TEST REPORT

FCC PART 15 SUBPART C 15.247

Test report

On Behalf of

Guangzhou Eagle Electronic Technology Co.,Ltd

For

Vehicle-mounted camera system

Model No.: EA1088-W, EA1028, EA1028-H, EA1085, EA1085-H, EA1080,EA1080-H, EA1087, EA1087-H, EA1088, EA1088-H, EA9890SX-20K, EA9890SX-20K-W, EA9890SX-20R, EA9890SX-20R-W, EA9890SX-40, EA9890SX-40-W

FCC ID: 2AWGA-EA1088W

Prepared for : **Guangzhou Eagle Electronic Technology Co.,Ltd**

4th Floor, No.6, Longnan Road, Huashan Second Industrial Zone, Huadu District, Guangzhou, China

Prepared By : **Shenzhen HUAK Testing Technology Co., Ltd.**

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Date of Test: **Apr. 07, 2020 -- Apr. 21, 2020**

Date of Report: **Apr. 21, 2020**

Report Number: **HK2004100594-E**

TEST RESULT CERTIFICATION

Applicant's name.....:	Guangzhou Eagle Electronic Technology Co.,Ltd
Address.....:	4th Floor, No.6, Longnan Road, Huashan Second Industrial Zone, Huadu District, Guangzhou, China
Manufacture's Name .....:	Guangzhou Eagle Electronic Technology Co.,Ltd
Address.....:	4th Floor, No.6, Longnan Road, Huashan Second Industrial Zone, Huadu District, Guangzhou, China
Product description	
Trade Mark.....:	FLY EAGLE
Product name .....:	Vehicle-mounted camera system
Model and/or type reference ...:	EA1088-W, EA1028, EA1028-H, EA1085, EA1085-H, EA1080, EA1080-H, EA1087, EA1087-H, EA1088, EA1088-H, EA9890SX-20K, EA9890SX-20K-W, EA9890SX-20R, EA9890SX-20R-W, EA9890SX-40, EA9890SX-40-W
Standards .....:	**FCC Part 15 Subpart C 15.247**

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Date of Test.....:	
Date (s) of performance of tests .....:	Apr. 07, 2020 -- Apr. 21, 2020
Date of Issue.....:	Apr. 21, 2020
Test Result.....:	**Pass**

Prepared by: Gary Qian

Project Engineer

Reviewed by: Leo Zhang

Project Supervisor

Approved by: James Zhou

Technical Director

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1 Test Summary

1.1 Test Description

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

1.2 Test Facility

1.2.1 Address of the test laboratory

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

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.2.2 Laboratory accreditation

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

IC Registration No.: 21210

The 3m alternate test site of Shenzhen HUAK Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 21210 on May 24, 2016.

1.3 Measurement Uncertainty

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 Shenzhen HUAK Testing Technology Co., Ltd. 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.

Hereafter the best measurement capability for HUAK laboratory is reported:

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2 General Information

2.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2 General Description of EUT

Product Name:	Vehicle-mounted camera system
Model/Type reference:	EA1088-W
Serial Model:	EA1028, EA1028-H, EA1085, EA1085-H, EA1080,EA1080-H, EA1087, EA1087-H, EA1088, EA1088-H, EA9890SX-20K, EA9890SX-20K-W, EA9890SX-20R, EA9890SX-20R-W, EA9890SX-40, EA9890SX-40-W
Trade Mark:	FLY EAGLE
FCC ID	2AWGA-EA1088W
Hardware Version:	V1.3
Software Version:	V1.0
Operation frequency:	2405MHz to 2472MHz
Channel separation:	⩾3MHz
Channel number:	20
Modulation Technology:	GFSK
Antenna Type:	Glue stick antenna
Antenna Gain:	2dBi
Power Supply:	DC12V battery/others

Note: 1. For more detailed features description, please refer to the Manual.
2.There are multiple models, please refer to Differences declaration for specific differences

2.3 Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.
There are 40 channels provided to the EUT and Channel 00/19/39 was selected for testing.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2405	10	2440
1	2409.5	11	2444.5
2	2413	12	2448
3	2416.5	13	2451.5
4	2420	14	2445
5	2423.5	15	2448.5
6	2427	16	2462
7	2430.5	17	2465.5
8	2434	18	2469
9	2437	19	2472

Test channel：

Channel	Frequency (MHz)	/
0	2405	Low channel
10	2440	Middle channel
19	2472	High channel

Preliminary tests were performed in each mode and packet length, and found worst case as bellow, finally test were conducted at those mode and recorded in this report.

Test Items	Worst case
Conducted Emissions	N/A
Radiated Emissions and Band Edge	Low/Middle/High channel
Maximum Conducted Output Power	Low/Middle/High channel
Power Spectral Density	Low/Middle/High channel
6dB Bandwidth&99% Bandwidth	Low/Middle/High channel
Out-of-band Emissions	Low/Middle/High channel

2.4 Equipments Used during the Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 26, 2019	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 26, 2019	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 26, 2019	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 26, 2019	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 26, 2019	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 26, 2019	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 26, 2019	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 26, 2019	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 26, 2019	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 26, 2019	1 Year
11.	Pre-amplifier	EMCI	EMC051845SE	HKE-015	Dec. 26, 2019	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 26, 2019	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	/	N/A
14.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 26, 2019	1 Year
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 26, 2019	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Dec. 26, 2019	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Dec. 26, 2019	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 26, 2019	3 Year
19.	Power Meter	R&S	NRVD	SEL0069	Dec. 26, 2019	1 Year
20	High Gain Antenna	Schewarzbeck	LB-180400 KF	HKE-054	Dec. 26, 2019	1 Year

2.5 Description of Test conditions

(1) E.U.T. test conditions:
For intentional radiators, measurements of the variation of the input power or the adiated 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 (2405 MHz), middle (2440 MHz) and highest (2472 MHz) channel with different data packet and conducted to determine the worst-case mode,
only the worst-case results are recorded in this report.

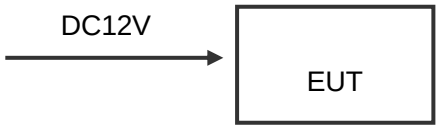
(4) The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

2.6 DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing:

N/A

Operation of EUT during Radiation and Above1GHz Radiation testing:



2.7 Description of Support Units

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

Description	Information	Manufacturer	Remark	Certificate
/	/	/	/	/
/	/	/	/	/

3 TEST CONDITIONS AND RESULTS

3.1 Antenna Requirement

Standard requirement

Standard Applicable

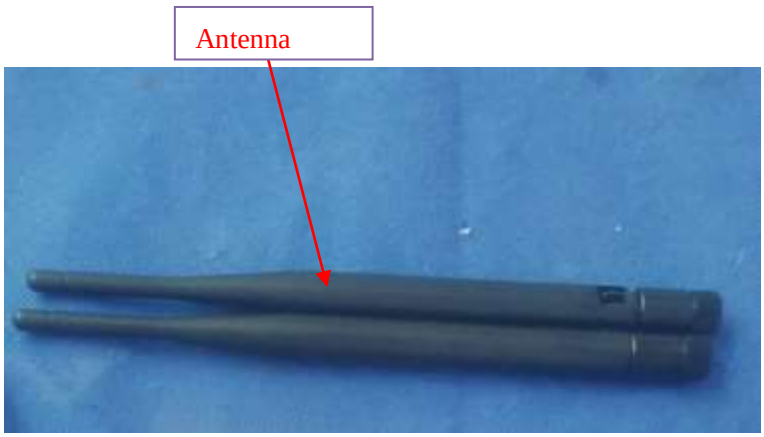
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247, if transmitting antennas of directional gain 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 Glue stick antenna, The directional gains of antenna used for transmitting is 2dBi.



3.2 Conduction Emissions Measurement

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:

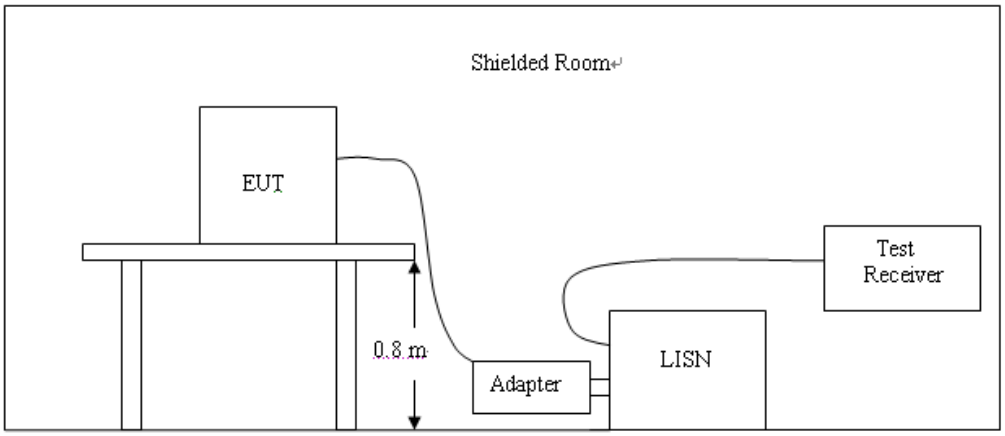
Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test procedure

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
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.

Test setup



Test results

N/A

3.3 Radiated Emissions Measurement

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.

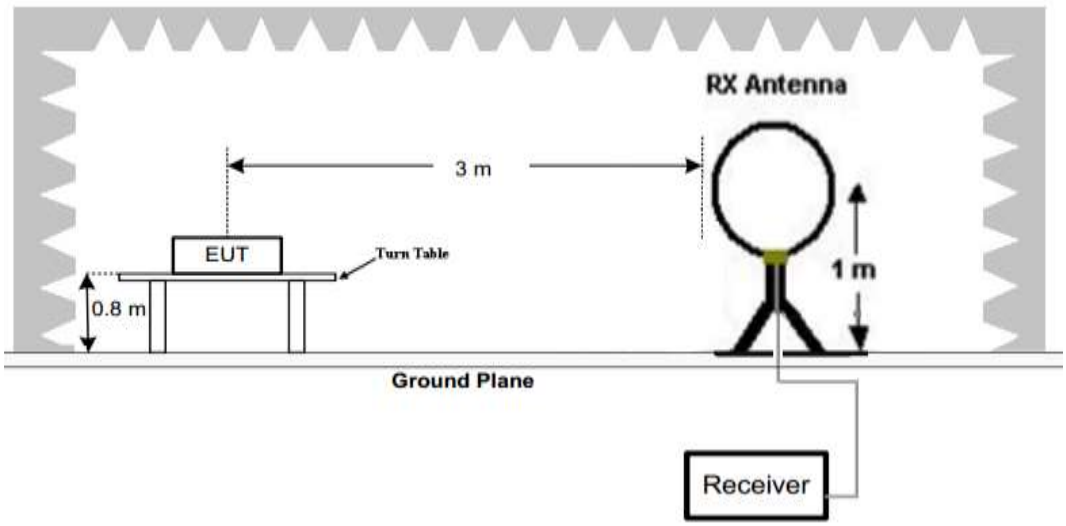
Radiated emission limits

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

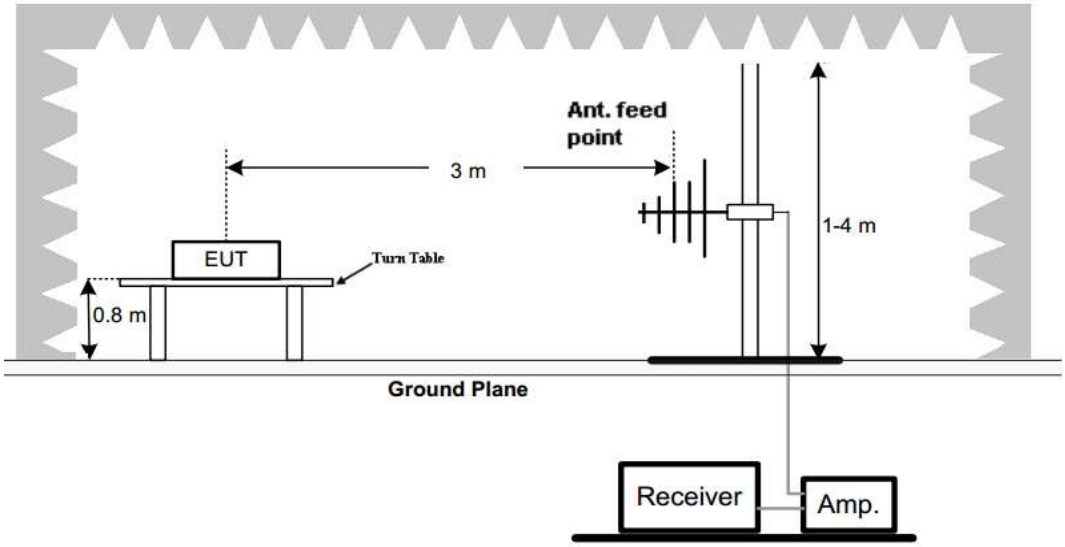
Test setup

Test Configuration:

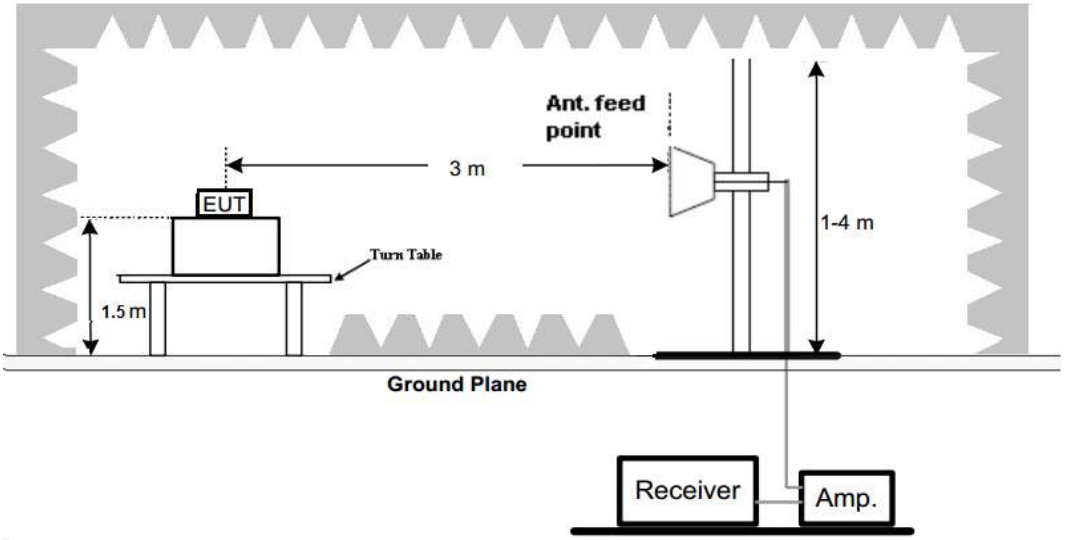
9 kHz to 30 MHz emissions:



30 MHz to 1 GHz emissions:



1 GHz to 25 GHz emissions:



Test Procedure

1) Below 1G: 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.
2) Above 1G: The EUT was placed on the top of a rotating table 1.5 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.
Note: For the radiated emission test above 1GHz:Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a

variable-height antenna tower.

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.

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.

The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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.

Test the EUT in the lowest channel,the middle channel,the Highest channel

The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.Repeat above procedures until all frequencies measured was complete.

Test Result

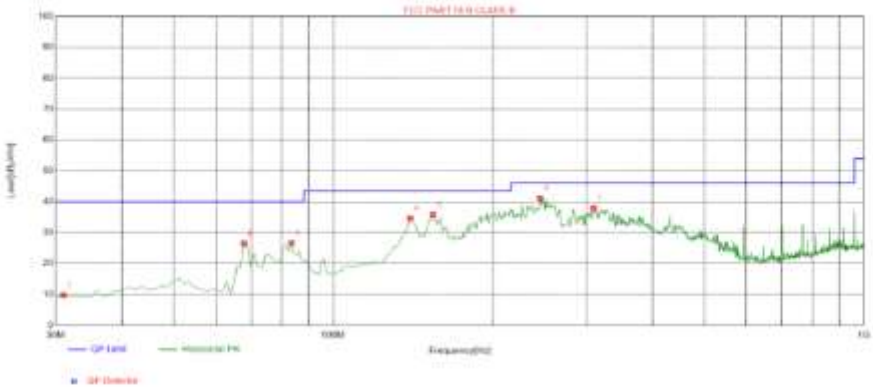
Remark:

1. Radiated Emission measured at GFSK low/middle/high channel from 9 KHz to 10th harmonic of fundamental and recorded worst case at Low channel
2. Radiated emission test from 9KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor (more than 20dB below the limit) in 9KHz to 30MHz and not recorded in this report.
3. For below 1GHz testing recorded worst at Low channel.

Below 1GHz Test Results:

Antenna polarity: H

Test Graph



Suspected List

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	30.9710	-16.30	25.95	9.65	40.00	30.35	100	80	Horizontal
2	67.8679	-17.13	43.60	26.47	40.00	13.53	100	197	Horizontal
3	83.4034	-18.65	45.25	26.60	40.00	13.40	100	2	Horizontal
4	139.7197	-19.16	53.86	34.70	43.50	8.80	100	41	Horizontal
5	154.2843	-18.63	54.41	35.78	43.50	7.72	100	44	Horizontal
6	245.5556	-13.60	54.69	41.09	46.00	4.91	100	191	Horizontal
7	309.6396	-12.61	50.44	37.83	46.00	8.17	100	271	Horizontal

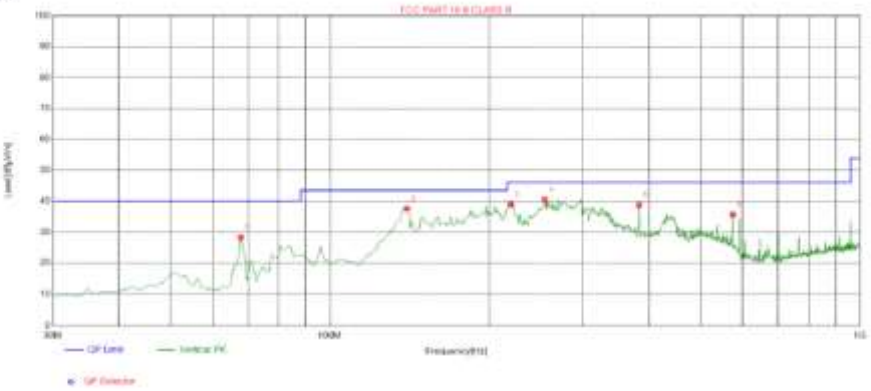
Remark: Margin = Limit – Level

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

Level=Test receiver reading + correction factor

Antenna polarity: V

Test Graph



Suspected List

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	67.8679	-17.13	45.40	28.27	40.00	11.73	100	278	Vertical
2	139.7197	-19.16	56.78	37.62	43.50	5.88	100	314	Vertical
3	219.3393	-14.58	53.55	38.97	46.00	7.03	100	106	Vertical
4	254.2943	-13.45	53.90	40.45	46.00	5.55	100	220	Vertical
5	383.4334	-10.76	49.50	38.74	46.00	7.26	100	333	Vertical
6	575.6857	-6.51	42.15	35.64	46.00	10.36	100	42	Vertical

Remark: Margin = Limit – Level

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

Level=Test receiver reading + correction factor

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(emission in 9kHz to 30MHz is more than 20dB below the limit), so not recorded in the report.

(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.

For 1GHz to 25GHz

CH Low (2405MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4810	66.60	-3.65	62.95	74	-11.05	Peak
4810	48.20	-3.65	44.55	54	-9.45	AVG
7215	63.12	-0.95	62.17	74	-11.83	Peak
7215	48.98	-0.95	48.03	54	-5.97	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4810	67.07	-3.65	63.42	74	-10.58	Peak
4810	47.87	-3.65	44.22	54	-9.78	AVG
7215	63.38	-0.95	62.43	74	-11.57	Peak
7215	48.36	-0.95	47.41	54	-6.59	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

CH Middle (2440MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4880	63.57	-3.54	60.03	74	-13.97	Peak
4880	42.97	-3.54	39.43	54	-14.57	AVG
7320	55.02	-0.81	54.21	74	-19.79	Peak
7320	43.84	-0.81	43.03	54	-10.97	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4880	62.61	-3.54	59.07	74	-14.93	Peak
4880	42.25	-3.54	38.71	54	-15.29	AVG
7320	56.12	-0.81	55.31	74	-18.69	Peak
7320	42.93	-0.81	42.12	54	-11.88	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

CH High (2472MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4944	64.42	-3.44	60.98	74	-13.02	Peak
4944	42.33	-3.44	38.89	54	-15.11	AVG
7416	55.47	-0.78	54.69	74	-19.31	Peak
7416	43.83	-0.78	43.05	54	-10.95	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4944	64.97	-3.44	61.53	74	-12.47	Peak
4944	43.53	-3.44	40.09	54	-13.91	AVG
7416	55.99	-0.78	55.21	74	-18.79	Peak
7416	42.28	-0.78	41.50	54	-12.50	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) Data of measurement within this frequency range shown “--- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(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.

Radiated Band Edge Test:

Operation Mode: TX CH Low (2405MHz)

Horizontal (Worst case):

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2310	60.02	-5.81	54.21	74	-19.79	Peak
2310	45.90	-5.81	40.09	54	-13.91	AVG
2390	59.36	-5.84	53.52	74	-20.48	Peak
2390	48.09	-5.84	42.25	54	-11.75	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2310	59.10	-5.81	53.29	74	-20.71	Peak
2310	43.02	-5.81	37.21	54	-16.79	AVG
2390	59.69	-5.84	53.85	74	-20.15	Peak
2390	47.48	-5.84	41.64	54	-12.36	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Operation Mode: TX CH High (2472MHz)
Horizontal (Worst case)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	60.93	-6.04	54.89	74	-19.11	Peak
2483.5	43.21	-6.04	37.17	54	-16.83	AVG
2500	59.80	-6.06	53.74	74	-20.26	Peak
2500	48.04	-6.06	41.98	54	-12.02	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	61.93	-6.04	55.89	74	-18.11	Peak
2483.5	43.74	-6.04	37.70	54	-16.30	AVG
2500	59.28	-6.06	53.22	74	-20.78	Peak
2500	48.44	-6.06	42.38	54	-11.62	AVG
Remark :Factor= Antenna Factor + Cable Loss - Pre-amplifier						

3.4 Maximum Output Power Measurement

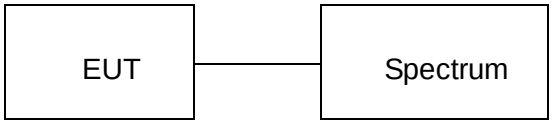
Limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

Test procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum.

Test setup



Test results

Channel	Channel frequency (MHz)	Output power (dBm)	Limit (dBm)	Result
Low	2405	7.031	30	Pass
Middle	2440	6.536		Pass
High	2472	6.565		Pass

Low

Middle

High

3.5 Power Spectral Density

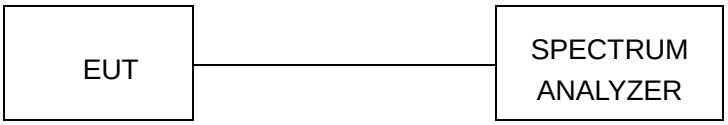
Limit

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.

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.

Test setup



Test results

Channel	Channel frequency (MHz)	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
Low	2405	-8.185	8	Pass
Middle	2440	-9.065		Pass
High	2472	-8.658		Pass

Low

Middle

High

3.6 6dB Bandwidth

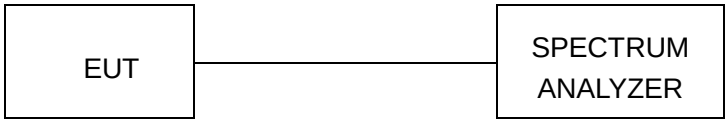
Limit

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

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) ≥ 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.

Test setup



Test result

Channel	Channel frequency (MHz)	6dB Bandwidth (MHz)	Limit (KHz)	Result
Low	2405	1.643	≥500	Pass
Middle	2440	1.630		Pass
High	2472	1.642		Pass

Low

Middle

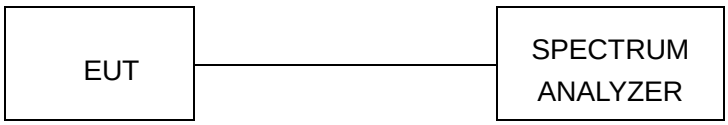
High

3.7 Occupied Bandwidth

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.

Test setup



Test result

N/A

3.8 Band edge

Limit

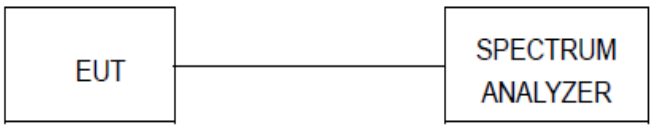
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either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

Test procedure

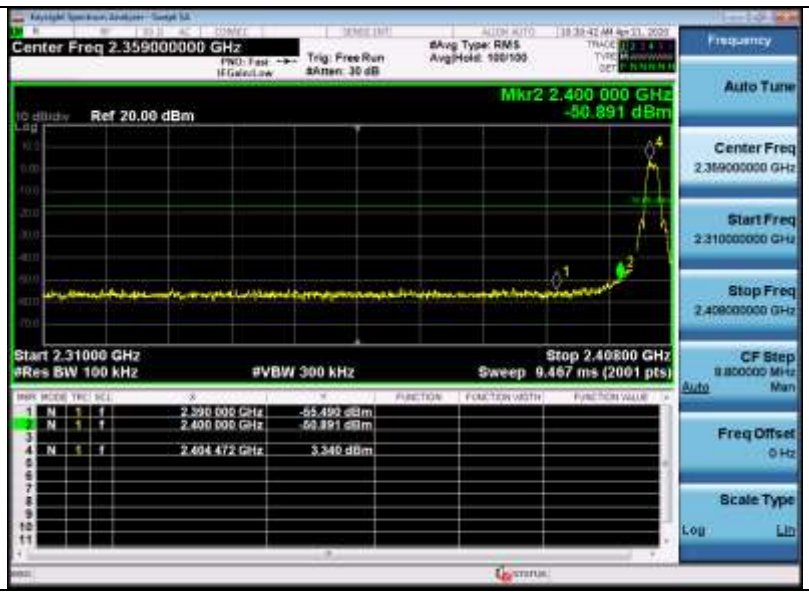
The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

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

Test setup



Test Results



Center Freq 2.483500000 GHz
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg/Hold: 100/100
Mkr2 2.500 000 0 GHz
-57.548 dBm
10 dB/div
Ref 20.00 dBm
Start 2.46000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 3.200 ms (2001 pts)
Frequency
Auto Tune
Center Freq
2.483500000 GHz
Start Freq
2.460000000 GHz
Stop Freq
2.500000000 GHz
CF Step
3.300000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
1 N 1 f 2.483 500 0 GHz -57.013 dBm
2 N 1 f 2.500 000 0 GHz -57.548 dBm
4 N 1 f 2.470 485 0 GHz 3.057 dBm

3.9 Conducted Spurious Emissions

Limit

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

For below 30MHz,For 9KHz-150kHz,150K-10MHz,We use the RBW 1KHz,10KHz, So the limit need to 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.

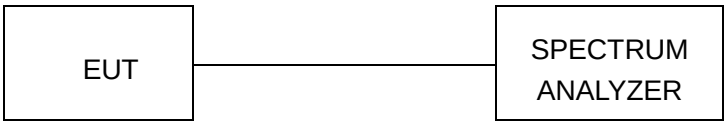
Test procedure

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

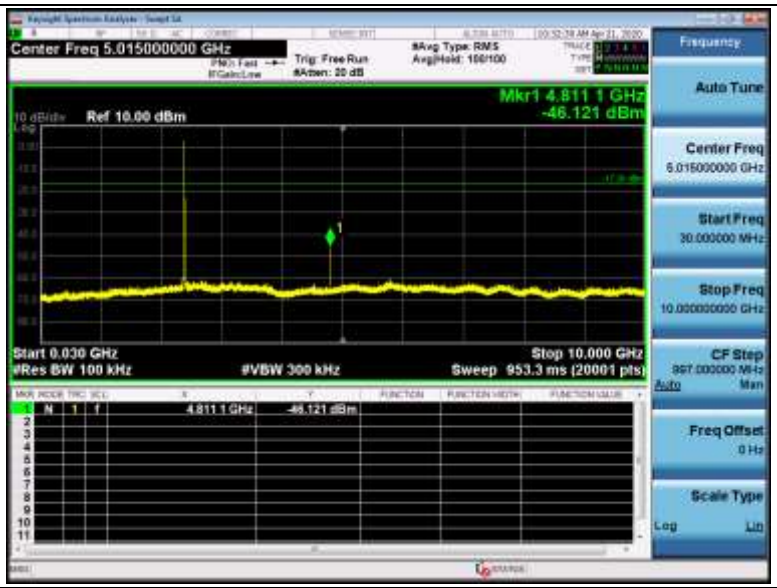
b.Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation, RBW ≥ 1% of the span, VBW ≥ RBW, Sweep = auto,

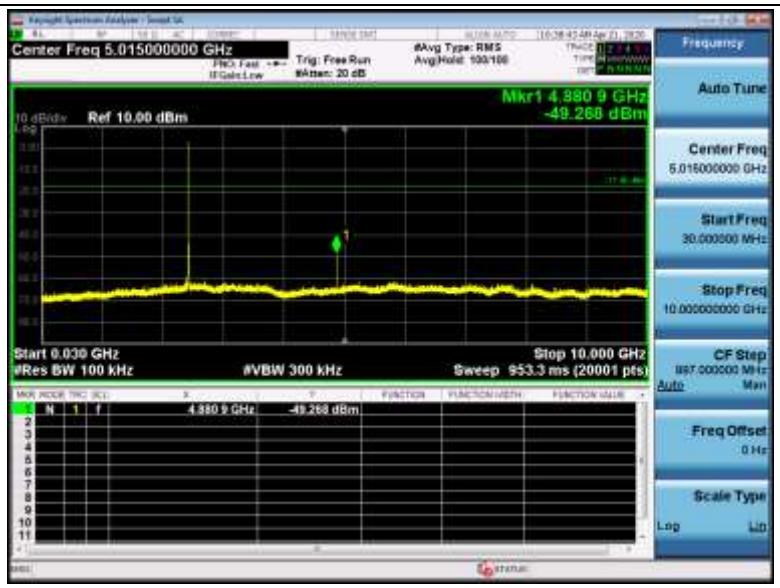
Detector function = peak, Trace = max hold

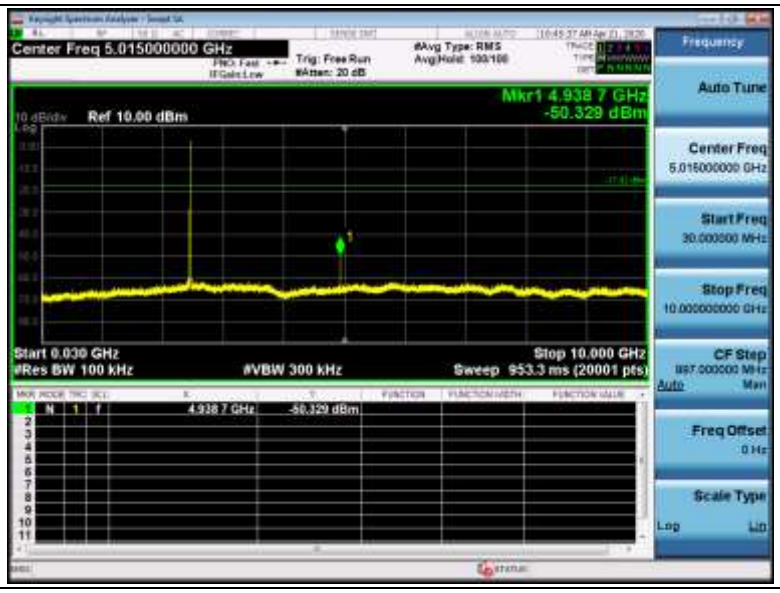
Test setup



Test results

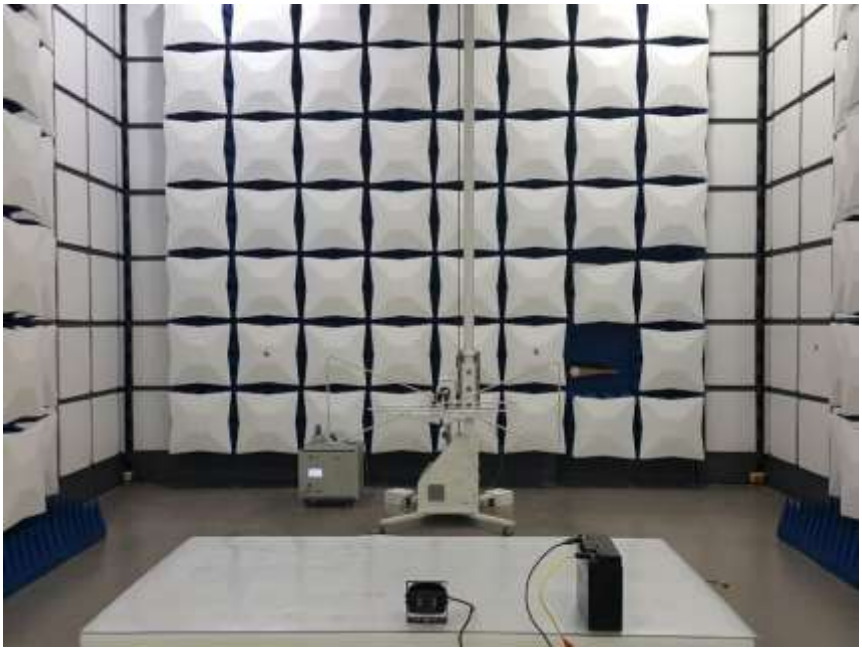
	Reference
	30MHz-10GHz
CH00	
	10GHz-26GHz

	Reference
	30MHz-10GHz
CH10	
	10GHz-26.5GHz

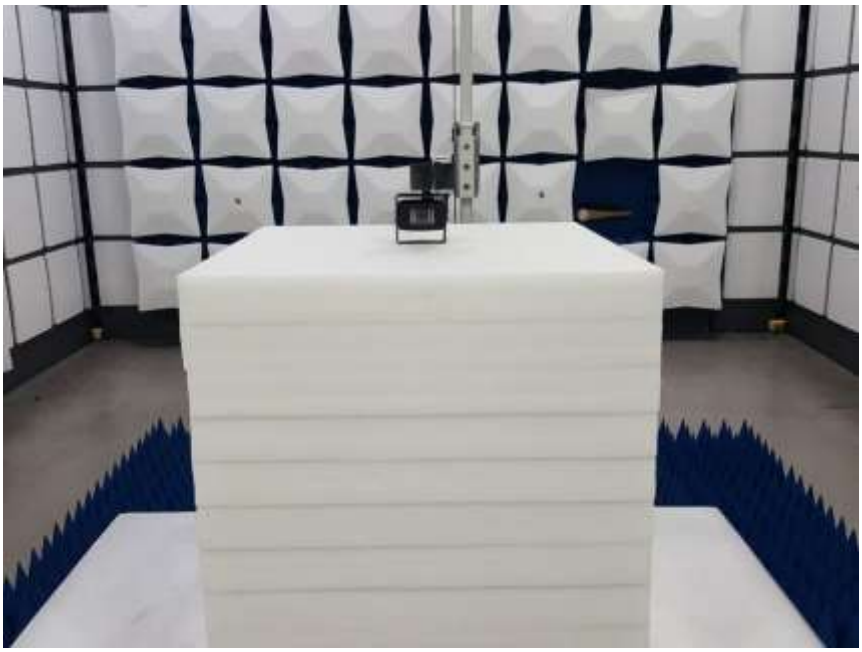
	Reference
	30MHz-10GHz
CH19	
	10GHz-26.5GHz

4 Test Setup Photos of the EUT

Radiated Emissions: 30MHz-1000MHz



Radiated Emissions: Above 1000MHz

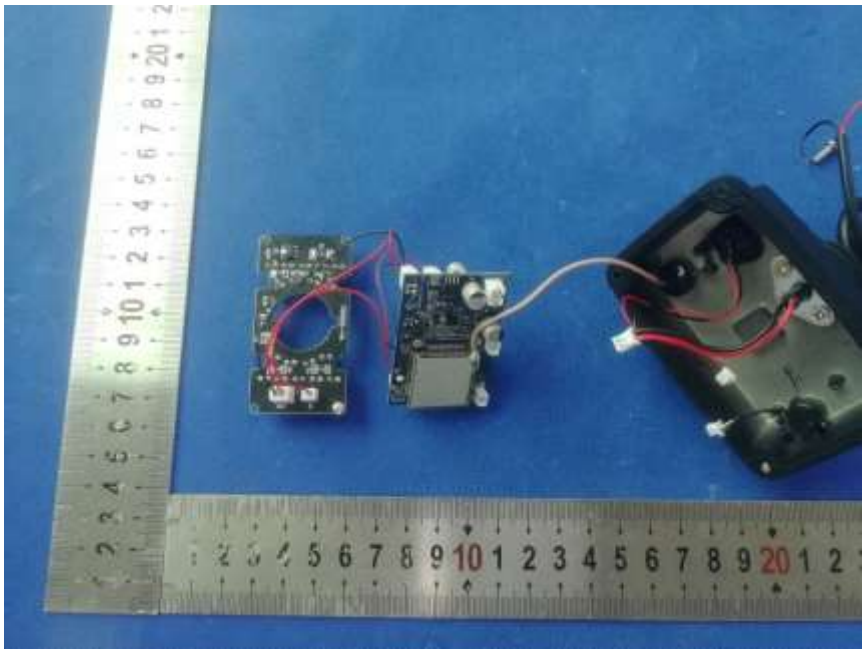


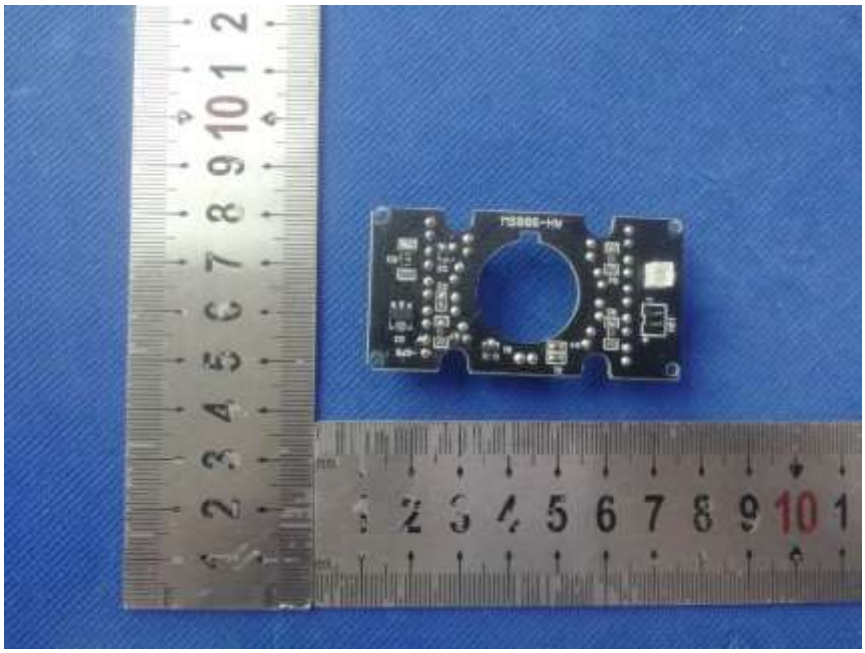
5 PHOTOS OF THE EUT

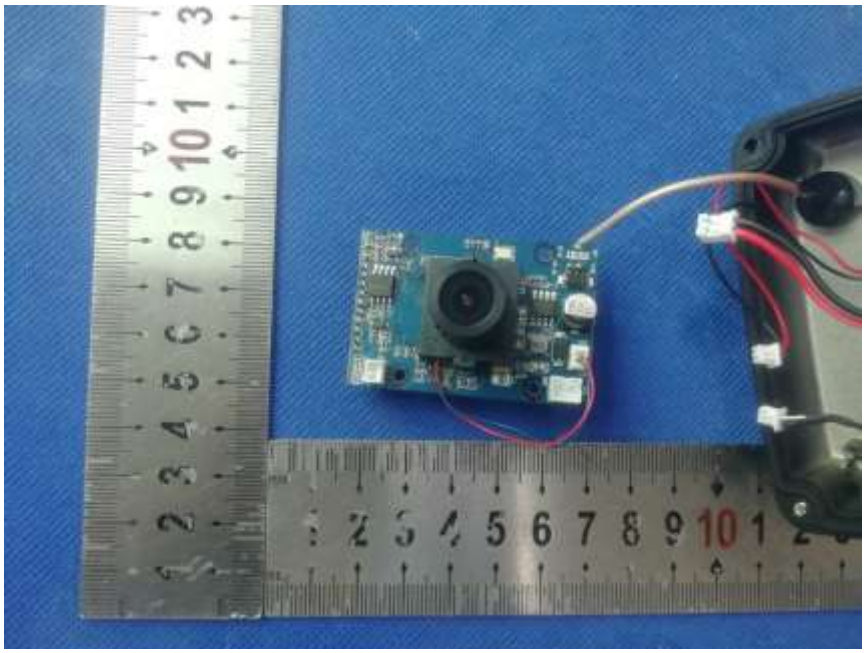
External Photos

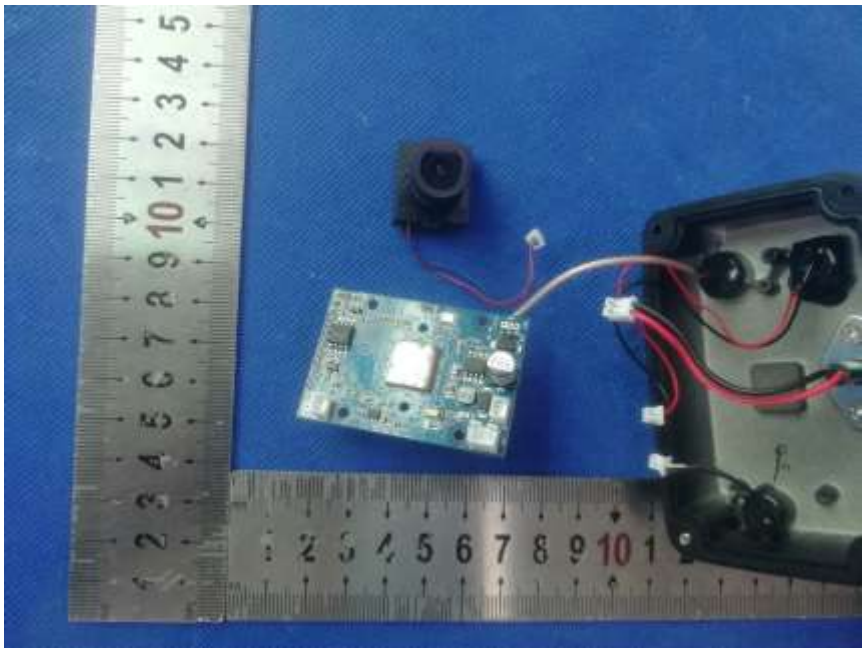
2 3 4 5 6 7 8

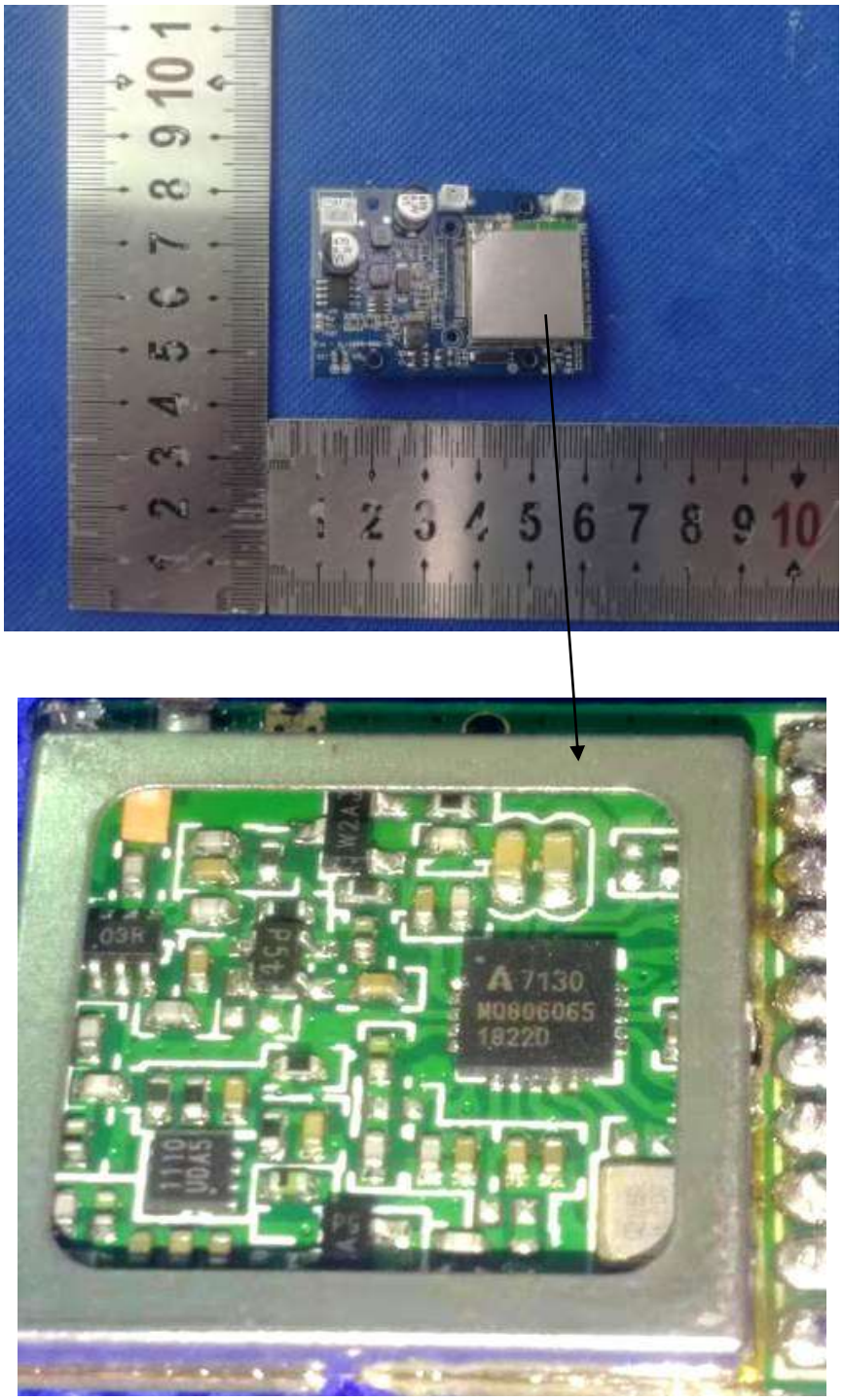
Internal Photos

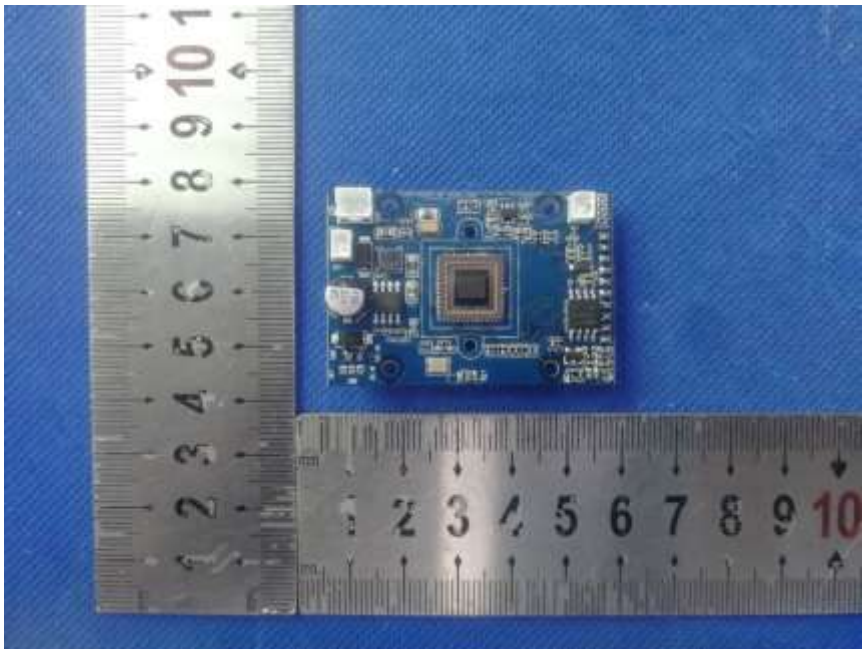









A 7130
MQ806065
1822D



END