



1 Cover Page

TEST REPORT

Application No.: SHCR2203000502HS
FCC ID: 2A5AU5X-MODEL2
Applicant: Ningbo Haishu Tianxiang Winch Co.,Ltd.
Address of Applicant: No.3 Lingfeng Road,Meiliangqiao Village,Hengjie Town,Haishu,Ningbo,
315181 Zhejiang,China.
Manufacturer: Ningbo Haishu Tianxiang Winch Co.,Ltd.
Address of Manufacturer: No.3 Lingfeng Road,Meiliangqiao Village,Hengjie Town,Haishu,Ningbo,
315181 Zhejiang,China.
Factory: Ningbo Haishu Tianxiang Winch Co.,Ltd.
Address of Factory: No.3 Lingfeng Road,Meiliangqiao Village,Hengjie Town,Haishu,Ningbo,
315181 Zhejiang,China.
Equipment Under Test (EUT):
EUT Name: WIRELESS REMOTE SWITCH
Model No.: TX-MODEL2
Standard(s) : 47 CFR Part 15, Subpart C 15.231
Date of Receipt: 2022-03-02
Date of Test: 2022-03-02 to 2022-03-04
Date of Issue: 2022-03-04

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

Parlam Zhan
Laboratory Manager



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Revision Record			
Version	Description	Date	Remark
00	Original	2022-03-04	/

Authorized for issue by:			
			
		Bill Wu / Project Engineer	
			
		Parlam Zhan /Reviewer	



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2 Test Summary

Test Item	FCC Requirement	Test method	Result
Antenna Requirement	Part 15.203	/	PASS
Conducted Emission	Part 15.207	ANSI C63.10 (2013) Section 6.2	N/A
Field Strength of the Fundamental	Part 15.231 (b)	ANSI C63.10 (2013) Section 6.4	PASS
Radiated Spurious emissions	Part 15.209 15.231(b)	ANSI C63.10 (2013) Section 6.4&6.5&6.6	PASS
20dB Bandwidth	Part 15.231 (c)	ANSI C63.10 (2013) Section 6.9.2	PASS
Dwell Time	Part 15.231 (a)	ANSI C63.10 (2013) Section 7.8.4	PASS

N/A: Not applicable.





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4 General Information

4.1 General Description of E.U.T.

Power supply:	DC 12V by Alkaline battery
Test voltage:	DC 12V

4.2 Technical Specifications:

Modulation Type	ASK
Number of Channels	1
Operation Frequency	433.92MHz
Antenna Type	Integral Antenna
Transmitter type	Manually

4.3 Description of Support Units

The EUT has been tested independently

4.4 Test Location

All tests were performed at:

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588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

No tests were sub-contracted.



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4.5 Test Facility

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

• **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA).

• **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized by Federal Communications Commission (FCC) as an accredited testing laboratory.

• **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

ISED#: 8617A.

• **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

• **GAC (No. ATL 0031)**

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4.6 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4 x 10 ⁻⁸
2	Timeout	2s
3	Duty cycle	0.4%
4	Occupied Bandwidth	3%
5	RF conducted power	0.6dB
6	RF power density	2.9dB
7	Conducted Spurious emissions	0.75dB
8	RF Radiated power	5.1dB (Below 1GHz)
		5.9dB (Above 1GHz)
		4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-6GHz)
9	Radiated Spurious emission test	5.4dB (6GHz-18GHz)
10	Temperature test	1°C
11	Humidity test	3%
12	Supply voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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5 Equipments Used during Test

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF Radiated Test					
EMI test Receiver	R&S	ESU40	SHEM051-1	2021-12-20	2022-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2021-12-20	2022-12-19
Communication Tester	R&S	CMW500	SHEM183-2	2021-04-16	2022-04-15
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2021-12-20	2022-12-19
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2021-09-11	2023-09-10
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM202-1	2020-04-30	2022-04-29
Horn Antenna (1-18GHz)	Schwarzbeck	HF906	SHEM009-1	2019-10-24	2022-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2021-09-18	2023-09-17
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2021-09-18	2023-09-17
Pre-Amplifier	HP	8447D	SHEM236-1	2021-05-27	2022-05-26
Pre-Amplifier	PANSHAN	LNA 1-18G	SHEM235-1	2021-05-27	2022-05-26
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2021-12-20	2022-12-19
Band Filter	LORCH	9BRX-875/X150	SHEM156-1	/	/
Band Filter	LORCH	13BRX-1950/X500	SHEM083-2	/	/
Band Filter	LORCH	5BRX-2400/X200	SHEM155-1	/	/
Band Filter	LORCH	5BRX-5500/X1000	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020-05-25	2023-05-24
RE test Cable	/	RE01, RE02, RE06	/	2021-12-20	2022-12-19
Test software	ESE	E3	Version: 6.111221a	/	/





6 Test results and Measurement Data

6.1 Antenna Requirement

15.203 Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The antenna is Integral antenna and no consideration of replacement.

Antenna location: Refer to Appendix (Internal Photos)



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6.2 Spurious Emissions

Test frequency range: 9KHz – 5GHz

Test Site: Measurement Distance: 3m

Receiver Setup:

Limit:
(Spurious Emissions)

Limit:
(Field strength of the
fundamental signal)

Test Procedure:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.015MHz	Quasi-peak	200Hz	1KHz	Quasi-peak
0.015MHz-30MHz	Quasi-peak	9kHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average
Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	Quasi-peak	300
0.490MHz-1.705MHz	24000/F(kHz)	-	Quasi-peak	30
1.705MHz-30MHz	30	-	Quasi-peak	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3
		74.0	Peak	3
Frequency	Limit (dBuV/m @3m)		Remark	
433.09 - 434.61MHz	80.83		Average Value	
	100.83		Peak Value	

- 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.
- The radiation measurements are performed in X, Y, Z axis positioning. And found the Z axis positioning which it is worse case, only the test worst case



mode is recorded in the report.

E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a: TX mode_Keep the EUT in transmitting with modulation mode.

Test Setup:

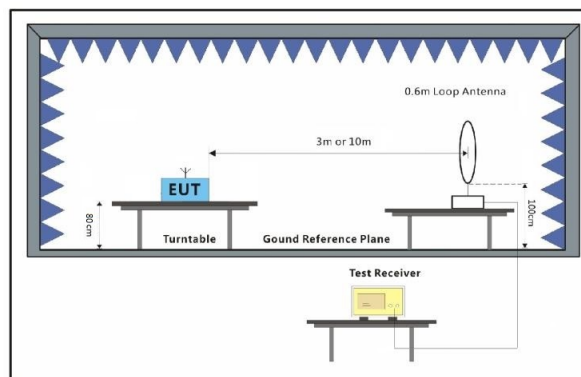
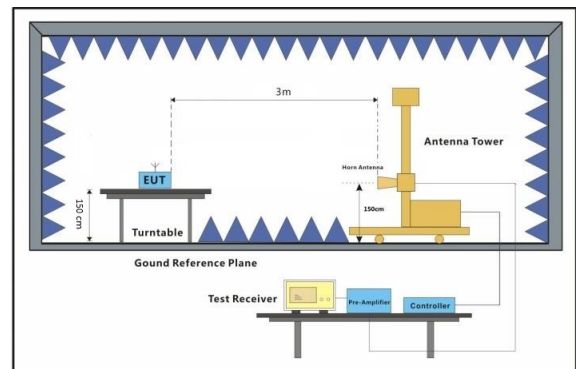
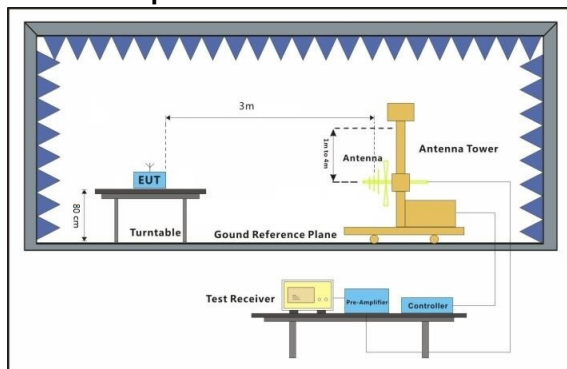


Figure1. radiated emissions test configuration

Test Results: Pass

6.2.1 Field Strength of the Fundamental Signal

Test channel	Freq. (MHz)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
Channel 1	433.92	75.66	80.83	-5.17	Peak	Vertical
		71.90	80.83	-8.93	Peak	Horizontal

Remark:

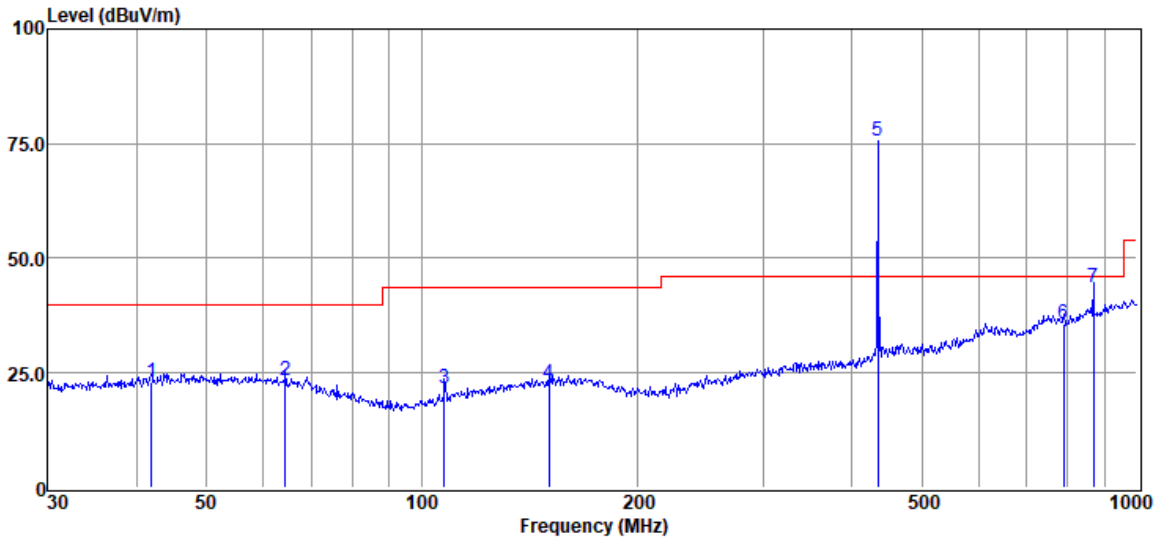
- If the Peak value below the AV Limit, the AV test doesn't perform for this submission.



6.2.2 Spurious Emissions

Below 1GHz

Vertical:



Item	Freq.	Read	Antenna	Preamp	Cable	Result	Limit	Over	Detector
(Mark)	(MHz)	Level	Factor	Factor	Loss	Level	Line	Limit	
		(dBμV)	(dBμA/μVm)	(dB)	(dB)	(dBμA/m)	(dBμA/m)	(dB)	
1	41.860	34.47	13.53	26.20	1.10	22.90	40.00	-17.10	QP
2	64.433	35.40	12.65	26.16	1.39	23.28	40.00	-16.72	QP
3	107.510	36.88	10.03	27.10	1.79	21.60	43.50	-21.90	QP
4	150.538	34.43	13.15	27.10	2.11	22.59	43.50	-20.91	QP
5	434.065	81.94	16.78	26.70	3.64	75.66	Fundamental Signal		
6	790.619	36.34	22.39	27.81	4.89	35.81	46.00	-10.19	QP
7	869.130	42.33	23.48	27.17	5.17	43.81	46.00	-2.19	QP



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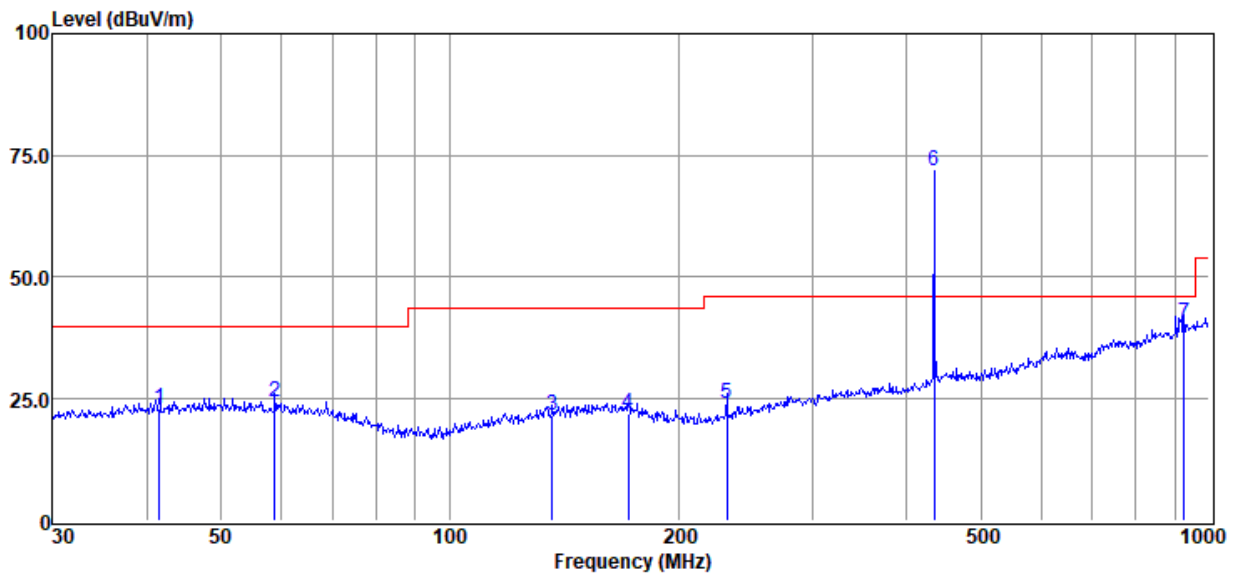
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Horizontal:



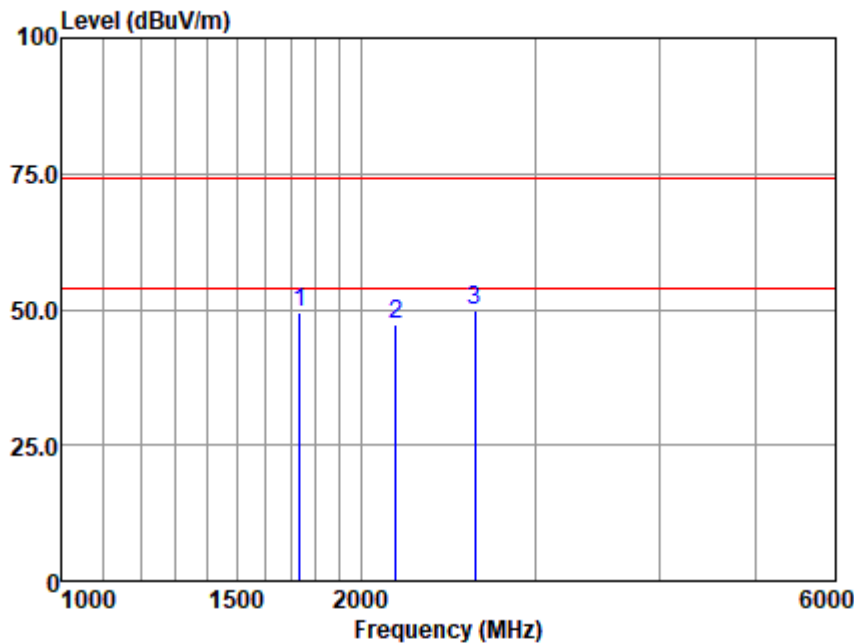
Item	Freq.	Read	Antenna	Preamp	Cable	Result	Limit	Over	Detector
(Mark)	(MHz)	Level	Factor	Factor	Loss	Level	Line	Limit	
1	41.422	34.75	13.50	26.20	1.11	23.16	40.00	-16.84	QP
2	58.819	35.86	13.36	26.20	1.26	24.28	40.00	-15.72	QP
3	136.460	34.32	12.45	27.10	2.03	21.70	43.50	-21.80	QP
4	171.995	34.01	12.77	26.92	2.30	22.16	43.50	-21.34	QP
5	231.718	37.81	10.59	26.85	2.66	24.21	46.00	-21.79	QP
6	434.065	78.18	16.78	26.70	3.64	71.90	Fundamental Signal		
7	925.756	38.27	23.91	27.15	5.39	40.42	46.00	-5.58	QP





Above 1GHz

Horizontal



Antenna Polarity :HORIZONTAL

EUT/Project :0502HS

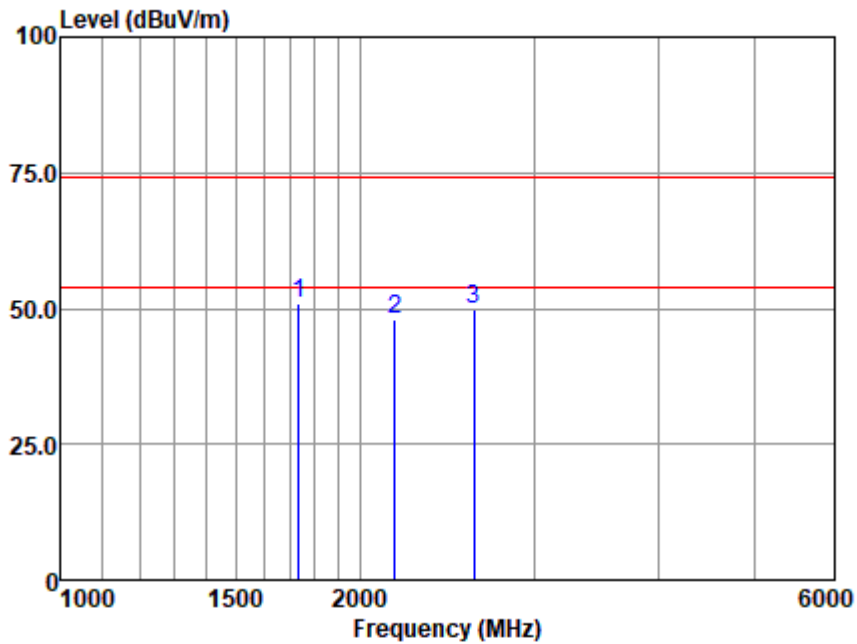
Test mode :00

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1736.829	57.49	25.46	7.81	41.28	49.48	74.00	-24.52	Peak
2	2169.767	53.92	26.45	8.79	41.79	47.37	74.00	-26.63	Peak
3	2603.126	54.60	27.82	9.83	42.40	49.85	74.00	-24.15	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



Vertical



Antenna Polarity :VERTICAL

EUT/Project :0502HS

Test mode :00

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1736.829	58.96	25.46	7.81	41.28	50.95	74.00	-23.05	Peak
2	2169.767	54.37	26.45	8.79	41.79	47.82	74.00	-26.18	Peak
3	2603.126	54.60	27.82	9.83	42.40	49.85	74.00	-24.15	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor



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6.3 20dB Bandwidth

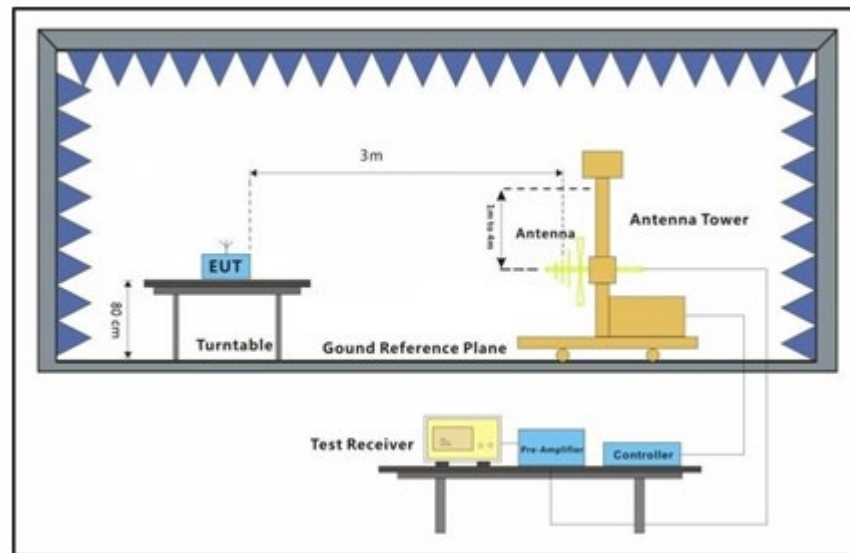
E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a: TX mode_Keep the EUT in transmitting with modulation mode.

Test Setup:



Limit:

The bandwidth of the emission shall be no wider than 0.25% of the center 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 center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

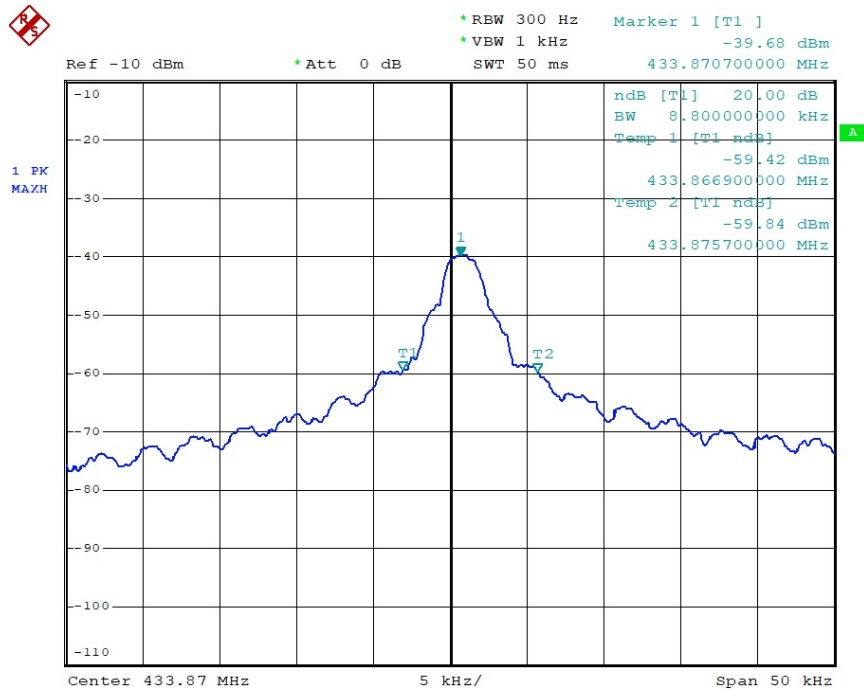
Test Results:

Pass

Frequency (MHz)	20dB bandwidth (kHz)	Limit (kHz)	Results
433.92	8.80	1084.8	Pass



Test plot as follows:



Date: 3.MAR.2022 13:43:45



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6.4 Dwell Time

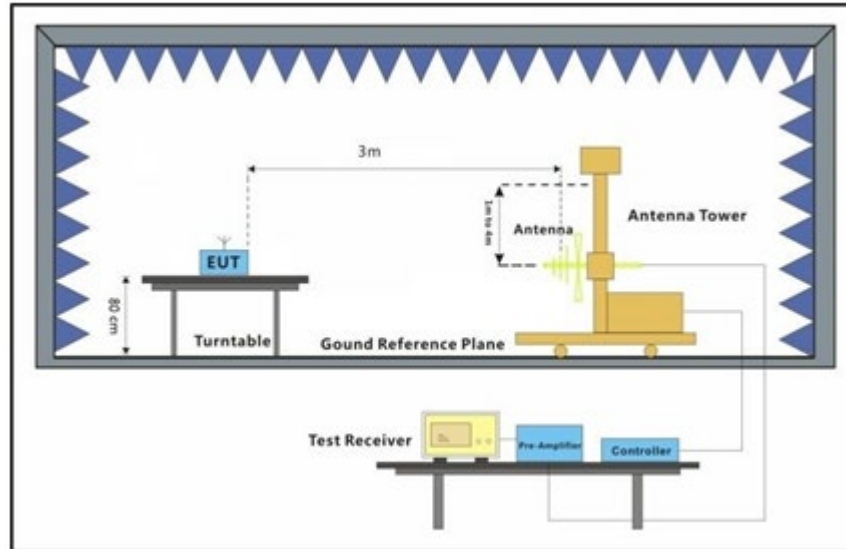
E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a: TX mode_Keep the EUT in transmitting with modulation mode.

Test Setup:



Limit: 15.231 (a): Not more than 5 seconds

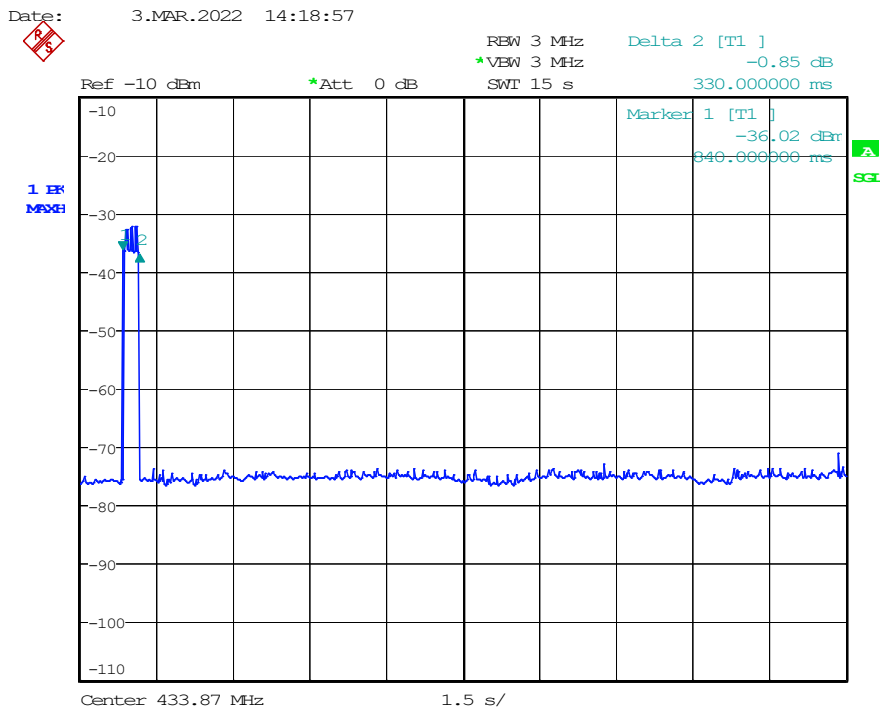
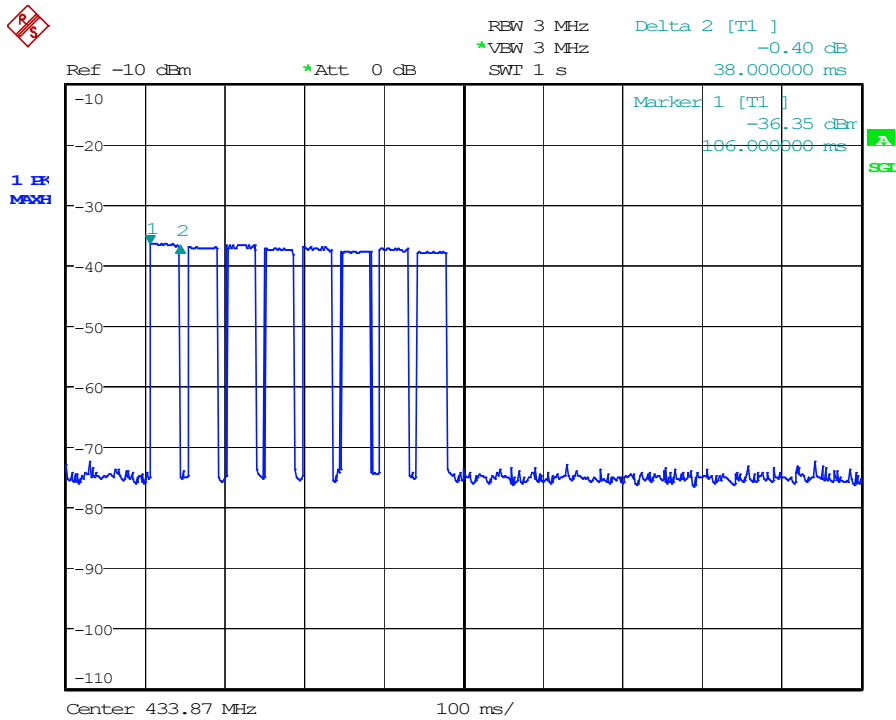
Test Results: Pass

Measurement Data:

Test item	Limit (s)	Results
Transmission Duration	≤5s	Pass



Test plot as follows:



Date: 17.MAR.2022 08:50:24



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7 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

8 EUT Constructional Details

Refer to the < External Photos > & <Internal Photos >.

--End of the Report--

