

FCC RF Test Report

APPLICANT : Violet L.L.C.
EQUIPMENT : Wireless Scanner
MODEL NAME : OR83YV
FCC ID : 2ABD7-5363
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was tested on Jan. 08, 2014. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant 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.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

Report No. : FR361132-01
Report Version : Rev. 01
Page Number : 1 of 50

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR361132-01	Rev. 01	Initial issue of report	Mar. 18, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.09 dB at 2390.000 MHz
-	15.207	AC Conducted Emission	15.207(a)	N/A	EUT is powered on by battery only without any AC power port.
3.6	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Violet L.L.C.

14301 First National Bank Parkway

Suite 100

Omaha, Nebraska 68154

1.2 Feature of Equipment Under Test

Product Feature	
Equipment	Wireless Scanner
Model Name	OR83YV
FCC ID	2ABD7-5363
EUT supports Radios application	WLAN 11b/g/n (HT20)

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

1.3 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 21.24 dBm (0.1330 W) 802.11g : 23.61 dBm (0.2296 W) 802.11n HT20 : 23.52 dBm (0.2249 W)
Antenna Type	Fixed Internal Antenna type with gain 2.67 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.4 Modification of EUT

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

1.5 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	TH02-HY	03CH07-HY	722060/4086B-1

Note: The test site complies with ANSI C63.4 2003 requirement.

1.6 Applied 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 v03r01
- ANSI C63.4-2003

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 tested under standalone configuration due to being powered on by battery and set to operate in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

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

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

2.1 Carrier Frequency Channel

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

2.2 Pre-Scanned RF Power

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

2.4GHz 802.11b mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	21.24	21.18	21.16	21.14

2.4GHz 802.11g mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Peak Power (dBm)	23.61	23.57	23.53	23.60	23.57	23.59	23.58	23.56

2.4GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	23.52	23.49	23.51	23.48	23.41	23.43	23.51	23.45

2.3 Test Mode

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

Test Cases				
Conducted TCs	Test Items	Mode	Data Rate	Test Channel
	6dB BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
	Output Power	802.11b	1 Mbps	1/2/6/11
		802.11g	6 Mbps	1/2/3/6/10/11
		802.11n HT20	MCS0	1/2/3/4/6/10/11
	Conducted Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	MCS0	1/11
	Conducted Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	1/2/11
		802.11g	6 Mbps	1/2/3/10/11
		802.11n HT20	MCS0	1/2/3/4/10/11
	Radiated Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11

2.4 EUT Operation Test Setup

For WLAN function, programmed RF utility, "cmd" installed in the notebook make the EUT provides functions like channel selection and power level for continuous transmitting and receiving signals.

2.5 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.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

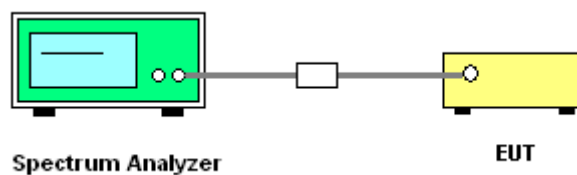
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

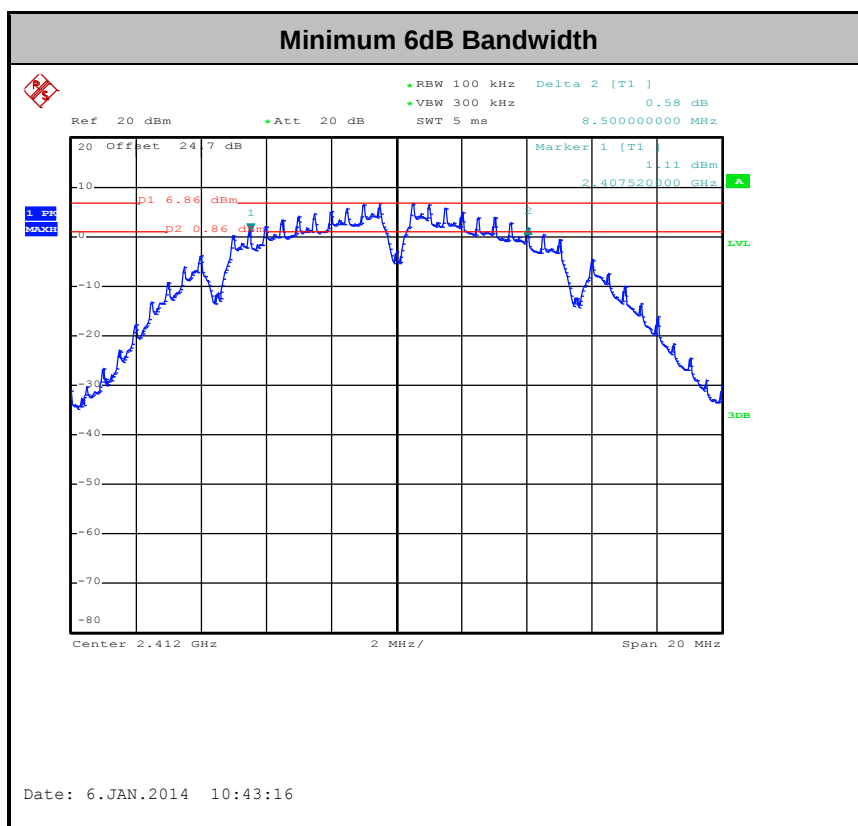
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Test Band :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	8.50	0.5	Pass
11b	1Mbps	1	6	2437	8.52	0.5	Pass
11b	1Mbps	1	11	2462	8.52	0.5	Pass
11g	6Mbps	1	1	2412	15.12	0.5	Pass
11g	6Mbps	1	6	2437	15.10	0.5	Pass
11g	6Mbps	1	11	2462	15.10	0.5	Pass
HT20	MCS0	1	1	2412	15.32	0.5	Pass
HT20	MCS0	1	6	2437	15.12	0.5	Pass
HT20	MCS0	1	11	2462	15.12	0.5	Pass



3.2 Output Power Measurement

3.2.1 Limit of Output Power

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

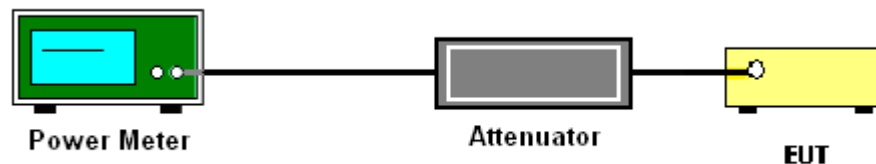
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test Mode :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	RF Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	19.01	30.00	2.67	Pass
11b	1Mbps	1	2	2417	21.24	30.00	2.67	Pass
11b	1Mbps	1	6	2437	20.84	30.00	2.67	Pass
11b	1Mbps	1	11	2462	19.64	30.00	2.67	Pass
11g	6Mbps	1	1	2412	20.63	30.00	2.67	Pass
11g	6Mbps	1	2	2417	22.03	30.00	2.67	Pass
11g	6Mbps	1	3	2422	23.57	30.00	2.67	Pass
11g	6Mbps	1	6	2437	23.61	30.00	2.67	Pass
11g	6Mbps	1	10	2457	23.35	30.00	2.67	Pass
11g	6Mbps	1	11	2462	23.29	30.00	2.67	Pass
HT20	MCS0	1	1	2412	20.82	30.00	2.67	Pass
HT20	MCS0	1	2	2417	22.04	30.00	2.67	Pass
HT20	MCS0	1	3	2422	23.31	30.00	2.67	Pass
HT20	MCS0	1	4	2427	23.52	30.00	2.67	Pass
HT20	MCS0	1	6	2437	23.45	30.00	2.67	Pass
HT20	MCS0	1	10	2457	23.06	30.00	2.67	Pass
HT20	MCS0	1	11	2462	22.99	30.00	2.67	Pass

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

3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	2.4GHz	Temperature :	21~26°C
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Duty Factor (dB)	Average Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	0.00	16.26	30	2.67	Pass
11b	1Mbps	1	2	2417	0.00	18.55	30	2.67	Pass
11b	1Mbps	1	6	2437	0.00	18.13	30	2.67	Pass
11b	1Mbps	1	11	2462	0.00	17.04	30	2.67	Pass
11g	6Mbps	1	1	2412	0.15	10.84	30	2.67	Pass
11g	6Mbps	1	2	2417	0.15	13.01	30	2.67	Pass
11g	6Mbps	1	3	2422	0.15	16.61	30	2.67	Pass
11g	6Mbps	1	6	2437	0.15	16.76	30	2.67	Pass
11g	6Mbps	1	10	2457	0.15	15.48	30	2.67	Pass
11g	6Mbps	1	11	2462	0.15	15.23	30	2.67	Pass
HT20	MCS0	1	1	2412	0.13	10.54	30	2.67	Pass
HT20	MCS0	1	2	2417	0.13	12.79	30	2.67	Pass
HT20	MCS0	1	3	2422	0.13	15.68	30	2.67	Pass
HT20	MCS0	1	4	2427	0.13	17.21	30	2.67	Pass
HT20	MCS0	1	6	2437	0.13	16.65	30	2.67	Pass
HT20	MCS0	1	10	2457	0.13	15.21	30	2.67	Pass
HT20	MCS0	1	11	2462	0.13	15.17	30	2.67	Pass

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

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

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

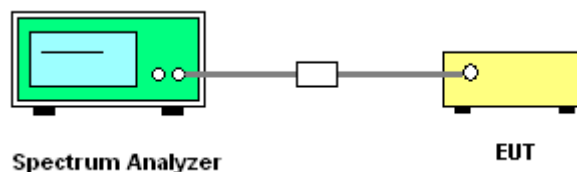
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

3.3.4 Test Setup

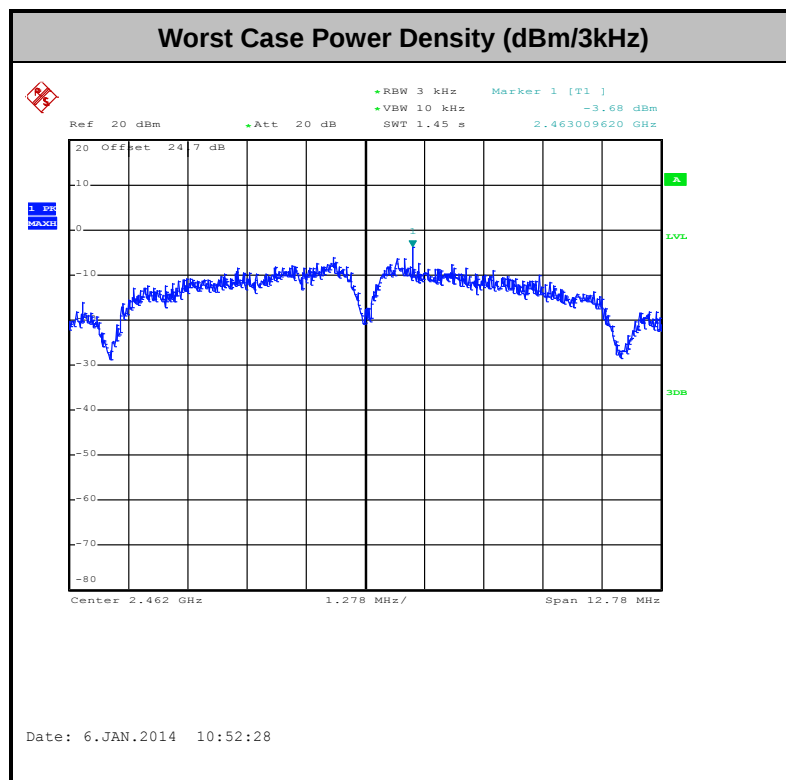


3.3.5 Test Result of Power Spectral Density

Test Mode :	2.4GHz	Temperature :	21~26℃
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Peak Power Density (dBm/3kHz)	Max. Limits (dBm/3kHz)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	-7.95	8	2.67	Pass
11b	1Mbps	1	6	2437	-4.08	8	2.67	Pass
11b	1Mbps	1	11	2462	-3.68	8	2.67	Pass
11g	6Mbps	1	1	2412	-14.34	8	2.67	Pass
11g	6Mbps	1	6	2437	-8.59	8	2.67	Pass
11g	6Mbps	1	11	2462	-10.65	8	2.67	Pass
HT20	MCS0	1	1	2412	-15.97	8	2.67	Pass
HT20	MCS0	1	6	2437	-7.61	8	2.67	Pass
HT20	MCS0	1	11	2462	-10.63	8	2.67	Pass

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



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).

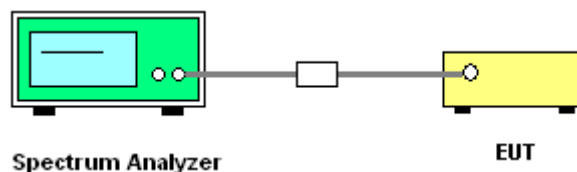
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

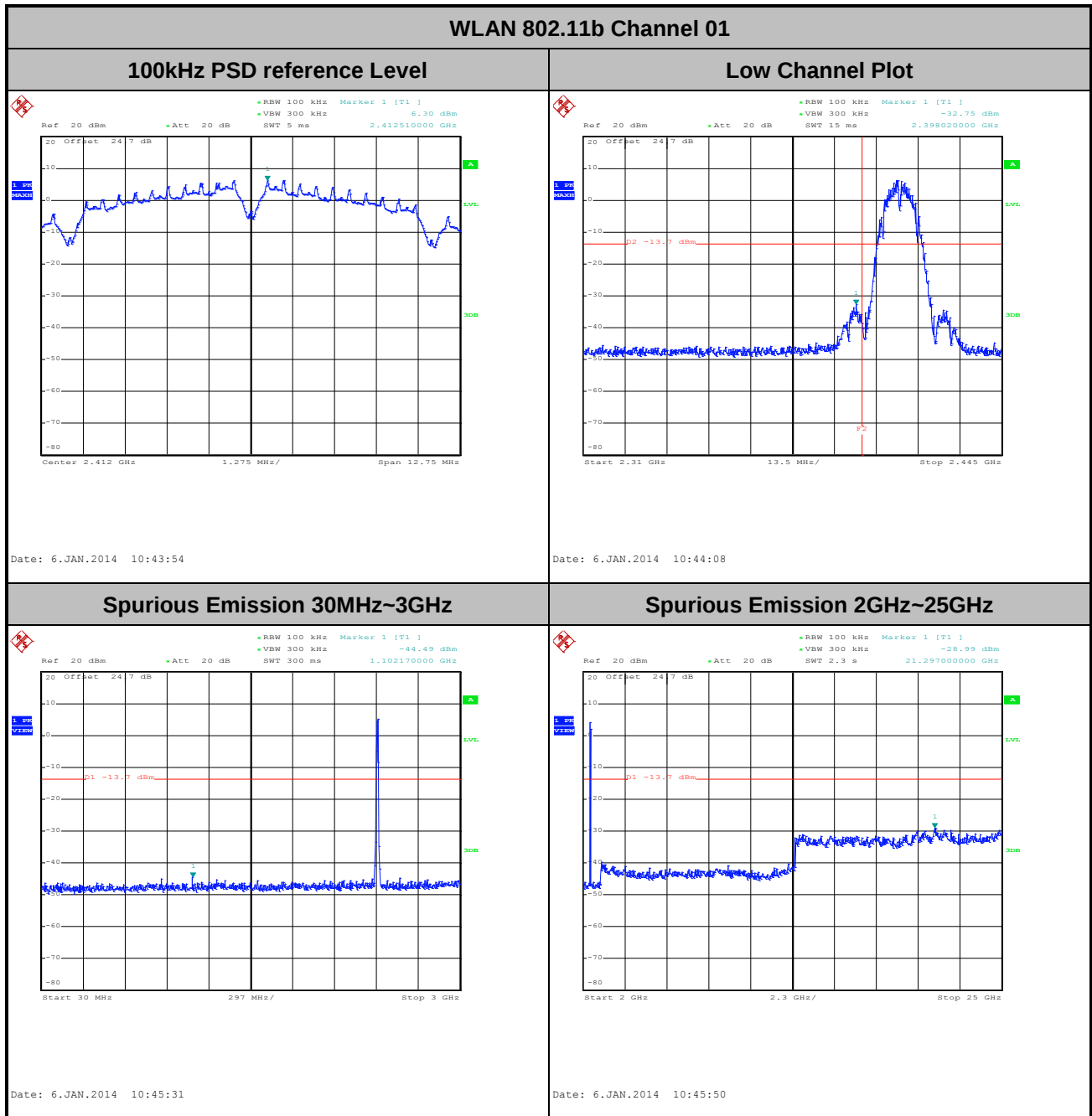
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges and Spurious Emission

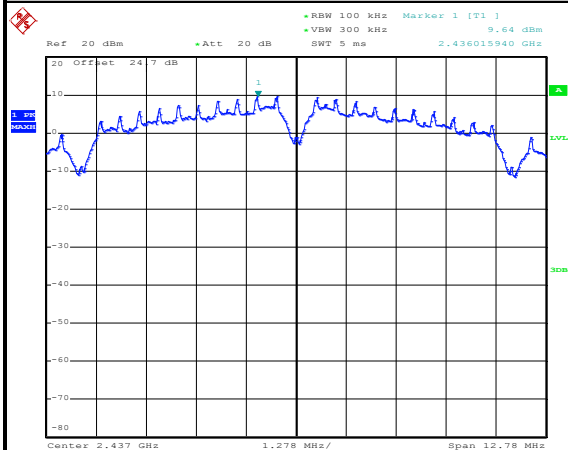
Test Mode :	802.11b	Temperature :	21~26℃
Test Band :	2.4GHz Low	Relative Humidity :	45~54%
Test Channel :	01	Test Engineer :	Stuart Lin



Test Mode :	802.11b	Temperature :	21~26℃
Test Band :	2.4GHz Mid.	Relative Humidity :	45~54%
Test Channel :	06	Test Engineer :	Stuart Lin

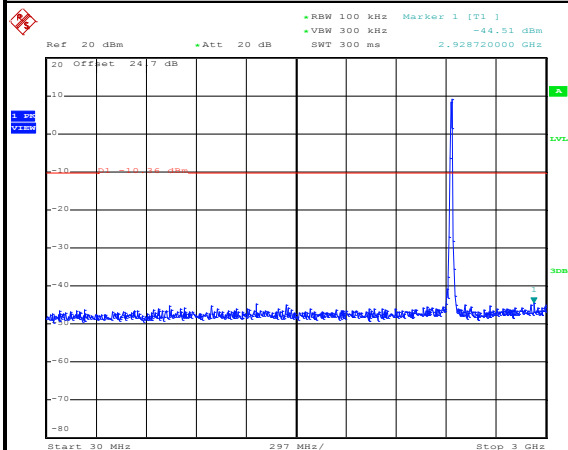
WLAN 802.11b Channel 06

100kHz PSD reference Level



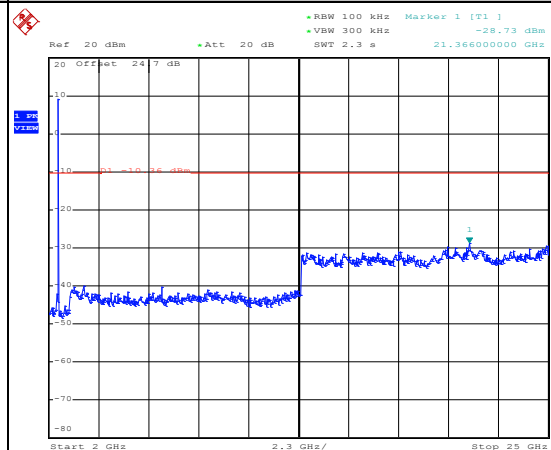
Date: 6.JAN.2014 10:48:59

Spurious Emission 30MHz~3GHz



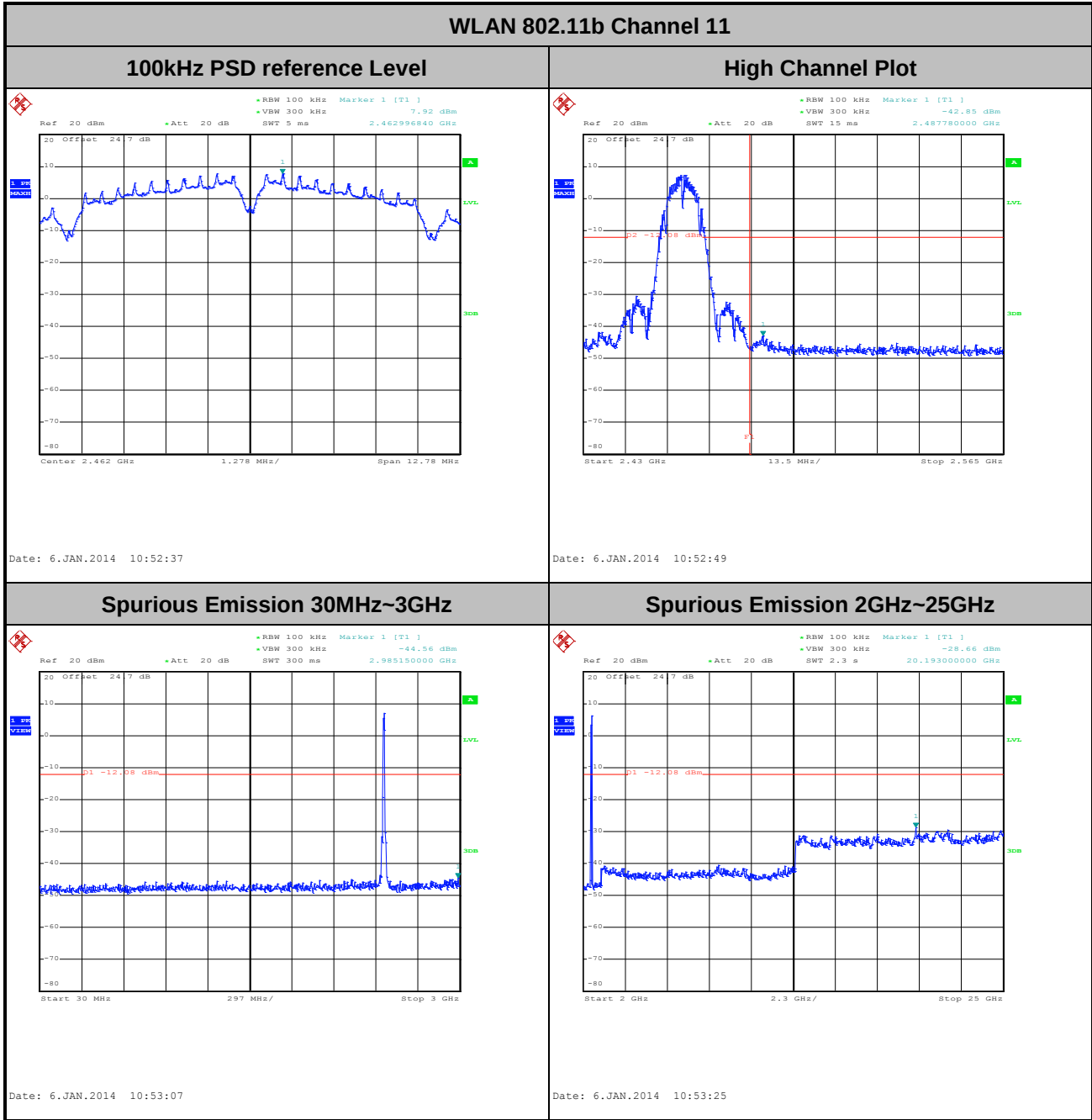
Date: 6.JAN.2014 10:49:19

Spurious Emission 2GHz~25GHz

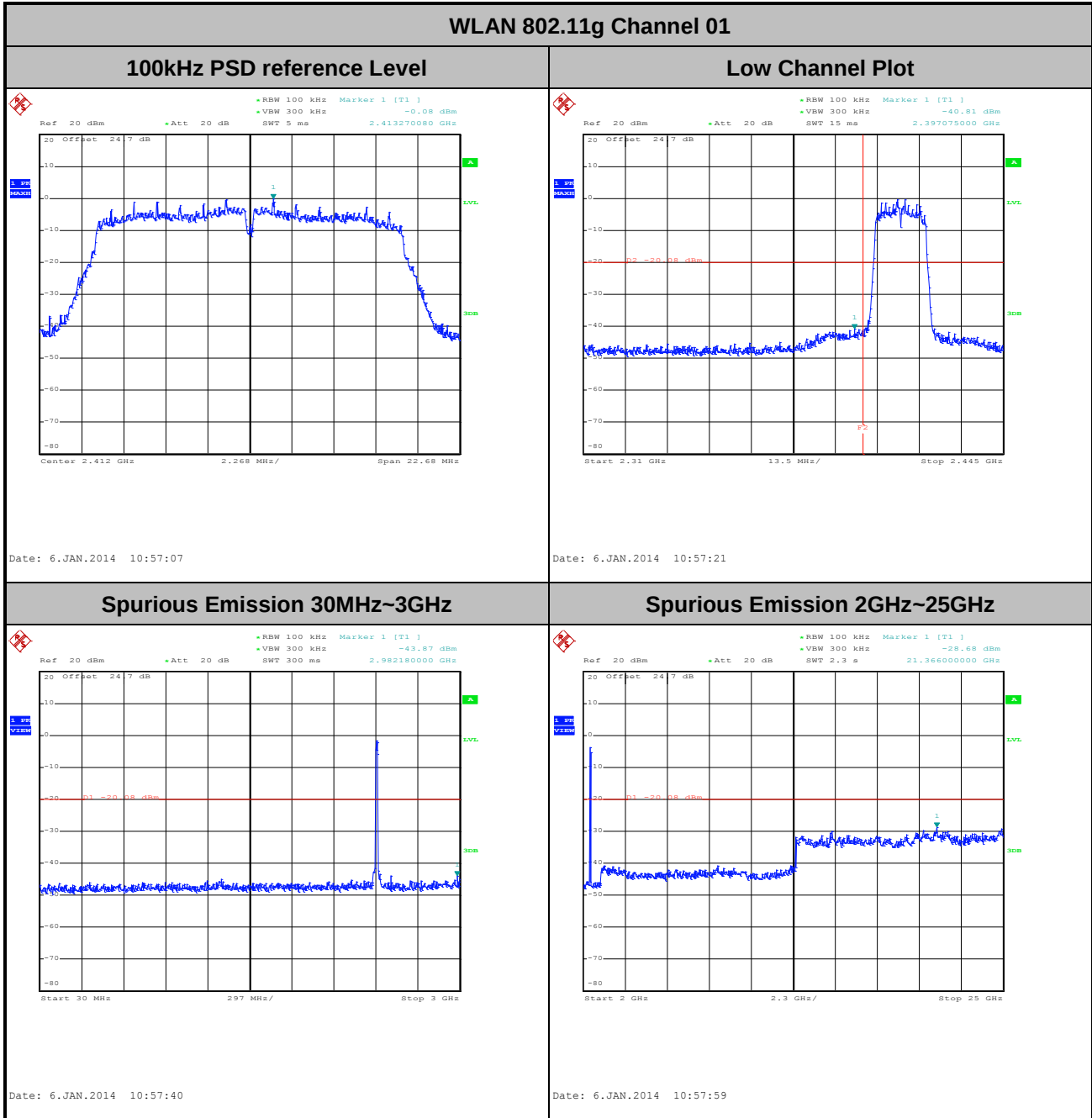


Date: 6.JAN.2014 10:49:37

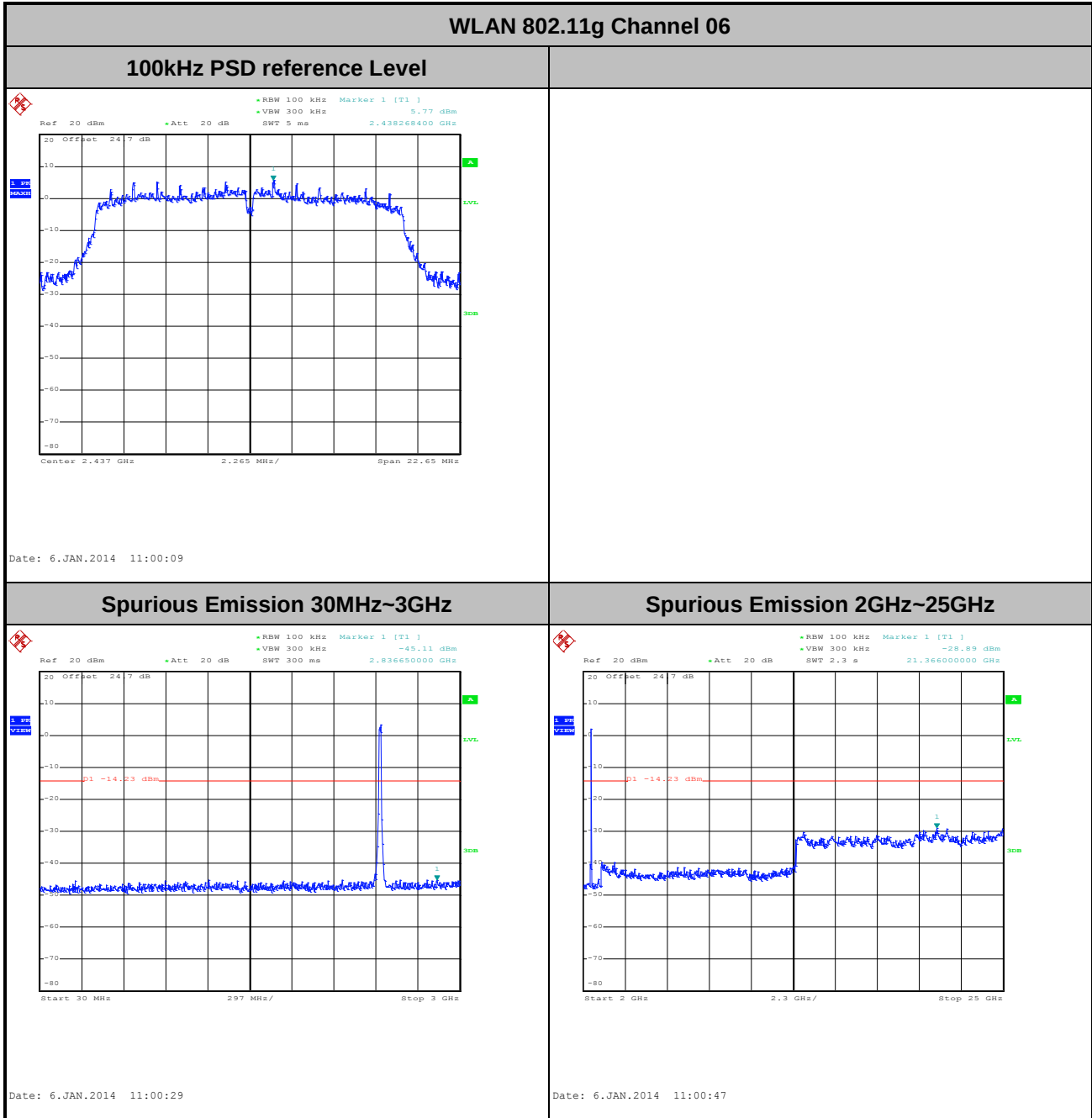
Test Mode :	802.11b	Temperature :	21~26℃
Test Band :	2.4GHz High	Relative Humidity :	45~54%
Test Channel :	11	Test Engineer :	Stuart Lin



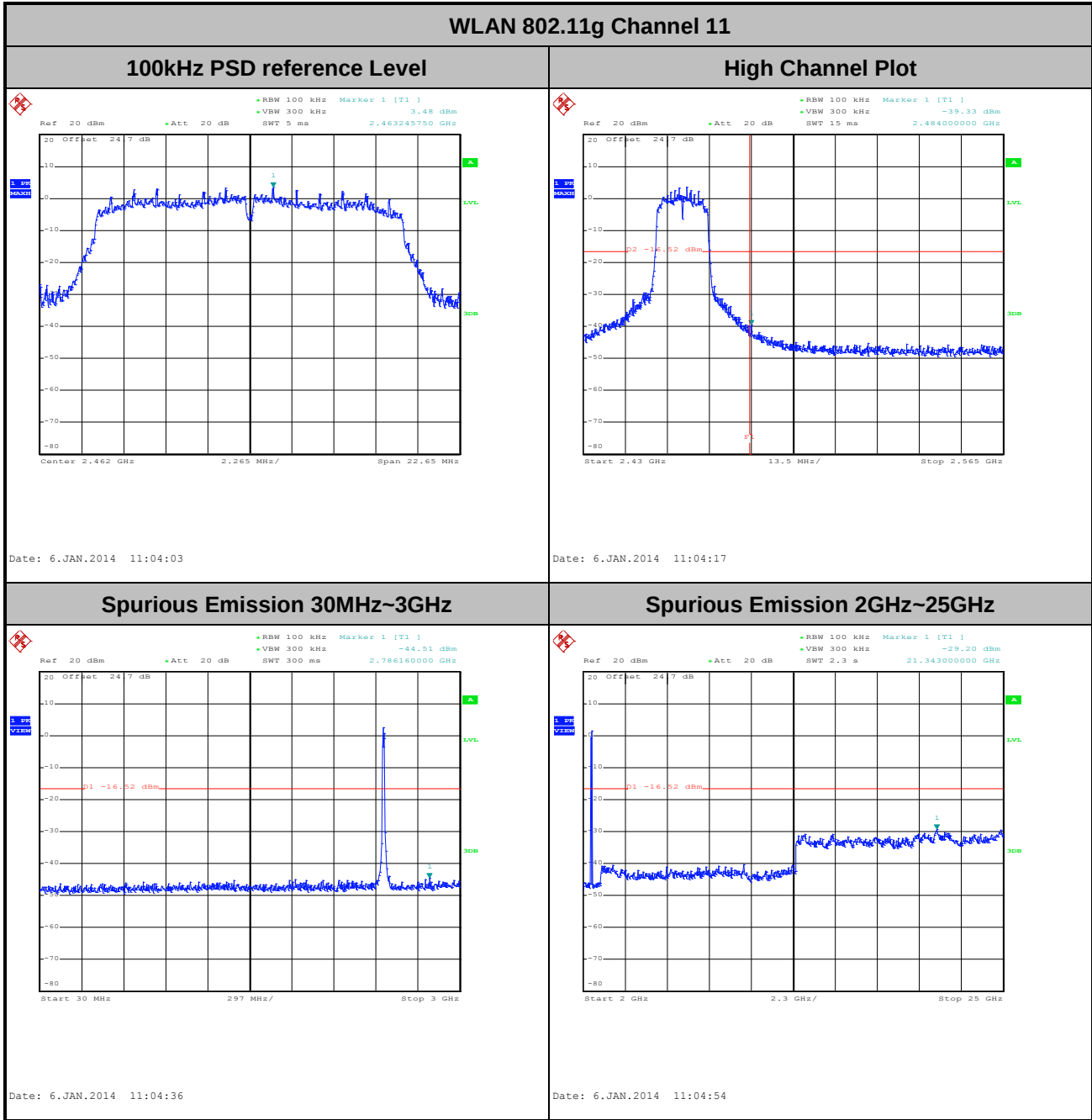
Test Mode :	802.11g	Temperature :	21~26℃
Test Band :	2.4GHz Low	Relative Humidity :	45~54%
Test Channel :	01	Test Engineer :	Stuart Lin



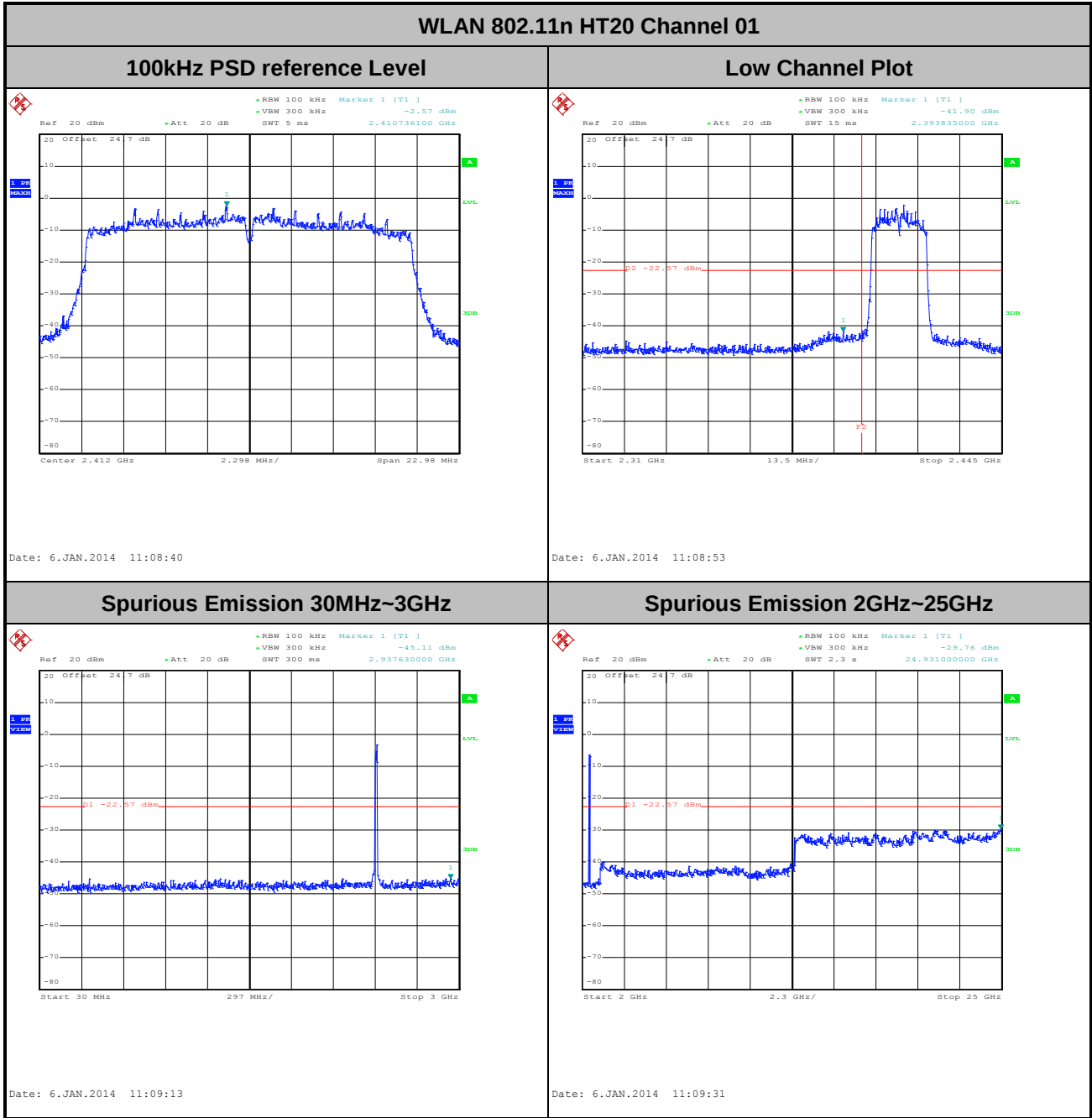
Test Mode :	802.11g	Temperature :	21~26℃
Test Band :	2.4GHz Mid.	Relative Humidity :	45~54%
Test Channel :	06	Test Engineer :	Stuart Lin



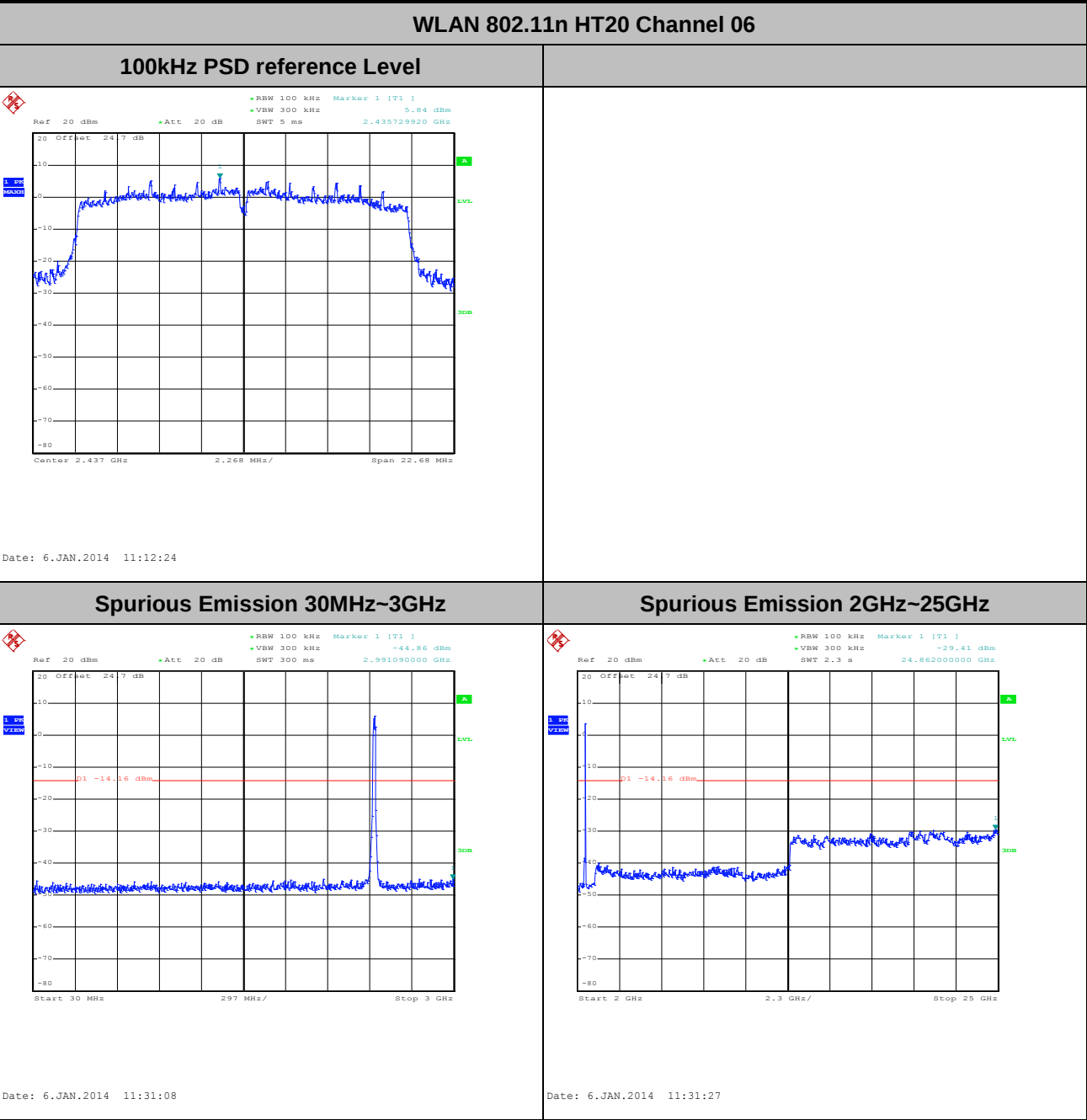
Test Mode :	802.11g	Temperature :	21~26℃
Test Band :	2.4GHz High	Relative Humidity :	45~54%
Test Channel :	11	Test Engineer :	Stuart Lin



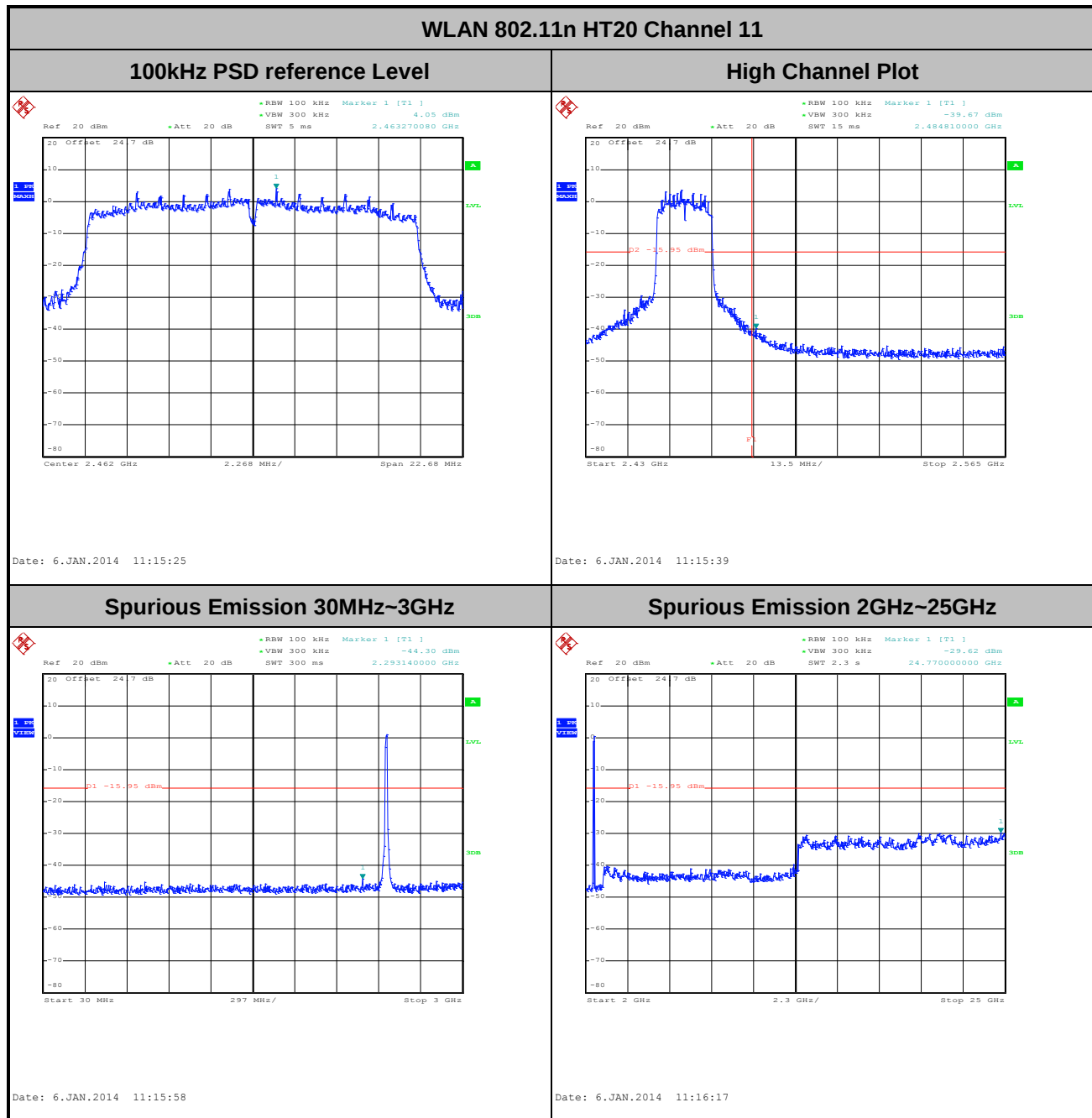
Test Mode :	802.11n HT20	Temperature :	21~26℃
Test Band :	2.4GHz Low	Relative Humidity :	45~54%
Test Channel :	01	Test Engineer :	Stuart Lin



Test Mode :	802.11n HT20	Temperature :	21~26℃
Test Band :	2.4GHz Mid.	Relative Humidity :	45~54%
Test Channel :	06	Test Engineer :	Stuart Lin



Test Mode :	802.11n HT20	Temperature :	21~26°C
Test Band :	2.4GHz High	Relative Humidity :	45~54%
Test Channel :	11	Test Engineer :	Stuart Lin



3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

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

3.5.2 Measuring Instruments

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

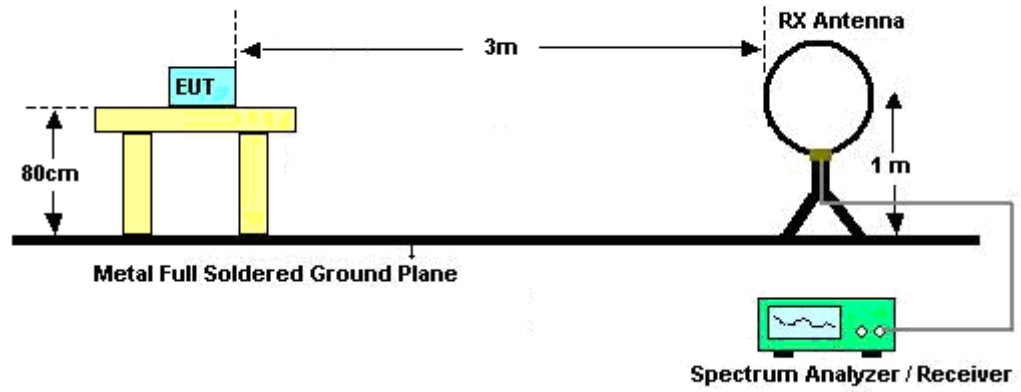
3.5.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
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 - Preamplifier Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.For average measurement:
 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

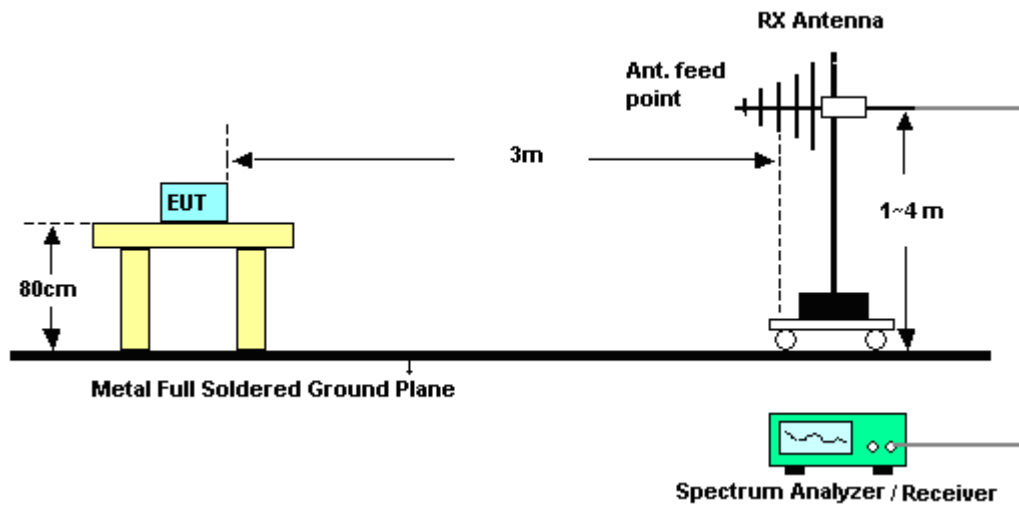
Band	Duty Cycle(%)	T(μ s)	1/T(kHz)	VBW Setting
802.11b	100.00	-	-	10Hz
802.11g	96.55	1400.00	0.71	1kHz
2.4GHz 802.11n HT20	97.04	1310.00	0.76	1kHz

3.5.4 Test Setup

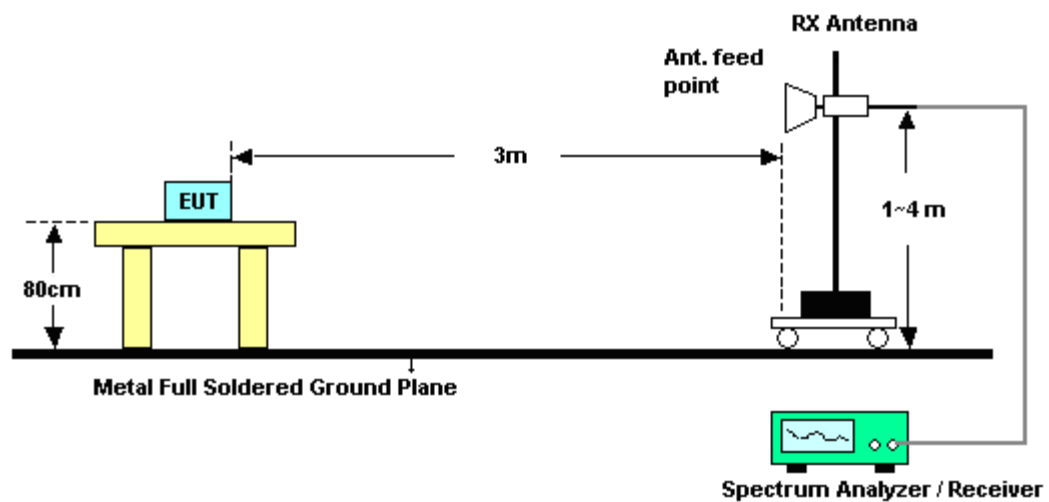
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

3.5.6 Test Result of Radiated Spurious at Band Edges

Test Mode :	802.11b	Temperature :	20~22°C
Test Band :	Low	Relative Humidity :	45~47%
Test Channel :	01	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2386.95	62.02	-11.98	74	57.08	32.3	6.91	34.27	115	54	Peak
2385.33	53.41	-0.59	54	48.49	32.28	6.91	34.27	115	54	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2386.32	58.37	-15.63	74	53.43	32.3	6.91	34.27	107	84	Peak
2385.24	47.83	-6.17	54	42.91	32.28	6.91	34.27	107	84	Average

Test Mode :	802.11b	Temperature :	20~22°C
Test Band :	Low	Relative Humidity :	45~47%
Test Channel :	02	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.92	62.9	-11.1	74	57.99	32.3	6.91	34.3	115	55	Peak
2390	53.36	-0.64	54	48.45	32.3	6.91	34.3	115	55	Average
2418	110.28	-	-	105.37	32.31	6.95	34.35	115	55	Average
2418	114.56	-	-	109.65	32.31	6.95	34.35	115	55	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2388.12	60	-14	74	55.06	32.3	6.91	34.27	108	84	Peak
2390	48.06	-5.94	54	43.15	32.3	6.91	34.3	108	84	Average
2418	105.24	-	-	100.33	32.31	6.95	34.35	108	84	Average
2418	109.53	-	-	104.62	32.31	6.95	34.35	108	84	Peak

Test Mode :	802.11b	Temperature :	20~22°C
Test Band :	High	Relative Humidity :	45~47%
Test Channel :	11	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.65	61.96	-12.04	74	56.95	32.38	7.06	34.43	111	54	Peak
2483.5	51.23	-2.77	54	46.22	32.38	7.06	34.43	111	54	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2487.49	59.29	-14.71	74	54.28	32.38	7.06	34.43	102	90	Peak
2483.5	46.8	-7.2	54	41.79	32.38	7.06	34.43	102	90	Average

Test Mode :	802.11g	Temperature :	20~22°C
Test Band :	Low	Relative Humidity :	45~47%
Test Channel :	01	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2385.96	66.34	-7.66	74	61.4	32.3	6.91	34.27	117	48	Peak
2386.68	53.68	-0.32	54	48.74	32.3	6.91	34.27	117	48	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2388.3	67.03	-6.97	74	62.09	32.3	6.91	34.27	102	52	Peak
2387.94	52.21	-1.79	54	47.27	32.3	6.91	34.27	102	52	Average

Test Mode :	802.11g	Temperature :	20~22°C
Test Band :	Low	Relative Humidity :	45~47%
Test Channel :	02	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2388.75	67.79	-6.21	74	62.85	32.3	6.91	34.27	115	52	Peak
2390	53.91	-0.09	54	49	32.3	6.91	34.3	115	52	Average
2416	100.73	-	-	95.82	32.31	6.95	34.35	115	52	Average
2416	110.17	-	-	105.26	32.31	6.95	34.35	115	52	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2387.85	62.05	-11.95	74	57.11	32.3	6.91	34.27	109	96	Peak
2390	48.83	-5.17	54	43.92	32.3	6.91	34.3	109	96	Average
2418	95.61	-	-	90.7	32.31	6.95	34.35	109	96	Average
2418	105.48	-	-	100.57	32.31	6.95	34.35	109	96	Peak

Test Mode :	802.11g	Temperature :	20~22°C
Test Band :	Low	Relative Humidity :	45~47%
Test Channel :	03	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2388.57	67.5	-6.5	74	62.56	32.3	6.91	34.27	115	53	Peak
2389.65	53.63	-0.37	54	48.69	32.3	6.91	34.27	115	53	Average
2424	104.78	-	-	99.85	32.33	6.95	34.35	115	53	Average
2424	114.37	-	-	109.44	32.33	6.95	34.35	115	53	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.29	59.33	-14.67	74	54.39	32.3	6.91	34.27	102	84	Peak
2389.74	46.19	-7.81	54	41.25	32.3	6.91	34.27	102	84	Average
2424	99.7	-	-	94.77	32.33	6.95	34.35	102	84	Average
2424	109.76	-	-	104.83	32.33	6.95	34.35	102	84	Peak

Test Mode :	802.11g	Temperature :	20~22°C
Test Band :	High	Relative Humidity :	45~47%
Test Channel :	10	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2460	101.92	-	-	96.92	32.37	7.02	34.39	181	344	Average
2460	110.63	-	-	105.63	32.37	7.02	34.39	181	344	Peak
2484.76	70.34	-3.66	74	65.33	32.38	7.06	34.43	181	344	Peak
2483.56	52.73	-1.27	54	47.72	32.38	7.06	34.43	181	344	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2458	102.19	-	-	97.19	32.37	7.02	34.39	166	96	Average
2458	111.43	-	-	106.43	32.37	7.02	34.39	166	96	Peak
2485.15	70.88	-3.12	74	65.87	32.38	7.06	34.43	166	96	Peak
2483.5	52.15	-1.85	54	47.14	32.38	7.06	34.43	166	96	Average

Test Mode :	802.11g	Temperature :	20~22°C
Test Band :	High	Relative Humidity :	45~47%
Test Channel :	11	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.59	69.8	-4.2	74	64.79	32.38	7.06	34.43	181	341	Peak
2483.5	51.96	-2.04	54	46.95	32.38	7.06	34.43	181	341	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.71	72.33	-1.67	74	67.32	32.38	7.06	34.43	103	83	Peak
2483.56	53.83	-0.17	54	48.82	32.38	7.06	34.43	103	83	Average

Test Mode :	802.11n HT20	Temperature :	20~22°C
Test Band :	Low	Relative Humidity :	45~47%
Test Channel :	01	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2388.48	66.06	-7.94	74	61.12	32.3	6.91	34.27	114	58	Peak
2388.66	53.3	-0.7	54	48.36	32.3	6.91	34.27	114	58	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2387.85	60.53	-13.47	74	55.59	32.3	6.91	34.27	107	81	Peak
2389.74	48.62	-5.38	54	43.68	32.3	6.91	34.27	107	81	Average

Test Mode :	802.11n HT20	Temperature :	20~22°C
Test Band :	Low	Relative Humidity :	45~47%
Test Channel :	02	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.2	67.5	-6.5	74	62.56	32.3	6.91	34.27	115	53	Peak
2389.92	53.08	-0.92	54	48.17	32.3	6.91	34.3	115	53	Average
2416	100.78	-	-	95.87	32.31	6.95	34.35	115	53	Average
2416	110.16	-	-	105.25	32.31	6.95	34.35	115	53	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	63.15	-10.85	74	58.24	32.3	6.91	34.3	108	83	Peak
2390	49.1	-4.9	54	44.19	32.3	6.91	34.3	108	83	Average
2418	95.8	-	-	90.89	32.31	6.95	34.35	108	83	Average
2418	105.34	-	-	100.43	32.31	6.95	34.35	108	83	Peak

Test Mode :	802.11n HT20	Temperature :	20~22°C
Test Band :	Low	Relative Humidity :	45~47%
Test Channel :	03	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2388.39	67.68	-6.32	74	62.74	32.3	6.91	34.27	114	57	Peak
2389.83	52.83	-1.17	54	47.92	32.3	6.91	34.3	114	57	Average
2424	103.16	-	-	98.23	32.33	6.95	34.35	114	57	Average
2424	113.28	-	-	108.35	32.33	6.95	34.35	114	57	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.38	60	-14	74	55.06	32.3	6.91	34.27	102	83	Peak
2390	46.03	-7.97	54	41.12	32.3	6.91	34.3	102	83	Average
2422	96.57	-	-	91.64	32.33	6.95	34.35	102	83	Average
2422	106.88	-	-	101.95	32.33	6.95	34.35	102	83	Peak

Test Mode :	802.11n HT20	Temperature :	20~22°C
Test Band :	Low	Relative Humidity :	45~47%
Test Channel :	04	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.92	61.85	-12.15	74	56.94	32.3	6.91	34.3	119	343	Peak
2389.38	47.24	-6.76	54	42.3	32.3	6.91	34.27	119	343	Average
2426	101.16	-	-	96.23	32.33	6.95	34.35	119	343	Average
2426	110.45	-	-	105.52	32.33	6.95	34.35	119	343	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2388.66	58.09	-15.91	74	53.15	32.3	6.91	34.27	169	82	Peak
2390	44.88	-9.12	54	39.97	32.3	6.91	34.3	169	82	Average
2428	98.31	-	-	93.34	32.33	6.99	34.35	169	82	Average
2428	107.77	-	-	102.8	32.33	6.99	34.35	169	82	Peak

Test Mode :	802.11n HT20	Temperature :	20~22°C
Test Band :	High	Relative Humidity :	45~47%
Test Channel :	10	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2456	102.82	-	-	97.82	32.37	7.02	34.39	115	50	Average
2456	112.96	-	-	107.96	32.37	7.02	34.39	115	50	Peak
2487.79	69.16	-4.84	74	64.13	32.4	7.06	34.43	115	50	Peak
2483.53	51.96	-2.04	54	46.95	32.38	7.06	34.43	115	50	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2456	97.32	-	-	92.32	32.37	7.02	34.39	100	80	Average
2456	107.36	-	-	102.36	32.37	7.02	34.39	100	80	Peak
2486.62	65.51	-8.49	74	60.5	32.38	7.06	34.43	100	80	Peak
2483.5	48.63	-5.37	54	43.62	32.38	7.06	34.43	100	80	Average

Test Mode :	802.11n HT20	Temperature :	20~22°C
Test Band :	High	Relative Humidity :	45~47%
Test Channel :	11	Test Engineer :	Eric Shih

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2484.01	70.68	-3.32	74	65.67	32.38	7.06	34.43	112	53	Peak
2483.56	52.95	-1.05	54	47.94	32.38	7.06	34.43	112	53	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.74	68.51	-5.49	74	63.5	32.38	7.06	34.43	103	87	Peak
2483.59	48.8	-5.2	54	43.79	32.38	7.06	34.43	103	87	Average

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

Note: Pre-scanned all test modes and only choose the worst case mode recorded in the test report for radiated spurious emission below 1GHz.

Test Mode :	802.11b	Temperature :	20~22°C
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	111.05	-	-	106.09	32.31	6.95	34.3	115	55	Average
2412	115.14	-	-	110.18	32.31	6.95	34.3	115	55	Peak
4824	49.87	-4.13	54	66.06	33.97	8.77	58.93	111	334	Average
4824	51.53	-22.47	74	67.72	33.97	8.77	58.93	111	334	Peak

Test Mode :	802.11b	Temperature :	20~22°C
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	98.27	-	-	93.31	32.31	6.95	34.3	107	84	Average
2412	107.1	-	-	102.14	32.31	6.95	34.3	107	84	Peak
4824	48.23	-25.77	74	64.42	33.97	8.77	58.93	100	0	Peak

Test Mode :	802.11b	Temperature :	20~22°C
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	109.22	-	-	104.23	32.35	6.99	34.35	114	52	Average
2438	113.49	-	-	108.5	32.35	6.99	34.35	114	52	Peak
4875	46.54	-7.46	54	62.6	33.95	8.82	58.83	100	150	Average
4875	51.5	-22.5	74	67.56	33.95	8.82	58.83	100	150	Peak
7311	44.27	-29.73	74	55.55	35.54	10.91	57.73	100	0	Peak

Test Mode :	802.11b	Temperature :	20~22°C
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	104.25	-	-	99.26	32.35	6.99	34.35	106	98	Average
2438	108.03	-	-	103.04	32.35	6.99	34.35	106	98	Peak
4875	51.16	-2.84	54	67.22	33.95	8.82	58.83	102	352	Average
4875	52.57	-21.43	74	68.63	33.95	8.82	58.83	102	352	Peak
7308	44.7	-29.3	74	55.98	35.54	10.91	57.73	100	0	Peak

Test Mode :	802.11b	Temperature :	20~22°C
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	108.51	-	-	103.51	32.37	7.02	34.39	111	54	Average
2462	112.96	-	-	107.96	32.37	7.02	34.39	111	54	Peak
4926	53.22	-0.78	54	69.12	33.93	8.9	58.73	109	173	Average
4926	53.23	-20.77	74	69.13	33.93	8.9	58.73	109	173	Peak
7386	44.43	-29.57	74	55.72	35.52	10.99	57.8	100	0	Peak

Test Mode :	802.11b	Temperature :	20~22°C
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	103.63	-	-	98.63	32.37	7.02	34.39	102	90	Average
2462	107.9	-	-	102.9	32.37	7.02	34.39	102	90	Peak
4926	52.55	-1.45	54	68.45	33.93	8.9	58.73	138	158	Average
4926	53.37	-20.63	74	69.27	33.93	8.9	58.73	138	158	Peak
7386	46.1	-27.9	74	57.39	35.52	10.99	57.8	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22°C
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	98.42	-	-	93.46	32.31	6.95	34.3	117	48	Average
2412	108.01	-	-	103.05	32.31	6.95	34.3	117	48	Peak
4827	47.03	-26.97	74	63.22	33.97	8.77	58.93	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22°C
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	97.56	-	-	92.6	32.31	6.95	34.3	102	52	Average
2412	106.91	-	-	101.95	32.31	6.95	34.3	102	52	Peak
4815	48.13	-25.87	74	64.34	33.98	8.77	58.96	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22°C
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	2438 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	105.74	-	-	100.75	32.35	6.99	34.35	114	51	Average
2438	117.42	-	-	112.43	32.35	6.99	34.35	114	51	Peak
4872	52.35	-1.65	54	68.41	33.95	8.82	58.83	100	1	Average
4872	58.16	-15.84	74	74.22	33.95	8.82	58.83	100	1	Peak
7305	44.22	-9.78	54	55.5	35.54	10.91	57.73	100	6	Average
7305	51.05	-22.95	74	62.33	35.54	10.91	57.73	100	6	Peak

Test Mode :	802.11g	Temperature :	20~22°C
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	2438 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	100.44	-	-	95.45	32.35	6.99	34.35	105	96	Average
2438	109.88	-	-	104.89	32.35	6.99	34.35	105	96	Peak
4866	50.9	-3.1	54	66.98	33.96	8.82	58.86	112	217	Average
4866	56.17	-17.83	74	72.25	33.96	8.82	58.86	112	217	Peak
7302	46.67	-7.33	54	57.95	35.54	10.91	57.73	144	222	Average
7302	53.52	-20.48	74	64.8	35.54	10.91	57.73	144	222	Peak

Test Mode :	802.11g	Temperature :	20~22°C
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
31.35	18.7	-21.3	40	31.3	18.28	0.54	31.42	-	-	Peak
240.06	23.66	-22.34	46	41.73	11.4	1.53	31	-	-	Peak
288.12	24.82	-21.18	46	41.16	13.04	1.68	31.06	-	-	Peak
503.7	45.24	-0.76	46	55.37	18.03	2.46	30.62	186	111	Peak
503.7	41.67	-4.33	46	51.8	18.03	2.46	30.62	186	111	QP
552	45.55	-0.45	46	53.94	19.84	2.56	30.79	171	105	Peak
552	42.64	-3.36	46	51.03	19.84	2.56	30.79	171	105	QP
575.8	43.15	-2.85	46	51.59	19.64	2.62	30.7	153	110	Peak
575.8	42.32	-3.68	46	50.76	19.64	2.62	30.7	153	110	QP
2462	100.13	-	-	95.13	32.37	7.02	34.39	181	341	Average
2462	110.33	-	-	105.33	32.37	7.02	34.39	181	341	Peak
4923	46.96	-7.04	54	62.89	33.93	8.87	58.73	121	3	Average
4923	55.32	-18.68	74	71.25	33.93	8.87	58.73	121	3	Peak
7377	44.95	-29.05	74	56.23	35.52	10.99	57.79	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22°C
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
51.33	14.5	-25.5	40	36.99	8	0.71	31.2	-	-	Peak
171.75	14.51	-28.99	43.5	34.8	9.54	1.23	31.06	-	-	Peak
264.09	18.35	-27.65	46	34.18	13.56	1.61	31	-	-	Peak
503.7	37.42	-8.58	46	47.55	18.03	2.46	30.62	-	-	Peak
552	39.28	-6.72	46	47.67	19.84	2.56	30.79	128	197	Peak
575.8	38.94	-7.06	46	47.38	19.64	2.62	30.7	-	-	Peak
2462	101.48	-	-	96.48	32.37	7.02	34.39	103	83	Average
2462	111.48	-	-	106.48	32.37	7.02	34.39	103	83	Peak
4929	45.64	-8.36	54	61.54	33.93	8.9	58.73	100	344	Average
4929	54.28	-19.72	74	70.18	33.93	8.9	58.73	100	344	Peak
7383	46.77	-27.23	74	58.05	35.52	10.99	57.79	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	20~22°C
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2414	98.61	-	-	93.65	32.31	6.95	34.3	114	58	Average
2414	109.07	-	-	104.11	32.31	6.95	34.3	114	58	Peak
4821	46.66	-27.34	74	62.85	33.97	8.77	58.93	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	20~22°C
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2414	93.48	-	-	88.52	32.31	6.95	34.3	107	81	Average
2414	102.83	-	-	97.87	32.31	6.95	34.3	107	81	Peak
4824	48.76	-25.24	74	64.95	33.97	8.77	58.93	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	20~22°C
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	104.26	-	-	99.27	32.35	6.99	34.35	112	51	Average
2438	114.12	-	-	109.13	32.35	6.99	34.35	112	51	Peak
4875	49.88	-4.12	54	65.94	33.95	8.82	58.83	110	3	Average
4875	59.85	-14.15	74	75.91	33.95	8.82	58.83	110	3	Peak
7305	45.27	-28.73	74	56.55	35.54	10.91	57.73	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	20~22°C
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2438 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2438	99.21	-	-	94.22	32.35	6.99	34.35	103	85	Average
2438	109.38	-	-	104.39	32.35	6.99	34.35	103	85	Peak
4866	43.29	-10.71	54	59.37	33.96	8.82	58.86	100	102	Average
4866	56.58	-17.42	74	72.66	33.96	8.82	58.86	100	102	Peak
7308	47.28	-26.72	74	58.56	35.54	10.91	57.73	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	20~22°C
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	100.19	-	-	95.19	32.37	7.02	34.39	112	53	Average
2462	110.35	-	-	105.35	32.37	7.02	34.39	112	53	Peak
4929	46.79	-27.21	74	62.69	33.93	8.9	58.73	100	0	Peak
7386	42.45	-31.55	74	53.74	35.52	10.99	57.8	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	20~22°C
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Eric Shih	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	95.02	-	-	90.02	32.37	7.02	34.39	103	87	Average
2462	105.3	-	-	100.3	32.37	7.02	34.39	103	87	Peak
4926	46.65	-27.35	74	62.55	33.93	8.9	58.73	100	0	Peak
7335	44.53	-29.47	74	55.82	35.53	10.94	57.76	100	0	Peak

3.6 Antenna Requirements

3.6.1 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.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.6.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Dec. 17, 2013 ~ Jan. 06, 2014	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 17, 2013	Dec. 17, 2013 ~ Jan. 06, 2014	Aug. 16, 2014	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 17, 2013	Dec. 17, 2013 ~ Jan. 06, 2014	Aug. 16, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9 kHz~7 GHz	Sep. 06, 2013	Jan. 07, 2014 ~ Jan. 08, 2014	Sep. 05, 2014	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9 kHz ~ 30 GHz	Nov. 20, 2013	Jan. 07, 2014 ~ Jan. 08, 2014	Nov. 19, 2014	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9 kHz~30 Mhz	Jul. 03, 2012	Jan. 07, 2014 ~ Jan. 08, 2014	Jul. 03, 2014	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30 MHz ~ 1 GHz	Oct. 10, 2013	Jan. 07, 2014 ~ Jan. 08, 2014	Oct. 09, 2014	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1 GHz~18 GHz	Aug. 22, 2013	Jan. 07, 2014 ~ Jan. 08, 2014	Aug. 21, 2014	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15 GHz- 40 GHz	Oct. 03, 2013	Jan. 07, 2014 ~ Jan. 08, 2014	Oct. 02, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	30 MHz~1 GHz	Feb. 26, 2013	Jan. 07, 2014 ~ Jan. 08, 2014	Feb. 25, 2014	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A01917	1 GHz~26.5 GHz	Aug. 12, 2013	Jan. 07, 2014 ~ Jan. 08, 2014	Aug. 11, 2014	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	159088	DC~18 G High Gain	Feb. 27, 2013	Jan. 07, 2014 ~ Jan. 08, 2014	Feb. 26, 2014	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Jan. 07, 2014 ~ Jan. 08, 2014	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Jan. 07, 2014 ~ Jan. 08, 2014	N/A	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

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