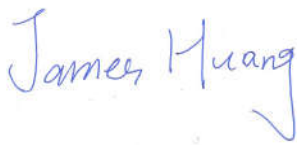


FCC RF Test Report

APPLICANT : Acer Incorporated
EQUIPMENT : Smart HandHeld
BRAND NAME : Acer
MODEL NAME : T012, TM012
MARKETING NAME : Liquid Z320, Liquid M320
FCC ID : HLZDMZ320
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Jun. 24, 2015 and testing was completed on Nov. 11, 2015. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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



Prepared by: James Huang / Manager



Approved by: Jones Tsai / Manager



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



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR562418C	Rev. 01	Initial issue of report	Nov. 17, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	RSS-247 5.2(1)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	RSS-Gen 6.6	99% Bandwidth	-	Pass	-
3.2	15.247(b)	RSS-247 A5.4(4)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	RSS-247 5.2(2)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	RSS-247 5.5	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
			Conducted Spurious Emission		Pass	-
3.5	15.247(d)	RSS-247 5.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 5.06 dB at 2483.680 MHz
3.6	15.207	RSS-GEN 8.8	AC Conducted Emission	15.207(a)	Pass	Under limit 15.65 dB at 1.100 MHz
3.7	15.203 & 15.247(b)	N/A	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Acer Incorporated

8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22181, Taiwan (R.O.C)

1.2 Manufacturer

Shanghai HuaQin Telecom Technology CO., LTD

Building 1, No.399, Keyuan Road, High-tech Park PudongZhangjiang, Shanghai, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart HandHeld
Brand Name	Acer
Model Name	T012, TM012
Marketing Name	Liquid Z320, Liquid M320
FCC ID	HLZDMZ320
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/ HSPA+(16QAM uplink is not supported)/ WLAN2.4GHz 802.11b/g/n HT20/ Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
IMEI Code	Conducted: 354636060004952/354636060006262 Conduction: 354636060004788/354636060012658 Radiation: 354636060004952/354636060006262
EUT Stage	Identical Prototype

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

1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 17.74 dBm (0.0594 W) 802.11g : 21.11 dBm (0.1291 W) 802.11n HT20 : 20.06 dBm (0.1014 W)
99% Occupied Bandwidth	802.11b : 13.25MHz 802.11g : 18.30MHz 802.11n HT20 : 18.95MHz
Antenna Type / Gain	IFA Antenna with gain 0.42 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)



1.5 Modification of EUT

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

1.6 Testing 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/IC Registration No.
	TH01-KS	03CH02-KS	CO01-KS	418269/4086E

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

1.7 Applicable Standards

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

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r03
- ANSI C63.10-2009
- IC RSS-247 Issue 1
- IC RSS-Gen Issue 4

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. FCC permits the use of the 1.5 meter table as an alternative in C63.10-2013 through inquiry tracking number 961829.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

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

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

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

2.1 Carrier Frequency Channel

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

2.2 Pre-Scanned RF Power

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

2.4GHz 802.11b RF Output Power (dBm)						
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate 1Mbps	Channel	2Mbps	5.5Mbps	11Mbps
CH 01	2412 MHz	15.78	CH 11	17.62	17.69	17.73
CH 06	2437 MHz	16.88				
CH 11	2462 MHz	17.74				

2.4GHz 802.11g RF Output Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412 MHz	19.95	CH 11	20.97	20.02	20.98	21.05	21.01	21.04	21.08
CH 06	2437 MHz	20.22								
CH 11	2462 MHz	21.11								

2.4GHz 802.11n HT20 RF Output Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412 MHz	18.74	CH 11	19.89	19.93	19.97	19.96	20.01	19.99	20.03
CH 06	2437 MHz	19.26								
CH 11	2462 MHz	20.06								

2.3 Test Mode

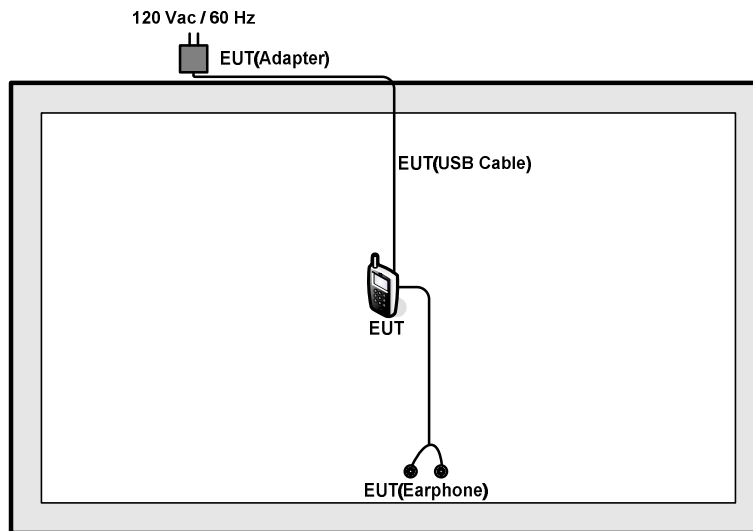
Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0

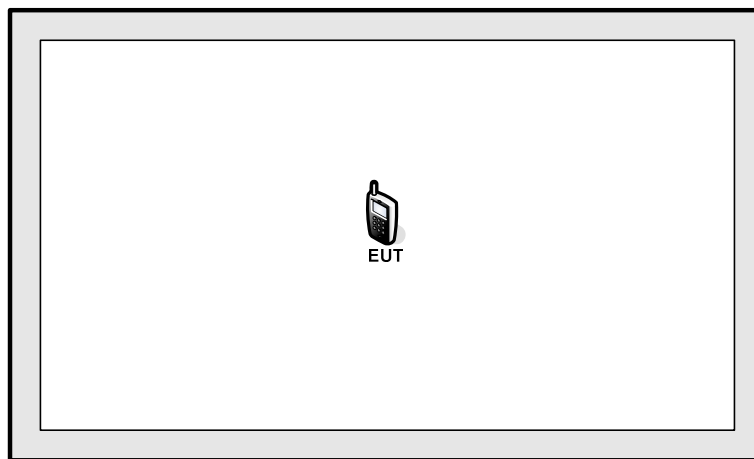
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter)+ SIM 1
Remark: For radiated test cases, the tests were performed with adapter, earphone, USB cable.	

2.4 Connection Diagram of Test System

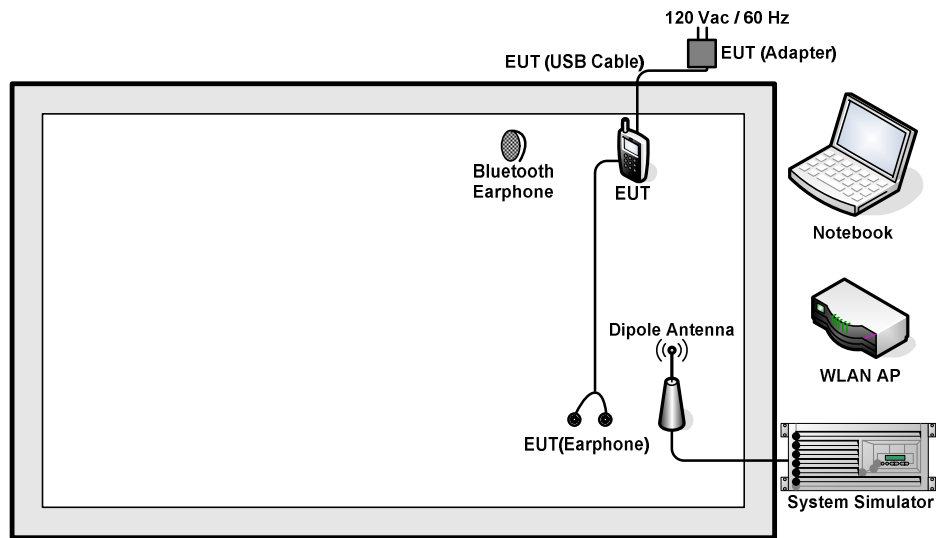
<WLAN2.4GHz 802.11g Tx Mode>



<WLAN2.4GHz 802.11b/n HT20 Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A

2.6 EUT Operation Test Setup

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

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

2.7 Measurement Results Explanation Example

For all conducted test items:

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

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

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

Offset(dB) = RF cable loss(dB) = 6.0 (dB)

3 Test Result

3.1 6dB and 99%Bandwidth Measurement

3.1.1 Limit of 6dB and 99%Bandwidth

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

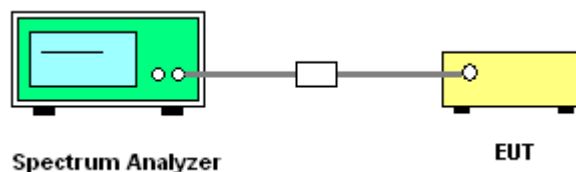
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r03.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

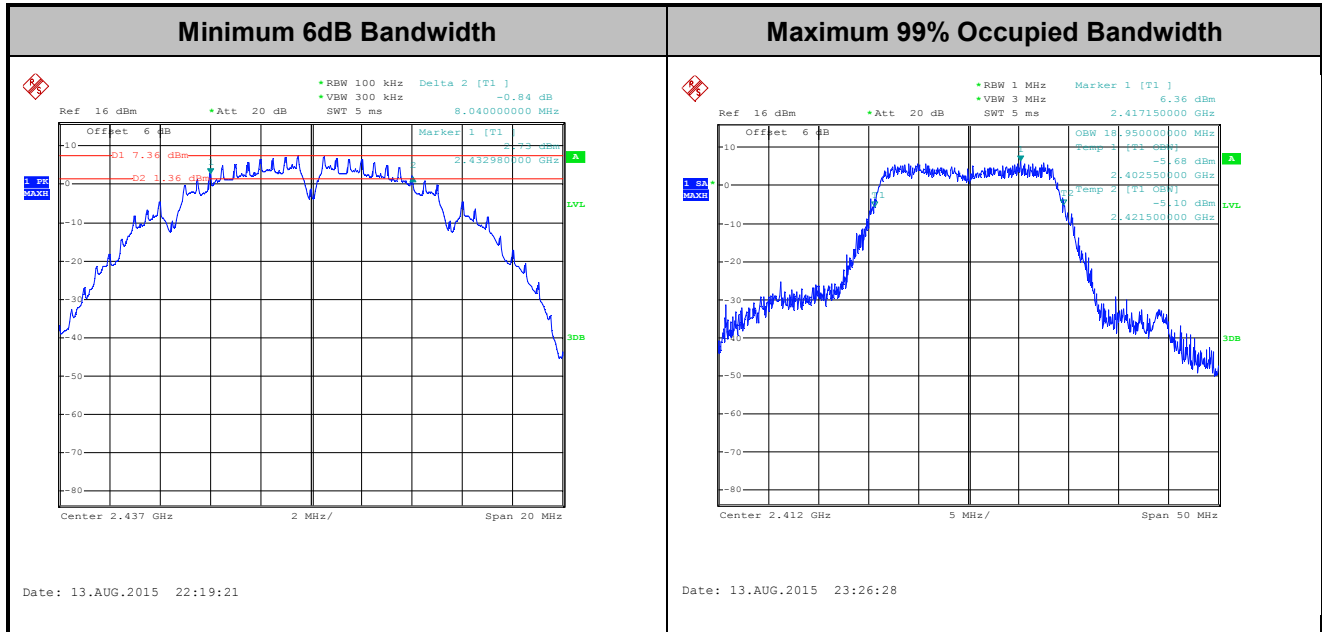
3.1.4 Test Setup





3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A of this test report.



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

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting Antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the Antenna exceeds 6dBi.

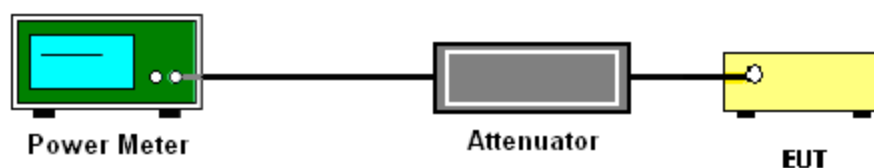
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r03.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A of this test report.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A of this test report.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

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

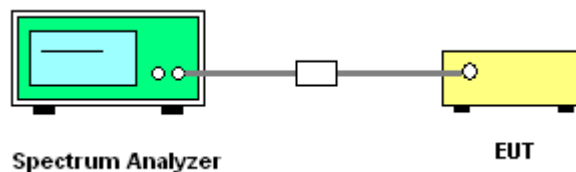
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

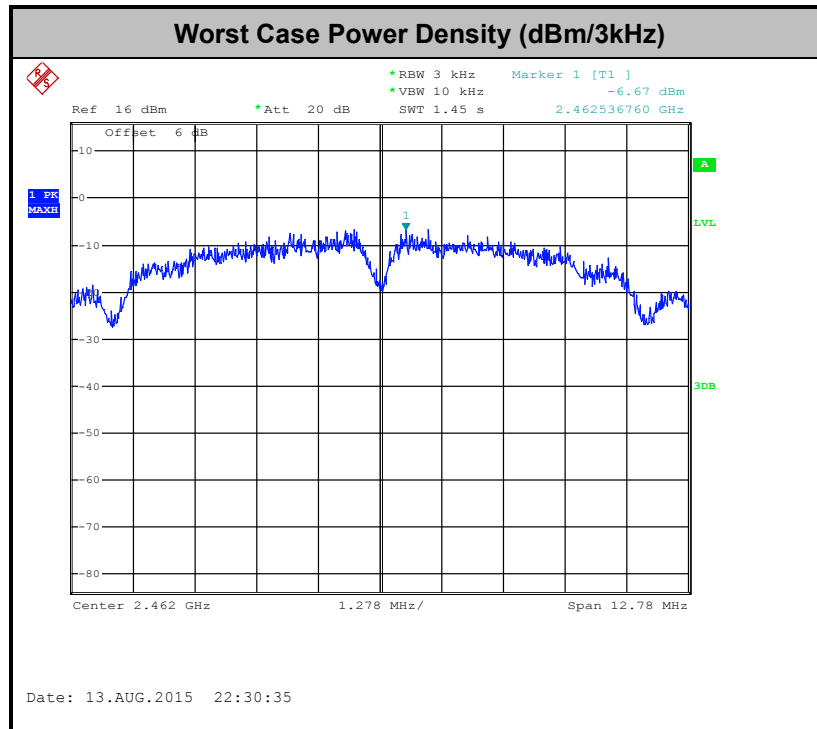
1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r03
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A of this test report.



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

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

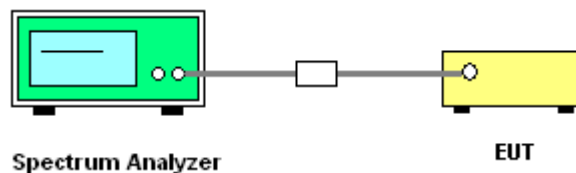
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r03.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



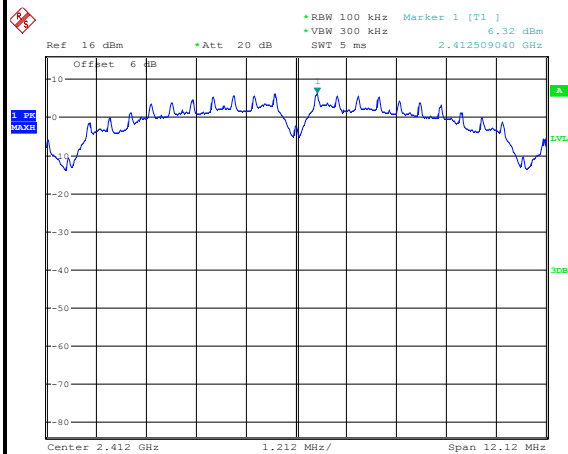


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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

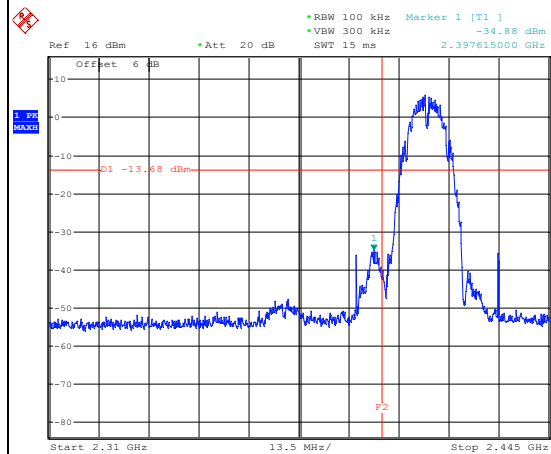
WLAN 802.11b Channel 01

100kHz PSD reference Level



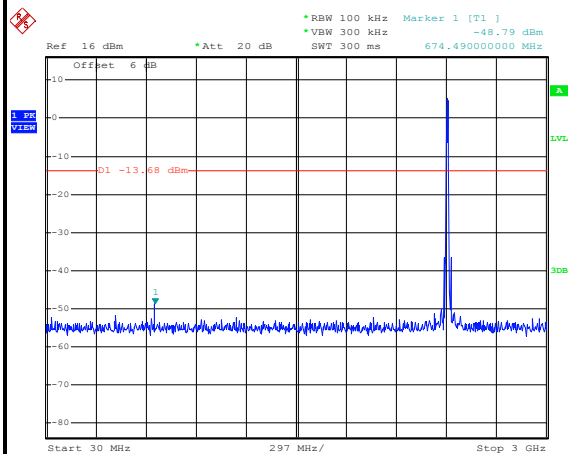
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Low Channel Plot



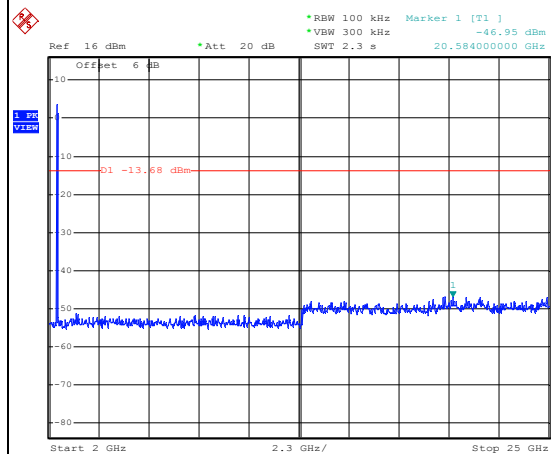
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Spurious Emission 30MHz~3GHz



Date: 13.AUG.2015 22:13:56

Spurious Emission 2GHz~25GHz



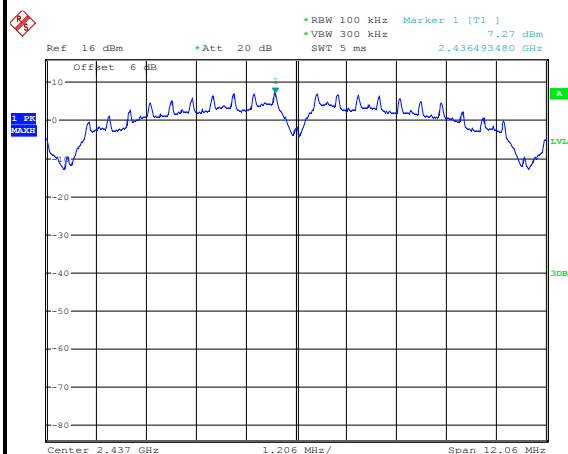
Date: 13.AUG.2015 22:11:04



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

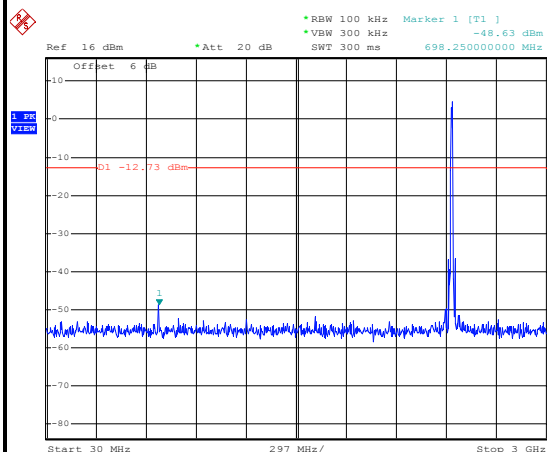
WLAN 802.11b Channel 06

100kHz PSD reference Level



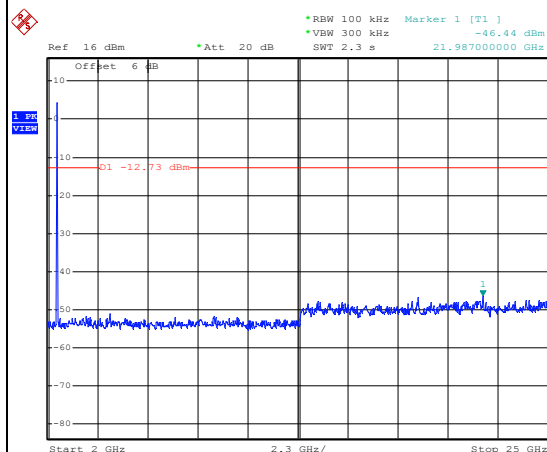
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Spurious Emission 30MHz~3GHz



Date: 13.AUG.2015 22:25:07

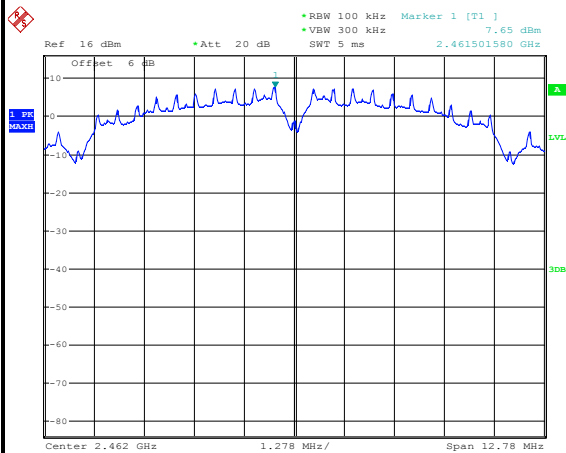
Spurious Emission 2GHz~25GHz



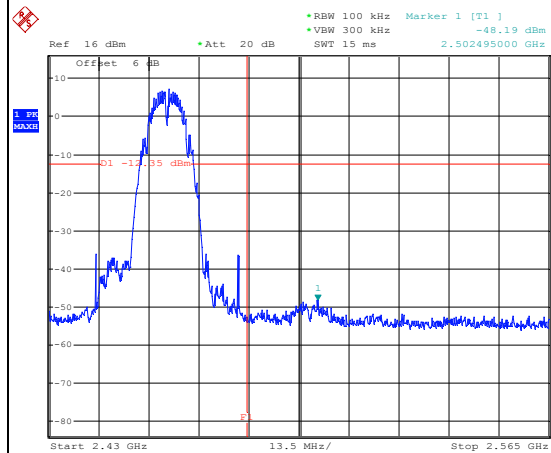
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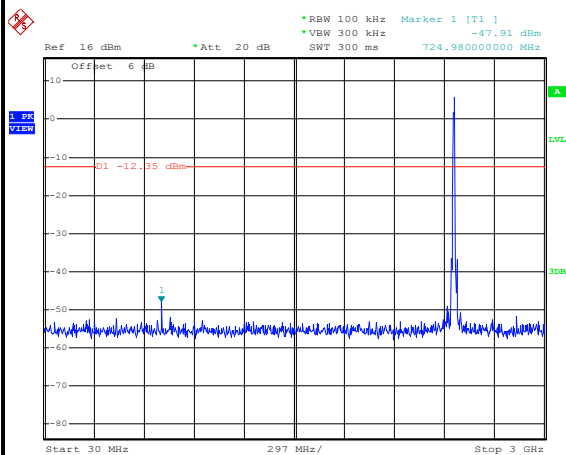
Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Issac Song

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

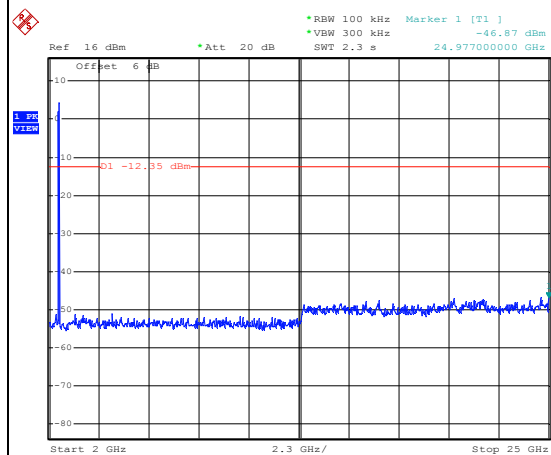
Date: 13.AUG.2015 22:31:51

High Channel Plot

Date: 13.AUG.2015 22:32:12

Spurious Emission 30MHz~3GHz

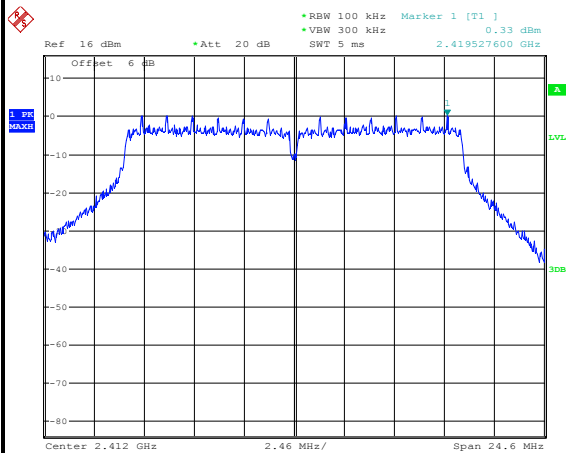
Date: 13.AUG.2015 22:39:16

Spurious Emission 2GHz~25GHz

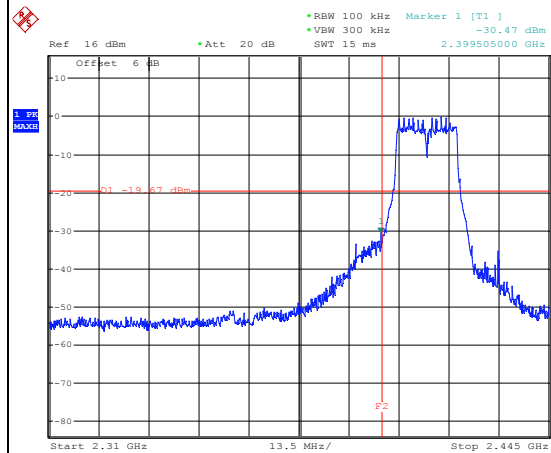
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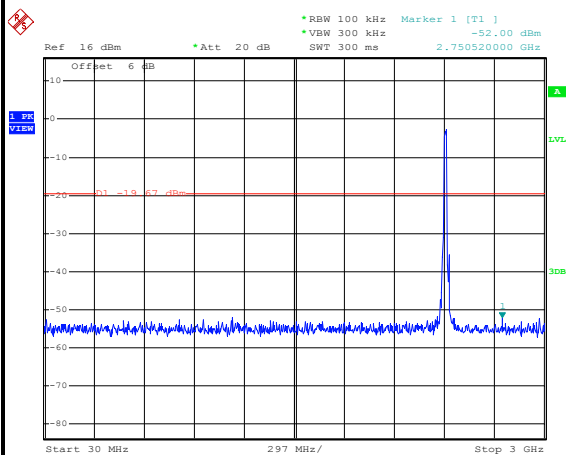
Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Issac Song

WLAN 802.11g Channel 01**100kHz PSD reference Level**

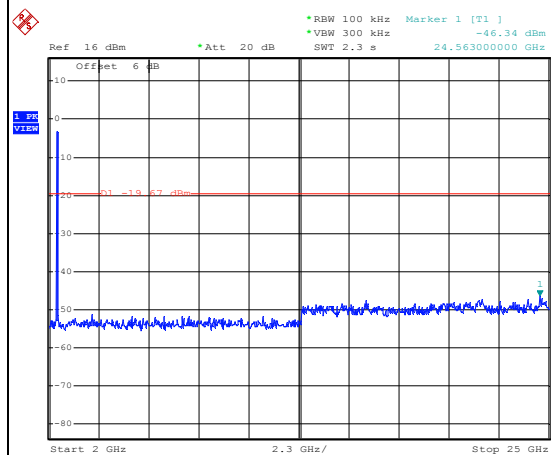
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Low Channel Plot

Date: 13.AUG.2015 22:45:52

Spurious Emission 30MHz~3GHz

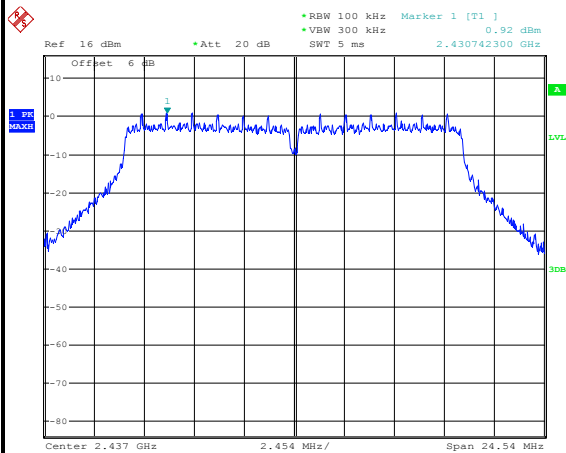
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Spurious Emission 2GHz~25GHz

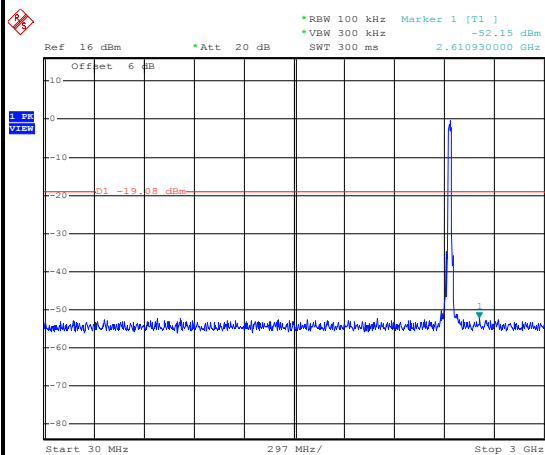
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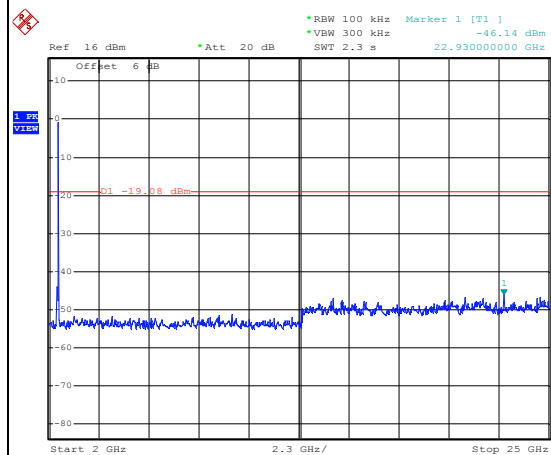
Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

WLAN 802.11g Channel 06**100kHz PSD reference Level**

Date: 13.AUG.2015 23:02:43

Spurious Emission 30MHz~3GHz

Date: 13.AUG.2015 23:04:58

Spurious Emission 2GHz~25GHz

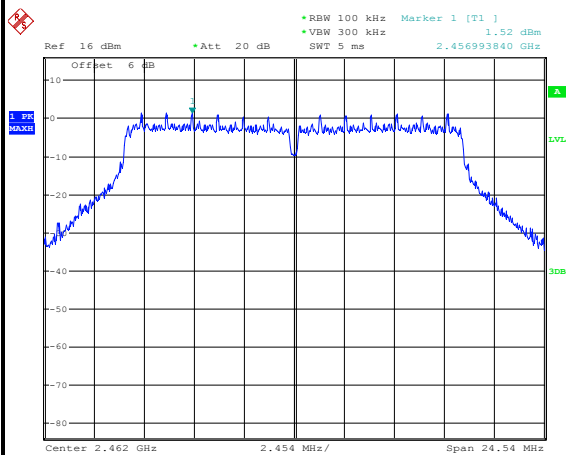
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Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Issac Song

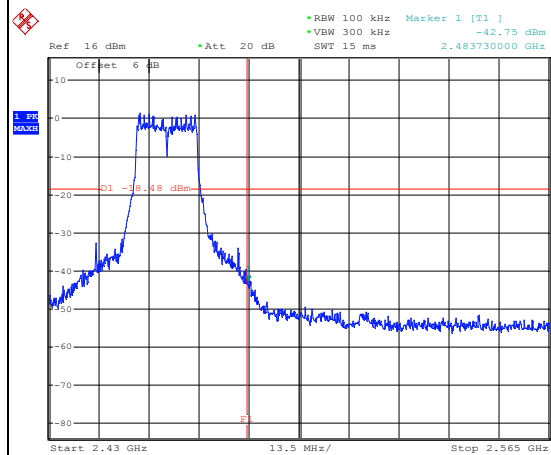
WLAN 802.11g Channel 11

100kHz PSD reference Level



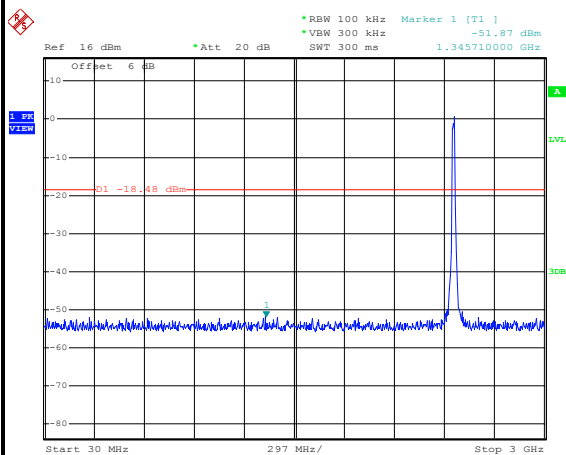
Date: 13.AUG.2015 23:09:52

High Channel Plot



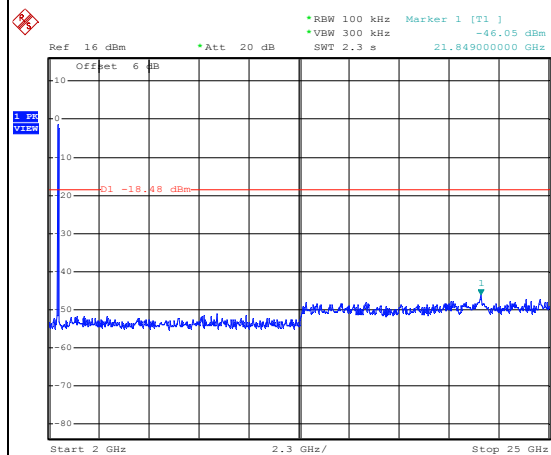
Date: 13.AUG.2015 23:10:15

Spurious Emission 30MHz~3GHz



Date: 13.AUG.2015 23:11:24

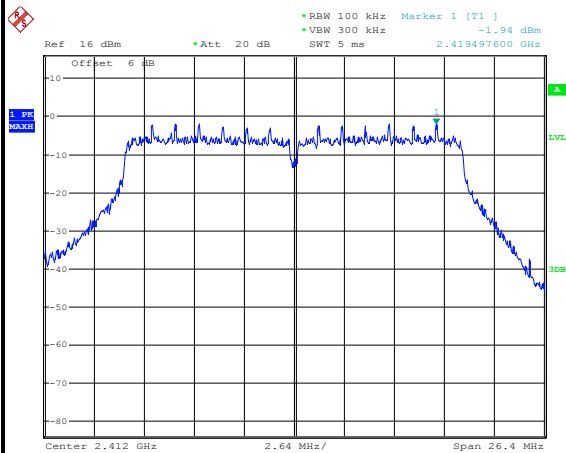
Spurious Emission 2GHz~25GHz



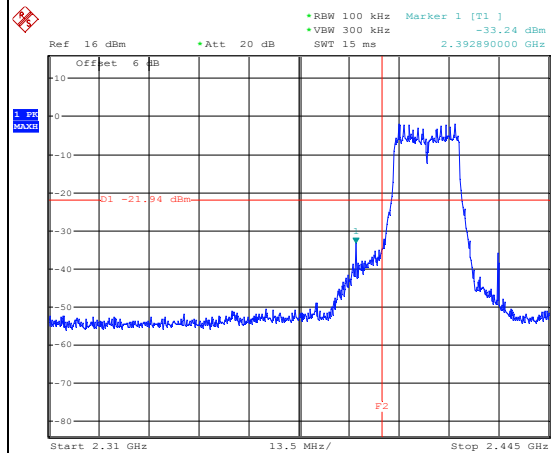
Date: 13.AUG.2015 23:11:42



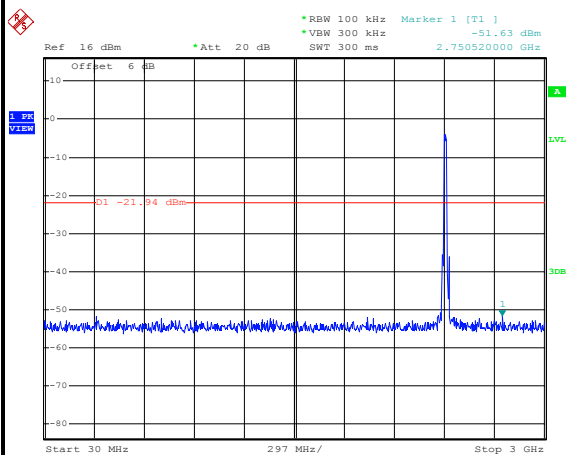
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Issac Song

WLAN 802.11n HT20 Channel 01**100kHz PSD reference Level**

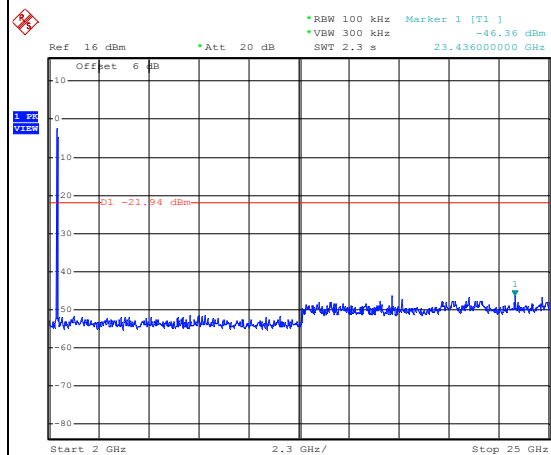
Date: 13.AUG.2015 23:18:32

Low Channel Plot

Date: 13.AUG.2015 23:18:59

Spurious Emission 30MHz~3GHz

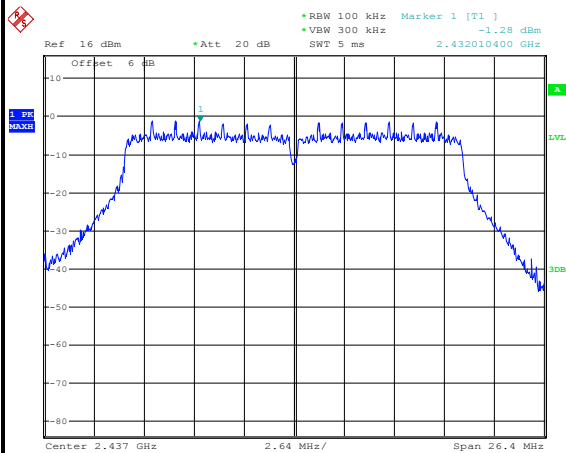
Date: 13.AUG.2015 23:25:07

Spurious Emission 2GHz~25GHz

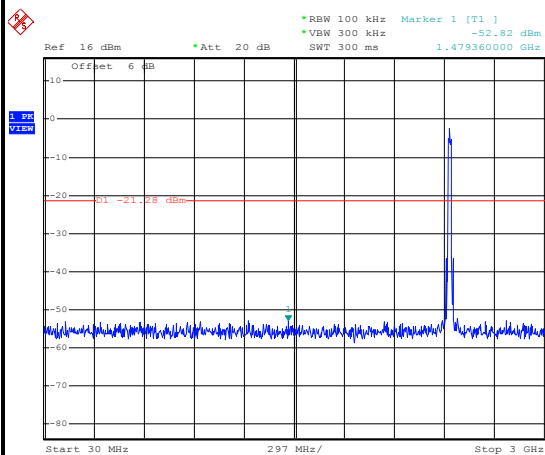
Date: 13.AUG.2015 23:22:56



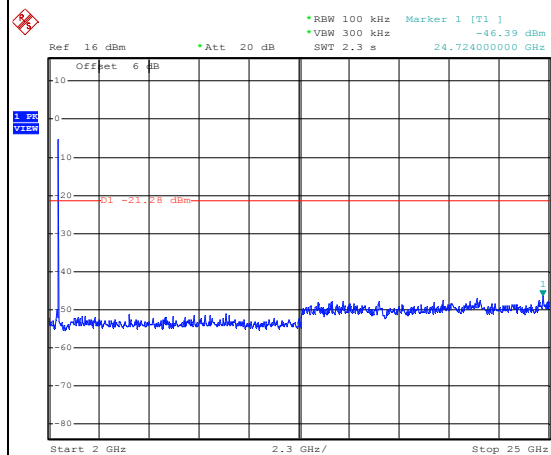
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

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

Date: 13.AUG.2015 23:35:28

Spurious Emission 30MHz~3GHz

Date: 13.AUG.2015 23:38:55

Spurious Emission 2GHz~25GHz

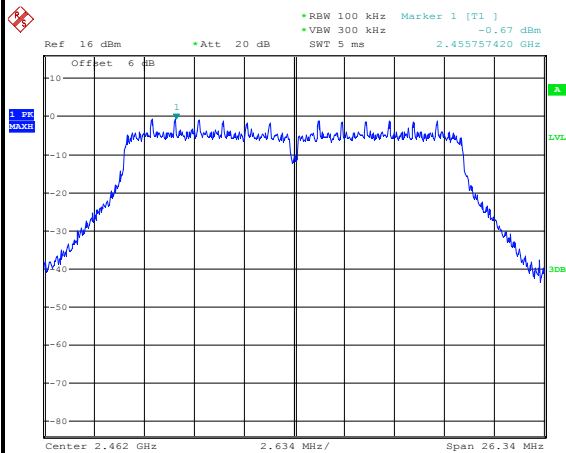
Date: 13.AUG.2015 23:36:11



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

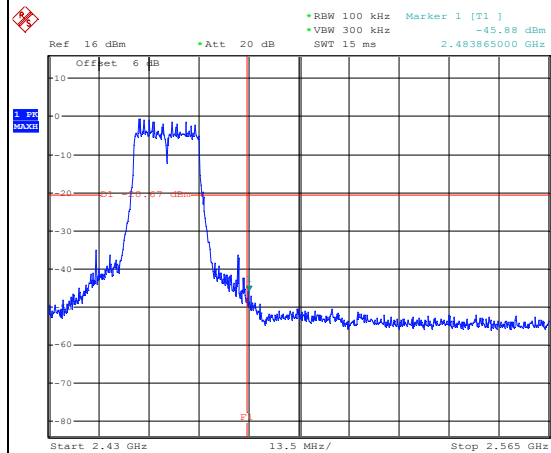
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



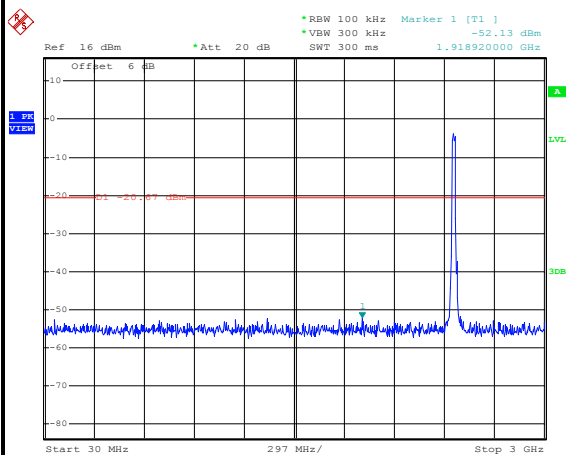
Date: 13.AUG.2015 23:44:00

High Channel Plot



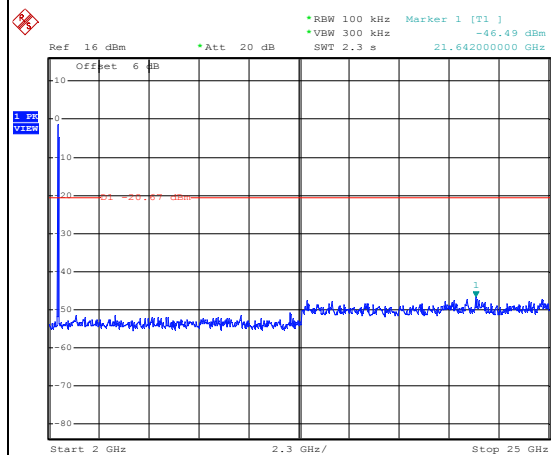
Date: 13.AUG.2015 23:44:20

Spurious Emission 30MHz~3GHz



Date: 13.AUG.2015 23:49:30

Spurious Emission 2GHz~25GHz



Date: 13.AUG.2015 23:47:44

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r03.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

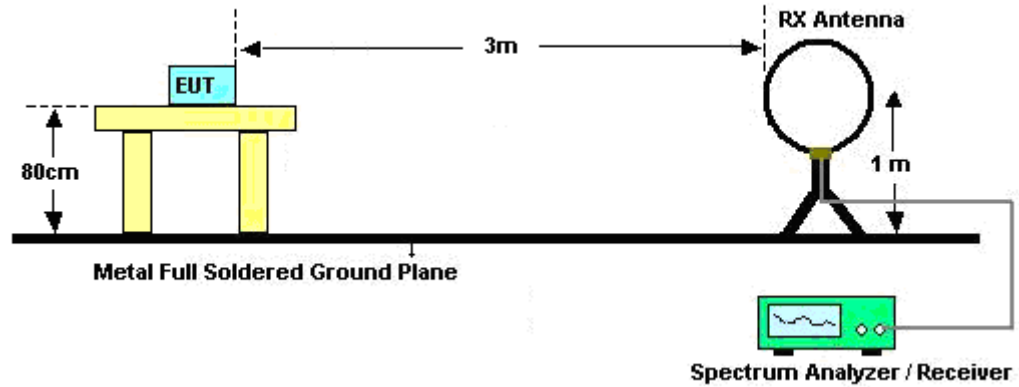
For average measurement:

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

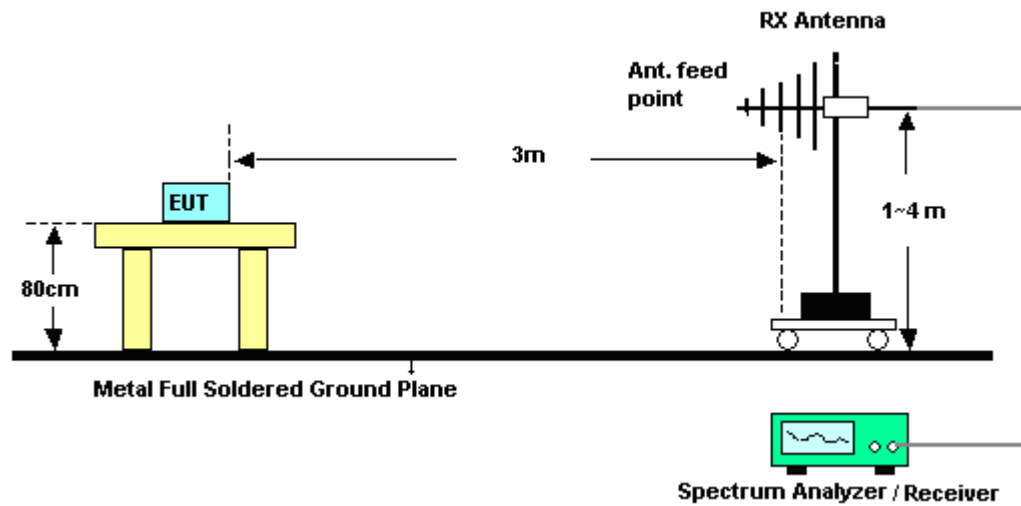
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	97.63	8.24	0.12	300Hz
802.11g	87.26	1.37	0.73	1kHz
2.4GHz 802.11n HT20	86.49	1.28	0.78	1kHz

3.5.4 Test Setup

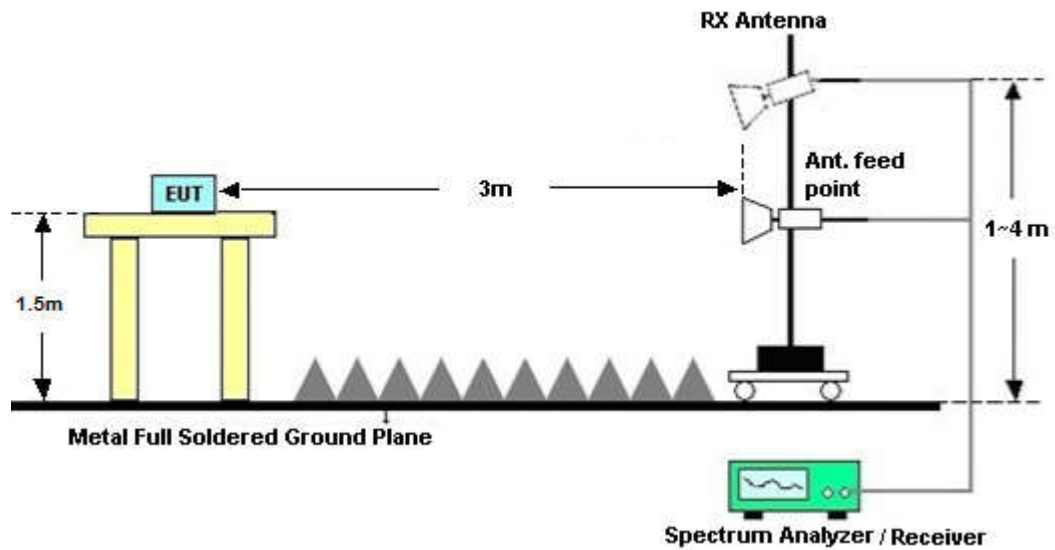
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

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

Please refer to Appendix B.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

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

*Decreases with the logarithm of the frequency.

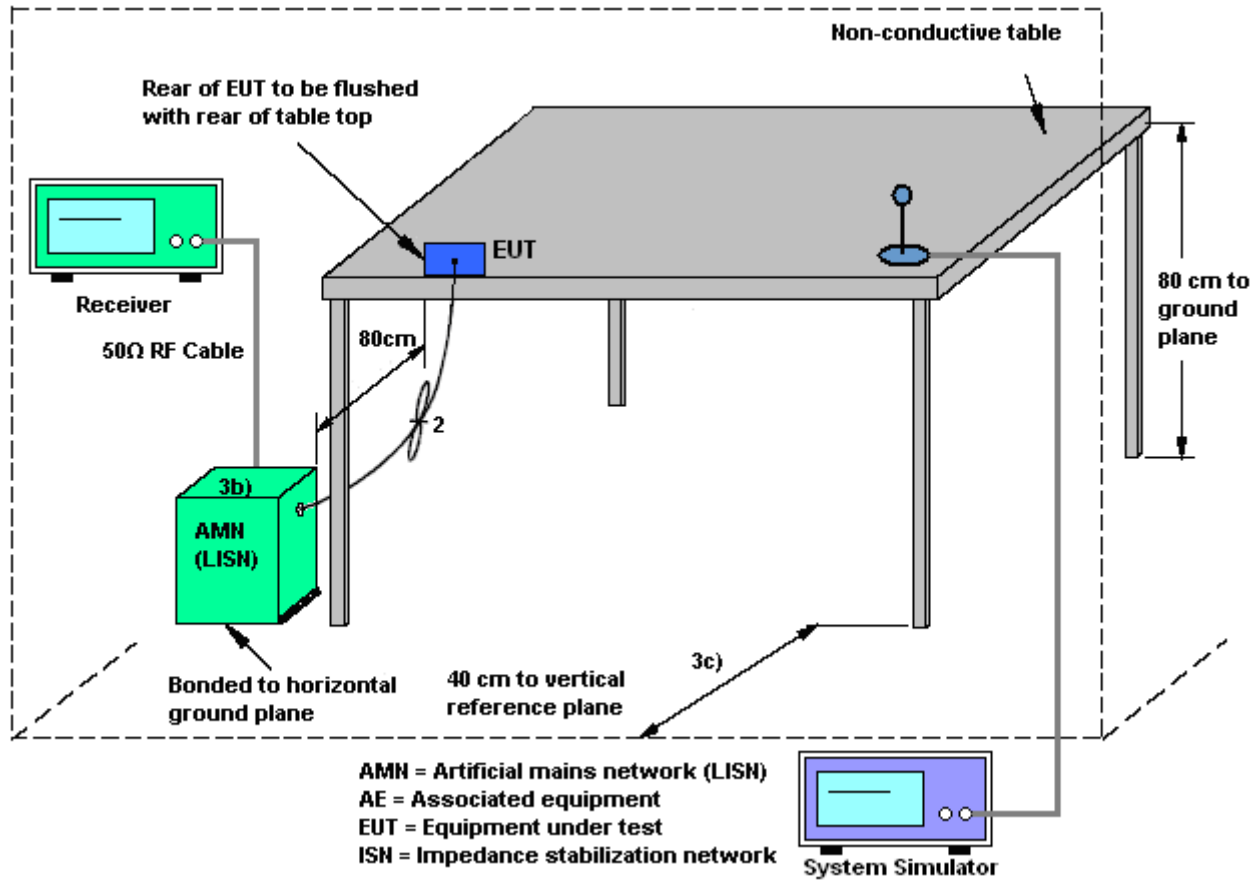
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

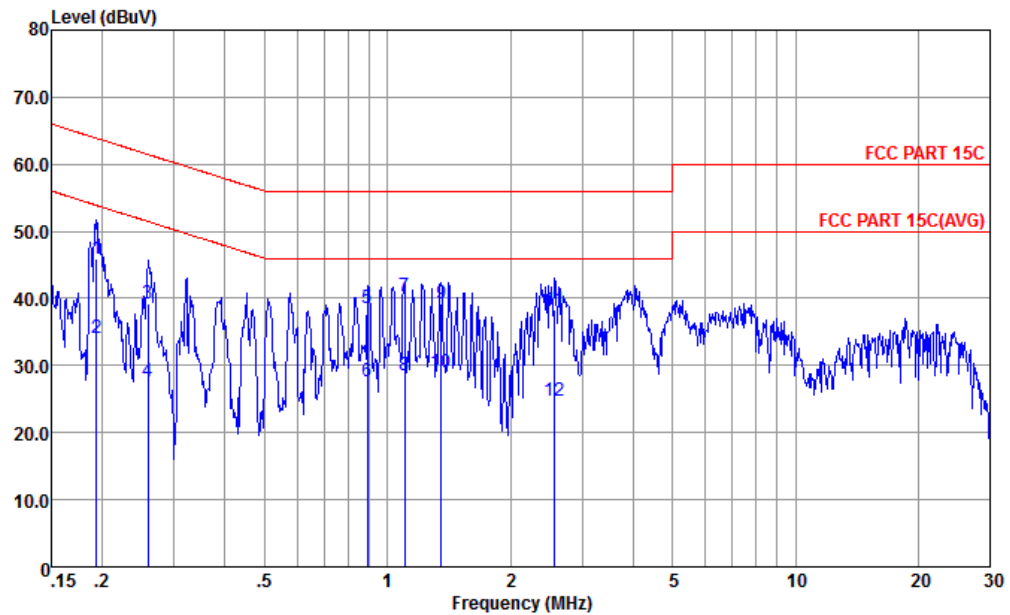
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter) + SIM 1		

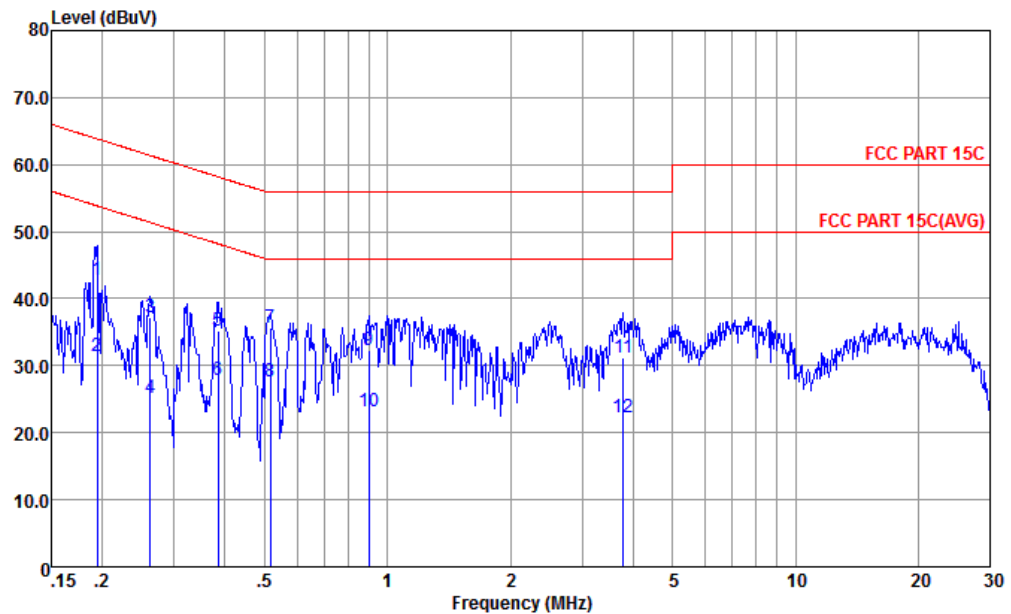


Site : CO01-KS
Condition : FCC PART 15C LISN-L20140306 LINE

mode		: Mode 1							
	Freq	Level	Over	Limit	Read	LISN	Cable	Remark	
	MHz	dBuV	Limit	Line	Level	Factor	Loss		
			dB	dBuV	dBuV	dB	dB		
1	0.19	45.87	-18.02	63.89	34.30	1.08	10.49	QP	
2	0.19	34.07	-19.82	53.89	22.50	1.08	10.49	Average	
3	0.26	39.29	-22.18	61.47	27.91	0.85	10.53	QP	
4	0.26	27.59	-23.88	51.47	16.21	0.85	10.53	Average	
5	0.89	38.57	-17.43	56.00	27.80	0.12	10.65	QP	
6	0.89	27.67	-18.33	46.00	16.90	0.12	10.65	Average	
7 *	1.10	40.35	-15.65	56.00	29.60	0.10	10.65	QP	
8	1.10	28.55	-17.45	46.00	17.80	0.10	10.65	Average	
9	1.35	39.27	-16.73	56.00	28.50	0.10	10.67	QP	
10	1.35	28.87	-17.13	46.00	18.10	0.10	10.67	Average	
11	2.57	38.35	-17.65	56.00	27.49	0.12	10.74	QP	
12	2.57	24.75	-21.25	46.00	13.89	0.12	10.74	Average	



Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter) + SIM 1		



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

mode		: Mode 1						
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.19	42.75	-21.09	63.84	31.20	1.06	10.49	QP
2	0.19	31.35	-22.49	53.84	19.80	1.06	10.49	Average
3	0.26	37.20	-24.18	61.38	25.80	0.86	10.54	QP
4	0.26	25.20	-26.18	51.38	13.80	0.86	10.54	Average
5	0.39	35.24	-22.93	58.17	24.19	0.43	10.62	QP
6	0.39	27.84	-20.33	48.17	16.79	0.43	10.62	Average
7	0.52	35.72	-20.28	56.00	24.80	0.29	10.63	QP
8 *	0.52	27.62	-18.38	46.00	16.70	0.29	10.63	Average
9	0.90	32.27	-23.73	56.00	21.50	0.12	10.65	QP
10	0.90	23.07	-22.93	46.00	12.30	0.12	10.65	Average
11	3.78	31.30	-24.70	56.00	20.30	0.18	10.82	QP
12	3.78	22.20	-23.80	46.00	11.20	0.18	10.82	Average



3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 28, 2014	Aug. 13, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	30MHz~40GHz	Jan. 23, 2015	Aug. 13, 2015	Jan. 22, 2016	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 23, 2015	Aug. 13, 2015	Jan. 22, 2016	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 29, 2014 Sep. 10, 2015	Aug. 18, 2015~ Nov. 11, 2015	Sep. 28, 2015 Sep. 09, 2016	Radiation (03CH02-KS)
Spectrum Analyzer	R&S	FSV40	101040	10kHz~40GHz; Max 30dBm	Sep. 25, 2014 Sep. 10, 2015	Aug. 18, 2015~ Nov. 11, 2015	Sep. 24, 2015 Sep. 09, 2016	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 13, 2014	Aug. 18, 2015~ Nov. 11, 2015	Nov. 12, 2015	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30MHz~2GHz	Sep. 13, 2014 Sep. 12, 2015	Aug. 18, 2015~ Nov. 11, 2015	Sep. 12, 2015 Sep. 11, 2016	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 08, 2014 Nov. 07, 2015	Aug. 18, 2015~ Nov. 11, 2015	Nov. 07, 2015 Nov. 06, 2016	Radiation (03CH02-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	1865802	1GHz-18GHz	Jan. 23, 2015	Aug. 18, 2015~ Nov. 11, 2015	Jan. 22, 2016	Radiation (03CH02-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA1702 49	15GHz ~40GHz	Mar. 03, 2015	Aug. 18, 2015~ Nov. 11, 2015	Mar. 02, 2016	Radiation (03CH02-KS)
Amplifier	com-power	PA-103A	161069	1kHz~1000MHz / 32 dB	May 04, 2015	Aug. 18, 2015~ Nov. 11, 2015	May 03, 2016	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A023 84	1GHz~26.5GHz Gain 30dB	Oct. 28, 2014 Oct. 24, 2015	Aug. 18, 2015~ Nov. 11, 2015	Oct. 27, 2015 Oct. 23, 2016	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002 473	N/A	NCR	Aug. 18, 2015~ Nov. 11, 2015	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Aug. 18, 2015~ Nov. 11, 2015	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Aug. 18, 2015~ Nov. 11, 2015	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	May 04, 2015	Aug. 18, 2015	May 03, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 25, 2014	Aug. 18, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 25, 2014	Aug. 18, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 25, 2014	Aug. 18, 2015	Oct. 24, 2015	Conduction (CO01-KS)



5 Uncertainty of Evaluation

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

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

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

Test Engineer:	Issac Song	Temperature:	24~25	°C
Test Date:	2015/8/13	Relative Humidity:	49~51	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	13.15	8.08	0.50	Pass
11b	1Mbps	1	6	2437	13.15	8.04	0.50	Pass
11b	1Mbps	1	11	2462	13.25	8.52	0.50	Pass
11g	6Mbps	1	1	2412	18.30	16.40	0.50	Pass
11g	6Mbps	1	6	2437	18.15	16.36	0.50	Pass
11g	6Mbps	1	11	2462	18.10	16.36	0.50	Pass
HT20	MCS0	1	1	2412	18.95	17.60	0.50	Pass
HT20	MCS0	1	6	2437	18.90	17.60	0.50	Pass
HT20	MCS0	1	11	2462	18.85	17.56	0.50	Pass

TEST RESULTS DATA
Peak Power Table

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
11b	1Mbps	1	1	2412	15.78	30.00	0.42	16.20	36.00	Pass
11b	1Mbps	1	6	2437	16.88	30.00	0.42	17.30	36.00	Pass
11b	1Mbps	1	11	2462	17.74	30.00	0.42	18.16	36.00	Pass
11g	6Mbps	1	1	2412	19.95	30.00	0.42	20.37	36.00	Pass
11g	6Mbps	1	6	2437	20.22	30.00	0.42	20.64	36.00	Pass
11g	6Mbps	1	11	2462	21.11	30.00	0.42	21.53	36.00	Pass
HT20	MCS0	1	1	2412	18.74	30.00	0.42	19.16	36.00	Pass
HT20	MCS0	1	6	2437	19.26	30.00	0.42	19.68	36.00	Pass
HT20	MCS0	1	11	2462	20.06	30.00	0.42	20.48	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

2.4GHz Band						
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.10	12.65
11b	1Mbps	1	6	2437	0.10	14.11
11b	1Mbps	1	11	2462	0.10	14.92
11g	6Mbps	1	1	2412	0.59	10.01
11g	6Mbps	1	6	2437	0.59	11.24
11g	6Mbps	1	11	2462	0.59	12.23
HT20	MCS0	1	1	2412	0.63	8.10
HT20	MCS0	1	6	2437	0.63	9.38
HT20	MCS0	1	11	2462	0.63	10.38

TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-8.73	0.42	8.00	Pass
11b	1Mbps	1	6	2437	-6.97	0.42	8.00	Pass
11b	1Mbps	1	11	2462	-6.67	0.42	8.00	Pass
11g	6Mbps	1	1	2412	-12.10	0.42	8.00	Pass
11g	6Mbps	1	6	2437	-13.23	0.42	8.00	Pass
11g	6Mbps	1	11	2462	-12.34	0.42	8.00	Pass
HT20	MCS0	1	1	2412	-16.46	0.42	8.00	Pass
HT20	MCS0	1	6	2437	-15.49	0.42	8.00	Pass
HT20	MCS0	1	11	2462	-14.56	0.42	8.00	Pass



Appendix B. Radiated Test Results

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.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz	*	2412.024	100.46	-	-	104.72	27.13	5.61	37	112	98	P	H
	*	2410.938	97.79	-	-	102.05	27.13	5.61	37	112	98	A	H
		2375.52	52.6	-21.4	74	57.1	26.95	5.57	37.02	112	98	P	H
		2372.73	43.39	-10.61	54	47.89	26.95	5.57	37.02	112	98	A	H
	*	2412.024	98.96	-	-	103.22	27.13	5.61	37	375	43	P	V
	*	2410.938	96.26	-	-	100.52	27.13	5.61	37	375	43	A	V
		2378.22	51.91	-22.09	74	56.41	26.95	5.57	37.02	375	43	P	V
		2372.37	42.21	-11.79	54	46.71	26.95	5.57	37.02	375	43	A	V
802.11b CH 06 2437MHz	*	2435.655	100.58	-	-	105.55	27.26	4.76	36.99	229	143	P	H
	*	2436.239	96.34	-	-	101.31	27.26	4.76	36.99	229	143	A	H
	*	2435.989	104.57	-	-	109.54	27.26	4.76	36.99	150	97	P	V
	*	2436.239	100.32	-	-	105.29	27.26	4.76	36.99	150	97	A	V
802.11b CH 11 2462MHz	*	2463.126	100.62	-	-	105.28	27.51	4.79	36.96	288	130	P	H
	*	2461.289	96.31	-	-	100.97	27.51	4.79	36.96	288	130	A	H
		2499	46.44	-27.56	74	50.78	27.77	4.82	36.93	288	130	P	H
		2499.6	36.59	-17.41	54	40.93	27.77	4.82	36.93	288	130	A	H
	*	2460.955	104.58	-	-	109.24	27.51	4.79	36.96	150	54	P	V
	*	2461.289	100.48	-	-	105.14	27.51	4.79	36.96	150	54	A	V
		2497.64	50.38	-23.62	74	54.72	27.77	4.82	36.93	150	54	P	V
		2499.48	40.77	-13.23	54	45.11	27.77	4.82	36.93	150	54	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI 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	44.78	-29.22	74	42.1	31.51	7.85	36.68	166	257	P	H
		4824	43.95	-30.05	74	41.27	31.51	7.85	36.68	300	310	P	V
802.11b CH 06 2437MHz		4875	45.82	-28.18	74	44.02	31.59	6.87	36.66	150	215	P	H
		7311	44.42	-29.58	74	38.51	34.03	8.57	36.69	150	171	P	H
		4875	46.38	-27.62	74	44.58	31.59	6.87	36.66	150	310	P	V
		7311	44.79	-29.21	74	38.88	34.03	8.57	36.69	150	196	P	V
802.11b CH 11 2462MHz		4923	46.03	-27.97	74	44.09	31.67	6.92	36.65	150	329	P	H
		7386	46.89	-27.11	74	40.7	34.29	8.68	36.78	150	160	P	H
		4926	46.18	-27.82	74	44.24	31.67	6.92	36.65	150	173	P	V
		7386	45.99	-28.01	74	39.8	34.29	8.68	36.78	150	221	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

WIFI 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	*	2416.282	101.16	-	-	106.29	27.13	4.74	37	165	335	P	H
	*	2417.201	90.41	-	-	95.54	27.13	4.74	37	165	335	A	H
		2390	65.14	-8.86	74	70.44	27	4.72	37.02	165	335	P	H
		2389.83	44.94	-9.06	54	50.24	27	4.72	37.02	165	335	A	H
	*	2415.448	99.41	-	-	104.54	27.13	4.74	37	293	226	P	V
	*	2414.78	88.17	-	-	93.3	27.13	4.74	37	293	226	A	V
		2389.47	60.56	-13.44	74	65.86	27	4.72	37.02	293	226	P	V
		2390	40.61	-13.39	54	45.91	27	4.72	37.02	293	226	A	V
802.11g CH 06 2437MHz	*	2442.585	103.13	-	-	107.94	27.39	4.77	36.97	150	268	P	H
	*	2442.251	92.61	-	-	97.42	27.39	4.77	36.97	150	268	A	H
	*	2431.479	101.39	-	-	106.36	27.26	4.76	36.99	300	253	P	V
	*	2432.398	90.31	-	-	95.28	27.26	4.76	36.99	300	253	A	V
802.11g CH 11 2462MHz	*	2467.051	104.53	-	-	109.19	27.51	4.79	36.96	150	275	P	H
	*	2455.444	93.68	-	-	98.34	27.51	4.79	36.96	150	275	A	H
	!	2483.68	68.94	-5.06	74	73.44	27.64	4.8	36.94	150	275	P	H
		2483.52	45.71	-8.29	54	50.21	27.64	4.8	36.94	150	275	A	H
	*	2466.466	100.96	-	-	105.62	27.51	4.79	36.96	281	232	P	V
	*	2457.365	90.42	-	-	95.08	27.51	4.79	36.96	281	232	A	V
		2483.68	66.99	-7.01	74	71.49	27.64	4.8	36.94	281	232	P	V
		2483.56	40.35	-13.65	54	44.85	27.64	4.8	36.94	281	232	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI 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	42.85	-31.15	74	41.19	31.51	6.83	36.68	150	265	P	H
		4824	42.39	-31.61	74	40.73	31.51	6.83	36.68	162	321	P	V
802.11g CH 06 2437MHz		4874	43.21	-30.79	74	41.41	31.59	6.87	36.66	154	144	P	H
		7311	45.44	-28.56	74	39.53	34.03	8.57	36.69	150	166	P	H
		4874	42.32	-31.68	74	40.52	31.59	6.87	36.66	150	185	P	V
		7311	46.04	-27.96	74	40.13	34.03	8.57	36.69	150	102	P	V
802.11g CH 11 2462MHz		4923	44.7	-29.3	74	42.76	31.67	6.92	36.65	261	0	P	H
		7386	46.49	-27.51	74	40.3	34.29	8.68	36.78	150	327	P	H
		4923	42.36	-31.64	74	40.42	31.67	6.92	36.65	185	174	P	V
		7386	46.61	-27.39	74	40.42	34.29	8.68	36.78	150	155	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (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 HT20 CH 01 2412MHz	*	2408	91.33	-	-	96.46	27.13	4.74	37	296	309	P	H
	*	2406	81.26	-	-	86.39	27.13	4.74	37	296	309	A	H
		2389.92	50.6	-23.4	74	55.9	27	4.72	37.02	296	309	P	H
		2389.92	31.05	-22.95	54	36.35	27	4.72	37.02	296	309	A	H
	*	2418	97.67	-	-	102.8	27.13	4.74	37	150	292	P	V
	*	2418	87	-	-	92.13	27.13	4.74	37	150	292	A	V
		2389.92	54.28	-19.72	74	59.58	27	4.72	37.02	150	292	P	V
		2360.13	36.05	-17.95	54	41.48	26.91	4.68	37.02	150	292	A	V
802.11n HT20 CH 06 2437MHz	*	2442	90.72	-	-	95.53	27.39	4.77	36.97	289	309	P	H
	*	2442	80.62	-	-	85.43	27.39	4.77	36.97	289	309	A	H
	*	2442	97.45	-	-	102.26	27.39	4.77	36.97	150	294	P	V
	*	2430	87.08	-	-	92.05	27.26	4.76	36.99	150	294	A	V
802.11n HT20 CH 11 2462MHz	*	2456	95.1	-	-	99.76	27.51	4.79	36.96	284	315	P	H
	*	2456	85.1	-	-	89.76	27.51	4.79	36.96	284	315	A	H
		2485.6	54.03	-19.97	74	58.53	27.64	4.8	36.94	284	315	P	H
		2483.56	33.24	-20.76	54	37.74	27.64	4.8	36.94	284	315	A	H
	*	2458	101.14	-	-	105.8	27.51	4.79	36.96	150	258	P	V
	*	2458	90.81	-	-	95.47	27.51	4.79	36.96	150	258	A	V
		2483.72	63.83	-10.17	74	68.33	27.64	4.8	36.94	150	258	P	V
		2483.52	40.13	-13.87	54	44.63	27.64	4.8	36.94	150	258	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

WIFI 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 HT20 CH 01 2412MHz		4824	42.95	-31.05	74	41.29	31.51	6.83	36.68	289	315	P	H
		4824	42.63	-31.37	74	40.97	31.51	6.83	36.68	150	288	P	V
802.11n HT20 CH 06 2437MHz		4875	42.06	-31.94	74	40.26	31.59	6.87	36.66	288	315	P	H
		7311	45.43	-28.57	74	39.52	34.03	8.57	36.69	281	307	P	H
		4875	42.14	-31.86	74	40.34	31.59	6.87	36.66	150	284	P	V
		7311	45.5	-28.5	74	39.59	34.03	8.57	36.69	150	284	P	V
802.11n HT20 CH 11 2462MHz		4923	42.26	-31.74	74	40.32	31.67	6.92	36.65	150	268	P	H
		7386	46.88	-27.12	74	40.69	34.29	8.68	36.78	150	259	P	H
		4923	42.68	-31.32	74	40.74	31.67	6.92	36.65	280	315	P	V
		7386	47.42	-26.58	74	41.23	34.29	8.68	36.78	150	311	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11b (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11b LF		94.99	29.47	-14.03	43.5	51.88	11.4	1.26	35.07	120	154	P	H
		194.9	20.63	-22.87	43.5	44.29	9.58	1.82	35.06	-	-	P	H
		394.72	17.65	-28.35	46	34.2	16.04	2.62	35.21	-	-	P	H
		593.57	21.24	-24.76	46	34.44	18.46	3.24	34.9	-	-	P	H
		739.07	21.93	-24.07	46	33.1	19.69	3.65	34.51	-	-	P	H
		821.52	23.09	-22.91	46	33.04	20.65	3.85	34.45	-	-	P	H
		104.69	27.39	-16.11	43.5	49.39	12.01	1.32	35.33	185	145	P	V
		194.9	23.74	-19.76	43.5	47.4	9.58	1.82	35.06	-	-	P	V
		484.93	18.68	-27.32	46	33.21	17.21	2.91	34.65	-	-	P	V
		551.86	21.17	-24.83	46	34.33	18.21	3.14	34.51	-	-	P	V
		820.55	22.03	-23.97	46	32.01	20.63	3.85	34.46	-	-	P	V
		884.57	24.95	-21.05	46	34.15	21.31	3.99	34.5	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11g (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11g LF		94.99	27.47	-16.03	43.5	49.88	11.4	1.26	35.07	145	202	P	H
		194.9	18.63	-24.87	43.5	42.29	9.58	1.82	35.06	-	-	P	H
		436.43	18.46	-27.54	46	33.91	16.78	2.76	34.99	-	-	P	H
		568.35	18.75	-27.25	46	31.93	18.31	3.18	34.67	-	-	P	H
		792.42	20.8	-25.2	46	31.32	20.22	3.78	34.52	-	-	P	H
		913.67	22.8	-23.2	46	31.82	21.48	4.06	34.56	-	-	P	H
		104.69	27.39	-16.11	43.5	49.39	12.01	1.32	35.33	122	174	P	V
		176.47	21.41	-22.09	43.5	44.4	10.25	1.71	34.95	-	-	P	V
		254.07	16.02	-29.98	46	37.23	11.56	2.09	34.86	-	-	P	V
		448.07	16.51	-29.49	46	31.66	16.97	2.79	34.91	-	-	P	V
		620.73	18.94	-27.06	46	31.83	18.71	3.31	34.91	-	-	P	V
		836.07	21.8	-24.2	46	31.43	20.88	3.88	34.39	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT20 LF		101.78	30.18	-13.32	43.5	52.15	12.07	1.3	35.34	145	78	P	H
		194.9	23.63	-19.87	43.5	47.29	9.58	1.82	35.06	-	-	P	H
		414.12	17.1	-28.9	46	33.12	16.43	2.69	35.14	-	-	P	H
		556.71	20.08	-25.92	46	33.25	18.24	3.15	34.56	-	-	P	H
		739.07	20.93	-25.07	46	32.1	19.69	3.65	34.51	-	-	P	H
		934.04	23.93	-22.07	46	32.75	21.61	4.12	34.55	-	-	P	H
		104.69	32.39	-11.11	43.5	54.39	12.01	1.32	35.33	122	15	P	V
		166.77	25.29	-18.21	43.5	47.96	10.6	1.66	34.93	-	-	P	V
		448.07	16.51	-29.49	46	31.66	16.97	2.79	34.91	-	-	P	V
		551.86	19.17	-26.83	46	32.33	18.21	3.14	34.51	-	-	P	V
		726.46	19.61	-26.39	46	31.04	19.56	3.63	34.62	-	-	P	V
		884.57	22.95	-23.05	46	32.15	21.31	3.99	34.5	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

**Note symbol**

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



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

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

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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