



FCC RF Test Report

APPLICANT : HTC Corporation
EQUIPMENT : Smartphone
MODEL NAME : 2Q5V200
FCC ID : NM82Q5V200
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Jan. 02, 2018 and testing was completed on Feb. 28, 2018. 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.

This report contains data that were produced under subcontract by Laboratory SPORTON INTERNATIONAL INC.

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.

Approved by: James Huang / Manager



Sporton International (Kunshan) Inc.

***No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335
China***



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR810208C	Rev. 01	Initial issue of report	Mar. 15, 2018



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 3.42 dB at 2389.520 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.94 dB at 0.546 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

HTC Corporation

No. 88, Sec. 3, Zhongxing Rd. Xindian Dist., New Taipei City, Taiwan

1.2 Manufacturer

Shanghai Longcheer Technology Co., Ltd

Building 1, No.401, Caobao Rd., Xuhui Dist, Shanghai, P.R.China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smartphone
Model Name	2Q5V200
FCC ID	NM82Q5V200
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/HSPA+/LTE WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth v3.0+EDR/ Bluetooth v4.0 LE
EUT Stage	Production Unit

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	802.11b : 20.13 dBm (0.1030 W) 802.11g : 23.23 dBm (0.2104 W) 802.11n HT20 : 23.35 dBm (0.2163 W) 802.11n HT40 : 23.96 dBm (0.2489 W)
Antenna Type / Gain	PIFA Antenna with gain -1.0 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

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



1.6 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No. is CN5013.

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.		FCC Test Firm Registration No.
	TH01-KS	CO01-KS	630927

Note: The test site complies with ANSI C63.4 2014 requirement.

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

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

Note:

1. The test site complies with ANSI C63.4 2014 requirement.
2. Test data subcontracted: radiated spurious emissions for section 3.5 of this report.



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 v04
- ♦ 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 (Z 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

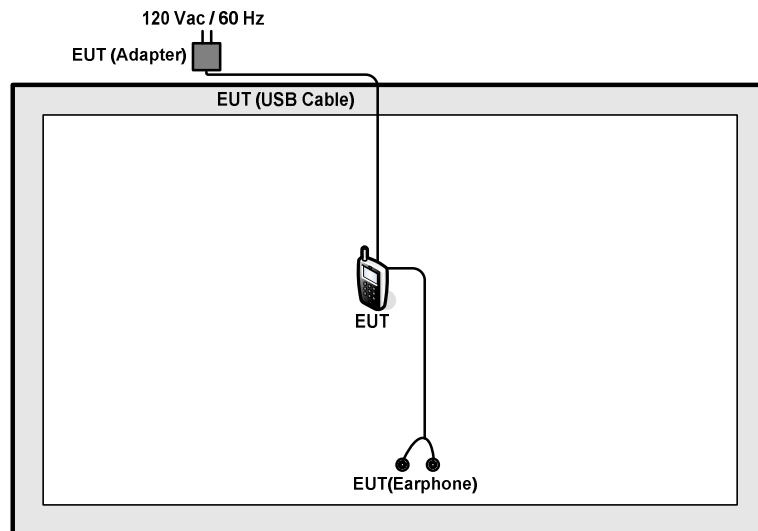
Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

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

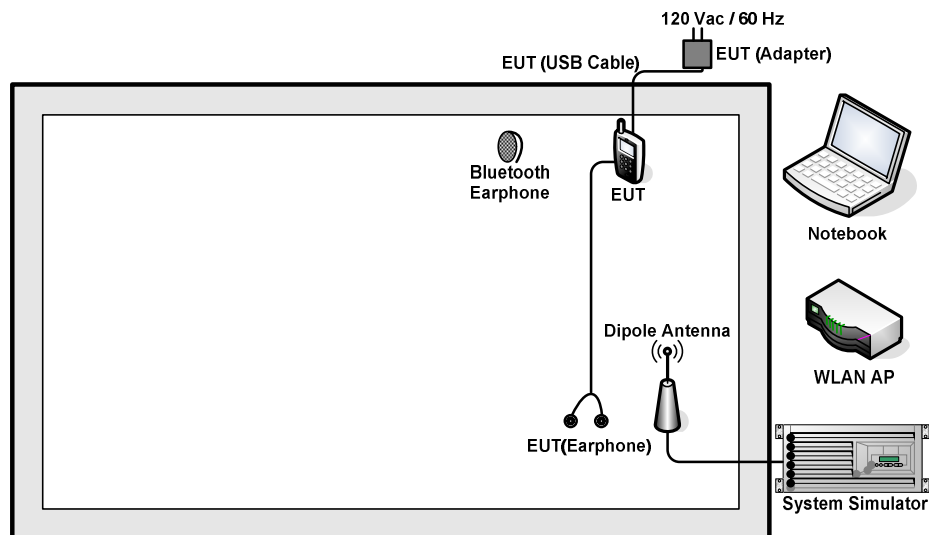
Test Cases	
AC Conducted Emission	Mode 1 :GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter) + Earphone
Remark: For Radiated Test Cases, The tests were performed with Adapter, Earphone and USB Cable .	

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.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m
2.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	G480	N/A	N/A	Shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
4.	Bluetooth Earphone	Lenovo	LBH308	NA	N/A	N/A
5.	SD Card	Kingston	8GB	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 WLAN link with the WLAN AP 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 5.5 dB.

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

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

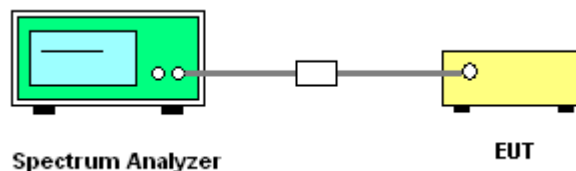
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

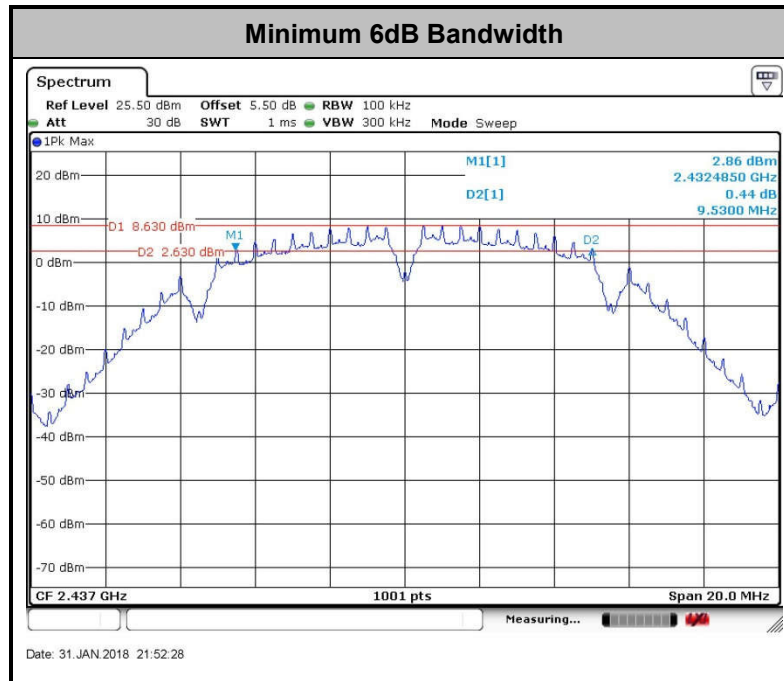
1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit 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 Occupied Bandwidth

Please refer to Appendix A.



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.

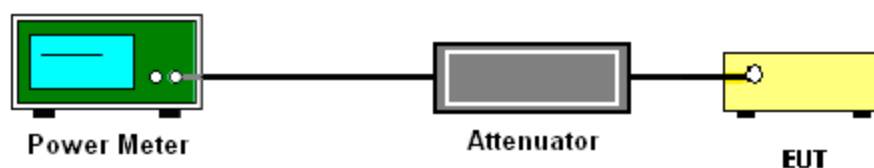
3.2.2 Measuring Instruments

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 v04 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.

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.

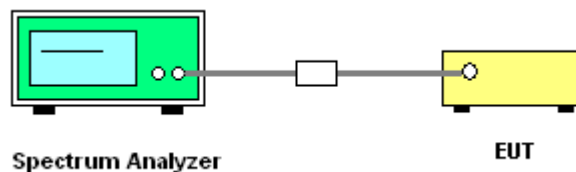
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

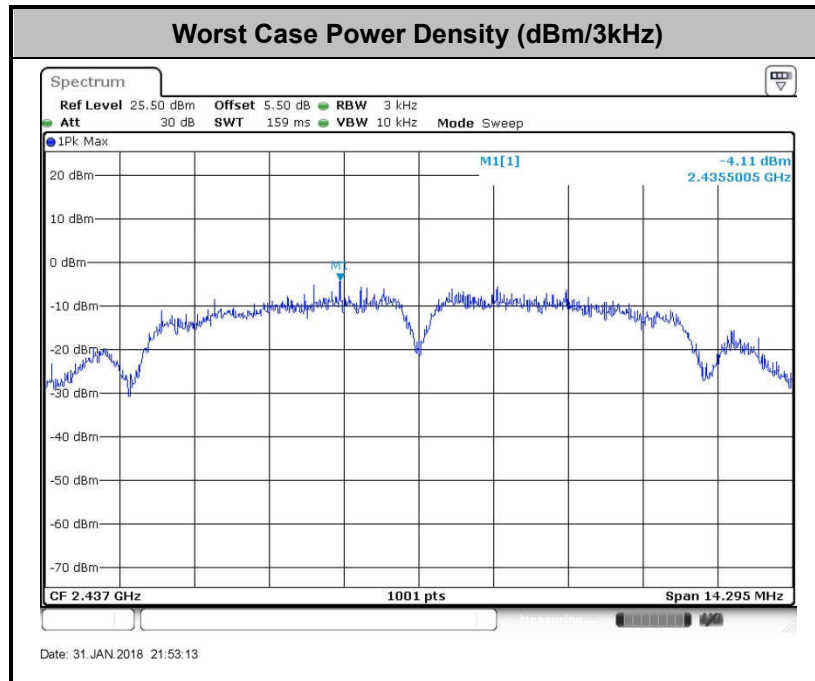
1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



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.

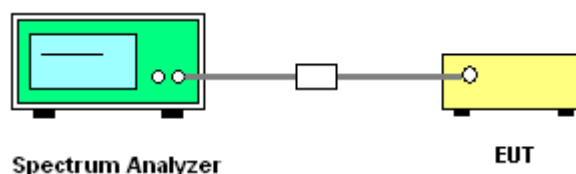
3.4.2 Measuring Instruments

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 v04.
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.
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.

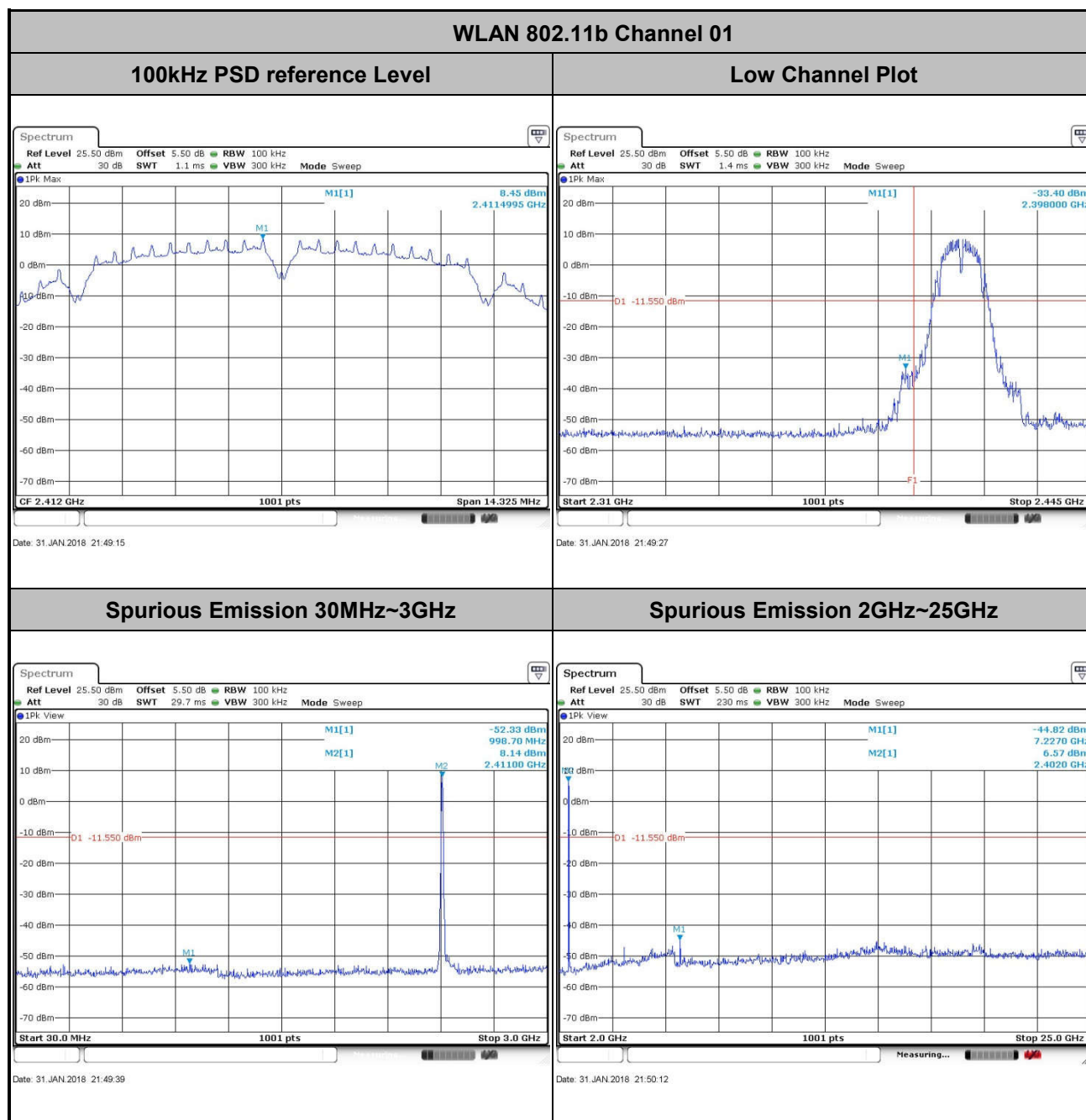
3.4.4 Test Setup





3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	01	Test Engineer :	Silent Hai

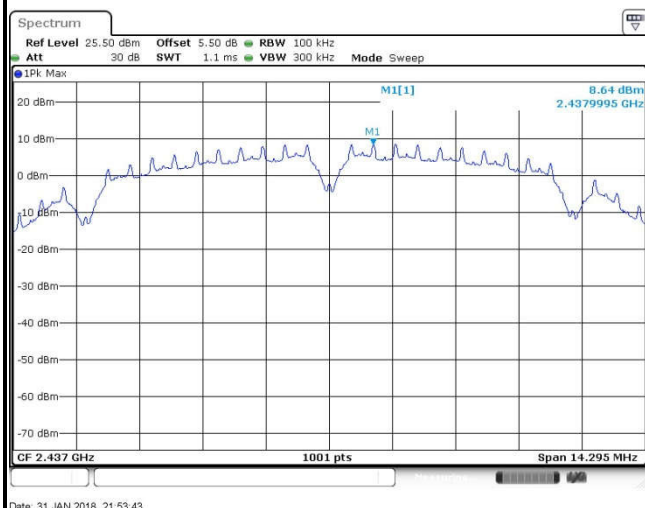




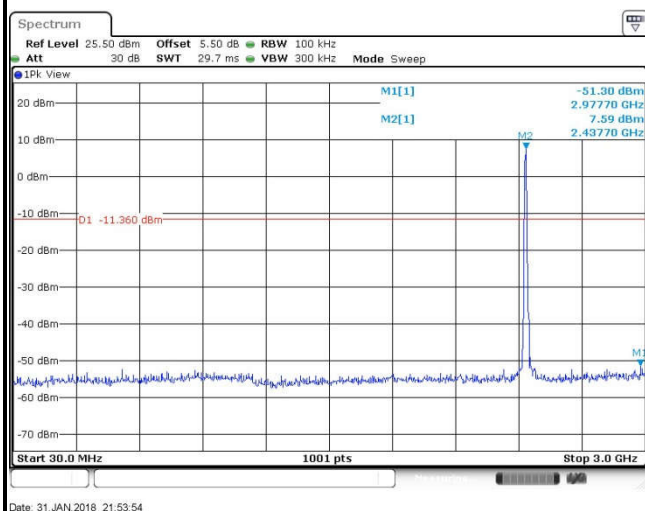
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent Hai

WLAN 802.11b Channel 06

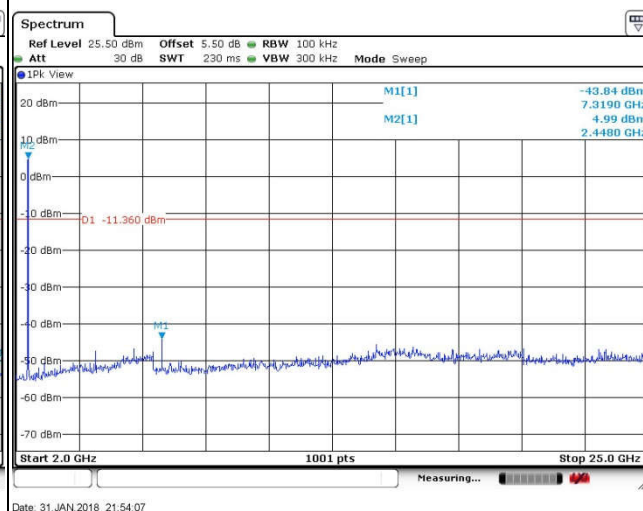
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

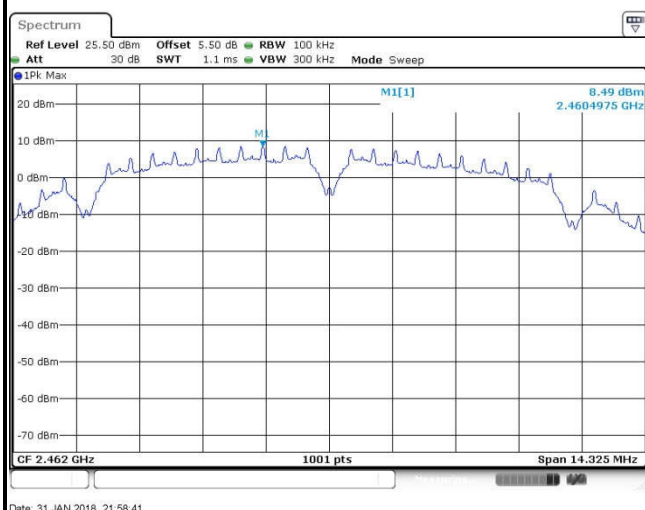




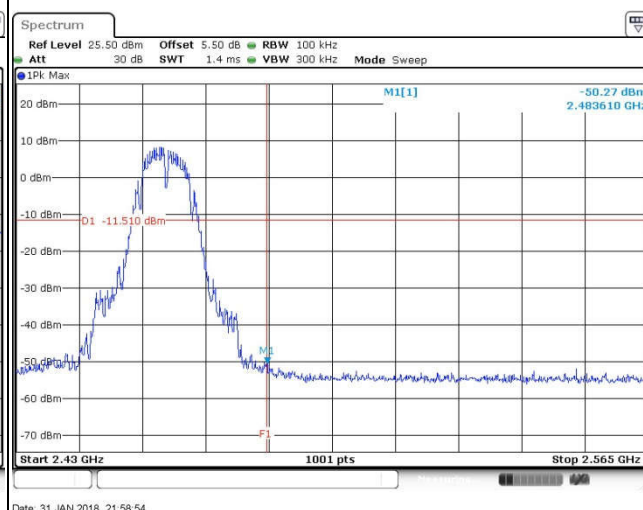
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	11	Test Engineer :	Silent Hai

WLAN 802.11b Channel 11

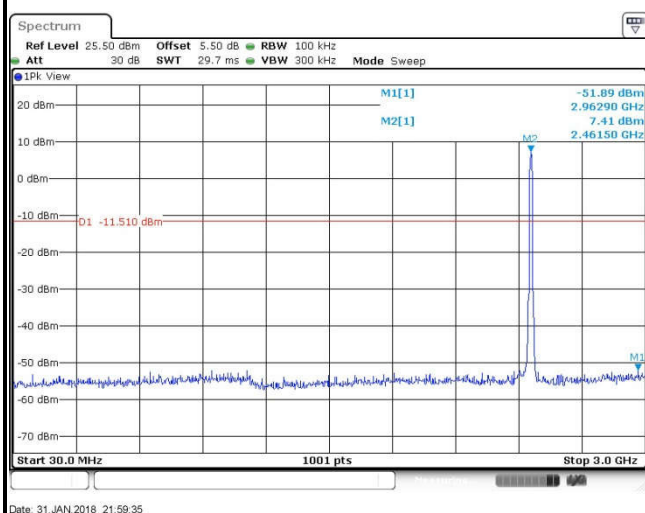
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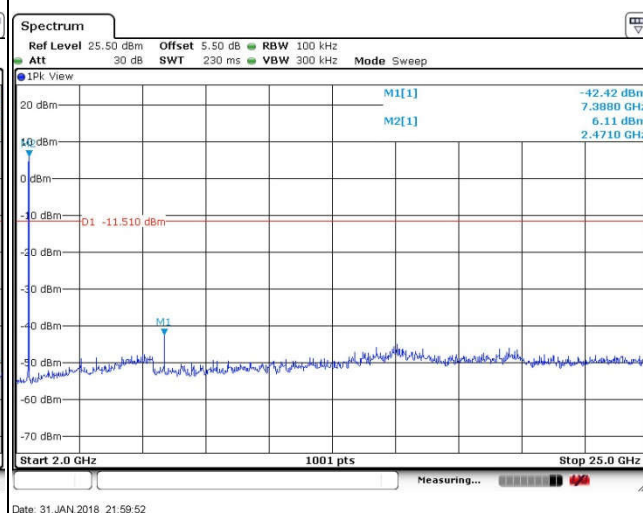
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

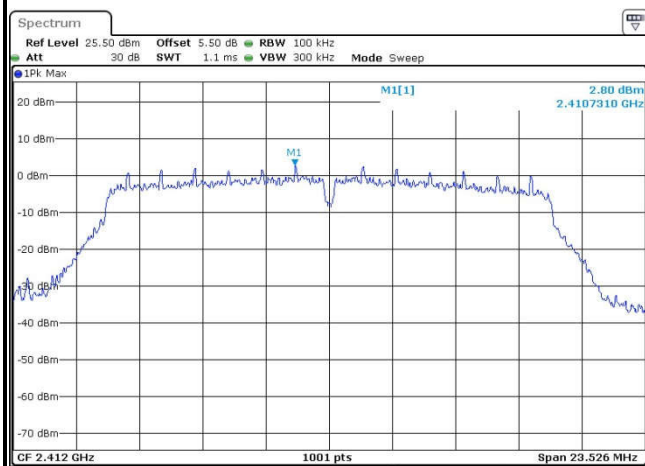




Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	01	Test Engineer :	Silent Hai

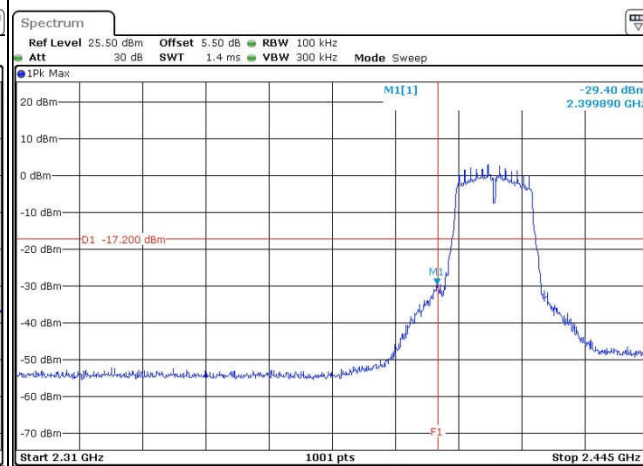
WLAN 802.11g Channel 01

100kHz PSD reference Level



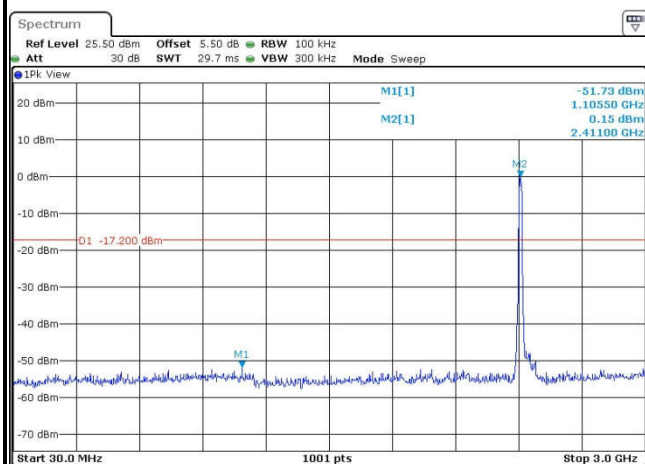
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Low Channel Plot



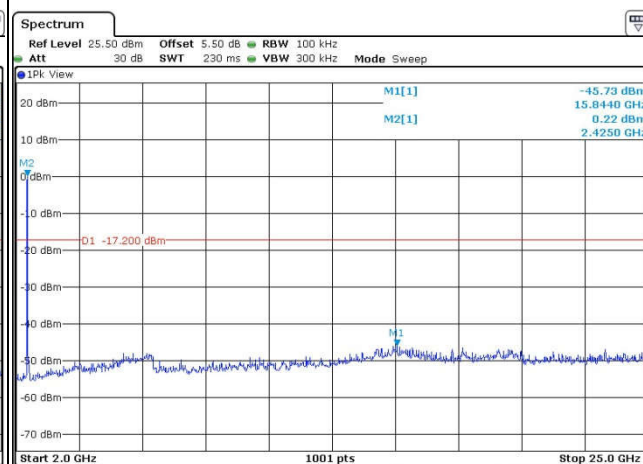
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Spurious Emission 30MHz~3GHz



Date: 31.JAN.2018 22:06:04

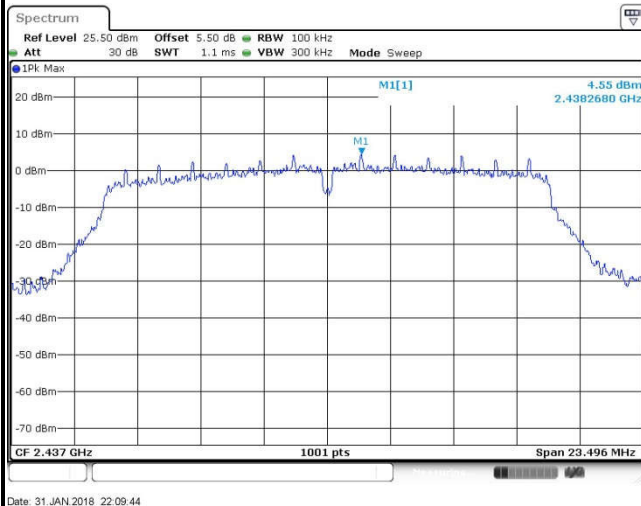
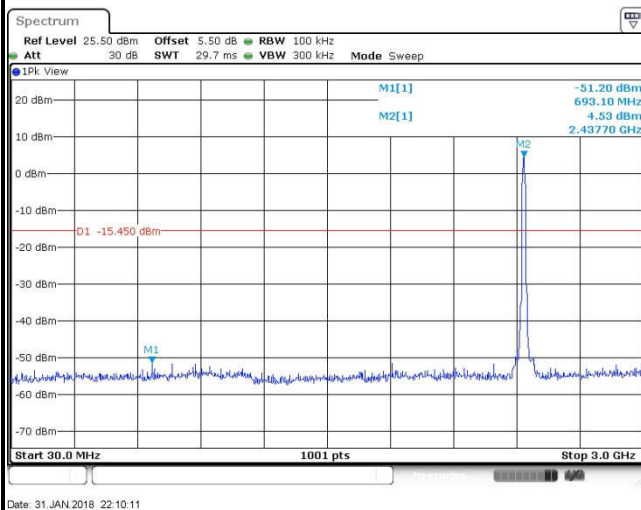
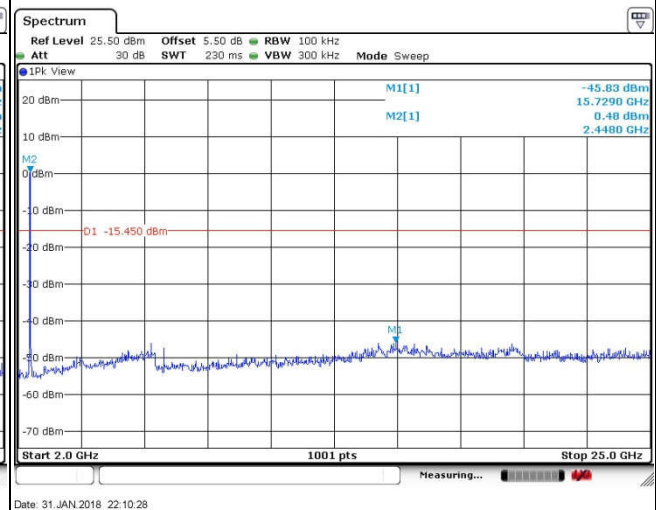
Spurious Emission 2GHz~25GHz



Date: 31.JAN.2018 22:06:17



Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent Hai

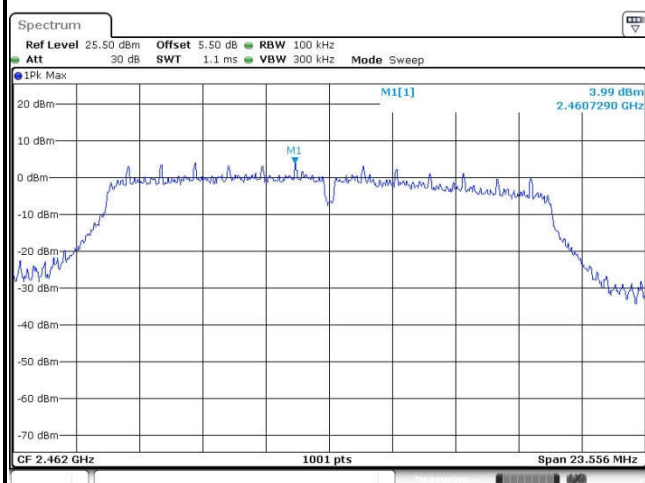
WLAN 802.11g Channel 06**100kHz PSD reference Level****Spurious Emission 30MHz~3GHz****Spurious Emission 2GHz~25GHz**



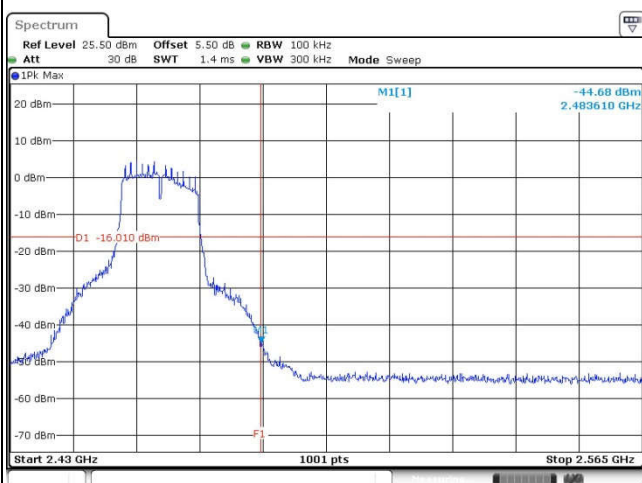
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	11	Test Engineer :	Silent Hai

WLAN 802.11g Channel 11

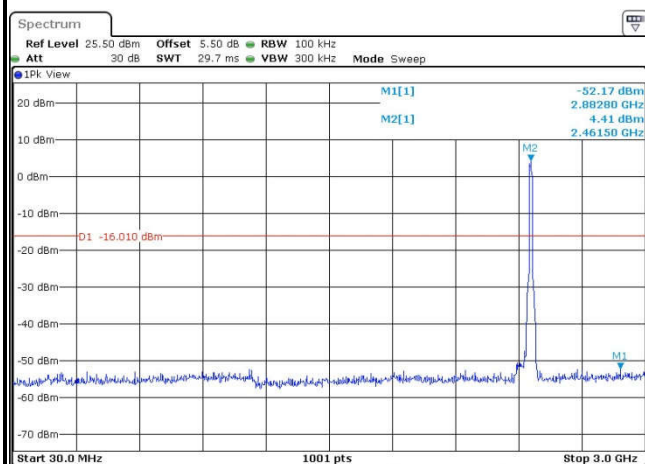
100kHz PSD reference Level



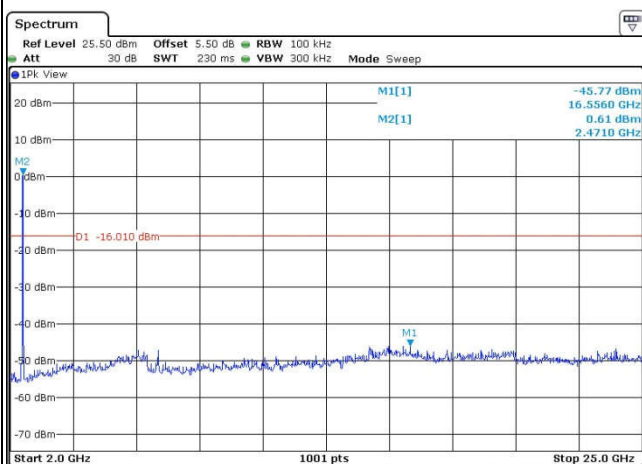
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

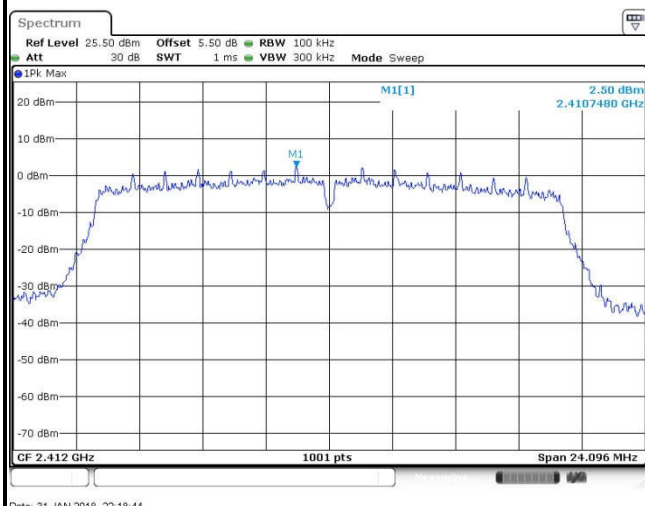




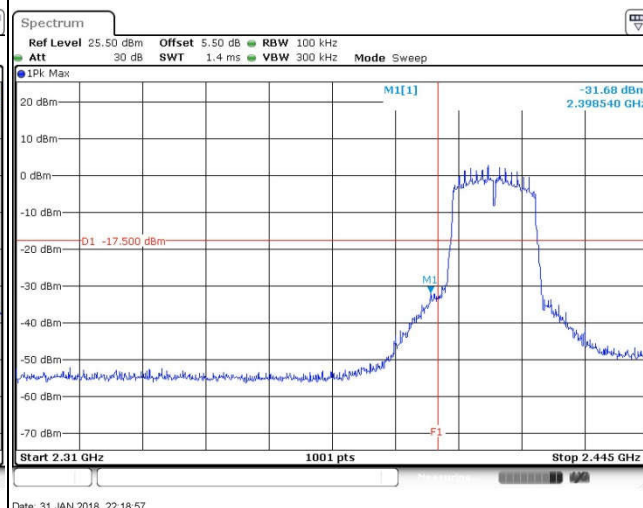
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Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	01	Test Engineer :	Silent Hai

WLAN 802.11n HT20 Channel 01

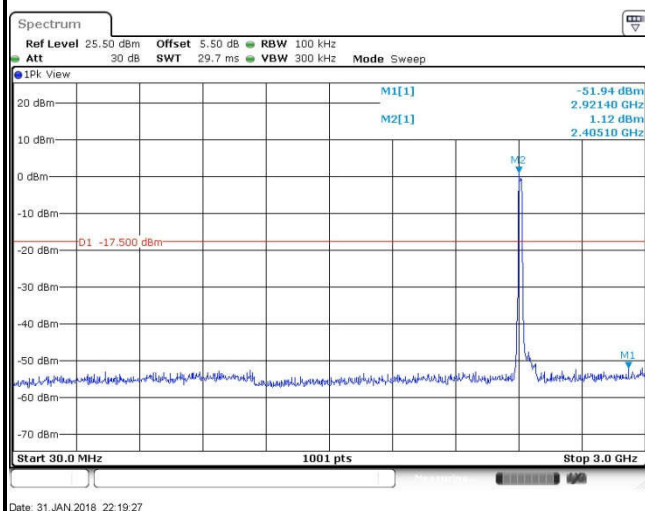
100kHz PSD reference Level



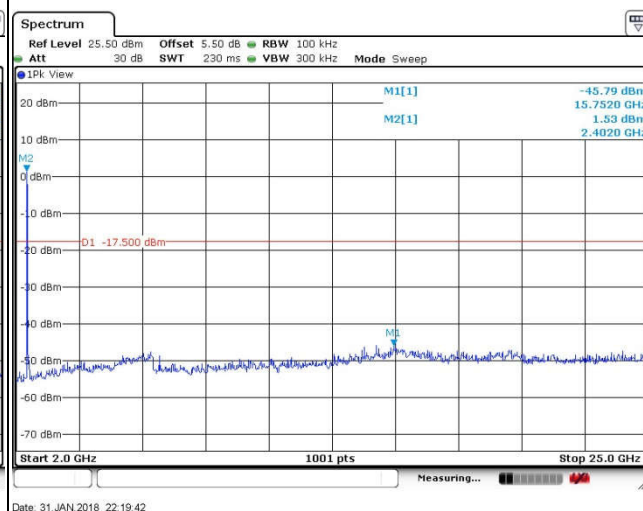
Low Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

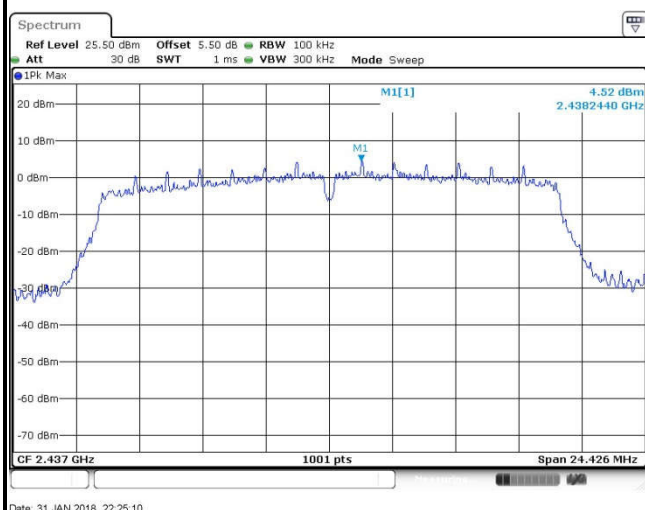




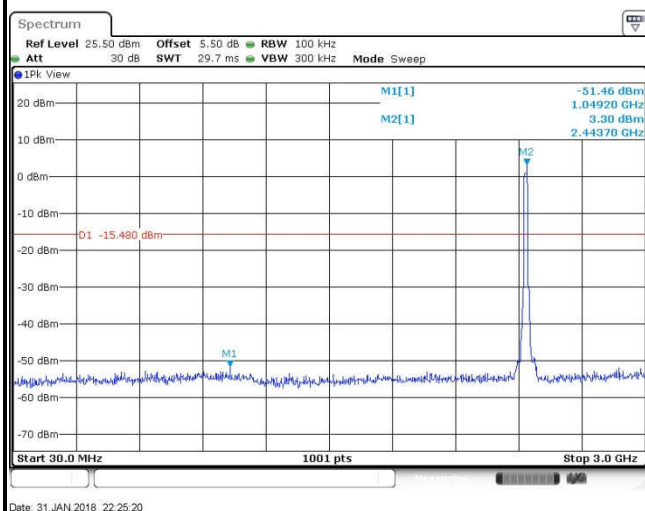
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent Hai

WLAN 802.11n HT20 Channel 06

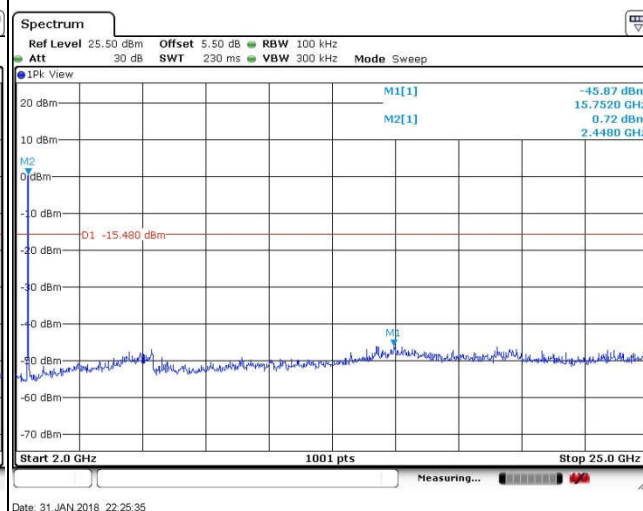
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

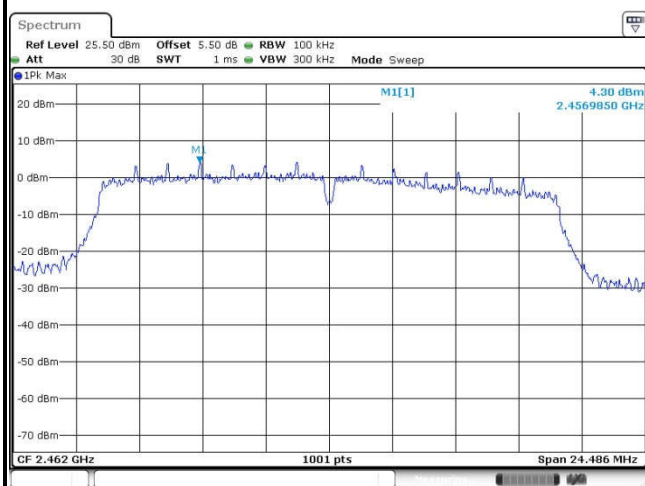




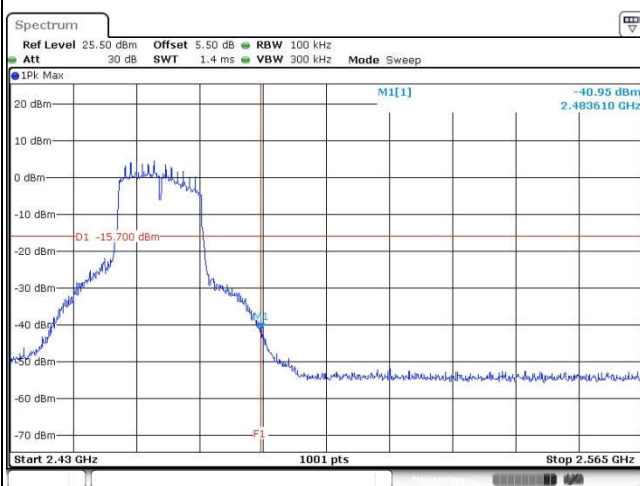
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	11	Test Engineer :	Silent Hai

WLAN 802.11n HT20 Channel 11

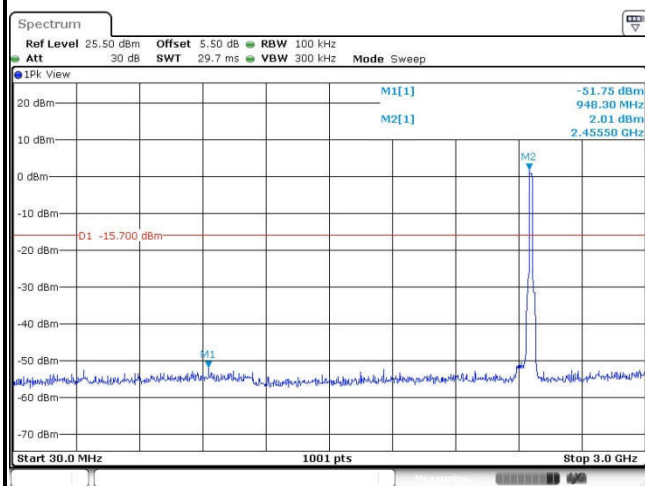
100kHz PSD reference Level



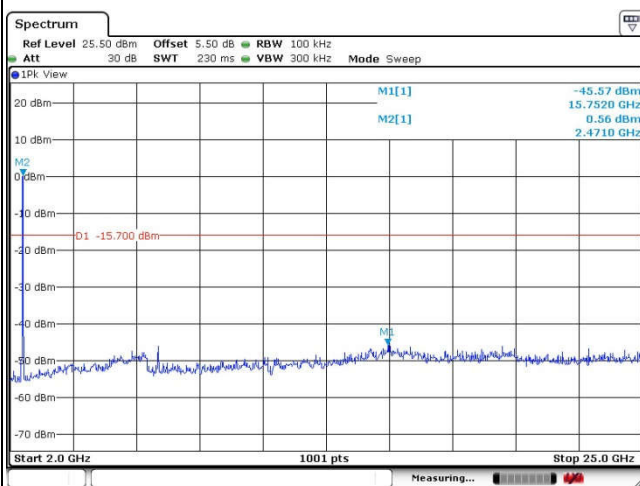
High Channel Plot



Spurious Emission 30MHz~3GHz

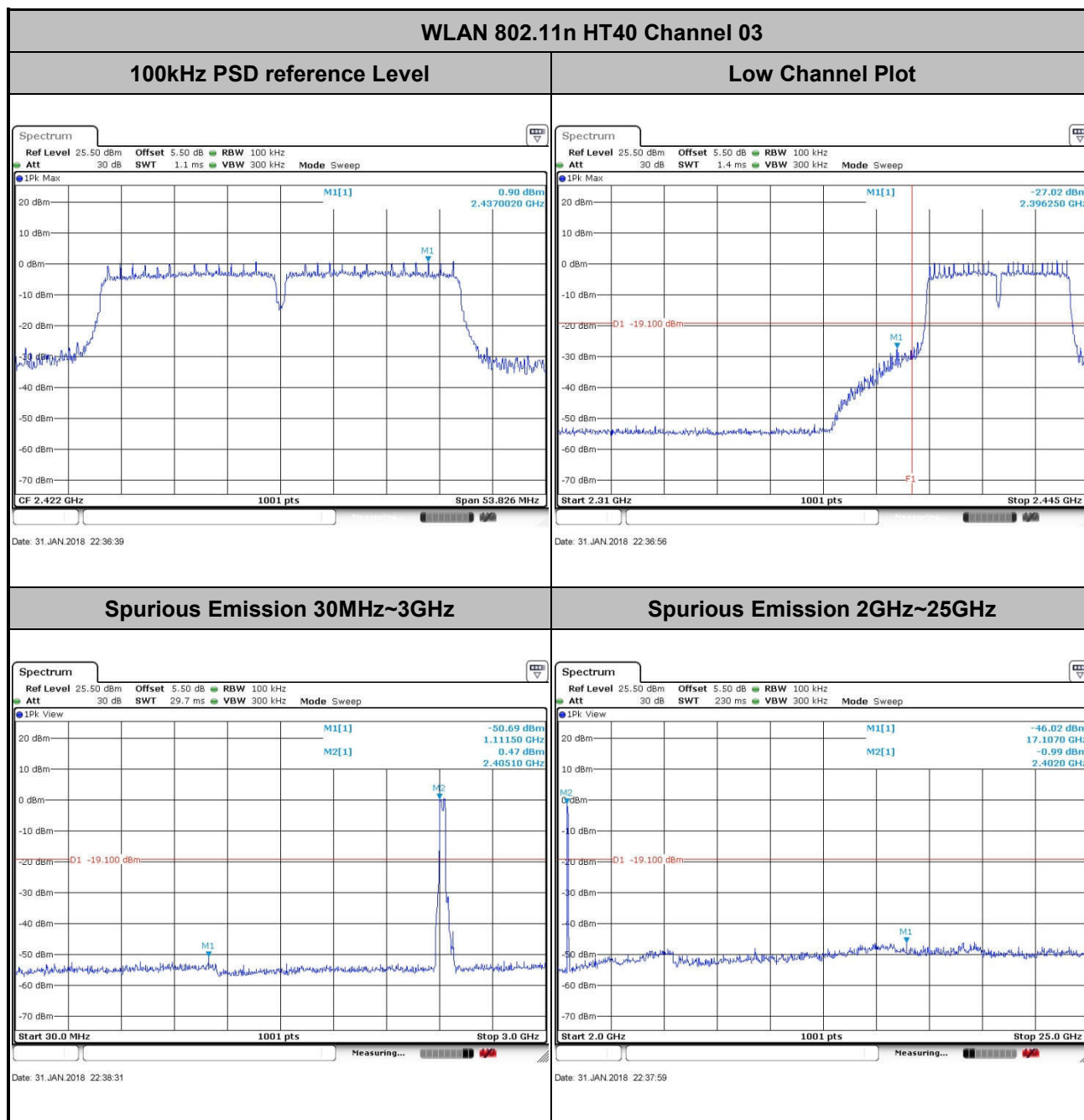


Spurious Emission 2GHz~25GHz





Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	03	Test Engineer :	Silent Hai

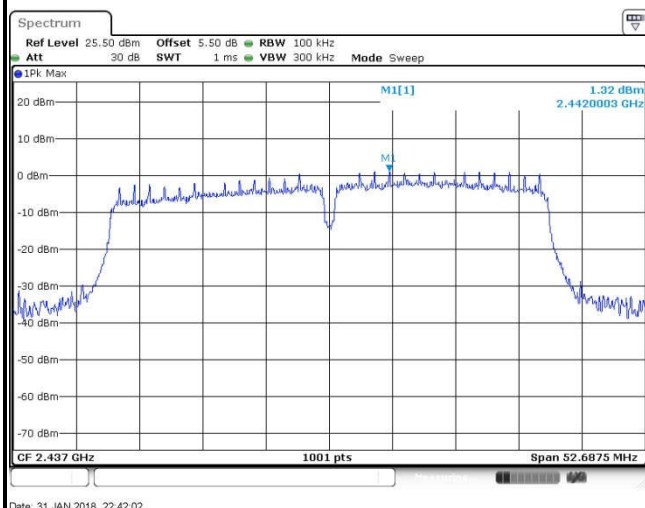




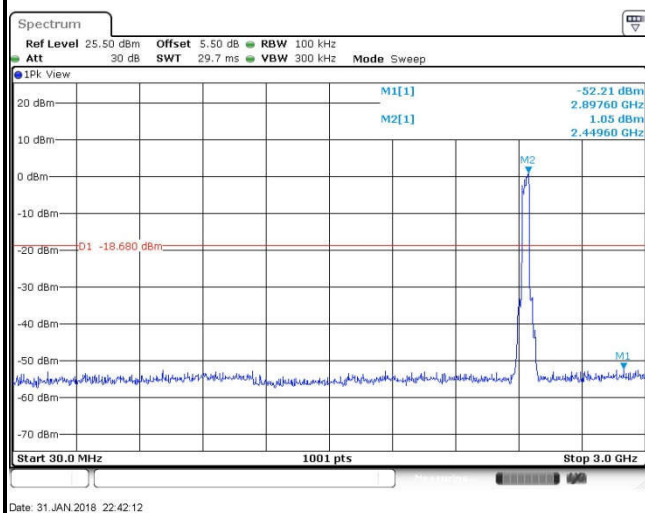
Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent Hai

WLAN 802.11n HT40 Channel 06

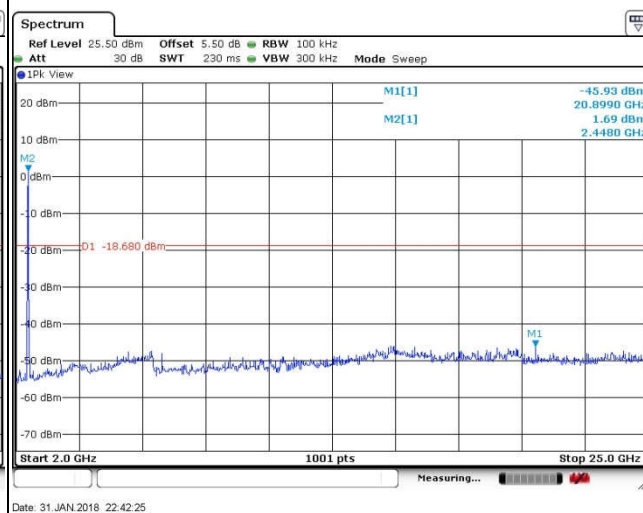
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

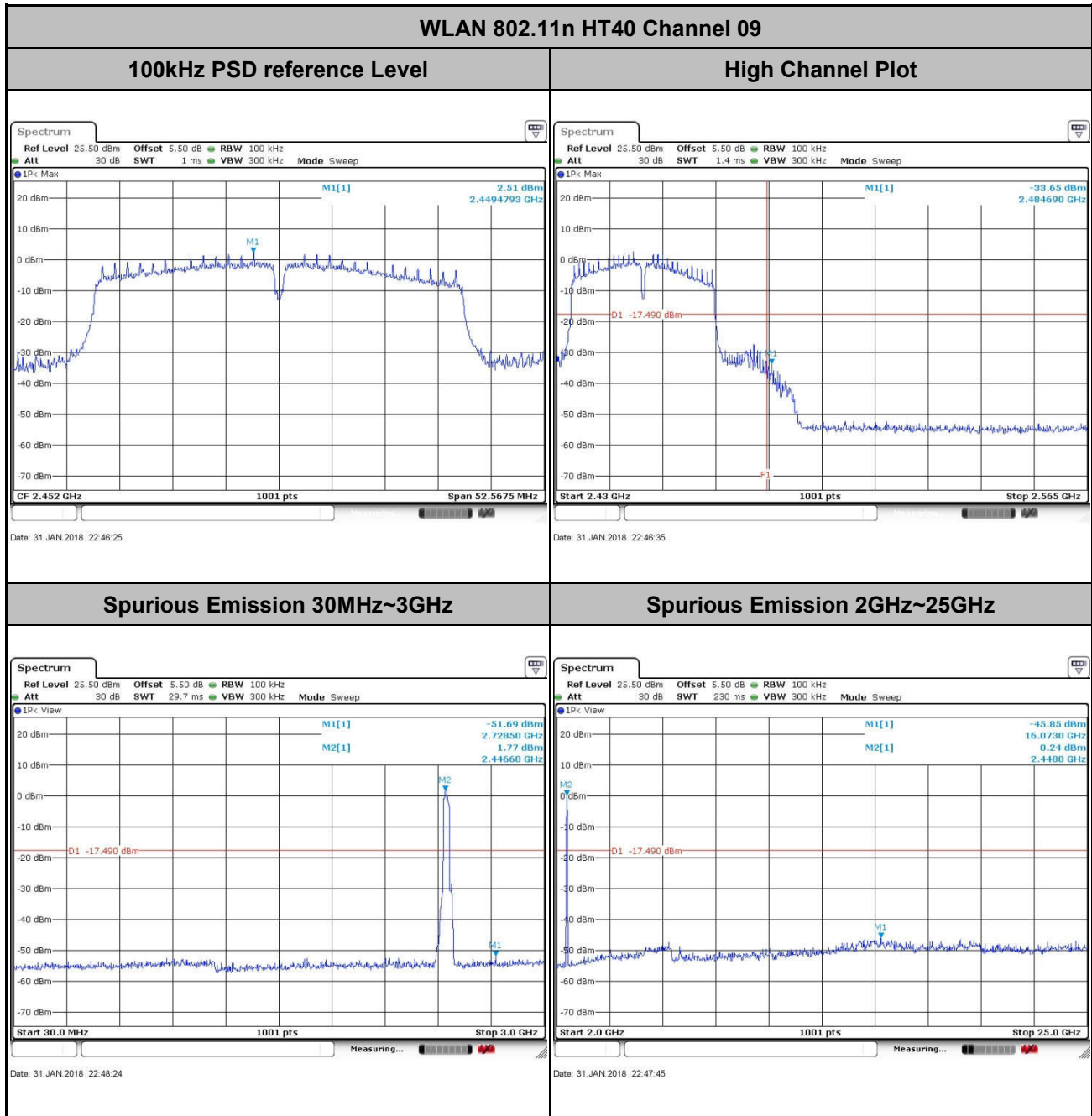


Spurious Emission 2GHz~25GHz





Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	09	Test Engineer :	Silent Hai



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 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

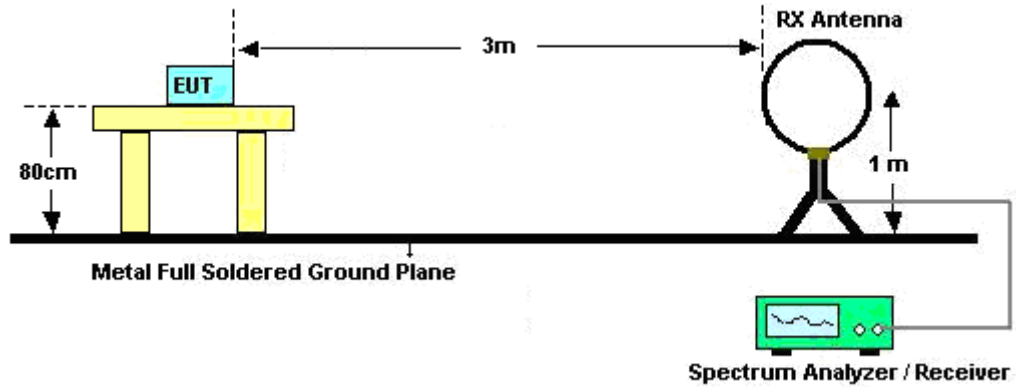
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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:

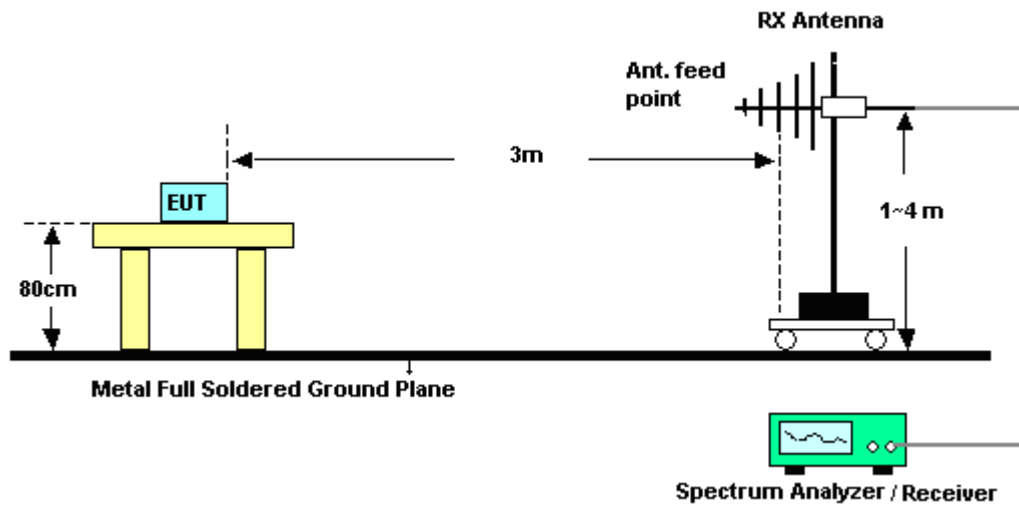
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

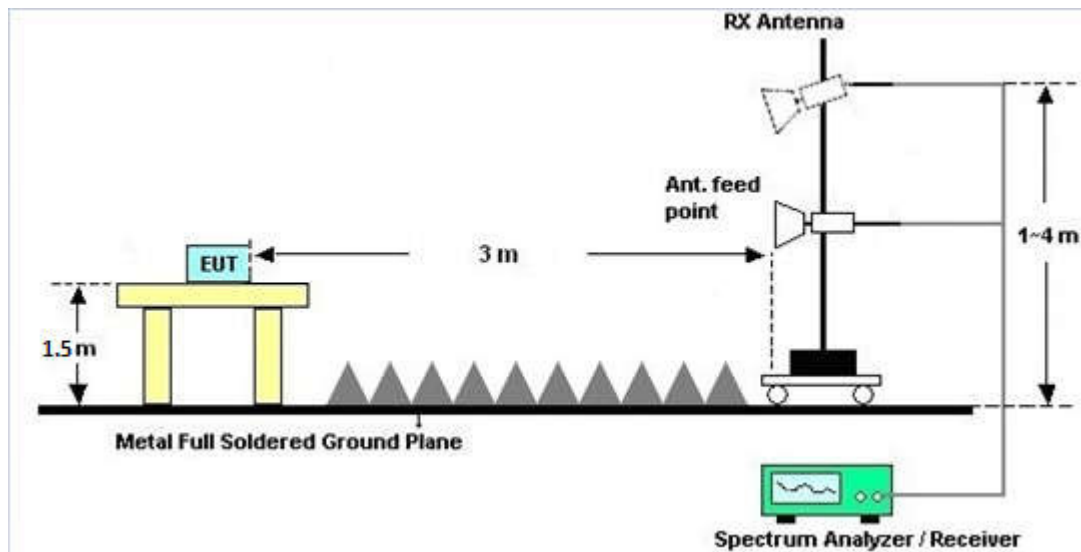
For radiated emissions below 30MHz



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 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.

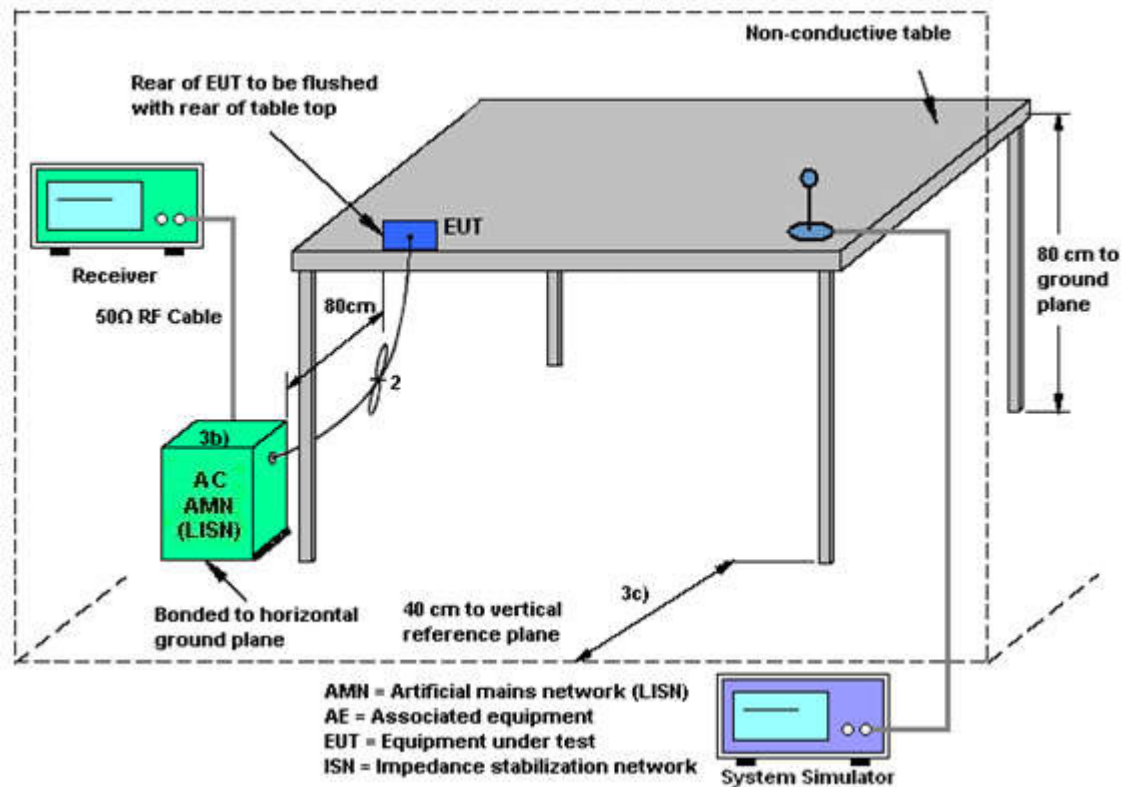
3.6.2 Measuring Instruments

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.

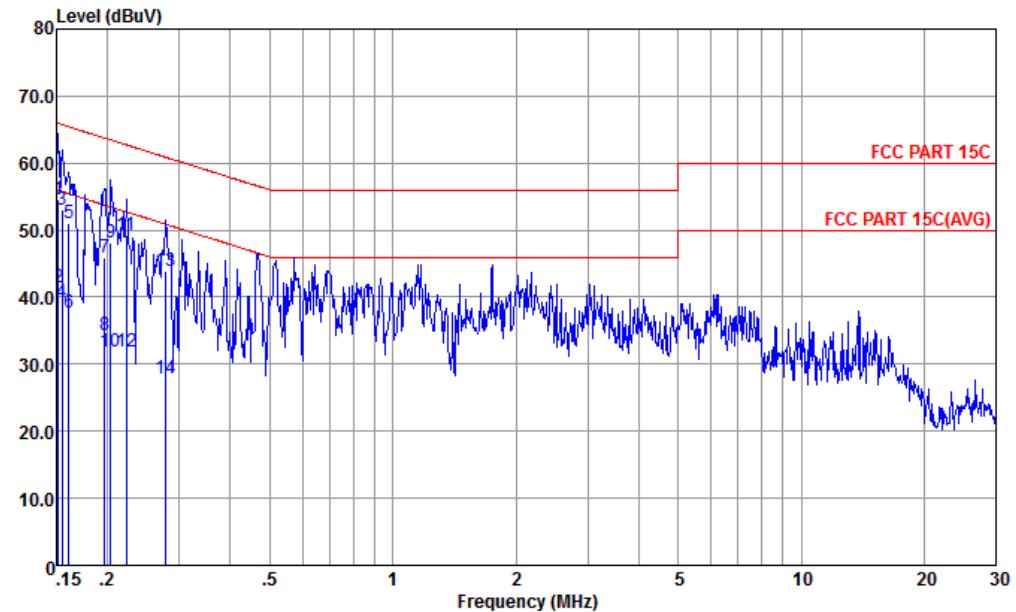
3.6.4 Test Setup





3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Amos Zhang	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter) + Earphone		

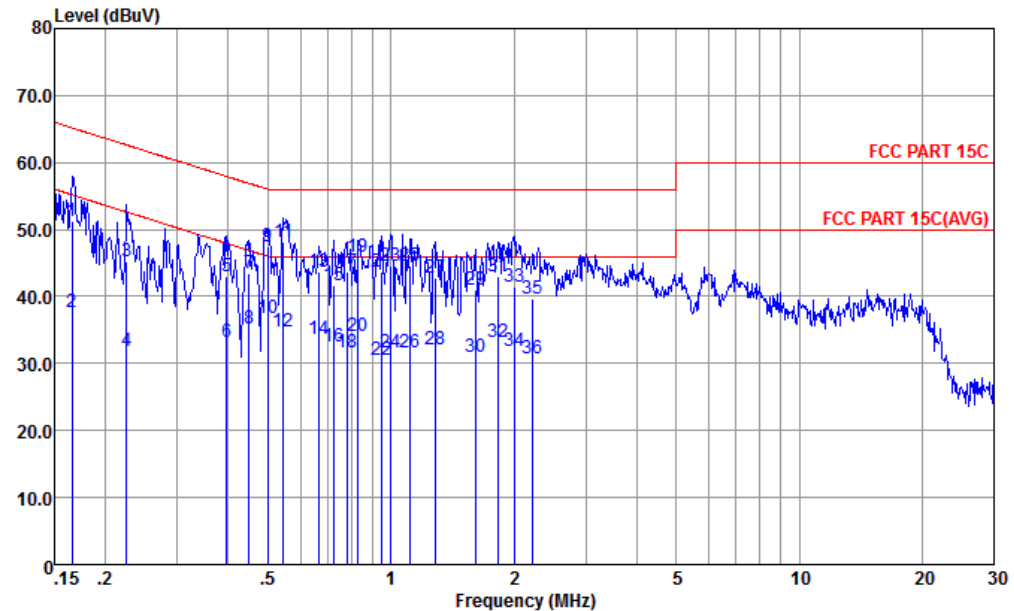


Site : CO01-KS
Condition : FCC PART 15C LISN-L-171013-060103 LINE
mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.152	54.67	-11.24	65.91	43.90	0.16	10.61	QP
2	0.152	41.37	-14.54	55.91	30.60	0.16	10.61	Average
3	0.155	52.96	-12.78	65.74	42.20	0.16	10.60	QP
4	0.155	39.26	-16.48	55.74	28.50	0.16	10.60	Average
5	0.161	50.95	-14.48	65.43	40.20	0.17	10.58	QP
6	0.161	37.65	-17.78	55.43	26.90	0.17	10.58	Average
7	0.197	45.87	-17.89	63.76	35.20	0.20	10.47	QP
8	0.197	34.27	-19.49	53.76	23.60	0.20	10.47	Average
9	0.204	48.16	-15.29	63.45	37.51	0.20	10.45	QP
10	0.204	31.76	-21.69	53.45	21.11	0.20	10.45	Average
11	0.222	49.15	-13.59	62.74	38.49	0.21	10.45	QP
12	0.222	31.85	-20.89	52.74	21.19	0.21	10.45	Average
13	0.277	43.95	-16.95	60.90	33.30	0.22	10.43	QP
14	0.277	27.85	-23.05	50.90	17.20	0.22	10.43	Average



Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Amos Zhang	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter) + Earphone		

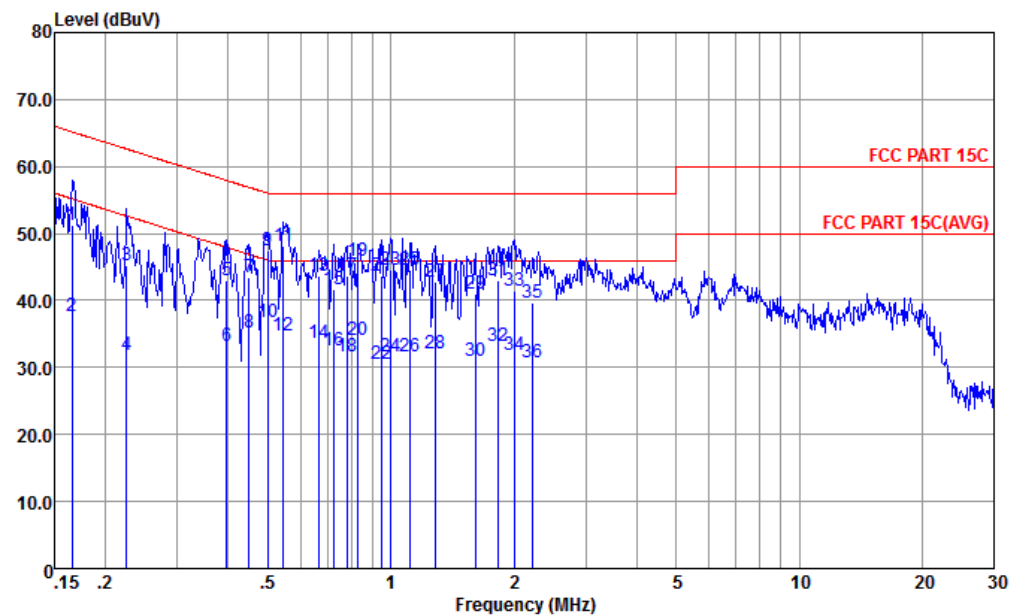


Site : CO01-KS
Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL
mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.166	51.34	-13.82	65.16	40.50	0.28	10.56	QP
2	0.166	37.74	-17.42	55.16	26.90	0.28	10.56	Average
3	0.226	45.23	-17.38	62.61	34.50	0.28	10.45	QP
4	0.226	31.93	-20.68	52.61	21.20	0.28	10.45	Average
5	0.396	43.00	-14.95	57.95	32.30	0.29	10.41	QP
6	0.396	33.30	-14.65	47.95	22.60	0.29	10.41	Average
7	0.449	43.54	-13.35	56.89	32.89	0.29	10.36	QP
8	0.449	35.24	-11.65	46.89	24.59	0.29	10.36	Average
9	0.499	47.40	-8.61	56.01	36.80	0.29	10.31	QP
10	0.499	36.80	-9.21	46.01	26.20	0.29	10.31	Average
11 *	0.546	48.06	-7.94	56.00	37.50	0.29	10.27	QP
12	0.546	34.76	-11.24	46.00	24.20	0.29	10.27	Average
13	0.665	43.68	-12.32	56.00	33.20	0.30	10.18	QP
14	0.665	33.68	-12.32	46.00	23.20	0.30	10.18	Average
15	0.727	41.64	-14.36	56.00	31.20	0.30	10.14	QP
16	0.727	32.54	-13.46	46.00	22.10	0.30	10.14	Average
17	0.779	43.62	-12.38	56.00	33.21	0.30	10.11	QP



Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Amos Zhang	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable (Charging from Adapter) + Earphone		



Site : CO01-KS
Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL
mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.779	31.62	-14.38	46.00	21.21	0.30	10.11	Average
19	0.830	46.01	-9.99	56.00	35.61	0.30	10.10	QP
20	0.830	34.01	-11.99	46.00	23.61	0.30	10.10	Average
21	0.948	43.71	-12.29	56.00	33.29	0.31	10.11	QP
22	0.948	30.61	-15.39	46.00	20.19	0.31	10.11	Average
23	1.000	44.62	-11.38	56.00	34.20	0.31	10.11	QP
24	1.000	31.62	-14.38	46.00	21.20	0.31	10.11	Average
25	1.117	44.64	-11.36	56.00	34.21	0.31	10.12	QP
26	1.117	31.64	-14.36	46.00	21.21	0.31	10.12	Average
27	1.282	42.76	-13.24	56.00	32.30	0.31	10.15	QP
28	1.282	32.06	-13.94	46.00	21.60	0.31	10.15	Average
29	1.610	41.10	-14.90	56.00	30.60	0.32	10.18	QP
30	1.610	31.06	-14.94	46.00	20.56	0.32	10.18	Average
31	1.829	43.12	-12.88	56.00	32.60	0.32	10.20	QP
32	1.829	33.12	-12.88	46.00	22.60	0.32	10.20	Average
33	2.001	41.43	-14.57	56.00	30.90	0.32	10.21	QP
34	2.001	31.83	-14.17	46.00	21.30	0.32	10.21	Average
35	2.225	39.73	-16.27	56.00	29.20	0.32	10.21	QP
36	2.225	30.83	-15.17	46.00	20.30	0.32	10.21	Average



3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 12, 2017	Jan. 31, 2018	Oct. 11, 2018	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 08, 2017	Jan. 31, 2018	Aug. 07, 2018	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 18, 2018	Jan. 31, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 18, 2018	Jan. 31, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	35419&03	30MHz to 1GHz	Dec. 18, 2017	Feb. 08, 2018~ Feb. 14, 2018	Dec. 17, 2018	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 23, 2017	Feb. 08, 2018~ Feb. 14, 2018	Aug. 22, 2018	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Nov. 10, 2017	Feb. 08, 2018~ Feb. 14, 2018	Nov. 09, 2019	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	1GHz ~ 18GHz	Apr. 25, 2017	Feb. 08, 2018~ Feb. 14, 2018	Apr. 24, 2018	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1GHz	Mar. 14, 2017	Feb. 08, 2018~ Feb. 14, 2018	Mar. 13, 2018	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A023 62	1GHz~ 26.5GHz	Oct. 30, 2017	Feb. 08, 2018~ Feb. 14, 2018	Oct. 29, 2018	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9010A	MY534701 18	10Hz~44GHz	Apr. 17, 2017	Feb. 08, 2018~ Feb. 14, 2018	Apr. 16, 2018	Radiation (03CH07-HY)
Controller	ChainTek	Chaintek 3000	N/A	Control Turn table	N/A	Feb. 08, 2018~ Feb. 14, 2018	N/A	Radiation (03CH07-HY)
Controller	Max-Full	MF7802	MF780208 368	Control Ant Mast	N/A	Feb. 08, 2018~ Feb. 14, 2018	N/A	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Feb. 08, 2018~ Feb. 14, 2018	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Feb. 08, 2018~ Feb. 14, 2018	N/A	Radiation (03CH07-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 18, 2017	Feb. 08, 2018~ Feb. 14, 2018	Jul. 17, 2018	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 251	18GHz- 40GHz	Nov. 10, 2017	Feb. 08, 2018~ Feb. 14, 2018	Nov. 09, 2018	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY532900 53	20Hz to 26.5GHz	Jan. 16, 2018	Feb. 08, 2018~ Feb. 14, 2018	Jan. 15, 2019	Radiation (03CH07-HY)
EMI Receiver	R&S	ESC17	100768	9kHz~7GHz;	Apr. 20, 2017	Feb. 28, 2018	Apr. 19, 2018	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2017	Feb. 28, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2017	Feb. 28, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2017	Feb. 28, 2018	Oct. 11, 2018	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% ($U = 2Uc(y)$)	2.3dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.7dB
---	-------

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.5dB
---	-------

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.2dB
---	-------



Appendix A. Conducted Test Results

A1 - DTS Part

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2018/1/30~2018/1/31	Relative Humidity:	51~55	%

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
11b	1Mbps	1	1	2412	12.69	9.55	0.50	Pass
11b	1Mbps	1	6	2437	12.49	9.53	0.50	Pass
11b	1Mbps	1	11	2462	12.79	9.55	0.50	Pass
11g	6Mbps	1	1	2412	17.83	15.68	0.50	Pass
11g	6Mbps	1	6	2437	17.63	15.66	0.50	Pass
11g	6Mbps	1	11	2462	17.88	15.70	0.50	Pass
HT20	MCS0	1	1	2412	18.48	16.06	0.50	Pass
HT20	MCS0	1	6	2437	18.48	16.28	0.50	Pass
HT20	MCS0	1	11	2462	18.78	16.32	0.50	Pass
HT40	MCS0	1	3	2422	36.86	35.88	0.50	Pass
HT40	MCS0	1	6	2437	36.36	35.13	0.50	Pass
HT40	MCS0	1	9	2452	35.96	35.05	0.50	Pass

TEST RESULTS DATA
Peak Power Table

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
11b	1Mbps	1	1	2412	19.76	30.00	-1.00	18.76	36.00	Pass
11b	1Mbps	1	6	2437	20.13	30.00	-1.00	19.13	36.00	Pass
11b	1Mbps	1	11	2462	19.17	30.00	-1.00	18.17	36.00	Pass
11g	6Mbps	1	1	2412	21.84	30.00	-1.00	20.84	36.00	Pass
11g	6Mbps	1	6	2437	23.23	30.00	-1.00	22.23	36.00	Pass
11g	6Mbps	1	11	2462	21.94	30.00	-1.00	20.94	36.00	Pass
HT20	MCS0	1	1	2412	22.17	30.00	-1.00	21.17	36.00	Pass
HT20	MCS0	1	6	2437	23.35	30.00	-1.00	22.35	36.00	Pass
HT20	MCS0	1	11	2462	22.17	30.00	-1.00	21.17	36.00	Pass
HT40	MCS0	1	3	2422	23.96	30.00	-1.00	22.96	36.00	Pass
HT40	MCS0	1	6	2437	23.59	30.00	-1.00	22.59	36.00	Pass
HT40	MCS0	1	9	2452	23.43	30.00	-1.00	22.43	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

2.4GHz Band						
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.00	16.79
11b	1Mbps	1	6	2437	0.00	17.19
11b	1Mbps	1	11	2462	0.00	16.41
11g	6Mbps	1	1	2412	0.11	12.77
11g	6Mbps	1	6	2437	0.11	14.90
11g	6Mbps	1	11	2462	0.11	14.35
HT20	MCS0	1	1	2412	0.12	12.76
HT20	MCS0	1	6	2437	0.12	14.93
HT20	MCS0	1	11	2462	0.12	14.41
HT40	MCS0	1	3	2422	0.23	14.64
HT40	MCS0	1	6	2437	0.23	14.47
HT40	MCS0	1	9	2452	0.23	14.39

TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-4.14	-1.00	8.00	Pass
11b	1Mbps	1	6	2437	-4.11	-1.00	8.00	Pass
11b	1Mbps	1	11	2462	-5.03	-1.00	8.00	Pass
11g	6Mbps	1	1	2412	-11.53	-1.00	8.00	Pass
11g	6Mbps	1	6	2437	-8.91	-1.00	8.00	Pass
11g	6Mbps	1	11	2462	-9.72	-1.00	8.00	Pass
HT20	MCS0	1	1	2412	-10.94	-1.00	8.00	Pass
HT20	MCS0	1	6	2437	-9.40	-1.00	8.00	Pass
HT20	MCS0	1	11	2462	-9.62	-1.00	8.00	Pass
HT40	MCS0	1	3	2422	-13.92	-1.00	8.00	Pass
HT40	MCS0	1	6	2437	-13.19	-1.00	8.00	Pass
HT40	MCS0	1	9	2452	-12.42	-1.00	8.00	Pass



Appendix B. Radiated Spurious Emission

Test Engineer :	Jesse Wang, Stan Hsieh, Lance Chiang	Temperature :	22~24°C
		Relative Humidity :	51~53%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2343.285	55.1	-18.9	74	39.8	31.83	18.5	35.03	349	62	P	H
		2390	44.77	-9.23	54	29.28	31.95	18.59	35.05	349	62	A	H
	*	2412	99.59	-	-	84.06	31.99	18.59	35.05	349	62	P	H
	*	2412	96.37	-	-	80.84	31.99	18.59	35.05	349	62	A	H
		2361.45	55.61	-18.39	74	40.27	31.87	18.5	35.03	100	117	P	V
		2390	44.91	-9.09	54	29.42	31.95	18.59	35.05	100	117	A	V
	*	2412	100.45	-	-	84.92	31.99	18.59	35.05	100	117	P	V
	*	2412	97.32	-	-	81.79	31.99	18.59	35.05	100	117	A	V
802.11b CH 06 2437MHz		2338.7	56.29	-17.71	74	41.08	31.83	18.4	35.02	335	60	P	H
		2388.12	44.54	-9.46	54	29.04	31.95	18.59	35.04	335	60	A	H
	*	2437	98.76	-	-	83.1	32.08	18.64	35.06	335	60	P	H
	*	2437	95.78	-	-	80.12	32.08	18.64	35.06	335	60	A	H
		2488.66	55.4	-18.6	74	39.58	32.2	18.69	35.07	335	60	P	H
		2489.71	44.89	-9.11	54	29.07	32.2	18.69	35.07	335	60	A	H
		2326.66	55.14	-18.86	74	39.97	31.79	18.4	35.02	110	116	P	V
		2389.1	44.55	-9.45	54	29.05	31.95	18.59	35.04	110	116	A	V
	*	2437	101.99	-	-	86.33	32.08	18.64	35.06	110	116	P	V
	*	2437	98.68	-	-	83.02	32.08	18.64	35.06	110	116	A	V
		2489.92	55.56	-18.44	74	39.74	32.2	18.69	35.07	110	116	P	V
		2489.64	44.89	-9.11	54	29.07	32.2	18.69	35.07	110	116	A	V



802.11b CH 11 2462MHz	*	2462	99.91	-	-	84.16	32.12	18.69	35.06	371	57	P	H
	*	2462	96.72	-	-	80.97	32.12	18.69	35.06	371	57	A	H
		2497.72	55.54	-18.46	74	39.73	32.2	18.69	35.08	371	57	P	H
		2483.52	44.93	-9.07	54	29.15	32.16	18.69	35.07	371	57	A	H
	*	2462	101.53	-	-	85.78	32.12	18.69	35.06	100	115	P	V
	*	2462	98.21	-	-	82.46	32.12	18.69	35.06	100	115	A	V
		2496.64	55.82	-18.18	74	40.01	32.2	18.69	35.08	100	115	P	V
		2483.52	45.04	-8.96	54	29.26	32.16	18.69	35.07	100	115	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 (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	44.19	-29.81	74	56.83	34.23	12.51	59.38	100	0	P	H
		4824	49.52	-24.48	74	62.16	34.23	12.51	59.38	100	0	P	V
802.11b CH 06 2437MHz		4874	42.56	-31.44	74	55.07	34.22	12.56	59.29	100	0	P	H
		7311	41.7	-32.3	74	48.89	35.71	15.15	58.05	100	0	P	H
		4874	47.71	-26.29	74	60.22	34.22	12.56	59.29	100	0	P	V
		7311	40.42	-33.58	74	47.61	35.71	15.15	58.05	100	0	P	V
802.11b CH 11 2462MHz		4924	42.38	-31.62	74	54.77	34.21	12.61	59.21	100	0	P	H
		7386	42.68	-31.32	74	49.92	35.66	15.22	58.12	100	0	P	H
		4924	48.35	-25.65	74	60.74	34.21	12.61	59.21	100	0	P	V
		7386	42.02	-31.98	74	49.26	35.66	15.22	58.12	100	0	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 (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2384.34	55.62	-18.38	74	40.16	31.91	18.59	35.04	350	58	P	H
		2389.695	45.67	-8.33	54	30.17	31.95	18.59	35.04	350	58	A	H
	*	2412	97.22	-	-	81.69	31.99	18.59	35.05	350	58	P	H
	*	2412	89.98	-	-	74.45	31.99	18.59	35.05	350	58	A	H
		2333.1	56.03	-17.97	74	40.86	31.79	18.4	35.02	100	117	P	V
		2389.905	46.11	-7.89	54	30.62	31.95	18.59	35.05	100	117	A	V
	*	2412	98.52	-	-	82.99	31.99	18.59	35.05	100	117	P	V
	*	2412	91.06	-	-	75.53	31.99	18.59	35.05	100	117	A	V
802.11g CH 06 2437MHz		2348.22	55.76	-18.24	74	40.46	31.83	18.5	35.03	368	59	P	H
		2389.24	45.31	-8.69	54	29.81	31.95	18.59	35.04	368	59	A	H
	*	2437	100	-	-	84.34	32.08	18.64	35.06	368	59	P	H
	*	2437	92.64	-	-	76.98	32.08	18.64	35.06	368	59	A	H
		2495.03	55.34	-18.66	74	39.53	32.2	18.69	35.08	368	59	P	H
		2490.83	45.83	-8.17	54	30.01	32.2	18.69	35.07	368	59	A	H
		2318.12	55.34	-18.66	74	40.17	31.79	18.4	35.02	100	118	P	V
		2386.02	45.48	-8.52	54	29.98	31.95	18.59	35.04	100	118	A	V
	*	2437	101.03	-	-	85.37	32.08	18.64	35.06	100	118	P	V
	*	2437	93.31	-	-	77.65	32.08	18.64	35.06	100	118	A	V
		2488.24	55.96	-18.04	74	40.14	32.2	18.69	35.07	100	118	P	V
		2489.01	45.93	-8.07	54	30.11	32.2	18.69	35.07	100	118	A	V



802.11g CH 11 2462MHz	*	2462	99.02	-	-	83.27	32.12	18.69	35.06	378	57	P	H
	*	2462	92.12	-	-	76.37	32.12	18.69	35.06	378	57	A	H
		2483.68	59	-15	74	43.22	32.16	18.69	35.07	378	57	P	H
		2483.84	47.36	-6.64	54	31.58	32.16	18.69	35.07	378	57	A	H
	*	2462	99.73	-	-	83.98	32.12	18.69	35.06	100	106	P	V
	*	2462	92.04	-	-	76.29	32.12	18.69	35.06	100	106	A	V
		2483.68	58.19	-15.81	74	42.41	32.16	18.69	35.07	100	106	P	V
		2483.68	46.93	-7.07	54	31.15	32.16	18.69	35.07	100	106	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 (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	39.91	-34.09	74	52.55	34.23	12.51	59.38	100	0	P	H
		4824	44.33	-29.67	74	56.97	34.23	12.51	59.38	100	0	P	V
802.11g CH 06 2437MHz		4874	40.26	-33.74	74	52.77	34.22	12.56	59.29	100	0	P	H
		7311	42.03	-31.97	74	49.22	35.71	15.15	58.05	100	0	P	H
		4874	44.93	-29.07	74	57.44	34.22	12.56	59.29	100	0	P	V
		7311	40.86	-33.14	74	48.05	35.71	15.15	58.05	100	0	P	V
802.11g CH 11 2462MHz		4924	39.86	-34.14	74	52.25	34.21	12.61	59.21	100	0	P	H
		7386	41.24	-32.76	74	48.48	35.66	15.22	58.12	100	0	P	H
		4924	43.14	-30.86	74	55.53	34.21	12.61	59.21	100	0	P	V
		7386	41.73	-32.27	74	48.97	35.66	15.22	58.12	100	0	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 Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2380.56	56.01	-17.99	74	40.55	31.91	18.59	35.04	348	62	P	H
		2390	46.32	-7.68	54	30.83	31.95	18.59	35.05	348	62	A	H
	*	2412	97.15	-	-	81.62	31.99	18.59	35.05	348	62	P	H
	*	2412	89.6	-	-	74.07	31.99	18.59	35.05	348	62	A	H
		2389.695	57.16	-16.84	74	41.66	31.95	18.59	35.04	100	117	P	V
		2389.8	46.85	-7.15	54	31.36	31.95	18.59	35.05	100	117	A	V
	*	2412	97.79	-	-	82.26	31.99	18.59	35.05	100	117	P	V
	*	2412	90.47	-	-	74.94	31.99	18.59	35.05	100	117	A	V
802.11n HT20 CH 06 2437MHz		2331.14	55.2	-18.8	74	40.03	31.79	18.4	35.02	334	62	P	H
		2382.1	45.39	-8.61	54	29.93	31.91	18.59	35.04	334	62	A	H
	*	2437	99.34	-	-	83.68	32.08	18.64	35.06	334	62	P	H
	*	2437	91.64	-	-	75.98	32.08	18.64	35.06	334	62	A	H
		2486.84	55.51	-18.49	74	39.73	32.16	18.69	35.07	334	62	P	H
		2487.61	45.71	-8.29	54	29.89	32.2	18.69	35.07	334	62	A	H
		2370.2	56.01	-17.99	74	40.64	31.91	18.5	35.04	111	116	P	V
		2383.36	45.48	-8.52	54	30.02	31.91	18.59	35.04	111	116	A	V
	*	2437	102.28	-	-	86.62	32.08	18.64	35.06	111	116	P	V
	*	2437	94.34	-	-	78.68	32.08	18.64	35.06	111	116	A	V
		2495.38	55.88	-18.12	74	40.07	32.2	18.69	35.08	111	116	P	V
		2485.86	45.89	-8.11	54	30.11	32.16	18.69	35.07	111	116	A	V



802.11n HT20 CH 11 2462MHz	*	2462	98.34	-	-	82.59	32.12	18.69	35.06	336	63	P	H
	*	2462	90.85	-	-	75.1	32.12	18.69	35.06	336	63	A	H
		2483.52	60.5	-13.5	74	44.72	32.16	18.69	35.07	336	63	P	H
		2483.56	47.39	-6.61	54	31.61	32.16	18.69	35.07	336	63	A	H
	*	2462	100.44	-	-	84.69	32.12	18.69	35.06	100	116	P	V
	*	2462	93.03	-	-	77.28	32.12	18.69	35.06	100	116	A	V
		2483.64	59.22	-14.78	74	43.44	32.16	18.69	35.07	100	116	P	V
		2483.6	48.14	-5.86	54	32.36	32.16	18.69	35.07	100	116	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	40.28	-33.72	74	52.92	34.23	12.51	59.38	100	0	P	H
		4824	45.25	-28.75	74	57.89	34.23	12.51	59.38	100	0	P	V
802.11n HT20 CH 06 2437MHz		4874	41.1	-32.9	74	53.61	34.22	12.56	59.29	100	0	P	H
		7311	41.03	-32.97	74	48.22	35.71	15.15	58.05	100	0	P	H
		4874	45.84	-28.16	74	58.35	34.22	12.56	59.29	100	0	P	V
		7311	41.32	-32.68	74	48.51	35.71	15.15	58.05	100	0	P	V
802.11n HT20 CH 11 2462MHz		4924	40.63	-33.37	74	53.02	34.21	12.05	59.21	100	0	P	H
		7386	41.96	-32.04	74	49.2	35.66	14.82	58.12	100	0	P	H
		4924	43.07	-30.93	74	55.46	34.21	12.05	59.21	100	0	P	V
		7386	42.67	-31.33	74	49.91	35.66	14.82	58.12	100	0	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.52	58.85	-15.15	74	43.35	31.95	18.59	35.04	331	62	P	H
		2389.66	48.37	-5.63	54	32.87	31.95	18.59	35.04	331	62	A	H
	*	2422	95.53	-	-	79.92	32.03	18.64	35.06	331	62	P	H
	*	2422	88.46	-	-	72.85	32.03	18.64	35.06	331	62	A	H
		2490.83	54.99	-19.01	74	39.17	32.2	18.69	35.07	331	62	P	H
		2484.04	46.41	-7.59	54	30.63	32.16	18.69	35.07	331	62	A	H
		2389.24	61.21	-12.79	74	45.71	31.95	18.59	35.04	111	116	P	V
		2389.52	50.58	-3.42	54	35.08	31.95	18.59	35.04	111	116	A	V
	*	2422	98.69	-	-	83.08	32.03	18.64	35.06	111	116	P	V
	*	2422	91.25	-	-	75.64	32.03	18.64	35.06	111	116	A	V
		2492.44	55.44	-18.56	74	39.63	32.2	18.69	35.08	111	116	P	V
		2485.37	46.84	-7.16	54	31.06	32.16	18.69	35.07	111	116	A	V
802.11n HT40 CH 06 2437MHz		2362.78	55.3	-18.7	74	39.96	31.87	18.5	35.03	331	62	P	H
		2379.86	46.24	-7.76	54	30.87	31.91	18.5	35.04	331	62	A	H
	*	2437	97.56	-	-	81.9	32.08	18.64	35.06	331	62	P	H
	*	2437	90.25	-	-	74.59	32.08	18.64	35.06	331	62	A	H
		2492.72	55.73	-18.27	74	39.92	32.2	18.69	35.08	331	62	P	H
		2492.16	46.85	-7.15	54	31.04	32.2	18.69	35.08	331	62	A	H
		2314.62	55.12	-18.88	74	40	31.74	18.4	35.02	115	101	P	V
		2373.14	46.12	-7.88	54	30.75	31.91	18.5	35.04	115	101	A	V
	*	2437	100.1	-	-	84.44	32.08	18.64	35.06	115	101	P	V
	*	2437	92.93	-	-	77.27	32.08	18.64	35.06	115	101	A	V
		2483.62	55.51	-18.49	74	39.73	32.16	18.69	35.07	115	101	P	V
		2488.87	46.67	-7.33	54	30.85	32.2	18.69	35.07	115	101	A	V



802.11n HT40 CH 09 2452MHz		2340.94	55	-19	74	39.7	31.83	18.5	35.03	331	62	P	H
		2387.56	46.27	-7.73	54	30.77	31.95	18.59	35.04	331	62	A	H
	*	2452	97.59	-	-	81.93	32.08	18.64	35.06	331	62	P	H
	*	2452	90.19	-	-	74.53	32.08	18.64	35.06	331	62	A	H
		2484.18	58.94	-15.06	74	43.16	32.16	18.69	35.07	331	62	P	H
		2483.52	48.86	-5.14	54	33.08	32.16	18.69	35.07	331	62	A	H
		2385.74	55.6	-18.4	74	40.1	31.95	18.59	35.04	115	117	P	V
		2358.3	46.1	-7.9	54	30.76	31.87	18.5	35.03	115	117	A	V
	*	2452	101.27	-	-	85.61	32.08	18.64	35.06	115	117	P	V
	*	2452	93.35	-	-	77.69	32.08	18.64	35.06	115	117	A	V
		2483.55	62.68	-11.32	74	46.9	32.16	18.69	35.07	115	117	P	V
		2483.52	50.36	-3.64	54	34.58	32.16	18.69	35.07	115	117	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		4844	40.32	-33.68	74	52.93	34.23	12.51	59.35	100	0	P	H
		7266	43.11	-30.89	74	50.28	35.73	15.12	58.02	100	0	P	H
		4844	40.23	-33.77	74	52.84	34.23	12.51	59.35	100	0	P	V
		7266	42.03	-31.97	74	49.2	35.73	15.12	58.02	100	0	P	V
802.11n HT40 CH 06 2437MHz		4874	40.32	-33.68	74	52.83	34.22	12.56	59.29	100	0	P	H
		7311	42.07	-31.93	74	49.26	35.71	15.15	58.05	100	0	P	H
		4874	41.31	-32.69	74	53.82	34.22	12.56	59.29	100	0	P	V
		7311	40.7	-33.3	74	47.89	35.71	15.15	58.05	100	0	P	V
802.11n HT40 CH 09 2452MHz		4904	40.34	-33.66	74	52.75	34.22	12.61	59.24	100	0	P	H
		7356	41.13	-32.87	74	48.35	35.68	15.19	58.09	100	0	P	H
		4904	40.33	-33.67	74	52.74	34.22	12.61	59.24	100	0	P	V
		7356	41.02	-32.98	74	48.24	35.68	15.19	58.09	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT40 LF		97.5	39.56	-3.94	43.5	53.65	15.58	1.89	31.56	100	0	P	H
		189.03	32.02	-11.48	43.5	46.12	14.76	2.6	31.46	-	-	P	H
		276.24	34.07	-11.93	46	43.44	18.89	3.08	31.34	-	-	P	H
		354.6	29.79	-16.21	46	37.15	20.49	3.36	31.21	-	-	P	H
		861.4	33.57	-12.43	46	29.73	29.02	5.37	30.55	-	-	P	H
		979	36.74	-17.26	54	30.84	30.82	5.59	30.51	-	-	P	H
		49.44	29.08	-10.92	40	44.57	14.66	1.46	31.61	-	-	P	V
		96.15	32.19	-11.31	43.5	46.53	15.33	1.89	31.56	-	-	P	V
		293.25	28.96	-17.04	46	38.17	19.01	3.09	31.31	-	-	P	V
		844.6	33.91	-12.09	46	30.63	28.63	5.21	30.56	-	-	P	V
		882.4	34.61	-11.39	46	30.88	28.87	5.39	30.53	-	-	P	V
		954.5	35.62	-10.38	46	29.96	30.59	5.58	30.51	100	0	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	P eak or A verage
H/V	H orizontal or V ertical



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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)

2. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

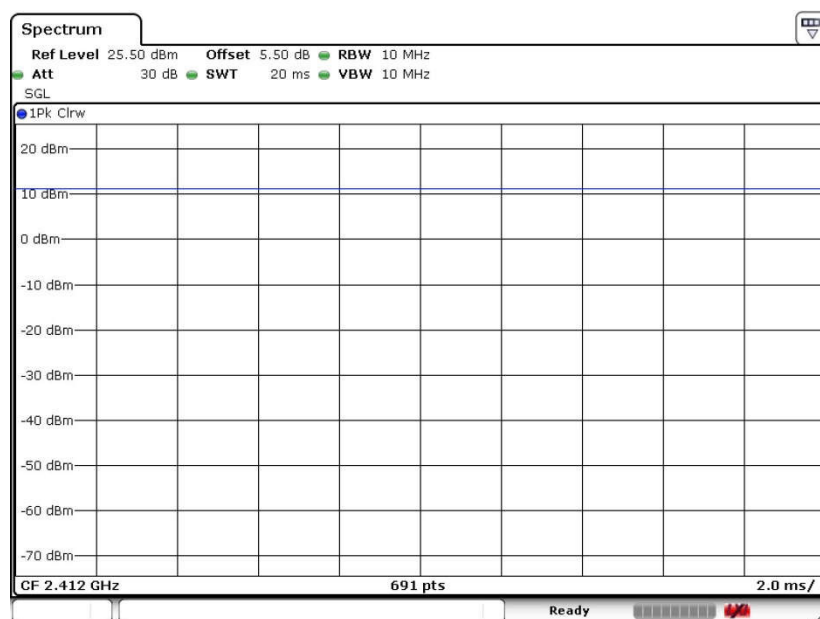
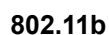
= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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



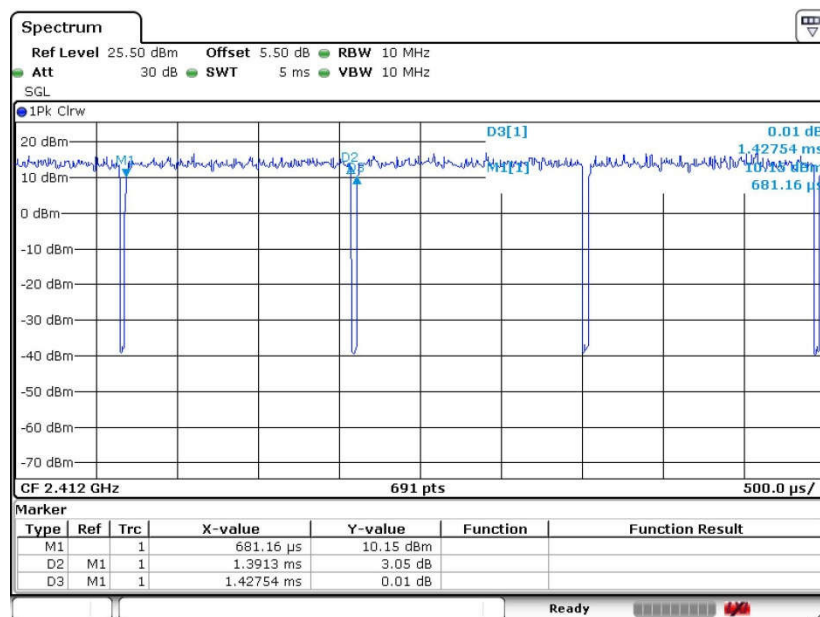
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	100.00	-	-	10Hz
802.11g	97.46	1.391	0.719	1kHz
802.11n HT20	97.28	1.297	0.771	1kHz
802.11n HT40	94.92	0.649	1.541	3kHz



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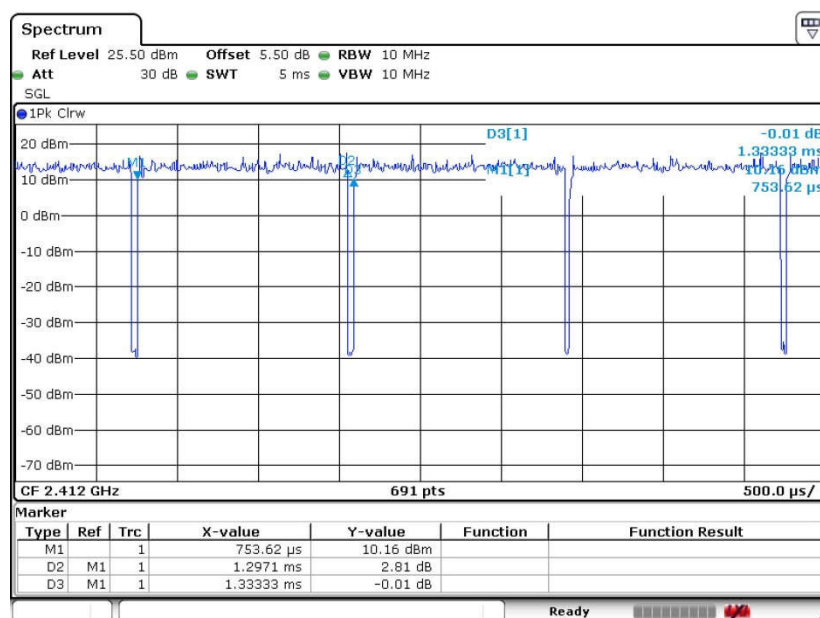


802.11g



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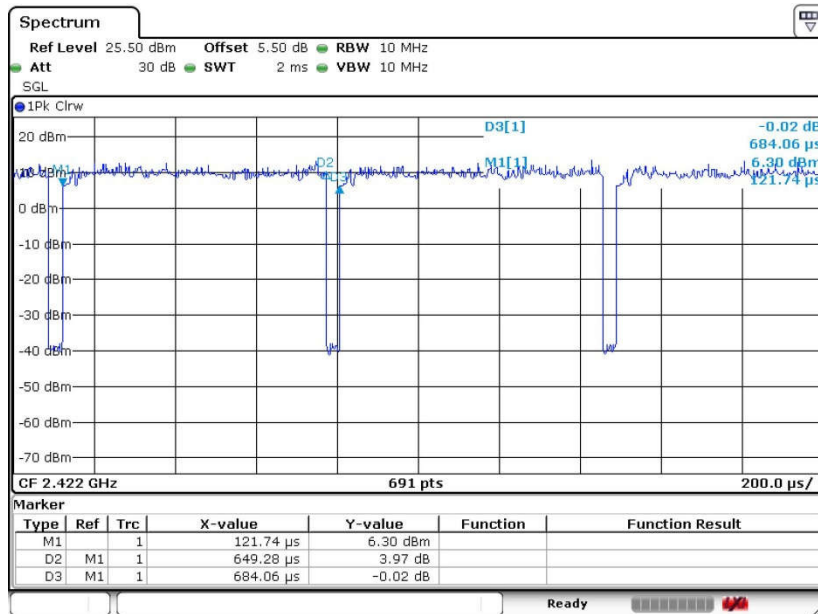
802.11n HT20



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802.11n HT40



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