

FCC RF Test Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : LTE Ufi
BRAND NAME : ZTE
MODEL NAME : MF970
FCC ID : SRQ-MF970
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Jun. 29, 2015 and testing was completed on Jul. 20, 2015. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



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



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR562904A	Rev. 01	Initial issue of report	Aug. 12, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	99% Bandwidth	-	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	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 3.04 dB at 4875.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 11.13 dB at 5.680 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 Product Feature of Equipment Under Test

Product Feature	
Equipment	LTE Ufi
Brand Name	ZTE
Model Name	MF970
FCC ID	SRQ-MF970
EUT supports Radios application	WCDMA/HSPA/HSPA+(Downlink Only)/DC-HSDPA/LTE/ WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/
IMEI Code	Conduction sample: 004401783353580 Radiation sample: 867610020000001 Conducted sample: 866603020001578
HW Version	xz2A
SW Version	MF970V1.0.2
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 subjective to this standard

Product Specification subjective to this standard			
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz		
Maximum (Peak) Output Power to antenna	802.11b : 16.41 dBm (0.0438 W) 802.11g : 22.26 dBm (0.1683 W) 802.11n HT20 : 22.62 dBm (0.1828 W) 802.11n HT40 : 22.47 dBm (0.1766 W)		
99% Occupied Bandwidth	802.11b : 13.90MHz 802.11g : 18.60MHz 802.11n HT20 : 19.45MHz 802.11n HT40 : 37.20MHz		
Antenna Type / Gain	WLAN for Chain Port 0: IFA Antenna with gain 2.00 dBi WLAN for Chain Port 1: IFA Antenna with gain 2.00 dBi		
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)		
Antenna Function for Transmitter			
		Chain Port 0	Chain Port 1
	802.11 b	V	V
	802.11 g	V	V
	802.11 n SISO	V	V
	802.11 n MIMO	V	V



1.5 Modification of EUT

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

1.6 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	Sporton Site No.			FCC Registration No.
	TH01-KS	CO01-KS	03CH02-KS	418269

Note: The test site complies with ANSI C63.4 2009 requirement.

1.7 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 v03r03
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. FCC permits the use of the 1.5 meter table for frequency above 1GHz as an alternative in C63.10-2013 through inquiry tracking number 961829.
3. 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 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 and 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 Peak Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	Data Rate 1Mbps	Channel	2Mbps	5.5Mbps	11Mbps				
CH 01	2412	0	16.05	CH 01	15.98	15.99	16.03				
CH 06	2437	0	15.47								
CH 11	2462	0	15.78								
CH 01	2412	1	16.41	CH 01	16.35	16.31	16.24				
CH 06	2437	1	16.03								
CH 11	2462	1	16.06								

WLAN 2.4GHz 802.11g Peak Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	0	17.73	CH 01	17.68	17.72	17.56	22.14	22.26	21.96	21.76
CH 06	2437	0	17.39						21.05		
CH 11	2462	0	17.40						20.93		
CH 01	2412	1	18.04	CH 01	17.94	18.04	17.97	21.70	21.81	21.44	21.38
CH 06	2437	1	18.23						20.78		
CH 11	2462	1	18.33						21.23		



WLAN 2.4GHz 802.11n HT20 Peak Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	0	16.72	CH 01	16.66	16.58	20.47	20.42	20.61	21.75	20.87
CH 06	2437	0	16.39							20.72	
CH 11	2462	0	16.70							20.60	
CH 01	2412	1	16.72	CH 01	17.31	17.07	21.06	20.65	20.75	21.83	21.07
CH 06	2437	1	17.14							21.72	
CH 11	2462	1	17.80							21.28	
CH 01	2412	0+1(0)	14.68	CH 01	14.89	14.80	18.79	18.13	18.56	19.77	18.84
CH 06	2437	0+1(0)	14.25							19.08	
CH 11	2462	0+1(0)	14.66							18.95	
CH 01	2412	0+1(1)	15.08	CH 01	14.43	14.06	18.80	18.20	17.89	19.45	18.60
CH 06	2437	0+1(1)	14.36							18.96	
CH 11	2462	0+1(1)	15.05							19.01	
CH 01	2412	0+1	17.89	CH 01	17.68	17.46	21.81	21.18	21.25	22.62	21.73
CH 06	2437	0+1	17.32							22.03	
CH 11	2462	0+1	17.87							21.99	

WLAN 2.4GHz 802.11n HT40 Peak Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	0	18.39	CH 03	18.40	18.48	21.34	20.78	20.89	20.62	19.93
CH 06	2437	0	18.31				20.02				
CH 09	2452	0	16.55				20.24				
CH 03	2422	1	19.06	CH 06	18.81	18.54	21.74	20.99	21.24	21.01	20.78
CH 06	2437	1	19.09							21.86	
CH 09	2452	1	18.46							20.79	
CH 03	2422	0+1(0)	16.92	CH 03	16.38	16.51	19.85	19.02	19.17	18.76	18.12
CH 06	2437	0+1(0)	15.81				18.99				
CH 09	2452	0+1(0)	14.54				18.46				
CH 03	2422	0+1(1)	16.14	CH 03	15.97	15.35	19.03	17.74	18.53	18.59	17.17
CH 06	2437	0+1(1)	16.12				19.01				
CH 09	2452	0+1(1)	15.68				18.67				
CH 03	2422	0+1	19.56	CH 03	19.19	18.98	22.47	21.44	21.87	21.69	20.68
CH 06	2437	0+1	18.98				22.01				
CH 09	2452	0+1	18.16				21.58				

Note: Chain Port 0+1 is a calculated result from sum of the power Chain Port 0+1(0) and Chain Port 0+1(1).

2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

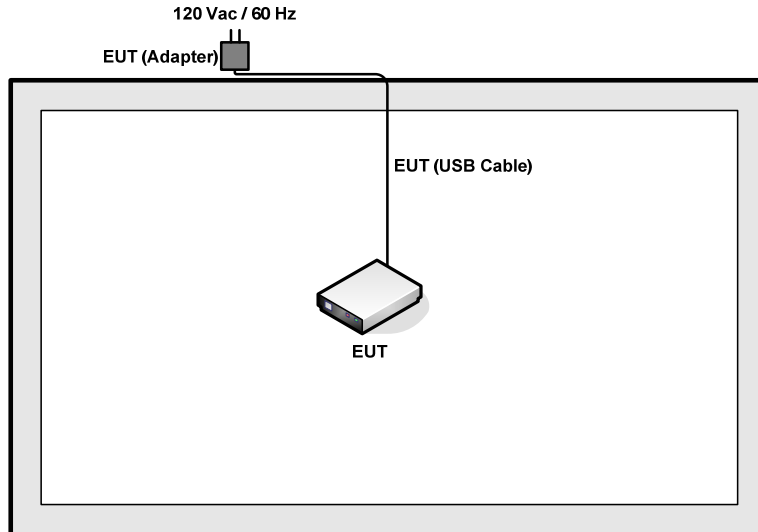
<2.4GHz>

Modulation	Data Rate
802.11b	1 Mbps
802.11g	36 Mbps
802.11n HT20	MCS6
802.11n HT40	MCS3/MCS6

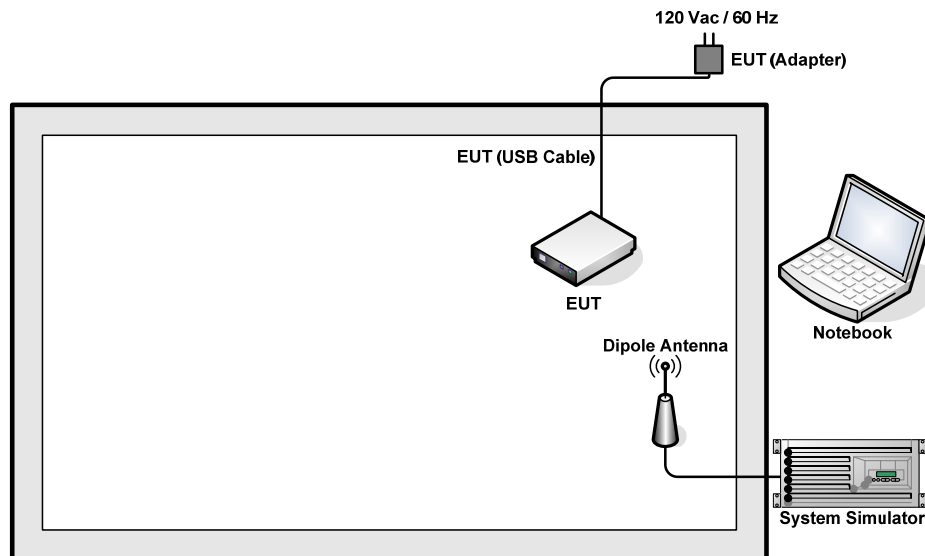
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + WLAN Link + USB Cable (Charging from Adapter)
Remark: For Radiated TCs, The tests were performance with Adapter, and USB Cable.	

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.	Notebook	Lenovo	G480	PRC4	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m

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 Notebook 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 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.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 6.0 dB.

Offset(dB) = RF cable loss(dB).

= 6.0 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

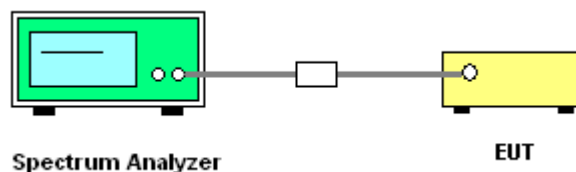
3.1.2 Measuring Instruments

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 v03r03.
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. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

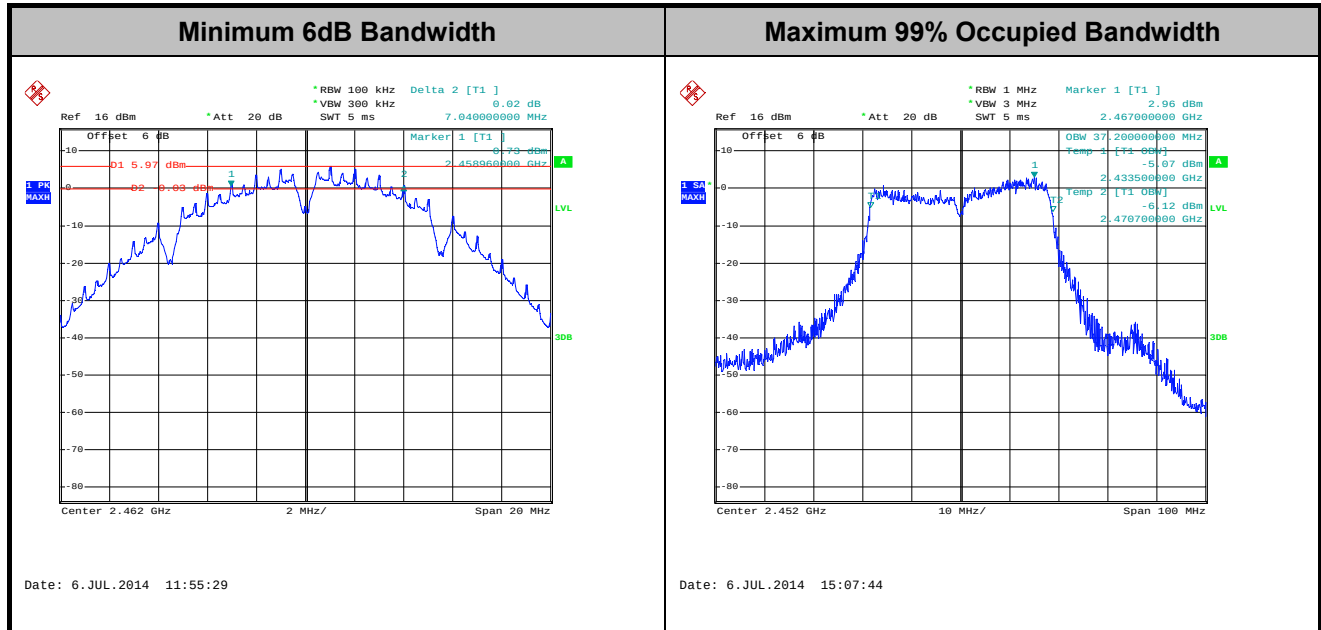
3.1.4 Test Setup





3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A of this test report.



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

3.2 Peak Output Power Measurement

3.2.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is 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.

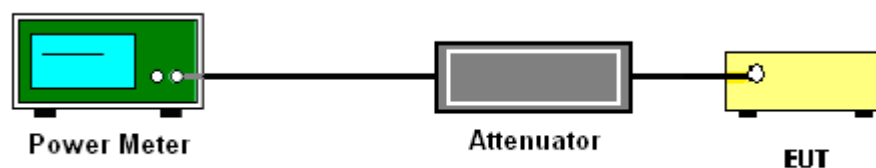
3.2.2 Measuring Instruments

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 v03r03 section 9.1.2 PKPM1 Peak power meter method.
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.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup





3.2.5 Test Result of Peak Output Power

Please refer to Appendix A of this test report.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A of this test report.

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 v03r03
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.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

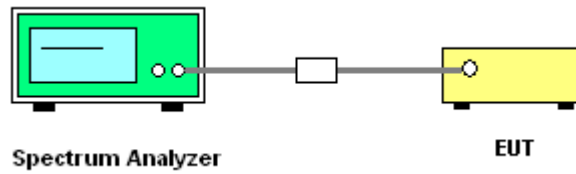
If measurements performed using method (2) plus $10 \log(N)$ exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

Method (1): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

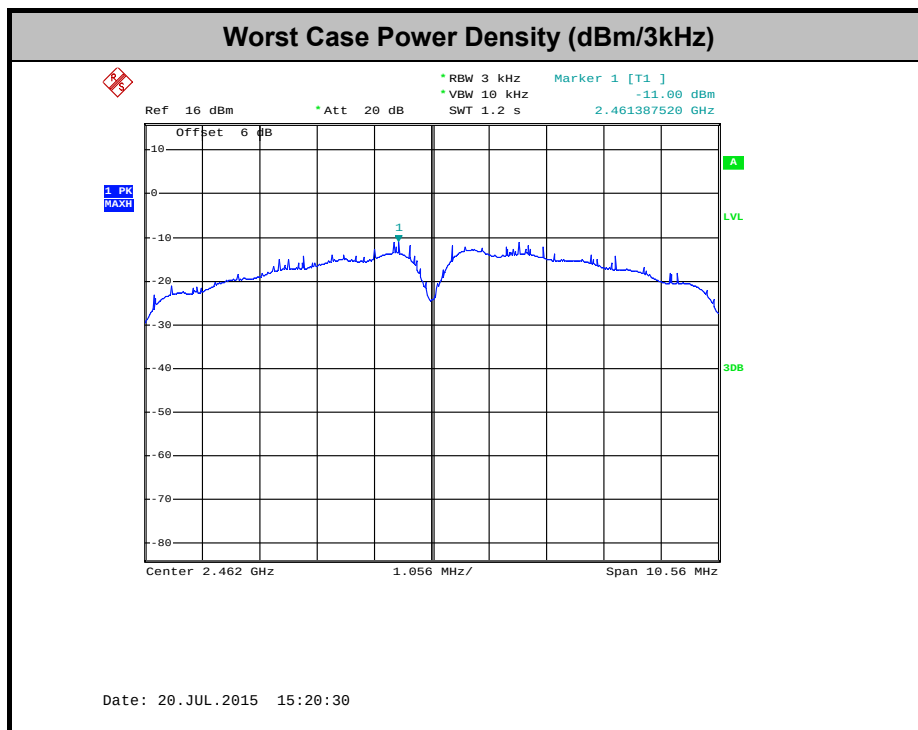
Method (2): Measure and add $10 \log(N)$ dB, where N is the number of outputs. (N=2)

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A of this test report.



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).

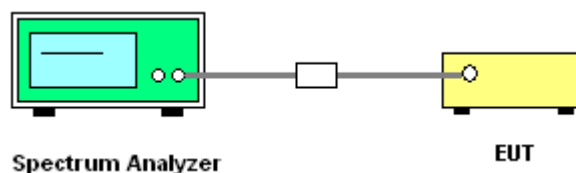
3.4.2 Measuring Instruments

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 v03r03.
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

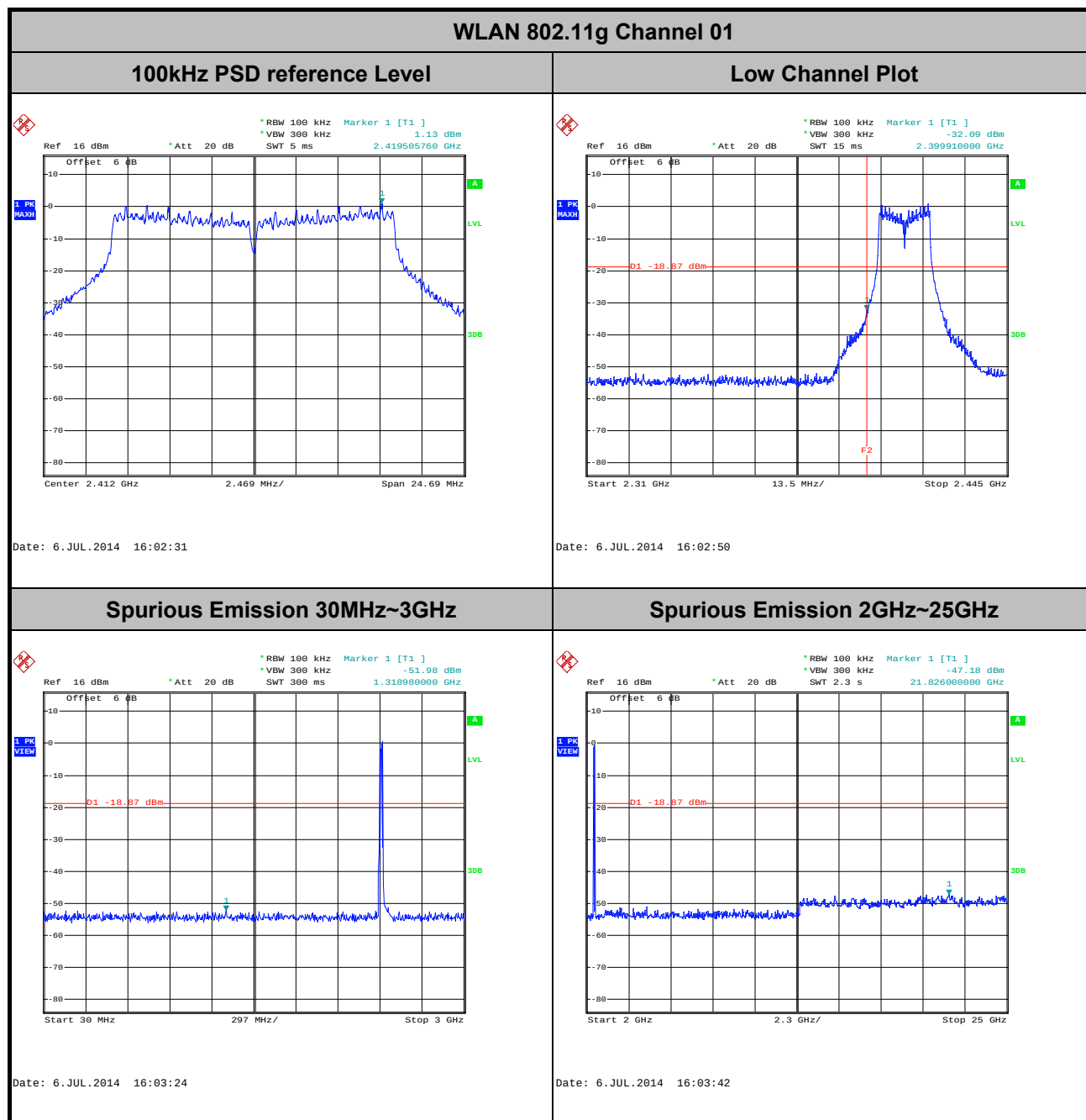




3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Number of TX = 1, Chain Port 0 (Measured)

Number of TX :	1	Chain Port:	0
Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Issac Song

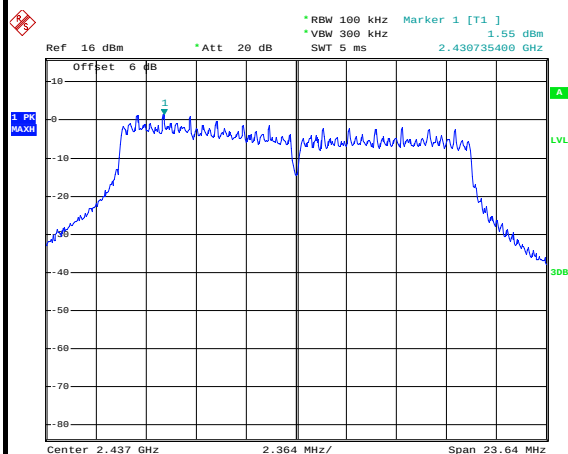




Number of TX :	1	Chain Port:	0
Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

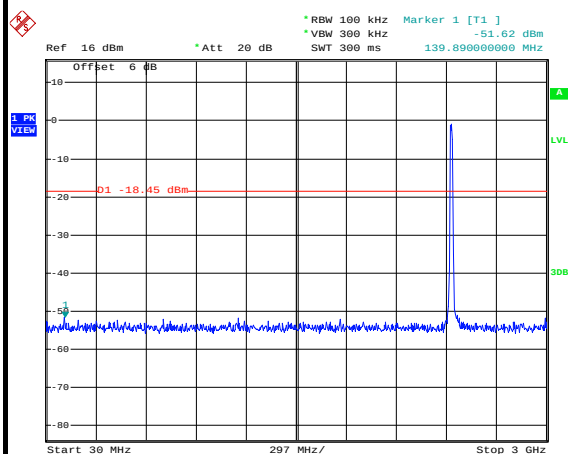
WLAN 802.11g Channel 06

100kHz PSD reference Level



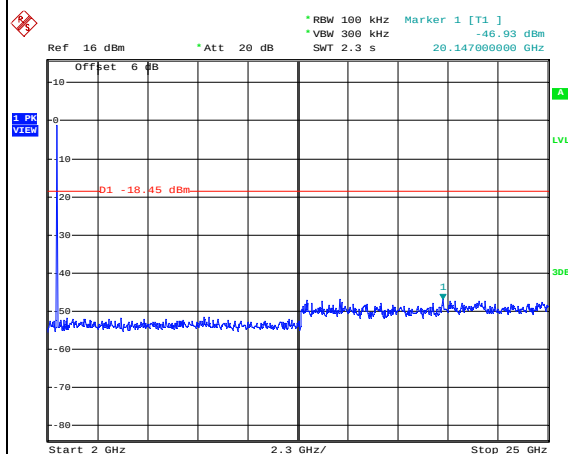
Date: 6.JUL.2014 16:07:33

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 16:07:57

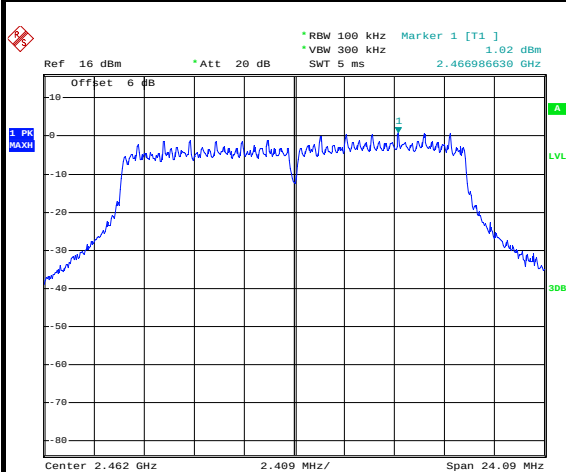
Spurious Emission 2GHz~25GHz



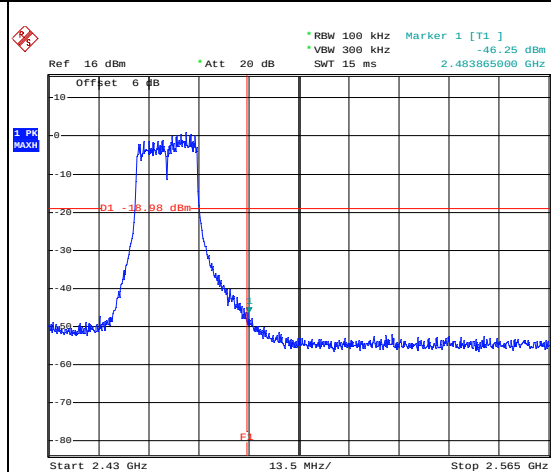
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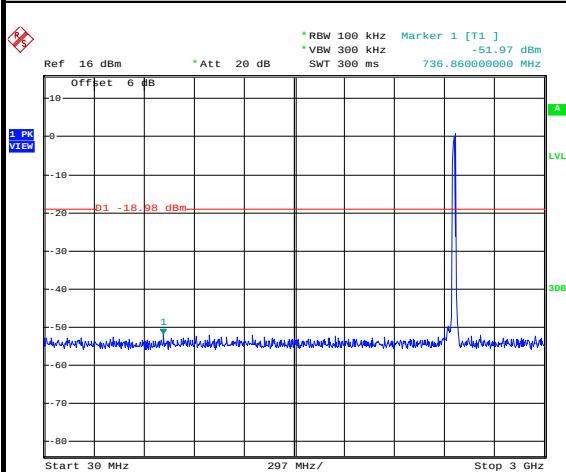
Number of TX :	1	Chain Port:	0
Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Issac Song

WLAN 802.11g Channel 11**100kHz PSD reference Level**

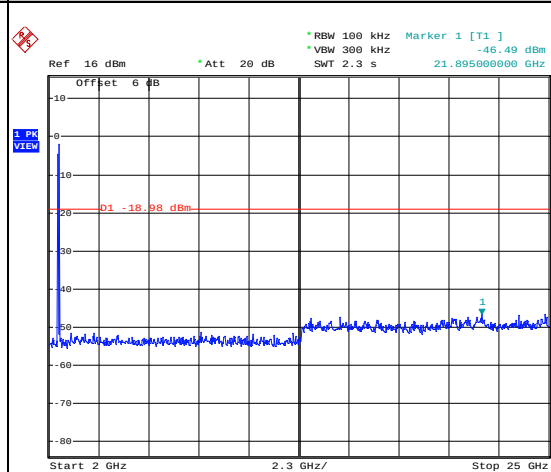
Date: 6.JUL.2014 16:12:17

High Channel Plot

Date: 6.JUL.2014 16:12:42

Spurious Emission 30MHz~3GHz

Date: 6.JUL.2014 16:13:36

Spurious Emission 2GHz~25GHz

Date: 6.JUL.2014 16:13:54

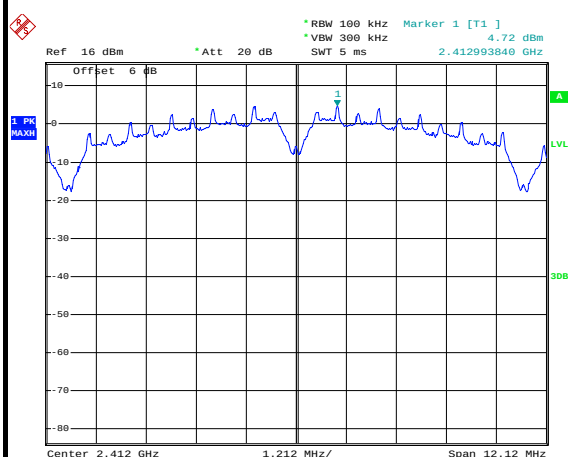


Number of TX = 1, Chain Port 1 (Measured)

Number of TX	1	Chain Port:	1
Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Issac Song

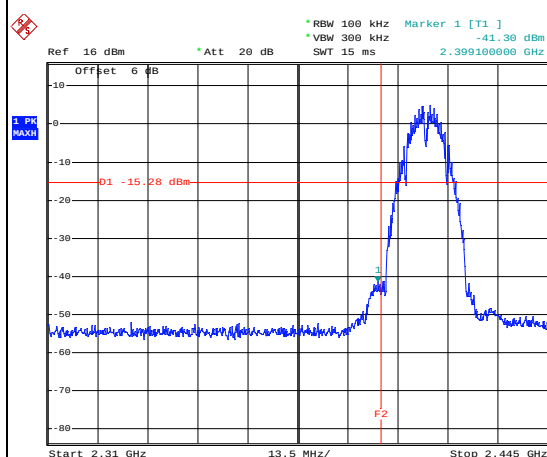
WLAN 802.11b Channel 01

100kHz PSD reference Level



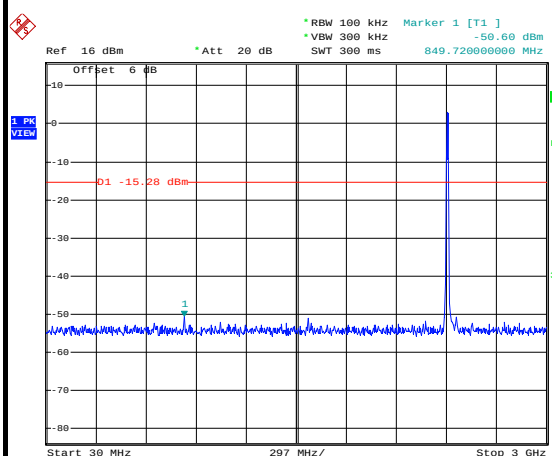
Date: 6.JUL.2014 11:43:10

Low Channel Plot



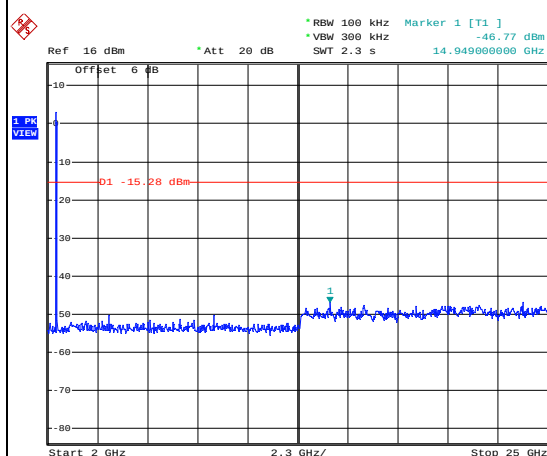
Date: 6.JUL.2014 11:43:28

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 11:43:57

Spurious Emission 2GHz~25GHz



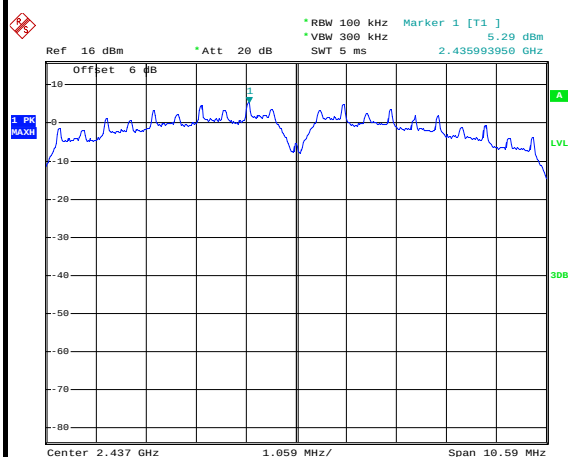
Date: 6.JUL.2014 11:44:15



Number of TX :	1	Chain Port:	1
Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

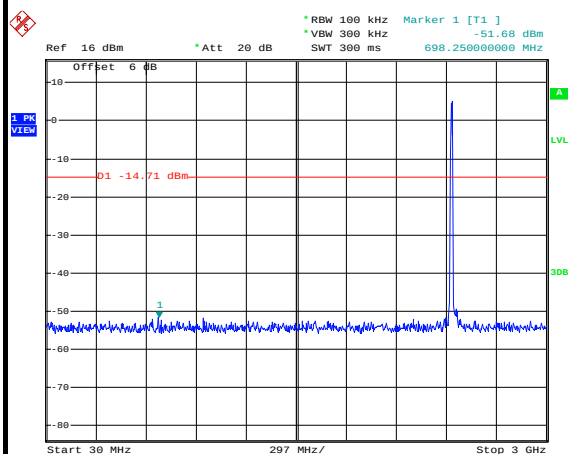
WLAN 802.11b Channel 06

100kHz PSD reference Level



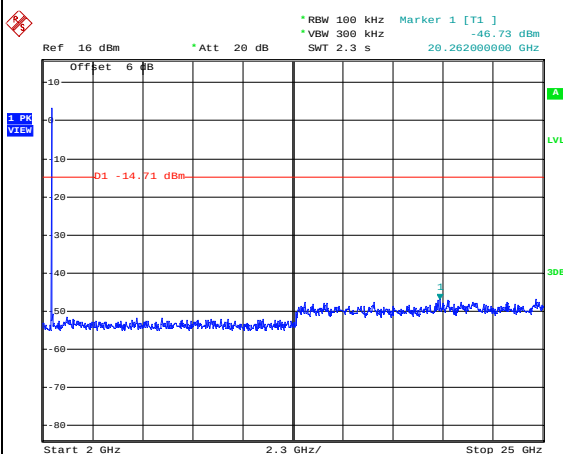
Date: 6.JUL.2014 11:49:15

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 11:49:40

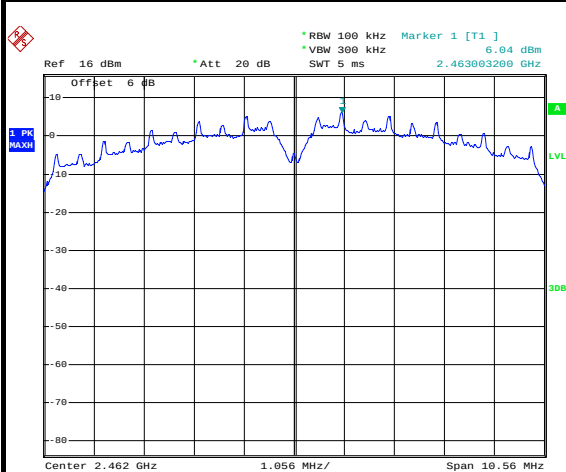
Spurious Emission 2GHz~25GHz



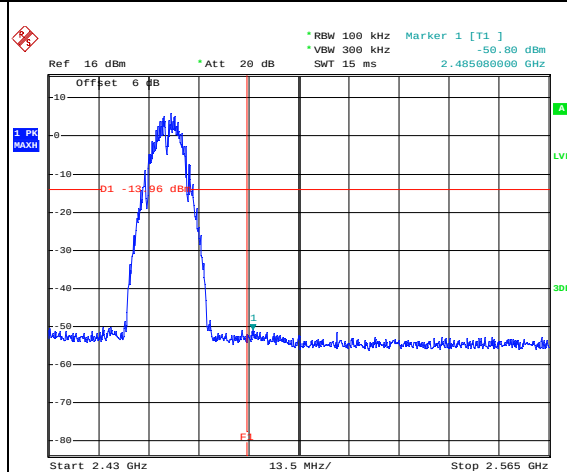
Date: 6.JUL.2014 11:49:57



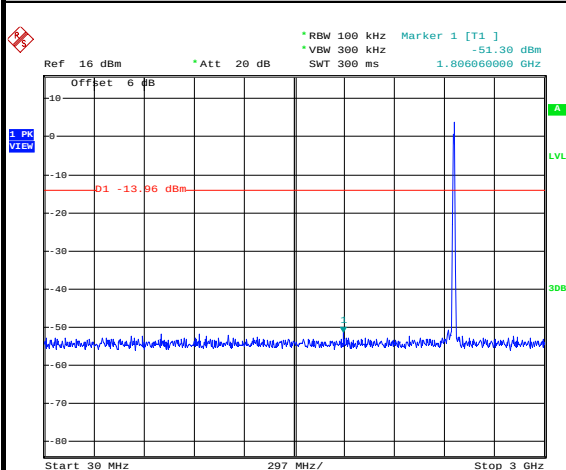
Number of TX :	1	Chain Port:	1
Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Issac Song

WLAN 802.11b Channel 11**100kHz PSD reference Level**

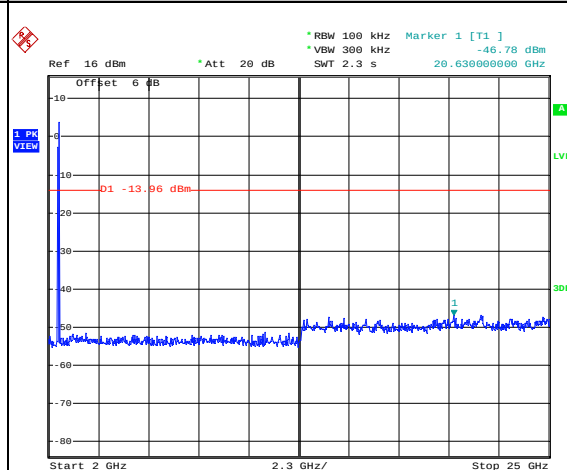
Date: 6.JUL.2014 11:56:48

High Channel Plot

Date: 6.JUL.2014 11:57:07

Spurious Emission 30MHz~3GHz

Date: 6.JUL.2014 11:57:38

Spurious Emission 2GHz~25GHz

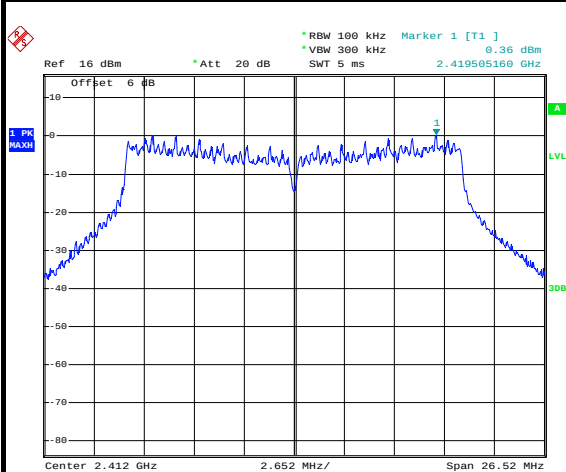
Date: 6.JUL.2014 11:57:56



Number of TX :	1	Chain Port:	1
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Issac Song

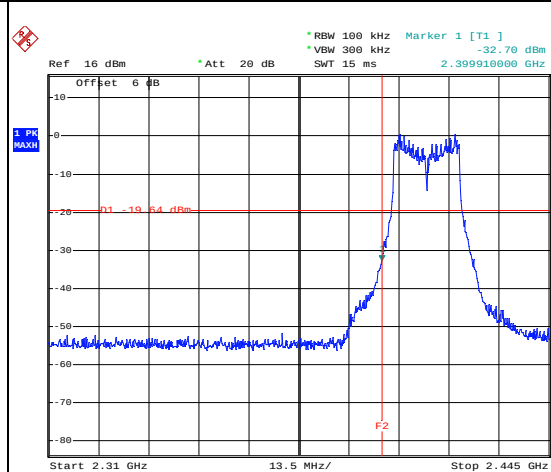
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



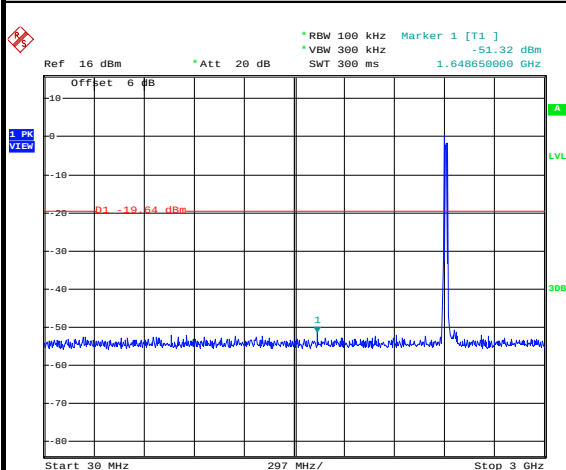
Date: 6.JUL.2014 12:26:09

Low Channel Plot



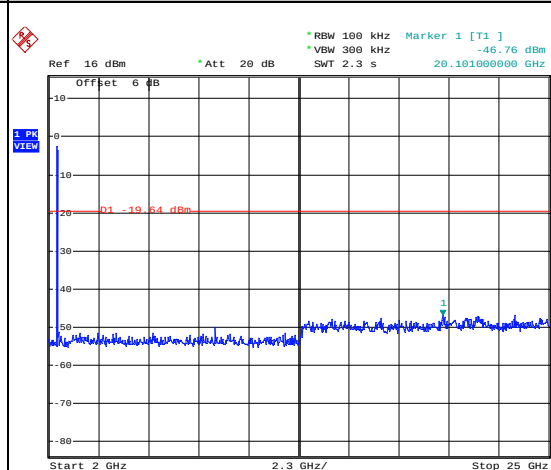
Date: 6.JUL.2014 12:27:07

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 12:28:13

Spurious Emission 2GHz~25GHz



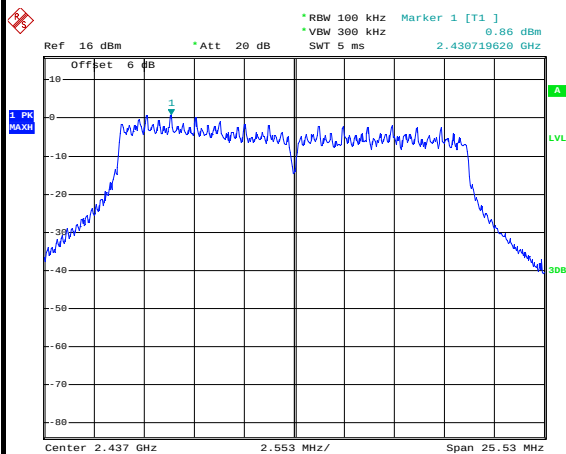
Date: 6.JUL.2014 12:28:31



Number of TX :	1	Chain Port:	1
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

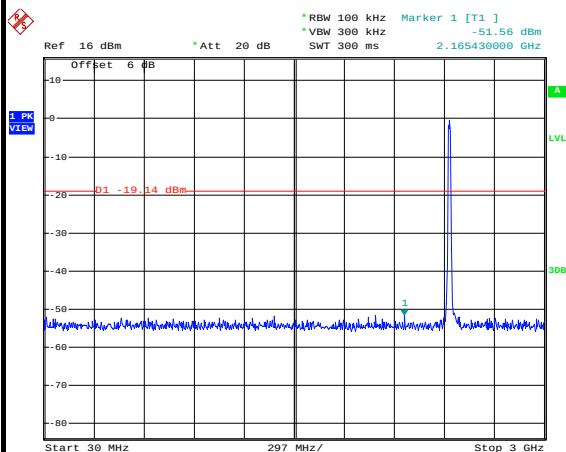
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



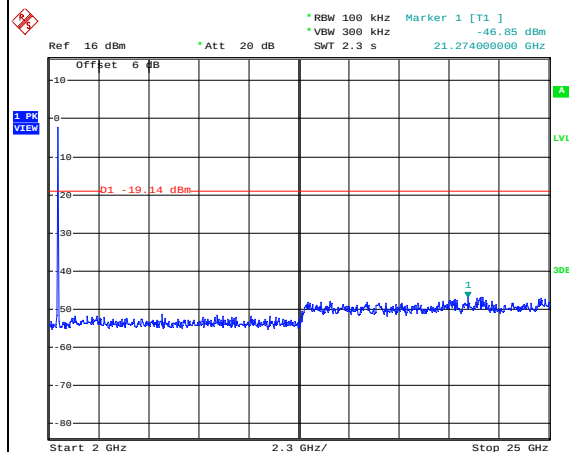
Date: 6.JUL.2014 12:31:32

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 12:32:01

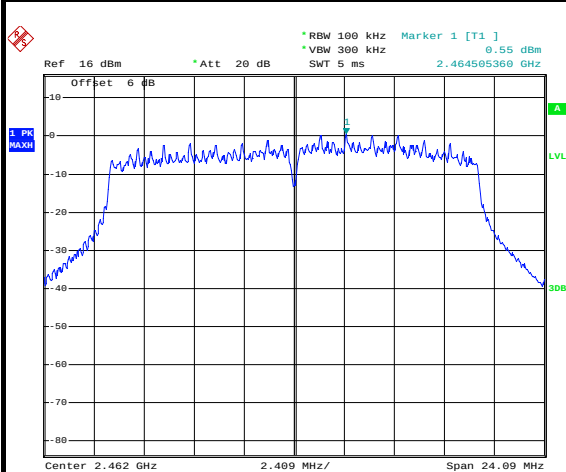
Spurious Emission 2GHz~25GHz



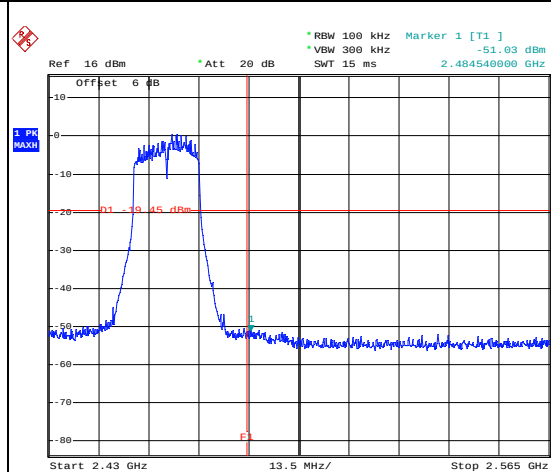
Date: 6.JUL.2014 12:32:19



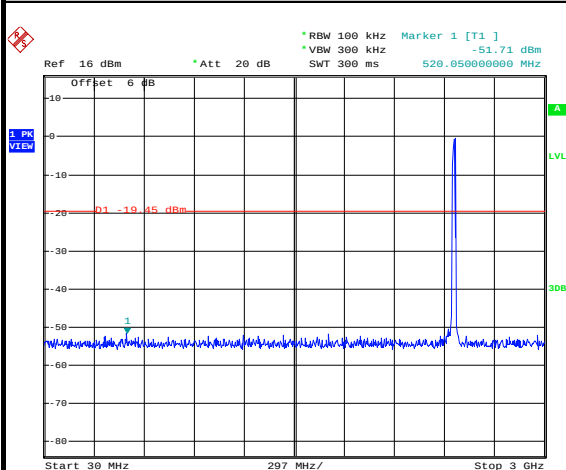
Number of TX :	1	Chain Port:	1
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Issac Song

WLAN 802.11n HT20 Channel 11**100kHz PSD reference Level**

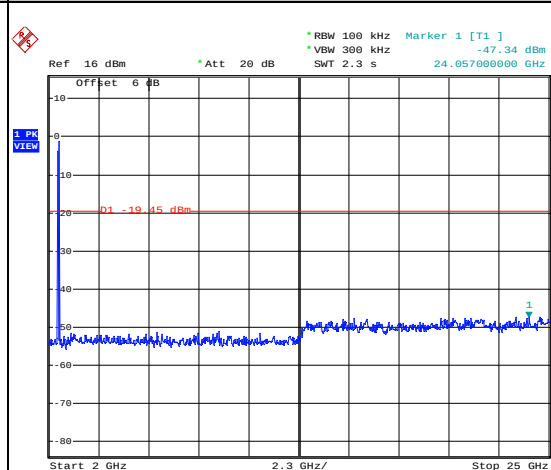
Date: 6.JUL.2014 12:35:25

High Channel Plot

Date: 6.JUL.2014 12:35:45

Spurious Emission 30MHz~3GHz

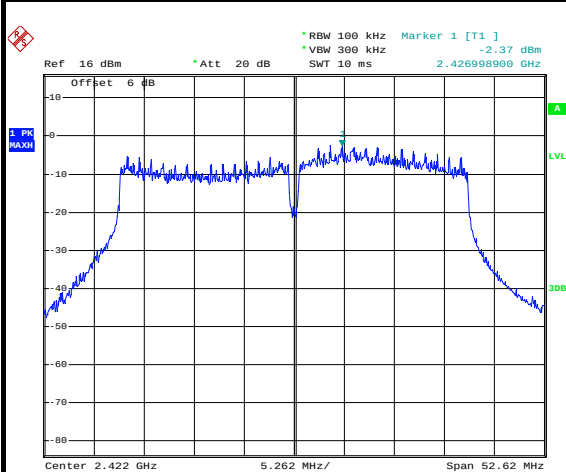
Date: 6.JUL.2014 12:36:26

Spurious Emission 2GHz~25GHz

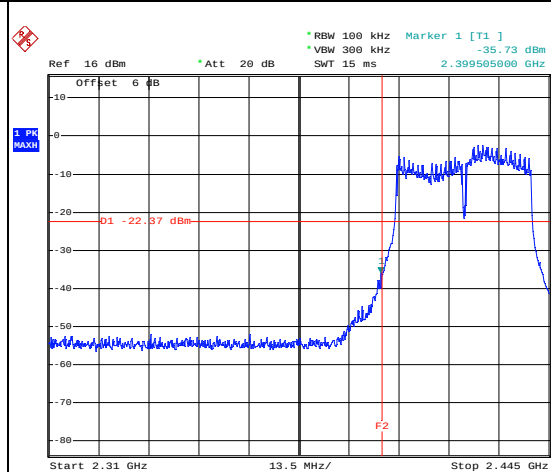
Date: 6.JUL.2014 12:36:44



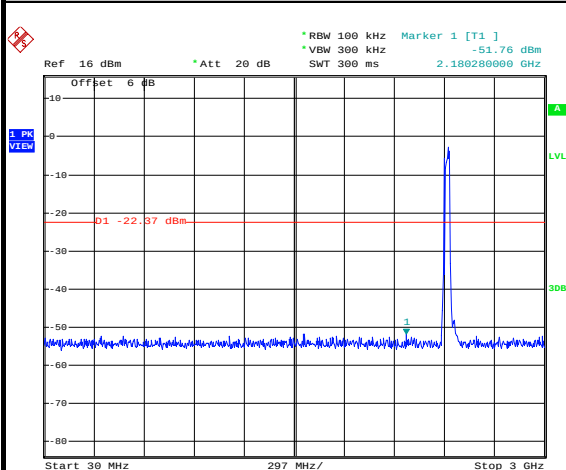
Number of TX :	1	Chain Port:	1
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	03	Test Engineer :	Issac Song

WLAN 802.11n HT40 Channel 03**100kHz PSD reference Level**

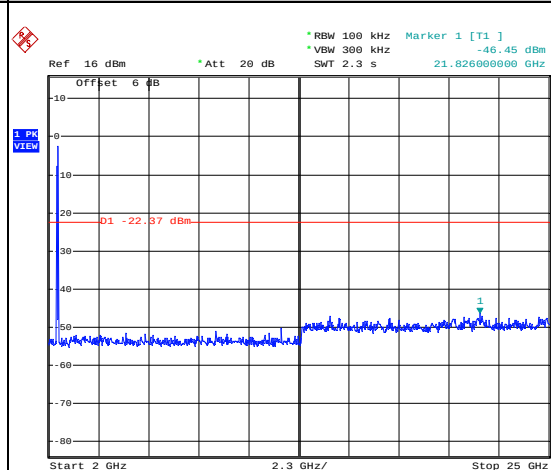
Date: 6.JUL.2014 14:27:37

Low Channel Plot

Date: 6.JUL.2014 14:27:57

Spurious Emission 30MHz~3GHz

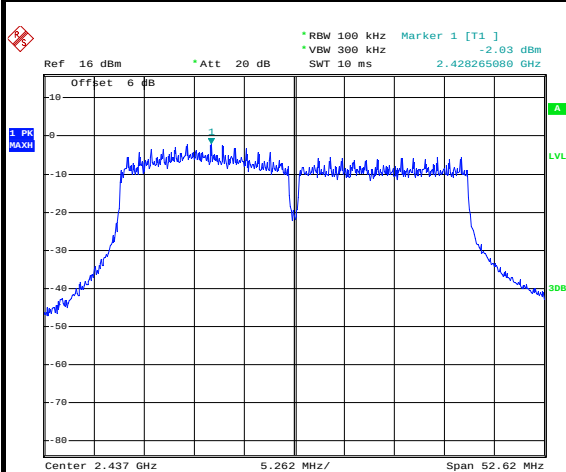
Date: 6.JUL.2014 14:28:38

Spurious Emission 2GHz~25GHz

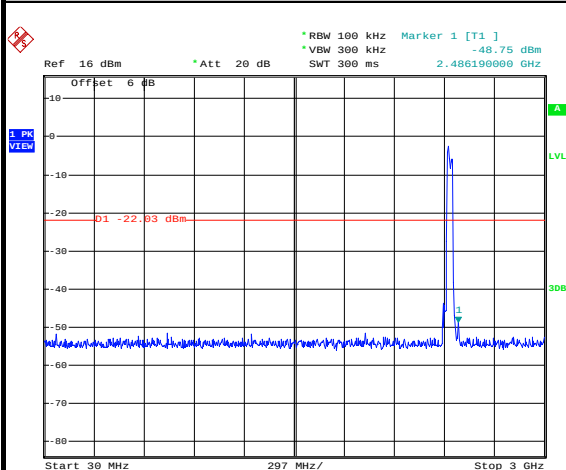
Date: 6.JUL.2014 14:28:56



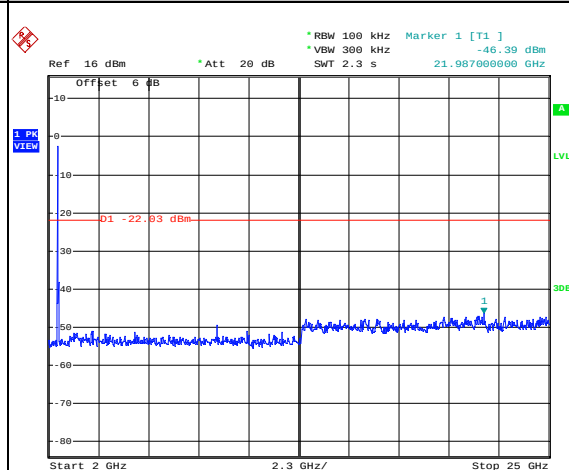
Number of TX :	1	Chain Port:	1
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

WLAN 802.11n HT40 Channel 06**100kHz PSD reference Level**

Date: 6.JUL.2014 14:32:32

Spurious Emission 30MHz~3GHz

Date: 6.JUL.2014 14:36:20

Spurious Emission 2GHz~25GHz

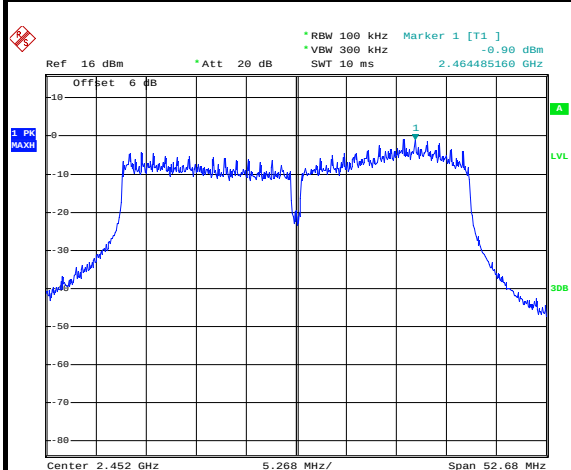
Date: 6.JUL.2014 14:36:38



Number of TX :	1	Chain Port:	1
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	09	Test Engineer :	Issac Song

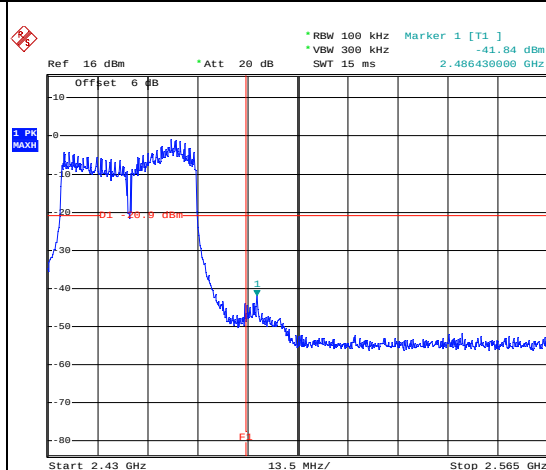
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



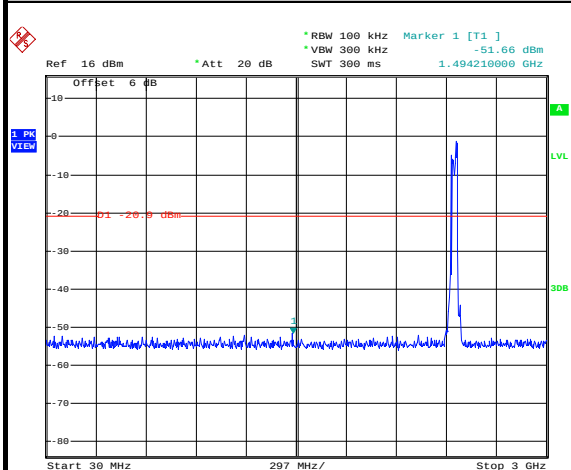
Date: 6.JUL.2014 14:39:45

High Channel Plot



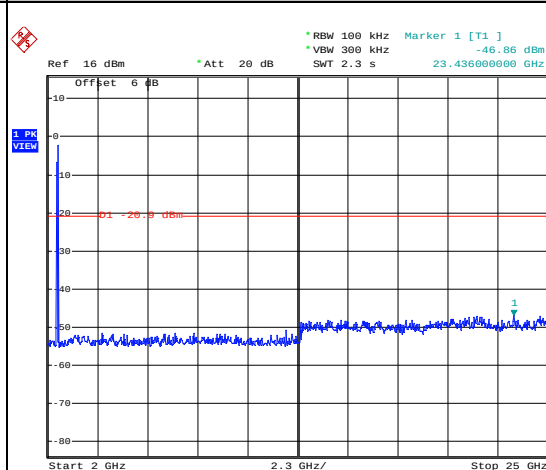
Date: 6.JUL.2014 14:40:05

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 14:47:36

Spurious Emission 2GHz~25GHz



Date: 6.JUL.2014 14:44:02

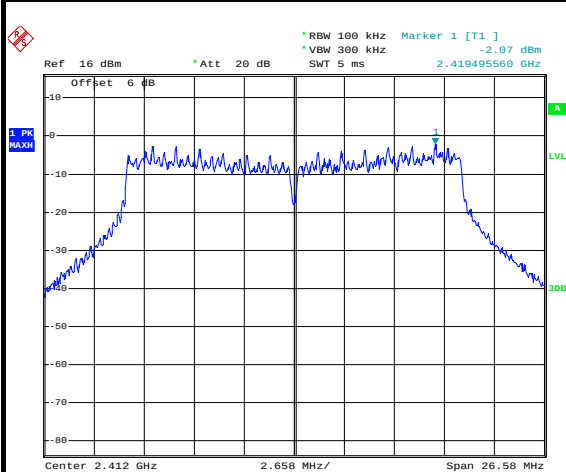


Number of TX = 2, Chain Port 0+1(0) (Measured)

Number of TX :	2	Chain Port:	0+1(0)
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Issac Song

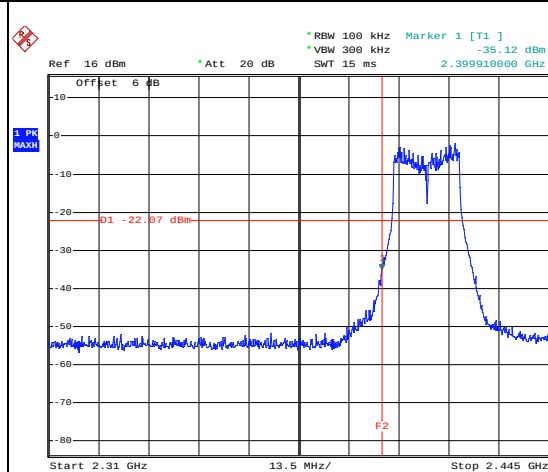
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



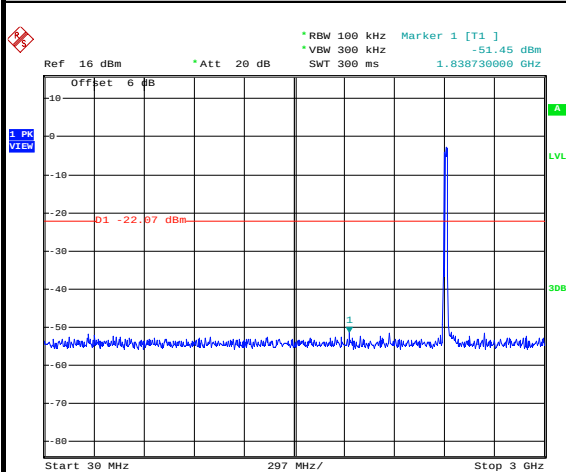
Date: 6.JUL.2014 12:42:41

Low Channel Plot



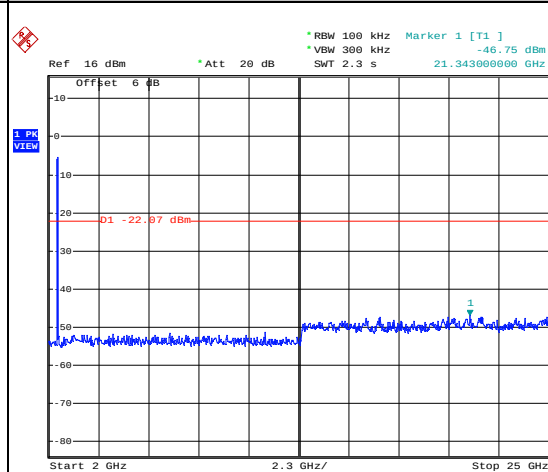
Date: 6.JUL.2014 12:44:38

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 12:45:39

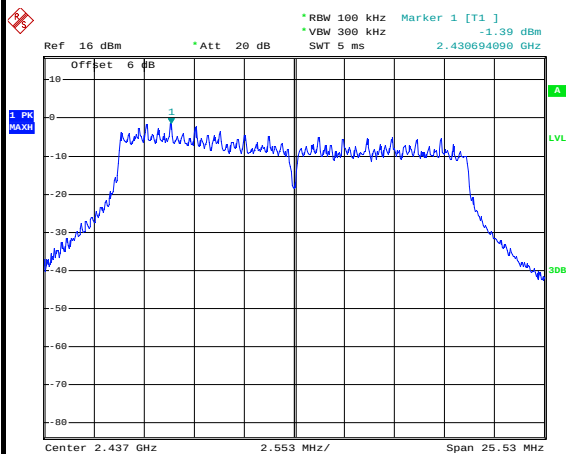
Spurious Emission 2GHz~25GHz



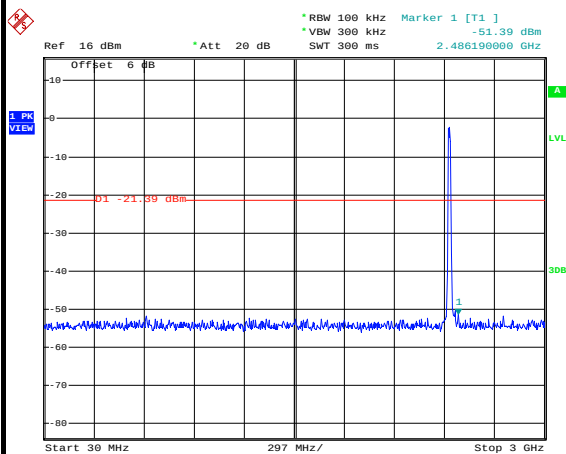
Date: 6.JUL.2014 12:45:57



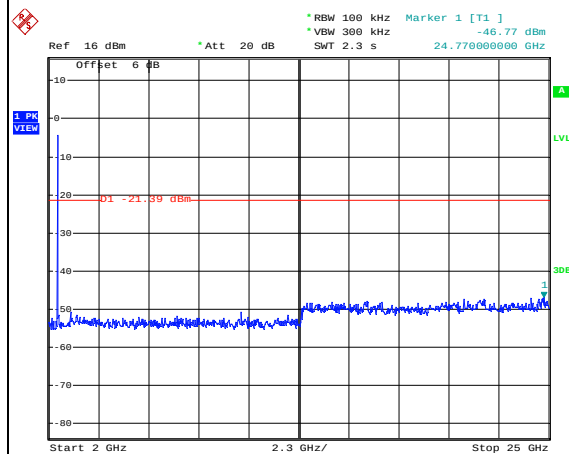
Number of TX :	2	Chain Port:	0+1(0)
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

WLAN 802.11n HT20 Channel 06**100kHz PSD reference Level**

Date: 6.JUL.2014 12:49:29

Spurious Emission 30MHz~3GHz

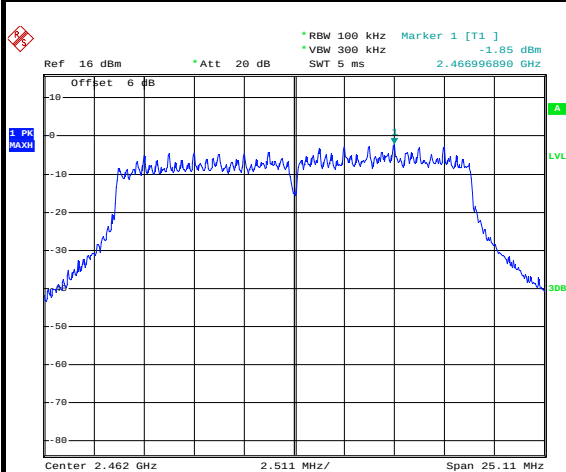
Date: 6.JUL.2014 12:49:53

Spurious Emission 2GHz~25GHz

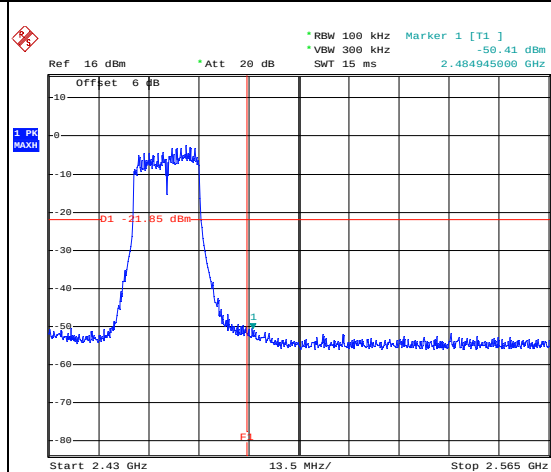
Date: 6.JUL.2014 12:50:11



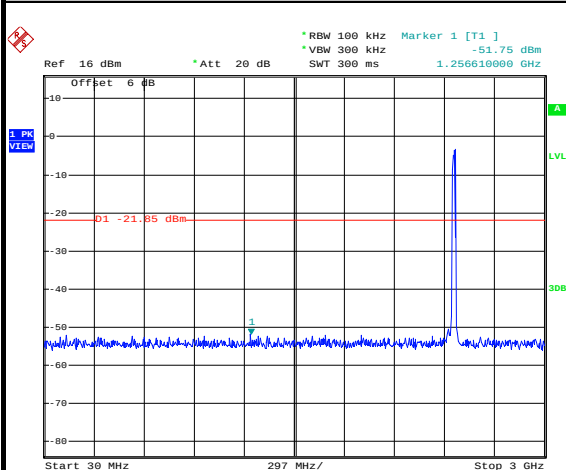
Number of TX :	2	Chain Port:	0+1(0)
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Issac Song

WLAN 802.11n HT20 Channel 11**100kHz PSD reference Level**

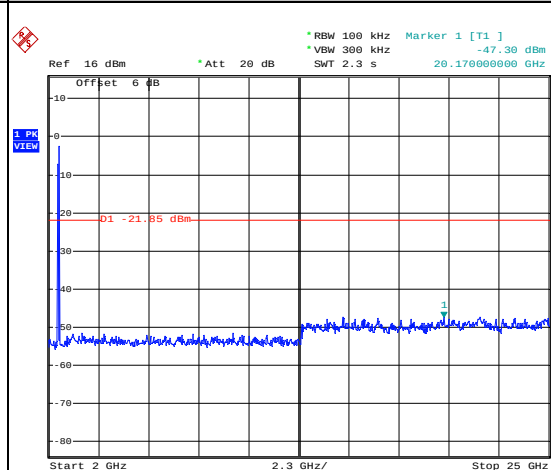
Date: 6.JUL.2014 12:53:34

High Channel Plot

Date: 6.JUL.2014 12:53:53

Spurious Emission 30MHz~3GHz

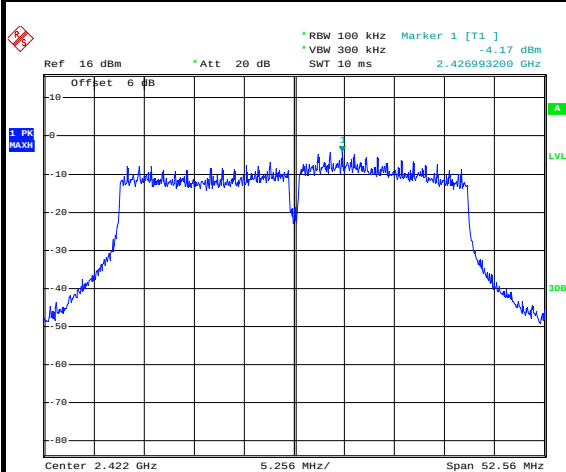
Date: 6.JUL.2014 12:54:35

Spurious Emission 2GHz~25GHz

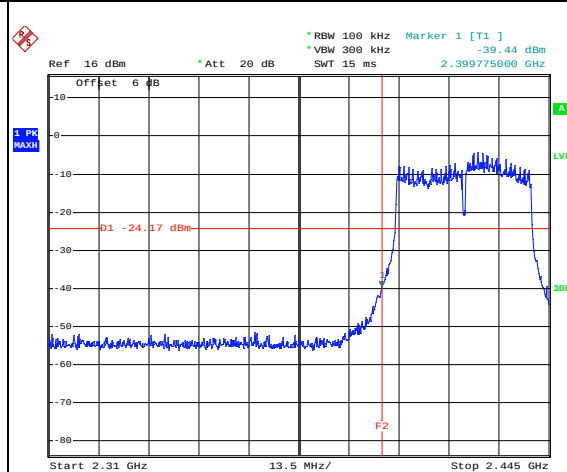
Date: 6.JUL.2014 12:54:53



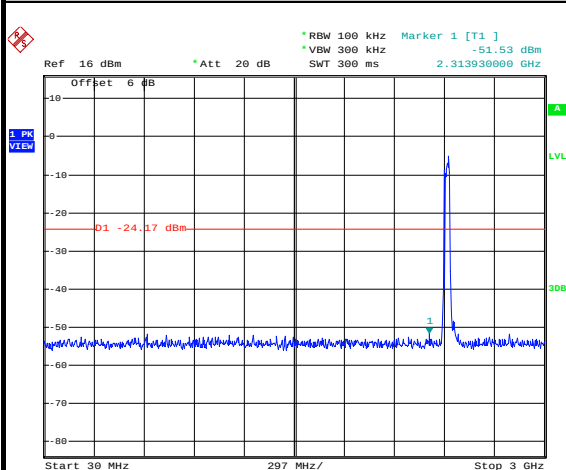
Number of TX :	2	Chain Port:	0+1(0)
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	03	Test Engineer :	Issac Song

WLAN 802.11n HT40 Channel 03**100kHz PSD reference Level**

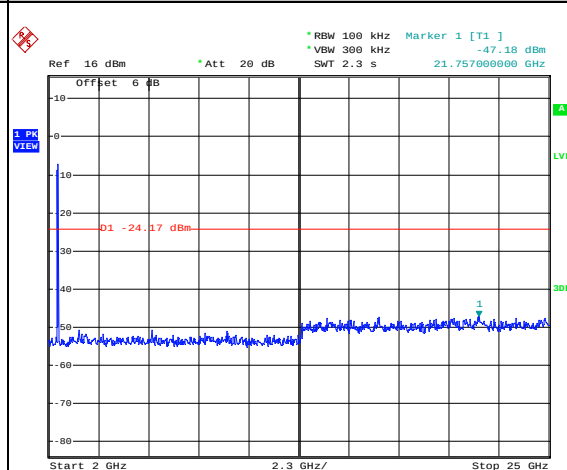
Date: 6.JUL.2014 14:52:37

Low Channel Plot

Date: 6.JUL.2014 14:53:36

Spurious Emission 30MHz~3GHz

Date: 6.JUL.2014 14:54:00

Spurious Emission 2GHz~25GHz

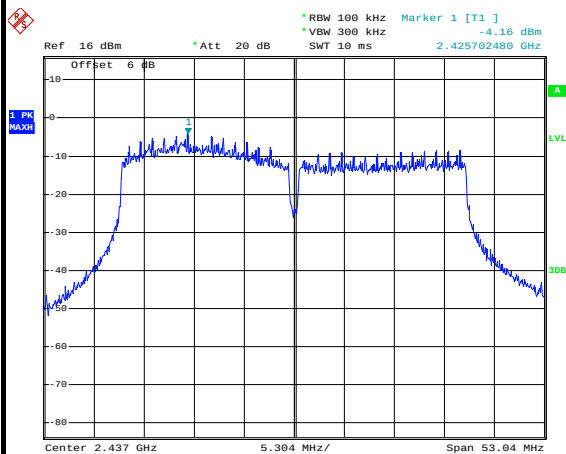
Date: 6.JUL.2014 14:54:18



Number of TX :	2	Chain Port:	0+1(0)
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

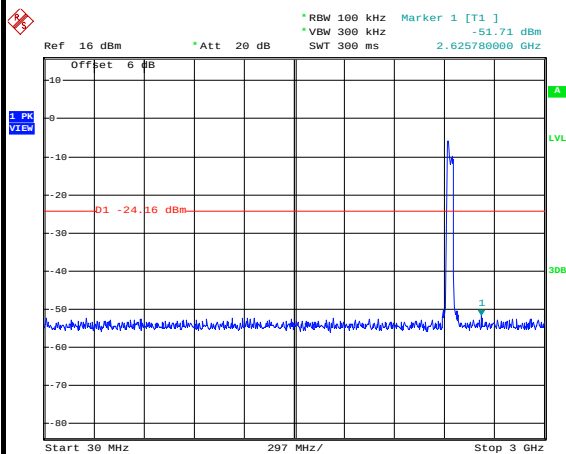
WLAN 802.11n HT40 Channel 06

100kHz PSD reference Level



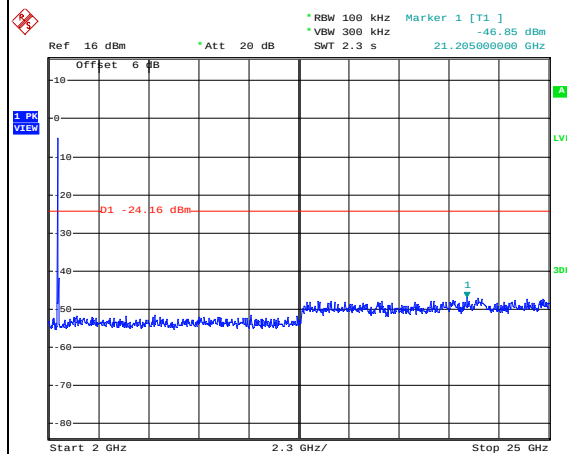
Date: 6.JUL.2014 14:58:40

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 14:59:03

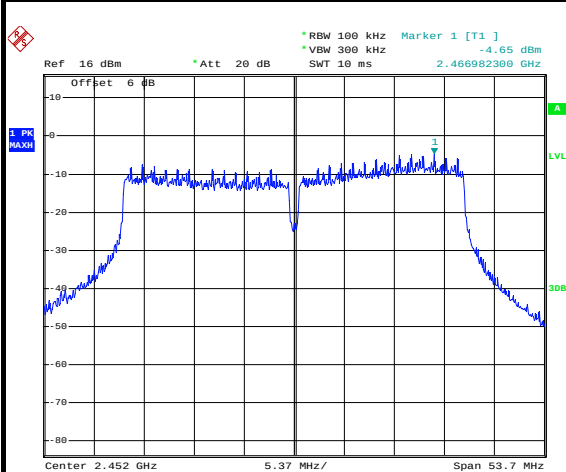
Spurious Emission 2GHz~25GHz



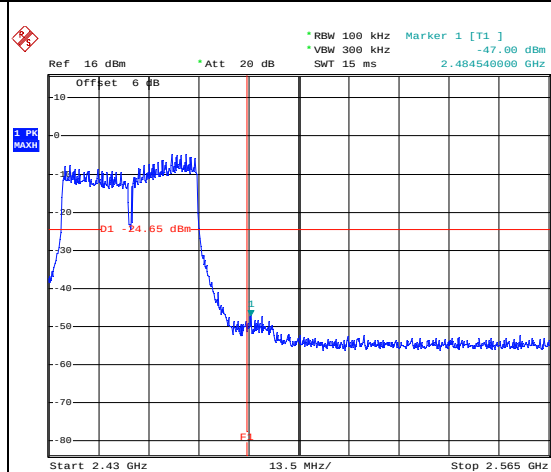
Date: 6.JUL.2014 14:59:21



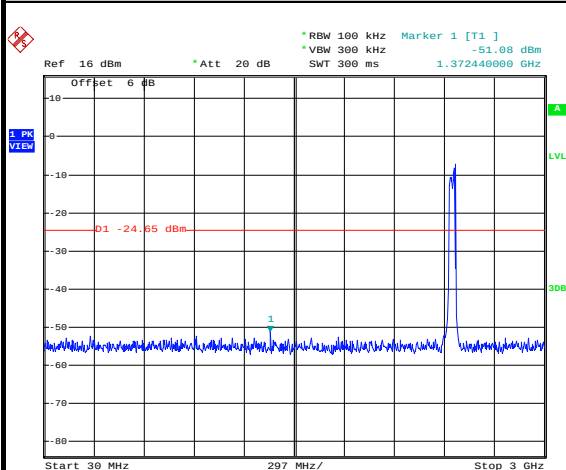
Number of TX :	2	Chain Port:	0+1(0)
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	09	Test Engineer :	Issac Song

WLAN 802.11n HT40 Channel 09**100kHz PSD reference Level**

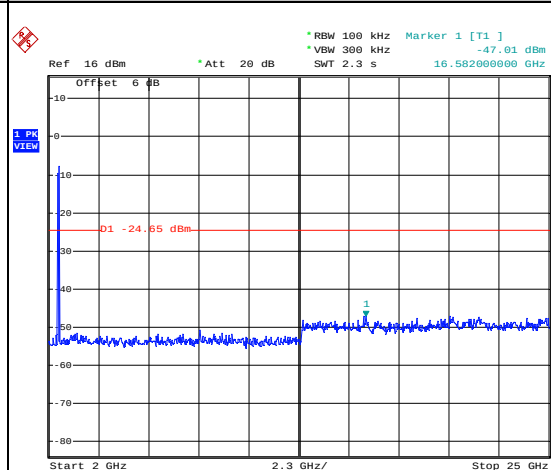
Date: 6.JUL.2014 15:04:04

High Channel Plot

Date: 6.JUL.2014 15:04:46

Spurious Emission 30MHz~3GHz

Date: 6.JUL.2014 15:06:22

Spurious Emission 2GHz~25GHz

Date: 6.JUL.2014 15:05:39

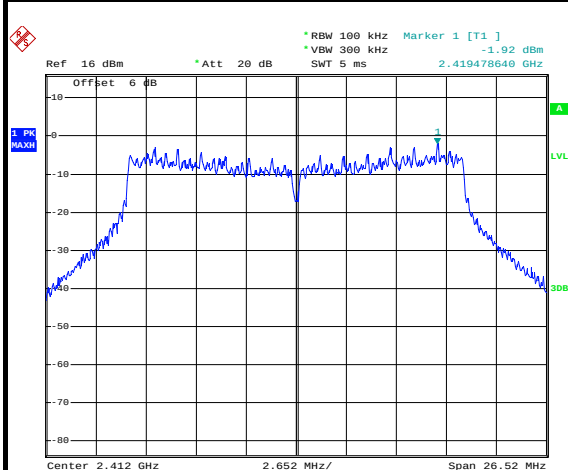


Number of TX = 2, Chain Port 0+1(1) (Measured)

Number of TX :	2	Chain Port:	0+1(1)
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Issac Song

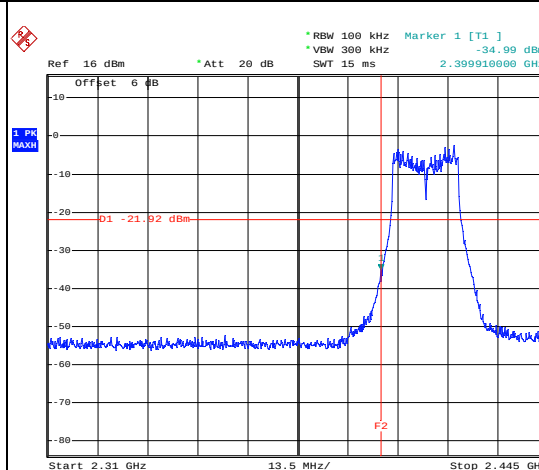
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



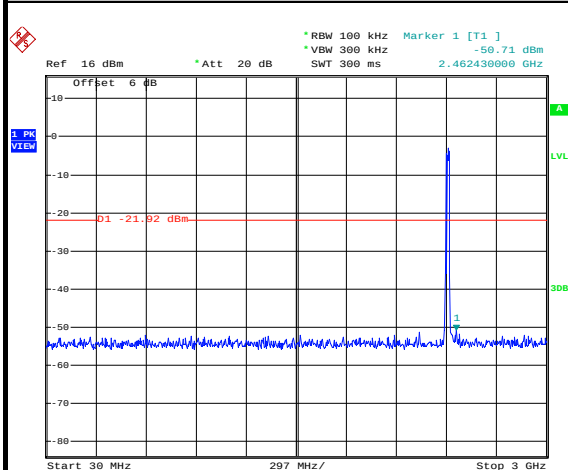
Date: 6.JUL.2014 14:05:57

Low Channel Plot



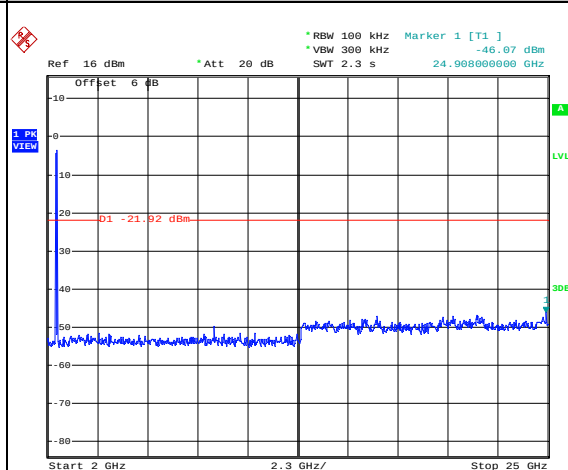
Date: 6.JUL.2014 14:06:47

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 14:08:35

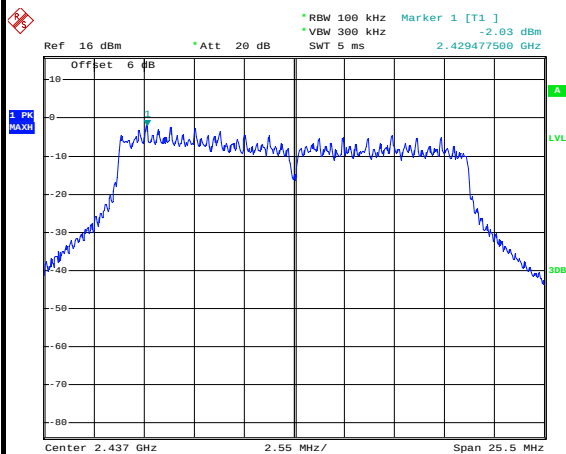
Spurious Emission 2GHz~25GHz



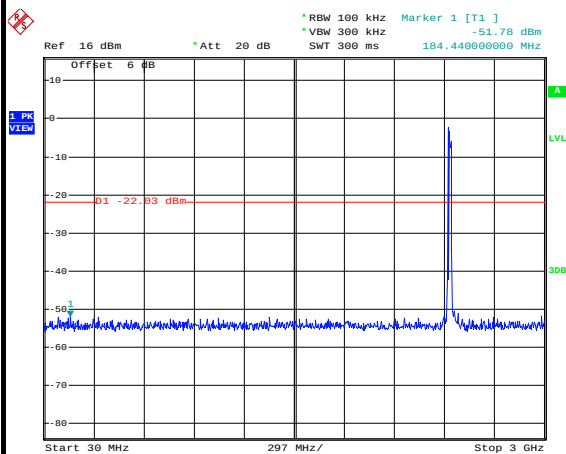
Date: 6.JUL.2014 14:08:53



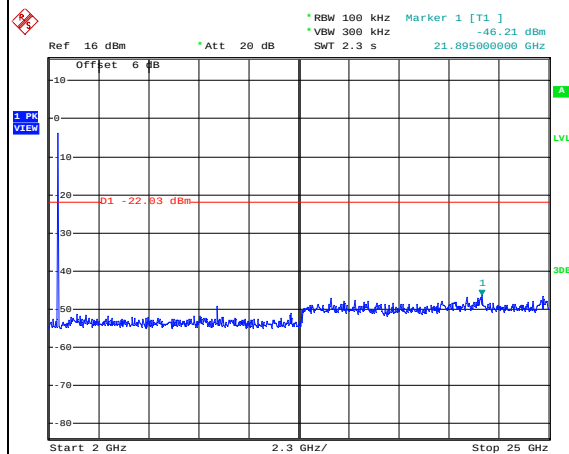
Number of TX :	2	Chain Port:	0+1(1)
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

WLAN 802.11n HT20 Channel 06**100kHz PSD reference Level**

Date: 6.JUL.2014 14:12:09

Spurious Emission 30MHz~3GHz

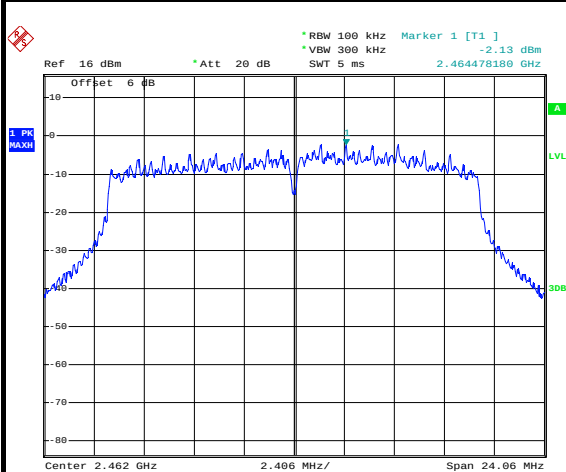
Date: 6.JUL.2014 14:13:58

Spurious Emission 2GHz~25GHz

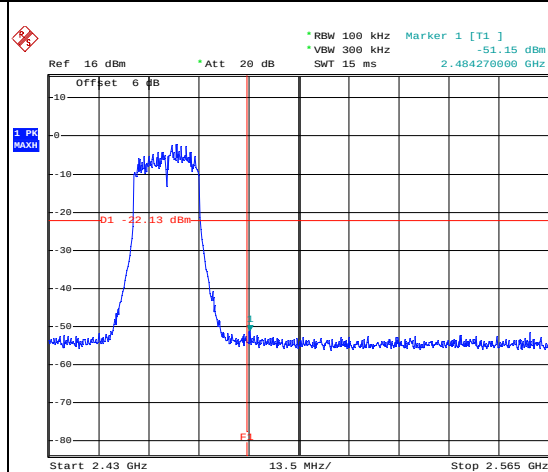
Date: 6.JUL.2014 14:14:16



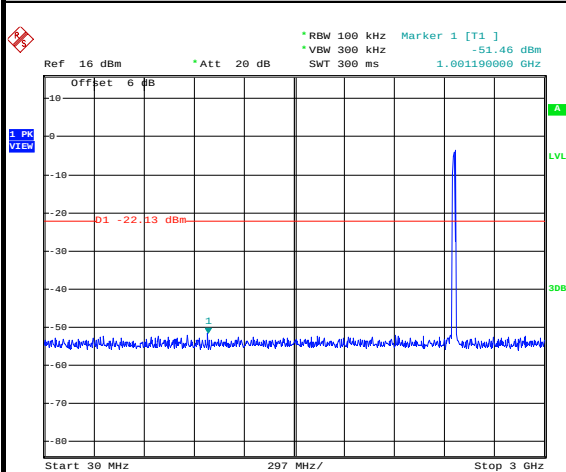
Number of TX :	2	Chain Port:	0+1(1)
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Issac Song

WLAN 802.11n HT20 Channel 11**100kHz PSD reference Level**

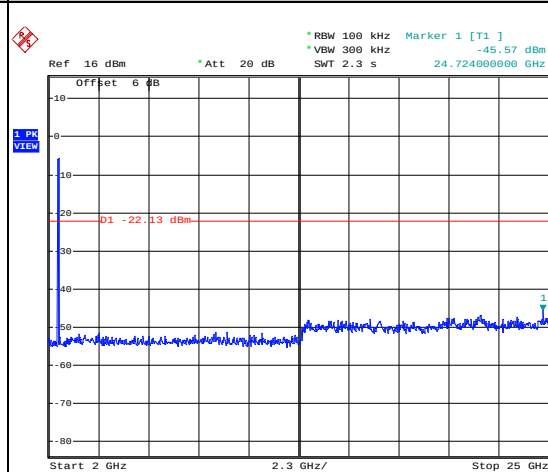
Date: 6.JUL.2014 14:19:49

High Channel Plot

Date: 6.JUL.2014 14:20:19

Spurious Emission 30MHz~3GHz

Date: 6.JUL.2014 14:20:47

Spurious Emission 2GHz~25GHz

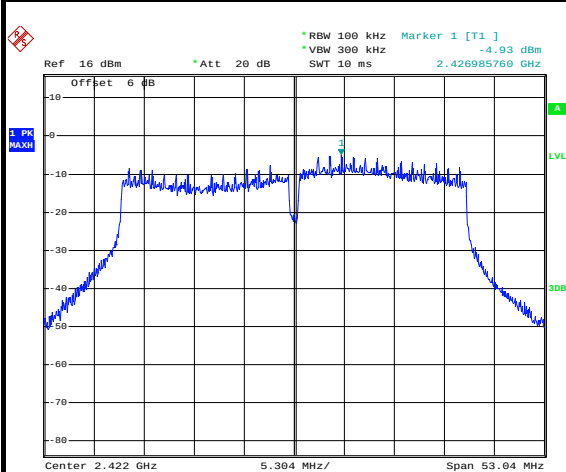
Date: 6.JUL.2014 14:21:05



Number of TX :	2	Chain Port:	0+1(1)
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	03	Test Engineer :	Issac Song

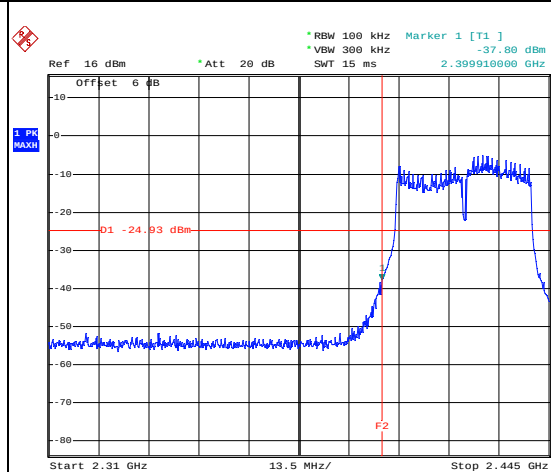
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



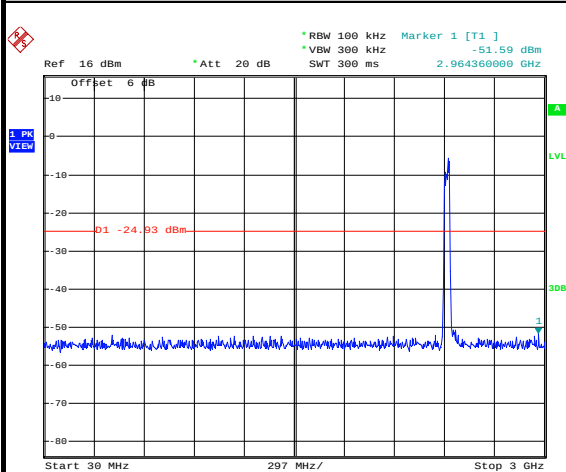
Date: 6.JUL.2014 15:11:42

Low Channel Plot



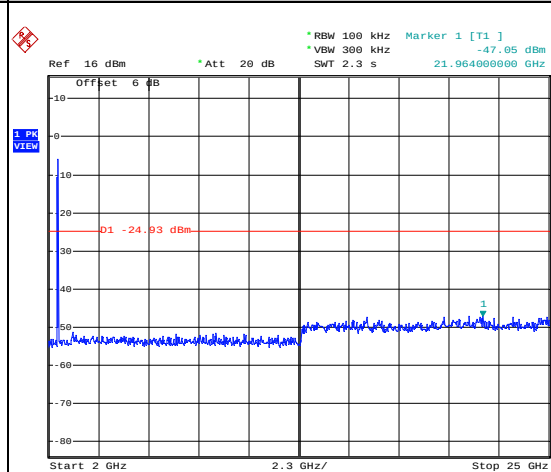
Date: 6.JUL.2014 15:12:25

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 15:17:48

Spurious Emission 2GHz~25GHz



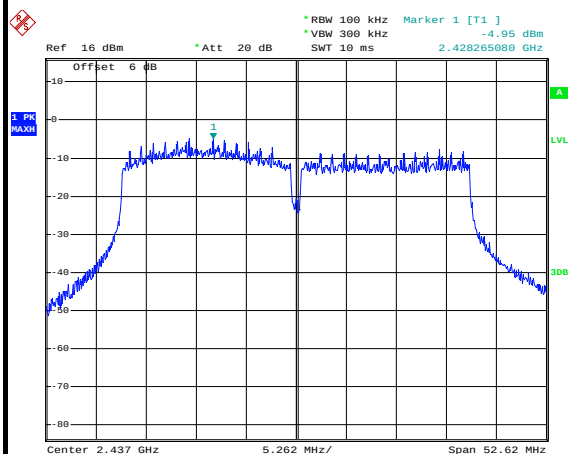
Date: 6.JUL.2014 15:15:05



Number of TX :	2	Chain Port:	0+1(1)
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

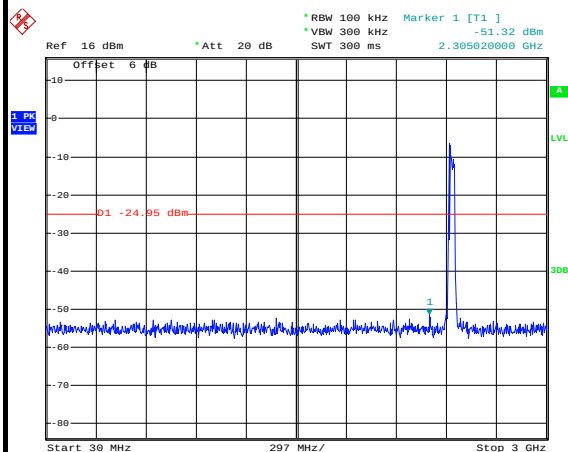
WLAN 802.11n HT40 Channel 06

100kHz PSD reference Level



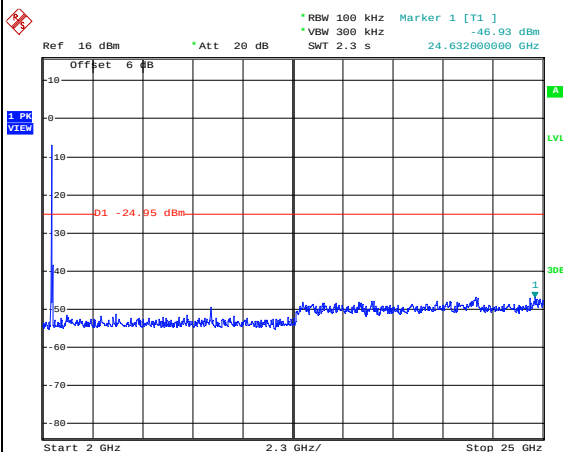
Date: 6.JUL.2014 15:22:46

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 15:25:04

Spurious Emission 2GHz~25GHz



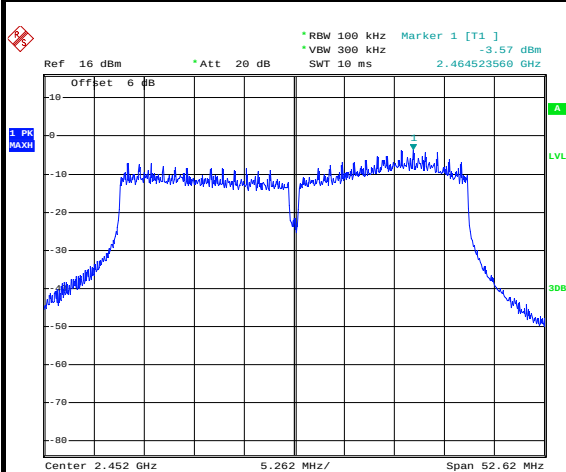
Date: 6.JUL.2014 15:23:59



Number of TX :	2	Chain Port:	0+1(1)
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	09	Test Engineer :	Issac Song

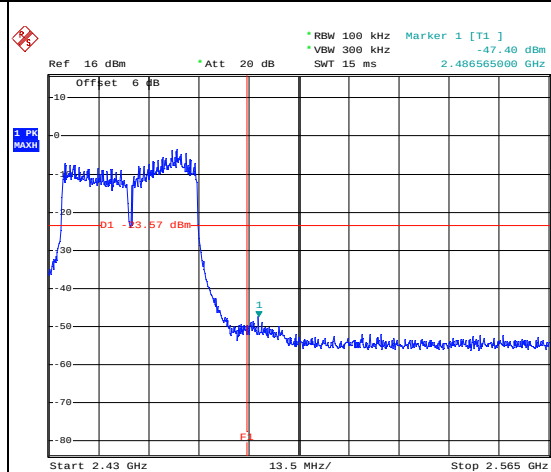
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



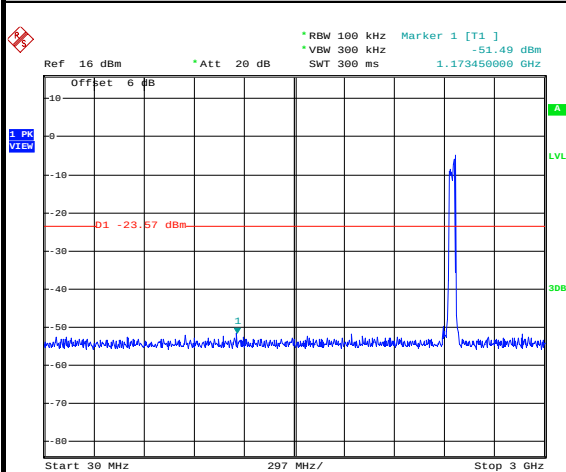
Date: 6.JUL.2014 15:33:48

High Channel Plot



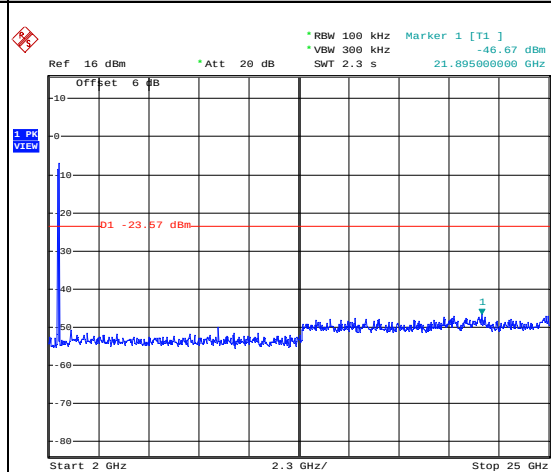
Date: 6.JUL.2014 15:34:09

Spurious Emission 30MHz~3GHz



Date: 6.JUL.2014 15:34:35

Spurious Emission 2GHz~25GHz



Date: 6.JUL.2014 15:34:53

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 Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r03.
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 for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively 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 $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

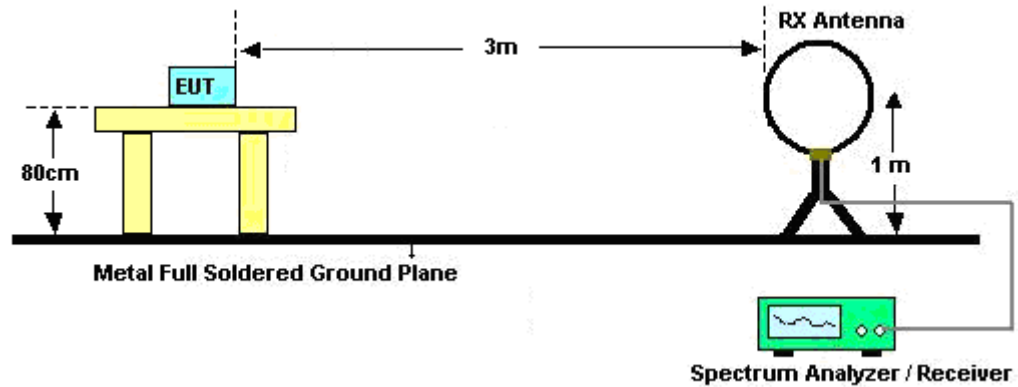
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



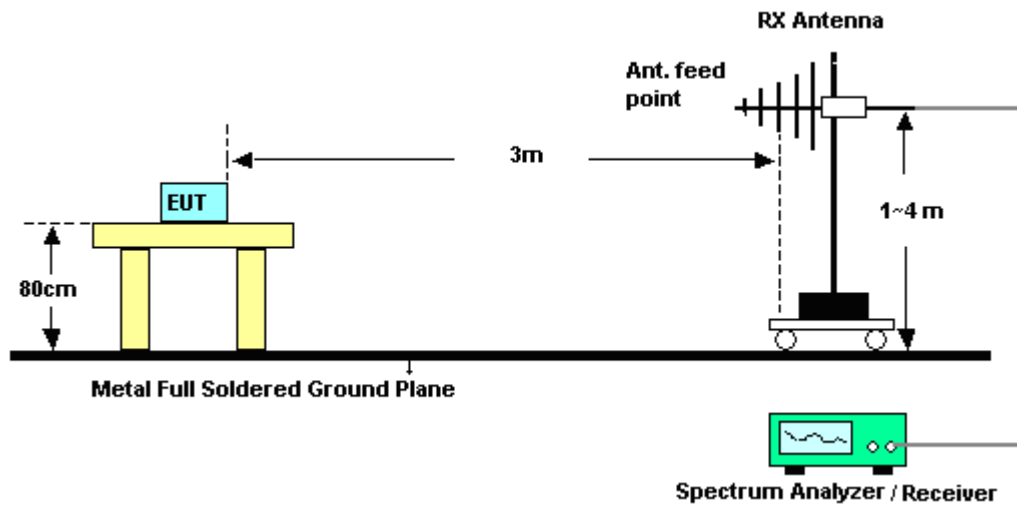
Chain Port	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
0	802.11b	100	-	-	10Hz
1	802.11b	100	-	-	
0	802.11g	78.44	0.36	2.78	3kHz
1	802.11g	79.25	0.37	2.70	3kHz
0+1	2.4GHz 802.11n HT20	72.15	0.25	4.00	10kHz
0+1	2.4GHz 802.11n HT40	72.80	0.26	3.85	10kHz

3.5.4 Test Setup

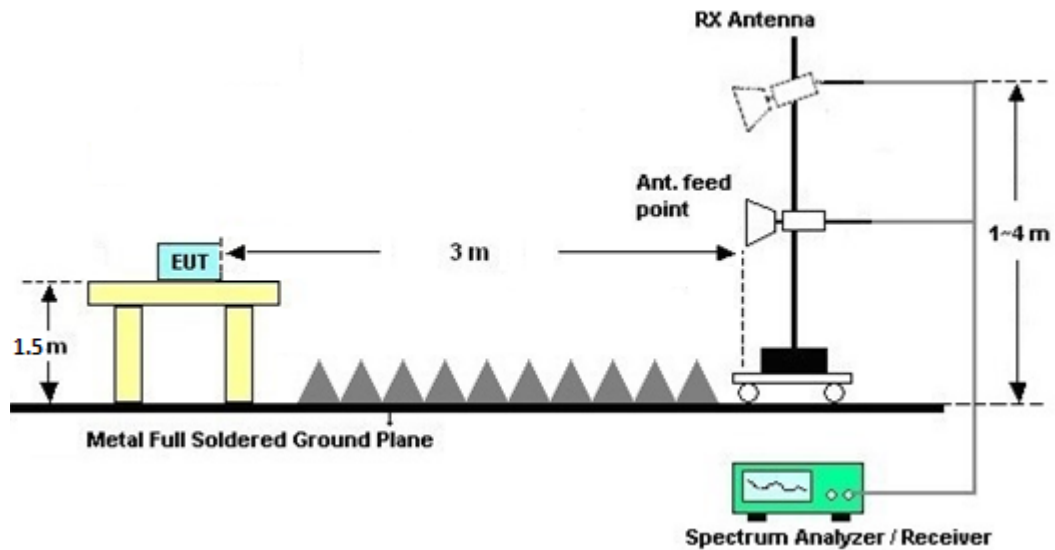
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated 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

Please refer to Appendix B of this test report.

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

Please refer to Appendix B of this test report.

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 (dB μ V)	
	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.

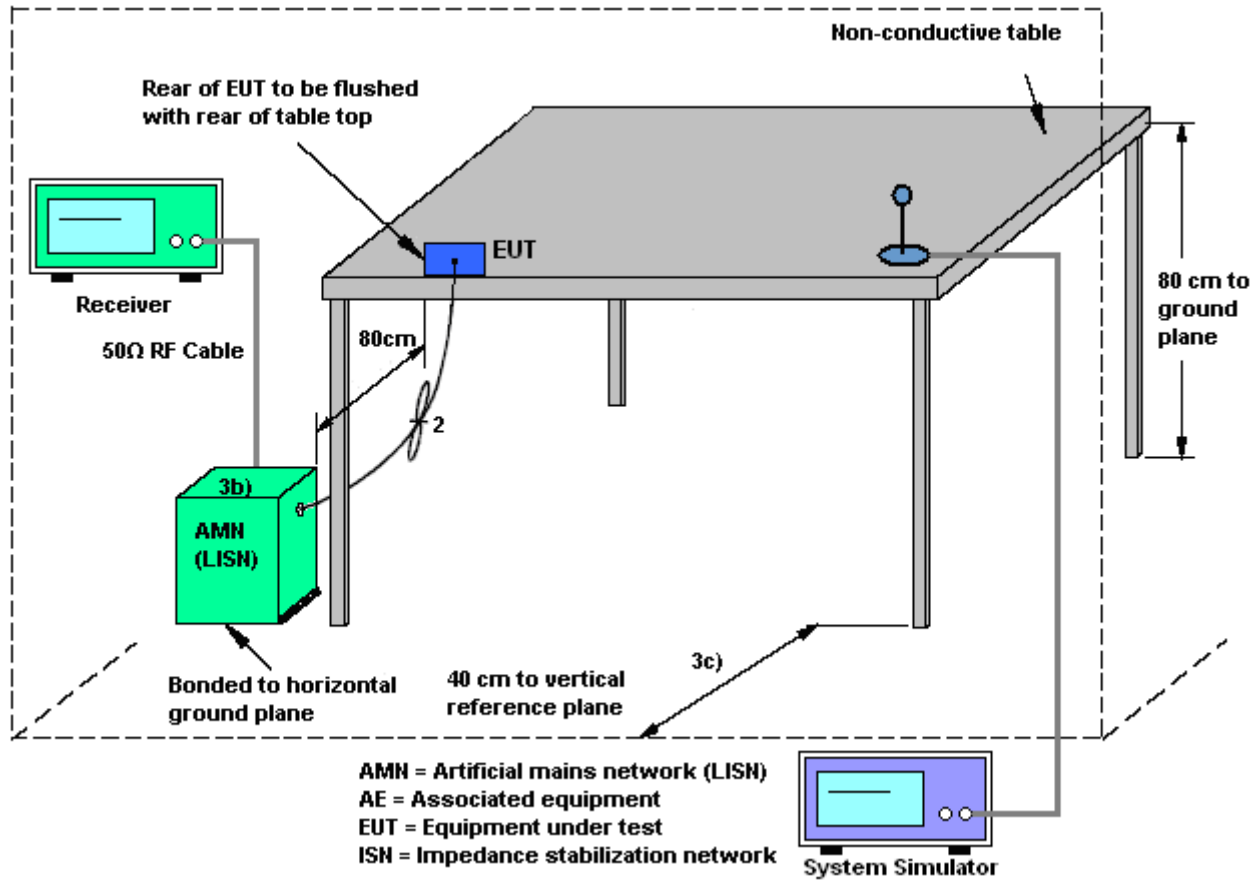
3.6.2 Measuring Instruments

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 (IF bandwidth = 9kHz) with Maximum Hold Mode.

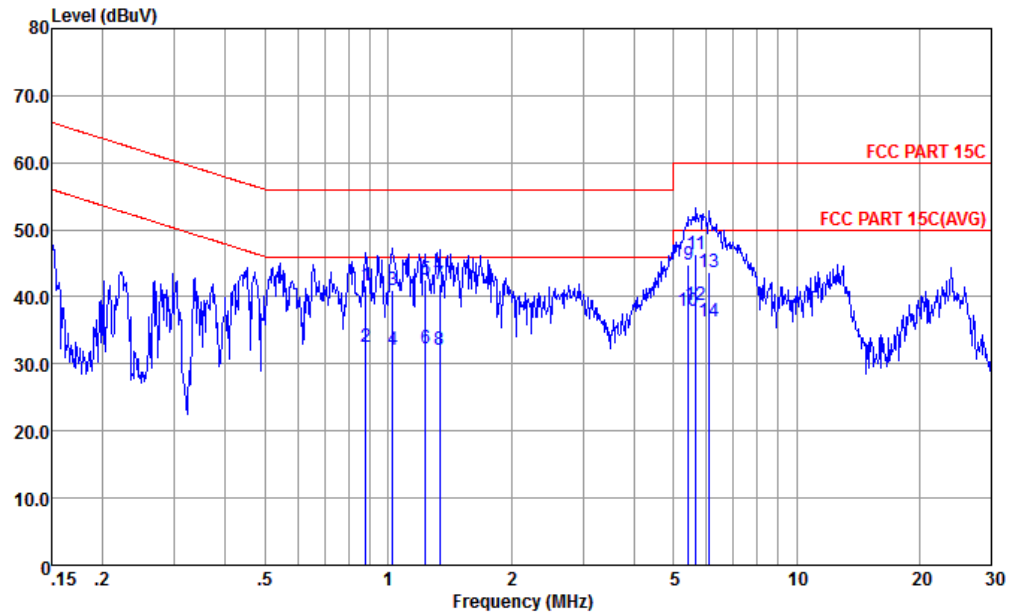
3.6.4 Test Setup





3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Eligah Wang	Relative Humidity :	58~60%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + WLAN Link + USB Cable(Charging from Adapter)		



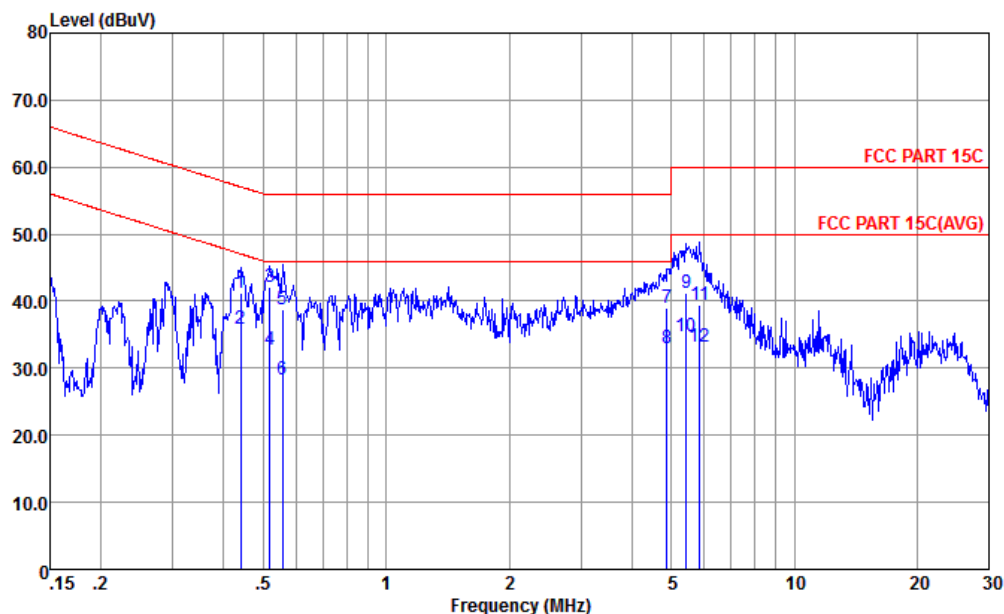
Site : CO01-KS
Condition : FCC PART 15C LISN-L20140306 LINE

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.88	41.58	-14.42	56.00	30.80	0.13	10.65	QP
2	0.88	32.58	-13.42	46.00	21.80	0.13	10.65	Average
3	1.03	40.95	-15.05	56.00	30.20	0.10	10.65	QP
4	1.03	32.05	-13.95	46.00	21.30	0.10	10.65	Average
5	1.24	42.56	-13.44	56.00	31.80	0.10	10.66	QP
6	1.24	32.36	-13.64	46.00	21.60	0.10	10.66	Average
7	1.34	41.97	-14.03	56.00	31.20	0.10	10.67	QP
8	1.34	32.07	-13.93	46.00	21.30	0.10	10.67	Average
9	5.45	44.86	-15.14	60.00	33.80	0.20	10.86	QP
10	5.45	37.86	-12.14	50.00	26.80	0.20	10.86	Average
11	5.68	46.27	-13.73	60.00	35.20	0.20	10.87	QP
12 *	5.68	38.87	-11.13	50.00	27.80	0.20	10.87	Average
13	6.09	43.58	-16.42	60.00	32.50	0.20	10.88	QP
14	6.09	36.38	-13.62	50.00	25.30	0.20	10.88	Average



Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Eligah Wang	Relative Humidity :	58~60%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + WLAN Link + USB Cable(Charging from Adapter)		



Site : CO01-KS
Condition : FCC PART 15C LISN-N20140306 NEUTRAL

mode : Mode 1

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.44	41.17	-15.90	57.07	30.20	0.35	10.62	QP
2 *	0.44	35.77	-11.30	47.07	24.80	0.35	10.62	Average
3	0.52	42.22	-13.78	56.00	31.30	0.29	10.63	QP
4	0.52	32.72	-13.28	46.00	21.80	0.29	10.63	Average
5	0.56	38.70	-17.30	56.00	27.80	0.27	10.63	QP
6	0.56	28.20	-17.80	46.00	17.30	0.27	10.63	Average
7	4.87	38.95	-17.05	56.00	27.90	0.20	10.85	QP
8	4.87	32.95	-13.05	46.00	21.90	0.20	10.85	Average
9	5.45	41.26	-18.74	60.00	30.20	0.20	10.86	QP
10	5.45	34.86	-15.14	50.00	23.80	0.20	10.86	Average
11	5.87	39.37	-20.63	60.00	28.30	0.20	10.87	QP
12	5.87	33.17	-16.83	50.00	22.10	0.20	10.87	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

FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = $10 \log(N_{ANT}/N_{SS}=1)$ dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

The EUT supports CDD mode.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain "DG" is calculated as following table.

			DG	DG	Power	PSD
			for	for	Limit	Limit
	Chain Port 0	Chain Port 1	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	2.00	2.00	2.00	5.01	0.00	0.00

$Power\ Limit\ Reduction = DG(Power) - 6dBi, (min = 0)$

$PSD\ Limit\ Reduction = DG(PSD) - 6dBi, (min = 0)$

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	Oct. 28, 2014	Jul. 06, 2015~ Jul. 20, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	30MHz~40GHz	Jan. 23, 2015	Jul. 06, 2015~ Jul. 20, 2015	Jan. 22, 2016	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 23, 2015	Jul. 06, 2015~ Jul. 20, 2015	Jan. 22, 2016	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 29, 2014	Jul. 16, 2015	Sep. 28, 2015	Radiation (03CH02-KS)
Spectrum Analyzer	R&S	FSV40	101040	10kHz~40GHz; Max 30dBm	Sep. 25, 2014	Jul. 16, 2015	Sep. 24, 2015	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 13, 2014	Jul. 16, 2015	Nov. 12, 2015	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30MHz~2GHz	Sep. 13, 2014	Jul. 16, 2015	Sep. 12, 2015	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 08, 2014	Jul. 16, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 08, 2014	Jul. 16, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz~40GHz	Sep. 04, 2014	Jul. 16, 2015	Sep. 03, 2015	Radiation (03CH02-KS)
Amplifier	com-power	PA-103A	161069	1kHz~1000MHz / 32 dB	May 04, 2015	Jul. 16, 2015	May 03, 2016	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A023 84	1GHz~26.5GHz Gain 30dB	Oct. 28, 2014	Jul. 16, 2015	Oct. 27, 2015	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002 473	N/A	NCR	Jul. 16, 2015	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jul. 16, 2015	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jul. 16, 2015	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	May 04, 2015	Jul. 03, 2015	May 03, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 25, 2014	Jul. 03, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 25, 2014	Jul. 03, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 25, 2014	Jul. 03, 2015	Oct. 24, 2015	Conduction (CO01-KS)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.3dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1dB
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Appendix A. Conducted Test Results

Test Engineer:	Bin Yuan	Temperature:	21~25	°C
Test Date:	2015/7/6~2015/7/20	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	1	1	2412		13.90		8.08	0.50	Pass
11b	1Mbps	1	6	2437		13.30		7.06	0.50	Pass
11b	1Mbps	1	11	2462		12.10		7.04	0.50	Pass
11g	36Mbps	1	1	2412	18.60		16.46		0.50	Pass
11g	36Mbps	1	6	2437	18.15		15.76		0.50	Pass
11g	36Mbps	1	11	2462	17.50		16.06		0.50	Pass
HT20	MCS6	1	1	2412		19.45		17.68	0.50	Pass
HT20	MCS6	1	6	2437		18.90		17.02	0.50	Pass
HT20	MCS6	1	11	2462		18.20		16.06	0.50	Pass
HT40	MCS6	1	3	2422		37.00		35.08	0.50	Pass
HT40	MCS6	1	6	2437		36.90		35.08	0.50	Pass
HT40	MCS6	1	9	2452		37.10		35.12	0.50	Pass
HT20	MCS6	2	1	2412	19.45	19.30	17.72	17.68	0.50	Pass
HT20	MCS6	2	6	2437	18.95	18.80	17.02	17.00	0.50	Pass
HT20	MCS6	2	11	2462	18.40	18.10	16.74	16.04	0.50	Pass
HT40	MCS3	2	3	2422	36.60	37.00	35.04	35.36	0.50	Pass
HT40	MCS3	2	6	2437	36.80	36.80	35.36	35.08	0.50	Pass
HT40	MCS3	2	9	2452	37.20	36.90	35.80	35.08	0.50	Pass

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	16.05	16.41		30.00	30.00	2.00	2.00	18.05	18.41	36.00	36.00	Pass
11b	1Mbps	1	6	2437	15.47	16.03		30.00	30.00	2.00	2.00	17.47	18.03	36.00	36.00	Pass
11b	1Mbps	1	11	2462	15.78	16.06		30.00	30.00	2.00	2.00	17.78	18.06	36.00	36.00	Pass
11g	36Mbps	1	1	2412	22.26	21.81		30.00	30.00	2.00	2.00	24.26	23.81	36.00	36.00	Pass
11g	36Mbps	1	6	2437	21.05	20.78		30.00	30.00	2.00	2.00	23.05	22.78	36.00	36.00	Pass
11g	36Mbps	1	11	2462	20.93	21.23		30.00	30.00	2.00	2.00	22.93	23.23	36.00	36.00	Pass
HT20	MCS6	1	1	2412	21.75	21.83		30.00	30.00	2.00	2.00	23.75	23.83	36.00	36.00	Pass
HT20	MCS6	1	6	2437	20.72	21.72		30.00	30.00	2.00	2.00	22.72	23.72	36.00	36.00	Pass
HT20	MCS6	1	11	2462	20.60	21.28		30.00	30.00	2.00	2.00	22.60	23.28	36.00	36.00	Pass
HT40	MCS6	1	3	2422	21.34	21.01		30.00	30.00	2.00	2.00	23.34	23.01	36.00	36.00	Pass
HT40	MCS6	1	6	2437	20.02	21.86		30.00	30.00	2.00	2.00	22.02	23.86	36.00	36.00	Pass
HT40	MCS6	1	9	2452	20.24	20.79		30.00	30.00	2.00	2.00	22.24	22.79	36.00	36.00	Pass
HT20	MCS6	2	1	2412	19.77	19.45	22.62	30.00		2.00		24.62		36.00		Pass
HT20	MCS6	2	6	2437	19.08	18.96	22.03	30.00		2.00		24.03		36.00		Pass
HT20	MCS6	2	11	2462	18.95	19.01	21.99	30.00		2.00		23.99		36.00		Pass
HT40	MCS3	2	3	2422	19.85	19.03	22.47	30.00		2.00		24.47		36.00		Pass
HT40	MCS3	2	6	2437	18.99	19.01	22.01	30.00		2.00		24.01		36.00		Pass
HT40	MCS3	2	9	2452	18.46	18.67	21.58	30.00		2.00		23.58		36.00		Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	1	1	2412	0.00	0.00	13.62	13.98	
11b	1Mbps	1	6	2437	0.00	0.00	13.08	13.65	
11b	1Mbps	1	11	2462	0.00	0.00	13.04	13.49	
11g	36Mbps	1	1	2412	0.21	0.21	11.73	12.00	
11g	36Mbps	1	6	2437	0.21	0.21	11.12	10.98	
11g	36Mbps	1	11	2462	0.21	0.21	11.38	10.86	
HT20	MCS6	1	1	2412	0.24	0.21	10.98	11.16	
HT20	MCS6	1	6	2437	0.24	0.21	9.83	11.00	
HT20	MCS6	1	11	2462	0.24	0.21	10.31	10.86	
HT40	MCS6	1	3	2422	0.41	0.44	10.62	10.80	
HT40	MCS6	1	6	2437	0.41	0.44	10.10	11.21	
HT40	MCS6	1	9	2452	0.41	0.44	9.63	10.99	
HT20	MCS6	2	1	2412	0.22	0.22	8.68	8.25	11.48
HT20	MCS6	2	6	2437	0.22	0.22	8.08	8.01	11.06
HT20	MCS6	2	11	2462	0.22	0.22	8.20	7.98	11.10
HT40	MCS3	2	3	2422	0.44	0.47	8.80	7.93	11.40
HT40	MCS3	2	6	2437	0.44	0.47	8.21	7.80	11.02
HT40	MCS3	2	9	2452	0.44	0.47	7.68	7.89	10.80

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

TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412		-12.17	-	2.00	2.00	8.00	8.00	Pass
11b	1Mbps	1	6	2437		-12.39		2.00	2.00	8.00	8.00	Pass
11b	1Mbps	1	11	2462		-11.00		2.00	2.00	8.00	8.00	Pass
11g	36Mbps	1	1	2412	-14.72			2.00	2.00	8.00	8.00	Pass
11g	36Mbps	1	6	2437	-15.18			2.00	2.00	8.00	8.00	Pass
11g	36Mbps	1	11	2462	-13.60			2.00	2.00	8.00	8.00	Pass
HT20	MCS6	1	1	2412		-15.26		2.00	2.00	8.00	8.00	Pass
HT20	MCS6	1	6	2437		-14.95		2.00	2.00	8.00	8.00	Pass
HT20	MCS6	1	11	2462		-14.14		2.00	2.00	8.00	8.00	Pass
HT40	MCS6	1	3	2422		-19.33		2.00	2.00	8.00	8.00	Pass
HT40	MCS6	1	6	2437		-16.76		2.00	2.00	8.00	8.00	Pass
HT40	MCS6	1	9	2452		-17.55		2.00	2.00	8.00	8.00	Pass
HT20	MCS6	2	1	2412	-17.26	-17.60	-14.25	5.01		8.00		Pass
HT20	MCS6	2	6	2437	-17.75	-17.56	-14.55	5.01		8.00		Pass
HT20	MCS6	2	11	2462	-17.68	-17.73	-14.67	5.01		8.00		Pass
HT40	MCS3	2	3	2422	-20.56	-21.73	-17.55	5.01		8.00		Pass
HT40	MCS3	2	6	2437	-20.05	-20.80	-17.04	5.01		8.00		Pass
HT40	MCS3	2	9	2452	-21.27	-19.82	-16.81	5.01		8.00		Pass

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



Appendix B. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Chain Port				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
0		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz	*	2413.11	99.59	-	-	100.62	31.23	4.74	37	270	182	P	H
	*	2412.692	95.49	-	-	96.52	31.23	4.74	37	270	182	A	H
		2390	46.98	-27.02	74	48.08	31.2	4.72	37.02	270	182	P	H
		2390	33.76	-20.24	54	34.86	31.2	4.72	37.02	270	182	A	H
	*	2410.771	96.48	-	-	97.51	31.23	4.74	37	203	271	P	V
	*	2411.189	91.87	-	-	92.9	31.23	4.74	37	203	271	A	V
		2390	44.66	-29.34	74	45.76	31.2	4.72	37.02	203	271	P	V
		2390	31.55	-22.45	54	32.65	31.2	4.72	37.02	203	271	A	V
802.11b CH 06 2437MHz	*	2435.571	97.89	-	-	98.86	31.26	4.76	36.99	264	188	P	H
	*	2436.239	93.8	-	-	94.77	31.26	4.76	36.99	264	188	A	H
	*	2435.655	101.23	-	-	102.2	31.26	4.76	36.99	150	91	P	V
	*	2436.239	96.99	-	-	97.96	31.26	4.76	36.99	150	91	A	V
802.11b CH 11 2462MHz	*	2463.209	100.17	-	-	101.03	31.31	4.79	36.96	182	88	P	H
	*	2462.792	96.34	-	-	97.2	31.31	4.79	36.96	182	88	A	H
		2485.12	48.33	-25.67	74	49.13	31.34	4.8	36.94	182	88	P	H
		2483.96	34.13	-19.87	54	34.93	31.34	4.8	36.94	182	88	A	H
	*	2463.209	99.62	-	-	100.48	31.31	4.79	36.96	150	69	P	V
	*	2462.875	95.47	-	-	96.33	31.31	4.79	36.96	150	69	A	V
		2484.88	48.65	-25.35	74	49.45	31.34	4.8	36.94	150	69	P	V
		2483.92	34.22	-19.78	54	35.02	31.34	4.8	36.94	150	69	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Chain Port 0	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	48.44	-25.56	74	43.36	34.93	6.83	36.68	165	0	P	H
		4824	46.69	-27.31	74	41.61	34.93	6.83	36.68	185	230	P	V
802.11b CH 06 2437MHz		4875	47.27	-26.73	74	42.11	34.95	6.87	36.66	162	58	P	H
		7311	48.48	-25.52	74	40.84	35.76	8.57	36.69	150	116	P	H
		4875	47.41	-26.59	74	42.25	34.95	6.87	36.66	188	100	P	V
		7311	48.07	-25.93	74	40.43	35.76	8.57	36.69	150	152	P	V
802.11b CH 11 2462MHz		4923	47.82	-26.18	74	42.58	34.97	6.92	36.65	150	100	P	H
		7386	49.2	-24.8	74	41.52	35.78	8.68	36.78	150	85	P	H
		4923	47.76	-26.24	74	42.52	34.97	6.92	36.65	150	355	P	V
		7386	47.69	-26.31	74	40.01	35.78	8.68	36.78	150	155	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

WIFI Chain Port 0	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz	*	2405.845	105.09	-	-	106.12	31.23	4.74	37	150	338	P	H
	*	2405.761	94.25	-	-	95.28	31.23	4.74	37	150	338	A	H
		2390	62.29	-11.71	74	63.39	31.2	4.72	37.02	150	338	P	H
		2390	44.56	-9.44	54	45.66	31.2	4.72	37.02	150	338	A	H
	*	2405.928	102.8	-	-	103.83	31.23	4.74	37	150	140	P	V
	*	2419.289	92.39	-	-	93.42	31.23	4.74	37	150	140	A	V
		2389.92	60.8	-13.2	74	61.9	31.2	4.72	37.02	150	140	P	V
		2390	41.14	-12.86	54	42.24	31.2	4.72	37.02	150	140	A	V
802.11g CH 06 2437MHz	*	2430.812	104.29	-	-	105.26	31.26	4.76	36.99	150	331	P	H
	*	2429.977	93.24	-	-	94.21	31.26	4.76	36.99	150	331	A	H
	*	2430.645	103.89	-	-	104.86	31.26	4.76	36.99	150	77	P	V
	*	2430.645	93.17	-	-	94.14	31.26	4.76	36.99	150	77	A	V
802.11g CH 11 2462MHz	*	2463.543	101.06	-	-	101.92	31.31	4.79	36.96	150	341	P	H
	*	2464.128	90.32	-	-	91.18	31.31	4.79	36.96	150	341	A	H
		2484.12	61.97	-12.03	74	62.77	31.34	4.8	36.94	150	341	P	H
		2483.52	43.63	-10.37	54	44.43	31.34	4.8	36.94	150	341	A	H
	*	2465.381	101.58	-	-	102.44	31.31	4.79	36.96	300	73	P	V
	*	2466.299	91.19	-	-	92.05	31.31	4.79	36.96	300	73	A	V
		2484.44	64.39	-9.61	74	65.19	31.34	4.8	36.94	300	73	P	V
		2483.52	45.09	-8.91	54	45.89	31.34	4.8	36.94	300	73	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Chain Port 0	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	45.6	-28.4	74	40.52	34.93	6.83	36.68	150	22	P	H
		4824	46.07	-27.93	74	40.99	34.93	6.83	36.68	150	322	P	V
802.11g CH 06 2437MHz		4875	45.93	-28.07	74	40.77	34.95	6.87	36.66	150	115	P	H
		7311	48.51	-25.49	74	40.87	35.76	8.57	36.69	150	203	P	H
		4875	47.02	-26.98	74	41.86	34.95	6.87	36.66	150	23	P	V
		7311	47.02	-26.98	74	39.38	35.76	8.57	36.69	150	174	P	V
802.11g CH 11 2462MHz		4924	46.67	-27.33	74	41.43	34.97	6.92	36.65	150	195	P	H
		7386	48.37	-25.63	74	40.69	35.78	8.68	36.78	195	213	P	H
		4923	45.88	-28.12	74	40.64	34.97	6.92	36.65	150	113	P	V
		7386	48.22	-25.78	74	40.54	35.78	8.68	36.78	150	332	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Chain Port				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2331.33	52.07	-21.93	74	46.17	31.23	6.12	31.45	219	217	P	H
		2390	39.19	-14.81	54	33.08	31.3	6.17	31.36	219	217	A	H
	*	2410.855	103.68	-	-	97.44	31.31	6.22	31.29	219	217	P	H
	*	2412.775	97.94	-	-	91.7	31.31	6.22	31.29	219	217	A	H
		2316.03	51.73	-22.27	74	45.93	31.21	6.06	31.47	334	56	P	V
		2390	38.49	-15.51	54	32.38	31.3	6.17	31.36	334	56	A	V
	*	2410.604	95.9	-	-	89.66	31.31	6.22	31.29	334	56	P	V
	*	2411.105	90.14	-	-	83.9	31.31	6.22	31.29	334	56	A	V
802.11b CH 06 2437MHz	*	2435.905	102.19	-	-	95.86	31.33	6.22	31.22	151	360	P	H
	*	2436.156	94.68	-	-	88.35	31.33	6.22	31.22	151	360	A	H
	*	2435.989	103.64	-	-	97.31	31.33	6.22	31.22	289	0	P	V
	*	2436.239	98.82	-	-	92.49	31.33	6.22	31.22	289	0	A	V
802.11b CH 11 2462MHz	*	2463.126	105.11	-	-	98.56	31.36	6.28	31.09	150	227	P	H
	*	2462.792	100.29	-	-	93.74	31.36	6.28	31.09	150	227	A	H
		2491.6	53.12	-20.88	74	46.35	31.39	6.33	30.95	150	227	P	H
		2485.12	40.1	-13.9	54	33.42	31.37	6.33	31.02	150	227	A	H
	*	2463.209	100.31	-	-	93.76	31.36	6.28	31.09	366	254	P	V
	*	2462.708	95.16	-	-	88.61	31.36	6.28	31.09	366	254	A	V
		2495.28	51.91	-22.09	74	45.14	31.39	6.33	30.95	366	254	P	V
		2485.52	38.65	-15.35	54	31.97	31.37	6.33	31.02	366	254	A	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Chain Port 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	45.56	-28.44	74	34.52	34.89	8.73	32.58	150	319	P	H
		4824	47.61	-26.39	74	36.57	34.89	8.73	32.58	150	0	P	V
802.11b CH 06 2437MHz		4875	49	-25	74	38.14	34.92	8.76	32.82	165	230	P	H
		7311	47.65	-26.35	74	36.3	35.56	10.84	35.05	150	140	P	H
		4875	59.18	-14.82	74	48.32	34.92	8.76	32.82	150	53	P	V
	!	4875	50.96	-3.04	54	40.1	34.92	8.76	32.82	150	53	A	V
		7311	47.14	-26.86	74	35.79	35.56	10.84	35.05	165	203	P	V
802.11b CH 11 2462MHz		4923	46.03	-27.97	74	35.35	34.95	8.79	33.06	150	360	P	H
		7386	46.69	-27.31	74	35.61	35.58	10.89	35.39	150	94	P	H
		4923	46.67	-27.33	74	35.99	34.95	8.79	33.06	150	0	P	V
		7386	49.23	-24.77	74	38.15	35.58	10.89	35.39	150	127	P	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

WIFI Chain Port 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz	*	2405.678	107.16	-	-	108.19	31.23	4.74	37	162	135	P	H
	*	2405.678	95.23	-	-	96.26	31.23	4.74	37	162	135	A	H
		2389.92	59.71	-14.29	74	60.81	31.2	4.72	37.02	162	135	P	H
	!	2389.92	50.13	-3.87	54	51.23	31.2	4.72	37.02	162	135	A	H
	*	2404.593	102.98	-	-	104.01	31.23	4.74	37	159	62	P	V
	*	2405.26	91.28	-	-	92.31	31.23	4.74	37	159	62	A	V
		2390	56.75	-17.25	74	57.85	31.2	4.72	37.02	159	62	P	V
		2390	39.58	-14.42	54	40.68	31.2	4.72	37.02	159	62	A	V
802.11g CH 06 2437MHz	*	2430.645	108	-	-	108.97	31.26	4.76	36.99	158	133	P	H
	*	2430.979	96.72	-	-	97.69	31.26	4.76	36.99	158	133	A	H
	*	2430.812	103.58	-	-	104.55	31.26	4.76	36.99	150	254	P	V
	*	2430.812	85.29	-	-	86.26	31.26	4.76	36.99	150	254	A	V
802.11g CH 11 2462MHz	*	2465.548	106.2	-	-	107.06	31.31	4.79	36.96	155	148	P	H
	*	2465.464	96.21	-	-	97.07	31.31	4.79	36.96	155	148	A	H
		2484.24	59.26	-14.74	74	60.06	31.34	4.8	36.94	155	148	P	H
		2483.52	41.19	-12.81	54	41.99	31.34	4.8	36.94	155	148	A	H
	*	2465.297	104.61	-	-	105.47	31.31	4.79	36.96	150	110	P	V
	*	2465.715	93.62	-	-	94.48	31.31	4.79	36.96	150	110	A	V
		2484	56.13	-17.87	74	56.93	31.34	4.8	36.94	150	110	P	V
		2485.4	37.09	-16.91	54	37.89	31.34	4.8	36.94	150	110	A	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Chain Port 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01		4824	50.36	-23.64	74	45.28	34.93	6.83	36.68	150	0	P	H
2412MHz		4824	54.28	-19.72	74	49.2	34.93	6.83	36.68	159	360	P	V
		4824	40.48	-13.52	54	35.4	34.93	6.83	36.68	159	360	A	V
802.11g CH 06		4872	49.07	-24.93	74	43.91	34.95	6.87	36.66	150	156	P	H
		7311	47.17	-26.83	74	39.53	35.76	8.57	36.69	150	221	P	H
2437MHz		4874	54.62	-19.38	74	49.46	34.95	6.87	36.66	150	165	P	V
		4874	41.22	-12.78	54	36.06	34.95	6.87	36.66	150	165	A	V
		7311	47.48	-26.52	74	39.84	35.76	8.57	36.69	150	251	P	V
802.11g CH 11		4924	48.75	-25.25	74	43.51	34.97	6.92	36.65	150	112	P	H
		7386	48.59	-25.41	74	40.91	35.78	8.68	36.78	150	84	P	H
2462MHz		4924	49.19	-24.81	74	43.95	34.97	6.92	36.65	150	352	P	V
		7386	48.23	-25.77	74	40.55	35.78	8.68	36.78	150	119	P	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Chain Port 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz	*	2419.706	105.9	-	-	106.87	31.26	4.76	36.99	150	326	P	H
	*	2405.26	95.93	-	-	96.96	31.23	4.74	37	150	326	A	H
		2389.83	58.17	-15.83	74	59.27	31.2	4.72	37.02	150	326	P	H
		2389.83	45.42	-8.58	54	46.52	31.2	4.72	37.02	150	326	A	H
	*	2419.873	102.5	-	-	103.47	31.26	4.76	36.99	150	178	P	V
	*	2419.372	92.83	-	-	93.86	31.23	4.74	37	150	178	A	V
		2389.92	58.54	-15.46	74	59.64	31.2	4.72	37.02	150	178	P	V
		2389.65	44.96	-9.04	54	46.06	31.2	4.72	37.02	150	178	A	V
802.11n HT20 CH 06 2437MHz	*	2431.98	105.1	-	-	106.07	31.26	4.76	36.99	150	130	P	H
	*	2430.812	95.76	-	-	96.73	31.26	4.76	36.99	150	130	A	H
	*	2432.398	104.4	-	-	105.37	31.26	4.76	36.99	254	341	P	V
	*	2430.728	95.26	-	-	96.23	31.26	4.76	36.99	254	341	A	V
802.11n HT20 CH 11 2462MHz	*	2465.297	104.33	-	-	105.19	31.31	4.79	36.96	172	133	P	H
	*	2466.383	94.66	-	-	95.52	31.31	4.79	36.96	172	133	A	H
		2484.52	54.07	-19.93	74	54.87	31.34	4.8	36.94	172	133	P	H
		2484.2	39.73	-14.27	54	40.53	31.34	4.8	36.94	172	133	A	H
	*	2463.293	102.23	-	-	103.09	31.31	4.79	36.96	150	1	P	V
	*	2462.959	93.02	-	-	93.88	31.31	4.79	36.96	150	1	A	V
		2483.52	56.79	-17.21	74	57.59	31.34	4.8	36.94	150	1	P	V
		2483.68	41.08	-12.92	54	41.88	31.34	4.8	36.94	150	1	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Chain Port 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	47.29	-26.71	74	42.21	34.93	6.83	36.68	150	221	P	H
		4824	50.34	-23.66	74	45.26	34.93	6.83	36.68	150	23	P	V
802.11n HT20 CH 06 2437MHz		4875	46.53	-27.47	74	41.37	34.95	6.87	36.66	150	85	P	H
		7311	47.98	-26.02	74	40.34	35.76	8.57	36.69	150	218	P	H
		4874	45.83	-28.17	74	40.67	34.95	6.87	36.66	150	149	P	V
		7311	47.03	-26.97	74	39.39	35.76	8.57	36.69	150	92	P	V
802.11n HT20 CH 11 2462MHz		4923	46.72	-27.28	74	41.48	34.97	6.92	36.65	165	89	P	H
		7386	47.61	-26.39	74	39.93	35.78	8.68	36.78	150	116	P	H
		4924	46.26	-27.74	74	41.02	34.97	6.92	36.65	150	221	P	V
		7386	47.9	-26.1	74	40.22	35.78	8.68	36.78	150	78	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Chain Port 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.83	57.54	-16.46	74	58.64	31.2	4.72	37.02	188	326	P	H
		2389.92	43.85	-10.15	54	44.95	31.2	4.72	37.02	188	326	A	H
	*	2428.306	103.65	-	-	104.62	31.26	4.76	36.99	188	326	P	H
	*	2426.553	94.77	-	-	95.74	31.26	4.76	36.99	188	326	A	H
		2483.64	46.96	-27.04	74	47.76	31.34	4.8	36.94	188	326	P	H
		2483.8	36.63	-17.37	54	37.43	31.34	4.8	36.94	188	326	A	H
		2390	55.33	-18.67	74	56.43	31.2	4.72	37.02	193	110	P	V
		2390	42.2	-11.8	54	43.3	31.2	4.72	37.02	193	110	A	V
	*	2426.803	101.41	-	-	102.38	31.26	4.76	36.99	193	110	P	V
	*	2426.386	91.61	-	-	92.58	31.26	4.76	36.99	193	110	A	V
		2486.76	45.45	-28.55	74	46.25	31.34	4.8	36.94	193	110	P	V
		2484.8	34.43	-19.57	54	35.23	31.34	4.8	36.94	193	110	A	V
802.11n HT40 CH 06 2437MHz		2389.92	46.95	-27.05	74	48.05	31.2	4.72	37.02	150	342	P	H
		2390	38.49	-15.51	54	39.59	31.2	4.72	37.02	150	342	A	H
	*	2426.469	104.05	-	-	105.02	31.26	4.76	36.99	150	342	P	H
	*	2424.549	95.59	-	-	96.56	31.26	4.76	36.99	150	342	A	H
		2484.2	50.75	-23.25	74	51.55	31.34	4.8	36.94	150	342	P	H
		2485.52	37.99	-16.01	54	38.79	31.34	4.8	36.94	150	342	A	H
		2389.65	47.99	-26.01	74	49.09	31.2	4.72	37.02	150	125	P	V
		2389.29	35.62	-18.38	54	36.72	31.2	4.72	37.02	150	125	A	V
	*	2425.384	100.73	-	-	101.7	31.26	4.76	36.99	150	125	P	V
	*	2424.716	91.85	-	-	92.82	31.26	4.76	36.99	150	125	A	V
		2485.48	49.51	-24.49	74	50.31	31.34	4.8	36.94	150	125	P	V
		2484.52	37.79	-16.21	54	38.59	31.34	4.8	36.94	150	125	A	V



802.11n HT40 CH 09 2452MHz		2389.2	43.9	-30.1	74	45	31.2	4.72	37.02	151	317	P	H
		2389.83	34.15	-19.85	54	35.25	31.2	4.72	37.02	151	317	A	H
	*	2428.306	103.62	-	-	104.59	31.26	4.76	36.99	151	317	P	H
	*	2430.144	94.64	-	-	95.61	31.26	4.76	36.99	151	317	A	H
		2484.56	53.88	-20.12	74	54.68	31.34	4.8	36.94	151	317	P	H
		2485.16	42.7	-11.3	54	43.5	31.34	4.8	36.94	151	317	A	H
		2385.6	44.12	-29.88	74	45.22	31.2	4.72	37.02	150	108	P	V
		2389.47	33.46	-20.54	54	34.56	31.2	4.72	37.02	150	108	A	V
	*	2425.384	101.82	-	-	102.79	31.26	4.76	36.99	150	108	P	V
	*	2424.549	92.23	-	-	93.2	31.26	4.76	36.99	150	108	A	V
		2486.36	51.78	-22.22	74	52.58	31.34	4.8	36.94	150	108	P	V
		2484.04	39.93	-14.07	54	40.73	31.34	4.8	36.94	150	108	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Chain Port 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4845	46.42	-27.58	74	41.32	34.93	6.85	36.68	150	0	P	H
HT40		7266	48.29	-25.71	74	40.66	35.76	8.53	36.66	150	147	P	H
CH 03		4845	48.63	-25.37	74	43.53	34.93	6.85	36.68	182	86	P	V
2422MHz		7266	47.43	-26.57	74	39.8	35.76	8.53	36.66	150	311	P	V
802.11n		4875	46.96	-27.04	74	41.8	34.95	6.87	36.66	198	115	P	H
HT40		7311	47.13	-26.87	74	39.49	35.76	8.57	36.69	150	236	P	H
CH 06		4875	48.14	-25.86	74	42.98	34.95	6.87	36.66	168	335	P	V
2437MHz		7311	47.34	-26.66	74	39.7	35.76	8.57	36.69	150	195	P	V
802.11n		4905	46.1	-27.9	74	40.89	34.96	6.9	36.65	150	196	P	H
HT40		7356	48.34	-25.66	74	40.68	35.77	8.64	36.75	150	47	P	H
CH 09		4905	45.58	-28.42	74	40.37	34.96	6.9	36.65	150	145	P	V
2452MHz		7356	47.4	-26.6	74	39.74	35.77	8.64	36.75	195	203	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11b (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Chain Port				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11b LF		30	21.79	-18.21	40	34.46	19.2	0.79	32.66	165	201	P	H
		40.67	20.41	-19.59	40	38.44	13.79	0.79	32.61	-	-	P	H
		51.34	18.12	-21.88	40	41.5	8.44	0.79	32.61	-	-	P	H
		104.69	22.72	-20.78	43.5	42.98	11.34	1.04	32.64	-	-	P	H
		120.21	18.87	-24.63	43.5	38.82	11.46	1.23	32.64	-	-	P	H
		143.49	16	-27.5	43.5	35.68	11.65	1.23	32.56	-	-	P	H
		30.97	27.68	-12.32	40	40.84	18.71	0.79	32.66	175	160	P	V
		35.82	25.27	-14.73	40	40.84	16.26	0.79	32.62	-	-	P	V
		64.92	18.98	-21.02	40	43.63	7.15	0.79	32.59	-	-	P	V
		89.17	16.49	-27.01	43.5	37.98	10.09	1.04	32.62	-	-	P	V
		101.78	15.98	-27.52	43.5	36.25	11.32	1.04	32.63	-	-	P	V
		138.64	14.82	-28.68	43.5	34.55	11.61	1.23	32.57	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	P eak or A verage
H/V	H orizontal or V ertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.