



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

No. 1 Workshop, M-10, Middle section, Science & Technology Park,

Nanshan District, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053

Fax: +86 (0) 755 2671 0594

Email: ee.shenzhen@sgs.com

Report No.: SZEM151200792301

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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 301 489-1 V1.9.2 (2011-09)
 EN 301 489-3 V1.6.1 (2013-08)
Date of Receipt: 2015-12-28
Date of Test: 2016-01-19 to 2016-03-14
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.

Authorized Signature:



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.

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2 Test Summary

Applied Standards			
According to the specifications of the manufacture, The EUT must comply with the requirements of EN 301 489-1 V1.9.2 (2011-09) EN 301 489-3 V1.6.1 (2013-08)			
Electromagnetic Compatibility (EMC) Part			
Electromagnetic Interference (EMI)			
Test Items	Test Method	Reference Clause	Result
Radiated Emission	EN 55022:2010	EN 301 489-1 V1.9.2 (2011-09) Clause 8.2	PASS
Electromagnetic Susceptibility(EMS)			
ESD (Electrostatic Discharge)	EN 61000-4-2:2009	EN 301 489-1 V1.9.2 (2011-09) Clause 9.3	PASS
Radiated Immunity, 80MHz to 2.7 GHz	EN 61000-4-3:2006 +A1:2008+A2:2010	EN 301 489-1 V1.9.2 (2011-09) Clause 9.2	PASS

Remark:

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

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

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..



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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
Carrier Frequency:	2410MHz-2465MHz
Modulation Type:	GFSK
Channel Spacing:	5MHz
Sample Type:	Fixed production
The highest working frequency(except RF modulator):	16MHz
Antenna Gain:	1.0dBi
Antenna Type:	Chip Antenna
Power Supply:	6.0V DC (4 x 1.5V "AA" Size Batteries)

4.3 Details of Test Mode

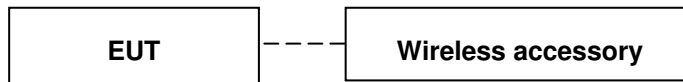
Test Mode:	
mode 1	Wireless mode





4.4 Configuration of EUT

Mode 1





4.5 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.
Wireless accessory	Supplied by client	H501S

4.6 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.

4.7 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.



4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

4.10 Other Information Requested by the Customer

None.

4.11 Monitoring of EUT for the Immunity Test

Visual: Monitored the display and work status of the EUT.

Audio: None

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

No.	Item	Measurement Uncertainty
1	Conduction emission	3.45dB (9kHz to 150kHz)
		3.0dB (150kHz to 30MHz)
2	Radiated emission	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-6GHz)
3	Temperature test	1 °C
4	Humidity test	3%
5	DC power 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	10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEL0303	2015-08-01	2016-08-01
2	EMI Test Receiver (9k-3GHz)	Rohde & Schwarz	ESCI	SEL0175	2015-05-13	2016-05-13
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	Coaxial cable	SGS	N/A	SEL0288	2015-05-13	2016-05-13
5	Coaxial cable	SGS	N/A	SEL0275	2015-05-13	2016-05-13
6	Coaxial cable	SGS	N/A	SEL0274	2015-05-13	2016-05-13
7	Trilog-Broadband Antenna(30M-1GHz)	Schwarzbeck	VULB9168	SEM003-17	2016-01-26	2017-01-26
8	Pre-amplifier	Sonoma Instrument Co	310N	SEL0298	2015-05-13	2016-05-13
9	Loop Antenna	ETS-LINDGREN	6502	SEL0802	2015-08-14	2016-08-14

ESD						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	ESD Simulator	SCHAFFNER	NSG 438	SEL0035	2016-03-16	2017-03-16
2	ESD Ground Plane	SGS(3m*3m)	N/A	SEL0004	N/A	N/A



Radiated Immunity						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	Fully-Anechoic Chamber 2	Chang Zhou Zhong Shuo	854	SEL0169	2014-06-10	2017-06-10
2	Power Sensor	Rohde & Schwarz	NRP-Z91	SEL0809	2015-06-09	2016-06-09
3	Power Sensor	Rohde & Schwarz	NRP-Z91	SEL0810	2015-06-09	2016-06-09
4	Software EMC32	Rohde & Schwarz	EMC32-S	SEL0082	N/A	N/A
5	Log-periodic Antenna (0.07-3GMHz)	Schwarzbeck	VUSLP911 1E	SEL0804	N/A	N/A
6	Signal Generator	Rohde & Schwarz	SMB100A	SEL0805	2015-06-05	2016-06-05
7	Broadband Amplifier (80MHz-1GHz)	Rohde & Schwarz	BBA150-B C250	SEL0806	2015-10-31	2016-10-31
8	Broadband Amplifier (800MHz-3GHz)	Rohde & Schwarz	BBA150-D 110	SEL0807	2015-10-31	2016-10-31
9	Open Switch and Control Unit	Rohde & Schwarz	OSP130	SEL0808	2015-10-31	2016-10-31
10	Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	SEL0091	2015-10-23	2016-10-23
11	Universal Radio Communication Tester	Rohde & Schwarz	CMW 500	SEL0368	2016-01-14	2017-01-14
12	Audio Analyzer	Rohde & Schwarz	UPV	SEL0193	2015-10-09	2016-10-09
13	Conditioning Amplifier	Brüel & Kjaer	2690-OS2	SEL0106	2015-04-29	2016-04-29
14	Amplifier	Rohde & Schwarz	75A250A	SEL0108	2015-04-25	2016-04-25



General used equipment						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEL0101	2015-10-12	2016-10-12
2	Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEL0102	2015-10-12	2016-10-12
3	Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEL0103	2015-10-12	2016-10-12
4	Barometer	Changchun Meteorological Industry Factory	DYM3	SEL0088	2015-05-13	2016-05-13

6 EMC Requirements Specification in EN 301 489-1/-3

6.1 EMI (Emission)

6.1.1 Radiated Emission

Reference Clause: EN 301 489-1 Clause 8.2.2

Test Method: EN 55022

EUT Operation:

Ambient: Temp.: 25.0 °C Humid.: 50 % Press.: 1015 mbar

Test Mode: Mode 1

Receive Setup:

Frequency range (MHz)	Detector	RBW	VBW
30-1000	Quasi-peak	120kHz	300kHz
Frequency		Limit(@10m)	Remark
30MHz-230MHz		30dBuv/m	QP value
230MHz-1GHz		37dBuv/m	QP value

Limit:

Test Setup:

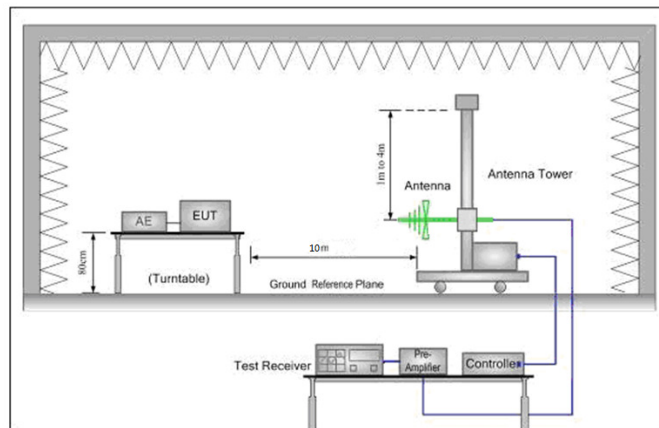


Figure 1. 30MHz to 1GHz

Test Procedure:

- From 30 MHz to 1GHz test procedure as below:
 - The radiated emissions were tested in a semi-anechoic chamber.
 - The EUT is placed on a turntable, which is 0.8m above ground plane.
 - The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
 - EUT is set 10m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
 - Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
 - And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
 - Repeat above procedures until the measurements for all frequencies are complete.
- Above 1GHz test procedure as below:



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- 1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber.

Equipment Used: Refer to section 5 for details.

Measurement Data:

Mode 1:

Below 1GHz (QP)

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
111.738	7.26	10.57	32.64	33.12	18.31	30	-11.69	Vertical
193.095	7.57	9.63	32.59	34.47	19.08	30	-10.92	Vertical
203.523	7.62	9.38	32.59	39.31	23.72	30	-6.28	Vertical
271.325	7.96	11.89	32.56	33.65	20.94	37	-16.06	Vertical
338.400	8.19	13.63	32.54	30.43	19.71	37	-17.29	Vertical
508.258	8.64	16.95	32.59	28.87	21.87	37	-15.13	Vertical
203.523	7.62	9.38	32.59	41.99	26.40	30	-3.60	Horizontal
271.325	7.96	11.89	32.56	34.73	22.02	37	-14.98	Horizontal
338.400	8.19	13.63	32.54	43.34	32.62	37	-4.38	Horizontal
407.515	8.32	15.07	32.54	42.34	33.19	37	-3.81	Horizontal
508.258	8.64	16.95	32.59	36.68	29.68	37	-7.32	Horizontal
580.703	8.85	18.30	32.62	37.17	31.70	37	-5.30	Horizontal

Remark: Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.

6.2 EMS (Immunity)

Performance Criteria of EN 301 489-3, sub clause 6.3 table 4.

Class 1 SRD Equipment		
Criteria	During Test	After Test
A	Operated as intended, No loss of function, For equipment Type II the minimum performance shall be 12dB SINAD, No unintentional responses.	Operated as intended, No loss of function, For equipment Type II the communication link shall be maintained. No Degradation of performance, No loss of data or user programmable functions
B	May be loss of function (one or more) No unintentional responses	Operated as intended, Loss functions shall be self- recoverable, No Degradation of performance, No loss of data or user programmable functions
Class 2 SRD Equipment		
Criteria	During Test	After Test
A	Operated as intended, No loss of function, For equipment Type II the minimum performance shall be 6dB SINAD, No unintentional responses.	Operated as intended, No loss of function, For equipment Type II the communication link shall be maintained. No Degradation of performance, No loss of data or user programmable functions
B	May be loss of function (one or more), No unintentional responses	Operate as intended, Loss functions shall be self- recoverable, No Degradation of performance, No loss of data or user programmable functions
Class 3 SRD Equipment		
Criteria	During Test	After Test
A & B	May be loss of function (one or more), No unintentional respond.	Operate as intended, for equipment Type II the communication link may be lost, but shall be recoverable by user. No Degradation of performance. Loss functions shall be self- recoverable.

Remark: The EUT belong to class 3.

6.2.1 Radiated Immunity

Reference Clause: EN 301 489-1 Clause 9.2.2

Test Method: EN 61000-4-3

EUT Operation:

Ambient: Temp.: 20.0 °C Humid.: 51 % Press.: 1015 mbar

Test Mode: Mode 1

Criterion Required: A

Instruments Used: Refer to section 5 for details.

Test Setup:

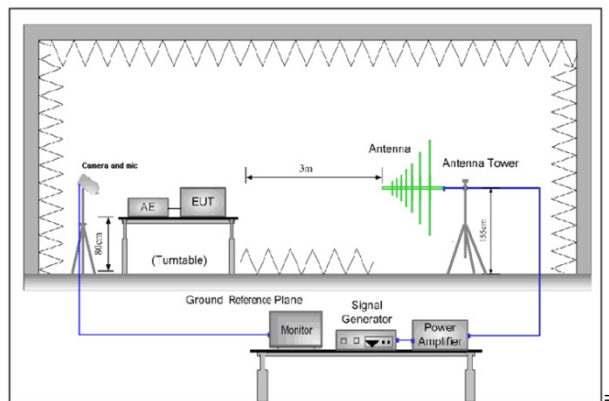


Figure 1. 80MHz to 1GHz, 1.4GHz to 2.7GHz

Test Procedure:

- 1) For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items.
- 2) If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length.
- 3) The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area).
- 4) The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Where the frequency range was swept incrementally, the step size was not exceed 1% of the preceding frequency value.
- 5) The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5s.
- 6) The test normally was performed with the generating antenna facing each side of the EUT.
- 7) The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
- 8) The EUT was performed in a configuration to actual installation conditions,



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a video camera, test data and/or an audio monitor were used to monitor the performance of the EUT.

Test Results:

Frequency	Level	Modulation	EUT Face	Antenna Polaxis	Result / Observations
80MHz-1GHz, 1.4GHz to 2.7GHz	3V/m	1kHz, 80% Amp. Mod, 1% increment Dwell time: 3 seconds	Top	V	A
				H	A
			Under	V	A
				H	A
			Other Face	V	A
				H	A

Reaction of EUT:

A: Normal performance within the specification limits.

6.2.2 ESD

Reference Clause: EN 301 489-1 Clause 9.3.2

Test Method: EN61000-4-2

EUT Operation:

Ambient: Temp.: 22.0 °C Humid.: 53 % Press.: 1015 mbar

Test Mode: Mode 1

Criterion Required: B

Discharge Impedance: 330 Ω / 150 pF

Polarity: Positive & Negative

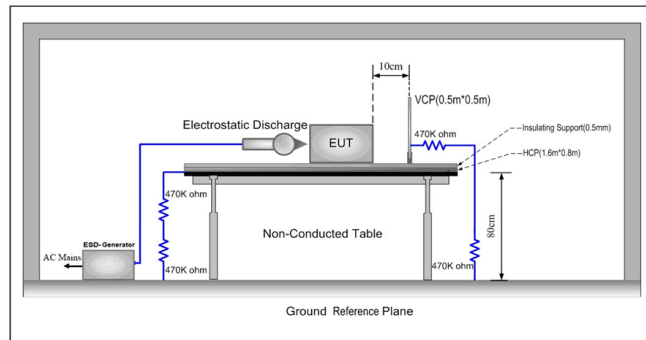
Number of Discharge: Minimum 10 times at each test point

Discharge Mode: Single Discharge

Discharge Period: 1 second minimum

Equipment Used: Refer to section 5 for details.

Test Setup:



Test set-up for tabletop equipment

Test Procedure:

- 1) Contact discharges to the conductive surfaces and to coupling planes:
Air discharge at slots and apertures, and insulating surfaces:
On those parts of the EUT where it was not possible to perform contact discharge testing, the equipment was investigated to identify user accessible points where breakdown may occur. This investigation was restricted to those areas normally handled by the user. A minimum of 10 single air discharges were applied to the selected test point for each such area.
The application of electrostatic discharges to the contacts of open connectors was not required by this standard.
- 2) The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP).
- 3) A horizontal coupling plane (HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size & HCP were constructed from the same material type & thickness as that of the GRP, and connected to the GRP via a 470k Ω resistor at each end. The distance between EUT and any of the other metallic surface excepted the GRP, HCP and VCP was greater than 1m.
- 4) During the contact discharges, the tip of the discharge electrode was touch



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the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.

- 5) After each discharge, the ESD generator was removed from the EUT, the generator was then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances was used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

Test Results:

Observations:

Test Point:

1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.

Direct Application Test Results

Direct Application			Test Results	
Discharge Level (kV)	Pulse No.	Test Point	Contact Discharge	Air Discharge
$\pm 2,4,8$	10 for every level	1	N/A	B
± 4	10 for every level	2	A	N/A

Indirect Application for tabletop equipment Test Results

Indirect Application		Test Results	
Discharge Level (kV)	Pulse No.	Horizontal Coupling	Vertical Coupling
± 4	10 for every level	A	A

Remark:

A: No performance degradation during test.

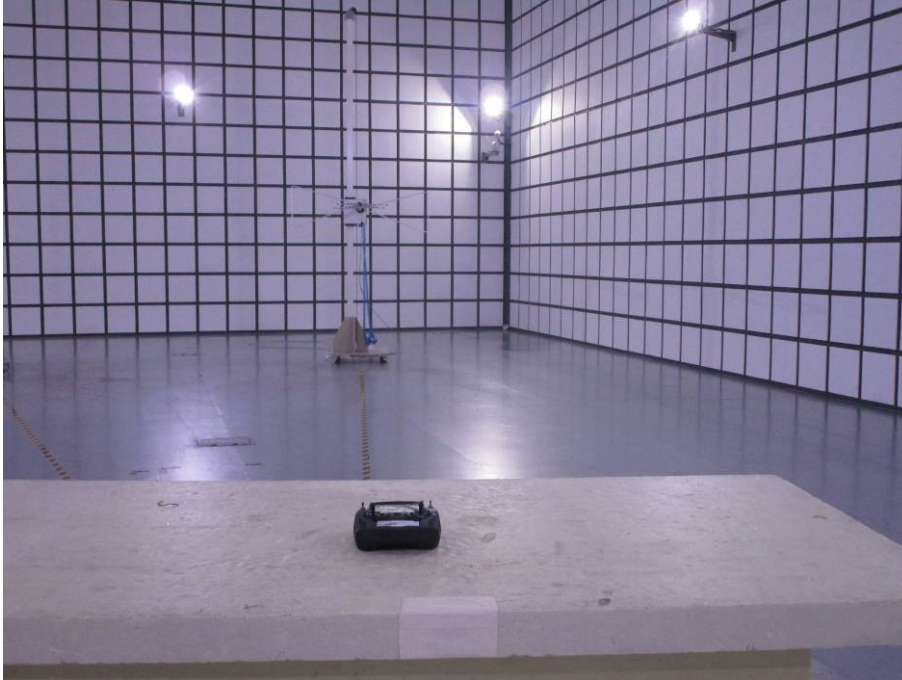
B: The display is flicker when testing on the surface of screen, but it can recover automatically.

N/A: Not applicable

7 Photographs—EUT Test Setup

Test Model No.: H901A

7.1 Radiated Emission



7.2 ESD



7.3 Radiated Immunity



8 Photographs–EUT Constructional Details





