

FCC RADIO TEST REPORT

Applicant's company	Belkin International, Inc.
Applicant Address	12045 East Waterfront Drive, Playa Vista, CA 90094
FCC ID	K7SF7D7602V1

Product Name	NetCam HD
Brand Name	Belkin
Model Name	F7D7602v1
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Feb. 07, 2013
Final Test Date	Mar. 14, 2013
Submission Type	Original Equipment



Statement

Test result included in this report is for the IEEE 802.11n and IEEE 802.11b/g part 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 v02 and KDB 662911 D01 v01r02.

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
FR320712	Rev. 01	Initial issue of report	Mar. 18, 2013



1. CERTIFICATE OF COMPLIANCE

Product Name : NetCam HD
Brand Name : Belkin
Model Name : F7D7602v1
Applicant : Belkin International, Inc.
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Feb. 07, 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, appearing to read '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	15.73 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	15.63 dB
4.3	15.247(e)	Power Spectral Density	Complies	20.49 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	0.25 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.02 dB
4.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	±8.5×10 ⁻⁸	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7°C	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n

Items	Description
Product Type	WLAN (1TX, 1RX)
Radio Type	Intentional Transceiver
Power Type	Power Adapter
Modulation	see the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11 for 20MHz bandwidth ; 7 for 40MHz bandwidth
Channel Band Width (99%)	MCS0 (20MHz): 17.68 MHz ; MCS0 (40MHz): 36.16 MHz
Maximum Conducted Output Power	MCS0 (20MHz): 14.37 dBm ; MCS0 (40MHz): 8.45 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11b/g

Items	Description
Product Type	WLAN (1TX, 1RX)
Radio Type	Intentional Transceiver
Power Type	Power Adapter
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11g
Data Modulation	DSSS (BPSK / QPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11
Channel Band Width (99%)	11b: 15.04 MHz ; 11g: 16.56 MHz
Maximum Conducted Output Power	11b: 14.27 dBm ; 11g: 13.97 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

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

IEEE 802.11n spec

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Datarate(Mbps)			
									800nsGI		400nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.200	15
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.400	30
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.700	45
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.900	60
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.300	90
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.800	120
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.000	135
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.200	150

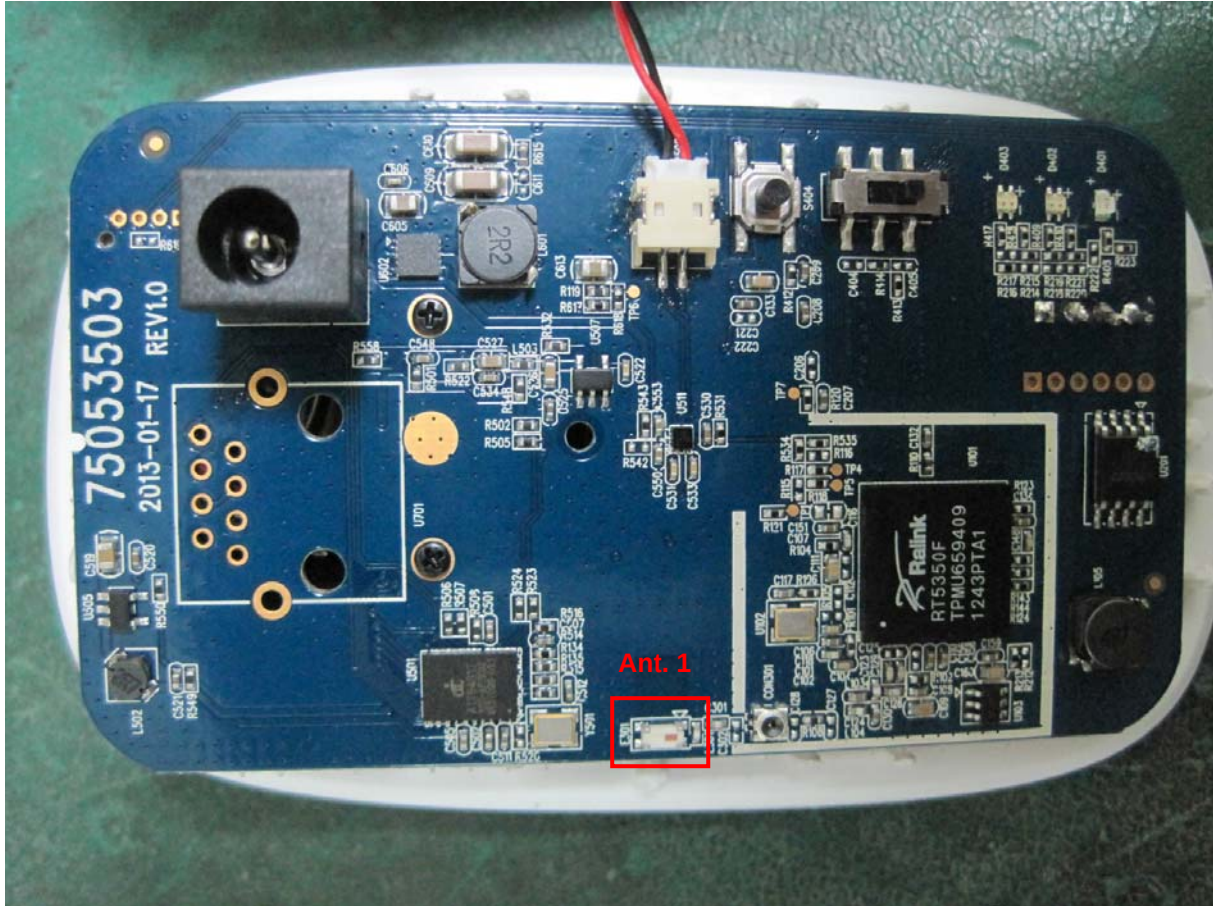
Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	guard interval

3.2. Accessories

Power	Brand	Model	Rating
Adapter	belkin	DSC-6PFA-05 FUS 050100	Input: 100-240VAC, 50/60Hz, 0.2A Output: 5VDC, 1A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	ACX	AT3216_-T2R4PAA_	Chip Antenna	N/A	1.5



3.4. Table for Carrier Frequencies

For IEEE 802.11b/g, use Channel 1~Channel 11.

There are two bandwidth systems for IEEE 802.11n.

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

For both 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	MCS0/20MHz	6.5 Mbps	1/6/11	1
	MCS0/40MHz	13.5 Mbps	3/6/9	1
	11b/BPSK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
Power Spectral Density	MCS0/20MHz	6.5 Mbps	1/6/11	1
	MCS0/40MHz	13.5 Mbps	3/6/9	1
	11b/BPSK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
6dB Spectrum Bandwidth	MCS0/20MHz	6.5 Mbps	1/6/11	1
	MCS0/40MHz	13.5 Mbps	3/6/9	1
	11b/BPSK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
Radiated Emissions 9kHz~1GHz	Normal Link	-	-	-
Radiated Emissions 1GHz~10 th Harmonic	MCS0/20MHz	6.5 Mbps	1/6/11	1
	MCS0/40MHz	13.5 Mbps	3/6/9	1
	11b/BPSK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
Band Edge Emissions	MCS0/20MHz	6.5 Mbps	1/6/11	1
	MCS0/40MHz	13.5 Mbps	3/6/9	1
	11b/BPSK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1

The following test modes were performed for all tests:

For Radiated Emission test:

The following test modes were performed for all tests:

Mode 1: Place EUT in X axis

Mode 2: Place EUT in Y axis

Mode 3: Place EUT in Z axis

Mode 3 generated the worst case, so it was selected to perform test and its test result was written in the 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).

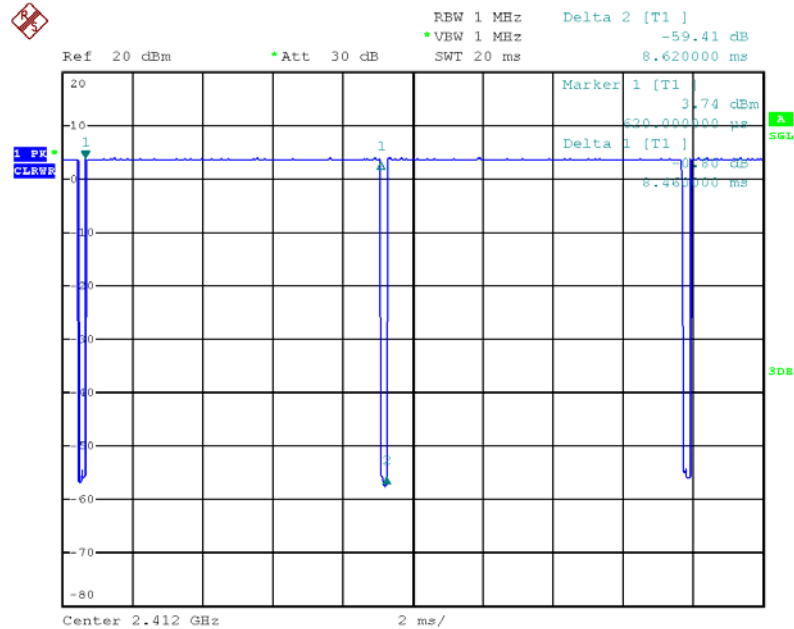
Please refer section 6 for Test Site Address.

3.7. EUT Operation during Test

During the test, "HyperTerminal" was executed the test program to control the EUT continuously transmit RF signal.

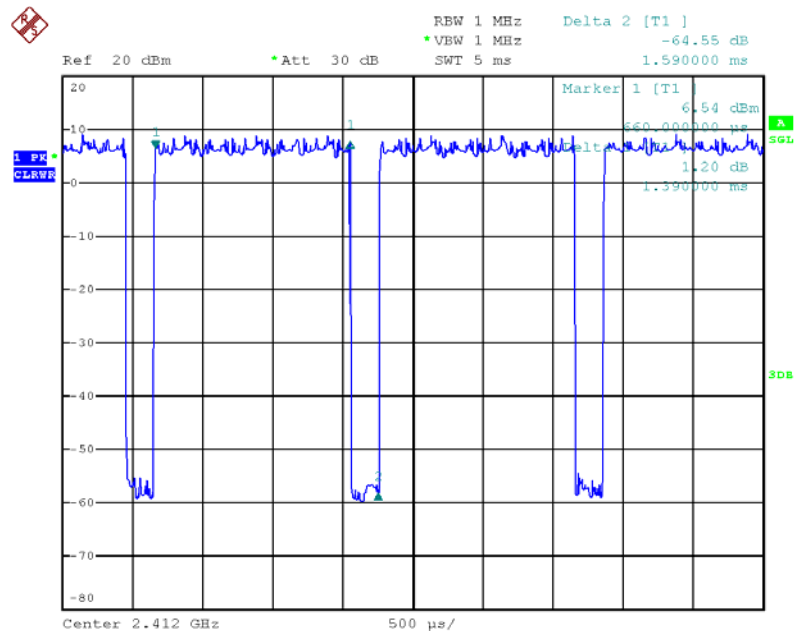
3.8. Duty Cycle

For 802.11b mode:



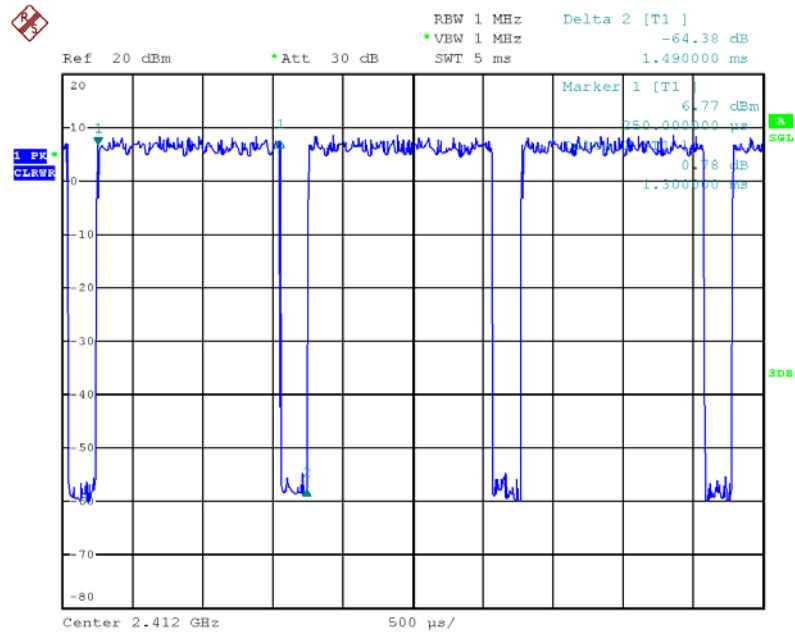
Date: 14.MAR.2013 13:37:48

For 802.11g mode:



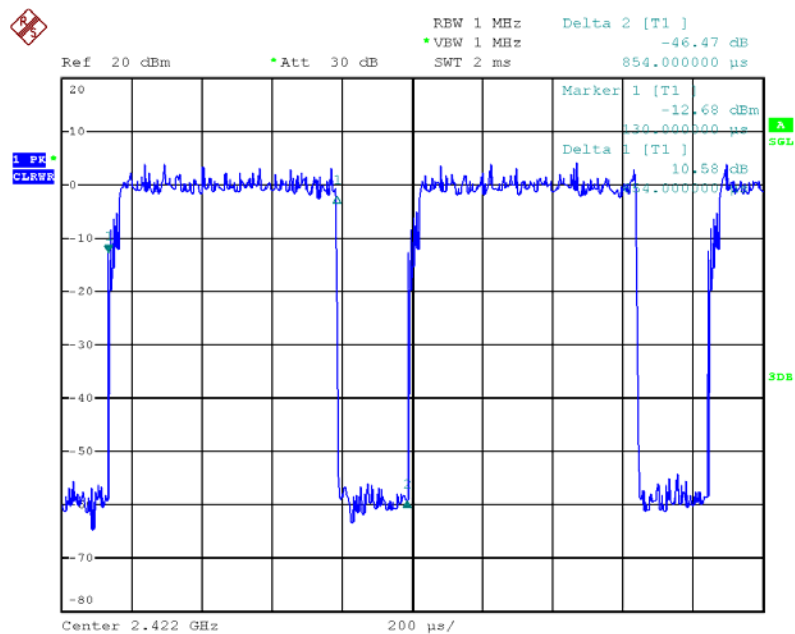
Date: 14.MAR.2013 13:42:39

For 802.11n MCS0 20MHz mode:



Date: 14.MAR.2013 13:43:47

For 802.11n MCS0 40MHz mode:



Date: 14.MAR.2013 13:44:28

3.9. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6220	QDS-BRCM1049LE
Notebook	DELL	M1330	E2K4965AGNM

3.10. 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.

Power Parameters of IEEE 802.11n

Test Software Version	HyperTerminal		
Frequency	2412 MHz	2437 MHz	2462 MHz
MCS0 20MHz	9	16	8
Frequency	2422 MHz	2437 MHz	2452 MHz
MCS0 40MHz	0	4	0

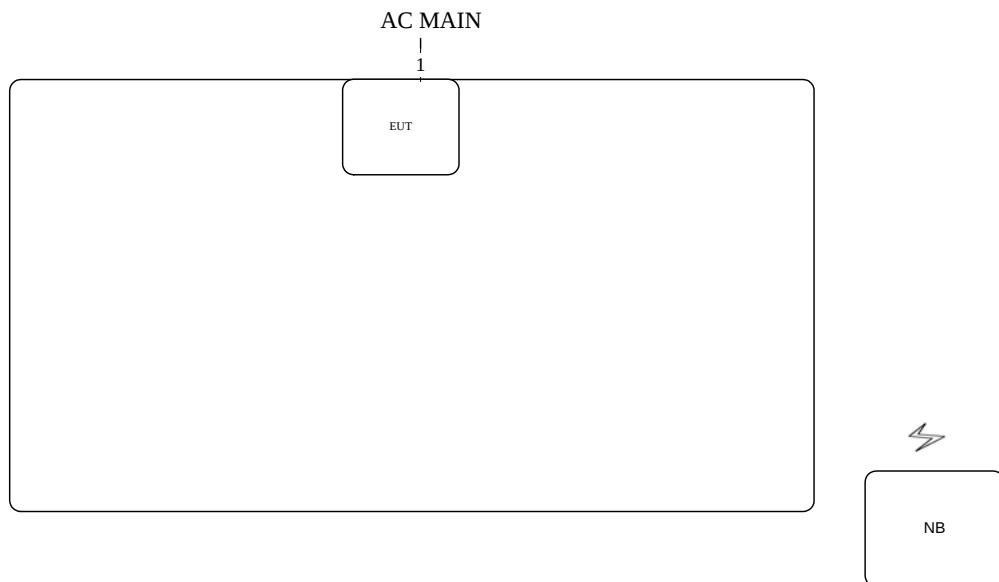
Power Parameters of IEEE 802.11b/g

Test Software Version	HyperTerminal		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	18	20	19
IEEE 802.11g	9	14	8

3.11. Test Configurations

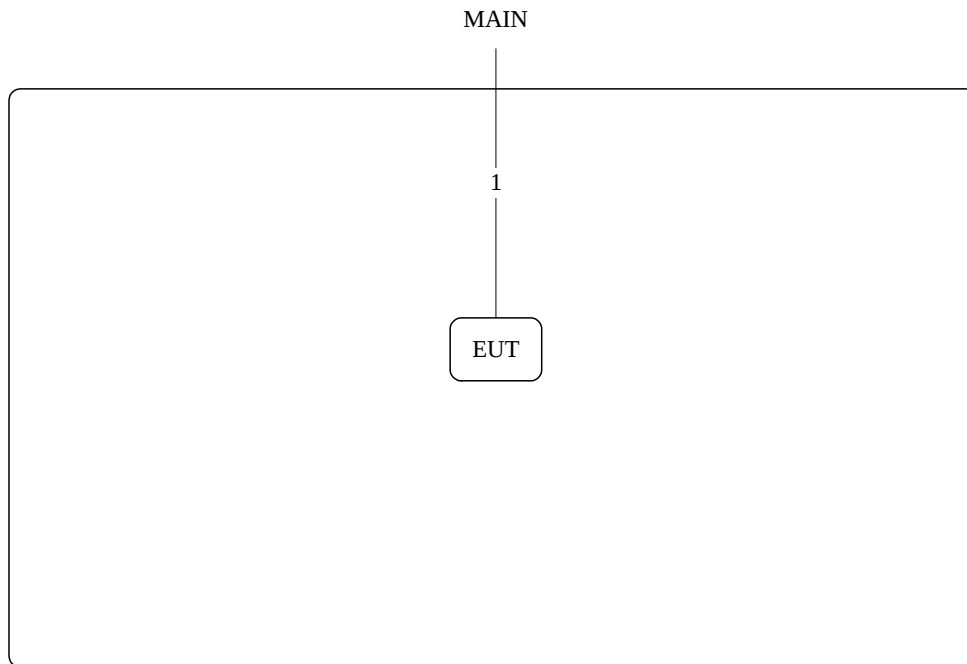
3.11.1. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz / Mode 3



Item	Connection	Shield	Length	Remark
1	Power cable	No	3M	-

Test Configuration: above 1GHz / Mode 3



Item	Connection	Shield	Length	Remark
1	Power cable	No	3M	-

3.11.2. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shield	Length	Remark
1	Power cable	No	3.0m	-

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

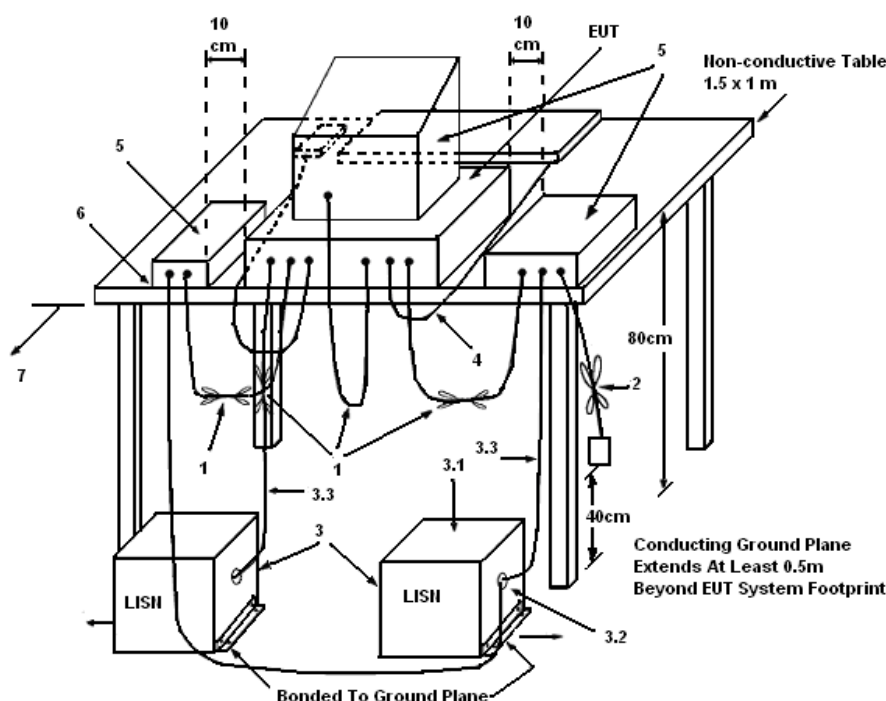
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

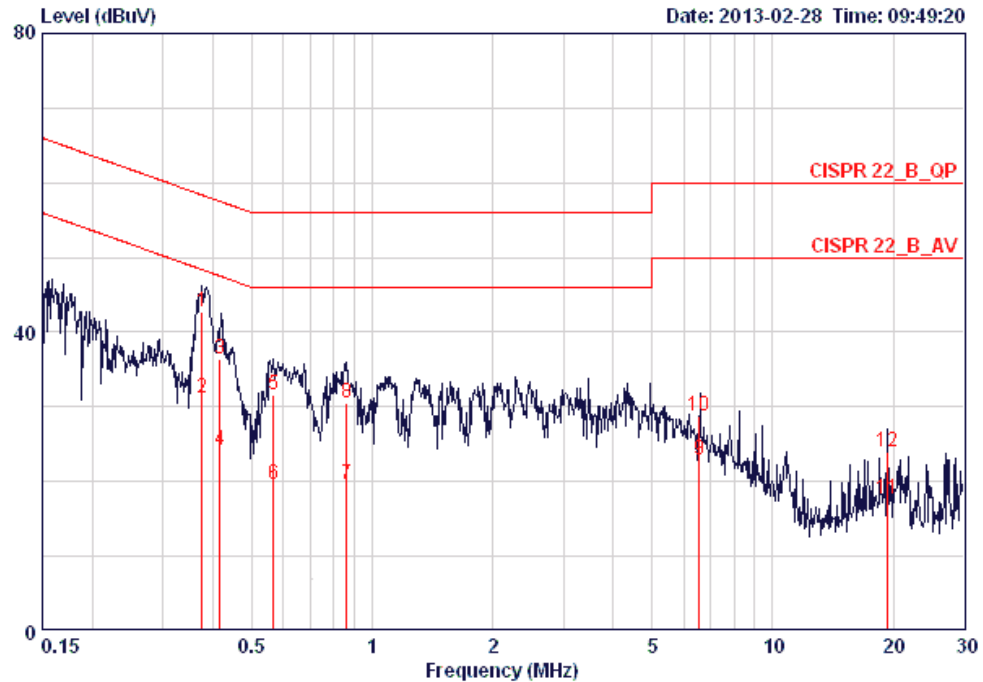
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

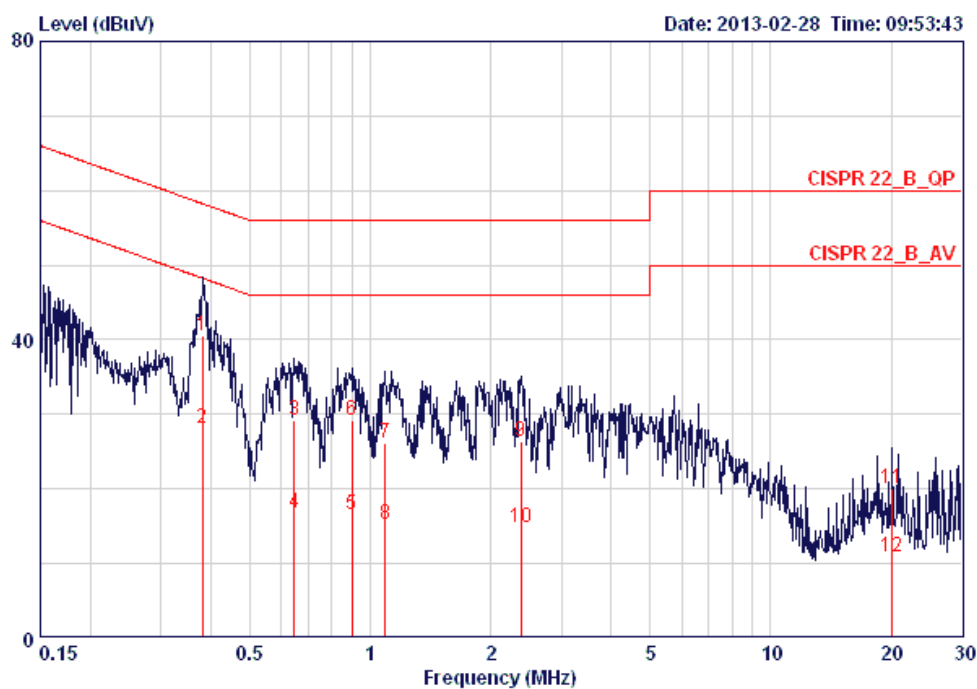
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	25°C	Humidity	60%
Test Engineer	Parody Lin	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.37512	42.66	-15.73	58.39	42.31	0.15	0.20	QP
2	0.37512	31.14	-17.25	48.39	30.79	0.15	0.20	AVERAGE
3	0.41677	36.48	-21.03	57.51	36.13	0.15	0.20	QP
4	0.41677	24.16	-23.35	47.51	23.81	0.15	0.20	AVERAGE
5	0.56709	31.55	-24.45	56.00	31.19	0.16	0.20	QP
6	0.56709	19.68	-26.32	46.00	19.32	0.16	0.20	AVERAGE
7	0.86185	19.70	-26.31	46.00	19.33	0.17	0.20	AVERAGE
8	0.86185	30.42	-25.59	56.00	30.05	0.17	0.20	QP
9	6.571	22.98	-27.02	50.00	22.40	0.27	0.31	AVERAGE
10	6.571	28.85	-31.15	60.00	28.27	0.27	0.31	QP
11	19.305	17.76	-32.24	50.00	16.79	0.47	0.50	AVERAGE
12	19.305	23.93	-36.07	60.00	22.96	0.47	0.50	QP

Temperature	25°C	Humidity	60%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.38113	40.54	-17.71	58.25	40.26	0.08	0.20	QP
2	0.38113	28.10	-20.15	48.25	27.82	0.08	0.20	AVERAGE
3	0.64740	29.18	-26.82	56.00	28.90	0.08	0.20	QP
4	0.64740	16.88	-29.12	46.00	16.60	0.08	0.20	AVERAGE
5	0.89917	16.59	-29.41	46.00	16.30	0.09	0.20	AVERAGE
6	0.89917	29.13	-26.87	56.00	28.84	0.09	0.20	QP
7	1.088	26.23	-29.77	56.00	25.93	0.09	0.20	QP
8	1.088	15.34	-30.66	46.00	15.04	0.09	0.20	AVERAGE
9	2.384	26.32	-29.68	56.00	25.97	0.11	0.24	QP
10	2.384	14.79	-31.21	46.00	14.44	0.11	0.24	AVERAGE
11	20.162	20.01	-39.99	60.00	19.12	0.39	0.50	QP
12	20.162	10.79	-39.21	50.00	9.90	0.39	0.50	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

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

4.2.2. Measuring Instruments and Setting

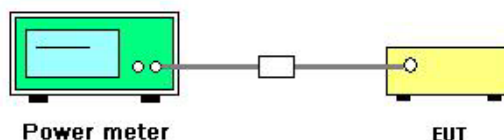
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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

4.2.3. Test Procedures

1. Test procedures refer KDB558074 v01 r02 section 8.2.3 option 3.
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	23°C	Humidity	63%
Test Engineer	Benson Peng	Configurations	IEEE 802.11n
Test Date	Mar. 14, 2013		

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	11.25	30.00	Complies
6	2437 MHz	14.37	30.00	Complies
11	2462 MHz	10.29	30.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	7.45	30.00	Complies
6	2437 MHz	8.45	30.00	Complies
9	2452 MHz	7.02	30.00	Complies

Temperature	23°C	Humidity	63%
Test Engineer	Benson Peng	Configurations	IEEE 802.11b/g
Test Date	Mar. 14, 2013		

Configuration IEEE 802.11b

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	14.13	30.00	Complies
6	2437 MHz	14.27	30.00	Complies
11	2462 MHz	12.99	30.00	Complies

Configuration IEEE 802.11g

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	11.63	30.00	Complies
6	2437 MHz	13.97	30.00	Complies
11	2462 MHz	10.11	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

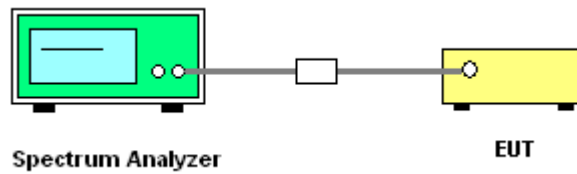
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.3.3. Test Procedures

1. Test procedures refer KDB 558074 v01 r02 section 9.1 option 1 & KDB662911 D01 Multiple Transmitter Output v01r02 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 $\geq 2 \times \text{span/RBW}$ (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	23°C	Humidity	63%
Test Engineer	Benson Peng	Configurations	IEEE 802.11n

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Power Density (dBm/100kHz)	Max. Limit (dBm/3kHz)	Result
1	2412 MHz	-16.84	8.00	Complies
6	2437 MHz	-12.49	8.00	Complies
11	2462 MHz	-16.43	8.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Power Density (dBm/100kHz)	Max. Limit (dBm/3kHz)	Result
3	2422 MHz	-22.19	8.00	Complies
6	2437 MHz	-20.19	8.00	Complies
9	2452 MHz	-22.31	8.00	Complies

Temperature	23°C	Humidity	63%
Test Engineer	Benson Peng	Configurations	IEEE 802.11b/g

Configuration IEEE 802.11b

Channel	Frequency	Power Density (dBm/100kHz)	Max. Limit (dBm/3kHz)	Result
1	2412 MHz	-13.30	8.00	Complies
6	2437 MHz	-12.72	8.00	Complies
11	2462 MHz	-14.16	8.00	Complies

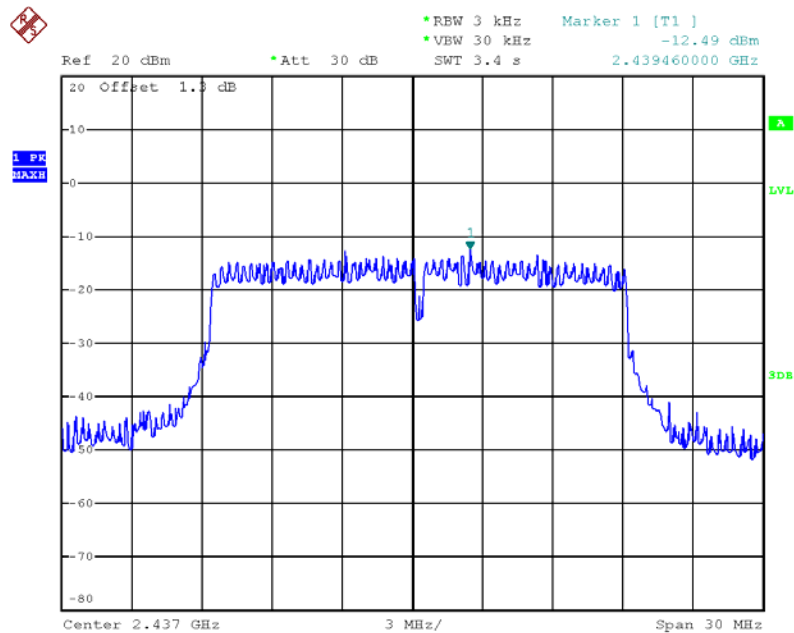
Configuration IEEE 802.11g

Channel	Frequency	Power Density (dBm/100kHz)	Max. Limit (dBm/3kHz)	Result
1	2412 MHz	-16.01	8.00	Complies
6	2437 MHz	-14.83	8.00	Complies
11	2462 MHz	-17.48	8.00	Complies

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

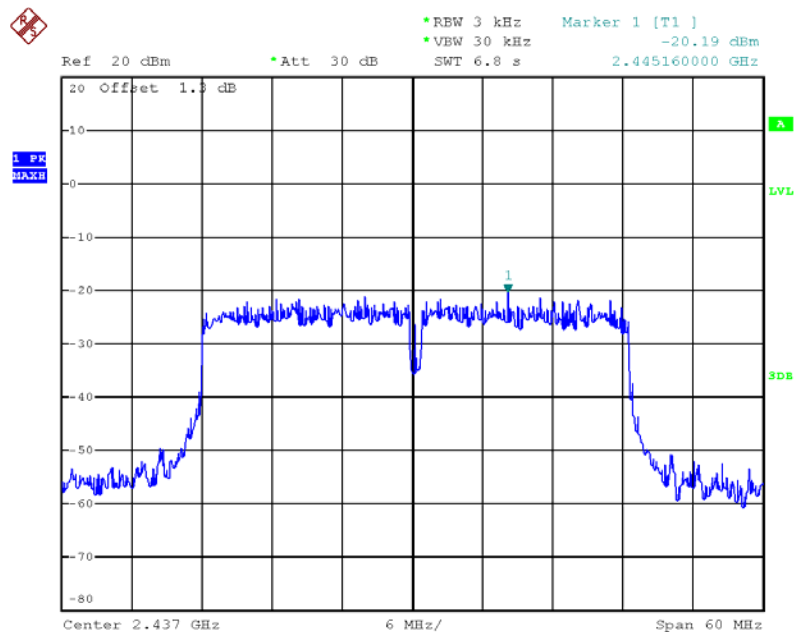
For plots, only the channel with maximum results was shown.

Power Density Plot on Configuration IEEE 802.11n MCS0 20MHz / 2437 MHz



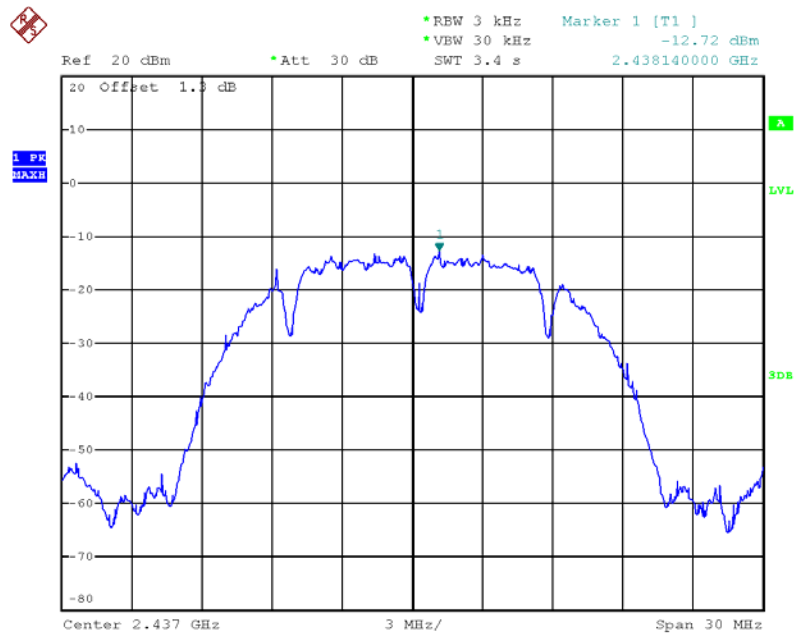
Date: 14.MAR.2013 12:51:48

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



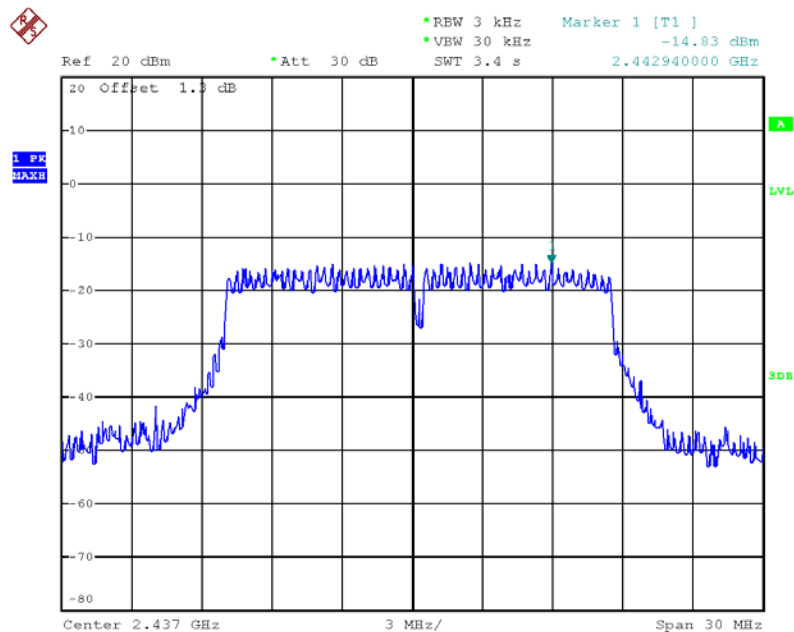
Date: 14.MAR.2013 12:53:30

Power Density Plot on Configuration IEEE 802.11b / 2437 MHz



Date: 14.MAR.2013 12:47:55

Power Density Plot on Configuration IEEE 802.11g / 2437 MHz



Date: 14.MAR.2013 12:50:05

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

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

4.4.2. Measuring Instruments and Setting

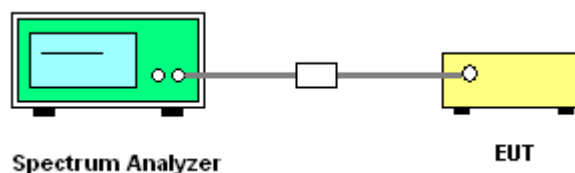
Please refer to section 5 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	1-5 % or DTS BW, not exceed 100KHz
VB	$\geq 3 \times \text{RBW}$
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 Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 5.1.1 EBW Measurement Procedure
3. Multiple antenna system was performed in accordance with KDB 662911 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	23°C	Humidity	63%
Test Engineer	Benson Peng	Configurations	IEEE 802.11n

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.96	17.60	500	Complies
6	2437 MHz	17.04	17.68	500	Complies
11	2462 MHz	17.12	17.68	500	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	35.20	36.16	500	Complies
6	2437 MHz	35.36	36.16	500	Complies
9	2452 MHz	35.36	36.16	500	Complies

Temperature	23°C	Humidity	63%
Test Engineer	Benson Peng	Configurations	IEEE 802.11b/g

Configuration IEEE 802.11b

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	12.08	15.04	500	Complies
6	2437 MHz	12.00	14.96	500	Complies
11	2462 MHz	12.00	14.96	500	Complies

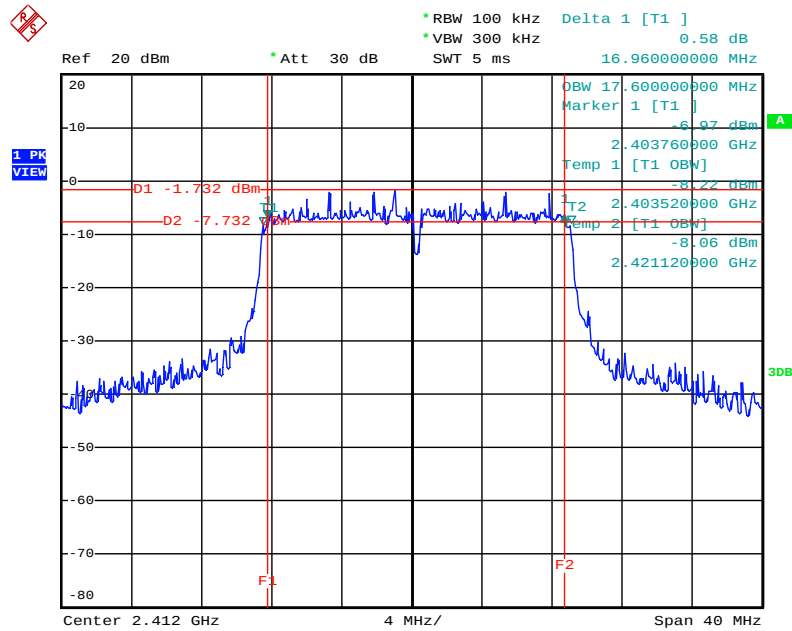
Configuration IEEE 802.11g

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.40	16.48	500	Complies
6	2437 MHz	16.32	16.56	500	Complies
11	2462 MHz	16.32	16.48	500	Complies

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

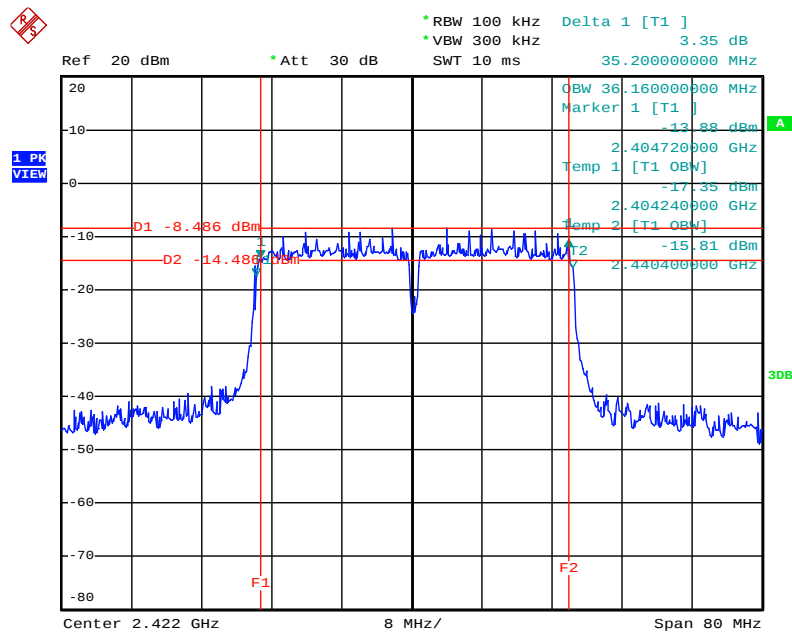
For plots, only the channel with maximum results was shown.

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



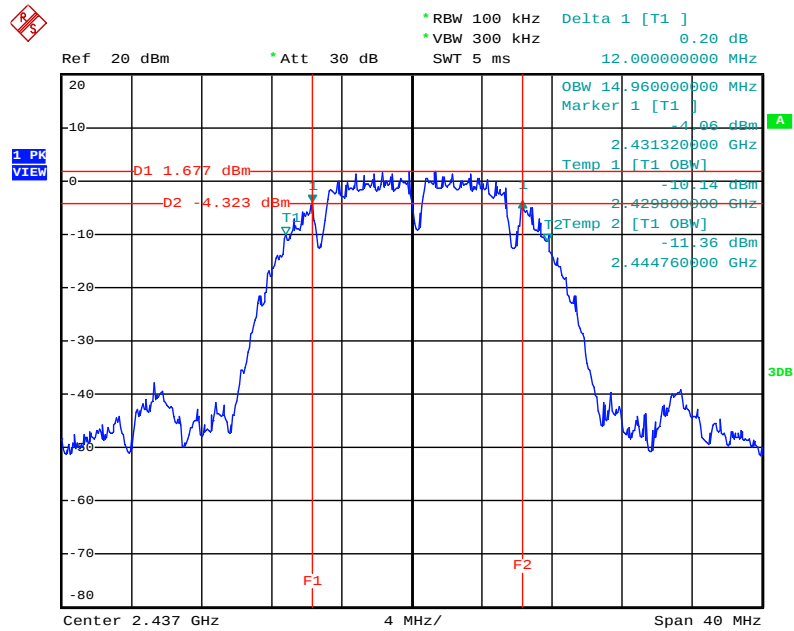
Date: 14.MAR.2013 12:39:46

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



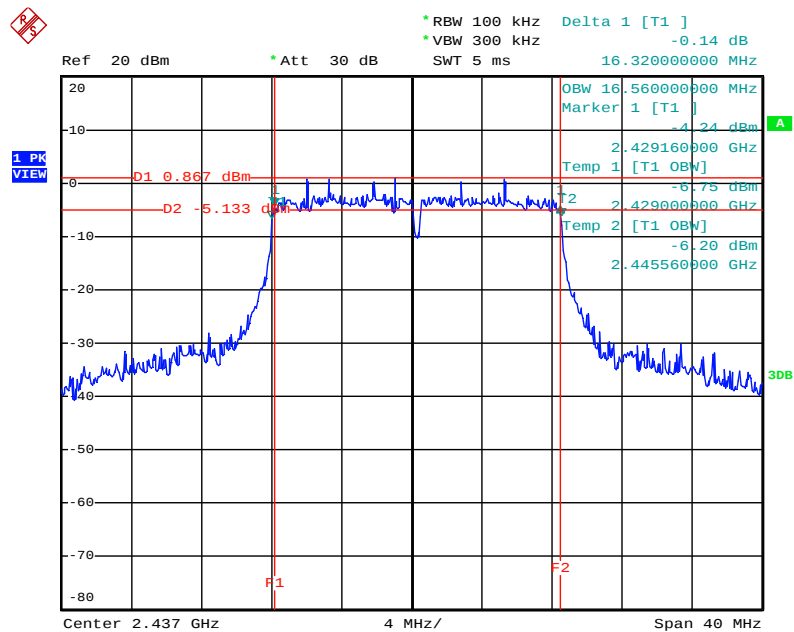
Date: 14.MAR.2013 12:41:57

6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2437 MHz



Date: 14.MAR.2013 12:37:08

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



Date: 14.MAR.2013 12:38:44

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
RB / VB (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100kHz / 300kHz for peak

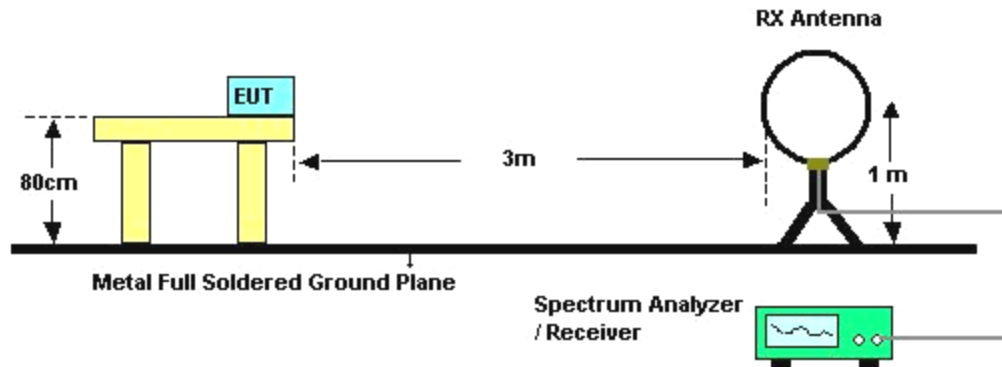
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.5.3. Test Procedures

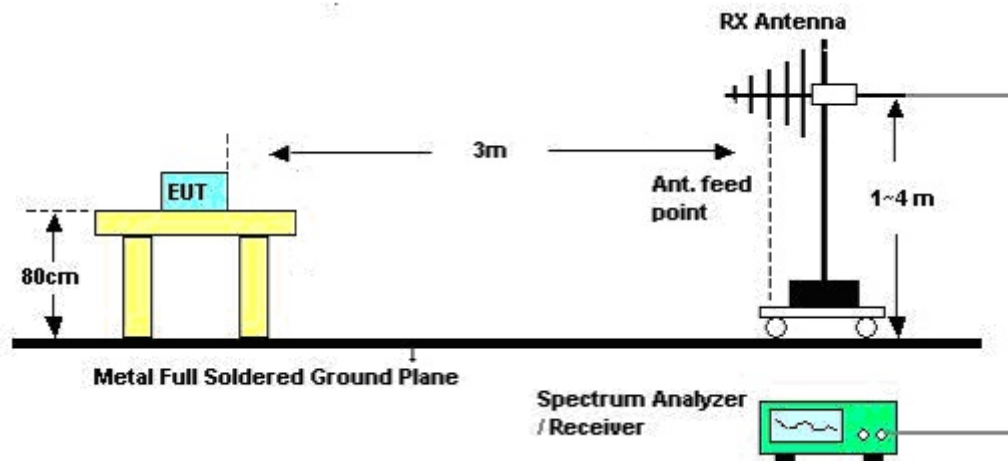
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 below 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	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	Normal Link / Mode 3
Test Date	Mar. 07, 2013		

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.

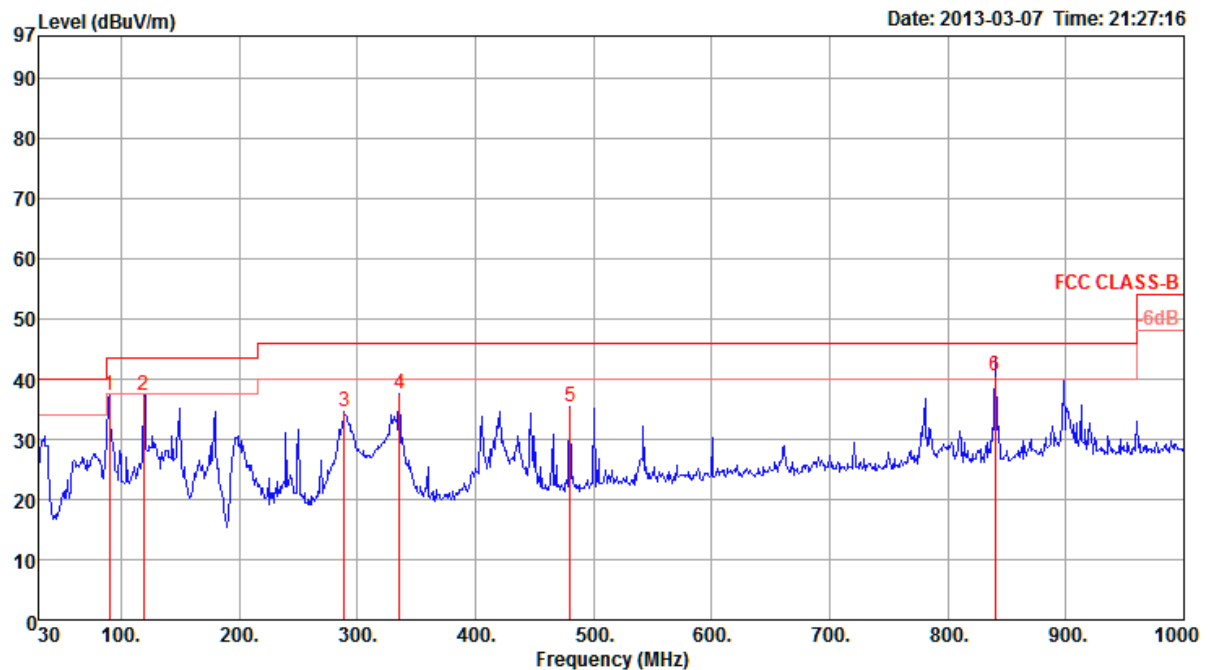
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

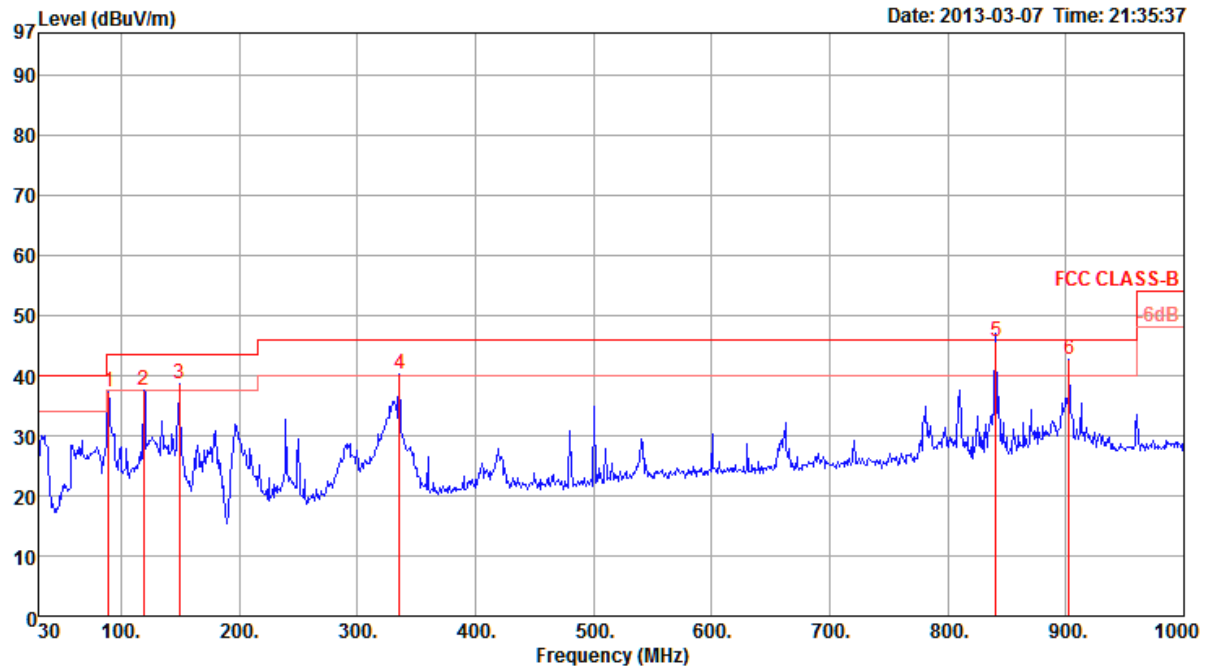
Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	Normal Link / Mode 3

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	90.14	37.41	43.50	-6.09	54.57	1.41	27.87	9.30	Peak	0	400	HORIZONTAL
2	119.24	37.35	43.50	-6.15	50.45	1.63	27.69	12.96	Peak	0	400	HORIZONTAL
3	288.99	34.62	46.00	-11.38	45.18	2.52	26.85	13.77	Peak	0	400	HORIZONTAL
4	335.55	37.68	46.00	-8.32	47.08	2.72	26.99	14.87	Peak	0	400	HORIZONTAL
5	480.08	35.33	46.00	-10.67	42.42	3.33	27.90	17.48	Peak	0	400	HORIZONTAL
6 q	839.95	40.64	46.00	-5.36	42.00	4.42	26.90	21.12	QP	0	400	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	89.17	37.34	43.50	-6.16	54.69	1.40	27.87	9.12	Peak	0	400	VERTICAL
2	119.24	37.60	43.50	-5.90	50.70	1.63	27.69	12.96	Peak	0	400	VERTICAL
3	149.31	38.69	43.50	-4.81	53.13	1.79	27.51	11.28	Peak	0	400	VERTICAL
4	335.55	40.32	46.00	-5.68	49.72	2.72	26.99	14.87	Peak	0	400	VERTICAL
5	840.92	45.75	46.00	-0.25	47.10	4.42	26.90	21.13	QP	0	400	VERTICAL
6	903.00	42.76	46.00	-3.24	43.44	4.61	26.81	21.52	Peak	0	400	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	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11n MCS0 20MHz Ch 1
Test Date	Mar. 13, 2013		

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	4824.64	46.88	54.00	-7.12	45.54	3.31	33.06	35.03	Average	123	139	HORIZONTAL
2	4824.71	50.62	74.00	-23.38	49.28	3.31	33.06	35.03	Peak	123	139	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	4824.61	47.64	54.00	-6.36	46.30	3.31	33.06	35.03	Average	100	164	VERTICAL
2	4824.64	52.83	74.00	-21.17	51.49	3.31	33.06	35.03	Peak	100	164	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11n MCS0 20MHz Ch 6
Test Date	Mar. 13, 2013		

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	4874.58	50.78	54.00	-3.22	49.32	3.33	33.16	35.03	Average	134	132	HORIZONTAL
2	4874.61	55.68	74.00	-18.32	54.22	3.33	33.16	35.03	Peak	134	132	HORIZONTAL
3	7307.86	34.51	54.00	-19.49	29.89	4.06	35.96	35.40	Average	100	143	HORIZONTAL
4	7309.43	37.20	74.00	-36.80	32.58	4.06	35.96	35.40	Peak	100	143	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	4874.74	50.76	54.00	-3.24	49.30	3.33	33.16	35.03	Average	100	170	VERTICAL
2	4874.80	55.52	74.00	-18.48	54.06	3.33	33.16	35.03	Peak	100	170	VERTICAL
3	7313.05	34.42	54.00	-19.58	29.80	4.06	35.96	35.40	Average	100	133	VERTICAL
4	7314.65	37.33	74.00	-36.67	32.71	4.06	35.96	35.40	Peak	100	133	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11n MCS0 20MHz Ch11
Test Date	Mar. 13, 2013		

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	4924.48	37.51	54.00	-16.49	35.91	3.35	33.26	35.01	Average	105	150	HORIZONTAL
2	4924.71	42.03	74.00	-31.97	40.43	3.35	33.26	35.01	Peak	105	150	HORIZONTAL
3	7385.81	37.54	74.00	-36.46	32.79	4.06	36.09	35.40	Peak	100	254	HORIZONTAL
4	7394.21	34.33	54.00	-19.67	29.54	4.06	36.13	35.40	Average	100	254	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	4920.73	46.22	74.00	-27.78	44.65	3.35	33.23	35.01	Peak	100	179	VERTICAL
2	4924.61	41.35	54.00	-12.65	39.75	3.35	33.26	35.01	Average	100	179	VERTICAL
3	7389.08	37.35	74.00	-36.65	32.60	4.06	36.09	35.40	Peak	100	340	VERTICAL
4	7393.66	34.52	54.00	-19.48	29.73	4.06	36.13	35.40	Average	100	340	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11n MCS0 40MHz Ch 3
Test Date	Mar. 13, 2013		

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	4843.52	35.48	74.00	-38.52	34.10	3.32	33.09	35.03	Peak	100	193	HORIZONTAL
2	4844.48	32.36	54.00	-21.64	30.98	3.32	33.09	35.03	Average	100	193	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	4844.29	38.28	74.00	-35.72	36.90	3.32	33.09	35.03	Peak	100	177	VERTICAL
2	4844.35	33.76	54.00	-20.24	32.38	3.32	33.09	35.03	Average	100	177	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11n MCS0 40MHz Ch 6
Test Date	Mar. 13, 2013		

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	4873.36	41.37	74.00	-32.63	39.91	3.33	33.16	35.03	Peak	162	132	HORIZONTAL
2	4874.72	37.20	54.00	-16.80	35.74	3.33	33.16	35.03	Average	162	132	HORIZONTAL
3	7330.39	38.07	74.00	-35.93	33.42	4.06	35.99	35.40	Peak	100	131	HORIZONTAL
4	7333.28	35.00	54.00	-19.00	30.35	4.06	35.99	35.40	Average	100	131	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	4874.64	38.61	54.00	-15.39	37.15	3.33	33.16	35.03	Average	100	172	VERTICAL
2	4874.96	44.59	74.00	-29.41	43.13	3.33	33.16	35.03	Peak	100	172	VERTICAL
3	7310.68	37.98	74.00	-36.02	33.36	4.06	35.96	35.40	Peak	100	142	VERTICAL
4	7320.55	35.01	54.00	-18.99	30.39	4.06	35.96	35.40	Average	100	142	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11n MCS0 40MHz Ch 9
Test Date	Mar. 13, 2013		

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	4879.16	34.71	74.00	-39.29	33.25	3.33	33.16	35.03	Peak	100	184	HORIZONTAL
2	4880.59	31.92	54.00	-22.08	30.46	3.33	33.16	35.03	Average	100	184	HORIZONTAL
3	7331.56	38.26	74.00	-35.74	33.61	4.06	35.99	35.40	Peak	100	280	HORIZONTAL
4	7335.97	35.00	54.00	-19.00	30.35	4.06	35.99	35.40	Average	100	280	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	4904.32	37.30	74.00	-36.70	35.79	3.34	33.19	35.02	Peak	100	182	VERTICAL
2	4904.56	33.72	54.00	-20.28	32.21	3.34	33.19	35.02	Average	100	182	VERTICAL
3	7331.00	34.95	54.00	-19.05	30.30	4.06	35.99	35.40	Average	100	250	VERTICAL
4	7341.58	38.01	74.00	-35.99	33.33	4.06	36.02	35.40	Peak	100	250	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.

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11b CH 1
Test Date	Mar. 05, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	deg	cm	Pol/Phase
1 p	4824.58	49.77	74.00	-24.23	47.69	4.21	34.69	32.56	Peak	169	113	HORIZONTAL
2 a	4824.58	46.32	54.00	-7.68	44.24	4.21	34.69	32.56	Average	169	113	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	deg	cm	Pol/Phase
1 a	4824.61	50.63	54.00	-3.37	48.55	4.21	34.69	32.56	Average	138	126	VERTICAL
2 p	4824.68	53.54	74.00	-20.46	51.46	4.21	34.69	32.56	Peak	138	126	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11b CH 6
Test Date	Mar. 06, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor		deg	cm	
1 p	4874.57	52.32	74.00	-21.68	50.11	4.22	34.67	32.66	Peak	146	100	HORIZONTAL
2 a	4874.57	49.35	54.00	-4.65	47.14	4.22	34.67	32.66	Average	146	100	HORIZONTAL
3	7311.00	44.92	74.00	-29.08	37.54	5.34	34.93	36.97	Peak	210	100	HORIZONTAL
4	7311.00	33.51	54.00	-20.49	26.13	5.34	34.93	36.97	Average	210	100	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor		deg	cm	
1 p	4874.52	53.19	74.00	-20.81	50.98	4.22	34.67	32.66	Peak	105	102	VERTICAL
2 a	4874.62	50.87	54.00	-3.13	48.66	4.22	34.67	32.66	Average	105	102	VERTICAL
3	7311.00	45.08	74.00	-28.92	37.70	5.34	34.93	36.97	Peak	124	100	VERTICAL
4	7311.00	34.11	54.00	-19.89	26.73	5.34	34.93	36.97	Average	124	100	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11b CH 11
Test Date	Mar. 06, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor		deg	cm	
1 p	4924.58	51.23	74.00	-22.77	48.89	4.23	34.65	32.76	Peak	213	134	HORIZONTAL
2 a	4924.58	47.76	54.00	-6.24	45.42	4.23	34.65	32.76	Average	213	134	HORIZONTAL
3	7386.04	45.32	74.00	-28.68	37.84	5.36	34.96	37.08	Peak	173	100	HORIZONTAL
4	7386.04	35.03	54.00	-18.97	27.55	5.36	34.96	37.08	Average	173	100	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor		deg	cm	
1 l	4924.64	50.78	54.00	-3.22	48.44	4.23	34.65	32.76	Average	287	113	VERTICAL
2 a	4924.64	52.80	54.00	-1.20	50.46	4.23	34.65	32.76	Average	287	113	VERTICAL
3 p	7386.04	45.21	74.00	-28.79	37.73	5.36	34.96	37.08	Peak	252	100	VERTICAL
4	7386.04	34.91	54.00	-19.09	27.43	5.36	34.96	37.08	Average	252	100	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11g CH 1
Test Date	Mar. 13, 2013		

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	4822.40	56.44	74.00	-17.56	55.10	3.31	33.06	35.03	Peak	141	142	HORIZONTAL
2	4824.51	42.45	54.00	-11.55	41.11	3.31	33.06	35.03	Average	141	142	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	4824.48	43.19	54.00	-10.81	41.85	3.31	33.06	35.03	Average	100	177	VERTICAL
2	4827.46	57.13	74.00	-16.87	55.79	3.31	33.06	35.03	Peak	100	177	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11g CH 6
Test Date	Mar. 13, 2013		

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	4874.51	49.95	54.00	-4.05	48.49	3.33	33.16	35.03	Average	138	138	HORIZONTAL
2	4877.37	63.69	74.00	-10.31	62.23	3.33	33.16	35.03	Peak	138	138	HORIZONTAL
3	7314.85	46.17	74.00	-27.83	41.55	4.06	35.96	35.40	Peak	100	66	HORIZONTAL
4	7315.23	34.28	54.00	-19.72	29.66	4.06	35.96	35.40	Average	100	66	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	4874.51	50.25	54.00	-3.75	48.79	3.33	33.16	35.03	Average	100	167	VERTICAL
2	4878.65	63.60	74.00	-10.40	62.14	3.33	33.16	35.03	Peak	100	167	VERTICAL
3	7313.02	46.17	74.00	-27.83	41.55	4.06	35.96	35.40	Peak	100	202	VERTICAL
4	7313.37	34.66	54.00	-19.34	30.04	4.06	35.96	35.40	Average	100	202	VERTICAL

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11g CH 11
Test Date	Mar. 13, 2013		

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	4922.24	52.62	74.00	-21.38	51.02	3.35	33.26	35.01	Peak	130	149	HORIZONTAL
2	4924.32	40.46	54.00	-13.54	38.86	3.35	33.26	35.01	Average	130	149	HORIZONTAL
3	7384.56	34.61	54.00	-19.39	29.86	4.06	36.09	35.40	Average	101	91	HORIZONTAL
4	7391.39	46.46	74.00	-27.54	41.71	4.06	36.09	35.40	Peak	101	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	4922.40	55.17	74.00	-18.83	53.57	3.35	33.26	35.01	Peak	100	193	VERTICAL
2	4922.72	41.43	54.00	-12.57	39.83	3.35	33.26	35.01	Average	100	193	VERTICAL
3	7379.91	46.59	74.00	-27.41	41.84	4.06	36.09	35.40	Peak	101	122	VERTICAL
4	7387.57	33.50	54.00	-20.50	28.75	4.06	36.09	35.40	Average	101	122	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
RB / VB (Emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (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 Conducted Out of Band Emission Measurement:

1. Test was performed in accordance with KDB 558074 v02 Guidance 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 conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.
Only worst data of each operating mode is presented.

4.6.4. Test Setup Layout

For Radiated band edges Measurement:

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

For Conducted Out of Band Emission Measurement:

This test setup layout is the same as that shown in section 4.4.4.

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	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11n MCS0 20MHz Ch 1, 6, 11
Test Date	Mar. 13, 2013		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2389.68	61.87	74.00	-12.13	31.49	2.21	28.17	0.00 Peak	158	361	HORIZONTAL
2	2390.00	52.78	54.00	-1.22	22.39	2.22	28.17	0.00 Average	158	361	HORIZONTAL
3	2410.88	94.81			64.38	2.22	28.21	0.00 Average	158	361	HORIZONTAL
4	2415.05	100.17			69.74	2.22	28.21	0.00 Peak	158	361	HORIZONTAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2385.83	48.42	54.00	-5.58	18.04	2.21	28.17	0.00 Average	127	360	HORIZONTAL
2	2385.83	58.81	74.00	-15.19	28.43	2.21	28.17	0.00 Peak	127	360	HORIZONTAL
3	2431.87	98.78			68.30	2.23	28.25	0.00 Average	127	360	HORIZONTAL
4	2432.19	108.28			77.80	2.23	28.25	0.00 Peak	127	360	HORIZONTAL
5	2489.27	50.06	54.00	-3.94	19.38	2.26	28.42	0.00 Average	127	360	HORIZONTAL
6	2489.27	60.24	74.00	-13.76	29.56	2.26	28.42	0.00 Peak	127	360	HORIZONTAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2463.60	95.79			65.22	2.24	28.33	0.00 Average	155	360	HORIZONTAL
2	2467.45	105.16			74.57	2.26	28.33	0.00 Peak	155	360	HORIZONTAL
3	2483.50	52.35	54.00	-1.65	21.71	2.26	28.38	0.00 Average	155	360	HORIZONTAL
4	2483.82	69.77	74.00	-4.23	39.13	2.26	28.38	0.00 Peak	155	360	HORIZONTAL

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

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11n MCS0 40MHz Ch 3, 6, 9
Test Date	Mar. 08, 2013 ~ Mar. 13, 2013		

Channel 3

	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	2388.80	62.01	74.00	-11.99	31.63	2.21	28.17	0.00	Peak	156	353	HORIZONTAL
2	2390.00	53.89	54.00	-0.11	23.50	2.22	28.17	0.00	Average	156	353	HORIZONTAL
3	2420.00	93.94			63.46	2.23	28.25	0.00	Peak	156	353	HORIZONTAL
4	2424.80	88.38			57.90	2.23	28.25	0.00	Average	156	353	HORIZONTAL

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	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2389.36	58.03	74.00	-15.97	27.65	2.21	28.17	0.00	Peak	149	360	HORIZONTAL
2	2390.00	48.42	54.00	-5.58	18.03	2.22	28.17	0.00	Average	149	360	HORIZONTAL
3	2448.86	90.79			60.26	2.24	28.29	0.00	Average	149	360	HORIZONTAL
4	2452.71	101.72			71.15	2.24	28.33	0.00	Peak	149	360	HORIZONTAL
5	2483.50	52.40	54.00	-1.60	21.76	2.26	28.38	0.00	Average	149	360	HORIZONTAL
6	2483.50	64.45	74.00	-9.55	33.81	2.26	28.38	0.00	Peak	149	360	HORIZONTAL

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

Channel 9

	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	2461.20	88.88			58.31	2.24	28.33	0.00	Average	153	353	HORIZONTAL
2	2463.60	94.76			64.19	2.24	28.33	0.00	Peak	153	353	HORIZONTAL
3	2483.50	53.98	54.00	-0.02	23.34	2.26	28.38	0.00	Average	153	353	HORIZONTAL
4	2484.70	62.29	74.00	-11.71	31.65	2.26	28.38	0.00	Peak	153	353	HORIZONTAL

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

Note:

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

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

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11b CH 1, 6, 11
Test Date	Mar. 06, 2013		

Channel 1

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2390.00	53.20	74.00	-20.80	22.42	2.91	0.00	27.87	Peak	205	100	HORIZONTAL
2	2390.00	43.04	54.00	-10.96	12.26	2.91	0.00	27.87	Average	205	100	HORIZONTAL
3 p	2413.40	96.68			65.92	2.92	0.00	27.84	Peak	205	100	HORIZONTAL
4 a	2414.00	91.73			60.97	2.92	0.00	27.84	Average	205	205	HORIZONTAL

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

Channel 6

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2390.00	53.78	74.00	-20.22	23.00	2.91	0.00	27.87	Peak	12	155	HORIZONTAL
2	2390.00	42.86	54.00	-11.14	12.08	2.91	0.00	27.87	Average	12	155	HORIZONTAL
3 p	2438.20	103.39			72.67	2.94	0.00	27.78	Peak	12	155	HORIZONTAL
4 a	2439.00	98.95			68.23	2.94	0.00	27.78	Average	12	155	HORIZONTAL
5	2493.10	55.62	74.00	-18.38	24.95	2.97	0.00	27.70	Peak	12	155	HORIZONTAL
6	2493.10	44.23	54.00	-9.77	13.56	2.97	0.00	27.70	Average	12	155	HORIZONTAL

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

Channel 11

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	2463.40	101.77			71.06	2.95	0.00	27.76	Peak	17	180	HORIZONTAL
2 a	2464.00	96.76			66.05	2.95	0.00	27.76	Average	17	180	HORIZONTAL
3	2483.50	55.37	74.00	-18.63	24.68	2.96	0.00	27.73	Peak	17	180	HORIZONTAL
4	2484.50	44.56	54.00	-9.44	13.87	2.96	0.00	27.73	Average	17	180	HORIZONTAL

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

Temperature	21°C	Humidity	53%
Test Engineer	Andre Zhuo	Configurations	IEEE 802.11g CH 1, 6, 11
Test Date	Mar. 13, 2013		

Channel 1

	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	2389.52	67.42	74.00	-6.58	37.04	2.21	28.17	0.00	Peak	157	360	HORIZONTAL
2	2390.00	52.69	54.00	-1.31	22.30	2.22	28.17	0.00	Average	157	360	HORIZONTAL
3	2410.40	105.34			74.91	2.22	28.21	0.00	Peak	157	360	HORIZONTAL
4	2411.04	96.48			66.05	2.22	28.21	0.00	Average	157	360	HORIZONTAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2385.19	48.30	54.00	-5.70	17.92	2.21	28.17	0.00	Average	153	360	HORIZONTAL
2	2388.40	59.99	74.00	-14.01	29.61	2.21	28.17	0.00	Peak	153	360	HORIZONTAL
3	2432.51	108.26			77.78	2.23	28.25	0.00	Peak	153	360	HORIZONTAL
4	2435.08	98.72			68.20	2.23	28.29	0.00	Average	153	360	HORIZONTAL
5	2489.59	51.28	54.00	-2.72	20.60	2.26	28.42	0.00	Average	153	360	HORIZONTAL
6	2490.23	63.07	74.00	-10.93	32.39	2.26	28.42	0.00	Peak	153	360	HORIZONTAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2461.20	96.74			66.17	2.24	28.33	0.00	Average	151	360	HORIZONTAL
2	2461.52	106.38			75.81	2.24	28.33	0.00	Peak	151	360	HORIZONTAL
3	2483.50	52.40	54.00	-1.60	21.76	2.26	28.38	0.00	Average	151	360	HORIZONTAL
4	2483.82	66.71	74.00	-7.29	36.07	2.26	28.38	0.00	Peak	151	360	HORIZONTAL

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

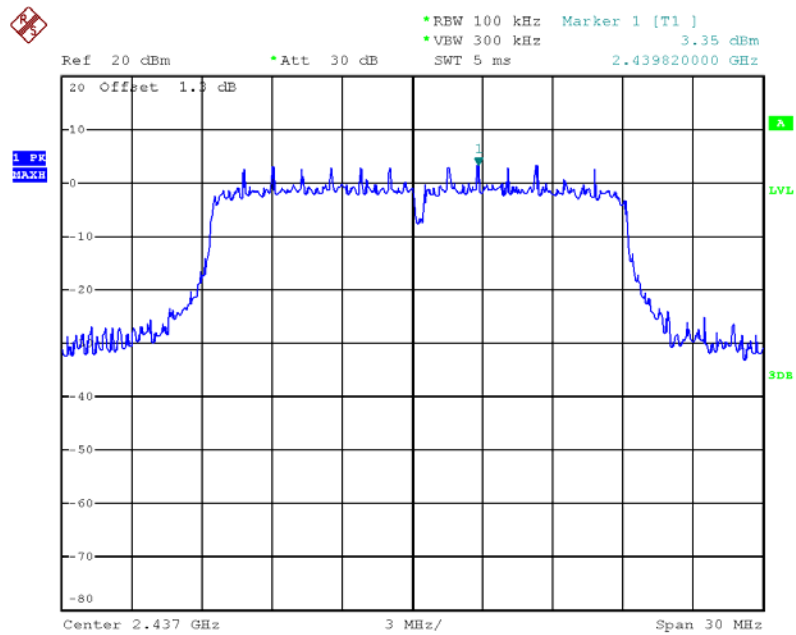
Note:

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

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

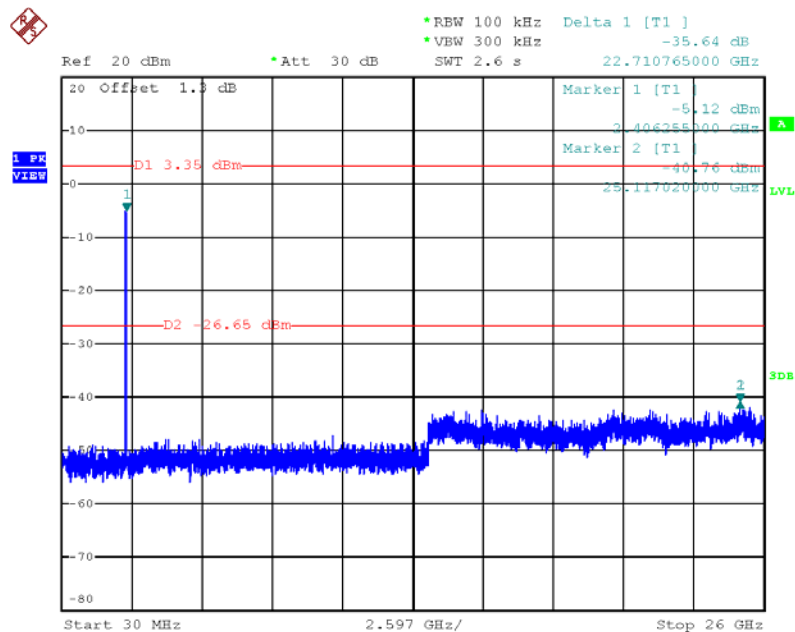
For Emission not in Restricted Band

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



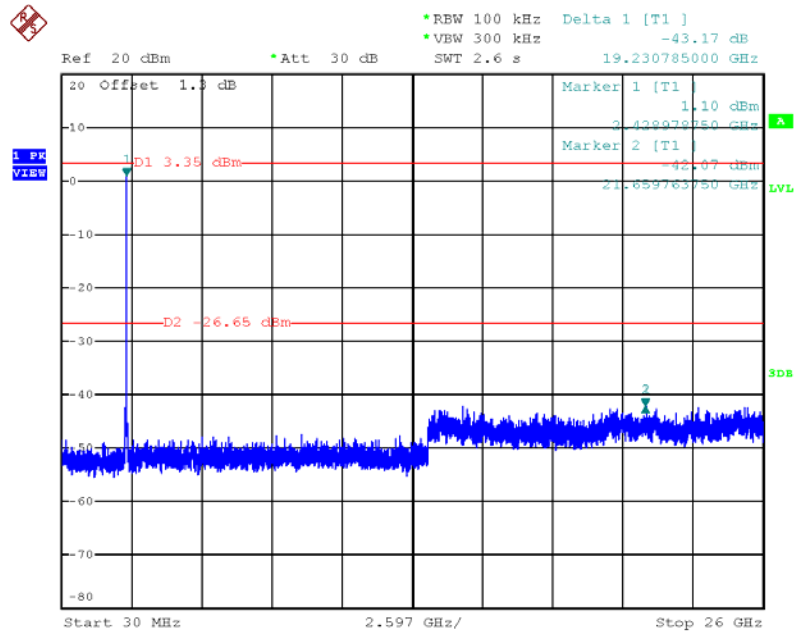
Date: 14.MAR.2013 13:14:14

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



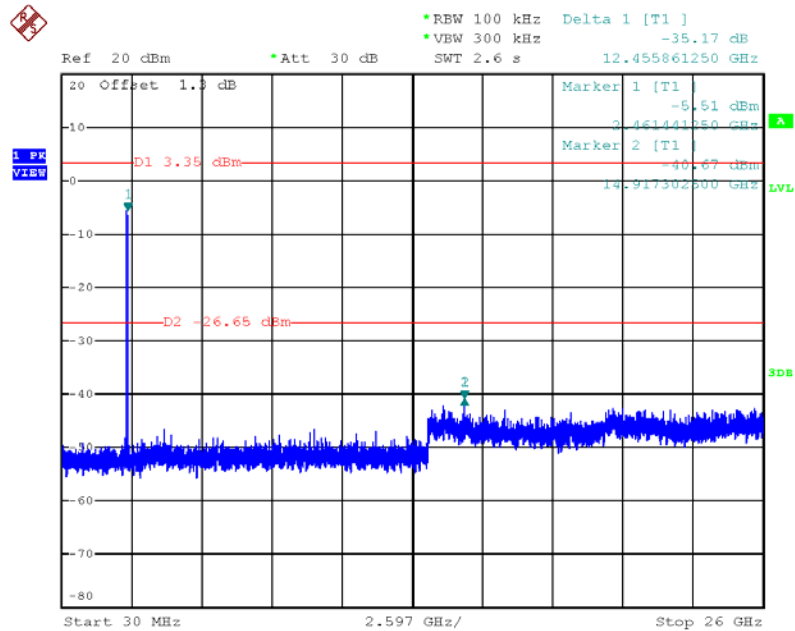
Date: 14.MAR.2013 13:24:07

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 6 (down 30dBc)



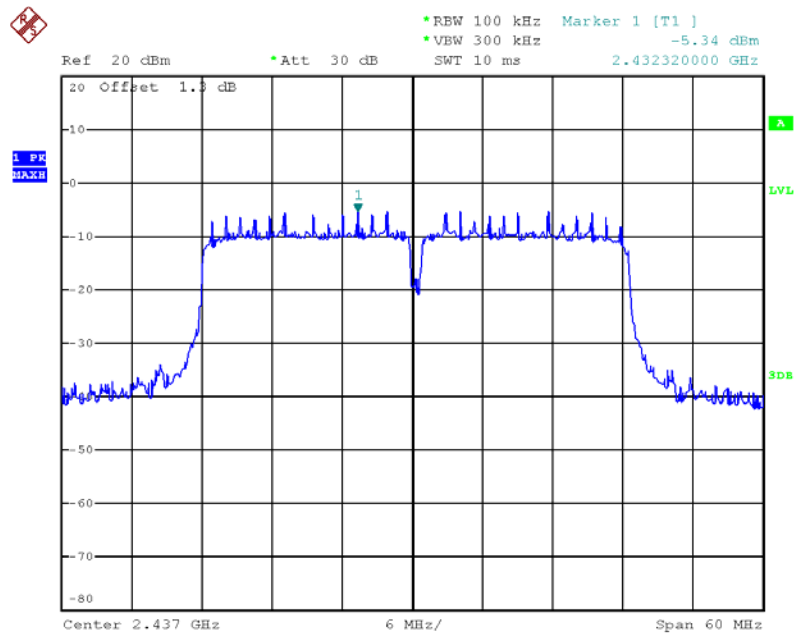
Date: 14.MAR.2013 13:24:39

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



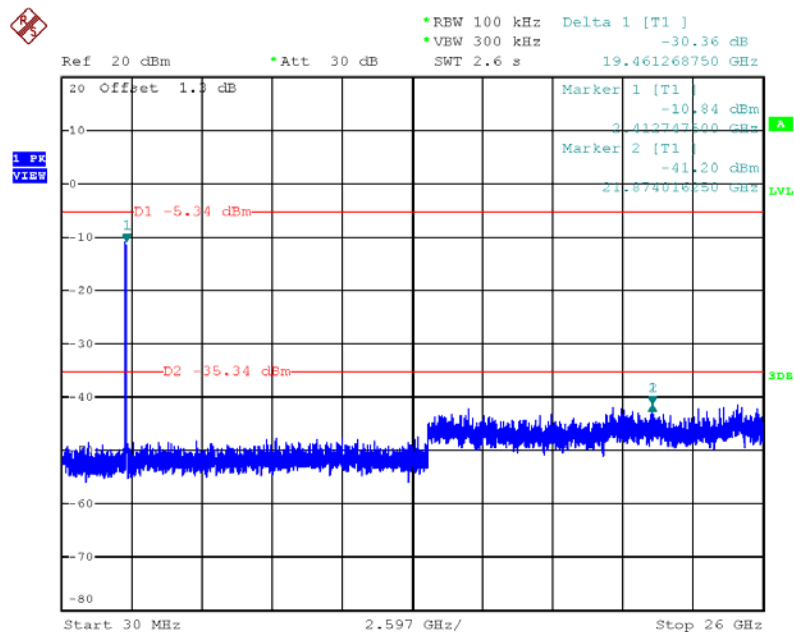
Date: 14.MAR.2013 13:25:08

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



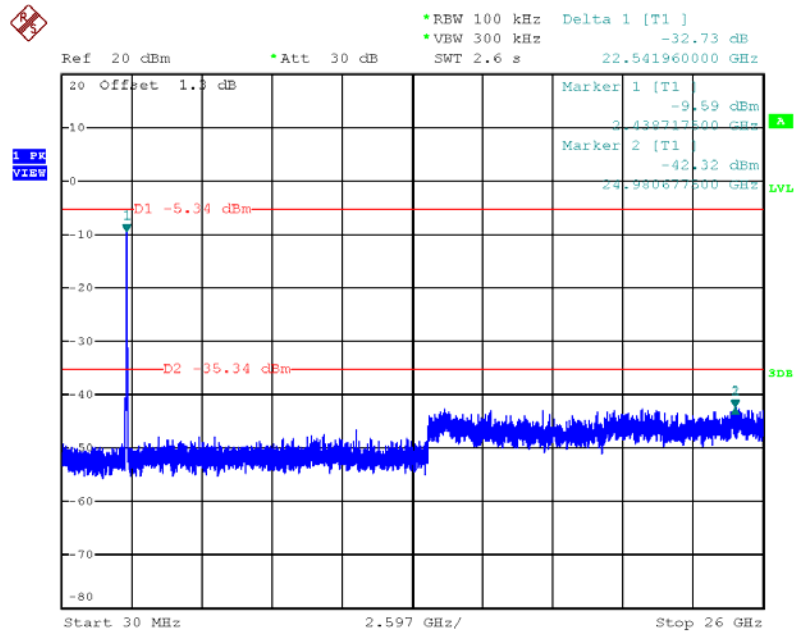
Date: 14.MAR.2013 13:14:50

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



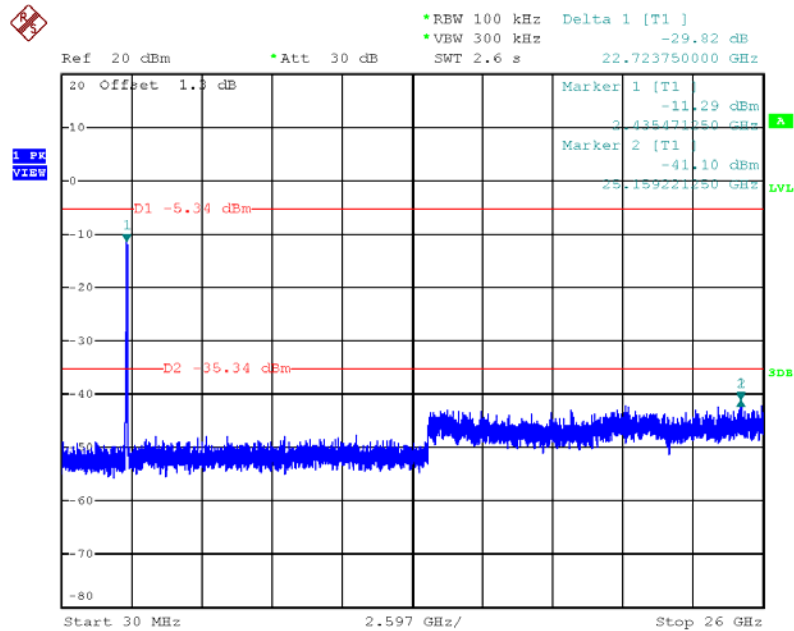
Date: 14.MAR.2013 13:27:17

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 6 (down 30dBc)



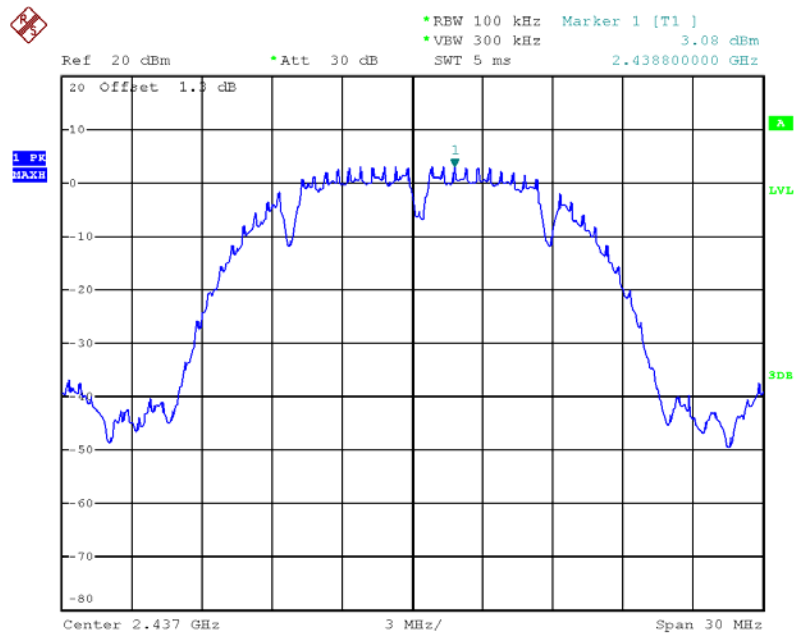
Date: 14.MAR.2013 13:27:57

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



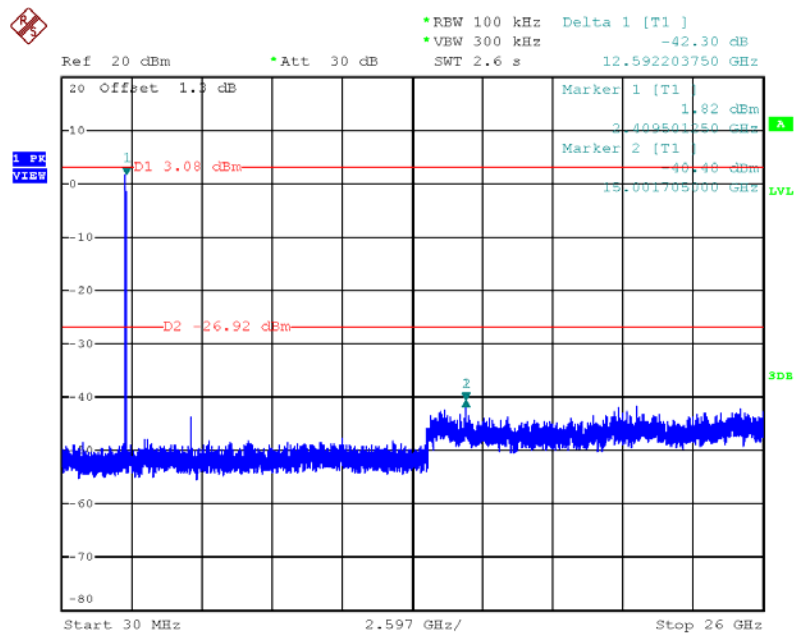
Date: 14.MAR.2013 13:28:26

Plot on Configuration IEEE 802.11b / Reference Level



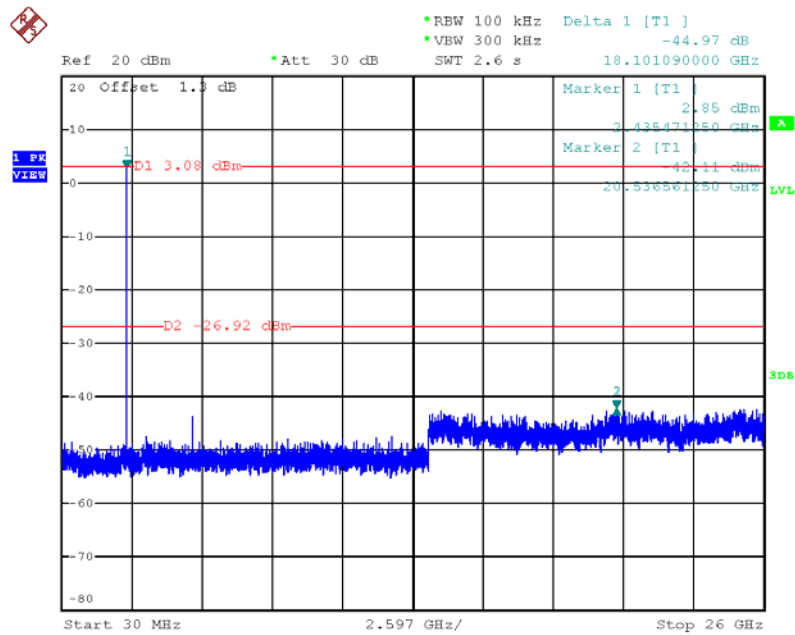
Date: 14.MAR.2013 13:13:41

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



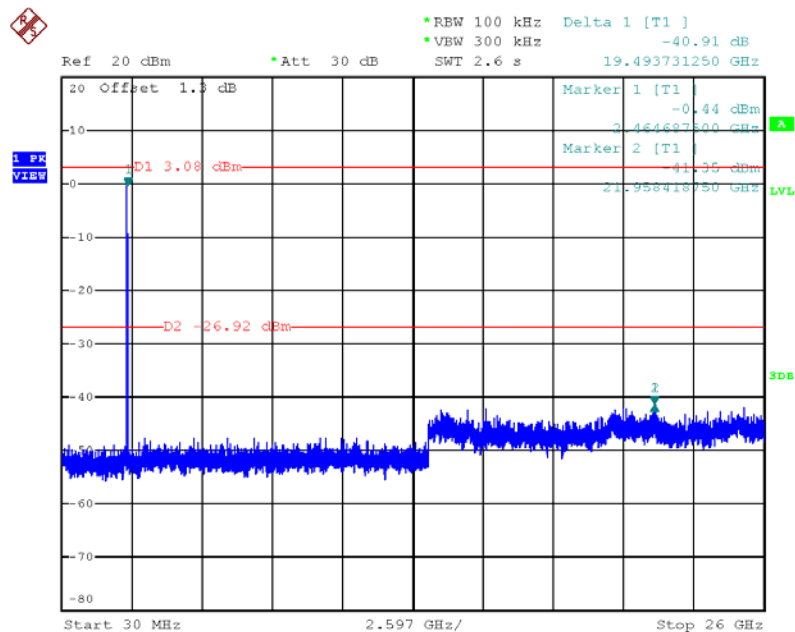
Date: 14.MAR.2013 13:18:15

Plot on Configuration IEEE 802.11b / CH 6 (down 30dBc)



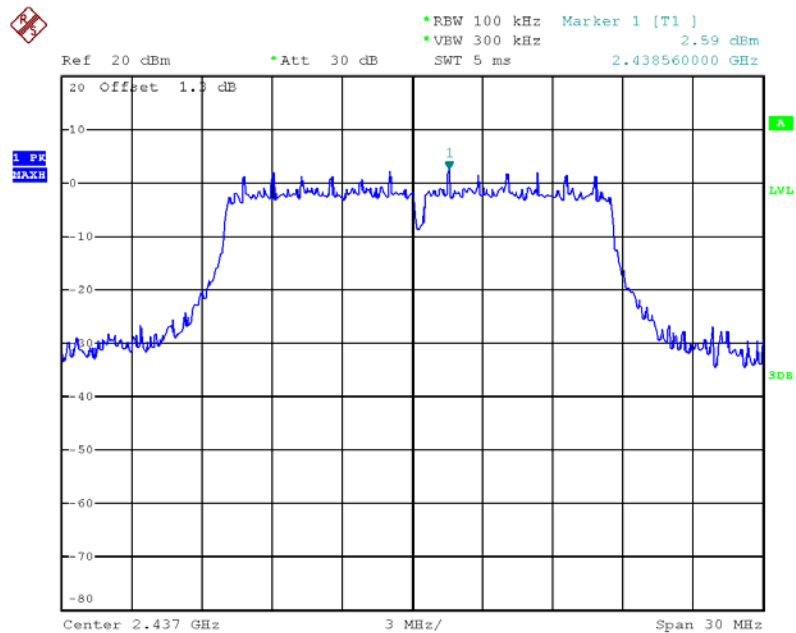
Date: 14.MAR.2013 13:18:53

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



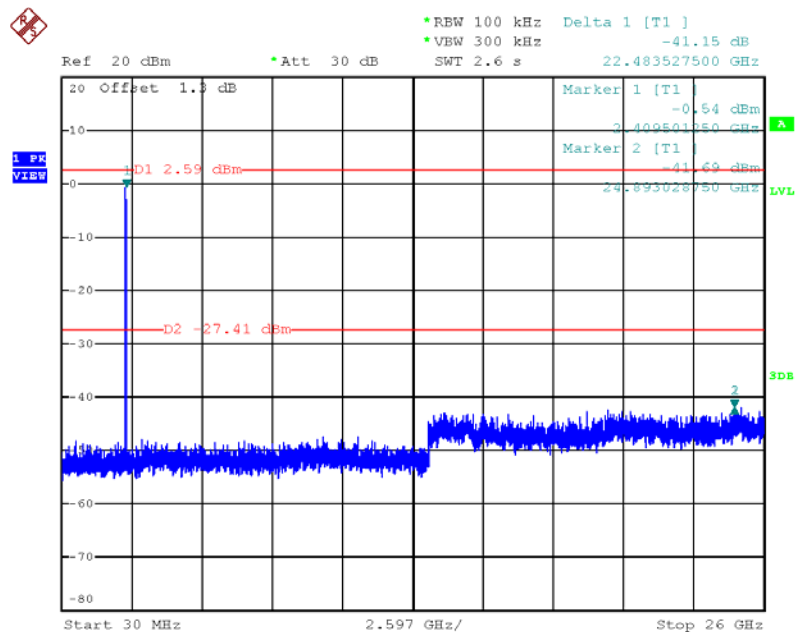
Date: 14.MAR.2013 13:19:26

Plot on Configuration IEEE 802.11g / Reference Level



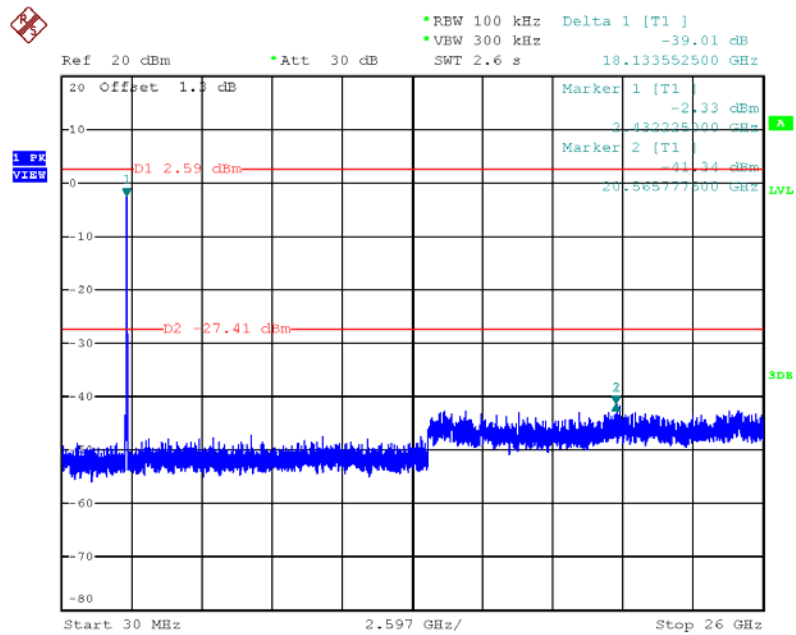
Date: 14.MAR.2013 13:13:59

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



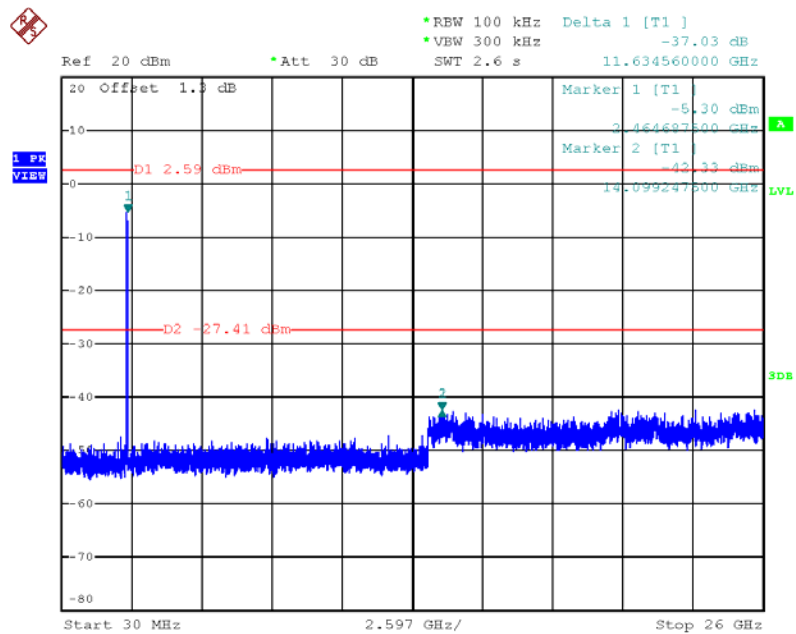
Date: 14.MAR.2013 13:20:55

Plot on Configuration IEEE 802.11g / CH 6 (down 30dBc)



Date: 14.MAR.2013 13:21:27

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



Date: 14.MAR.2013 13:22:18

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	8127-478	9kHz ~ 30MHz	Jun. 22, 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	Jan. 11, 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	Mar. 20, 2012	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)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 05, 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.

Note: “*” Calibration Interval of instruments listed above is two years.

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., Neihs 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