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Report No.: HK2302240508-1E

# **FCC Test Report**

## FCC PART 15 SUBPART C 15.247

Test report On Behalf of AC Infinity Inc. For CONTROLLER 69 PRO+ Model No.: CTR69Q

FCC ID: 2AXMF-CTR69Q

**Prepared For:** 

AC Infinity Inc.

21880 Baker Parkway, City of Industry, California, 91789, United States

Prepared By:

Shenzhen HUAK Testing Technology Co., Ltd. 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

 Date of Test:
 Feb. 24, 2023 ~ Mar. 17, 2023

 Date of Report:
 Mar. 17, 2023

 Report Number:
 HK2302240508-1E

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Report No.: HK2302240508-1E

## **Test Result Certification**

Applicant's Name:	AC Infinity Inc.
Address:	21880 Baker Parkway, City of Industry, California, 91789, United States
Manufacture's Name	AC Infinity Inc.
Address	21880 Baker Parkway, City of Industry, California, 91789, United States
Product Description	
Trade Mark:	AC INFINITY
Product Name:	CONTROLLER 69 PRO+

Model and/or type reference ...: CTR69Q

Standards...... 47 CFR FCC Part 15 Subpart C 15.247

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Date of Test	- MG
Date (s) of Performance of Tests	Feb. 24, 2023 ~ Mar. 17, 2023
Date of Issue	: Mar. 17, 2023
Test Result	Pass

Prepared by:

Project Engineer

Reviewed by:

Approved by:

Project Supervisor

rein Misu

**Technical Director** 

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# HUAK TESTING

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# \*\* Modified History \*\*

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Mar. 17, 2023	Jason Zhou
TESTING	THE	ESTING TESTIN	G

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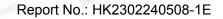
# 1 Test Summary

## 1.1 Test Description

ALC ALC	A HU	AD.
Test Item	Test Requirement	Result
Antenna Requirement	§15.203/§15.247(b)(4)	PASS
Conducted Emission	FCC Part 15.207	N/A
Radiated Emissions	FCC Part 15.205/15.209	PASS
Maximum Peak Output Power	FCC Part 15.247(b)	PASS
Power Spectral Density	FCC Part 15.247(e)	PASS
6dB Bandwidth & 99% Bandwidth	FCC Part 15.247(a)(2)	PASS
Spurious RF Conducted Emission	FCC Part 15.247(d)	PASS
Band Edge	FCC Part 15.247(d)	PASS

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# HUAK TESTING

## **1.2 Measurement Uncertainty**

All measurements involve certain levels of uncertainties. The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. The maximum value of the uncertainty as below:

No.	Item Street August	Uncertainty
1	Conducted Emission Test	±2.71dB
2	All emissions, radiated(<1G)	±3.90dB
3	All emissions, radiated(>1G)	±4.28dB
4	RF power, conducted	±0.37dB
5	Spurious emissions, conducted	±0.11dB
6	Temperature	±0.1°C
7 6	Humidity	±1.0%
(P)	1. TES.	1880 V

## **1.3 Information of the Test Laboratory**

Shenzhen HUAK Testing Technology Co., Ltd. Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization:

A2LA Accreditation Code is 4781.01. FCC Designation Number is CN1229. Canada IC CAB identifier is CN0045. CNAS Registration Number is L9589.

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## 2 General Information

## 2.1 General Description of EUT

EUT Name:	CONTROLLER 6	9 PRO+	O Hour	O HOME
Model No:	CTR69Q		TING	
Series Model:	N/A	STING	HUANTED	-STING
Model Difference:	N/A	DK I		HUAK
Brand Name:	AC INFINITY		TESTING	Ś
Operation Frequency:	2402 MHz to 248	0 MHz	NUAL .	6
Channel Separation:	2MHz	HUAKTEST	I LAK TESTI	- HUAKTE
Number of Channel:	40	9	0	0
Modulation Technology:	GFSK			
Hardware Version:	V1.0	TING	TING	
Software Version:	V1.0	HUAKTL	HUAKTL	HUAK
Antenna Type:	PCB Antenna	9		w.
Antenna Gain:	3.18dBi	.0	X TESTING	.0
Power Supply:	Input: DC 9~12V	AK TESTING	O HOM	AN TESTING
Note:			G	O.m.
1. For a more detailed feature	es description, please i	refer to the man	ufacturer's specifie	cations or

the User's Manual.

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		Description of	of Channel:		
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2430	28	2458
AKTESTI 1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
s <sup>muG</sup> 3	2408	17	2436	31	2464
4	2410	18	2438	32	2466
5 🔘 🐩	2412	19	2440	33	2468
6	2414	20	2442	34	2470
7.00	2416	21	2444	35	2472
8	2418	22	2446	36	2474
9	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

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## 2.2 Description of Test Conditions

- (1) E.U.T. test conditions:
  - For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.
- (2) Frequency range of radiated measurements:The test range will be up to the tenth harmonic of the highest fundamental frequency.
- (3) Pre-test the EUT in all transmitting mode at the lowest (2402 MHz), middle (2440 MHz) and highest (2480 MHz) channel with different data packet and conducted to determine the worst-case mode, only the worst-case results are recorded in this report.
- (4) The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

## 2.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

30	Equipment	Model No.	Serial No.	FCC ID	Trade Name
	/	1	1	/	1

Note:

All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
 Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

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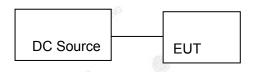


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## 2.4 Description of Test Setup

Operation of EUT during Radiation testing:



The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. The worst case is X position.

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## **3** Equipments List for All Test Items

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
K TE TONG	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Feb. 17, 2023	1 Year
2.	L.I.S.N.	R&S	ENV216	HKE-059	Feb. 17, 2023	1 Year
3.	Receiver	R&S	ESR-7	HKE-010	Feb. 17, 2023	<sup>3</sup> 1 Year
4.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	1 Year
5.	Spectrum analyzer	R&S	FSP40	HKE-025	Feb. 17, 2023	1 Year
6.	Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	1 Year
7.	High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Feb. 17, 2023	1 Year
8.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Feb. 17, 2023	1 Year
9.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Feb. 17, 2023	1 Year
10.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Feb. 17, 2023	1 Year
11.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Feb. 17, 2023	<sup>3</sup> 1 Year
12.	Pre-amplifier	EMCI	EMC051845SE	HKE-015	Feb. 17, 2023	1 Year
13.	Pre-amplifier	Agilent	83051A	HKE-016	Feb. 17, 2023	1 Year
14.	High pass filter unit	Tonscend	JS0806-F	HKE-055	Feb. 17, 2023	1 Year
15.	Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A	N/A
16.	Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A	N/A
<sup>17.</sup>	RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	N/A	N/A
18.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	1 Year
19.	RF test software	Tonscend	JS1120-4	HKE-113	N/A	N/A
20.	RF test software	Tonscend	JS1120-3	HKE-114	N/A	N/A
21.	RF test software	Tonscend	JS1120-1	HKE-115	N/A	N/A
22.	Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	1 Year
23.	Signal generator	Agilent	N5182A	HKE-029	Feb. 17, 2023	1 Year
24.	Signal Generator	Agilent	83630A	HKE-028	Feb. 17, 2023	1 Year
25.	Power meter	Agilent	E4419B	HKE-085	Feb. 17, 2023	1 Year

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26.	Power Sensor	Agilent	E9300A	HKE-086	Feb. 17, 2023	1 Year
27.	RF Cable(below1GHz)	Times	9kHz-1GHz	HKE-117	Feb. 17, 2023	1 Year
28.	RF Cable(above 1GHz)	Times	1-40G	HKE-034	Feb. 17, 2023	1 Year
29.	RF Cable (9KHz-40GHz)	Tonscend	170660	N/A	Feb. 17, 2023	1 Year
30.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 17, 2020	3 Year
31.	High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Feb. 17, 2023	1 Year

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## 4 Test Result

## 4.1 Antenna Requirement

#### 4.1.1 Standard Requirement

#### **Standard Applicable**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

#### Refer to Statement Below for Compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

#### **Antenna Connected Construction**

The antenna used in this product is a PCB Antenna, is a permanently attached antenna on the PCB. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 3.18dBi.

#### 4.1.2 EUT Antenna



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## 4.2 Conduction Emissions Measurement

### 4.2.1 Applied Procedures / Limit

According to FCC CFR Title 47 Part 15 Subpart C Section 15.207, AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus as below:

TESTING	-	Limit	(dBuV)
	Frequency range (MHz)	Quasi-peak	Average
3	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
HUAKTES	5-30	60	50

\* Decreases with the logarithm of the frequency.

## 4.2.2 Test Procedure

- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
- 2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
- The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5. All support equipments received AC power from a second LISN, if any.
- 6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.

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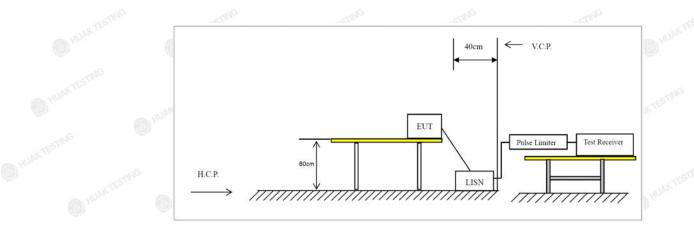


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## 4.2.3 Test Setup



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## 4.2.4 Test Results

Not applicable.

Note: EUT Power Supply by DC Power, so this test item not applicable.

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## 4.3 Radiated Emissions Measurement

#### 4.3.1 Applied Procedures / Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

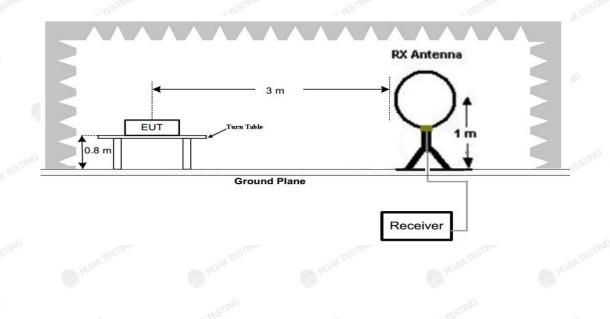
Except when the requirements applicable to a given device state otherwise, emissions from license-exempt transmitters shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

	Radi	ated Emission Limits		
Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)	
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)	
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)	
1.705-30 3		20log(30)+ 40log(30/3)	30	
30-88	3	40.0	100	
88-216	3	43.5	150	
216-960	3	46.0	200	
Above 960	3	54.0	500	
	182	182		

### 4.3.2 Test Setup

**Test Configuration:** 

1) 9 kHz to 30 MHz emissions:



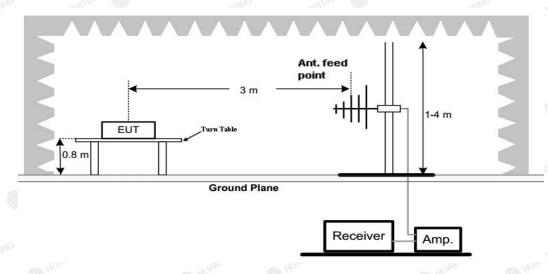
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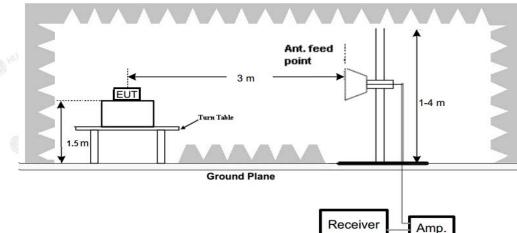


2) 30 MHz to 1 GHz emissions:

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### 3) 1 GHz to 25 GHz emissions:



#### **Test Procedure**

- 1. The EUT was placed on turn table which is 0.8m above ground plane for below 1GHz test, and on a low permittivity and low loss tangent turn table which is 1.5m above ground plane for above 1GHz test.
- 2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT.
- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4. Repeat above procedures until all frequency measurements have been completed.

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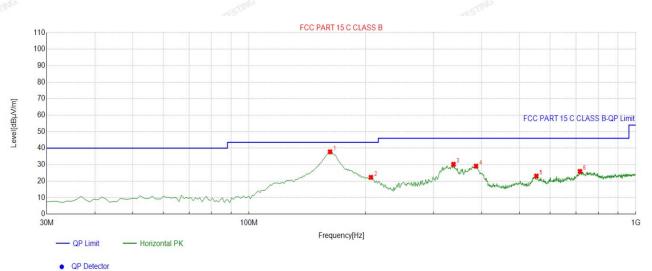
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#### 4.3.3 Test Result

Below 1GHz Test Results:

All modes have been tested, only the worst mode is reflected.

#### Antenna polarity: H



	. 182		(1999) · · · ·	. 1	62	1000		TEP	
Suspe	cted List								
NO	Freq.	Factor	Reading	Level	Limit	Margin	Height	Angle	Delerity
NO.	[MHz]	[dB]	[dBµV/m]	[dBµV/m]	[dBµV/m]	[dB]	[cm]	[°]	Polarity
1	162.0521	-17.28	55.02	37.74	43.50	5.76	100	27	Horizontal
2	206.7167	-14.61	36.90	22.29	43.50	21.21	100	128	Horizontal
3	337.7978	-11.41	41.61	30.20	46.00	15.80	100	144	Horizontal
4	386.3463	-10.32	39.39	29.07	46.00	16.93	100	152	Horizontal
5	553.3534	-6.05	29.10	23.05	46.00	22.95	100	144	Horizontal
6	717.4474	-3.58	29.47	25.89	46.00	20.11	100	338	Horizontal

Remark: Factor = Cable loss + Antenna factor - Preamplifier; Level = Reading + Factor; Margin = Limit - Level;

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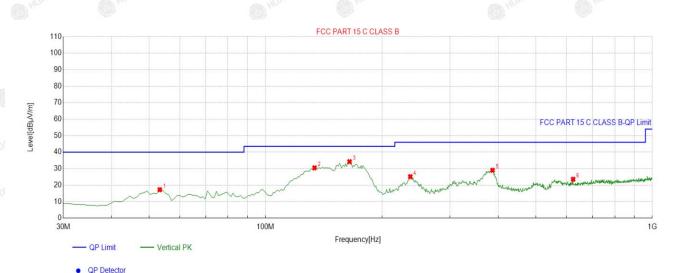
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NG

IК

Antenna polarity: V



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµ∨/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	53.3033	-14.44	31.66	17.22	40.00	22.78	100	245	Vertical
2	133.8939	-17.31	47.77	30.46	43.50	13.04	100	259	Vertical
3	164.9650	-17.39	51.61	34.22	43.50	9.28	100	205	Vertical
4	236.8168	-13.41	38.54	25.13	46.00	20.87	100	112	Vertical
5	386.3463	-10.32	39.32	29.00	46.00	17.00	100	229	Vertical
6	624.2342	-4.40	27.97	23.57	46.00	22.43	100	200	Vertical
			1105			1105-			

Remark: Factor = Cable loss + Antenna factor - Preamplifier; Level = Reading + Factor; Margin = Limit - Level;

#### Harmonics and Spurious Emissions

#### Frequency Range (9kHz-30MHz)

100			160
	Frequency (MHz)	Level@3m (dBµV/m)	Limit@3m (dBµV/m)
	<u> </u>	<u> </u>	
6		K ESTING	KTESTING
	WKTESTIN-	ok "Still	- unkresting
	O Hu-		Θ

Note: 1. Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor.

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.

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## For 1GHz to 25GHz

CH Low (2402MHz)

Horizontal:

		S2277	0230	State /		32207
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4804	54.60	-3.65	50.95	74.00	-23.05	peak
4804	41.80	-3.65	38.15	54.00	-15.85	AVG
7206	51.68	-0.95	50.73	74.00	-23.27	peak
7206	42.06	-0.95	41.11	54.00	-12.89	AVG

Vertical:

Limit.

6 Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Datastan
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4804	53.98	-3.65	50.33	74.00	-23.67	peak
4804	41.01	-3.65	37.36	54.00	-16.64	AVG
7206	49.98	-0.95	49.03	74.00	-24.97	peak
7206	37.95	-0.95	37.00	54.00	-17.00	AVG
Remark: Facto	or = Antenna Fac	tor + Cable Lo	oss – Pre-amplifier;L	evel = Reading	+ Factor; Mar	gin = Level -

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#### CH Middle (2440MHz)

#### Horizontal:

	101	- Eggs	-ta.		101	101
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detecto Type
4880.00	54.71	-3.54	51.17	74.00	-22.83	peak
4880.00	40.62	-3.54	37.08	54.00	-16.92	AVG
7320.00	50.92	-0.81	50.11	74.00	-23.89	peak
7320.00	41.58	-0.81	40.77	54.00	-13.23	AVG

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4880.00	55.63	-3.54	52.09	74.00	-21.91	peak
4880.00	42.18	-3.54	38.64	54.00	-15.36	AVG
7320.00	50.20	-0.81	49.39	74.00	-24.61	peak
7320.00	39.33	-0.81	38.52	54.00	-15.48	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier;Level = Reading + Factor; Margin = Level - Limit.

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#### CH High (2480MHz)

#### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detecto
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4960	52.37	-3.43	48.94	74.00	-25.06	peak
4960	43.29	-3.44	39.85	54.00	-14.15	AVG
7440	49.92	-0.77	49.15	74.00	-24.85	peak
7440	37.84	-0.77	37.07	54.00	-16.93	AVG

#### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	w.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4960	54.35	-3.43	50.92	74.00	-23.08	peak
4960	42.58	-3.44	39.14	54.00	-14.86	AVG
7440	50.12	-0.77	49.35	74.00	-24.65	peak
7440	37.10	-0.77	36.33	54.00	-17.67	AVG

#### Remark:

(1) Measuring frequencies from 1 GHz to the 25 GHz.

(2) "F" denotes fundamental frequency; "H" denotes spurious frequency; "E" denotes band edge frequency.
(3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.

(4) The emissions are attenuated more than 20dB below the permissible limits are not recorded in the report.
(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.

(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed. (7) All modes of operation were investigated and the worst-case emissions are reported.

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## Radiated Band Edge Test:

Operation Mode: TX CH Low (2402MHz)

Horizontal (Worst case):

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector	
🤲 (MHz)	(dBµV)	(dB)	(dBµV/m) (dBµV/m)		(dB)	Туре	
2310.00 57.15		-5.81	51.34	74	-22.66	peak	
2310.00	2310.00 / -		1	54	1	AVG	
2390.00	2390.00 56.31		50.47	74	-23.53	peak	
2390.00	2390.00 / -5.84		D HUM	54	HUAN	AVG	
2400.00 54.09		-5.84	48.25	74	-25.75	peak	
2400.00	Ling	-5.84		o <sup>sio</sup> 54	SMP	AVG	

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier;Level = Reading + Factor; Margin = Level -Limit.

Vertical:

Frequency	Reading Result	- Factor I Emi		Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
2310.00	56.32	-5.81 50.51 74		-23.49	peak		
2310.00	310.00 /		/	54	1	AVG	
2390.00	55.17	-5.84	49.33	74	-24.67	peak	
2390.00	1	-5.84	/	54	1	AVG	
2400.00	55.98	-5.84	50.14	74	-23.86	peak	
2400.00	1	-5.84	and the part of th	54	1 64	AVG	

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier;Level = Reading + Factor; Margin = Level - Limit.

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#### Operation Mode: TX CH High (2480MHz)

Horizontal (Worst case)

Frequency	requency Meter Reading		Emission Level	Limits	Margin	Detector	
(MHz)	(dBµV)	/) (dB) (dB		(dBµV/m) (dBµV/m)		Туре	
2483.50	57.33	-5.81	51.52	74	-22.48	peak	
2483.50	ALTER /	-5.81	A MARCA	54	/	AVG	
2500.00	56.37	-6.06	50.31	74	-23.69	peak	
2500.00	TSTG OF	-6.06	STANG / TEST	54	Innig	AVG	

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier;Level = Reading + Factor; Margin = Level - Limit.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2483.50	56.22	-5.81	50.41	74	-23.59	peak
2483.50	1	-5.81	1	54	1	AVG
2500.00	56.91	-6.06	50.85	74	-23.15	peak
2500.00		-6.06		54	/	AVG

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Remark:

1. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

2. In restricted bands of operation, the spurious emissions below the permissible value more than 20dB.

3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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## 4.4 Maximum Output Power Measurement

#### 4.4.1 Limit

The Maximum Peak Output Power Measurement is 30dBm.

#### 4.4.2 Test Procedure

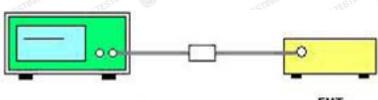
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF power meter with a thermocouple detector or equivalent. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

#### 4.4.3 Deviation from Standard

No deviation.

#### 4.4.4 Test Setup



Power Meter

EUT

#### 4.4.5 Test Results

Channel	Channel Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Result		
Low	2402	-2.61	0	Pass		
Middle	2440	-2.03	30	Pass		
High	2480	-1.14	HUAKTEST	Pass		

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## 4.5 Power Spectral Density

#### 4.5.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

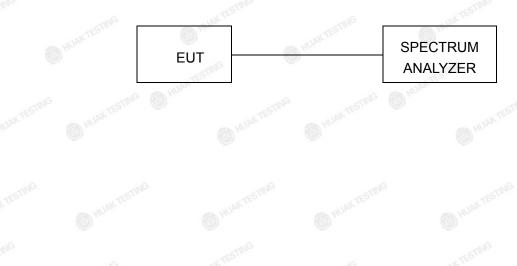
#### 4.5.2 Test Procedure

Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance. Set the RBW =3 kHz. Set the VBW =10 KHz. Set the span to 1.5 times the DTS channel bandwidth. Detector = peak. Sweep time = auto couple. Trace mode = max hold. Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level. If measured value exceeds limit, reduce RBW(no less than 3 kHz)and repeat. The resulting peak PSD level must be 8 dBm.

### 4.5.3 Deviation from Standard

No deviation.

#### 4.5.4 Test Setup



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## 4.5.5 Test Results

- rm	Channel	Channel Frequency(MHz)	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result	
	Low	2402	-18	Dim	Pass	
	Middle	2440	-17.41	8.00	Pass	
	High	2480	-16.49		Pass	

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CH 39



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## 4.6 6dB Bandwidth

#### 4.6.1 Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

#### 4.6.2 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300 KHz. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB

- 1. Set RBW = 100 kHz.
- 2. Set the video bandwidth (VBW)  $\geq$  3 RBW.
- 3. Detector = Peak.
- 4. Trace mode = max hold.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.

7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 4.6.3 Deviation from Standard

No deviation.

#### 4.6.4 Test Setup



#### 4.6.5 Test Result

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (KHz)	Result	
Low	2402	0.648	A HOLE	Pass	
Middle	2440	0.648	≥500	Pass	
High	2480	0.644		Pass	

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## 4.7 Occupied Bandwidth

#### 4.7.1 Test Procedure

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

RBW=1% to 5% of the OBW

VBW=approximately 3 X RBW

Detector=Peak

Trace Mode: Max Hold

Use the 99% power bandwidth function of the instrument to measure the Occupied Bandwidth and recorded.

#### 4.7.2 Deviation from Standard

No deviation.

#### 4.7.3 Test Setup



4.7.4 Test Result

N/A

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## 4.8 Band Edge

#### 4.8.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under FCC rules in section 5.8.1, the attenuation required shall be 30 dB instead of 20 dB.

#### 4.8.2 Test Procedure

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation, RBW ≥ 1% of the span, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold.

#### 4.8.3 Deviation from Standard

No deviation.

## 4.8.4 Test Setup

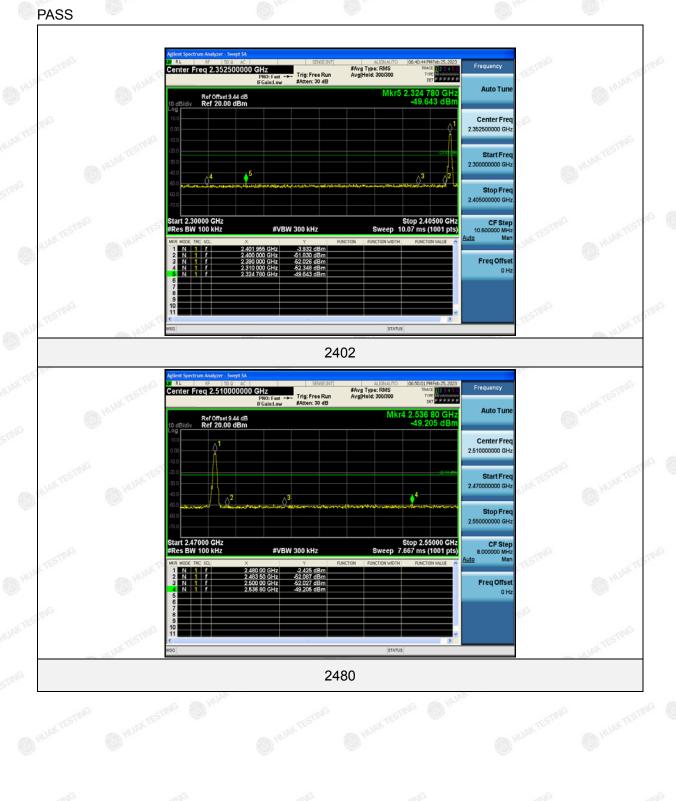


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#### 4.8.5 Test Results



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## 4.9 Conducted Spurious Emissions

## 4.9.1 Applied Procedures / Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section (b)(3) of RSS 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. For below 30MHz,For 9KHz-150kHz,150K-10MHz,We use the RBW 1KHz,10KHz, So the limit need to

For below 30MHz,For 9KHz-150kHz,150K-10MHz,We use the RBW 1KHz,10KHz, So the limit need to calculated by "10lg(BW1/BW2)". for example For9KHz-150kHz,RBW 1KHz, The Limit= the highest emission level-20-10log(100/1)= the highest emission level-40.

#### 4.9.2 Test Procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Span= wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation,  $RBW \ge 1\%$  of the span,  $VBW \ge RBW$ , Sweep = auto, Detector function = peak, Trace = max hold.

#### 4.9.3 Deviation from Standard

No deviation.

#### 4.9.4 Test Setup



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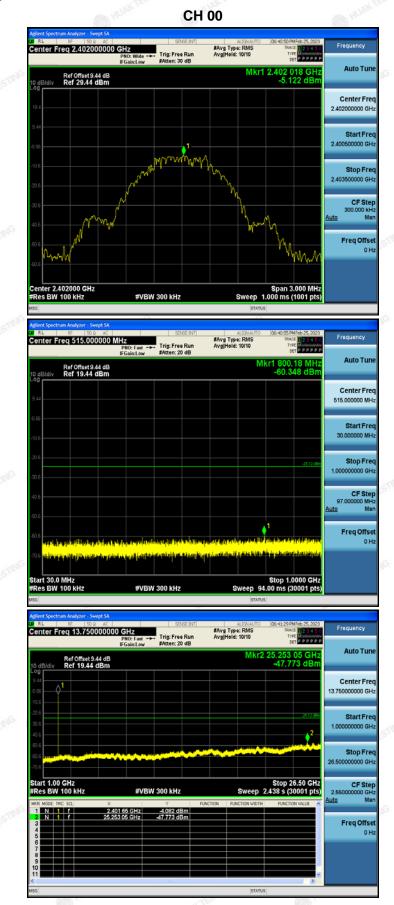


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#### 4.9.5 Test Results



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Agilent Spect	rum Analyzer - Swept SA		58	GEONT		ALIGNAUTO	05:42:46 PM	IFeb 25, 2023	
Center F	req 515.000000	MHZ PNO: Fast			#Avg Type AvgiHold:	e: RMS	TRAC	123456	Frequency
10 dB/div	Ref Offset 9.44 dB Ref 19.44 dBm	IFGain:Low	#Atten: 20				kr1 671.	11 MHz 12 dBm	Auto Tune
9.44									Center Free 515.000000 MH
-0.56									Start Free 30.000000 MH:
-20.6								-23.98 d <del>Br</del>	Stop Free 1.000000000 GH
-40.6									CF Step 97.000000 MH: Auto Mar
-60.6	يوروندورية والعارية. مرواحدودة والعارية	أتتبنا بمالتتر بمزية	Hlandster	ki organisma	∳ <sup>1</sup> Isplacelikaan	antan pipin	or particular	tinter et an	Freq Offse 0 H
-70.6 <mark> (1))<sup>464</sup> Start 30.0</mark>	niterio <mark>humaniterio anterio</mark>	an a	el i a la dela dela dela	and the second sec	(julik)eler	o läetkon üheen kohootta			
start 30.0 #Res BW		#VBW	300 kHz		S	weep 94	Stop 1.0	000 GHz 0001 pts)	
/SG						STATUS	5		

Agilent Spectrum Analyz						
Center Freq 13.	50 R AC	sense ast +++ Trig: Free R	#Avg Ty		05:43:19 PM Feb 25, 2023 TRACE 2 3 4 5 6 TYPE	Frequency
	rset 9.44 dB 9.44 dBm				25.254 75 GHz -47.438 dBm	Auto Tune
						Center Freq 13.750000000 GHz
-20.6					  ∳ <sup>2</sup>	Start Freq 1.000000000 GHz
-60.6 -60.6 -70.6			a privati di ali privi			Stop Freq 26.500000000 GHz
Start 1.00 GHz #Res BW 100 kH	lz i	≇VBW 300 kHz	FUNCTION FL	Sweep 2	Stop 26.50 GHz 438 s (30001 pts)	CF Step 2.55000000 GHz <u>Auto</u> Man
1 N 1 f 2 N 1 f 3 4 5 5 6 7 7 8 9 9 10	2 439 90 GH 25 254 75 GH	iz3.975 dBm				Freq Offset 0 Hz
11 MSG				STATUS	>	

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ALIGNAUTO 06:50:11 PM Feb 25, 2023 g Type: RMS TRACE	
Mold: 10/10 TYPE M P P P P P P P P P P P P P P P P P P	PNO: Fast Trig: Free Run / IFGain:Low #Atten: 20 dB 44 dB 45 m
51	
3	
-22227.50*	
97 Auto	
	en la presidente de la constitución de la desta de
ite de la faite	fild reddig, arlender of duckfritten allengigte
Sweep 94.00 ms (30001 pts)	#VBW 300 kHz

	Analyzer - Swept SA					
	RF 50 R AC		SENSE:INT	#Avg Type: RMS AvgIHold: 10/10	06:50:44 PMFeb 25, 2023 TRACE 2 3 4 5 6 TYPE M	Frequency
			en: 20 dB	-	DETPPPPP	Auto Tune
	tef Offset 9.44 dB tef 19.44 dBm			Mkr2	25.863 35 GHz -48.521 dBm	Auto Tune
9.44						Center Freq 13.750000000 GHz
-20.6 -30.6 -40.6					-22	Start Freq 1.00000000 GHz
-50.6 -60.6 -70.6				w <sub>ein</sub> na an An		Stop Freq 26.50000000 GHz
Start 1.00 GI #Res BW 10	0 kHz	#VBW 300	kHz Funct		Stop 26.50 GHz 2.438 s (30001 pts)	CF Step 2.55000000 GHz Auto Man
1 N 1 2 N 1 3 4 5 6 7	f 2.479	85 GHz -2.65	55 dBm 21 dBm			Freq Offset 0 Hz
8 9 10 11				STATUS	>	

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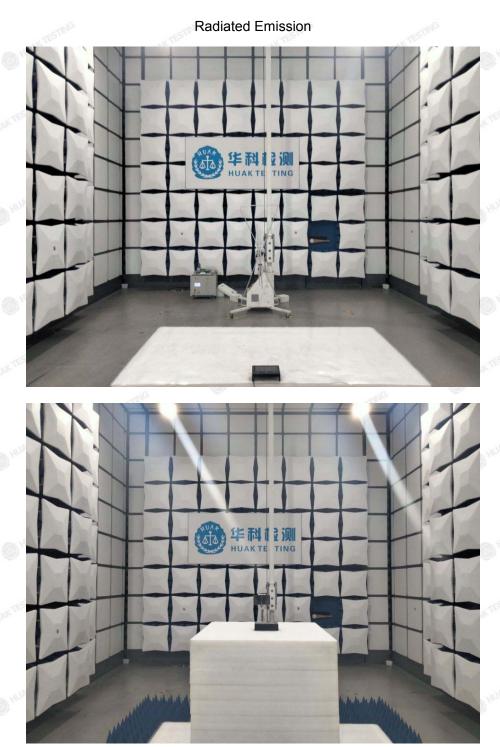


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SE PAL

# 5 Test Setup Photos



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# 6 Photos of the EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos.

-----End of test report----

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