SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

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TEST REPORT

Application No.:	SZEM1512007923CR
Applicant:	Shenzhen Hubsan Intelligent Co., Ltd.
Manufacturer:	Shenzhen Hubsan Intelligent Co., Ltd.
Factory:	DONGGUAN TENGSHENG INDUSTRIAL CO., LTD.
Product Name:	HUBSAN FPV X4 BRUSHLESS
Model No.(EUT):	H901A
Add Model No.:	FPV2
Trade Mark:	HUBSAN
Standards:	EN 300 440-1 V1.6.1 (2010-08)
	EN 300 440-2 V1.4.1 (2010-08)
Date of Receipt:	2015-12-28
Date of Test:	2016-01-19 to 2016-04-05
Date of Issue:	2016-04-08
Test Result:	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

2 Test Summary

Radio Spectrum Matter (RSM) Part				
Transmitter Parameters				
Test	**Test Requirement**	**Test Procedure**	**Limit**	**Result**
Equivalent Isotropically Radiated Power	EN 300 440-2 V1.4.1 (2010-08) Clause 4.2.1.1	EN 300 440-1 V1.6.1 (2010-08) Clause 7.1	10mW	PASS
Permitted Range of Operating Frequencies	EN 300 440-2 V1.4.1 (2010-08) Clause 4.2.1.2	EN 300 440-1 V1.6.1 (2010-08) Clause 7.2	Clause 7.2.4	PASS
Spurious Emission from Tx	EN 300 440-2 V1.4.1 (2010-08) Clause 4.2.1.3	EN 300 440-1 V1.6.1 (2010-08) Clause 7.3	Table 5	PASS
Duty Cycle	EN 300 440-2 V1.4.1 (2010-08) Clause 4.2.1.4	EN 300 440-1 V1.6.1 (2010-08) Clause 7.4	Table 6	PASS
Receiver Parameters				
Spurious Emission from Rx	EN 300 440-2 V1.4.1 (2010-08) Clause 4.2.2.3	EN 300 440-1 V1.6.1 (2010-08) Clause 8.3	Clause 8.3.5	PASS

Remark:

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp meansTemperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application

Model No.: H901A, FPV2

Only the model H901A was tested, since the electrical circuit design, layout, components used and internal wiring were identical for all above models, only different on model No..

3 Contents

4 General Information

4.1 Client information

Applicant:	Shenzhen Hubsan Intelligent Co., Ltd.
Address of Applicant:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China.
Manufacturer:	Shenzhen Hubsan Intelligent Co., Ltd.
Address of Manufacturer:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China.
Factory:	DONGGUAN TENGSHENG INDUSTRIAL CO., LTD.
Address of Factory:	A22# Luyi Street, Tianxin Village, Tangxia Town, Dong guan, China

4.2 General Description of EUT

Product Name:	HUBSAN FPV X4 BRUSHLESS
Model No.:	H901A
Trade Mark:	HUBSAN
Frequency Range:	2410MHz-2465MHz
Modulation Type:	GFSK
Sample Type:	Portable production
Antenna Type:	Chip Antenna
Antenna Gain:	1.0dBi
Power Supply:	6.0V DC (4 x 1.5V “AA” Size Batteries)

Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1 CH	2410 MHz	5 CH	2430 MHz	9 CH	2450 MHz
2 CH	2415 MHz	6 CH	2435 MHz	10 CH	2455 MHz
3 CH	2420 MHz	7 CH	2440 MHz	11 CH	2460 MHz
4 CH	2425 MHz	8 CH	2445 MHz	12 CH	2465 MHz

Using test software was control EUT work in continuous transmitter and receiver mode.and select test channel as below:

Channel	Frequency
The lowest channel (CH1)	2410MHz
The middle channel (CH6)	2435MHz
The highest channel (CH12)	2465MHz

4.3 Description of Support Units

The EUT has been tested independently.

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 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. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen 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. Registration No.: 556682.

• **Industry Canada (IC)**

The 3m Semi-anechoic chambers and the 10m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-2, 4620C-3.

4.6 Deviation from Standards

None.

4.7 Abnormalities from Standard Conditions

None.

4.8 Other Information Requested by the Customer

None.

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

No.	Item	Measurement Uncertainty
1	Radio frequency	7.25×10^{-8}
2	RF power (conducted)	0.75dB
3	Radiated Spurious emission	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-25GHz)
4	Temperature test	1℃
5	Humidity test	3%
6	DC and low frequency voltages test	0.5%

5 Equipment List

RE in Chamber						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
1	Fully-Anechoic Chamber 1	SAEMC	MFAC	SEL0338	2014-07-22	2017-07-22
2	Spectrum Analyzer	Rohde & Schwarz	FSP 30	SEL0154	2015-10-17	2016-10-17
3	Test software	Farad	EMC-RI	SEL0340	N/A	N/A
4	Coaxial cable	SGS	N/A	SEL0272	2014-10-23	2017-10-23
5	Coaxial cable	SGS	N/A	SEL0279	2015-10-23	2017-10-23
6	Coaxial cable	SGS	N/A	SEL0339	2014-10-23	2017-10-23
7	BiConiLog Antenna (30MHz-3GHz)	Schwarzbeck	VULB9163	SEL0334	2015-10-17	2018-10-17
8	Horn Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEL0310	2015-06-14	2018-06-14
9	Pre-amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEL0314	2015-10-17	2016-10-17
10	Radio Communication Analyzer	Anritsu	MT8820C	SEL0401	2015-04-25	2016-04-25
11	Universal Radio Communication Tester	Rohde & Schwarz	CMU200	SEL0230	2015-04-25	2016-04-25
12	Humidity and Temperature Indicator	Meijieshi	TH101B	SEL0306	2015-04-28	2016-04-28

RF connected test						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
1	Temperature Chamber	GuangZhou GongWen	GDJW-100	SEL0043	2015-05-20	2016-05-20
2	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2015-10-09	2016-10-09
3	Humidity/ Temperature Indicator	HYGRO	ZJ1-2B	SEL0033	2015-10-24	2016-10-24
4	Spectrum Analyzer	Rohde & Schwarz	FSP	SEL0154	2015-10-17	2016-10-17
5	Coaxial cable	SGS	N/A	SEL0178	2015-05-29	2016-05-29
6	Coaxial cable	SGS	N/A	SEL0179	2015-05-29	2016-05-29
7	Barometer	ChangChun	DYM3	SEL0088	2015-05-13	2016-05-13
8	Signal Generator	Rohde & Schwarz	SML03	SEL0068	2015-04-25	2016-04-25
9	Band filter	Amideon	82346	SEL0094	2015-05-13	2016-05-13
10	POWER METER	R & S	NRVS	SEL0144	2015-10-09	2016-10-09
11	Attenuator	Beijin Feihang Taida	TST-2-6dB	SEL0205	2015-04-25	2016-04-25
12	NOISE GENERATOR	Beijin Daming Jidian	DM1660	EMC0047	2015-10-24	2016-10-24

6 Radio Technical Requirements Specification in EN 300 440-2

6.1 Transmitter Requirements

6.1.1 Equivalent Isotropically Radiated Power

6.1.1.1 -6dB Bandwidth

Test Requirement: EN 300 440-1 Clause 7.1.2.1

Test Method: EN 300 440-1 Clause 7.1.2

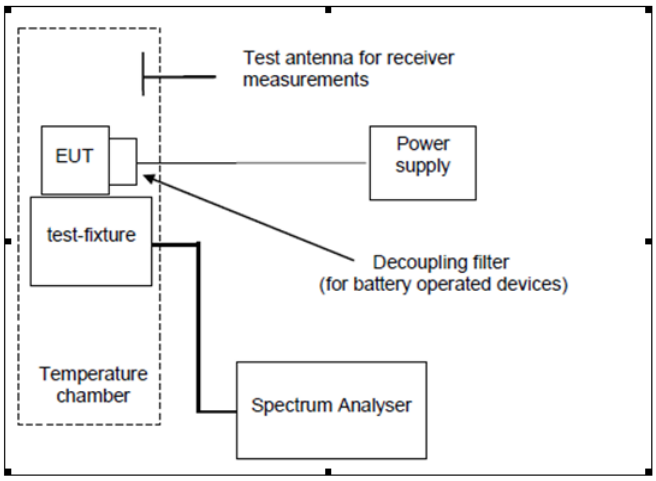
EUT Operation:

Ambient: Temp.: 26.0 °C Humid.: 56 % Press.: 1025 mbar

Test Status: 1) Keep the EUT in continuously transmitting with Modulation test single.
2) Test EUT in normal conditions

Equipment Used: Refer to section 5 for details.

Test Setup:



Bandwidth Requirement: Channel bandwidth of 1 MHz or less

Test Result: N/A

Test Data:

Mode	Channel (Frequency)	-6dB Bandwidth(MHz)	Requirement (MHz)	Conclusion
GFSK	CH1 (2410MHz)	0.568	Channel bandwidth of 1 MHz or less	N/A
	CH6 (2435MHz)	0.568	Channel bandwidth of 1 MHz or less	N/A
	CH12 (2465MHz)	0.572	Channel bandwidth of 1 MHz or less	N/A

6.1.1.2 Equivalent Isotropically Radiated Power

Test Requirement: EN 300 440-2 Clause 4.2.1.1

Test Method: EN 300 440-1 Clause 7.1.2

EUT Operation:

Ambient: Temp.: 25.0 °C Humid.: 57 % Press.:1025 mbar

Test Status: 1) Keep the EUT in continuously transmitting with Modulation test single.

2) Test EUT in normal conditions, then repeat in extreme conditions.

Equipment Used: Refer to section 5 for details.

Test Procedure:

1. Using test software to set up the lowest channel, the middle channel, the highest channel.
2. The technique used to find the radiated power of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERIP emission levels of the EUT.

The following test procedure as below:

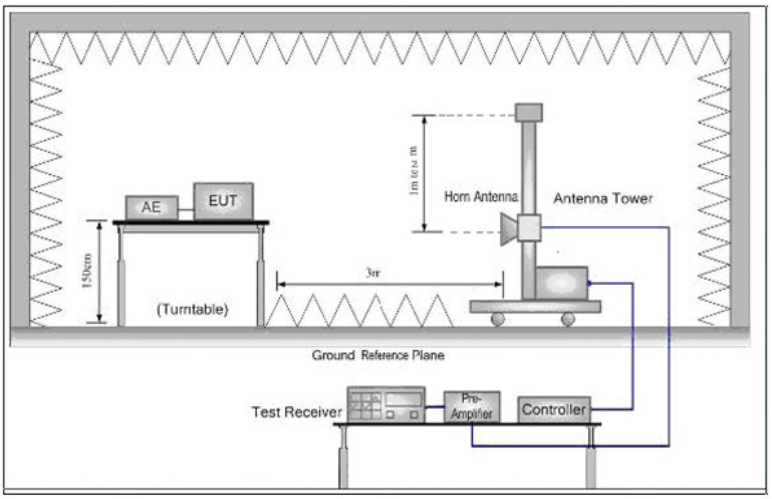
1) The EUT was powered ON and placed on a 1.5m high table in the chamber. The antenna of the transmitter was extended to its maximum length.
2) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering the receive antenna from 1m to 2m and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
3) Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
4) The transmitter was then removed and replaced with substitution antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
5) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.
6) The output power into the substitution antenna was then measured.
7) Steps 5) and 6) were repeated with both antennas polarized.
8) Pretest the EUT at different transmission time slot data and worst case data in the report.
9) Calculate power in dBm by the following formula:

EIRP valuse (dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

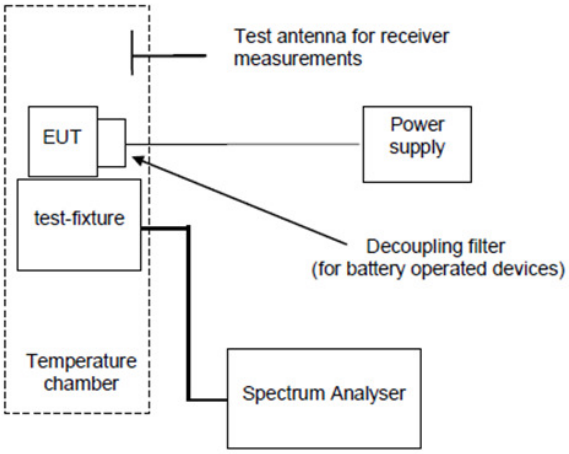
where:

Pg is the generator output power into the substitution antenna.

Test Setup:
(Normal Condition)



Test Setup:
(Extreme Condition)



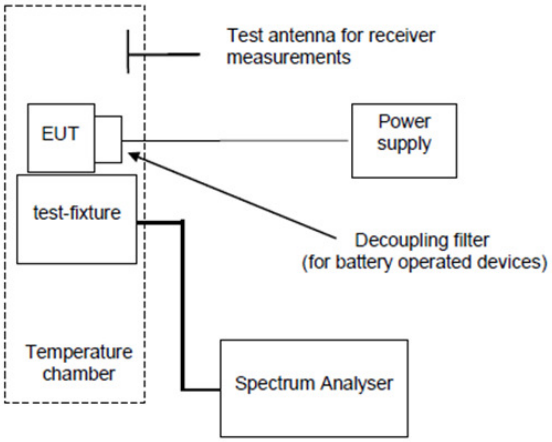
Limit: 10dBm

Test Data:

Test Conditions		Mode	Channel (Frequency)	EIRP value (dBm)	Limit (dBm)	Result
Temp (℃)	Volt (V DC)					
Normal (25)	V_{norm}: 6	GFSK	CH1(2410MHz)	4.13	10	PASS
			CH6(2435MHz)	5.23	10	PASS
			CH12(2465MHz)	5.87	10	PASS
0	V_{min}: 5.1	GFSK	CH1(2410MHz)	4.12	10	PASS
			CH6(2435MHz)	5.22	10	PASS
			CH12(2465MHz)	5.86	10	PASS
0	V_{max}: 6.0	GFSK	CH1(2410MHz)	4.11	10	PASS
			CH6(2435MHz)	5.21	10	PASS
			CH12(2465MHz)	5.85	10	PASS
35	V_{min}: 5.1	GFSK	CH1(2410MHz)	4.14	10	PASS
			CH6(2435MHz)	5.24	10	PASS
			CH12(2465MHz)	5.88	10	PASS
35	V_{max}: 6.0	GFSK	CH1(2410MHz)	4.15	10	PASS
			CH6(2435MHz)	5.25	10	PASS
			CH12(2465MHz)	5.89	10	PASS
Remark: EIRP= Read EIRP value (dBm)						

6.1.2 Permitted Range of Operating Frequencies

Test Requirement: EN 300 440-2 Clause 4.2.1.2
Test Method: EN 300 440-1 Clause 7.2.2
EUT Operation:
Ambient: Temp.: 26.0 °C Humid.: 56 % Press.: 1025 mbar
Test Status: 1) Keep the EUT in continuously transmitting with Modulation test single.
2) Test EUT in normal conditions, then repeat in extreme conditions.
Equipment Used: Refer to section 5 for details.
Test Setup:



Limit: F_L>2.4GHz and F_H <2.4835GHz (section 7.1.3 table 4)

Test Data:

Test Conditions		Mode	CH(Frequency)	Result(MHz)	Limit (MHz)	Conclusion
Temp (℃)	Volt (V DC)					
Normal (25)	V_{norm}: 6	GFSK	CH1(2410MHz)	2409.385	>2400	PASS
			CH12(2465MHz)	2465.715	<2483.5	PASS
0	V_{min}: 5.1	GFSK	CH1(2410MHz)	2409.384	>2400	PASS
			CH12(2465MHz)	2465.714	<2483.5	PASS
0	V_{max}: 6.0	GFSK	CH1(2410MHz)	2409.383	>2400	PASS
			CH12(2465MHz)	2465.713	<2483.5	PASS
35	V_{min}: 5.1	GFSK	CH1(2410MHz)	2409.386	>2400	PASS
			CH12(2465MHz)	2465.716	<2483.5	PASS
35	V_{max}: 6.0	GFSK	CH1(2410MHz)	2409.387	>2400	PASS
			CH12(2465MHz)	2465.717	<2483.5	PASS
Remark: Actual Test Line=-30dBm						

Test results: The unit does meet the EN 300 440-2 Clause 4.2.1.2 requirements.

6.1.3 Spurious Emissions

Test Requirement: EN 300 440-2 Clause 4.2.1.3

Test Method: EN 300 440-1 Clause 7.3.4

EUT Operation:

Ambient: Temp.: 26.0 °C Humid.: 56 % Press.: 1025 mbar

Test Status: 1) Keep the EUT in continuously transmitting with Modulation test single.
2) Keep the EUT in standby mode.
3) Test EUT in normal conditions.

Receiver Setup:

Frequency range	Measuring receiver bandwidth	Detector mode
25MHz-1000MHz	100kHz	QP
1GHz-25GHz	1MHz	Peak

Equipment Used: Refer to section 5 for details.

Test Setup:

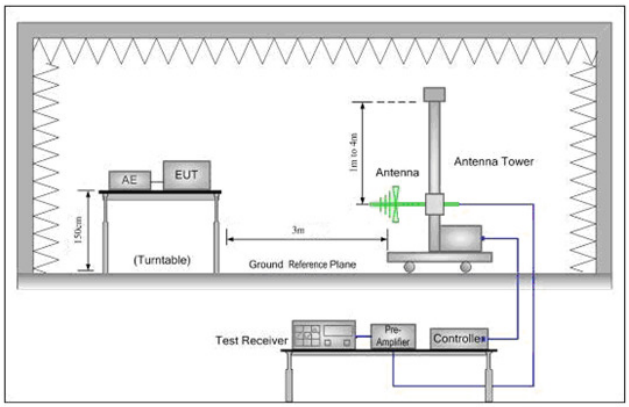


Figure 1. 25MHz to 1GHz

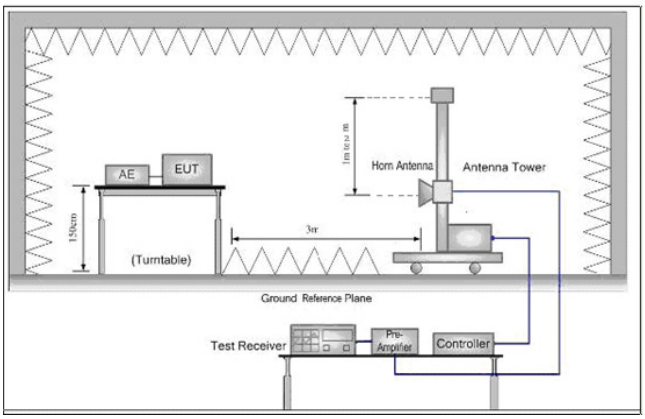


Figure 2. Above 1GHz

Test Procedure:

1. Using test software to set up the lowest channel (2410MHz), the middle channel (2440MHz), the highest channel (2465MHz).
2. Scan from 25MHz to 25GHz, find the maximum radiation frequency to measure. No Standby Mode apply for the EUT.
3. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Below 1GHz test procedure as below:

1) The EUT was powered ON and placed on a 1.5m hight table in the chamber. The antenna of the transmitter was extended to its maximum length. If possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.
2) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
3) Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
4) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center

of the transmitter.

5) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6) The output power into the substitution antenna was then measured.

7) Steps 5) and 6)were repeated with both antennas polarized.

8) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

where:

Pg is the generator output power into the substitution antenna.

Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and receiving antenna is moved from 1m to 2m.

2) Calculate power in dBm by the following formula:

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

where:

Pg is the generator output power into the substitution antenna.

Standby mode test procedure as below:

1) Steps 1) to 8) and 1) to 2) shall be repeated with the transmitter in the standby condition if this option is available.

Limit:

Frequency Ranges / State	47 MHz to 74 MHz 87.5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other Frequencies ≤ 1000 MHz	Frequencies > 1000 MHz
Operating	4 nW	250 nW	1 µW
Standby	2 nW	2 nW	20 nW

Test Data:

Lowest channel (2410MHz)				
Frequency	**Spurious Emission Level**		**Limit**	**Over limit**
(MHz)	Polaxis	(dBm)	(dBm)	(dB)
3704.031	V	-57.57	-30.00	-27.57
4819.188	V	-48.91	-30.00	-18.91
5831.563	V	-55.12	-30.00	-25.12
7229.469	V	-51.60	-30.00	-21.60
9640.969	V	-48.37	-30.00	-18.37
11929.375	V	-52.38	-30.00	-22.38
3738.563	H	-56.62	-30.00	-26.62
4820.406	H	-51.79	-30.00	-21.79
5854.719	H	-55.18	-30.00	-25.18
7229.063	H	-51.77	-30.00	-21.77
8955.219	H	-53.18	-30.00	-23.18
10500.188	H	-49.26	-30.00	-19.26

Middle channel (2435MHz)				
Frequency	**Spurious Emission Level**		**Limit**	**Over limit**
(MHz)	Polaxis	(dBm)	(dBm)	(dB)
3722.313	V	-57.32	-30.00	-27.32
4870.375	V	-49.08	-30.00	-19.08
6223.188	V	-53.65	-30.00	-23.65
8100.469	V	-53.69	-30.00	-23.69
10632.219	V	-51.55	-30.00	-21.55
12036.219	V	-52.29	-30.00	-22.29
3733.688	H	-56.71	-30.00	-26.71
4870.781	H	-51.28	-30.00	-21.28
6493.750	H	-54.29	-30.00	-24.29
8026.938	H	-52.11	-30.00	-22.11
9740.906	H	-50.94	-30.00	-20.94
10632.219	H	-48.86	-30.00	-18.86

Highest channel (2465MHz)				
Frequency	**Spurious Emission Level**		**Limit**	**Over limit**
(MHz)	Polaxis	(dBm)	(dBm)	(dB)
3639.438	V	-57.83	-30.00	-27.83
4929.688	V	-47.35	-30.00	-17.35
6233.750	V	-53.15	-30.00	-23.15
7800.250	V	-52.48	-30.00	-22.48
9860.750	V	-49.35	-30.00	-19.35
11922.063	V	-52.38	-30.00	-22.38
3731.250	H	-56.13	-30.00	-26.13
4930.094	H	-55.57	-30.00	-25.57
6379.188	H	-54.36	-30.00	-24.36
8518.094	H	-53.77	-30.00	-23.77
10732.156	H	-50.22	-30.00	-20.22
11935.063	H	-52.21	-30.00	-22.21

Remark:

1) The disturbance above 12GHz and below 3GHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

2) Measurement was conducted in standby mode and more than 10dB margins to the limit, so it is not reported.

6.1.4 Duty Cycle

Test Requirement: EN 300 440-2 Clause 4.2.1.4
Test Method: EN 300 440-1 Clause 7.4.2
Test Limit: No Restriction

6.2 Receiver Requirements

Receiver Classification, Table 2 of EN 300 440-1.		
Receiver category	Relevant receiver clauses	Risk assessment of receiver performance
1	8.1, 8.2 and 8.3	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person).
2	8.2 and 8.3	Medium reliable SRD communication media e.g. causing Inconvenience to persons, which cannot simply be overcome by other means.
3	8.3	Standard reliable SRD communication media e.g. Inconvenience to persons, which can simply be overcome by other means (e.g. manual).
Note: With reference to the present document, manufacturers are recommended to declare classification of their devices in accordance with table 2 and EN 300 440-2[5], subclause 4.2, as relevant. In particular where an SRD which may have an inherent safety of human life impactions, manufacturers and user should pay particular attention to the potential for interference from other system operating in the same or adjacent bands.		

The EUT (Receiver part) belong to Class 3.

6.2.1 Adjacent Channel Selectivity

Test Requirement: EN 300 440-2 Clause 4.2.2.1

Test Method: EN 300 440-1 Clause 8.1.2

Test Results: Not applicable, since the test applied to class 1 receivers only. Please refer to clause 4.1.1 of EN 300 440-1

6.2.2 Blocking or Desensitization

Test Requirement: EN 300 440-2 Clause 4.2.2.2

Test Method: EN 300 440-1 Clause 8.2.2

Test Results: Not applicable, since the test applied to class 1 or class 2 receivers only. Please refer to clause 4.1.1 of EN 300 440-1.

6.2.3 Spurious Radiations

Test Requirement: EN 300 440-2 Clause 4.2.2.3

Test Method: EN 300 440-1 Clause 8.3.4

EUT Operation:

Ambient: Temp.: 25.0 °C Humid.: 57 % Press.: 1025 mbar

Test Status: 1) Keep the EUT in continuously receiver with test single.

2) Keep the EUT searching and receiving the useful test signal.

3) Test EUT in normal conditions.

Receiver Setup:

Frequency range	Measuring receiver bandwidth	Detector mode
25MHz-1000MHz	100kHz	QP
1GHz-25GHz	1MHz	Peak

Equipment Used: Refer to section 5 for details.

Test Setup:

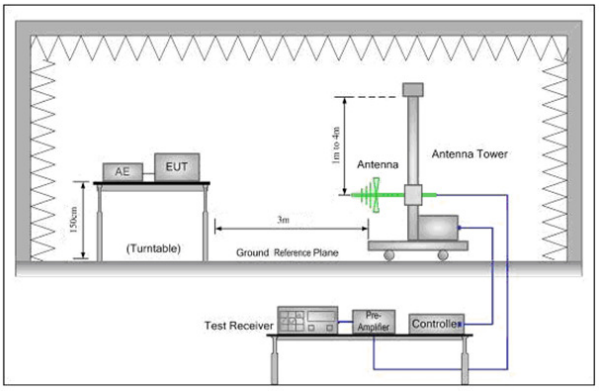


Figure 1. 25MHz to 1GHz

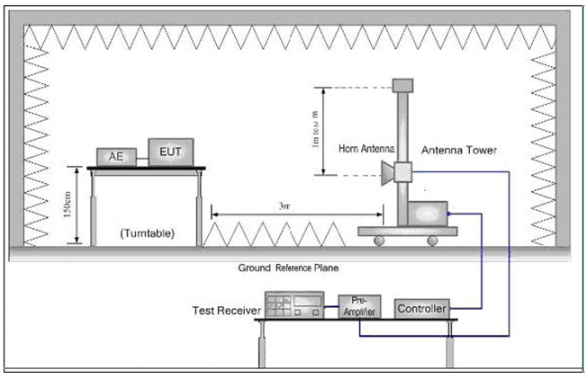


Figure 2. Above 1GHz

Test Procedure:

1. Using test software to set up the lowest channel (2410MHz), the middle channel (2440MHz), the highest channel (2465MHz).
2. Scan from 25MHz to 25GHz, find the maximum radiation frequency to measure. No Standby Mode apply for the EUT.
3. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Below 1GHz test procedure as below:

1) The EUT was powered ON and placed on a 1.5m hight table in the chamber. The antenna of the transmitter was extended to its maximum length. Receiver mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.

2) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3) Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.
6) The output power into the substitution antenna was then measured.
7) Steps 5) and 6)were repeated with both antennas polarized.
8) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

where:

Pg is the generator output power into the substitution antenna.

Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and receiving antenna is moved from 1m to 2m.
2) Calculate power in dBm by the following formula:

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

where:

Pg is the generator output power into the substitution antenna.

Limit:

Frequency range	Limit
25MHz-1000MHz	2nW
1GHz-25GHz	20nW

Test Data:

Lowest channel (2410MHz)				
Frequency	**Spurious Emission Level**		**Limit**	**Over limit**
(MHz)	Polaxis	(dBm)	(dBm)	(dB)
3925.031	V	-55.75	-47.00	-8.75
5189.687	V	-55.17	-47.00	-8.17
6344.250	V	-53.33	-47.00	-6.33
7807.968	V	-52.66	-47.00	-5.66
9261.531	V	-51.61	-47.00	-4.61
11259.468	V	-51.34	-47.00	-4.34
3663.812	H	-56.47	-47.00	-9.47
4822.031	H	-55.07	-47.00	-8.07
6239.031	H	-53.87	-47.00	-6.87
7844.125	H	-52.64	-47.00	-5.64
9327.750	H	-52.46	-47.00	-5.46
11263.125	H	-52.48	-47.00	-5.48

Middle channel (2435MHz)				
Frequency	**Spurious Emission Level**		**Limit**	**Over limit**
(MHz)	Polaxis	(dBm)	(dBm)	(dB)
3316.875	V	-57.30	-47.00	-10.30
4447.875	V	-55.09	-47.00	-8.09
5679.218	V	-54.68	-47.00	-7.68
7430.562	V	-53.32	-47.00	-6.32
9861.562	V	-52.11	-47.00	-5.11
11981.781	V	-50.85	-47.00	-3.85
3530.968	H	-57.40	-47.00	-10.40
4746.875	H	-55.21	-47.00	-8.21
6048.093	H	-54.28	-47.00	-7.28
7102.718	H	-53.58	-47.00	-6.58
9240.406	H	-51.29	-47.00	-4.29
11259.875	H	-52.42	-47.00	-5.42

Highest channel (2465MHz)				
Frequency	**Spurious Emission Level**		**Limit**	**Over limit**
(MHz)	Polaxis	(dBm)	(dBm)	(dB)
3871.000	V	-55.72	-47.00	-8.72
4926.843	V	-54.84	-47.00	-7.84
6558.343	V	-53.68	-47.00	-6.68
8089.906	V	-52.98	-47.00	-5.98
9682.000	V	-52.37	-47.00	-5.37
11930.593	V	-52.19	-47.00	-5.19
3589.875	H	-57.45	-47.00	-10.45
4731.437	H	-55.87	-47.00	-8.87
6025.343	H	-53.37	-47.00	-6.37
7271.312	H	-54.50	-47.00	-7.50
9237.562	H	-52.18	-47.00	-5.18

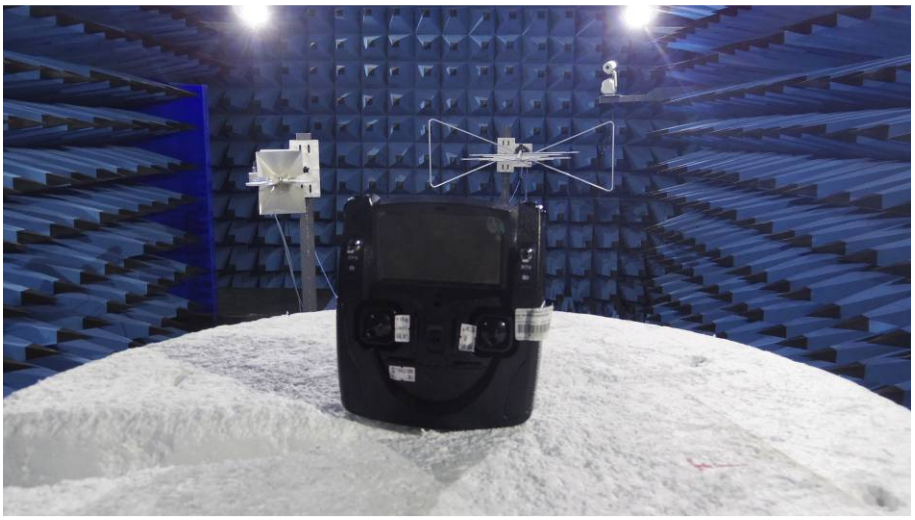
Remark:

The disturbance above 12GHz and below 3GHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

7 Photographs

Test Model No.: H901A

7.1 Test Setup Photo



7.2 EUT Constructional Details

Refer to Report No.SZEM151200792301 for EUT external and internal photos.