FCC RF Test Report

APPLICANT	:	ZTE CORPORATION
EQUIPMENT	:	WCDMA/LTE Multi-Mode Digital Mobile Phone
BRAND NAME	:	ZTE
MODEL NAME	:	Z830
FCC ID	:	SRQ-Z830
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was testing completed on Apr. 29, 2014. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant with the applicable technical standards.

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

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
2627

SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.

TABLE OF CONTENTS

REVISION HISTORY **3**

SUMMARY OF TEST RESULT **4**

1 GENERAL DESCRIPTION **5**

1.1 Applicant 5
1.2 Manufacturer 5
1.3 Feature of Equipment Under Test 5
1.4 Product Specification of Equipment Under Test 5
1.5 Modification of EUT 6
1.6 Testing Site 6
1.7 Applied Standards 6

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST **7**

2.1 Carrier Frequency Channel 7
2.2 Pre-Scanned RF Power 8
2.3 Test Mode 9
2.4 Connection Diagram of Test System 10
2.5 Support Unit used in test configuration and system 11
2.6 EUT Operation Test Setup 11
2.7 Measurement Results Explanation Example 11

3 TEST RESULT **12**

3.1 6dB Bandwidth Measurement 12
3.2 Output Power Measurement 14
3.3 Power Spectral Density Measurement 17
3.4 Conducted Band Edges and Spurious Emission Measurement 19
3.5 Radiated Band Edges and Spurious Emission Measurement 29
3.6 AC Conducted Emission Measurement 46
3.7 Antenna Requirements 50

4 LIST OF MEASURING EQUIPMENT **51**

5 UNCERTAINTY OF EVALUATION **52**

APPENDIX A. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR440405C	Rev. 01	Initial issue of report	May 19, 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 6.42 dB at 7311.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 14.76 dB at 0.460 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

ZTE CORPORATION
ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

1.2 Manufacturer

ZTE CORPORATION
ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	WCDMA/LTE Multi-Mode Digital Mobile Phone
Brand Name	ZTE
Model Name	Z830
FCC ID	SRQ-Z830
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/HSPA+/LTE/ WLAN 2.4GHz 802. 11b/g/n HT20/ Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
HW Version	wwuA
SW Version	Z830V1.0.0B01
EUT Stage	Identical Prototype

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

1.4 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 : 17.53 dBm (0.0566 W) 802.11g : 21.86 dBm (0.1535 W) 802.11n HT20 : 21.08 dBm (0.1282 W)
Antenna Type	PIFA Antenna with gain 2.40 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

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

1.6 Testing Site

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	**Sporton Site No.**			**FCC Registration No.**
	TH01-KS	03CH01-KS	CO01-KS	149928

Note: The test site complies with ANSI C63.4 2003 requirement.

1.7 Applied 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.

WLAN 2.4GHz 802.11b Average Power (dBm)						
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate 1Mbps	Channel	2Mbps	5.5Mbps	11Mbps
CH 01	2412 MHz	16.17	CH 06	17.41	17.43	17.51
CH 06	2437 MHz	**17.53**				
CH 11	2462 MHz	16.35				

WLAN 2.4GHz 802.11g Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412 MHz	20.95	CH 06	21.64	21.82	21.85	21.76	21.82	21.67	21.78
CH 06	2437 MHz	**21.86**								
CH 11	2462 MHz	21.23								

WLAN 2.4GHz 802.11n HT20 Average Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412 MHz	19.65	CH 06	20.83	21.07	21.01	20.95	20.75	20.83	20.66
CH 06	2437 MHz	**21.08**								
CH 11	2462 MHz	20.18								

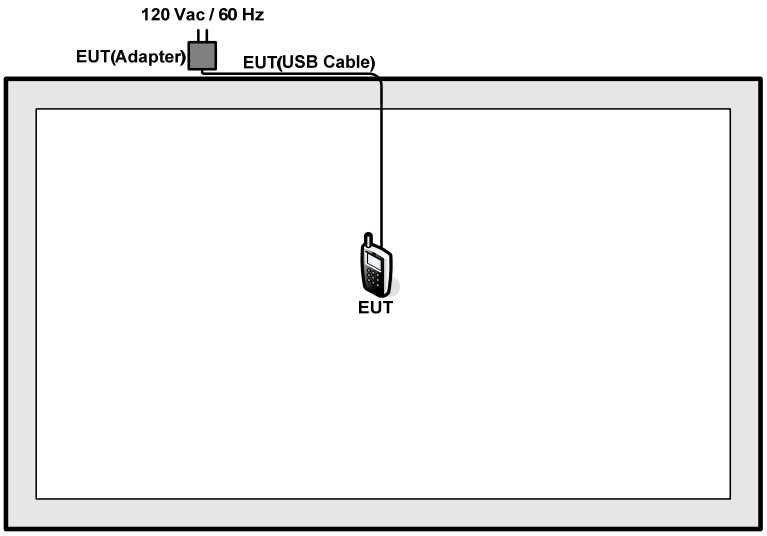
2.3 Test Mode

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

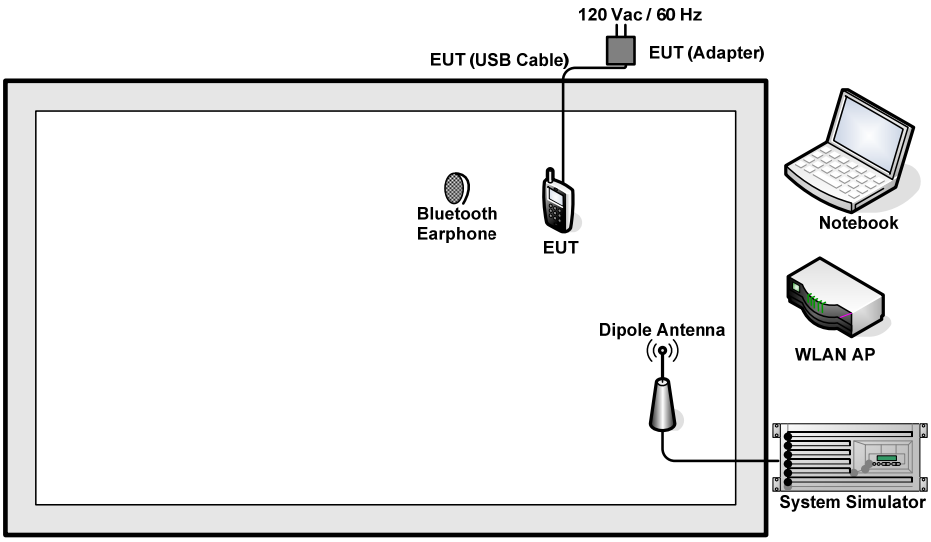
Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	6dB BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
	Conducted Band Edge	802.11b	1 Mbps	1/11
		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	1/11
		802.11n HT20	MCS0	1/11
	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 : GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter)			
Remark: For radiated TCs, the tests were performed with adapter and USB cable.				

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-106	QTLBH-106	N/A	N/A

2.6 EUT Operation Test Setup

For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

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 6.3 dB and 10dB attenuator.

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

= 6.3 + 10 = 16.3 (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.

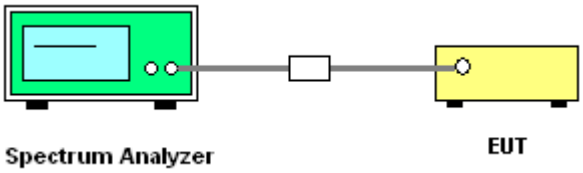
3.1.2 Measuring Instruments

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

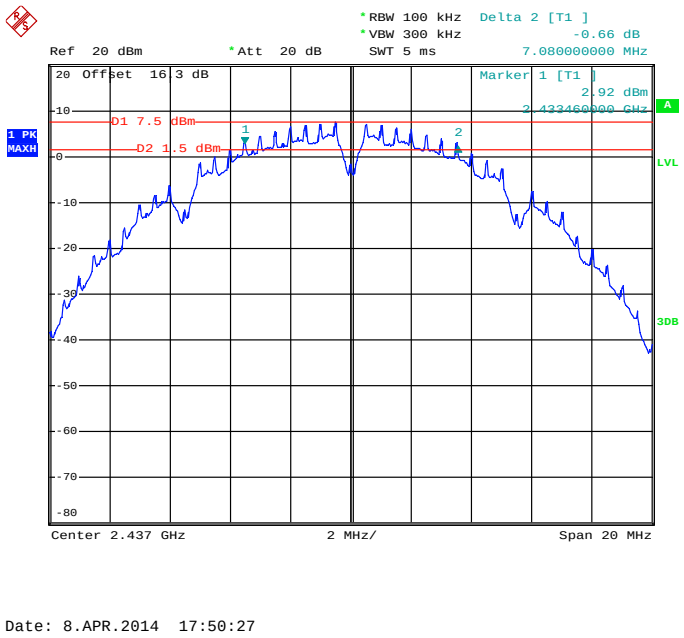


3.1.5 Test Result of 6dB Occupied Bandwidth

Test Band :	2.4GHz	Temperature :	23~24℃
Test Engineer :	Adonis Li	Relative Humidity :	47~48%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	7.54	0.5	Pass
11b	1Mbps	1	6	2437	7.08	0.5	Pass
11b	1Mbps	1	11	2462	7.08	0.5	Pass
11g	6Mbps	1	1	2412	16.30	0.5	Pass
11g	6Mbps	1	6	2437	16.32	0.5	Pass
11g	6Mbps	1	11	2462	16.34	0.5	Pass
HT20	MCS0	1	1	2412	17.56	0.5	Pass
HT20	MCS0	1	6	2437	17.30	0.5	Pass
HT20	MCS0	1	11	2462	17.56	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.

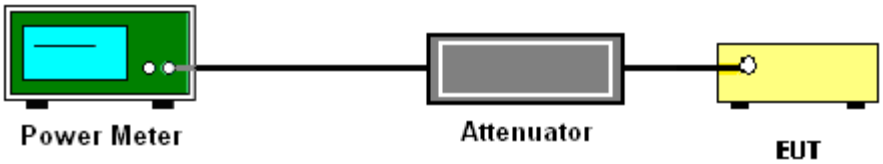
3.2.2 Measuring Instruments

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 :	23~24℃
Test Engineer :	Adonis Li	Relative Humidity :	47~48%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	RF Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	16.17	30	2.40	Pass
11b	1Mbps	1	6	2437	17.53	30	2.40	Pass
11b	1Mbps	1	11	2462	16.35	30	2.40	Pass
11g	6Mbps	1	1	2412	20.95	30	2.40	Pass
11g	6Mbps	1	6	2437	21.86	30	2.40	Pass
11g	6Mbps	1	11	2462	21.23	30	2.40	Pass
HT20	MCS0	1	1	2412	19.65	30	2.40	Pass
HT20	MCS0	1	6	2437	21.08	30	2.40	Pass
HT20	MCS0	1	11	2462	20.18	30	2.40	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 :	23~24℃
Test Engineer :	Adonis Li	Relative Humidity :	47~48%

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	0.10	13.37	30	2.40	Pass
11b	1Mbps	1	6	2437	0.10	14.65	30	2.40	Pass
11b	1Mbps	1	11	2462	0.10	13.32	30	2.40	Pass
11g	6Mbps	1	1	2412	0.56	12.72	30	2.40	Pass
11g	6Mbps	1	6	2437	0.56	13.82	30	2.40	Pass
11g	6Mbps	1	11	2462	0.56	12.92	30	2.40	Pass
HT20	MCS0	1	1	2412	0.63	11.10	30	2.40	Pass
HT20	MCS0	1	6	2437	0.63	12.37	30	2.40	Pass
HT20	MCS0	1	11	2462	0.63	11.40	30	2.40	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.

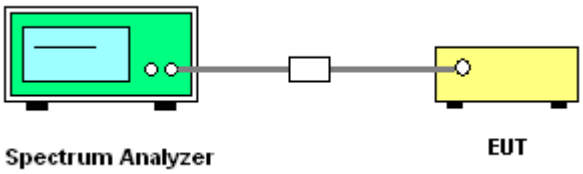
3.3.2 Measuring Instruments

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



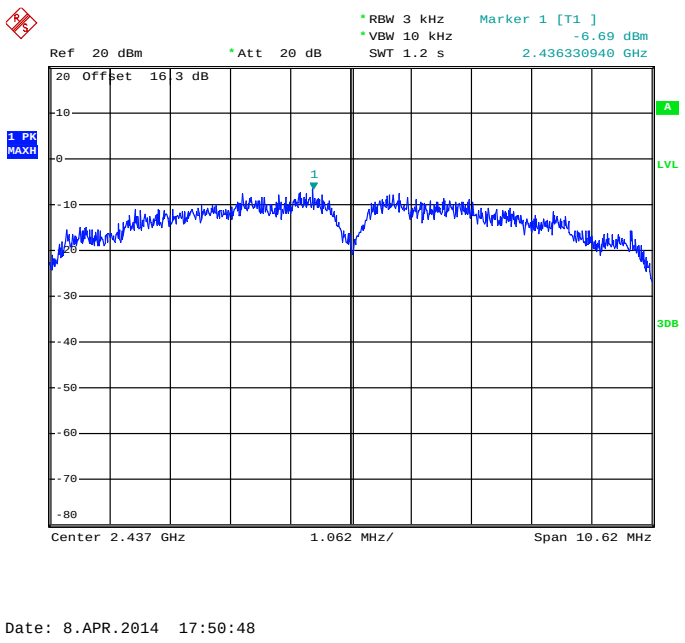
3.3.5 Test Result of Power Spectral Density

Test Mode :	2.4GHz	Temperature :	23~24℃
Test Engineer :	Adonis Li	Relative Humidity :	47~48%

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	-8.11	8	2.40	Pass
11b	1Mbps	1	6	2437	-6.69	8	2.40	Pass
11b	1Mbps	1	11	2462	-7.99	8	2.40	Pass
11g	6Mbps	1	1	2412	-11.36	8	2.40	Pass
11g	6Mbps	1	6	2437	-10.21	8	2.40	Pass
11g	6Mbps	1	11	2462	-11.85	8	2.40	Pass
HT20	MCS0	1	1	2412	-13.24	8	2.40	Pass
HT20	MCS0	1	6	2437	-13.51	8	2.40	Pass
HT20	MCS0	1	11	2462	-14.12	8	2.40	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).

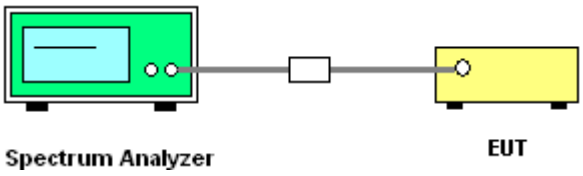
3.4.2 Measuring Instruments

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

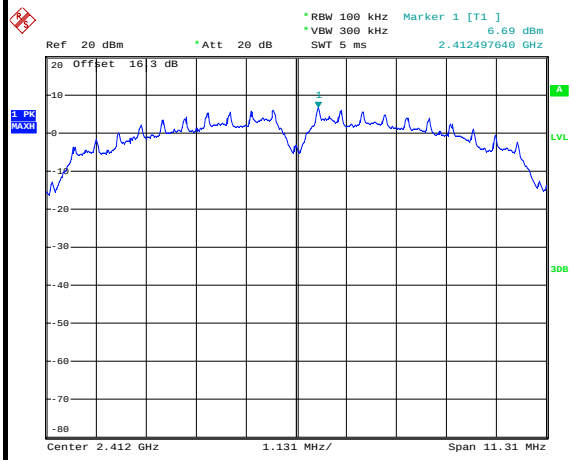


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Mode :	802.11b	**Temperature :**	23~24℃
Test Band :	2.4GHz Low	**Relative Humidity :**	47~48%
Test Channel :	01	**Test Engineer :**	Adonis Li

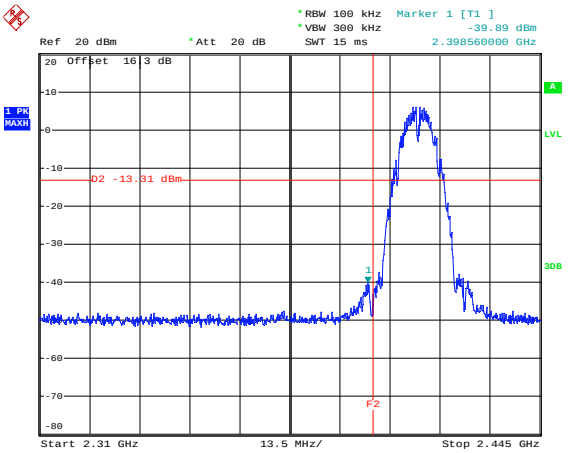
WLAN 802.11b Channel 01

100kHz PSD reference Level



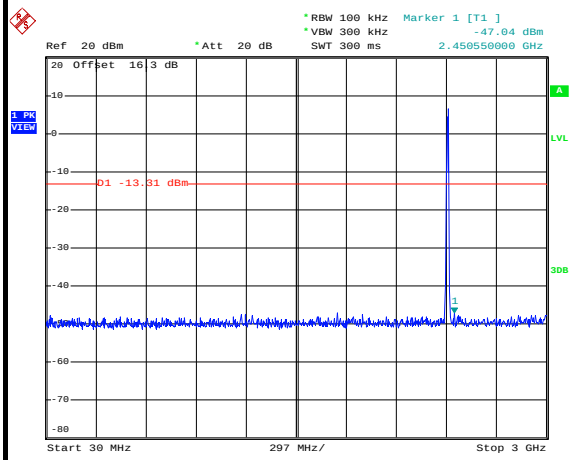
Date: 8.APR.2014 17:48:09

Low Channel Plot



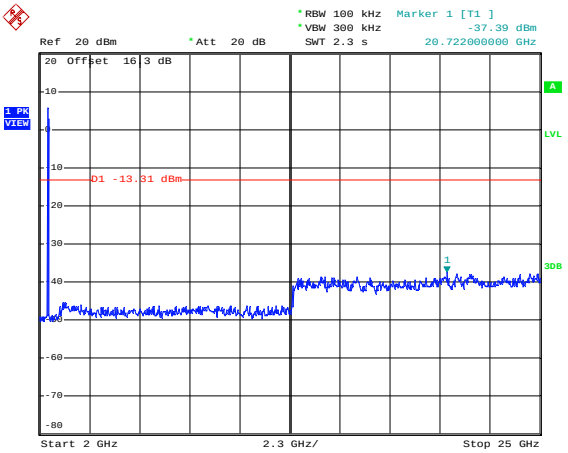
Date: 8.APR.2014 17:48:23

Spurious Emission 30MHz~3GHz



Date: 8.APR.2014 17:48:42

Spurious Emission 2GHz~25GHz

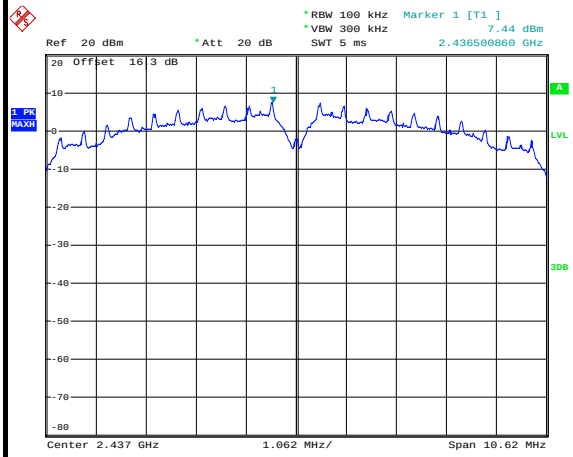


Date: 8.APR.2014 17:49:01

Test Mode :	802.11b	**Temperature :**	23~24℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	47~48%
Test Channel :	06	**Test Engineer :**	Adonis Li

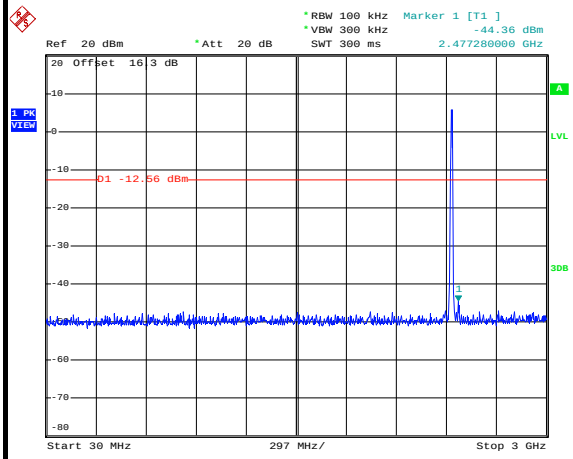
WLAN 802.11b Channel 06

100kHz PSD reference Level



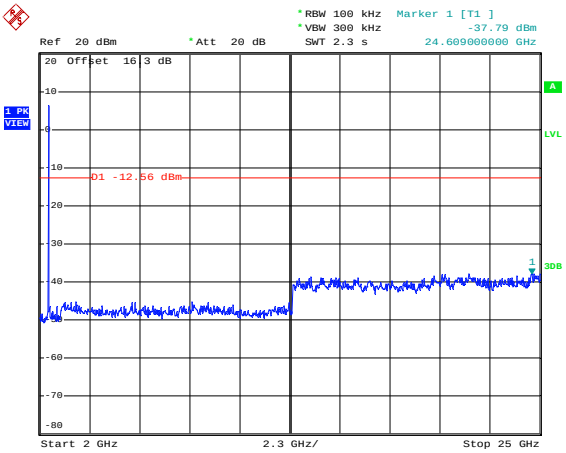
Date: 8.APR.2014 17:50:57

Spurious Emission 30MHz~3GHz



Date: 8.APR.2014 17:51:17

Spurious Emission 2GHz~25GHz

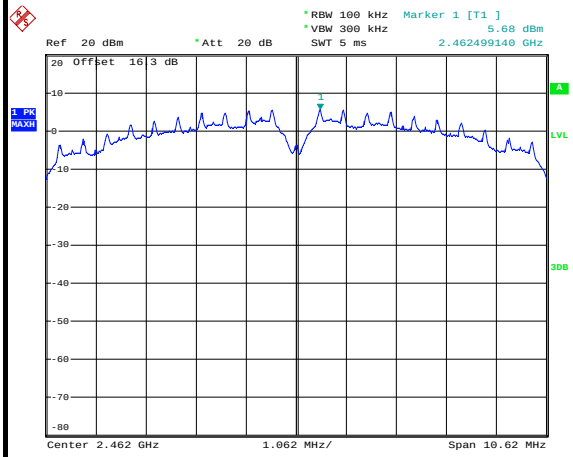


Date: 8.APR.2014 17:51:35

Test Mode :	802.11b	**Temperature :**	23~24℃
Test Band :	2.4GHz High	**Relative Humidity :**	47~48%
Test Channel :	11	**Test Engineer :**	Adonis Li

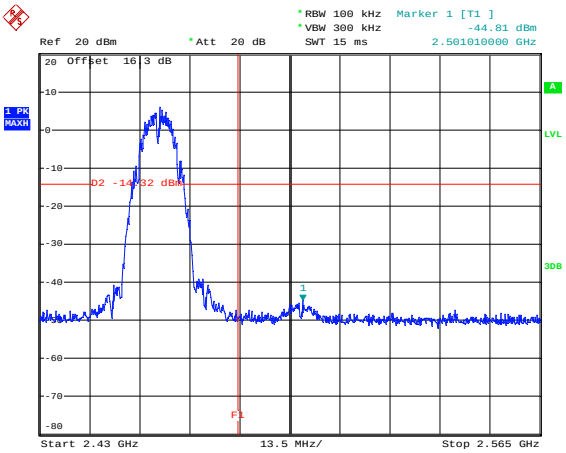
WLAN 802.11b Channel 11

100kHz PSD reference Level



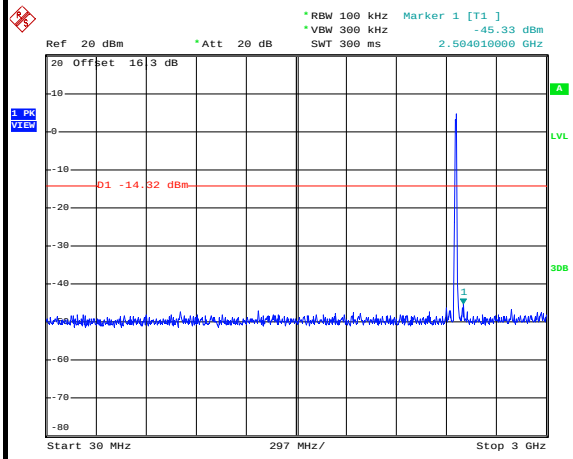
Date: 8.APR.2014 17:53:26

High Channel Plot



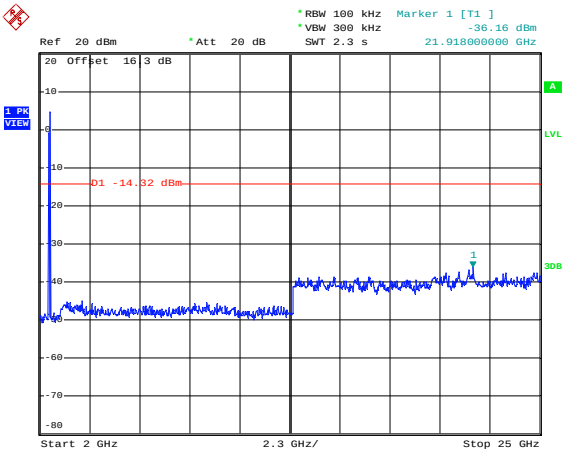
Date: 8.APR.2014 17:53:40

Spurious Emission 30MHz~3GHz



Date: 8.APR.2014 17:53:59

Spurious Emission 2GHz~25GHz

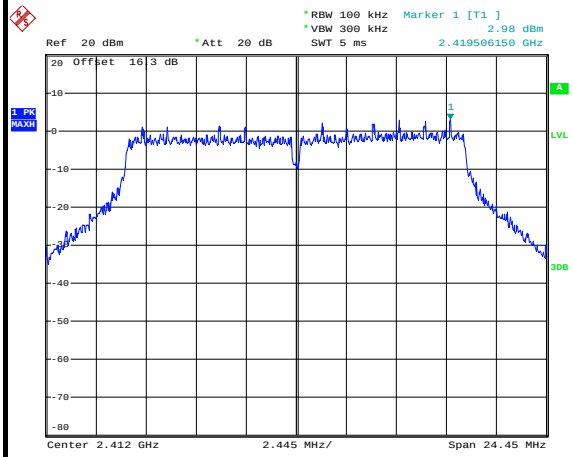


Date: 8.APR.2014 17:54:18

Test Mode :	802.11g	**Temperature :**	23~24℃
Test Band :	2.4GHz Low	**Relative Humidity :**	47~48%
Test Channel :	01	**Test Engineer :**	Adonis Li

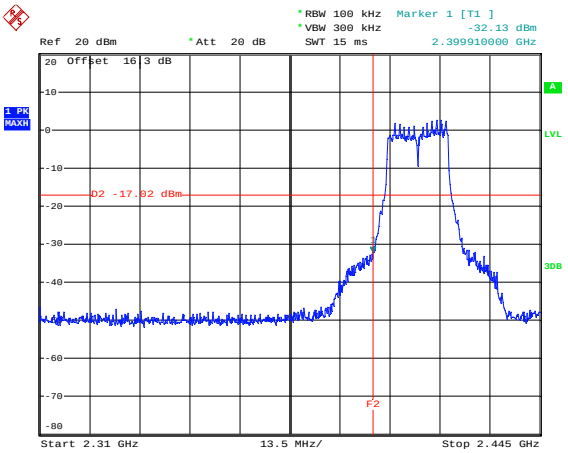
WLAN 802.11g Channel 01

100kHz PSD reference Level



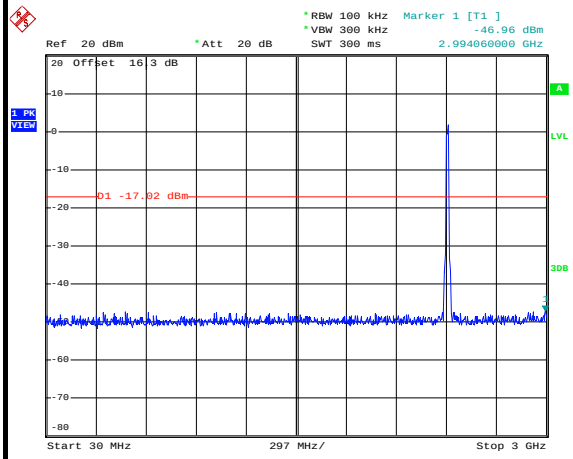
Date: 8.APR.2014 17:56:26

Low Channel Plot



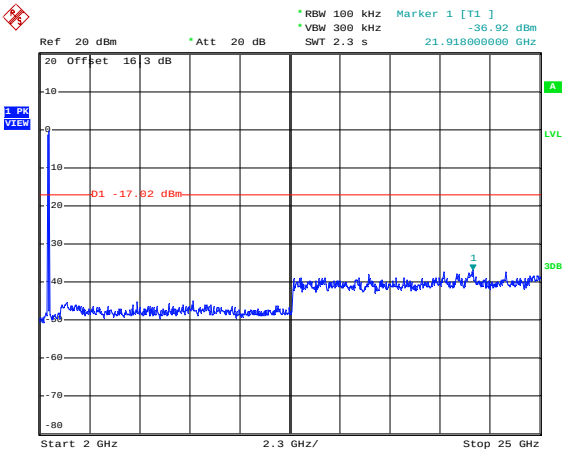
Date: 8.APR.2014 17:56:40

Spurious Emission 30MHz~3GHz



Date: 8.APR.2014 17:57:00

Spurious Emission 2GHz~25GHz

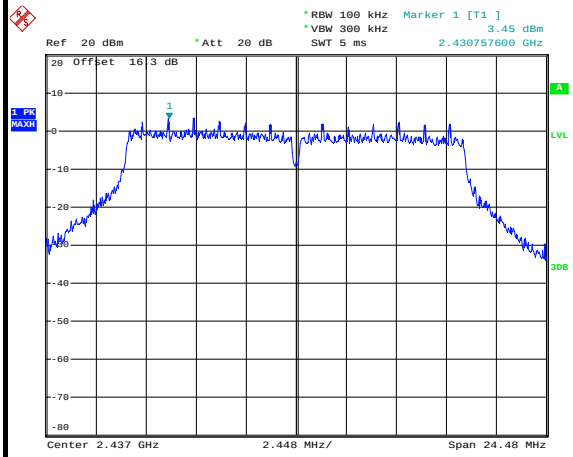


Date: 8.APR.2014 17:57:18

Test Mode :	802.11g	**Temperature :**	23~24℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	47~48%
Test Channel :	06	**Test Engineer :**	Adonis Li

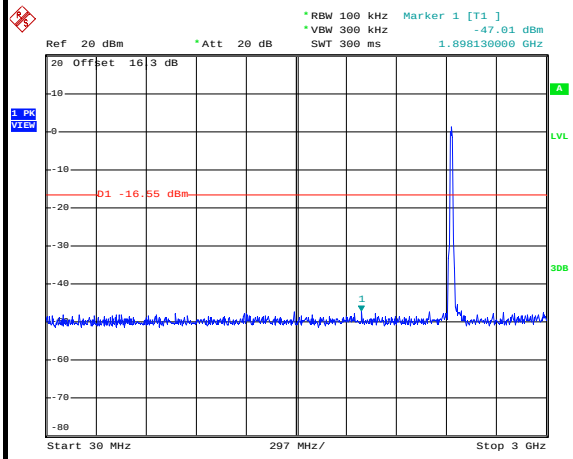
WLAN 802.11g Channel 06

100kHz PSD reference Level



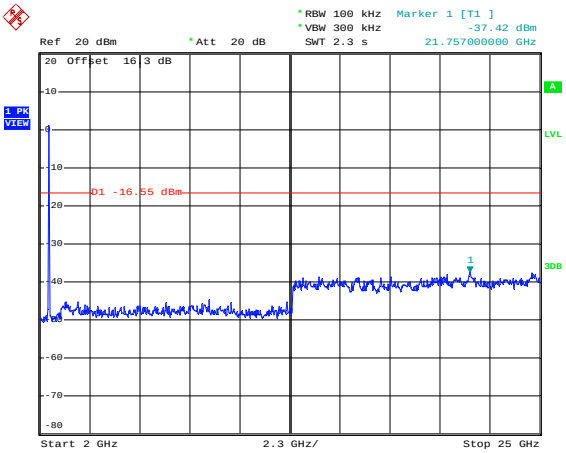
Date: 8.APR.2014 17:59:38

Spurious Emission 30MHz~3GHz



Date: 8.APR.2014 17:59:58

Spurious Emission 2GHz~25GHz

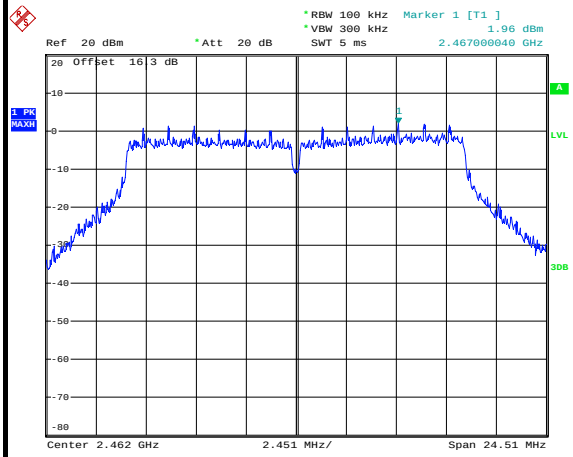


Date: 8.APR.2014 18:00:17

Test Mode :	802.11g	**Temperature :**	23~24℃
Test Band :	2.4GHz High	**Relative Humidity :**	47~48%
Test Channel :	11	**Test Engineer :**	Adonis Li

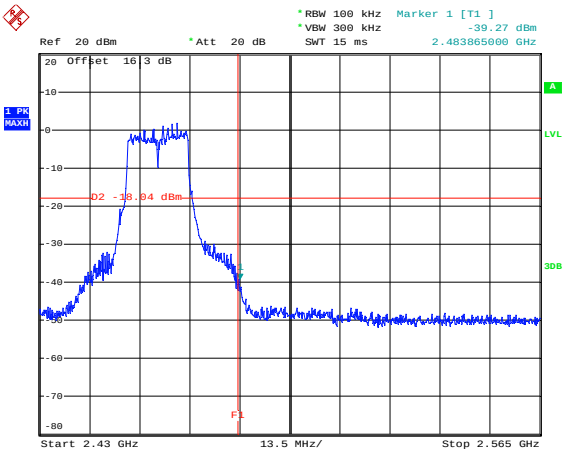
WLAN 802.11g Channel 11

100kHz PSD reference Level



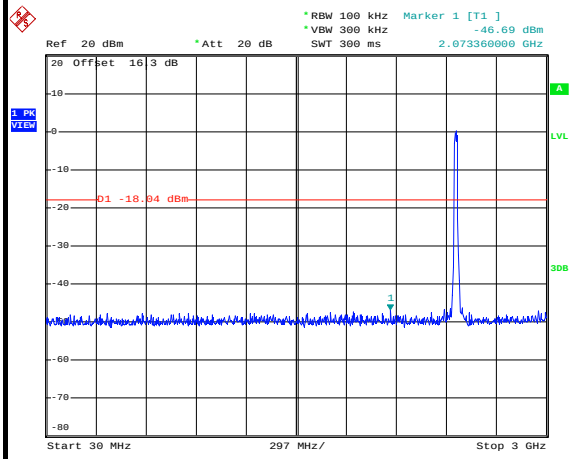
Date: 8.APR.2014 18:02:19

High Channel Plot



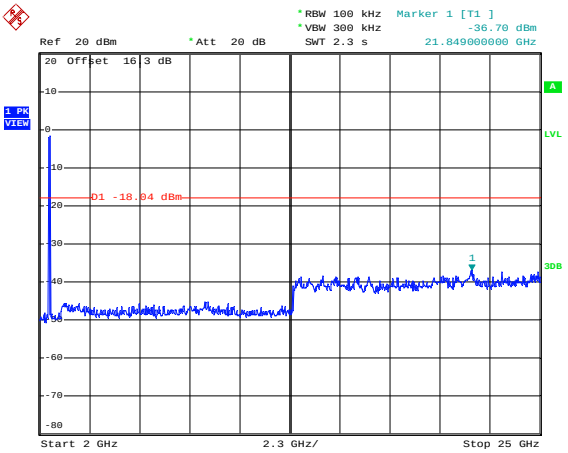
Date: 8.APR.2014 18:02:33

Spurious Emission 30MHz~3GHz



Date: 8.APR.2014 18:02:52

Spurious Emission 2GHz~25GHz

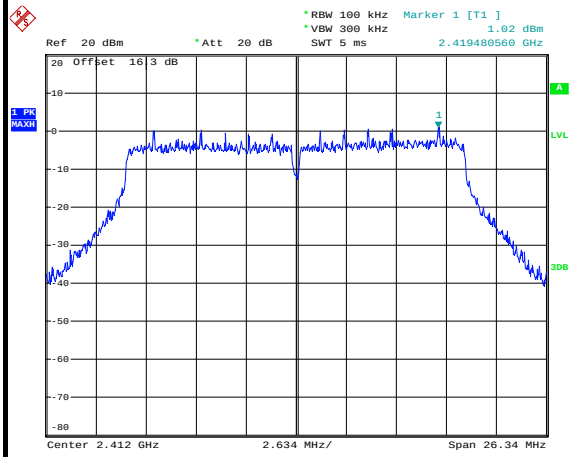


Date: 8.APR.2014 18:03:11

Test Mode :	802.11n HT20	**Temperature :**	23~24℃
Test Band :	2.4GHz Low	**Relative Humidity :**	47~48%
Test Channel :	01	**Test Engineer :**	Adonis Li

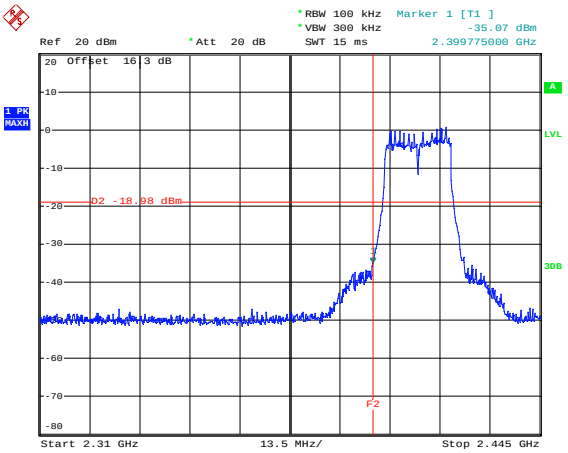
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



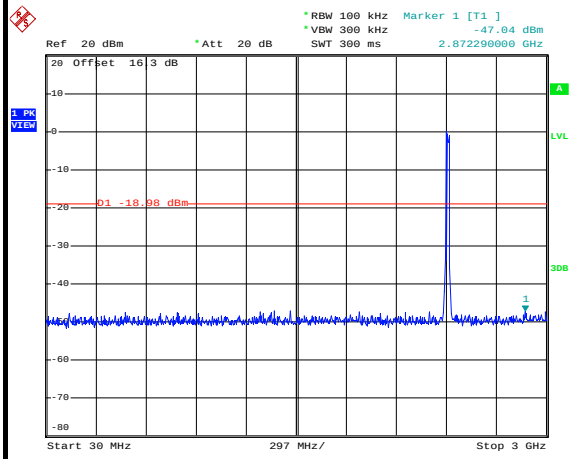
Date: 8.APR.2014 18:06:34

Low Channel Plot



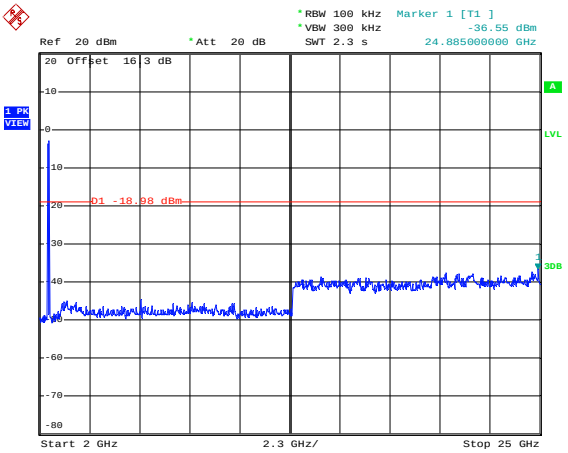
Date: 8.APR.2014 18:08:45

Spurious Emission 30MHz~3GHz



Date: 8.APR.2014 18:07:08

Spurious Emission 2GHz~25GHz

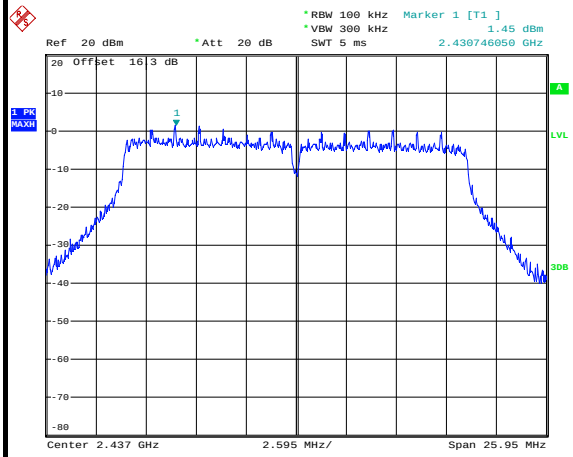


Date: 8.APR.2014 18:07:26

Test Mode :	802.11n HT20	**Temperature :**	23~24℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	47~48%
Test Channel :	06	**Test Engineer :**	Adonis Li

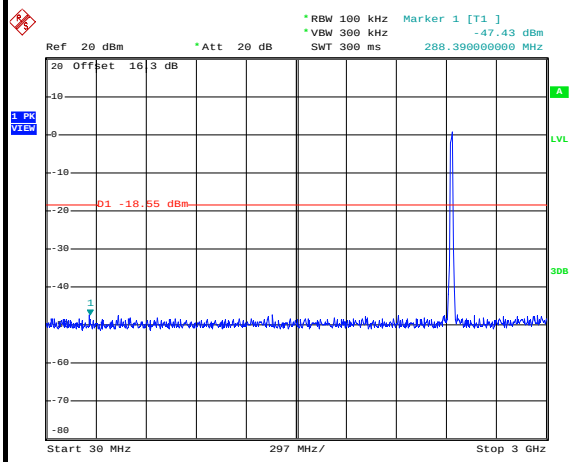
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



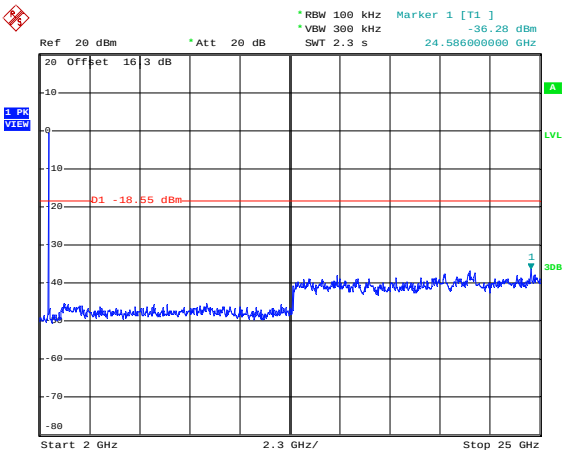
Date: 8.APR.2014 18:10:35

Spurious Emission 30MHz~3GHz



Date: 8.APR.2014 18:10:55

Spurious Emission 2GHz~25GHz

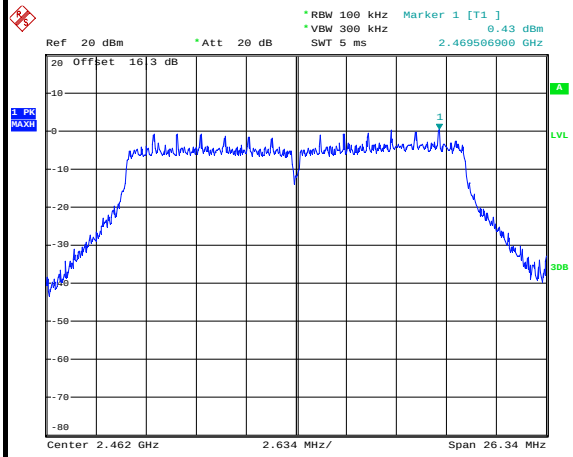


Date: 8.APR.2014 18:11:14

Test Mode :	802.11n HT20	**Temperature :**	23~24℃
Test Band :	2.4GHz High	**Relative Humidity :**	47~48%
Test Channel :	11	**Test Engineer :**	Adonis Li

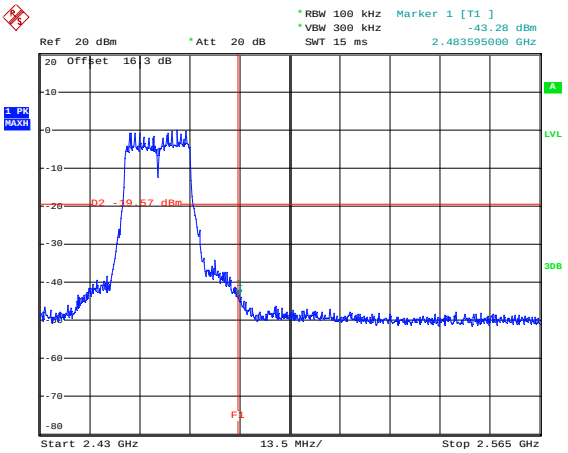
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



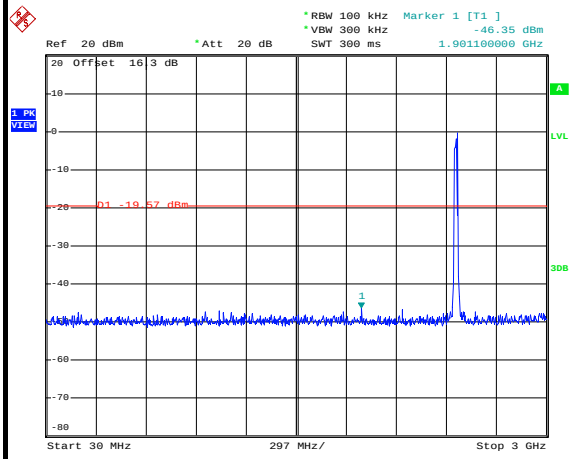
Date: 8.APR.2014 18:13:08

High Channel Plot



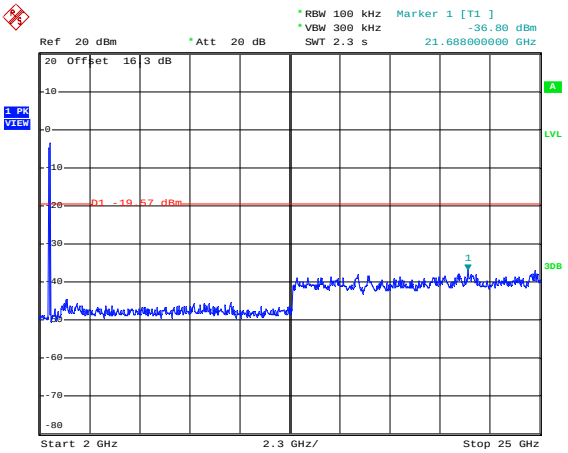
Date: 8.APR.2014 18:13:22

Spurious Emission 30MHz~3GHz



Date: 8.APR.2014 18:13:41

Spurious Emission 2GHz~25GHz



Date: 8.APR.2014 18:14:00

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.

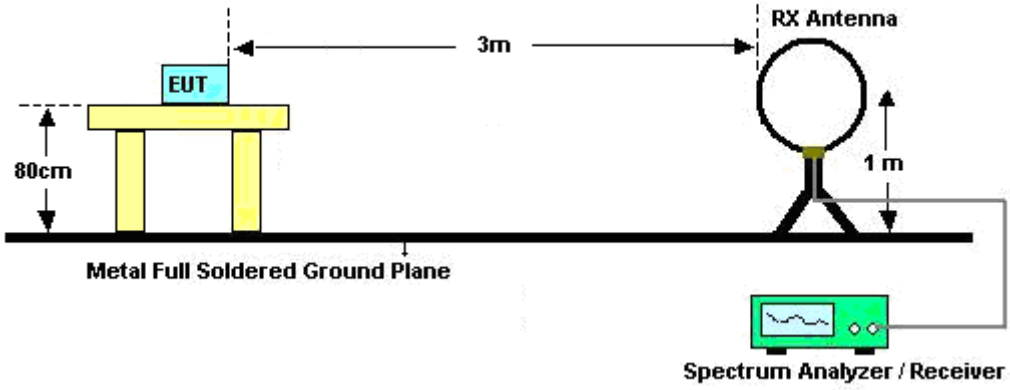
3.5.3 Test Procedures

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.

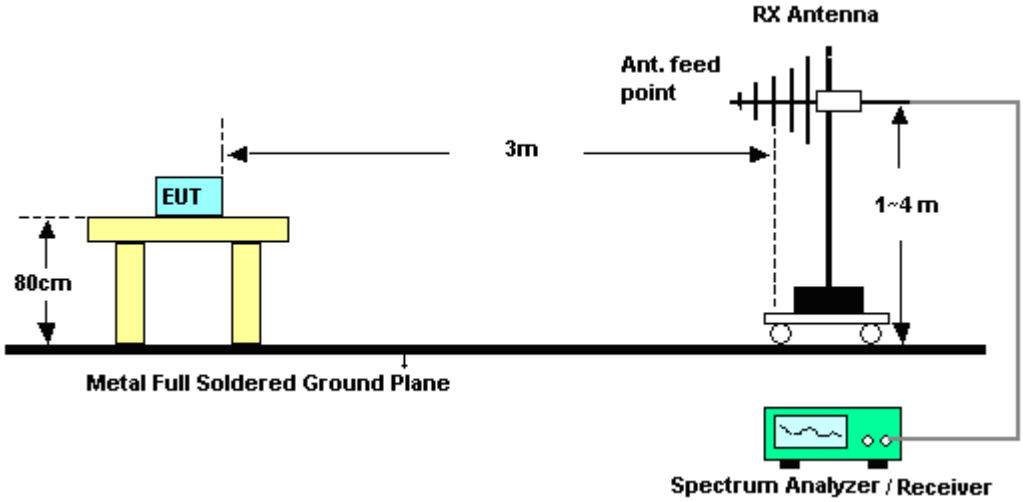
Band	Duty Cycle (%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	97.63	8.240	0.121	300Hz
802.11g	87.82	1.370	0.730	1kHz
2.4GHz 802.11n HT20	86.50	1.282	0.780	1kHz

3.5.4 Test Setup

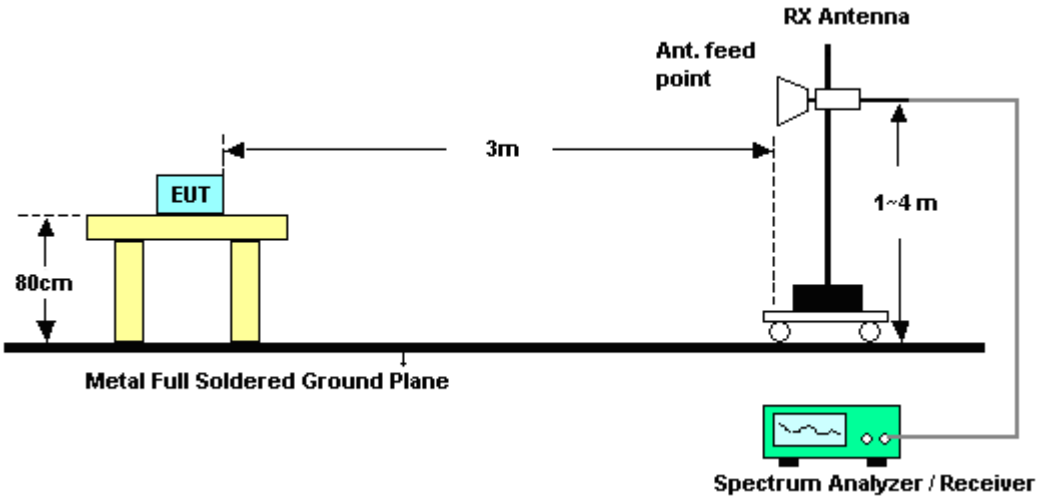
For radiated emissions below 30MHz



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 :**	22~23°C
Test Band :	Low	**Relative Humidity :**	42~43%
Test Channel :	01	**Test Engineer :**	Star Wei

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
2376.33	48.06	-25.94	74	44.91	32.83	3.58	33.26	100	0	Peak
2376.06	35.37	-18.63	54	32.22	32.83	3.58	33.26	100	0	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
2389.83	49.24	-24.76	74	46.05	32.86	3.59	33.26	100	277	Peak
2375.16	38.54	-15.46	54	35.39	32.83	3.58	33.26	100	277	Average

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Band :	High	**Relative Humidity :**	42~43%
Test Channel :	11	**Test Engineer :**	Star Wei

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
2498.32	52.6	-21.4	74	49.19	33.05	3.66	33.3	102	43	Peak
2499.64	43.07	-10.93	54	39.66	33.05	3.66	33.3	102	43	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
2499.13	51.2	-22.8	74	47.79	33.05	3.66	33.3	100	236	Peak
2499.49	42.35	-11.65	54	38.94	33.05	3.66	33.3	100	236	Average

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Band :	Low	**Relative Humidity :**	42~43%
Test Channel :	01	**Test Engineer :**	Star Wei

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
2389.74	62.8	-11.2	74	59.61	32.86	3.59	33.26	106	0	Peak
2389.83	41.98	-12.02	54	38.79	32.86	3.59	33.26	106	0	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
2389.74	61.39	-12.61	74	58.2	32.86	3.59	33.26	100	272	Peak
2389.83	42.88	-11.12	54	39.69	32.86	3.59	33.26	100	272	Average

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Band :	High	**Relative Humidity :**	42~43%
Test Channel :	11	**Test Engineer :**	Star Wei

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
2485.18	61.99	-12.01	74	58.62	33.01	3.65	33.29	128	0	Peak
2483.59	40.51	-13.49	54	37.14	33.01	3.65	33.29	128	0	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
2484.64	63.61	-10.39	74	60.24	33.01	3.65	33.29	100	284	Peak
2483.5	39.91	-14.09	54	36.54	33.01	3.65	33.29	100	284	Average

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Band :	Low	**Relative Humidity :**	42~43%
Test Channel :	01	**Test Engineer :**	Star Wei

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
2389.65	59.6	-14.4	74	56.41	32.86	3.59	33.26	200	360	Peak
2389.83	41.45	-12.55	54	38.26	32.86	3.59	33.26	200	360	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
2389.29	61.87	-12.13	74	58.68	32.86	3.59	33.26	100	278	Peak
2389.83	41.69	-12.31	54	38.5	32.86	3.59	33.26	100	278	Average

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Band :	High	**Relative Humidity :**	42~43%
Test Channel :	11	**Test Engineer :**	Star Wei

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
2484.07	59.76	-14.24	74	56.39	33.01	3.65	33.29	100	360	Peak
2483.59	39.92	-14.08	54	36.55	33.01	3.65	33.29	100	360	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
2484.28	60.42	-13.58	74	57.05	33.01	3.65	33.29	122	234	Peak
2483.5	39.97	-14.03	54	36.6	33.01	3.65	33.29	100	234	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 :**	22~23°C
Test Channel :	01	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2412	100.37	-	-	97.14	32.89	3.61	33.27	163	294	Peak
2412	96.18	-	-	92.95	32.89	3.61	33.27	163	294	Average
4824	47.63	-26.37	74	41.01	35.17	5.25	33.8	100	152	Peak

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2412	99.53	-	-	96.3	32.89	3.61	33.27	100	277	Peak
2412	94.91	-	-	91.68	32.89	3.61	33.27	100	277	Average
4824	46.86	-27.14	74	40.24	35.17	5.25	33.8	115	48	Peak

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
30	26.73	-13.27	40	41.82	18	0.48	33.57	118	41	Peak
52.31	24.8	-15.2	40	50.7	7.01	0.67	33.58	-	-	Peak
217.21	20.23	-25.77	46	42.5	9.89	1.36	33.52	-	-	Peak
239.52	22.98	-23.02	46	43.49	11.51	1.44	33.46	-	-	Peak
547.98	20.16	-25.84	46	32.62	18.47	2.09	33.02	-	-	Peak
806.97	21.28	-24.72	46	31.41	19.92	2.59	32.64	-	-	Peak
2437	108.2	-	-	104.9	32.95	3.63	33.28	107	335	Peak
2437	103.8	-	-	100.5	32.95	3.63	33.28	107	335	Average
4874	46.91	-27.09	74	40.25	35.18	5.28	33.8	115	184	Peak
7311	55.08	-18.92	74	46.4	36.2	6.61	34.13	100	339	Peak
7311	47.58	-6.42	54	38.9	36.2	6.61	34.13	100	339	Average

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
30	32.12	-7.88	40	47.21	18	0.48	33.57	-	-	Peak
52.31	32.15	-7.85	40	58.05	7.01	0.67	33.58	100	30	QP
91.11	26.55	-16.95	43.5	50.17	9.12	0.88	33.62	-	-	Peak
155.13	25.65	-17.85	43.5	48.29	9.8	1.14	33.58	-	-	Peak
527.61	19.55	-26.45	46	32.57	17.96	2.08	33.06	-	-	Peak
702.21	22.5	-23.5	46	33.67	19.32	2.39	32.88	-	-	Peak
2437	105.01	-	-	101.71	32.95	3.63	33.28	100	261	Peak
2437	100.54	-	-	97.24	32.95	3.63	33.28	100	261	Average
4874	46.68	-27.32	74	40.02	35.18	5.28	33.8	100	200	Peak
7311	55.53	-18.47	74	46.85	36.2	6.61	34.13	100	0	Peak
7311	45.5	-8.5	54	36.82	36.2	6.61	34.13	100	0	Average

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**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.		

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	101.73	-	-	98.4	32.98	3.64	33.29	105	46	Peak
2462	97.17	-	-	93.84	32.98	3.64	33.29	105	46	Average
4924	48.74	-25.26	74	42.04	35.19	5.31	33.8	100	228	Peak
7386	50.64	-23.36	74	41.86	36.24	6.7	34.16	100	174	Peak

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**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.		

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	98.25	-	-	94.92	32.98	3.64	33.29	100	232	Peak
2462	93.57	-	-	90.24	32.98	3.64	33.29	100	232	Average
4924	47.33	-26.67	74	40.63	35.19	5.31	33.8	100	189	Peak
7386	50.94	-23.06	74	42.16	36.24	6.7	34.16	100	226	Peak

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2412	97.2	-	-	93.97	32.89	3.61	33.27	100	0	Peak
2412	86.56	-	-	83.33	32.89	3.61	33.27	100	0	Average
4824	48.45	-25.55	74	41.83	35.17	5.25	33.8	115	229	Peak

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2412	101.06	-	-	97.83	32.89	3.61	33.27	100	242	Peak
2412	88.25	-	-	85.02	32.89	3.61	33.27	100	242	Average
4824	47.63	-26.37	74	41.01	35.17	5.25	33.8	100	100	Peak

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2437	105.7	-	-	102.4	32.95	3.63	33.28	107	5	Peak
2437	94.19	-	-	90.89	32.95	3.63	33.28	107	5	Average
4874	47.49	-26.51	74	40.83	35.18	5.28	33.8	115	221	Peak
7311	59.16	-14.84	74	50.48	36.2	6.61	34.13	100	360	Peak
7311	41.84	-12.16	54	33.16	36.2	6.61	34.13	100	360	Average

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2437	106.17	-	-	102.87	32.95	3.63	33.28	111	237	Peak
2437	95.05	-	-	91.75	32.95	3.63	33.28	111	237	Average
4874	45.81	-28.19	74	39.15	35.18	5.28	33.8	100	221	Peak
7311	54.8	-19.2	74	46.12	36.2	6.61	34.13	100	165	Peak
7311	37.53	-16.47	54	28.85	36.2	6.61	34.13	100	165	Average

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**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.		

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	100.17	-	-	96.84	32.98	3.64	33.29	131	0	Peak
2462	89.49	-	-	86.16	32.98	3.64	33.29	131	0	Average
4924	46.16	-27.84	74	39.46	35.19	5.31	33.8	100	62	Peak
7386	55.86	-18.14	74	47.08	36.24	6.7	34.16	100	0	Peak
7386	39.11	-14.89	54	30.33	36.24	6.7	34.16	100	0	Average

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**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.		

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	101.43	-	-	98.1	32.98	3.64	33.29	100	235	Peak
2462	90.17	-	-	86.84	32.98	3.64	33.29	100	235	Average
4924	45.89	-28.11	74	39.19	35.19	5.31	33.8	100	339	Peak
7386	52.93	-21.07	74	44.15	36.24	6.7	34.16	100	209	Peak
7386	34.25	-19.75	54	25.47	36.24	6.7	34.16	100	209	Average

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2412	97.63	-	-	94.4	32.89	3.61	33.27	200	0	Peak
2412	86.49	-	-	83.26	32.89	3.61	33.27	200	0	Average
4824	46.8	-27.2	74	40.18	35.17	5.25	33.8	117	46	Peak

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2412	98.18	-	-	94.95	32.89	3.61	33.27	100	277	Peak
2412	86.6	-	-	83.37	32.89	3.61	33.27	100	277	Average
4824	47.77	-26.23	74	41.15	35.17	5.25	33.8	116	239	Peak

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2437	102.35	-	-	99.05	32.95	3.63	33.28	106	0	Peak
2437	91.57	-	-	88.27	32.95	3.63	33.28	106	0	Average
4874	46.88	-27.12	74	40.22	35.18	5.28	33.8	112	87	Peak
7311	52.04	-21.96	74	43.36	36.2	6.61	34.13	110	0	Peak
7311	39.35	-14.65	54	30.67	36.2	6.61	34.13	110	0	Average

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

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
2437	103.27	-	-	99.97	32.95	3.63	33.28	100	249	Peak
2437	92.03	-	-	88.73	32.95	3.63	33.28	100	249	Average
4874	46.82	-27.18	74	40.16	35.18	5.28	33.8	100	216	Peak
7311	50.7	-23.3	74	42.02	36.2	6.61	34.13	122	285	Peak

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**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.		

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	98.8	-	-	95.47	32.98	3.64	33.29	104	0	Peak
2462	87.46	-	-	84.13	32.98	3.64	33.29	104	0	Average
4924	47.35	-26.65	74	40.65	35.19	5.31	33.8	136	217	Peak
7386	50.15	-23.85	74	41.37	36.24	6.7	34.16	119	55	Peak

Test Mode :	2.4GHz 802.11n HT20	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**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.		

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	98.64	-	-	95.31	32.98	3.64	33.29	100	247	Peak
2462	87.35	-	-	84.02	32.98	3.64	33.29	100	247	Average
4924	49.56	-24.44	74	42.86	35.19	5.31	33.8	100	21	Peak
7386	49.02	-24.98	74	40.24	36.24	6.7	34.16	200	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.

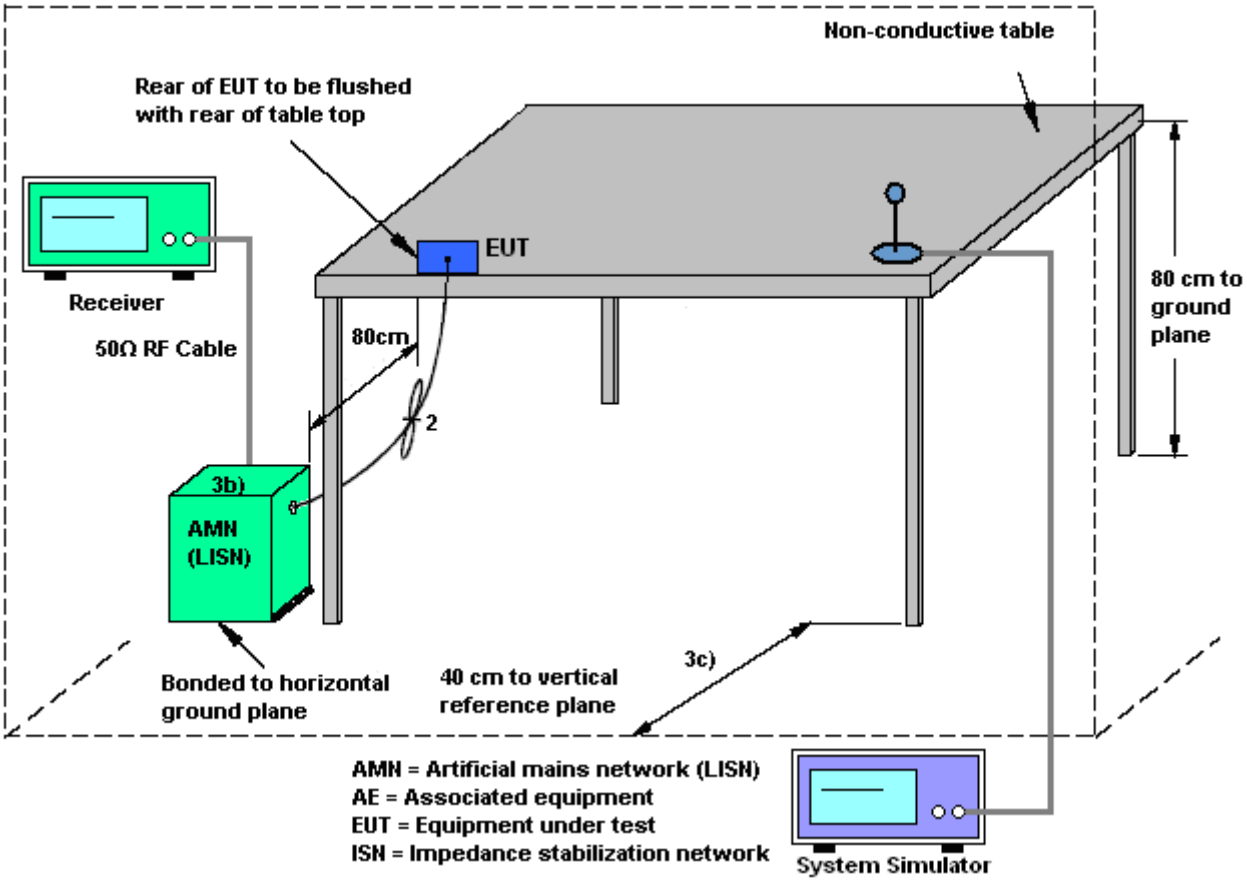
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

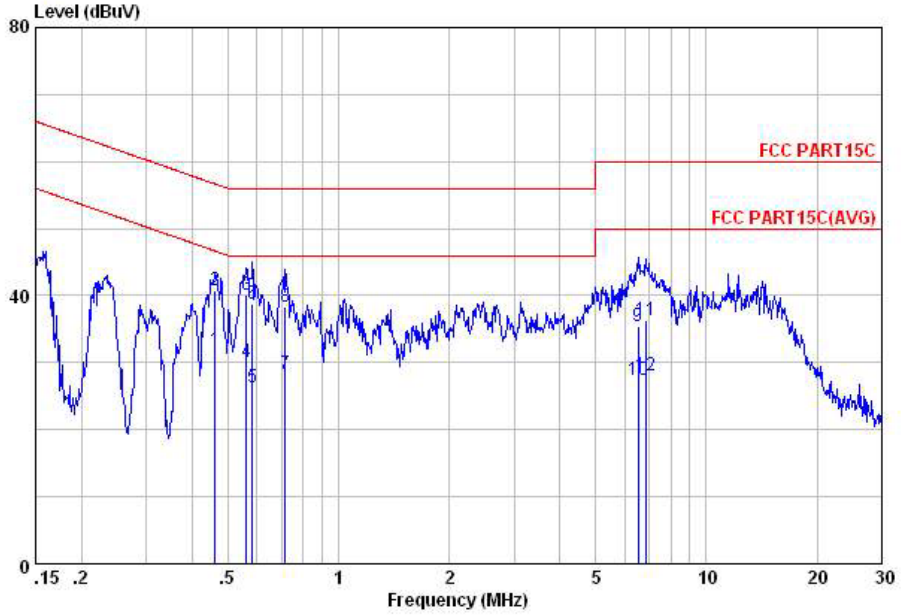
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Eligah Wang	**Relative Humidity :**	35~37%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter)		

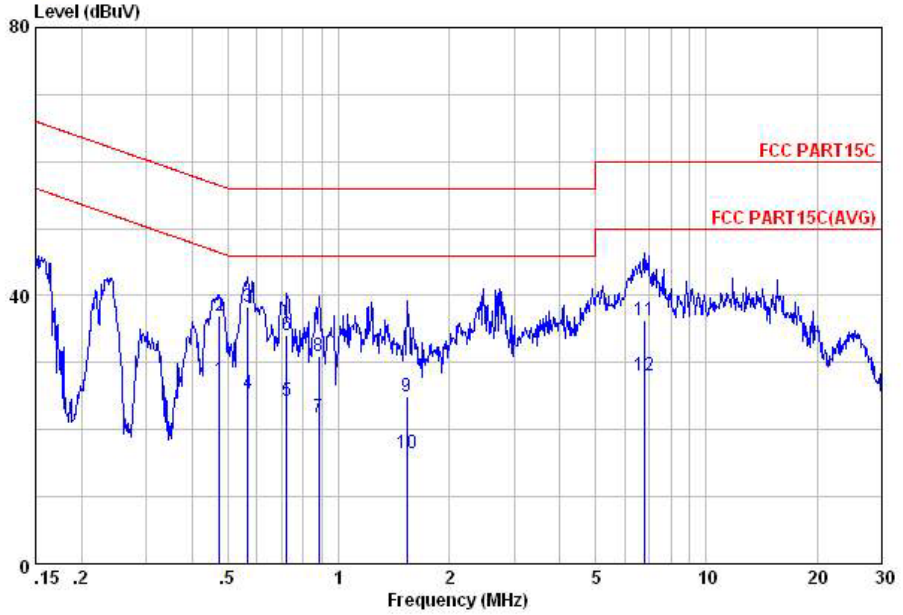


Site : C001-KS
Condition: FCC PART15C LISN-L20130306 LINE

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.46	31.91	-14.76	46.67	21.40	0.24	10.27	Average
2	0.46	40.81	-15.86	56.67	30.30	0.24	10.27	QP
3	0.56	40.05	-15.95	56.00	29.60	0.20	10.25	QP
4	0.56	30.05	-15.95	46.00	19.60	0.20	10.25	Average
5	0.58	26.35	-19.65	46.00	15.90	0.20	10.25	Average
6	0.58	38.75	-17.25	56.00	28.30	0.20	10.25	QP
7	0.72	28.30	-17.70	46.00	17.89	0.20	10.21	Average
8	0.72	38.30	-17.70	56.00	27.89	0.20	10.21	QP
9	6.52	35.41	-24.59	60.00	24.90	0.20	10.31	QP
10	6.52	27.41	-22.59	50.00	16.90	0.20	10.31	Average
11	6.84	36.42	-23.58	60.00	25.90	0.20	10.32	QP
12	6.84	28.12	-21.88	50.00	17.60	0.20	10.32	Average

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eligah Wang	Relative Humidity :	35~37%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter)		



Site : C001-KS
Condition: FCC PART15C LISN-N20130306 NEUTRAL

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.47	27.49	-18.96	46.45	16.90	0.32	10.27	Average
2	0.47	36.89	-19.56	56.45	26.30	0.32	10.27	QP
3	0.57	38.42	-17.58	56.00	27.90	0.27	10.25	QP
4	0.57	25.42	-20.58	46.00	14.90	0.27	10.25	Average
5	0.72	24.30	-21.70	46.00	13.90	0.19	10.21	Average
6	0.72	34.20	-21.80	56.00	23.80	0.19	10.21	QP
7	0.88	21.92	-24.08	46.00	11.60	0.13	10.19	Average
8	0.88	30.92	-25.08	56.00	20.60	0.13	10.19	QP
9	1.54	24.89	-31.11	56.00	14.60	0.10	10.19	QP
10	1.54	16.59	-29.41	46.00	6.30	0.10	10.19	Average
11	6.81	36.42	-23.58	60.00	25.90	0.20	10.32	QP
12	6.81	28.12	-21.88	50.00	17.60	0.20	10.32	Average

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	R&S	FSP40	100319	9kHz~40GHz	Dec. 28, 2013	Apr. 08, 2014~ Apr. 29, 2014	Dec. 27, 2014	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Feb. 27, 2014	Apr. 08, 2014~ Apr. 29, 2014	Feb. 26, 2015	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Feb. 27, 2014	Apr. 08, 2014~ Apr. 29, 2014	Feb. 26, 2015	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 05, 2013	Apr. 26, 2014	Nov. 04, 2014	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP30	101399	9kHz~30GHz	May 23, 2013	Apr. 26, 2014	May 22, 2014	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 09, 2013	Apr. 26, 2014	Oct. 08, 2014	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Jan. 08, 2014	Apr. 26, 2014	Jan. 07, 2015	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	00075959	1GHz~18GHz	Jan. 08, 2014	Apr. 26, 2014	Jan. 07, 2015	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Mar. 10, 2014	Apr. 26, 2014	Mar. 09, 2015	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 18, 2013	Apr. 26, 2014	Nov. 17, 2014	Radiation (03CH01-KS)
Amplifier	com-power	PA-103A	161069	1MHz~1GHz	May 23, 2013	Apr. 26, 2014	May 22, 2014	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02371	1GHz~26.5GHz	Dec. 10, 2013	Apr. 26, 2014	Dec. 09, 2014	Radiation (03CH01-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Apr. 26, 2014	NCR	Radiation (03CH01-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Apr. 26, 2014	NCR	Radiation (03CH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 23, 2013	Apr. 26, 2014	May 22, 2014	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Dec. 10, 2013	Apr. 26, 2014	Dec. 09, 2014	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Dec. 10, 2013	Apr. 26, 2014	Dec. 09, 2014	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Nov. 12, 2013	Apr. 26, 2014	Nov. 11, 2014	Conduction (CO01-KS)

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))	2.54