FCC RF Test Report

APPLICANT	:	**Texas Instruments Incorporated**
EQUIPMENT	:	**WiFi and Bluetooth Module**
BRAND NAME	:	**Texas Instruments**
MODEL NAME	:	**WL18MODGI**
FCC ID	:	**Z64-WL18DBMOD**
STANDARD	:	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	:	**(DTS) Digital Transmission System**

The product was received on Oct. 09, 2014 and testing was completed on Dec. 12, 2014. We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL INC.
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APPENDIX A. TEST RESULT OF RADIATED TEST RESULTS

APPENDIX B. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4O0971C	Rev. 01	Initial issue of report	Dec. 19, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	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)	Band Edges and Spurious Emission in the Restricted Band	15.209(a) & 15.247(d)	Pass	Under limit 0.31 dB at 2483.840 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 15.10 dB at 0.150 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Texas Instruments Incorporated
12500 TI Boulevard, M/S 8751, Dallas, TX 75243, USA

1.2 Manufacturer

Jorjin Technologies Inc
17F, No. 239, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	WiFi and Bluetooth Module
Brand Name	Texas Instruments
Model Name	WL18MODGI
FCC ID	Z64-WL18DBMOD
EUT supports Radios application	WLAN 11a/b/g/n HT20/HT40 Bluetooth v4.0 EDR/LE
HW Version	WG7837-T0B
EUT Stage	Identical Prototype

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

1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz
Maximum Output Power to antenna	**<Ant. 1>** 802.11b : 18.11 dBm (0.0647 W) 802.11g : 20.62 dBm (0.1153 W) 802.11n HT20 : 20.56 dBm (0.1138 W) 802.11n HT40 : 20.10 dBm (0.1023 W) **<MIMO Ant. 1+2 >** 802.11n HT20 : 23.86 dBm (0.2432 W)
99% Occupied Bandwidth	802.11b : 14.75MHz 802.11g : 20.10MHz 802.11n HT20 : 19.70MHz 802.11n HT40 : 36.40MHz
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
Antenna Function for Transmitter	

	Ant. 1	Ant. 2
802.11 b	V	-
802.11 g	V	-
802.11 n SISO	V	-
802.11 n MIMO	V	V

Note: MIMO only support MCS 12 to MCS15.

Antenna Information			
Antenna Type	**Brand**	**2.4GHz~2.5GHz**	**4.9GHz~5.8GHz**
PCB	Ethertronics	-0.6	4.5
Dipole	LSR	2	2
PCB	Laird	2	4
Chip	Pulse	3.2	4.2
PIFA	LSR	2	3
Chip	TDK	2.4	3.96

1.5 Modification of EUT

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

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	**Sporton Site No.**		
	TH02-HY	CO05-HY	03CH07-HY

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
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- 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).

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

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

2.1 Carrier Frequency and Channel

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

2.2 Pre-Scanned RF Power

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

<Ant. 1>

802.11b			
Data Rate (MHz)	1M bps		
Channel	01	06	11
Frequency (MHz)	2412	2437	2462
Peak Power (dBm)	18.11	17.95	17.80

802.11g			
Data Rate (MHz)	6M bps		
Channel	01	06	11
Frequency (MHz)	2412	2437	2462
Peak Power (dBm)	19.99	20.62	19.82

2.4GHz 802.11n HT20			
Data Rate (MHz)	MCS0		
Channel	01	06	11
Frequency (MHz)	2412	2437	2462
Peak Power (dBm)	19.97	20.56	19.78

2.4GHz 802.11n HT40			
Data Rate (MHz)	MCS0		
Channel	03	06	09
Frequency (MHz)	2422	2437	2452
Peak Power (dBm)	19.07	20.10	19.29

MIMO <Ant. 1+2>

2.4GHz 802.11n HT20			
Data Rate (MHz)	MCS12		
Channel	01	06	11
Frequency (MHz)	2412	2437	2462
Peak Power (dBm)	23.75	23.86	23.37

Note: MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.

2.3 Test Mode

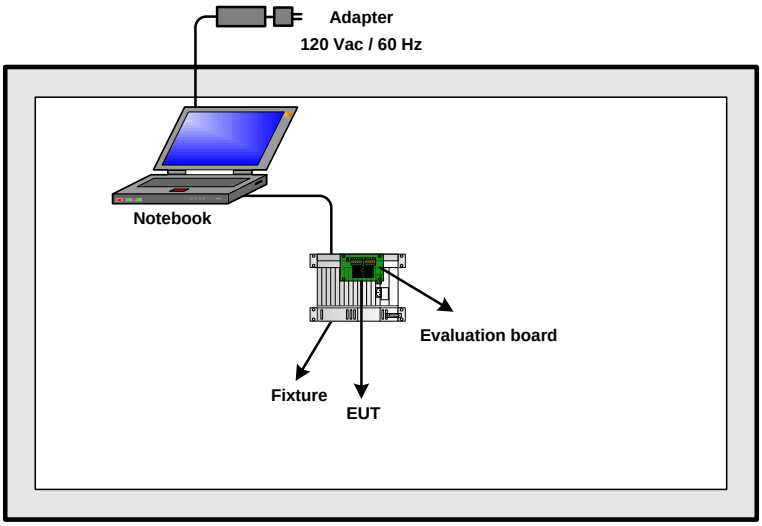
Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	6dB and 99% BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0 / MCS12	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 / MCS12	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 / MCS12	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 / MCS12	1/6/11
		802.11n HT40	MCS0	3/6/9
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0 / MCS12	1/6/11
		802.11n HT40	MCS0	3/6/9
	Radiated Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0 / MCS12	1/6/11
		802.11n HT40	MCS0	3/6/9

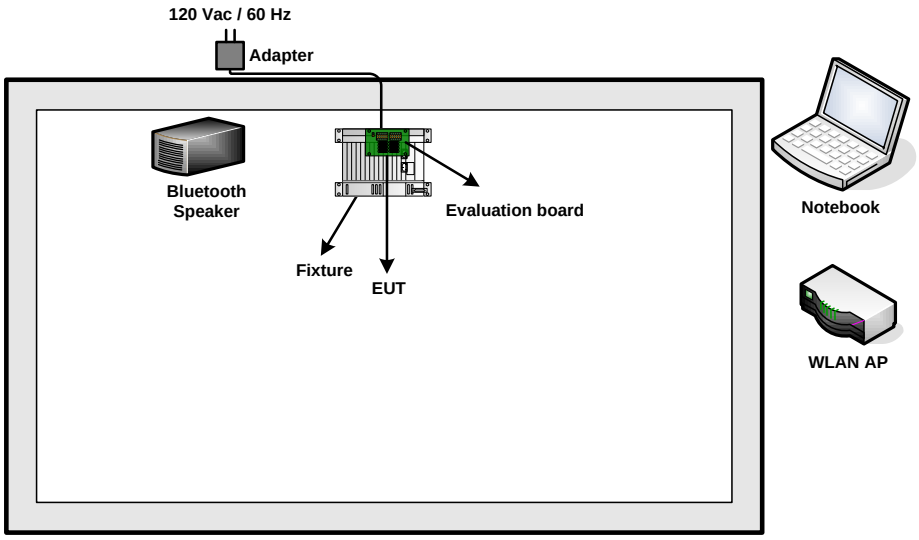
Test Cases	
AC Conducted Emission	Mode 1 : WLAN (2.4GHz) Link + Bluetooth Link + Adapter

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.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Notebook	Lenovo	M490S	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Speaker	MI	MDZ-03-AC	N/A	N/A	N/A
5.	Fixture	N/A	N/A	N/A	N/A	N/A
6.	Evaluation board	N/A	WG1300BE00	N/A	N/A	N/A

2.6 EUT Operation Test Setup

For WLAN function, programmed RF utility, “RTTT Tool” installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

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 4.2 dB and 10dB attenuator.

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

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

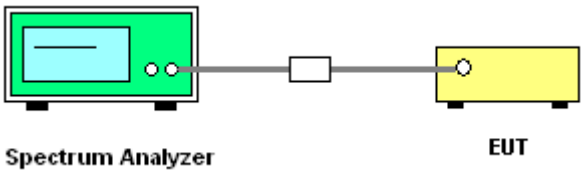
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance 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. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

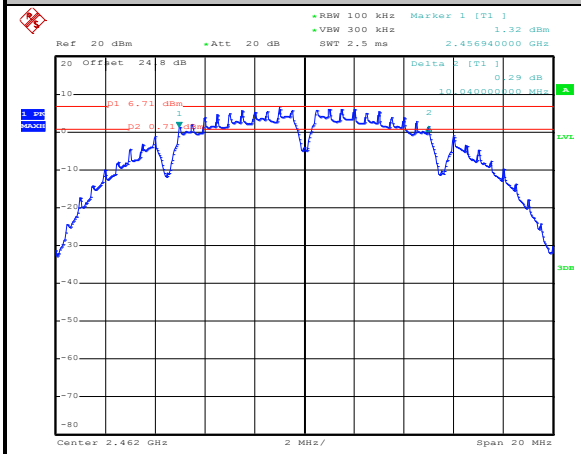
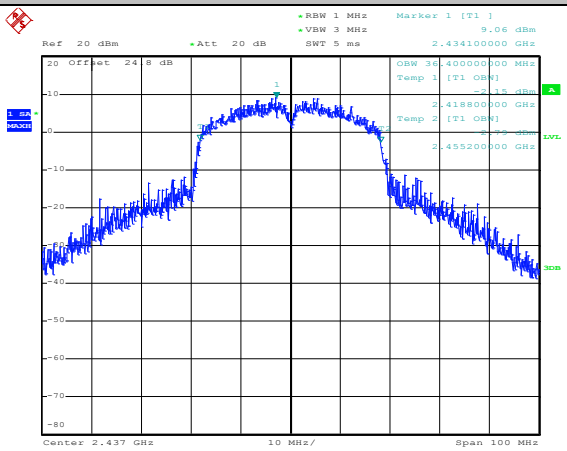
3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Test Band :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Alex Lee	Relative Humidity :	41~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	99% Bandwidth (MHz)		6dB Bandwidth (MHz)		6dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Ant. 1	Ant. 2	Ant. 1	Ant. 2		
11b	1Mbps	1	1	2412	14.70		10.08		0.5	Pass
11b	1Mbps	1	6	2437	14.70		10.08		0.5	Pass
11b	1Mbps	1	11	2462	14.75		10.04		0.5	Pass
11g	6Mbps	1	1	2412	16.80		15.12		0.5	Pass
11g	6Mbps	1	6	2437	20.10		15.12		0.5	Pass
11g	6Mbps	1	11	2462	16.90		15.12		0.5	Pass
HT20	MCS0	1	1	2412	17.95		15.12		0.5	Pass
HT20	MCS0	1	6	2437	19.70		15.12		0.5	Pass
HT20	MCS0	1	11	2462	17.95		15.12		0.5	Pass
HT40	MCS0	1	3	2422	35.60		32.64		0.5	Pass
HT40	MCS0	1	6	2437	36.40		32.64		0.5	Pass
HT40	MCS0	1	9	2452	35.90		32.64		0.5	Pass
HT20	MCS12	2	1	2412	17.95	17.95	15.16	15.12	0.5	Pass
HT20	MCS12	2	6	2437	18.45	18.25	15.12	15.20	0.5	Pass
HT20	MCS12	2	11	2462	18.05	18.05	15.12	15.12	0.5	Pass

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	
Date: 12.DEC.2014 00:38:07	Date: 12.DEC.2014 01:21:55

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

3.2 Peak Output Power Measurement

3.2.1 Limit of Peak Output Power

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

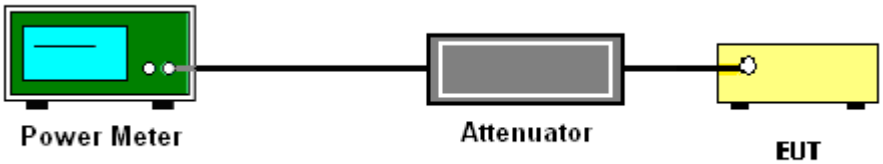
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance 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.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test Band :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Alex Lee	Relative Humidity :	41~54%

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Max. Limit (dBm)		DG (dBi)		Pass/Fail
					Ant. 1	Ant. 2	SUM	Ant. 1	Ant. 2	Ant. 1	Ant. 2	
11b	1Mbps	1	1	2412	18.11		-	30.00	30.00	3.20	3.20	Pass
11b	1Mbps	1	6	2437	17.95			30.00	30.00	3.20	3.20	Pass
11b	1Mbps	1	11	2462	17.80			30.00	30.00	3.20	3.20	Pass
11g	6Mbps	1	1	2412	19.99			30.00	30.00	3.20	3.20	Pass
11g	6Mbps	1	6	2437	20.62			30.00	30.00	3.20	3.20	Pass
11g	6Mbps	1	11	2462	19.82			30.00	30.00	3.20	3.20	Pass
HT20	MCS0	1	1	2412	19.97			30.00	30.00	3.20	3.20	Pass
HT20	MCS0	1	6	2437	20.56			30.00	30.00	3.20	3.20	Pass
HT20	MCS0	1	11	2462	19.78			30.00	30.00	3.20	3.20	Pass
HT40	MCS0	1	3	2422	19.07			30.00	30.00	3.20	3.20	Pass
HT40	MCS0	1	6	2437	20.10			30.00	30.00	3.20	3.20	Pass
HT40	MCS0	1	9	2452	19.29			30.00	30.00	3.20	3.20	Pass
HT20	MCS12	2	1	2412	19.64	21.62	23.75	30.00		3.20		Pass
HT20	MCS12	2	6	2437	20.05	21.53	23.86	30.00		3.20		Pass
HT20	MCS12	2	11	2462	19.43	21.13	23.37	30.00		3.20		Pass

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

3.2.6 Test Result of Average output Power (Reporting Only)

Test Band :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Alex Lee	Relative Humidity :	41~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant. 1	Ant. 2	Ant. 1	Ant. 2	Sum Power
11b	1Mbps	1	1	2412	3.91		16.11		-
11b	1Mbps	1	6	2437	3.91		15.97		
11b	1Mbps	1	11	2462	3.91		15.81		
11g	6Mbps	1	1	2412	4.84		12.15		
11g	6Mbps	1	6	2437	4.84		16.30		
11g	6Mbps	1	11	2462	4.84		11.92		
HT20	MCS0	1	1	2412	4.88		12.47		
HT20	MCS0	1	6	2437	4.88		15.75		
HT20	MCS0	1	11	2462	4.88		12.24		
HT40	MCS0	1	3	2422	5.11		10.20		
HT40	MCS0	1	6	2437	5.11		14.13		
HT40	MCS0	1	9	2452	5.11		10.58		
HT20	MCS12	2	1	2412	5.02	5.10	11.64	13.39	15.62
HT20	MCS12	2	6	2437	5.02	5.10	13.52	13.61	16.58
HT20	MCS12	2	11	2462	5.02	5.10	11.42	13.05	15.32

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

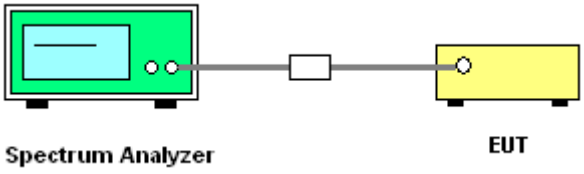
   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

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

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

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

3.3.4 Test Setup



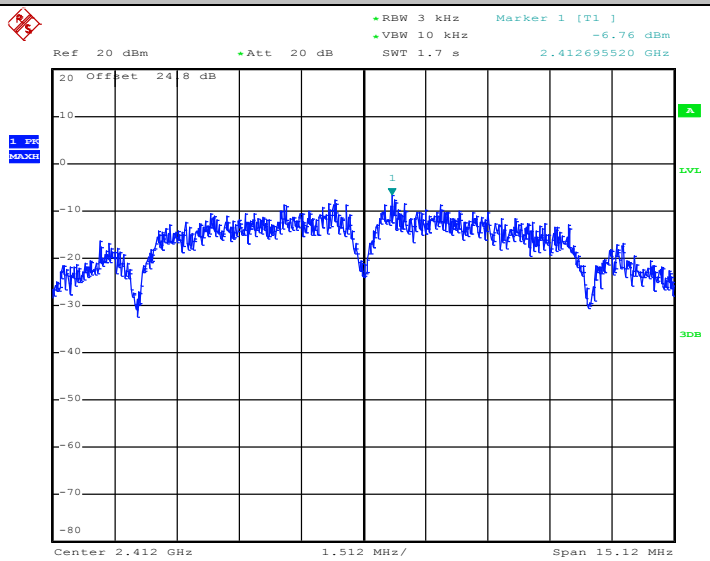
3.3.5 Test Result of Power Spectral Density

Test Band :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Alex Lee	Relative Humidity :	41~54%

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Peak Power Density (dBm/3kHz)			Max. Limit (dBm/3kHz)		DG (dBi)		Pass/Fail
					Ant. 1	Ant. 2	Worst +10log(2)	Ant. 1	Ant. 2	Ant. 1	Ant. 2	
11b	1Mbps	1	1	2412	-6.76		-	8.00	8.00	3.20	3.20	Pass
11b	1Mbps	1	6	2437	-7.25			8.00	8.00	3.20	3.20	Pass
11b	1Mbps	1	11	2462	-8.43			8.00	8.00	3.20	3.20	Pass
11g	6Mbps	1	1	2412	-12.86			8.00	8.00	3.20	3.20	Pass
11g	6Mbps	1	6	2437	-9.68			8.00	8.00	3.20	3.20	Pass
11g	6Mbps	1	11	2462	-12.82			8.00	8.00	3.20	3.20	Pass
HT20	MCS0	1	1	2412	-12.83			8.00	8.00	3.20	3.20	Pass
HT20	MCS0	1	6	2437	-9.35			8.00	8.00	3.20	3.20	Pass
HT20	MCS0	1	11	2462	-14.00			8.00	8.00	3.20	3.20	Pass
HT40	MCS0	1	3	2422	-18.52			8.00	8.00	3.20	3.20	Pass
HT40	MCS0	1	6	2437	-13.76			8.00	8.00	3.20	3.20	Pass
HT40	MCS0	1	9	2452	-17.61			8.00	8.00	3.20	3.20	Pass
HT20	MCS12	2	1	2412	-13.27	-12.11	-9.10	8.00		3.20		Pass
HT20	MCS12	2	6	2437	-11.46	-13.42	-8.45	8.00		3.20		Pass
HT20	MCS12	2	11	2462	-14.37	-12.49	-9.48	8.00		3.20		Pass

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

Worst Case Power Density (dBm/3kHz)



Date: 12.DEC.2014 00:27:28

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).

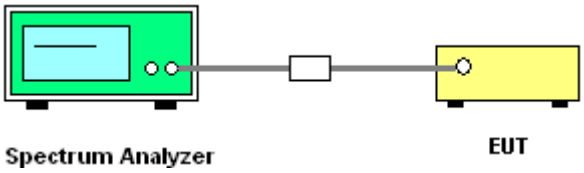
3.4.2 Measuring Instruments

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



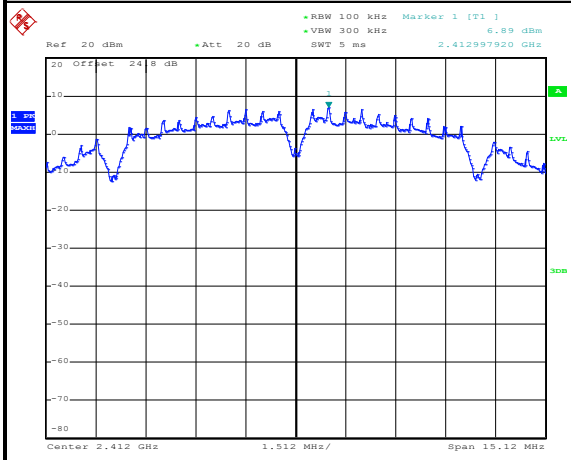
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Number of TX = 1, Ant. 1 (Measured)

Number of TX	1	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	41~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

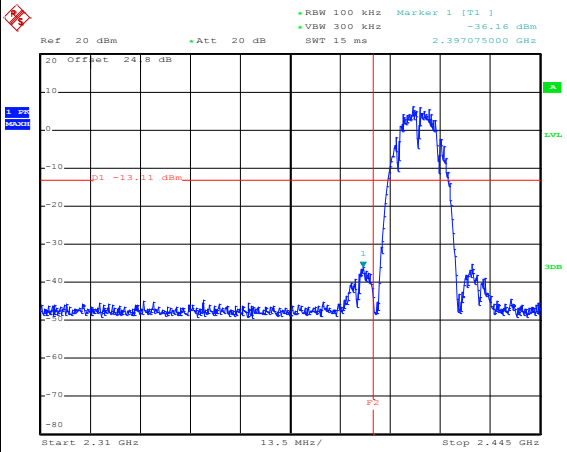
WLAN 802.11b Channel 01

100kHz PSD reference Level



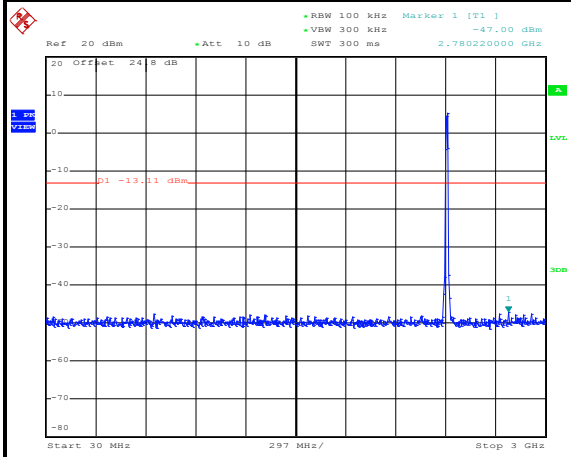
Date: 12.DEC.2014 00:27:52

Low Channel Plot



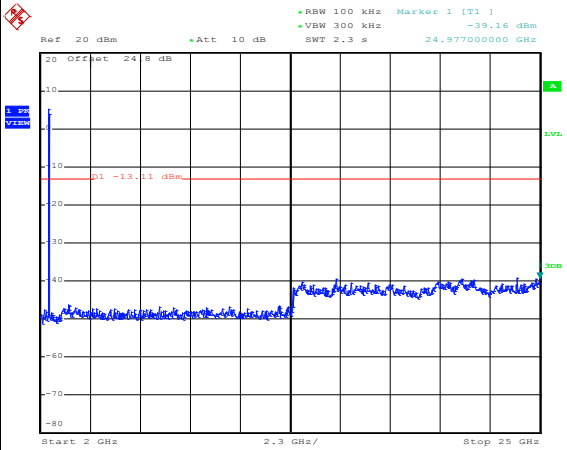
Date: 12.DEC.2014 00:28:14

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 00:28:36

Spurious Emission 2GHz~25GHz

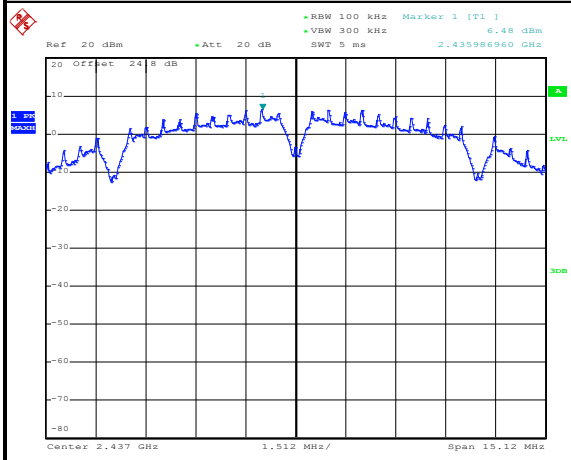


Date: 12.DEC.2014 00:28:54

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	41~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

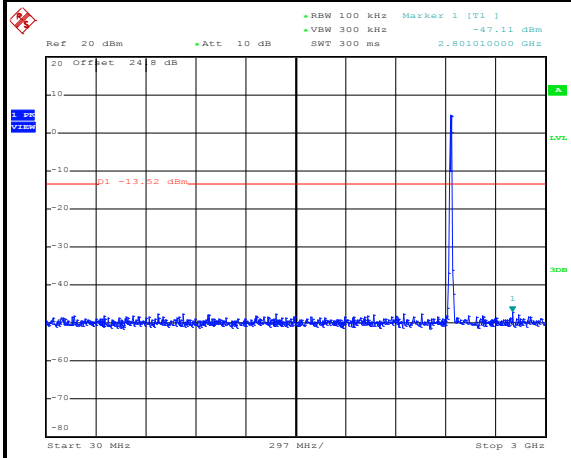
WLAN 802.11b Channel 06

100kHz PSD reference Level



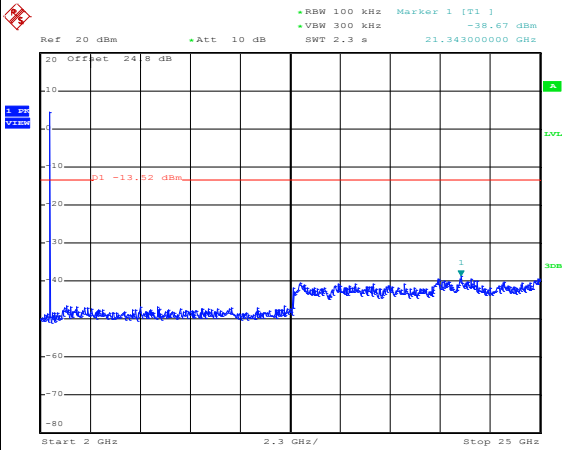
Date: 12.DEC.2014 00:35:39

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 00:36:04

Spurious Emission 2GHz~25GHz

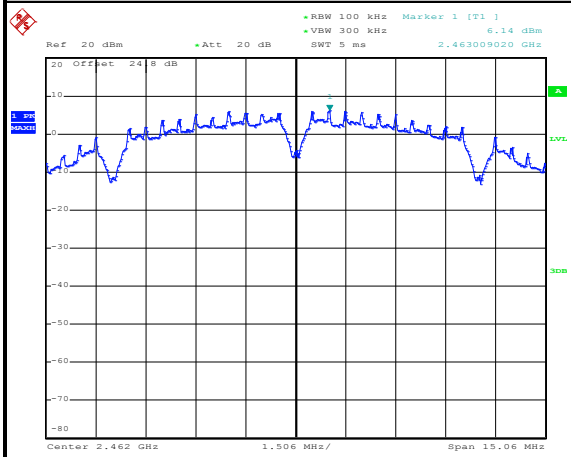


Date: 12.DEC.2014 00:36:22

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	41~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

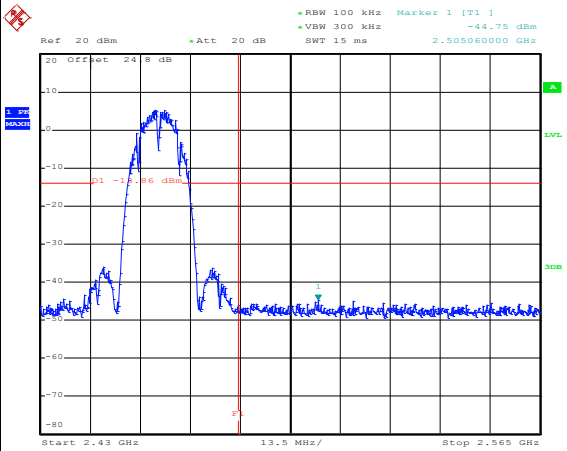
WLAN 802.11b Channel 11

100kHz PSD reference Level



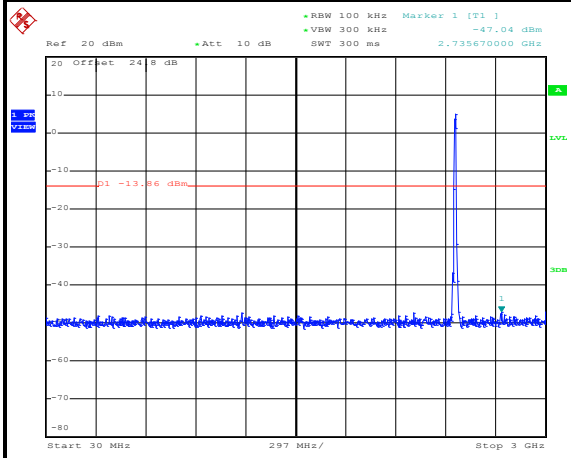
Date: 12.DEC.2014 00:38:52

High Channel Plot



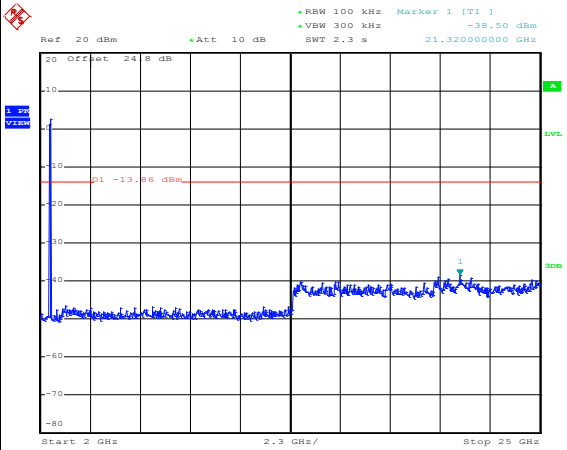
Date: 12.DEC.2014 00:39:11

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 00:39:49

Spurious Emission 2GHz~25GHz

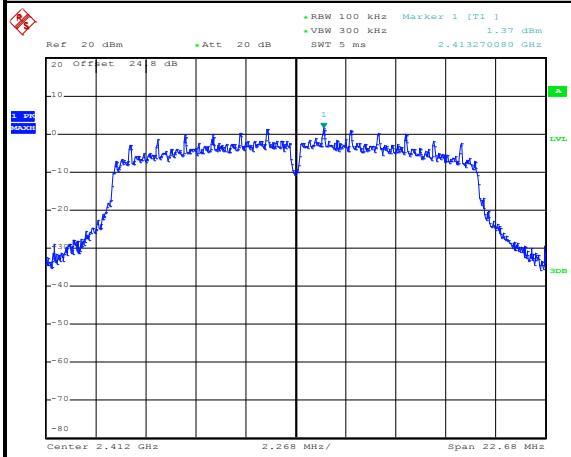


Date: 12.DEC.2014 00:40:07

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11g	**Temperature :**	21~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	41~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

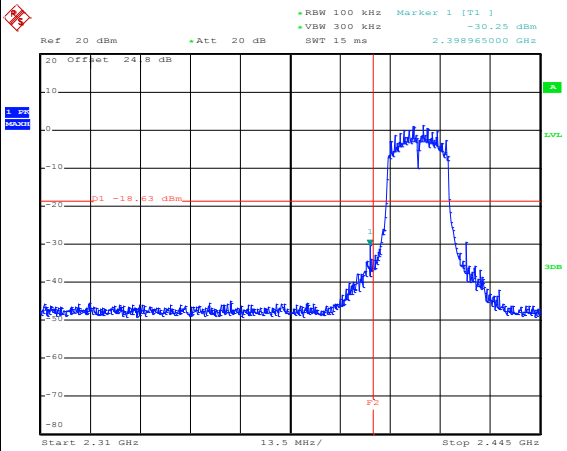
WLAN 802.11g Channel 01

100kHz PSD reference Level



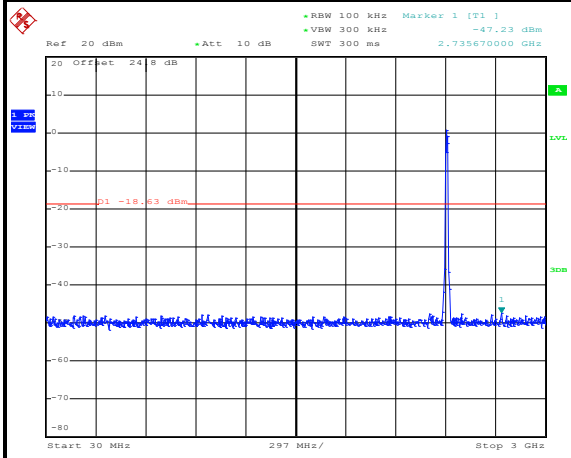
Date: 12.DEC.2014 00:52:02

Low Channel Plot



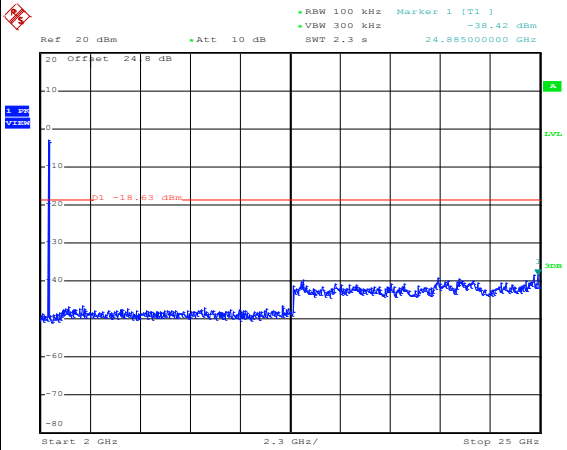
Date: 12.DEC.2014 00:52:19

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 00:52:40

Spurious Emission 2GHz~25GHz

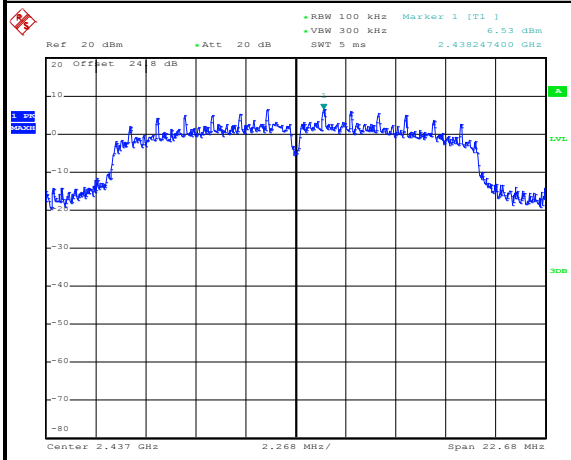


Date: 12.DEC.2014 00:52:58

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11g	**Temperature :**	21~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	41~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

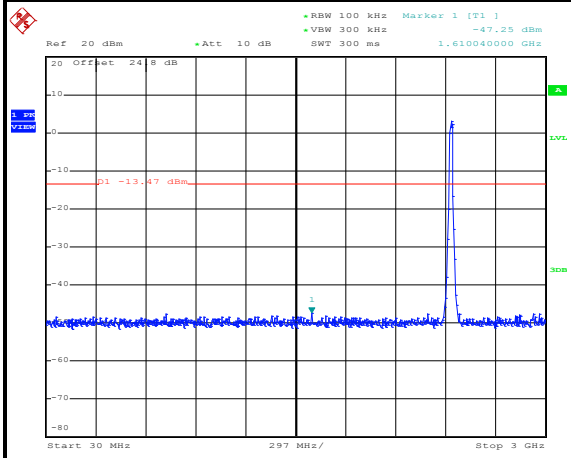
WLAN 802.11g Channel 06

100kHz PSD reference Level



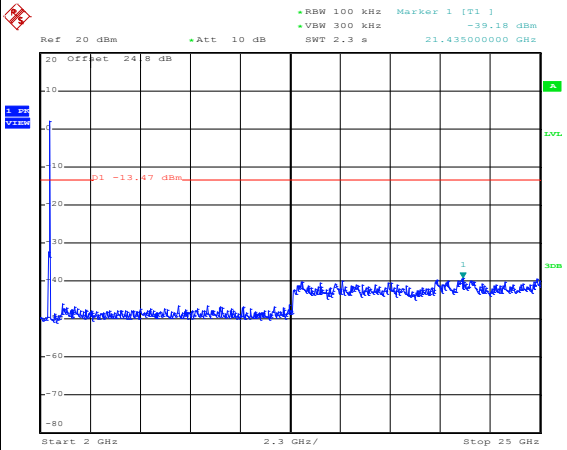
Date: 12.DEC.2014 00:48:29

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 00:48:51

Spurious Emission 2GHz~25GHz

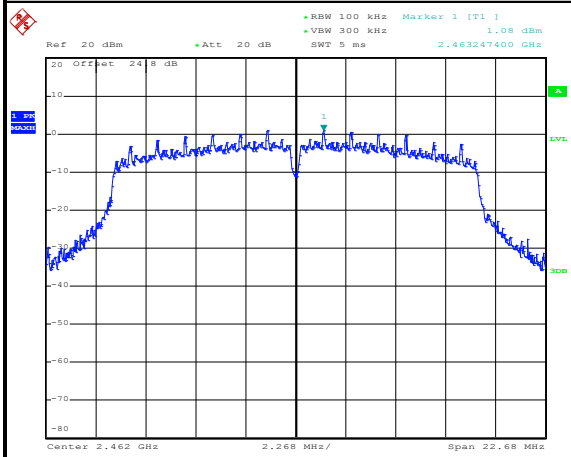


Date: 12.DEC.2014 00:49:09

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11g	**Temperature :**	21~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	41~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

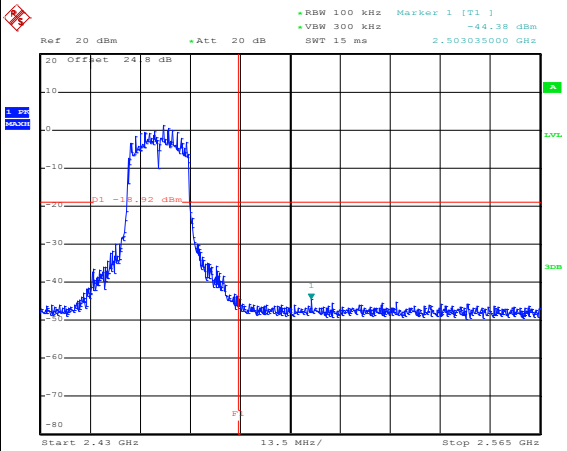
WLAN 802.11g Channel 11

100kHz PSD reference Level



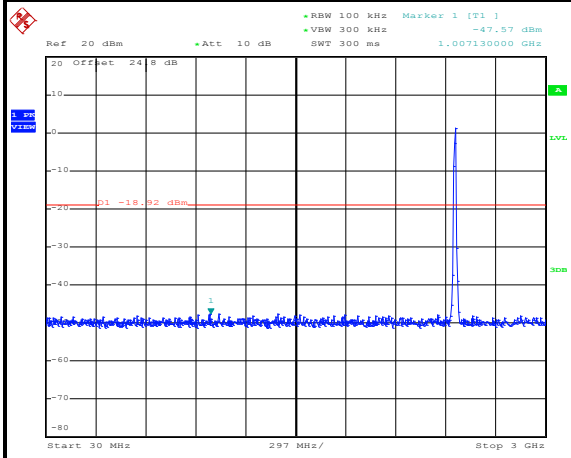
Date: 12.DEC.2014 00:55:52

High Channel Plot



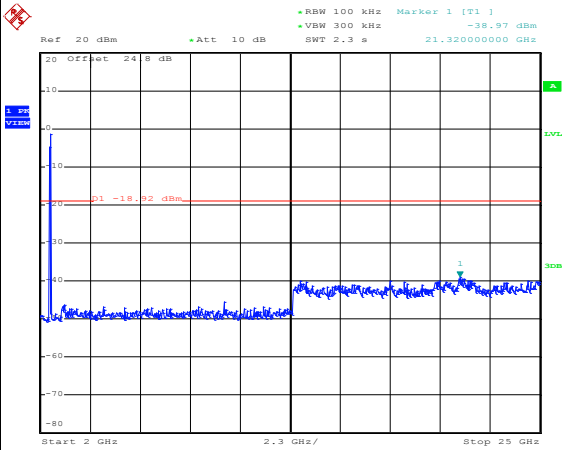
Date: 12.DEC.2014 00:56:09

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 00:56:31

Spurious Emission 2GHz~25GHz

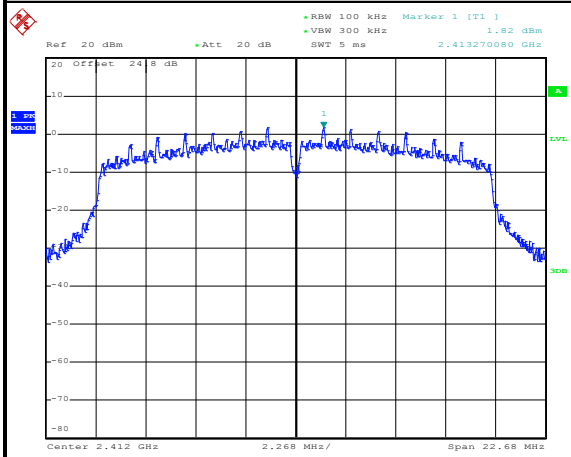


Date: 12.DEC.2014 00:56:49

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	41~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

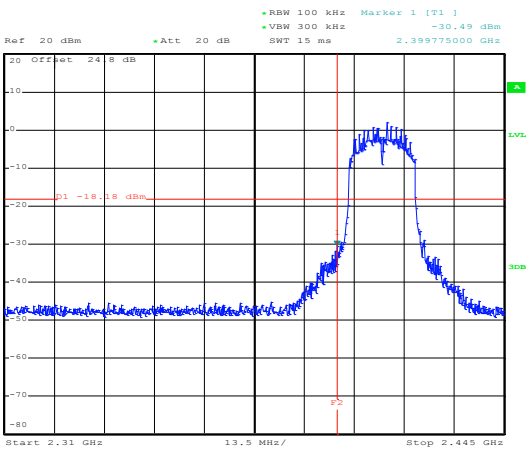
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



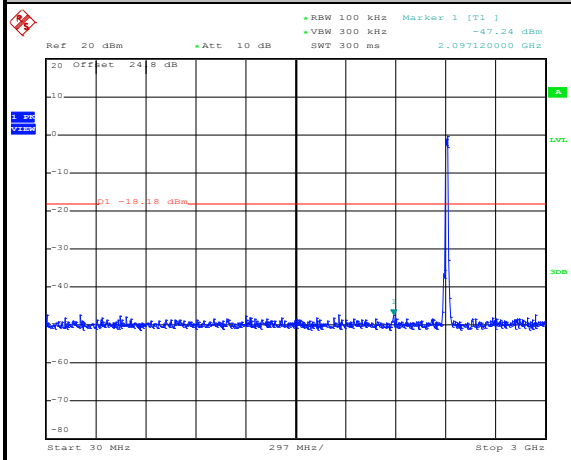
Date: 12.DEC.2014 01:08:57

Low Channel Plot



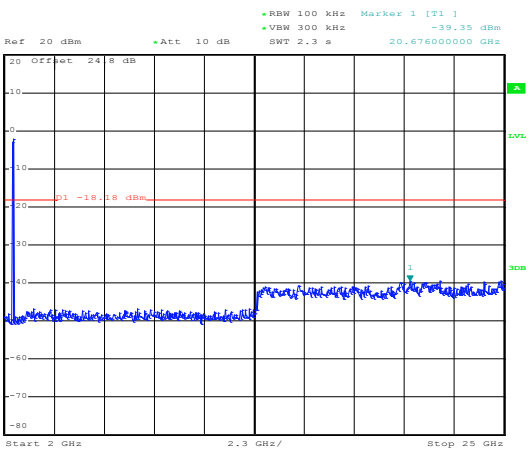
Date: 12.DEC.2014 01:09:19

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:09:42

Spurious Emission 2GHz~25GHz

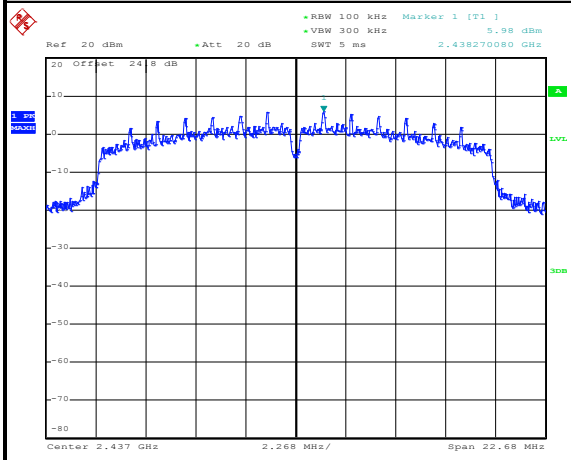


Date: 12.DEC.2014 01:10:00

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	41~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

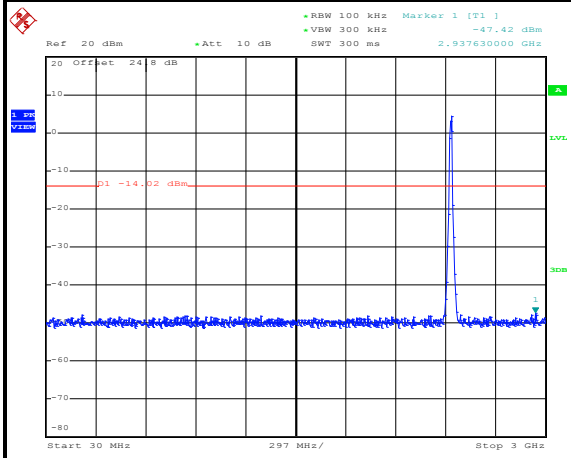
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



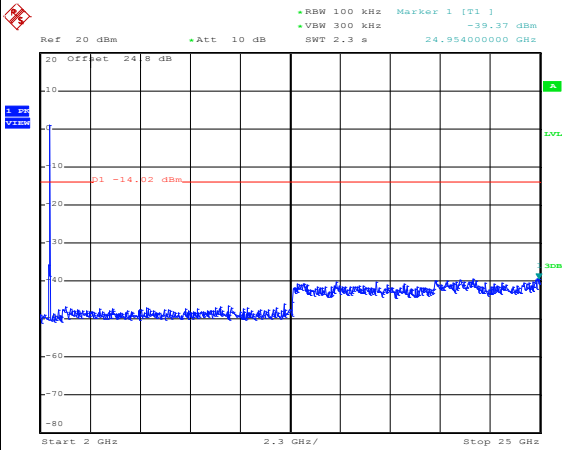
Date: 12.DEC.2014 01:05:14

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:11:55

Spurious Emission 2GHz~25GHz

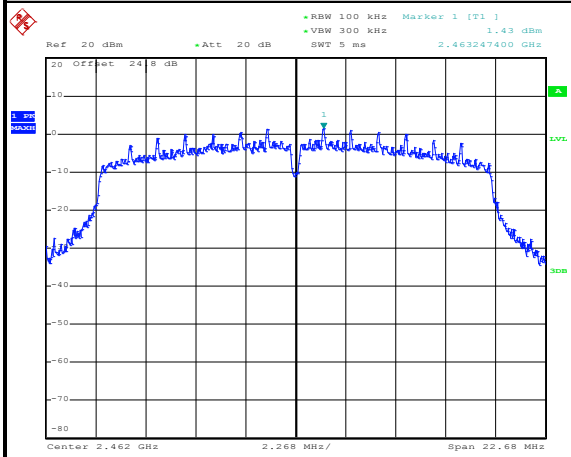


Date: 12.DEC.2014 01:12:13

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	41~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

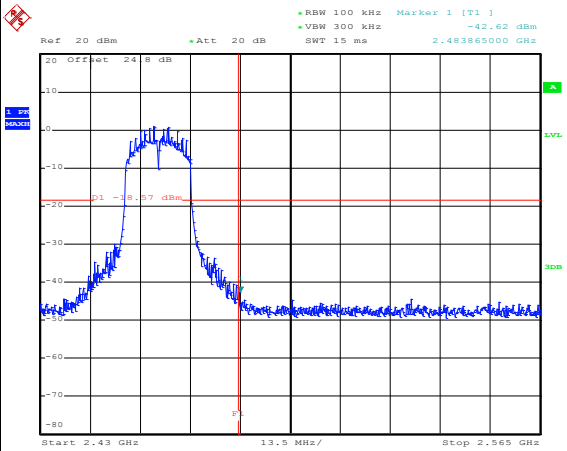
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



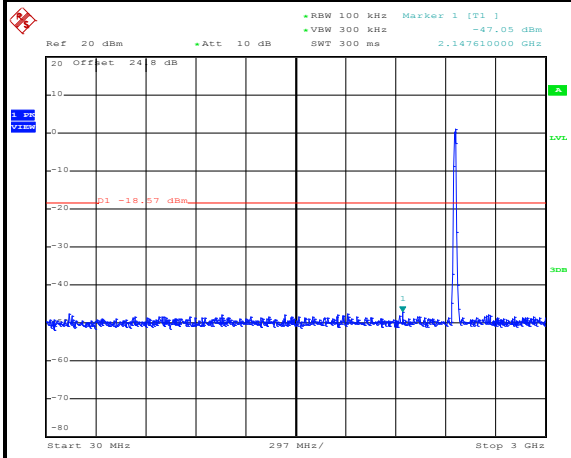
Date: 12.DEC.2014 01:01:07

High Channel Plot



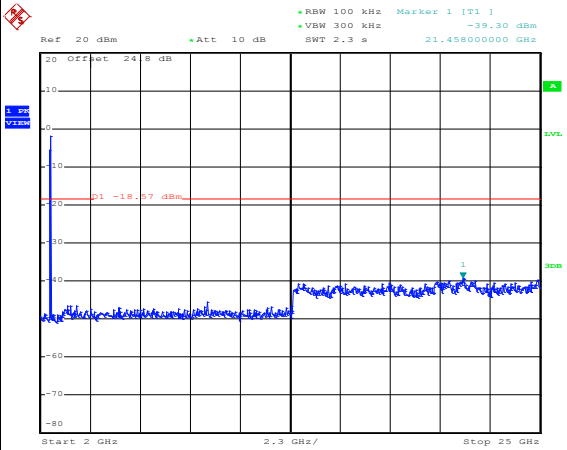
Date: 12.DEC.2014 01:01:31

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:02:13

Spurious Emission 2GHz~25GHz

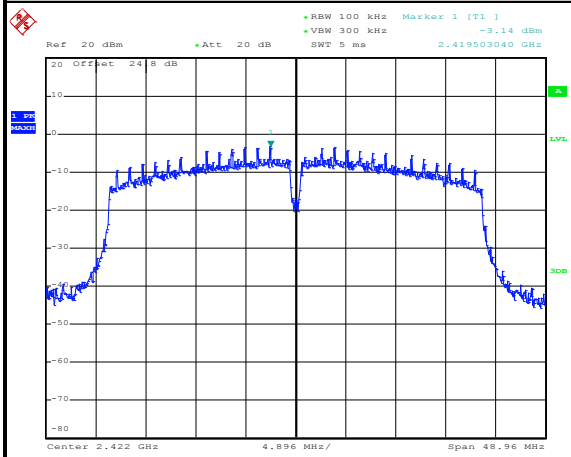


Date: 12.DEC.2014 01:02:37

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT40	**Temperature :**	21~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	41~54%
Test Channel :	03	**Test Engineer :**	Alex Lee

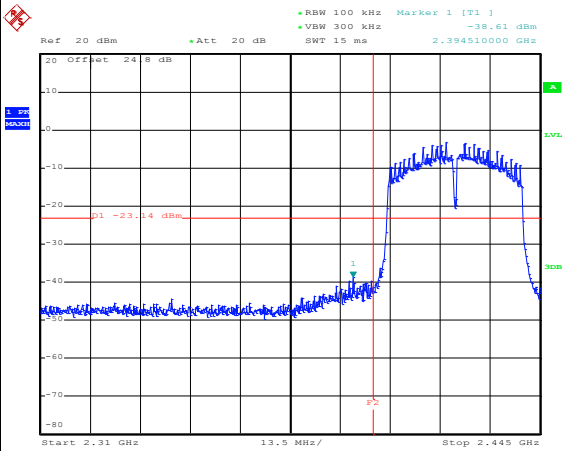
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



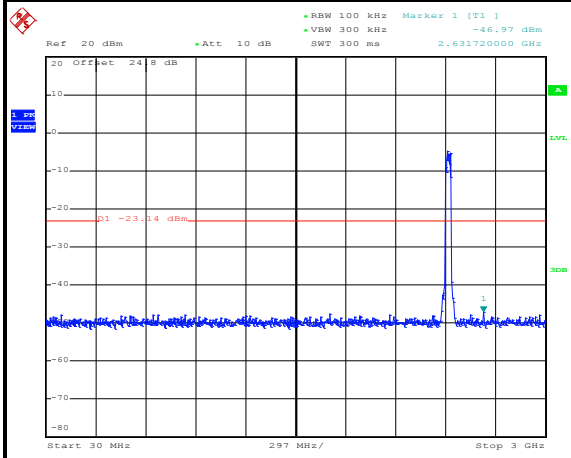
Date: 12.DEC.2014 01:30:52

Low Channel Plot



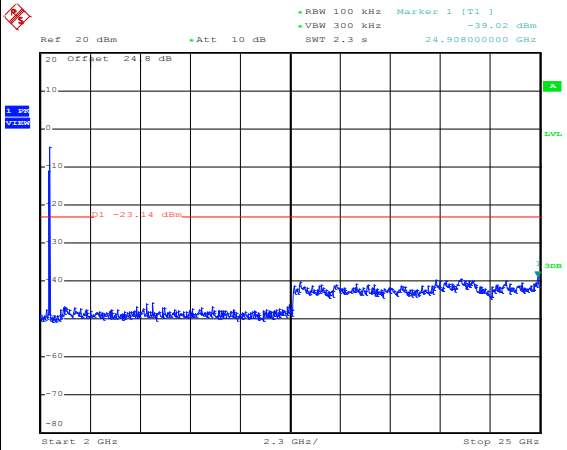
Date: 12.DEC.2014 01:31:11

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:31:36

Spurious Emission 2GHz~25GHz

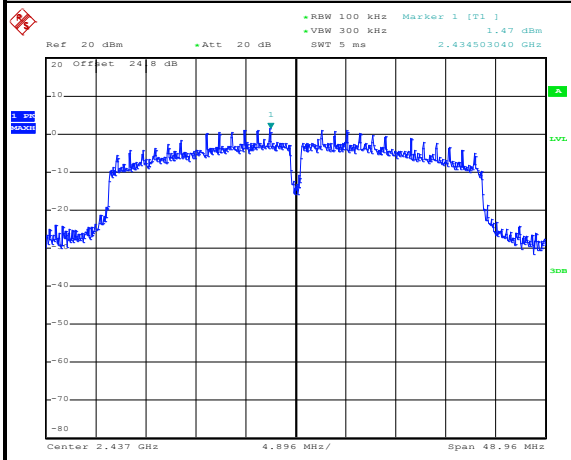


Date: 12.DEC.2014 01:31:54

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT40	**Temperature :**	21~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	41~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

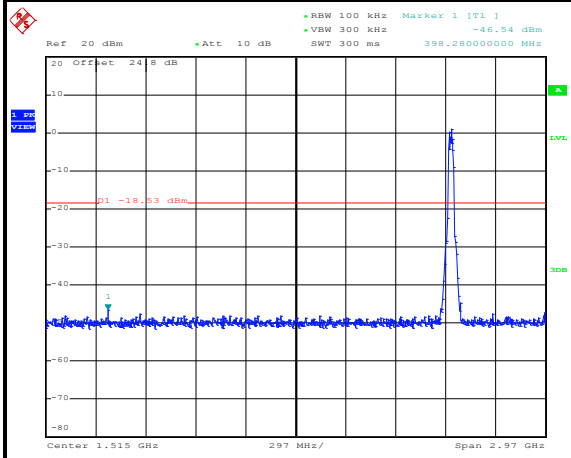
WLAN 802.11n HT40 Channel 06

100kHz PSD reference Level



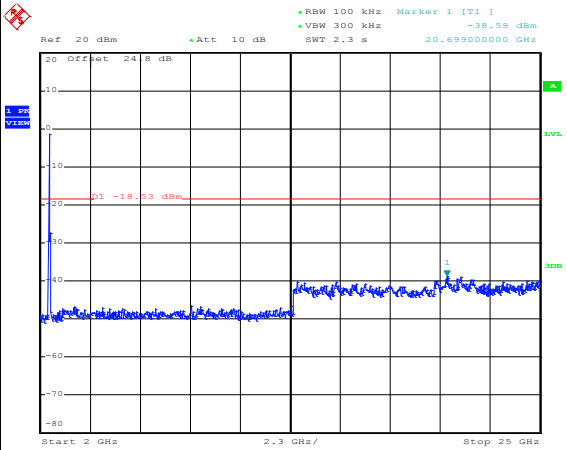
Date: 12.DEC.2014 01:20:57

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:27:49

Spurious Emission 2GHz~25GHz

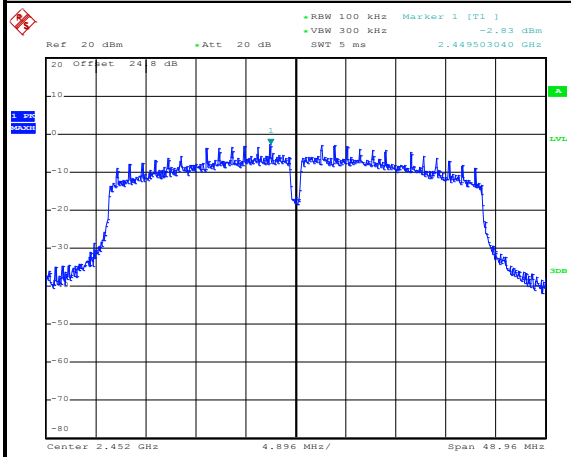


Date: 12.DEC.2014 01:28:07

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT40	**Temperature :**	21~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	41~54%
Test Channel :	09	**Test Engineer :**	Alex Lee

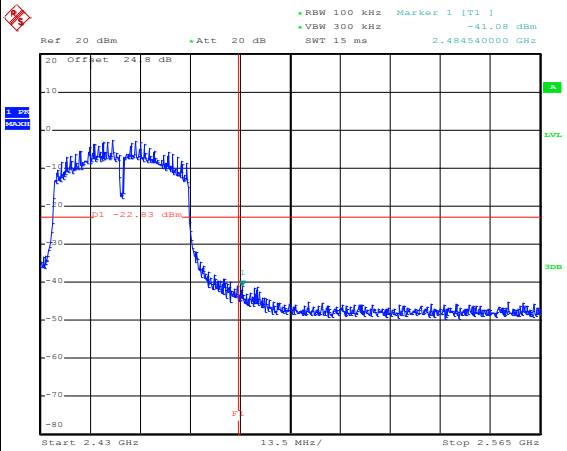
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



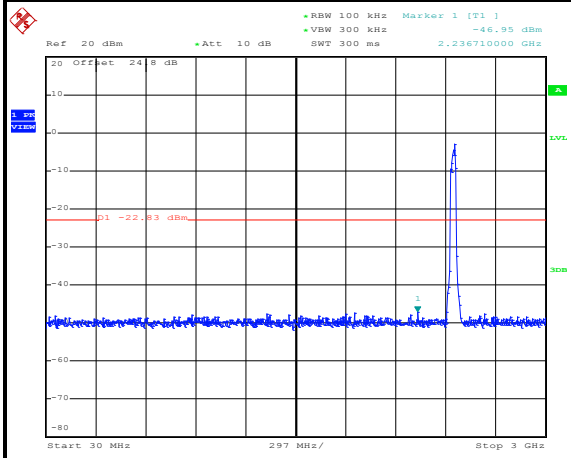
Date: 12.DEC.2014 01:24:26

High Channel Plot



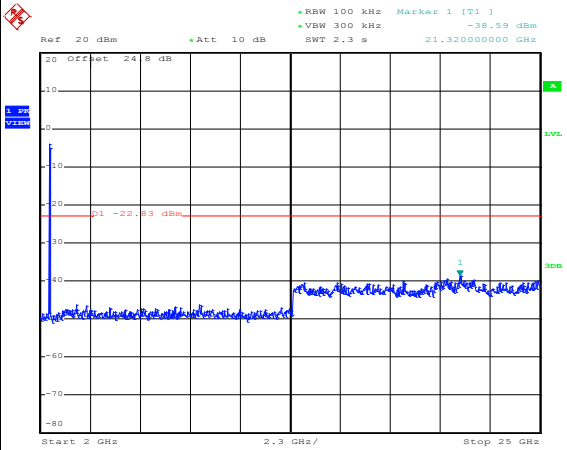
Date: 12.DEC.2014 01:24:48

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:25:15

Spurious Emission 2GHz~25GHz



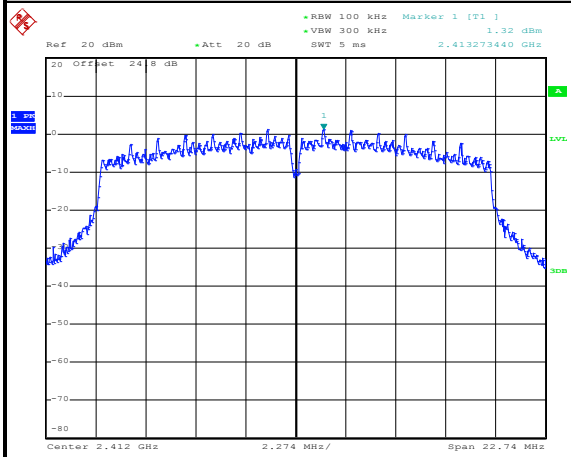
Date: 12.DEC.2014 01:25:33

Number of TX = 2, Ant. 1 (Measured)

Number of TX :	2	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	41~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

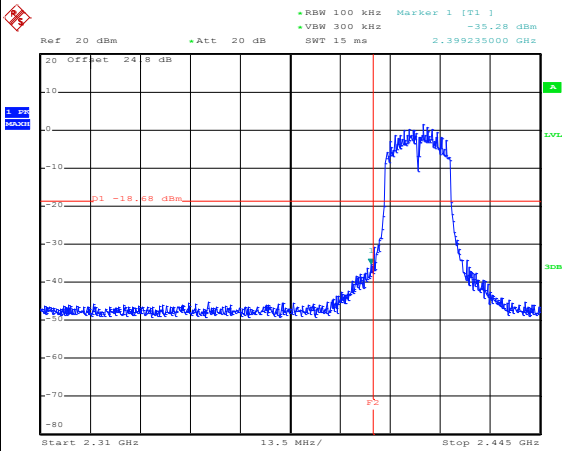
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



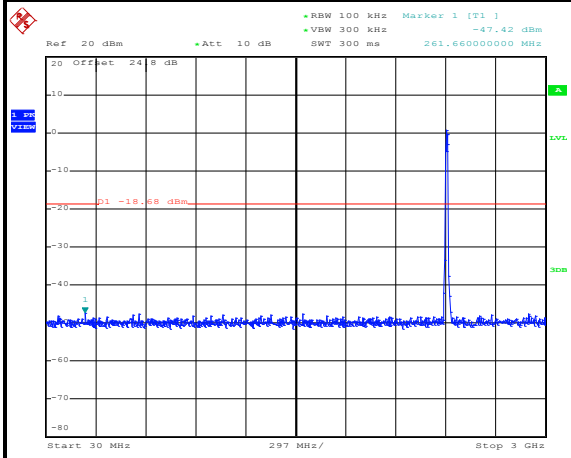
Date: 12.DEC.2014 01:50:42

Low Channel Plot



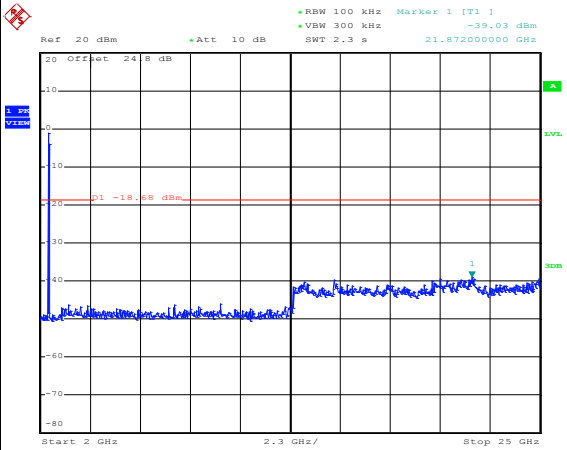
Date: 12.DEC.2014 01:50:59

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:51:22

Spurious Emission 2GHz~25GHz

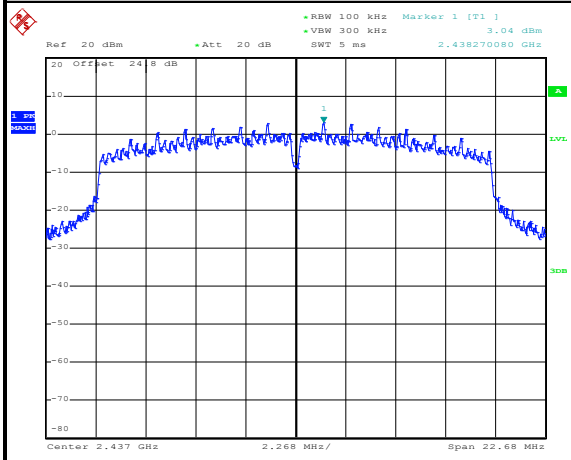


Date: 12.DEC.2014 01:51:40

Number of TX :	2	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	41~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

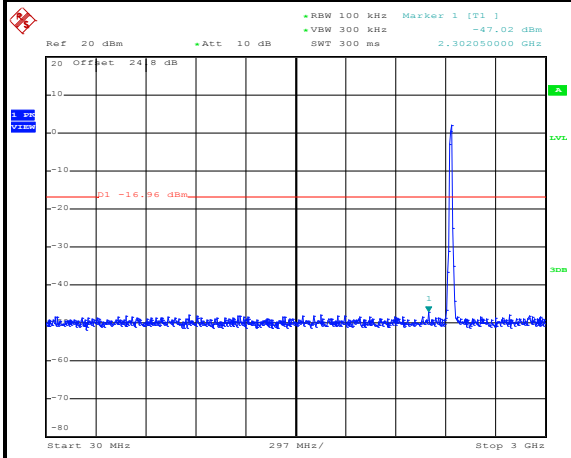
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



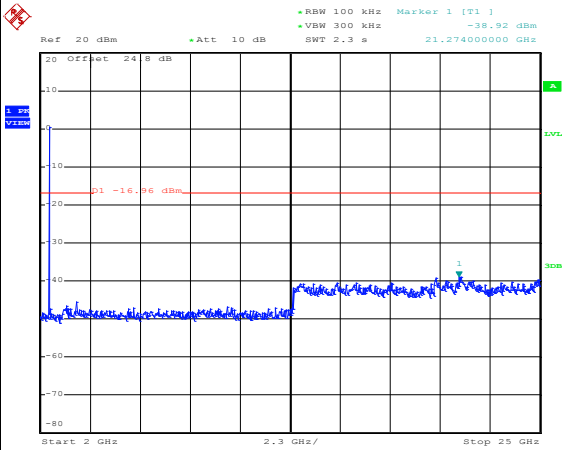
Date: 12.DEC.2014 01:36:21

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:36:44

Spurious Emission 2GHz~25GHz

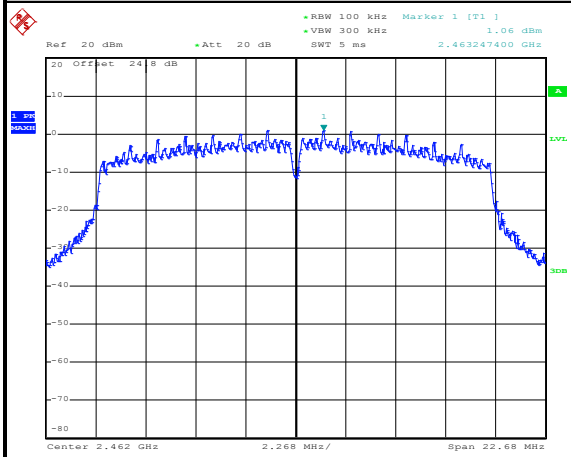


Date: 12.DEC.2014 01:37:02

Number of TX :	2	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	41~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

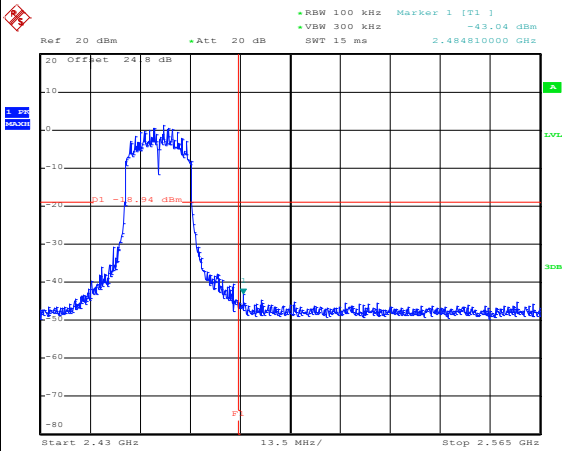
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



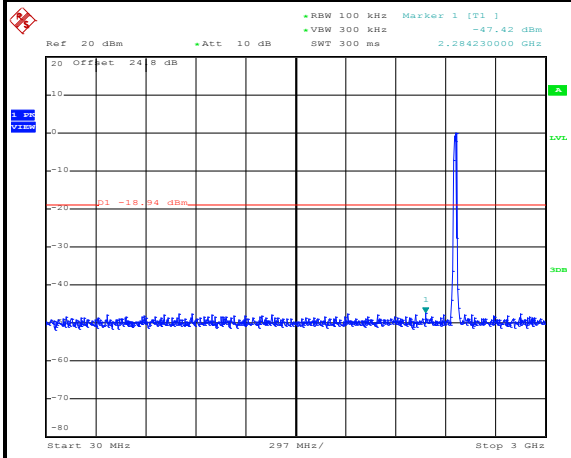
Date: 12.DEC.2014 01:54:05

High Channel Plot



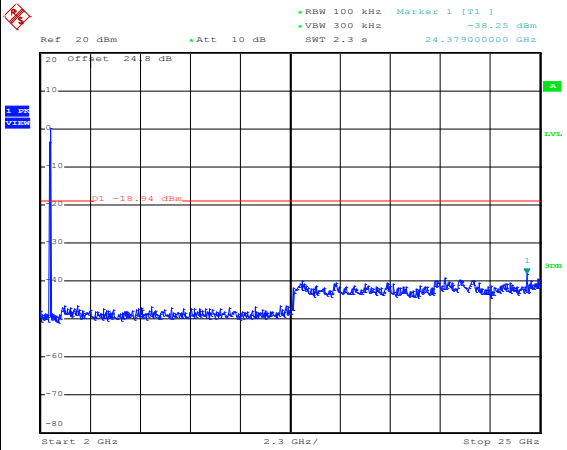
Date: 12.DEC.2014 01:54:24

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:54:46

Spurious Emission 2GHz~25GHz



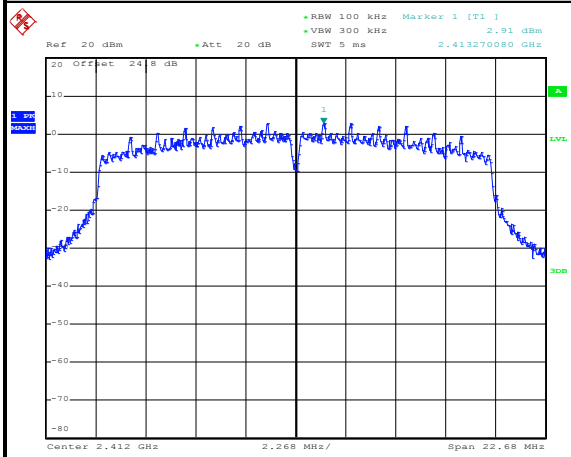
Date: 12.DEC.2014 01:55:04

Number of TX = 2, Ant. 2 (Measured)

Number of TX :	2	**Ant. :**	2
Test Mode :	802.11n HT20	**Temperature :**	21~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	41~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

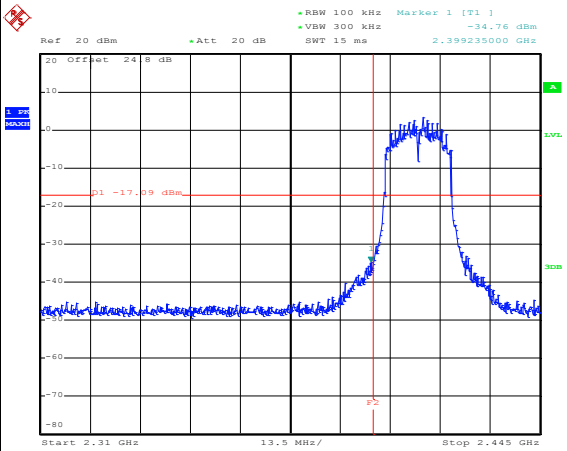
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



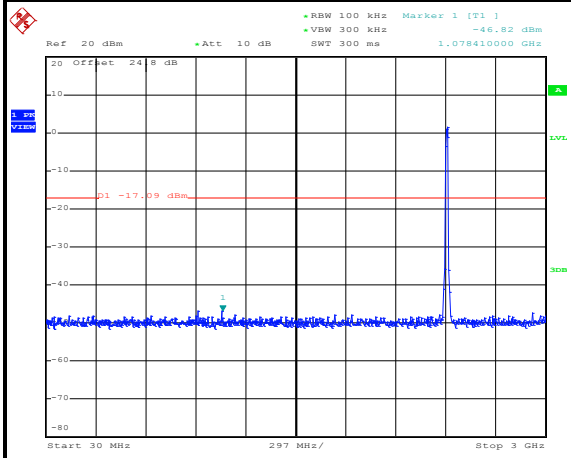
Date: 12.DEC.2014 01:46:44

Low Channel Plot



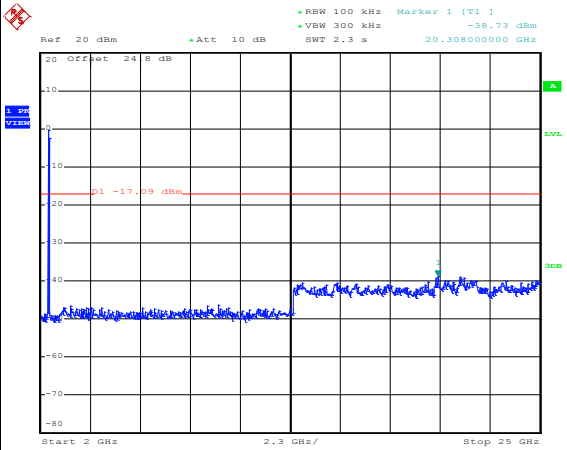
Date: 12.DEC.2014 01:47:06

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:47:30

Spurious Emission 2GHz~25GHz

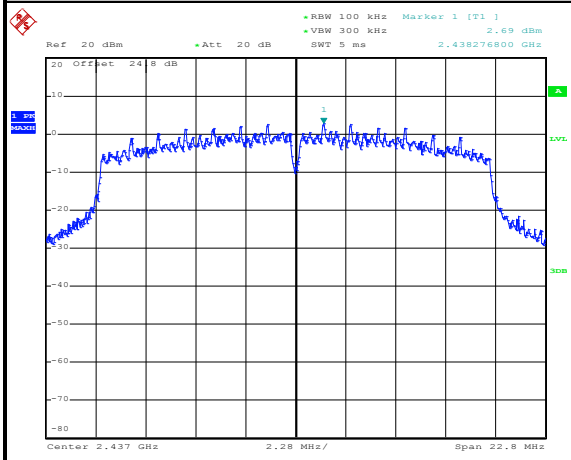


Date: 12.DEC.2014 01:47:48

Number of TX :	2	**Ant. :**	2
Test Mode :	802.11n HT20	**Temperature :**	21~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	41~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

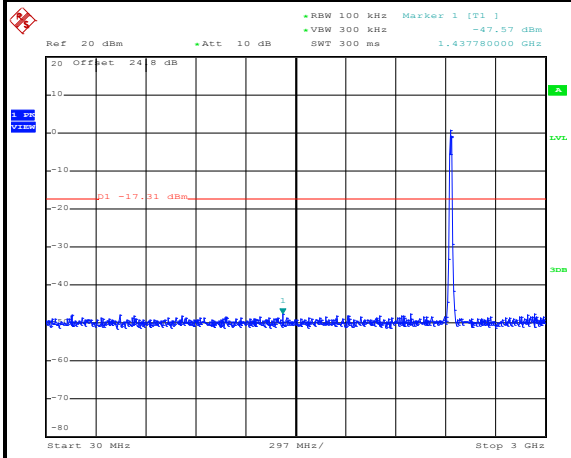
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



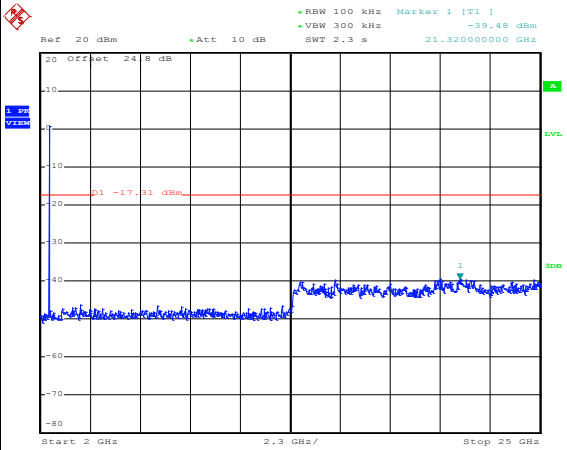
Date: 12.DEC.2014 01:40:12

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:40:38

Spurious Emission 2GHz~25GHz

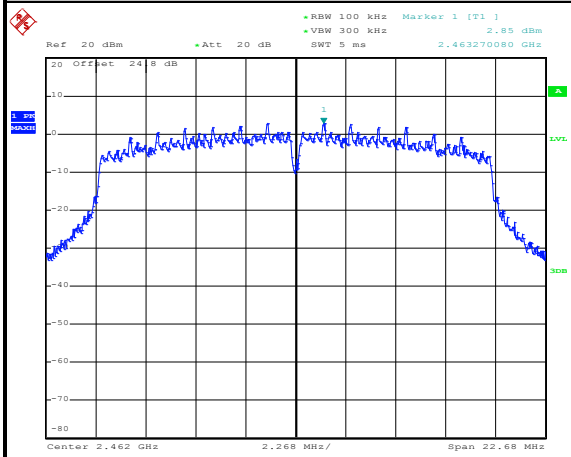


Date: 12.DEC.2014 01:40:56

Number of TX :	2	**Ant. :**	2
Test Mode :	802.11n HT20	**Temperature :**	21~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	41~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

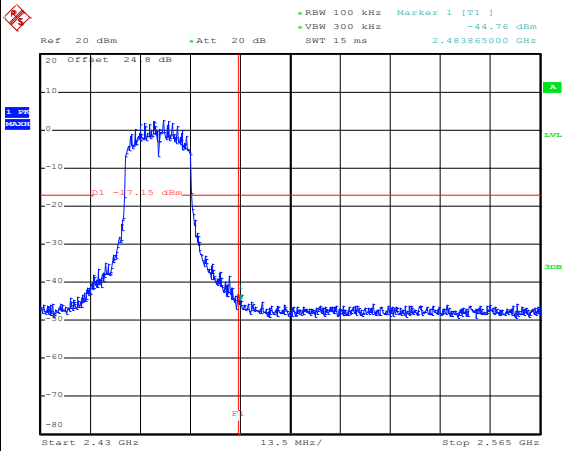
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



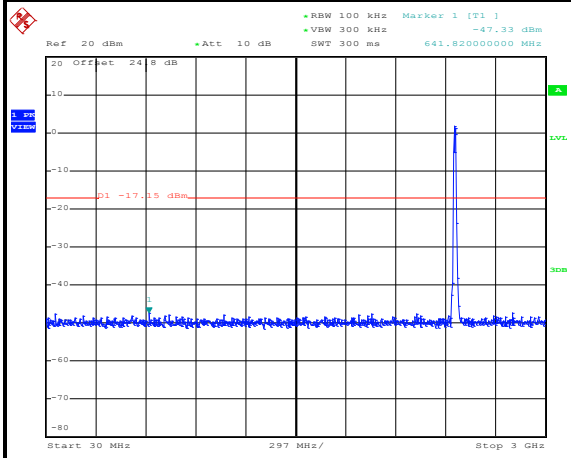
Date: 12.DEC.2014 01:57:50

High Channel Plot



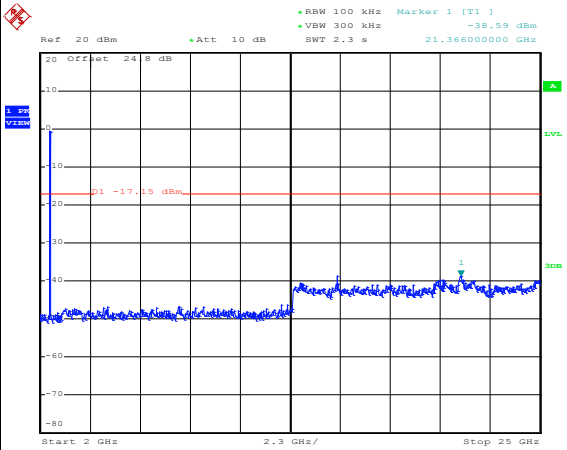
Date: 12.DEC.2014 01:58:09

Spurious Emission 30MHz~3GHz



Date: 12.DEC.2014 01:58:32

Spurious Emission 2GHz~25GHz



Date: 12.DEC.2014 01:58:50

3.5 Band Edges and Spurious Emission in the Restricted Band

3.5.1 Limit of Band Edges and Spurious Emission in the Restricted Band

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

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

3.5.2 Measuring Instruments

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

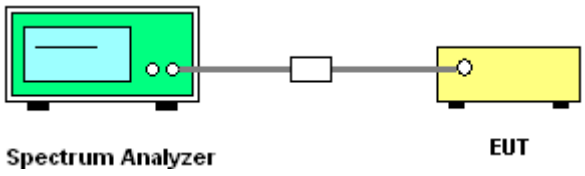
3.5.3 Test Procedure

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

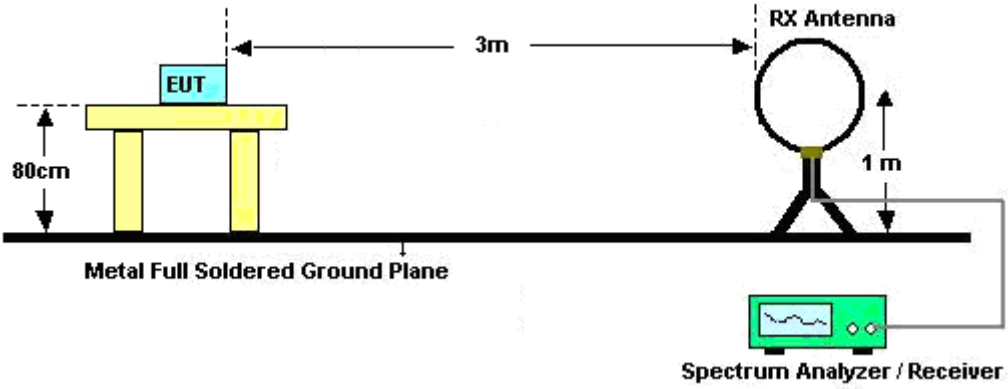
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11b	98.84	-	-	10Hz
1	802.11g	93.42	3413.46	0.29	300Hz
1	2.4GHz 802.11n HT20	92.96	3173.08	0.32	1kHz
1	2.4GHz 802.11n HT40	85.71	1538.46	0.65	1kHz
1+2	2.4GHz 802.11n HT20 for Ant 1	54.07	298.08	3.35	10kHz
1+2	2.4GHz 802.11n HT20 for Ant 2	54.39	298.08	3.35	10kHz

3.5.4 Test Setup

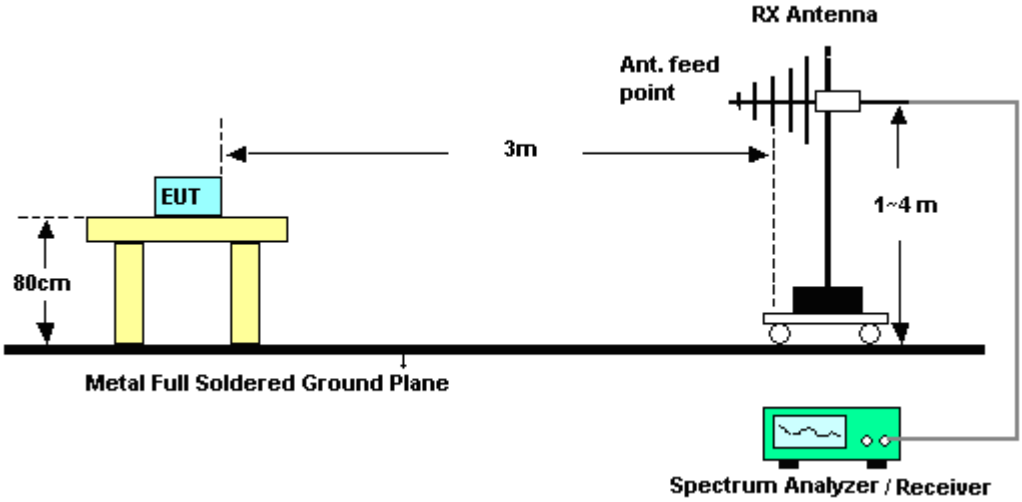
For Conducted Measurement Setup:



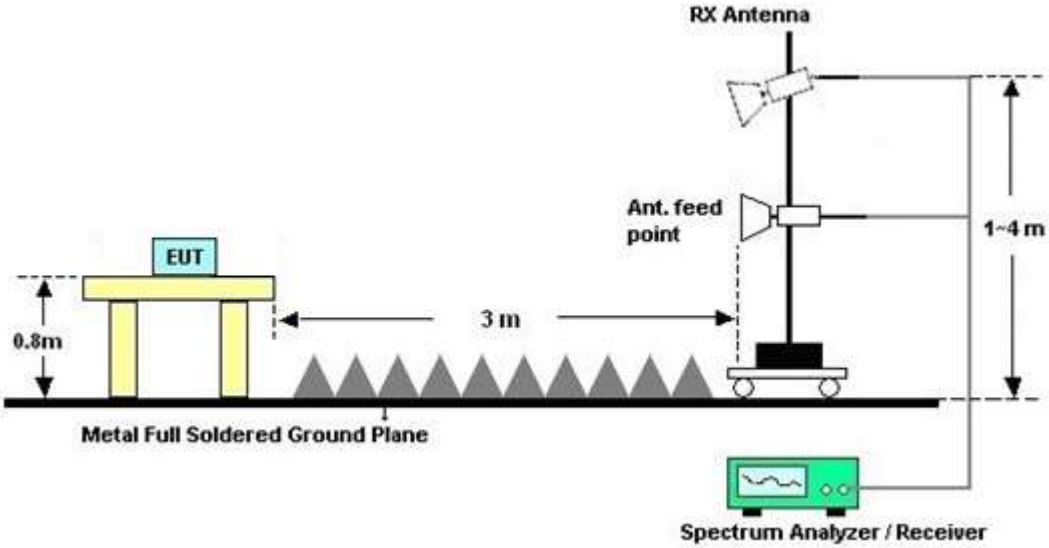
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

3.5.6 Test Result of Conducted Spurious at Band Edges in the Restricted Band

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	Peak Avg (P/A)
802.11b CH 01 2412MHz		2383.17	-40.47	-19.27	-21.2	-46.17	3.2	2.5	0	P
		2386.86	-48.83	-7.63	-41.2	-54.53	3.2	2.5	0	A
	*	2413.444	13.7	-	-	8	3.2	2.5	0	P
	*	2411.356	9.73	-	-	4.03	3.2	2.5	0	A
802.11b CH 06 2437MHz		2373.63	-41.81	-20.61	-21.2	-47.51	3.2	2.5	0	P
		2334.48	-53.81	-12.61	-41.2	-59.51	3.2	2.5	0	A
	*	2435.571	13.3	-	-	7.6	3.2	2.5	0	P
	*	2436.323	9.42	-	-	3.72	3.2	2.5	0	A
		2495.72	-40.67	-19.47	-21.2	-46.37	3.2	2.5	0	P
		2485.32	-54.29	-13.09	-41.2	-59.99	3.2	2.5	0	A
802.11b CH 11 2462MHz	*	2463.46	13.3	-	-	7.6	3.2	2.5	0	P
	*	2461.289	9.4	-	-	3.7	3.2	2.5	0	A
		2485.24	-37.36	-16.16	-21.2	-43.06	3.2	2.5	0	P
		2483.52	-47.99	-6.79	-41.2	-53.69	3.2	2.5	0	A

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	Peak Avg (P/A)
802.11g CH 01 2412MHz		2389.83	-28.11	-6.91	-21.2	-33.81	3.2	2.5	0	P
		2389.29	-45.81	-4.61	-41.2	-51.51	3.2	2.5	0	A
	*	2410.855	15.8	-	-	10.1	3.2	2.5	0	P
	*	2413.36	6.34	-	-	0.64	3.2	2.5	0	A
802.11g CH 06 2437MHz		2388.93	-27.95	-6.75	-21.2	-33.65	3.2	2.5	0	P
		2390	-49.41	-8.21	-41.2	-55.11	3.2	2.5	0	A
	*	2439.245	20.06	-	-	14.36	3.2	2.5	0	P
	*	2439.579	11.05	-	-	5.35	3.2	2.5	0	A
		2484.04	-29.94	-8.74	-21.2	-35.64	3.2	2.5	0	P
		2484.64	-48.2	-7	-41.2	-53.9	3.2	2.5	0	A
802.11g CH 11 2462MHz	*	2461.373	15.4	-	-	9.7	3.2	2.5	0	P
	*	2461.039	6.09	-	-	0.39	3.2	2.5	0	A
		2484.56	-23.9	-2.7	-21.2	-29.6	3.2	2.5	0	P
		2483.6	-43.75	-2.55	-41.2	-49.45	3.2	2.5	0	A

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	Peak Avg (P/A)
802.11n HT20 CH 01 2412MHz		2389.83	-28.03	-6.83	-21.2	-33.73	3.2	2.5	0	P
		2390	-44.86	-3.66	-41.2	-50.56	3.2	2.5	0	A
	*	2410.771	12.64	-	-	6.94	3.2	2.5	0	P
	*	2413.11	3.56	-	-	-2.14	3.2	2.5	0	A
802.11n HT20 CH 06 2437MHz		2386.95	-37.5	-16.3	-21.2	-43.2	3.2	2.5	0	P
		2390	-53.87	-12.67	-41.2	-59.57	3.2	2.5	0	A
	*	2439.162	16.06	-	-	10.36	3.2	2.5	0	P
	*	2435.404	7.24	-	-	1.54	3.2	2.5	0	A
		2492.16	-35.64	-14.44	-21.2	-41.34	3.2	2.5	0	P
		2484.2	-52.18	-10.98	-41.2	-57.88	3.2	2.5	0	A
802.11n HT20 CH 11 2462MHz	*	2460.872	13.41	-	-	7.71	3.2	2.5	0	P
	*	2460.788	3.5	-	-	-2.2	3.2	2.5	0	A
		2484.2	-24.78	-3.58	-21.2	-30.48	3.2	2.5	0	P
		2483.64	-44.95	-3.75	-41.2	-50.65	3.2	2.5	0	A

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	Peak Avg (P/A)
802.11n HT40 CH 03 2422MHz		2386.86	-24.72	-3.52	-21.2	-30.42	3.2	2.5	0	P
		2388.57	-43.1	-1.9	-41.2	-48.8	3.2	2.5	0	A
	*	2427.889	8.66	-	-	2.96	3.2	2.5	0	P
	*	2419.539	-1.33	-	-	-7.03	3.2	2.5	0	A
802.11n HT40 CH 06 2437MHz		2387.85	-23.52	-2.32	-21.2	-29.22	3.2	2.5	0	P
		2390.00	-41.61	-0.41	-41.2	-47.31	3.2	2.5	0	A
	*	2440.581	13.08	-	-	7.38	3.2	2.5	0	P
	*	2439.162	2.92	-	-	-2.78	3.2	2.5	0	A
		2483.84	-21.51	-0.31	-21.2	-27.21	3.2	2.5	0	P
		2483.56	-42.03	-0.83	-41.2	-47.73	3.2	2.5	0	A
802.11n HT40 CH 09 2452MHz	*	2457.198	8.69	-	-	2.99	3.2	2.5	0	P
	*	2454.108	-0.93	-	-	-6.63	3.2	2.5	0	A
		2487.52	-23.48	-2.28	-21.2	-29.18	3.2	2.5	0	P
		2484.56	-42.41	-1.21	-41.2	-48.11	3.2	2.5	0	A

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 MIMO (Band Edge @ 3m)

WIFI Ant.	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	MIMO Factor (dB)	Peak Avg (P/A)
1+2(1)											
802.11n HT20 CH 01 2412MHz		2388.84	-24.97	-3.77	-21.2	-33.68	3.2	2.5	0	3.01	P
		2390.00	-44.34	-3.14	-41.2	-53.05	3.2	2.5	0	3.01	A
	*	2413.11	16.08	-	-	7.37	3.2	2.5	0	3.01	P
	*	2410.688	6.66	-	-	-2.05	3.2	2.5	0	3.01	A
802.11n HT20 CH 06 2437MHz		2388.21	-39.82	-18.62	-21.2	-48.53	3.2	2.5	0	3.01	P
		2390	-54.32	-13.12	-41.2	-63.03	3.2	2.5	0	3.01	A
	*	2434.152	17.69	-	-	8.98	3.2	2.5	0	3.01	P
	*	2435.822	7.19	-	-	-1.52	3.2	2.5	0	3.01	A
		2485.28	-40.04	-18.84	-21.2	-48.75	3.2	2.5	0	3.01	P
		2484.76	-52.56	-11.36	-41.2	-61.27	3.2	2.5	0	3.01	A
802.11n HT20 CH 11 2462MHz	*	2463.126	16.55	-	-	7.84	3.2	2.5	0	3.01	P
	*	2461.039	5.52	-	-	-3.19	3.2	2.5	0	3.01	A
		2483.72	-24.01	-2.81	-21.2	-32.72	3.2	2.5	0	3.01	P
		2483.88	-42.8	-1.6	-41.2	-51.51	3.2	2.5	0	3.01	A
1+2(2)											
802.11n HT20 CH 01 2412MHz		2390	-22.46	-1.26	-21.2	-31.17	3.2	2.5	0	3.01	P
		2390	-42.07	-0.87	-41.2	-50.78	3.2	2.5	0	3.01	A
	*	2412	15.98	-	-	7.27	3.2	2.5	0	3.01	P
	*	2411	5.89	-	-	-2.82	3.2	2.5	0	3.01	A
802.11n HT20 CH 06 2437MHz		2390	-40.69	-19.49	-21.2	-49.4	3.2	2.5	0	3.01	P
		2390	-53.66	-12.46	-41.2	-62.37	3.2	2.5	0	3.01	A
	*	2435	18.08	-	-	9.37	3.2	2.5	0	3.01	P
	*	2436	7.98	-	-	-0.73	3.2	2.5	0	3.01	A
		2483.5	-39.86	-18.66	-21.2	-48.57	3.2	2.5	0	3.01	P
		2485.9	-51.58	-10.38	-41.2	-60.29	3.2	2.5	0	3.01	A
802.11n HT20 CH 11 2462MHz	*	2463	18.46	-	-	9.75	3.2	2.5	0	3.01	P
	*	2462	5.99	-	-	-2.72	3.2	2.5	0	3.01	A
		2483.5	-23.48	-2.28	-21.2	-32.19	3.2	2.5	0	3.01	P
		2483.6	-41.99	-0.79	-41.2	-50.7	3.2	2.5	0	3.01	A

3.5.7 Test Result of Conducted Spurious Emission in the Restricted Band

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	Peak Avg (P/A)
802.11b CH 01 2412MHz		105.33	-62.71	-11.01	-51.7	-73.11	3.2	2.5	4.7	P
		164.73	-62.08	-10.38	-51.7	-72.48	3.2	2.5	4.7	P
		229.26	-61.78	-12.58	-49.2	-72.18	3.2	2.5	4.7	P
		501.6	-61	-11.8	-49.2	-71.4	3.2	2.5	4.7	P
		619.2	-52.8	-3.6	-49.2	-63.2	3.2	2.5	4.7	P
		806.8	-60.87	-11.67	-49.2	-71.27	3.2	2.5	4.7	P
		4824	-44.66	-23.46	-21.2	-50.36	3.2	2.5	0	P
		4824	-47.77	-6.57	-41.2	-53.47	3.2	2.5	0	A
802.11b CH 06 2437MHz		70.23	-62.57	-7.37	-55.2	-72.97	3.2	2.5	4.7	P
		139.89	-61.85	-10.15	-51.7	-72.25	3.2	2.5	4.7	P
		268.68	-61.62	-12.42	-49.2	-72.02	3.2	2.5	4.7	P
		466.6	-61.22	-12.02	-49.2	-71.62	3.2	2.5	4.7	P
		669.6	-56.74	-7.54	-49.2	-67.14	3.2	2.5	4.7	P
		843.2	-60.67	-11.47	-49.2	-71.07	3.2	2.5	4.7	P
		4875	-44.99	-23.79	-21.2	-50.69	3.2	2.5	0	P
		4875	-47.08	-5.88	-41.2	-52.78	3.2	2.5	0	A
		7311	-56.7	-35.5	-21.2	-62.4	3.2	2.5	0	P
802.11b CH 11 2462MHz		124.23	-61.82	-10.12	-51.7	-72.22	3.2	2.5	4.7	P
		166.08	-62.06	-10.36	-51.7	-72.46	3.2	2.5	4.7	P
		196.86	-60.96	-9.26	-51.7	-71.36	3.2	2.5	4.7	P
		353.9	-61.81	-12.61	-49.2	-72.21	3.2	2.5	4.7	P
		719.3	-54.47	-5.27	-49.2	-64.87	3.2	2.5	4.7	P
		915.3	-60.53	-11.33	-49.2	-70.93	3.2	2.5	4.7	P
		4926	-41.94	-20.74	-21.2	-47.64	3.2	2.5	0	P
		4926	-45.79	-4.59	-41.2	-51.49	3.2	2.5	0	A
		7386	-55.97	-34.77	-21.2	-61.67	3.2	2.5	0	P

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	Peak Avg (P/A)
802.11g CH 01 2412MHz		64.83	-60.92	-5.72	-55.2	-71.32	3.2	2.5	4.7	P
		178.5	-59.08	-7.38	-51.7	-69.48	3.2	2.5	4.7	P
		256.53	-59.44	-10.24	-49.2	-69.84	3.2	2.5	4.7	P
		372.1	-58.84	-9.64	-49.2	-69.24	3.2	2.5	4.7	P
		732.6	-57.97	-8.77	-49.2	-68.37	3.2	2.5	4.7	P
		792.8	-57.98	-8.78	-49.2	-68.38	3.2	2.5	4.7	P
		4824	-42.58	-21.38	-21.2	-48.28	3.2	2.5	0	P
		4824	-45.19	-3.99	-41.2	-50.89	3.2	2.5	0	A
802.11g CH 06 2437MHz		68.34	-60.47	-5.27	-55.2	-70.87	3.2	2.5	4.7	P
		164.46	-59.27	-7.57	-51.7	-69.67	3.2	2.5	4.7	P
		179.58	-58.1	-6.4	-51.7	-68.5	3.2	2.5	4.7	P
		423.9	-59.34	-10.14	-49.2	-69.74	3.2	2.5	4.7	P
		671	-52.97	-3.77	-49.2	-63.37	3.2	2.5	4.7	P
		833.4	-58.21	-9.01	-49.2	-68.61	3.2	2.5	4.7	P
		4875	-41.21	-20.01	-21.2	-46.91	3.2	2.5	0	P
		4875	-45.99	-4.79	-41.2	-51.69	3.2	2.5	0	A
		7311	-56.42	-35.22	-21.2	-62.12	3.2	2.5	0	P
802.11g CH 11 2462MHz		57.27	-61.4	-6.2	-55.2	-71.8	3.2	2.5	4.7	P
		153.66	-59.55	-7.85	-51.7	-69.95	3.2	2.5	4.7	P
		184.98	-58.33	-6.63	-51.7	-68.73	3.2	2.5	4.7	P
		439.3	-59.32	-10.12	-49.2	-69.72	3.2	2.5	4.7	P
		641.6	-58.28	-9.08	-49.2	-68.68	3.2	2.5	4.7	P
		833.4	-57.67	-8.47	-49.2	-68.07	3.2	2.5	4.7	P
		4926	-42.33	-21.13	-21.2	-48.03	3.2	2.5	0	P
		4926	-45.42	-4.22	-41.2	-51.12	3.2	2.5	0	A
		7386	-54.22	-33.02	-21.2	-59.92	3.2	2.5	0	P

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	Peak Avg (P/A)
802.11n HT20 CH 01 2412MHz		74.01	-62.63	-7.43	-55.2	-73.03	3.2	2.5	4.7	P
		173.1	-62.16	-10.46	-51.7	-72.56	3.2	2.5	4.7	P
		218.46	-61.94	-12.74	-49.2	-72.34	3.2	2.5	4.7	P
		497.4	-60.79	-11.59	-49.2	-71.19	3.2	2.5	4.7	P
		643	-60.38	-11.18	-49.2	-70.78	3.2	2.5	4.7	P
		833.4	-60.2	-11	-49.2	-70.6	3.2	2.5	4.7	P
		4824	-43.03	-21.83	-21.2	-48.73	3.2	2.5	0	P
		4824	-45.17	-3.97	-41.2	-50.87	3.2	2.5	0	A
802.11n HT20 CH 06 2437MHz		105.06	-62.68	-10.98	-51.7	-73.08	3.2	2.5	4.7	P
		124.77	-62.57	-10.87	-51.7	-72.97	3.2	2.5	4.7	P
		231.15	-62.03	-12.83	-49.2	-72.43	3.2	2.5	4.7	P
		432.3	-62.03	-12.83	-49.2	-72.43	3.2	2.5	4.7	P
		670.3	-54.33	-5.13	-49.2	-64.73	3.2	2.5	4.7	P
		764.8	-59.85	-10.65	-49.2	-70.25	3.2	2.5	4.7	P
		4875	-41.43	-20.23	-21.2	-47.13	3.2	2.5	0	P
		4875	-45.09	-3.89	-41.2	-50.79	3.2	2.5	0	A
		7311	-57.24	-36.04	-21.2	-62.94	3.2	2.5	0	P
802.11n HT20 CH 11 2462MHz		117.75	-62.38	-10.68	-51.7	-72.78	3.2	2.5	4.7	P
		200.1	-61.55	-9.85	-51.7	-71.95	3.2	2.5	4.7	P
		247.08	-61.94	-12.74	-49.2	-72.34	3.2	2.5	4.7	P
		370.7	-59.12	-9.92	-49.2	-69.52	3.2	2.5	4.7	P
		529.6	-60.8	-11.6	-49.2	-71.2	3.2	2.5	4.7	P
		879.6	-60.7	-11.5	-49.2	-71.1	3.2	2.5	4.7	P
		4926	-42.5	-21.3	-21.2	-48.2	3.2	2.5	0	P
		4926	-45.72	-4.52	-41.2	-51.42	3.2	2.5	0	A
		7386	-57.89	-36.69	-21.2	-63.59	3.2	2.5	0	P

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	Peak Avg (P/A)
802.11n HT40 CH 03 2422MHz		98.58	-62.37	-10.67	-51.7	-72.77	3.2	2.5	4.7	P
		153.93	-61.32	-9.62	-51.7	-71.72	3.2	2.5	4.7	P
		244.92	-61.81	-12.61	-49.2	-72.21	3.2	2.5	4.7	P
		481.3	-60.7	-11.5	-49.2	-71.1	3.2	2.5	4.7	P
		577.9	-59.22	-10.02	-49.2	-69.62	3.2	2.5	4.7	P
		876.1	-60.76	-11.56	-49.2	-71.16	3.2	2.5	4.7	P
		4845	-43.42	-22.22	-21.2	-49.12	3.2	2.5	0	P
		4845	-45.83	-4.63	-41.2	-51.53	3.2	2.5	0	A
		7266	-59.17	-37.97	-21.2	-64.87	3.2	2.5	0	P
802.11n HT40 CH 06 2437MHz		106.41	-62.11	-10.41	-51.7	-72.51	3.2	2.5	4.7	P
		193.35	-61.76	-10.06	-51.7	-72.16	3.2	2.5	4.7	P
		258.42	-61.38	-12.18	-49.2	-71.78	3.2	2.5	4.7	P
		464.5	-60.77	-11.57	-49.2	-71.17	3.2	2.5	4.7	P
		623.4	-60.49	-11.29	-49.2	-70.89	3.2	2.5	4.7	P
		878.2	-60.57	-11.37	-49.2	-70.97	3.2	2.5	4.7	P
		4875	-43.09	-21.89	-21.2	-48.79	3.2	2.5	0	P
		4875	-46.77	-5.57	-41.2	-52.47	3.2	2.5	0	A
		7311	-57.72	-36.52	-21.2	-63.42	3.2	2.5	0	P
802.11n HT40 CH 09 2452MHz		116.4	-61.91	-10.21	-51.7	-72.31	3.2	2.5	4.7	P
		197.67	-59.73	-8.03	-51.7	-70.13	3.2	2.5	4.7	P
		246.27	-61.65	-12.45	-49.2	-72.05	3.2	2.5	4.7	P
		463.1	-60.94	-11.74	-49.2	-71.34	3.2	2.5	4.7	P
		692	-59.79	-10.59	-49.2	-70.19	3.2	2.5	4.7	P
		923.7	-60.23	-11.03	-49.2	-70.63	3.2	2.5	4.7	P
		4905	-42.76	-21.56	-21.2	-48.46	3.2	2.5	0	P
		4905	-45.81	-4.61	-41.2	-51.51	3.2	2.5	0	A
		7356	-56.23	-35.03	-21.2	-61.93	3.2	2.5	0	P

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 MIMO (Harmonic @ 3m)

WIFI Ant. 1+2(1)	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	MIMO Factor (dB)	Peak Avg (P/A)
802.11n HT20 CH 01 2412MHz		44.85	-58.61	-3.41	-55.2	-72.02	3.2	2.5	4.7	3.01	P
		171.48	-59.28	-7.58	-51.7	-72.69	3.2	2.5	4.7	3.01	P
		226.02	-58.54	-9.34	-49.2	-71.95	3.2	2.5	4.7	3.01	P
		421.1	-58.2	-9	-49.2	-71.61	3.2	2.5	4.7	3.01	P
		741	-56.91	-7.71	-49.2	-70.32	3.2	2.5	4.7	3.01	P
		871.9	-57.48	-8.28	-49.2	-70.89	3.2	2.5	4.7	3.01	P
		4824	-38.88	-17.68	-21.2	-47.59	3.2	2.5	0	3.01	P
		4824	-42.47	-21.27	-21.2	-51.18	3.2	2.5	0	3.01	A
802.11n HT20 CH 06 2437MHz		97.5	-59.61	-7.91	-51.7	-73.02	3.2	2.5	4.7	3.01	P
		152.58	-59.54	-7.84	-51.7	-72.95	3.2	2.5	4.7	3.01	P
		206.31	-59.15	-7.45	-51.7	-72.56	3.2	2.5	4.7	3.01	P
		367.2	-57.89	-8.69	-49.2	-71.3	3.2	2.5	4.7	3.01	P
		627.6	-56.02	-6.82	-49.2	-69.43	3.2	2.5	4.7	3.01	P
		799.8	-56.22	-7.02	-49.2	-69.63	3.2	2.5	4.7	3.01	P
		4875	-39.47	-18.27	-21.2	-48.18	3.2	2.5	0	3.01	P
		4875	-45.12	-3.92	-41.2	-53.83	3.2	2.5	0	3.01	A
		7311	-53.69	-32.49	-21.2	-62.4	3.2	2.5	0	3.01	P
802.11n HT20 CH 11 2462MHz		78.33	-59.49	-4.29	-55.2	-72.9	3.2	2.5	4.7	3.01	P
		118.29	-60.22	-8.52	-51.7	-73.63	3.2	2.5	4.7	3.01	P
		170.94	-59.68	-7.98	-51.7	-73.09	3.2	2.5	4.7	3.01	P
		462.4	-58.42	-9.22	-49.2	-71.83	3.2	2.5	4.7	3.01	P
		618.5	-57.4	-8.2	-49.2	-70.81	3.2	2.5	4.7	3.01	P
		779.5	-57.77	-8.57	-49.2	-71.18	3.2	2.5	4.7	3.01	P
		4926	-42.09	-20.89	-21.2	-50.8	3.2	2.5	0	3.01	P
		4926	-45.04	-3.84	-41.2	-53.75	3.2	2.5	0	3.01	A
		7386	-54.07	-32.87	-21.2	-62.78	3.2	2.5	0	3.01	P

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 MIMO (Harmonic @ 3m)

WIFI Ant. 1+2(2)	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Gain (dBi)	Cable Loss (dB)	Grounding Factor (dB)	MIMO Factor (dB)	Peak Avg (P/A)
802.11n HT20 CH 01 2412MHz		78.6	-61.56	-6.36	-55.2	-74.97	3.2	2.5	4.7	3.01	P
		105.33	-61.16	-9.46	-51.7	-74.57	3.2	2.5	4.7	3.01	P
		291.63	-60.62	-11.42	-49.2	-74.03	3.2	2.5	4.7	3.01	P
		332.9	-58.68	-9.48	-49.2	-72.09	3.2	2.5	4.7	3.01	P
		517.7	-58.25	-9.05	-49.2	-71.66	3.2	2.5	4.7	3.01	P
		643.7	-57.6	-8.4	-49.2	-71.01	3.2	2.5	4.7	3.01	P
		4824	-37.69	-16.49	-21.2	-46.4	3.2	2.5	0	3.01	P
		4824	-41.59	-20.39	-21.2	-50.3	3.2	2.5	0	3.01	A
802.11n HT20 CH 06 2437MHz		47.55	-60.06	-4.86	-55.2	-73.47	3.2	2.5	4.7	3.01	P
		152.58	-59.54	-7.84	-51.7	-72.95	3.2	2.5	4.7	3.01	P
		252.75	-59.09	-9.89	-49.2	-72.5	3.2	2.5	4.7	3.01	P
		472.9	-58.99	-9.79	-49.2	-72.4	3.2	2.5	4.7	3.01	P
		513.5	-58.87	-9.67	-49.2	-72.28	3.2	2.5	4.7	3.01	P
		949.6	-58.74	-9.54	-49.2	-72.15	3.2	2.5	4.7	3.01	P
		4875	-38.01	-16.81	-21.2	-46.72	3.2	2.5	0	3.01	P
		4875	-44.89	-3.69	-41.2	-53.6	3.2	2.5	0	3.01	A
		7311	-52.99	-31.79	-21.2	-61.7	3.2	2.5	0	3.01	P
802.11n HT20 CH 11 2462MHz		46.47	-60.24	-5.04	-55.2	-73.65	3.2	2.5	4.7	3.01	P
		154.74	-59.82	-8.12	-51.7	-73.23	3.2	2.5	4.7	3.01	P
		270.57	-60.28	-11.08	-49.2	-73.69	3.2	2.5	4.7	3.01	P
		345.5	-59.72	-10.52	-49.2	-73.13	3.2	2.5	4.7	3.01	P
		534.5	-58.74	-9.54	-49.2	-72.15	3.2	2.5	4.7	3.01	P
		826.4	-58.17	-8.97	-49.2	-71.58	3.2	2.5	4.7	3.01	P
		4924	-41.85	-20.65	-21.2	-50.56	3.2	2.5	0	3.01	P
		4924	-45.08	-3.88	-41.2	-53.79	3.2	2.5	0	3.01	A
		7386	-53.89	-32.69	-21.2	-62.6	3.2	2.5	0	3.01	P

3.5.8 Test Result of Cabinet Radiated Spurious at Band Edges

Please refer to Appendix A of this report.

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

Please refer to Appendix A of this report.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

Frequency of Emission (MHz)	Conducted Limit (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.

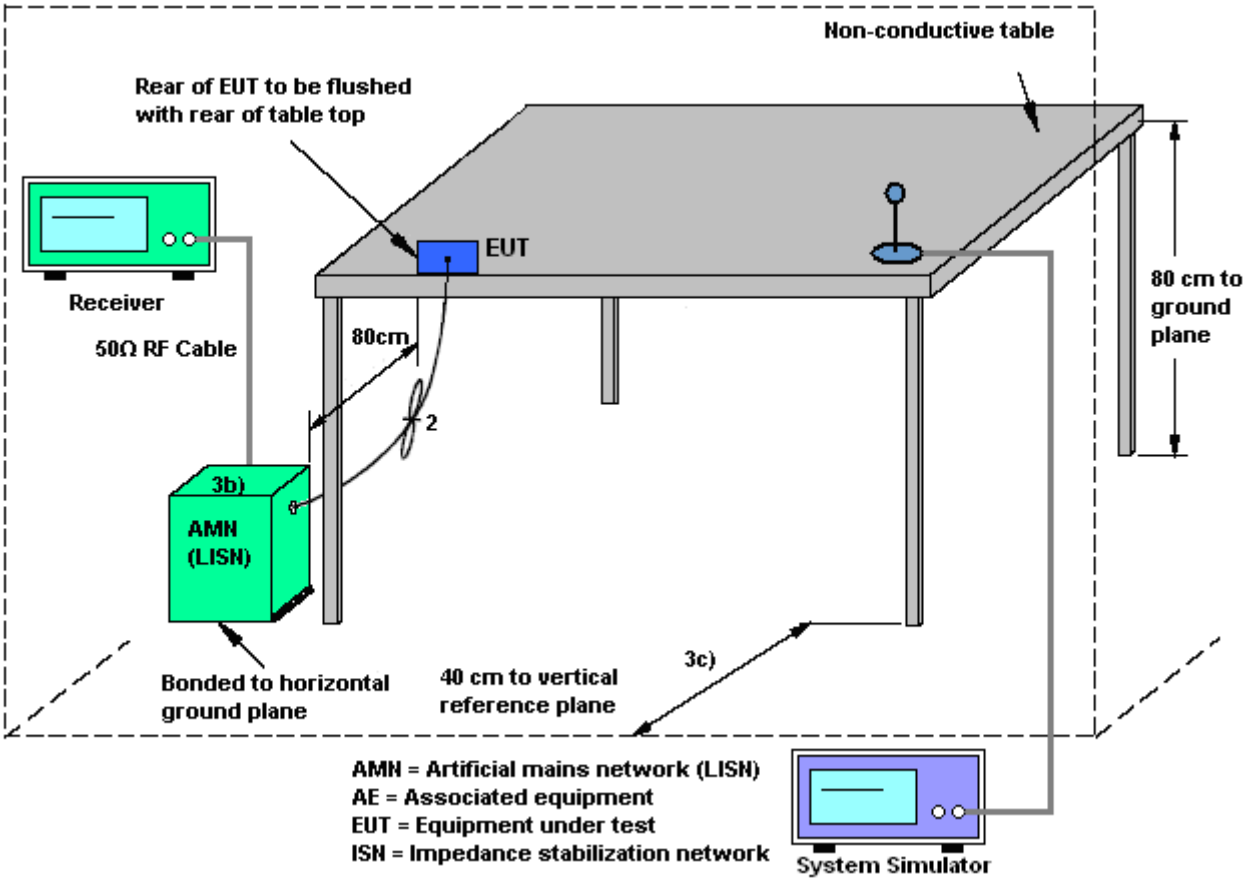
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

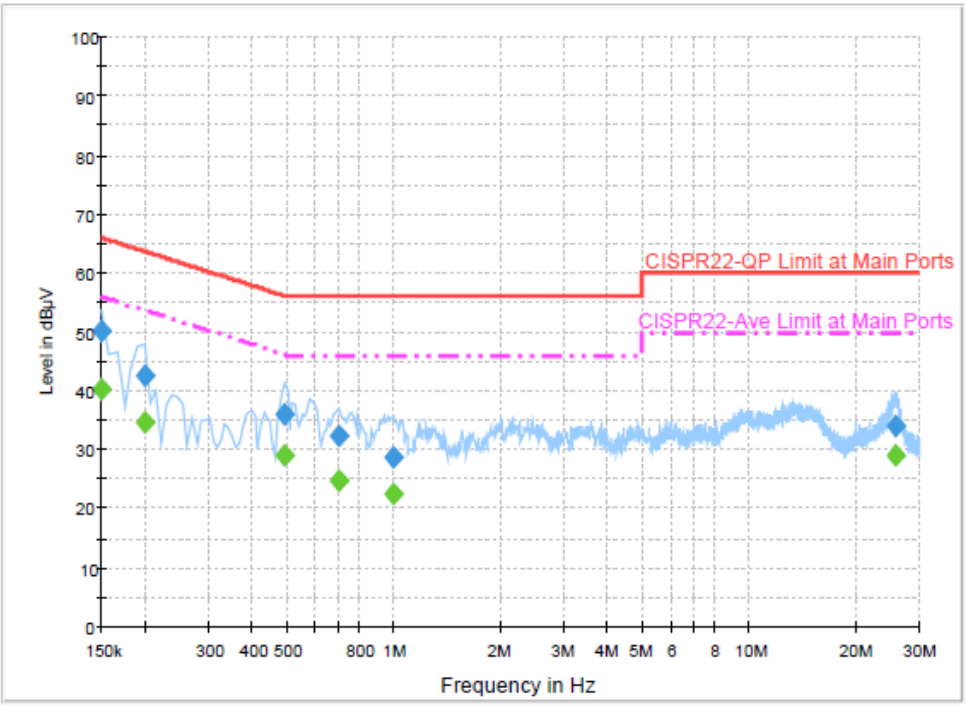
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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 :**	20~22℃
Test Engineer :	Kai-Chun Chu	**Relative Humidity :**	46~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WLAN (2.4GHz) Link + Bluetooth Link + Adapter		



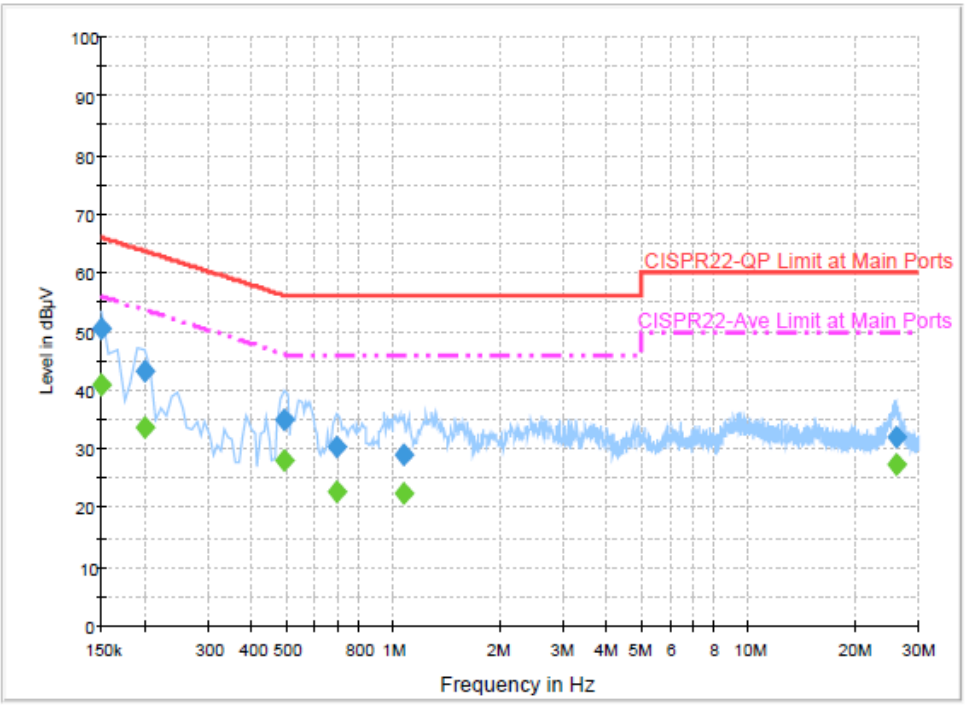
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	50.1	Off	L1	19.5	15.9	66.0
0.198000	42.5	Off	L1	19.4	21.2	63.7
0.494000	36.0	Off	L1	19.4	20.1	56.1
0.702000	32.5	Off	L1	19.6	23.5	56.0
0.990000	28.9	Off	L1	19.5	27.1	56.0
25.766000	34.0	Off	L1	19.9	26.0	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	40.3	Off	L1	19.5	15.7	56.0
0.198000	34.6	Off	L1	19.4	19.1	53.7
0.494000	29.2	Off	L1	19.4	16.9	46.1
0.702000	24.9	Off	L1	19.6	21.1	46.0
0.990000	22.5	Off	L1	19.5	23.5	46.0
25.766000	29.0	Off	L1	19.9	21.0	50.0

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Kai-Chun Chu	**Relative Humidity :**	46~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	WLAN (2.4GHz) Link + Bluetooth Link + Adapter		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	50.6	Off	N	19.5	15.4	66.0
0.198000	43.2	Off	N	19.4	20.5	63.7
0.494000	35.1	Off	N	19.4	21.0	56.1
0.694000	30.3	Off	N	19.6	25.7	56.0
1.070000	29.0	Off	N	19.6	27.0	56.0
25.982000	31.9	Off	N	20.1	28.1	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	40.9	Off	N	19.5	15.1	56.0
0.198000	33.7	Off	N	19.4	20.0	53.7
0.494000	28.1	Off	N	19.4	18.0	46.1
0.694000	22.7	Off	N	19.6	23.3	46.0
1.070000	22.4	Off	N	19.6	23.6	46.0
25.982000	27.3	Off	N	20.1	22.7	50.0

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

Non-standard antenna connector is used.

3.7.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

For CDD transmissions, directional gain is calculated as

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

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

Array Gain = 10 log(N_{ANT}=2/N_{SS}=2) = 0 dB.

(MIMO only support MCS 12 to MCS15.)

For power measurements on IEEE 802.11 devices,

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

The EUT supports CDD mode.

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

The directional gain “DG” is calculated as following table.

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	3.20	3.20	3.20	3.20	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Dec. 10, 2014 ~ Dec. 12, 2014	Jun. 08, 2015	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 09, 2014	Dec. 10, 2014 ~ Dec. 12, 2014	Aug. 08, 2015	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 09, 2014	Dec. 10, 2014 ~ Dec. 12, 2014	Aug. 08, 2015	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 12, 2014	Dec. 10, 2014	Nov. 11, 2015	Conduction (CO05-HY)
LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2013	Dec. 10, 2014	Dec. 11, 2014	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 02, 2014	Dec. 10, 2014	Dec. 01, 2015	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Dec. 10, 2014	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9 kHz~7 GHz	Aug. 30, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Aug. 29, 2015	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	101749	10Hz ~ 30GHz	Feb. 10, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Feb. 09, 2015	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	100315	9 kHz~30 MHz	Jul. 28, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Jul. 27, 2015	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Sep. 27, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Sep. 26, 2015	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz~18GHz	Aug. 19, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Aug. 18, 2015	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Oct. 02, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Oct. 01, 2015	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz	Mar. 17, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Mar. 16, 2015	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1 GHz~26.5 GHz	Oct. 21, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Oct. 20, 2015	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590074	DC~18 GHz	Jul. 07, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Jul. 06, 2015	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590075	DC~18 GHz	Apr. 21, 2014	Dec. 10, 2014 ~ Dec. 11, 2014	Apr. 20, 2015	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Dec. 10, 2014 ~ Dec. 11, 2014	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Dec. 10, 2014 ~ Dec. 11, 2014	N/A	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.50**

Appendix A. Radiated Spurious Emission

Test Engineer :	Derreck Chen	Temperature :	23~25°C
		Relative Humidity :	48~51%

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		2383.89	58.42	-15.58	74	52.78	32.16	7.75	34.27	100	0	P	H
		2335.92	45.69	-8.31	54	40.2	32.11	7.6	34.22	100	0	A	H
	*	2412	58.82	-	-	53.17	32.2	7.75	34.3	100	0	P	H
	*	2412	45.97	-	-	40.32	32.2	7.75	34.3	100	0	A	H
													H
													H
		2330.25	57.87	-16.13	74	52.4	32.09	7.6	34.22	100	0	P	V
		2342.4	45.7	-8.3	54	40.16	32.11	7.68	34.25	100	0	A	V
	*	2412	58.52	-	-	52.87	32.2	7.75	34.3	100	0	P	V
	*	2412	45.78	-	-	40.13	32.2	7.75	34.3	100	0	A	V
													V
													V
802.11b CH 06 2437MHz		2371.56	58.08	-15.92	74	52.51	32.16	7.68	34.27	100	0	P	H
		2320.98	45.72	-8.28	54	40.25	32.09	7.6	34.22	100	0	A	H
	*	2437	59.25	-	-	53.53	32.24	7.83	34.35	100	0	P	H
	*	2437	46.11	-	-	40.39	32.24	7.83	34.35	100	0	A	H
		2484.36	58.19	-15.81	74	52.43	32.28	7.91	34.43	100	0	P	H
		2484.76	45.73	-8.27	54	39.97	32.28	7.91	34.43	100	0	A	H
		2353.83	58.2	-15.8	74	52.64	32.13	7.68	34.25	100	0	P	V
		2318.28	45.85	-8.15	54	40.38	32.09	7.6	34.22	100	0	A	V
	*	2437	59.15	-	-	53.43	32.24	7.83	34.35	100	0	P	V
	*	2437	45.85	-	-	40.13	32.24	7.83	34.35	100	0	A	V
		2486.8	58.54	-15.46	74	52.78	32.28	7.91	34.43	100	0	P	V
		2492.36	45.9	-8.1	54	40.17	32.3	7.91	34.48	100	0	A	V

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 11 2462MHz	*	2462	58.95	-	-	53.17	32.26	7.91	34.39	100	0	P	H
	*	2462	45.87	-	-	40.09	32.26	7.91	34.39	100	0	A	H
		2492.32	58.07	-15.93	74	52.34	32.3	7.91	34.48	100	0	P	H
		2486.88	46.01	-7.99	54	40.25	32.28	7.91	34.43	100	0	A	H
													H
													H
	*	2462	58.81	-	-	53.03	32.26	7.91	34.39	100	0	P	V
	*	2462	45.84	-	-	40.06	32.26	7.91	34.39	100	0	A	V
		2498.92	58.18	-15.82	74	52.45	32.3	7.91	34.48	100	0	P	V
		2499.04	45.77	-8.23	54	40.04	32.3	7.91	34.48	100	0	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	40.79	-33.21	74	54.3	34.26	11.16	58.93	100	0	P	H
													H
													H
													H
		4824	40.59	-33.41	74	54.1	34.26	11.16	58.93	100	0	P	V
													V
													V
													V
802.11b CH 06 2437MHz		4872	40.75	-33.25	74	54.07	34.3	11.21	58.83	100	0	P	H
		7311	43.39	-30.61	74	50.44	35.6	15.08	57.73	100	0	P	H
													H
													H
		4872	41.43	-32.57	74	54.75	34.3	11.21	58.83	100	0	P	V
		7311	42.63	-31.37	74	49.68	35.6	15.08	57.73	100	0	P	V
													V
													V
802.11b CH 11 2462MHz		4926	41.19	-32.81	74	54.31	34.34	11.27	58.73	100	0	P	H
		7386	42.99	-31.01	74	50.05	35.6	15.14	57.8	100	0	P	H
													H
													H
		4926	40.55	-33.45	74	53.67	34.34	11.27	58.73	100	0	P	V
		7386	42.73	-31.27	74	49.79	35.6	15.14	57.8	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2370.48	58.55	-15.45	74	52.98	32.16	7.68	34.27	100	0	P	H
		2366.16	45.89	-8.11	54	40.35	32.13	7.68	34.27	100	0	A	H
	*	2412	58.76	-15.24	-	-	32.2	7.75	34.3	100	0	P	H
	*	2412	45.83	-8.17	-	-	32.2	7.75	34.3	100	0	A	H
													H
													H
		2376.33	58.55	-15.45	74	52.98	32.16	7.68	34.27	100	0	P	V
		2368.95	45.67	-8.33	54	40.1	32.16	7.68	34.27	100	0	A	V
	*	2412	58.92	-15.08	-	-	32.2	7.75	34.3	100	0	P	V
	*	2412	45.83	-8.17	-	-	32.2	7.75	34.3	100	0	A	V
													V
													V
802.11g CH 06 2437MHz		2388.03	58.5	-15.5	74	52.84	32.18	7.75	34.27	100	0	P	H
		2340.15	45.71	-8.29	54	40.17	32.11	7.68	34.25	100	0	A	H
	*	2437	59.21	-14.79	-	-	32.24	7.83	34.35	100	0	P	H
	*	2437	45.87	-8.13	-	-	32.24	7.83	34.35	100	0	A	H
		2489	58.64	-15.36	74	52.86	32.3	7.91	34.43	100	0	P	H
		2488.88	45.68	-8.32	54	39.9	32.3	7.91	34.43	100	0	A	H
		2313.06	58.04	-15.96	74	52.56	32.07	7.6	34.19	100	0	P	V
		2334.39	45.69	-8.31	54	40.22	32.09	7.6	34.22	100	0	A	V
	*	2437	58.58	-15.42	-	-	32.24	7.83	34.35	100	0	P	V
	*	2437	45.86	-8.14	-	-	32.24	7.83	34.35	100	0	A	V
		2488.8	58.16	-15.84	74	52.38	32.3	7.91	34.43	100	0	P	V
		2496.32	45.9	-8.1	54	40.17	32.3	7.91	34.48	100	0	A	V

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 11 2462MHz	*	2462	58.47	-	-	52.69	32.26	7.91	34.39	100	0	P	H
	*	2462	45.95	-	-	40.17	32.26	7.91	34.39	100	0	A	H
		2488.72	58.42	-15.58	74	52.64	32.3	7.91	34.43	100	0	P	H
		2491.36	45.89	-8.11	54	40.11	32.3	7.91	34.43	100	0	A	H
													H
													H
	*	2462	58.75	-	-	52.97	32.26	7.91	34.39	100	0	P	V
	*	2462	45.89	-	-	40.11	32.26	7.91	34.39	100	0	A	V
		2485.36	58	-16	74	52.24	32.28	7.91	34.43	100	0	P	V
		2494.84	45.88	-8.12	54	40.15	32.3	7.91	34.48	100	0	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	40.56	-33.44	74	54.07	34.26	11.16	58.93	100	0	P	H
													H
													H
													H
		4824	40.43	-33.57	74	53.94	34.26	11.16	58.93	100	0	P	V
													V
													V
													V
802.11g CH 06 2437MHz		4873	40.61	-33.39	74	53.93	34.3	11.21	58.83	100	0	P	H
		7311	42.96	-31.04	74	50.01	35.6	15.08	57.73	100	0	P	H
													H
													H
		4873	41.36	-32.64	74	54.68	34.3	11.21	58.83	100	0	P	V
		7311	42.37	-31.63	74	49.42	35.6	15.08	57.73	100	0	P	V
													V
													V
802.11g CH 11 2462MHz		4924	41.09	-32.91	74	54.21	34.34	11.27	58.73	100	0	P	H
		7386	42.71	-31.29	74	49.77	35.6	15.14	57.8	100	0	P	H
													H
													H
		4925	40.41	-33.59	74	53.53	34.34	11.27	58.73	100	0	P	V
		7386	42.63	-31.37	74	49.69	35.6	15.14	57.8	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2342.13	57.96	-16.04	74	52.42	32.11	7.68	34.25	100	0	P	H
		2352.48	46.42	-7.58	54	40.86	32.13	7.68	34.25	100	0	A	H
	*	2422	58.28	-	-	52.58	32.22	7.83	34.35	100	0	P	H
	*	2422	46.4	-	-	40.7	32.22	7.83	34.35	100	0	A	H
		2488.12	57.81	-16.19	74	52.03	32.3	7.91	34.43	100	0	P	H
		2490.84	46.17	-7.83	54	40.39	32.3	7.91	34.43	100	0	A	H
		2355.81	58.72	-15.28	74	53.16	32.13	7.68	34.25	100	0	P	V
		2354.01	46.35	-7.65	54	40.79	32.13	7.68	34.25	100	0	A	V
	*	2422	58.91	-	-	53.21	32.22	7.83	34.35	100	0	P	V
	*	2422	46.71	-	-	41.01	32.22	7.83	34.35	100	0	A	V
		2490.36	57.88	-16.12	74	52.1	32.3	7.91	34.43	100	0	P	V
		2492	46.33	-7.67	54	40.6	32.3	7.91	34.48	100	0	A	V
802.11n HT40 CH 06 2437MHz		2311.53	58.69	-15.31	74	53.21	32.07	7.6	34.19	100	0	P	H
		2329.53	46.24	-7.76	54	40.77	32.09	7.6	34.22	100	0	A	H
	*	2437	58.7	-	-	52.98	32.24	7.83	34.35	100	0	P	H
	*	2437	46.25	-	-	40.53	32.24	7.83	34.35	100	0	A	H
		2484	58.73	-15.27	74	52.97	32.28	7.91	34.43	100	0	P	H
		2487.2	46.57	-7.43	54	40.81	32.28	7.91	34.43	100	0	A	H
		2369.04	58.53	-15.47	74	52.96	32.16	7.68	34.27	100	0	P	V
		2341.95	46.33	-7.67	54	40.79	32.11	7.68	34.25	100	0	A	V
	*	2437	58.22	-	-	52.5	32.24	7.83	34.35	100	0	P	V
	*	2437	46.61	-	-	40.89	32.24	7.83	34.35	100	0	A	V
		2484.12	58.31	-15.69	74	52.55	32.28	7.91	34.43	100	0	P	V
		2499.68	46.24	-7.76	54	40.51	32.3	7.91	34.48	100	0	A	V

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 HT40 CH 09 2452MHz		2386.59	58.94	-15.06	74	53.28	32.18	7.75	34.27	100	0	P	H
		2347.44	46.29	-7.71	54	40.75	32.11	7.68	34.25	100	0	A	H
	*	2452	58.64	-	-	52.96	32.24	7.83	34.39	100	0	P	H
	*	2452	46.66	-	-	40.98	32.24	7.83	34.39	100	0	A	H
		2494.28	58.32	-15.68	74	52.59	32.3	7.91	34.48	100	0	P	H
		2488.04	46.47	-7.53	54	40.69	32.3	7.91	34.43	100	0	A	H
		2341.23	58.96	-15.04	74	53.42	32.11	7.68	34.25	100	0	P	V
		2311.8	46.12	-7.88	54	40.64	32.07	7.6	34.19	100	0	A	V
	*	2452.021	56.71	-	-	51.03	32.24	7.83	34.39	100	0	P	V
	*	2452.021	45.54	-	-	39.86	32.24	7.83	34.39	100	0	A	V
		2484.88	59.26	-14.74	74	53.5	32.28	7.91	34.43	100	0	P	V
		2489.36	46.32	-7.68	54	40.54	32.3	7.91	34.43	100	0	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		4842	40.35	-33.65	74	53.8	34.28	11.16	58.89	100	0	P	H
		7266	43.3	-30.7	74	50.33	35.6	15.06	57.69	100	0	P	H
													H
													H
		4842	40.72	-33.28	74	54.17	34.28	11.16	58.89	100	0	P	V
		7266	44.43	-29.57	74	51.46	35.6	15.06	57.69	100	0	P	V
													V
													V
802.11n HT40 CH 06 2437MHz		4872	40.54	-33.46	74	53.86	34.3	11.21	58.83	100	0	P	H
		7311	43.16	-30.84	74	50.21	35.6	15.08	57.73	100	0	P	H
													H
													H
		4872	41.27	-32.73	74	54.59	34.3	11.21	58.83	100	0	P	V
		7311	42.39	-31.61	74	49.44	35.6	15.08	57.73	100	0	P	V
													V
													V
802.11n HT40 CH 09 2452MHz		4902	41.11	-32.89	74	54.27	34.33	11.27	58.76	100	0	P	H
		7356	46.37	-27.63	74	53.43	35.6	15.11	57.77	100	0	P	H
													H
													H
		4902	41.46	-32.54	74	54.62	34.33	11.27	58.76	100	0	P	V
		7356	43.4	-30.6	74	50.46	35.6	15.11	57.77	100	0	P	V
													V
													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 HT40 (LF)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
2.4GHz 802.11n HT40 LF		96.96	16.91	-26.59	43.5	36.27	9.68	2.06	31.1			P	H
		148.8	23.7	-19.8	43.5	41.11	11.08	2.61	31.1			P	H
		257.34	21.35	-24.65	46	35.87	13.52	2.96	31			P	H
		349.7	17.18	-28.82	46	30.44	14.4	3.39	31.05			P	H
		559.7	21.99	-24.01	46	28.74	20	4.01	30.76			P	H
		941.9	26.65	-19.35	46	27.77	24.32	4.94	30.38	257	12	P	H
													H
													H
													H
													H
													H
													H
		65.1	10	-30	40	33.14	6	2.06	31.2			P	V
		154.47	12.42	-31.08	43.5	30.24	10.72	2.61	31.15			P	V
		259.23	18.39	-27.61	46	32.59	13.84	2.96	31			P	V
		419	18.92	-27.08	46	29.55	16.65	3.52	30.8			P	V
		618.5	23.25	-22.75	46	29.56	20.17	4.08	30.56			P	V
		892.2	29.82	-16.18	46	32.52	22.96	4.66	30.32	145	228	P	V
													V
													V
													V
													V
													V
													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 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".

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2344.02	58.52	-15.48	74	52.98	32.11	7.68	34.25	100	0	P	H
		2339.88	46.41	-7.59	54	40.95	32.11	7.6	34.25	100	0	A	H
	*	2412.024	56.28	-	-	50.63	32.2	7.75	34.3	100	0	P	H
	*	2412.024	45.5	-	-	39.85	32.2	7.75	34.3	100	0	A	H
													H
													H
		2348.79	59.11	-14.89	74	53.57	32.11	7.68	34.25	100	0	P	V
		2376.96	46.38	-7.62	54	40.81	32.16	7.68	34.27	100	0	A	V
	*	2412.024	55.78	-	-	50.13	32.2	7.75	34.3	100	0	P	V
	*	2412.024	45.62	-	-	39.97	32.2	7.75	34.3	100	0	A	V
													V
													V
802.11n HT20 CH 06 2437MHz		2350.05	58.29	-15.71	74	52.75	32.11	7.68	34.25	100	0	P	H
		2322.96	46.32	-7.68	54	40.85	32.09	7.6	34.22	100	0	A	H
	*	2437	56.5	-	-	50.78	32.24	7.83	34.35	100	0	P	H
	*	2437	45.49	-	-	39.77	32.24	7.83	34.35	100	0	A	H
		2488.76	58.45	-15.55	74	52.67	32.3	7.91	34.43	100	0	P	H
		2488.96	46.36	-7.64	54	40.58	32.3	7.91	34.43	100	0	A	H
		2369.13	58.71	-15.29	74	53.14	32.16	7.68	34.27	100	0	P	V
		2368.41	46.36	-7.64	54	40.82	32.13	7.68	34.27	100	0	A	V
	*	2437	56.62	-	-	50.9	32.24	7.83	34.35	100	0	P	V
	*	2437	45.38	-	-	39.66	32.24	7.83	34.35	100	0	A	V
		2499.24	58.73	-15.27	74	53	32.3	7.91	34.48	100	0	P	V
		2498.92	46.29	-7.71	54	40.56	32.3	7.91	34.48	100	0	A	V

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 11 2462MHz	*	2462.041	56.42	-	-	50.64	32.26	7.91	34.39	100	0	P	H
	*	2462.041	45.73	-	-	39.95	32.26	7.91	34.39	100	0	A	H
		2484.04	58.86	-15.14	74	53.1	32.28	7.91	34.43	100	0	P	H
		2485.56	46.21	-7.79	54	40.45	32.28	7.91	34.43	100	0	A	H
													H
													H
	*	2462.041	56.32	-	-	50.54	32.26	7.91	34.39	100	0	P	V
	*	2462.041	45.64	-	-	39.86	32.26	7.91	34.39	100	0	A	V
		2494.8	58.22	-15.78	74	52.49	32.3	7.91	34.48	100	0	P	V
		2484.28	46.48	-7.52	54	40.72	32.28	7.91	34.43	100	0	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	40.63	-33.37	74	54.14	34.26	11.16	58.93	100	0	P	H
													H
													H
													H
		4824	40.39	-33.61	74	53.9	34.26	11.16	58.93	100	0	P	V
													V
													V
													V
802.11n HT20 CH 06 2437MHz		4872	40.52	-33.48	74	53.84	34.3	11.21	58.83	100	0	P	H
		7311	43.25	-30.75	74	50.3	35.6	15.08	57.73	100	0	P	H
													H
													H
		4872	41.35	-32.65	74	54.67	34.3	11.21	58.83	100	0	P	V
		7311	42.51	-31.49	74	49.56	35.6	15.08	57.73	100	0	P	V
													V
													V
802.11n HT20 CH 11 2462MHz		4926	41.24	-32.76	74	54.36	34.34	11.27	58.73	100	0	P	H
		7386	43.18	-30.82	74	50.24	35.6	15.14	57.8	100	0	P	H
													H
													H
		4926	40.84	-33.16	74	53.96	34.34	11.27	58.73	100	0	P	V
		7386	42.87	-31.13	74	49.93	35.6	15.14	57.8	100	0	P	V
													V
													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 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)
2.4GHz 802.11n HT20 LF		40.53	28.36	-11.64	40	44.49	13.3	1.77	31.2	135	111	P	H
		141.24	22.67	-20.83	43.5	39.66	11.5	2.61	31.1			P	H
		298.92	32.85	-13.15	46	47.51	13.19	3.16	31.01			P	H
		377	29.38	-16.62	46	41.96	15.04	3.39	31.01			P	H
		420.4	25.93	-20.07	46	36.4	16.7	3.63	30.8			P	H
		967.1	29.74	-24.26	54	30.36	24.77	4.94	30.33			P	H
													H
													H
													H
													H
													H
													H
		40.8	26.97	-13.03	40	43.1	13.3	1.77	31.2	100	244	P	V
		119.91	20.22	-23.28	43.5	37.54	11.4	2.38	31.1			P	V
		298.92	29	-17	46	43.66	13.19	3.16	31.01			P	V
		324.5	26.09	-19.91	46	40.21	13.6	3.28	31			P	V
		540.8	29.28	-16.72	46	37.31	18.72	4.01	30.76			P	V
		647.2	28.85	-17.15	46	34.74	20.4	4.22	30.51			P	V
													V
													V
													V
													V
													V
													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 CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

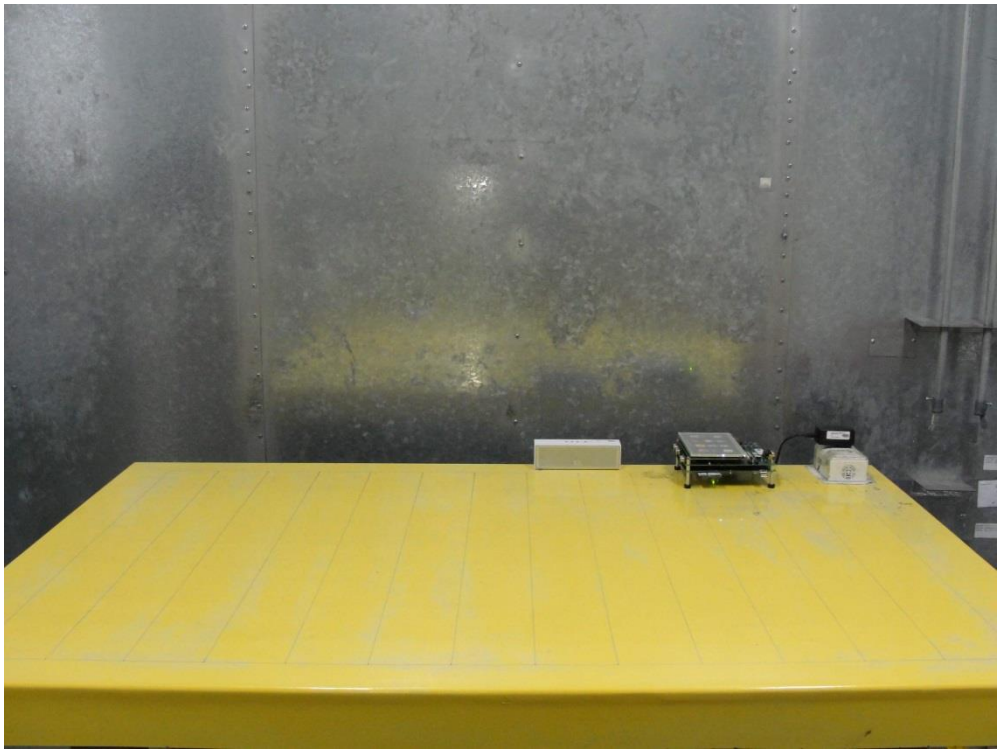
= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

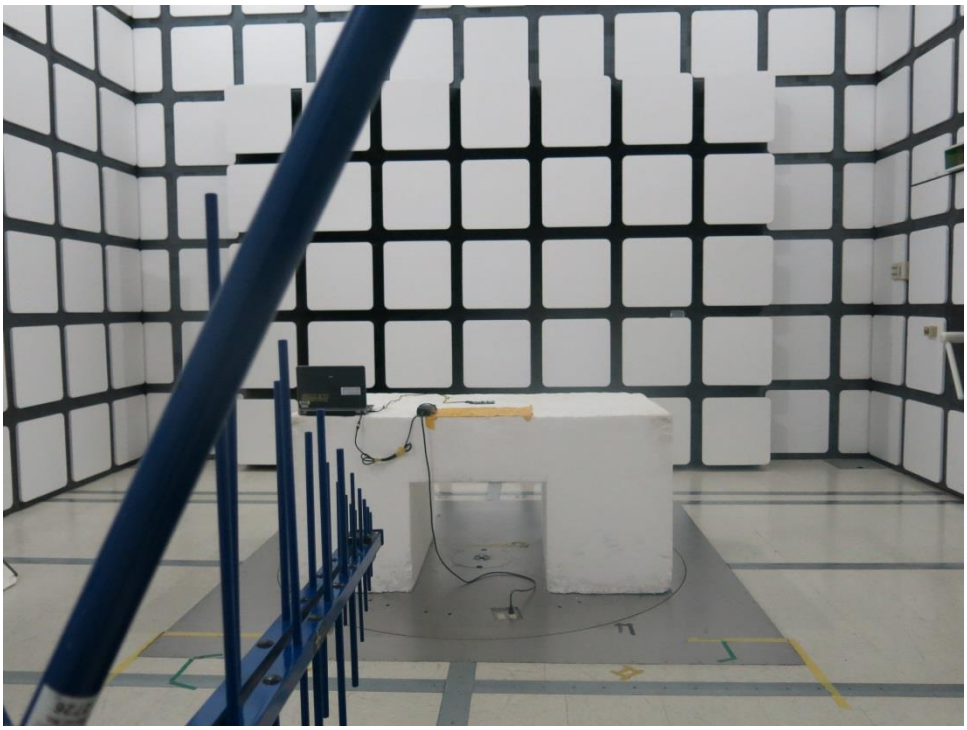
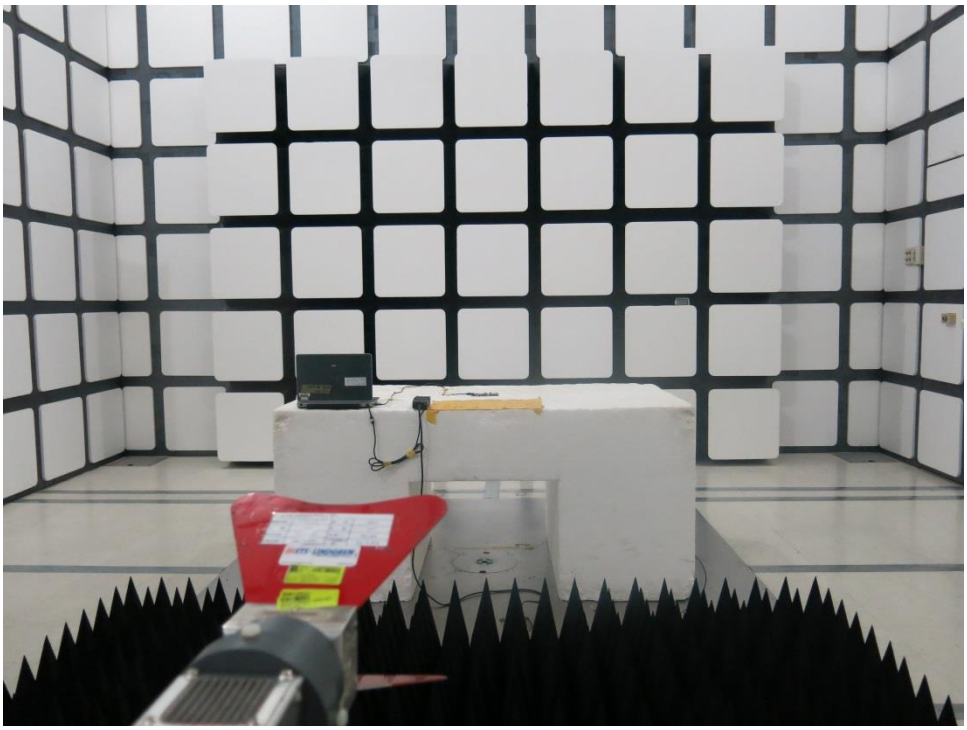
Appendix B. Setup Photographs

<Conducted Emission>



<Radiated Emission>

LF



HF