



**BUREAU  
VERITAS**

Test Report No.: RF180313N027



# TEST REPORT



Applicant	GUANGDONG SYMA MODEL AIRCRAFT INDUSTRIAL CO., LTD
Address	NO.2 West Xingye Road Laimei Industrial Area Chenghai Shantou Guangdong China

Manufacturer or Supplier	SHENZHEN LOGIC ELECTRONIC TECHNOLOGY CO.,LTD
Address	Floor D, 1063 of YIBEN e-commerce Industrial Park Chaguang west rode xili town ShenZhen City
Product	Wifi Camera
Brand Name	LOGIC
Model	LOG1623-SM
Additional Model & Model Difference	N/A
Date of tests	Mar.13, 2018 ~ Mar. 28, 2018

The tests have been carried out according to the requirements of the following standard:

**FCC Part 15, Subpart C, Section 15.247**

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Tested by Breeze Jiang Project Engineer / EMC Department	Approved by Glyn He Supervisor / EMC Department
	  Date: Apr. 04, 2018

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## **TABLE OF CONTENTS**

RELEASE CONTROL RECORD..... 4

1 SUMMARY OF TEST RESULTS ..... 5

2 MEASUREMENT UNCERTAINTY ..... 5

3 GENERAL INFORMATION..... 6

    3.1 GENERAL DESCRIPTION OF EUT..... 6

    3.2 DESCRIPTION OF TEST MODES..... 7

        3.2.1 CONFIGURATION OF SYSTEM UNDER TEST ..... 7

        3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL..... 7

    3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS..... 10

    3.4 DESCRIPTION OF SUPPORT UNITS..... 10

4 TEST TYPES AND RESULTS ..... 11

    4.1 RADIATED EMISSION MEASUREMENT ..... 11

        4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT ..... 11

        4.1.2 TEST INSTRUMENTS..... 12

        4.1.3 TEST PROCEDURES ..... 13

        4.1.4 DEVIATION FROM TEST STANDARD ..... 14

        4.1.5 TEST SETUP ..... 14

        4.1.6 EUT OPERATING CONDITIONS ..... 15

        4.1.7 TEST RESULTS ..... 16

    4.2 6DB BANDWIDTH MEASUREMENT ..... 21

        4.2.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT ..... 21

        4.2.2 TEST INSTRUMENTS..... 21

        4.2.3 TEST PROCEDURE ..... 21

        4.2.4 DEVIATION FROM TEST STANDARD ..... 22

        4.2.5 TEST SETUP ..... 22

        4.2.6 EUT OPERATING CONDITIONS ..... 22

        4.2.7 TEST RESULTS ..... 23

    4.3 CONDUCTED OUTPUT POWER ..... 25

        4.3.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT ..... 25

        4.3.2 TEST SETUP ..... 25

        4.3.3 TEST INSTRUMENTS..... 25

        4.3.4 TEST PROCEDURES ..... 26

        4.3.5 DEVIATION FROM TEST STANDARD ..... 26

        4.3.6 EUT OPERATING CONDITIONS ..... 26

        4.3.7 TEST RESULTS ..... 27



4.4	POWER SPECTRAL DENSITY MEASUREMENT .....	29
4.4.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	29
4.4.2	TEST SETUP .....	29
4.4.3	TEST INSTRUMENTS.....	29
4.4.4	TEST PROCEDURE .....	29
4.4.5	DEVIATION FROM TEST STANDARD .....	29
4.4.6	EUT OPERATING CONDITION .....	30
4.4.7	TEST RESULTS .....	30
4.5	OUT OF BAND EMISSION MEASUREMENT .....	32
4.5.1	LIMITS OF OUT OF BAND EMISSION MEASUREMENT .....	32
4.5.2	TEST SETUP .....	32
4.5.3	TEST INSTRUMENTS.....	32
4.5.4	TEST PROCEDURE .....	32
4.5.5	DEVIATION FROM TEST STANDARD .....	33
4.5.6	EUT OPERATING CONDITION .....	33
4.5.7	TEST RESULTS .....	34
5	PHOTOGRAPHS OF THE TEST CONFIGURATION .....	36
6	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	37



**BUREAU**  
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Test Report No.: RF180313N027

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF180313N027	Original release	Apr. 04, 2018



## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	N/A	Powered by Battery
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used

## 2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Radiated emissions	9KHz ~ 30MHz	2.90dB
	30MHz ~ 1GMHz	3.83dB
	1GHz ~ 18GHz	4.93dB
	18GHz ~ 40GHz	4.80dB

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



### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Wifi Camera
<b>MODEL NO.</b>	LOG1623-SM
<b>ADDITIONAL NO.</b>	N/A
<b>FCC ID</b>	QV7-LOG1623SM
<b>NOMINAL VOLTAGE</b>	DC 3.7V from Li-ion Battery
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM
<b>OPERATING FREQUENCY</b>	2412MHz for 11b/g/n(HT20)
<b>PEAK OUTPUT POWER</b>	20.62dBm(Maximum)
<b>ANTENNA TYPE</b>	Wire Antenna, with 2.0dBi gain
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	N/A

**NOTE:**

1. The EUT provides completed transmitters and receivers:

MODULATION MODE	FUNCTION
802.11b	1TX/1RX
802.11g	1TX/1RX
802.11n (HT20)	1TX/1RX

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
- Please refer to the EUT photo document (Reference No.: 180313N027) for detailed product photo.
- The EUT is WiFi module, if no any accessories, the test standard were specified by client.



### 3.2 DESCRIPTION OF TEST MODES

1channel is provided for 802.11b, 802.11g and 802.11n(HT20):

CHANNEL	FREQUENCY
1	2412 MHz

#### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photographs of the test configuration for reference.

#### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports.  
 The worst case was found when positioned on X axis for radiated emission. Following test modes were selected for the final test, and the final worst case is marked in boldface and recorded in the report:

EUT CONFIGURE MODE	APPLICABLE TO				MODE
	RE<1G	RE≥1G	PLC	APCM	
-	√	√	-	√	Powered by Fully Battery with WIFI Link

Where **RE<1G**: Radiated Emission below 1GHz      **RE≥1G**: Radiated Emission above 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

#### RADIATED EMISSION TEST (BELOW 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel was selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1	1	OFDM	DBPSK	1.0



**RADIATED EMISSION TEST (ABOVE 1GHz):**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

Following channel was selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1	1	CCK	DBPSK	1.0
-	802.11g	1	1	CCK	DBPSK	1.0
-	802.11n HT20	1	1	OFDM	BPSK	6.5

**BANDEDGE MEASUREMENT:**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel was selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1	1	CCK	DBPSK	1.0
-	802.11g	1	1	CCK	DBPSK	1.0
-	802.11n HT20	1	1	OFDM	BPSK	6.5

**ANTENNA PORT CONDUCTED MEASUREMENT:**

This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel was selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1	1	CCK	DBPSK	1.0
-	802.11g	1	1	CCK	DBPSK	1.0
-	802.11n HT20	1	1	OFDM	BPSK	6.5





**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	23deg. C, 53%RH	DC 3.7V from Fully Battery	Eric Fang
RE≥1G	23deg. C, 53%RH	DC 3.7V from Fully Battery	Eric Fang
PLC	N/A	N/A	N/A
APCM	20deg. C, 55%RH	DC 3.7V from Fully Battery	Hardy

**REMARKS:**

The Wifi camera shell is removed for test in this report because the camera will be shipped with different shell material. The shell material does not cause deviations to test result and won't affect performance in practice.



### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

- FCC Part 15, Subpart C, Section 15.247**
- KDB 558074 D01 DTS Meas Guidance v04**
- ANSI C63.10-2013**

All test items have been performed and recorded as per the above standards.

### 3.4 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.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Li-ion Battery	N/A	DC3.7V	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A



## 4 TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



#### 4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 11,18	Mar. 10,19
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	Nov. 04,17	Nov. 03,18
Active Loop Antenna (9KHz -30MHz)	SCHWARZBECK	FMZB 1519B	1519B-045	May 31,17	May 30,18
Amplifier (9KHz -1GHz)	Burgeon	BPA-530	100210	Apr. 05,17	Apr. 04,18
Bilog Antenna (20MHz -2GHz)	Teseq	CBL 6111D	30643	Jul. 28, 17	Jul. 27, 18
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 19,17	May 18,18
Horn Antenna (18GHz -40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Mar. 15,18	Mar. 14,19
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Mar. 06,18	Mar. 05,19
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
Broadband Preamplifier (1GHz~18GHz)	SCHWARZBECK	BBV9718	305	Mar. 06,18	Mar. 05,19
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 08,17	Nov. 07,18
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A

**NOTE:**

1. The test was performed in 966 Chamber.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 749762.



#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- g. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

#### **NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes, the worst-case test configuration was reported on the file test setup photo.

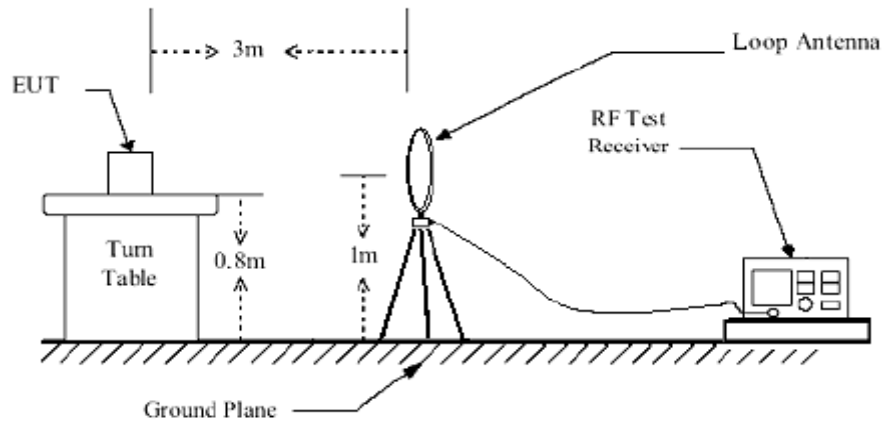


#### 4.1.4 DEVIATION FROM TEST STANDARD

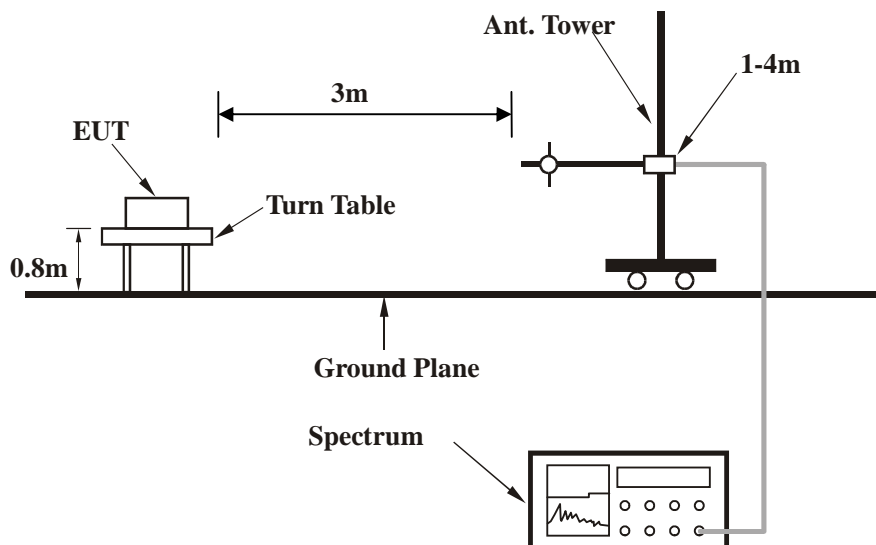
No deviation.

#### 4.1.5 TEST SETUP

##### Below 30MHz test setup



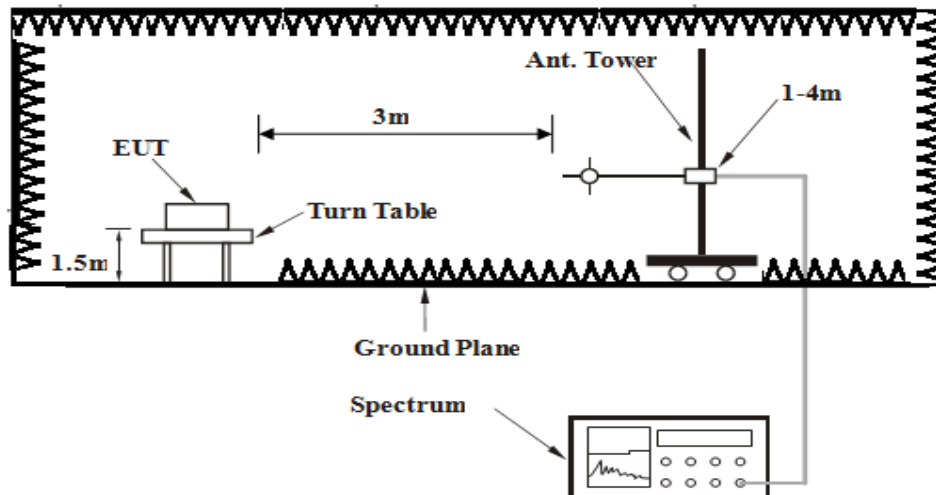
##### Below 1GHz test setup



**Note:** For the actual test configuration, please refer to the attached file (Test Setup Photo).



### Above 1GHz test setup



**Note:** For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

- Placed the EUT on a testing table.
- Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the EUT in full functions.



### 4.1.7 TEST RESULTS

#### BELOW 1GHz WORST-CASE DATA:

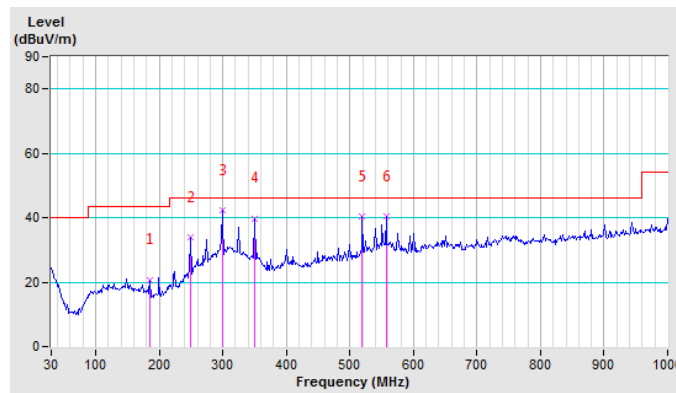
##### 802.11b

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	185.45	20.78 QP	43.50	-22.72	1.50 H	152	33.86	-13.08
2	249.18	33.93 QP	46.00	-12.07	1.50 H	325	42.71	-8.78
3	298.93	42.39 QP	46.00	-3.61	1.50 H	251	49.52	-7.13
4	350.22	39.81 QP	46.00	-6.19	1.50 H	85	44.10	-4.29
5	519.66	40.41 QP	46.00	-5.59	1.50 H	112	39.99	0.42
6	556.97	40.32 QP	46.00	-5.68	1.50 H	164	37.85	2.47

#### REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.





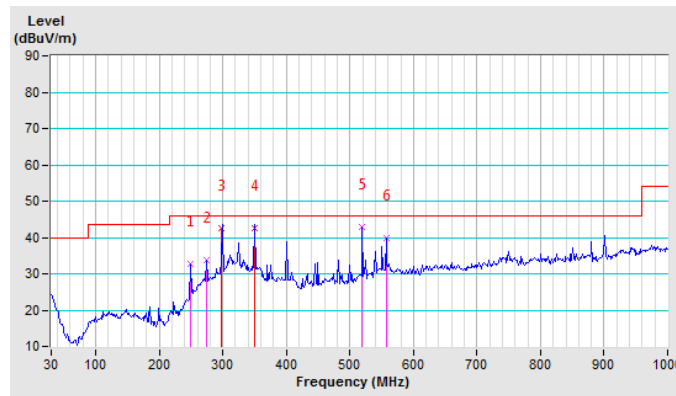


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	249.18	32.74 QP	46.00	-13.26	2.00 V	105	41.52	-8.78
2	274.05	33.66 QP	46.00	-12.34	2.00 V	20	41.42	-7.76
3	298.68	42.61 QP	46.00	-3.39	1.02 V	44	49.75	-7.14
4	350.24	42.59 QP	46.00	-3.41	1.30 V	117	46.88	-4.29
5	519.66	42.90 QP	46.00	-3.10	2.00 V	119	42.48	0.42
6	556.97	39.84 QP	46.00	-6.16	2.00 V	260	37.37	2.47

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.





ABOVE 1GHz DATA

802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.62 PK	74.00	-17.38	1.30 H	89	53.52	3.10
2	2390.00	45.69 AV	54.00	-8.31	1.30 H	89	42.59	3.10
3	*2412.00	110.68 PK			1.30 H	245	107.51	3.17
4	*2412.00	101.11 AV			1.30 H	245	97.94	3.17
5	4824.00	57.85 PK	74.00	-16.15	1.30 H	245	51.75	6.10
6	4824.00	49.25 AV	54.00	-4.75	1.30 H	245	43.15	6.10
7	#7236.00	56.69 PK	74.00	-17.31	1.30 H	247	45.18	11.51
8	#7236.00	43.58 AV	54.00	-10.42	1.30 H	247	32.07	11.51

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	53.57 PK	74.00	-20.43	1.24 V	58	50.47	3.10
2	2390.00	42.25 AV	54.00	-11.75	1.24 V	58	39.15	3.10
3	*2412.00	103.68 PK			1.35 V	248	100.51	3.17
4	*2412.00	95.98 AV			1.35 V	248	92.81	3.17
5	4824.00	54.24 PK	74.00	-19.76	1.20 V	145	48.14	6.10
6	4824.00	48.58 AV	54.00	-5.42	1.20 V	145	42.48	6.10
7	#7236.00	57.25 PK	74.00	-16.75	1.02 V	144	45.74	11.51
8	#7236.00	43.28 AV	54.00	-10.72	1.02 V	144	31.77	11.51

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



802.11g

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	72.54 PK	74.00	-1.46	1.20 H	258	69.44	3.10
2	2390.00	52.85 AV	54.00	-1.15	1.20 H	258	49.75	3.10
3	*2412.00	109.68 PK			1.30 H	269	106.51	3.17
4	*2412.00	94.58 AV			1.30 H	269	91.41	3.17
5	4824.00	52.49 PK	74.00	-21.51	1.24 H	158	46.39	6.10
6	4824.00	39.68 AV	54.00	-14.32	1.24 H	158	33.58	6.10
7	#7236.00	55.54 PK	74.00	-18.46	1.20 H	103	44.03	11.51
8	#7236.00	45.21 AV	54.00	-8.79	1.20 H	103	33.70	11.51

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.37 PK	74.00	-11.63	1.20 V	145	59.27	3.10
2	2390.00	44.23 AV	54.00	-9.77	1.20 V	145	41.13	3.10
3	*2412.00	102.21 PK			1.25 V	248	99.04	3.17
4	*2412.00	91.24 AV			1.25 V	248	88.07	3.17
5	4824.00	50.24 PK	74.00	-23.76	1.20 V	158	44.14	6.10
6	4824.00	41.02 AV	54.00	-12.98	1.20 V	158	34.92	6.10
7	#7236.00	54.57 PK	74.00	-19.43	1.30 V	251	43.06	11.51
8	#7236.00	43.27 AV	54.00	-10.73	1.30 V	251	31.76	11.51

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band



**802.11n HT20**

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	73.23 PK	74.00	-0.77	1.20 H	258	70.13	3.10
2	<b>2390.00</b>	<b>53.74 AV</b>	<b>54.00</b>	<b>-0.26</b>	<b>1.20 H</b>	<b>258</b>	<b>50.64</b>	<b>3.10</b>
3	*2412.00	108.25 PK			1.32 H	258	105.08	3.17
4	*2412.00	95.98 AV			1.32 H	258	92.81	3.17
5	4824.00	51.27 PK	74.00	-22.73	1.30 H	269	45.17	6.10
6	4824.00	42.25 AV	54.00	-11.75	1.30 H	269	36.15	6.10
7	#7236.00	56.36 PK	74.00	-17.64	1.30 H	249	44.85	11.51
8	#7236.00	45.57 AV	54.00	-8.43	1.30 H	249	34.06	11.51

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.59 PK	74.00	-13.41	1.22 V	248	57.49	3.10
2	2390.00	43.69 AV	54.00	-10.31	1.22 V	248	40.59	3.10
3	*2412.00	100.58 PK			1.30 V	258	97.41	3.17
4	*2412.00	90.24 AV			1.30 V	258	87.07	3.17
5	4824.00	54.27 PK	74.00	-19.73	1.35 V	281	48.17	6.10
6	4824.00	40.13 AV	54.00	-13.87	1.35 V	281	34.03	6.10
7	#7236.00	56.38 PK	74.00	-17.62	1.35 V	28	44.87	11.51
8	#7236.00	42.57 AV	54.00	-11.43	1.35 V	28	31.06	11.51

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



## 4.2 6dB BANDWIDTH MEASUREMENT

### 4.2.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

### 4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Sensor	Keysight	U2021XA	MY55060016	May 19,17	May 18,18
Power Sensor	Keysight	U2021XA	MY55060018	May 19,17	May 18,18
Power Meter	Anritsu	ML2495A	1139001	Nov. 04,17	Nov. 03,18
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 21, 17	Oct.20, 18
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.05,17	Sep. 04,18
Oscilloscope	Agilent	DSO9254A	MY51260160	Nov. 08,17	Nov. 07,18
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 04,17	Nov. 03,18
Signal Generator	Agilent	N5183A	MY50140980	Jan. 02,18	Jan. 01,19
Agile Signal Generator	Agilent	8645A	Agilent	Sep.01, 17	Aug.31, 18
Spectrum Analyzer	Keysight	N9020A	MY55400499	Apr. 10,17	Apr. 09,18
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Jan. 02,18	Jan. 01,19
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A	N/A
DC Source	Keysight	E3642A	MY56146098	N/A	N/A

**NOTE:**

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 4.2.3 TEST PROCEDURE

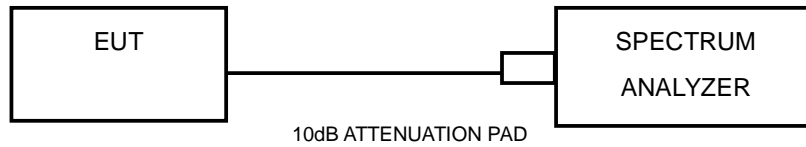
1. Set resolution bandwidth (RBW) = 100KHz
2. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



#### 4.2.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



#### 4.2.7 TEST RESULTS

##### 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.65	0.5	PASS

##### 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.56	0.5	PASS

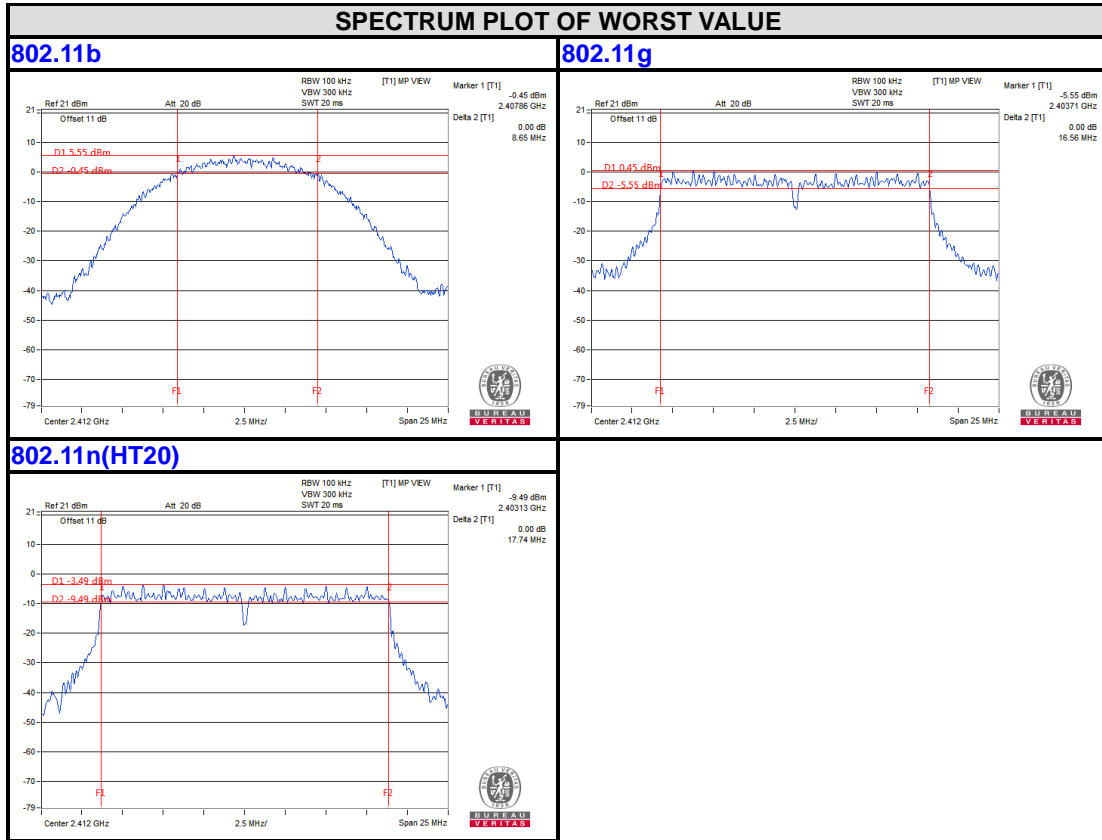
##### 802.11n HT20

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.74	0.5	PASS



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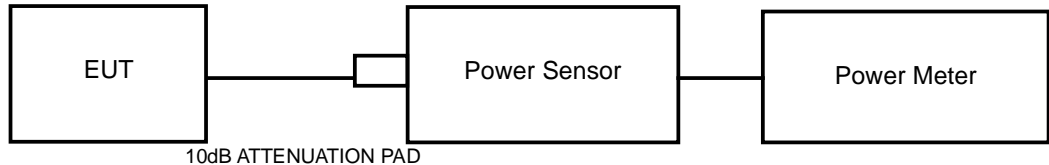


### 4.3 CONDUCTED OUTPUT POWER

#### 4.3.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm).

#### 4.3.2 TEST SETUP



#### 4.3.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Sensor	Keysight	U2021XA	MY55060016	May 19,17	May 18,18
Power Sensor	Keysight	U2021XA	MY55060018	May 19,17	May 18,18
Power Meter	Anritsu	ML2495A	1139001	Nov. 04,17	Nov. 03,18
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 21, 17	Oct.20, 18
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.05,17	Sep. 04, 18
Oscilloscope	Agilent	DSO9254A	MY51260160	Nov. 08,17	Nov. 07,18
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 04,17	Nov. 03,18
Signal Generator	Agilent	N5183A	MY50140980	Nov. 04,17	Nov. 03,18
Agile Signal Generator	Agilent	8645A	Agilent	Sep.01, 17	Aug.31, 18
Spectrum Analyzer	Keysight	N9020A	MY55400499	Apr. 10,17	Apr. 09,18
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Dec.05, 17	Dec. 04, 18
Attenuator	MINI	BW-S10W2+	S130129FGE 2	N/A	N/A
DC Source	Keysight	E3642A	MY56146098	N/A	N/A

**NOTE:**

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.



#### 4.3.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A peak power meter was used to read the response of the peak power sensor. Record the peak power level.

#### 4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



### 4.3.7 TEST RESULTS

#### MAXIMUM PEAK OUTPUT POWER

##### 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	20.62	115.345	1	PASS

##### 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	19.86	96.828	1	PASS

##### 802.11n HT20

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	16.08	40.551	1	PASS



### AVERAGE OUTPUT POWER (FOR REFERENCE)

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

#### 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
1	2412	14.58	28.708

#### 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
1	2412	12.06	16.069

#### 802.11n HT20

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
1	2412	8.19	6.592

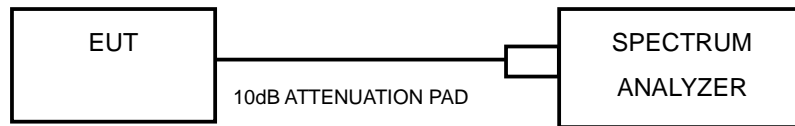


## 4.4 POWER SPECTRAL DENSITY MEASUREMENT

### 4.4.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm/3KHz.

### 4.4.2 TEST SETUP



### 4.4.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.4.4 TEST PROCEDURE

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set span to at least 1.5 times the OBW.
- c) Set RBW to: 3KHz
- d) Set VBW  $\geq 3 \times$  RBW.
- e) Detector = peak
- f) Ensure that the number of measurement points in the sweep  $\geq 2 \times$  span/RBW.
- g) Sweep time = auto couple.
- h) Use the peak marker function to determine the maximum amplitude level.

### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.



#### 4.4.6 EUT OPERATING CONDITION

Same as item 4.3.6.

#### 4.4.7 TEST RESULTS

##### 802.11b

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-9.68	8.00	PASS

##### 802.11g

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-14.19	8.00	PASS

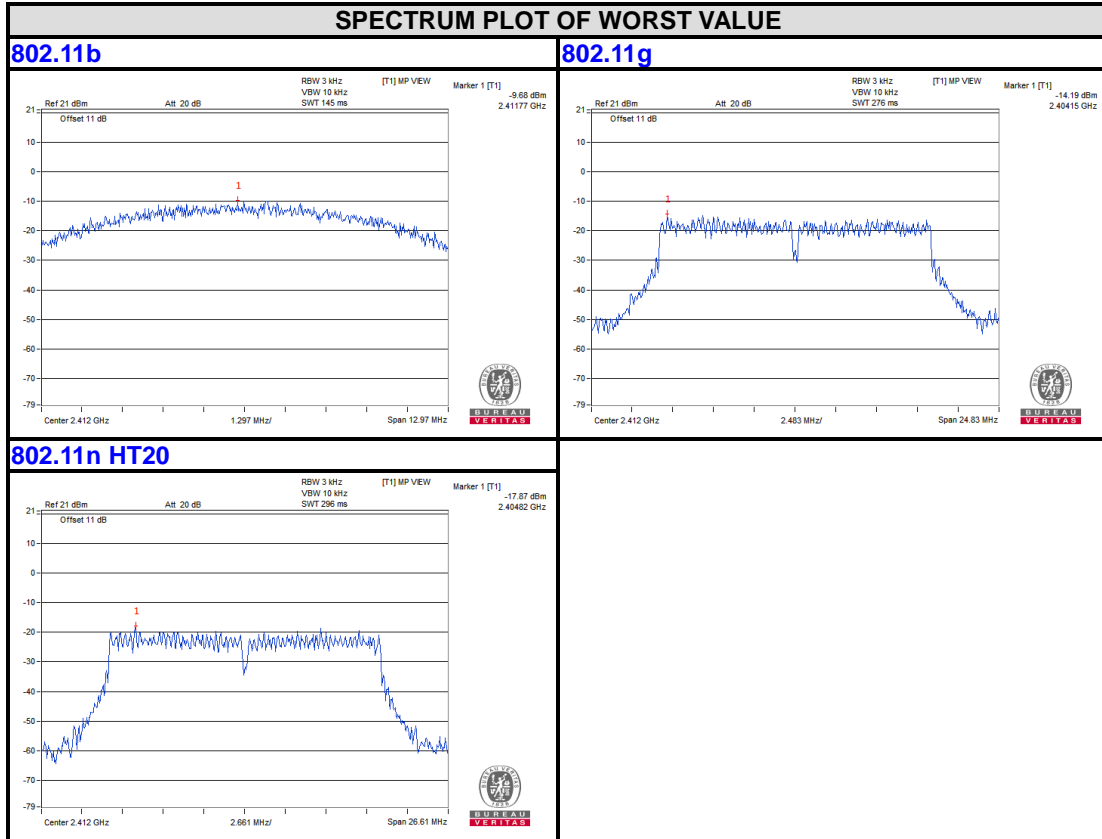
##### 802.11n HT20

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-17.87	8.00	PASS



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## 4.5 OUT OF BAND EMISSION MEASUREMENT

### 4.5.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below  $-20\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.5.2 TEST SETUP



### 4.5.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.5.4 TEST PROCEDURE

#### Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.





### Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

#### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

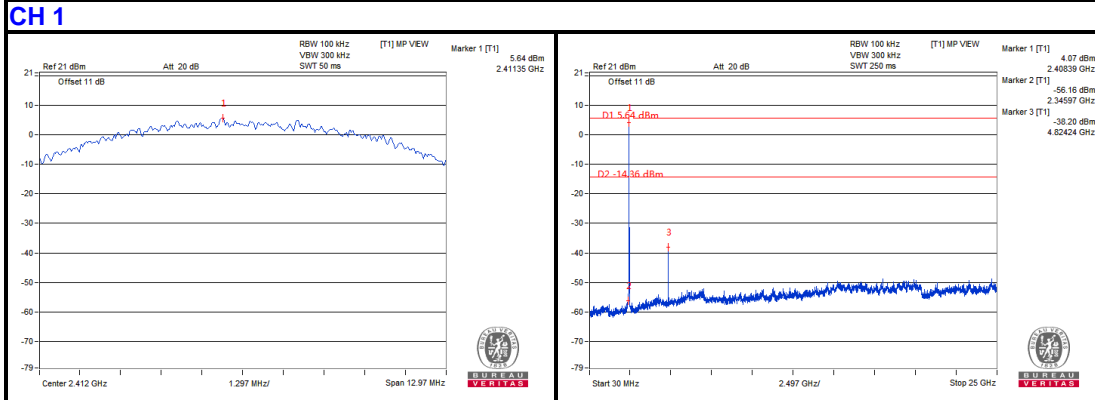
#### 4.5.6 EUT OPERATING CONDITION

Same as item 4.3.6

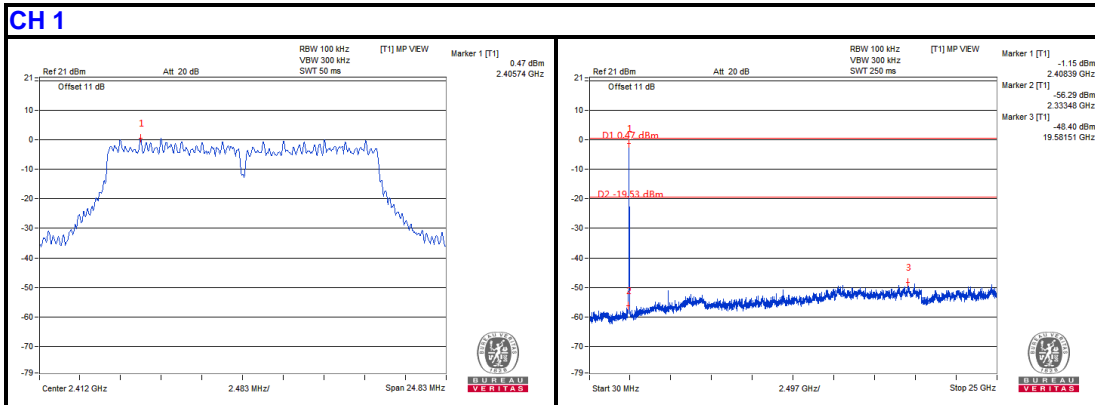


### 4.5.7 TEST RESULTS

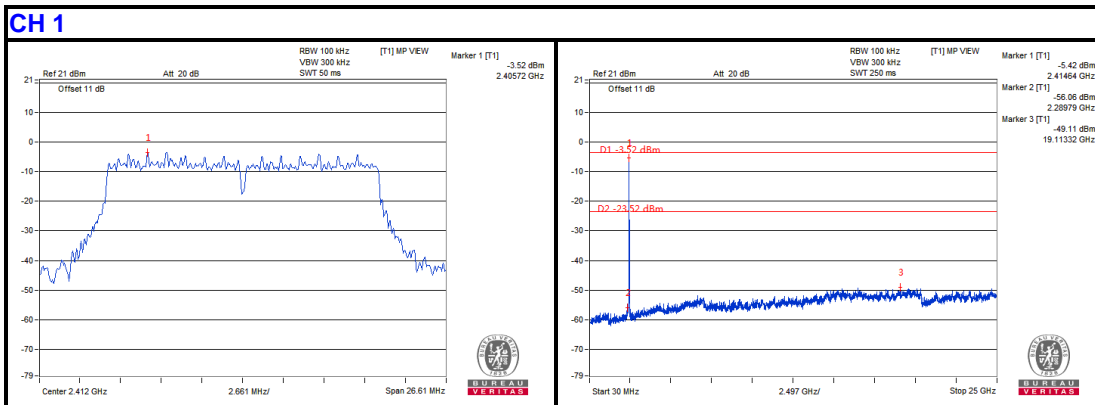
#### 802.11b



#### 802.11g



#### 802.11n HT20

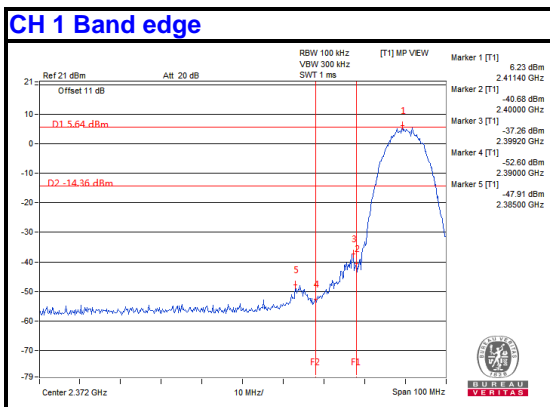




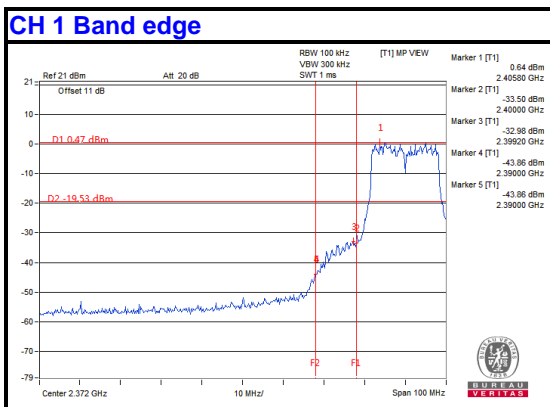
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Test Report No.: RF180313N027

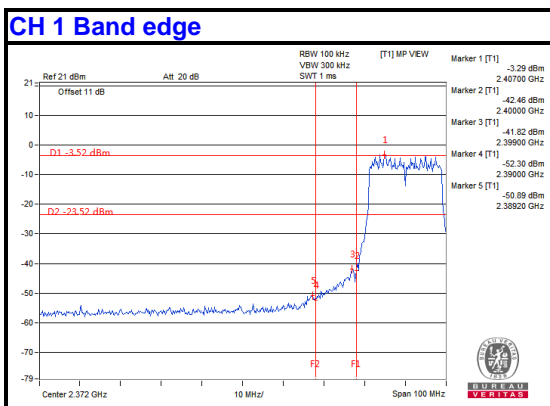
### 802.11b



### 802.11g



### 802.11n HT20



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## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



## **6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**