



FCC REPORT

Report No.: JYTSZ-R01-2400199

Applicant: Alligator Communications

Address of Applicant: 3561 Homestead Road #345, Santa Clara, CA 95051 USA

Equipment Under Test (EUT)

Product Name: MAS Radio

Model No.: 2888E

FCC ID: JIL2888E

Applicable standards: FCC CFR Title 47 Part 2
FCC CFR Title 47 Part 101 Subpart C
FCC CFR Title 47 Part 101 Subpart H

Date of sample receipt: 14 Mar., 2024

Date of Test: 15 Mar., to 20 May, 2024

Date of report issued: 20 May, 2024

Test Result: PASS*

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

Project by:

Date:

20 May, 2024

Reviewed by:

Date:

20 May, 2024

Approved by:

Date:

20 May, 2024

Manager

2. Version

Version No.	Date	Description
00	07 May, 2024	Original
01	20 May, 2024	Updated pages 9, 11, 12 and 20 of the report

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4. Test Summary

Test Item	Section in CFR 47	Result
Conducted Output Power	Part 2.1046 Part 101.113 (a)	Pass
99% Occupied Bandwidth	Part 2.1049 Part 101.109(c)	Pass
Emission Mask	Part 101.111 (a)(2)(i)	Pass
Out-band Spurious Emission at Antenna Terminals	Part 2.1051 Part 101.111 (a)(2)(iii)	Pass
Field Strength of Spurious Radiation	Part 2.1051 Part 101.111 (a)(2)(iii)	Pass
Frequency Tolerance	Part 2.1055 Part 101.107 (a)	Pass
Pass: The EUT complies with the essential requirements in the standard.		

5. General Information

5.1 Client Information

Applicant:	Alligator Communications
Address:	3561 Homestead Road #345, Santa Clara, CA 95051 USA
Manufacturer:	Alligator Communications
Address:	3561 Homestead Road #345, Santa Clara, CA 95051 USA

5.2 General Description of E.U.T.

Product Name:	MAS Radio
Model No.:	2888E
Operation Frequency range:	928MHz-952.99999MHz
Modulation type:	Orthogonal Frequency Division Multiplexing(OFDM)
Antenna type:	External antenna ("N" type)
Power supply:	DC 11~14V
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

Operation Frequency		
Lowest Channel	Middle Channel	Highest Channel
928.00000MHz	940.50000MHz	952.99999MHz

5.3 Test environment and mode, and test samples plans

Operating Environment:	
Temperature:	24.5 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Continuously transmitting mode	Keep the EUT in 100% duty cycle transmitting with modulation.
We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:	
Remark: JianYan Testing Group Shenzhen Co., Ltd. is only responsible for the test project data of the above samples, and will keep the above samples for a month.	

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
Alligator	Antenna	/	/	/

5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty (Confidence of 95%)
Radiated Emission (30MHz ~ 200MHz) (3m SAC)	4.6 dB
Radiated Emission (200MHz ~ 1000MHz) (3m SAC)	5.8 dB
Radiated Emission (1GHz ~ 6GHz) (3m FAR)	4.95 dB
Radiated Emission (6GHz ~ 18GHz) (3m FAR)	5.23 dB
Radiated Emission (18GHz ~ 40GHz) (3m FAR)	5.32 dB
Note: All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.	

5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

5.7 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

5.8 Test Instruments list

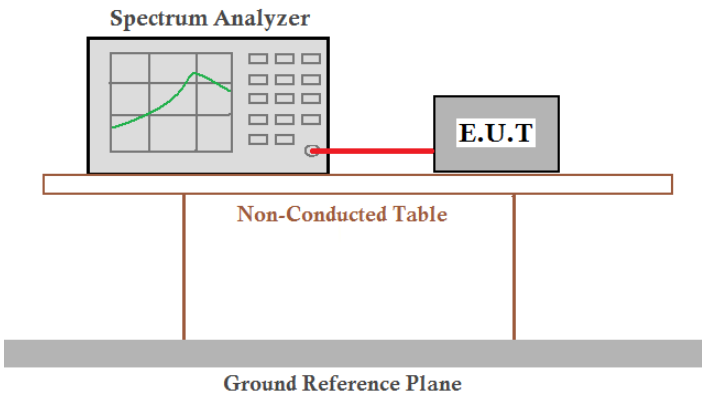
Radiated Emission(3m SAC):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	WXJ001-1	04-14-2021	04-13-2026
Loop Antenna	Schwarzbeck	FMZB 1519 B	WXJ002-4	01-05-2024	01-04-2025
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	01-09-2024	01-08-2025
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	12-28-2023	12-27-2024
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	12-27-2023	12-26-2024
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	12-27-2023	12-26-2024
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-17-2024	01-16-2025
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

Radiated Emission(3m FAR):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m FAR	YUNYI	9m*6m*6m	WXJ097	06-15-2023	06-14-2028
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ097-2	07-13-2023	07-12-2024
Biconical Antenna	Schwarzbeck	VUBA9117	WXJ002-1	07-02-2021	07-01-2024
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ097-3	07-14-2023	07-13-2024
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-3	12-28-2023	12-27-2024
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-5	12-28-2023	12-27-2024
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-6	12-28-2023	12-27-2024
Pre-amplifier (30MHz ~ 1GHz)	YUNYI	PAM-310N	WXJ097-5	05-14-2023	05-13-2024
				04-24-2024	04-23-2025
Pre-amplifier (1GHz ~ 18GHz)	YUNYI	PAM-118N	WXJ097-6	05-14-2023	05-13-2024
				04-24-2024	04-23-2025
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXJ002-7	12-27-2023	12-26-2024
EMI Test Receiver	Rohde & Schwarz	ESCI3	WXJ003	12-27-2023	12-26-2024
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	12-27-2023	12-26-2024
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ081-1	06-13-2023	06-12-2024
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-13M	WXG097-1	08-01-2023	07-31-2024
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG097-2	08-01-2023	07-31-2024
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG097-3	08-01-2023	07-31-2024
High Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Low Band Reject Filter Group	Tonscend	JS0806-F	WXJ097-4	N/A	
Test Software	Tonscend	TS+	Version: 5.0.0		

Conducted Method:					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Spectrum Analyzer	Keysight	N9020B	WXJ081-1	06-13-2023	06-12-2024
Temperature Humidity Chamber	ZHONG ZHI	CZ-A-80D	WXJ032-3	01-09-2023	01-08-2025
DC Power Supply	Keysight	E3642A	WXJ025-2	N/A	

6. Test results

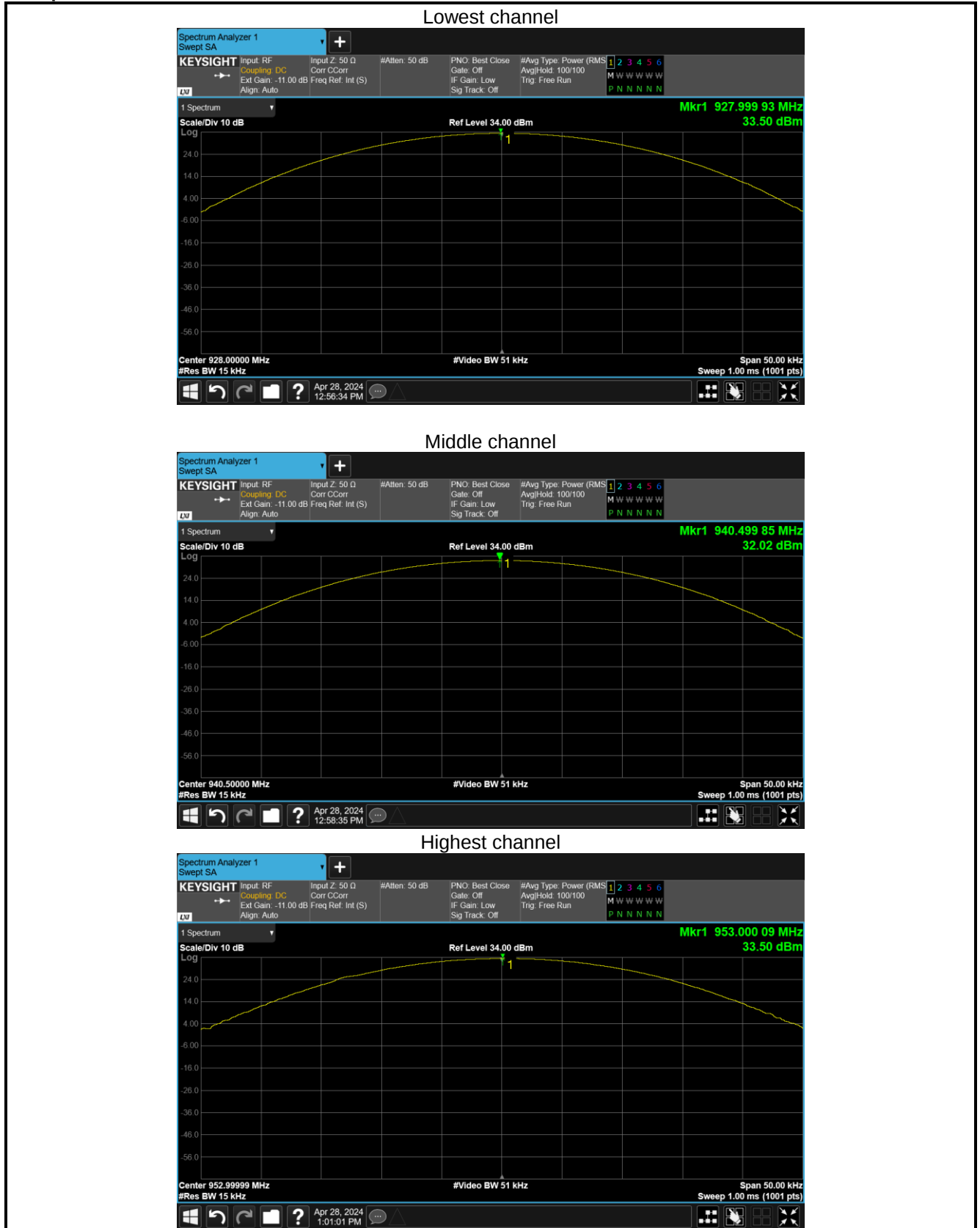
6.1 Conducted Output Power

Test Requirement:	FCC part 101.113(a)
Test Method:	ANSI/TIA-603-D 2010
Limit:	928.0 MHz-929.0MHz: 17dBW(47dBm) EIRP 932.0 MHz-932.5MHz: 17dBW(47dBm) EIRP 932.5 MHz-935.0MHz: 40dBW(70dBm) EIRP 941.0 MHz-941.5MHz: 30dBW(60dBm) EIRP 941.5 MHz-944.0MHz: 40dBW(70dBm) EIRP 952.0 MHz-960.0MHz: 40dBW(70dBm) EIRP
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

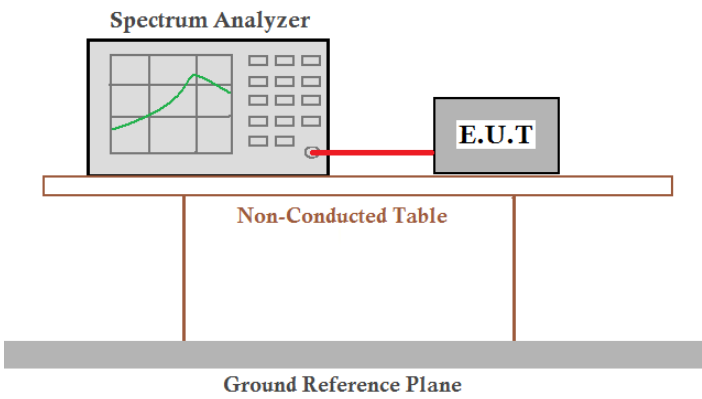
Measurement Data:

Test CH	Conducted Power (dBm)	EIRP Limit (dBm)	Result
Lowest	33.50	928.0 MHz-929.0MHz: 47dBm	Pass
		932.0 MHz-932.5MHz: 47dBm	
Middle	32.02	932.5 MHz-935.0MHz: 70dBm	
		941.0 MHz-941.5MHz: 60dBm	
		941.5 MHz-944.0MHz: 70dBm	
Highest	33.50	952.0 MHz-960.0MHz: 70dBm	

Test plot as follows:



6.2 Occupied Bandwidth

Test Requirement:	FCC part 101.109(c)
Test Method	ANSI/TIA-603-D 2010
Limit:	928MHz-929MHz: $\leq 25\text{KHz}$ 932MHz-932.5MHz: $\leq 12.5\text{KHz}$ 932.5MHz-935MHz: $\leq 200\text{KHz}$ 941MHz-941.5MHz: $\leq 12.5\text{KHz}$ 941.5MHz-944MHz: $\leq 200\text{KHz}$ 952MHz-960MHz: $\leq 200\text{KHz}$
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

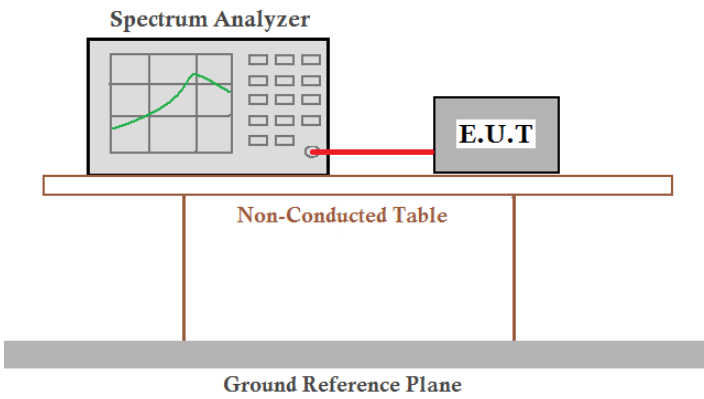
Test CH	99% Occupy Bandwidth (kHz)	Limit(kHz)	Result
Lowest	11.626	928MHz-929MHz: $\leq 25\text{KHz}$	Pass
932.5MHz	10.807	932MHz-932.5MHz: $\leq 12.5\text{KHz}$	
Middle	11.627	932.5MHz-935MHz: $\leq 200\text{KHz}$	
941.5MHz	10.813	941MHz-941.5MHz: $\leq 12.5\text{KHz}$	
Highest	11.630	941.5MHz-944MHz: $\leq 200\text{KHz}$	
		952MHz-960MHz: $\leq 200\text{KHz}$	

Test plots as below:





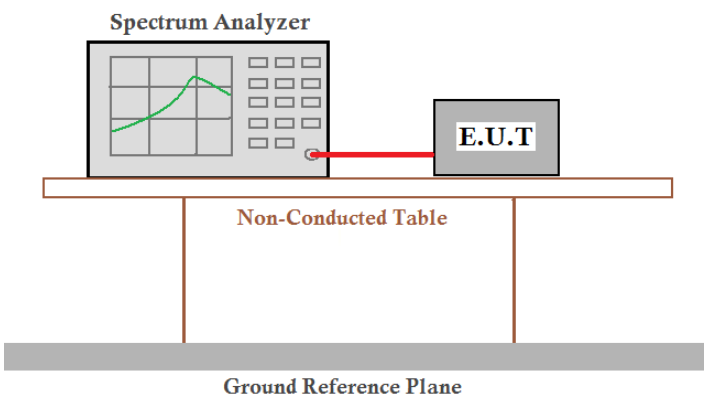
6.3 Emission Mask

Test Requirement:	FCC part 101.111(a)(2)(i)
Test Method:	ANSI/TIA-603-D 2010
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer, shown with a grid and a green curve, is connected to an E.U.T (Equipment Under Test) box by a red cable. Both the Spectrum Analyzer and the E.U.T are positioned on a table labeled 'Non-Conducted Table'. This table is supported by two vertical legs. Below the table, there is a horizontal grey bar labeled 'Ground Reference Plane'.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plot as follows:



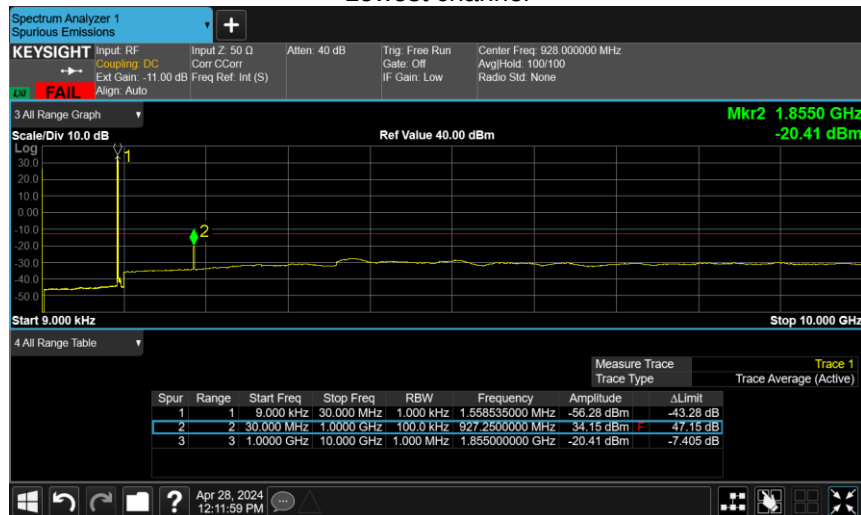
6.4 Out-band Spurious Emission at Antenna Terminals

Test Requirement:	FCC part 101.111(a)(2)(iii)
Test Method:	ANSI/TIA-603-D 2010
Limit:	In any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log_{10}$ (the mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation.
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	1. The emission levels of 30 GHz to 40 GHz are very lower than the limit and not show in test report. 2. The conducted output power is 37dBm of declare by applicant.

Test plots as follows:

The FAIL points shown in the figure are the basic signals:

Lowest channel



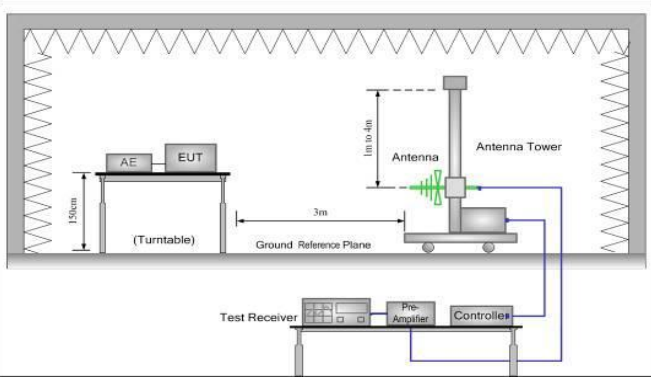
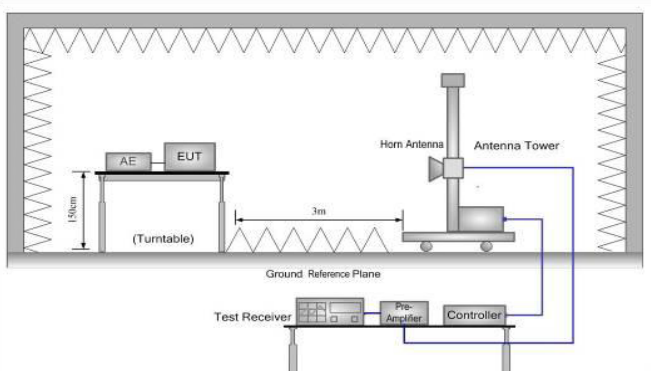
Middle channel



Highest channel



6.5 Field strength of spurious radiation measurement

Test Requirement:	FCC part 101.111(a)(2)(iii)
Test Method:	ANSI/TIA-603-D 2010
Limit:	In any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 Log10 (the mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation.
Test setup:	Below 1GHz  Above 1GHz 
Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method. 4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. $ERP / EIRP = S.G. \text{ output (dBm) } + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details.
Test results:	Passed

Measurement Data (worst case):

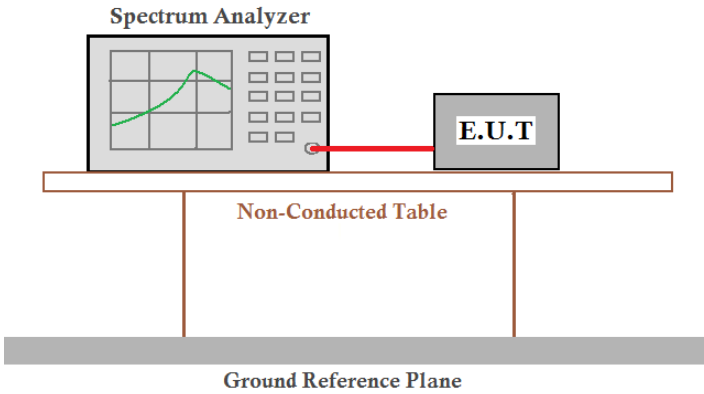
928MHz				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
353.17	Vertical	-30.97	-13.00	Pass
665.55	V	-26.38		
1856.28	V	-36.33		
2783.06	V	-49.80		
269.98	Horizontal	-31.09		
619.96	H	-26.52		
1856.28	H	-35.44		
2783.06	H	-46.50		
940.5MHz				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
343.11	Vertical	-31.38	-13.00	Pass
616.56	V	-26.32		
1879.78	V	-38.25		
2821.25	V	-42.76		
257.01	Horizontal	-31.82		
621.17	H	-25.51		
1879.78	H	-35.04		
2821.25	H	-39.73		
952.99999MHz				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
341.29	Vertical	-30.69	-13.00	Pass
675.86	V	-26.62		
1904.75	V	-41.61		
2857.97	V	-32.69		
258.46	Horizontal	-31.57		
619.11	H	-25.90		
1904.75	H	-38.46		
2857.97	H	-33.56		

Remark:

1.

The conducted output power is 37dBm of declare by applicant, so Limit is -13dBm.

6.6 Frequency Tolerance

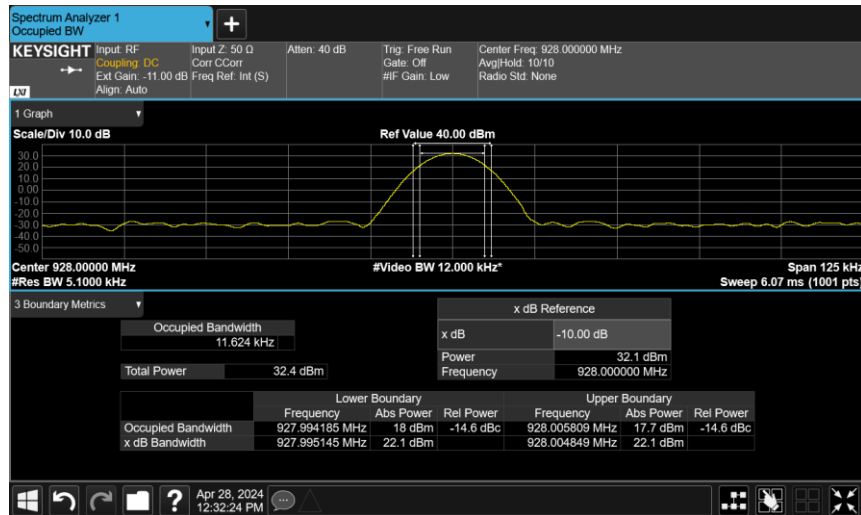
Test Requirement:	FCC Part 101.107(a)
Test Method:	ANSI/TIA-6-3-D 2010
Limit:	928MHz-929MHz: 0.0005% 932MHz-932.5MHz: 0.00015% 932.5MHz-935MHz: 0.00025% 941MHz-941.5MHz: 0.00015% 941.5MHz-944MHz: 0.00025% 952MHz-960MHz: 0.0005%
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data (the worst channel):

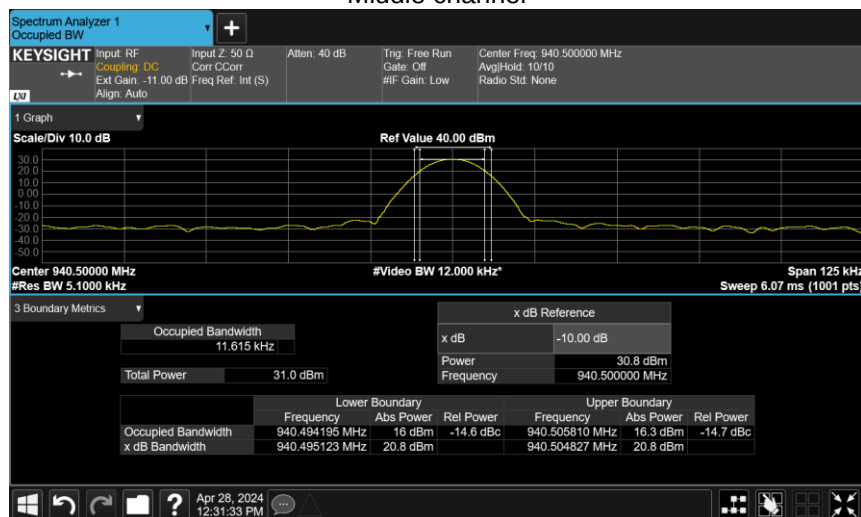
Test Mode	F _L	F _H	Tolerance (%)	Limit (%)
928.00000	927.995145	928.004849	-0.0000003233	928MHz-929MHz: 0.0005% 932MHz-932.5MHz: 0.00015%
940.50000	940.495123	940.504827	-0.0000026582	932.5MHz-935MHz: 0.00025% 941MHz-941.5MHz: 0.00015%
952.99999	952.995394	953.005107	0.0000273347	941.5MHz-944MHz: 0.00025% 952MHz-960MHz: 0.0005%

Test plot as follows:

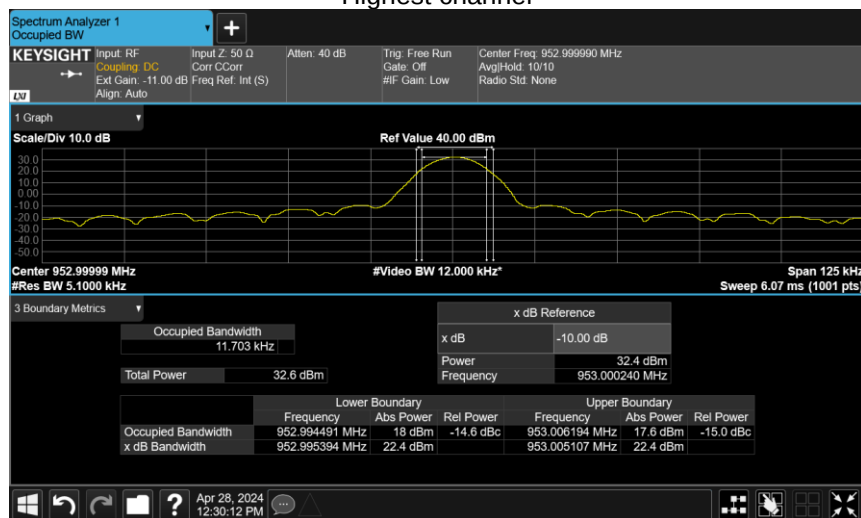
Lowest channel



Middle channel

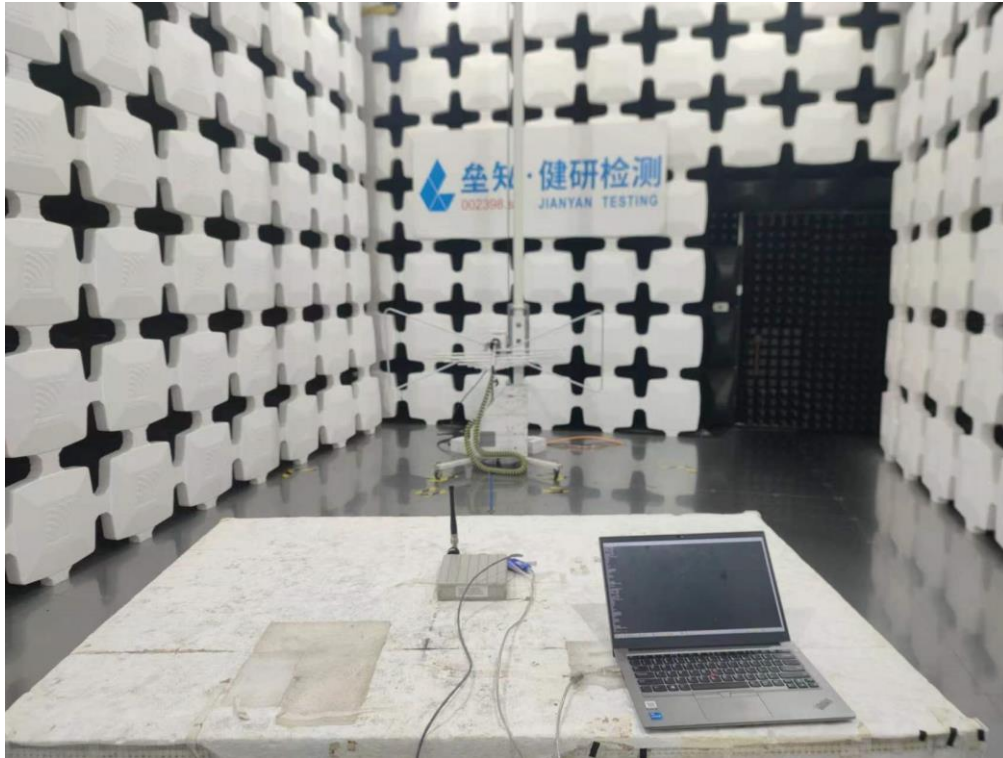


Highest channel

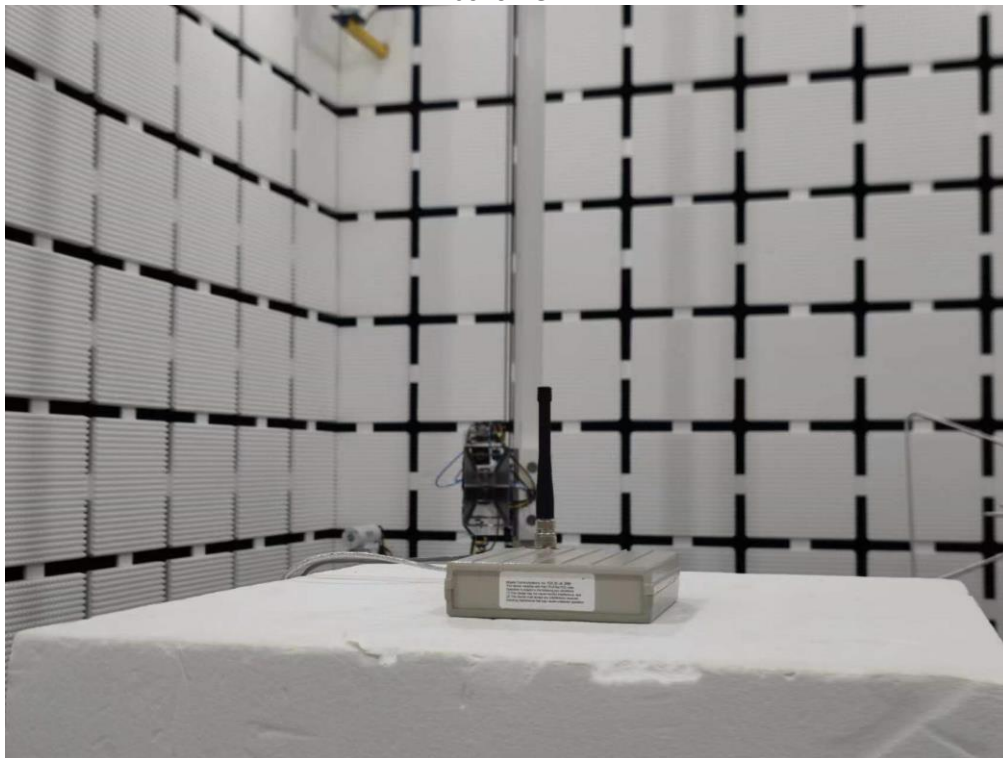


7 Test Setup Photo

Radiated Spurious Emission
Below 1GHz



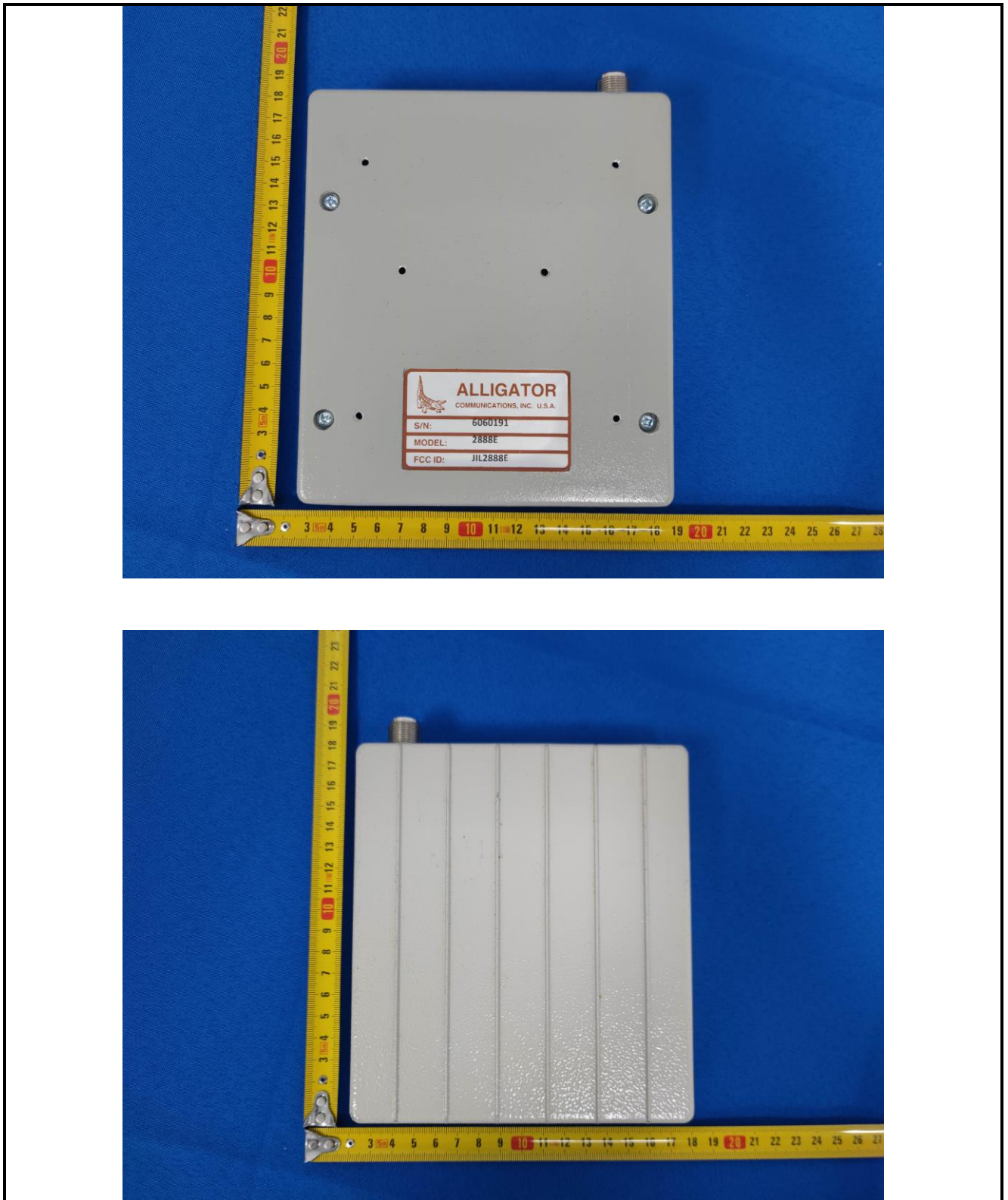
Above 1GHz

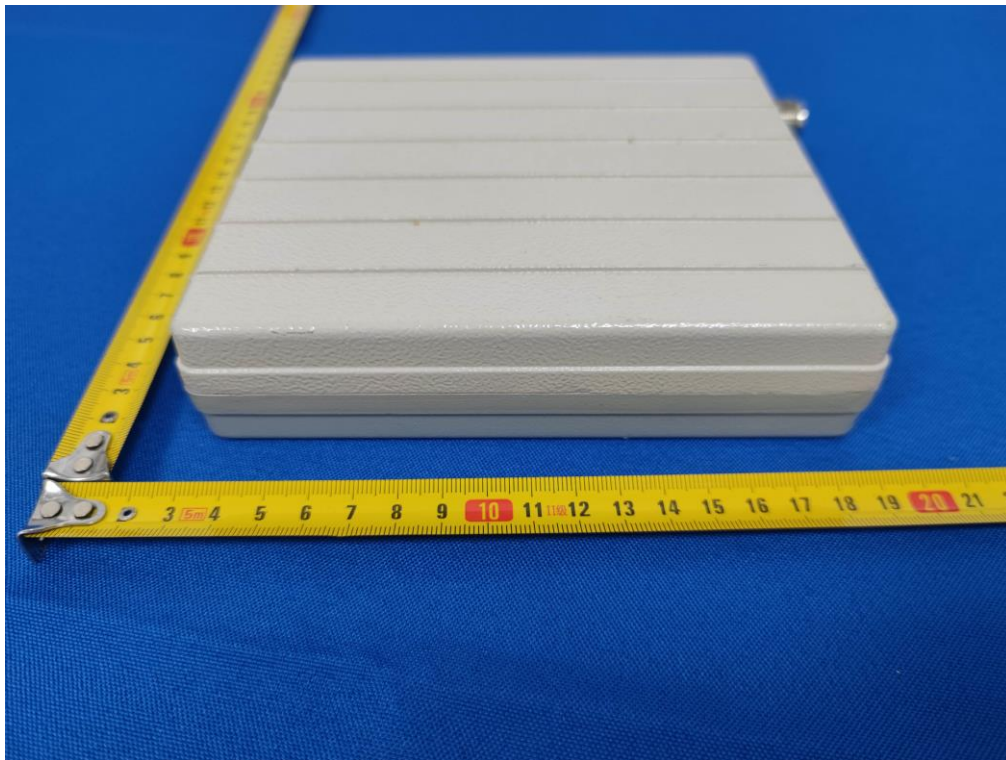


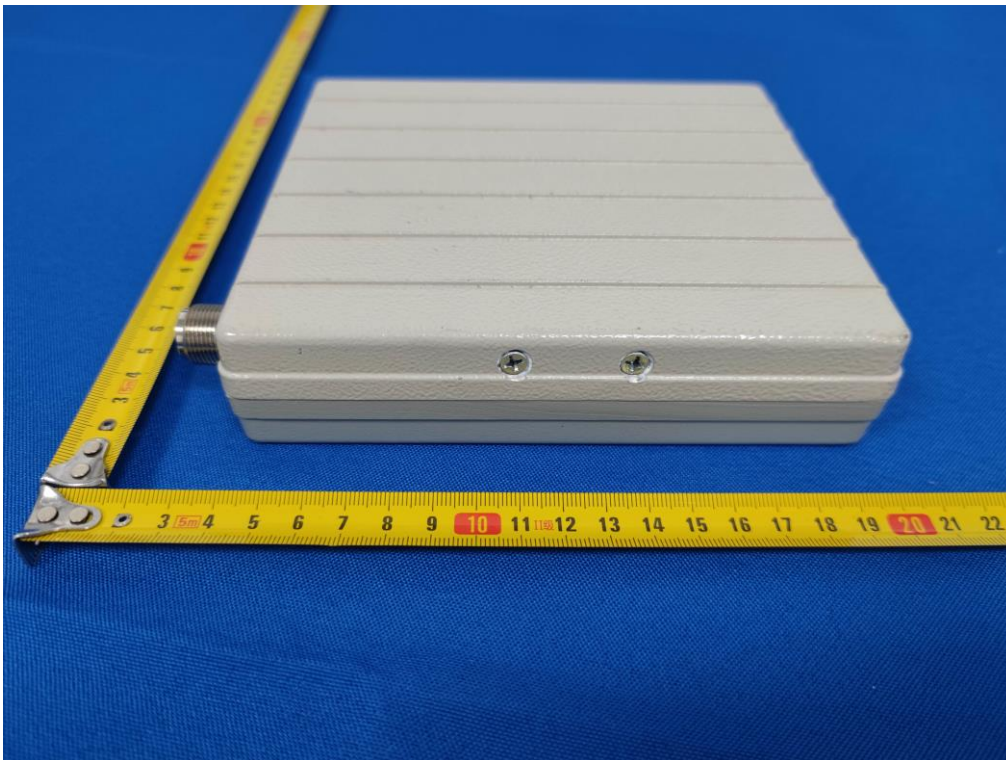
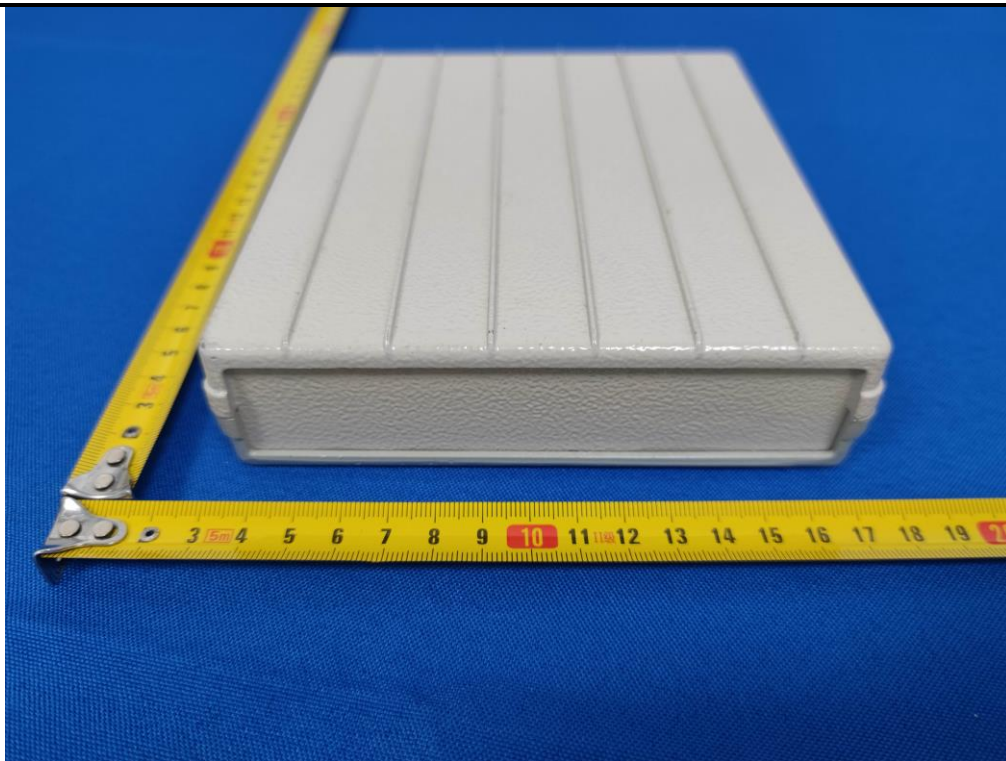
Conducted method

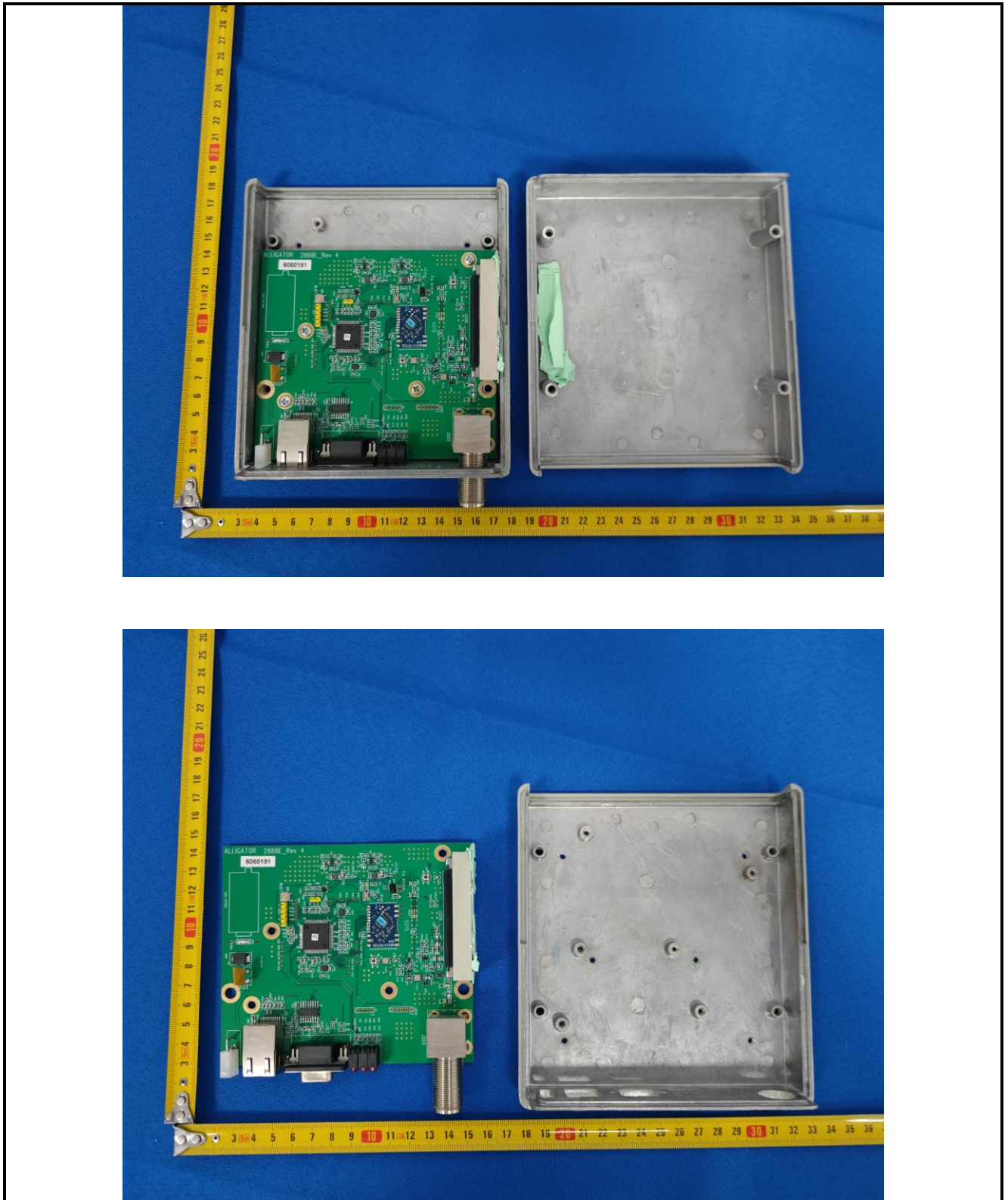


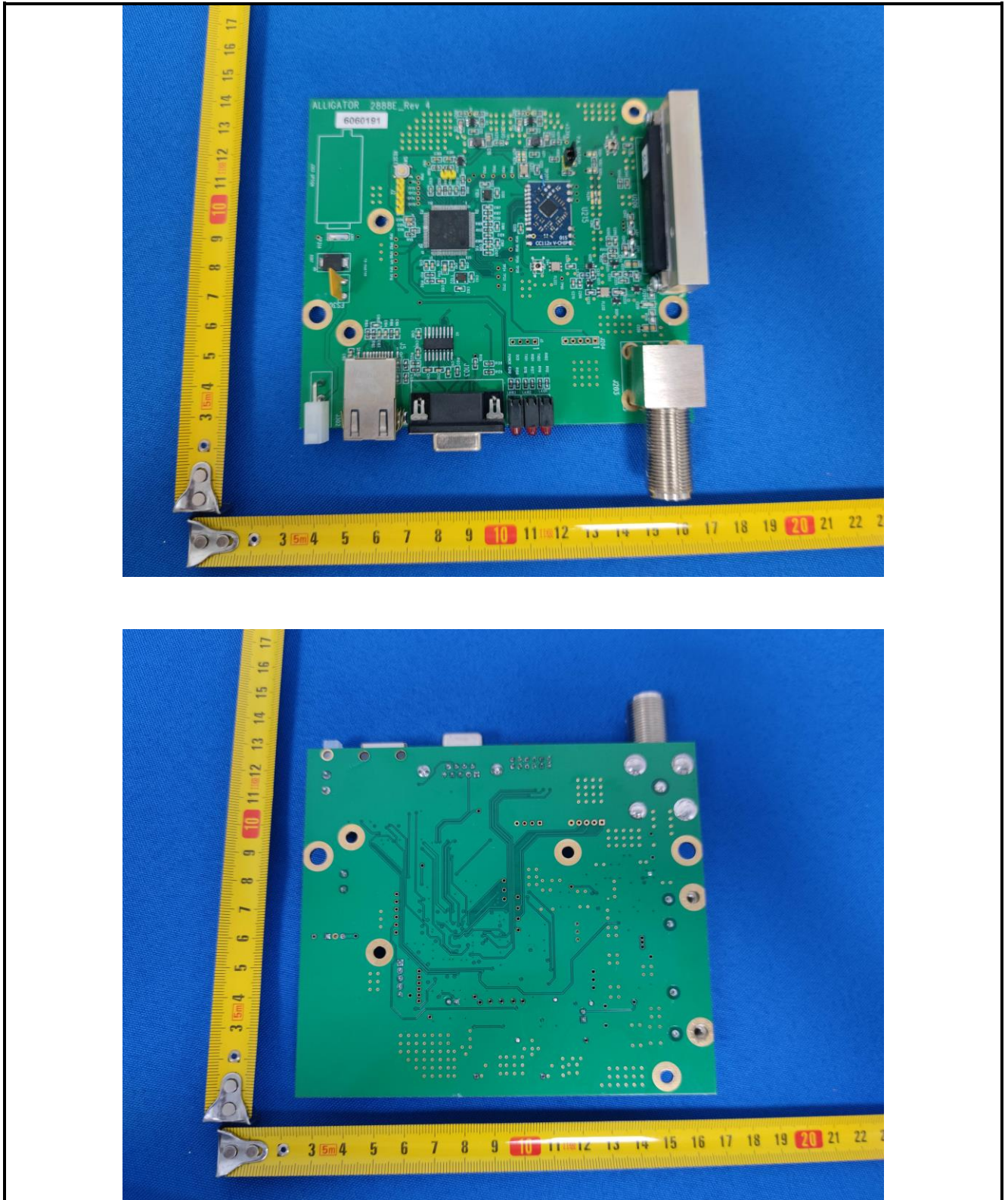
8 EUT Constructional Details

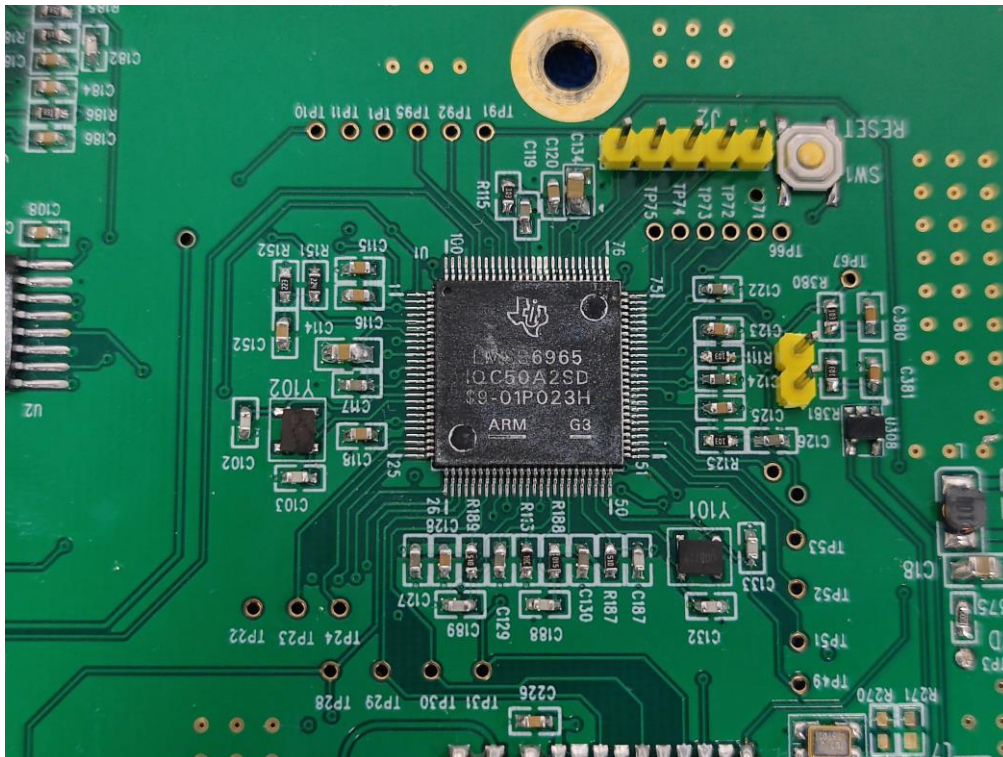


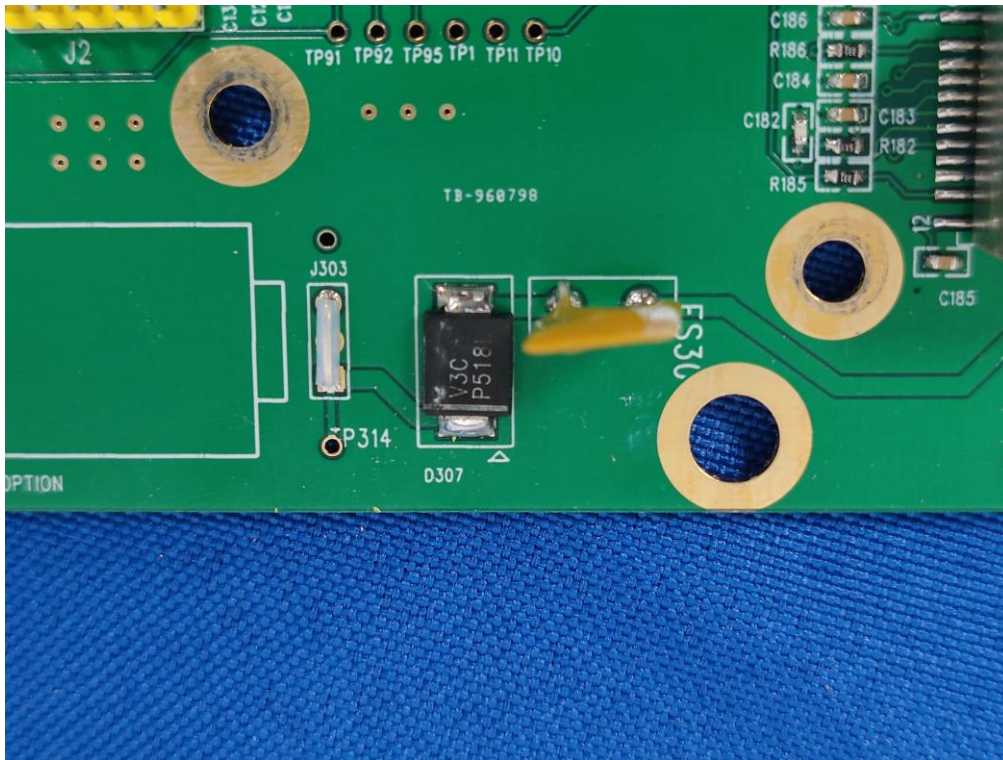
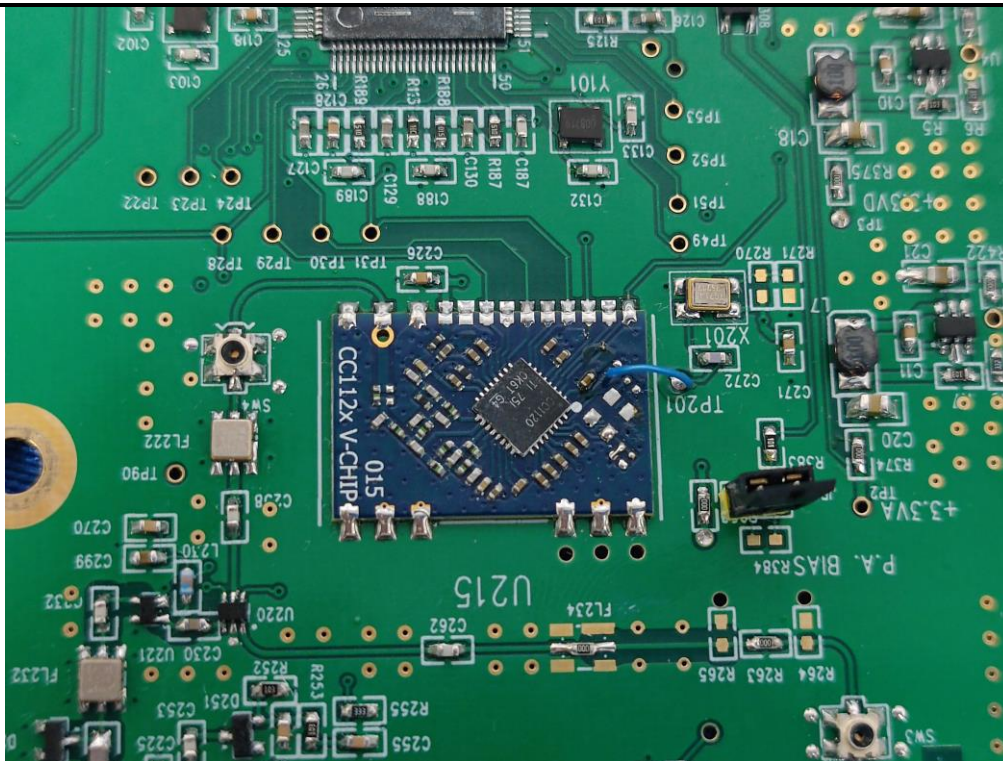


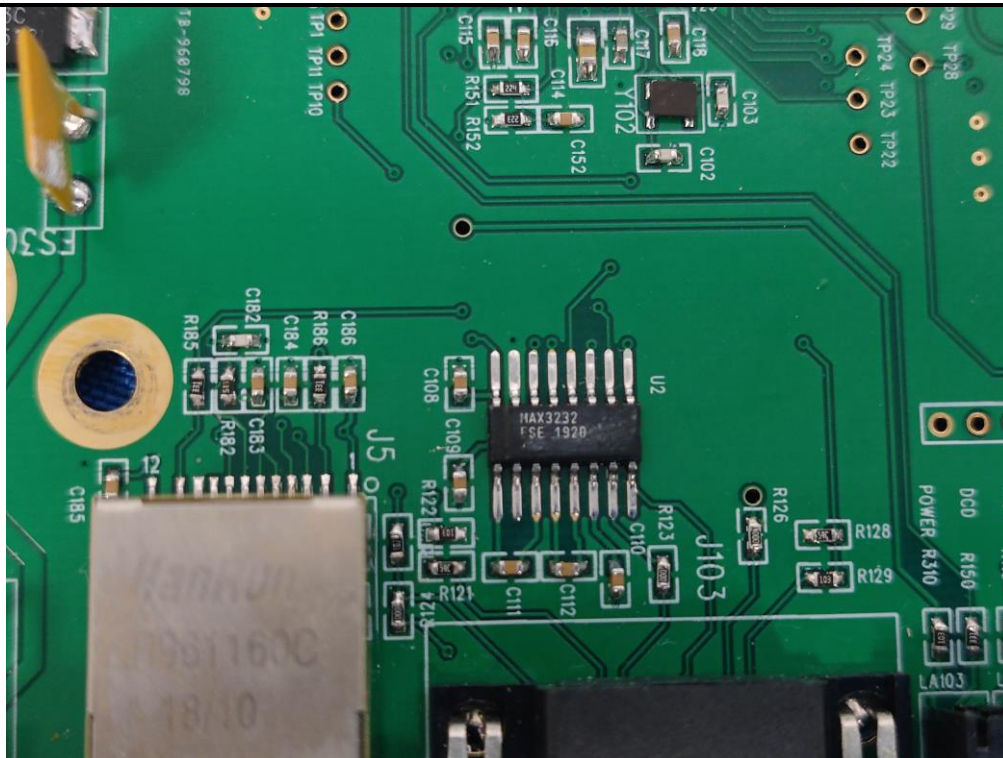












-----End of report-----