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

Test Report

Report No.:	CQASZ20210801369E-01
Applicant:	Shenzhen Hollyland Technology Co.,Ltd
Address of Applicant:	8F, Building 5D, Skyworth Innovation Valley, Tangtou Road. Shiyan Street, Baoan District Shenzhen, China.
Equipment Under Test (EUT):	
Product:	WIRELESS VIDEO TRANSMISSION SYSTEM
Model No.:	COSMO C1, COSMO C2, COSMO C3, COSMO M1, COSMO M2, COSMO M3
Teat Model No.:	COSMO C1
Brand Name:	HOLLYLAND
FCC ID:	2ADZC-9620T
Standards:	47 CFR Part 15, Subpart E
	KDB 789033 D02 General UNII Test Procedures New Rules v02r01
	KDB 558074 D01 Meas Guidance v05
Date of Receipt:	2021-08-17
Date of Test:	2021-08-17 to 2021-10-19
Date of Issue:	2021-10-25
Test Result:	**PASS***

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

Tested By: lewis zhou

(Lewis Zhou)

Reviewed By: Rock Huang

(Rock Huang)

Approved By:

(Jack ai)

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210801369E-01	Rev.01	Initial report	2021-10-25

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 C Section 15.207	ANSI C63.10-2013	PASS
Conducted Output Power and transmit power control mechanism	47 CFR Part 15 Subpart E	ANSI C63.10-2013	PASS
Emission Bandwidth	47 CFR Part 15 Subpart E	ANSI C63.10-2013	PASS
Peak Power Spectral Density	47 CFR Part 15 Subpart E	ANSI C63.10-2013	PASS
Frequency stability	47 CFR Part 15 Subpart E	ANSI C63.10-2013	PASS
Operation in the absence of information to the transmit	47 CFR Part 15 Subpart E	47 CFR Part 15 Subpart E	PASS
Radiated Spurious Emissions	47 CFR Part 15 Subpart E	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15 Subpart E	ANSI C63.10-2013	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

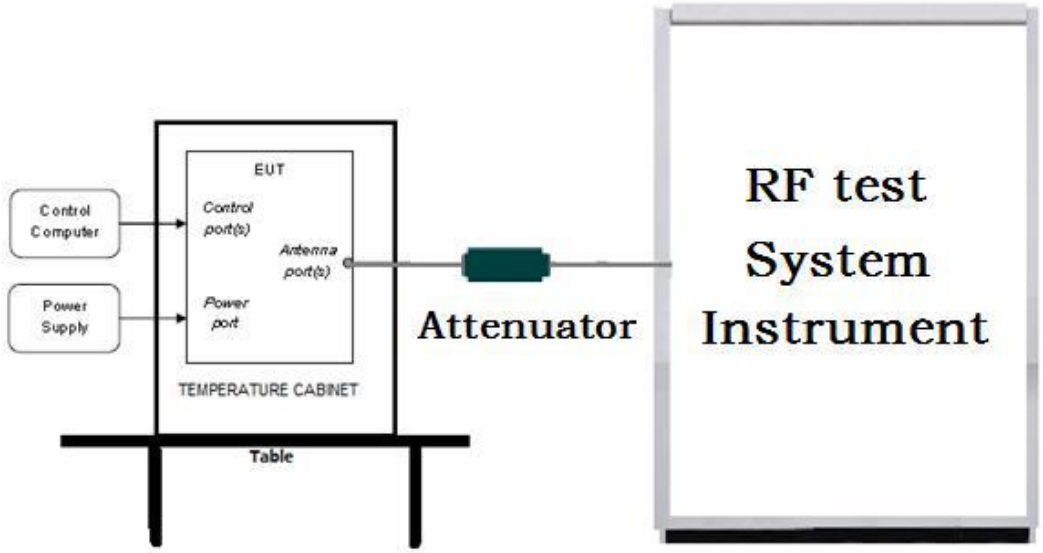
Tx: In this whole report Tx (or tx) means Transmitter.
Rx: In this whole report Rx (or rx) means Receiver.
RF: In this whole report RF means Radiated Frequency.
CH: In this whole report CH means channel.
Volt: In this whole report Volt means Voltage.
Temp: In this whole report Temp means Temperature.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

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:

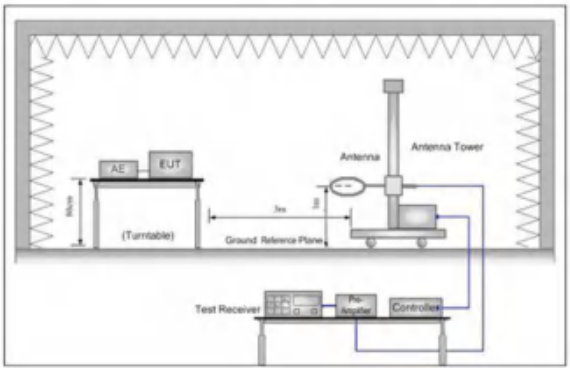


Figure 1. Below 30MHz

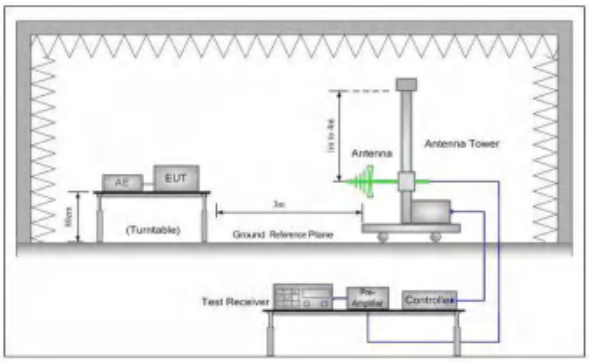


Figure 2. 30MHz to 1GHz

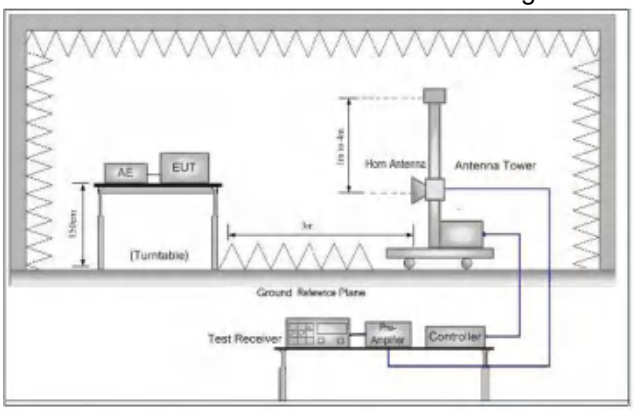
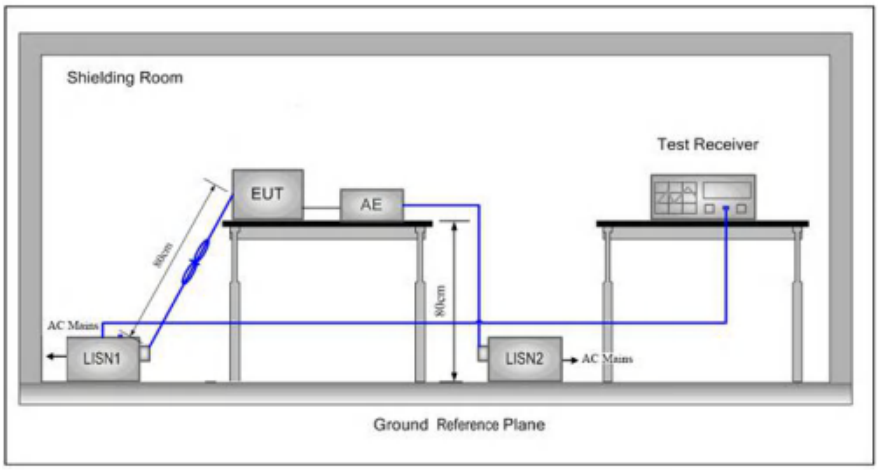


Figure 3. Above 1GHz

4.1.3 For Conducted Emissions test setup

Conducted Emissions setup



4.2 Test Environment

Operating Environment:		
Conducted Emissions:		
Temperature:	25.6 °C	
Humidity:	60 % RH	
Atmospheric Pressure:	1009 mbar	
Radiated Emissions:		
Temperature:	25.5 °C	
Humidity:	54 % RH	
Atmospheric Pressure:	1009mbar	
Radio conducted item test (RF Conducted test room):		
Temperature:	25.3 °C	
Humidity:	50 % RH	
Atmospheric Pressure:	1009 mbar	
Test Condition	Temperature (°C)	Voltage (V)
TN/VN	+15 to +35	7.6
TL/VL	0	6.84
TH/VL	50	6.84
TL/VH	0	8.36
TH/VH	50	8.36

Remark:

1)The EUT just work in such extreme temperature of 0 °C to 50 °C and the extreme voltage of 6.84V to 8.36V, so here the EUT is tested in the temperature of 0 °C to 50 °C and the voltage of 6.84V to 8.36V.

2)VN: Normal Voltage; TN: Normal Temperature;

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

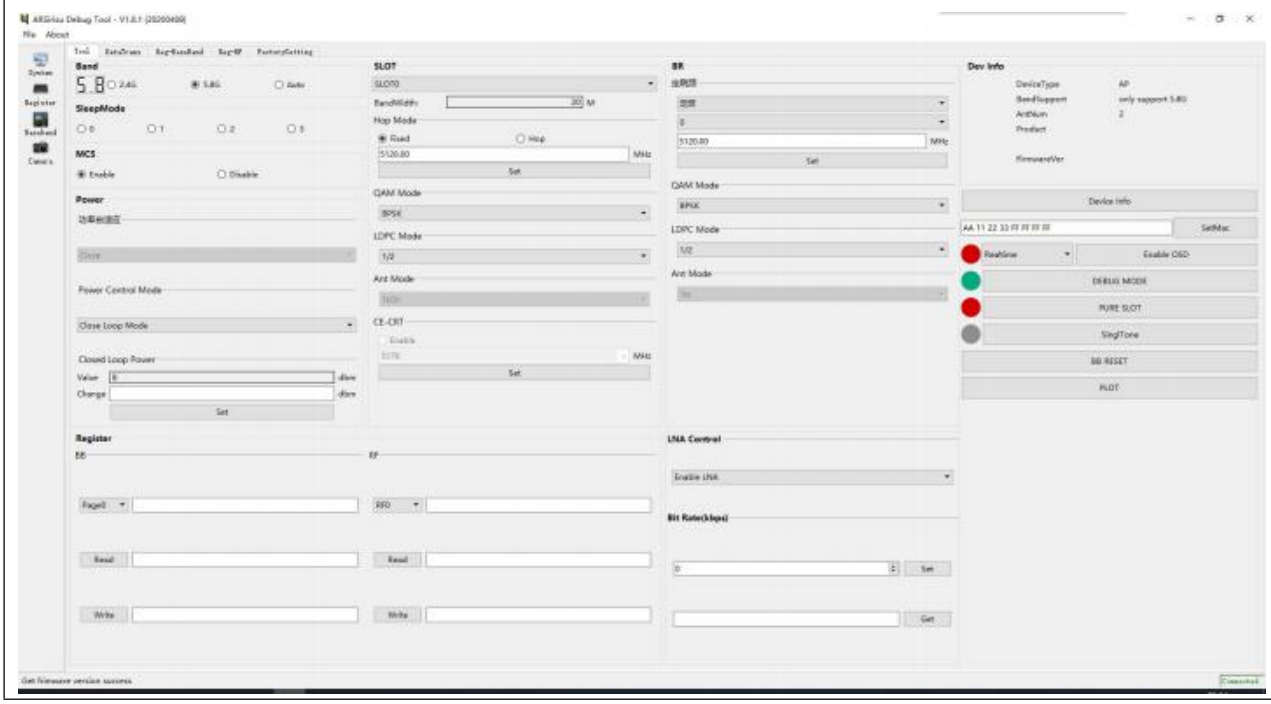
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.3 Test Condition

Test channel:

Tx/Rx	RF Channel		
	Low(L)	Middle(M)	High(H)
5150MHz ~5250 MHz	Channel 0	Channel 1	Channel 2
	5180MHz	5200MHz	5240MHz
5725MHz ~5850 MHz	Channel 3	Channel 4	Channel 5
	5760MHz	5780MHz	5820MHz

Run Software:



Test mode:
Pre-scan under all rate at lowest channel for Ant1

5 General Information

5.1 Client Information

Applicant:	Shenzhen Hollyland Technology Co.,Ltd
Address of Applicant:	8F, Building 5D, Skyworth Innovation Valley, Tangtou Road. Shiyan Street, Baoan District Shenzhen, China.
Manufacturer:	Shenzhen Hollyland Technology Co.,Ltd
Address of Manufacturer:	8F, Building 5D, Skyworth Innovation Valley, Tangtou Road. Shiyan Street, Baoan District Shenzhen, China.
Factory:	Shenzhen Hollyland Technology Co.,Ltd BanTian Branch
Address of Factory:	8F, Building 5D, Skyworth Innovation Valley, Tangtou Road. Shiyan Street, Baoan District Shenzhen, China.

5.2 General Description of EUT

Product Name:	WIRELESS VIDEO TRANSMISSION SYSTEM
Model No.:	COSMO C1, COSMO C2, COSMO C3, COSMO M1, COSMO M2, COSMO M3
Test Model No.:	COSMO C1
Trade Mark:	HOLLYLAND
Hardware Version:	F782381028
Software Version:	V1.0.1.2
Test sample SN:	002140R I000016
EUT Power Supply:	Adapter: MODEL: A241-120200I INPUT: 100-240V~50/60Hz 0.8A Max OUTPUT: 12V 2A, 24W
EUT Supports Radios application:	5GHz: custom: U-NII-1: 5.15-5.25GHz; U-NII-3: 5.725-5.850GHz

5.3 Product Specification subjective to this standard

Operation Frequency:	5150MHz ~5250 MHz 5725MHz ~5850 MHz
Channel Numbers:	5150MHz ~5250MHz/ 3 channel 5725MHz ~5850MHz/ 3 channel
Type of Modulation:	OFDM
Sample Type:	☒ Mobile ☐ Portable ☐ Fix Location
Test Power Grade:	N/A
Test Software of EUT:	ARSirisu Debug Tool (manufacturer declare)
Antenna Type:	External antenna
Antenna gain:	4dBi@5GHz: Wi-Fi: U-NII-1, 4dBi@5GHz: Wi-Fi: U-NII-3

Operation Frequency each of channel

5150MHz ~5250 MHz			
Channel	Frequency	Channel	Frequency
0	5180MHz	1	5200MHz
2	5240MHz	NA	NA
5725MHz ~5850 MHz			
Channel	Frequency	Channel	Frequency
3	5760MHz	4	5780MHz
5	5820MHz	NA	NA

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Certification	Supplied by
PC	Lenovo	ThinkPad E450c	FCC ID	CQA

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	2021/9/10	2022/9/09
Spectrum analyzer	R&S	FSU26	CQA-038	2021/9/10	2022/9/09
Spectrum analyzer	R&S	FSU40	CQA-075	2021/9/10	2022/9/09
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2021/9/14	2024/9/13
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2021/9/14	2024/9/13
Preamplifier	EMCI	EMC184055SE	CQA-089	2021/9/14	2024/9/13
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2021/9/14	2024/9/13
Bilog Antenna	R&S	HL562	CQA-011	2021/9/10	2022/9/09
Horn Antenna	R&S	HF906	CQA-012	2021/9/10	2022/9/09
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/9/10	2022/9/09
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2021/9/10	2022/9/09
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2021/9/10	2022/9/09
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2021/9/10	2022/9/09
Antenna Connector	CQA	RFC-01	CQA-080	2021/9/10	2022/9/09
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2021/9/10	2022/9/09
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2021/9/14	2024/9/13
Power meter	R&S	NRVD	CQA-029	2021/9/14	2024/9/13
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2021/9/14	2024/9/13
EMI Test Receiver	R&S	ESR7	CQA-005	2021/9/14	2024/9/13
LISN	R&S	ENV216	CQA-003	2021/9/14	2024/9/13
Coaxial cable	CQA	N/A	CQA-C009	2021/9/14	2024/9/13
DC power	KEYSIGHT	E3631A	CQA-028	2021/9/14	2024/9/13

Test software:

	Manufacturer	Software brand
Radiated Emissions test software	Tonscend	JS1120-3
Conducted Emissions test software	Audix	e3
RF Conducted test software	Audix	e3

7 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15E	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicesed 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	KDB789033	Emission Bandwidth and Occupied Bandwidth	PASS	Appendix A)
Part15E Section 15.407	KDB789033 / KDB 662911	Conducted Output Power and transmit power control mechanism	PASS	Appendix B)
Part15E Section 15.407	KDB789033 / KDB 662911	Power Spectral Density	PASS	Appendix C)
Part15E Section 15.407	KDB789033 / KDB 662911	Band Edge Measurements	PASS	Appendix D)
Part15E Section 15.407	KDB789033	Frequency stability	PASS	Appendix E)
Part15C Section 15.203	ANSI C63.10	Antenna Requirement	PASS	Appendix F)
Part15E Section 15.407	Section 15.407	Operation in the absence of information to the transmit	PASS	Appendix G)
Part15C Section 15.207	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix H)
Part15E Section 15.407	KDB789033	Restricted bands around fundamental frequency(Radiated Emission)	PASS	Appendix I)
Part15E Section 15.407	KDB789033	Radiated Spurious Emissions	PASS	Appendix J)

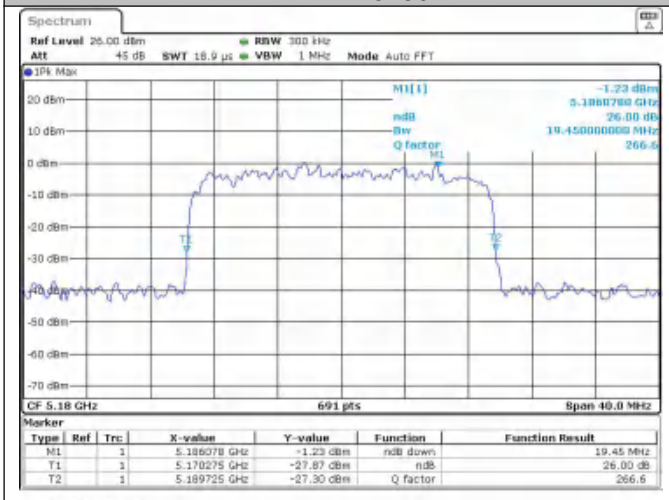
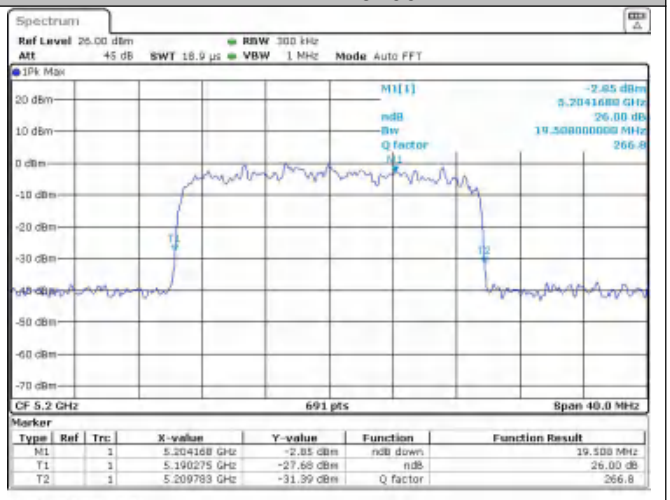
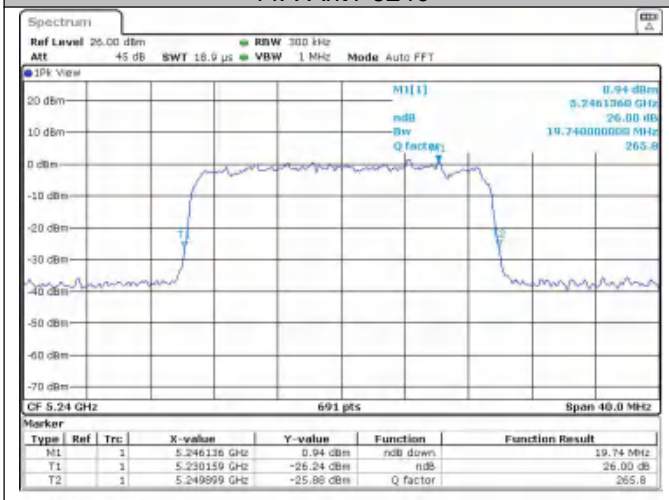
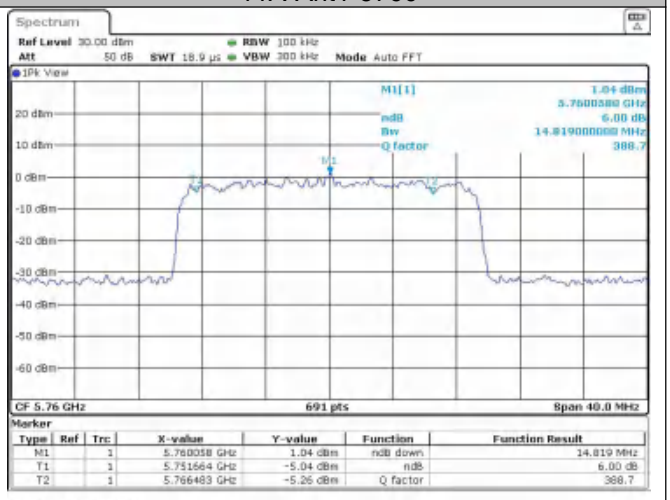
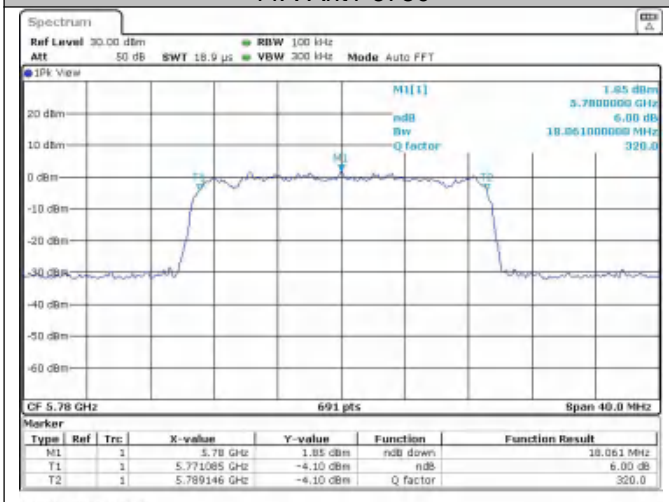
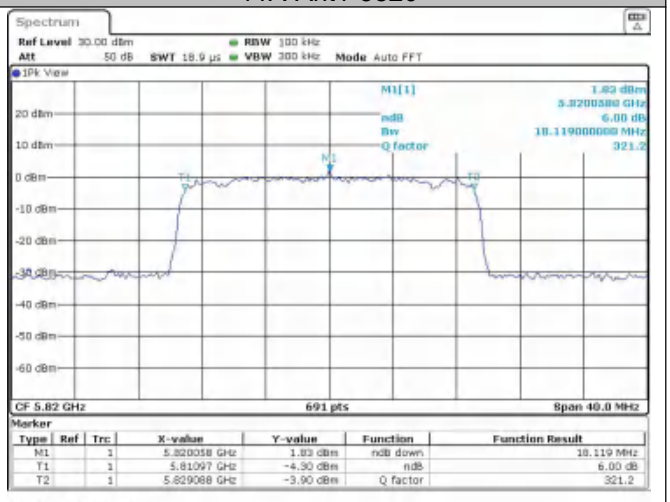
Appendix A): Emission Bandwidth

Result Table

Test Mode	Antenna	Channel	EBW[MHz]	Verdict
11A	Ant1	5180	19.450	PASS
11A	Ant1	5200	19.508	PASS
11A	Ant1	5240	19.740	PASS
Test Mode	**Antenna**	**Channel**	**6 dB OBW [MHz]**	**Verdict**
11A	Ant1	5760	17.887	PASS
11A	Ant1	5780	18.061	PASS
11A	Ant1	5820	18.119	PASS

Test Graph

EBW:

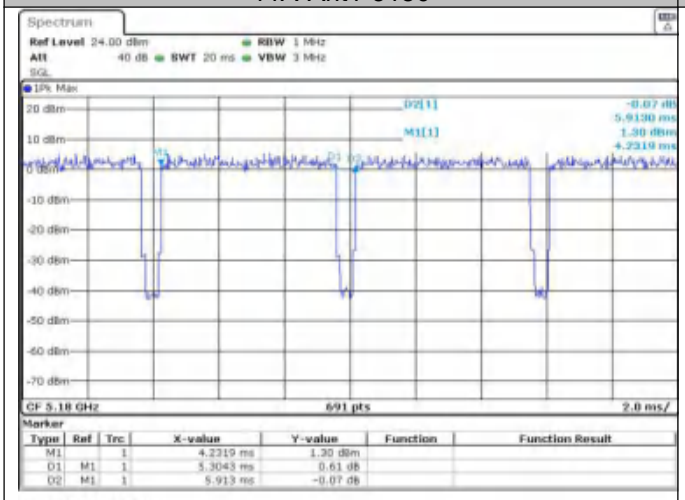
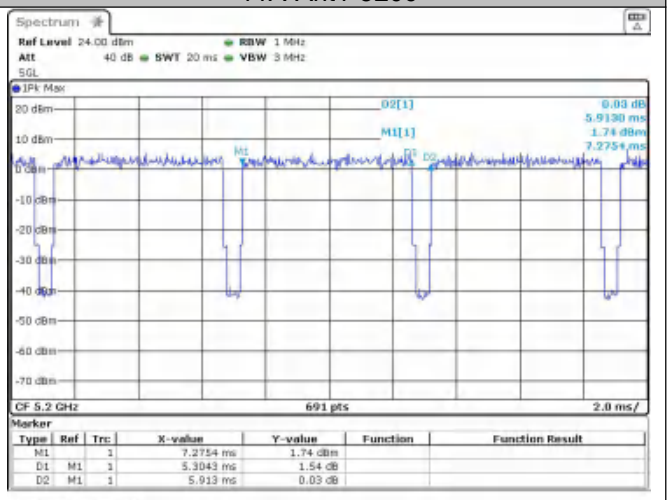
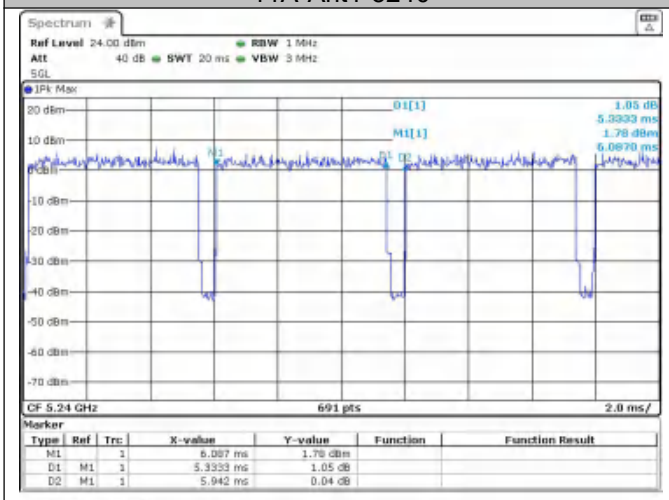
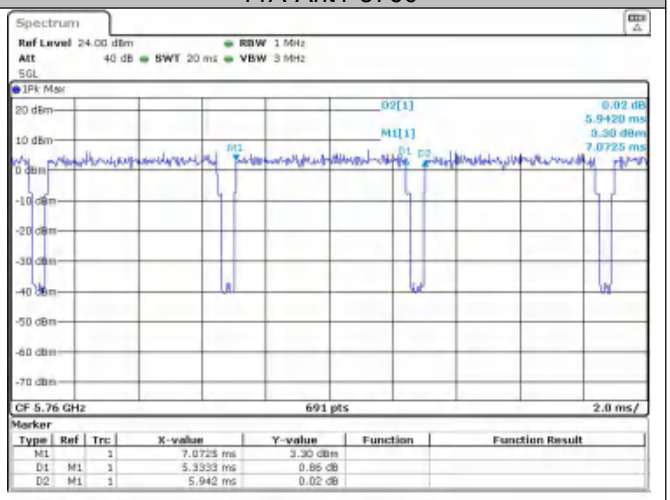
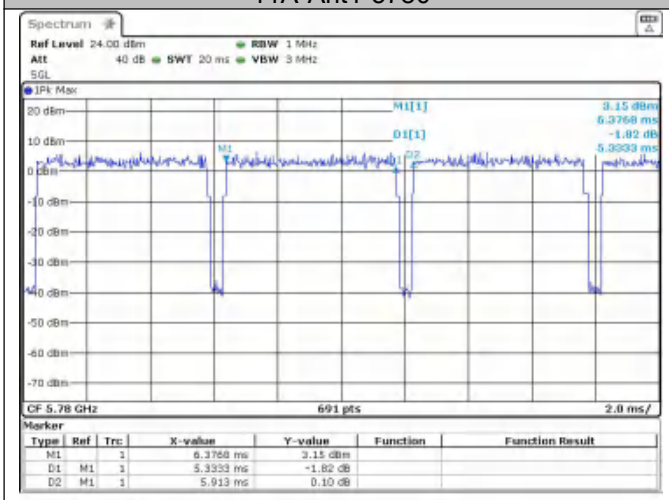
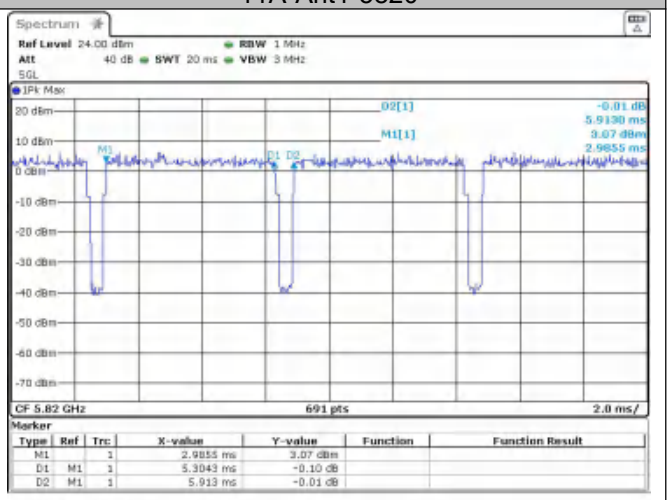
11A-Ant1-5180	11A-Ant1-5200
	
11A-Ant1-5240	11A-Ant1-5760
	
11A-Ant1-5780	11A-Ant1-5820
	

Appendix B): Maximum Conduct Output Power

1.Duty Cycle (x)

Measurement Data

Test Mode	Antenna	Channel	Duty Cycle[%]	10log(1/x) Factor[dB]
11A	Ant1	5180	89.71	0.47
11A	Ant1	5200	89.71	0.47
11A	Ant1	5240	89.76	0.47
11A	Ant1	5760	89.76	0.47
11A	Ant1	5780	90.20	0.45
11A	Ant1	5820	89.71	0.47

11A-Ant1-5180	11A-Ant1-5200
	
11A-Ant1-5240	11A-Ant1-5760
	
11A-Ant1-5780	11A-Ant1-5820
	

2. Conducted Average Output Power

Measurement Data

Test Mode	Antenna	Channel	Meas.Level [dBm]	Av.Power [dBm]	Verdict
11A	Ant1	5180	8.07	8.54	PASS
11A	Ant1	5200	8.49	8.96	PASS
11A	Ant1	5240	9.05	9.52	PASS
11A	Ant1	5760	10.00	10.47	PASS
11A	Ant1	5780	10.30	10.75	PASS
11A	Ant1	5820	11.50	11.97	PASS

Remark:
Av.Power=Meas.Level+10 log (1/duty cycle)
E.i.r.p=Av.Power+G,
G = antenna gain in dBi.

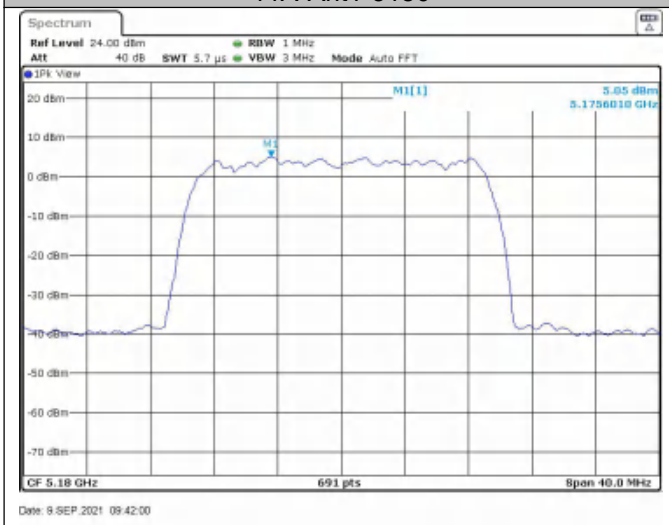
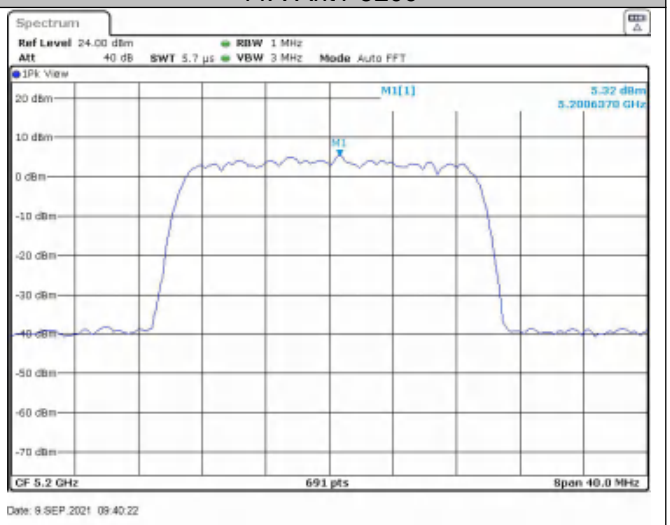
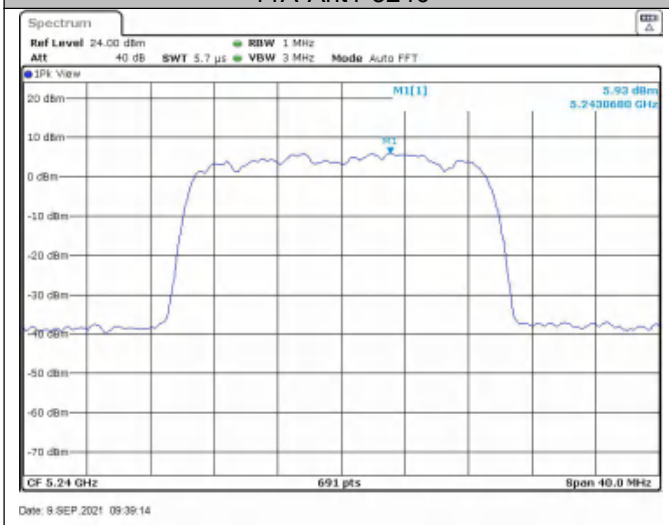
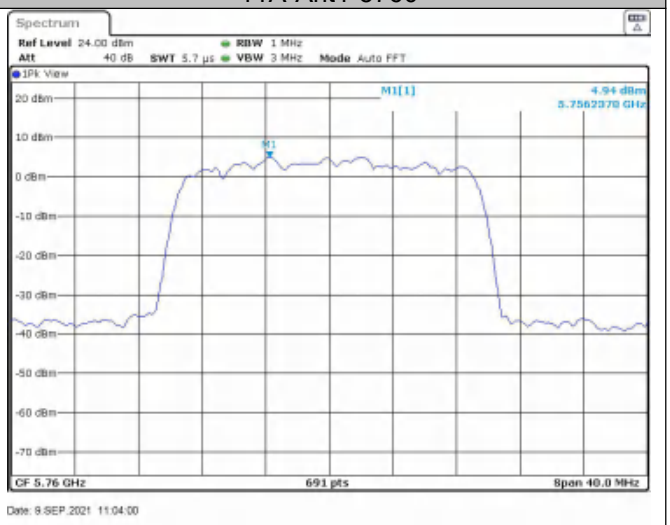
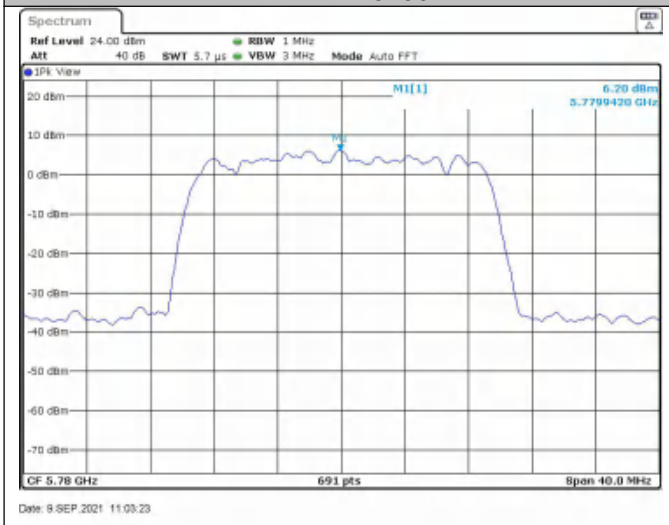
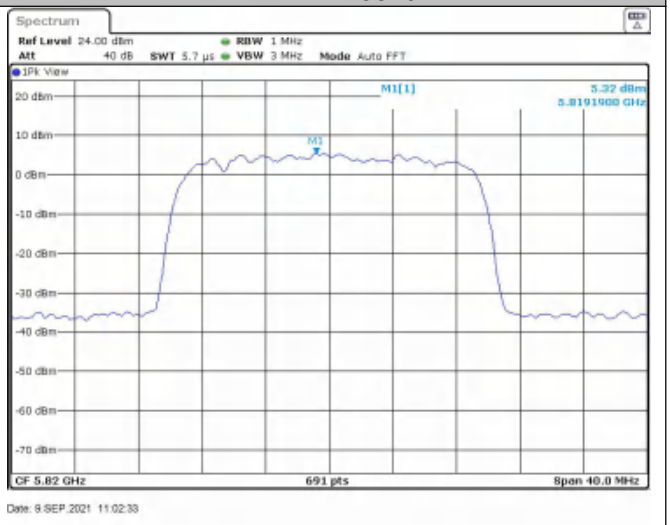
Appendix C): Power Spectral Density

Result Table

Test Mode	Antenna	Channel	Meas.Level [dBm]	Duty Cycle Factor [dB]	PSD [dBm/MHz]	Limit [dBm/MHz]	Verdict
11A	Ant1	5180	5.05	0.47	5.52	11.00	PASS
11A	Ant1	5200	5.32	0.47	5.79	11.00	PASS
11A	Ant1	5240	5.24	0.47	5.71	11.00	PASS
Test Mode	Antenna	Channel	Meas.Level [dBm]	Duty Cycle Factor [dB]	PSD [dBm/MHz]	Limit [dBm/500kHz]	Verdict
11A	Ant1	5760	5.76	0.47	6.23	30.00	PASS
11A	Ant1	5780	5.78	0.45	6.23	30.00	PASS
11A	Ant1	5820	5.82	0.47	6.29	30.00	PASS

Remark:

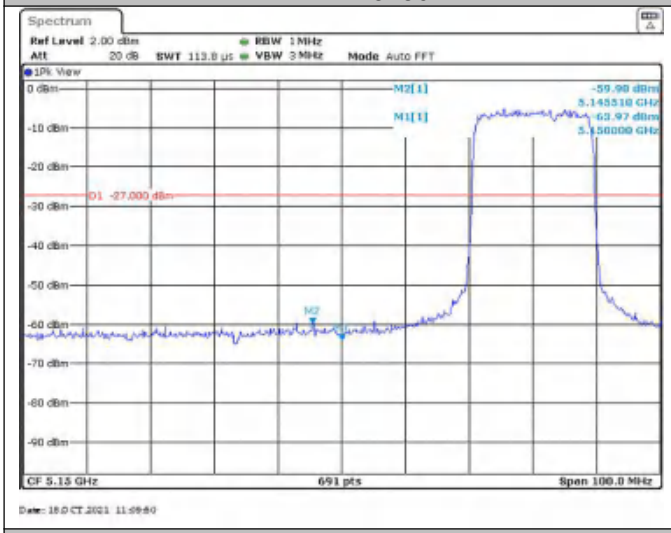
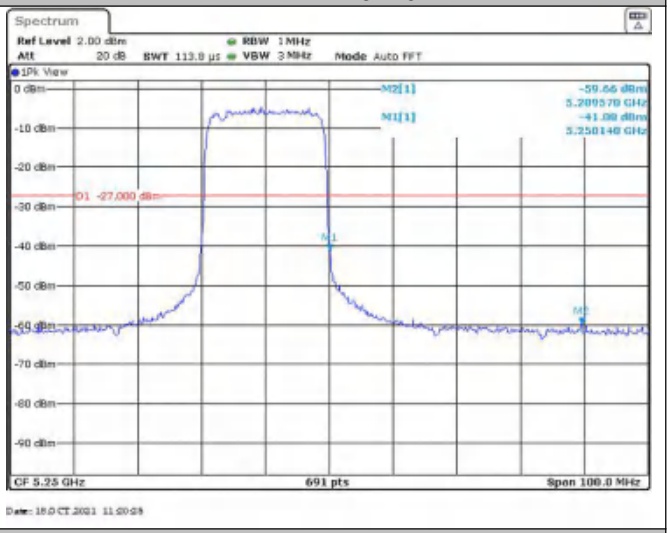
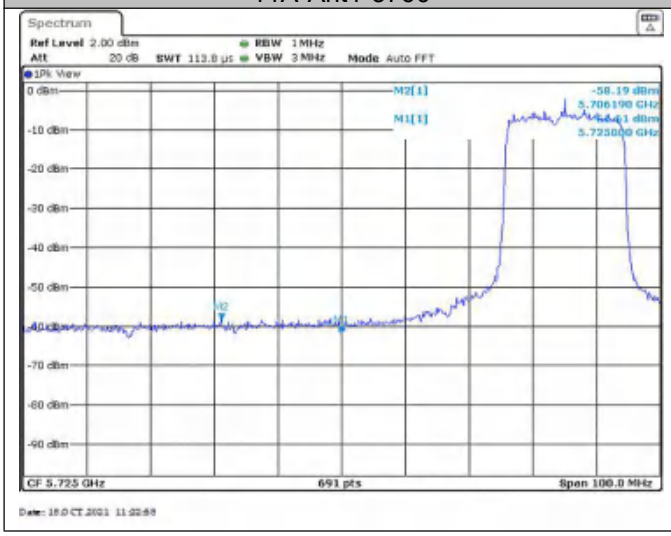
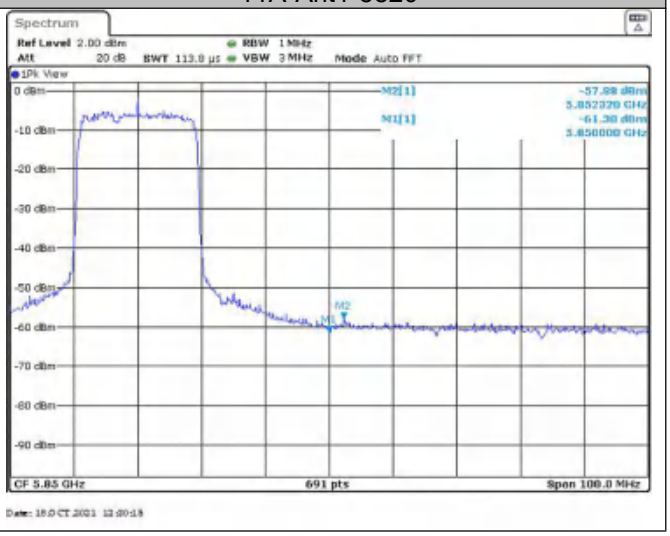
PSD = Meas PSD + Duty Cycle Factor

11A-Ant1-5180	11A-Ant1-5200
	
11A-Ant1-5240	11A-Ant1-5760
	
11A-Ant1-5780	11A-Ant1-5820
	

Appendix D): Band Edge Measurements

Result Table

Test Mode	Antenna	Channel	Max.Level [dBm]		Verdict
11A	Ant1	5180	-59.90		PASS
11A	Ant1	5240	-59.66		PASS
Test Mode	**Antenna**	**Channel**	**Max.Level [dBm]**		**Verdict**
			Below 5715	**5715-5725**	
11A	Ant1	5760	-61.61	-58.17	PASS
Test Mode	**Antenna**	**Channel**	**Max.Level [dBm]**		**Verdict**
			5850-5860	**Above 5860**	
11A	Ant1	5820	-61.30	-57.88	PASS

11A-Ant1-5180	11A-Ant1-5240
	
11A-Ant1-5760	11A-Ant1-5820
	

Appendix E): Frequency Stability

Measurement Data

Frequency Stability Versus Temp.			
Operating Frequency: 5240 MHz			
Temp (℃)	Volta ge	Measured Frequency (MHz)	Frequency Drift (ppm)
50	VN	5240.01	1.90840
40		5240.03	5.72519
30		5240.02	2.86260
20		5240.02	2.86260
10		5240.02	2.86260
0		5240.02	2.86260
-10		5240.01	1.90840
-20		5240.03	5.72519

Frequency Stability Versus Temp.			
Operating Frequency: 5240 MHz			
Temp.	Volta ge	Measured Frequency (MHz)	Frequency Drift (ppm)
TN	VL	5240.00	0.00000
	VN	5240.03	5.72519
	VH	5240.02	2.86260

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

Appendix F): 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 External antenna with reversed SMA connector.The best case gain of the 5G antenna is 4dBi@Band 1, 4dBi@Band 4, Only one antenna is used for transmission, and the other root is a receiving antenna and does not transmit signals.

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

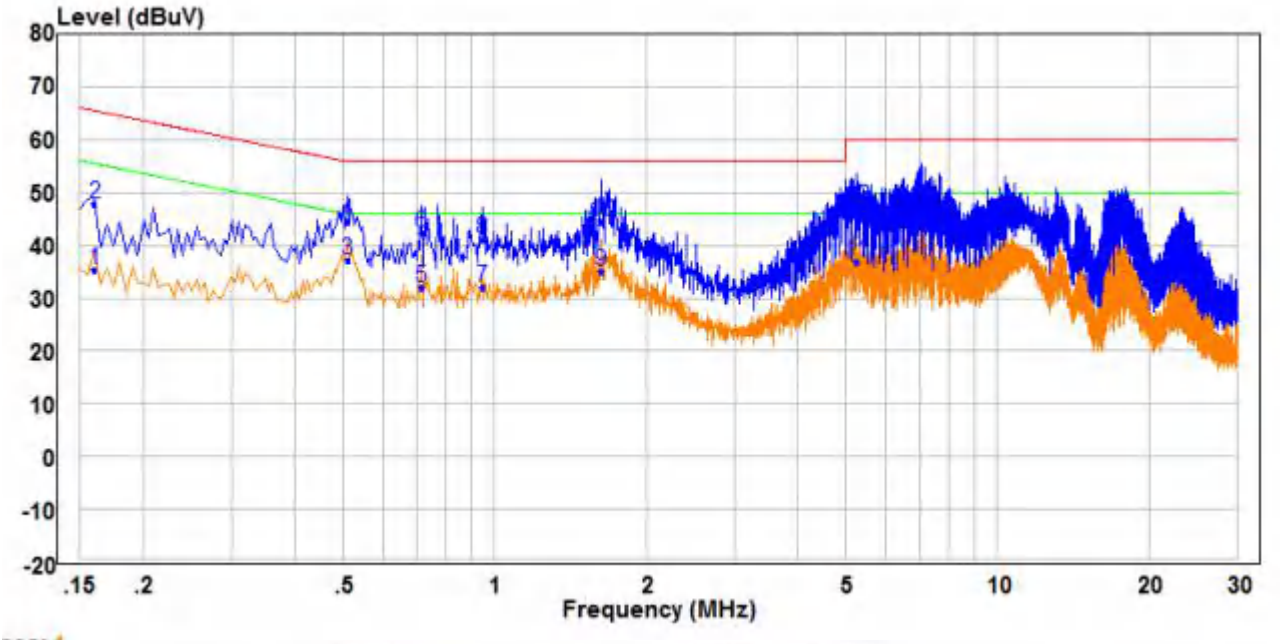
<table>
<tr><td>Test Procedure:</td><td>Test frequency range :150KHz-30MHz
1)The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance.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

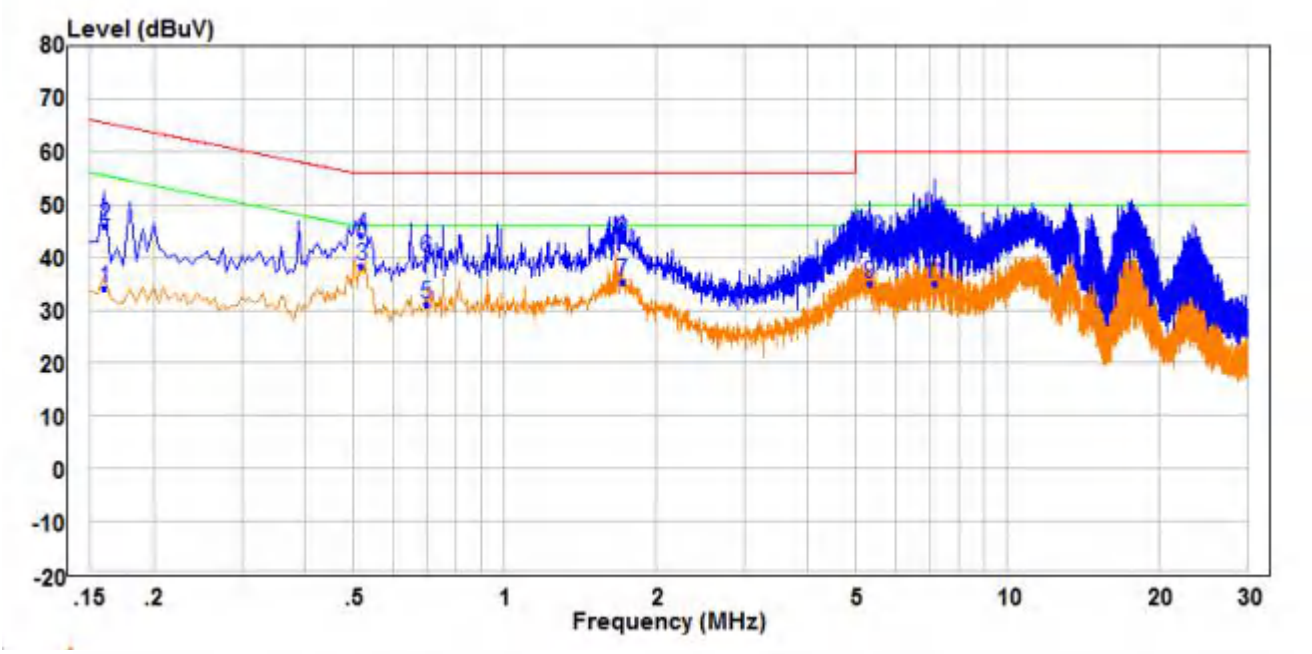
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.160	25.92	9.49	35.41	55.46	-20.05	Average	Line
2	0.160	38.27	9.49	47.76	65.46	-17.70	QP	Line
3 PP	0.510	27.61	9.54	37.15	46.00	-8.85	Average	Line
4	0.510	34.92	9.54	44.46	56.00	-11.54	QP	Line
5	0.715	22.13	9.85	31.98	46.00	-14.02	Average	Line
6	0.715	32.33	9.85	42.18	56.00	-13.82	QP	Line
7	0.945	22.38	9.59	31.97	46.00	-14.03	Average	Line
8	0.945	31.42	9.59	41.01	56.00	-14.99	QP	Line
9	1.630	25.36	9.52	34.88	46.00	-11.12	Average	Line
10 QP	1.630	35.07	9.52	44.59	56.00	-11.41	QP	Line
11	5.255	27.16	9.73	36.89	50.00	-13.11	Average	Line
12	5.255	37.33	9.73	47.06	60.00	-12.94	QP	Line

Neutral line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.160	24.75	9.48	34.23	55.46	-21.23	Average	Neutral
2		0.160	36.63	9.48	46.11	65.46	-19.35	QP	Neutral
3	PP	0.520	28.63	9.61	38.24	46.00	-7.76	Average	Neutral
4	QP	0.520	34.64	9.61	44.25	56.00	-11.75	QP	Neutral
5		0.700	21.33	9.83	31.16	46.00	-14.84	Average	Neutral
6		0.700	29.97	9.83	39.80	56.00	-16.20	QP	Neutral
7		1.715	25.74	9.72	35.46	46.00	-10.54	Average	Neutral
8		1.715	33.44	9.72	43.16	56.00	-12.84	QP	Neutral
9		5.320	25.27	9.82	35.09	50.00	-14.91	Average	Neutral
10		5.320	33.58	9.82	43.40	60.00	-16.60	QP	Neutral
11		7.145	25.12	9.77	34.89	50.00	-15.11	Average	Neutral
12		7.145	34.53	9.77	44.30	60.00	-15.70	QP	Neutral

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. The 6Mbps of rate of OFDM_5240 is the worst case, only the worst data recorded in the report.

Appendix I): 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:

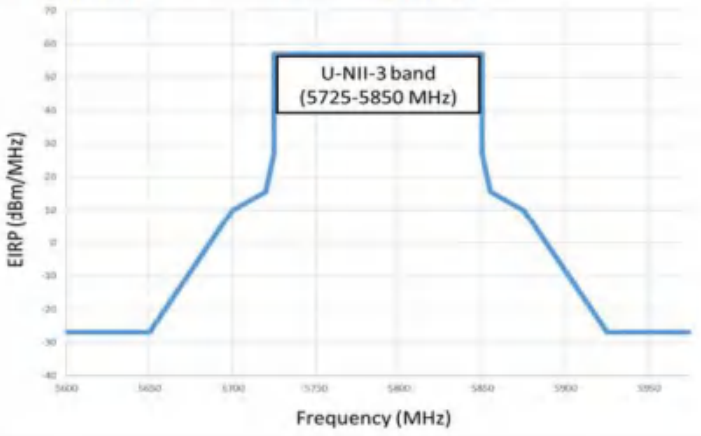
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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

Un-restricted band emissions	
Out Operating Band (MHz)	Limit
5150 - 5250	e.i.r.p. -27 dBm (68.2 dBuV/m@3m)
5250 - 5350	e.i.r.p. -27 dBm (68.2 dBuV/m@3m)
5470 - 5725	e.i.r.p. -27 dBm (68.2 dBuV/m@3m)
5725 - 5850	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. 

Test plot as follows:

Test channel:				0			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	53.98	-3.63	50.35	68.2	-17.85	peak	H
5150.00	55.59	-3.63	51.96	68.2	-16.24	peak	V

Test channel:				2			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	53.93	-3.59	50.34	68.2	-17.86	peak	H
5350.00	56.24	-3.59	52.65	68.2	-15.55	peak	V

Test channel:				3			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650	56.18	-3.46	52.72	68.2	-15.48	peak	H
5925	56.16	-3.44	52.72	68.2	-15.48	peak	H
5650	58.54	-3.46	55.08	68.2	-13.12	peak	V
5925	57.87	-3.44	54.43	68.2	-13.77	peak	V

Test channel:				5			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650	57.57	-3.42	54.15	68.2	-14.05	peak	H
5925	56.46	-3.41	53.05	68.2	-15.15	peak	H
5650	56.93	-3.42	53.51	68.2	-14.69	peak	V
5925	58.07	-3.41	54.66	68.2	-13.54	peak	V

Note:
1) Through Pre-scan transmitting mode with all kind of modulation and data rate, find the 6Mbps is the worst case of OFDM; 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 J): 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

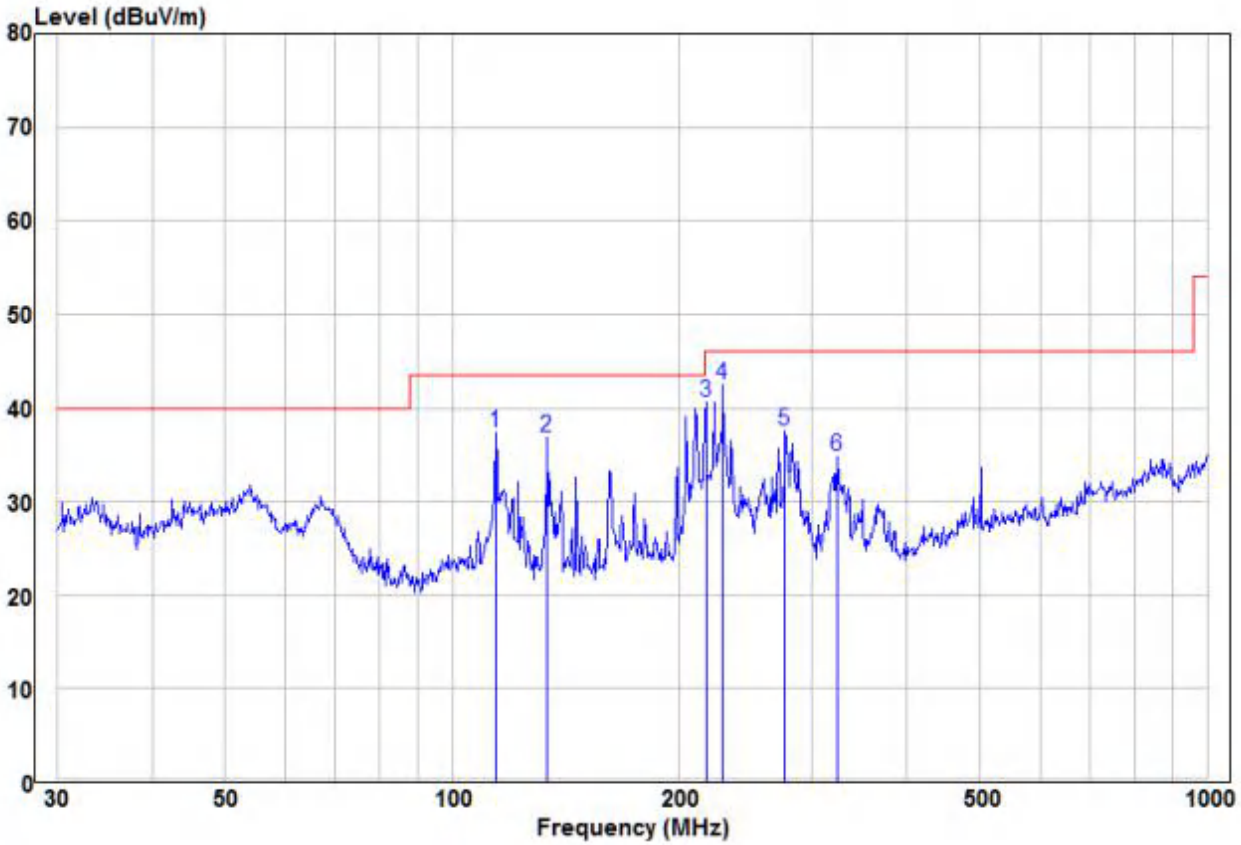
Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Test result: PASS

Test Data:

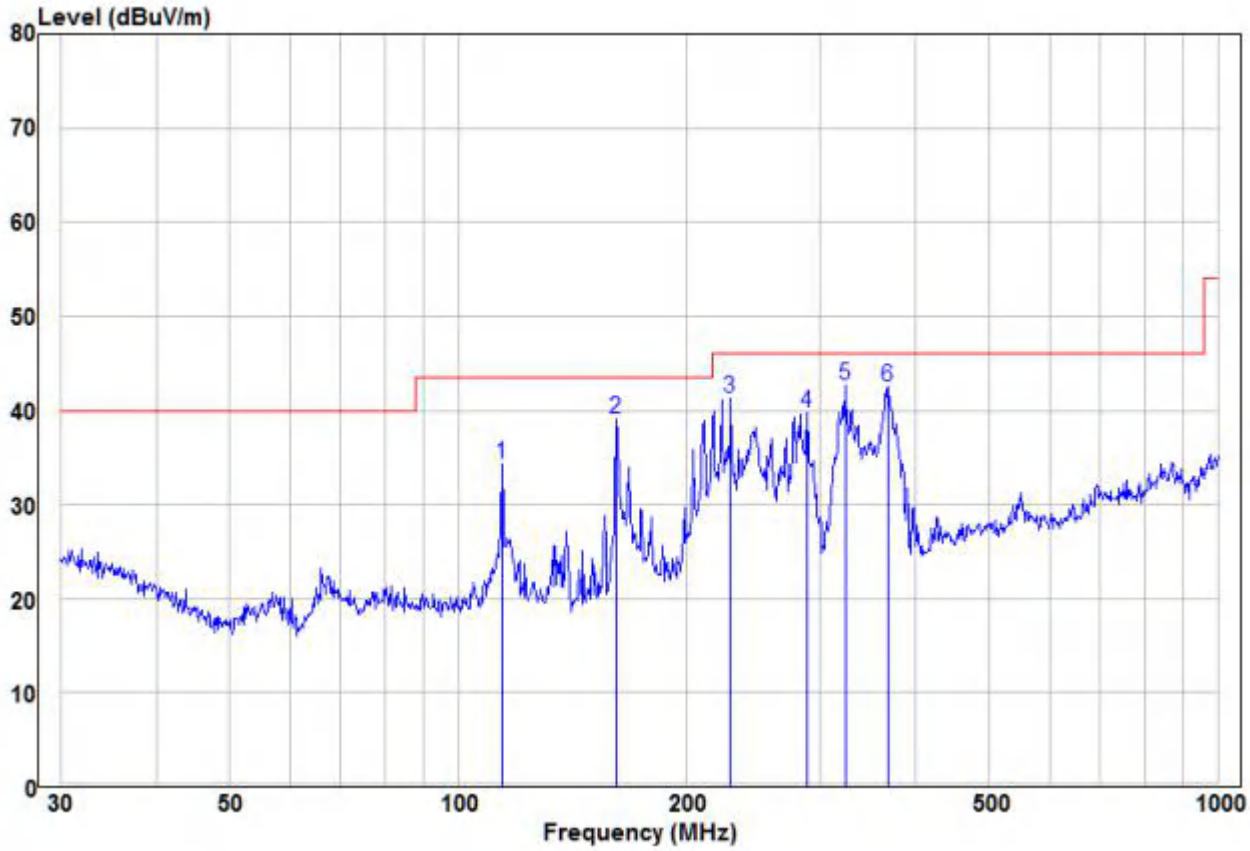
Radiated Emission below 1GHz

30MHz~1GHz		
Test mode:	Transmitting	Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	114.11	26.89	10.39	37.28	43.50	-6.22	Peak	VERTICAL
2	133.62	27.43	9.50	36.93	43.50	-6.57	Peak	VERTICAL
3	216.78	31.54	9.02	40.56	46.00	-5.44	Peak	VERTICAL
4 pp	228.49	32.22	10.24	42.46	46.00	-3.54	Peak	VERTICAL
5	276.12	24.53	12.94	37.47	46.00	-8.53	Peak	VERTICAL
6	324.46	20.55	14.32	34.87	46.00	-11.13	Peak	VERTICAL

Test mode:	Transmitting	Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	114.11	23.96	10.39	34.35	43.50	-9.15	Peak	HORIZONTAL
2	161.47	31.24	7.77	39.01	43.50	-4.49	Peak	HORIZONTAL
3	228.49	30.99	10.24	41.23	46.00	-4.77	Peak	HORIZONTAL
4	287.99	26.46	13.34	39.80	46.00	-6.20	Peak	HORIZONTAL
5 pp	323.32	28.30	14.30	42.60	46.00	-3.40	Peak	HORIZONTAL
6	368.11	27.03	15.39	42.42	46.00	-3.58	Peak	HORIZONTAL

Transmitter Emission above 1GHz

Test mode:	OFDM(6Mbps)			Test channel:		2	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10480	49.21	2.31	51.52	74	-22.48	peak	H
10480	38.42	2.31	40.73	54	-13.27	AVG	H
15720	46.65	3.79	50.44	74	-23.56	peak	H
15720	35.84	3.79	39.63	54	-14.37	AVG	H
10480	49.48	2.31	51.79	74	-22.21	peak	V
10480	38.67	2.31	40.98	54	-13.02	AVG	V
15720	47.34	3.79	51.13	74	-22.87	peak	V
15720	37.74	3.79	41.53	54	-12.47	AVG	V

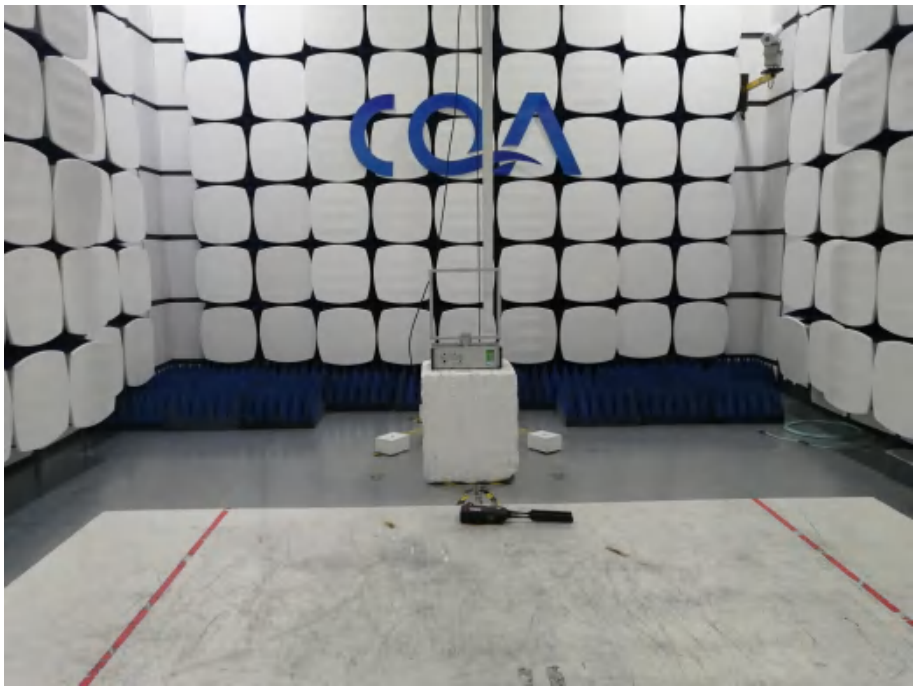
Remark:

1) The 6Mbps of rate of OFDM at 2 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.

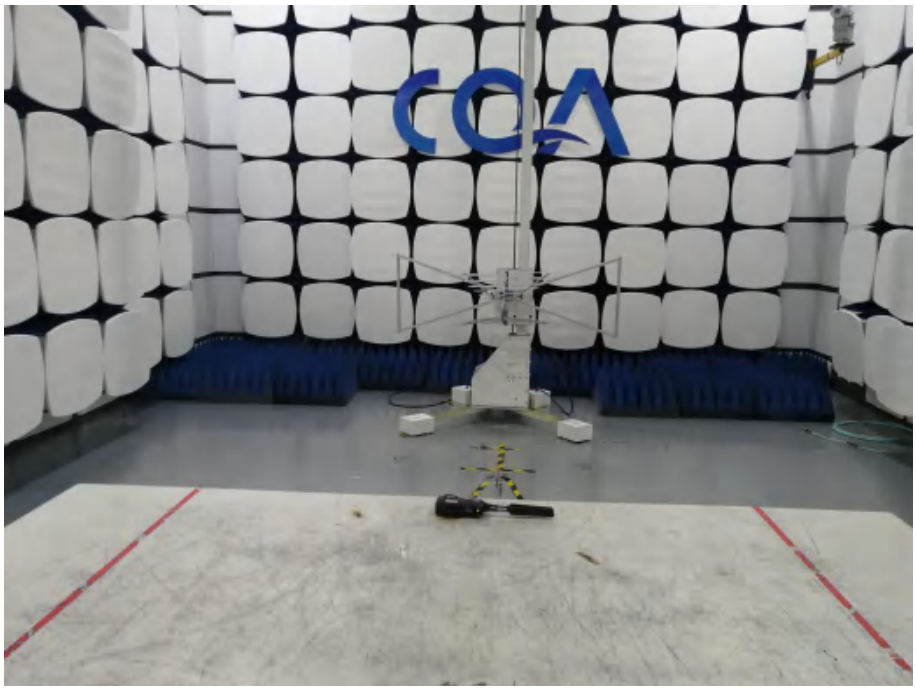
8 Photographs - EUT Test Setup

8.1 Radiated Spurious Emission

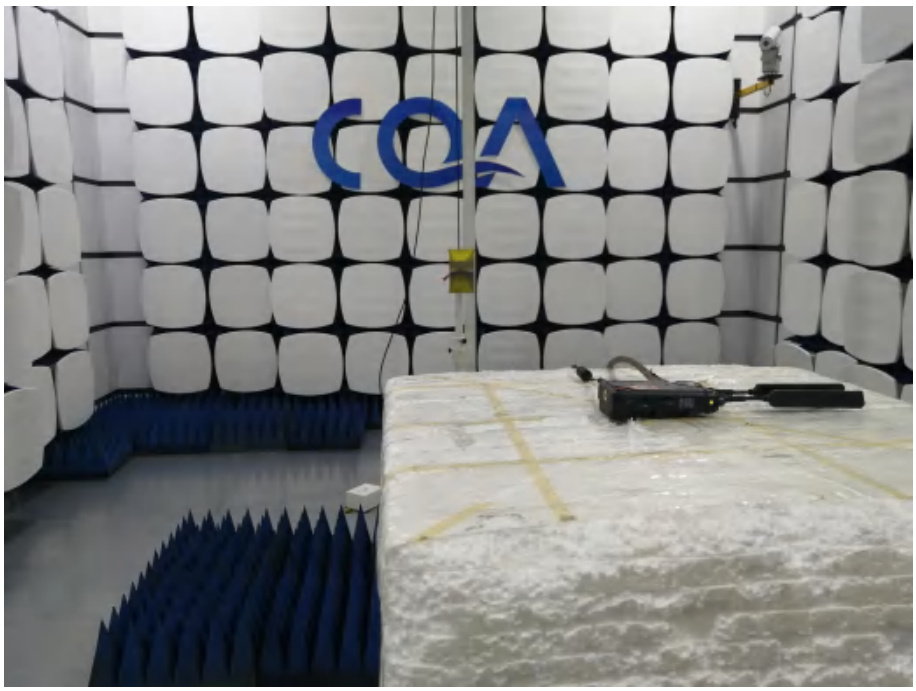
9kHz~30MHz:



30MHz~1GHz:



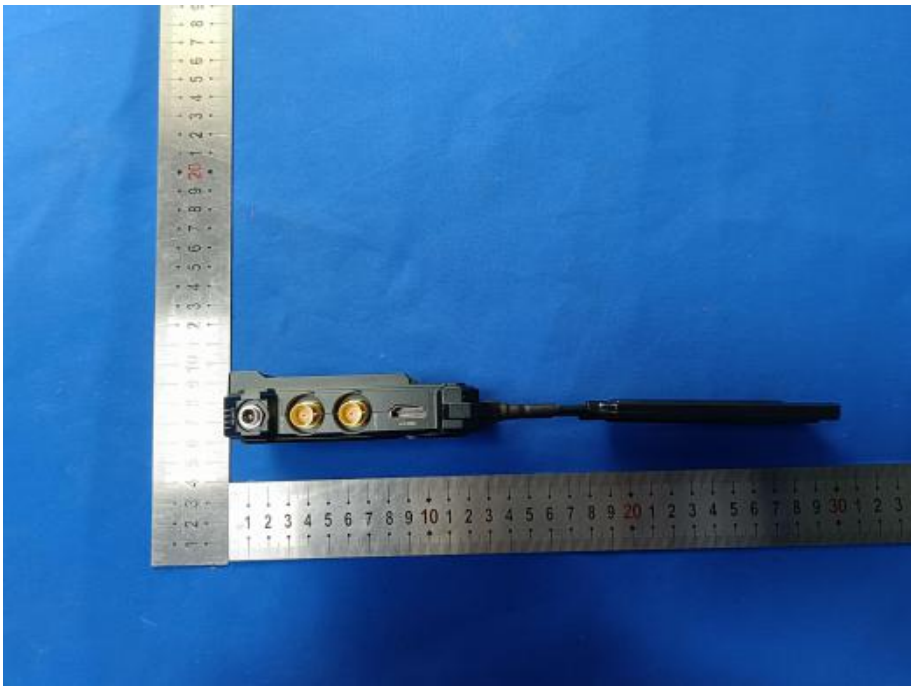
Above 1GHz:

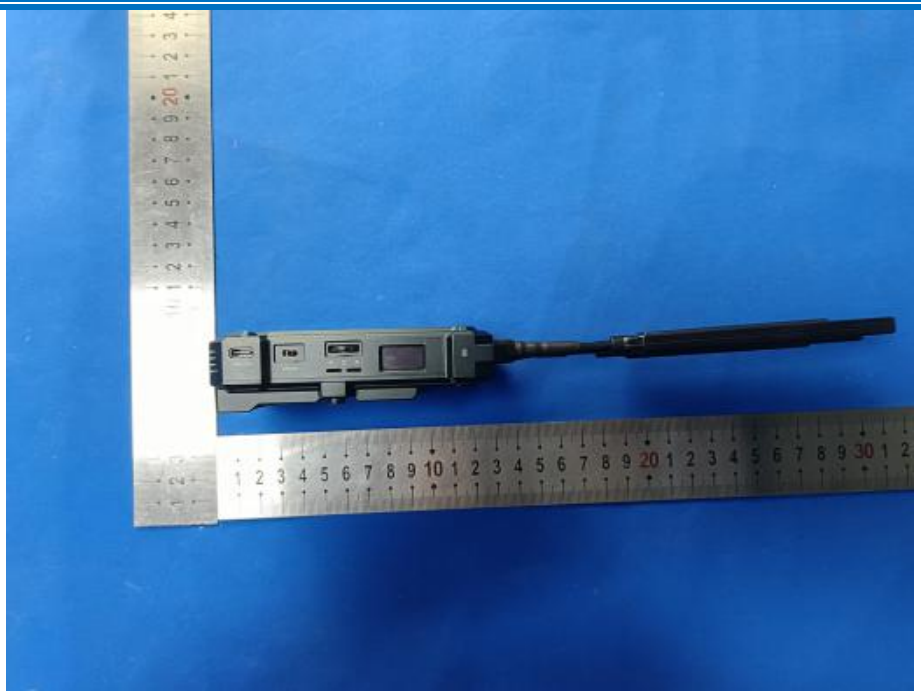


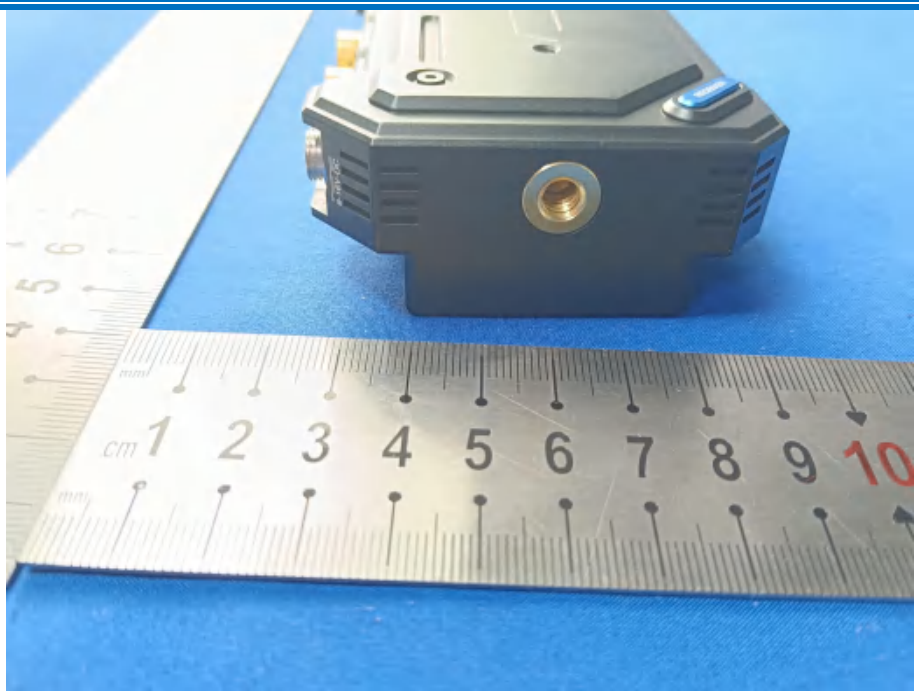
8.2 Conducted Emission

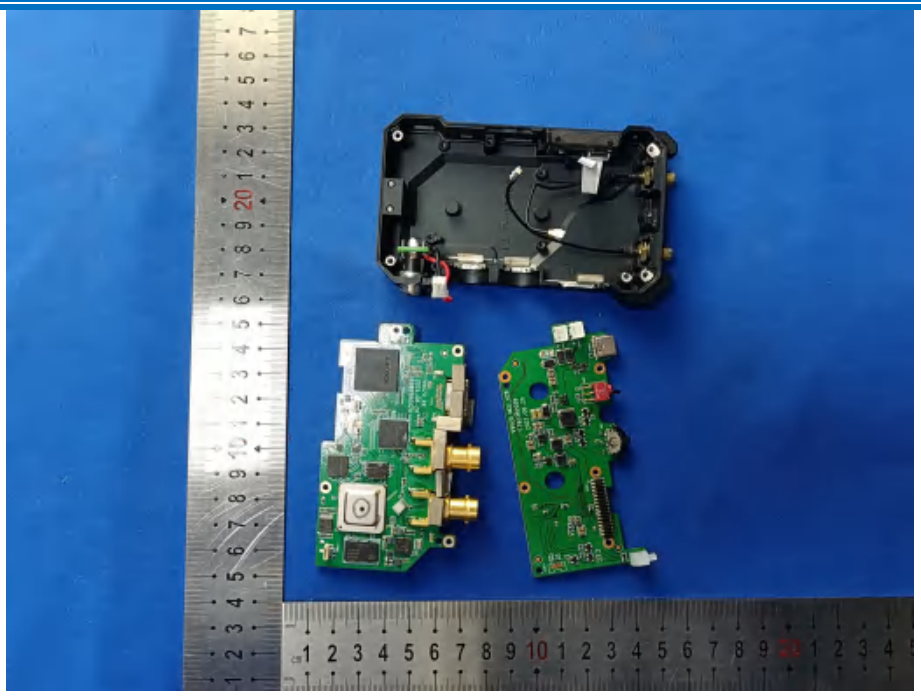
9 Photographs - EUT Constructional Details

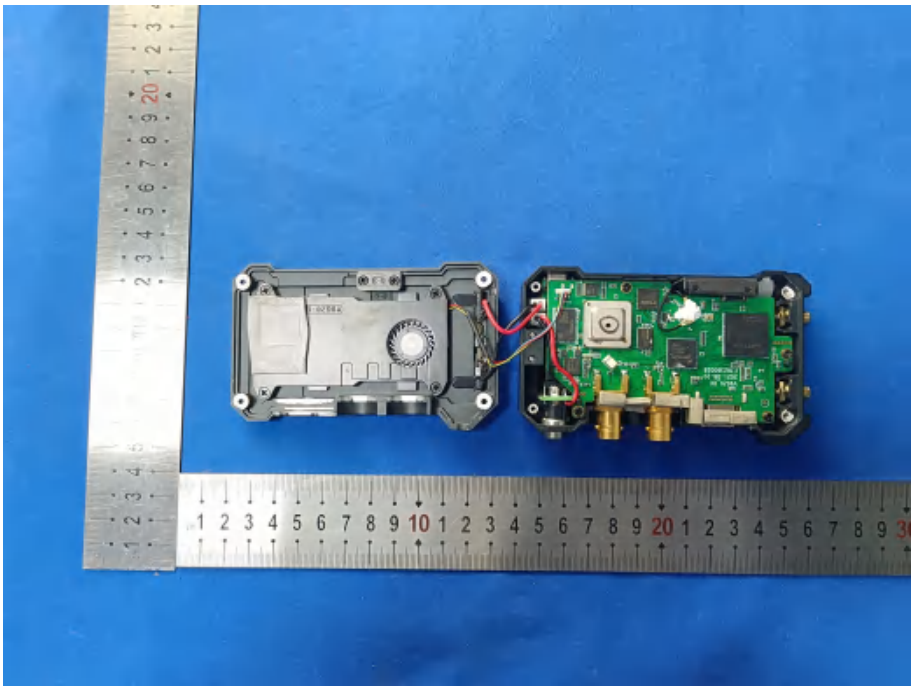
Receiver

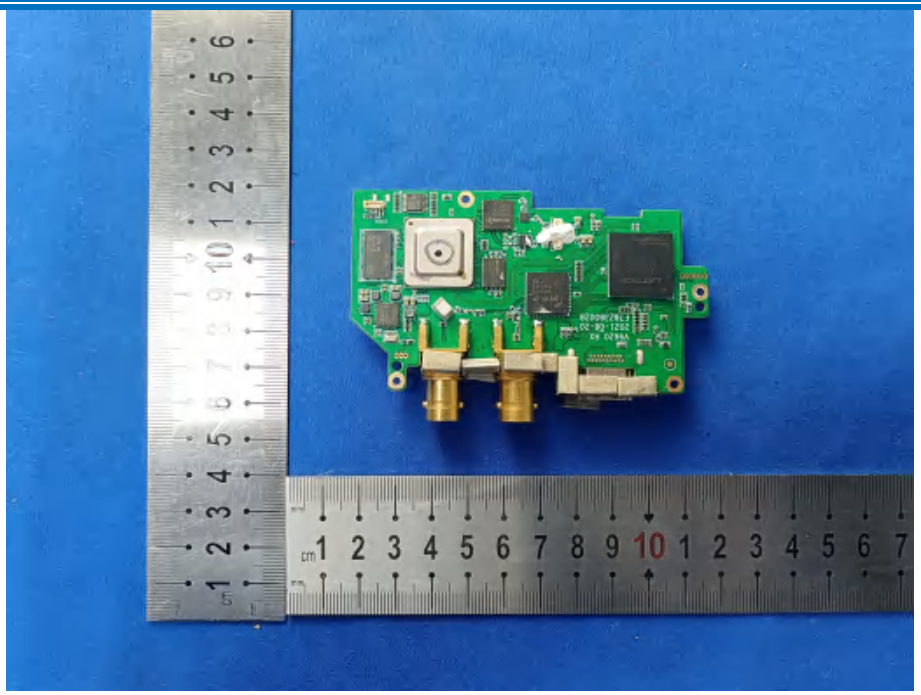


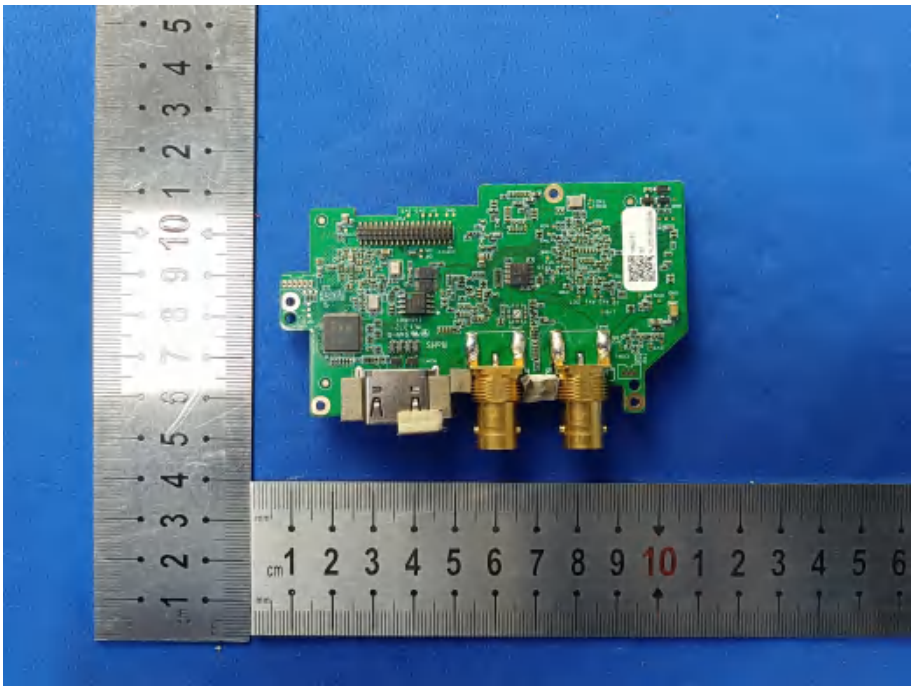


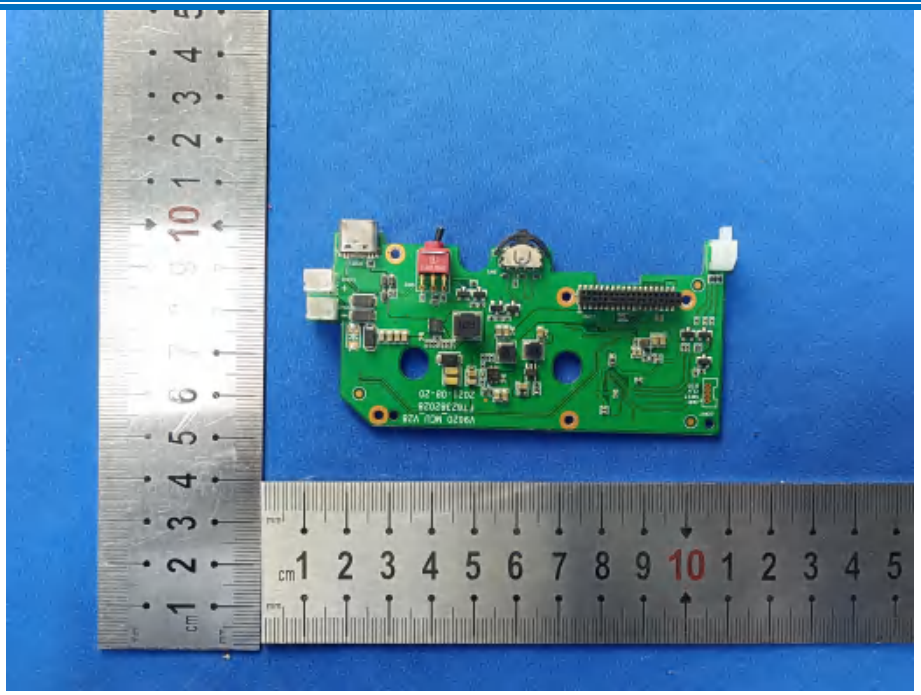


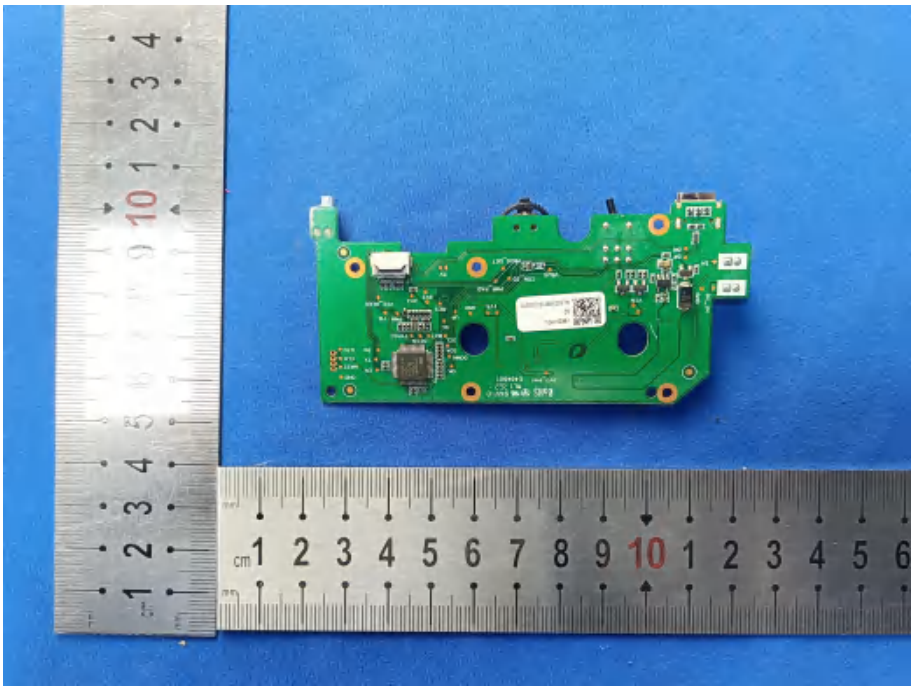




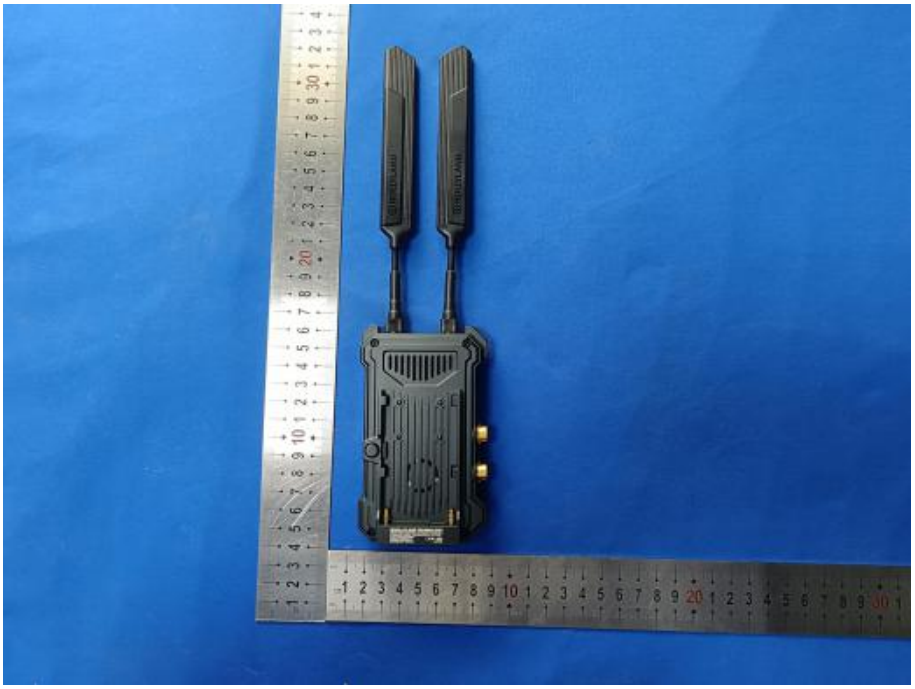


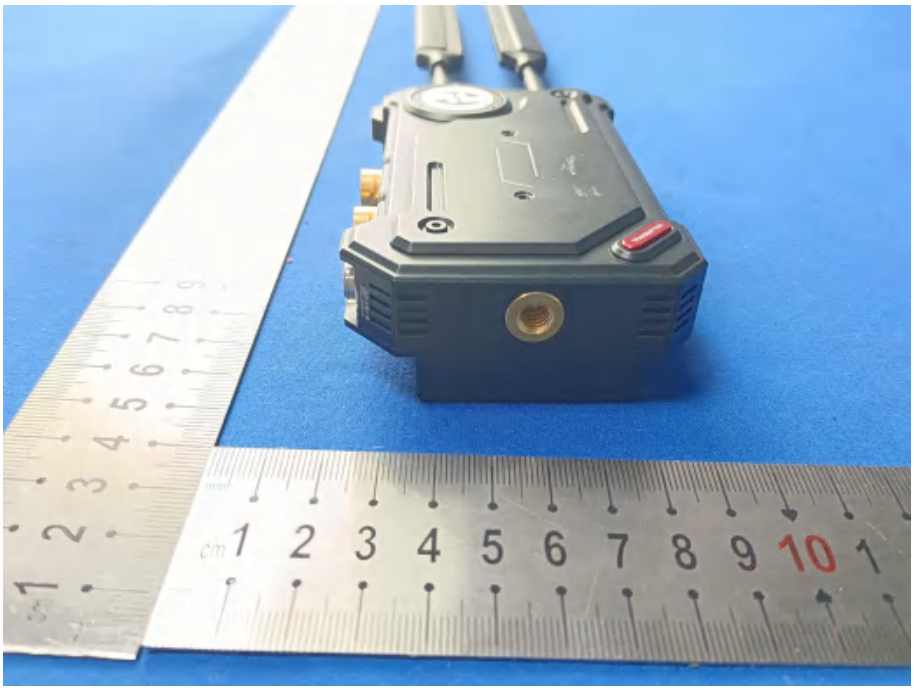


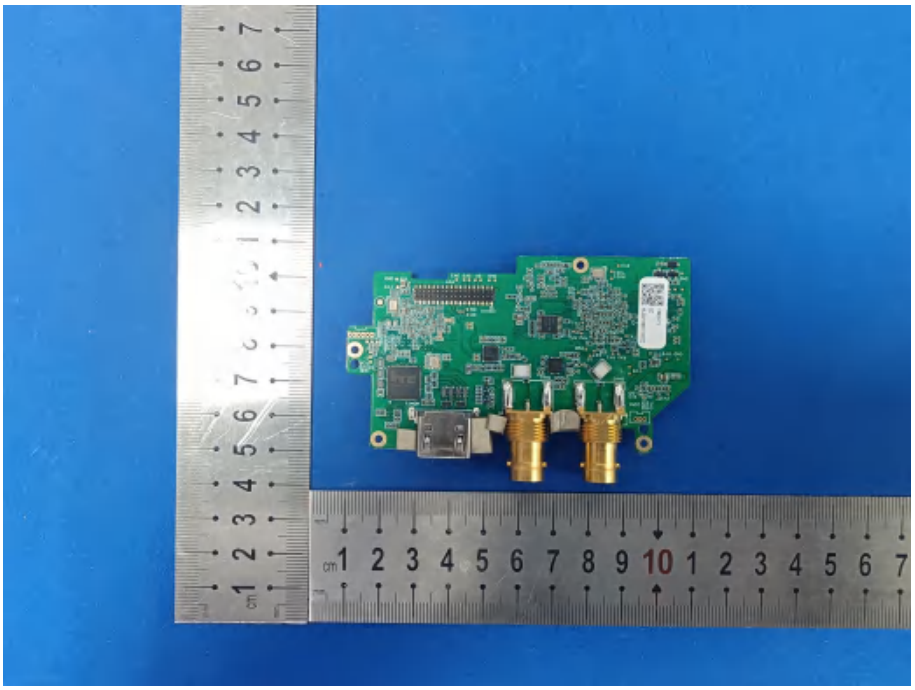


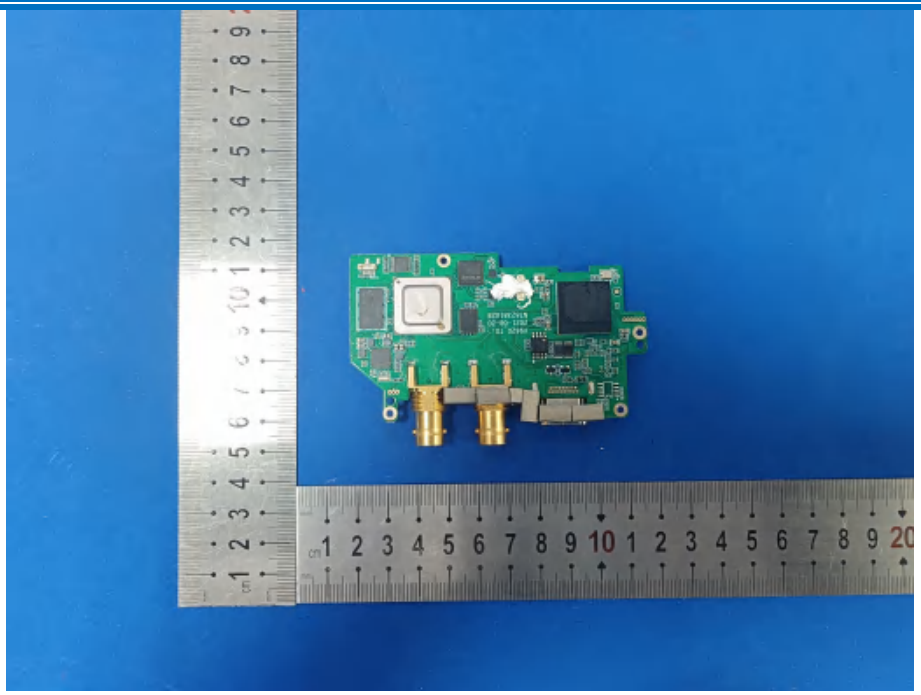


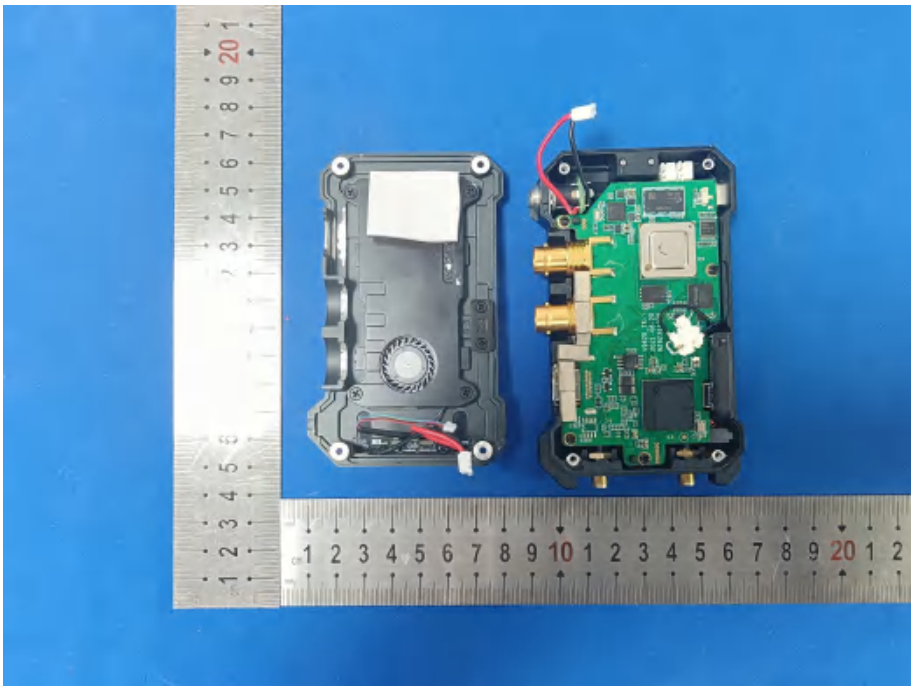
Transmitter

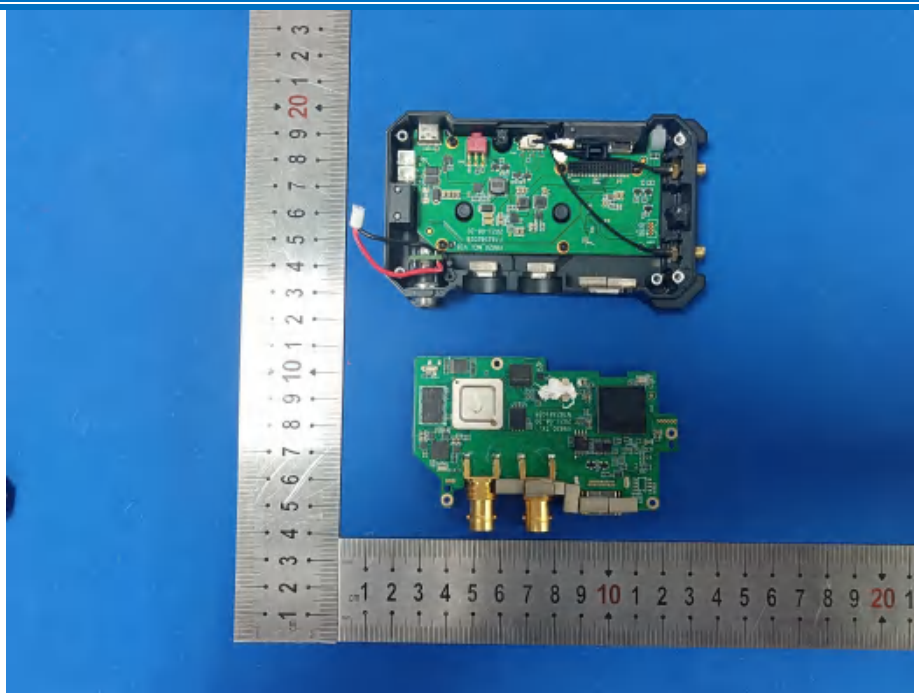












*** End of Report ***