



# FCC Part 15C Test Report

## FCC ID: 2A5SN-TC196

Applicant: Hangzhou Sanford Technology Co., Ltd

Address: 2853 Yuhangtang Rd., Building 1 Room 1203, Hangzhou, 311121, China

Manufacturer: Zhejiang Sanford Intelligent Gate Control System Co., Ltd.

Address: 889 Huanchengbei Rd., Building 40, Deqing County, Huzhou, 313205, China

EUT: Tuya WiFi Remote Control

Trade Mark: TOPENS

Model Number: TC196  
LM196R

Date of Receipt: Aug. 14, 2024

Test Date: Aug. 14, 2024 - Sep. 06, 2024

Date of Report: Sep. 06, 2024

Prepared By: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

Applicable Standards: FCC PART 15 C 15.231  
ANSI C63.10:2013

Test Result: Pass

Report Number: DL-240814018-2ER

Prepared (Test Engineer): Dimon Tan

Reviewer (Supervisor): Jack Bu

Approved (Manager): Jade Yang



*This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.*



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## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.231) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.209,15.231b	Fundamental &Radiated Spurious Emission Measurement	PASS	
15.231a	Transmission cease time	PASS	
15.215	20dB Bandwidth	PASS	
15.203	Antenna Requirement	PASS	

### NOTE:

(1)" N/A " denotes test is not applicable in this Test Report

Test lab: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

FCC Test Firm Registration Number: 854456

Designation Number: CN1307

IC Registered No.: 27485

CAB ID.: CN0118

### 1.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 2.56\text{dB}$
2	RF power,conducted	$\pm 0.42\text{dB}$
3	Spurious emissions,conducted	$\pm 2.76\text{dB}$
4	All emissions,radiated(<1G)	$\pm 3.65\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$
8	-20dB Bandwidth	$\pm 0.2\text{MHz}$



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Tuya WiFi Remote Control
Trademark	TOPENS
Model No.:	TC196 LM196R
Model Difference	The product's different for model number and appearance color.
Operation Frequency:	433.92MHz
Channel numbers:	1 Channels
Modulation technology:	ASK
Antenna Type:	Glue stick antenna
Antenna gain:	0.52dBi
Power supply:	DC 12V from adapter
Adapter:	MODEL: QZT-1201000 INPUT: 100-240V~50/60Hz 0.3A 15W OUTPUT: 12V---1000mA

Note:

- 1.For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.The EUT's all information provided by client.

### 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

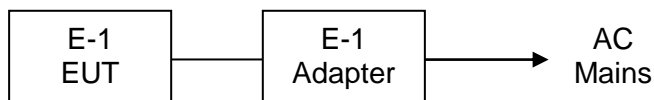
Pretest Mode	Description
Mode 1	TX Mode
<b>For Conducted &amp; Radiated Emission</b>	
Final Test Mode	Description
Mode 1	TX Mode

Note:

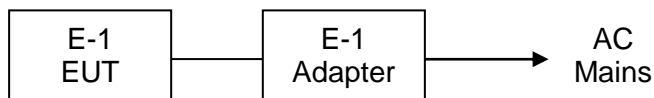


## 2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

### Radiated Spurious Emission Test



### Conducted Emission Test



## 2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Model/Type No.	Series No.	Note
E-1	Tuya WiFi Remote Control	TC196	N/A	EUT
E-1	Adapter	QZT-1201000	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

## 2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

None.



## 2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

### Radiation test, Band-edge test and 20db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4408B	MY50140780	Nov. 04, 2023	Nov. 03, 2024
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 04, 2023	Nov. 03, 2024
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 04, 2023	Nov. 03, 2024
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 04, 2023	Nov. 03, 2024
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 04, 2023	Nov. 03, 2024
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 04, 2023	Nov. 03, 2024
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 04, 2023	Nov. 03, 2024
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 04, 2023	Nov. 03, 2024
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 04, 2023	Nov. 03, 2024
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 04, 2023	Nov. 03, 2024
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 04, 2023	Nov. 03, 2024
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 04, 2023	Nov. 03, 2024
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 04, 2023	Nov. 03, 2024
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 04, 2023	Nov. 03, 2024
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 04, 2023	Nov. 03, 2024
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 04, 2023	Nov. 03, 2024

### Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	YIHENG	843 Room	843	Nov. 05, 2023	Nov.04, 2026
2	EMI Receiver	R&S	ESR	101421	Nov. 04, 2023	Nov. 03, 2024
3	LISN	R&S	ENV216	102417	Nov. 04, 2023	Nov. 03, 2024
4	843 Cable 1#	ChengYu	CE Cable	001	Nov. 04, 2023	Nov. 03, 2024

### Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMCC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMCC	FA-03A2
3	RF test system	MAIWEI	MTS8310	2.0.0.0
4	RF communication test system	MAIWEI	MTS8200	2.0.0.0



### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

##### 3.1.2 TEST PROCEDURE

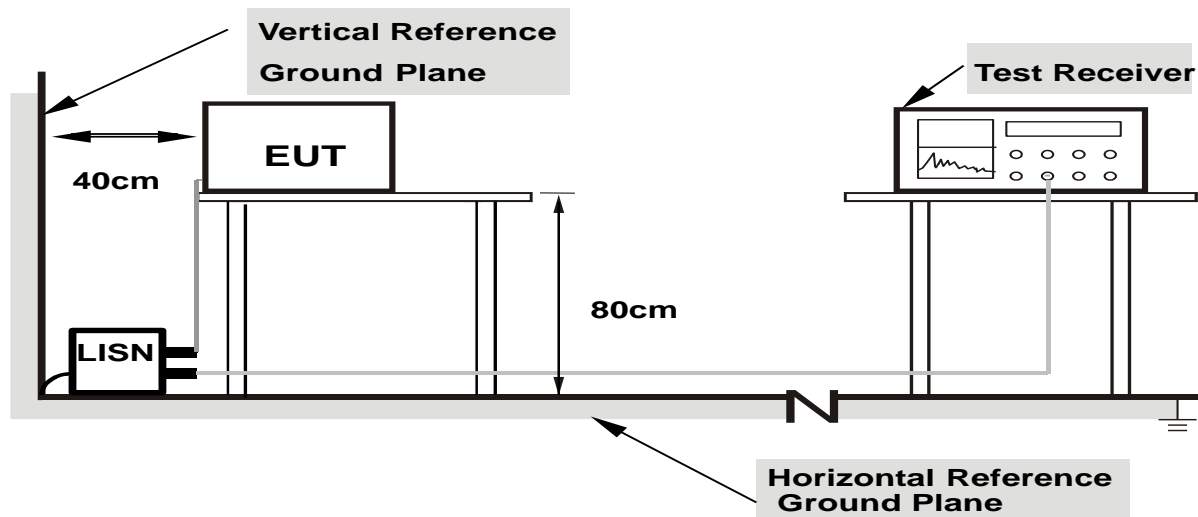
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

##### 3.1.3 DEVIATION FROM TEST STANDARD

No deviation



### 3.1.4 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

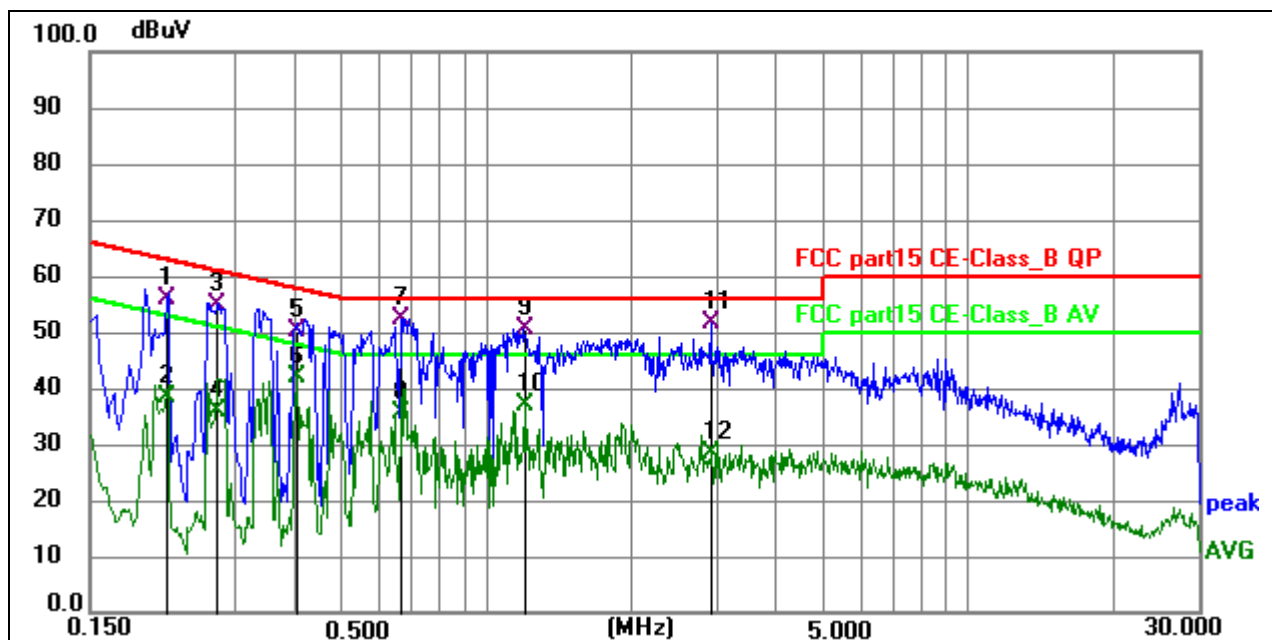
### 3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

### 3.1.6 TEST RESULTS



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1



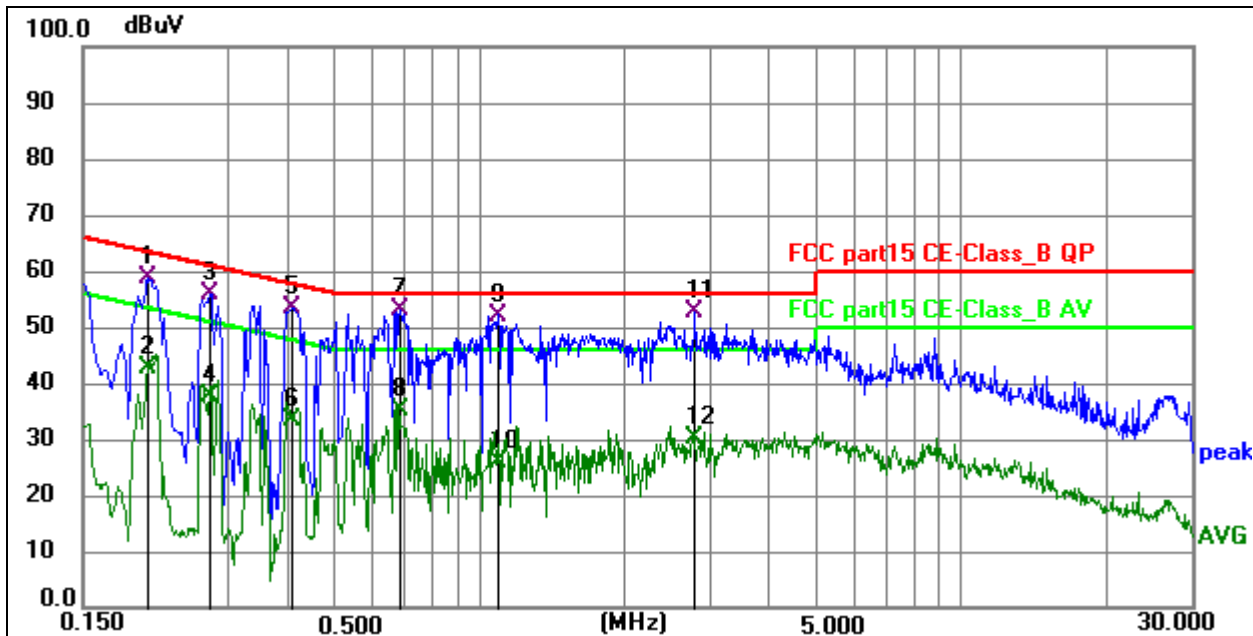
Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.2174	45.65	10.11	55.76	62.92	-7.16	QP	P
2	0.2174	28.31	10.11	38.42	52.92	-14.50	AVG	P
3	0.2760	44.82	10.18	55.00	60.94	-5.94	QP	P
4	0.2760	25.87	10.18	36.05	50.94	-14.89	AVG	P
5	0.4020	39.80	10.27	50.07	57.81	-7.74	QP	P
6	0.4020	31.56	10.27	41.83	47.81	-5.98	AVG	P
7 *	0.6673	42.33	10.11	52.44	56.00	-3.56	QP	P
8	0.6673	25.56	10.11	35.67	46.00	-10.33	AVG	P
9	1.1983	40.38	10.05	50.43	56.00	-5.57	QP	P
10	1.1983	26.86	10.05	36.91	46.00	-9.09	AVG	P
11	2.9219	41.40	10.12	51.52	56.00	-4.48	QP	P
12	2.9219	18.24	10.12	28.36	46.00	-17.64	AVG	P



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1



Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.2040	48.44	10.16	58.60	63.45	-4.85	QP	P
2	0.2040	32.60	10.16	42.76	53.45	-10.69	AVG	P
3	0.2760	45.64	10.20	55.84	60.94	-5.10	QP	P
4	0.2760	27.49	10.20	37.69	50.94	-13.25	AVG	P
5	0.4103	43.07	10.21	53.28	57.64	-4.36	QP	P
6	0.4103	23.15	10.21	33.36	47.64	-14.28	AVG	P
7 *	0.6854	42.85	10.13	52.98	56.00	-3.02	QP	P
8	0.6854	24.92	10.13	35.05	46.00	-10.95	AVG	P
9	1.0905	42.04	10.10	52.14	56.00	-3.86	QP	P
10	1.0905	15.92	10.10	26.02	46.00	-19.98	AVG	P
11	2.8050	42.47	10.08	52.55	56.00	-3.45	QP	P
12	2.8050	20.11	10.08	30.19	46.00	-15.81	AVG	P



### 3.2 RADIATED EMISSION MEASUREMENT

#### 3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency (MHz)	Field Strength (micровolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
40.66-40.70 MHz	2250	225
70-130 MHz	1250	125
130-174 MHz	1250-3750**	1250-375**
174-260 MHz	3750	375
260-470 MHz	3750-12500**	3750-1250**
Above 470 MHz	12500	1250

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz,  $\mu\text{V/m}$  at 3 meters =  $56.81818(F) - 6136.3636$ ; for the band 260-470 MHz,  $\mu\text{V/m}$  at 3 meters =  $41.6667(F) - 7083.3333$ . The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level ( $\mu\text{V/m}$ ).



Receiver setup:

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

### 3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre( Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

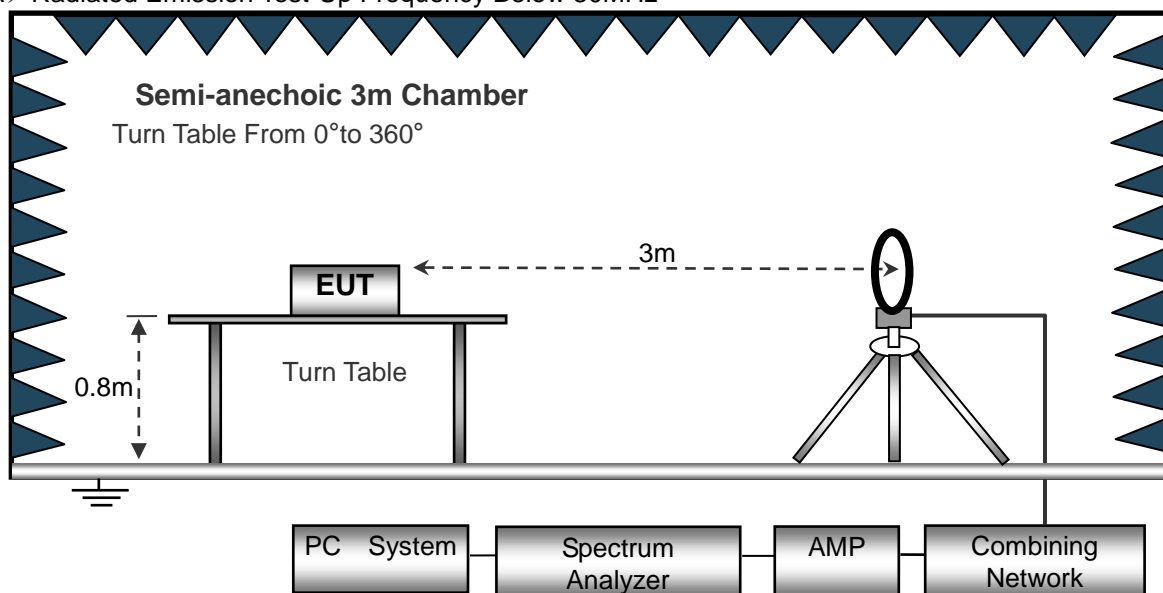
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 3.2.3 DEVIATION FROM TEST STANDARD

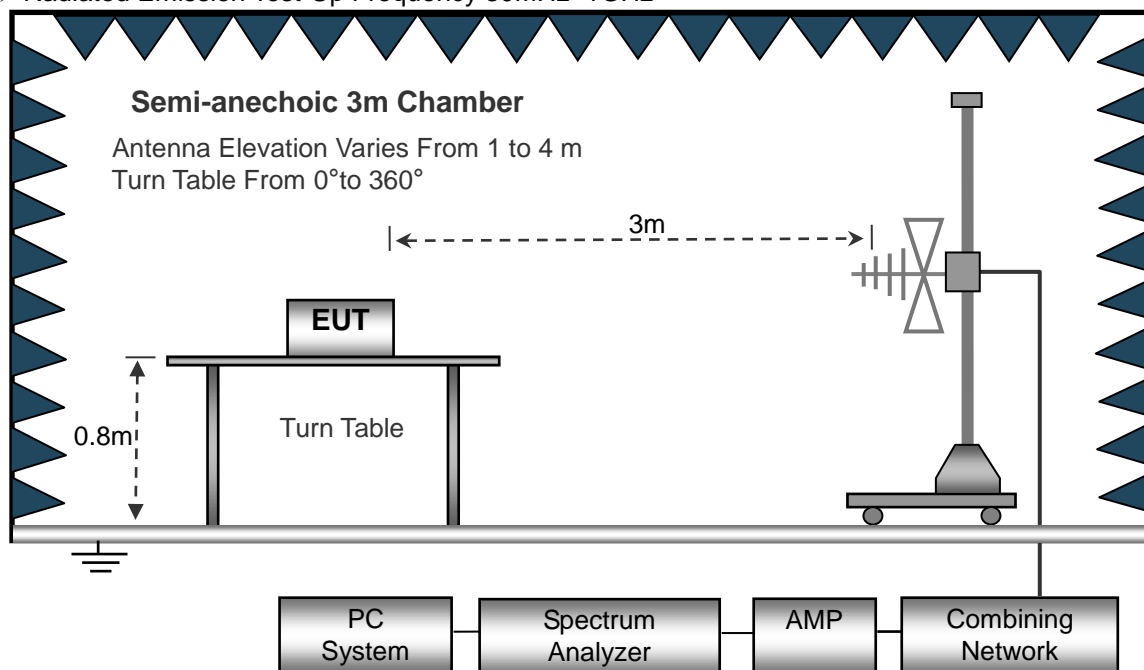
No deviation

### 3.2.4 TEST SETUP

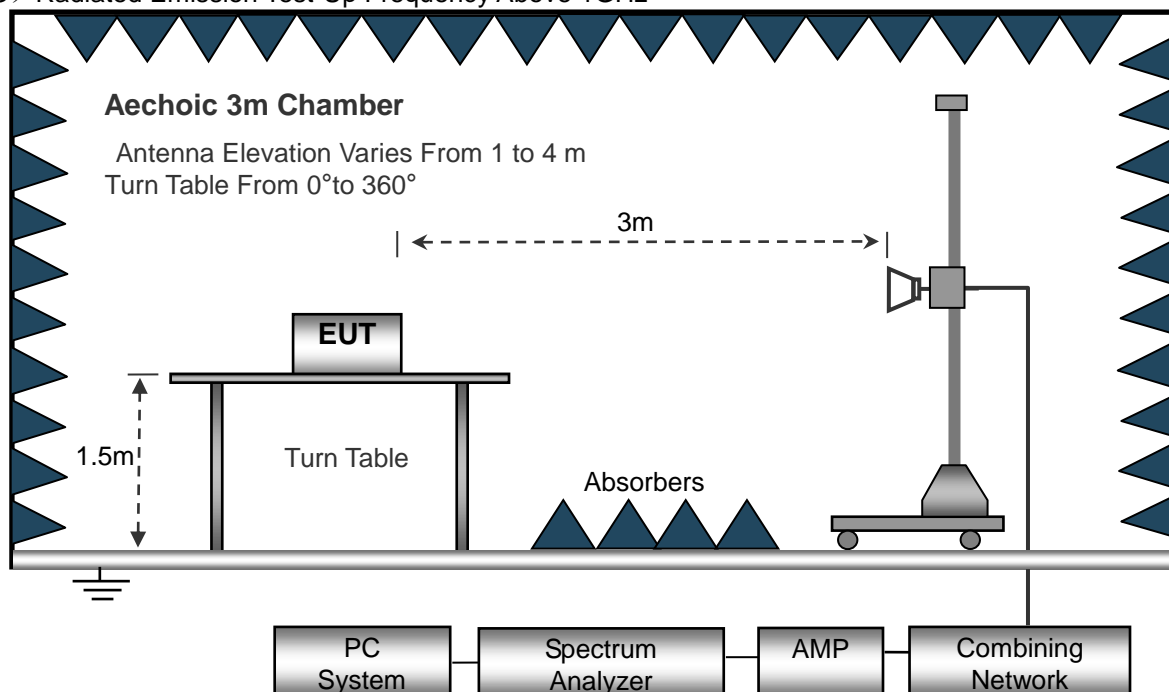
#### (A) Radiated Emission Test-Up Frequency Below 30MHz



#### (B) Radiated Emission Test-Up Frequency 30MHz~1GHz



### (C) Radiated Emission Test-Up Frequency Above 1GHz



### 3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)**

Temperature:	20°C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 12V
Test Mode :	Mode 1	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

**NOTE:**

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

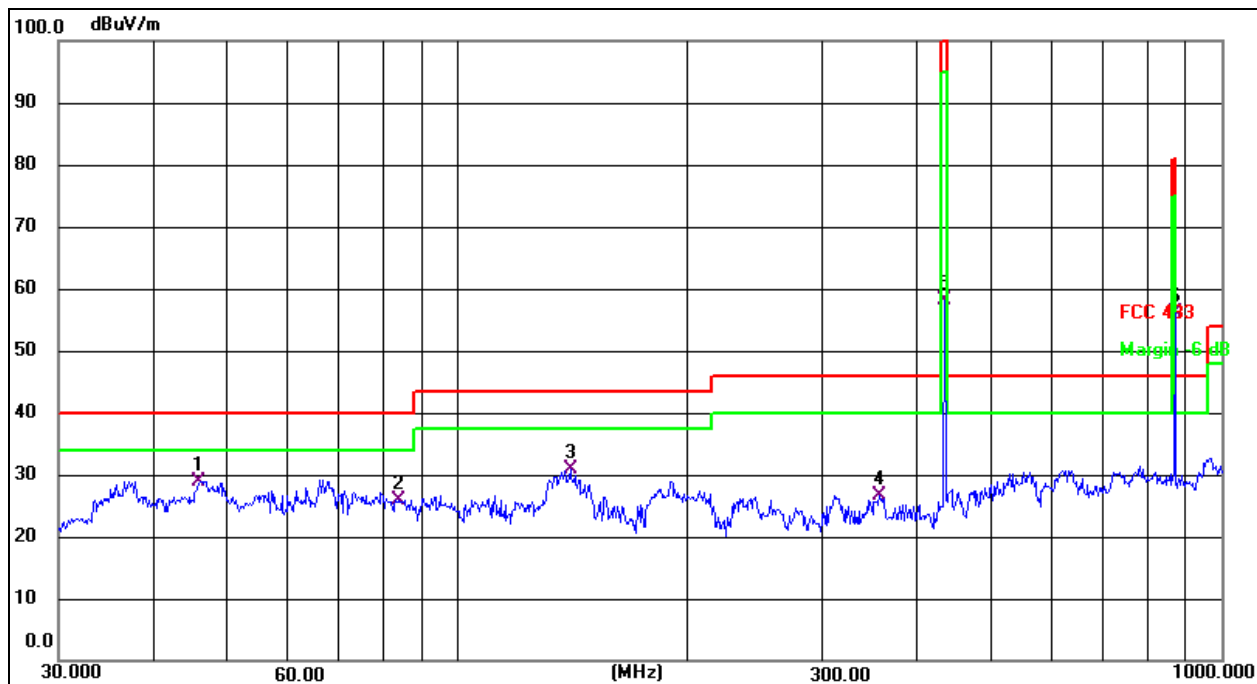
Distance extrapolation factor =  $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



**3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)**

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 12V		
Test Mode :	Mode 1		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	46.0162	42.46	-13.46	29.00	40.00	-11.00	QP
2		83.5220	43.31	-17.35	25.96	40.00	-14.04	QP
3		140.3420	48.18	-17.41	30.77	43.50	-12.73	QP
4		356.6757	37.06	-10.49	26.57	46.00	-19.43	QP
5		434.0649	67.07	-9.01	58.06	100.80	-42.74	peak
6		869.1300	57.06	-1.04	56.02	80.80	-24.78	peak

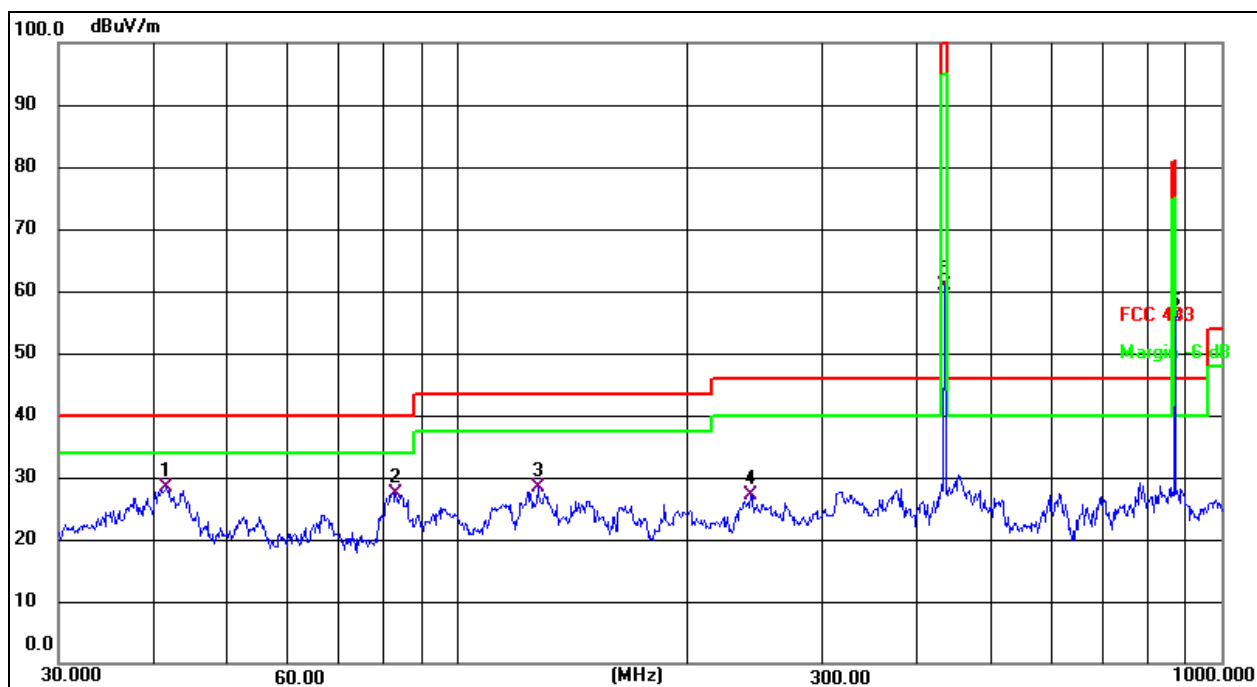
Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Level - Limit;



Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 12V		
Test Mode :	Mode 1		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	41.5670	42.07	-13.73	28.34	40.00	-11.66	QP
2		82.9384	44.81	-17.39	27.42	40.00	-12.58	QP
3		127.2176	45.25	-16.81	28.44	43.50	-15.06	QP
4		241.6759	40.14	-13.06	27.08	46.00	-18.92	QP
5		434.0649	69.87	-9.01	60.86	100.80	-39.94	peak
6		869.1300	56.91	-1.04	55.87	80.80	-24.93	peak

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Level - Limit;



## For average Emission

Frequency MHz	Peak Level dBuV/m	Duty cycle factor	AverageLevel dBuV/m	Polarization	Limit AV	Margin
434.0649	58.06	-9.9	48.16	Horizontal	80.8	-32.64
869.1300	56.02	-9.9	46.12	Horizontal	60.6	-14.48

Notes: 1. Average emission Level = Peak Level + Duty cycle factor  
2. Duty cycle level please see clause 5.

Frequency MHz	Peak Level dBuV/m	Duty cycle factor	AverageLevel dBuV/m	Polarization	Limit AV	Margin
434.0649	60.86	-9.9	50.96	Vertical	80.8	-29.84
869.1300	55.87	-9.9	45.97	Vertical	60.6	-14.63

Notes: 1. Average emission Level = Peak Level + Duty cycle factor  
2. Duty cycle level please see clause 5.

**3.2.8 TEST RESULTS (1GHZ TO 10<sup>TH</sup> HARMONICS)**

Polar (H/V)	Frequency	Peak Reading Level	Correct Factor	Peak Level	Duty cycle factor	Average Level	Limits PK	Limits AV	Margin PK	Margin AV
	(MHz)	(dBUV)	(dB)	(dB)	(dB/m)	(dBUV/m)	(dB)	(dB)		
operation frequency:433.92										
V	1301.76	55.36	-21.97	33.39	-9.9	23.49	74	54	-40.61	-30.51
V	1735.68	64.11	-21.97	42.14	-9.9	32.24	80.8	60.8	-38.66	-28.56
V	2169.6	63.84	-17.41	46.43	-9.9	36.53	80.8	60.8	-34.37	-24.27
V	2603.52	64.65	-17.41	47.24	-9.9	37.34	80.8	60.8	-33.56	-23.46
V	3037.44	46.74	-2.63	44.11	-9.9	34.21	80.8	60.8	-36.69	-26.59
V	3471.36	47.92	-2.63	45.29	-9.9	35.39	80.8	60.8	-35.51	-25.41
H	1301.76	56.15	-21.97	34.18	-9.9	24.28	74	54	-39.82	-29.72
H	1735.68	63.29	-21.97	41.32	-9.9	31.42	80.8	60.8	-39.48	-29.38
H	2169.6	65.62	-17.41	48.21	-9.9	38.31	80.8	60.8	-32.59	-22.49
H	2603.52	63.33	-17.41	45.92	-9.9	36.02	80.8	60.8	-34.88	-24.78
H	3037.44	46.87	-2.63	44.24	-9.9	34.34	80.8	60.8	-36.56	-26.46
H	3471.36	45.95	-2.63	43.32	-9.9	33.42	80.8	60.8	-37.48	-27.38

**Remark:**

1. PK Emission Level = Peak Reading Level + Correct Factor
2. Correct Factor= Antenna Factor + Cable Loss – Pre-amplifier,  
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Notes: 1. Average emission Level = Peak Level + Duty cycle factor

2. Duty cycle level please see clause 5.

3. Pulse Desensitization Correction Factor

Pulse Width (PW) = 48.84ms

$2/PW = 2/48.84\text{ms} = 0.04\text{kHz}$

RBW (100 kHz) > 2/PW (0.04kHz)

Therefore PDCF is not needed



#### 4. BANDWIDTH TEST

##### 4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.231) , Subpart C	
Section	Description
15.231C	<p>The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.</p> <p><math>B.W (20dBc) \text{ Limit} = 0.25\% * f(\text{MHz}) = 0.25\% * 433.92\text{MHz} = 1.0848\text{MHz}</math></p>

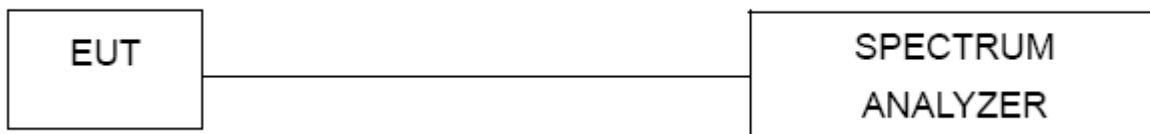
##### 4.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set VBW = 300 kHz.
3. Detector = normal.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

##### 4.1.2 DEVIATION FROM STANDARD

No deviation.

##### 4.1.3 TEST SETUP



##### 4.1.4 EUT OPERATION CONDITIONS

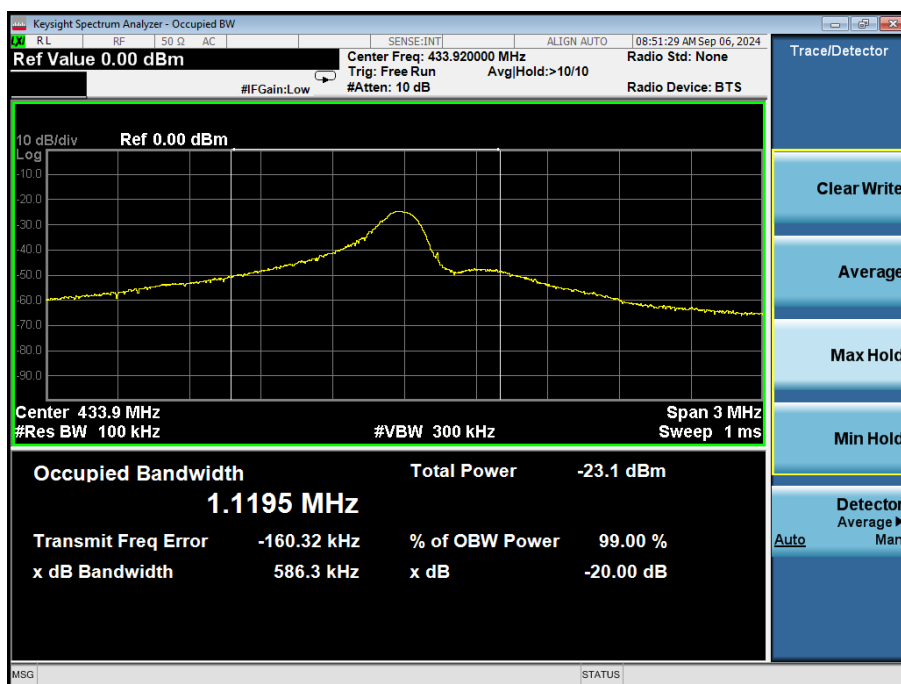
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



#### 4.1.5 TEST RESULTS

Frequency (MHz)	20dB Bandwidth (MHz)	Result
433.92	0.585	Pass

#### FSK





## 5. CALCULATION OF AVERAGE FACTOR

### 5.1 APPLIED PROCEDURES / LIMIT

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

#### 5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set VBW = 300 kHz.
3. Detector = normal.
4. Sweep = auto couple.
5. Allow the trace to stabilize.

#### 5.1.2 TEST SETUP



#### 5.1.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



### 5.1.4 TEST RESULTS

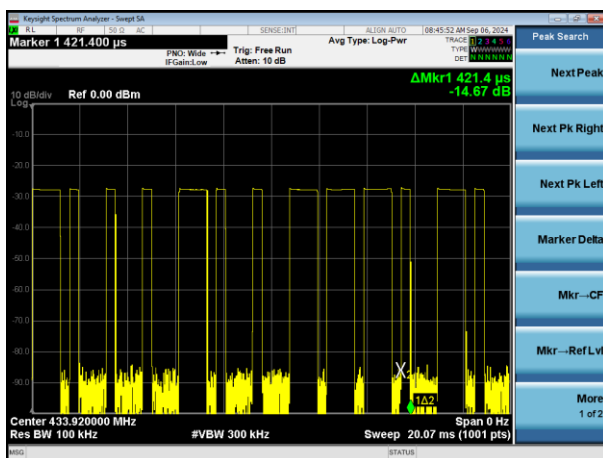
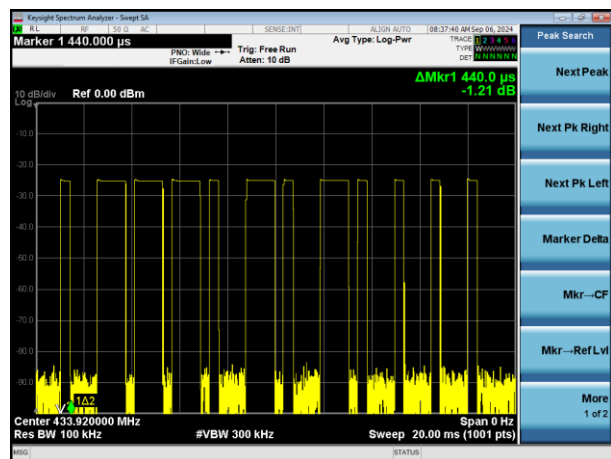
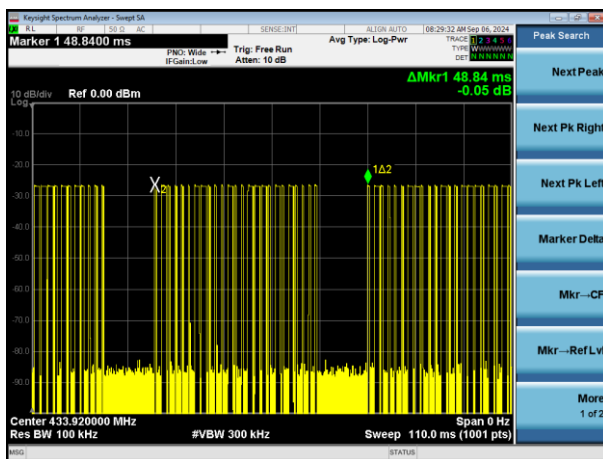
Duty Cycle= Effective time one cycle/ Total time one cycle

Averaging factor in dB =20log (duty cycle)

Duty Cycle = (0.44ms\*18+0.42ms\*6)/48.84

Therefore, the averaging factor is found by 20log0.32=-9.9dB

Test plot as follows:







## 6. TRANSMISSION CEASE TIME

### 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.231) , Subpart C	
Section	Description
15.231a	A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

#### 6.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set VBW = 300 kHz.
3. Detector = Peak.
4. Trace mode = max hold.
5. Allow the trace to stabilize.

#### 6.1.2 DEVIATION FROM STANDARD

No deviation.

#### 6.1.3 TEST SETUP



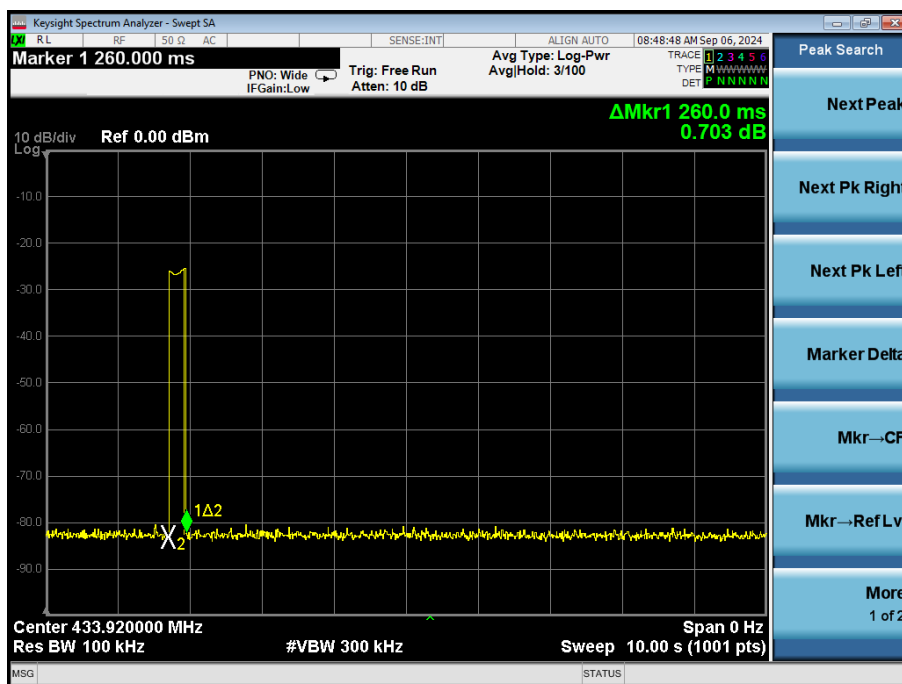
#### 6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



### 6.1.5 TEST RESULTS

	Transmission cease time (second)	Limit (second)	Result
Normal	0.260	<5s	Pass





## **7. ANTENNA REQUIREMENT**

### **7.1 STANDARD REQUIREMENT**

15.203 requirement: For intentional device, according to 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.

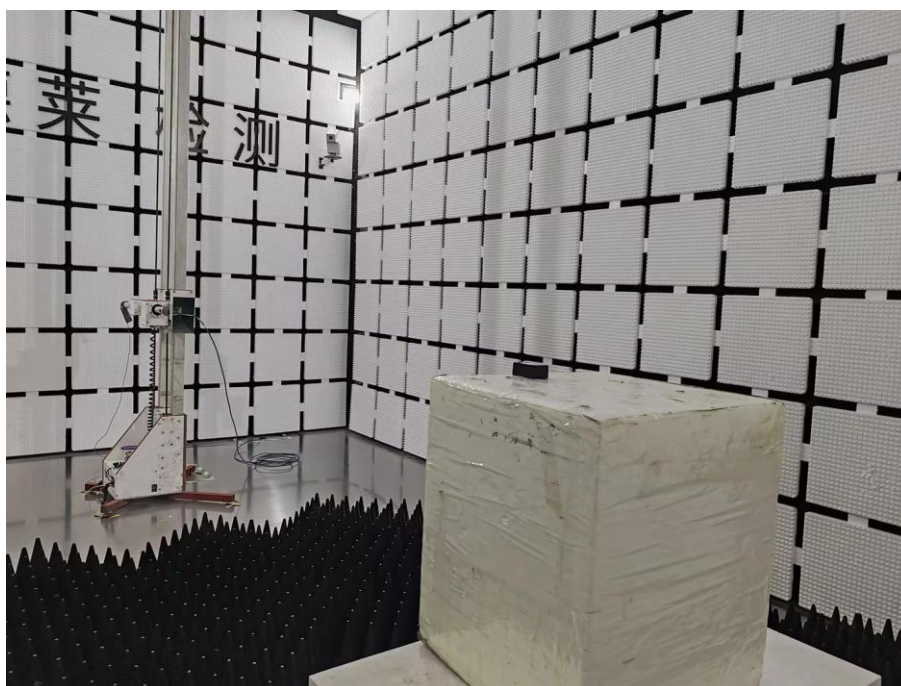
### **7.2 EUT ANTENNA**

The EUT antenna is internal antenna, It comply with the standard requirement.



## 8. TEST SEUUP PHOTO

Radiated Measurement Photos





### Conducted Emission Photos

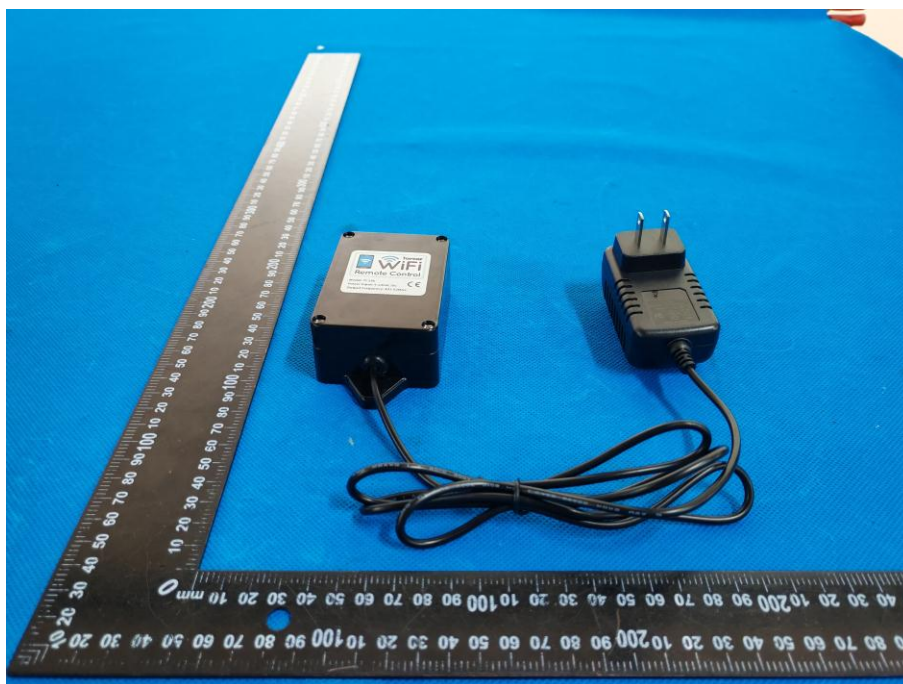




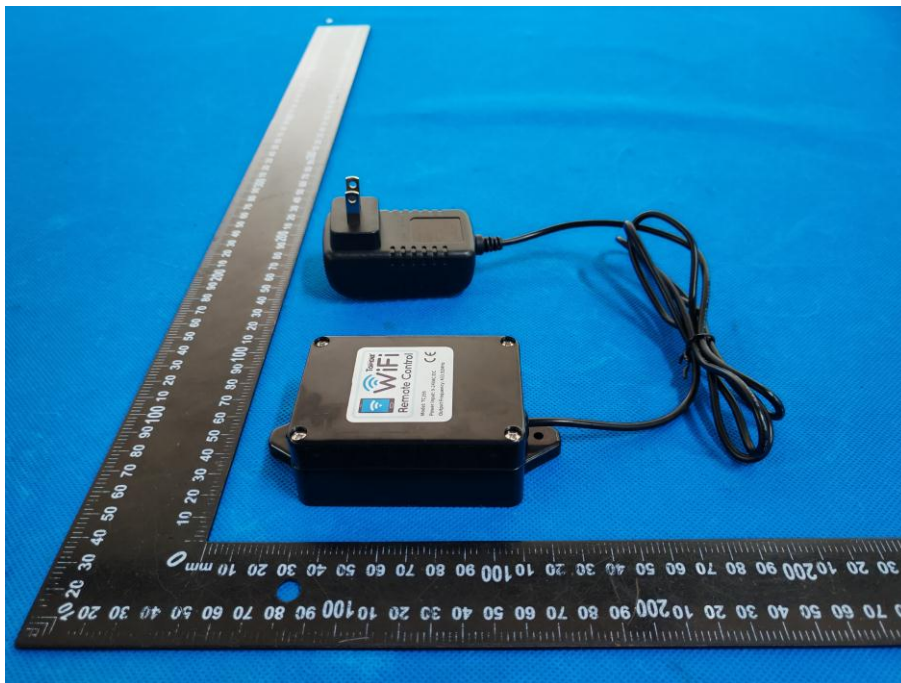


## 9. EUT PHOTO



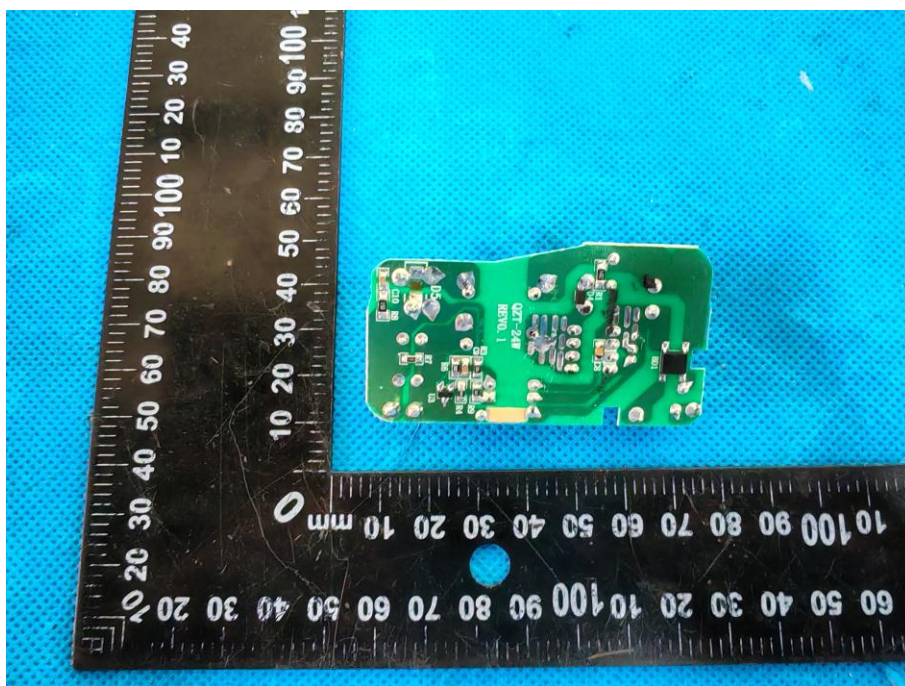
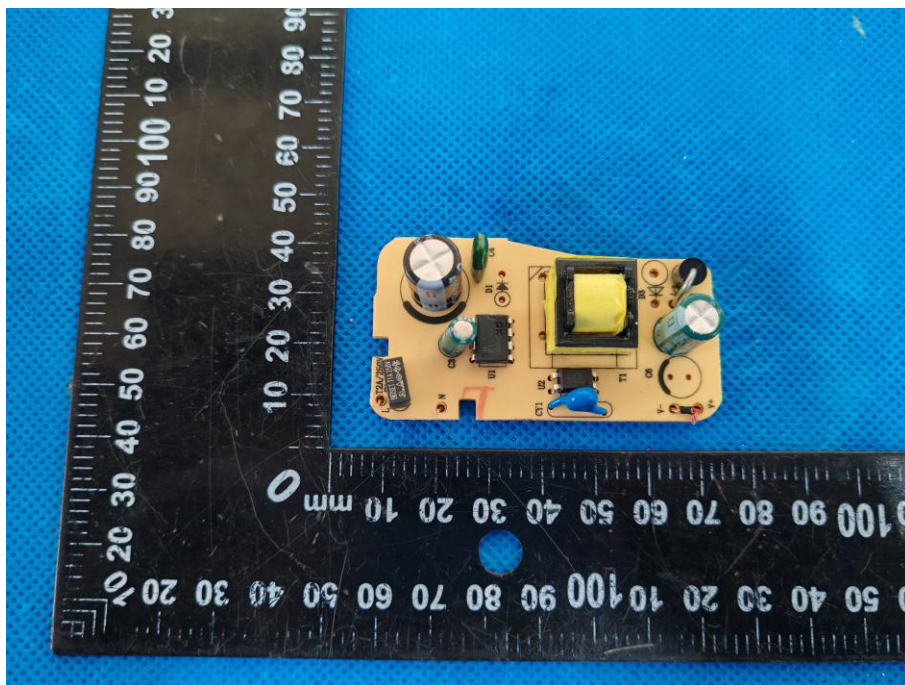




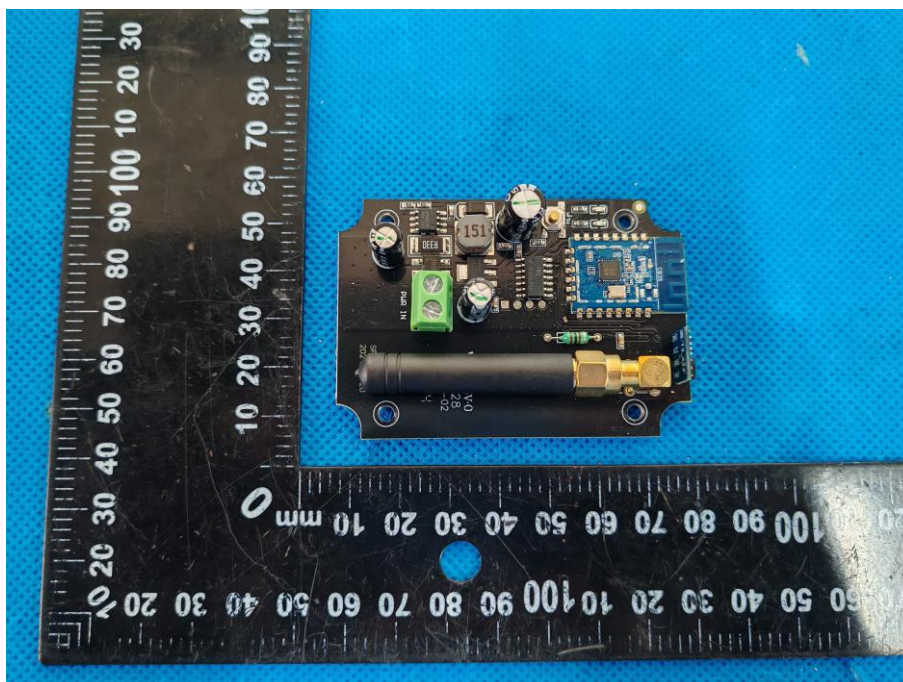
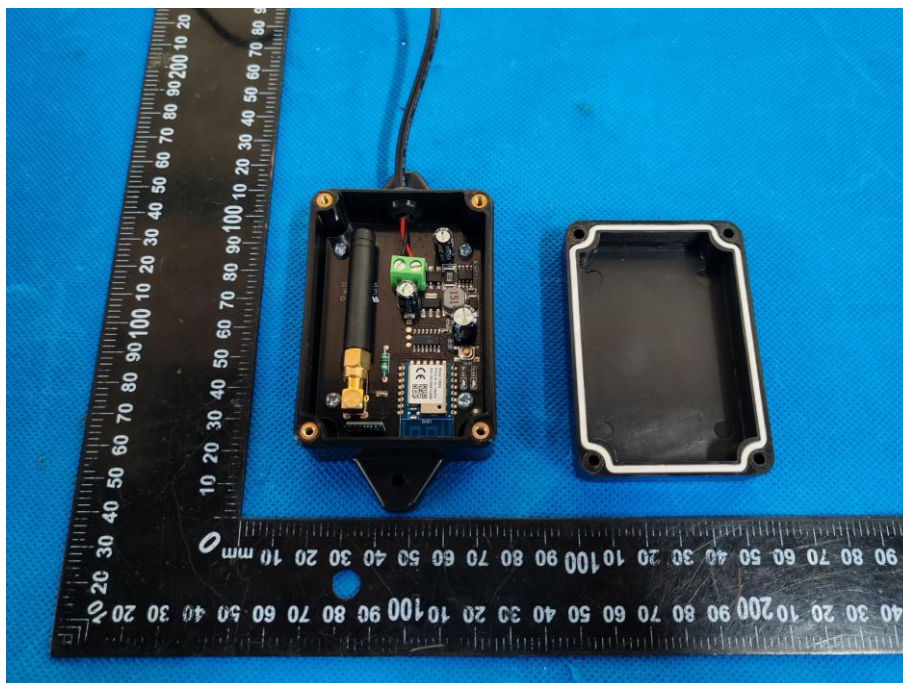


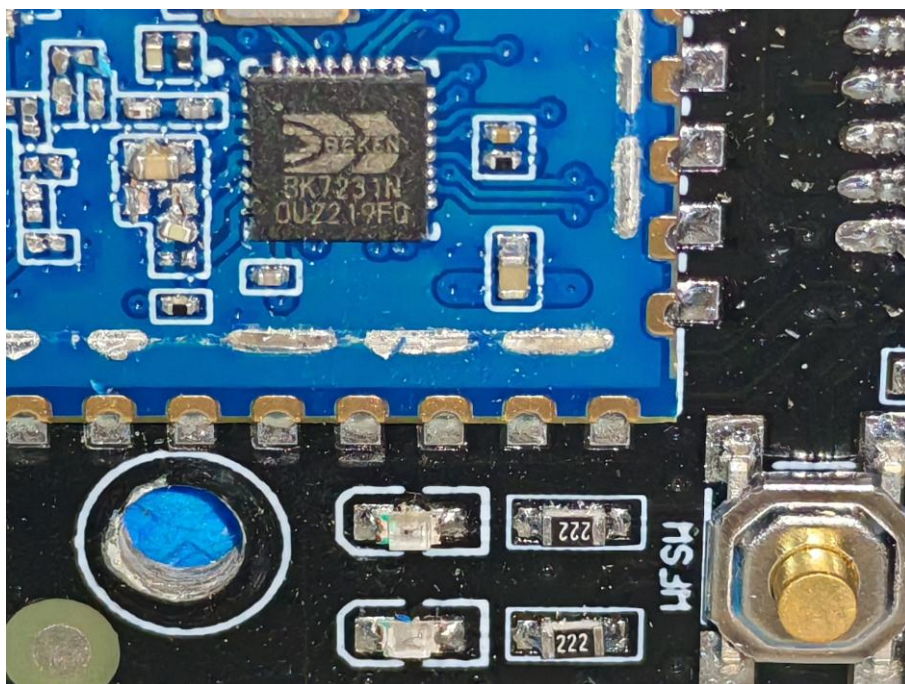
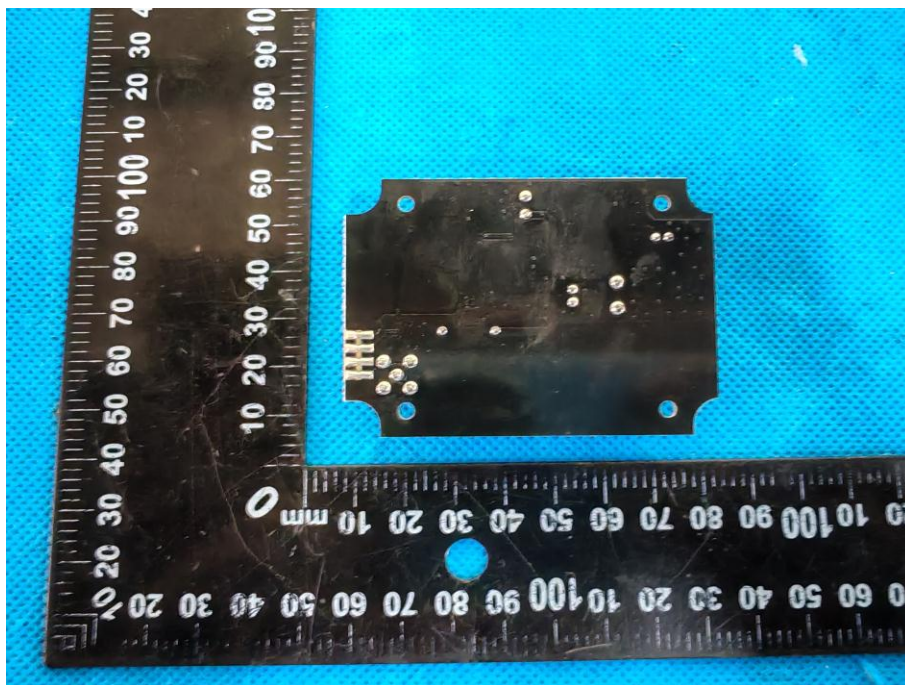












\*\*\*\*\* END OF REPORT \*\*\*\*\*