10:09

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	$\geq 3 \times \text{RBW}$
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	$\geq 3 \times \text{RBW}$
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 KDB 558074 D01 v03r03 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 8.0 DTS bandwidth= > 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

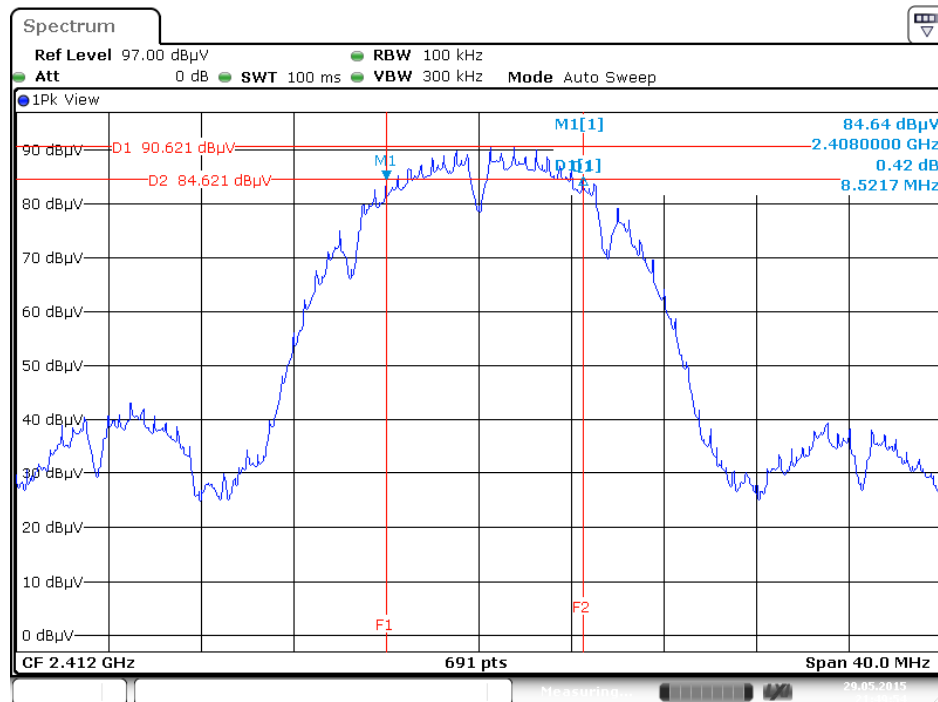
Temperature	24°C	Humidity	45%
Test Engineer	Andy Tsai		

Mode	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11b	2412 MHz	8.52	11.63	500	Complies
	2437 MHz	12.58	12.06	500	Complies
	2462 MHz	8.58	12.16	500	Complies
802.11g	2412 MHz	12.64	15.02	500	Complies
	2437 MHz	12.58	16.50	500	Complies
	2462 MHz	15.07	14.59	500	Complies
802.11n MCS0 HT20	2412 MHz	15.07	17.63	500	Complies
	2437 MHz	15.07	17.71	500	Complies
	2462 MHz	15.07	17.63	500	Complies
802.11n MCS0 HT40	2422 MHz	35.01	36.61	500	Complies
	2437 MHz	32.58	35.46	500	Complies
	2452 MHz	33.39	35.17	500	Complies

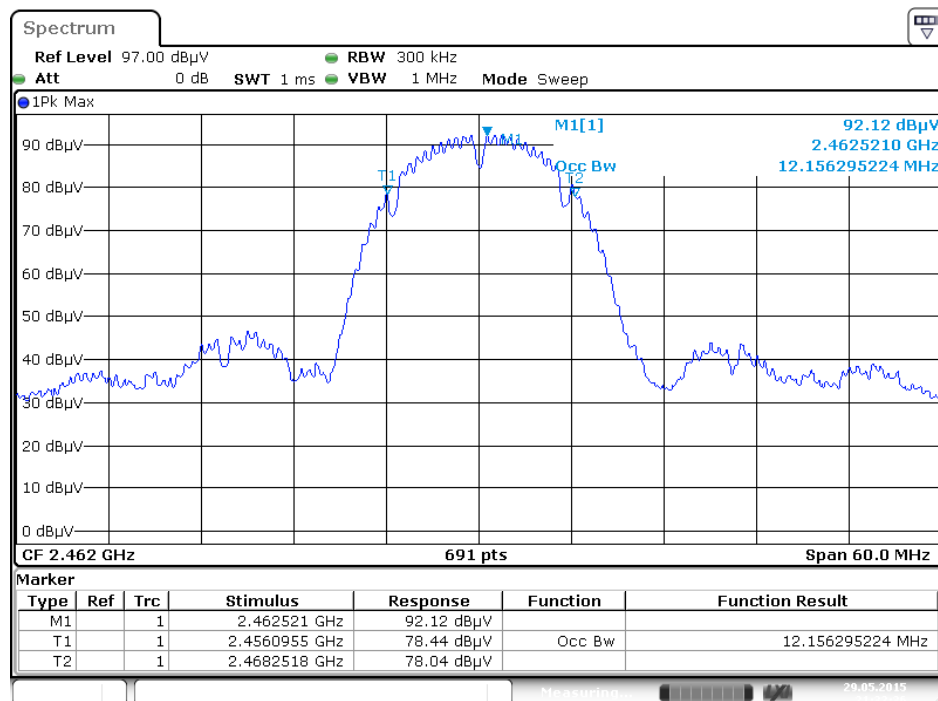
Note: All the test values were listed in the report.

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

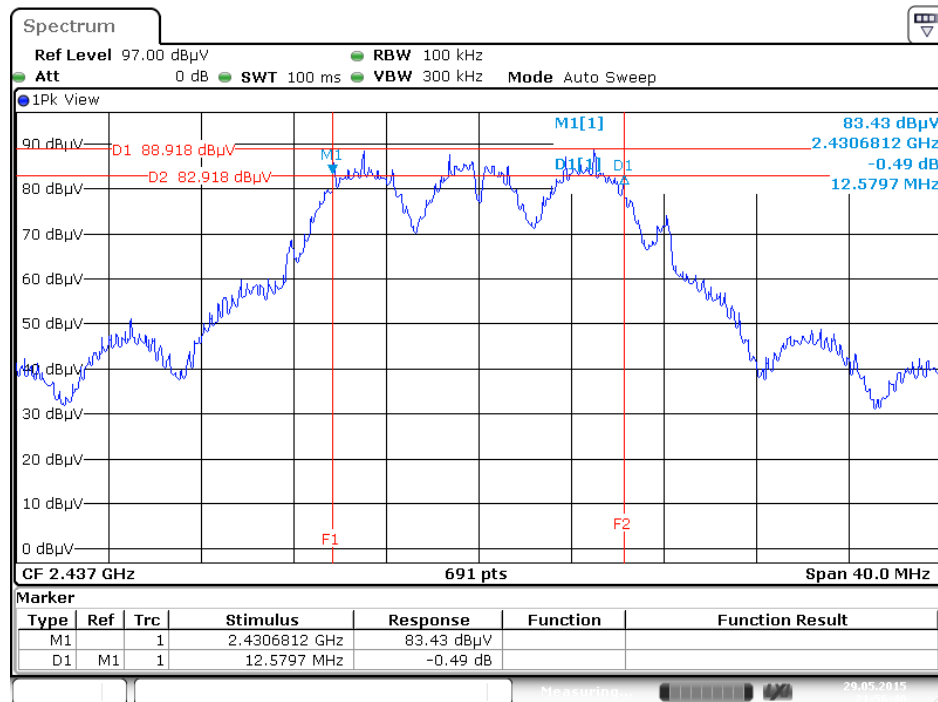
6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2412 MHz / Antenna 1 + Antenna 2



99% Occupied Bandwidth Plot on Configuration IEEE 802.11b / 2462 MHz / Antenna 1 + Antenna 2



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



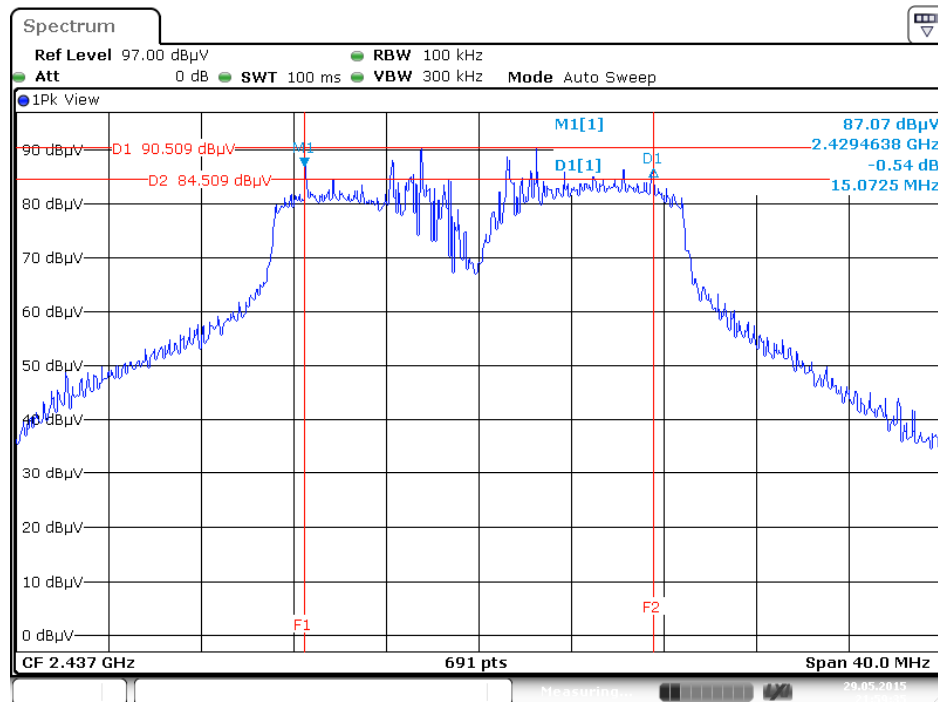
Date: 29.MAY.2015 21:56:40

99% Occupied Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz / Antenna 1 + Antenna 2

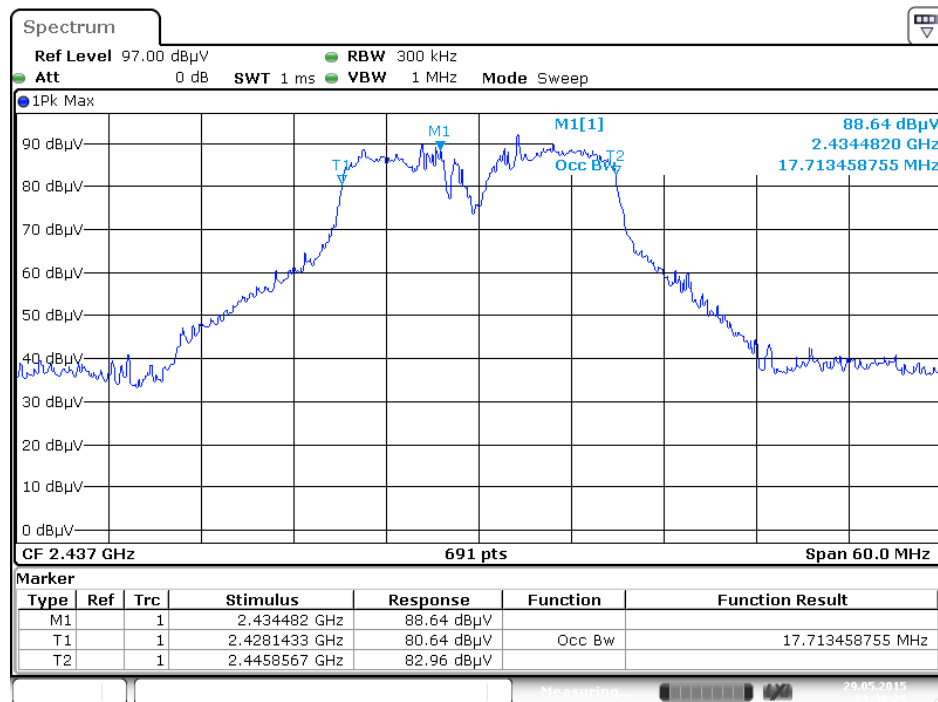


Date: 29.MAY.2015 21:35:15

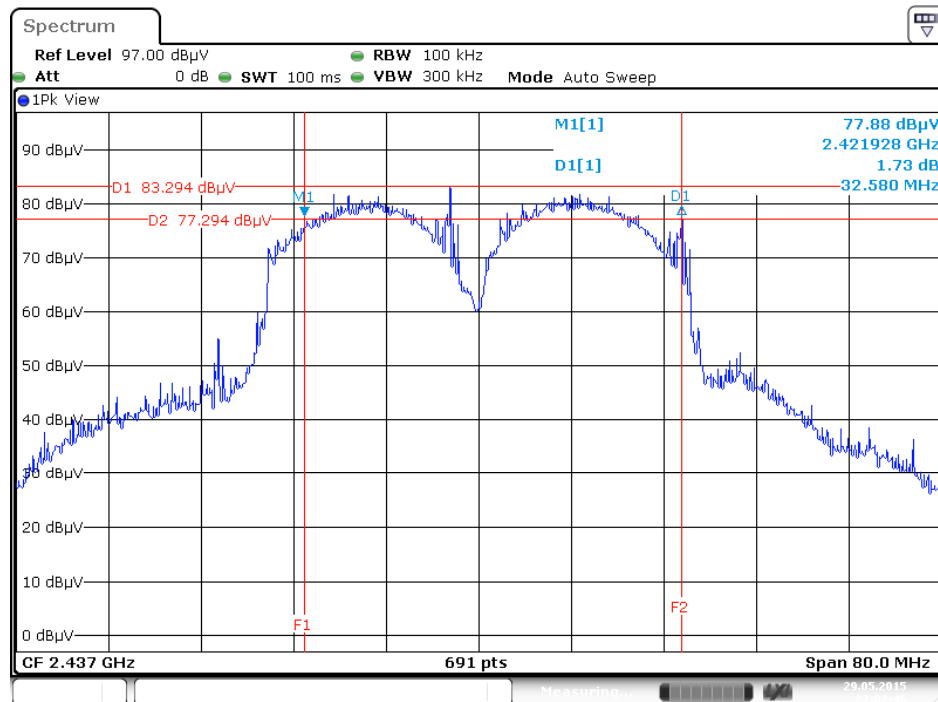
6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Antenna 1 + Antenna 2



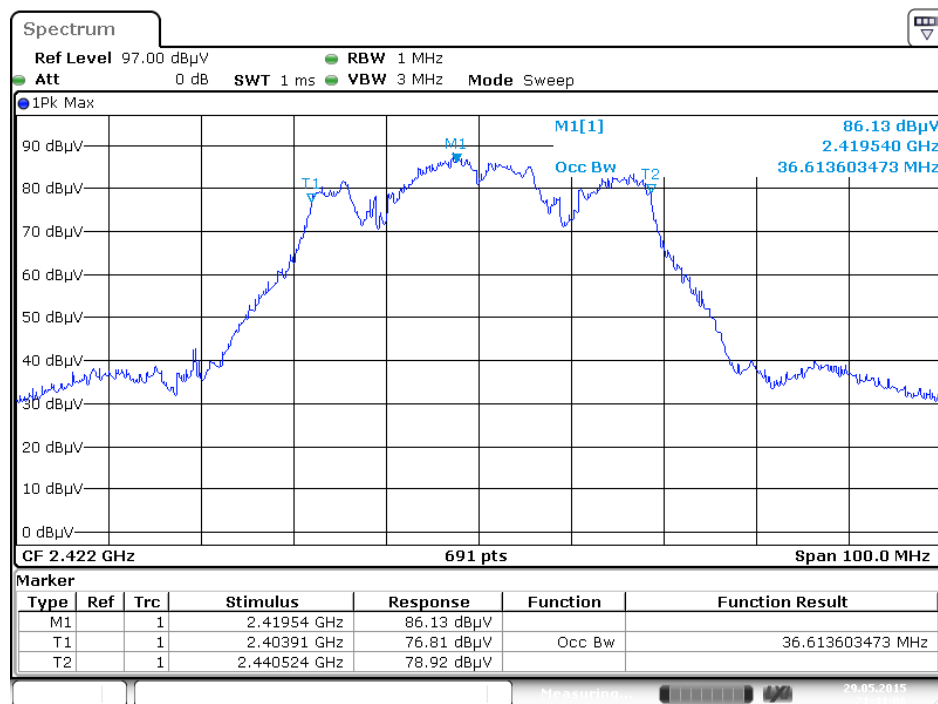
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Antenna 1 + Antenna 2



6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / 2437 MHz / Antenna 1 + Antenna 2



99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / 2422 MHz / Antenna 1 + Antenna 2



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 (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

4.5.2. 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

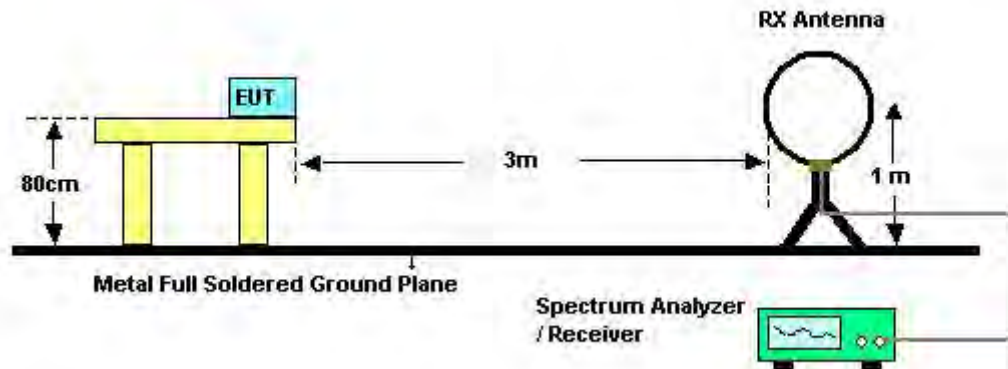
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.5.3. Test Procedures

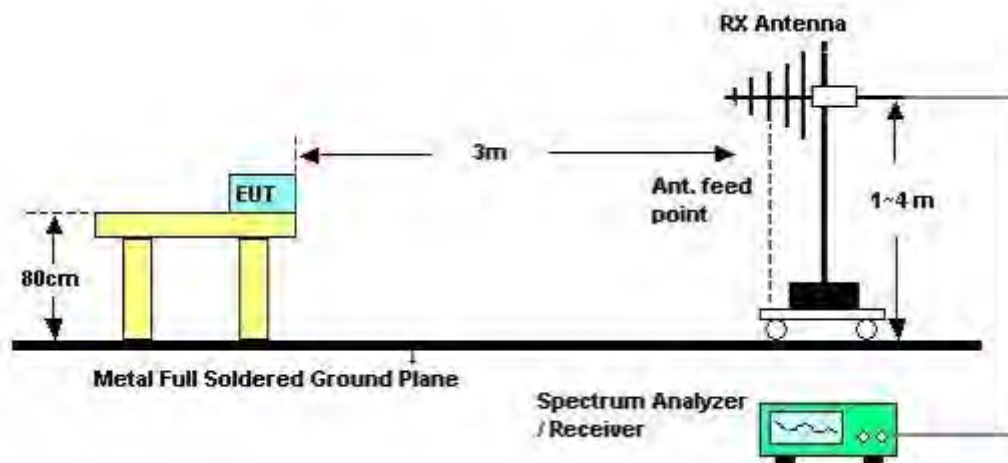
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting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

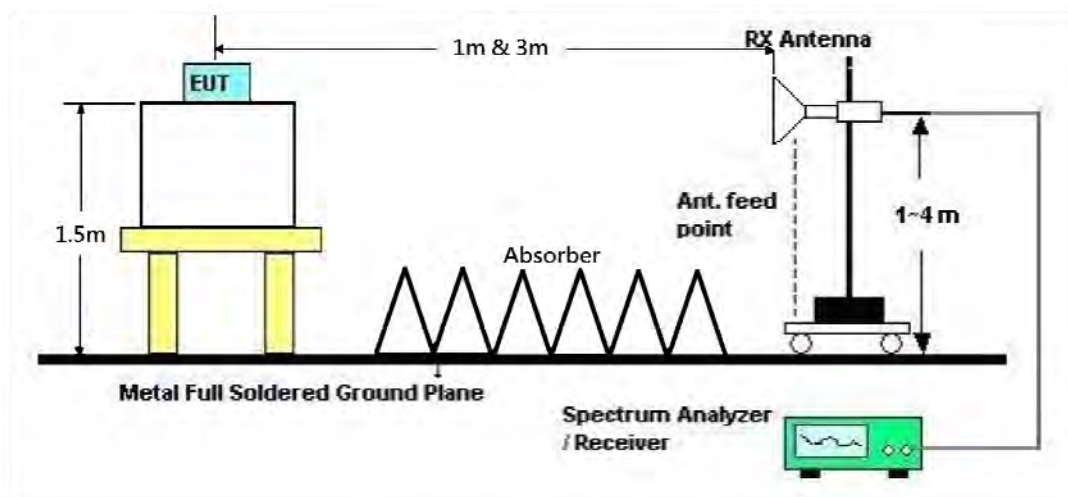
For Radiated Emissions: 9kHz ~30MHz



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	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	Normal Link
Test Date	Jun. 03, 2015	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.

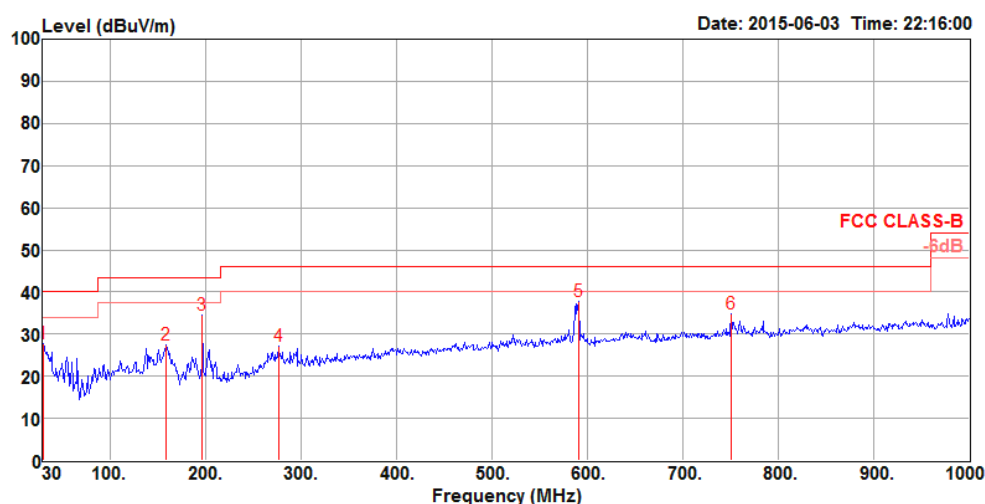
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

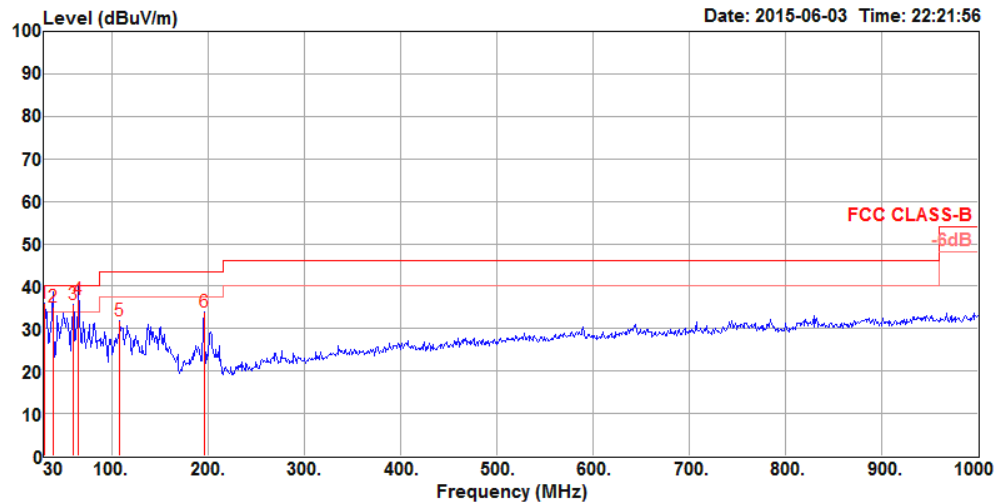
Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	Normal Link
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	30.00	27.79	40.00	-12.21	39.29	0.64	20.10	32.24	150	184	Peak
2	159.01	27.56	43.50	-15.94	47.73	1.17	10.84	32.18	125	199	Peak
3	196.84	34.54	43.50	-8.96	55.19	1.25	10.16	32.06	300	0	Peak
4	276.38	27.07	46.00	-18.93	44.28	1.44	13.54	32.19	100	50	Peak
5	590.66	37.68	46.00	-8.32	48.86	2.05	19.02	32.25	200	106	Peak
6	750.71	34.67	46.00	-11.33	44.11	2.22	20.41	32.07	150	206	Peak

Vertical



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	30.00	35.93	40.00	-4.07	47.43	0.64	20.10	32.24	100	78 Peak	VERTICAL
2	38.73	35.09	40.00	-4.91	51.90	0.66	14.82	32.29	100	86 QP	VERTICAL
3	60.07	35.70	40.00	-4.30	60.33	0.77	6.90	32.30	100	78 Peak	VERTICAL
4	65.89	36.99	40.00	-3.01	61.67	0.80	6.84	32.32	150	82 QP	VERTICAL
5	108.57	31.87	43.50	-11.63	51.01	0.98	12.14	32.26	100	150 Peak	VERTICAL
6	195.87	33.96	43.50	-9.54	54.70	1.25	10.07	32.06	150	144 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	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11b CH 1 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4824.03	46.05	54.00	-7.95	41.75	5.87	33.39	34.96	Average	234	53	HORIZONTAL
2	4824.03	50.38	74.00	-23.62	46.08	5.87	33.39	34.96	Peak	234	53	HORIZONTAL
3	7235.25	38.87	54.00	-15.13	30.63	7.09	36.37	35.22	Average	250	17	HORIZONTAL
4	7237.65	50.35	74.00	-23.65	42.11	7.09	36.37	35.22	Peak	250	17	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4823.97	43.28	54.00	-10.72	38.98	5.87	33.39	34.96	Average	107	352	VERTICAL
2	4824.01	49.12	74.00	-24.88	44.82	5.87	33.39	34.96	Peak	107	352	VERTICAL
3	7235.13	50.64	74.00	-23.36	42.40	7.09	36.37	35.22	Peak	150	0	VERTICAL
4	7235.22	38.17	54.00	-15.83	29.93	7.09	36.37	35.22	Average	150	0	VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11b CH 6 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4873.97	44.45	54.00	-9.55	40.01	5.92	33.48	34.96	Average	226	10	HORIZONTAL
2	4874.01	50.30	74.00	-23.70	45.86	5.92	33.48	34.96	Peak	226	10	HORIZONTAL
3	7310.31	40.57	54.00	-13.43	32.15	7.13	36.51	35.22	Average	236	60	HORIZONTAL
4	7312.51	51.44	74.00	-22.56	43.03	7.13	36.51	35.23	Peak	236	60	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Limit	Level	Loss	Factor	Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4874.01	40.36	54.00	-13.64	35.92	5.92	33.48	34.96	Average	105	346	VERTICAL
2	4874.10	48.26	74.00	-25.74	43.82	5.92	33.48	34.96	Peak	105	346	VERTICAL
3	7310.25	43.77	54.00	-10.23	35.35	7.13	36.51	35.22	Average	100	0	VERTICAL
4	7310.65	52.40	74.00	-21.60	43.98	7.13	36.51	35.22	Peak	100	0	VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11b CH 11 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4924.00	43.54	54.00	-10.46	38.94	5.97	33.58	34.95	Average	239	7	HORIZONTAL
2	4924.03	49.30	74.00	-24.70	44.70	5.97	33.58	34.95	Peak	239	7	HORIZONTAL
3	7385.77	51.14	74.00	-22.86	42.59	7.17	36.61	35.23	Peak	242	48	HORIZONTAL
4	7386.84	40.54	54.00	-13.46	31.99	7.17	36.61	35.23	Average	242	48	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4923.84	47.51	74.00	-26.49	42.91	5.97	33.58	34.95	Peak	240	11	VERTICAL
2	4924.04	38.57	54.00	-15.43	33.97	5.97	33.58	34.95	Average	240	11	VERTICAL
3	7382.30	51.72	74.00	-22.28	43.18	7.16	36.61	35.23	Peak	100	360	VERTICAL
4	7384.29	42.07	54.00	-11.93	33.52	7.17	36.61	35.23	Average	100	360	VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11g CH 1 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4814.88	50.56	74.00	-23.44	46.31	5.85	33.36	34.96	Peak	107	52	HORIZONTAL
2	4817.13	37.28	54.00	-16.72	33.01	5.87	33.36	34.96	Average	107	52	HORIZONTAL
3	7217.77	49.17	74.00	-24.83	40.96	7.08	36.35	35.22	Peak	150	360	HORIZONTAL
4	7255.90	36.36	54.00	-17.64	28.08	7.10	36.40	35.22	Average	150	360	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4814.16	35.41	54.00	-18.59	31.16	5.85	33.36	34.96	Average	207	358	VERTICAL
2	4816.69	47.50	74.00	-26.50	43.23	5.87	33.36	34.96	Peak	207	358	VERTICAL
3	7232.02	36.26	54.00	-17.74	28.02	7.09	36.37	35.22	Average	150	60	VERTICAL
4	7241.28	48.89	74.00	-25.11	40.62	7.09	36.40	35.22	Peak	150	60	VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11g CH 6 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4864.81	51.22	74.00	-22.78	46.83	5.90	33.45	34.96	Peak	120	53	HORIZONTAL
2	4866.04	38.68	54.00	-15.32	34.29	5.90	33.45	34.96	Average	120	53	HORIZONTAL
3	7314.76	37.64	54.00	-16.36	29.23	7.13	36.51	35.23	Average	132	321	HORIZONTAL
4	7318.16	51.83	74.00	-22.17	43.41	7.14	36.51	35.23	Peak	132	321	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4880.87	36.95	54.00	-17.05	32.51	5.92	33.48	34.96	Average	217	360	VERTICAL
2	4883.12	50.02	74.00	-23.98	45.58	5.92	33.48	34.96	Peak	217	360	VERTICAL
3	7312.16	54.79	74.00	-19.21	46.38	7.13	36.51	35.23	Peak	121	0	VERTICAL
4	7315.27	40.54	54.00	-13.46	32.13	7.13	36.51	35.23	Average	121	0	VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11g CH 11 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4917.92	49.74	74.00	-24.26	45.20	5.95	33.54	34.95	Peak	140	56	HORIZONTAL
2	4919.15	36.63	54.00	-17.37	32.07	5.97	33.54	34.95	Average	140	56	HORIZONTAL
3	7386.19	50.07	74.00	-23.93	41.52	7.17	36.61	35.23	Peak	188	360	HORIZONTAL
4	7388.47	37.28	54.00	-16.72	28.73	7.17	36.61	35.23	Average	188	360	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4922.05	33.43	54.00	-20.57	28.83	5.97	33.58	34.95	Average	140	262	VERTICAL
2	4923.70	45.50	74.00	-28.50	40.90	5.97	33.58	34.95	Peak	140	262	VERTICAL
3	7383.77	37.50	54.00	-16.50	28.95	7.17	36.61	35.23	Average	171	30	VERTICAL
4	7385.86	51.52	74.00	-22.48	42.97	7.17	36.61	35.23	Peak	171	30	VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 1 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4821.51	37.19	54.00	-16.81	32.89	5.87	33.39	34.96	Average	138	3	HORIZONTAL
2	4821.97	50.54	74.00	-23.46	46.24	5.87	33.39	34.96	Peak	138	3	HORIZONTAL
3	7232.47	51.68	74.00	-22.32	43.44	7.09	36.37	35.22	Peak	240	48	HORIZONTAL
4	7236.81	37.43	54.00	-16.57	29.19	7.09	36.37	35.22	Average	240	48	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4825.39	50.68	74.00	-23.32	46.38	5.87	33.39	34.96	Peak	235	357	VERTICAL
2	4825.59	36.53	54.00	-17.47	32.23	5.87	33.39	34.96	Average	235	357	VERTICAL
3	7232.70	52.79	74.00	-21.21	44.55	7.09	36.37	35.22	Peak	100	6	VERTICAL
4	7236.98	38.61	54.00	-15.39	30.37	7.09	36.37	35.22	Average	100	6	VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 6 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4867.63	48.92	74.00	-25.08	44.51	5.92	33.45	34.96	Peak	153	3 HORIZONTAL
2	4872.06	36.43	54.00	-17.57	31.99	5.92	33.48	34.96	Average	153	3 HORIZONTAL
3	7308.14	37.17	54.00	-16.83	28.75	7.13	36.51	35.22	Average	163	0 HORIZONTAL
4	7317.05	49.42	74.00	-24.58	41.00	7.14	36.51	35.23	Peak	163	0 HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4866.07	49.98	74.00	-24.02	45.59	5.90	33.45	34.96	Peak	160	350 VERTICAL
2	4866.30	36.50	54.00	-17.50	32.11	5.90	33.45	34.96	Average	160	350 VERTICAL
3	7301.01	49.52	74.00	-24.48	41.13	7.13	36.48	35.22	Peak	153	315 VERTICAL
4	7312.42	37.29	54.00	-16.71	28.88	7.13	36.51	35.23	Average	153	315 VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 11 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4921.74	35.04	54.00	-18.96	30.48	5.97	33.54	34.95	Average	137	288	HORIZONTAL
2	4926.61	48.66	74.00	-25.34	44.06	5.97	33.58	34.95	Peak	137	288	HORIZONTAL
3	7386.38	37.18	54.00	-16.82	28.63	7.17	36.61	35.23	Average	150	91	HORIZONTAL
4	7391.88	50.71	74.00	-23.29	42.16	7.17	36.61	35.23	Peak	150	91	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4921.28	36.89	54.00	-17.11	32.33	5.97	33.54	34.95	Average	188	360	VERTICAL
2	4926.89	50.03	74.00	-23.97	45.43	5.97	33.58	34.95	Peak	188	360	VERTICAL
3	7387.10	52.44	74.00	-21.56	43.89	7.17	36.61	35.23	Peak	110	360	VERTICAL
4	7387.30	39.13	54.00	-14.87	30.58	7.17	36.61	35.23	Average	110	360	VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 3 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4847.02	46.41	74.00	-27.59	42.07	5.88	33.42	34.96 Peak	150	56	HORIZONTAL
2	4848.54	34.45	54.00	-19.55	30.11	5.88	33.42	34.96 Average	150	56	HORIZONTAL
3	7264.22	49.32	74.00	-24.68	41.01	7.10	36.43	35.22 Peak	160	349	HORIZONTAL
4	7267.95	36.83	54.00	-17.17	28.51	7.11	36.43	35.22 Average	160	349	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4845.49	46.06	74.00	-27.94	41.72	5.88	33.42	34.96 Peak	164	357	VERTICAL
2	4846.31	33.58	54.00	-20.42	29.24	5.88	33.42	34.96 Average	164	357	VERTICAL
3	7262.90	50.74	74.00	-23.26	42.43	7.10	36.43	35.22 Peak	150	7	VERTICAL
4	7265.85	36.95	54.00	-17.05	28.63	7.11	36.43	35.22 Average	150	7	VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 6 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4875.67	48.60	74.00	-25.40	44.16	5.92	33.48	34.96	Peak	173	0 HORIZONTAL
2	4876.59	35.41	54.00	-18.59	30.97	5.92	33.48	34.96	Average	173	0 HORIZONTAL
3	7307.96	36.97	54.00	-17.03	28.55	7.13	36.51	35.22	Average	160	302 HORIZONTAL
4	7310.69	49.75	74.00	-24.25	41.33	7.13	36.51	35.22	Peak	160	302 HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4877.82	35.11	54.00	-18.89	30.67	5.92	33.48	34.96	Average	194	339 VERTICAL
2	4879.48	48.43	74.00	-25.57	43.99	5.92	33.48	34.96	Peak	194	339 VERTICAL
3	7309.12	49.92	74.00	-24.08	41.50	7.13	36.51	35.22	Peak	171	20 VERTICAL
4	7312.31	36.87	54.00	-17.13	28.46	7.13	36.51	35.23	Average	171	20 VERTICAL

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 9 / Antenna 1 + Antenna 2
Test Date	May 01, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4907.39	46.45	74.00	-27.55	41.91	5.95	33.54	34.95	Peak	151	47 HORIZONTAL
2	4909.56	33.20	54.00	-20.80	28.66	5.95	33.54	34.95	Average	151	47 HORIZONTAL
3	7354.10	49.76	74.00	-24.24	41.27	7.16	36.56	35.23	Peak	171	335 HORIZONTAL
4	7359.39	37.22	54.00	-16.78	28.70	7.16	36.59	35.23	Average	171	335 HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4910.01	45.65	74.00	-28.35	41.11	5.95	33.54	34.95	Peak	167	85 VERTICAL
2	4913.33	32.70	54.00	-21.30	28.16	5.95	33.54	34.95	Average	167	86 VERTICAL
3	7355.84	37.03	54.00	-16.97	28.54	7.16	36.56	35.23	Average	150	124 VERTICAL
4	7359.47	50.56	74.00	-23.44	42.04	7.16	36.59	35.23	Peak	150	124 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 KDB 558074 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	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11b CH 1, 6, 11 / Antenna 1 + Antenna 2
Test Date	Apr. 21, 2015		

Channel 1

	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	2369.05	63.06	74.00	-10.94	31.44	3.72	27.90	0.00	104	138	VERTICAL	Peak
2	2370.33	50.70	54.00	-3.30	19.08	3.72	27.90	0.00	104	138	VERTICAL	Average
3	2410.40	111.94			80.30	3.74	27.90	0.00	104	138	VERTICAL	Average
4	2411.36	115.73			84.09	3.74	27.90	0.00	104	138	VERTICAL	Peak

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2370.65	53.60	54.00	-0.40	21.98	3.72	27.90	0.00	100	75	HORIZONTAL	Average
2	2372.26	65.71	74.00	-8.29	34.09	3.72	27.90	0.00	100	75	HORIZONTAL	Peak
3	2413.28	118.26			86.62	3.74	27.90	0.00	100	75	HORIZONTAL	Peak
4	2413.92	114.20			82.56	3.74	27.90	0.00	100	75	HORIZONTAL	Average

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2460.40	112.89			81.20	3.79	27.90	0.00	194	194	VERTICAL	Average
2	2461.36	116.87			85.18	3.79	27.90	0.00	194	194	VERTICAL	Peak
3	2487.96	53.12	54.00	-0.88	21.41	3.81	27.90	0.00	194	194	VERTICAL	Average
4	2502.06	62.37	74.00	-11.63	30.64	3.83	27.90	0.00	194	194	VERTICAL	Peak

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

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11g CH 1, 6, 11 / Antenna 1 + Antenna 2
Test Date	Apr. 21, 2015		

Channel 1

	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	2389.56	67.28	74.00	-6.72	35.66	3.72	27.90	0.00	100	75	HORIZONTAL	Peak
2	2390.00	53.89	54.00	-0.11	22.27	3.72	27.90	0.00	100	75	HORIZONTAL	Average
3	2414.24	108.19			76.55	3.74	27.90	0.00	100	75	HORIZONTAL	Average
4	2414.56	117.76			86.12	3.74	27.90	0.00	100	75	HORIZONTAL	Peak

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	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2388.92	63.31	74.00	-10.69	31.69	3.72	27.90	0.00	100	72	HORIZONTAL	Peak
2	2390.00	52.99	54.00	-1.01	21.37	3.72	27.90	0.00	100	72	HORIZONTAL	Average
3	2433.80	109.90			78.23	3.77	27.90	0.00	100	72	HORIZONTAL	Average
4	2434.60	119.26			87.59	3.77	27.90	0.00	100	72	HORIZONTAL	Peak
5	2483.50	52.56	54.00	-1.44	20.85	3.81	27.90	0.00	100	72	HORIZONTAL	Average
6	2483.50	63.19	74.00	-10.81	31.48	3.81	27.90	0.00	100	72	HORIZONTAL	Peak

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	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2464.24	108.83			77.14	3.79	27.90	0.00	100	66	HORIZONTAL	Average
2	2464.89	118.37			86.68	3.79	27.90	0.00	100	66	HORIZONTAL	Peak
3	2483.80	53.61	54.00	-0.39	21.90	3.81	27.90	0.00	100	66	HORIZONTAL	Average
4	2484.76	66.53	74.00	-7.47	34.82	3.81	27.90	0.00	100	66	HORIZONTAL	Peak

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

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT20 CH 1, 6, 11 / Antenna 1 + Antenna 2
Test Date	Apr. 21, 2015		

Channel 1

	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	2388.60	66.81	74.00	-7.19	35.19	3.72	27.90	0.00	100	68	HORIZONTAL	Peak
2	2390.00	53.77	54.00	-0.23	22.15	3.72	27.90	0.00	100	68	HORIZONTAL	Average
3	2411.04	116.76			85.12	3.74	27.90	0.00	100	68	HORIZONTAL	Peak
4	2411.36	107.18			75.54	3.74	27.90	0.00	100	68	HORIZONTAL	Average

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.56	64.28	74.00	-9.72	32.66	3.72	27.90	0.00	100	74	HORIZONTAL	Peak
2	2390.00	53.32	54.00	-0.68	21.70	3.72	27.90	0.00	100	74	HORIZONTAL	Average
3	2434.44	121.11			89.44	3.77	27.90	0.00	100	74	HORIZONTAL	Peak
4	2436.04	111.32			79.65	3.77	27.90	0.00	100	74	HORIZONTAL	Average
5	2483.50	52.96	54.00	-1.04	21.25	3.81	27.90	0.00	100	74	HORIZONTAL	Average
6	2484.12	64.04	74.00	-9.96	32.33	3.81	27.90	0.00	100	74	HORIZONTAL	Peak

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2462.64	116.86			85.17	3.79	27.90	0.00	100	70	HORIZONTAL	Peak
2	2463.28	107.09			75.40	3.79	27.90	0.00	100	70	HORIZONTAL	Average
3	2483.50	53.68	54.00	-0.32	21.97	3.81	27.90	0.00	100	70	HORIZONTAL	Average
4	2483.50	67.80	74.00	-6.20	36.09	3.81	27.90	0.00	100	70	HORIZONTAL	Peak

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

Temperature	24.6°C	Humidity	54%
Test Engineer	Lucke Hsieh	Configurations	IEEE 802.11n MCS0 HT40 CH 3, 6, 9 / Antenna 1 + Antenna 2
Test Date	Apr. 21, 2015		

Channel 3

	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	2390.00	53.50	54.00	-0.50	21.88	3.72	27.90	0.00	100	74	HORIZONTAL	Average
2	2390.00	64.76	74.00	-9.24	33.14	3.72	27.90	0.00	100	74	HORIZONTAL	Peak
3	2430.65	100.61			68.94	3.77	27.90	0.00	100	74	HORIZONTAL	Average
4	2430.65	110.12			78.45	3.77	27.90	0.00	100	74	HORIZONTAL	Peak

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.24	53.67	54.00	-0.33	22.05	3.72	27.90	0.00	100	70	HORIZONTAL	Average
2	2389.24	64.86	74.00	-9.14	33.24	3.72	27.90	0.00	100	70	HORIZONTAL	Peak
3	2427.71	114.25			82.58	3.77	27.90	0.00	100	70	HORIZONTAL	Peak
4	2428.03	104.33			72.66	3.77	27.90	0.00	100	70	HORIZONTAL	Average
5	2483.50	52.10	54.00	-1.90	20.39	3.81	27.90	0.00	100	70	HORIZONTAL	Average
6	2485.40	63.61	74.00	-10.39	31.90	3.81	27.90	0.00	100	70	HORIZONTAL	Peak

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

Channel 9

	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	2461.62	100.92			69.23	3.79	27.90	0.00	100	69	HORIZONTAL	Average
2	2463.22	110.83			79.14	3.79	27.90	0.00	100	69	HORIZONTAL	Peak
3	2483.50	53.60	54.00	-0.40	21.89	3.81	27.90	0.00	100	69	HORIZONTAL	Average
4	2483.50	64.78	74.00	-9.22	33.07	3.81	27.90	0.00	100	69	HORIZONTAL	Peak

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.

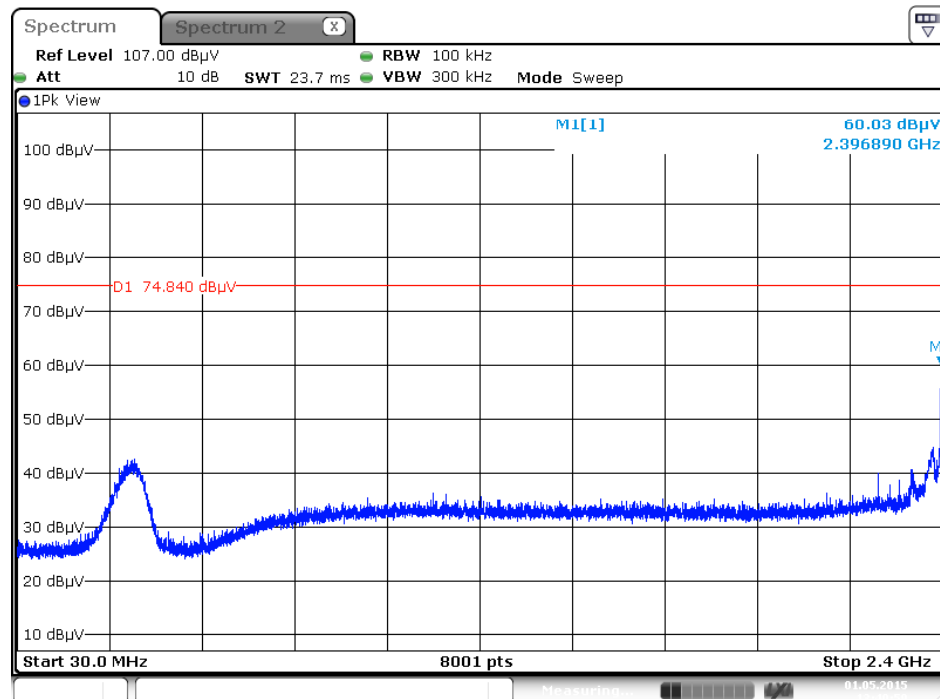
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11b / Reference Level



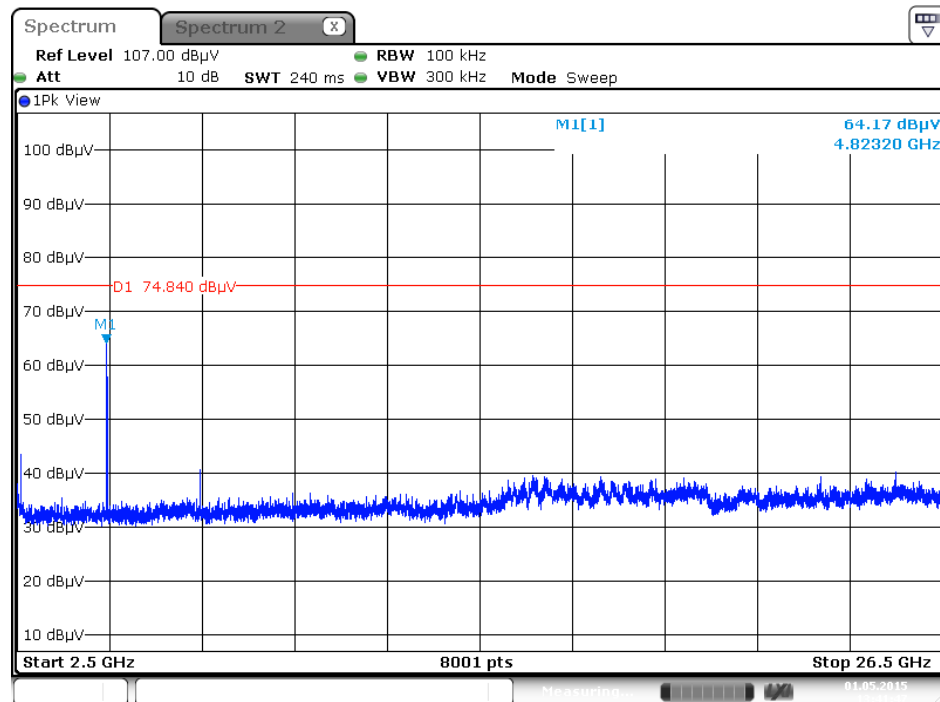
Date: 1 MAY 2015 13:36:43

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



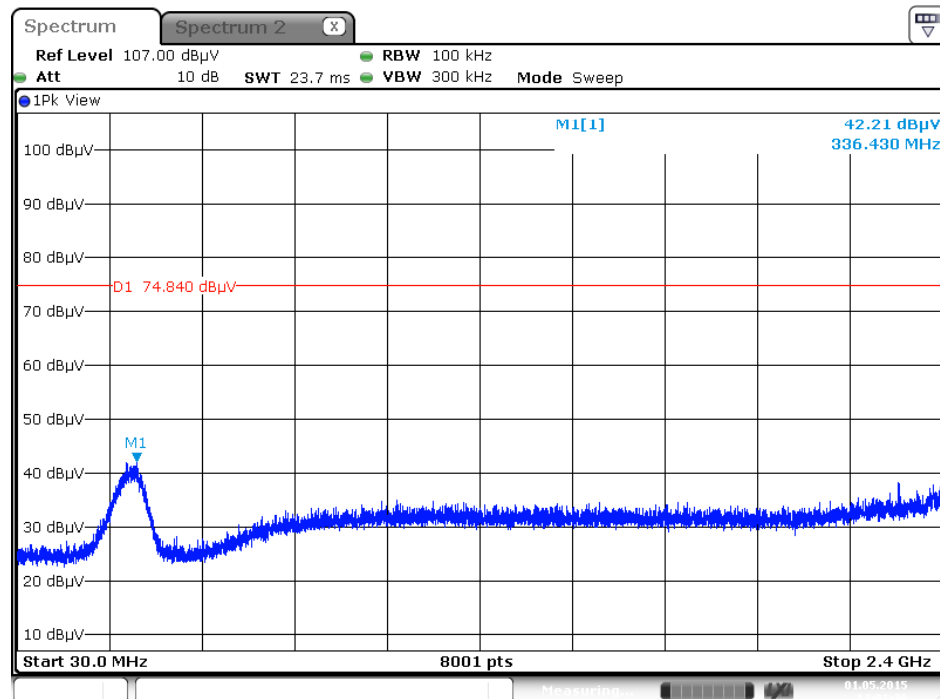
Date: 1 MAY 2015 13:40:58

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



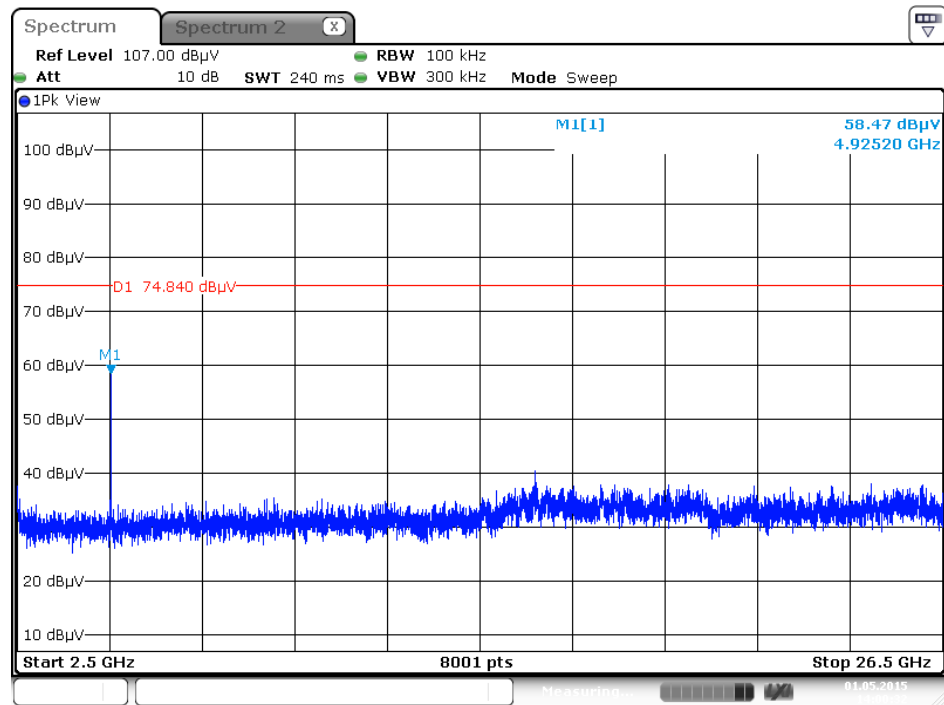
Date: 1 MAY 2015 13:41:48

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



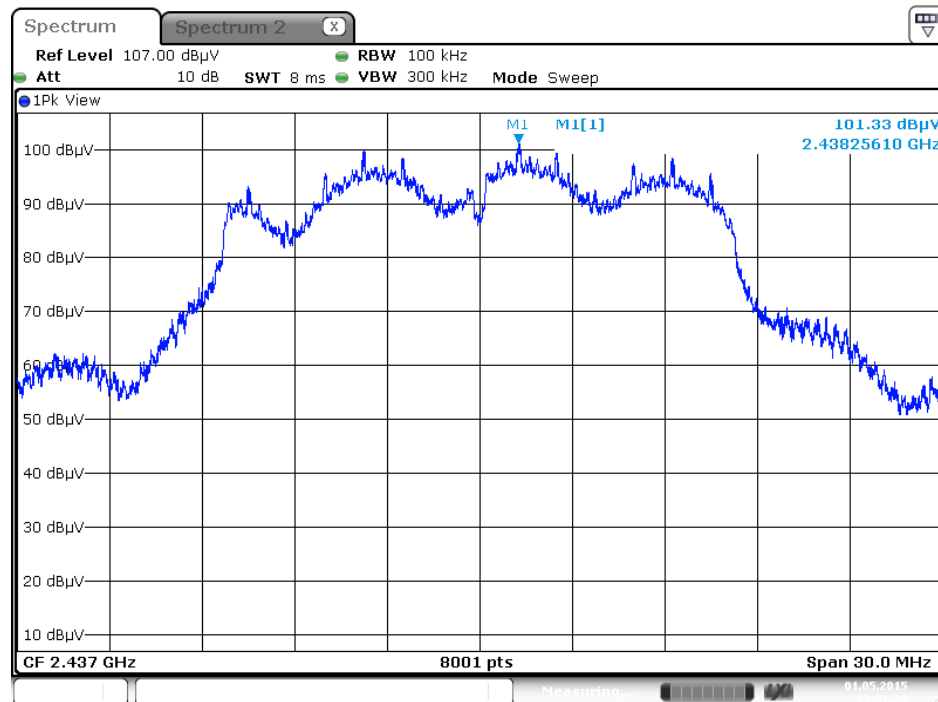
Date: 1 MAY 2015 14:01:36

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



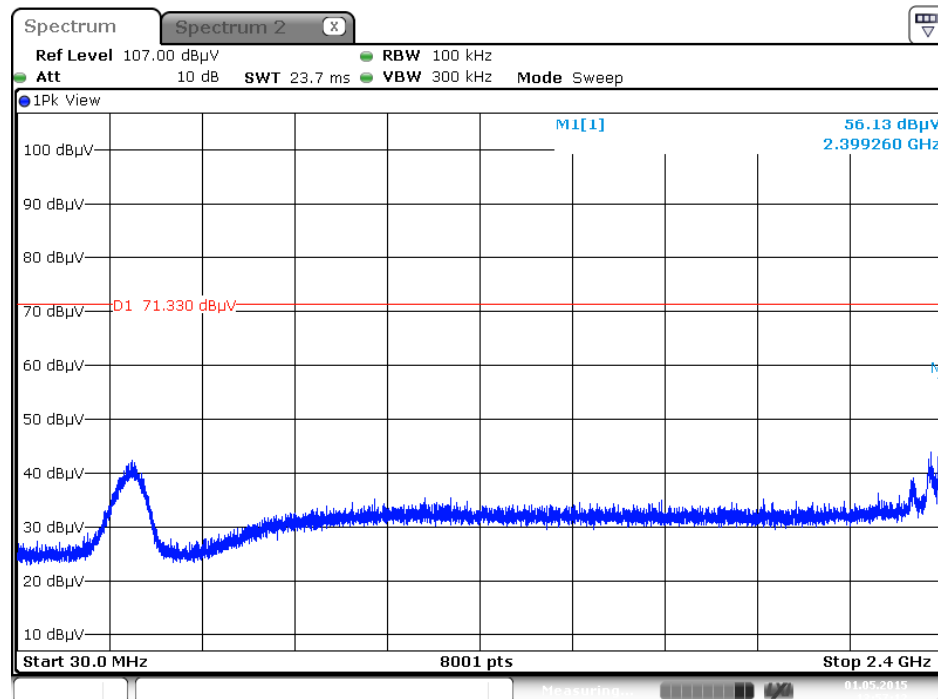
Date: 1 MAY 2015 14:00:32

Plot on Configuration IEEE 802.11g / Reference Level



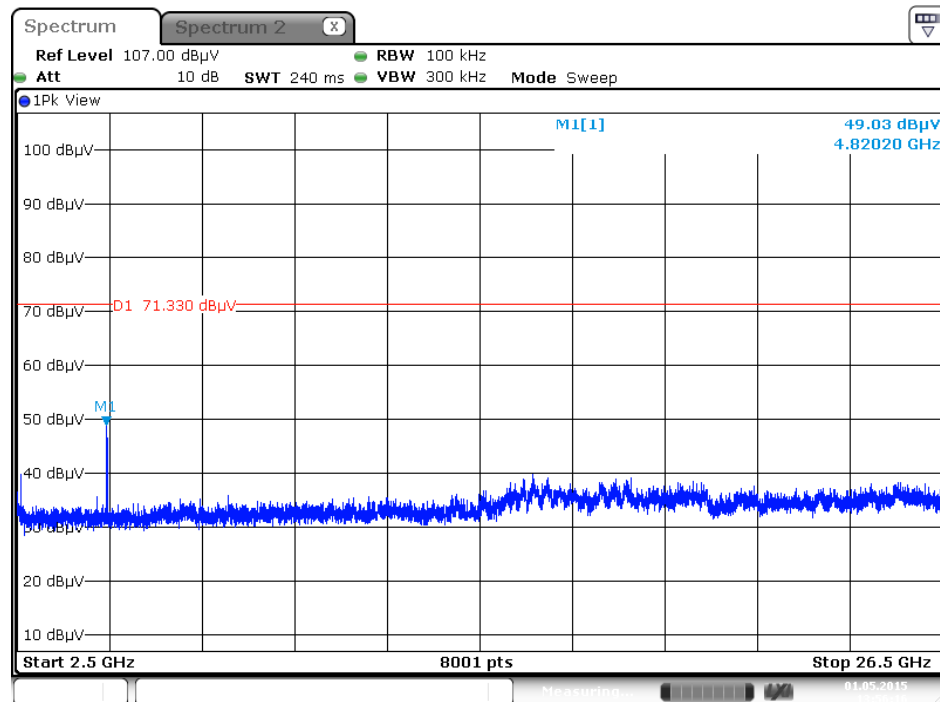
Date: 1 MAY 2015 13:51:29

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



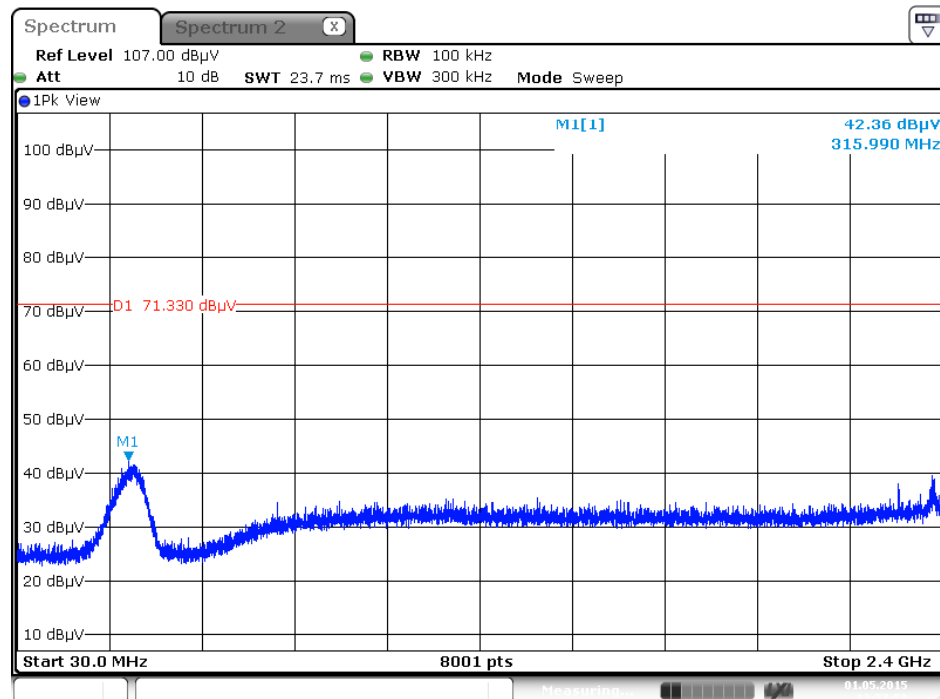
Date: 1 MAY 2015 13:57:12

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



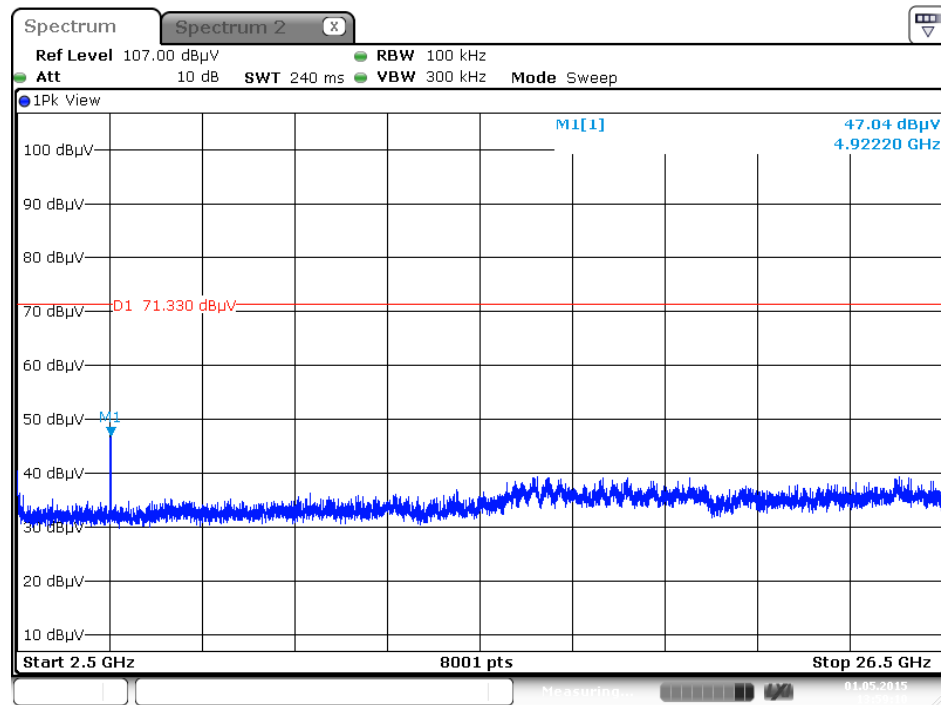
Date: 1 MAY 2015 13:56:17

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



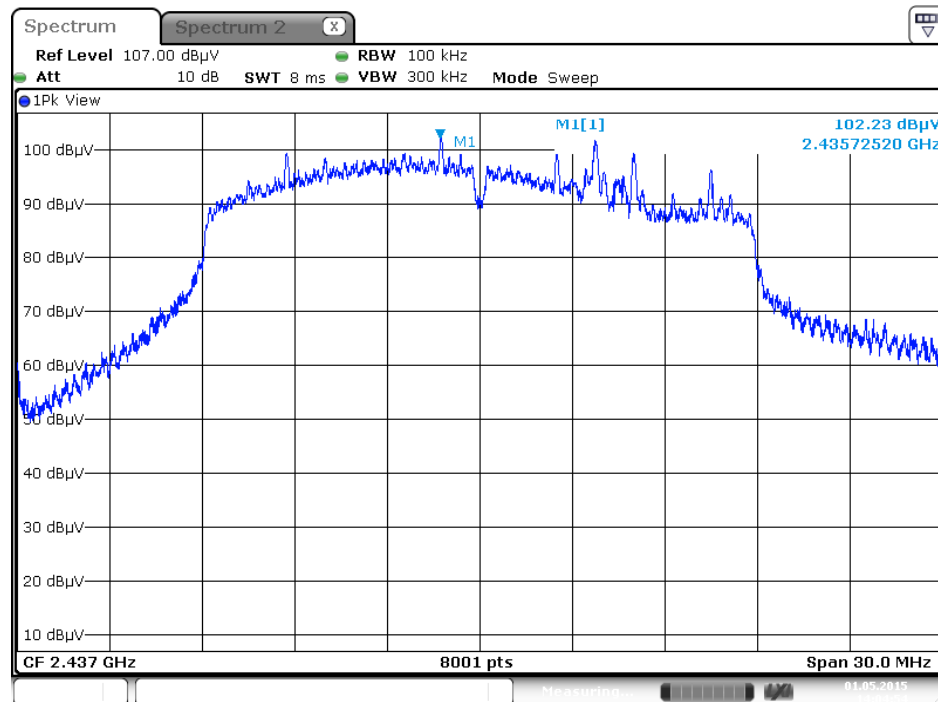
Date: 1 MAY 2015 13:57:57

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



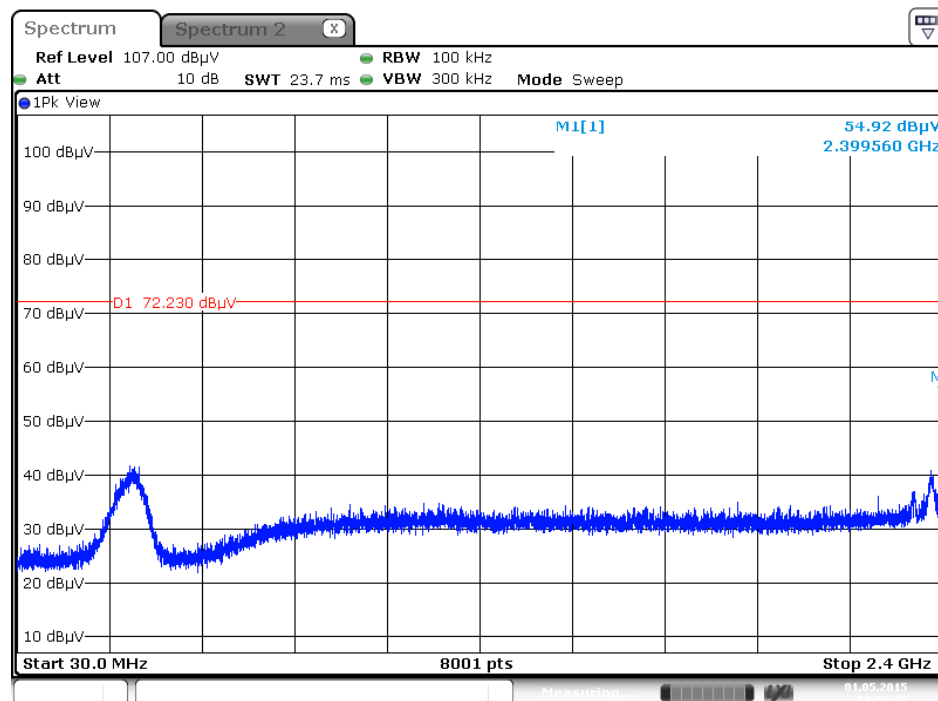
Date: 1 MAY 2015 13:59:10

Plot on Configuration IEEE 802.11n MCS0 HT20 / Reference Level



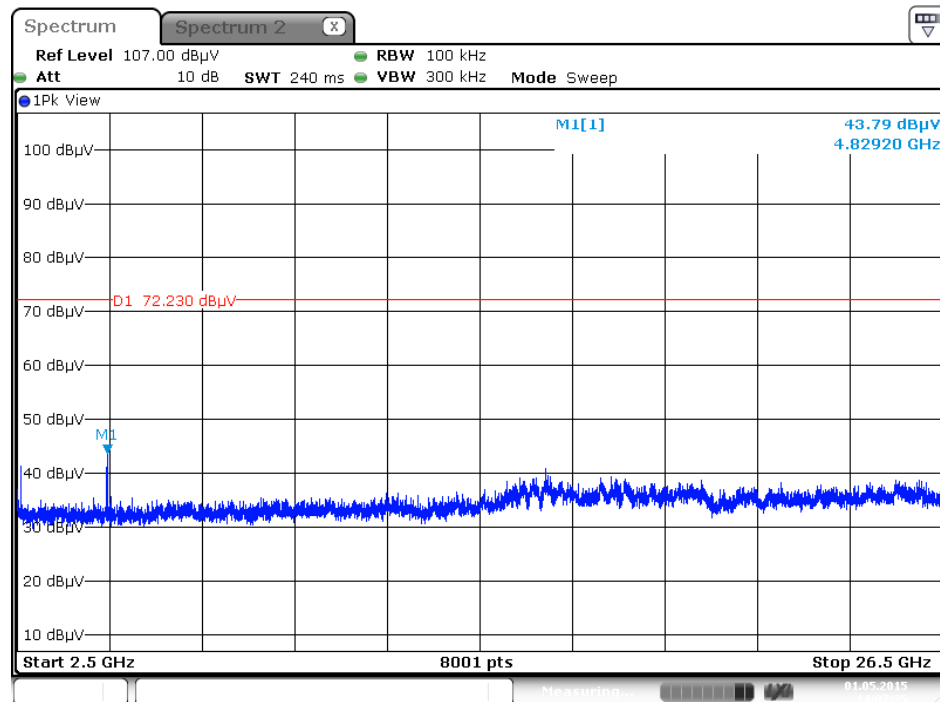
Date: 1 MAY 2015 14:04:55

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



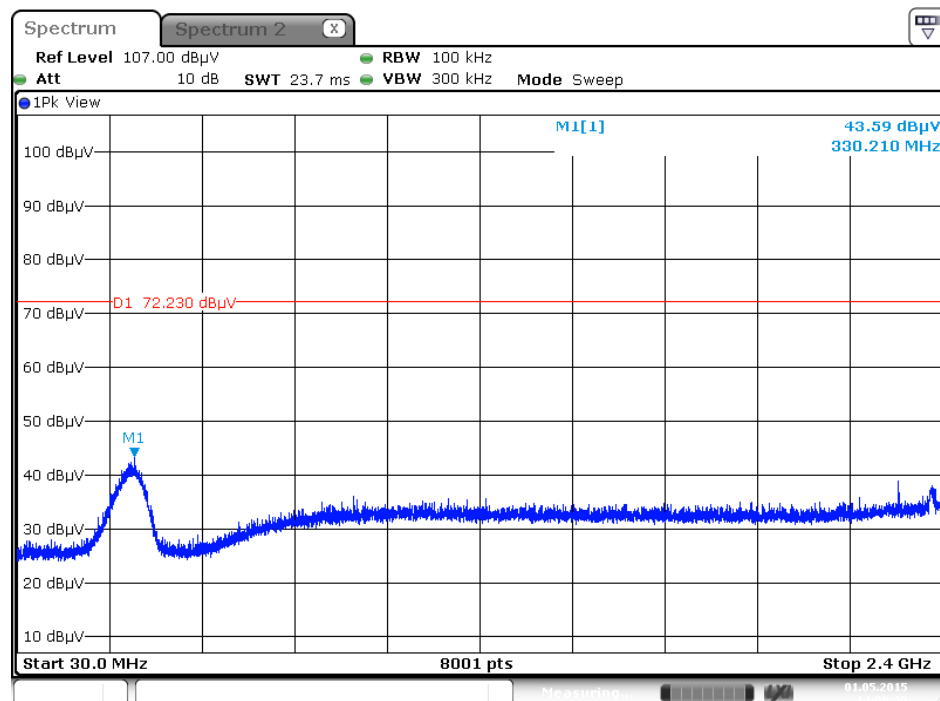
Date: 1 MAY 2015 14:06:42

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



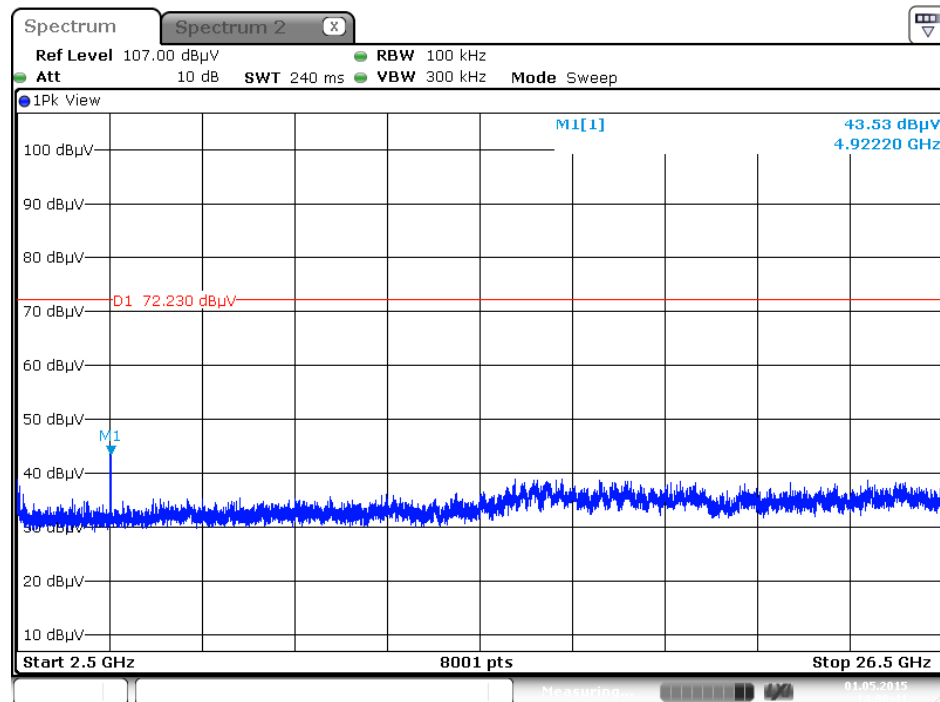
Date: 1 MAY 2015 14:07:25

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



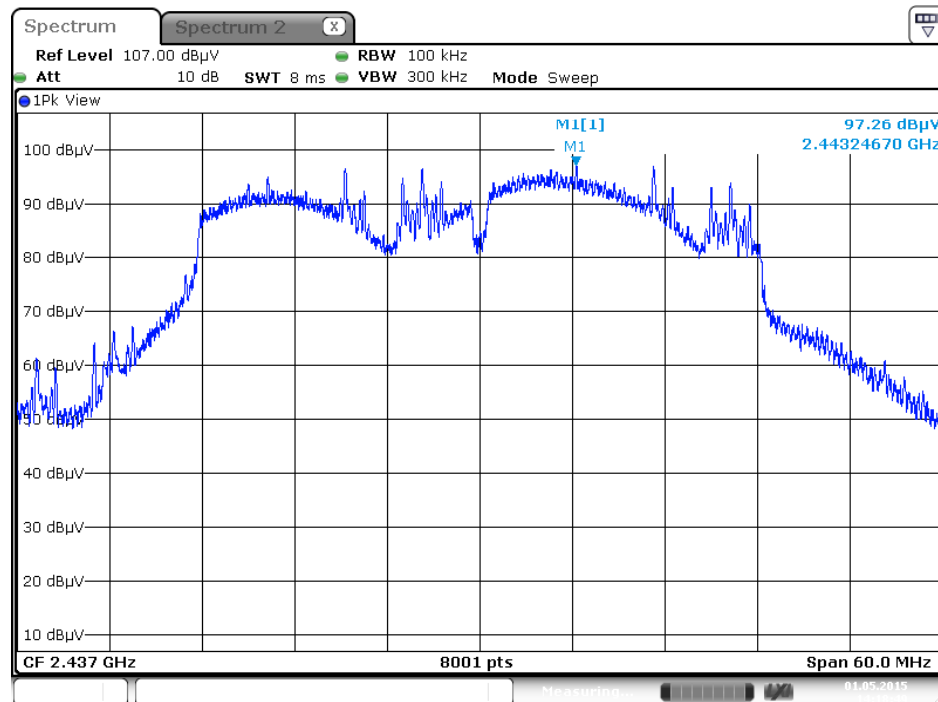
Date: 1 MAY 2015 14:09:30

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

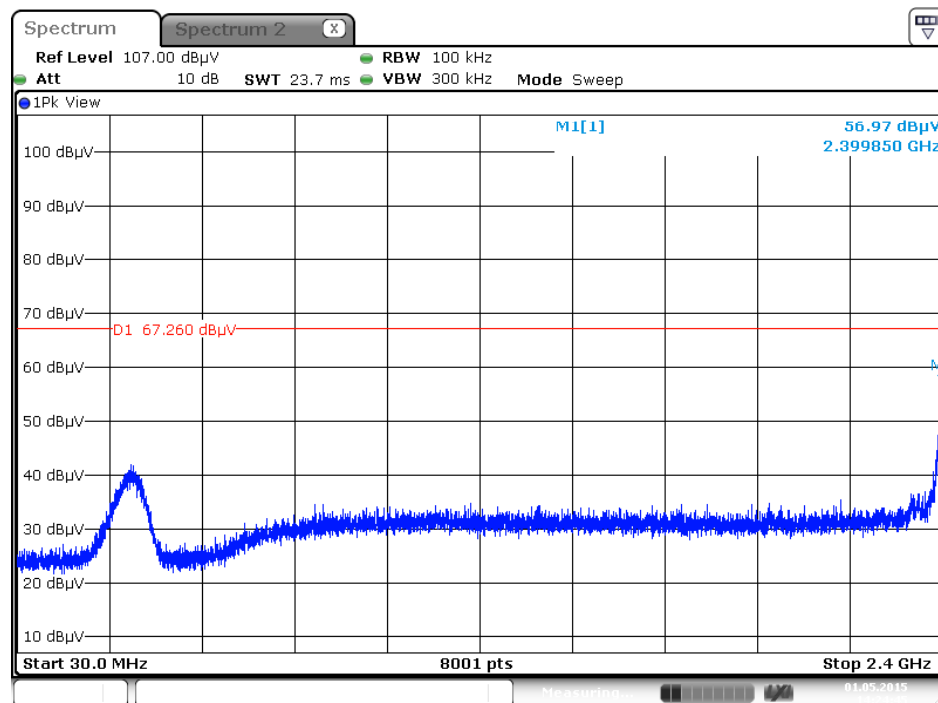


Date: 1 MAY 2015 14:08:41

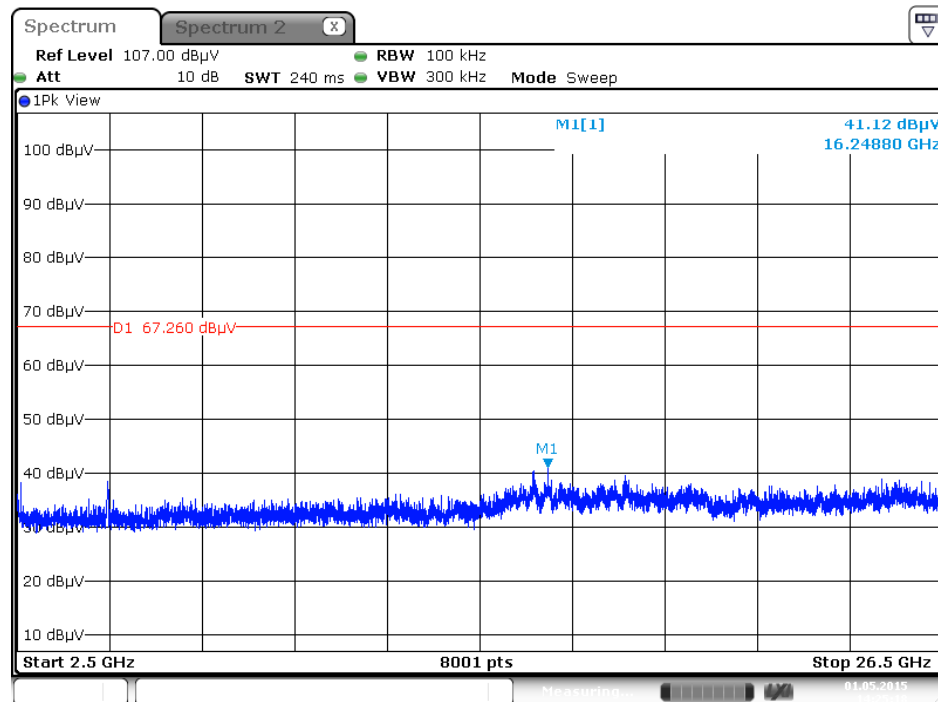
Plot on Configuration IEEE 802.11n MCS0 HT40 / Reference Level



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

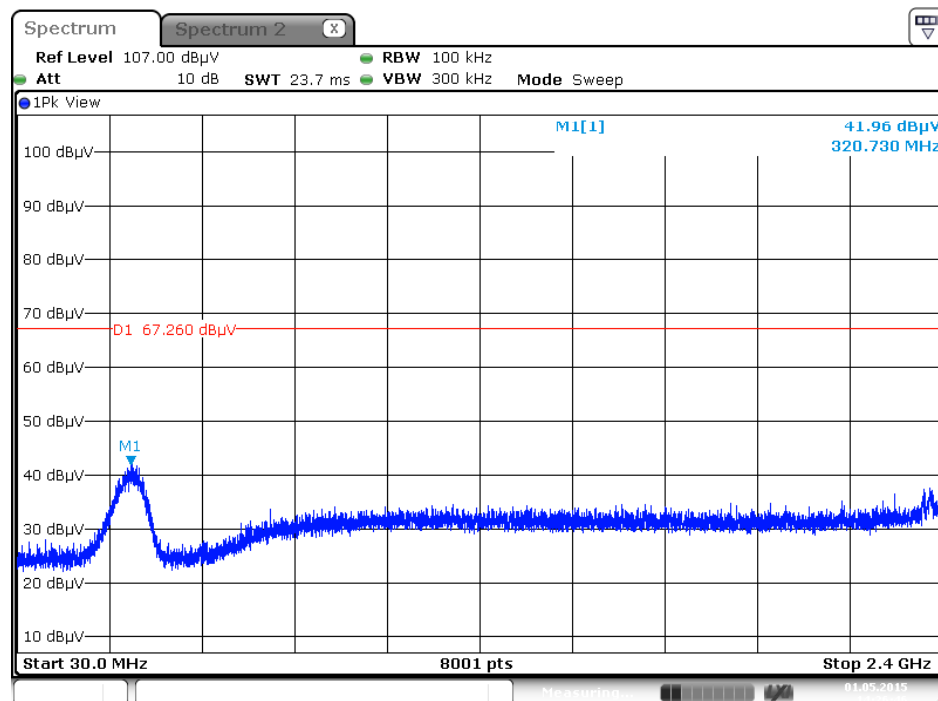


Plot on Configuration IEEE 802.11n MCS0 HT40 / CH 3 / 2500MHz~26500MHz (down 30dBc)



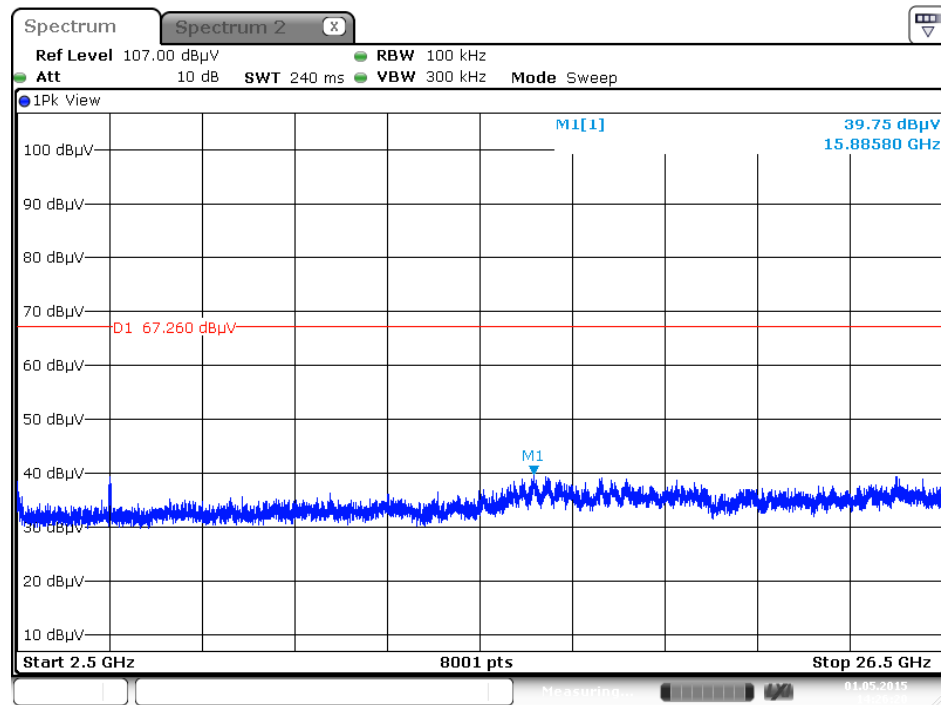
Date: 1 MAY 2015 14:25:18

Plot on Configuration IEEE 802.11n MCS0 HT40 / CH 9 / 30MHz~2400MHz (down 30dBc)



Date: 1 MAY 2015 14:26:47

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



Date: 1 MAY 2015 14:26:20

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	5.410e	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 06, 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	Aug. 22, 2014	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 Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Jan. 21, 2015	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO 2000	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. 15, 2014	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)
Thermometer	HTC-1	HTC-1	TP-1	-50°C~70°C	Mar. 11, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015	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)

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

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%