

FCC RF Test Report

APPLICANT : Lenovo(Shanghai) Electronics
Technology Co., Ltd.
EQUIPMENT : Portable Tablet Computer
BRAND NAME : Lenovo
MODEL NAME : TB-X704A
FCC ID : O57TBX704A
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Mar. 13, 2017 and testing was completed on May 23, 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 Development Zone, Jiangsu, China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR731307C	Rev. 01	Initial issue of report	Jun. 02, 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 3.80 dB at 30.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.84 dB at 0.598 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Lenovo(Shanghai) Electronics Technology Co., Ltd.

NO.68 BUILDING, 199 FENJU RD, China (Shanghai) Pilot Free Trade Zone, 200131, CHINA

1.2 Manufacturer

Lenovo PC HK Limited

23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Portable Tablet Computer
Brand Name	Lenovo
Model Name	TB-X704A
FCC ID	O57TBX704A
EUT supports Radios application	WCDMA/HSPA/ HSPA+(16QAM uplink is not supported)/DC-HSDPA/LTE/ WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth v3.0+EDR/Bluetooth v4.0LE/ Bluetooth v4.1LE/ Bluetooth v4.2LE
HW Version	Lenovo Tablet TB-X704A
SW Version	TB-X704A_RF04_170515
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	802.11b : 18.05 dBm (0.0638 W) 802.11g : 24.62 dBm (0.2897 W) 802.11n HT20 : 25.05 dBm (0.3199 W) 802.11n HT40 : 25.62 dBm (0.3648 W)
Antenna Type / Gain	PIFA Antenna type with gain 0.54 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 Component List

There are two types of EUT, the detailed differences between them are shown in the table. According to the differences, we choose sample 1 to perform full test and sample 2 to verify worst case.

Component	Sample 1		Sample 2	
	spec	supplier	spec	supplier
CPU	MSM8953	Qualcomm	MSM8953	Qualcomm
Flash	MCP_32GB-eMMC_16Gb-LPDDR3	Samsung	MCP_32GB-eMMC_16Gb-LPDDR3	Hynix
LCD+TP	A6090A_OCA_4.8 mm_G+F+F_NEG_COFF_10.1_1200*1920_IPS_400_GT9110P_INX_INX_OFLIM_ZIF+ZIF	O-film	A6090A_OCA_4.7 mm_GFF_NEG_COFF_10.1_1200*1920_IPS_350_GT9110P_BOE_BOE_ZIF+ZIF	GIS
Front Camera	Camera_6.5*6.5*3.9_OV5695_5M_FF	Q Technology Limited	Camera_6.5*6.5*3.9_500W_OV5695_FF	AVC
Rear Camera	camera_8.62*8.56*5.06_IMX219_8MP_AF_	Q Technology Limited	Camera_8.5*8.5*5.0mm-800W-OV8856-AF-BB	O-film
Battery	7000 mAh_4.4V_ATL268494	SCUD(FUJIAN)	7000mAh_4.4V_CA278494G_A6090	Celxpert



1.7 Testing Location

Test Site	Sporton International (KunShan) INC.			
Test Site Location	No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	Sporton Site No.			FCC Registration No.
	TH01-KS	03CH03-KS	CO01-KS	306251

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

1.8 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 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.

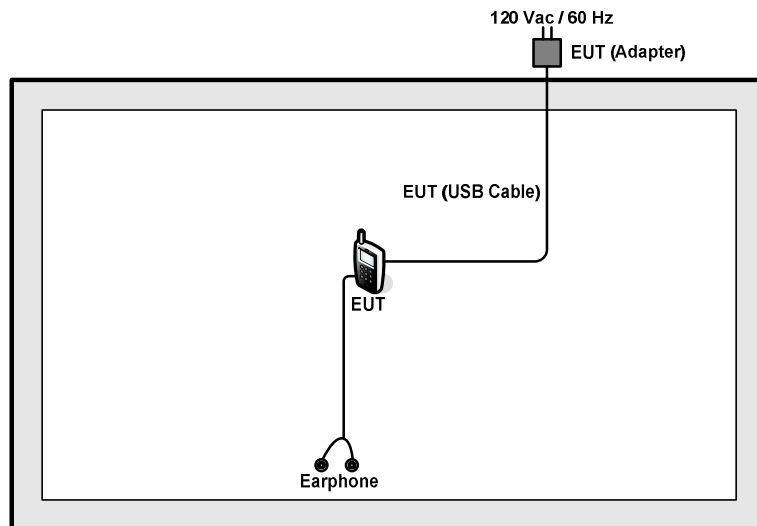
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

Test Cases	
AC Conducted Emission	Mode 1: WCDMA BandV Idle + Bluetooth Link + WLAN Link(2.4G) + USB Cable 1(Charging from Adapter 1) + Earphone for Sample 1
	Mode 2: WCDMA BandV Idle + Bluetooth Link + WLAN Link(2.4G) + USB Cable 2(Charging from Adapter 2) + Earphone for Sample 2
Remark: 1. The worst case of conducted emission is mode 2; only the test data of it was reported. 2. For Radiated Test Cases, We evaluate sample1 tests with Adapter 1, USB cable 1; And sample 2 tests with Adapter 2, USB cable 2.	

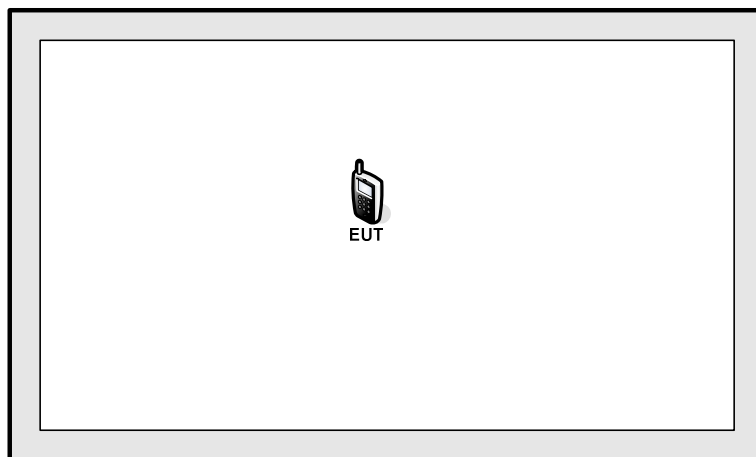
2.3 Connection Diagram of Test System

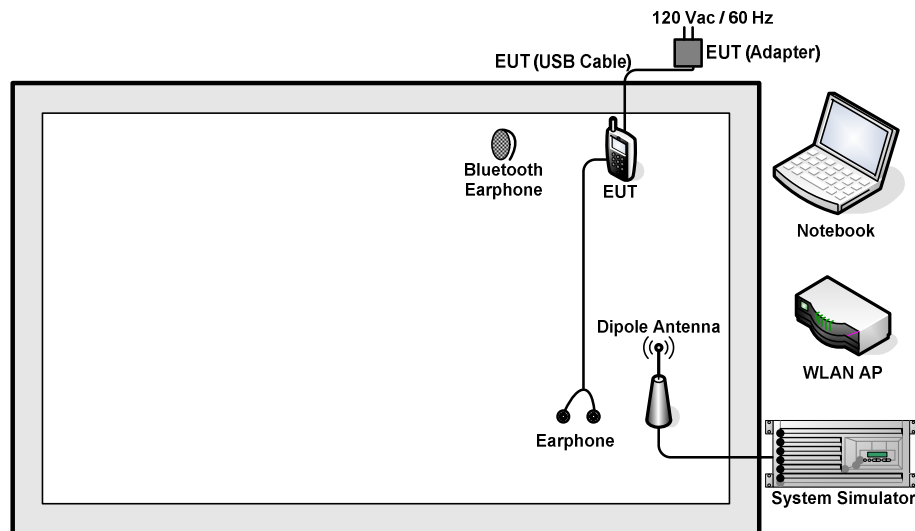
<WLAN Tx Mode>

802.11b/11g/11n HT40



802.11n HT20



<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	G480	PRC4	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
2.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
3.	LTE Base Station	Anritus	MT8820C	N/A	N/A	Unshielded,1.8m
4.	Router	LINKSYS	WRT600N	Q87-WRT60 0NV11	N/A	shielded cable DC O/P1.8m , Unshielded AC I/P1.8m
5.	Earphone	Lenovo	LH102	N/A	N/A	Unshielded,1.2m
6.	Earphone	Lenovo	SH100	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 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 5.8dB.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} \\ &= 5.8 \text{ (dB)}\end{aligned}$$

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.

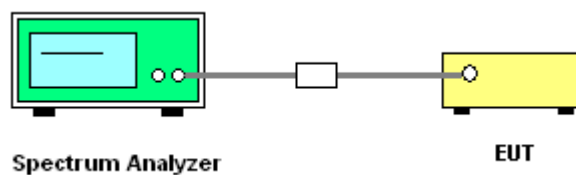
3.1.2 Measuring Instruments

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.

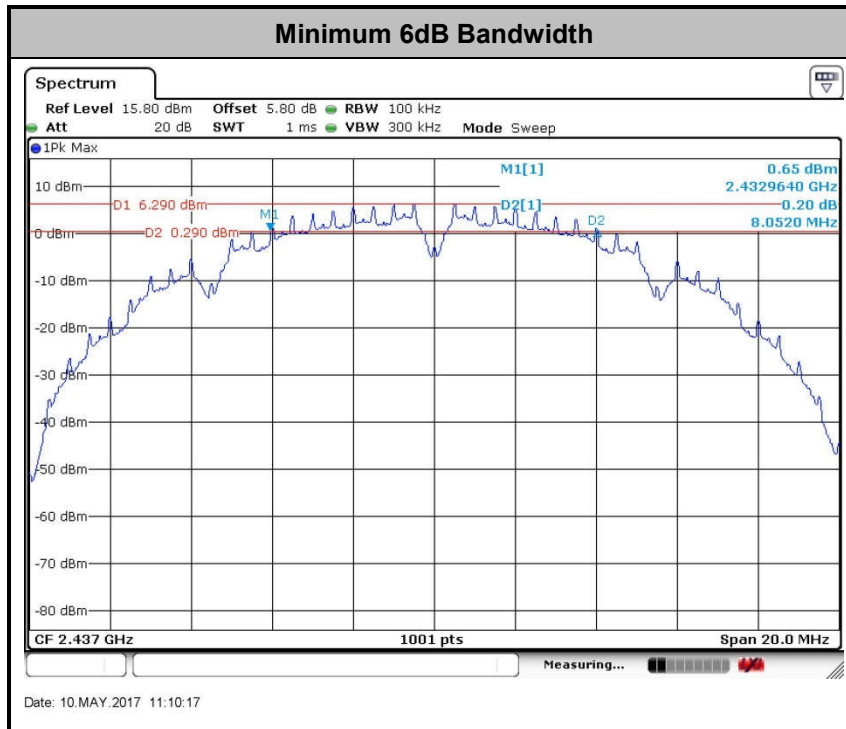
3.1.4 Test Setup





3.1.5 Test Result of 6dB

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.

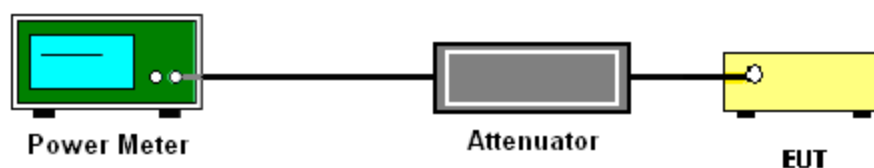
3.2.2 Measuring Instruments

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.

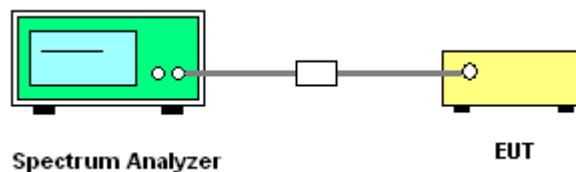
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

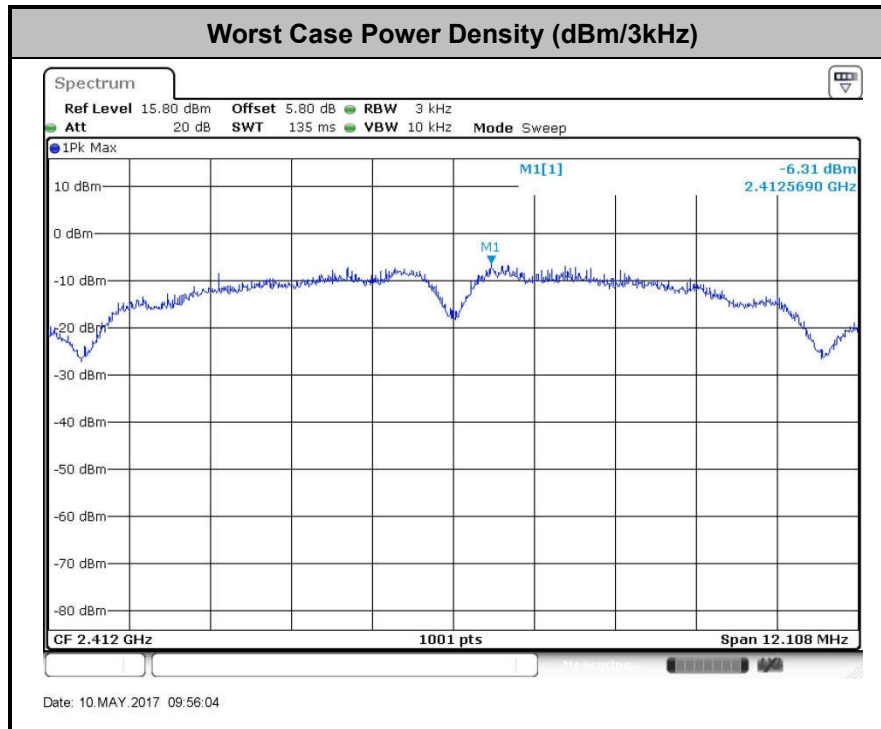
1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum 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.

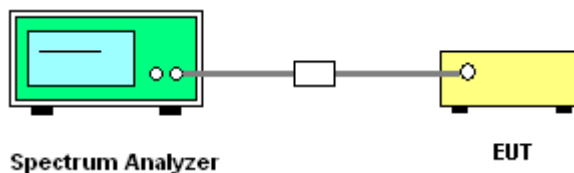
3.4.2 Measuring Instruments

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.

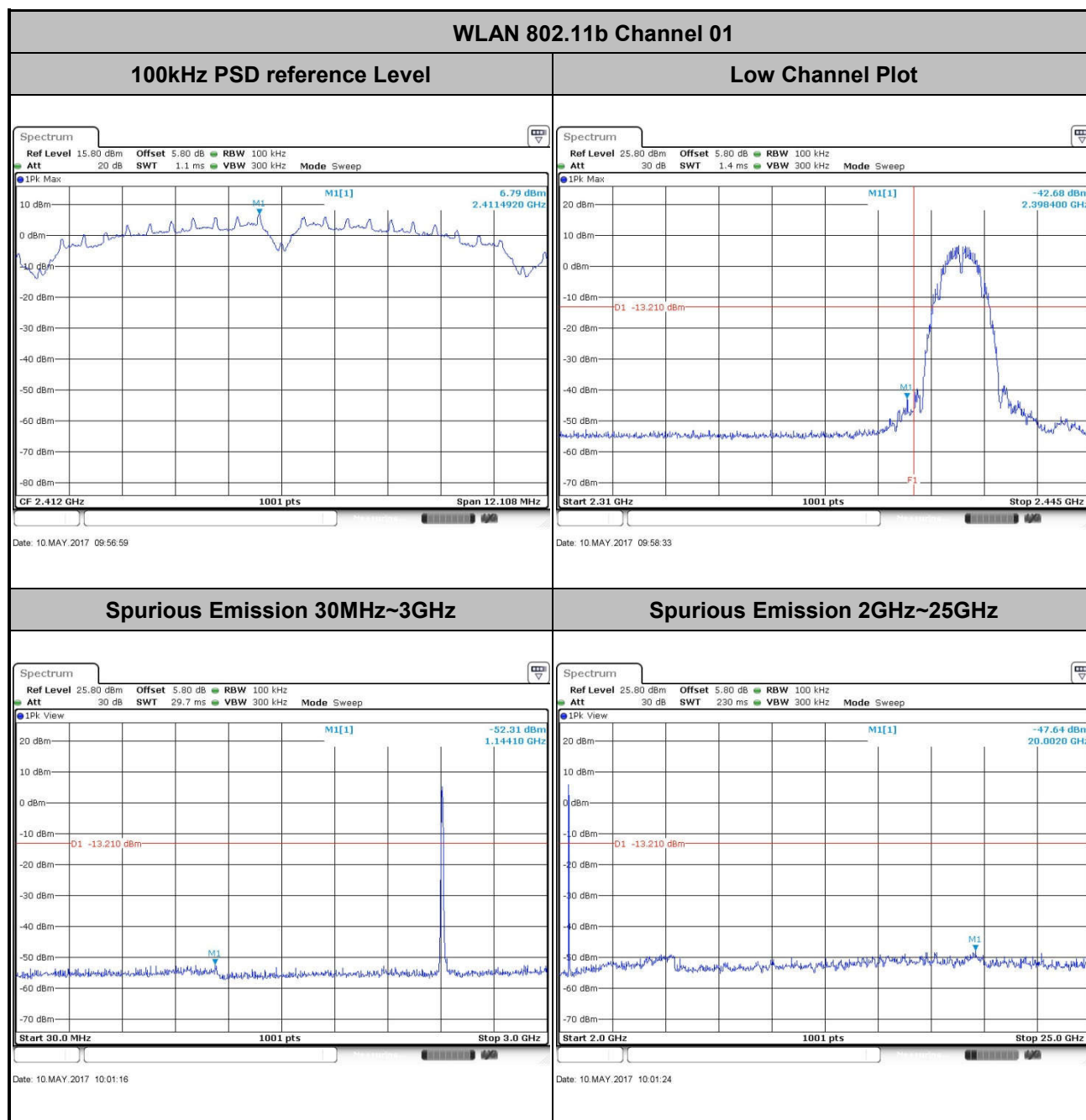
3.4.4 Test Setup





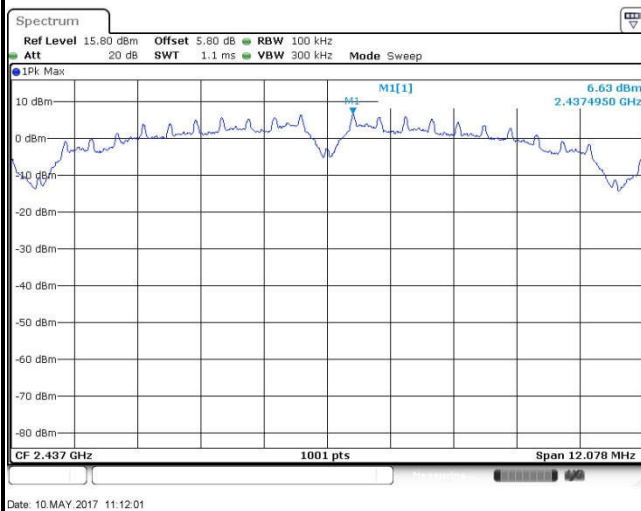
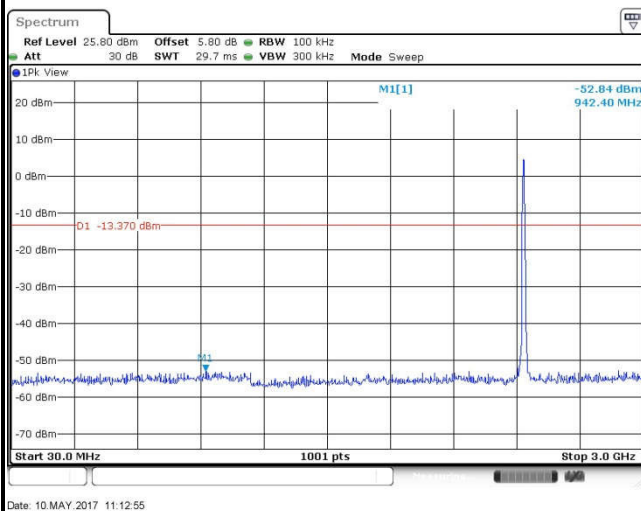
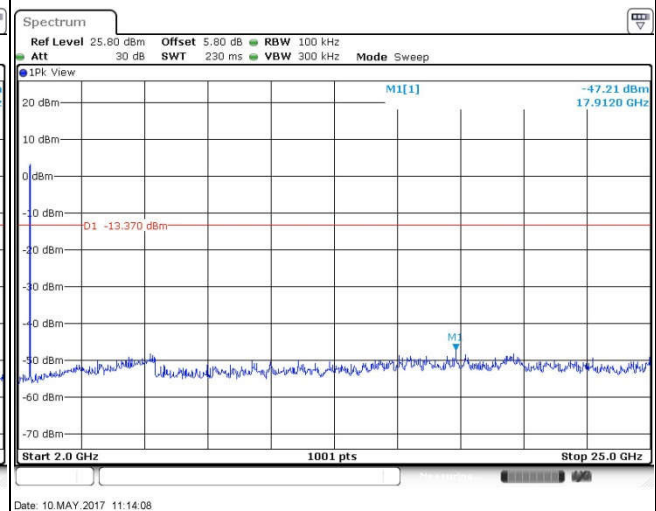
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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



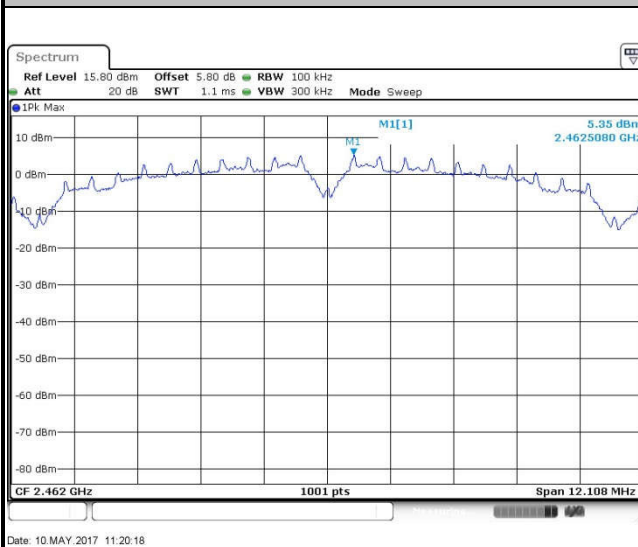
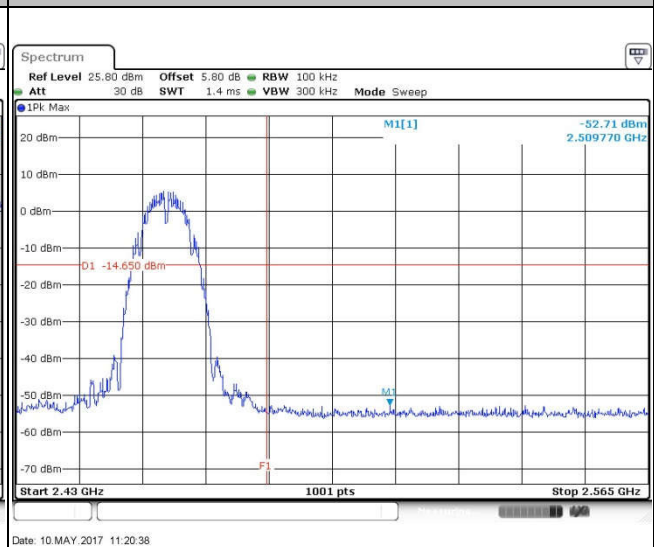
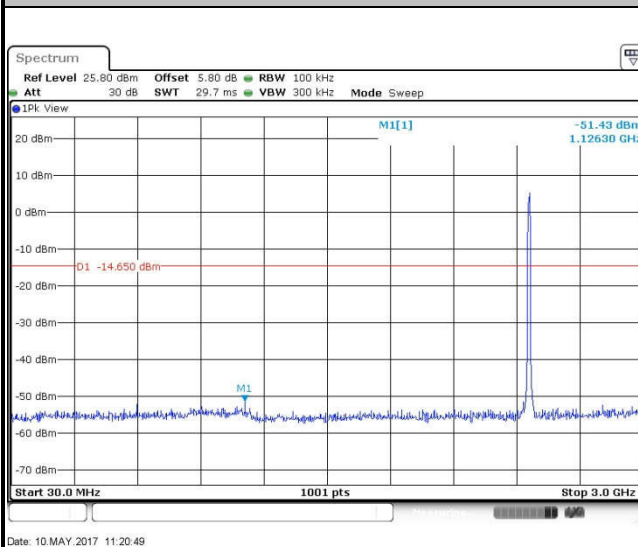
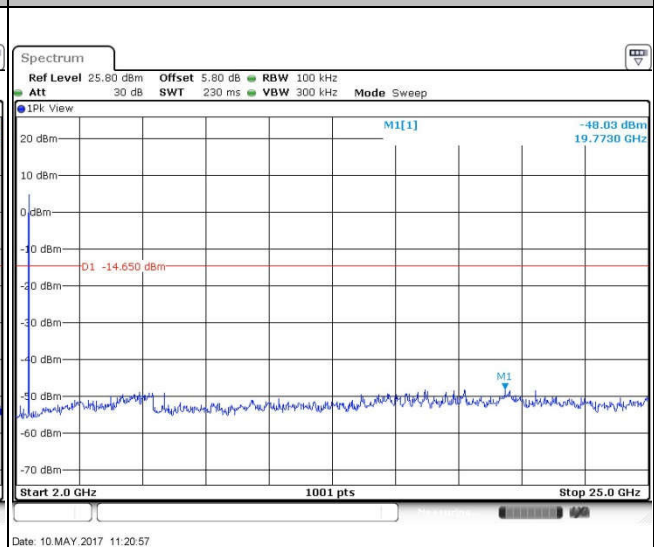


Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent

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

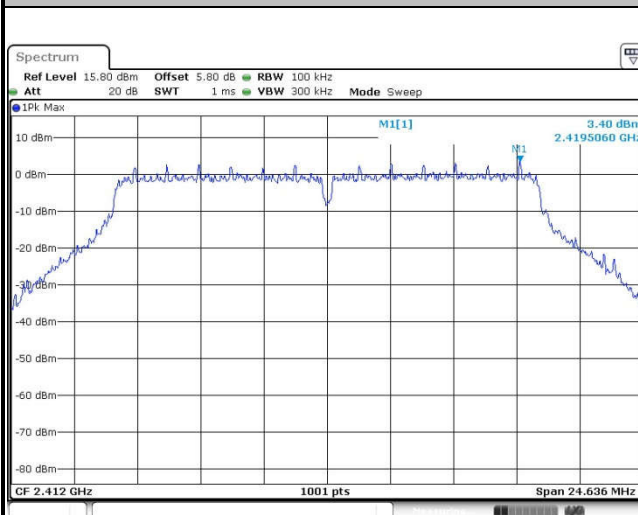
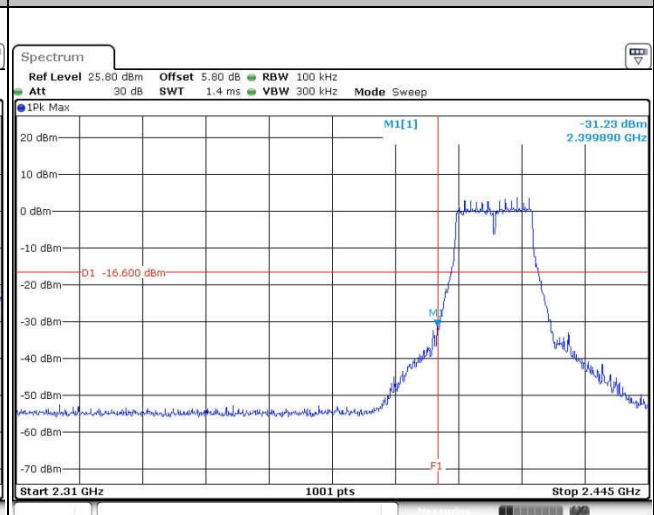
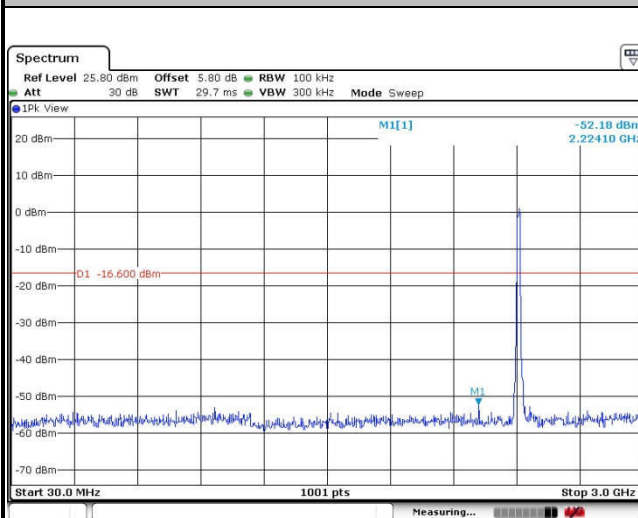
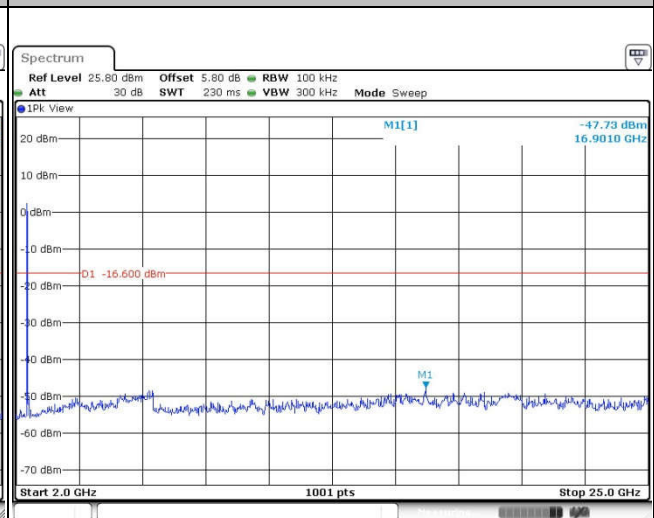


Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	11	Test Engineer :	Silent

WLAN 802.11b Channel 11**100kHz PSD reference Level****High Channel Plot****Spurious Emission 30MHz~3GHz****Spurious Emission 2GHz~25GHz**

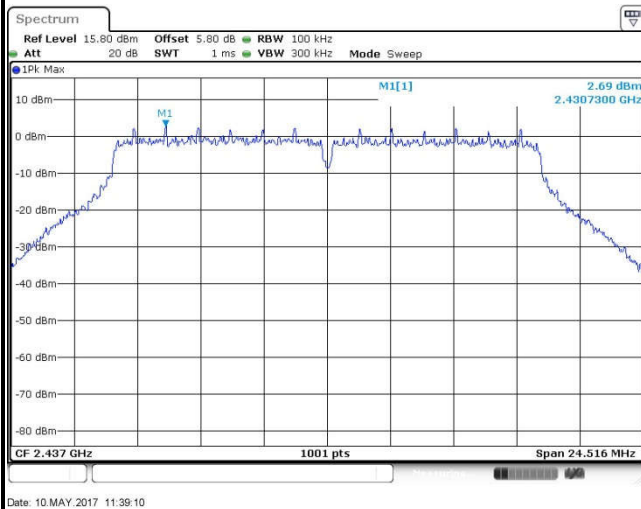
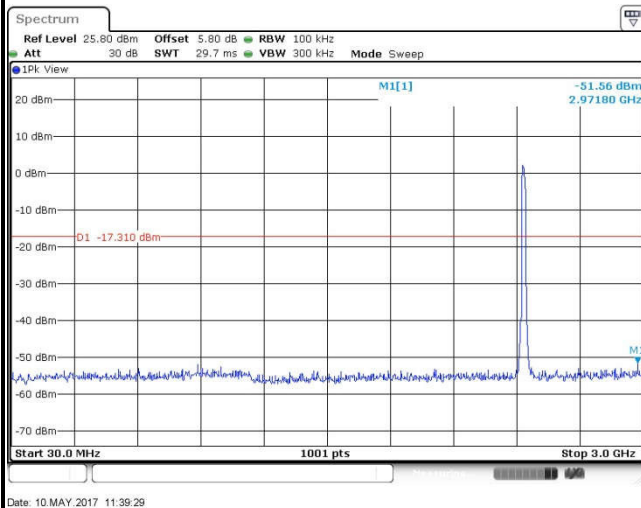
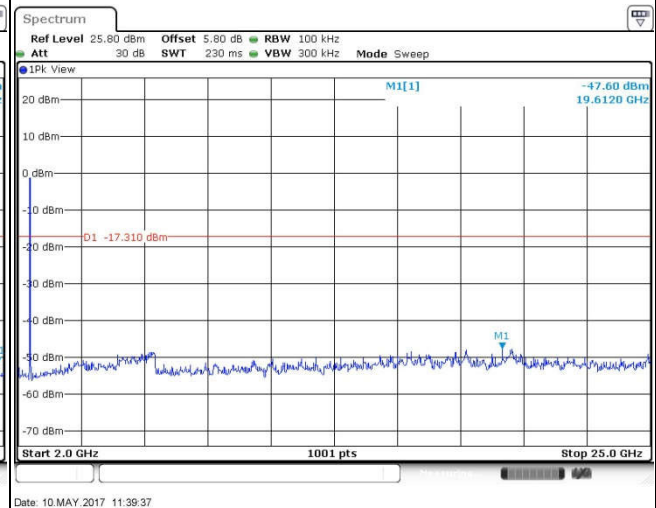


Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	01	Test Engineer :	Silent

WLAN 802.11g Channel 01**100kHz PSD reference Level****Low Channel Plot****Spurious Emission 30MHz~3GHz****Spurious Emission 2GHz~25GHz**

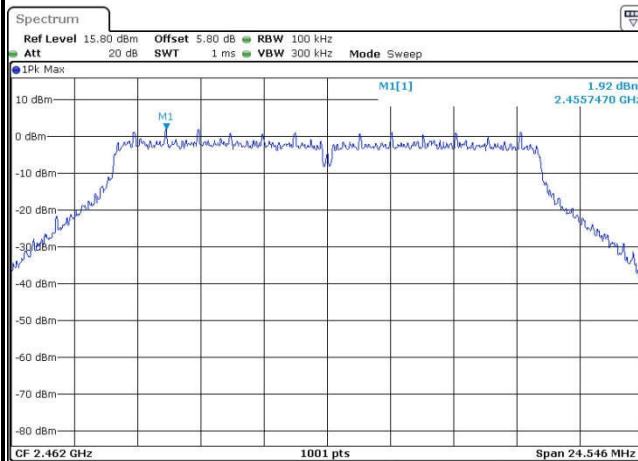


Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent

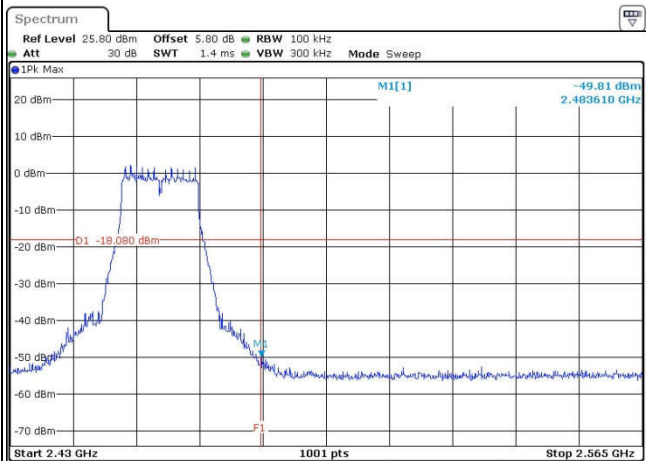
WLAN 802.11g Channel 06**100kHz PSD reference Level****Spurious Emission 30MHz~3GHz****Spurious Emission 2GHz~25GHz**



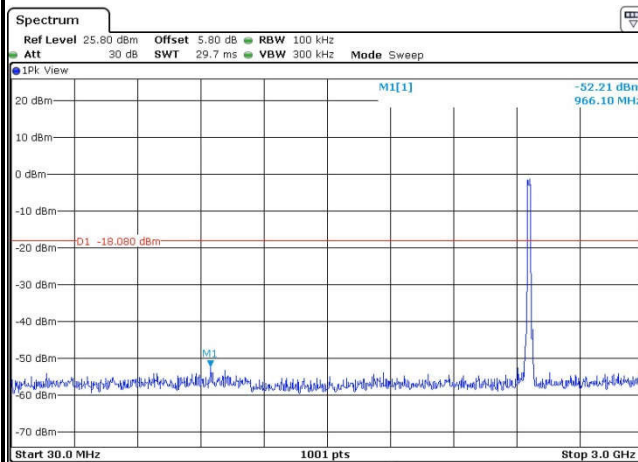
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	11	Test Engineer :	Silent

WLAN 802.11g Channel 11**100kHz PSD reference Level**

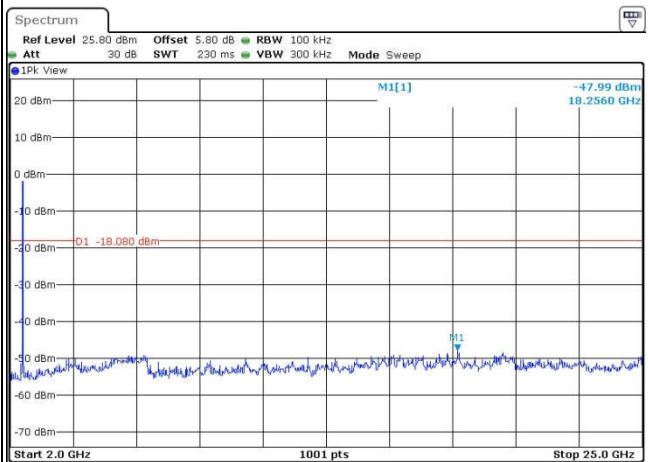
Date: 10.MAY.2017 11:44:40

High Channel Plot

Date: 10.MAY.2017 11:45:15

Spurious Emission 30MHz~3GHz

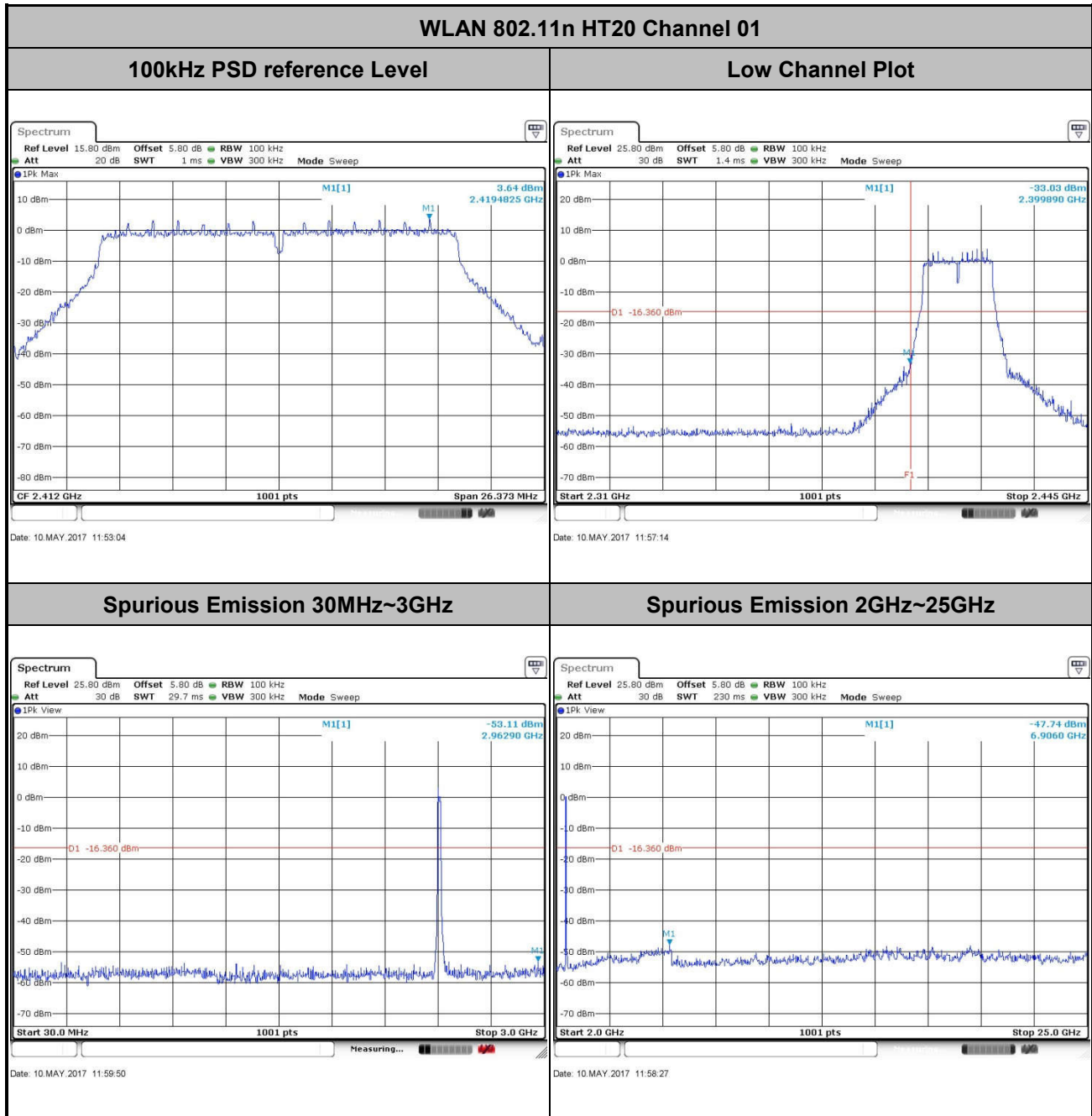
Date: 10.MAY.2017 11:47:46

Spurious Emission 2GHz~25GHz

Date: 10.MAY.2017 11:46:21



Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	01	Test Engineer :	Silent

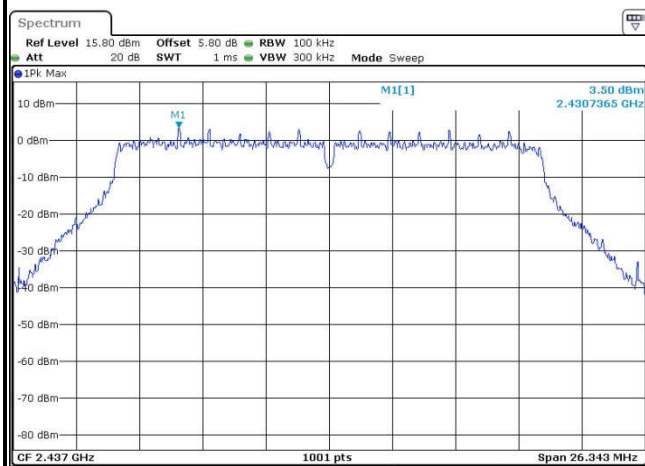




Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent

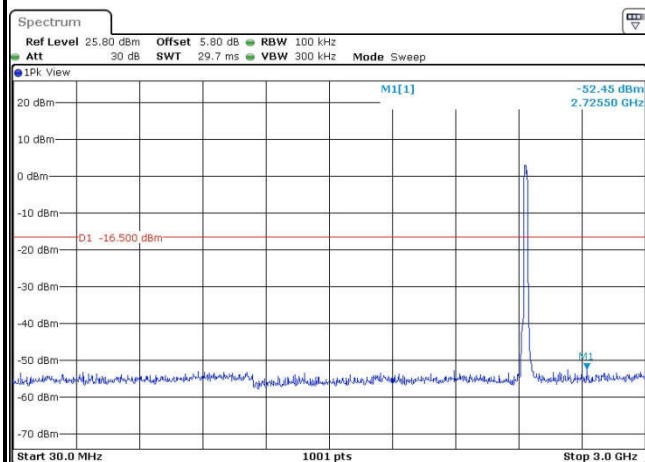
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



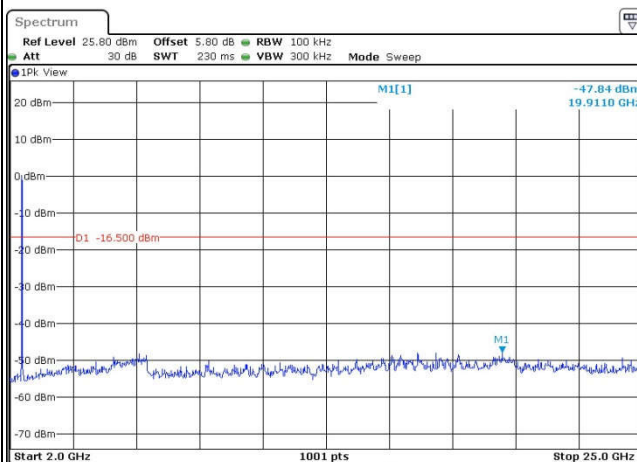
Date: 10.MAY.2017 13:42:23

Spurious Emission 30MHz~3GHz



Date: 10.MAY.2017 13:43:25

Spurious Emission 2GHz~25GHz



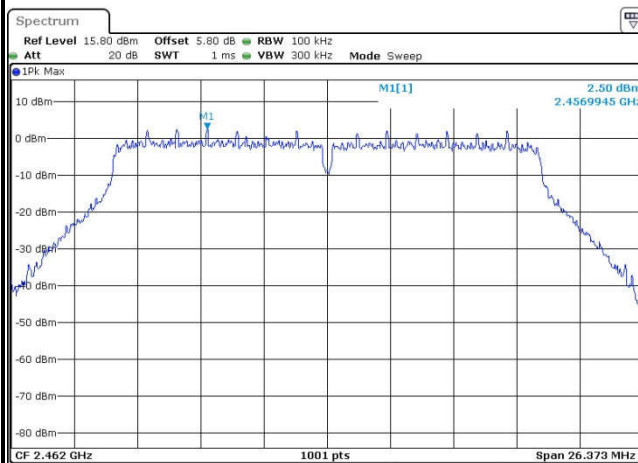
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Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~55%
Test Channel :	11	Test Engineer :	Silent

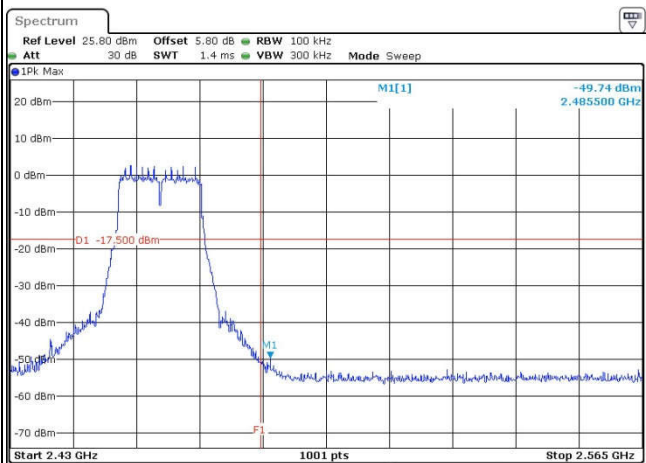
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



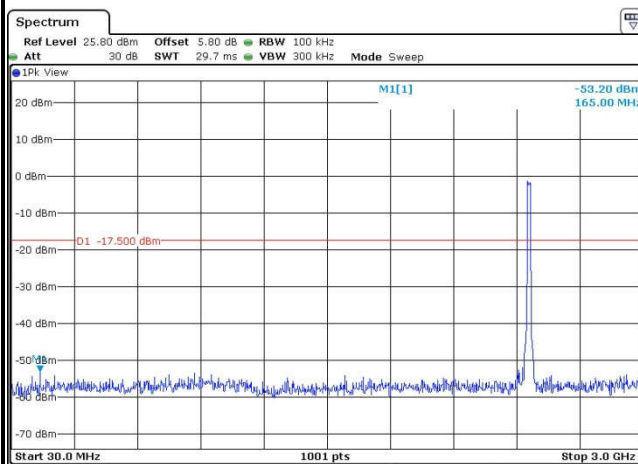
Date: 10.MAY.2017 13:46:34

High Channel Plot



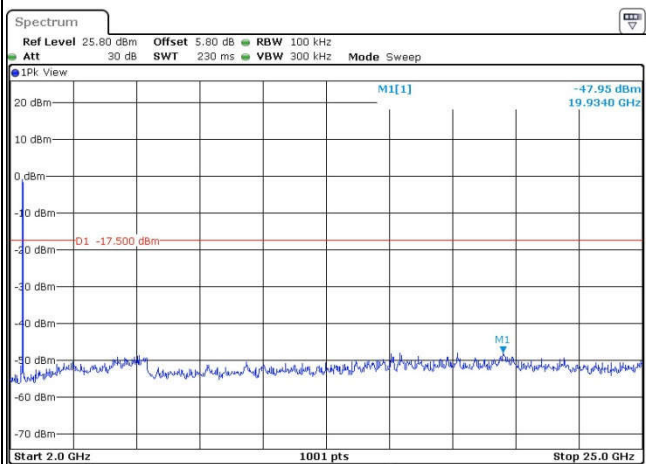
Date: 10.MAY.2017 13:47:01

Spurious Emission 30MHz~3GHz



Date: 10.MAY.2017 13:52:38

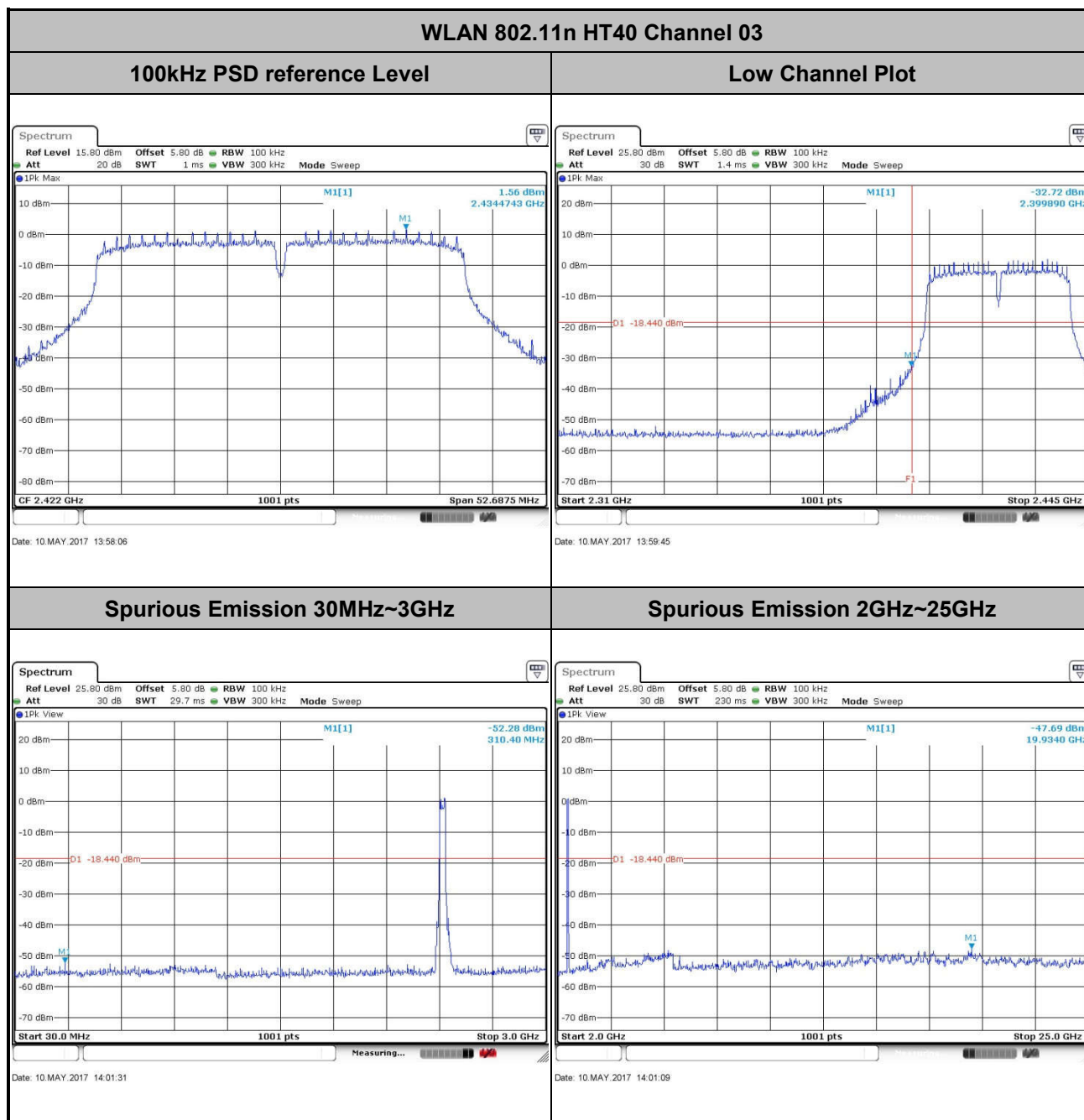
Spurious Emission 2GHz~25GHz



Date: 10.MAY.2017 13:50:21

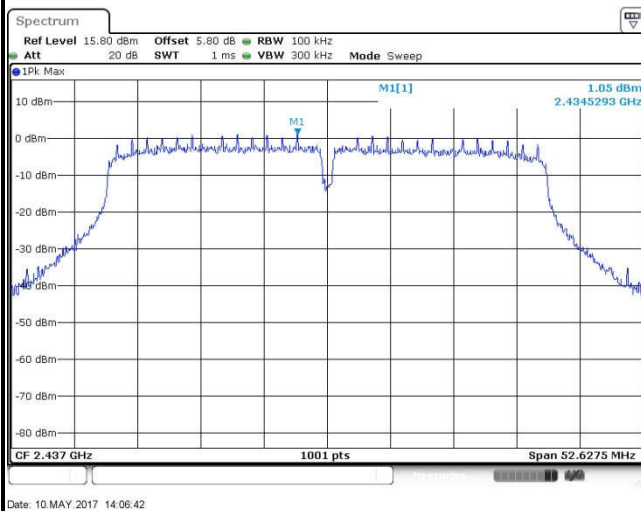
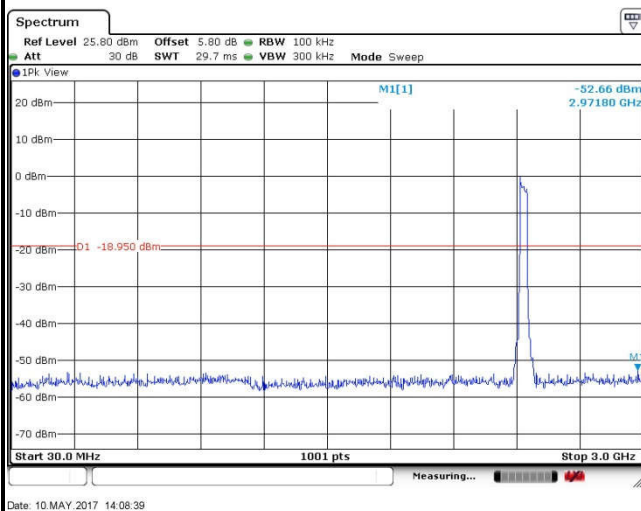
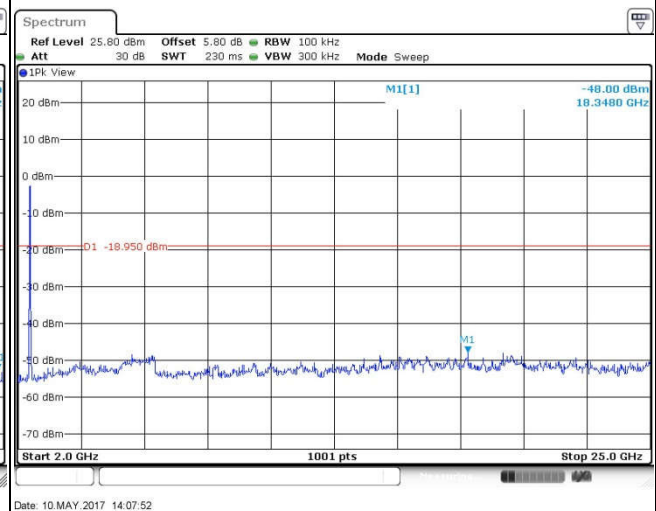


Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~55%
Test Channel :	03	Test Engineer :	Silent



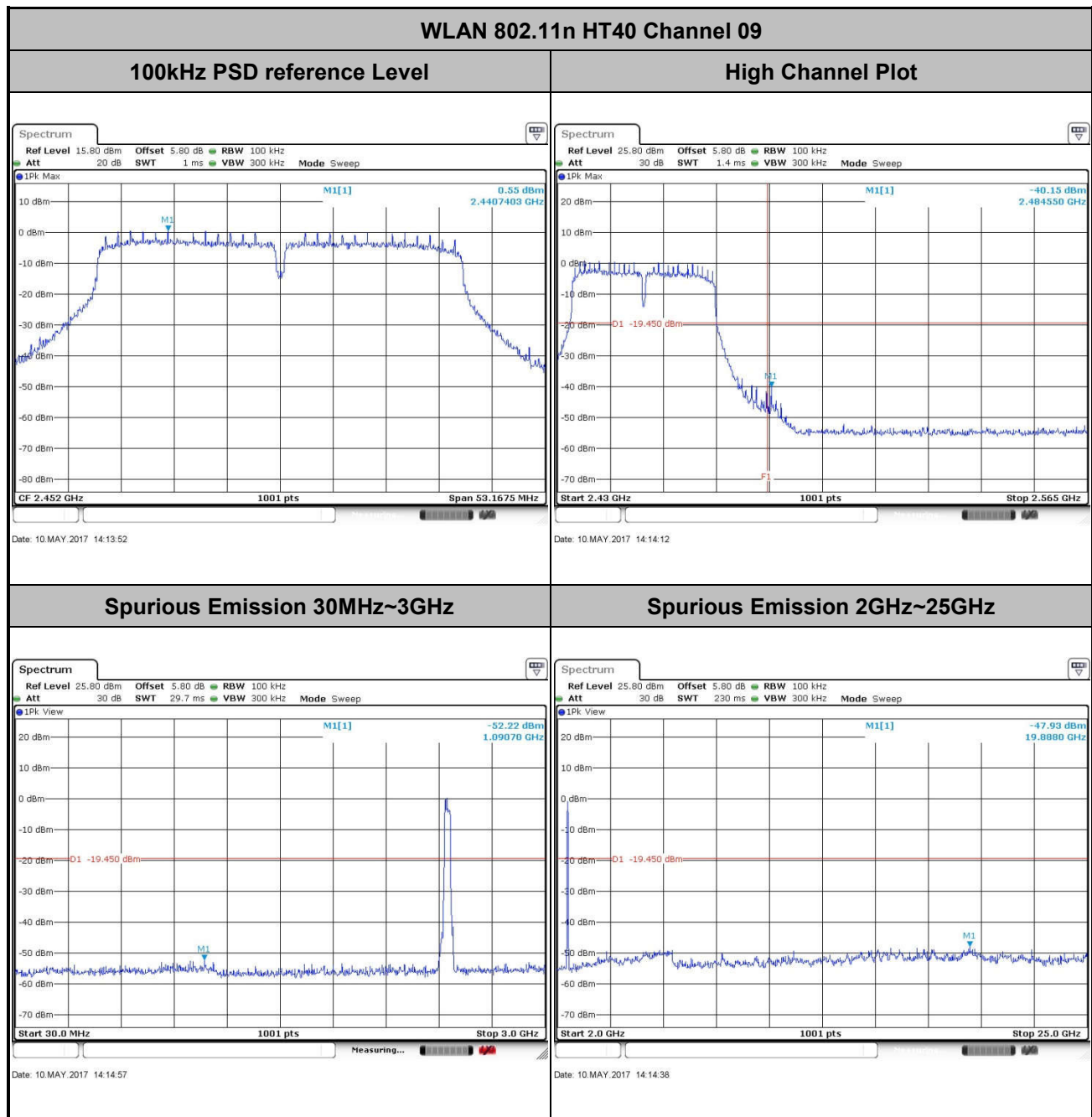


Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~55%
Test Channel :	06	Test Engineer :	Silent

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



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

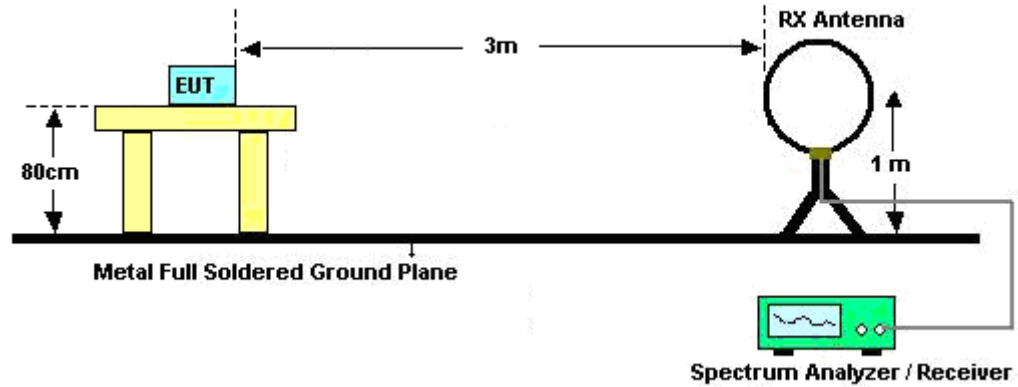
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test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

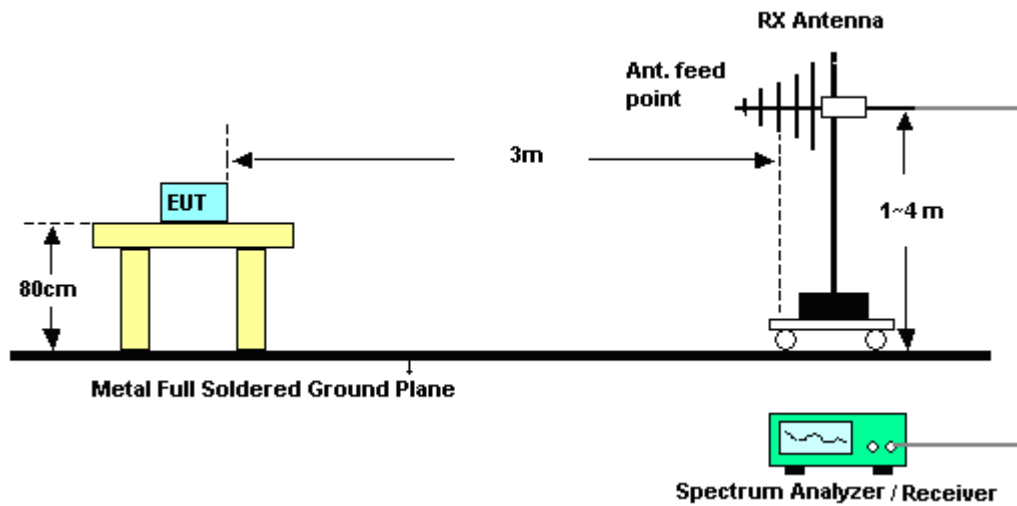
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

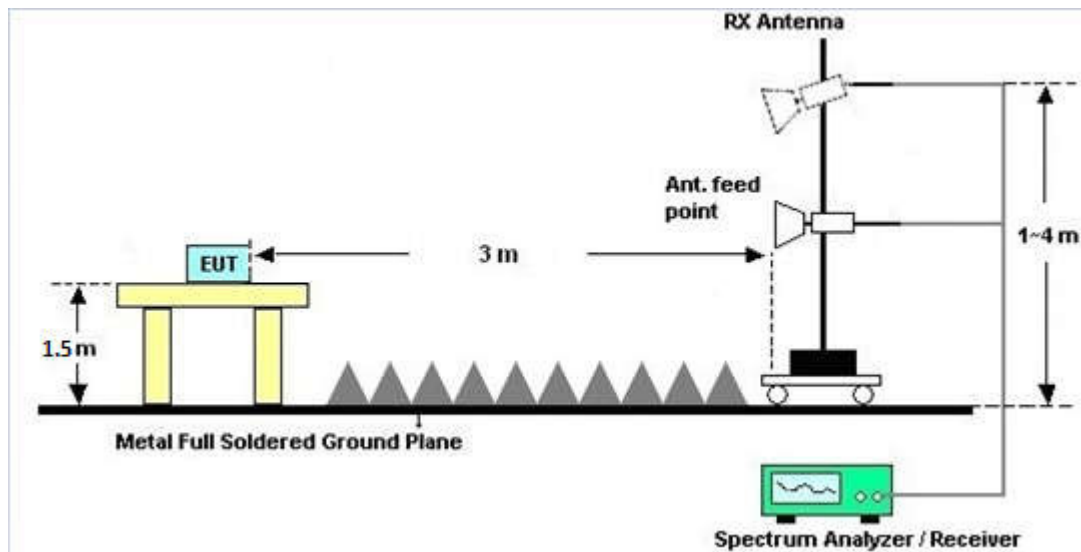
For radiated emissions below 30MHz



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.

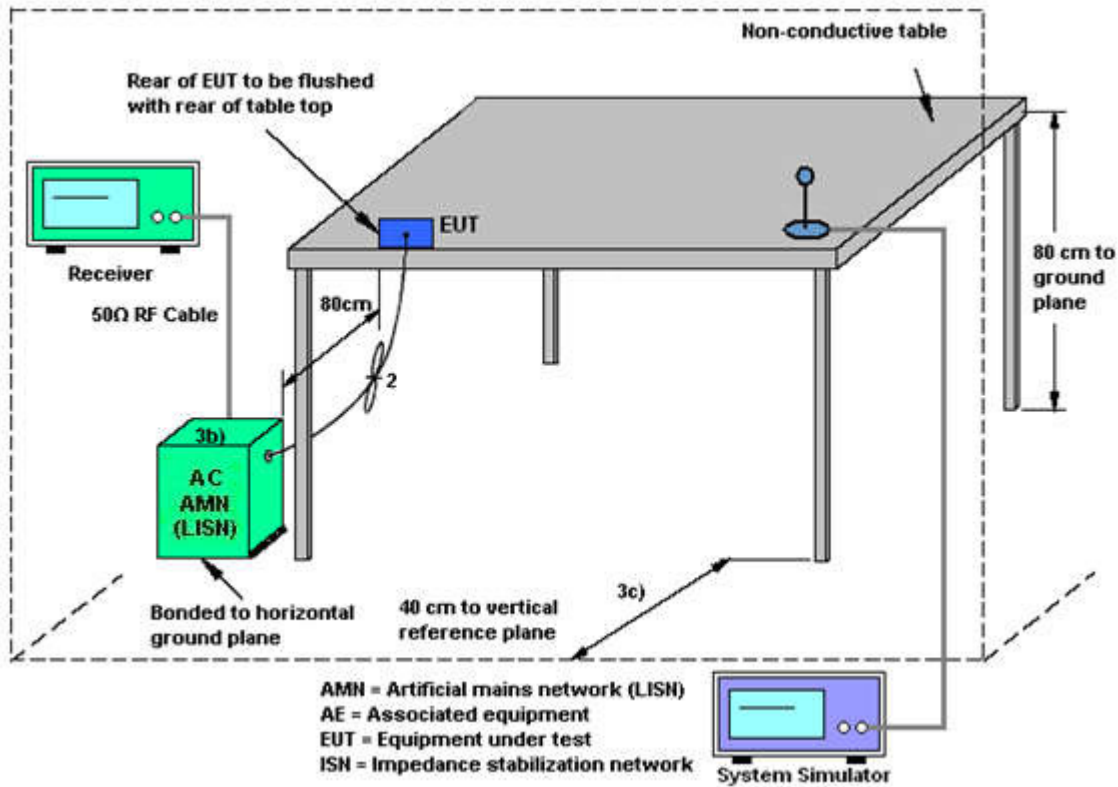
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

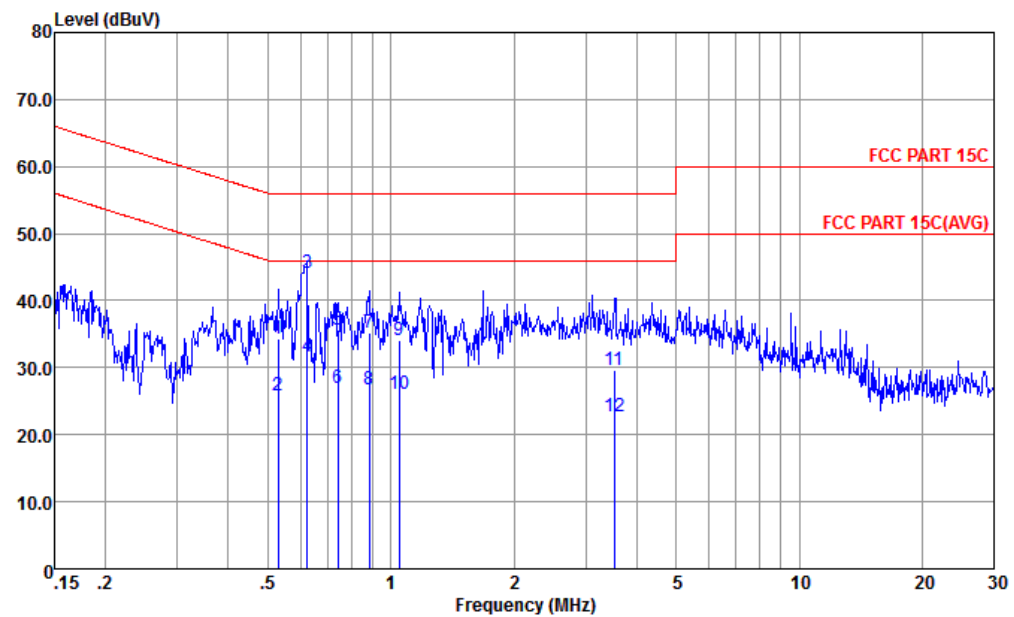
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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 2	Temperature :	22~24℃
Test Engineer :	Amos	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA BandV Idle + Bluetooth Link + WLAN Link(2.4G) + USB Cable 2(Charging from Adapter 2) + Earphone for Sample 2		

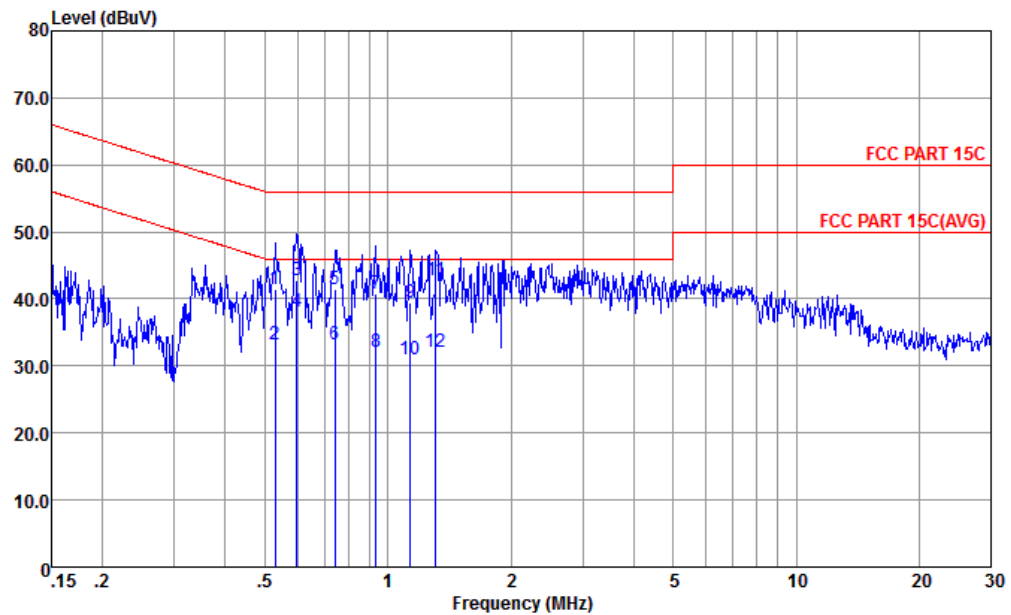


Site : CO01-KS
Condition : FCC PART 15C LISN-L-161017-060103 LINE
Project : (FR) 731307
mode : Mode 2
: 865301030005694 #44

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.529	34.35	-21.65	56.00	23.89	0.27	10.19	QP
2	0.529	25.75	-20.25	46.00	15.29	0.27	10.19	Average
3 *	0.624	44.04	-11.96	56.00	33.60	0.26	10.18	QP
4	0.624	31.74	-14.26	46.00	21.30	0.26	10.18	Average
5	0.743	35.63	-20.37	56.00	25.20	0.25	10.18	QP
6	0.743	27.03	-18.97	46.00	16.60	0.25	10.18	Average
7	0.885	35.24	-20.76	56.00	24.80	0.26	10.18	QP
8	0.885	26.74	-19.26	46.00	16.30	0.26	10.18	Average
9	1.049	34.05	-21.95	56.00	23.60	0.26	10.19	QP
10	1.049	26.05	-19.95	46.00	15.60	0.26	10.19	Average
11	3.528	29.74	-26.26	56.00	19.30	0.21	10.23	QP
12	3.528	22.64	-23.36	46.00	12.20	0.21	10.23	Average



Test Mode :	Mode 2	Temperature :	22~24°C
Test Engineer :	Amos	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA BandV Idle + Bluetooth Link + WLAN Link(2.4G) + USB Cable 2(Charging from Adapter 2) + Earphone for Sample 2		



Site : CO01-KS
 Condition : FCC PART 15C LISN-N-161017-060103 NEUTRAL
 Project : (FR) 731307
 mode : Mode 2
 : 865301030005694 #44

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.529	41.47	-14.53	56.00	30.90	0.38	10.19	QP
2	0.529	33.17	-12.83	46.00	22.60	0.38	10.19	Average
3	0.598	42.86	-13.14	56.00	32.30	0.38	10.18	QP
4 *	0.598	38.16	-7.84	46.00	27.60	0.38	10.18	Average
5	0.743	41.36	-14.64	56.00	30.80	0.38	10.18	QP
6	0.743	33.16	-12.84	46.00	22.60	0.38	10.18	Average
7	0.933	40.88	-15.12	56.00	30.30	0.40	10.18	QP
8	0.933	32.18	-13.82	46.00	21.60	0.40	10.18	Average
9	1.135	39.39	-16.61	56.00	28.80	0.40	10.19	QP
10	1.135	30.89	-15.11	46.00	20.30	0.40	10.19	Average
11	1.310	42.79	-13.21	56.00	32.20	0.40	10.19	QP
12	1.310	32.19	-13.81	46.00	21.60	0.40	10.19	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.13, 2016	May 10,2017 ~May 23, 2017	Oct.13, 2017	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 9, 2016	May 10, 2017 ~May 23, 2017	Aug. 8, 2017	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 19, 2017	May 10, 2017 ~May 23, 2017	Jan. 19, 2018	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 19, 2017	May 10, 2017 ~May 23, 2017	Jan. 19, 2018	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 20, 2017	May 02, 2017	Apr. 19, 2018	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2016	May 02, 2017	Oct. 13, 2017	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2016	May 02, 2017	Oct. 13, 2017	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000811	AC 0V~300V, 45Hz~1000Hz	Oct. 13, 2016	May 02, 2017	Oct. 13, 2017	Conduction (CO01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Ma x 30dBm	Oct..22.2016	May 13, 2017	Oct..21.2017	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	Apr. 18, 2017	May 13, 2017	Apr.17, 2018	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 23, 2016	May 13, 2017	Nov.22, 2017	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz-2GHz	Apr. 22, 2017	May 13, 2017	Apr 21, 2018	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 22, 2017	May 13, 2017	Apr 21, 2018	Radiation (03CH03-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz ~40GHz	Oct. 19, 2016	May 13, 2017	Oct. 18, 2017	Radiation (03CH03-KS)
Amplifier	com-power	PA-103A	161069	1MHz ~1000MHz / 32 dB	Apr 18, 2017	May 13, 2017	Apr 17, 2018	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Oct. 13, 2016	May 13, 2017	Oct. 12, 2017	Radiation (03CH03-KS)
high gain Amplifier	MITEQ	AMF-7D-001 01800-30-10 P	2025788	1Ghz-18Ghz	Apr.18.2017	May 13, 2017	Apr.17,2018	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	May 13, 2017	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	May 13, 2017	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	May 13, 2017	NCR	Radiation (03CH03-KS)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.3dB
---	-------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.6dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.7dB
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Appendix A. Conducted Test Results

A1 - DTS Part

Test Engineer:	Silent	Temperature:	21~25	°C
Test Date:	2017/5/10~2017/5/23	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	13.14	8.07	0.50	Pass
11b	1Mbps	1	6	2437	13.09	8.05	0.50	Pass
11b	1Mbps	1	11	2462	13.24	8.07	0.50	Pass
11g	6Mbps	1	1	2412	18.73	16.42	0.50	Pass
11g	6Mbps	1	6	2437	18.38	16.34	0.50	Pass
11g	6Mbps	1	11	2462	18.83	16.36	0.50	Pass
HT20	MCS0	1	1	2412	19.28	17.58	0.50	Pass
HT20	MCS0	1	6	2437	19.23	17.56	0.50	Pass
HT20	MCS0	1	11	2462	19.53	17.58	0.50	Pass
HT40	MCS0	1	3	2422	36.36	35.13	0.50	Pass
HT40	MCS0	1	6	2437	36.56	35.09	0.50	Pass
HT40	MCS0	1	9	2452	36.76	35.45	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	18.05	30.00	0.54	18.59	36.00	Pass
11b	1Mbps	1	6	2437	17.88	30.00	0.54	18.42	36.00	Pass
11b	1Mbps	1	11	2462	16.85	30.00	0.54	17.39	36.00	Pass
11g	6Mbps	1	1	2412	24.62	30.00	0.54	25.16	36.00	Pass
11g	6Mbps	1	6	2437	24.48	30.00	0.54	25.02	36.00	Pass
11g	6Mbps	1	11	2462	23.58	30.00	0.54	24.12	36.00	Pass
HT20	MCS0	1	1	2412	25.05	30.00	0.54	25.59	36.00	Pass
HT20	MCS0	1	6	2437	24.82	30.00	0.54	25.36	36.00	Pass
HT20	MCS0	1	11	2462	23.65	30.00	0.54	24.19	36.00	Pass
HT40	MCS0	1	3	2422	25.62	30.00	0.54	26.16	36.00	Pass
HT40	MCS0	1	6	2437	25.36	30.00	0.54	25.90	36.00	Pass
HT40	MCS0	1	9	2452	24.52	30.00	0.54	25.06	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	0.10	15.15
11b	1Mbps	1	6	2437	0.10	14.95
11b	1Mbps	1	11	2462	0.10	14.06
11g	6Mbps	1	1	2412	0.59	14.86
11g	6Mbps	1	6	2437	0.59	14.35
11g	6Mbps	1	11	2462	0.59	13.64
HT20	MCS0	1	1	2412	0.63	15.16
HT20	MCS0	1	6	2437	0.63	14.88
HT20	MCS0	1	11	2462	0.63	13.84
HT40	MCS0	1	3	2422	0.63	15.19
HT40	MCS0	1	6	2437	0.63	14.88
HT40	MCS0	1	9	2452	0.63	14.25

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	-6.31	0.54	8.00	Pass
11b	1Mbps	1	6	2437	-7.65	0.54	8.00	Pass
11b	1Mbps	1	11	2462	-7.92	0.54	8.00	Pass
11g	6Mbps	1	1	2412	-8.64	0.54	8.00	Pass
11g	6Mbps	1	6	2437	-10.43	0.54	8.00	Pass
11g	6Mbps	1	11	2462	-11.80	0.54	8.00	Pass
HT20	MCS0	1	1	2412	-10.66	0.54	8.00	Pass
HT20	MCS0	1	6	2437	-10.72	0.54	8.00	Pass
HT20	MCS0	1	11	2462	-11.21	0.54	8.00	Pass
HT40	MCS0	1	3	2422	-12.44	0.54	8.00	Pass
HT40	MCS0	1	6	2437	-12.90	0.54	8.00	Pass
HT40	MCS0	1	9	2452	-12.06	0.54	8.00	Pass



Appendix B. Radiated Spurious Emission

Sample1

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2373.44	49.29	-24.71	74	54.63	25.67	5.45	36.46	110	243	P	H
		2389.95	38.85	-15.15	54	44	25.8	5.47	36.42	110	243	A	H
	*	2412	104.38	-	-	109.51	25.83	5.47	36.43	110	243	P	H
	*	2414	101.17	-	-	106.3	25.83	5.47	36.43	110	243	A	H
		2355.63	49.37	-24.63	74	54.9	25.55	5.43	36.51	349	64	P	V
		2389.69	38.72	-15.28	54	43.87	25.8	5.47	36.42	349	64	A	V
	*	2414	104.15	-	-	109.28	25.83	5.47	36.43	349	64	P	V
	*	2414	101.13	-	-	106.26	25.83	5.47	36.43	349	64	A	V
802.11b CH 06 2437MHz		2328.2	49.47	-24.53	74	55.39	25.29	5.39	36.6	100	242	P	H
		2388.13	38.47	-15.53	54	43.62	25.8	5.47	36.42	100	242	A	H
	*	2436	103.3	-	-	108.4	25.86	5.48	36.44	100	242	P	H
	*	2436	100.14	-	-	105.24	25.86	5.48	36.44	100	242	A	H
		2487.52	49.75	-24.25	74	54.74	25.97	5.52	36.48	100	242	P	H
		2483.74	38.7	-15.3	54	43.72	25.94	5.51	36.47	100	242	A	H
		2386.7	49.13	-24.87	74	54.28	25.8	5.47	36.42	301	60	P	V
		2389.82	38.45	-15.55	54	43.6	25.8	5.47	36.42	301	60	A	V
	*	2436	104.51	-	-	109.61	25.86	5.48	36.44	301	60	P	V
	*	2436	101.3	-	-	106.4	25.86	5.48	36.44	301	60	A	V
		2485.42	49.95	-24.05	74	54.97	25.94	5.51	36.47	301	60	P	V
		2485.48	38.75	-15.25	54	43.77	25.94	5.51	36.47	301	60	A	V



802.11b CH 11 2462MHz	*	2462	102.23	-	-	107.28	25.91	5.5	36.46	100	242	P	H
	*	2462	98.82	-	-	103.87	25.91	5.5	36.46	100	242	A	H
		2483.92	49.46	-24.54	74	54.48	25.94	5.51	36.47	100	242	P	H
		2486.26	39.2	-14.8	54	44.22	25.94	5.51	36.47	100	242	A	H
	*	2462	103.25	-	-	108.3	25.91	5.5	36.46	338	64	P	V
	*	2464	99.9	-	-	104.95	25.91	5.5	36.46	338	64	A	V
		2486.5	49.57	-24.43	74	54.59	25.94	5.51	36.47	338	64	P	V
		2486.86	39.32	-14.68	54	44.34	25.94	5.51	36.47	338	64	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	40.41	-33.59	74	38.52	30.68	7.72	36.51	100	0	P	H
		4824	40.9	-33.1	74	39.01	30.68	7.72	36.51	100	360	P	V
802.11b CH 06 2437MHz		4872	41.8	-32.2	74	39.72	30.85	7.76	36.53	100	0	P	H
		7308	46.28	-27.72	74	37.96	34.81	9.76	36.25	100	0	P	H
		4872	41.67	-32.33	74	39.59	30.85	7.76	36.53	100	360	P	V
		7311	46.12	-27.88	74	37.8	34.81	9.76	36.25	100	360	P	V
802.11b CH 11 2462MHz		4926	41.93	-32.07	74	39.67	31.02	7.8	36.56	100	360	P	H
		7386	46.29	-27.71	74	37.68	35.03	9.86	36.28	100	360	P	H
		4924	41.12	-32.88	74	38.86	31.02	7.8	36.56	100	0	P	V
		7386	46.64	-27.36	74	38.03	35.03	9.86	36.28	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.56	53.93	-20.07	74	59.08	25.8	5.47	36.42	332	216	P	H
		2389.56	41	-13	54	46.15	25.8	5.47	36.42	332	216	A	H
	*	2420	103.85	-	-	108.95	25.86	5.48	36.44	332	216	P	H
	*	2418	96.35	-	-	101.48	25.83	5.47	36.43	332	216	A	H
		2389.43	55.9	-18.1	74	61.05	25.8	5.47	36.42	400	68	P	V
		2389.95	42.99	-11.01	54	48.14	25.8	5.47	36.42	400	68	A	V
	*	2418	105.47	-	-	110.6	25.83	5.47	36.43	400	68	P	V
	*	2416	97.8	-	-	102.93	25.83	5.47	36.43	400	68	A	V
802.11g CH 06 2437MHz		2381.11	49.4	-24.6	74	54.74	25.67	5.45	36.46	100	217	P	H
		2382.02	39.52	-14.48	54	44.86	25.67	5.45	36.46	100	217	A	H
	*	2434	102.79	-	-	107.89	25.86	5.48	36.44	100	217	P	H
	*	2430	95.19	-	-	100.29	25.86	5.48	36.44	100	217	A	H
		2488.96	49.4	-24.6	74	54.39	25.97	5.52	36.48	100	217	P	H
		2489.32	40.05	-13.95	54	45.04	25.97	5.52	36.48	100	217	A	H
		2388	49.41	-24.59	74	54.56	25.8	5.47	36.42	400	65	P	V
		2384.88	39.59	-14.41	54	44.93	25.67	5.45	36.46	400	65	A	V
	*	2432	104.4	-	-	109.5	25.86	5.48	36.44	400	65	P	V
	*	2430	97.02	-	-	102.12	25.86	5.48	36.44	400	65	A	V
		2485.36	50.1	-23.9	74	55.12	25.94	5.51	36.47	400	65	P	V
		2488.96	40.08	-13.92	54	45.07	25.97	5.52	36.48	400	65	A	V



802.11g CH 11 2462MHz	*	2466	103.2	-	-	108.25	25.91	5.5	36.46	349	256	P	H
	*	2466	95.52	-	-	100.57	25.91	5.5	36.46	349	256	A	H
		2483.62	56.66	-17.34	74	61.68	25.94	5.51	36.47	349	256	P	H
		2484.1	42.03	-11.97	54	47.05	25.94	5.51	36.47	349	256	A	H
	*	2458	104.48	-	-	109.53	25.91	5.5	36.46	387	60	P	V
	*	2466	97.25	-	-	102.3	25.91	5.5	36.46	387	60	A	V
		2484.7	57.14	-16.86	74	62.16	25.94	5.51	36.47	387	60	P	V
		2483.74	42.96	-11.04	54	47.98	25.94	5.51	36.47	387	60	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	40.49	-33.51	74	38.6	30.68	7.72	36.51	100	0	P	H
		4824	41.31	-32.69	74	39.42	30.68	7.72	36.51	100	0	P	V
802.11g CH 06 2437MHz		4872	40.83	-33.17	74	38.75	30.85	7.76	36.53	100	0	P	H
		7311	48.04	-25.96	74	39.72	34.81	9.76	36.25	100	0	P	H
		4874	41.48	-32.52	74	39.4	30.85	7.76	36.53	100	0	P	V
		7308	46.47	-27.53	74	38.15	34.81	9.76	36.25	100	0	P	V
802.11g CH 11 2462MHz		4924	41.16	-32.84	74	38.9	31.02	7.8	36.56	100	0	P	H
		7386	45.85	-28.15	74	37.24	35.03	9.86	36.28	100	0	P	H
		4926	41.6	-32.4	74	39.34	31.02	7.8	36.56	300	0	P	V
		7386	46.37	-27.63	74	37.76	35.03	9.86	36.28	300	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2388.78	57.87	-16.13	74	63.02	25.8	5.47	36.42	100	260	P	H
		2389.95	43.4	-10.6	54	48.55	25.8	5.47	36.42	100	260	A	H
	*	2420	105.93	-	-	111.03	25.86	5.48	36.44	100	260	P	H
	*	2416	97.77	-	-	102.9	25.83	5.47	36.43	100	260	A	H
		2389.69	62.15	-11.85	74	67.3	25.8	5.47	36.42	357	46	P	V
		2389.95	45.25	-8.75	54	50.4	25.8	5.47	36.42	357	46	A	V
	*	2416	107.37	-	-	112.5	25.83	5.47	36.43	357	46	P	V
	*	2418	99.57	-	-	104.7	25.83	5.47	36.43	357	46	A	V
802.11n HT20 CH 06 2437MHz		2384.88	49.85	-24.15	74	55.19	25.67	5.45	36.46	100	260	P	H
		2385.4	39.09	-14.91	54	44.43	25.67	5.45	36.46	100	260	A	H
	*	2432	102.89	-	-	107.99	25.86	5.48	36.44	100	260	P	H
	*	2430	95	-	-	100.1	25.86	5.48	36.44	100	260	A	H
		2488.12	49.88	-24.12	74	54.87	25.97	5.52	36.48	100	260	P	H
		2488.42	39.44	-14.56	54	44.43	25.97	5.52	36.48	100	260	A	H
		2328.46	49.26	-24.74	74	55.18	25.29	5.39	36.6	347	49	P	V
		2385.53	39.6	-14.4	54	44.75	25.8	5.47	36.42	347	49	A	V
	*	2434	106.2	-	-	111.3	25.86	5.48	36.44	347	49	P	V
	*	2432	98.34	-	-	103.44	25.86	5.48	36.44	347	49	A	V
		2488.48	50.56	-23.44	74	55.55	25.97	5.52	36.48	347	49	P	V
		2488.6	40.21	-13.79	54	45.2	25.97	5.52	36.48	347	49	A	V



802.11n HT20 CH 11 2462MHz	*	2456	103.83	-	-	108.88	25.91	5.5	36.46	100	243	P	H
	*	2458	94.63	-	-	99.68	25.91	5.5	36.46	100	243	A	H
		2483.56	60.88	-13.12	74	65.9	25.94	5.51	36.47	100	243	P	H
		2483.56	43.06	-10.94	54	48.08	25.94	5.51	36.47	100	243	A	H
	*	2466	105.33	-	-	110.38	25.91	5.5	36.46	347	46	P	V
	*	2456	97.37	-	-	102.42	25.91	5.5	36.46	347	46	A	V
		2484.1	60.61	-13.39	74	65.63	25.94	5.51	36.47	347	46	P	V
		2483.5	44.34	-9.66	54	49.36	25.94	5.51	36.47	347	46	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	40.48	-33.52	74	38.59	30.68	7.72	36.51	100	0	P	H
													V
		4824	40.75	-33.25	74	38.86	30.68	7.72	36.51	100	360	P	
802.11n HT20 CH 06 2437MHz		4872	41.74	-32.26	74	39.66	30.85	7.76	36.53	100	0	P	H
		7308	46.46	-27.54	74	38.14	34.81	9.76	36.25	100	0	P	H
		4872	40.45	-33.55	74	38.37	30.85	7.76	36.53	100	360	P	V
		7308	45.94	-28.06	74	37.62	34.81	9.76	36.25	100	360	P	V
802.11n HT20 CH 11 2462MHz		4926	41.54	-32.46	74	39.28	31.02	7.8	36.56	100	360	P	H
		7386	46.45	-27.55	74	37.84	35.03	9.86	36.28	100	360	P	H
		4926	42.92	-31.08	74	40.66	31.02	7.8	36.56	100	0	P	V
		7386	46.37	-27.63	74	37.76	35.03	9.86	36.28	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.69	61.49	-12.51	74	66.64	25.8	5.47	36.42	355	46	P	H
		2389.95	46.07	-7.93	54	51.22	25.8	5.47	36.42	355	46	A	H
	*	2420	103.72	-	-	108.82	25.86	5.48	36.44	355	46	P	H
	*	2418	95.07	-	-	100.2	25.83	5.47	36.43	355	46	A	H
		2484.28	51.26	-22.74	74	56.28	25.94	5.51	36.47	355	46	P	H
		2484.04	40.08	-13.92	54	45.1	25.94	5.51	36.47	355	46	A	H
		2389.82	59.17	-14.83	74	64.32	25.8	5.47	36.42	100	94	P	V
		2389.95	42.84	-11.16	54	47.99	25.8	5.47	36.42	100	94	A	V
	*	2434	100.56	-	-	105.66	25.86	5.48	36.44	100	94	P	V
	*	2424	92.14	-	-	97.24	25.86	5.48	36.44	100	94	A	V
		2485.36	49.68	-24.32	74	54.7	25.94	5.51	36.47	100	94	P	V
		2484.22	39.67	-14.33	54	44.69	25.94	5.51	36.47	100	94	A	V
802.11n HT40 CH 06 2437MHz		2389.95	52.02	-21.98	74	57.17	25.8	5.47	36.42	343	48	P	H
		2389.95	40.3	-13.7	54	45.45	25.8	5.47	36.42	343	48	A	H
	*	2432	102.42	-	-	107.52	25.86	5.48	36.44	343	48	P	H
	*	2428	94.59	-	-	99.69	25.86	5.48	36.44	343	48	A	H
		2483.74	53.93	-20.07	74	58.95	25.94	5.51	36.47	343	48	P	H
		2483.92	40.92	-13.08	54	45.94	25.94	5.51	36.47	343	48	A	H
		2389.82	49.98	-24.02	74	55.13	25.8	5.47	36.42	100	82	P	V
		2389.82	39.28	-14.72	54	44.43	25.8	5.47	36.42	100	82	A	V
	*	2424	99.23	-	-	104.33	25.86	5.48	36.44	100	82	P	V
	*	2426	91.04	-	-	96.14	25.86	5.48	36.44	100	82	A	V
		2483.86	51.86	-22.14	74	56.88	25.94	5.51	36.47	100	82	P	V
		2483.62	40.09	-13.91	54	45.11	25.94	5.51	36.47	100	82	A	V



802.11n HT40 CH 09 2452MHz		2389.69	49.36	-24.64	74	54.51	25.8	5.47	36.42	335	45	P	H
		2389.82	39.25	-14.75	54	44.4	25.8	5.47	36.42	335	45	A	H
	*	2448	101.99	-	-	107.06	25.89	5.49	36.45	335	45	P	H
	*	2440	93.81	-	-	98.88	25.89	5.49	36.45	335	45	A	H
		2483.68	61.62	-12.38	74	66.64	25.94	5.51	36.47	335	45	P	H
		2483.62	44.5	-9.5	54	49.52	25.94	5.51	36.47	335	45	A	H
		2383.06	49.68	-24.32	74	55.02	25.67	5.45	36.46	100	95	P	V
		2389.43	39.03	-14.97	54	44.18	25.8	5.47	36.42	100	95	A	V
	*	2442	98.89	-	-	103.96	25.89	5.49	36.45	100	95	P	V
	*	2444	90.63	-	-	95.7	25.89	5.49	36.45	100	95	A	V
		2483.68	57.92	-16.08	74	62.94	25.94	5.51	36.47	100	95	P	V
		2483.98	42.05	-11.95	54	47.07	25.94	5.51	36.47	100	95	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4842	42.11	-31.89	74	40.16	30.73	7.74	36.52	100	360	P	H
HT40		7266	47.15	-26.85	74	38.95	34.72	9.72	36.24	100	360	P	H
CH 03	!	4842	41.86	-32.14	74	39.91	30.73	7.74	36.52	100	360	P	V
2422MHz		7266	45.71	-28.29	74	37.51	34.72	9.72	36.24	100	360	P	V
802.11n		4872	41.85	-32.15	74	39.77	30.85	7.76	36.53	100	360	P	H
HT40		7308	46.67	-27.33	74	38.35	34.81	9.76	36.25	100	360	P	H
CH 06		4872	40.6	-33.4	74	38.52	30.85	7.76	36.53	100	360	P	V
2437MHz		7308	46.46	-27.54	74	38.14	34.81	9.76	36.25	100	360	P	V
802.11n		4902	41.51	-32.49	74	39.32	30.96	7.78	36.55	100	360	P	H
HT40		7356	46.24	-27.76	74	37.75	34.94	9.82	36.27	100	360	P	H
CH 09		4902	40.76	-33.24	74	38.57	30.96	7.78	36.55	100	360	P	V
2452MHz		7356	46.25	-27.75	74	37.76	34.94	9.82	36.27	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

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT40 LF		35.82	28.21	-11.79	40	34.09	24.84	0.63	31.35	-	-	P	H
		56.19	22.22	-17.78	40	37.92	14.52	1.19	31.41	-	-	P	H
		159.98	32.68	-10.82	43.5	45.3	17.49	1.43	31.54	-	-	P	H
	!	196.84	37.62	-5.88	43.5	51.42	15.92	1.77	31.49	100	256	P	H
		273.47	31.27	-14.73	46	42.98	17.99	1.72	31.42	-	-	P	H
		443.22	26.34	-19.66	46	30.09	25.18	2.31	31.24	-	-	P	H
	!	30	36.2	-3.8	40	39.85	27.2	0.42	31.27	200	36	P	V
		43.58	33.69	-6.31	40	44.36	20	0.74	31.41	-	-	P	V
		81.41	24.45	-15.55	40	39.08	15.93	0.95	31.51	-	-	P	V
		198.78	29.82	-13.68	43.5	43.66	15.84	1.81	31.49	-	-	P	V
		323.91	25.6	-20.4	46	34.87	20.13	1.9	31.3	-	-	P	V
		841.89	30.88	-15.12	46	29.39	28.83	3.57	30.91	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Sample2

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 03 2422MHz		2389.69	59.23	-14.77	74	64.38	25.8	5.47	36.42	100	113	P	H
		2389.95	43.78	-10.22	54	48.93	25.8	5.47	36.42	100	113	A	H
	*	2428	101.53	-	-	106.63	25.86	5.48	36.44	100	113	P	H
	*	2434	93.25	-	-	98.35	25.86	5.48	36.44	100	113	A	H
		2488.9	49.82	-24.18	74	54.81	25.97	5.52	36.48	100	113	P	H
		2483.5	40.08	-13.92	54	45.1	25.94	5.51	36.47	100	113	A	H
		2389.82	60.04	-13.96	74	65.19	25.8	5.47	36.42	343	42	P	V
		2389.82	45.15	-8.85	54	50.3	25.8	5.47	36.42	343	42	A	V
	*	2434	104.3	-	-	109.4	25.86	5.48	36.44	343	42	P	V
	*	2434	95.27	-	-	100.37	25.86	5.48	36.44	343	42	A	V
		2483.62	52.77	-21.23	74	57.79	25.94	5.51	36.47	343	42	P	V
		2483.5	40.5	-13.5	54	45.52	25.94	5.51	36.47	343	42	A	V
Remark	3. No other spurious found.												
	4. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4842	40.42	-33.58	74	38.47	30.73	7.74	36.52	100	360	P	H
HT40		7266	47.05	-26.95	74	38.85	34.72	9.72	36.24	100	360	P	H
CH 03		4844	41.44	-32.56	74	39.49	30.73	7.74	36.52	100	360	P	V
2422MHz		7266	46.45	-27.55	74	38.25	34.72	9.72	36.24	100	360	P	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average 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.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(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. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

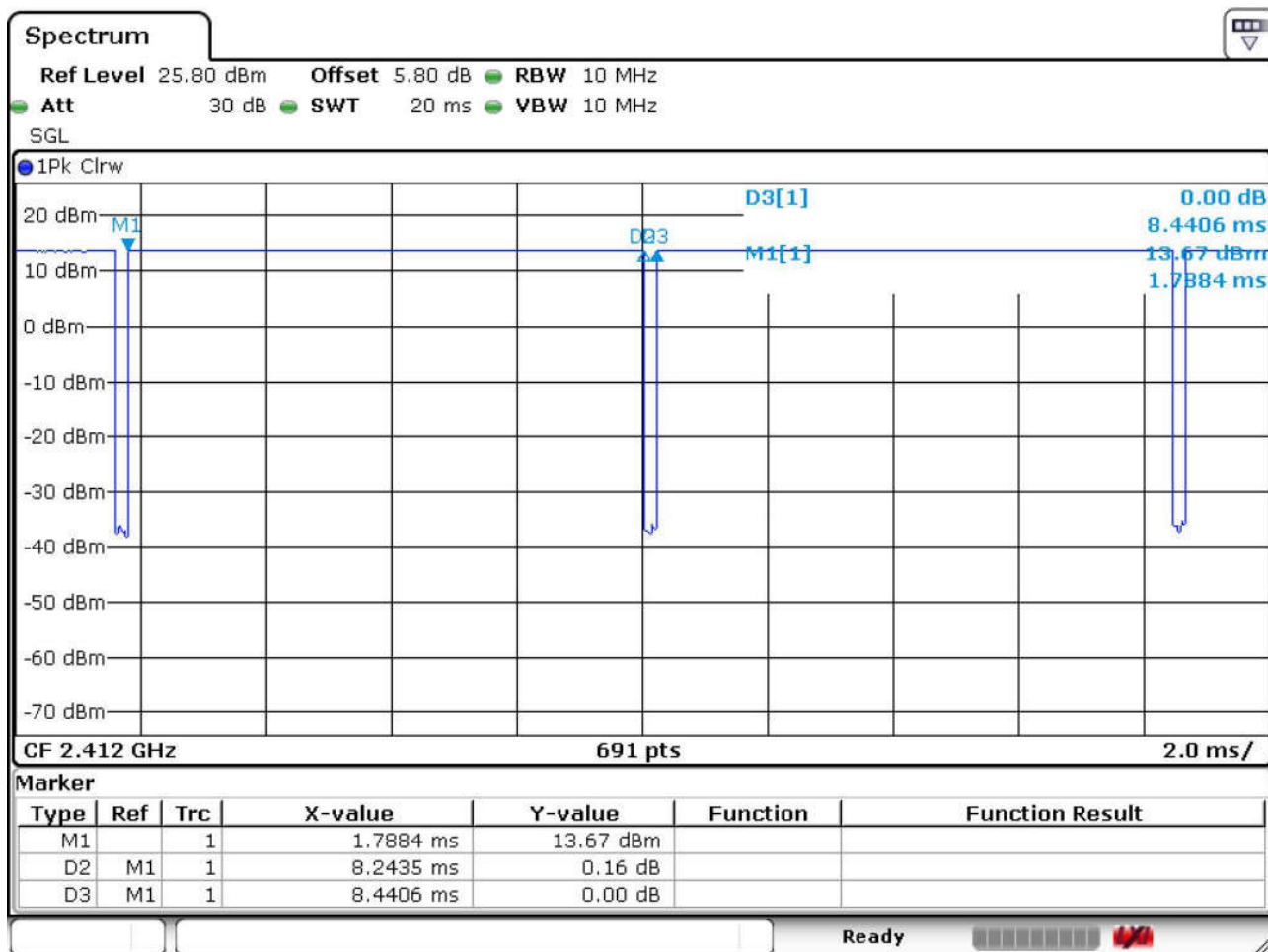
Both peak and average measured complies with the limit line, so test result is “PASS”.

Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(KHz)	VBW Setting
802.11b	97.66	8.244	0.121	300Hz
802.11g	82.60	0.929	1.076	3KHz
802.11n HT20	86.58	1.281	0.781	1KHz
802.11n HT40	86.56	1.232	0.812	1KHz



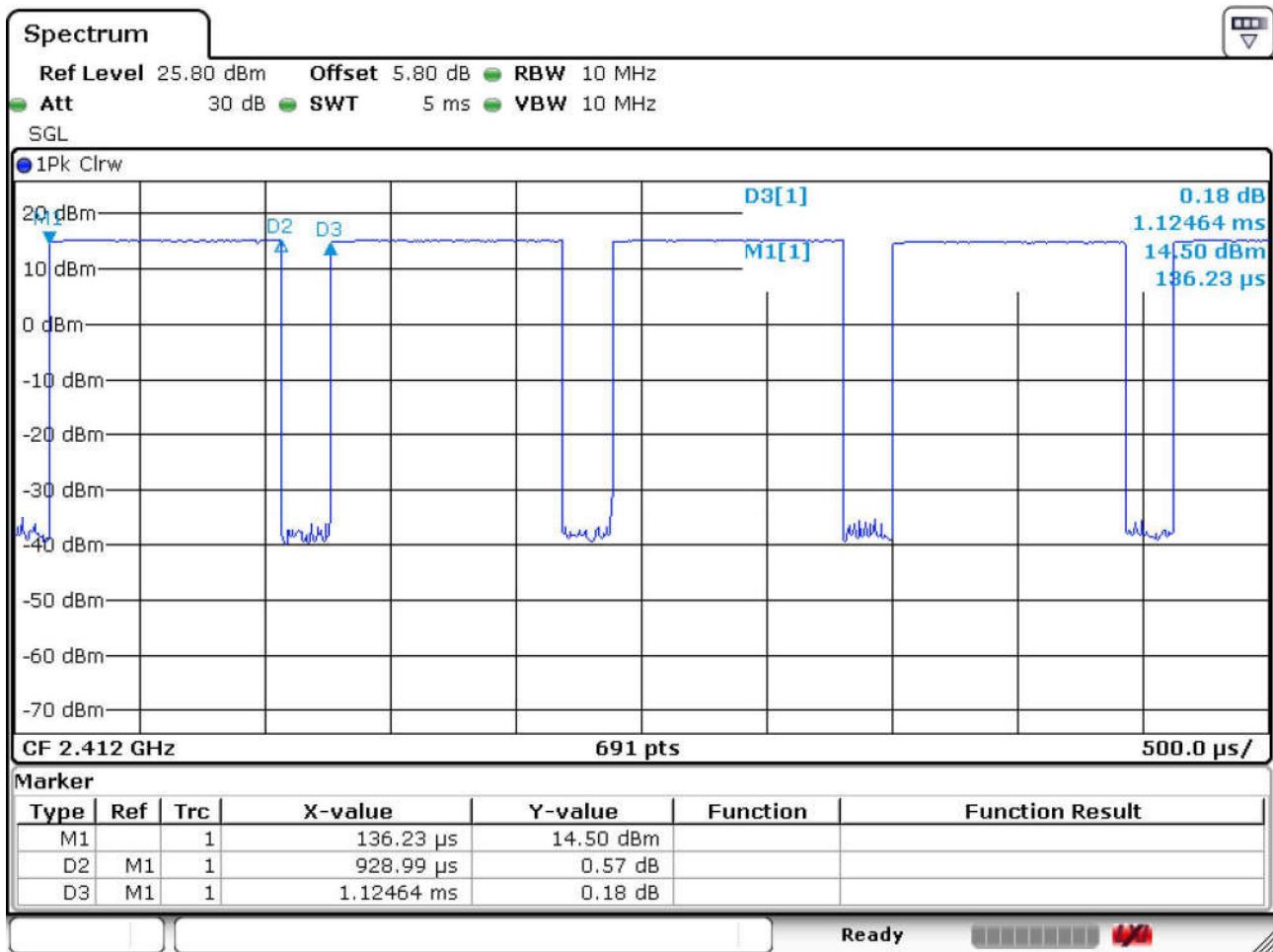
802.11b



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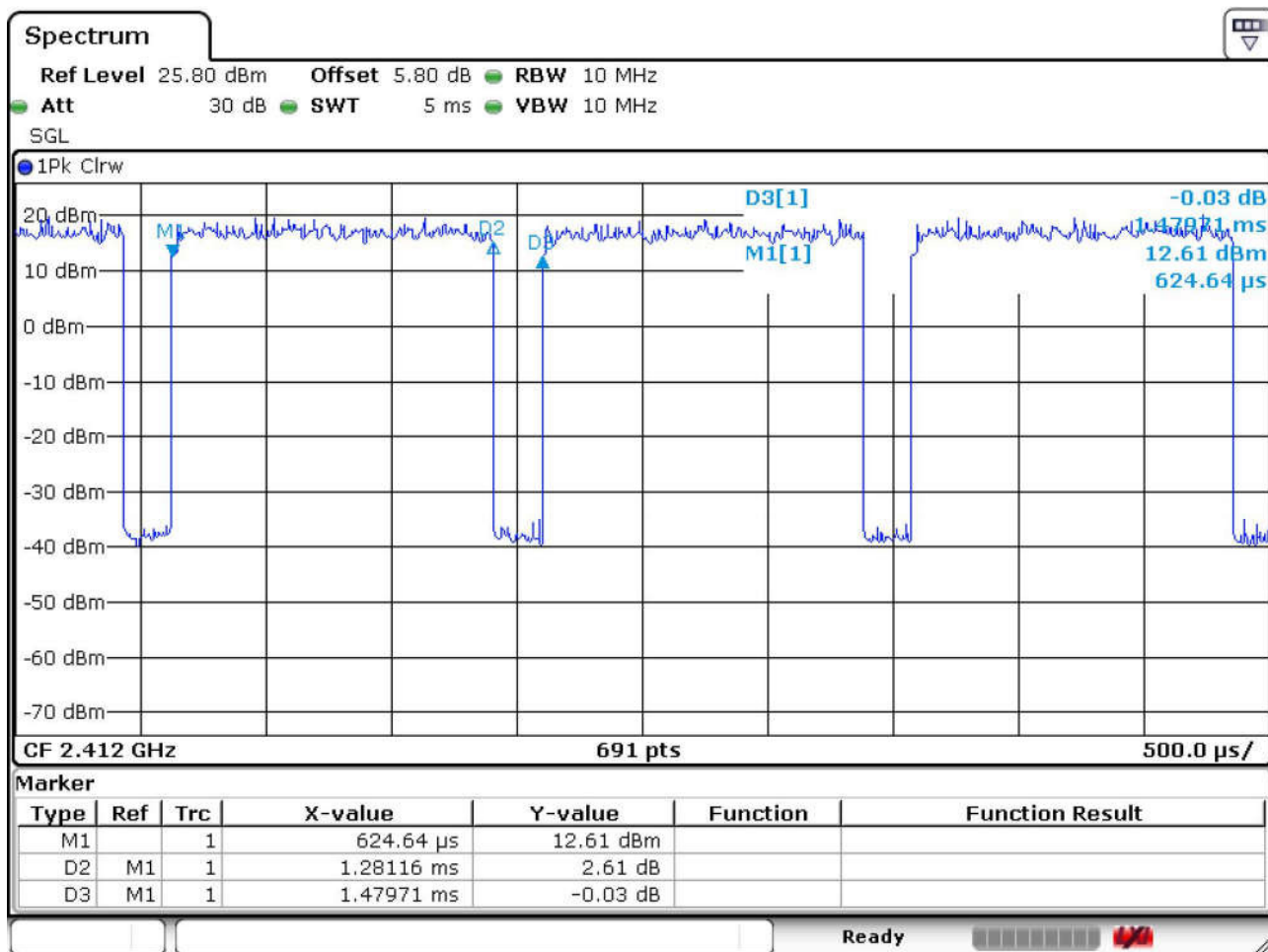
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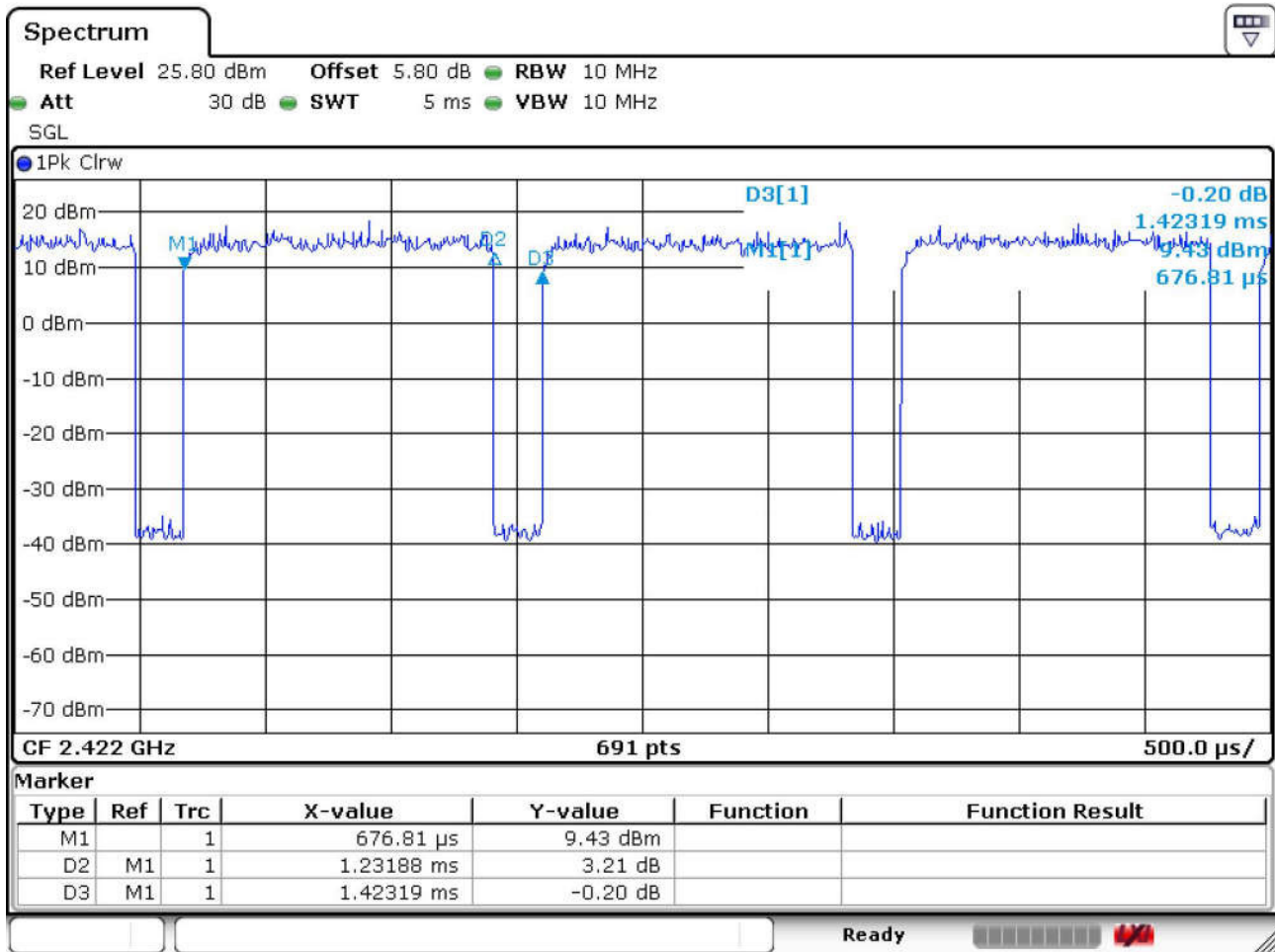
802.11n HT20



Date: 5.MAY.2017 22:28:58



802.11n HT40



Date: 5.MAY.2017 22:35:00