

TEST REPORT

Product Name : reMarkable paper tablet
Trade mark : reMarkable
Model/Type reference : RM100
Serial Number : N/A
Report Number : EED32J00094002
FCC ID : 2AMK2-RM100
Date of Issue : Aug. 23, 2017
Test Standards : 47 CFR Part 15 Subpart E
Test result : PASS

Prepared for:

reMarkable AS
Pilestredet 75C, 0354, Oslo, Norway

Prepared by:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District,
Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Tested By:

Tom - chen

Compiled by:

Kevin Yang

Tom chen (Test Project)

Kevin yang (Project Engineer)

Reviewed by:

Kevin lan

Approved by:

Sheek Luo

Kevin lan (Reviewer)

Sheek Luo (Lab supervisor)

Date:

Aug. 23, 2017

Check No.:2496527073



2 Version

Version No.	Date	Description
00	Aug. 23, 2017	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart E Section 15.407 (b)(6)	ANSI C63.10-2013	PASS
Conducted Output Power and transmit power control mechanism	47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(4)(h)(1)	ANSI C63.10-2013	PASS
Emission Bandwidth	47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)	ANSI C63.10-2013	PASS
Peak Power Spectral Density	47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(5)	ANSI C63.10-2013	PASS
Frequency stability	47 CFR Part 15 Subpart E Section 15.407 (g)	ANSI C63.10-2013	PASS
Operation in the absence of information to the transmit	47 CFR Part 15 Subpart E Section 15.407 (c)	47 CFR Part 15 Subpart E	PASS
Unwanted Emissions that fall Outside of the Restricted Bands	47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(5)	ANSI C63.10-2013	PASS
Unwanted Emissions in the Restricted Bands	47 CFR Part 15 Subpart E Section 15.407 (b)(6)(7)(8)	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15 Subpart E Section 15.407 (b)(6)(7)(8)	ANSI C63.10-2013	PASS

Remark:

The tested sample and the sample information are provided by the client.

Tx: In this whole report Tx (or tx) means Transmitter.
 Rx: In this whole report Rx (or rx) means Receiver.
 RF: In this whole report RF means Radiated Frequency.
 CH: In this whole report CH means channel.
 Volt: In this whole report Volt means Voltage.
 Temp: In this whole report Temp means Temperature.
 Humid: In this whole report Humid means humidity.
 Press: In this whole report Press means Pressure.
 N/A: In this whole report not application.

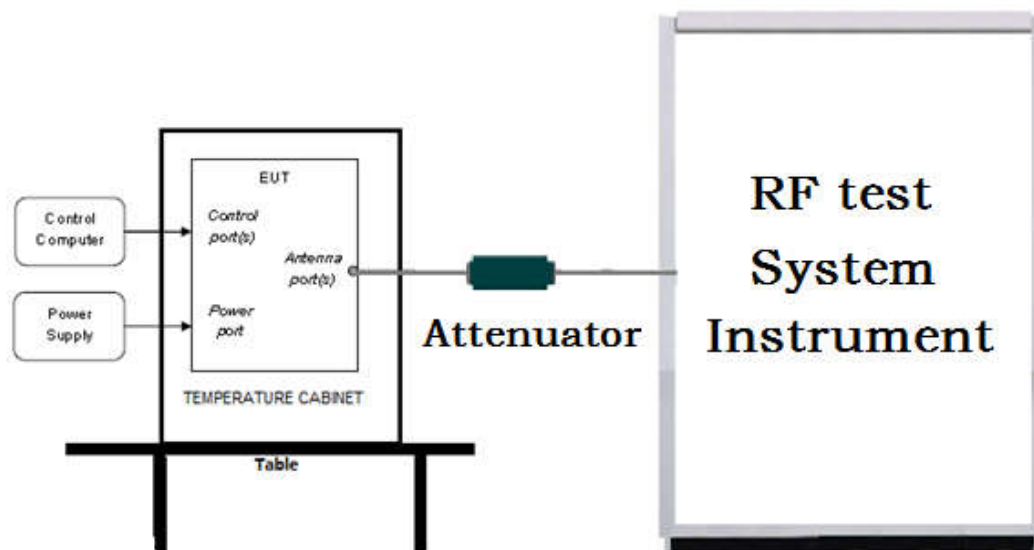
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5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

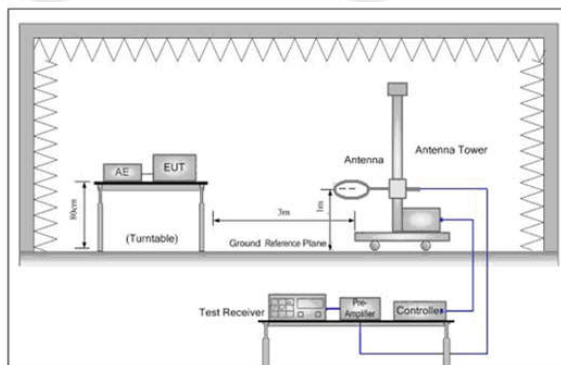


Figure 1. Below 30MHz

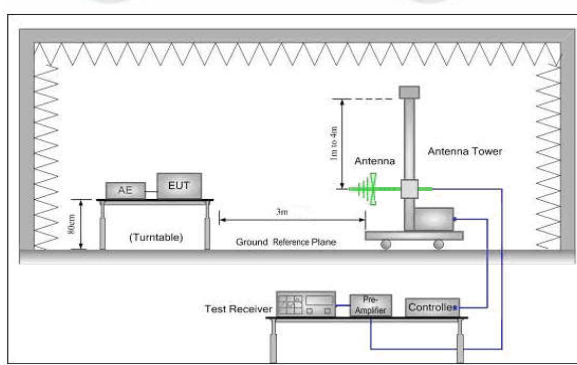


Figure 2. 30MHz to 1GHz

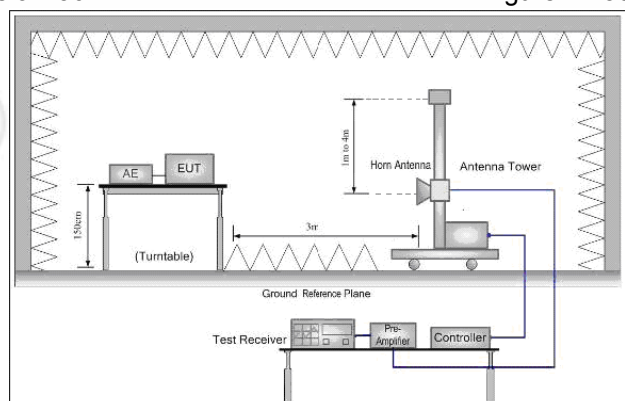
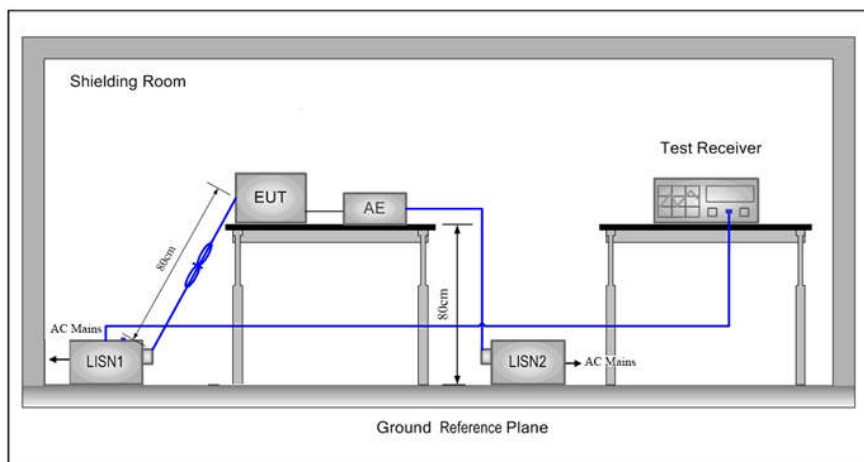


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	25°C
Humidity:	52% RH
Atmospheric Pressure:	1010 mbar

5.3 Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
802.11a	5150MHz ~5250 MHz	Channel 36	Channel 44	Channel 48
		5180MHz	5220MHz	5240MHz
802.11a	5725MHz ~5850 MHz	Channel 149	Channel 157	Channel 165
		5745MHz	5785MHz	5825MHz

Test mode:

Pre-scan under all rate at lowest channel 1

Mode	802.11a for 5150MHz ~5250 MHz							
Data Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Power(dBm)	12.71	12.66	12.60	12.53	12.49	12.40	12.33	12.29
Mode	802.11a for 5725MHz ~5850 MHz							
Data Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Power(dBm)	15.79	15.73	15.69	15.61	15.55	15.49	15.43	15.38

Through Pre-scan, MCS0 is the worst case of 802.11a (20M) for 5150MHz ~5250 MHz; MCS0 is the worst case of 802.11a (20M) for 5725MHz ~5850 MHz;

6 General Information

6.1 Client Information

Applicant:	reMarkable AS
Address of Applicant:	Pilestredet 75C, 0354, Oslo, Norway
Manufacturer:	reMarkable AS
Address of Manufacturer:	Pilestredet 75C, 0354, Oslo, Norway
Factory:	Dongguang Kaifa Technology Co., Ltd
Address of Factory:	Kaifa Park of CEC Industry Base, Humen town, Dongguan City, Guangdong Province

6.2 General Description of EUT

Product Name:	reMarkable paper tablet
Model No.:	RM100
Trade Mark:	reMarkable
EUT Supports Radios application:	Wlan 2.4GHz 802.11b/g/n(HT20): 2412MHz ~2462 MHz 5G: U-NII-1: 5.15-5.25GHz; U-NII-3: 5.725-5.850GHz; 802.11a (EUT can't operation in 2.4 GHz and 5 GHz simultaneous, the hardware and software limited to prevent simultaneous operation in the 2.4 GHz and 5GHz bands)
Power Supply:	DC5V by USB port
Battery:	DC 3.7V, 3000mAh
Sample Received Date:	May 16, 2017
Sample tested Date:	May 16, 2017 to Aug. 23, 2017

6.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11a: 5150MHz ~5250 MHz IEEE 802.11a: 5725MHz ~5850 MHz
Channel Numbers:	IEEE 802.11a: 5150MHz ~5250MHz/ 4 channel IEEE 802.11a: 5725MHz ~5850MHz/ 5 channel
Type of Modulation:	OFDM (64QAM, 16QAM, QPSK, BPSK)
Sample Type:	Portable production
Test Power Grade:	a :11 (manufacturer declare)
Test Software of EUT:	Secure CRT 6.5.0 (manufacturer declare)
Antenna Type and Gain:	PIFA Antenna and 5.07dBi
Test Voltage:	DC 5V by USB port

Operation Frequency each of channel

For 802.11a Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz

For 802.11a Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
149	5745MHz	162	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz	NA	NA

6.4 Description of Support Units

The EUT has been tested with associated equipment below.

Test Ancillary equipment		Model	Type	Remark
EUT B	Adapter	CAA-0002016-C	---	CTI

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101

Telephone: +86 (0) 755 3368 3668 Fax: +86 (0) 755 3368 3385

No tests were sub-contracted.

6.6 Deviation from Standards

None.

6.7 Abnormalities from Standard Conditions

None.

6.8 Other Information Requested by the Customer

None.

6.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.31dB (30MHz-1GHz)
		0.57dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-12.75GHz)
4	Conduction emission	3.6dB (9kHz to 150kHz)
		3.2dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	2.8%
7	DC power voltages	0.025%

7 Equipment List

RF test system					
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Signal Generator	Keysight	E8257D	MY53401106	03-14-2017	03-13-2018
Communication test set test set	Agilent	N4010A	MY51400230	03-14-2017	03-13-2018
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-14-2017	03-13-2018
Signal Generator	Keysight	N5182B	MY53051549	03-14-2017	03-13-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-11-2017	01-10-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-11-2017	01-10-2018
DC Power	Keysight	E3642A	MY54436035	03-14-2017	03-13-2018
PC-1	Lenovo	R4960d	---	04-01-2017	03-31-2018
BT&Wi-Fi Automatic control	R&S	OSP120	101374	03-14-2017	03-13-2018
RF control unit	JS Tonscend	JS0806-2	158060006	03-14-2017	03-13-2018
BT&Wi-Fi Automatic test software	JS Tonscend	JS1120-2	---	03-14-2017	03-13-2018

Conducted disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESCI	100009	06-14-2017	06-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-08-2017	05-07-2018
Communication test set	Agilent	E5515C	GB47050534	03-14-2017	03-13-2018
Communication test set	R&S	CMW500	152394	03-14-2017	03-13-2018
LISN	R&S	ENV216	100098	06-13-2017	06-12-2018
LISN	schwarzbeck	NNLK8121	8121-529	06-13-2017	06-12-2018
Voltage Probe	R&S	ESH2-Z3	--	06-13-2017	06-11-2020
Current Probe	R&S	EZ17	100106	06-13-2017	06-12-2018
ISN	TESEQ GmbH	ISN T800	30297	02-23-2017	02-22-2018

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06-05-2016	06-05-2019
TRILOG Broadband Antenna	SCHWARZBEC K	VULB9163	9163-484	05-23-2017	05-22-2018
Microwave Preamplifier	Agilent	8449B	3008A02425	02-16-2017	02-15-2018
Horn Antenna	ETS-LINDGREN	3117	00057407	07-20-2015	07-18-2018
Loop Antenna	ETS	6502	00071730	06-22-2017	06-21-2019
Microwave Preamplifier	A.H.SYSTEMS	PAP-1840-60	6041.6042	06-30-2015	06-28-2018
Horn Antenna	A.H.SYSTEMS	SAS-574	374	06-30-2015	06-28-2018
Microwave Preamplifier	A.H.SYSTEMS	PAP-1840-60	6041.6042	06-30-2015	06-28-2018
Horn Antenna	A.H.SYSTEMS	SAS-574	374	06-30-2015	06-28-2018
Spectrum Analyzer	R&S	FSP40	100416	06-13-2017	06-12-2018
Receiver	R&S	ESCI	100435	06-14-2017	06-13-2018
Multi device Controller	maturo	NCD/070/10711 112	---	01-12-2017	01-11-2018
LISN	schwarzbeck	NNBM8125	81251547	06-13-2017	06-12-2018
LISN	schwarzbeck	NNBM8125	81251548	06-13-2017	06-12-2018
Signal Generator	Agilent	E4438C	MY45095744	03-14-2017	03-13-2018
Signal Generator	Keysight	E8257D	MY53401106	03-14-2017	03-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-08-2017	05-07-2018
Cable line	Fulai(7M)	SF106	5219/6A	01-11-2017	01-10-2018
Cable line	Fulai(6M)	SF106	5220/6A	01-11-2017	01-10-2018
Cable line	Fulai(3M)	SF106	5216/6A	01-11-2017	01-10-2018
Cable line	Fulai(3M)	SF106	5217/6A	01-11-2017	01-10-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-11-2017	01-10-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX01CA09 CL12-0395-001	---	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX01CA08 CL12-0393-001	---	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX02CA04 CL12-0396-002	---	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX02CA03 CL12-0394-001	---	01-11-2017	01-10-2018

8 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15E	Subpart E—Unlicensed National Information Infrastructure
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB 789033 D02 General UNII Test Procedures New Rules v01r04	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15 subpart E

Test Results List:

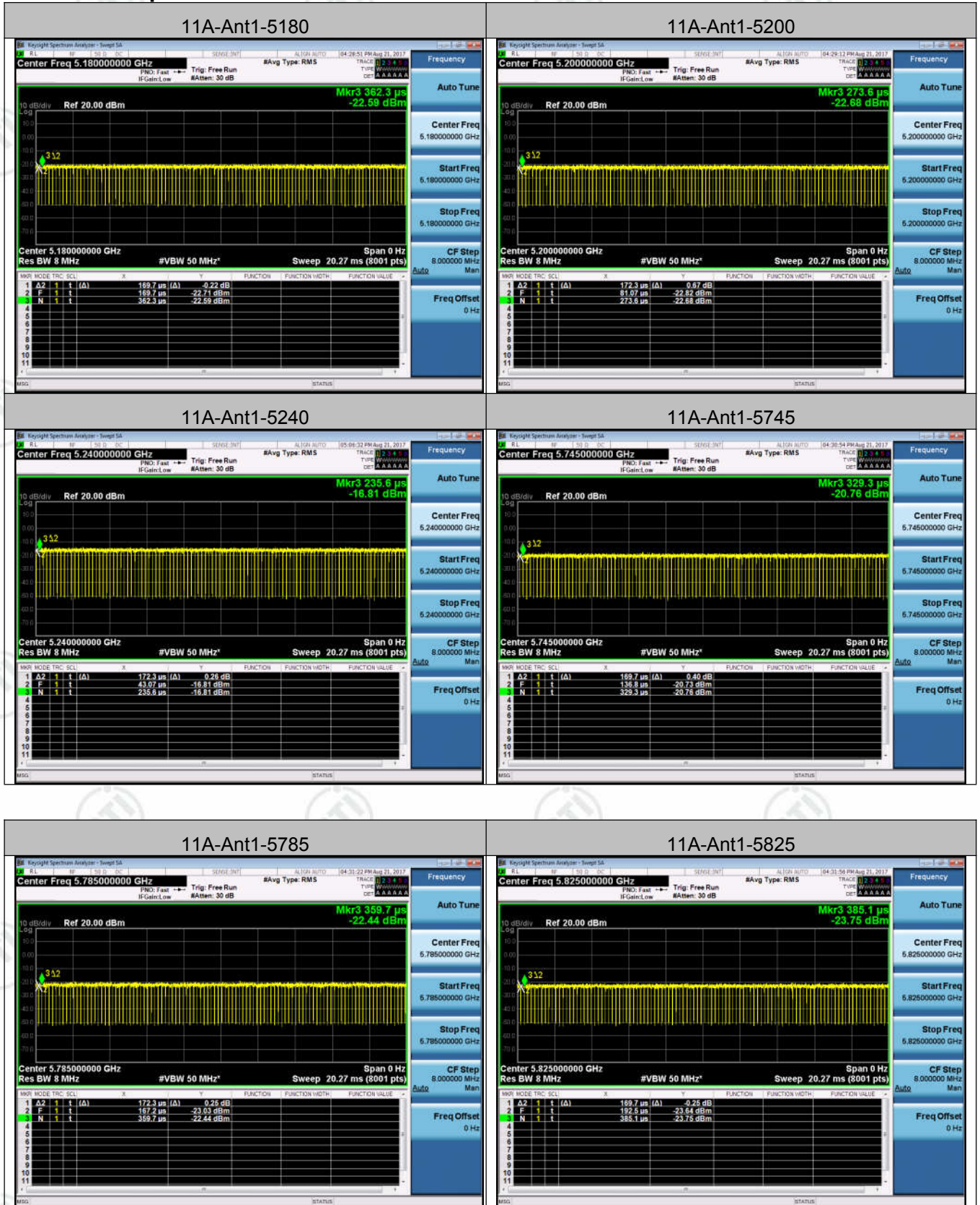
Test Requirement	Test method	Test item	Verdict	Note
Part15E Section 15.407 (a)(1)(2)	KDB789033	Emission Bandwidth and Occupied Bandwidth	PASS	Appendix B)
Part15E Section 15.407 (a)(1)(2)(4)(h)(1)	KDB789033	Conducted Output Power and transmit power control mechanism	PASS	Appendix C)
Part15E Section 15.407 (a)(1)(2)(5)	KDB789033	Power Spectral Density	PASS	Appendix D)
Part15E Section 15.407 (b)(1)to(6)	KDB789033	Band Edge Measurements	PASS	Appendix E)
Part15E Section 15.407 (g)	KDB789033	Frequency stability	PASS	Appendix F)
Part15C Section 15.203	ANSI C63.10	Antenna Requirement	PASS	Appendix G)
Part15E Section 15.407 (c)	Section 15.407	Operation in the absence of information to the transmit	PASS	Appendix H)
Part15E Section 15.407 (b)(6)	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix I)
Part15E Section 15.407 (b)(6)(7)(8)	KDB789033	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix J)
Part15E Section 15.407 (b)(6)(7)(8)	KDB789033	Unwanted Emissions in the Restricted Bands	PASS	Appendix K)
Part15E Section 15.407 (b)(1)(2)(3)(5)	KDB789033	Unwanted Emissions that fall Outside of the Restricted Bands	PASS	Appendix L)

Appendix A): Duty Cycle

Result Table

Test Mode	Antenna	Channel	Duty Cycle[%]	Verdict
11A	Ant1	5180	88.16%	PASS
11A	Ant1	5200	89.47%	PASS
11A	Ant1	5240	89.47%	PASS
11A	Ant1	5745	88.16%	PASS
11A	Ant1	5785	89.47%	PASS
11A	Ant1	5825	88.16%	PASS

Test Graph



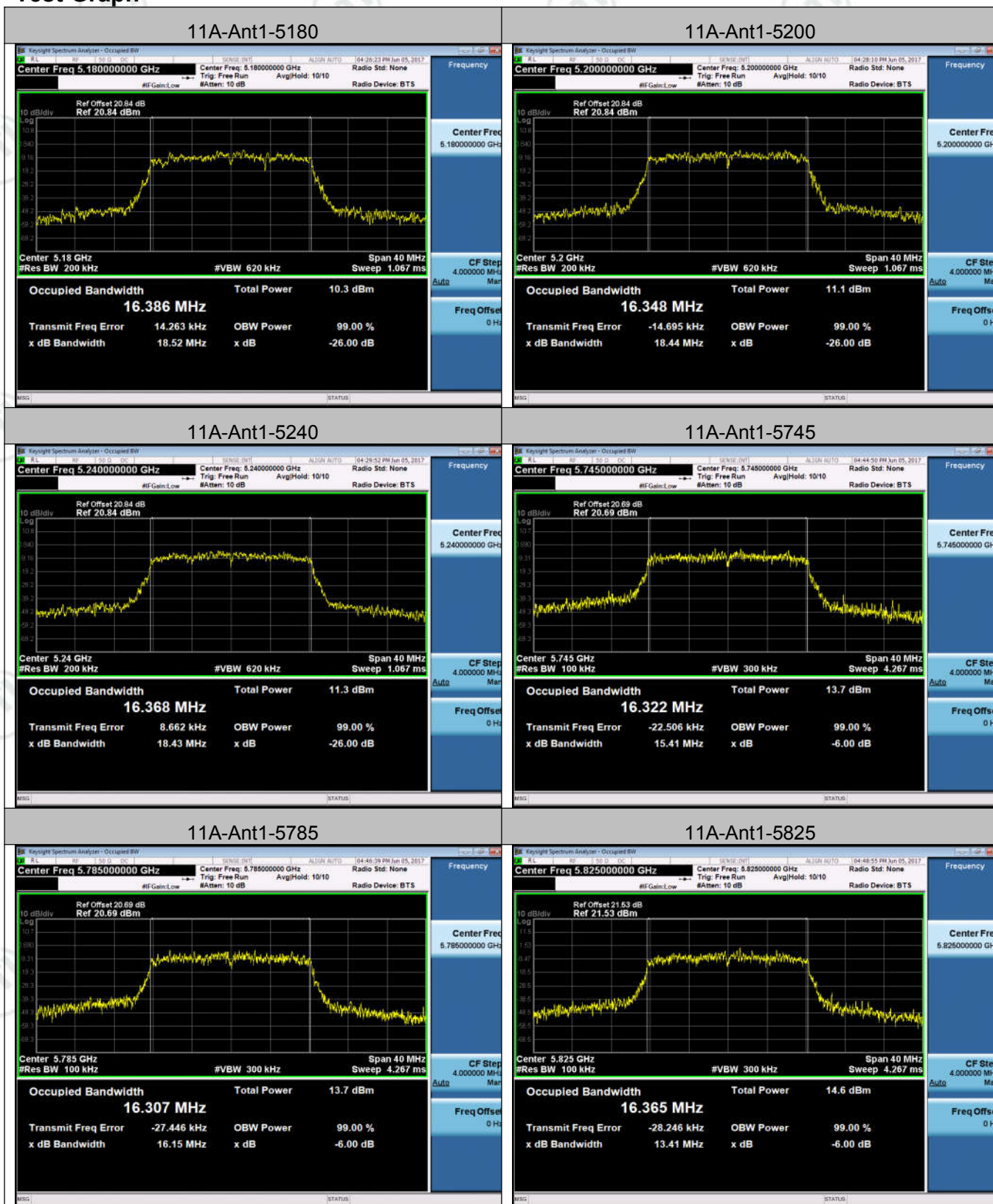
Appendix B): Emission Bandwidth

Result Table

Test Mode	Antenna	Channel	26dB EBW[MHz]	99% OBW[MHz]	Verdict
11A	Ant1	5180	18.52	16.386	PASS
11A	Ant1	5200	18.44	16.348	PASS
11A	Ant1	5240	18.43	16.368	PASS

Test Mode	Antenna	Channel	6dB EBW[MHz]	99% OBW[MHz]	Verdict
11A	Ant1	5745	15.41	16.322	PASS
11A	Ant1	5785	16.15	16.307	PASS
11A	Ant1	5825	13.41	16.365	PASS

Test Graph



Appendix C): Maximum Conduct Output Power

Result Table

Test Mode	Antenna	Channel	Meas.Level [dBm]	Av.Power [dBm]	Verdict
11A	Ant1	5180	10.6	11.14	PASS
11A	Ant1	5200	11.36	11.84	PASS
11A	Ant1	5240	11.7	12.18	PASS
11A	Ant1	5745	13.68	14.22	PASS
11A	Ant1	5785	13.57	14.05	PASS
11A	Ant1	5825	14.02	14.56	PASS

Remark:

1. According KDB789033 D02, If continuous transmission cannot be achieved the 10 log (1/duty cycle) should be add.

Av.Power=Meas.Level+10 log (1/duty cycle)

E.i.r.p=Av.Power+G, G = antenna gain in dBi.

2. Duty Cycle value in report Appendix A, Meas.Level value in report Appendix C,

For band 1, MCS0 mode, 802.11a channel 36:5180MHz, Duty Cycle value is 88.16%=0.8816, Meas.Level value is 10.6dBm, Av.Power=10.6+10 log (1/0.8816) =11.14dBm. E.i.r.p=11.14+5.07=16.21dBm.

Test Graph



Appendix D): Power Spectral Density

Result Table

Test Mode	Antenna	Channel	Meas.Level [dBm]	PSD [dBm/MHz]	Verdict
11A	Ant1	5180	4.57	5.11	PASS
11A	Ant1	5200	4.90	5.38	PASS
11A	Ant1	5240	5.65	6.13	PASS
Test Mode	Antenna	Channel	Meas.Level [dBm]	PSD [dBm/500kHz]	Verdict
11A	Ant1	5745	4.95	5.49	PASS
11A	Ant1	5785	4.53	5.01	PASS
11A	Ant1	5825	5.50	6.04	PASS

Remark:

1. According KDB789033 D02, If continuous transmission cannot be achieved the 10 log (1/duty cycle) should be add.

$PSD = Meas.Level + 10 \log (1/duty \ cycle)$

E.i.r.p spectral density = $PSD + G$, G = antenna gain in dBi.

2. Duty Cycle value in report Appendix A, Meas.Level value in report Appendix D,

For band 1, MCS0 mode, 802.11a channel 36:5180MHz, Duty Cycle value is 88.16%=0.8816, Meas.Level value is 4.57 in report Appendix D, $PSD = 4.57 + 10 \log (1/0.8816) = 5.11$.

E.i.r.p spectral density = $5.11 + 5.07 = 10.18$.

Test Graph

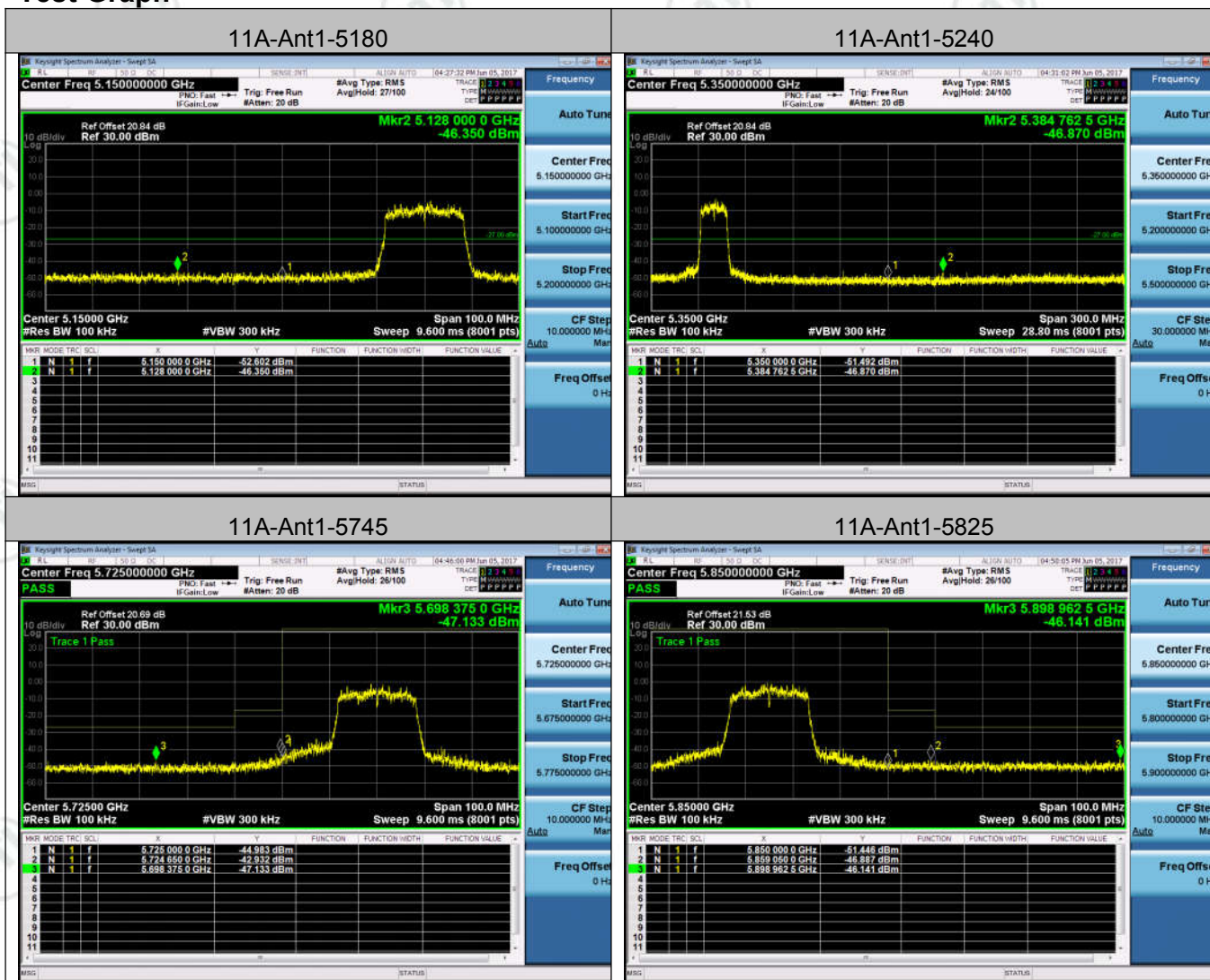


Appendix E): Band Edge Measurements

Result Table

Test Mode	Antenna	Channel	Max.Level [dBm]		Verdict
11A	Ant1	5180	-46.35		PASS
11A	Ant1	5240	-46.87		PASS
Test Mode	Antenna	Channel	Max.Level [dBm]		Verdict
			Below 5715	5715-5725	
11A	Ant1	5745	-47.133	-42.932	PASS
Test Mode	Antenna	Channel	Max.Level [dBm]		Verdict
			5850-5860	Above 5860	
11A	Ant1	5825	-45.165	-43.177	PASS

Test Graph



Appendix F): Frequency Stability

Frequency Error vs. Voltage:

Test Mode	Antenna	Channel	Temp.	Volt.	Freq.Error(MHz)	Freq.vs.rated(ppm)	Verdict
11A	Ant1	5180	TN	VL	5179.955	-8.687259	PASS
			TN	VN	5180.075	14.478764	PASS
			TN	VH	5179.94	-11.583012	PASS
11A	Ant1	5200	TN	VL	5199.985	-2.884615	PASS
			TN	VN	5199.985	-2.884615	PASS
			TN	VH	5200.06	11.538462	PASS
11A	Ant1	5240	TN	VL	5239.985	-2.862595	PASS
			TN	VN	5239.985	-2.862595	PASS
			TN	VH	5239.94	-11.450382	PASS
11A	Ant1	5745	TN	VL	5745.015	2.610966	PASS
			TN	VN	5745	0	PASS
			TN	VH	5745	0	PASS
11A	Ant1	5785	TN	VL	5784.955	-7.778738	PASS
			TN	VN	5785.03	5.185825	PASS
			TN	VH	5784.985	-2.592913	PASS
11A	Ant1	5825	TN	VL	5824.94	-10.300429	PASS
			TN	VN	5825.015	2.575107	PASS
			TN	VH	5824.94	-10.300429	PASS

Frequency Error vs. Temperature:

Test Mode	Antenna	Channel	Temp.	Volt.	Freq.Error(MHz)	Freq.vs.rated(ppm)	Verdict
11A	Ant1	5180	50	VN	5179.985	-2.895753	PASS
			40	VN	5180.03	5.791506	PASS
			30	VN	5179.985	-2.895753	PASS
			20	VN	5180	0	PASS
			10	VN	5180	0	PASS
			0	VN	5179.94	-11.583012	PASS
			-10	VN	5180.06	11.583012	PASS
			-20	VN	5179.985	-2.895753	PASS
			-30	VN	5179.955	-8.687259	PASS
11A	Ant1	5200	50	VN	5200.03	5.769231	PASS
			40	VN	5200	0	PASS
			30	VN	5200.06	11.538462	PASS
			20	VN	5199.97	-5.769231	PASS
			10	VN	5199.985	-2.884615	PASS
			0	VN	5200.015	2.884615	PASS
			-10	VN	5199.97	-5.769231	PASS
			-20	VN	5199.97	-5.769231	PASS
			-30	VN	5199.94	-11.538462	PASS
11A	Ant1	5240	50	VN	5239.955	-8.587786	PASS
			40	VN	5240	0	PASS
			30	VN	5240.03	5.725191	PASS
			20	VN	5239.97	-5.725191	PASS
			10	VN	5240.045	8.587786	PASS
			0	VN	5239.94	-11.450382	PASS
			-10	VN	5240.03	5.725191	PASS
			-20	VN	5239.97	-5.725191	PASS
			-30	VN	5240.045	8.587786	PASS
11A	Ant1	5745	50	VN	5744.94	-10.443864	PASS
			40	VN	5744.97	-5.221932	PASS
			30	VN	5745.03	5.221932	PASS
			20	VN	5744.955	-7.832898	PASS

			10	VN	5745.03	5.221932	PASS
			0	VN	5745	0	PASS
			-10	VN	5744.985	-2.610966	PASS
			-20	VN	5745.045	7.832898	PASS
			-30	VN	5745.06	10.443864	PASS
11A	Ant1	5785	50	VN	5785.045	7.778738	PASS
			40	VN	5784.94	-10.371651	PASS
			30	VN	5784.955	-7.778738	PASS
			20	VN	5785.015	2.592913	PASS
			10	VN	5784.94	-10.371651	PASS
			0	VN	5785.03	5.185825	PASS
			-10	VN	5785	0	PASS
			-20	VN	5784.97	-5.185825	PASS
			-30	VN	5784.955	-7.778738	PASS
11A	Ant1	5825	50	VN	5825.045	7.725322	PASS
			40	VN	5825	0	PASS
			30	VN	5825.045	7.725322	PASS
			20	VN	5825	0	PASS
			10	VN	5825.045	7.725322	PASS
			0	VN	5825	0	PASS
			-10	VN	5824.985	-2.575107	PASS
			-20	VN	5824.985	-2.575107	PASS
			-30	VN	5824.985	-2.575107	PASS

Appendix G): Antenna Requirement

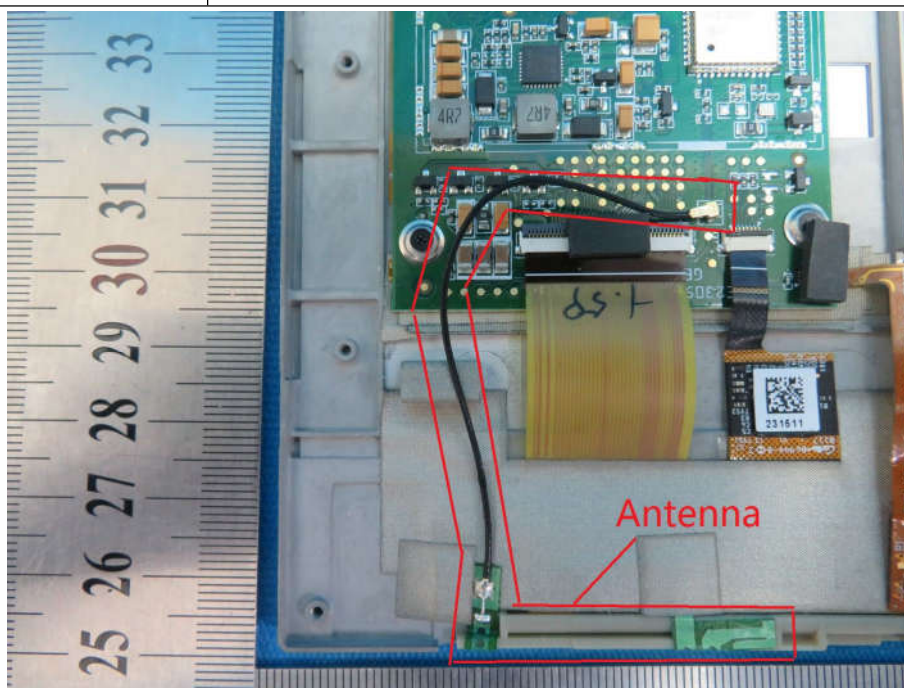
15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.407(a)(1) (2) requirement:

The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:



The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the WIFI antenna is 5.07dBi.

Appendix H): Operation in the absence of information to the transmit

15.407(c) requirement:

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 signal ling 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 a description of how this requirement is met.

Operation in the absence of information to the transmit

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 ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission. (manufacturer declare)

Appendix I): AC Power Line Conducted Emission

Test Procedure:	Test frequency range :150KHz-30MHz 1)The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.														
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> * The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. NOTE : The lower limit is applicable at the transition frequency	Frequency range (MHz)	Limit (dBμV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBμV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													

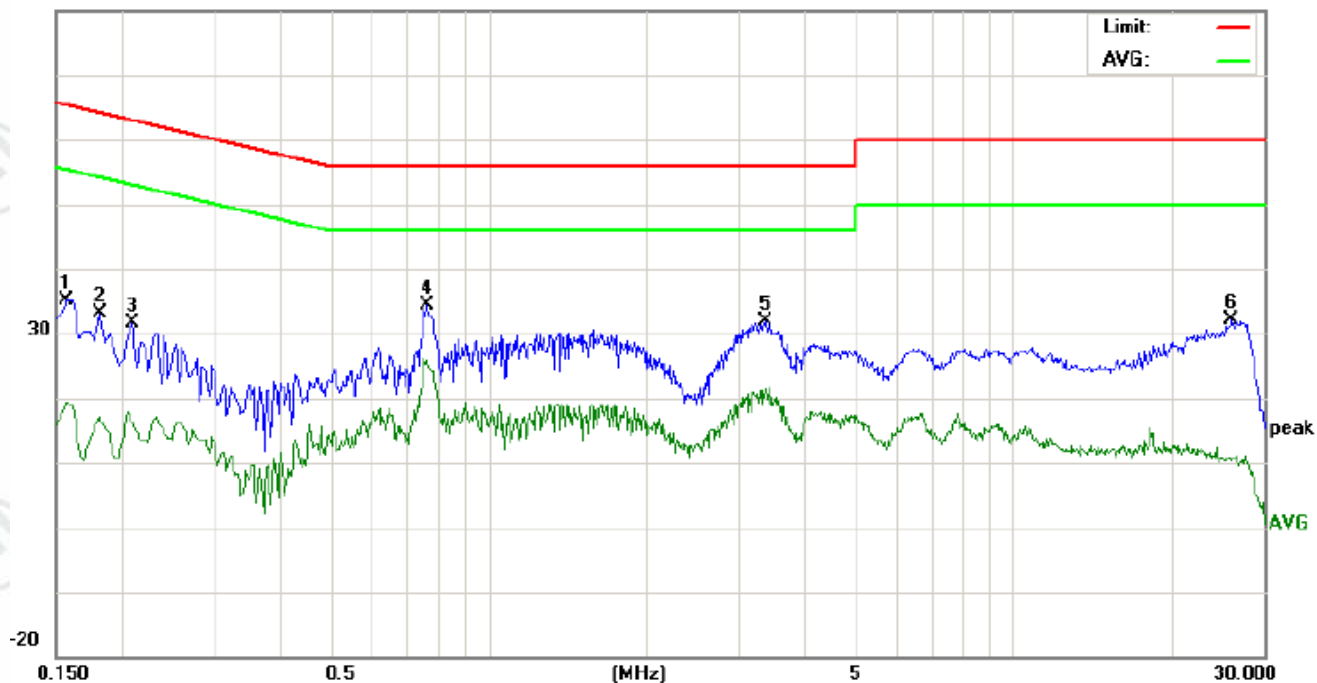
Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:

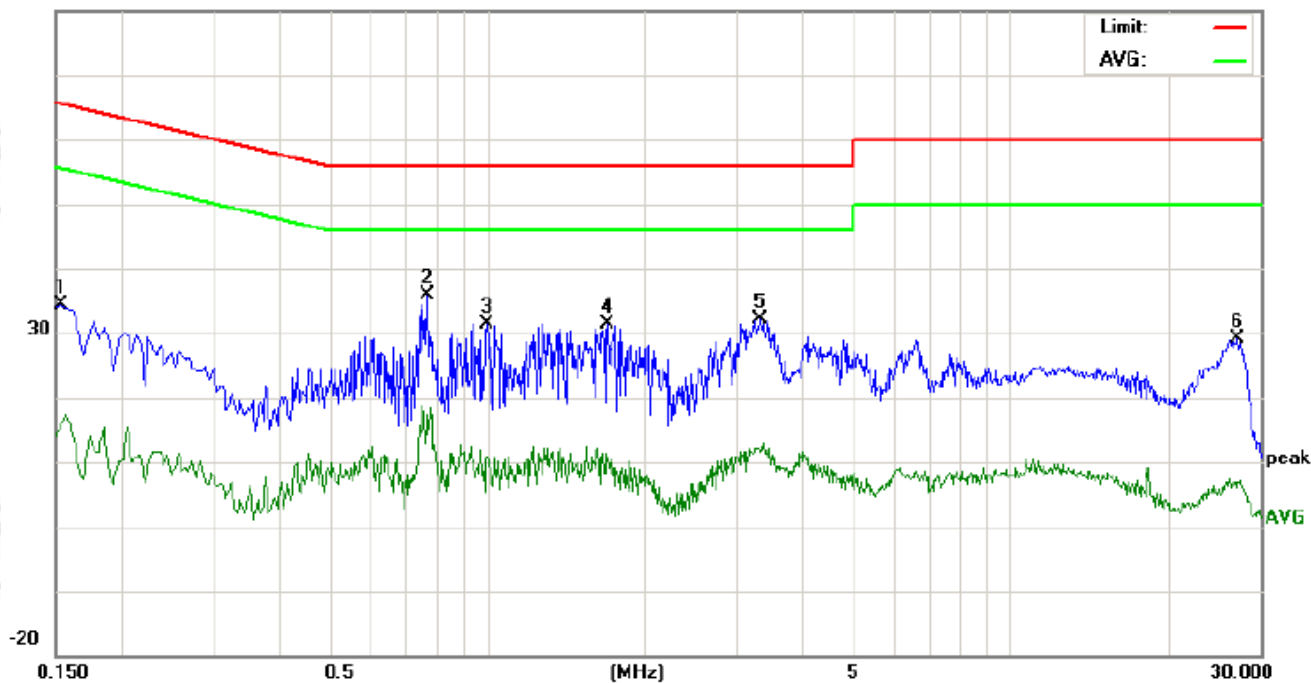
80.0 dBuV



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1580	25.37	21.38	8.51	9.76	35.13	31.14	18.27	65.56	55.56	-34.42	-37.29	P	
2	0.1819	23.46	18.76	7.03	9.73	33.19	28.49	16.76	64.39	54.39	-35.90	-37.63	P	
3	0.2100	21.86	16.69	6.09	9.72	31.58	26.41	15.81	63.20	53.20	-36.79	-37.39	P	
4	0.7660	24.75	21.68	15.51	9.74	34.49	31.42	25.25	56.00	46.00	-24.58	-20.75	P	
5	3.3660	22.08	17.52	8.64	9.67	31.75	27.19	18.31	56.00	46.00	-28.81	-27.69	P	
6	26.1380	21.92	15.10	-2.35	10.18	32.10	25.28	7.83	60.00	50.00	-34.72	-42.17	P	

Neutral line:

80.0 dBuV



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1539	24.57	21.13	5.11	9.76	34.33	30.89	14.87	65.78	55.78	-34.89	-40.91	P	
2	0.7700	26.05	18.01	6.64	9.74	35.79	27.75	16.38	56.00	46.00	-28.25	-29.62	P	
3	1.0020	21.83	11.40	-0.44	9.62	31.45	21.02	9.18	56.00	46.00	-34.98	-36.82	P	
4	1.7020	21.59	10.99	-1.11	9.69	31.28	20.68	8.58	56.00	46.00	-35.32	-37.42	P	
5	3.3420	22.39	11.69	0.15	9.68	32.07	21.37	9.83	56.00	46.00	-34.63	-36.17	P	
6	27.1740	18.85	12.07	-6.64	10.19	29.04	22.26	3.55	60.00	50.00	-37.74	-46.45	P	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

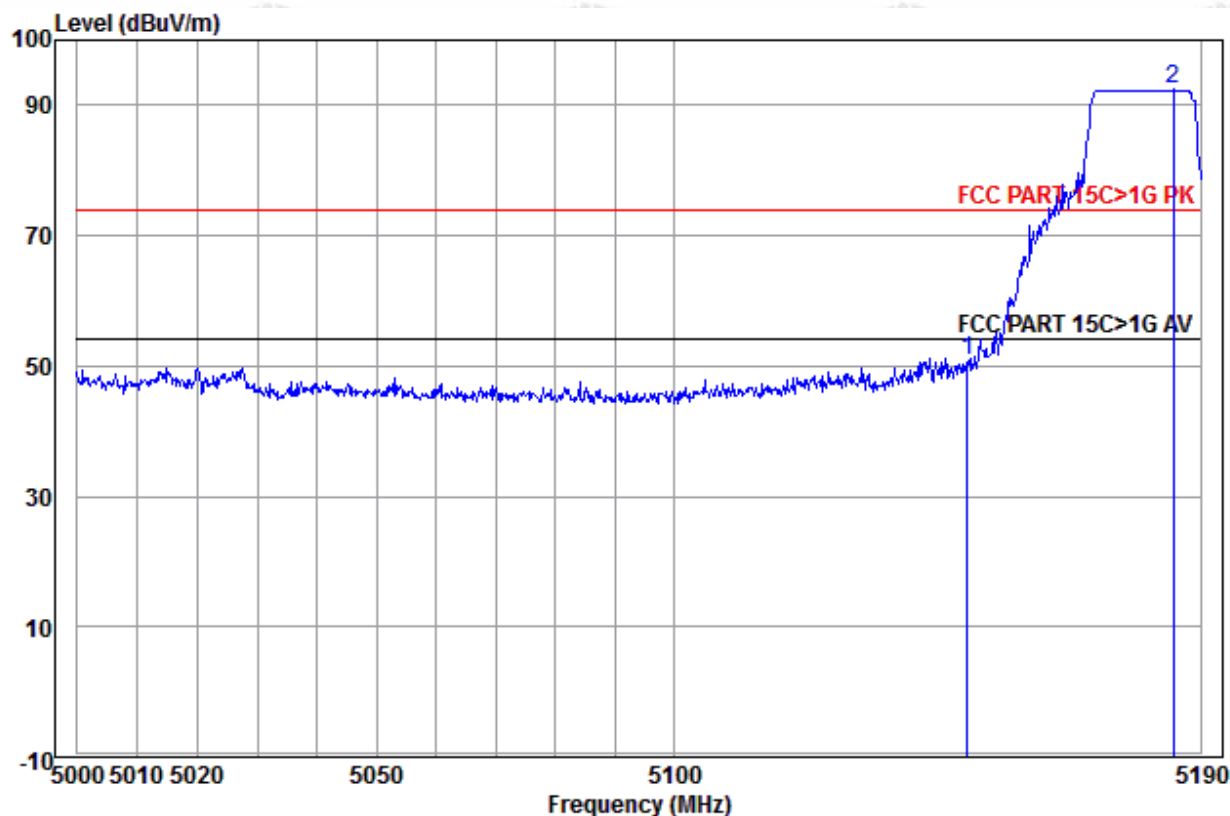
Appendix J): Restricted bands around fundamental frequency (Radiated Emission)

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Test Procedure:	Below 1GHz test procedure as below: - The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. - The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. - The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. - For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading. - The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. - Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel Above 1GHz test procedure as below: - Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre). - Test the EUT in the lowest channel , the Highest channel - The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. - Repeat above procedures until all frequencies measured was complete.				
Limit:	Frequency	Limit (dBμV/m @3cm)		Remark	
	30MHz-88MHz	40.0		Quasi-peak Value	
	88MHz-216MHz	43.5		Quasi-peak Value	
	216MHz-960MHz	46.0		Quasi-peak Value	
	960MHz-1GHz	54.0		Quasi-peak Value	
	Above 1GHz	54.0		Average Value	
		74.0		Peak Value	

Test plot as follows:

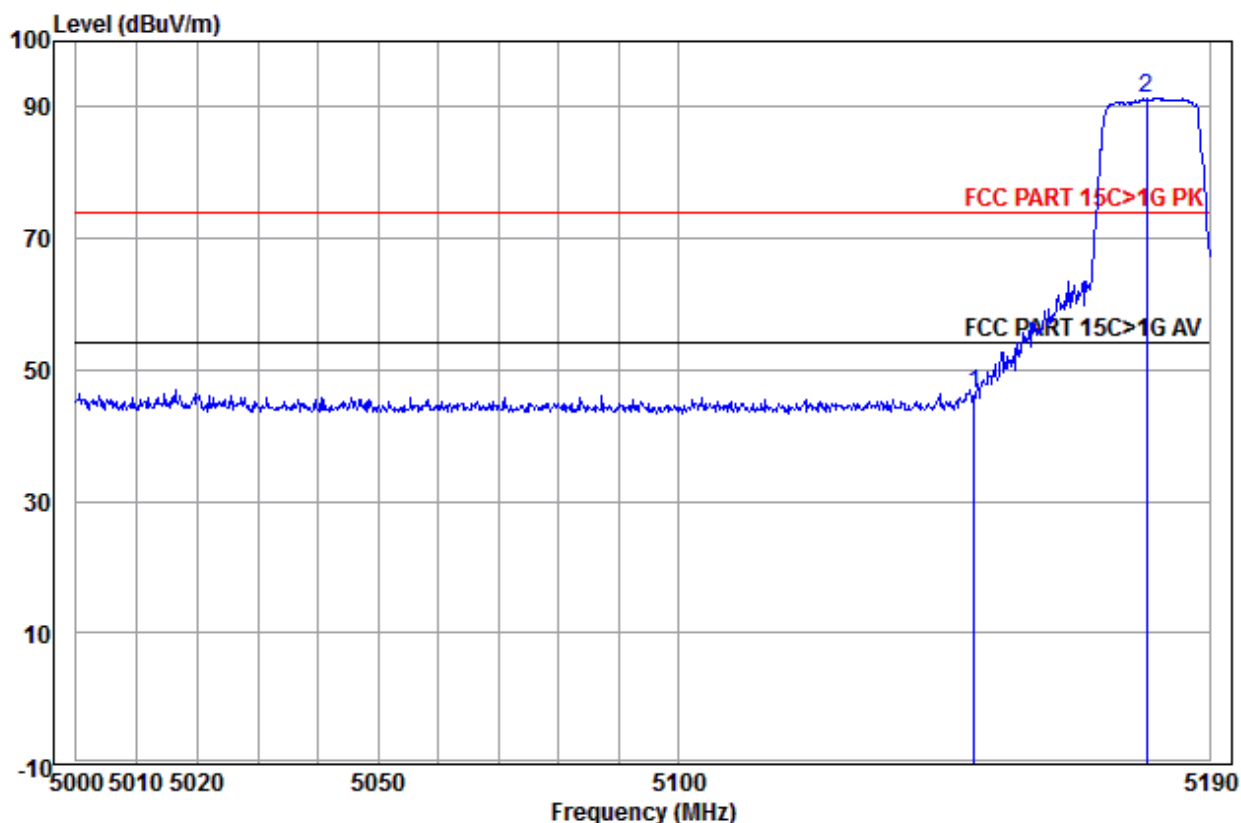
For 802.11a Operation in the 5150MHz ~5250 MHz band

Worse case mode:	802.11a (MCS0)		
Frequency: 5180MHz	Test channel: 36 channel	Polarization: Horizontal	Remark: Peak



	Ant Freq	Preamp Factor	Read Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dB	
1	5150.000	35.23	44.58	54.62	50.70	74.00	-23.30 Horizontal
2 pp	5185.356	35.26	44.58	96.19	92.39	74.00	18.39 Horizontal

Worse case mode:	802.11a (MCS0)		
Frequency: 5180MHz	Test channel: 36 channel	Polarization: Vertical	Remark: Peak



	Ant Freq	Preamp Factor	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dB	
1	5150.000	35.23	44.58	50.42	46.50	74.00	-27.50 Vertical
2 pp	5179.365	35.25	44.58	95.28	91.45	74.00	17.45 Vertical

Note:

1) Through Pre-scan transmitting mode with all kind of modulation and data rate, find the MCS0 is the worst case of 802.11a; and then Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading - Correct Factor

Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

Appendix K): Unwanted Emissions in the Restricted Bands (Radiated Emission)

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Test Procedure:					
Below 1GHz test procedure as below:					
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.					
Above 1GHz test procedure as below:					
g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre) h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. j. Repeat above procedures until all frequencies measured was complete.					
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBµV/cm)	Remark	Measurement distance (cm)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				
Test result:					
PASS					

Radiated Spurious Emissions test Data:

Radiated Emission below 1GHz

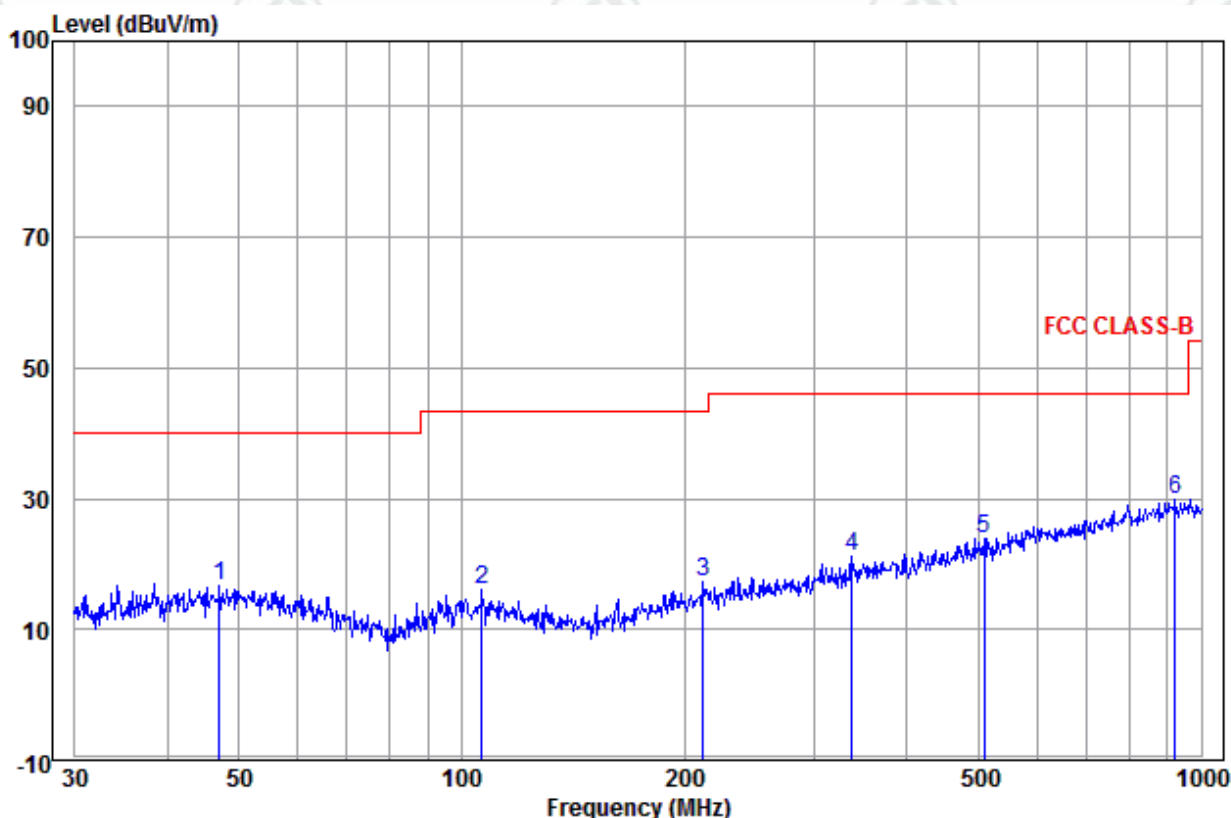
30MHz~1GHz (QP)

Worse case mode:802.11a(MCS0)

Test Frequency: 5180MHz

Transmitting

Horizontal



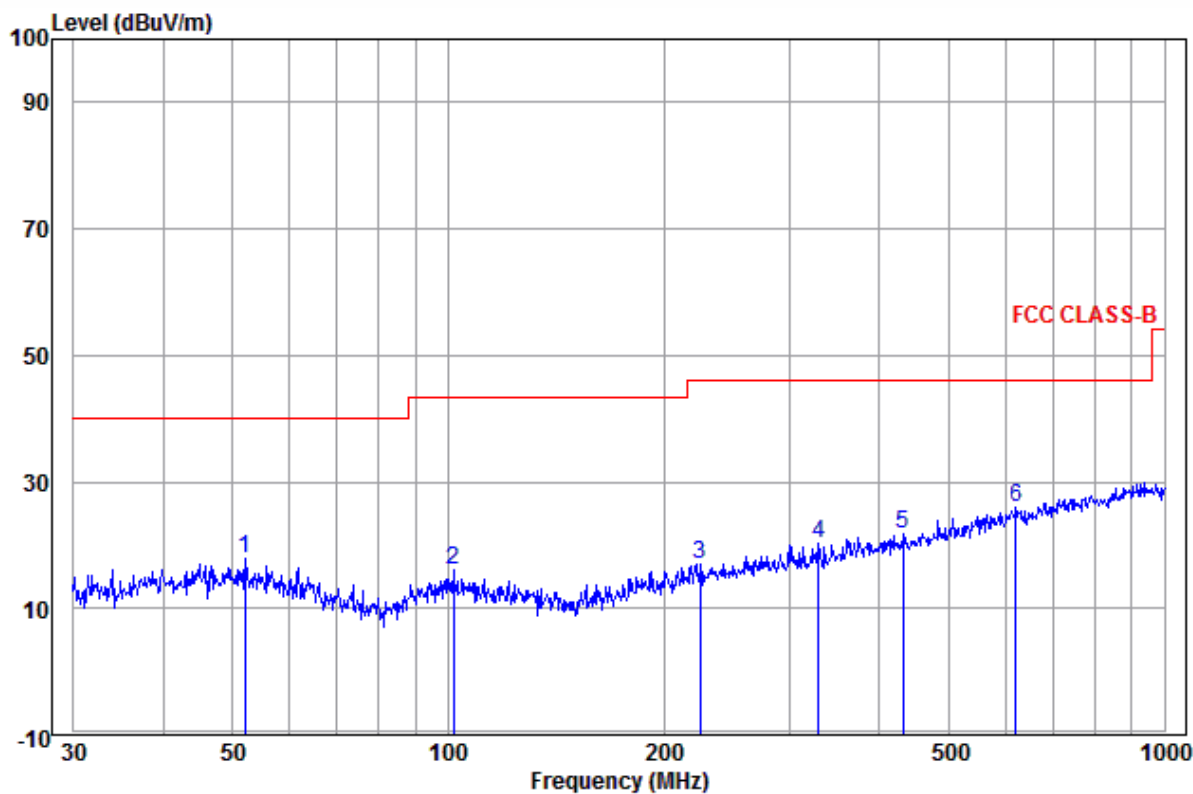
	Ant Freq	Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	46.995	13.05	0.09	3.61	16.75	40.00	-23.25	Horizontal
2	106.385	10.60	0.59	4.89	16.08	43.50	-27.42	Horizontal
3	212.270	11.27	1.16	4.83	17.26	43.50	-26.24	Horizontal
4	337.216	14.26	1.26	5.64	21.16	46.00	-24.84	Horizontal
5	508.258	17.34	1.52	5.08	23.94	46.00	-22.06	Horizontal
6 pp	922.516	22.23	2.43	5.09	29.75	46.00	-16.25	Horizontal

Worse case mode:802.11a(MCS0)

Test Frequency: 5180MHz

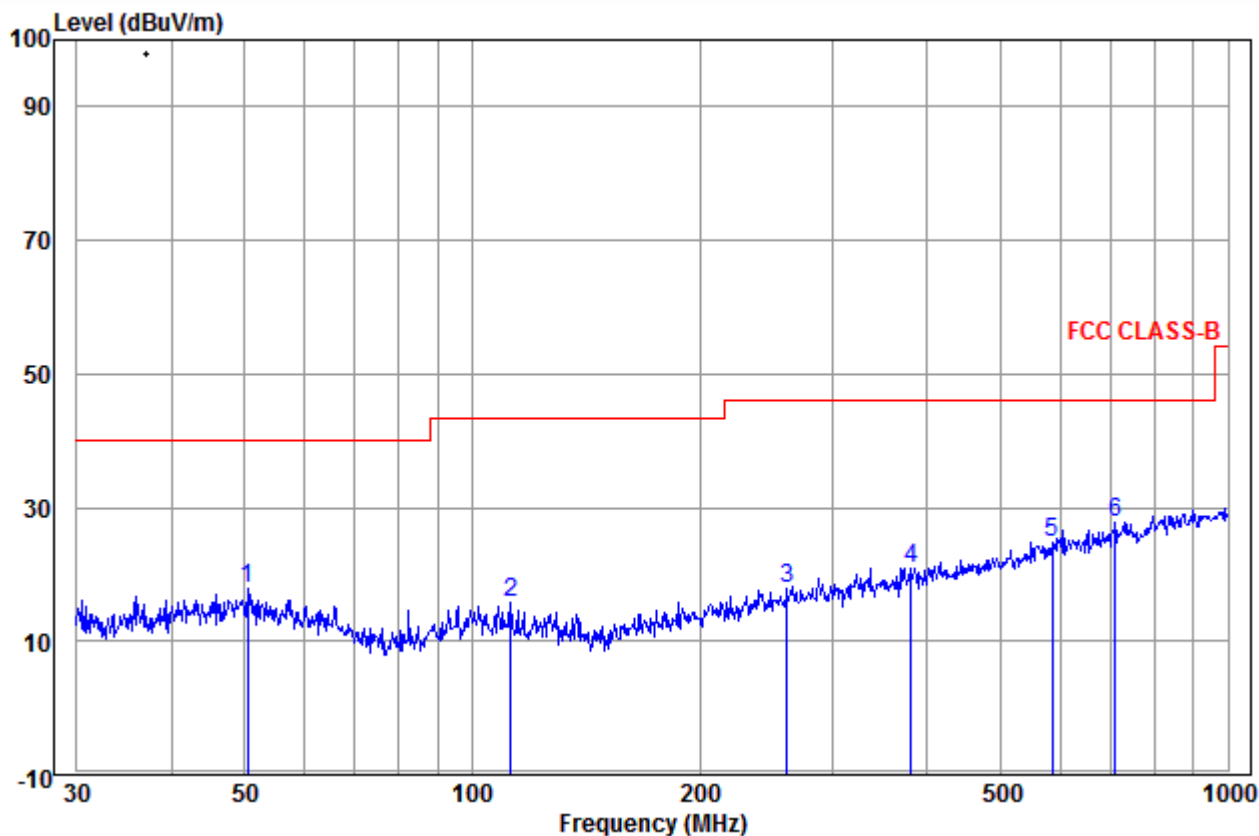
Transmitting

Vertical



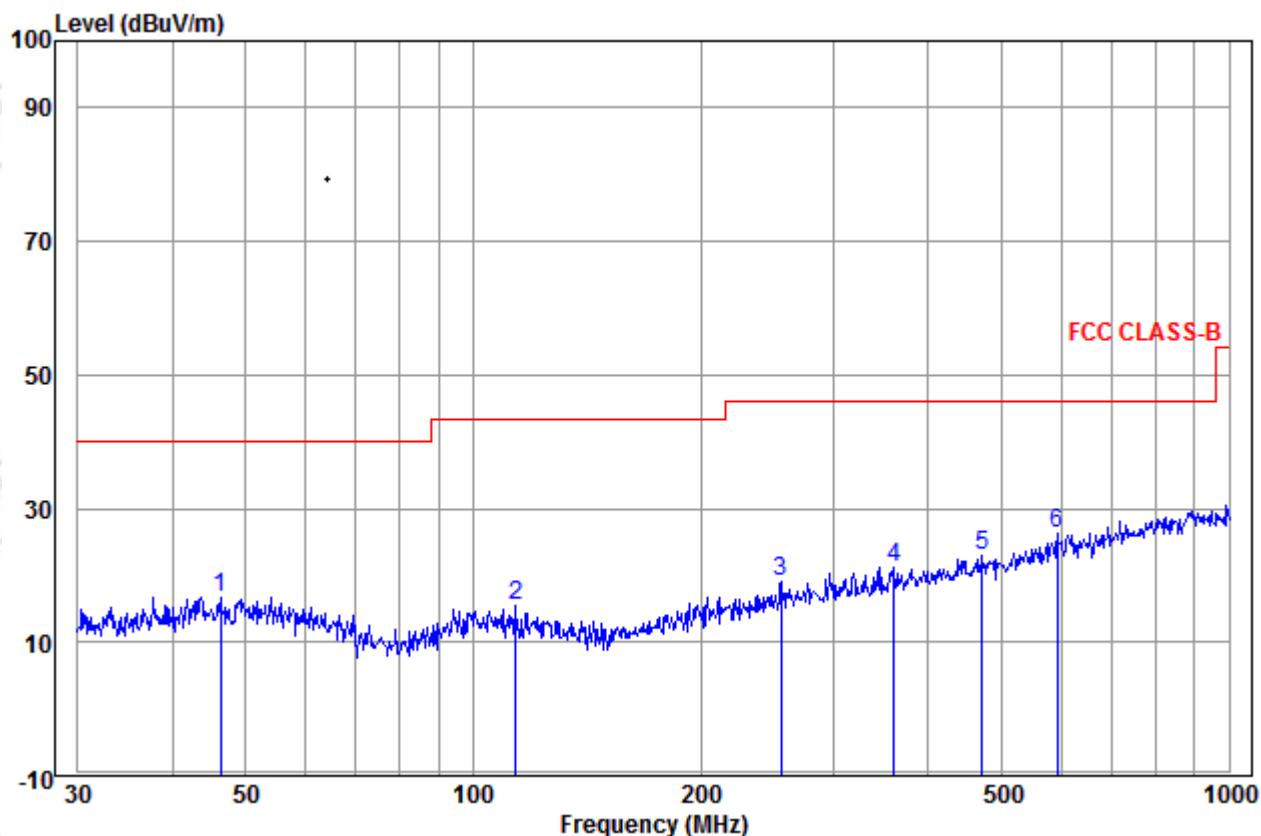
	Ant Freq	Ant Factor	Cable Loss	Read Level	Limit Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	52.025	12.89	0.13	4.74	17.76	40.00	-22.24	Vertical	
2	101.644	10.97	0.59	4.44	16.00	43.50	-27.50	Vertical	
3	224.519	11.52	1.22	4.17	16.91	46.00	-29.09	Vertical	
4	329.039	14.10	1.22	4.99	20.31	46.00	-25.69	Vertical	
5	431.032	16.01	1.42	4.39	21.82	46.00	-24.18	Vertical	
6 pp	620.710	18.94	1.83	5.16	25.93	46.00	-20.07	Vertical	

30MHz~1GHz (QP)			
Worse case mode:802.11a(MCS0)	Test Frequency: 5745MHz	Transmitting	Horizontal



	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz		dB	dBuV	dBuV/m	dBuV/m	dB		
1	50.409	13.22	0.11	4.47	17.80	40.00	-22.20	Horizontal	
2	112.524	10.14	0.60	5.02	15.76	43.50	-27.74	Horizontal	
3	261.058	12.36	1.28	4.13	17.77	46.00	-28.23	Horizontal	
4	381.249	15.14	1.32	4.54	21.00	46.00	-25.00	Horizontal	
5	584.790	18.63	1.74	4.50	24.87	46.00	-21.13	Horizontal	
6 pp	709.182	19.92	2.11	5.84	27.87	46.00	-18.13	Horizontal	

Worse case mode:802.11a(MCS0)	Test Frequency: 5745MHz	Transmitting	Vertical
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	Ant Freq	Ant Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	46.340	12.99	0.09	3.73	16.81	40.00	-23.19	Vertical
2	113.714	10.05	0.60	4.74	15.39	43.50	-28.11	Vertical
3	255.623	12.18	1.31	5.53	19.02	46.00	-26.98	Vertical
4	360.448	14.72	1.32	5.27	21.31	46.00	-24.69	Vertical
5	472.176	16.71	1.49	4.78	22.98	46.00	-23.02	Vertical
6 pp	593.050	18.78	1.79	5.82	26.39	46.00	-19.61	Vertical

Transmitter Emission 1GHz-18GHz
802.11a for 5150MHz ~5250 MHz, 5725MHz ~5850MHz

Test mode: 802.11a(MCS0)			Test Frequency: 5180MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1308.399	30.48	2.64	44.23	49.88	38.77	74.00	-35.23	Pass	Horizontal
1872.381	31.51	3.14	43.61	50.15	41.19	74.00	-32.81	Pass	Horizontal
2428.671	32.61	4.37	44.07	50.35	43.26	74.00	-30.74	Pass	Horizontal
3252.005	33.38	5.57	44.67	50.51	44.79	74.00	-29.21	Pass	Horizontal
10360.000	38.67	7.45	45.24	46.63	47.51	74.00	-26.49	Pass	Horizontal
15540.000	40.92	9.35	44.75	44.28	49.80	74.00	-24.20	Pass	Horizontal
1370.328	30.61	2.70	44.15	49.50	38.66	74.00	-35.34	Pass	Vertical
1916.180	31.58	3.17	43.57	49.70	40.88	74.00	-33.12	Pass	Vertical
2718.469	33.14	5.04	44.41	48.44	42.21	74.00	-31.79	Pass	Vertical
3214.623	33.41	5.58	44.68	49.69	44.00	74.00	-30.00	Pass	Vertical
10360.000	38.67	7.45	45.24	44.80	45.68	74.00	-28.32	Pass	Vertical
15540.000	40.92	9.35	44.75	44.56	50.08	74.00	-23.92	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5220MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1431.047	30.73	2.76	44.08	49.85	39.26	74.00	-34.74	Pass	Horizontal
1938.463	31.61	3.19	43.55	50.52	41.77	74.00	-32.23	Pass	Horizontal
2782.060	33.25	5.18	44.48	48.67	42.62	74.00	-31.38	Pass	Horizontal
3252.005	33.38	5.57	44.67	50.46	44.74	74.00	-29.26	Pass	Horizontal
10440.000	38.75	7.46	45.18	47.91	48.94	74.00	-25.06	Pass	Horizontal
15660.000	40.97	9.35	44.77	43.75	49.30	74.00	-24.70	Pass	Horizontal
1435.189	30.74	2.77	44.07	48.67	38.11	74.00	-35.89	Pass	Vertical
2442.751	32.64	4.41	44.09	48.93	41.89	74.00	-32.11	Pass	Vertical
3280.326	33.35	5.56	44.67	49.76	44.00	74.00	-30.00	Pass	Vertical
7497.646	36.45	6.93	45.01	48.84	47.21	74.00	-26.79	Pass	Vertical
10440.000	38.75	7.46	45.18	45.86	46.89	74.00	-27.11	Pass	Vertical
15660.000	40.97	9.35	44.77	44.29	49.84	74.00	-24.16	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5240MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1447.688	30.77	2.78	44.06	49.44	38.93	74.00	-35.07	Pass	Horizontal
1888.687	31.53	3.15	43.60	49.84	40.92	74.00	-33.08	Pass	Horizontal
2710.622	33.12	5.02	44.40	48.94	42.68	74.00	-31.32	Pass	Horizontal
3223.928	33.40	5.57	44.67	49.36	43.66	74.00	-30.34	Pass	Horizontal
10480.000	38.79	7.46	45.16	46.21	47.30	74.00	-26.70	Pass	Horizontal
15720.000	40.99	9.35	44.77	43.84	49.41	74.00	-24.59	Pass	Horizontal
1346.769	30.56	2.68	44.18	48.94	38.00	74.00	-36.00	Pass	Vertical
1883.236	31.53	3.15	43.60	49.78	40.86	74.00	-33.14	Pass	Vertical
2471.157	32.69	4.48	44.13	48.96	42.00	74.00	-32.00	Pass	Vertical
3214.623	33.41	5.58	44.68	49.89	44.20	74.00	-29.80	Pass	Vertical
10480.000	38.79	7.46	45.16	46.03	47.12	74.00	-26.88	Pass	Vertical
15720.000	40.99	9.35	44.77	43.49	49.06	74.00	-24.94	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5745MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1366.374	30.60	2.70	44.16	49.82	38.96	74.00	-35.04	Pass	Horizontal
2144.825	32.03	3.64	43.71	49.11	41.07	74.00	-32.93	Pass	Horizontal
2442.751	32.64	4.41	44.09	49.50	42.46	74.00	-31.54	Pass	Horizontal
3252.005	33.38	5.57	44.67	49.38	43.66	74.00	-30.34	Pass	Horizontal
11490.000	39.45	8.02	44.85	46.25	48.87	74.00	-25.13	Pass	Horizontal
17235.000	41.44	9.98	45.35	44.59	50.66	74.00	-23.34	Pass	Horizontal
1354.577	30.58	2.68	44.17	49.71	38.80	74.00	-35.20	Pass	Vertical
2182.346	32.11	3.74	43.76	49.49	41.58	74.00	-32.42	Pass	Vertical
3357.061	33.29	5.55	44.66	49.84	44.02	74.00	-29.98	Pass	Vertical
8764.146	37.04	8.05	45.63	49.67	49.13	74.00	-24.87	Pass	Vertical
11490.000	39.45	8.02	44.85	44.85	47.47	74.00	-26.53	Pass	Vertical
17235.000	41.44	9.98	45.35	42.56	48.63	74.00	-25.37	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5785MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1323.614	30.51	2.65	44.21	48.51	37.46	74.00	-36.54	Pass	Horizontal
1905.135	31.56	3.16	43.58	49.07	40.21	74.00	-33.79	Pass	Horizontal
2428.671	32.61	4.37	44.07	49.29	42.20	74.00	-31.80	Pass	Horizontal
3168.500	33.45	5.59	44.68	50.02	44.38	74.00	-29.62	Pass	Horizontal
11570.000	39.47	8.10	44.86	45.77	48.48	74.00	-25.52	Pass	Horizontal
17355.000	41.52	10.07	45.37	42.12	48.34	74.00	-25.66	Pass	Horizontal
1315.985	30.49	2.64	44.22	49.53	38.44	74.00	-35.56	Pass	Vertical
2188.663	32.12	3.76	43.77	50.59	42.70	74.00	-31.30	Pass	Vertical
2521.664	32.79	4.60	44.19	48.74	41.94	74.00	-32.06	Pass	Vertical
8688.480	36.99	7.98	45.61	48.60	47.96	74.00	-26.04	Pass	Vertical
11570.000	39.47	8.10	44.86	45.81	48.52	74.00	-25.48	Pass	Vertical
17355.000	41.52	10.07	45.37	42.73	48.95	74.00	-25.05	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5825MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1362.430	30.59	2.69	44.16	49.20	38.32	74.00	-35.68	Pass	Horizontal
2456.913	32.66	4.44	44.11	50.44	43.43	74.00	-30.57	Pass	Horizontal
3261.418	33.37	5.57	44.67	50.24	44.51	74.00	-29.49	Pass	Horizontal
4354.454	33.68	5.29	44.60	49.43	43.80	74.00	-30.20	Pass	Horizontal
11650.000	39.50	8.18	44.87	46.01	48.82	74.00	-25.18	Pass	Horizontal
17475.000	41.59	10.16	45.40	42.75	49.10	74.00	-24.90	Pass	Horizontal
1370.328	30.61	2.70	44.15	49.22	38.38	74.00	-35.62	Pass	Vertical
2182.346	32.11	3.74	43.76	49.22	41.31	74.00	-32.69	Pass	Vertical
2750.080	33.19	5.11	44.44	48.79	42.65	74.00	-31.35	Pass	Vertical
3242.619	33.38	5.57	44.67	49.57	43.85	74.00	-30.15	Pass	Vertical
11650.000	39.50	8.18	44.87	45.34	48.15	74.00	-25.85	Pass	Vertical
17475.000	41.59	10.16	45.40	42.96	49.31	74.00	-24.69	Pass	Vertical

Transmitter Emission 18GHz-40GHz
802.11a for 5150MHz ~5250 MHz, 5725MHz ~5850MHz

Test mode: 802.11a(MCS0)			Test Frequency: 5180MHz		Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
18539.740	40.24	60.55	62.35	42.04	74.00	-31.96	Pass	Horizontal
20720.000	40.18	62.04	60.55	38.69	74.00	-35.31	Pass	Horizontal
22982.090	40.39	57.85	52.99	35.53	74.00	-38.47	Pass	Horizontal
25782.610	40.30	57.44	53.14	36.00	74.00	-38.00	Pass	Horizontal
26940.160	40.49	56.71	52.64	36.42	74.00	-37.58	Pass	Horizontal
28625.700	40.39	55.14	48.74	33.99	74.00	-40.01	Pass	Horizontal
18569.370	40.23	60.67	63.96	43.52	74.00	-30.48	Pass	Vertical
20720.000	40.18	62.04	61.18	39.32	74.00	-34.68	Pass	Vertical
22799.300	40.34	58.16	54.60	36.78	74.00	-37.22	Pass	Vertical
24892.480	40.33	57.70	53.54	36.17	74.00	-37.83	Pass	Vertical
26875.700	40.48	56.76	53.56	37.28	74.00	-36.72	Pass	Vertical
28534.410	40.43	55.22	50.28	35.49	74.00	-38.51	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5220MHz		Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
18584.210	40.22	60.73	62.59	42.08	74.00	-31.92	Pass	Horizontal
20880.000	40.14	62.16	56.70	34.68	74.00	-39.32	Pass	Horizontal
22690.330	40.31	58.35	53.27	35.23	74.00	-38.77	Pass	Horizontal
24615.760	40.41	57.69	51.53	34.25	74.00	-39.75	Pass	Horizontal
26875.700	40.48	56.76	53.08	36.80	74.00	-37.20	Pass	Horizontal
31228.840	40.45	51.71	47.75	36.49	74.00	-37.51	Pass	Horizontal
20016.830	40.39	61.53	61.84	40.70	74.00	-33.30	Pass	Vertical
20880.000	40.14	62.16	56.67	34.65	74.00	-39.35	Pass	Vertical
23765.920	40.55	57.70	51.78	34.63	74.00	-39.37	Pass	Vertical
26854.250	40.47	56.77	52.34	36.04	74.00	-37.96	Pass	Vertical
27992.780	40.70	55.70	49.48	34.48	74.00	-39.52	Pass	Vertical
30102.570	40.31	53.17	46.67	33.81	74.00	-40.19	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5240MHz		Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
18733.200	40.18	61.34	63.21	42.05	74.00	-31.95	Pass	Horizontal
20960.000	40.11	62.21	54.76	32.66	74.00	-41.34	Pass	Horizontal
22313.020	40.20	59.01	54.84	36.03	74.00	-37.97	Pass	Horizontal
26897.170	40.48	56.74	52.22	35.96	74.00	-38.04	Pass	Horizontal
27970.430	40.69	55.72	50.51	35.48	74.00	-38.52	Pass	Horizontal
32216.670	40.60	49.77	45.69	36.52	74.00	-37.48	Pass	Horizontal
18703.300	40.19	61.22	62.91	41.88	74.00	-32.12	Pass	Vertical
20016.830	40.39	61.53	63.44	42.30	74.00	-31.70	Pass	Vertical
20960.000	40.11	62.21	56.38	34.28	74.00	-39.72	Pass	Vertical
23727.990	40.55	57.70	51.87	34.72	74.00	-39.28	Pass	Vertical
26897.170	40.48	56.74	51.86	35.60	74.00	-38.40	Pass	Vertical
31278.750	40.46	51.61	45.80	34.65	74.00	-39.35	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5745MHz		Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
18703.300	40.19	61.22	63.39	42.36	74.00	-31.64	Pass	Horizontal
21116.890	40.10	61.92	60.25	38.43	74.00	-35.57	Pass	Horizontal
22980.000	40.39	57.85	50.82	33.36	74.00	-40.64	Pass	Horizontal
26471.030	40.40	57.04	51.77	35.13	74.00	-38.87	Pass	Horizontal
29767.930	40.28	53.63	47.16	33.81	74.00	-40.19	Pass	Horizontal
34424.210	40.66	47.83	47.44	40.27	74.00	-33.73	Pass	Horizontal
18763.140	40.17	61.46	62.64	41.35	74.00	-32.65	Pass	Vertical
20258.020	40.32	61.71	59.68	38.29	74.00	-35.71	Pass	Vertical
22980.000	40.39	57.85	52.24	34.78	74.00	-39.22	Pass	Vertical
26918.660	40.48	56.73	51.48	35.23	74.00	-38.77	Pass	Vertical
29744.170	40.27	53.67	47.52	34.12	74.00	-39.88	Pass	Vertical
32319.730	40.60	49.62	45.20	36.18	74.00	-37.82	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5785MHz		Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
18688.370	40.19	61.16	63.05	42.08	74.00	-31.92	Pass	Horizontal
21116.890	40.10	61.92	58.85	37.03	74.00	-36.97	Pass	Horizontal
23140.000	40.43	57.80	49.73	32.36	74.00	-41.64	Pass	Horizontal
26897.170	40.48	56.74	53.91	37.65	74.00	-36.35	Pass	Horizontal
31253.790	40.45	51.66	47.17	35.96	74.00	-38.04	Pass	Horizontal
34396.730	40.66	47.85	47.47	40.28	74.00	-33.72	Pass	Horizontal
18451.130	40.26	60.18	61.79	41.87	74.00	-32.13	Pass	Vertical
20000.850	40.40	61.52	62.13	41.01	74.00	-32.99	Pass	Vertical
23140.000	40.43	57.80	50.44	33.07	74.00	-40.93	Pass	Vertical
25823.820	40.30	57.43	51.69	34.56	74.00	-39.44	Pass	Vertical
28015.140	40.69	55.68	49.73	34.74	74.00	-39.26	Pass	Vertical
30368.150	40.34	52.88	46.34	33.80	74.00	-40.20	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5825MHz		Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
19434.090	40.23	62.02	62.33	40.54	74.00	-33.46	Pass	Horizontal
20782.330	40.16	62.09	60.41	38.48	74.00	-35.52	Pass	Horizontal
23300.000	40.46	57.77	52.35	35.04	74.00	-38.96	Pass	Horizontal
25762.030	40.30	57.45	53.10	35.95	74.00	-38.05	Pass	Horizontal
27549.280	40.61	56.13	50.19	34.67	74.00	-39.33	Pass	Horizontal
31179.010	40.44	51.82	46.25	34.87	74.00	-39.13	Pass	Horizontal
20032.820	40.39	61.54	62.07	40.92	74.00	-33.08	Pass	Vertical
23300.000	40.46	57.77	51.01	33.70	74.00	-40.30	Pass	Vertical
26897.170	40.48	56.74	52.36	36.10	74.00	-37.90	Pass	Vertical
31253.790	40.45	51.66	45.77	34.56	74.00	-39.44	Pass	Vertical
34451.710	40.65	47.80	47.39	40.24	74.00	-33.76	Pass	Vertical
37285.730	41.00	46.76	47.98	42.22	74.00	-31.78	Pass	Vertical

Note:

1) Through Pre-scan transmitting mode with all kind of modulation and data rate, find the MCS0 is the worst case of 802.11a and then Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading - Correct Factor

Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

3) Scan from 9kHz to 40GHz, the disturbance below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

Appendix L): Unwanted Emissions that fall Outside of the Restricted Bands

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak
Test Procedure:					
a) The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f) Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel j) Test the EUT in the lowest channel or/and the middle channel ,the Highest channel h) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. i) Repeat above procedures until all frequencies measured was complete.					
Limit:	Transmitter Operation Frequency(MHz)	Limit (EIRP)		Limit (dBμV/m)@3m	Measurement distance (cm)
	5150-5350	-27dBm/MHz		68.2dBuV/m	3
	5470-5725	-27dBm/MHz		68.2dBuV/m	3
	5725-5850	Below 5725MHz	-27dBm/MHz	68.2dBuV/m	3
		5725-5735MHz	-17dBm/MHz	78.2dBuV/m	3
		5840-5850MHz	-17dBm/MHz	78.2dBuV/m	3
		Above 5850MHz	-27dBm/MHz	68.2dBuV/m	3
	Note: (i) $EIRP = ((E \cdot d)^2) / 30$ where: • E is the field strength in V/m; • d is the measurement distance in meters; • EIRP is the equivalent isotropically radiated power in watts. (ii) Working in dB units, the above equation is equivalent to: $EIRP[dBm] = E[dB\mu V/m] + 20 \log(d[meters]) - 104.77$ (iii) Or, if d is 3 meters: $EIRP[dBm] = E[dB\mu V/m] - 95.2$				
Test result:	PASS				

Test Data:
802.11a for 5150MHz ~5250 MHz, 5725MHz ~5850MHz

Test mode: 802.11a(MCS0)			Test Frequency: 5180MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1179.100	30.18	2.49	44.41	48.99	37.25	68.20	-30.95	Pass	Horizontal
1639.274	31.13	2.95	43.84	49.21	39.45	68.20	-28.75	Pass	Horizontal
2687.220	33.08	4.97	44.37	49.17	42.85	68.20	-25.35	Pass	Horizontal
8106.200	36.58	7.46	45.43	48.98	47.59	68.20	-20.61	Pass	Horizontal
10636.850	38.95	7.48	45.05	47.92	49.30	68.20	-18.90	Pass	Horizontal
15577.900	40.93	9.35	44.76	45.51	51.03	68.20	-17.17	Pass	Horizontal
1162.182	30.13	2.47	44.44	49.34	37.50	68.20	-30.70	Pass	Vertical
1672.779	31.18	2.98	43.81	48.74	39.09	68.20	-29.11	Pass	Vertical
3768.513	32.97	5.48	44.62	50.01	43.84	68.20	-24.36	Pass	Vertical
6756.708	36.29	6.69	44.58	48.50	46.90	68.20	-21.30	Pass	Vertical
9205.540	37.44	8.07	45.66	48.56	48.41	68.20	-19.79	Pass	Vertical
11837.450	39.55	8.36	44.88	46.21	49.24	68.20	-18.96	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5220MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1252.885	30.35	2.58	44.31	49.07	37.69	68.20	-30.51	Pass	Horizontal
2449.822	32.65	4.43	44.10	49.15	42.13	68.20	-26.07	Pass	Horizontal
3768.513	32.97	5.48	44.62	49.41	43.24	68.20	-24.96	Pass	Horizontal
6470.026	36.14	6.96	44.55	48.72	47.27	68.20	-20.93	Pass	Horizontal
8613.468	36.94	7.92	45.59	49.02	48.29	68.20	-19.91	Pass	Horizontal
12079.390	39.58	8.51	44.88	46.71	49.92	68.20	-18.28	Pass	Horizontal
1249.269	30.34	2.57	44.31	48.43	37.03	68.20	-31.17	Pass	Vertical
1829.582	31.44	3.11	43.65	47.46	38.36	68.20	-29.84	Pass	Vertical
2947.623	33.52	5.52	44.65	47.33	41.72	68.20	-26.48	Pass	Vertical
6679.040	36.25	6.76	44.57	47.93	46.37	68.20	-21.83	Pass	Vertical
9475.497	37.74	7.84	45.60	47.10	47.08	68.20	-21.12	Pass	Vertical
11172.560	39.35	7.70	44.82	47.21	49.44	68.20	-18.76	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5240MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1109.660	30.00	2.41	44.52	49.16	37.05	68.20	-31.15	Pass	Horizontal
2393.824	32.54	4.29	44.03	48.49	41.29	68.20	-26.91	Pass	Horizontal
4354.454	33.68	5.29	44.60	50.10	44.47	68.20	-23.73	Pass	Horizontal
8082.804	36.56	7.44	45.43	48.71	47.28	68.20	-20.92	Pass	Horizontal
11871.710	39.56	8.40	44.89	46.81	49.88	68.20	-18.32	Pass	Horizontal
13797.090	39.62	8.63	44.76	46.87	50.36	68.20	-17.84	Pass	Horizontal
1100.079	29.98	2.39	44.53	49.27	37.11	68.20	-31.09	Pass	Vertical
1583.392	31.03	2.90	43.90	49.26	39.29	68.20	-28.91	Pass	Vertical
2194.998	32.14	3.78	43.78	49.02	41.16	68.20	-27.04	Pass	Vertical
3790.361	32.95	5.47	44.62	49.27	43.07	68.20	-25.13	Pass	Vertical
6583.209	36.20	6.85	44.56	49.48	47.97	68.20	-20.23	Pass	Vertical
8514.456	36.87	7.83	45.56	49.10	48.24	68.20	-19.96	Pass	Vertical

Test mode: 802.11a(MCS0)			Test Frequency: 5745MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1569.721	31.00	2.89	43.92	49.35	39.32	68.20	-28.88	Pass	Horizontal
2774.030	33.23	5.16	44.47	48.74	42.66	68.20	-25.54	Pass	Horizontal
3757.637	32.97	5.48	44.62	49.65	43.48	68.20	-24.72	Pass	Horizontal
8995.123	37.20	8.25	45.70	48.36	48.11	68.20	-20.09	Pass	Horizontal
13173.560	39.37	8.46	44.64	47.48	50.67	68.20	-17.53	Pass	Horizontal
15443.410	40.88	9.36	44.75	44.95	50.44	68.20	-17.76	Pass	Horizontal
1556.169	30.98	2.88	43.93	48.89	38.82	68.20	-29.38	Pass	Vertical
2407.703	32.57	4.32	44.05	49.22	42.06	68.20	-26.14	Pass	Vertical
3801.333	32.94	5.47	44.62	49.45	43.24	68.20	-24.96	Pass	Vertical
4859.975	34.81	5.09	44.60	49.68	44.98	68.20	-23.22	Pass	Vertical
7541.114	36.46	6.97	45.05	48.53	46.91	68.20	-21.29	Pass	Vertical
9781.603	38.07	7.59	45.54	48.35	48.47	68.20	-19.73	Pass	Vertical

Test mode: 802.11a(MCS0)				Test Frequency: 5785MHz		Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1129.072	30.05	2.43	44.49	48.74	36.73	68.20	-31.47	Pass	Horizontal
1658.337	31.16	2.97	43.82	49.05	39.36	68.20	-28.84	Pass	Horizontal
2718.469	33.14	5.04	44.41	48.24	42.01	68.20	-26.19	Pass	Horizontal
3790.361	32.95	5.47	44.62	50.23	44.03	68.20	-24.17	Pass	Horizontal
8248.005	36.68	7.59	45.48	49.18	47.97	68.20	-20.23	Pass	Horizontal
11076.100	39.32	7.60	44.81	47.17	49.28	68.20	-18.92	Pass	Horizontal
1777.458	31.36	3.06	43.70	49.16	39.88	68.20	-28.32	Pass	Vertical
3233.260	33.39	5.57	44.67	49.75	44.04	68.20	-24.16	Pass	Vertical
4341.886	33.65	5.29	44.60	50.17	44.51	68.20	-23.69	Pass	Vertical
7454.429	36.45	6.89	44.98	48.96	47.32	68.20	-20.88	Pass	Vertical
9781.603	38.07	7.59	45.54	48.42	48.54	68.20	-19.66	Pass	Vertical
13757.270	39.61	8.62	44.75	46.42	49.90	68.20	-18.30	Pass	Vertical

Test mode: 802.11a(MCS0)				Test Frequency: 5825MHz		Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Final test level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1762.112	31.33	3.05	43.72	48.92	39.58	68.20	-28.62	Pass	Horizontal
2990.531	33.59	5.60	44.69	48.83	43.33	68.20	-24.87	Pass	Horizontal
3801.333	32.94	5.47	44.62	49.35	43.14	68.20	-25.06	Pass	Horizontal
8514.456	36.87	7.83	45.56	48.74	47.88	68.20	-20.32	Pass	Horizontal
13097.620	39.34	8.44	44.62	46.35	49.51	68.20	-18.69	Pass	Horizontal
15443.410	40.88	9.36	44.75	44.90	50.39	68.20	-17.81	Pass	Horizontal
1520.598	30.91	2.85	43.97	49.30	39.09	68.20	-29.11	Pass	Vertical
2492.677	32.73	4.53	44.15	48.49	41.60	68.20	-26.60	Pass	Vertical
3757.637	32.97	5.48	44.62	49.86	43.69	68.20	-24.51	Pass	Vertical
4354.454	33.68	5.29	44.60	49.32	43.69	68.20	-24.51	Pass	Vertical
8082.804	36.56	7.44	45.43	49.14	47.71	68.20	-20.49	Pass	Vertical
10363.710	38.67	7.45	45.24	47.61	48.49	68.20	-19.71	Pass	Vertical

Note:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading - Correct Factor

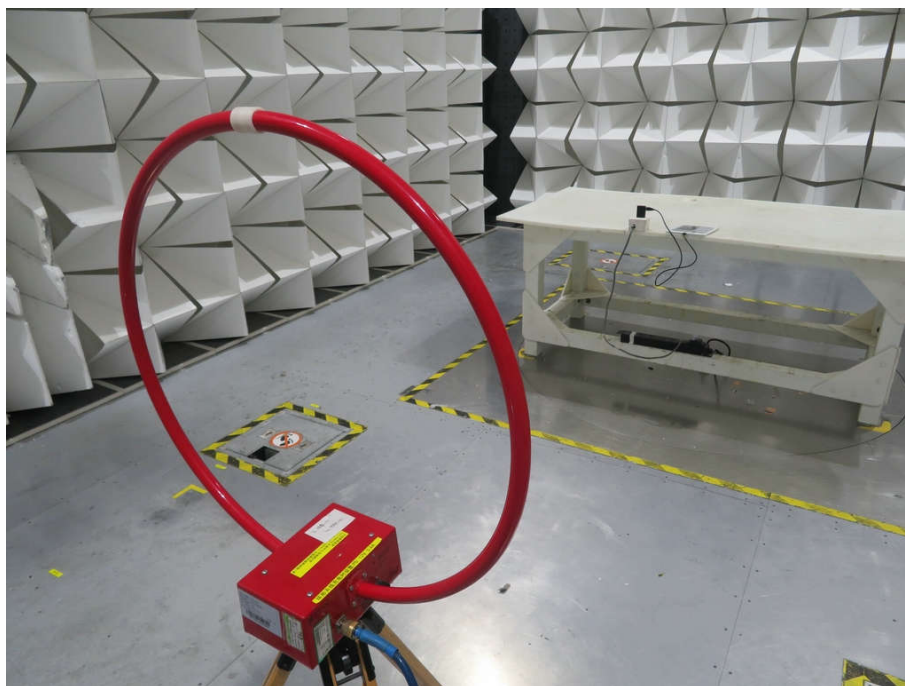
Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

2) Through Pre-scan transmitting mode with all kind of modulation and data rate, find the MCS0 is the worst case of 802.11a and then Only the worst case is recorded in the report.

3) Scan from 9kHz to 40GHz, the disturbance below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

PHOTOGRAPHS OF TEST SETUP

Test Model No.: RM100



Radiated spurious emission Test Setup-1(Below 30MHz)



Radiated spurious emission Test Setup-2(30MHz-1GHz)



Radiated spurious emission Test Setup-3(Above 1GHz)



Conducted Emissions Test Setup

PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No.EED32J00094001 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.