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FCC RADIO TEST REPORT

Applicant's company	ChipSiP Technology Co., Ltd
Applicant Address	8F-1, No. 186, Jian 1st Road, Zhonghe District., New Taipei City 235, Taiwan
FCC ID	O7N-CWFF202
Manufacturer's company	ChipSiP Technology Co., Ltd
Manufacturer Address	8F-1, No. 186, Jian 1st Road, Zhonghe District., New Taipei City 235, Taiwan

Product Name	dual band USB dongle
Brand Name	CHIPSIP
Model No.	CWFF202
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Jul. 09, 2013
Final Test Date	Aug. 16, 2013
Submission Type	Original Equipment

Statement

Test result included is only for the IEEE 802.11n, IEEE 802.11b/g part and IEEE 802.11a (5725 ~ 5850MHz) of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2009, 47 CFR FCC Part 15 Subpart C, KDB 558074 D01 v03 and KDB 662911 D01 v02.**

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



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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR371641AA	Rev. 01	Initial issue of report	Aug. 12, 2013
FR371641AA	Rev. 02	The Power was reduced, so we verified the output power	Aug. 20, 2013



1. CERTIFICATE OF COMPLIANCE

Product Name : dual band USB dongle
Brand Name : CHIPSIP
Model No. : CWFF202
Applicant : ChipSIP Technology Co., Ltd
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 Jul. 09, 2013 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

A handwritten signature in blue ink that reads 'Sam Chen' is written over a horizontal line.

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	12.46 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	20.07 dB
4.3	15.247(e)	Power Spectral Density	Complies	23.77 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	1.08 dB
4.6	15.247(d)	Band Edge Emissions	Complies	6.58 dB
4.7	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n

Items	Description
Product Type	WLAN (1TX, 1RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	see the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	For 2.4GHz Band: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth For 5GHz Band: 5 for 20MHz bandwidth ; 2 for 40MHz bandwidth
Channel Band Width (99%)	For 2.4GHz Band: MCS0 (20MHz): 17.84MHz ; MCS0 (40MHz): 36.32MHz For 5GHz Band: MCS0 (20MHz): 17.76MHz ; MCS0 (40MHz): 36.16MHz
Maximum Conducted Output Power	For 2.4GHz Band: MCS0 (20MHz): 9.71 dBm ; MCS0 (40MHz): 9.89 dBm For 5GHz Band: MCS0 (20MHz): 7.70 dBm ; MCS0 (40MHz): 7.75 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

802.11a/b/g

Items	Description
Product Type	WLAN (1TX, 1RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11a/g
Data Modulation	DSSS (BPSK / QPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	11b/g: 11 ; 11a: 5
Channel Band Width (99%)	11b: 15.04 MHz ; 11g: 16.64 MHz ; 11a: 16.56 MHz
Maximum Conducted Output Power	11b: 9.93 dBm ; 11g: 9.83 dBm ; 11a: 7.74 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Single (TX)	
	20 MHz	40 MHz
IEEE 802.11a	V	X
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)	1	MCS 0-7
802.11n (HT40)	1	MCS 0-7

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

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

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
					2.4GHz	5GHz
1	-	-	Printed Antenna	Morata	3.6	3.2

Note: Note: The EUT has two antennas.

<For 2.4GHz Band>

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

The EUT supports the antenna with TX and RX diversity functions.

Both Chain 1 and Chain 2 support transmit and receive functions, but only one of them will be used at the same time.

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

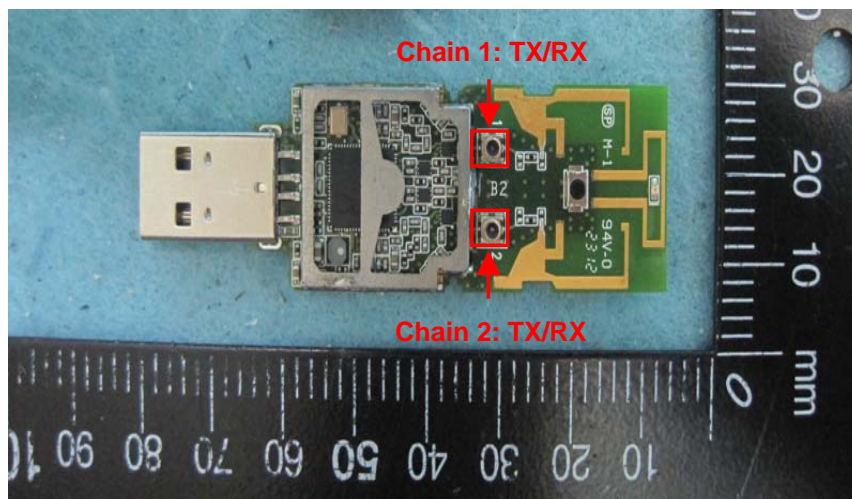
<For 5GHz Band>

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

The EUT supports the antenna with TX and RX diversity functions.

Both Chain 1 and Chain 2 support transmit and receive functions, but only one of them will be used at the same time.

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



3.4. Table for Carrier Frequencies

For 2.4GHz Band:

There are two bandwidth systems.

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

For 40MHz bandwidth systems, use Channel 3~Channel 9.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	7	2442 MHz
	2	2417 MHz	8	2447 MHz
	3	2422 MHz	9	2452 MHz
	4	2427 MHz	10	2457 MHz
	5	2432 MHz	11	2462 MHz
	6	2437 MHz	-	-

For 5GHz Band:

There are two bandwidth systems.

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

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

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

3.5. Table for Test Modes

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

For 2.4GHz Band

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	-	-	-
Maximum Conducted Output Power	11n 20MHz	MCS0	1/6/11	1
	11n 40MHz	MCS0	3/6/9	1
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
Power Spectral Density	11n 20MHz	MCS0	1/6/11	1
	11n 40MHz	MCS0	3/6/9	1
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
6dB Spectrum Bandwidth	11n 20MHz	MCS0	1/6/11	1
	11n 40MHz	MCS0	3/6/9	1
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
Radiated Emissions Below 1GHz	Normal Link	-	-	-
Radiated Emissions Above 1GHz	11n 20MHz	MCS0	1/6/11	1
	11n 40MHz	MCS0	3/6/9	1
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
Band Edge Emissions	11n 20MHz	MCS0	1/6/11	1
	11n 40MHz	MCS0	3/6/9	1
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1

For 5GHz Band

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	-	-	-
Maximum Conducted Output Power	11n 20MHz	MCS0	149/157/165	1
	11n 40MHz	MCS0	151/159	1
	11a/BPSK	6 Mbps	149/157/165	1
Power Spectral Density	11n 20MHz	MCS0	149/157/165	1
	11n 40MHz	MCS0	151/159	1
	11a/BPSK	6 Mbps	149/157/165	1
6dB Spectrum Bandwidth	11n 20MHz	MCS0	149/157/165	1
	11n 40MHz	MCS0	151/159	1
	11a/BPSK	6 Mbps	149/157/165	1
Radiated Emissions Below 1GHz	Normal Link	-	-	-
Radiated Emissions Above 1GHz	11n 20MHz	MCS0	149/157/165	1
	11n 40MHz	MCS0	151/159	1
	11a/BPSK	6 Mbps	149/157/165	1
Band Edge Emissions	11n 20MHz	MCS0	149/157/165	1
	11n 40MHz	MCS0	151/159	1
	11a/BPSK	6 Mbps	149/157/165	1

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. Normal Link for 2.4G Function

Mode 2. Normal Link for 5G Function

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

For Radiated Emission test (30MHz~1GHz):

Mode 1. Normal Link for 2.4G Function

Mode 2. Normal Link for 5G Function

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

For Radiated Emission test (above 1GHz):

Mode 1. Place EUT in X axis

Mode 2. Place EUT in Y axis

Mode 3. Place EUT in Z axis

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

3.6. Table for Testing Locations

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); Please refer section 6 for Test Site Address.

3.7. Table for Supporting Units

For Test Site No : 03CH01-CB (Below 1G) and CO01-CB

Support Unit	Brand	Model	FCC ID
Wireless AP	Planex	GW-AP54SGX	N/A
Notebook	DELL	E6430	QDS-BRCM1049LE
Mouse	Logitech	M-U0026	DoC
Earphone	E-BOOKI	E-EPC040	N/A

For Test Site No : 03CH01-CB (above 1G) and TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	D420	E2KWM3945ABG

3.8. Table for Parameters of Test Software Setting

During testing, Channel & 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.

For 2.4GHz Band

Power Parameters of IEEE 802.11n MCS0 20MHz

Test Software Version	Realtek 11n Dual MAC 92D USB WLAN MP Diagnostic Program 0.0019.0307.2012		
Frequency	2412 MHz	2437 MHz	2462 MHz
MCS0 20MHz	44	42	42

Power Parameters of IEEE 802.11n MCS0 40MHz

Test Software Version	Realtek 11n Dual MAC 92D USB WLAN MP Diagnostic Program 0.0019.0307.2012		
Frequency	2422 MHz	2437 MHz	2452 MHz
MCS0 40MHz	44	43	43

Power Parameters of IEEE 802.11b/g

Test Software Version	Realtek 11n Dual MAC 92D USB WLAN MP Diagnostic Program 0.0019.0307.2012		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	34	29	27
IEEE 802.11g	44	43	42

For 5GHz Band
Power Parameters of IEEE 802.11n MCS0 20MHz

Test Software Version	Realtek 11n Dual MAC 92D USB WLAN MP Diagnostic Program 0.0019.0307.2012		
Frequency	5745 MHz	5785 MHz	5825 MHz
MCS0 20MHz	34	34	35

Power Parameters of IEEE 802.11n MCS0 40MHz

Test Software Version	Realtek 11n Dual MAC 92D USB WLAN MP Diagnostic Program 0.0019.0307.2012	
Frequency	5755 MHz	5795 MHz
MCS0 40MHz	33	34

Power Parameters of IEEE 802.11a

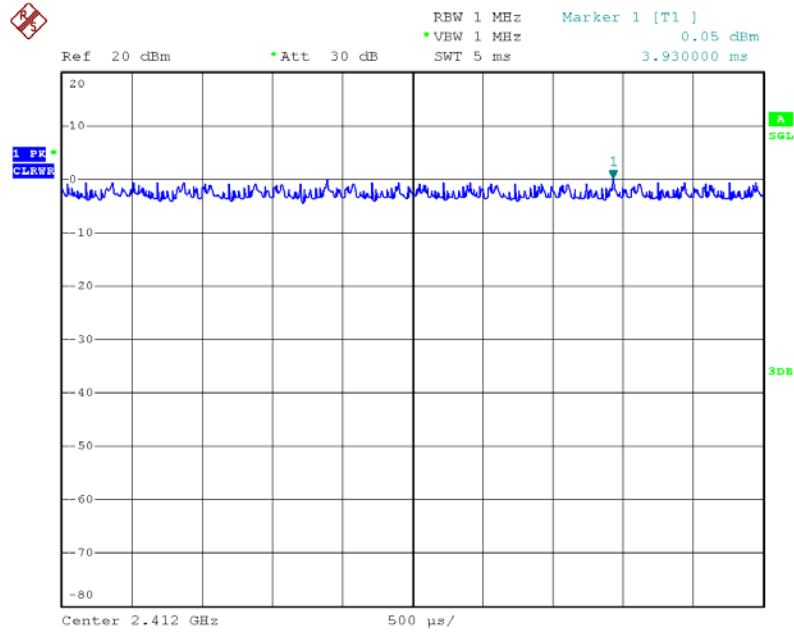
Test Software Version	Realtek 11n Dual MAC 92D USB WLAN MP Diagnostic Program 0.0019.0307.2012		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	34	34	35

3.9. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

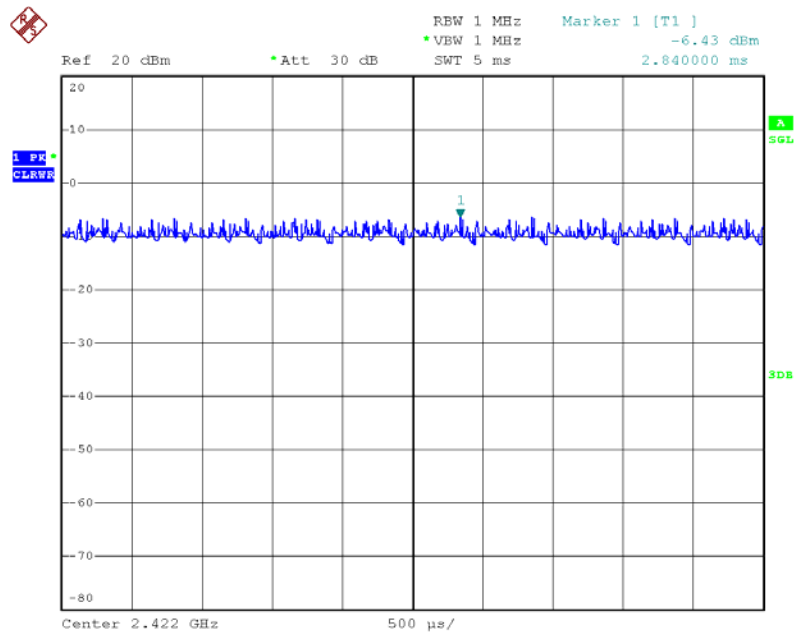
3.10. Duty Cycle

IEEE 802.11n MCS0 20MHz / For 2.4GHz Band



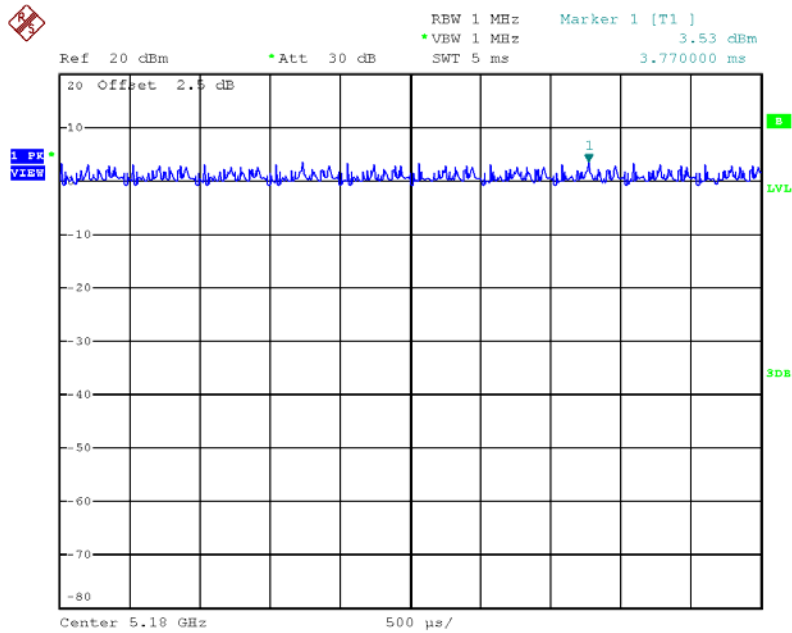
Date: 25.JUL.2013 13:09:15

IEEE 802.11n MCS0 40MHz / For 2.4GHz Band



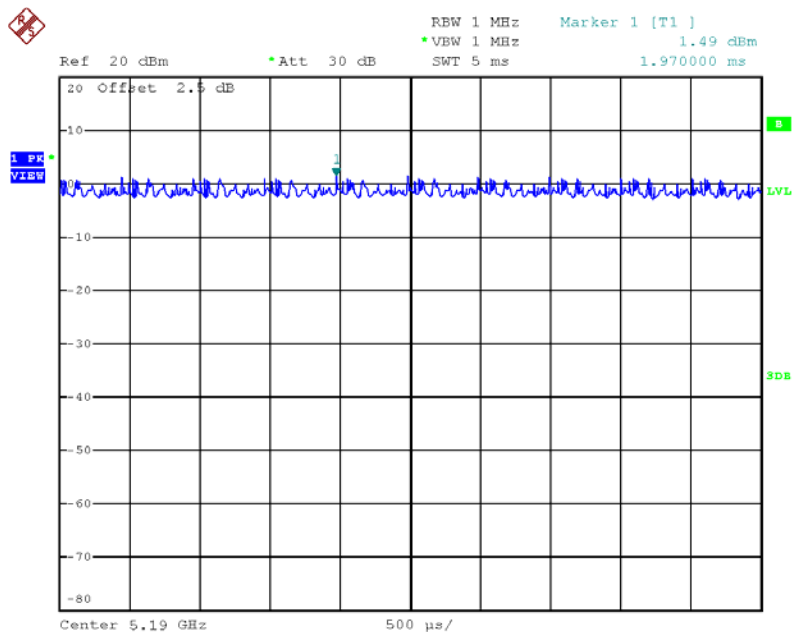
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IEEE 802.11n MCS0 20MHz / For 5GHz Band



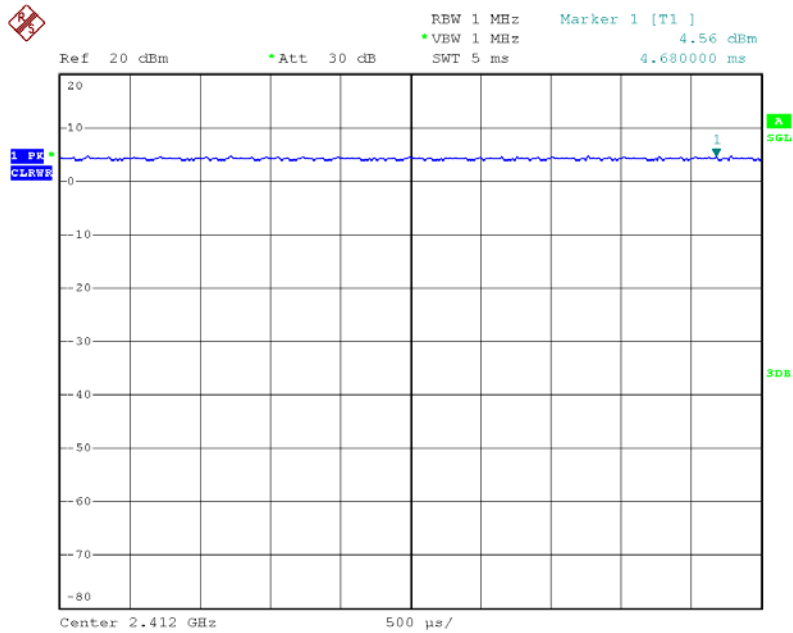
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IEEE 802.11n MCS0 40MHz / For 5GHz Band



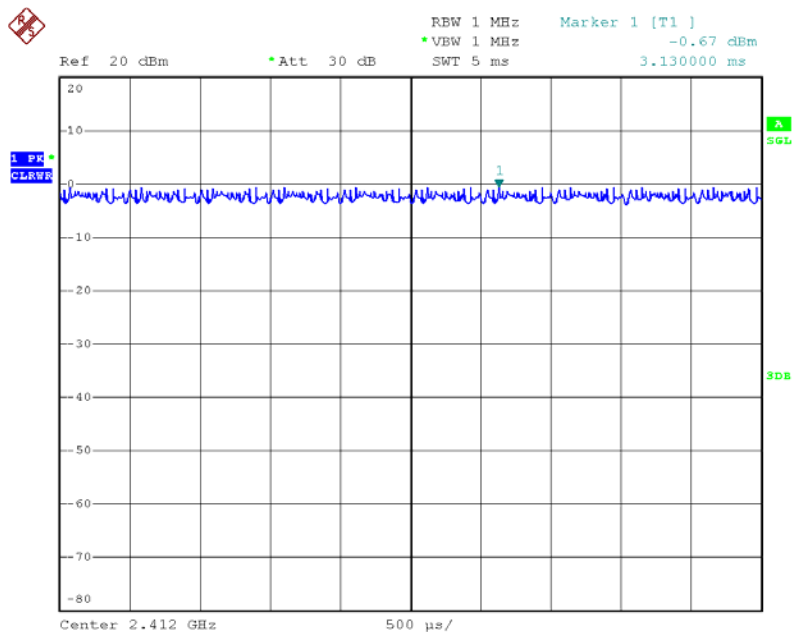
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IEEE 802.11b



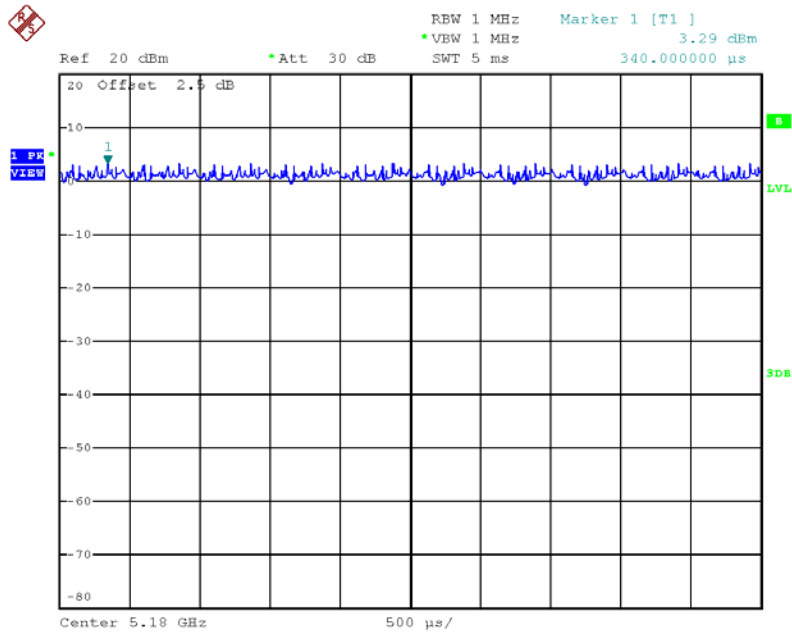
Date: 25.JUL.2013 13:10:47

IEEE 802.11g



Date: 25.JUL.2013 13:09:51

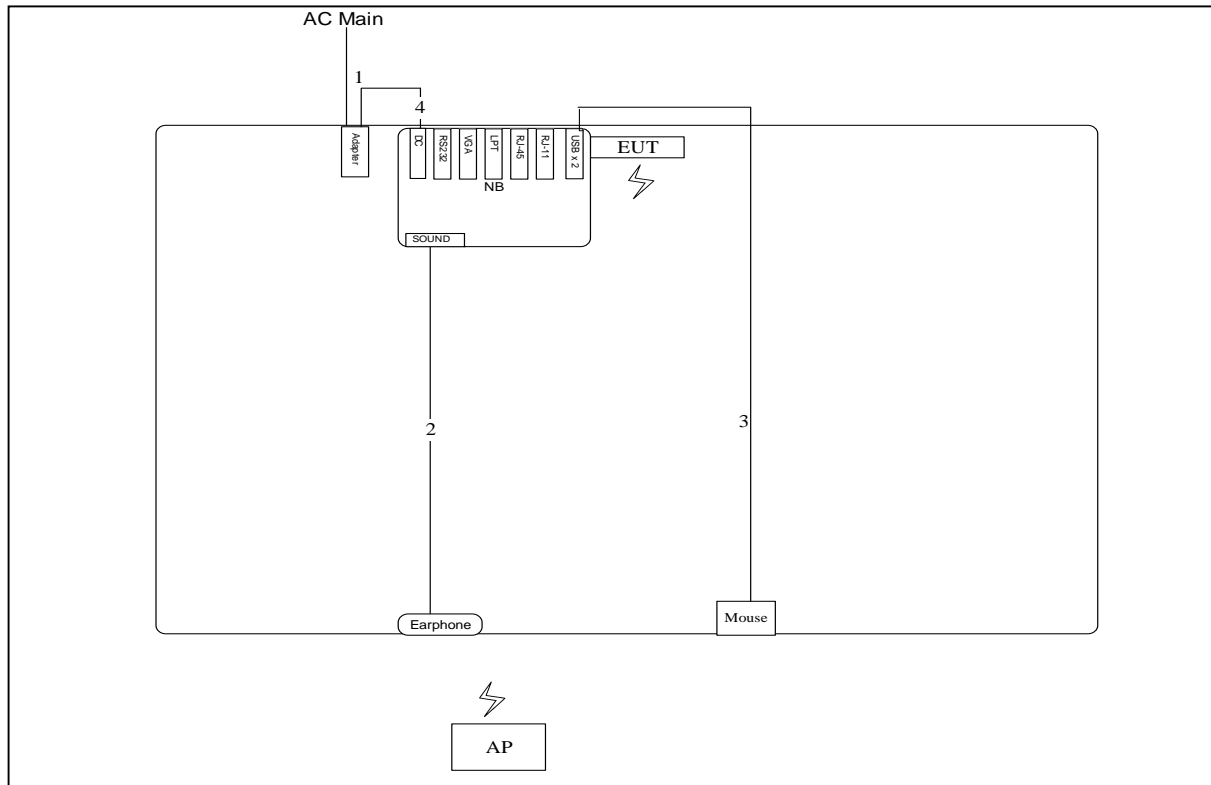
IEEE 802.11a



Date: 26.JUL.2013 01:21:49

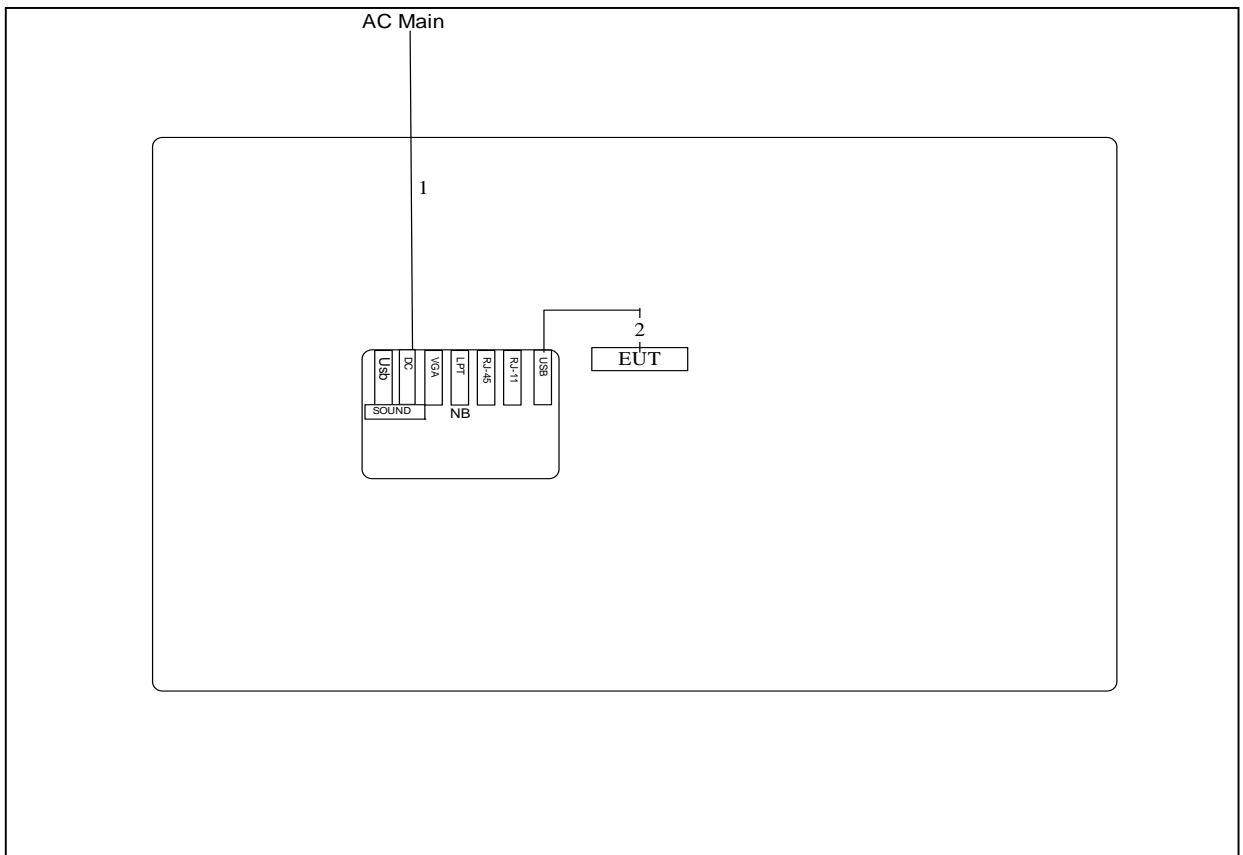
3.11. Test Configurations

3.11.1.AC Power Line Conduction Emissions and Radiation Emissions (30MHz~1GHz)Test Configuration



Item	Connection	Shield	Length(m)
1	AC Power cable	No	1.8m
2	Audio cable	No	1.1m
3	USB cable	No	1.8m
4	DC Power cable	No	0.8m

3.11.2. Radiation Emissions (above 1GHz) Test Configuration



Item	Connection	Shield	Length(m)
1	AC Power cable	No	2.6m
2	USB cable	No	1.2m

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

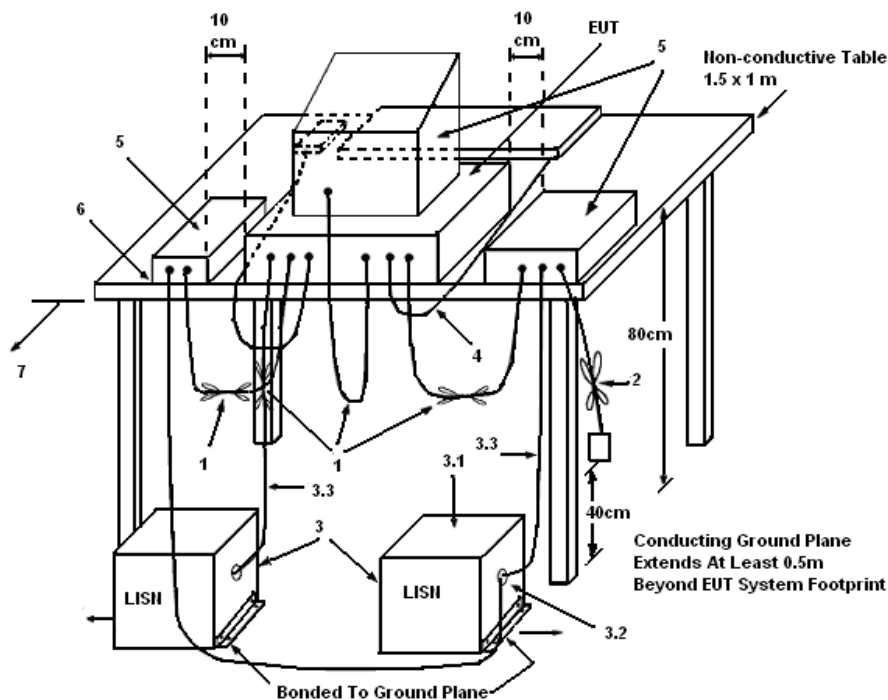
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

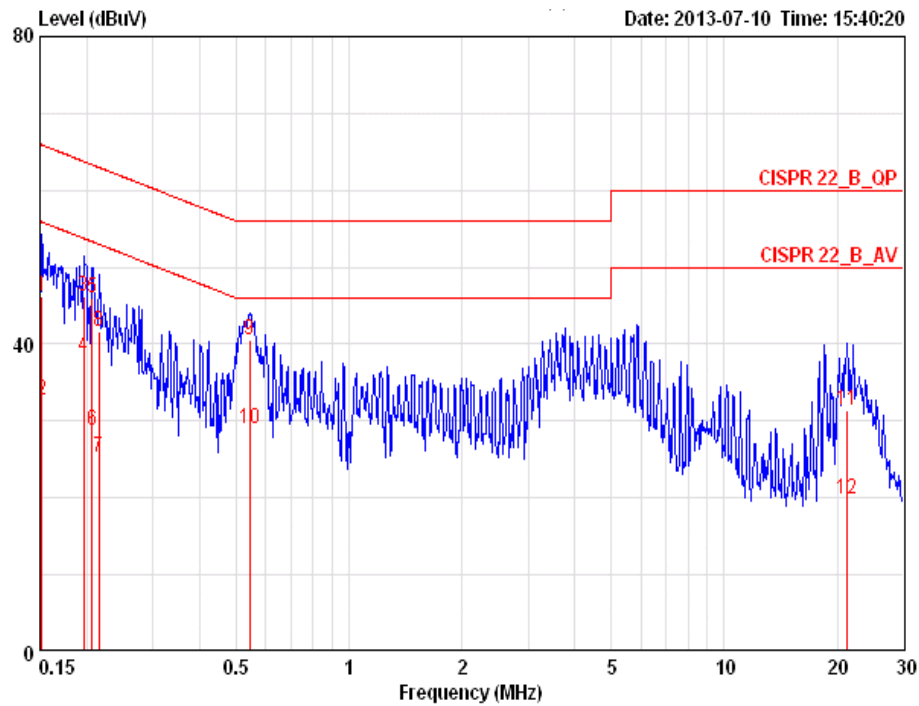
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

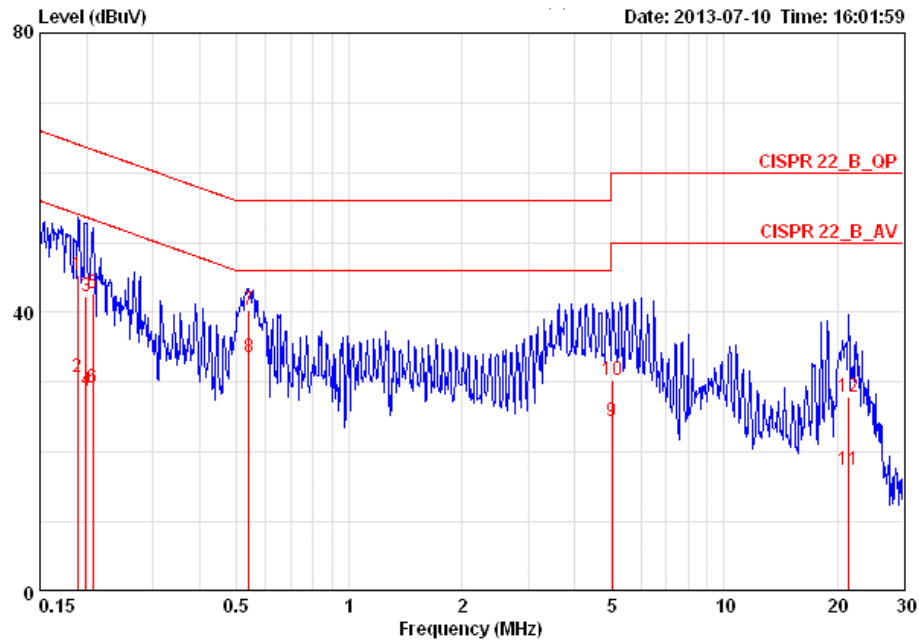
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	54%
Test Engineer	Parody Lin	Phase	Line
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	0.15160	46.13	-19.78	65.91	45.80	0.15	0.18	LINE	QP
2	0.15160	32.75	-23.16	55.91	32.42	0.15	0.18	LINE	AVERAGE
3	0.19654	46.12	-17.64	63.76	45.77	0.15	0.20	LINE	QP
4	0.19654	38.42	-15.34	53.76	38.07	0.15	0.20	LINE	AVERAGE
5	0.20614	45.90	-17.46	63.36	45.55	0.15	0.20	LINE	QP
6	0.20614	28.80	-24.56	53.36	28.45	0.15	0.20	LINE	AVERAGE
7	0.21506	25.34	-27.67	53.01	24.99	0.15	0.20	LINE	AVERAGE
8	0.21506	41.63	-21.38	63.01	41.28	0.15	0.20	LINE	QP
9	0.54355	40.45	-15.55	56.00	40.10	0.15	0.20	LINE	QP
10	0.54355	29.03	-16.97	46.00	28.68	0.15	0.20	LINE	AVERAGE
11	21.147	31.33	-28.67	60.00	30.19	0.64	0.50	LINE	QP
12	21.147	19.91	-30.09	50.00	18.77	0.64	0.50	LINE	AVERAGE

Temperature	24°C	Humidity	54%
Test Engineer	Parody Lin	Phase	Neutral
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	0.18938	45.44	-18.63	64.06	45.17	0.07	0.20	NEUTRAL	QP
2	0.18938	30.82	-23.25	54.06	30.55	0.07	0.20	NEUTRAL	AVERAGE
3	0.19863	42.38	-21.29	63.67	42.11	0.07	0.20	NEUTRAL	QP
4	0.19863	28.85	-24.82	53.67	28.58	0.07	0.20	NEUTRAL	AVERAGE
5	0.20723	42.80	-20.52	63.32	42.53	0.07	0.20	NEUTRAL	QP
6	0.20723	29.11	-24.21	53.32	28.84	0.07	0.20	NEUTRAL	AVERAGE
7	0.54068	40.27	-15.73	56.00	40.00	0.07	0.20	NEUTRAL	QP
8	0.54068	33.54	-12.46	46.00	33.27	0.07	0.20	NEUTRAL	AVERAGE
9	5.031	24.47	-25.53	50.00	24.00	0.15	0.32	NEUTRAL	AVERAGE
10	5.031	30.21	-29.79	60.00	29.74	0.15	0.32	NEUTRAL	QP
11	21.373	17.51	-32.49	50.00	16.50	0.51	0.50	NEUTRAL	AVERAGE
12	21.373	27.94	-32.06	60.00	26.93	0.51	0.50	NEUTRAL	QP

Note:

$$\text{Level} = \text{Read Level} + \text{LISN Factor} + \text{Cable Loss}$$

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi. Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter output power.

4.2.2. Measuring Instruments and Setting

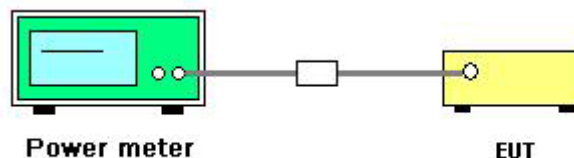
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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 v03 section 9.2.2 Measurement using a power meter (PM).
2. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Maximum Conducted Output Power

Temperature	26°C	Humidity	63%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n
Test Date	Aug. 16, 2013		

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1		
1	2412 MHz	9.67	30.00	Complies
6	2437 MHz	9.57	30.00	Complies
11	2462 MHz	9.71	30.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1		
3	2422 MHz	9.89	30.00	Complies
6	2437 MHz	9.66	30.00	Complies
9	2452 MHz	9.72	30.00	Complies

For 5GHz Band

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1		
149	5745 MHz	7.70	30.00	Complies
157	5785 MHz	7.49	30.00	Complies
165	5825 MHz	7.61	30.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1		
151	5755 MHz	7.66	30.00	Complies
159	5795 MHz	7.75	30.00	Complies

Temperature	26°C	Humidity	63%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a/b/g
Test Date	Aug. 16, 2013		

Configuration IEEE 802.11b

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1		
1	2412 MHz	9.93	30.00	Complies
6	2437 MHz	7.95	30.00	Complies
11	2462 MHz	6.26	30.00	Complies

Configuration IEEE 802.11g

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1		
1	2412 MHz	9.83	30.00	Complies
6	2437 MHz	9.71	30.00	Complies
11	2462 MHz	9.52	30.00	Complies

Configuration IEEE 802.11a

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1		
149	5745 MHz	7.74	30.00	Complies
157	5785 MHz	7.54	30.00	Complies
165	5825 MHz	7.62	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 8dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2. Measuring Instruments and Setting

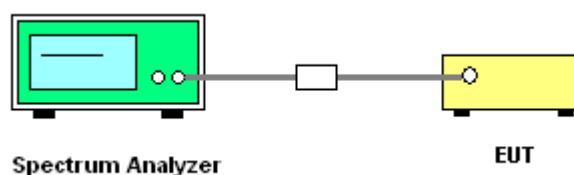
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 procedures refer KDB 558074 D01 v03 section 10.2 Method PKPSD (peak PSD) & KDB 662911 D01 v02 section In-Band Power Spectral Density (PSD) Measurements option (2) Measure and add $10 \log(\text{NANT})$ dB.
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$ (use of a greater number of measurement points than this minimum requirement is recommended).
4. Use the peak marker function to determine the maximum level in any 3 kHz band segment within the fundamental EBW.
5. The resulting PSD level must be ≤ 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	26°C	Humidity	63%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Power Density (dBm/3kHz)	Single Port Limit (dBm/3kHz)	Result
		Chain 1		
1	2412 MHz	-16.19	8.00	Complies
6	2437 MHz	-17.15	8.00	Complies
11	2462 MHz	-17.65	8.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Power Density (dBm/3kHz)	Single Port Limit (dBm/3kHz)	Result
		Chain 1		
3	2422 MHz	-17.62	8.00	Complies
6	2437 MHz	-17.44	8.00	Complies
9	2452 MHz	-18.78	8.00	Complies

For 5GHz Band

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Power Density (dBm/3kHz)	Single Port Limit (dBm/3kHz)	Result
		Chain 1		
149	5745 MHz	-18.85	8.00	Complies
157	5785 MHz	-18.72	8.00	Complies
165	5825 MHz	-18.86	8.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Power Density (dBm/3kHz)	Single Port Limit (dBm/3kHz)	Result
		Chain 1		
151	5755 MHz	-20.67	8.00	Complies
159	5795 MHz	-20.27	8.00	Complies

Temperature	26°C	Humidity	63%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a/b/g

Configuration IEEE 802.11b

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Chain 1		
1	2412 MHz	-20.13	8.00	Complies
6	2437 MHz	-21.94	8.00	Complies
11	2462 MHz	-23.77	8.00	Complies

Configuration IEEE 802.11g

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Chain 1		
1	2412 MHz	-16.76	8.00	Complies
6	2437 MHz	-17.10	8.00	Complies
11	2462 MHz	-17.85	8.00	Complies

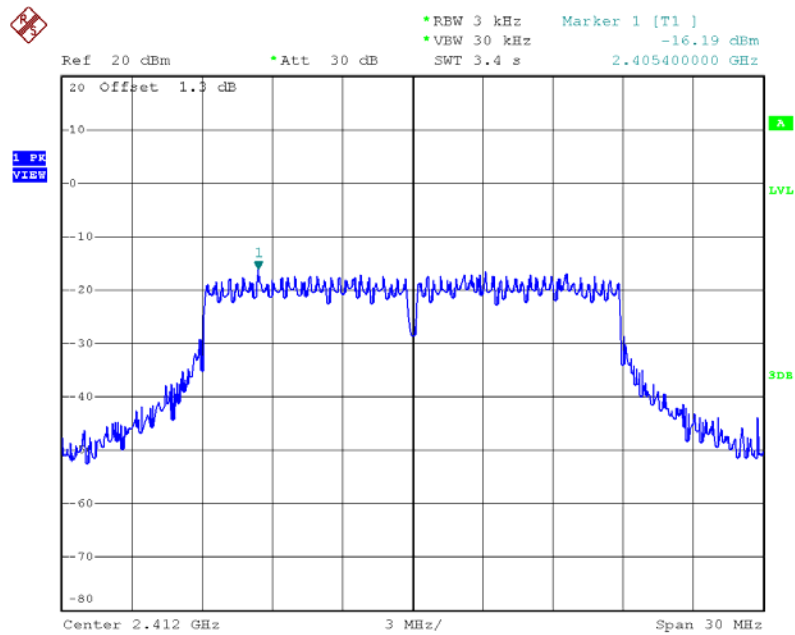
Configuration IEEE 802.11a

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Chain 1		
149	5745 MHz	-18.69	8.00	Complies
157	5785 MHz	-18.75	8.00	Complies
165	5825 MHz	-15.77	8.00	Complies

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

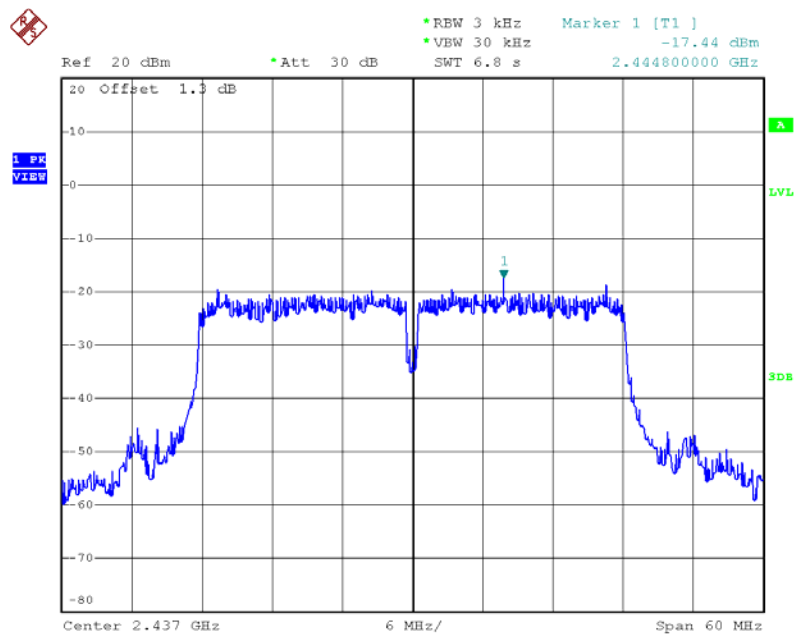
For plots, only the channel with maximum results was shown.

Power Density Plot on Configuration IEEE 802.11n MCS0 20MHz / Chain 1/ 2412 MHz



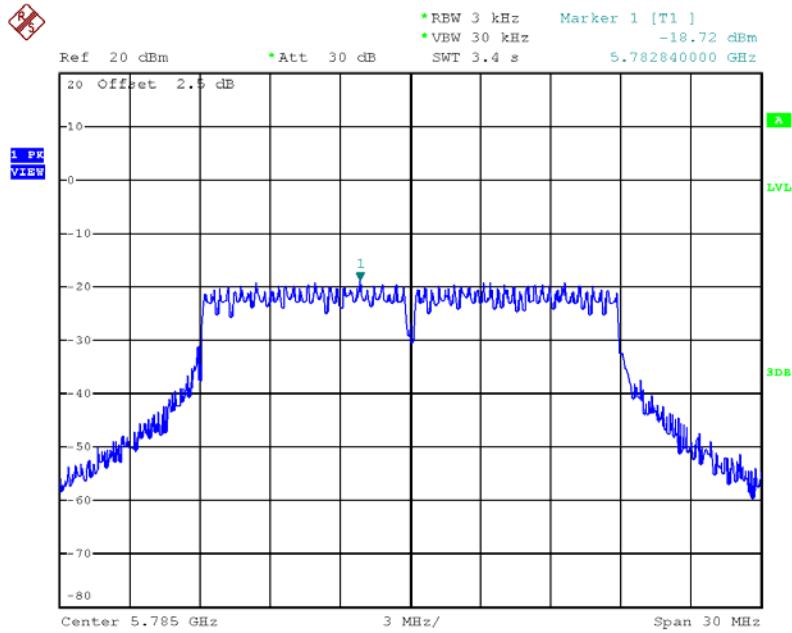
Date: 25.JUL.2013 12:36:24

Power Density Plot on Configuration IEEE 802.11n MCS0 40MHz / Chain 1/ 2437 MHz



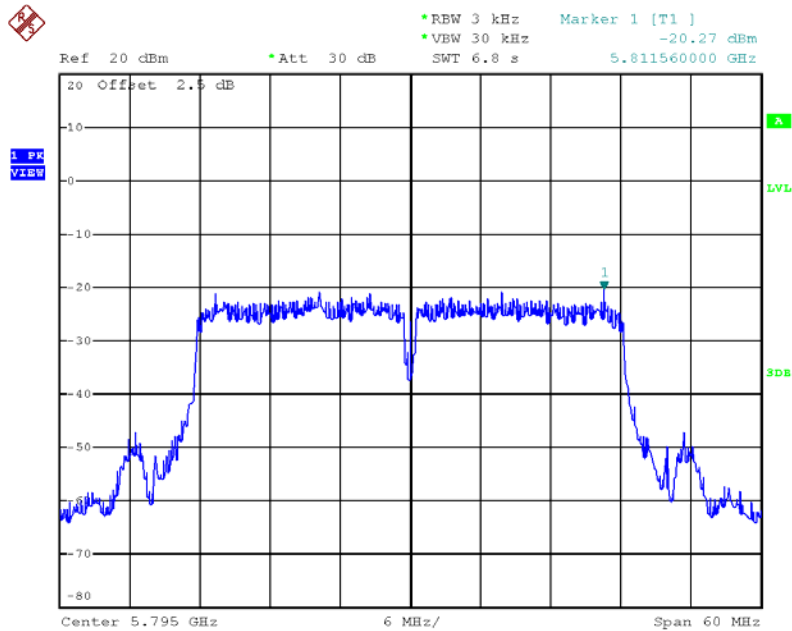
Date: 25.JUL.2013 12:39:59

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



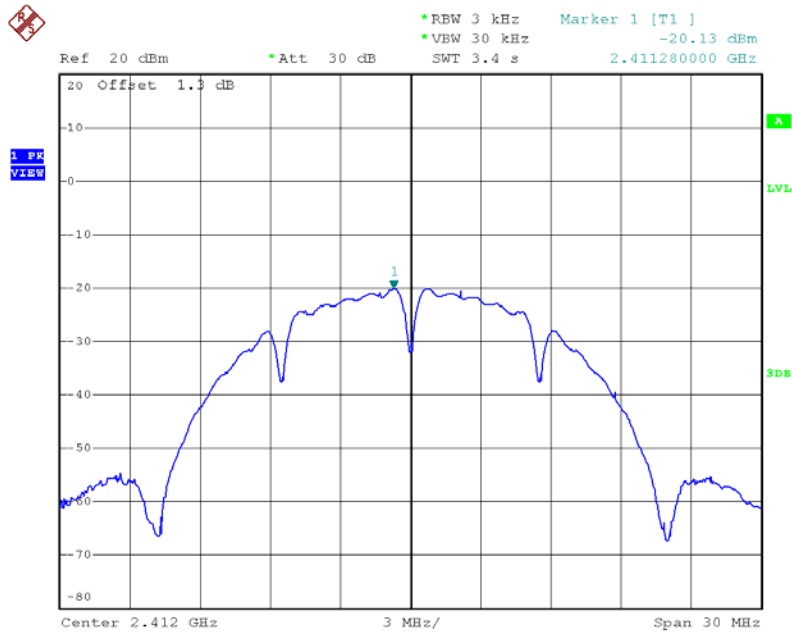
Date: 26.JUL.2013 00:31:45

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



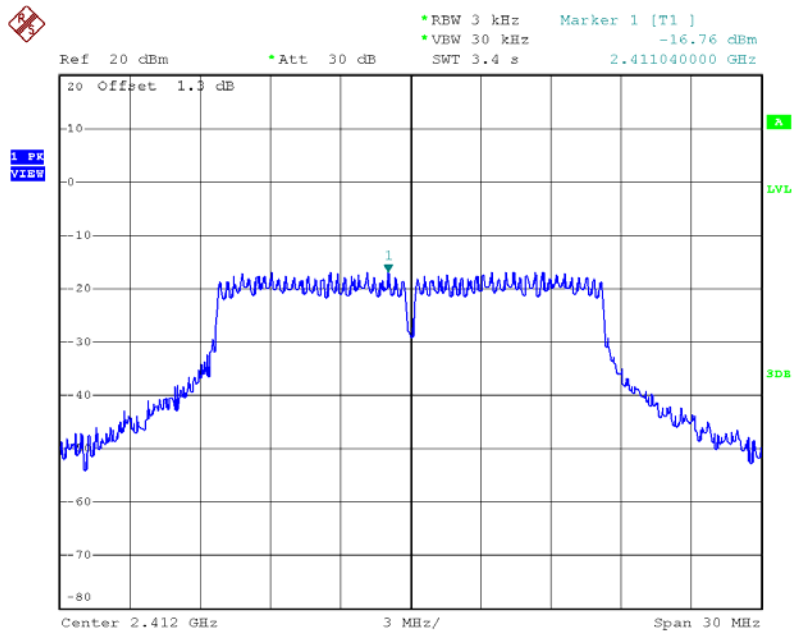
Date: 26.JUL.2013 00:35:25

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



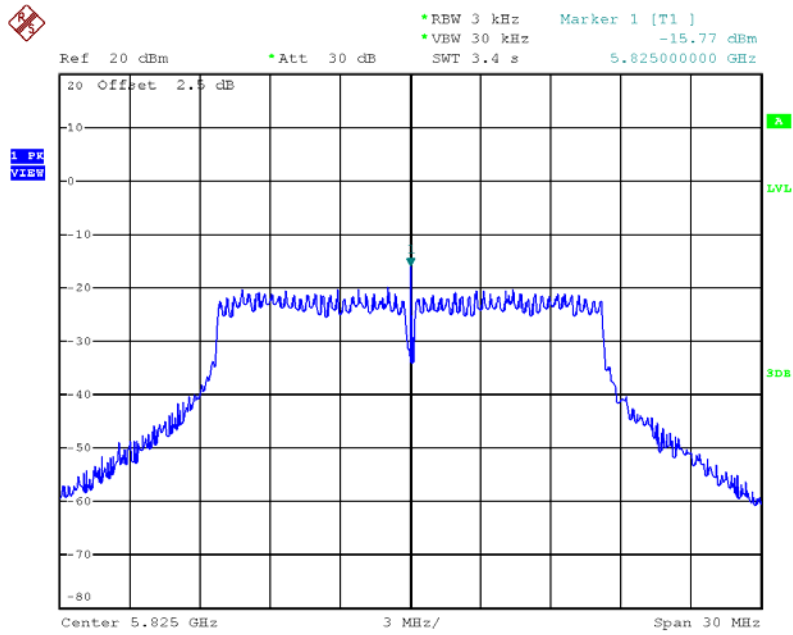
Date: 25.JUL.2013 12:28:12

Power Density Plot on Configuration IEEE 802.11g / Chain 1 / 2412 MHz



Date: 25.JUL.2013 12:32:41

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



Date: 26.JUL.2013 00:12:11

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

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

4.4.2. Measuring Instruments and Setting

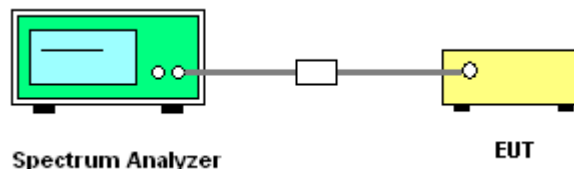
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB 558074 D01 v03 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8.0 DTS 6-dB signal bandwidth option 1.
3. Multiple antenna system was performed in accordance with KDB 662911 D01 v02 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



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	26°C	Humidity	63%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 20MHz / Chain 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.84	17.84	500	Complies
6	2437 MHz	17.84	17.84	500	Complies
11	2462 MHz	17.84	17.84	500	Complies

Configuration IEEE 802.11n MCS0 40MHz / Chain 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	36.48	36.32	500	Complies
6	2437 MHz	36.48	36.32	500	Complies
9	2452 MHz	36.48	36.32	500	Complies

For 5GHz Band

Configuration IEEE 802.11n MCS0 20MHz / Chain 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	17.76	17.76	500	Complies
157	5785 MHz	17.84	17.76	500	Complies
165	5825 MHz	17.76	17.76	500	Complies

Configuration IEEE 802.11n MCS0 40MHz / Chain 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	36.48	36.16	500	Complies
159	5795 MHz	36.48	36.16	500	Complies

Temperature	26°C	Humidity	63%
Test Engineer	Robert Chang	Configurations	IEEE 802.11 a/b/g

Configuration IEEE 802.11b / Chain 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	10.08	15.04	500	Complies
6	2437 MHz	10.08	14.96	500	Complies
11	2462 MHz	10.08	15.04	500	Complies

Configuration IEEE 802.11g / Chain 1

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

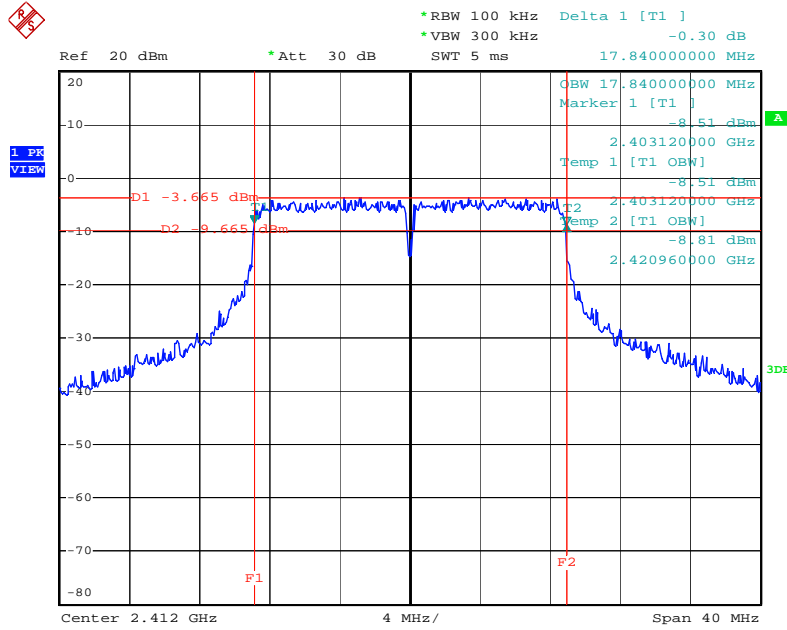
Configuration IEEE 802.11a / Chain 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	16.64	16.56	500	Complies
157	5785 MHz	16.56	16.48	500	Complies
165	5825 MHz	16.56	16.56	500	Complies

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

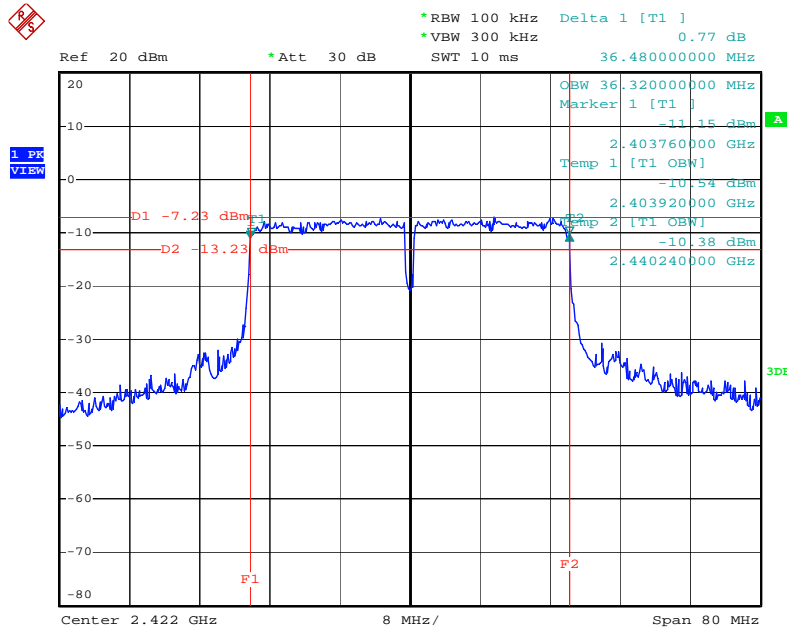
For plots, only the channel with maximum results was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz/ Chain 1 / 2412 MHz



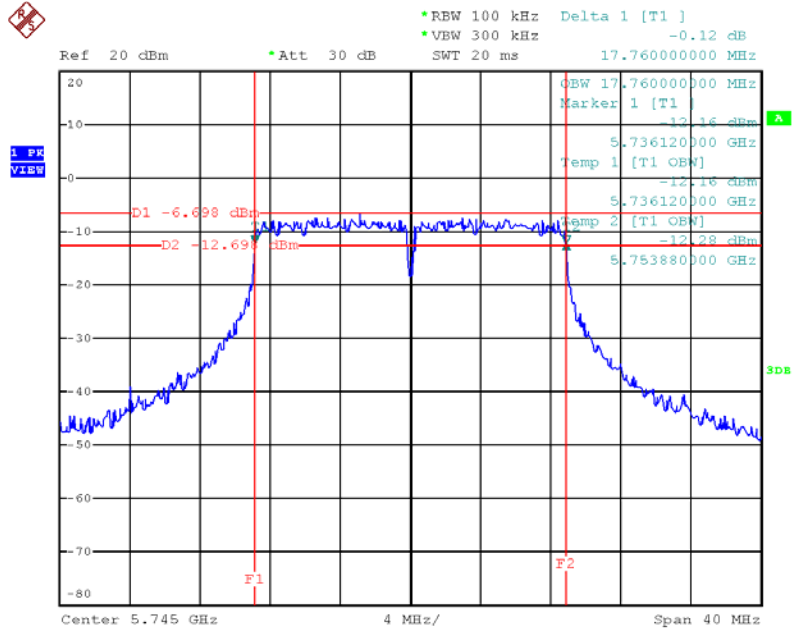
Date: 25.JUL.2013 13:01:45

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz/ Chain 1 / 2422 MHz



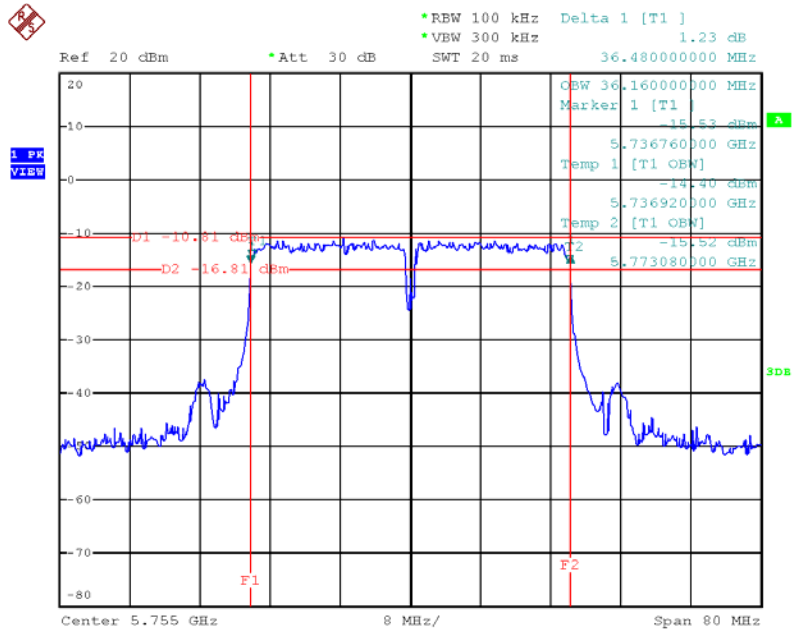
Date: 25.JUL.2013 13:04:15

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz/ Chain 1 / 5745 MHz



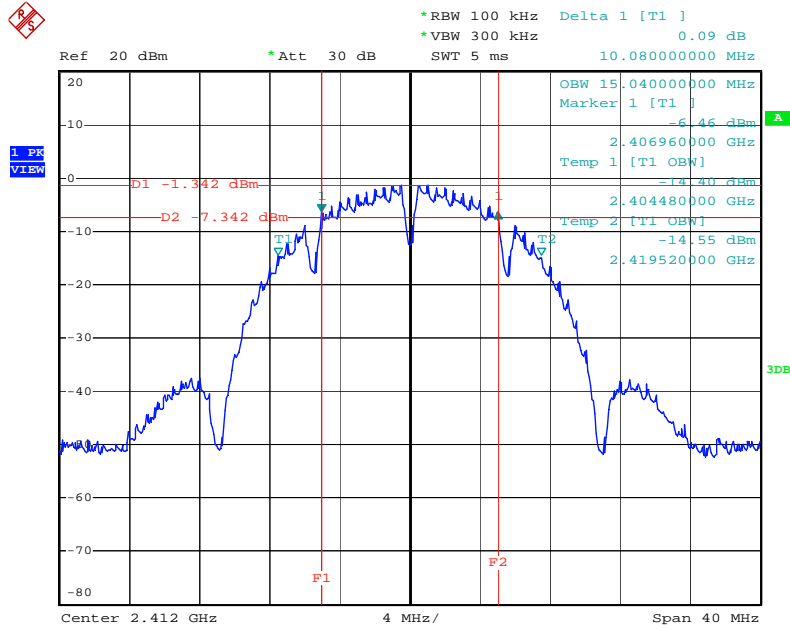
Date: 26.JUL.2013 00:25:01

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz / Chain 1 / 5755MHz



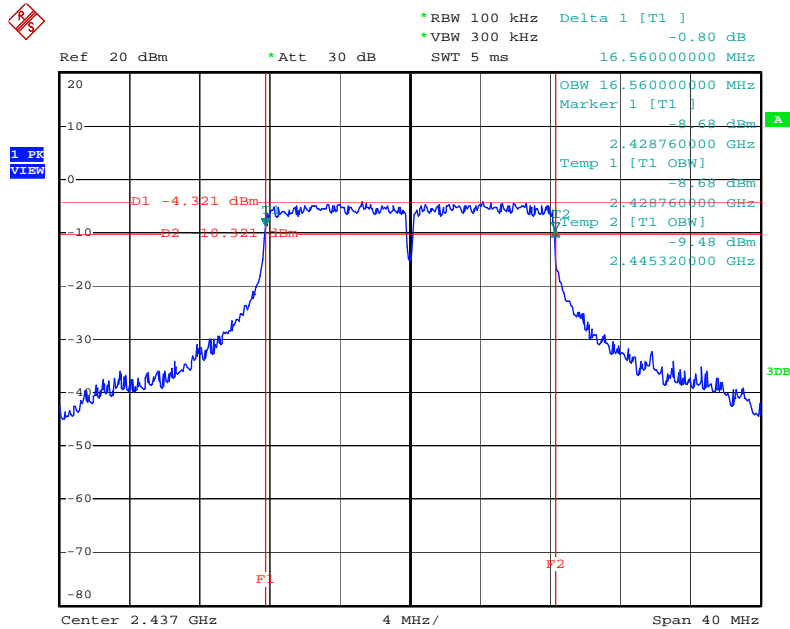
Date: 26.JUL.2013 00:26:26

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



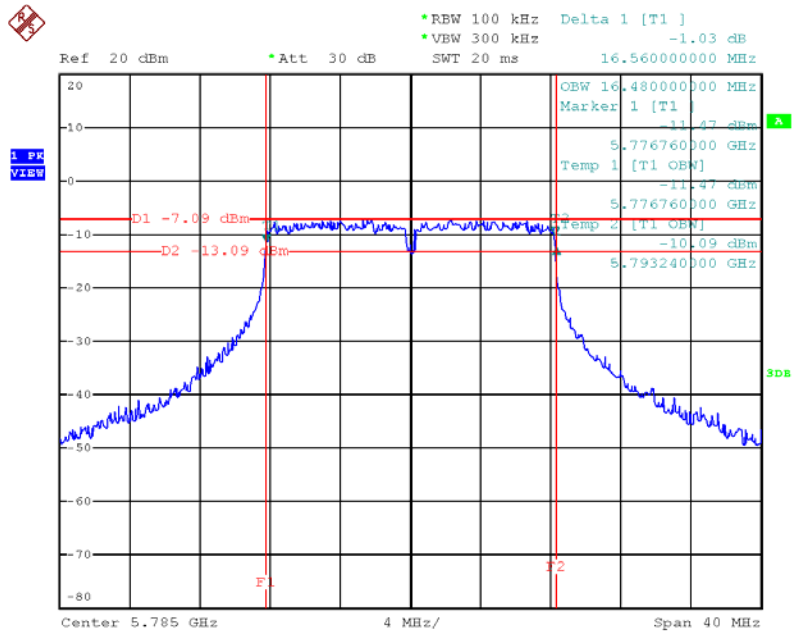
Date: 25.JUL.2013 12:56:48

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



Date: 25.JUL.2013 13:00:22

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 / 5785 MHz



Date: 26.JUL.2013 00:19:12

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 / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100kHz / 300kHz for peak

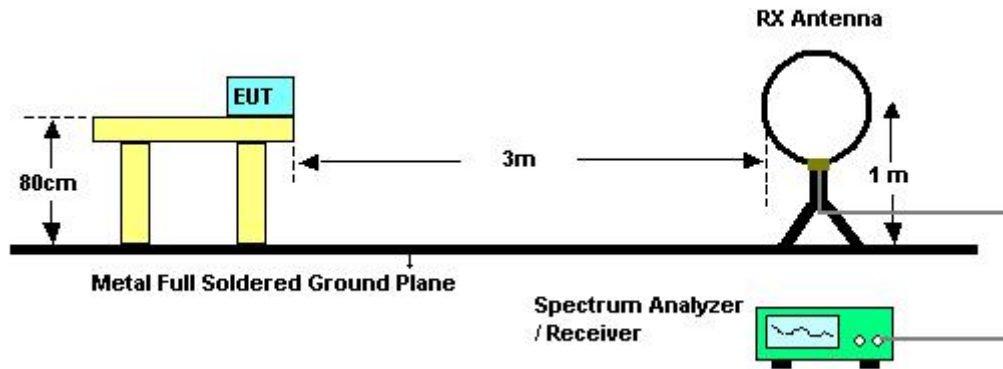
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.5.3. Test Procedures

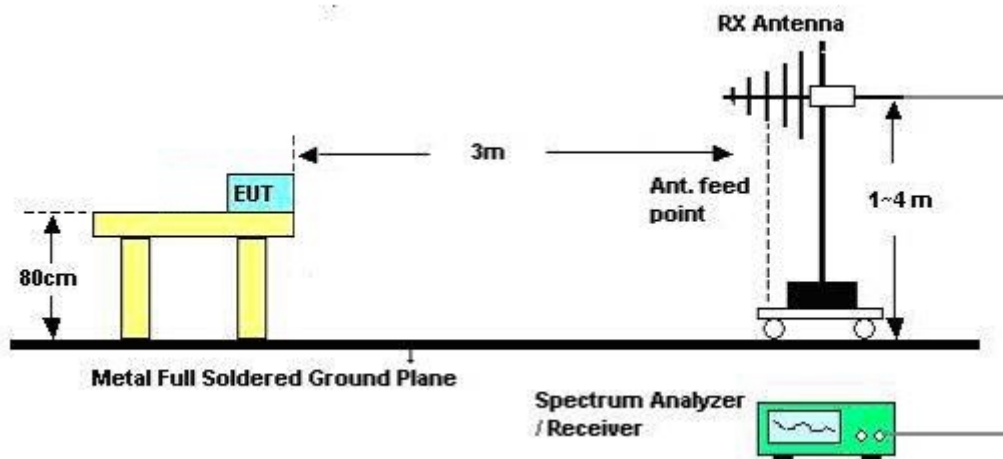
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.5.4. Test Setup Layout

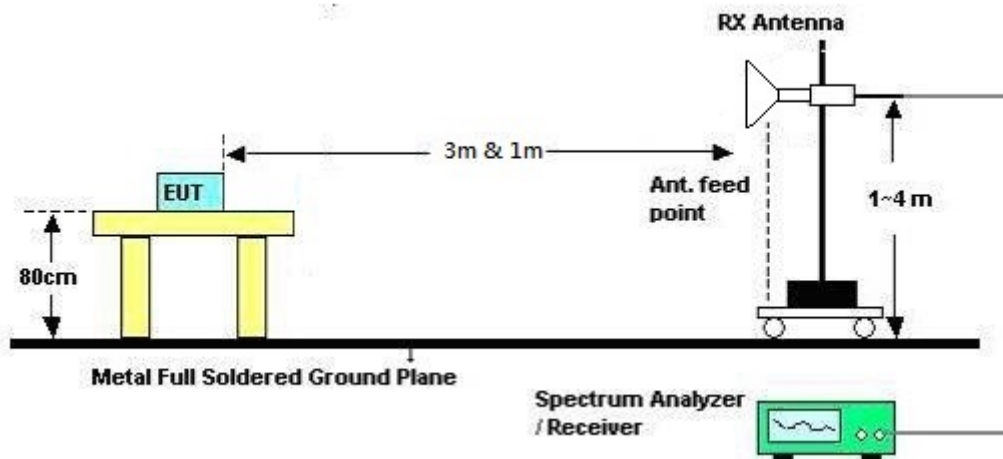
For Radiated Emissions: 9kHz ~30MHz



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	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	Normal Link
Test Date	Jul. 30, 2013		

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

Note:

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

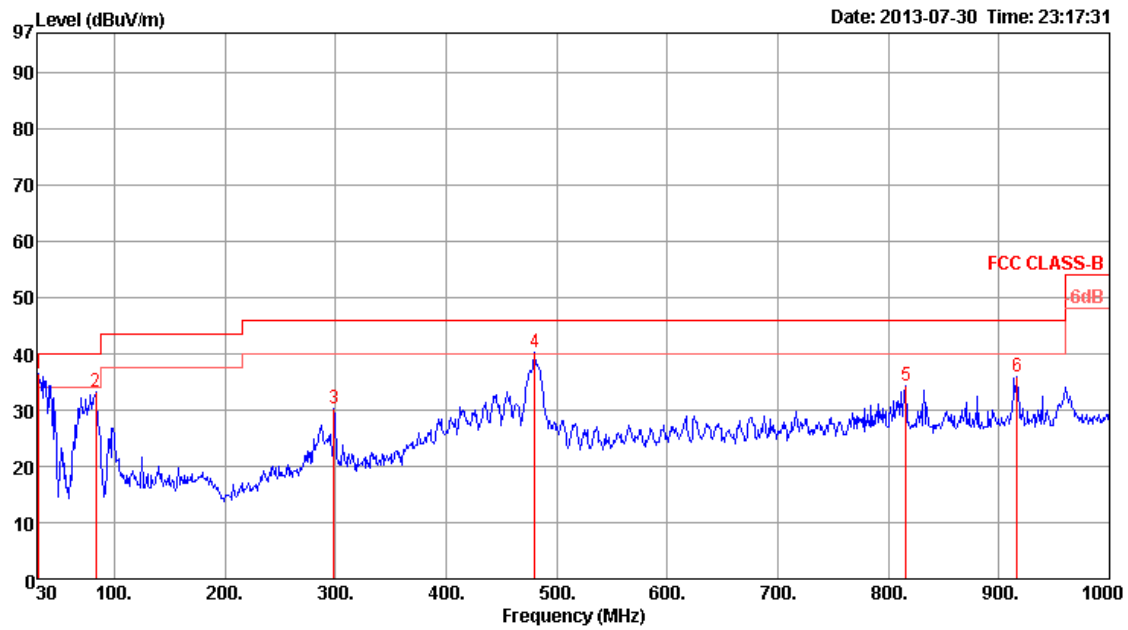
Distance extrapolation factor = $40 \log(\text{specific distance} / \text{test distance})$ (dB);

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

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

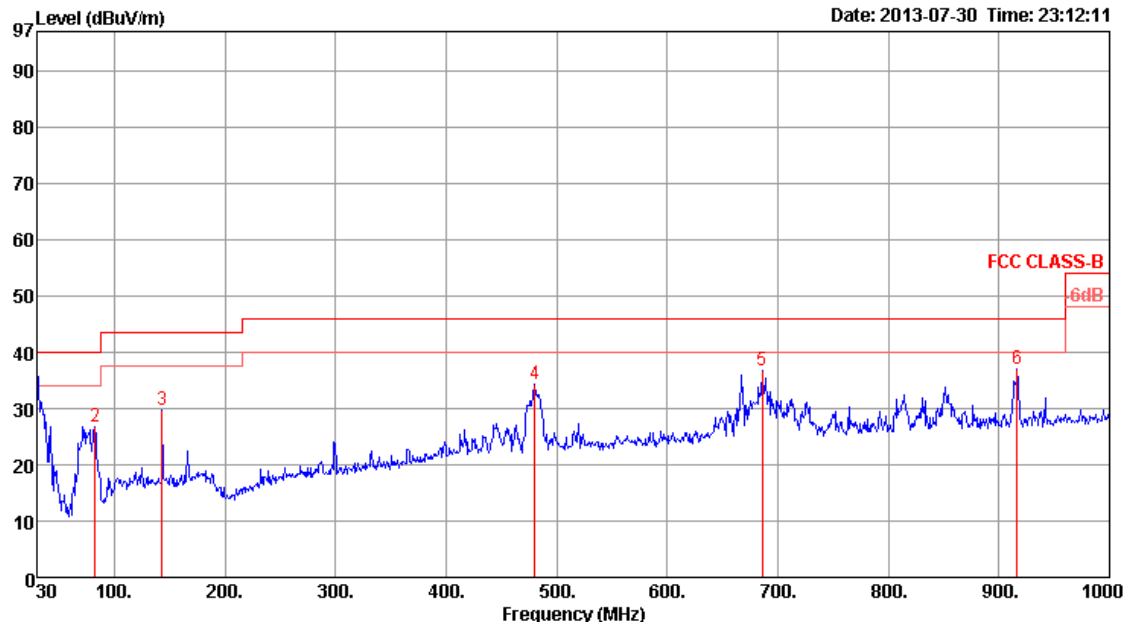
Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Test Mode	Mode 1

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	31.94	36.42	40.00	-3.58	45.88	0.65	17.69	27.80	Peak	400	0 HORIZONTAL
2	83.35	33.14	40.00	-6.86	52.03	1.07	7.71	27.67	Peak	400	0 HORIZONTAL
3	298.69	30.23	46.00	-15.77	41.75	2.03	13.35	26.90	Peak	400	0 HORIZONTAL
4	480.08	40.14	46.00	-5.86	48.24	2.59	17.31	28.00	Peak	400	0 HORIZONTAL
5	815.70	34.28	46.00	-11.72	38.69	3.27	19.89	27.57	Peak	400	0 HORIZONTAL
6	916.58	36.02	46.00	-9.98	39.15	3.54	20.66	27.33	Peak	400	0 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	30.00	36.68	40.00	-3.32	45.11	0.61	18.76	27.80	Peak	400	0	VERTICAL
2	82.38	26.73	40.00	-13.27	45.84	1.03	7.53	27.67	Peak	400	0	VERTICAL
3	143.49	29.70	43.50	-13.80	43.49	1.42	12.17	27.38	Peak	400	0	VERTICAL
4	480.08	34.27	46.00	-11.73	42.37	2.59	17.31	28.00	Peak	400	0	VERTICAL
5	685.72	36.77	46.00	-9.23	42.67	3.07	19.04	28.01	Peak	400	0	VERTICAL
6	916.58	36.91	46.00	-9.09	40.04	3.54	20.66	27.33	Peak	400	0	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.

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

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 20MHz Ch 1 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4824.05	44.15	54.00	-9.85	41.00	5.69	32.76	35.30	182	184	HORIZONTAL	Average
2 pk	4826.55	58.77	74.00	-15.23	55.61	5.69	32.77	35.30	182	184	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	4827.15	60.43	74.00	-13.57	57.27	5.69	32.77	35.30	154	170	VERTICAL	Peak
2	4827.80	46.73	54.00	-7.27	43.57	5.69	32.77	35.30	154	170	VERTICAL	Average



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 20MHz Ch 6 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4874.20	43.83	54.00	-10.17	40.59	5.75	32.80	35.31	100	346	HORIZONTAL	Average
2	pk 4876.40	57.16	74.00	-16.84	53.93	5.75	32.80	35.32	100	346	HORIZONTAL	Peak
3	7315.35	40.19	54.00	-13.81	31.37	7.06	37.12	35.36	100	276	HORIZONTAL	Average
4	7319.80	52.37	74.00	-21.63	43.53	7.06	37.13	35.35	100	276	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4874.25	50.93	54.00	-3.07	47.69	5.75	32.80	35.31	154	174	VERTICAL	Average
2	pk 4876.40	63.95	74.00	-10.05	60.72	5.75	32.80	35.32	154	174	VERTICAL	Peak
3	7314.90	42.69	54.00	-11.31	33.87	7.06	37.12	35.36	100	89	VERTICAL	Average
4	7316.50	56.05	74.00	-17.95	47.22	7.06	37.13	35.36	100	89	VERTICAL	Peak

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 20MHz Ch11 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4917.50	57.85	74.00	-16.15	54.55	5.80	32.83	35.33	177	347	HORIZONTAL Peak
2	4924.20	44.42	54.00	-9.58	41.10	5.81	32.84	35.33	177	347	HORIZONTAL Average
3	7389.95	45.56	54.00	-8.44	36.62	7.09	37.16	35.31	129	225	HORIZONTAL Average
4 pk	7391.30	58.99	74.00	-15.01	50.05	7.09	37.16	35.31	129	225	HORIZONTAL Peak

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4924.20	52.88	54.00	-1.12	49.56	5.81	32.84	35.33	146	79	VERTICAL Average
2 pk	4928.80	66.14	74.00	-7.86	62.82	5.81	32.84	35.33	146	79	VERTICAL Peak
3	7375.10	55.96	74.00	-18.04	47.05	7.08	37.15	35.32	100	206	VERTICAL Peak
4	7389.85	44.40	54.00	-9.60	35.46	7.09	37.16	35.31	100	206	VERTICAL Average



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 40MHz Ch 3 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4844.10	39.91	54.00	-14.09	36.72	5.71	32.78	35.30	131	132	HORIZONTAL	Average
2 pk	4850.55	52.51	74.00	-21.49	49.32	5.72	32.78	35.31	131	132	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4844.15	47.18	54.00	-6.82	43.99	5.71	32.78	35.30	120	88	VERTICAL	Average
2 pk	4852.15	58.86	74.00	-15.14	55.67	5.72	32.78	35.31	120	88	VERTICAL	Peak

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 40MHz Ch 6 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4873.25	52.24	74.00	-21.76	49.00	5.75	32.80	35.31	100	345 HORIZONTAL	Peak
2	4874.10	41.81	54.00	-12.19	38.57	5.75	32.80	35.31	100	345 HORIZONTAL	Average
3 pk	7309.00	53.24	74.00	-20.76	44.42	7.06	37.12	35.36	100	199 HORIZONTAL	Peak
4	7324.20	42.74	54.00	-11.26	33.90	7.06	37.13	35.35	100	199 HORIZONTAL	Average

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4874.20	48.50	54.00	-5.50	45.26	5.75	32.80	35.31	152	131 VERTICAL	Average
2 pk	4874.75	60.51	74.00	-13.49	57.27	5.75	32.80	35.31	152	131 VERTICAL	Peak
3	7317.20	38.54	54.00	-15.46	29.71	7.06	37.13	35.36	100	250 VERTICAL	Average
4	7328.60	51.00	74.00	-23.00	42.16	7.06	37.13	35.35	100	250 VERTICAL	Peak

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 40MHz Ch 9 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4904.10	41.09	54.00	-12.91	37.82	5.78	32.82	35.33	100	340	HORIZONTAL	Average
2	4921.95	52.55	74.00	-21.45	49.24	5.81	32.83	35.33	100	340	HORIZONTAL	Peak
3 pk	7354.50	55.44	74.00	-18.56	46.56	7.07	37.14	35.33	100	166	HORIZONTAL	Peak
4	7365.00	44.84	54.00	-9.16	35.94	7.08	37.15	35.33	100	166	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4904.15	49.63	54.00	-4.37	46.36	5.78	32.82	35.33	147	152	VERTICAL	Average
2 pk	4908.70	61.72	74.00	-12.28	58.44	5.79	32.82	35.33	147	152	VERTICAL	Peak
3	7351.15	44.37	54.00	-9.63	35.50	7.07	37.14	35.34	100	26	VERTICAL	Average
4	7372.00	56.70	74.00	-17.30	47.79	7.08	37.15	35.32	100	26	VERTICAL	Peak

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 20MHz CH 149 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	11487.10	52.17	74.00	-21.83	38.83	9.09	39.10	34.85	100	80	HORIZONTAL	Peak
2	11489.70	41.79	54.00	-12.21	28.45	9.09	39.10	34.85	100	80	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11488.40	41.57	54.00	-12.43	28.23	9.09	39.10	34.85	100	286	VERTICAL	Average
2 pk	11489.50	52.56	74.00	-21.44	39.22	9.09	39.10	34.85	100	286	VERTICAL	Peak



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 20MHz CH 157 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11568.20	41.38	54.00	-12.62	28.11	9.11	39.01	34.85	100	296	HORIZONTAL	Average
2 pk	11572.40	53.13	74.00	-20.87	39.86	9.11	39.01	34.85	100	296	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	11569.60	52.36	74.00	-21.64	39.09	9.11	39.01	34.85	100	108	VERTICAL	Peak
2	11570.90	41.41	54.00	-12.59	28.14	9.11	39.01	34.85	100	108	VERTICAL	Average



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 20MHz CH 165 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	11651.10	53.03	74.00	-20.97	39.88	9.11	38.89	34.85	100	310	HORIZONTAL	Peak
2	11652.50	42.08	54.00	-11.92	28.93	9.11	38.89	34.85	100	310	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11649.10	42.13	54.00	-11.87	28.94	9.11	38.93	34.85	100	110	VERTICAL	Average
2 pk	11649.70	53.48	74.00	-20.52	40.29	9.11	38.93	34.85	100	110	VERTICAL	Peak

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 40MHz CH 151 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11508.20	41.31	54.00	-12.69	27.96	9.10	39.10	34.85	100	310	HORIZONTAL	Average
2 pk	11508.20	52.62	74.00	-21.38	39.27	9.10	39.10	34.85	100	310	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	11504.20	53.90	74.00	-20.10	40.55	9.10	39.10	34.85	100	102	VERTICAL	Peak
2	11511.90	41.32	54.00	-12.68	27.97	9.10	39.10	34.85	100	102	VERTICAL	Average

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 40MHz CH 159 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11586.70	41.58	54.00	-12.42	28.35	9.11	38.97	34.85	100	222	HORIZONTAL	Average
2 pk	11587.90	52.83	74.00	-21.17	39.60	9.11	38.97	34.85	100	222	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	11589.90	51.66	74.00	-22.34	38.43	9.11	38.97	34.85	100	89	VERTICAL	Peak
2	11592.90	41.47	54.00	-12.53	28.24	9.11	38.97	34.85	100	89	VERTICAL	Average



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11b CH 1 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4824.03	50.74	54.00	-3.26	47.59	5.69	32.76	35.30	102	278	HORIZONTAL	Average
2 pk	4824.07	53.89	74.00	-20.11	50.74	5.69	32.76	35.30	102	278	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	4824.02	54.86	74.00	-19.14	51.71	5.69	32.76	35.30	138	44	VERTICAL	Peak
2	4824.04	52.11	54.00	-1.89	48.96	5.69	32.76	35.30	138	44	VERTICAL	Average

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11b CH 6 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4874.03	50.99	54.00	-3.01	47.75	5.75	32.80	35.31	170	169	HORIZONTAL	Average
2 pk	4874.08	54.07	74.00	-19.93	50.83	5.75	32.80	35.31	170	169	HORIZONTAL	Peak
3	7310.22	41.90	54.00	-12.10	33.08	7.06	37.12	35.36	100	207	HORIZONTAL	Average
4	7311.18	52.40	74.00	-21.60	43.58	7.06	37.12	35.36	100	207	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4874.04	51.79	54.00	-2.21	48.55	5.75	32.80	35.31	136	5	VERTICAL	Average
2 pk	4874.04	55.00	74.00	-19.00	51.76	5.75	32.80	35.31	136	5	VERTICAL	Peak
3	7310.28	43.71	54.00	-10.29	34.89	7.06	37.12	35.36	143	33	VERTICAL	Average
4	7312.10	52.33	74.00	-21.67	43.51	7.06	37.12	35.36	143	33	VERTICAL	Peak



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11b CH 11 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1 pk	4923.96	53.06	74.00	-20.94	49.74	5.81	32.84	35.33	100	302	HORIZONTAL Peak
2	4924.03	49.97	54.00	-4.03	46.65	5.81	32.84	35.33	100	302	HORIZONTAL Average
3	7385.42	39.19	54.00	-14.81	30.26	7.09	37.16	35.32	100	229	HORIZONTAL Average
4	7385.45	51.45	74.00	-22.55	42.52	7.09	37.16	35.32	100	229	HORIZONTAL Peak

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4924.03	52.92	54.00	-1.08	49.60	5.81	32.84	35.33	119	129	VERTICAL Average
2 pk	4924.08	55.48	74.00	-18.52	52.16	5.81	32.84	35.33	119	129	VERTICAL Peak
3	7385.11	51.42	74.00	-22.58	42.49	7.09	37.16	35.32	100	103	VERTICAL Peak
4	7385.39	39.06	54.00	-14.94	30.13	7.09	37.16	35.32	100	103	VERTICAL Average



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11g CH 1 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	cm	deg	
1	4824.60	40.30	54.00	-13.70	37.15	5.69	32.76	35.30	100	129 HORIZONTAL	Average
2 pk	4825.65	50.44	74.00	-23.56	47.28	5.69	32.77	35.30	100	129 HORIZONTAL	Peak

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	cm	deg	
1	4826.05	44.92	54.00	-9.08	41.76	5.69	32.77	35.30	153	130 VERTICAL	Average
2 pk	4834.55	57.80	74.00	-16.20	54.63	5.70	32.77	35.30	153	130 VERTICAL	Peak



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11g CH 6 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4874.10	45.44	54.00	-8.56	42.20	5.75	32.80	35.31	167	181	HORIZONTAL	Average
2	pk 4880.20	58.05	74.00	-15.95	54.82	5.75	32.80	35.32	167	181	HORIZONTAL	Peak
3	7315.35	42.91	54.00	-11.09	34.09	7.06	37.12	35.36	100	169	HORIZONTAL	Average
4	7320.50	55.16	74.00	-18.84	46.32	7.06	37.13	35.35	100	169	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4874.15	49.03	54.00	-4.97	45.79	5.75	32.80	35.31	152	153	VERTICAL	Average
2	pk 4874.80	62.48	74.00	-11.52	59.24	5.75	32.80	35.31	152	153	VERTICAL	Peak
3	7309.55	42.95	54.00	-11.05	34.13	7.06	37.12	35.36	100	8	VERTICAL	Average
4	7311.80	55.57	74.00	-18.43	46.75	7.06	37.12	35.36	100	8	VERTICAL	Peak



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11g CH 11 / Chain 1
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4923.90	42.46	54.00	-11.54	39.14	5.81	32.84	35.33	100	197	HORIZONTAL Average
2	4923.95	53.71	74.00	-20.29	50.39	5.81	32.84	35.33	100	197	HORIZONTAL Peak
3 pk	7384.30	55.01	74.00	-18.99	46.09	7.08	37.16	35.32	139	218	HORIZONTAL Peak
4	7390.15	42.84	54.00	-11.16	33.90	7.09	37.16	35.31	139	218	HORIZONTAL Average

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	4924.15	51.43	54.00	-2.57	48.11	5.81	32.84	35.33	146	101	VERTICAL Average
2 pk	4925.10	64.26	74.00	-9.74	60.94	5.81	32.84	35.33	146	101	VERTICAL Peak
3	7387.80	47.19	54.00	-6.81	38.26	7.09	37.16	35.32	120	22	VERTICAL Average
4	7390.20	59.22	74.00	-14.78	50.28	7.09	37.16	35.31	120	22	VERTICAL Peak

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a CH 149
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11489.00	42.11	54.00	-11.89	28.77	9.09	39.10	34.85	100	284	HORIZONTAL	Average
2 pk	11490.00	52.74	74.00	-21.26	39.40	9.09	39.10	34.85	100	284	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11485.90	42.15	54.00	-11.85	28.81	9.09	39.10	34.85	100	290	VERTICAL	Average
2 pk	11493.90	52.35	74.00	-21.65	39.00	9.10	39.10	34.85	100	290	VERTICAL	Peak

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a CH 157
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11569.30	41.62	54.00	-12.38	28.35	9.11	39.01	34.85	100	192	HORIZONTAL	Average
2 pk	11577.20	53.79	74.00	-20.21	40.52	9.11	39.01	34.85	100	192	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	11567.60	51.66	74.00	-22.34	38.39	9.11	39.01	34.85	100	80	VERTICAL	Peak
2	11570.90	41.59	54.00	-12.41	28.32	9.11	39.01	34.85	100	80	VERTICAL	Average



Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a CH 165
Test Date	Jul. 20, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	11647.60	54.10	74.00	-19.90	40.91	9.11	38.93	34.85	100	281	HORIZONTAL	Peak
2	11652.30	42.36	54.00	-11.64	29.21	9.11	38.89	34.85	100	281	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 pk	11648.90	53.82	74.00	-20.18	40.63	9.11	38.93	34.85	101	70	VERTICAL	Peak
2	11650.90	42.39	54.00	-11.61	29.24	9.11	38.89	34.85	101	70	VERTICAL	Average

Note:

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

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

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

4.6. Emissions Measurement

4.6.1. Limit

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

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

4.6.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100 kHz / 300 kHz for Peak

4.6.3. Test Procedures

For Radiated band edges Measurement:

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

For Radiated Out of Band Emission Measurement:

1. Test was performed in accordance with KDB 558074 D01 v03 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10.1 Unwanted Emissions into Non-Restricted Frequency Bands Measurement Procedure
2. The radiated emission test is performed on each TX port of operating mode without summing or adding $10\log(N)$ since the limit is relative emission limit. Only worst data of each operating mode is presented.

4.6.4. Test Setup Layout

For Radiated band edges Measurement:

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

For Radiated Out of Band Emission Measurement:

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

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 20MHz Ch 1, 6, 11 / Chain 1
Test date	Jul. 20, 2013		

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	2389.80	65.76	74.00	-8.24	34.18	3.68	27.90	0.00	195	360	HORIZONTAL	Peak
2	2390.00	47.27	54.00	-6.73	15.69	3.68	27.90	0.00	195	360	HORIZONTAL	Average
3 pk	2407.20	101.60			70.01	3.69	27.90	0.00	195	360	HORIZONTAL	Peak
4	2417.50	91.92			60.33	3.69	27.90	0.00	195	360	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	2387.00	56.92	74.00	-17.08	25.34	3.68	27.90	0.00	118	324	HORIZONTAL	Peak
2	2390.00	38.67	54.00	-15.33	7.09	3.68	27.90	0.00	118	324	HORIZONTAL	Average
3 pk	2440.40	102.22			70.61	3.71	27.90	0.00	118	324	HORIZONTAL	Peak
4	2442.40	92.65			61.04	3.71	27.90	0.00	118	324	HORIZONTAL	Average
5	2483.50	56.90	74.00	-17.10	25.27	3.73	27.90	0.00	118	324	HORIZONTAL	Peak
6	2500.10	40.42	54.00	-13.58	8.71	3.75	27.96	0.00	118	324	HORIZONTAL	Average

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

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	2459.00	103.60			71.98	3.72	27.90	0.00	121	328	HORIZONTAL	Peak
2 pp	2467.40	94.08			62.46	3.72	27.90	0.00	121	328	HORIZONTAL	Average
3	2483.50	44.34	54.00	-9.66	12.71	3.73	27.90	0.00	121	328	HORIZONTAL	Average
4	2483.80	61.82	74.00	-12.18	30.19	3.73	27.90	0.00	121	328	HORIZONTAL	Peak

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

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n MCS0 40MHz Ch 3, 6, 9 / Chain 1
Test date	Jul. 20, 2013		

Channel 3

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2383.40	58.88	74.00	-15.12	27.30	3.68	27.90	0.00	100	89 VERTICAL	Peak
2	2390.00	42.38	54.00	-11.62	10.80	3.68	27.90	0.00	100	89 VERTICAL	Average
3 pk	2437.80	101.81			70.20	3.71	27.90	0.00	100	89 VERTICAL	Peak
4	2438.00	91.99			60.38	3.71	27.90	0.00	100	89 VERTICAL	Average

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

Channel 6

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2345.00	58.49	74.00	-15.51	26.94	3.65	27.90	0.00	120	326 HORIZONTAL	Peak
2	2390.00	40.45	54.00	-13.55	8.87	3.68	27.90	0.00	120	326 HORIZONTAL	Average
3 pk	2443.80	99.18			67.57	3.71	27.90	0.00	120	326 HORIZONTAL	Peak
4	2446.40	89.57			57.96	3.71	27.90	0.00	120	326 HORIZONTAL	Average
5	2483.50	44.59	54.00	-9.41	12.96	3.73	27.90	0.00	120	326 HORIZONTAL	Average
6	2484.50	60.17	74.00	-13.83	28.54	3.73	27.90	0.00	120	326 HORIZONTAL	Peak

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

Channel 9

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1 pk	2467.80	100.59			68.97	3.72	27.90	0.00	119	327 HORIZONTAL	Peak
2	2468.00	90.91			59.29	3.72	27.90	0.00	119	327 HORIZONTAL	Average
3	2483.50	47.42	54.00	-6.58	15.79	3.73	27.90	0.00	119	327 HORIZONTAL	Average
4	2488.10	63.36	74.00	-10.64	31.73	3.73	27.90	0.00	119	327 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.

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11b CH 1, 6, 11 / Chain 1
Test Date	Jul. 20, 2013		

Channel 1

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2387.50	56.97	74.00	-17.03	25.39	3.68	27.90	0.00	165	212	HORIZONTAL Peak
2	2390.00	37.87	54.00	-16.13	6.29	3.68	27.90	0.00	165	212	HORIZONTAL Average
3	2411.30	94.29			62.70	3.69	27.90	0.00	165	212	HORIZONTAL Average
4 pk	2411.60	96.54			64.95	3.69	27.90	0.00	165	212	HORIZONTAL Peak

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

Channel 6

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2380.60	57.42	74.00	-16.58	25.85	3.67	27.90	0.00	158	212	HORIZONTAL Peak
2	2390.00	38.02	54.00	-15.98	6.44	3.68	27.90	0.00	158	212	HORIZONTAL Average
3	2436.20	92.12			60.51	3.71	27.90	0.00	158	212	HORIZONTAL Average
4 pk	2436.80	94.60			62.99	3.71	27.90	0.00	158	212	HORIZONTAL Peak
5	2483.50	38.05	54.00	-15.95	6.42	3.73	27.90	0.00	158	212	HORIZONTAL Average
6	2492.90	57.17	74.00	-16.83	25.53	3.74	27.90	0.00	158	212	HORIZONTAL Peak

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

Channel 11

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2461.30	90.95			59.33	3.72	27.90	0.00	100	98	VERTICAL Average
2 pk	2462.90	93.38			61.76	3.72	27.90	0.00	100	98	VERTICAL Peak
3	2483.50	38.45	54.00	-15.55	6.82	3.73	27.90	0.00	100	98	VERTICAL Average
4	2487.20	56.49	74.00	-17.51	24.86	3.73	27.90	0.00	100	98	VERTICAL Peak

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

Temperature	24.5°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11g CH 1, 6, 11 / Chain 1
Test Date	Jul. 20, 2013		

Channel 1

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2389.50	63.01	74.00	-10.99	31.43	3.68	27.90	0.00	193	342 HORIZONTAL	Peak
2	2390.00	46.41	54.00	-7.59	14.83	3.68	27.90	0.00	193	342 HORIZONTAL	Average
3	2416.20	94.13			62.54	3.69	27.90	0.00	193	342 HORIZONTAL	Average
4 pk	2418.80	103.97			72.37	3.70	27.90	0.00	193	342 HORIZONTAL	Peak

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

Channel 6

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2364.60	56.70	74.00	-17.30	25.13	3.67	27.90	0.00	100	87 VERTICAL	Peak
2	2390.00	38.83	54.00	-15.17	7.25	3.68	27.90	0.00	100	87 VERTICAL	Average
3 pk	2438.60	104.38			72.77	3.71	27.90	0.00	100	87 VERTICAL	Peak
4	2441.20	95.14			63.53	3.71	27.90	0.00	100	87 VERTICAL	Average
5	2500.00	40.85	54.00	-13.15	9.14	3.75	27.96	0.00	100	87 VERTICAL	Average
6	2500.00	57.86	74.00	-16.14	26.11	3.76	27.99	0.00	100	87 VERTICAL	Peak

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

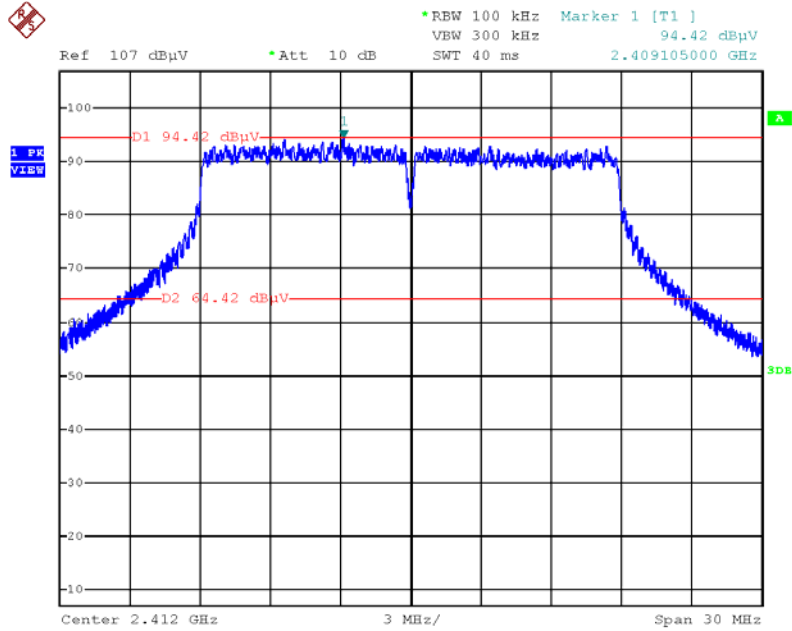
Channel 11

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2466.20	94.66			63.04	3.72	27.90	0.00	121	325 HORIZONTAL	Average
2 pk	2468.90	103.73			72.11	3.72	27.90	0.00	121	325 HORIZONTAL	Peak
3	2483.50	43.68	54.00	-10.32	12.05	3.73	27.90	0.00	121	325 HORIZONTAL	Average
4	2483.80	61.43	74.00	-12.57	29.80	3.73	27.90	0.00	121	325 HORIZONTAL	Peak

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

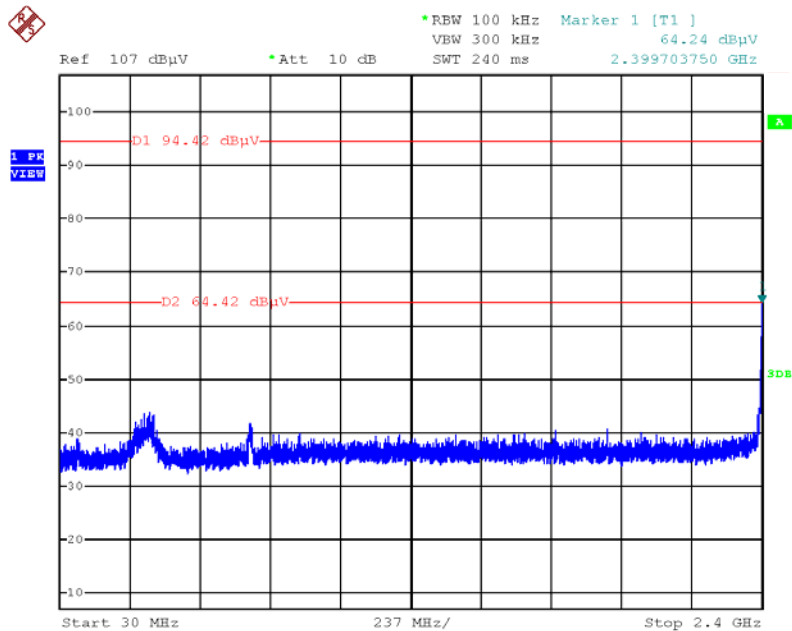
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11n MCS0 20MHz / Reference Level



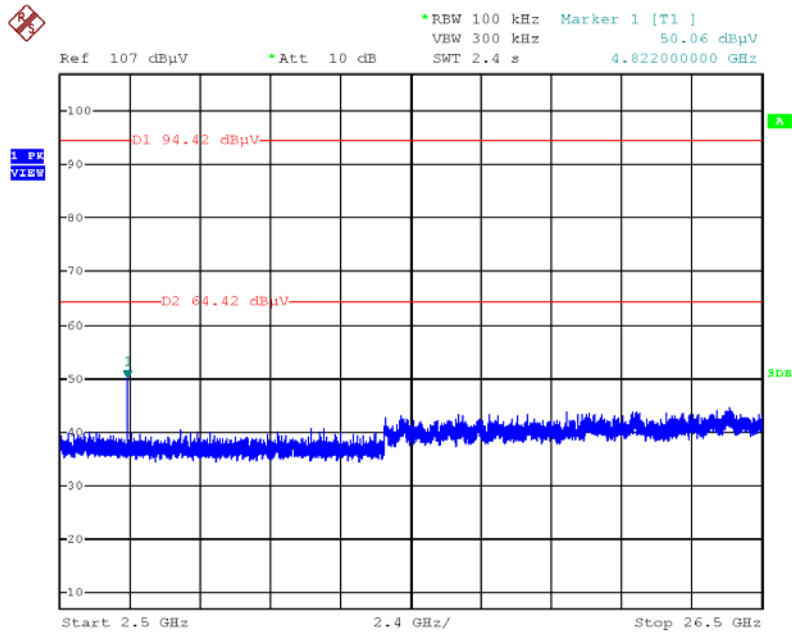
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Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 1 / 30MHz~2400MHz (down 30dBc)



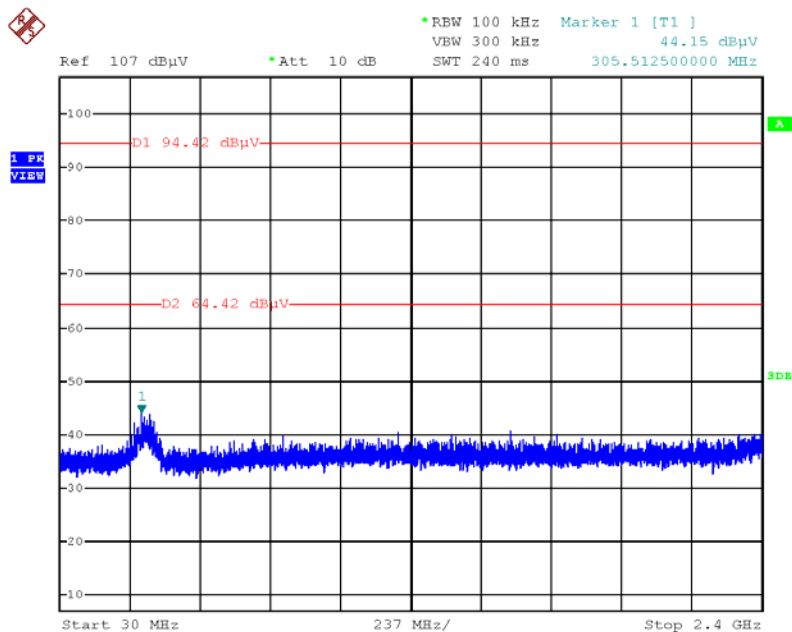
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Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 1 / 2500MHz~26500MHz (down 30dBc)



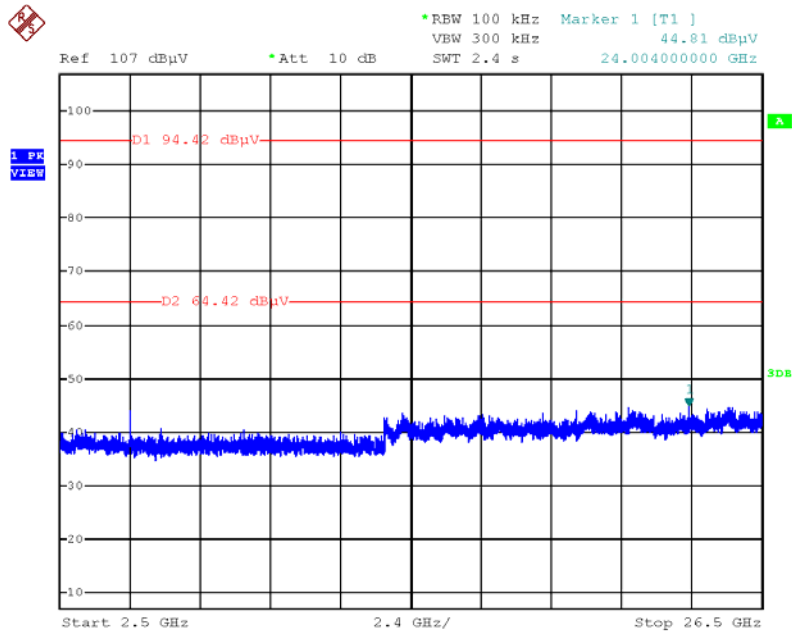
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Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 11 / 30MHz~2400MHz (down 30dBc)



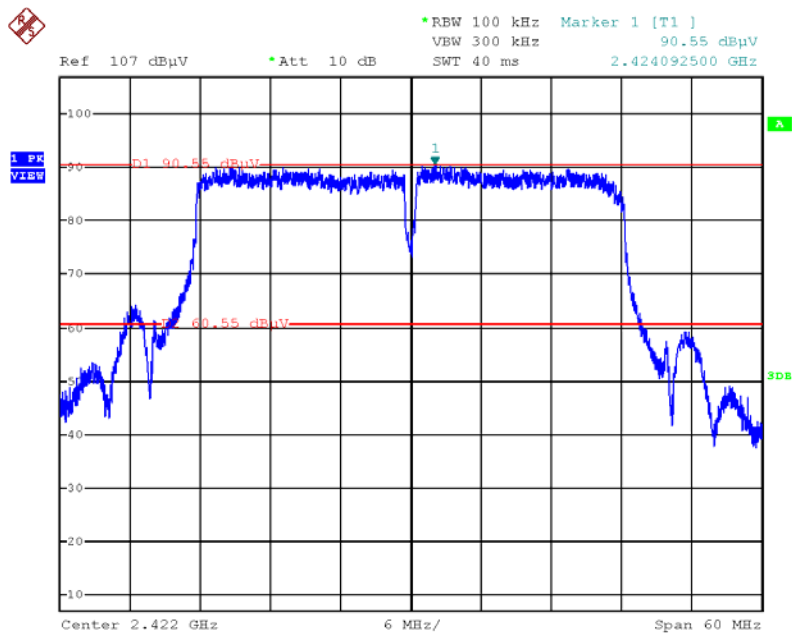
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Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 11 / 2500MHz~26500MHz (down 30dBc)



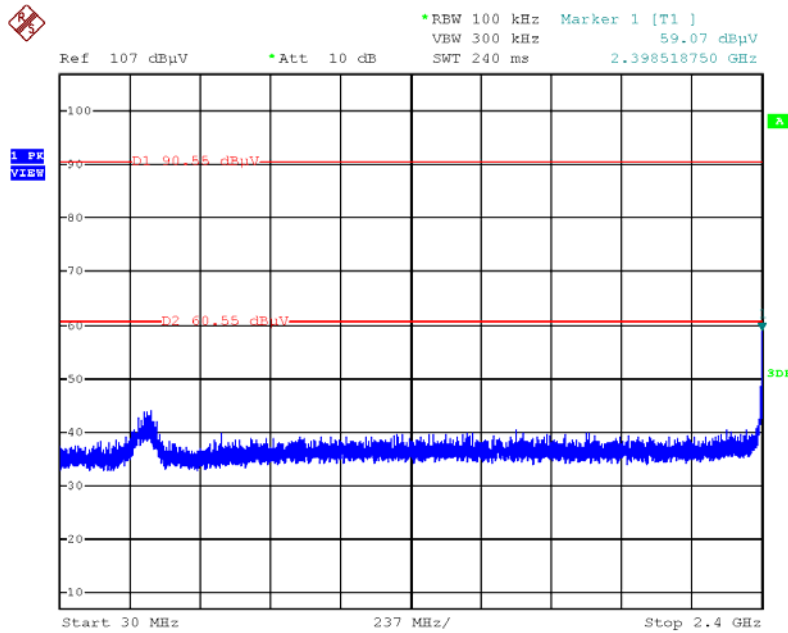
Date: 29.JUL.2013 15:35:46

Plot on Configuration IEEE 802.11n MCS0 40MHz / Reference Level



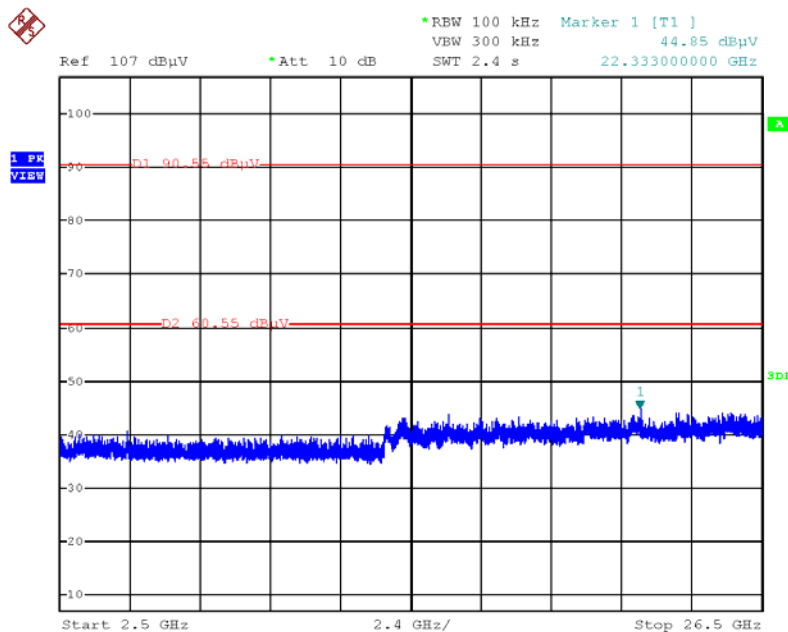
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Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 3 / 30MHz~2400MHz (down 30dBc)



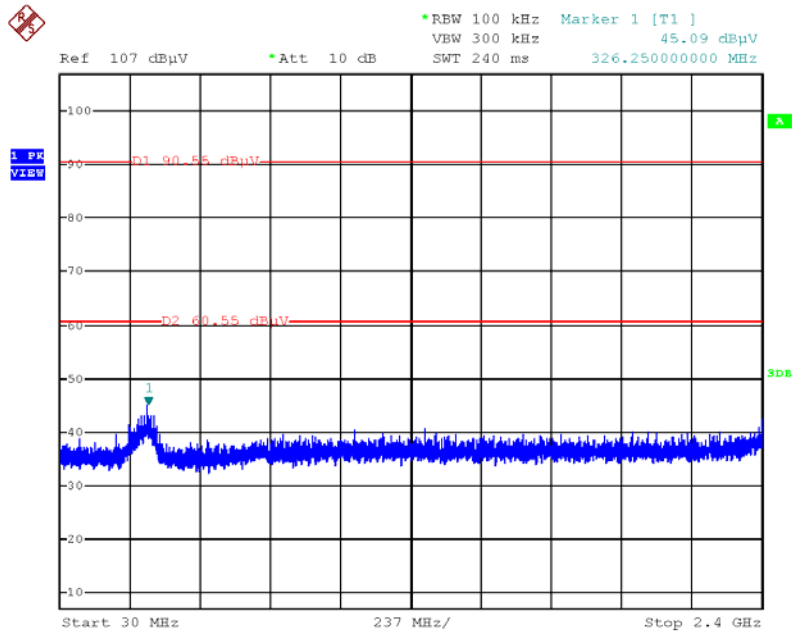
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Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 3 / 2500MHz~26500MHz (down 30dBc)



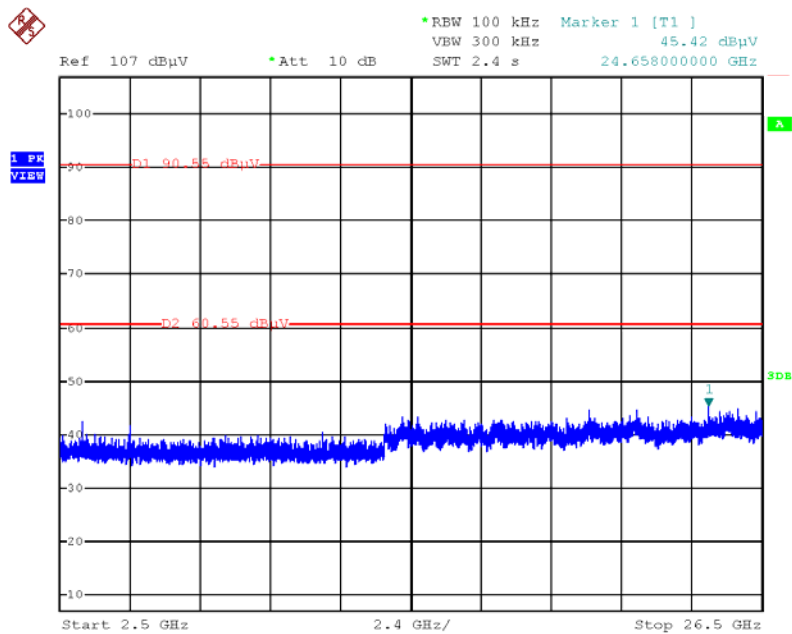
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Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 9 / 30MHz~2400MHz (down 30dBc)



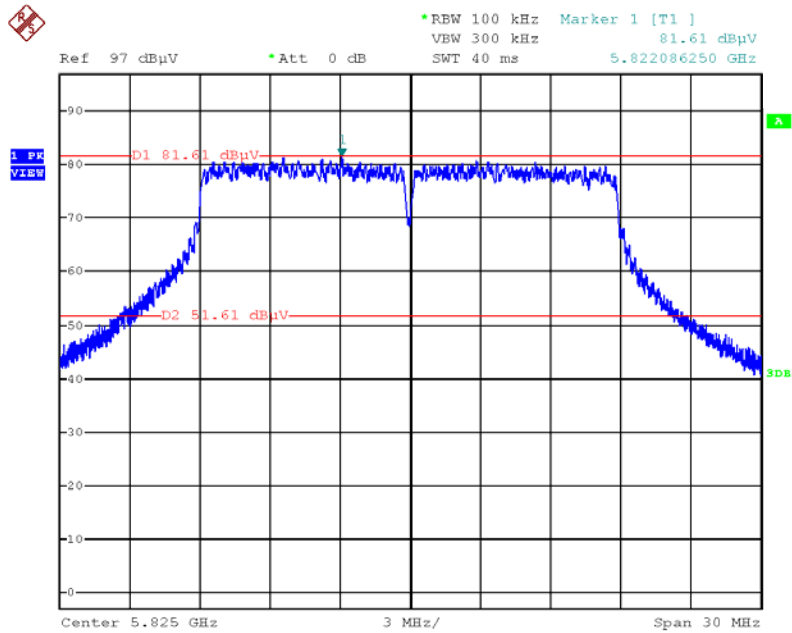
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Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 9 / 2500MHz~26500MHz (down 30dBc)



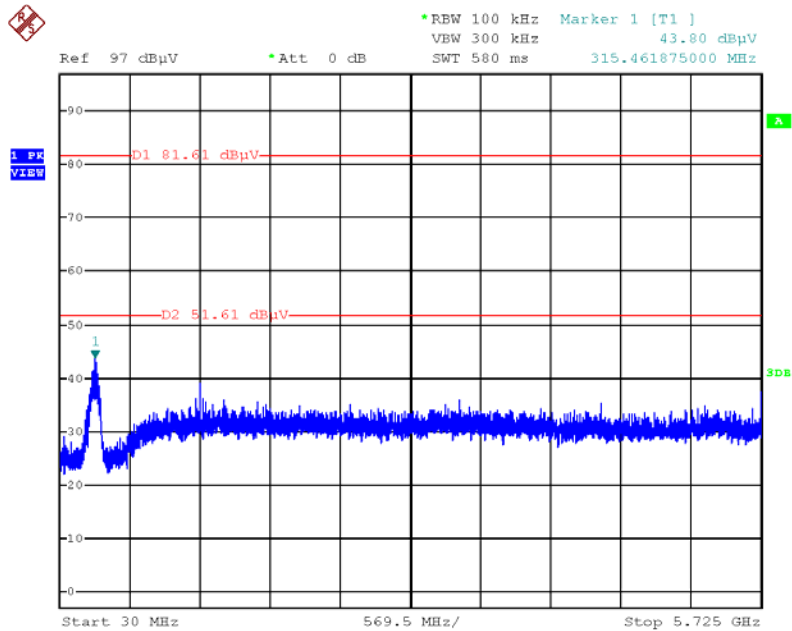
Date: 29.JUL.2013 15:43:48

Plot on Configuration IEEE 802.11n MCS0 20MHz / Reference Level



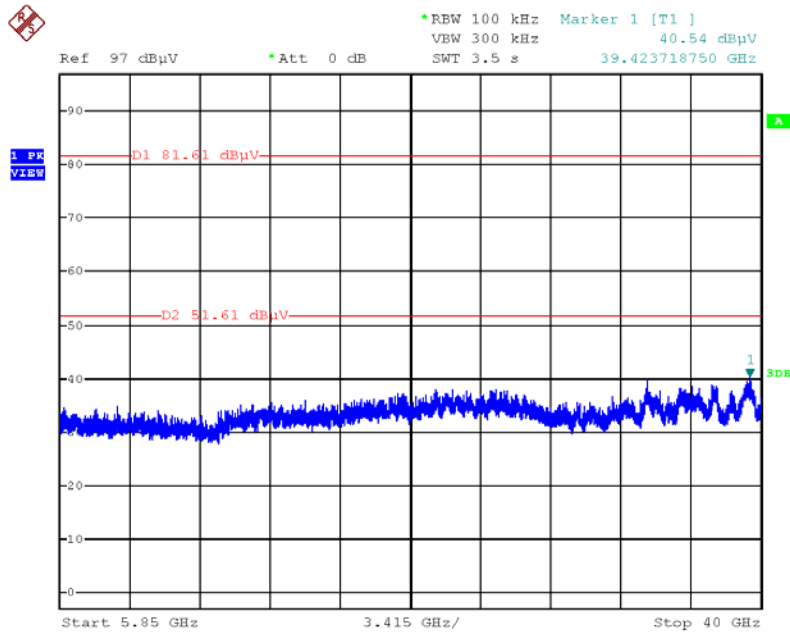
Date: 29.JUL.2013 16:01:28

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



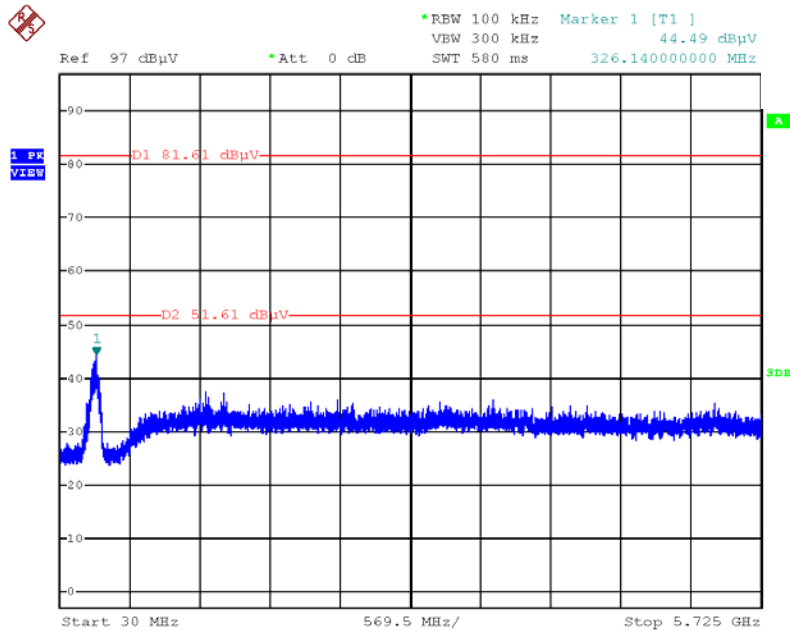
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Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 149 / 5850MHz~40000MHz (down 30dBc)



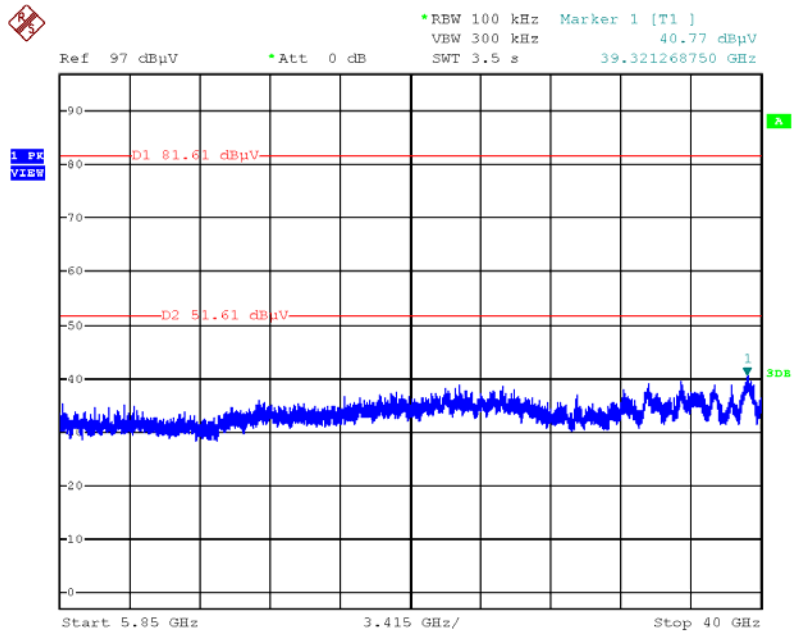
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Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 165 / 30MHz~5725MHz (down 30dBc)



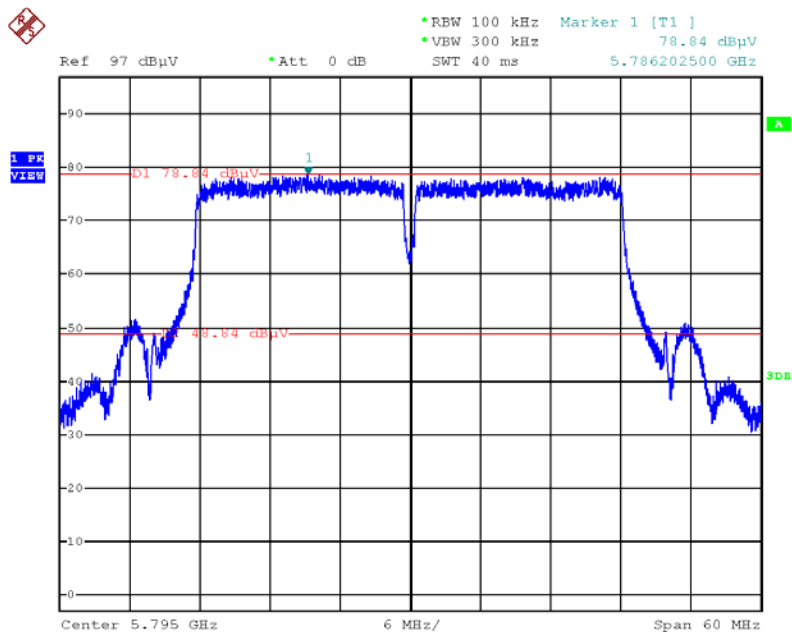
Date: 29.JUL.2013 16:05:09

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



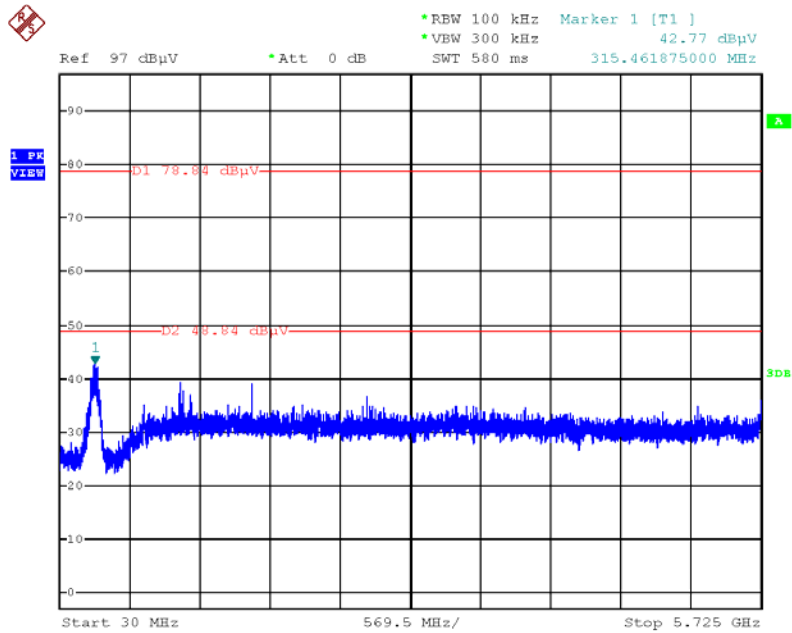
Date: 29.JUL.2013 16:06:01

Plot on Configuration IEEE 802.11n MCS0 40MHz / Reference Level



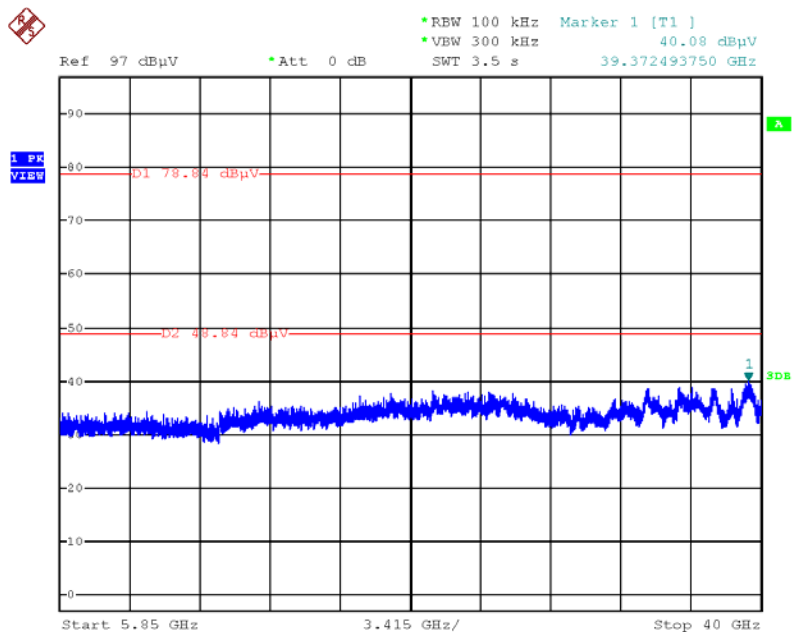
Date: 29.JUL.2013 16:11:31

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



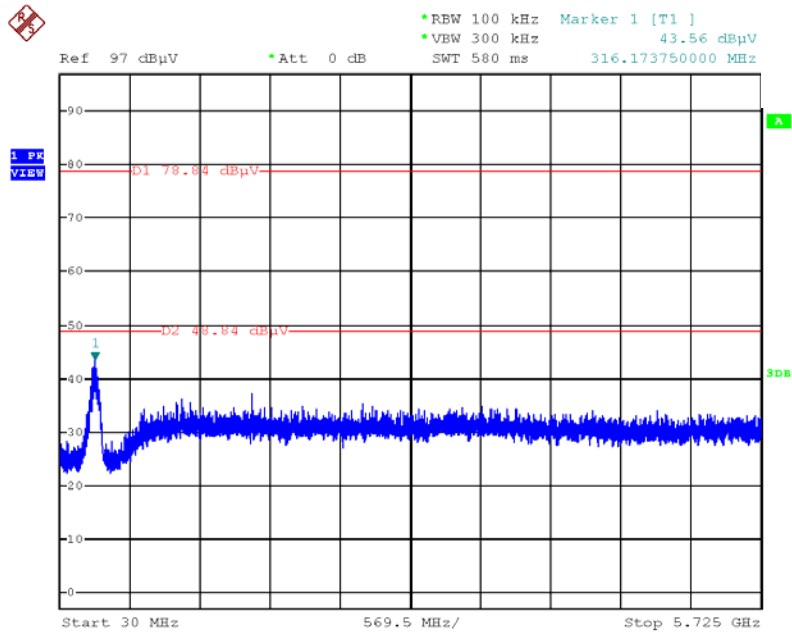
Date: 29.JUL.2013 16:14:27

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



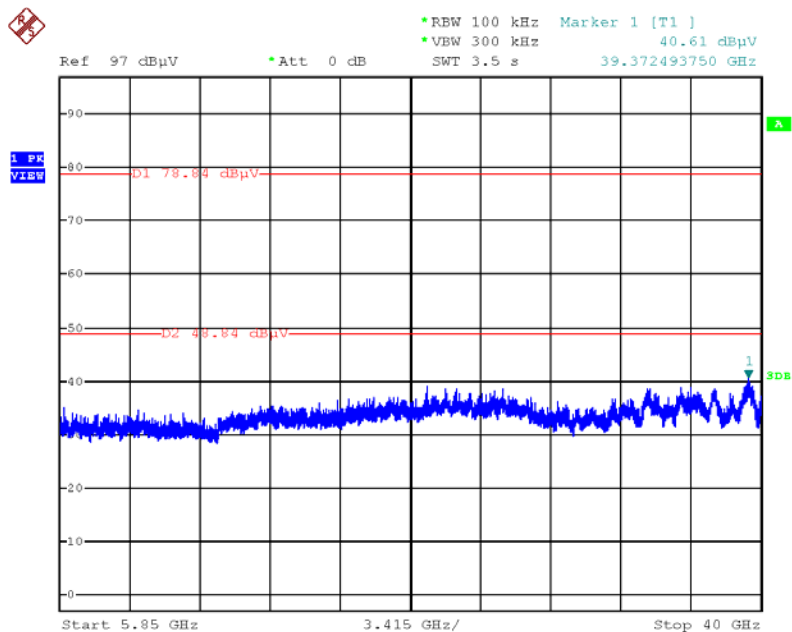
Date: 29.JUL.2013 16:15:23

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



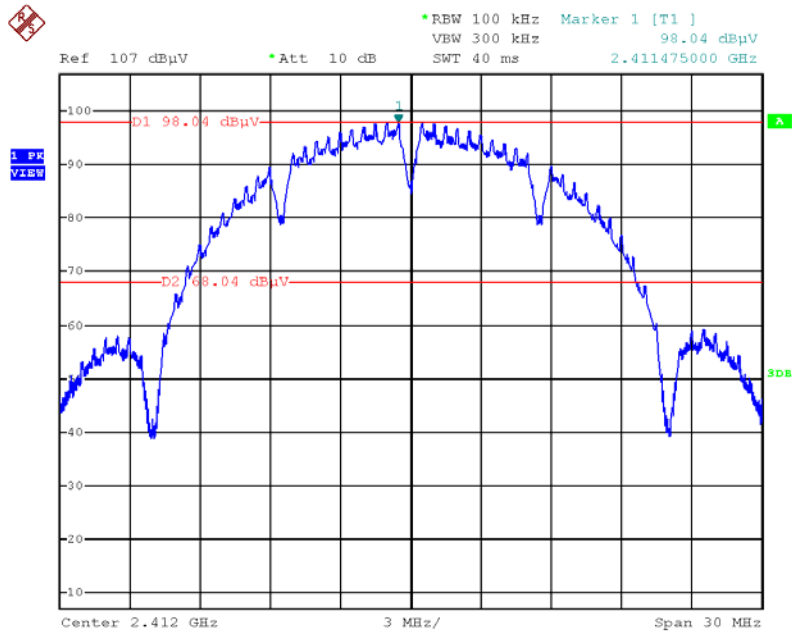
Date: 29.JUL.2013 16:11:59

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



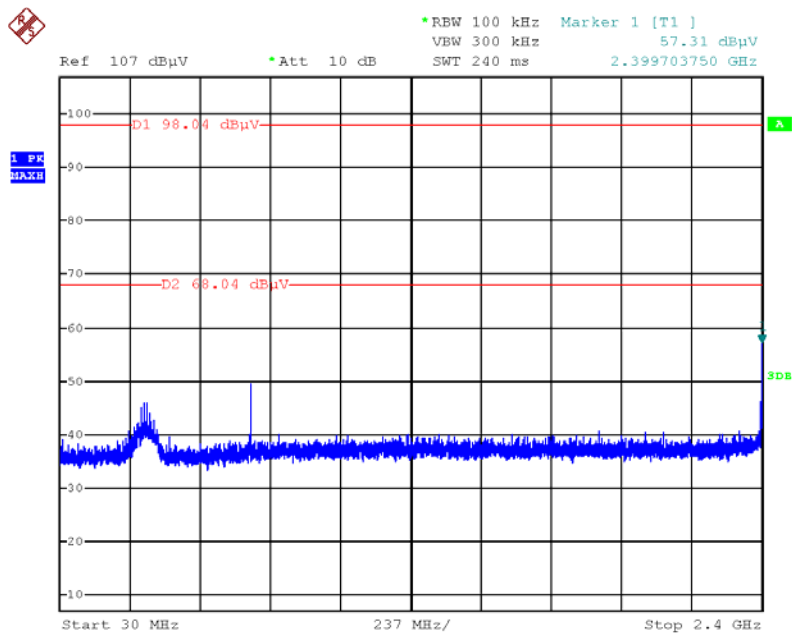
Date: 29.JUL.2013 16:12:56

Plot on Configuration IEEE 802.11b / Reference Level



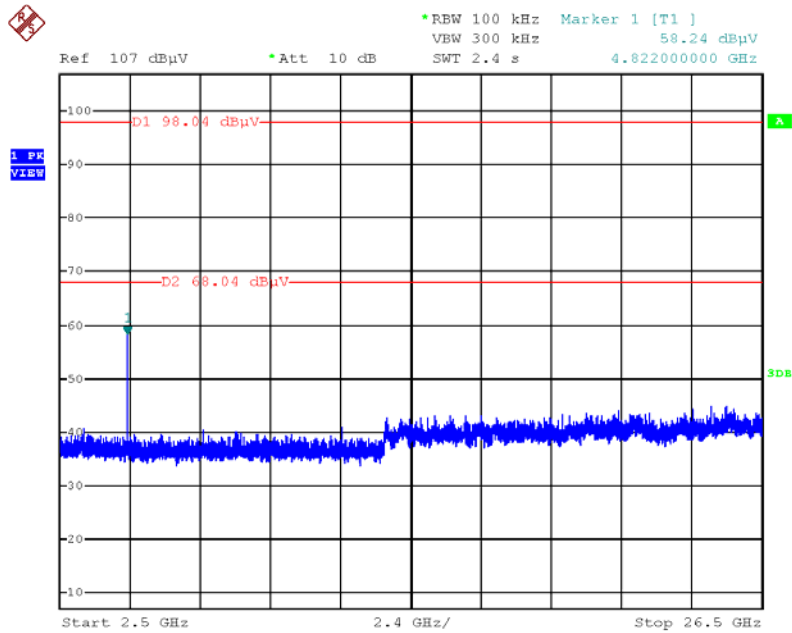
Date: 29.JUL.2013 13:31:15

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



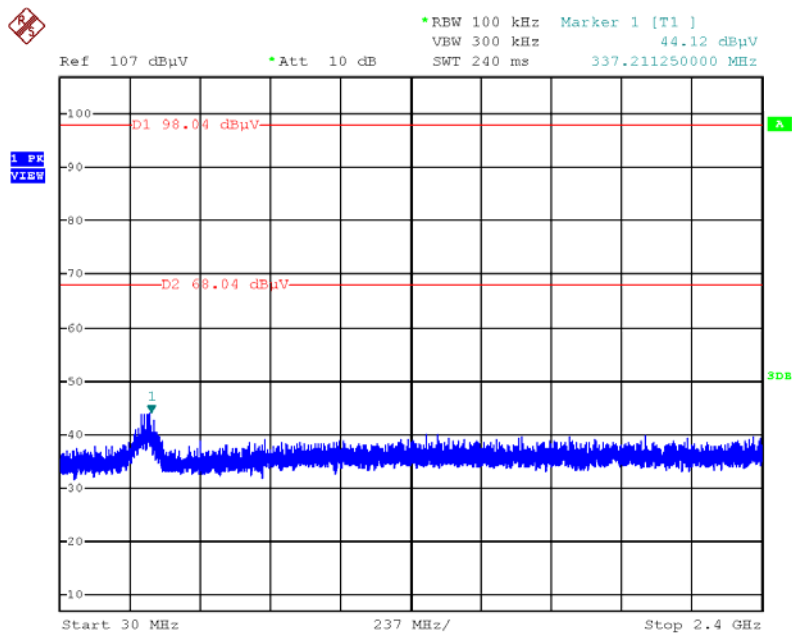
Date: 29.JUL.2013 13:33:47

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



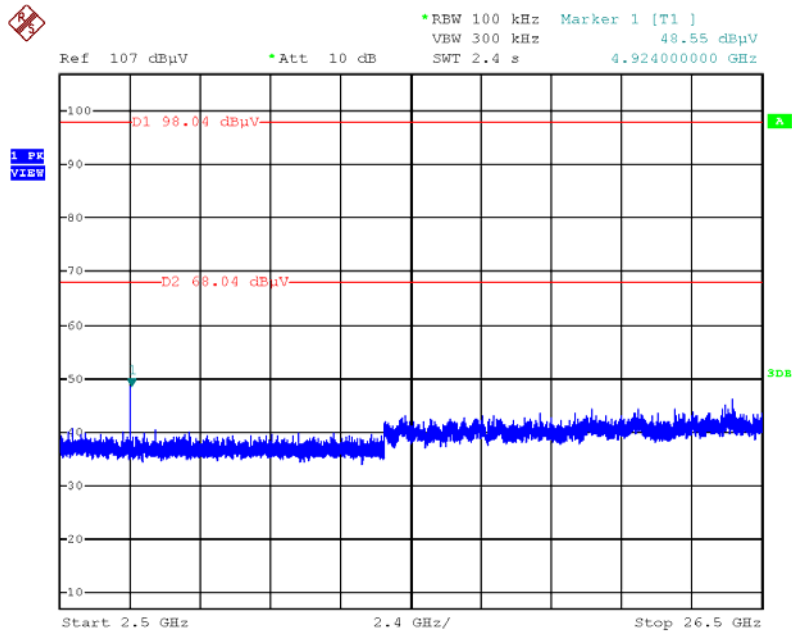
Date: 29.JUL.2013 13:36:55

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



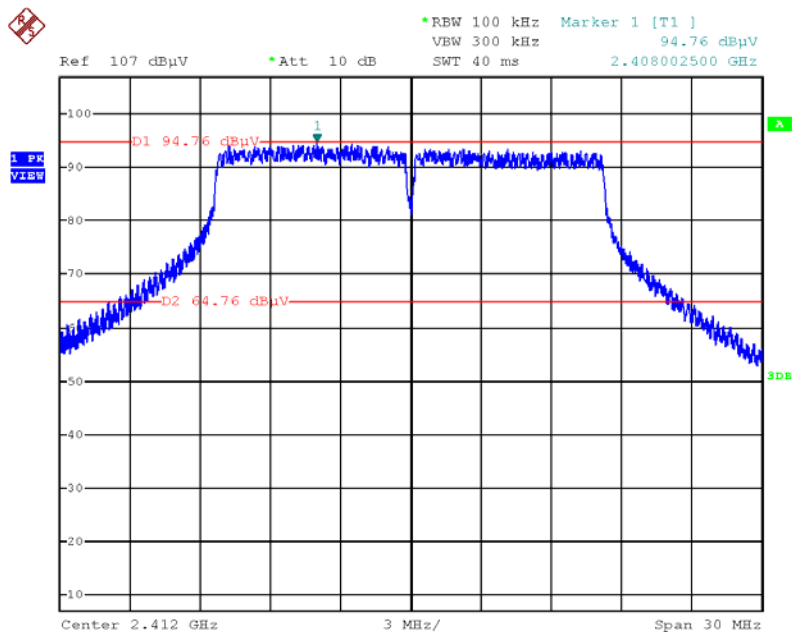
Date: 29.JUL.2013 13:48:53

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



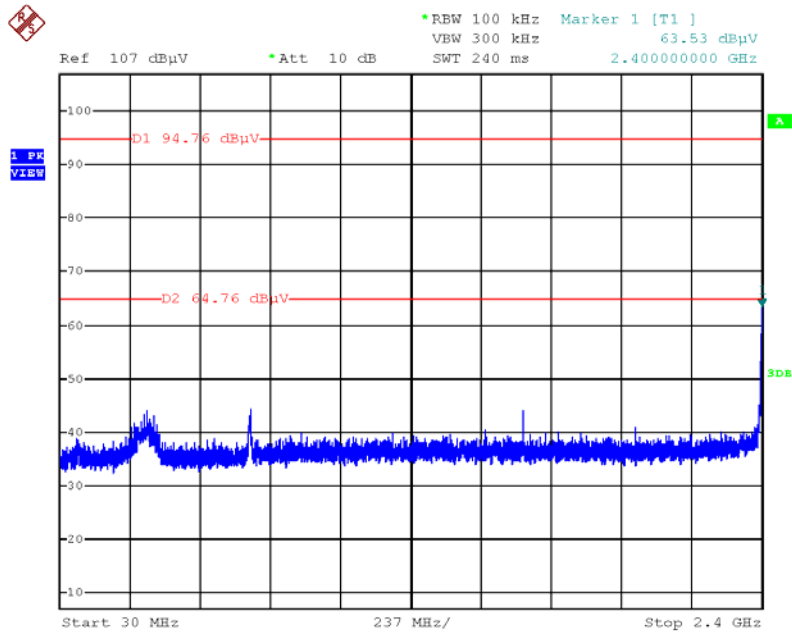
Date: 29.JUL.2013 13:48:24

Plot on Configuration IEEE 802.11g / Reference Level



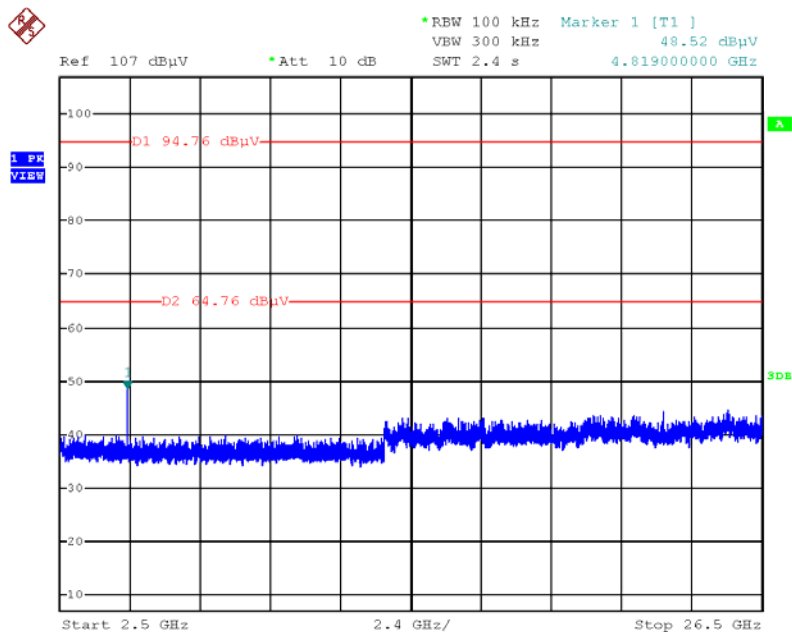
Date: 29.JUL.2013 15:20:24

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



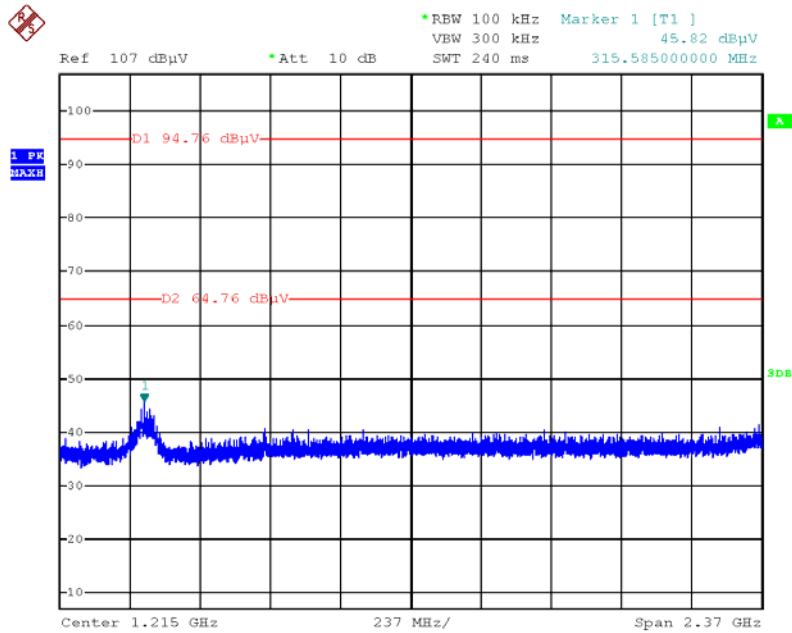
Date: 29.JUL.2013 15:23:17

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



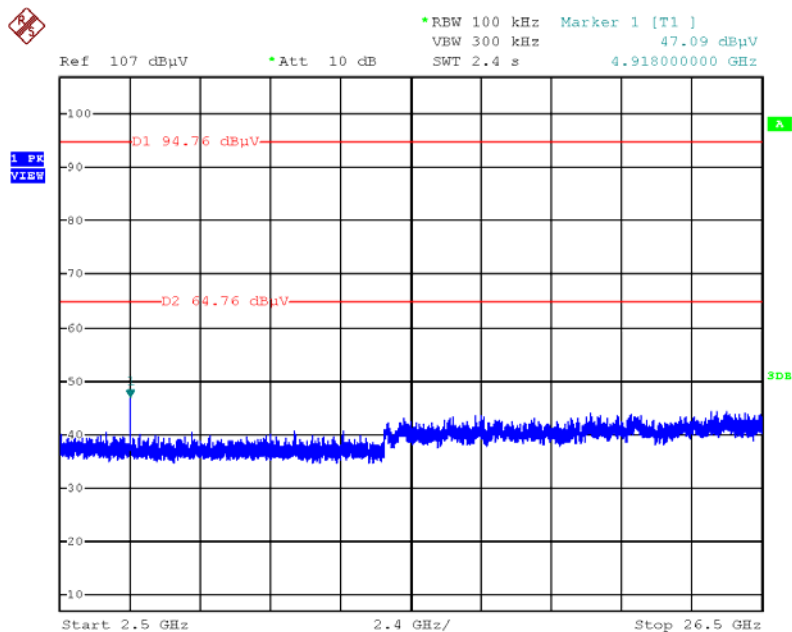
Date: 29.JUL.2013 15:24:19

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



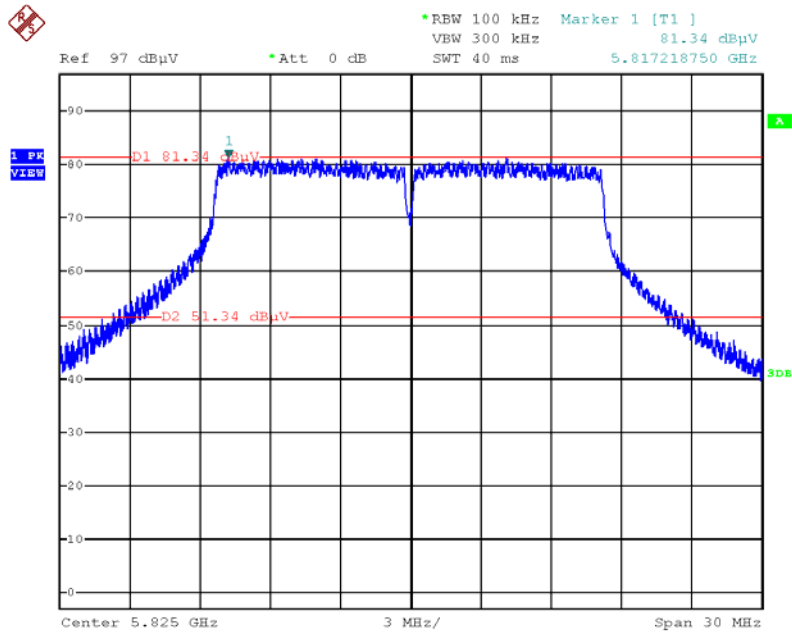
Date: 29.JUL.2013 15:25:51

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



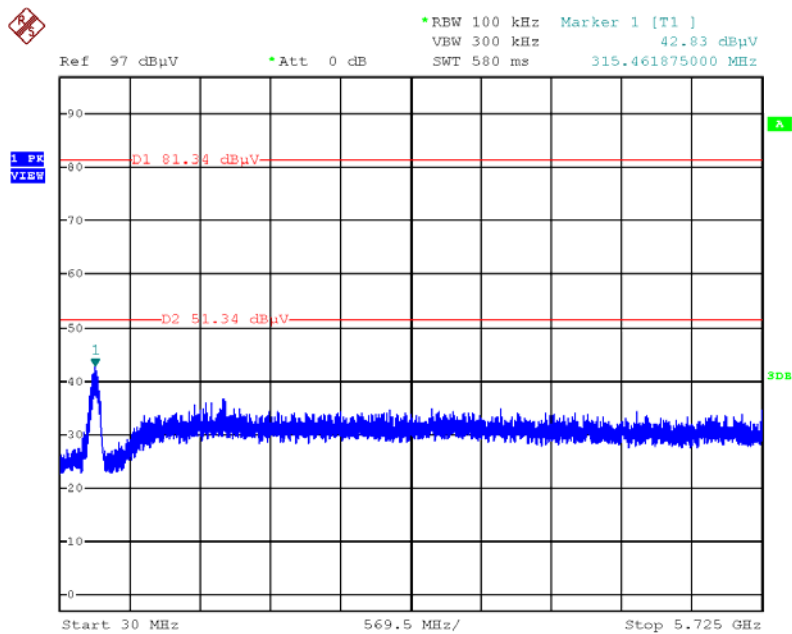
Date: 29.JUL.2013 15:26:34

Plot on Configuration IEEE 802.11a / Reference Level



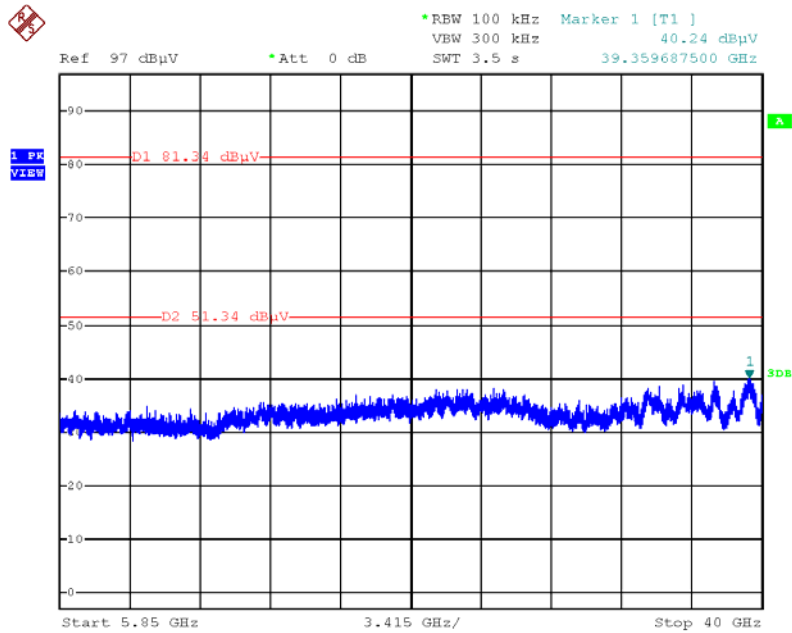
Date: 29.JUL.2013 15:51:55

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



Date: 29.JUL.2013 15:56:46

Plot on Configuration IEEE 802.11a / CH 165 / 5850MHz~4000MHz (down 30dBc)



Date: 29.JUL.2013 15:53:44

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	100377	9kHz ~ 2.75GHz	Oct. 23, 2012	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov. 26, 2012	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Jul. 17, 2012	Conduction (CO01-CB)
Impulsbegrenzer Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz~30MHz	Feb. 21, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 04, 2012	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	-	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Apr. 16, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9kHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 12, 2013	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Oct. 08, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	0120A02056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	3 Way	MDC2366	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Power Divider	Woken	4 Way	0120A04056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Nov. 28, 2012	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Nov. 27, 2012	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

*Calibration Interval of instruments listed above is two year.

N.C.R. means Non-Calibration required.

6. TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

7. MEASUREMENT UNCERTAINTY

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	0.026	dB	normal(k=2)	0.013
Cable loss	0.002	dB	normal(k=2)	0.001
AMN/LISN specification	1.200	dB	normal(k=2)	0.600
Mismatch Receiver VSWR 1= AMN/LISN VSWR 2=	-0.080	dB	U-shaped	0.060
Combined standard uncertainty $U_c(y)$				1.2
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				2.4

Uncertainty of Radiated Emission Measurement (30MHz ~ 1,000MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	± 0.173	dB	K=1	0.086
Cable loss	± 0.174	dB	K=2	0.087
Antenna gain	± 0.169	dB	K=2	0.084
Site imperfection	± 0.433	dB	Triangular	0.214
Pre-amplifier gain	± 0.366	dB	K=2	0.183
Transmitter antenna	± 1.200	dB	Rectangular	0.600
Signal generator	± 0.461	dB	Rectangular	0.231
Mismatch	± 0.080	dB	U-shape	0.040
Spectrum analyzer	± 0.500	dB	Rectangular	0.250
Combined standard uncertainty $U_c(y)$				1.778
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				3.555

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.191	dB	K=1	0.095
Cable loss	±0.169	dB	K=2	0.084
Antenna gain	±0.191	dB	K=2	0.096
Site imperfection	±0.582	dB	Triangular	0.291
Pre-amplifier gain	±0.304	dB	K=2	0.152
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty $U_c(y)$				1.839
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				3.678

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.186	dB	K=1	0.093
Cable loss	±0.167	dB	K=2	0.083
Antenna gain	±0.190	dB	K=2	0.095
Site imperfection	±0.488	dB	Triangular	0.244
Pre-amplifier gain	±0.269	dB	K=2	0.134
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty $U_c(y)$				1.771
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				3.541

Uncertainty of Conducted Emission Measurement

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Cable loss	±0.038	dB	K=2	0.019
Attenuator	±0.047	dB	K=2	0.024
Power Meter specification	±0.300	dB	Triangular	0.150
Power Sensor specification	±0.300	dB	Rectangular	0.150
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty $U_c(y)$				0.863
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				1.726