

## TEST REPORT



Applicant	Particle Industries, Inc
Address	325 9th Street, San Francisco, CA 94103 United States

Manufacturer or Supplier	Particle Industries, Inc
Address	325 9th Street, San Francisco, CA 94103 United States
Product	Wi-Fi Module
Brand Name	Particle
Model	P2
Additional Model & Model Difference	N/A
Date of tests	Feb. 21, 2021 ~ Apr. 11, 2022

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

- ☒ **Canada RSS-247 Issue 2 (2017-02)**
- ☒ **Canada RSS-Gen Issue 5 (2021-02)**

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

Tested by Lucas Chen Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department
	 Date: May 19, 2022

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
IC2202WDG0092-2	Original release	May 19, 2022

## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: RSS-247; RSS-Gen			
Standard	Test Type and Limit	Result	Remark
RSS-Gen			
RSS-Gen 8.8	AC Power Conducted Emission	PASS	Meet the requirement of limit
RSS-Gen 6.7	Occupied Bandwidth Measurement	PASS	Meet the requirement of limit
8.10 Table 7	Restricted Band of Operation	PASS	Meet the requirement of limit
8.9 Table 5	Transmitter Radiated Emissions	PASS	Meet the requirement of limit.
Standard	Test Type and Limit	Result	Remark
RSS-247			
5.2(a)	6db Bandwidth Measurement	PASS	Meet the requirement of limit
5.2(b)	Power Spectral Density Measurement	PASS	Meet the requirement of limit.
5.4(d)	Maximum Output Power	PASS	Meet the requirement of limit.
5.5	Out of band Emission Measurement	PASS	Meet the requirement of limit.

## 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
Conducted emissions	9kHz~30MHz	3.05dB
Radiated emissions	9KHz ~ 30MHz	2.16dB
	30MHz ~ 1GMHz	3.82dB
	1GHz ~ 18GHz	4.94dB
	18GHz ~ 40GHz	5.07dB

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>	Wi-Fi Module
<b>BRAND</b>	Particle
<b>MODEL NO.</b>	P2
<b>ADDITIONAL MODEL</b>	N/A
<b>IC</b>	20127-P2
<b>NOMINAL VOLTAGE</b>	DC 3.3V
<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 ~ 2462MHz for 11b/g/n(HT20)
<b>PEAK OUTPUT POWER</b>	376.704mW (Measured Max.)
<b>ANTENNA TYPE</b>	PCB Antenna, 2.41dBi Gain External PCB Antenna, 1.55dBi Gain
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	Refer to user's manual
<b>PRODUCT SW/HW</b>	v1.0/ v1.0
<b>RADIO SW/HW</b>	v1.0/ v1.0
<b>TEST SW VERSION</b>	AmebaD_mptool_2V2
<b>RF POWER SETTING IN TEST SW</b>	See note 7

**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.: 2202WDG0092-1) for detailed product photo.
3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
4. Conformity Assessment Body Identifier (CABID): CN0026
5. The Wi-Fi Module uses two antennas, but couldn't transmit simultaneously, the antenna type and gain are different, and the antenna port is the same, so the RF conducted output power is the same. EIRP, Radiated emission and conducted emission have been evaluated for both antennas respectively, EIRP data for both antennas are shown in the report, but only the worst antenna data (PCB antenna) is shown in the test report for the radiation spurious emission test and conducted emission.

6. The EUT provides completed transmitters and receivers, the EUT uses only one antenna at any time.

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

7. By means of test software provided by manufacturer, the power levels during the tests were set according to the following codes:

<b>802.11b</b>		<b>802.11g</b>		<b>802.11n(HT20)</b>	
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting
<b>1</b>	115	<b>1</b>	92	<b>1</b>	92
<b>6</b>	115	<b>6</b>	92	<b>6</b>	92
<b>11</b>	115	<b>11</b>	100	<b>11</b>	100



### 3.2 DESCRIPTION OF TEST MODES

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 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 DC 3.3V from PCB base support with WIFI function

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

### POWER LINE CONDUCTED EMISSION TEST:

- ☒ 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	TESTED CONDITION
A	WIFI (2.4G) Link

### 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 to 11	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 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n HT20	1 to 11	1, 6, 11	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 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n HT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5

#### **TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE<1G	25deg. C, 55%RH	DC 3.3V from PCB base support	Jelly
RE≥1G	25deg. C, 55%RH	DC 3.3V from PCB base support	Jelly
PLC	25deg. C, 58%RH	DC 3.3V from PCB base support	Summer
APCM	25deg. C, 58%RH	DC 3.3V from PCB base support	Vincent

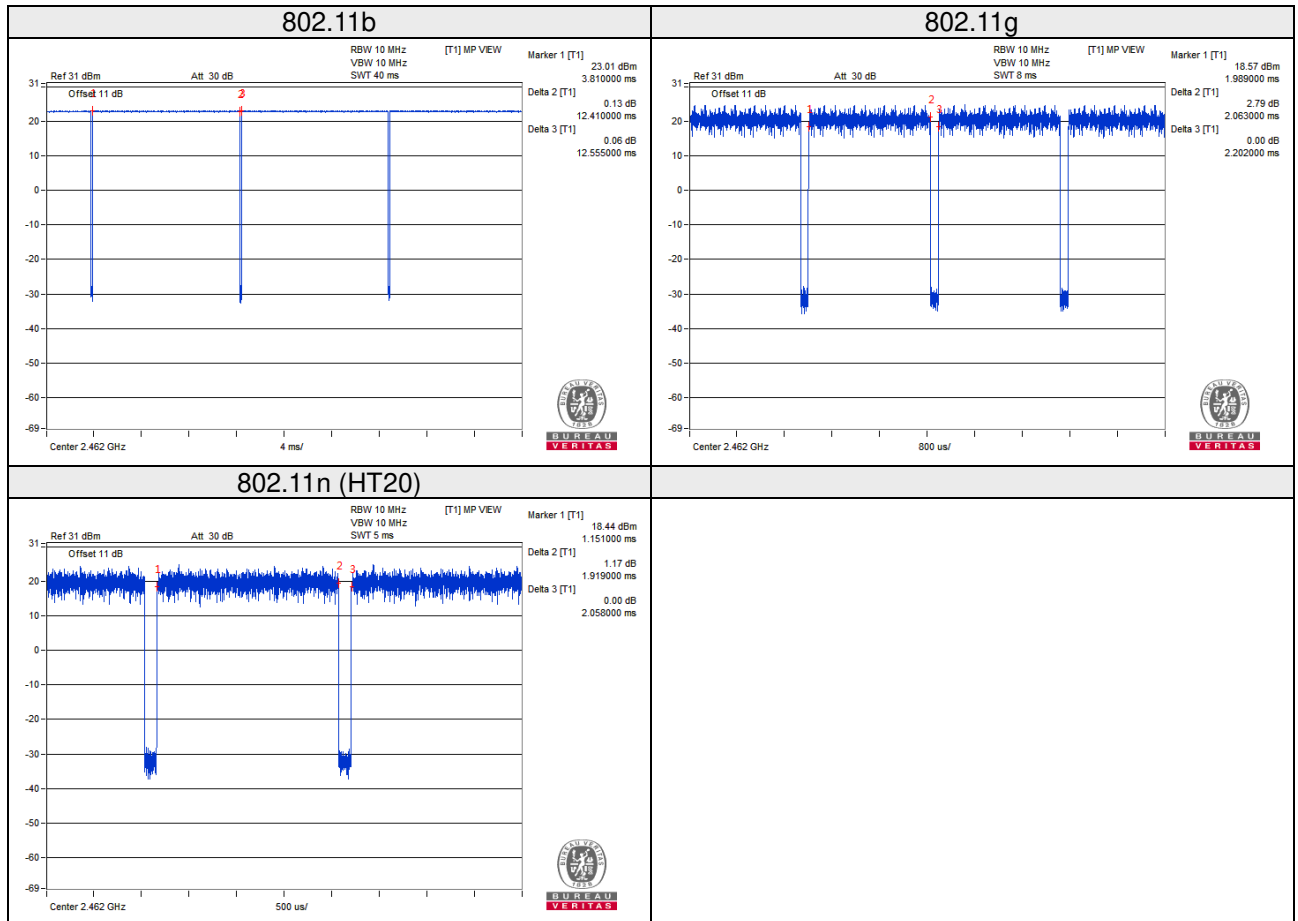


### 3.3 DUTY CYCLE OF TEST SIGNAL

802.11b: Duty cycle =  $12.41/12.555 = 98.8\%$

802.11g: Duty cycle =  $2.063/2.202 = 93.7\%$

802.11n (HT20): Duty cycle =  $1.919/2.058 = 93.2\%$



### 3.4 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:

**Canada RSS-247 Issue 2 (2017-02)**

**Canada RSS-Gen Issue 5 (2021-02)**

ANSI C63.10-2013

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

### 3.5 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	Notebook	DELL	Inspiron 13-7378	GMSJZD2	N/A
2	PCB base support	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Line: Unshielded, Detachable 0.8m; DC Line: Unshielded, Non-detachable 1.8m; USB Cable: Shielded, Detachable, 0.5m
2	N/A

## 4 TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Jan. 18,23
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Jan. 23,23
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Jan. 18,23
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Aug. 05,22
Coaxial RF Cable	/	CE CABLE	C2310066D G	Jul. 27,22
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A

**NOTES:**

1. The test was performed in shielded room 553.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GREGT/CHINA and NIM/CHINA.

#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

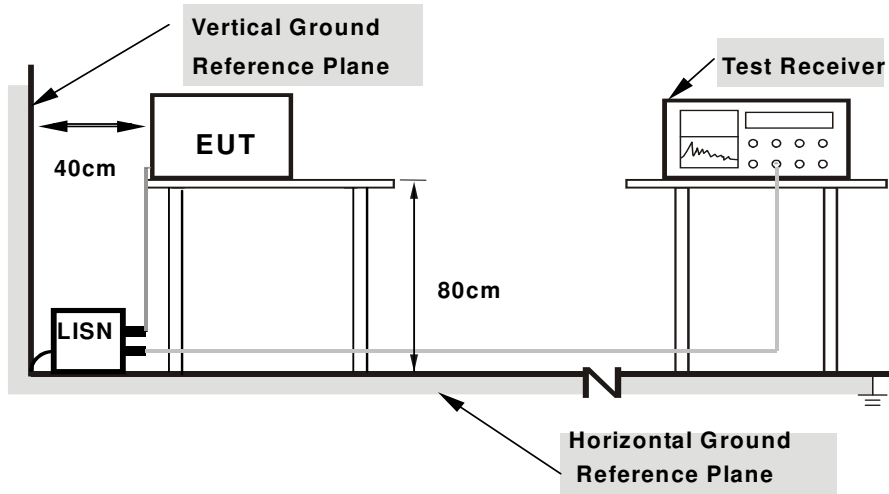
**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.



#### 4.1.5 TEST SETUP



**Note: 1.**Support units were connected to second LISN.

**2.**Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

#### 4.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power and connected of all equipment.
- b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

#### 4.1.7 TEST RESULTS

##### CONDUCTED DATA: WIFI Link (Worst-case PCB Antenna)

PHASE	Line	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.90	46.46	18.09	56.36	27.99	66.00	56.00	-9.64	-28.01
2	0.18375	9.91	39.17	19.03	49.08	28.94	64.31	54.31	-15.23	-25.37
3	4.00082	10.15	21.76	15.80	31.91	25.95	56.00	46.00	-24.09	-20.05
4	5.00000	10.18	21.33	15.69	31.51	25.87	56.00	46.00	-24.49	-20.13
5	5.80200	10.21	19.58	11.23	29.79	21.44	60.00	50.00	-30.21	-28.56
6	16.57275	10.43	19.60	10.50	30.03	20.93	60.00	50.00	-29.97	-29.07

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

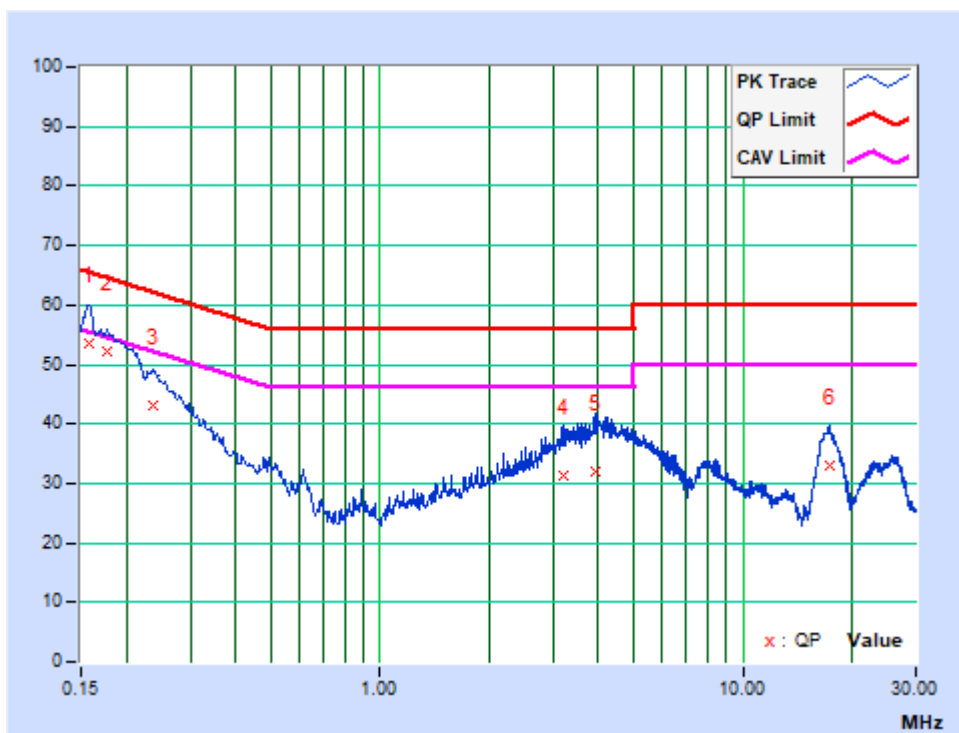




PHASE	Neutral	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15715	9.84	43.58	11.85	53.42	21.69	65.61	55.61	-12.19	-33.92
2	0.17698	9.85	42.32	22.91	52.17	32.76	64.63	54.63	-12.46	-21.87
3	0.23662	9.85	33.38	13.58	43.23	23.43	62.21	52.21	-18.98	-28.78
4	3.21450	9.93	21.29	14.44	31.22	24.37	56.00	46.00	-24.78	-21.63
5	3.93675	9.95	22.11	15.64	32.06	25.59	56.00	46.00	-23.94	-20.41
6	17.33100	10.29	22.76	13.70	33.05	23.99	60.00	50.00	-26.95	-26.01

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in RSS-Gen Section 8.10, must also comply with the radiated emission limits specified in RSS-Gen Section 8.9. as following:

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).



## 4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 07, 23
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	May 09, 22
Active Loop Antenna (9KHz -30MHz)	SCHWARZBECK	FMZB 1519B	1519B-045	May 20, 22
Amplifier (9KHz -1GHz)	Burgeon	BPA-530	100210	Mar. 13, 23
Bilog Antenna (20MHz -2GHz)	Teseq	CBL 6111D	30643	May 21, 22
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 21, 22
Horn Antenna (18GHz -40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	May 14, 22
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	May 22, 22
Test Software	ADT	ADT_Radiated_V 7.6.15.9.2	N/A	N/A
Broadband Preamplifier (1GHz~18GHz)	SCHWARZBECK	BBV9718	305	May 12, 22
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Jan. 10, 23
Test Software	ADT	ADT_Radiated_V 7.6.15.9.2	N/A	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 IC test Site Registration No. is 5936A.

#### 4.2.3 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.

#### 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 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.

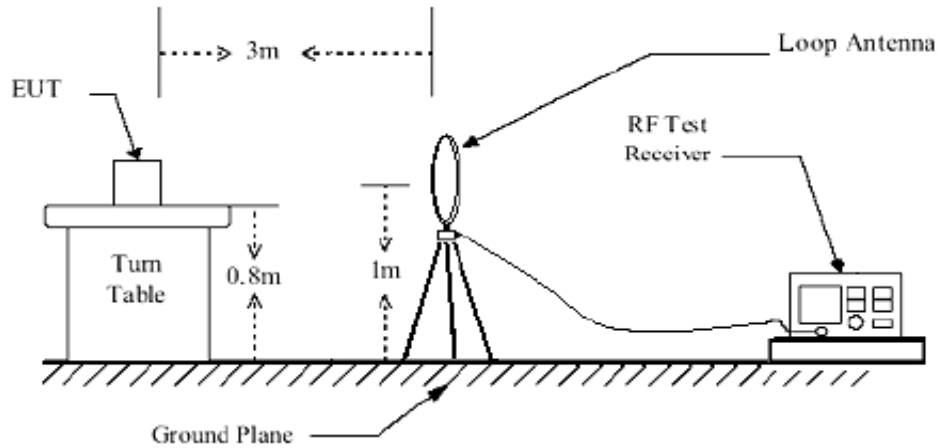
#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

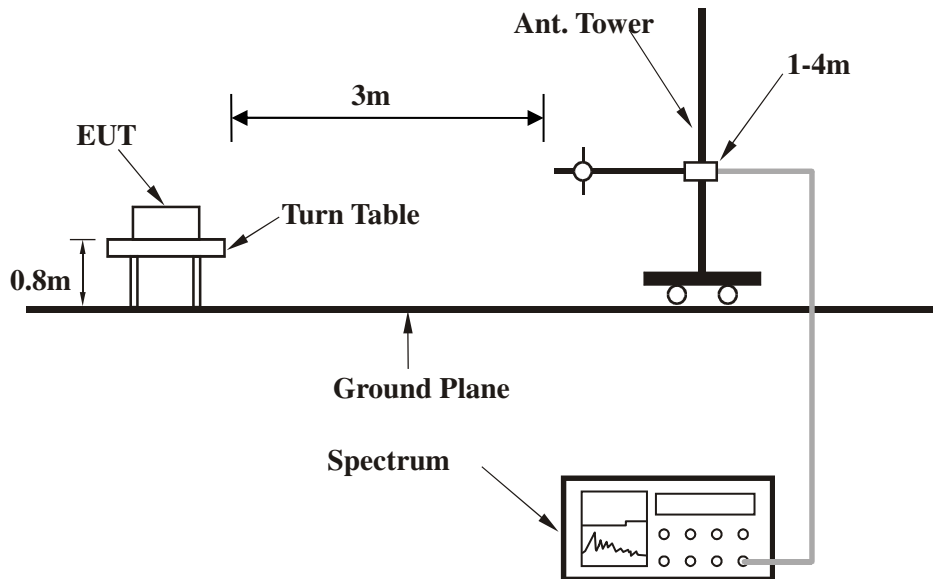


#### 4.2.5 TEST SETUP

##### Below 30MHz

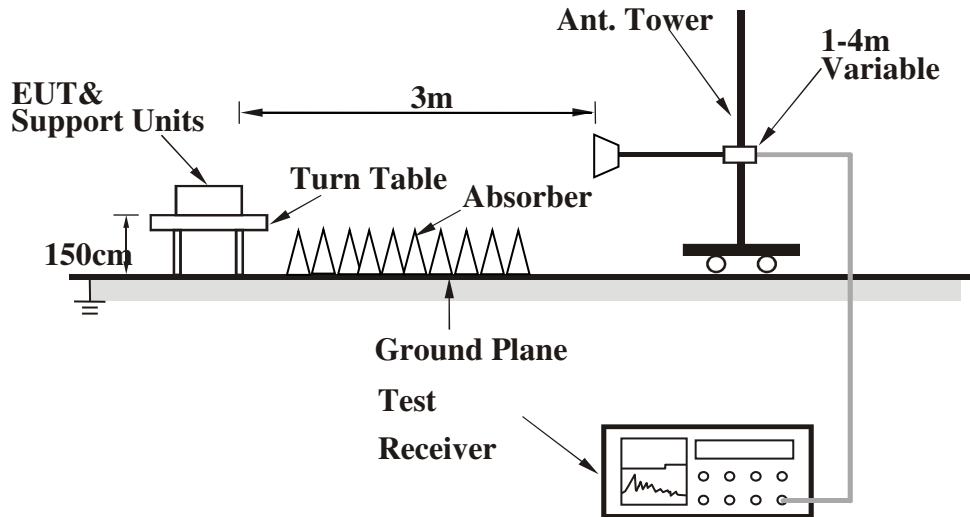


##### Below 1GHz test setup



**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).

#### 4.2.6 EUT OPERATING CONDITIONS

- Set the EUT placed them 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.

## 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA:

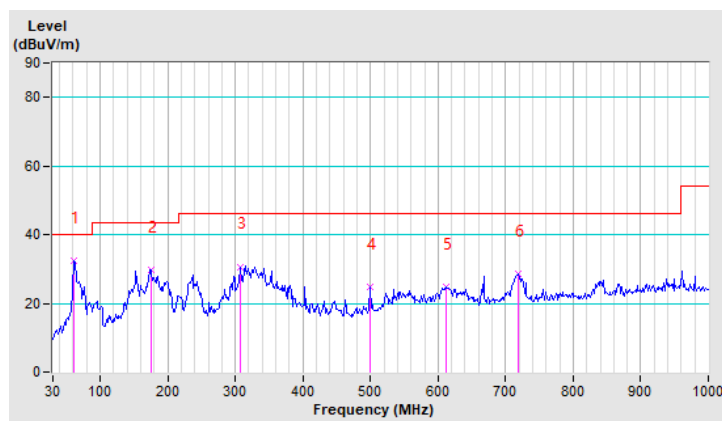
#### 802.11b

<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	61.09	32.33 QP	40.00	-7.67	1.00 H	313	50.70	-18.37
2	174.57	29.78 QP	43.50	-13.72	1.00 H	301	47.52	-17.74
3	306.70	30.66 QP	46.00	-15.34	1.00 H	285	46.09	-15.43
4	499.46	24.68 QP	46.00	-21.32	1.00 H	261	35.22	-10.54
5	611.38	24.73 QP	46.00	-21.27	1.00 H	272	32.47	-7.74
6	718.64	28.52 QP	46.00	-17.48	1.00 H	243	34.93	-6.41

#### 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.



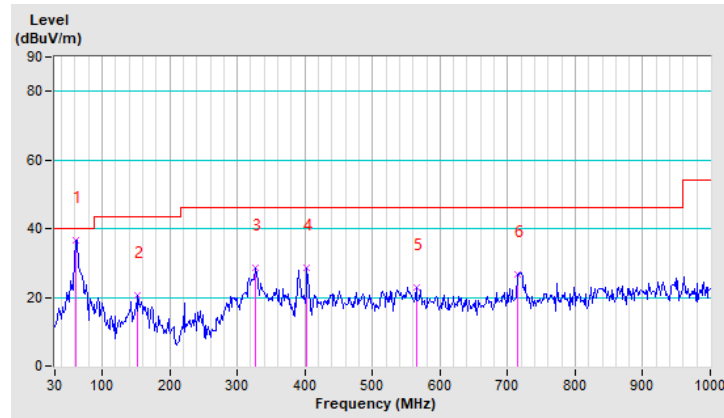


<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9KHz ~ 1GHz		

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	61.09	36.65 QP	40.00	-3.35	1.00 V	265	55.02	-18.37
2	152.80	20.65 QP	43.50	-22.85	1.00 V	289	37.32	-16.67
3	326.91	28.63 QP	46.00	-17.37	1.00 V	301	43.56	-14.93
4	403.08	28.72 QP	46.00	-17.28	1.00 V	313	41.63	-12.91
5	564.74	22.87 QP	46.00	-23.13	1.00 V	324	31.73	-8.86
6	713.97	26.62 QP	46.00	-19.38	1.00 V	336	33.10	-6.48

**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**

<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	67.05 PK	74.00	-6.95	1.00 H	81	66.51	0.54
2	2390.00	50.94 AV	54.00	-3.06	1.00 H	81	50.40	0.54
3	*2412.00	109.63 PK			1.00 H	81	109.01	0.62
4	*2412.00	103.61 AV			1.00 H	81	102.99	0.62
5	4824.00	50.31 PK	74.00	-23.69	1.00 H	129	44.98	5.33
6	4824.00	36.57 AV	54.00	-17.43	1.00 H	129	31.24	5.33
7	#7236.00	51.23 PK	74.00	-22.77	1.00 H	51	41.51	9.72
8	#7236.00	37.49 AV	54.00	-16.51	1.00 H	51	27.77	9.72

**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)	Peak (PK) Average (AV)
1	2390.00	65.36 PK	74.00	-8.64	1.03 V	96	64.82	0.54
2	2390.00	49.21 AV	54.00	-4.79	1.03 V	96	48.67	0.54
3	*2412.00	103.17 PK			1.03 V	96	102.55	0.62
4	*2412.00	97.36 AV			1.03 V	96	96.74	0.62
5	4824.00	49.68 PK	74.00	-24.32	1.00 V	58	44.35	5.33
6	4824.00	36.20 AV	54.00	-17.80	1.00 V	58	30.87	5.33
7	#7236.00	50.36 PK	74.00	-23.64	1.00 V	209	40.64	9.72
8	#7236.00	37.26 AV	54.00	-16.74	1.00 V	209	27.54	9.72

**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.
6. " # ": The radiated frequency is out of the restricted band.



CHANNEL	TX Channel 6	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	*2437.00	110.39 PK			1.16 H	209	109.68	0.71
2	*2437.00	104.09 AV			1.16 H	209	103.38	0.71
3	4874.00	51.36 PK	74.00	-22.64	1.00 H	185	45.98	5.38
4	4874.00	37.25 AV	54.00	-16.75	1.00 H	185	31.87	5.38
5	7311.00	52.36 PK	74.00	-21.64	1.40 H	72	42.59	9.77
6	7311.00	38.16 AV	54.00	-15.84	1.40 H	72	28.39	9.77
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	*2437.00	103.88 PK			1.02 V	251	103.17	0.71
2	*2437.00	97.41 AV			1.02 V	251	96.70	0.71
3	4874.00	50.62 PK	74.00	-23.38	1.00 V	109	45.24	5.38
4	4874.00	36.39 AV	54.00	-17.61	1.00 V	109	31.01	5.38
5	7311.00	51.14 PK	74.00	-22.86	1.05 V	51	41.37	9.77
6	7311.00	37.10 AV	54.00	-16.90	1.05 V	51	27.33	9.77

**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.

<b>CHANNEL</b>	TX Channel 11	<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	*2462.00	112.05 PK			1.00 H	57	111.24	0.81
2	*2462.00	104.94 AV			1.00 H	57	104.13	0.81
3	2483.50	58.99 PK	74.00	-15.01	1.00 H	57	58.10	0.89
4	2483.50	39.50 AV	54.00	-14.50	1.00 H	57	38.61	0.89
5	4924.00	49.62 PK	74.00	-24.38	1.00 H	62	44.17	5.45
6	4924.00	38.02 AV	54.00	-15.98	1.00 H	62	32.57	5.45
7	7386.00	51.26 PK	74.00	-22.74	1.04 H	108	41.44	9.82
8	7386.00	40.39 AV	54.00	-13.61	1.04 H	108	30.57	9.82
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	*2462.00	108.62 PK			1.00 V	85	107.81	0.81
2	*2462.00	102.39 AV			1.00 V	85	101.58	0.81
3	2483.50	57.62 PK	74.00	-16.38	1.00 V	85	56.73	0.89
4	2483.50	39.10 AV	54.00	-14.90	1.00 V	85	38.21	0.89
5	4924.00	50.36 PK	74.00	-23.64	1.02 V	206	44.91	5.45
6	4924.00	36.51 AV	54.00	-17.49	1.02 V	206	31.06	5.45
7	7386.00	52.03 PK	74.00	-21.97	1.00 V	108	42.21	9.82
8	7386.00	42.10 AV	54.00	-11.90	1.00 V	108	32.28	9.82

**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

<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	71.80 PK	74.00	-2.20	1.00 H	156	69.83	1.97
2	2390.00	48.26 AV	54.00	-5.74	1.00 H	156	46.29	1.97
3	*2412.00	104.30 PK			1.00 H	156	102.32	1.98
4	*2412.00	94.12 AV			1.00 H	156	92.14	1.98
5	4824.00	50.18 PK	74.00	-23.82	1.24 H	155	45.22	4.96
6	4824.00	40.56 AV	54.00	-13.44	1.24 H	155	35.60	4.96
7	#7236.00	53.66 PK	74.00	-20.34	1.20 H	180	43.97	9.69
8	#7236.00	44.40 AV	54.00	-9.60	1.20 H	180	34.71	9.69
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	60.86 PK	74.00	-13.14	1.27 V	163	58.89	1.97
2	2390.00	45.11 AV	54.00	-8.89	1.27 V	163	43.14	1.97
3	*2412.00	100.52 PK			1.27 V	163	98.54	1.98
4	*2412.00	90.58 AV			1.27 V	163	88.60	1.98
5	4824.00	49.36 PK	74.00	-24.64	1.00 V	185	44.40	4.96
6	4824.00	41.33 AV	54.00	-12.67	1.00 V	185	36.37	4.96
7	#7236.00	54.10 PK	74.00	-19.90	1.00 V	185	44.41	9.69
8	#7236.00	44.00 AV	54.00	-10.00	1.00 V	185	34.31	9.69

**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.
6. " # ": The radiated frequency is out of the restricted band.



CHANNEL	TX Channel 6	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	*2437.00	104.12 PK			1.50 H	147	102.13	1.99
2	*2437.00	94.35 AV			1.50 H	147	92.36	1.99
3	4874.00	51.05 PK	74.00	-22.95	1.00 H	124	45.89	5.16
4	4874.00	41.93 AV	54.00	-12.07	1.00 H	124	36.77	5.16
5	7311.00	54.42 PK	74.00	-19.58	1.35 H	160	44.42	10.00
6	7311.00	44.18 AV	54.00	-9.82	1.35 H	160	34.18	10.00
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	*2437.00	100.82 PK			1.50 V	188	98.83	1.99
2	*2437.00	90.75 AV			1.50 V	188	88.76	1.99
3	4874.00	51.65 PK	74.00	-22.35	1.00 V	177	46.49	5.16
4	4874.00	42.10 AV	54.00	-11.90	1.00 V	177	36.94	5.16
5	7311.00	54.10 PK	74.00	-19.90	1.26 V	251	44.10	10.00
6	7311.00	44.20 AV	54.00	-9.80	1.26 V	251	34.20	10.00

**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.



CHANNEL	TX Channel 11	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	*2462.00	105.21 PK			1.00 H	122	104.40	0.81
2	*2462.00	93.75 AV			1.00 H	122	92.94	0.81
3	2483.50	68.70 PK	74.00	-5.30	1.00 H	122	67.81	0.89
4	2483.50	50.50 AV	54.00	-3.50	1.00 H	122	49.61	0.89
5	4924.00	48.36 PK	74.00	-25.64	1.00 H	84	42.91	5.45
6	4924.00	35.21 AV	54.00	-18.79	1.00 H	84	29.76	5.45
7	7386.00	49.68 PK	74.00	-24.32	1.05 H	205	39.86	9.82
8	7386.00	36.58 AV	54.00	-17.42	1.05 H	205	26.76	9.82
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	*2462.00	100.36 PK			1.10 V	65	99.55	0.81
2	*2462.00	88.57 AV			1.10 V	65	87.76	0.81
3	2483.50	67.41 PK	74.00	-6.59	1.10 V	65	66.52	0.89
4	2483.50	48.36 AV	54.00	-5.64	1.10 V	65	47.47	0.89
5	4924.00	47.96 PK	74.00	-26.04	1.00 V	70	42.51	5.45
6	4924.00	34.85 AV	54.00	-19.15	1.00 V	70	29.40	5.45
7	7386.00	49.10 PK	74.00	-24.90	1.00 V	306	39.28	9.82
8	7386.00	35.81 AV	54.00	-18.19	1.00 V	306	25.99	9.82

**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.

802.11n 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	71.89 PK	74.00	-2.11	1.00 H	125	69.92	1.97
2	2390.00	47.32 AV	54.00	-6.68	1.00 H	125	45.35	1.97
3	*2412.00	104.15 PK			1.00 H	125	102.17	1.98
4	*2412.00	94.32 AV			1.00 H	125	92.34	1.98
5	4824.00	51.36 PK	74.00	-22.64	1.25 H	144	46.40	4.96
6	4824.00	40.24 AV	54.00	-13.76	1.25 H	144	35.28	4.96
7	#7236.00	54.18 PK	74.00	-19.82	1.45 H	133	44.49	9.69
8	#7236.00	43.56 AV	54.00	-10.44	1.45 H	133	33.87	9.69
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	66.48 PK	74.00	-7.52	1.25 V	173	64.51	1.97
2	2390.00	45.36 AV	54.00	-8.64	1.25 V	173	43.39	1.97
3	*2412.00	100.65 PK			1.25 V	173	98.67	1.98
4	*2412.00	90.85 AV			1.25 V	173	88.87	1.98
5	4824.00	51.02 PK	74.00	-22.98	1.00 V	147	46.06	4.96
6	4824.00	40.69 AV	54.00	-13.31	1.00 V	147	35.73	4.96
7	#7236.00	54.62 PK	74.00	-19.38	1.25 V	145	44.93	9.69
8	#7236.00	44.69 AV	54.00	-9.31	1.25 V	145	35.00	9.69

**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.
6. " # ": The radiated frequency is out of the restricted band.



CHANNEL	TX Channel 6	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	*2437.00	104.51 PK			1.00 H	143	102.52	1.99
2	*2437.00	94.35 AV			1.00 H	143	92.36	1.99
3	4874.00	50.26 PK	74.00	-23.74	1.22 H	156	45.10	5.16
4	4874.00	41.71 AV	54.00	-12.29	1.22 H	156	36.55	5.16
5	7311.00	54.11 PK	74.00	-19.89	1.00 H	120	44.11	10.00
6	7311.00	44.30 AV	54.00	-9.70	1.00 H	120	34.30	10.00
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	*2437.00	100.25 PK			1.00 V	188	98.26	1.99
2	*2437.00	90.56 AV			1.00 V	188	88.57	1.99
3	4874.00	50.85 PK	74.00	-23.15	1.22 V	156	45.69	5.16
4	4874.00	41.06 AV	54.00	-12.94	1.22 V	156	35.90	5.16
5	7311.00	54.26 PK	74.00	-19.74	1.00 V	176	44.26	10.00
6	7311.00	44.68 AV	54.00	-9.32	1.00 V	176	34.68	10.00

**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.





CHANNEL	TX Channel 11	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	*2462.00	105.23 PK			1.00 H	88	103.22	2.01
2	*2462.00	94.83 AV			1.00 H	88	92.82	2.01
3	2483.50	70.23 PK	74.00	-3.77	1.00 H	88	68.20	2.03
4	2483.50	47.11 AV	54.00	-6.89	1.00 H	88	45.08	2.03
5	4924.00	48.36 PK	74.00	-25.64	1.05 H	123	43.01	5.35
6	4924.00	37.10 AV	54.00	-16.90	1.05 H	123	31.75	5.35
7	7386.00	49.63 PK	74.00	-24.37	1.00 H	107	39.33	10.30
8	7386.00	38.51 AV	54.00	-15.49	1.00 H	107	28.21	10.30
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	*2462.00	104.90 PK			1.03 V	209	102.89	2.01
2	*2462.00	94.03 AV			1.03 V	209	92.02	2.01
3	2483.50	69.91 PK	74.00	-4.09	1.03 V	209	67.88	2.03
4	2483.50	46.57 AV	54.00	-7.43	1.03 V	209	44.54	2.03
5	4924.00	47.12 PK	74.00	-26.88	1.00 V	74	41.77	5.35
6	4924.00	37.05 AV	54.00	-16.95	1.00 V	74	31.70	5.35
7	7386.00	49.22 PK	74.00	-24.78	1.08 V	305	38.92	10.30
8	7386.00	37.72 AV	54.00	-16.28	1.08 V	305	27.42	10.30

**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.

### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz

#### 4.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Power Sensor	Keysight	U2021XA	MY57320002	Feb.23.23
Power Sensor	Keysight	U2021XA	MY55060018	May 09, 22
Power Meter	Anritsu	ML2495A	1139001	Feb. 24, 22
Power Sensor	Anritsu	MA2411B	1531155	Feb. 24, 22
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Nov. 03, 22
Oscilloscope	Agilent	DSO9254A	MY51260160	Aug. 11, 22
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 16, 23
Signal Generator	Agilent	N5183A	MY50140980	Mar 23, 23
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Sep. 14, 22
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.

#### 4.3.3 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.5 TEST SETUP



#### 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****802.11b**

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.08	0.5	PASS
6	2437	10.08	0.5	PASS
11	2462	9.61	0.5	PASS

**802.11g**

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.11	0.5	PASS
6	2437	16.37	0.5	PASS
11	2462	16.37	0.5	PASS

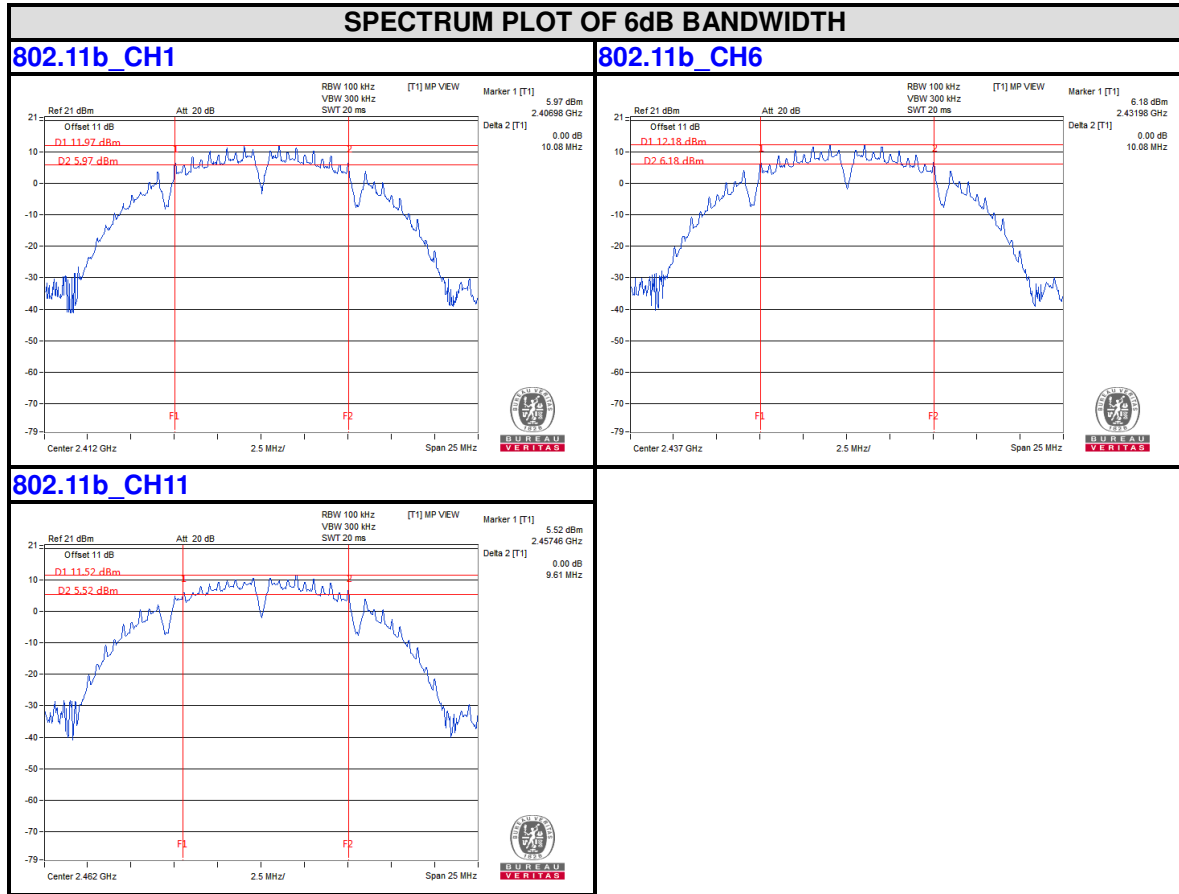
**802.11n HT20**

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.99	0.5	PASS
6	2437	17.01	0.5	PASS
11	2462	16.91	0.5	PASS



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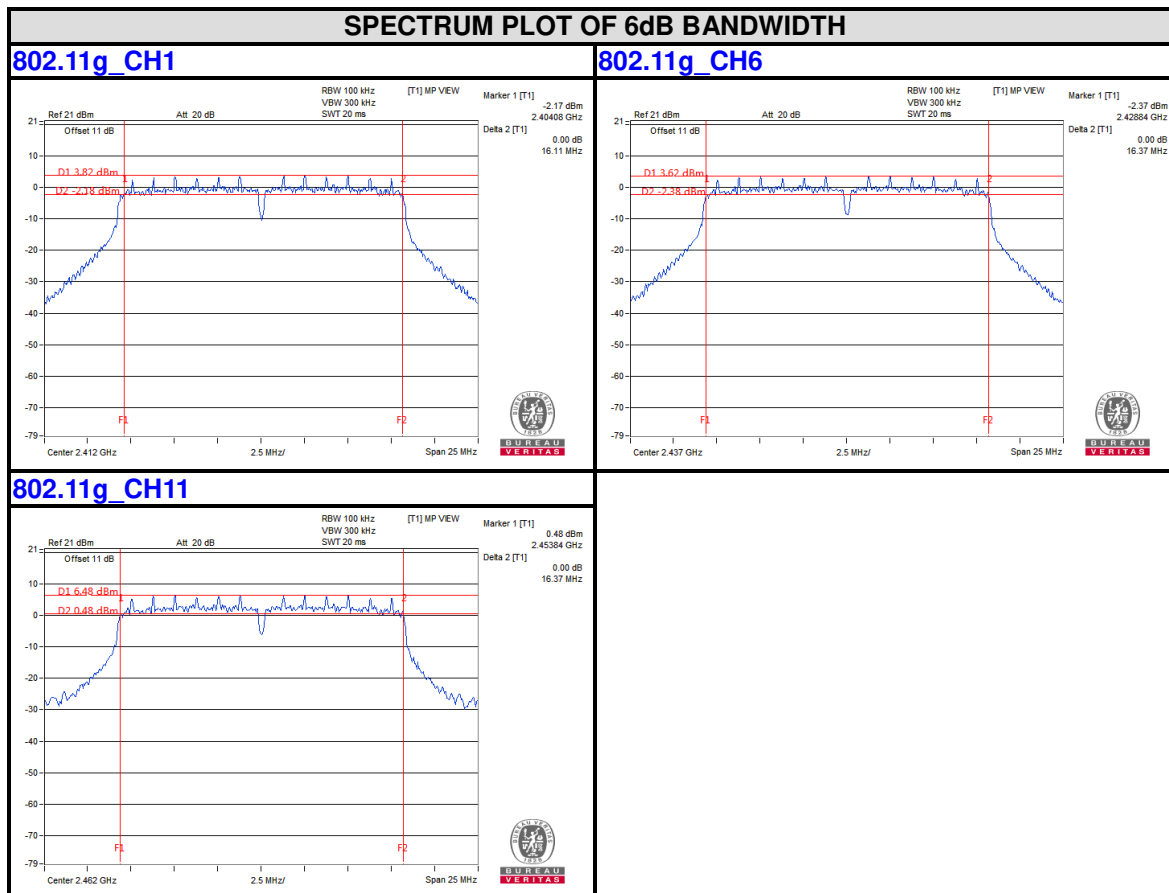
Test Report No.: IC2202WDG0092-2





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Test Report No.: IC2202WDG0092-2



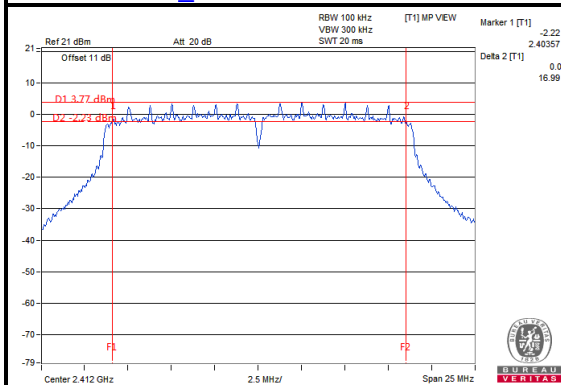


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VERITAS

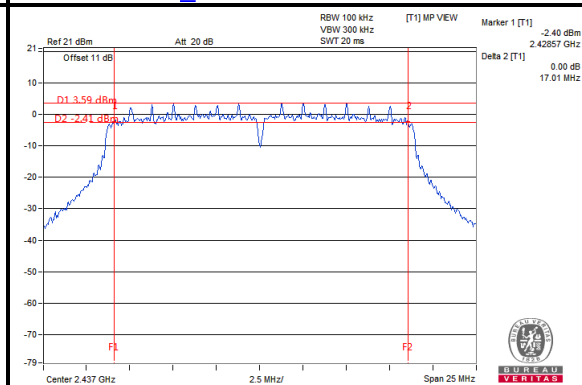
Test Report No.: IC2202WDG0092-2

### SPECTRUM PLOT OF 6dB BANDWIDTH

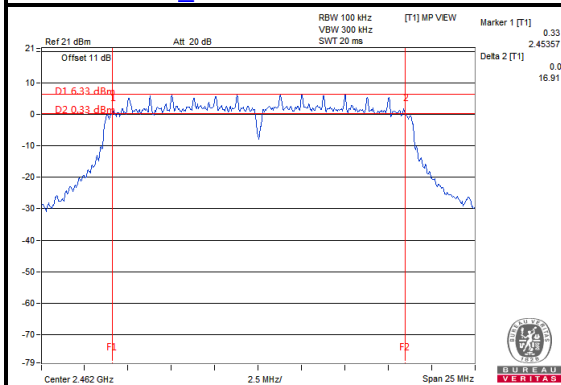
802.11n HT20\_CH1



802.11n HT20\_CH6



802.11n HT20\_CH11

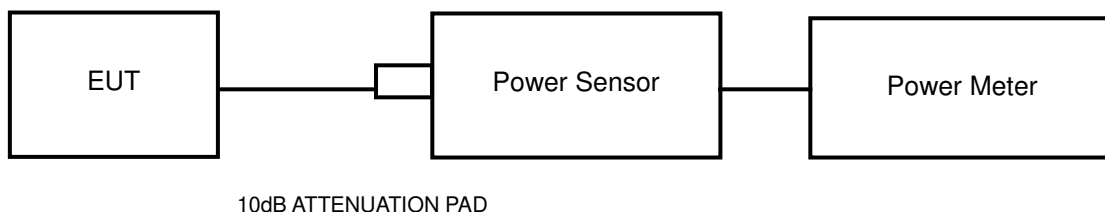


## 4.4 MAXIMUM OUTPUT POWER

### 4.4.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W(30dBm). The e.i.r.p. shall not exceed 4 W(36dBm)

### 4.4.2 TEST SETUP



### 4.4.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Power Sensor	Keysight	U2021XA	MY57320002	Feb.23.23
Power Sensor	Keysight	U2021XA	MY55060018	May 09, 22
Power Meter	Anritsu	ML2495A	1139001	Feb. 24, 22
Power Sensor	Anritsu	MA2411B	1531155	Feb. 24, 22
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Nov. 03, 22
Oscilloscope	Agilent	DSO9254A	MY51260160	Aug. 11, 22
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 16, 23
Signal Generator	Agilent	N5183A	MY50140980	Mar 23, 23
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Sep. 14, 22
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.



#### 4.4.4 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.

#### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4.6 EUT OPERATING CONDITIONS

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



## 4.4.7 TEST RESULTS

## MAXIMUM OUTPUT POWER

PCB Antenna  
802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	EIRP (mW)	PEAK POWER LIMIT (W)	EIRP LIMIT (W)	PASS/FAIL
1	2412	23.15	206.538	359.749	1	4	PASS
6	2437	23.45	221.309	385.478	1	4	PASS
11	2462	23.52	224.905	391.742	1	4	PASS

## 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	EIRP (mW)	PEAK POWER LIMIT (W)	EIRP LIMIT (W)	PASS/FAIL
1	2412	23.73	236.048	411.150	1	4	PASS
6	2437	24.22	264.241	460.257	1	4	PASS
11	2462	25.73	374.111	651.628	1	4	PASS

## 802.11n HT20

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	EIRP (mW)	PEAK POWER LIMIT (W)	EIRP LIMIT (W)	PASS/FAIL
1	2412	23.06	202.302	352.371	1	4	PASS
6	2437	24.15	260.016	452.898	1	4	PASS
11	2462	<b>25.76</b>	<b>376.704</b>	<b>656.145</b>	1	4	PASS

**External PCB Antenna**  
**802.11b**

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	EIRP (mW)	PEAK POWER LIMIT (W)	EIRP LIMIT (W)	PASS/FAIL
1	2412	23.15	206.538	295.121	1	4	PASS
6	2437	23.45	221.309	316.228	1	4	PASS
11	2462	23.52	224.905	321.366	1	4	PASS

**802.11g**

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	EIRP (mW)	PEAK POWER LIMIT (W)	EIRP LIMIT (W)	PASS/FAIL
1	2412	23.73	236.048	337.287	1	4	PASS
6	2437	24.22	264.241	377.572	1	4	PASS
11	2462	25.73	374.111	534.564	1	4	PASS

**802.11n HT20**

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	EIRP (mW)	PEAK POWER LIMIT (W)	EIRP LIMIT (W)	PASS/FAIL
1	2412	23.06	202.302	289.068	1	4	PASS
6	2437	24.15	260.016	371.535	1	4	PASS
11	2462	<b>25.76</b>	<b>376.704</b>	<b>538.270</b>	1	4	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	20.15	103.514
6	2437	20.24	105.682
11	2462	20.34	108.143

### 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
1	2412	15.87	38.637
6	2437	16.16	41.305
11	2462	17.93	62.087

### 802.11n HT20

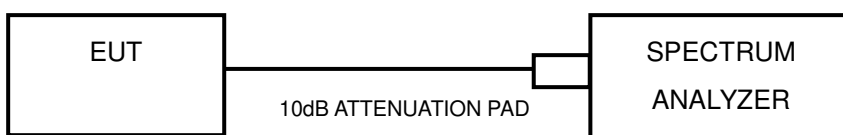
CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
1	2412	15.50	35.481
6	2437	16.18	41.495
11	2462	17.87	61.235

## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

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

### 4.5.2 TEST SETUP



### 4.5.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Power Sensor	Keysight	U2021XA	MY57320002	Feb.23.23
Power Sensor	Keysight	U2021XA	MY55060018	May 09, 22
Power Meter	Anritsu	ML2495A	1139001	Feb. 24, 22
Power Sensor	Anritsu	MA2411B	1531155	Feb. 24, 22
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Nov. 03, 22
Oscilloscope	Agilent	DSO9254A	MY51260160	Aug. 11, 22
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 16, 23
Signal Generator	Agilent	N5183A	MY50140980	Mar 23, 23
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Sep. 14, 22
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.

#### 4.5.4 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.

#### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.5.6 EUT OPERATING CONDITION

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

## 4.5.7 TEST RESULTS

### 802.11b

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-4.16	8.00	PASS
6	2437	-5.23	8.00	PASS
11	2462	-6.53	8.00	PASS

### 802.11g

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-12.82	8.00	PASS
6	2437	-11.74	8.00	PASS
11	2462	-9.60	8.00	PASS

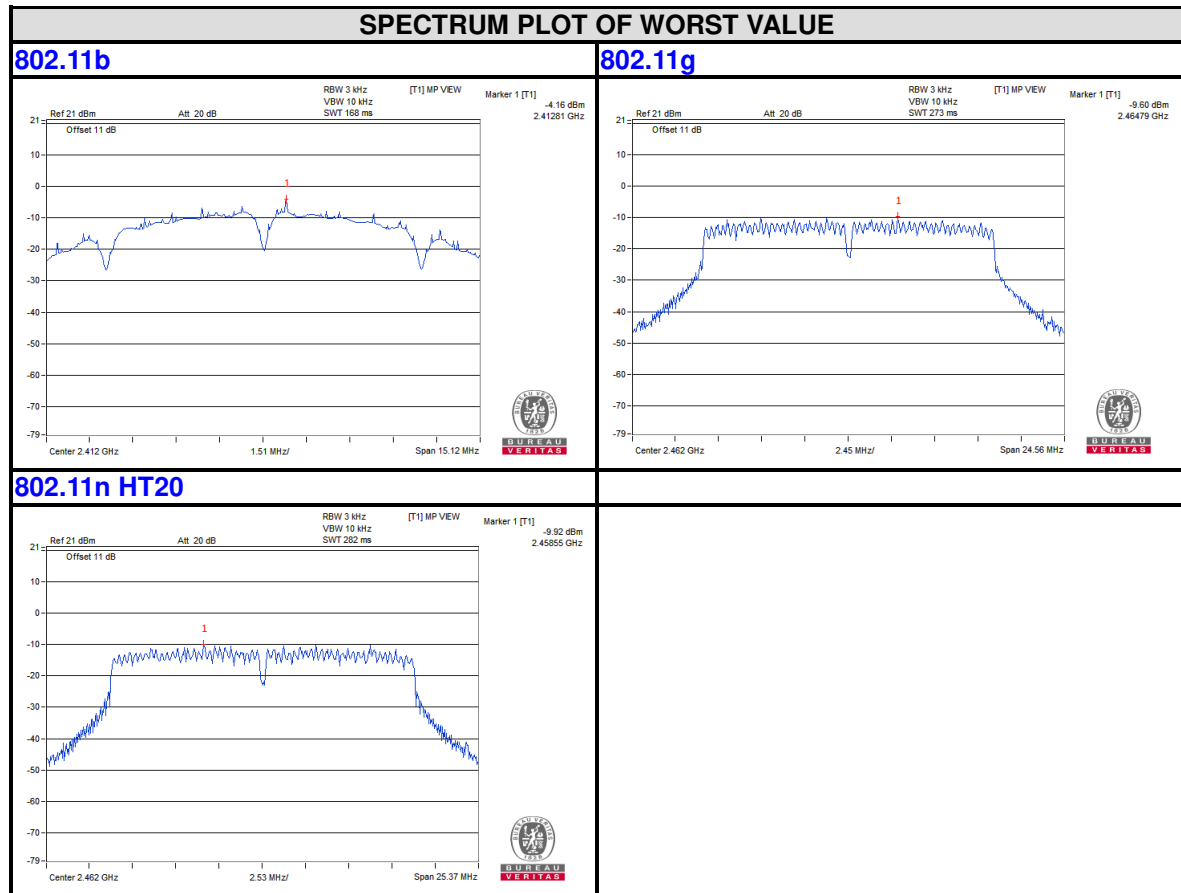
### 802.11n HT20

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-12.17	8.00	PASS
6	2437	-11.91	8.00	PASS
11	2462	-9.92	8.00	PASS



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Test Report No.: IC2202WDG0092-2



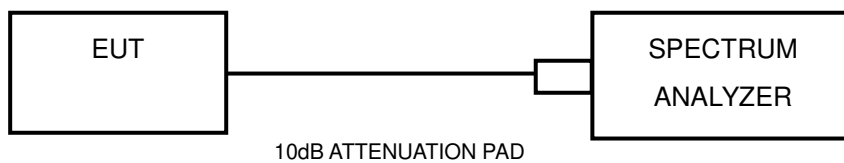


## 4.6 OUT OF BAND EMISSION MEASUREMENT

### 4.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 TEST SETUP



### 4.6.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.6.4 TEST PROCEDURE

#### MEASUREMENT PROCEDURE REF

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 OOB

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.

### 4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.6.6 EUT OPERATING CONDITION

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

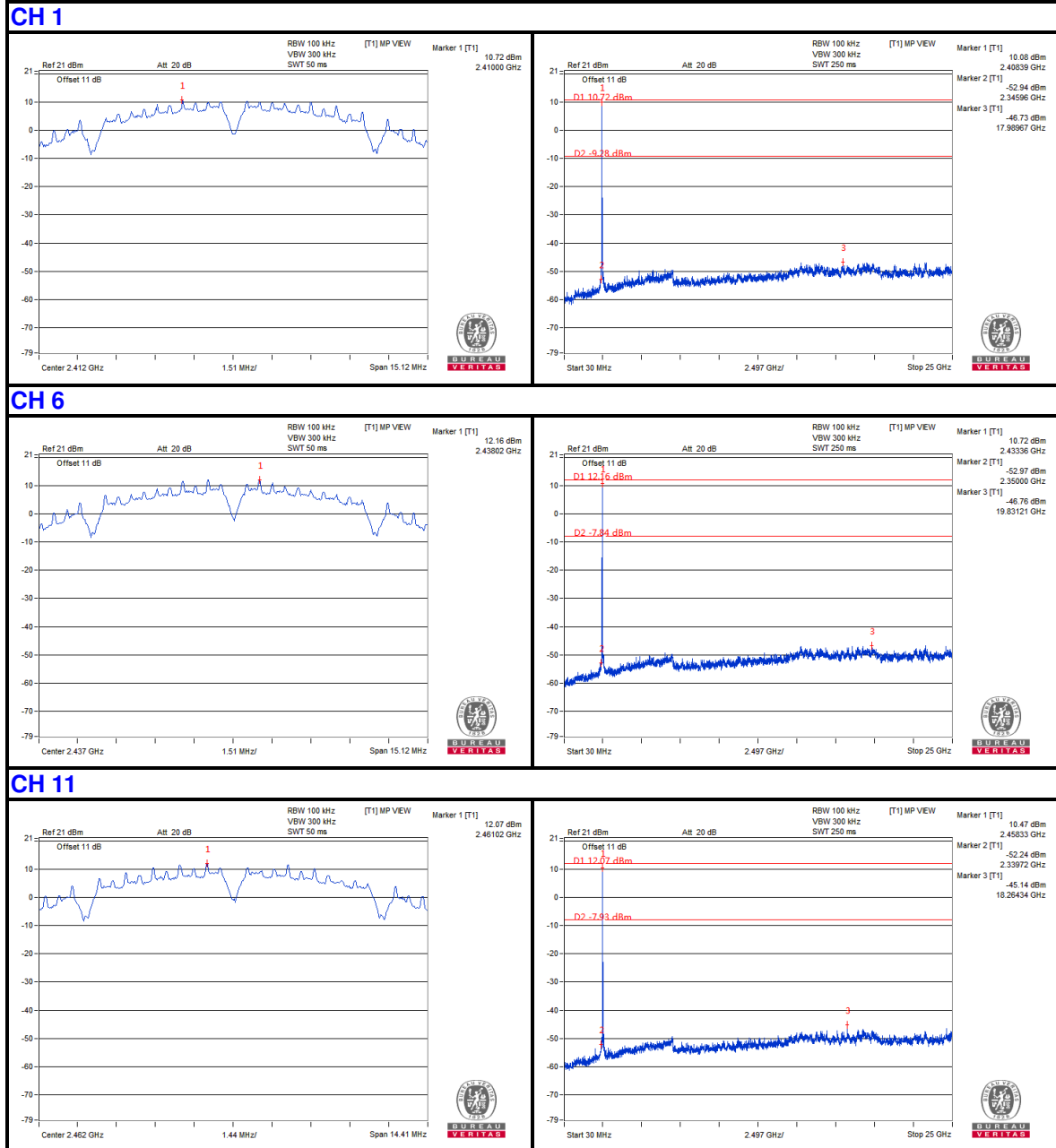


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VERITAS

Test Report No.: IC2202WDG0092-2

## 4.6.7 TEST RESULTS

### 802.11b



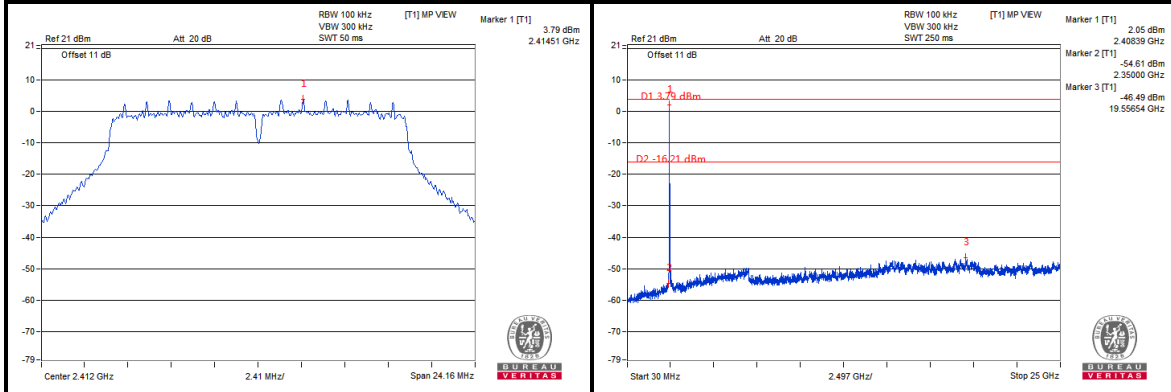


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VERITAS

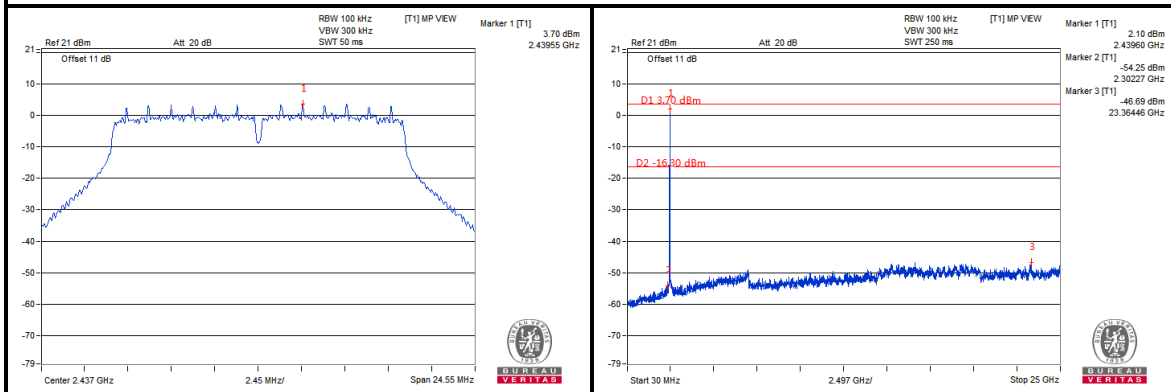
## Test Report No.: IC2202WDG0092-2

802.11g

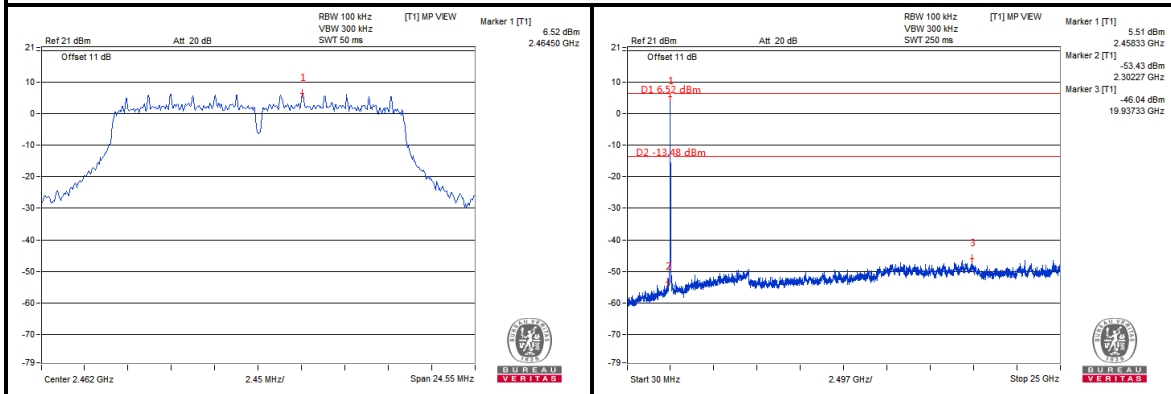
### CH 1



### CH 6



### CH 11

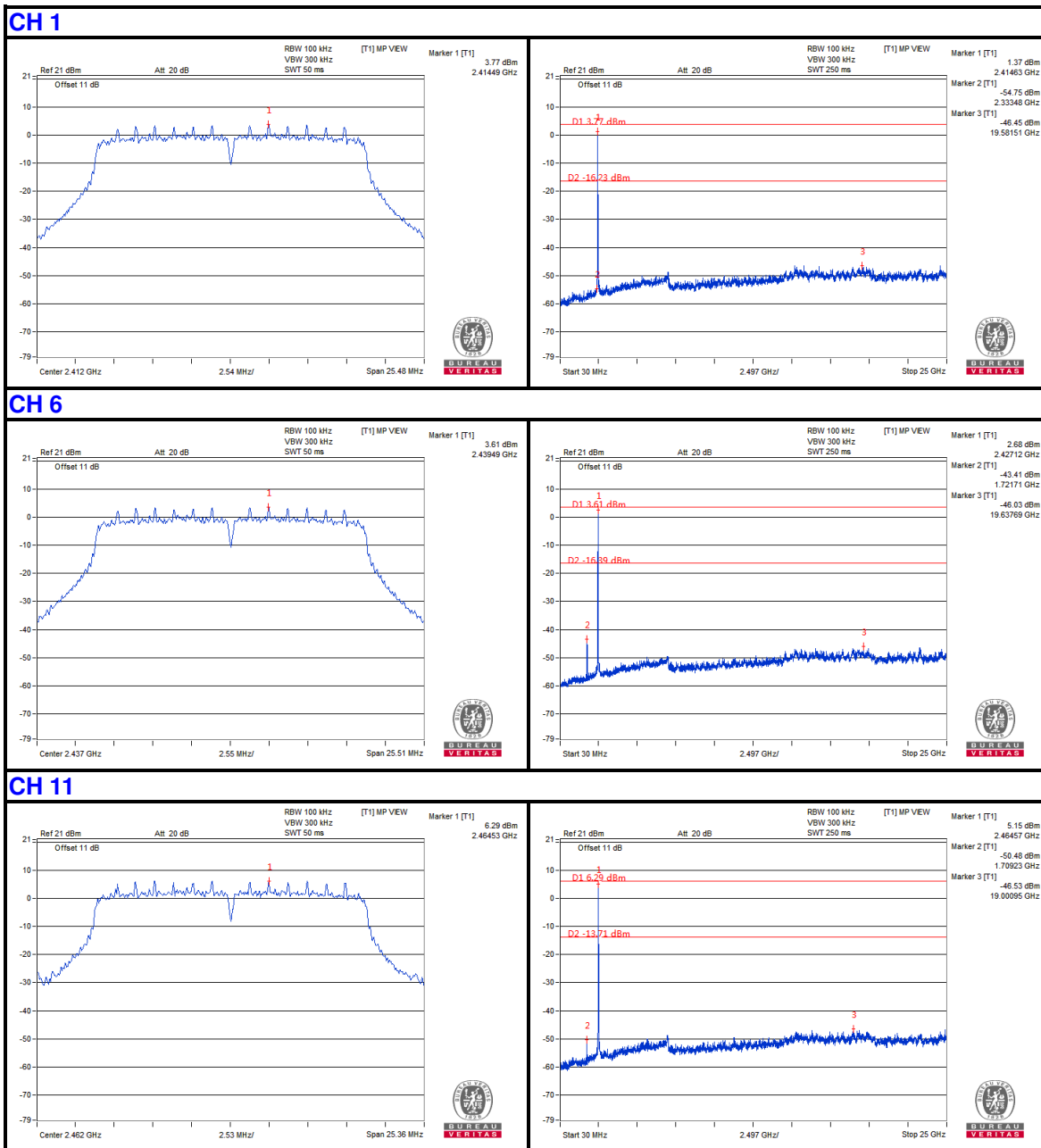




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VERITAS

## Test Report No.: IC2202WDG0092-2

### 802.11n HT20





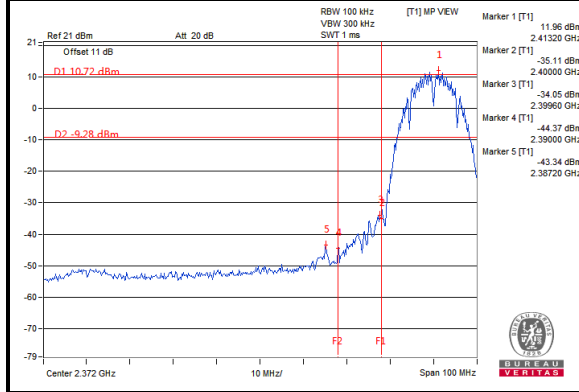
**BUREAU  
VERITAS**

Test Report No.: IC2202WDG0092-2

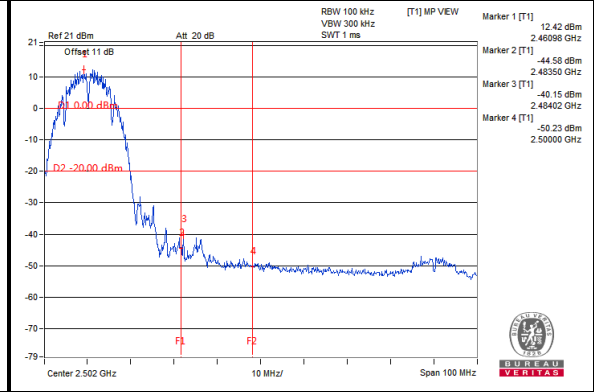
802.11b.

Chain 0

### CH 1 Band edge

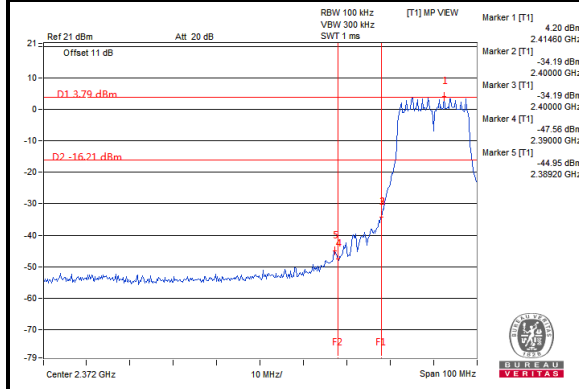


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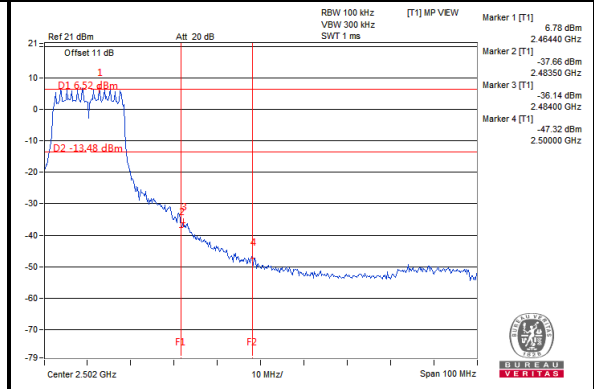


802.11g

### CH 1 Band edge

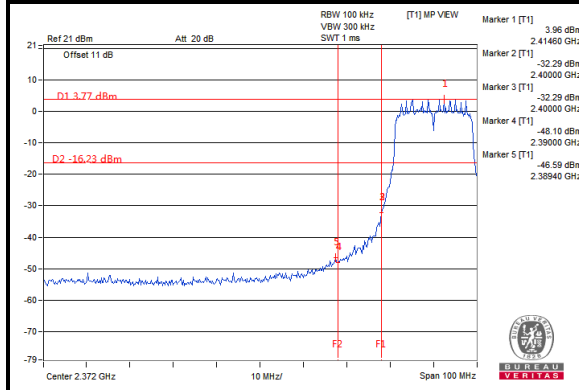


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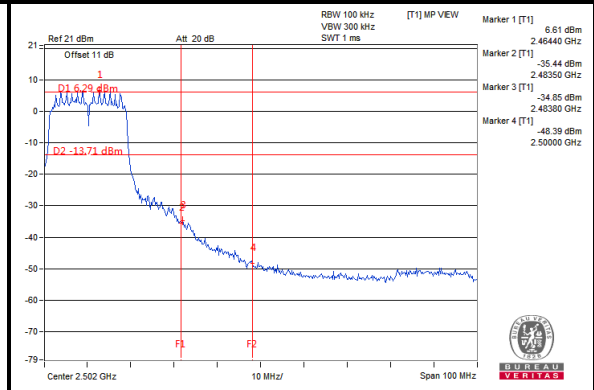


802.11n HT20

### CH 1 Band edge



### CH 11 Band edge





## 4.7 OCCUPIED BANDWIDTH MEASUREMENT

### 4.7.1 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Power Sensor	Keysight	U2021XA	MY57320002	Feb.23.23
Power Sensor	Keysight	U2021XA	MY55060018	May 09, 22
Power Meter	Anritsu	ML2495A	1139001	Feb. 24, 22
Power Sensor	Anritsu	MA2411B	1531155	Feb. 24, 22
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Nov. 03, 22
Oscilloscope	Agilent	DSO9254A	MY51260160	Aug. 11, 22
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 16, 23
Signal Generator	Agilent	N5183A	MY50140980	Mar 23, 23
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Sep. 14, 22
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.

### 4.7.2 TEST PROCEDURE

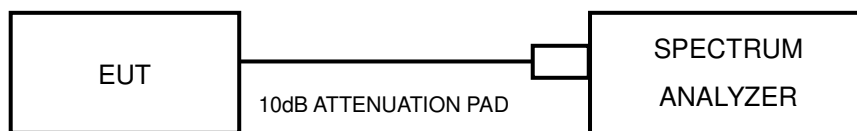
The transmitter antenna output was connected to the spectrum analyzer through an attenuator. The resolution bandwidth shall be set to the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.

Below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

#### 4.7.3 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.7.4 TEST SETUP



#### 4.7.5 EUT OPERATING CONDITIONS

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





#### 4.7.6 TEST RESULTS

##### 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
1	2412	14.78
6	2437	14.76
11	2462	14.76

##### 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
1	2412	16.69
6	2437	16.80
11	2462	16.80

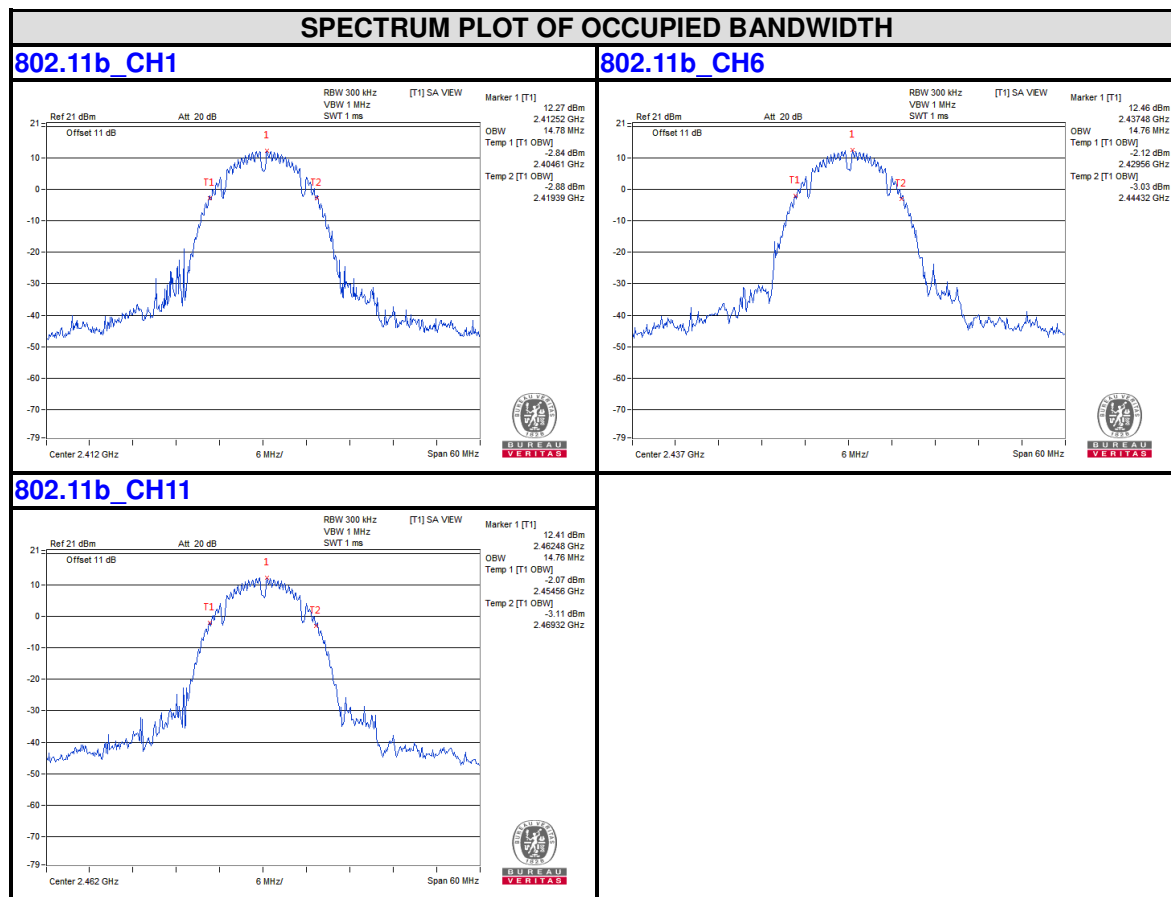
##### 802.11n HT20

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
1	2412	17.76
6	2437	17.76
11	2462	17.88



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VERITAS

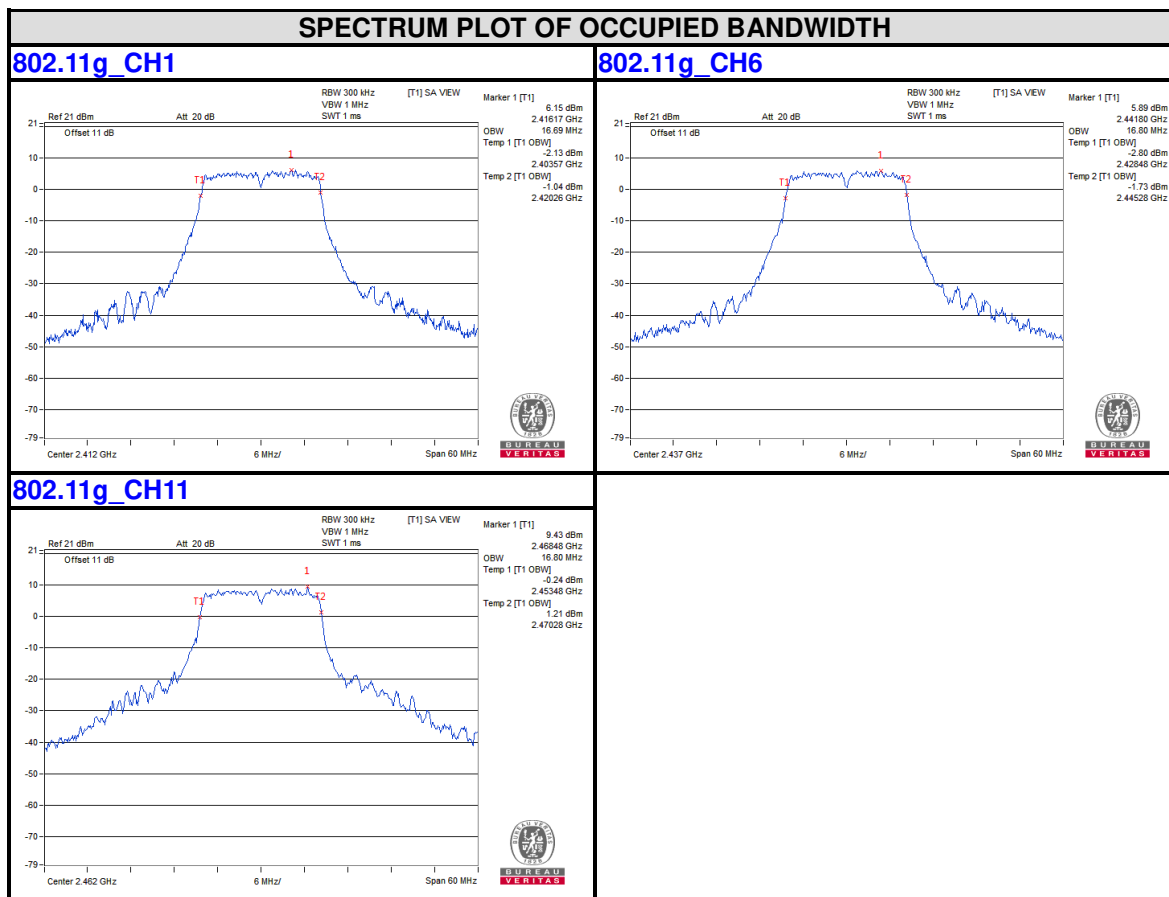
Test Report No.: IC2202WDG0092-2





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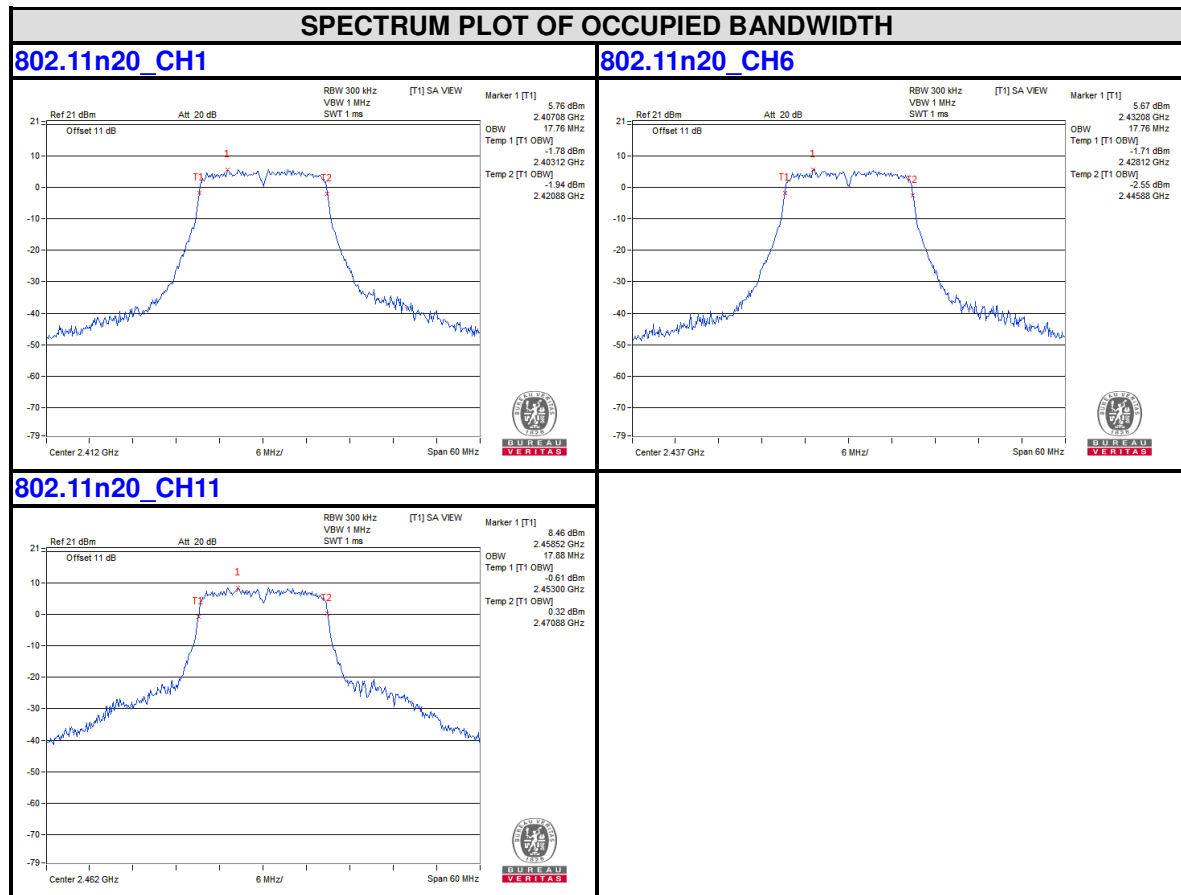
Test Report No.: IC2202WDG0092-2





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Test Report No.: IC2202WDG0092-2





## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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Test Report No.: IC2202WDG0092-2

## **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---**