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1 Cover Page

TEST REPORT

Application No.:	SHCR2201000176AT		
FCC ID:	SVN-ARM310-W2		
Applicant:	ZHEJIANG DAHUA VISION TECHNOLOGY CO.,LTD.		
Address of Applicant:	No.1199, Bin'an Road, Binjiang District, Hangzhou, P.R. China		
Manufacturer:	ZHEJIANG DAHUA VISION TECHNOLOGY CO.,LTD.		
Address of Manufacturer:	No.1199, Bin'an Road, Binjiang District, Hangzhou, P.R. China		
Equipment Under Test (EU1	Г):		
EUT Name:	Wireless Input Expander		
Model No.:	DHI-ARM310-W2;ARM310-W2;DH-ARM310-W2¤		
¤	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.		
Standard(s) :	47 CFR Part 15, Subpart C 15.231		
Date of Receipt:	2022-01-13		
Date of Test:	2022-03-07 to 2022-03-08		
Date of Issue:	2022-03-09		
Test Result:	Pass*		

* In the configuration tested, the EUT complied with the standards specified above.

parlan share

Parlam Zhan E&E Section Manager



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Revision Record				
Version	Description	Date	Remark	
00	Original	2022-03-09	/	

Authorized for issue by:		
	pichal Nich	
	Micheal Niu / Project Engineer	
	Parlam zhan	
	Parlam Zhan / Reviewer	



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2 Test Summary

Test Item	FCC Requirement	Test method	Result
Antenna Requirement	Part 15.203	1	PASS
Conducted Emission	Part 15.207	ANSI C63.10 (2013) Section 6.2	N/A
Field Strength of the Fundamental	Part 15.231 (b)	ANSI C63.10 (2013) Section 6.4	PASS
Radiated Spurious emissions	Part 15.209 15.231(b)	ANSI C63.10 (2013) Section 6.4&6.5&6.6	PASS
20dB Bandwidth	Part 15.231 (c)	ANSI C63.10 (2013) Section 6.9.2	PASS
Dwell Time	Part 15.231 (a)	ANSI C63.10 (2013) Section 7.8.4	PASS

N/A: Not applicable. Please refer to Section 6.2 of this report for details.

Declaration of EUT Family Grouping:

Note: There are series models mentioned in this report, and they are the identical in electrical and electronic characters. Only the model DHI-ARM310-W2 was tested since their differences were the model number and appearance.



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4 General Information

4.1 General Description of E.U.T.

Power supply:	DC 3V by battery CR123A	
Test voltage:	DC 3V	

4.2 Technical Specifications:

Modulation Type	FSK		
Number of Channels	6		
Operation Frequency	433.35MHz-434.6MHz		
Channel Spacing	250KHz		
Antenna Type	Spring Antenna		

4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	ThinkPad X100e	/
Serial port adapter plate	/	Test Plate 3	/

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4 x 10-8
2	Timeout	2s
3	Duty cycle	0.4%
4	Occupied Bandwidth	3%
5	Conducted Spurious emissions	0.75dB
0	DE Dedicted neuver	5.1dB (Below 1GHz)
6	RF Radiated power	5.9dB (Above 1GHz)
		4.2dB (Below 30MHz)
7	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		5.1dB (1GHz-6GHz)
8	Temperature test	1°C
9	Humidity test	3%
10	Supply voltages	1.5%
11	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 (ISED) Canada as an accredited testing laboratory.

CAB Identifier: CN0072.

• 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-11600, C-11707, T-11499, G-10216 respectively.



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5 Equipments Used during Test

Item	Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal. Due Date
RF Ra	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
9	Pre-Amplifier(30MHz~18GHz)	LNA	/	/	04/15/2021	04/14/2022
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 \sim 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	/	04/15/2021	04/14/2022
24	Software	Faratronic	EZ_EMC	N/A	N/A	N/A



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6 Test results and Measurement Data

6.1 Antenna Requirement

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.

The antenna is spring antenna and no consideration of replacement.

Antenna location: Refer to Appendix (Internal Photos)



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6.2 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:	

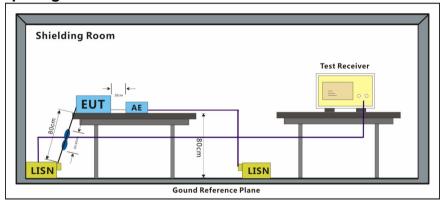
Frequency of optionion(MHT)	Conducted	limit(dBµV)
Frequency of emission(MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the fr	equency.	•

6.2.1 E.U.T. Operation

Operating Environment:

Temperature:N/A °CHumidity:N/A % RHAtmospheric Pressure:N/AmbarTest modeN/A

6.2.2 Test Setup Diagram





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6.2.3 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 50ohm/50 μ H + 5ohm 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: LISN=Read Level+ Cable Loss+ LISN Factor

Note: This EUT is powered by battery only; therefore the AC Conducted Emission test is not applicable.



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6.3 Spurious Emissions

Test frequency range		0							
Test Site: Receiver Setup:	Measurement Distant				Demente				
Receiver Setup.	Frequency 0.009MHz-0.015MHz	Detector	RBW	VBW	Remark				
	0.015MHz-30MHz	Quasi-peak	200Hz 9kHz	1KHz 30KHz	Quasi-peak				
	30MHz-1GHz	Quasi-peak	9KHZ 120 kHz		Quasi-peak				
	3010102-10002	Quasi-peak Peak	120 KHZ 1MHz	300KHz 3MHz	Quasi-peak Peak				
	Above 1GHz	Peak	1MHz	10Hz	Average				
Limit:		Field strength	Limit		Measurement				
(Spurious Emissions	Frequency	(microvolt/meter)	(dBuV/m)	Remark	distance (m)				
	0.009MHz-0.490MHz	2400/F(kHz)	-	Quasi-peak	300				
	0.490MHz-1.705MHz	24000/F(kHz)	-	Quasi-peak	30				
	1.705MHz-30MHz	30	-	Quasi-peak	30				
	30MHz-88MHz	100	40.0	Quasi-peak	3				
	88MHz-216MHz	150	43.5	Quasi-peak	3				
	216MHz-960MHz	200	46.0	Quasi-peak	3				
	960MHz-1GHz	500	54.0	Quasi-peak	3				
	Above 1GHz	500	54.0	Average	3				
		300	74.0	Peak	3				
Limit:	Frequency	Limit (dBuV/m	n @3m)	Remark					
(Field strength of the	433.09 - 434.61MHz	80.83		Average Value					
fundamental signal) Test Procedure:		100.83		Peak Value					
	 a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. 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 (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 								
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mode is recorded in the report.

E.U.T. Operation

Operating Environment:

Temperature:	22 °C	Humidity:	50	% RH	Atmospheric Pressure: 1020	mbar
Test mode	a: TX mode_K	eep the EUT	in tra	ansmitting v	with FSK modulation mode.	

Test Setup:

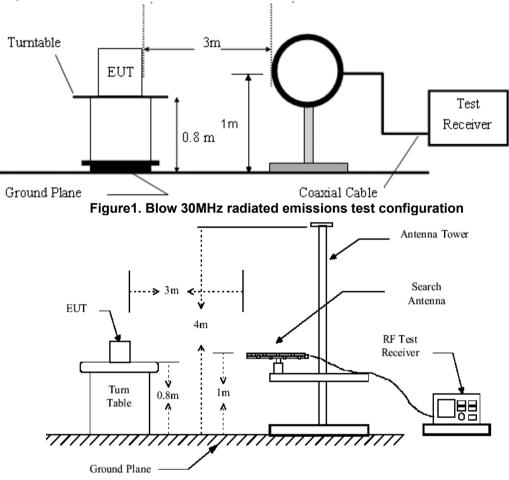


Figure 2. 30MHz to 1GHz radiated emissions test configuration



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Test Results:

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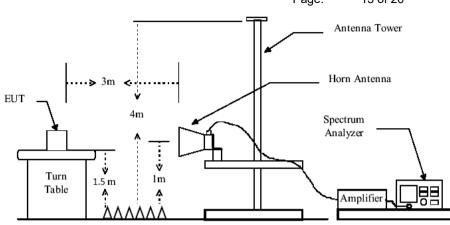


Figure3. Above 1GHz radiated emissions test configuration Pass

6.3.1 Field Strength of the Fundamental Signal

Test channel	Freq. (MHz)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
		84.03	100.83	-16.80	Peak	Vertical
Channel 1	100.05	80.16	100.83	-20.67	Peak	Horizontal
Channel I	433.35	74.30	80.83	-6.53	AVG	Vertical
		70.43	80.83	-10.40	AVG	Horizontal
		83.44	100.83	-17.39	Peak	Vertical
Channel 6	124 60	80.86	100.83	-19.97	Peak	Horizontal
Channel 6	434.60	73.71	80.83	-7.12	AVG	Vertical
		71.13	80.83	-9.70	AVG	Horizontal

Remark:

- 1. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.
- 2. Average level=Peak level-Duty Cycle Factor
- 3. Duty Cycle Factor= 20log(Duty Cycle)= -9.73dB



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Spectrum									
Ref Level -	8.00 dBm	I	🔵 R	BW 1 MHz					
Att	10 dB	😑 SWT 10	0 ms 👄 ٧	BW 1 MHz					
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-70 dBm									
-80 dBm									
-90 dBm									
-100 dBm									
CF 433.35 M	IHz			691 p	ts				10.0
Marker									
Type Ref	Trc	X-valu		Y-value	Fund	tion		Function I	Result
M1 D2 M1	1		768 ms 609 ms	-26.44 dBm -0.04 dB					
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z							
Spectrum Ref Level -8.00 dBm	- F	BW 1 MHz					
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-70 dBm							
-80 dBm							
-90 dBm							
-100 dBm							
CF 434.6 MHz		691 pts	;				10
Marker		•					
Type Ref Trc	X-value	Y-value	Functi	on 📃	Fund	ction Result	_
M1 1 D2 M1 1	27.681 ms 32.609 ms	-25.59 dBm -0.01 dB		Read			-



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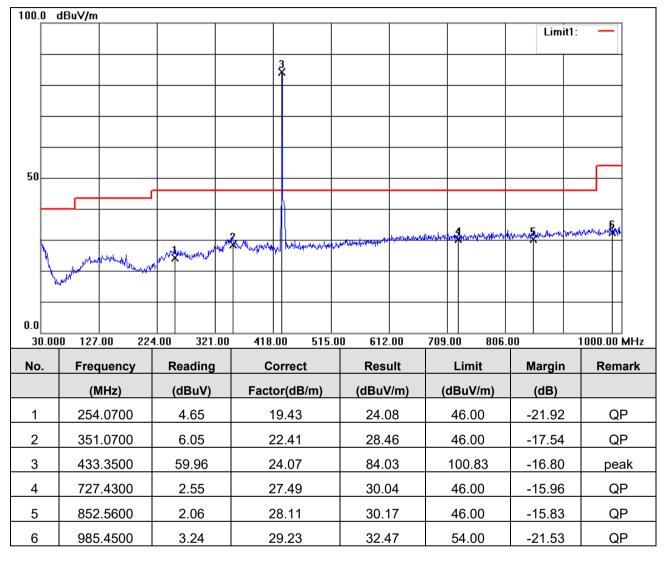
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6.3.2 Spurious Emissions

Below 1GHz

433.35MHz

Vertical:





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	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	323.9100	6.09	21.46	27.55	46.00	-18.45	QP
2	349.1300	7.72	22.35	30.07	46.00	-15.93	QP
3	433.3500	56.09	24.07	80.16	100.83	-20.67	peak
4	624.6100	3.30	26.81	30.11	46.00	-15.89	QP
5	720.6400	2.59	27.49	30.08	46.00	-15.92	QP
6	948.5900	3.97	29.28	33.25	46.00	-12.75	QP



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434.6MHz

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Vertical: 100.0 dBuV/m Limit1: 3 X 50 Sec. 4 مراده المراس Mar manus mar south line male 0.0 30.000 127.00 224.00 321.00 418.00 515.00 612.00 709.00 806.00 1000.00 MHz No. Reading Correct Margin Remark Frequency Result Limit (dBuV) Factor(dB/m) (dBuV/m) (dBuV/m) (MHz) (dB) 1 261.8300 6.71 19.63 26.34 46.00 -19.66 QP 2 348.1600 7.72 22.32 30.04 46.00 -15.96 QP 3 peak 434.6000 59.35 24.09 83.44 100.83 -17.394 674.0800 46.00 QP 3.99 27.30 31.29 -14.71 5 825.4000 27.96 30.09 46.00 -15.91 QP 2.13 6 953.4400 3.00 29.29 32.29 46.00 -13.71 QP



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30.00	0 127.00 22	4.00 321.00	418.00 515.	DO 612.00	709.00 806.0		 1000.00 MHz
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	143.4900	4.84	19.93	24.77	43.50	-18.73	peak
2	345.2500	7.91	22.21	30.12	46.00	-15.88	QP
3	434.6000	56.77	24.09	80.86	100.83	-19.97	peak
4	633.3400	3.28	26.91	30.19	46.00	-15.81	QP
5	746.8300	2.79	27.48	30.27	46.00	-15.73	QP
6	985.4500	3.18	29.23	32.41	54.00	-21.59	QP



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Above 1GHz

433.35MHz

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	1820.000	58.18	-17.01	41.17	54.00	-12.83	peak	Vertical
2	2265.000	58.04	-15.59	42.45	54.00	-11.55	peak	Vertical
3	3055.000	57.05	-13.41	43.64	54.00	-10.36	peak	Vertical
4	1560.000	58.71	-17.45	41.26	54.00	-12.74	peak	Horizontal
5	2265.000	58.04	-15.59	42.45	54.00	-11.55	peak	Horizontal
6	2965.000	55.21	-13.59	41.62	54.00	-12.38	peak	Horizontal

434.6MHz

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	1705.000	60.15	-17.21	42.94	54.00	-11.06	peak	Vertical
2	2055.000	59.00	-16.48	42.52	54.00	-11.48	peak	Vertical
3	2555.000	57.05	-14.48	42.57	54.00	-11.43	peak	Vertical
4	1625.000	58.16	-17.34	40.82	54.00	-13.18	peak	Horizontal
5	1930.000	57.90	-16.83	41.07	54.00	-12.93	peak	Horizontal
6	2520.000	56.57	-14.56	42.01	54.00	-11.99	peak	Horizontal



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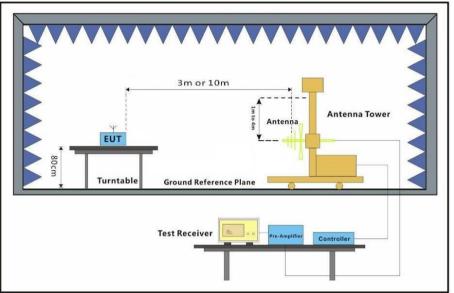
6.4 20dB Bandwidth

E.U.T. Operation

Operating Environment:

Temperature: Test mode 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar a: TX mode_Keep the EUT in transmitting with FSK modulation mode.

Test Setup:



Limit:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier. Pass

Test Results:

Frequency(MHz)	20dB bandwidth (kHz)	Limit (kHz)	Results
433.35	61.36	1084	Pass
434.60	61.65	1087	Pass



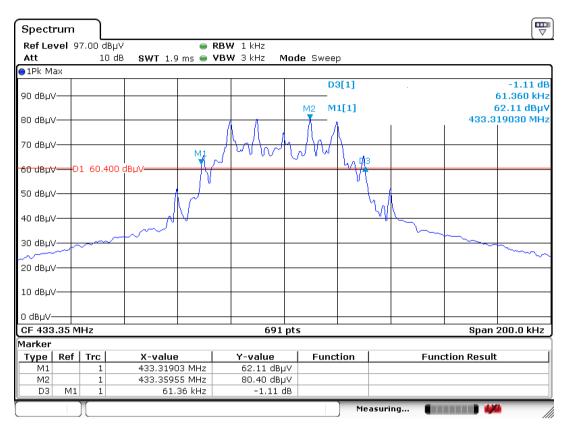
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Test plot as follows: 433.35MHz





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434.6MHz ₩ Spectrum Ref Level 97.00 dBµV 🔵 RBW 1 kHz Att 10 dB SWT 1.9 ms 👄 VBW 3 kHz Mode Sweep ⊖1Pk Max D3[1] 1.66 dB 90 dBµV-61.650 kHz M2 M1[1] 58.62 dBµV 434.568740 MHz 80 dBµV-70 dBµVn мβ D1 60.670 dBµV 60 dBriv 50 dBµV· ١٨ 40 dBµV-30 dBµV-20 dBµV-10 dBµV 0 dBµV-Span 200.0 kHz CF 434.6 MHz 691 pts Marker Function Type Ref Trc **Function Result** X-value Y-value 434.56874 MHz 58.62 dBuV M1 1 M2 1 434.60955 MHz 80.67 dBµV D3 M1 1 61.65 kHz 1.66 dB Measuring...



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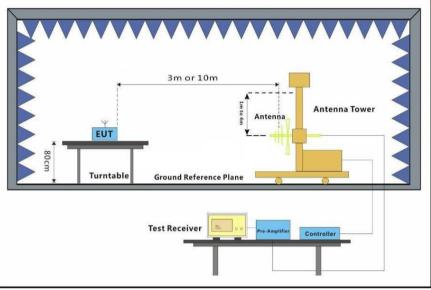
6.5 Dwell Time

E.U.T. Operation

Operating Environment:

Temperature:22 °CHumidity:50 % RHAtmospheric Pressure:1020 mbarTest modea: TX mode_Keep the EUT in transmitting with FSK modulation mode.

Test Setup:



Limit:15.231 (a): Not more than 5 secondsTest Results:Pass

Measurement Data:

Test item	Limit (s)	Results
Transmission Duration	≪5s	Pass



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ot as follows:					
Spectrum					
RefLevel -8.00 dE Att 10 d	8m 🛛 👄 RB' dB 🖷 SWT 10 s 👄 VB'	W 1 MHz W 1 MHz			
• 1Pk Max					
			D2[1]		-34
-20 dBm	M1		M1[1]		5 -27.:
-30 dBm	<u> </u>				2
-40 dBm					
-50 dBm					
n-991.9892-	~~~~~~~	umunthille	mummun	ler manning m	hunderstalling
-70 dBm					
-80 dBm					
-90 dBm					
-100 dBm					
CF 433.35 MHz		691 pts		1	
Marker					
TypeRefTrcM11	X-value 2.6232 s	Y-value -27.23 dBm	Function	Fun	ction Result
D2 M1 1	5.0 s	-34.39 dB			



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7 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

8 EUT Constructional Details

Refer to the < External Photos > & <Internal Photos >.

--End of the Report--



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