

TEST REPORT

Report No. : CQASZ20191201316E-02
Applicant: SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant: 13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054
Equipment Under Test (EUT):
EUT Name: HUBSAN ZINO 2
Model No.: ZINO 2
Brand Name: HUBSAN
Standards: ETSI EN 301 489-1 V2.2.3 (2019-11)
Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
ETSI EN 301 489-3 V2.1.1 (2019-03)
Date of Receipt: 2019-12-16
Date of Test: 2019-12-16 to 2020-01-03
Date of Issue: 2020-01-03
Test Result : **PASS***
***In the configuration tested, the EUT complied with the standards specified above**

Tested By: _____

(Martin Lee)

Reviewed By: _____

(Aaron Ma)

Approved By: _____

(Jack Ai)



1 Version

Revision History of Report

Report No.	Version	Description	Issue Date
CQASZ20191201316E-02	Rev.01	Initial report	2020-01-03

2 Test Summary

Electromagnetic Compatibility (EMC) Part				
Electromagnetic Interference (EMI)				
Test	Test Requirement	Test Method	Limit	Result
Radiated Emission	EN 301 489-17 V3.2.0 (2017-03) Clause 7.1 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.1	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 8.2	Clause 8.2.3	PASS
Conducted Emission (DC port)	EN 301 489-17 V3.2.0 (2017-03) Clause 7.1 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.1	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 8.3	Clause 8.3.3	N/A ¹⁾
Conducted Emission (AC port)	EN 301 489-17 V3.2.0 (2017-03) Clause 7.1 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.1	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 8.4	Clause 8.4.3	N/A ¹⁾
Harmonic Emission on AC, 50Hz to 2kHz	EN 301 489-17 V3.2.0 (2017-03) Clause 7.1 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.1	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 8.5	Clause 8.5	N/A ¹⁾
Flicker Emission on AC	EN 301 489-17 V3.2.0 (2017-03) Clause 7.1 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.1	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 8.6	Clause 8.6	N/A ¹⁾
Conducted Emission (telecommunication port)	EN 301 489-17 V3.2.0 (2017-03) Clause 7.1 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.1	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 8.7	Clause 8.7.3	N/A ²⁾
Electromagnetic Susceptibility(EMS)				
ESD (Electrostatic Discharge)	EN 301 489-17 V3.2.0 (2017-03) Clause 7.2 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.2	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 9.3	Clause 9.3.3	PASS
Radiated Immunity, 80MHz to 6 GHz	EN 301 489-17 V3.2.0 (2017-03) Clause 7.2 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.2	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 9.2	Clause 9.2.3	PASS
EFT (Electrical Fast Transients)	EN 301 489-17 V3.2.0 (2017-03) Clause 7.2 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.2	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 9.4	Clause 9.4.3	N/A ¹⁾
Surge Immunity	EN 301 489-17 V3.2.0 (2017-03) Clause 7.2 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.2	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 9.8	Clause 9.8.3	N/A ¹⁾

Injected Currents 150kHz to 80MHz	EN 301 489-17 V3.2.0 (2017-03) Clause 7.2 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.2	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 9.5	Clause 9.5.3	N/A ¹⁾
Voltage Dips and Interruptions	EN 301 489-17 V3.2.0 (2017-03) Clause 7.2 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.2	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 9.7	Clause 9.7.3	N/A ¹⁾
Transients and Surges in the Vehicular Environment	EN 301 489-17 V3.2.0 (2017-03) Clause 7.2 ETSI EN 301 489-3 V2.1.1 (2019-03) Clause 7.2	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 9.6	Clause 9.6.3	N/A ¹⁾

Remark:

N/A¹⁾: Because this test EUT is portable product.

N/A²⁾: Because this test EUT not telecommunication port.

The tested sample(s) and the sample information are provided by the client.

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 means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application.

The highest frequency of the internal sources of the EUT is 5850 MHz.

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4 General Information

4.1 Client Information

Applicant:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Applicant:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054
Manufacturer:	SHENZHEN HUBSAN TECHNOLOGY CO., LTD
Address of Manufacturer:	13th Floor, Bldg 1C, Shenzhen Software Industry Base, Xuefu Road, Nanshan District, Shenzhen, China 518054

4.2 General Description of EUT

Product Name:	HUBSAN ZINO 2	
Mode No.:	ZINO 2	
Trade Mark:	HUBSAN	
EUT Supports Radios application	5G WIFI: 5150MHz~5250 MHz, 5725MHz~5850 MHz	
Power Supply:	remote-control unit	Battery: 3.6V 3350 mAh Li-Po
	plane unit	Battery: 15.2 V 3800 mAh Li-Po Power Supply: MODEL: P173D3000 INPUT: 100-240V~50/60Hz 1.2A OUTPUT: 17.3V 3000mA

4.3 Product Specification subjective to this standard

Radio function:	5G WIFI
Operation frequency range:	5150MHz~5250 MHz, 5725MHz~5850 MHz
Test Mode:	
Normal working:	The remote-control unit and the plane unit WIFI pairing work normally
Standby mode:	Keep EUT at standby mode

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Phone	MI	MI3	/	CQA

2) Cable

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
/	/	/	/	/

4.5 Test Location

Other than radiated immunity, all tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Radiated immunity test is performed at:

Guangdong Huizhou Quality & Measuring Supervision Testing Institute

Quality Supervision & Test Building No.1, Wenhua 2th Road, Jiangbei, Huizhou, Guangdong, China

4.6 Deviation from Standards

None.

4.7 Abnormalities from Standard Conditions

None.

4.8 Other Information Requested by the Customer

None.

4.9 Monitoring of EUT for the Immunity Test

Visual: Monitor the LED flash and movement of the EUT.

Audio: N/A

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

No.	Item	Measurement Uncertainty
1	Conduction emission	3.74dB (9kHz to 150kHz)
		3.34dB (150kHz to 30MHz)
2	Radiated emission	5.12dB (30MHz-1GHz)
		4.60dB (1GHz-6GHz)
3	Radiated Immunity	1.61dB
4	Conducted Immunity	0.92dB
5	ESD	6 %
6	EFT (Electrical Fast Transients)	5 %
7	Surge Immunity	4 %
8	Voltage Dips and Interruptions	4 %
9	Temperature test	0.8°C
10	Humidity test	2.0%
11	DC power test	0.5 %

5 Equipment List

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
Loop antenna	SCHWARZBECK	FMZB 1516	CQA-060	2019/10/21	2020/10/20
Horn Antenna	R&S	BBHA 9170	CQA-088	2019/9/25	2020/9/24
Horn Antenna	R&S	HF906	CQA-012	2019/9/26	2020/9/25
Bilog Antenna	R&S	HL562	CQA-011	2019/9/26	2020/9/25
EMI Test Receiver	R&S	ESR7	CQA-005	2019/10/25	2020/10/24
Spectrum analyzer	R&S	FSU26	CQA-038	2019/10/25	2020/10/24
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2019/10/25	2020/10/24
Coaxial cable (1GHz~40GHz)	CQA	N/A	C007	2019/9/26	2020/9/25
Coaxial cable (9KHz~1GHz)	CQA	N/A	C013	2019/9/26	2020/9/25

Electrostatic Discharge					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
ESD Simulator	EM TEST	DITO	CQA-001	2019/9/26	2020/9/25

Guangdong Huizhou Quality & Measuring Supervision Testing Institute:

Radiated Immunity (80MHz-6GHz)					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	Albatross	APC13102-SAC	Z-064	2017/12/2	2020/12/1
Signal Generator	R&S	SMB100A	Z-063-01	2019/4/18	2020/4/17
Power amplifier	R&S	BBA150-BC1000	Z-140	2019/6/2	2020/6/1
Power amplifier	R&S	BBA150-D200+E200	Z-144	2019/11/28	2020/11/27
log-periodic antenna	R&S	HL046E	Z-063-18	2019/4/19	2021/4/18
Stacked Double Log-periodic Antenna	Schwarzbeck	STLP 9149	Z-063-19	2019/4/19	2021/4/18
Power Meter	R&S	NRP2	Z-063-06	2019/6/2	2020/6/1

Audio mouth	BK	BK-4227	Z-063-23	2019/4/19	2020/4/18
Audio Box	BK	ACO-B0X	Z-063-24	2019/4/19	2020/4/18
Audio analyzer	R&S	UPL	Z-063-76	2019/4/19	2020/4/18

6 EMC Requirements Specification in EN 301 489-17

EMI in EN 301 489-1, sub clause 7.1 table 1.

EMS in EN 301 489-1, sub clause 7.2 table 2.

6.1 EMI (Emission)

6.1.1 Radiated Emission

Test Requirement: EN 301 489-17 Clause 7.1&ETSI EN 301 489-3 Clause 7.1

Test Method: EN 301 489-1 Clause 8.2.2

EUT Operation:

Ambient: Temp.: 25.2°C

Humid.: 52%

Press.: 1015mbar

Test Mode: Normal working

Receive Setup:

Frequency range (MHz)	Detector	RBW	VBW
30-1000	Quasi-peak	120kHz	300kHz
Above 1000	Peak	1MHz	3MHz

Limit:

Frequency	Limit(@3m)	Remark
30MHz-230MHz	40dBuV/m	QP value
230MHz-1GHz	47dBuV/m	QP value
1GHz-3GHz	50dBuV/m	Average value
	70dBuV/m	PK value
3GHz-6GHz	54dBuV/m	Average value
	74dBuV/m	PK value

Test Setup:

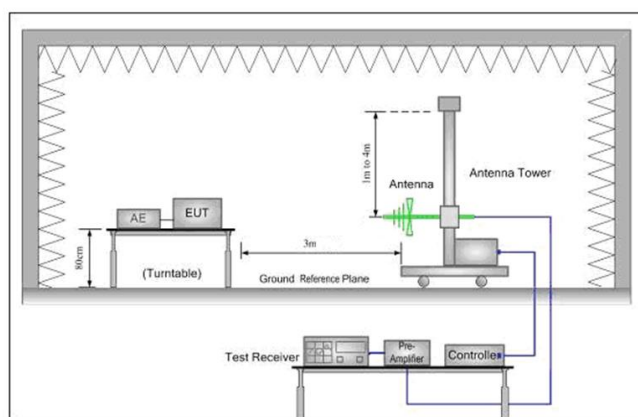


Figure 1. 30MHz to 1GHz

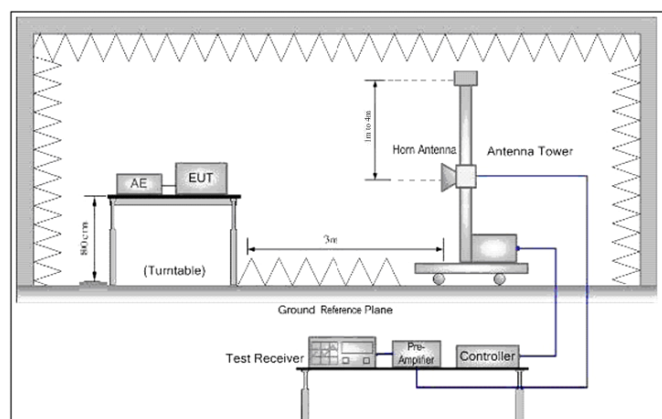


Figure 2. Above 1 GHz

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 3m 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:
 - 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.

Equipment Used:

Refer to section 5 for details.

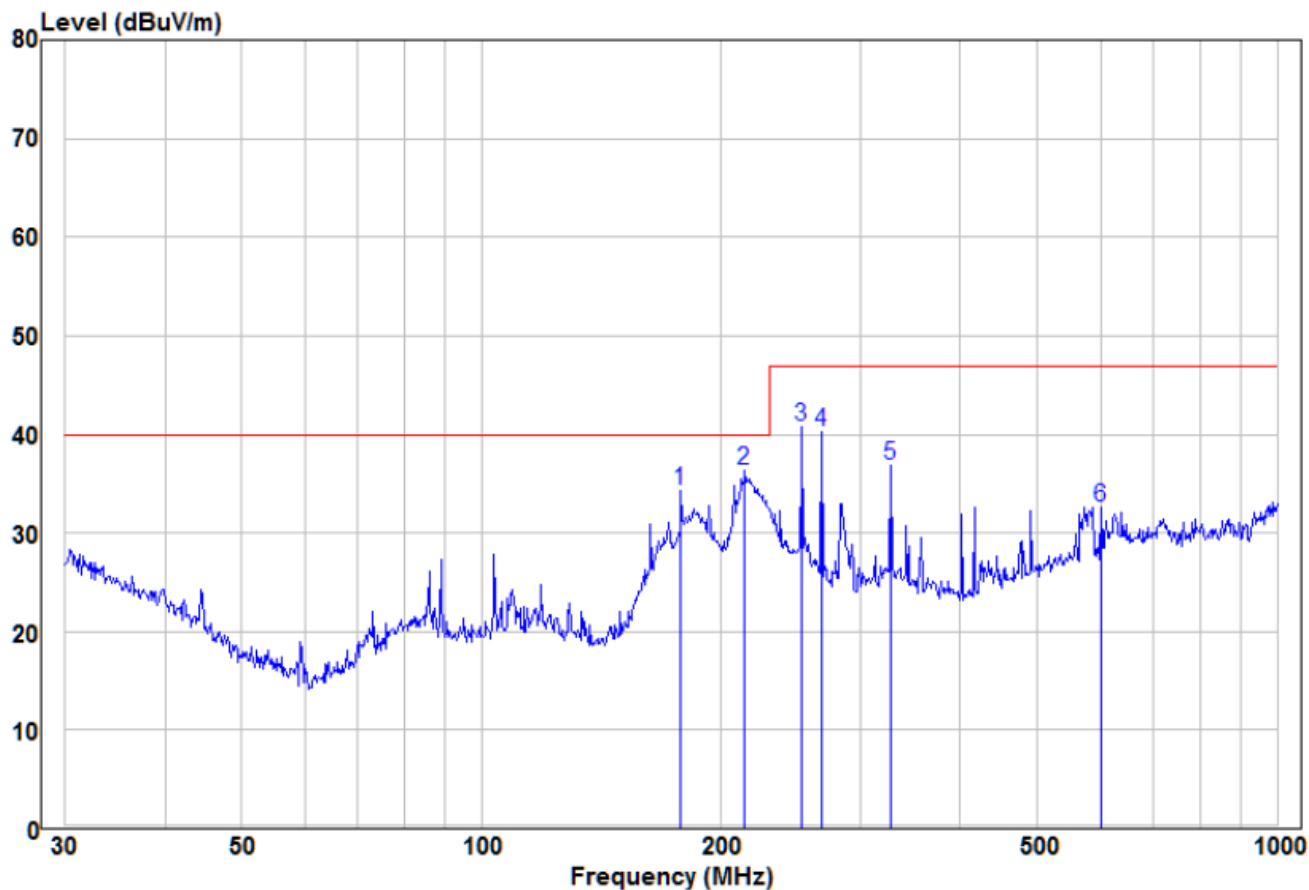
Test result:

PASS

Measurement Data:

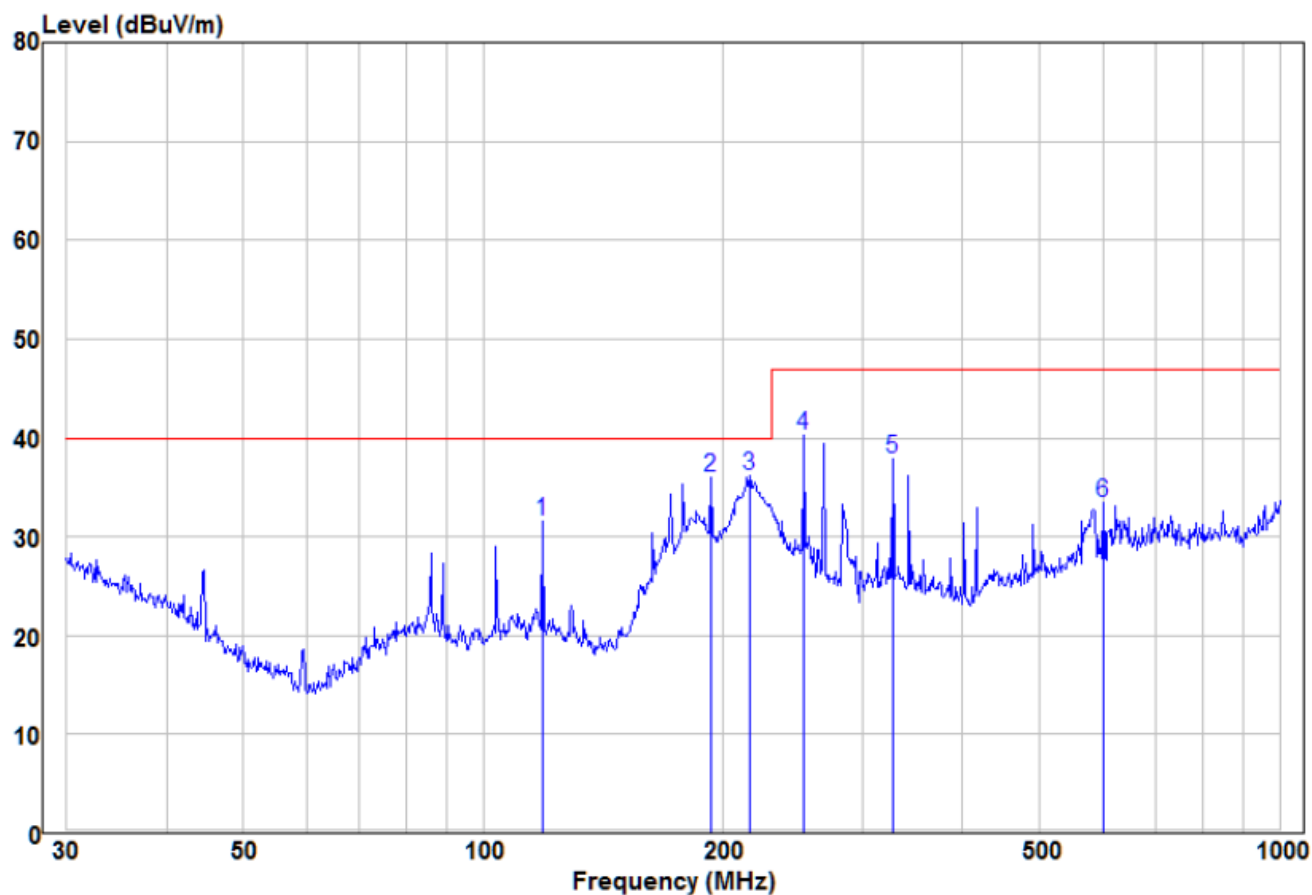
Below 1GHz:

Horizontal



	Freq	Read		Limit	Over			
	MHz	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	178.13	26.09	8.21	34.30	40.00	-5.70	Peak	HORIZONTAL
2	214.51	27.32	8.95	36.27	40.00	-3.73	Peak	HORIZONTAL
3	252.95	30.67	10.18	40.85	47.00	-6.15	Peak	HORIZONTAL
4	267.55	29.56	10.66	40.22	47.00	-6.78	Peak	HORIZONTAL
5	326.74	24.51	12.39	36.90	47.00	-10.10	Peak	HORIZONTAL
6	601.43	14.34	18.32	32.66	47.00	-14.34	Peak	HORIZONTAL

Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	118.60	20.88	10.62	31.50	40.00	-8.50	Peak	VERTICAL
2	193.09	27.83	8.12	35.95	40.00	-4.05	Peak	VERTICAL
3 pp	216.02	27.09	9.00	36.09	40.00	-3.91	Peak	VERTICAL
4	252.95	30.00	10.18	40.18	47.00	-6.82	Peak	VERTICAL
5	326.74	25.42	12.39	37.81	47.00	-9.19	Peak	VERTICAL
6	601.43	15.16	18.32	33.48	47.00	-13.52	Peak	VERTICAL

Above 1GHz

Class B: Above 1GHz : at 3M							
Ant.Pol.	Frequency	Measurement (dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	MHz	PK	AV	PK	AV	PK	AV
Horizontal	1442.78	52.13	37.41	70	50	-17.87	-12.59
	2055.29	52.37	35.34	70	50	-17.63	-14.66
	4235.20	55.36	39.30	74	54	-18.64	-14.70
Vertical	1617.68	51.90	36.78	70	50	-18.10	-13.22
	2328.38	55.52	37.92	70	50	-14.48	-12.08
	4853.59	57.34	37.86	74	54	-16.66	-16.14

Remark: The EUT was test at 3m in field chamber.

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

6.2 EMS (Immunity)

Performance Criteria of EN 301 489-17

6 Performance criteria

6.1 General performance criteria

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

6.2 Performance table

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).
<p>NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p> <p>NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p> <p>NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p>		

6.3 Performance criteria for Continuous phenomena applied to Transmitters (CT)

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

6.4 Performance criteria for Transient phenomena applied to Transmitters (TT)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

6.5 Performance criteria for Continuous phenomena applied to Receivers (CR)

The performance criteria A shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

6.6 Performance criteria for Transient phenomena applied to Receivers (TR)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Exclusion Bands

The exclusion band for immunity testing of equipment operating in the 2,4 GHz band shall be:

lower limit of exclusion band = lowest allocated band edge frequency -120 MHz

$$=2400\text{MHz}-120\text{MHz}=2280\text{MHz}$$

upper limit of exclusion band = highest allocated band edge frequency +120 MHz

$$=2483.5\text{MHz}+120\text{MHz}=2603.5\text{MHz}$$

Performance Criteria of EN 301 489-3, sub clause 6.2 table 1.

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 Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions

6.2.1 Radiated Immunity

Test Requirement: EN 301 489-17 Clause 7.2&ETSI EN 301 489-3 Clause 7.2

Test Method: EN 301 489-1 Clause 9.2.2

EUT Operation:

Ambient: Temp.: 24.0°C

Humid.:56%

Press.: 1015 mbar

Test Mode: Normal working, Standby mode

Criterion Required: A

Equipment Used: Refer to section 5 for details.

Test Setup:

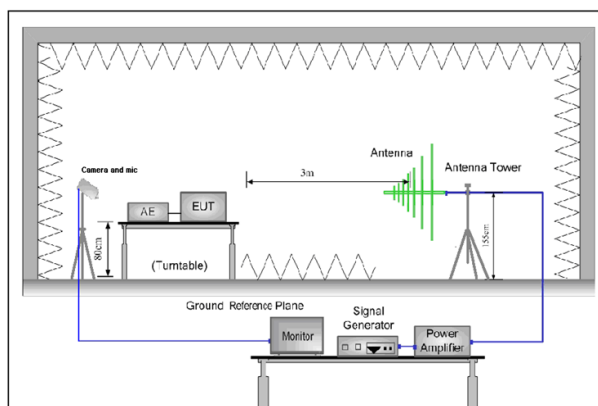


Figure 1. 80MHz to 1GHz

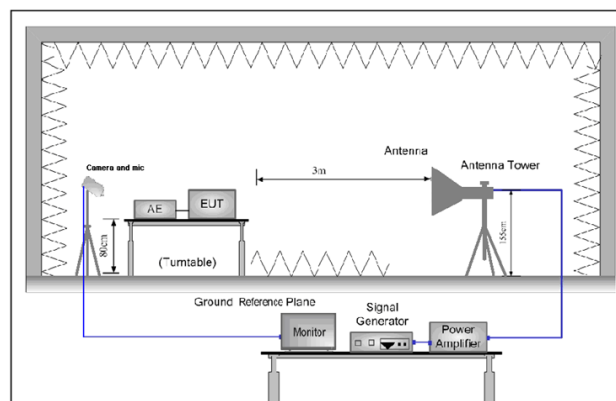


Figure 2. 1GHz to 6GHz

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 0.5 s.
- 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, a video camera and/or an audio monitor were used to monitor the performance of the EUT.

Test result:

PASS

Test Data:

Frequency	Level	Modulation	EUT Face	Antenna Polaxis	Result / Observations
80MHz-1GHz, 1GHz to 6GHz	3V/m	1kHz, 80% Amp. Mod, 10% increment Dwell time: 3 seconds	Front	V	A
				H	A
			Back	V	A
				H	A
			Left	V	A
				H	A
			Right	V	A
				H	A
			Top	V	A
				H	A
			Under	V	A
				H	A

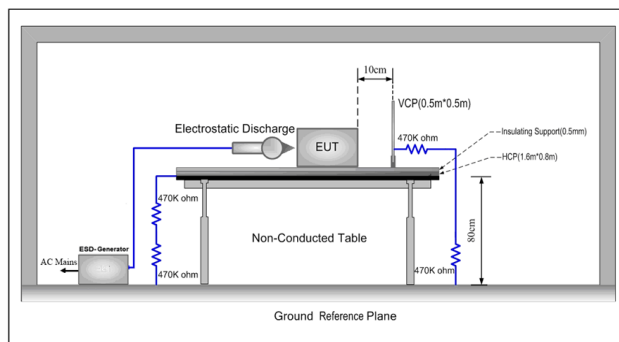
Remark:

A: No performance degradation during test

PERORMANCE CRITERIA	
Criteria requested	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR
Criteria meet	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR

6.2.2 ESD

Test Requirement:	EN 301 489-17 Clause 7.2&ETSI EN 301 489-3 Clause 7.2
Test Method:	EN 301 489-1 Clause 9.3.2
EUT Operation:	
Ambient:	Temp.: 23.3°C Humid.: 55% Press.: 1015mbar
Test Mode:	Normal working, Standby mode
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:
 The EUT was exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points (a minimum of 50 discharges at each point). One of the test points was subjected to at least 50 indirect discharges (contact) to the centre of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points were available, then at least 200 indirect discharges were applied in the indirect mode. Tests were performed at a maximum repetition rate of one discharge per second.
 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 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: PASS

Test Data:

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
± 2,4,8	10 for every level	1	N/A	A
± 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.

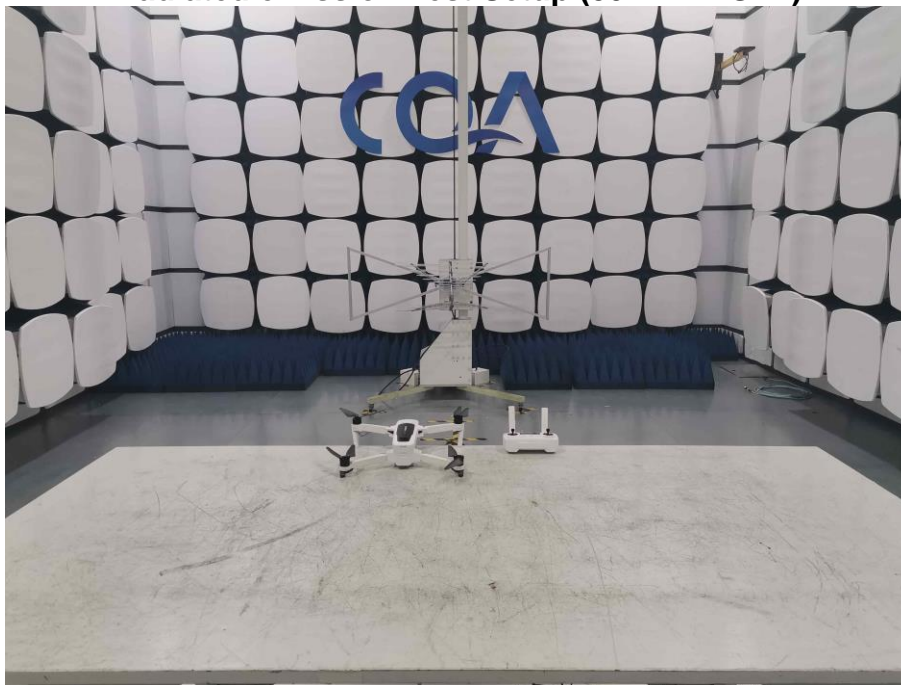
N/A: Not applicable

PERORMANCE CRITERIA	
Criteria requested	<input checked="" type="checkbox"/> TT / <input checked="" type="checkbox"/> TR
Criteria meet	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Test mode No.: ZINO 2

Radiated emission Test Setup (30MHz~1GHz)



Radiated emission Test Setup (Above 1GHz)



Electrostatic discharge Test Setup



PHOTOGRAPHS OF EUT Constructional Details

Refer to APPENDIX 2 PHOTOGRAPHS OF EUT for CQASZ20191201316E-01.

*** End of Report ***