

FCC RF Test Report

APPLICANT : TCT Mobile Limited
EQUIPMENT : GSM Quad-band / UMTS Quad-band
/ LTE Penta-band mobile phone
BRAND NAME : Alcatel
MODEL NAME : 6039Y
FCC ID : RAD546
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Jan. 14, 2015 and testing was completed on Apr. 24, 2015. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.

No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China



TABLE OF CONTENTS

REVISION HISTORY.....	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant.....	5
1.2 Manufacturer.....	5
1.3 Product Feature of Equipment Under Test.....	5
1.4 Product Specification subjective to this standard	5
1.5 Accessories and Support Equipment	6
1.6 Modification of EUT	7
1.7 Testing Location	7
1.8 Applicable Standards.....	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	8
2.1 Carrier Frequency Channel	8
2.2 Pre-Scanned RF Power.....	9
2.3 Test Mode.....	10
2.4 Connection Diagram of Test System.....	11
2.5 Support Unit used in test configuration and system	12
2.6 EUT Operation Test Setup	12
2.7 Measurement Results Explanation Example.....	13
3 TEST RESULT.....	14
3.1 6dB Bandwidth Measurement	14
3.2 Output Power Measurement.....	16
3.3 Power Spectral Density Measurement	18
3.4 Conducted Band Edges and Spurious Emission Measurement	20
3.5 Radiated Band Edges and Spurious Emission Measurement	33
3.6 AC Conducted Emission Measurement.....	37
3.7 Antenna Requirements.....	41
4 LIST OF MEASURING EQUIPMENT	42
5 UNCERTAINTY OF EVALUATION	44
APPENDIX A. CONDUCTED TEST RESULTS	
APPENDIX B. RADIATED TEST RESULTS	
APPENDIX C. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR511303-01C	Rev. 01	Initial issue of report	Apr. 27, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.06 dB at 2483.520 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 9.66 dB at 2.490 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

TCT Mobile Limited

5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203

1.2 Manufacturer

TCT Mobile Limited

5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	GSM Quad-band / UMTS Quad-band / LTE Penta-band mobile phone
Brand Name	Alcatel
Model Name	6039Y
FCC ID	RAD546
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/HSPA+(Downlink Only)/DC-HSDPA/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20 / Bluetooth v3.0+ EDR/Bluetooth v4.1 LE
HW Version	BAB34D000GCX
SW Version	vA5M
EUT Stage	Identical Prototype

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

1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2472 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 20.17 dBm (0.1040 W) 802.11g : 20.92 dBm (0.1236 W) 802.11n HT20 : 19.81 dBm (0.0957 W)
Antenna Type/Gain	802.11b/g/n : PIFA Antenna with gain -0.50 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Accessories and Support Equipment

Specification of Accessory				
AC Adapter 1	Brand Name	ACE-Tenpao	Model Name	UC11US
	Power Rating	I/P: 100-240Vac, 200mA, O/P: 5Vdc, 1000mA		
	P/N	CBA0058AG0C2		
AC Adapter 2	Brand Name	ACE-Yingju	Model Name	UC11US
	Power Rating	I/P: 100-240Vac, 200mA, O/P: 5Vdc, 1000mA		
	P/N	CBA0058AG0C3		
Battery 1	Brand Name	ALCATEL onetouch	Model Name	TLp020K2
	Power Rating	3.8Vdc, 2000mAh		
	P/N	CAC2000023C2		
Battery 2	Brand Name	ALCATEL onetouch	Model Name	TLp020KJ
	Power Rating	3.8Vdc, 2000mAh		
	P/N	CAC2000025CJ		
USB Cable 1	Brand Name	ACE-Shenhua	Model Name	CDA0000025C1
	Signal Line Type	1.1m shielded without core		
USB Cable 2	Brand Name	ACE-Juwei	Model Name	CDA0000025C2
	Signal Line Type	1.1m shielded without core		
USB Cable 3	Brand Name	ACE-Juwei	Model Name	CDA0000025C8
	Signal Line Type	1.1m shielded without core		
Earphone 1	Brand Name	ACE-JBL	Model Name	CCA0001A10C9
	Signal Line Type	1.2m non-shielded without core		
Earphone 2	Brand Name	ACE-JBL	Model Name	J22C
	Signal Line Type	1.38m non-shielded without core		
Earphone 3	Brand Name	ACE-Lianyun	Model Name	CCB0023A11C2
	Signal Line Type	1.26m non-shielded without core		
Earphone 4	Brand Name	ACE-Lianyun	Model Name	CCB0023A10C2
	Signal Line Type	1.26m non-shielded without core		

1.6 Modification of EUT

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

1.7 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 INC.		
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	Sporton Site No.		FCC Registration No.
	03CH10-HY		TW1022

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

1.8 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 v03r02
- ♦ 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 (Y 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	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442	-	-



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
CH01	2412 MHz	20.12	CH 11	20.06	20.12	20.15
CH07	2442 MHz	20.11				
CH11	2462 MHz	20.17				
CH12	2467 MHz	15.04				
CH13	2472 MHz	15.15				

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
CH01	2412 MHz	19.87	CH 11	20.71	20.63	20.62	20.68	20.87	20.60	20.66
CH07	2442 MHz	20.70								
CH11	2462 MHz	20.92								
CH12	2467 MHz	16.81								
CH13	2472 MHz	17.35								

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
CH01	2412 MHz	18.58	CH 11	19.68	19.80	19.48	19.73	19.61	19.62	19.58
CH07	2442 MHz	19.55								
CH11	2462 MHz	19.81								
CH12	2467 MHz	15.81								
CH13	2472 MHz	16.27								

2.3 Test Mode

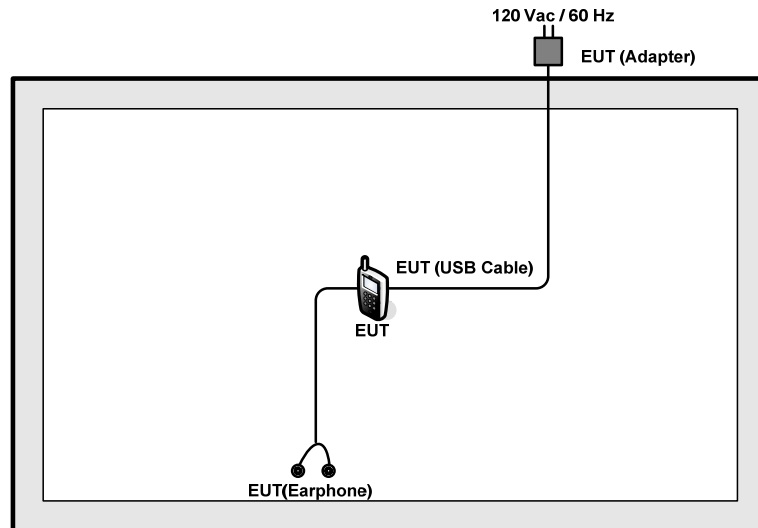
Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

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

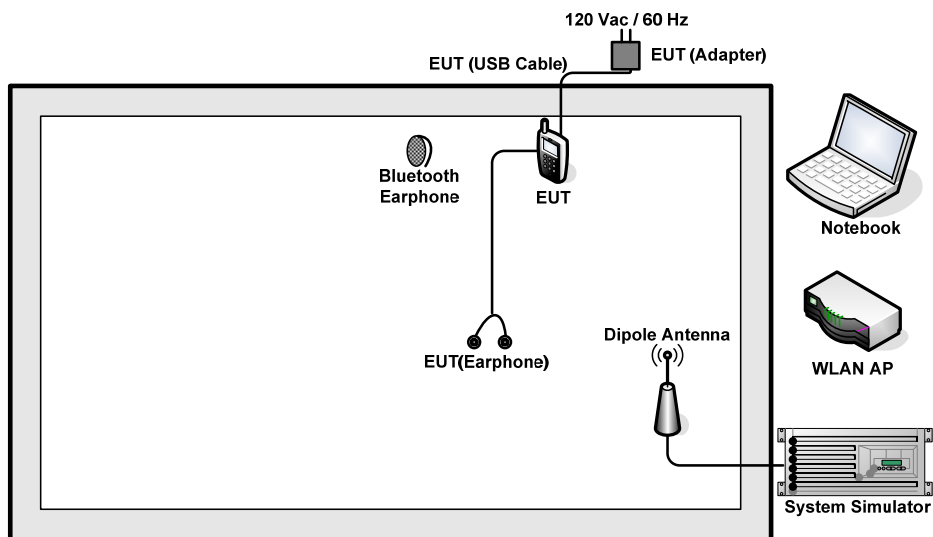
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable 1(Charging from Adapter 1) + Earphone 1 + Battery 1
Remark: For radiated test cases, the tests were performance with adapter 1, battery 1, earphone 1, and USB cable 1.	

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	CMW 500	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	G480	PRC4	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 5.5 dB.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)}. \\ &= 5.5 \text{ (dB)}\end{aligned}$$

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.

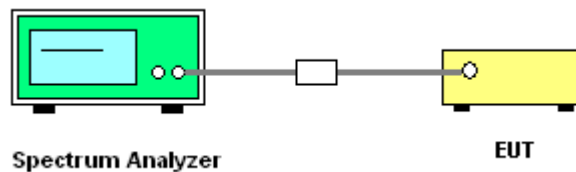
3.1.2 Measuring Instruments

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 v03r02.
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.

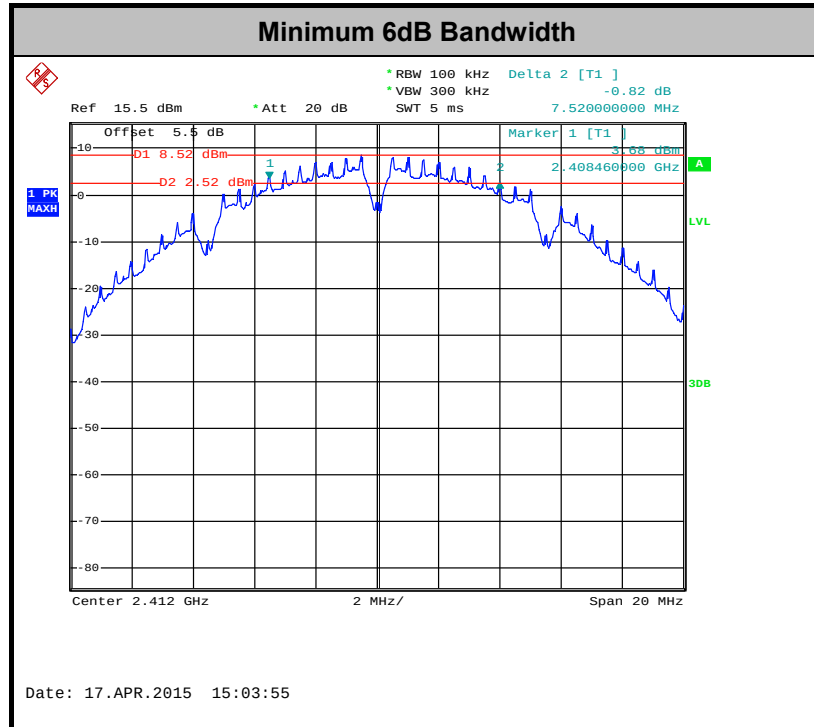
3.1.4 Test Setup





3.1.5 Test Result of 6dB Bandwidth

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.

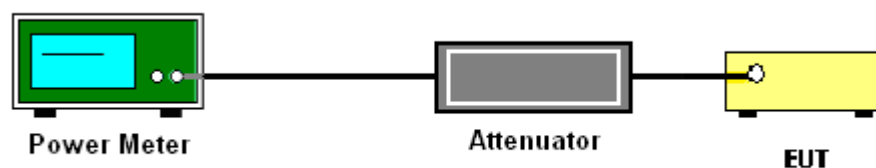
3.2.2 Measuring Instruments

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 v03r02.
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.

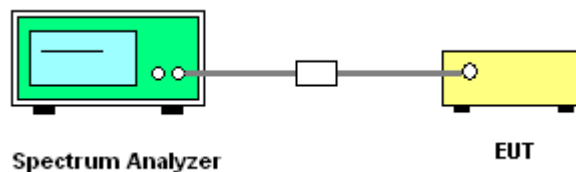
3.3.2 Measuring Instruments

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 v03r02
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.

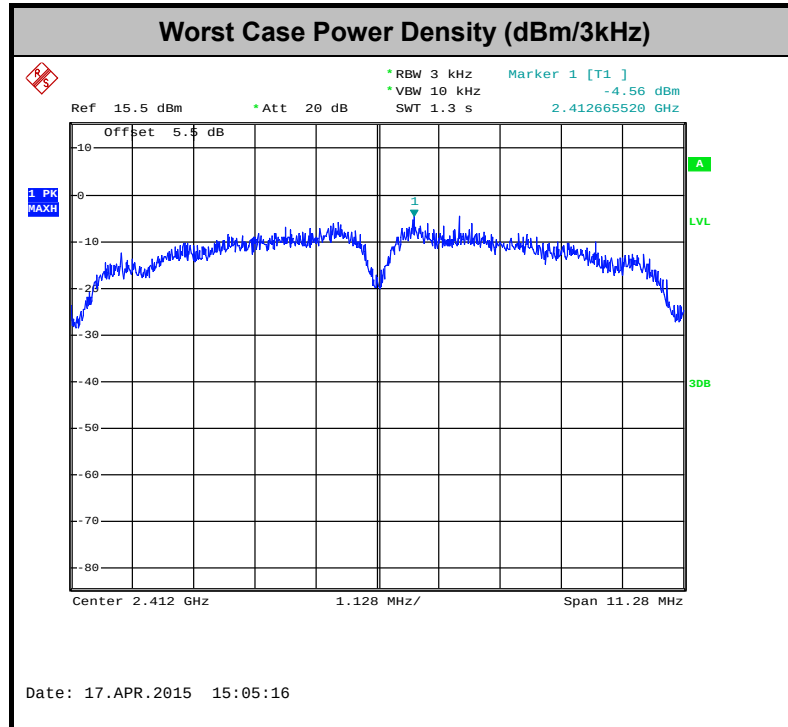
3.3.4 Test Setup





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).

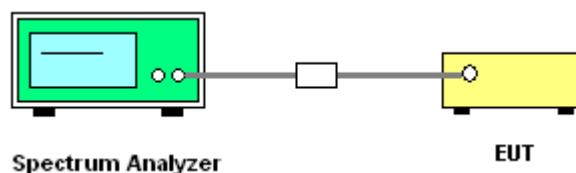
3.4.2 Measuring Instruments

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 v03r02.
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



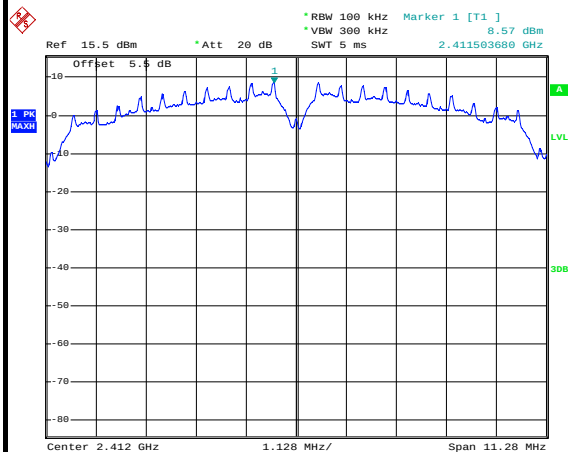


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Mygai Wang

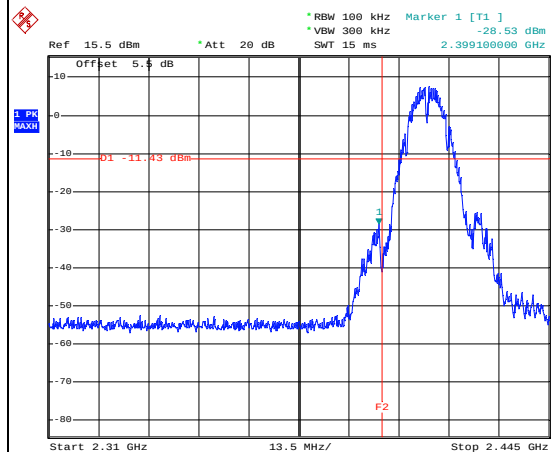
WLAN 802.11b Channel 01

100kHz PSD reference Level



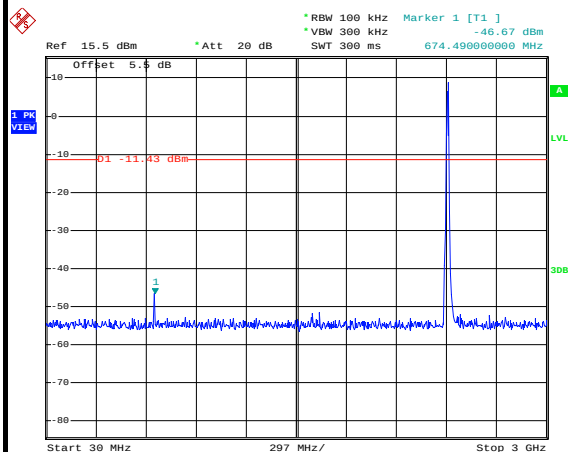
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Channel Plot



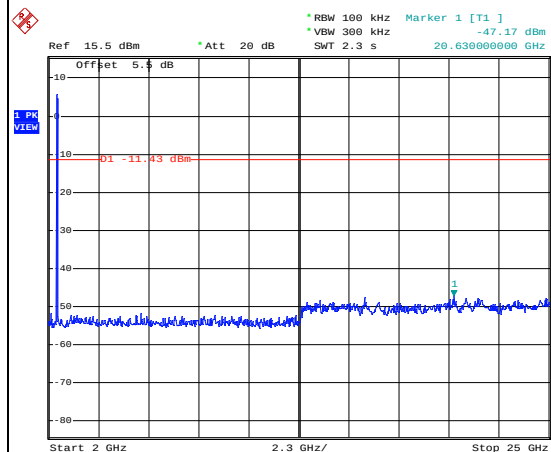
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Spurious Emission 30MHz~3GHz



Date: 17.APR.2015 15:06:29

Spurious Emission 2GHz~25GHz



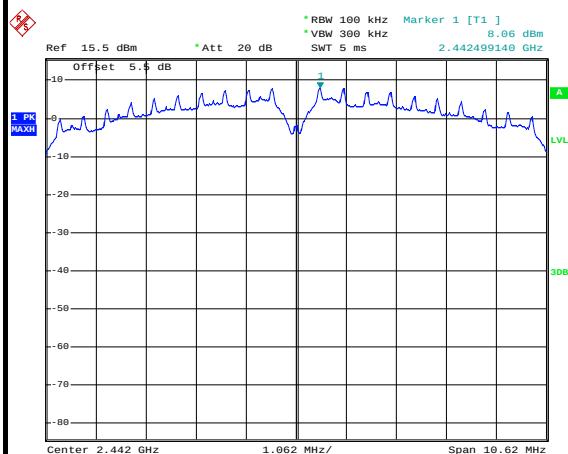
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Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	07	Test Engineer :	Mygai Wang

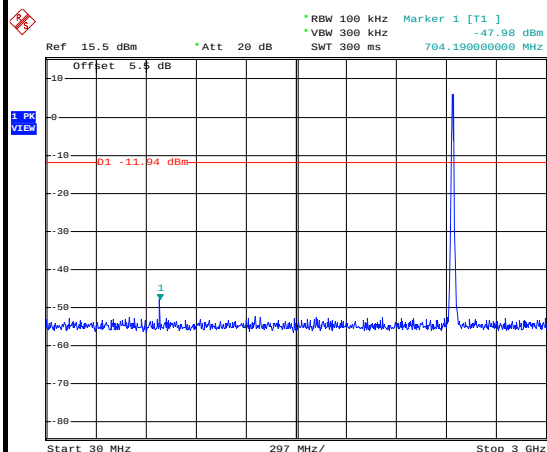
WLAN 802.11b Channel 07

100kHz PSD reference Level



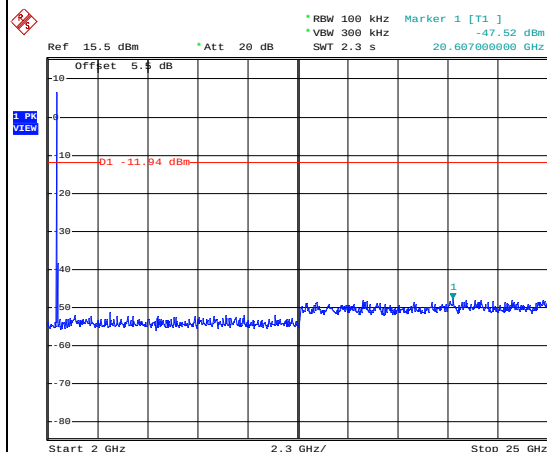
Date: 17.APR.2015 15:17:01

Spurious Emission 30MHz~3GHz



Date: 17.APR.2015 15:17:29

Spurious Emission 2GHz~25GHz



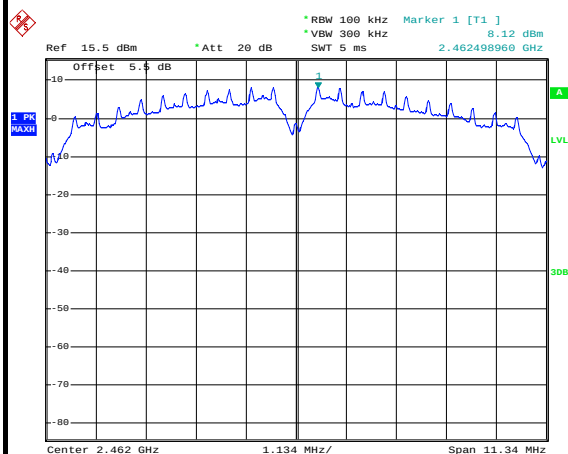
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Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Mygai Wang

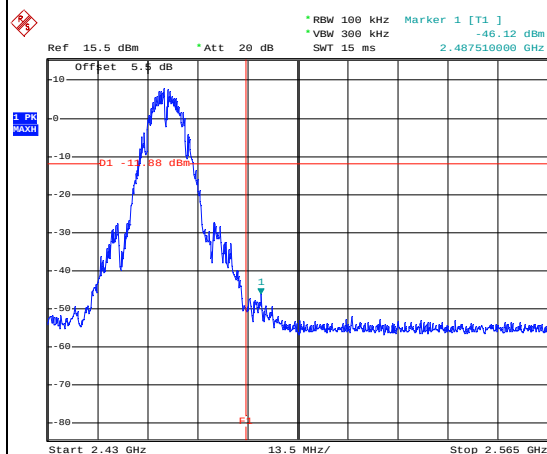
WLAN 802.11b Channel 11

100kHz PSD reference Level



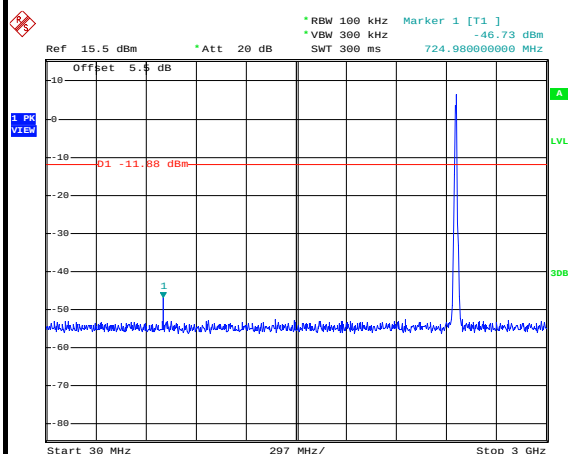
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Channel Plot



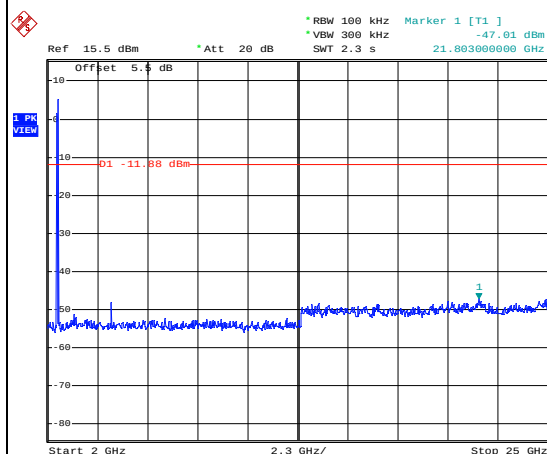
Date: 17.APR.2015 15:21:11

Spurious Emission 30MHz~3GHz



Date: 17.APR.2015 15:21:39

Spurious Emission 2GHz~25GHz



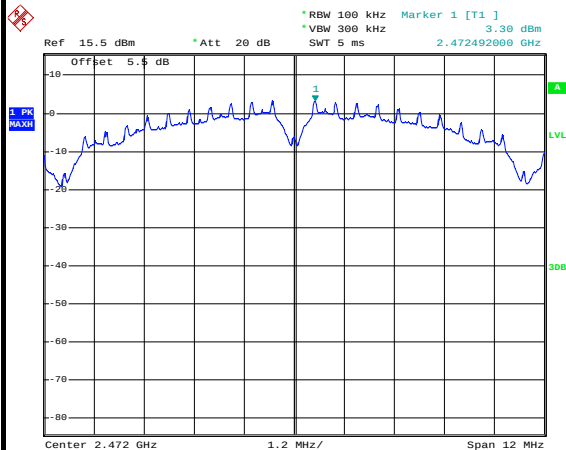
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Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	13	Test Engineer :	Mygai Wang

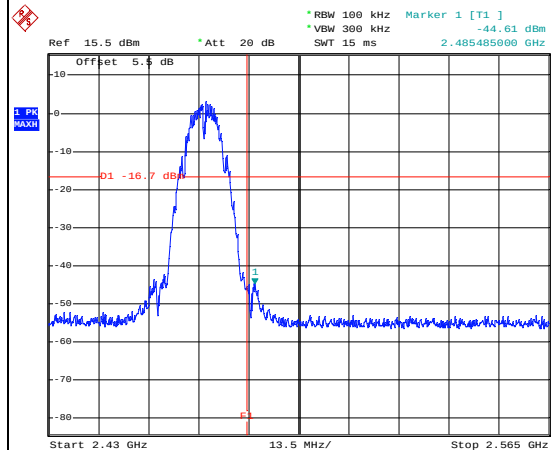
WLAN 802.11b Channel 13

100kHz PSD reference Level



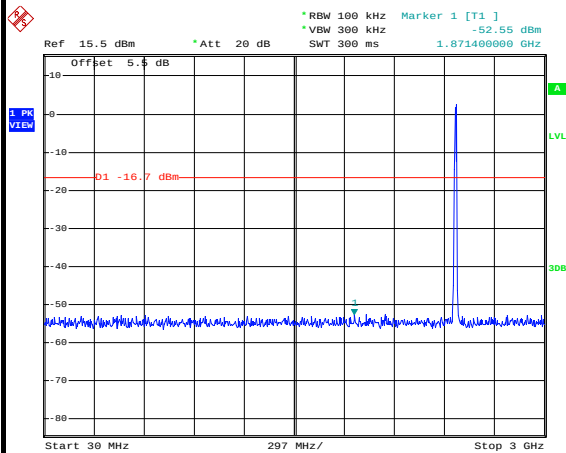
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Channel Plot



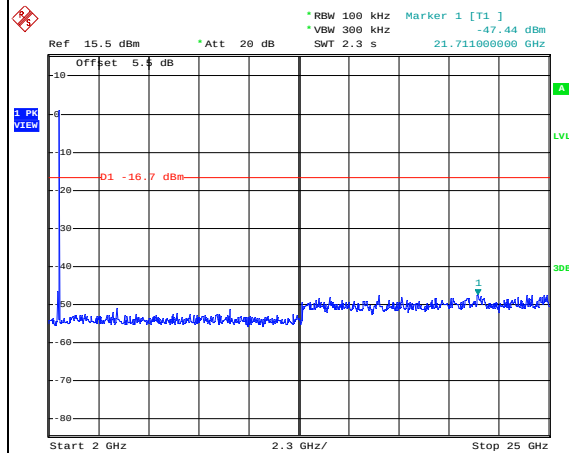
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Spurious Emission 30MHz~3GHz



Date: 17.APR.2015 15:26:51

Spurious Emission 2GHz~25GHz



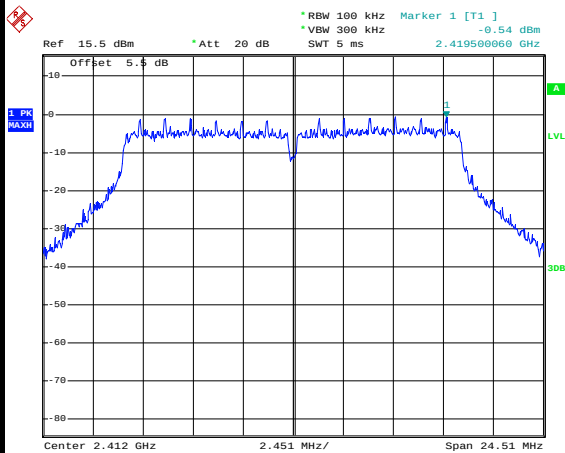
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Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Mygai Wang

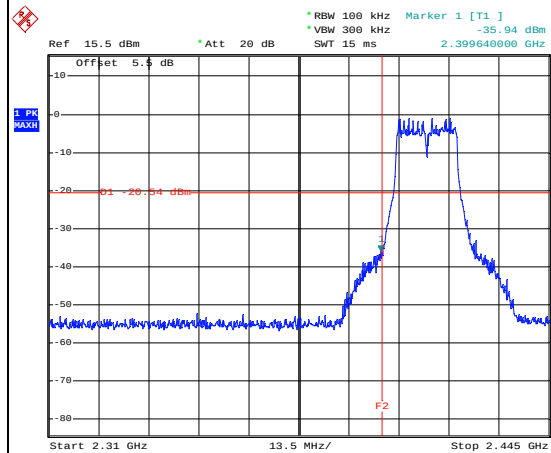
WLAN 802.11g Channel 01

100kHz PSD reference Level



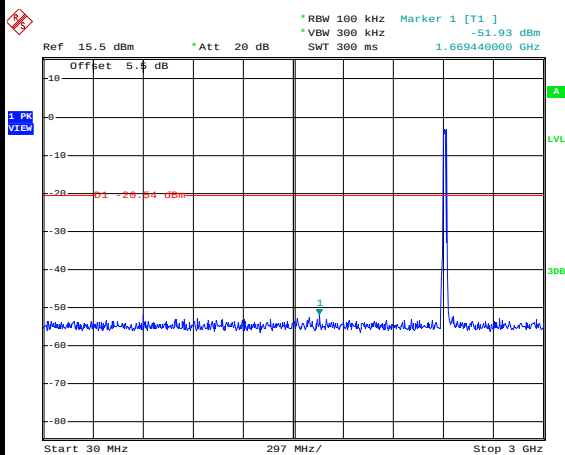
Date: 6.FEB.2015 18:57:42

Channel Plot



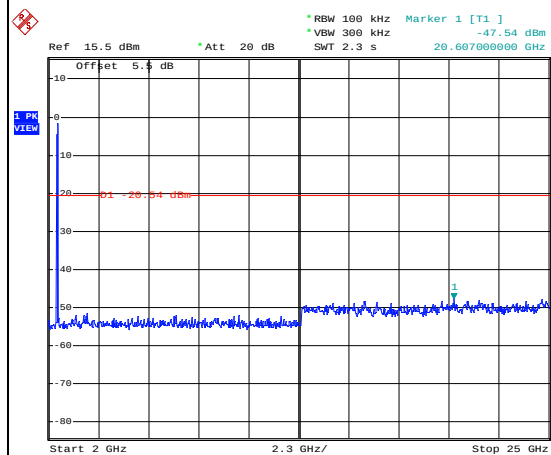
Date: 6.FEB.2015 18:58:37

Spurious Emission 30MHz~3GHz



Date: 6.FEB.2015 18:59:04

Spurious Emission 2GHz~25GHz

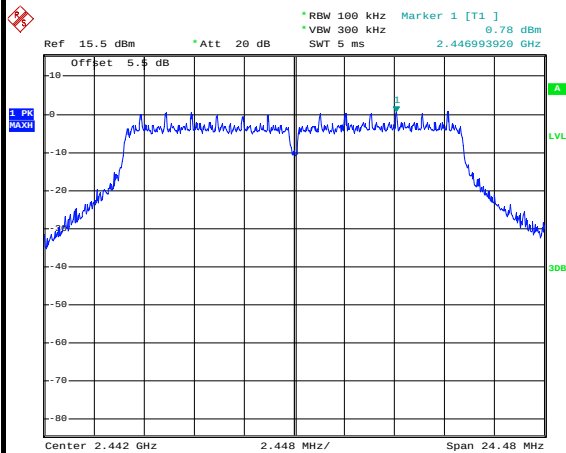


Date: 6.FEB.2015 18:59:22

Test Mode :	802.11g	Temperature :	24~26℃
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	07	Test Engineer :	Mygai Wang

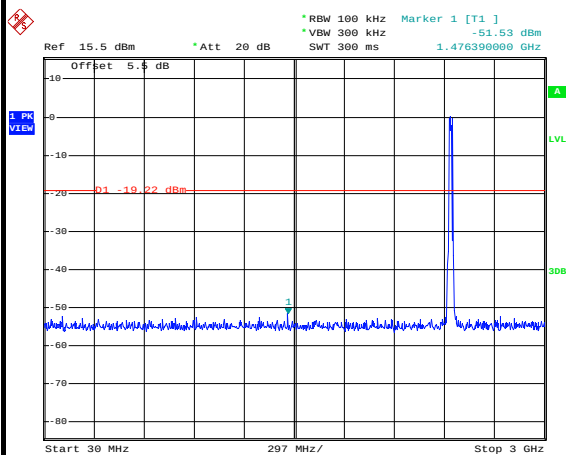
WLAN 802.11g Channel 07

100kHz PSD reference Level



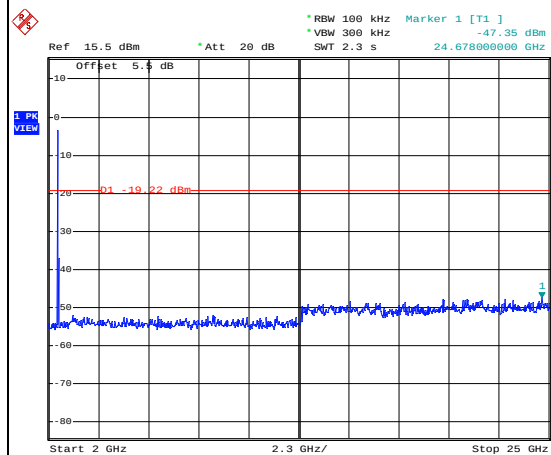
Date: 6.FEB.2015 19:02:21

Spurious Emission 30MHz~3GHz



Date: 6.FEB.2015 19:02:44

Spurious Emission 2GHz~25GHz



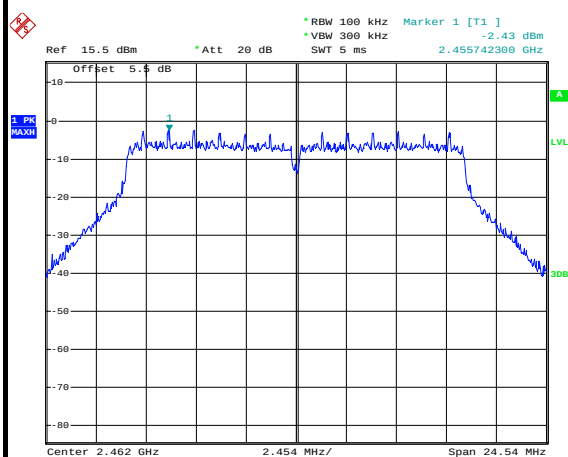
Date: 6.FEB.2015 19:03:01



Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Mygai Wang

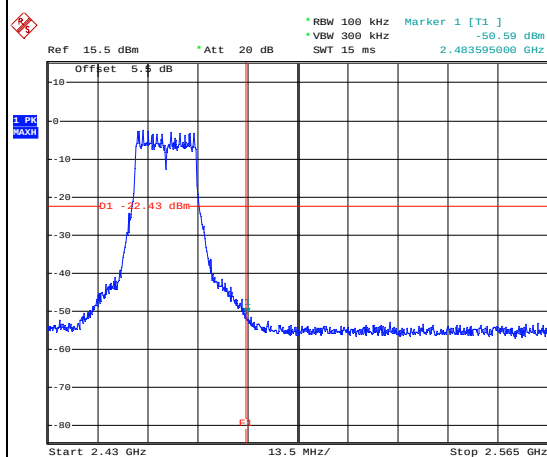
WLAN 802.11g Channel 11

100kHz PSD reference Level



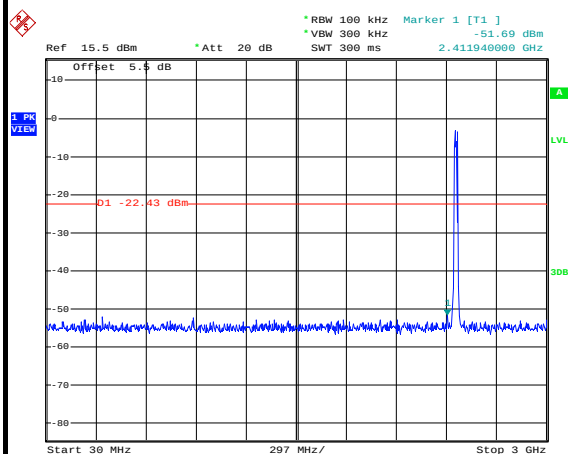
Date: 10.MAR.2015 15:46:35

Channel Plot



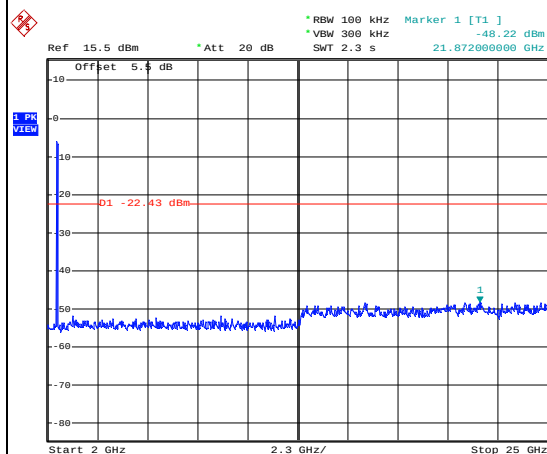
Date: 10.MAR.2015 15:47:05

Spurious Emission 30MHz~3GHz



Date: 10.MAR.2015 15:47:32

Spurious Emission 2GHz~25GHz



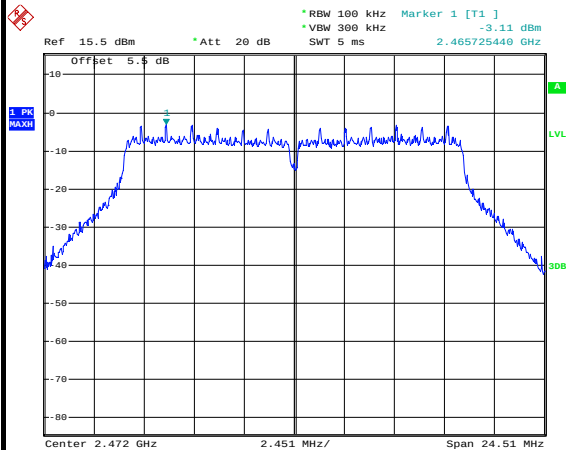
Date: 10.MAR.2015 15:47:50



Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	13	Test Engineer :	Mygai Wang

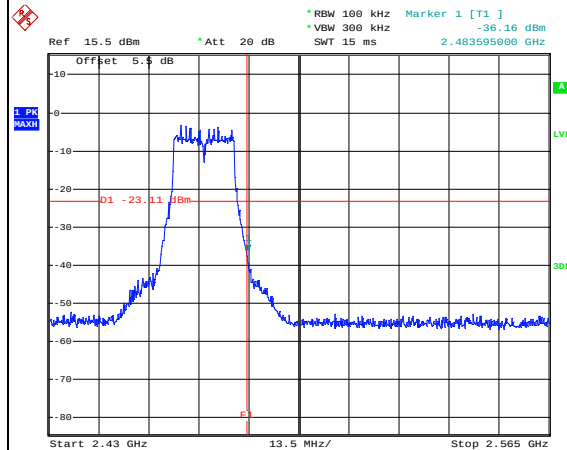
WLAN 802.11g Channel 13

100kHz PSD reference Level



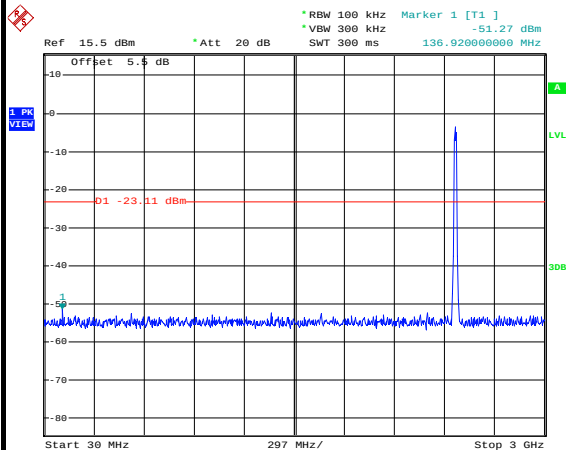
Date: 24.APR.2015 11:35:16

Channel Plot



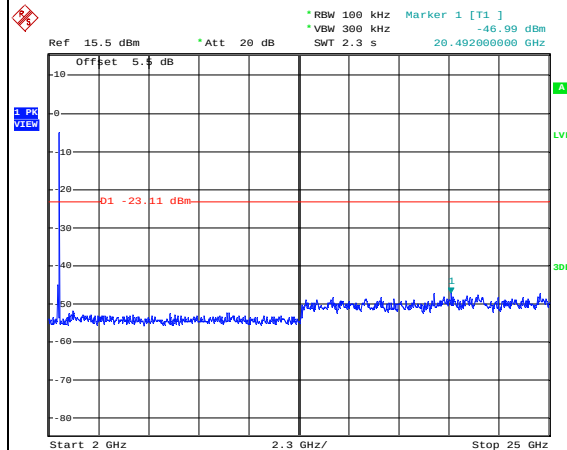
Date: 24.APR.2015 11:36:36

Spurious Emission 30MHz~3GHz



Date: 24.APR.2015 11:37:20

Spurious Emission 2GHz~25GHz



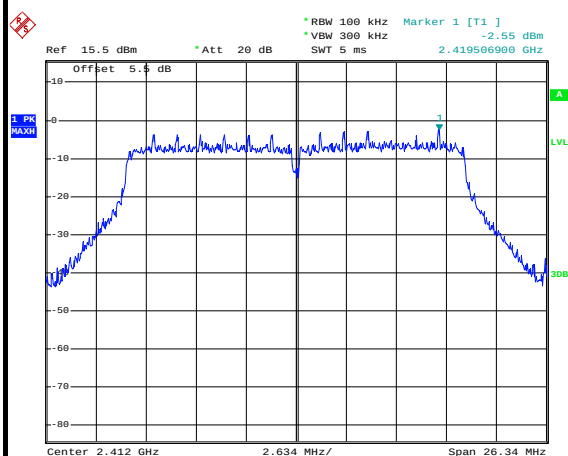
Date: 24.APR.2015 11:37:38



Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Mygai Wang

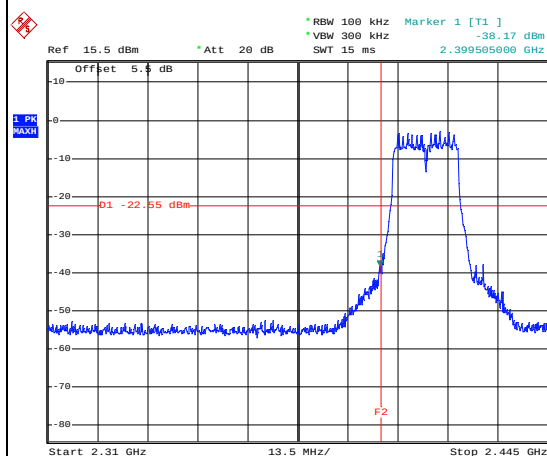
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



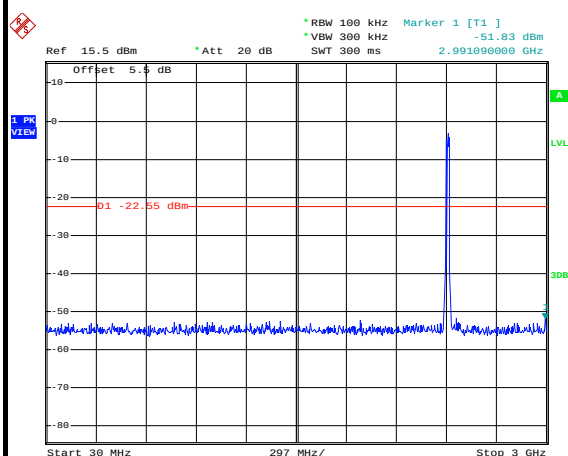
Date: 6.FEB.2015 19:13:57

Channel Plot



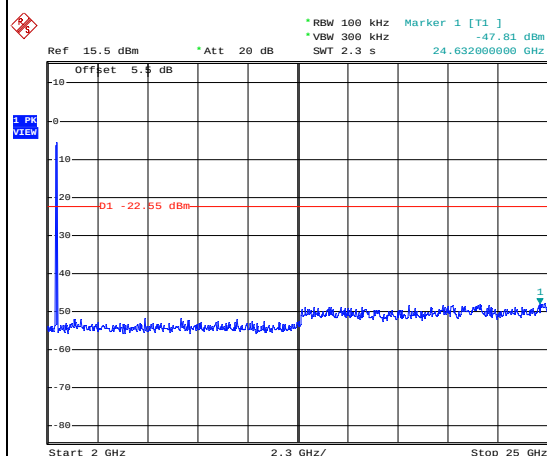
Date: 6.FEB.2015 19:14:13

Spurious Emission 30MHz~3GHz



Date: 6.FEB.2015 19:15:26

Spurious Emission 2GHz~25GHz



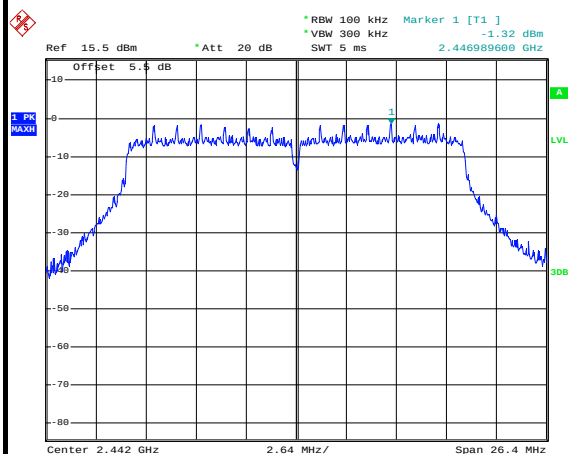
Date: 6.FEB.2015 19:15:43



Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	07	Test Engineer :	Mygai Wang

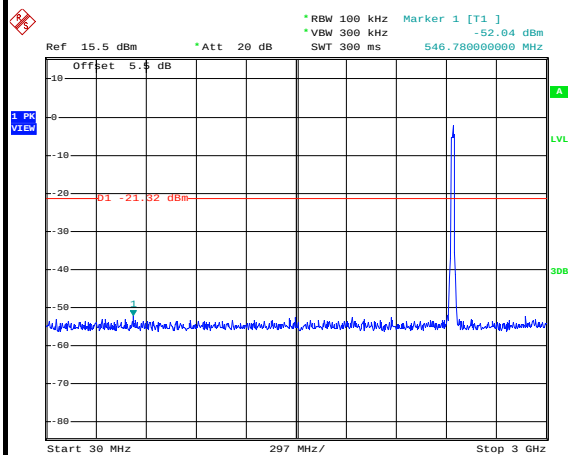
WLAN 802.11n HT20 Channel 07

100kHz PSD reference Level



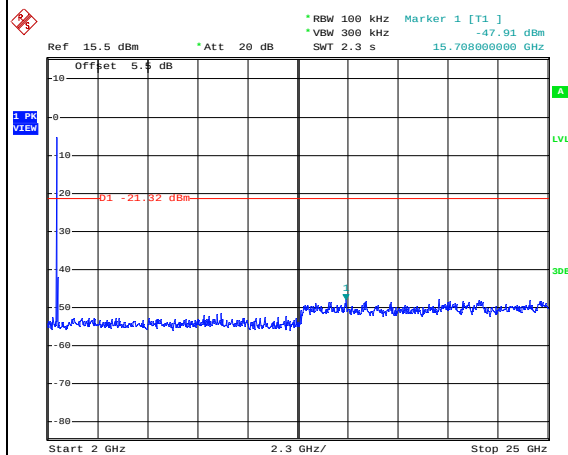
Date: 6.FEB.2015 19:19:05

Spurious Emission 30MHz~3GHz



Date: 6.FEB.2015 19:19:43

Spurious Emission 2GHz~25GHz



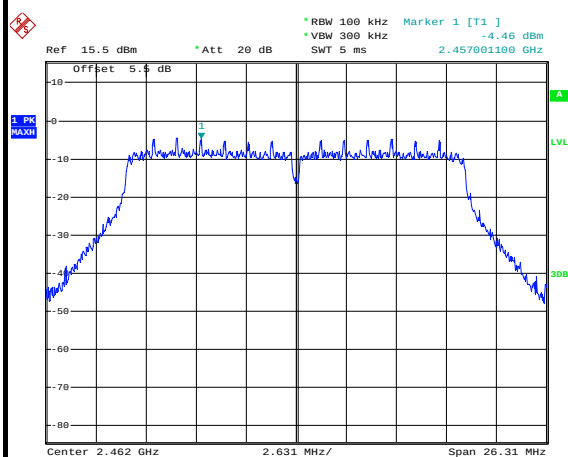
Date: 6.FEB.2015 19:20:01



Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Mygai Wang

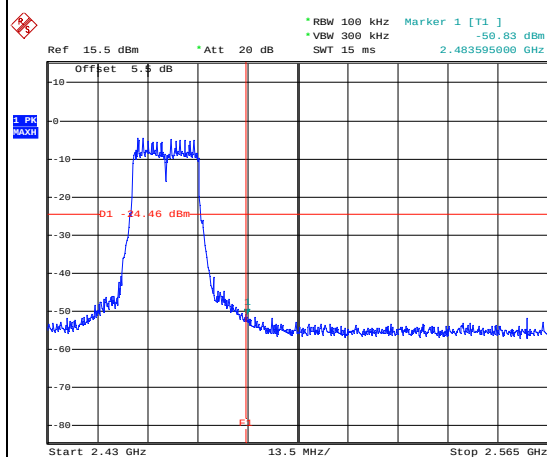
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



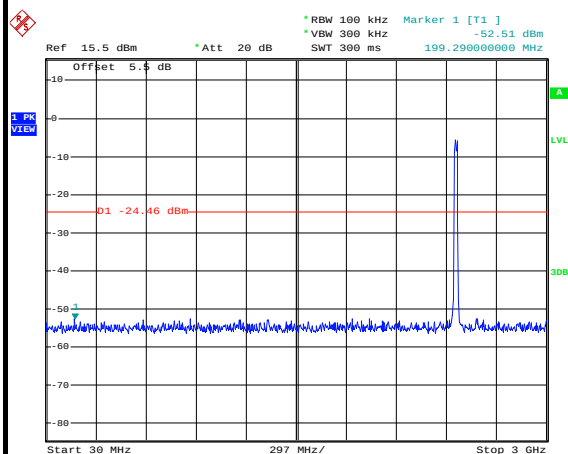
Date: 10.MAR.2015 15:57:53

Channel Plot



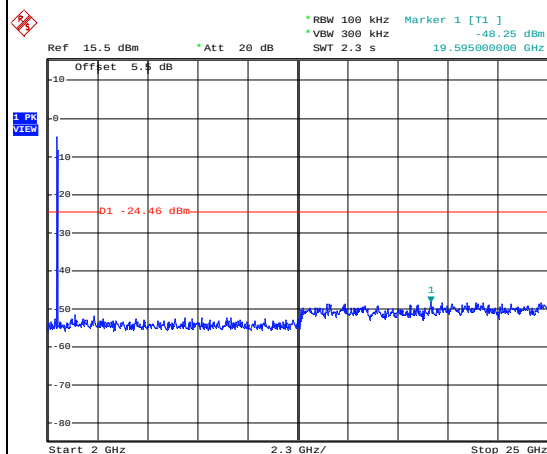
Date: 10.MAR.2015 15:58:20

Spurious Emission 30MHz~3GHz



Date: 10.MAR.2015 15:58:51

Spurious Emission 2GHz~25GHz



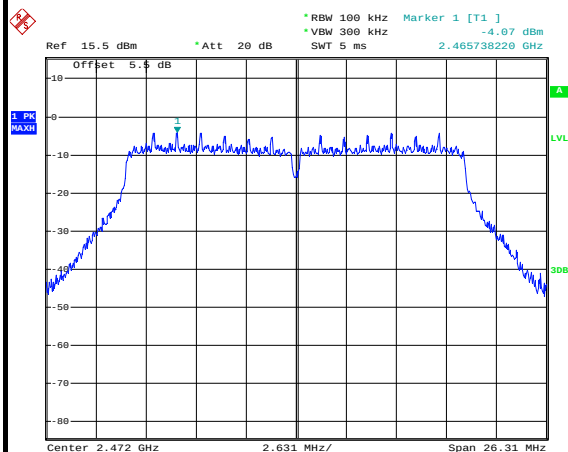
Date: 10.MAR.2015 15:59:09



Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	2.4GHz	Relative Humidity :	50~53%
Test Channel :	13	Test Engineer :	Mygai Wang

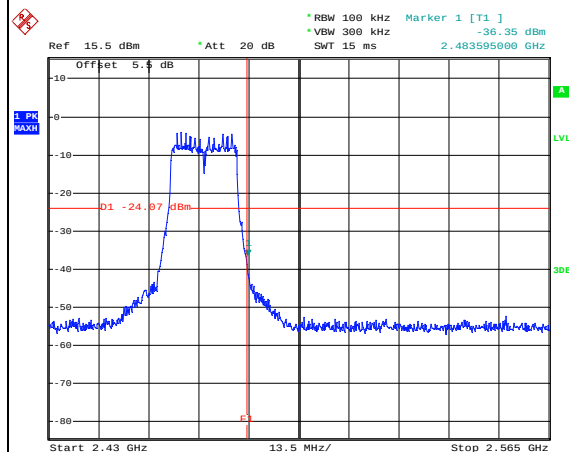
WLAN 802.11n HT20 Channel 13

100kHz PSD reference Level



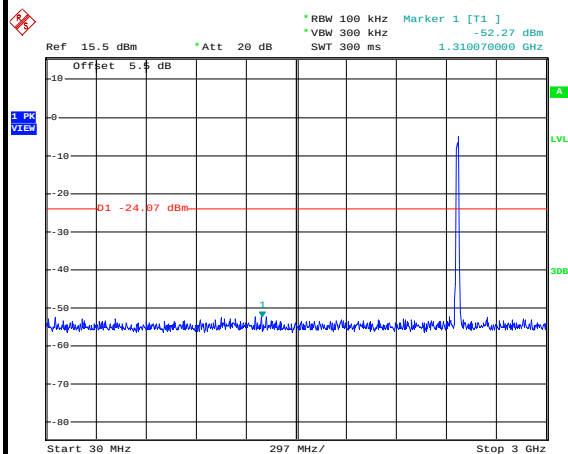
Date: 24.APR.2015 11:40:55

Channel Plot



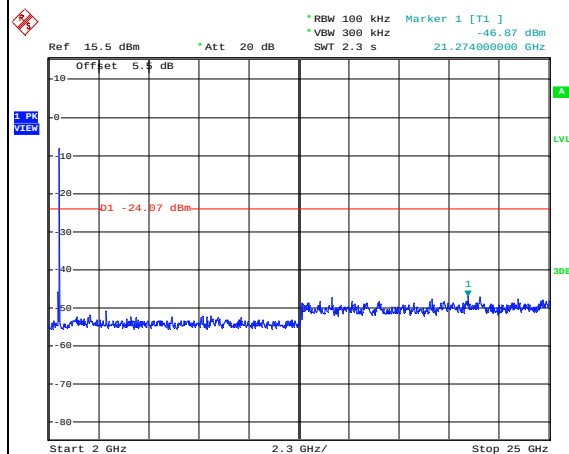
Date: 24.APR.2015 11:41:54

Spurious Emission 30MHz~3GHz



Date: 24.APR.2015 11:42:18

Spurious Emission 2GHz~25GHz



Date: 24.APR.2015 11:42:36

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 v03r02.
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 0.8 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.

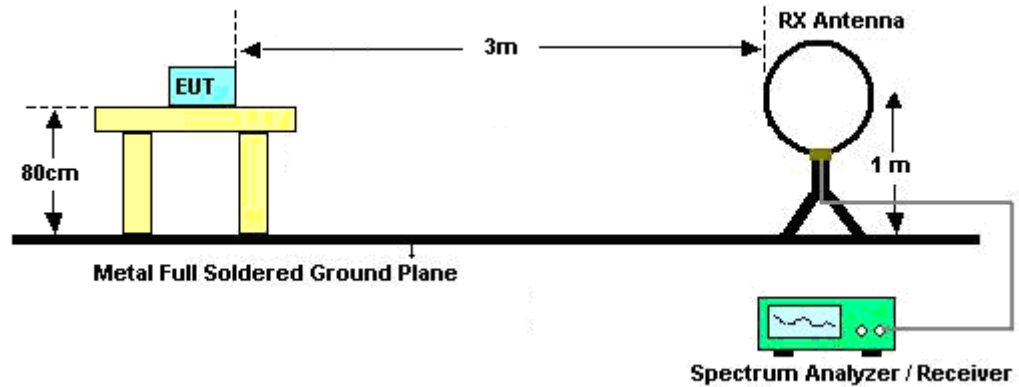
For average measurement:

 - 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.

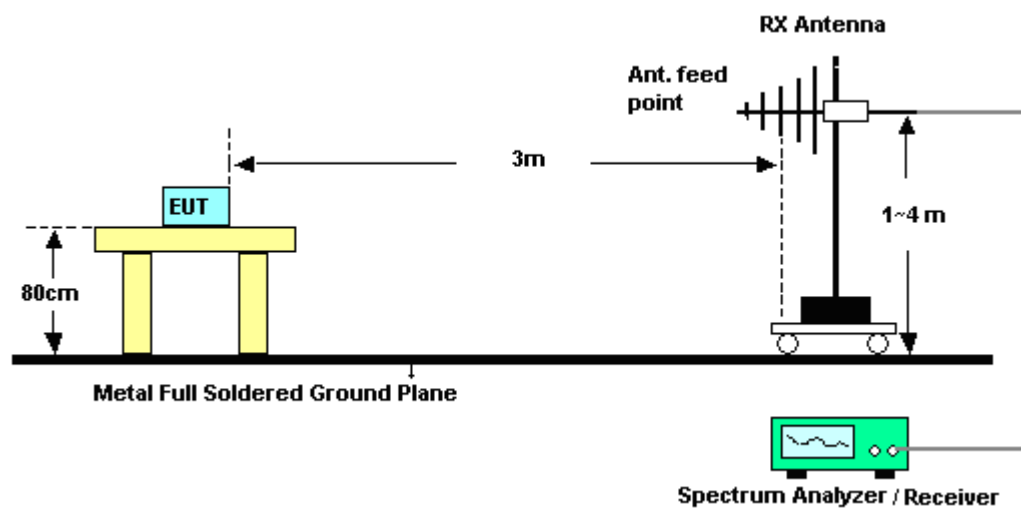
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	97.62	8.20	0.12	300Hz
802.11g	87.18	1.36	0.74	1kHz
2.4GHz 802.11n HT20	86.62	1.28	0.78	1kHz

3.5.4 Test Setup

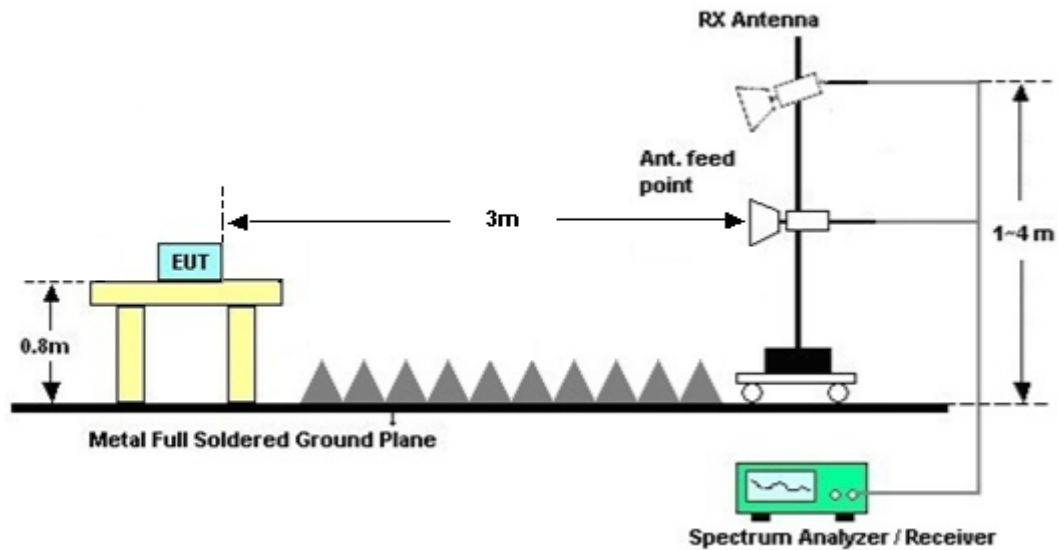
For radiated emissions below 30MHz



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.

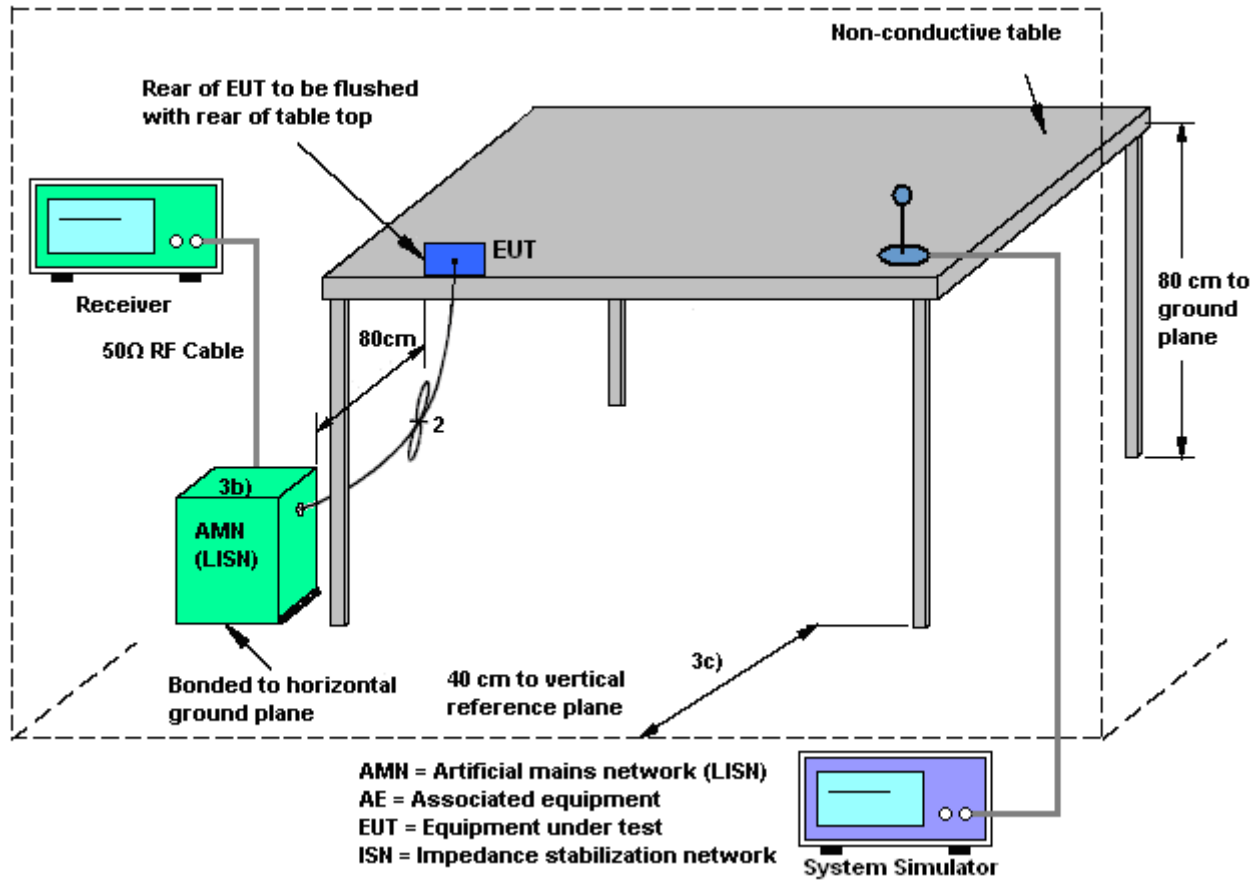
3.6.2 Measuring Instruments

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.

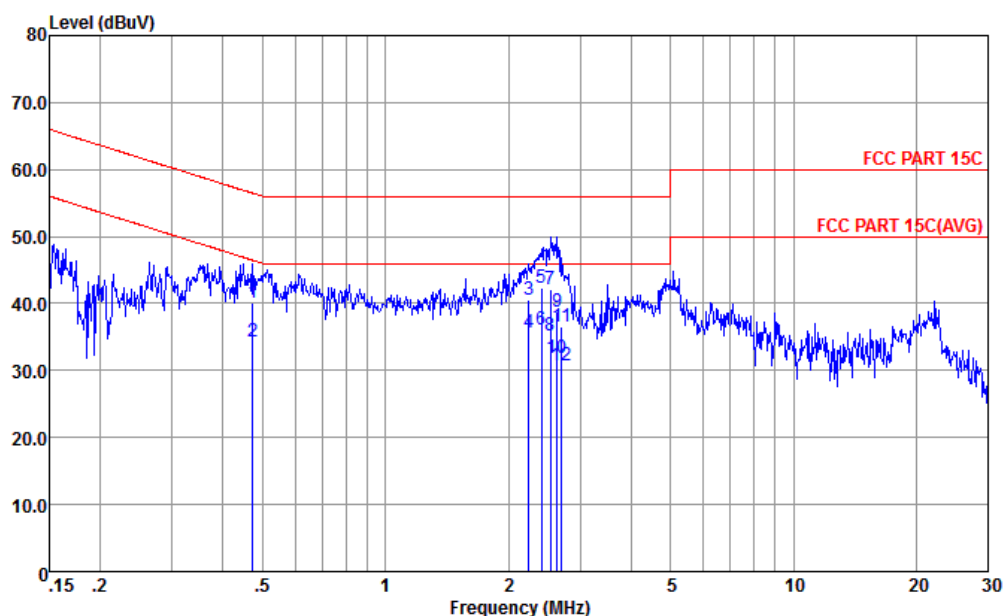
3.6.4 Test Setup





3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Issac Song	Relative Humidity :	30~33%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable 1(Charging from Adapter 1) + Earphone 1 + Battery 1		

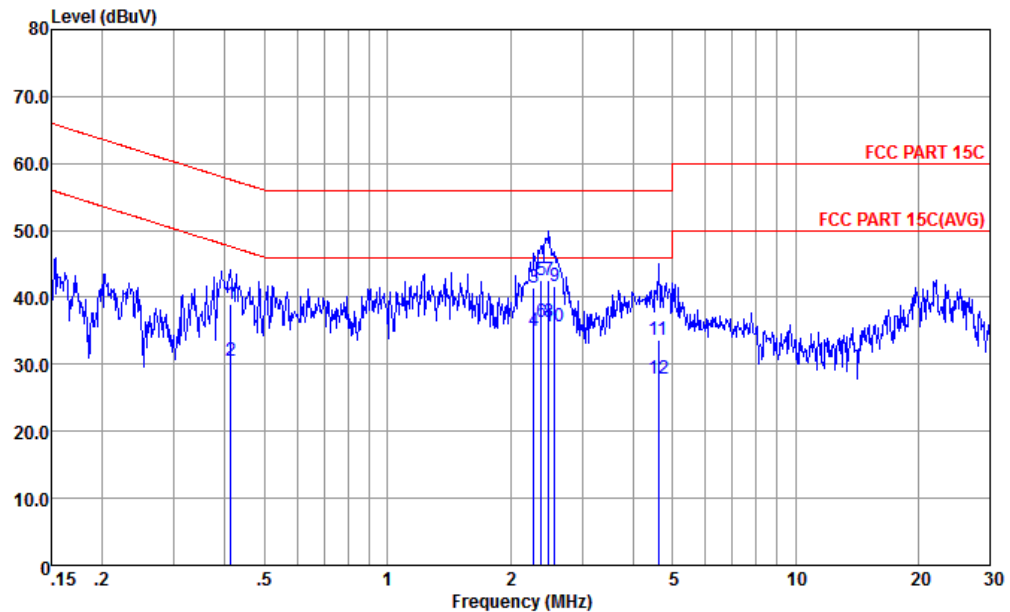


Site : CO01-KS
Condition : FCC PART 15C LISN-L20140306 LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.47	40.05	-16.40	56.45	29.21	0.22	10.62	QP
2	0.47	34.25	-12.20	46.45	23.41	0.22	10.62	Average
3	2.25	40.62	-15.38	56.00	29.80	0.11	10.71	QP
4	2.25	35.62	-10.38	46.00	24.80	0.11	10.71	Average
5	2.41	42.24	-13.76	56.00	31.41	0.11	10.72	QP
6 *	2.41	36.04	-9.96	46.00	25.21	0.11	10.72	Average
7	2.64	42.05	-13.95	56.00	31.20	0.12	10.73	QP
8	2.64	35.15	-10.85	46.00	24.30	0.12	10.73	Average
9	2.64	38.76	-17.24	56.00	27.90	0.12	10.74	QP
10	2.64	31.76	-14.24	46.00	20.90	0.12	10.74	Average
11	2.71	36.47	-19.53	56.00	25.60	0.12	10.75	QP
12	2.71	30.67	-15.33	46.00	19.80	0.12	10.75	Average



cTest Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Issac Song	Relative Humidity :	30~33%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable 1(Charging from Adapter 1) + Earphone 1 + Battery 1		



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

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.41	38.91	-18.68	57.59	27.90	0.39	10.62	QP
2	0.41	30.61	-16.98	47.59	19.60	0.39	10.62	Average
3	2.28	41.42	-14.58	56.00	30.59	0.11	10.72	QP
4	2.28	34.92	-11.08	46.00	24.09	0.11	10.72	Average
5	2.38	42.53	-13.47	56.00	31.70	0.11	10.72	QP
6	2.38	36.23	-9.77	46.00	25.40	0.11	10.72	Average
7	2.49	42.64	-13.36	56.00	31.80	0.11	10.73	QP
8 *	2.49	36.34	-9.66	46.00	25.50	0.11	10.73	Average
9	2.57	41.65	-14.35	56.00	30.79	0.12	10.74	QP
10	2.57	35.75	-10.25	46.00	24.89	0.12	10.74	Average
11	4.62	33.64	-22.36	56.00	22.60	0.20	10.84	QP
12	4.62	27.94	-18.06	46.00	16.90	0.20	10.84	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	Feb. 06, 2015~ Apr. 24, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	30MHz~40GHz	Jan. 23, 2015	Feb. 06, 2015~ Apr. 24, 2015	Jan. 22, 2016	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 23, 2015	Feb. 06, 2015~ Apr. 24, 2015	Jan. 22, 2016	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 04, 2014	Mar. 11, 2015	May 03, 2015	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 25, 2014	Mar. 11, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 25, 2014	Mar. 11, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 25, 2014	Mar. 11, 2015	Oct. 24, 2015	Conduction (CO01-KS)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Nov. 24, 2014	Apr. 23, 2015	Nov. 23, 2015	Radiation (03CH10-HY)
Base Station	Anritsu	MT8820C	6201432817	GSM/GPRS/WCDMA/LTE	Oct. 28, 2014	Apr. 23, 2015	Oct. 27, 2016	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Oct. 24, 2014	Apr. 23, 2015	Oct. 23, 2015	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Oct. 03, 2014	Apr. 23, 2015	Oct. 02, 2015	Radiation (03CH10-HY)
Hygrometer	TECEPEL	DTM-303B	TP140320	N/A	Nov. 17, 2014	Apr. 23, 2015	Nov. 16, 2015	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY53270078	1GHz~26.5GHz	Nov. 20, 2014	Apr. 23, 2015	Nov. 19, 2015	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz ~ 44GHz	Oct. 14, 2014	Apr. 23, 2015	Oct. 13, 2015	Radiation (03CH10-HY)
3m Semi Anechoic Chamber (NSA)	Riken	SAC-3M	03CH10-HY	30MHz~1GHz	Oct. 24, 2014	Apr. 23, 2015	Oct. 23, 2015	Radiation (03CH10-HY)
3m Semi Anechoic Chamber (Site VSWR)	Riken	SAC-3M	03CH10-HY	1GHz~18GHz	Oct. 29, 2014	Apr. 23, 2015	Oct. 28, 2015	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY249564 MY249524 MY283184	25GHz~40GHz	Nov. 06, 2014	Apr. 23, 2015	Nov. 05, 2015	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY249564 MY249524 MY283184	30MHz~1GHz	Nov. 06, 2014	Apr. 23, 2015	Nov. 05, 2015	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY249564 MY249524 MY283184	1GHz~25GHz	Nov. 06, 2014	Apr. 23, 2015	Nov. 05, 2015	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	NCR	Apr. 23, 2015	NCR	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	NCR	Apr. 23, 2015	NCR	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0-360 degree	NCR	Apr. 23, 2015	NCR	Radiation (03CH10-HY)
Base Station(Measure)	Rohde & Schwarz	CMU200	117997	GSM / GPRS / WCDMA / CDMA	Aug. 21, 2014	Apr. 23, 2015	Aug. 20, 2015	Radiation (03CH10-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	May. 23, 2014	Apr. 23, 2015	May. 22, 2015	Radiation (03CH10-HY)



5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.9dB
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Test Engineer:	Ocean Wang	Temperature:	21~25	°C
Test Date:	2015/2/6 ~ 2015 /4/24	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	13.70	7.52	0.50	Pass
11b	1Mbps	1	7	2442	13.50	7.56	0.50	Pass
11b	1Mbps	1	11	2462	13.70	7.56	0.50	Pass
11b	1Mbps	1	13	2472	12.35	8.00	0.50	Pass
11g	6Mbps	1	1	2412	18.10	16.34	0.50	Pass
11g	6Mbps	1	7	2442	18.30	16.32	0.50	Pass
11g	6Mbps	1	11	2462	18.20	16.36	0.50	Pass
11g	6Mbps	1	13	2472	18.30	16.34	0.50	Pass
HT20	MCS0	1	1	2412	18.90	17.56	0.50	Pass
HT20	MCS0	1	7	2442	18.85	17.60	0.50	Pass
HT20	MCS0	1	11	2462	18.80	17.54	0.50	Pass
HT20	MCS0	1	13	2472	19.00	17.54	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	20.12	30.00	-0.50	19.62	36.00	Pass
11b	1Mbps	1	7	2442	20.11	30.00	-0.50	19.61	36.00	Pass
11b	1Mbps	1	11	2462	20.17	30.00	-0.50	18.65	36.00	Pass
11b	1Mbps	1	13	2472	15.15	30.00	-0.50	14.65	36.00	Pass
11g	6Mbps	1	1	2412	19.87	30.00	-0.50	19.37	36.00	Pass
11g	6Mbps	1	7	2442	20.70	30.00	-0.50	20.20	36.00	Pass
11g	6Mbps	1	11	2462	20.92	30.00	-0.50	20.42	36.00	Pass
11g	6Mbps	1	13	2472	17.35	30.00	-0.50	16.85	36.00	Pass
HT20	MCS0	1	1	2412	18.58	30.00	-0.50	18.08	36.00	Pass
HT20	MCS0	1	7	2442	19.55	30.00	-0.50	19.05	36.00	Pass
HT20	MCS0	1	11	2462	19.81	30.00	-0.50	19.31	36.00	Pass
HT20	MCS0	1	13	2472	16.27	30.00	-0.50	15.77	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	17.74
11b	1Mbps	1	7	2442	0.10	17.37
11b	1Mbps	1	11	2462	0.10	17.88
11b	1Mbps	1	13	2472	0.10	11.99
11g	6Mbps	1	1	2412	0.60	11.22
11g	6Mbps	1	7	2442	0.60	12.37
11g	6Mbps	1	11	2462	0.60	12.57
11g	6Mbps	1	13	2472	0.60	7.72
HT20	MCS0	1	1	2412	0.62	9.38
HT20	MCS0	1	7	2442	0.62	10.60
HT20	MCS0	1	11	2462	0.62	10.85
HT20	MCS0	1	13	2472	0.62	6.80

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	-4.56	-0.50	8.00	Pass
11b	1Mbps	1	7	2442	-6.21	-0.50	8.00	Pass
11b	1Mbps	1	11	2462	-5.89	-0.50	8.00	Pass
11b	1Mbps	1	13	2472	-10.87	-0.50	8.00	Pass
11g	6Mbps	1	1	2412	-14.60	-0.50	8.00	Pass
11g	6Mbps	1	7	2442	-13.33	-0.50	8.00	Pass
11g	6Mbps	1	11	2462	-16.81	-0.50	8.00	Pass
11g	6Mbps	1	13	2472	-17.18	-0.50	8.00	Pass
HT20	MCS0	1	1	2412	-17.29	-0.50	8.00	Pass
HT20	MCS0	1	7	2442	-15.52	-0.50	8.00	Pass
HT20	MCS0	1	11	2462	-18.69	-0.50	8.00	Pass
HT20	MCS0	1	13	2472	-18.12	-0.50	8.00	Pass



Appendix B. Radiated Spurious Emission

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preampl	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		2388.93	52.51	-21.49	74	53.13	27.23	33.24	5.39	202	14	P	H
		2390	42.65	-11.35	54	43.25	27.23	33.22	5.39	202	14	A	H
	*	2412.024	102.83	-	-	103.35	27.28	33.22	5.42	202	14	P	H
	*	2410.938	100.25	-	-	100.77	27.28	33.22	5.42	202	14	A	H
		2322.42	52.7	-21.3	74	53.64	27.05	33.26	5.27	231	227	P	V
		2389.92	42.08	-11.92	54	42.68	27.23	33.22	5.39	231	227	A	V
	*	2412.024	97.63	-	-	98.15	27.28	33.22	5.42	231	227	P	V
	*	2410.938	95.2	-	-	95.72	27.28	33.22	5.42	231	227	A	V
802.11b CH 07 2442MHz	*	2323.23	52.87	-21.13	74	53.81	27.05	33.26	5.27	221	360	P	V
		2385.69	42.03	-11.97	54	42.65	27.23	33.24	5.39	221	360	A	V
		2442	102.8	-	-	103.21	27.37	33.2	5.42	221	360	P	V
		2443.002	100.07	-	-	100.48	27.37	33.2	5.42	221	360	A	V
		2484.28	52.74	-21.26	74	53	27.46	33.18	5.46	221	360	P	V
	*	2483.52	42.4	-11.6	54	42.66	27.46	33.18	5.46	221	360	A	V
	*	2325.66	52.43	-21.57	74	53.31	27.05	33.26	5.33	149	350	P	V
	*	2388.75	41.83	-12.17	54	42.45	27.23	33.24	5.39	149	350	A	V
		2442	95.83	-	-	96.24	27.37	33.2	5.42	149	350	P	V
		2442.919	93.02	-	-	93.43	27.37	33.2	5.42	149	350	A	V
		2490.04	53.39	-20.61	74	53.61	27.5	33.18	5.46	149	350	P	V
		2485.72	42.11	-11.89	54	42.37	27.46	33.18	5.46	149	350	A	V



802.11b CH 13 2472MHz	*	2470.892	97.31	-	-	97.59	27.46	33.18	5.44	334	316	P	H
	*	2471.059	94.7	-	-	94.98	27.46	33.18	5.44	334	316	A	H
		2483.64	56.09	-17.91	74	56.35	27.46	33.18	5.46	334	316	P	H
		2483.52	49.12	-4.88	54	49.38	27.46	33.18	5.46	334	316	A	H
	*	2472.061	93.19	-	-	93.47	27.46	33.18	5.44	199	199	P	V
	*	2470.975	91.12	-	-	91.4	27.46	33.18	5.44	199	199	A	V
		2483.52	54.5	-19.5	74	54.76	27.46	33.18	5.46	199	199	P	V
		2483.52	45.93	-8.07	54	46.19	27.46	33.18	5.46	199	199	A	V
802.11b CH 11 2462MHz	*	2460.955	102.84	-	-	103.19	27.41	33.2	5.44	190	7	P	H
	*	2461.039	100.3	-	-	100.65	27.41	33.2	5.44	190	7	A	H
		2484.2	55.54	-18.46	74	55.8	27.46	33.18	5.46	190	7	P	H
		2486.92	44.99	-9.01	54	45.25	27.46	33.18	5.46	190	7	A	H
	*	2462.041	96.45	-	-	96.8	27.41	33.2	5.44	255	232	P	V
	*	2461.039	93.87	-	-	94.22	27.41	33.2	5.44	255	232	A	V
		2486.92	53.68	-20.32	74	53.94	27.46	33.18	5.46	255	232	P	V
		2486.6	42.84	-11.16	54	43.1	27.46	33.18	5.46	255	232	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	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		4824	38	-36	74	59.57	31.46	60.61	7.58	100	0	P	H
		4824	39.25	-34.75	74	60.82	31.46	60.61	7.58	100	0	P	V
802.11b CH 07 2442MHz		4884	38.97	-35.03	74	60.11	31.56	60.52	7.82	100	0	P	H
		7326	43.53	-30.47	74	58.78	36.22	60.98	9.51	100	0	P	H
		4884	38.87	-35.13	74	60.01	31.56	60.52	7.82	100	0	P	V
		7326	43.14	-30.86	74	58.39	36.22	60.98	9.51	100	0	P	V
802.11b CH 13 2472MHz		4944	38.74	-35.26	74	59.5	31.7	60.39	7.93	100	0	P	H
		7416	42.3	-31.7	74	57.52	36.41	61.24	9.61	100	0	P	H
		4944	38.76	-35.24	74	59.52	31.7	60.39	7.93	100	0	P	V
		7416	42.68	-31.32	74	57.9	36.41	61.24	9.61	100	0	P	V
802.11b CH 11 2462MHz		4924	39.52	-34.48	74	60.35	31.66	60.42	7.93	100	0	P	H
		7386	42.95	-31.05	74	58.24	36.37	61.19	9.53	100	0	P	H
		4924	38.99	-35.01	74	59.82	31.66	60.42	7.93	100	0	P	V
		7386	44.23	-29.77	74	59.52	36.37	61.19	9.53	100	0	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	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)
802.11g CH 01 2412MHz		2389.92	54.92	-19.08	74	55.52	27.23	33.22	5.39	227	18	P	H
		2390	43.19	-10.81	54	43.79	27.23	33.22	5.39	227	18	A	H
	*	2414	99.27	-	-	99.79	27.28	33.22	5.42	227	18	P	H
	*	2414	91.61	-	-	92.13	27.28	33.22	5.42	227	18	A	H
		2390	52.74	-21.26	74	53.34	27.23	33.22	5.39	259	259	P	V
		2389.83	42.41	-11.59	54	43.01	27.23	33.22	5.39	259	259	A	V
	*	2414	94.24	-	-	94.76	27.28	33.22	5.42	259	259	P	V
	*	2414	85.92	-	-	86.44	27.28	33.22	5.42	259	259	A	V
802.11g CH 07 2442MHz	*	2382.54	52.85	-21.15	74	53.51	27.19	33.24	5.39	308	347	P	H
	*	2389.56	42.51	-11.49	54	43.13	27.23	33.24	5.39	308	347	A	H
		2440	98.9	-	-	99.32	27.37	33.21	5.42	308	347	P	H
		2440	91.1	-	-	91.52	27.37	33.21	5.42	308	347	A	H
		2497.16	52.31	-21.69	74	52.52	27.5	33.17	5.46	308	347	P	H
		2486	42.63	-11.37	54	42.89	27.46	33.18	5.46	308	347	A	H
	*	2365.8	52.54	-21.46	74	53.25	27.14	33.24	5.39	253	262	P	V
	*	2386.32	42.28	-11.72	54	42.9	27.23	33.24	5.39	253	262	A	V
		2443.67	95.61	-	-	96	27.37	33.2	5.44	253	262	P	H
		2440	87.33	-	-	87.75	27.37	33.21	5.42	253	262	A	H
		2493.36	52.94	-21.06	74	53.15	27.5	33.17	5.46	253	262	P	H
		2486	42.87	-11.13	54	43.13	27.46	33.18	5.46	253	262	A	H



802.11g CH 13 2472MHz	*	2470	94.83	-	-	95.16	27.41	33.18	5.44	249	347	P	H
	*	2470	86.59	-	-	86.92	27.41	33.18	5.44	249	347	A	H
	!	2483.52	68.07	-5.93	74	68.33	27.46	33.18	5.46	249	347	P	H
		2483.52	53.11	-0.89	54	53.37	27.46	33.18	5.46	249	347	A	H
	*	2470	88.71	-	-	89.04	27.41	33.18	5.44	127	269	P	V
	*	2470	82.01	-	-	82.34	27.41	33.18	5.44	127	269	A	V
		2483.52	62.45	-11.55	74	62.71	27.46	33.18	5.46	127	269	P	V
		2483.52	49.03	-4.97	54	49.29	27.46	33.18	5.46	127	269	A	V
802.11g CH 11 2462MHz	*	2460	101.08	-	-	101.43	27.41	33.2	5.44	244	336	P	H
	*	2464	92.2	-	-	92.55	27.41	33.2	5.44	244	336	A	H
		2483.8	67.2	-6.8	74	67.46	27.46	33.18	5.46	244	336	P	H
		2483.6	50.19	-3.81	54	50.45	27.46	33.18	5.46	244	336	A	H
	*	2464	95.31	-	-	95.66	27.41	33.2	5.44	197	241	P	V
	*	2464	85.71	-	-	86.06	27.41	33.2	5.44	197	241	A	V
		2483.68	59.56	-14.44	74	59.82	27.46	33.18	5.46	197	241	P	V
		2483.52	45.84	-8.16	54	46.1	27.46	33.18	5.46	197	241	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	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)
802.11g CH 01 2412MHz		4824	38.22	-35.78	74	59.79	31.46	60.61	7.58	100	0	P	H
		4824	39.51	-34.49	74	61.08	31.46	60.61	7.58	100	0	P	V
802.11g CH 07 2442MHz		4884	38.12	-35.88	74	59.26	31.56	60.52	7.82	100	0	P	H
		7326	43.24	-30.76	74	58.49	36.22	60.98	9.51	100	0	P	H
		4884	38.19	-35.81	74	59.33	31.56	60.52	7.82	100	0	P	V
		7326	42.5	-31.5	74	57.75	36.22	60.98	9.51	100	0	P	V
802.11g CH 13 2472MHz		4944	39.03	-34.97	74	59.79	31.7	60.39	7.93	100	0	P	H
		7416	42.61	-31.39	74	57.83	36.41	61.24	9.61	100	0	P	H
		4944	40.24	-33.76	74	61	31.7	60.39	7.93	100	0	P	V
		7416	41.59	-32.41	74	56.81	36.41	61.24	9.61	100	0	P	V
802.11g CH 11 2462MHz		4924	39.27	-34.73	74	60.1	31.66	60.42	7.93	100	0	P	H
		7386	42.35	-31.65	74	57.64	36.37	61.19	9.53	100	0	P	H
		4924	40.01	-33.99	74	60.84	31.66	60.42	7.93	100	0	P	V
		7386	42.73	-31.27	74	58.02	36.37	61.19	9.53	100	0	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	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)
802.11n HT20 CH 01 2412MHz		2370.93	52.51	-21.49	74	53.17	27.19	33.24	5.39	100	339	P	H
		2387.4	42.31	-11.69	54	42.93	27.23	33.24	5.39	100	339	A	H
	*	2414	95.57	-	-	96.09	27.28	33.22	5.42	100	339	P	H
	*	2414	87.93	-	-	88.45	27.28	33.22	5.42	100	339	A	H
		2350.14	52.11	-21.89	74	52.93	27.1	33.25	5.33	262	206	P	V
		2388.93	42.19	-11.81	54	42.81	27.23	33.24	5.39	262	206	A	V
	*	2410	92.74	-	-	93.26	27.28	33.22	5.42	262	206	P	V
	*	2414	84.49	-	-	85.01	27.28	33.22	5.42	262	206	A	V
802.11n HT20 CH 07 2442MHz	*	2368.32	52.54	-21.46	74	53.25	27.14	33.24	5.39	122	328	P	H
	*	2390	42.35	-11.65	54	42.95	27.23	33.22	5.39	122	328	A	H
		2446.426	96.86	-	-	97.25	27.37	33.2	5.44	122	328	P	H
		2440	88.1	-	-	88.52	27.37	33.21	5.42	122	328	A	H
		2499.16	52.24	-21.76	74	52.45	27.5	33.17	5.46	122	328	P	H
		2483.92	42.57	-11.43	54	42.83	27.46	33.18	5.46	122	328	A	H
		2381.91	51.96	-22.04	74	52.62	27.19	33.24	5.39	131	242	P	H
		2382.9	42.18	-11.82	54	42.84	27.19	33.24	5.39	131	242	A	H
		2440.748	91.16	-	-	91.58	27.37	33.21	5.42	131	242	P	H
		2444	81.64	-	-	82.03	27.37	33.2	5.44	131	242	A	H
	*	2490.84	52.21	-21.79	74	52.43	27.5	33.18	5.46	131	242	P	V
	*	2484.52	42.46	-11.54	54	42.72	27.46	33.18	5.46	131	242	A	V



802.11n HT20 CH 13 2472MHz	*	2470	94.77	-	-	95.1	27.41	33.18	5.44	165	360	P	H
	*	2470	86.16	-	-	86.49	27.41	33.18	5.44	165	360	A	H
	!	2483.6	68.03	-5.97	74	68.29	27.46	33.18	5.46	165	360	P	H
		2483.52	53.94	-0.06	54	54.2	27.46	33.18	5.46	165	360	A	H
	*	2470	90.44	-	-	90.77	27.41	33.18	5.44	123	267	P	V
	*	2470	81.8	-	-	82.13	27.41	33.18	5.44	123	267	A	V
		2483.52	64.03	-9.97	74	64.29	27.46	33.18	5.46	123	267	P	V
		2483.52	49.42	-4.58	54	49.68	27.46	33.18	5.46	123	267	A	V
802.11n HT20 CH 11 2462MHz	*	2464	96.87	-	-	97.22	27.41	33.2	5.44	100	11	P	H
	*	2464	88.83	-	-	89.18	27.41	33.2	5.44	100	11	A	H
		2483.56	62.3	-11.7	74	62.56	27.46	33.18	5.46	100	11	P	H
		2483.52	46.86	-7.14	54	47.12	27.46	33.18	5.46	100	11	A	H
	*	2464	90.94	-	-	91.29	27.41	33.2	5.44	284	275	P	V
	*	2464	82.92	-	-	83.27	27.41	33.2	5.44	284	275	A	V
		2484.24	57.36	-16.64	74	57.62	27.46	33.18	5.46	284	275	P	V
		2483.96	43.64	-10.36	54	43.9	27.46	33.18	5.46	284	275	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	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)
802.11n HT20 CH 01 2412MHz		4824	37.84	-36.16	74	59.41	31.46	60.61	7.58	100	0	P	H
		4824	38.65	-35.35	74	60.22	31.46	60.61	7.58	100	0	P	V
802.11n HT20 CH 07 2442MHz		4884	38.71	-35.29	74	59.85	31.56	60.52	7.82	100	0	P	H
		7326	43.4	-30.6	74	58.65	36.22	60.98	9.51	100	0	P	H
		4884	38.87	-35.13	74	60.01	31.56	60.52	7.82	100	0	P	V
		7326	43.19	-30.81	74	58.44	36.22	60.98	9.51	100	0	P	V
802.11n HT20 CH 13 2472MHz		4944	38.81	-35.19	74	59.57	31.7	60.39	7.93	100	0	P	H
		7416	42.22	-31.78	74	57.44	36.41	61.24	9.61	100	0	P	H
		4944	39.3	-34.7	74	60.06	31.7	60.39	7.93	100	0	P	V
		7416	42.21	-31.79	74	57.43	36.41	61.24	9.61	100	0	P	V
802.11n HT20 CH 11 2462MHz		4944	38.81	-35.19	74	59.57	31.7	60.39	7.93	100	0	P	H
		7416	42.22	-31.78	74	57.44	36.41	61.24	9.61	100	0	P	H
		4944	39.3	-34.7	74	60.06	31.7	60.39	7.93	100	0	P	V
		7416	42.21	-31.79	74	57.43	36.41	61.24	9.61	100	0	P	V
Remark	1. No other spurious found.												
	2. All results are PASS against Peak and Average limit line.												



15C 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		113.97	24.24	-19.26	43.5	44.11	11.63	32.64	1.14	-	-	P	H
		165.54	21.94	-21.56	43.5	42.65	10.5	32.69	1.48	-	-	P	H
		209.01	28.69	-14.81	43.5	49.43	10.37	32.73	1.62	100	0	P	H
		313.3	25.14	-20.86	46	41.82	14.18	32.74	1.88	-	-	P	H
		691.3	26.07	-19.93	46	35.71	20.53	32.99	2.82	-	-	P	H
		946.8	26.44	-19.56	46	30.7	24.24	31.79	3.29	-	-	P	H
		44.31	31.83	-8.17	40	52.27	11.7	32.79	0.65	100	0	P	V
		57.54	26.61	-13.39	40	51.41	7.03	32.76	0.93	-	-	P	V
		104.52	21.61	-21.89	43.5	42.2	10.9	32.63	1.14	-	-	P	V
		650	24.37	-21.63	46	34.51	20.2	33.01	2.67	-	-	P	V
		691.3	32.57	-13.43	46	42.21	20.53	32.99	2.82	-	-	P	V
		750.1	30.4	-15.6	46	38.83	21.6	32.94	2.91	-	-	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 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	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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