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Report No.: HK2204241705-E

TEST REPORT

FCC PART 15 SUBPART C 15.247

Test report On Behalf of Shenzhen Ruidian Technology Co., Ltd.

For

Capacitance pen

Model No.: ID715D, ID730, ID715S, ID718D, ID715, ID735, ID738

FCC ID: 2A44B-ID715D

Shenzhen Ruidian Technology Co., Ltd.

Prepared for :

Room314-B01, Building 4, Qidi Xiexin, No.333, Longfei Avenue, Huanggekeng Community, Longcheng Street, Longgang District, Shenzhen, 518000 China

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:
 Apr. 24, 2022 ~ May. 07, 2022

 Date of Report:
 May. 07, 2022

 Report Number:
 HK2204241705-E

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TEST RESULT CERTIFICATION

Applicant's name.....: Shenzhen Ruidian Technology Co., Ltd.

Room314-B01, Building 4, Qidi Xiexin, No.333, Longfei Avenue, Huanggekeng Community, Longcheng Street, Longgang District, Shenzhen, 518000 China

Manufacture's Name: Shenzhen Ruidian Technology Co., Ltd.

Room314-B01, Building 4, Qidi Xiexin, No.333, Longfei Avenue,: Huanggekeng Community, Longcheng Street, Longgang District, Shenzhen, 518000 China

Product description

Trade Mark:

Address..

Address

Product name Capacitance pen

Model and/or type reference ...: ID715D, ID730, ID715S, ID718D, ID715, ID735, ID738

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Date of Test	
Date (s) of performance of tests:	Apr. 24, 2022 ~ May. 07, 2022
Date of Issue	May. 07, 2022
Test Result	Pass

Prepared by:

Project Engineer

Reviewed by:

Project Supervisor

Approved by:

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Report No.: HK2204241705-E

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Revision History

Revisior	ı	Issue Date	Description	0	Revised By
V1.0		May. 07, 2022 Initial Issue			Jason Zhou
TING	-7146	TING	TING	TRU	3 TING
HUAKTES	HUAKTES	THUAK TES	THUAK TES	HUALTES	HUAK TES

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CATION

1 Test Summary

1.1 Test Description

The MAKIN	MAKIL	MAKIN	MAKIL	MAKIL
Test Item	1 million	Test Requirem	ent	Result
Antenna Requirement	AL TOOL	§15.203/§15.247	7(b)(4)	PASS
Conducted Emission	our como	FCC Part 15.2	207	PASS
Radiated Emissions	C PRIAK THE	FCC Part 15.205/	15.209	PASS
Maximum Peak Output Po	ower	FCC Part 15.24	17(b)	PASS
Power Spectral Density	HOME	FCC Part 15.24	-7 (e)	PASS
6dB Bandwidth & 99% Band	dwidth	FCC Part 15.247	7(a)(2)	PASS
Spurious RF Conducted Em	ission	FCC Part 15.24	-7(d)	PASS
Band Edge	MAK TESTING	FCC Part 15.24	-7(d)	PASS

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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.	ltem	Uncertainty		
1	Conducted Emission Test	±2.71dB		
2	All emissions, radiated(<1G)	±3.90dB		
3	All emissions, radiated(>1G)	±4.28dB		

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Report No.: HK2204241705-E

HUAK TESTING

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.

2 General Information

Manufacturer:	Shenzhen Ruidian Te	echnology Co., Ltd.	0	0
STING	Room314-B01, Build	ing 4, Qidi Xiexin, N	o.333, Longf	ei Avenue,
Manufacturer Address:	Huanggekeng Com District, Shenzhen, 5	1400	ig Street,	Longgang
EUT Name:	Capacitance pen		STING	W
Model No:	ID715D	HUAK!		
Series Models:	ID730, ID715S, ID71	8D, ID715, ID735, II	D738	MAND ALAK T
Model Difference:	All model's the funct same, only with a pro- different. Test sample	oduct color, appeara		
Brand Name:	N/A	AKTESTING	NK TESTIN	. 13
Operation frequency:	2402 MHz to 2480 M	Hz	O HOM	O HOM
Channel separation:	2MHz		TING	
Number of Channel:	40	ESTING	HUAKTES	STA
Modulation Technology:	GFSK	Pr. 1		HUAK
Hardware Version:	V2.0		STING	
Software Version:	V2.0	ING HUAK		iG.
Antenna Type:	PCB Antenna	HUAKTES	UAK TES	THUNK T
	1dBi	9	0	O.
Antenna Gain:				
Antenna Gain: Power Supply:	DC 5V from Type-C	or DC 3.7V from bat	tery	

2.1 General Description of EUT

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NKTESTIN	LAK TEST	Description of	Channel	NKTEST	HAR TES
HUM OF	-	Description of		HUM	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2430	28	2458
1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
3	2408	17	2436	31	2464
4 HUAK	2410	18	2438	32	2466
5	2412	⁶ 19	2440	33	2468
6	2414	20	2442	34	2470
HUAKTY A	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	HO	- Come

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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.

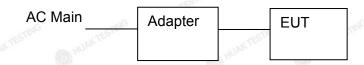
- (2) Frequency range of radiated measurements: The test range will be up to the tenth harmonic of the highest fundamental frequency.
- (3) Pre-test the EUT in all transmitting mode at the lowest (2402 MHz), middle (2440 MHz) and highest (2480 MHz) channel with different data packet and conducted to 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 TEST SETUP

Operation of EUT during conducted testing and radiation below 1GHz testing:



Operation of EUT during Above1GHz Radiation testing:



 Adapter information Model: HW-059200CHQ Input: AC 100-240V, 50/60Hz, 0.5A Output: DC5V, 2A

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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HUAK TESTING Equipments List for All Test Items

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Feb. 18, 2022	1 Year
2.	L.I.S.N.	R&S	ENV216	HKE-059	Feb. 18, 2022	1 Year
3.	Receiver	R&S	ESCI 7	HKE-010	Feb. 18, 2022	1 Year
4.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 18, 2022	1 Year
5.	Spectrum analyzer	R&S	FSP40	HKE-025	Feb. 18, 2022	1 Year
6.	Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 18, 2022	1 Year
7.	High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Feb. 18, 2022	1 Year
8.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Feb. 18, 2022	1 Year
9.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Feb. 18, 2022	1 Year
10.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Feb. 18, 2022	1 Year
11.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Feb. 18, 2022	1 Year
12	Pre-amplifier	EMCI	EMC051845SE	HKE-015	Feb. 18, 2022	1 Year
13	Pre-amplifier	Agilent	83051A	HKE-016	Feb. 18, 2022	1 Year
14	High pass filter unit	Tonscend	JS0806-F	HKE-055	Feb. 18, 2022	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
17.	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. 18, 2022	3 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. 18, 2022	1 Year
23.	Signal generator	Agilent	N5182A	HKE-029	Feb. 18, 2022	1 Year
24.	Signal Generator	Agilent	83630A	HKE-028	Feb. 18, 2022	1 Year
25	Power meter	Agilent	E4419B	HKE-085	Feb. 18, 2022	1 Year
26	Power Sensor	Agilent	E9300A	HKE-086	Feb. 18, 2022	1 Year

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Report No.: HK2204241705-E

TEICATION

	TEST MAL		(FSIND			
	Times	9kHz-1GHz	HKE-117	Feb 18 2022	1 Year	
Cable(below1GHz)	CING STING				STING	
RF Cable(above	JUAK TEL	HUAK		AN TEL HUAK		
1GHz)	limes	🔍 1-40G	HKE-034	Feb. 18, 2022	1 Year	
,						
	Tonscend	170660	N/A	Feb. 18, 2022	1 Year	
(9KHz-40GHz)	renecenta	in cooc		100110, 2022	CTING	
Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 17, 2020	3 Year	
Horn Antenna	Schewarzbeck	BBHA 9170	HKE-017	Feb. 18, 2022	1 Year	
		Cable(below1GHz)TimesRF Cable(above 1GHz)TimesRF Cable (9KHz-40GHz)TonscendShielded roomShiel Hong	Cable(below1GHz)Times9kHz-1GHzRF Cable(above 1GHz)Times1-40GRF Cable (9KHz-40GHz)Tonscend170660Shielded roomShiel Hong4*3*3	Cable(below1GHz)Times9kHz-1GHzHKE-117RF Cable(above 1GHz)Times1-40GHKE-034RF Cable (9KHz-40GHz)Tonscend170660N/AShielded roomShiel Hong4*3*3HKE-039	Cable(below1GHz)Times9kHz-1GHzHKE-117Feb. 18, 2022RF Cable(above 1GHz)Times1-40GHKE-034Feb. 18, 2022RF Cable (9KHz-40GHz)Tonscend170660N/AFeb. 18, 2022Shielded roomShiel Hong4*3*3HKE-039Dec. 17, 2020	

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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.

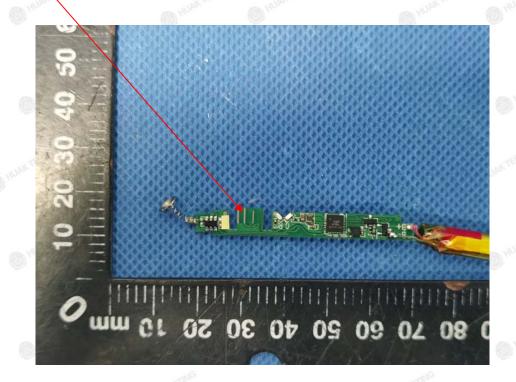
Refer to statement below for compliance.

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 which permanently attached. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 0dBi.

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:

HUAKTESTIN		Limit	(dBuV)
Frequ	uency range (MHz)	Quasi-peak	Average
TESTINC	0.15-0.5	66 to 56*	56 to 46*
(A) ⁴	0.5-5	56	46
\$	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 placed on turntable; 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.
- 4. 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.

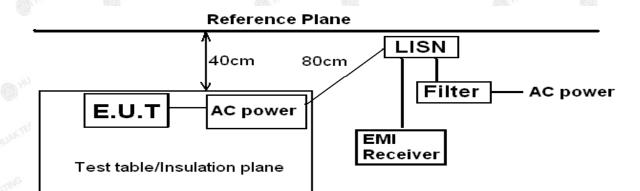
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4.2.3 Test setup



Remark: E.U.T: Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m

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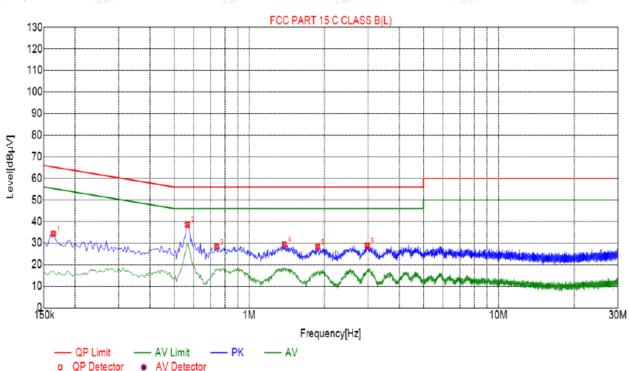
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4.2.4 Test results

Remark: All modes of GFSK test at Low, Middle, and High channel; only the worst result of High Channel was reported as below:

Test Specification: Line



Suspected List

Ц									
3	NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Туре
	1	0.1635	34.31	19.98	65.28	30.97	14.33	PK	L
ŝ	2	0.5640	38.51	20.06	56.00	17.49	18.45	PK	L
	3	0.7395	28.34	20.06	56.00	27.66	8.28	PK	L
	4	1.3830	29.29	20.11	56.00	26.71	9.18	PK	L
	5	1.8825	28.24	20.14	56.00	27.76	8.10	PK	L
	6	2.9760	28.88	20.22	56.00	27.12	8.66	PK	L

Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

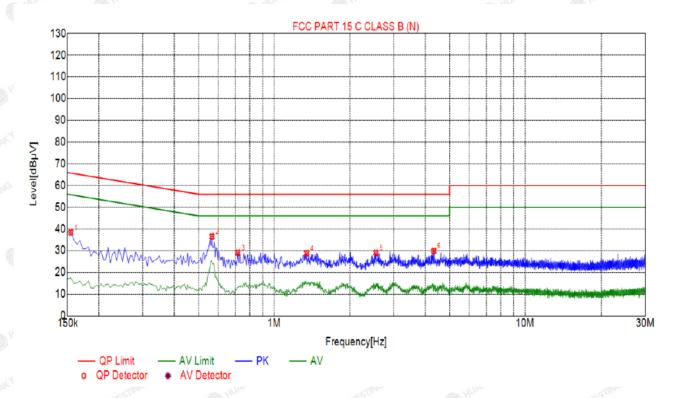
Level=Test receiver reading + correction factor

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Test Specification: Neutral



è	Sus	spected	l List						
101	NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Туре
	1	0.1545	38.31	20.03	65.75	27.44	18.28	PK	Ν
	2	0.5640	36.53	20.06	56.00	19.47	16.47	РК	Ν
2	3	0.7170	29.09	20.05	56.00	26.91	9.04	PK	Ν
K	4	1.3470	28.81	20.10	56.00	27.19	8.71	PK	Ν
	5	2.5440	29.01	20.20	56.00	26.99	8.81	PK	Ν
	6	4.3305	29.86	20.25	56.00	26.14	9.61	PK	Ν

Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss Level=Test receiver reading + correction factor

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FICATION



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)

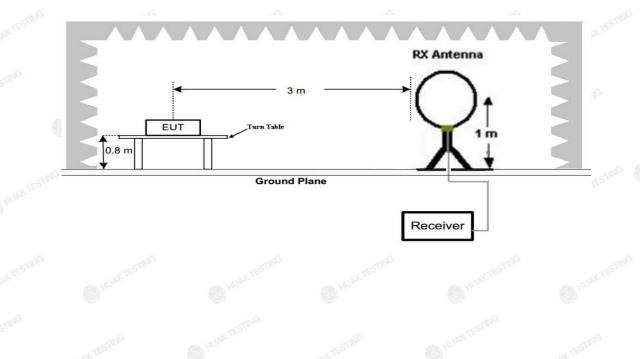
Except when the requirements applicable to a given device state otherwise, emissions from licence exempt transmitters shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

		Rad	liated emission limits	
ŝ	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)
3	1.705-30	3	20log(30)+ 40log(30/3)	30
	30-88	3	40.0	100
STR	88-216	3 SING	43.5	150
	216-960	3	46.0	200
	Above 960	3	54.0	500

4.3.2 Test setup

Test Configuration:

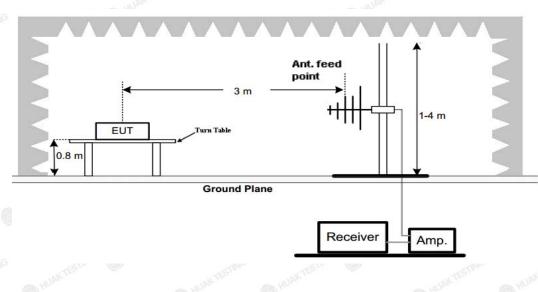
1) 9 kHz to 30 MHz emissions:



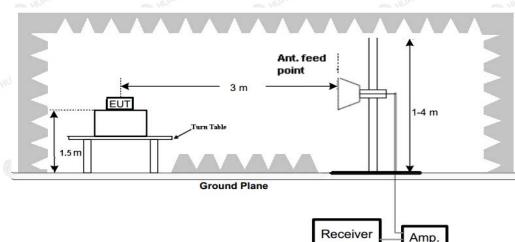
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1 GHz to 25 GHz emissions:



Test Procedure

3)

- 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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A P

4.3.3 Test Result

Below 1GHz Test Results:

Antenna polarity: H



QP Detector

-C'D			2540. V		C'2 1 2546. V		- 6.5		
Suspe	ected List								
NO.	Freq.	Factor	Reading	Level	Limit	Margin	Height	Angle	Polarity
NO.	[MHz]	[dB]	[dBµV/m]	[dBµV/m]	[dBµV/m]	[dB]	[cm]	[°]	Polarity
1	71.7518	-17.99	27.18	9.19	40.00	30.81	100	278	Horizontal
2	199.9199	-15.07	27.92	12.85	43.50	30.65	100	326	Horizontal
3	308.6687	-12.63	27.38	14.75	46.00	31.25	100	13	Horizontal
4	439.7498	-9.43	26.32	16.89	46.00	29.11	100	108	Horizontal
5	504.8048	-8.16	25.43	17.27	46.00	28.73	100	17	Horizontal
6	799.9800	-3.12	33.44	30.32	46.00	15.68	100	13	Horizontal

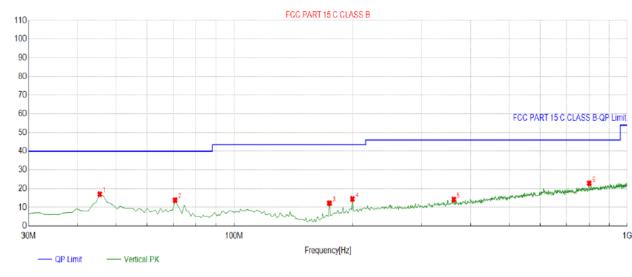
Remark: Factor = Cable loss + Antenna factor - Preamplifier; Level = Reading + Factor; Margin = Limit - Level

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QP Detector

Suspe	cted List								
NO.	Freq.	Freq. Factor		Level	Limit	Margin	Height	Angle	Polarity
NO.	[MHz]	[dB]	[dBµV/m]	[dBµV/m]	[dBµV/m]	[dB]	[cm]	[°]	Folanty
1	45.5355	-13.65	30.70	17.05	40.00	22.95	100	81	Vertical
2	70.7808	-17.81	31.63	13.82	40.00	26.18	100	196	Vertical
3	174.6747	-17.81	30.01	12.20	43.50	31.30	100	327	Vertical
4	199.9199	-15.07	29.55	14.48	43.50	29.02	100	359	Vertical
5	362.0721	-11.27	25.53	14.26	46.00	31.74	100	22	Vertical
6	799.9800	-3.12	26.00	22.88	46.00	23.12	100	240	Vertical
			103-			105			

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

Remark:

- (1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
- (2) * 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.
- (3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

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Harmonics and Spurious Emissions

Frequency Range (9 kHz-30MHz)

Fr	Frequency (MHz)		Level@3	3m (dBµV/m)	Limit@3r	m (dBµV/m)
SING	TESTING		TESTING		TESTI	NG
	HUAN -	(B) ³	UAN	HUAN	HUAN	- HUDE
		Ŵ	<i>.</i>	<u> </u>		_
20		13	ESTIM		TESTING	

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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AL.

For 1GHz to 25GHz

CH Low (2402MHz) Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	HUAKTE
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	_c (dB)	Detecto Type
4804	58.62	-3.65	54.97	74.00	-19.03	peak
4804	45.12	-3.65	41.47	54.00	-12.53	AVG
7206	56.22	-0.95	55.27	74.00	-18.73	peak
7206	43.01	-0.95	42.06	54.00	-11.94	AVG

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type	
4804	59.38	-3.65	55.73	74.00	-18.27	peak	
4804	46.32	-3.65	42.67	54.00	-11.33	AVG	
7206	56.78	-0.95	55.83	74.00	-18.17	peak	
7206	43.02	-0.95	42.07	54.00	-11.93	AVG	

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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CH Middle (2440MHz) Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Datasta
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4880.00	59.34	-3.54	55.80	74.00	-18.20	peak
4880.00	o 43.01	-3.54	39.47	54.00	-14.53	AVG
7320.00	55.82	-0.81	55.01	74.00	-18.99	peak
7320.00	43.01	-0.81	42.20	54.00	-11.80	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4880.00	59.32	-3.54	55.78	74.00	-18.22	peak
4880.00	46.02	-3.54	42.48	54.00	-11.52	AVG
7320.00	56.38	-0.81	55.57	74.00	-18.43	peak
7320.00	44.02	-0.81	43.21	54.00	-10.79	AVG

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CH High (2480MHz) Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Datastar
MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4960	58.64	-3.43	55.21	74.00	-18.79	peak
4960	45.78	-3.44	42.34	54.00	-11.66	AVG
7440	56.24	-0.77	55.47	74.00	-18.53	peak
7440	42.02	-0.77	41.25	54.00	-12.75	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data atau
MHz)	(dBµV)	(dB)	(dBµV/m)	<pre>(dBµV/m)</pre>	(dB)	Detector Type
4960	58.92	-3.43	55.49	74.00	-18.51	peak
4960	45.78	-3.44	42.34	54.00	-11.66	AVG
7440	56.24	-0.77	55.47	74.00	-18.53	peak
7440	43.05	-0.77	42.28	54.00	-11.72	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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 of test receiver/spectrum analyzer is 1MHz and video 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	Street 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	AKTESTAN /	-5.81	HUAKTESTING	54	1	AVG
2390.00	56.55	-5.84	50.71	74	-23.29	peak
2390.00	Ino O	-5.84	TING /	54	I	AVG
2400.00	54.92	-5.84	49.08	74	-24.92	peak
2400.00	1	-5.84	/	54	1	AVG

Vertical:

FrequencyReading Result(MHz)(dBµV)2310.0053.92		Emission Level	Limits	Margin	Detector	
		(dB) (dBµV/m)		(dB)	Туре	
		48.11	74	-25.89	peak	
HUAK !!	-5.81	AL TES HUAK IN	54	HUNYTE	AVG	
56.32	-5.84	50.48	74	-23.52	peak	
ISTING	-5.84	annis I	54	sthe	AVG	
54.54	-5.84	48.7	74	-25.3	peak	
/	-5.84	ρ /	54	mis /	AVG	
	Result (dBµV) 53.92 / 56.32 /	Result Factor (dBµV) (dB) 53.92 -5.81 / -5.81 56.32 -5.84 / -5.84 54.54 -5.84	Result Factor Emission Level (dBµV) (dB) (dBµV/m) 53.92 -5.81 48.11 / -5.81 / 56.32 -5.84 50.48 / -5.84 / 54.54 -5.84 48.7	Result Factor Emission Level Limits (dBµV) (dB) (dBµV/m) (dBµV/m) 53.92 -5.81 48.11 74 / -5.81 / 54 56.32 -5.84 50.48 74 / -5.84 48.7 54 54.54 -5.84 48.7 74	Result Factor Emission Level Limits Margin (dBμV) (dB) (dBμV/m) (dBμV/m) (dB) 53.92 -5.81 48.11 74 -25.89 / -5.81 / 54 / 56.32 -5.84 50.48 74 -23.52 / -5.84 / 54 / 54.54 -5.84 48.7 74 -25.3	

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le:

HUAK TESTING Operation Mode: TX CH High (2480MHz)

Horizontal (Worst case)

requency Meter Reading		Factor Emission Level I Limits				Detector			
(MHz)	483.50 54.28		(dB) (dBµV/m) (dBµ		(dB)	Туре			
2483.50					-5.81 48.47 74 -5.81 / 54 -6.06 49.95 74		-25.53	peak AVG	
2483.50							1		
2500.00	56.01	-6.06	-24.05	peak					
2500.00	1	-6.06	T I MAR	54	/ 🕥	AVG			

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

FrequencyMeter Reading(MHz)(dBµV)				Limits	Margin	Detector		
		(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре		
2483.50	2483.50 55.97 2483.50 / 2500.00 56.32		0 55.97 -5.81 50.16		50.16	74	-23.84	peak
2483.50			I JAK TESTING	54	/	AVG		
2500.00			00.00 56.32 -6.06		50.26	74	-23.74	peak
2500.00	1.00	-6.06	1	54	1	AVG		
Domark: Easta	r - Antonno Fr	I	Pre amplifier	an and	y TESTING	LOK TEST		

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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

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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

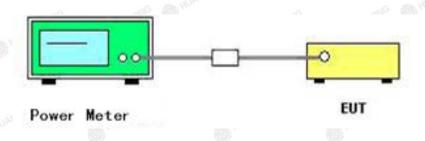
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF power meter with a thermocouple director 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



4.4.5 Test results

Channel	Channel frequency (MHz)	Output power (dBm)	Limit (dBm)	Result
Low	2402	-3.83	WAK TESTING	Pass
Middle	2440	-2.89	30	Pass
High	2480	-2.56		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

	and the		And the	96373)
Channel	Channel frequency (MHz)	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
Low	2402	-19.11	<u>w</u>	Pass
Middle	2440	-18.16	8.00	Pass
High	2480	-17.65	HUAN	Pass



CH 19



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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=300KHz. 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	0.664	HUAKTER	Pass
Middle	dle 2440 0.660		≥500	Pass
High	2480	0.696	O HOM	Pass

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CH 19



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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 bandedge, 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



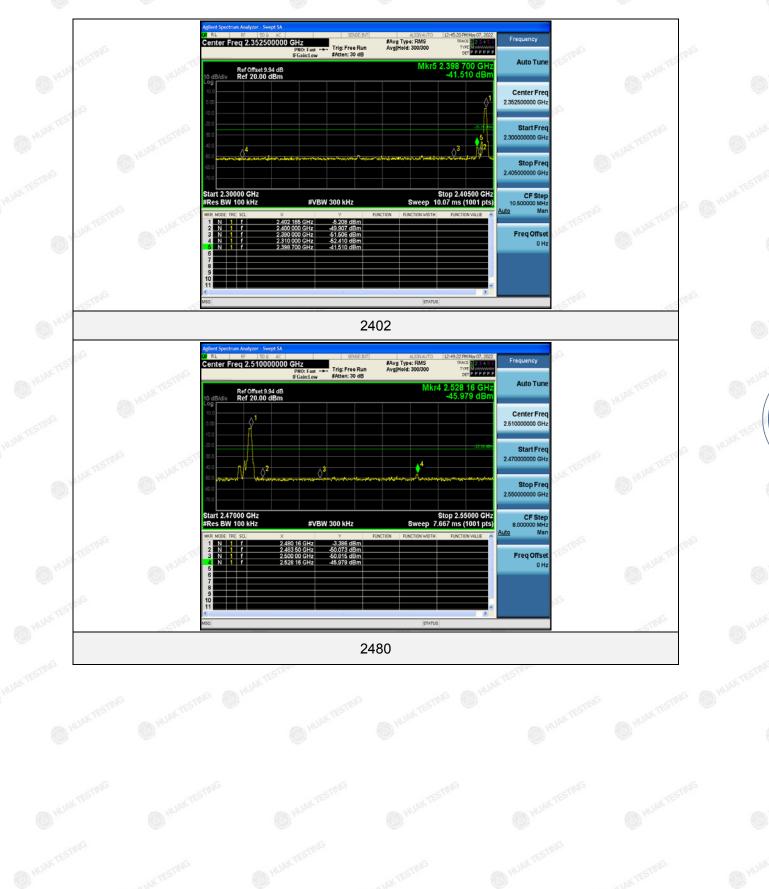
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4.8.5 Test results

PASS



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4.9 Conducted Spurious Emissions

4.9.1 Applied procedures / Limit

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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 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 bandedge, 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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4.9.5 Test results



glient Spectrum Analyzer - Swept SA RL RF 50.9 AC enter Freq 515.000000 N	Hz PNO: Fast ↔	SENS	INT						
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gilent Spectrum Analyz	zer - Swept SA		SENSE:INT		ALIGNAUTO	12:46:14 PM May		
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6 7 8 9								
10								

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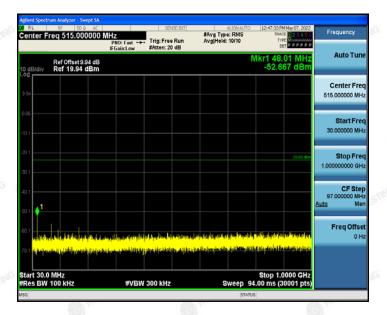
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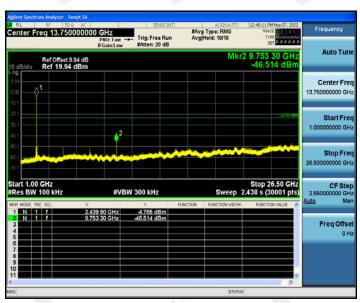
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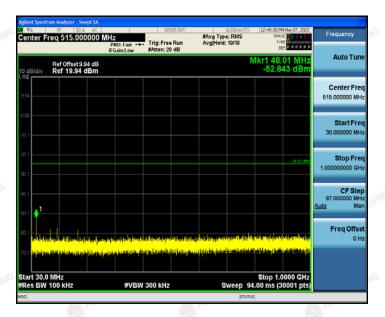
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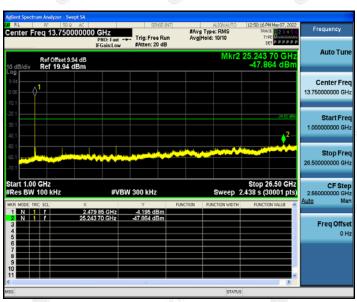
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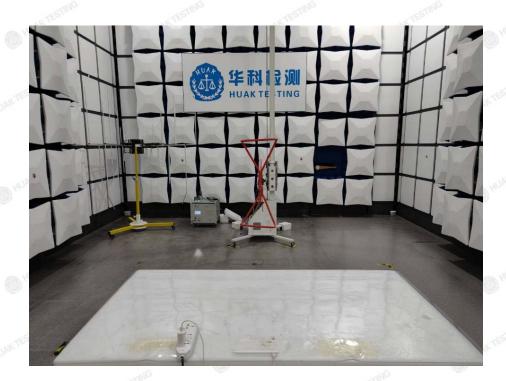


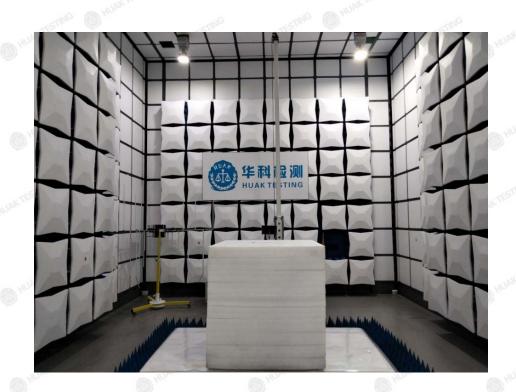
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5 Test setup photo

Radiated Emissions





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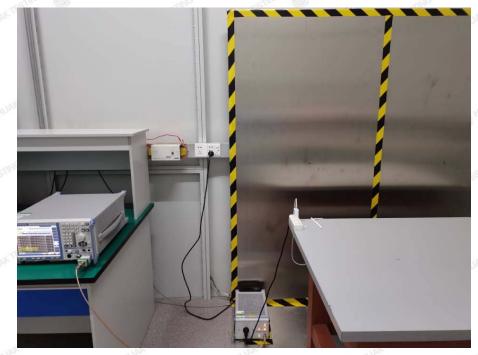
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Conducted Emissions



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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