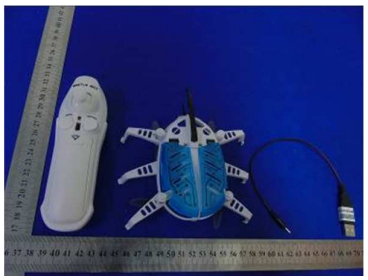
\ **TEST REPORT No.: (5218)136-1238**

TEST REPORT

To :	**SILVERLIT TOYS MANUFACTORY LTD.**	Fax :	--
Attn :	-=	Email :	--
Address :	Rm 1701-03, World Trade Ctr., 280 Gloucester Rd., Causeway Bay, Hong Kong		
Cc :	--	Fax/Email:	--
Attn :	--		
Folder No.:	--	Date of Receipt:	--
		Test date :	2018-05-17 to 2018-05-30

MANUFACTURER OR SUPPLIER NAME :	**SILVERLIT TOYS MANFACTORY LTD**
MANUFACTURER OR SUPPLIER ADDRESS :	Rm 1701-03, World Trade Ctr., 280 Gloucester Rd., Causeway Bay, Hong Kong
PRODUCT :	Beetle Bot
MODEL REFERENCE :	88555
ADDITIONAL MODEL & MODEL DIFFERENCE :	--
RATED VOLTAGE :	Remote: 3Vd.c. (“AAA” size battery x 2) Plan: 3.7Vd.c. (“Li-ion battery” x 1) Plan battery: 5Vd.c. (“USB Host Unit” x 1)
REMARKS :	--
SAMPLE NO. :	(5218)136-1238



The submitted sample of the above equipment has been tested according to the requirements of the following standards:

Draft ETSI EN 301 489-1 V2.2.0 (2017-03)
Final Draft ETSI EN 301 489-3 V2.1.1(2017-03)
EN 61000-6-3:2007+A1:2011+AC:2012
EN 61000-6-1:2007

CONCLUSION: The submitted sample was found to <u>COMPLY</u> with the test requirement

Assistant Manager,
EMC Department

Name: Law Man Kit
Date: May 30, 2018

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Table of Contents

1 SUMMARY OF TEST RESULTS 5

1.1 MEASUREMENT UNCERTAINTY 6

2 GENERAL INFORMATION 7

2.1 GENERAL DESCRIPTION OF EUT 7
2.2 DESCRIPTION OF TEST MODES 7
2.3 TEST PROGRAM USED AND OPERATION DESCRIPTIONS 9
2.4 MISCELLANEOUS 9
2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS 10
2.6 DESCRIPTION OF SUPPORT UNITS 10

3 CONDUCTED EMISSION FROM THE AC MAINS POWER PORT 11

3.1 LIMITS 11
3.2 TEST INSTRUMENT 11
3.3 TEST ARRANGEMENT 11
3.4 TEST SETUP 12
3.5 SUPPLEMENTARY INFORMATION 12
3.6 TEST RESULTS 13

4 RADIATED EMISSION MEASUREMENT 16

4.1 LIMITS OF RADIATED EMISSION MEASUREMENT 16
4.2 TEST INSTRUMENTS 18
4.3 TEST PROCEDURE 19
4.4 TEST SETUP 21
4.5 SUPPLEMENTARY INFORMATION 24
4.6 TEST RESULTS 24

5 IMMUNITY TEST 28

5.1 GENERAL DESCRIPTION 28
5.1.1 PERFORMANCE CRITERIA 29
5.2 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD) (EN301489/EN 61000-6-1) 31
5.2.1 TEST SPECIFICATION 31
5.2.2 TEST INSTRUMENT 31
5.2.3 TEST PROCEDURE 32
5.2.4 DEVIATION FROM TEST STANDARD 32
5.2.5 TEST SETUP 33
5.2.6 TEST RESULTS 34
5.3 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN301489) 38
5.3.1 TEST SPECIFICATION 38
5.3.2 TEST INSTRUMENT 38
5.3.3 TEST PROCEDURE 40
5.3.4 DEVIATION FROM TEST STANDARD 40
5.3.5 TEST SETUP 41
5.3.6 TEST RESULTS 42

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5.4 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN 61000-6-1) 43
5.4.1 TEST SPECIFICATION 43
5.4.2 TEST INSTRUMENTS 43
5.4.3 TEST PROCEDURE 44
5.4.4 DEVIATION FROM TEST STANDARD 44
5.4.5 TEST SETUP 44
5.4.6 TEST RESULTS 45
6 PHOTOGRAPHS OF THE TEST CONFIGURATION 46
7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB 55

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RELEASE CONTROL RECORD

Issue No.	Description	Date Issued
CE180517N069	Original release	May 30, 2018

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1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Item	Result	Remarks
EN 55032:2015, Class B & EN 61000-6-3:2007 +A1:2011+AC:2012	Conducted emission from the AC mains power port	PASS	Minimum passing Class B margin is -20.85dB at 1.46850MHz
	Radiated emission 30MHz-1GHz	PASS	Minimum passing Class B margin is -3.06dB at 627.278MHz
	Radiated emission Above 1GHz	PASS	Minimum passing Class B margin is -13.02dB at 3976.450MHz

IMMUNITY (Draft EN 301 489-1 V2.2.0, FINAL DRAFT EN 301 489-3 V2.1.1,)			
Standard	**Test Type**	**Result**	**Remarks**
EN 61000-4-2:2009	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 4kV Contact discharge, 2, 4, 8kV Air discharge, Performance Criterion A
EN 61000-4-3:2006 + A1 + A2:2010	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-6000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion A

IMMUNITY (EN 61000-6-1:2007)			
Standard	**Test Type**	**Result**	**Remarks**
IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 2, 4, 8kV Air discharge, 4kV Contact discharge, Performance Criterion A

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IEC 61000-4-3:2010 ED. 3.2	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), 1400-2000 MHz, 3V/m, 80% AM (1kHz) 2000-2700 MHz, 1V/m, 80% AM (1kHz) Performance Criterion A

1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	**FREQUENCY**	**UNCERTAINTY**
Conducted emission from the AC mains power port using AMN	0.15MHz ~ 30MHz	+/- 2.70 dB
Radiated emission	30MHz ~ 1GHz	+/- 4.03 dB
	1GHz ~ 18GHz	+/- 4.72 dB

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2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Beetle Bot
BRAND	Silverlit
TEST MODEL	88555
ADDITIONAL MODEL	N/A
POWER SUPPLY	Remote Control: DC 3V (2*1.5V*AAA) from battery Plane: DC 3.7V from Li-ion Battery Plane Battery: DC 5V from USB Host Unit
CABLE SUPPLIED	N/A
OPERATING FREQUENCY	2407-2477MHz

Note:

1. For the test results, the EUT had been tested with all conditions. But only the worst case was showed in test report.
2. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
3. Please refer to the EUT photo document (Reference No.: 180517N069) for detailed product photo.

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2.2 DESCRIPTION OF TEST MODES

The EUT were tested under the following modes, the final worst mode was marked in boldface and recorded in this report.

FOR CONDUCTED EMISSION TEST

Test Mode	Test Standard	Test Voltage
Charging	**EN 61000-6-3**	**DC 5V from USB**

FOR RADIATED EMISSIONS TEST (BELOW 1G)

Test Mode	Test Standard	Test Voltage
TX RX Link Normal Working	**EN 301489-1/-3**	**TX: DC 3V from Battery, RX: DC 3.7V from Battery**
Charging	EN 61000-6-3	DC 5V from USB

FOR RADIATED EMISSIONS TEST (ABOVE 1G)

Test Mode	Test Standard	Test Voltage
TX RX Link Normal Working	**EN 301489-1/-3**	**TX: DC 3V from Battery, RX: DC 3.7V from Battery**

FOR IMMUNITY TESTS

Test Mode	Test Standard	Test Voltage
TX RX Link Normal Working	**EN 301489-1/-3**	**TX: DC 3V from Battery, RX: DC 3.7V from Battery**
Charging	**EN 61000-6-1**	**DC 5V from USB**

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2.3 TEST PROGRAM USED AND OPERATION DESCRIPTIONS

a. Turned on the power of all equipment.

b. EUT was operated according to the type described in manufacturer's specifications or the user's manual

2.4 MISCELLANEOUS

➢ Affix CE marking

The marking must be placed visibly and legibly on the product or, if not possible due to the nature of the product, be affixed to the packaging and the accompanying document. The CE marking shall consist of the initials 'CE' taking the following form:

The various components of the CE marking must have the same vertical dimension, and may not be smaller than 5 mm. If the CE marking is reduced or enlarged, the proportions given in the graduated drawing above must be respected.

When the product is subject to other Directives covering other aspects and which also provide for the 'CE' marking, the accompanying documents must indicate that the product also conforms to those other Directives.

However, when one or more of those Directives allow the manufacturer, during a transitional period, to choose which arrangements to apply, the 'CE' marking has to indicate conformity only with the Directives applied by the manufacturer. In this case, the particularities of the Directives applied, as published in the Official Journal of the European Union, must be given in the documents, notices or instructions required by the Directives and accompanying such products.

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2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to the specifications of the manufacturers, the EUT must comply with the requirements of the following standards:

Draft EN 301 489-1 V2.2.0 (2017-03)
FINAL DRAFT EN 301 489-3 V2.1.1
EN 55032:2015
EN 61000-4-2:2009
EN 61000-4-3:2006 + A1 + A2:2010
EN 61000-6-3:2007+A1:2011+AC:2012
EN 61000-6-1:2007
IEC 61000-4-2:2008 ED. 2.0
IEC 61000-4-3:2010 ED. 3.2

All applicable tests have been performed and recorded as per the above standards. The EUT haven't any components susceptible to magnetic fields, so don't test power-frequency magnetic filed item.

2.6 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as a dependent unit together without any other necessary accessories or support units.

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3 CONDUCTED EMISSION FROM THE AC MAINS POWER PORT

3.1 LIMITS

Frequency (MHz)	dBuV	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Notes: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

3.2 TEST INSTRUMENT

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Apr. 04,18	Apr. 03,19
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Mar. 03,18	Mar. 02,19
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Apr. 04,18	Apr. 03,19
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Jan. 17,18	Jan. 16,19
Test software	ADT	ADT_Cond_V 7.3.7	N/A	N/A	N/A

NOTE: 1. The test was performed at Shielded Room 553.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

3.3 TEST ARRANGEMENT

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

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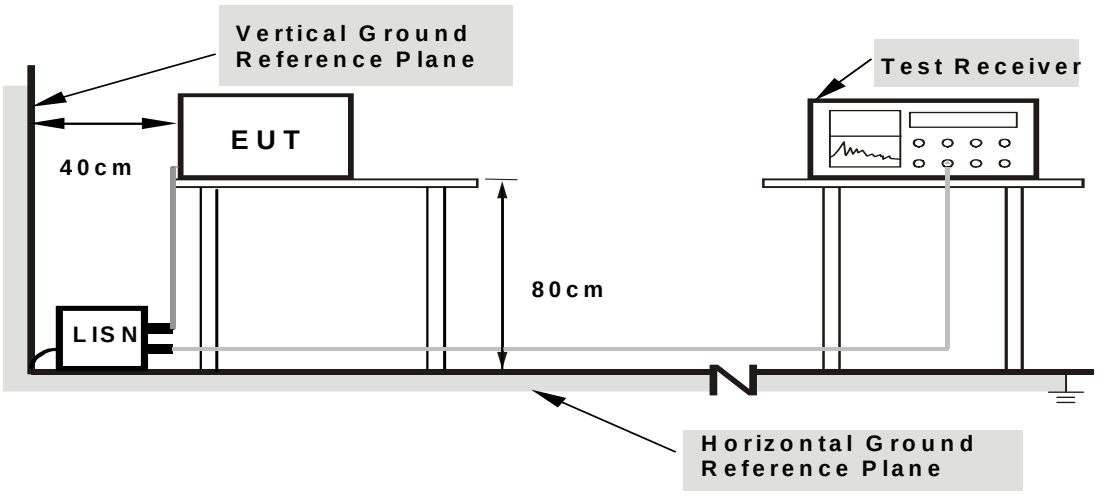
3.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

3.5 SUPPLEMENTARY INFORMATION

N/A

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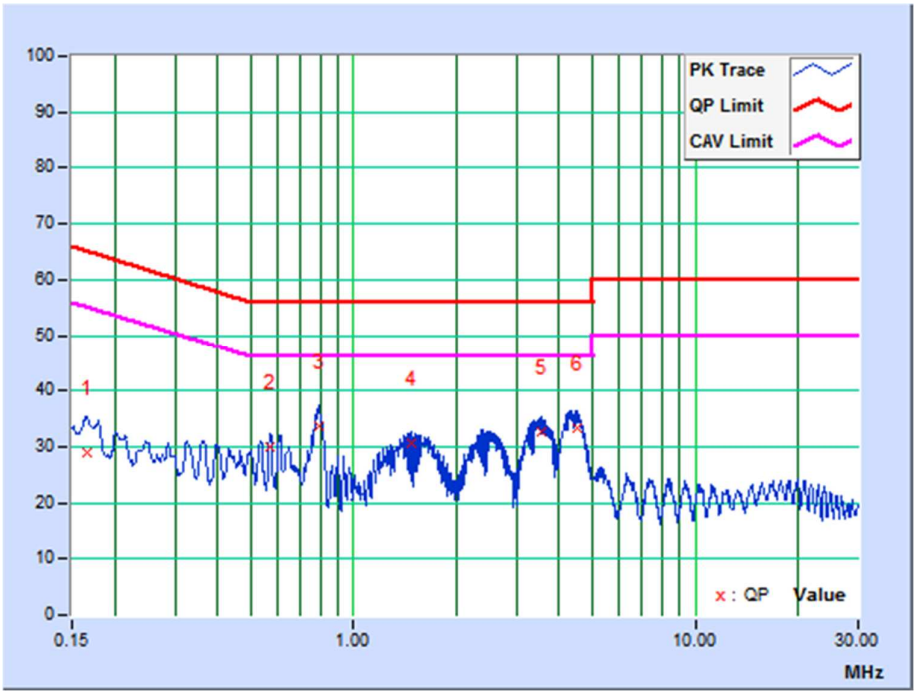
3.6 TEST RESULTS

TEST MODE	Charging	**6DB BANDWIDTH**	9 kHz
TEST VOLTAGE	DC 5V from USB	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	**TESTED BY**	Dragon

No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16524	9.75	19.26	7.65	29.01	17.40	65.20	55.20	-36.19	-37.80
2	0.57075	10.42	19.52	14.64	29.94	25.06	56.00	46.00	-26.06	-20.94
3	0.78875	10.40	23.11	14.63	33.51	25.03	56.00	46.00	-22.49	-20.97
4	**1.46850**	**10.24**	**20.47**	**14.91**	**30.71**	**25.15**	**56.00**	**46.00**	**-25.29**	**-20.85**
5	3.54975	9.79	22.81	14.46	32.60	24.25	56.00	46.00	-23.40	-21.75
6	4.52175	10.07	23.25	13.47	33.32	23.54	56.00	46.00	-22.68	-22.46

REMARKS: The emission levels of other frequencies were very low against the limit.



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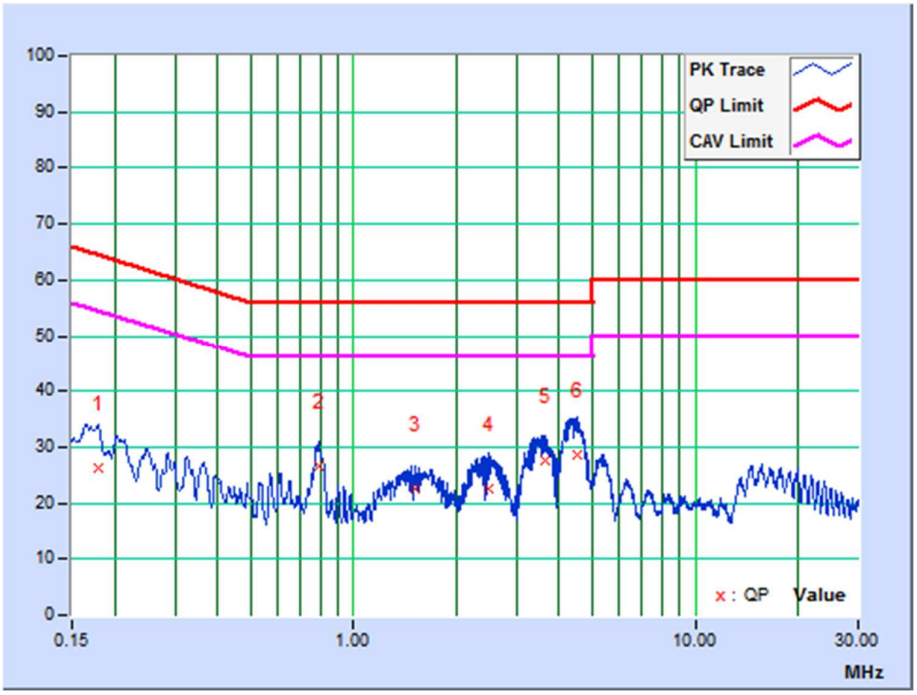
TEST MODE	Charging	**6DB BANDWIDTH**	9 kHz
TEST VOLTAGE	DC 5V from Adapter	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	**TESTED BY**	Dragon

No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17886	10.23	16.17	1.60	26.40	11.83	64.54	54.54	-38.14	-42.71
2	0.79084	9.95	16.68	4.74	26.63	14.69	56.00	46.00	-29.37	-31.31
3	1.50900	9.93	12.57	3.50	22.50	13.43	56.00	46.00	-33.50	-32.57
4	2.48084	9.83	12.81	1.92	22.64	11.75	56.00	46.00	-33.36	-34.25
5	3.62846	9.92	17.69	6.53	27.61	16.45	56.00	46.00	-28.39	-29.55
6	4.52625	9.78	18.91	6.10	28.69	15.88	56.00	46.00	-27.31	-30.12

REMARKS: The emission levels of other frequencies were very low against the limit.



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4 RADIATED EMISSION MEASUREMENT

4.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	Up to 5 times of the highest frequency or 6 GHz, whichever is less

FOR FREQUENCY BELOW 1000 MHz

FREQUENCY (MHz)	Class A (at 10m) Quasi-Peak dBuV/m	Class B (at 10m) Quasi-Peak dBuV/m
30 – 230	40	30
230 – 1000	47	37

FREQUENCY (MHz)	Class A (at 3m) Quasi-Peak dBuV/m	Class B (at 3m) Quasi-Peak dBuV/m
30 – 230	50	40
230 – 1000	57	47

FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (GHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
1 to 3	76	56	70	50
3 to 6	80	60	74	54

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NOTE: 1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

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4.2 TEST INSTRUMENTS

FREQUENCY RANGE BELOW 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU26	100005	Jun. 05,17	Jun. 04,18
EMI Test Receiver	Rohde&Schwarz	ESR7	101564	Jan. 18,18	Jan. 17,19
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-555	Nov. 10, 17	Nov. 09, 18
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-554	Dec. 10, 17	Dec. 09, 18
Preamplifier	EMCI	EMC1135	980378	Mar. 19,18	Mar. 18,19
Preamplifier	EMCI	EMC1135	980423	Mar. 19,18	Mar. 18,19
10m Semi-anechoic Chamber	CHANGLING	21.4m*12.1m*8.8m	NSEMC006	Feb. 10,18	Feb. 09,19
Test Software	ADT	ADT_Radiated_V8.7.07	N/A	N/A	N/A

NOTES: 1. The test was performed in 10m Chamber.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

FREQUENCY RANGE ABOVE 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Horn Antenna	ETS-Lindgren	3117	00085519	Dec. 10, 17	Dec. 09, 18
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170242	May 05,18	May 04,19
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101003	Apr. 21,18	Apr. 20,19
Broadband Preamplifier (1~18GHz)	SCHWARZBECK	BBV9718	266	Apr. 18,18	Apr. 18,19
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 08,17	Nov. 07,18
Test Software	ADT	ADT_Radiated_V8.7.07	N/A	N/A	N/A

NOTES: 1. The test was performed in 10m Chamber.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

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4.3 TEST PROCEDURE

<Frequency Range below 1GHz>

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from 1 meter to 4 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.

d. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
5. Margin value = Emission level – Limit value.

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<Frequency Range above 1GHz>

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
5. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
6. Margin value = Emission level – Limit value.

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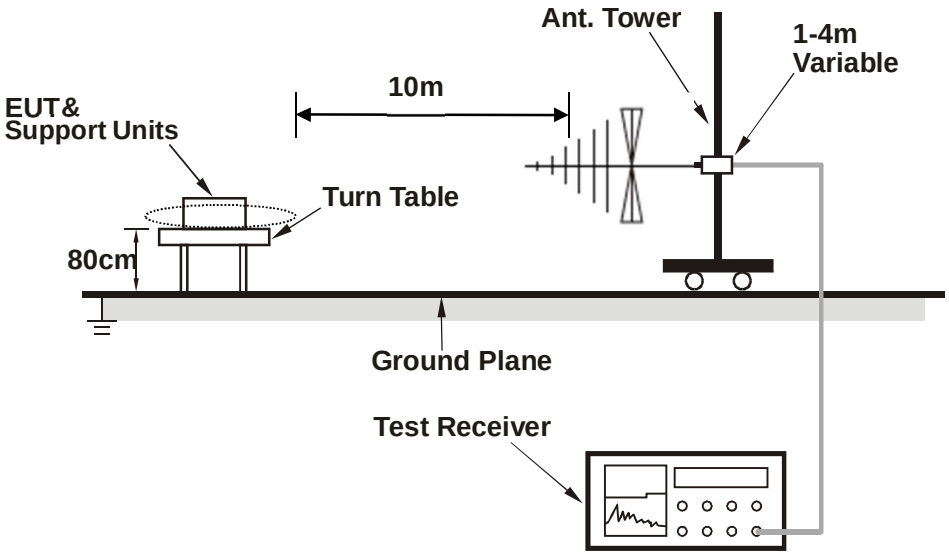
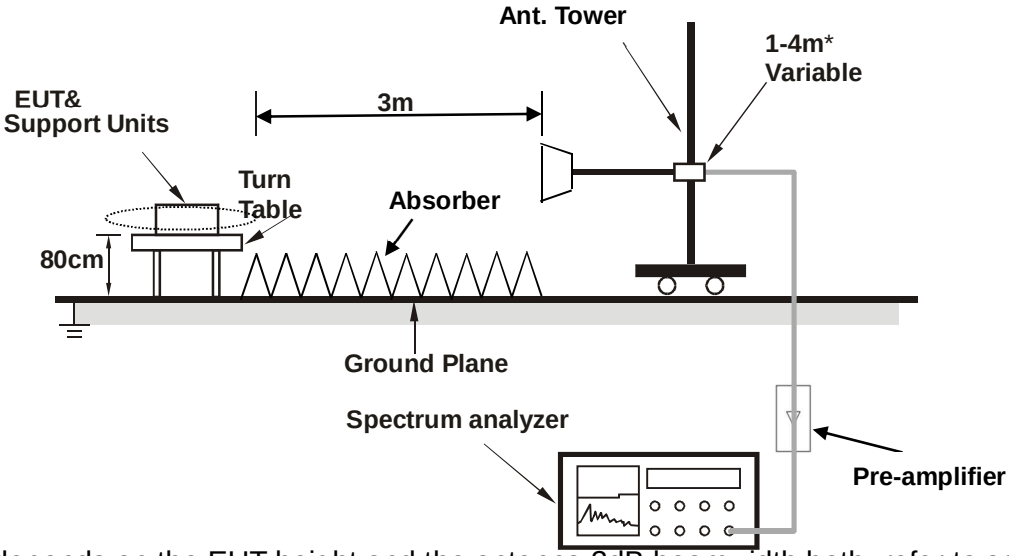
4.4 TEST SETUP

For EN 301489-1/-3

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



***** : depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of

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\ **TEST REPORT No.: (5218)136-1238**

CISPR 16-2-3

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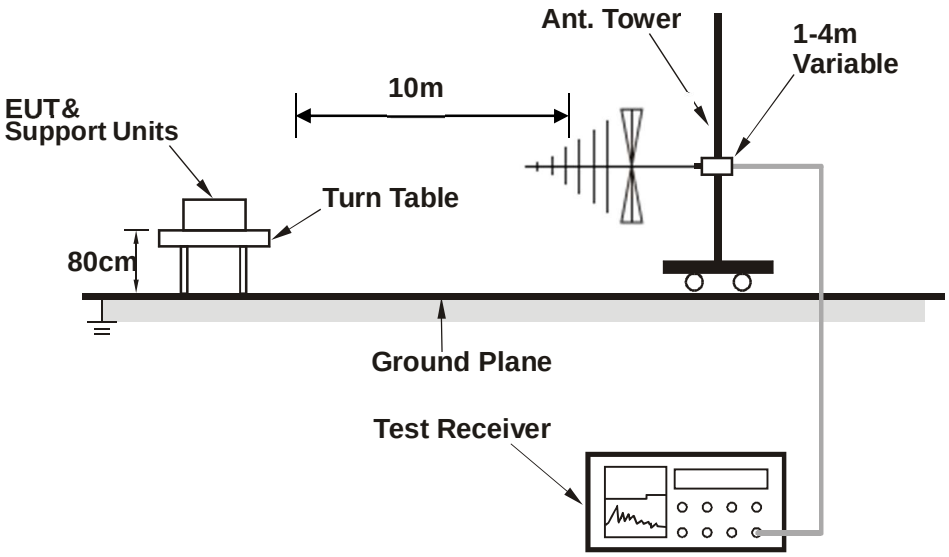
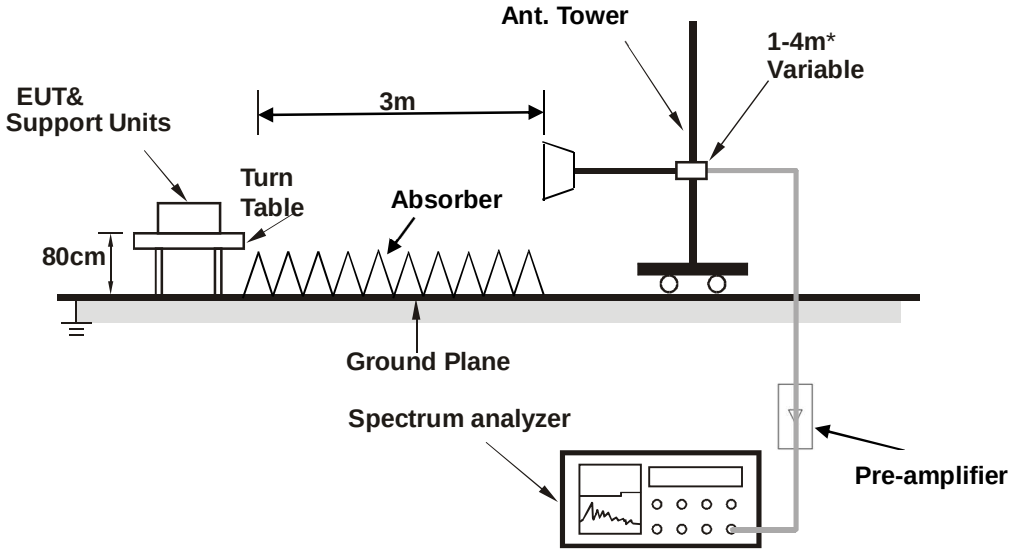
For EN 61000-6-3

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



***** : depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of

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CISPR 16-2-3

4.5 SUPPLEMENTARY INFORMATION

The more stringent measurement method of paragraph 8.3.2 in ANSI C63.4:2014 was applied for the test.

4.6 TEST RESULTS (Below 1GHZ)

TEST MODE	TX RX Link Normal Working	**FREQUENCY RANGE**	30-1000 MHz
TEST VOLTAGE	TX: DC 3V from Battery RX: DC 3.7V from Battery	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 69% RH	**TESTED BY**: Luke	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value （dBuV）	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	37.033	-17.74	32.39	14.65	30.00	-15.35	400	274
2	156.464	-16.91	31.19	14.28	30.00	-15.72	400	16
3	534.885	-10.58	31.08	20.50	37.00	-16.50	200	23
4	**627.278**	**-8.26**	**42.20**	**33.94**	**37.00**	**-3.06**	**400**	**329**
5	740.610	-5.73	27.13	21.40	37.00	-15.60	400	60
6	829.038	-4.54	37.30	32.76	37.00	-4.24	400	340

REMARKS: 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.

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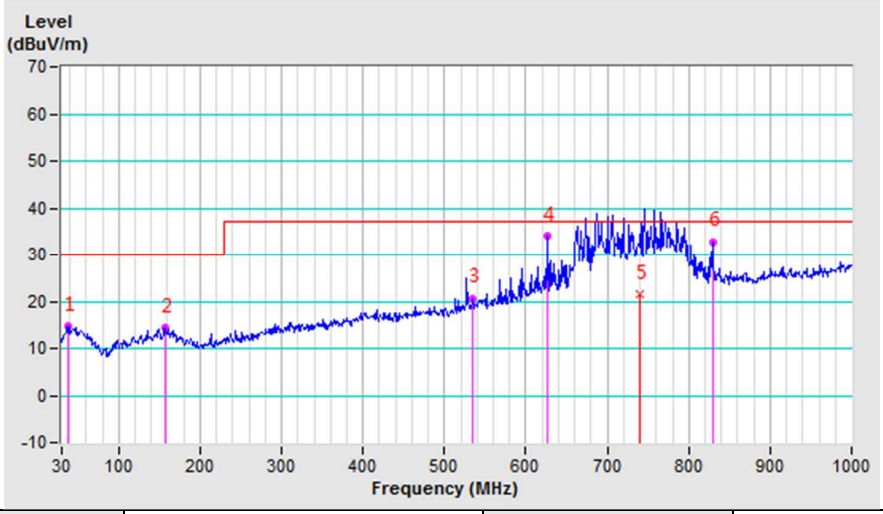

TEST MODE	TX RX Link Normal Working	**FREQUENCY RANGE**	30-1000 MHz
TEST VOLTAGE	TX: DC 3V from Battery RX: DC 3.7V from Battery	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	20deg. C, 69% RH	**TESTED BY**:Luke	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value （dBuV）	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	39.798	-17.79	34.58	16.79	30.00	-13.21	100	146
2	150.626	-15.97	30.06	14.09	30.00	-15.91	300	338
3	326.932	-13.69	29.89	16.20	37.00	-20.80	100	149
4	457.403	-10.75	30.11	19.36	37.00	-17.64	100	344
5	545.241	-8.71	30.43	21.72	37.00	-15.28	100	6
6	729.987	-5.18	30.02	24.84	37.00	-12.16	300	12

REMARKS: 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported.

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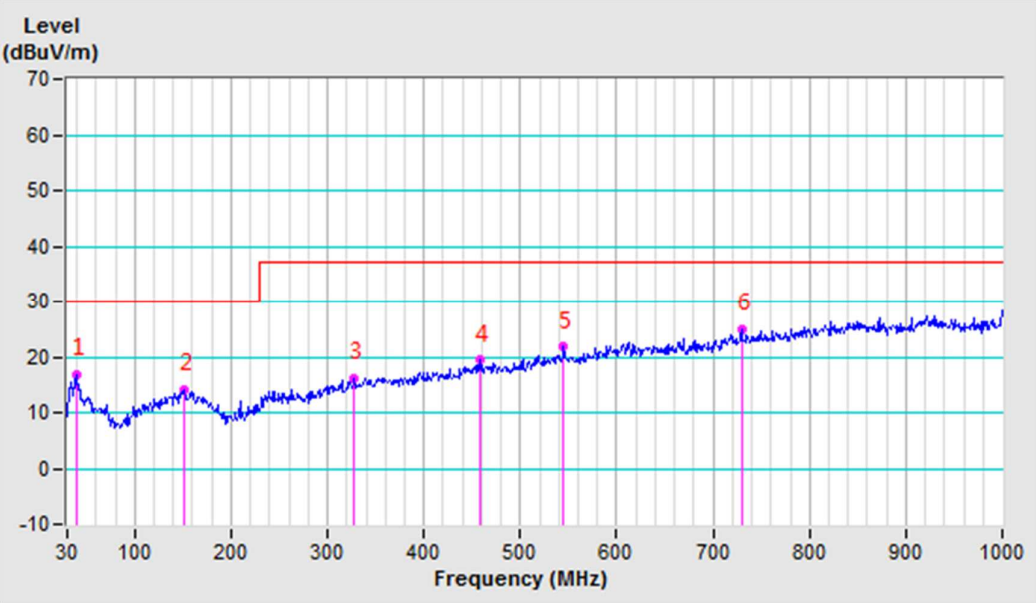

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TEST RESULTS (ABOVE 1GHZ)

TEST MODE	TX RX Link Normal Working		
TEST VOLTAGE	TX: DC 3V from Battery RX: DC 3.7V from Battery	**FREQUENCY RANGE**	1-6 GHz
ENVIRONMENTAL CONDITIONS	21deg. C, 54% RH	**TESTED BY**: Luke	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	3154.225 PK	3.51	56.63	60.14	74.00	-13.86	100	218
2	3154.225 AV	3.51	36.71	40.22	54.00	-13.78	100	218
3	3562.285 PK	5.23	55.18	60.41	74.00	-13.59	100	213
4	3562.285 AV	5.23	35.00	40.23	54.00	-13.77	100	213
5	4215.350 PK	5.85	54.42	60.27	74.00	-13.73	100	213
6	4215.350 AV	5.85	34.51	40.36	54.00	-13.64	100	213

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	3425.700 PK	4.87	55.12	59.99	74.00	-14.01	100	165
2	3425.700 AV	4.87	35.45	40.32	54.00	-13.68	100	165
3	3976.450 PK	5.21	55.14	60.35	74.00	-13.65	100	168
4	**3976.450 AV**	**5.21**	**35.77**	**40.98**	**54.00**	**-13.02**	**100**	**168**
5	4627.800 PK	6.76	53.67	60.43	74.00	-13.57	100	214
6	4627.800 AV	6.76	33.89	40.65	54.00	-13.35	100	214

REMARKS:
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 1GHz to 6GHz.
4. Only emissions significantly above equipment noise floor are reported.

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5 IMMUNITY TEST

5.1 GENERAL DESCRIPTION

Product Standard	**Draft EN 301 489-1 V2.2.0 (2017-03)** **FINAL DRAFT EN 301 489-3 V2.1.1**	
Basic Standard, Specification, and Performance Criterion required	EN 61000-4-2	Electrostatic Discharge – ESD: 2, 4, 8kV air discharge, 4 kV contact discharge, Performance Criterion B
	EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~ 6000 MHz, 3 V/m, 80% AM (1 kHz), Performance Criterion A

Product Standard:	**EN 61000-6-1:2007**	
Basic Standard, specification requirement, and Performance Criteria:	IEC 61000-4-2	Electrostatic Discharge – ESD: 2, 4, 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), 1400-2000 MHz, 3V/m, 80% AM (1kHz) 2000-2700 MHz, 1V/m, 80% AM (1kHz) Performance Criterion A

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5.1.1 PERFORMANCE CRITERIA

For EN 301 489-3

The phenomena allowed during and after test in each criterion are clearly stated in the following table.

Performance criteria		
Criteria	**During test**	**After test**
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Loss of function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions

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For EN 61000-6-1

According to Clause 7.1 of EN 61000-6-1 standard, the following describes the general performance criteria.

CRITERION A	The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
CRITERION B	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
CRITERION C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

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5.2 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD) (EN301489/EN 61000-6-1)

5.2.1 TEST SPECIFICATION

Basic Standard:	EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: 8 kV (Direct) Contact Discharge: 4 kV (Direct and Indirect)
Polarity:	Positive & Negative
Number of Discharge:	20 times on each test points
Discharge Mode:	Single Discharge
Discharge Period:	1 second

5.2.2 TEST INSTRUMENT

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
ESD Generator	TESEQ	NSG 437	279	Mar. 07,18	Mar. 06,19
Test Software	TESEQ	V03.03	N/A	N/A	N/A
ESD Generator	EM TEST	Dito	V1211112265	Feb. 25,18	Feb. 24,19
Test Software	EM TEST	V 2.31	N/A	N/A	N/A

NOTE: 1. The test was performed in ESD Room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

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5.2.3 TEST PROCEDURE

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The discharge return cable of the generator shall be kept at a distance of at least 0. 2 m from the EUT whilst the discharge is being applied and should not be held by the operator.

e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

g. At least ten single discharges (in the most sensitive polarity) were applied to the **H**orizontal **C**oupling **P**lane at points on each side of the EUT. The ESD generator was positioned horizontally at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP.**

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **V**ertical **C**oupling **P**lane in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

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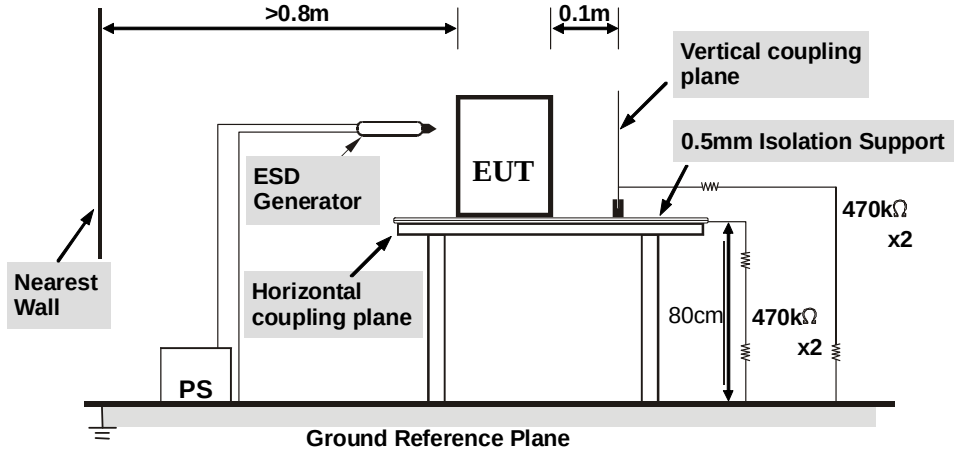
5.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **G**round **R**eference **P**lane. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **H**orizontal **C**oupling **P**lane (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN 61000-4-2 and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 0.8 minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

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5.2.6 TEST RESULTS

TEST MODE	See Section 2.2	**TEST VOLTAGE**	See section 2.2
ENVIRONMENTAL CONDITIONS	24deg. C, 41% RH, 101.3kPa	**TESTED BY:** Andy	

Direct Discharge Application				
Test Level (kV)	**Polarity**	**Test Point**	**Test Result of Contact Discharge**	**Test Result of Air Discharge**
4	+ /-	All metal part	A	N/A
2,4,8	+ /-	All non-metal part	N/A	A

Indirect Discharge Application				
Discharge Level (kV)	**Polarity**	**Test Point**	**Test Result of HCP**	**Test Result of VCP**
4	+ /-	HCP	A	N/A
4	+ /-	VCP	N/A	A

NOTE: A: There was no change compared with initial operation during the test.

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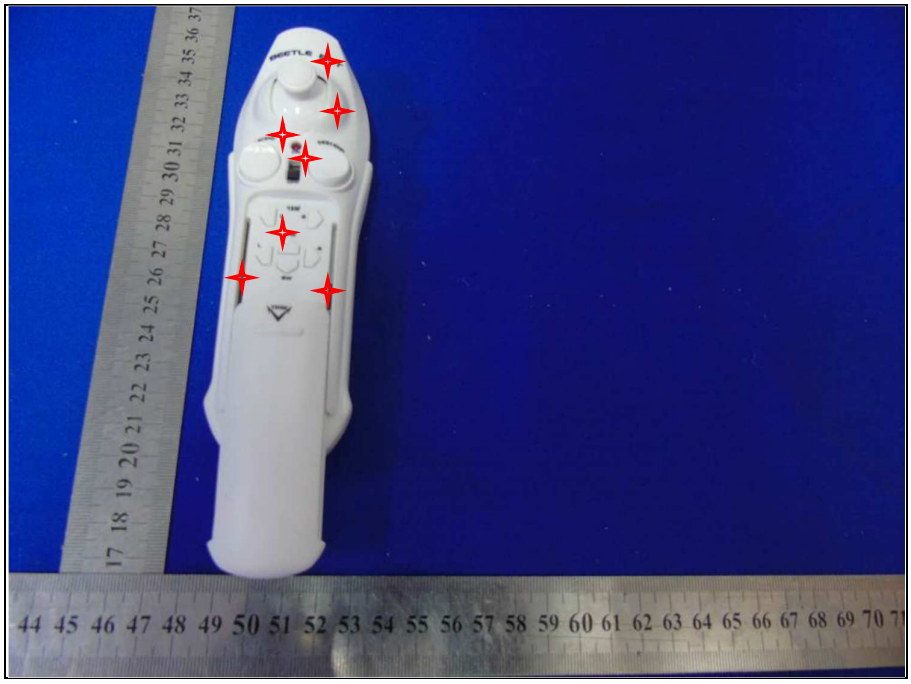
ESD TEST POINT
(O- Direct Contact Discharge; ✦ -Air Discharge)



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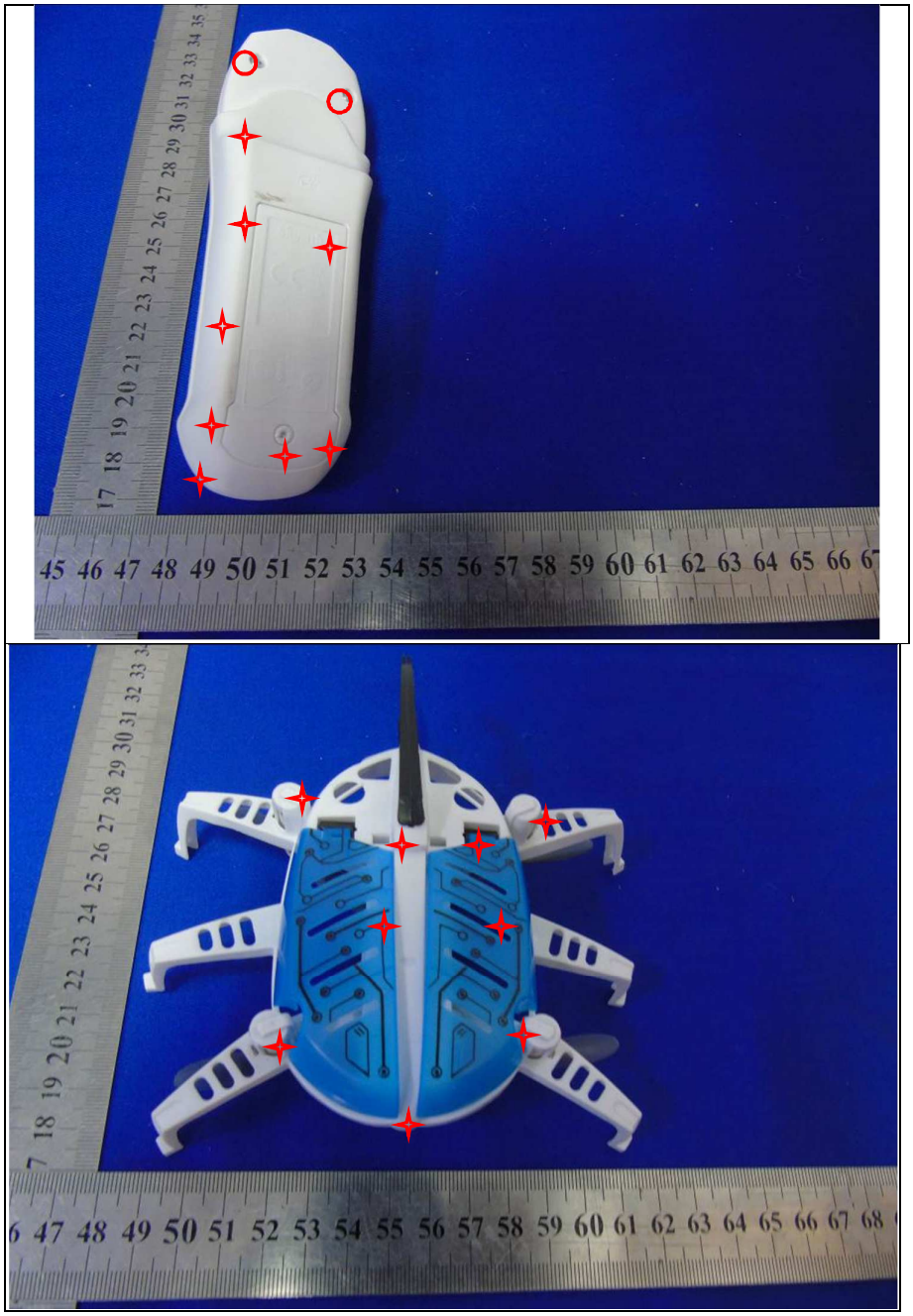

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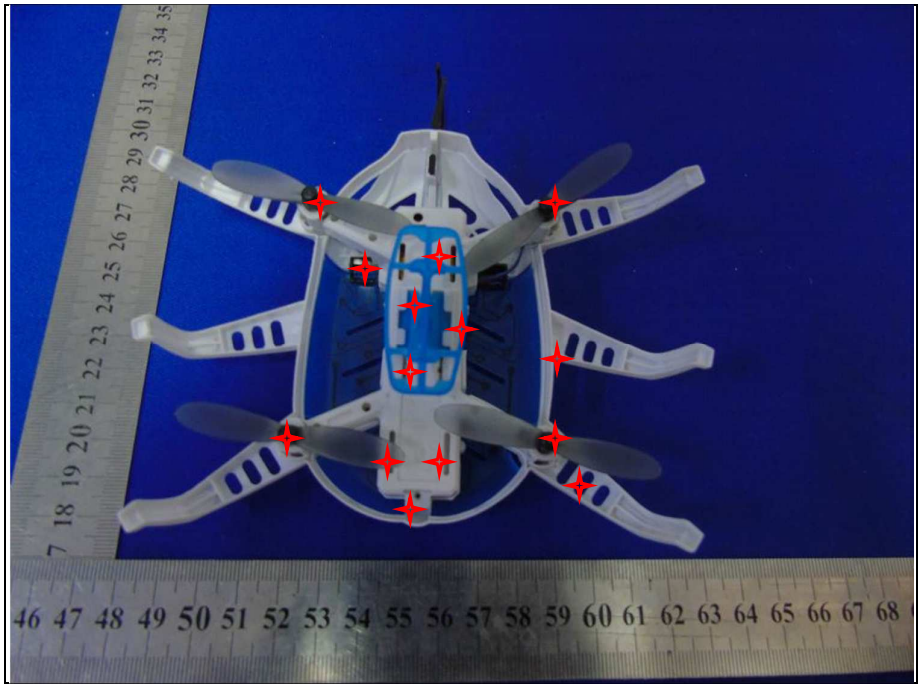

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5.3 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN301489)

5.3.1 TEST SPECIFICATION

Basic Standard:	EN 61000-4-3
Frequency Range:	80 MHz ~ 6000 MHz
Field Strength:	3 V/m
Modulation:	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step:	10% of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5 m
Dwell Time:	3 seconds

5.3.2 TEST INSTRUMENT

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Agilent	N5181A	MY50142530	Oct. 20,17	Oct. 19,18
Bilog Antenna	Teseq	CBL 6111D	25757	N/A	N/A
Antenna Log-Periodic	AR	ATR80M6G	0337307	N/A	N/A
Antenna Log-Periodic	AR	ATS700M11G	0336821	N/A	N/A
Switch Controller	AR	SC1000	0337343	N/A	N/A
RF Power Meter	ESE	4242	13984	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35716	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35715	Jan. 02,18	Jan. 01,19
E-Field probe	Narda	NBM-520	2403/01B	Sep. 28,17	Sep. 27,18
Power Amplifier	TESEQ	CBA 1G-150	T44029	N/A	N/A
Power Amplifier	TESEQ	CBA 3G-100	T44030	N/A	N/A
Power Amplifier	TESEQ	CBA 6G-050	1041204	N/A	N/A
Dual Directional Coupler	TESEQ	C5982	95208	Nov. 08,17	Nov. 07,18
Dual Directional Coupler	TESEQ	C6187	95175	Nov. 08,17	Nov. 07,18
Dual Directional Coupler	TESEQ	CPH-274F	M251304-01	Nov. 08,17	Nov. 07,18
Test Software	ADT	BVADT_RS_V7.6.4-DG	N/A	N/A	N/A

NOTE: 1. The test was performed in RS chamber.

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2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

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5.3.3 TEST PROCEDURE

The test procedure was in accordance with EN 61000-4-3.

a. The testing was performed in a fully-anechoic chamber.

b. The frequency range is swept from 80 MHz to 6000 MHz with the signal 80% amplitude modulated with a 1 kHz sine wave.

c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5s.

d. The field strength level was 3 V/m.

e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

5.3.4 DEVIATION FROM TEST STANDARD

No deviation.

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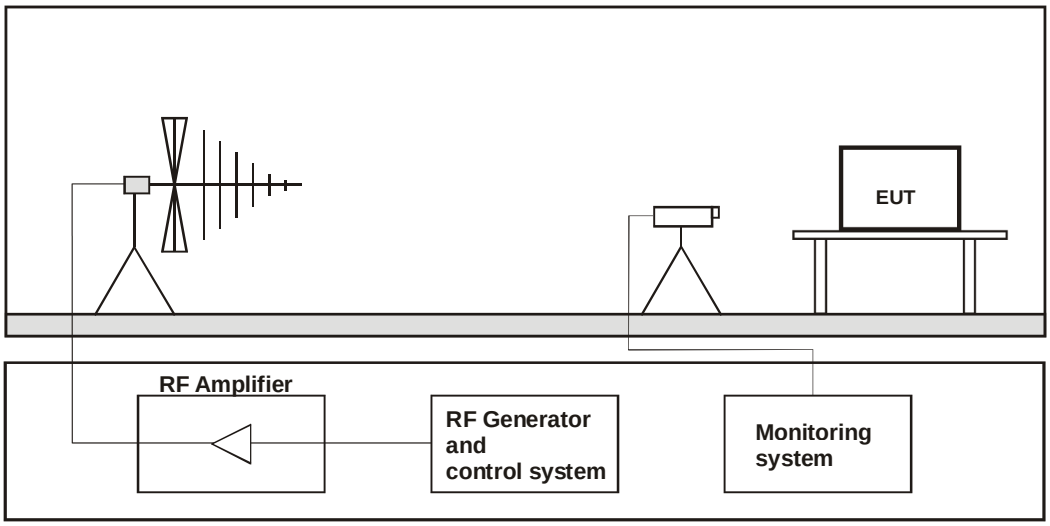
5.3.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:
TABLETOP EQUIPMENT
The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

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5.3.6 TEST RESULTS

TEST MODE	See items 2.2	**TEST VOLTAGE**	See items 2.2
ENVIRONMENTAL CONDITIONS	22.7deg.C, 50.7% RH	**TESTED BY:** Xue Wang	

Field Strength (V/m)	Test Frequency Note#1 (MHz)	Polarization of antenna (Horizontal / Vertical)	Test Distance (m)	Test Result	Remark
3	80-6000	H / V	3	A	N/A

Note#1: Tested Israel SII Frequencies 89,100,107,144,163,196,244,315,434,460,600,825,845,880 MHz

NOTE: A: There was no change compared with initial operation during the test.

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5.4 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN 61000-6-1)

5.4.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-3
Frequency Range:	80-1000MHz, 1400-2000MHz, 2000-2700MHz
Field Strength:	3 V/m,3V/m,1V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5m
Dwell Time:	at least 3 seconds

5.4.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Agilent	N5181A	MY50142530	Oct. 20,17	Oct. 19,18
Bilog Antenna	Teseq	CBL 6111D	25757	N/A	N/A
Antenna Log-Periodic	AR	ATR80M6G	0337307	N/A	N/A
Antenna Log-Periodic	AR	ATS700M11G	0336821	N/A	N/A
Switch Controller	AR	SC1000	0337343	N/A	N/A
RF Power Meter	ESE	4242	13984	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35716	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35715	Jan. 02,18	Jan. 01,19
E-Field probe	Narda	NBM-520	2403/01B	Sep. 28,17	Sep. 27,18
Power Amplifier	TESEQ	CBA 1G-150	T44029	N/A	N/A
Power Amplifier	TESEQ	CBA 3G-100	T44030	N/A	N/A
Power Amplifier	TESEQ	CBA 6G-050	1041204	N/A	N/A
Dual Directional Coupler	TESEQ	C5982	95208	Nov. 08,17	Nov. 07,18
Dual Directional Coupler	TESEQ	C6187	95175	Nov. 08,17	Nov. 07,18
Dual Directional Coupler	TESEQ	CPH-274F	M251304-01	Nov. 08,17	Nov. 07,18
Test Software	ADT	BVADT_RS_V7.6.4-DG	N/A	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RS chamber.

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5.4.3 TEST PROCEDURE

The test procedure was in accordance with IEC 61000-4-3

f. The testing was performed in a fully-anechoic chamber.

g. The frequency range is swept from 80 MHz to 1000 MHz, 1400MHz to 2000MHz, 2000MHz to 2700MHz with the signal 80% amplitude modulated with a 1kHz sine wave.

h. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.

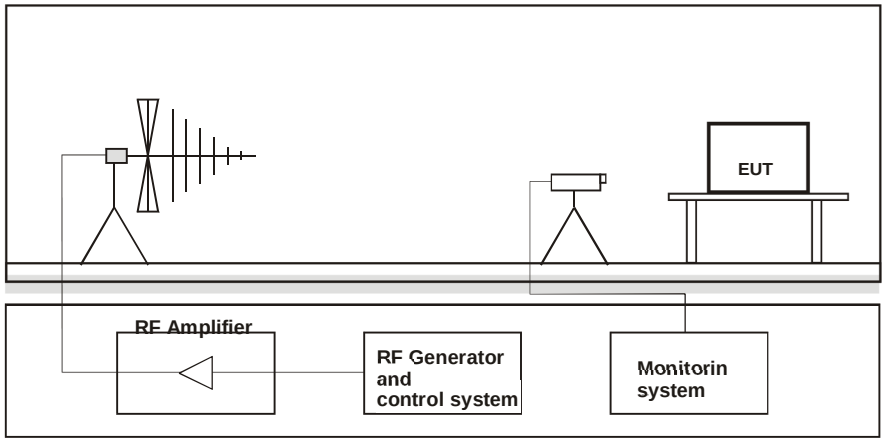
i. The field strength levels were 3V/m, 1V/m.

j. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

5.4.4 DEVIATION FROM TEST STANDARD

No Deviation.

5.4.5 TEST SETUP



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NOTE:

TABLETOP EQUIPMENT
The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT
The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

5.4.6 TEST RESULTS

TEST MODE	See items 2.2	**TEST VOLTAGE**	See items 2.2
ENVIRONMENTAL CONDITIONS	22.7deg.C, 50.7% RH	**TESTED BY:** Xue Wang	

Field Strength (V/m)	Test Frequency Note#1 (MHz)	Polarization of antenna (Horizontal / Vertical)	Test Distance (m)	Test Result	Remark
3	80 - 1000	H&V	3	A	N/A
3	1400 - 2000	H&V	3	A	N/A
1	2000 - 2700	H&V	3	A	N/A

NOTE: A: There was no change compared with initial operation during the test.

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6 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST (EN61000-6-3)

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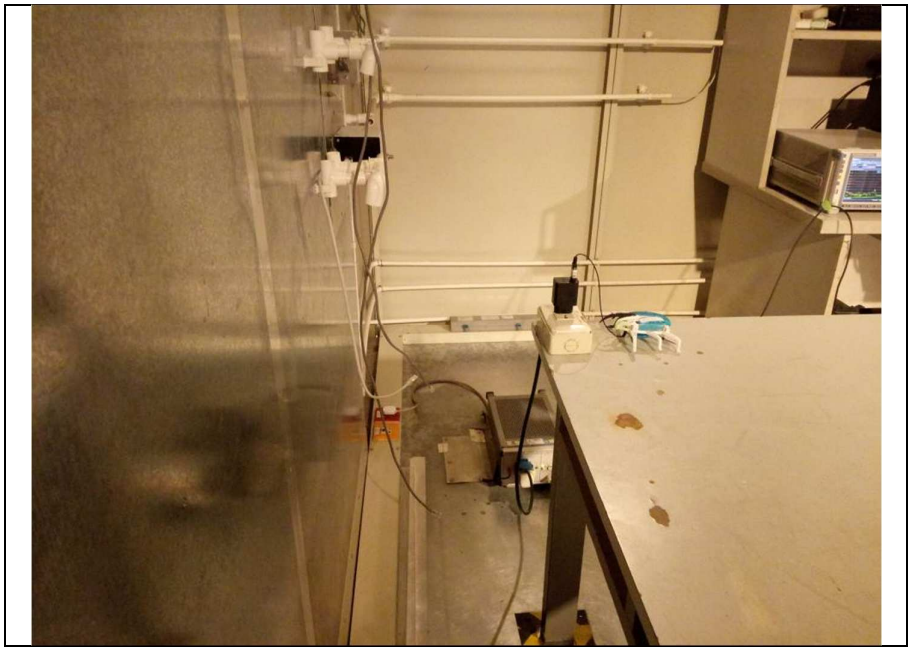
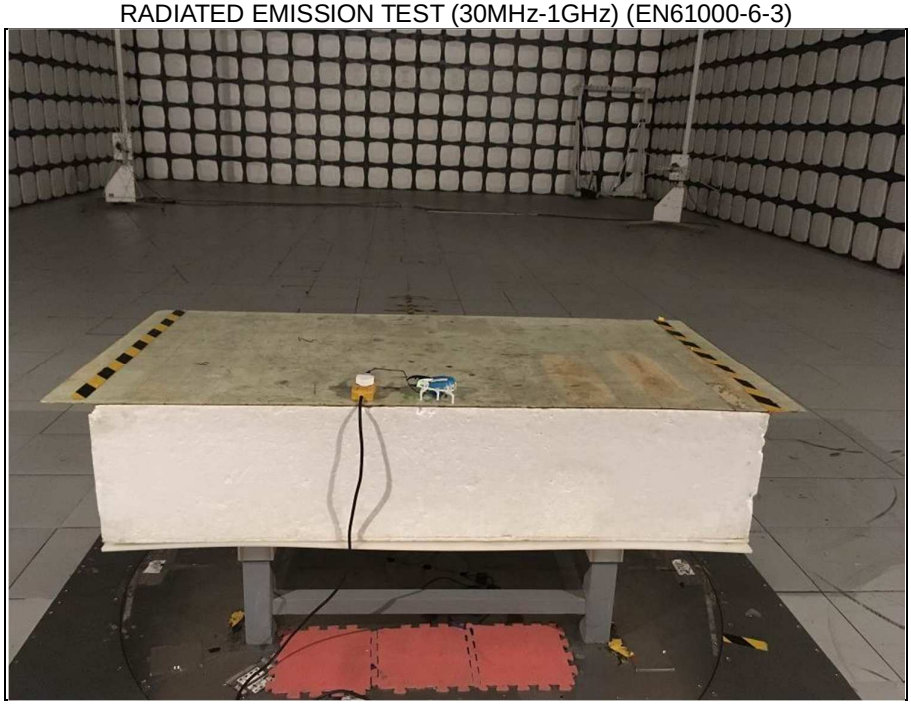


RADIATED EMISSION TEST (30MHz-1GHz) (EN61000-6-3)



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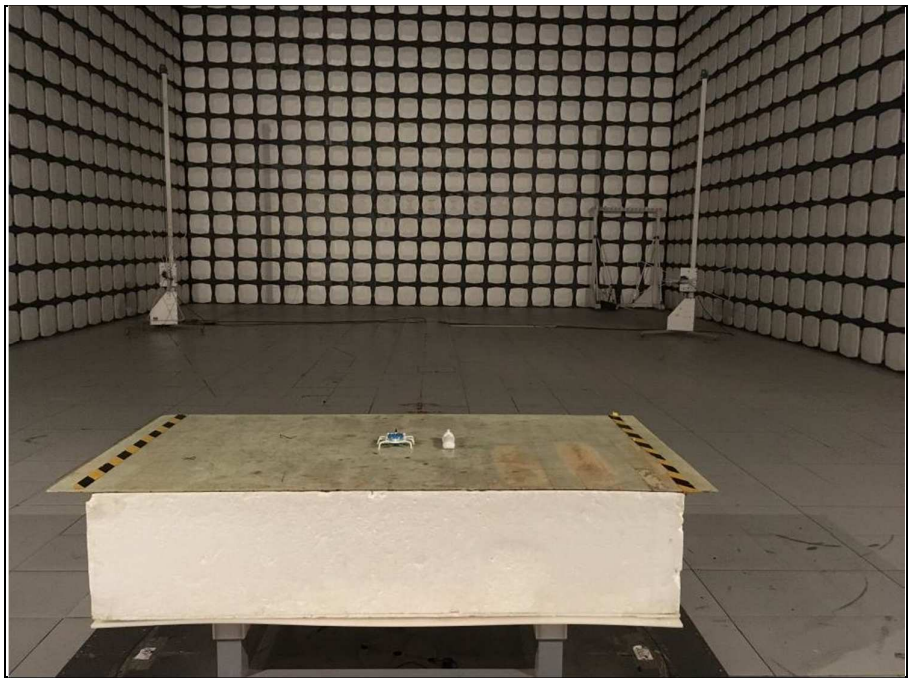

RADIATED EMISSION TEST (30MHz-1GHz)(EN301489)

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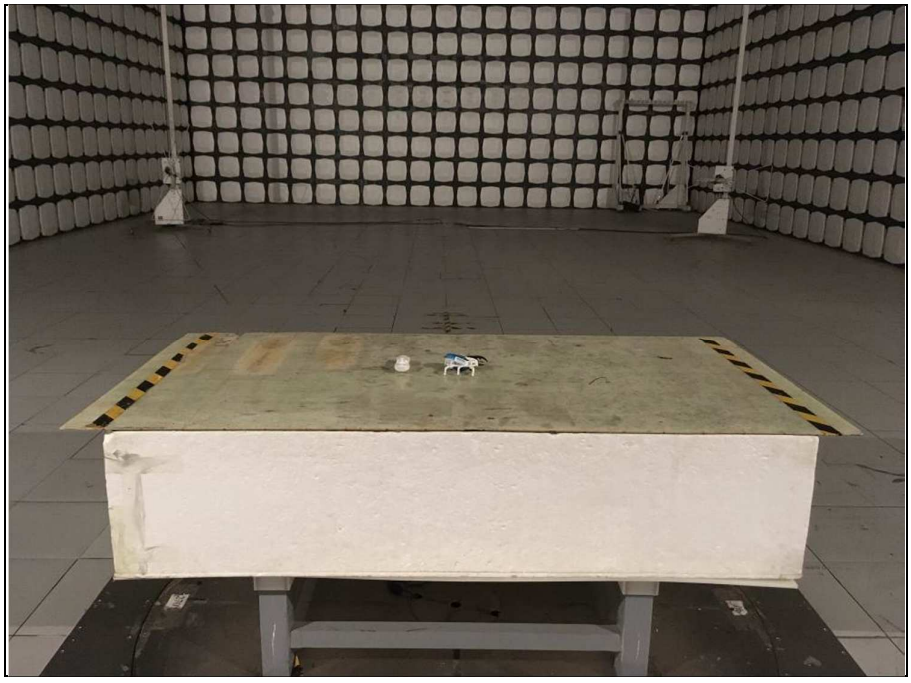

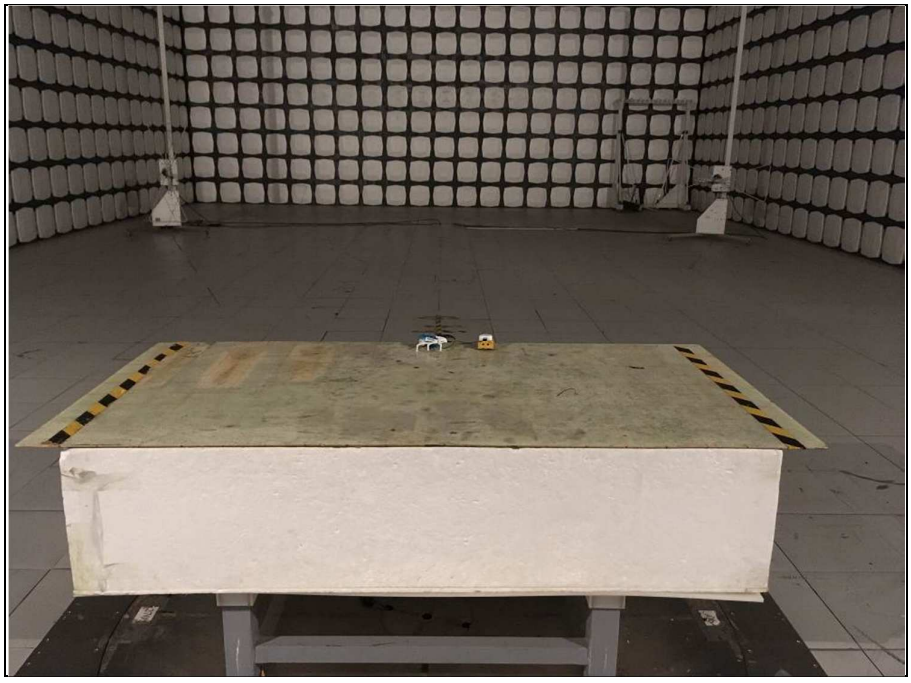

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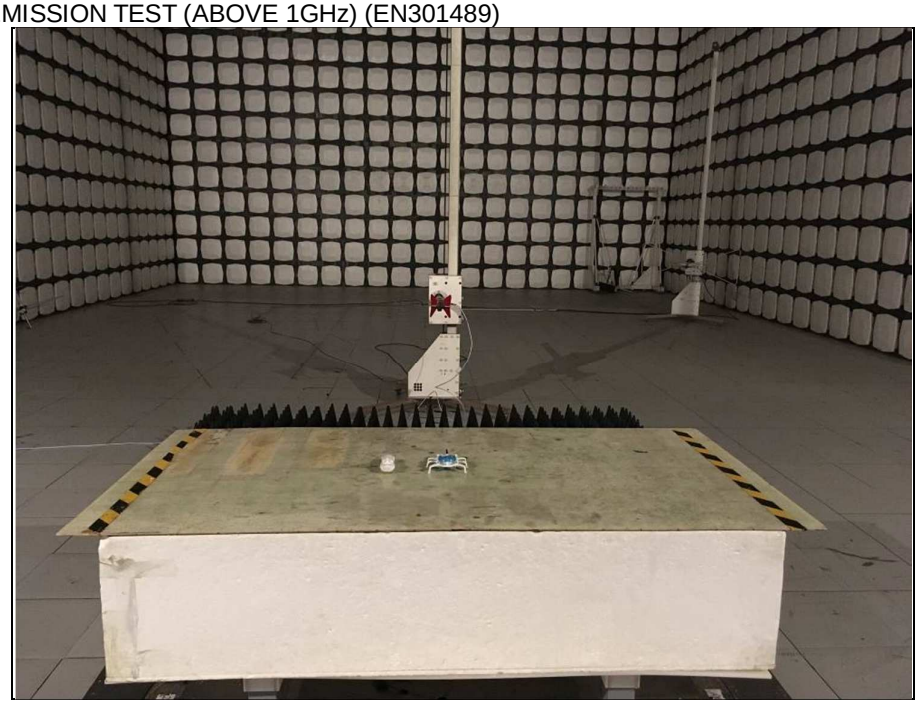
RADIATED EMISSION TEST (ABOVE 1GHz) (EN301489)



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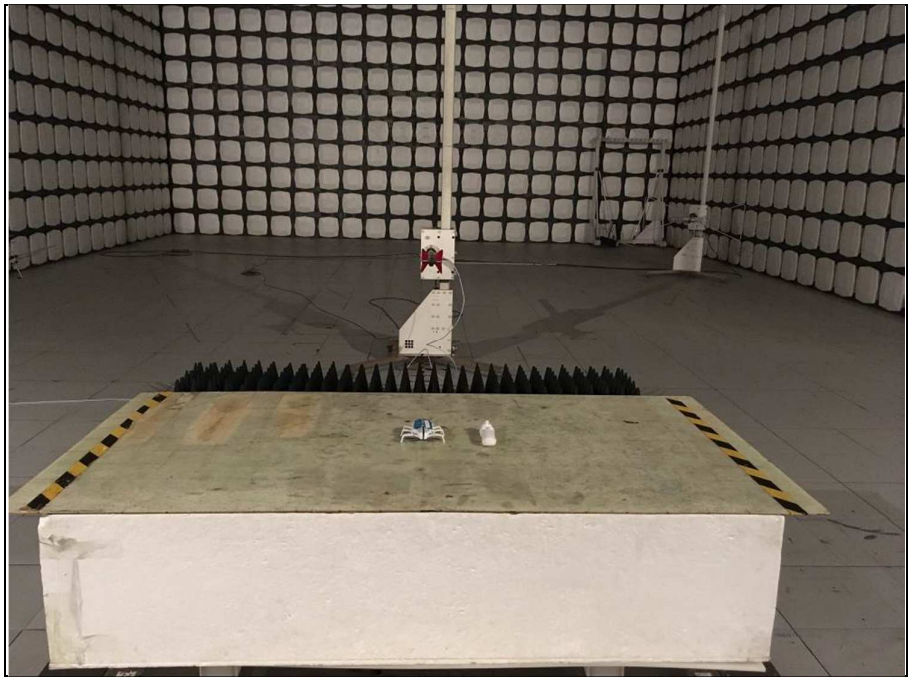

ESD TEST (EN61000-6-1)

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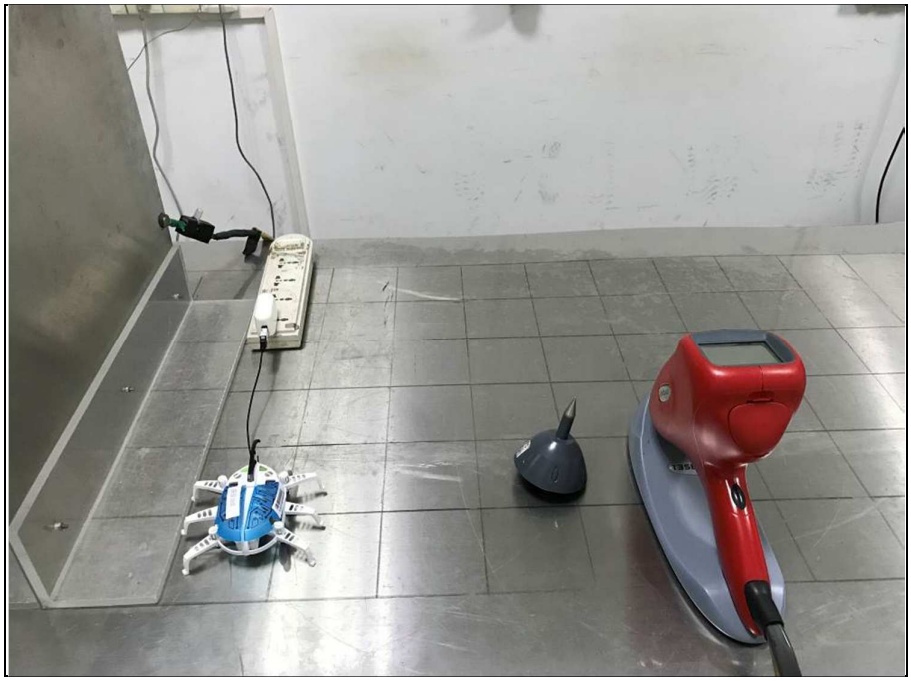

ESD TEST (EN301489)

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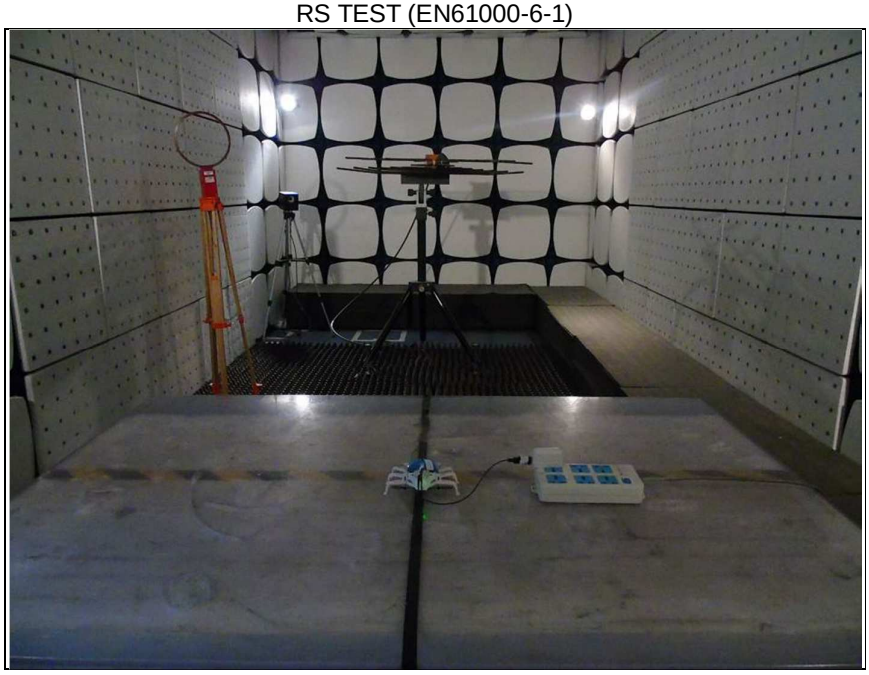
RS TEST (EN61000-6-1)



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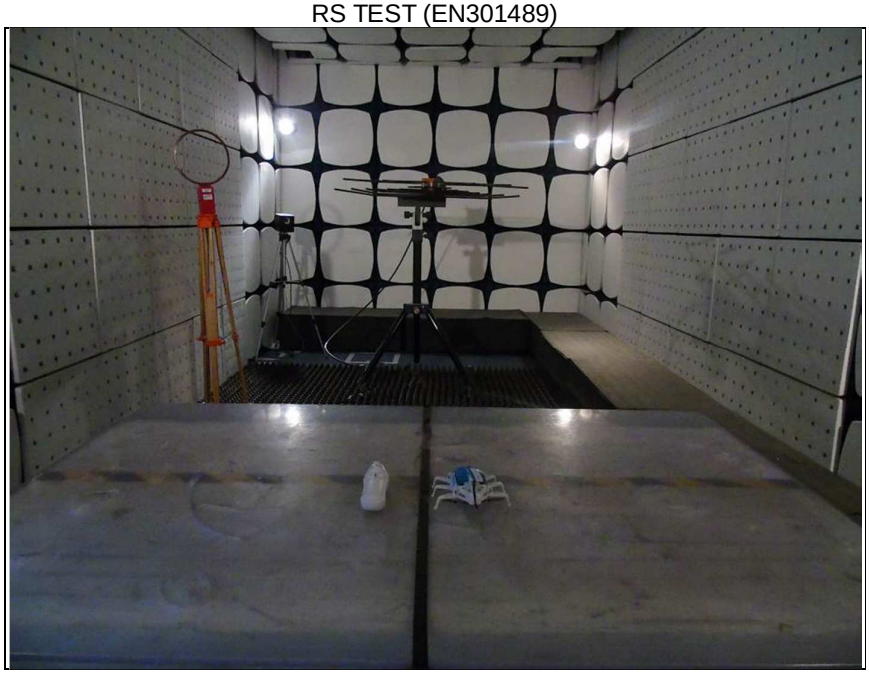
RS TEST (EN301489)



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7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

---END---

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