

Report No.: KSCR220300037802

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## TEST REPORT

Application No.:KSCR2203000378ATFCC ID:2ADTD-CP03009601219

Applicant: Hangzhou Hikvision Digital Technology Co., Ltd

Address of Applicant: 555 Qianmo Road, Binjiang District, Hangzhou, Hangzhou, Zhejiang, China

Manufacturer: Hangzhou Hikvision Digital Technology Co., Ltd

Address of Manufacturer: 555 Qianmo Road, Binjiang District, Hangzhou, Hangzhou, Zhejiang, China

**Factory:** 1.Hangzhou Hikvision Electronics Co., Ltd. 2.Hangzhou Hikvision Technology Co., Ltd.

3.CHONGQING HIKVISION TECHNOLOGY CO.,LTD.

Address of Factory: 1.No.299,Qiushi Road,Tonglu Economic Development Zone,Tonglu County,

Hangzhou, Zhejiang

2.No.700 Dongliu Road, Binjiang District, Hangzhou 310052, China 3.No. 118, Haikang Road, Area C, Jianqiao Industrial Park, Dadukou

District, Chongqing, 401325, China

**Equipment Under Test (EUT):** 

EUT Name: AX PRO

Model No.: DS-PWA96-M2-WB,DS-PWA96-M2-WBUHK,DS-PWA96-M2-WBCKV,DS-

PWA96-M2-WBUVS,DS-PWA96-M2-WBKVO,DS-PWA96-M2-WBHUN

Please refer to section 2 of this report which indicates which model was

actually tested and which were electrically identical.

Trade Mark: HIKVISION

Standard(s): 47 CFR Part 15, Subpart C 15.231

**Date of Receipt:** 2022-03-24

**Date of Test:** 2022-05-10 to 2022-05-15

**Date of Issue:** 2022-05-16

Test Result: Pass\*

Eric Lin
EMC Laboratory Manager

Jose Sin



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<sup>\*</sup> In the configuration tested, the EUT complied with the standards specified above.



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Revision Record							
Version	Chapter	Date	Modifier	Remark			
01		2022-05-16		Original			

Authorized for issue by:		
	Paun Liu	
	Pawn.Liu/Project Engineer	
	Eric Li	
	Eric Lin/Reviewer	



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## 2 Test Summary

Radio Spectrum Technical Requirement							
Item Standard Method Requirement Result							
Antenna Requirement	47 CFR Part 15, Subpart C 15.231	N/A	47 CFR Part 15, Subpart C 15.203	Pass			

Radio Spectrum Matter Part							
Item	Standard	Method	Requirement	Result			
Conducted Emissions at AC Power Line (150kHz-30MHz)		ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass			
20dB Bandwidth		ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.231(c)	Pass			
Radiated Emissions below 1GHz	47 CFR Part 15,	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15C Section 15.231(b) and 15.209	Pass			
Dwell Time (15.231(a))	Subpart C 15.231	ANSI C63.10 (2013) Section 7.5	47 CFR Part 15, Subpart C 15.231(a)	Pass			
Field Strength of the Fundamental Signal (15.231(b))		ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.231(b)	Pass			
Radiated Emissions above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15C Section 15.231(b) and 15.209	Pass			

Model No.: DS-PWA96-M2-WB,DS-PWA96-M2-WBUHK,DS-PWA96-M2-WBUVS,DS-PWA96-M2-WBKVO,DS-PWA96-M2-WBHUN

Only the model DS-PWA96-M2-WB was tested.

There are series models mentioned in this report, and they are the Identical in electrical and electronic characters. Only the model DS-PWA96-M2-WB was tested since their differences were the model number, trade name, color, appearance.



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### **General Information**

#### 4.1 Details of E.U.T.

Power supply:	AC 100-240V,50/60Hz,0.2-0.1A
Operation Frequency	R3 module:433.1-433.7MHz;RX module:434.6MHz
Channel Numbers:	R3 module: 7 ;RX module: 1
Channel Space	R3 module:100KHz
Modulation Type:	ASK
	R3 module:
	Ant 1:-3.5dBi (Provided by manufacturer)
Antenna Gain:	Ant 2:-3.1dBi (Provided by manufacturer)
Antenna Gam.	RX module:
	Ant 1:-3.5dBi (Provided by manufacturer)
	Ant 2:-3.1dBi (Provided by manufacturer)
Antonna Typo:	R3 module:Ant1 :PCB antenna,Ant2 :PCB antenna;
Antenna Type:	RX module:Ant1 :PCB antenna,Ant2 :PCB antenna

#### 4.2 Environment Parameter

Environment Parameter		Selected Values During Tests		
Relative Humidity		Ambient	Ambient	
Value		Temperati	ure(°C)	Voltage(V)
NTNV		25°C		AC120
Note:				
NV:Normal Voltage	LV:Low Extreme Test Vo	ltage	HV:High Extren	ne Test Voltage
NT:Normal Temperature	LT:Low Extreme Test Te	mperature	rature HT:High Extreme Test Temperature	

### 4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Notebook	LENOVO	K27	EB24537645
SecureCRT	VanDyke	V 6.2.0	/
Serial port adapter plate	/	Test Plate 3	/



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### 4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4 x 10 <sup>-8</sup>
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
0	DE De dieted Deves	5.2dB (Below 1GHz)
8	RF Radiated Power	5.9dB (Above 1GHz)
		4.2dB (Below 30MHz)
	Dadieted Courieus Emissies Test	4.5dB (30MHz-1GHz)
9	Radiated Spurious Emission Test	5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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#### 4.5 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

### 4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### CNAS (No. CNAS L4354)

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

#### • A2LA (Certificate No. 2541.01)

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

#### • FCC (Designation Number: CN1172)

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory.

Designation Number: CN1172.

#### • ISED (CAB identifier: CN0072)

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 2324E
• VCCI (Member No.: 1938)

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

#### 4.7 Deviation from Standards

None

#### 4.8 Abnormalities from Standard Conditions

None



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## 5 Equipment List

Item	Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal. Due Date
Con	ducted Emission at Mains Terminals (150	kHz-30MHz)				
1	EMI Test Receive	R&S	ESCI	100781	01/22/2022	01/21/2023
2	LISN	R&S	ENV216	101604	10/12/2021	10/11/2022
3	LISN	Schwarzbeck	NNLK 8129	8129-143	10/12/2021	10/11/2022
4	Pulse Limiter	R&S	ESH3-Z2	100609	01/22/2022	01/21/2023
5	CE test Cable	Thermax	/	14	10/16/2021	10/15/2022
6	Test Software	Faratronic	EZ-EMC	CCS-03A1	N.C.R	N.C.R
RF	Conducted Test					
1	Spectrum Analyzer	Agilent	E4446A	MY44020154	04/16/2021 04/15/2022	04/15/2022 04/15/2023
2	Spectrum Analyzer	Keysight	N9020A	MY55370209	10/11/2021	10/10/2022
4	Signal Generator	Agilent	N5182A	MY50142015	08/27/2021	08/26/2022
5	Spectrum Analyzer	Keysight	N9030B	MY61330164	01/22/2022	01/21/2023
6	Vector Signal Generator	R&S	SMW200A	110074	10/12/2021	10/11/2022
7	Radio Communication Test Station	Anritsu	MT8000A	6262012849	09/23/2021	09/22/2022
8	Radio Communication Analyzer	Anritsu	MT8821C	6201692222	09/23/2021	09/22/2022
9	Universal Radio Communication Tester	R&S	CMW500	159275	10/12/2021	10/11/2022
10	Universal Radio Communication Tester	R&S	CMW500	167239	04/16/2021	04/15/2022
					04/15/2022	04/15/2023 04/15/2022
11	Power Meter	Anritsu	ML2495A	1445010	04/16/2021	04/15/2022
12	Switcher	CCSRF	FY562	KUS2001M001-3	10/12/2021	10/11/2022
13	AC Power Source	EXTECH	6605	1570106	N.C.R	N.C.R
14	DC Power Supply	Aglient	E3632A	MY50340053	N.C.R	N.C.R
15	6dB Attenuator	Mini-Circuits	NAT-6-2W	15542-1	N.C.R	N.C.R
16	Power Divider	AISI	IOWOPE2068	PE2068	N.C.R	N.C.R
17	Filter	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
18					04/16/2021	04/15/2022
	Conducted Test Cable	/	RF01-RF04	/	04/15/2022	04/15/2023
19	Software	BST	TST-PASS	N/A	N/A	N/A
20	Taran / Harridita Charaban	TEDOLIV	MULIC 400AIC	V20400	04/16/2021	04/15/2022
20	Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	04/15/2022	04/15/2023
21	Thermometer	Anymetre	TH603	CCS007	10/14/2021	10/13/2022
RF R	adiated Test					
1	Spectrum Analyzer	R&S	FSV40	101493	10/11/2021	10/10/2022
2	Signal Generator	Agilent	E8257C	MY43321570	10/18/2021	10/17/2022
3	Loop Antenna	Com-Power	AL-130R	10160008	04/13/2021	04/12/2023
4	Bilog Antenna	TESEQ	CBL 6112D	35403	06/21/2021	06/20/2023
5	Bilog Antenna	SCHWARZBECK	VULB9160	9160-3342	04/13/2021	04/12/2023
6	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	267	10/26/2020	10/25/2022
7	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	00143290	02/22/2021	02/21/2023
8	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	BBHA9170171	02/20/2022	02/19/2023



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9	Pre-Amplifier(30MHz~18GHz)	1.010	,	,	04/16/2021	04/15/2022
	Fie-Ampliner(Solvinz~186nz)	LNA	/	/	04/15/2022	04/15/2023
10	Amplifier(18~40GHz)	COM-POWER	PAM-840A	461332	10/18/2021	10/17/2022
11	Low Pass Filter	MICRO-TRONICS	VLFX-950	RV142900829	N.C.R	N.C.R
12	High Pass Filter	Mini-Circuits	VHF-1200	15542	N.C.R	N.C.R
13	Filter (5450MHz~5770 MHz)	MICRO-TRONICS	BRC50704-01	2	N.C.R	N.C.R
14	Filter (5690 MHz~5930 MHz)	MICRO-TRONICS	BRC50705-01	4	N.C.R	N.C.R
15	Filter (5150 MHz~5350 MHz)	MICRO-TRONICS	BRC50703-01	2	N.C.R	N.C.R
16	Filter (885 MHz~915 MHz)	MICRO-TRONICS	BRM14698	1	N.C.R	N.C.R
17	Filter (815 MHz~860 MHz)	MICRO-TRONICS	BRM14697	1	N.C.R	N.C.R
18	Filter (1745 MHz $\sim$ 1910 MHz)	MICRO-TRONICS	BRM14700	1	N.C.R	N.C.R
19	Filter (1922 MHz~1977 MHz)	MICRO-TRONICS	BRM50715	1	N.C.R	N.C.R
20	Filter (2550 MHz)	MICRO-TRONICS	HPM13362	5	N.C.R	N.C.R
21	Filter (1532 MHz $\sim$ 1845 MHz)	MICRO-TRONICS	BRM50713	1	N.C.R	N.C.R
22	Filter (2.4GHz)	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
23	RE test cable	,	RE01-RE04	,	04/16/2021	04/15/2022
	RE lest cable	/	REUI-REU4	/	04/15/2022	04/15/2023
24	Software	Faratronic	EZ_EMC	N/A	N/A	N/A



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## 6 Radio Spectrum Technical Requirement

### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

#### 6.1.2 Conclusion

#### 15.203 requirement:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### **EUT Antenna:**

The antenna 1 and antenna 2 is PCB antenna, and all no consideration of replacement. The best case gain of the antenna 1 is -3.5dBi and antenna 2 is -3.1dBi.

Antenna location: Refer to Appendix (Internal Photos).



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## 7 Radio Spectrum Matter Test Results

### 7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207 Test Method: ANSI C63.10 (2013) Section 6.2

#### Limit:

Frequency of	Conducted limit(dBµV)				
emission(MHz)	Quasi-peak	Average			
0.15-0.5	66 to 56*	56 to 46*			
0.5-5	56	46			
5-30	60	50			
*Decreases with the logarithm of the frequency.					
Detector: Peak for pre-scan (9k	Hz resolution bandwidth) 0.15M	1 to 30MHz			

#### 7.1.1 E.U.T. Operation

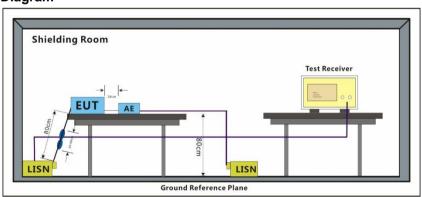
Operating Environment:

Temperature: 24 °C Humidity: 48 % RH Atmospheric Pressure: 1010 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with ASK mode

#### 7.1.3 Test Setup Diagram





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#### 7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a  $50 \text{ohm}/50 \mu\text{H} + 5 \text{ohm}$  linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: Level=Read Level+ Cable Loss+ LISN Factor



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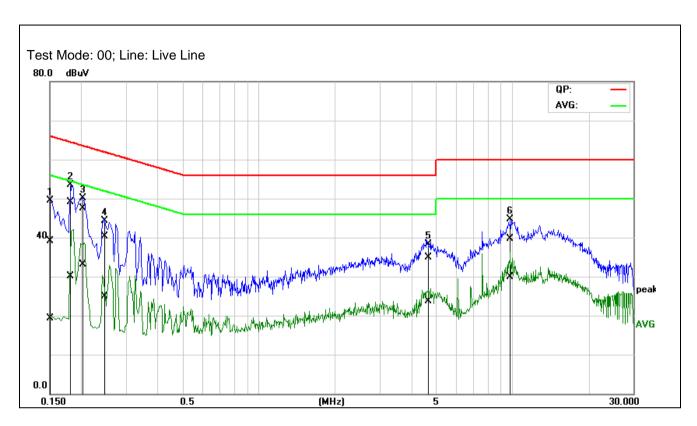
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No	Frequenc y	QuasiPea k	Averag e	Correctio n	QuasiPea k	Averag e	QuasiPea k	Averag e	QuasiPea k	Averag e	Remar k
		reading	reading	factor	result	result	limit	limit	margin	margin	
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1503	19.51	-0.27	19.50	39.01	19.23	65.98	55.98	-26.97	-36.75	Pass
2*	0.1818	29.56	10.59	19.50	49.06	30.09	64.40	54.40	-15.34	-24.31	Pass
3	0.1994	28.03	13.69	19.50	47.53	33.19	63.64	53.64	-16.11	-20.45	Pass
4	0.2486	20.77	5.40	19.50	40.27	24.90	61.80	51.80	-21.53	-26.90	Pass
5	4.6565	15.17	3.81	19.80	34.97	23.61	56.00	46.00	-21.03	-22.39	Pass
6	9.8518	19.60	9.96	20.04	39.64	30.00	60.00	50.00	-20.36	-20.00	Pass



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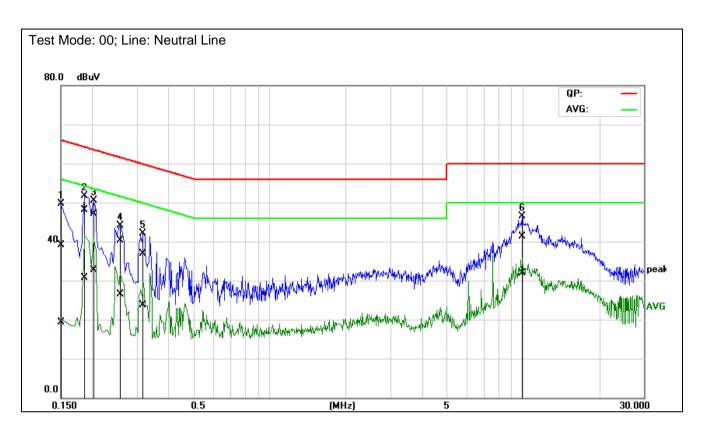
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No	Frequenc y	QuasiPea k	Averag e	Correctio n	QuasiPea k	Averag e	QuasiPea k	Averag e	QuasiPea k	Averag e	Remar k
		reading	reading	factor	result	result	limit	limit	margin	margin	
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1500	19.69	-0.25	19.48	39.17	19.23	66.00	56.00	-26.83	-36.77	Pass
2*	0.1829	28.59	11.21	19.49	48.08	30.70	64.35	54.35	-16.27	-23.65	Pass
3	0.1993	27.56	13.16	19.49	47.05	32.65	63.64	53.64	-16.59	-20.99	Pass
4	0.2563	20.74	6.97	19.50	40.24	26.47	61.55	51.55	-21.31	-25.08	Pass
5	0.3180	17.35	4.26	19.50	36.85	23.76	59.76	49.76	-22.91	-26.00	Pass
6	9.9216	21.31	11.81	20.04	41.35	31.85	60.00	50.00	-18.65	-18.15	Pass



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#### 7.2 20dB Bandwidth

47 CFR Part 15, Subpart C 15.231(c) Test Requirement ANSI C63.10 (2013) Section 6.9 Test Method:

#### Limit:

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

#### 7.2.1 E.U.T. Operation

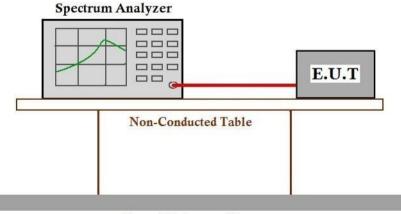
Operating Environment:

Temperature: 25.2 °C Humidity: 49.5 % RH Atmospheric Pressure: 1010 mbar

#### 7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the module RX_Ant1 in transmitting mode
Final test	02	TX mode_Keep the module RX_Ant2 in transmitting mode
Final test	03	TX mode_Keep the module R3_Ant1 in transmitting mode
Final test	04	TX mode_Keep the module R3_Ant2 in transmitting mode

#### 7.2.3 Test Setup Diagram



Ground Reference Plane

#### 7.2.4 Measurement Procedure and Data

The detailed test data see: Appendix B for KSCR220300037802-R3 module Appendix B for KSCR220300037802-RX module



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#### 7.3 Radiated Emissions below 1GHz

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

#### Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### 7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25.2 °C Humidity: 49.5 % RH Atmospheric Pressure: 1010 mbar

#### 7.3.2 Test Mode Description

· · · · · · · · · · · · · · · · · · ·				
Pre-scan / Final test	Mode Code	Description		
Final test	01	TX mode_Keep the module RX_Ant1 in transmitting mode		
Final test	02	TX mode_Keep the module RX_Ant2 in transmitting mode		
Final test	03	TX mode_Keep the module R3_Ant1 in transmitting mode		
Final test	04	TX mode_Keep the module R3_Ant2 in transmitting mode		



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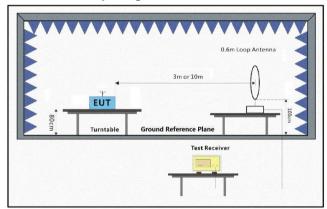
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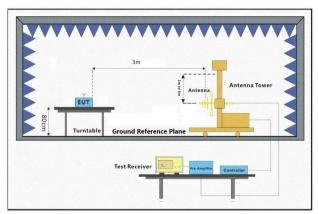


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#### 7.3.3 Test Setup Diagram





#### 7.3.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level =Receiver Reading + Antenna Factor + Cable Factor Preamplifier Factor
- 2) Scan from 9kHz to 1GHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



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The detailed test data see: Appendix B for KSCR220300037802-R3 module

Appendix B for KSCR220300037802-RX module



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### 7.4 Dwell Time (15.231(a))

Test Requirement 47 CFR Part 15, Subpart C 15.231(a)
Test Method: ANSI C63.10 (2013) Section 7.5

#### Limit:

Device type	Limit
Manually operated transmitter	The switch automatically deactivate the transmitter within not more than 5 seconds of being released
Automatically actived transmitter	Cease transmission within 5 seconds after activation
Periodic transmissions to determine system integrity of transmitters used in security or safety applications	The total transmission time does not exceed 2 seconds per hour

#### 7.4.1 E.U.T. Operation

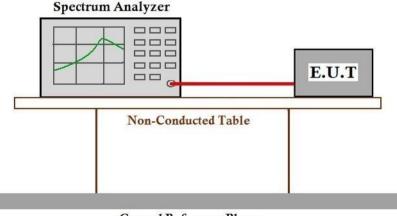
Operating Environment:

Temperature: 25.2 °C Humidity: 49.5 % RH Atmospheric Pressure: 1010 mbar

#### 7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the module RX_Ant1 in transmitting mode
Final test	02	TX mode_Keep the module RX_Ant2 in transmitting mode
Final test	03	TX mode_Keep the module R3_Ant1 in transmitting mode
Final test	04	TX mode_Keep the module R3_Ant2 in transmitting mode

### 7.4.3 Test Setup Diagram



Ground Reference Plane



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#### 7.4.4 Measurement Procedure and Data

The detailed test data see: Appendix B for KSCR220300037802-R3 module Appendix B for KSCR220300037802-RX module



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### 7.5 Field Strength of the Fundamental Signal (15.231(b))

Test Requirement 47 CFR Part 15, Subpart C 15.231(b)
Test Method: ANSI C63.10 (2013) Section 6.5

#### Limit:

Fundamental frequency(MHz)	Field strength of fundamental(microvolts/meter)	Field strength of spurious emissions(microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750	125 to 375
174-260	3750	375
260-470	3750 to 12500	375 to 1250
Above 470	12500	1250

Remark: the emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 25.2 °C Humidity: 49.5 % RH Atmospheric Pressure: 1010 mbar

#### 7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the module RX_Ant1 in transmitting mode
Final test	02	TX mode_Keep the module RX_Ant2 in transmitting mode
Final test	03	TX mode_Keep the module R3_Ant1 in transmitting mode
Final test	04	TX mode_Keep the module R3_Ant2 in transmitting mode



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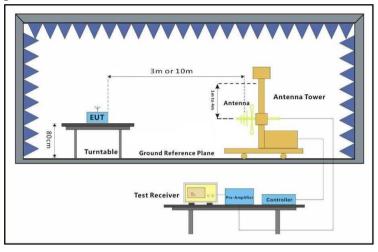
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#### 7.5.3 Test Setup Diagram



#### 7.5.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

The detailed test data see: Appendix B for KSCR220300037802-R3 module

Appendix B for KSCR220300037802-RX module



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#### 7.6 Radiated Emissions above 1GHz

47 CFR Part 15C Section 15.231(b) and 15.209 Test Requirement

Test Method: ANSI C63.10 (2013) Section 6.6

Limit:

For Restricted bands

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### For Other bands

Fundamental Frequency MHz	Field Strength of Fundamental (dBµV/m @ 3 m)	Field Strength of Hasrmonics and Spurious Emissions (dBµV/m @ 3 m)	
40.66 to 40.70	67.04	47.04	
70 to 130	61.94	41.94	
130 to 174	**61.94 to 71.48	41.94 to 51.48	
174 to 260	71.48	51.48	
260 to 470	**71.48 to 81.94	51.48 to 61.94	
Above 470	81.94	61.94	
Detector:	Peak for pre-scan		
	QP for 30MHz to1000 MHz:120 kHz resolution bandwidth		
	Peak for Above 1 GHz: 1 MHz resolution bandwidth		

<sup>\*\*</sup> linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636;

for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]



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The fundamental frequency of the EUT is 433.10~433.70 MHz&434.6MHz.

The limit for Average or QP field strength dBuv/m for the fundamental emission=  $80.83 \text{ dB}\mu\text{V/m}$  @3m No fundamental is allowed in the restricted bands.

The limit for average field strength dBuv/m for the spurious emission=60.83 dBuV/m@3m. Spurious in the restricted bands must be less than 60.83 dBuV/m @3m or 15.209, whichever limit permits a higher field strength.

#### 7.6.1 E.U.T. Operation

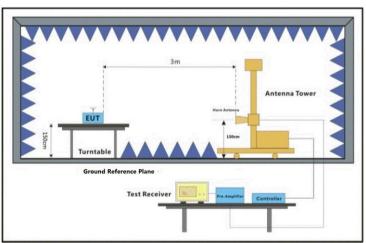
Operating Environment:

Temperature: 24 °C Humidity: 48 % RH Atmospheric Pressure: 1010 mbar

#### 7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the module RX_Ant1 in transmitting mode
Final test	02	TX mode_Keep the module RX_Ant2 in transmitting mode
Final test	03	TX mode_Keep the module R3_Ant1 in transmitting mode
Final test	04	TX mode_Keep the module R3_Ant2 in transmitting mode

#### 7.6.3 Test Setup Diagram





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#### 7.6.4 Measurement Procedure and Data

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level =Receiver Reading + Antenna Factor + Cable Factor Preamplifier Factor
- 2) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

The detailed test data see: Appendix B for KSCR220300037802-R3 module

Appendix B for KSCR220300037802-RX module



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## 8 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2203000378AT



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## 9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2203000378AT

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