



ETSI EN 300440 RADIO TEST REPORT

On Behalf of

SHENZHEN FEIJIADA TECHNOLOGY CO., LTD

REMOTE CONTROL AIRCRAFTSERIES

Model No.: See page 5

Prepared for : SHENZHEN FEIJIADA TECHNOLOGY CO., LTD
428, BLDG. 2, JINFANGHUA E-COMMERCE INDUSTRIAL PARK,
Address : NO. 450 BULONG ROAD, BANTIAN ST., LONGGANG DISTRICT
SHENZHEN CHINA (MAINLAND)

Prepared By : Shenzhen Alpha Product Testing Co., Ltd.
Address : Building i, No.2, Lixin Road, Fuyong Street, Bao'an District,
518103, Shenzhen, Guangdong, China

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Date of Receipt : September 20, 2020
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Date of Report : September 25, 2020
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TEST REPORT DECLARATION

Applicant : SHENZHEN FEIJIADA TECHNOLOGY CO., LTD
 428, BLDG. 2, JINFANGHUA E-COMMERCE INDUSTRIAL PARK, NO. 450
 Address : BULONG ROAD, BANTIAN ST., LONGGANG DISTRICT SHENZHEN CHINA
 (MAINLAND)
 Manufacturer : SHENZHEN FEIJIADA TECHNOLOGY CO., LTD
 428, BLDG. 2, JINFANGHUA E-COMMERCE INDUSTRIAL PARK, NO. 450
 Address : BULONG ROAD, BANTIAN ST., LONGGANG DISTRICT SHENZHEN CHINA
 (MAINLAND)
 EUT Description : REMOTE CONTROL AIRCRAFT SERIES
 (A) Model No. : See page 5
 (B) Trademark : N/A

Measurement Standard Used:

ETSI EN 300 440 V2.2.1:2018

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. The measurement results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 300 440 requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:

Lucas Pang
 Project Engineer

Approved by (name + signature).....:

Simple Guan
 Project Manager

Date of issue.....:

September 25, 2020



Revision History

Revision	Issue Date	Revisions	Revised By
V0	September 25, 2020	Initial released Issue	Lucas Pang

1. General Information

1.1. Description of Device (EUT)

EUT Name	: REMOTE CONTROL AIRCRAFTSERIES
Trade Name	: N/A
Model No.	: JD-22, JD-22S, JD-23, JD-23S, JD-25, JD-25S, JD-26, JD-26S, JD-27, JD-27S, JD-28, JD-28S, JD-29, JD-29S, JD-30, JD-30S, E020, E021, E021S, E022, E022S, E38, E58, E58 PRO, E61, E61H, E61HW, E65H, E65HW, E511, E511S, E520, E520S, E520S PRO, E530, E530S, E68, E69, E610, E540, E540S, EX5 PRO, EX6, EX7, FX1, FX2, FX10, F111, F40, F41, F540, F540S, JY025, JY026, JY028, JY029, S161, S162, S163, S165, S166, S167, S168, S169, S171, S172, S173, S175, S176, S177, S178, S179, S186, S188, S189, S199
DIFF.	: There is no difference except for the model name. So all the test were performed on the model EX5
Power supply	: DC 6V by battery

2.4G Technology

Operation frequency	: 2405MHz -2475MHz
Number of channels	: 71
Channel spacing	: 1MHz
Antenna Type	: Internal Antenna, max gain 3.8dBi.

Hardware version : 6.SJ-297L+PA V3.0

Software version : 6.SJ-297L+PA V3.0

Sample Type : Prototype production

1.2. Accessories of Device (EUT)

Accessories1 : N/A
Manufacturer : N/A
Model : N/A
Input : N/A
Output : N/A

1.3. Ancillary Equipment Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1	/	/	/	/	/

1.4. Test Lab Information

Shenzhen Alpha Product Testing Co., Ltd
Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103,
Shenzhen, Guangdong, China

2. Summary of Test

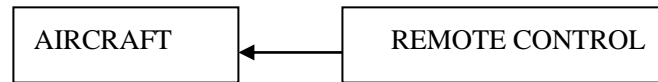
2.1. Test Standard description:

ETSI EN 300 440 V2.2.1:2018 Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum.

2.2. Summary of test result

Test Items	Standard	Clause No.	Result
Equivalent isotropically radiated power	EN 300 440 V2.2.1	4.2.2	PASS
Permitted range of operating frequencies	EN 300 440 V2.2.1	4.2.3	PASS
Unwanted emissions in the spurious domain	EN 300 440 V2.2.1	4.2.4	PASS
Duty cycle	EN 300 440 V2.2.1	4.2.5	N/A
Additional requirements for FHSS equipment	EN 300 440 V2.2.1	4.2.6	N/A
Adjacent channel selectivity	EN 300 440 V2.2.1	4.3.3	N/A
Blocking or desensitization	EN 300 440 V2.2.1	4.3.4	PASS
Spurious radiations	EN 300 440 V2.2.1	4.3.5	PASS
Note 1: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.			

2.3. Block Diagram of Configuration for test



2.4. Test mode

Tested mode and channel information		
Mode	Channel	Frequency (MHz)
GFSK	Low	2405
	Middle	2445
	High	2475

Channel list					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405MHz	5	2409MHz	68	2472MHz
2	2406MHz	6	2410MHz	69	2473MHz
3	2407MHz	7...66	2411...2470 MHz	70	2474MHz
4	2408MHz	67	2471MHz	71	2475MHz

2.5. Test Conditions

	Normal Conditions	Extreme Conditions
Temperature range	15-35°C	0°C and 40°C
Humidity range	20-75%	20-75%
Pressure range	86-106kPa	86-106kPa
Power supply	DC 6V	0.85times and 1.15times of normal voltage
Note 1: The test procedure described in clause 5.5, 5.6 and 5.7 of EN 300 440 was used for extreme test procedure.		

2.6. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Conducted Emission Test	2.74dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.77dB	Polarize: V
	3.80dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.13dB	Polarize: H
	4.16dB	Polarize: V
Uncertainty for radio frequency	5.4×10^{-8}	
Uncertainty for conducted RF Power	0.37dB	

2.7. Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last cal.	Cal. Due day
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	2019.09.07	2021.09.06
Test Receiver	R&S	ESCI	101165	2020.09.02	2021.09.01
Spectrum analyzer	R&S	FSV40-N	102137	2020.09.02	2021.09.01
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2019.09.07	2021.09.06
Filter	KANGMAI	ZLPF-LDC-1000- 1959	1209002075	2020.09.02	2021.09.01
Filter	WAINWRIGHT	WHKX2.80 /18G- 12SS	SN1	2020.09.02	2021.09.01
RF Cable	Resenberger	Cable 4	N/A	2020.09.02	2021.09.01
CMU200	R&S	CMU200	116785	2020.09.02	2021.09.01
Signal Analyzer	Agilent	N9020A	MY499100060	2020.09.02	2021.09.01
vector Signal Generator	Agilent	N5182A	MY49060042	2020.09.02	2021.09.01
vector Signal Generator	Agilent	E4438C	US44271917	2020.09.02	2021.09.01
Amplifier	HP	HP8347A	2834A00455	2020.09.02	2021.09.01
Amplifier	Agilent	8449B	3008A02664	2020.09.02	2021.09.01
Filter	WAINWRIGHT	WHKX1.0G/15G- 10SS	SN40	2020.09.02	2021.09.01
Test Receiver	R&S	ESR	1316.3003K03- 102082-Wa	2020.09.02	2021.09.01
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	2020.09.02	2021.09.01
RF Cable	Resenberger	Cable 1	N/A	2020.09.02	2021.09.01
RF Cable	Resenberger	Cable 2	N/A	2020.09.02	2021.09.01
RF Cable	Resenberger	Cable 3	N/A	2020.09.02	2021.09.01
Power Sensor	DARE	RPR3006W	15100041SNO91	2020.09.02	2021.09.01
Power Sensor	DARE	RPR3006W	15100041SNO92	2020.09.02	2021.09.01
CMW500	R&S	CMW500	1201.0002K50-1172 39-sM	2020.09.02	2021.09.01
Loop Antenna	SCHWARZBECK	FMZB 1519B	00059	2019.09.07	2020.09.06
Attenuator	HP	8494B	DC-18G	2020.09.02	2021.09.01
Attenuator	HP	8496B	DC-18G	2020.09.02	2021.09.01
Temp. & Humid. Chamber	Wei Huang	WHTH-1000-40-8 80	100631	2020.08.11	2021.08.10
20dB Attenuator	ICPROBING	IATS1	82347	2020.09.02	2021.09.01

3. Technical Requirements Specifications

3.1. Equivalent isotropically radiated power

3.1.1. Test Limit

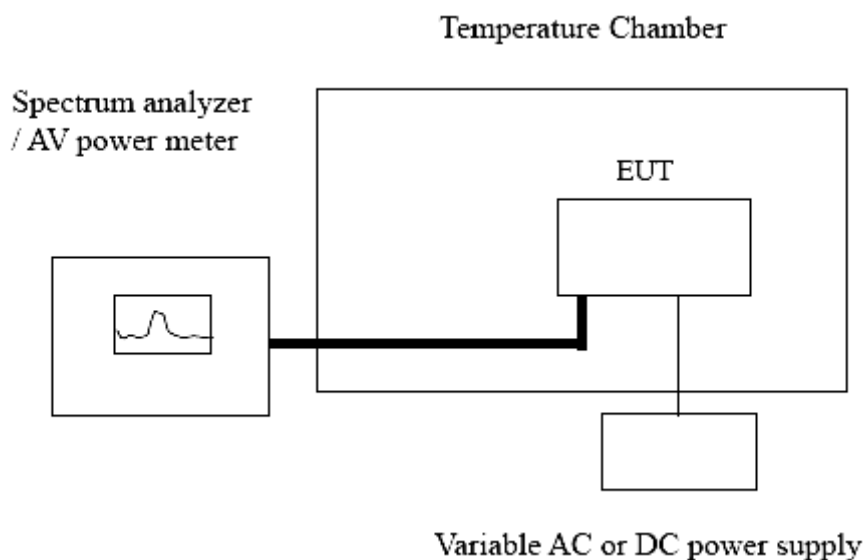
The transmitter maximum e.i.r.p. under normal and extreme test conditions shall not exceed the values given in table 2.

Table 2: Maximum radiated peak power (e.i.r.p.)

Frequency Bands	Power	Application	Notes
2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Non-specific short range devices	
2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Radio determination devices	
(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Non-specific short range devices	
9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radio determination devices	
9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radio determination devices	
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radio determination devices	
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radio determination devices	
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radio determination devices	See annex F
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and Radio determination devices	

3.1.2. Test Setup

See the next page.



3.1.3. Test Procedure

For more details, please see the ETSI EN300 440 V2.2.1 clause 4.2.2.

3.1.4. Test Results

Test Conditions		Transmitter Power(dBm)		
		Low Channel (PK, dBm)	Middle Channel (PK, dBm)	High Channel (PK, dBm)
Temp (0 °C)	V _{min}	-4.17	-5.12	-7.75
	V _{max}	-4.86	-5.33	-7.23
Temp (25°C)	V _{nom}	-4.16	-5.13	-7.15
Temp (40°C)	V _{min}	-4.34	-5.16	-7.13
	V _{max}	-4.13	-5.18	-7.54
Notes: Test limit is 10mW				

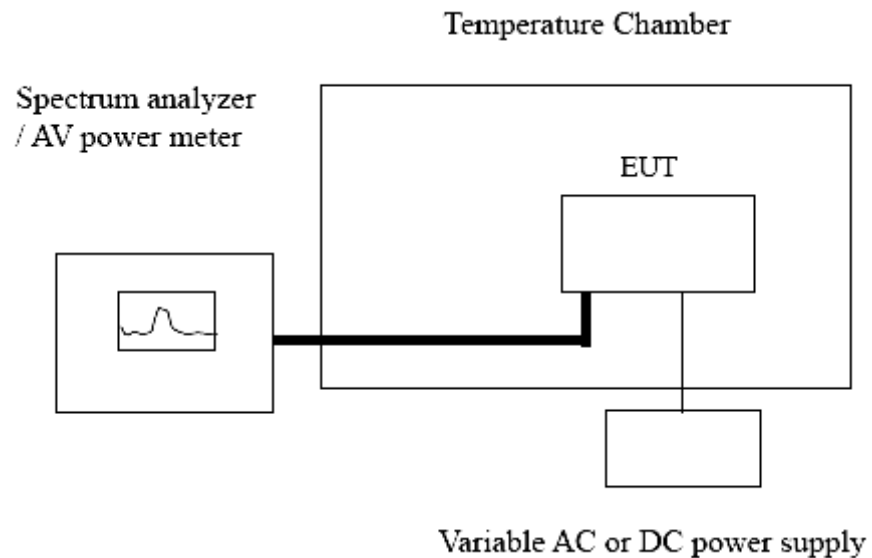
Test Conditions		EIRP (dBm)		
		Low Channel (PK, dBm)	Middle Channel (PK, dBm)	High Channel (PK, dBm)
Temp (0 °C)	V _{min}	-0.37	-1.32	-3.95
	V _{max}	-1.06	-1.53	-3.43
Temp (25°C)	V _{nom}	-0.36	-1.33	-3.35
Temp (40°C)	V _{min}	-0.54	-1.36	-3.33
	V _{max}	-0.33	-1.38	-3.74
Notes: 1 Test limit is 10mW. 2 Antenna gain =3.8dBi				

3.2. Permitted range of operating frequencies

3.2.1. Limit

For all equipment the frequency range shall lie within the band 2.4GHz to 2.4835 GHz ($f_L > 2.4\text{GHz}$ and $f_H < 2.4835\text{GHz}$).

3.2.2. Test Setup



3.2.3. Test Procedure

See subclause 4.2.3 of ETSI EN 300 440V2.2.1

3.2.4. Frequency Range Test Results

Pass

Test Conditions		Frequency (MHz)	
Temperature (°C)	Voltage (V DC)	Lowest	Highest
0	V _{min}	2400.389	2483.243
	V _{max}	2400.385	2483.256
25	V _{nom}	2400.386	2483.252
40	V _{min}	2400.381	2483.245
	V _{max}	2400.387	2483.256
Measured Frequencies			
Limit		2400.0000MHz	2483.500MHz

3.3. Unwanted emissions in the spurious domain

3.3.1. Limit

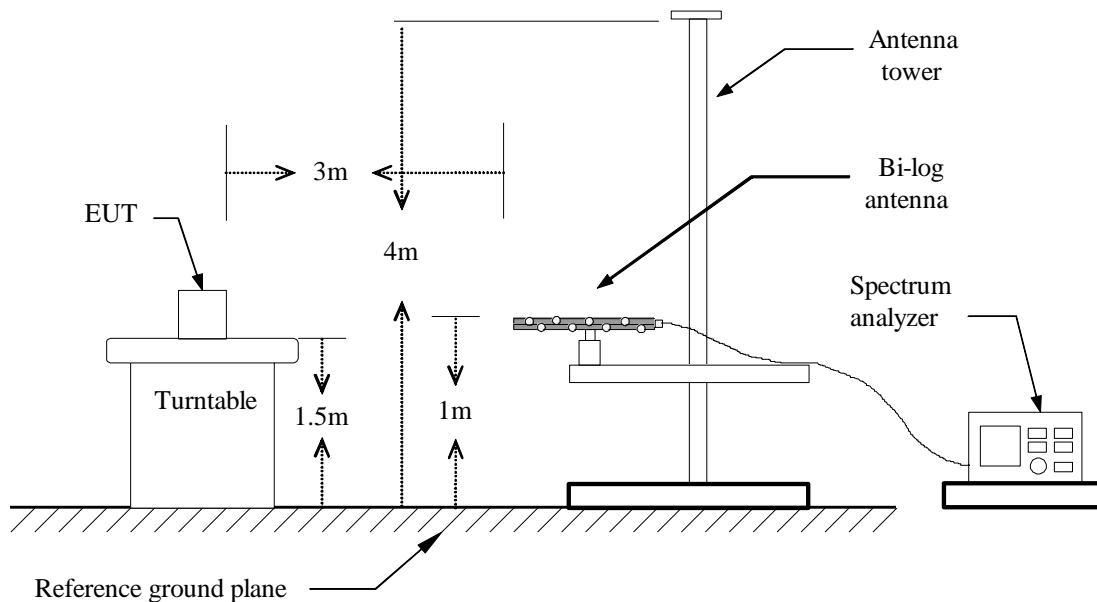
ETSI EN 300 440 V2.2.1 Sub-clause 4.2.4

The power of any spurious emission, conducted or radiated, shall not exceed the following values given below:

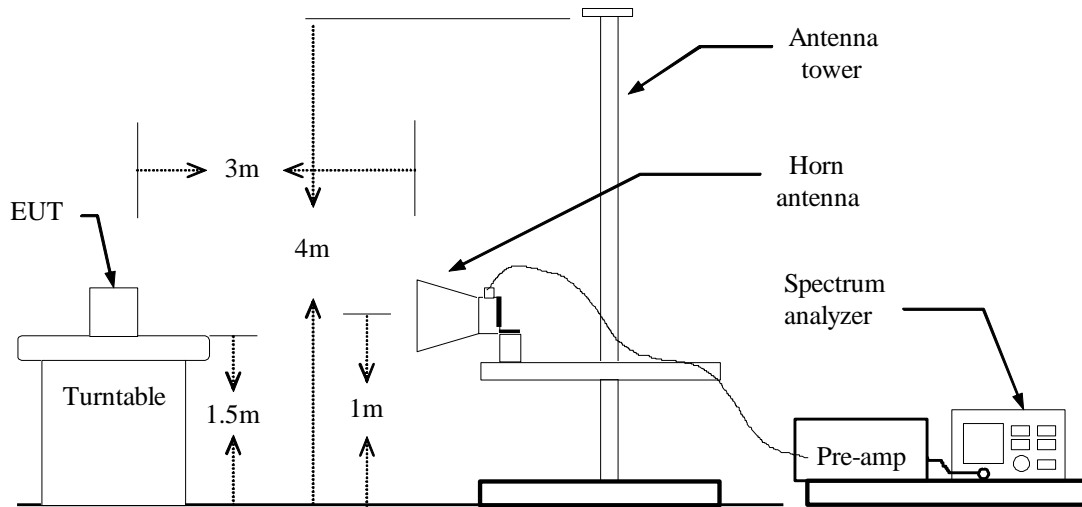
State	47MHz-74MHz 87.5MHz-118 MHz 174 MHz -230 MHz 470 MHz -862 MHz	Other frequencies <=1000MHz	Frequencies > 1000MHz
Operating	4nW/-54dBm	250nW/-36dBm	1 μ W/-30dBm
Standby	2nW/-57dBm	2nW/-57dBm	20nW/-47dBm

3.3.2. Test Setup

Below 1GHz



Above 1GHz



3.3.3. Test Procedure

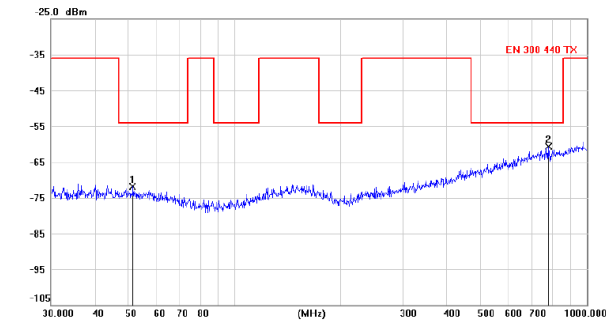
Please refer to ETSI EN 300 440 V2.2.1 Sub-clause 7.3.4

3.3.4. Test Result

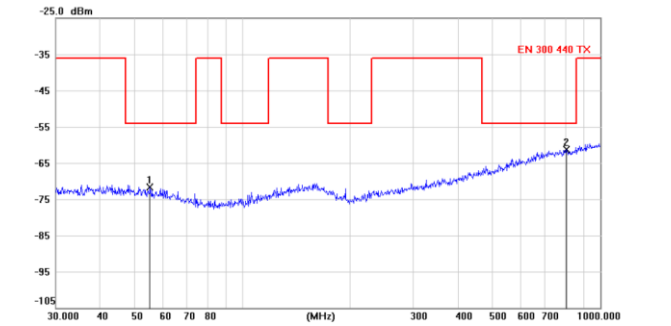
PASS.

For more details, Please see the next page.

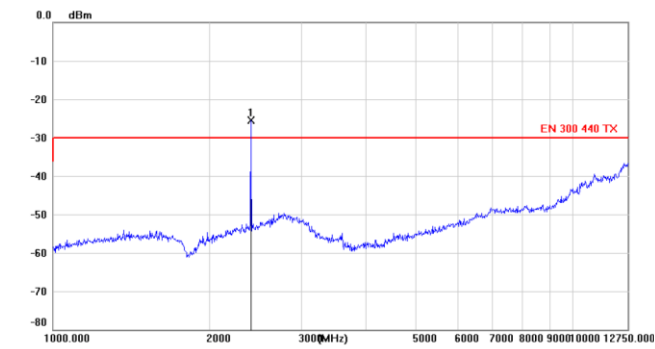
CH1:2405MHz

Vertical

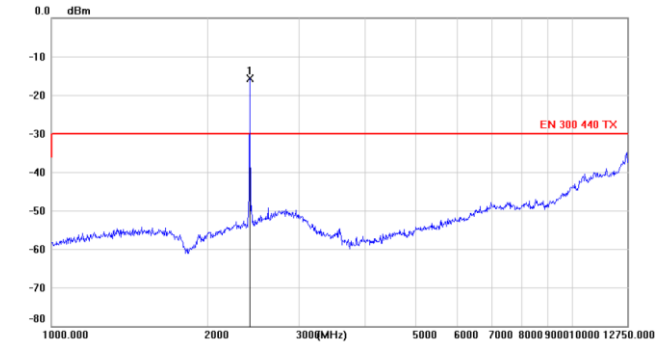
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	Detector	cm	degree
1		51.4627	-97.67	25.73	-71.94	-54.00	-17.94	peak		
2	*	778.5141	-95.33	34.61	-60.72	-54.00	-6.72	peak		

Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	Detector	cm	degree
1		55.1820	-97.13	25.42	-71.71	-54.00	-17.71	peak		
2	*	805.4496	-96.11	34.83	-61.28	-54.00	-7.28	peak		



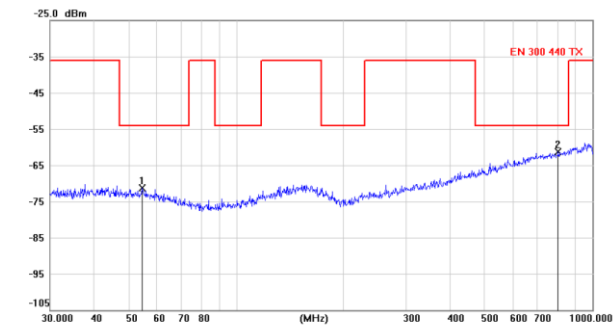
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	Detector	cm	degree
1	*	2404.747	-32.92	7.37	-25.55	-30.00	4.45	peak		



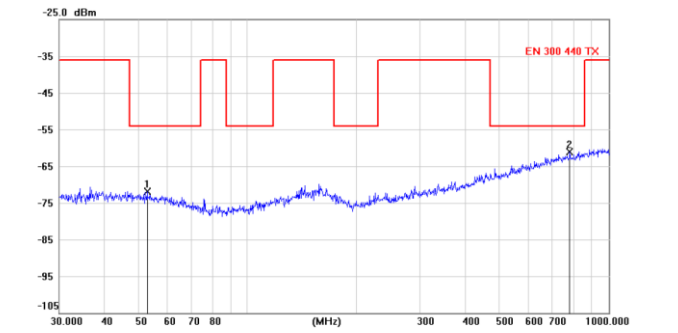
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	Detector	cm	degree
1	*	2404.747	-22.99	7.37	-15.62	-30.00	14.38	peak		

Note: The test data from 12.75G to 26.5G is too low than the limit, so not show in this report.

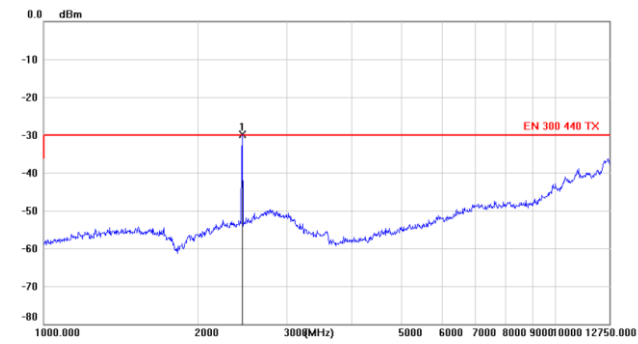
CH5:2445MHz

Vertical

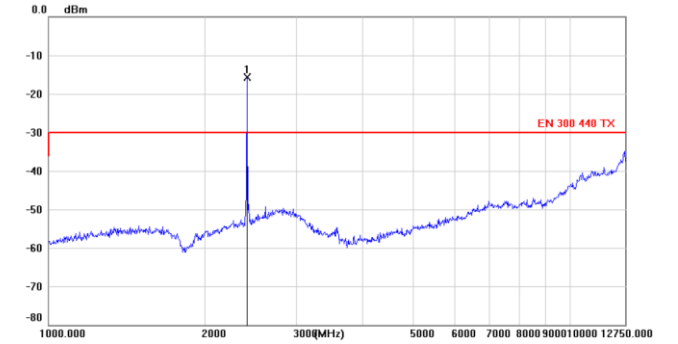
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	cm	degree	Comment
1		54.4707	-96.84	25.50	-71.34	-54.00	-17.34			peak
2	*	803.7567	-96.05	34.81	-61.24	-54.00	-7.24			peak

Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	cm	degree	Comment
1		52.6122	-97.52	25.63	-71.89	-54.00	-17.89			peak
2	*	781.2468	-95.68	34.63	-61.05	-54.00	-7.05			peak



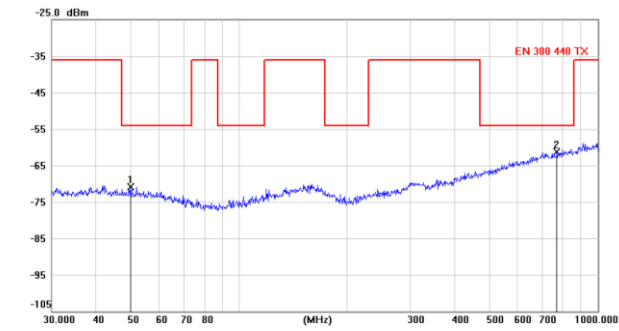
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	cm	degree	Comment
1	*	2444.244	-37.43	7.60	-29.83	-30.00	0.17			peak



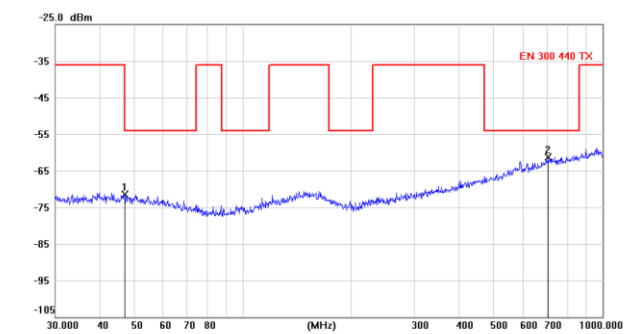
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	cm	degree	Comment
1	*	2404.747	-22.99	7.37	-15.62	-30.00	14.38			peak

Note: The test data from 12.75G to 26.5G is too low than the limit, so not show in this report.

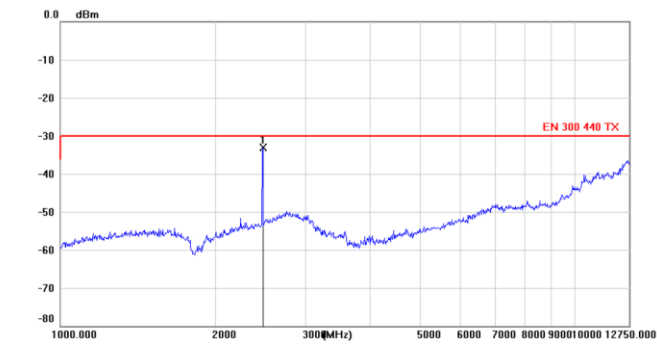
CH12:2475MHz

Vertical

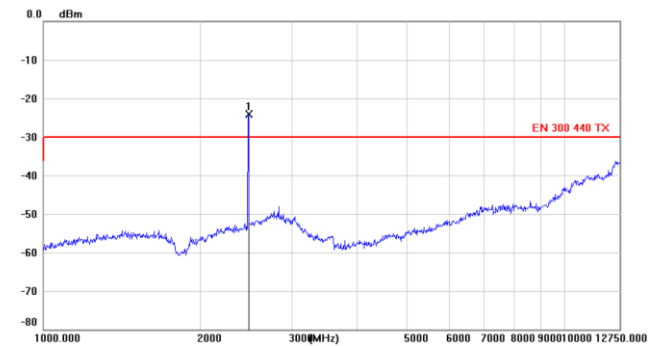
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree
		MHz	dBm	dB	dBm	dBm	dB	cm	degree
1		49.8639	-96.81	25.89	-70.92	-54.00	-16.92	peak	
2	*	770.0972	-95.78	34.54	-61.24	-54.00	-7.24	peak	

Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree
		MHz	dBm	dB	dBm	dBm	dB	cm	degree
1		48.9618	-97.35	25.92	-71.43	-54.00	-35.43	peak	
2	*	706.2044	-94.92	33.66	-61.26	-54.00	-7.26	peak	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree
		MHz	dBm	dB	dBm	dBm	dB	cm	degree
1	*	2474.923	-40.91	7.78	-33.13	-30.00	-3.13	peak	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree
		MHz	dBm	dB	dBm	dBm	dB	cm	degree
1	*	2474.923	-31.89	7.78	-24.11	-30.00	5.89	peak	

Note: The test data from 12.75G to 26.5G is too low than the limit, so not show in this report.

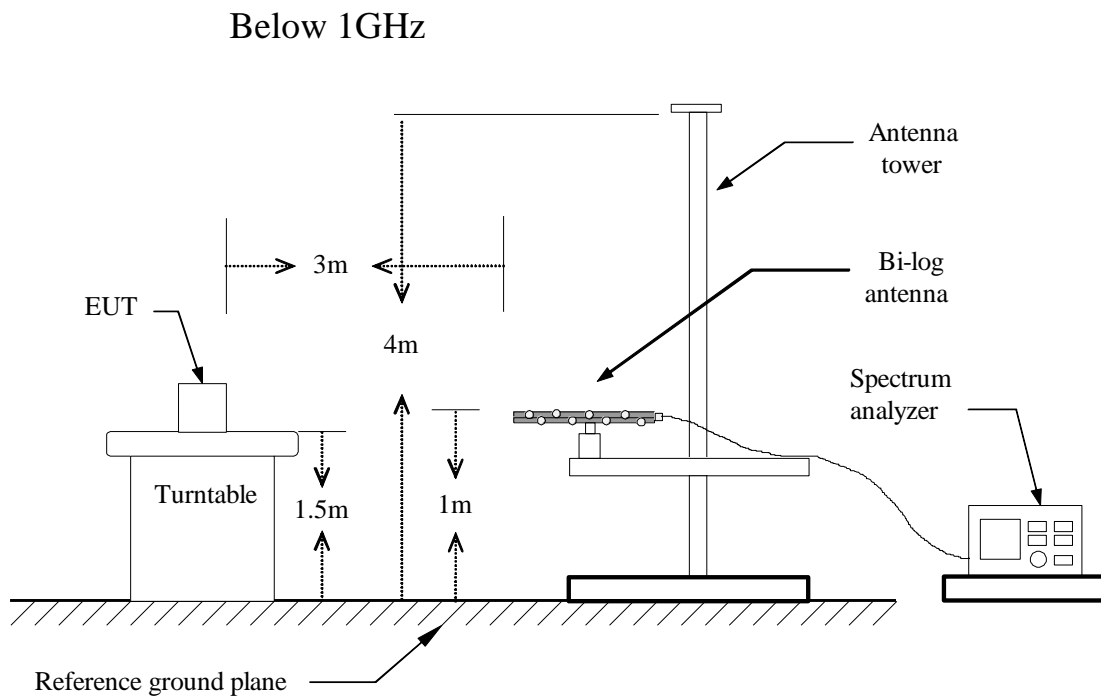
3.4. Receive Spurious Emission

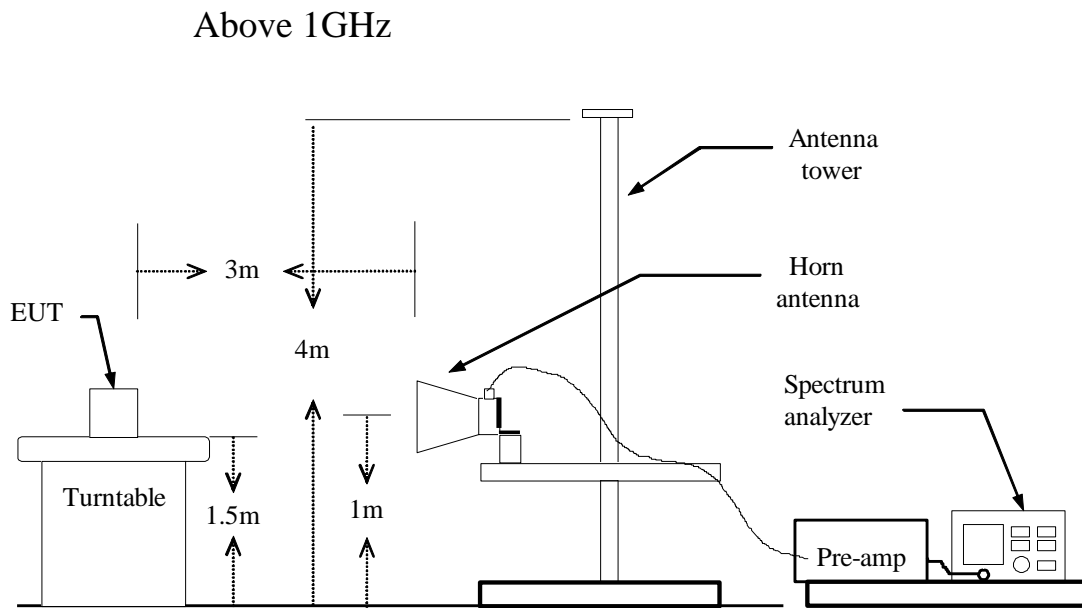
3.4.1. Limit

Please refer to ETSI EN 300 440 V2.2.1 Sub-clause 4.3.5

The power of any spurious emission shall not exceed $2\text{nW}(-57\text{dBm})$ in the range 25MHz to 1GHz and shall not exceed $20\text{nW}(-47\text{dBm})$ on frequencies above 1GHz.

3.4.2. Test Setup





3.4.3. Test Procedure

Please refer to ETSI EN 300 440 V2.2.1 Sub-clause 4.3.5

3.4.4. Test Result

The EUT have no RX function, so this item does not applicable.

3.5.Blocking or desensitization

3.5.1. Limit

Please refer to ETSI EN 300 440 V2.2.1: 2018 Sub-clause 4.3.4.

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table ,except at frequencies on which spurious responses are found.

Table 6: Limits for blocking or desensitization

Receiver category	Limit
1	-30 dBm + k
2	-45 dBm + k
3	-60 dBm + k

The correction factor, k, is as follows:

$$k = \square -20\log f -10\log BW$$

Where:

- f is the frequency in GHz;
- BW is the channel bandwidth in MHz.

The factor k is limited within the following:

- $0 < k < 40$ dB.

3.5.2. Test Procedure

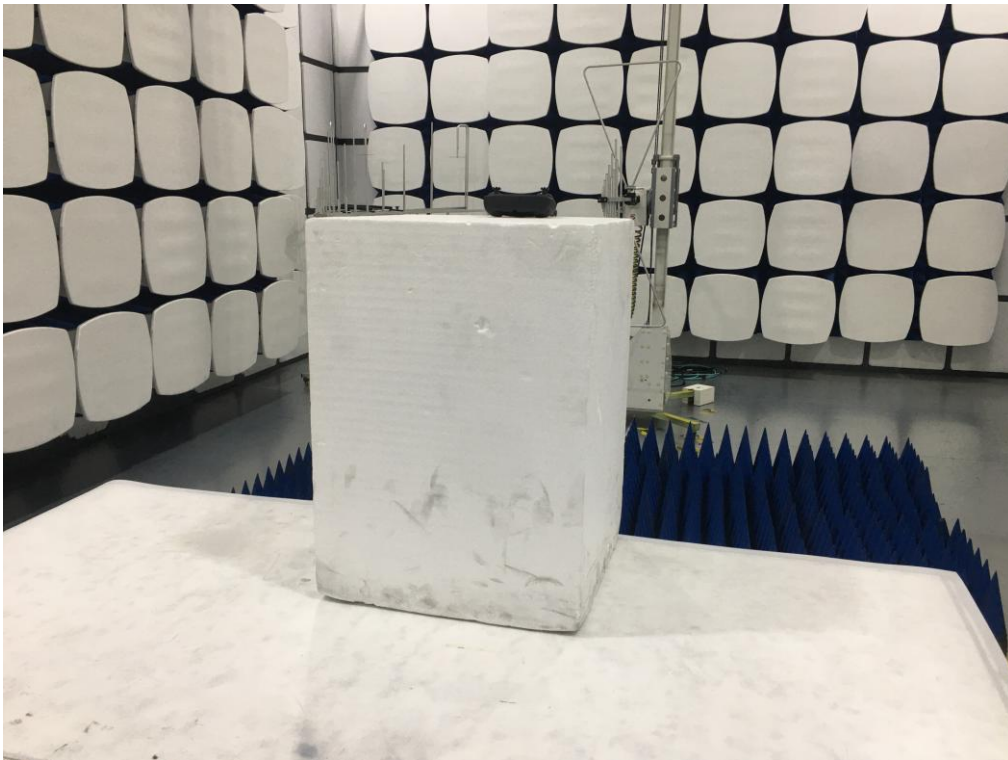
Please refer to ETSI EN 300 440 V2.2.1 Sub-clause 4.3.4

3.5.3. Test Result

Receiver Category 2				
Wanted Signal Channel (MHz)	Unwanted Signal Frequency (MHz)	Test Result (dBm)	Limit (dBm)	Result
2402	2402-200	>0	-56.63	Pass
2402	2402-400	>0	-56.63	Pass
2402	2402-1000	>0	-56.63	Pass
2482	2482 +200	>0	-56.78	Pass
2482	2482 +400	>0	-56.78	Pass
2482	2482 +1000	>0	-56.78	Pass
<p>The method of coupling to the receiver is via a test antenna to the receiver integrated.</p> <p>(2405MHz) $BW1=99\%OBW= 2.522MHz$</p> <p>(2475MHz) $BW2=99\%OBW= 2.446MHz$</p> <p>(2405MHz) $K1=-20\log f -10\log BW=-20\log(2.402)-10\log(2.522)= -11.63dB$</p> <p>(2475MHz) $K2=-20\log f -10\log BW=-20\log(2.482)-10\log(2.446)= -11.78dB$</p> <p>So</p> <p>Limit=-45dBm+K1= -56.63dBm</p> <p>Limit=-45dBm+K2= -56.78dBm</p>				

4. Test setup photo

TX



5. Photos of EUT

Please refer to report A2009169-C02-R01.

-----THE END OF REPORT-----