

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	GUANGDONG SYMA MODEL AIRCRAFT INDUSTRIAL CO., LTD
Address	NO.2 West Xingye Road Laimei Industrial Area Chenghai Shantou Guangdong China
Product	DRONE
Brand Name	Syma
Model	Z4W
Additional Model & Model Difference	Z5W, see item 3.1
Date of tests	Apr. 29, 2023 ~ May 05, 2023

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 Eric Fang Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department
	

Date: Jun. 14, 2023

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Test Report No.: RF2303WDG0185-2

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2303WDG0185-2	Original release	Jun. 14, 2023

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	Antenna connector is i-pex not a standard connector.

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	2.80dB
	30MHz ~ 1GMHz	4.24dB
	1GHz ~ 18GHz	4.76dB
	18GHz ~ 40GHz	4.50dB

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

PRODUCT	DRONE
BRAND	Syma
MODEL NO.	Z4W
ADDITIONAL NO.	Z5W
FCC ID	QV7-GC88752-88
NOMINAL VOLTAGE	Airplane: DC 3.7V From Li-ion Battery Battery charging: DC 5V From USB
MODULATION TECHNOLOGY	DSSS, OFDM
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
OPERATING FREQUENCY	2412MHz for 11b/g/n(HT20)
PEAK OUTPUT POWER	53.703 mW(Maximum)
ANTENNA TYPE	Dimple Antenna, with -0.76dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB Line: Unshielded, Detachable, 0.6m

NOTES:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.
2. Please refer to the EUT photo document (Reference No.: 2303WDG0185-2) for detailed product photo.
3. Additional model Z5W is identical with the test model Z4W except the appearance and model number for trading purpose.
4. Z4W and Z5W are the model sold in combination with airplane and remote control, and EUT refers to airplane in this report
5. The EUT provides completed transmitters and receivers:

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

3.2 DESCRIPTION OF TEST MODES

1 channels 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, power supply voltage range 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	
A	√	√	-	√	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(s) was (were) selected for the final test as listed below.

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

For the test results, only the worst case was shown in test report.

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(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1	1	DSSS	DBPSK	1.0
A	802.11g	1	1	OFDM	BPSK	6.0
A	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(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1	1	DSSS	DBPSK	1.0
A	802.11g	1	1	OFDM	BPSK	6.0
A	802.11n HT20	1	1	OFDM	BPSK	6.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER(POE)	TESTED BY
RE<1G	25deg. C, 53%RH	DC 3.7V from Fully Battery	Stalker
RE≥1G	25deg. C, 53%RH	DC 3.7V from Fully Battery	Stalker
APCM	25deg. C, 60%RH	DC 3.7V from Fully Battery	Vincent

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 15.247 Meas Guidance v05r02

ANSI C63.10-2013

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

3.4 DESCRIPTION OF SUPPORT UNITS

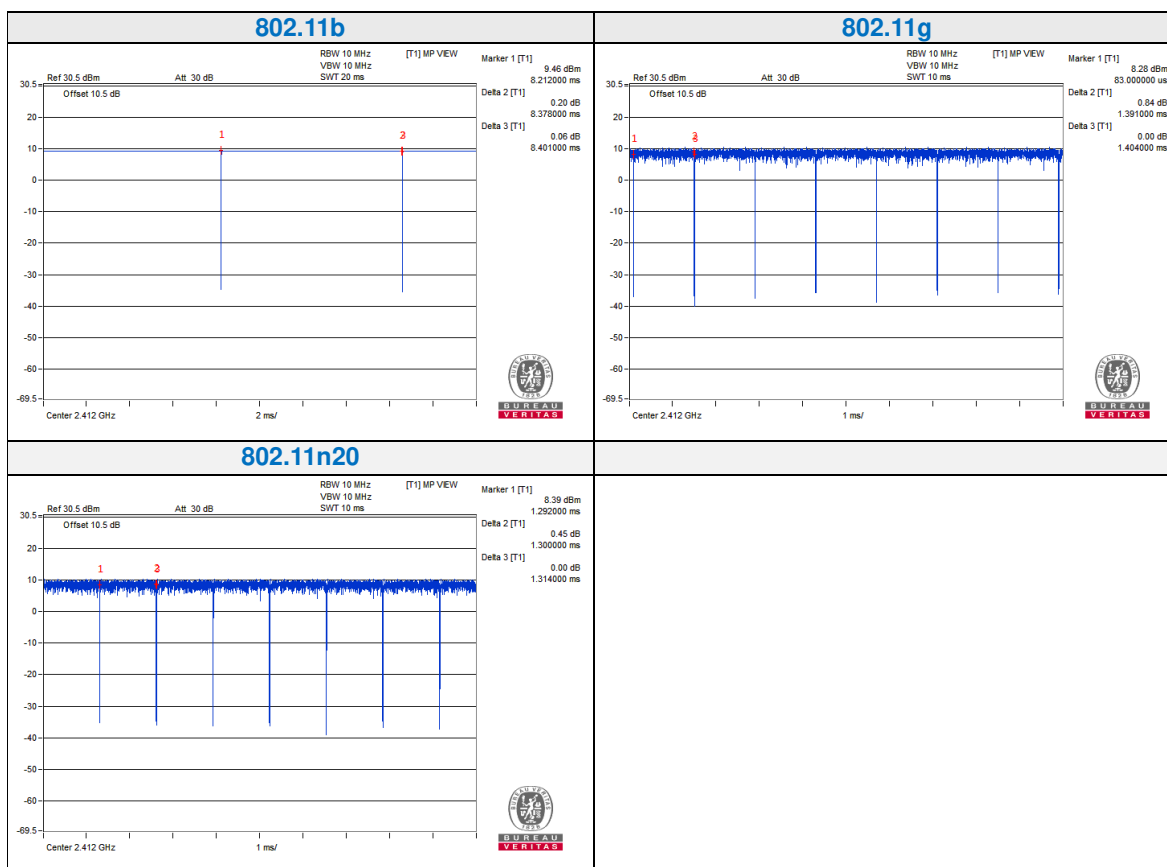
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	N/A	N/A	N/A	N/A	N/A

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

3.5 DUTY CYCLE OF TESET SIGNAL

Test Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty factor (dB)	1/T Min. VBW (KHz)	VBW Setting
802.11b	8.378	8.401	99.7	-	-	10Hz
802.11g	1.391	1.404	99.1	-	-	10Hz
802.11n (HT20)	1.300	1.314	98.9	-	-	10Hz



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

NOTES:

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.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Jan. 10, 24
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	May. 09, 23
Active Loop Antenna (9KHz -30MHz)	SCHWARZBECK	FMZB 1519B	1519B-045	Apr. 27, 24
Amplifier (9KHz -1GHz)	Burgeon	BPA-530	100210	Mar. 06, 24
Trilog-Broadband Antenna(20M-2G)	SCHWARZBECK	VULB 9168	01282	Aug. 21, 23
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	Apr. 27, 24
Horn Antenna (18GHz -40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	Apr. 28, 24
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	May 22, 23
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A
Broadband Preamplifier (1GHz~18GHz)	SCHWARZBECK	BBV9718	305	Apr. 26, 24
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Jan. 16, 24
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A

NOTES:

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 1.3m 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.

NOTES:

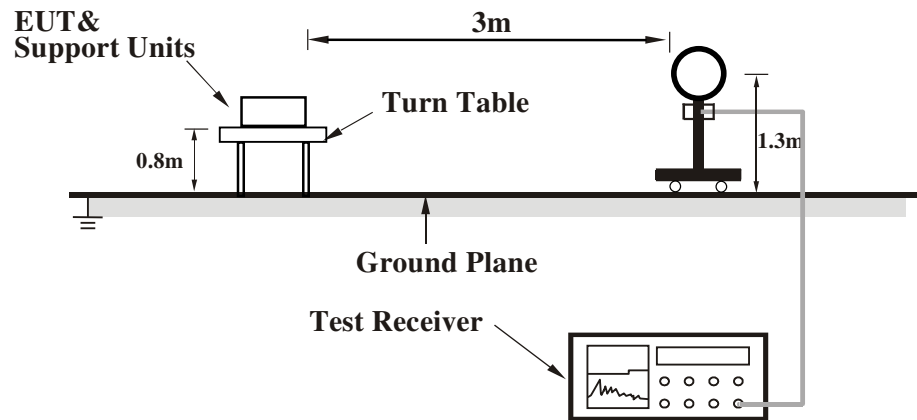
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 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

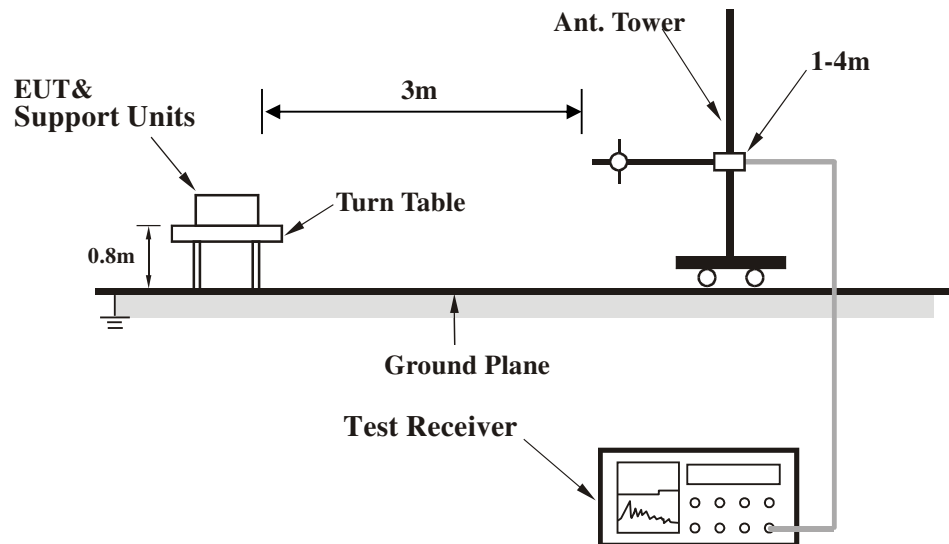
No deviation.

4.1.5 TEST SETUP

Below 30MHz test setup

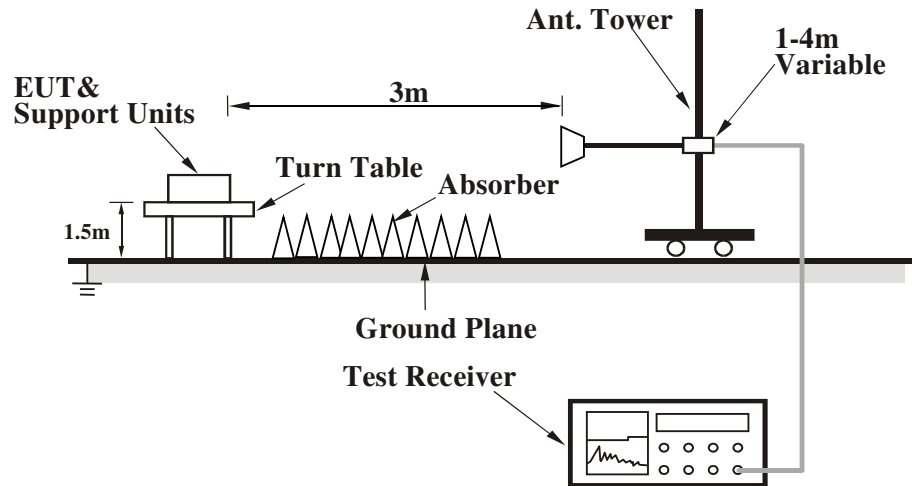


Below 1GHz test setup



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:

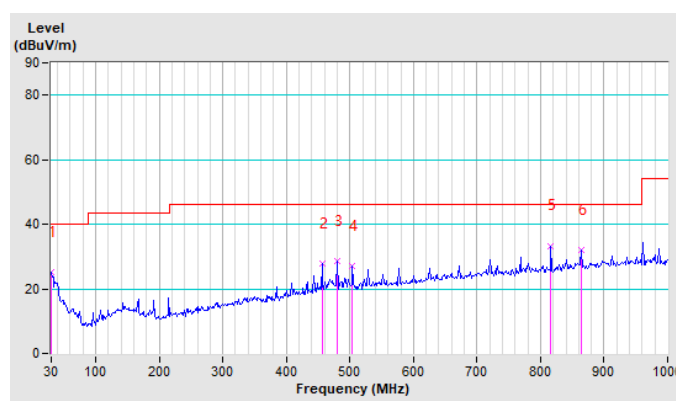
802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	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	30.00	25.1 QP	40.0	-14.9	2.00 H	46	43.3	-18.1
2	455.93	27.9 QP	46.0	-18.1	2.00 H	125	37.9	-9.9
3	480.80	28.7 QP	46.0	-17.3	2.00 H	111	38.1	-9.3
4	504.12	26.9 QP	46.0	-19.1	2.00 H	97	35.7	-8.8
5	816.57	33.4 QP	46.0	-12.6	2.00 H	82	36.4	-3.1
6	864.76	32.2 QP	46.0	-13.8	2.00 H	65	34.2	-2.0

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 greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value.

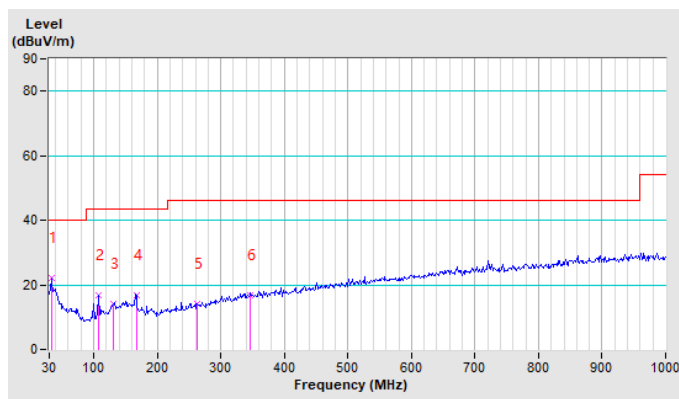


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

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	33.11	22.1 QP	40.0	-17.9	1.00 V	62	39.8	-17.6
2	107.72	16.9 QP	43.5	-26.6	1.00 V	33	35.8	-18.9
3	131.04	14.0 QP	43.5	-29.6	1.00 V	47	30.6	-16.7
4	166.79	16.9 QP	43.5	-26.7	1.00 V	19	33.3	-16.5
5	263.17	14.2 QP	46.0	-31.8	1.00 V	6	29.9	-15.7
6	345.56	16.7 QP	46.0	-29.3	1.00 V	0	29.4	-12.8

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 greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. 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	47.1 PK	74.0	-26.9	2.17 H	94	44.3	2.8
2	2390.00	34.2 AV	54.0	-19.8	2.17 H	94	31.4	2.8
3	*2412.00	98.3 PK			2.17 H	94	95.4	2.9
4	*2412.00	90.3 AV			2.17 H	94	87.5	2.9
5	4824.00	49.4 PK	74.0	-24.6	1.65 H	259	42.2	7.2
6	4824.00	35.9 AV	54.0	-18.1	1.65 H	259	28.7	7.2
7	7236.00	50.1 PK	74.0	-23.9	1.48 H	94	40.1	10.0
8	7236.00	41.0 AV	54.0	-13.0	1.48 H	94	31.0	10.0
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	47.0 PK	74.0	-27.1	2.36 V	139	44.2	2.8
2	2390.00	35.5 AV	54.0	-18.5	2.36 V	139	32.7	2.8
3	*2412.00	94.2 PK			2.36 V	139	91.3	2.9
4	*2412.00	86.5 AV			2.36 V	139	83.6	2.9
5	4824.00	46.9 PK	74.0	-27.1	1.69 V	167	39.7	7.2
6	4824.00	34.3 AV	54.0	-19.7	1.69 V	167	27.1	7.2
7	7236.00	50.4 PK	74.0	-23.6	1.54 V	85	40.4	10.0
8	7236.00	40.3 AV	54.0	-13.7	1.54 V	85	30.3	10.0

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 greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " * " : Fundamental frequency.

802.11g

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	52.7 PK	74.0	-21.3	3.00 H	297	49.9	2.8
2	2390.00	38.7 AV	54.0	-15.3	3.00 H	297	35.9	2.8
3	*2412.00	94.6 PK			3.00 H	297	91.8	2.9
4	*2412.00	84.4 AV			3.00 H	297	81.6	2.9
5	4824.00	47.9 PK	74.0	-26.1	1.62 H	219	40.7	7.2
6	4824.00	38.0 AV	54.0	-16.0	1.62 H	219	30.8	7.2
7	7236.00	50.1 PK	74.0	-23.9	1.49 H	304	40.1	10.0
8	7236.00	39.2 AV	54.0	-14.9	1.49 H	304	29.2	10.0
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	49.4 PK	74.0	-24.6	1.45 V	105	46.6	2.8
2	2390.00	35.5 AV	54.0	-18.5	1.45 V	105	32.7	2.8
3	*2412.00	91.5 PK			1.45 V	105	88.6	2.9
4	*2412.00	82.0 AV			1.45 V	105	79.1	2.9
5	4824.00	50.2 PK	74.0	-23.8	1.65 V	64	43.0	7.2
6	4824.00	40.3 AV	54.0	-13.7	1.65 V	64	33.1	7.2
7	7236.00	51.3 PK	74.0	-22.7	1.33 V	81	41.3	10.0
8	7236.00	40.3 AV	54.0	-13.7	1.33 V	81	30.3	10.0

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 greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

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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	50.3 PK	74.0	-23.7	1.52 H	69	47.5	2.8
2	2390.00	40.4 AV	54.0	-13.6	1.52 H	69	37.6	2.8
3	*2412.00	94.2 PK			1.50 H	270	91.3	2.9
4	*2412.00	83.2 AV			1.50 H	270	80.3	2.9
5	4824.00	50.7 PK	74.0	-23.3	1.65 H	177	43.5	7.2
6	4824.00	41.0 AV	54.0	-13.0	1.65 H	177	33.8	7.2
7	7236.00	51.1 PK	74.0	-22.9	1.65 H	89	41.1	10.0
8	7236.00	40.3 AV	54.0	-13.7	1.65 H	89	30.3	10.0
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	52.0 PK	74.0	-22.0	1.46 V	104	49.2	2.8
2	2390.00	38.2 AV	54.0	-15.8	1.46 V	104	35.4	2.8
3	*2412.00	92.9 PK			1.46 V	104	90.0	2.9
4	*2412.00	84.0 AV			1.46 V	104	81.1	2.9
5	4824.00	47.1 PK	74.0	-26.9	1.65 V	257	39.9	7.2
6	4824.00	35.3 AV	54.0	-18.7	1.65 V	257	28.1	7.2
7	7236.00	50.6 PK	74.0	-23.5	1.49 V	330	40.6	10.0
8	7236.00	42.3 AV	54.0	-11.7	1.49 V	330	32.3	10.0

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 greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. "*" : Fundamental frequency.

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.	Next Cal.
Power Sensor	Keysight	U2021XA	MY57320002	Jan. 11, 24
Power Meter	Anritsu	ML2495A	1139001	Aug. 22, 23
Power Sensor	Anritsu	MA2411B	1531155	Aug. 22, 23
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Nov. 02, 23
Oscilloscope	Agilent	DSO9254A	MY51260160	Jul. 27, 23
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 11, 24
Signal Generator	Agilent	N5183A	MY50140980	Jul. 20, 23
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Jul. 20, 23
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A
DC Source	Keysight	E3642A	MY56146098	N/A
Test software	ADT	ADT_RF Test Software V6.6.5.3	N/A	N/A

NOTES: 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.

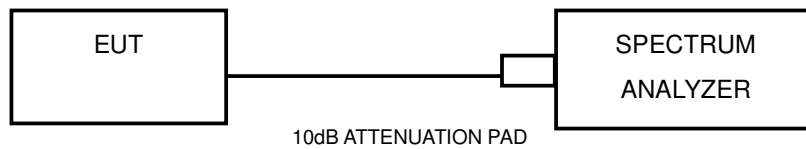
4.2.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 100KHz
2. Set the video bandwidth (VBW) $\geq 3 \times$ 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

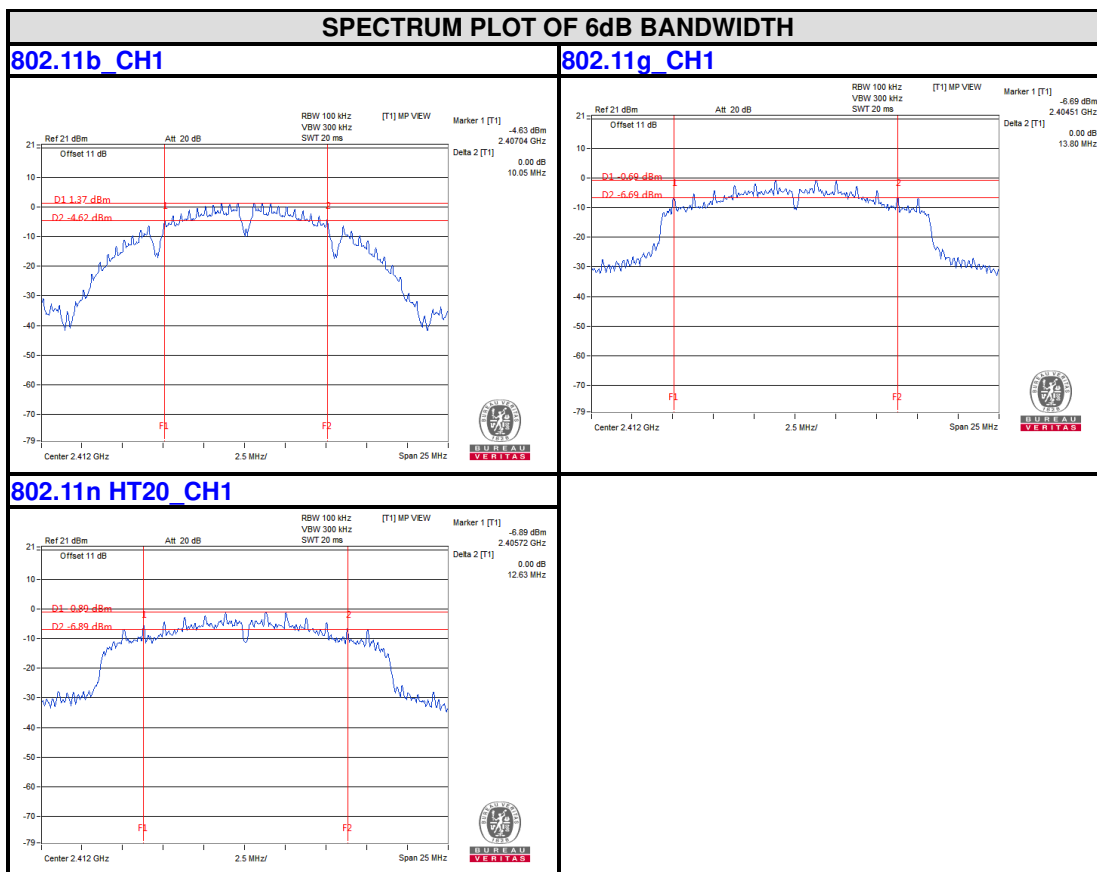
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.05	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	13.80	0.5	PASS

802.11n HT20

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	12.63	0.5	PASS

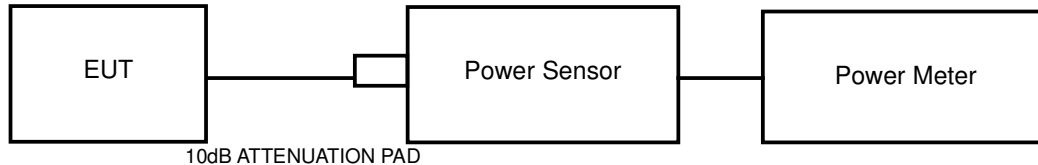


4.3 CONDUCTED OUTPUT POWER

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.	Next Cal.
Power Sensor	Keysight	U2021XA	MY57320002	Jan. 11, 24
Power Meter	Anritsu	ML2495A	1139001	Aug. 22, 23
Power Sensor	Anritsu	MA2411B	1531155	Aug. 22, 23
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Nov. 02, 23
Oscilloscope	Agilent	DSO9254A	MY51260160	Jul. 27, 23
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 11, 24
Signal Generator	Agilent	N5183A	MY50140980	Jul. 20, 23
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Jul. 20, 23
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A
DC Source	Keysight	E3642A	MY56146098	N/A
Test software	ADT	ADT_RF Test Software V6.6.5.3	N/A	N/A

NOTES:

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	15.18	32.961	1	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	17.30	53.703	1	PASS

802.11n HT20

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	17.07	50.933	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	11.47	14.028

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
1	2412	9.64	9.204

802.11n HT20

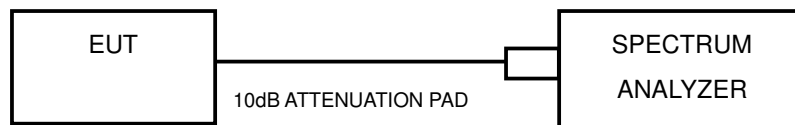
CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
1	2412	9.51	8.933

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 4.2.2 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 1.5 times the DTS bandwidth.
- 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

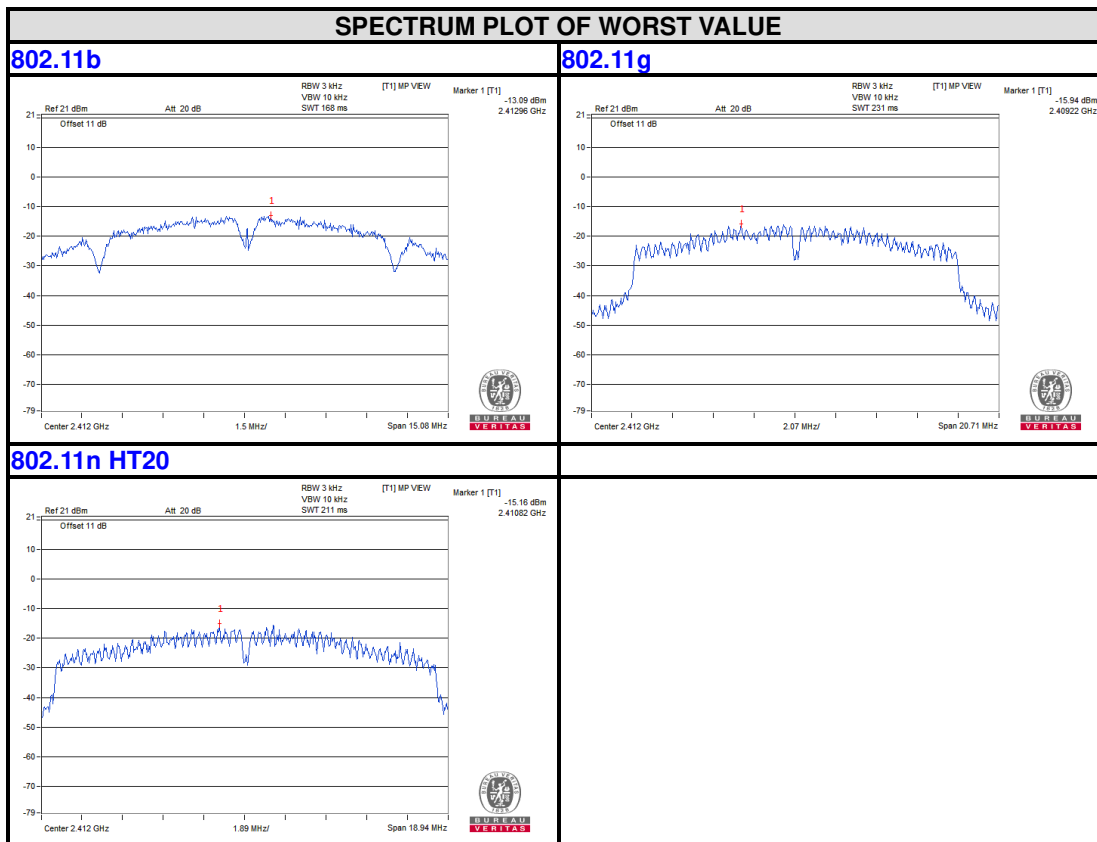
Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-13.09	8.00	PASS

802.11g

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-15.94	8.00	PASS

802.11n HT20

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-15.16	8.00	PASS



4.5 OUT OF BAND EMISSION MEASUREMENT

4.5.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below -20dB 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 4.2.2 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

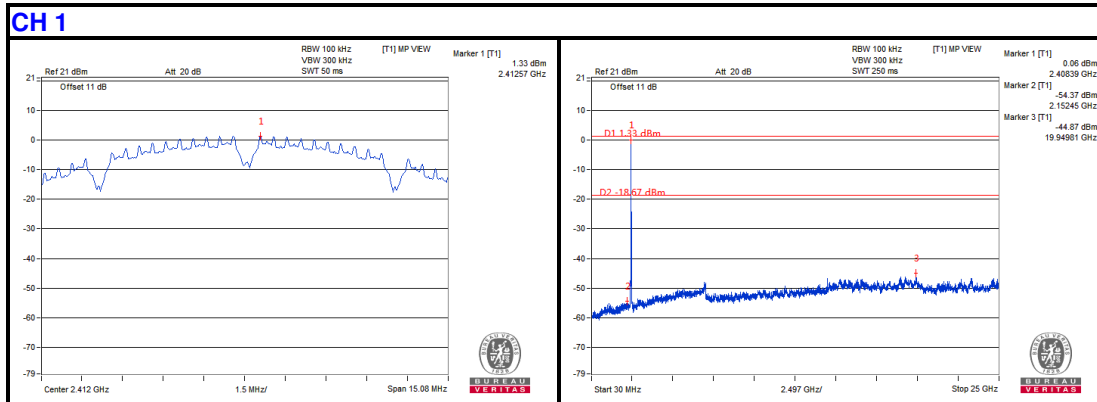
No deviation.

4.5.6 EUT OPERATING CONDITION

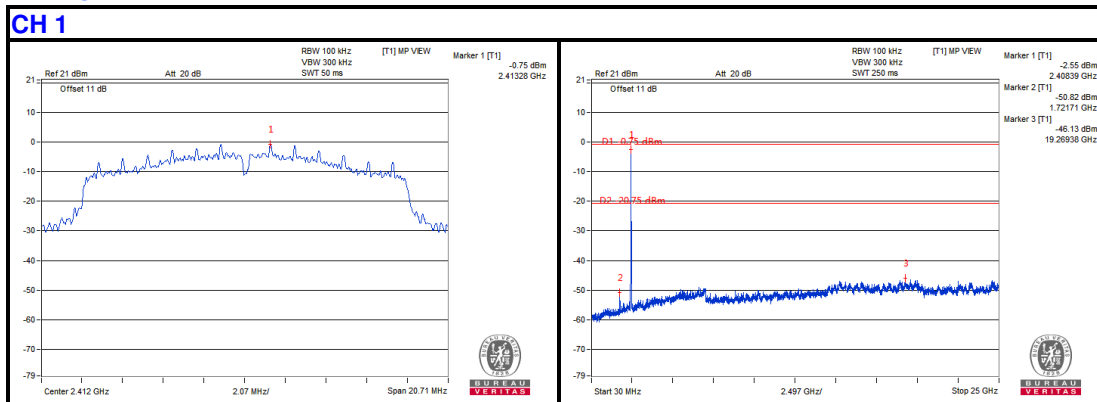
Same as item 4.3.6

4.5.7 TEST RESULTS

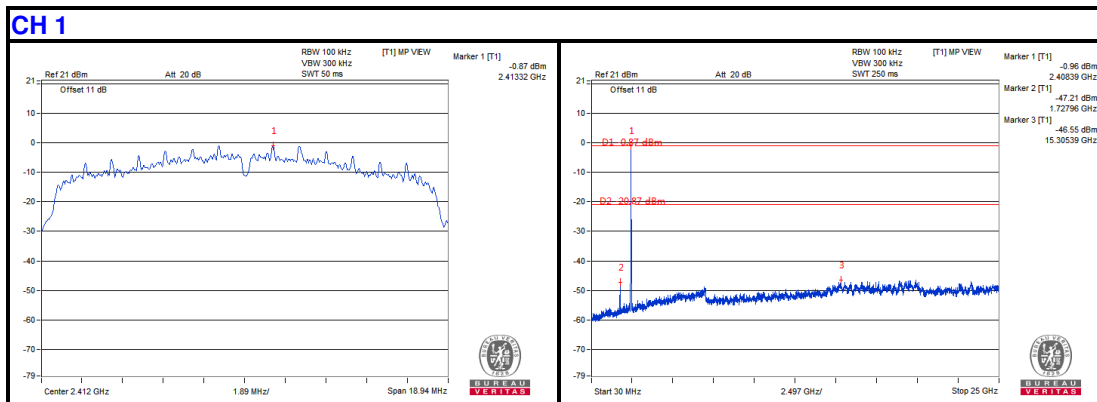
802.11b



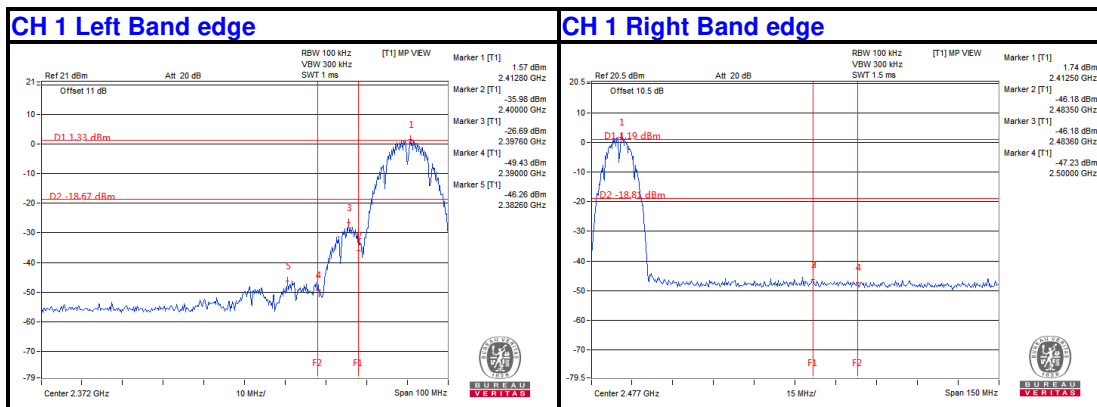
802.11g



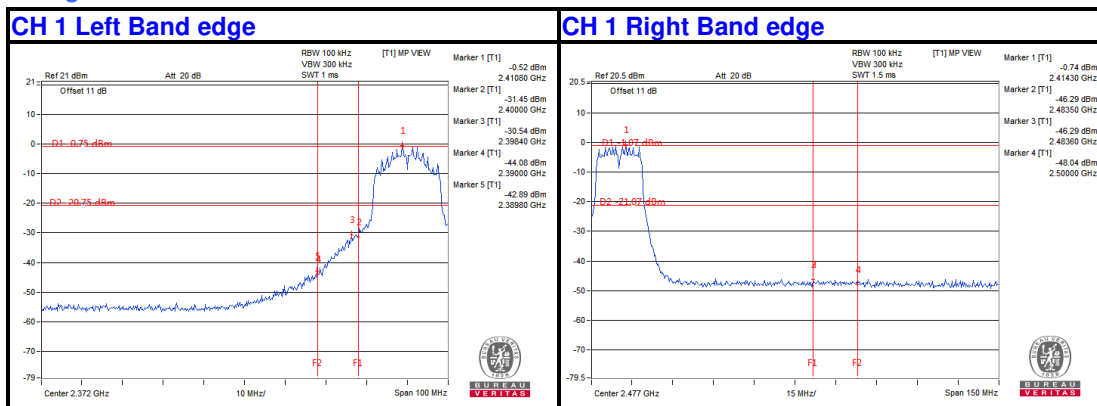
802.11n HT20



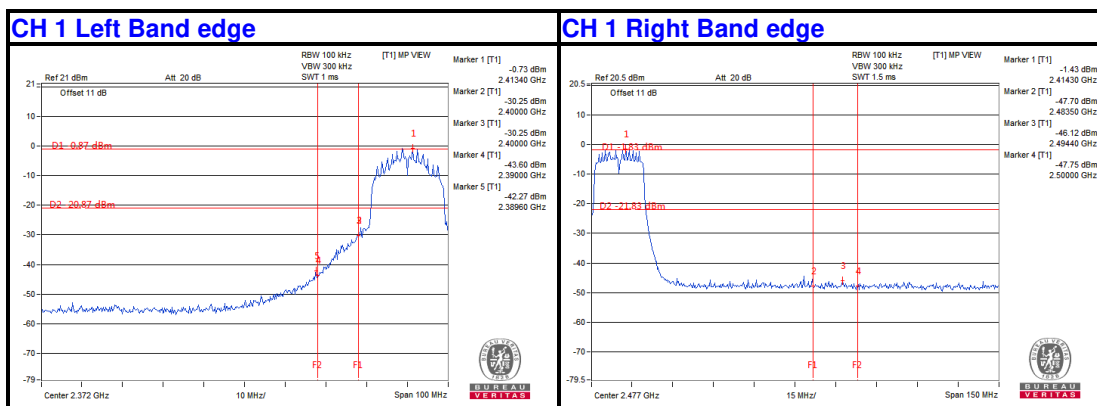
802.11b



802.11g



802.11n HT20





Test Report No.: RF2303WDG0185-2

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



Test Report No.: RF2303WDG0185-2

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---