FCC RADIO TEST REPORT

FCC ID	:	**Z64-CC3135MOD**
Equipment	:	**Dual-Band Wi-Fi® Network Processor Module**
Brand Name	:	**Texas Instruments**
Model name	:	**CC3135MODRNMMOB**
Marketing Name	:	**SimpleLink™ Wi-Fi CC3135MOD Dual-Band Network Processor Module**
Applicant	:	**Texas Instruments Incorported 12500 TI BLVD., Dallas Texas, 75243**
Manufacturer	:	**Texas Instruments Incorported 12500 TI BLVD., Dallas Texas, 75243**
Standard	:	**FCC Part 15 Subpart E §15.407**

The product was received on Dec. 19, 2018 and testing was started from May 16, 2019 and completed on Aug. 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.

Approved by: Jones Tsai

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
FR8D1931C	01	Initial issue of report	Aug. 08, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.403 (i)	6dB & 26dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.407 (a)	Maximum Conducted Output Power	Pass	-
3.3	15.407 (a)	Power Spectral Density	Pass	-
3.4	15.407(b)	Unwanted Emissions	Pass	Under limit 8.38 dB at 11570 MHz
3.5	15.207	AC Conducted Emission	Pass	Under limit 11.46 dB at 2.47875 MHz
3.6	15.407 (c)	Automatically Discontinue Transmission	Pass	-
3.7	15.203 & 15.407 (a)	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: Dar Chiu

1 General Description

1.1 Product Feature of Equipment Under Test

Wi-Fi 2.4GHz 802.11b/g/n and Wi-Fi 5GHz 802.11a

Antenna Information					
	Antenna Type	Brand Name	Model	2.4GHz Gain(dBi)	5GHz Gain(dBi)
1.	Chip	Pulse	W3078	1.7	4.3
2.		Yageo	ANT5320LL04R2455A	2.17	3.51
3.		Ethertronics	M830520	1	2.6
4.	PCB		1000423	-0.6	4.5
5.		Laird	CAF94504	2	4
6.			CAF94505	2	4
7.	Dipole	LSR	001-0012	2	2
8.			080-0013	2	2
9.			080-0014	2	2
10.	PIFA		001-0016	2.5	3
11.			001-0021	2.5	3
Note: The EUT used a dual-band chip antenna (Antenna 3 from Ethertronics)					

1.2 Modification of EUT

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

1.3 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

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No. 58, 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.**
	03CH15-HY

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

FCC designation No.: TW1190 and TW0007

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- 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

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)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	161	5805
	153	5765	165	5825
	157	5785	-	-

2.2 Test Mode

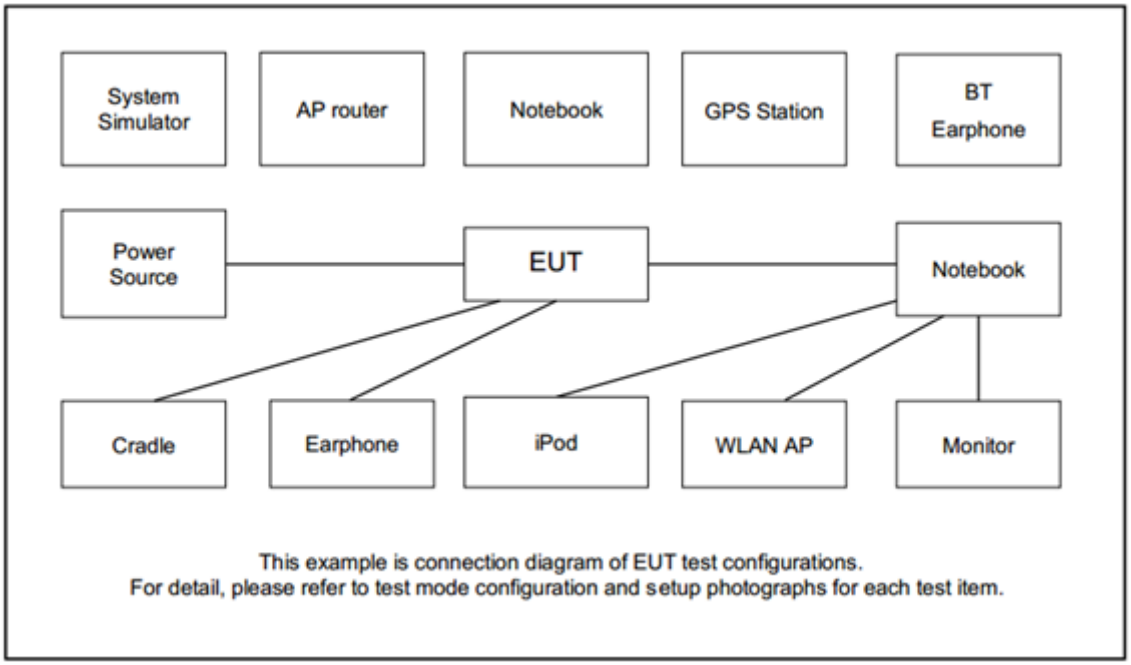
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	**6 Mbps**

Test Cases	
AC Conducted Emission	Mode 1： WLAN 5G Link + USB Cable(Charging from Notebook)

Ch. #		Band IV：5725-5850 MHz
		802.11a
L	**Low**	149
M	**Middle**	157
H	**High**	165

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	ASUS	RT-AC1750	MSQ-RTAC66U	N/A	Unshielded,1.8m
2.	WLAN AP	D-Link	DIR-865L	KA2IR865LA1	N/A	Unshielded,1.8m
3.	Notebook	Lenovo	L570	NA	N/A	AC I/P：Unshielded, 1.2m DC O/P：Shielded, 1.8m
4.	Notebook	Dell	Latitude E3340	FCC DoC	N/A	AC I/P：Unshielded, 1.2m DC O/P：Shielded, 1.8m
5.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0m	N/A

2.5 EUT Operation Test Setup

The RF test items, utility “CC31XX/CC32XX Radio Tool v1.0.3.10” 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 14.6 dB and 10.00dB attenuator.

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

= 14.6 + 10.00 = 24.6(dB)

3 Test Result

3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

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

26dB and 99% Occupied bandwidth are reporting only.

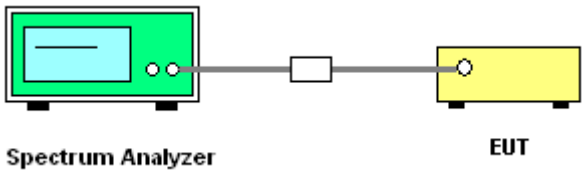
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

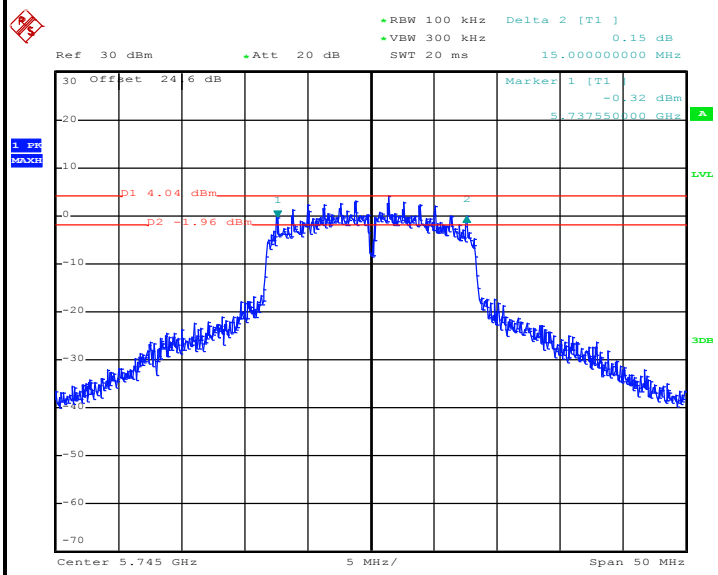
3.1.4 Test Setup



3.1.5 Test Result of 6dB and 26dB and 99% Occupied Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth



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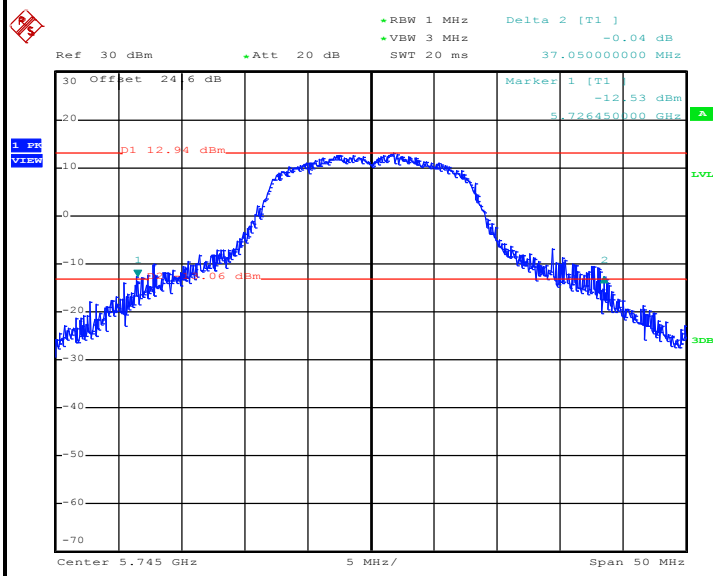
Maximum 26dB Bandwidth



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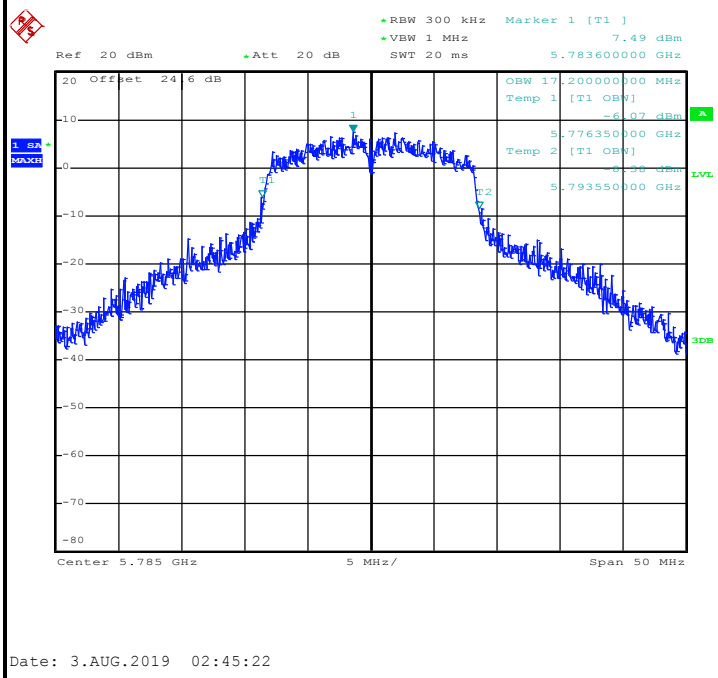
Maximum 99% Occupied Bandwidth



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

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

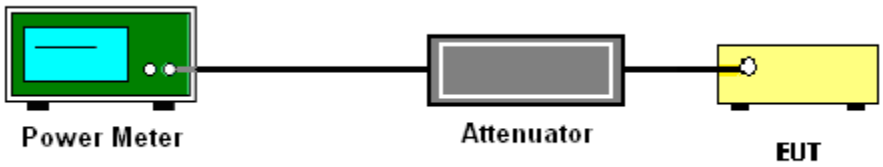
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section F) Maximum power spectral density.

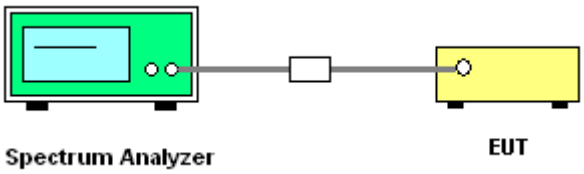
 # Method SA-3 #

(power averaging (rms) detection with max hold):

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz.
- Set VBW ≥ 1 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time ≤ (number of points in sweep) × 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.
- Detector = power averaging (rms).
- Trace mode = max hold.
- Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

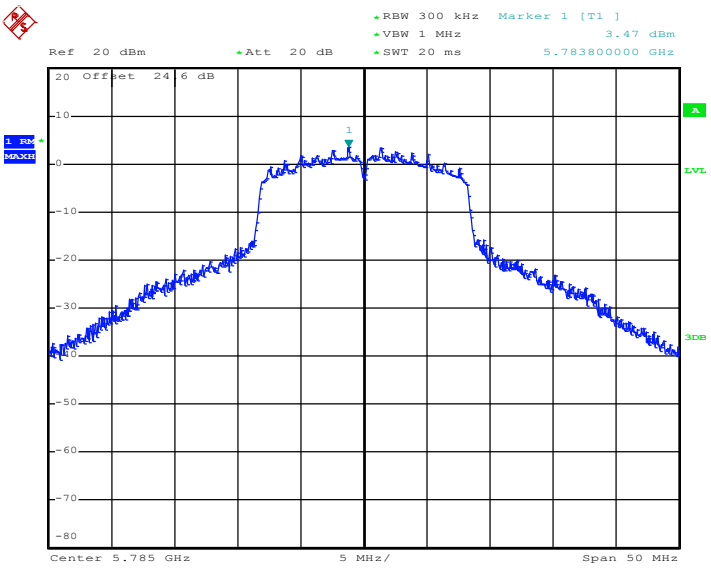
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/MHz)



3.4 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

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

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

(3) KDB789033 D02 v02r01 G)2)c)

(i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.3

(ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.[4]

Note 3: An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

Note 4: Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

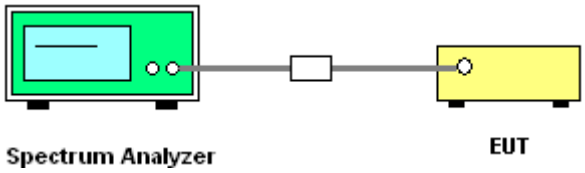
(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

- RBW = 1 MHz
- 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.

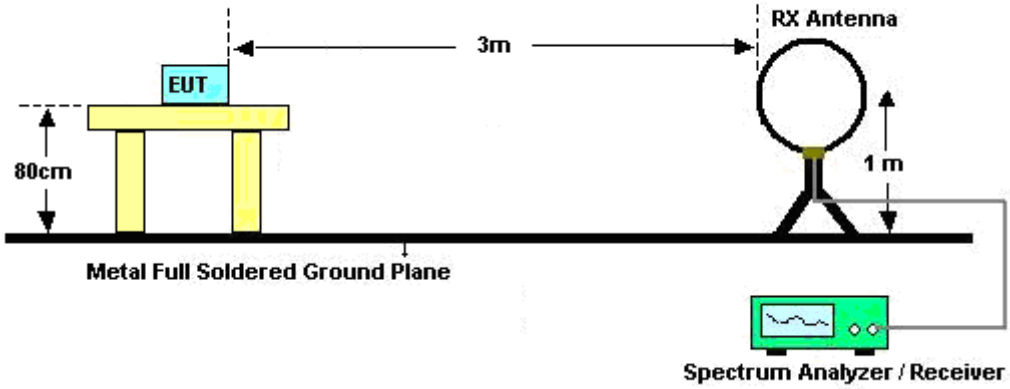
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
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.

3.4.4 Test Setup

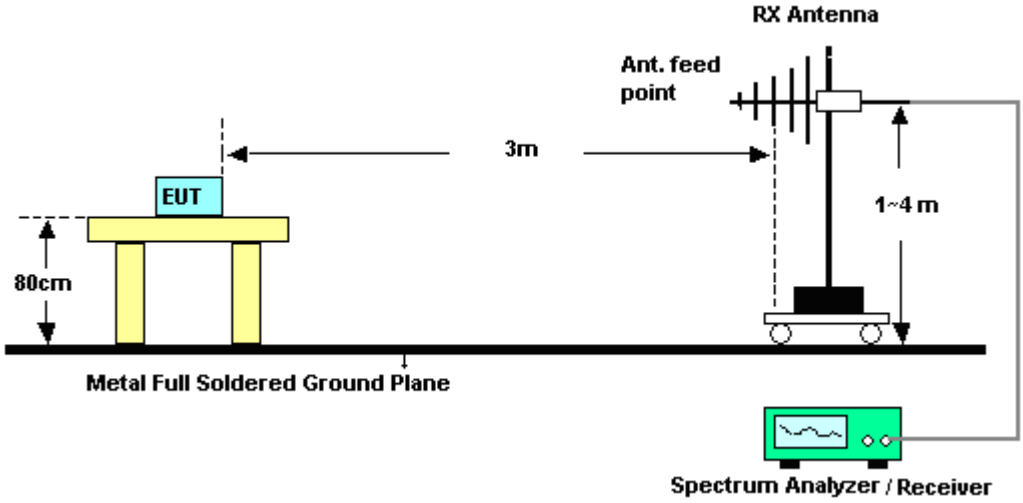
For Conducted Measurement Setup:



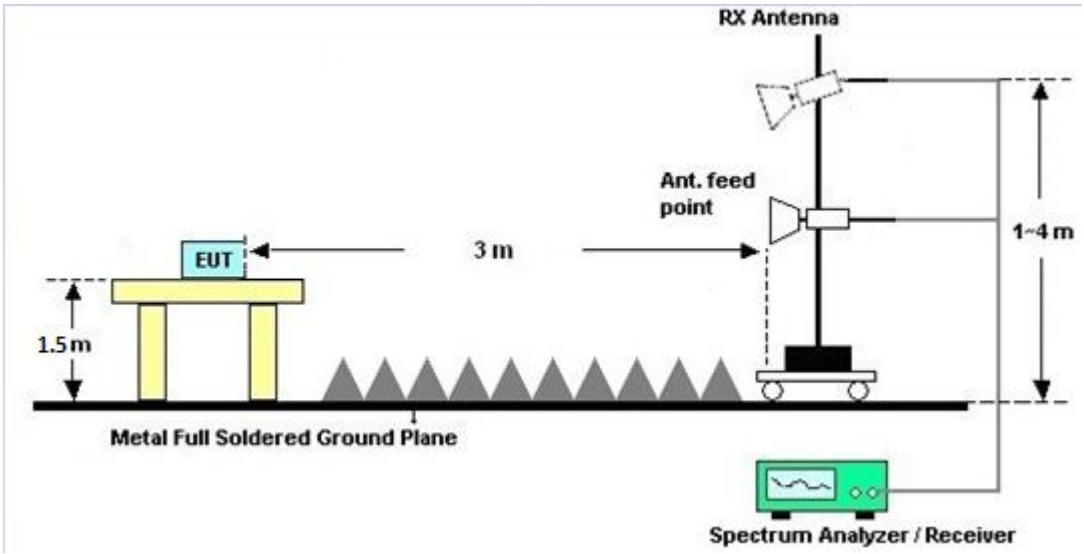
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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.

3.4.6 Test Result of Conduced Spurious at Band Edges in the Restricted Band

Please refer to Appendix C and D.

3.4.7 Test Result of Conduced Spurious Emission in the Restricted Band

Please refer to Appendix C and D.

3.4.8 Test Result of Cabinet Radiated Band Edges

Please refer to Appendix E and F.

3.4.9 Test Result of Cabinet Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix E and F.

3.4.10 Duty Cycle

Please refer to Appendix G.

3.5 AC Conducted Emission Measurement

3.5.1 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.

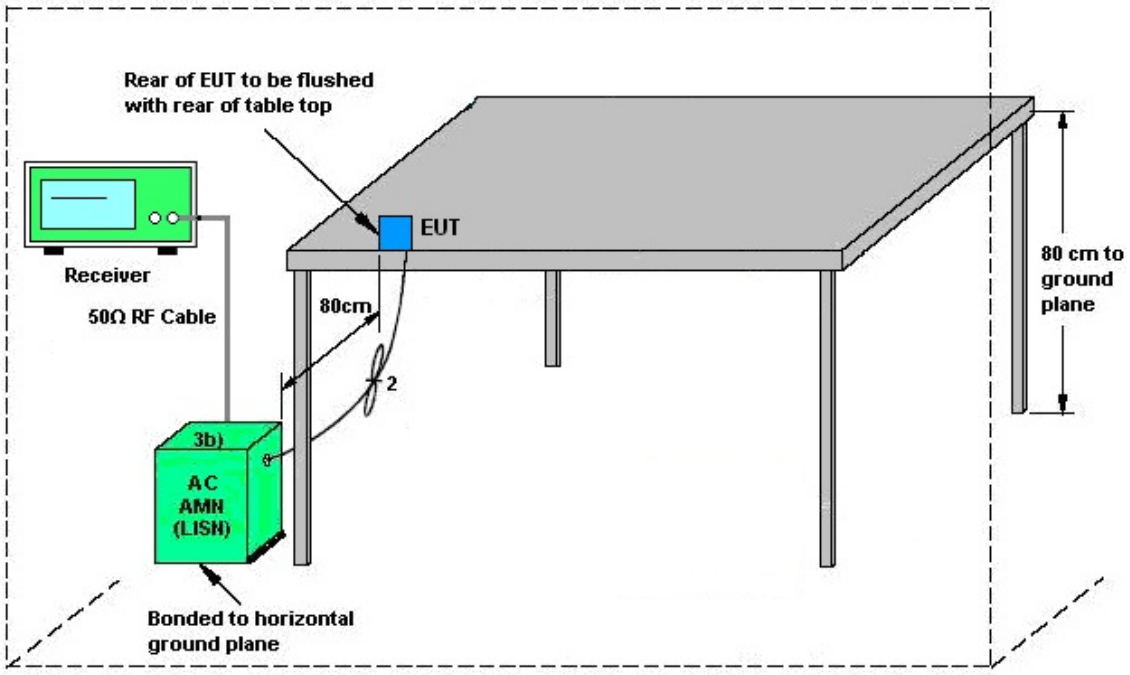
3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room 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 with Maximum Hold Mode.

3.5.4 Test Setup



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

3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.6 Automatically Discontinue Transmission

3.6.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 07, 2019	Jul. 29, 2019 ~ Aug. 01, 2019	Jan. 06, 2020	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&00800N1D01N-06	41912&05	30MHz to 1GHz	Feb. 12, 2019	Jul. 29, 2019 ~ Aug. 01, 2019	Feb. 11, 2020	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1620	1G~18GHz	Oct. 17, 2018	Jul. 29, 2019 ~ Aug. 01, 2019	Oct. 16, 2019	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Dec. 05, 2018	Jul. 29, 2019 ~ Aug. 01, 2019	Dec. 04, 2019	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2018	Jul. 29, 2019 ~ Aug. 01, 2019	Dec. 27, 2019	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055007	1GHz~18GHz	Apr. 01, 2019	Jul. 29, 2019 ~ Aug. 01, 2019	Mar. 31, 2020	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 23, 2018	Jul. 29, 2019 ~ Aug. 01, 2019	Aug. 22, 2019	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Jul. 29, 2019 ~ Aug. 01, 2019	Dec. 05, 2019	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY54130085	20Hz ~ 8.4GHz	Nov. 01, 2018	Jul. 29, 2019 ~ Aug. 01, 2019	Oct. 31, 2019	Radiation (03CH15-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz~44GHz	Nov. 02, 2018	Jul. 29, 2019 ~ Aug. 01, 2019	Nov. 01, 2019	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jul. 29, 2019 ~ Aug. 01, 2019	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jul. 29, 2019 ~ Aug. 01, 2019	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24(k5)	RK-000451	N/A	N/A	Jul. 29, 2019 ~ Aug. 01, 2019	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY36980/4	30M-18G	Apr. 15, 2019	Jul. 29, 2019 ~ Aug. 01, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9838/4	30M-18G	Apr. 15, 2019	Jul. 29, 2019 ~ Aug. 01, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY802430/4	30M~18GHz	May. 13, 2019	Jul. 29, 2019 ~ Aug. 01, 2019	May. 12, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 13, 2019	Jul. 29, 2019 ~ Aug. 01, 2019	Mar. 12, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz-40GHz	Mar. 13, 2019	Jul. 29, 2019 ~ Aug. 01, 2019	Mar. 12, 2020	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN11	1G Low Pass	Sep. 16, 2018	Jul. 29, 2019 ~ Aug. 01, 2019	Sep. 15, 2019	Radiation (03CH15-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN3	6.75 GHz Highpass	Sep. 16, 2018	Jul. 29, 2019 ~ Aug. 01, 2019	Sep. 15, 2019	Radiation (03CH15-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Sensor	DARE	RPR3006W	16I00054SNO10	10MHz~6GHz	Dec. 19, 2018	Jul. 29, 2019~ Aug. 03, 2019	Dec. 18, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 21, 2018	Jul. 29, 2019~ Aug. 03, 2019	Nov. 20, 2019	Conducted (TH05-HY)
Switch Box & RF Cable	EM	EMSW18	SW1070903	N/A	Dec. 19, 2018	Jul. 29, 2019~ Aug. 03, 2019	Dec. 18, 2019	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	May. 16, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9KHz~3.6GHz	Nov. 12, 2018	May 20, 2019	Nov. 11, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	May 20, 2019	Nov. 13, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 09, 2018	May 20, 2019	Nov. 08, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	May 20, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	May 20, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	May 20, 2019	Dec. 30, 2019	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9KHz~3.6GHz	Nov. 12, 2018	May 20, 2019	Nov. 11, 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))	**2.70dB**

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

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

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2B**

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Leo Li/ Shiming Liu	Temperature:	21~25	°C
Test Date:	2019/7/29~2019/8/3	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 26dB EBW and 99% OBW

Band IV												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	1	149	5745	16.80	-	37.05	-	15.00	-	0.5	Pass
11a	6Mbps	1	157	5785	17.20	-	37.00	-	15.00	-	0.5	Pass
11a	6Mbps	1	165	5825	16.55	-	30.00	-	15.00	-	0.5	Pass

TEST RESULTS DATA
Average Power Table

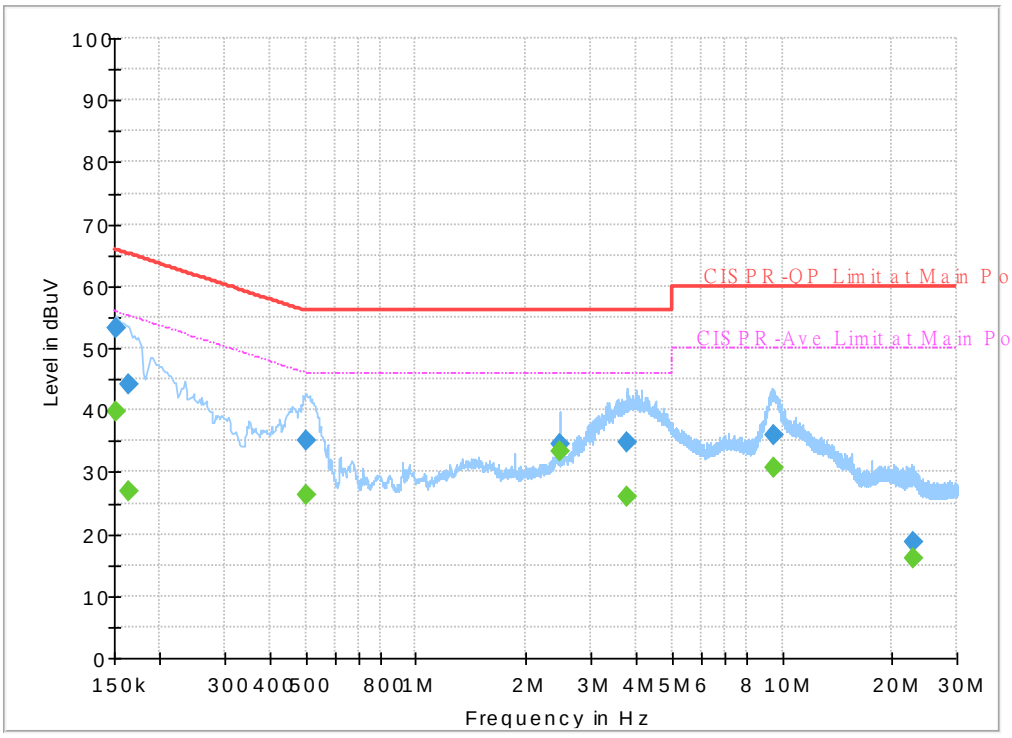
Band IV													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	14.10	-		30.00	-	4.50	-	Pass
11a	6Mbps	1	157	5785	15.00	-		30.00	-	4.50	-	Pass
11a	6Mbps	1	165	5825	12.60	-		30.00	-	4.50	-	Pass

TEST RESULTS DATA
Power Spectral Density

Band IV														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	10log (500kHz /RBW) Factor (dB)		Average Power Density (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	2.22	-	4.86	-		30.00	-	4.50	-	Pass
11a	6Mbps	1	157	5785	2.22	-	5.69	-		30.00	-	4.50	-	Pass
11a	6Mbps	1	165	5825	2.22	-	2.49	-		30.00	-	4.50	-	Pass

Appendix B. AC Conducted Emission Test Results

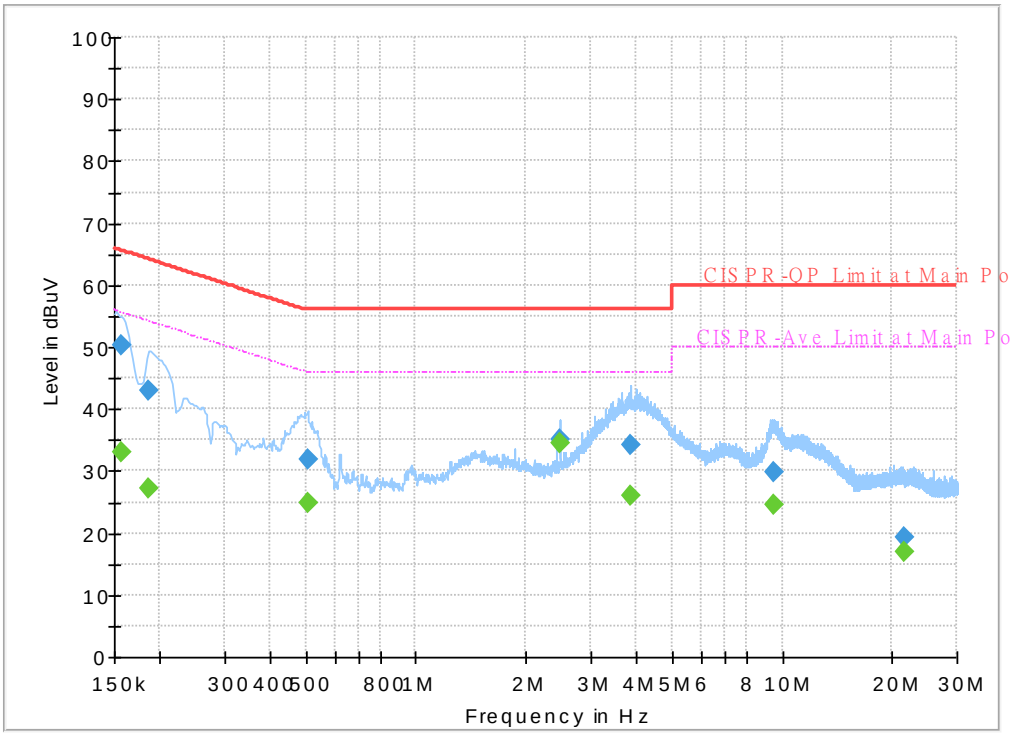
Test Engineer :	Jimmy Chang	**Temperature :**	24~26℃
		Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	39.83	55.88	16.05	L1	OFF	19.5
0.152250	53.09	---	65.88	12.79	L1	OFF	19.5
0.163500	---	27.04	55.28	28.24	L1	OFF	19.5
0.163500	44.10	---	65.28	21.18	L1	OFF	19.5
0.501000	---	26.41	46.00	19.59	L1	OFF	19.5
0.501000	35.23	---	56.00	20.77	L1	OFF	19.5
2.476500	---	33.46	46.00	12.54	L1	OFF	19.5
2.476500	34.45	---	56.00	21.55	L1	OFF	19.5
3.783750	---	26.08	46.00	19.92	L1	OFF	19.6
3.783750	34.91	---	56.00	21.09	L1	OFF	19.6
9.465000	---	30.77	50.00	19.23	L1	OFF	19.7
9.465000	35.93	---	60.00	24.07	L1	OFF	19.7
22.832250	---	16.00	50.00	34.00	L1	OFF	19.8
22.832250	18.74	---	60.00	41.26	L1	OFF	19.8

Test Engineer :	Jimmy Chang	**Temperature :**	24~26℃
		Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	33.05	55.63	22.58	N	OFF	19.5
0.156750	50.35	---	65.63	15.28	N	OFF	19.5
0.186000	---	27.15	54.21	27.06	N	OFF	19.5
0.186000	43.10	---	64.21	21.11	N	OFF	19.5
0.505500	---	24.97	46.00	21.03	N	OFF	19.5
0.505500	31.82	---	56.00	24.18	N	OFF	19.5
2.478750	---	34.54	46.00	11.46	N	OFF	19.5
2.478750	35.14	---	56.00	20.86	N	OFF	19.5
3.844500	---	25.97	46.00	20.03	N	OFF	19.6
3.844500	34.31	---	56.00	21.69	N	OFF	19.6
9.516750	---	24.54	50.00	25.46	N	OFF	19.7
9.516750	29.76	---	60.00	30.24	N	OFF	19.7
21.576750	---	16.82	50.00	33.18	N	OFF	19.9
21.576750	19.25	---	60.00	40.75	N	OFF	19.9

Appendix C. Conducted Spurious Emission

Test Engineer :	Rebecca Li	Temperature :	23~25°C
		Relative Humidity :	52~58%

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	MIMO Factor	Grounding Factor	Peak Avg.
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(P/A)
802.11a CH 149 5745MHz		2296	-41.69	-20.49	-21.2	-48.31	4.5	2.12	0	0	P
		2296	-50.59	-9.39	-41.2	-57.21	4.5	2.12	0	0	A
		5648.8	-34.52	-7.52	-27	-42.5	4.5	3.48	0	0	P
		5697.2	-30.57	-38.51	7.94	-38.57	4.5	3.5	0	0	P
		5719.4	-22.38	-39.17	16.79	-30.38	4.5	3.5	0	0	P
		5725	-15.25	-42.25	27	-23.25	4.5	3.5	0	0	P
	*	5745	15.02	-	-	6.98	4.5	3.54	0	0	P
	*	5745	6.97	-	-	-1.07	4.5	3.54	0	0	A
802.11a CH 157 5785MHz		2308	-45.17	-18.17	-27	-51.79	4.5	2.12	0	0	P
		5622.4	-34.84	-7.84	-27	-42.79	4.5	3.45	0	0	P
		5697.6	-31.93	-40.16	8.23	-39.93	4.5	3.5	0	0	P
		5719	-30.1	-46.75	16.65	-38.1	4.5	3.5	0	0	P
		5721.4	-30.72	-50.52	19.8	-38.72	4.5	3.5	0	0	P
	*	5785	15.13	-	-	7.06	4.5	3.57	0	0	P
	*	5785	7.79	-	-	-0.28	4.5	3.57	0	0	A
		5851	-31.11	-56.11	25	-39.26	4.5	3.65	0	0	P
		5856.8	-30.29	-46.66	16.37	-38.44	4.5	3.65	0	0	P
		5875.4	-32.84	-42.54	9.7	-40.99	4.5	3.65	0	0	P
		5944.6	-33.66	-6.66	-27	-41.86	4.5	3.7	0	0	P

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	MIMO Factor (dB)	Grounding Factor (dB)	Peak Avg. (P/A)
		2338	-44.36	-23.16	-21.2	-51	4.5	2.14	0	0	P
	*	5825	12.24	-	-	4.13	4.5	3.61	0	0	P
802.11a	*	5825	5.92	-	-	-2.19	4.5	3.61	0	0	A
CH 165		5852.8	-24.99	-46.39	21.4	-33.14	4.5	3.65	0	0	P
5825MHz		5855.4	-28.73	-45.59	16.86	-36.88	4.5	3.65	0	0	P
		5876.4	-31.68	-40.64	8.96	-39.83	4.5	3.65	0	0	P
		5927.4	-35.3	-8.3	-27	-43.5	4.5	3.7	0	0	P

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

Band 4 5725~5850MHz

WIFI 802.11a (Harmonic)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	MIMO Factor (dB)	Grounding Factor (dB)	Peak Avg. (P/A)
802.11a		8045.5	-51.94	-30.74	-21.2	-61.75	4.5	5.31	0	0	P
CH 149		11490	-56.58	-35.38	-21.2	-67.51	4.5	6.43	0	0	P
5745MHz		17235	-58.22	-31.22	-27	-70.59	4.5	7.87	0	0	P
802.11a		8106.7	-52.29	-31.09	-21.2	-62.12	4.5	5.33	0	0	P
CH 157		11570	-52.33	-31.13	-21.2	-63.25	4.5	6.42	0	0	P
5785MHz		17355	-57.11	-30.11	-27	-69.5	4.5	7.89	0	0	P
802.11a		8157.7	-54.78	-33.58	-21.2	-64.65	4.5	5.37	0	0	P
CH 165		11650	-57.38	-36.18	-21.2	-68.3	4.5	6.42	0	0	P
5825MHz		17475	-62.62	-35.62	-27	-75.04	4.5	7.92	0	0	P
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.										

Emission below 1GHz

5GHz WIFI 802.11a (LF)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	MIMO Factor	Grounding Factor	Peak Avg.
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(P/A)
5GHz 802.11a LF		39.18	-80.56	-25.36	-55.2	-90.12	4.5	0.36	0	4.7	P
		203.34	-79.82	-28.12	-51.7	-89.8	4.5	0.78	0	4.7	P
		224.13	-79.07	-29.87	-49.2	-89.06	4.5	0.79	0	4.7	P
		309.8	-79.34	-30.14	-49.2	-89.38	4.5	0.84	0	4.7	P
		729.1	-76.41	-27.21	-49.2	-86.87	4.5	1.26	0	4.7	P
		946.1	-77.04	-27.84	-49.2	-87.81	4.5	1.57	0	4.7	P
Remark	1. No other spurious found. 2. 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	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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

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

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

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

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

Appendix D. Conducted Spurious Emission Plots

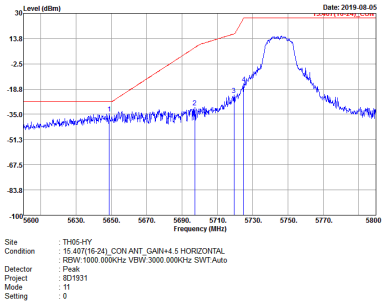
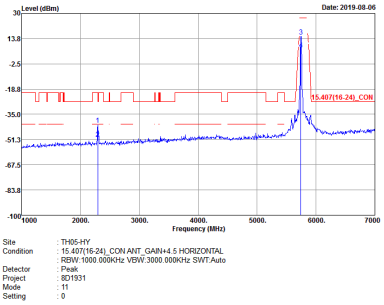
Test Engineer :	Rebecca Li	**Temperature :**	23~25°C
		Relative Humidity :	52~58%

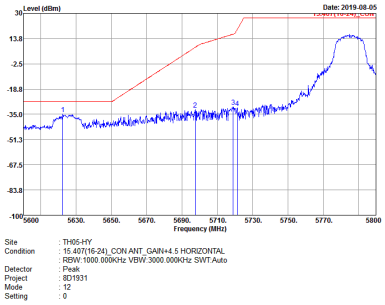
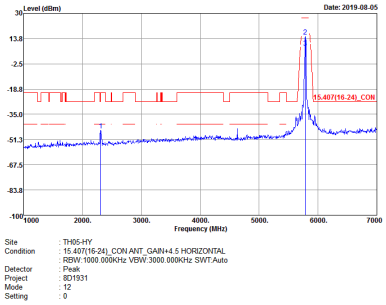
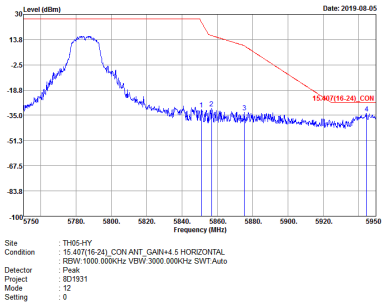
Note symbol

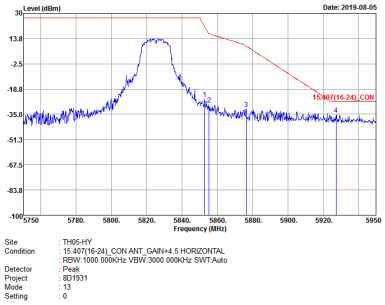
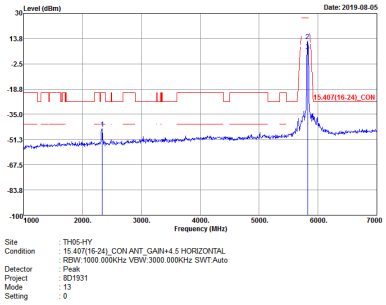
-L	**Low channel location**
-R	**High channel location**

Band 4 - 5725~5850MHz

802.11a (Band Edge)

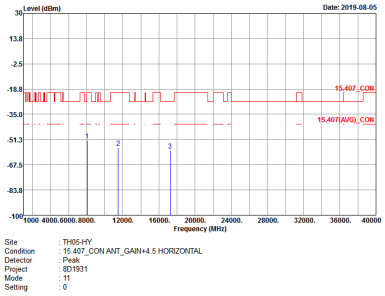
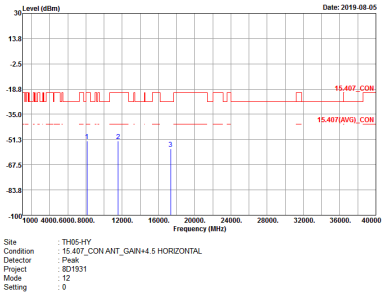
WIFI	Band 4 5725~5850MHz Band Edge	
ANT	802.11a CH149 5745MHz	
1	CSE	Fundamental
Peak		

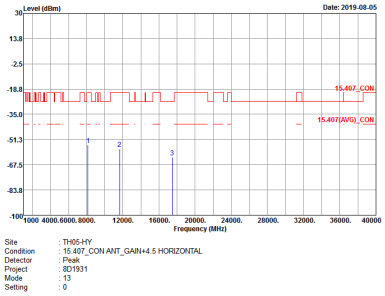
WIFI	Band 4 5725~5850MHz Band Edge	
ANT	802.11a CH157 5785MHz	
1	CSE	Fundamental
Peak		
Peak		Left blank

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
1	CSE	Fundamental
Peak		

Band 4 - 5725~5850MHz

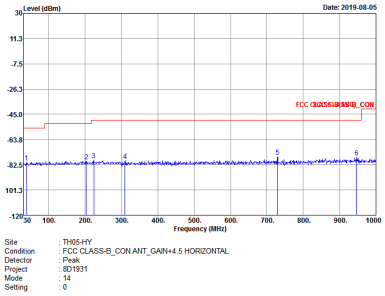
WIFI 802.11a (Harmonic)

WIFI	Band 4 5725~5850MHz Harmonic	
ANT	802.11a	
1	CH149 5745MHz	CH157 5785MHz
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic	
ANT	802.11a	
1	CH165 5825MHz	
Peak Avg.		Left blank

Emission below 1GHz

5GHz WIFI 802.11a (LF)

WIFI	5GHz 5725~5850MHz	
ANT	802.11a LF	
1	CSE	
QP / Peak		Left blank

Appendix E. Cabinet Radiated Spurious Emission

Test Engineer :	Karl Hou, Big Show Wang	**Temperature :**	23~26°C
		Relative Humidity :	50~65%

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5632.6	50.91	-17.29	68.2	39.66	31.73	9.85	30.33	186	120	P	H
		5651.8	49.85	-19.69	69.54	38.63	31.7	9.86	30.34	186	120	P	H
		5717.6	50.11	-60.02	110.13	38.69	31.93	9.86	30.37	186	120	P	H
		5722.8	52.05	-65.13	117.18	40.64	31.93	9.86	30.38	186	120	P	H
	*	5745	85.03	-	-	73.56	32	9.86	30.39	186	120	P	H
	*	5745	78.27	-	-	66.8	32	9.86	30.39	186	120	A	H
		5629.8	50.69	-17.51	68.2	39.4	31.77	9.85	30.33	200	185	P	V
		5681	50.68	-40.5	91.18	39.42	31.75	9.86	30.35	200	185	P	V
		5712.8	49.33	-59.46	108.79	37.97	31.87	9.86	30.37	200	185	P	V
		5723.8	50.94	-68.52	119.46	39.53	31.93	9.86	30.38	200	185	P	V
	*	5745	85.3	-	-	73.83	32	9.86	30.39	200	185	P	V
	*	5745	78.66	-	-	67.19	32	9.86	30.39	200	185	A	V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 157 5785MHz		5628.4	50.58	-17.62	68.2	39.29	31.77	9.85	30.33	199	113	P	H
		5689.2	50.3	-46.94	97.24	39	31.8	9.86	30.36	199	113	P	H
		5719.6	50.12	-60.57	110.69	38.7	31.93	9.86	30.37	199	113	P	H
		5721.4	49.2	-64.79	113.99	37.79	31.93	9.86	30.38	199	113	P	H
	*	5785	86.5	-	-	74.91	32.13	9.87	30.41	199	113	P	H
	*	5785	79.64	-	-	68.05	32.13	9.87	30.41	199	113	A	H
		5854.2	49.39	-63.23	112.62	37.66	32.23	9.94	30.44	199	113	P	H
		5856	51.57	-58.95	110.52	39.85	32.23	9.94	30.45	199	113	P	H
		5912.6	50.5	-26.85	77.35	38.63	32.33	10.01	30.47	199	113	P	H
		5949.2	51.38	-16.82	68.2	39.41	32.4	10.06	30.49	199	113	P	H
		5625.8	51.46	-16.74	68.2	40.17	31.77	9.85	30.33	184	186	P	V
		5697.6	50.2	-53.23	103.43	38.9	31.8	9.86	30.36	184	186	P	V
		5711.8	49.89	-58.62	108.51	38.53	31.87	9.86	30.37	184	186	P	V
		5724.8	49.19	-72.55	121.74	37.78	31.93	9.86	30.38	184	186	P	V
	*	5785	86.54	-	-	74.95	32.13	9.87	30.41	184	186	P	V
	*	5785	79.76	-	-	68.17	32.13	9.87	30.41	184	186	A	V
		5853.8	49.61	-63.93	113.54	37.88	32.23	9.94	30.44	184	186	P	V
		5864.4	50.38	-57.79	108.17	38.65	32.23	9.95	30.45	184	186	P	V
		5884.8	52.02	-45.9	97.92	40.23	32.27	9.98	30.46	184	186	P	V
		5932.8	50.47	-17.73	68.2	38.55	32.37	10.04	30.49	184	186	P	V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz	*	5825	85.24	-	-	73.57	32.2	9.9	30.43	260	129	P	H
	*	5825	78.27	-	-	66.6	32.2	9.9	30.43	260	129	A	H
		5851.6	49.68	-68.87	118.55	37.99	32.2	9.93	30.44	260	129	P	H
		5865.4	50.43	-57.46	107.89	38.7	32.23	9.95	30.45	260	129	P	H
		5924.4	51.44	-17.2	68.64	39.52	32.37	10.03	30.48	260	129	P	H
		5934.6	50.96	-17.24	68.2	39.04	32.37	10.04	30.49	260	129	P	H
	*	5825	84.08	-	-	72.41	32.2	9.9	30.43	219	215	P	V
	*	5825	77.57	-	-	65.9	32.2	9.9	30.43	219	215	A	V
		5854.2	49.83	-62.79	112.62	38.1	32.23	9.94	30.44	219	215	P	V
		5873.2	50.24	-55.46	105.7	38.46	32.27	9.96	30.45	219	215	P	V
		5907.4	50.92	-30.27	81.19	39.06	32.33	10	30.47	219	215	P	V
		5937.2	50.64	-17.56	68.2	38.72	32.37	10.04	30.49	219	215	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 149 5745MHz		11490	48.39	-25.61	74	55.91	40.17	14.5	62.19	100	0	P	H
		17235	45.85	-22.35	68.2	45.72	40.7	18.51	59.08	100	0	P	H
		11490	49.49	-24.51	74	57.01	40.17	14.5	62.19	100	0	P	V
		17235	44.99	-23.21	68.2	44.86	40.7	18.51	59.08	100	0	P	V
802.11a CH 157 5785MHz		11570	51.57	-22.43	74	59.27	40	14.56	62.26	271	272	P	H
		11570	45.62	-8.38	54	53.32	40	14.56	62.26	271	272	A	H
		17355	46.18	-22.02	68.2	44.88	41.4	18.72	58.82	100	0	P	H
		11570	49.5	-24.5	74	57.2	40	14.56	62.26	100	0	P	V
		17355	45.98	-22.22	68.2	44.68	41.4	18.72	58.82	100	0	P	V
802.11a CH 165 5825MHz		11650	43.32	-30.68	74	51.36	39.66	14.62	62.32	100	0	P	H
		17475	48.17	-20.03	68.2	45.42	42.43	18.88	58.56	100	0	P	H
		11650	45.7	-28.3	74	53.74	39.66	14.62	62.32	100	0	P	V
		17475	46.66	-21.54	68.2	43.91	42.43	18.88	58.56	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

5GHz WIFI 802.11a (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11a LF		79.47	26.24	-13.76	40	44.18	13.39	1.21	32.54	-	-	P	H
		137.67	27.12	-16.38	43.5	40.45	17.6	1.57	32.5	-	-	P	H
		167.74	30.24	-13.26	43.5	45.09	15.83	1.82	32.5	-	-	P	H
		239.52	31.57	-14.43	46	44.78	17.24	2.06	32.51	-	-	P	H
		480.08	33.11	-12.89	46	39.29	23.6	2.79	32.57	-	-	P	H
		713.85	37.09	-8.91	46	39.16	26.85	3.45	32.37	100	0	P	H
		69.77	23.95	-16.05	40	43.1	12.28	1.13	32.56	-	-	P	V
		167.74	25.37	-18.13	43.5	40.22	15.83	1.82	32.5	-	-	P	V
		191.99	23.53	-19.97	43.5	39.28	14.8	1.94	32.49	-	-	P	V
		480.08	34.11	-11.89	46	40.29	23.6	2.79	32.57	100	0	P	V
		676.02	30.06	-15.94	46	32.55	26.6	3.36	32.45	-	-	P	V
		719.67	32.67	-13.33	46	34.39	27.18	3.46	32.36	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

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

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

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

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

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

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

Appendix F. Cabinet Radiated Spurious Emission Plots

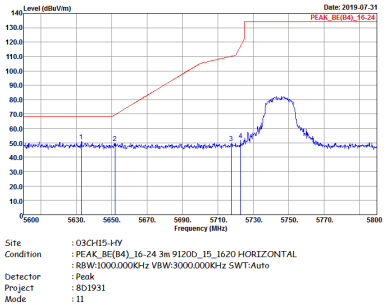
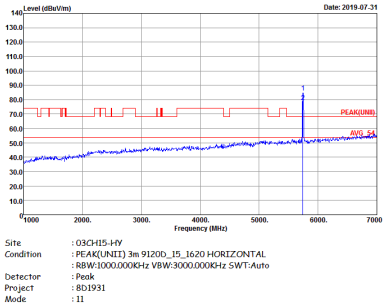
Test Engineer :	Karl Hou, Big Show Wang	**Temperature :**	23~26°C
		Relative Humidity :	50~65%

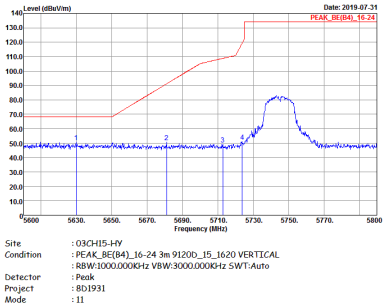
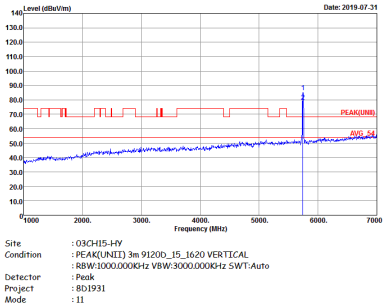
Note symbol

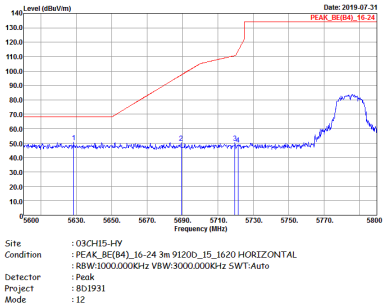
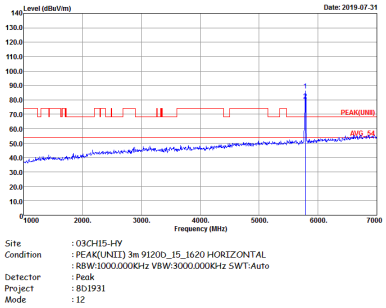
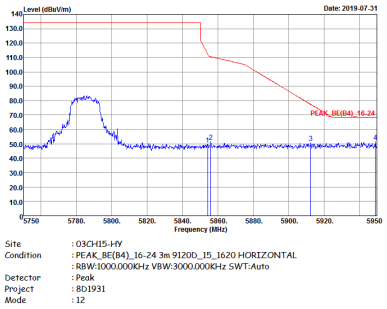
-L	**Low channel location**
-R	**High channel location**

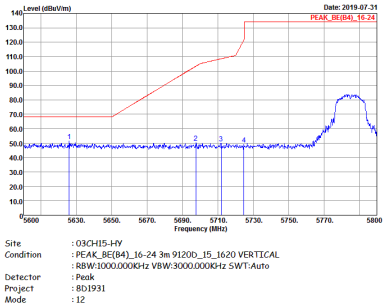
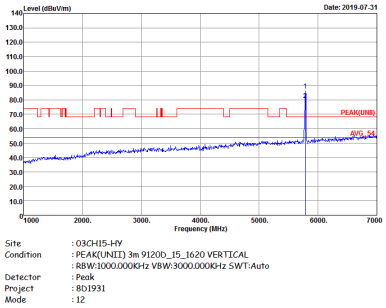
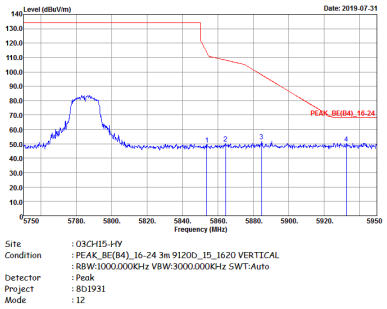
Band 4 - 5725~5850MHz

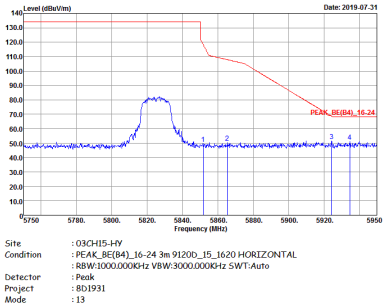
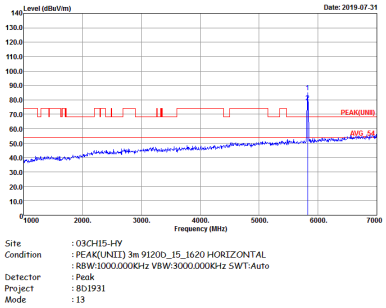
WIFI 802.11a (Band Edge @ 3m)

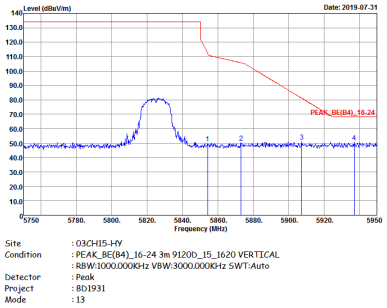
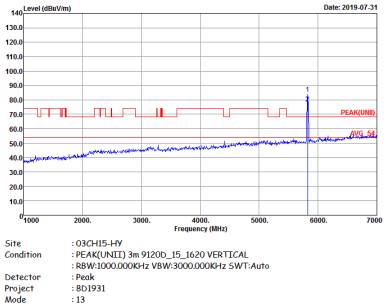
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
1	Horizontal	Fundamental
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
1	Vertical	Fundamental
Peak		

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Fundamental
Peak		
Peak		Left blank

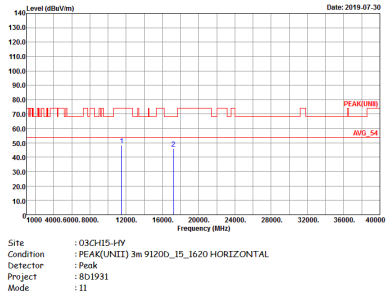
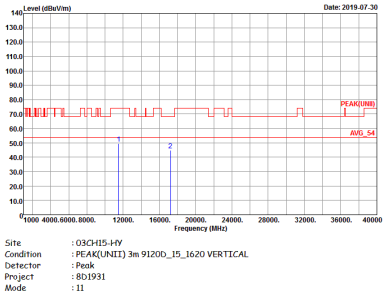
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Vertical	Fundamental
Peak		
Peak		Left blank

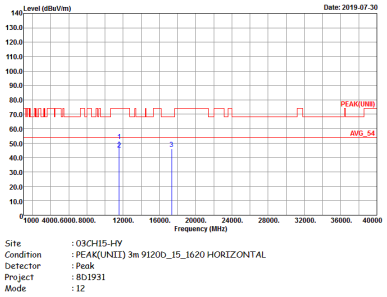
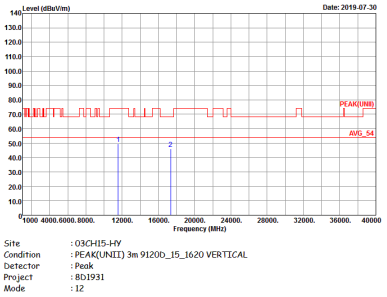
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
1	Horizontal	Fundamental
Peak		

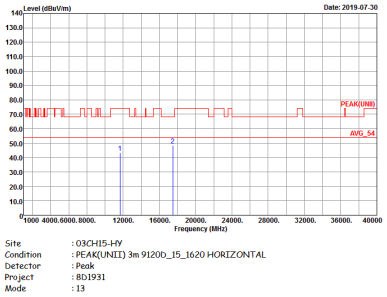
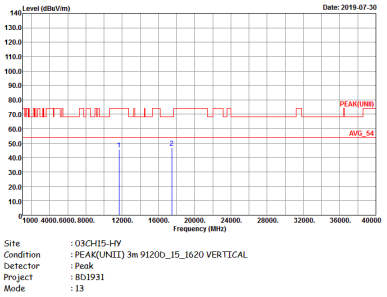
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
1	Vertical	Fundamental
Peak		

Band 4 - 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

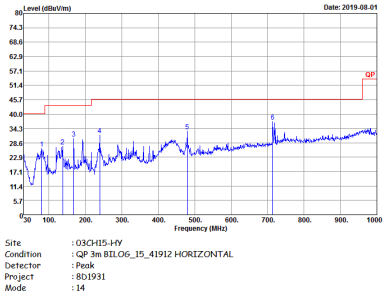
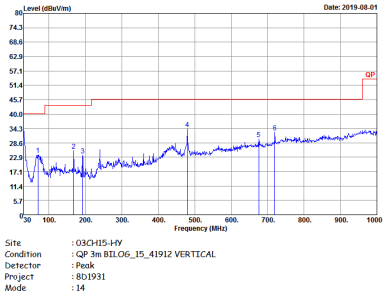
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH149 5745MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH165 5825MHz	
1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

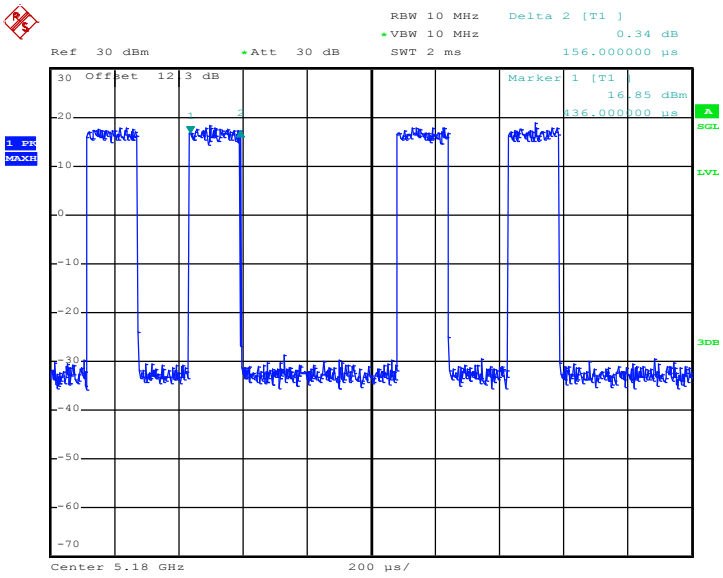
5GHz WIFI 802.11a (LF)

WIFI	5GHz 5725~5850MHz	
ANT	802.11a LF	
1	Horizontal	Vertical
QP / Peak		

Appendix G. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
802.11a	30.20	156	6.41	10kHz

802.11a



Date: 29.JUL.2019 17:00:46