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Report Template Version: V04
Report Template Revision Date: 2018-07-06

Test Report

Report No. :	CQASZ20191201314E-01
Applicant:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054
Equipment Under Test (EUT):	
Product:	HUBSAN HT018A Transmitter
Model No.:	HT018A
Brand Name:	HUBSAN
FCC ID:	2AN75-HT018ATX
Standards:	47 CFR Part 15, Subpart E
	KDB 789033 D02 General UNII Test Procedures New Rules v02
	KDB 558074 D01 Meas Guidance v05
Date of Receipt:	2019-12-16
Date of Test:	2019-12-16 to 2019-12-26
Date of Issue:	2019-12-26
Test Result :	**PASS***

***In the configuration tested, the EUT complied with the standards specified above**

Tested By ： Tom chen.

(Tom chen)

Reviewed By: Aaron Ma

(Aaron Ma)

Approved By:

(Jack Ai)

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20191201314E-01	Rev.01	Initial report	2019-12-26

2 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
Radiated Spurious Emissions	47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(5)(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(s) and the sample information are provided by the client.

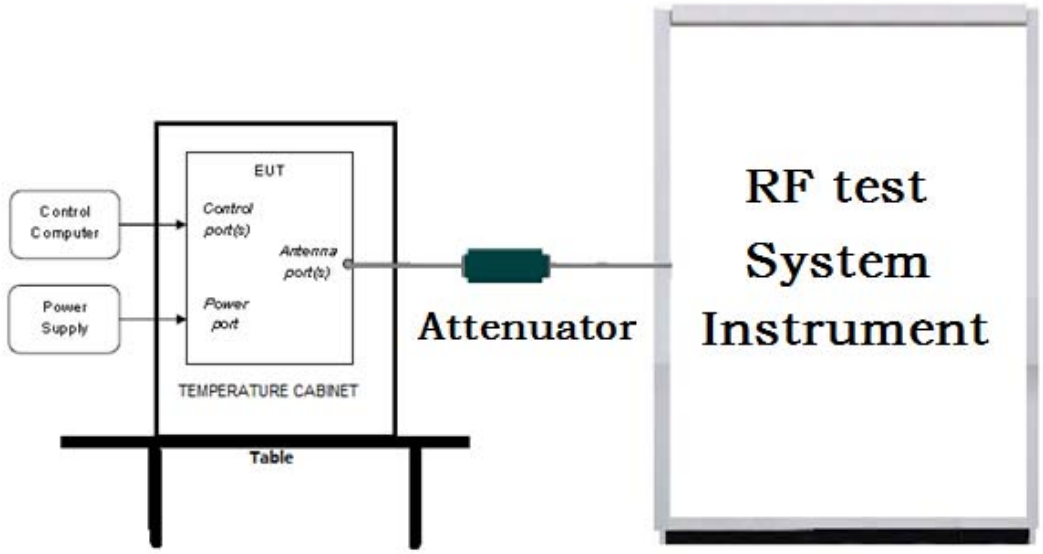
Tx: In this whole report Tx (or tx) means Transmitter.
Rx: In this whole report Rx (or rx) means Receiver.
RF: In this whole report RF means Radiated Frequency.
CH: In this whole report CH means channel.
Volt: In this whole report Volt means Voltage.
Temp: In this whole report Temp means Temperature.
Humid: In this whole report Humid means humidity.
Press: In this whole report Press means Pressure.

3 Content

4 Test Requirement

4.1 Test setup

4.1.1 For Conducted test setup



4.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

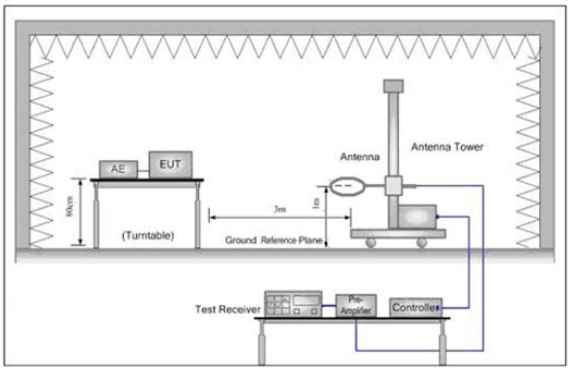


Figure 1. Below 30MHz

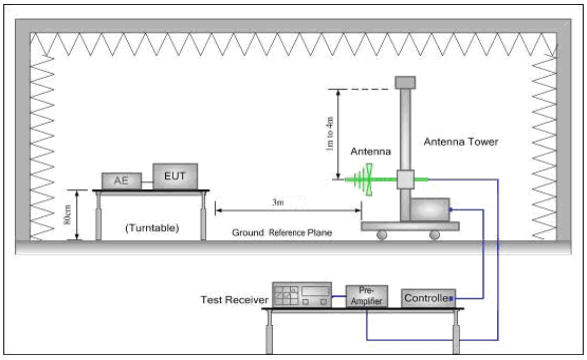


Figure 2. 30MHz to 1GHz

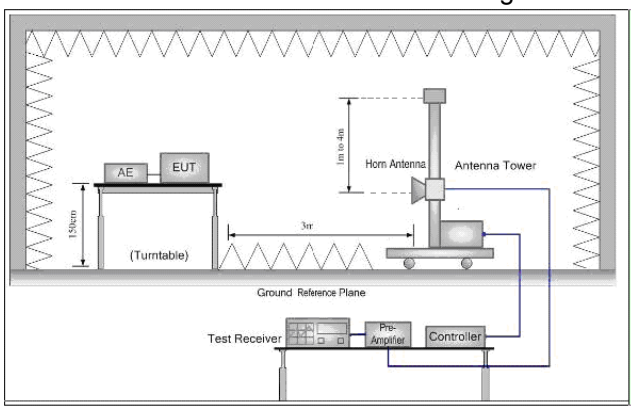
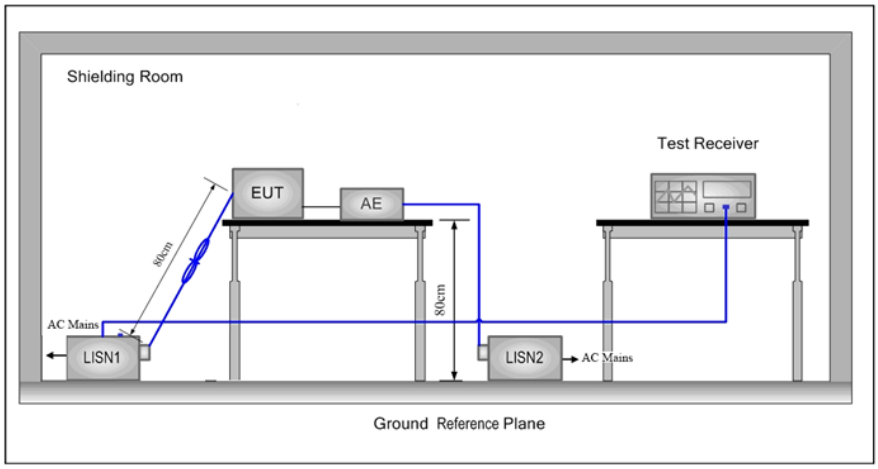


Figure 3. Above 1GHz

4.1.3 For Conducted Emissions test setup

Conducted Emissions setup



4.2 Test Environment

Operating Environment:		
Radiated Emissions:		
Temperature:	24.5 °C	
Humidity:	55 % RH	
Atmospheric Pressure:	1015 mbar	
Conducted Emissions:		
Temperature:	24.8 °C	
Humidity:	59 % RH	
Atmospheric Pressure:	1015 mbar	
Radio conducted item test (RF Conducted test room):		
Humidity:	51 % RH	
Atmospheric Pressure:	1015 mbar	
Test Condition	Temperature (°C)	Voltage (V)
TN/VN	+15 to +35	3.6
TL/VL	-20	3.4
TH/VL	50	3.4
TL/VH	-20	4.2
TH/VH	50	4.2

Remark:

1)The EUT just work in such extreme temperature of -20 °C to 50 °C and the extreme voltage of 3.4 V to 4.2 V, so here the EUT is tested in the temperature of -20 °C to 50 °C and the voltage of 3.4 V to 4.2 V.

2VN: Normal Voltage; TN: Normal Temperature;

TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;

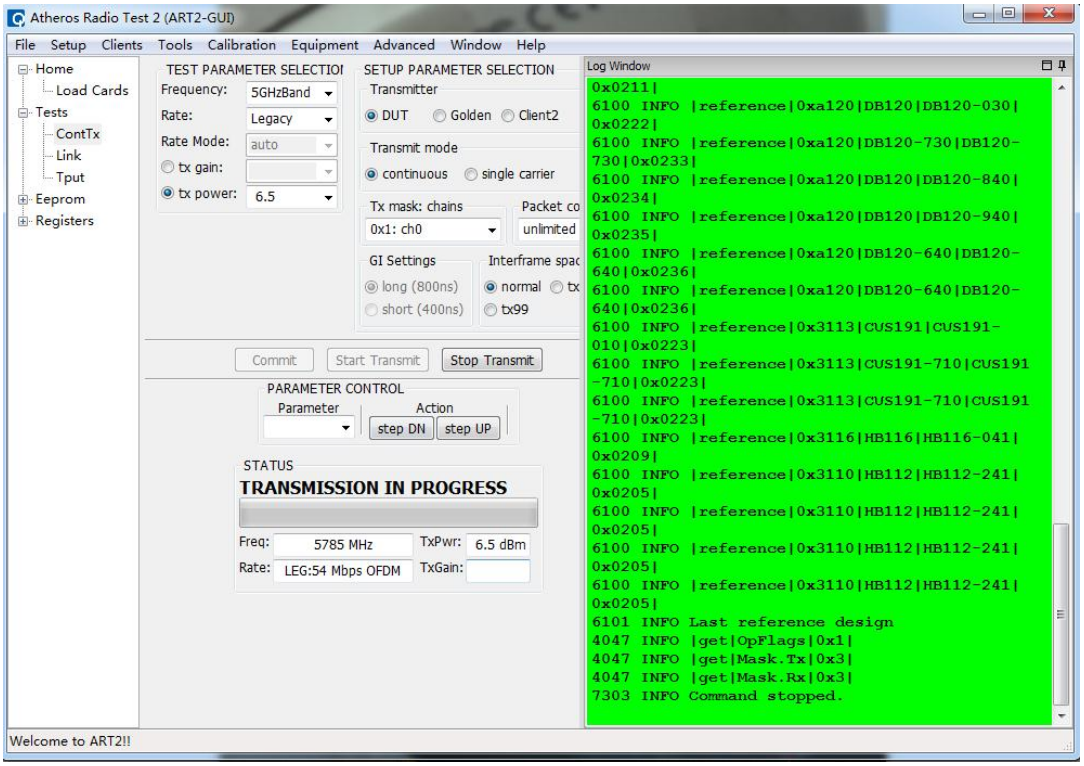
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.3 Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
802.11a	5150MHz ~5250 MHz	Channel 36	Channel 40	Channel 48
		5180MHz	5200MHz	5240MHz
802.11a	5725MHz ~5850 MHz	Channel 149	Channel 157	Channel 165
		5745MHz	5785MHz	5825MHz

Run Software:



Test mode:

Pre-scan under all rate at lowest channel for Ant1 and Ant2

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

5 General Information

5.1 Client Information

Applicant:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054
Manufacturer:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Manufacturer:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054

5.2 General Description of EUT

Product Name:	HUBSAN HT018A Transmitter
Model No.:	HT018A
Trade Mark:	HUBSAN
Power Supply:	Battery: 3.6V 3350 mAh Li-Po

5.3 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
Channel Separation:	IEEE 802.11a: 20 MHz
Transmitter Operating channel width(OCW)	≤20MHz (provider declaration)
Type of Modulation:	OFDM(BPSK\QPSK\16QAM\64QAM)
Sample Type:	☐ Mobile ☒ Portable ☐ Fix Location
Hardware version:	EA04058034-04
Software version:	V0.1.1
Test Software of EUT:	Atheros Radio Test 2 (manufacturer declare)
Antenna Type:	Integral antenna
Antenna gain:	ANT1: 3.0dBi
	ANT2: 3.0dBi

Operation Frequency each of channel

For 802.11a(20M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz
For 802.11a(20M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz	NA	NA

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

1）Support equipment

Description	Manufacturer	Model No.	Remark	FCC certification
PC	Lenovo	ThinkPad E450c	FCC ID and DOC	CQA
Adapter	HUAWEI	LPL-C010050200Z	DOC	CQA

2) Cable

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
/	/	/	/	/

5.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China

5.6 Test Facility

• A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

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

No.	Item	Measurement Uncertainty
1	Radio Frequency	3×10^{-8}
2	RF power, conducted	0.86dB
3	Radiated Spurious emission test	5.12dB (Below 1GHz)
		4.6dB (Above 1GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.8°C
6	Humidity test	2.0%
7	DC power voltages	0.5%

6 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2019/10/25	2020/10/24
Spectrum analyzer	R&S	FSU26	CQA-038	2019/10/25	2020/10/24
Spectrum analyzer	R&S	FSV40	CQA-075	2019/6/11	2020/6/10
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	4012339	2019/10/25	2020/10/24
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2019/10/25	2020/10/24
Preamplifier	EMCI	EMC184055SE	CQA-089	2019/9/25	2020/9/24
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2019/10/21	2020/10/20
Bilog Antenna	R&S	HL562	CQA-011	2019/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2019/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2019/9/25	2020/9/24
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2019/9/26	2020/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2019/9/26	2020/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2019/9/26	2020/9/25
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2019/9/26	2020/9/25
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2019/9/26	2020/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2019/9/26	2020/9/25
EMI Test Receiver	R&S	ESR7	CQA-005	2019/10/25	2020/10/24
LISN	R&S	ENV216	CQA-003	2019/10/23	2020/10/22
Coaxial cable	CQA	N/A	CQA-C009	2019/9/26	2020/9/25
high-low temperature chamber	Auchno	OJN-9606	CQA-S003	2019/9/25	2020/9/24
DC power	KEYSIGHT	E3631A	CQA-028	2019/9/26	2020/9/25

7 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	47 CFR Part 15, Subpart E	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15, subpart E
4	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

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 A)
Part15E Section 15.407 (a)(1)(2)(4)(h)(1)	KDB789033 / KDB 662911	Conducted Output Power and transmit power control mechanism	PASS	Appendix B)
Part15E Section 15.407 (a)(1)(2)(5)	KDB789033 / KDB 662911	Power Spectral Density	PASS	Appendix C)
Part15E Section 15.407 (g)	KDB789033	Frequency stability	PASS	Appendix D)
Part15C Section 15.203	ANSI C63.10	Antenna Requirement	PASS	Appendix E)
Part15E Section 15.407 (c)	Section 15.407	Operation in the absence of information to the transmit	PASS	Appendix F)
Part15E Section 15.407 (b)(6)	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix G)
Part15E Section 15.407 (b)(6)(7)(8)	KDB789033	Restricted bands around fundamental frequency(Radiated Emission)	PASS	Appendix H)
Part15E Section 15.407 (b)(1)(2)(3)(5)(6)(7)(8)	KDB789033	Radiated Spurious Emissions	PASS	Appendix I)

Appendix A): Emission Bandwidth

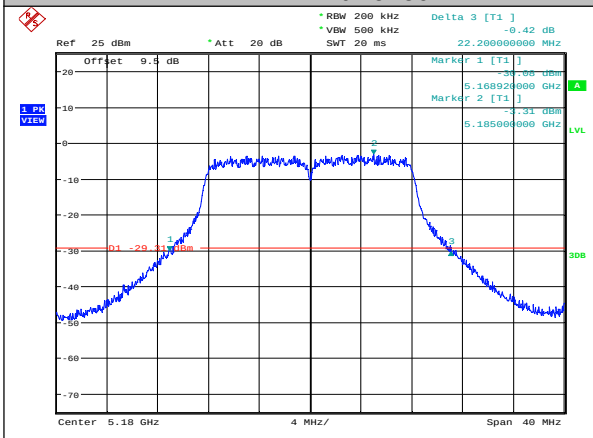
26dB emission Bandwidth:

Measurement Data

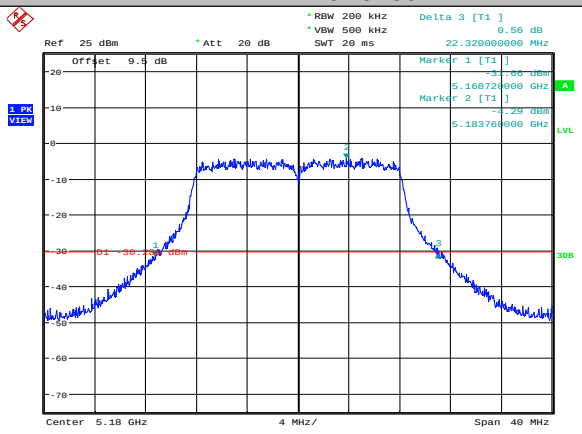
Test Mode	Test Channel	Ant	EBW[MHz]	Limit[MHz]	Verdict
11A	5180	Ant1	22.200	---	PASS
11A	5180	Ant2	22.320	---	PASS
11A	5200	Ant1	21.680	---	PASS
11A	5200	Ant2	21.880	---	PASS
11A	5240	Ant1	21.600	---	PASS
11A	5240	Ant2	21.760	---	PASS

Test plot as follows:

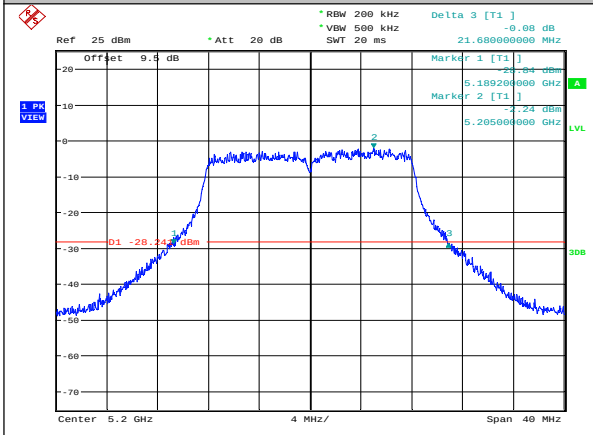
11A-Ant1-5180



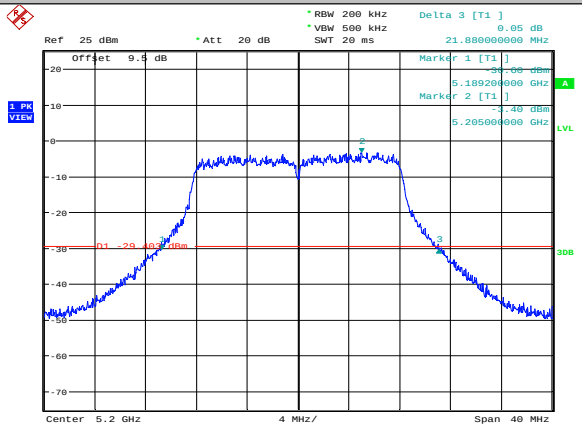
11A-Ant2-5180



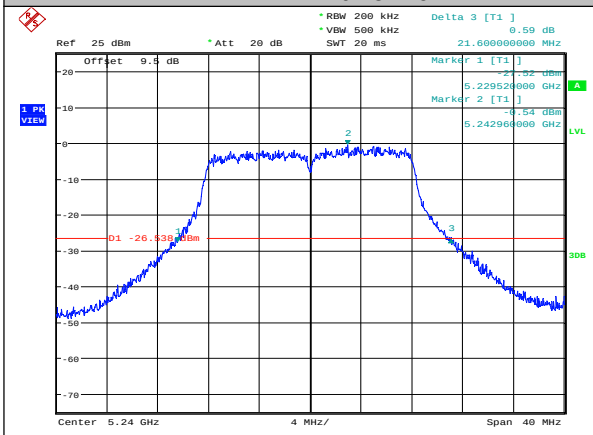
11A-Ant1-5200



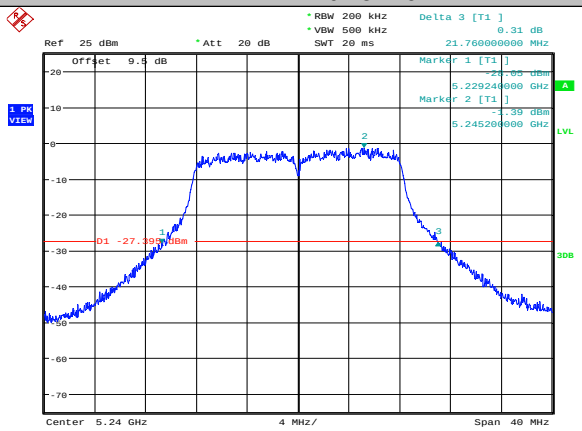
11A-Ant2-5200



11A-Ant1-5240



11A-Ant2-5240



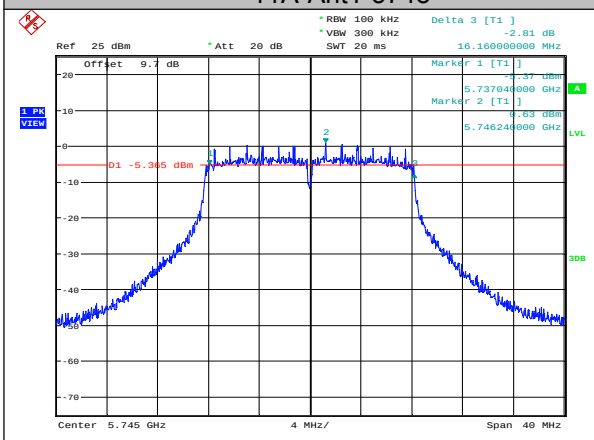
6dB Occupied Bandwidth:

Measurement Data

Test Mode	Test Channel	Ant	EBW[MHz]	Limit[MHz]	Verdict
11A	5745	Ant1	16.160	0.5	PASS
11A	5745	Ant2	16.000	0.5	PASS
11A	5785	Ant1	16.120	0.5	PASS
11A	5785	Ant2	15.960	0.5	PASS
11A	5825	Ant1	16.160	0.5	PASS
11A	5825	Ant2	15.760	0.5	PASS

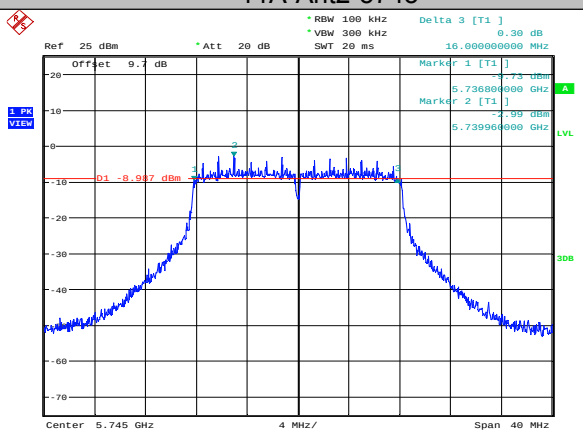
Test plot as follows:

11A-Ant1-5745



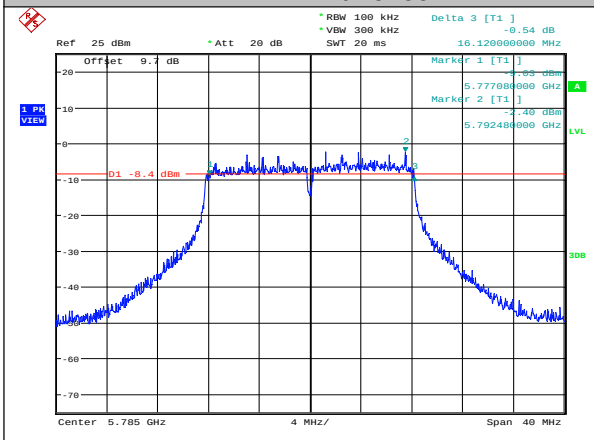
Date: 19.DEC.2019 11:25:29

11A-Ant2-5745



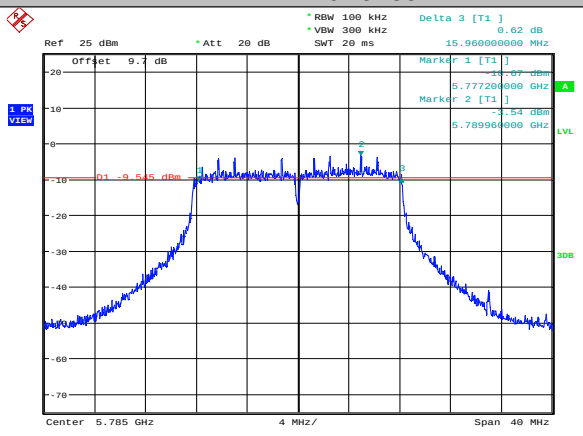
Date: 19.DEC.2019 12:00:50

11A-Ant1-5785



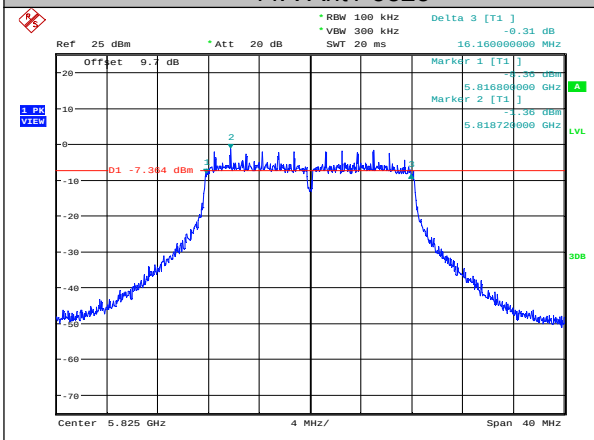
Date: 19.DEC.2019 11:30:47

11A-Ant2-5785



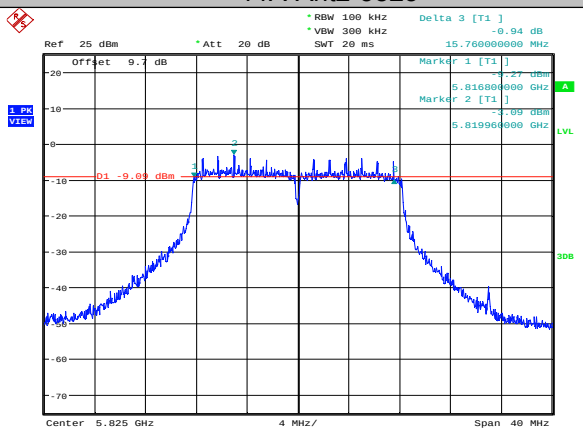
Date: 19.DEC.2019 12:05:30

11A-Ant1-5825



Date: 19.DEC.2019 11:35:58

11A-Ant2-5825



Date: 19.DEC.2019 12:09:32

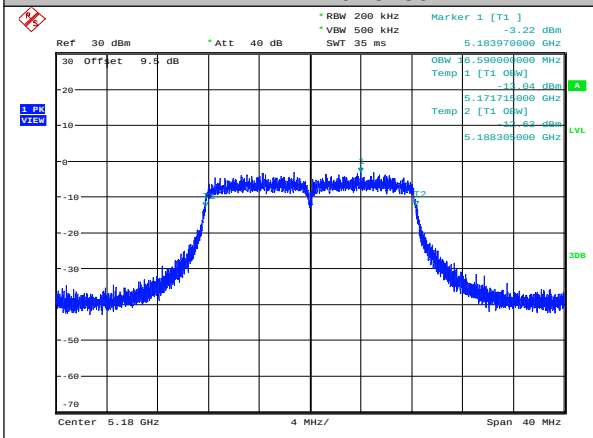
99% Occupied Bandwidth:

Measurement Data

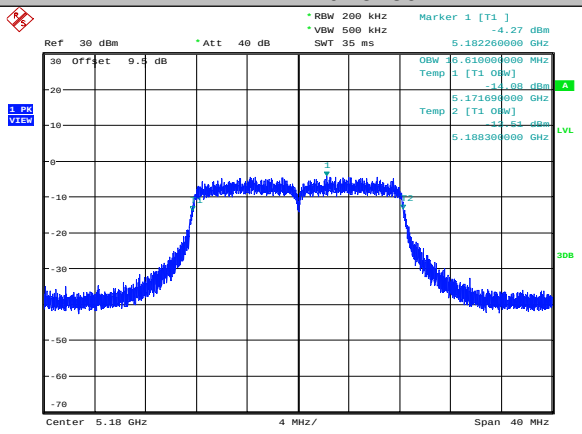
Test Mode	Test Channel	Ant	EBW[MHz]	Limit[MHz]	Verdict
11A	5180	Ant1	16.590	---	PASS
11A	5180	Ant2	16.610	---	PASS
11A	5200	Ant1	16.615	---	PASS
11A	5200	Ant2	16.630	---	PASS
11A	5240	Ant1	16.585	---	PASS
11A	5240	Ant2	16.595	---	PASS
11A	5745	Ant1	16.405	---	PASS
11A	5745	Ant2	16.425	---	PASS
11A	5785	Ant1	16.445	---	PASS
11A	5785	Ant2	16.465	---	PASS
11A	5825	Ant1	16.475	---	PASS
11A	5825	Ant2	16.470	---	PASS

Test plot as follows:

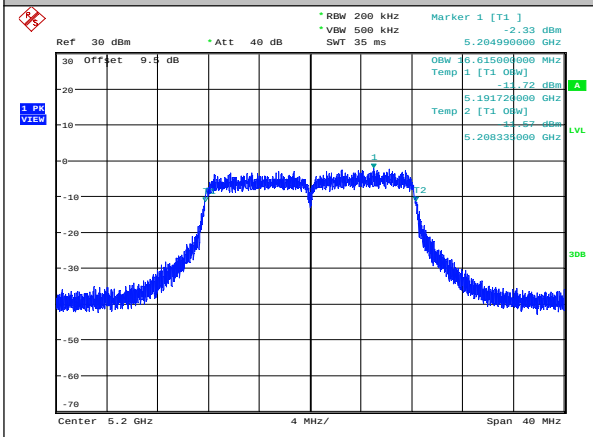
11A-Ant1-5180



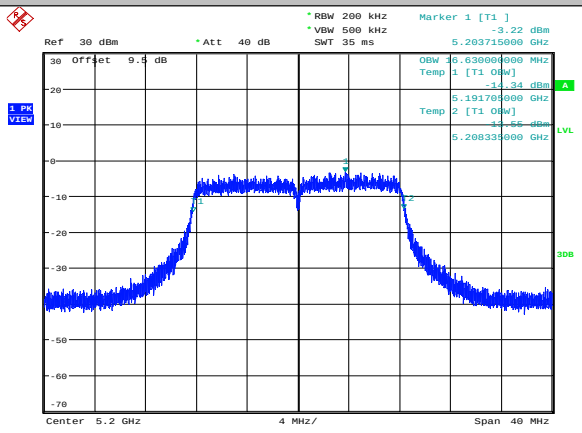
11A-Ant2-5180



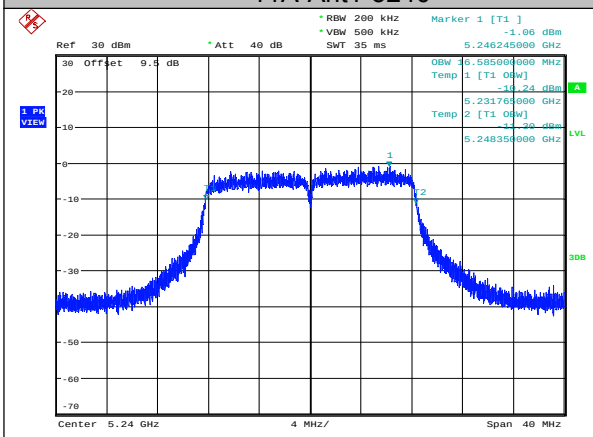
11A-Ant1-5200



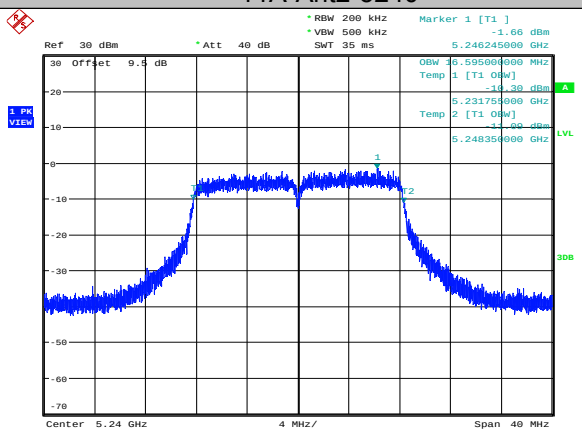
11A-Ant2-5200

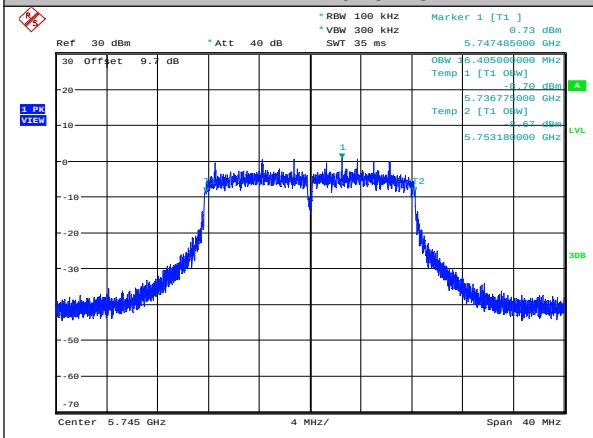
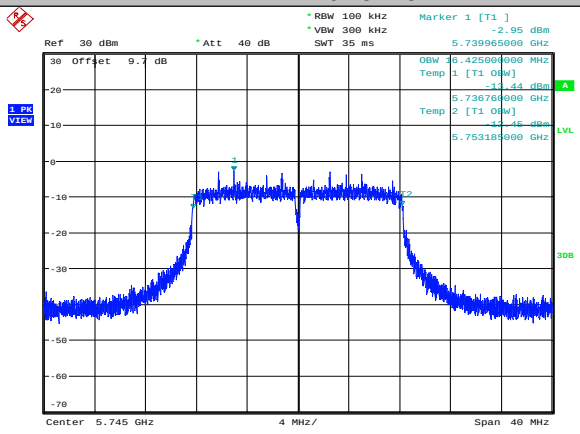
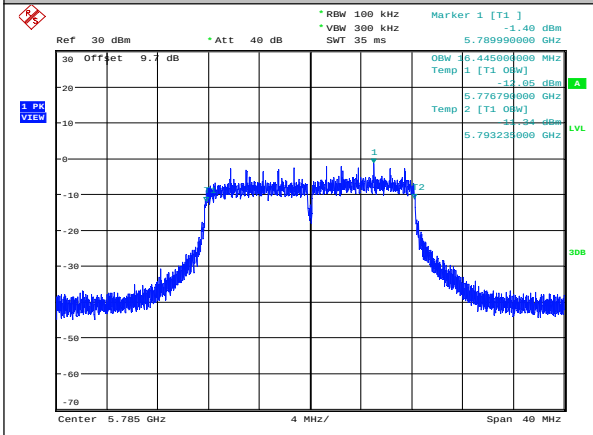
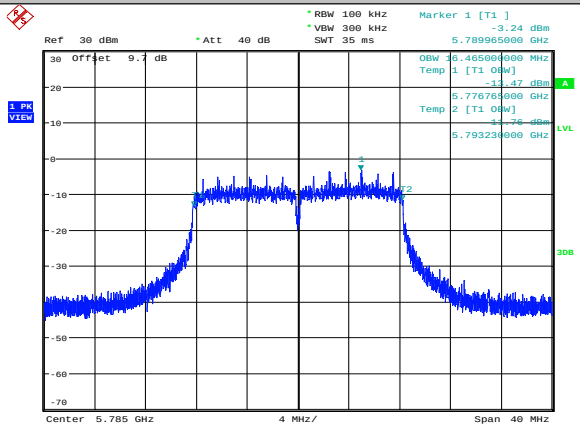
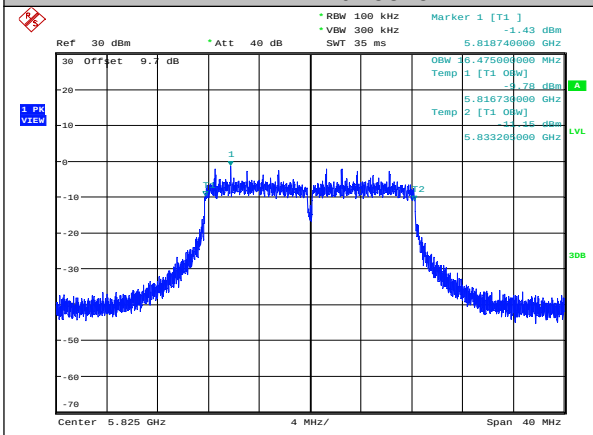
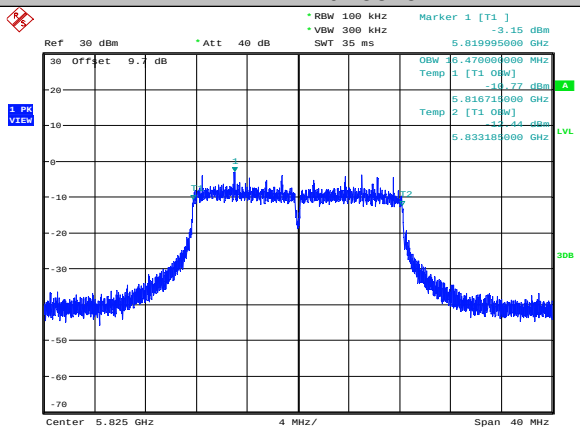


11A-Ant1-5240



11A-Ant2-5240



11A-Ant1-5745	11A-Ant2-5745
	
Date: 19.DEC.2019 11:25:50	Date: 19.DEC.2019 12:01:10
11A-Ant1-5785	**11A-Ant2-5785**
	
Date: 19.DEC.2019 11:31:07	Date: 19.DEC.2019 12:05:50
11A-Ant1-5825	**11A-Ant2-5825**
	
Date: 19.DEC.2019 11:36:18	Date: 19.DEC.2019 12:09:52

Appendix B): Maximum Conduct Output Power

Directional Antenna Gain

The TX chains are correlated, the antenna gain is equal among the chains.
Employs an antenna that operates simultaneously on multiple directional beams using the same frequency channels. No carrier aggregation techniques.
The directional gainis:

Antenna 1 Gain(dBi)	Antenna 2 Gain(dBi)
3.0	3.0

Duty Cycle:

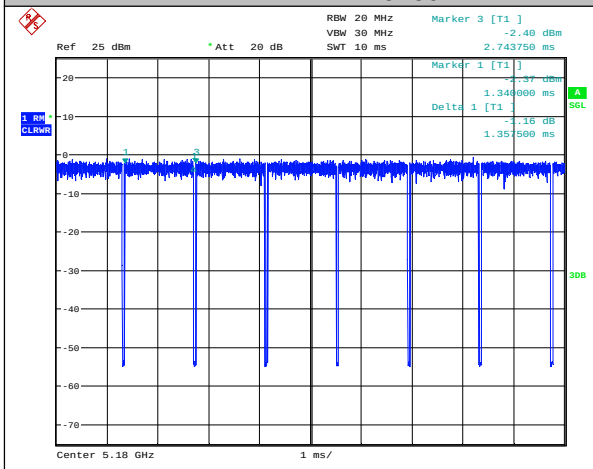
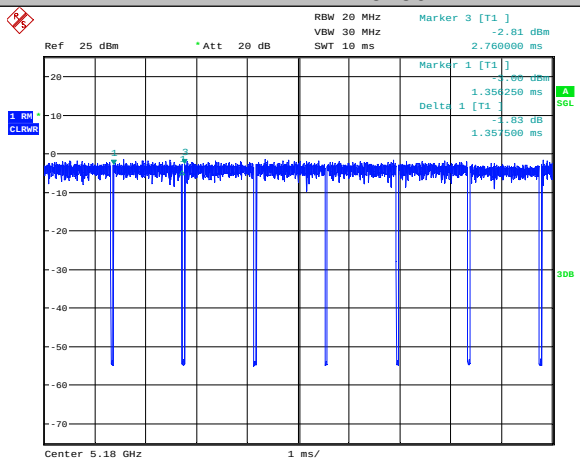
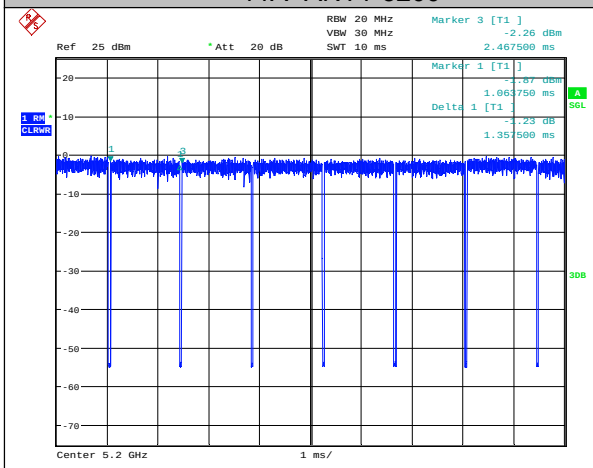
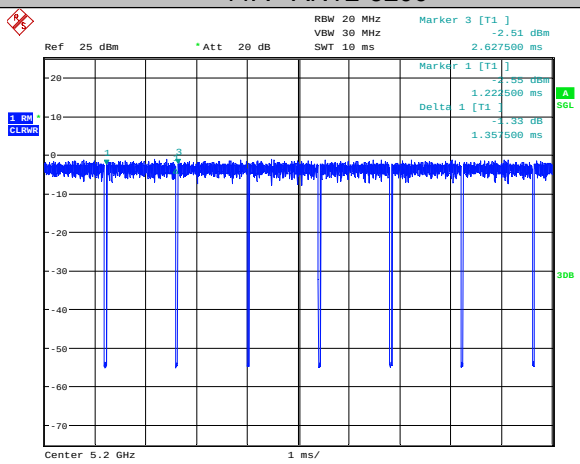
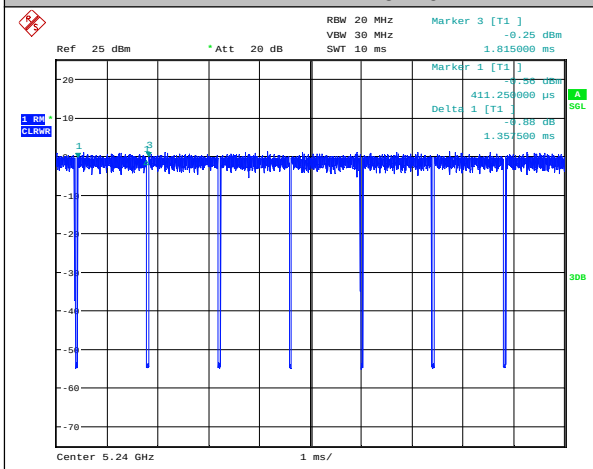
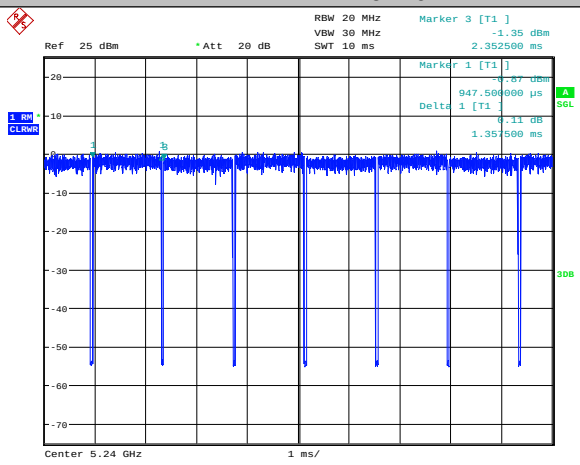
Test Mode	Channel	Ant	Duty Cycle[%]	Duty Cycle factor (dB)
11A	5180	Ant1	96.71%	0.15
11A	5180	Ant2	96.71%	0.15
11A	5200	Ant1	96.71%	0.15
11A	5200	Ant2	96.62%	0.15
11A	5240	Ant1	96.71%	0.15
11A	5240	Ant2	96.62%	0.15
11A	5745	Ant1	96.71%	0.15
11A	5745	Ant2	96.71%	0.15
11A	5785	Ant1	96.71%	0.15
11A	5785	Ant2	96.71%	0.15
11A	5825	Ant1	96.62%	0.15
11A	5825	Ant2	96.62%	0.15

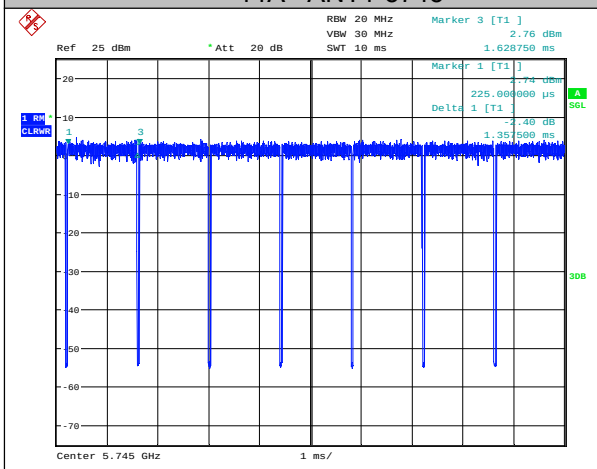
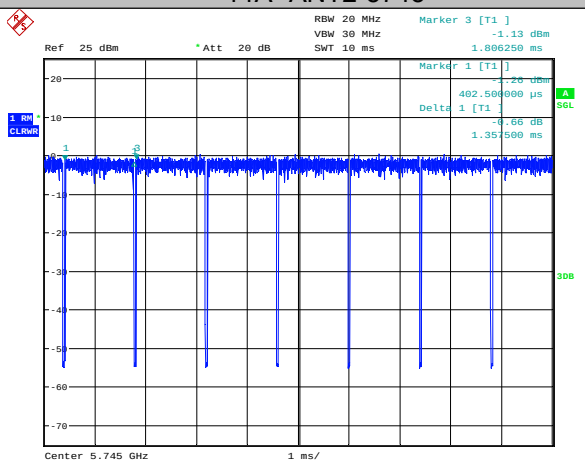
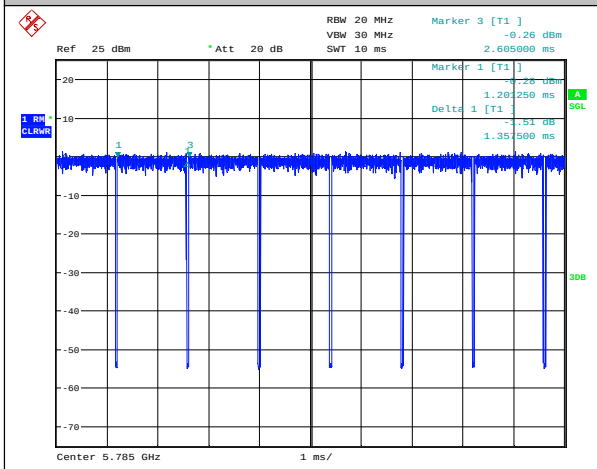
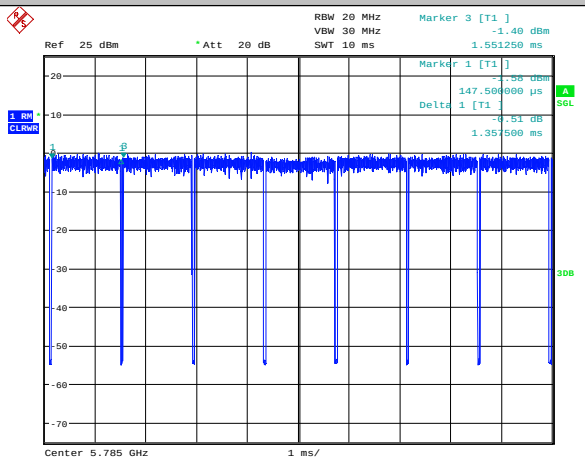
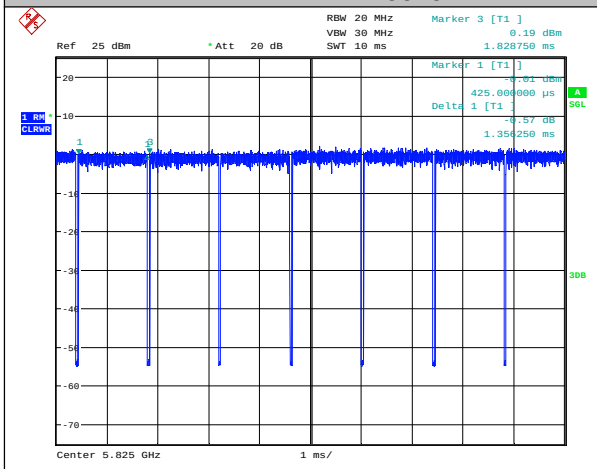
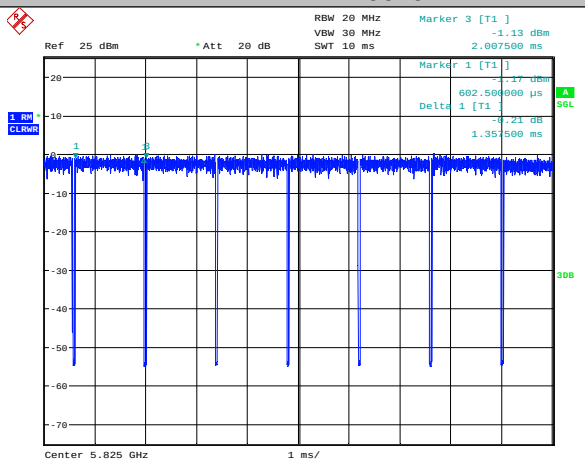
Remark:

1) Duty cycle= On Time/ Period;

2) Duty Cycle factor = 10 * log(1/ Duty cycle);

Test plot as follows:

11A -ANT1-5180	11A –ANT2-5180
	
11A -ANT1-5200	11A –ANT2-5200
	
11A -ANT1-5240	11A –ANT2-5240
	

11A –ANT1-5745	11A -ANT2-5745
	
11A –ANT1-5785	**11A -ANT2-5745**
	
11A –ANT1-5825	**11A -ANT2-5825**
	

Conducted Average Output Power:

Measurement Data

Test Mode	Antenna	Test Channel	Level [dBm]	Duty Cycle factor (dB)	Power [dBm]	Limit [dBm]	Verdict
11A	Ant1	5180	7.12	0.15	7.27	24.00	PASS
11A	Ant2	5180	7.23	0.15	7.38	24.00	PASS
11A	Ant1	5200	7.33	0.15	7.48	24.00	PASS
11A	Ant2	5200	7.01	0.15	7.16	24.00	PASS
11A	Ant1	5240	6.77	0.15	6.92	24.00	PASS
11A	Ant2	5240	6.66	0.15	6.81	24.00	PASS
11A	Ant1	5745	6.46	0.15	6.61	30.00	PASS
11A	Ant2	5745	6.63	0.15	6.78	30.00	PASS
11A	Ant1	5785	6.81	0.15	6.96	30.00	PASS
11A	Ant2	5785	6.49	0.15	6.64	30.00	PASS
11A	Ant1	5825	6.58	0.15	6.73	30.00	PASS
11A	Ant2	5825	6.57	0.15	6.72	30.00	PASS

Appendix C): Power Spectral Density

Measurement Data

For U-NII-1 Band:

Test Mode	Test Channel	Antenna	Meas PSD [dBm/MHz]	Duty Cycle Factor [dB]	PSD [dBm/MHz]	Limit [dBm/MHz]	Verdict
11A	5180	Ant1	-3.42	0.15	-3.27	11.00	PASS
11A	5180	Ant2	-3.44	0.15	-3.29	11.00	PASS
11A	5200	Ant1	-2.77	0.15	-2.62	11.00	PASS
11A	5200	Ant2	-2.62	0.15	-2.47	11.00	PASS
11A	5240	Ant1	-1.52	0.15	-1.37	11.00	PASS
11A	5240	Ant2	-2.51	0.15	-2.36	11.00	PASS

Remark:

PSD = Meas PSD + Duty Cycle Factor

For U-NII-3 Band:

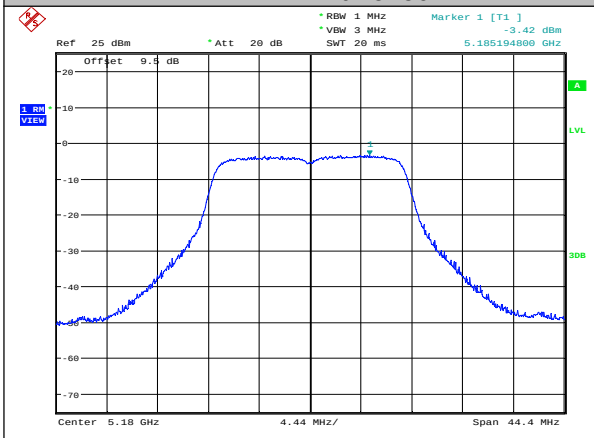
Test Mode	Test Channel	Antenna	Meas PSD [dBm/500kHz]	Duty Cycle Factor [dB]	PSD [dBm/500kHz]	Limit [dBm/500kHz]	Verdict
11A	5745	Ant1	-4.71	0.15	-4.56	30.00	PASS
11A	5745	Ant2	-4.80	0.15	-4.65	30.00	PASS
11A	5785	Ant1	-4.14	0.15	-3.99	30.00	PASS
11A	5785	Ant2	-4.75	0.15	-4.60	30.00	PASS
11A	5825	Ant1	-4.50	0.15	-4.35	30.00	PASS
11A	5825	Ant2	-3.77	0.15	-3.62	30.00	PASS

Remark:

PSD = Meas PSD + Duty Cycle Factor

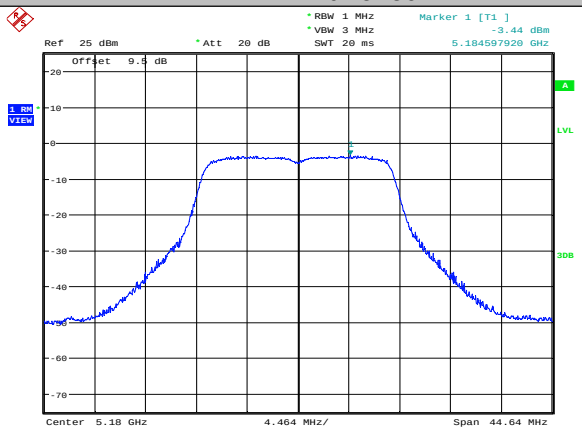
Test plot as follows:

11A-Ant1-5180



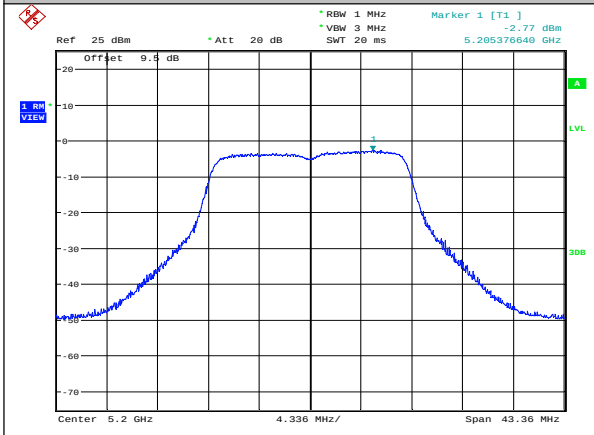
Date: 19.DEC.2019 11:11:38

11A-Ant2-5180



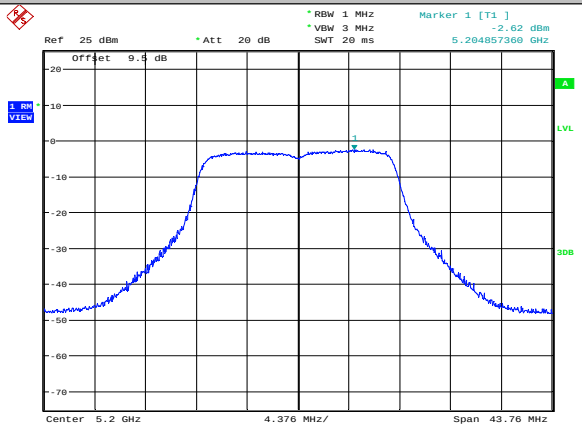
Date: 19.DEC.2019 11:45:51

11A-Ant1-5200



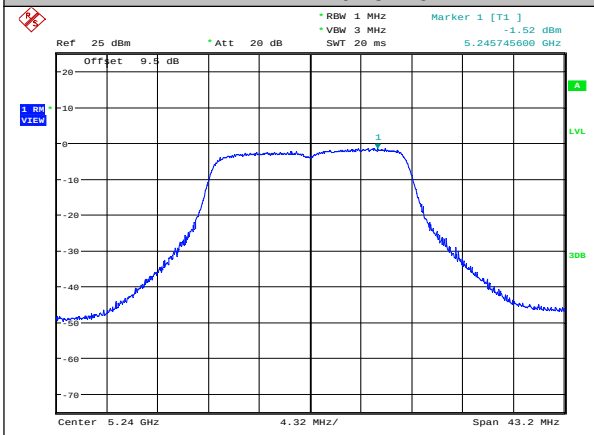
Date: 19.DEC.2019 11:17:06

11A-Ant2-5200



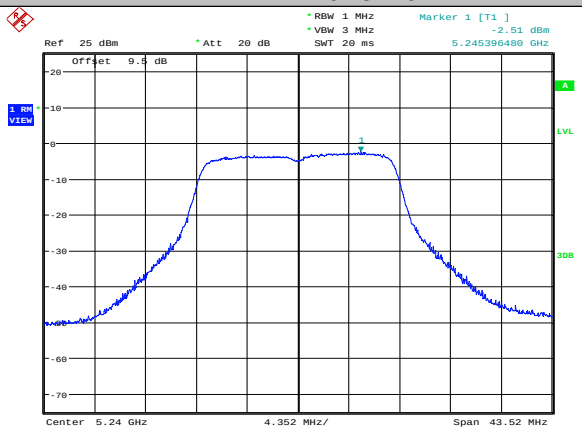
Date: 19.DEC.2019 11:52:03

11A-Ant1-5240

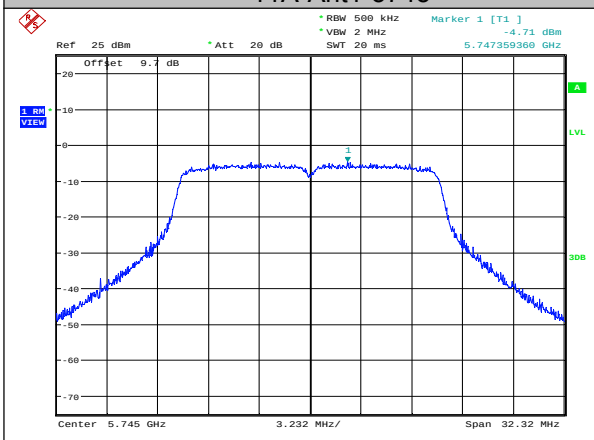
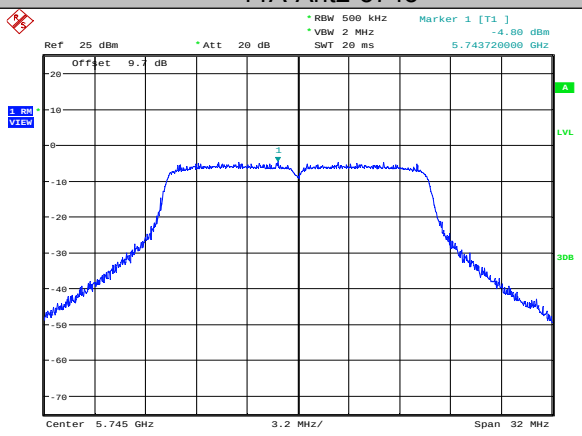
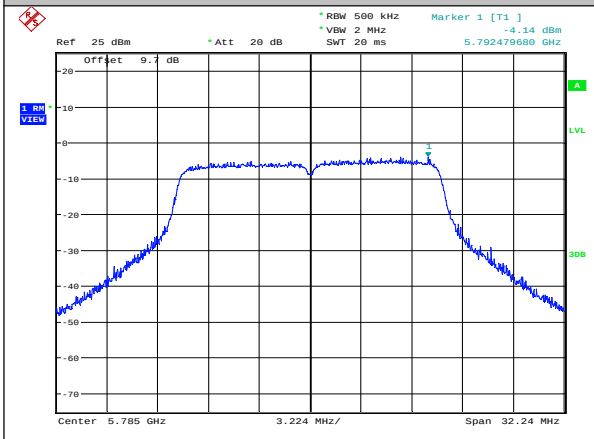
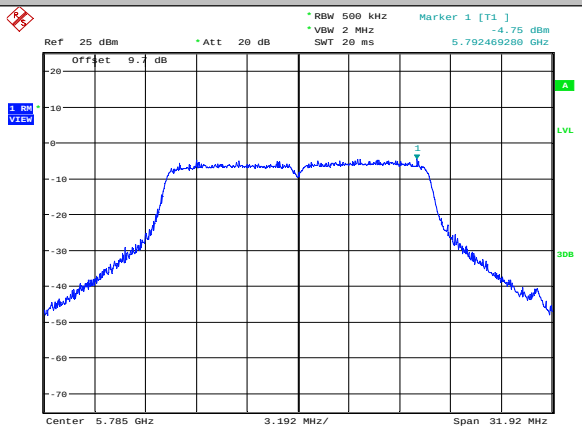
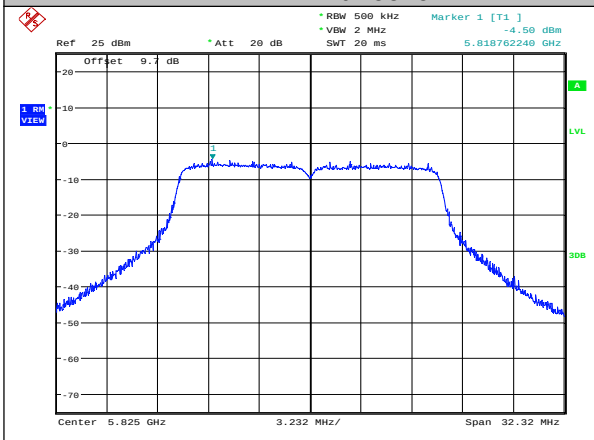
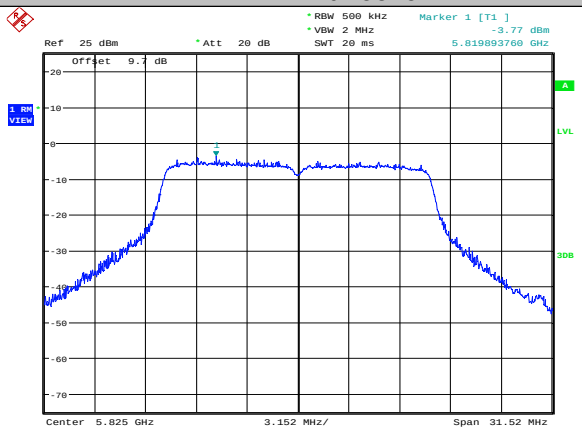


Date: 19.DEC.2019 11:22:09

11A-Ant2-5240



Date: 19.DEC.2019 11:57:21

11A-Ant1-5745	11A-Ant2-5745
 Date: 19.DEC.2019 11:27:22	 Date: 19.DEC.2019 12:02:27
11A-Ant1-5785	11A-Ant2-5785
 Date: 19.DEC.2019 11:32:53	 Date: 19.DEC.2019 12:06:53
11A-Ant1-5825	11A-Ant2-5825
 Date: 19.DEC.2019 11:38:20	 Date: 19.DEC.2019 12:10:56

Appendix D): Frequency Stability

Measurement Data

Frequency Stability Versus Temp.			
Operating Frequency: 5200 MHz_ANT1			
Temp (℃)	Volta ge	Measured Frequency (MHz)	Frequency Drift (ppm)
50	VN	5200.02	3.8462
40		5199.99	-1.9231
30		5199.98	-3.8462
20		5200.01	1.9231
10		5200.00	0.0000
0		5200.02	3.8462
-10		5199.99	-1.9231
-20		5200.01	1.9231

Frequency Stability Versus Temp.			
Operating Frequency: 5200 MHz_ANT1			
Temp.	Volta ge	Measured Frequency (MHz)	Frequency Drift (ppm)
TN	VL	5199.98	-3.8462
	VN	5200.01	1.9231
	VH	5199.99	-1.9231

Note:All the modulation and channels had been tested, but only the worst data recorded in the report.

Appendix E): 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 internal antenna with ipex connector.

The best case gain of the ANT1 is 3.0dBi. The best case gain of the ANT2 is 3.0dBi.

Note: These tow antennas does not transmit simultaneously.

Appendix F): 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 G): AC Power Line Conducted Emission

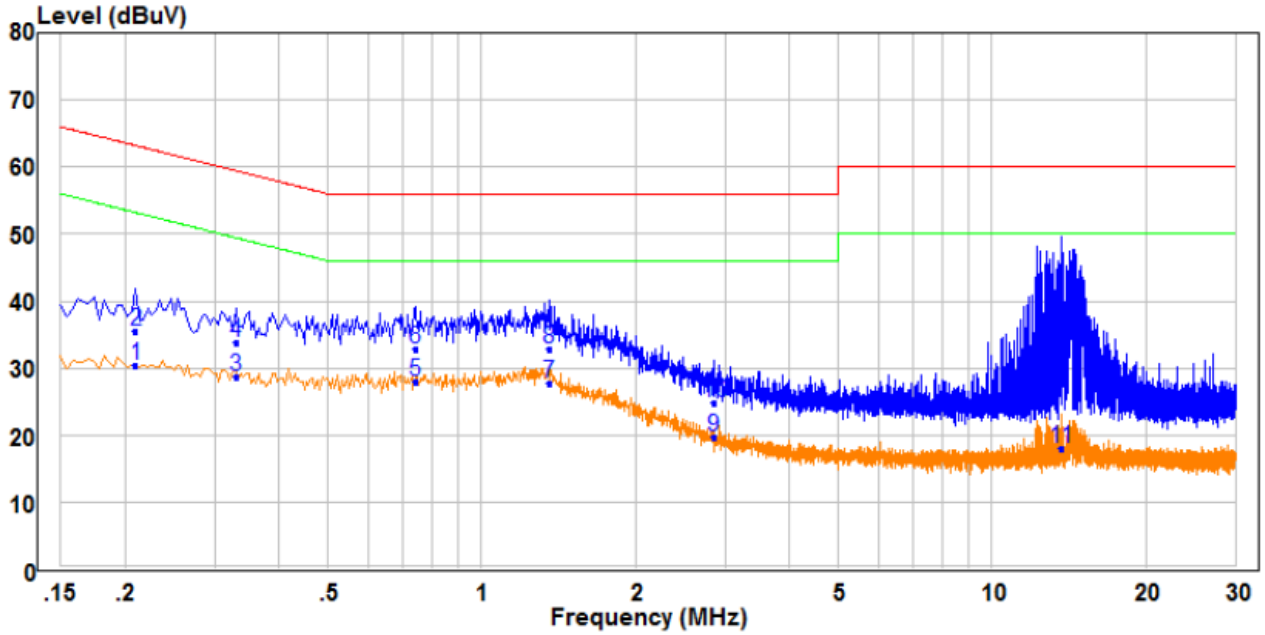
<table>
<tr><td>Test Procedure:</td><td>Test frequency range :150KHz-30MHz
1)The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. 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.</td></tr>
<tr><td>Limit:</td><td>
<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</td></tr>
</table>

Measurement Data

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

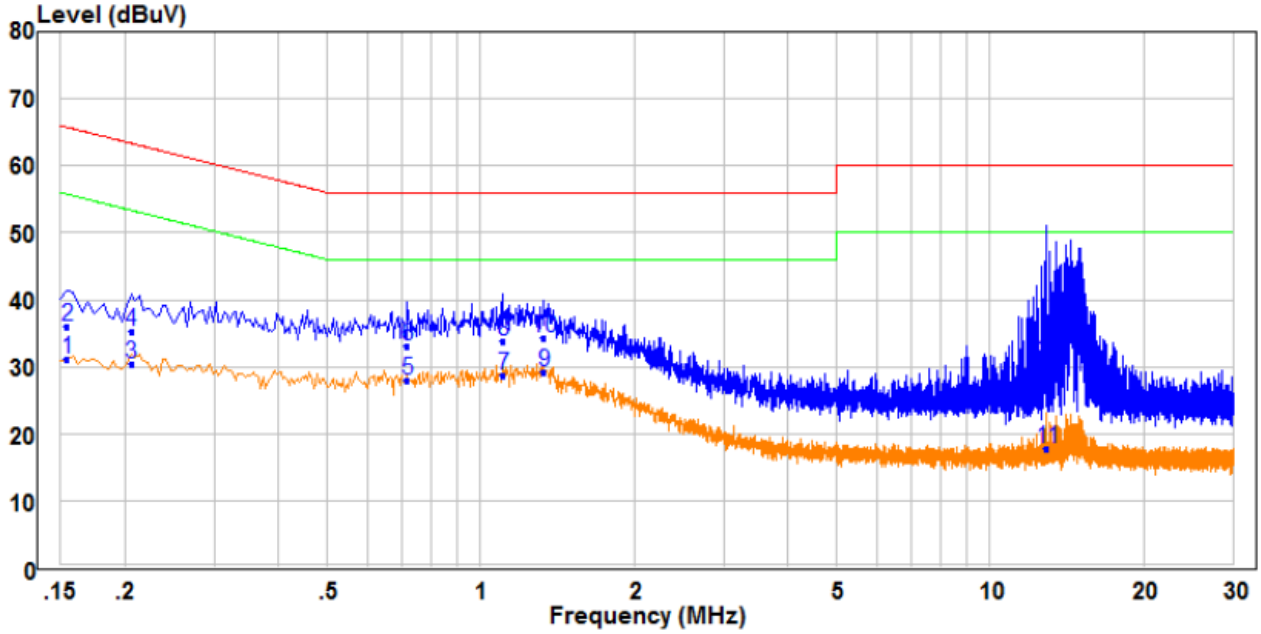
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.210	20.96	9.49	30.45	63.21	-32.76	Average	Line
2		0.210	26.05	9.49	35.54	63.21	-27.67	QP	Line
3		0.330	19.12	9.50	28.62	59.45	-30.83	Average	Line
4		0.330	24.40	9.50	33.90	59.45	-25.55	QP	Line
5	AV	0.742	18.06	9.82	27.88	56.00	-28.12	Average	Line
6	PP	0.742	23.04	9.82	32.86	56.00	-23.14	QP	Line
7		1.354	18.25	9.53	27.78	56.00	-28.22	Average	Line
8		1.354	23.20	9.53	32.73	56.00	-23.27	QP	Line
9		2.850	10.11	9.59	19.70	56.00	-36.30	Average	Line
10		2.850	15.19	9.59	24.78	56.00	-31.22	QP	Line
11		13.681	8.16	9.88	18.04	60.00	-41.96	Average	Line
12		13.681	25.53	9.88	35.41	60.00	-24.59	QP	Line

Neutral line:



		Freq	Read Level	Factor	Limit Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.154	21.61	9.48	31.09	65.78	-34.69	Average	Neutral
2		0.154	26.57	9.48	36.05	65.78	-29.73	QP	Neutral
3		0.206	20.96	9.48	30.44	63.37	-32.93	Average	Neutral
4		0.206	25.88	9.48	35.36	63.37	-28.01	QP	Neutral
5		0.718	18.14	9.83	27.97	56.00	-28.03	Average	Neutral
6		0.718	23.17	9.83	33.00	56.00	-23.00	QP	Neutral
7		1.106	18.93	9.72	28.65	56.00	-27.35	Average	Neutral
8		1.106	24.03	9.72	33.75	56.00	-22.25	QP	Neutral
9	AV	1.330	19.49	9.72	29.21	56.00	-26.79	Average	Neutral
10	PP	1.330	24.47	9.72	34.19	56.00	-21.81	QP	Neutral
11		12.937	7.80	9.94	17.74	60.00	-42.26	Average	Neutral
12		12.937	20.77	9.94	30.71	60.00	-29.29	QP	Neutral

Notes:

1. The 6Mbps of rate of 802.11a_Ant2 at 40 channel is the worst case, only the worst data recorded in the report.
2. The following Quasi-Peak and Average measurements were performed on the EUT.
3. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

Appendix H) 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:

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 and the rotatable 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

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 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	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:

ANT1:

Worse case mode:		802.11a(6Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	55.42	-3.63	51.79	74	-22.21	peak	H
5150.00	45.24	-3.63	41.61	54	-12.39	AVG	H
5150.00	55.27	-3.63	51.64	74	-22.36	peak	V
5150.00	45.29	-3.63	41.66	54	-12.34	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	56.56	-3.59	52.97	74	-21.03	peak	H
5350.00	45.04	-3.59	41.45	54	-12.55	AVG	H
5350.00	56.53	-3.59	52.94	74	-21.06	peak	V
5350.00	44.19	-3.59	40.60	54	-13.40	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650	58.35	-3.46	54.89	68.2	-13.31	peak	H
5742.50	96.03	-3.44	92.59	122.2	-29.61	peak	H
5650	57.34	-3.46	53.88	68.2	-14.32	peak	V
5744.77	98.18	-3.44	94.74	122.2	-27.46	peak	V

Worse case mode:		802.11a(6Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5825.32	97.08	-3.42	93.66	122.2	-28.54	peak	H
5925	58.31	-3.41	54.90	68.2	-13.30	peak	H
5826.30	96.82	-3.42	93.40	122.2	-28.80	peak	V
5925	57.03	-3.41	53.62	68.2	-14.58	peak	V

ANT2:

Worse case mode:		802.11a(6Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	56.03	-3.63	52.40	74	-21.60	peak	H
5150.00	44.13	-3.63	40.50	54	-13.50	AVG	H
5150.00	55.61	-3.63	51.98	74	-22.02	peak	V
5150.00	42.69	-3.63	39.06	54	-14.94	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	53.65	-3.59	50.06	74	-23.94	peak	H
5350.00	44.62	-3.59	41.03	54	-12.97	AVG	H
5350.00	54.31	-3.59	50.72	74	-23.28	peak	V
5350.00	44.54	-3.59	40.95	54	-13.05	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650	58.32	-3.46	54.86	68.2	-13.34	peak	H
5741.75	96.17	-3.44	92.73	122.2	-29.47	peak	H
5650	58.05	-3.46	54.59	68.2	-13.61	peak	V
5740.88	96.84	-3.44	93.40	122.2	-28.80	peak	V

Worse case mode:		802.11a(6Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5820.71	96.33	-3.42	92.91	122.2	-29.29	peak	H
5925	57.38	-3.41	53.97	68.2	-14.23	peak	H
5824.94	97.41	-3.42	93.99	122.2	-28.21	peak	V
5925	55.66	-3.41	52.25	68.2	-15.95	peak	V

Note:
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 + Antenna Factor + Cable Factor – Preamplifier Factor

Appendix I): Radiated Spurious Emissions

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

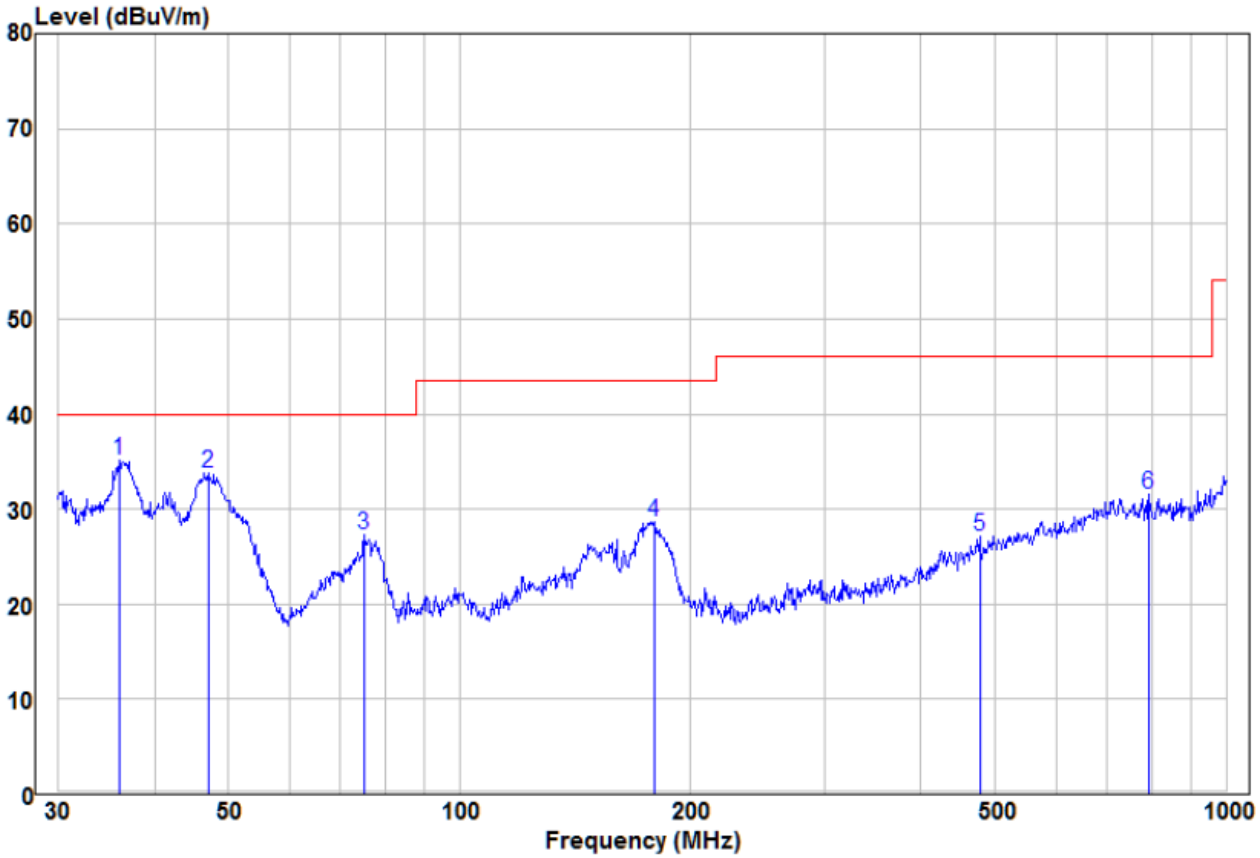
Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Test result: PASS

Test Data:

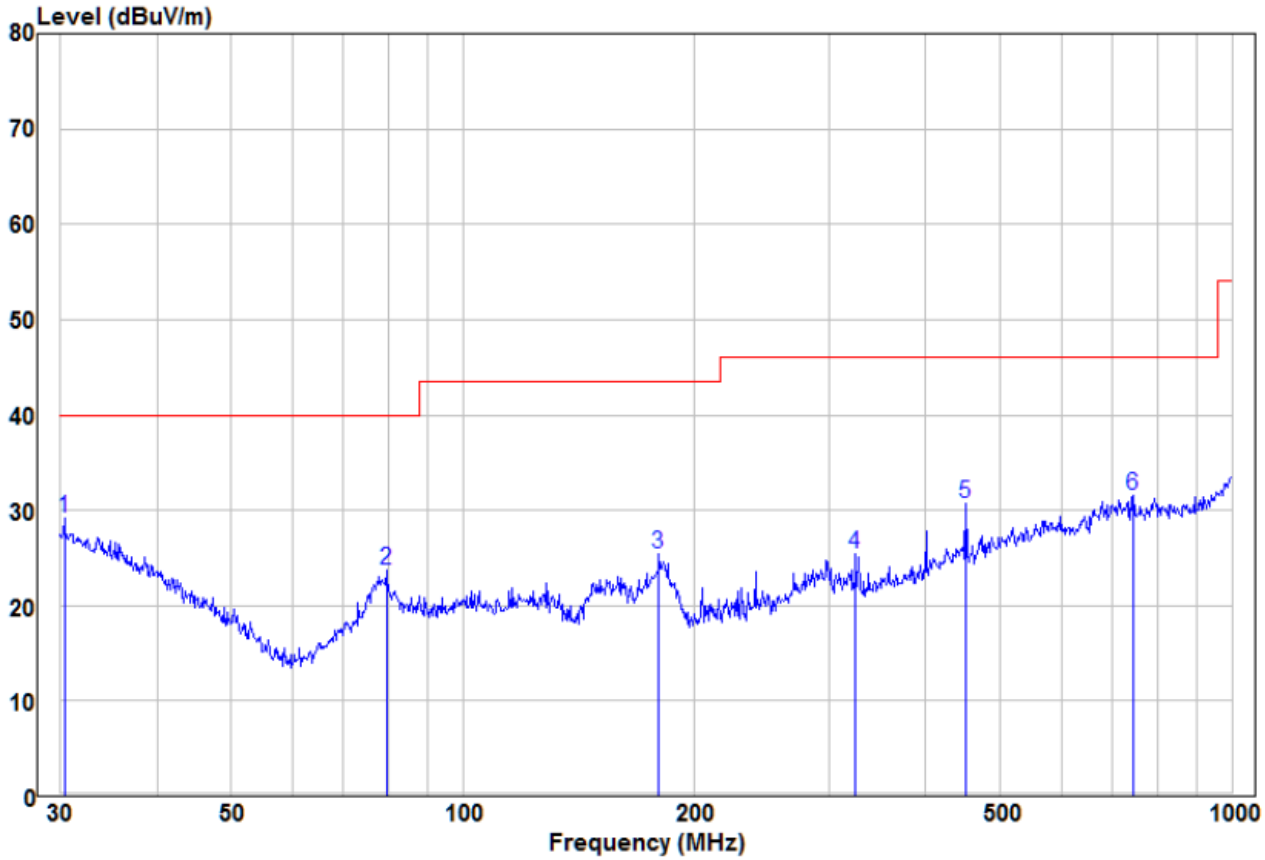
Radiated Emission below 1GHz

30MHz~1GHz		
Test mode:	Charge +Transmitting	Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	36.00	18.92	16.24	35.16	40.00	-4.84	Peak	VERTICAL
2	46.99	22.98	10.80	33.78	40.00	-6.22	Peak	VERTICAL
3	75.18	18.28	9.00	27.28	40.00	-12.72	Peak	VERTICAL
4	180.02	20.40	8.34	28.74	43.50	-14.76	Peak	VERTICAL
5	477.17	10.51	16.57	27.08	46.00	-18.92	Peak	VERTICAL
6	793.40	10.84	20.77	31.61	46.00	-14.39	Peak	VERTICAL

Test mode:	Charge +Transmitting	Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	30.32	10.84	18.30	29.14	40.00	-10.86	Peak	HORIZONTAL
2	79.52	14.02	9.70	23.72	40.00	-16.28	Peak	HORIZONTAL
3	180.02	17.16	8.34	25.50	43.50	-18.00	Peak	HORIZONTAL
4	324.46	13.02	12.32	25.34	46.00	-20.66	Peak	HORIZONTAL
5	451.14	14.87	15.76	30.63	46.00	-15.37	Peak	HORIZONTAL
6	744.87	11.15	20.39	31.54	46.00	-14.46	Peak	HORIZONTAL

Transmitter Emission above 1GHz

Test mode:	802.11a(6Mbps)_Ant2			Test channel:		40	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol. H/V
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
10440	48.59	2.23	50.82	74	-23.18	peak	H
10440	37.24	2.23	39.47	54	-14.53	AVG	H
15660	47.90	3.75	51.65	74	-22.35	peak	H
15660	36.00	3.75	39.75	54	-14.25	AVG	H
10440	50.12	2.23	52.35	74	-21.65	peak	V
10440	36.87	2.23	39.10	54	-14.90	AVG	V
15660	48.33	3.75	52.08	74	-21.92	peak	V
15660	36.27	3.75	40.02	54	-13.98	AVG	V

Remark:

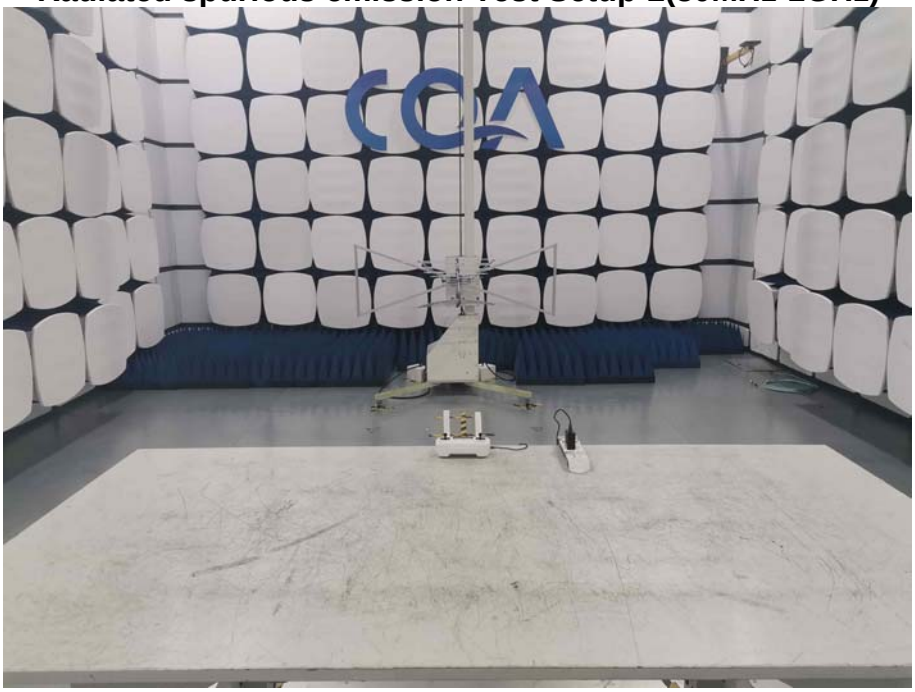
1) The 6Mbps of rate of 802.11a_Ant2 at 40 channel is the worst case, only the worst data recorded in the report.
2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
3) Scan from 9kHz to 40GHz,The disturbance above 18GHz and 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

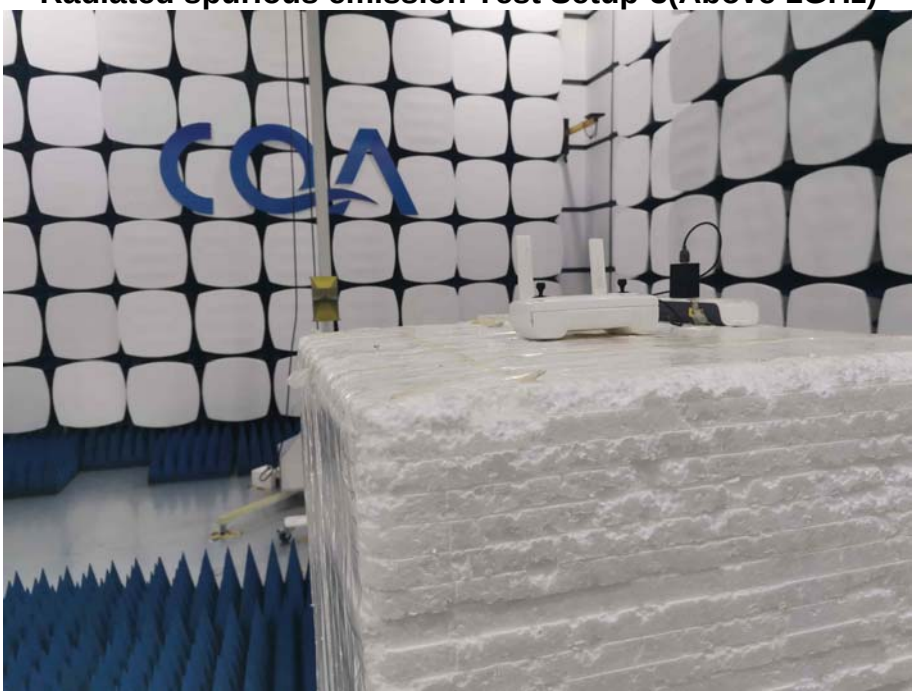
Test model No.: HT018A

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

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



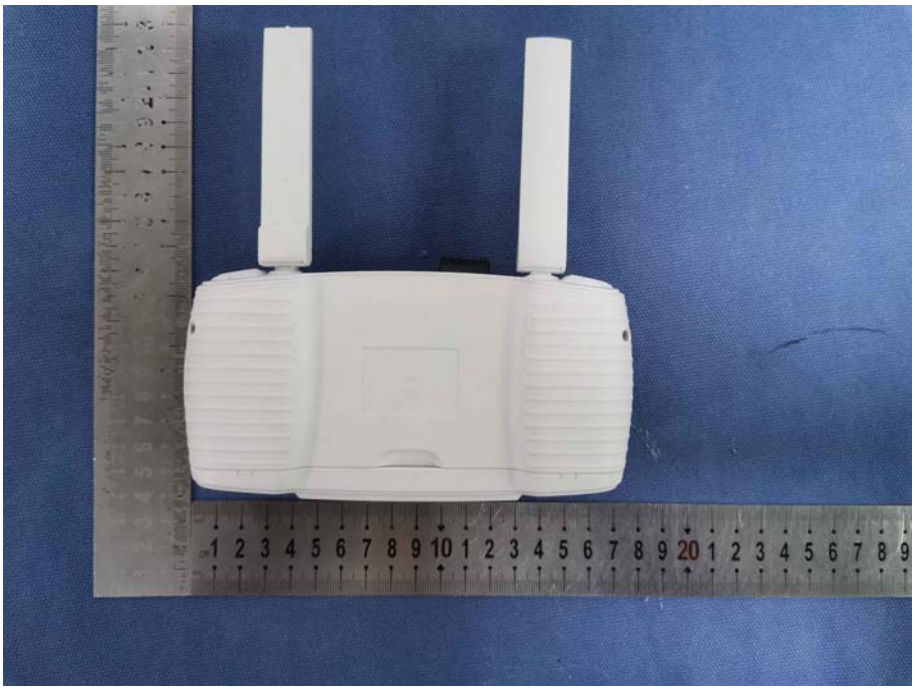
Radiated spurious emission Test Setup-3(Above 1GHz)

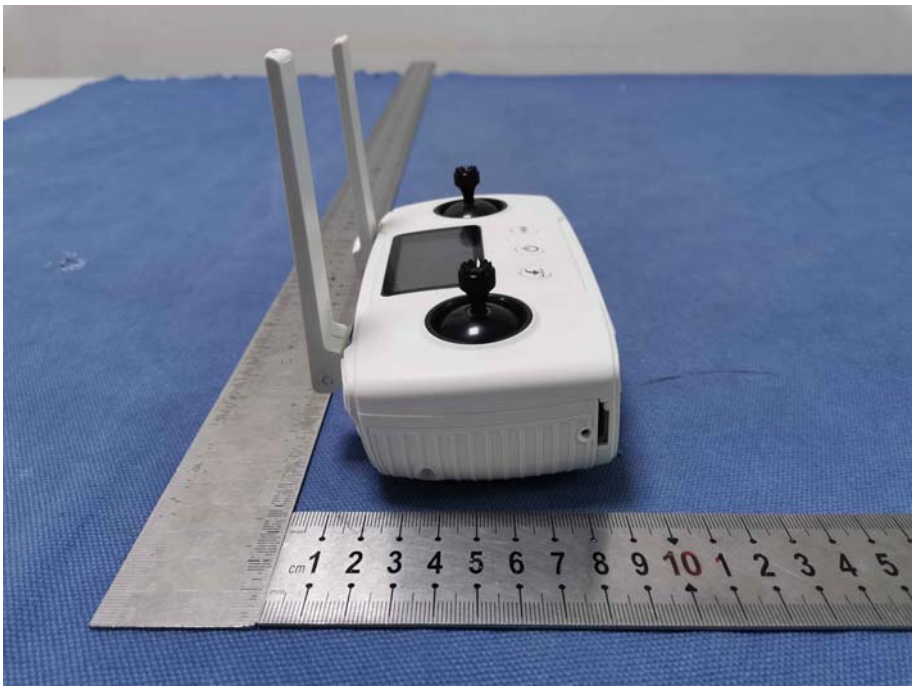


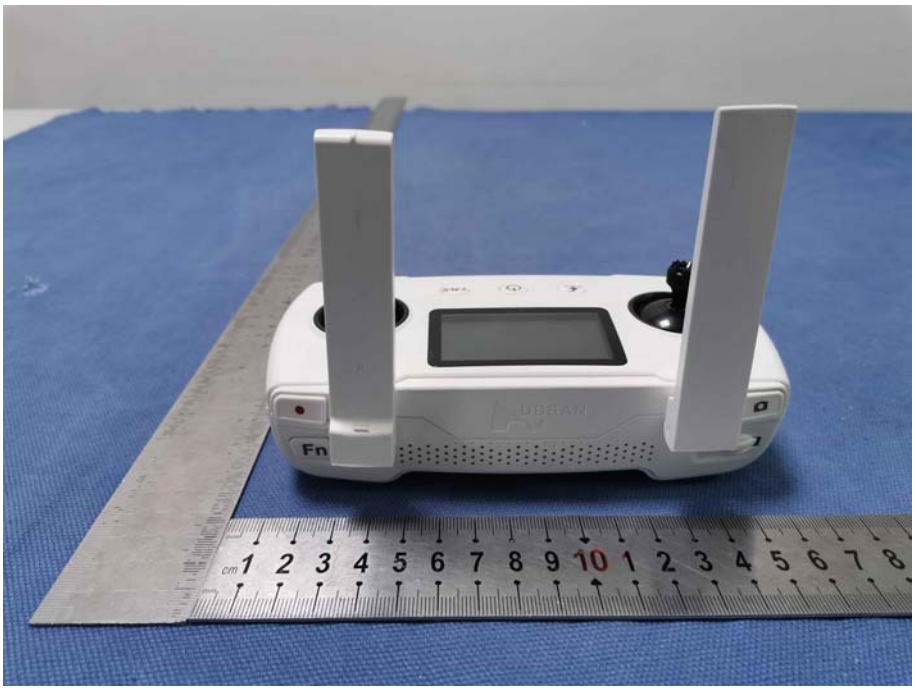
Conducted Emissions Test Setup

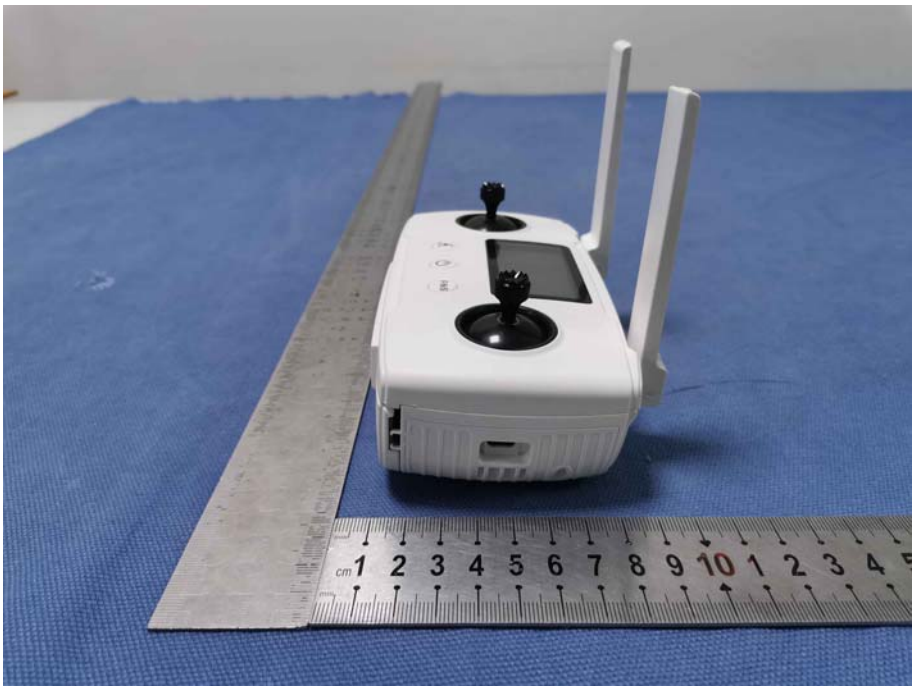
PHOTOGRAPHS OF EUT Constructional Details

Test model No.: HT018A





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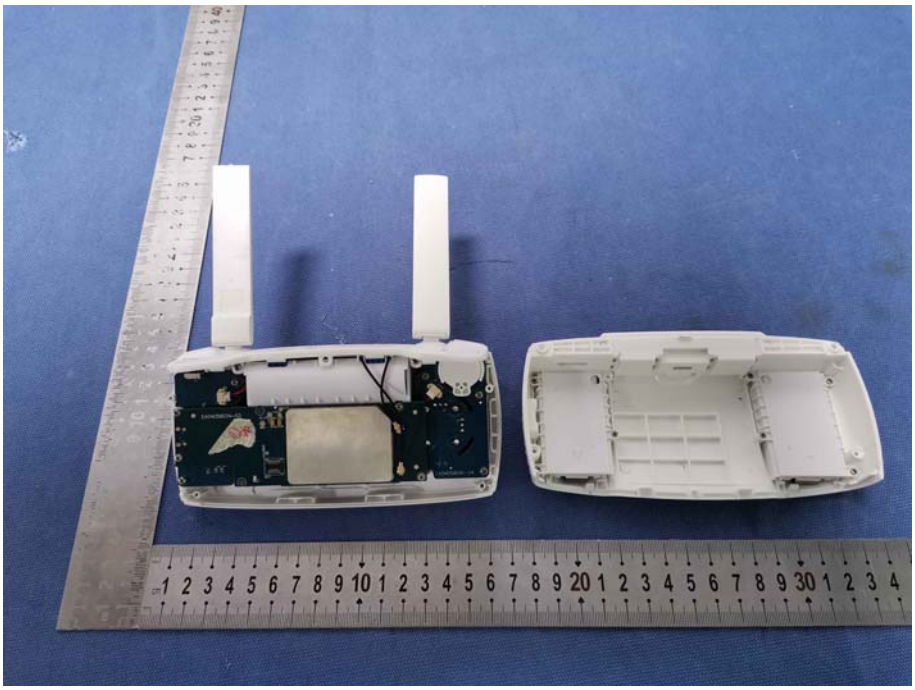


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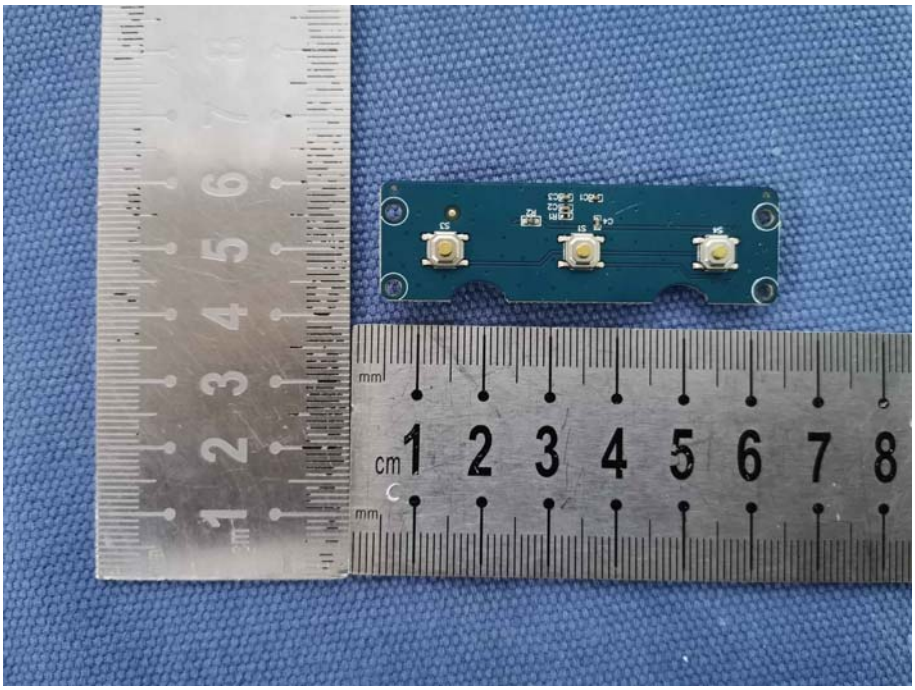
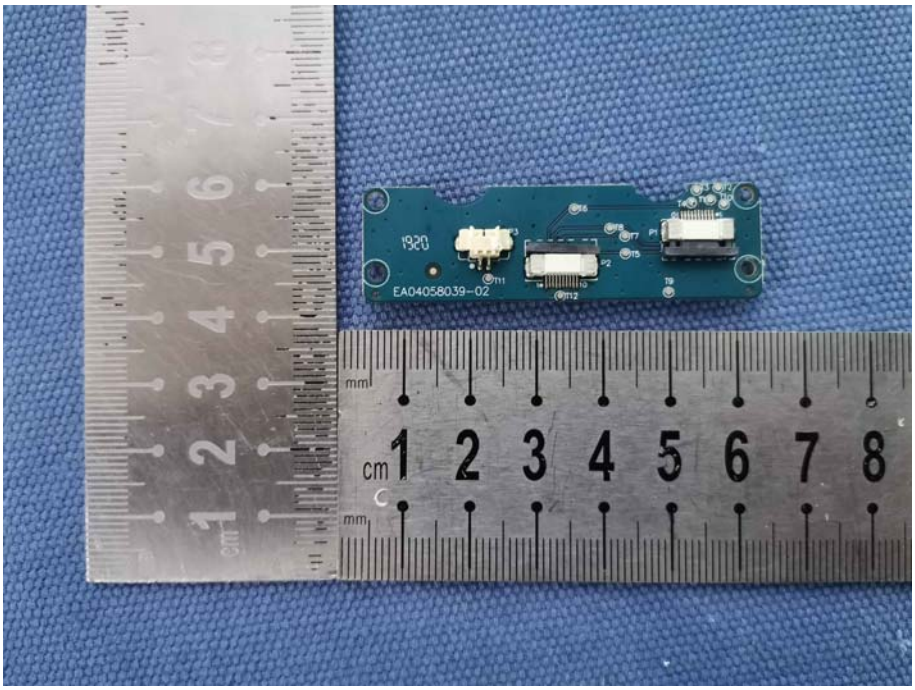
EverPlus
2019/09
Li-ion
20650 12.06Wh
3.6V 3350mAh
EverPlus
Li-ion

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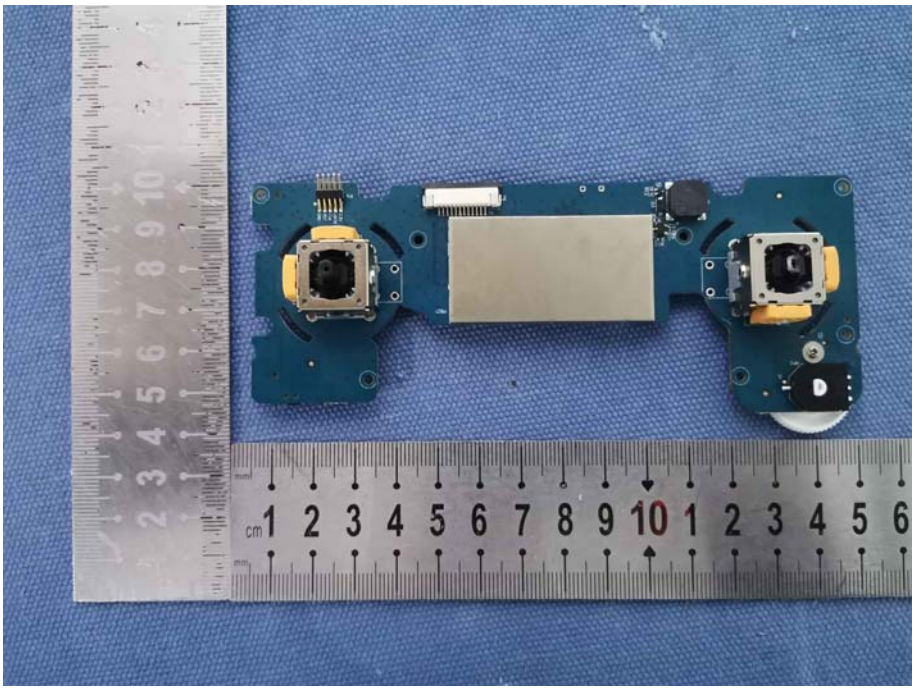

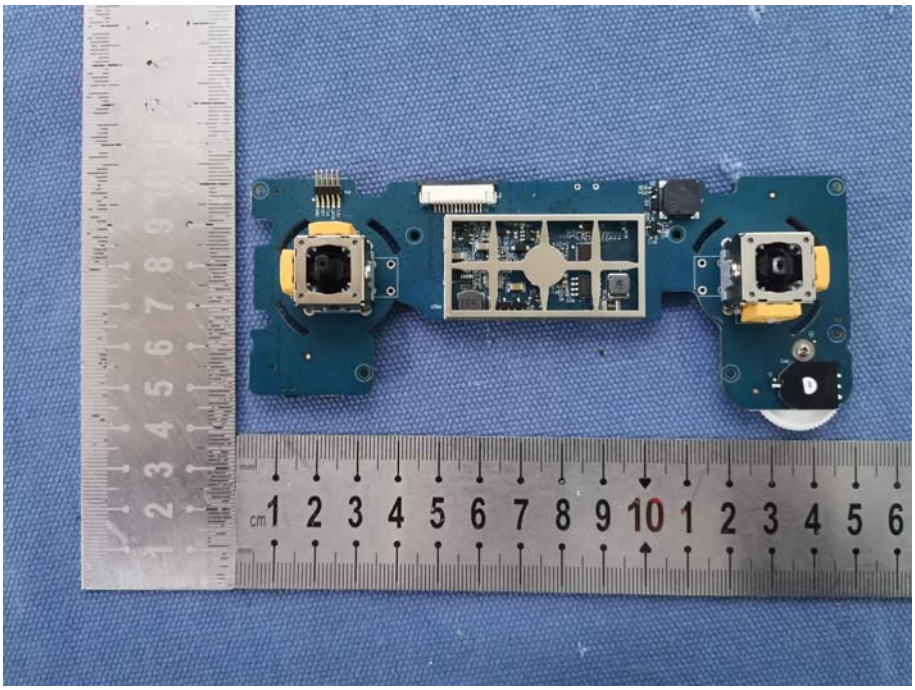

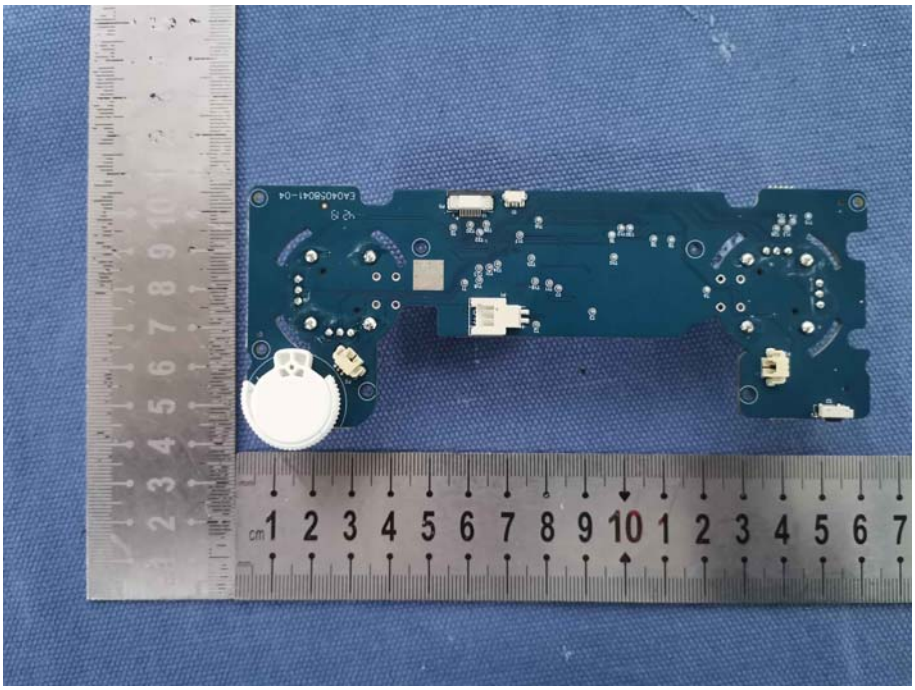

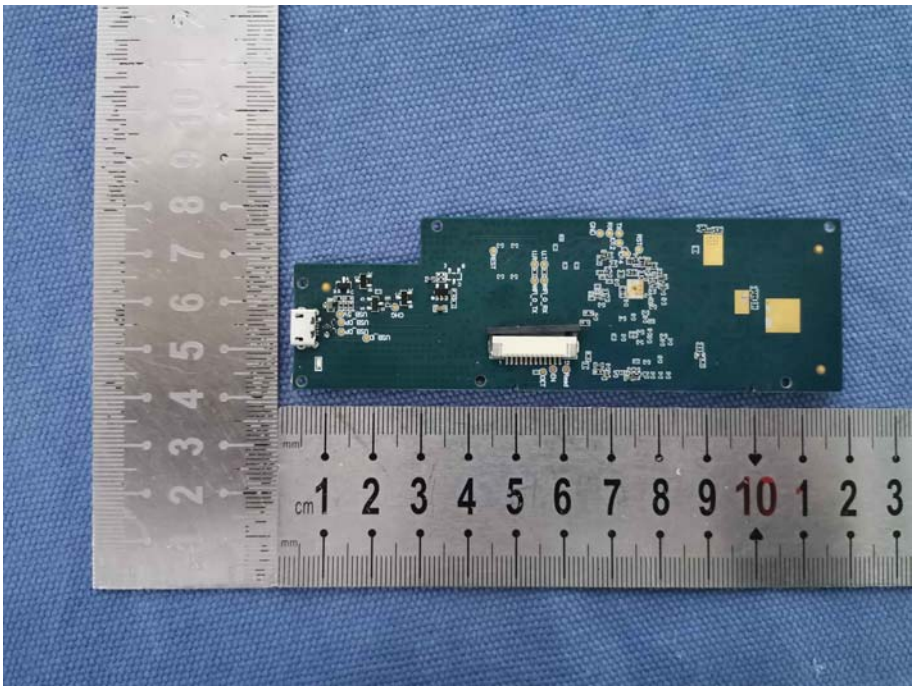

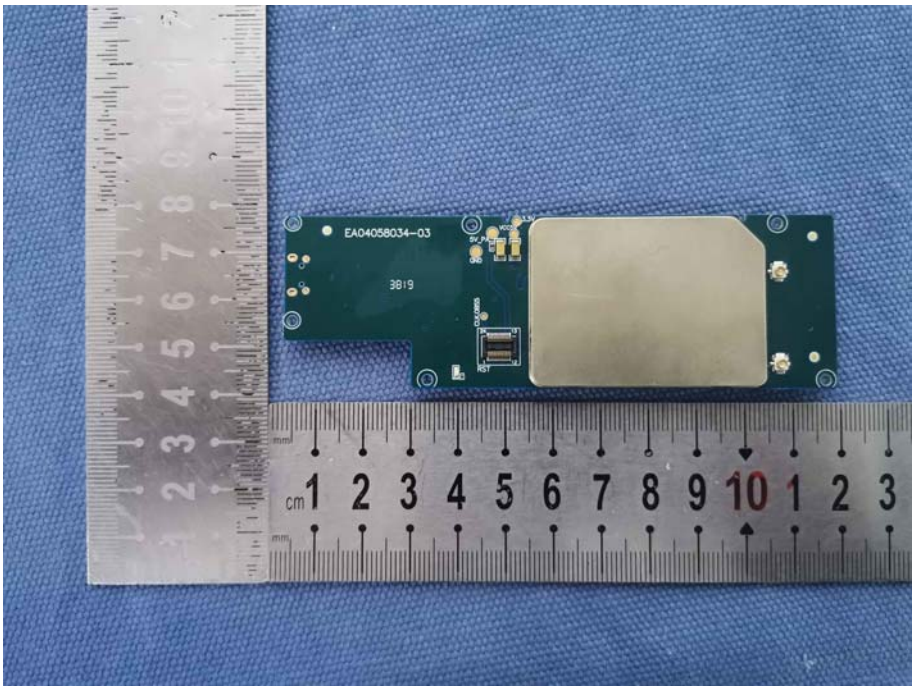
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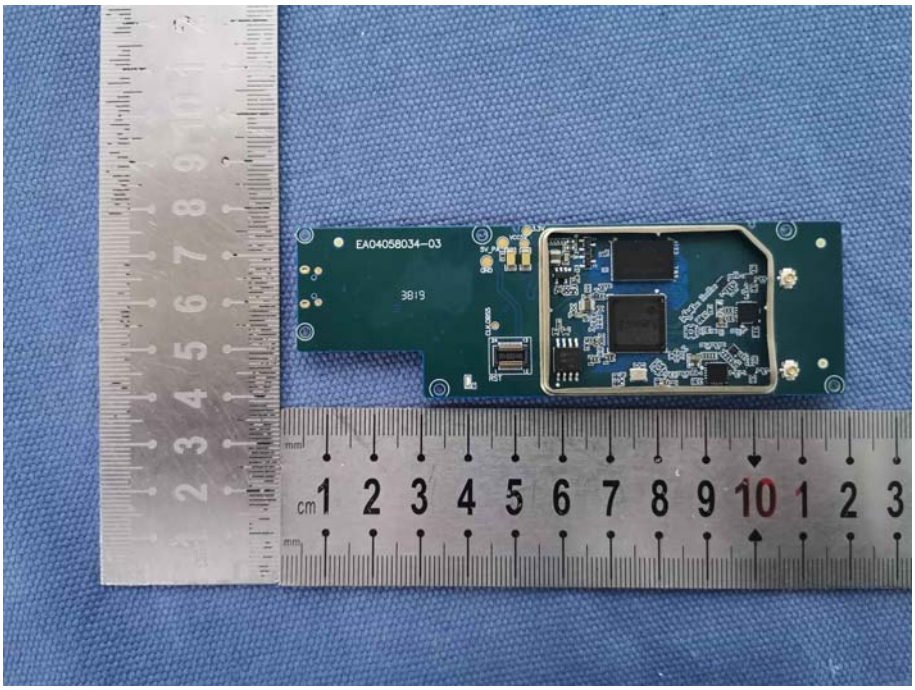
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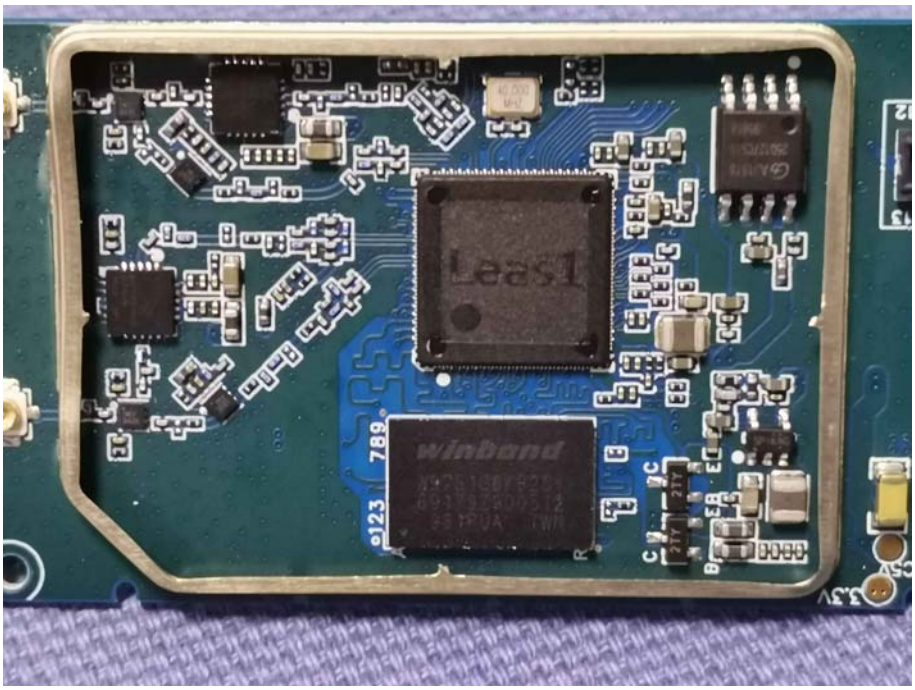

*** End of Report ***