FCC RF Test Report

APPLICANT	:	ZTE CORPORATION
EQUIPMENT	:	LTE uFi
BRAND NAME	:	ZTE
MODEL NAME	:	MF97B_T
FCC ID	:	SRQ-MF97B-T
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was completed and tested on Mar. 10, 2016. 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.

James Huang

Prepared by: James Huang / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

Testing Laboratory 2627

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

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APPENDIX A. RADIATED TEST RESULTS

APPENDIX B. SETUP PHOTOGRAPHS

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4O2101-02C	Rev. 01	This is a variant product of MF97B_T. The product change description could be referred to Appendix C. The test cases were performed on original report which can be referred to Sporton Report Number FR4O2101C with FCC ID: SRQ-MF97B. Based on the original test report, conducted power and radiated spurious emissions were full tested for the differences.	Mar. 16, 2016

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 6.38 dB at 2483.800 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 13.73 dB at 0.160 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	MF97B_T
FCC ID	SRQ-MF97B-T
EUT supports Radios application	WCDMA/HSPA/HSPA+(16QAM uplink is not supported)/ DC-HSDPA/LTE/ WLAN 2.4GHz 802. 11b/g/n HT20/HT40/ WLAN 5GHz 802. 11n HT20/HT40/ Bluetooth v2.1 + EDR/Bluetooth v4.0 LE
HW Version	d96C
SW Version	SPRO2BV1.0.0B01
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 subjective to this standard

<table>
<tr><th colspan="2">Product Specification subjective to this standard</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>802.11b/g/n : 2412 MHz ~ 2462 MHz</td></tr>
<tr><td>Maximum (Peak) Output Power to antenna</td><td>< Chain Port 0>
802.11b : 18.09 dBm (0.0644 W)
802.11g : 19.51 dBm (0.0893 W)
802.11n HT20 : 20.42 dBm (0.1102 W)
802.11n HT40 : 20.35 dBm (0.1084 W)
<Chain Port 1>
802.11b : 17.86 dBm (0.0611 W)
802.11g : 20.41 dBm (0.1099 W)
802.11n HT20 : 21.20 dBm (0.1318 W)
802.11n HT40 : 19.63 dBm (0.0918 W)
<Chain Port 0 + 1>
802.11n HT20 : 21.26 dBm (0.1337 W)
802.11n HT40 : 20.12 dBm (0.1028 W)</td></tr>
<tr><td>Antenna Type / Gain</td><td>WLAN for Chain Port 0: IFA Antenna with gain 1.20 dBi
WLAN for Chain Port 1: IFA Antenna with gain 1.20 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11b : DSSS (DBPSK / DQPSK / CCK)
802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)</td></tr>
<tr><td>Antenna Function for Transmitter</td><td><table>
<tr><th></th><th>Chain Port 0</th><th>Chain Port 1</th></tr>
<tr><td>802.11 b</td><td>V</td><td>V</td></tr>
<tr><td>802.11 g</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n SISO</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n MIMO</td><td>V</td><td>V</td></tr>
</table></td></tr>
</table>

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	149928

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755- 3320-2398	
Test Site No.	**Sporton Site No.**	**FCC Registration No.**
	03CH01-SZ	831040

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 v03r04
- 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. 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.

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	**18.09**	CH 01	18.05	18.02	18.07
CH 06	2437	0	17.62				
CH 11	2462	0	16.92				
CH 01	2412	1	16.88	CH 06	17.81	17.78	17.84
CH 06	2437	1	**17.86**				
CH 11	2462	1	16.92				

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	**19.51**	CH 01	19.26	19.20	18.91	19.03	19.31	19.37	19.21
CH 06	2437	0	19.08								
CH 11	2462	0	18.22								
CH 01	2412	1	19.05	CH 11	20.26	20.04	20.23	20.36	20.38	20.37	20.28
CH 06	2437	1	19.51								
CH 11	2462	1	**20.41**								

2.4GHz 802.11n HT20 Peak Power (dBm)											
Power vs. Channel				Power vs. MCS Index							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	0	18.67	CH 06	20.25	20.14	20.33	20.30	20.35	20.38	20.37
CH 06	2437	0	**20.42**								
CH 11	2462	0	18.28								
CH 01	2412	1	19.34	CH 06	20.98	20.94	21.17	21.16	21.18	21.12	21.15
CH 06	2437	1	**21.20**								
CH 11	2462	1	19.73								
CH 01	2412	0+1(0)	17.48	CH 06	18.28	18.20	18.24	18.29	18.16	18.30	18.27
CH 06	2437	0+1(0)	18.34								
CH 11	2462	0+1(0)	16.11								
CH 01	2412	0+1(1)	17.25	CH 06	18.04	18.01	17.99	18.12	18.07	18.10	18.03
CH 06	2437	0+1(1)	18.15								
CH 11	2462	0+1(1)	15.54								
CH 01	2412	0+1	20.38	CH 06	21.17	21.12	21.13	21.22	21.13	21.21	21.16
CH 06	2437	0+1	**21.26**								
CH 11	2462	0+1	18.84								

2.4GHz 802.11n HT40 Peak Power (dBm)											
Power vs. Channel				Power vs. MCS Index							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	0	18.93	CH 06	20.24	20.27	20.18	19.95	20.05	19.99	20.16
CH 06	2437	0	**20.35**								
CH 09	2452	0	18.84								
CH 03	2422	1	18.38	CH 06	19.46	19.58	19.52	19.44	19.61	19.57	19.54
CH 06	2437	1	**19.63**								
CH 09	2452	1	18.92								
CH 03	2422	0+1(0)	16.42	CH 06	17.07	17.14	17.24	17.17	17.22	17.26	17.23
CH 06	2437	0+1(0)	17.31								
CH 09	2452	0+1(0)	16.34								
CH 03	2422	0+1(1)	16.39	CH 06	16.53	16.48	16.88	16.86	16.84	16.87	16.82
CH 06	2437	0+1(1)	16.89								
CH 09	2452	0+1(1)	16.52								
CH 03	2422	0+1	19.42	CH 06	19.82	19.83	20.07	20.03	20.04	20.08	20.04
CH 06	2437	0+1	**20.12**								
CH 09	2452	0+1	19.44								

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).

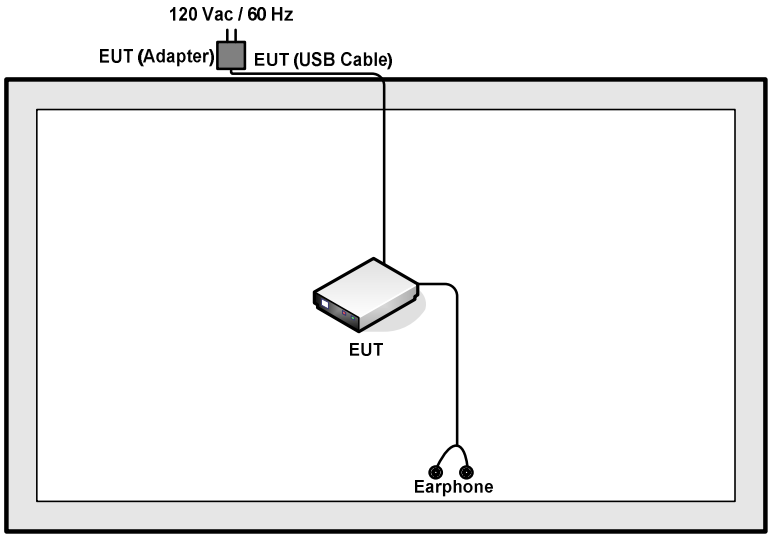
2.3 Test Mode

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

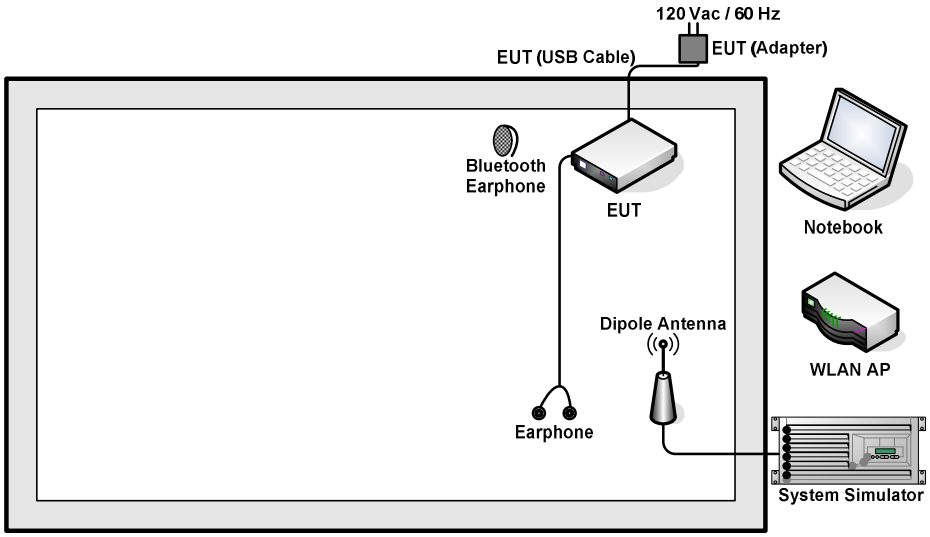
Test Cases				
Conducted TCs	Test Items	Mode	Data Rate	Test Channel
	6dB BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11n HT40	MCS0	3/6/9
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11n HT40	MCS0	3/6/9
	Conducted Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	MCS0	1/11
		802.11n HT40	MCS0	3/9
	Conducted Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11n HT40	MCS0	3/6/9
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	MCS0	1/11
		802.11n HT40	MCS0	3/9
	Radiated Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11n HT40	MCS0	3/6/9
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + Earphone + USB Cable (Charging from Adapter)			
Remark: For radiated TCs, the tests were performed with adapter, earphone 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.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
3.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
4.	Notebook	Lenovo	G480	PRC4	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
5.	Earphone	Lenovo	SH100	N/A	Unshielded, 1.2 m	N/A

2.6 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously 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 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 dB.

Offset (dB) = RF cable loss (dB)

=6 (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.

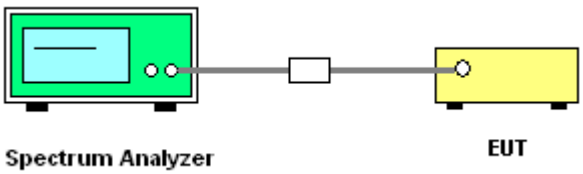
3.1.2 Measuring Instruments

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 v03r04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

3.1.4 Test Setup

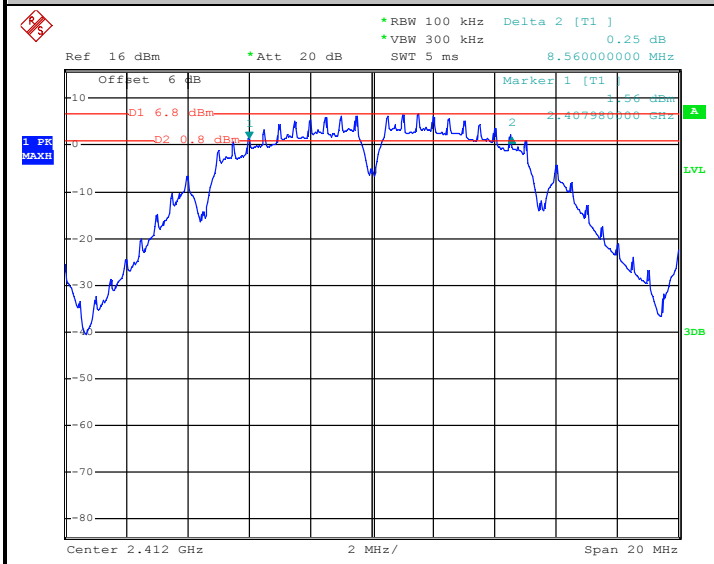


3.1.5 Test Result of 6dB Bandwidth

Test Band :	2.4GHz	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	6dB Bandwidth (MHz)		6dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Chain Port 0	Chain Port 1		
11b	1Mbps	1	1	2412	-	8.56	0.5	Pass
11b	1Mbps	1	6	2437	-	9.08	0.5	Pass
11b	1Mbps	1	11	2462	-	9.04	0.5	Pass
11g	6Mbps	1	1	2412	-	16.04	0.5	Pass
11g	6Mbps	1	6	2437	-	16.36	0.5	Pass
11g	6Mbps	1	11	2462	-	16.28	0.5	Pass
HT20	MCS0	1	1	2412	-	17.20	0.5	Pass
HT20	MCS0	1	6	2437	-	17.56	0.5	Pass
HT20	MCS0	1	11	2462	-	17.56	0.5	Pass
HT40	MCS0	1	3	2422	-	35.68	0.5	Pass
HT40	MCS0	1	6	2437	-	36.32	0.5	Pass
HT40	MCS0	1	9	2452	-	36.36	0.5	Pass
HT20	MCS0	2	1	2412	17.28	17.60	0.5	Pass
HT20	MCS0	2	6	2437	16.32	17.60	0.5	Pass
HT20	MCS0	2	11	2462	17.60	17.60	0.5	Pass
HT40	MCS0	2	3	2422	35.76	35.76	0.5	Pass
HT40	MCS0	2	6	2437	35.16	36.32	0.5	Pass
HT40	MCS0	2	9	2452	35.12	36.32	0.5	Pass

Minimum 6dB Bandwidth



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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.

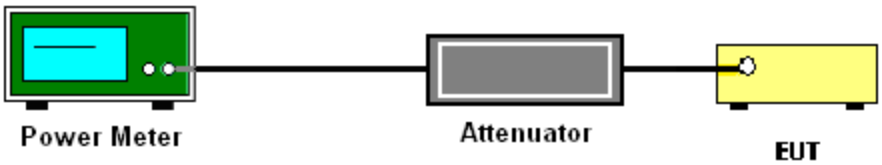
3.2.2 Measuring Instruments

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 v03r04 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

Test Band :	2.4GHz	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Max. Limit (dBm)		DG (dBi)		Pass/Fail
					Chain Port 0	Chain Port 1	SUM	Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	
11b	1Mbps	1	1	2412	18.09	16.88	-	30.00	30.00	1.20	1.20	Pass
11b	1Mbps	1	6	2437	17.62	17.86		30.00	30.00	1.20	1.20	Pass
11b	1Mbps	1	11	2462	16.92	16.92		30.00	30.00	1.20	1.20	Pass
11g	6Mbps	1	1	2412	19.51	19.05		30.00	30.00	1.20	1.20	Pass
11g	6Mbps	1	6	2437	19.08	19.51		30.00	30.00	1.20	1.20	Pass
11g	6Mbps	1	11	2462	18.22	20.41		30.00	30.00	1.20	1.20	Pass
HT20	MCS0	1	1	2412	18.67	19.34		30.00	30.00	1.20	1.20	Pass
HT20	MCS0	1	6	2437	20.42	21.20		30.00	30.00	1.20	1.20	Pass
HT20	MCS0	1	11	2462	18.28	19.73		30.00	30.00	1.20	1.20	Pass
HT40	MCS0	1	3	2422	18.93	18.38		30.00	30.00	1.20	1.20	Pass
HT40	MCS0	1	6	2437	20.35	19.63		30.00	30.00	1.20	1.20	Pass
HT40	MCS0	1	9	2452	18.84	18.92		30.00	30.00	1.20	1.20	Pass
HT20	MCS0	2	1	2412	17.48	17.25	20.38	30.00		1.20		Pass
HT20	MCS0	2	6	2437	18.34	18.15	21.26	30.00		1.20		Pass
HT20	MCS0	2	11	2462	16.11	15.54	18.84	30.00		1.20		Pass
HT40	MCS0	2	3	2422	16.42	16.39	19.42	30.00		1.20		Pass
HT40	MCS0	2	6	2437	17.31	16.89	20.12	30.00		1.20		Pass
HT40	MCS0	2	9	2452	16.34	16.52	19.44	30.00		1.20		Pass

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

3.2.6 Test Result of Average output Power (Reporting Only)

Test Band :	2.4GHz	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	Sum Power
11b	1Mbps	1	1	2412	0.04	0.05	14.69	13.36	-
11b	1Mbps	1	6	2437	0.04	0.05	14.31	14.20	
11b	1Mbps	1	11	2462	0.04	0.05	13.35	13.38	
11g	6Mbps	1	1	2412	0.30	0.30	12.25	12.04	
11g	6Mbps	1	6	2437	0.30	0.30	12.11	12.63	
11g	6Mbps	1	11	2462	0.30	0.30	11.00	13.62	
HT20	MCS0	1	1	2412	0.32	0.32	11.34	11.90	
HT20	MCS0	1	6	2437	0.32	0.32	12.88	14.36	
HT20	MCS0	1	11	2462	0.32	0.32	10.94	12.57	
HT40	MCS0	1	3	2422	0.61	0.62	11.16	10.74	
HT40	MCS0	1	6	2437	0.61	0.62	12.53	12.05	
HT40	MCS0	1	9	2452	0.61	0.62	11.46	11.16	
HT20	MCS0	2	1	2412	0.31	0.32	10.13	9.88	13.02
HT20	MCS0	2	6	2437	0.31	0.32	10.85	10.53	13.70
HT20	MCS0	2	11	2462	0.31	0.32	8.52	8.39	11.47
HT40	MCS0	2	3	2422	0.62	0.63	8.90	8.74	11.83
HT40	MCS0	2	6	2437	0.62	0.63	9.14	8.84	12.00
HT40	MCS0	2	9	2452	0.62	0.63	8.83	8.80	11.83

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 v03r04.
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.

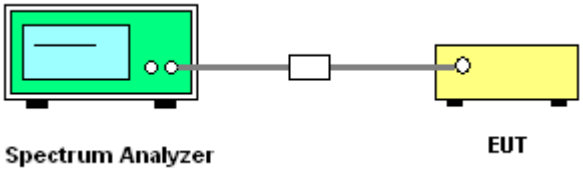
   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   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



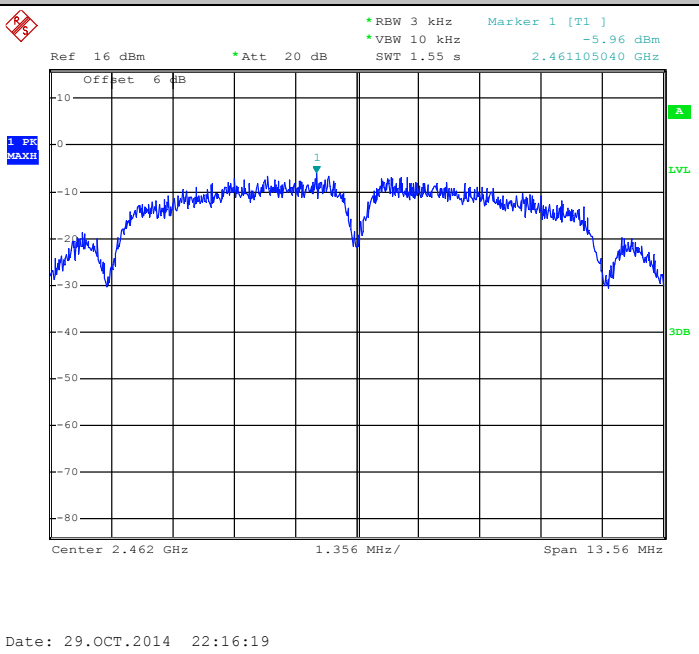
3.3.5 Test Result of Power Spectral Density

Test Band :	2.4GHz	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Peak Power Density (dBm/3kHz)			Max. Limit (dBm/3kHz)		DG (dBi)		Pass/Fail
					Chain Port 0	Chain Port 1	Worst +10log(2)	Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	
11b	1Mbps	1	1	2412	-	-8.20	-	8.00	8.00	1.20	1.20	Pass
11b	1Mbps	1	6	2437	-	-6.53		8.00	8.00	1.20	1.20	Pass
11b	1Mbps	1	11	2462	-	-5.96		8.00	8.00	1.20	1.20	Pass
11g	6Mbps	1	1	2412	-	-11.66		8.00	8.00	1.20	1.20	Pass
11g	6Mbps	1	6	2437	-	-9.31		8.00	8.00	1.20	1.20	Pass
11g	6Mbps	1	11	2462	-	-9.02		8.00	8.00	1.20	1.20	Pass
HT20	MCS0	1	1	2412	-	-11.32		8.00	8.00	1.20	1.20	Pass
HT20	MCS0	1	6	2437	-	-10.38		8.00	8.00	1.20	1.20	Pass
HT20	MCS0	1	11	2462	-	-10.70		8.00	8.00	1.20	1.20	Pass
HT40	MCS0	1	3	2422	-	-15.50		8.00	8.00	1.20	1.20	Pass
HT40	MCS0	1	6	2437	-	-14.85		8.00	8.00	1.20	1.20	Pass
HT40	MCS0	1	9	2452	-	-16.04		8.00	8.00	1.20	1.20	Pass
HT20	MCS0	2	1	2412	-14.23	-13.15	-10.14	8.00		4.21		Pass
HT20	MCS0	2	6	2437	-13.80	-13.82	-10.79	8.00		4.21		Pass
HT20	MCS0	2	11	2462	-15.44	-13.16	-10.15	8.00		4.21		Pass
HT40	MCS0	2	3	2422	-18.40	-17.70	-14.69	8.00		4.21		Pass
HT40	MCS0	2	6	2437	-18.16	-18.47	-15.15	8.00		4.21		Pass
HT40	MCS0	2	9	2452	-17.94	-16.96	-13.95	8.00		4.21		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).

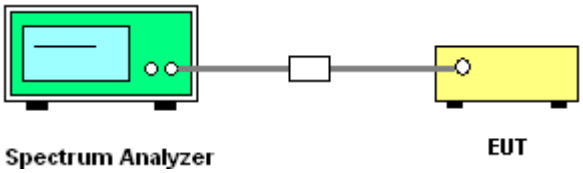
3.4.2 Measuring Instruments

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 v03r04.
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



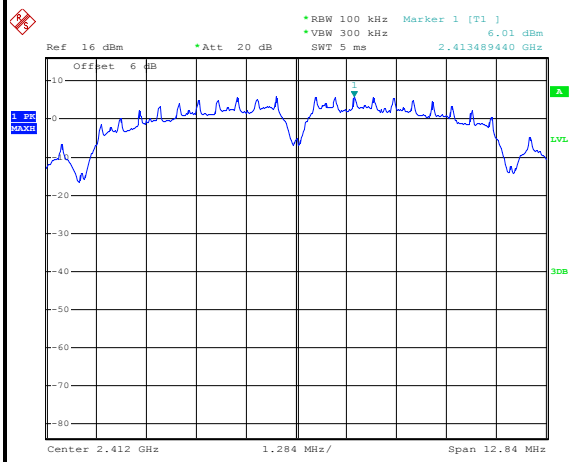
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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

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

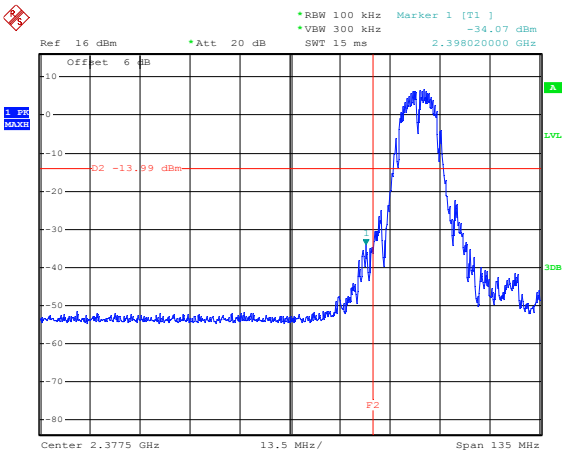
WLAN 802.11b Channel 01

100kHz PSD reference Level



Date: 29.OCT.2014 21:56:39

Low Channel Plot



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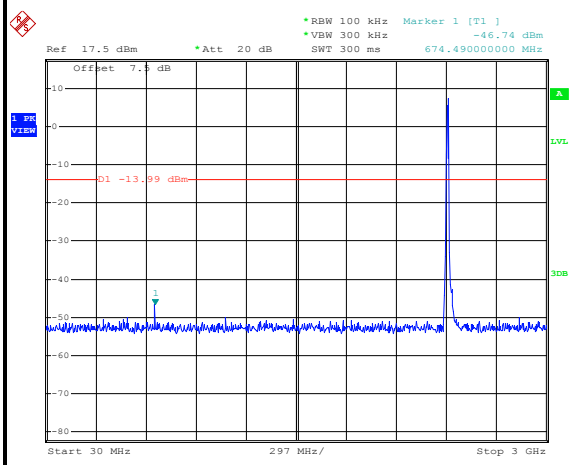
Spurious Emission 30MHz~3GHz



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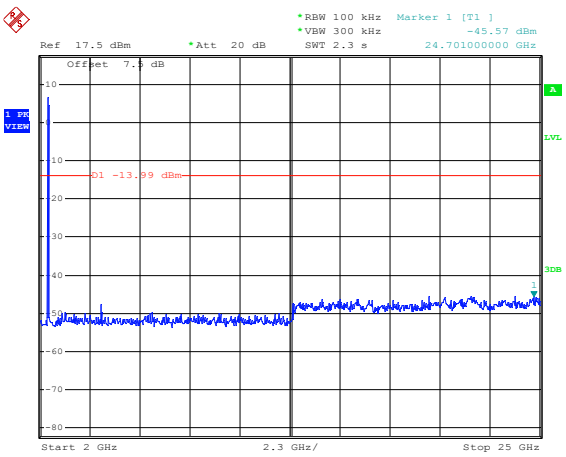
Spurious Emission 2GHz~25GHz

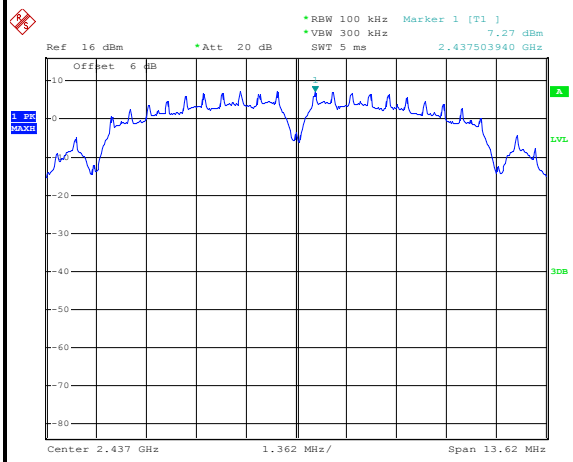


Date: 29.OCT.2014 21:57:31

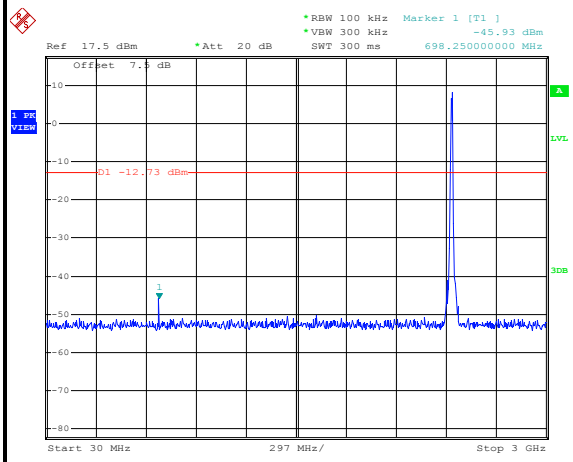
Number of TX :	1	**Chain Port:**	1
Test Mode :	802.11b	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11b Channel 06

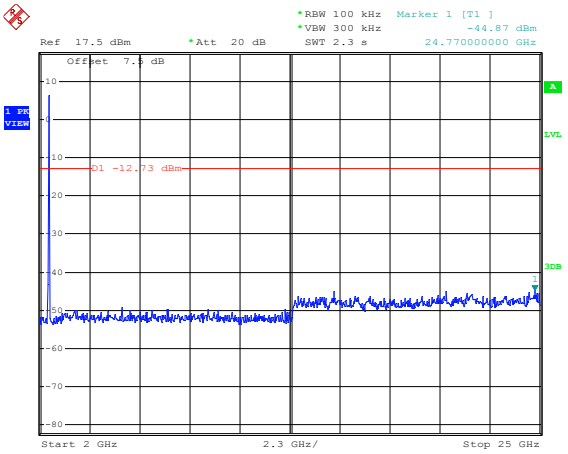
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



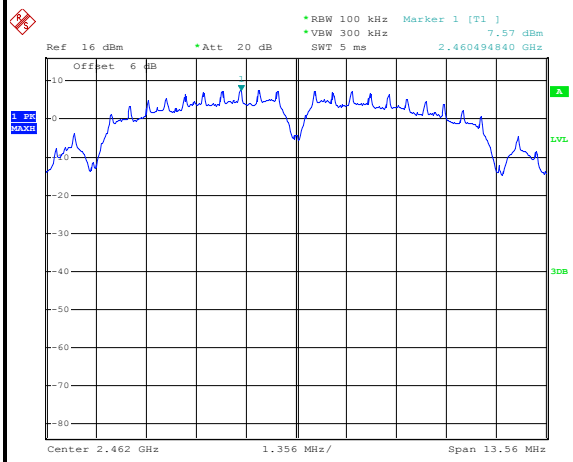
Spurious Emission 2GHz~25GHz



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

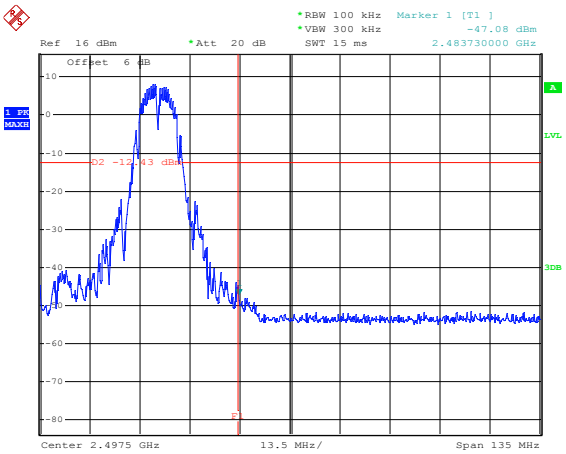
WLAN 802.11b Channel 11

100kHz PSD reference Level



Date: 29.OCT.2014 22:16:28

High Channel Plot



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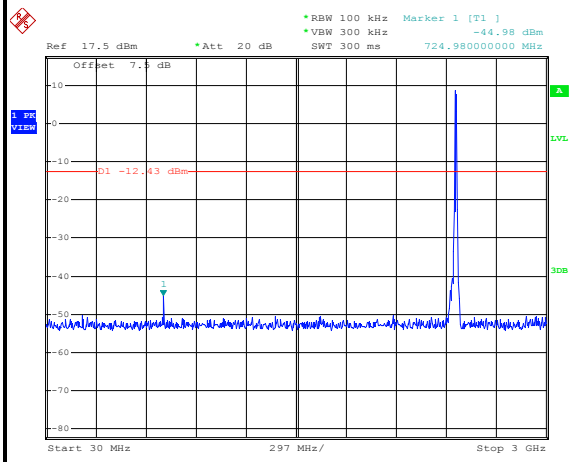
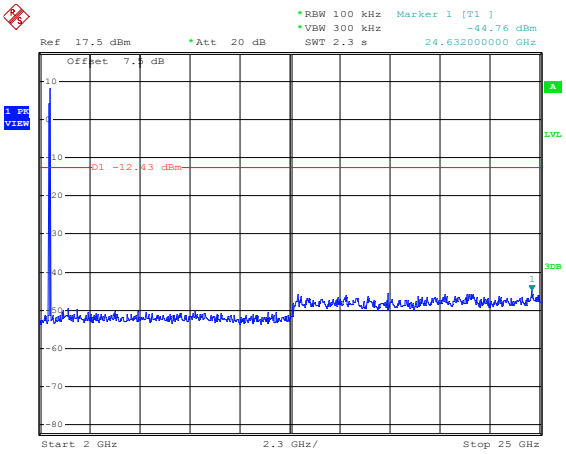
Spurious Emission 30MHz~3GHz



Date: 29.OCT.2014 22:17:01

Spurious Emission 2GHz~25GHz

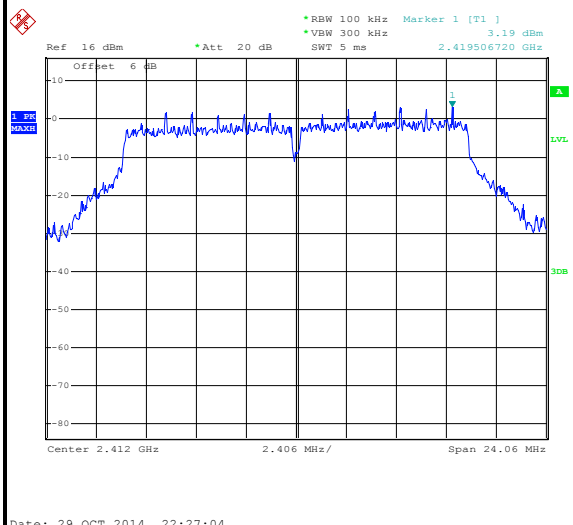


Date: 29.OCT.2014 22:17:19

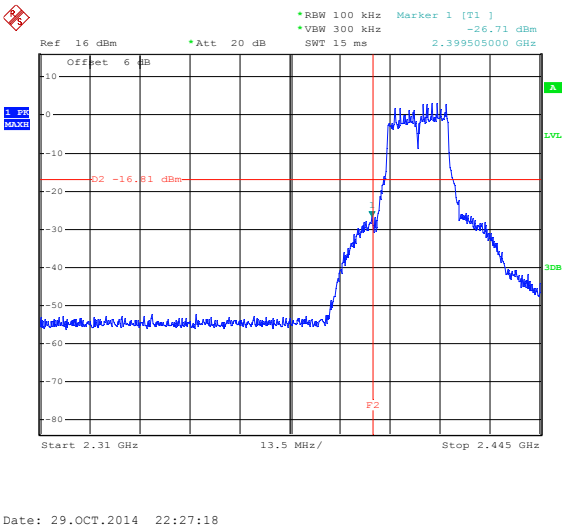
Number of TX :	1	**Chain Port:**	1
Test Mode :	802.11g	**Temperature :**	24~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	01	**Test Engineer :**	Issac Song

WLAN 802.11g Channel 01

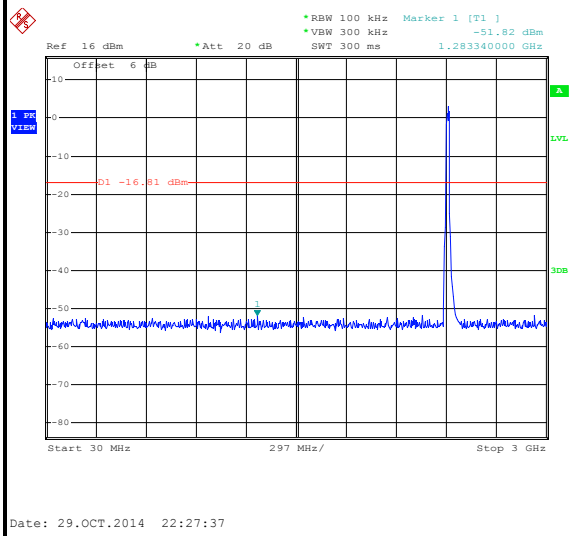
100kHz PSD reference Level



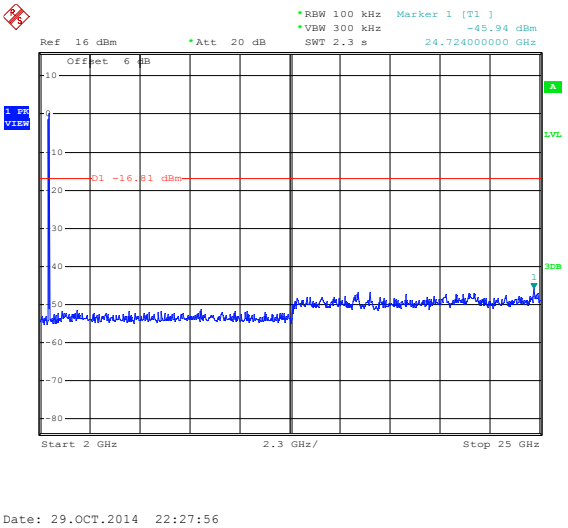
Low Channel Plot



Spurious Emission 30MHz~3GHz



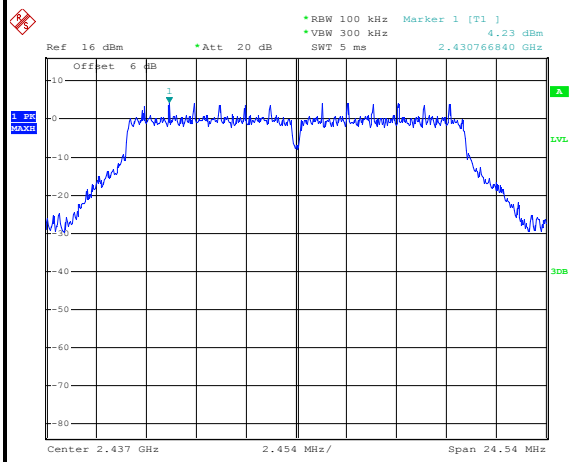
Spurious Emission 2GHz~25GHz



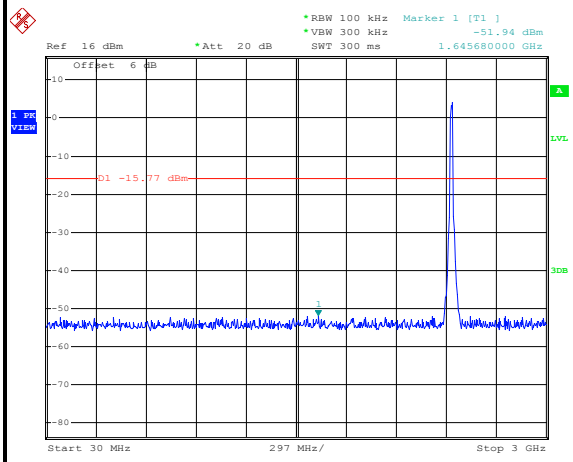
Number of TX :	1	**Chain Port:**	1
Test Mode :	802.11g	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11g Channel 06

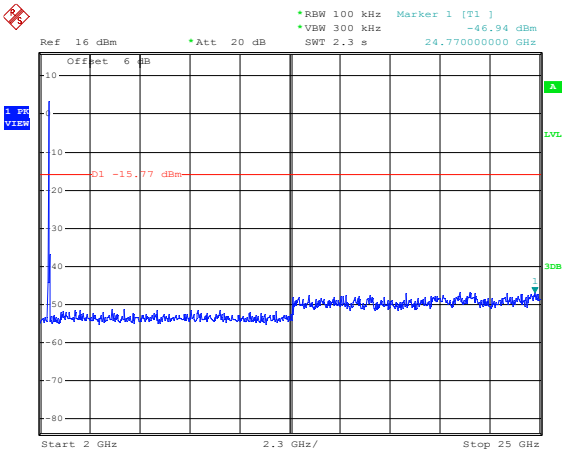
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



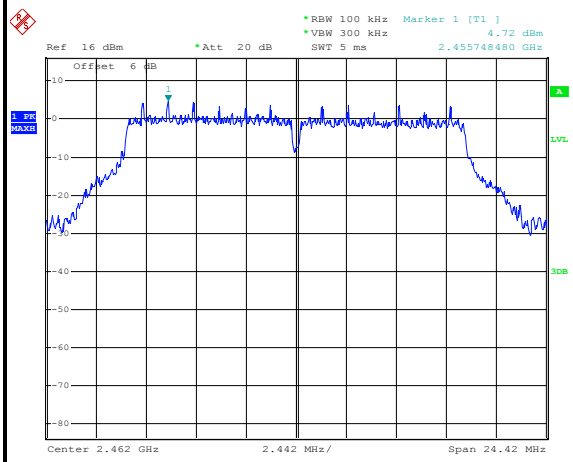
Spurious Emission 2GHz~25GHz



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

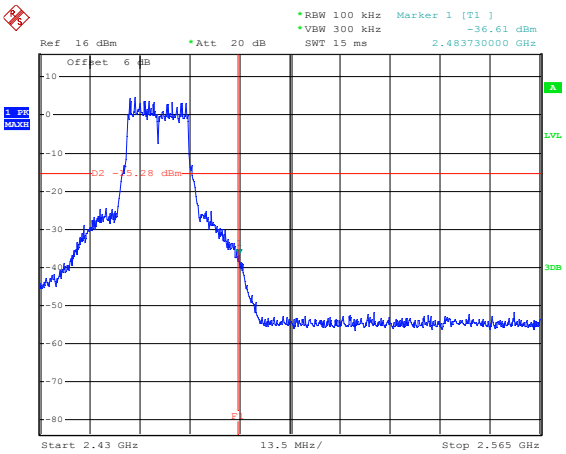
WLAN 802.11g Channel 11

100kHz PSD reference Level



Date: 29.OCT.2014 22:34:51

High Channel Plot



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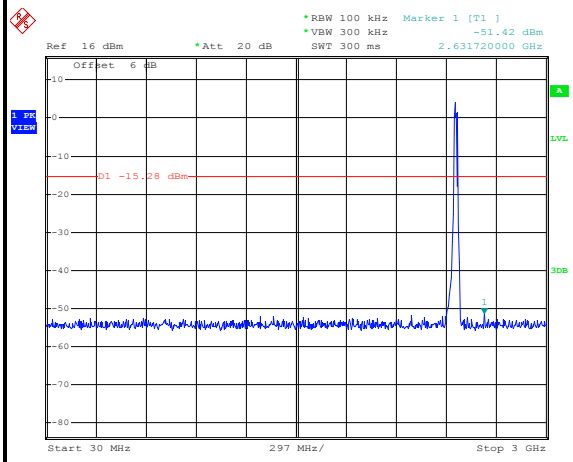
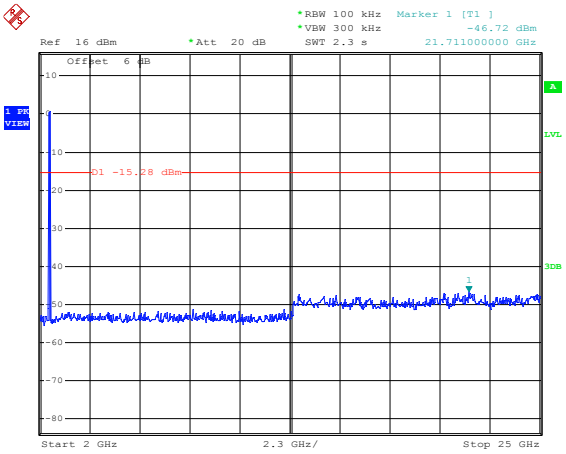
Spurious Emission 30MHz~3GHz



Date: 29.OCT.2014 22:35:24

Spurious Emission 2GHz~25GHz

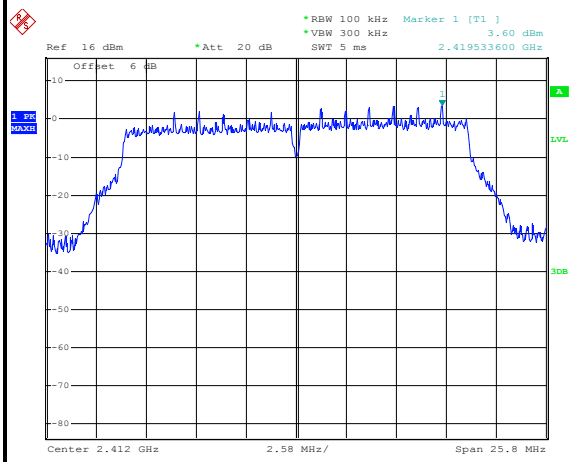


Date: 29.OCT.2014 22:35:43

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

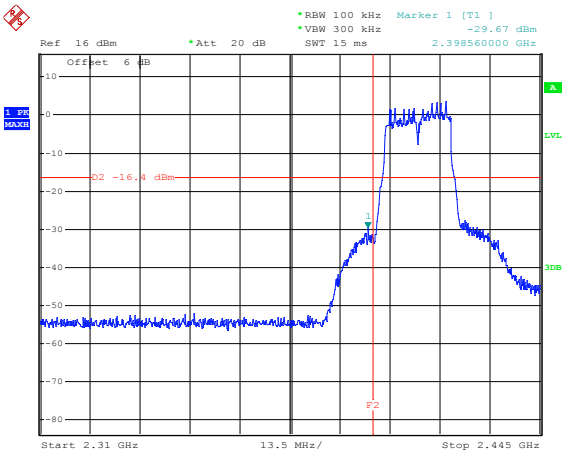
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



Date: 29.OCT.2014 23:12:19

Low Channel Plot



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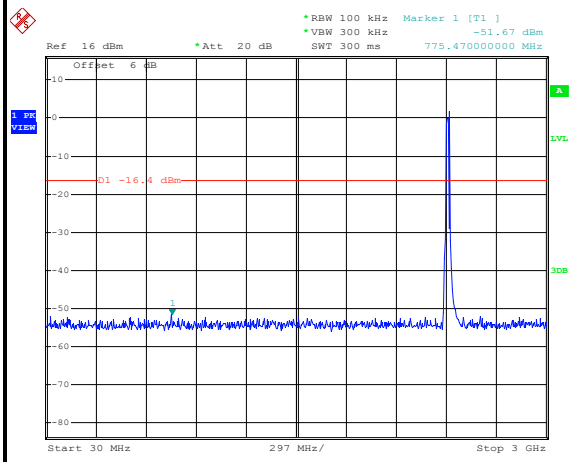
Spurious Emission 30MHz~3GHz



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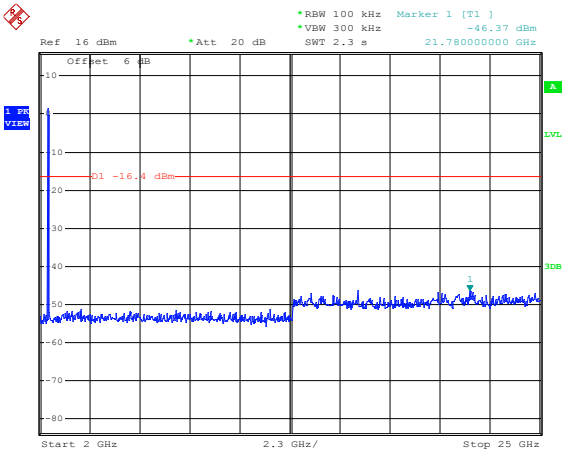
Spurious Emission 2GHz~25GHz

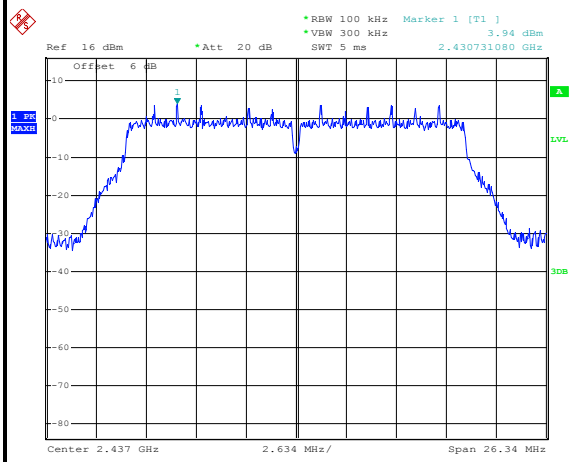


Date: 29.OCT.2014 23:13:11

Number of TX :	1	**Chain Port:**	1
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
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



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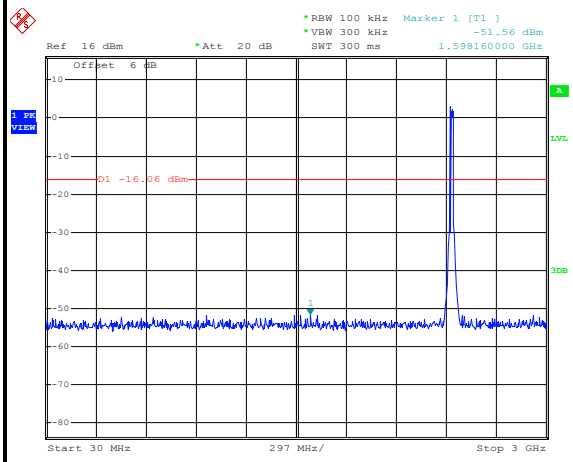
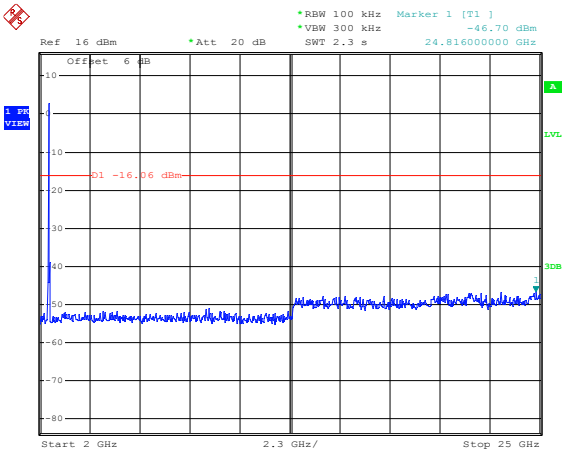
Spurious Emission 30MHz~3GHz



Date: 29.OCT.2014 23:15:52

Spurious Emission 2GHz~25GHz

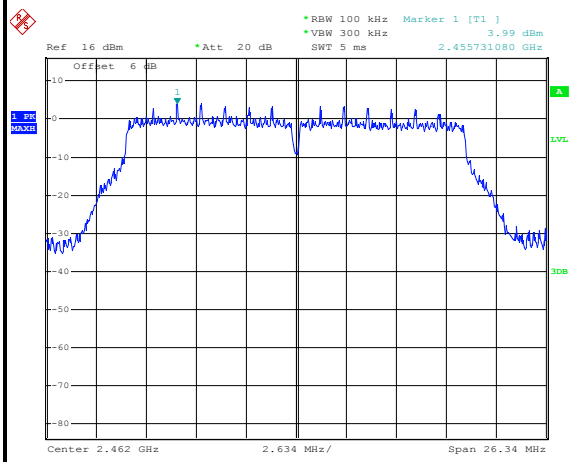


Date: 29.OCT.2014 23:16:10

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

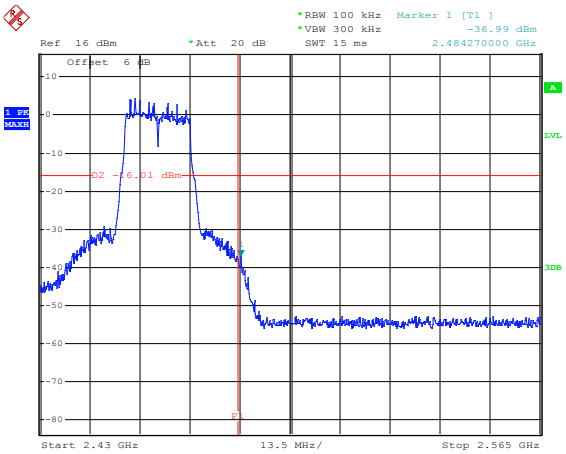
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



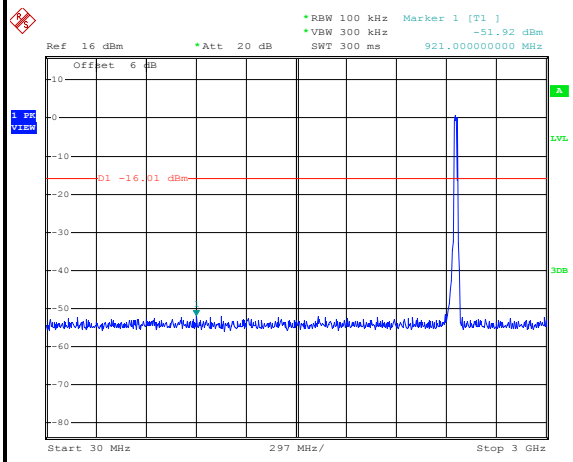
Date: 29.OCT.2014 23:18:31

High Channel Plot



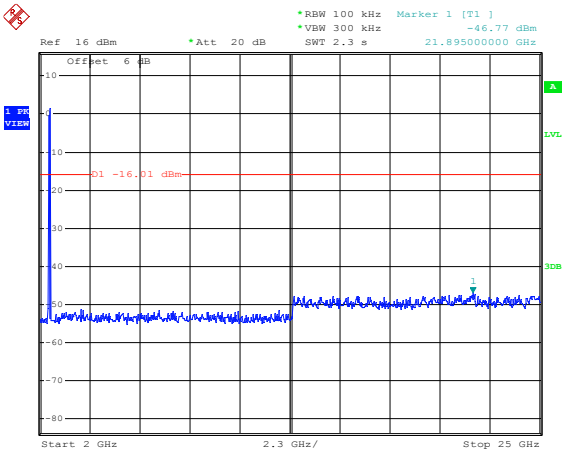
Date: 29.OCT.2014 23:18:45

Spurious Emission 30MHz~3GHz



Date: 29.OCT.2014 23:19:04

Spurious Emission 2GHz~25GHz

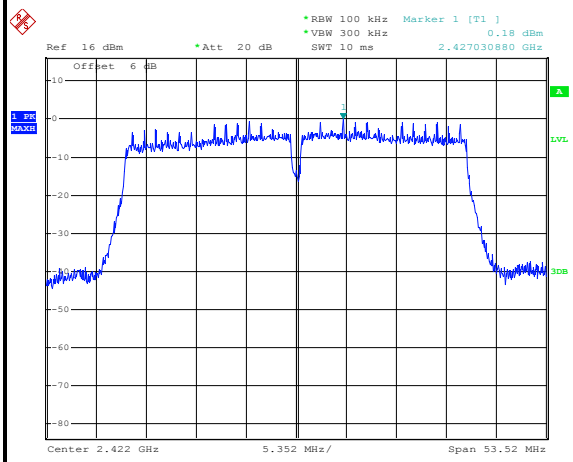


Date: 29.OCT.2014 23:19:23

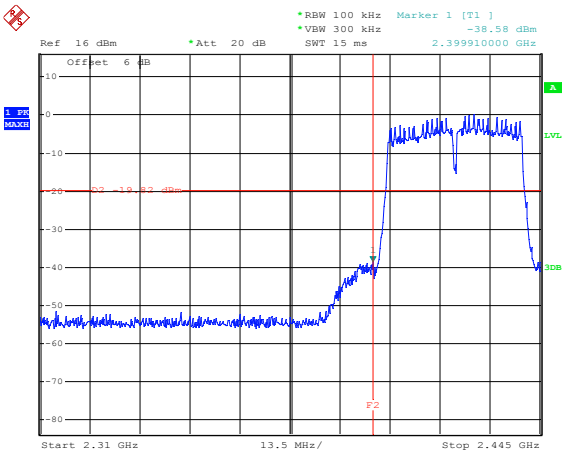
Number of TX :	1	**Chain Port:**	1
Test Mode :	802.11n HT40	**Temperature :**	24~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	03	**Test Engineer :**	Issac Song

WLAN 802.11n HT40 Channel 03

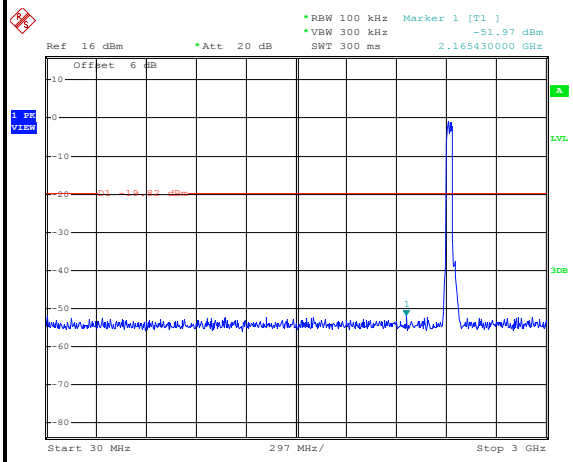
100kHz PSD reference Level



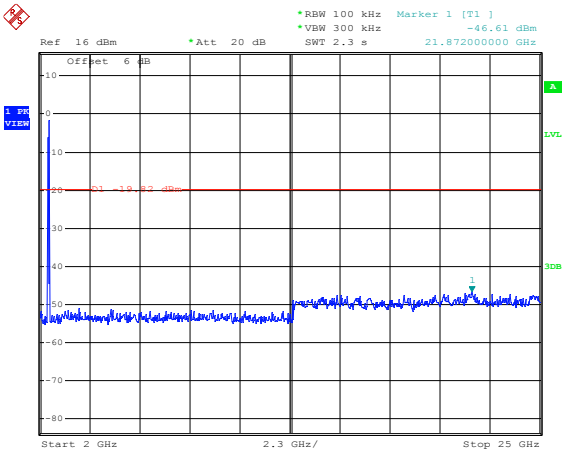
Low Channel Plot



Spurious Emission 30MHz~3GHz



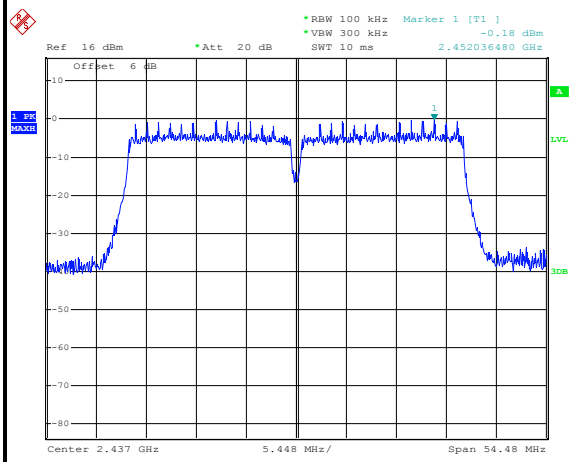
Spurious Emission 2GHz~25GHz



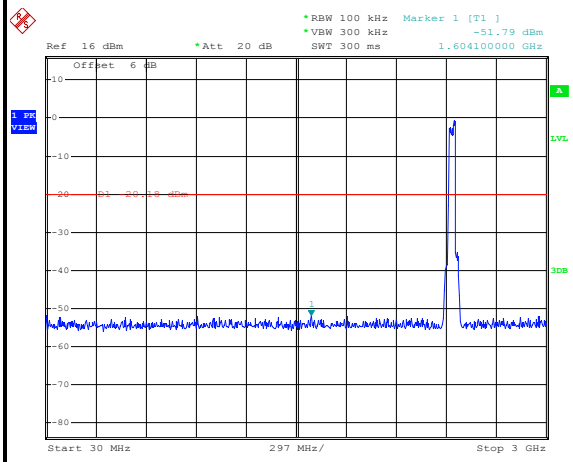
Number of TX :	1	**Chain Port:**	1
Test Mode :	802.11n HT40	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11n HT40 Channel 06

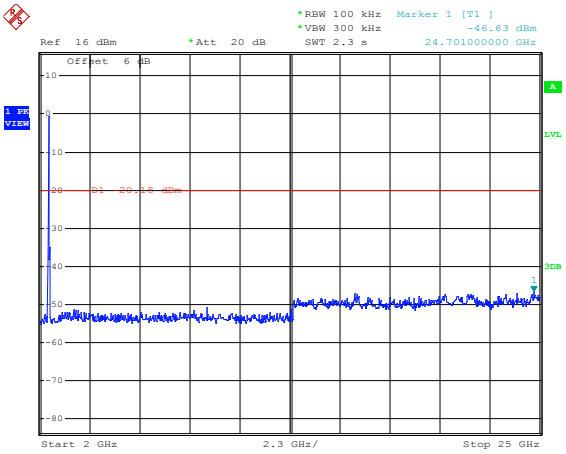
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



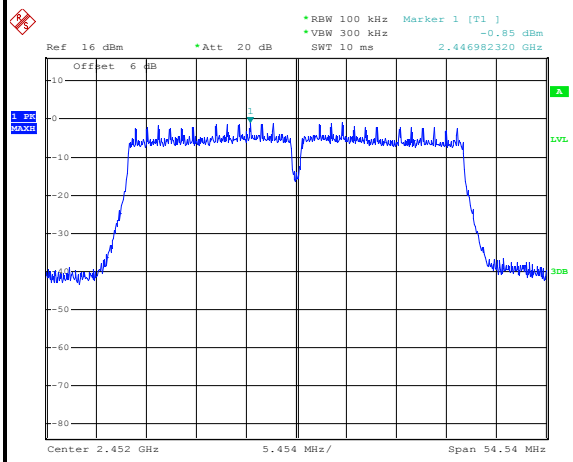
Spurious Emission 2GHz~25GHz



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

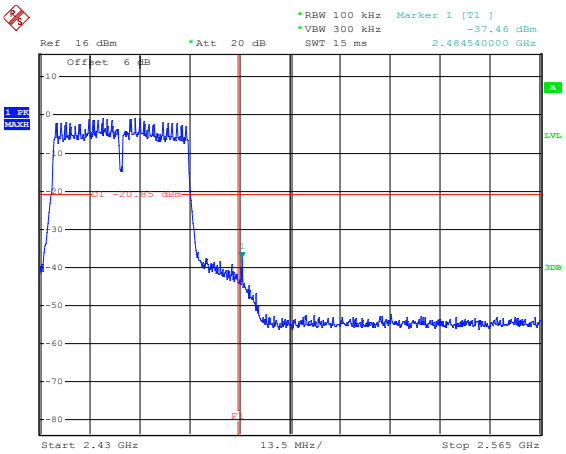
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



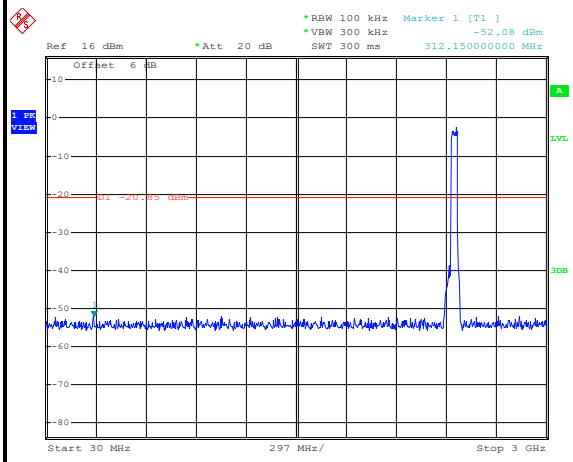
Date: 31.OCT.2014 20:29:19

High Channel Plot



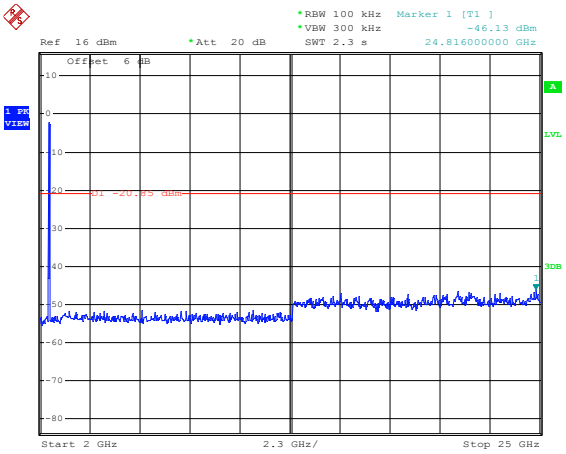
Date: 31.OCT.2014 20:31:03

Spurious Emission 30MHz~3GHz



Date: 31.OCT.2014 20:31:32

Spurious Emission 2GHz~25GHz



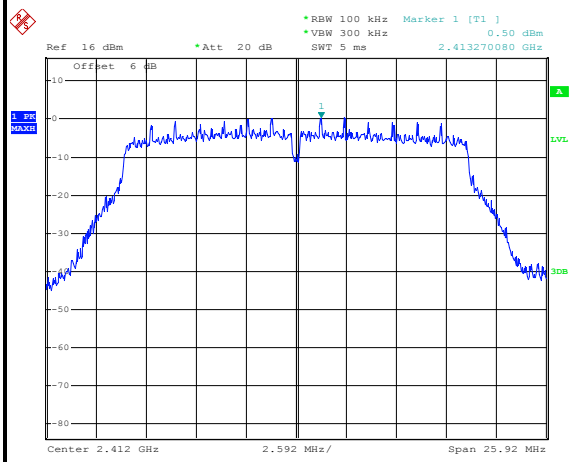
Date: 31.OCT.2014 20:31:50

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℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	01	**Test Engineer :**	Issac Song

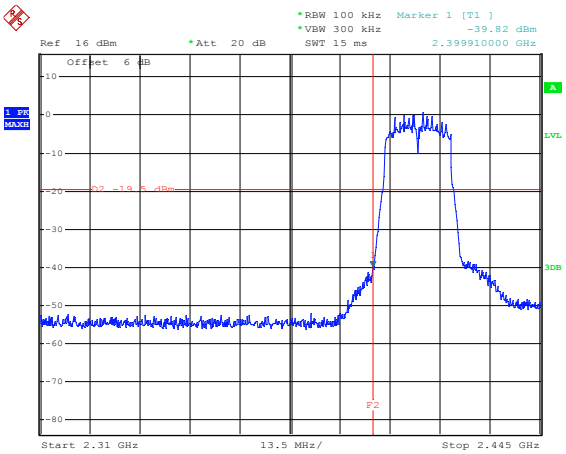
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



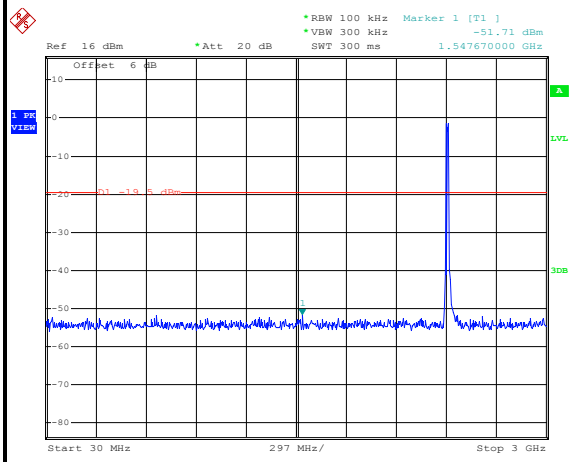
Date: 29.OCT.2014 23:31:30

Low Channel Plot



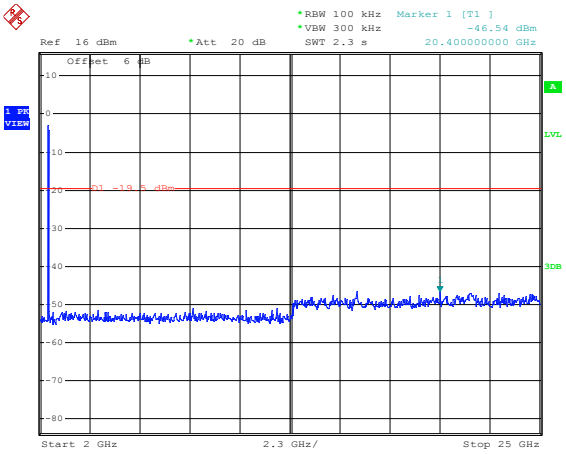
Date: 29.OCT.2014 23:33:50

Spurious Emission 30MHz~3GHz



Date: 29.OCT.2014 23:32:03

Spurious Emission 2GHz~25GHz

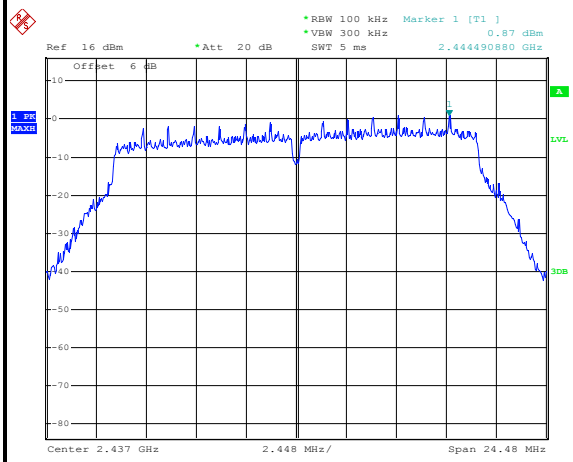


Date: 29.OCT.2014 23:32:22

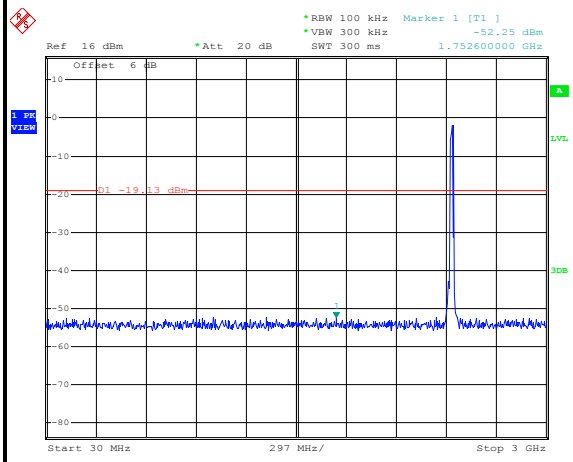
Number of TX :	2	**Chain Port:**	0+1(0)
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 06

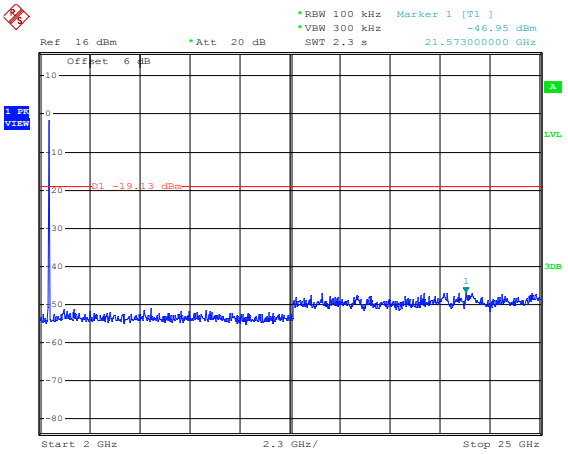
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



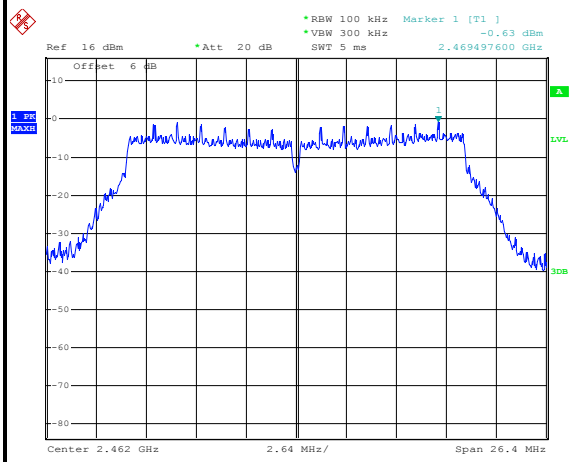
Spurious Emission 2GHz~25GHz



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

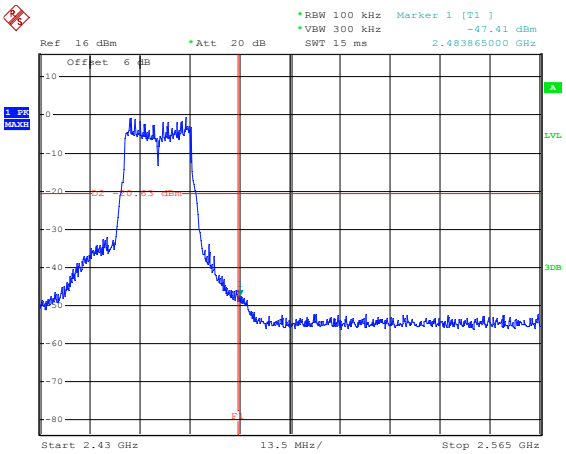
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



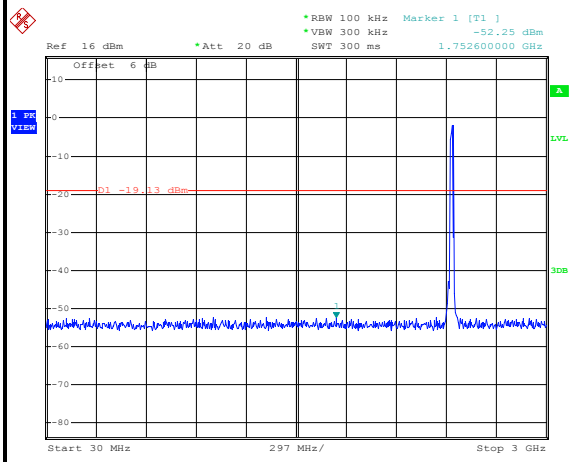
Date: 29.OCT.2014 23:45:09

High Channel Plot



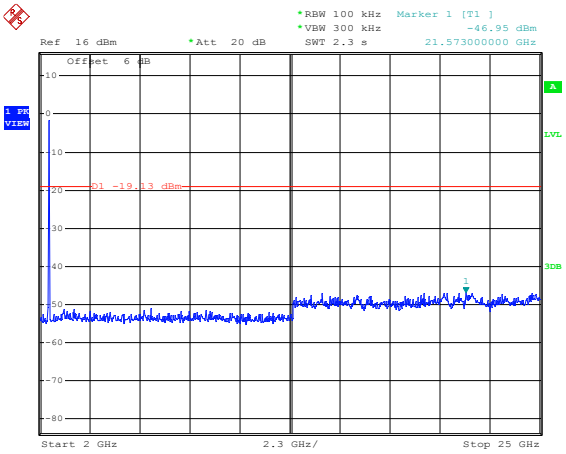
Date: 29.OCT.2014 23:45:23

Spurious Emission 30MHz~3GHz



Date: 29.OCT.2014 23:37:09

Spurious Emission 2GHz~25GHz

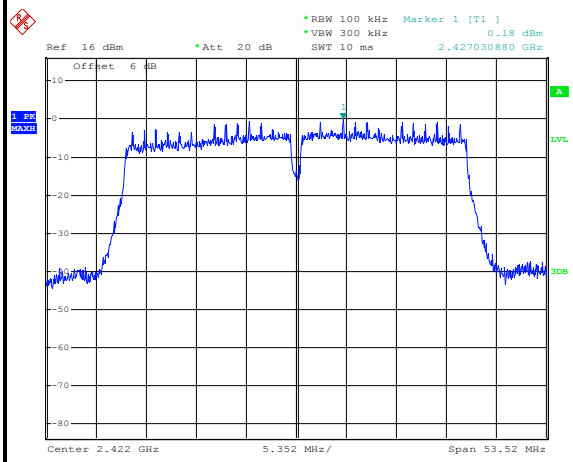


Date: 29.OCT.2014 23:37:28

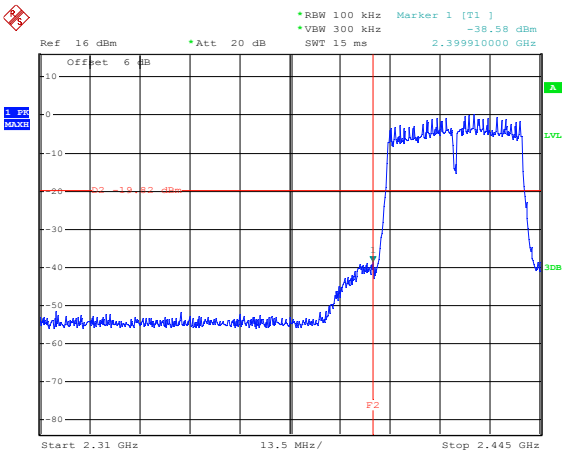
Number of TX :	2	**Chain Port:**	0+1(0)
Test Mode :	802.11n HT40	**Temperature :**	24~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	03	**Test Engineer :**	Issac Song

WLAN 802.11n HT40 Channel 03

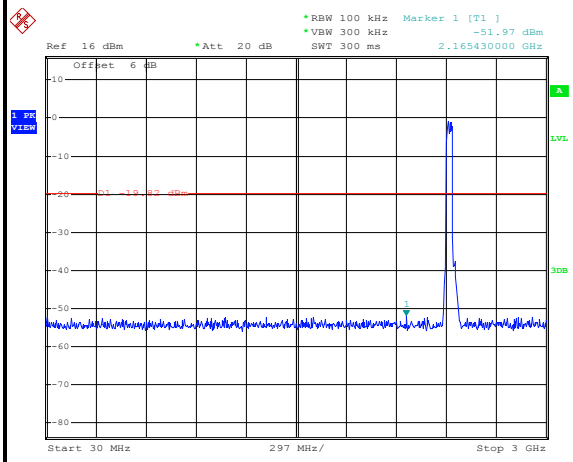
100kHz PSD reference Level



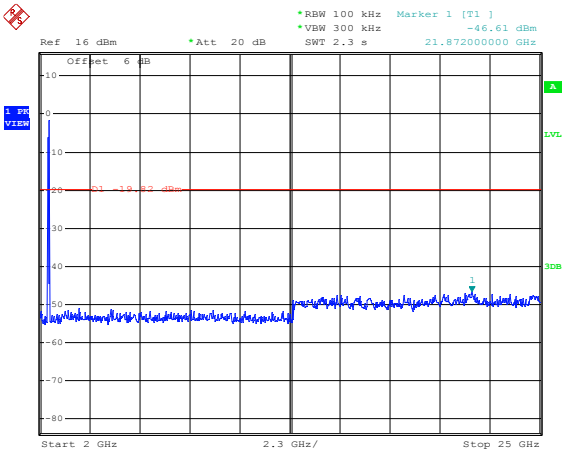
Low Channel Plot



Spurious Emission 30MHz~3GHz



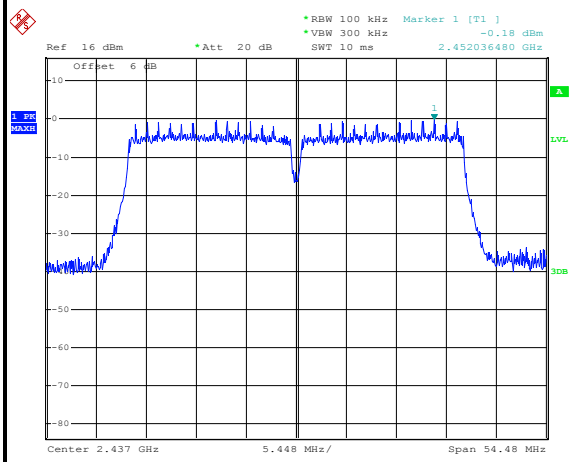
Spurious Emission 2GHz~25GHz



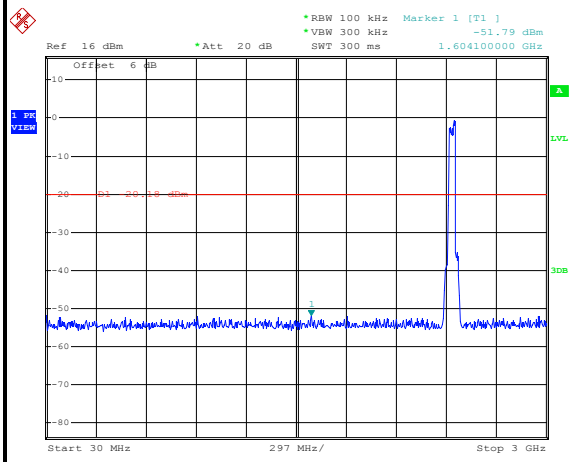
Number of TX :	2	**Chain Port:**	0+1(0)
Test Mode :	802.11n HT40	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11n HT40 Channel 06

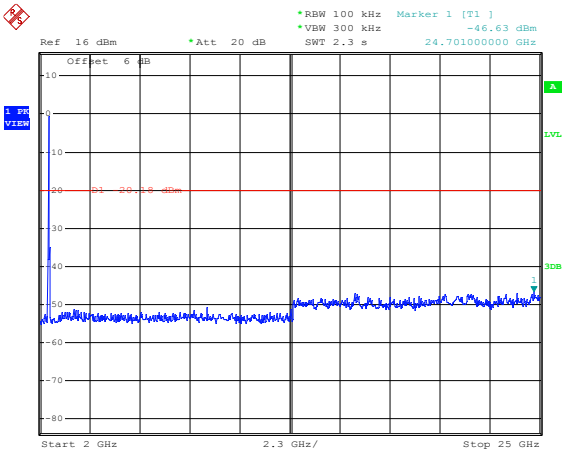
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



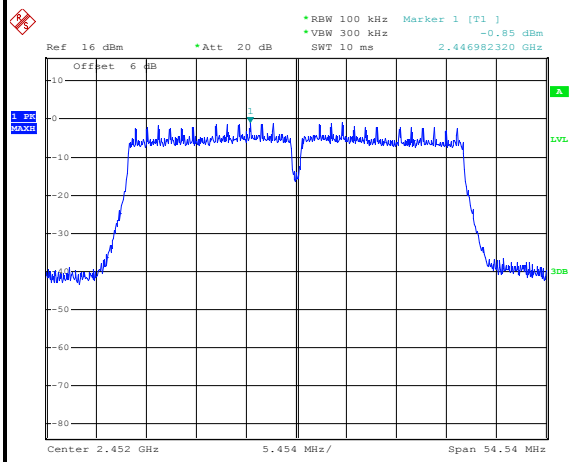
Spurious Emission 2GHz~25GHz



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

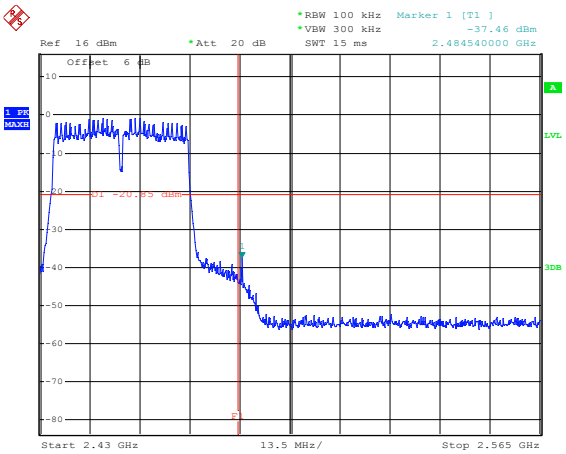
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



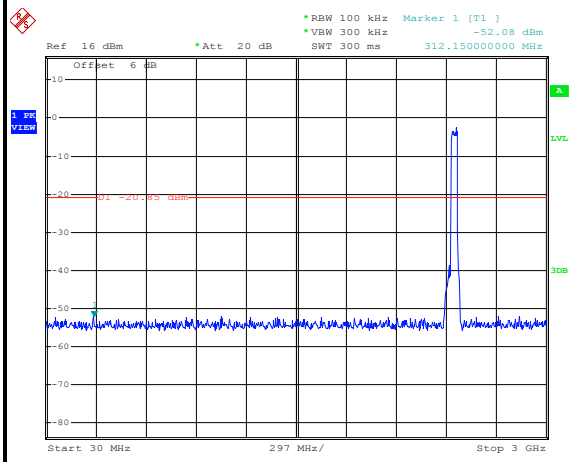
Date: 31.OCT.2014 20:29:19

High Channel Plot



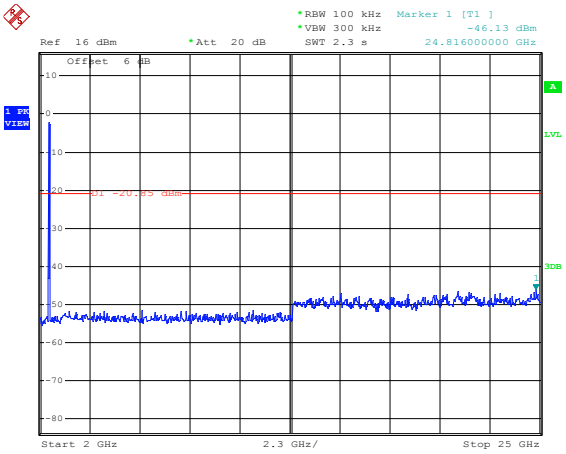
Date: 31.OCT.2014 20:31:03

Spurious Emission 30MHz~3GHz



Date: 31.OCT.2014 20:31:32

Spurious Emission 2GHz~25GHz



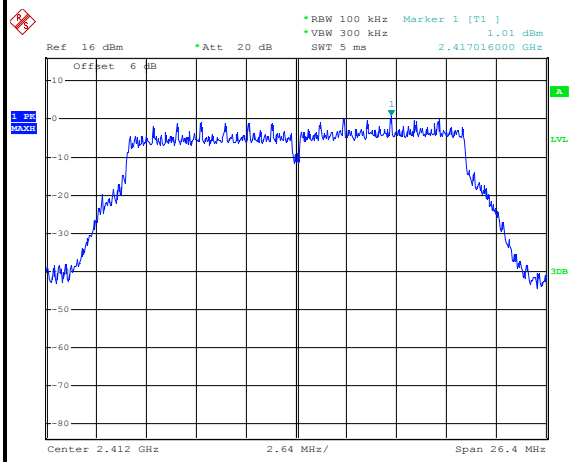
Date: 31.OCT.2014 20:31:50

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℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	01	**Test Engineer :**	Issac Song

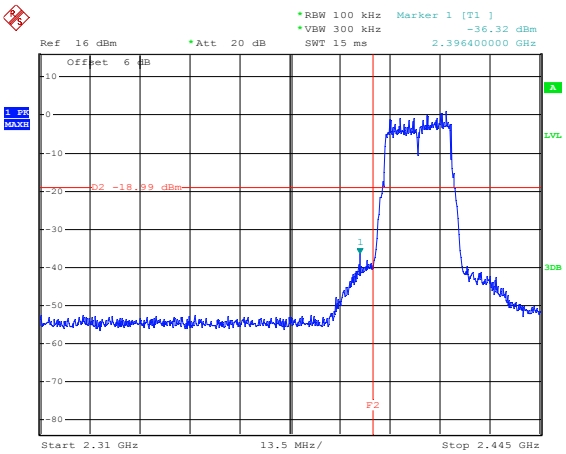
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



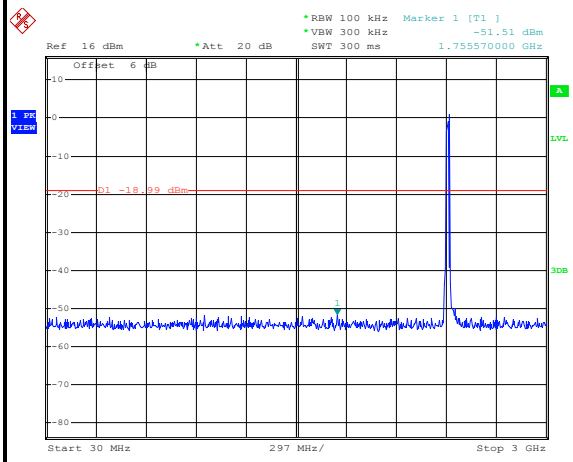
Date: 29.OCT.2014 23:27:43

Low Channel Plot



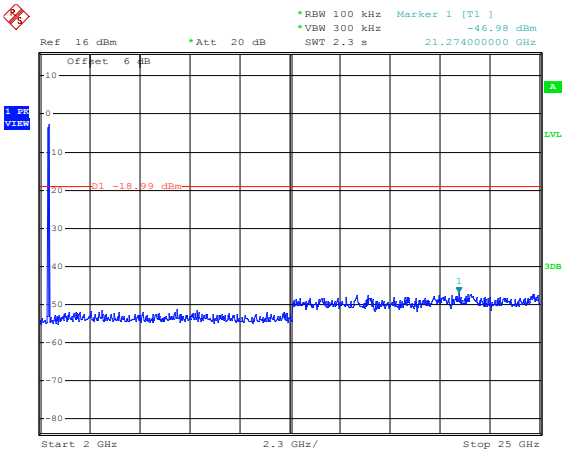
Date: 29.OCT.2014 23:27:57

Spurious Emission 30MHz~3GHz



Date: 29.OCT.2014 23:28:16

Spurious Emission 2GHz~25GHz

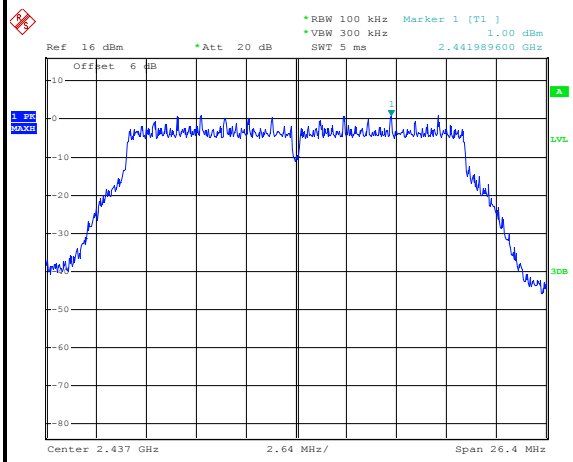


Date: 29.OCT.2014 23:28:35

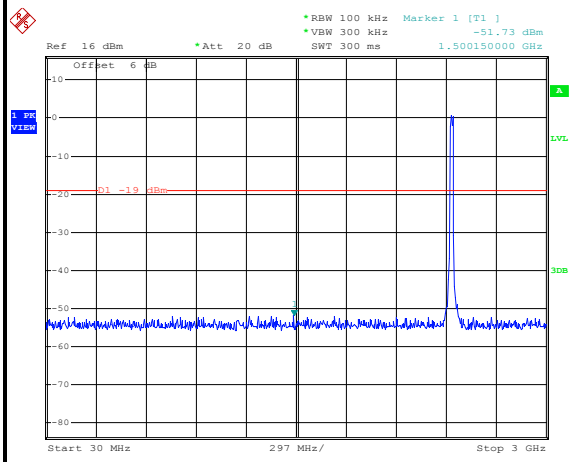
Number of TX :	2	**Chain Port:**	0+1(1)
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 06

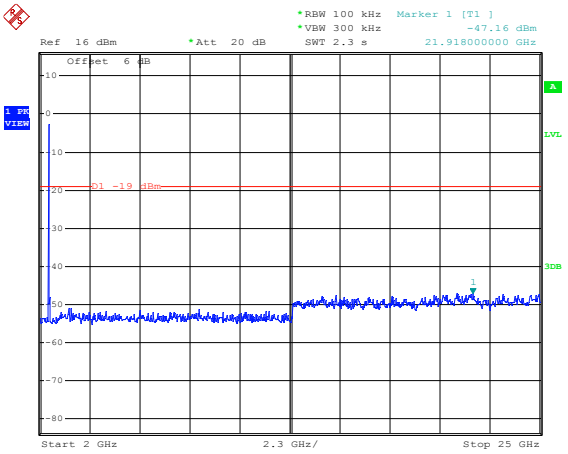
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



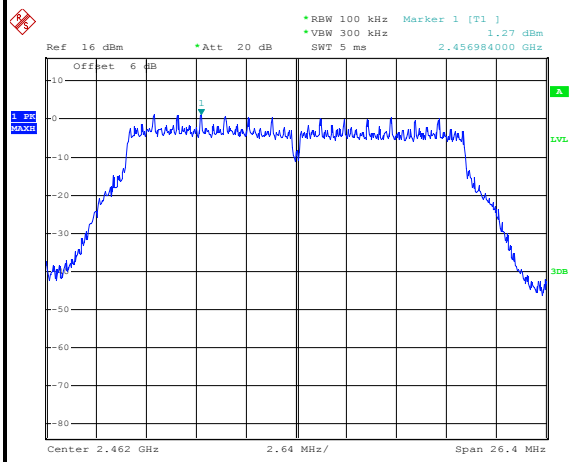
Spurious Emission 2GHz~25GHz



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

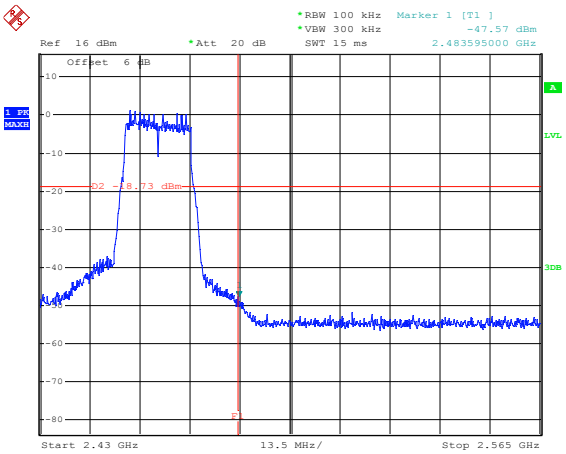
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



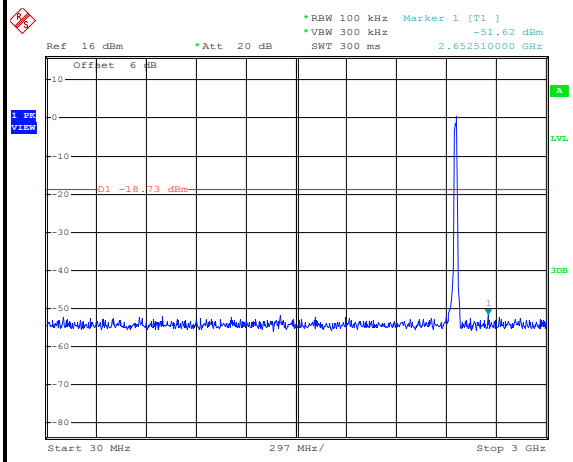
Date: 29.OCT.2014 23:42:08

High Channel Plot



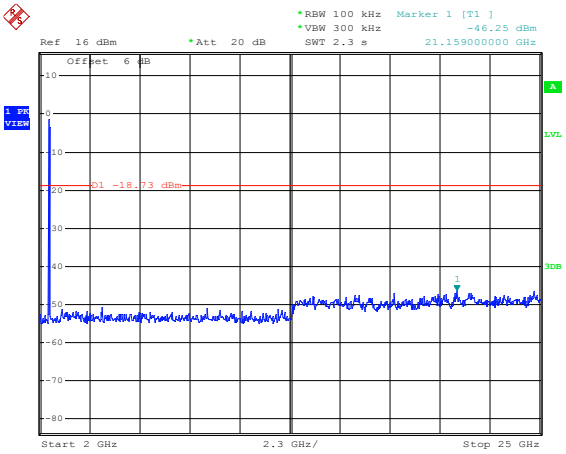
Date: 29.OCT.2014 23:42:22

Spurious Emission 30MHz~3GHz



Date: 29.OCT.2014 23:42:42

Spurious Emission 2GHz~25GHz

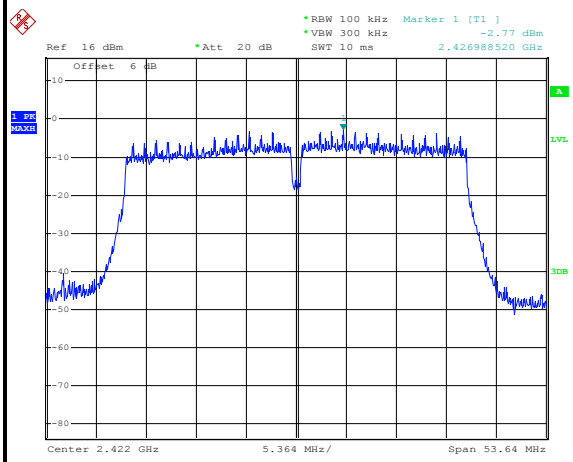


Date: 29.OCT.2014 23:43:00

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

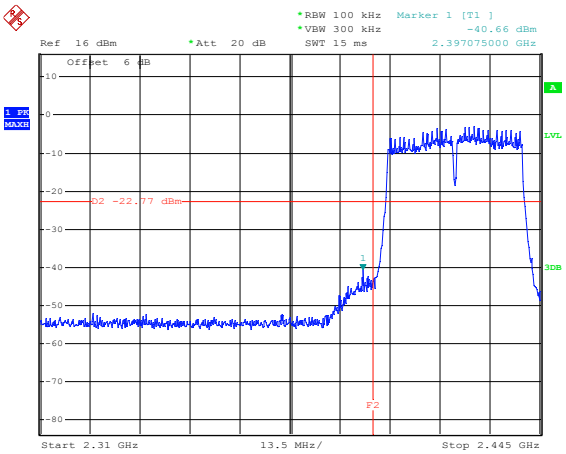
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



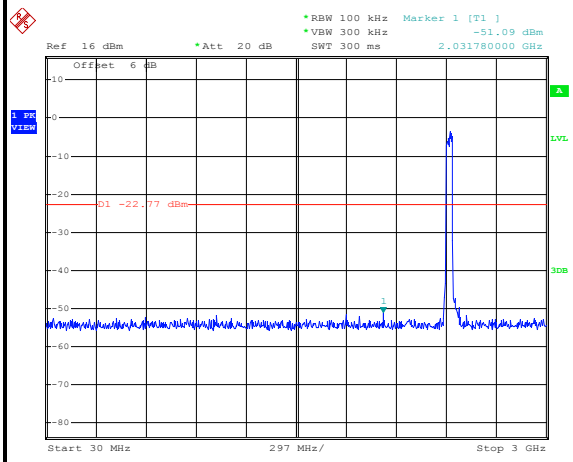
Date: 30.OCT.2014 00:19:17

Low Channel Plot



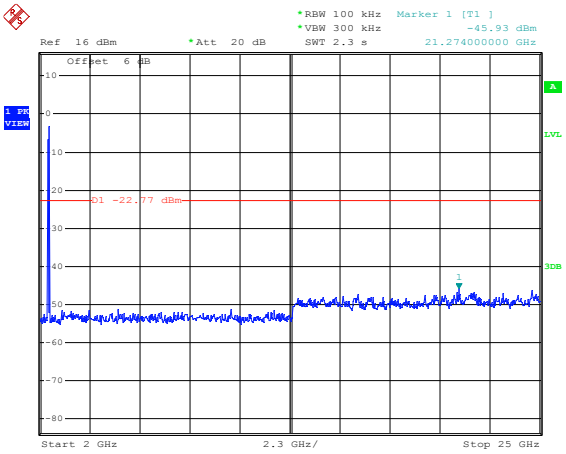
Date: 30.OCT.2014 00:19:31

Spurious Emission 30MHz~3GHz



Date: 30.OCT.2014 00:19:50

Spurious Emission 2GHz~25GHz

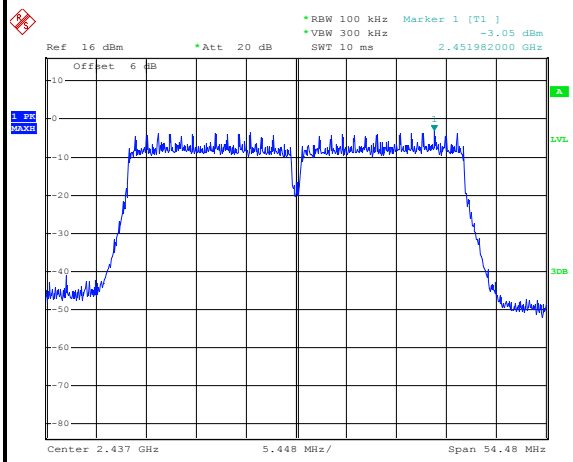


Date: 30.OCT.2014 00:20:09

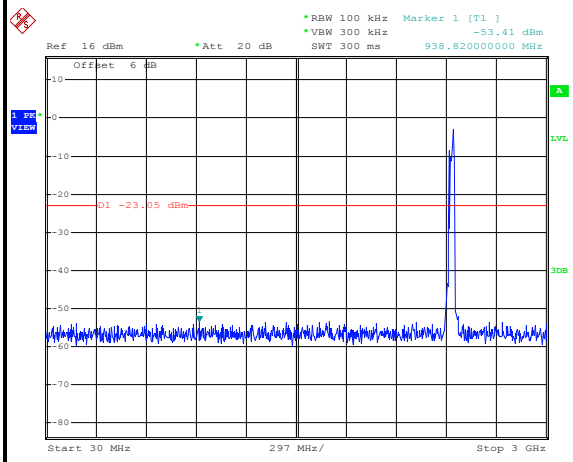
Number of TX :	2	**Chain Port:**	0+1(1)
Test Mode :	802.11n HT40	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11n HT40 Channel 06

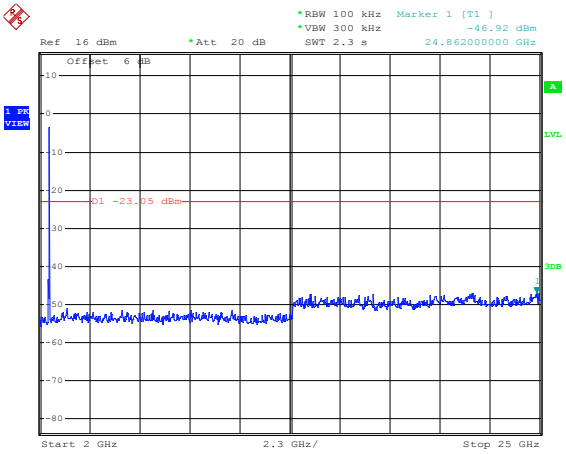
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



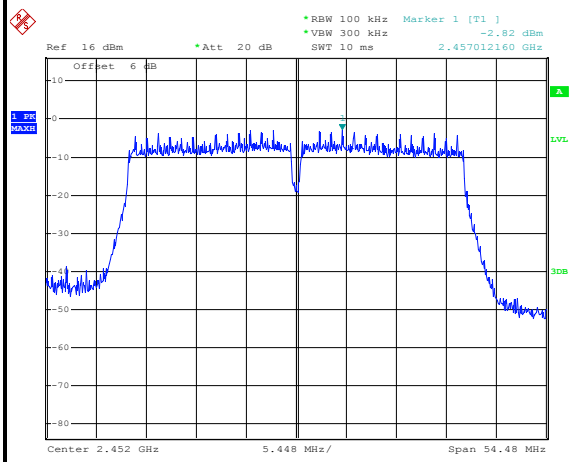
Spurious Emission 2GHz~25GHz



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

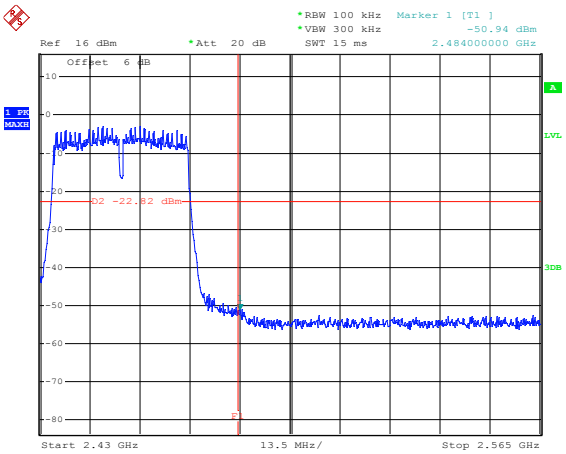
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



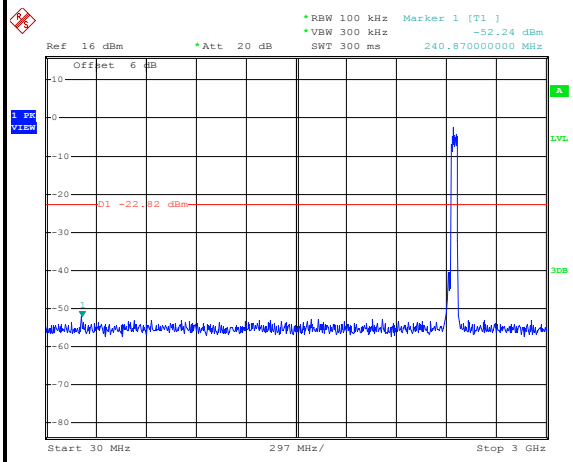
Date: 30.OCT.2014 00:39:29

High Channel Plot



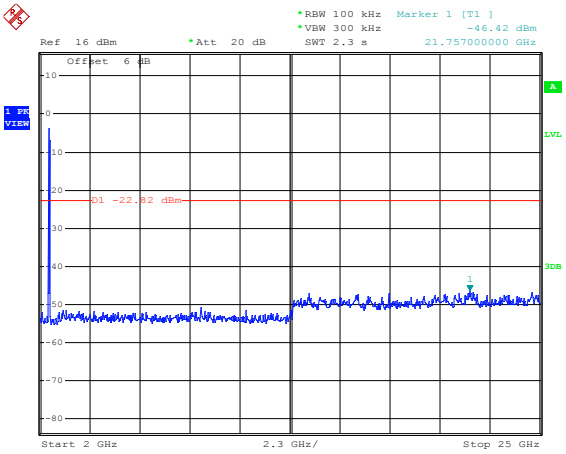
Date: 30.OCT.2014 00:39:43

Spurious Emission 30MHz~3GHz



Date: 30.OCT.2014 00:42:39

Spurious Emission 2GHz~25GHz



Date: 30.OCT.2014 00:41:39

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.

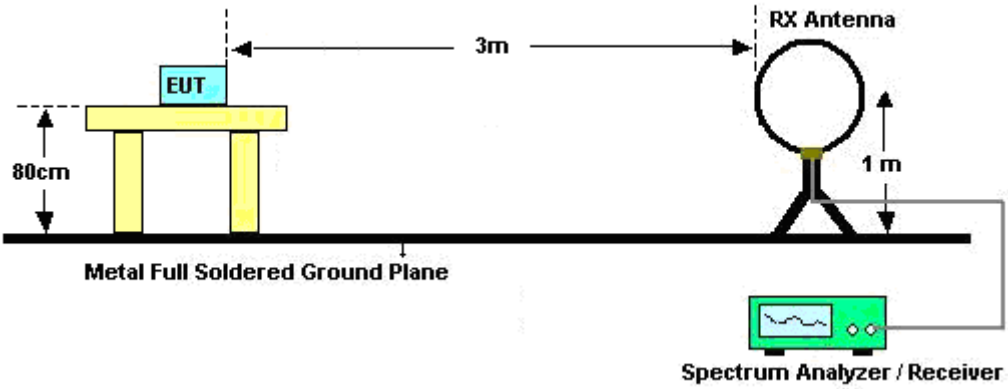
3.5.3 Test Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r04.
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.

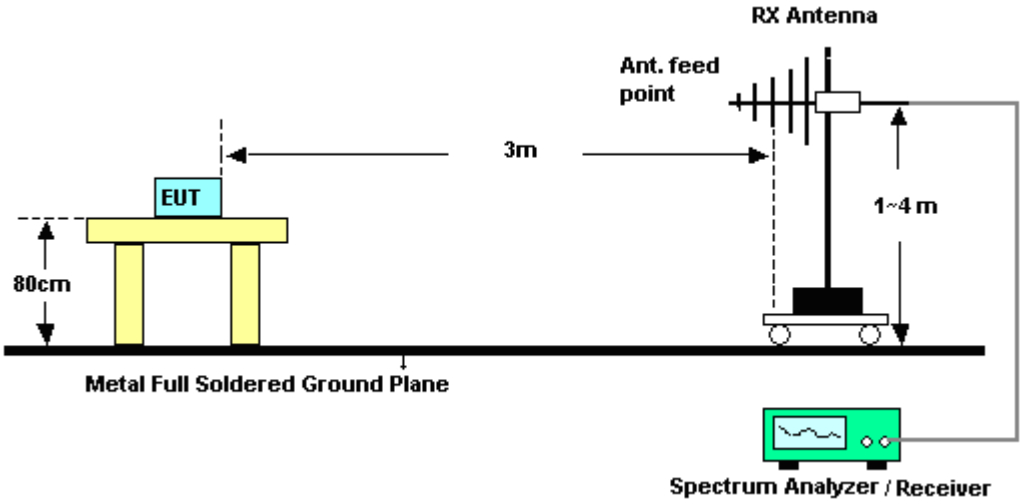
Ant	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11b	99.00	-	-	10Hz
2	802.11b	98.83	-	-	
1	802.11g	93.36	1.43	0.70	1kHz
2	802.11g	93.36	1.43	0.70	
1+2	2.4GHz 802.11n HT20	93.04	1.34	0.75	1kHz
1	2.4GHz 802.11n HT40	86.93	0.67	1.50	3kHz
1+2	2.4GHz 802.11n HT40	86.60	0.67	1.50	3kHz

3.5.4 Test Setup

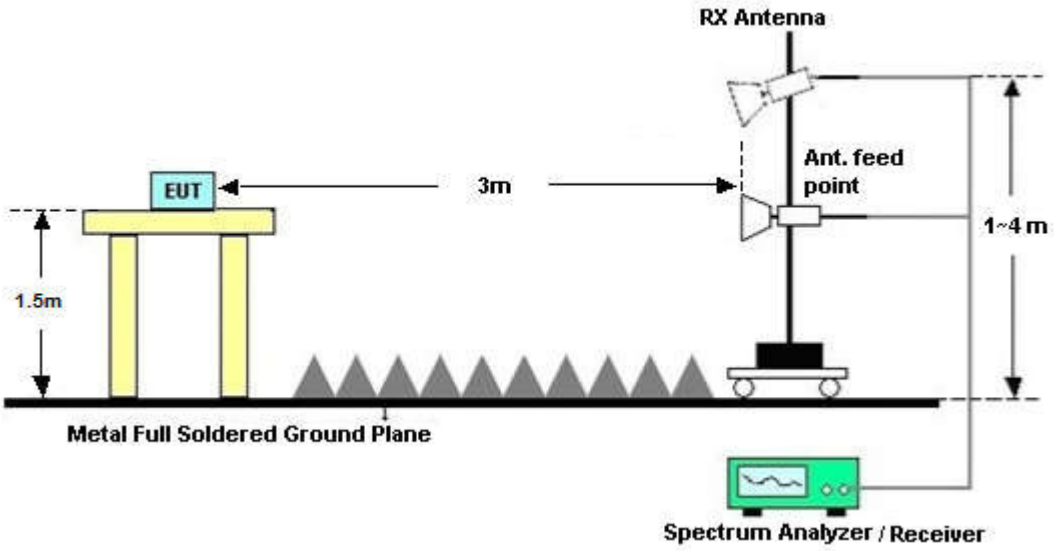
For radiated emissions below 30MHz



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 A.

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

Please refer to Appendix A.

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.

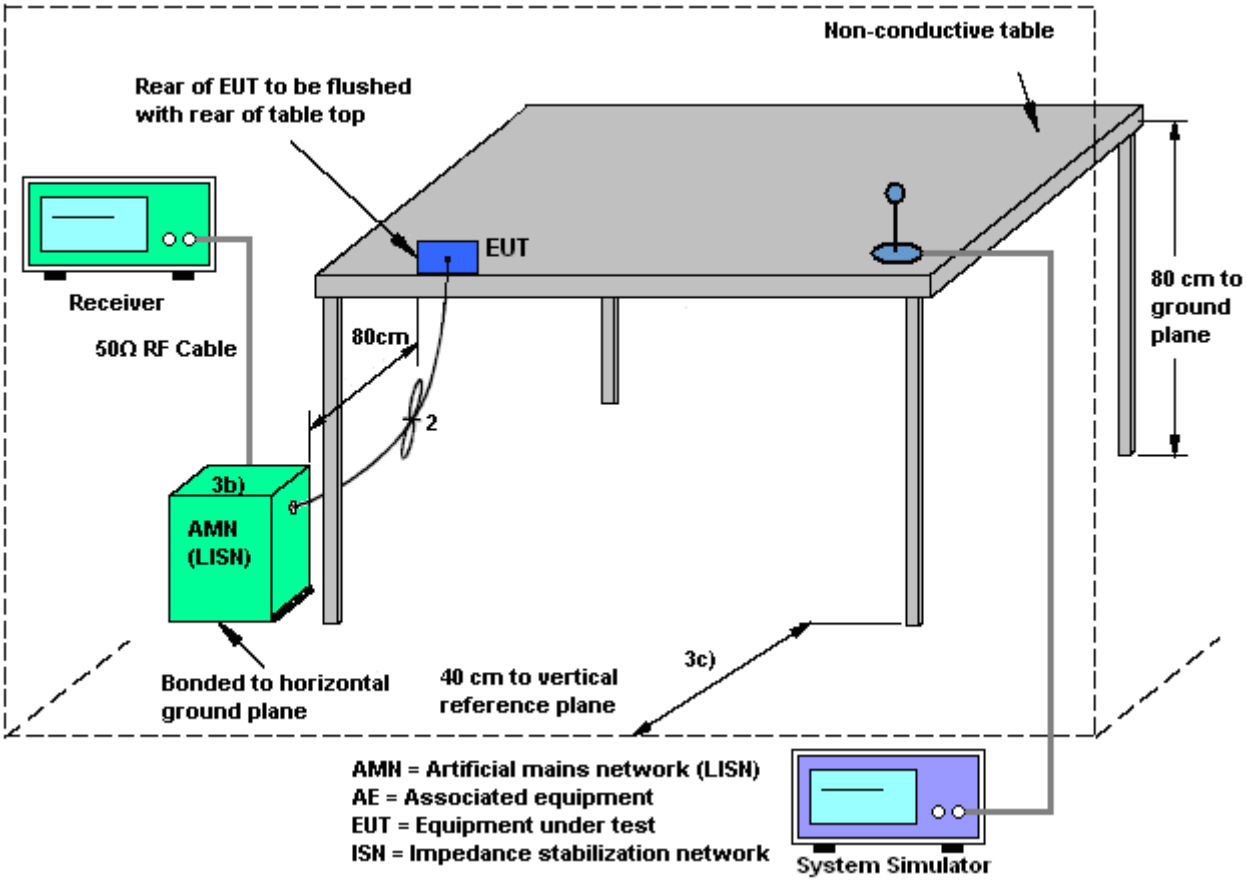
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

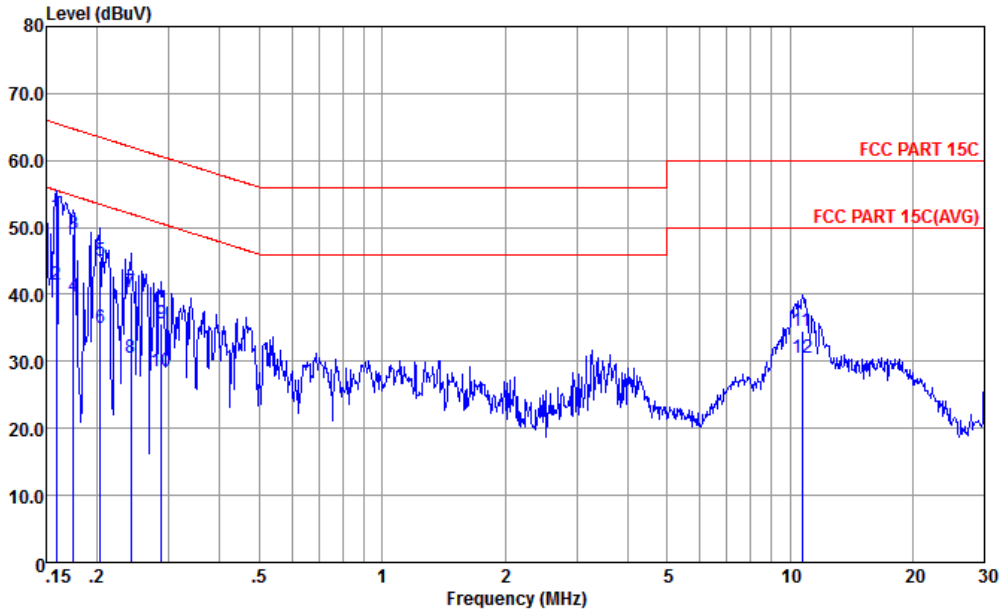
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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 (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

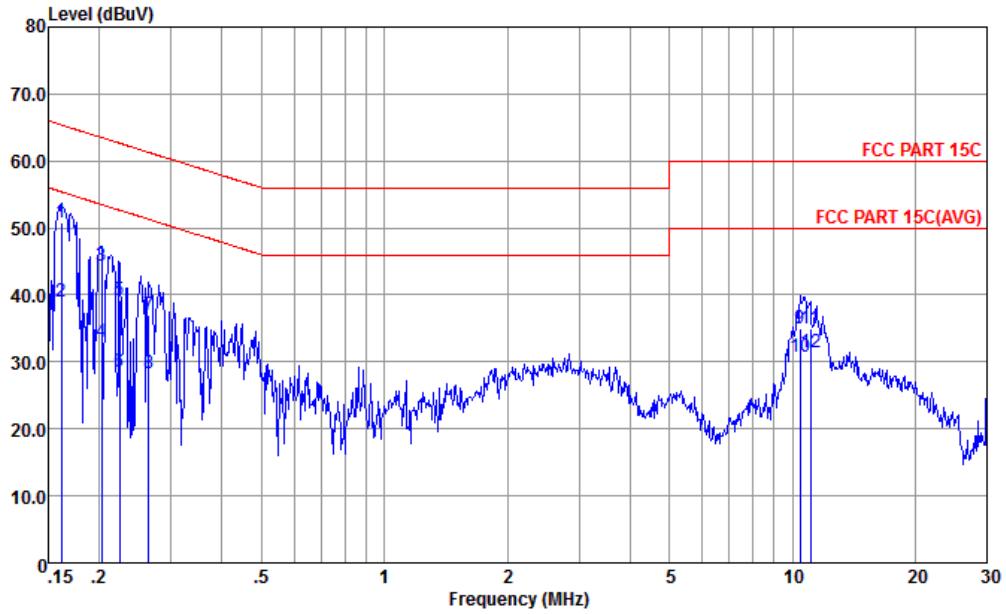
Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Eligah Wamg	Relative Humidity :	25~28%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + Earphone + USB Cable (Charging from Adapter)		



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

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.16	51.79	-13.73	65.52	39.60	1.80	10.39	QP
2	0.16	41.49	-14.03	55.52	29.30	1.80	10.39	Average
3	0.17	49.06	-15.66	64.72	37.20	1.42	10.44	QP
4	0.17	39.76	-14.96	54.72	27.90	1.42	10.44	Average
5	0.20	44.99	-18.46	63.45	33.50	0.99	10.50	QP
6	0.20	35.09	-18.36	53.45	23.60	0.99	10.50	Average
7	0.24	40.32	-21.72	62.04	28.90	0.90	10.52	QP
8	0.24	30.52	-21.52	52.04	19.10	0.90	10.52	Average
9	0.29	35.71	-24.88	60.59	24.39	0.75	10.57	QP
10	0.29	28.41	-22.18	50.59	17.09	0.75	10.57	Average
11	10.73	34.56	-25.44	60.00	23.40	0.20	10.96	QP
12	10.73	30.46	-19.54	50.00	19.30	0.20	10.96	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Eligah Wamg	Relative Humidity :	25~28%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + Earphone + USB Cable (Charging from Adapter)		



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

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	*	0.16	50.81	-14.57	65.38	38.70	1.71	10.40	QP
2		0.16	39.01	-16.37	55.38	26.90	1.71	10.40	Average
3		0.20	44.30	-19.19	63.49	32.81	0.99	10.50	QP
4		0.20	32.90	-20.59	53.49	21.41	0.99	10.50	Average
5		0.22	39.26	-23.40	62.66	27.80	0.95	10.51	QP
6		0.22	28.56	-24.10	52.66	17.10	0.95	10.51	Average
7		0.26	37.09	-24.20	61.29	25.70	0.85	10.54	QP
8		0.26	28.29	-23.00	51.29	16.90	0.85	10.54	Average
9		10.45	35.07	-24.93	60.00	23.90	0.21	10.96	QP
10		10.45	30.67	-19.33	50.00	19.50	0.21	10.96	Average
11		11.08	35.08	-24.92	60.00	23.89	0.22	10.97	QP
12		11.08	31.38	-18.62	50.00	20.19	0.22	10.97	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

$$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth antenna.

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.

	Chain Port 0 (dBi)	Chain Port 1 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	1.20	1.20	1.20	4.21	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	Oct. 29, 2014~ Oct. 31, 2014	Oct. 27, 2015	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Feb. 27, 2014	Oct. 29, 2014~ Oct. 31, 2014	Feb. 26, 2015	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Feb. 27, 2014	Oct. 29, 2014~ Oct. 31, 2014	Feb. 26, 2015	Conducted (TH01-KS)
EMI Test Receiver&SA	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May. 26, 2015	Mar. 10, 2016	May. 25, 2016	Radiation (03CH01-SZ)
Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz;Max 30dBm	Jun. 07, 2015	Mar. 10, 2016	Jun. 06, 2016	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May. 06, 2015	Mar. 10, 2016	May.05, 2016	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	23188	30MHz-2GHz	Oct. 17, 2015	Mar. 10, 2016	Oct. 16, 2016	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 17, 2015	Mar. 10, 2016	Oct. 16, 2016	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul.18.2015	Mar. 10, 2016	Jul.17.2016	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Aug.19, 2015	Mar. 10, 2016	Aug. 18, 2016	Radiation (03CH01-SZ)
Amplifier	HP	8447F	3113A04622	9kHz ~1300MHz / 30 dB	Aug. 7, 2015	Mar. 10, 2016	Aug. 6, 2016	Radiation (03CH01-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 12, 2016	Mar. 10, 2016	Jan. 11, 2017	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Mar. 10, 2016	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Mar. 10, 2016	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Mar. 10, 2016	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 04, 2014	Jan. 06, 2015	May 03, 2015	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 25, 2014	Jan. 06, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 25, 2014	Jan. 06, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 25, 2014	Jan. 06, 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))	2.3 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.8 dB

Appendix A. Radiated Spurious Emission

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	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		2389.92	53.46	-20.54	74	56.42	27.25	4.79	35	150	227	P	H
		2389.91	40.9	-13.1	54	43.86	27.25	4.79	35	150	227	A	H
	*	2412	103.31	-	-	106.18	27.31	4.82	35	150	227	P	H
	*	2412	100.69	-	-	103.56	27.31	4.82	35	150	227	A	H
		2384.25	49.53	-24.47	74	52.57	27.19	4.79	35.02	150	177	P	V
		2389.91	40.1	-13.9	54	43.06	27.25	4.79	35	150	177	A	V
	*	2412	102.2	-	-	105.07	27.31	4.82	35	150	177	P	V
	*	2412	99.69	-	-	102.56	27.31	4.82	35	150	177	A	V
802.11b CH 06 2437MHz		2315.67	50.24	-23.76	74	53.65	26.96	4.7	35.07	160	214	P	H
		2389.83	38.82	-15.18	54	41.78	27.25	4.79	35	160	214	A	H
	*	2437	102.03	-	-	104.76	27.42	4.82	34.97	160	214	P	H
	*	2437	99.21	-	-	101.94	27.42	4.82	34.97	160	214	A	H
		2497.44	51.18	-22.82	74	53.59	27.6	4.89	34.9	160	214	P	H
		2483.52	39.75	-14.25	54	42.28	27.54	4.85	34.92	160	214	A	H
		2381.1	50.4	-23.6	74	53.44	27.19	4.79	35.02	150	176	P	V
		2389.56	38.84	-15.16	54	41.82	27.25	4.79	35.02	150	176	A	V
	*	2437	101.38	-	-	104.11	27.42	4.82	34.97	150	176	P	V
	*	2437	98.87	-	-	101.6	27.42	4.82	34.97	150	176	A	V
		2484.24	50.93	-23.07	74	53.46	27.54	4.85	34.92	150	176	P	V
		2483.56	39.8	-14.2	54	42.33	27.54	4.85	34.92	150	176	A	V

802.11b CH 11 2462MHz	*	2462	99.96	-	-	102.58	27.48	4.85	34.95	208	126	P	H
	*	2462	97.23	-	-	99.85	27.48	4.85	34.95	208	126	A	H
		2485.16	53.25	-20.75	74	55.78	27.54	4.85	34.92	208	126	P	H
		2483.52	42.37	-11.63	54	44.9	27.54	4.85	34.92	208	126	A	H
	*	2462	99.06	-	-	101.68	27.48	4.85	34.95	150	176	P	V
	*	2462	96.51	-	-	99.13	27.48	4.85	34.95	150	176	A	V
		2484.08	52.3	-21.7	74	54.83	27.54	4.85	34.92	150	176	P	V
		2483.52	42.36	-11.64	54	44.89	27.54	4.85	34.92	150	176	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 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	45.33	-28.67	74	65.7	31.05	6.97	58.39	250	0	P	H
		4824	47.67	-26.33	74	68.04	31.05	6.97	58.39	250	0	P	V
802.11b CH 06 2437MHz		4874	41.57	-32.43	74	62.12	31.12	6.99	58.66	150	360	P	H
		7311	48.77	-25.23	74	63.21	35.96	8.22	58.62	174	100	P	H
		4874	40	-34	74	60.55	31.12	6.99	58.66	150	360	P	V
		7311	49.61	-24.39	74	64.05	35.96	8.22	58.62	174	100	P	V
802.11b CH 11 2462MHz		4924	41.77	-32.23	74	62.1	31.19	7	58.52	150	360	P	H
		7386	47.07	-26.93	74	61.26	36.08	8.27	58.54	150	360	P	H
		4924	44.69	-29.31	74	65.02	31.19	7	58.52	150	360	P	V
		7386	48.03	-25.97	74	62.22	36.08	8.27	58.54	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 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		2389.91	50.54	-23.46	74	53.5	27.25	4.79	35	157	335	P	H
		2389.91	41.03	-12.97	54	43.99	27.25	4.79	35	157	335	A	H
	*	2412	103.38	-	-	106.25	27.31	4.82	35	157	335	P	H
	*	2412	95.82	-	-	98.69	27.31	4.82	35	157	335	A	H
		2389.47	50.31	-23.69	74	53.29	27.25	4.79	35.02	188	63	P	V
		2389.91	40.88	-13.12	54	43.84	27.25	4.79	35	188	63	A	V
	*	2412	102.65	-	-	105.52	27.31	4.82	35	188	63	P	V
	*	2412	95.07	-	-	97.94	27.31	4.82	35	188	63	A	V
802.11g CH 06 2437MHz		2321.52	50.2	-23.8	74	53.56	27.01	4.7	35.07	163	216	P	H
		2376.78	39.6	-14.4	54	42.64	27.19	4.79	35.02	163	216	A	H
	*	2437	101.47	-	-	104.2	27.42	4.82	34.97	163	216	P	H
	*	2437	93.85	-	-	96.58	27.42	4.82	34.97	163	216	A	H
		2495.64	52.35	-21.65	74	54.76	27.6	4.89	34.9	163	216	P	H
		2494.4	42.09	-11.91	54	44.5	27.6	4.89	34.9	163	216	A	H
		2325.3	49.57	-24.43	74	52.93	27.01	4.7	35.07	174	176	P	V
		2367.33	39.63	-14.37	54	42.78	27.13	4.74	35.02	174	176	A	V
	*	2437	101.08	-	-	103.81	27.42	4.82	34.97	174	176	P	V
	*	2437	93.57	-	-	96.3	27.42	4.82	34.97	174	176	A	V
		2493.36	51.12	-22.88	74	53.53	27.6	4.89	34.9	174	176	P	V
		2483.64	40.91	-13.09	54	43.44	27.54	4.85	34.92	174	176	A	V

802.11g CH 11 2462MHz	*	2462	100.59	26.59	74	103.21	27.48	4.85	34.95	156	335	P	H
	*	2462	92.94	38.94	54	95.56	27.48	4.85	34.95	156	335	A	H
		2498	60.27	-13.73	74	62.68	27.6	4.89	34.9	156	335	P	H
		2483.6	43.53	-10.47	54	46.06	27.54	4.85	34.92	156	335	A	H
	*	2462	97.36	23.36	74	99.98	27.48	4.85	34.95	150	76	P	V
	*	2462	89.94	35.94	54	92.56	27.48	4.85	34.95	150	76	A	V
		2484.6	53.52	-20.48	74	56.05	27.54	4.85	34.92	150	76	P	V
		2483.52	42.83	-11.17	54	45.36	27.54	4.85	34.92	150	76	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 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		4824	42.31	-31.69	74	62.68	31.05	6.97	58.39	150	360	P	H
		4824	42.46	-31.54	74	62.83	31.05	6.97	58.39	250	0	P	V
802.11g CH 06 2437MHz		4874	39.36	-34.64	74	59.91	31.12	6.99	58.66	150	360	P	H
		7311	45.38	-28.62	74	59.82	35.96	8.22	58.62	174	100	P	H
		4874	39.21	-34.79	74	59.76	31.12	6.99	58.66	150	360	P	V
		7311	46.1	-27.9	74	60.54	35.96	8.22	58.62	174	100	P	V
802.11g CH 11 2462MHz		4924	46.2	-27.8	74	66.53	31.19	7	58.52	150	347	P	H
		7386	48.36	-25.64	74	62.55	36.08	8.27	58.54	150	274	P	H
		4924	44.75	-29.25	74	65.08	31.19	7	58.52	150	347	P	V
		7386	48.21	-25.79	74	62.4	36.08	8.27	58.54	150	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1+2	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		2359.23	50.56	-23.44	74	53.74	27.13	4.74	35.05	150	332	P	H
		2389.91	41.02	-12.98	54	43.98	27.25	4.79	35	150	332	A	H
	*	2412	103.27	-	-	106.14	27.31	4.82	35	150	332	P	H
	*	2412	95.92	-	-	98.79	27.31	4.82	35	150	332	A	H
		2389.47	49.84	-24.16	74	52.82	27.25	4.79	35.02	228	58	P	V
		2389.91	40.95	-13.05	54	43.91	27.25	4.79	35	228	58	A	V
	*	2412	101.71	-	-	104.58	27.31	4.82	35	228	58	P	V
	*	2412	94.33	-	-	97.2	27.31	4.82	35	228	58	A	V
802.11n HT20 CH 06 2437MHz		2339.61	50.05	-23.95	74	53.29	27.07	4.74	35.05	168	225	P	H
		2389.65	39.67	-14.33	54	42.65	27.25	4.79	35.02	168	225	A	H
	*	2437	104.16	-	-	106.89	27.42	4.82	34.97	168	225	P	H
	*	2437	96	-	-	98.73	27.42	4.82	34.97	168	225	A	H
		2485	50.55	-23.45	74	53.08	27.54	4.85	34.92	168	225	P	H
		2483.64	41.36	-12.64	54	43.89	27.54	4.85	34.92	168	225	A	H
		2347.35	49.74	-24.26	74	52.98	27.07	4.74	35.05	175	179	P	V
		2373.18	39.6	-14.4	54	42.64	27.19	4.79	35.02	175	179	A	V
	*	2437	101.59	-	-	104.32	27.42	4.82	34.97	175	179	P	V
	*	2437	94.15	-	-	96.88	27.42	4.82	34.97	175	179	A	V
		2484.6	50.78	-23.22	74	53.31	27.54	4.85	34.92	175	179	P	V
		2484.32	40.83	-13.17	54	43.36	27.54	4.85	34.92	175	179	A	V

802.11n HT20 CH 11 2462MHz	*	2462	102.11	-	-	104.73	27.48	4.85	34.95	150	347	P	H
	*	2462	94.64	-	-	97.26	27.48	4.85	34.95	150	347	A	H
		2490.6	58.58	-15.42	74	61.01	27.6	4.89	34.92	150	347	P	H
		2483.72	43.46	-10.54	54	45.99	27.54	4.85	34.92	150	347	A	H
	*	2462	97.34	-	-	99.96	27.48	4.85	34.95	187	57	P	V
	*	2462	90.05	-	-	92.67	27.48	4.85	34.95	187	57	A	V
		2483.72	53.38	-20.62	74	55.91	27.54	4.85	34.92	187	57	P	V
		2483.72	41.95	-12.05	54	44.48	27.54	4.85	34.92	187	57	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1+2	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	39.17	-34.83	74	59.54	31.05	6.97	58.39	250	0	P	H
		4824	40.53	-33.47	74	60.9	31.05	6.97	58.39	250	0	P	V
802.11n HT20 CH 06 2437MHz		4874	39.13	-34.87	74	59.68	31.12	6.99	58.66	150	360	P	H
		7311	45.85	-28.15	74	60.29	35.96	8.22	58.62	174	100	P	H
		4874	39.38	-34.62	74	59.93	31.12	6.99	58.66	150	360	P	V
		7311	47.4	-26.6	74	61.84	35.96	8.22	58.62	174	100	P	V
802.11n HT20 CH 11 2462MHz		4924	40.16	-33.84	74	60.49	31.19	7	58.52	146	347	P	H
		7386	45.34	-28.66	74	59.53	36.08	8.27	58.54	145	274	P	H
		4924	40.59	-33.41	74	60.92	31.19	7	58.52	146	347	P	V
		7386	45.16	-28.84	74	59.35	36.08	8.27	58.54	145	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 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		2389.92	51.15	-22.85	74	54.11	27.25	4.79	35	150	332	P	H
		2389.91	42.31	-11.69	54	45.27	27.25	4.79	35	150	332	A	H
	*	2422	97.68	-	-	100.46	27.37	4.82	34.97	150	332	P	H
	*	2422	90.01	-	-	92.79	27.37	4.82	34.97	150	332	A	H
		2497.36	54.16	-19.84	74	56.57	27.6	4.89	34.9	150	332	P	H
		2483.52	41.68	-12.32	54	44.21	27.54	4.85	34.92	150	332	A	H
		2389.47	50.57	-23.43	74	53.55	27.25	4.79	35.02	155	70	P	V
		2389.92	41.56	-12.44	54	44.52	27.25	4.79	35	155	70	A	V
	*	2422	96.88	-	-	99.66	27.37	4.82	34.97	155	70	P	V
	*	2422	89.37	-	-	92.15	27.37	4.82	34.97	155	70	A	V
		2493	54.74	-19.26	74	57.15	27.6	4.89	34.9	155	70	P	V
		2492.76	41.81	-12.19	54	44.22	27.6	4.89	34.9	155	70	A	V
802.11n HT40 CH 06 2437MHz		2317.56	50.18	-23.82	74	53.54	27.01	4.7	35.07	166	215	P	H
		2389.92	41.07	-12.93	54	44.03	27.25	4.79	35	166	215	A	H
	*	2437	99.24	-	-	101.97	27.42	4.82	34.97	166	215	P	H
	*	2437	91.96	-	-	94.69	27.42	4.82	34.97	166	215	A	H
		2483.76	53.63	-20.37	74	56.16	27.54	4.85	34.92	166	215	P	H
		2483.6	43.11	-10.89	54	45.64	27.54	4.85	34.92	166	215	A	H
		2377.41	49.52	-24.48	74	52.56	27.19	4.79	35.02	176	171	P	V
		2389.38	40.78	-13.22	54	43.76	27.25	4.79	35.02	176	171	A	V
	*	2437	98.07	-	-	100.8	27.42	4.82	34.97	176	171	P	V
	*	2437	90.44	-	-	93.17	27.42	4.82	34.97	176	171	A	V
		2483.56	52.81	-21.19	74	55.34	27.54	4.85	34.92	176	171	P	V
		2483.76	43.28	-10.72	54	45.81	27.54	4.85	34.92	176	171	A	V

802.11n HT40 CH 09 2452MHz		2376.6	49.68	-24.32	74	52.72	27.19	4.79	35.02	150	328	P	H
		2386.68	40.16	-13.84	54	43.14	27.25	4.79	35.02	150	328	A	H
	*	2452	98.11	-	-	100.79	27.42	4.85	34.95	150	328	P	H
	*	2452	90.66	-	-	93.34	27.42	4.85	34.95	150	328	A	H
		2483.84	57.31	-16.69	74	59.84	27.54	4.85	34.92	150	328	P	H
		2483.8	47.62	-6.38	54	50.15	27.54	4.85	34.92	150	328	A	H
		2373.45	50.34	-23.66	74	53.38	27.19	4.79	35.02	150	71	P	V
		2353.74	40.08	-13.92	54	43.26	27.13	4.74	35.05	150	71	A	V
	*	2452	97.7	-	-	100.38	27.42	4.85	34.95	150	71	P	V
	*	2452	89.76	-	-	92.44	27.42	4.85	34.95	150	71	A	V
		2484	57.06	-16.94	74	59.59	27.54	4.85	34.92	150	71	P	V
		2483.72	47.17	-6.83	54	49.7	27.54	4.85	34.92	150	71	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 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		4844	38.78	-35.22	74	59.22	31.07	6.97	58.48	250	0	P	H
		4844	39.38	-34.62	74	59.82	31.07	6.97	58.48	250	0	P	V
802.11n HT40 CH 06 2437MHz		4874	39.6	-34.4	74	60.15	31.12	6.99	58.66	150	163	P	H
		7311	47.02	-26.98	74	61.46	35.96	8.22	58.62	150	360	P	H
		4874	39.63	-34.37	74	60.18	31.12	6.99	58.66	150	163	P	V
		7311	45.62	-28.38	74	60.06	35.96	8.22	58.62	150	360	P	V
802.11n HT40 CH 09 2452MHz		4904	40.95	-33.05	74	61.42	31.17	7	58.64	150	360	P	H
		7356	45.55	-28.45	74	59.84	36.03	8.25	58.57	150	320	P	H
		4904	39.04	-34.96	74	59.51	31.17	7	58.64	150	360	P	V
		7356	45.48	-28.52	74	59.77	36.03	8.25	58.57	150	320	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 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.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2383.08	49.43	-24.57	74	52.47	27.19	4.79	35.02	197	222	P	H
		2389.91	40.16	-13.84	54	43.12	27.25	4.79	35	197	222	A	H
	*	2412	100.26	-	-	103.13	27.31	4.82	35	197	222	P	H
	*	2412	98.48	-	-	101.35	27.31	4.82	35	197	222	A	H
		2360.04	49.95	-24.05	74	53.13	27.13	4.74	35.05	193	360	P	V
		2389.91	39.51	-14.49	54	42.47	27.25	4.79	35	193	360	A	V
	*	2412	97.59	-	-	100.46	27.31	4.82	35	193	360	P	V
	*	2412	95.07	-	-	97.94	27.31	4.82	35	193	360	A	V
802.11b CH 06 2437MHz		2384.07	50.32	-23.68	74	53.36	27.19	4.79	35.02	167	221	P	H
		2389.92	38.82	-15.18	54	41.78	27.25	4.79	35	167	221	A	H
	*	2437	101.94	-	-	104.67	27.42	4.82	34.97	167	221	P	H
	*	2437	99.03	-	-	101.76	27.42	4.82	34.97	167	221	A	H
		2484.2	50.92	-23.08	74	53.45	27.54	4.85	34.92	167	221	P	H
		2483.56	39.82	-14.18	54	42.35	27.54	4.85	34.92	167	221	A	H
		2371.11	50.19	-23.81	74	53.23	27.19	4.79	35.02	150	8	P	V
		2389.56	38.87	-15.13	54	41.85	27.25	4.79	35.02	150	8	A	V
	*	2437	97.59	-	-	100.32	27.42	4.82	34.97	150	8	P	V
	*	2437	95.83	-	-	98.56	27.42	4.82	34.97	150	8	A	V
		2489.44	51.32	-22.68	74	53.75	27.6	4.89	34.92	150	8	P	V
		2484.32	39.52	-14.48	54	42.05	27.54	4.85	34.92	150	8	A	V

802.11b CH 11 2462MHz	*	2462	100.84	-	-	103.46	27.48	4.85	34.95	161	221	P	H
	*	2462	97.78	-	-	100.4	27.48	4.85	34.95	161	221	A	H
		2485.56	52.66	-21.34	74	55.19	27.54	4.85	34.92	161	221	P	H
		2483.52	43.87	-10.13	54	46.4	27.54	4.85	34.92	161	221	A	H
	*	2462	97.13	-	-	99.75	27.48	4.85	34.95	162	0	P	V
	*	2462	93.97	-	-	96.59	27.48	4.85	34.95	162	0	A	V
		2495.52	50.73	-23.27	74	53.14	27.6	4.89	34.9	162	0	P	V
		2483.52	41.86	-12.14	54	44.39	27.54	4.85	34.92	162	0	A	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 2	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	42.27	-31.73	74	62.64	31.05	6.97	58.39	250	0	P	H
		4824	42.11	-31.89	74	62.48	31.05	6.97	58.39	250	0	P	V
802.11b CH 06 2437MHz		4874	41.61	-32.39	74	62.16	31.12	6.99	58.66	150	360	P	H
		7311	45.9	-28.1	74	60.34	35.96	8.22	58.62	174	100	P	H
		4874	43.5	-30.5	74	64.05	31.12	6.99	58.66	150	360	P	V
		7311	45.65	-28.35	74	60.09	35.96	8.22	58.62	174	100	P	V
802.11b CH 11 2462MHz		4924	41.76	-32.24	74	62.09	31.19	7	58.52	150	360	P	H
		7386	48.56	-25.44	74	62.75	36.08	8.27	58.54	150	360	P	H
		4924	44.17	-29.83	74	64.5	31.19	7	58.52	150	360	P	V
		7386	50.44	-23.56	74	64.63	36.08	8.27	58.54	150	360	P	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 2	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		2389.92	50.09	-23.91	74	53.05	27.25	4.79	35	150	220	P	H
		2389.91	41.63	-12.37	54	44.59	27.25	4.79	35	150	220	A	H
	*	2412	100.85	-	-	103.72	27.31	4.82	35	150	220	P	H
	*	2412	93.28	-	-	96.15	27.31	4.82	35	150	220	A	H
		2332.5	49.76	-24.24	74	53.08	27.01	4.74	35.07	150	345	P	V
		2389.91	40.45	-13.55	54	43.41	27.25	4.79	35	150	345	A	V
	*	2412	97.22	-	-	100.09	27.31	4.82	35	150	345	P	V
	*	2412	89.6	-	-	92.47	27.31	4.82	35	150	345	A	V
802.11g CH 06 2437MHz		2366.52	50.18	-23.82	74	53.33	27.13	4.74	35.02	151	28	P	H
		2389.92	39.72	-14.28	54	42.68	27.25	4.79	35	151	28	A	H
	*	2437	101.17	27.17	74	103.9	27.42	4.82	34.97	151	28	P	H
	*	2437	92.89	38.89	54	95.62	27.42	4.82	34.97	151	28	A	H
		2484.32	51.19	-22.81	74	53.72	27.54	4.85	34.92	151	28	P	H
		2483.64	41.27	-12.73	54	43.8	27.54	4.85	34.92	151	28	A	H
		2386.86	49.99	-24.01	74	52.97	27.25	4.79	35.02	150	20	P	V
		2389.91	40.1	-13.9	54	43.06	27.25	4.79	35	150	20	A	V
	*	2437	98.99	24.99	74	101.72	27.42	4.82	34.97	150	20	P	V
	*	2437	90.98	36.98	54	93.71	27.42	4.82	34.97	150	20	A	V
		2497.36	51.5	-22.5	74	53.91	27.6	4.89	34.9	150	20	P	V
		2493.36	41.07	-12.93	54	43.48	27.6	4.89	34.9	150	20	A	V

802.11g CH 11 2462MHz	*	2462	102.88	-	-	105.5	27.48	4.85	34.95	250	58	P	H
	*	2462	95.35	-	-	97.97	27.48	4.85	34.95	250	58	A	H
		2483.64	58.82	-15.18	74	61.35	27.54	4.85	34.92	250	58	P	H
		2483.52	46.89	-7.11	54	49.42	27.54	4.85	34.92	250	58	A	H
	*	2462	100.23	-	-	102.85	27.48	4.85	34.95	160	91	P	V
	*	2462	92.64	-	-	95.26	27.48	4.85	34.95	160	91	A	V
		2483.56	56.1	-17.9	74	58.63	27.54	4.85	34.92	160	91	P	V
		2483.64	44.67	-9.33	54	47.2	27.54	4.85	34.92	160	91	A	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 2	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	41.71	-32.29	74	62.08	31.05	6.97	58.39	250	0	P	H
		4824	43.99	-30.01	74	64.36	31.05	6.97	58.39	250	0	P	V
802.11g CH 06 2437MHz		4874	45.99	-28.01	74	66.54	31.12	6.99	58.66	100	360	P	H
		7311	50.03	-23.97	74	64.47	35.96	8.22	58.62	174	100	P	H
		4874	49.38	-24.62	74	69.93	31.12	6.99	58.66	100	360	P	V
		7311	50.5	-23.5	74	64.94	35.96	8.22	58.62	174	100	P	V
802.11g CH 11 2462MHz		4924	45.59	-28.41	74	65.92	31.19	7	58.52	150	347	P	H
		7386	47.55	-26.45	74	61.74	36.08	8.27	58.54	150	274	P	H
		4924	48.06	-25.94	74	68.39	31.19	7	58.52	150	347	P	V
		7386	49.54	-24.46	74	63.73	36.08	8.27	58.54	150	274	P	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1+2	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		2389.91	51.11	-22.89	74	54.07	27.25	4.79	35	158	125	P	H
		2389.92	41.33	-12.67	54	44.29	27.25	4.79	35	158	125	A	H
		2422	97.21	23.21	74	99.99	27.37	4.82	34.97	158	125	P	H
		2422	89.88	35.88	54	92.66	27.37	4.82	34.97	158	125	A	H
		2484.52	50.18	-23.82	74	52.71	27.54	4.85	34.92	158	125	P	H
		2484.92	41.06	-12.94	54	43.59	27.54	4.85	34.92	158	125	A	H
		2381.01	49.71	-24.29	74	52.75	27.19	4.79	35.02	150	184	P	V
		2389.83	41.08	-12.92	54	44.04	27.25	4.79	35	150	184	A	V
		2422	96.08	22.08	74	98.86	27.37	4.82	34.97	150	184	P	V
		2422	88.74	34.74	54	91.52	27.37	4.82	34.97	150	184	A	V
		2483.6	50.48	-23.52	74	53.01	27.54	4.85	34.92	150	184	P	V
		2484.88	40.93	-13.07	54	43.46	27.54	4.85	34.92	150	184	A	V
802.11n HT40 CH 06 2437MHz		2372.28	50.05	-23.95	74	53.09	27.19	4.79	35.02	163	125	P	H
		2389.91	40.52	-13.48	54	43.48	27.25	4.79	35	163	125	A	H
		2437	97.55	23.55	74	100.28	27.42	4.82	34.97	163	125	P	H
		2437	90.06	36.06	54	92.79	27.42	4.82	34.97	163	125	A	H
		2484	50.93	-23.07	74	53.46	27.54	4.85	34.92	163	125	P	H
		2484.44	41.69	-12.31	54	44.22	27.54	4.85	34.92	163	125	A	H
		2382.36	49.72	-24.28	74	52.76	27.19	4.79	35.02	150	188	P	V
		2388.93	40.32	-13.68	54	43.3	27.25	4.79	35.02	150	188	A	V
		2437	95.72	21.72	74	98.45	27.42	4.82	34.97	150	188	P	V
		2437	88.61	34.61	54	91.34	27.42	4.82	34.97	150	188	A	V
		2483.96	50.27	-23.73	74	52.8	27.54	4.85	34.92	150	188	P	V
		2483.6	41.29	-12.71	54	43.82	27.54	4.85	34.92	150	188	A	V

802.11n HT40 CH 09 2452MHz		2348.43	50.05	-23.95	74	53.29	27.07	4.74	35.05	163	126	P	H
		2365.53	40.21	-13.79	54	43.36	27.13	4.74	35.02	163	126	A	H
		2452	97.11	23.11	74	99.79	27.42	4.85	34.95	163	126	P	H
		2452	88.88	34.88	54	91.56	27.42	4.85	34.95	163	126	A	H
		2483.88	54.12	-19.88	74	56.65	27.54	4.85	34.92	163	126	P	H
		2483.52	45.06	-8.94	54	47.59	27.54	4.85	34.92	163	126	A	H
		2371.02	50.1	-23.9	74	53.14	27.19	4.79	35.02	150	184	P	V
		2374.8	40.16	-13.84	54	43.2	27.19	4.79	35.02	150	184	A	V
		2452	94.95	20.95	74	97.63	27.42	4.85	34.95	150	184	P	V
		2452	87.62	33.62	54	90.3	27.42	4.85	34.95	150	184	A	V
		2484.48	53.1	-20.9	74	55.63	27.54	4.85	34.92	150	184	P	V
		2484.36	43.75	-10.25	54	46.28	27.54	4.85	34.92	150	184	A	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1+2	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		4844	39.89	-34.11	74	60.33	31.07	6.97	58.48	250	0	P	H
		4844	39.91	-34.09	74	60.35	31.07	6.97	58.48	250	0	P	V
802.11n HT40 CH 06 2437MHz		4874	39.64	-34.36	74	60.19	31.12	6.99	58.66	150	163	P	H
		7311	46.77	-27.23	74	61.21	35.96	8.22	58.62	150	360	P	H
		4874	39.67	-34.33	74	60.22	31.12	6.99	58.66	150	163	P	V
		7311	45.94	-28.06	74	60.38	35.96	8.22	58.62	150	360	P	V
802.11n HT40 CH 09 2452MHz		4904	39.82	-34.18	74	60.29	31.17	7	58.64	150	360	P	H
		7356	46.63	-27.37	74	60.92	36.03	8.25	58.57	150	320	P	H
		4904	39.78	-34.22	74	60.25	31.17	7	58.64	150	360	P	V
		7356	46.22	-27.78	74	60.51	36.03	8.25	58.57	150	320	P	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												

15C Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI Ant.	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)
1													
2.4GHz 802.11n HT40 LF		30.97	22.58	-17.42	40	35.69	17.67	1	31.78	-	-	P	H
		199.75	26.67	-16.83	43.5	46.25	10.1	1.57	31.25	-	-	P	H
		232.73	26.88	-19.12	46	45.04	11.32	1.8	31.28	-	-	P	H
		299.66	32.69	-13.31	46	48.28	13.8	1.94	31.33	100	360	P	H
		399.57	27.74	-18.26	46	40.36	16.5	2.12	31.24	-	-	P	H
		714.82	26.54	-19.46	46	35.41	19.6	2.75	31.22	-	-	P	H
		32.91	33.13	-6.87	40	47.3	16.61	1	31.78	100	0	P	V
		97.9	22.84	-20.66	43.5	41.07	11.98	1.38	31.59	-	-	P	V
		298.69	28.86	-17.14	46	44.49	13.76	1.94	31.33	-	-	P	V
		399.57	28.05	-17.95	46	40.67	16.5	2.12	31.24	-	-	P	V
		497.54	27.71	-18.29	46	38.59	17.86	2.41	31.15	-	-	P	V
		714.82	26.43	-19.57	46	35.3	19.6	2.75	31.22	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

15C Emission below 1GHz

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency per 15.209(c).
!	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 Ant. 1+2	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		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		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”.

Appendix C. Product Equality Declaration

ZTE CORPORATION

Product Change Description

As the applicant of the below model, [ZTE Corporation] declares that the product,

[MF97B_T]

[ZTE Corporation]

is the variant of the initial certified product,

[MF97B]

[ZTE Corporation]

[Project Number: 14ZTE147]

SOFTWARE MODIFICATIONS:

Protocol Stack changes: NO
MMS/STK changes: NO
JAVA changes: NO
Other changes detailed: YES, merged applications and mandatory requirements that new carrier needed and ZTE updated software to disable/enable bands as below.
MF97B for AT&T
E-UTRA CA: CA_4A-17A/CA_2A-17A/CA_4A-29A/CA_2A-29A
E-UTRA FDD: Band 2/Band 4/Band 5/Band 17/Band 29
UMTS FDD: Band I/Band II/Band V
WiFi: 802.11 a/ac/b/g/n/MIMO

MF97B_T for TMO
E-UTRA CA: **CA B4A_B12A**
E-UTRA FDD: Band 2/Band 4/Band 5/**Band12**
UMTS FDD: Band II/**Band IV**/Band V
WiFi: 802.11 b/g/n

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HARDWARE MODIFICATION:

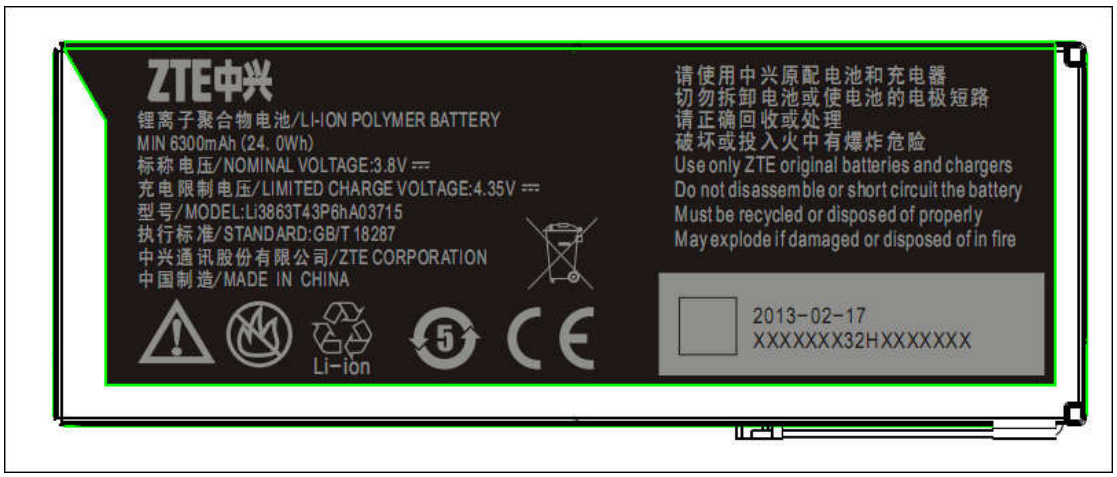
Band changes: NO
Power Amplifier changes: NO
Antenna changes: **YES, new antenna for WiFi/Bluetooth.**
PCB Layout changes: NO
Components on PCB changes: NO
LCD changes: NO
Speaker changes: NO
Camera changes: NO
Vibrator changes: NO
Bluetooth changes: NO
FM changes: NO
Other changes: NO

MECHANICAL MODIFICATIONS:

Use new metal front/back cover or keypad: NO
Mechanical shell changes: NO
Other changes detailed: NO

ACCESSORY MODIFICATIONS:

Battery changes: **YES, new battery.**
Please refer to below photo.
Original



Updated

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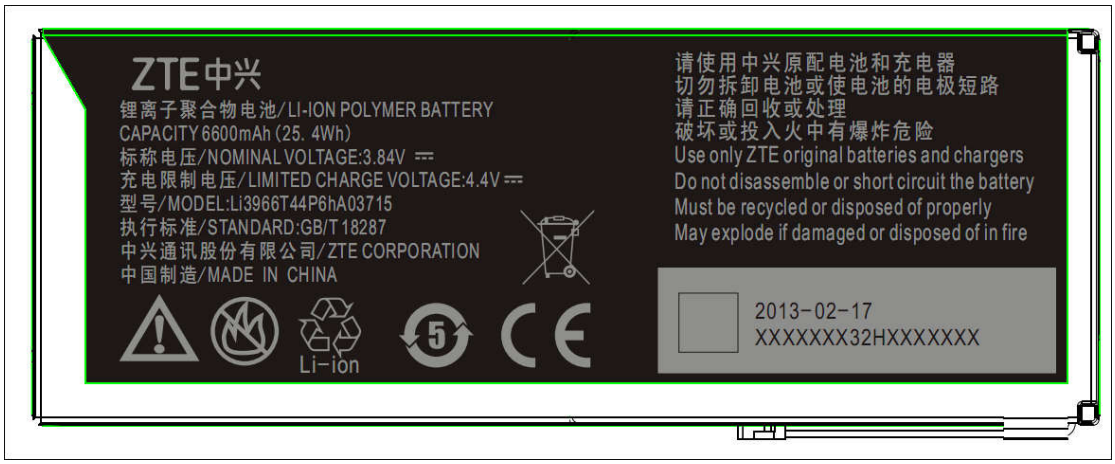

AC Adaptor changes: NO
Earphone changes: NO

Min Zhang

APPROVED BY: Min Zhang

Project Manager: Fa ng kui

Date:2016-2-14

Company: ZTE Corporation

Address: B109, #889, Bibo Rd, Zhangjiang Hi-Tech Park, Shanghai,China

Tel:+86-21-68896840

Fax: +86-21-68896835

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