

Test Report

Product: Remote control

Trade Mark: N/A

Model Number: QB199-433TX-01

FCC ID: QOB-QB199

Prepared for

Jasco Products Company LLC

10 e memorial road Office oklahoma city Oklahoma United States

Prepared by

Shenzhen HongBiao Certification& Testing Co., Ltd

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TEST RESULT CERTIFICATION

Applicant's Name..... : Jasco Products Company LLC
Address : 10 e memorial road Office oklahoma city Oklahoma United States
Manufacturer's Name : Shaoxing Shangyu Shunhe Electric Appliance For Illumination Co., Ltd
Address : Xiaoyue Town, Shangyu District, SHAOXING CITY Zhejiang
Manufacturer's Name : SUNLIT LIGHTING (THAILAND) COMPANY LIMITED
Address : 7/588 Moo.6 Map Yang Phon, Pluak Daeng, Rayong 21140

Product description

Product name : Remote control
Model Number : QB199-433TX-01
Standards : FCC Part 15.231(a)
Test procedure..... : IEEE/ANSI C63.10-2020

This device described above has been tested by Shenzhen HongBiao Certification& Testing Co., Ltd and the test results show that the equipment under test (EUT) is in compliance with the EMC requirements. And it is applicable only to the tested sample identified in the report.

Date of Test

Date (s) of performance of tests..... : Jan. 21, 2025~ Feb.18, 2025
Test Result..... : **Pass**

Testing Engineer :

Zoe Su

(Z o e S u)

Technical Manager :

Ming Liu

(M i n g L i u)

Authorized Signatory :

Leo Su

(L e o S u)

[illegible]

1 General Description

1.1 Description of EUT

Product name:	Remote control
Model name:	QB199-433TX-01
Series Model:	N/A
Different of series model:	N/A
Operation frequency:	433.92MHz
Modulation type:	OOK
Bit Rate of transmitter:	1 Mbps
Antenna type:	Onboard non-standard Antenna
Antenna gain:	0dBi
Max. output power:	48.26dBuV/m
Hardware version:	V1.0
Software version:	V1.0
Battery:	DC 2.2-3.6V
Power supply:	DC 3V from the battery
Adapter information:	N/A

1.2 Test Mode

Test Mode	Channel	Frequency (MHz)
1	01	433.92

1.3 Operation Channel list

Channel	Frequency (MHz)
01	433.92

1.4 Test Setup

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

1.5 Ancillary Equipment

Equipment	Model	S/N	Manufacturer
/	/	/	/

2 Summary of Test Result

No.	Standard Section	Test Item	Result	Remark
1	15.203	Antenna requirement	Pass	
2	15.207	AC power line conducted emission	N/A	
3	15.231(a)	Field strength of fundamental and harmonic emissions	Pass	
4	15.231(b)/15.205 /15.209	Radiated emission and bandedge	Pass	
5	15.215 (c)	Occupied Bandwidth	Pass	
6	15.231(a)	Release time	Pass	

Note: In this whole report not applicable.

3 Test Facilities and Accreditations

3.1 Test Laboratory

Test Site	Shenzhen HongBiao Certification& Testing Co., Ltd
Test Site Location	Room 102, 201, Building 2, Yuanwanggu RFID Industrial Park, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen, China
Telephone:	(86-755) 2998 9321
Fax:	(86-755) 2998 5110
FCC Registration No.:	CN1341
A2LA Certificate No.:	6765.01

3.2 Environmental Conditions

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

Temperature:	15°C~35°C
Relative Humidity:	20%~75%
Air Pressure:	98kPa~101kPa

3.3 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 %.

The data and results quoted in this document are true and accurate values, and uncertainties are not involved in the calculations.

In addition, components and mass production processes that are similar to testing equipment may introduce additional deviations, and the manufacturer is solely responsible for the continued compliance of the equipment.

Measurement Frequency Range	U, (dB)	Note
RF frequency	2×10^{-5}	
RF power, conducted	± 0.57 dB	
Conducted emission(150kHz~30MHz)	± 2.5 dB	
Radiated emission(9kHz-30MHz)	± 2.5 dB	
Radiated emission(30MHz~1GHz)	± 4.2 dB	
Radiated emission (above 1GHz)	± 4.7 dB	
Occupied Bandwidth	$\pm 3\%$	
Temperature	± 1 degree	
Humidity	$\pm 5 \%$	

3.4 Test Software

Software name	Manufacturer	Model	Version
EMI Measurement	Farad	EZ-EMC	V1.1.4.2
Conducted test system	MWRF-test	MTS 8310	V2.0.0

4 List of Test Equipment

Radiation emission							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E001	Horn Antenna	Schwarzbeck	BBHA 9120D	02592	2024-05-18	2026-05-17
2	HB-E002	Biconical log-periodic composite antenna	Schwarzbeck	VULB 9168	01340	2024-05-18	2026-05-17
3	HB-E003	SHF-EHF Horn	Schwarzbeck	BBHA 91270	01193	2024-05-18	2026-05-17
4	HB-E005	Preamplifier	Noyetec	LAN-0118	NYCM1420102	2024-05-17	2025-05-16
5	HB-E006	Preamplifier	Noyetec	LAN-1840	NYCM1420103	2024-05-17	2025-05-16
6	HB-E007	EMI TEST RECEIVER	R&S	ESR7	102520	2024-05-17	2025-05-16
7	HB-E009	POSITINAL COTROLLE R	Noyetec	N/A	N/A	/	/
8	HB-E013	RF switch	Noyetec	NY-RF4	NY0CM1420204	/	/
9	HB-E066	Illuminance Tester	TASI	TA8121	N/A	2024-05-21	2025-05-20
10	HB-E075	Active loop antenna	Schwarzbeck	FMZB 1519B	1519B-245	2024-05-18	2026-05-17
11	HB-E076	Preamplifier	Hewlett Packard	8447D	1937A02278	2024-05-17	2025-05-16
Conduction emission							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E014	4 Path V-LISN	Schwarzbeck	NNLK 8121	00770	2024-05-17	2025-05-16
2	HB-E015	Pulse Limiter	Schwarzbeck	VTSD 9561-F	00949	2024-05-17	2025-05-16
3	HB-E016	ZN23201	Noyetec	ZN23201	N/A	2024-05-21	2025-05-20
4	HB-E059	Attenuator	Xianghua	TS2-6-1	220215166	2024-05-17	2025-05-16
5	HB-E069	EMI TEST RECEIVER	R&S	ESCI	N/A	2024-05-17	2025-05-16
RF							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E041	MXG AnaioG Signal Generator	Agilent	N5181A	MY47070421	2024-05-17	2025-05-16
2	HB-E042	WIDEBAND RADIO COMMUNICA	R&S	CMW500	132108	2024-05-17	2025-05-16

		TION TESTER					
3	HB-E043	MXG Anaio Signal Generator	Agilent	N5182A	US46240335	2024-05-17	2025-05-16
4	HB-E044	Signal& spectrum Analyzer	R&S	FSV3044	101264	2024-05-17	2025-05-16
5	HB-E045	RF Control Box	Noyetec	NY100-R FCB	N/A	/	/
6	HB-E058	Thermometer Clock Humidity Monitor	N/A	HTC-1	N/A	/	/

Note: the calibration interval of the above test instruments is 12&24 months and the calibrations are traceable to international system unit (SI).

5 Test Item And Results

5.1 Antenna Requirement

5.1.1 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

5.1.2 Test Result

The EUT antenna is Onboard non-standard Antenna. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.

5.2 AC Power Line Conducted Emission

5.2.1 Limits

Limits – Class B		
Frequency (MHz)	Limit (dBμV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

Note:

- the tighter limit applies at the band edges.
- the limit of "*" marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

5.2.2 Test Procedures

a) EUT Operating Conditions

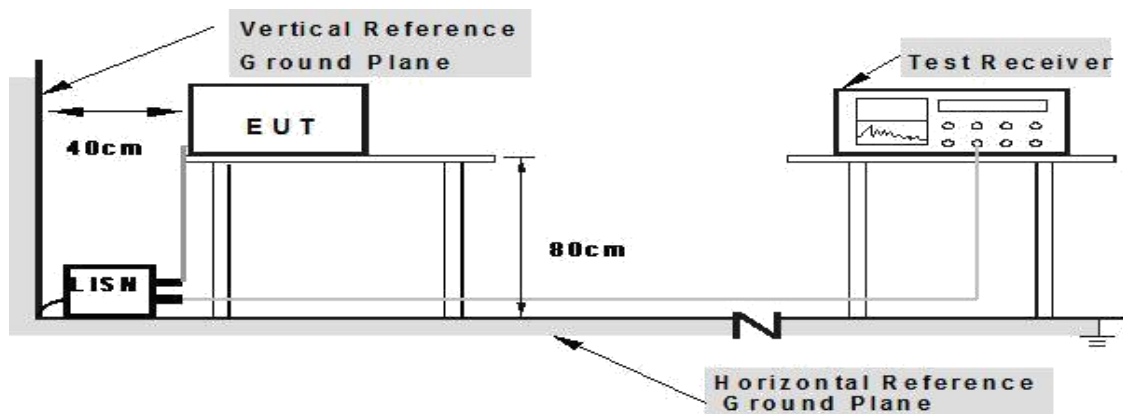
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

b) 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

- 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 equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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.
- 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.
- LISN is at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item – photographs of the test setup.

5.2.3 Test Setup



5.2.4 Test Result

Note: The sample is DC powered, and Conducted Emission is not applicable.

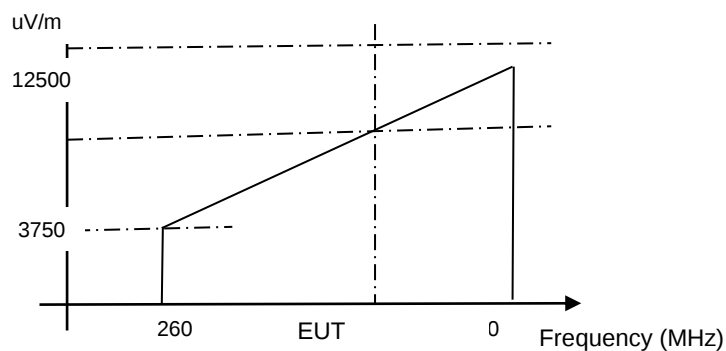
5.3 Radiated Emission Field Strength of Fundamental and Harmonic Emissions

5.3.1 Limits

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750*	125 to 375*
174-260	3750	375
260-470	3750 to 12500*	375 to 1250*
Above 470	12500	1250

*Linear interpolations

For example for 433.92MHz



The Field Strength of Fundamental Emissions (Operating Frequency) is:

$$3750 \text{ uV/m} = 20 \cdot \log(3750) \text{ dBuV/m} = 71.48 \text{ dBuV/m}$$

$$12500 \text{ uV/m} = 20 \cdot \log(12500) \text{ dBuV/m} = 81.94 \text{ dBuV/m}$$

For example the Fundamental emission is 433.92MHz, the limit is X.

$$(433.92-260)/(470-260)=(X-3750)/(12500-3750)$$

$$0.828=(X-3750)/8750$$

$$X=0.828 \cdot 8750 + 3750$$

$$= 10996.67 \text{ uV/m}$$

$$\text{AV Limit} = 20 \cdot \log(10996.67) \text{ dBuV/m} = 80.83 \text{ dBuV/m}$$

$$\text{PK Limit} = 100.83 \text{ dBuV/m}$$

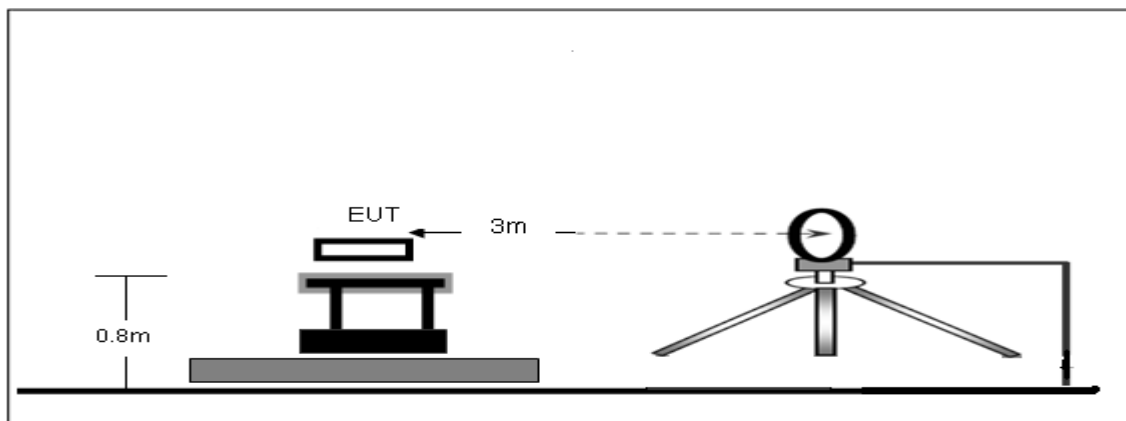
$$\text{AV Limit} = \text{PK Limit} - 20 \text{ dB}$$

5.3.2 Test Procedures

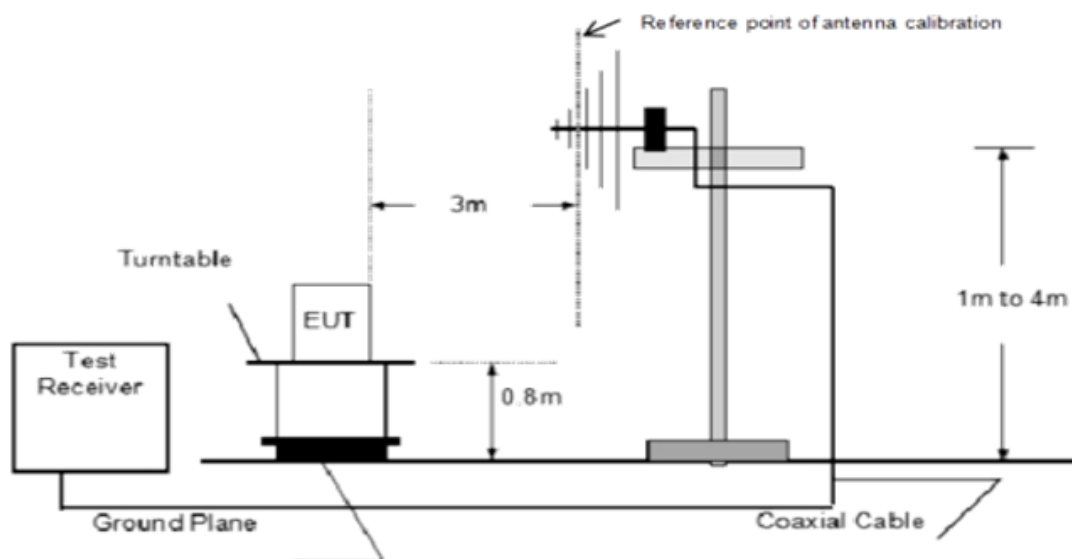
1. The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range below 1GHz, and 1.5m above ground plane for test frequency range above 1GHz.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
 - Span = wide enough to fully capture the emission being measured
 - RBW = 1 MHz for $f \geq 1\text{GHz}$
 - RBW = 100 kHz for $f < 1\text{GHz}$
 - VBW $\geq$ RBW
 - Sweep = Auto
 - Detector function = Peak
 - Trace = max hold
4. Follow the guidelines in ANSI C63.4-2020 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. The peak level, once corrected, must comply with the limit specified in Section 15.209.
 - Set the spectrum to
 - RBW = 1MHz
 - VBW = 10Hz
 - Detector = PK for AV value, while maintaining all of the other instrument settings

5.3.3 Test Setup

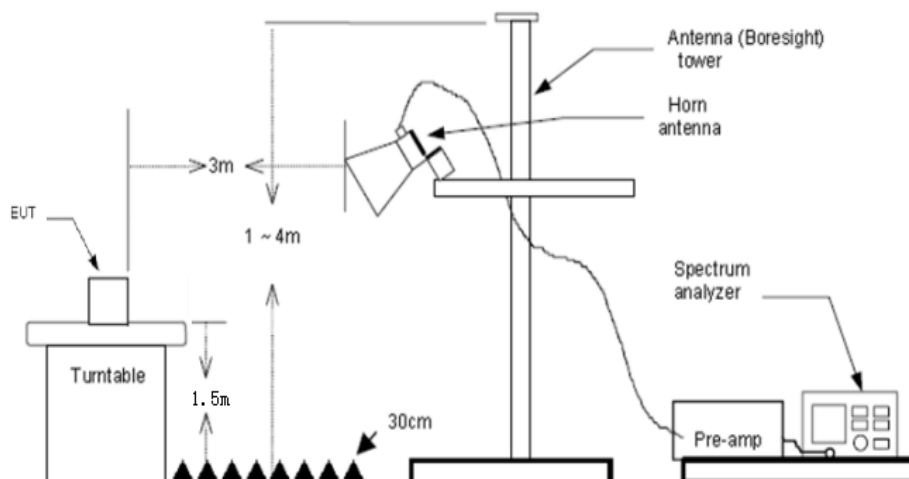
Radiated Emission Test-Up Frequency Below 30MHz



Radiated Emission Test-Up Frequency 30MHz~1GHz



Radiated emission test-up frequency above 1GHz

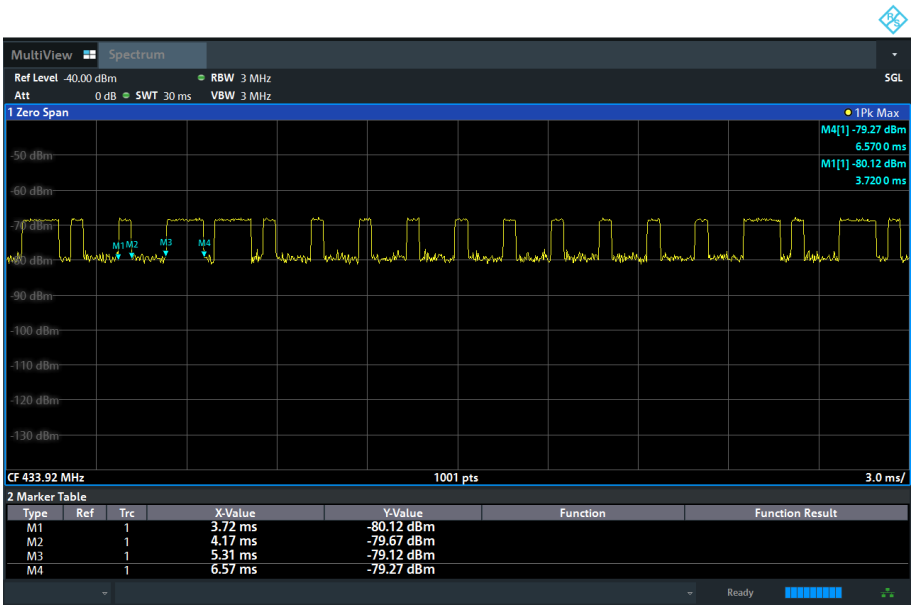
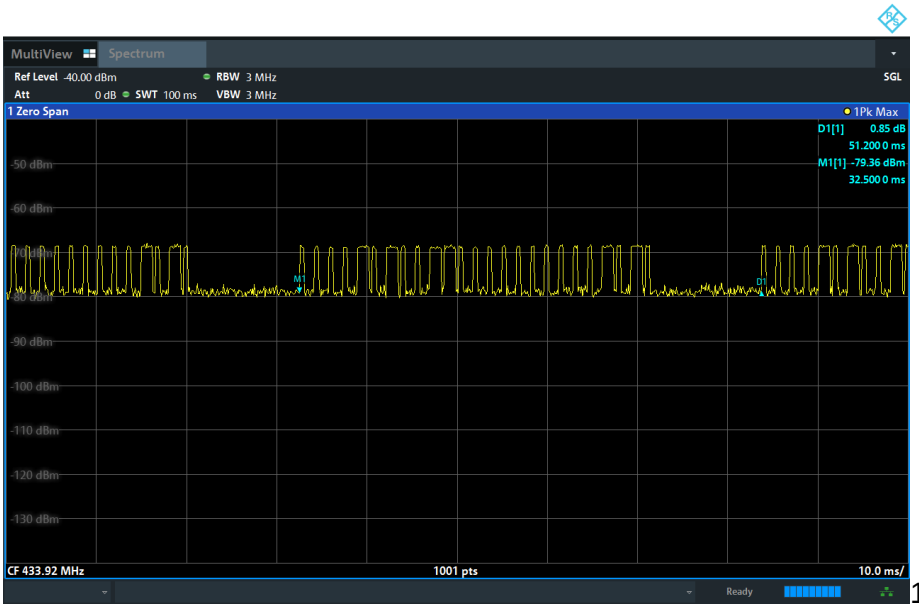


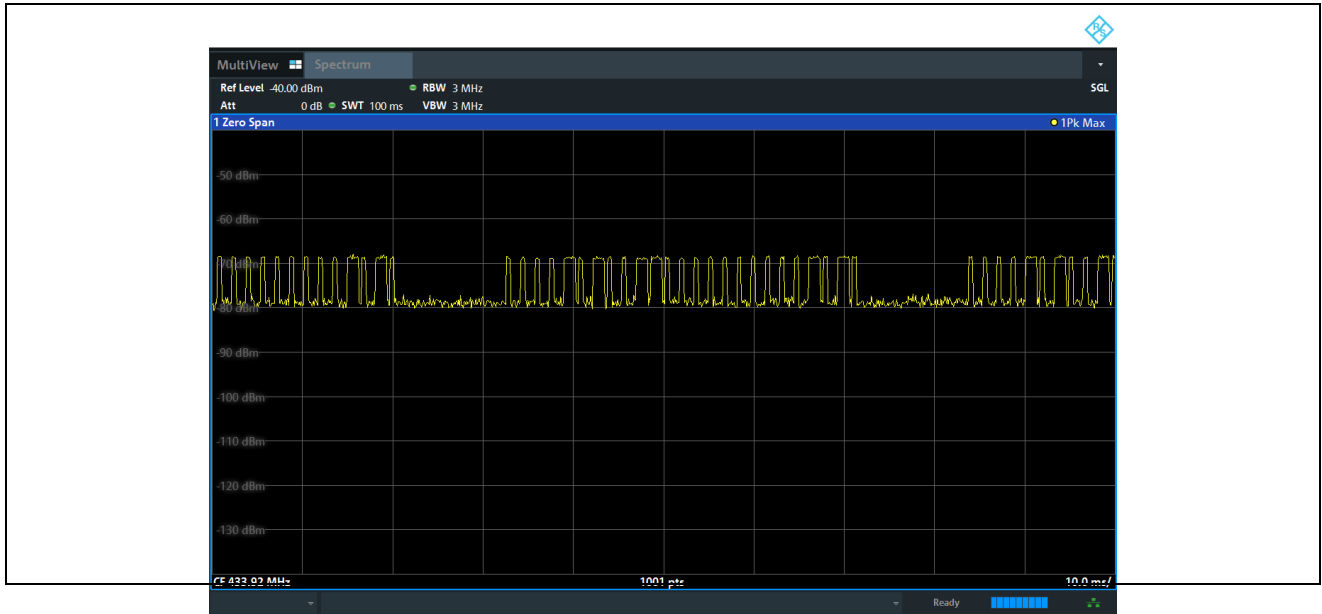
5.3.4 Test Result

Duty Cycle

433.92MHz

Total time (ms)	Effective time (ms)	Duty Cycle	AV Factor(dB)
51.2	18.7	31.5%	-10.03





Type of Pulse	Width of Pulse ms	Quantity of Pulse	Transmission Time	Total Time(Ton) ms
Pulse 1	0.45	19	8.55	18.7
Pulse 2	1.26	6	7.56	

Frequenc y (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Dutycycl e Factor (dB)	Level (dBuV/ m)	Limit (dBuV/m)	Margin (dB)	Detec tor	Polariz ation
433.92	56.85	-8.59	-	48.26	100.83	-52.57	Peak	Horizontal
433.92	-	-	-10.03	38.23	80.83	-42.6	AVG	Horizontal
433.92	47.23	-8.59	-	38.64	100.83	-62.19	Peak	Vertical
433.92	-	-	-10.03	28.61	80.83	-52.22	AVG	Vertical

Note:

1. If the PK measured values lower than average mode limit, the EUT shall be deemed to meet average limits and then no additional average mode measurement performed.
2. EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report(Y orientation).
3. Calculate Average value based on Duty Cycle correction factor:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff}) = 18.7\text{ms} / 51.2\text{ms} = 0.315 = 31.5\%$$

$$\text{Duty Cycle factor} = 20\lg(\text{Duty Cycle}) = 20\lg(0.315) = -10.03\text{Db}$$

$$\text{Average} = \text{Peak} + \text{Duty Cycle factor}$$

5.4 Radiated Emission and Band Edge Spurious Emission

5.4.1 Limit

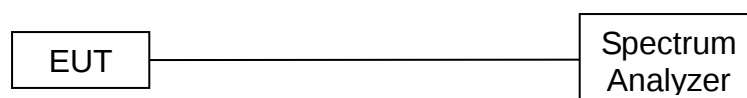
Emissions radiated outside of the specified frequency bands, except for harmonic emissions, (b) shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

Frequency (MHz)	Field strength $\mu\text{V/m}$	Field strength $\text{dB}\mu\text{V/m}$	Detector	Measurement distance
30-88	100	40	QP	3m
88-216	150	43.5	QP	
216-960	200	46	QP	
960-1000	500	54	QP	
Above 1000	500	54	AV	
Above 1000	5000	74	PK	

5.4.2 Test Procedure

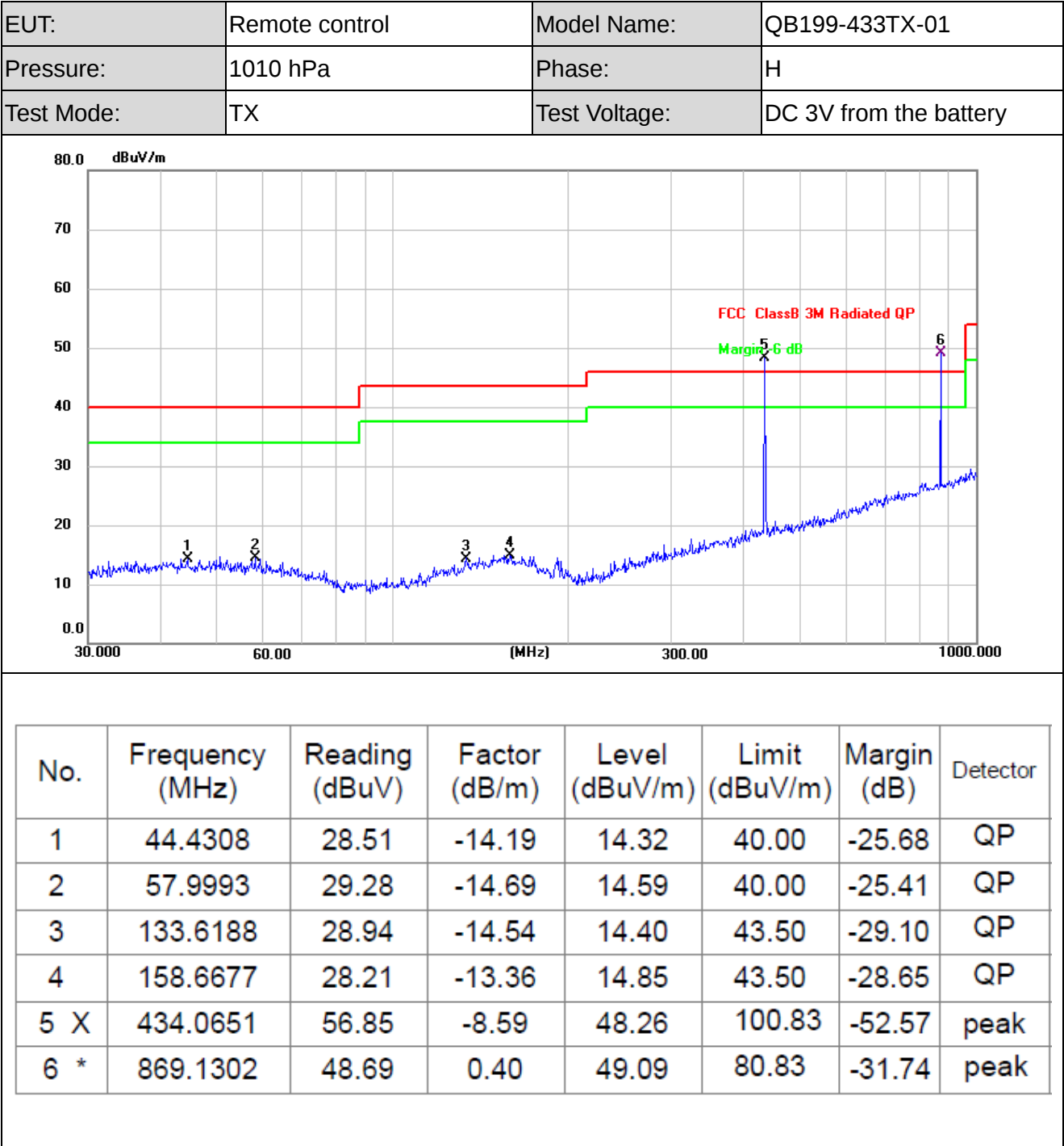
- The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range below 1GHz, and 1.5m above ground plane for test frequency range above 1GHz.
- EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- Use the following spectrum analyzer settings:
 - Span = wide enough to fully capture the emission being measured
 - RBW = 1 MHz for $f \geq 1\text{GHz}$
 - 100 kHz for $f < 1\text{GHz}$, VBW $\geq$ RBW
 - Sweep = auto
 - Detector function = peak
 - Trace = max hold
- Follow the guidelines in ANSI C63.4-2020 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- The peak level, once corrected, must comply with the limit specified in Section 15.209. Set the RBW = 1MHz, VBW = 10Hz, Detector = PK for AV value, while maintaining all of the other instrument settings.

5.4.3 Test Setup

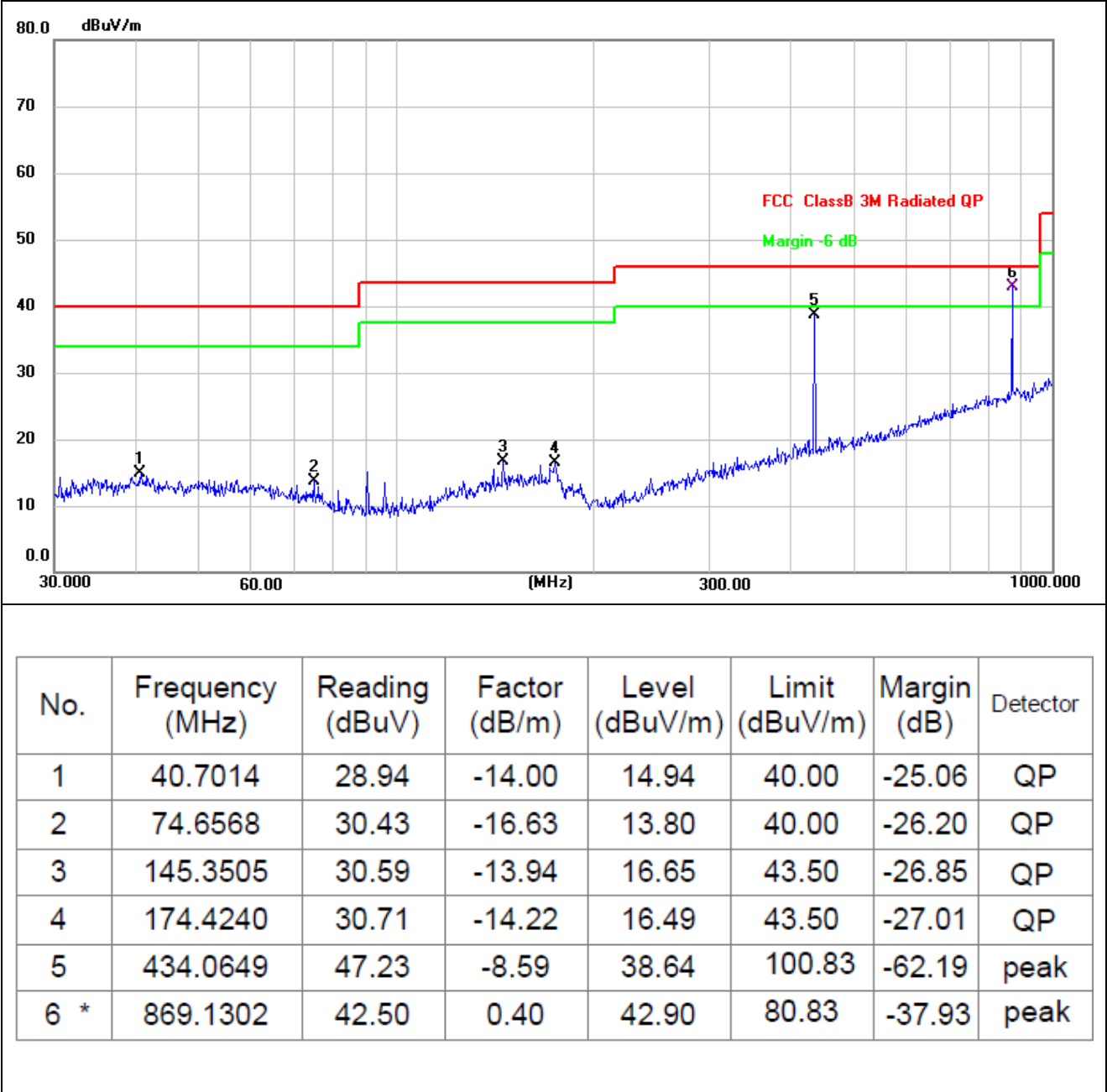


5.4.4 Test Results

Below 1GHz



EUT:	Remote control	Model Name:	QB199-433TX-01
Pressure:	1010 hPa	Phase:	V
Test Mode:	TX	Test Voltage:	DC 3V from the battery



Above 1GHz

EUT:	Remote control	Model Name:	QB199-433TX-01
Pressure:	1010 hPa	Phase:	Horizontal
Test Mode:	TX	Test Voltage:	DC 3V from the battery

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Dutycycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark
1	1736.483	53.48	-3.28	-	50.20	80.83	-30.63	Peak
2	2168.510	49.40	-0.50	-	48.90	80.83	-31.9	Peak
3	2603.351	49.22	-0.83	-	48.39	80.83	-32.44	Peak
4	1736.483	-	-	-10.03	40.20	60.83	-20.63	AVG
5	2168.510	-	-	-10.03	38.90	60.83	-21.93	AVG
6	2603.351	-	-	-10.03	38.39	60.83	-22.44	AVG

EUT:	Remote control	Model Name:	QB199-433TX-01
Pressure:	1010 hPa	Phase:	Vertical
Test Mode:	TX	Test Voltage:	DC 3V from the battery

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Dutycycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark
1	1736.457	49.03	-3.28	-	45.75	80.83	-35.08	Peak
2	2168.534	45.68	-0.50	-	45.18	80.83	-35.65	Peak
3	2603.344	45.68	-0.83	-	44.85	80.83	-35.98	Peak
4	1736.457	-	-	-10.03	35.75	60.83	-25.08	AVG
5	2168.534	-	-	-10.03	35.18	60.83	-25.65	AVG
6	2603.344	-	-	-10.03	34.85	60.83	-25.98	AVG

Note:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. The peak value is less than the AV value, AV value is not required Factor added by measurement software automatically.

5.5 Occupied Bandwidth

5.5.1 Limit

According to 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.5.2 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW $\geq 1\%$ of the 20 dB bandwidth

VBW $\geq$ RBW

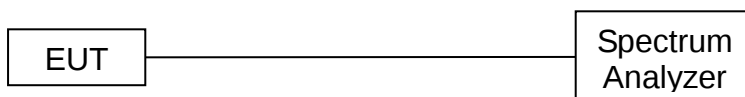
Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth.

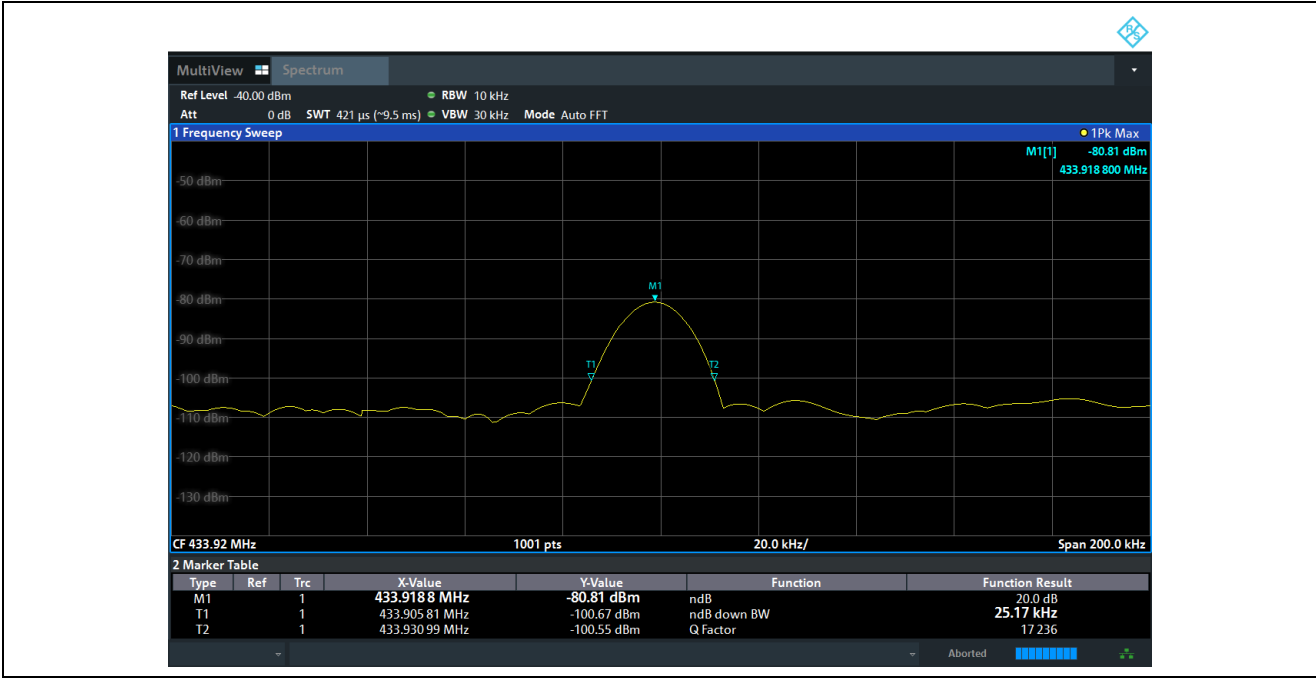
5.5.3 Test Setup



5.5.4 Test Results

Frequency (MHz)	20dB emission bandwidth (kHz)	Limit(kHz)	Result
433.92	25.17	1084.8	Pass

Test plots as below:



Note: Limit=433.92MHz*0.25%=1084.8kHz

5.6 Release time

5.6.1 Limit

Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

5.6.2 Test Procedure

Setup the EUT as show in the block diagram above.

Set Spectrum Analyzer

Centre Frequency= Fundamental Frequency

RBW=100 kHz, VBW= 300 kHz

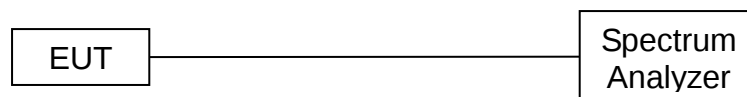
Span= 0 Hz

Sweep Time= 10 Seconds.

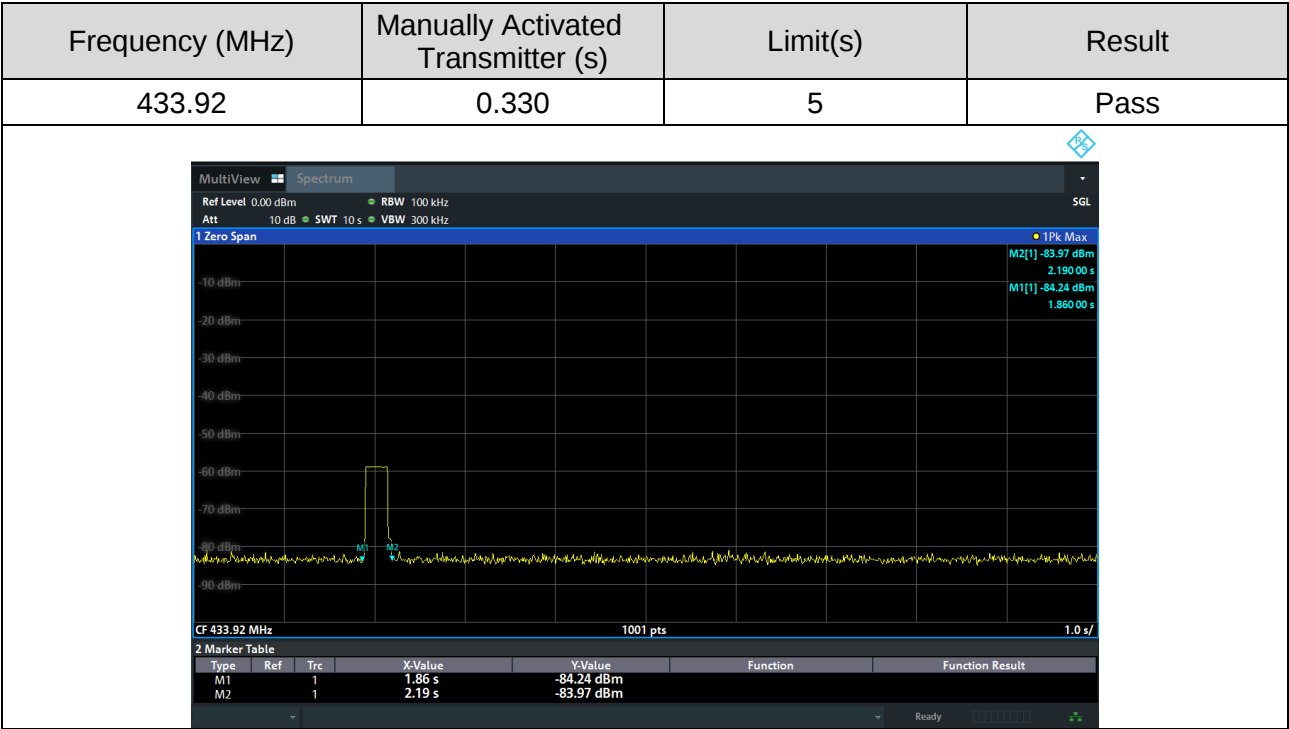
Setup the EUT as normal operation and press Transmitter button

Release the button, use Delta Mark function to test the time.

5.6.3 Test Setup

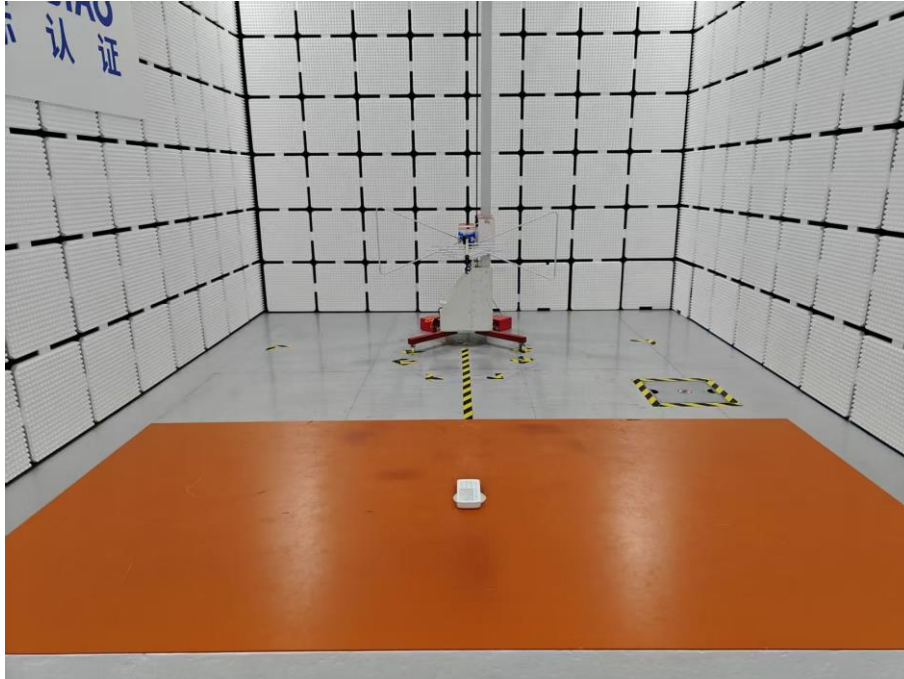


5.6.4 Test Results



6 Photographs of the Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



7 Photographs of the EUT

Photo 1

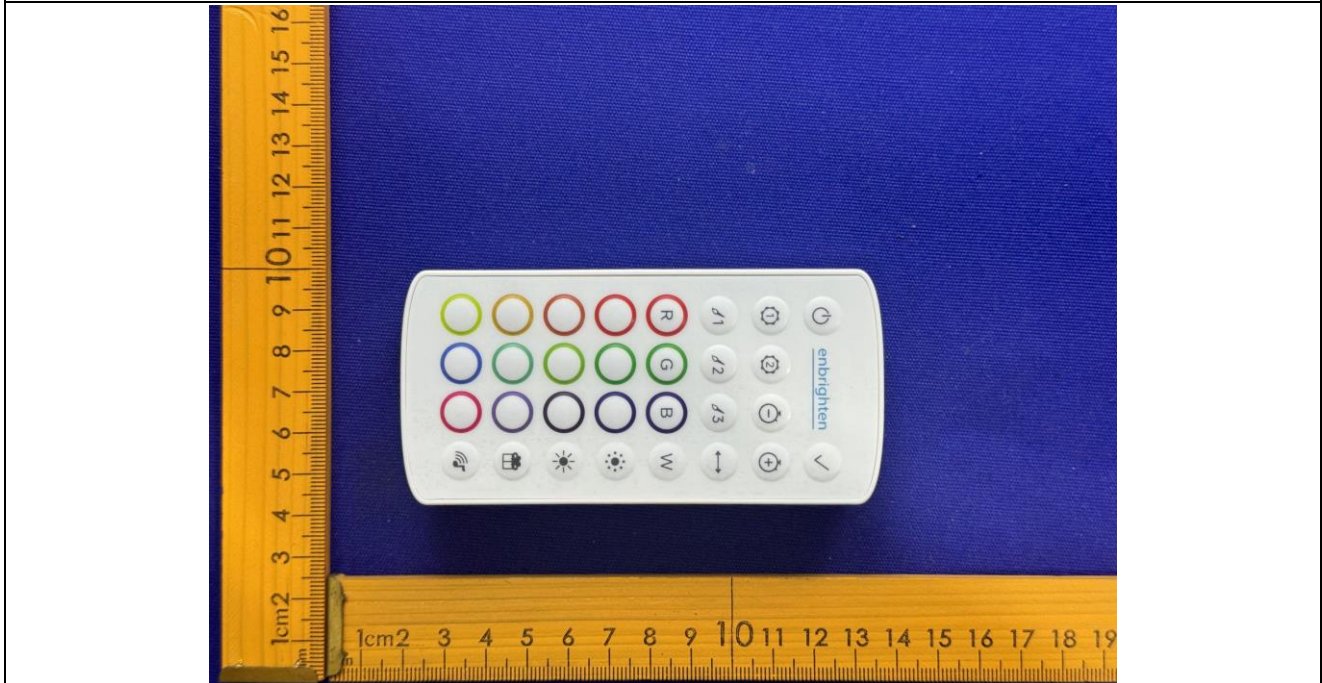


Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8

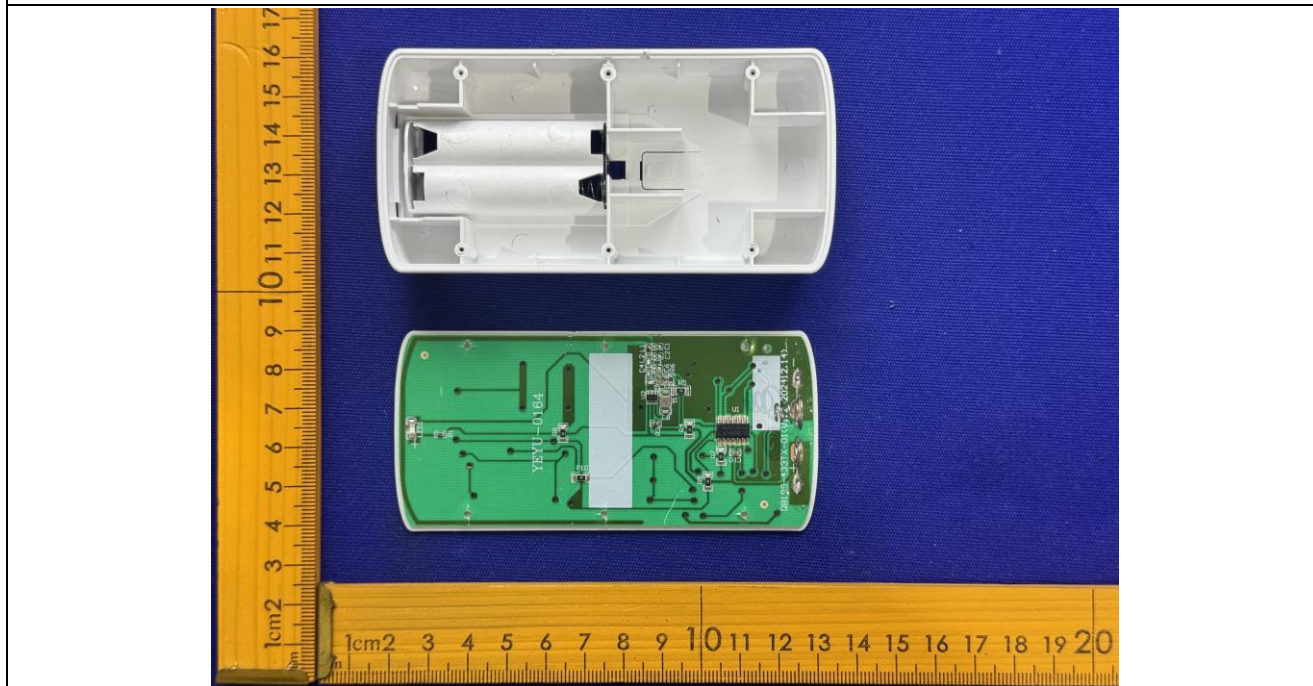


Photo 9

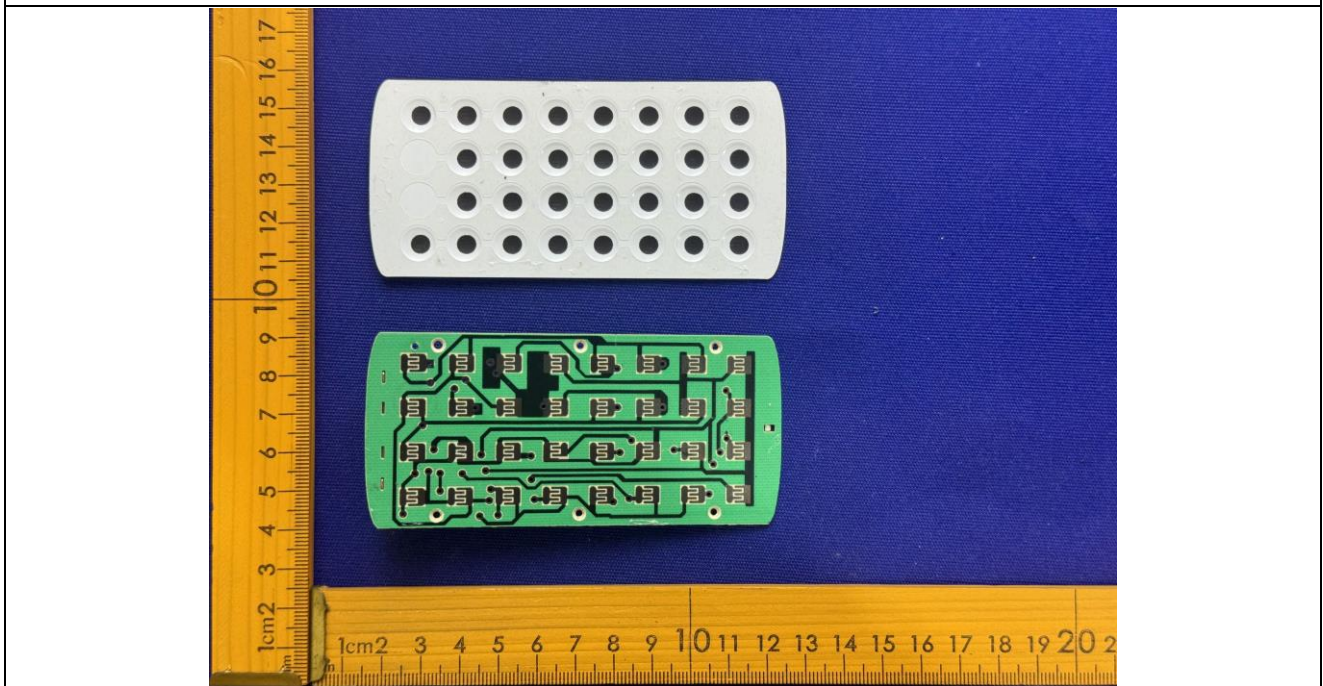


Photo 10

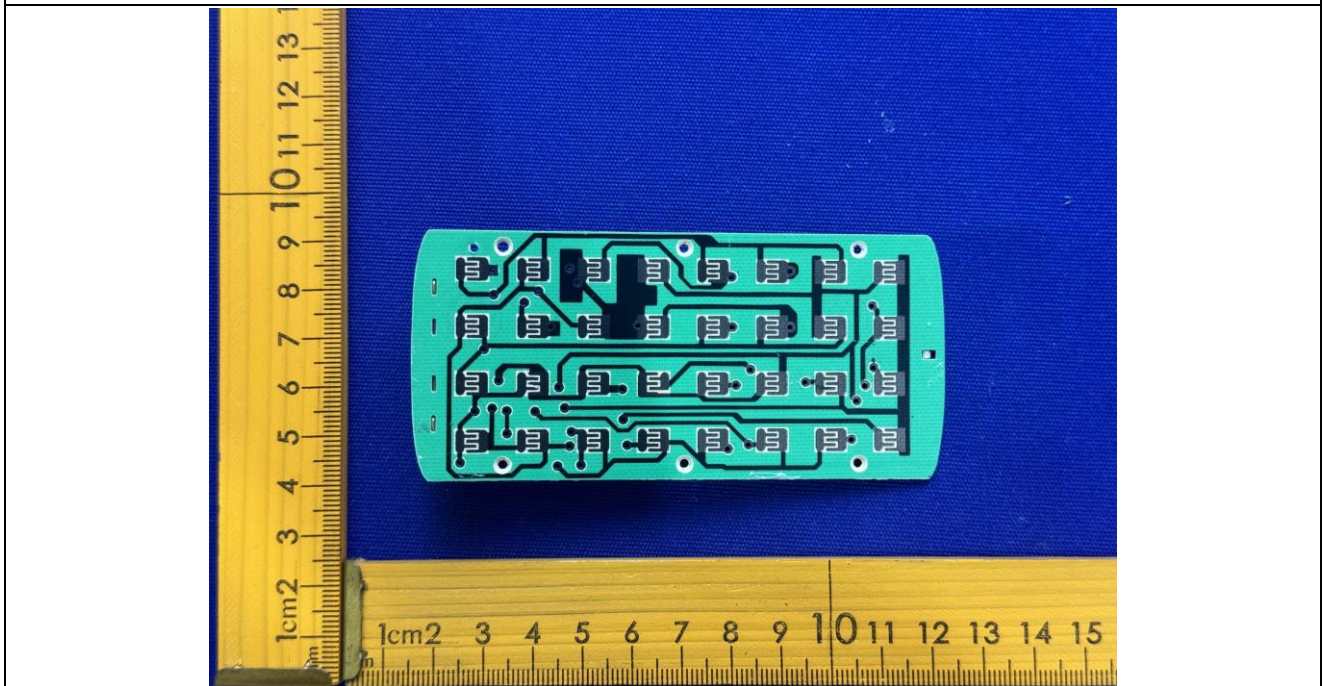
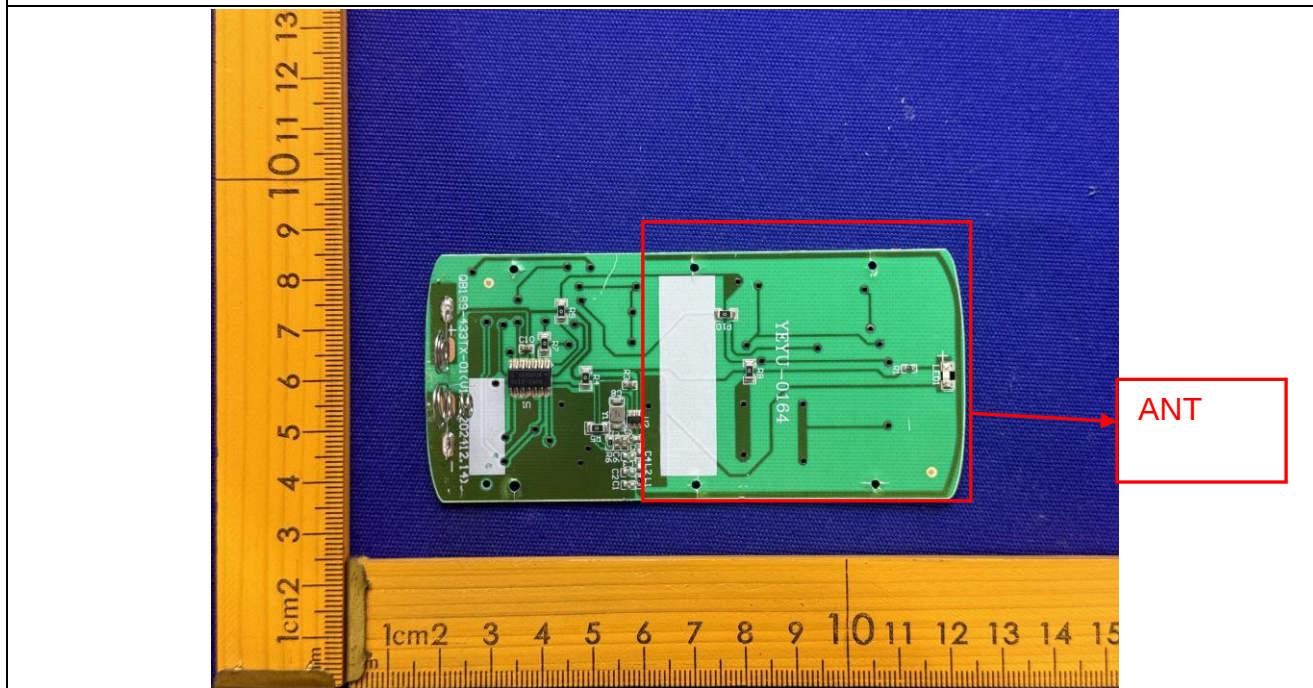


Photo 11



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