



FCC RF Test Report

APPLICANT : Starry, Inc.
EQUIPMENT : Starry Wing
BRAND NAME : Starry
MODEL NAME : S00211
FCC ID : 2AGZ3S00211
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product testing was completed on Jan. 16, 2017. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Prepared by: James Huang / Manager

Approved by: Jones Tsai / Manager



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



TABLE OF CONTENTS

1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer.....	5
1.3 Product Feature of Equipment Under Test.....	5
1.4 Product Specification of Equipment Under Test.....	6
1.5 Modification of EUT	6
1.6 Testing Location	7
1.7 Applicable Standards.....	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST.....	8
2.1 Carrier Frequency and Channel	8
2.2 Test Mode.....	8
2.3 Connection Diagram of Test System.....	9
2.4 Support Unit used in test configuration and system.....	10
2.5 EUT Operation Test Setup	10
2.6 Measurement Results Explanation Example.....	10
3 TEST RESULT.....	11
3.1 6dB Bandwidth Measurement	11
3.2 Peak Output Power Measurement	13
3.3 Power Spectral Density Measurement.....	14
3.4 Conducted Band Edges and Spurious Emission Measurement	16
3.5 Radiated Band Edges and Spurious Emission Measurement	47
3.6 AC Conducted Emission Measurement.....	51
3.7 Antenna Requirements	55
4 LIST OF MEASURING EQUIPMENT	56
5 UNCERTAINTY OF EVALUATION	57
APPENDIX A. CONDUCTED TEST RESULTS	
APPENDIX B. RADIATED SPURIOUS EMISSION	
APPENDIX C. DUTY CYCLE PLOTS	
APPENDIX D. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR690802C	Rev. 01	Initial issue of report	Jan. 25, 2017



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 0.53 dB at 2483.500 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 5.55 dB at 0.389 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Starry, Inc.
PO Box 52226 Boston, MA 02205

1.2 Manufacturer

Flextronics Manufacturing (Zhuhai) Co. Ltd
Xin Qing Science & Technology Industrial Park, Doumen County, Zhuhai

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Starry Wing
Brand Name	Starry
Model Name	S00211
FCC ID	2AGZ3S00211
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth v3.0 + EDR/Bluetooth v4.0 LE/Bluetooth v4.2 LE
HW Version	Wing Ver1.2
SW Version	uboot version:1.0.9 Kernel version:W00002
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 of Equipment Under Test

Standards-related Product Specification											
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz										
Maximum (Peak) Output Power to antenna	<Ant. 1> 802.11b : 19.81 dBm (0.0957 W) 802.11g : 25.04 dBm (0.3192 W) 802.11n HT20 : 25.12 dBm (0.3251 W) 802.11n HT40 : 21.74 dBm (0.1493 W) <Ant. 2> 802.11b : 20.53 dBm (0.1130 W) 802.11g : 24.18 dBm (0.2618 W) 802.11n HT20 : 25.66 dBm (0.3681 W) 802.11n HT40 : 22.17 dBm (0.1648 W) MIMO <Ant. 1 + 2> 802.11n HT20 : 28.82 dBm (0.7621 W) 802.11n HT40 : 27.15 dBm (0.5188 W)										
Antenna Type / Gain	<Ant 1> FPC Antenna with gain 2.93 dBi <Ant 2> FPC Antenna with gain 2.92 dBi										
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)										
Antenna Function for Transmitter	<table border="1"><thead><tr><th></th><th>Ant. 1</th><th>Ant. 2</th></tr></thead><tbody><tr><td>802.11 b/g/n SISO</td><td>V</td><td>V</td></tr><tr><td>802.11 n MIMO</td><td>V</td><td>V</td></tr></tbody></table>			Ant. 1	Ant. 2	802.11 b/g/n SISO	V	V	802.11 n MIMO	V	V
	Ant. 1	Ant. 2									
802.11 b/g/n SISO	V	V									
802.11 n MIMO	V	V									

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

1.5 Modification of EUT

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



1.6 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.		
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
Test Site No.	Sportun Site No.		FCC Registration No.
	TH01-KS	03CH03-KS	CO01-KS
306251			

Note: The test site complies with ANSI C63.4 2014 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 v03r05
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

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

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 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

Single Antenna

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

MIMO Antenna

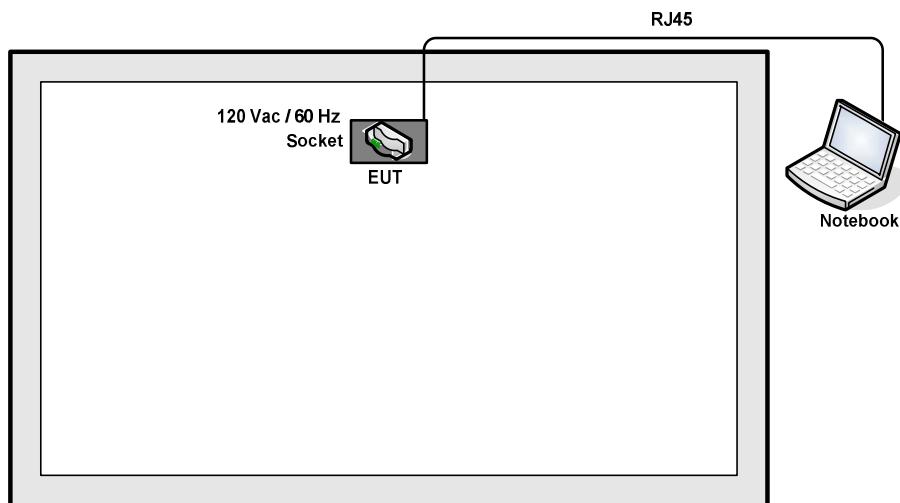
Modulation	Data Rate
802.11n HT20	MCS0
802.11n HT40	MCS0

Test Cases

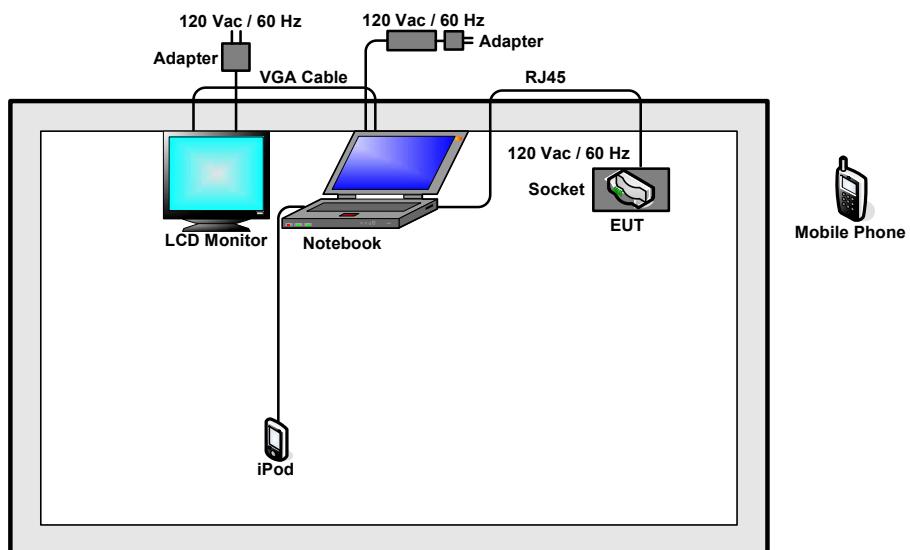
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN (2.4G) Link + LAN Link
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2.3 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>





2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	E49	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
2.	LCD Monitor	DELL	BO-130	N/A	N/A	Unshielded, 1.8 m
3.	iPod	Apple	A1199	FCC DoC	Shielded, 1.2 m	N/A
4.	Mobile Phone	ZTE	A1	N/A	N/A	N/A
5.	VGA Cable	N/A	N/A	N/A	N/A	N/A
6.	Socket	N/A	N/A	N/A	N/A	N/A

2.5 EUT Operation Test Setup

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

For AC power line conducted emissions, the EUT was set to connect with the Notebook (for LAN/WLAN Link) and Mobile phone (for Bluetooth Link) under large package sizes transmission.

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 5.5dB.

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

= 5.5 (dB)



3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

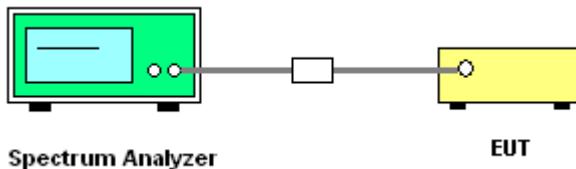
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz.
Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

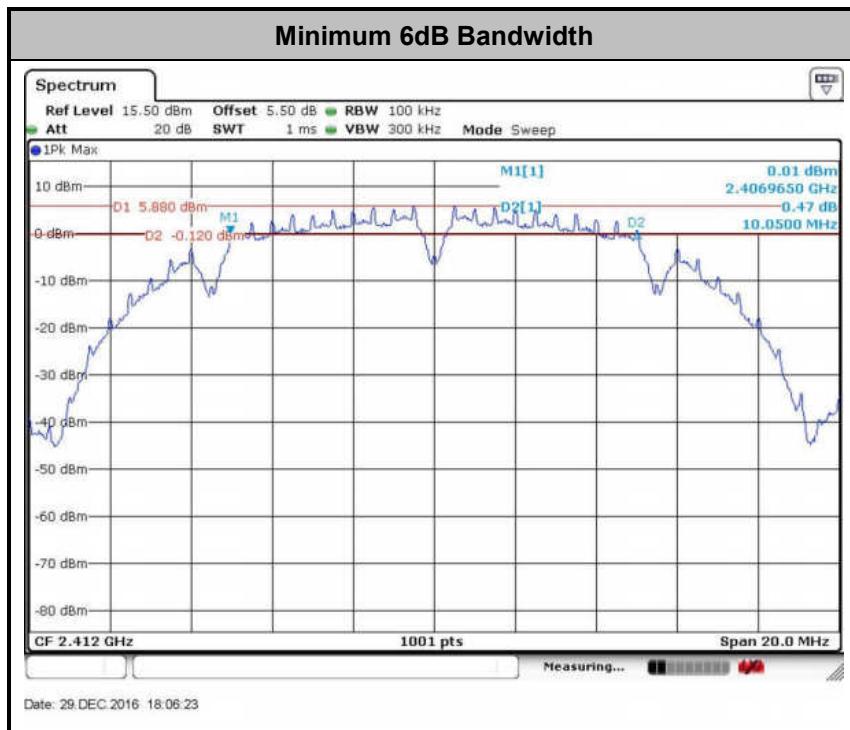
3.1.4 Test Setup





3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.



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.

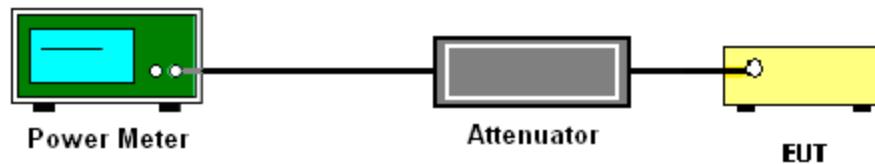
3.2.2 Measuring Instruments

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 v03r05 section 9.1.2 PKPM1 Peak power meter method.
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

Please refer to Appendix A.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A



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 v03r05.
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.

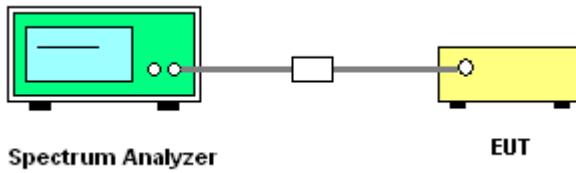
Method (1): Measure and sum the spectra across the outputs.

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)

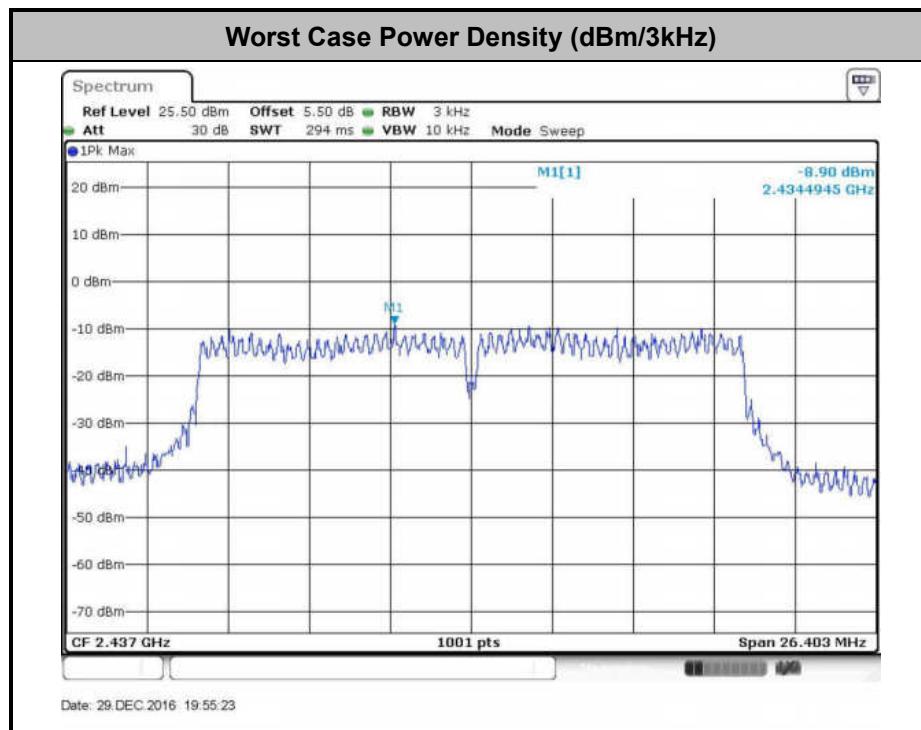


3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.





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).

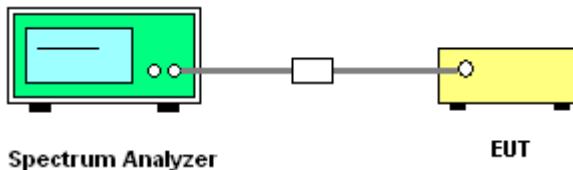
3.4.2 Measuring Instruments

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 v03r05.
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

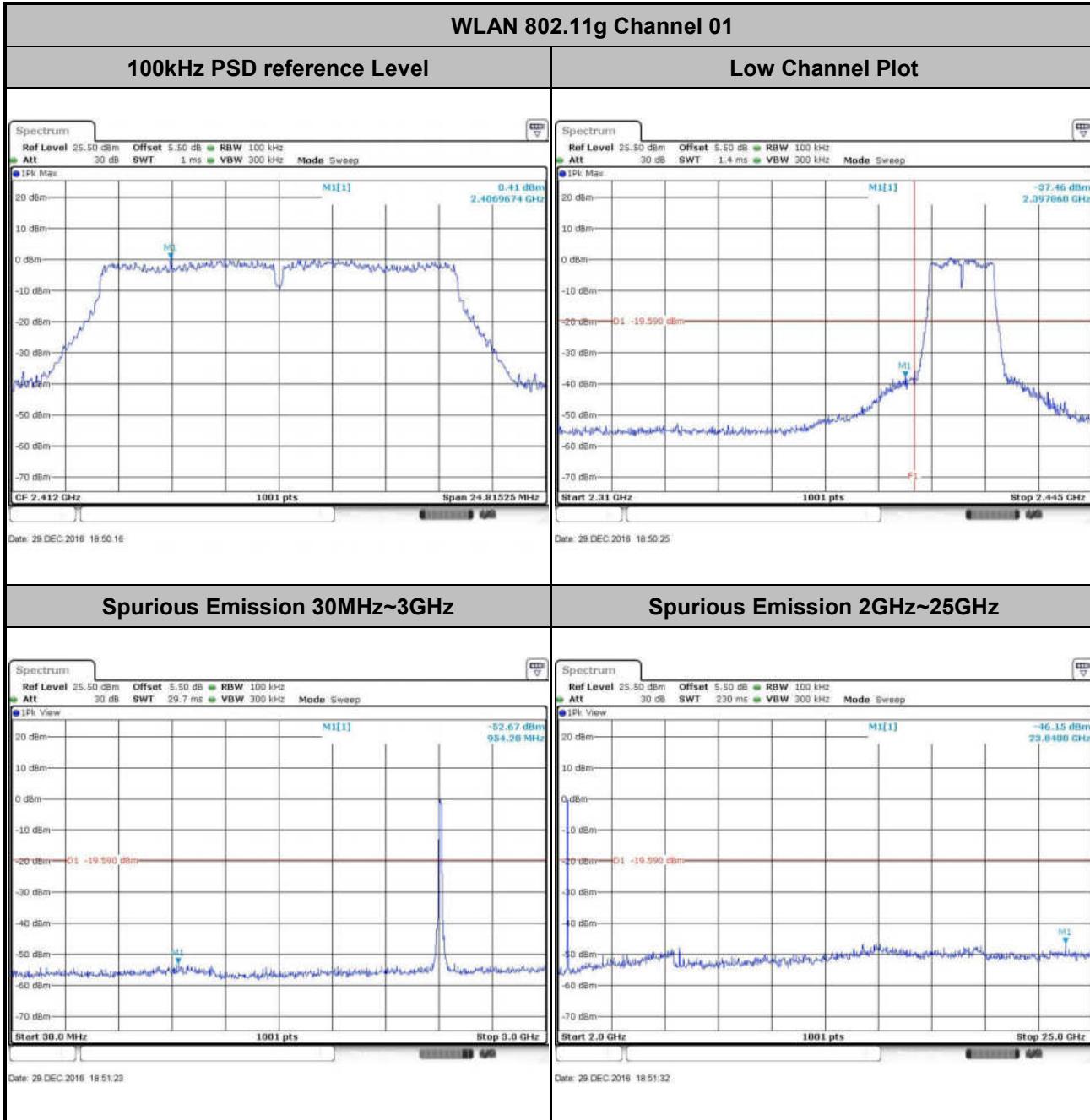




3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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

Number of TX :	1	Ant. :	1
Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	01	Test Engineer :	Ivan Zhang

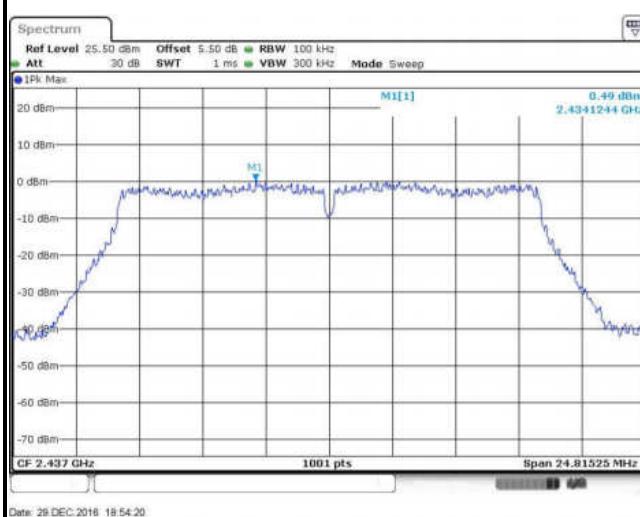




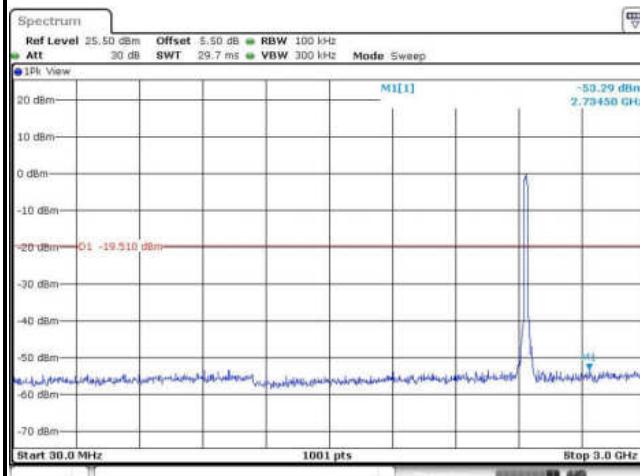
Number of TX :	1	Ant. :	1
Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Zhang

WLAN 802.11g Channel 06

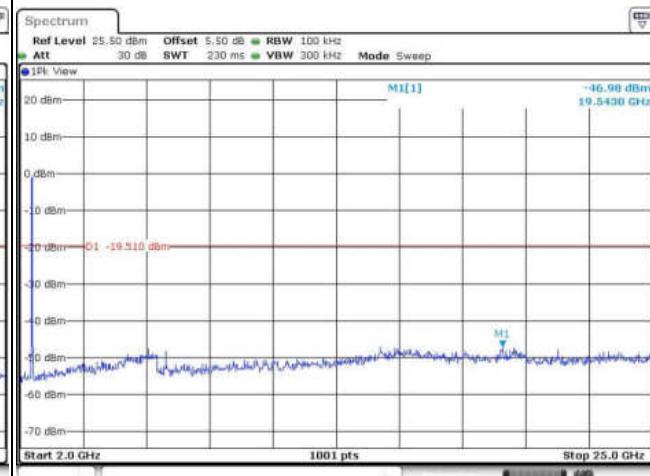
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

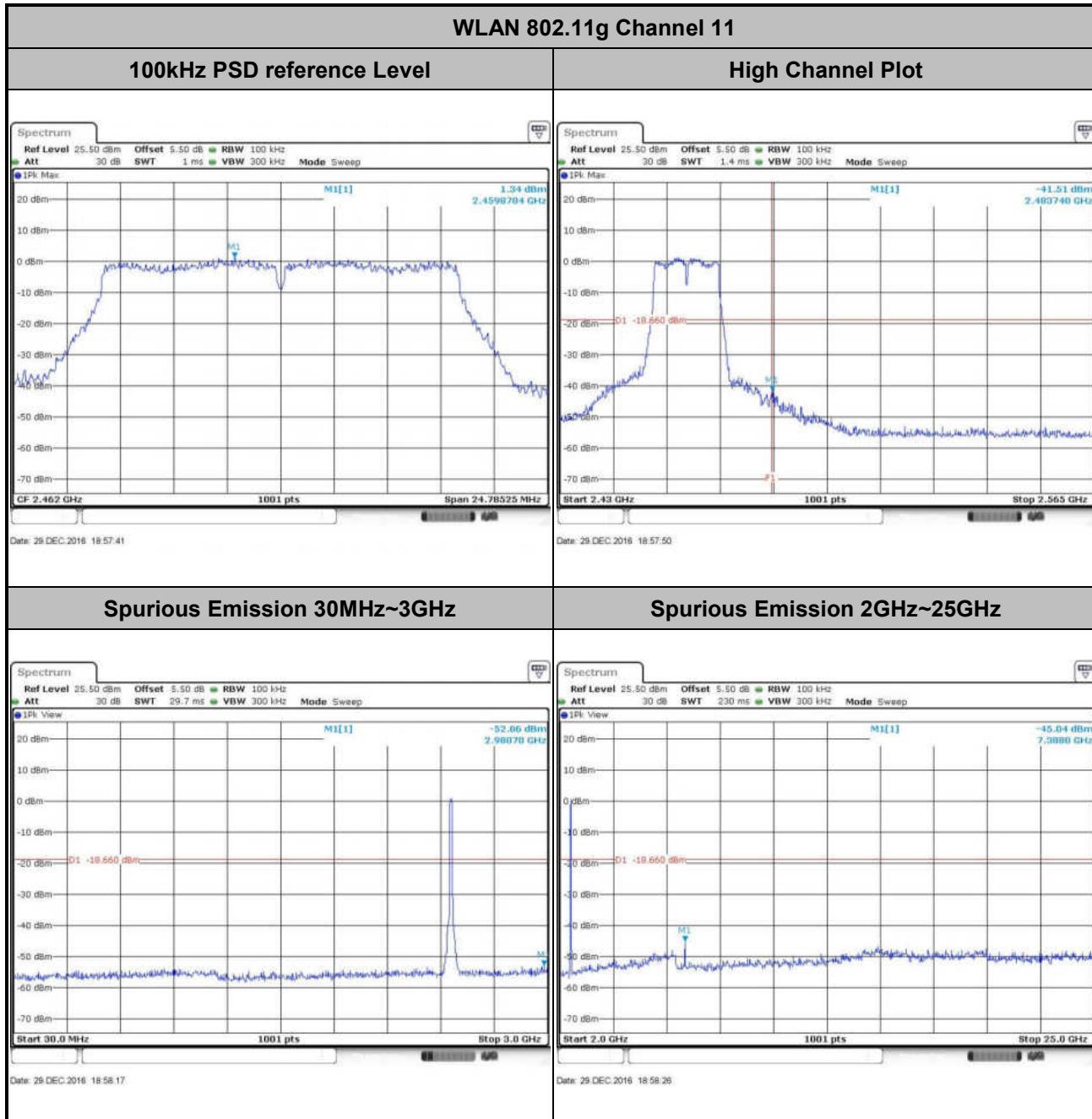


Spurious Emission 2GHz~25GHz





Number of TX :	1	Ant. :	1
Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	11	Test Engineer :	Ivan Zhang



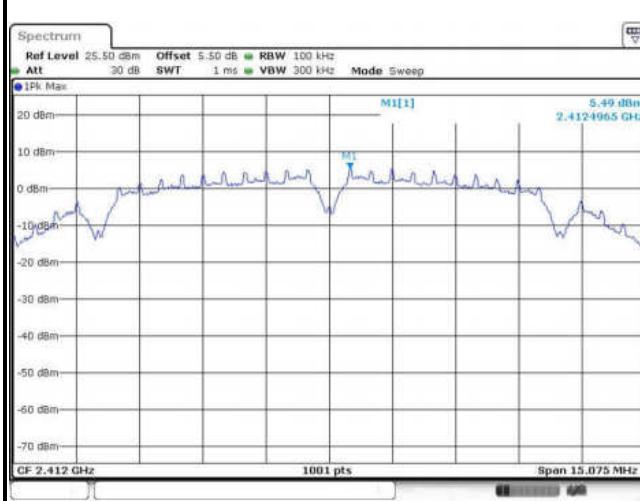


Number of TX = 1, Ant. 2 (Measured)

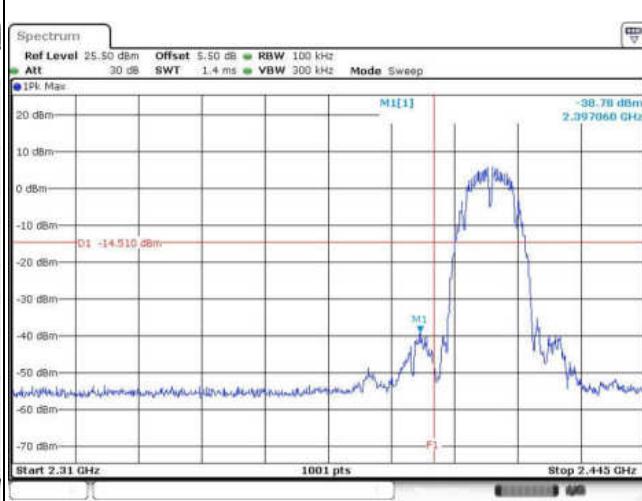
Number of TX	1	Ant. :	2
Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	01	Test Engineer :	Ivan Zhang

WLAN 802.11b Channel 01

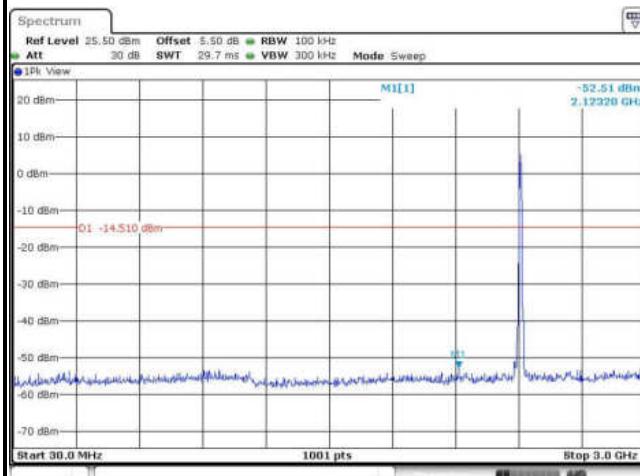
100kHz PSD reference Level



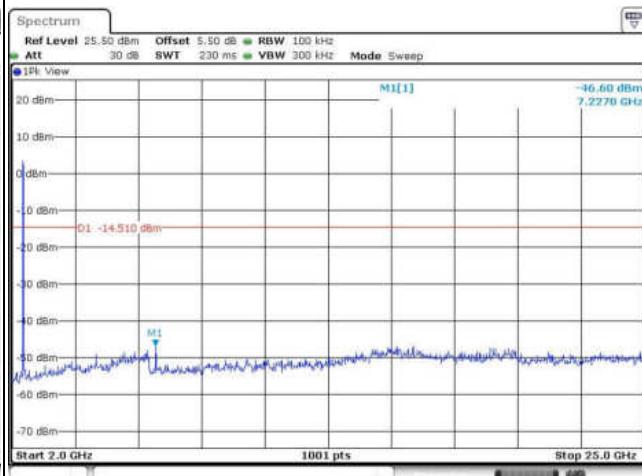
Low Channel Plot



Spurious Emission 30MHz~3GHz

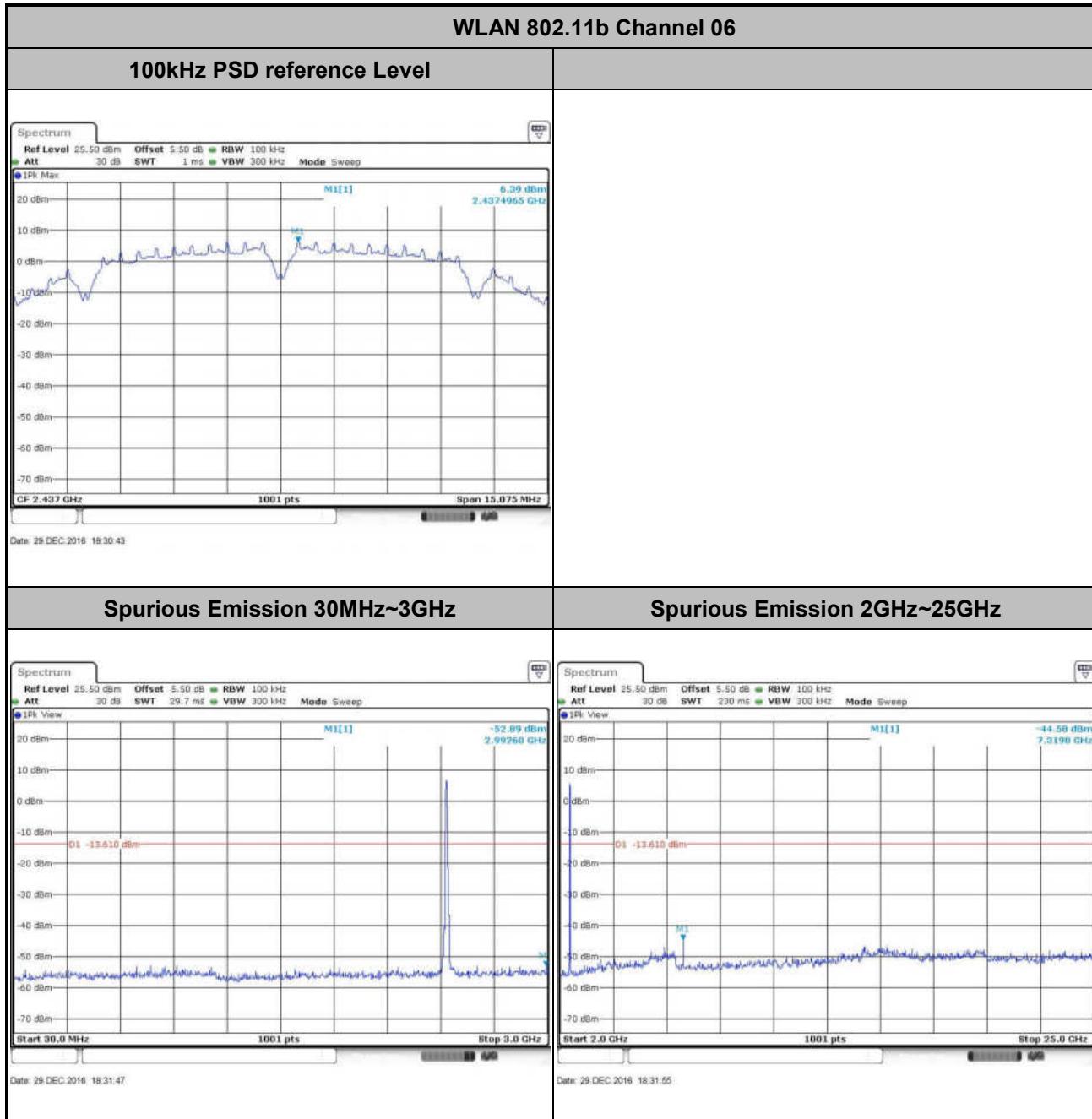


Spurious Emission 2GHz~25GHz



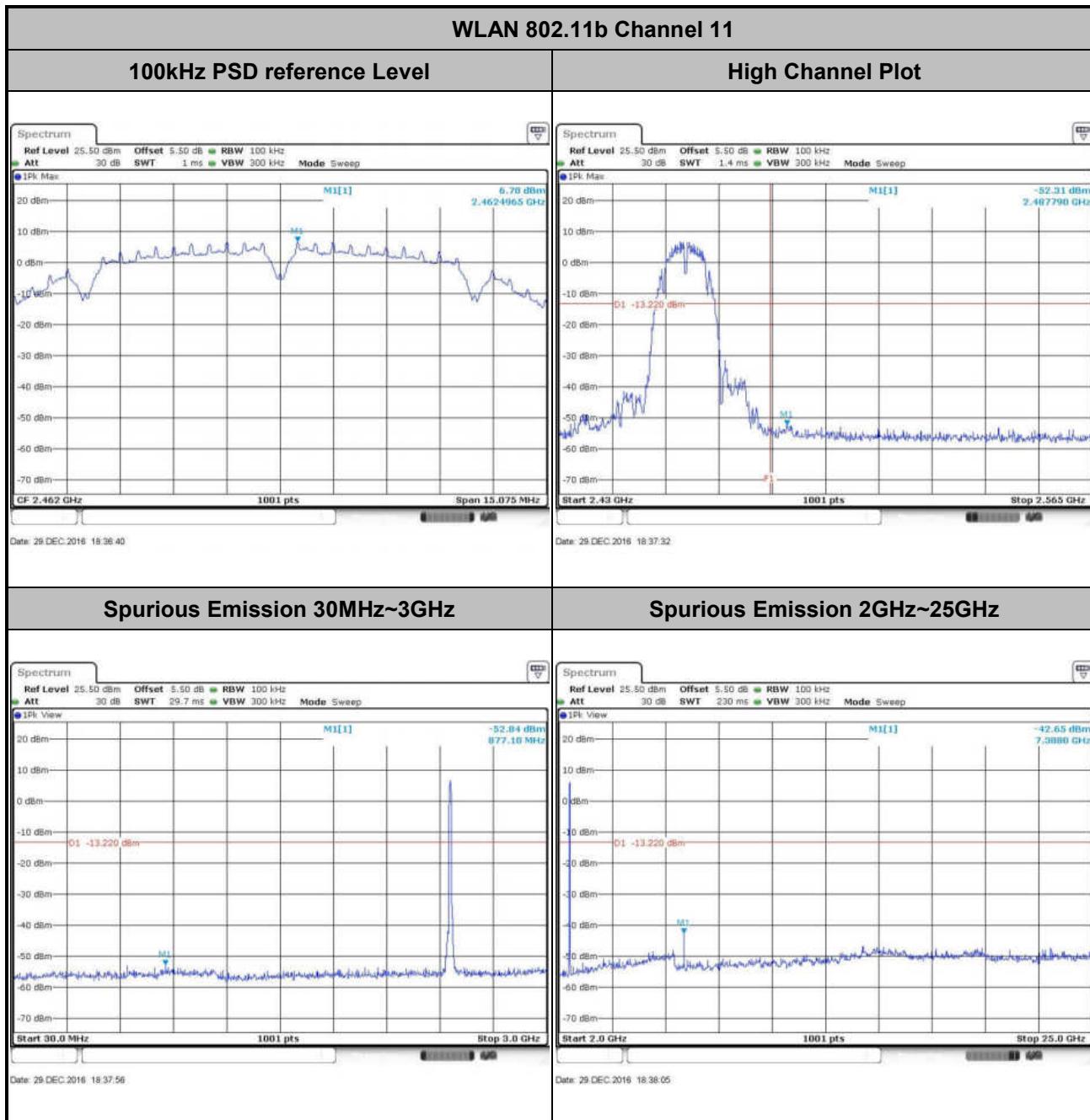


Number of TX :	1	Ant. :	2
Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Zhang



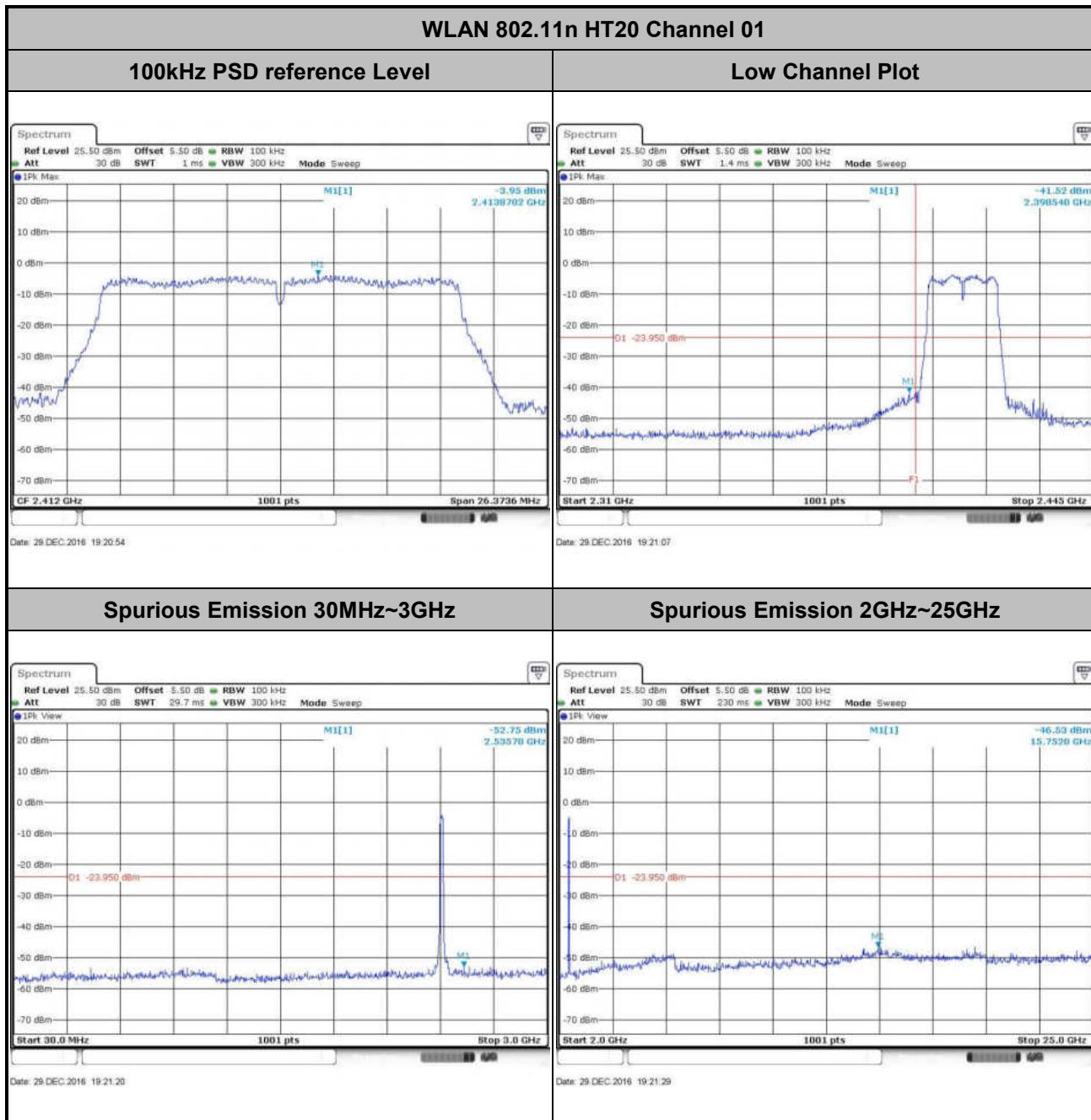


Number of TX :	1	Ant. :	2
Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	11	Test Engineer :	Ivan Zhang



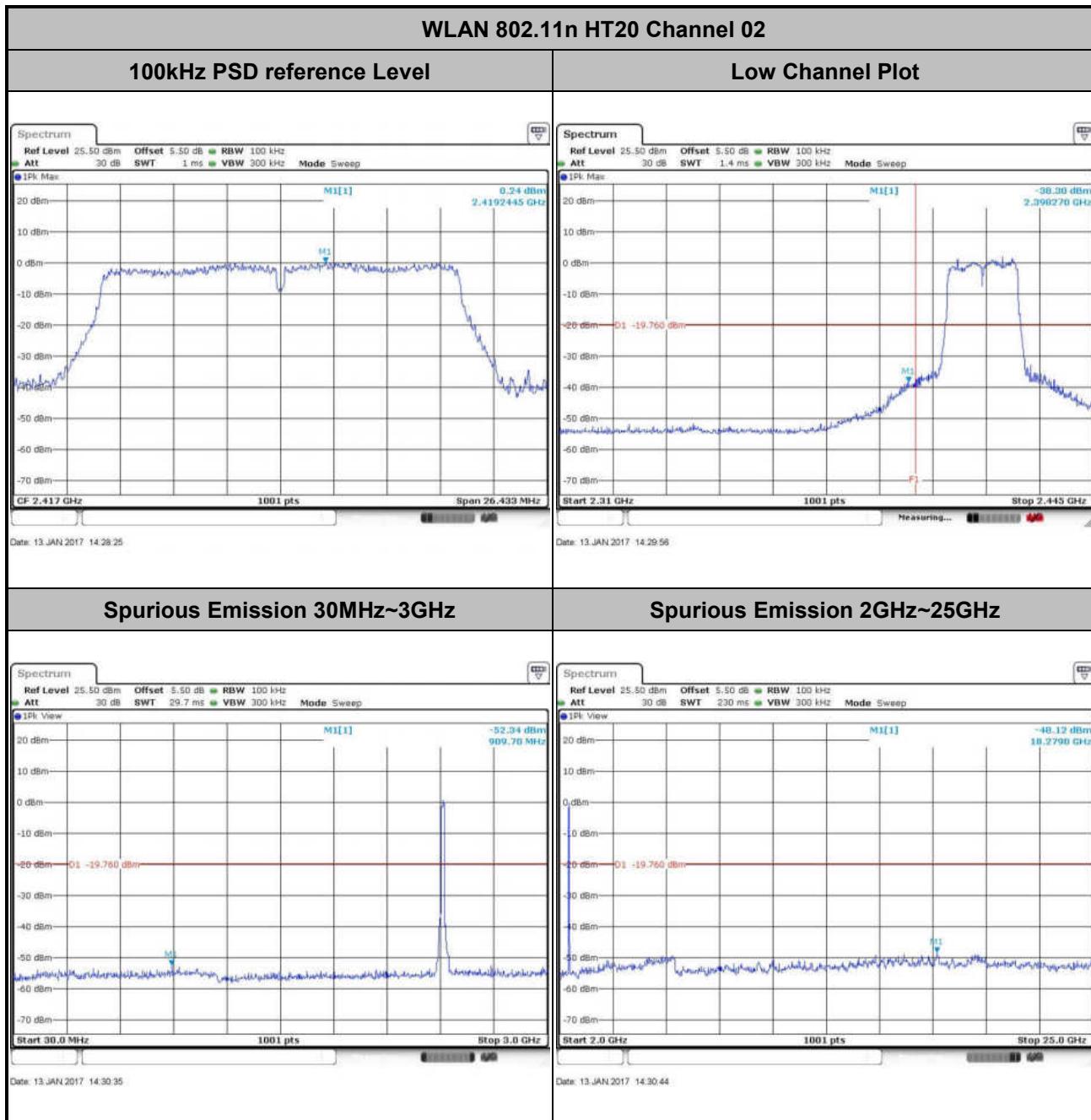


Number of TX :	1	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	01	Test Engineer :	Ivan Zhang



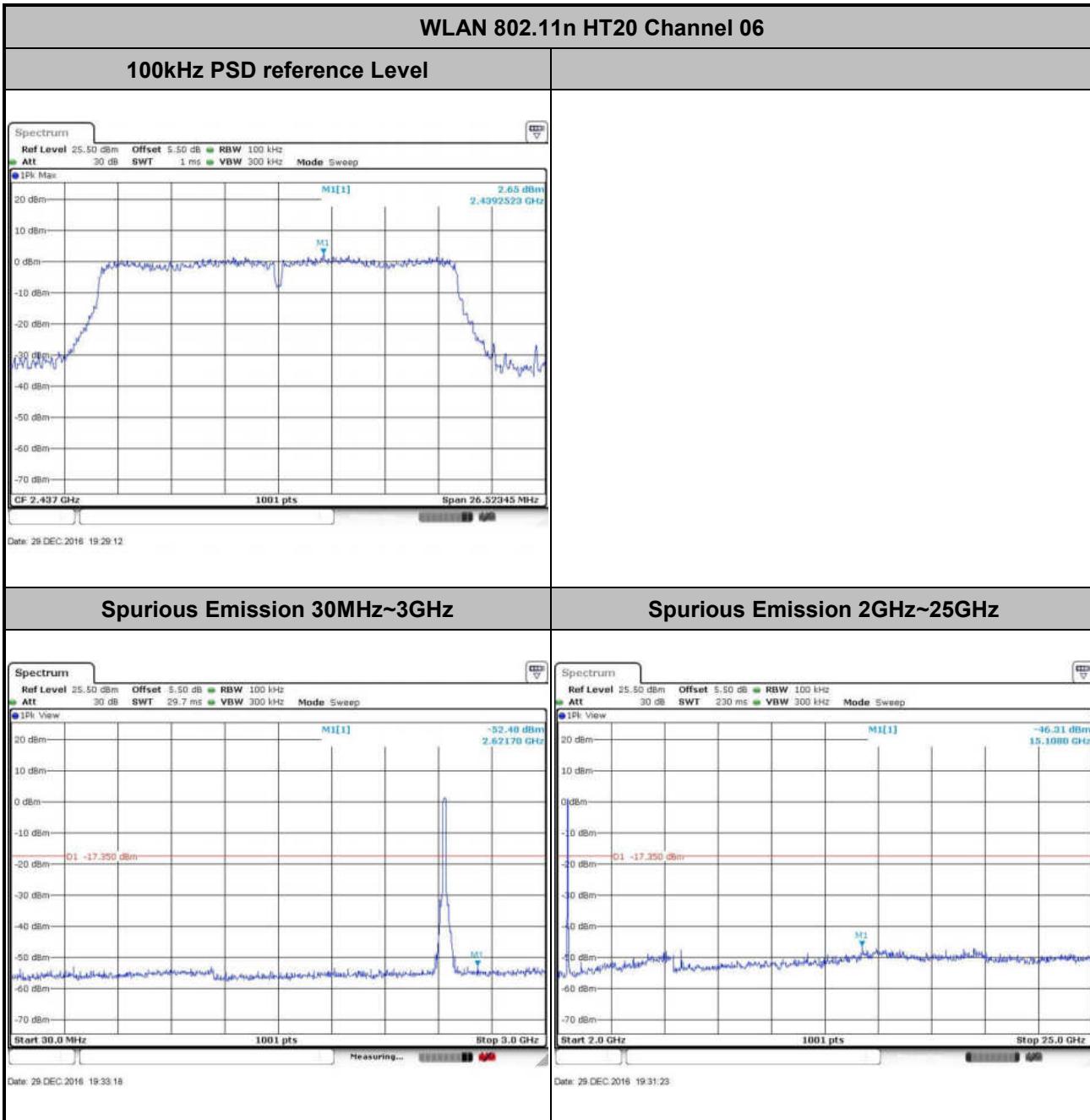


Number of TX :	1	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	02	Test Engineer :	Ivan Zhang



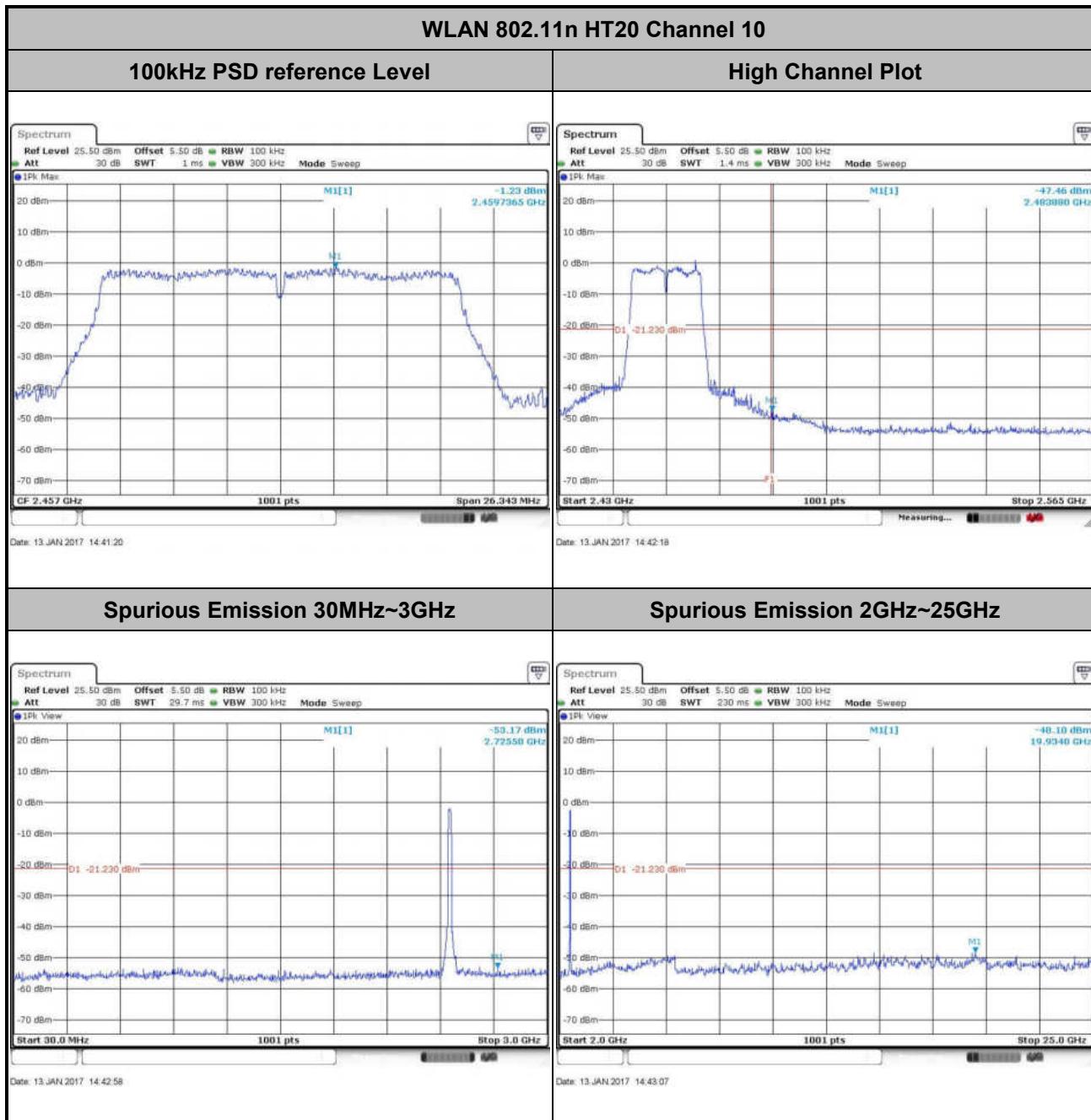


Number of TX :	1	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Zhang



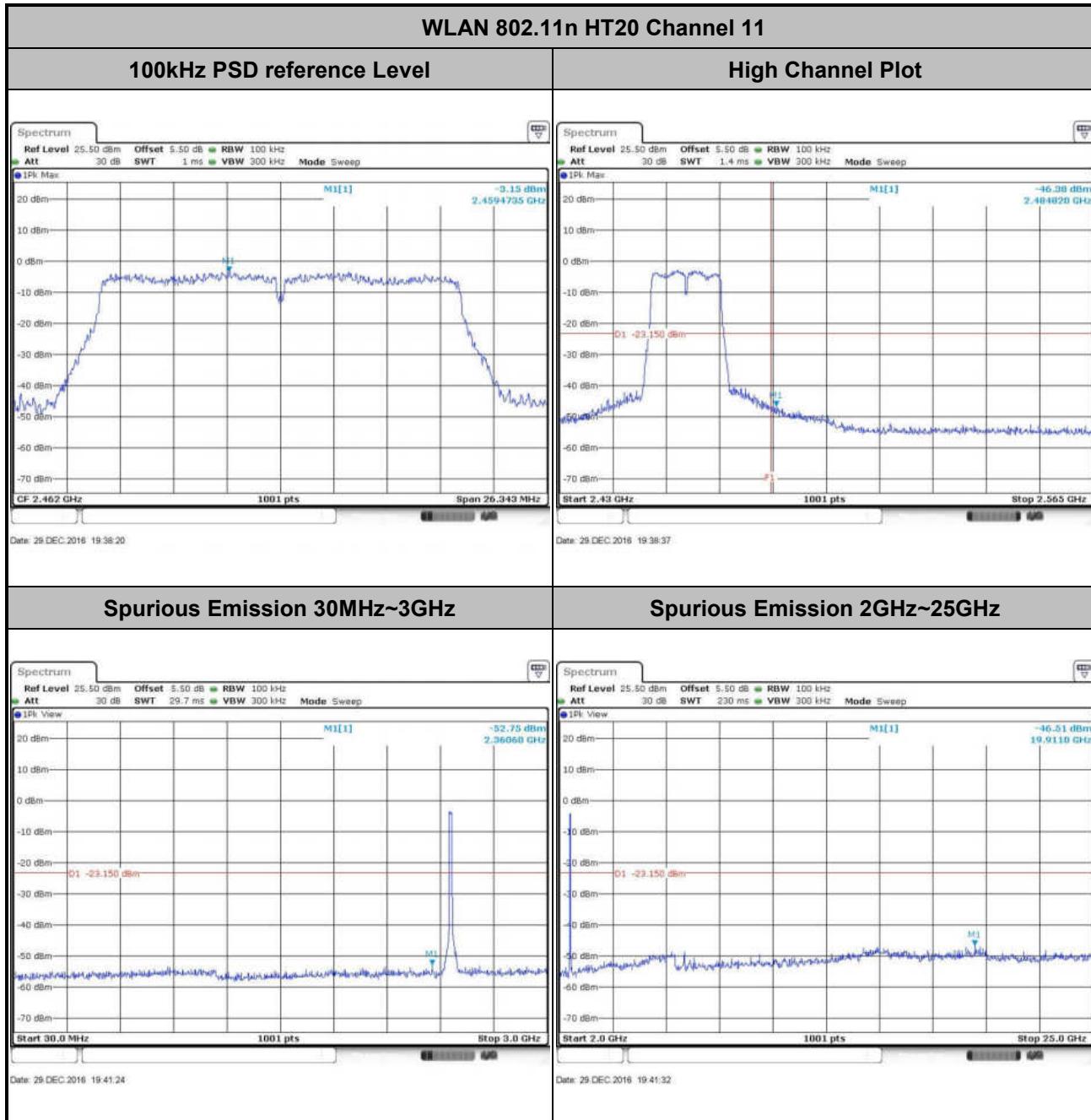


Number of TX :	1	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	10	Test Engineer :	Ivan Zhang



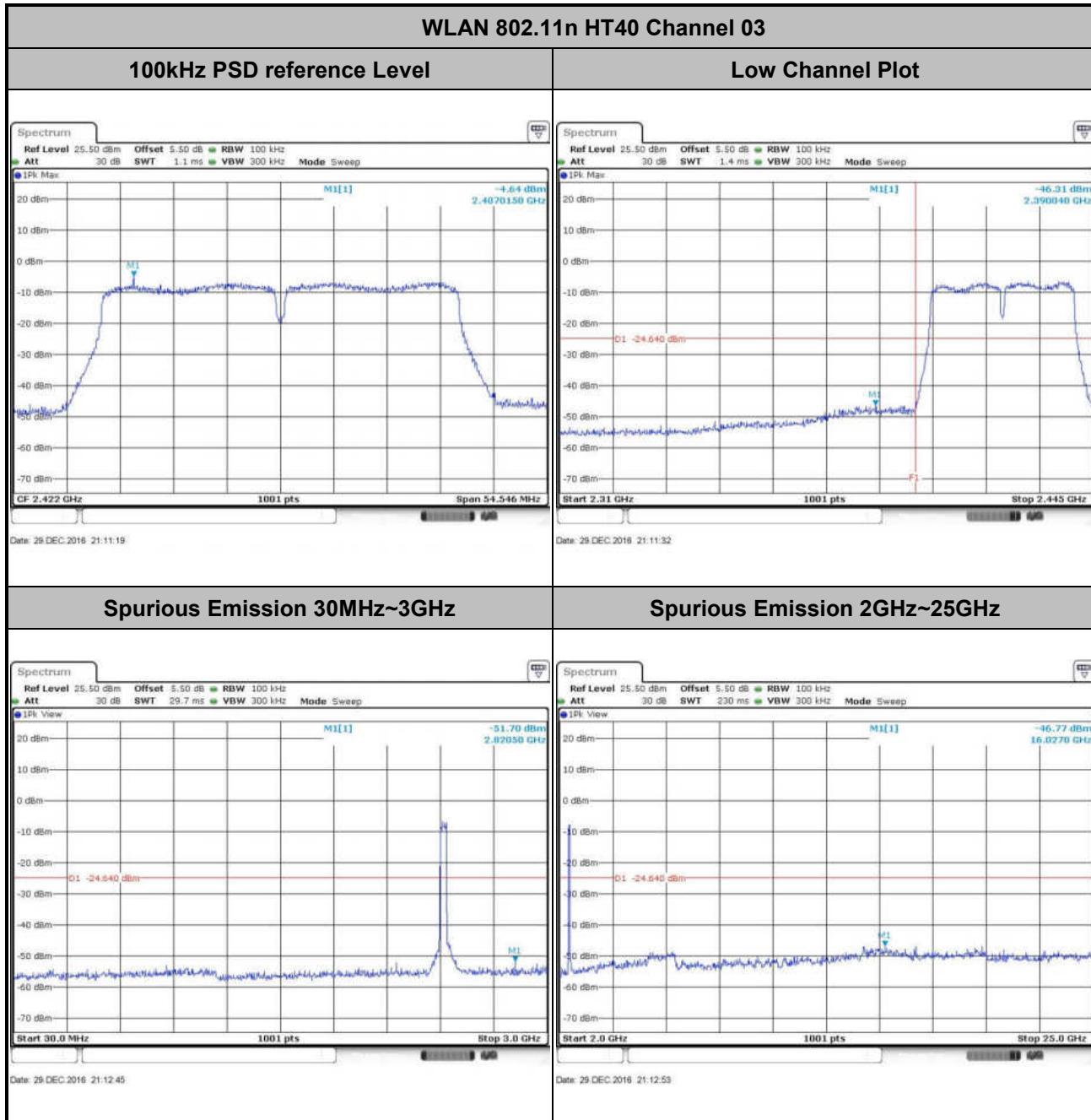


Number of TX :	1	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	11	Test Engineer :	Ivan Zhang



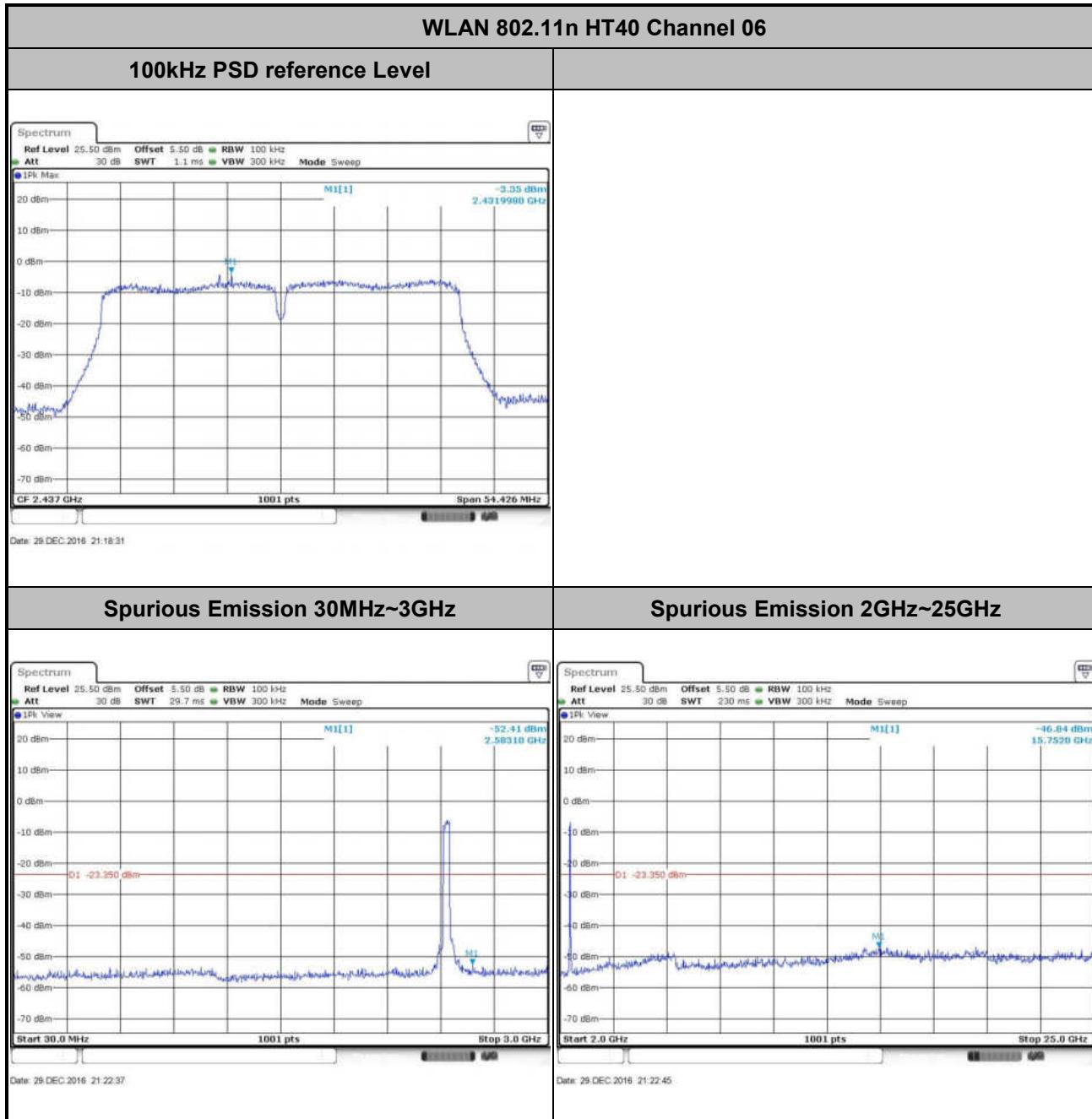


Number of TX :	1	Ant. :	1
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	03	Test Engineer :	Ivan Zhang



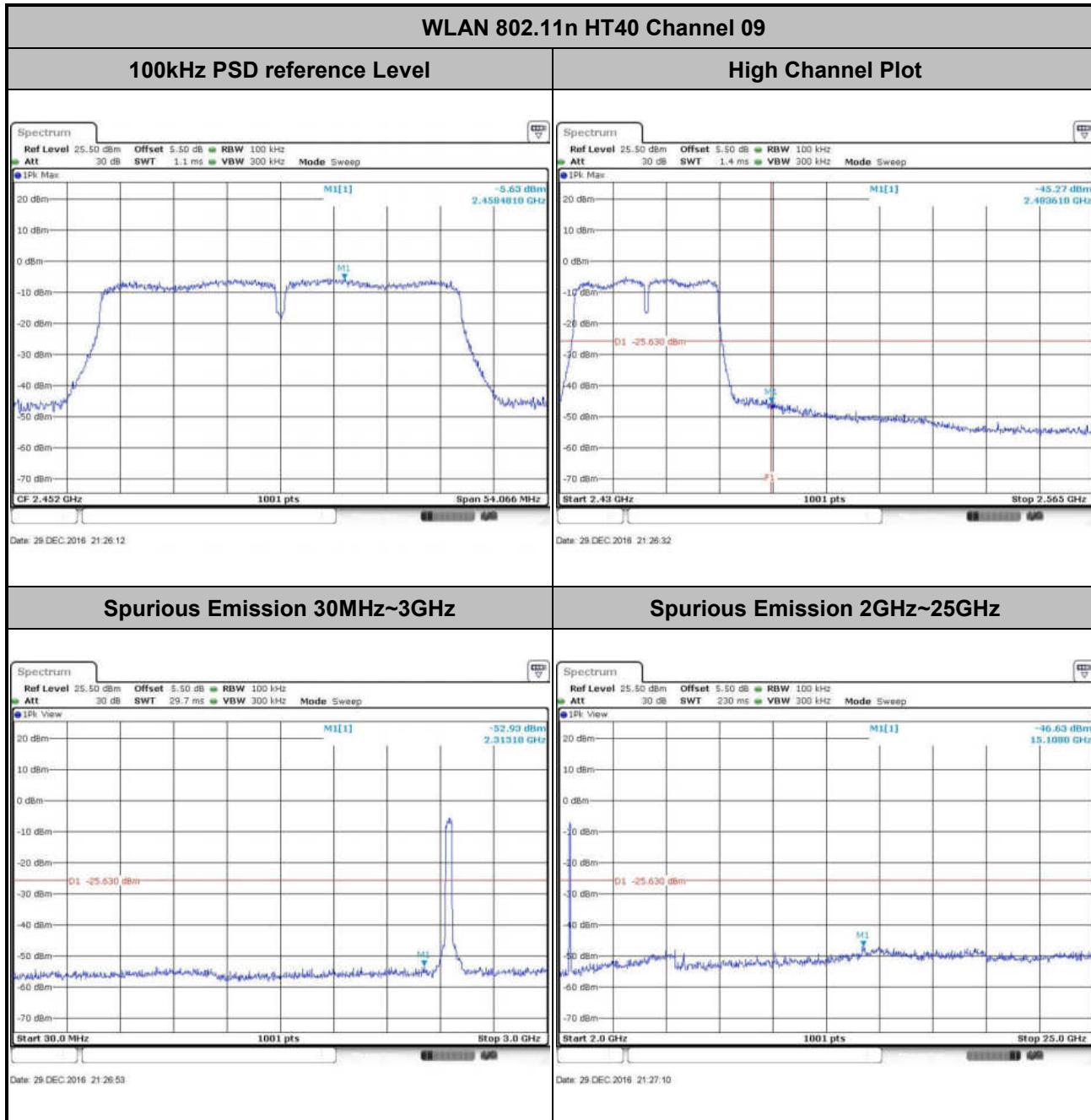


Number of TX :	1	Ant. :	1
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Zhang





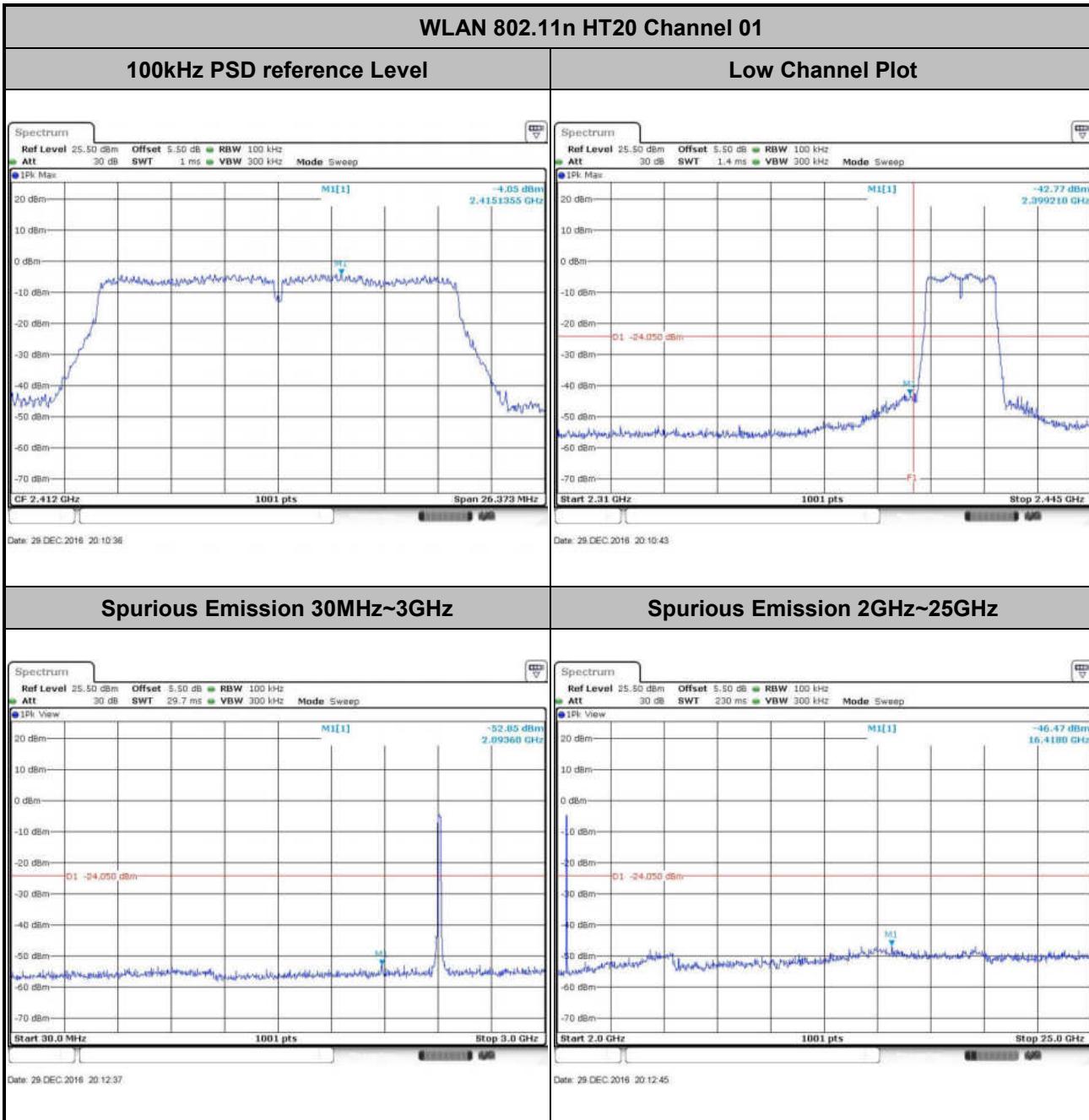
Number of TX :	1	Ant. :	1
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	09	Test Engineer :	Ivan Zhang





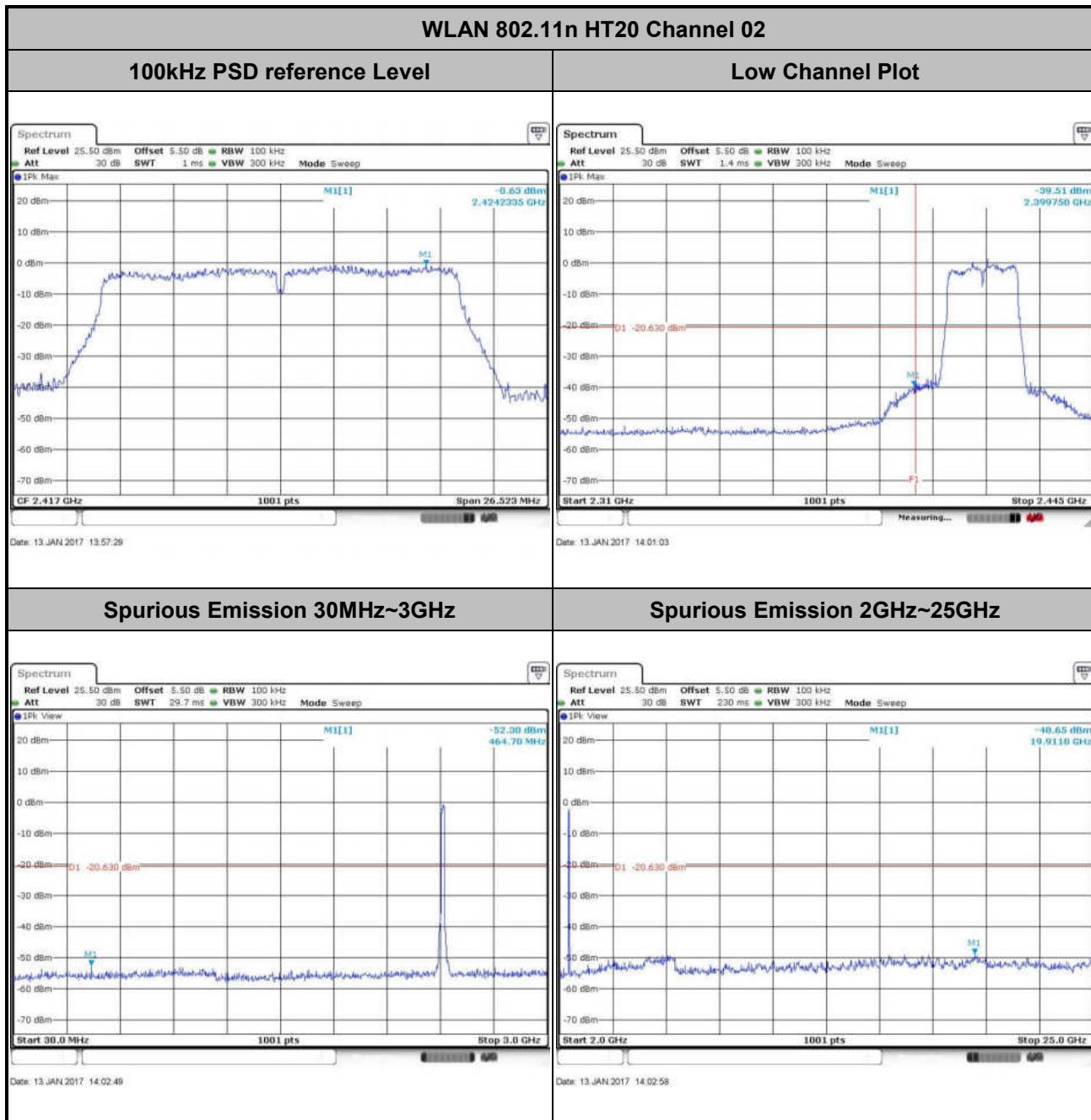
Number of TX = 2, Ant. 1 (Measured)

Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	01	Test Engineer :	Ivan Zhang



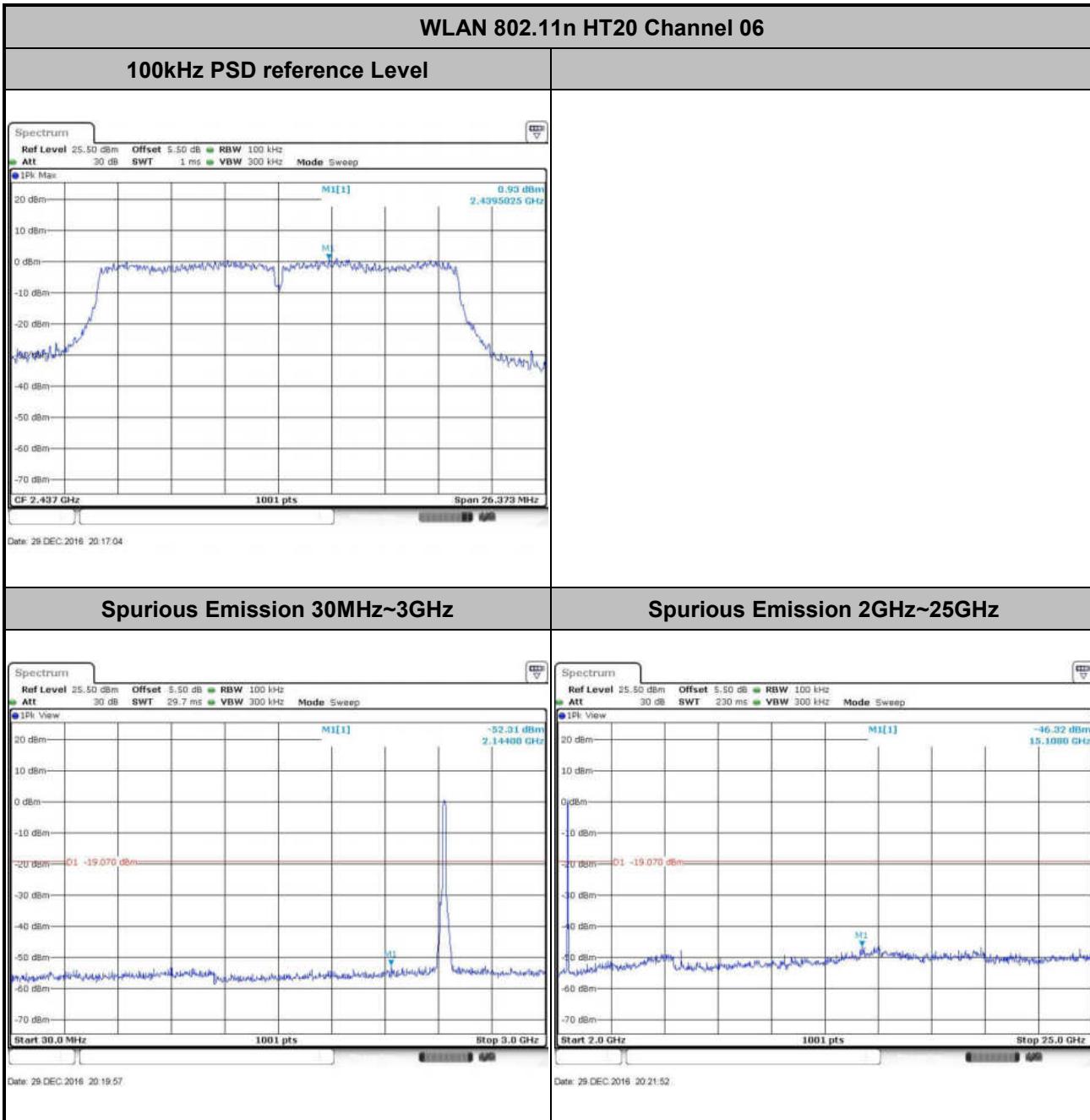


Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	02	Test Engineer :	Ivan Zhang



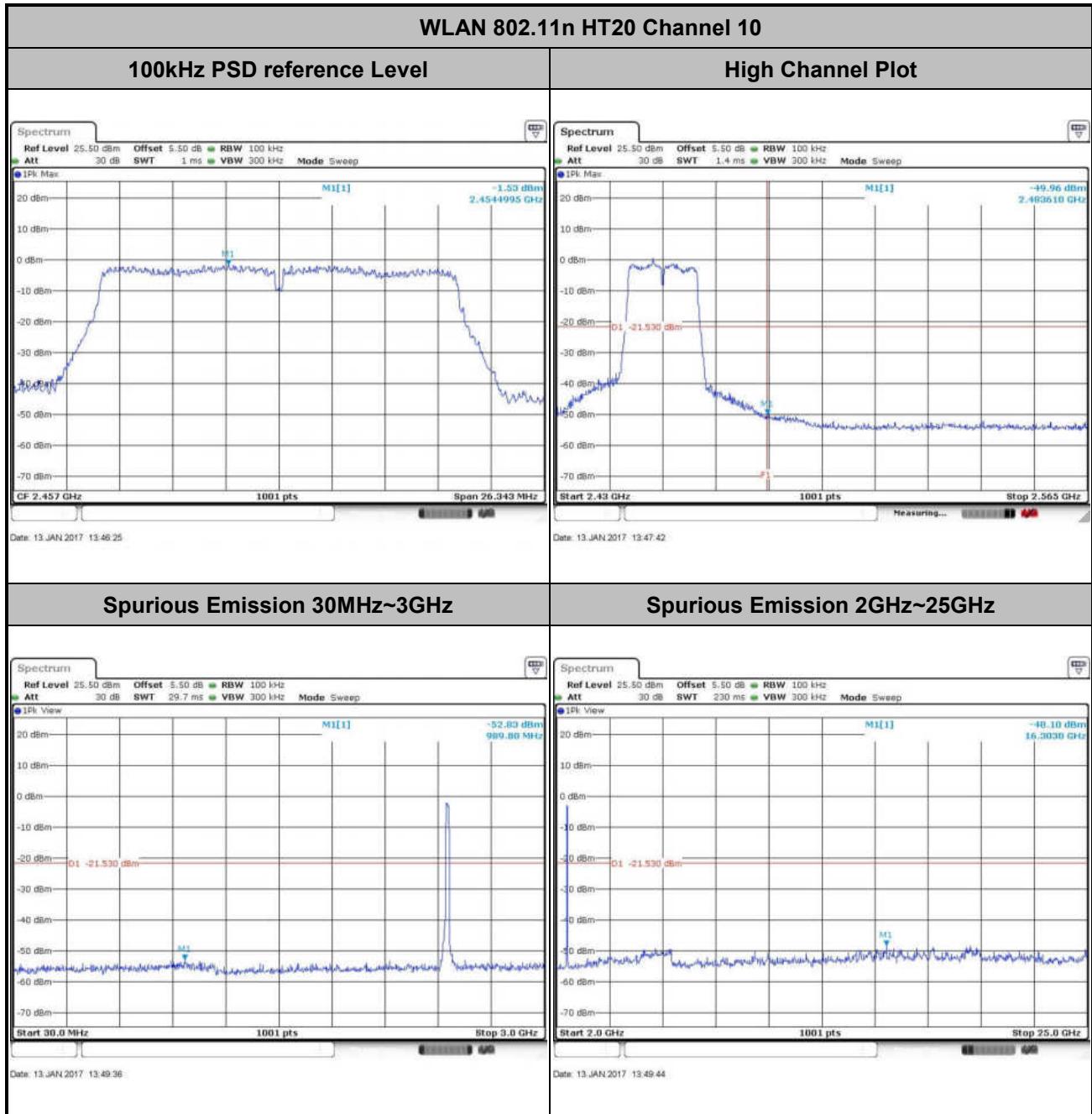


Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Zhang



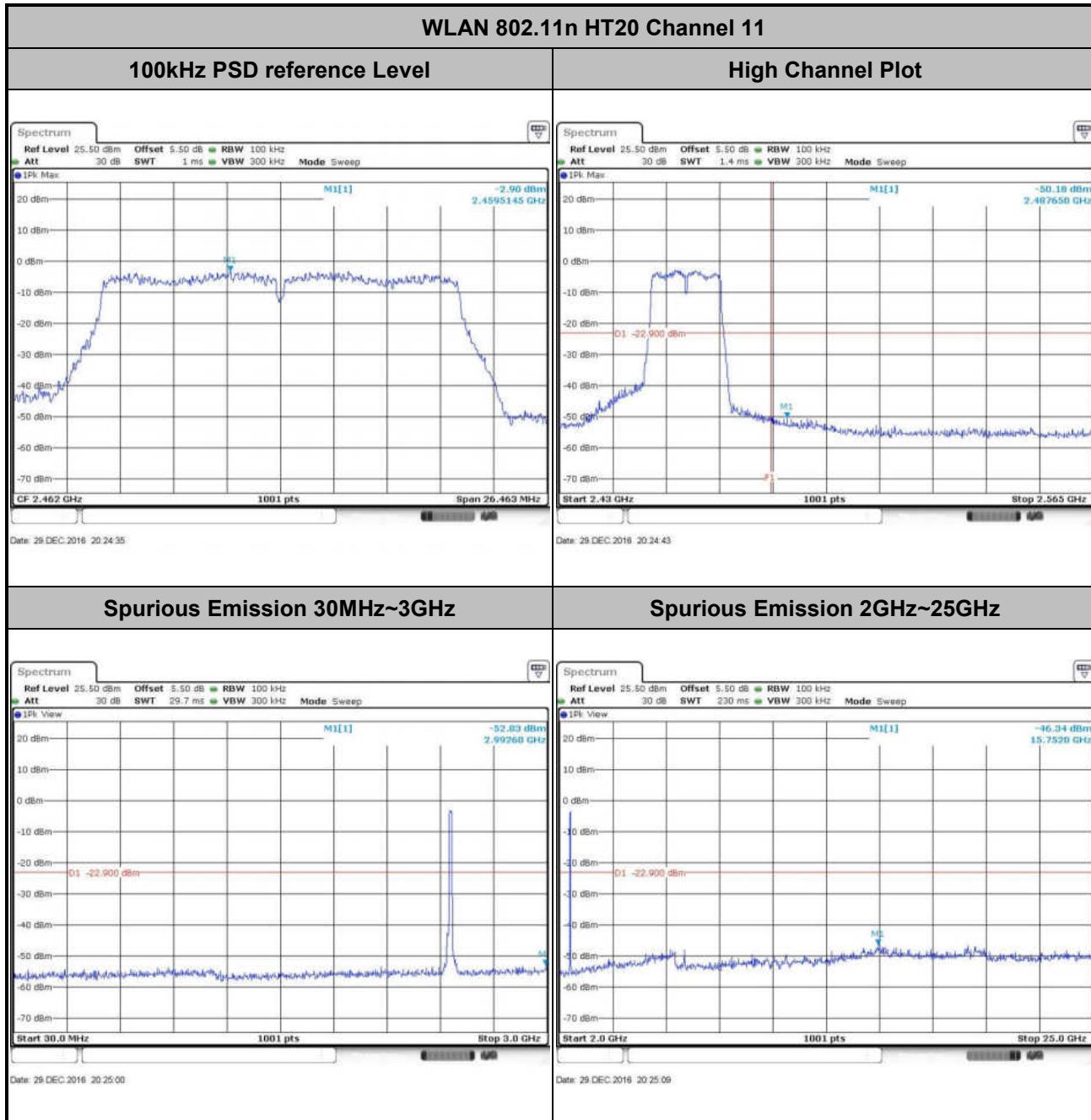


Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	10	Test Engineer :	Ivan Zhang



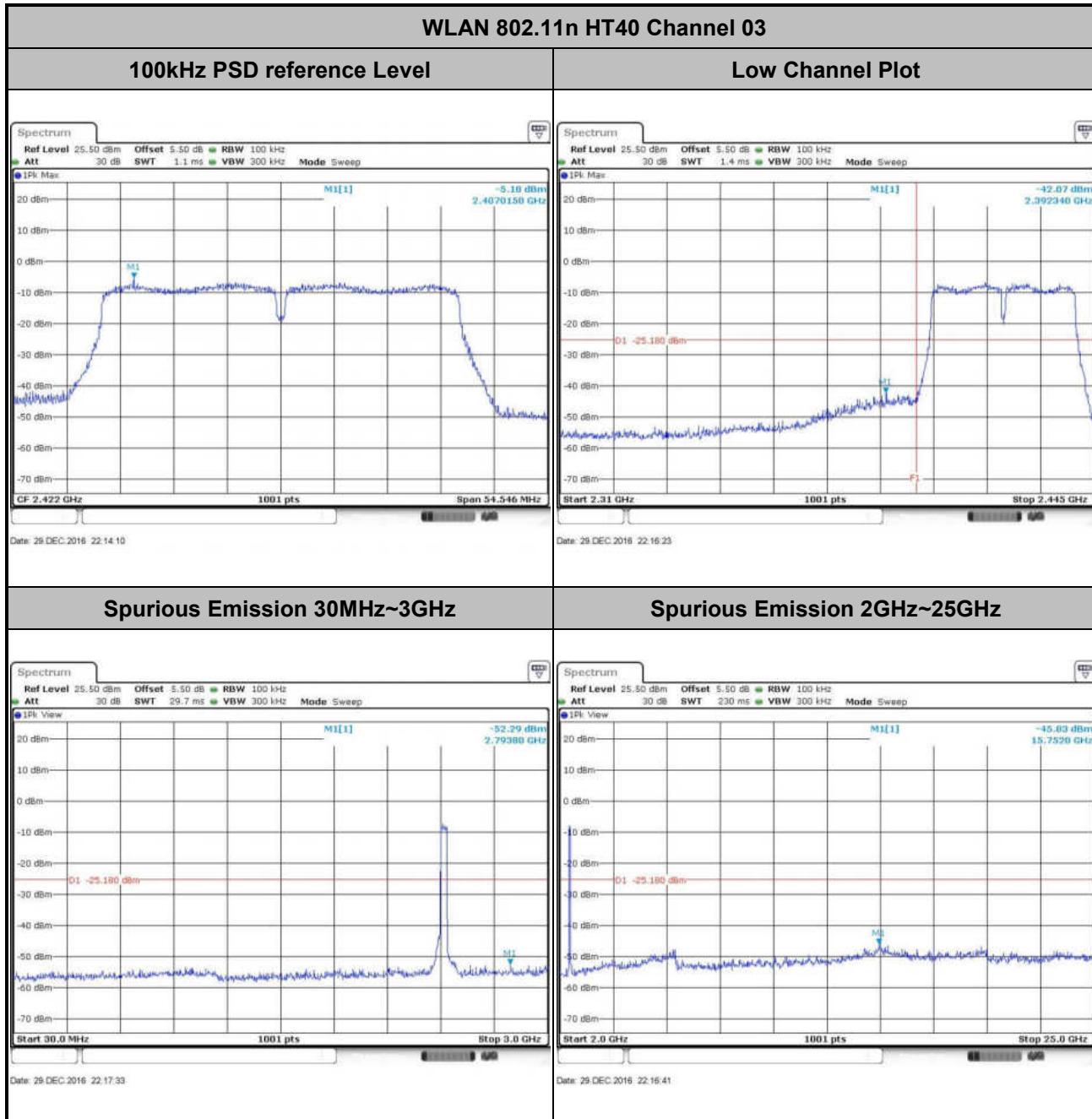


Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	11	Test Engineer :	Ivan Zhang



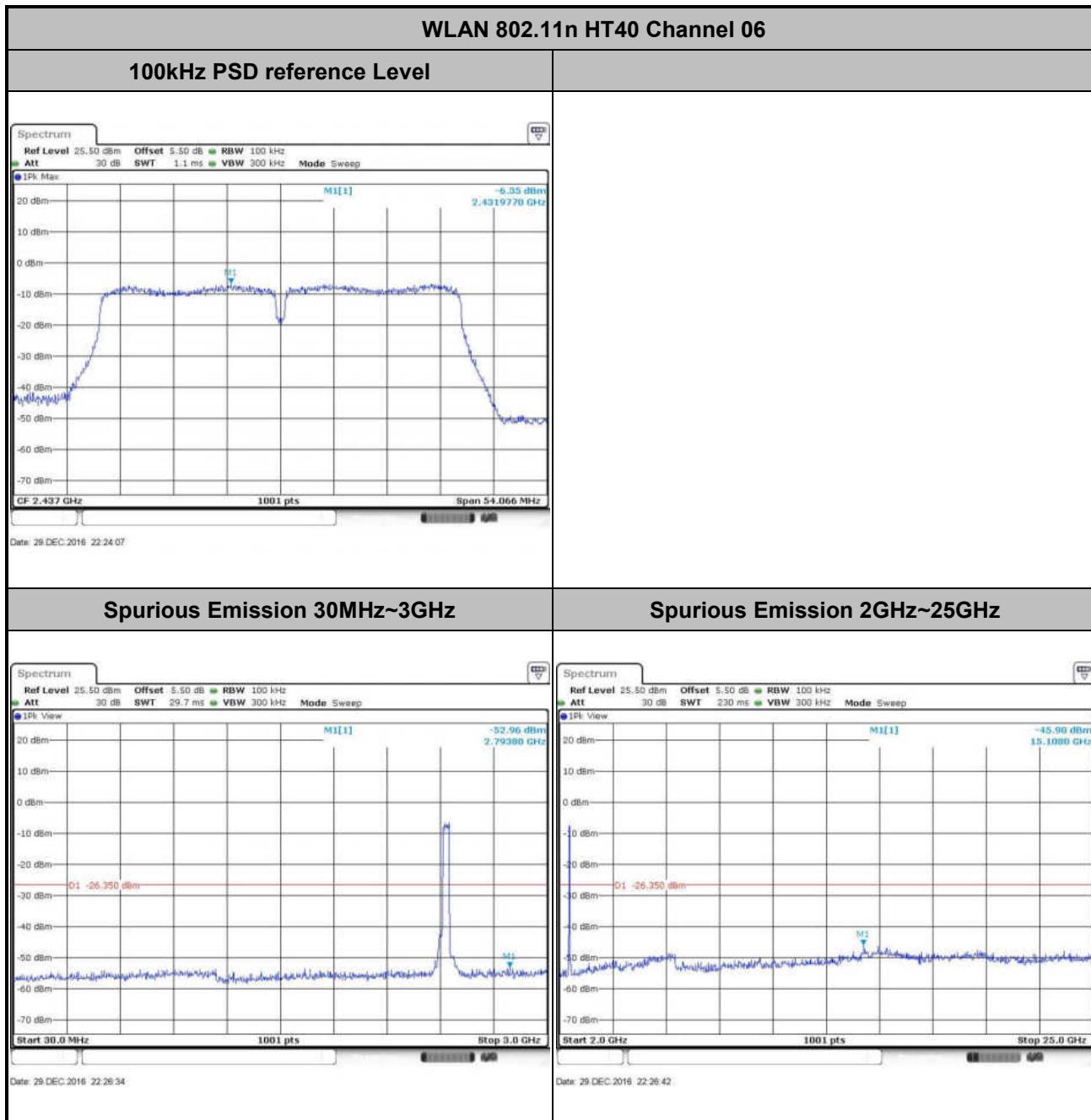


Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	03	Test Engineer :	Ivan Zhang



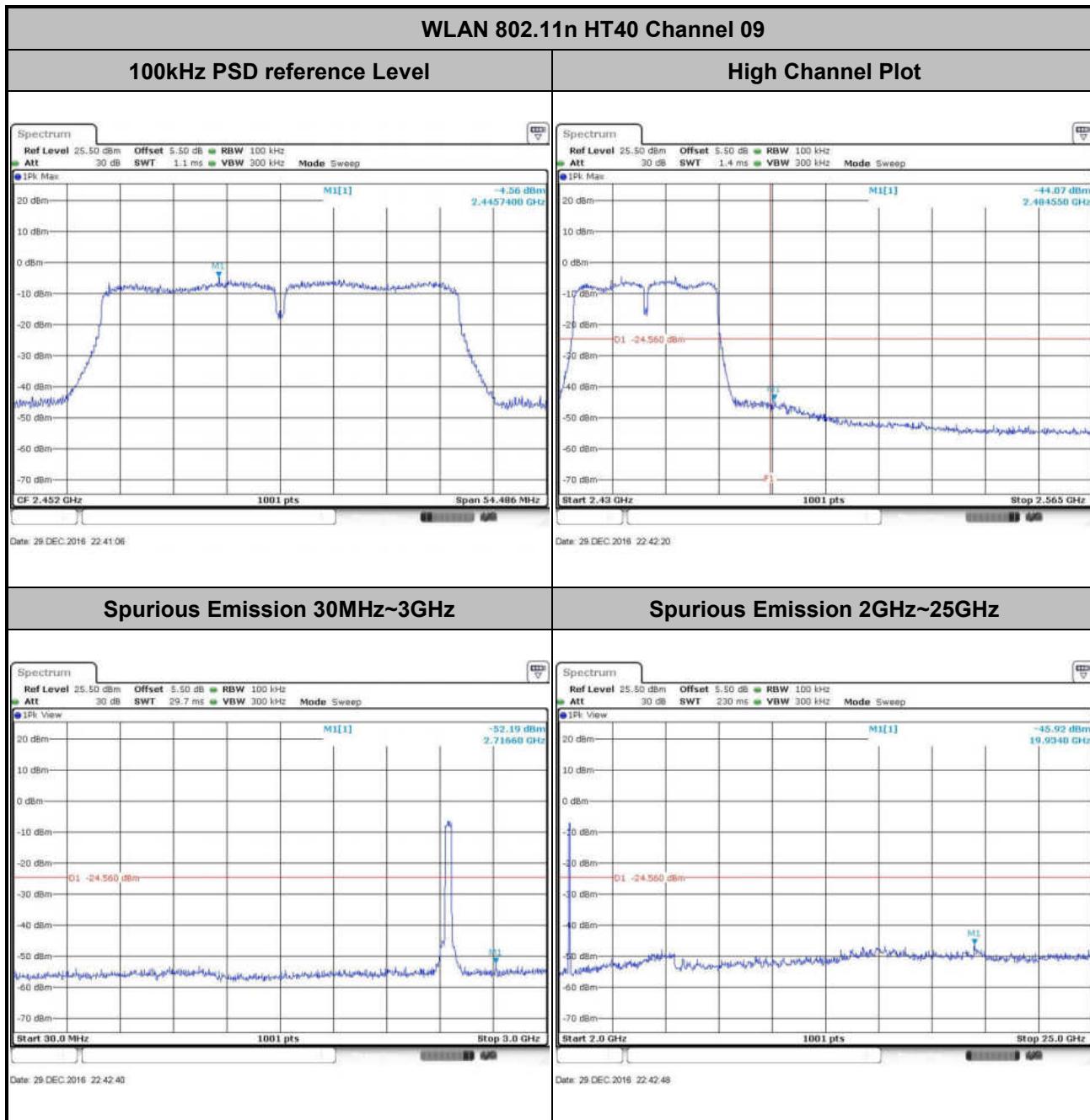


Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Zhang





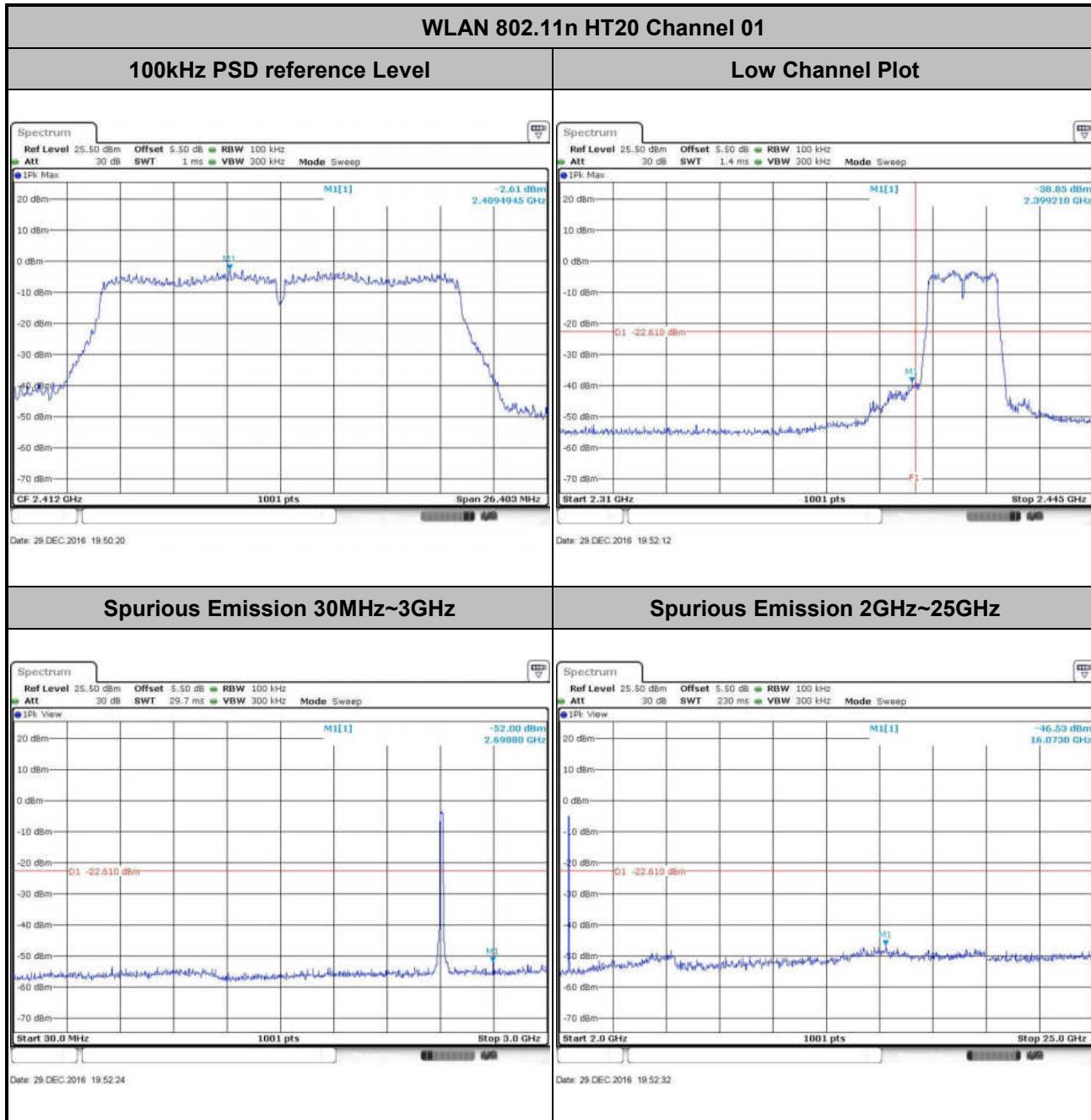
Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	09	Test Engineer :	Ivan Zhang





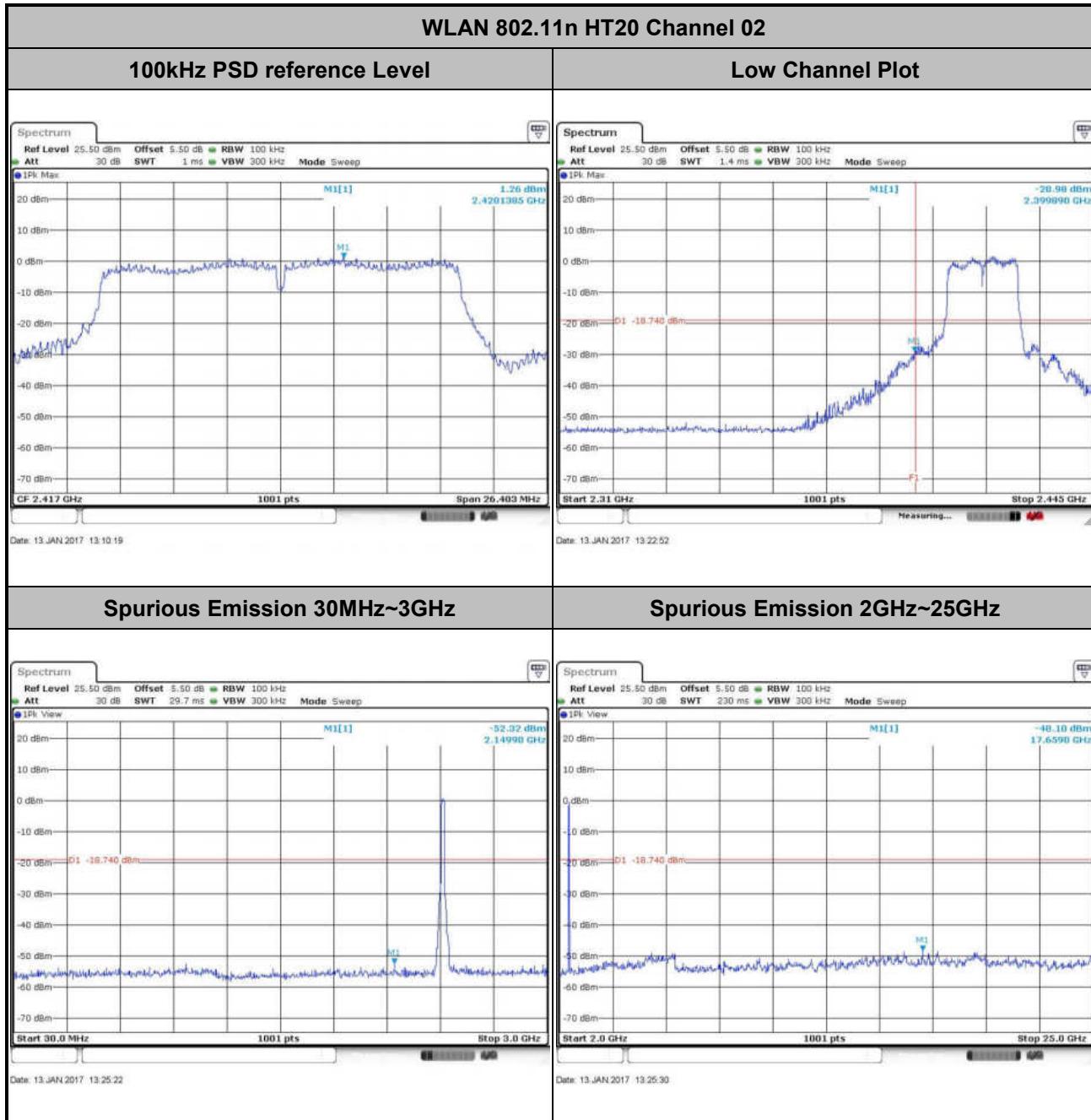
Number of TX = 2, Ant. 2 (Measured)

Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	01	Test Engineer :	Ivan Zhang



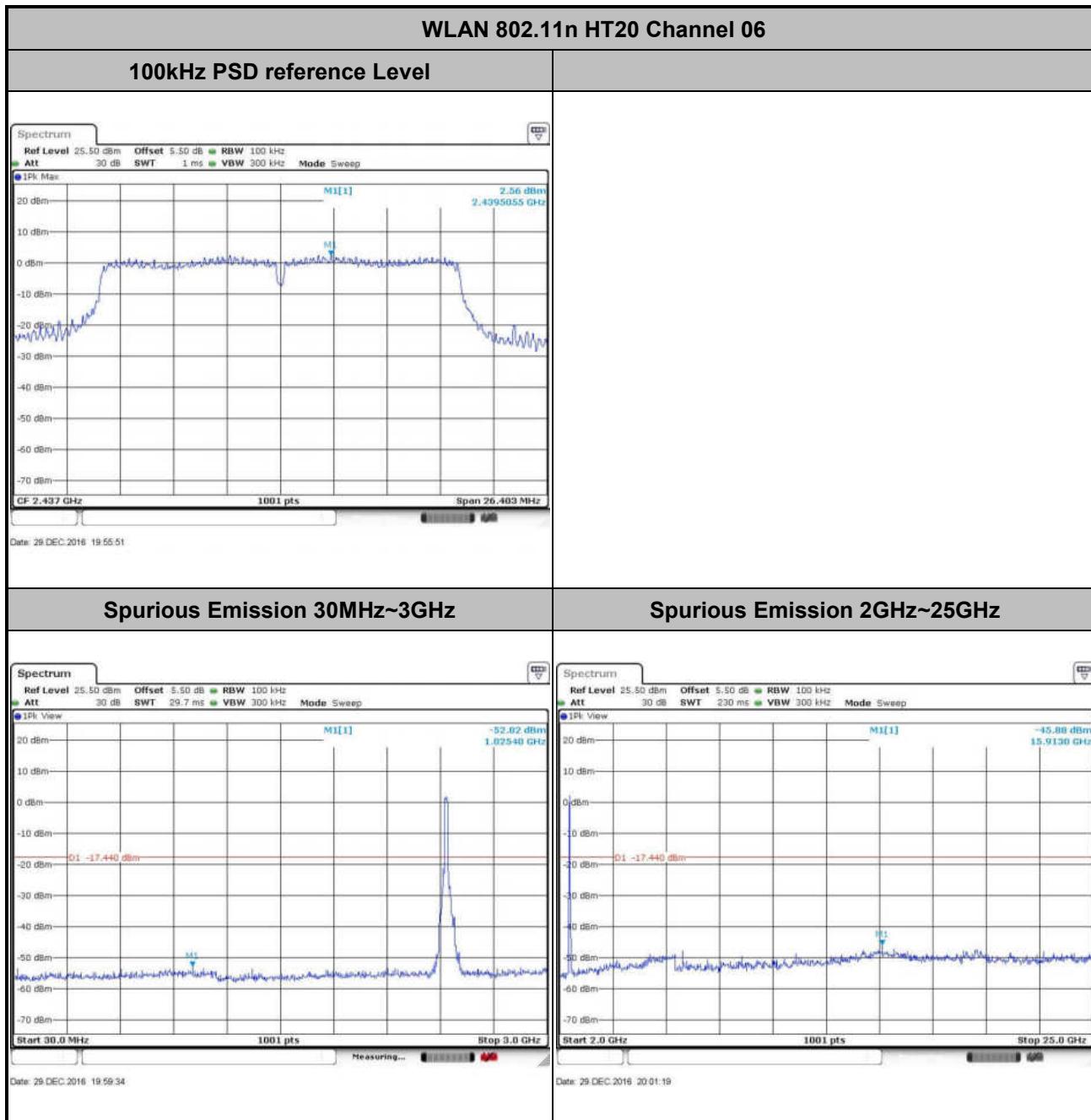


Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	02	Test Engineer :	Ivan Zhang



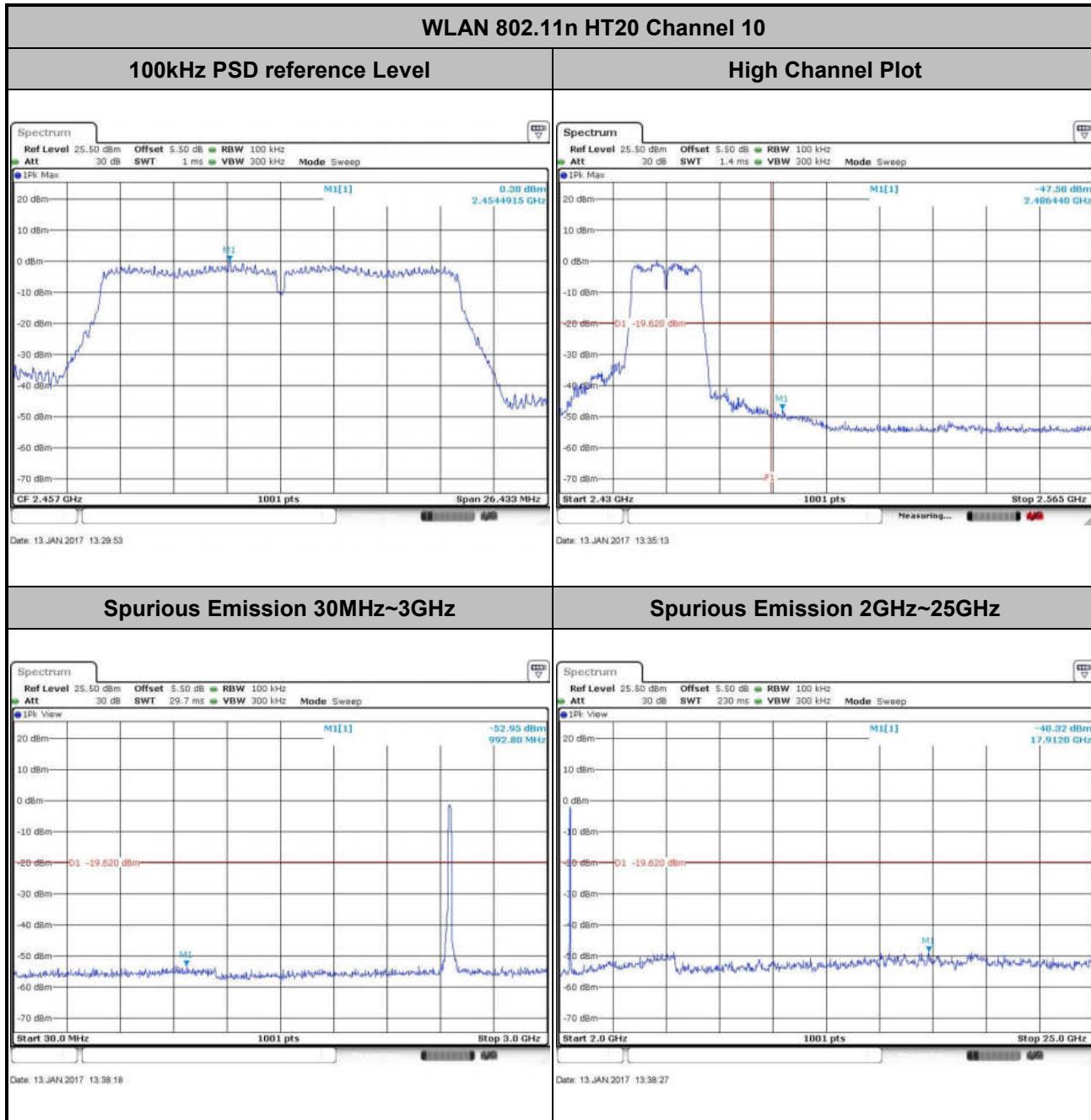


Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Zhang



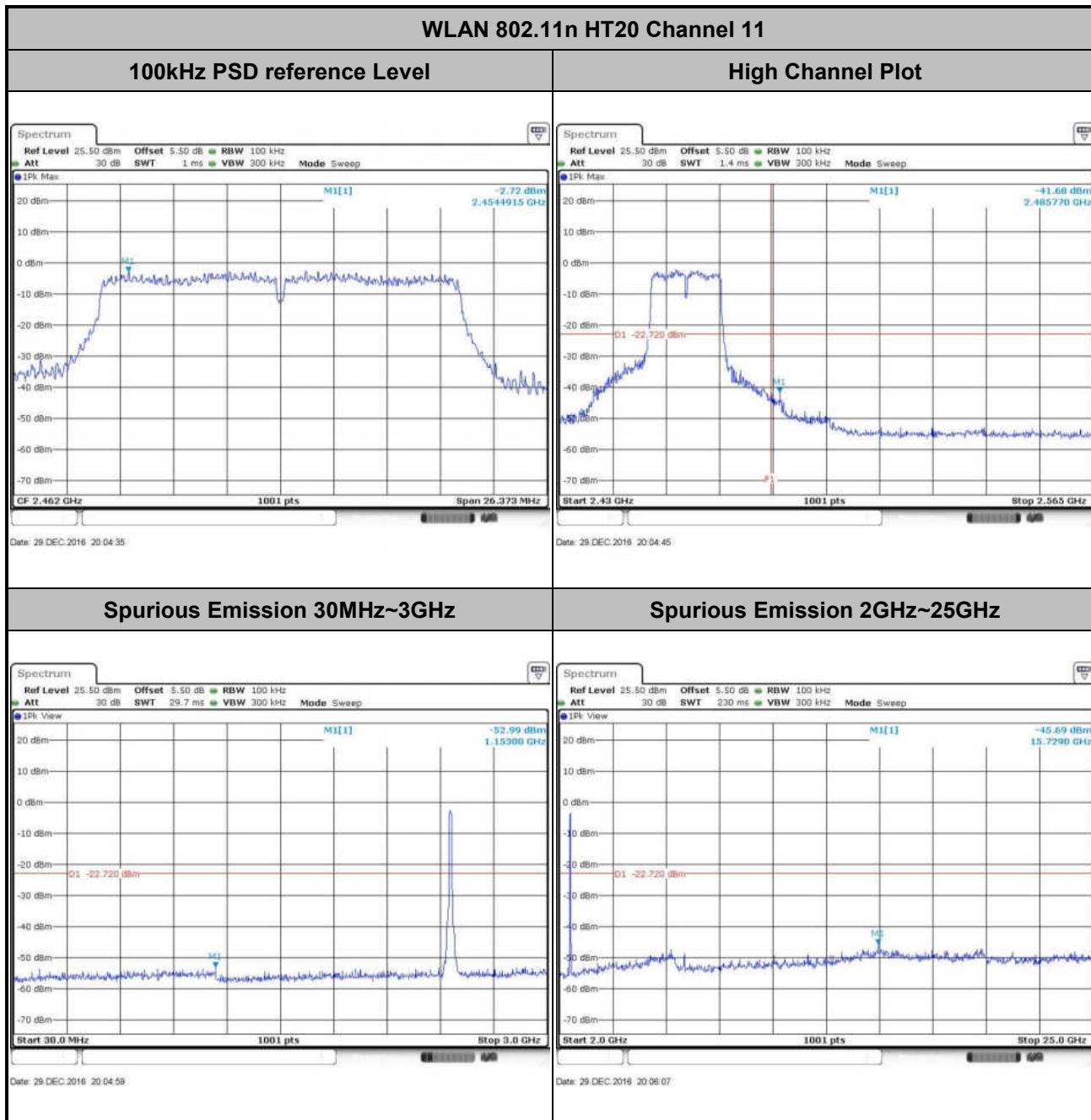


Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	10	Test Engineer :	Ivan Zhang



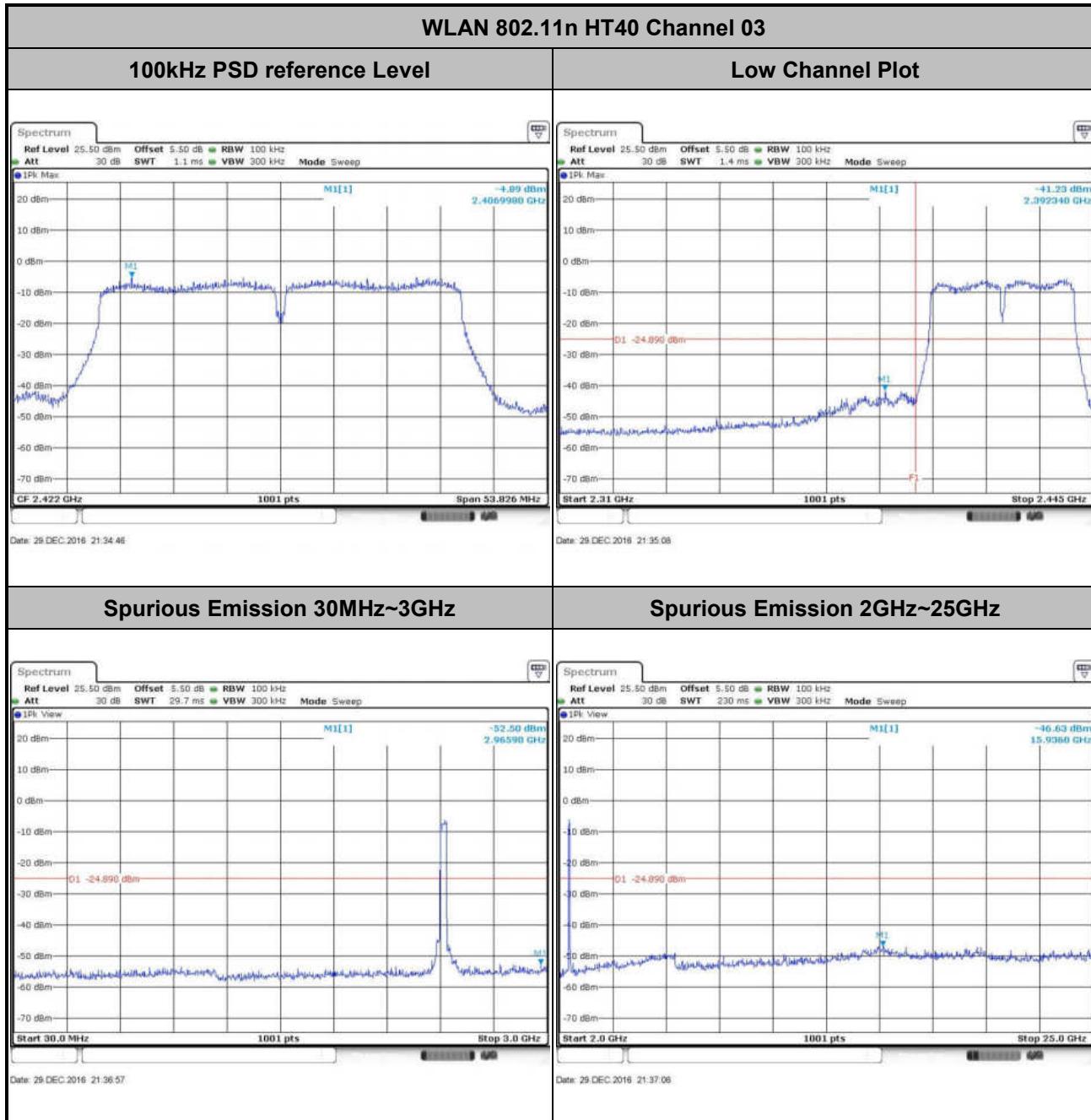


Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	11	Test Engineer :	Ivan Zhang



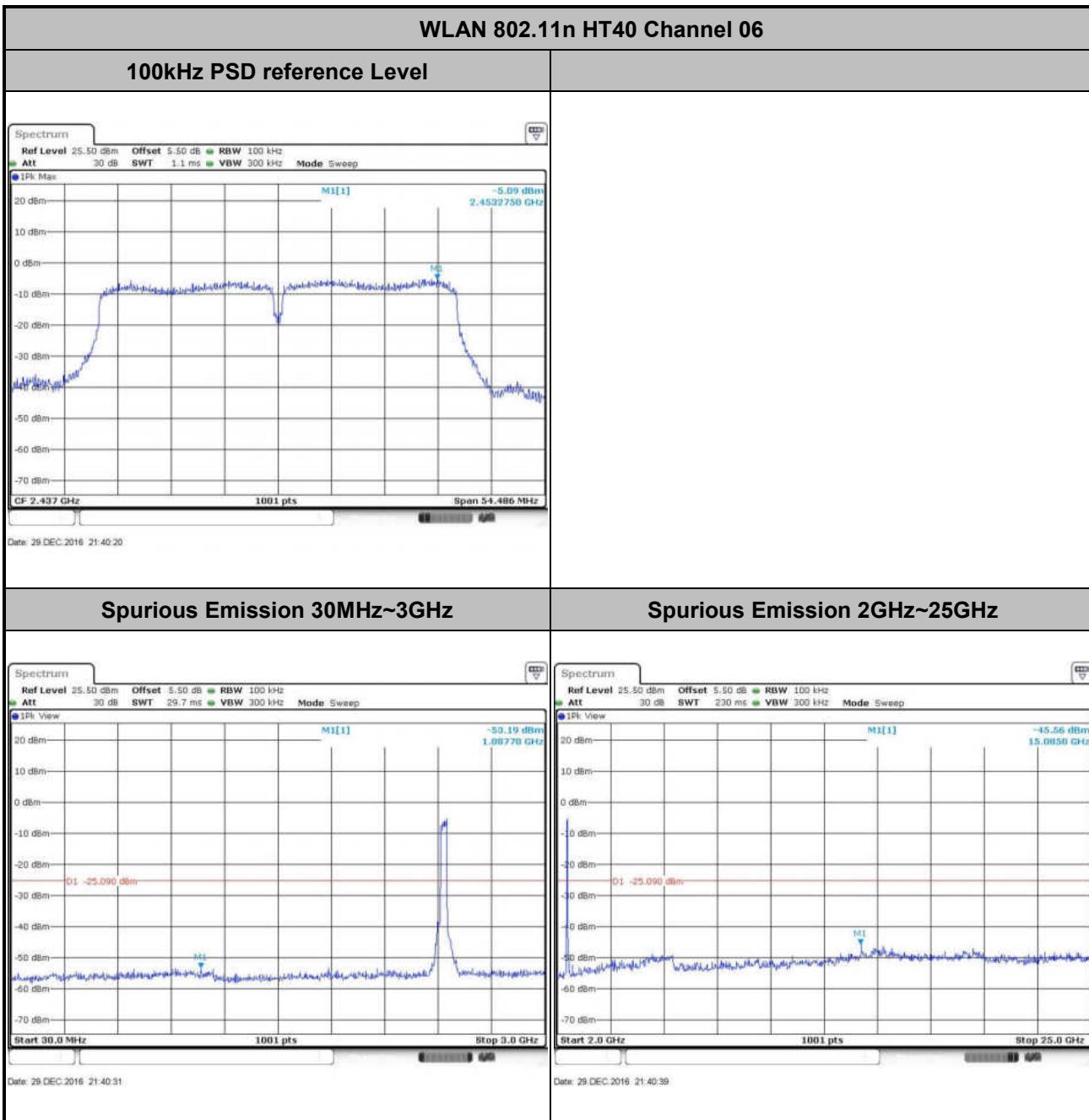


Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	03	Test Engineer :	Ivan Zhang



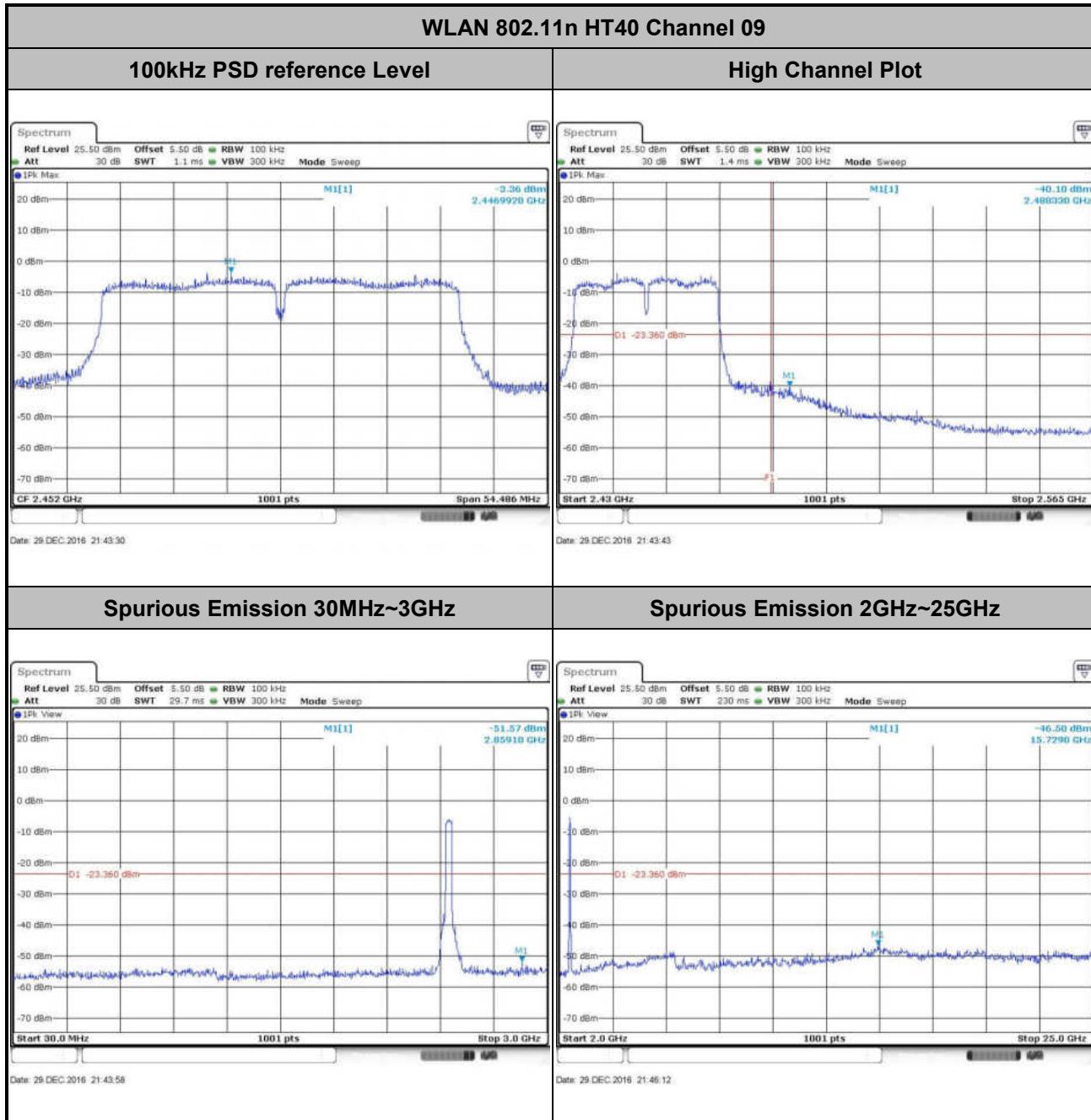


Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Zhang





Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT40	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	09	Test Engineer :	Ivan Zhang





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

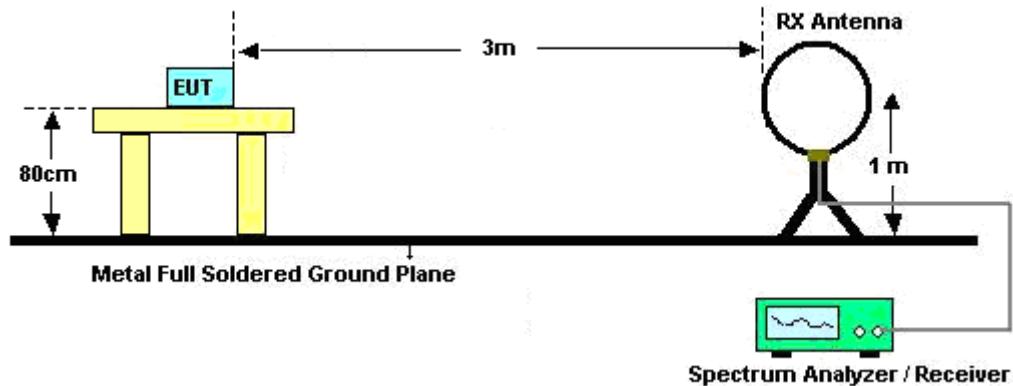
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

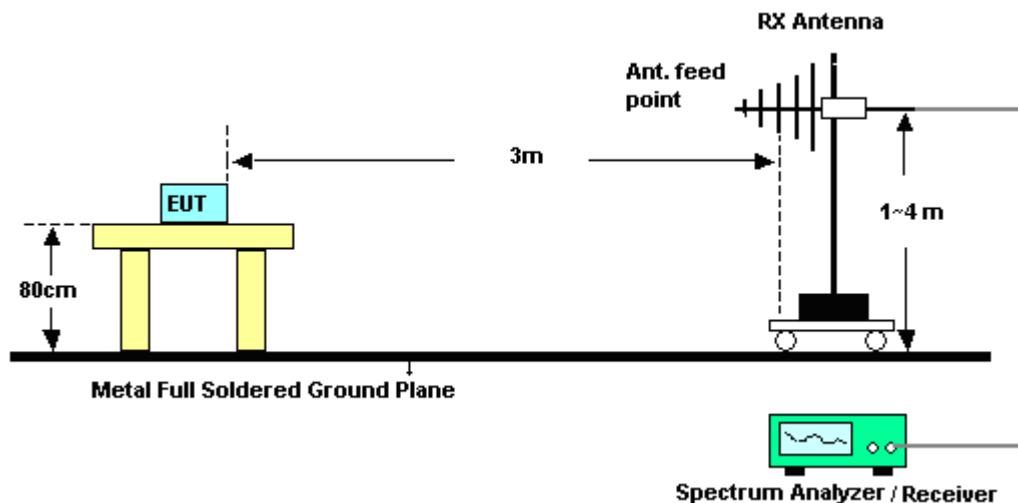
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

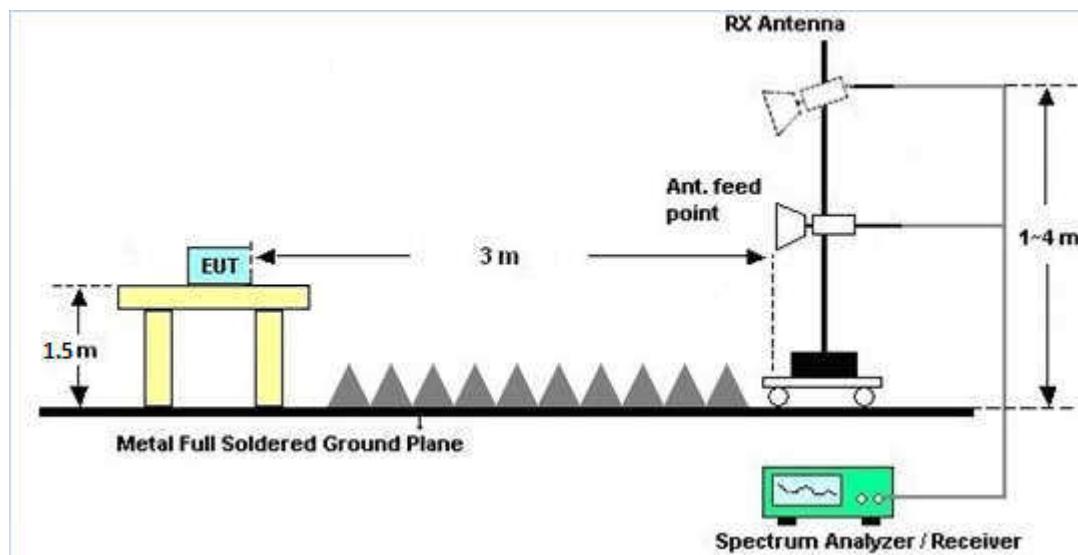
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

3.5.7 Duty Cycle

Please refer to Appendix C.

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

Please refer to Appendix B.



3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

3.6.2 Measuring Instruments

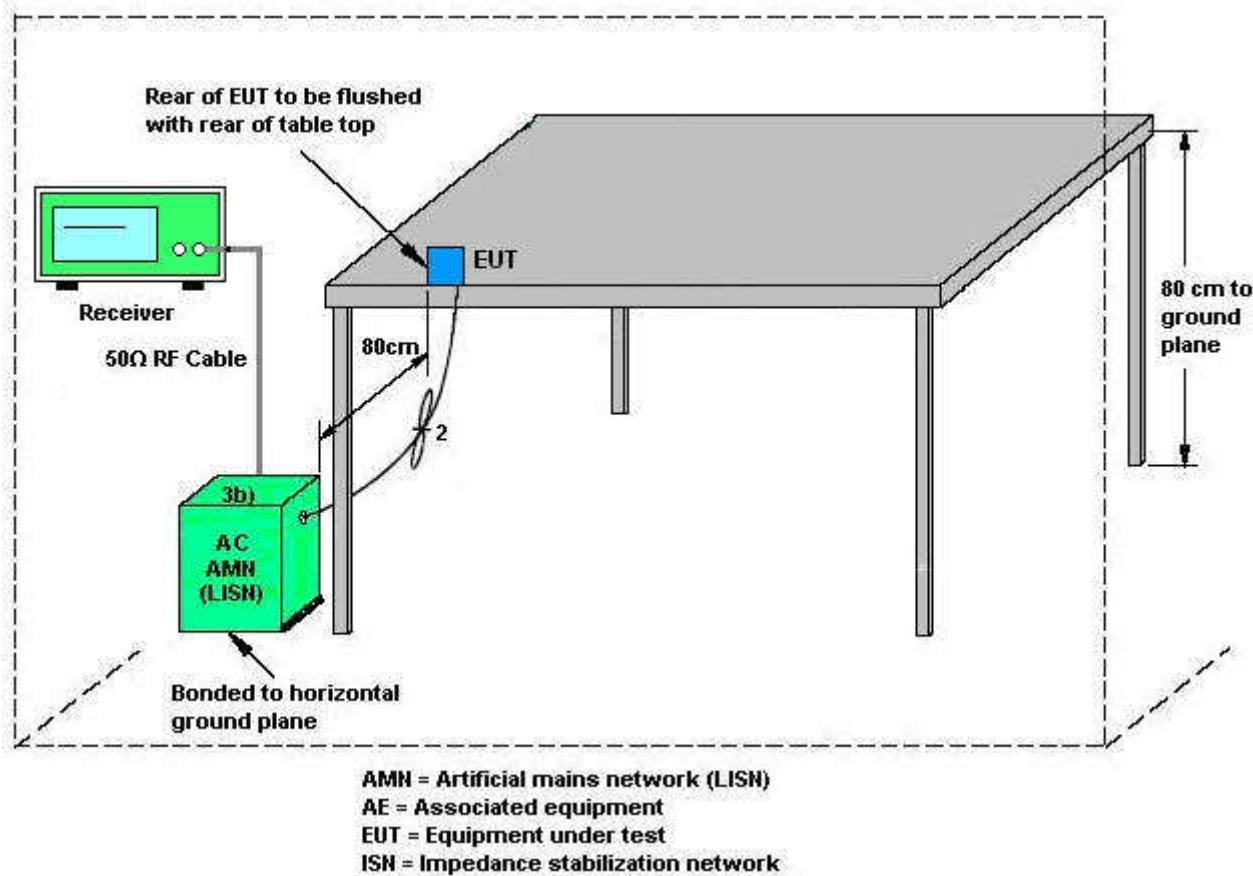
The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

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

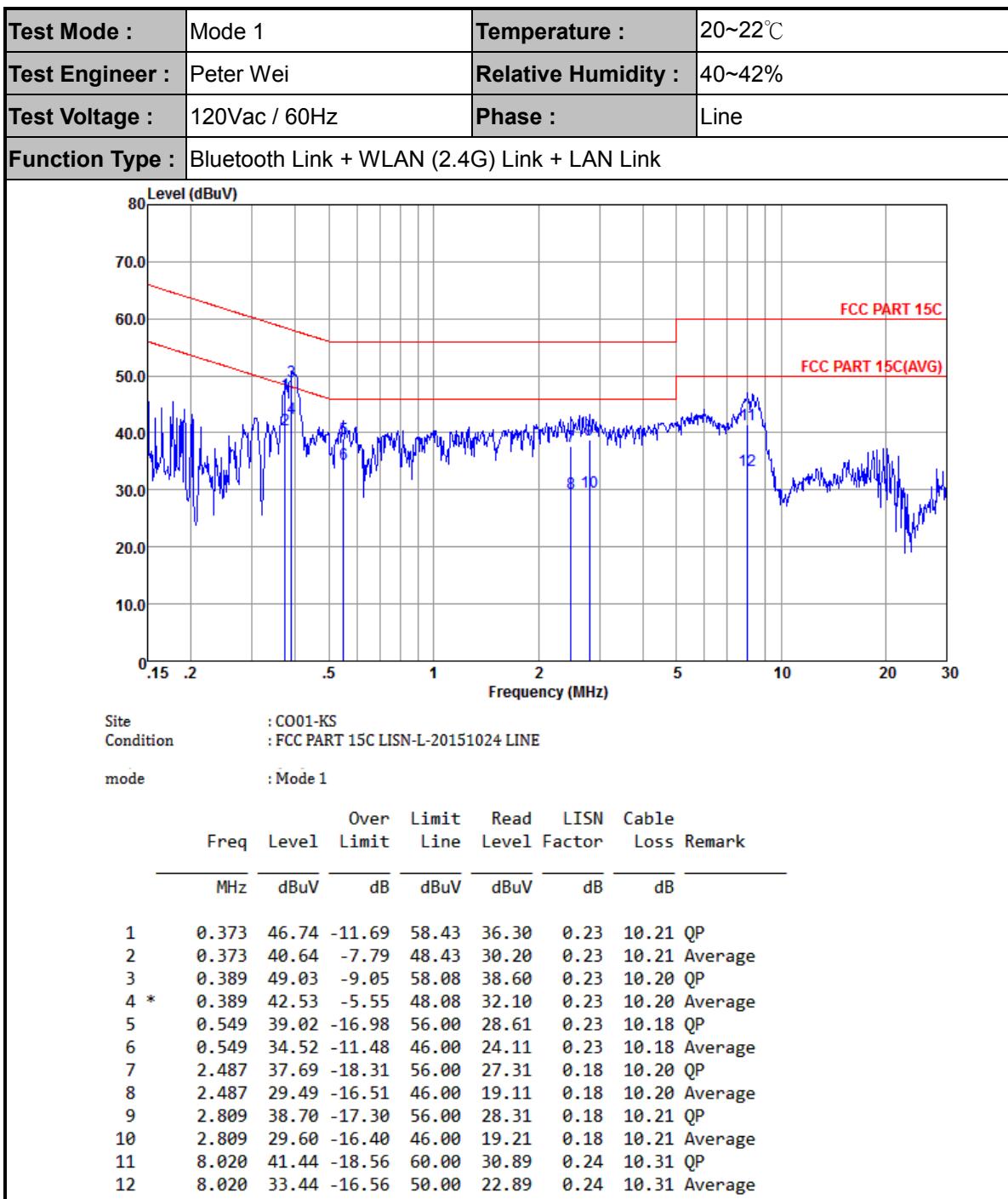


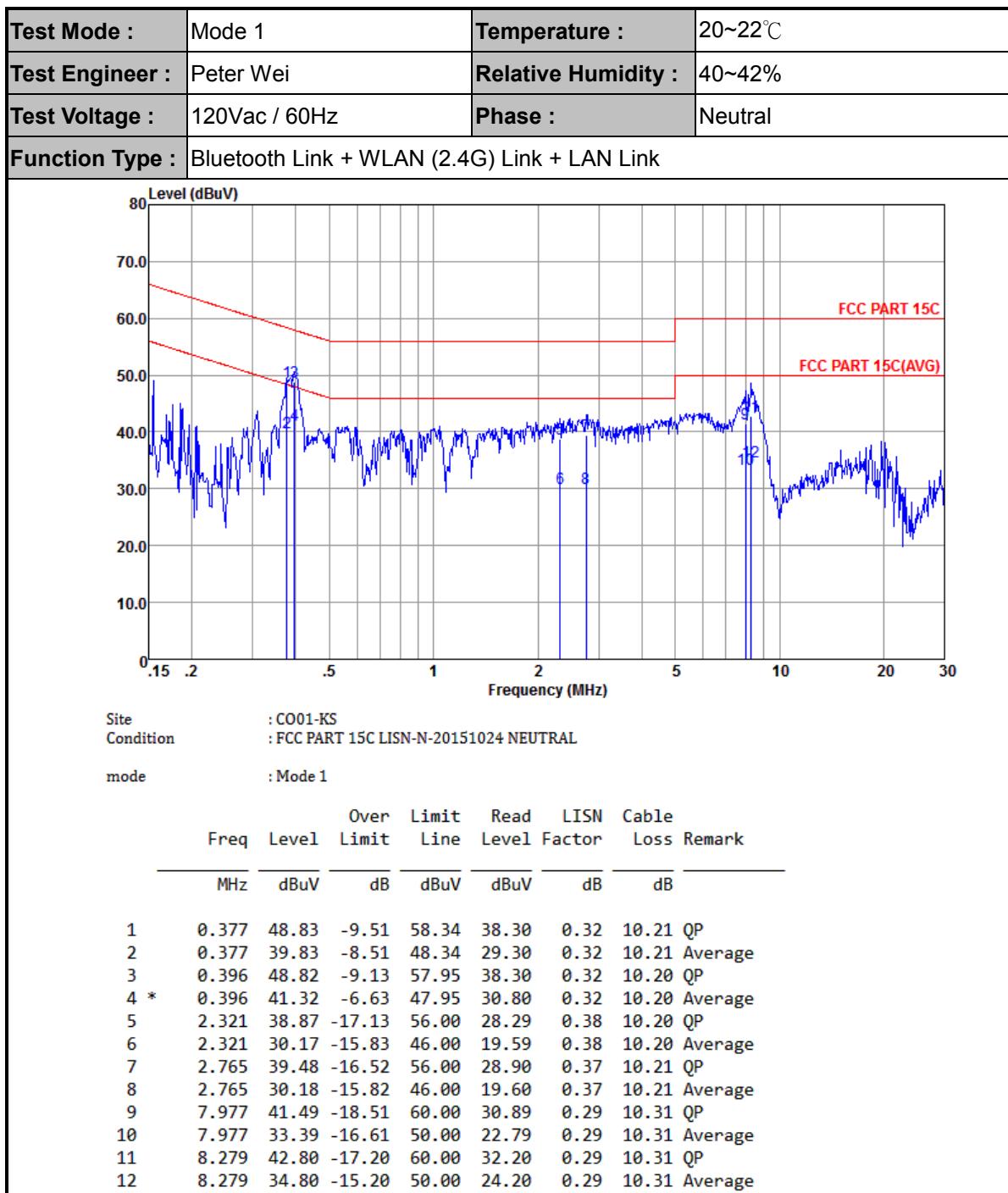
3.6.4 Test Setup





3.6.5 Test Result of AC Conducted Emission







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. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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 = $10 \log(N_{ANT}/N_{SS}=1)$ dB.

For power measurements on IEEE 802.11 devices,

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

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F2)f)i).

For PSD, the directional gain calculation is following F2)f)ii) of KDB 662911 D01 v02r01.

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.

			DG for Power	DG for PSD	Power Limit Reduction	PSD Limit Reduction
	Ant. 1 (dBi)	Ant. 2 (dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	2.93	2.92	2.93	5.94	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	R&S	FSV40	101040	10Hz~40GHz	Aug. 09, 2016	Dec. 29, 2016~Jan. 13, 2017	Aug. 08, 2017	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 20, 2016	Dec. 29, 2016~Jan. 13, 2017	Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 20, 2016	Dec. 29, 2016~Jan. 13, 2017	Jan. 19, 2017	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Aug. 09, 2016	Jan. 16, 2017	Aug. 08, 2017	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY551502 44	10Hz~44GHz	Apr. 22, 2016	Jan. 16, 2017	Apr. 21, 2017	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 23, 2016	Jan. 16, 2017	Nov. 22, 2017	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz~2GHz	Apr. 16, 2016	Jan. 16, 2017	Apr. 15, 2017	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-135 6	1GHz~18GHz	Apr. 16, 2016	Jan. 16, 2017	Apr. 15, 2017	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA1702 49	15GHz~40GHz	Mar. 03, 2016	Jan. 16, 2017	Mar. 02, 2017	Radiation (03CH03-KS)
Amplifier	SONOMA	310N	187289	9kHz~1GHz	Aug. 09, 2016	Jan. 16, 2017	Aug. 08, 2017	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18GHz~40GHz	Jan. 20, 2016	Jan. 16, 2017	Jan. 19, 2017	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A023 70	1GHz~26.5GHz	Oct. 13, 2016	Jan. 16, 2017	Oct. 12, 2017	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Jan. 16, 2017	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jan. 16, 2017	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jan. 16, 2017	NCR	Radiation (03CH03-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	Apr. 29, 2016	Jan. 12, 2017	Apr. 28, 2017	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2016	Jan. 12, 2017	Oct. 12, 2017	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2016	Jan. 12, 2017	Oct. 12, 2017	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 13, 2016	Jan. 12, 2017	Oct. 12, 2017	Conduction (CO01-KS)

NCR: No Calibration Required



5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_{c(y)}$)	4.5 dB
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Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_{c(y)}$)	4.5 dB
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Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_{c(y)}$)	4.6 dB
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Appendix A. Conducted Test Results

Test Engineer:	Ivan Zhang	Temperature:	24~25	°C
Test Date:	2016/12/29 ~ 2017/1/13	Relative Humidity:	54~55	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	Ntx	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	1	1	2412	-	13.39	-	10.05	0.50	Pass
11b	1Mbps	1	6	2437	-	13.44	-	10.05	0.50	Pass
11b	1Mbps	1	11	2462	-	13.44	-	10.05	0.50	Pass
11g	6Mbps	1	1	2412	17.28	-	16.54	-	0.50	Pass
11g	6Mbps	1	6	2437	17.48	-	16.54	-	0.50	Pass
11g	6Mbps	1	11	2462	17.38	-	16.52	-	0.50	Pass
HT20	MCS0	1	1	2412	-	18.23	-	17.58	0.50	Pass
HT20	MCS0	1	2	2417	-	18.23	-	17.62	0.50	Pass
HT20	MCS0	1	6	2437	-	18.13	-	17.68	0.50	Pass
HT20	MCS0	1	10	2457	-	18.23	-	17.56	0.50	Pass
HT20	MCS0	1	11	2462	-	18.18	-	17.56	0.50	Pass
HT40	MCS0	1	3	2422	-	36.56	-	36.36	0.50	Pass
HT40	MCS0	1	6	2437	-	36.46	-	36.28	0.50	Pass
HT40	MCS0	1	9	2452	-	36.36	-	36.04	0.50	Pass
HT20	MCS0	2	1	2412	18.13	18.33	17.58	17.60	0.50	Pass
HT20	MCS0	2	2	2417	18.23	18.23	17.68	17.60	0.50	Pass
HT20	MCS0	2	6	2437	18.28	18.83	17.58	17.60	0.50	Pass
HT20	MCS0	2	10	2457	18.23	18.33	17.56	17.62	0.50	Pass
HT20	MCS0	2	11	2462	18.13	18.23	17.64	17.58	0.50	Pass
HT40	MCS0	2	3	2422	36.56	36.36	36.36	35.88	0.50	Pass
HT40	MCS0	2	6	2437	36.36	36.36	36.04	36.32	0.50	Pass
HT40	MCS0	2	9	2452	36.26	36.26	36.32	36.32	0.50	Pass

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																
Mod.	Data Rate	Ntx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	18.92	19.08		30.00	30.00	2.93	2.92	21.85	22.00	36.00	36.00	Pass
11b	1Mbps	1	6	2437	19.41	20.26		30.00	30.00	2.93	2.92	22.34	23.18	36.00	36.00	Pass
11b	1Mbps	1	11	2462	19.81	20.53		30.00	30.00	2.93	2.92	22.74	23.45	36.00	36.00	Pass
11g	6Mbps	1	1	2412	24.67	23.05		30.00	30.00	2.93	2.92	27.60	25.97	36.00	36.00	Pass
11g	6Mbps	1	6	2437	24.68	24.02		30.00	30.00	2.93	2.92	27.61	26.94	36.00	36.00	Pass
11g	6Mbps	1	11	2462	25.04	24.18		30.00	30.00	2.93	2.92	27.97	27.10	36.00	36.00	Pass
HT20	MCS0	1	1	2412	20.92	21.09		30.00	30.00	2.93	2.92	23.85	24.01	36.00	36.00	Pass
HT20	MCS0	1	2	2417	23.67	24.01		30.00	30.00	2.93	2.92	26.60	26.93	36.00	36.00	Pass
HT20	MCS0	1	6	2437	25.12	25.66		30.00	30.00	2.93	2.92	28.05	28.58	36.00	36.00	Pass
HT20	MCS0	1	10	2457	22.88	23.16		30.00	30.00	2.93	2.92	25.81	26.08	36.00	36.00	Pass
HT20	MCS0	1	11	2462	22.48	22.35		30.00	30.00	2.93	2.92	25.41	25.27	36.00	36.00	Pass
HT40	MCS0	1	3	2422	20.68	21.39		30.00	30.00	2.93	2.92	23.61	24.31	36.00	36.00	Pass
HT40	MCS0	1	6	2437	20.62	21.12		30.00	30.00	2.93	2.92	23.55	24.04	36.00	36.00	Pass
HT40	MCS0	1	9	2452	21.74	22.17		30.00	30.00	2.93	2.92	24.67	25.09	36.00	36.00	Pass
HT20	MCS0	2	1	2412	25.38	21.75	26.94	30.00		2.93		29.87		36.00		Pass
HT20	MCS0	2	2	2417	23.15	25.28	27.35	30.00		2.93		30.28		36.00		Pass
HT20	MCS0	2	6	2437	25.86	25.75	28.82	30.00		2.93		31.75		36.00		Pass
HT20	MCS0	2	10	2457	22.89	24.87	27.00	30.00		2.93		29.93		36.00		Pass
HT20	MCS0	2	11	2462	25.85	22.24	27.42	30.00		2.93		30.35		36.00		Pass
HT40	MCS0	2	3	2422	21.39	20.68	24.06	30.00		2.93		26.99		36.00		Pass
HT40	MCS0	2	6	2437	20.85	24.65	26.16	30.00		2.93		29.09		36.00		Pass
HT40	MCS0	2	9	2452	25.33	22.48	27.15	30.00		2.93		30.08		36.00		Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	Ntx	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	1	1	2412	0.00	0.00	15.93	16.13	
11b	1Mbps	1	6	2437	0.00	0.00	16.46	17.32	
11b	1Mbps	1	11	2462	0.00	0.00	16.87	17.61	
11g	6Mbps	1	1	2412	0.00	0.00	14.86	12.96	
11g	6Mbps	1	6	2437	0.00	0.00	14.71	13.71	
11g	6Mbps	1	11	2462	0.00	0.00	15.73	14.24	
HT20	MCS0	1	1	2412	0.00	0.00	10.90	11.03	
HT20	MCS0	1	2	2417	0.00	0.00	13.65	14.62	
HT20	MCS0	1	6	2437	0.00	0.00	15.44	16.65	
HT20	MCS0	1	10	2457	0.00	0.00	12.79	13.02	
HT20	MCS0	1	11	2462	0.00	0.00	11.73	12.18	
HT40	MCS0	1	3	2422	0.00	0.00	10.10	10.49	
HT40	MCS0	1	6	2437	0.00	0.00	10.35	11.10	
HT40	MCS0	1	9	2452	0.00	0.00	10.67	11.55	
HT20	MCS0	2	1	2412	0.00	0.00	10.08	12.09	14.21
HT20	MCS0	2	2	2417	0.00	0.00	13.16	14.93	17.14
HT20	MCS0	2	6	2437	0.00	0.00	15.39	17.24	19.42
HT20	MCS0	2	10	2457	0.00	0.00	12.96	13.97	16.50
HT20	MCS0	2	11	2462	0.00	0.00	11.22	12.32	14.82
HT40	MCS0	2	3	2422	0.00	0.00	10.26	10.98	13.65
HT40	MCS0	2	6	2437	0.00	0.00	10.72	11.26	14.01
HT40	MCS0	2	9	2452	0.00	0.00	9.54	11.64	13.73

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

TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	Ntx	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	-	-7.99		2.93	2.92	8.00	8.00	Pass
11b	1Mbps	1	6	2437	-	-7.31		2.93	2.92	8.00	8.00	Pass
11b	1Mbps	1	11	2462	-	-7.21		2.93	2.92	8.00	8.00	Pass
11g	6Mbps	1	1	2412	-12.38	-		2.93	2.92	8.00	8.00	Pass
11g	6Mbps	1	6	2437	-12.64	-		2.93	2.92	8.00	8.00	Pass
11g	6Mbps	1	11	2462	-11.73	-		2.93	2.92	8.00	8.00	Pass
HT20	MCS0	1	1	2412	-	-14.35		2.93	2.92	8.00	8.00	Pass
HT20	MCS0	1	2	2417	-	-9.75		2.93	2.92	8.00	8.00	Pass
HT20	MCS0	1	6	2437	-	-10.03		2.93	2.92	8.00	8.00	Pass
HT20	MCS0	1	10	2457	-	-12.38		2.93	2.92	8.00	8.00	Pass
HT20	MCS0	1	11	2462	-	-14.73		2.93	2.92	8.00	8.00	Pass
HT40	MCS0	1	3	2422	-	-18.73		2.93	2.92	8.00	8.00	Pass
HT40	MCS0	1	6	2437	-	-17.86		2.93	2.92	8.00	8.00	Pass
HT40	MCS0	1	9	2452	-	-17.06		2.93	2.92	8.00	8.00	Pass
HT20	MCS0	2	1	2412	-14.84	-15.54	-11.83	5.94		8.00		Pass
HT20	MCS0	2	2	2417	-10.51	-11.51	-7.50	5.94		8.00		Pass
HT20	MCS0	2	6	2437	-10.21	-8.90	-5.89	5.94		8.00		Pass
HT20	MCS0	2	10	2457	-12.19	-12.84	-9.18	5.94		8.00		Pass
HT20	MCS0	2	11	2462	-13.48	-14.78	-10.47	5.94		8.00		Pass
HT40	MCS0	2	3	2422	-18.96	-18.05	-15.04	5.94		8.00		Pass
HT40	MCS0	2	6	2437	-18.41	-17.89	-14.88	5.94		8.00		Pass
HT40	MCS0	2	9	2452	-17.69	-16.95	-13.94	5.94		8.00		Pass

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



Appendix B. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2387.22	52.7	-21.3	74	57.25	27	5.47	37.02	299	297	P	H
		2389.3	43.18	-10.82	54	47.73	27	5.47	37.02	299	297	A	H
	*	2412	104.67	-	-	109.07	27.13	5.47	37	299	297	P	H
	*	2412	101.46	-	-	105.86	27.13	5.47	37	299	297	A	H
		2375.78	63.39	-10.61	74	68.01	26.95	5.45	37.02	298	48	P	V
		2385.79	46.05	-7.95	54	50.6	27	5.47	37.02	298	48	A	V
	*	2412	107.78	-	-	112.18	27.13	5.47	37	297	48	P	V
	*	2414	104.8	-	-	109.2	27.13	5.47	37	298	48	A	V
802.11b CH 06 2437MHz		2374.35	49.89	-24.11	74	54.51	26.95	5.45	37.02	100	353	P	H
		2389.43	39.37	-14.63	54	43.92	27	5.47	37.02	100	353	A	H
	*	2436	102.26	-	-	106.51	27.26	5.48	36.99	100	353	P	H
	*	2438	99.11	-	-	103.2	27.39	5.49	36.97	100	353	A	H
		2485.06	58.62	-15.38	74	62.41	27.64	5.51	36.94	100	353	P	H
		2483.5	40.35	-13.65	54	44.14	27.64	5.51	36.94	100	353	A	H
		2377.6	57.22	-16.78	74	61.84	26.95	5.45	37.02	119	65	P	V
		2387.74	39.77	-14.23	54	44.32	27	5.47	37.02	119	65	A	V
	*	2436	108.04	-	-	112.29	27.26	5.48	36.99	119	65	P	V
	*	2438	105.01	-	-	109.1	27.39	5.49	36.97	119	65	A	V
		2492.26	60.94	-13.06	74	64.58	27.77	5.52	36.93	119	65	P	V
		2483.98	40.87	-13.13	54	44.66	27.64	5.51	36.94	119	65	A	V



	*	2462	106.13	-	-	110.08	27.51	5.5	36.96	295	289	P	H
802.11b CH 11 2462MHz	*	2464	103.08	-	-	107.03	27.51	5.5	36.96	295	289	A	H
		2497.06	64.06	-9.94	74	67.7	27.77	5.52	36.93	295	289	P	H
		2483.5	46.91	-7.09	54	50.7	27.64	5.51	36.94	295	289	A	H
	*	2462	109.42	-	-	113.37	27.51	5.5	36.96	325	76	P	V
	*	2462	106.2	-	-	110.15	27.51	5.5	36.96	325	76	A	V
		2498.92	67.88	-6.12	74	71.52	27.77	5.52	36.93	325	76	P	V
		2483.5	47.25	-6.75	54	51.04	27.64	5.51	36.94	325	76	A	V
	Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.											



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

WIFI Ant. 1	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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	43.31	-30.69	74	40.76	31.51	7.72	36.68	100	0	P	H
		4824	42.86	-31.14	74	40.31	31.51	7.72	36.68	300	0	P	V
802.11b CH 06 2437MHz		4872	42.63	-31.37	74	39.94	31.59	7.76	36.66	100	360	P	H
		7308	46.07	-27.93	74	38.97	34.03	9.76	36.69	100	360	P	H
		4872	43.38	-30.62	74	40.69	31.59	7.76	36.66	100	360	P	V
		7308	45.94	-28.06	74	38.84	34.03	9.76	36.69	100	360	P	V
802.11b CH 11 2462MHz		4924	43.7	-30.3	74	40.88	31.67	7.8	36.65	300	360	P	H
		7386	45.83	-28.17	74	38.46	34.29	9.86	36.78	300	360	P	H
		4926	43.5	-30.5	74	40.68	31.67	7.8	36.65	300	360	P	V
		7386	47.04	-26.96	74	39.67	34.29	9.86	36.78	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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		2389.3	65.76	-8.24	74	70.31	27	5.47	37.02	275	293	P	H
		2389.95	52.2	-1.8	54	56.75	27	5.47	37.02	275	293	A	H
	*	2414	105.08	-	-	109.48	27.13	5.47	37	275	293	P	H
	*	2414	96.51	-	-	100.91	27.13	5.47	37	275	293	A	H
		2389.69	67.39	-6.61	74	71.94	27	5.47	37.02	302	47	P	V
		2389.95	53.36	-0.64	54	57.91	27	5.47	37.02	302	47	A	V
	*	2414	109.05	-	-	113.45	27.13	5.47	37	302	47	P	V
	*	2414	101.12	-	-	105.52	27.13	5.47	37	302	47	A	V
802.11g CH 06 2437MHz		2343.67	50.64	-23.36	74	55.38	26.86	5.41	37.01	301	55	P	H
		2389.95	39.65	-14.35	54	44.2	27	5.47	37.02	301	55	A	H
	*	2440	103.37	-	-	107.46	27.39	5.49	36.97	301	55	P	H
	*	2434	95.27	-	-	99.52	27.26	5.48	36.99	301	55	A	H
		2491.48	51.5	-22.5	74	55.14	27.77	5.52	36.93	301	55	P	H
		2483.98	40.34	-13.66	54	44.13	27.64	5.51	36.94	301	55	A	H
		2389.17	53.55	-20.45	74	58.1	27	5.47	37.02	110	108	P	V
		2389.95	41.41	-12.59	54	45.96	27	5.47	37.02	110	108	A	V
	*	2440	108.95	-	-	113.04	27.39	5.49	36.97	110	108	P	V
	*	2434	101.01	-	-	105.26	27.26	5.48	36.99	110	108	A	V
		2485.18	53.96	-20.04	74	57.75	27.64	5.51	36.94	110	108	P	V
		2483.56	42.15	-11.85	54	45.94	27.64	5.51	36.94	110	108	A	V



802.11g CH 11 2462MHz	*	2460	106.96	-	-	110.91	27.51	5.5	36.96	295	291	P	H
	*	2464	98.76	-	-	102.71	27.51	5.5	36.96	295	291	A	H
		2483.62	70.33	-3.67	74	74.12	27.64	5.51	36.94	295	291	P	H
		2483.5	51.19	-2.81	54	54.98	27.64	5.51	36.94	295	291	A	H
	*	2460	110.69	-	-	114.64	27.51	5.5	36.96	320	99	P	V
	*	2460	102.26	-	-	106.21	27.51	5.5	36.96	320	99	A	V
		2483.5	73.14	-0.86	74	76.93	27.64	5.51	36.94	320	99	P	V
		2483.5	53.47	-0.53	54	57.26	27.64	5.51	36.94	320	99	A	V
	Remark												
1. No other spurious found. 2. All results are PASS against Peak and Average limit line.													



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

WIFI Ant. 1	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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	41.44	-32.56	74	38.89	31.51	7.72	36.68	100	360	P	H
		4824	41.62	-32.38	74	39.07	31.51	7.72	36.68	100	360	P	V
802.11g CH 06 2437MHz		4872	41.99	-32.01	74	39.3	31.59	7.76	36.66	100	360	P	H
		7308	46.19	-27.81	74	39.09	34.03	9.76	36.69	100	360	P	H
		4872	42.1	-31.9	74	39.41	31.59	7.76	36.66	100	360	P	V
		7308	45.53	-28.47	74	38.43	34.03	9.76	36.69	100	360	P	V
802.11g CH 11 2462MHz		4926	42.29	-31.71	74	39.47	31.67	7.8	36.65	100	360	P	H
		7386	46.23	-27.77	74	38.86	34.29	9.86	36.78	100	360	P	H
		4926	41.77	-32.23	74	38.95	31.67	7.8	36.65	100	360	P	V
		7386	46.16	-27.84	74	38.79	34.29	9.86	36.78	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2379.68	56.59	-17.41	74	61.21	26.95	5.45	37.02	165	73	P	H
		2386.05	48.15	-5.85	54	52.7	27	5.47	37.02	165	73	A	H
	*	2412	103.84	-	-	108.24	27.13	5.47	37	165	73	P	H
	*	2412	100.6	-	-	105	27.13	5.47	37	165	73	A	H
		2386.05	58.08	-15.92	74	62.63	27	5.47	37.02	287	261	P	V
		2386.05	51.73	-2.27	54	56.28	27	5.47	37.02	287	261	A	V
	*	2412	110.5	-	-	114.9	27.13	5.47	37	287	261	P	V
	*	2414	107.36	-	-	111.76	27.13	5.47	37	287	261	A	V
802.11b CH 06 2437MHz		2321.44	50.32	-23.68	74	55.12	26.82	5.39	37.01	116	351	P	H
		2389.56	39.42	-14.58	54	43.97	27	5.47	37.02	116	351	A	H
	*	2438	102.92	-	-	107.01	27.39	5.49	36.97	116	351	P	H
	*	2438	99.84	-	-	103.93	27.39	5.49	36.97	116	351	A	H
		2484.88	58.06	-15.94	74	61.85	27.64	5.51	36.94	116	351	P	H
		2484.58	40.82	-13.18	54	44.61	27.64	5.51	36.94	116	351	A	H
		2388.78	51.21	-22.79	74	55.76	27	5.47	37.02	110	302	P	V
		2389.43	40.27	-13.73	54	44.82	27	5.47	37.02	110	302	A	V
	*	2436	108.9	-	-	113.15	27.26	5.48	36.99	110	302	P	V
	*	2438	105.78	-	-	109.87	27.39	5.49	36.97	110	302	A	V
		2485.96	62.98	-11.02	74	66.77	27.64	5.51	36.94	110	302	P	V
		2484.7	41.23	-12.77	54	45.02	27.64	5.51	36.94	110	302	A	V



		*	2462	103.83	-	-	107.78	27.51	5.5	36.96	302	287	P	H
		*	2464	100.61	-	-	104.56	27.51	5.5	36.96	302	287	A	H
			2487.94	68.02	-5.98	74	71.66	27.77	5.52	36.93	302	287	P	H
			2483.5	46.45	-7.55	54	50.24	27.64	5.51	36.94	302	287	A	H
		*	2462	110.62	-	-	114.57	27.51	5.5	36.96	290	259	P	V
		*	2464	107.5	-	-	111.45	27.51	5.5	36.96	290	259	A	V
			2483.92	71.83	-2.17	74	75.62	27.64	5.51	36.94	290	259	P	V
			2485.66	48.83	-5.17	54	52.62	27.64	5.51	36.94	290	259	A	V
Remark		1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 2	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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	45.1	-28.9	74	42.55	31.51	7.72	36.68	100	360	P	H
		4824	45.8	-28.2	74	43.25	31.51	7.72	36.68	300	360	P	V
802.11b CH 06 2437MHz		4872	42.48	-31.52	74	39.79	31.59	7.76	36.66	100	360	P	H
		7308	45.56	-28.44	74	38.46	34.03	9.76	36.69	100	360	P	H
		4872	43.94	-30.06	74	41.25	31.59	7.76	36.66	100	360	P	V
		7308	45.98	-28.02	74	38.88	34.03	9.76	36.69	100	360	P	V
802.11b CH 11 2462MHz		4926	42.74	-31.26	74	39.92	31.67	7.8	36.65	100	360	P	H
		7386	45.2	-28.8	74	37.83	34.29	9.86	36.78	100	360	P	H
		4926	43.46	-30.54	74	40.64	31.67	7.8	36.65	100	360	P	V
		7386	47	-27	74	39.63	34.29	9.86	36.78	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 2	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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		2389.69	61.98	-12.02	74	66.53	27	5.47	37.02	300	44	P	H
		2389.95	46.22	-7.78	54	50.77	27	5.47	37.02	300	44	A	H
	*	2410	102.43	-	-	106.83	27.13	5.47	37	300	44	P	H
	*	2414	94.05	-	-	98.45	27.13	5.47	37	300	44	A	H
		2389.82	68.48	-5.52	74	73.03	27	5.47	37.02	292	260	P	V
		2389.95	53.02	-0.98	54	57.57	27	5.47	37.02	292	260	A	V
	*	2414	109.06	-	-	113.46	27.13	5.47	37	292	260	P	V
	*	2414	101.02	-	-	105.42	27.13	5.47	37	292	260	A	V
802.11g CH 06 2437MHz		2348.74	51.33	-22.67	74	56.07	26.86	5.41	37.01	115	353	P	H
		2389.56	39.39	-14.61	54	43.94	27	5.47	37.02	115	353	A	H
	*	2434	102.52	-	-	106.77	27.26	5.48	36.99	115	353	P	H
	*	2440	94.38	-	-	98.47	27.39	5.49	36.97	115	353	A	H
		2490.16	51.66	-22.34	74	55.3	27.77	5.52	36.93	115	353	P	H
		2484.64	40.5	-13.5	54	44.29	27.64	5.51	36.94	115	353	A	H
		2381.5	51.06	-22.94	74	55.68	26.95	5.45	37.02	105	303	P	V
		2364.6	40.58	-13.42	54	45.26	26.91	5.43	37.02	105	303	A	V
	*	2440	107.83	-	-	111.92	27.39	5.49	36.97	105	303	P	V
	*	2440	99.96	-	-	104.05	27.39	5.49	36.97	105	303	A	V
		2483.68	55.06	-18.94	74	58.85	27.64	5.51	36.94	105	303	P	V
		2483.56	41.53	-12.47	54	45.32	27.64	5.51	36.94	105	303	A	V



802.11g CH 11 2462MHz	*	2466	101.02	-	-	104.97	27.51	5.5	36.96	297	294	P	H
	*	2464	93.12	-	-	97.07	27.51	5.5	36.96	297	294	A	H
		2486.14	62.28	-11.72	74	66.07	27.64	5.51	36.94	297	294	P	H
		2483.5	46.45	-7.55	54	50.24	27.64	5.51	36.94	297	294	A	H
	*	2464	109.66	-	-	113.61	27.51	5.5	36.96	289	244	P	V
	*	2464	101.82	-	-	105.77	27.51	5.5	36.96	289	244	A	V
		2483.86	68.98	-5.02	74	72.77	27.64	5.51	36.94	289	244	P	V
		2483.5	52.04	-1.96	54	55.83	27.64	5.51	36.94	289	244	A	V
	Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.											



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

WIFI Ant. 2	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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	43.28	-30.72	74	40.73	31.51	7.72	36.68	100	360	P	H
		4824	41.28	-32.72	74	38.73	31.51	7.72	36.68	100	360	P	V
802.11g CH 06 2437MHz		4872	42.53	-31.47	74	39.84	31.59	7.76	36.66	100	360	P	H
		7308	45.97	-28.03	74	38.87	34.03	9.76	36.69	100	360	P	H
		4872	42.32	-31.68	74	39.63	31.59	7.76	36.66	100	360	P	V
		7308	45.79	-28.21	74	38.69	34.03	9.76	36.69	100	360	P	V
802.11g CH 11 2462MHz		4926	43.25	-30.75	74	40.43	31.67	7.8	36.65	100	360	P	H
		7386	45.74	-28.26	74	38.37	34.29	9.86	36.78	100	360	P	H
		4926	42.1	-31.9	74	39.28	31.67	7.8	36.65	100	360	P	V
		7386	46.1	-27.9	74	38.73	34.29	9.86	36.78	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	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)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n		2387.61	60.59	-13.41	74	65.14	27	5.47	37.02	100	355	P	H
		2389.95	44.58	-9.42	54	49.13	27	5.47	37.02	100	355	A	H
HT20	*	2416	102.67	-	-	107.07	27.13	5.47	37	100	355	P	H
CH 01	*	2416	94.86	-	-	99.26	27.13	5.47	37	100	355	A	H
2412MHz		2388.91	68.54	-5.46	74	73.09	27	5.47	37.02	100	298	P	V
		2389.95	52.64	-1.36	54	57.19	27	5.47	37.02	100	298	A	V
802.11n	*	2414	108.39	-	-	112.79	27.13	5.47	37	100	298	P	V
	*	2410	99.75	-	-	104.15	27.13	5.47	37	100	298	A	V
HT20		2389.82	68.94	-5.06	74	73.49	27	5.47	37.02	100	40	P	H
		2387.74	46.19	-7.81	54	50.74	27	5.47	37.02	100	40	A	H
CH 06	*	2436	110.77	-	-	115.02	27.26	5.48	36.99	100	40	P	H
	*	2440	101.95	-	-	106.04	27.39	5.49	36.97	100	40	A	H
2437MHz		2483.5	46.69	-7.31	54	50.48	27.64	5.51	36.94	100	40	A	H
		2485	68.02	-5.98	74	71.81	27.64	5.51	36.94	100	40	P	H
CH 06		2389.82	71.85	-2.15	74	76.4	27	5.47	37.02	100	117	P	V
		2389.04	49.23	-4.77	54	53.78	27	5.47	37.02	100	117	A	V
HT20	*	2440	114.01	-	-	118.1	27.39	5.49	36.97	100	117	P	V
	*	2440	104.54	-	-	108.63	27.39	5.49	36.97	100	117	A	V
2437MHz		2484.1	70.51	-3.49	74	74.3	27.64	5.51	36.94	100	117	P	V
		2483.56	50.1	-3.9	54	53.89	27.64	5.51	36.94	100	117	A	V



	*	2466	105.18	-	-	109.13	27.51	5.5	36.96	100	353	P	H
	*	2462	96.66	-	-	100.61	27.51	5.5	36.96	100	353	A	H
802.11n		2486.44	62.38	-11.62	74	66.17	27.64	5.51	36.94	100	353	P	H
HT20		2485.36	46.7	-7.3	54	50.49	27.64	5.51	36.94	100	353	A	H
CH 11	*	2466	108.72	-	-	112.67	27.51	5.5	36.96	100	296	P	V
2462MHz	*	2464	100.26	-	-	104.21	27.51	5.5	36.96	100	296	A	V
		2483.74	67.94	-6.06	74	71.73	27.64	5.51	36.94	100	296	P	V
		2483.5	51.41	-2.59	54	55.2	27.64	5.51	36.94	100	296	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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	43.54	-30.46	74	40.99	31.51	7.72	36.68	100	360	P	H
		4824	42.78	-31.22	74	40.23	31.51	7.72	36.68	100	360	P	V
802.11n HT20 CH 06 2437MHz		4872	42.88	-31.12	74	40.19	31.59	7.76	36.66	100	360	P	H
		7308	45.84	-28.16	74	38.74	34.03	9.76	36.69	100	360	P	H
		4872	43.02	-30.98	74	40.33	31.59	7.76	36.66	100	360	P	V
		7308	45.61	-28.39	74	38.51	34.03	9.76	36.69	100	360	P	V
802.11n HT20 CH 11 2462MHz		4926	41.52	-32.48	74	38.7	31.67	7.8	36.65	100	360	P	H
		7386	45.88	-28.12	74	38.51	34.29	9.86	36.78	100	360	P	H
		4926	42.55	-31.45	74	39.73	31.67	7.8	36.65	100	360	P	V
		7386	45.73	-28.27	74	38.36	34.29	9.86	36.78	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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		2387.74	62.91	-11.09	74	67.46	27	5.47	37.02	100	352	P	H
		2387.09	48.7	-5.3	54	53.25	27	5.47	37.02	100	352	A	H
	*	2426	101.4	-	-	105.65	27.26	5.48	36.99	100	352	P	H
	*	2426	93.83	-	-	98.08	27.26	5.48	36.99	100	352	A	H
		2485.42	57.03	-16.97	74	60.82	27.64	5.51	36.94	100	352	P	H
		2486.56	43.72	-10.28	54	47.51	27.64	5.51	36.94	100	352	A	H
		2386.05	66.88	-7.12	74	71.43	27	5.47	37.02	112	63	P	V
		2389.95	53.35	-0.65	54	57.9	27	5.47	37.02	112	63	A	V
	*	2426	104.06	-	-	108.31	27.26	5.48	36.99	112	63	P	V
	*	2426	96.2	-	-	100.45	27.26	5.48	36.99	112	63	A	V
802.11n HT40 CH 06 2437MHz		2487.7	55.36	-18.64	74	59	27.77	5.52	36.93	112	63	P	V
		2486.26	44.13	-9.87	54	47.92	27.64	5.51	36.94	112	63	A	V
		2389.56	57.85	-16.15	74	62.4	27	5.47	37.02	100	354	P	H
		2389.56	43.71	-10.29	54	48.26	27	5.47	37.02	100	354	A	H
	*	2440	101.96	-	-	106.05	27.39	5.49	36.97	100	354	P	H
	*	2444	93.99	-	-	98.08	27.39	5.49	36.97	100	354	A	H
		2483.98	60.15	-13.85	74	63.94	27.64	5.51	36.94	100	354	P	H
		2483.98	45.73	-8.27	54	49.52	27.64	5.51	36.94	100	354	A	H
		2389.43	62.22	-11.78	74	66.77	27	5.47	37.02	100	307	P	V
		2389.95	47.93	-6.07	54	52.48	27	5.47	37.02	100	307	A	V
	*	2452	104.67	-	-	108.76	27.39	5.49	36.97	100	307	P	V
	*	2440	95.68	-	-	99.77	27.39	5.49	36.97	100	307	A	V
		2484.1	62.12	-11.88	74	65.91	27.64	5.51	36.94	100	307	P	V
		2484.46	47.85	-6.15	54	51.64	27.64	5.51	36.94	100	307	A	V



	2386.05	51.57	-22.43	74	56.12	27	5.47	37.02	100	356	P	H	
	2389.82	40.75	-13.25	54	45.3	27	5.47	37.02	100	356	A	H	
	*	2458	102.55	-	-	106.5	27.51	5.5	36.96	100	356	P	H
	*	2456	94.77	-	-	98.72	27.51	5.5	36.96	100	356	A	H
802.11n		2486.74	66.15	-7.85	74	69.94	27.64	5.51	36.94	100	356	P	H
HT40		2486.5	49.19	-4.81	54	52.98	27.64	5.51	36.94	100	356	A	H
CH 09		2388.39	57.25	-16.75	74	61.8	27	5.47	37.02	100	306	P	V
2452MHz		2389.56	43.98	-10.02	54	48.53	27	5.47	37.02	100	306	A	V
	*	2466	104.85	-	-	108.8	27.51	5.5	36.96	100	306	P	V
	*	2468	96.76	-	-	100.71	27.51	5.5	36.96	100	306	A	V
		2483.74	68.73	-5.27	74	72.52	27.64	5.51	36.94	100	306	P	V
		2483.5	52.02	-1.98	54	55.81	27.64	5.51	36.94	100	306	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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	41.69	-32.31	74	39.1	31.53	7.74	36.68	100	360	P	H
		7266	45.13	-28.87	74	38.14	33.93	9.72	36.66	100	360	P	H
		4842	43.09	-30.91	74	40.5	31.53	7.74	36.68	100	360	P	V
		7368	45.18	-28.82	74	37.86	34.24	9.84	36.76	100	360	P	V
802.11n HT40 CH 06 2437MHz		4872	42.67	-31.33	74	39.98	31.59	7.76	36.66	100	360	P	H
		7308	45.13	-28.87	74	38.03	34.03	9.76	36.69	100	360	P	H
		4872	42.55	-31.45	74	39.86	31.59	7.76	36.66	100	360	P	V
		7308	46.3	-27.7	74	39.2	34.03	9.76	36.69	100	360	P	V
802.11n HT40 CH 09 2452MHz		4902	41.62	-32.38	74	38.85	31.64	7.78	36.65	100	360	P	H
		7356	45.75	-28.25	74	38.49	34.19	9.82	36.75	100	360	P	H
		4902	42.11	-31.89	74	39.34	31.64	7.78	36.65	100	360	P	V
		7356	46.39	-27.61	74	39.13	34.19	9.82	36.75	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n	*	2389.69	65.2	-8.8	74	69.75	27	5.47	37.02	100	312	P	H
	*	2389.95	45.79	-8.21	54	50.34	27	5.47	37.02	100	312	A	H
HT20	*	2420	105.63	-	-	109.88	27.26	5.48	36.99	100	312	P	H
CH 02	*	2414	97.7	-	-	102.1	27.13	5.47	37	100	312	A	H
2417MHz	*	2389.56	71.19	-2.81	74	75.74	27	5.47	37.02	100	100	P	V
	*	2389.95	52.41	-1.59	54	56.96	27	5.47	37.02	100	100	A	V
802.11n	*	2420	111.94	-	-	116.19	27.26	5.48	36.99	100	100	P	V
	*	2416	102.36	-	-	106.76	27.13	5.47	37	100	100	A	V
HT20	*	2462	103.1	-	-	107.05	27.51	5.5	36.96	100	318	P	H
	*	2462	95.34	-	-	99.29	27.51	5.5	36.96	100	318	A	H
CH 10	*	2486.86	57.34	-16.66	74	61.13	27.64	5.51	36.94	100	318	P	H
2457MHz	*	2486.74	43.03	-10.97	54	46.82	27.64	5.51	36.94	100	318	A	H
	*	2454	109.2	-	-	113.15	27.51	5.5	36.96	100	111	P	V
2457MHz	*	2458	100.27	-	-	104.22	27.51	5.5	36.96	100	111	A	V
	*	2488.54	65.31	-8.69	74	68.95	27.77	5.52	36.93	100	111	P	V
Remark	No other spurious found. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	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 02 2417MHz		4836	42.88	-31.12	74	40.29	31.53	7.74	36.68	100	360	P	H
		7251	46.97	-27.03	74	40.03	33.88	9.7	36.64	100	360	P	H
		4836	44.21	-29.79	74	41.62	31.53	7.74	36.68	200	360	P	V
		7248	45.85	-28.15	74	38.91	33.88	9.7	36.64	200	360	P	V
802.11n HT20 CH 10 2457MHz		4914	42.79	-31.21	74	40.02	31.64	7.78	36.65	200	0	P	H
		7371	45.43	-28.57	74	38.11	34.24	9.84	36.76	200	0	P	H
		4914	42.86	-31.14	74	40.09	31.64	7.78	36.65	200	0	P	V
		7368	45.99	-28.01	74	38.67	34.24	9.84	36.76	200	0	P	V
Remark	No other spurious found. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11g (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11g LF		36.79	27.2	-12.8	40	33.65	24.18	0.73	31.36	-	-	P	H
		216.24	39.34	-6.66	46	52.86	16.23	1.73	31.48	100	250	P	H
		279.29	37.07	-8.93	46	48.29	18.22	1.97	31.41	-	-	P	H
		348.16	35.27	-10.73	46	42.98	21.21	2.3	31.22	-	-	P	H
		390.84	34.53	-11.47	46	40.51	22.83	2.44	31.25	-	-	P	H
		418.97	36.87	-9.13	46	41.53	24.06	2.53	31.25	-	-	P	H
		35.82	28.43	-11.57	40	34.22	24.84	0.72	31.35	-	-	P	V
		169.68	33.61	-9.89	43.5	46.48	17.08	1.58	31.53	100	25	P	V
		216.24	35.78	-10.22	46	49.3	16.23	1.73	31.48	-	-	P	V
		280.26	34.85	-11.15	46	46.04	18.25	1.97	31.41	-	-	P	V
		418	35.71	-10.29	46	40.42	24.01	2.53	31.25	-	-	P	V
		559.62	32.77	-13.23	46	36.35	24.74	2.96	31.28	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

**Note symbol**

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



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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V)	(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(dB μ V/m) =

$$= \text{Antenna Factor(dB/m)} + \text{Cable Loss(dB)} + \text{Read Level(dB μ V)} - \text{Preamp Factor(dB)}$$

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

For Peak Limit @ 2390MHz:

1. Level(dB μ V/m)

$$= \text{Antenna Factor(dB/m)} + \text{Cable Loss(dB)} + \text{Read Level(dB μ V)} - \text{Preamp Factor(dB)}$$

$$= 32.22(\text{dB/m}) + 4.58(\text{dB}) + 54.51(\text{dB μ V}) - 35.86 (\text{dB})$$

$$= 55.45 (\text{dB μ V/m})$$

2. Over Limit(dB)

$$= \text{Level(dB μ V/m)} - \text{Limit Line(dB μ V/m)}$$

$$= 55.45(\text{dB μ V/m}) - 74(\text{dB μ V/m})$$

$$= -18.55(\text{dB})$$

For Average Limit @ 2390MHz:

1. Level(dB μ V/m)

$$= \text{Antenna Factor(dB/m)} + \text{Cable Loss(dB)} + \text{Read Level(dB μ V)} - \text{Preamp Factor(dB)}$$

$$= 32.22(\text{dB/m}) + 4.58(\text{dB}) + 42.6(\text{dB μ V}) - 35.86 (\text{dB})$$

$$= 43.54 (\text{dB μ V/m})$$

2. Over Limit(dB)

$$= \text{Level(dB μ V/m)} - \text{Limit Line(dB μ V/m)}$$

$$= 43.54(\text{dB μ V/m}) - 54(\text{dB μ V/m})$$

$$= -10.46(\text{dB})$$

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



Appendix C. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11b	100	-	-	10Hz
2	802.11b	100	-	-	10Hz
1	802.11g	100	-	-	10Hz
2	802.11g	100	-	-	10Hz
1 + 2	802.11n HT20	100	-	-	10Hz
1 + 2	802.11n HT40	100	-	-	10Hz



802.11b for Ant.1

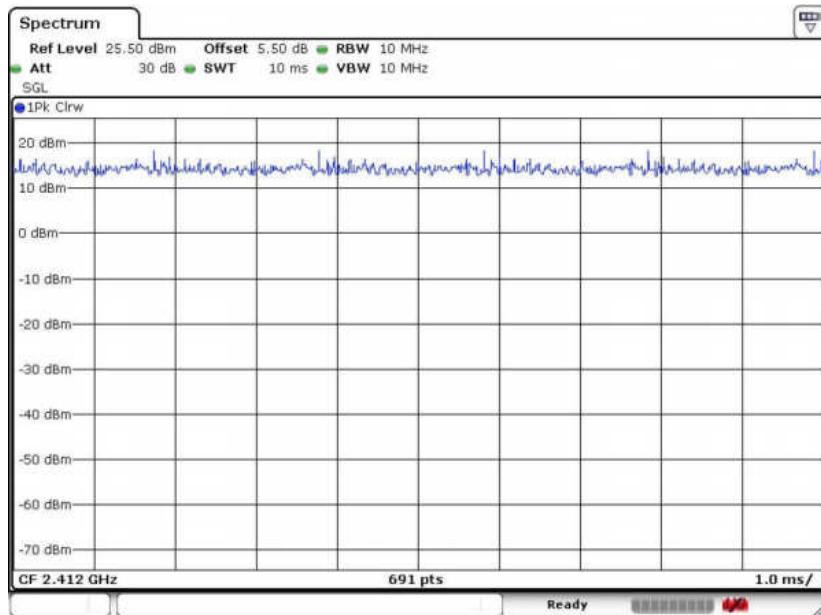


802.11b for Ant.2

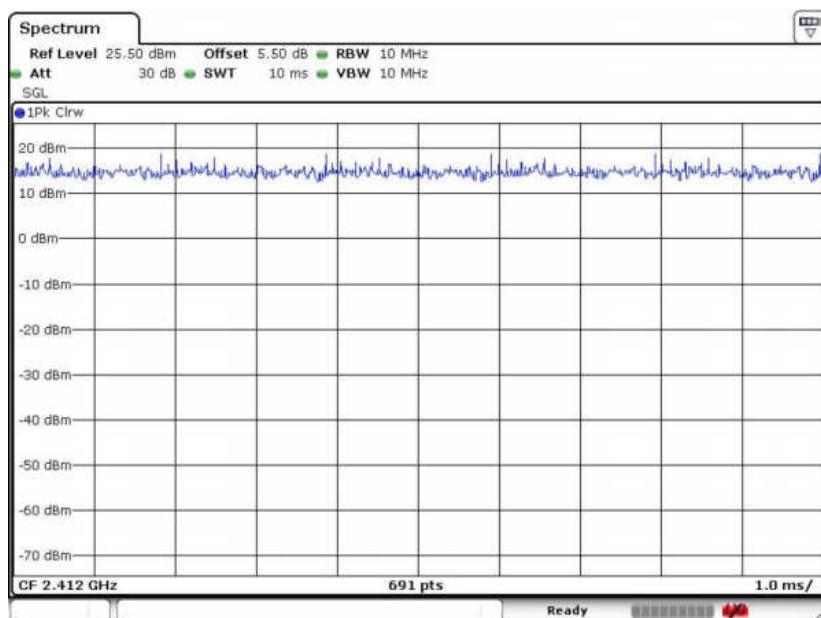




802.11g for Ant.1

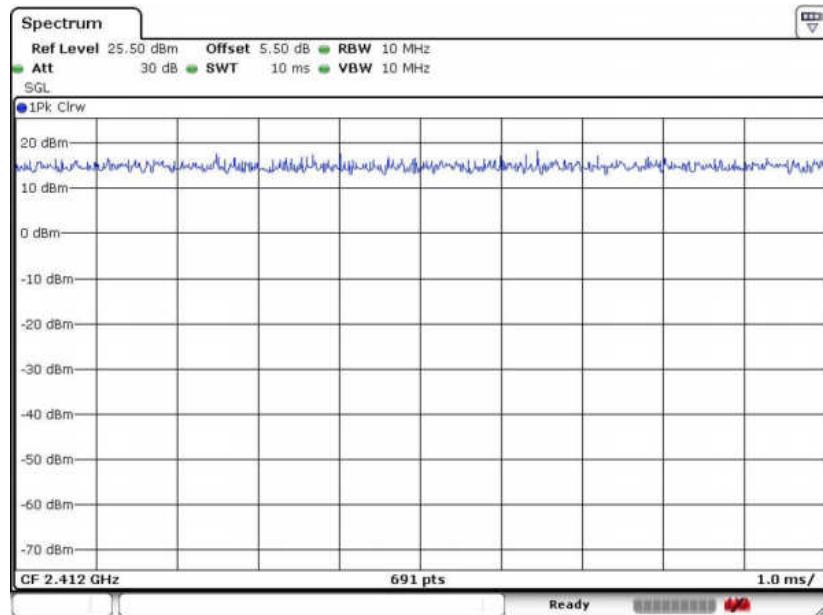


802.11g for Ant.2





802.11n HT20 for Ant.1 + 2



802.11n HT40 for Ant.1 + 2

