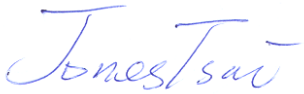
FCC RF Test Report

APPLICANT	**:**	**Cutino Limited Liability Company**
EQUIPMENT	**:**	**Tablet PC**
MODEL NAME	**:**	**PW98VM**
FCC ID	**:**	**2ABO8-1210**
STANDARD	**:**	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	**:**	**(DTS) Digital Transmission System**

The testing completed on Mar. 15, 2014. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and the testing has shown the tested sample to be in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR410321-01C	Rev. 01	Initial issue of report	May 09, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.59 dB at 2489.260 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 14.40 dB at 0.462 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Cutino Limited Liability Company
6565 Americas Parkway
Suite 200
Albuquerque, New Mexico 87110

1.2 Feature of Equipment Under Test

Product Feature	
Equipment	Tablet PC
Model Name	PW98VM
FCC ID	2ABO8-1210
EUT supports Radios application	WLAN 11b/g/n (HT20) Bluetooth v4.0 EDR/LE

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.3 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 20.81 dBm (0.1205 W) 802.11g : 24.69 dBm (0.2944 W) 802.11n HT20 : 24.66 dBm (0.2924 W)
Antenna Type	Fixed Internal Antenna type with gain 1.34 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.4 Modification of EUT

No modifications are made to the EUT during all test items.

1.5 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	**Sporton Site No.**		
	TH02-HY	CO05-HY	03CH08-HY

1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
- ANSI C63.4-2003

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	-	-

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test shown in the following tables.

2.4GHz 802.11b mode				
Data Rate (MHz)	**1M bps**	**2M bps**	**5.5M bps**	**11M bps**
Peak Power (dBm)	**20.81**	20.80	20.65	20.64

2.4GHz 802.11g mode								
Data Rate (MHz)	**6M bps**	**9M bps**	**12M bps**	**18M bps**	**24M bps**	**36M bps**	**48M bps**	**54M bps**
Peak Power (dBm)	**24.69**	24.66	24.67	24.66	24.64	24.61	24.66	24.65

2.4GHz 802.11n HT20 mode									
Data Rate (MHz)		**MCS0**	**MCS1**	**MCS2**	**MCS3**	**MCS4**	**MCS5**	**MCS6**	**MCS7**
Peak Power (dBm)	**400GI**	24.63	24.58	24.56	24.59	24.55	24.59	24.57	24.59
	800GI	**24.66**	24.64	24.62	24.65	24.61	24.65	24.63	24.65

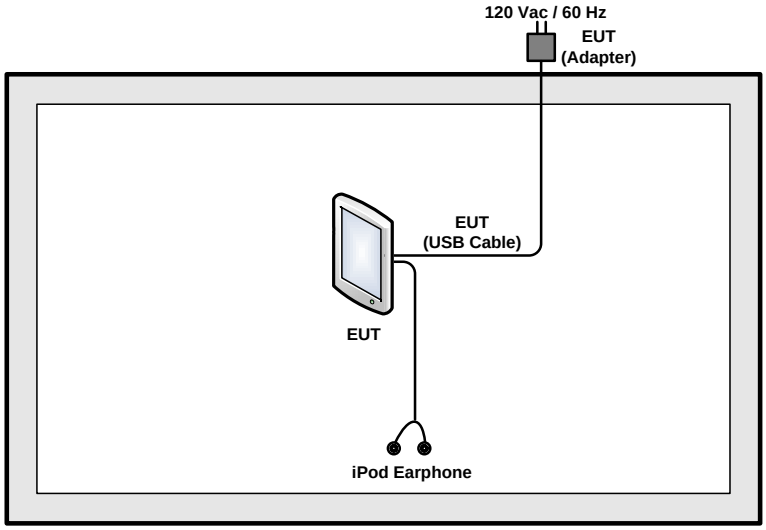
2.3 Test Mode

Final results of test modes, data rates and test channels are shown as following table.

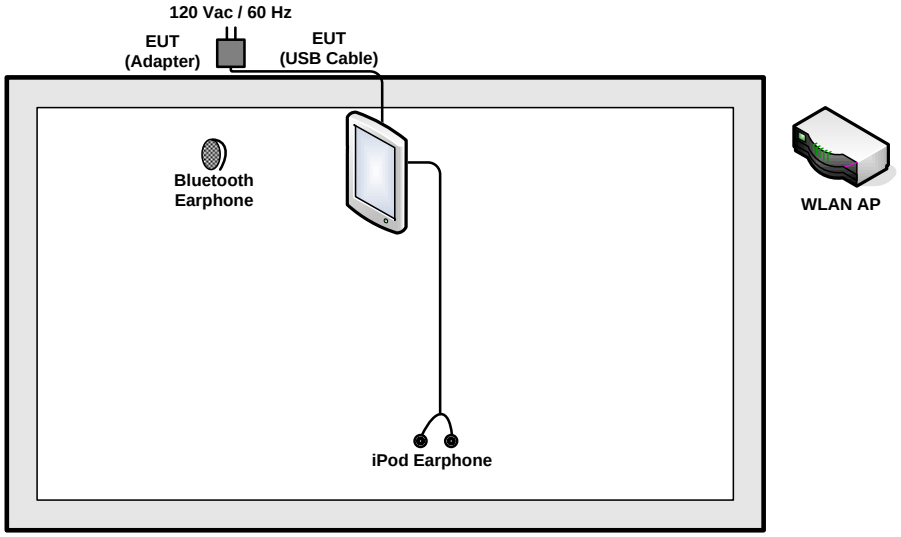
Test Cases				
	Test Items	**Mode**	**Data Rate**	**Test Channel**
Conducted TCs	**6dB BW Power Spectral Density**	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**MCS0**	**1/6/11**
	Output Power	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/10/11**
		802.11n HT20	**MCS0**	**1/6/10/11**
	Conducted Band Edge	**802.11b**	**1 Mbps**	**1/11**
		802.11g	**6 Mbps**	**1/11**
		802.11n HT20	**MCS0**	**1/11**
	Conducted Spurious Emission	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**MCS0**	**1/6/11**
Radiated TCs	**Radiated Band Edge**	**802.11b**	**1 Mbps**	**1/11**
		802.11g	**6 Mbps**	**1/10/11**
		802.11n HT20	**MCS0**	**1/10/11**
	Radiated Spurious Emission	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**MCS0**	**1/6/11**
AC Conducted Emission	Mode 1 : WLAN Link + Bluetooth Link + Earphone + USB Cable (Charging from Adapter) + Camera (Back) Mode 2 : WLAN (2.4GHz, 802.11g, Ch06, 6Mbps) SISO Tx + Earphone + USB Cable (Charging from Adapter) + Camera (Back)			
Remark:	The worst case of conducted emission is mode 2; only the test data of it was reported.			

2.4 Connection Diagram of Test System

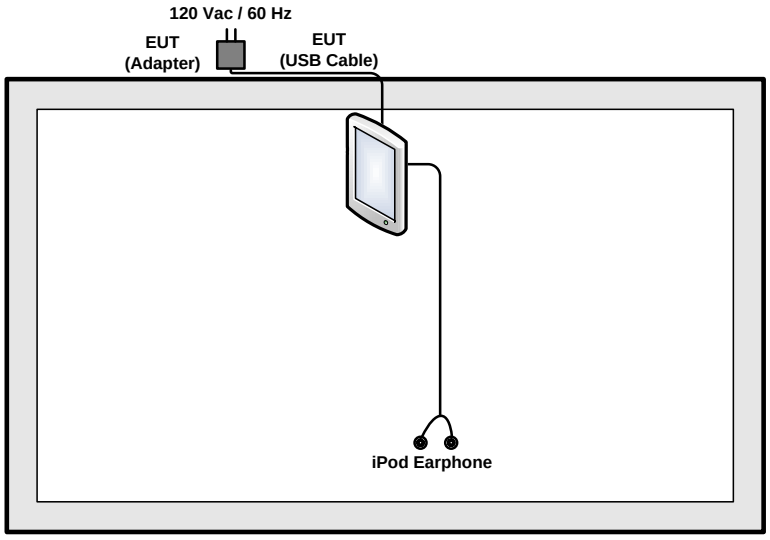
<WLAN Tx Mode>



<EUT with Adapter Mode for AC Conducted Emission Mode 1>



<EUT with Adapter Mode for AC Conducted Emission Mode 2>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
3.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A

2.6 EUT Operation Test Setup

The programmed RF utility “RFTOOL”, is installed in EUT to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testing. 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.

2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

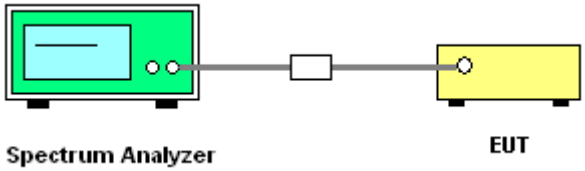
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

3.1.4 Test Setup

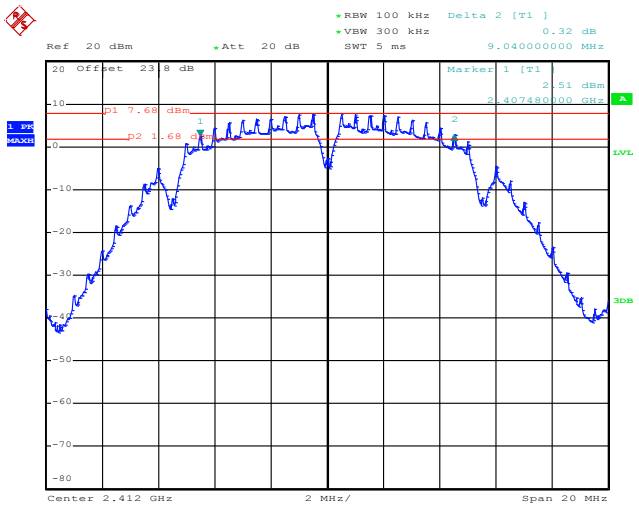


3.1.5 Test Result of 6dB Bandwidth

Test Band :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	9.04	0.5	Pass
11b	1Mbps	1	6	2437	9.08	0.5	Pass
11b	1Mbps	1	11	2462	9.04	0.5	Pass
11g	6Mbps	1	1	2412	16.38	0.5	Pass
11g	6Mbps	1	6	2437	15.80	0.5	Pass
11g	6Mbps	1	11	2462	16.40	0.5	Pass
HT20	MCS0	1	1	2412	17.58	0.5	Pass
HT20	MCS0	1	6	2437	16.80	0.5	Pass
HT20	MCS0	1	11	2462	17.60	0.5	Pass

Minimum 6dB Bandwidth



Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting Antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6 dBi. 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.

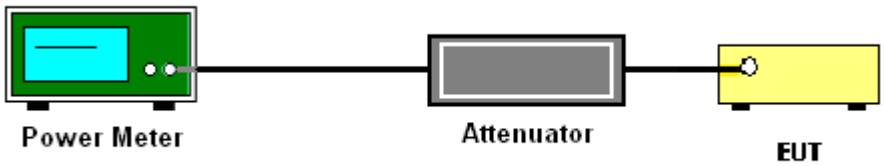
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test Mode :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	RF Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	20.10	30	1.34	Pass
11b	1Mbps	1	6	2437	20.81	30	1.34	Pass
11b	1Mbps	1	11	2462	19.66	30	1.34	Pass
11g	6Mbps	1	1	2412	23.69	30	1.34	Pass
11g	6Mbps	1	6	2437	24.69	30	1.34	Pass
11g	6Mbps	1	10	2457	24.26	30	1.34	Pass
11g	6Mbps	1	11	2462	23.28	30	1.34	Pass
HT20	MCS0	1	1	2412	23.84	30	1.34	Pass
HT20	MCS0	1	6	2437	24.66	30	1.34	Pass
HT20	MCS0	1	10	2457	24.22	30	1.34	Pass
HT20	MCS0	1	11	2462	23.45	30	1.34	Pass

Note: Measured power (dBm) has offset with cable loss.

3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Duty Factor (dB)	Average Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	0.06	16.87	30	1.34	Pass
11b	1Mbps	1	6	2437	0.06	17.59	30	1.34	Pass
11b	1Mbps	1	11	2462	0.06	16.36	30	1.34	Pass
11g	6Mbps	1	1	2412	0.33	12.89	30	1.34	Pass
11g	6Mbps	1	6	2437	0.33	15.79	30	1.34	Pass
11g	6Mbps	1	10	2457	0.33	13.84	30	1.34	Pass
11g	6Mbps	1	11	2462	0.33	12.39	30	1.34	Pass
HT20	MCS0	1	1	2412	0.35	12.97	30	1.34	Pass
HT20	MCS0	1	6	2437	0.35	15.83	30	1.34	Pass
HT20	MCS0	1	10	2457	0.35	13.83	30	1.34	Pass
HT20	MCS0	1	11	2462	0.35	12.45	30	1.34	Pass

Note: Measured power (dBm) has offset with cable loss and duty factor.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

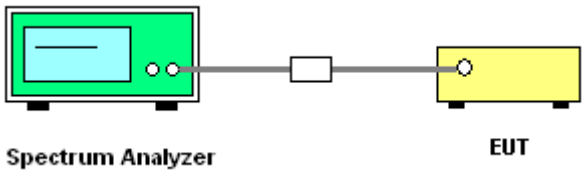
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

3.3.4 Test Setup



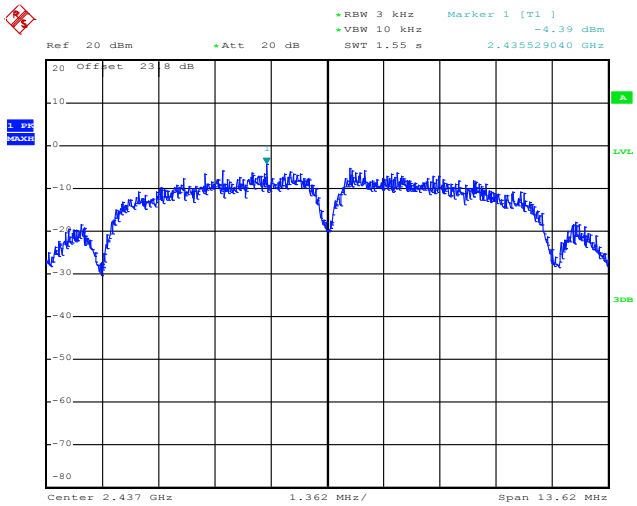
3.3.5 Test Result of Power Spectral Density

Test Mode :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Peak Power Density (dBm/3kHz)	Max. Limits (dBm/3kHz)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	-5.87	8	1.34	Pass
11b	1Mbps	1	6	2437	-4.39	8	1.34	Pass
11b	1Mbps	1	11	2462	-6.16	8	1.34	Pass
11g	6Mbps	1	1	2412	-13.30	8	1.34	Pass
11g	6Mbps	1	6	2437	-9.52	8	1.34	Pass
11g	6Mbps	1	11	2462	-13.08	8	1.34	Pass
HT20	MCS0	1	1	2412	-12.94	8	1.34	Pass
HT20	MCS0	1	6	2437	-9.45	8	1.34	Pass
HT20	MCS0	1	11	2462	-13.62	8	1.34	Pass

Note: Measured power density (dBm) has offset with cable loss.

Worst Case Power Density (dBm/3kHz)



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

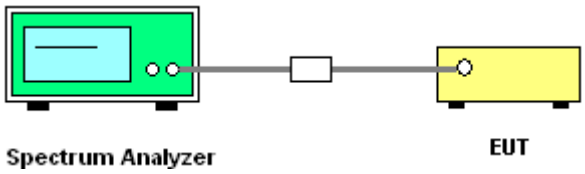
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup

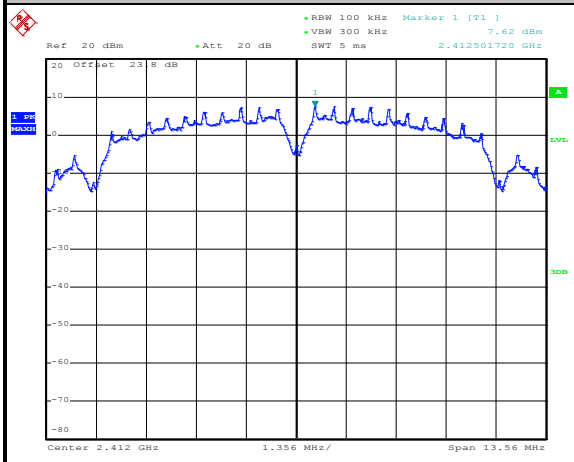


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Mode :	802.11b	**Temperature :**	21~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	45~54%
Test Channel :	01	**Test Engineer :**	Stuart Lin

WLAN 802.11b Channel 01

100kHz PSD reference Level



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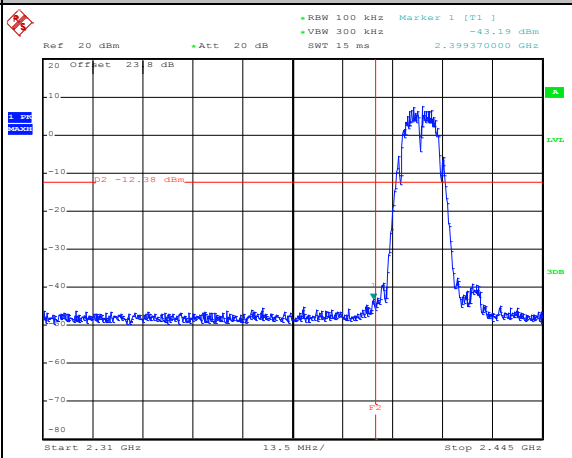
Low Channel Plot



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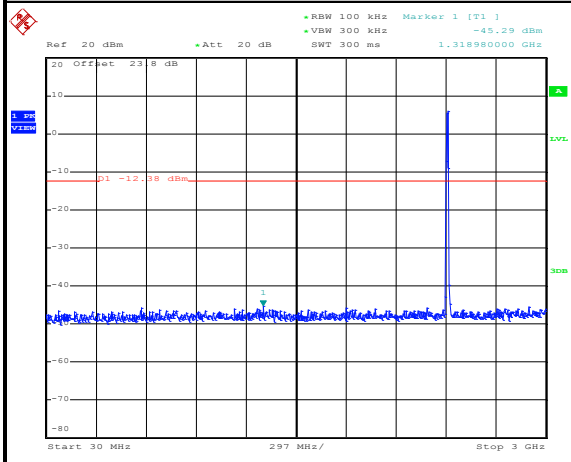
Spurious Emission 30MHz~3GHz



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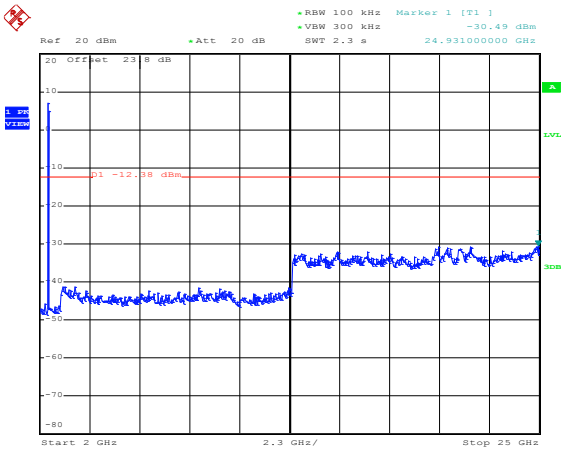
Spurious Emission 2GHz~25GHz



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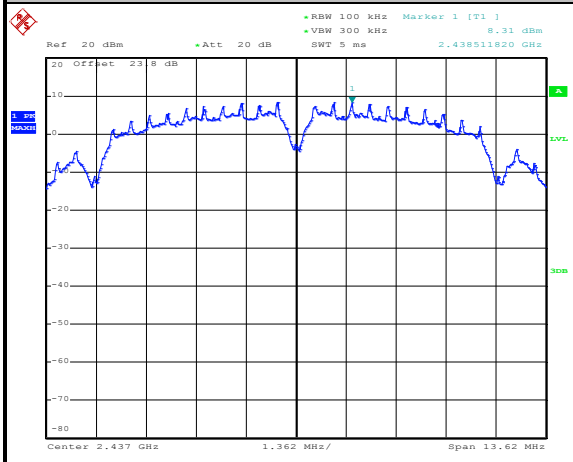
Test Mode :	802.11b	**Temperature :**	21~26℃
Test Band :	2.4GHz Mid.	**Relative Humidity :**	45~54%
Test Channel :	06	**Test Engineer :**	Stuart Lin

WLAN 802.11b Channel 06

100kHz PSD reference Level



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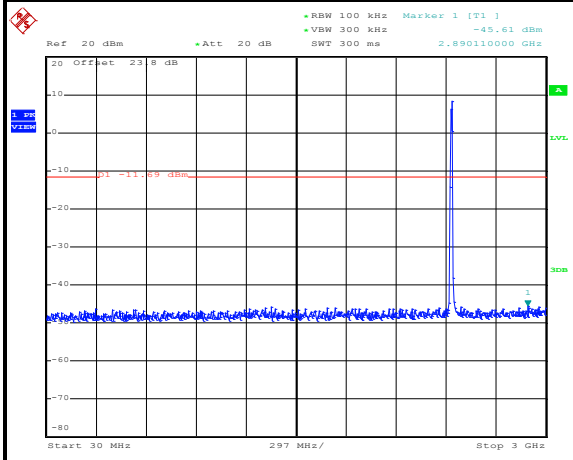
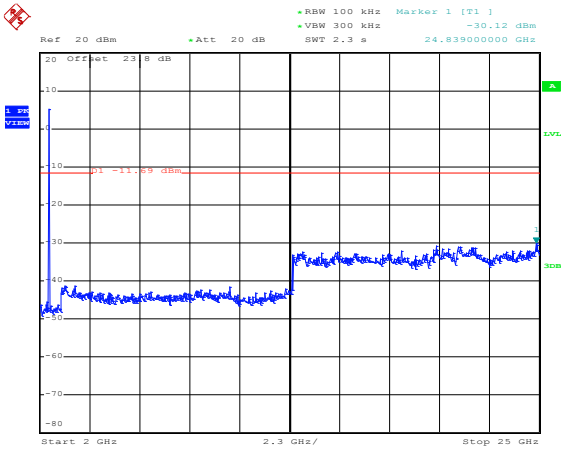
Spurious Emission 30MHz~3GHz



Date: 14.MAR.2014 15:49:26

Spurious Emission 2GHz~25GHz

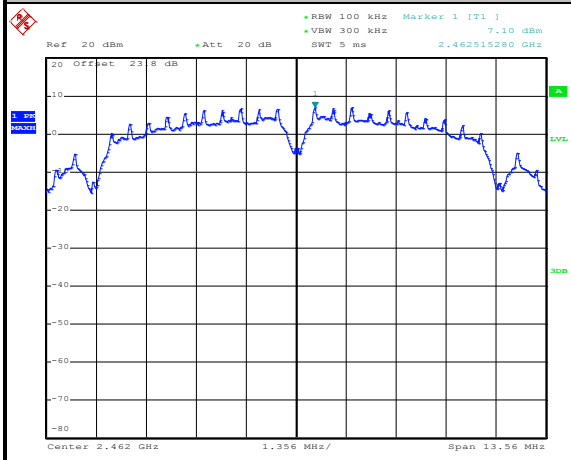


Date: 14.MAR.2014 15:49:45

Test Mode :	802.11b	Temperature :	21~26℃
Test Band :	2.4GHz High	Relative Humidity :	45~54%
Test Channel :	11	Test Engineer :	Stuart Lin

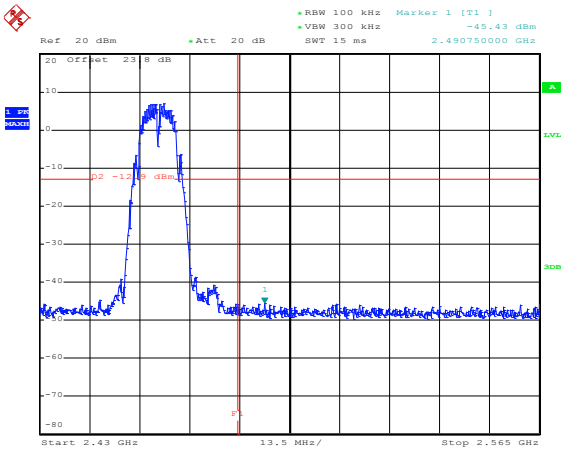
WLAN 802.11b Channel 11

100kHz PSD reference Level



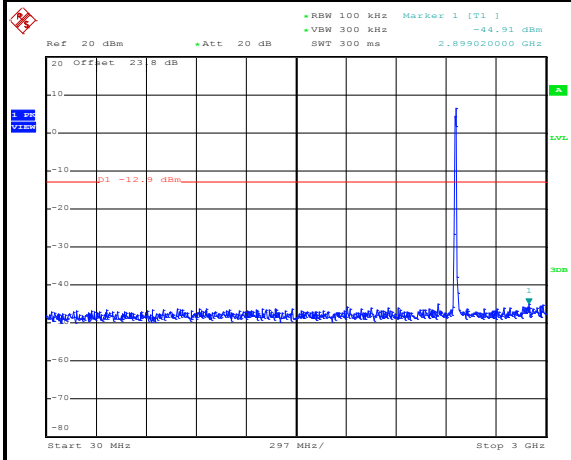
Date: 14.MAR.2014 15:52:57

High Channel Plot



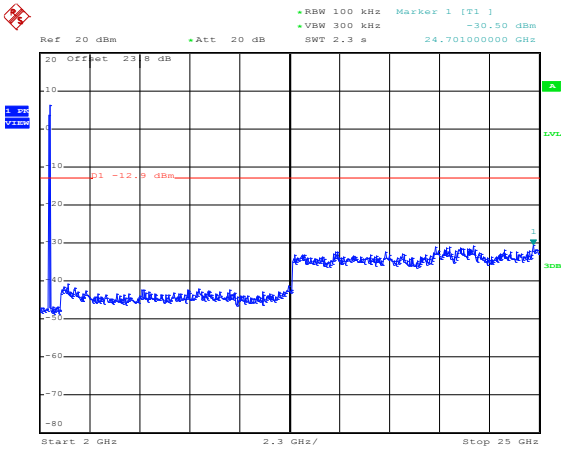
Date: 14.MAR.2014 15:53:10

Spurious Emission 30MHz~3GHz



Date: 14.MAR.2014 15:53:30

Spurious Emission 2GHz~25GHz

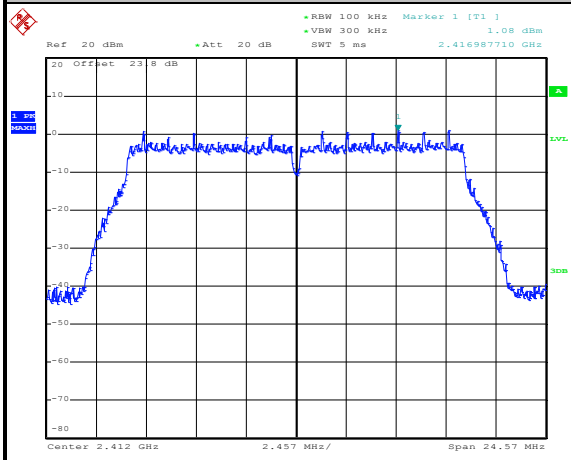


Date: 14.MAR.2014 15:53:48

Test Mode :	802.11g	Temperature :	21~26℃
Test Band :	2.4GHz Low	Relative Humidity :	45~54%
Test Channel :	01	Test Engineer :	Stuart Lin

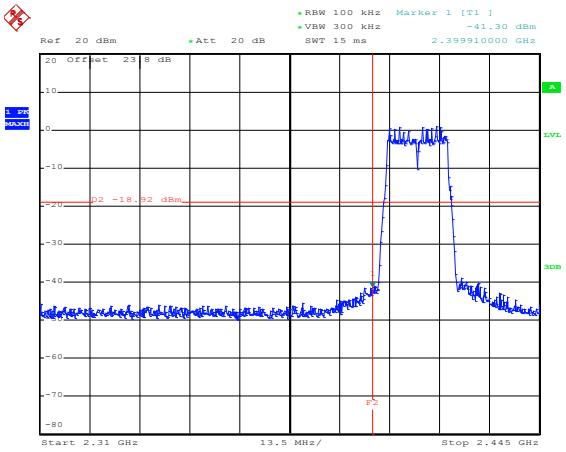
WLAN 802.11g Channel 01

100kHz PSD reference Level



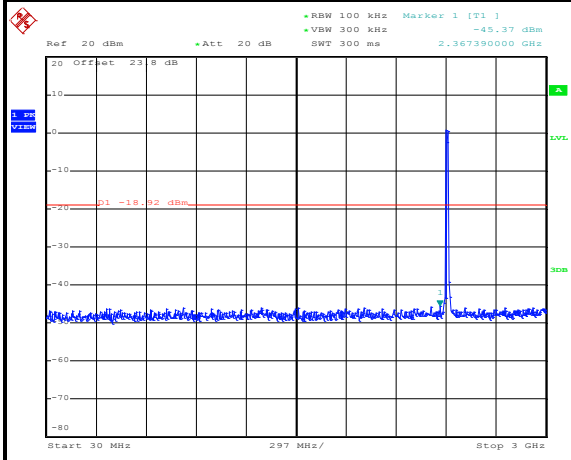
Date: 14.MAR.2014 16:03:19

Low Channel Plot



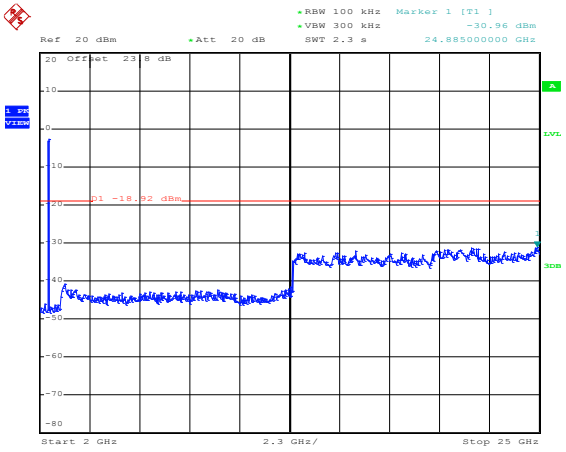
Date: 14.MAR.2014 16:03:33

Spurious Emission 30MHz~3GHz



Date: 14.MAR.2014 16:03:52

Spurious Emission 2GHz~25GHz

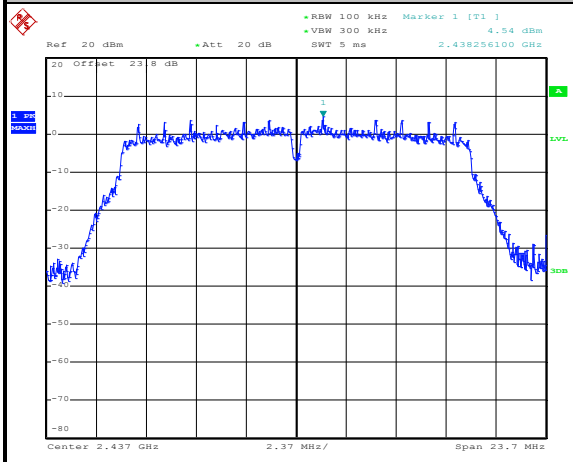


Date: 14.MAR.2014 16:04:10

Test Mode :	802.11g	**Temperature :**	21~26℃
Test Band :	2.4GHz Mid.	**Relative Humidity :**	45~54%
Test Channel :	06	**Test Engineer :**	Stuart Lin

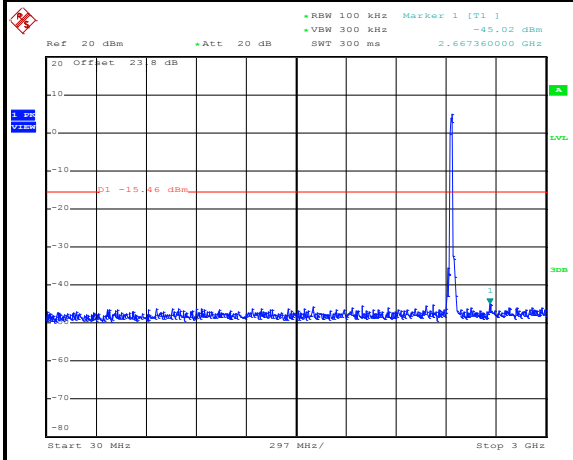
WLAN 802.11g Channel 06

100kHz PSD reference Level



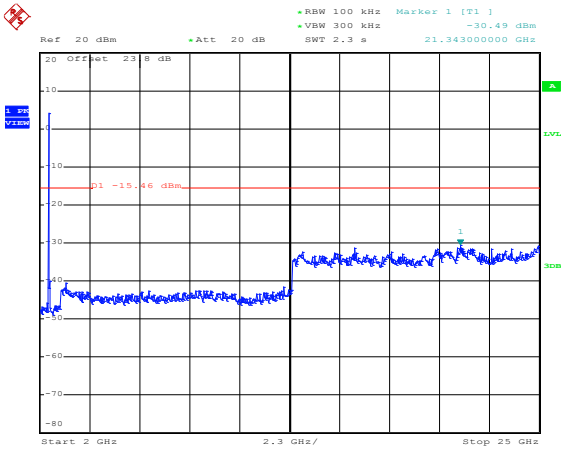
Date: 14.MAR.2014 16:00:34

Spurious Emission 30MHz~3GHz



Date: 14.MAR.2014 16:00:54

Spurious Emission 2GHz~25GHz

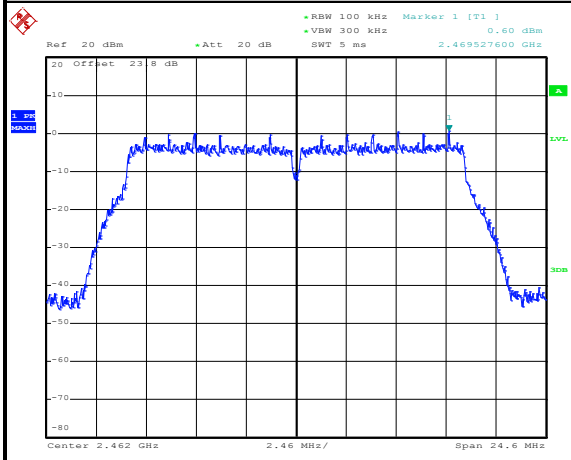


Date: 14.MAR.2014 16:01:12

Test Mode :	802.11g	Temperature :	21~26℃
Test Band :	2.4GHz High	Relative Humidity :	45~54%
Test Channel :	11	Test Engineer :	Stuart Lin

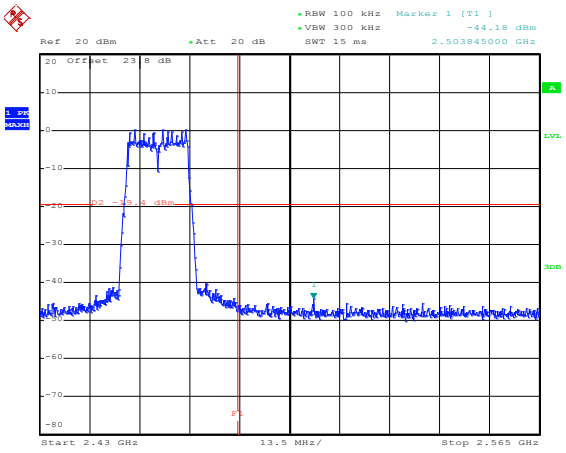
WLAN 802.11g Channel 11

100kHz PSD reference Level



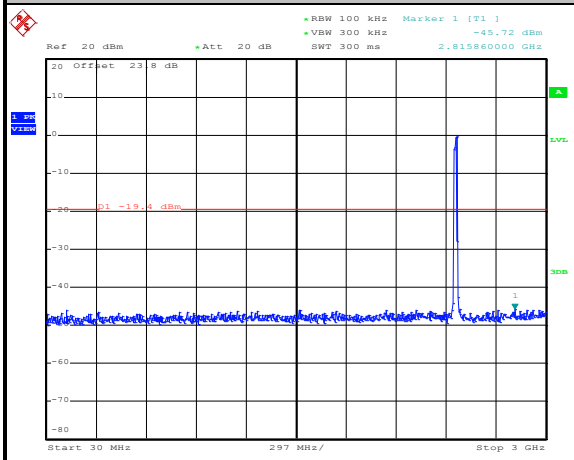
Date: 14.MAR.2014 15:56:03

High Channel Plot



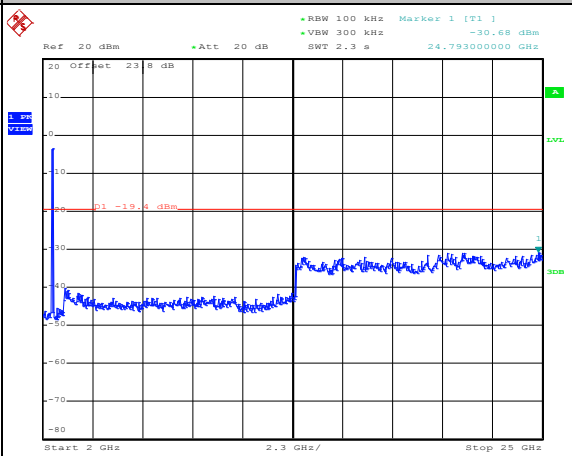
Date: 14.MAR.2014 15:56:17

Spurious Emission 30MHz~3GHz



Date: 14.MAR.2014 15:56:36

Spurious Emission 2GHz~25GHz

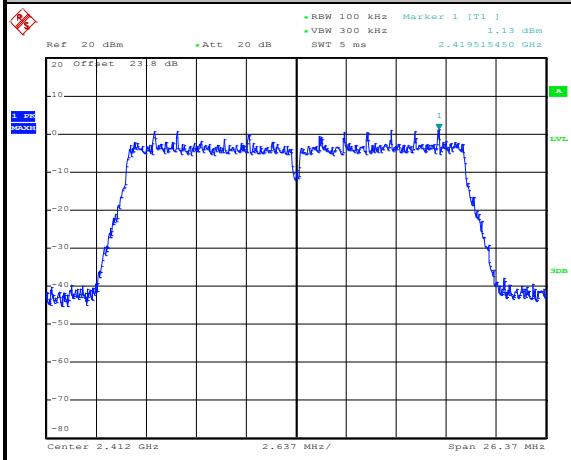


Date: 14.MAR.2014 15:56:55

Test Mode :	802.11n HT20	Temperature :	21~26℃
Test Band :	2.4GHz Low	Relative Humidity :	45~54%
Test Channel :	01	Test Engineer :	Stuart Lin

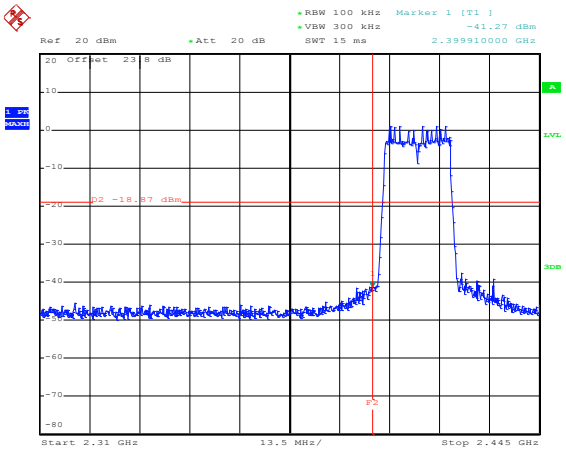
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



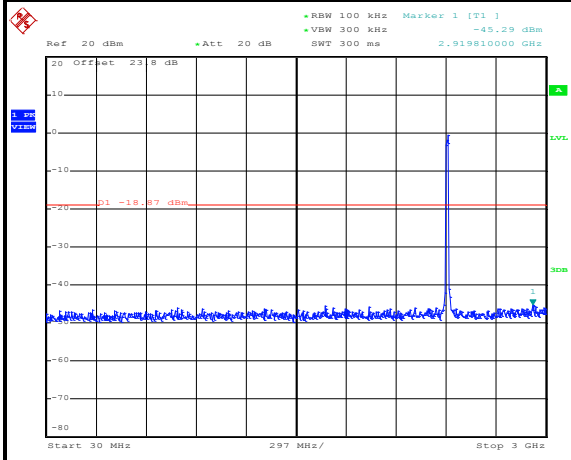
Date: 14.MAR.2014 16:06:17

Low Channel Plot



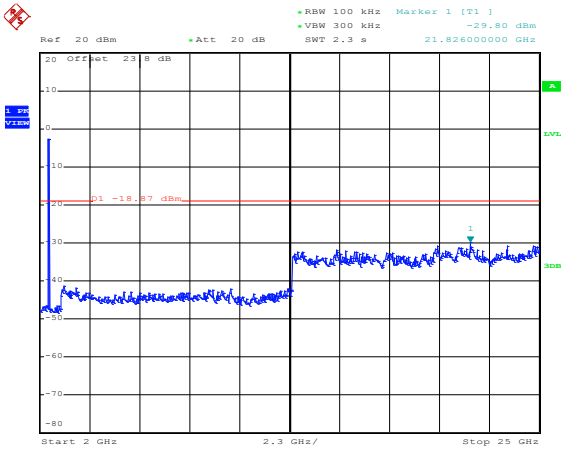
Date: 14.MAR.2014 16:06:31

Spurious Emission 30MHz~3GHz



Date: 14.MAR.2014 16:07:45

Spurious Emission 2GHz~25GHz

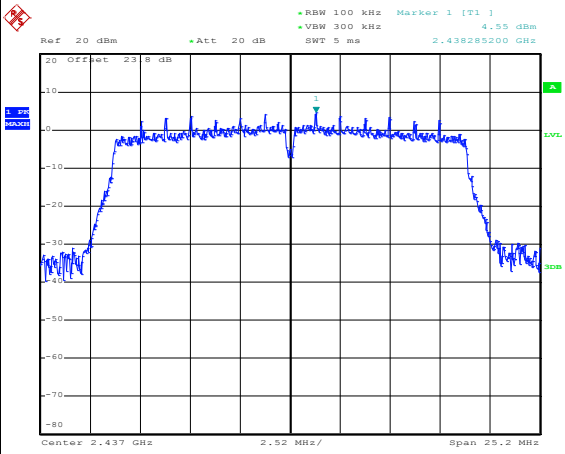


Date: 14.MAR.2014 16:08:04

Test Mode :	802.11n HT20	Temperature :	21~26℃
Test Band :	2.4GHz Mid.	Relative Humidity :	45~54%
Test Channel :	06	Test Engineer :	Stuart Lin

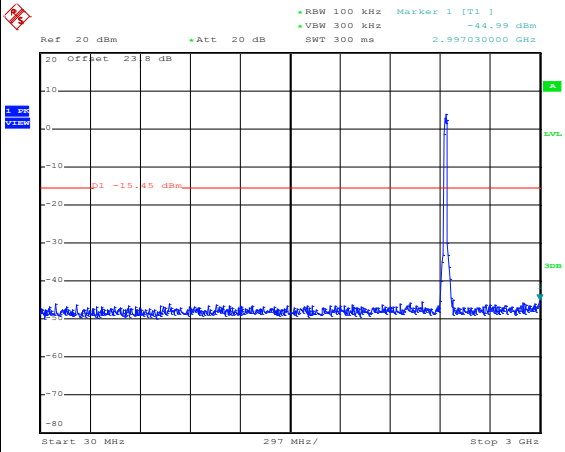
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



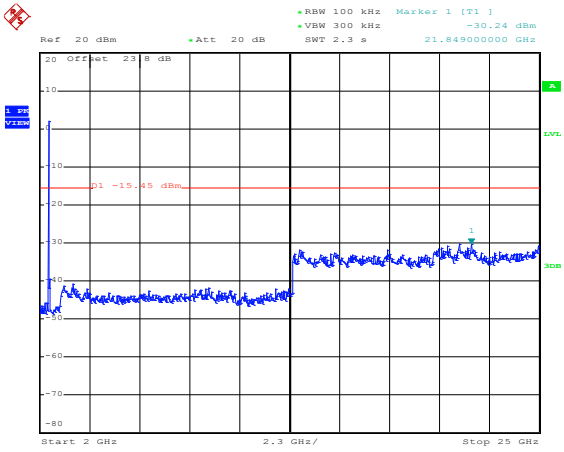
Date: 14.MAR.2014 16:10:11

Spurious Emission 30MHz~3GHz



Date: 14.MAR.2014 16:10:31

Spurious Emission 2GHz~25GHz

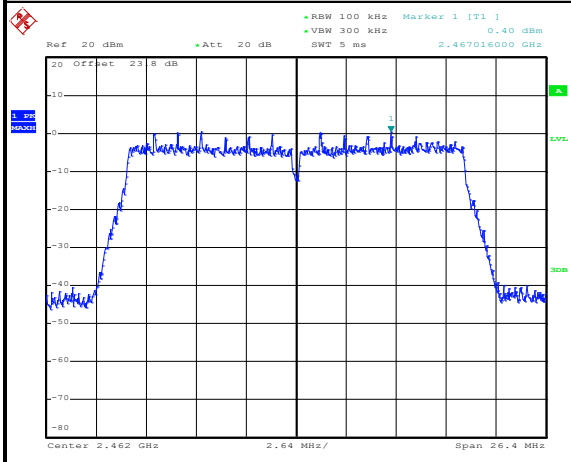


Date: 14.MAR.2014 16:10:49

Test Mode :	802.11n HT20	Temperature :	21~26℃
Test Band :	2.4GHz High	Relative Humidity :	45~54%
Test Channel :	11	Test Engineer :	Stuart Lin

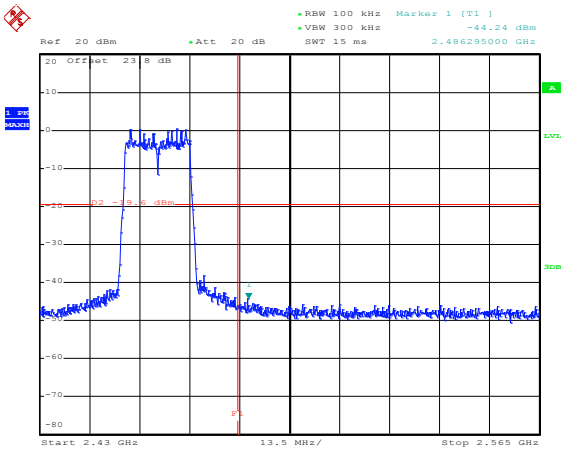
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



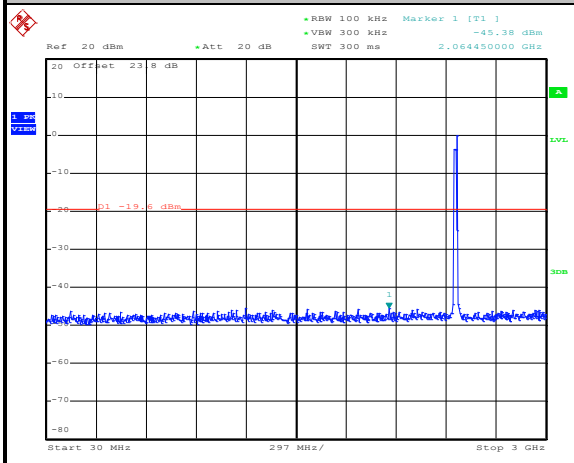
Date: 14.MAR.2014 16:12:30

High Channel Plot



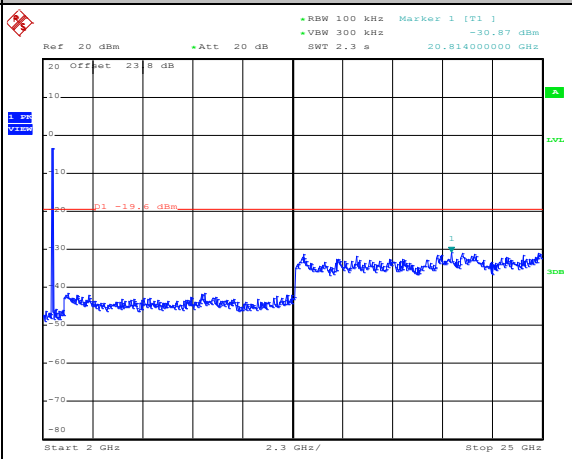
Date: 14.MAR.2014 16:12:43

Spurious Emission 30MHz~3GHz



Date: 14.MAR.2014 16:13:03

Spurious Emission 2GHz~25GHz



Date: 14.MAR.2014 16:13:21

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/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

3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

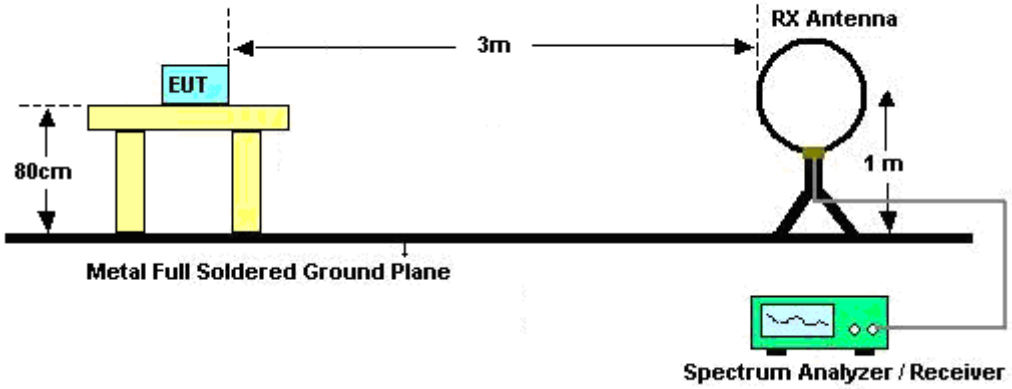
3.5.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

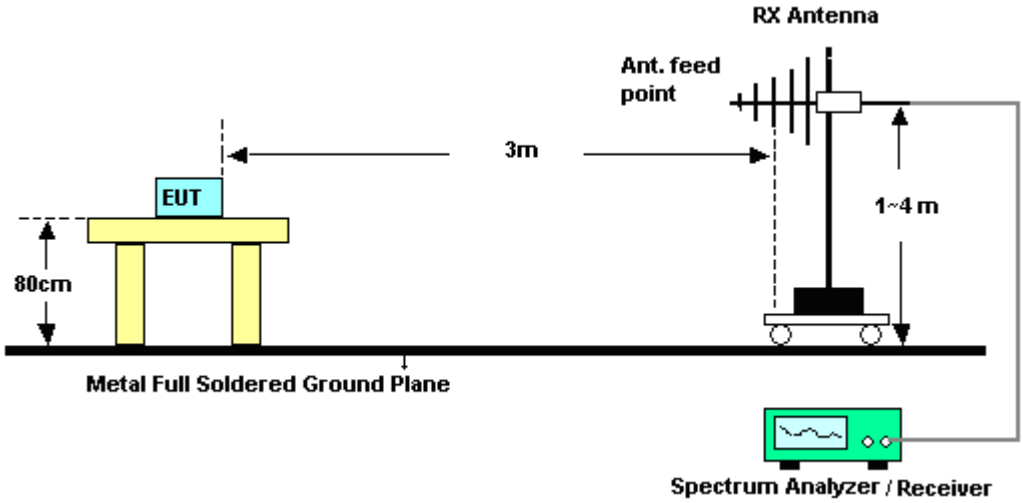
Band	Duty Cycle(%)	T(μs)	1/T(kHz)	VBW Setting
802.11b	98.59	-	-	10Hz
802.11g	92.72	1400.00	0.71	1kHz
802.11n HT20	92.20	1300.00	0.77	1kHz

3.5.4 Test Setup

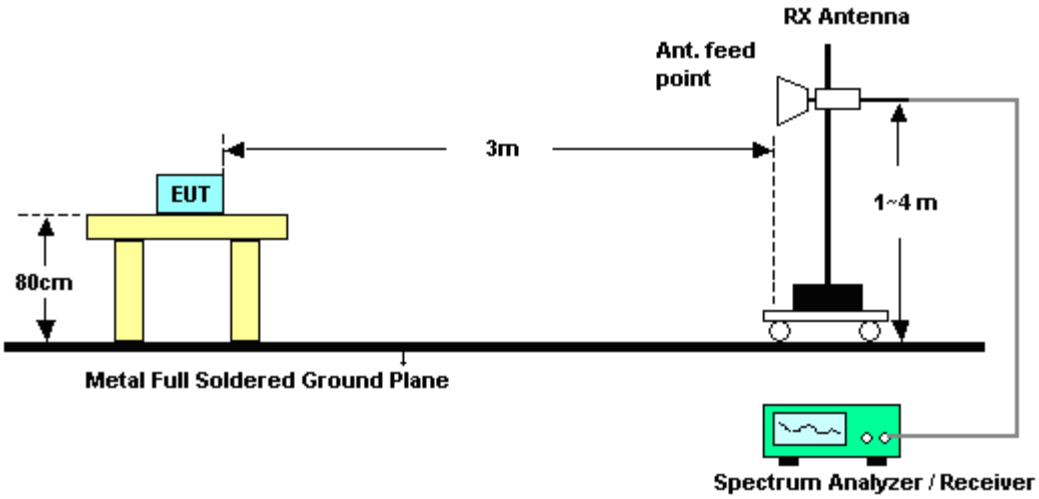
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.5.6 Test Result of Radiated Spurious at Band Edges

Test Mode :	802.11b	Temperature :	22~24°C
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2386.14	59.86	-14.14	74	56.88	32.29	6.22	35.53	100	305	Peak
2387.22	47.19	-6.81	54	44.21	32.29	6.22	35.53	100	305	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2378.4	58.82	-15.18	74	55.88	32.26	6.21	35.53	132	292	Peak
2386.95	45.21	-8.79	54	42.23	32.29	6.22	35.53	132	292	Average

Test Mode :	802.11b	Temperature :	22~24°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2495.11	59.43	-14.57	74	55.89	32.5	6.45	35.41	100	323	Peak
2483.56	46.09	-7.91	54	42.6	32.47	6.45	35.43	100	323	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2491.36	58.63	-15.37	74	55.11	32.5	6.45	35.43	103	291	Peak
2483.53	46.02	-7.98	54	42.53	32.47	6.45	35.43	103	291	Average

Test Mode :	802.11g	Temperature :	22~24°C
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.56	70.7	-3.3	74	67.72	32.29	6.22	35.53	100	309	Peak
2390	50.3	-3.7	54	47.29	32.29	6.22	35.5	100	309	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.2	67.22	-6.78	74	64.24	32.29	6.22	35.53	106	294	Peak
2389.83	48.45	-5.55	54	45.44	32.29	6.22	35.5	106	294	Average

Test Mode :	802.11g	Temperature :	22~24°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	10	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2456	104.67	-	-	101.31	32.43	6.39	35.46	100	315	Average
2456	114.82	-	-	111.46	32.43	6.39	35.46	100	315	Peak
2483.68	73.16	-0.84	74	69.67	32.47	6.45	35.43	100	315	Peak
2483.53	48.06	-5.94	54	44.57	32.47	6.45	35.43	100	315	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2456	101.26	-	-	97.9	32.43	6.39	35.46	103	275	Average
2456	111.49	-	-	108.13	32.43	6.39	35.46	103	275	Peak
2486.05	70.47	-3.53	74	66.98	32.47	6.45	35.43	103	275	Peak
2483.71	47.52	-6.48	54	44.03	32.47	6.45	35.43	103	275	Average

Test Mode :	802.11g	Temperature :	22~24°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2484.91	67.78	-6.22	74	64.29	32.47	6.45	35.43	100	309	Peak
2483.71	48.31	-5.69	54	44.82	32.47	6.45	35.43	100	309	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2486.02	65.99	-8.01	74	62.5	32.47	6.45	35.43	102	271	Peak
2483.65	48.32	-5.68	54	44.83	32.47	6.45	35.43	102	271	Average

Test Mode :	802.11n HT20	Temperature :	22~24°C
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.2	70.44	-3.56	74	67.46	32.29	6.22	35.53	100	312	Peak
2389.83	50.93	-3.07	54	47.92	32.29	6.22	35.5	100	312	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2385.96	68.64	-5.36	74	65.66	32.29	6.22	35.53	106	300	Peak
2390	49.53	-4.47	54	46.52	32.29	6.22	35.5	106	300	Average

Test Mode :	802.11n HT20	Temperature :	22~24°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	10	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2456	103.59	-	-	100.23	32.43	6.39	35.46	100	303	Average
2456	113.66	-	-	110.3	32.43	6.39	35.46	100	303	Peak
2489.26	73.41	-0.59	74	69.89	32.5	6.45	35.43	100	303	Peak
2483.71	48.6	-5.4	54	45.11	32.47	6.45	35.43	100	303	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2458	100.05	-	-	96.69	32.43	6.39	35.46	104	279	Average
2458	110.32	-	-	106.96	32.43	6.39	35.46	104	279	Peak
2483.68	71.81	-2.19	74	68.32	32.47	6.45	35.43	104	279	Peak
2483.62	47.54	-6.46	54	44.05	32.47	6.45	35.43	104	279	Average

Test Mode :	802.11n HT20	Temperature :	22~24°C
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2484.88	69.43	-4.57	74	65.94	32.47	6.45	35.43	100	305	Peak
2483.65	50.06	-3.94	54	46.57	32.47	6.45	35.43	100	305	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2484.01	67.41	-6.59	74	63.92	32.47	6.45	35.43	104	278	Peak
2483.5	48.77	-5.23	54	45.28	32.47	6.45	35.43	104	278	Average

3.5.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Note: Pre-scanned all test modes and only choose the worst case mode recorded in the test report for radiated spurious emission below 1GHz.

Test Mode :	802.11b	**Temperature :**	22~24°C
Test Channel :	01	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Horizontal
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2414	107.57	-	-	104.46	32.33	6.28	35.5	100	305	Average
2414	113.16	-	-	110.05	32.33	6.28	35.5	100	305	Peak
4824	41.45	-12.55	54	57.45	34.9	8.04	58.94	100	0	Peak

Test Mode :	802.11b	**Temperature :**	22~24°C
Test Channel :	01	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Vertical
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2414	103.96	-	-	100.85	32.33	6.28	35.5	132	292	Average
2414	109.4	-	-	106.29	32.33	6.28	35.5	132	292	Peak
4824	40.57	-13.43	54	56.57	34.9	8.04	58.94	100	0	Peak

Test Mode :	802.11b	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	109.67	-	-	106.41	32.4	6.34	35.48	123	306	Average
2438	115.1	-	-	111.84	32.4	6.34	35.48	123	306	Peak
4875	42.8	-11.2	54	58.63	34.93	8.11	58.87	100	0	Peak
7311	41.81	-12.19	54	53.16	36.64	10.47	58.46	100	0	Peak

Test Mode :	802.11b	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2436 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2436	104.05	-	-	100.83	32.36	6.34	35.48	100	102	Average
2436	109.33	-	-	106.11	32.36	6.34	35.48	100	102	Peak
4875	41.33	-12.67	54	57.16	34.93	8.11	58.87	100	0	Peak
7311	40.72	-13.28	54	52.07	36.64	10.47	58.46	100	0	Peak

Test Mode :	802.11b	**Temperature :**	22~24°C
Test Channel :	11	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	107.2	-	-	103.84	32.43	6.39	35.46	100	323	Average
2462	112.55	-	-	109.19	32.43	6.39	35.46	100	323	Peak
4923	41.06	-12.94	54	56.72	34.96	8.18	58.8	100	0	Peak
7386	41.55	-12.45	54	53.09	36.62	10.45	58.61	100	0	Peak

Test Mode :	802.11b	**Temperature :**	22~24°C
Test Channel :	11	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	104.96	-	-	101.6	32.43	6.39	35.46	103	291	Average
2462	110.24	-	-	106.88	32.43	6.39	35.46	103	291	Peak
4923	40.29	-13.71	54	55.95	34.96	8.18	58.8	100	0	Peak
7386	41.49	-12.51	54	53.03	36.62	10.45	58.61	100	0	Peak

Test Mode :	802.11g	**Temperature :**	22~24°C
Test Channel :	01	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Horizontal
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
95.61	26.66	-16.84	43.5	47.71	9.57	1.13	31.75	-	-	Peak
137.46	25.56	-17.94	43.5	44.87	11.07	1.37	31.75	-	-	Peak
240.6	25.14	-20.86	46	44.19	10.89	1.8	31.74	-	-	Peak
480.6	20.88	-25.12	46	33.37	16.9	2.52	31.91	-	-	Peak
721.4	31.14	-14.86	46	40.69	19.37	3.09	32.01	100	28	Peak
799.8	23.69	-22.31	46	32.43	19.95	3.26	31.95	-	-	Peak
2414	101.3	-	-	98.19	32.33	6.28	35.5	100	309	Average
2414	111.61	-	-	108.5	32.33	6.28	35.5	100	309	Peak
4824	39.72	-14.28	54	55.72	34.9	8.04	58.94	100	0	Peak

Test Mode :	802.11g	**Temperature :**	22~24°C
Test Channel :	01	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Vertical
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
36.21	29.21	-10.79	40	46.06	14.24	0.7	31.79	100	86	Peak
92.91	24.92	-18.58	43.5	46.05	9.5	1.12	31.75	-	-	Peak
135.03	25.29	-18.21	43.5	44.21	11.47	1.36	31.75	-	-	Peak
587	19.55	-26.45	46	30.16	18.63	2.8	32.04	-	-	Peak
830.6	20.7	-25.3	46	28.88	20.31	3.33	31.82	-	-	Peak
897.8	33.95	-12.05	46	41.3	20.7	3.49	31.54	-	-	Peak
2410	98.22	-	-	95.11	32.33	6.28	35.5	106	294	Average
2410	108.55	-	-	105.44	32.33	6.28	35.5	106	294	Peak
4824	39.4	-14.6	54	55.4	34.9	8.04	58.94	100	0	Peak

Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	105.08	-	-	101.82	32.4	6.34	35.48	124	312	Average
2438	116.27	-	-	113.01	32.4	6.34	35.48	124	312	Peak
4875	40.56	-13.44	54	56.39	34.93	8.11	58.87	100	0	Peak
7311	41.9	-12.1	54	53.25	36.64	10.47	58.46	100	0	Peak

Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2439 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2439	101.24	-	-	97.98	32.4	6.34	35.48	105	263	Average
2439	111.56	-	-	108.3	32.4	6.34	35.48	105	263	Peak
4875	40.33	-13.67	54	56.16	34.93	8.11	58.87	100	0	Peak
7311	41.9	-12.1	54	53.25	36.64	10.47	58.46	100	0	Peak

Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2460	100.8	-	-	97.44	32.43	6.39	35.46	100	309	Average
2460	111.98	-	-	108.62	32.43	6.39	35.46	100	309	Peak
4923	40.05	-13.95	54	55.71	34.96	8.18	58.8	100	0	Peak
7386	41.44	-12.56	54	52.98	36.62	10.45	58.61	100	0	Peak

Test Mode :	802.11g	Temperature :	22~24°C
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2464 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2464	97.68	-	-	94.32	32.43	6.39	35.46	102	271	Average
2464	108.26	-	-	104.9	32.43	6.39	35.46	102	271	Peak
4923	40.21	-13.79	54	55.87	34.96	8.18	58.8	100	0	Peak
7386	40.99	-13.01	54	52.53	36.62	10.45	58.61	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~24°C
Test Channel :	01	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Horizontal
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2414	100.34	-	-	97.23	32.33	6.28	35.5	100	312	Average
2414	111.06	-	-	107.95	32.33	6.28	35.5	100	312	Peak
4824	38.77	-15.23	54	54.77	34.9	8.04	58.94	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~24°C
Test Channel :	01	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Vertical
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2414	97.42	-	-	94.31	32.33	6.28	35.5	106	300	Average
2414	108.1	-	-	104.99	32.33	6.28	35.5	106	300	Peak
4824	39.64	-14.36	54	55.64	34.9	8.04	58.94	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	103.58	-	-	100.32	32.4	6.34	35.48	125	306	Average
2438	113.89	-	-	110.63	32.4	6.34	35.48	125	306	Peak
4875	40.67	-13.33	54	56.5	34.93	8.11	58.87	100	0	Peak
7311	41.68	-12.32	54	53.03	36.64	10.47	58.46	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	22~24°C
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	101.42	-	-	98.16	32.4	6.34	35.48	104	302	Average
2438	111.55	-	-	108.29	32.4	6.34	35.48	104	302	Peak
4875	39.63	-14.37	54	55.46	34.93	8.11	58.87	100	0	Peak
7311	41.03	-12.97	54	52.38	36.64	10.47	58.46	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~24°C
Test Channel :	11	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Horizontal
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2460	100.74	-	-	97.38	32.43	6.39	35.46	100	305	Average
2460	111.42	-	-	108.06	32.43	6.39	35.46	100	305	Peak
4923	40.12	-13.88	54	55.78	34.96	8.18	58.8	100	0	Peak
7386	42.3	-11.7	54	53.84	36.62	10.45	58.61	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~24°C
Test Channel :	11	**Relative Humidity :**	50~52%
Test Engineer :	Kyle Jhuang	**Polarization :**	Vertical
Remark :	1. 2464 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. 3. No spurious emissions are detected other than listed points as below.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2464	97.53	-	-	94.17	32.43	6.39	35.46	104	278	Average
2464	107.94	-	-	104.58	32.43	6.39	35.46	104	278	Peak
4923	40.93	-13.07	54	56.59	34.96	8.18	58.8	100	0	Peak
7386	41.64	-12.36	54	53.18	36.62	10.45	58.61	100	0	Peak

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (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 the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

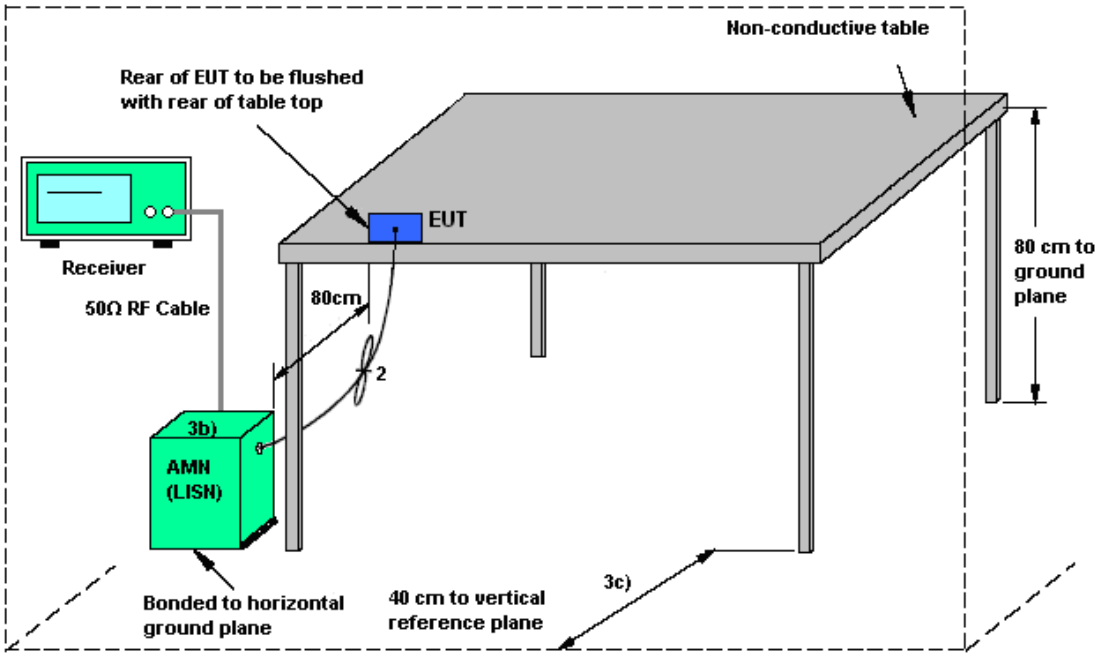
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

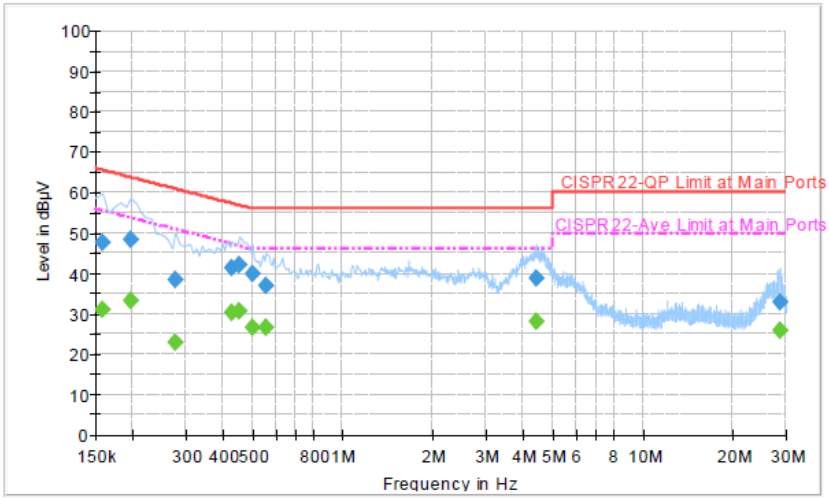
3.6.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 2	**Temperature :**	20~22℃
Test Engineer :	Cosmo Xu	**Relative Humidity :**	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WLAN (2.4GHz, 802.11g, Ch06, 6Mbps) SISO Tx + Earphone + USB Cable (Charging from Adapter) + Camera (Back)		



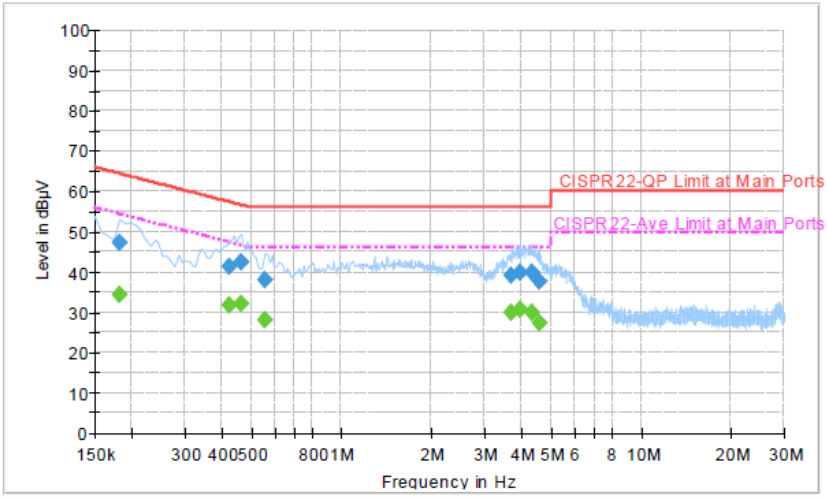
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	47.5	Off	L1	19.3	18.1	65.6
0.198000	48.3	Off	L1	19.3	15.4	63.7
0.278000	38.3	Off	L1	19.3	22.6	60.9
0.430000	41.3	Off	L1	19.4	16.0	57.3
0.454000	42.0	Off	L1	19.3	14.8	56.8
0.502000	39.8	Off	L1	19.4	16.2	56.0
0.558000	36.8	Off	L1	19.3	19.2	56.0
4.438000	38.8	Off	L1	19.6	17.2	56.0
28.614000	33.0	Off	L1	19.9	27.0	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	31.0	Off	L1	19.3	24.6	55.6
0.198000	33.3	Off	L1	19.3	20.4	53.7
0.278000	22.9	Off	L1	19.3	28.0	50.9
0.430000	30.4	Off	L1	19.4	16.9	47.3
0.454000	30.4	Off	L1	19.3	16.4	46.8
0.502000	26.7	Off	L1	19.4	19.3	46.0
0.558000	26.6	Off	L1	19.3	19.4	46.0
4.438000	28.2	Off	L1	19.6	17.8	46.0
28.614000	25.7	Off	L1	19.9	24.3	50.0

Test Mode :	Mode 2	Temperature :	20~22℃
Test Engineer :	Cosmo Xu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (2.4GHz, 802.11g, Ch06, 6Mbps) SISO Tx + Earphone + USB Cable (Charging from Adapter) + Camera (Back)		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	47.3	Off	N	19.3	17.1	64.4
0.422000	41.5	Off	N	19.4	15.9	57.4
0.462000	42.3	Off	N	19.4	14.4	56.7
0.558000	38.0	Off	N	19.3	18.0	56.0
3.702000	39.2	Off	N	19.6	16.8	56.0
3.958000	40.0	Off	N	19.6	16.0	56.0
4.318000	39.7	Off	N	19.6	16.3	56.0
4.590000	37.8	Off	N	19.7	18.2	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	34.3	Off	N	19.3	20.1	54.4
0.422000	31.8	Off	N	19.4	15.6	47.4
0.462000	32.2	Off	N	19.4	14.5	46.7
0.558000	27.9	Off	N	19.3	18.1	46.0
3.702000	30.1	Off	N	19.6	15.9	46.0
3.958000	30.7	Off	N	19.6	15.3	46.0
4.318000	29.9	Off	N	19.6	16.1	46.0
4.590000	27.3	Off	N	19.7	18.7	46.0

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Mar. 14, 2014	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 17, 2013	Mar. 14, 2014	Aug. 16, 2014	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 17, 2013	Mar. 14, 2014	Aug. 16, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz – 26.5GHz	Jan. 15, 2014	Mar. 15, 2014	Jan. 14, 2015	Radiation (03CH08-HY)
Bilog Antenna	Teseq GmbH	CBL6112D	35379	30MHz~2GHz	Oct. 10, 2013	Mar. 15, 2014	Oct. 09, 2014	Radiation (03CH08-HY)
Horn Antenna	ESCO	3117	00014326 1	1GHz~18GHz	Jan. 16, 2014	Mar. 15, 2014	Jan. 15, 2015	Radiation (03CH08-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA917 0251	15GHz~40GHz	Oct. 03, 2013	Mar. 15, 2014	Oct. 02, 2014	Radiation (03CH08-HY)
Amplifier	SONOMA	310N	187231	9kHz~1GHz	May 15, 2013	Mar. 15, 2014	May 14, 2014	Radiation (03CH08-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590074	1GHz~18GHz	Jul. 09, 2013	Mar. 15, 2014	Jul. 08, 2014	Radiation (03CH08-HY)
Pre Amplifier	Agilent	8449B	3008A026 65	1GHz~26.5GHz	Sep. 04, 2013	Mar. 15, 2014	Sep. 03, 2014	Radiation (03CH08-HY)
Turn Table	Chaintek	Chaintek 3000	N/A	0~360 Degree	N/A	Mar. 15, 2014	N/A	Radiation (03CH08-HY)
Antenna Mast	MF	MFA520BS	N/A	1m~4m	N/A	Mar. 15, 2014	N/A	Radiation (03CH08-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/00 01	9 kHz~30 MHz	Jul. 03, 2012	Mar. 15, 2014	Jul. 03, 2014	Radiation (03CH08-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 15, 2013	Mar. 15, 2014	Nov. 14, 2014	Conduction (CO05-HY)
LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2013	Mar. 15, 2014	Dec. 11, 2014	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 04, 2013	Mar. 15, 2014	Dec. 03, 2014	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Mar. 15, 2014	N/A	Conduction (CO05-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.30**