FCC RF Test Report

APPLICANT	:	CT Asia
EQUIPMENT	:	Mobile phone
BRAND NAME	:	BLU
MODEL NAME	:	VIVO AIR
FCC ID	:	YHLBLUVIVOAIR
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Nov. 14, 2014 and testing was completed on Dec. 09, 2014. We, SPORTON INTERNATIONAL (SHENZHEN) 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 (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
2353

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APPENDIX A. RADIATED SPURIOUS EMISSION

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4N1408C	Rev. 01	Initial issue of report	Jan. 05, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 2.45 dB at 2389.560 MHz and 2389.830 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.68 dB at 0.550 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

CT Asia
Unit 01, 15/F, Seaview Centre, 139-141 Hoi bun road, Kwun Tong, Kowloon, Hongkong

1.2 Manufacturer

Gionee Communication Equipment Co., Ltd.
21/F, Times Technology Building, No. 7028, Shennan Avenue, Futian District, Shenzhen, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile phone
Brand Name	BLU
Model Name	VIVO AIR
FCC ID	YHLBLUVIVOAIR
EUT supports Radios application	GSM/GPRS/EGPRS/ WCDMA/HSPA/HSPA+(Downlink only) WLAN 2.4GHz 802.11b/g/n HT20/HT40 Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
HW Version	VIVO AIR_MAINBOARD_P4
SW Version	BLU_D980I_V06_GENERIC_T7375
EUT Stage	Pre-Production

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

1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 18.78 dBm (0.0755 W) 802.11g : 23.67 dBm (0.2328 W) 802.11n HT20 : 23.37 dBm (0.2173 W) 802.11n HT40 : 22.62 dBm (0.1828 W)
Antenna Type	802.11b/g/n : IFA Antenna with gain -1.00 dB
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 (SHENZHEN) INC.	
Test Site Location	1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
Test Site No.	**Sporton Site No.**	
	TH01-SZ	CO01-SZ

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

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 v03r02
- ANSI C63.4-2009
- ANSI C63.10-2009

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	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	18.37	CH 11	18.75	18.72	18.68
CH 06	2437 MHz	18.65				
CH 11	2462 MHz	**18.78**				

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	22.56	CH 11	23.31	23.24	23.56	23.34	23.23	23.57	23.51
CH 06	2437 MHz	23.12								
CH 11	2462 MHz	**23.67**								

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	22.03	CH 11	22.89	22.87	22.79	22.78	23.27	23.26	23.21
CH 06	2437 MHz	22.25								
CH 11	2462 MHz	**23.37**								

2.4GHz 802.11n HT40 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 03	2422 MHz	21.92	CH 06	21.95	21.93	21.89	21.87	22.17	21.95	22.16
CH 06	2437 MHz	**22.62**								
CH 09	2452 MHz	22.27								

2.3 Test Mode

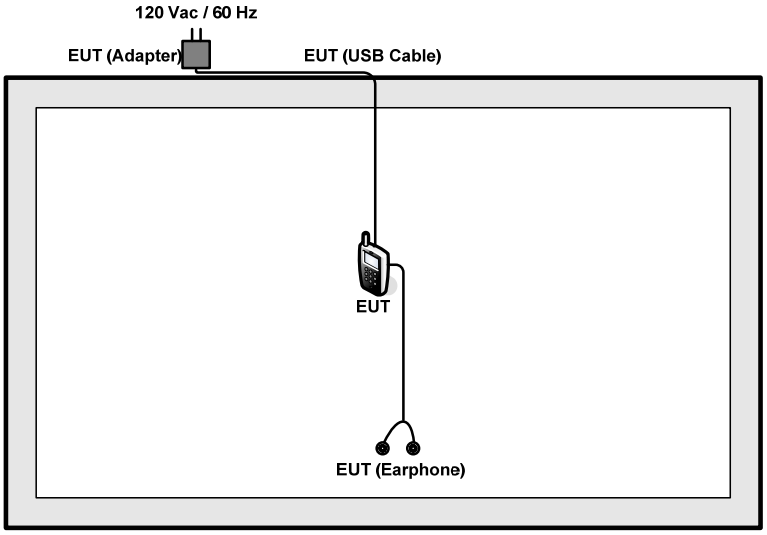
Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	6dB BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11n HT40	MCS0	3/6/9
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11n HT40	MCS0	3/6/9
	Conducted Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	MCS0	1/11
		802.11n HT40	MCS0	3/9
	Conducted Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11n HT40	MCS0	3/6/9
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	MCS0	1/11
		802.11n HT40	MCS0	3/9
	Radiated Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
		802.11n HT40	MCS0	3/6/9
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone + Battery			

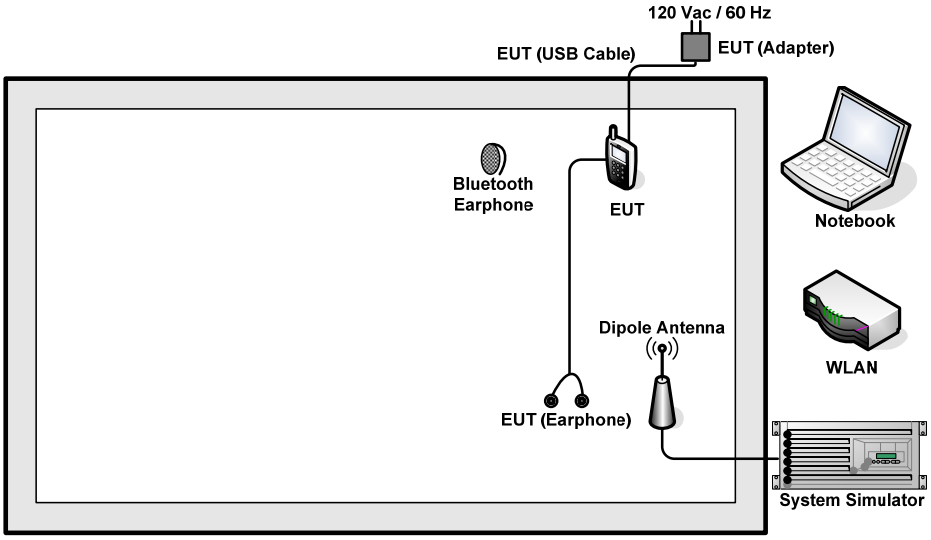
Remark: For Radiated TCs, the tests were performed with adapter, earphone and USB cable.

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-815	KA2IR815A1	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-108	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 and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5 dB and 10dB attenuator.

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

= 5 + 10 = 15 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

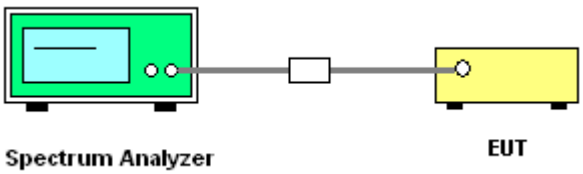
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

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

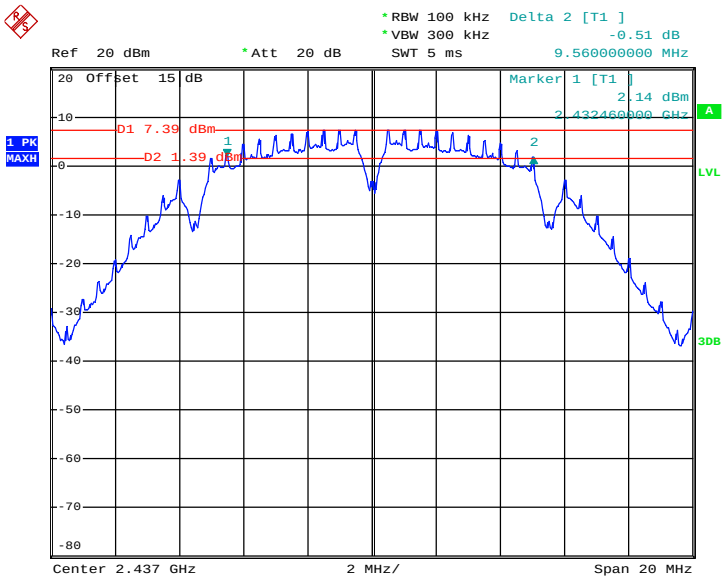


3.1.5 Test Result of 6dB Bandwidth

Test Band :	2.4GHz	Temperature :	24~26℃
Test Engineer :	Mygai Mo	Relative Humidity :	50~53%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	10.04	0.50	Pass
11b	1Mbps	1	6	2437	9.56	0.50	Pass
11b	1Mbps	1	11	2462	10.00	0.50	Pass
11g	6Mbps	1	1	2412	15.12	0.50	Pass
11g	6Mbps	1	6	2437	15.12	0.50	Pass
11g	6Mbps	1	11	2462	15.64	0.50	Pass
HT20	MCS0	1	1	2412	15.12	0.50	Pass
HT20	MCS0	1	6	2437	15.34	0.50	Pass
HT20	MCS0	1	11	2462	15.28	0.50	Pass
HT40	MCS0	1	3	2422	35.12	0.50	Pass
HT40	MCS0	1	6	2437	35.12	0.50	Pass
HT40	MCS0	1	9	2452	35.12	0.50	Pass

Minimum 6dB Bandwidth



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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.

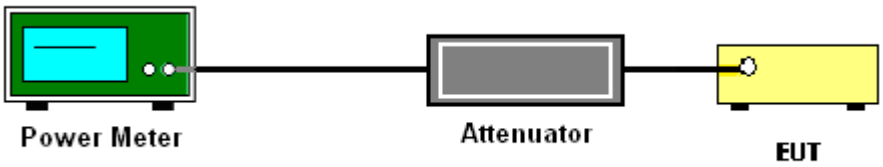
3.2.2 Measuring Instruments

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

Test Mode :	2.4GHz	Temperature :	24~26℃
Test Engineer :	Mygai Mo	Relative Humidity :	50~53%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	RF Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	18.37	30.00	-1.00	Pass
11b	1Mbps	1	6	2437	18.65	30.00	-1.00	Pass
11b	1Mbps	1	11	2462	18.78	30.00	-1.00	Pass
11g	6Mbps	1	1	2412	22.56	30.00	-1.00	Pass
11g	6Mbps	1	6	2437	23.12	30.00	-1.00	Pass
11g	6Mbps	1	11	2462	23.67	30.00	-1.00	Pass
HT20	MCS0	1	1	2412	22.03	30.00	-1.00	Pass
HT20	MCS0	1	6	2437	22.25	30.00	-1.00	Pass
HT20	MCS0	1	11	2462	23.37	30.00	-1.00	Pass
HT40	MCS0	1	3	2422	21.92	30.00	-1.00	Pass
HT40	MCS0	1	6	2437	22.62	30.00	-1.00	Pass
HT40	MCS0	1	9	2452	22.27	30.00	-1.00	Pass

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

3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	2.4GHz	Temperature :	24~26℃
Test Engineer :	Mygai Mo	Relative Humidity :	50~53%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Duty Factor (dB)	Average Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	0.08	15.53	30.00	-1.00	Pass
11b	1Mbps	1	6	2437	0.08	15.74	30.00	-1.00	Pass
11b	1Mbps	1	11	2462	0.08	15.81	30.00	-1.00	Pass
11g	6Mbps	1	1	2412	0.48	14.42	30.00	-1.00	Pass
11g	6Mbps	1	6	2437	0.48	14.69	30.00	-1.00	Pass
11g	6Mbps	1	11	2462	0.48	15.04	30.00	-1.00	Pass
HT20	MCS0	1	1	2412	0.55	13.45	30.00	-1.00	Pass
HT20	MCS0	1	6	2437	0.55	13.67	30.00	-1.00	Pass
HT20	MCS0	1	11	2462	0.55	14.00	30.00	-1.00	Pass
HT40	MCS0	1	3	2422	0.98	12.40	30.00	-1.00	Pass
HT40	MCS0	1	6	2437	0.98	13.63	30.00	-1.00	Pass
HT40	MCS0	1	9	2452	0.98	12.57	30.00	-1.00	Pass

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

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

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

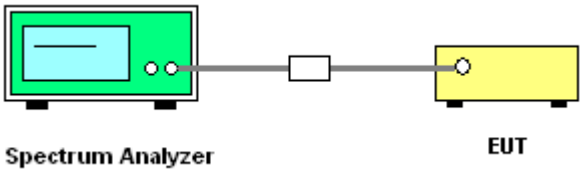
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance 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



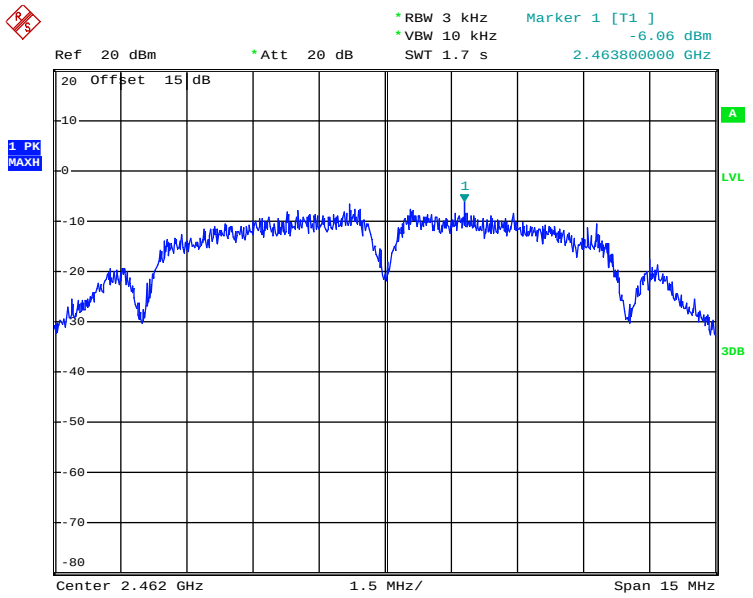
3.3.5 Test Result of Power Spectral Density

Test Mode :	2.4GHz	Temperature :	24~26℃
Test Engineer :	Mygai Mo	Relative Humidity :	50~53%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Peak Power Density (dBm/3kHz)	Max. Limits (dBm/3kHz)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	-6.85	8.00	-1.00	Pass
11b	1Mbps	1	6	2437	-7.11	8.00	-1.00	Pass
11b	1Mbps	1	11	2462	-6.06	8.00	-1.00	Pass
11g	6Mbps	1	1	2412	-10.24	8.00	-1.00	Pass
11g	6Mbps	1	6	2437	-10.39	8.00	-1.00	Pass
11g	6Mbps	1	11	2462	-10.89	8.00	-1.00	Pass
HT20	MCS0	1	1	2412	-10.38	8.00	-1.00	Pass
HT20	MCS0	1	6	2437	-12.04	8.00	-1.00	Pass
HT20	MCS0	1	11	2462	-11.64	8.00	-1.00	Pass
HT40	MCS0	1	3	2422	-15.34	8.00	-1.00	Pass
HT40	MCS0	1	6	2437	-15.42	8.00	-1.00	Pass
HT40	MCS0	1	9	2452	-15.17	8.00	-1.00	Pass

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

Worst Case Power Density (dBm/3kHz)



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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).

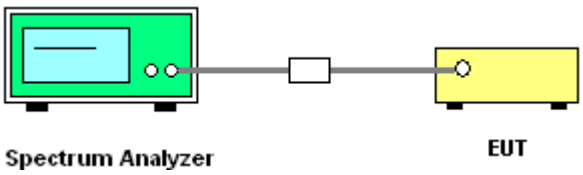
3.4.2 Measuring Instruments

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

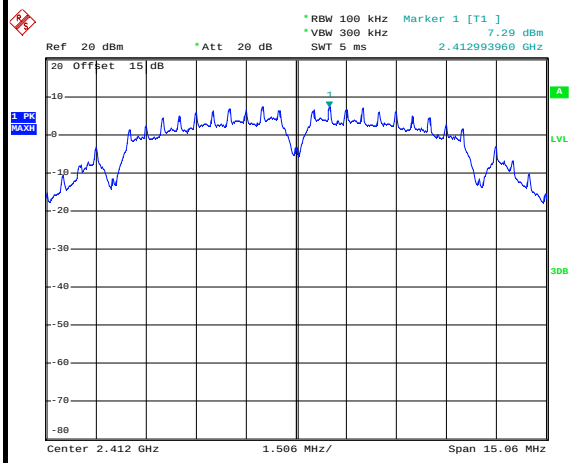


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Mode :	802.11b	**Temperature :**	24~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	50~53%
Test Channel :	01	**Test Engineer :**	Mygai Mo

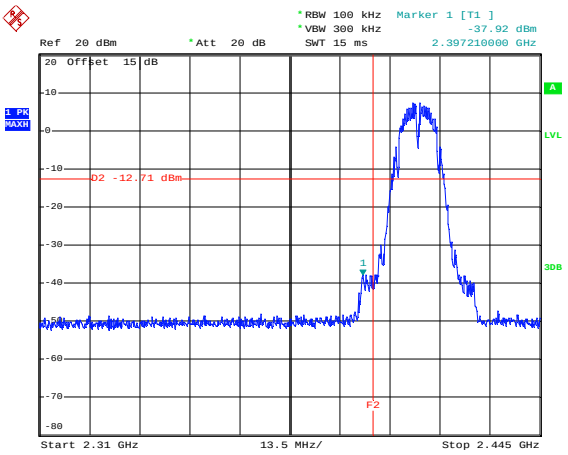
WLAN 802.11b Channel 01

100kHz PSD reference Level



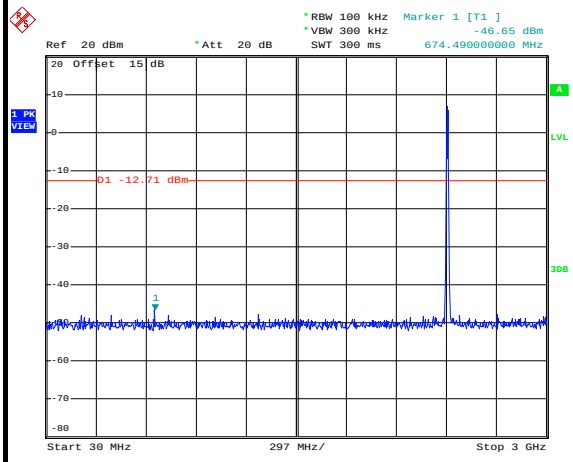
Date: 27.NOV.2014 20:32:14

Low Channel Plot



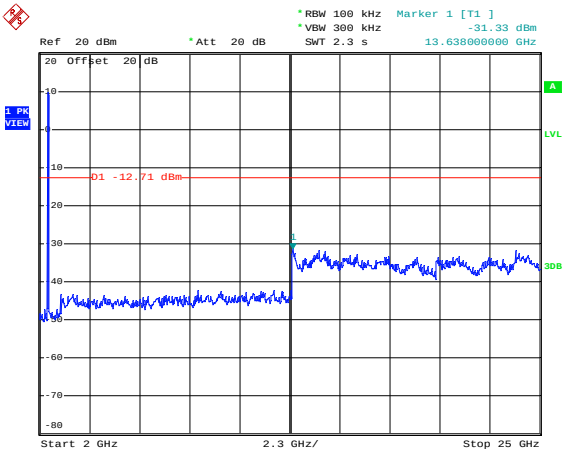
Date: 27.NOV.2014 20:32:28

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 20:32:48

Spurious Emission 2GHz~25GHz

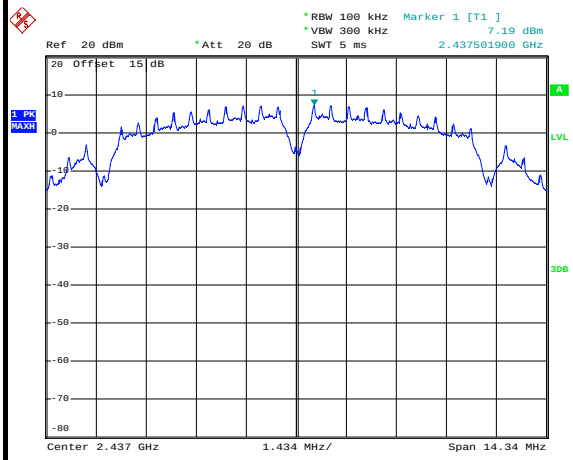


Date: 27.NOV.2014 20:33:06

Test Mode :	802.11b	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Mygai Mo

WLAN 802.11b Channel 06

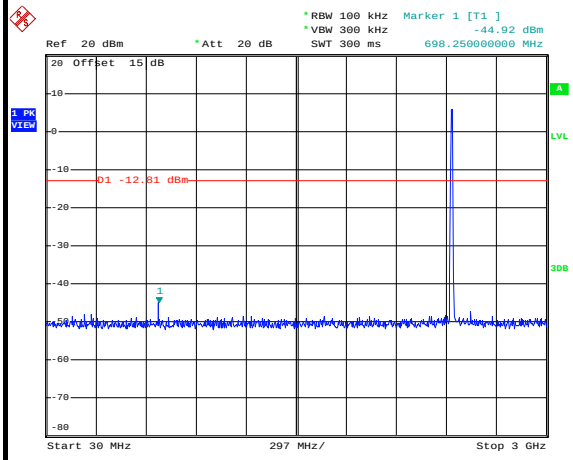
100kHz PSD reference Level



Date: 27.NOV.2014 21:58:22

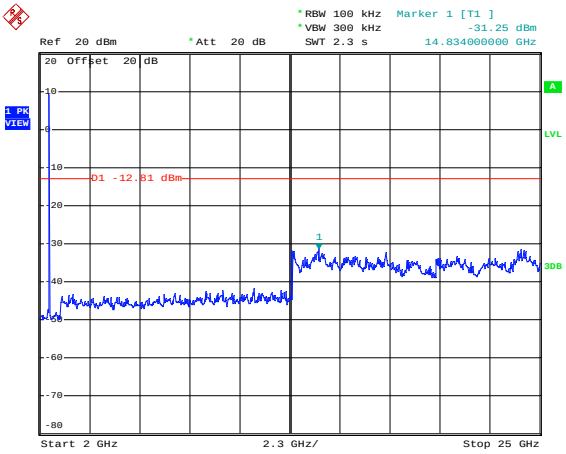
Mid Channel Plot

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 21:58:42

Spurious Emission 2GHz~25GHz

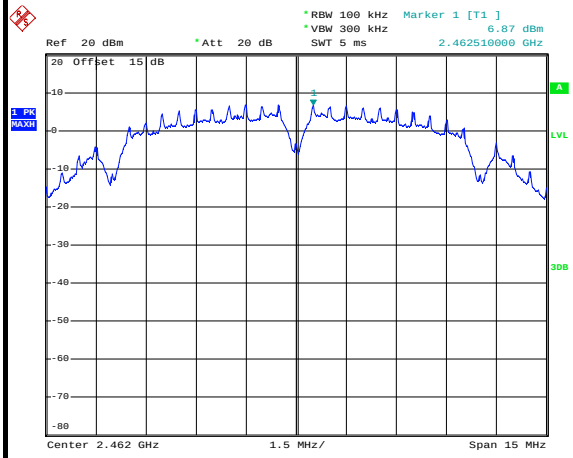


Date: 27.NOV.2014 21:59:01

Test Mode :	802.11b	**Temperature :**	24~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	50~53%
Test Channel :	11	**Test Engineer :**	Mygai Mo

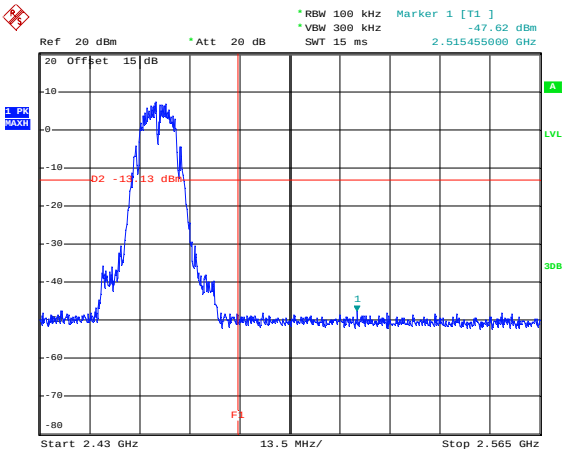
WLAN 802.11b Channel 11

100kHz PSD reference Level



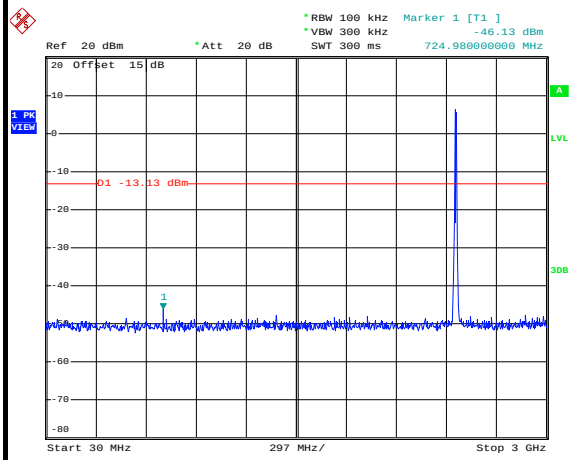
Date: 27.NOV.2014 20:41:45

High Channel Plot



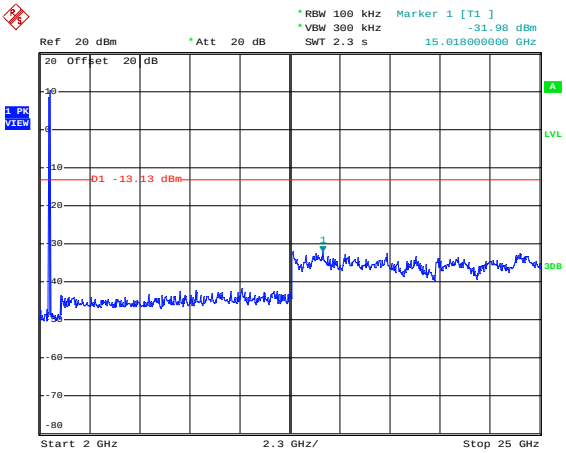
Date: 27.NOV.2014 20:42:00

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 20:42:19

Spurious Emission 2GHz~25GHz

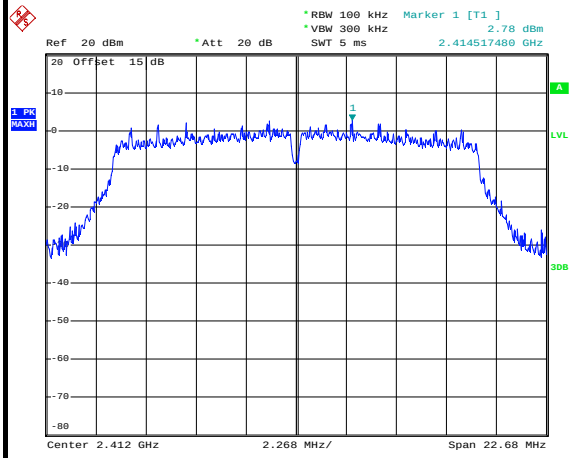


Date: 27.NOV.2014 20:42:38

Test Mode :	802.11g	**Temperature :**	24~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	50~53%
Test Channel :	01	**Test Engineer :**	Mygai Mo

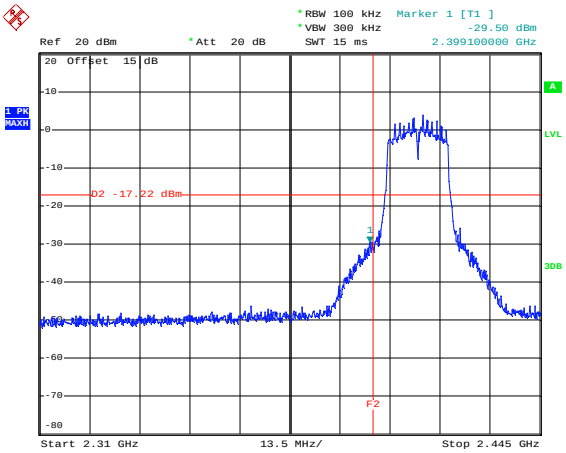
WLAN 802.11g Channel 01

100kHz PSD reference Level



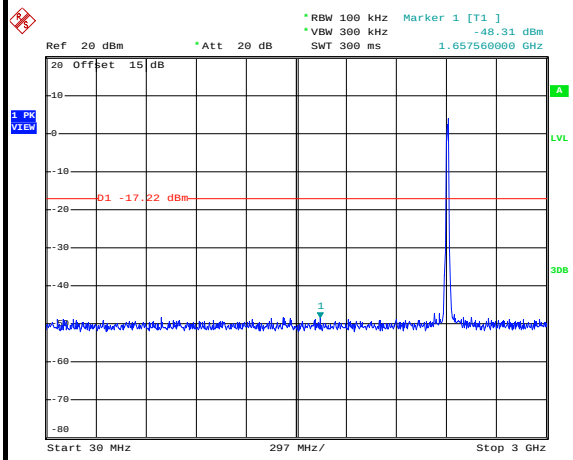
Date: 27.NOV.2014 21:05:18

Low Channel Plot



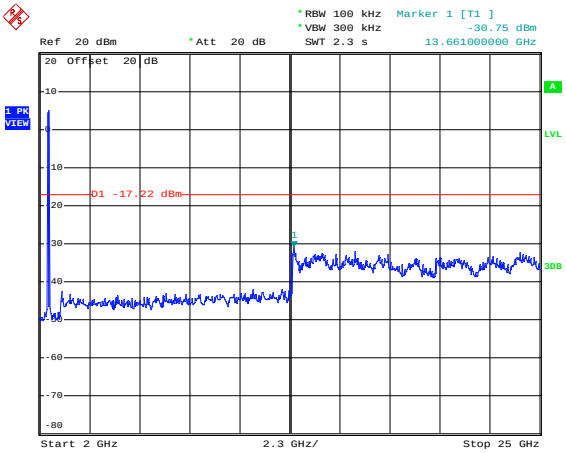
Date: 27.NOV.2014 21:05:32

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 21:05:52

Spurious Emission 2GHz~25GHz

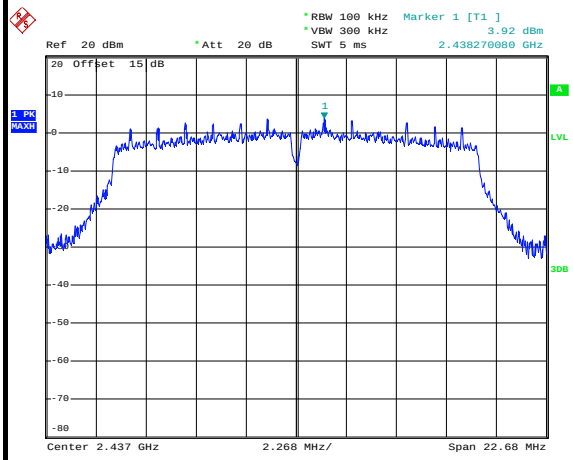


Date: 27.NOV.2014 21:06:11

Test Mode :	802.11g	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Mygai Mo

WLAN 802.11g Channel 06

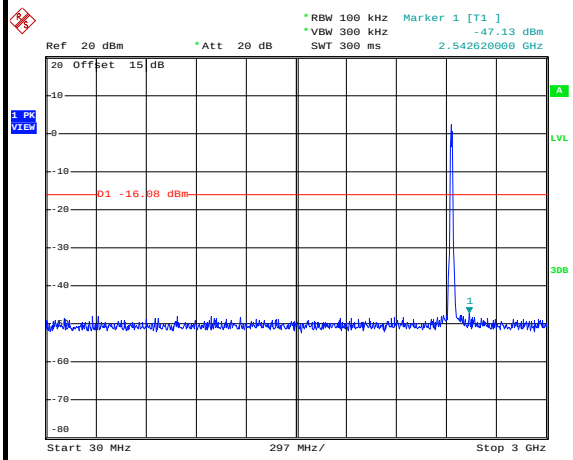
100kHz PSD reference Level



Date: 27.NOV.2014 21:01:15

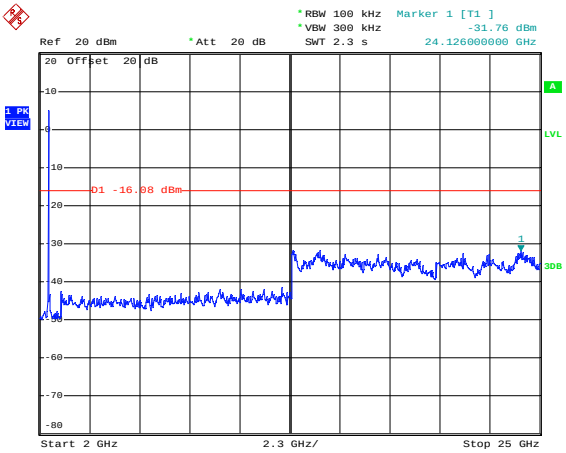
Mid Channel Plot

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 21:01:35

Spurious Emission 2GHz~25GHz

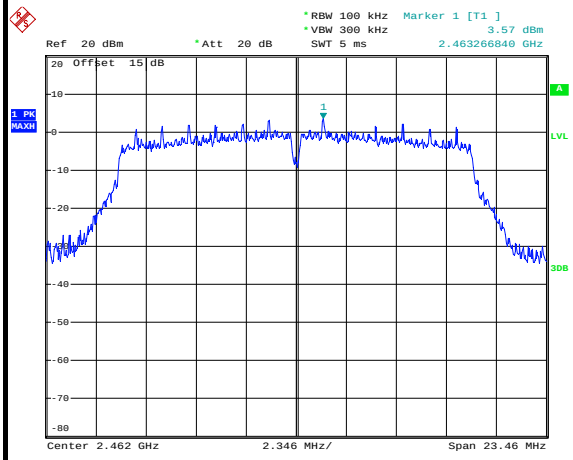


Date: 27.NOV.2014 21:01:54

Test Mode :	802.11g	**Temperature :**	24~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	50~53%
Test Channel :	11	**Test Engineer :**	Mygai Mo

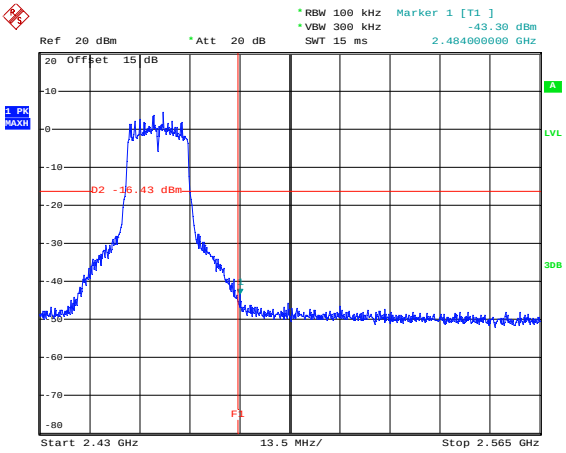
WLAN 802.11g Channel 11

100kHz PSD reference Level



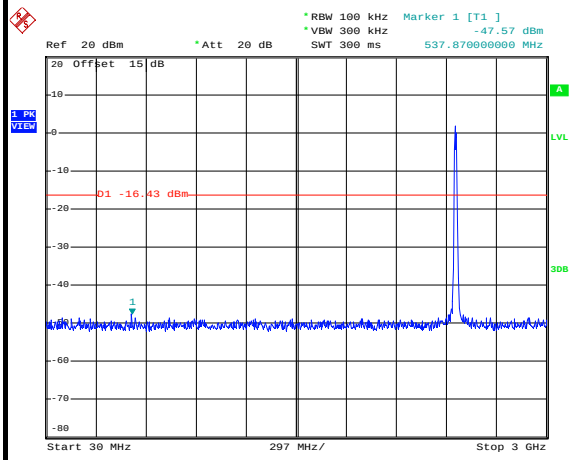
Date: 27.NOV.2014 20:54:58

High Channel Plot



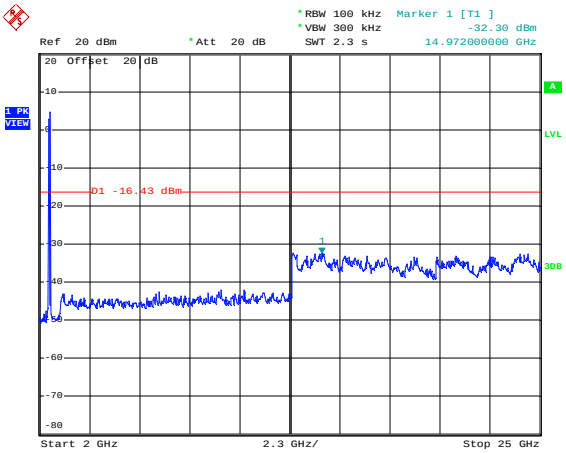
Date: 27.NOV.2014 21:09:56

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 20:55:32

Spurious Emission 2GHz~25GHz

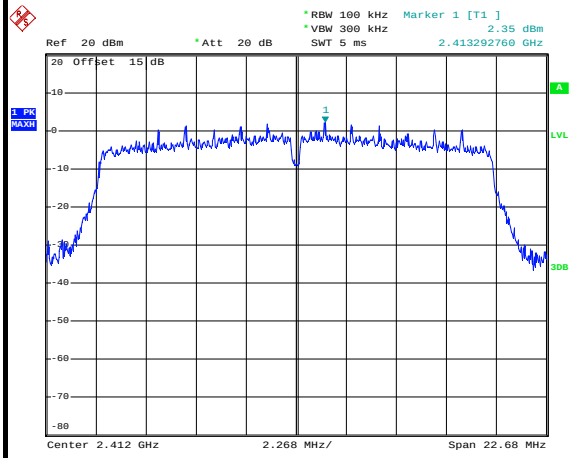


Date: 27.NOV.2014 20:55:51

Test Mode :	802.11n HT20	**Temperature :**	24~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	50~53%
Test Channel :	01	**Test Engineer :**	Mygai Mo

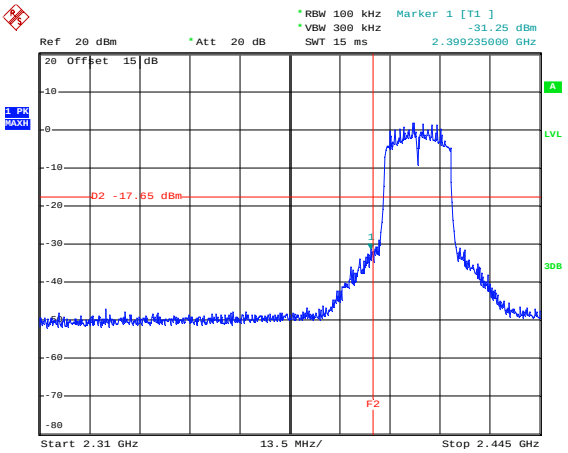
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



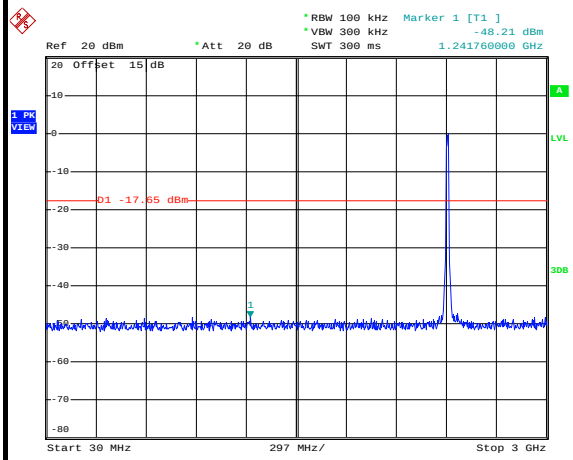
Date: 27.NOV.2014 21:23:45

Low Channel Plot



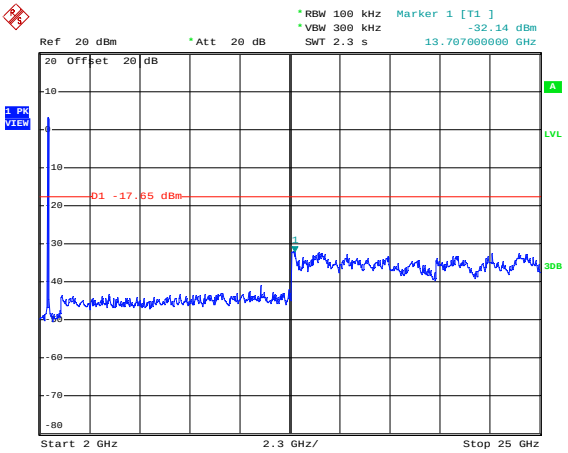
Date: 27.NOV.2014 21:24:00

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 21:24:19

Spurious Emission 2GHz~25GHz

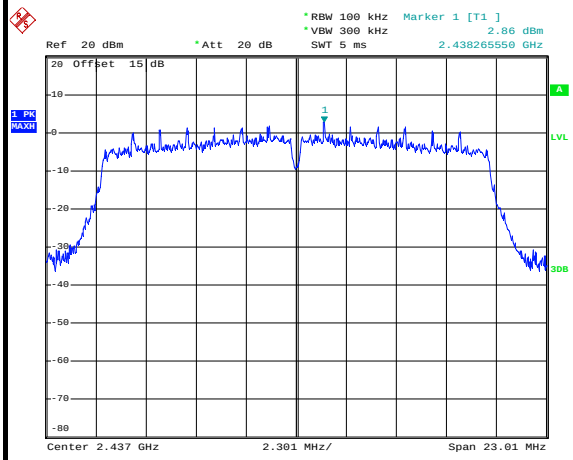


Date: 27.NOV.2014 21:24:38

Test Mode :	802.11n HT20	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Mygai Mo

WLAN 802.11n HT20 Channel 06

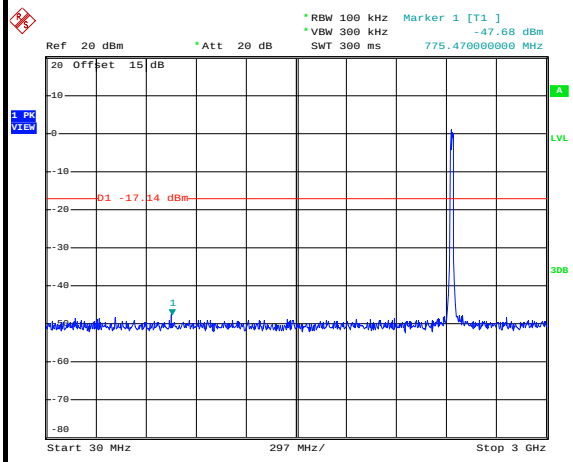
100kHz PSD reference Level



Date: 27.NOV.2014 21:19:56

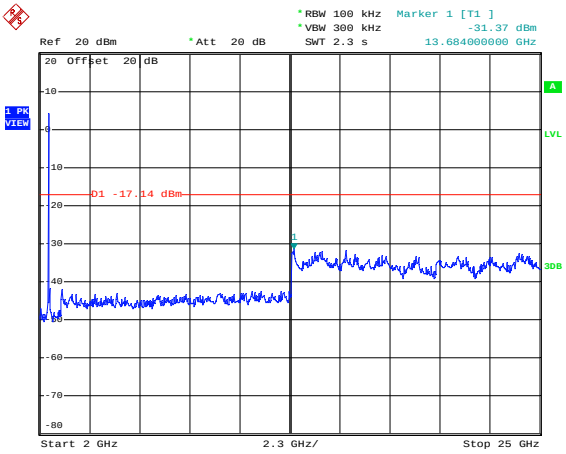
Mid Channel Plot

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 21:20:16

Spurious Emission 2GHz~25GHz

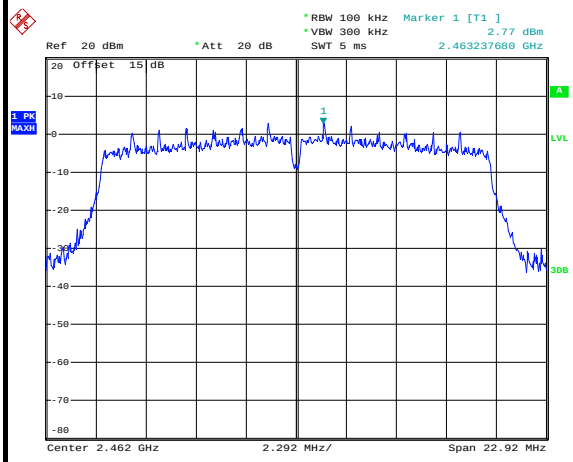


Date: 27.NOV.2014 21:20:35

Test Mode :	802.11n HT20	**Temperature :**	24~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	50~53%
Test Channel :	11	**Test Engineer :**	Mygai Mo

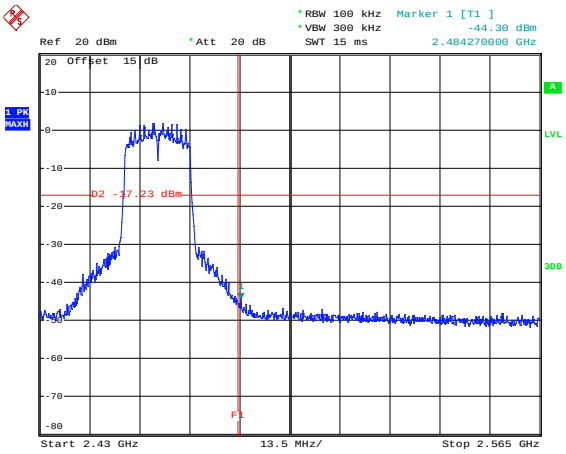
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



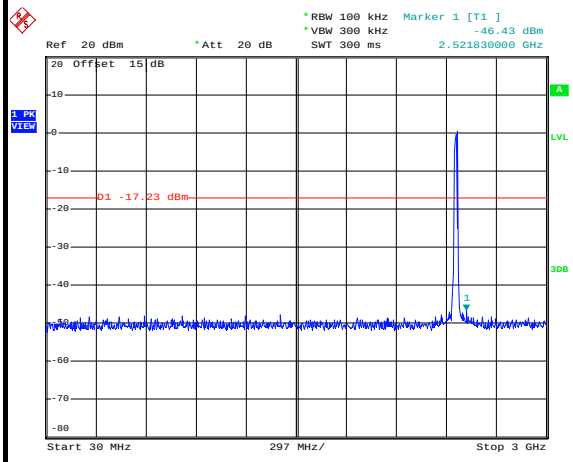
Date: 27.NOV.2014 21:13:26

High Channel Plot



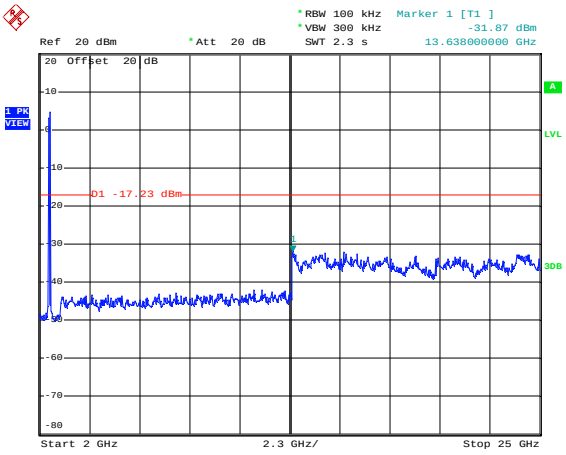
Date: 27.NOV.2014 21:13:40

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 21:13:59

Spurious Emission 2GHz~25GHz

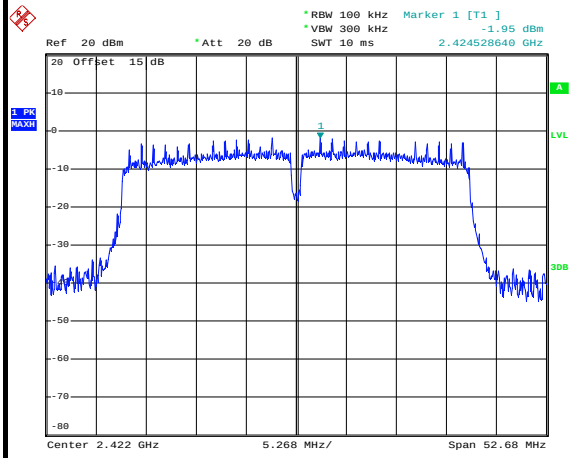


Date: 27.NOV.2014 21:14:18

Test Mode :	802.11n HT40	**Temperature :**	24~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	50~53%
Test Channel :	03	**Test Engineer :**	Mygai Mo

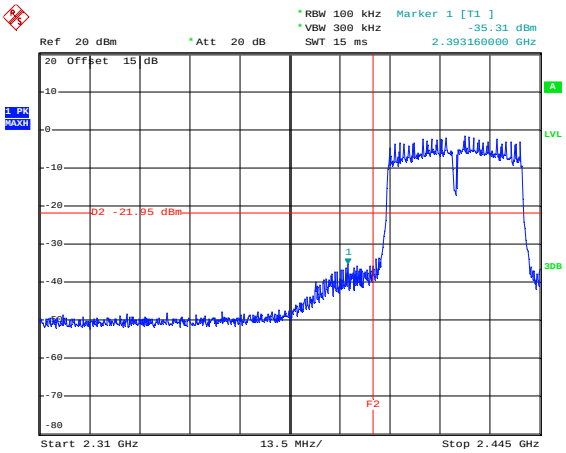
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



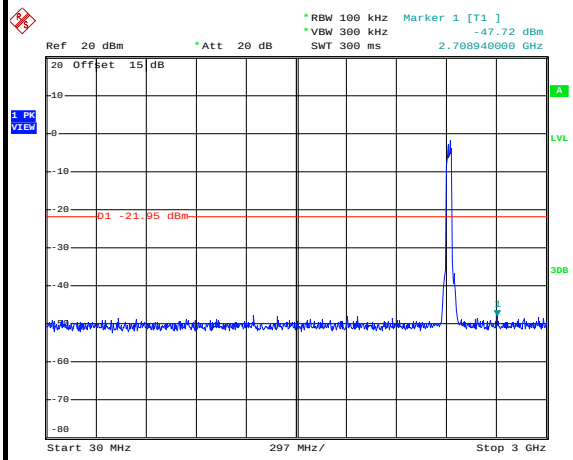
Date: 27.NOV.2014 21:27:36

Low Channel Plot



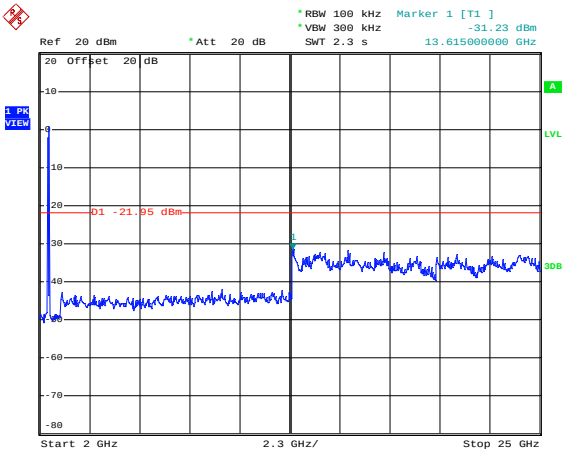
Date: 27.NOV.2014 21:27:50

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 21:40:04

Spurious Emission 2GHz~25GHz

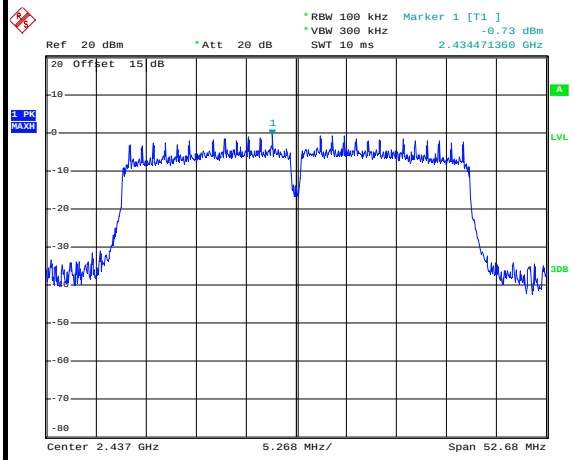


Date: 27.NOV.2014 21:40:23

Test Mode :	802.11n HT40	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Mygai Mo

WLAN 802.11n HT40 Channel 06

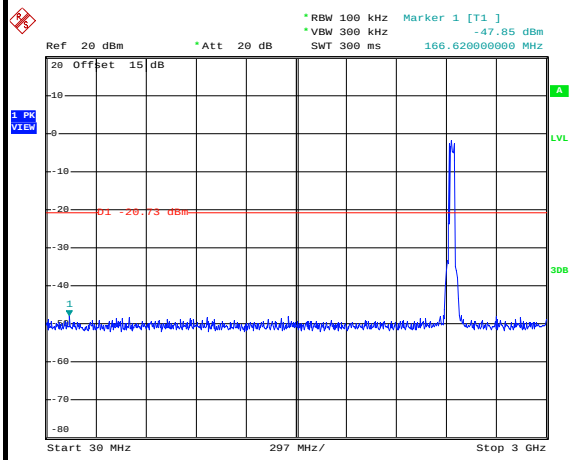
100kHz PSD reference Level



Date: 27.NOV.2014 21:31:21

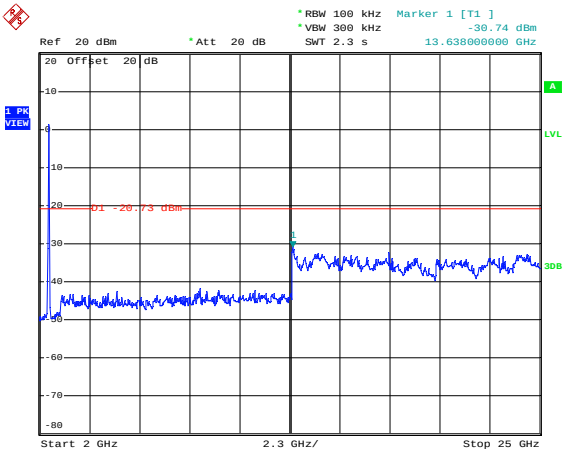
Mid Channel Plot

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 21:31:41

Spurious Emission 2GHz~25GHz

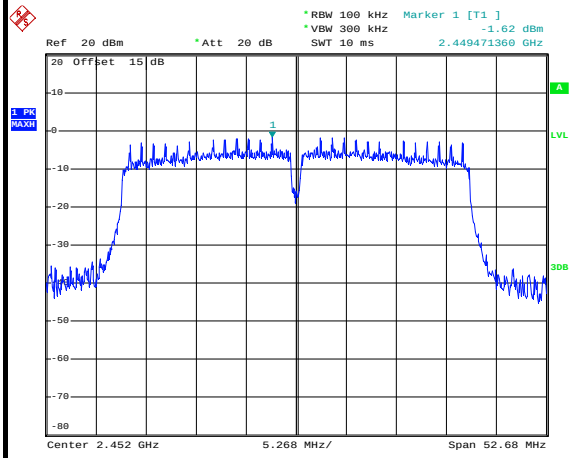


Date: 27.NOV.2014 21:31:59

Test Mode :	802.11n HT40	**Temperature :**	24~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	50~53%
Test Channel :	09	**Test Engineer :**	Mygai Mo

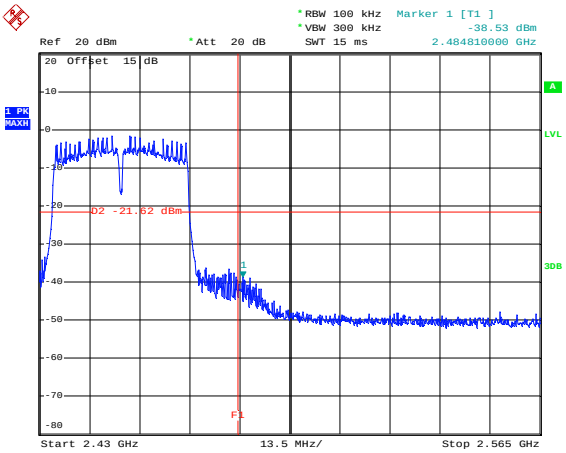
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



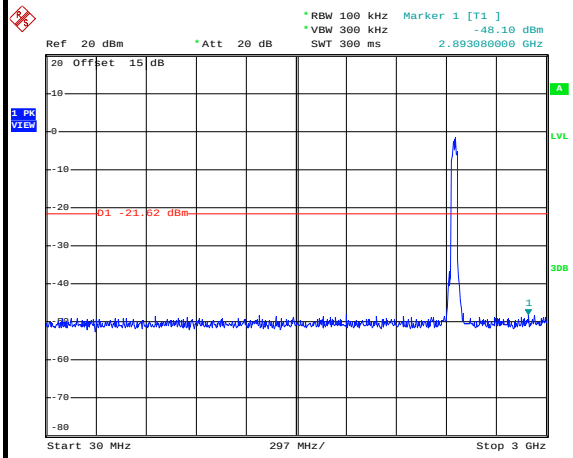
Date: 27.NOV.2014 21:35:14

High Channel Plot



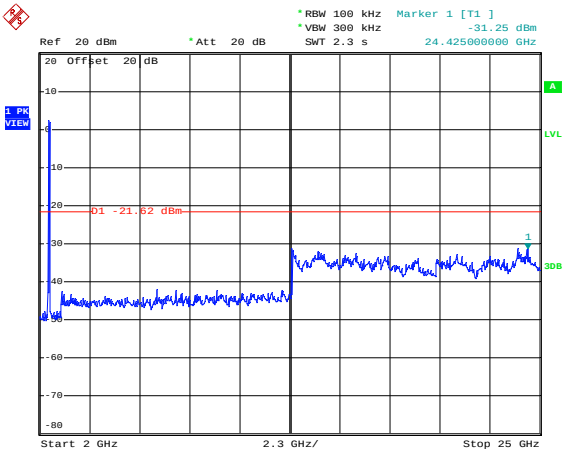
Date: 27.NOV.2014 21:35:28

Spurious Emission 30MHz~3GHz



Date: 27.NOV.2014 21:36:48

Spurious Emission 2GHz~25GHz



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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.

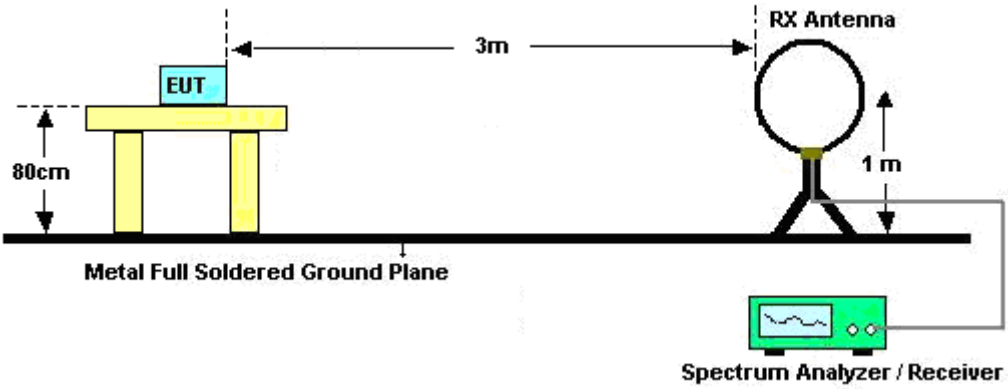
3.5.3 Test Procedures

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 above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

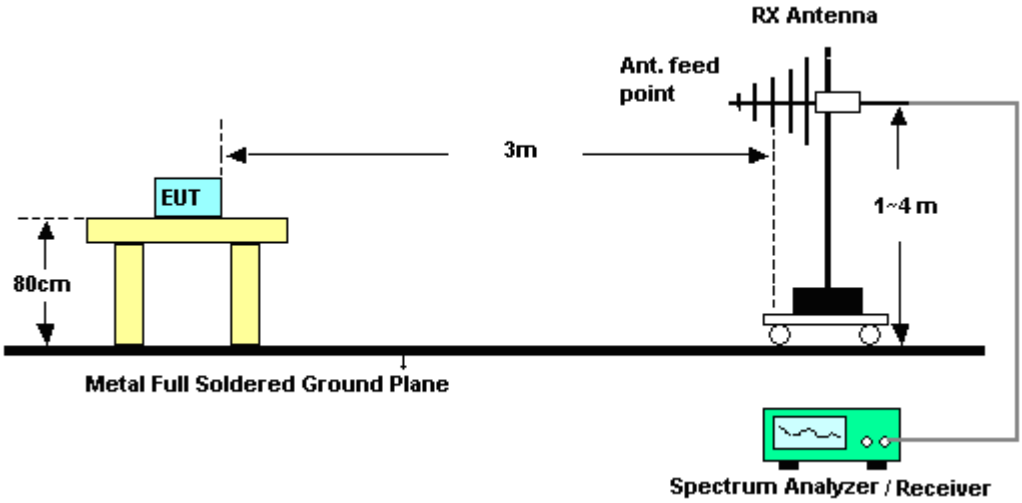
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	98.25	-	-	10Hz
802.11g	89.53	1.402	0.713	1kHz
2.4GHz 802.11n HT20	88.16	1.296	0.772	1kHz
2.4GHz 802.11n HT40	79.81	0.656	1.524	3kHz

3.5.4 Test Setup

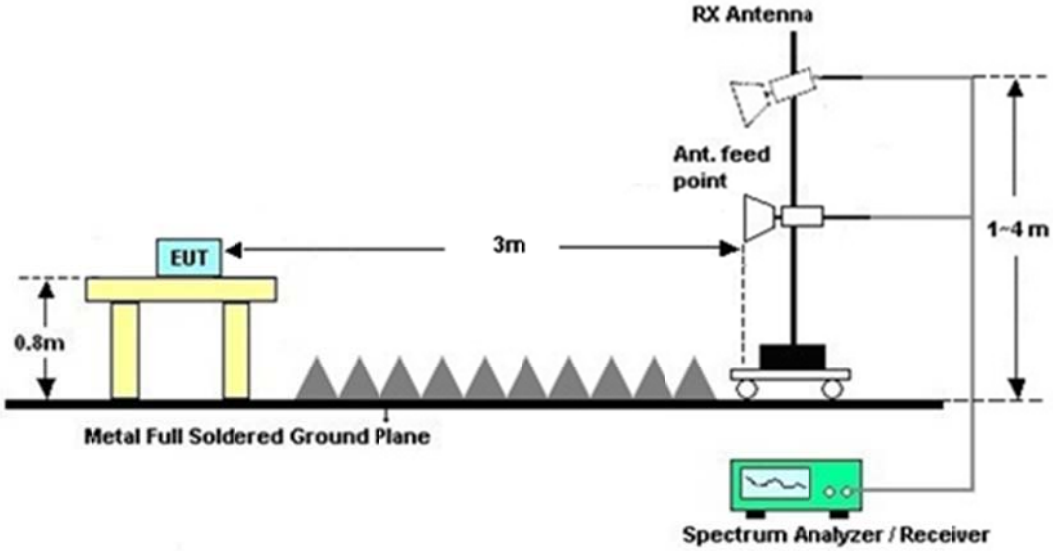
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated 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 A.

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

Please refer to Appendix A.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

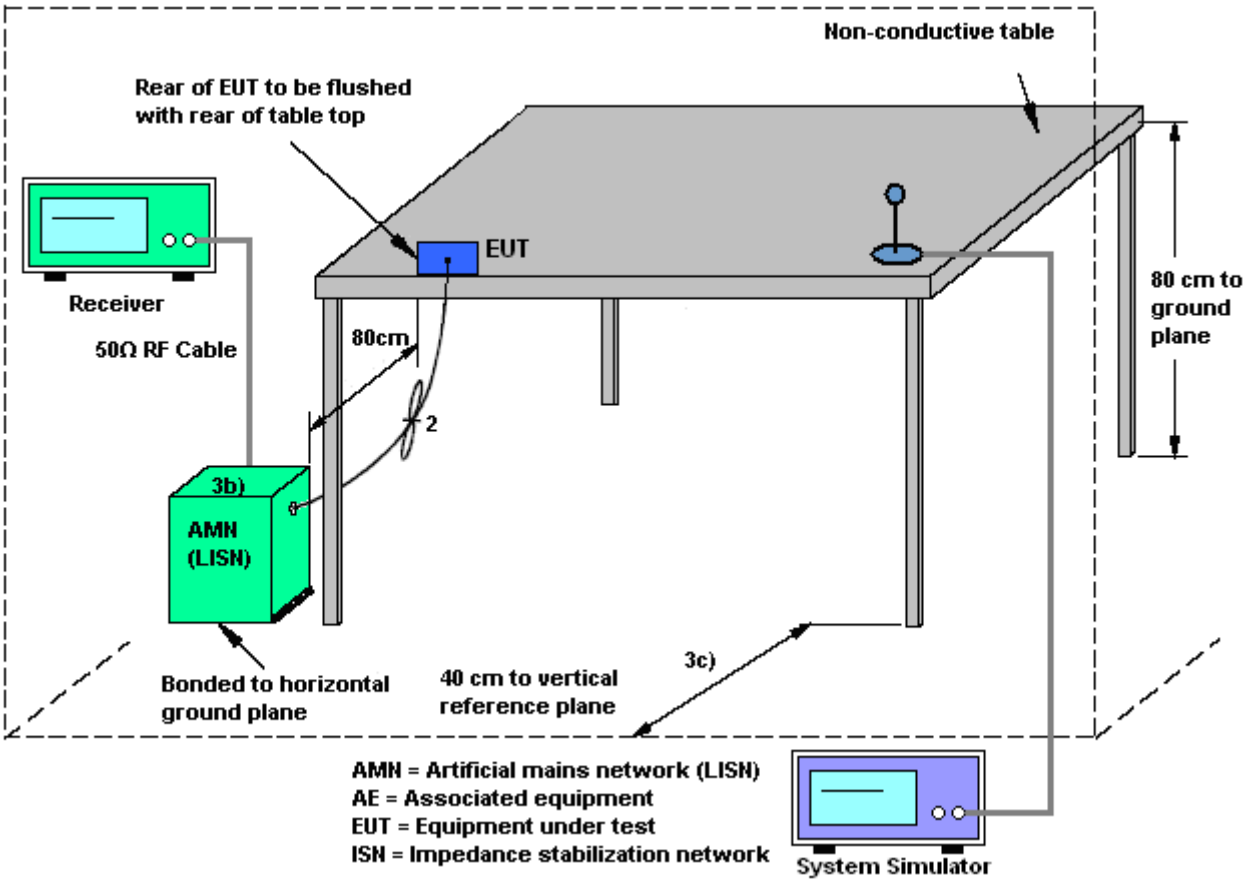
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

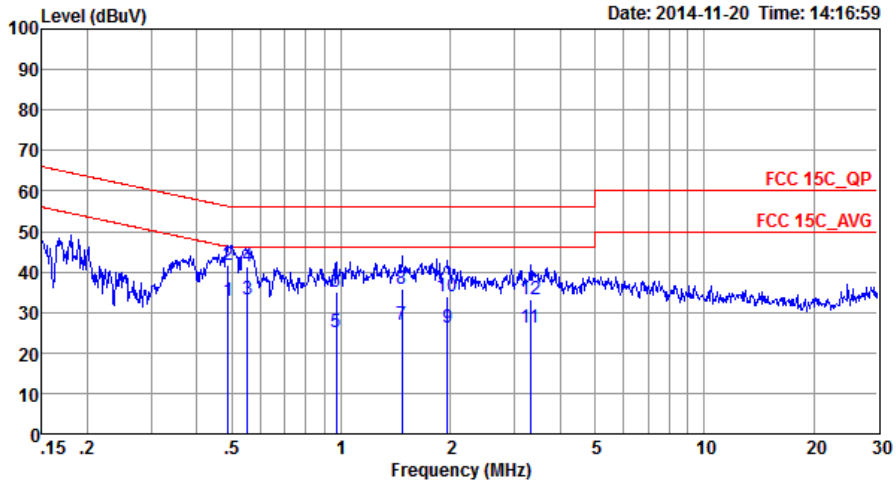
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other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

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	21~22℃
Test Engineer :	Jack Tian	**Relative Humidity :**	41~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone + Battery		

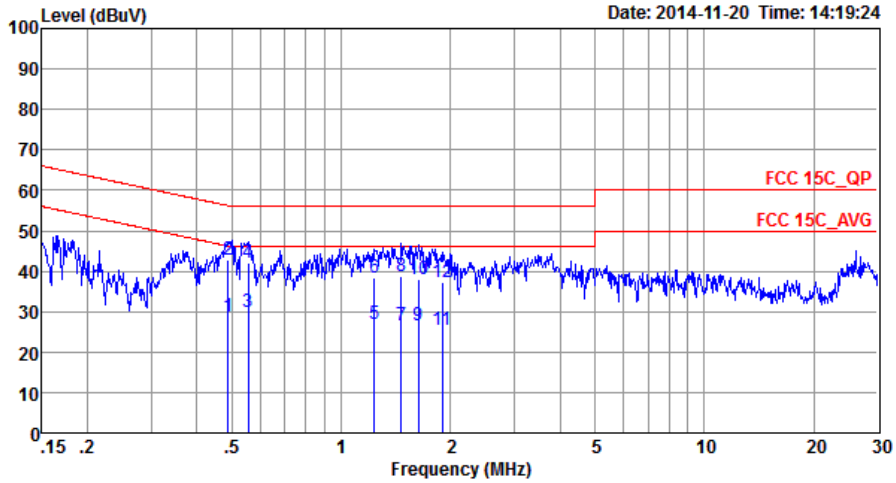


Site : CO01-SZ
Condition: FCC 15C_QP LISN_L_20140304 LINE

Mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.49	32.75	-13.44	46.19	22.29	0.30	10.16	Average
2	0.49	41.85	-14.34	56.19	31.39	0.30	10.16	QP
3 *	0.55	33.32	-12.68	46.00	22.91	0.26	10.15	Average
4	0.55	41.42	-14.58	56.00	31.01	0.26	10.15	QP
5	0.97	25.10	-20.90	46.00	14.70	0.25	10.15	Average
6	0.97	35.20	-20.80	56.00	24.80	0.25	10.15	QP
7	1.47	27.01	-18.99	46.00	16.60	0.24	10.17	Average
8	1.47	35.71	-20.29	56.00	25.30	0.24	10.17	QP
9	1.96	26.21	-19.79	46.00	15.80	0.22	10.19	Average
10	1.96	33.81	-22.19	56.00	23.40	0.22	10.19	QP
11	3.31	26.15	-19.85	46.00	15.60	0.33	10.22	Average
12	3.31	33.35	-22.65	56.00	22.80	0.33	10.22	QP

Test Mode :	Mode 1	**Temperature :**	21~22℃
Test Engineer :	Jack Tian	**Relative Humidity :**	41~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone + Battery		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_N_20140304 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		0.49	28.96	-17.23	46.19	18.39	0.41	10.16	Average
2	*	0.49	42.66	-13.53	56.19	32.09	0.41	10.16	QP
3		0.56	29.71	-16.29	46.00	19.20	0.36	10.15	Average
4		0.56	42.11	-13.89	56.00	31.60	0.36	10.15	QP
5		1.24	26.80	-19.20	46.00	16.30	0.34	10.16	Average
6		1.24	38.40	-17.60	56.00	27.90	0.34	10.16	QP
7		1.46	26.72	-19.28	46.00	16.20	0.35	10.17	Average
8		1.46	38.92	-17.08	56.00	28.40	0.35	10.17	QP
9		1.63	26.64	-19.36	46.00	16.10	0.36	10.18	Average
10		1.63	38.14	-17.86	56.00	27.60	0.36	10.18	QP
11		1.90	25.55	-20.45	46.00	14.99	0.37	10.19	Average
12		1.90	37.35	-18.65	56.00	26.79	0.37	10.19	QP

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	FSP30	101400	9kHz~30GHz	Mar. 03, 2014	Nov. 27, 2014	Mar. 02, 2015	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	13dBm ~-20dBm	Mar. 03, 2014	Nov. 27, 2014	Mar. 02, 2015	Conducted (TH01-SZ)
Power Sensor	Dare	RPR3006W	TH01SZ00019	0.3GHz~6GHz	Mar. 14, 2014	Nov. 27, 2014	Mar. 13, 2015	Conducted (TH01-SZ)
ESCIO TEST Receiver	R&S	ESCI	100724	9kHz~3GHz	Feb. 21, 2014	Dec. 09, 2014	Feb. 20, 2015	Radiation (03CH01-SZ)
Spectrum Analyzer	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May 26, 2014	Dec. 09, 2014	May 25, 2015	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 09, 2014	Dec. 09, 2014	May 08, 2015	Radiation (03CH01-SZ)
Bilog Antenna	TESEQ	CBL 6112D	37877	30MHz~2GHz	Oct. 15, 2014	Dec. 09, 2014	Oct. 14, 2015	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 15, 2014	Dec. 09, 2014	Oct. 14, 2015	Radiation (03CH01-SZ)
Double Ridged Horn Antenna	COM-POWER	AH-840	101073	18GHz~40GHz	Jun. 09, 2014	Dec. 09, 2014	Jun. 08, 2015	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz~3000MHz	Feb. 21, 2014	Dec. 09, 2014	Feb. 20, 2015	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	May 08, 2014	Dec. 09, 2014	May 07, 2015	Radiation (03CH01-SZ)
AC Source(AVR)	Chroma	61601	616010001985	100Vac~250Vac	Mar. 25, 2014	Dec. 09, 2014	Mar. 24, 2015	Radiation (03CH01-SZ)
Turn Table	EM Electronics	EM 1000	N/A	0~360 degree	NCR	Dec. 09, 2014	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM Electronics	EM 1000	N/A	1 m~4 m	NCR	Dec. 09, 2014	NCR	Radiation (03CH01-SZ)
ESCIO TEST Receiver	R&S	ESCI	100724	9kHz~3GHz	Feb. 21, 2014	Nov. 20, 2014	Feb. 20, 2015	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Mar. 04, 2014	Nov. 20, 2014	Mar. 03, 2015	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Mar. 04, 2014	Nov. 20, 2014	Mar. 03, 2015	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Dec. 17, 2013	Nov. 20, 2014	Dec. 16, 2014	Conduction (CO01-SZ)

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.9dB

Appendix A. Radiated Spurious Emission

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		2376.87	53	-21	74	41.13	32.58	8.51	29.22	147	206	P	H
		2376.42	42.21	-11.79	54	30.34	32.58	8.51	29.22	147	206	A	H
	*	2412	102.79	-	-	90.82	32.61	8.6	29.24	147	206	P	H
	*	2412	100.56	-	-	88.59	32.61	8.6	29.24	147	206	A	H
		2357.25	53.46	-20.54	74	41.57	32.56	8.51	29.18	184	297	P	V
		2368.41	41.3	-12.7	54	29.41	32.56	8.51	29.18	184	297	A	V
	*	2412	100.14	-	-	88.17	32.61	8.6	29.24	184	297	P	V
	*	2412	97.95	-	-	85.98	32.61	8.6	29.24	184	297	A	V
802.11b CH 06 2437MHz		2383.89	54.73	-19.27	74	42.86	32.58	8.51	29.22	175	195	P	H
		2382.09	44.53	-9.47	54	32.66	32.58	8.51	29.22	175	195	A	H
	*	2437	104.57	-	-	92.43	32.65	8.69	29.2	175	195	P	H
	*	2437	102.53	-	-	90.39	32.65	8.69	29.2	175	195	A	H
		2494.12	53.15	-20.85	74	40.81	32.7	8.78	29.14	175	195	P	H
		2493.92	41.05	-12.95	54	28.71	32.7	8.78	29.14	175	195	A	H
		2361.48	51.19	-22.81	74	39.3	32.56	8.51	29.18	165	194	P	V
		2360.4	39.67	-14.33	54	27.78	32.56	8.51	29.18	165	194	A	V
	*	2437	83.24	-	-	71.1	32.65	8.69	29.2	165	194	P	V
	*	2437	80.6	-	-	68.46	32.65	8.69	29.2	165	194	A	V
		2493.12	52.41	-21.59	74	40.07	32.7	8.78	29.14	165	194	P	V
		2493.92	39.05	-14.95	54	26.71	32.7	8.78	29.14	165	194	A	V

802.11b CH 11 2462MHz	*	2462	104.43	-	-	92.25	32.67	8.69	29.18	169	191	P	H
	*	2462	102.35	-	-	90.17	32.67	8.69	29.18	169	191	A	H
		2493.12	53.47	-20.53	74	41.13	32.7	8.78	29.14	169	191	P	H
		2489.92	42.21	-11.79	54	29.87	32.7	8.78	29.14	169	191	A	H
	*	2462	100.43	-	-	88.25	32.67	8.69	29.18	175	268	P	V
	*	2462	98.34	-	-	86.16	32.67	8.69	29.18	175	268	A	V
		2486.12	52.73	-21.27	74	40.43	32.68	8.78	29.16	175	268	P	V
		2487.96	41.2	-12.8	54	28.86	32.7	8.78	29.14	175	268	A	V
Remark	1. All results are PASS against Peak and Average limit line. 2. Frequency range of Radiated Band Edge is from 2310-2390 MHz and 2483.5-2500 MHz. 3. Above only list the worst result in these frequency ranges.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		4824	41.46	-32.54	74	44.94	34.4	12.86	50.74	105	198	P	H
		4824	37	-37	74	40.48	34.4	12.86	50.74	105	198	P	V
802.11b CH 06 2437MHz		4874	40.41	-33.59	74	43.64	34.43	12.92	50.58	100	260	P	H
		7311	43.33	-30.67	74	43.28	36.22	14.71	50.88	174	300	P	H
		4874	37.13	-36.87	74	40.36	34.43	12.92	50.58	100	260	P	V
		7311	44.68	-29.32	74	44.63	36.22	14.71	50.88	174	300	P	V
802.11b CH 11 2462MHz		4924	42.84	-31.16	74	45.76	34.46	13.04	50.42	146	347	P	H
		7386	41.23	-32.77	74	41.1	36.26	14.75	50.88	145	274	P	H
		4924	38.78	-35.22	74	41.7	34.46	13.04	50.42	146	347	P	V
		7386	42.88	-31.12	74	42.75	36.26	14.75	50.88	145	274	P	V

Remark
1. Other harmonics are lower than background noise.
2. Average measurement was not performed if peak level went lower than the average limit.
3. 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		2389.74	66.95	-7.05	74	55.01	32.6	8.6	29.26	100	199	P	H
		2389.92	51.25	-2.75	54	39.31	32.6	8.6	29.26	100	199	A	H
	*	2412	107.25	-	-	95.28	32.61	8.6	29.24	100	199	P	H
	*	2412	99.51	-	-	87.54	32.61	8.6	29.24	100	199	A	H
		2389.83	63.09	-10.91	74	51.15	32.6	8.6	29.26	187	271	P	V
		2389.92	49.25	-4.75	54	37.31	32.6	8.6	29.26	187	271	A	V
	*	2412	103.09	-	-	91.12	32.61	8.6	29.24	187	271	P	V
	*	2412	95.45	-	-	83.48	32.61	8.6	29.24	187	271	A	V
802.11g CH 06 2437MHz		2389.74	53.53	-20.47	74	41.59	32.6	8.6	29.26	119	190	P	H
		2383.53	42.78	-11.22	54	30.91	32.58	8.51	29.22	119	190	A	H
	*	2437	106.41	-	-	94.27	32.65	8.69	29.2	119	190	P	H
	*	2437	98.56	-	-	86.42	32.65	8.69	29.2	119	190	A	H
		2492.36	54.83	-19.17	74	42.49	32.7	8.78	29.14	119	190	P	H
		2487.92	44.22	-9.78	54	31.88	32.7	8.78	29.14	119	190	A	H
		2380.83	51.1	-22.9	74	39.23	32.58	8.51	29.22	151	230	P	V
		2387.49	40.86	-13.14	54	28.92	32.6	8.6	29.26	151	230	A	V
	*	2437	100.5	-	-	88.36	32.65	8.69	29.2	151	230	P	V
	*	2437	92.27	-	-	80.13	32.65	8.69	29.2	151	230	A	V
		2492.64	50.96	-23.04	74	38.62	32.7	8.78	29.14	151	230	P	V
		2498.64	40.01	-13.99	54	27.67	32.7	8.78	29.14	151	230	A	V

802.11g CH 11 2462MHz	*	2462	107.49	-	-	95.31	32.67	8.69	29.18	117	190	P	H
	*	2462	99.79	-	-	87.61	32.67	8.69	29.18	117	190	A	H
		2483.6	63.24	-10.76	74	50.94	32.68	8.78	29.16	117	190	P	H
		2483.56	49.8	-4.2	54	37.5	32.68	8.78	29.16	117	190	A	H
	*	2462	100.32	-	-	88.14	32.67	8.69	29.18	100	0	P	V
	*	2462	93.07	-	-	80.89	32.67	8.69	29.18	100	0	A	V
		2483.8	56.65	-17.35	74	44.35	32.68	8.78	29.16	100	0	P	V
		2483.56	43.32	-10.68	54	31.02	32.68	8.78	29.16	100	0	A	V
Remark	1. All results are PASS against Peak and Average limit line. 2. Frequency range of Radiated Band Edge is from 2310-2390 MHz and 2483.5-2500 MHz. 3. Above only list the worst result in these frequency ranges.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		4824	37.6	-36.4	74	41.08	34.4	12.86	50.74	105	198	P	H
		4824	38.02	-35.98	74	41.5	34.4	12.86	50.74	105	198	P	V
802.11g CH 06 2437MHz		4874	37.77	-36.23	74	41	34.43	12.92	50.58	100	260	P	H
		7311	44.86	-29.14	74	44.81	36.22	14.71	50.88	174	300	P	H
		4874	37.14	-36.86	74	40.37	34.43	12.92	50.58	100	260	P	V
		7311	45.12	-28.88	74	45.07	36.22	14.71	50.88	174	300	P	V
802.11g CH 11 2462MHz		4924	39.18	-34.82	74	42.1	34.46	13.04	50.42	146	347	P	H
		7386	41.47	-32.53	74	41.34	36.26	14.75	50.88	145	274	P	H
		4924	37.79	-36.21	74	40.71	34.46	13.04	50.42	146	347	P	V
		7386	41.88	-32.12	74	41.75	36.26	14.75	50.88	145	274	P	V
Remark	1. Other harmonics are lower than background noise. 2. Average measurement was not performed if peak level went lower than the average limit. 3. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 01 2412MHz		2389.56	68.03	-5.97	74	56.09	32.6	8.6	29.26	100	197	P	H
		2389.83	51.55	-2.45	54	39.61	32.6	8.6	29.26	100	197	A	H
	*	2412	105.17	-	-	93.2	32.61	8.6	29.24	100	197	P	H
	*	2412	98.16	-	-	86.19	32.61	8.6	29.24	100	197	A	H
		2389.47	64.04	-9.96	74	52.1	32.6	8.6	29.26	161	143	P	V
		2389.83	48.25	-5.75	54	36.31	32.6	8.6	29.26	161	143	A	V
	*	2412	104.13	-	-	92.16	32.61	8.6	29.24	161	143	P	V
	*	2412	96.21	-	-	84.24	32.61	8.6	29.24	161	143	A	V
802.11n HT20 CH 06 2437MHz		2381.64	54.79	-19.21	74	42.92	32.58	8.51	29.22	180	209	P	H
		2380.56	44.36	-9.64	54	32.49	32.58	8.51	29.22	180	209	A	H
	*	2437	106.2	-	-	94.06	32.65	8.69	29.2	180	209	P	H
	*	2437	98.8	-	-	86.66	32.65	8.69	29.2	180	209	A	H
		2483.56	54.37	-19.63	74	42.07	32.68	8.78	29.16	180	209	P	H
		2483.56	43.78	-10.22	54	31.48	32.68	8.78	29.16	180	209	A	H
		2385.15	52.81	-21.19	74	40.85	32.58	8.6	29.22	100	154	P	V
		2381.73	41.79	-12.21	54	29.92	32.58	8.51	29.22	100	154	A	V
	*	2437	100.77	-	-	88.63	32.65	8.69	29.2	100	154	P	V
	*	2437	93.07	-	-	80.93	32.65	8.69	29.2	100	154	A	V
		2484.32	53.5	-20.5	74	41.2	32.68	8.78	29.16	100	154	P	V
		2484.44	42.37	-11.63	54	30.07	32.68	8.78	29.16	100	154	A	V

802.11n HT20 CH 11 2462MHz	*	2462	105.36	-	-	93.18	32.67	8.69	29.18	146	206	P	H
	*	2462	97.91	-	-	85.73	32.67	8.69	29.18	146	206	A	H
		2485.2	62.43	-11.57	74	50.13	32.68	8.78	29.16	146	206	P	H
		2483.56	48.59	-5.41	54	36.29	32.68	8.78	29.16	146	206	A	H
	*	2462	102.17	-	-	89.99	32.67	8.69	29.18	100	144	P	V
	*	2462	94.85	-	-	82.67	32.67	8.69	29.18	100	144	A	V
		2484.08	62.11	-11.89	74	49.81	32.68	8.78	29.16	100	144	P	V
		2483.52	46.71	-7.29	54	34.41	32.68	8.78	29.16	100	144	A	V
Remark	1. All results are PASS against Peak and Average limit line. 2. Frequency range of Radiated Band Edge is from 2310-2390 MHz and 2483.5-2500 MHz. 3. Above only list the worst result in these frequency ranges.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
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	37.91	-36.09	74	41.39	34.4	12.86	50.74	105	198	P	H
		4824	37.64	-36.36	74	41.12	34.4	12.86	50.74	105	198	P	V
802.11n HT20 CH 06 2437MHz		4874	37.57	-36.43	74	40.8	34.43	12.92	50.58	100	260	P	H
		7311	42.37	-31.63	74	42.32	36.22	14.71	50.88	174	300	P	H
		4874	36.89	-37.11	74	40.12	34.43	12.92	50.58	100	260	P	V
		7311	41.56	-32.44	74	41.51	36.22	14.71	50.88	174	300	P	V
802.11n HT20 CH 11 2462MHz		4924	41.03	-32.97	74	43.95	34.46	13.04	50.42	146	347	P	H
		7386	40.95	-33.05	74	40.82	36.26	14.75	50.88	145	274	P	H
		4924	38.46	-35.54	74	41.38	34.46	13.04	50.42	146	347	P	V
		7386	41.47	-32.53	74	41.34	36.26	14.75	50.88	145	274	P	V

Remark

1. Other harmonics are lower than background noise.
2. Average measurement was not performed if peak level went lower than the average limit.
3. All results are PASS against Peak and Average limit line.

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 03 2422MHz		2388.21	69.2	-4.8	74	57.26	32.6	8.6	29.26	100	334	P	H
		2389.56	51.55	-2.45	54	39.61	32.6	8.6	29.26	100	334	A	H
	*	2422	99.39	-	-	87.38	32.63	8.6	29.22	100	334	P	H
	*	2422	91.2	-	-	79.19	32.63	8.6	29.22	100	334	A	H
		2488.32	52.83	-21.17	74	40.49	32.7	8.78	29.14	100	334	P	H
		2492	42.49	-11.51	54	30.15	32.7	8.78	29.14	100	334	A	H
		2388.03	63.55	-10.45	74	51.61	32.6	8.6	29.26	200	263	P	V
		2384.43	46.82	-7.18	54	34.95	32.58	8.51	29.22	200	263	A	V
	*	2422	98.52	-	-	86.51	32.63	8.6	29.22	200	263	P	V
	*	2422	90.9	-	-	78.89	32.63	8.6	29.22	200	263	A	V
		2490.08	53.49	-20.51	74	41.15	32.7	8.78	29.14	200	263	P	V
		2494.24	42.89	-11.11	54	30.55	32.7	8.78	29.14	200	263	A	V
802.11n HT40 CH 06 2437MHz		2371.56	51.32	-22.68	74	39.45	32.58	8.51	29.22	169	264	P	H
		2377.32	41.51	-12.49	54	29.64	32.58	8.51	29.22	169	264	A	H
	*	2437	89.91	-	-	77.77	32.65	8.69	29.2	169	264	P	H
	*	2437	82.45	-	-	70.31	32.65	8.69	29.2	169	264	A	H
		2496.16	51.85	-22.15	74	39.51	32.7	8.78	29.14	169	264	P	H
		2486.64	41.81	-12.19	54	29.51	32.68	8.78	29.16	169	264	A	H
		2315.22	52.22	-21.78	74	40.35	32.51	8.43	29.07	171	182	P	V
		2360.94	41.41	-12.59	54	29.52	32.56	8.51	29.18	171	182	A	V
	*	2437	88.97	-	-	76.83	32.65	8.69	29.2	171	182	P	V
	*	2437	81.42	-	-	69.28	32.65	8.69	29.2	171	182	A	V
		2493.96	51.68	-22.32	74	39.34	32.7	8.78	29.14	171	182	P	V
		2487.84	41.89	-12.11	54	29.55	32.7	8.78	29.14	171	182	A	V

802.11n HT40 CH 09 2452MHz		2388.12	53.29	-20.71	74	41.35	32.6	8.6	29.26	169	219	P	H
		2388.03	43.35	-10.65	54	31.41	32.6	8.6	29.26	169	219	A	H
	*	2452	100.38	-	-	88.24	32.65	8.69	29.2	169	219	P	H
	*	2452	92.1	-	-	79.96	32.65	8.69	29.2	169	219	A	H
		2485.04	67.48	-6.52	74	55.18	32.68	8.78	29.16	169	219	P	H
		2484.56	48.38	-5.62	54	36.08	32.68	8.78	29.16	169	219	A	H
		2375.7	52.57	-21.43	74	40.7	32.58	8.51	29.22	174	252	P	V
		2375.79	42.34	-11.66	54	30.47	32.58	8.51	29.22	174	252	A	V
	*	2452	98.86	-	-	86.72	32.65	8.69	29.2	174	252	P	V
	*	2452	90.95	-	-	78.81	32.65	8.69	29.2	174	252	A	V
		2484.8	65.54	-8.46	74	53.24	32.68	8.78	29.16	174	252	P	V
		2485.56	46.3	-7.7	54	34	32.68	8.78	29.16	174	252	A	V
Remark	1. All results are PASS against Peak and Average limit line. 2. Frequency range of Radiated Band Edge is from 2310-2390 MHz and 2483.5-2500 MHz. 3. Above only list the worst result in these frequency ranges.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 03 2422MHz		4844	39.1	-34.9	74	42.46	34.41	12.92	50.69	100	360	P	H
		7266	42.78	-31.22	74	42.75	36.21	14.7	50.88	200	360	P	H
		4844	39.32	-34.68	74	42.68	34.41	12.92	50.69	100	360	P	V
		7266	43.33	-30.67	74	43.3	36.21	14.7	50.88	200	360	P	V
802.11n HT40 CH 06 2437MHz		4874	38.4	-35.6	74	41.63	34.43	12.92	50.58	100	163	P	H
		7311	41.95	-32.05	74	41.9	36.22	14.71	50.88	120	360	P	H
		4874	37.7	-36.3	74	40.93	34.43	12.92	50.58	100	163	P	V
		7311	41.75	-32.25	74	41.7	36.22	14.71	50.88	120	360	P	V
802.11n HT40 CH 09 2452MHz		4904	37.94	-36.06	74	40.98	34.45	12.98	50.47	129	360	P	H
		7356	42.73	-31.27	74	42.64	36.24	14.73	50.88	121	320	P	H
		4844	39.61	-34.39	74	42.97	34.41	12.92	50.69	100	360	P	V
		7266	42.15	-31.85	74	42.12	36.21	14.7	50.88	200	360	P	V

Remark

1. Other harmonics are lower than background noise.
2. Average measurement was not performed if peak level went lower than the average limit.
3. All results are PASS against Peak and Average limit line.

15C Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (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 HT40 LF		102.75	20.92	-22.58	43.5	38.67	11.44	1.57	30.76	-	-	P	H
		254.07	23.65	-22.35	46	39.59	12.12	2.5	30.56	-	-	P	H
		317.12	23.91	-22.09	46	38.18	13.35	2.81	30.43	-	-	P	H
		593.57	24.87	-21.13	46	32.26	18.41	3.94	29.74	-	-	P	H
		864.2	28.73	-17.27	46	32.17	20.8	4.83	29.07	-	-	P	H
		944.71	28.95	-17.05	46	31.54	21.15	5.01	28.75	100	230	P	H
		37.76	24.41	-15.59	40	39.92	14.3	0.94	30.75	100	263	P	V
		62.98	22.03	-17.97	40	46.94	4.65	1.21	30.77	-	-	P	V
		250.19	19.85	-26.15	46	36.13	11.8	2.48	30.56	-	-	P	V
		413.15	22.45	-23.55	46	33.25	16.25	3.23	30.28	-	-	P	V
		847.71	28.01	-17.99	46	31.71	20.68	4.75	29.13	-	-	P	V
		967.02	28.66	-25.34	54	30.95	21.3	5.1	28.69	-	-	P	V
Remark	1. 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 Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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