



**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
FCC PART 15 SUBPART C REQUIREMENT**

OF

Video Doorbell Camera

Model No.: VDB2

Trademark: KANGAROO

FCC ID: 2APSE-VDB2

Report No.: E01A22120226F00102

Issue Date: March 23, 2023

Prepared for

Roo Inc

6 W 18th Street,8th Floor,New York City, NY 10003

Prepared by

Dong Guan Anci Electronic Technology Co., Ltd.

**1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake Hi-tech
Industrial Development Zone, Dongguan City, Guangdong Pr., China.**

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Dong Guan Anci Electronic Technology Co., Ltd.**

VERIFICATION OF COMPLIANCE

Applicant:	Roo Inc 6 W 18th Street,8th Floor,New York City, NY 10003
Manufacturer:	Roo Inc 6 W 18th Street,8th Floor,New York City, NY 10003
Product Description:	Video Doorbell Camera
Model number	VDB2
Trade Mark:	KANGAROO
Sample number:	A23020496 003

We hereby certify that:

The above equipment was tested by Dong Guan Anci Electronic Technology Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.231(2022).

Date of Test : December 08, 2022 to January 13, 2023

Prepared by : _____



Reviewer & Approved : _____

Tiger Xu/ Supervisor

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	E01A22120226F00102

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1 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Device Type:	Video Doorbell Camera
Modulation:	ASK
Operating Frequency Range(s):	433.92MHz
Number of Channels:	1 channel
Antenna Type :	Internal PCB antenna
Antenna Gain:	-0.2dBi
Power supply:	DC 3.7V, DC 5V, AC 12-24V
Test Power Supply:	DC 3.7V from battery, DC 5V from adapter, AC 24V from AC/AC ADAPTOR
Date of Sample Received :	December 08, 2022

Note: for more details, please refer to the User's manual of the EUT.

The EUT has been associated with peripherals pursuant to ANSI C63.10-2013 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

For Radiated: The EUT's antenna was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y axis
Mode B	Y-Z axis
Mode C	X-Z axis

From the above modes, the worst case was found in Mode A.

All the x/y/z orientation has been investigated, and only worst case is presented in this report.

2 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.231(c)	Occupied Bandwidth	PASS	
15.231(b)	Radiated Spurious Emissions	PASS	
15.231(b)	Transmission Requirement	PASS	
15.203	Antenna Requirement	PASS	
15.207(a)	Conducted Emission	PASS	

NOTE:

1: All buttons of EUT were investigated. The test results shown in the following sections represent the worst case emissions

RELATED SUBMITTAL(S) / GRANT(S):



Tested button

This submittal(s) (test report) is intended for FCC ID: 2APSE-VDB2 filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules

3 TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart C

3.2 MEASUREMENT EQUIPMENT USED

Radiated Emission Test Equipment

Item	Instr. Code	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	AN-E060	EMI Test Receiver	Rohde & Schwarz	ESCI	100302	2023-05-12
2	AN-E061	Pre-Amplifier	Anritsu	MH648A	M57886	2023-05-12
3	AN-E076	Bilog Antenna	Schwarzbeck	VULB9163	VULB9163-1290	2023-10-07
4	AN-E063	RF Cable	N/A	ZT06S-NJ-NJ-11M	19060398	2023-05-12
5	AN-E064	RF Cable	N/A	ZT06S-NJ-NJ-0.5M	19060400	2023-05-12
6	AN-E065	RF Cable	N/A	ZT06S-NJ-NJ-2.5M	19060404	2023-05-12
7	AN-E056	3m Semi-anechoic Chamber	chengyu	9m*6m*6m	N/A	2024-11-11
8	AN-E069	Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE)	N/A	N/A
9	AN-E037	Spectrum Analyzer	Rohde & Schwarz	FSV40	102257	2023-10-07
10	AN-E015	Low noise Amplifiers	A-INFO	LA1018N4009	J1013130524001	2023-05-12
11	AN-E014	Horn antenna	A-INFO	LB-10180-SF	J2031090612123	2023-05-14
12	AN-E065	RF Cable	N/A	ZT26-NJ-NJ-11M	19060401	2023-05-12
13	AN-E067	RF Cable	N/A	ZT26-NJ-NJ-2.5M	19060402	2023-05-12
14	AN-E068	RF Cable	N/A	ZT26-NJ-NJ-0.5M	19060403	2023-05-12
15	AN-E056	3m Semi-anechoic Chamber	chengyu	9m*6m*6m	N/A	2024-11-12
16	AN-E069	Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE)	N/A	N/A

Radio Frequency Test Equient

Item	Instr.Code	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	AN-E037	Spectrum Analyzer	KEYSIGHT	N9020A	MY61250185	2023-10-07
2	AN-E040	WIDEBAND RADIO COMMUNICATION	Rohde & Schwarz	CMW500	157423	2023-10-07
3	AN-E039	MXG Vector Signal Generator	KEYSIGHT	N5182B	MY61250185	2023-10-07
4	AN-E038	EXG Analog Signal Generator	KEYSIGHT	N5173B	My61252603	2023-10-07
5	AN-E041	USB RF Power sensor	RadiPower	RPR3006W	17I00015SNO88	2023-10-07
6	AN-E042	USB RF Power sensor	RadiPower	RPR3006W	17I00015SNO89	2023-10-07
7	/	RF Test Software	MWRF-test	MTS 8310	N/A	N/A
8	AN-E092	Radio Frequency control box	MWRF-test	MW200-RFCB	MW220111ANCI	2023-05-12
9	AN-E093	Radio Frequency control box	MWRF-test	MW200-RFCB 2#	/	2023-05-12

Remark: Each piece of equipment is scheduled for calibration once a year.

3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

4 FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

Site Description

EMC Lab. : Accredited by FCC, May 30, 2019
Designation Number: CN1230
Test Firm Registration Number: 991798

Name of Firm : Dong Guan Anci Electronic Technology Co., Ltd.

Site Location : 1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr., China.

4.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

Name of Firm : Dong Guan Anci Electronic Technology Co., Ltd.

Site Location : 1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr., China.

5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

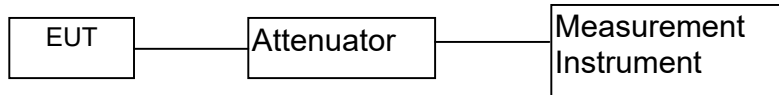
Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Temperature	$\pm 0.5^\circ\text{C}$
Humidity	$\pm 3\%$

Measurement Uncertainty for a level of Confidence of 95%

6 SETUP OF EQUIPMENT UNDER TEST

6.1 RADIO FREQUENCY TEST SETUP 1

The component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



6.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

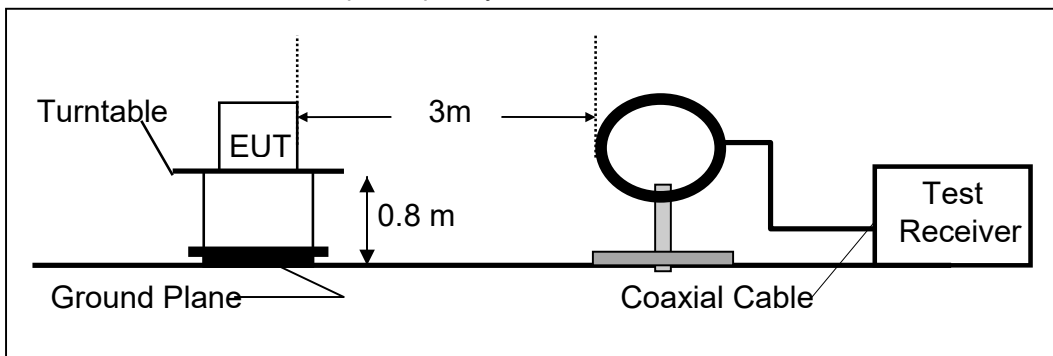
Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

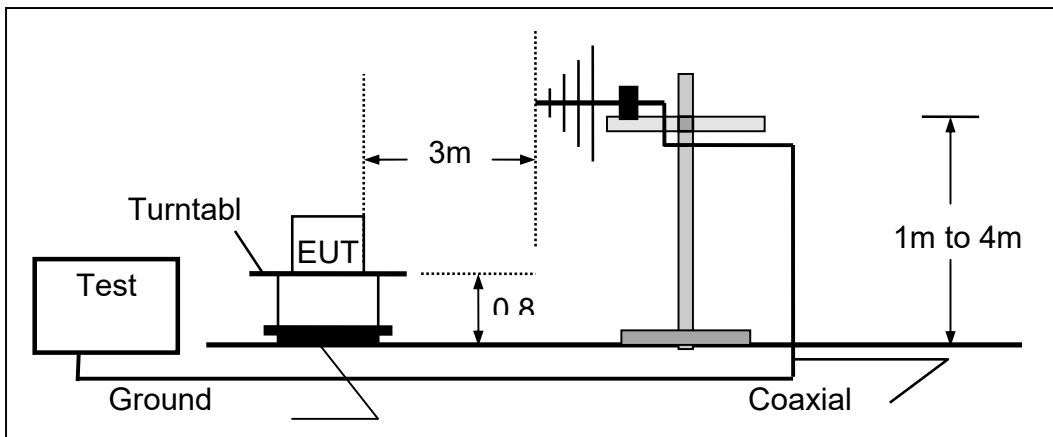
Above 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

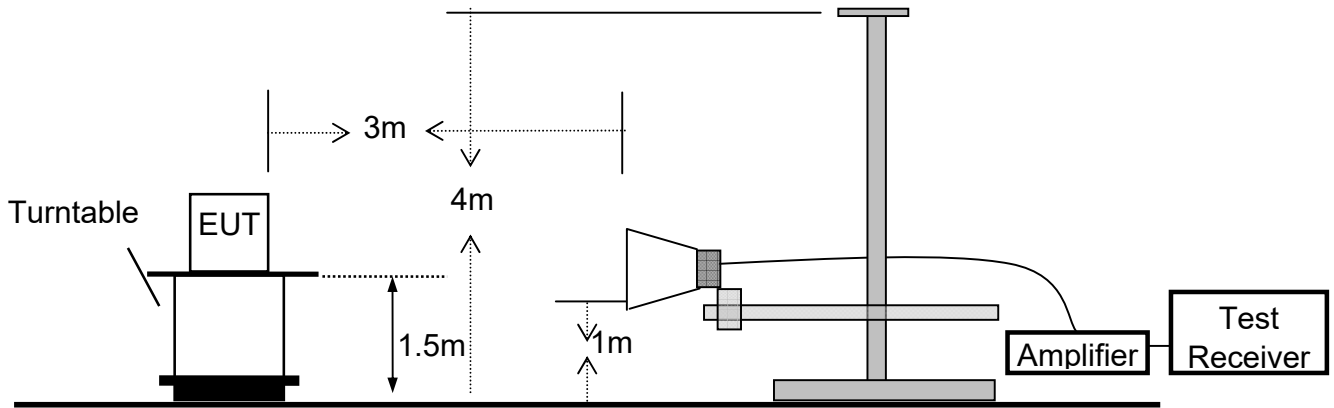
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz

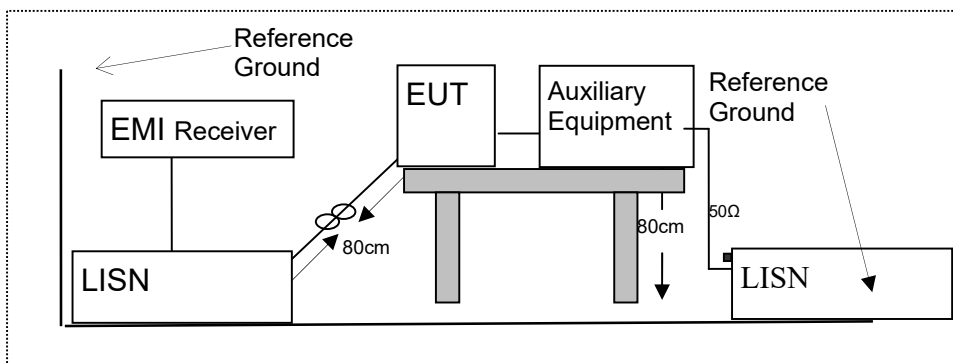


6.3 CONDUCTED EMISSION TEST SETUP

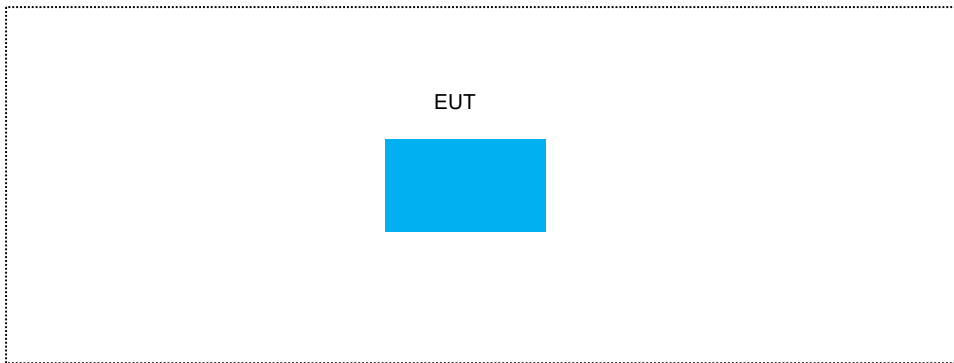
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



6.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



6.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1.	N/A	N/A	N/A	N/A	

Notes:

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

7 TEST REQUIREMENTS

7.1 OCCUPIED BANDWIDTH

7.1.1 Applicable Standard

According to FCC Part 2.1049 and part 15.231(c)

7.1.2 Conformance 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.

7.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.1.4 Test Procedure

The EUT was operating in transmit mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1% occupied bandwidth (30KHz).

Set the video bandwidth (VBW) =100KHz.

Set Span= approximately 3 to 5 times the occupied bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 99% down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 99% bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Measure and record the results in the test report.

Test Results

Temperature : 28°C Test Date : December 14, 2022
Humidity : 65 % Test By: Big

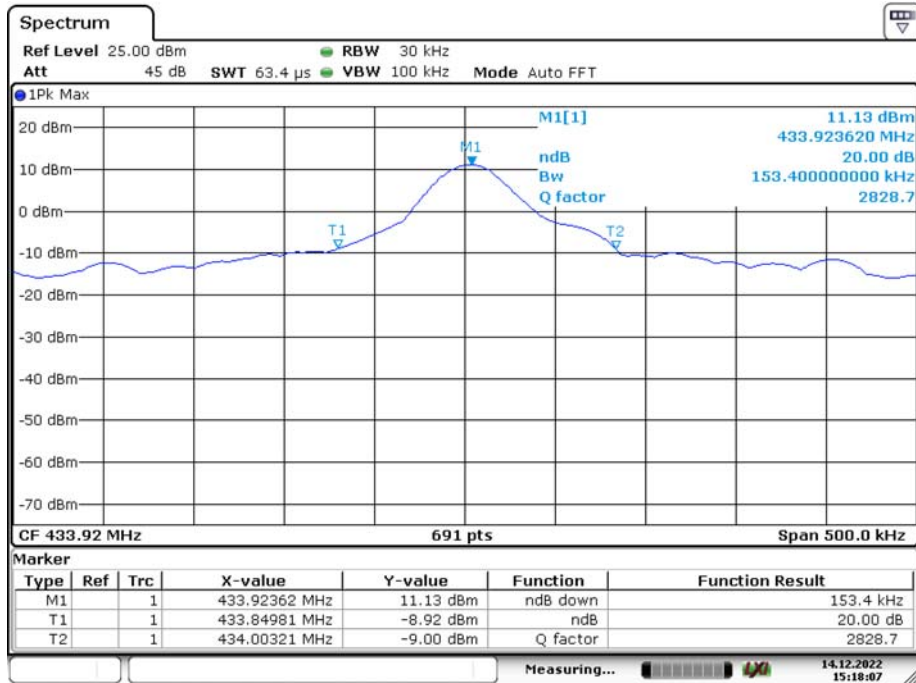
Modulation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (kHz)	Limit (kHz)	Verdict
ASK	0	433.92	153.4	≤1084.8KHz	PASS
Note: N/A (Not Applicable) BW=0.25% of the center frequency					

Occupied Bandwidth

Test Model

Channel 0: 433.92MHz

ASK Modulation



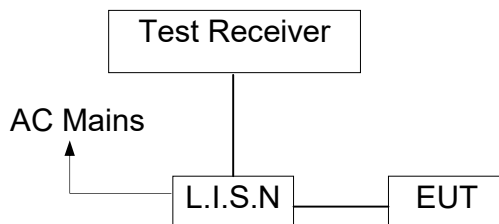
Date: 14.DEC.2022 15:18:07

7.2 Conducted Emissions Test

7.2.1 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

7.2.2 Test SET-UP (Block Diagram of Configuration)



7.2.3 Measurement Equipment Used:

C	Instr.Code	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	AN-E010	L.I.S.N	SCHWARZBECK	NSLK 8127	8127-669	2023-05-12
2	AN-E078	TRANSIENT LIMITER	CYBERTEK	EM5010A	E1950100113	2023-05-12
3	AN-E022	RF Cable	N/A	ZT06S-BNCJ-NJ-7.5M	19044020	2023-05-12
4	AN-E020	EMI Test Receiver	ROHDE&SCHWARZ	ESCI	101358	2023-05-12
5	AN-E058	1# Shielded Room	chengyu	8m*4m*3.3m	N/A	2024-11-12
6	AN-E046	Test Software	Farad	EZ-EMC (Ver.ANCI-3A1)	N/A	N/A

7.2.4 Conducted Emission Limit

Conducted Emission Frequency(MHz)

0.15-0.5

0.5-5.0

5.0-30.0

Quasi-peak

66-56

56

60

Average

56-46

46

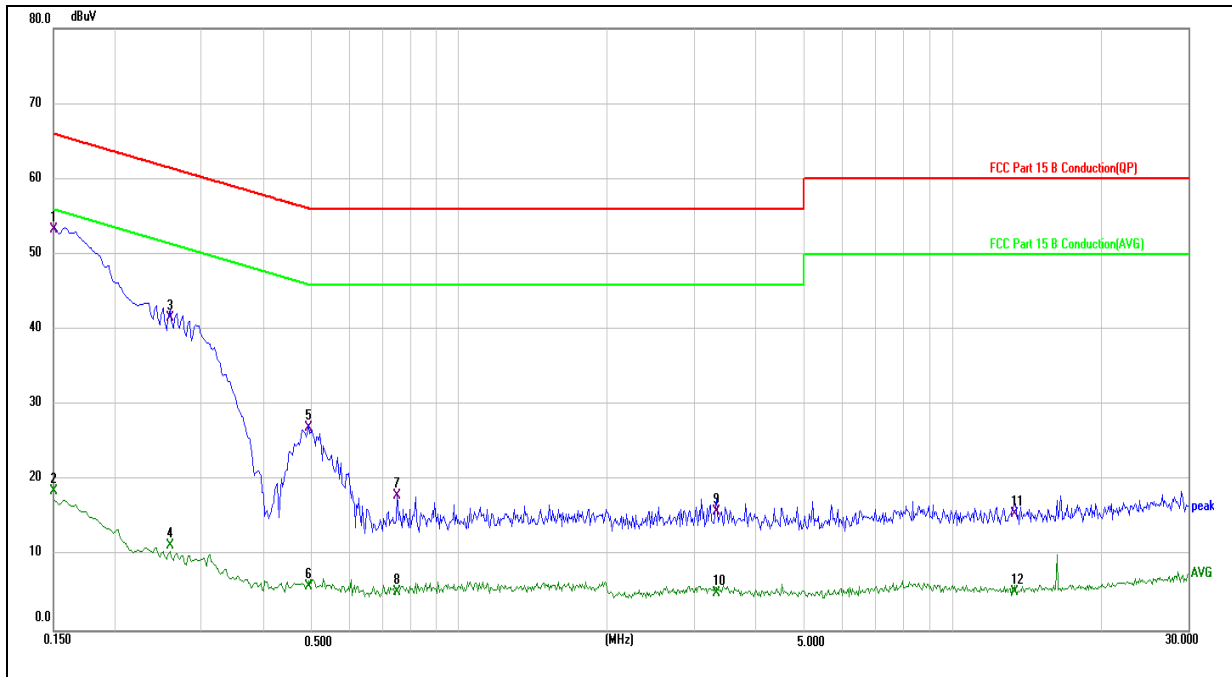
50

Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

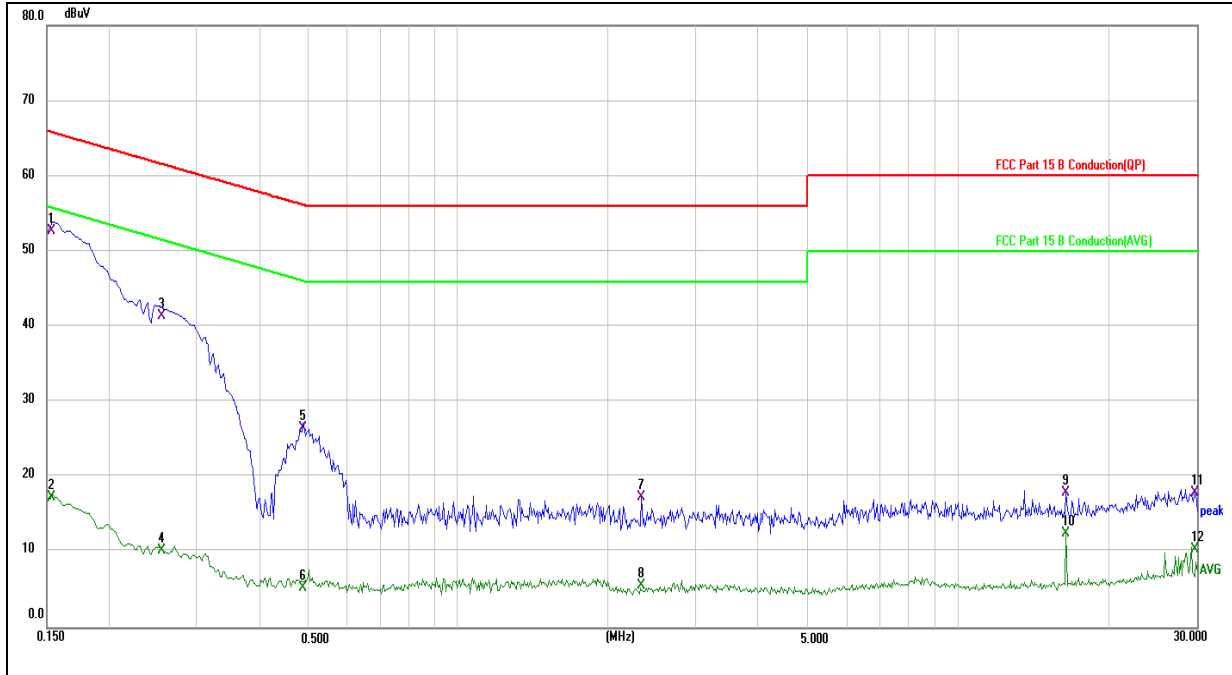
7.2.5 Measurement Result:

All the modulation modes were tested the data of the worst mode (802.11 n20 TX2437) are recorded in the following pages and the others modulation methods do not exceed the limits. Please refer to following pages.



Site:	ANCI 843	Phase:	N	Temperature(C):	23.5(C)
Limit:	FCC Part 15 Class B Conduction(QP)	Humidity(%):	52.6%		
EUT:	Video Doorbell Camera	Test Time:	2023-01-10 23:32:23		
M/N.:	VDB2	Power Rating:	AC 120V/60Hz		
Mode:	TX 433	Test Engineer:	Jayce		
Note:					

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measurement(dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1 *	0.1500	43.42	9.83	53.25	66.00	-12.75	QP	
2	0.1500	8.81	9.83	18.64	56.00	-37.36	AVG	
3	0.2580	31.24	10.28	41.52	61.50	-19.98	QP	
4	0.2580	1.08	10.28	11.36	51.50	-40.14	AVG	
5	0.4940	17.19	9.78	26.97	56.10	-29.13	QP	
6	0.4940	-3.82	9.78	5.96	46.10	-40.14	AVG	
7	0.7500	8.31	9.71	18.02	56.00	-37.98	QP	
8	0.7500	-4.45	9.71	5.26	46.00	-40.74	AVG	
9	3.3180	5.84	10.02	15.86	56.00	-40.14	QP	
10	3.3180	-5.00	10.02	5.02	46.00	-40.98	AVG	
11	13.3980	5.54	10.09	15.63	60.00	-44.37	QP	
12	13.3980	-4.88	10.09	5.21	50.00	-44.79	AVG	



Site:	ANCI 843	Phase:	L1	Temperature(C):	23.5(C)
Limit:	FCC Part 15 Class B Conduction(QP)			Humidity(%):	52.6%
EUT:	Video Doorbell Camera	Test Time:	2023-01-10 23:29:41		
M/N.:	VDB2	Power Rating:	AC 120V/60Hz		
Mode:	TX 433	Test Engineer:	Jayce		
Note:					

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measurement(dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1 *	0.1539	42.74	9.90	52.64	65.79	-13.15	QP	
2	0.1539	7.46	9.90	17.36	55.79	-38.43	AVG	
3	0.2540	31.05	10.31	41.36	61.63	-20.27	QP	
4	0.2540	-0.08	10.31	10.23	51.63	-41.40	AVG	
5	0.4900	16.88	9.70	26.58	56.17	-29.59	QP	
6	0.4900	-4.42	9.70	5.28	46.17	-40.89	AVG	
7	2.3300	7.26	10.05	17.31	56.00	-38.69	QP	
8	2.3300	-4.37	10.05	5.68	46.00	-40.32	AVG	
9	16.4340	7.76	10.26	18.02	60.00	-41.98	QP	
10	16.4340	2.32	10.26	12.58	50.00	-37.42	AVG	
11	29.8140	7.66	10.34	18.00	60.00	-42.00	QP	
12	29.8140	0.18	10.34	10.52	50.00	-39.48	AVG	

7.3 RADIATED SPURIOUS EMISSION

7.3.1 Applicable Standard

According to FCC Part 15.231(b) and 15.209

7.3.2 Conformance Limit

Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

FCC 15.209 Limited

Frequencies (MHz)	Field Strength (micровolts/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
960~1000	500	3
Above 1GHz	74 dBuV/m (PEAK) 54 dBuV/m (AVERAGE)	

15.231 Limited Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations

The field intensity in micro-volts per meter can then be determined by the following equation: $FI(V/m) = 10FI$ (dBV/ m) / 20 The FCC specified emission limits were calculated according the EUT operating frequency and obtained by following linear interpolation equations:

(a) For fundamental frequency:

$$f_{EUT} : \text{EUT Operating Frequency Emission Limit (V/m)}$$

$$= [f_{EUT}(\text{MHz}) - 260(\text{MHz})] \times \frac{12500(\text{V/m}) - 3750(\text{V/m})}{470(\text{MHz}) - 260(\text{MHz})} + 3750(\text{V/m})$$

(b) For spurious frequencies:

$$f_{EUT} : \text{EUT Operating Frequency Emission Limit (V/m)}$$

$$= [f_{EUT}(\text{MHz}) - 260(\text{MHz})] \times \frac{1250(\text{V/m}) - 375(\text{V/m})}{470(\text{MHz}) - 260(\text{MHz})} + 375(\text{V/m})$$

Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 1 5.209(a) limit in the table below has to be followed.

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

FCC Part15 (15.231) , Subpart C		
Fundamental Frequency	Field Strength Of Fundamental	Field Strength of Spurious Emissions
433.92MHz	AV:80.83 dBuV/m at 3m distance	AV:60.83 dBuV/m at 3m distance
	PK:100.83dBuV/m at 3m distance	PK:80.83 dBuV/m at 3m distance

Calculation of Average factor

The average correction factor is computed by analyzing the on time in 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency is: Average= Peak Value+20log(Duty Cycle), where the duty factor is calculated from following formula:

The duty cycle is simply the on-time divided by the period:

The duration of one cycle= $0.3913 \times 38 + 1.174 \times 12 = 28.9574\text{ms}$

Effective period of the cycle= 76.522ms

Duty Cycle= $(28.9574\text{ms}) / 76.522\text{ms} = 0.3784$

Therefore, the averaging factor is found by $20\log(0.2880) = -8.44$

Pulse Width(PW)= 76.522ms

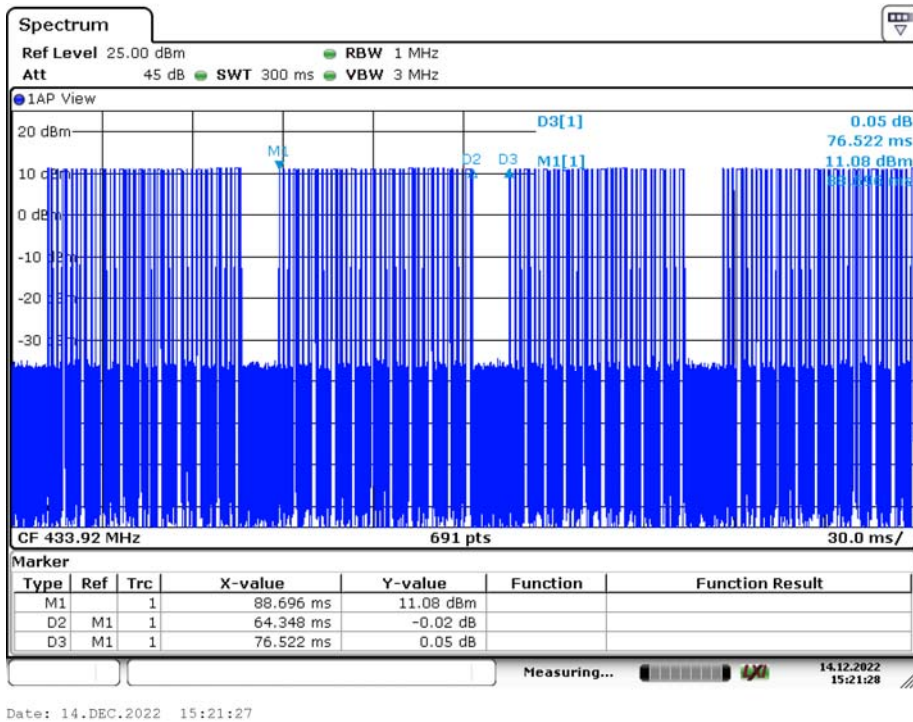
$2/PW = 2/76.522 = 0.026\text{KHz}$

$RBW = 1\text{MHz} > 2/PW (0.026\text{KHz})$

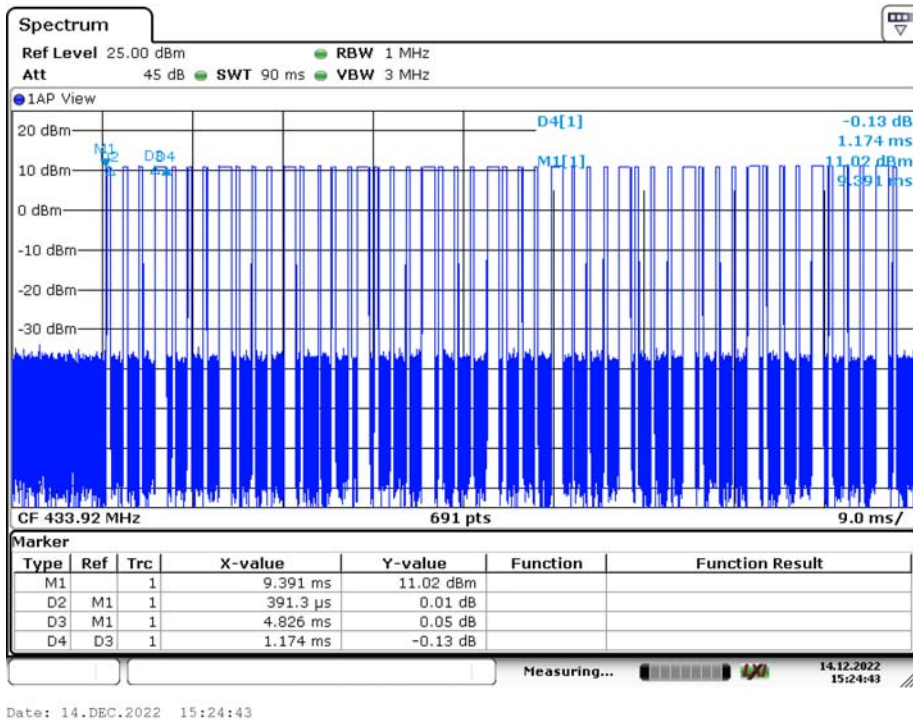
Therefore PDCF is no needed

Please see the test plot below:

pulse width:



pulse width of pulses:



7.3.5 Radiated spurious emission below 1GHz

Modulation:	ASK	Test Date :	January 12, 2023
Frequency Range:	30-1000MHz	Temperature :	26 °C
Test Result:	PASS	Humidity :	54 %
Measured Distance:	3m	Test By:	Big

Freq. (MHz)	Ant. Pol. H/V	Reading Level(dBuV/m)		Correc t Factor dB	Emission Level(dBuV/ m)		AVG Factor dB	Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV		PK	AV		PK	AV	PK	AV
434.0650(F)	H	85.9	77.46	-1.89	84.01	75.57	-8.44	100.83	80.83	-16.82	-5.26
434.0650(F)	V	84.9	76.46	-1.89	83.01	74.57	-8.44	100.83	80.83	-17.82	-6.26
869.13	H	49.59	41.15	6.57	56.16	47.72	-8.44	80.83	60.83	-24.67	-13.11
869.13	V	45.02	36.58	6.57	51.59	43.15	-8.44	80.83	60.83	-29.24	-17.68

Note: (1) All Readings are Peak Value.

(2) Correct Factor= Antenna Factor +Cable Loss- Amplifier Gain

(3) Emission Level= Reading Level+Probe Factor +Cable Loss

(4) True Value = Emission Level + Duty Cycle Correction Factor

(5) DF= Duty Cycle Correction Factor

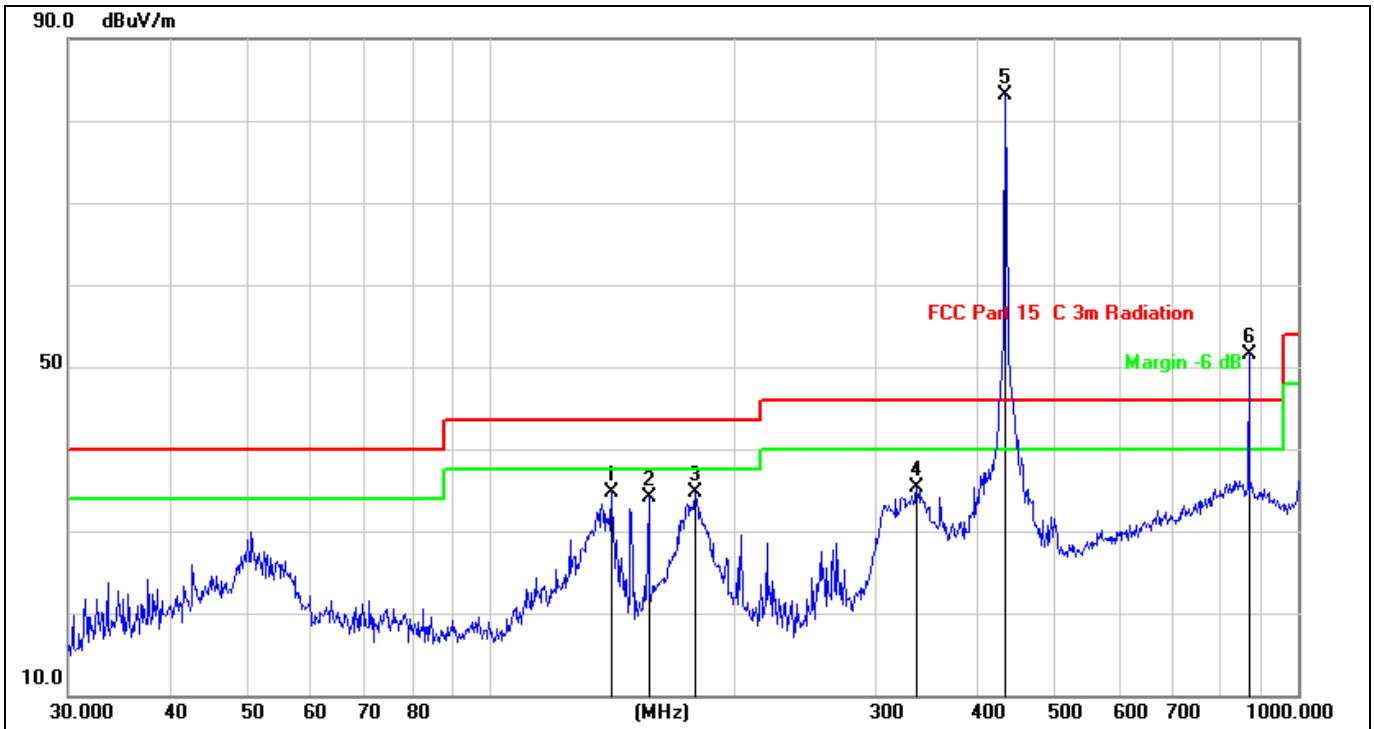
(6) Duty Cycle Correction Factor (dB) = $20\log(\text{Duty cycle}) = -8.44\text{dB}$

(7) Margin = PK Level – AV limit

(8) The "*" means restricted bands

(9) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

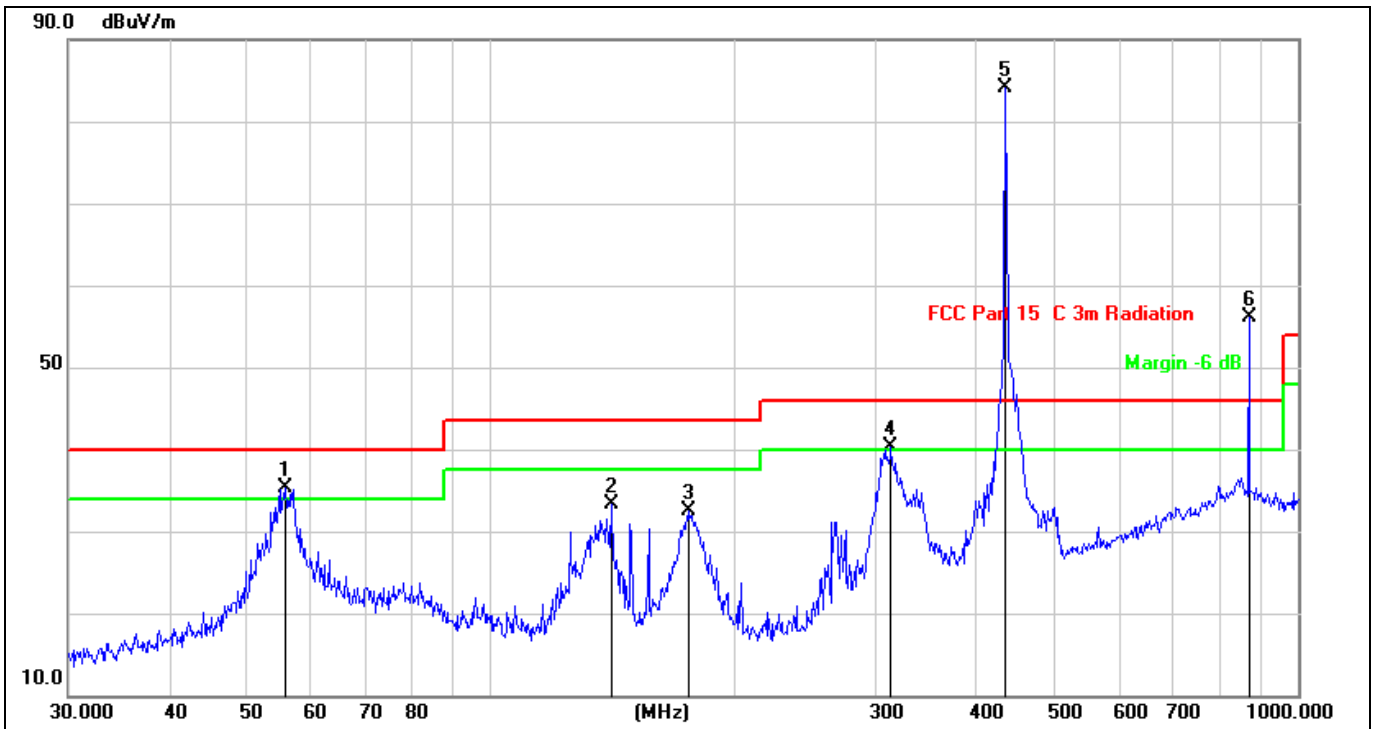
(10) The EUT has been evaluated in xyz orientation, and the worst result have been recorded in the report.



Site:	LAB	Antenna::	Vertical	Temperature(C):	26(C)
Limit:	FCC Part 15 C 3m Radiation			Humidity(%):	54%
EUT:	Video Doorbell Camera	Test Time:			2023/01/12 18:23:05
M/N.:	VDB2	Power Rating:			DC 3.7V
Mode:	TX	Test Engineer:			Big
Note:					

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Remark
1	141.3298	46.45	-11.76	34.69	43.50	-8.81	peak	
2	157.0074	45.55	-11.43	34.12	43.50	-9.38	peak	
3	179.3863	46.53	-11.82	34.71	43.50	-8.79	peak	
4	337.2155	40.88	-5.67	35.21	46.00	-10.79	peak	
5 *	434.0651	84.90	-1.89	83.01	46.00	37.01	peak	
6 X	869.1302	45.02	6.57	51.59	46.00	5.59	peak	

Note: 1. Result Level = Read Level+ Antenna Factor+ Cable Loss- Amp. Factor
 2. It is normal for the main frequency and double frequency points of 30MHz-1GHz to exceed the limit value. It is only used to evaluate the final test results and will not affect the accuracy of the report.



Site:	LAB	Antenna::	Horizontal	Temperature(C):	26(C)
Limit:	FCC Part 15 C 3m Radiation			Humidity(%):	54%
EUT:	Video Doorbell Camera	Test Time:		2023/01/12 18:21:53	
M/N.:	VDB2	Power Rating:		DC 3.7V	
Mode:	TX	Test Engineer:		Big	
Note:					

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Remark
1 !	55.8047	44.31	-9.10	35.21	40.00	-4.79	peak	
2	141.3298	45.04	-11.76	33.28	43.50	-10.22	peak	
3	176.2686	44.00	-11.55	32.45	43.50	-11.05	peak	
4 !	313.2760	47.15	-6.79	40.36	46.00	-5.64	peak	
5 *	434.0651	85.90	-1.89	84.01	46.00	38.01	peak	
6 X	869.1302	49.59	6.57	56.16	46.00	10.16	peak	

Note: 1. Result Level = Read Level+ Antenna Factor+ Cable Loss- Amp. Factor
 2. It is normal for the main frequency and double frequency points of 30MHz-1GHz to exceed the limit value. It is only used to evaluate the final test results and will not affect the accuracy of the report.

7.3.6 Radiated spurious emission above 1GHz

Modulation: ASK Test Date : January 12, 2023
 Frequency Range: 1000-6000MHz Temperature : 26 °C
 Test Result: PASS Humidity : 54 %
 Measured Distance: 3m Test By: Big

Freq. (MHz)	Ant. Pol. H/V	Reading Level(dBuV/ m)		Correc t Factor dB	Emission Level(dBuV/ m)		AVG Facto r dB	Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV		PK	AV		PK	AV	PK	AV
2429.819	H	73.12	64.68	-7.09	66.03	57.59	-8.44	80.83	60.83	-14.8	-3.24
3037.063	H	64.29	55.85	-2.78	61.51	53.07	-8.44	80.83	60.83	-19.32	-7.76
3905.591	H	66.75	58.31	0.01	66.76	58.32	-8.44	80.83	60.83	-14.07	-2.51
4339.135	H	64.76	56.32	1.18	65.94	57.5	-8.44	80.83	60.83	-14.89	-3.33
4834.861	H	62.53	54.09	2.75	65.28	56.84	-8.44	80.83	60.83	-15.55	-3.99
4924.476	H	70.1	61.66	-9.88	60.22	51.78	-8.44	80.83	60.83	-20.61	-9.05
1735.706	V	68.51	60.07	-9.88	58.63	50.19	-8.44	80.83	60.83	-22.2	-10.64
2169.967	V	67.3	58.86	-7.09	60.21	51.77	-8.44	80.83	60.83	-20.62	-9.06
2603.351	V	63.97	55.53	-5.15	58.82	50.38	-8.44	80.83	60.83	-22.01	-10.45
3037.743	V	65.32	56.88	-2.77	62.55	54.11	-8.44	80.83	60.83	-18.28	-6.72
3905.591	V	62.07	53.63	1.18	63.25	54.81	-8.44	80.83	60.83	-17.58	-6.02
4339.135	V	61.39	52.95	2.75	64.14	55.7	-8.44	80.83	60.83	-16.69	-5.13

Note: (1) All Readings are Peak Value.

(2) Correct Factor= Antenna Factor +Cable Loss- Amplifier Gain

(3) Emission Level= Reading Level+Probe Factor +Cable Loss

(4) True Value = Emission Level + Duty Cycle Correction Factor

(5) DF= Duty Cycle Correction Factor

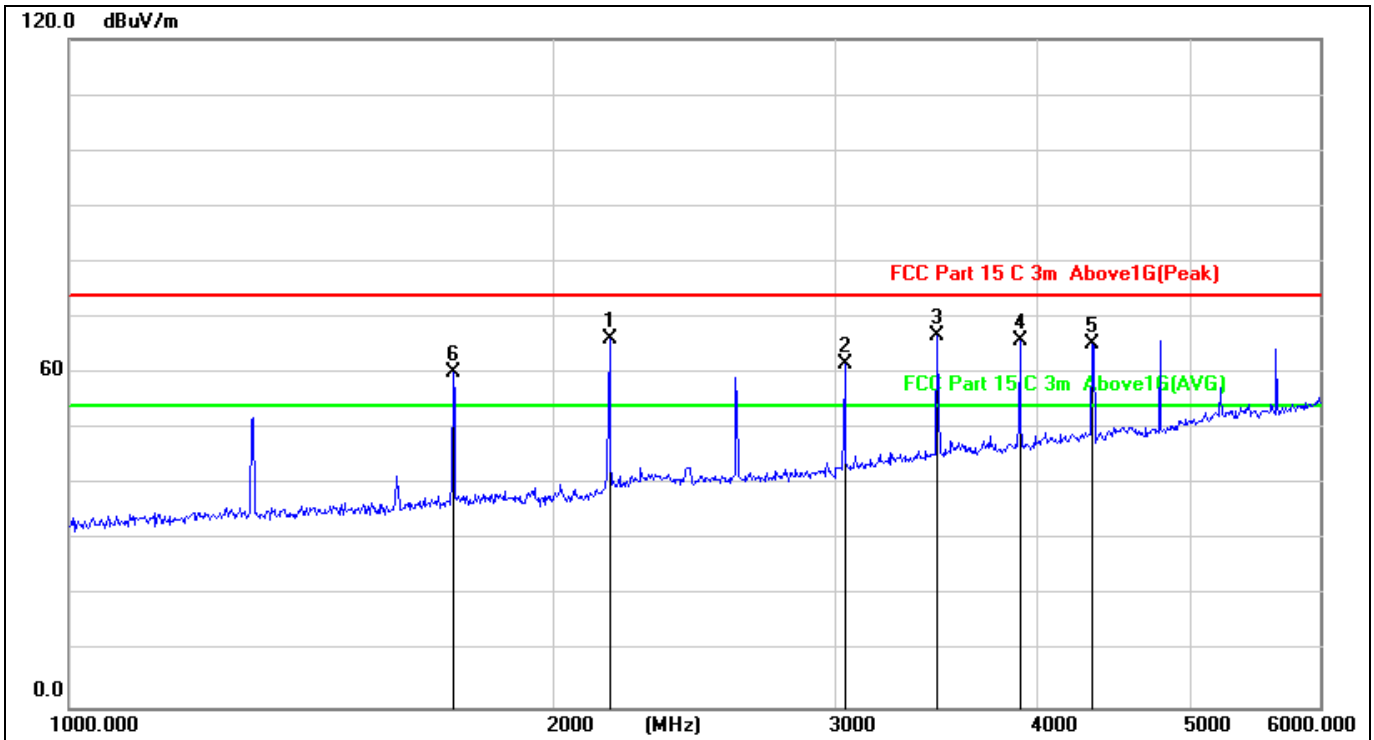
(6) Duty Cycle Correction Factor (dB) = $20\log(\text{Duty cycle})$ = -10.81dB

(7) Margin = PK Level – AV limit

(8) The “*” means restricted bands

(9) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

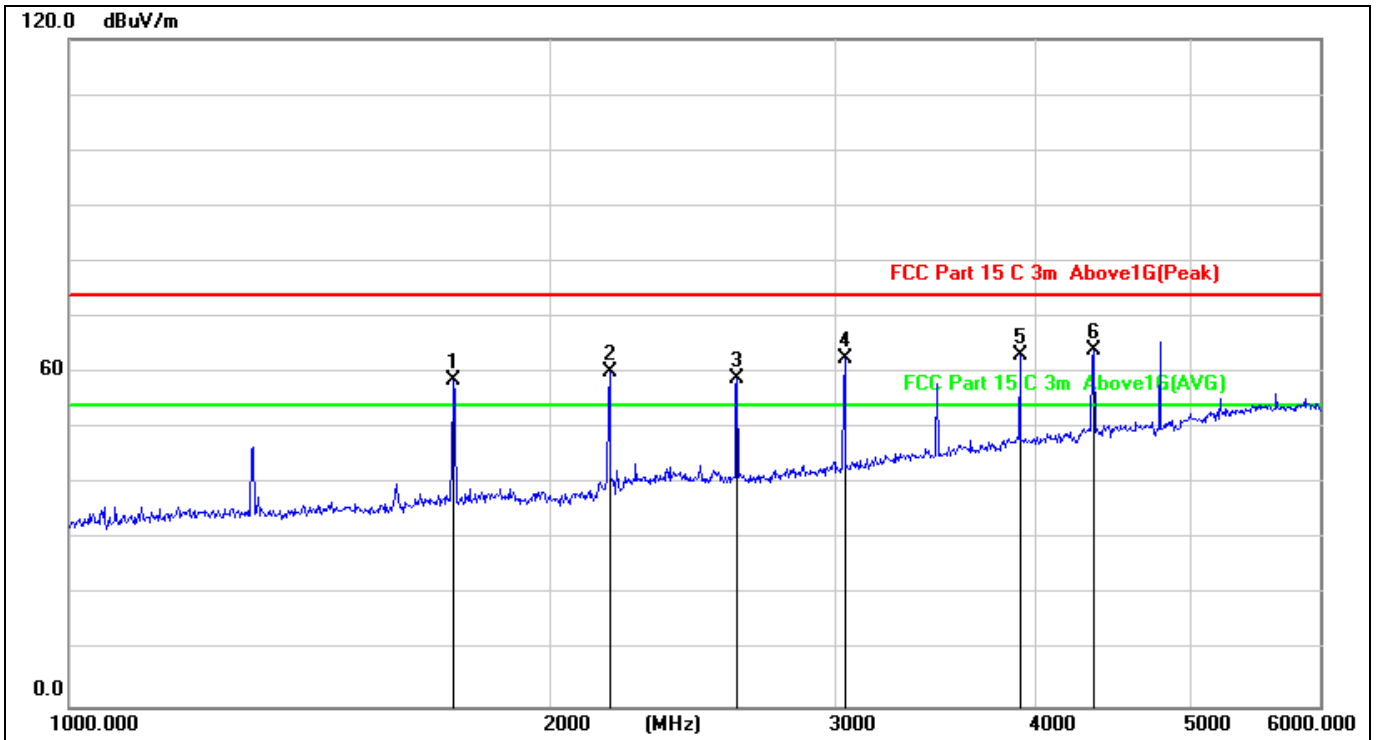
(10) The EUT has been evaluated in xyz orientation, and the worst result have been recorded in the report.



Site:	LAB	Antenna::	Horizontal	Temperature(C):	26(C)
Limit:	FCC Part 15 C 3m Radiation	Test Time:	2023/01/12 18:46:35		
EUT:	Video Doorbell Camera	Power Rating:	DC 3.7V		
M/N.:	VDB2	Test Engineer:	Big		
Mode:	TX	Note:			

No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Det.	Remark
1 X	2169.481	73.12	-7.09	66.03	74.00	-7.97	peak	
2	3037.063	64.29	-2.78	61.51	74.00	-12.49	peak	
3 X	3471.549	66.75	0.01	66.76	74.00	-7.24	peak	
4	3905.591	64.76	1.18	65.94	74.00	-8.06	peak	
5 *	4338.163	62.53	2.75	65.28	74.00	-8.72	peak	
6 X	1735.706	70.10	-9.88	60.22	74.00	-13.78	peak	

Note: 1. Result Level = Read Level+ Antenna Factor+ Cable Loss- Amp. Factor
 2. It is normal for the main frequency and double frequency points of 1GHz -6GHz to exceed the limit value. It is only used to evaluate the final test results and will not affect the accuracy of the report.



Site:	LAB	Antenna::	Vertical	Temperature(C)::	26(C)
Limit:	FCC Part 15 C 3m Radiation	Test Time:	2023/01/12 18:47:32	Humidity(%)::	54%
EUT:	Video Doorbell Camera	Power Rating:	DC 3.7V	Mode:	TX
M/N.:	VDB2	Test Engineer:	Big	Note:	

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Remark
1 *	1735.706	68.51	-9.88	58.63	74.00	-15.37	peak	
2	2169.967	67.30	-7.09	60.21	74.00	-13.79	peak	
3 X	2603.351	63.97	-5.15	58.82	74.00	-15.18	peak	
4	3037.743	65.32	-2.77	62.55	74.00	-11.45	peak	
5	3905.591	62.07	1.18	63.25	74.00	-10.75	peak	
6	4339.135	61.39	2.75	64.14	74.00	-9.86	peak	

Note: 1. Result Level = Read Level+ Antenna Factor+ Cable Loss- Amp. Factor
 2. It is normal for the main frequency and double frequency points of 1GHz -6GHz to exceed the limit value. It is only used to evaluate the final test results and will not affect the accuracy of the report.

7.4 TRANSMISSION REQUIREMENT

7.4.1 Applicable Standard

According to FCC Part 15.231(a)

7.4.2 Conformance Limit

According to FCC Part 15.231(a): A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

7.4.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

7.4.4 Test Procedure

The following table is the setting of spectrum analyzer.

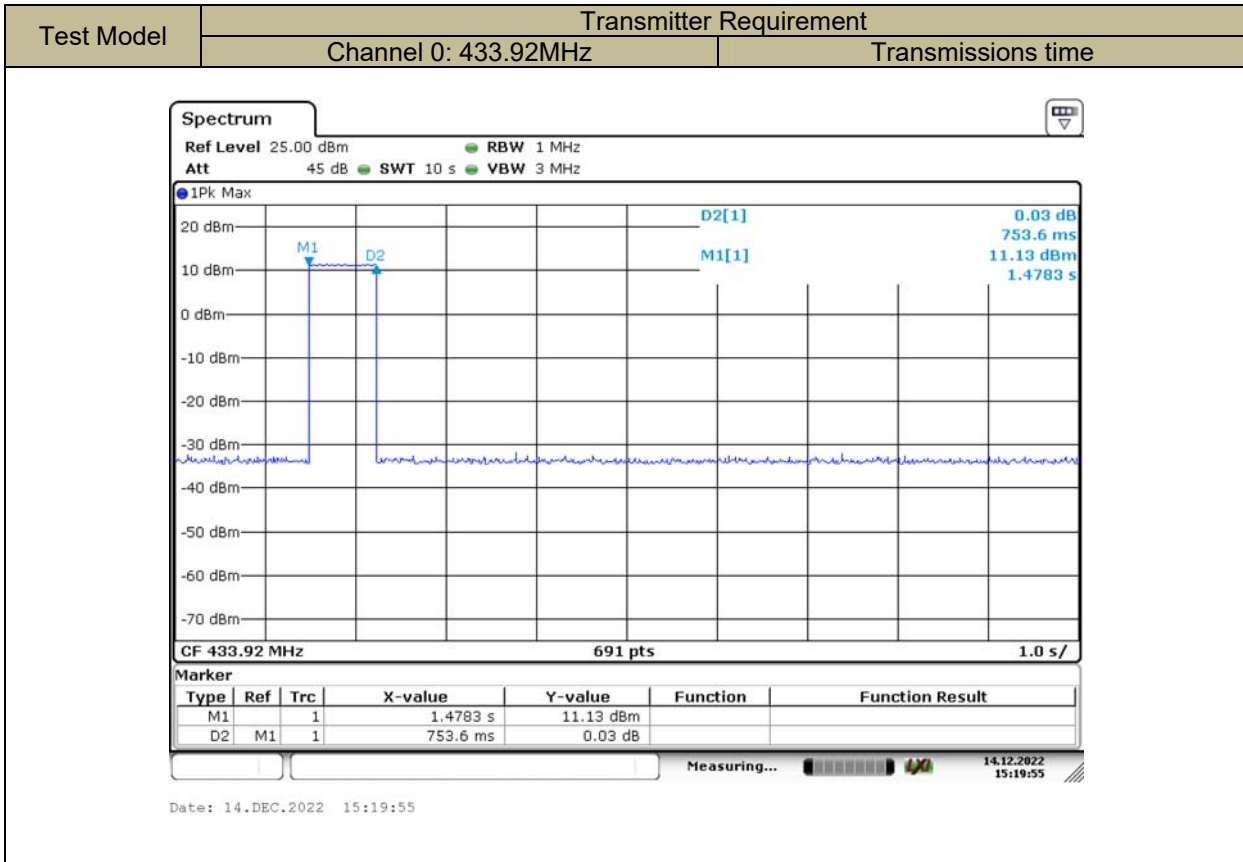
Spectrum analyzer	Setting
Attenuation	Auto
Span Frequency	0Hz
RBW	1M
VBW	3M
Detector	Peak
Trace	Max hold
Sweep Time	10S

- The transmitter output (antenna port) was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz, Set Detector to Peak, Trace to Max Hold.
- Set the span to 0Hz and the sweep time to 10s and record the value.

7.4.5 Test Results

Temperature:	24°C	Test Date:	November 08, 2022
Humidity:	53 %	Test By:	Big
Test mode:	TX Mode		

Frequency.(MHz)	Transmissions time	Limit	Verdict
433.92	753.6ms	5 seconds	PASS



7.5 Antenna Application

7.5.1 Antenna Requirement

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.

7.5.2 Result

The EUT's antenna is internal antenna, using a permanently attached antenna which is not replaceable. The antenna's gain is 0dBi and meets the requirement.

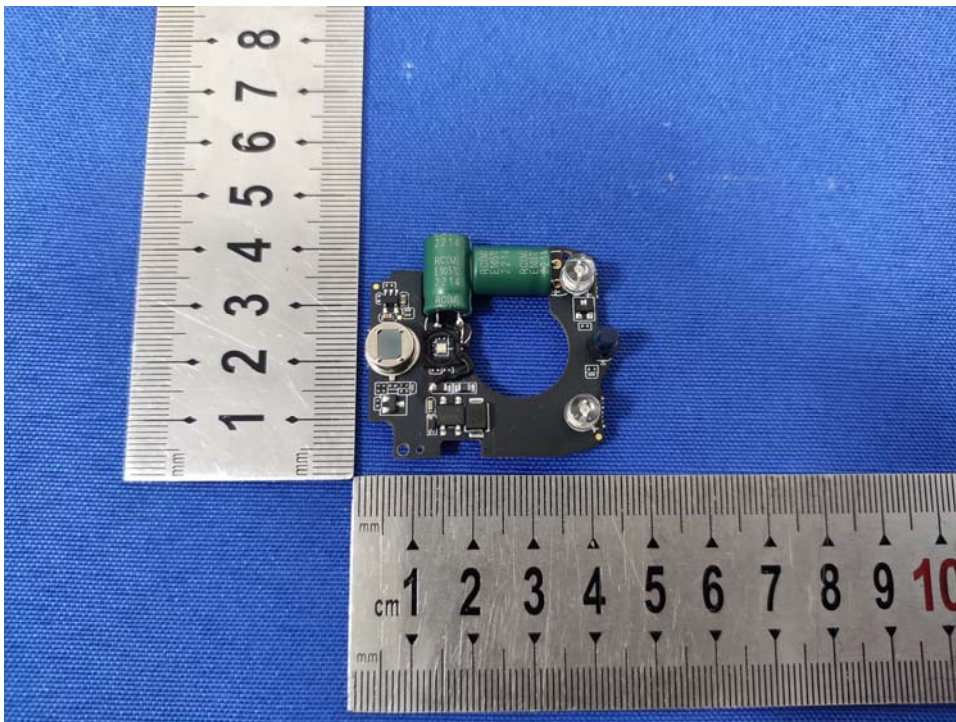
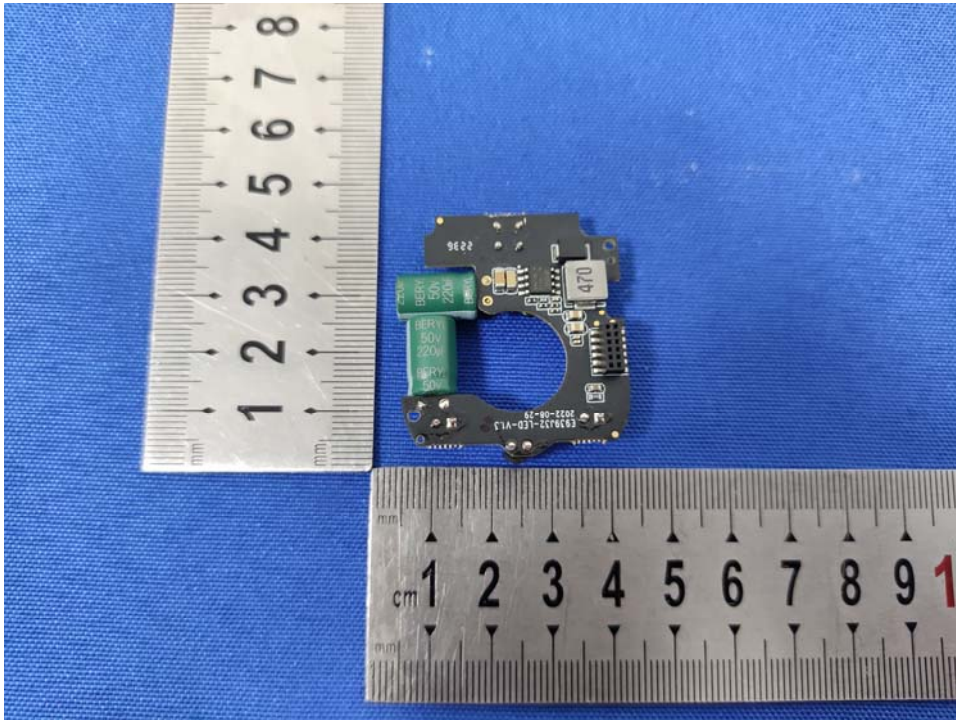
APPENDIX I (Photos of EUT)

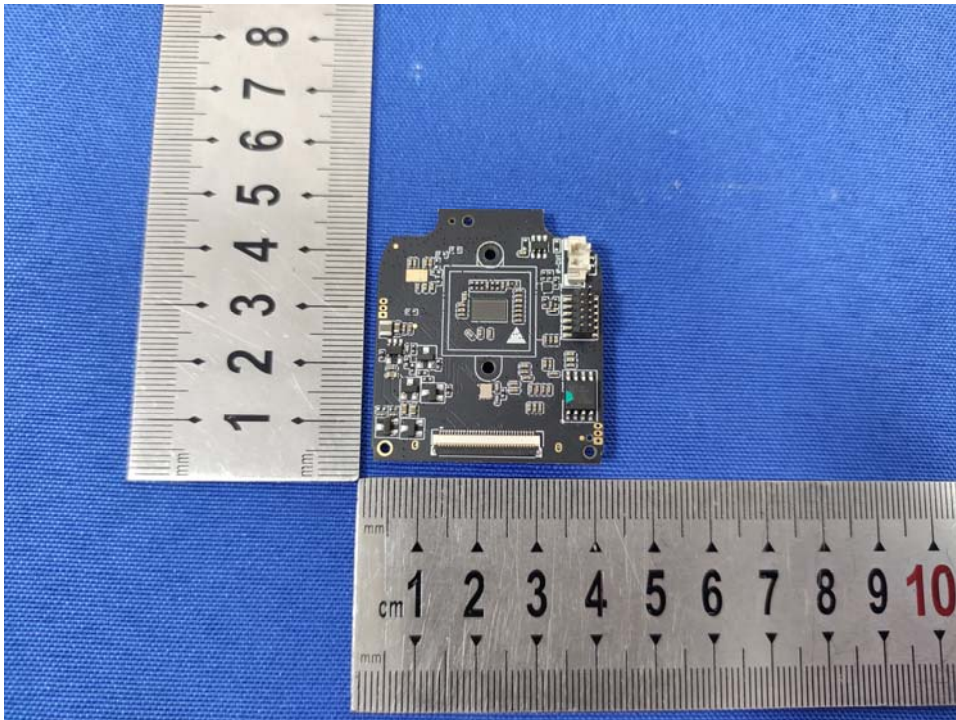
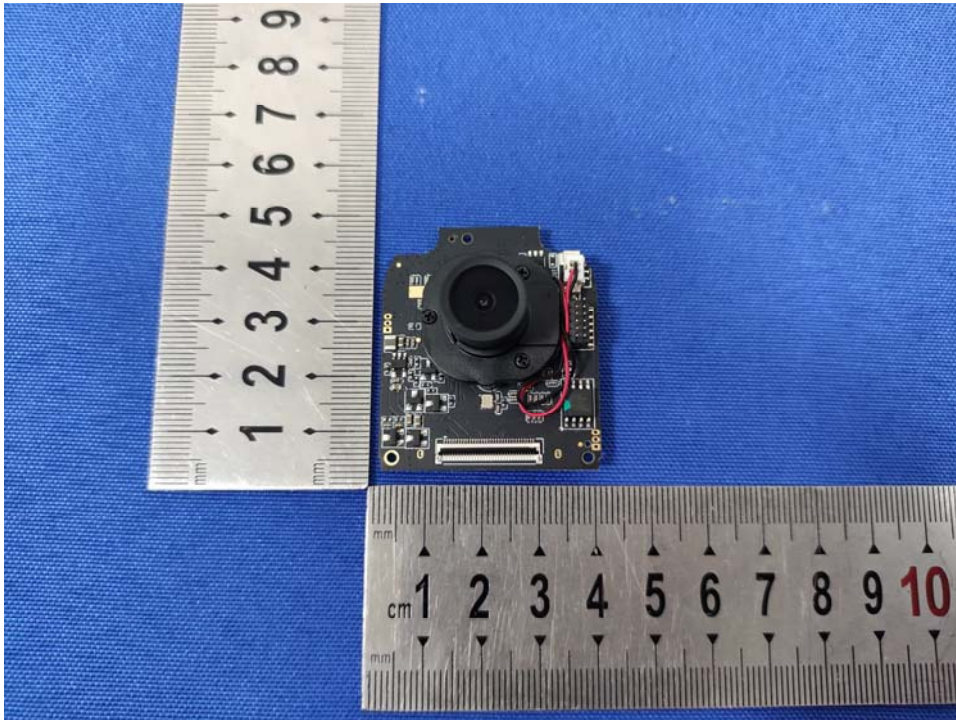


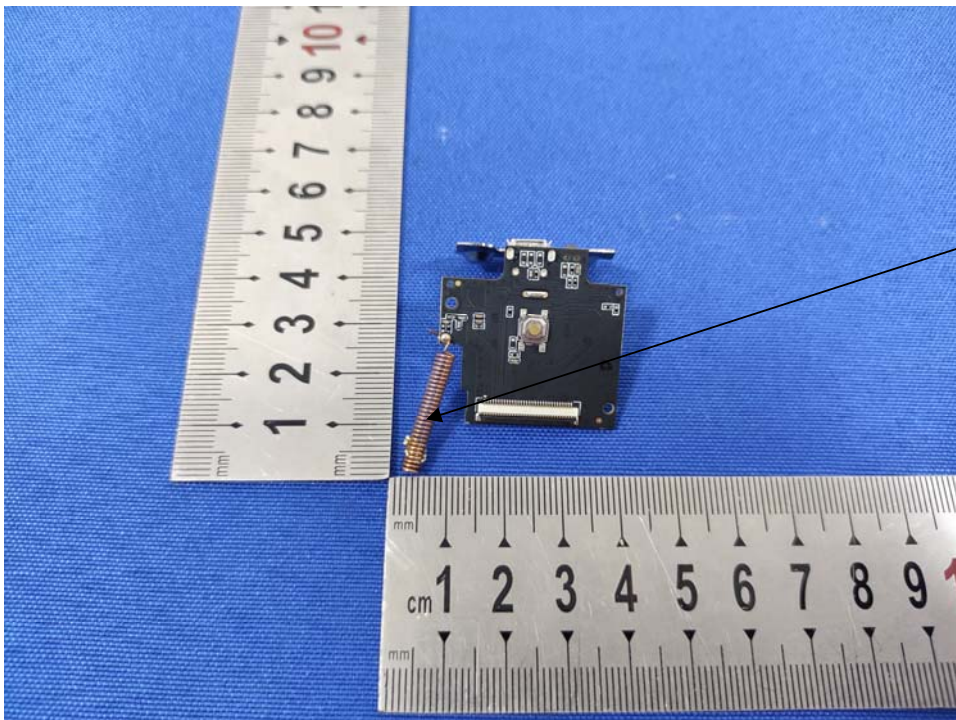
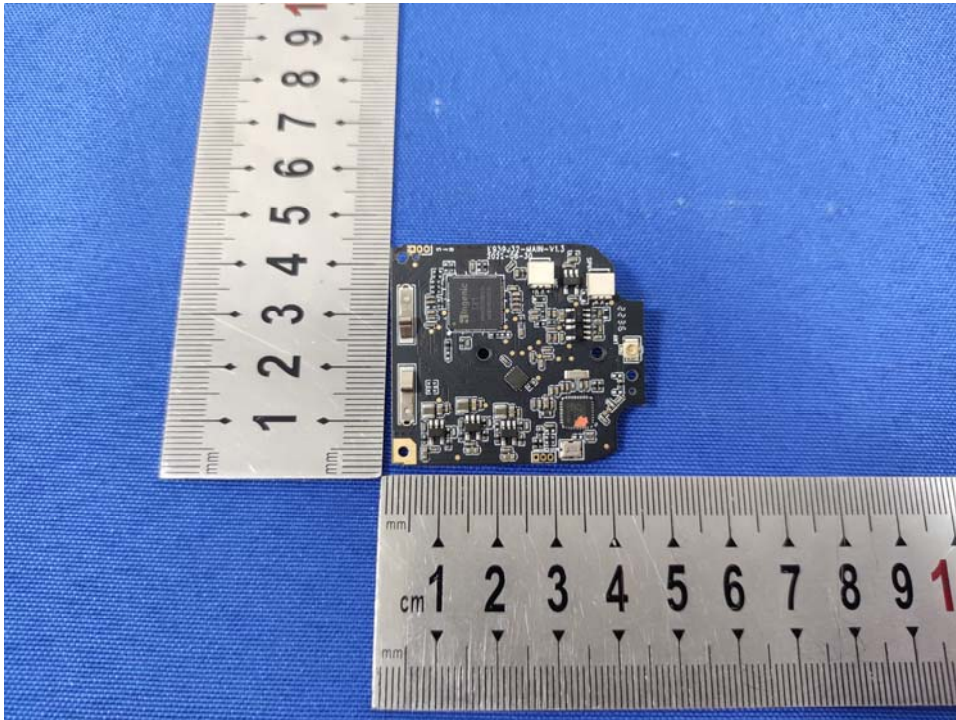




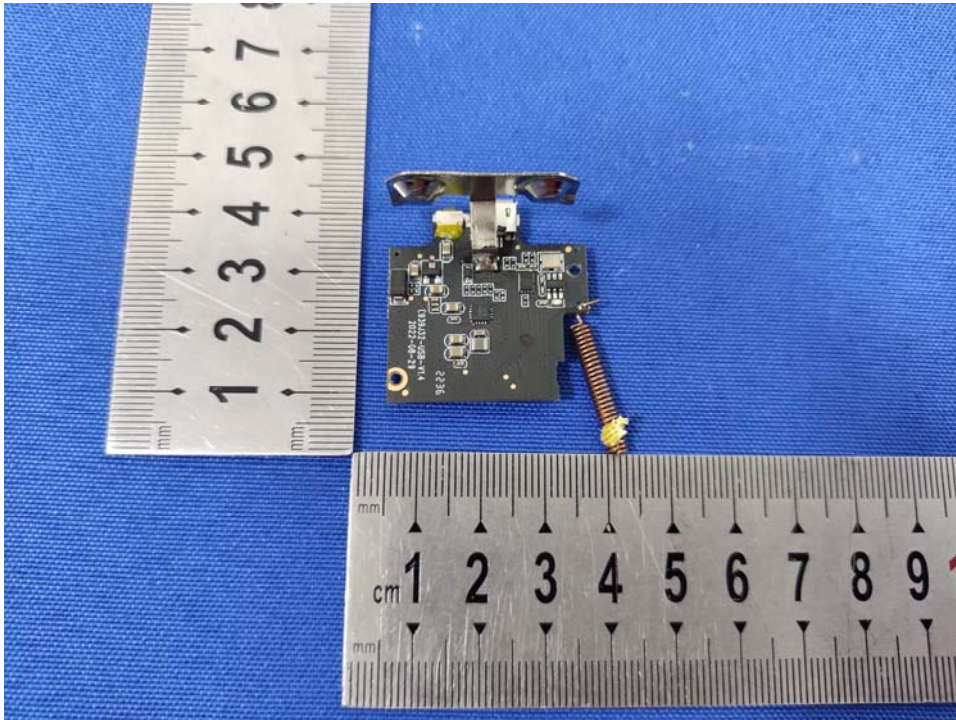








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