FCC RADIO TEST REPORT

FCC ID	:	**2ASD3-7878**
Equipment	:	**Digital Media Receiver**
Model Name	:	**C77A68**
Applicant	:	**H.C. China X LLC** **3450 N. Triumph Blvd., Suite 102** **Lehi, Utah 84043**
Standard	:	**FCC Part 15 Subpart C §15.247**

The product was received on Apr. 15, 2019 and testing was started from Jul. 06, 2019 and completed on Sep. 06, 2019. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FR941514-01C	01	Initial issue of report	Aug. 27, 2019
FR941514-01C	02	Adding test data of CH. 02 and CH. 10	Sep. 06, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)
3.1	15.247(a)(2)	6dB Bandwidth	Pass
3.1	2.1049	99% Occupied Bandwidth	Reporting only
3.2	15.247(b)	Power Output Measurement	Pass
3.3	15.247(e)	Power Spectral Density	Pass
3.4	15.247(d)	Conducted Band Edges	Pass
		Conducted Spurious Emission	Pass
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass
3.6	15.207	AC Conducted Emission	Pass
3.7	15.203 & 15.247(b)	Antenna Requirement	Pass

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Dara Chiu

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Digital Media Receiver
Model Name	C77A68
FCC ID	2ASD3-7878
EUT supports Radios application	WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2472 MHz
Maximum (Average) Output Power to antenna	802.11b : 18.90 dBm (0.0776 W) 802.11g : 20.70 dBm (0.1175 W) 802.11n HT20 : 20.60 dBm (0.1148 W)
99% Occupied Bandwidth	802.11b : 13.94MHz 802.11g : 18.23MHz 802.11n HT20 : 18.88MHz
Antenna Type / Gain	PCB Loop Antenna type with gain 1.80 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.3 Modification of EUT

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

1.4 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH05-HY	CO05-HY

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

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH15-HY

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

FCC designation No.: TW1190 and TW0007

1.5 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 v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

a. 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: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442		

2.2 Test Mode

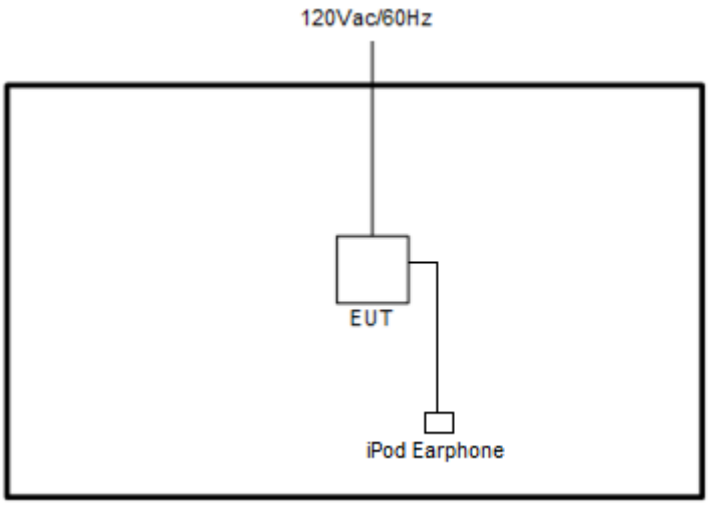
Final test modes are considering the modulation and worse data rates as below table.

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

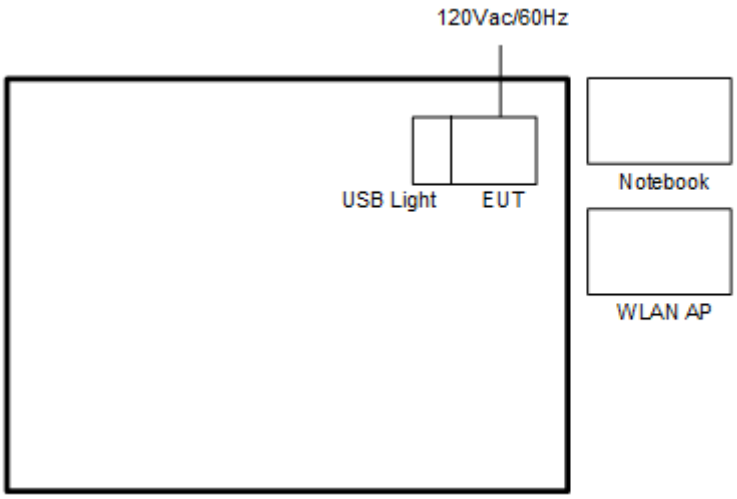
Test Cases	
AC Conducted Emission	Mode 1 :WLAN (2.4GHz) Link + Play news + USB light Mode 2 Bluetooth Link + Play MP3 + USB light
Remark: The worst case of conducted emission is mode 1; only the test data of it was reported.	

2.3 Connection Diagram of Test System

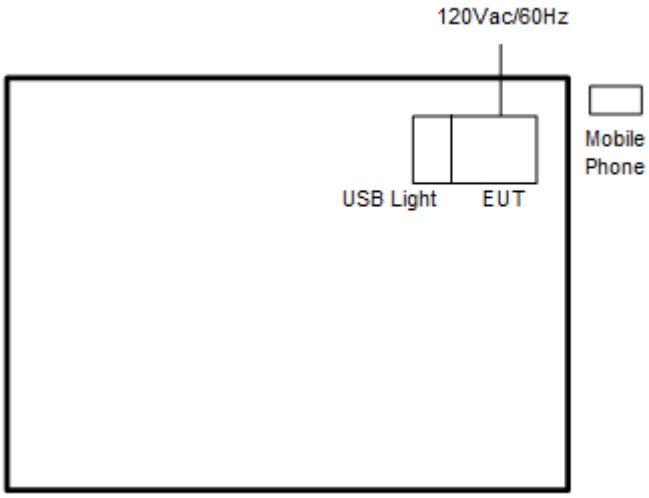
<WLAN Tx Mode>



<AC Conducted Emission Mode for WLAN Link>



<AC Conducted Emission Mode for Bluetooth Link>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
2.	WLAN AP	ASUS	RT-AC1750	MSQ-RTAC66U	N/A	Unshielded,1.8m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Mobile Phone	APPLE	A1524	N/A	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, utility “Compliance tool (1.0.0.54)” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

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 and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

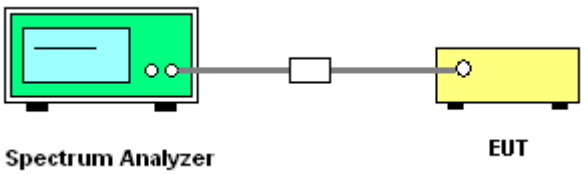
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

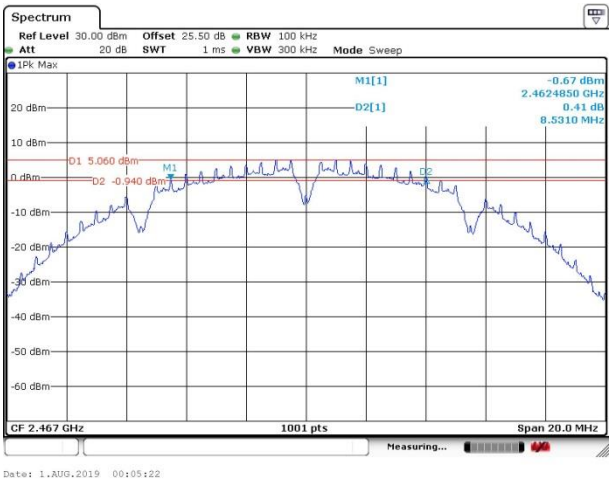
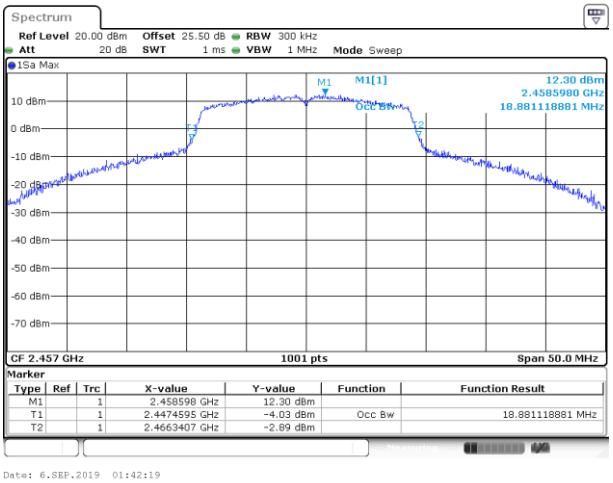
1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW) ≥ 3 * RBW.
6. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	

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

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 with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

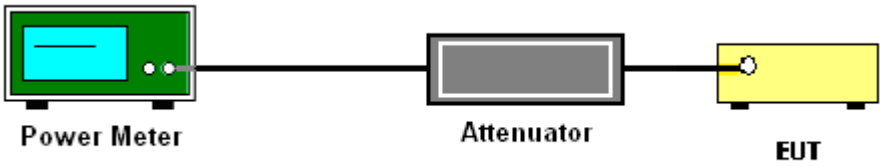
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
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 Average Output Power

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.

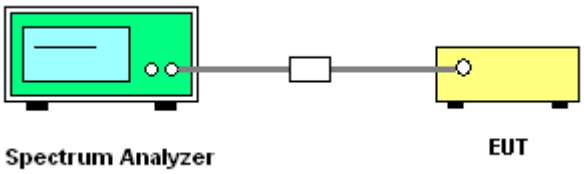
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.10.5 Method AVGPSD-2.
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) = 10 kHz. Video bandwidth VBW = 30 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW).
5. Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins).
6. Detector = RMS, Sweep time = auto couple.
7. Trace average at least 100 traces in power averaging mode.
8. Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.
9. Measure and record the results in the test report.

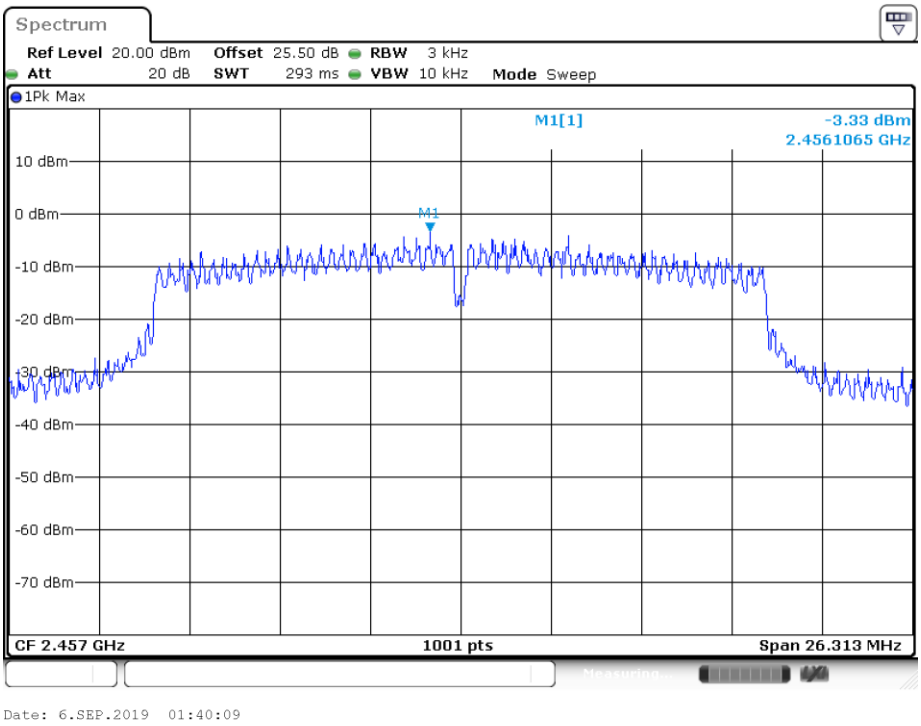
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/3kHz)



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.

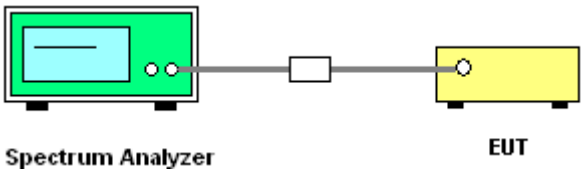
3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.11.3 Emission level measurement.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup

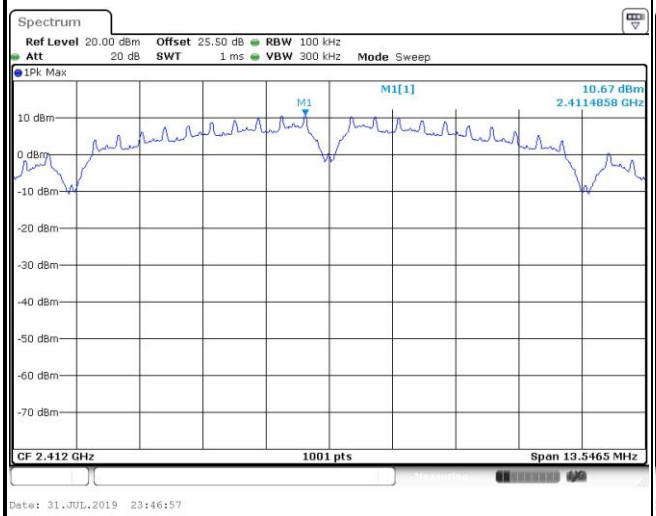


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

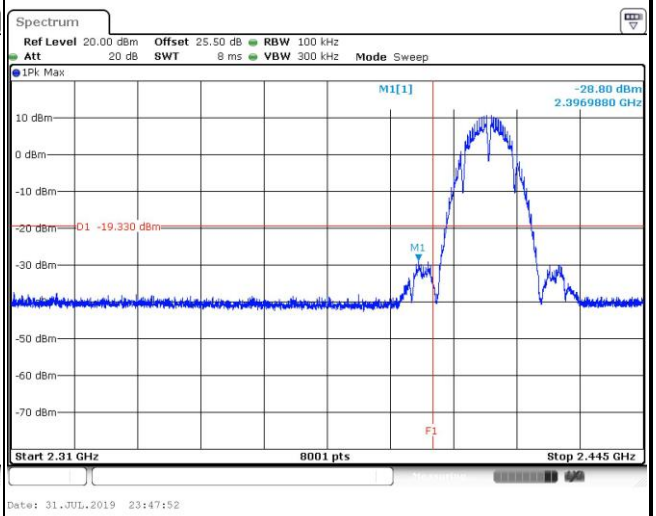
Test Engineer :	Kai Liao	**Temperature :**	21~25℃
		Relative Humidity :	51~54%

WLAN 802.11b Channel 01

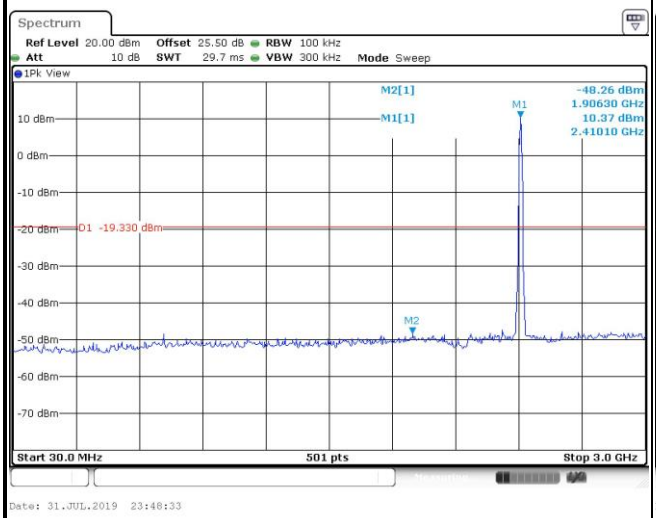
100kHz PSD reference Level



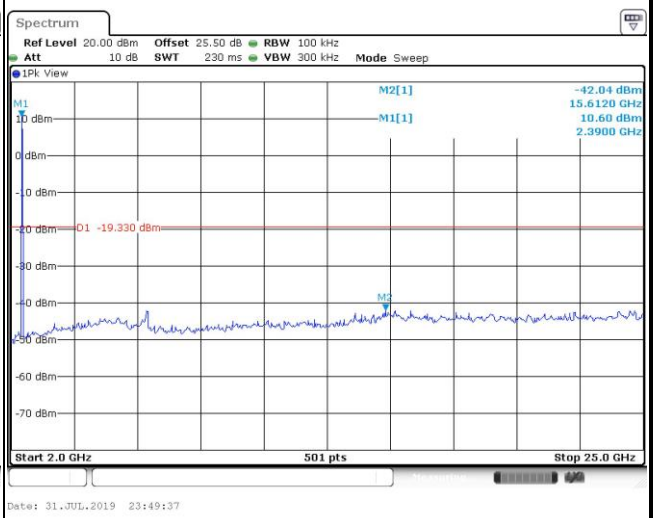
Low Channel Plot

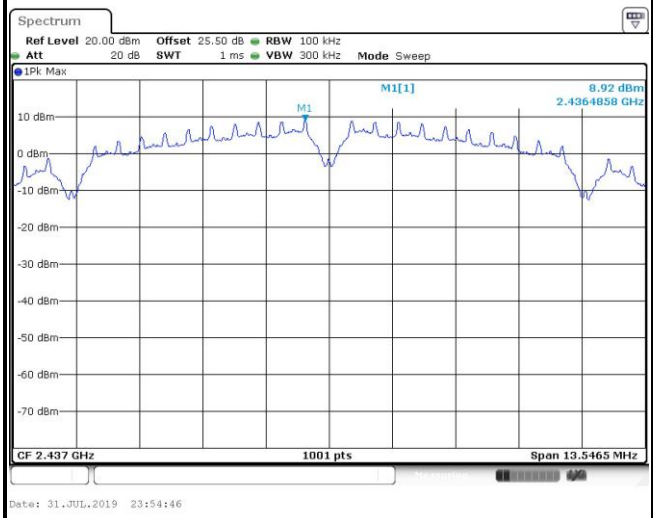
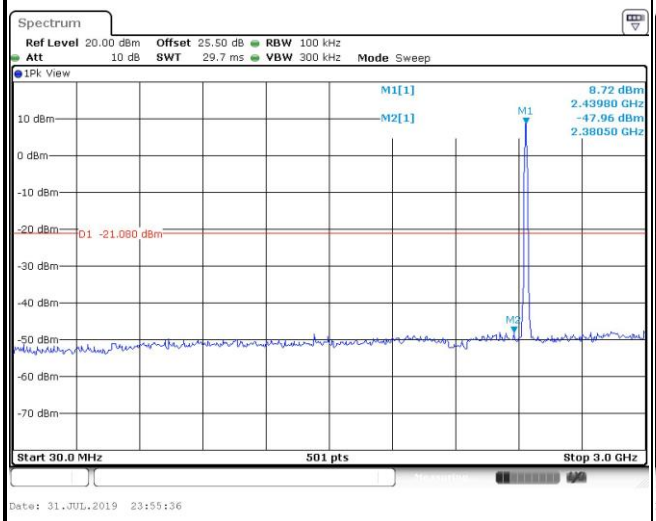
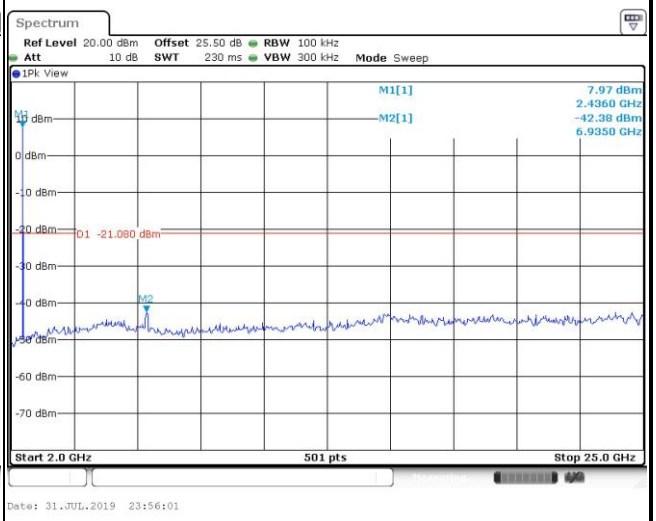


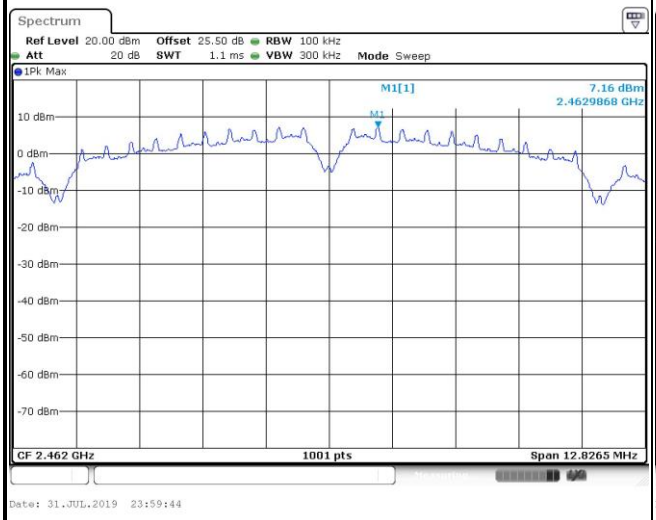
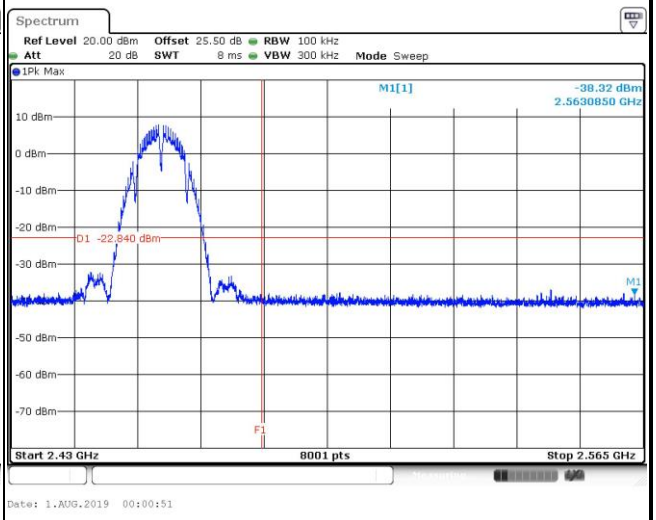
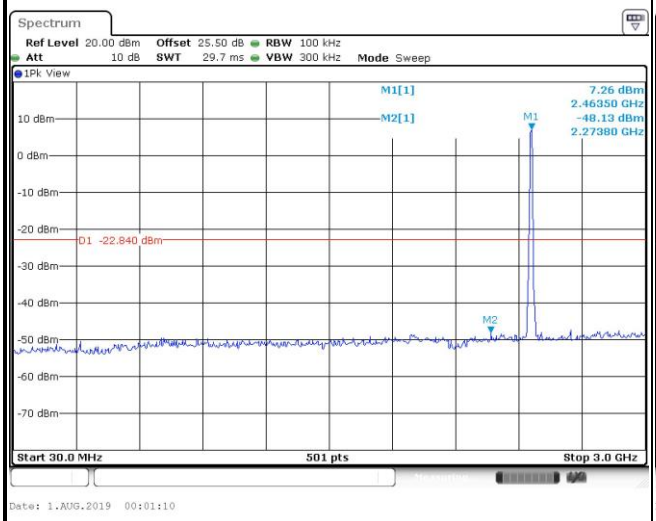
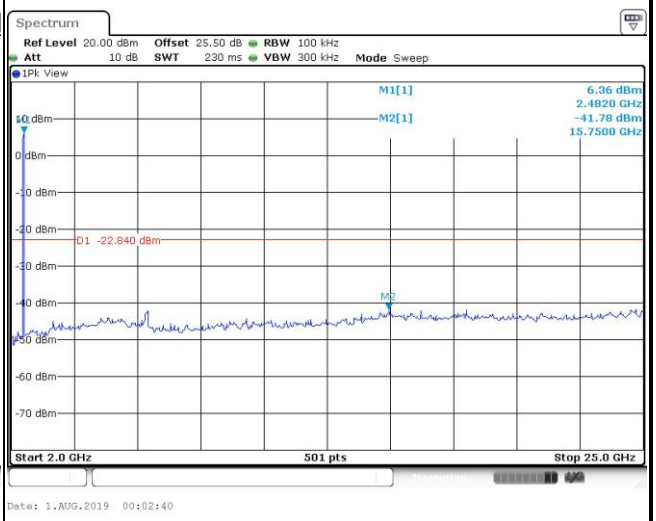
Spurious Emission 30MHz~3GHz

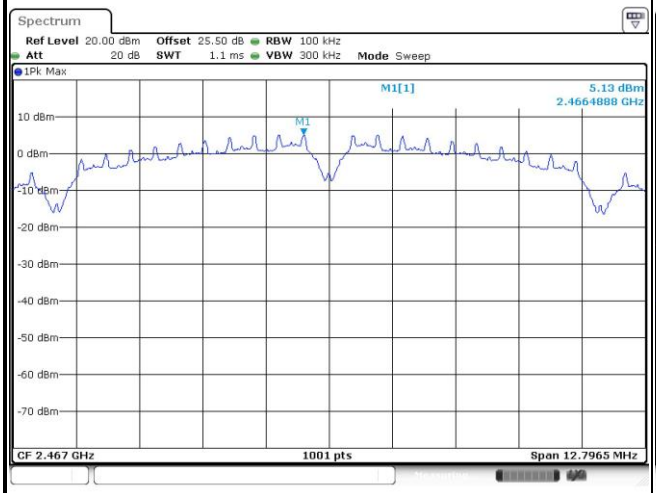
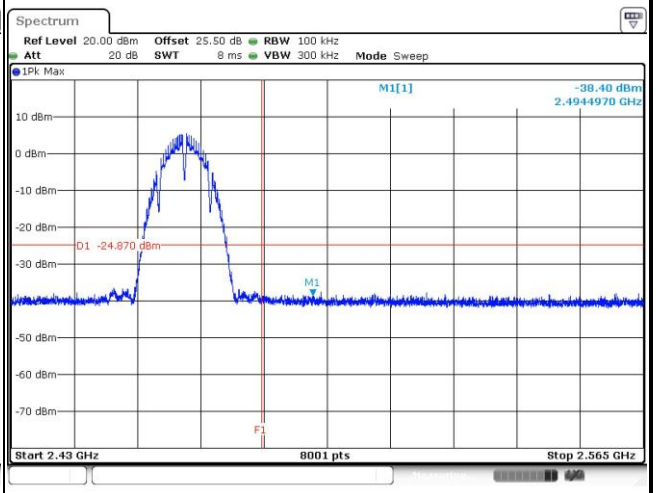
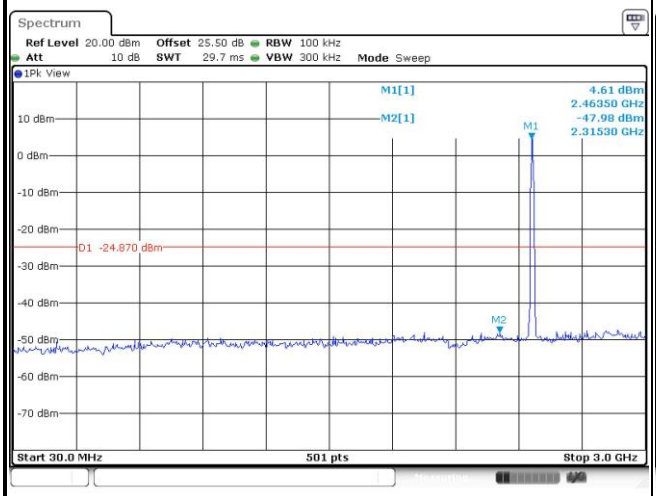
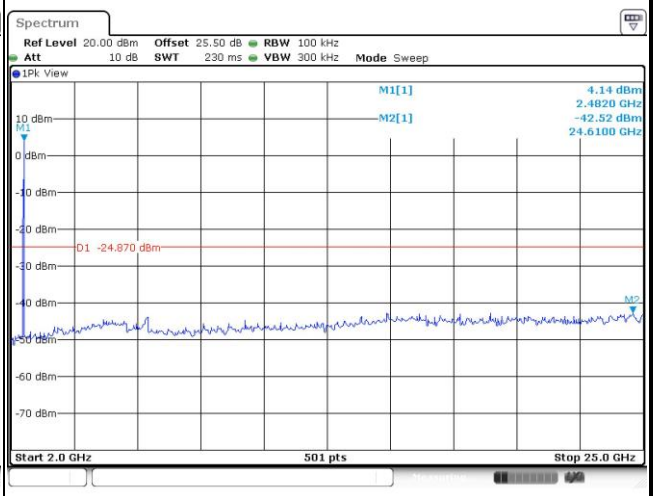


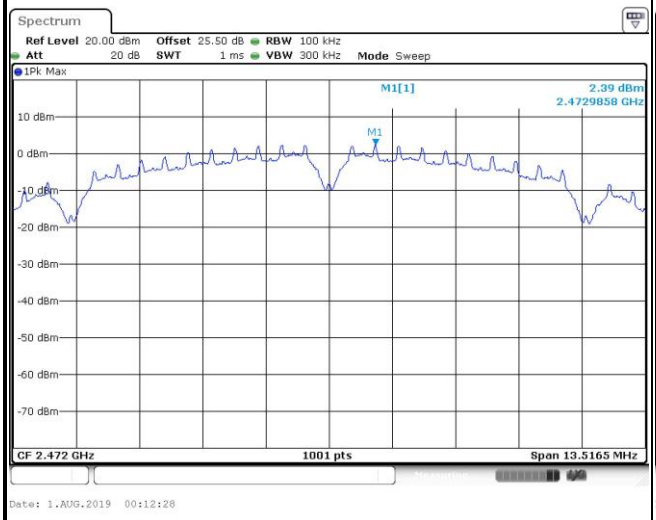
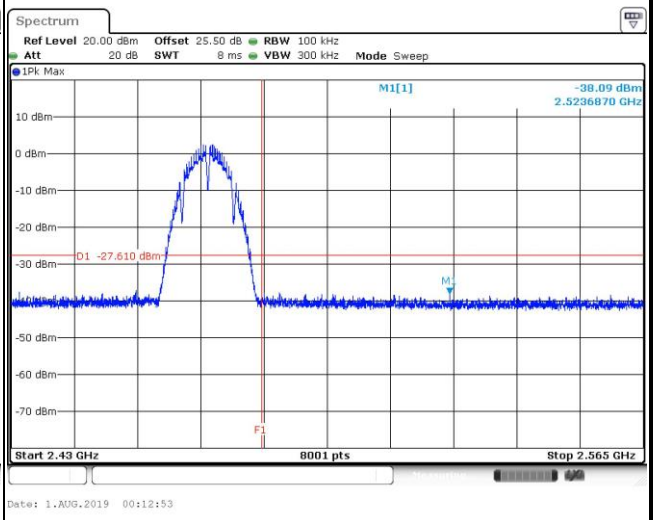
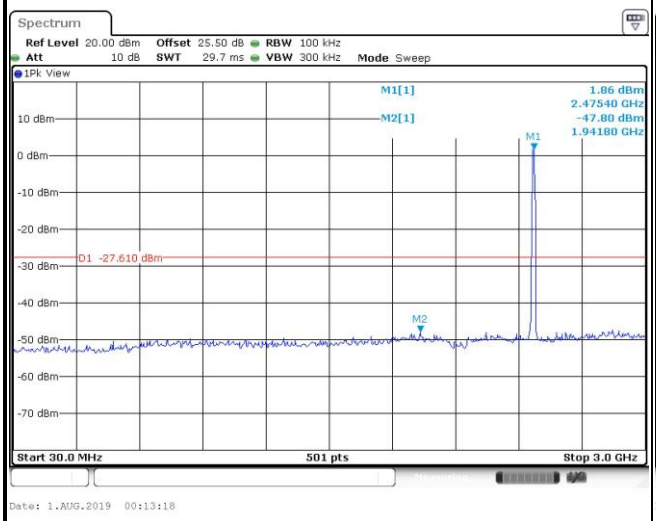
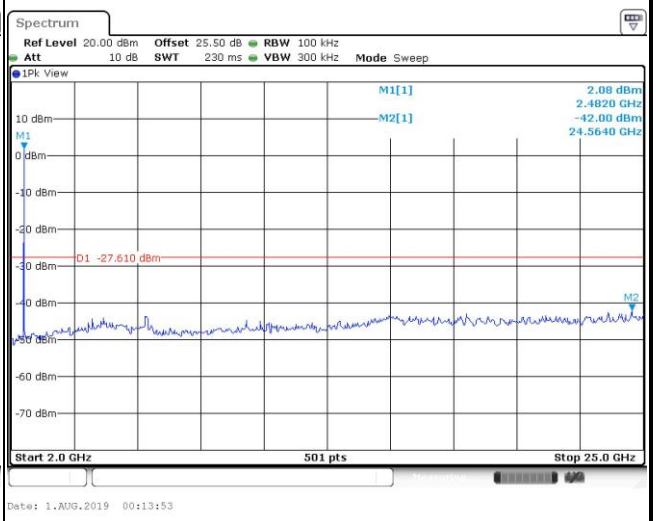
Spurious Emission 2GHz~25GHz

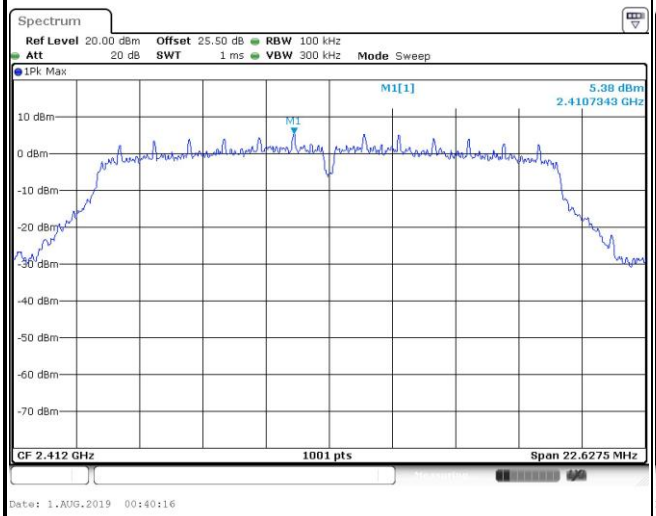
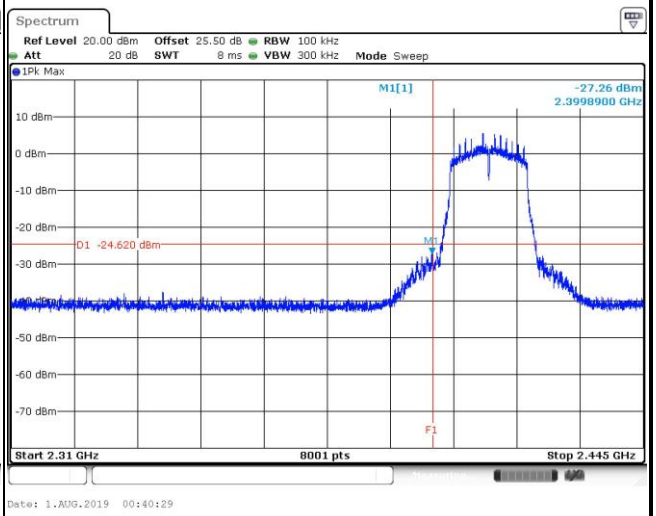
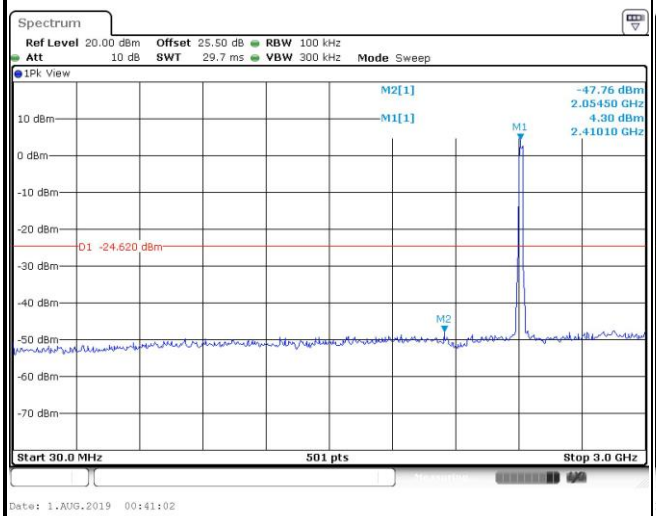
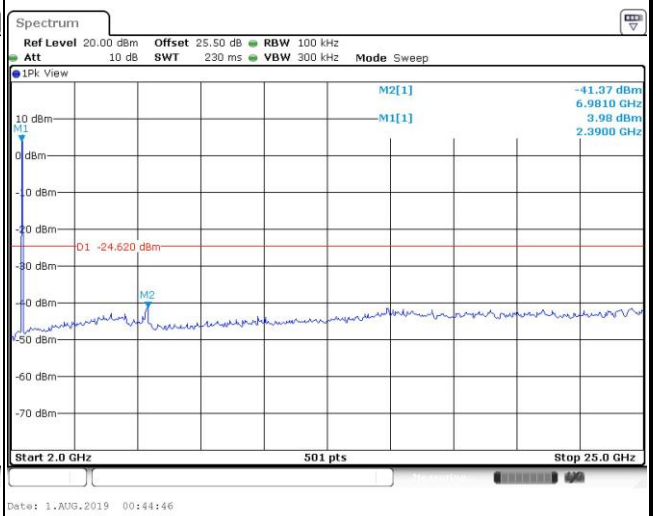


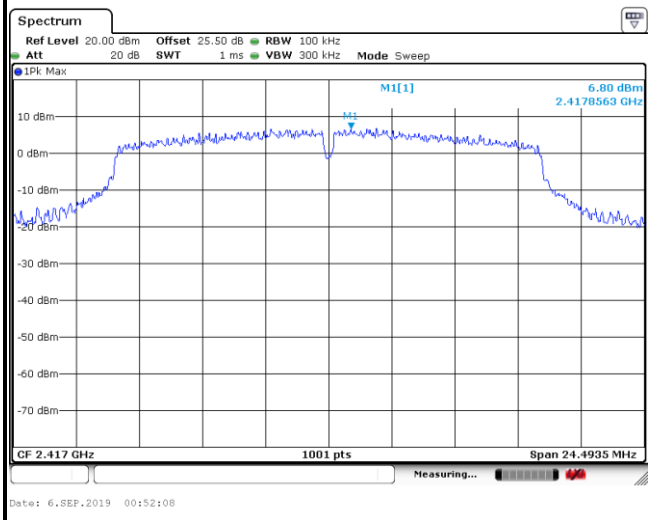
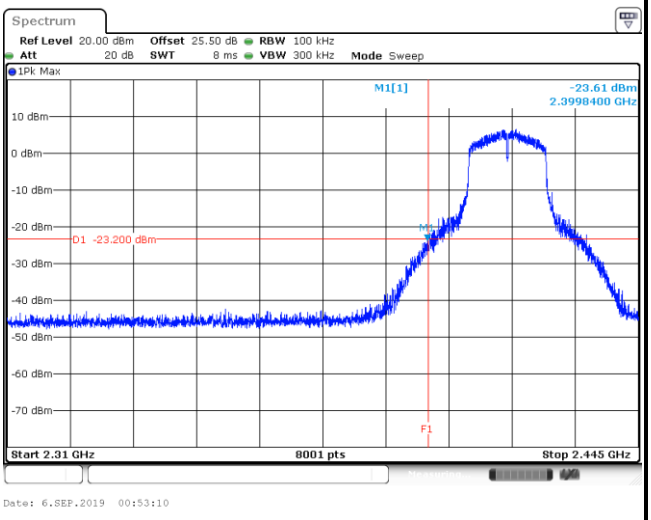
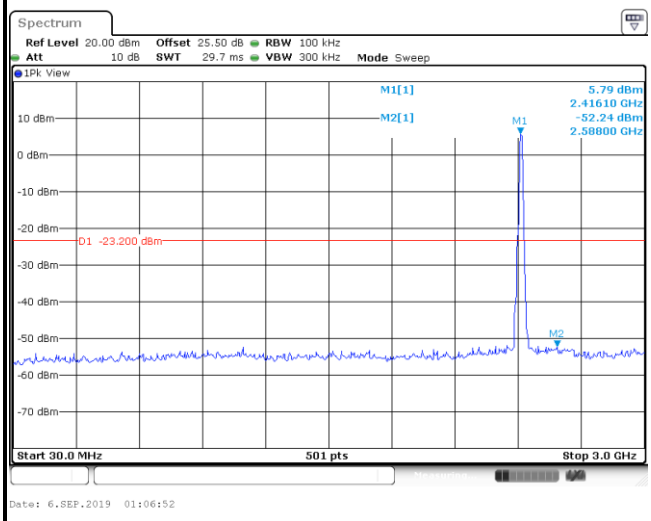
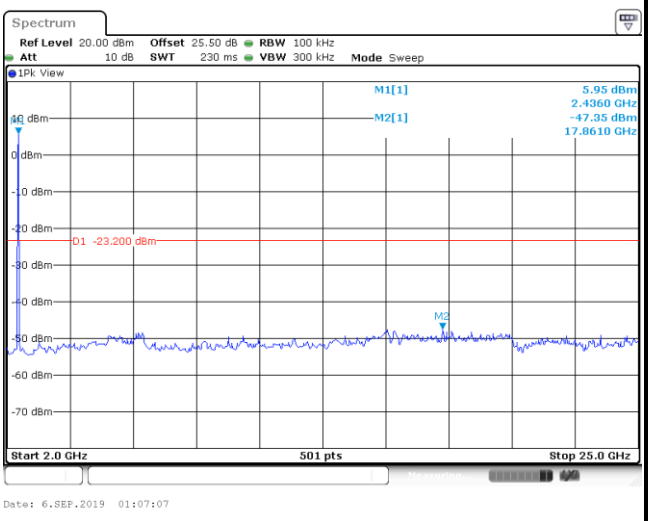
WLAN 802.11b Channel 06	
100kHz PSD reference Level	**Mid Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

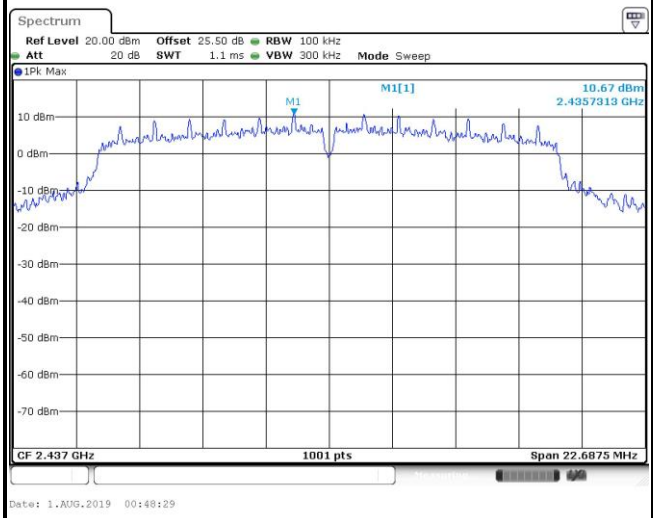
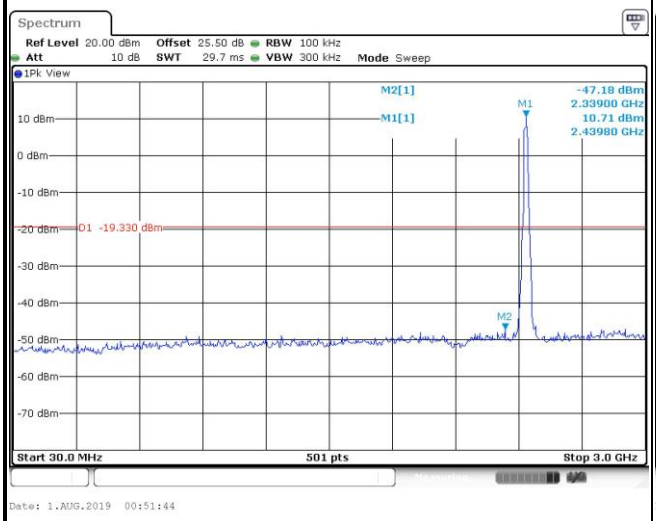
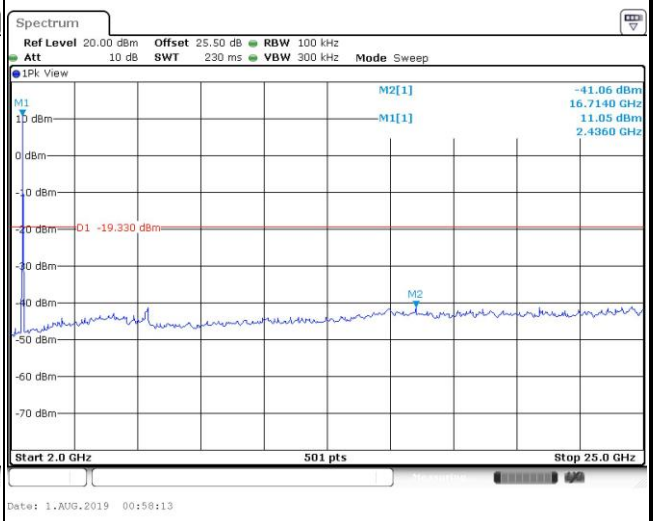
WLAN 802.11b Channel 11	
100kHz PSD reference Level	**High Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11b Channel 12	
100kHz PSD reference Level	**High Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11b Channel 13	
100kHz PSD reference Level	**High Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

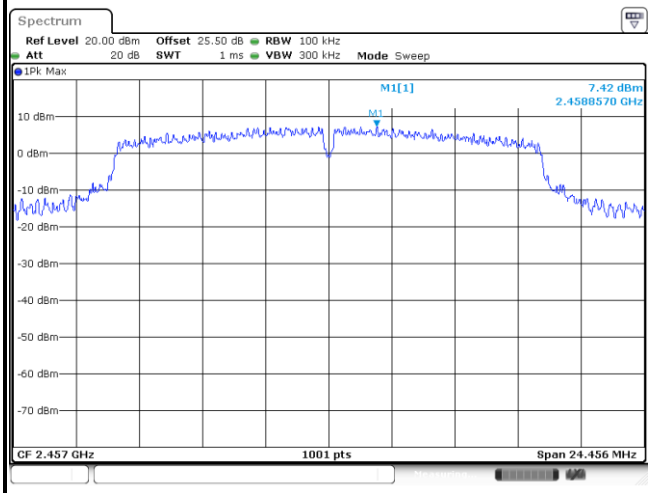
WLAN 802.11g Channel 01	
100kHz PSD reference Level	**Low Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11g Channel 02	
100kHz PSD reference Level	**Low Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

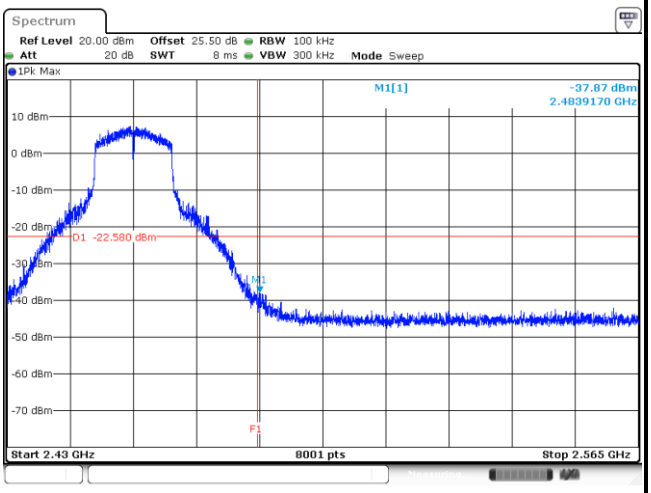
WLAN 802.11g Channel 06	
100kHz PSD reference Level	**Mid Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11g Channel 10

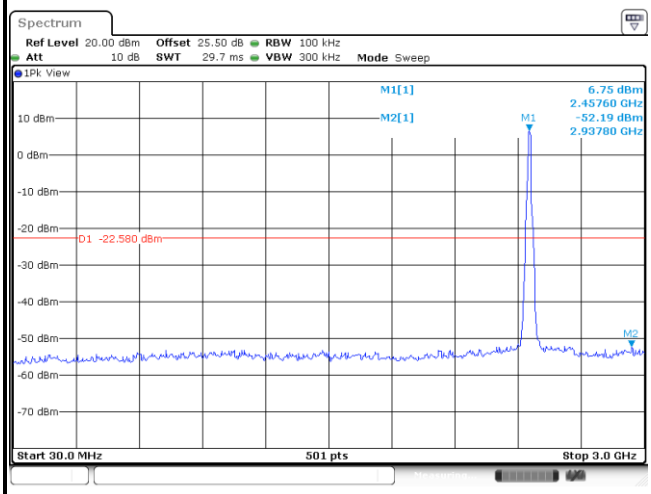
100kHz PSD reference Level



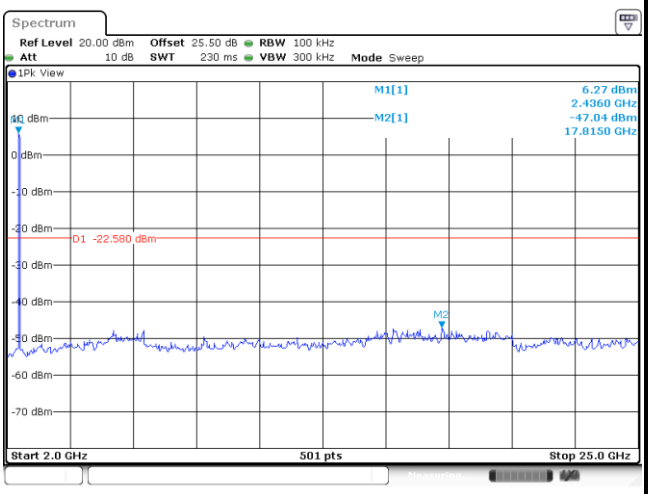
Low Channel Plot

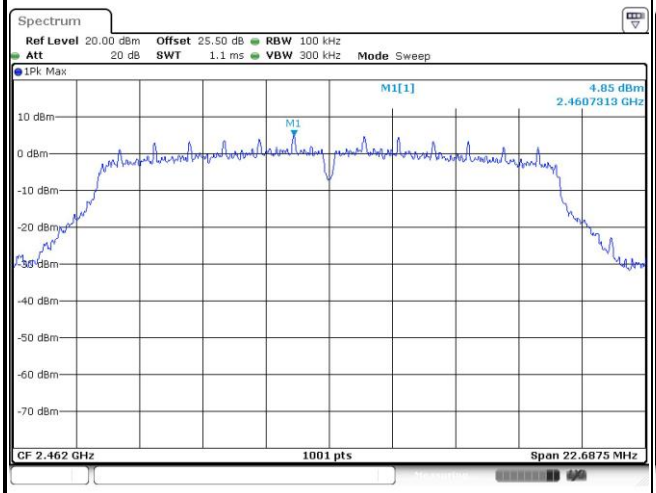
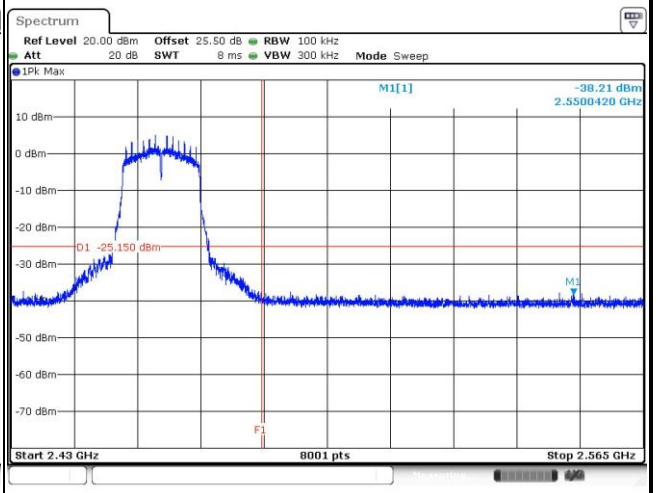
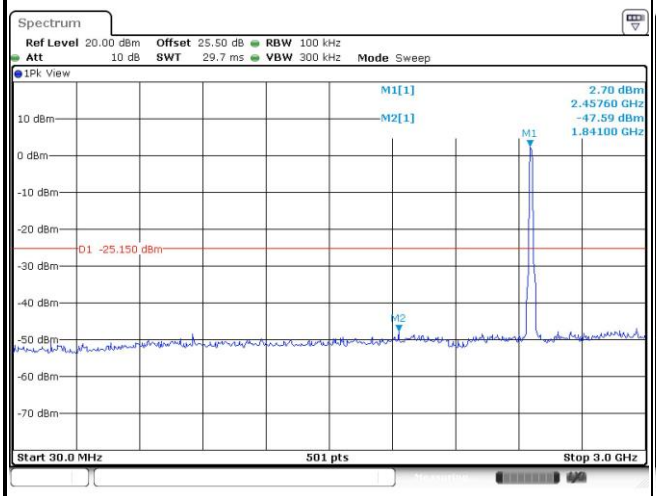
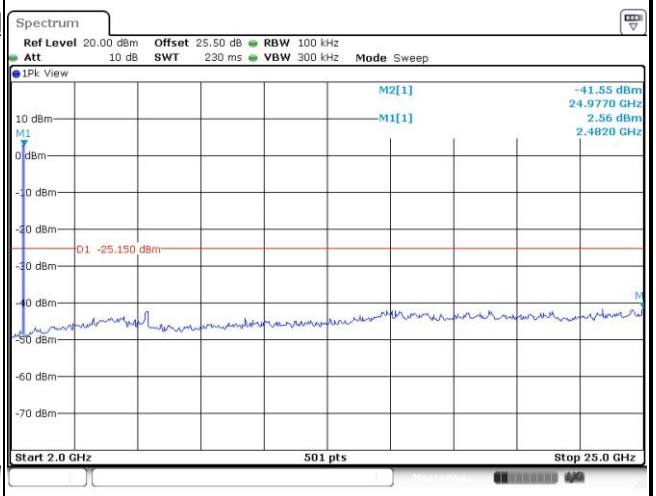


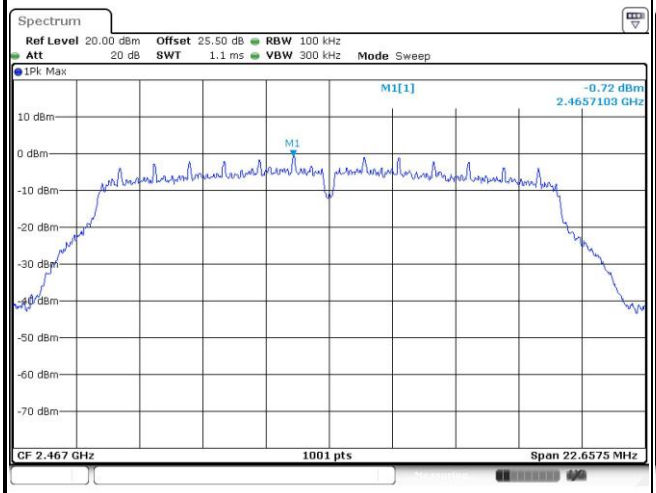
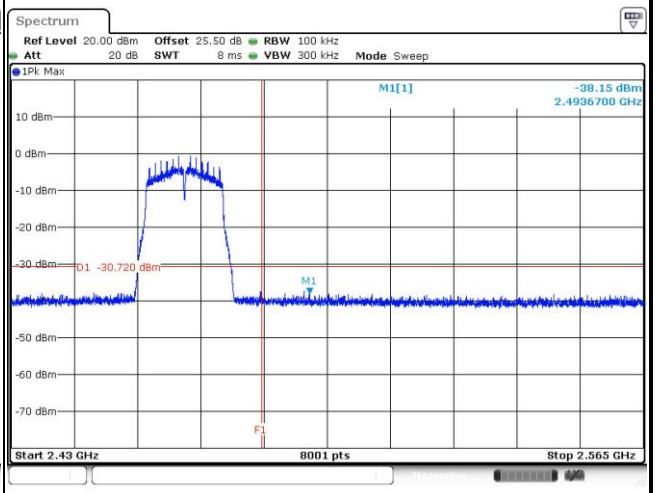
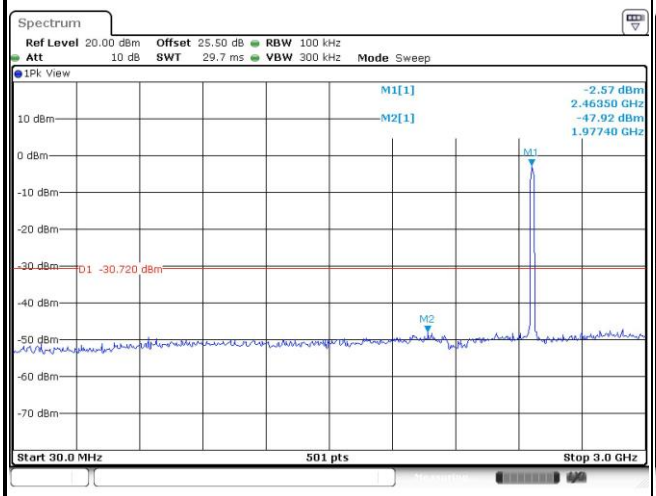
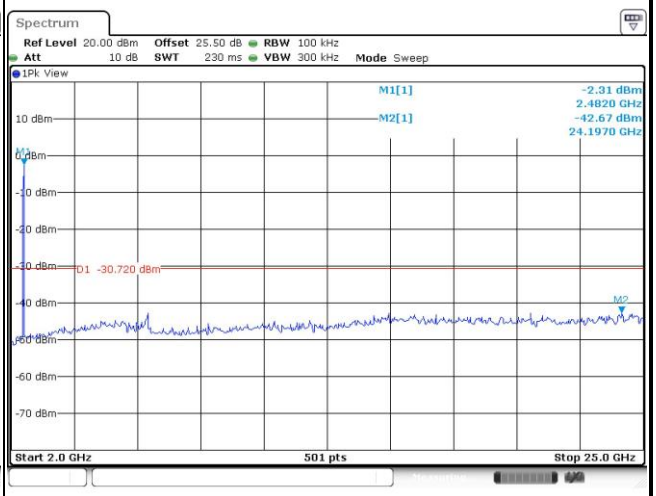
Spurious Emission 30MHz~3GHz

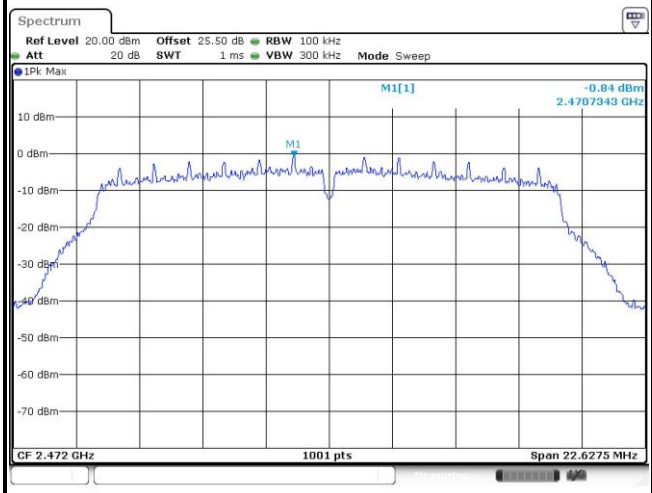
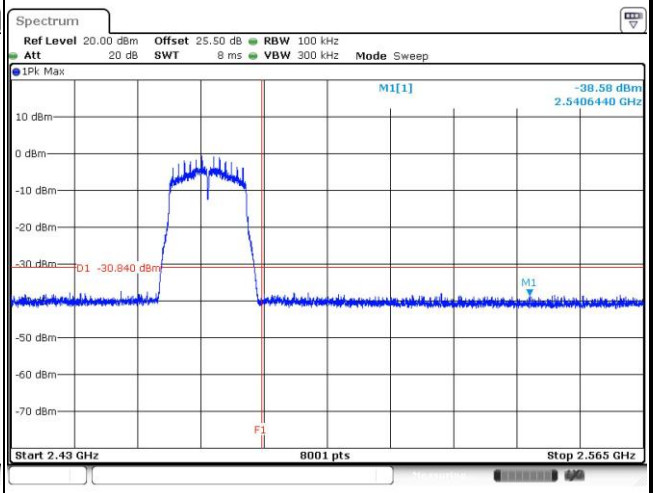
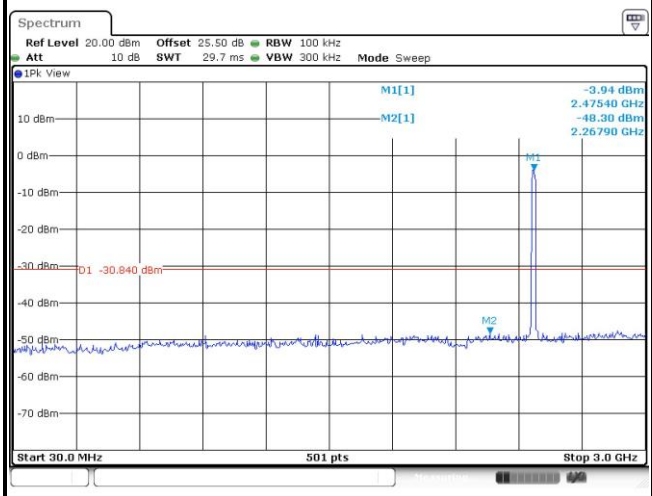
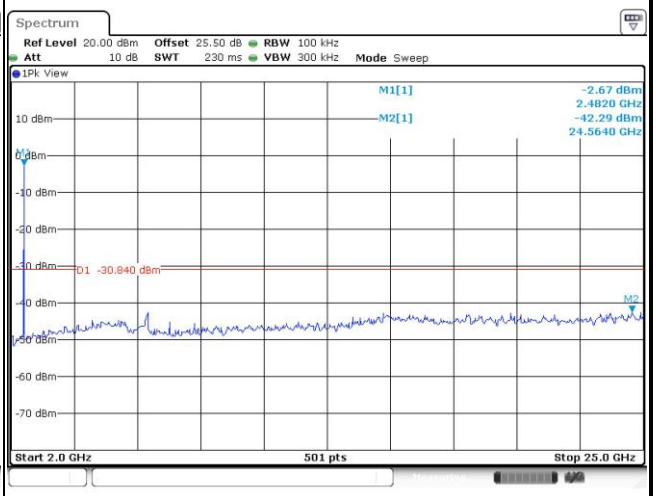


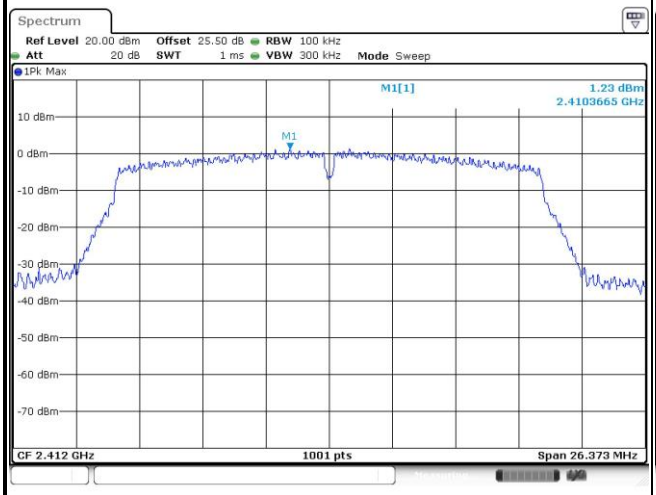
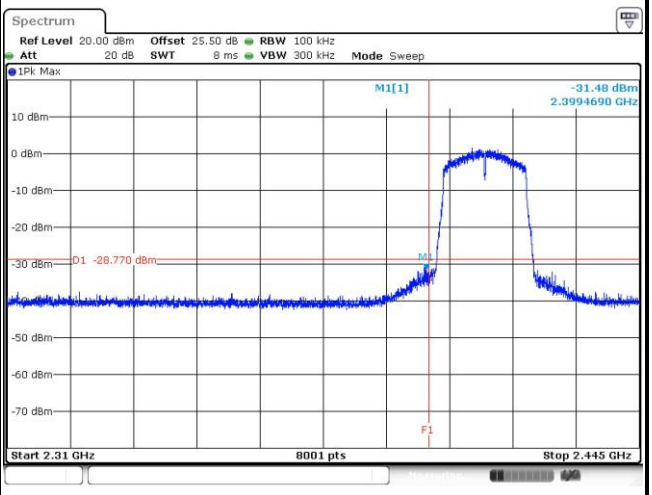
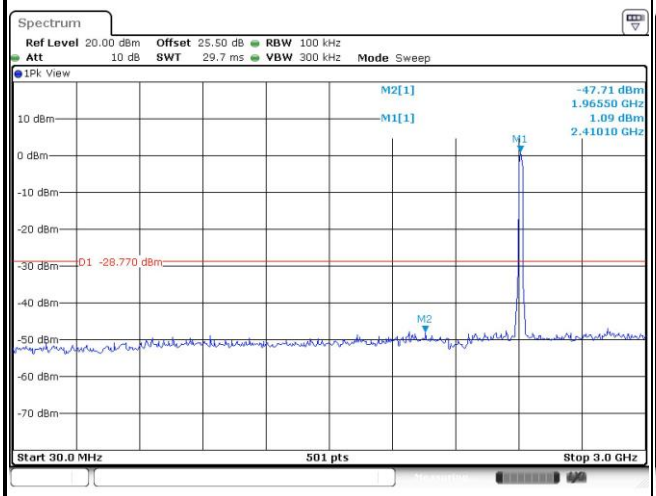
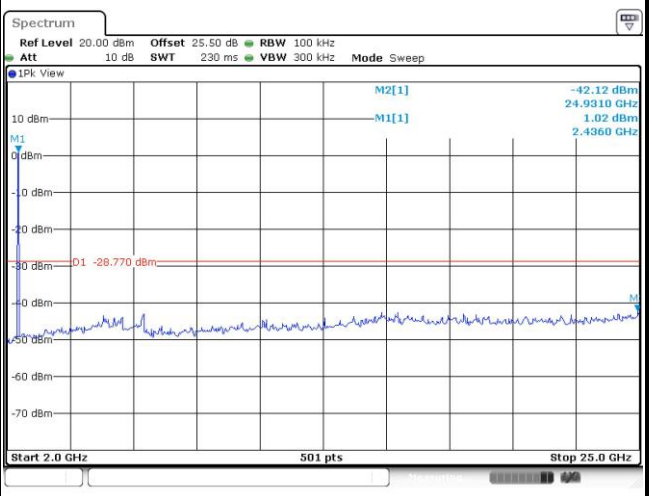
Spurious Emission 2GHz~25GHz



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

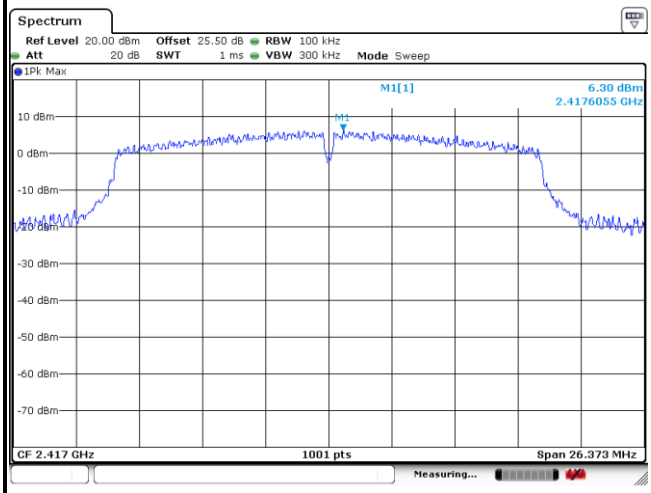
WLAN 802.11g Channel 12	
100kHz PSD reference Level	**High Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11g Channel 13	
100kHz PSD reference Level	**High Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

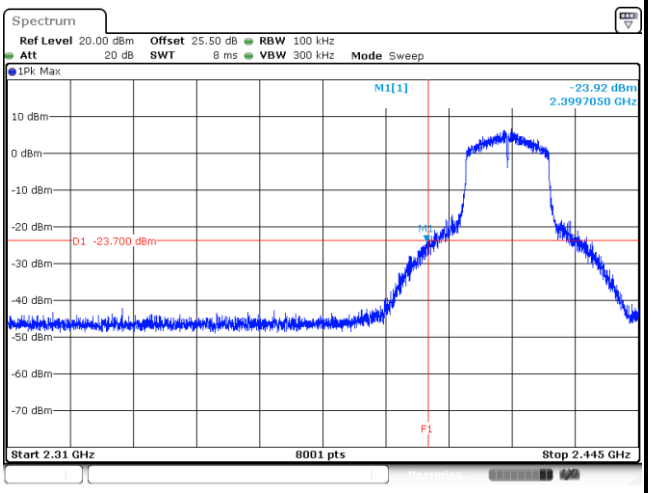
WLAN 802.11n HT20 Channel 01	
100kHz PSD reference Level	**Low Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11n HT20 Channel 02

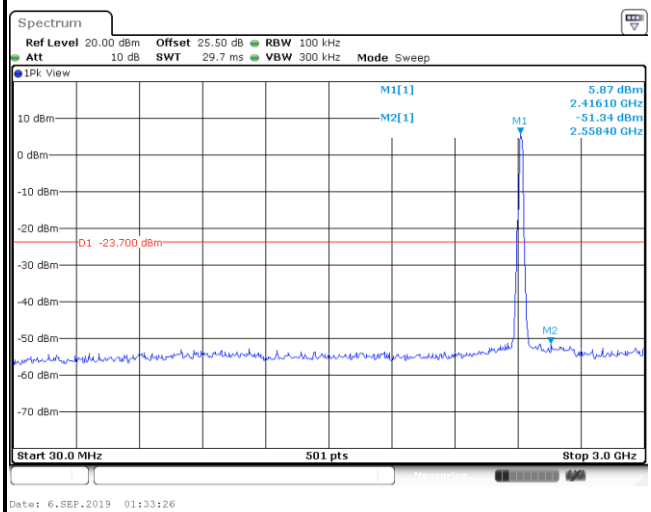
100kHz PSD reference Level



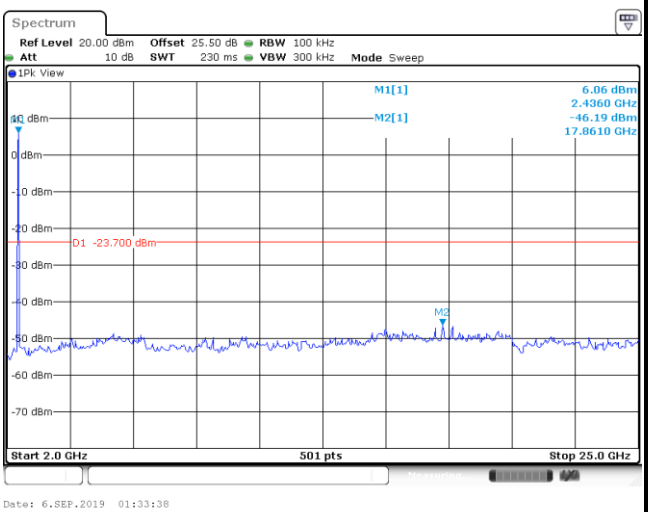
Low Channel Plot

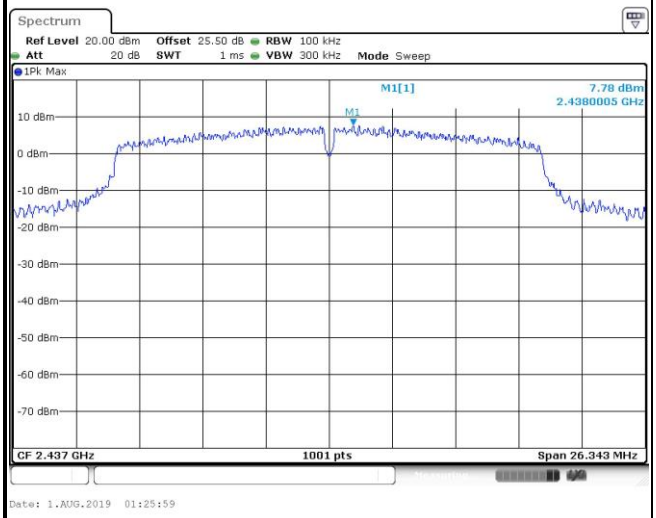
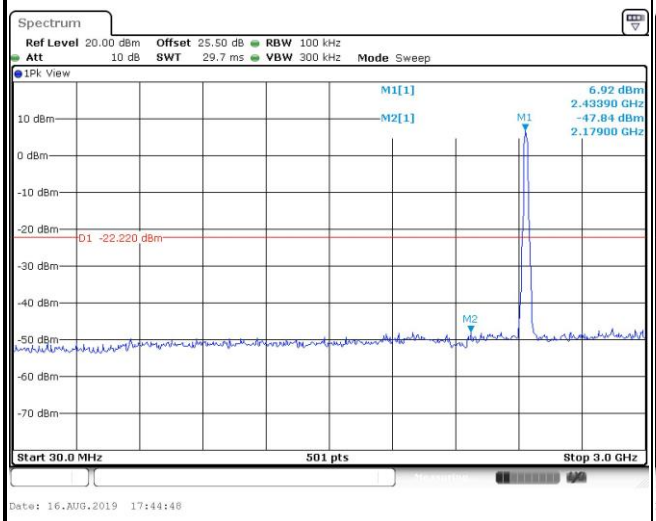
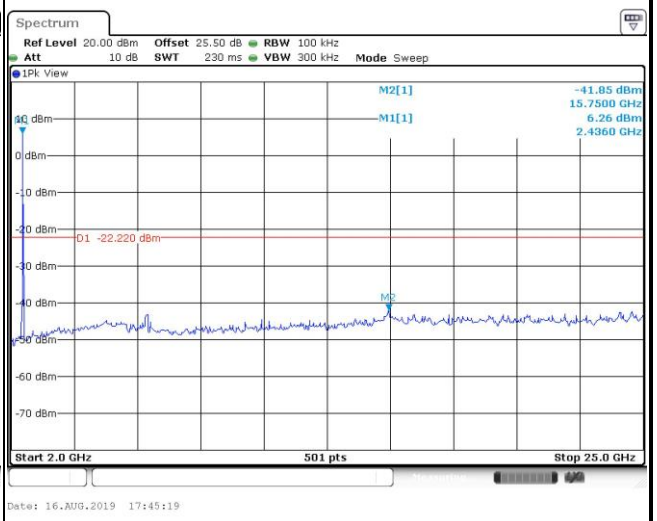


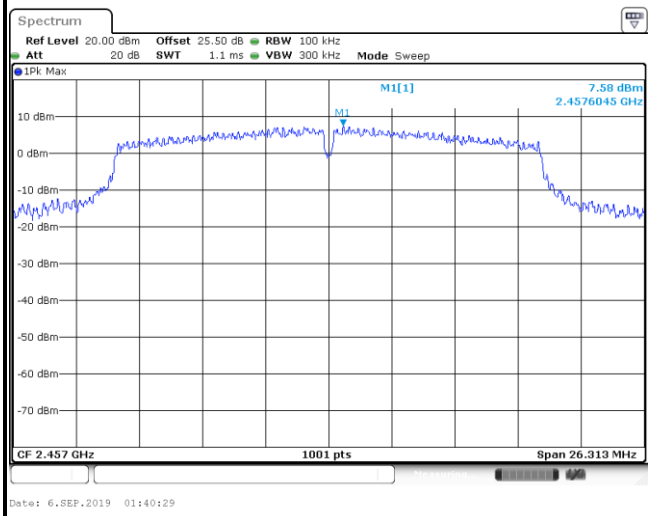
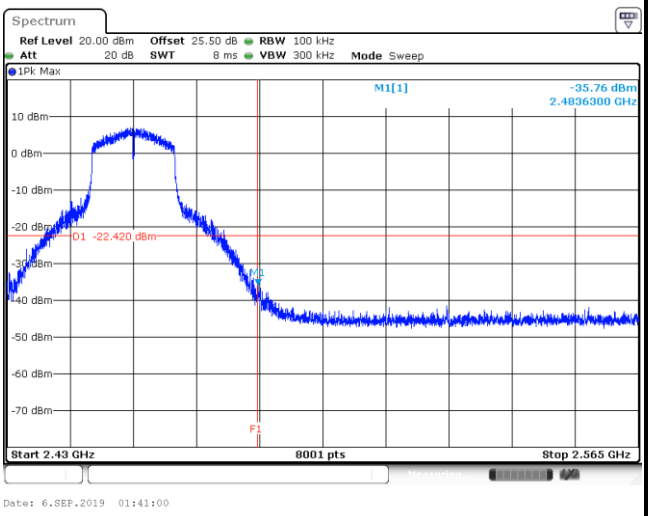
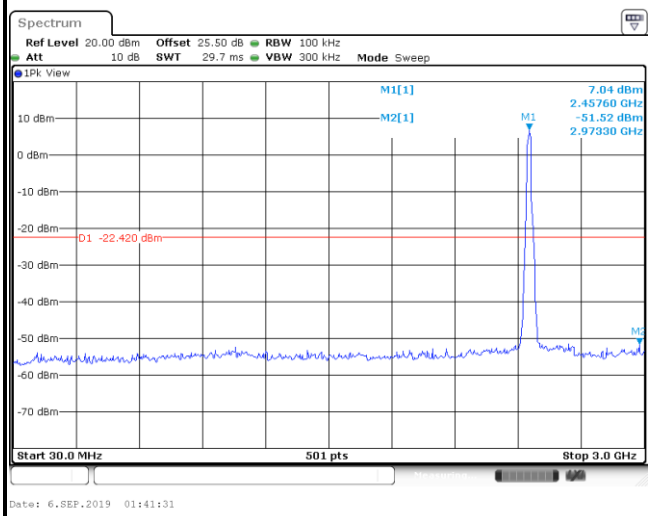
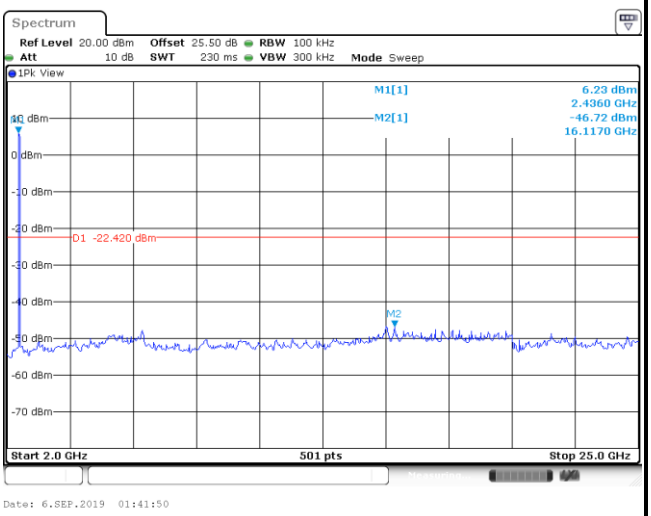
Spurious Emission 30MHz~3GHz

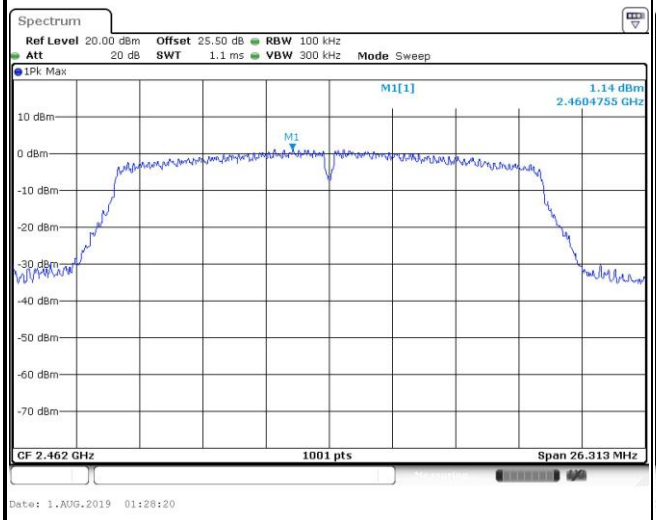
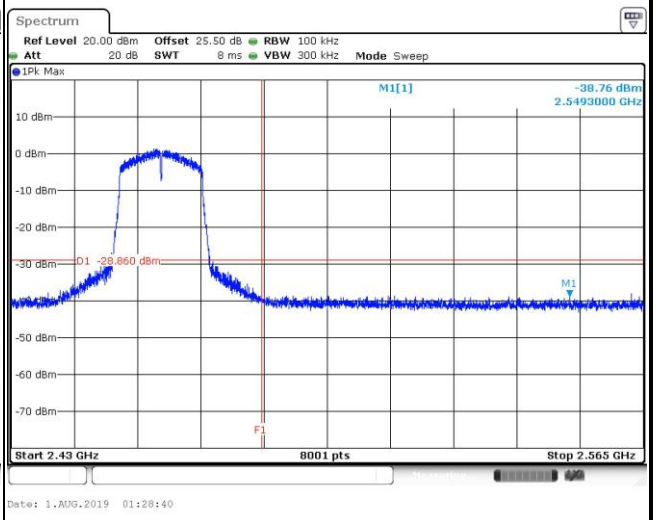
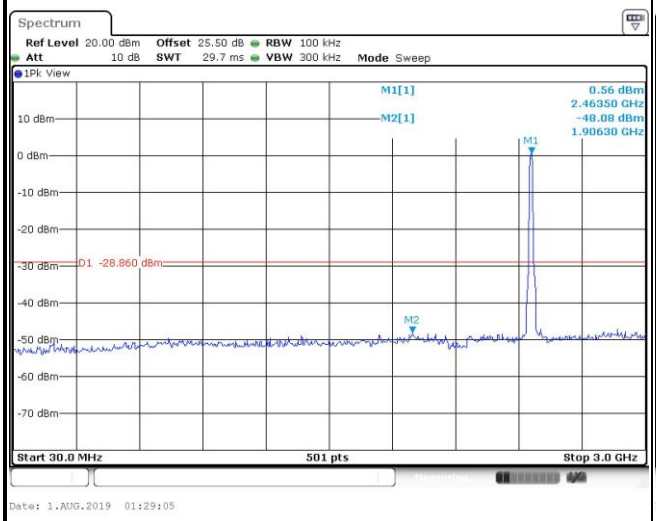
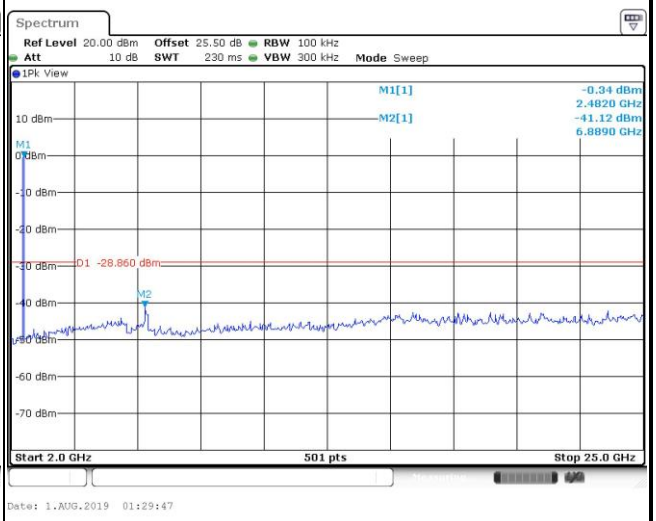


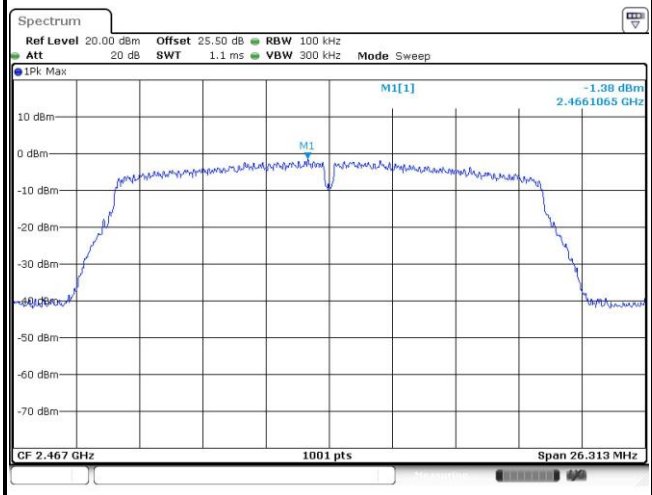
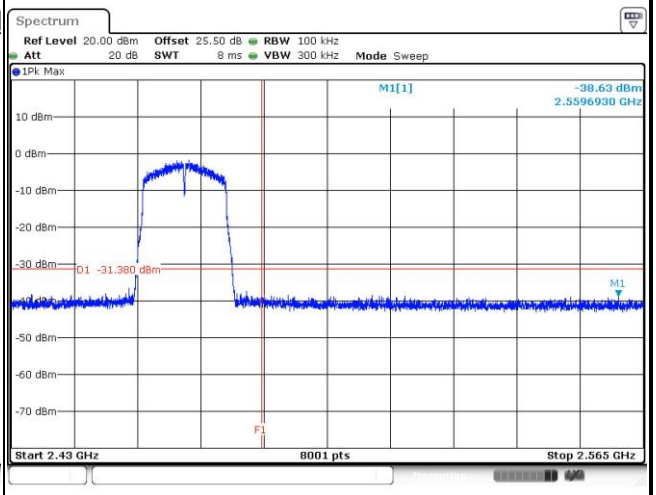
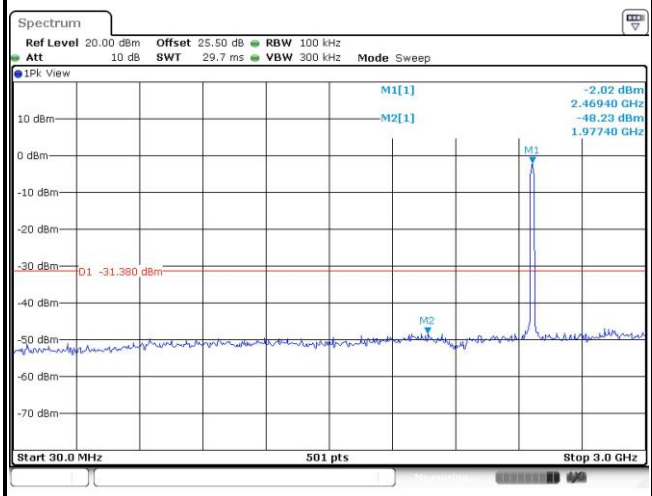
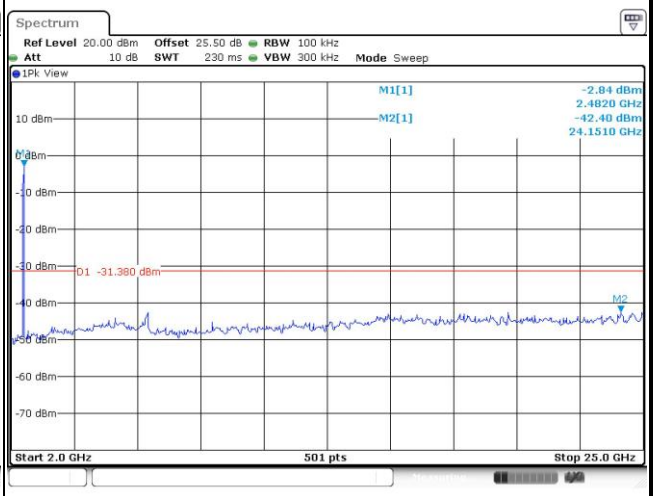
Spurious Emission 2GHz~25GHz

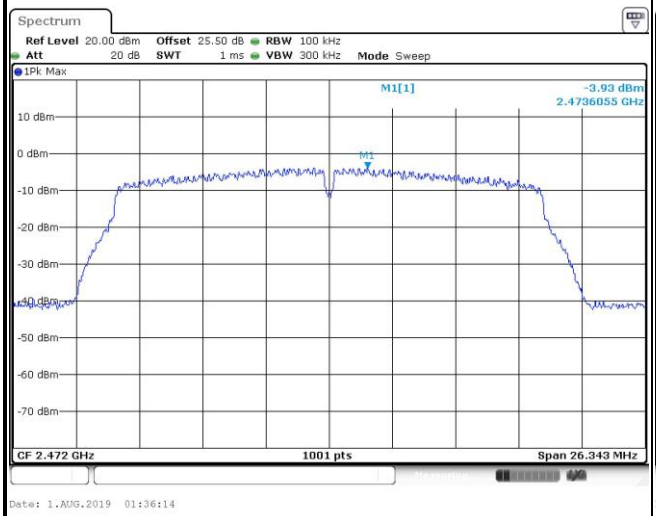
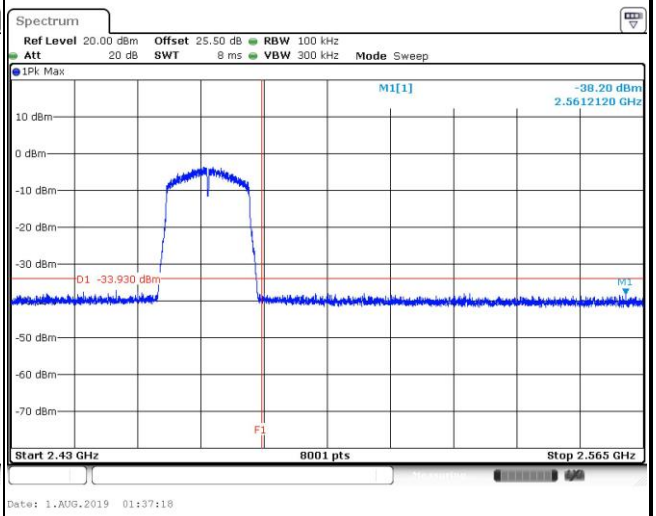
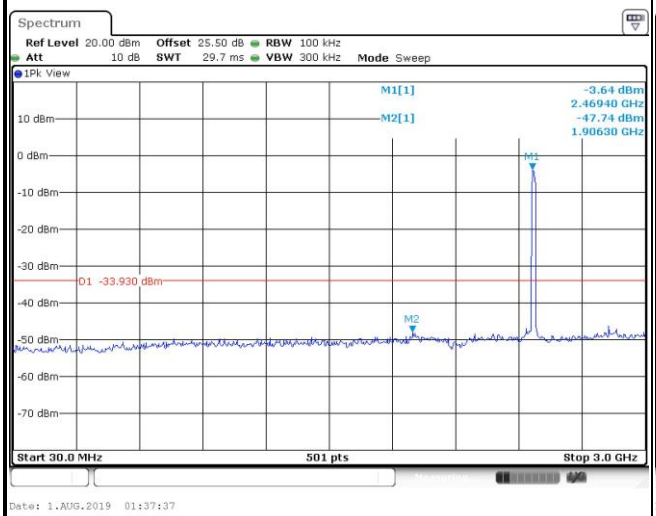
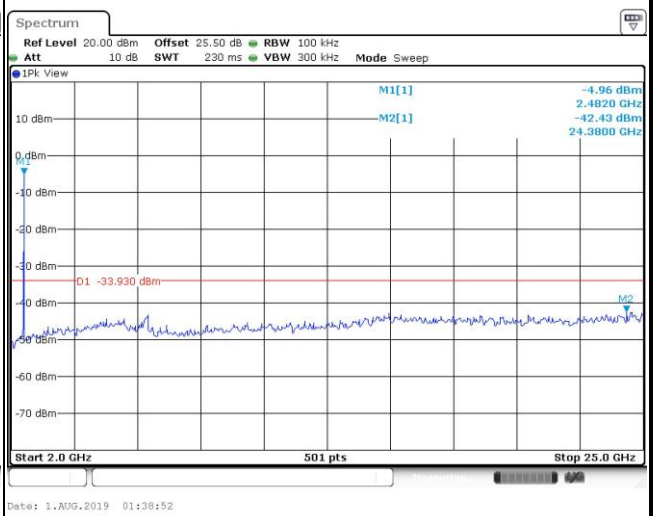


WLAN 802.11n HT20 Channel 06	
100kHz PSD reference Level	**Mid Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11n HT20 Channel 10	
100kHz PSD reference Level	**Low Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11n HT20 Channel 11	
100kHz PSD reference Level	**High Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11n HT20 Channel 12	
100kHz PSD reference Level	**High Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

WLAN 802.11n HT20 Channel 13	
100kHz PSD reference Level	**High Channel Plot**
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

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

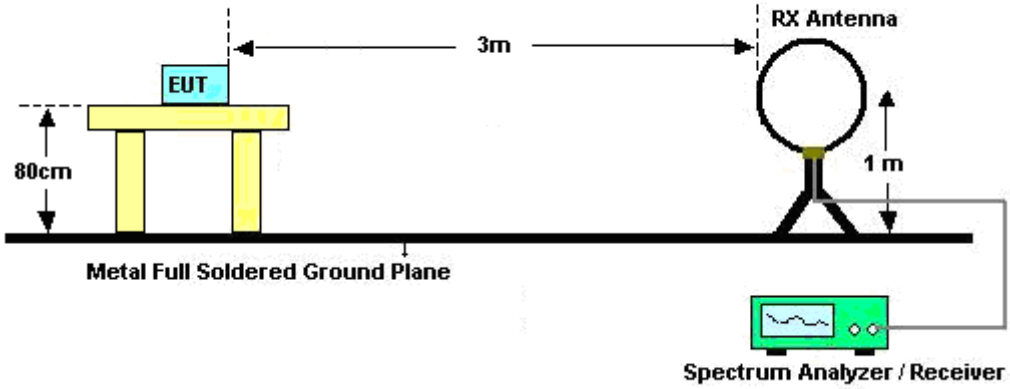
See list of measuring equipment of this test report.

3.5.3 Test Procedures

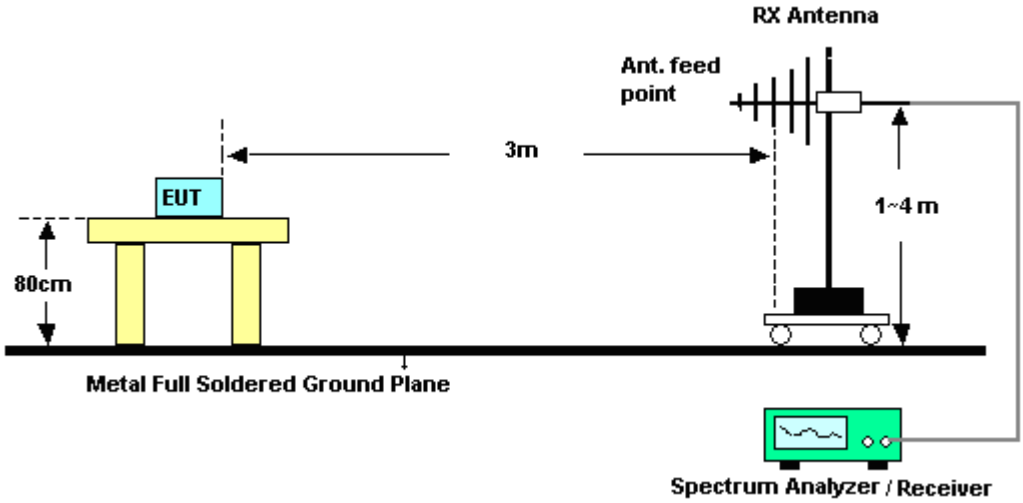
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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 testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

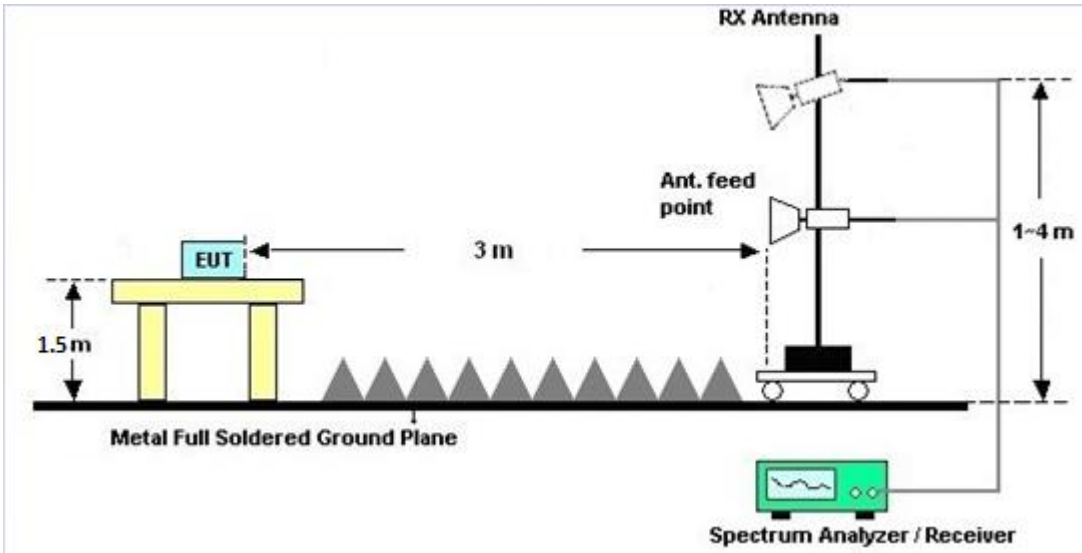
For radiated emissions below 30MHz



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.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.5.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and D.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

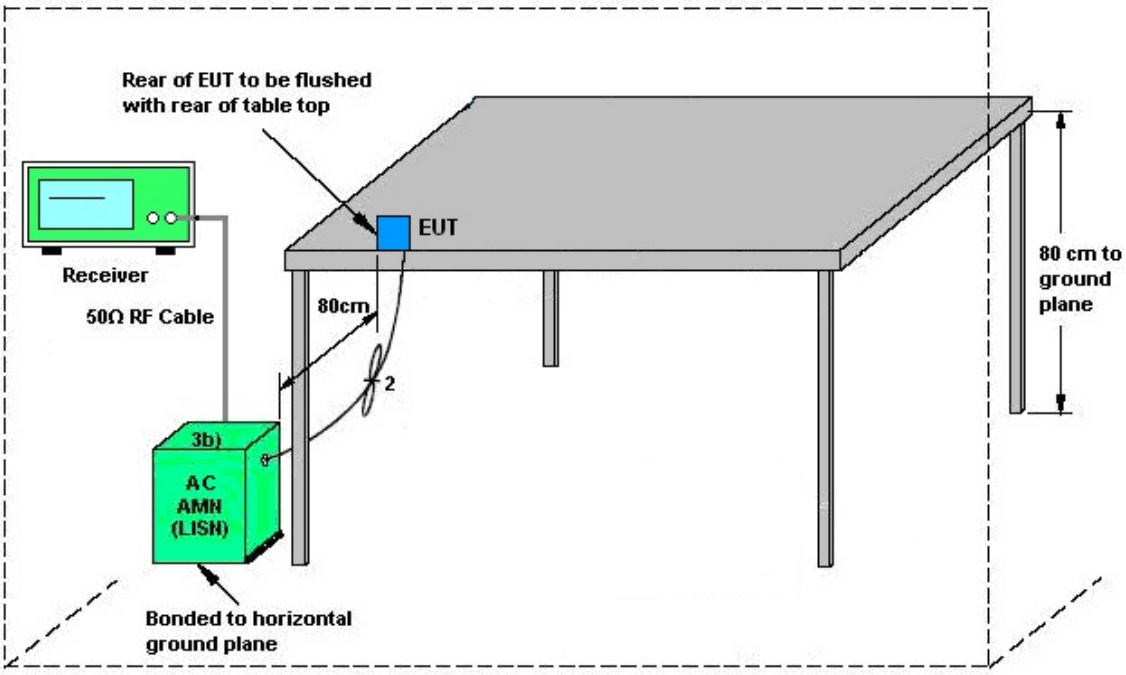
3.6.2 Measuring Instruments

See list of measuring equipment 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



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the 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
Power Sensor	DARE	RPR3006W	13I00030SNO32	9kHz~6GHz	Dec. 03, 2018	Jul. 09, 2019 ~ Sep. 06, 2019	Dec. 02, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 13, 2018	Jul. 09, 2019 ~ Sep. 06, 2019	Nov. 12, 2019	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC1208382	N/A	Mar. 27, 2019	Jul. 09, 2019 ~ Sep. 06, 2019	Mar. 26, 2020	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 07, 2019	Jul. 13, 2019 ~ Sep. 04, 2019	Jan. 06, 2020	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Jul. 13, 2019 ~ Sep. 04, 2019	Dec. 05, 2019	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&00800N1D01N-06	41912&05	30MHz to 1GHz	Feb. 12, 2019	Jul. 13, 2019 ~ Sep. 04, 2019	Feb. 11, 2020	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1620	1G~18GHz	Oct. 17, 2018	Jul. 13, 2019 ~ Sep. 04, 2019	Oct. 16, 2019	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Dec. 05, 2018	Jul. 13, 2019 ~ Sep. 04, 2019	Dec. 04, 2019	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2018	Jul. 13, 2019 ~ Sep. 04, 2019	Dec. 27, 2019	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055007	1GHz~18GHz	Apr. 01, 2019	Jul. 13, 2019 ~ Sep. 04, 2019	Mar. 31, 2020	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 23, 2018	Jul. 13, 2019 ~ Aug. 06, 2019	Aug. 22, 2019	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 23, 2019	Sep. 04, 2019	Aug. 22, 2020	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY54130085	20Hz ~ 8.4GHz	Nov. 01, 2018	Jul. 13, 2019 ~ Sep. 04, 2019	Oct. 31, 2019	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 29, 2019	Jul. 13, 2019 ~ Sep. 04, 2019	Apr. 28, 2020	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY57290111	3Hz ~ 26.5GHz	Nov. 29, 2018	Jul. 13, 2019 ~ Sep. 04, 2019	Nov. 28, 2019	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jul. 13, 2019 ~ Sep. 04, 2019	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jul. 13, 2019 ~ Sep. 04, 2019	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24(k5)	RK-000451	N/A	N/A	Jul. 13, 2019 ~ Sep. 04, 2019	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY36980/4	30M-18G	Apr. 15, 2019	Jul. 13, 2019 ~ Sep. 04, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9838/4	30M-18G	Apr. 15, 2019	Jul. 13, 2019 ~ Sep. 04, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY802430/4	30M~18GHz	May 13, 2019	Jul. 13, 2019 ~ Sep. 04, 2019	May 12, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 13, 2019	Jul. 13, 2019 ~ Sep. 04, 2019	Mar. 12, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz-40GHz	Mar. 13, 2019	Jul. 13, 2019 ~ Sep. 04, 2019	Mar. 12, 2020	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN11	1G Low Pass	Sep. 16, 2018	Jul. 13, 2019 ~ Sep. 04, 2019	Sep. 15, 2019	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN1	3 GHz Highpass	Sep. 16, 2018	Jul. 13, 2019 ~ Sep. 04, 2019	Sep. 15, 2019	Radiation (03CH15-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jul. 06, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 12, 2018	Jul. 06, 2019	Nov. 11, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Jul. 06, 2019	Nov. 13, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 09, 2018	Jul. 06, 2019	Nov. 08, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Jul. 06, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Jul. 06, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Jul. 06, 2019	Dec. 30, 2019	Conduction (CO05-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.20

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.20

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.50

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.20

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Kai Liao/Derek Hsu	Temperature:	21~25	°C
Test Date:	2019/7/9 ~2019/09/06	Relative Humidity:	51~54	%
TX Tool	Compliance	TX Tool Version	1.0.0.54	

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 0	Ant 1	Ant 0	Ant 1		
11b	1Mbps	1	1	2412	13.94	-	9.03	-	0.50	Pass
11b	1Mbps	1	6	2437	13.74	-	9.03	-	0.50	Pass
11b	1Mbps	1	11	2462	13.94	-	8.55	-	0.50	Pass
11b	1Mbps	1	12	2467	13.84	-	8.53	-	0.50	Pass
11b	1Mbps	1	13	2472	13.79	-	9.01	-	0.50	Pass
11g	6Mbps	1	1	2412	16.78	-	15.09	-	0.50	Pass
11g	6Mbps	1	2	2417	17.13	-	16.33	-	0.50	Pass
11g	6Mbps	1	6	2437	18.18	-	15.13	-	0.50	Pass
11g	6Mbps	1	10	2457	18.23	-	16.30	-	0.50	Pass
11g	6Mbps	1	11	2462	16.78	-	15.13	-	0.50	Pass
11g	6Mbps	1	12	2467	16.78	-	15.11	-	0.50	Pass
11g	6Mbps	1	13	2472	16.78	-	15.09	-	0.50	Pass
HT20	MCS0	1	1	2412	17.68	-	17.58	-	0.50	Pass
HT20	MCS0	1	2	2417	18.03	-	17.58	-	0.50	Pass
HT20	MCS0	1	6	2437	18.63	-	17.56	-	0.50	Pass
HT20	MCS0	1	10	2457	18.88	-	17.54	-	0.50	Pass
HT20	MCS0	1	11	2462	17.73	-	17.54	-	0.50	Pass
HT20	MCS0	1	12	2467	17.68	-	17.54	-	0.50	Pass
HT20	MCS0	1	13	2472	17.73	-	17.56	-	0.50	Pass

TEST RESULTS DATA
Average Output Power

2.4GHz Band																
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 0	Ant 1	SUM	Ant 0	Ant 1	Ant 0	Ant 1	Ant 0	Ant 1	Ant 0	Ant 1	
11b	1Mbps	1	1	2412	18.90	-		30.00	-	1.80	-	20.70	-	36.00	-	Pass
11b	1Mbps	1	6	2437	17.50	-		30.00	-	1.80	-	19.30	-	36.00	-	Pass
11b	1Mbps	1	11	2462	17.10	-		30.00	-	1.80	-	18.90	-	36.00	-	Pass
11b	1Mbps	1	12	2467	14.40	-		30.00	-	1.80	-	16.20	-	36.00	-	Pass
11b	1Mbps	1	13	2472	11.60	-		30.00	-	1.80	-	13.40	-	36.00	-	Pass
11g	6Mbps	1	1	2412	15.90	-		30.00	-	1.80	-	17.70	-	36.00	-	Pass
11g	6Mbps	1	2	2417	19.40	-		30.00	-	1.80	-	21.20	-	36.00	-	Pass
11g	6Mbps	1	6	2437	20.70	-		30.00	-	1.80	-	22.50	-	36.00	-	Pass
11g	6Mbps	1	10	2457	20.60	-		30.00	-	1.80	-	22.40	-	36.00	-	Pass
11g	6Mbps	1	11	2462	15.50	-	-	30.00	-	1.80	-	17.30	-	36.00	-	Pass
11g	6Mbps	1	12	2467	10.20	-		30.00	-	1.80	-	12.00	-	36.00	-	Pass
11g	6Mbps	1	13	2472	10.30	-		30.00	-	1.80	-	12.10	-	36.00	-	Pass
HT20	MCS0	1	1	2412	14.80	-		30.00	-	1.80	-	16.60	-	36.00	-	Pass
HT20	MCS0	1	2	2417	19.40	-		30.00	-	1.80	-	21.20	-	36.00	-	Pass
HT20	MCS0	1	6	2437	20.60	-		30.00	-	1.80	-	22.40	-	36.00	-	Pass
HT20	MCS0	1	10	2457	20.50	-		30.00	-	1.80	-	22.30	-	36.00	-	Pass
HT20	MCS0	1	11	2462	14.90	-		30.00	-	1.80	-	16.70	-	36.00	-	Pass
HT20	MCS0	1	12	2467	11.50	-		30.00	-	1.80	-	13.30	-	36.00	-	Pass
HT20	MCS0	1	13	2472	10.00	-		30.00	-	1.80	-	11.80	-	36.00	-	Pass

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

TEST RESULTS DATA
Average Power Spectral Density

2.4GHz Band														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average PSD (dBm/3kHz)			DG (dBi)		Average PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 0	Ant 1	Ant 0	Ant 1	Worse + 3.01	Ant 0	Ant 1	Ant 0	Ant 1	
11b	1Mbps	1	1	2412	0.00	-	-3.40	-	-	1.80	-	8.00	-	Pass
11b	1Mbps	1	6	2437	0.00	-	-5.06	-		1.80	-	8.00	-	Pass
11b	1Mbps	1	11	2462	0.00	-	-5.60	-		1.80	-	8.00	-	Pass
11b	1Mbps	1	12	2467	0.00	-	-8.24	-		1.80	-	8.00	-	Pass
11b	1Mbps	1	13	2472	0.00	-	-10.79	-		1.80	-	8.00	-	Pass
11g	6Mbps	1	1	2412	0.00	-	-10.84	-		1.80	-	8.00	-	Pass
11g	6Mbps	1	2	2417	0.00	-	-5.13	-		1.80	-	8.00	-	Pass
11g	6Mbps	1	6	2437	0.00	-	-6.05	-		1.80	-	8.00	-	Pass
11g	6Mbps	1	10	2457	0.00	-	-4.36	-		1.80	-	8.00	-	Pass
11g	6Mbps	1	11	2462	0.00	-	-10.00	-		1.80	-	8.00	-	Pass
11g	6Mbps	1	12	2467	0.00	-	-15.22	-		1.80	-	8.00	-	Pass
11g	6Mbps	1	13	2472	0.00	-	-15.50	-		1.80	-	8.00	-	Pass
HT20	MCS0	1	1	2412	0.00	-	-10.35	-		1.80	-	8.00	-	Pass
HT20	MCS0	1	2	2417	0.00	-	-5.07	-		1.80	-	8.00	-	Pass
HT20	MCS0	1	6	2437	0.00	-	-4.32	-		1.80	-	8.00	-	Pass
HT20	MCS0	1	10	2457	0.00	-	-3.33	-		1.80	-	8.00	-	Pass
HT20	MCS0	1	11	2462	0.00	-	-9.24	-		1.80	-	8.00	-	Pass
HT20	MCS0	1	12	2467	0.00	-	-12.66	-		1.80	-	8.00	-	Pass
HT20	MCS0	1	13	2472	0.00	-	-14.83	-		1.80	-	8.00	-	Pass

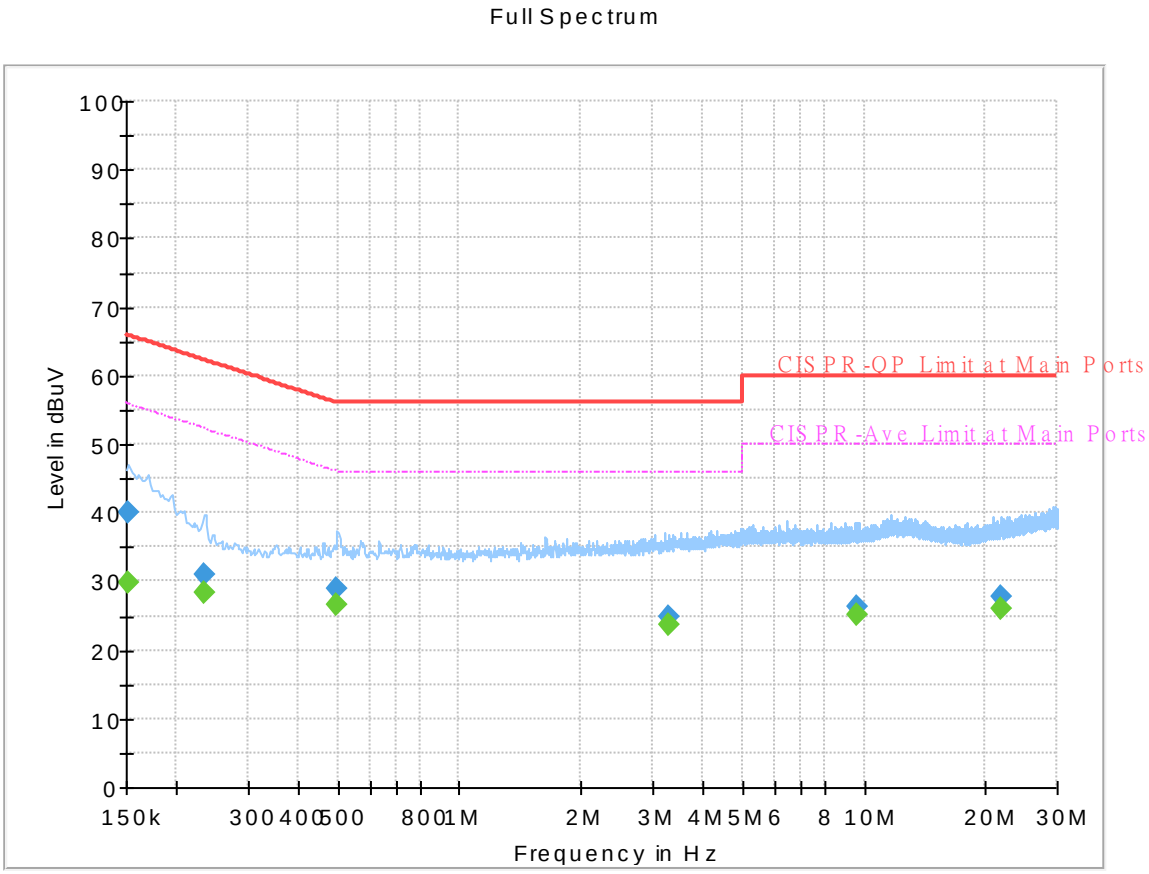
Measured power density (dBm) has offset with cable loss.

Appendix B. AC Conducted Emission Test Results

Test Engineer :	Jimmy Chang	**Temperature :**	24~26℃
		Relative Humidity :	52~56%

EUT Information

Report NO :	941514-01
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line

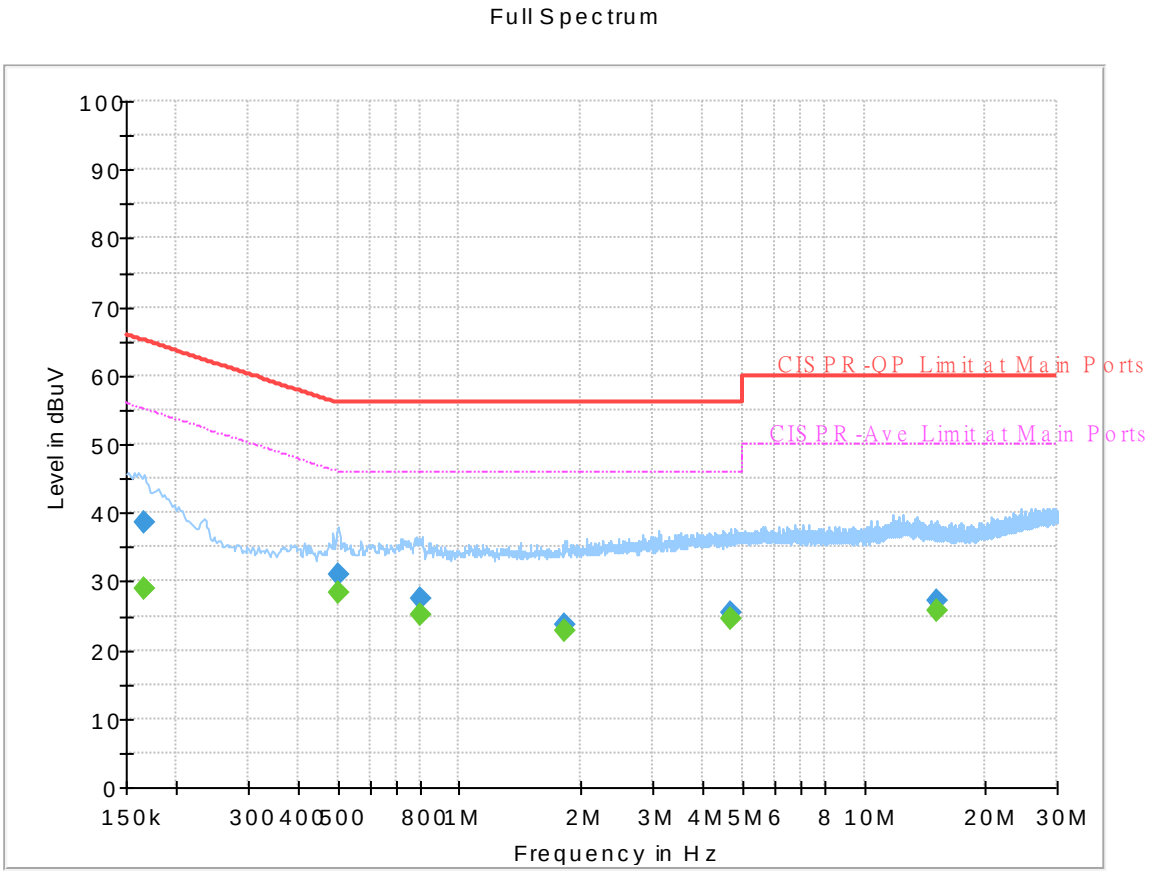


Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	29.75	55.88	26.13	L1	OFF	19.4
0.152250	40.07	---	65.88	25.81	L1	OFF	19.4
0.233250	---	28.37	52.33	23.96	L1	OFF	19.4
0.233250	31.03	---	62.33	31.30	L1	OFF	19.4
0.498750	---	26.65	46.02	19.37	L1	OFF	19.4
0.498750	29.00	---	56.02	27.02	L1	OFF	19.4
3.291000	---	23.79	46.00	22.21	L1	OFF	19.6
3.291000	24.74	---	56.00	31.26	L1	OFF	19.6
9.629250	---	25.10	50.00	24.90	L1	OFF	19.8
9.629250	26.27	---	60.00	33.73	L1	OFF	19.8
21.882750	---	26.00	50.00	24.00	L1	OFF	20.2
21.882750	27.64	---	60.00	32.36	L1	OFF	20.2

EUT Information

Report NO :	941514-01
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.165750	---	29.07	55.17	26.10	N	OFF	19.5
0.165750	38.61	---	65.17	26.56	N	OFF	19.5
0.501000	---	28.34	46.00	17.66	N	OFF	19.5
0.501000	31.08	---	56.00	24.92	N	OFF	19.5
0.802500	---	25.18	46.00	20.82	N	OFF	19.5
0.802500	27.48	---	56.00	28.52	N	OFF	19.5
1.812750	---	22.71	46.00	23.29	N	OFF	19.6
1.812750	23.62	---	56.00	32.38	N	OFF	19.6
4.681500	---	24.59	46.00	21.41	N	OFF	19.7
4.681500	25.41	---	56.00	30.59	N	OFF	19.7
15.065250	---	25.64	50.00	24.36	N	OFF	20.1
15.065250	27.30	---	60.00	32.70	N	OFF	20.1