RF TEST REPORT

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Report No.: 16021405-FCC-R1
Supersede Report No.: N/A

Applicant	CAMORAMA(USA)INC
Product Name	Camorama 4K Panoramic Camera
Model No.	CAMO-SP1
Serial No.	CAMO-SP2, CAMO-SP3, CAMO-SP4, CAMO-SP5, CAMO-SP6, CAMO-SP7, CAMO-SP8
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013
Test Date	November 06 to December 12, 2016
Issue Date	December 12, 2016
Test Result	☒ Pass ☐ Fail
Equipment complied with the specification	☒
Equipment did not comply with the specification	☐

Amos. Xia	Miro Bao	
Amos Xia Test Engineer	Miro Bao Checked By	

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Test result presented in this test report is applicable to the tested sample only

Issued by:
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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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CONTENTS

1. Report Revision History

Report No.	Report Version	Description	Issue Date
16021405-FCC-R1	NONE	Original	December 12, 2016

2. Customer information

Applicant Name	CAMORAMA(USA)INC
Applicant Add	20895 Currier Road Unit B Walnut, CA 91789 Los Angeles, CaliforniaLos Angeles, California
Manufacturer	CAMORAMA(USA)INC
Manufacturer Add	20895 Currier Road Unit B Walnut, CA 91789 Los Angeles, CaliforniaLos Angeles, California

3. Test site information

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	986914
IC Test Site No.	4842B-1
Test Software	EZ_EMC

Channel List

Type		Channel No.	Frequency (MHz)	Available (Y/N)
802.11b/g/n20	2412-2462	1	2412	Y
		2	2417	Y
		3	2422	Y
		4	2427	Y
		5	2432	Y
		6	2437	Y
		7	2442	Y
		8	2447	Y
		9	2452	Y
		10	2457	Y
		11	2462	Y
	2467-2472	12	2467	-
		13	2472	-
	2484	14	2484	-
802.11a/ac	5150-5250MHz	36	5180	Y
		40	5200	Y
		44	5220	Y
		48	5240	Y

4. Equipment under Test (EUT) Information

Description of EUT:	Camorama 4K Panoramic Camera
Main Model:	CAMO-SP1
Serial Model:	CAMO-SP2, CAMO-SP3, CAMO-SP4, CAMO-SP5, CAMO-SP6, CAMO-SP7, CAMO-SP8
Date EUT received:	November 01, 2016
Test Date(s):	November 06 to December 12, 2016
Equipment Category：	DTS
Antenna Gain:	WIFI(2.4G):0dBi WIFI(5G):3dBi
Antenna Type:	PIFA antenna
Type of Modulation:	802.11b/g/n20/40M: DSSS, OFDM
RF Operating Frequency (ies):	802.11b/g: 2412-2462 MHz (TX/RX) 802.11n20M: 2412-2462MHz 802.11a: 5180-5240 MHz(TX/RX) 802.11ac: 5180-5240 MHz(TX/RX)
Max. Output Power:	802.11b: 17.30dBm 802.11g: 14.42dBm 802.11n(20M): 13.94dBm
Number of Channels:	WIFI :802.11b/g: 11CH WIFI :802.11a: 4CH WIFI :802.11n20M: 11CH(2.4GHz) WIFI :802.11ac: 4CH
Port:	Power Port
Input Power:	DC 5V 2A Battery: 3.7V 1300mAh 4.81Wh
Trade Name :	WIPET Camorama
FCC ID:	2AJ77CAMORAMA

5. Test Summary

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.247 (a)(2)	DTS (6 dB&20 dB) CHANNEL BANDWIDTH	Compliance
§15.247(b)(3)	Conducted Maximum Output Power	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band-Edge & Unwanted Emissions into Restricted Frequency Bands	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Conducted Emissions & Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	1.634dB / 3.952dB

6. Measurements, Examination And Derived Results

6.1 Antenna Requirement

Applicable Standard

According to § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit. And according to FCC 47 CFR section 15.247 (b), if the 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 6 dBi.

Antenna Connector Construction

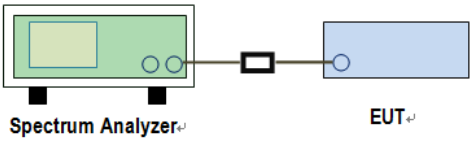
The EUT has 1 antenna:
A permanently attached PIFA antenna for WIFI(2.4G), the gain is 0dBi

The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 DTS (6 dB&20 dB) Channel Bandwidth

Temperature	22℃
Relative Humidity	54%
Atmospheric Pressure	1021mbar
Test date :	December 08 to December 09, 2016
Tested By :	Amos Xia

Spec	Item	Requirement	Applicable
§ 15.247(a)(2) RSS Gen(4.6.1)	a)	6dB BW≥500kHz; 20dB BW≥500kHz;	☒
	b)	99% BW: For FCC reference only; required by IC.	☒
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance v03r05, 8.1 DTS bandwidth 6dB bandwidth a) Set RBW = 100 kHz. b) Set the video bandwidth (VBW) ≥ 3 × RBW. c) Detector = Peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) 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. 20dB bandwidth C63.10 Occupied Bandwidth (OBW=20dB bandwidth) 1. Set RBW = 1%-5% OBW. 2. Set the video bandwidth (VBW) ≥ 3 x RBW. 3. Set the span range between 2 times and 5 times of the OBW. 4. Sweep time=Auto, Detector=PK, Trace=Max hold. 5. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst-case (i.e., the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the 20 dB levels with respect to the reference level.		
Remark			
Result	☒Pass ☐Fail		

Test Data ☒Yes ☐N/A

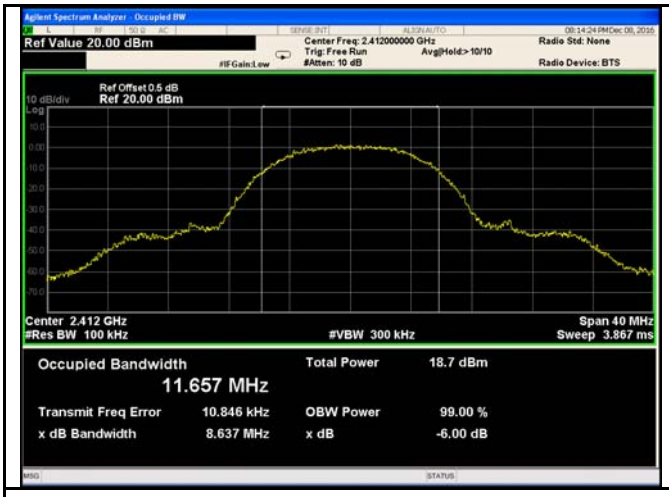
Test Plot ☒Yes (See below) ☐N/A

Measurement result

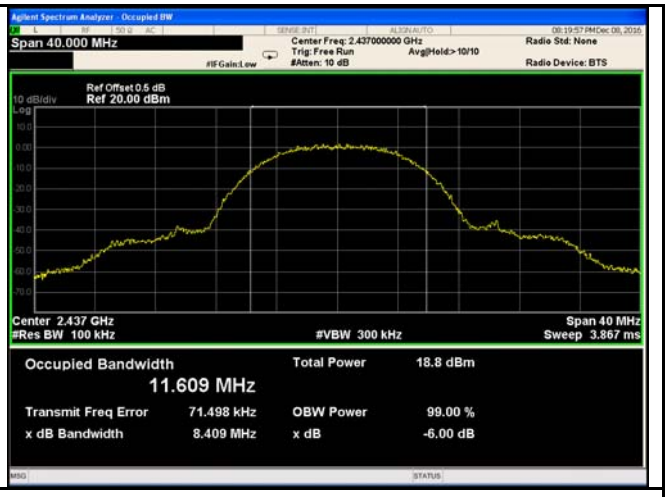
Test mode	CH	Freq (MHz)	6dB Bandwidth (MHz)	20dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	8.037	13.87	≥0.5
	Mid	2437	8.409	13.97	≥0.5
	High	2462	8.504	14.13	≥0.5
802.11g	Low	2412	15.79	19.12	≥0.5
	Mid	2437	15.79	18.52	≥0.5
	High	2462	15.79	18.99	≥0.5
802.11n (20M)	Low	2412	17.66	20.21	≥0.5
	Mid	2437	17.60	20.16	≥0.5
	High	2462	17.69	20.04	≥0.5

Test Plots

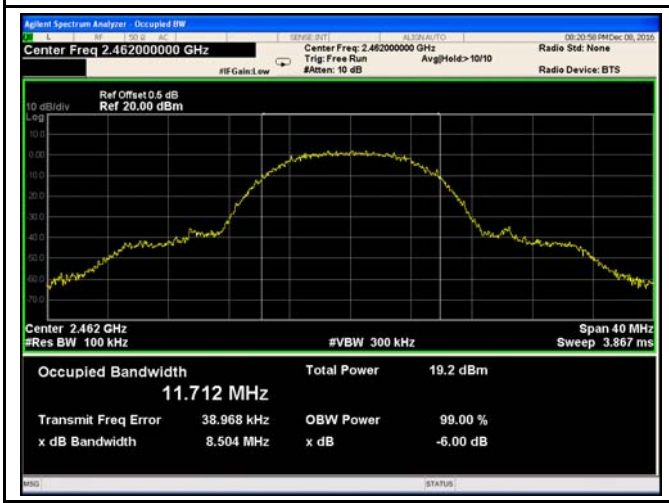
6dB Bandwidth measurement result



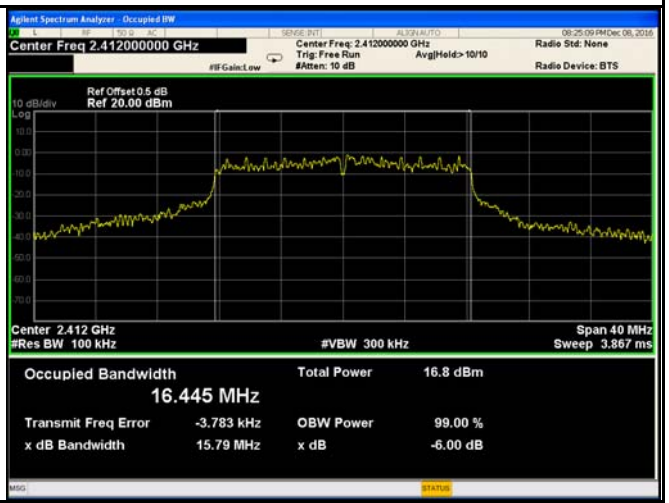
802.11b 6dB Bandwidth - Low CH 2412



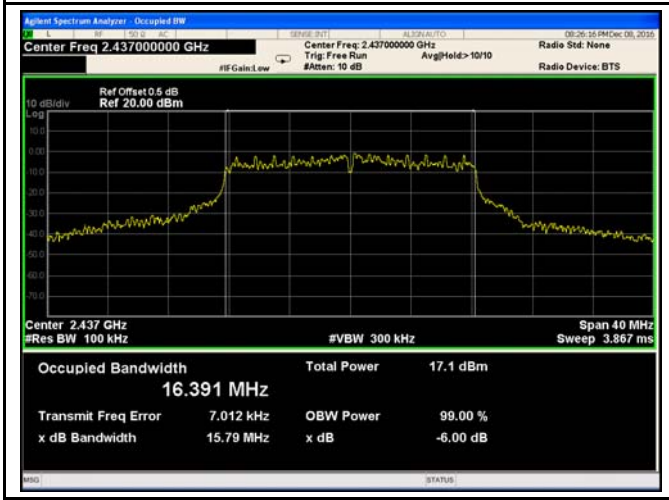
802.11b 6dB Bandwidth - Mid CH 2437



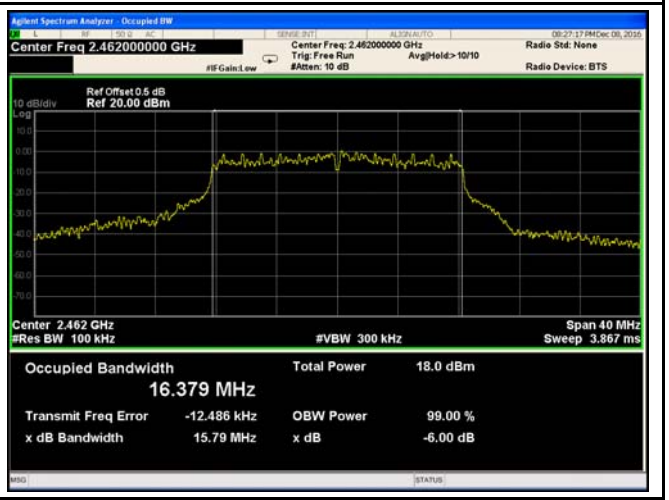
802.11b 6dB Bandwidth - High CH 2462



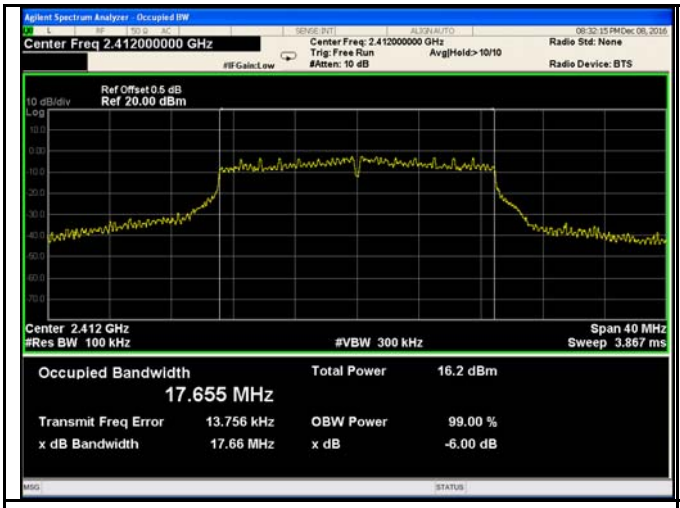
802.11g 6dB Bandwidth - Low CH 2412



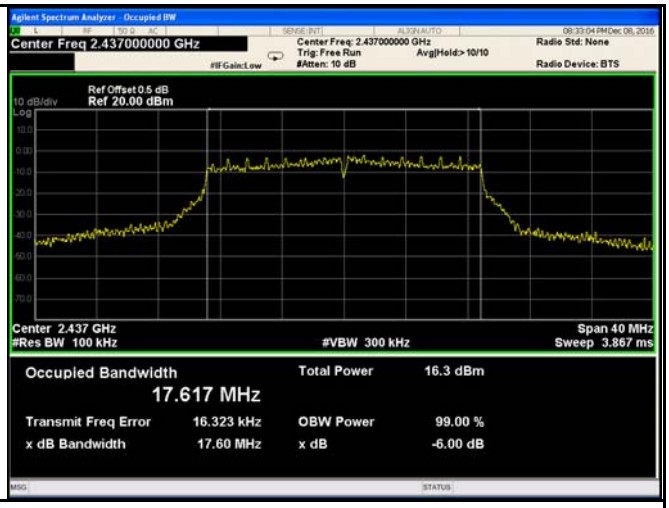
802.11g 6dB Bandwidth - Mid CH 2437



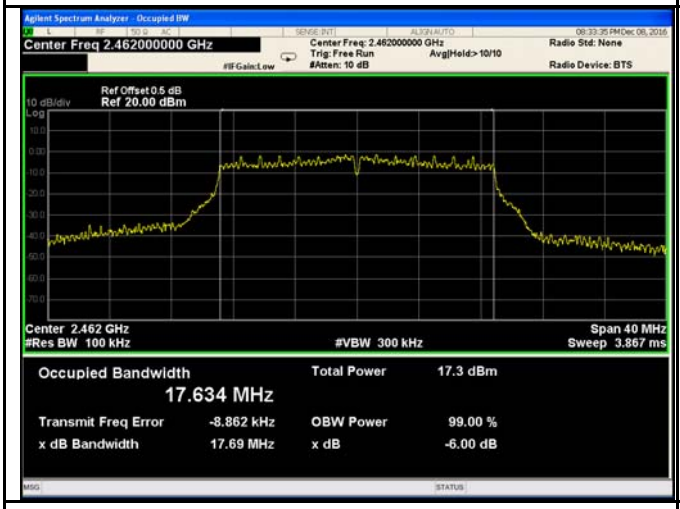
802.11g 6dB Bandwidth - High CH 2462



802.11n20 6dB Bandwidth - Low CH 2412

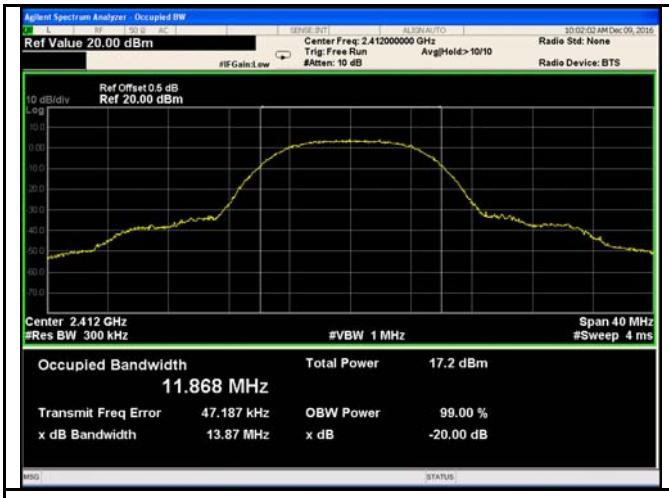


802.11n20 6dB Bandwidth - Mid CH 2437

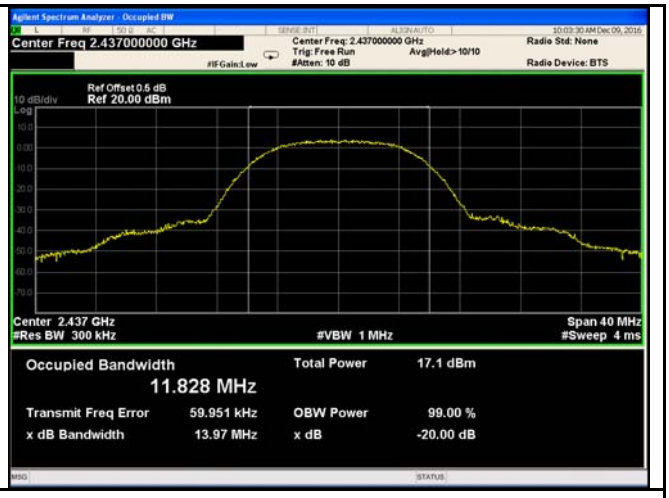


802.11n20 6dB Bandwidth - High CH 2462

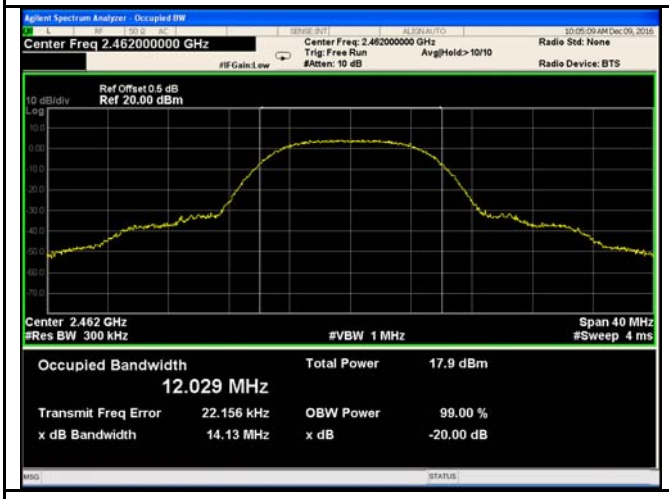
20 dB Bandwidth measurement result



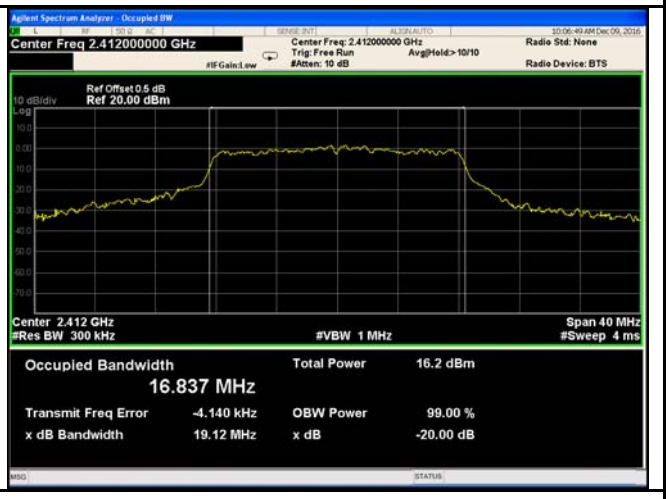
802.11b 20dB Bandwidth - Low CH 2412



802.11b 20dB Bandwidth - Mid CH 2437

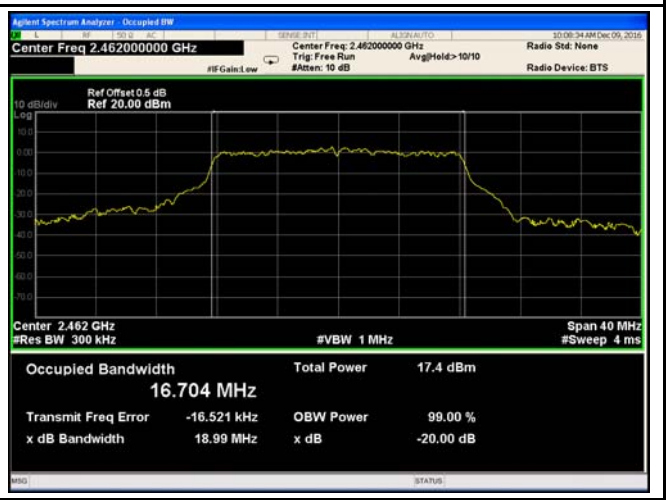


802.11b 20dB Bandwidth - High CH 2462

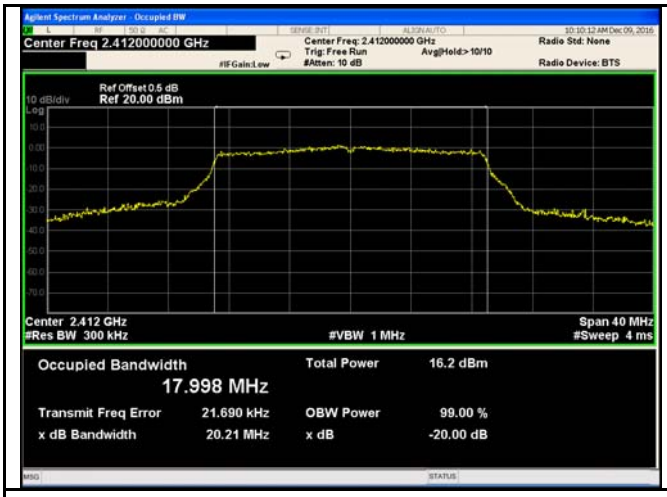


802.11g 20dB Bandwidth - Low CH 2412

802.11g 20dB Bandwidth - Mid CH 2437

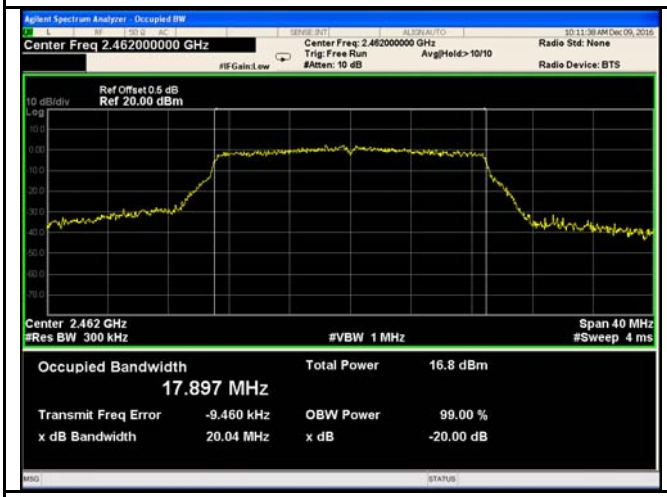


802.11g 20dB Bandwidth - High CH 2462



802.11n20 20dB Bandwidth - Low CH 2412

802.11n20 20dB Bandwidth - Mid CH 2437

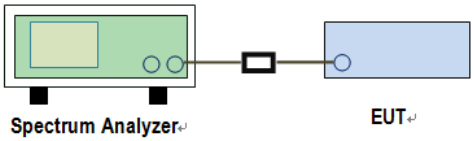


802.11n20 20dB Bandwidth - High CH 2462

6.3 Maximum Output Power

Temperature	22℃
Relative Humidity	54%
Atmospheric Pressure	1021mbar
Test date :	December 09, 2016
Tested By :	Amos Xia

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b)(3),RSS210(A8.4)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤1 Watt	☐
	b)	FHSS in 5725-5850MHz: ≤1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤0.125 Watt.	☐
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤0.25 Watt	☐
	f)	DTS in 902-928MHz, 2400-2483.5MHz: ≤1 Watt	☒
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance v03r05, 9.1.2 Integrated band power method Maximum output power measurement procedure - a) Set span to at least 1.5 times the OBW. - b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz. - c) Set VBW ≥ 3 x RBW. - d) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.) - e) Sweep time = auto. - f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. - g) If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”. - h) Trace average at least 100 traces in power averaging (i.e., RMS) mode. - i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.		
Remark			
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐N/A

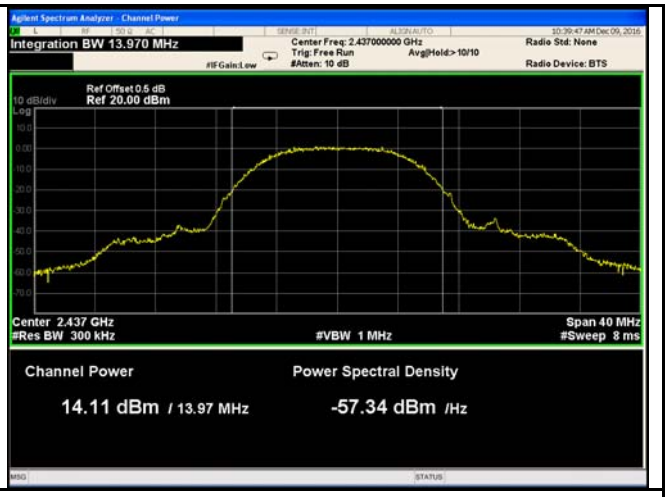
Test Plot ☒ Yes (See below) ☐N/A

Output Power measurement result

Type	Test mode	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	802.11b	Low	2412	14.38	30	Pass
		Mid	2437	14.11	30	Pass
		High	2462	17.30	30	Pass
	802.11g	Low	2412	14.37	30	Pass
		Mid	2437	13.74	30	Pass
		High	2462	14.42	30	Pass
	802.11n (20M)	Low	2412	12.75	30	Pass
		Mid	2437	12.81	30	Pass
		High	2462	13.94	30	Pass

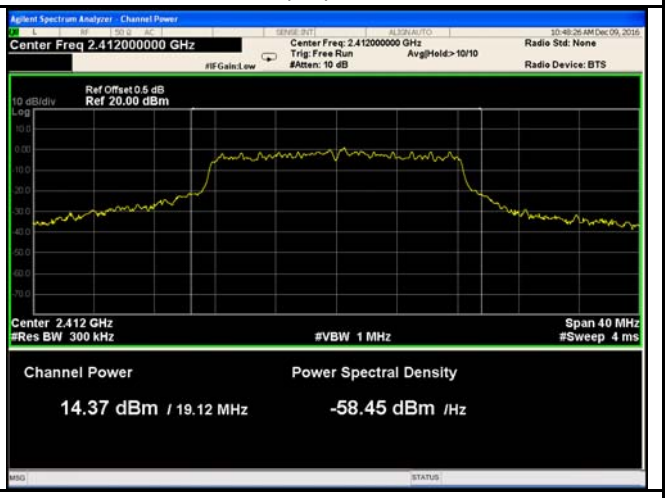
Test Plots
The Average Power

802.11b - AV Output power - Low CH 2412

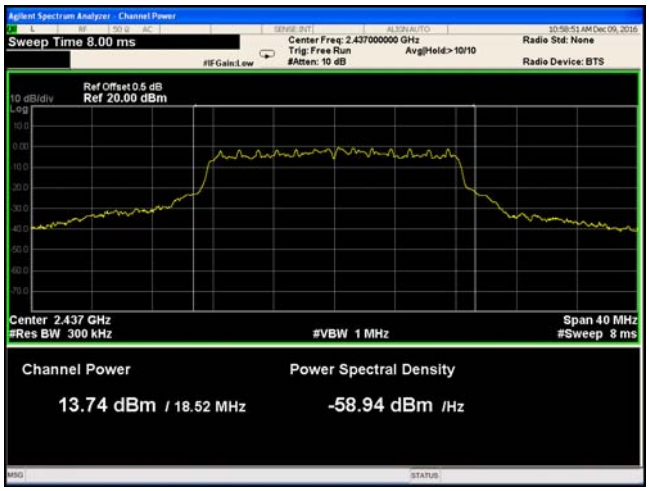


802.11b - AV Output power - Mid CH 2437

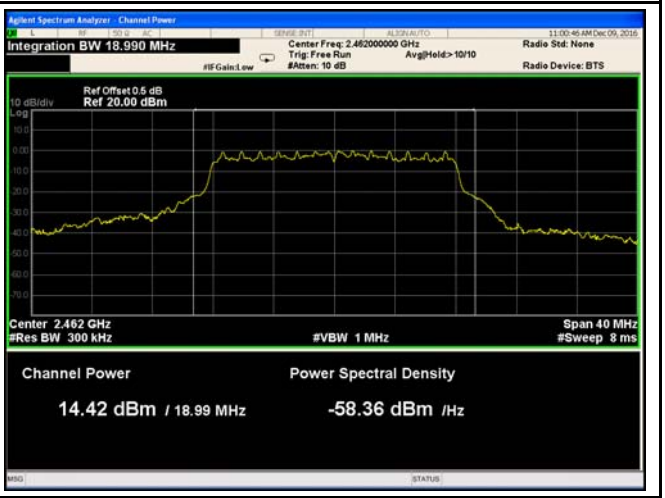
802.11b - AV Output power - High CH 2462



802.11g - AV Output power - Low CH 2412

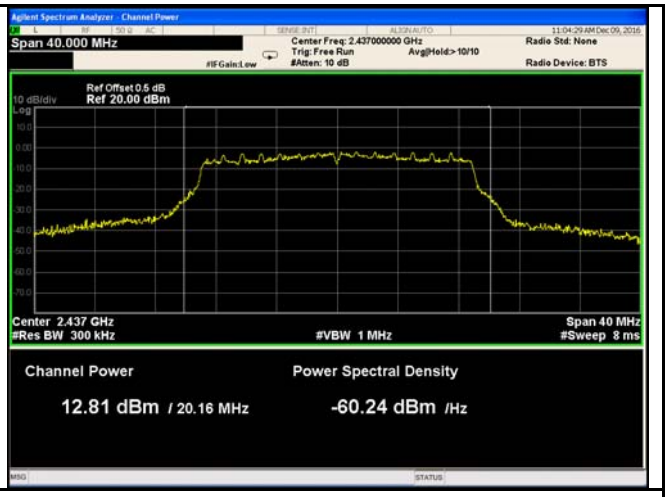


802.11g - AV Output power - Mid CH 2437



802.11g - AV Output power - High CH 2462

802.11n20 - AV Output power - Low CH 2412

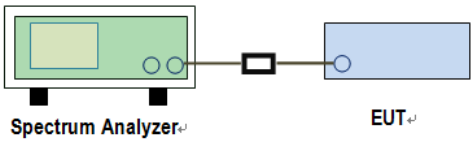


802.11n20 - AV Output power - Mid CH 2437

802.11n20 - AV Output power - High CH 2462

6.4 Power Spectral Density

Temperature	22℃
Relative Humidity	54%
Atmospheric Pressure	1021mbar
Test date :	December 03, 2016
Tested By :	Amos Xia

Spec	Item	Requirement	Applicable
§15.247(e)	a)	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 Setup			
Test Procedure	558074 D01 DTS MEAS Guidance v03r05, 10.2 power spectral density method power spectral density measurement procedure - a) Set analyzer center frequency to DTS channel center frequency. - b) Set the span to 1.5 times the DTS bandwidth. - c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. - d) Set the VBW ≥ 3 × RBW. - e) Detector = peak. - f) Sweep time = auto couple. - g) Trace mode = max hold. - h) Allow trace to fully stabilize. - i) Use the peak marker function to determine the maximum amplitude level within the RBW. - j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.		
Remark			
Result	☒ Pass ☐Fail		

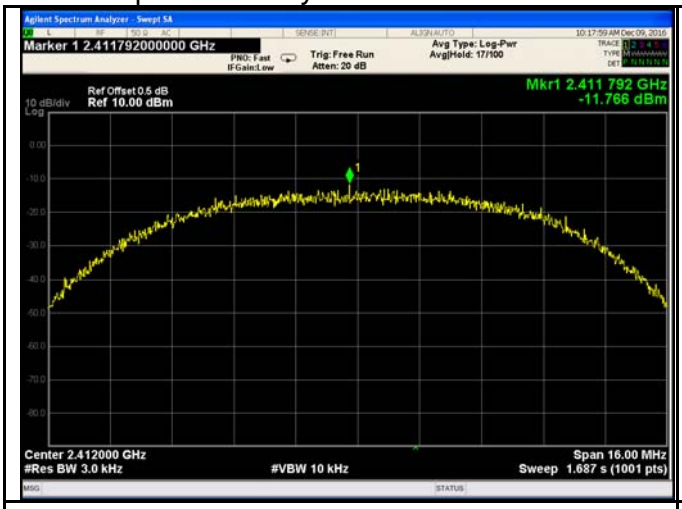
Test Data ☒Yes ☐N/A
Test Plot ☒Yes (See below) ☐N/A

Power Spectral Density measurement result

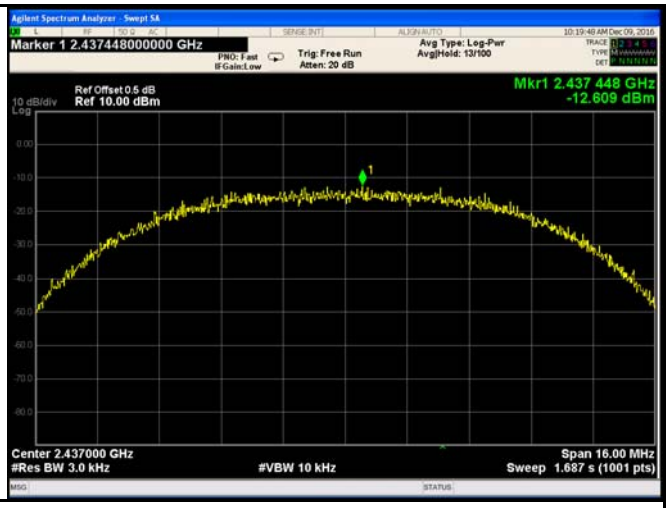
Type	Test mode	CH	Freq (MHz)	PSD (dBm)	Limit (dBm)	Result
PSD	802.11b	Low	2412	-11.766	8	Pass
		Mid	2437	-12.609	8	Pass
		High	2462	-11.315	8	Pass
	802.11g	Low	2412	-16.438	8	Pass
		Mid	2437	-16.002	8	Pass
		High	2462	-14.916	8	Pass
	802.11n (20M)	Low	2412	-17.280	8	Pass
		Mid	2437	-15.869	8	Pass
		High	2462	-16.025	8	Pass

Test Plots

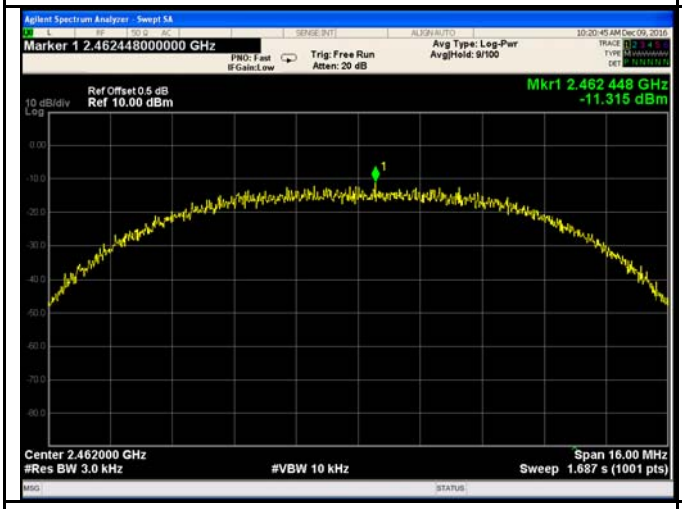
Power Spectral Density measurement result



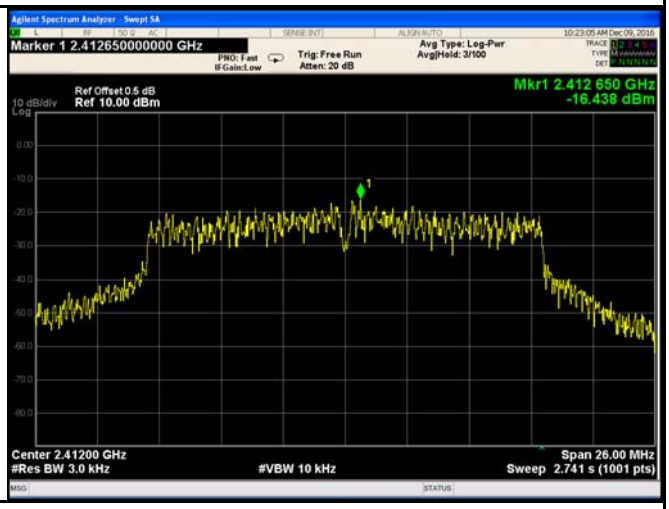
PSD - Low CH 2412 - 802.11b



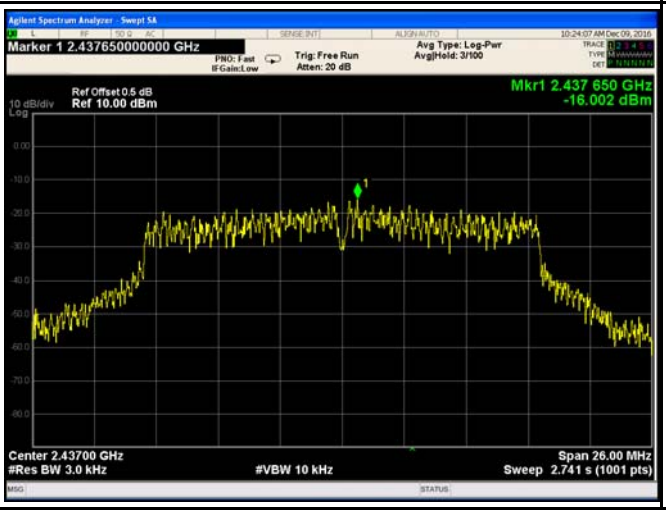
PSD - Mid CH 2437 –802.11b



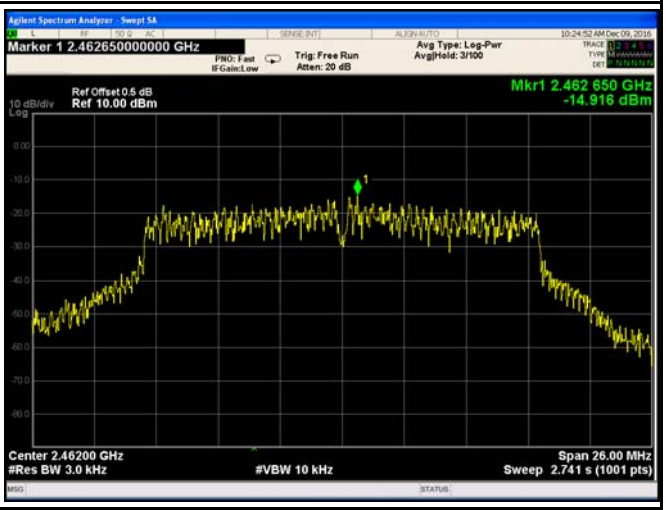
PSD - High CH 2462 - 802.11b



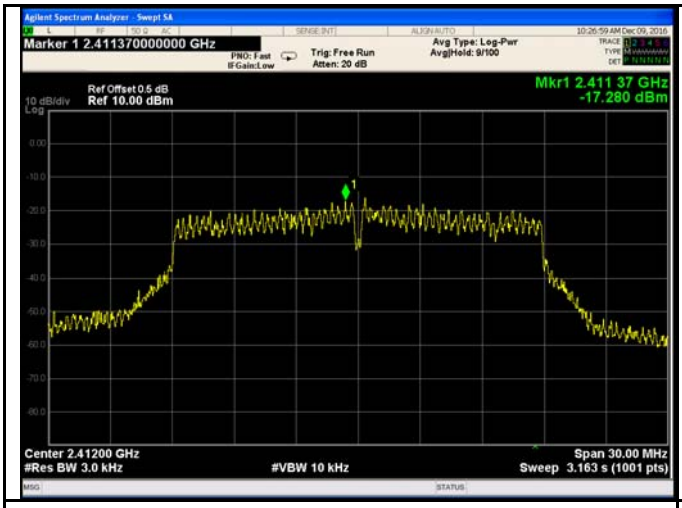
PSD - Low CH 2412 -802.11g



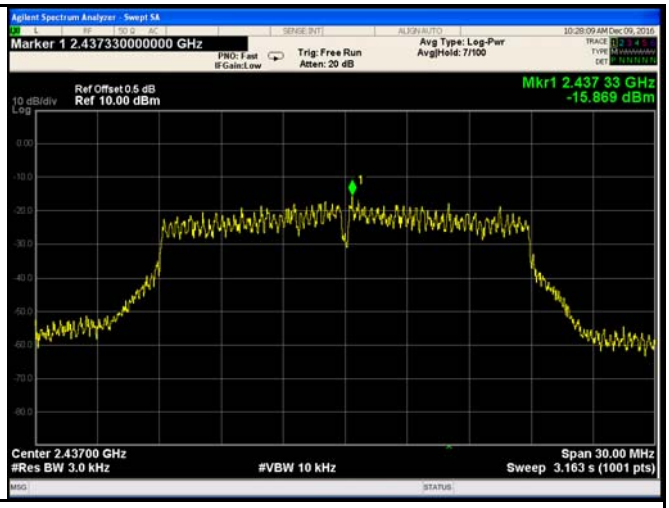
PSD - Mid CH 2437 – 802.11g



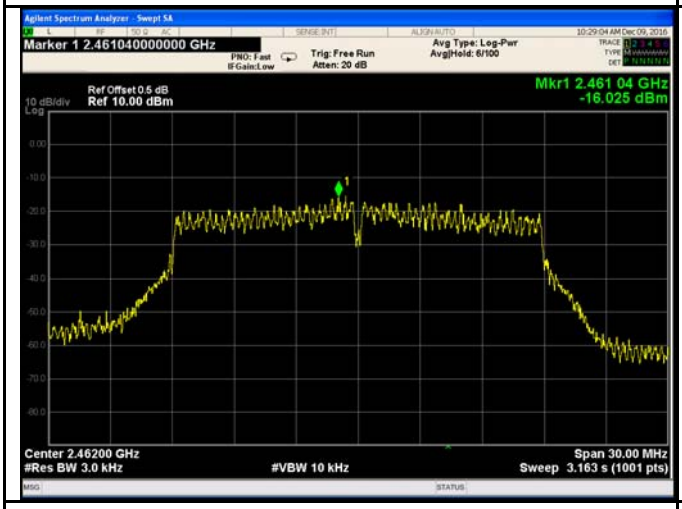
PSD - High CH 2462 - 802.11g



PSD - Low CH 2412 - 802.11n20



PSD - Mid CH 2437 –802.11n20



PSD - High CH 2472 - 802.11n20

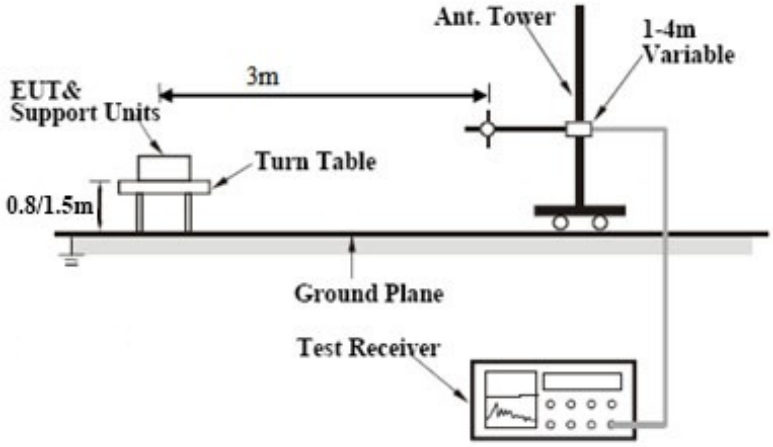
6.5 Band-Edge & Unwanted Emissions into Restricted Frequency Bands

Temperature	23℃
Relative Humidity	55%
Atmospheric Pressure	1022mbar
Test date :	December 12, 2016
Tested By :	Amos Xia

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(d)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits.	☒

Test Setup



Test Procedure

Radiated Method Only

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below:
  a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.
  b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.
  c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.

Remark

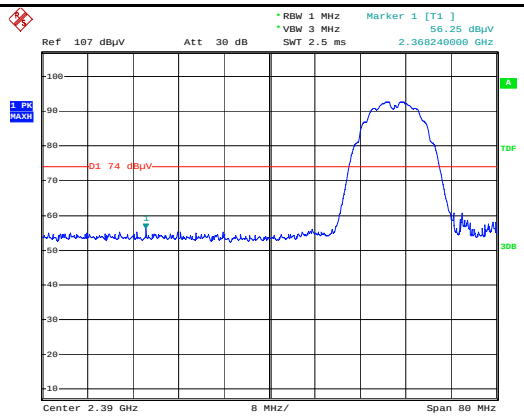
Result ☒ Pass ☐ Fail

Test Data ☒Yes ☐N/A

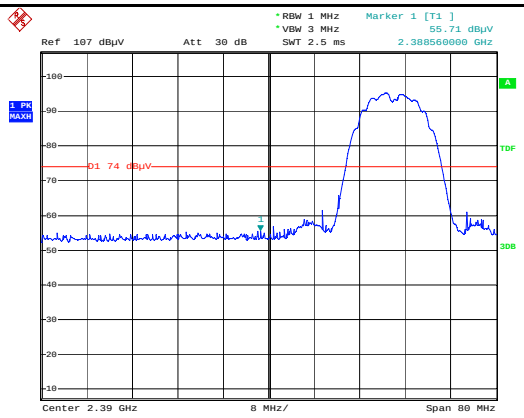
Test Plot ☒Yes (See below) ☐N/A

Test Plots

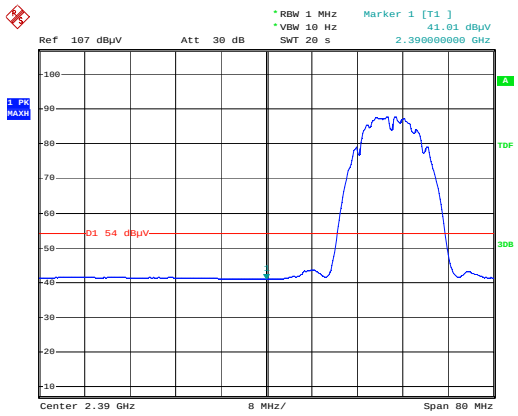
Band Edge measurement result



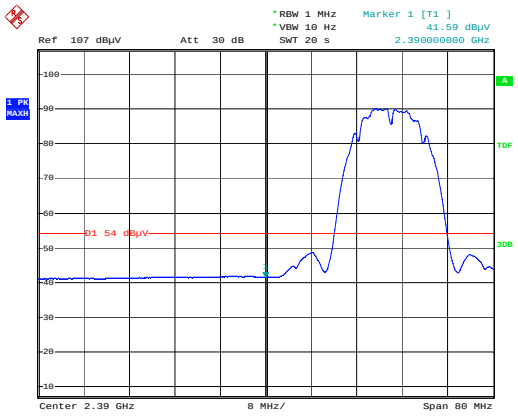
Band Edge, Left Side (Peak) - 802.11b-V



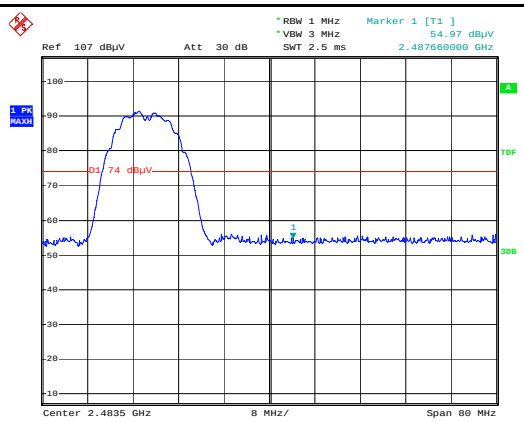
Band Edge, Left Side (Peak) - 802.11b-H



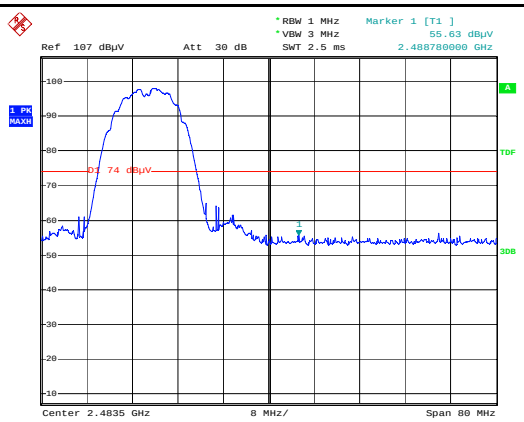
Band Edge, Left Side (Average) - 802.11b-V



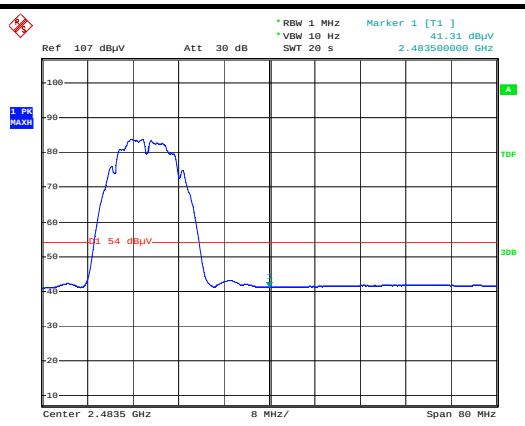
Band Edge, Left Side (Average) - 802.11b-H



Band Edge, Right Side (Peak) - 802.11b-V

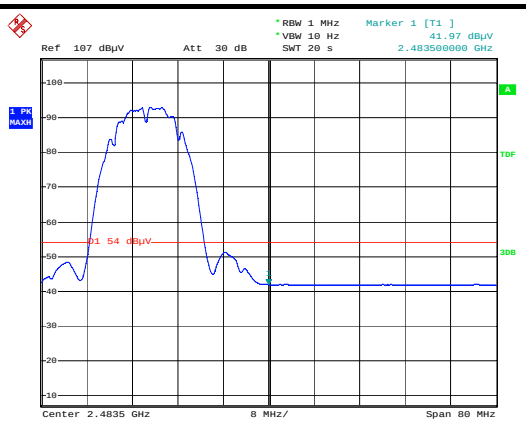


Band Edge, Right Side (Peak) - 802.11b-H



Date: 12.DEC.2016 18:26:01

Band Edge, Right Side (Average) - 802.11b-V



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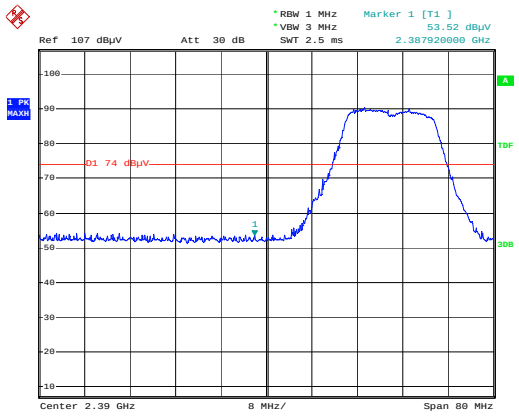
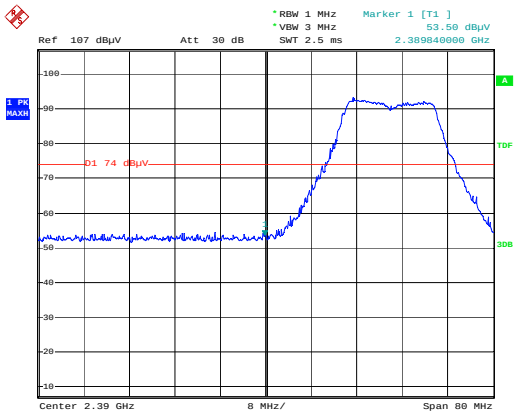
Band Edge, Right Side (Average) - 802.11b-H



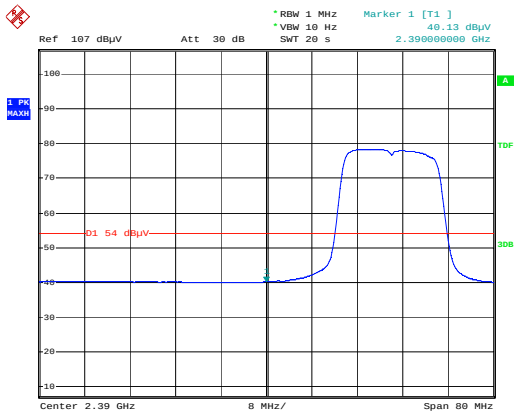
Date: 12.DEC.2016 18:35:27

Band Edge, Left Side (Peak) - 802.11g-V



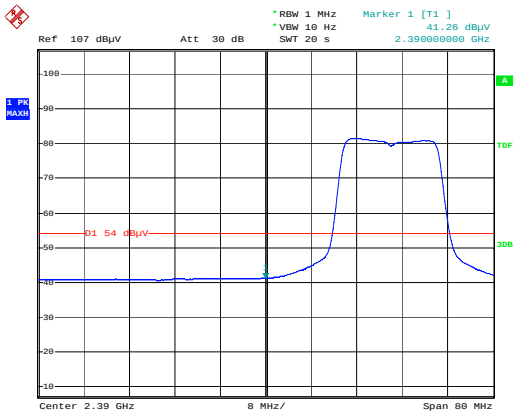
Date: 12.DEC.2016 18:33:58

Band Edge, Left Side (Peak) - 802.11g-H



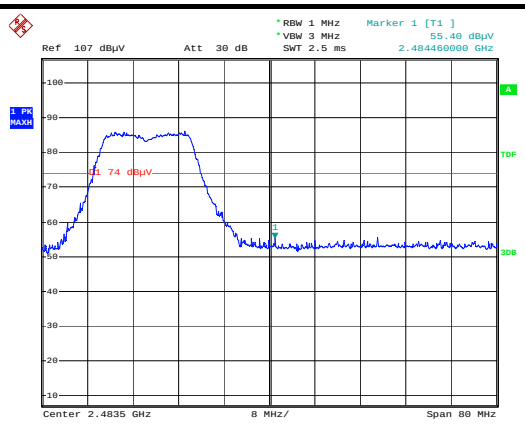
Date: 12.DEC.2016 18:36:11

Band Edge, Left Side (Average) - 802.11g-V

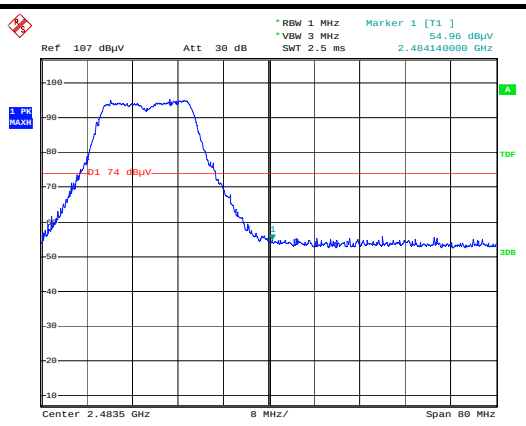


Date: 12.DEC.2016 18:34:35

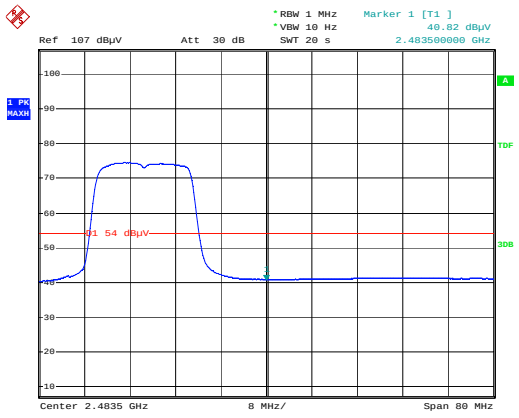
Band Edge, Left Side (Average) - 802.11g-H



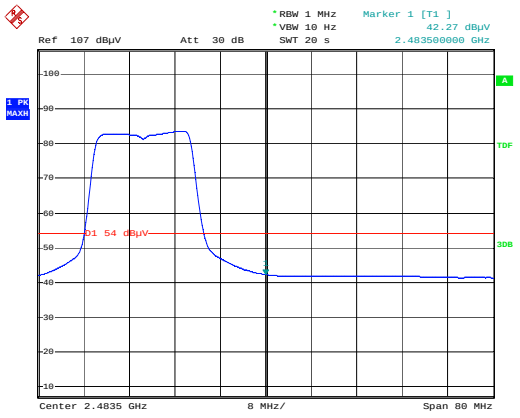
Band Edge, Right Side (Peak) - 802.11g-V



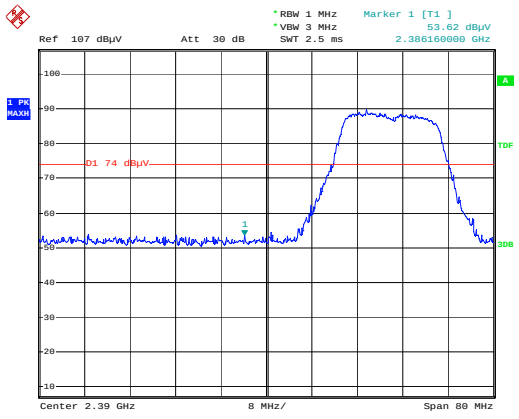
Band Edge, Right Side (Peak) - 802.11g-H



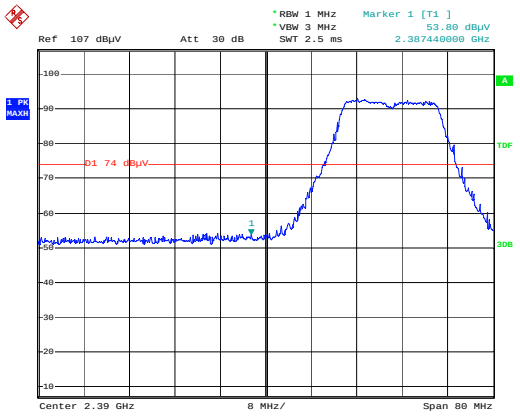
Band Edge, Right Side (Average) - 802.11g-V



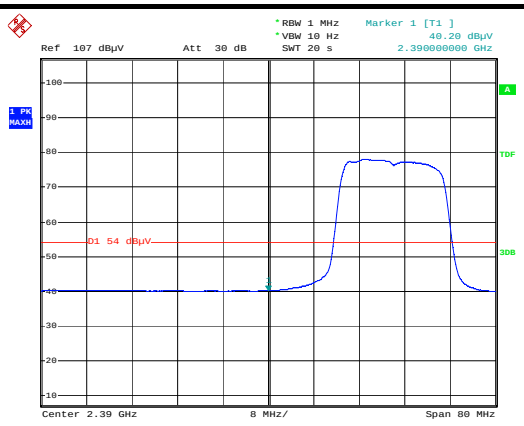
Band Edge, Right Side (Average) - 802.11g-H



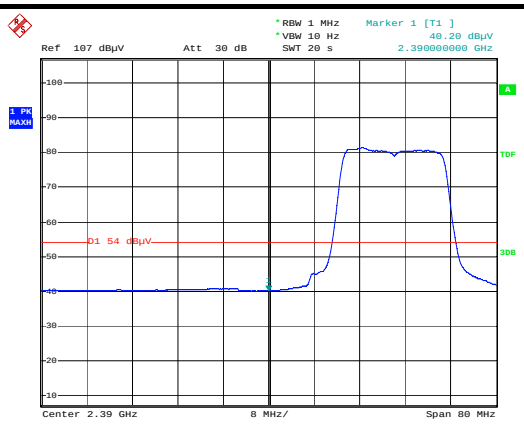
Band Edge, Left Side (Peak) - 802.11n20M-V



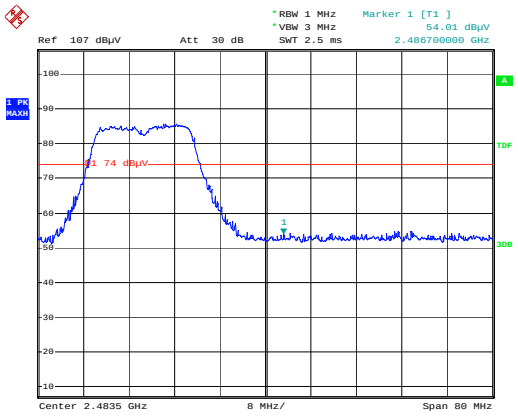
Band Edge, Left Side (Peak) - 802.11n20M-H



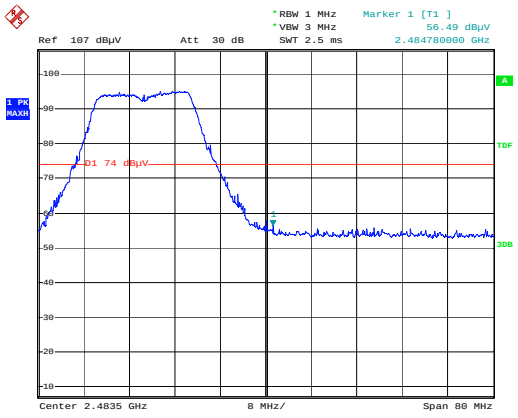
Band Edge, Left Side (Average) - 802.11n20M-V



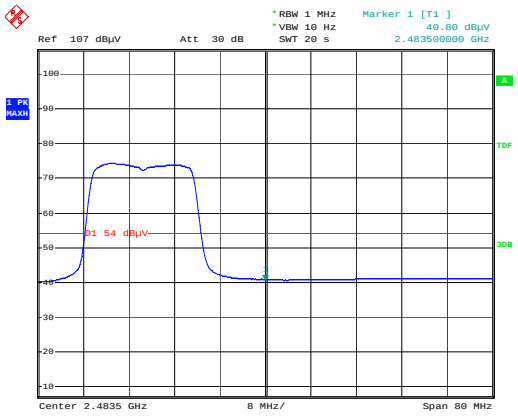
Band Edge, Left Side (Average) - 802.11n20M-H



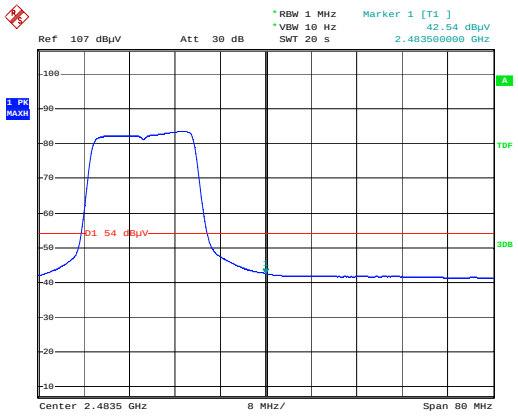
Band Edge, Right Side (Peak) - 802.11n20M-V



Band Edge, Right Side (Peak) - 802.11n20M-H



Band Edge, Right Side (Average) - 802.11n20M-V



Band Edge, Right Side (Average) - 802.11n20M-H

6.6 AC Power Line Conducted Emissions

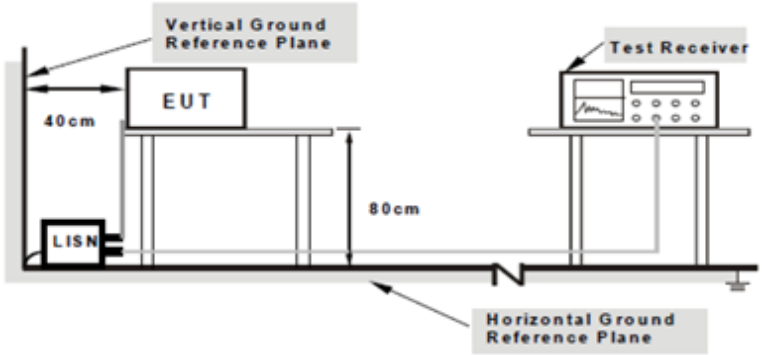
Temperature	23℃
Relative Humidity	55%
Atmospheric Pressure	1022mbar
Test date :	December 12, 2016
Tested By :	Amos Xia

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.207, RSS210 (A8.1)	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu] H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.	☒

Frequency ranges (MHz)	Limit (dBμV)	
	QP	Average
0.15 ~ 0.5	66 – 56	56 – 46
0.5 ~ 5	56	46
5 ~ 30	60	50

Test Setup



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

Procedure

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz.
8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).

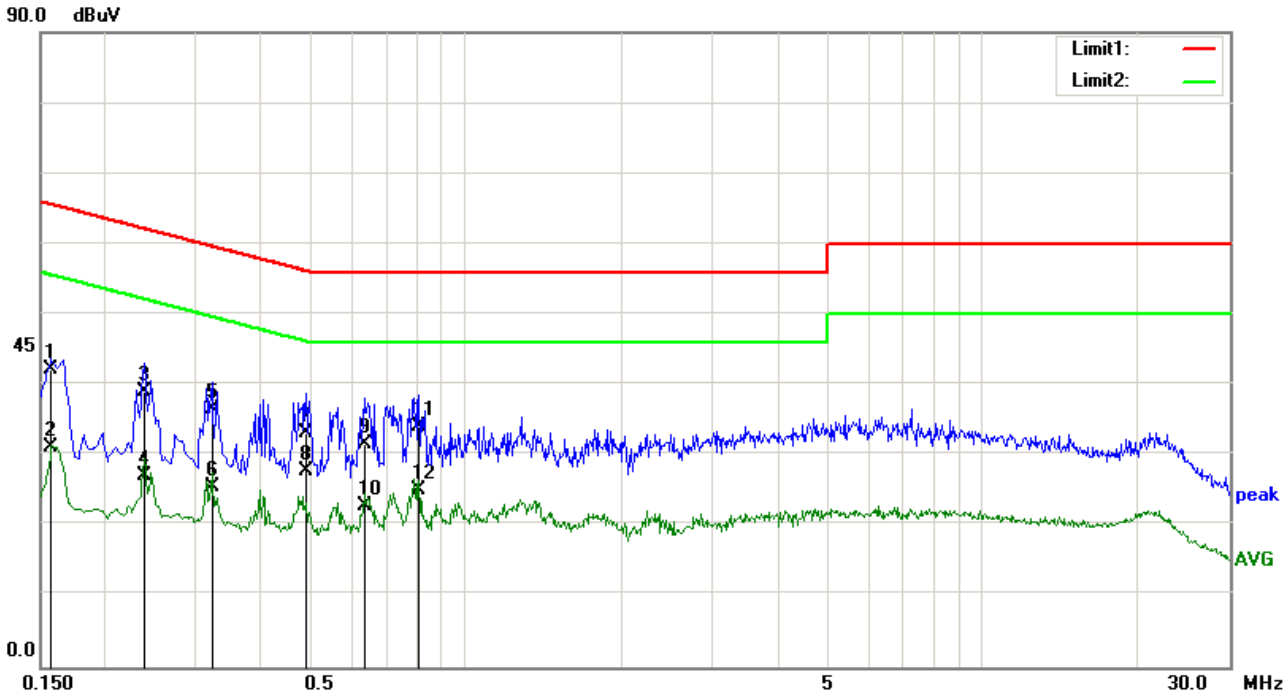
Remark

Result ☒ Pass ☐ Fail

Test Data ☒Yes ☐N/A

Test Plot ☒Yes (See below) ☐N/A

Test Mode:	Transmitting Mode

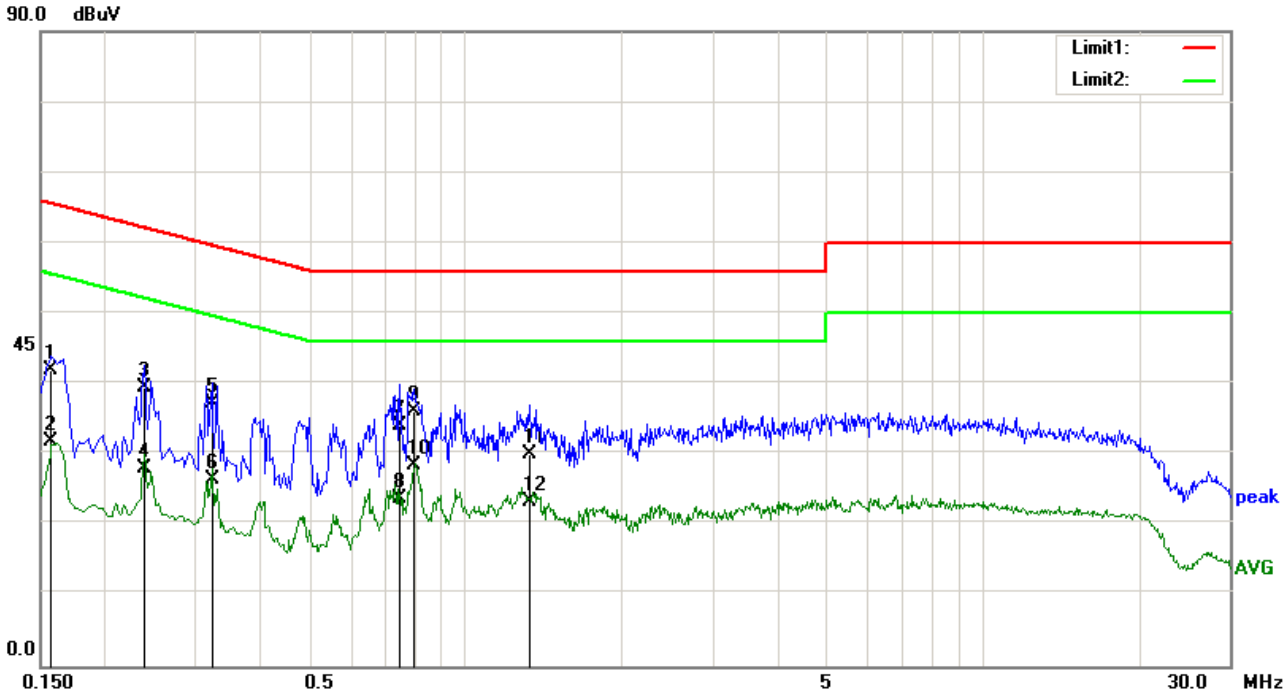


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	Frequency (MHz)	Reading (dBµV)	Detector	Lisn/lsn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	0.1580	31.76	QP	0.10	-10.00	0.35	42.21	65.57	-23.36
2	0.1580	20.74	AVG	0.10	-10.00	0.35	31.19	55.57	-24.38
3	0.2380	28.74	QP	0.10	-10.00	0.22	39.06	62.17	-23.11
4	0.2380	16.81	AVG	0.10	-10.00	0.22	27.13	52.17	-25.04
5	0.3220	26.33	QP	0.11	-10.00	0.20	36.64	59.66	-23.02
6	0.3220	15.14	AVG	0.11	-10.00	0.20	25.45	49.66	-24.21
7	0.4900	22.94	QP	0.12	-10.00	0.21	33.27	56.17	-22.90
8	0.4900	17.36	AVG	0.12	-10.00	0.21	27.69	46.17	-18.48
9	0.6340	21.36	QP	0.13	-10.00	0.20	31.69	56.00	-24.31
10	0.6340	12.53	AVG	0.13	-10.00	0.20	22.86	46.00	-23.14
11	0.8100	23.85	QP	0.13	-10.00	0.20	34.18	56.00	-21.82
12	0.8100	14.81	AVG	0.13	-10.00	0.20	25.14	46.00	-20.86

Test Mode:	Transmitting Mode

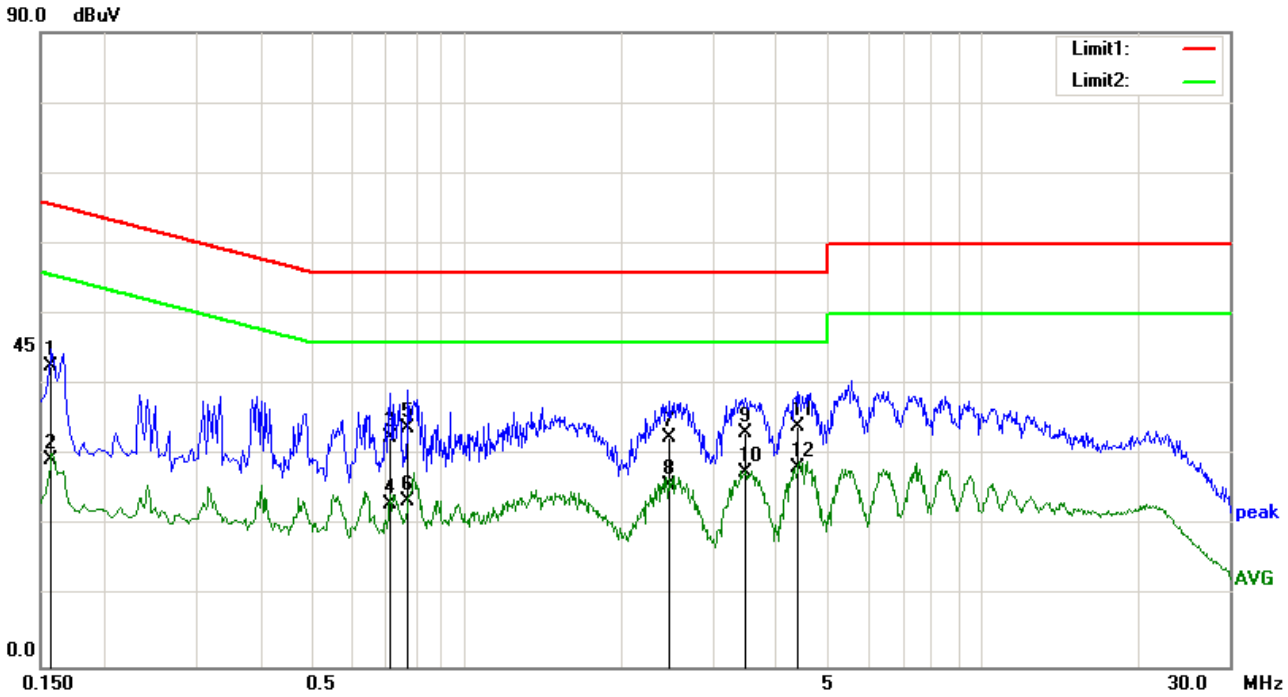


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	Frequency (MHz)	Reading (dBµV)	Detector	Lisn/Isn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	0.1580	31.52	QP	0.11	-10.00	0.35	41.98	65.57	-23.59
2	0.1580	21.30	AVG	0.11	-10.00	0.35	31.76	55.57	-23.81
3	0.2380	29.16	QP	0.10	-10.00	0.22	39.48	62.17	-22.69
4	0.2380	17.60	AVG	0.10	-10.00	0.22	27.92	52.17	-24.25
5	0.3220	26.83	QP	0.10	-10.00	0.20	37.13	59.66	-22.53
6	0.3220	16.04	AVG	0.10	-10.00	0.20	26.34	49.66	-23.32
7	0.7460	23.69	QP	0.12	-10.00	0.20	34.01	56.00	-21.99
8	0.7460	13.31	AVG	0.12	-10.00	0.20	23.63	46.00	-22.37
9	0.7940	25.88	QP	0.12	-10.00	0.20	36.20	56.00	-19.80
10	0.7940	18.06	AVG	0.12	-10.00	0.20	28.38	46.00	-17.62
11	1.3300	19.74	QP	0.14	-10.00	0.21	30.09	56.00	-25.91
12	1.3300	12.87	AVG	0.14	-10.00	0.21	23.22	46.00	-22.78

Test Mode:	Transmitting Mode

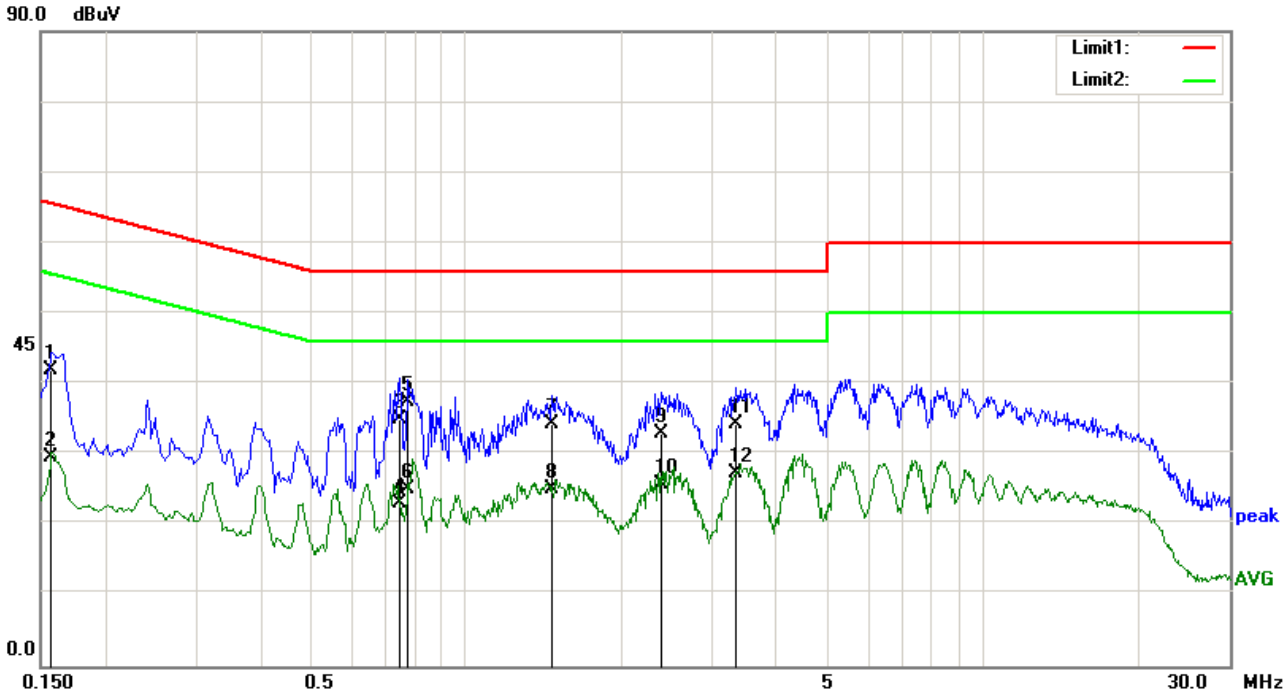


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	Frequency (MHz)	Reading (dBµV)	Detector	Lisn/lsn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	0.1580	32.09	QP	0.10	-10.00	0.35	42.54	65.57	-23.03
2	0.1580	18.90	AVG	0.10	-10.00	0.35	29.35	55.57	-26.22
3	0.7140	22.16	QP	0.13	-10.00	0.20	32.49	56.00	-23.51
4	0.7140	12.79	AVG	0.13	-10.00	0.20	23.12	46.00	-22.88
5	0.7740	23.64	QP	0.13	-10.00	0.20	33.97	56.00	-22.03
6	0.7740	13.09	AVG	0.13	-10.00	0.20	23.42	46.00	-22.58
7	2.4860	22.10	QP	0.18	-10.00	0.23	32.51	56.00	-23.49
8	2.4860	15.40	AVG	0.18	-10.00	0.23	25.81	46.00	-20.19
9	3.4860	22.81	QP	0.21	-10.00	0.25	33.27	56.00	-22.73
10	3.4860	17.08	AVG	0.21	-10.00	0.25	27.54	46.00	-18.46
11	4.4060	23.49	QP	0.25	-10.00	0.28	34.02	56.00	-21.98
12	4.4060	17.81	AVG	0.25	-10.00	0.28	28.34	46.00	-17.66

Test Mode:	Transmitting Mode



Test Data

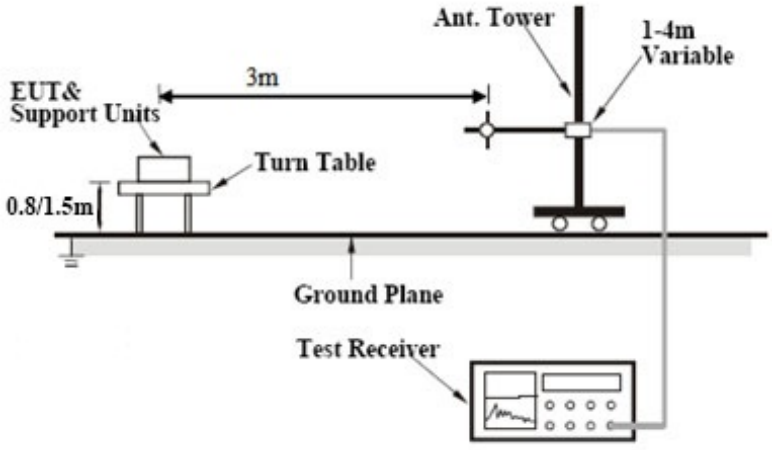
Phase Neutral Plot at 240Vac, 60Hz

No.	Frequency (MHz)	Reading (dBµV)	Detector	Lisn/lsn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	0.1580	31.42	QP	0.11	-10.00	0.35	41.88	65.57	-23.69
2	0.1580	19.23	AVG	0.11	-10.00	0.35	29.69	55.57	-25.88
3	0.7460	24.63	QP	0.12	-10.00	0.20	34.95	56.00	-21.05
4	0.7460	12.73	AVG	0.12	-10.00	0.20	23.05	46.00	-22.95
5	0.7740	27.18	QP	0.12	-10.00	0.20	37.50	56.00	-18.50
6	0.7740	14.84	AVG	0.12	-10.00	0.20	25.16	46.00	-20.84
7	1.4700	23.88	QP	0.15	-10.00	0.20	34.23	56.00	-21.77
8	1.4700	14.71	AVG	0.15	-10.00	0.20	25.06	46.00	-20.94
9	2.3900	22.49	QP	0.18	-10.00	0.23	32.90	56.00	-23.10
10	2.3900	15.33	AVG	0.18	-10.00	0.23	25.74	46.00	-20.26
11	3.3300	23.76	QP	0.22	-10.00	0.24	34.22	56.00	-21.78
12	3.3300	16.82	AVG	0.22	-10.00	0.24	27.28	46.00	-18.72

6.7 Radiated Spurious Emissions & Restricted Band

Temperature	23℃
Relative Humidity	55%
Atmospheric Pressure	1022mbar
Test date :	December 12, 2016
Tested By :	Amos Xia

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td rowspan="3">47CFR§15.247(d), RSS210 (A8.5)</td><td>a)</td><td>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges
<table>
<tr><th>Frequency range (MHz)</th><th>Field Strength (μV/m)</th></tr>
<tr><td>30 – 88</td><td>100</td></tr>
<tr><td>88 – 216</td><td>150</td></tr>
<tr><td>216 – 960</td><td>200</td></tr>
<tr><td>Above 960</td><td>500</td></tr>
</table></td><td>☒</td></tr>
<tr><td>b)</td><td>For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required
☒ 20 dB down ☐ 30 dB down</td><td>☒</td></tr>
<tr><td>c)</td><td>or restricted band, emission must also comply with the radiated emission limits specified in 15.209</td><td>☒</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 
</td></tr>
<tr><td>Procedure</td><td colspan="3">1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
b. The EUT was then rotated to the direction that gave the maximum emission.
c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with</td></tr>
</table>

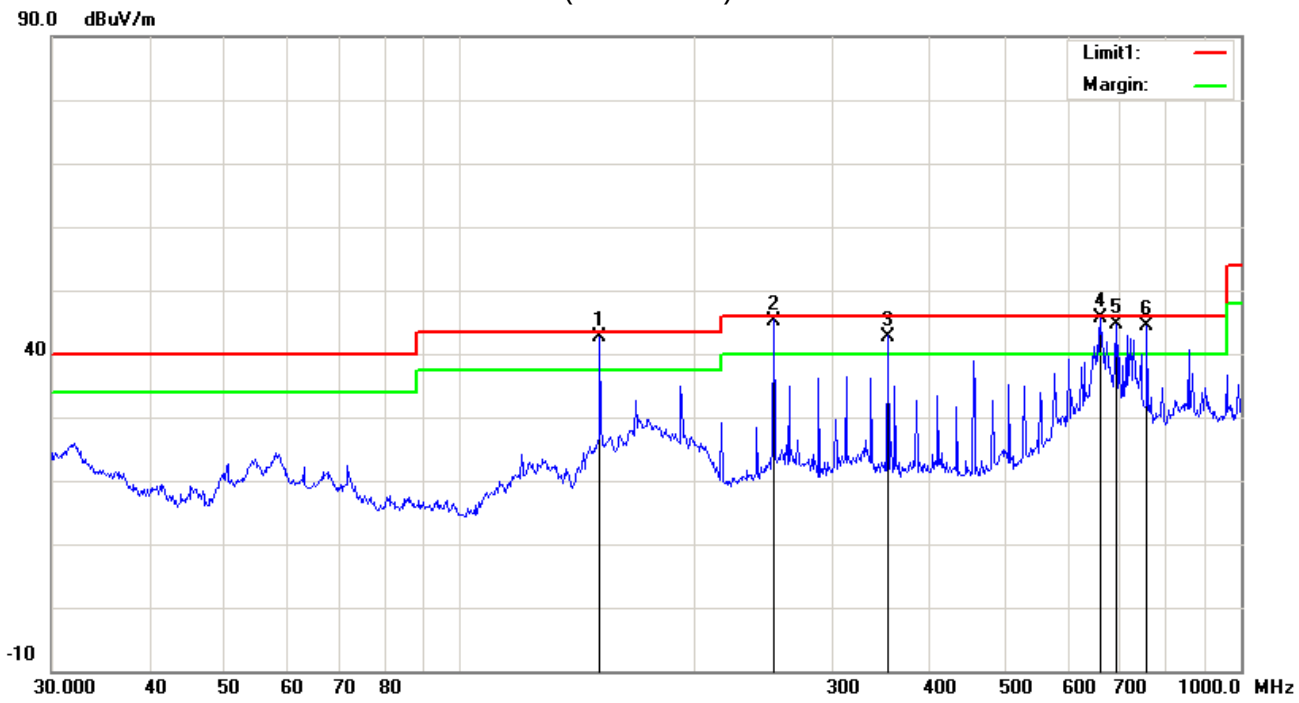
	5. Peak detection for Peak measurement at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒Yes ☐N/A

Test Plot ☒Yes (See below) ☐N/A

Test Mode:	Transmitting Mode

(Below 1GHz)

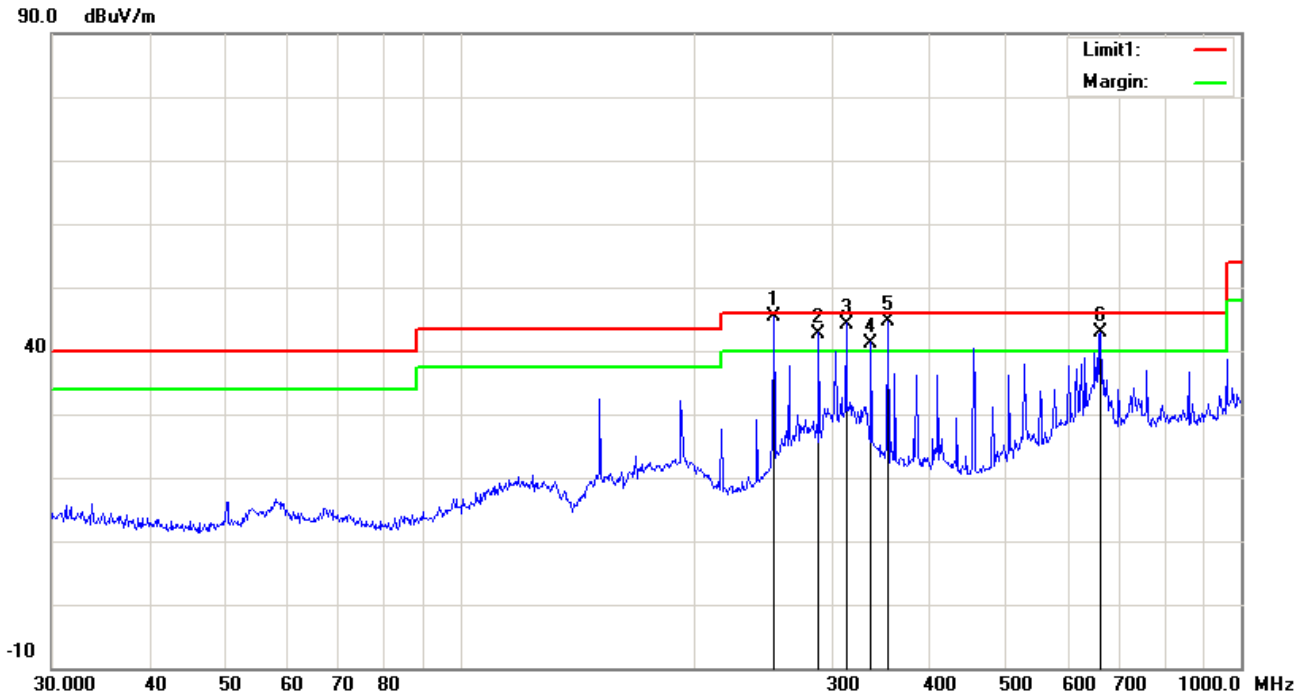


Test Data

Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	151.0666	74.41	QP	13.92	47.91	2.10	42.52	43.50	-0.98	100	92
2	252.0627	75.62	QP	14.90	47.81	2.52	45.23	46.00	-0.77	100	336
3	352.9434	72.50	QP	16.04	48.81	3.01	42.74	46.00	-3.26	200	204
4	661.1505	68.55	QP	21.68	48.84	4.12	45.51	46.00	-0.49	100	146
5	691.9867	63.85	QP	22.40	45.96	4.23	44.52	46.00	-1.48	100	108
6	758.0408	62.93	QP	21.99	44.96	4.42	44.38	46.00	-1.62	100	157

(Below 1GHz)



Test Data

Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	252.0627	75.33	QP	15.22	47.81	2.52	45.26	46.00	-0.74	100	187
2	287.9904	71.87	QP	16.48	48.38	2.71	42.68	46.00	-3.32	100	169
3	312.1794	73.15	QP	16.79	48.52	2.83	44.25	46.00	-1.75	100	190
4	336.0352	70.58	QP	16.58	48.86	2.93	41.23	46.00	-4.77	100	190
5	352.9434	73.92	QP	16.42	48.81	3.01	44.54	46.00	-1.46	100	200
6	661.1505	65.57	QP	21.96	48.84	4.12	42.81	46.00	-3.19	200	189

Test Mode:	Transmitting Mode(Above 1GHz)

Low Channel (2412 MHz) (802.11b mode is worst case)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4820	38.55	AV	V	33.1	6.85	32.60	45.9	54	-8.1
4820	38.64	AV	H	33.1	6.85	32.60	45.99	54	-8.01
4820	47.43	PK	V	33.1	6.85	32.60	54.78	74	-19.22
4820	47.30	PK	H	33.1	6.85	32.60	54.65	74	-19.35
17855	23.97	AV	V	45.15	11.54	32.15	48.51	54	-5.49
17855	23.78	AV	H	45.15	11.54	32.15	48.32	54	-5.68
17855	40.66	PK	V	45.15	11.54	32.15	65.2	74	-8.8
17855	40.45	PK	H	45.15	11.54	32.15	64.99	74	-9.01

Middle Channel (2437 MHz) (802.11b mode is worst case)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4870	38.51	AV	V	33.2	6.81	32.70	45.87	54	-8.13
4870	38.48	AV	H	33.2	6.81	32.70	45.75	54	-7.81
4870	47.53	PK	V	33.2	6.81	32.70	54.77	74	-18.76
4870	47.49	PK	H	33.2	6.81	32.70	54.7	74	-18.8
17828	24.15	AV	V	45.16	11.64	32.19	48.82	54	-5.23
17828	23.98	AV	H	45.16	11.64	32.19	48.55	54	-5.4
17828	40.34	PK	V	45.16	11.64	32.19	64.99	74	-9.04
17828	40.67	PK	H	45.16	11.64	32.19	65.23	74	-8.71

High Channel (2462 MHz) (802.11b mode is worst case)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4925	38.36	AV	V	33.84	6.94	32.77	46.32	54	-7.68
4925	38.12	AV	H	33.84	6.94	32.77	46.18	54	-7.81
4925	47.69	PK	V	33.84	6.94	32.77	55.66	74	-18.76
4925	47.53	PK	H	33.84	6.94	32.77	55.59	74	-18.80
17877	24.28	AV	V	45.18	11.62	32.25	48.87	54	-5.23
17877	24.04	AV	H	45.18	11.62	32.25	48.71	54	-5.40
17877	40.79	PK	V	45.18	11.62	32.25	65.18	74	-9.04
17877	40.32	PK	H	45.18	11.62	32.25	64.94	74	-8.71

Note:

*1, The testing has been conformed to 10*2462MHz=24,620MHz*

2, All other emissions more than 30 dB below the limit

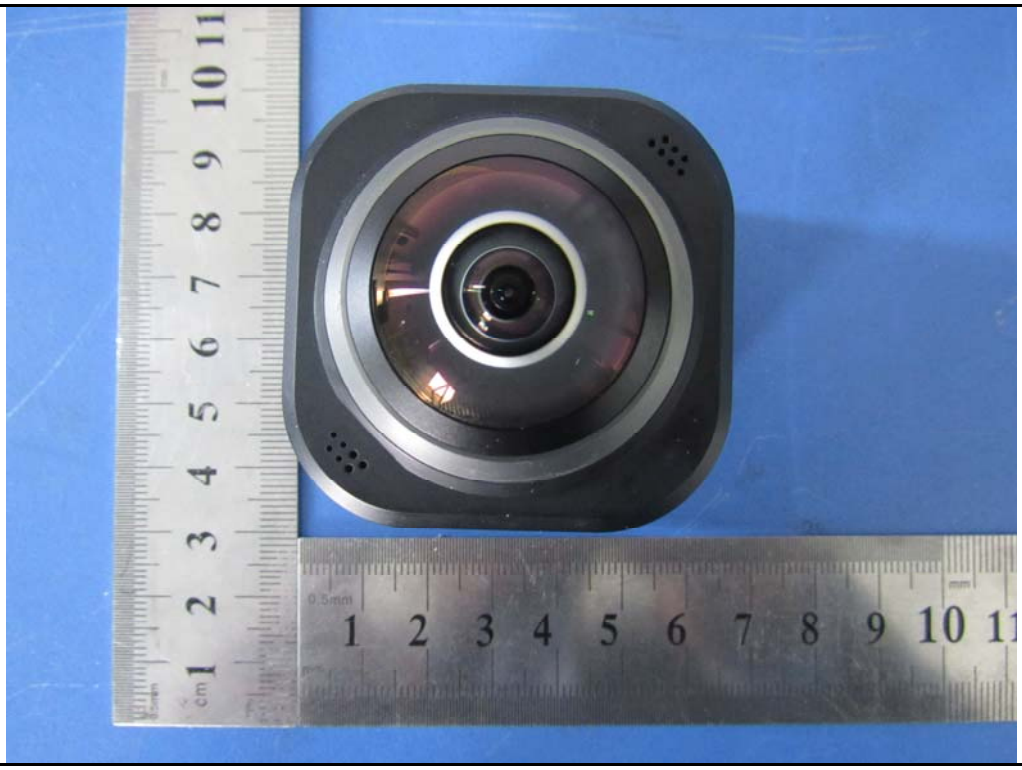
3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted Emissions					
R&S EMI Test Receiver	ESPI3	101216	03/31/2016	03/31/2017	☒
V-LISN	ESH3-Z5	838979/005	03/31/2016	03/31/2017	☒
SIEMIC EZ_EMC Conducted Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☒
RF conducted test					
R&S EMI Receiver	ESPI3	101216	03/31/2016	03/31/2017	☒
Power Splitter	1#	1#	02/02/2016	02/01/2017	☒
Spectrum Analyzer	N9010A	MY47191130	03/31/2016	03/31/2017	☒
Radiated Emissions					
Spectrum Analyzer	N9010A	MY47191130	03/31/2016	03/31/2017	☒
R&S EMI Receiver	ESPI3	101216	03/31/2016	03/31/2017	☒
Antenna (30MHz~6GHz)	JB6	A121411	10/31/2016	10/31/2017	☒
EMCO Horn Antenna (1 ~18GHz)	3115	N/A	11/15/2015	11/14/2016	☒
INFOMW Antenna (1 ~18GHz)	JXTXLB-10180	J2031081120092	10/31/2016	10/31/2017	☒
Horn Antenna (18~40GHz)	AH-840	101013	04/22/2016	04/21/2017	☒
Microwave Pre-Amp (18~40GHz)	PA-840	181250	05/29/2016	05/28/2017	☒
Hp Agilent Pre-Amplifier	8447F	1937A01160	10/30/2016	10/30/2017	☒
Agilent Technologies Pre-Amplifier (1-6G)	8449B	3008A02224	10/30/2016	10/30/2017	☒
SIEMIC EZ_EMC Radiated Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☒

Annex B. EUT and Test Setup Photographs

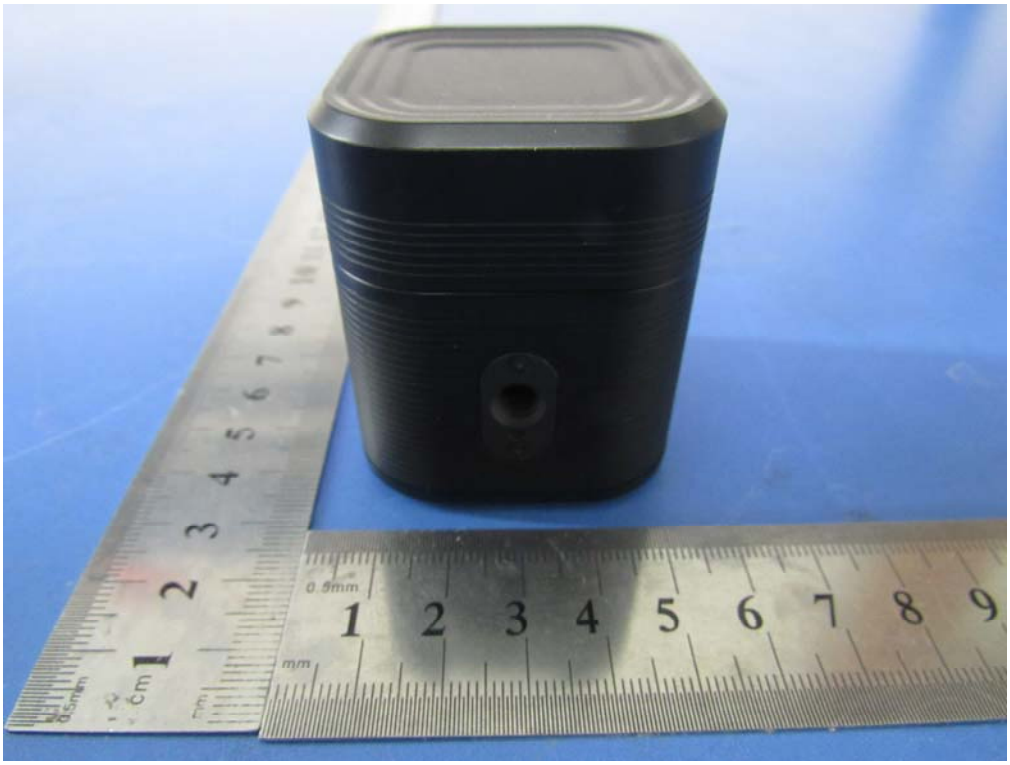
Annex B.i. Photograph: EUT External Photo



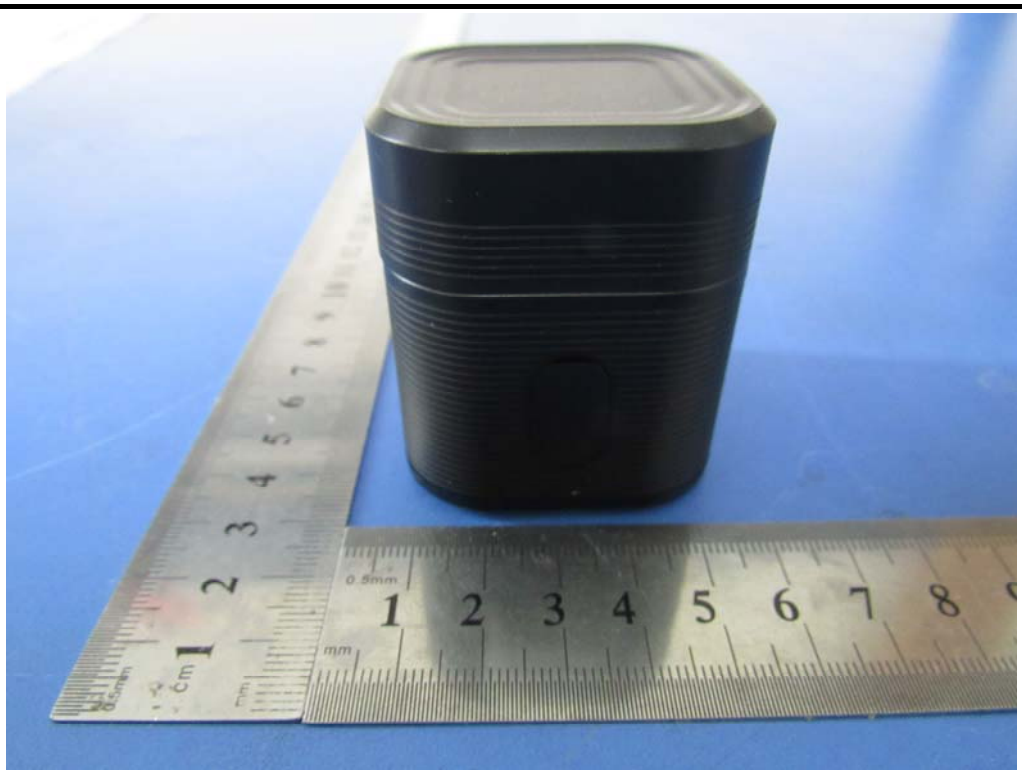
EUT - Front View

EUT - Rear View

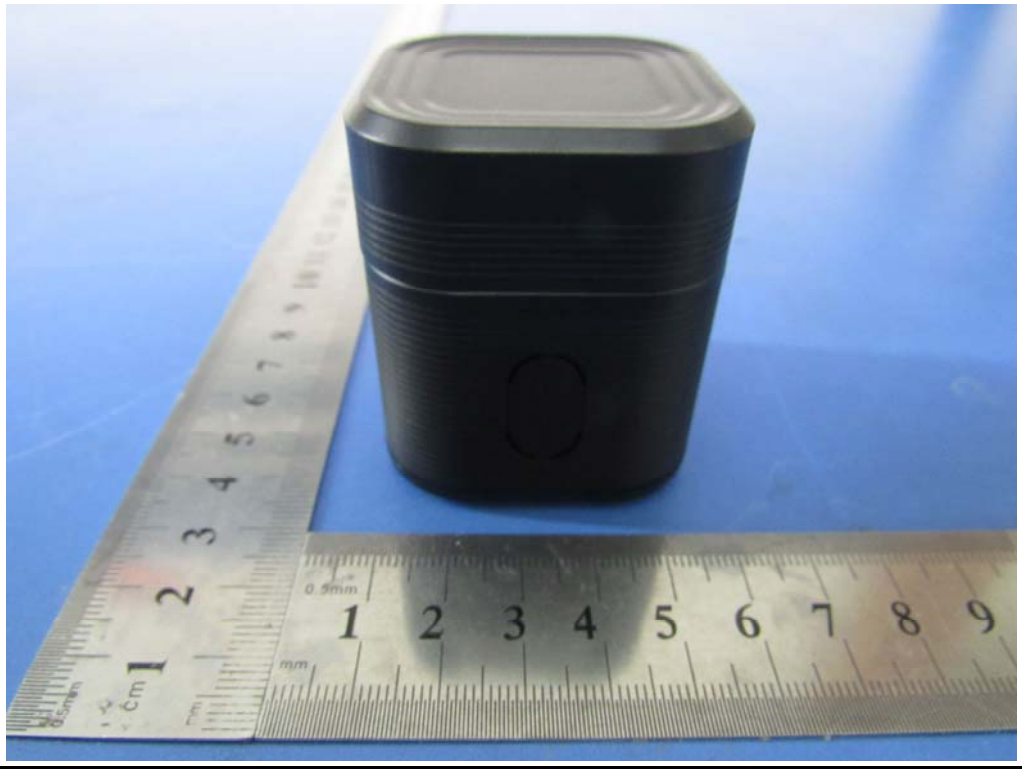
EUT - Top View



EUT - Bottom View

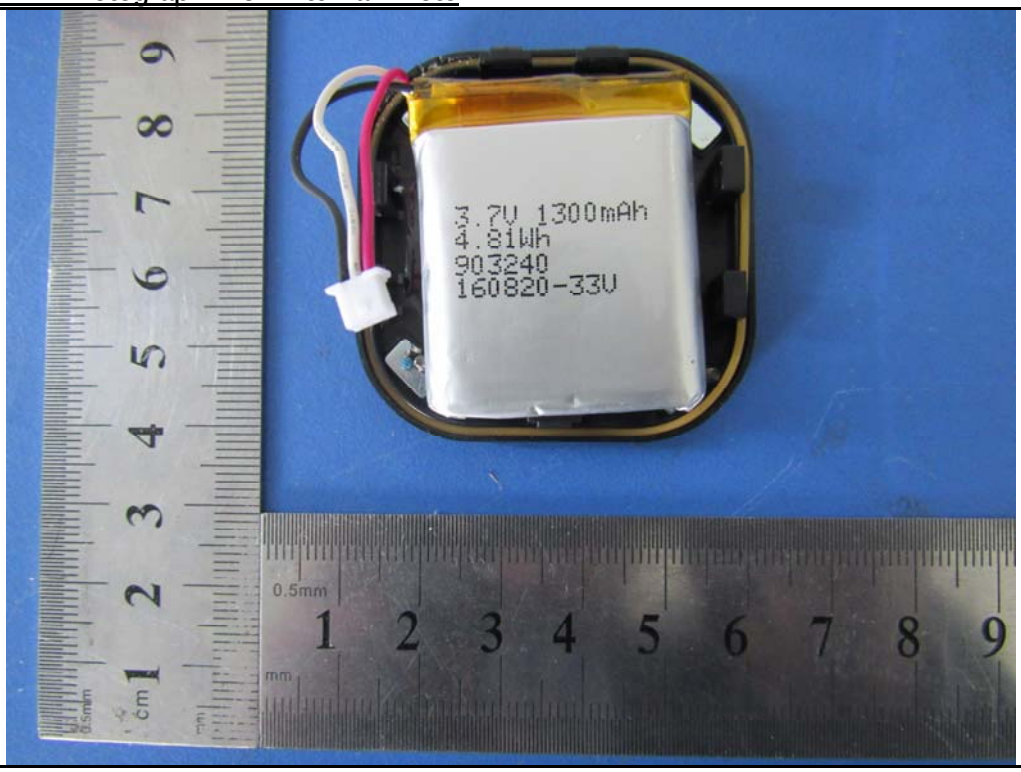


EUT - Left View

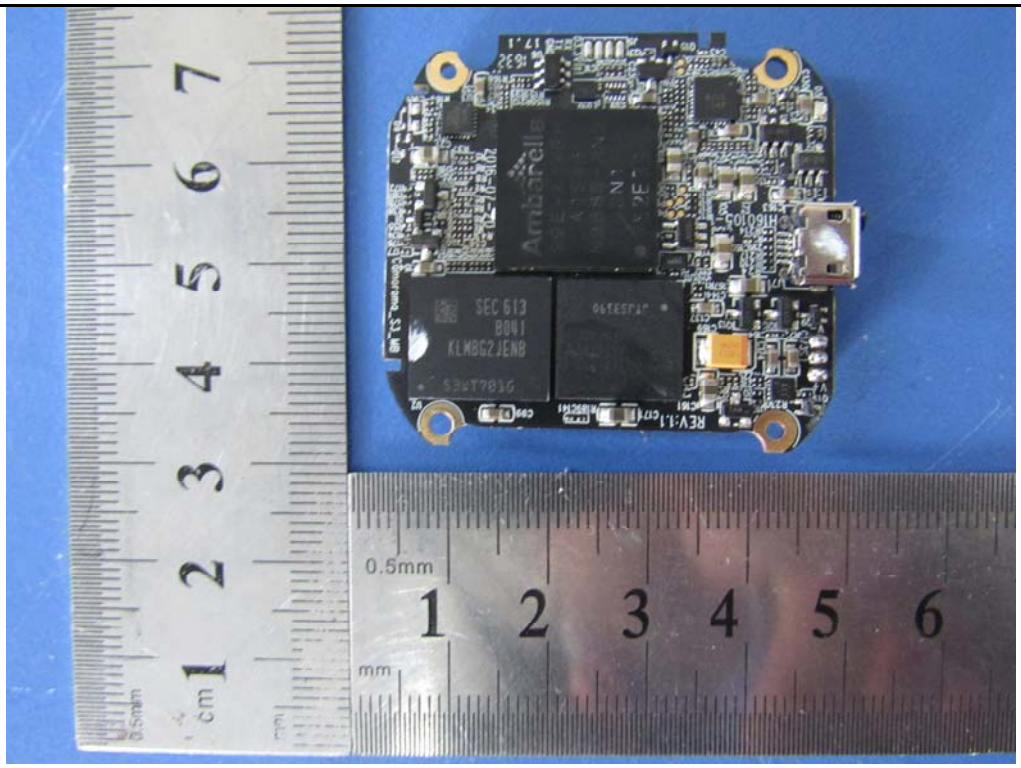


EUT - Right View

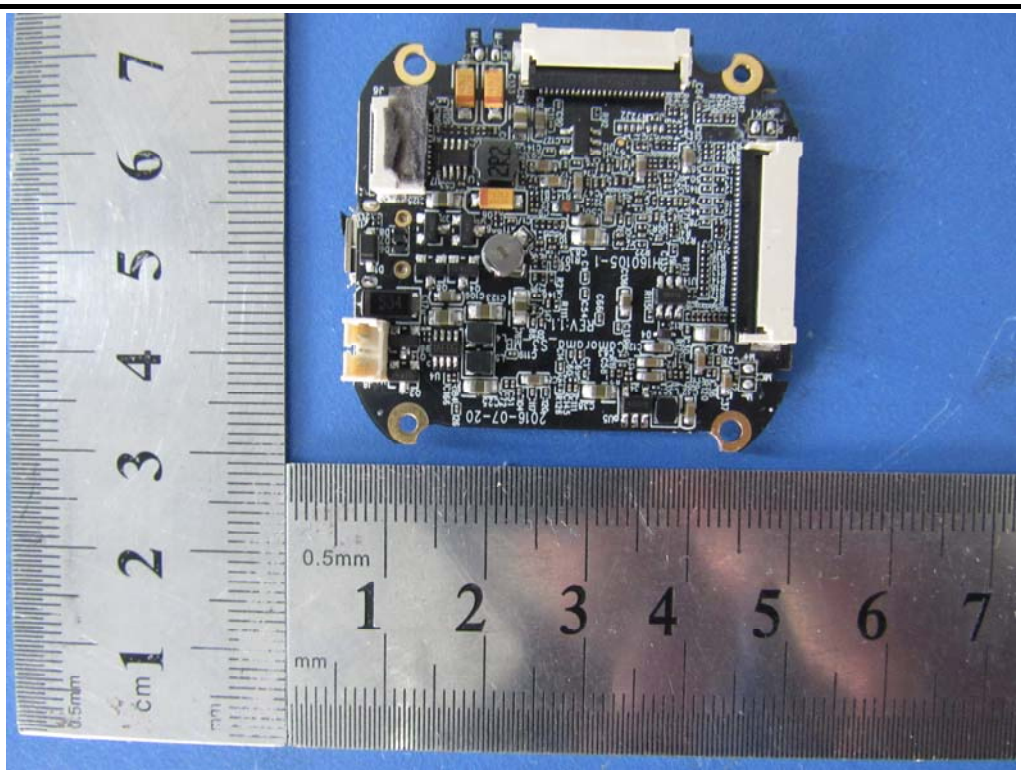
Annex B.ii. Photograph: EUT Internal Photo



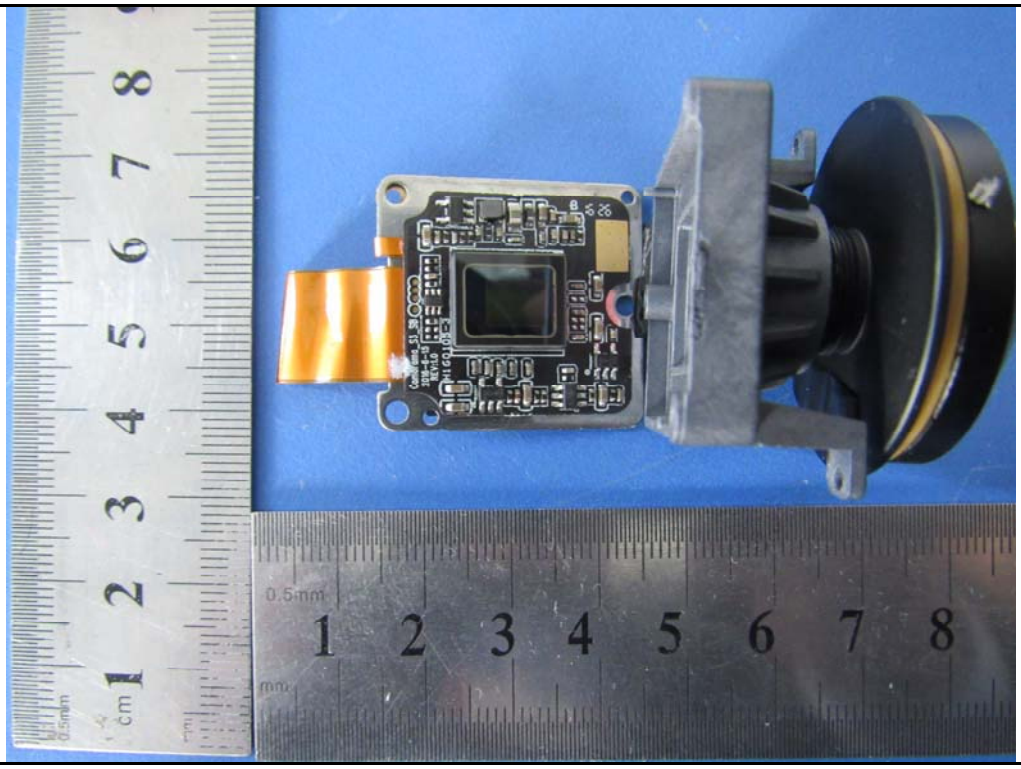
EUT Uncover – Front View



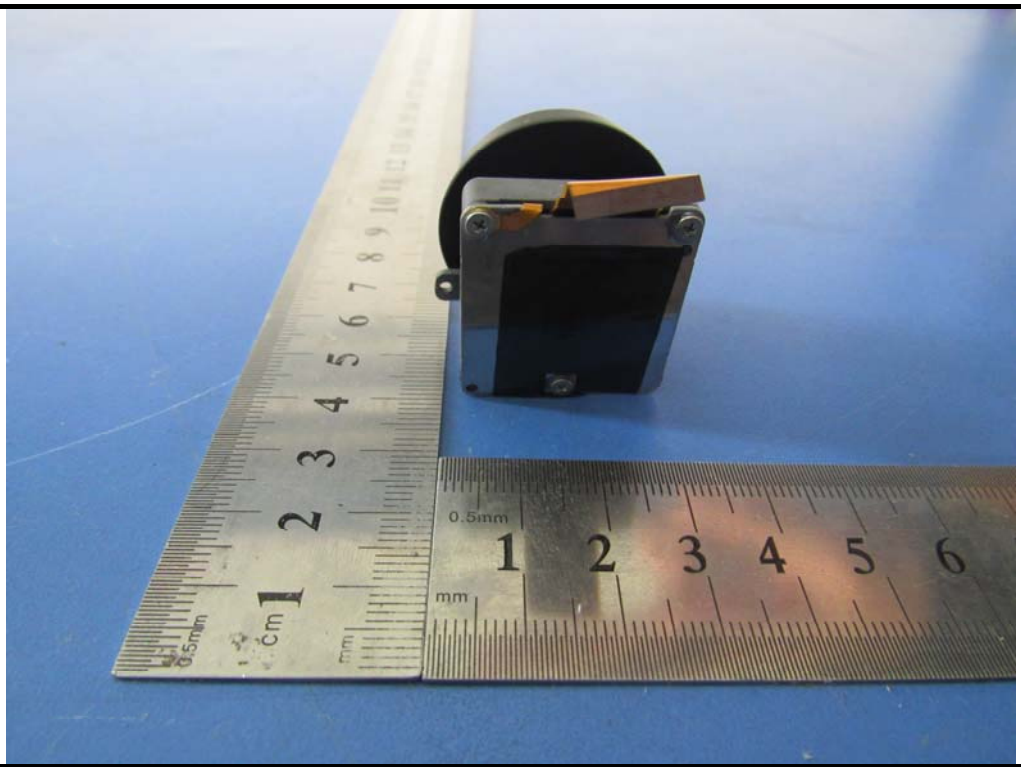
EUT – PCBA 1 Front View



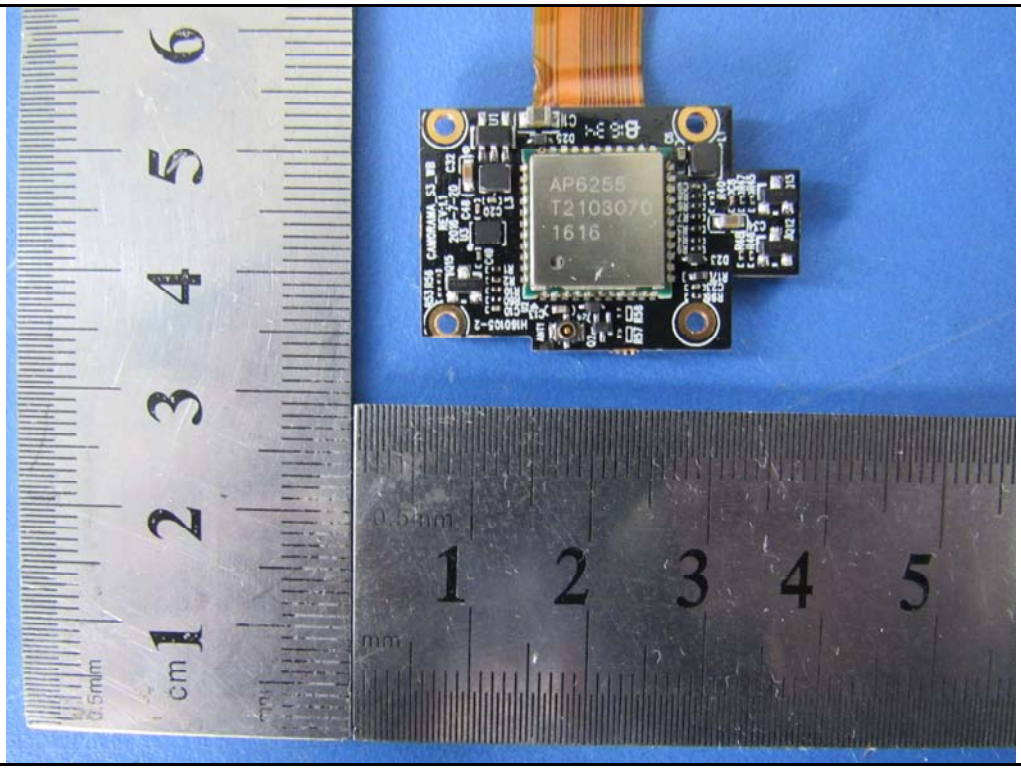
EUT – PCBA 1 Rear View



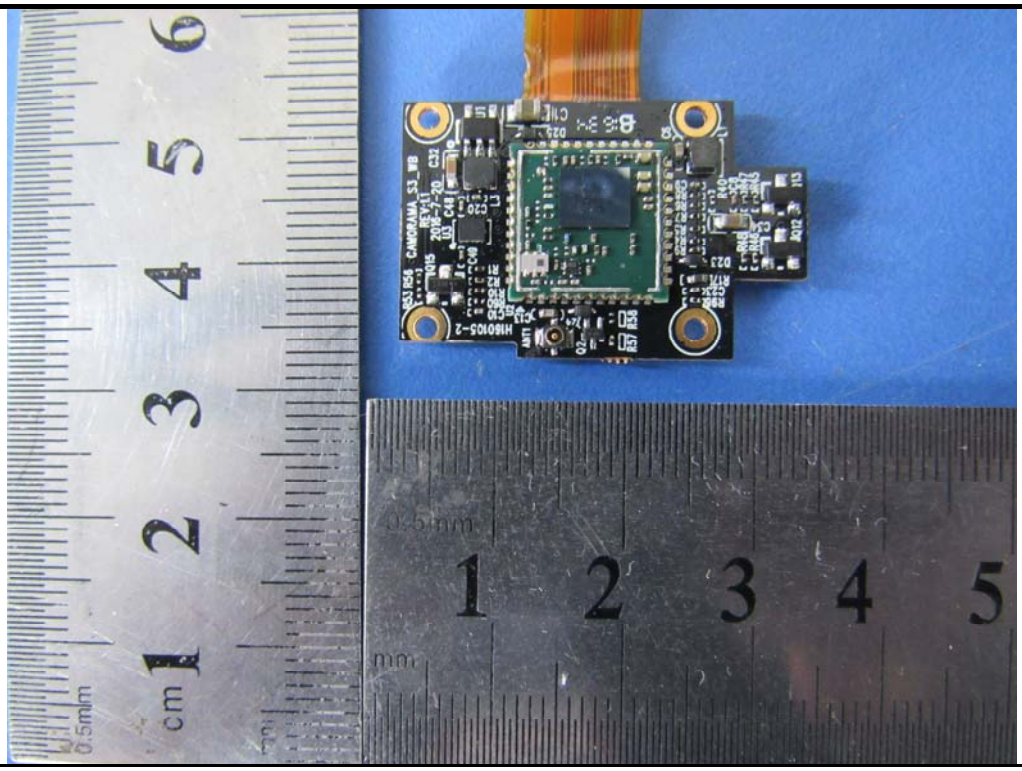
EUT – PCBA 2 Front View



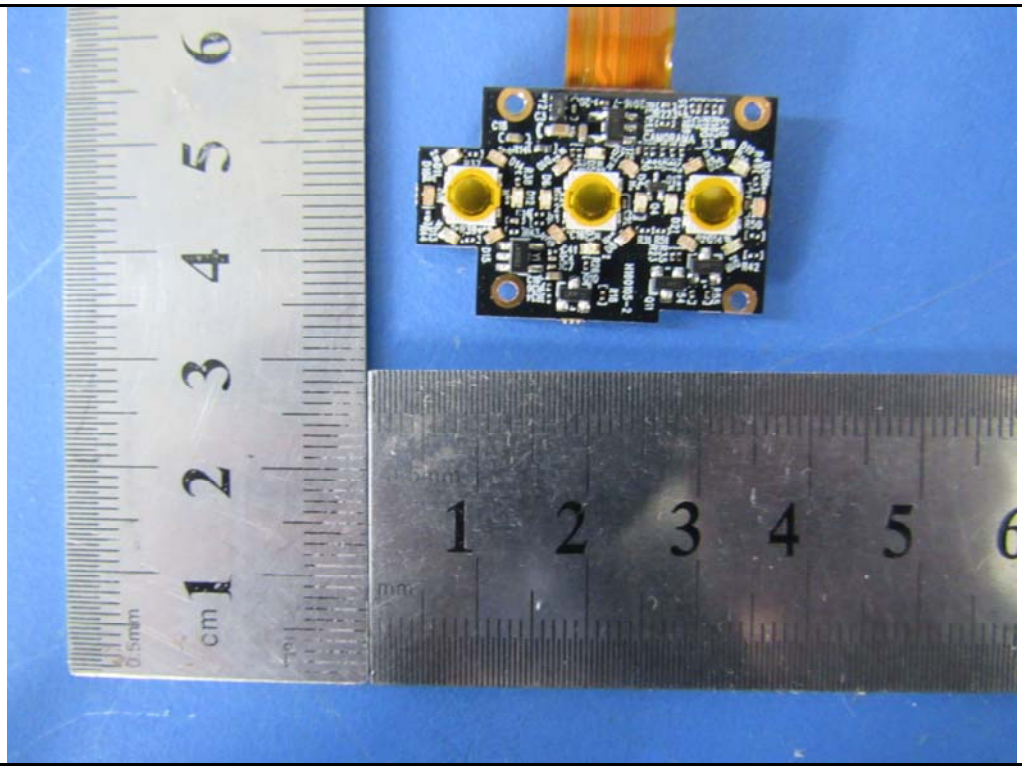
EUT – PCBA 2 Rear View



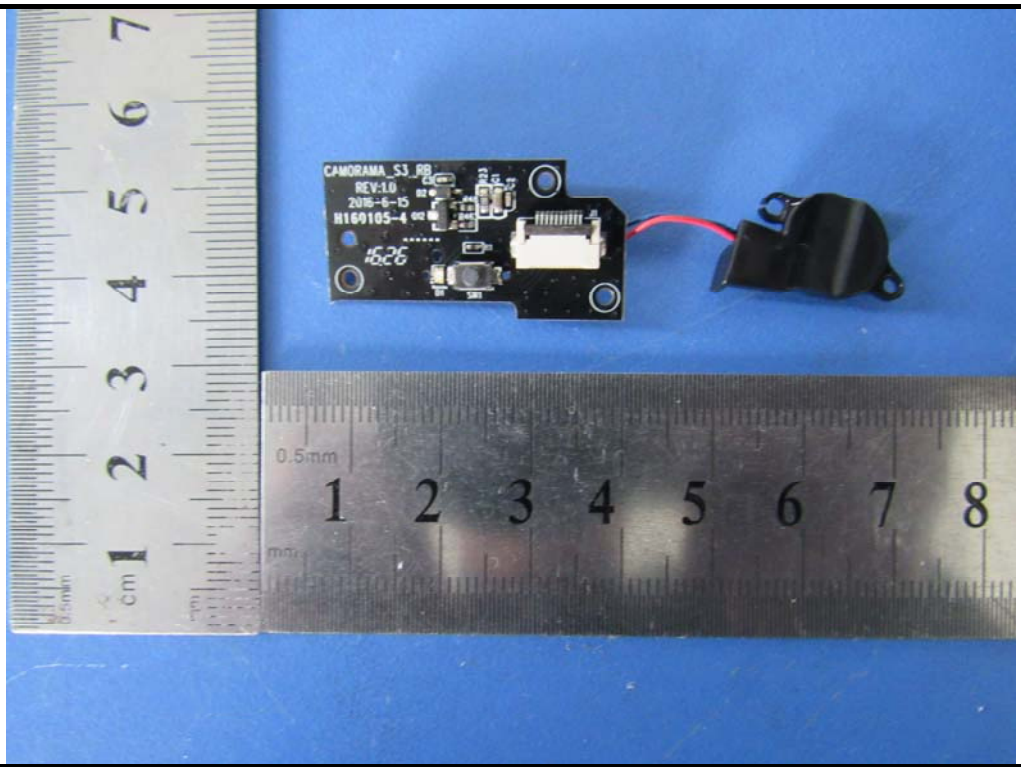
EUT – PCBA 3 Front View



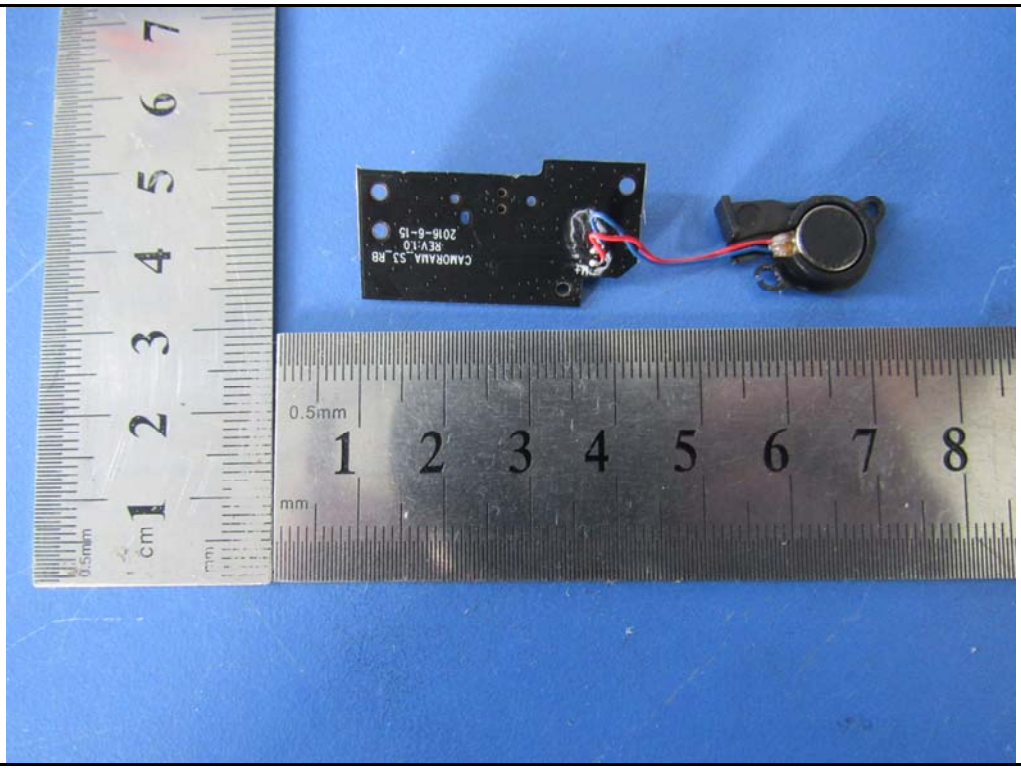
EUT – PCBA 3 Shielding off Front View



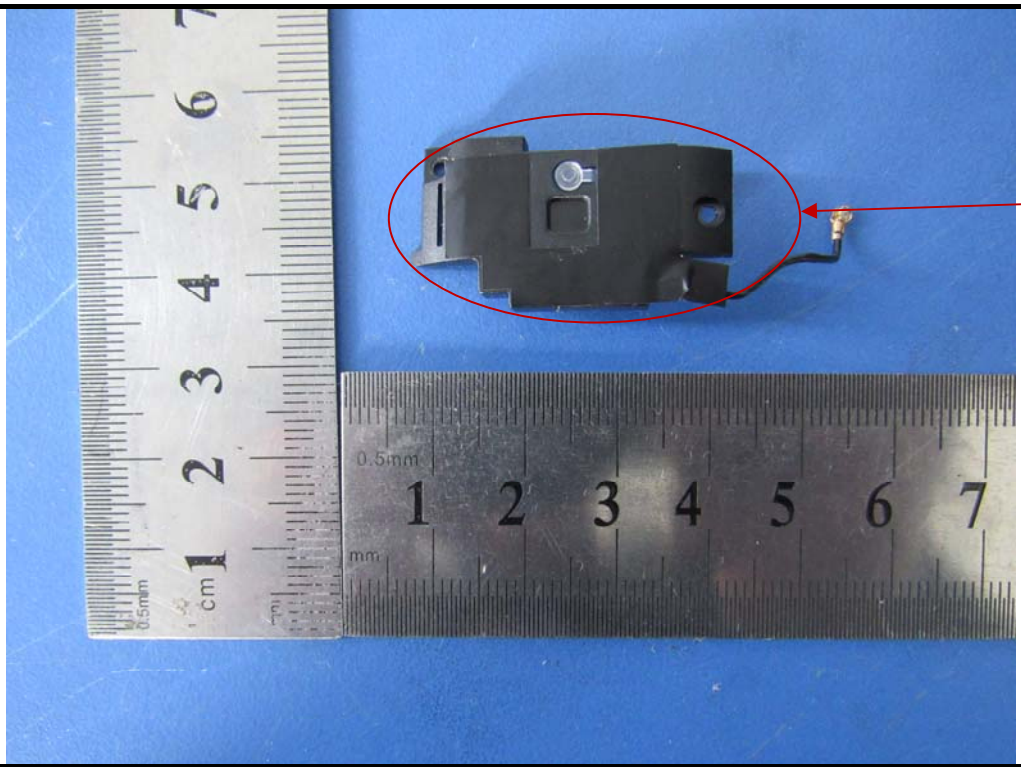
EUT – PCBA 3 Rear View



EUT – PCBA 4 Front View



EUT – PCBA 4 Rear View

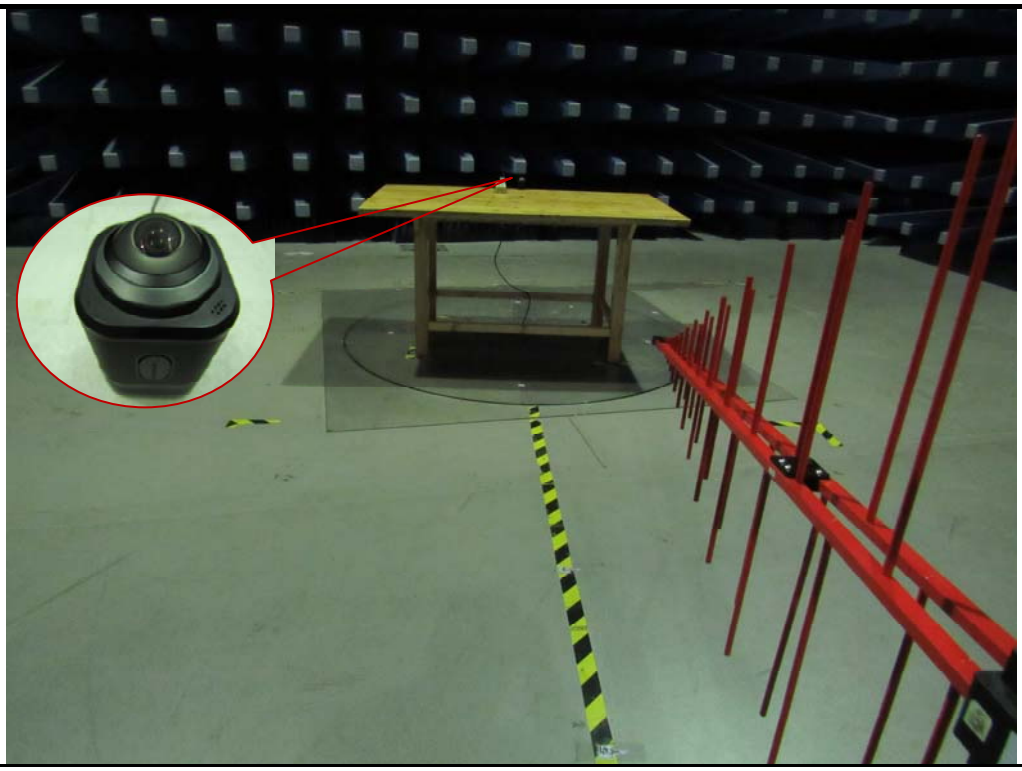


EUT – Antenna Front View

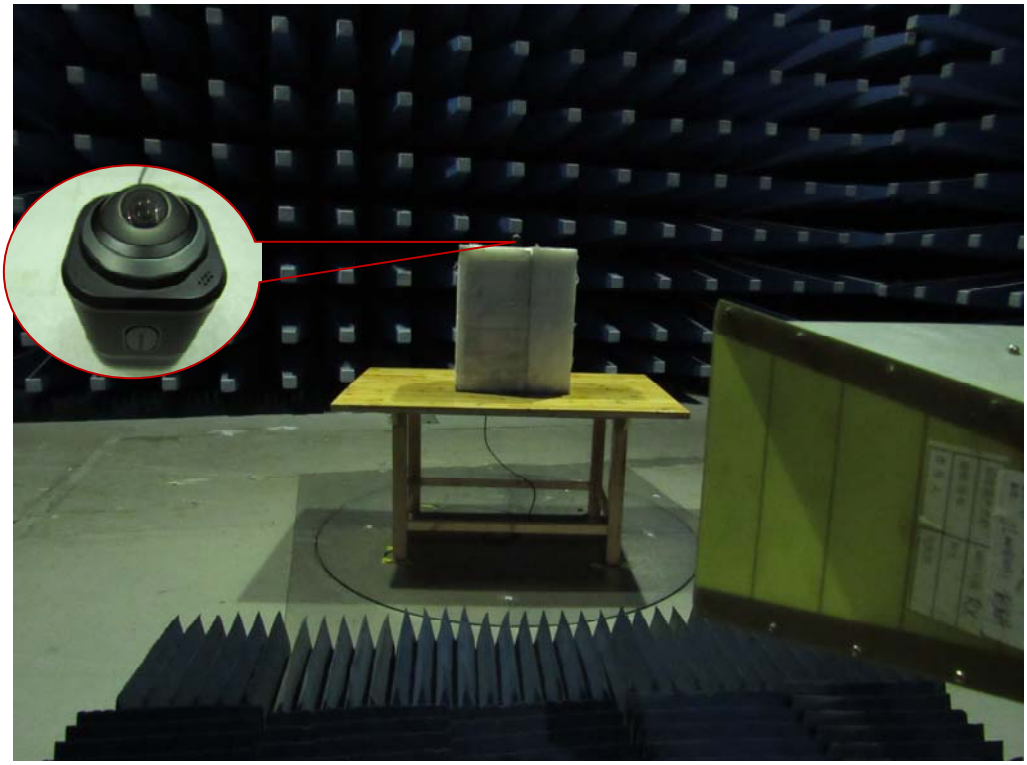
Annex B.iii. Photograph: Test Setup Photo

Conducted Emissions Test Setup Front View

Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz

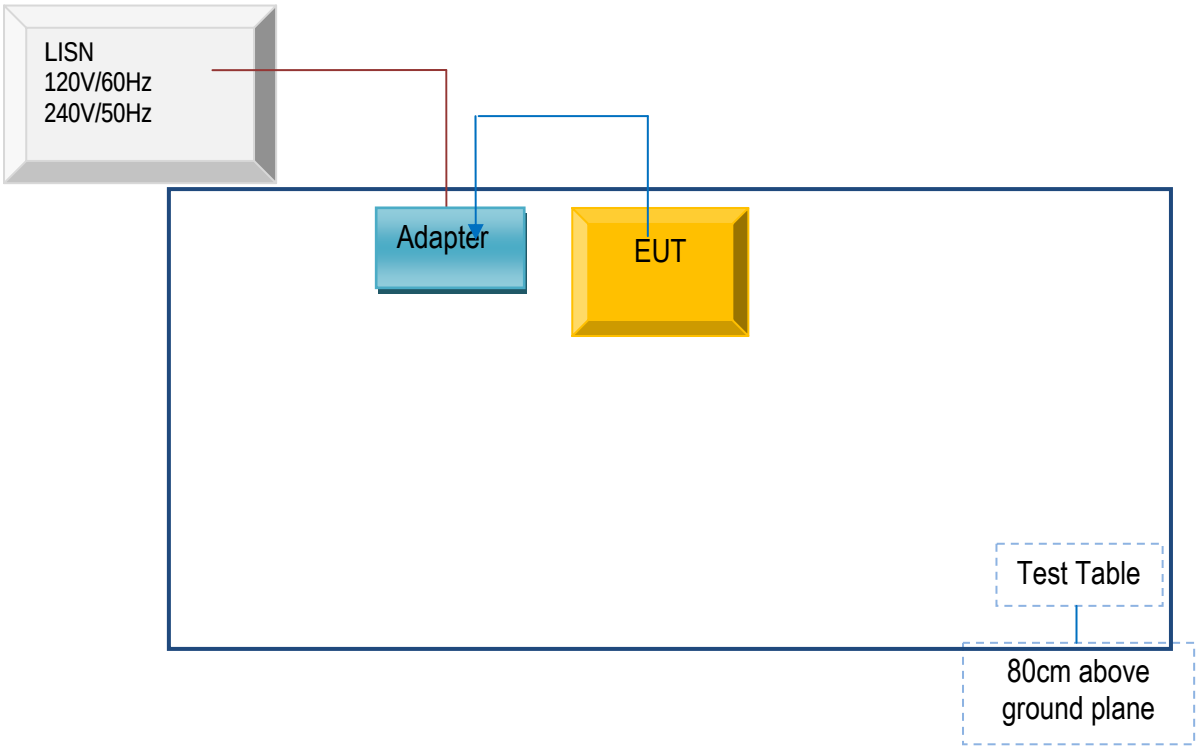


Radiated Spurious Emissions Test Setup Above 1GHz

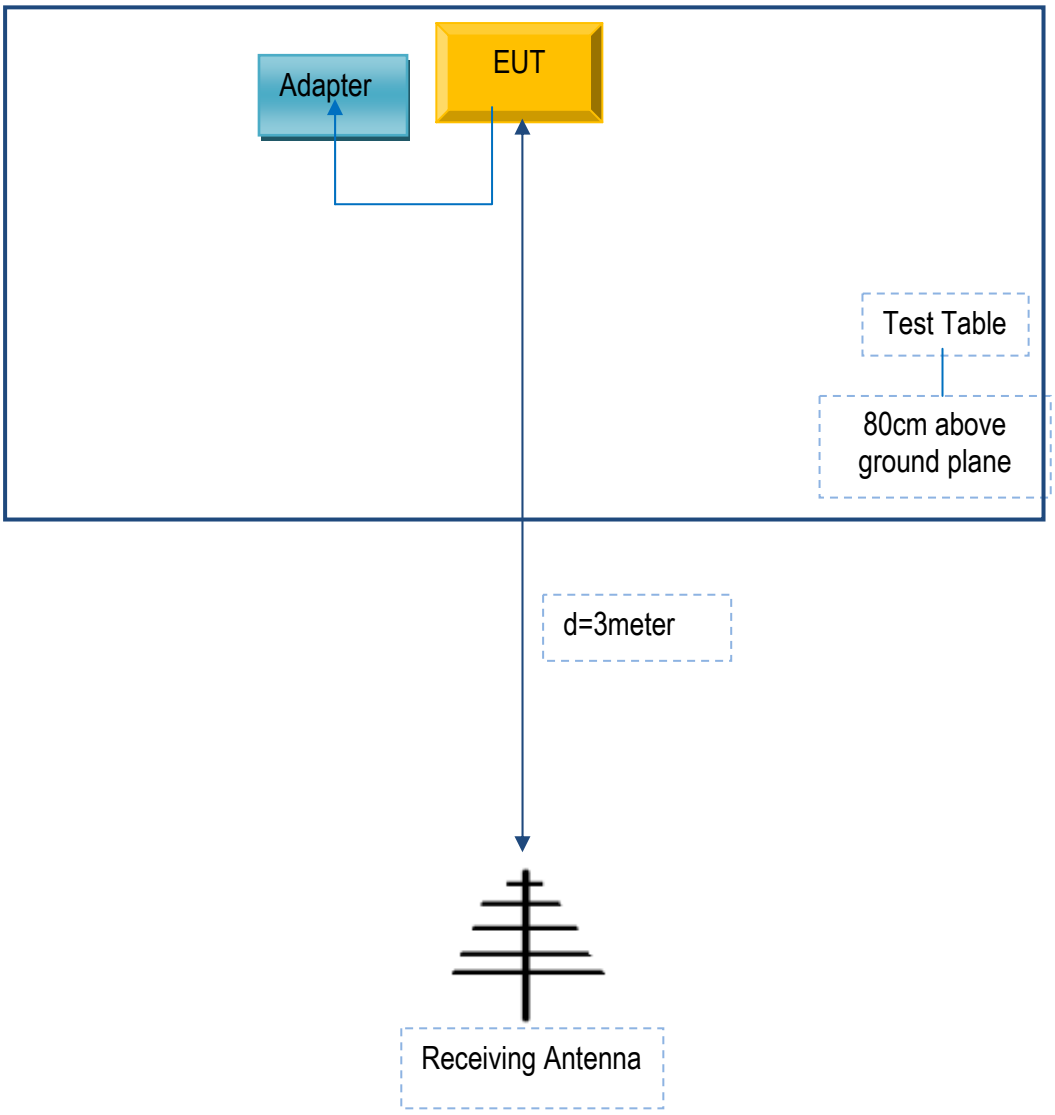
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.i. TEST SET UP BLOCK

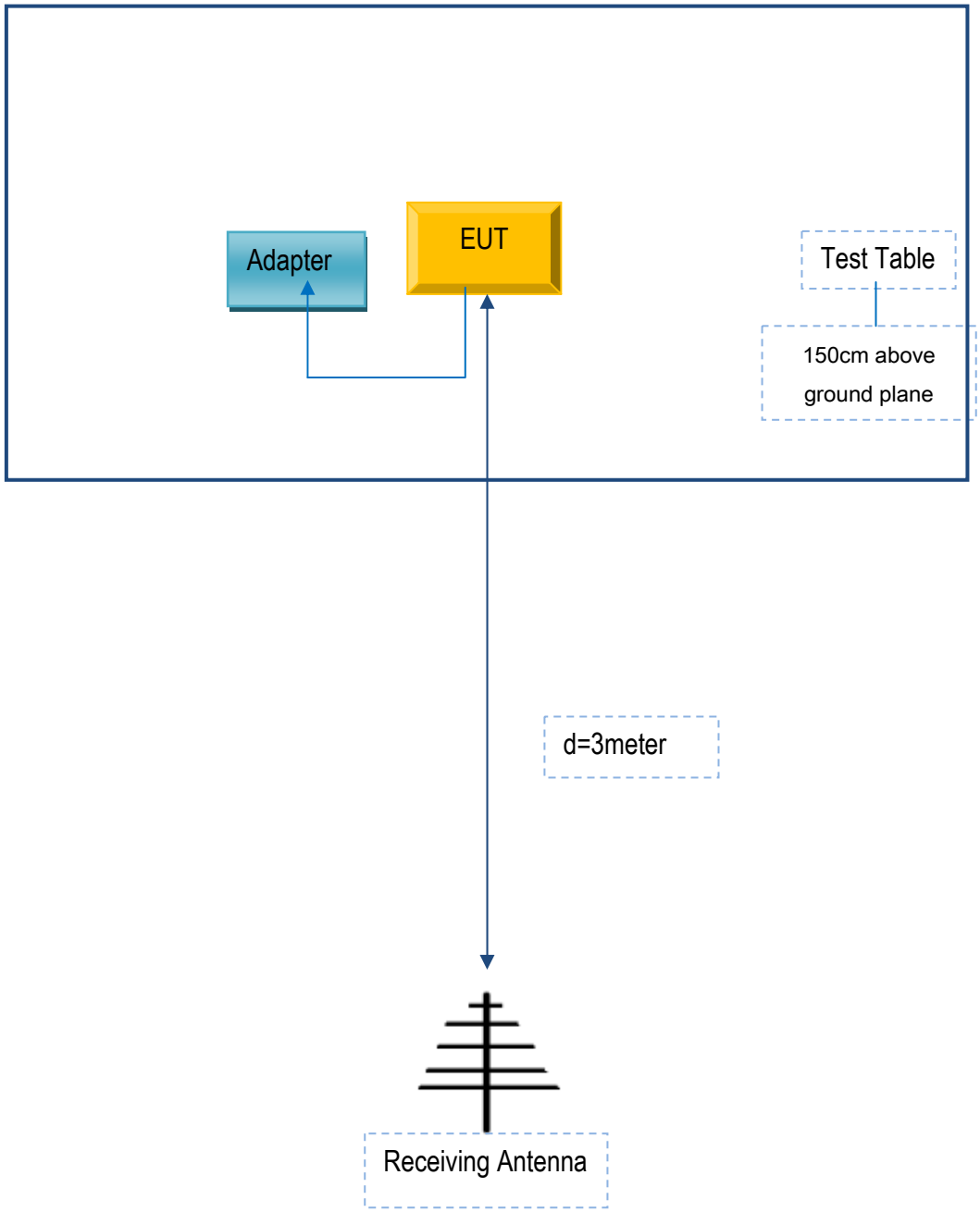
Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions （Below 1GHz）.



Block Configuration Diagram for Radiated Emissions （Above 1GHz）.



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Doublepow	Adapter	GS-0500210	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	YK84201153021

Annex D. User Manual / Block Diagram / Schematics / Partlist

See attachment

Annex E. DECLARATION OF SIMILARITY

CAMORAMA(USA)INC

20895 Currier Road Unit B Walnut, CA 91789 Los Angeles, California

Statement

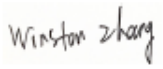
CAMORAMA(USA)INC

Product: Camorama 4K Panoramic Camera

FCC ID: 2AJ77CAMORAMA

Model: CAMO-SP1, CAMO-SP2,CAMO-SP3,CAMO-SP4,CAMO-SP5,CAMO-SP6, CAMO-SP7,CAMO-SP8 All models are all identical in interior structure, electrical circuits and components, and just model names and color are different for the marketing requirement. Your assistance on this matter is highly appreciated.

Yours sincerely,

signature : 

name / title : Winston Zhang/Manager

Contact information / address: 20895 Currier Road Unit B Walnut, CA 91789 Los Angeles, California