



Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC PART 15.247

Report Reference No.: CTL2607152031-WF

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Product Name: 16 ports reader

Model/Type reference: F5816-H

List Model(s): N/A

Trade Mark: N/A

FCC ID: 2BXMCF5816-H

Applicant's name: SANRAY TECHNOLOGY CO.,LIMITED

Address of applicant: FLAT/RM 1405B 14/F THE BELGIAN BANK BUILDING
NOS.721-725 NATHAN ROAD MONGKOK KL

Test specification:

Standard: FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

TRF Originator: Shenzhen CTL Testing Technology Co., Ltd.

Master TRF: Dated 2011-01

Date of receipt of test item: Jul 17, 2026

Date of Test Date: Jul 17, 2026-Aug 06, 2026

Date of Issue: Aug 07, 2026

Result: Pass

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TEST REPORT

Test Report No. :	CTL2607152031-WF	Aug 07, 2026
		Date of issue

Equipment under Test : 16 ports reader

Sample No : CTL260715203001, CTL260715203002, CTL260715203003

Model /Type : F5816-H

Listed Models : N/A

Applicant : **SANRAY TECHNOLOGY CO.,LIMITED**

Address : FLAT/RM 1405B 14/F THE BELGIAN BANK BUILDING
NOS.721-725 NATHAN ROAD MONGKOK KL

Manufacturer : **Shenzhen Sanray technology co.,ltd**

Address : Room 310, Building 2, Zhongliang Business Park, No.6
Liuxianer Road, Baoan District, Shenzhen City, Guangdong
Province, China.

Test result	Pass *
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*In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

** Modified History **

[illegible]

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

[ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024](#): American National Standard for Testing Unlicensed Wireless Devices

1.2. Test Description

FCC PART 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(1)(i)	20dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.247(b)	Pseudorandom Frequency Hopping Sequence	PASS
FCC Part 15.247(a)(1)(iii)	Number of hopping frequency& Time of Occupancy	PASS
FCC Part 15.247(a)(1)	Frequency Separation	PASS
FCC Part 15.205/15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge Compliance of RF Emission	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

1.3. Test Facility

Company Name:	Shenzhen CTL Testing Technology Co., Ltd.
Address 1:	Zone A.1/F..Warehouse 2.Baisha Technology Park, No.3011,Shahexi Road, Nanshan District,Shenzhen.518055,P.R.C.
Address 2:	Fl.A1, Bldg.A3, No.2533 GuanGuang Road, Fenghuang Community Fenghuang Street, Guangming District, Shenzhen, Guangdong, PR.C

1.3.2 Test location

All tests were performed at:

Company Name:	Shenzhen CTL Testing Technology Co., Ltd.
☐ Main location	Zone A.1/F..Warehouse 2.Baisha Technology Park, No.3011,Shahexi Road, Nanshan District,Shenzhen.518055,P.R.C.
☒ Satellite location	Fl.A1, Bldg.A3, No.2533 GuanGuang Road, Fenghuang Community Fenghuang Street, Guangming District, Shenzhen, Guangdong, PR.C

1.3.3 Laboratory accreditation

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

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC CAB identifier: CN0041

Main Company Number :9618B

Satellite Company Number:35187

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Main Company Number:9618B and Satellite Company Number:35187.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. 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. Designation No.: CN1216. Test Firm Registration 399832.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Conducted Emission 0.15~30MHz	$\pm 3.11\text{dB}$	(1)
Magnetic Field Emission 9KHz~30MHz	$\pm 3.24\text{dB}$	(1)
Radiated Emission 30~1000MHz	$\pm 4.5\text{dB}$	(1)
Radiated Emission Above 1GHz	$\pm 5.08\text{dB}$	(1)
DTS Bandwidth	$\pm 1.9\%$	(1)
Maximum Conducted Output Power	$\pm 1.18\text{ dB}$	(1)
Maximum Power Spectral Density Level	$\pm 0.98\text{ dB}$	(1)
Band-edge	$\pm 1.21\text{dB}$	(1)
Unwanted Emissions In Non-restricted Freq Bands	9kHz-7GHz: $\pm 1.09\text{dB}$ 7GHz-26.5GHz: $\pm 3.27\text{dB}$	(1)
Carrier Frequency Separation	$\pm 1.9\%$	(1)
Number of Hopping Channel	$\pm 1.9\%$	(1)
Radiated Spurious Emission	25MHz-1000MHz: $\pm 1.50\text{ dB}$ 1000MHz-20000MHz: $\pm 2.20\text{ dB}$	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2.0$.

(2) Decision rule for Statement of Conformity: The measurement uncertainty is not taken into account but only measured result.

2. GENERAL INFORMATION

2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	18-28°C
Relative Humidity:	30-60%
Air Pressure:	965-1030hPa

2.2. General Description of EUT

Product Name:	16 ports reader
Model/Type reference:	F5816-H
Power supply:	DC 12V by AC-DC adapter
Adapter information:	MODEL: A361-1202000DI INPUT: 100-240V~50/60Hz 1.5A OUTPUT: 12.0V==2.0A 24.0W
Test Voltage	DC 12V by AC-DC adapter
RFID	
Version:	Supported 902MHz-928MHz
Modulation:	GFSK
Operation frequency:	902.75MHz~927.25MHz
Channel number:	50
Channel separation:	500kHz
Antenna type:	External antenna
Antenna gain:	9 dBi provided by ☒ Applicant ☐ Manufacturer 12 dBi provided by ☒ Applicant ☐ Manufacturer

Note1: For more details, please refer to the user's manual of the EUT.

Note2: Antenna gain provided by the applicant.

Note3: The product has two types of antennas and does not support MIMO.

2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing. There are 79 channels provided to the EUT and Channel 00/39/78 were selected to test.

Operation Frequency :

Channel	Frequency (MHz)
01	902.75
02	903.25
⋮	⋮
24	914.25
25	914.75
26	915.25
⋮	⋮
49	926.75
50	927.25

Preliminary tests were performed in each mode and packet length of RFID, and found worst case as below, finally test were conducted at those mode and recorded in this report.

Test Items	Worst case
Conducted Emissions	GFSK
Radiated Emissions and Band Edge	GFSK
Maximum Conducted Output Power	GFSK
20dB Bandwidth	GFSK
Frequency Separation	GFSK
Number of hopping frequency	GFSK
Time of Occupancy (Dwell Time)	GFSK
Out-of-band Emissions	GFSK

RF Cable List and Details

RF Cable	RF Cable loss	RF Cable loss provided by
RF1.13	0.5dB	☒ Applicant ☐ Manufacturer ☐ Testing Laboratory (CTL)
RG 316	0.8dB	☒ Applicant ☐ Manufacturer ☐ Testing Laboratory (CTL)

2.4. Equipments Used during the Test

Conducted Emission						
Test Equipment	Manufacturer	Model No.	Serial No.	Previous calibration	Last Cal.	Cal.Due
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	/	2026/01/05	2027/01/04
LISN	ROHDE & SCHWARZ	ESH2-Z5	860014/010	/	2026/01/05	2027/01/04
Limitator	ROHDE & SCHWARZ	ESH3-Z2	100408	/	2026/01/05	2027/01/04
Software:						
Name of Software:			Version:			
ES-K1			V1.71			

Radiated Emission						
Test Equipment	Manufacturer	Model No.	Serial No.	Previous calibration	Last Cal.	Cal.Due
Loop antenna	BEIJING DA ZE TECHNOLOGY CO., LTD	ZN30900A	N/A	/	2026/06/30	2027/06/29
ULTRA-BROADBAND ANTENNA	Sunol Sciences Corp.	JB1 Antenna	A061713	/	2026/06/28	2027/06/27
Horn Antenna	Sunol Sciences Corp	DRH-118	A062013		2026/01/05	2027/01/04
Horn Antenna	Ocean Microwave	OBH100400	26999002		2026/07/06	2027/07/05
Amplifier	Agilent	8449B	3008A02306	/	2026/01/05	2027/01/04
Amplifier	Brief&Smart	LNA-4018	2104197	/	2026/06/30	2027/06/29
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	/	2026/07/01	2027/06/30
Spectrum Analyzer	RS	FSP	1164.4391.38	/	2026/06/30	2027/06/29
9kHz-40GHz coaxial line chamber 2	/	Z108-NJ-NJ-9.5M	21121049	/	2026/07/01	2027/06/30
Software:						
Name of Software:			Version:			
EZ EMC(Below 1GHz)			V1.1.4.2			
EZ EMC(Above 1GHz)			V1.1.4.2			

RF Conducted						
Test Equipment	Manufacturer	Model No.	Serial No.	Previous calibration	Last Cal.	Cal.Due
Spectrum Analyzer	Keysight	N9020A	MY53420874	/	2026/06/29	2027/06/28
Power meter	TSTPASS	TSPS2023R	TSCB220016	/	2026/06/30	2027/06/29
Temperature/Humidity Meter	Ji Yu	MC501	/	/	2026/07/02	2027/07/01
Software:						
Name of Software:			Version:			
TST-PASS			V2.0.2			

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

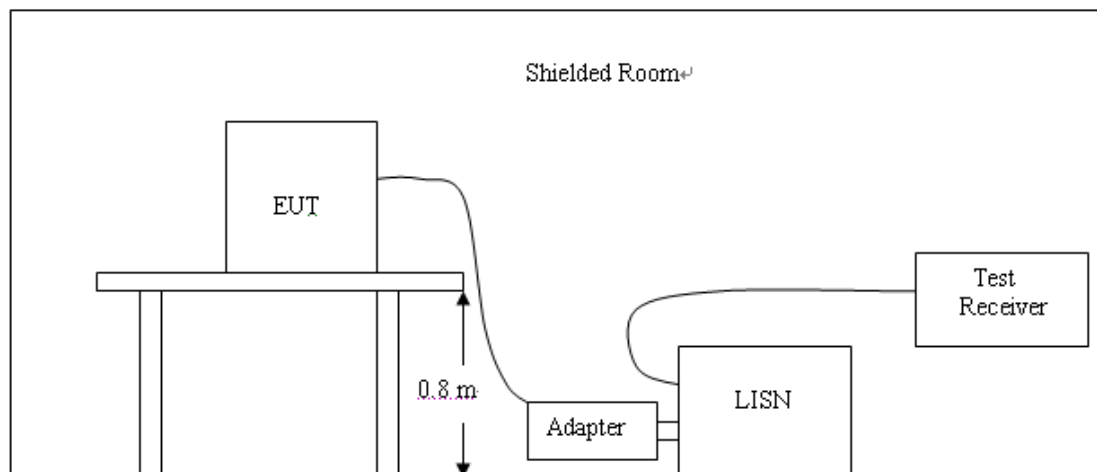
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024.
2. Support equipment, if needed, was placed as per ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.

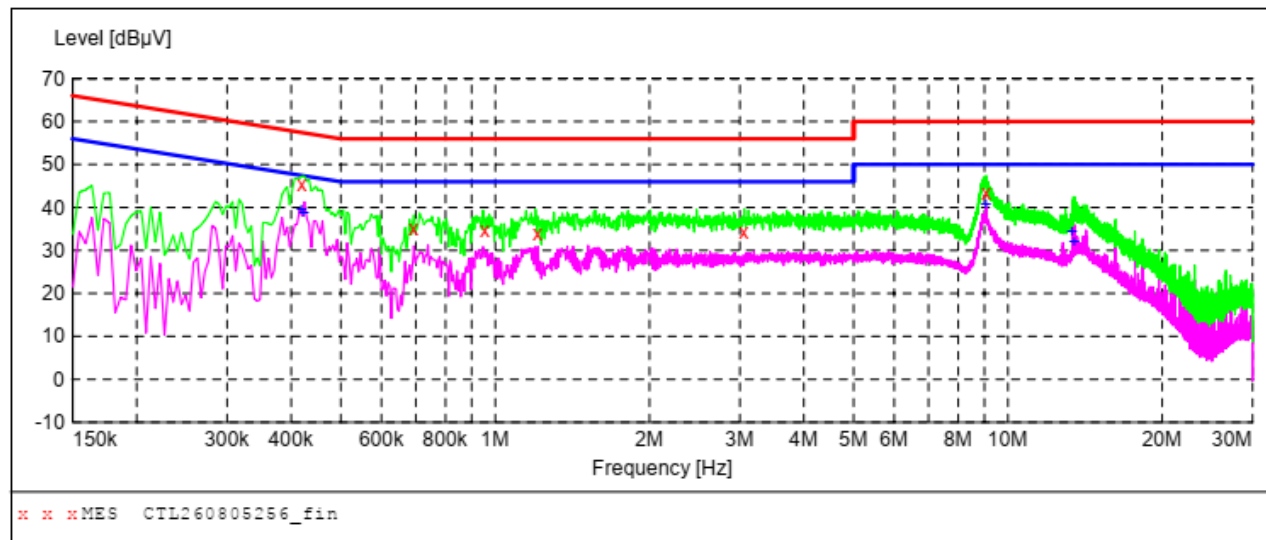
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Remark: The EUT has a total of 16 antenna ports, and there are two different types of antennas. We tested all the antenna ports and data of both types of antennas, and only retained the worst mode data, which is antenna port 1 and the 12dbi antenna.

Test Mode**RFID****Line:****L****SCAN TABLE: "Voltage (9K-30M)FIN"**

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL260805256_fin"**

8/5/2026 9:25PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.420000	45.50	10.0	57	11.9	QP	L1	GND
0.694500	35.20	10.0	56	20.8	QP	L1	GND
0.955500	34.60	10.1	56	21.4	QP	L1	GND
1.212000	33.90	10.2	56	22.1	QP	L1	GND
3.057000	34.10	10.4	56	21.9	QP	L1	GND
9.073500	43.30	10.9	60	16.7	QP	L1	GND

MEASUREMENT RESULT: "CTL260805256_fin2"

8/5/2026 9:25PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.420000	39.30	10.0	47	8.1	AV	L1	GND
0.424500	38.80	10.0	47	8.6	AV	L1	GND
9.069000	40.60	10.9	50	9.4	AV	L1	GND
13.357500	34.40	11.0	50	15.6	AV	L1	GND
13.483500	32.10	11.0	50	17.9	AV	L1	GND

Test Mode

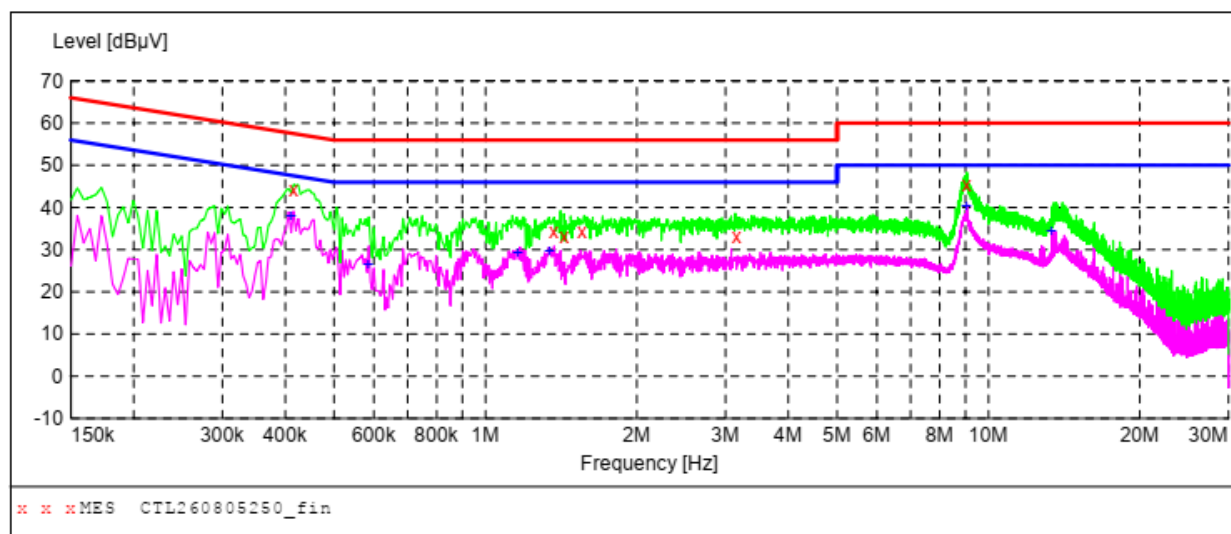
RFID

Line:

N

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL260805250_fin"**

8/5/2026 9:08PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.415500	44.10	10.0	58	13.4	QP	N	GND
1.369500	34.40	10.1	56	21.6	QP	N	GND
1.437000	33.10	10.1	56	22.9	QP	N	GND
1.558500	34.30	10.1	56	21.7	QP	N	GND
3.160500	33.30	10.4	56	22.7	QP	N	GND
9.060000	45.30	10.9	60	14.7	QP	N	GND

MEASUREMENT RESULT: "CTL260805250_fin2"

8/5/2026 9:08PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.411000	37.70	10.0	48	9.9	AV	N	GND
0.586500	26.40	10.0	46	19.6	AV	N	GND
1.162500	29.30	10.1	46	16.7	AV	N	GND
1.342500	29.40	10.1	46	16.6	AV	N	GND
9.060000	40.30	10.9	50	9.7	AV	N	GND
13.357500	34.30	11.0	50	15.7	AV	N	GND

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

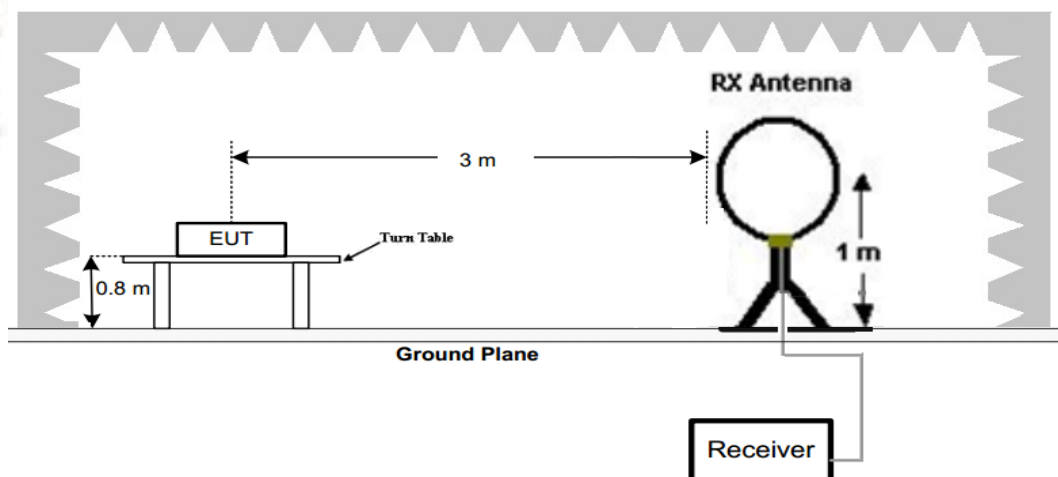
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

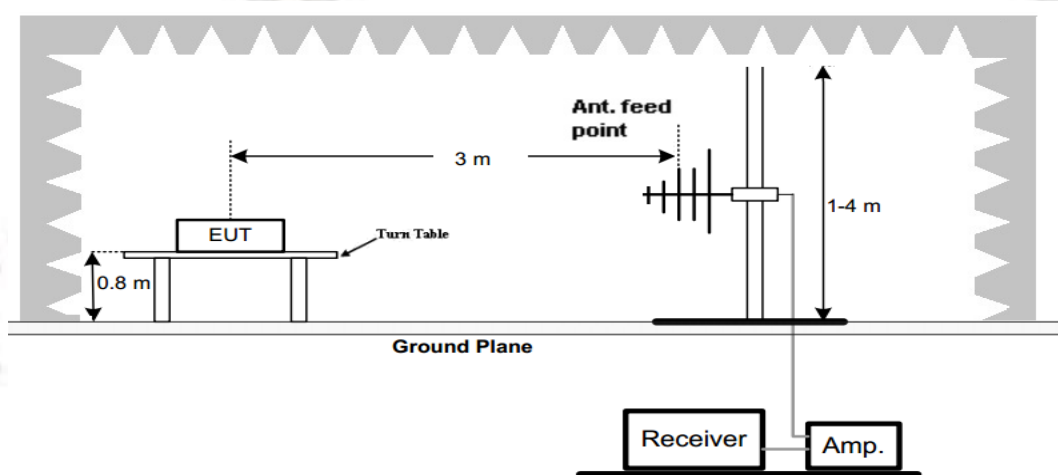
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz})) + 40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz})) + 40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30) + 40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

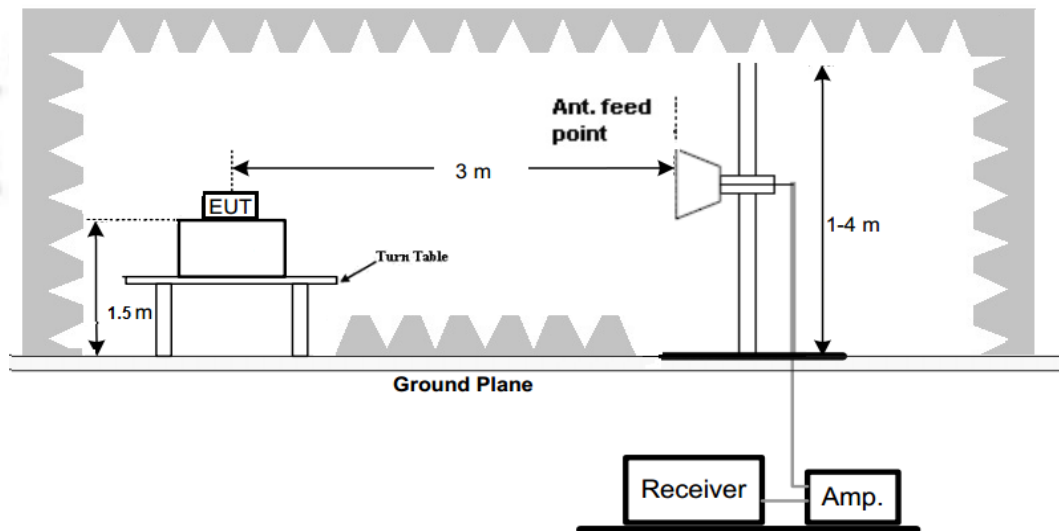
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

TEST RESULTS

Remark:

1. The EUT has a total of 16 antenna ports, and there are two different types of antennas. We tested all the antenna ports and data of both types of antennas, and only retained the worst mode data, which is antenna port 1 and the 12dbi antenna.
2. For below 1GHz testing recorded worst at antenna port 1 and the 12dbi antenna low channel.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, Found the emission level are attenuated 20dB below the limits from 9 kHz to 30MHz, so it does not recorded in report.

For 30MHz-1GHz

Horizontal



Shenzhen CTL Testing Technology Co., Ltd

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Unit 01A&B&C&D-1, Building A3, Guangming Sci-Tech Park, Guan Guang Road, Fenghu

Radiated Emission Measurement

File :RF2

Data :#10107

Date: 2026/08/03

Time: 19:31:07

120.0 dBuV/m



Site LAB Chamber 1

Polarization: *Horizontal*

Temperature: 25(C)

Limit: FCC Part15 Class C_30-1000MHz

Power:

Humidity: 50 %

EUT:

Distance: 3m

M/N:

Mode: 902.75MHz

Note: CTL2607152031-WF

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	104.5360	21.36	11.82	33.18	43.50	10.32	peak	100	46	P	
2	238.3101	22.99	13.00	35.99	46.00	10.01	peak	100	204	P	
3	250.3011	24.46	12.69	37.15	46.00	8.85	peak	100	16	P	
4	365.5390	19.97	15.83	35.80	46.00	10.20	peak	100	115	P	
5	501.1790	15.66	20.03	35.69	46.00	10.31	peak	100	360	P	
6	925.7562	65.03	24.56	89.59	/	/	peak	100	272	/	

Vertical



Shenzhen CTL Testing Technology Co., Ltd

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Unit 01A&B&C&D-1, Building A3, Guangming Sci-Tech Park, Guan Guang Road, Fenghu

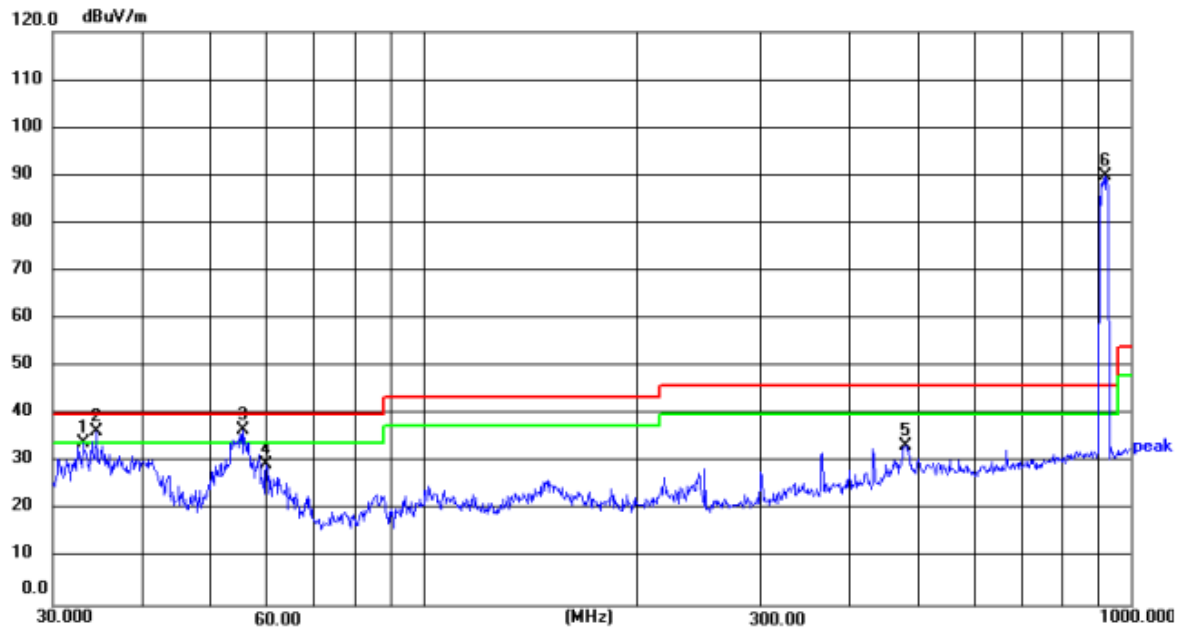
Radiated Emission Measurement

File :RF2

Data :#10108

Date: 2026/08/03

Time: 19:31:53



Site LAB Chamber 1

Limit: FCC Part15 Class C_30-1000MHz

EUT:

M/N:

Mode: 902.75MHz

Note: CTL2607152031-WF

Polarization: **Vertical**

Power:

Distance: 3m

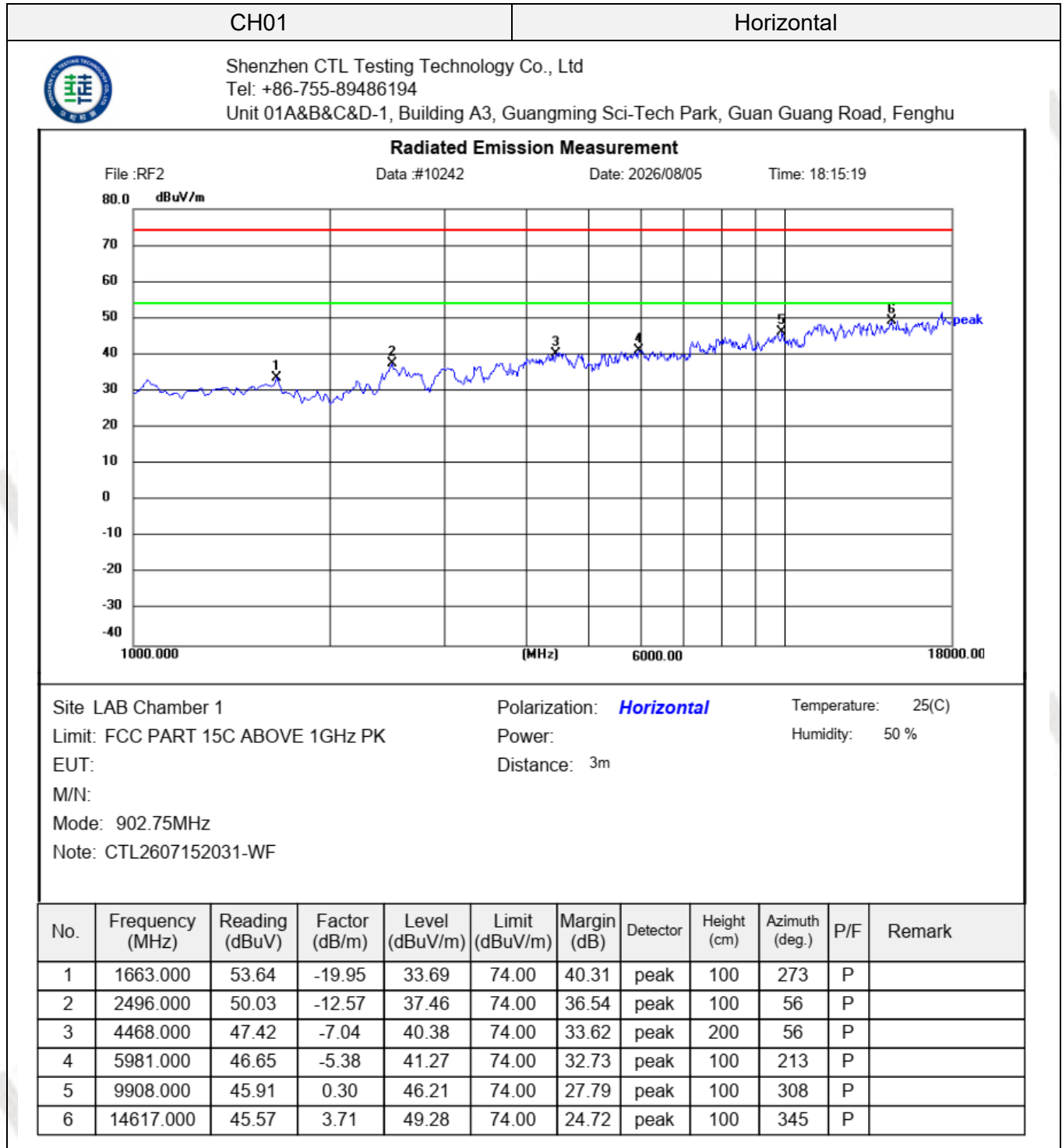
Temperature: 25(C)

Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	33.0950	15.03	19.10	34.13	40.00	5.87	peak	100	275	P	
2	34.5173	17.97	18.38	36.35	40.00	3.65	peak	100	295	P	
3	55.8047	27.31	9.30	36.61	40.00	3.39	peak	100	116	P	
4	60.0691	19.69	9.80	29.49	40.00	10.51	peak	100	86	P	
5	480.5276	13.66	19.90	33.56	46.00	12.44	peak	100	66	P	
6	922.5157	65.46	24.44	89.90	/	/	peak	100	344	/	

For 1GHz to 25GHz

Note: The EUT has a total of 16 antenna ports, and there are two different types of antennas. We tested all the antenna ports and data of both types of antennas, and only retained the worst mode data, which is antenna port 1 and the 12dbi antenna.

GFSK (above 1GHz)

CH01

Vertical



Shenzhen CTL Testing Technology Co., Ltd

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Radiated Emission Measurement

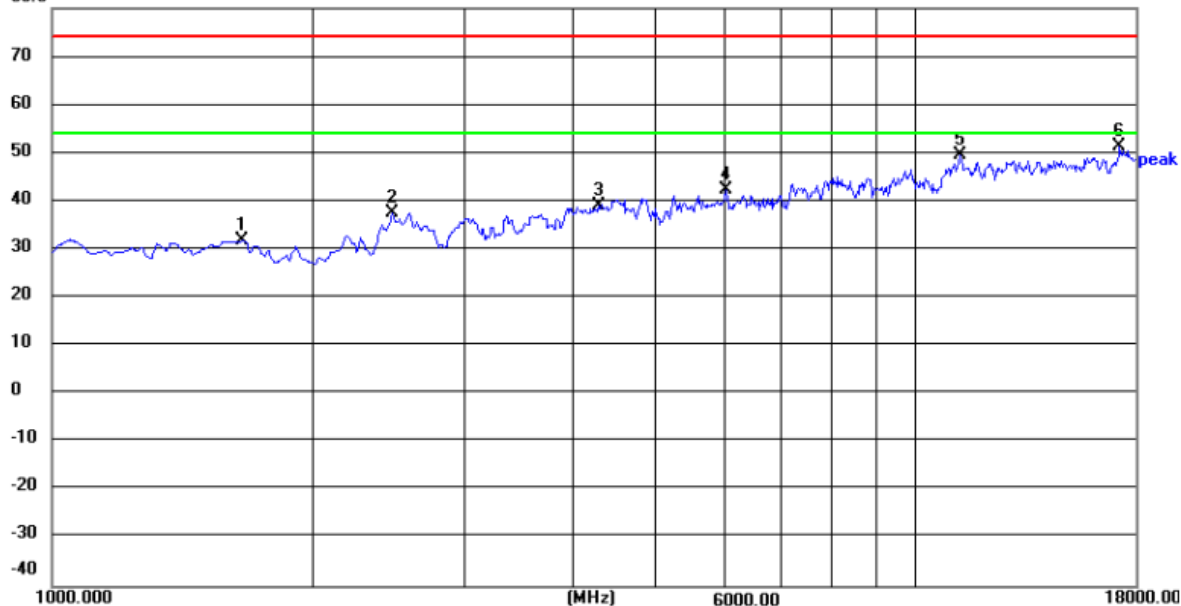
File :RF2

Data :#10243

Date: 2026/08/05

Time: 18:16:01

80.0 dBuV/m



Site LAB Chamber 1

Polarization: **Vertical**

Temperature: 25(C)

Limit: FCC PART 15C ABOVE 1GHz PK

Power:

Humidity: 50 %

EUT:

Distance: 3m

M/N:

Mode: 902.75MHz

Note: CTL2607152031-WF

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	1663.000	51.78	-19.95	31.83	74.00	42.17	peak	200	16	P	
2	2479.000	50.70	-13.08	37.62	74.00	36.38	peak	100	244	P	
3	4298.000	45.97	-6.81	39.16	74.00	34.84	peak	100	148	P	
4	6049.000	46.70	-4.43	42.27	74.00	31.73	peak	100	255	P	
5	11285.000	46.33	3.26	49.59	74.00	24.41	peak	100	219	P	
6	17269.000	44.53	6.74	51.27	74.00	22.73	peak	100	136	P	

CH25

Horizontal



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Radiated Emission Measurement

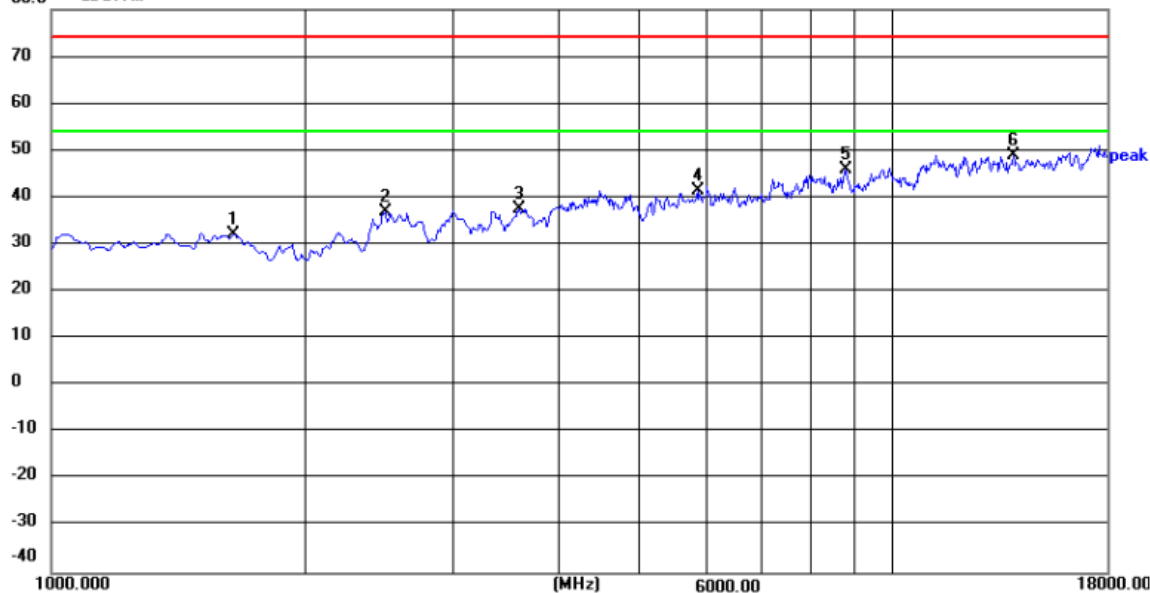
File :RF2

Data :#10240

Date: 2026/08/05

Time: 18:12:24

80.0 dBuV/m



Site LAB Chamber 1

Limit: FCC PART 15C ABOVE 1GHz PK

EUT:

M/N:

Mode: 915.25MHz

Note: CTL2607152031-WF

Polarization: **Horizontal**

Power:

Distance: 3m

Temperature: 25(C)

Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	1646.000	51.98	-19.77	32.21	74.00	41.79	peak	100	271	P	
2	2496.000	49.50	-12.57	36.93	74.00	37.07	peak	200	92	P	
3	3601.000	47.42	-9.87	37.55	74.00	36.45	peak	100	56	P	
4	5879.000	46.46	-4.86	41.60	74.00	32.40	peak	100	56	P	
5	8820.000	46.45	-0.45	46.00	74.00	28.00	peak	100	176	P	
6	13937.000	44.97	4.03	49.00	74.00	25.00	peak	100	284	P	

CH25

Vertical



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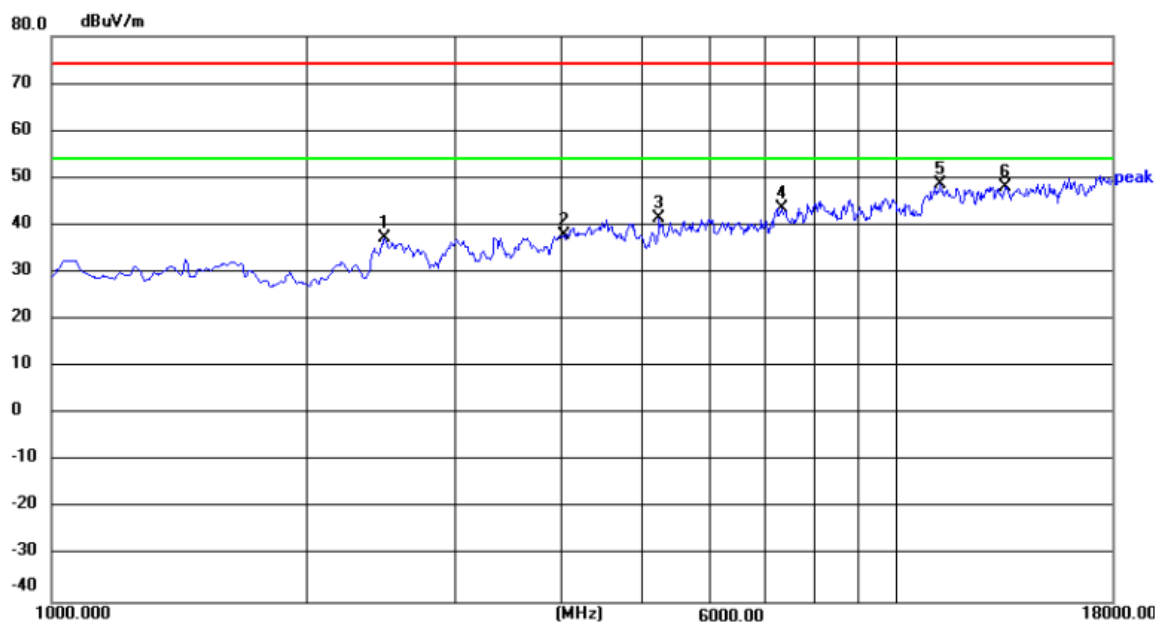
Radiated Emission Measurement

File :RF2

Data :#10241

Date: 2026/08/05

Time: 18:13:07



Site LAB Chamber 1

Limit: FCC PART 15C ABOVE 1GHz PK

EUT:

M/N:

Mode: 915.25MHz

Note: CTL2607152031-WF

Polarization: **Vertical**

Power:

Distance: 3m

Temperature: 25(C)

Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2479.000	50.20	-13.08	37.12	74.00	36.88	peak	200	244	P	
2	4043.000	46.92	-9.05	37.87	74.00	36.13	peak	100	53	P	
3	5250.000	47.52	-5.96	41.56	74.00	32.44	peak	100	255	P	
4	7341.000	46.25	-2.72	43.53	74.00	30.47	peak	100	89	P	
5	11302.000	45.20	3.47	48.67	74.00	25.33	peak	100	328	P	
6	13444.000	44.63	3.47	48.10	74.00	25.90	peak	100	280	P	

CH50

Horizontal



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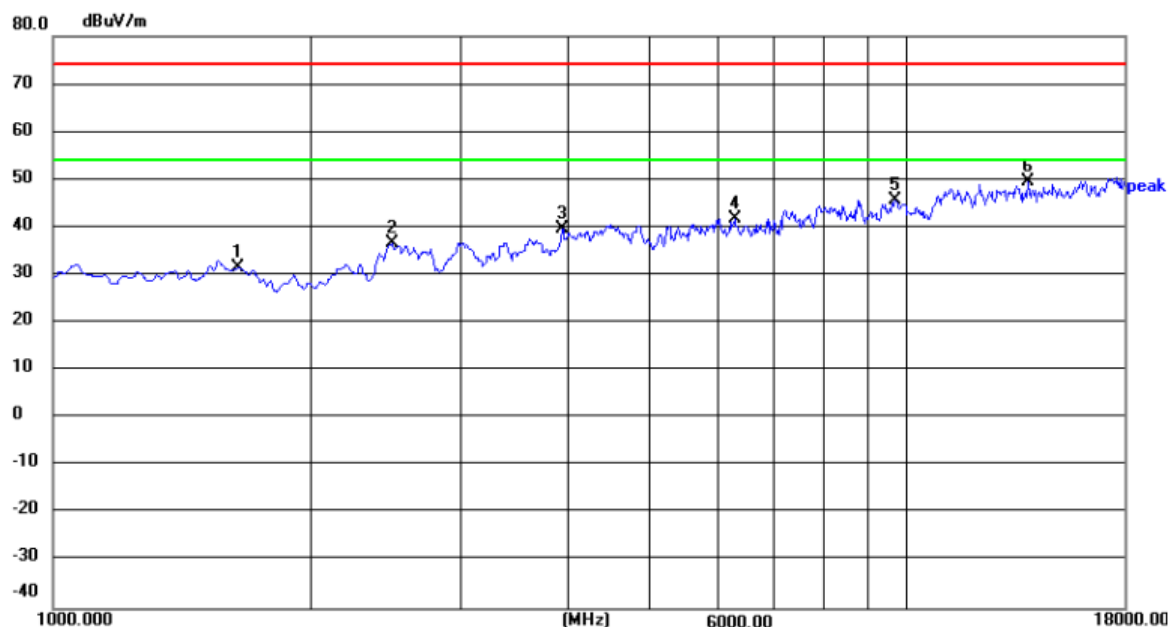
Radiated Emission Measurement

File :RF2

Data :#10244

Date: 2026/08/05

Time: 18:17:54



Site LAB Chamber 1

Limit: FCC PART 15C ABOVE 1GHz PK

EUT:

M/N:

Mode: 927.25MHz

Note: CTL2607152031-WF

Polarization: **Horizontal**

Power:

Distance: 3m

Temperature: 25(C)

Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	1646.000	51.34	-19.77	31.57	74.00	42.43	peak	100	236	P	
2	2496.000	49.14	-12.57	36.57	74.00	37.43	peak	200	68	P	
3	3958.000	48.17	-8.63	39.54	74.00	34.46	peak	100	201	P	
4	6287.000	46.73	-5.00	41.73	74.00	32.27	peak	100	307	P	
5	9721.000	45.57	-0.04	45.53	74.00	28.47	peak	100	21	P	
6	13903.000	45.07	4.48	49.55	74.00	24.45	peak	100	259	P	

CH50

Vertical



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Radiated Emission Measurement

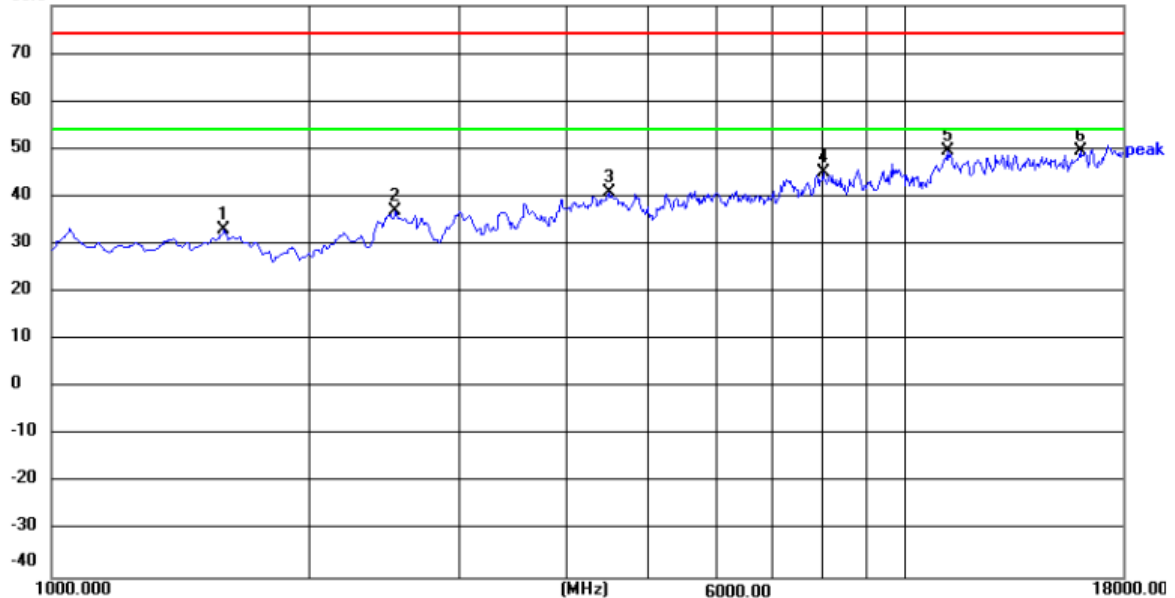
File :RF2

Data :#10245

Date: 2026/08/05

Time: 18:18:37

80.0 dBuV/m



Site LAB Chamber 1

Limit: FCC PART 15C ABOVE 1GHz PK

EUT:

M/N:

Mode: 927.25MHz

Note: CTL2607152031-WF

Polarization: **Vertical**

Power:

Distance: 3m

Temperature: 25(C)

Humidity: 50 %

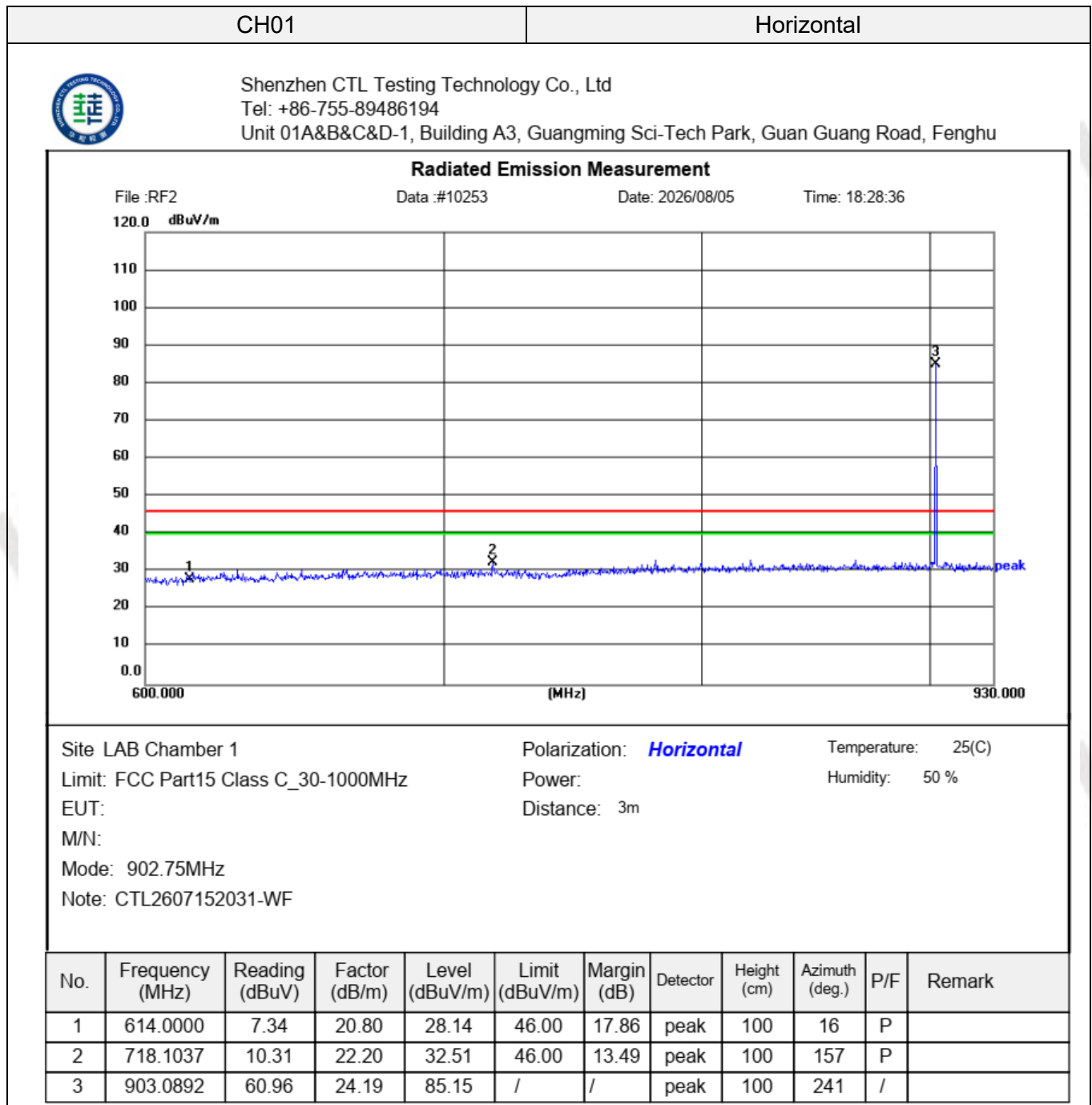
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	1595.000	52.87	-19.93	32.94	74.00	41.06	peak	100	137	P	
2	2530.000	50.41	-13.33	37.08	74.00	36.92	peak	200	315	P	
3	4502.000	47.03	-6.27	40.76	74.00	33.24	peak	100	327	P	
4	8021.000	47.46	-2.37	45.09	74.00	28.91	peak	100	184	P	
5	11217.000	47.50	2.10	49.60	74.00	24.40	peak	100	125	P	
6	16045.000	45.18	4.24	49.42	74.00	24.58	peak	100	220	P	

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
5. Other emissions are attenuated 20dB below the limits from 9kHz to 30MHz, so it does not recorded in report.
6. 18GHz-26GHz not recorded for no spurious point have a margin of less than 20 dB with respect to the limits
7. While performing the testing, the notch filter is used for avoiding test instrument overload.

Results of Band Edges Test (Radiated)

The EUT has a total of 16 antenna ports, and there are two different types of antennas. We tested all the antenna ports and data of both types of antennas, and only retained the worst mode data, which is antenna port 1 and the 12dbi antenna.



CH01

Vertical



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Radiated Emission Measurement

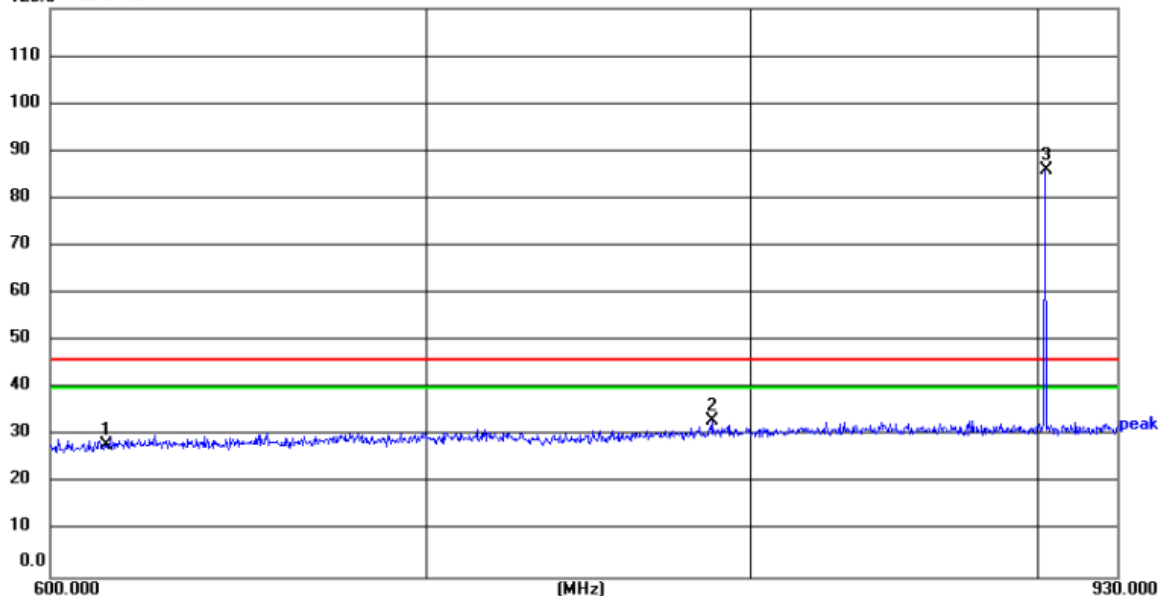
File :RF2

Data :#10254

Date: 2026/08/05

Time: 18:29:22

120.0 dBuV/m



Site LAB Chamber 1

Limit: FCC Part15 Class C_30-1000MHz

EUT:

M/N:

Mode: 902.75MHz

Note: CTL2607152031-WF

Polarization: **Vertical**

Power:

Distance: 3m

Temperature: 25(C)

Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	614.0000	7.12	20.80	27.92	46.00	18.08	peak	100	312	P	
2	787.3301	9.78	23.47	33.25	46.00	12.75	peak	100	158	P	
3	903.0893	61.74	24.19	85.93	/	/	peak	100	166	/	

CH50

Horizontal



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Radiated Emission Measurement

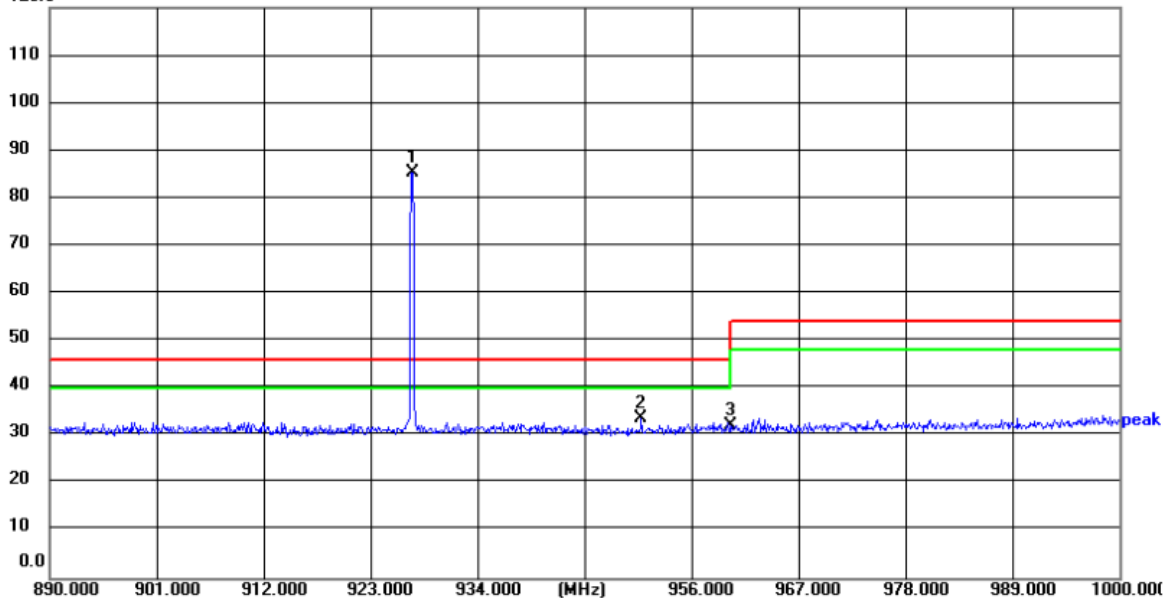
File :RF2

Data :#10251

Date: 2026/08/05

Time: 18:34:12

120.0 dBuV/m



Site LAB Chamber 1

Limit: FCC Part15 Class C_30-1000MHz

EUT:

M/N:

Mode: 927.25MHz

Note: CTL2607152031-WF

Polarization: **Horizontal**

Power:

Distance: 3m

Temperature: 25(C)

Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	927.2900	60.75	24.59	85.34	/	/	peak	100	276	/	
2	950.8300	9.12	24.62	33.74	46.00	12.26	peak	100	179	P	
3	960.0000	7.44	24.95	32.39	46.00	13.61	peak	100	130	P	

CH50

Vertical



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Radiated Emission Measurement

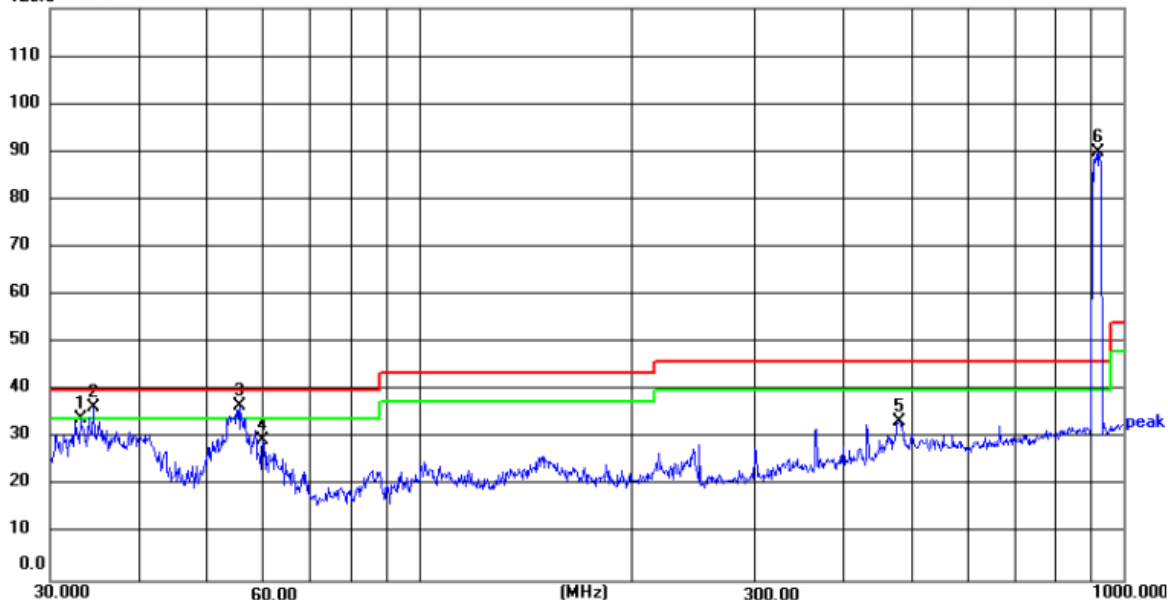
File :RF2

Data :#10108

Date: 2026/08/03

Time: 19:31:53

120.0 dBuV/m



Site LAB Chamber 1

Limit: FCC Part15 Class C_30-1000MHz

EUT:

M/N:

Mode: 902.75MHz

Note: CTL2607152031-WF

Polarization: **Vertical**

Temperature: 25(C)

Power:

Humidity: 50 %

Distance: 3m

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	33.0950	15.03	19.10	34.13	40.00	5.87	peak	100	275	P	
2	34.5173	17.97	18.38	36.35	40.00	3.65	peak	100	295	P	
3	55.8047	27.31	9.30	36.61	40.00	3.39	peak	100	116	P	
4	60.0691	19.69	9.80	29.49	40.00	10.51	peak	100	86	P	
5	480.5276	13.66	19.90	33.56	46.00	12.44	peak	100	66	P	
6	922.5157	65.46	24.44	89.90	/	/	peak	100	344	/	

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.

3.3. Maximum Peak Output Power

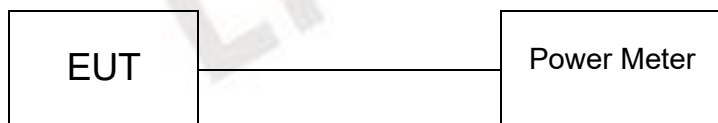
Limit

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power measurement module.

Test Configuration



Test Results

Raw data reference to Section 2 from CTL2607152031-WF Annex for 9dBi RFID.

Raw data reference to Section 2 from CTL2607152031-WF Annex for 12dBi RFID.

3.4. 20dB Bandwidth

Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the averagetime of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Procedure

The steps for the first option are as follows:

Set RBW = shall be in the range of 1% to 5% of the OBW

Set the VBW $\geq [3 \times \text{RBW}]$.

Detector = peak.

Trace mode = max-hold.

Sweep = No faster than coupled (auto) time.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Configuration



Test Results

Raw data reference to Section 1 from CTL2607152031-WF Annex for 9dBi RFID.

Raw data reference to Section 1 from CTL2607152031-WF Annex for 12dBi RFID.

3.5. Frequency Separation

LIMIT

According to 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the $2/3 \times 20\text{dB}$ bandwidth of the hopping channel, whichever is greater.

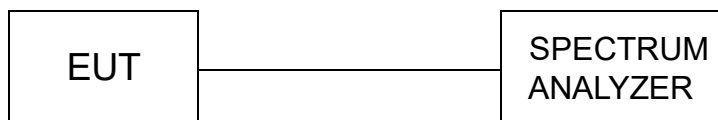
TEST PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a) Span: Wide enough to capture the peaks of two adjacent channels.
- b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- c) Video (or average) bandwidth (VBW) $\geq$ RBW.
- d) Sweep: No faster than coupled (auto) time.
- e) Detector function: Peak.
- f) Trace: Max-hold.
- g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

TEST CONFIGURATION



TEST RESULTS

Raw data reference to Section 3 from CTL2607152031-WF Annex for 9dBi RFID.
Raw data reference to Section 3 from CTL2607152031-WF Annex for 12dBi RFID.

3.6. Number of hopping frequency

Limit

FCC §15.247 (a)(1)(i)

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a) Span: The frequency band of operation. Depending on the number of channels the device supports, it could be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- c) VBW $\geq$ RBW.
- d) Sweep: No faster than coupled (auto) time.
- e) Detector function: Peak.
- f) Trace: Max-hold.
- g) Allow the trace to stabilize.

Test Configuration



Test Results

Raw data reference to Section 4 from CTL2607152031-WF Annex for 9dBi RFID.

Raw data reference to Section 4 from CTL2607152031-WF Annex for 12dBi RFID.

3.7. Time of Occupancy (Dwell Time)

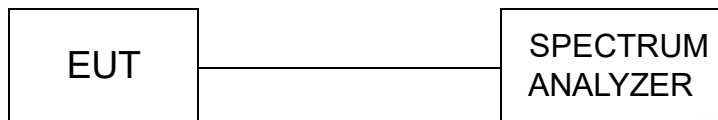
Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the averagetime of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with 1MHz RBW and 1MHz VBW, Span 0Hz.

Test Configuration



Test Results

Raw data reference to Section 5 from CTL2607152031-WF Annex for 9dBi RFID.
Raw data reference to Section 5 from CTL2607152031-WF Annex for 12dBi RFID.

3.8. Out-of-band Emissions

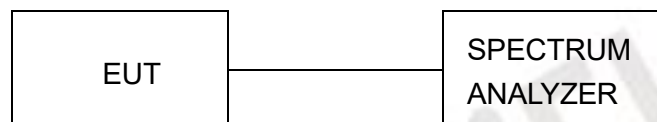
Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, band edge and out-of-band emissions.

Test Configuration



Test Results

Raw data reference to Section 6 from CTL2607152031-WF Annex for 9dBi RFID.

Raw data reference to Section 6 from CTL2607152031-WF Annex for 12dBi RFID.

3.9. Pseudorandom Frequency Hopping Sequence

TEST APPLICABLE

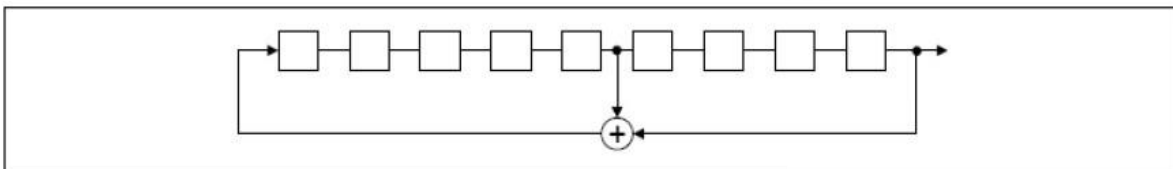
For 47 CFR Part 15C section 15.247 (a) (1) requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence Requirement

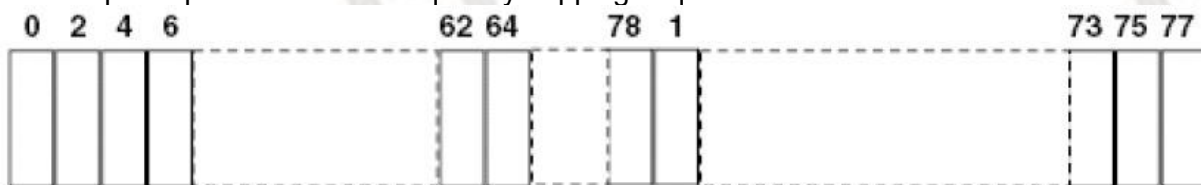
The pseudorandom frequency hopping sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages:9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros:8(non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of pseudorandom frequency hopping sequence as follows:



Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

3.10. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

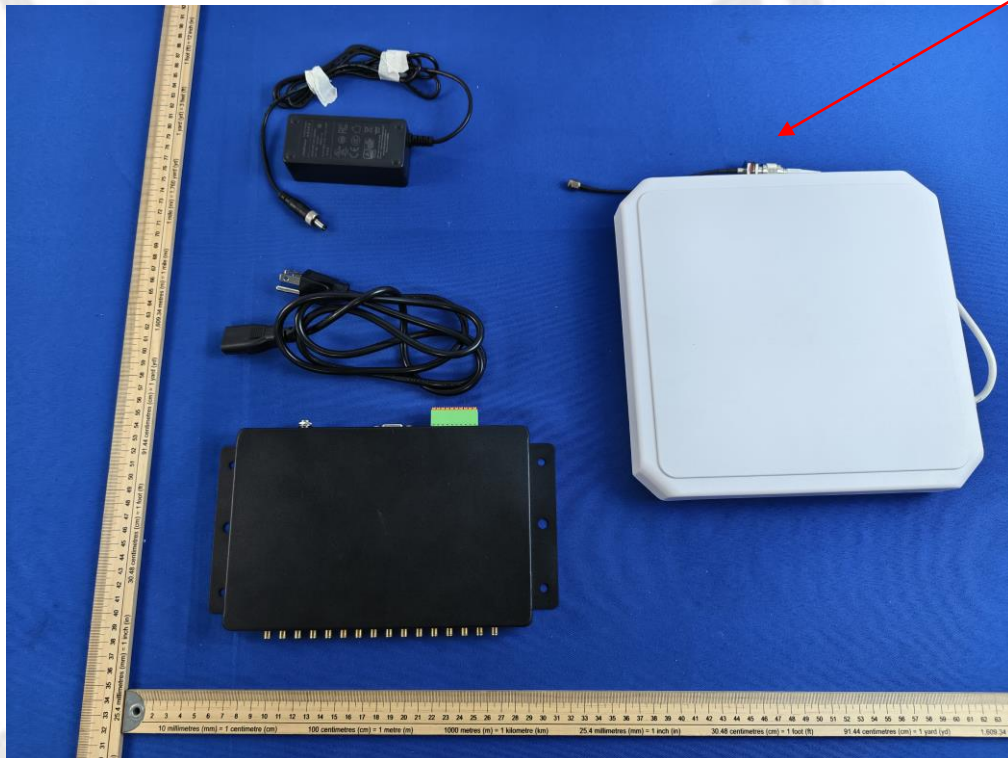
Antenna Connected Construction

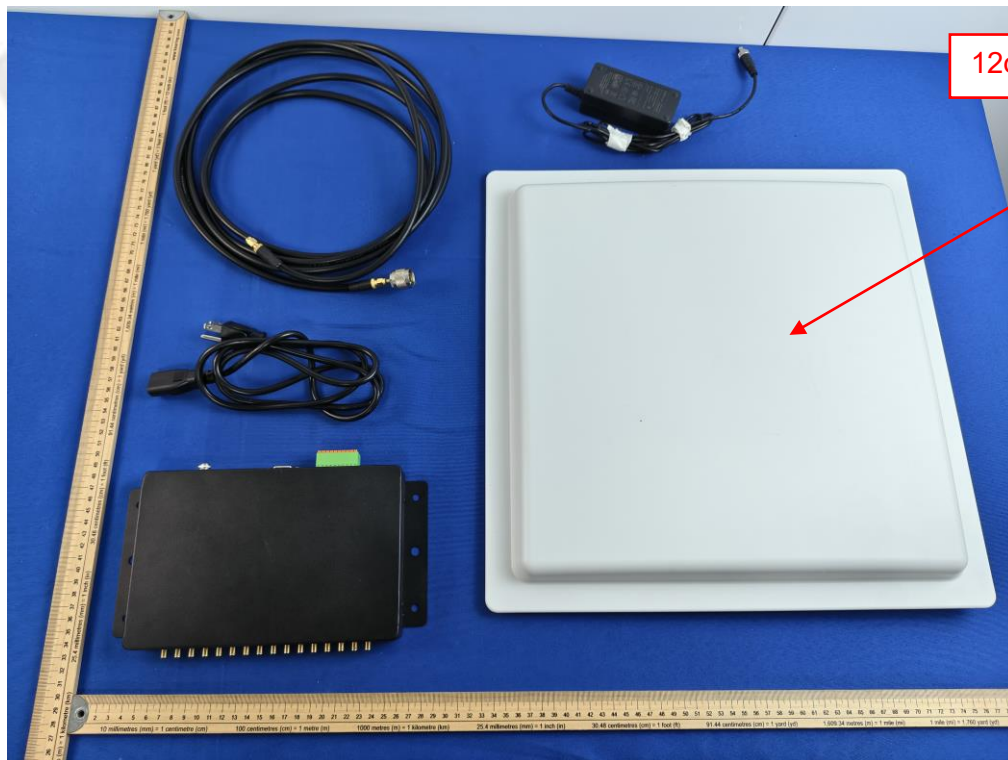
The maximum gain of antenna was 9dBi&12 dBi

PSD Limit=10-(9-6)=7

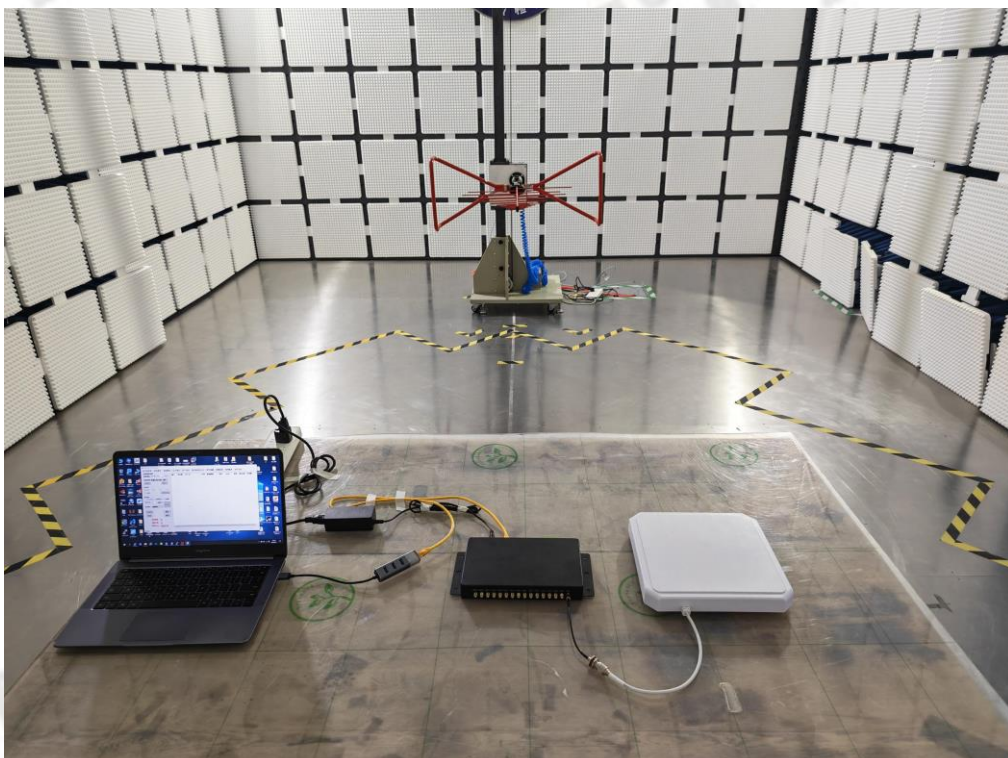
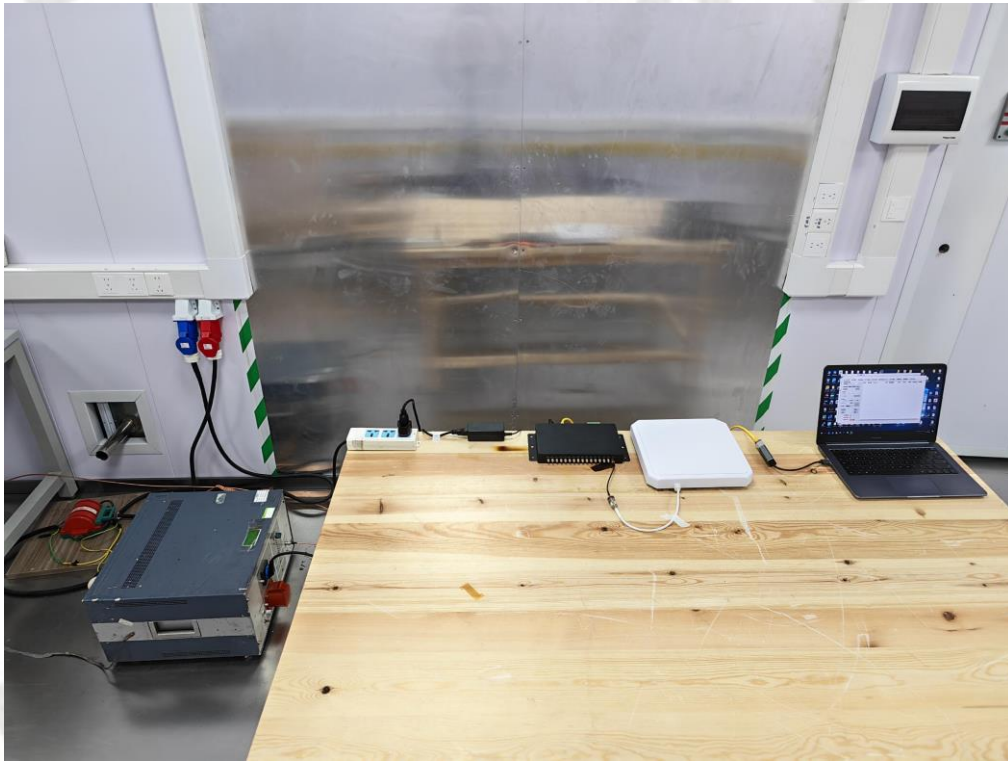
PSD Limit=10-(12-6)=4

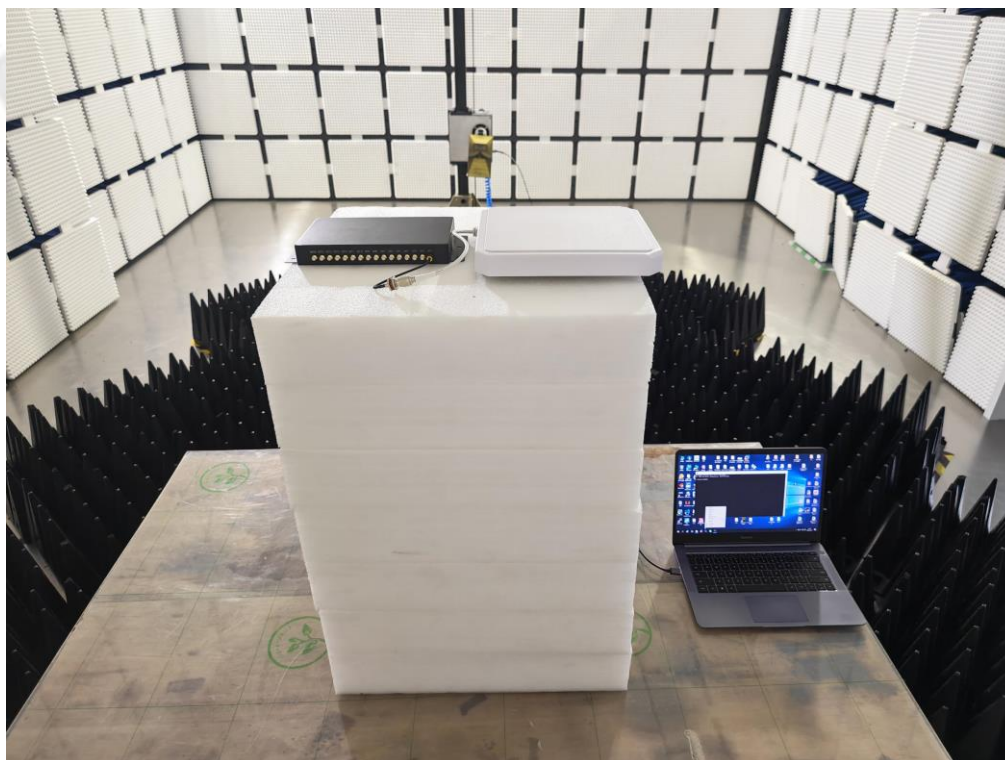
9dBi antenna

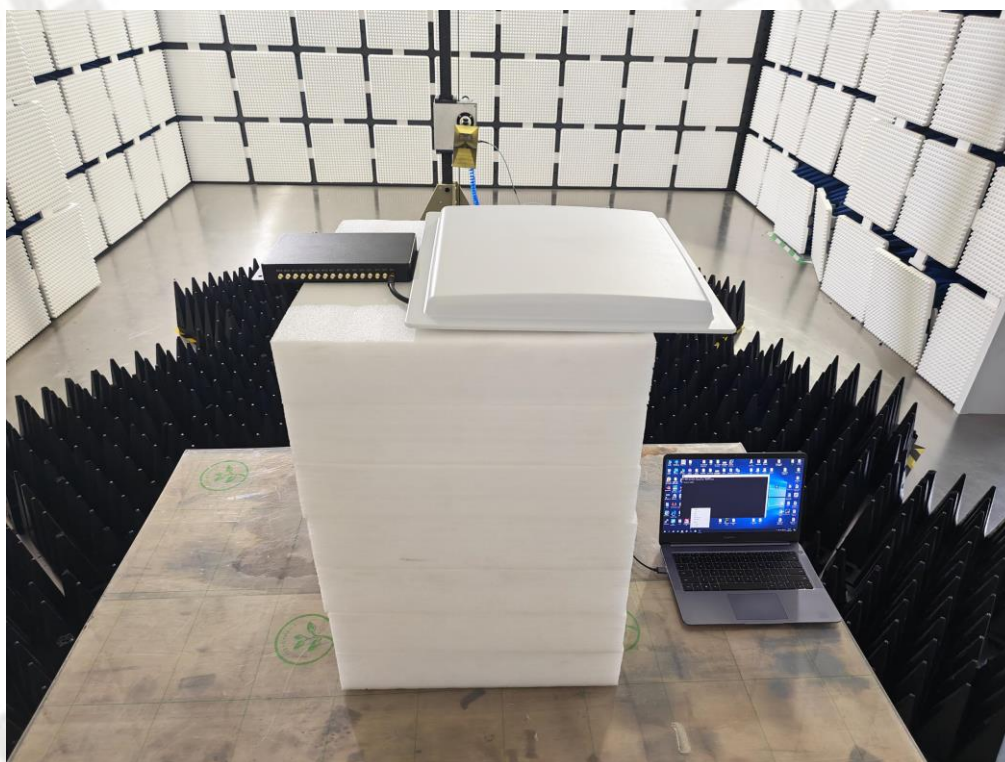
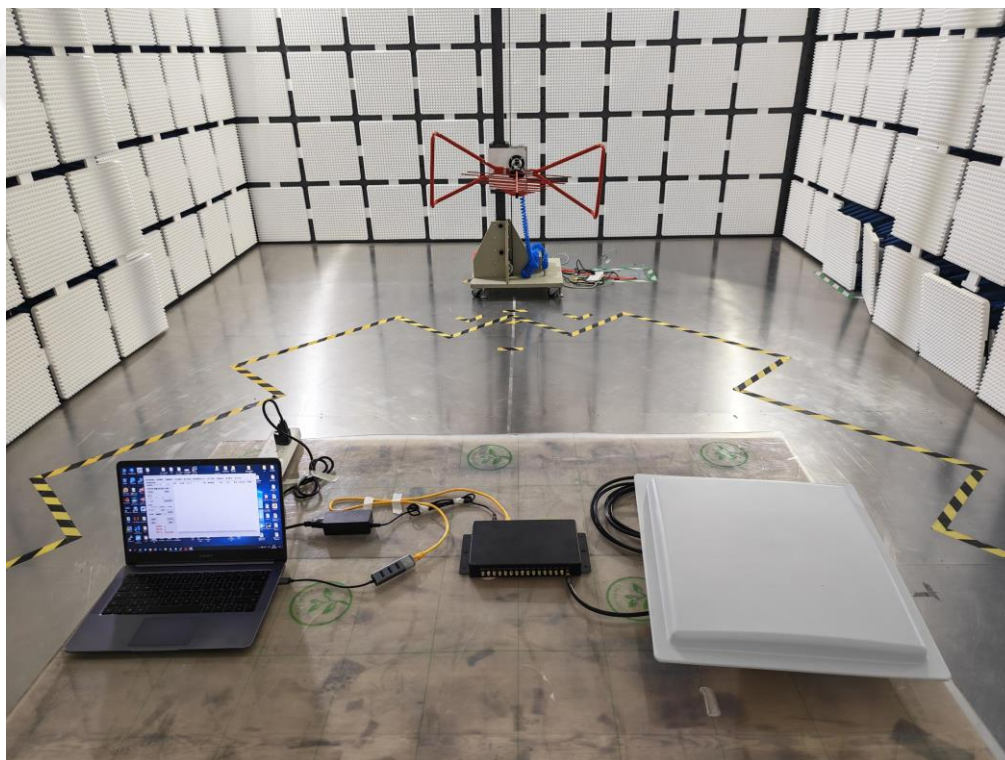


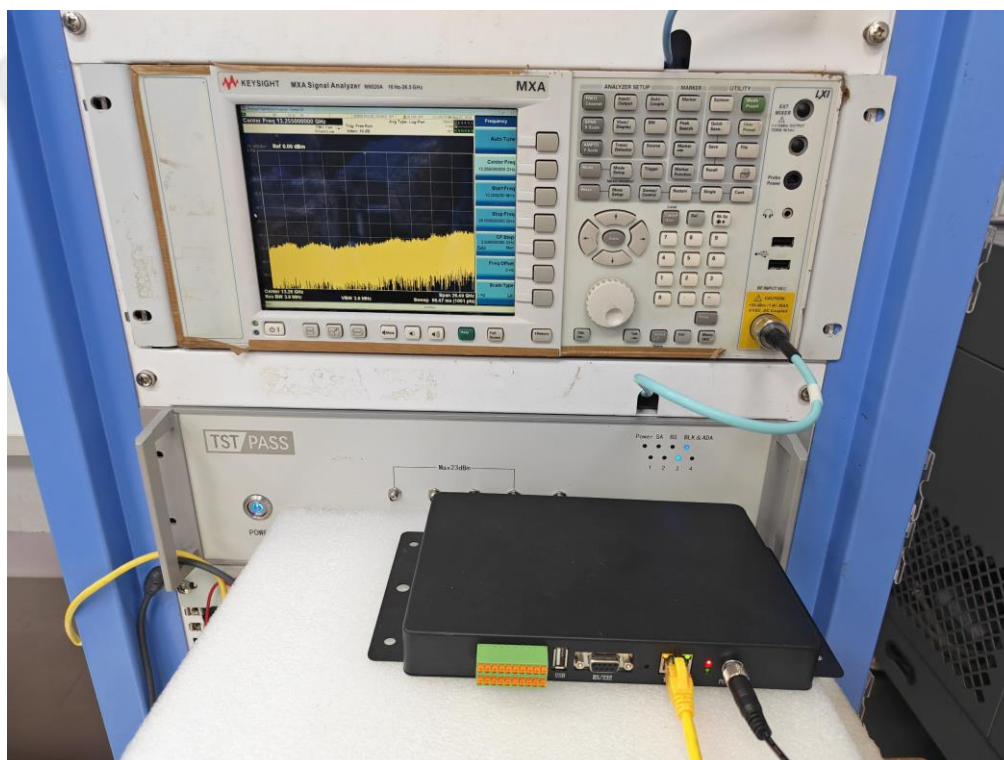


4. Test Setup Photos of the EUT



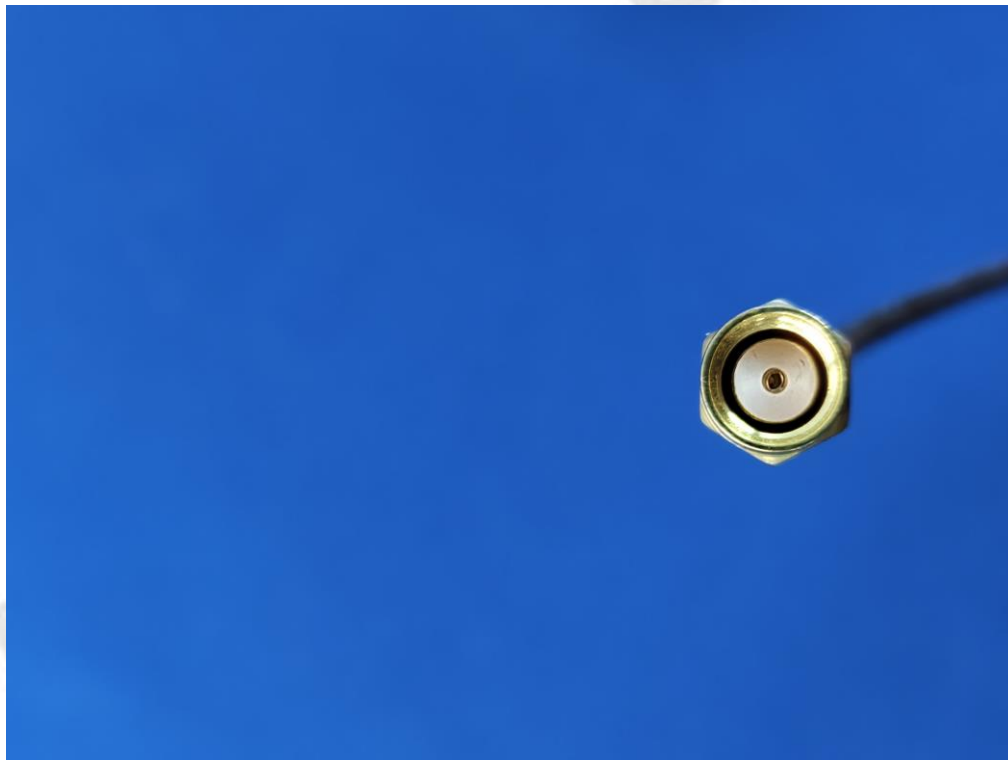


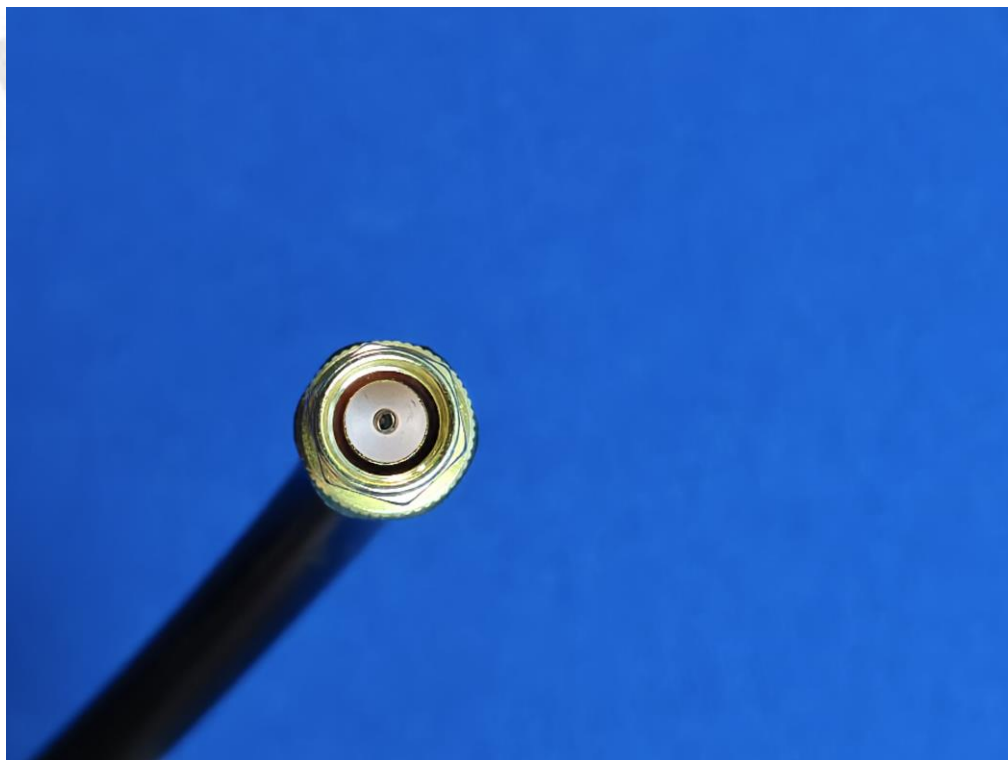


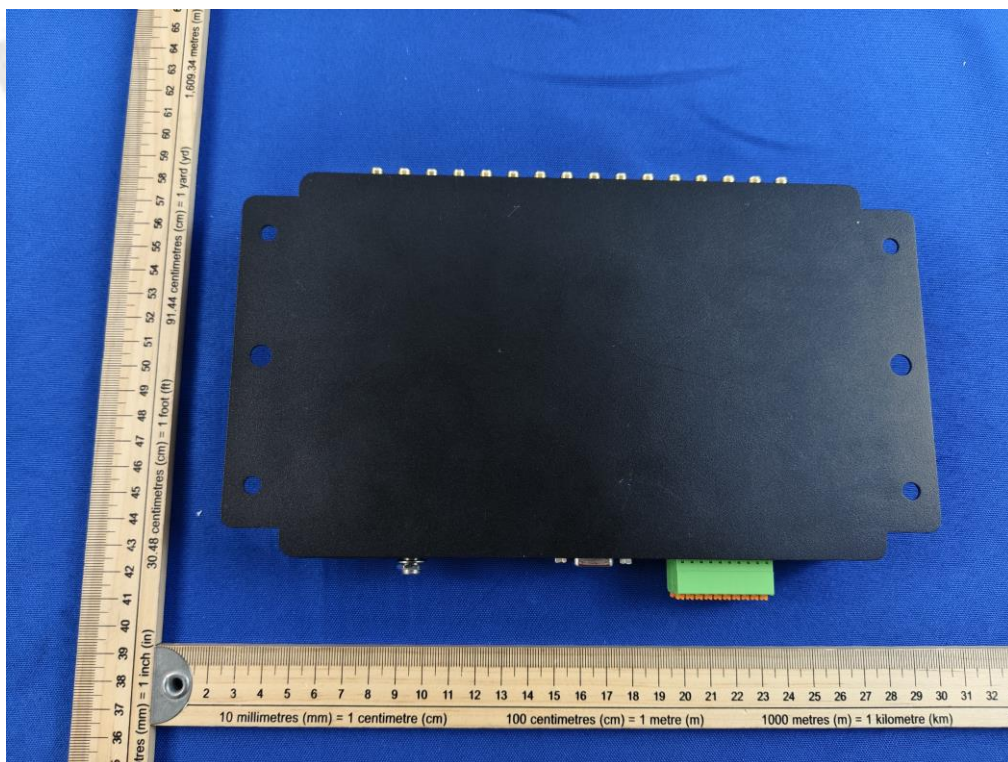
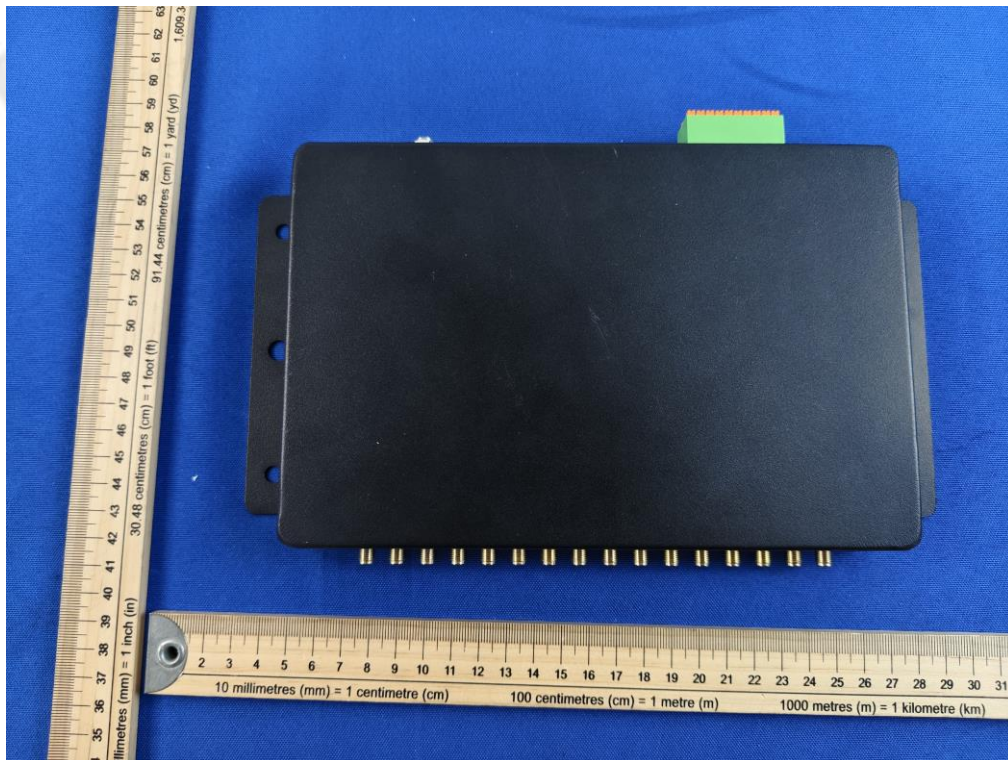


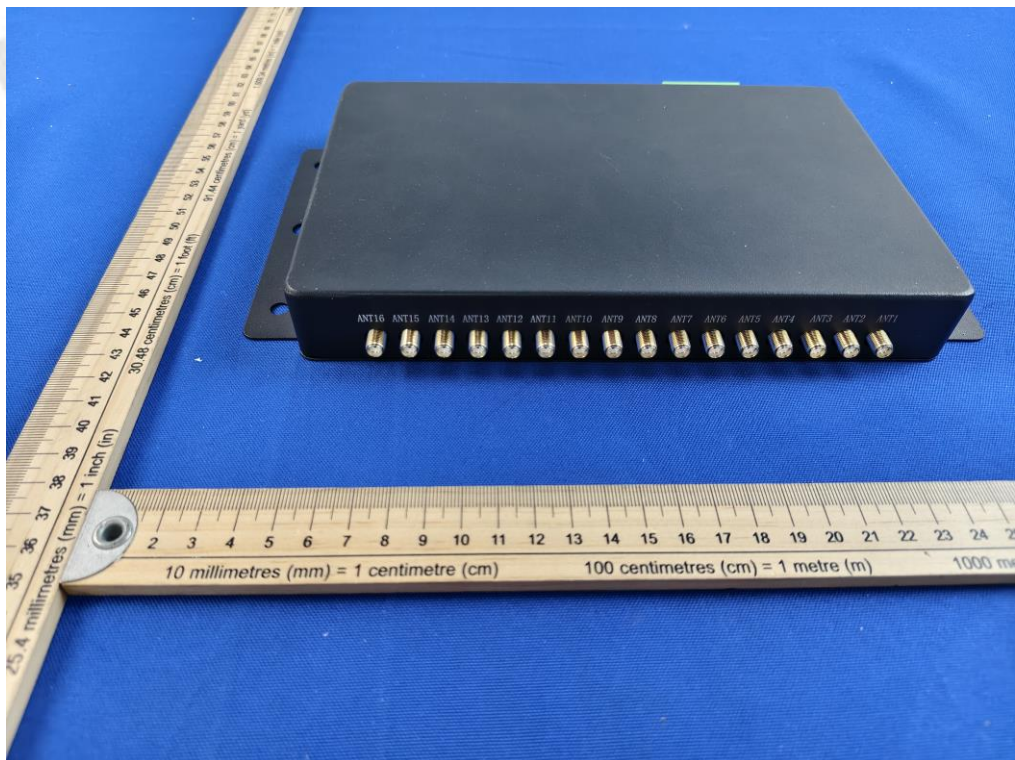
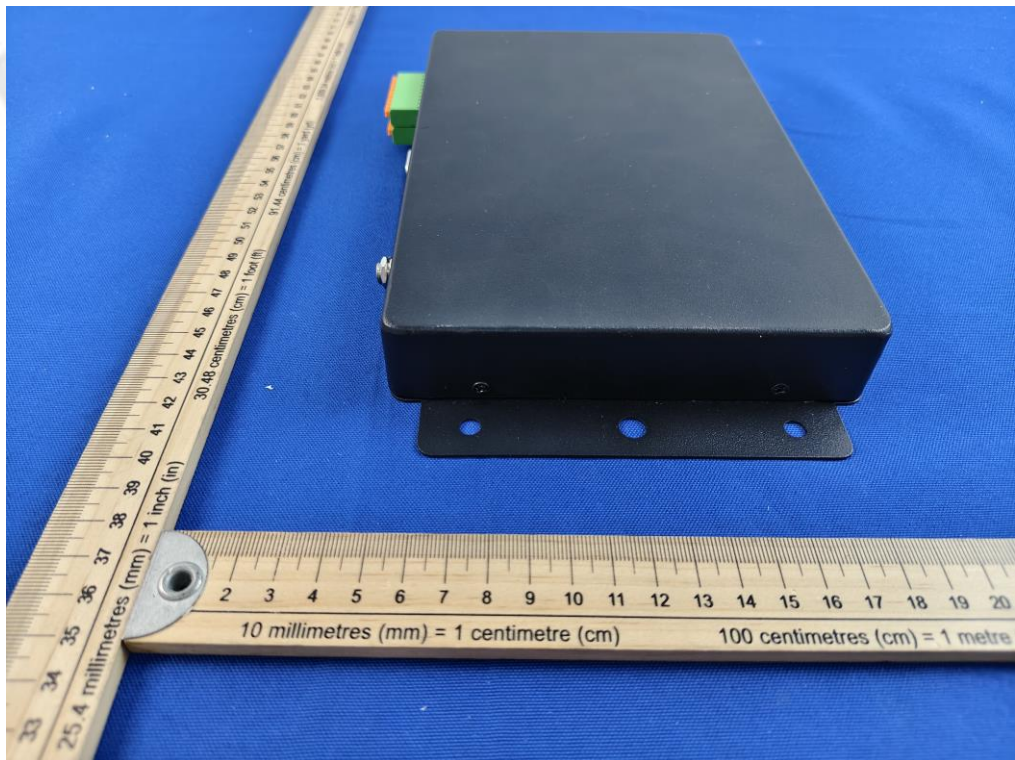
5. Photos of the EUT

External photo



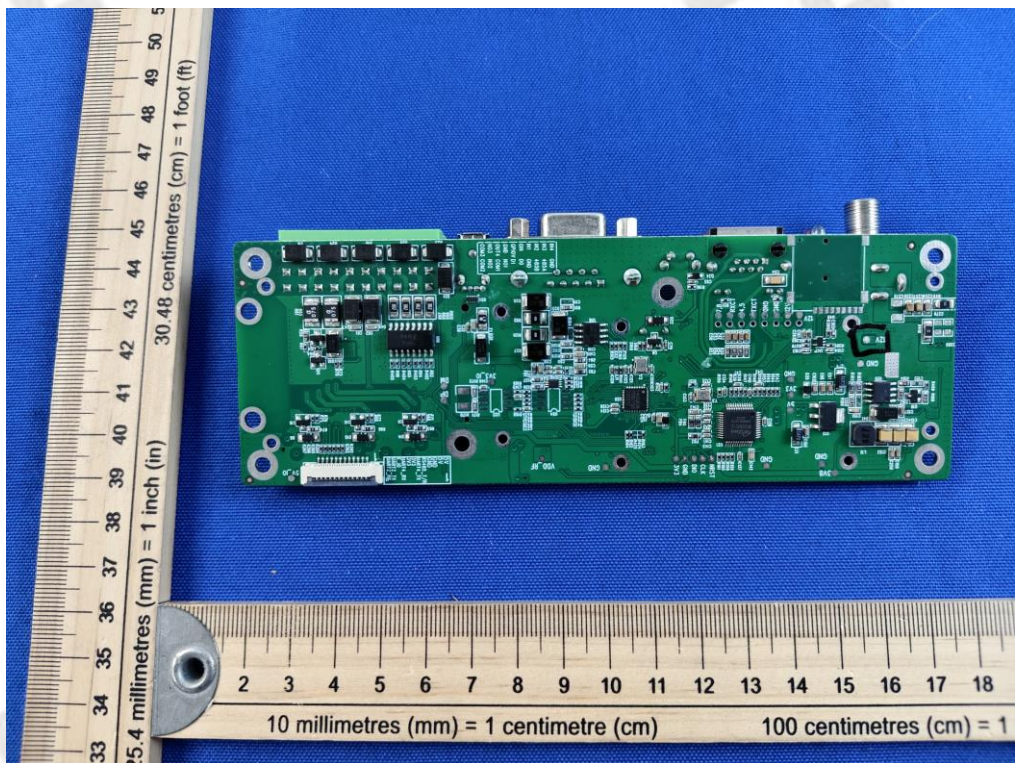
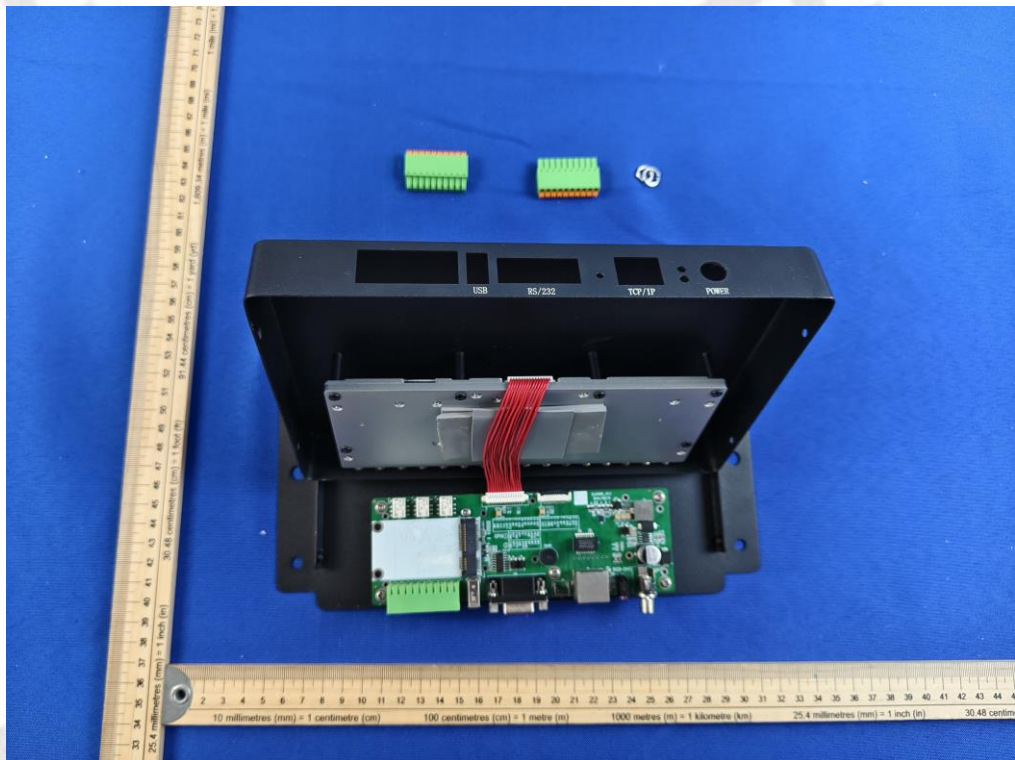


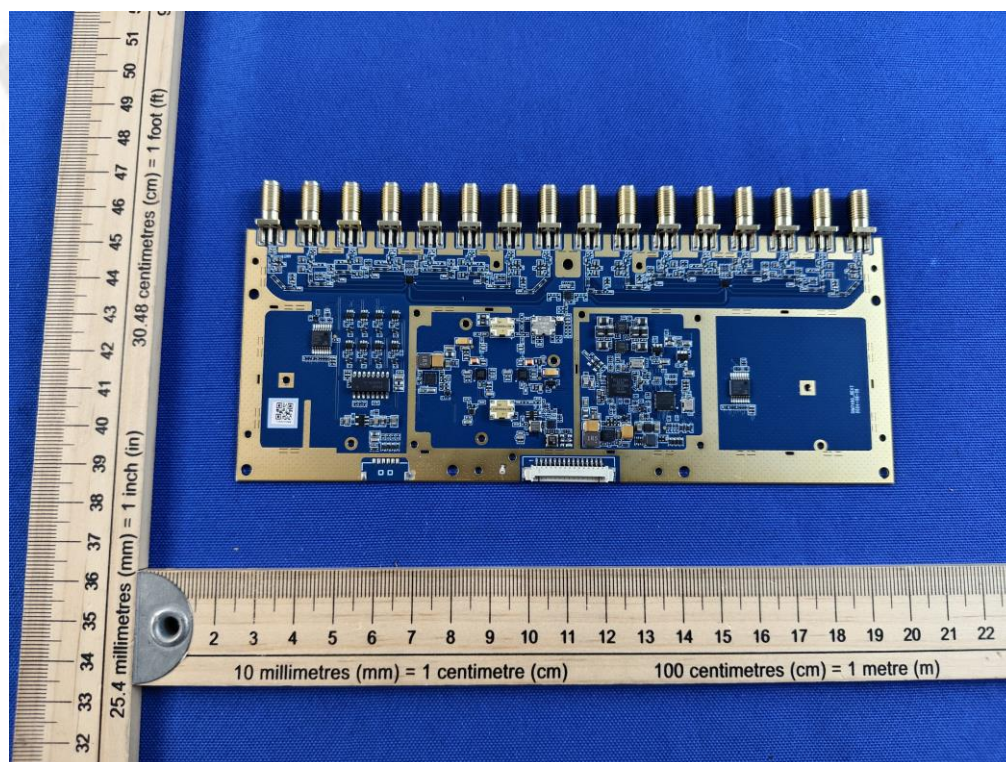
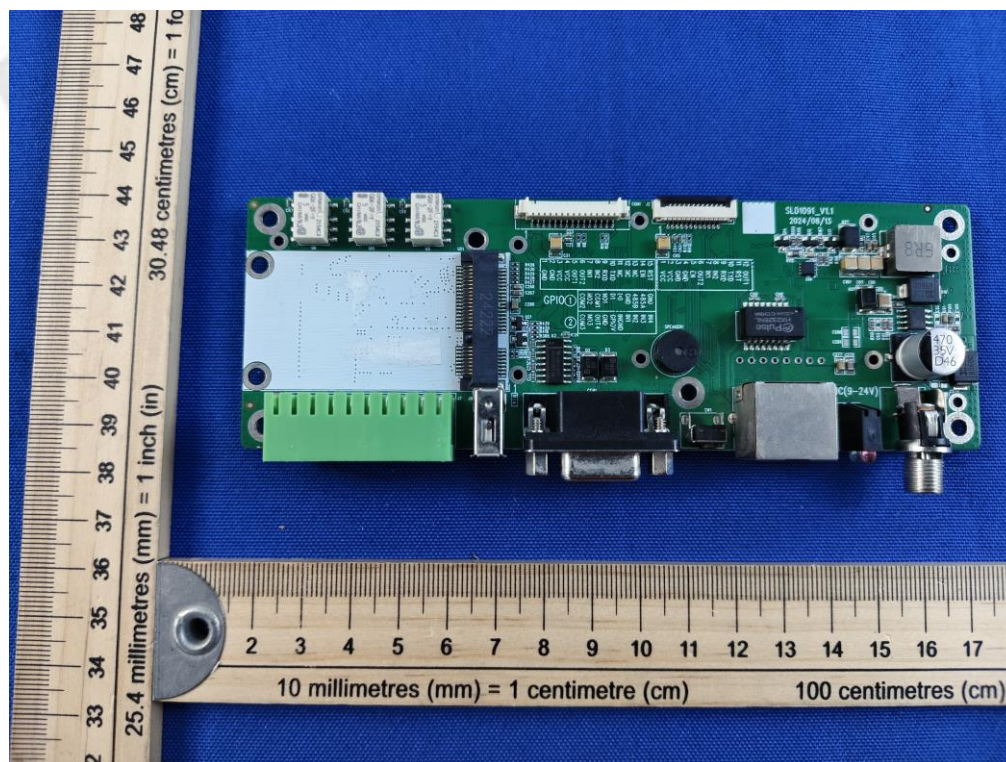


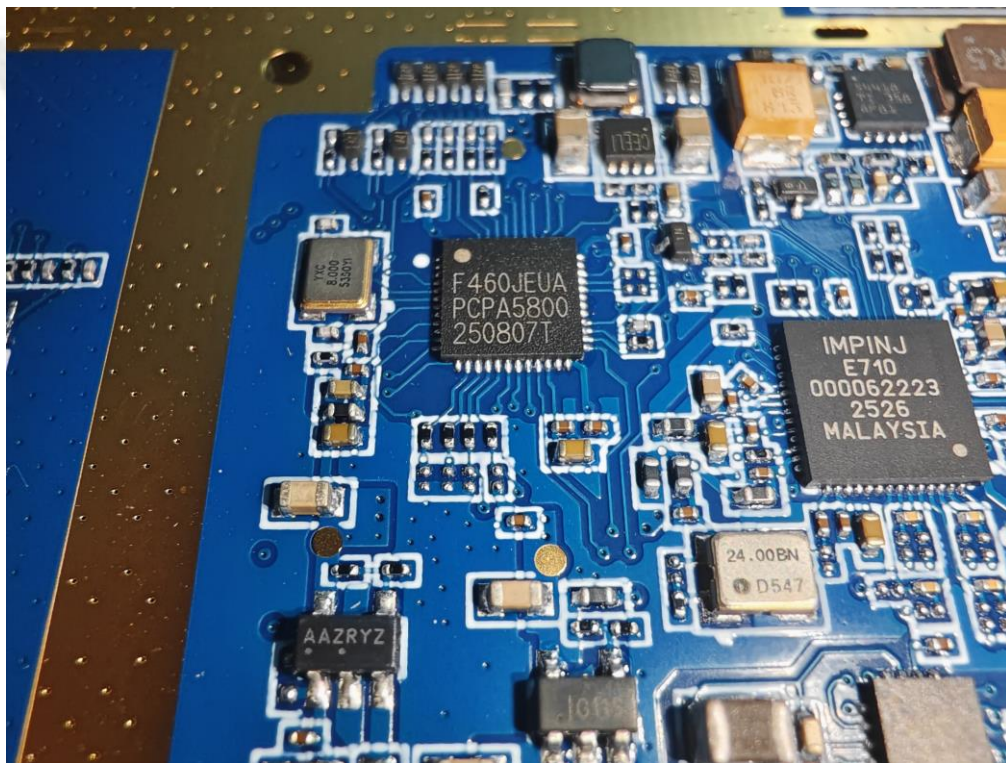
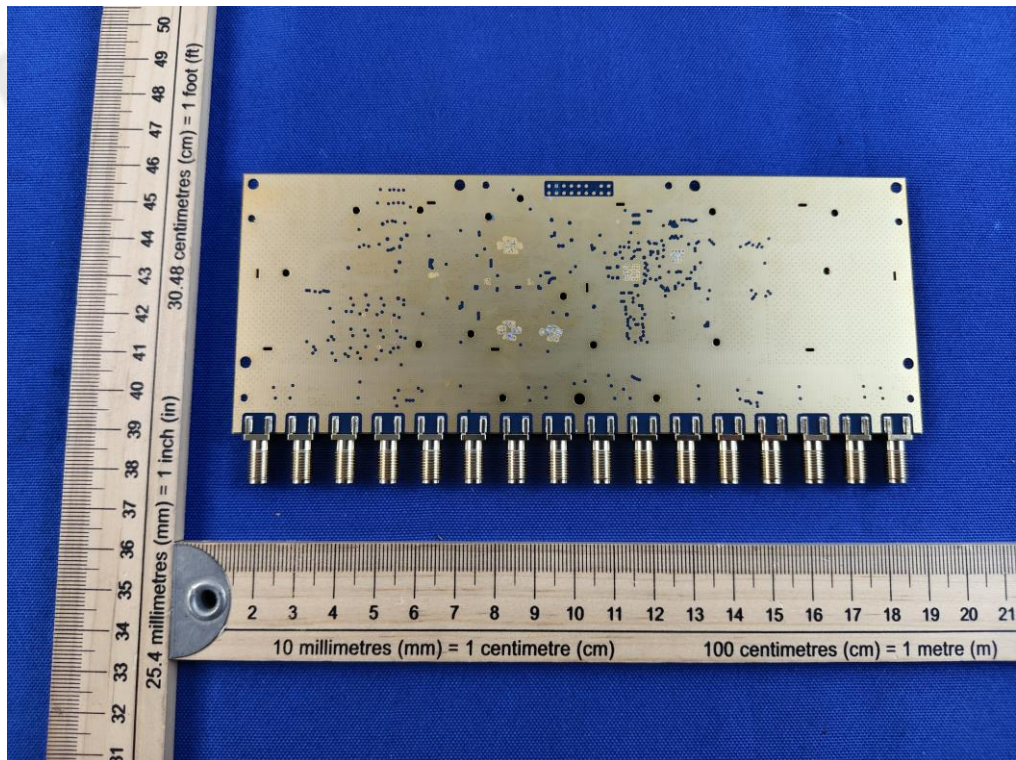




Interior photo







***** End of Report *****