



Test Report No.: RF2009WDG0427-2



# TEST REPORT



Applicant	Particle Industries, Inc
Address	126 Post St,4th floor, San Francisco, CA 94108 USA

Manufacturer or Supplier	Particle Industries, Inc
Address	126 Post St,4th floor, San Francisco, CA 94108 USA
Product	Tracker One LTE M1
Brand Name	Particle
Model	ONE402M
Additional Models & Model Difference	ONE404M, ONE402M-NB, ONE404M-NB, see section 3.1 note
Date of tests	Aug. 18, 2020 ~ Sep. 10, 2020, Oct. 16, 2020 ~ Oct. 28, 2020

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 Senior Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department
	 Date: Dec. 21, 2020

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2008WDG0081-2	Original release	Sep. 23, 2020
RF2009WDG0427-2	Based on the original report RF2008WDG0081-2 added GPIO isolation and LDO and model number, need retest radiated (below 1GHz) after engineer evaluated.	Dec. 21, 2020

## 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	PASS	Meet the requirement of limit.
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	2.16dB
	30MHz ~ 1GMHz	3.60dB
	1GHz ~ 18GHz	4.82dB
	18GHz ~ 40GHz	5.00dB
Conducted emissions	0.15MHz ~ 30MHz	2.70dB

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>	Tracker One LTE M1
<b>BRAND</b>	Particle
<b>MODEL NO.</b>	ONE402M
<b>ADDITIONAL MODELS</b>	ONE404M, ONE402M-NB, ONE404M-NB
<b>FCC ID</b>	2AEMI-ONE40X
<b>NOMINAL VOLTAGE</b>	LI+ pin: DC+3.6v--4.2V or Vusb PIN: DC+4.5V--5.5V or Vin PIN: DC 6V--30V
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>OPERATING FREQUENCY</b>	2412-2462MHz for 11b/g/n(HT20) 2422-2452MHz for 11n(HT40)
<b>PEAK OUTPUT POWER</b>	239.332 mW(Maximum)
<b>ANTENNA TYPE</b>	FPCB Antenna, with 1.71dBi gain
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	N/A

#### 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.: 2009WDG0427) for detailed product photo.
3. Additional models ONE404M, ONE402M-NB, ONE404M-NB are identical with the test model ONE402M except the model number for marketing purpose.
4. The EUT provides completed transmitters and receivers:

MODULATION MODE	FUNCTION
802.11b	1TX/1RX
802.11g	1TX/1RX
802.11n (HT20)	1TX/1RX
802.11n (HT40)	1TX/1RX

### 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		

7 channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

### 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	
A	-	-	-	√	Powered by Fully Battery with WIFI Link
B	√	√	√	-	Powered by Adapter 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

#### **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
B	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)
B	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)
B	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
B	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
B	802.11n HT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
B	802.11n HT40	3 to 9	3, 9	OFDM	BPSK	13.5

**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
A	802.11n HT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER(POE)	TESTED BY
RE<1G	25deg. C, 55%RH	DC5V from Adapter	Vincent
RE≥1G	25deg. C, 55%RH	DC5V from Adapter	Vincent
PLC	25deg. C, 56%RH	DC5V from Adapter	N/A
APCM	20deg. C, 55%RH	DC 3.7V From Battery	Daniel



### 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 a dependent 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	Adapter	N/A	DC 5V 2A	N/A	N/A
2	Adapter	PHICOMM	YH-AD-120A200-CH	N/A	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB-C Line: Unshielded detachable 2.0m.
2	DC Line: Unshielded detachable 2.0m.

## 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	Mar. 11,21
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Mar. 11,21
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Mar. 12,21
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Jan. 16,21
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, GRGT/CHINA and NIM/CHINA.



#### 4.1.3 TEST PROCEDURES

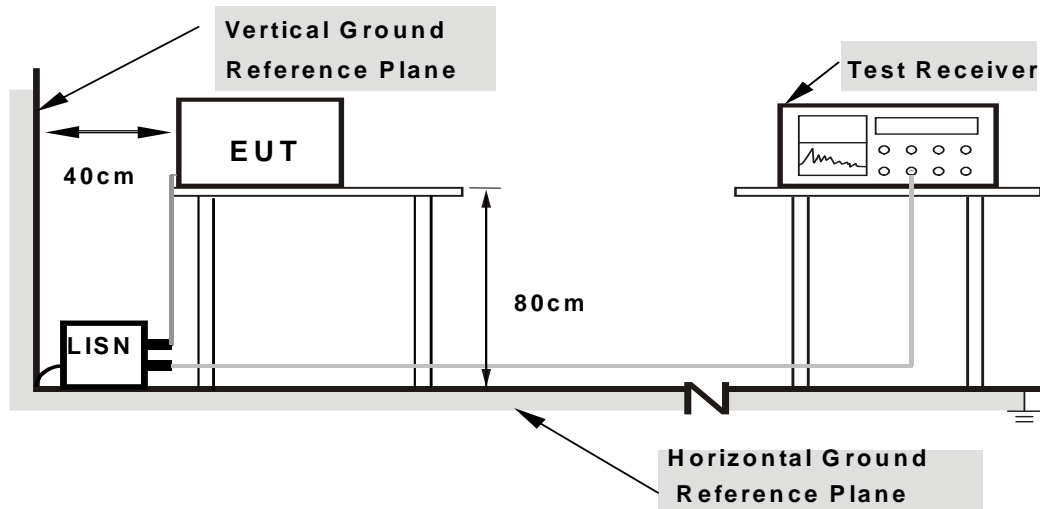
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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.

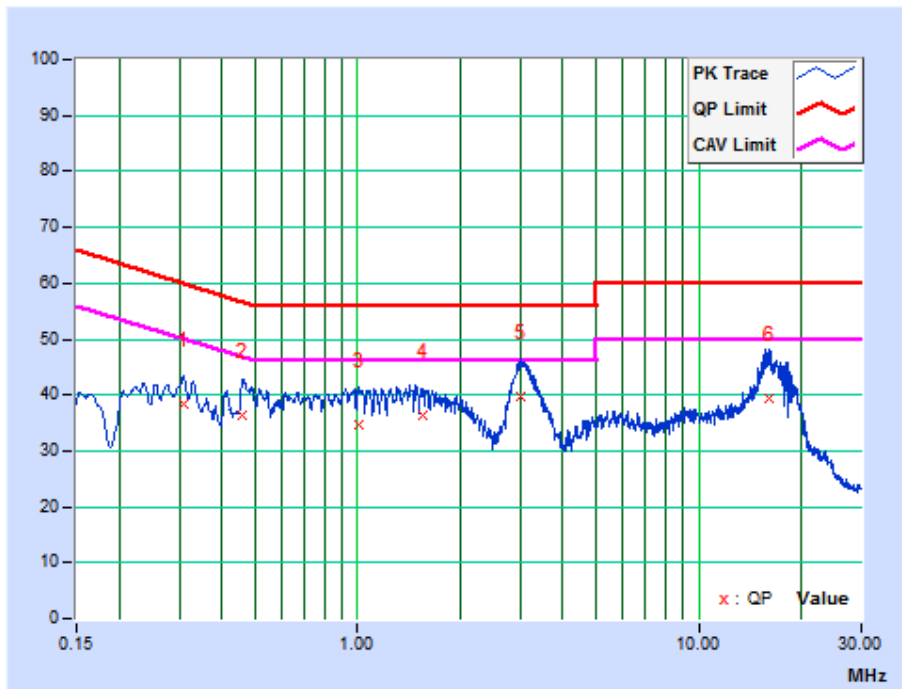
### 4.1.7 TEST RESULTS

**CONDUCTED WORST-CASE DATA:**

<b>PHASE</b>	Line	<b>6dB BANDWIDTH</b>	9kHz
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No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.30975	9.82	28.65	15.89	38.47	25.71	59.98	49.98	-21.50	-24.26
2	0.45906	9.86	26.58	11.85	36.44	21.71	56.71	46.71	-20.27	-25.00
3	1.00725	9.82	24.86	9.96	34.68	19.78	56.00	46.00	-21.32	-26.22
4	1.54648	9.84	26.42	16.46	36.26	26.30	56.00	46.00	-19.74	-19.70
5	3.02100	9.86	29.92	17.65	39.78	27.51	56.00	46.00	-16.22	-18.49
6	15.99675	10.15	29.33	17.35	39.48	27.50	60.00	50.00	-20.52	-22.50

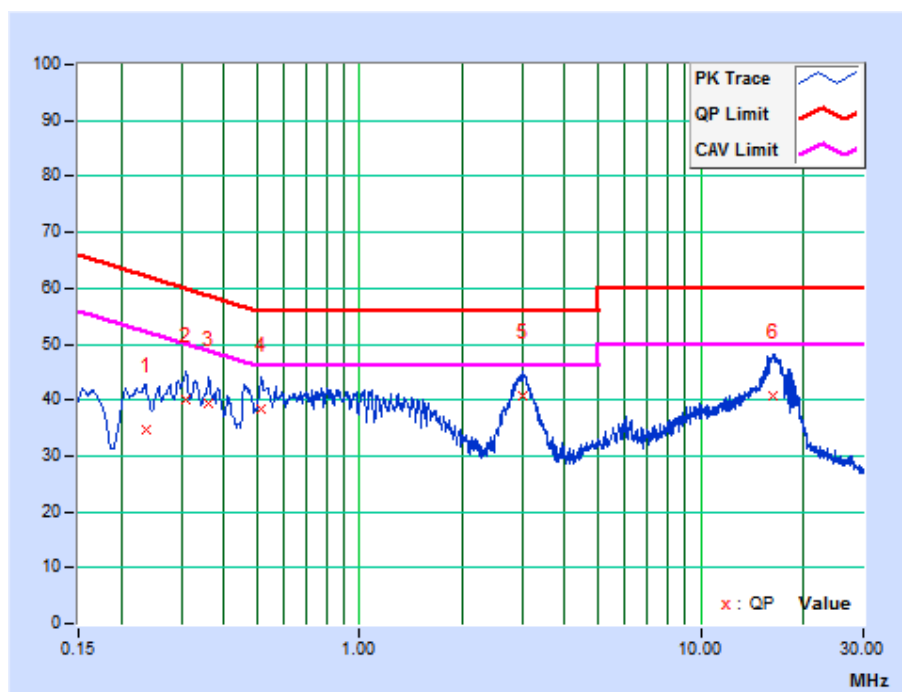
**REMARKS:** The emission levels of other frequencies were very low against the limit.



<b>PHASE</b>	Neutral	<b>6dB BANDWIDTH</b>	9kHz
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No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.23550	9.73	25.02	8.27	34.75	18.00	62.25	52.25	-27.51	-34.26
2	0.30975	9.76	30.19	16.21	39.95	25.97	59.98	49.98	-20.02	-24.00
3	0.36101	9.78	29.76	18.62	39.54	28.40	58.71	48.71	-19.16	-20.30
4	0.51698	9.81	28.74	16.00	38.55	25.81	56.00	46.00	-17.45	-20.19
5	3.00027	9.80	30.95	21.54	40.75	31.34	56.00	46.00	-15.25	-14.66
6	16.29600	10.15	30.72	17.34	40.87	27.49	60.00	50.00	-19.13	-22.51

**REMARKS:** The emission levels of other frequencies were very low against the limit.



## 4.2. RADIATED EMISSION MEASUREMENT

### 4.2.1 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.





4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 17,21
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	May 13, 21
Active Loop Antenna (9KHz -30MHz)	SCHWARZBECK	FMZB 1519B	1519B-045	May 27,21
Amplifier (9KHz -1GHz)	Burgeon	BPA-530	100210	Mar. 14,21
Bilog Antenna (20MHz -2GHz)	Teseq	CBL 6111D	30643	May 29,21
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 29,21
Horn Antenna (18GHz -40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	May 09, 21
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	May 22,21
Test Software	ADT	ADT_Radiated_V 7.6.15.9.2	N/A	N/A
Broadband Preamplifier (1GHz~18GHz)	SCHWARZBECK	BBV9718	305	May 08,21
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Mar. 03,21
Test Software	ADT	ADT_Radiated_V 7.6.15.9.2	N/A	N/A
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	May 19,21

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.

#### 4.2.3 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  $\geq 1/T$  (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.

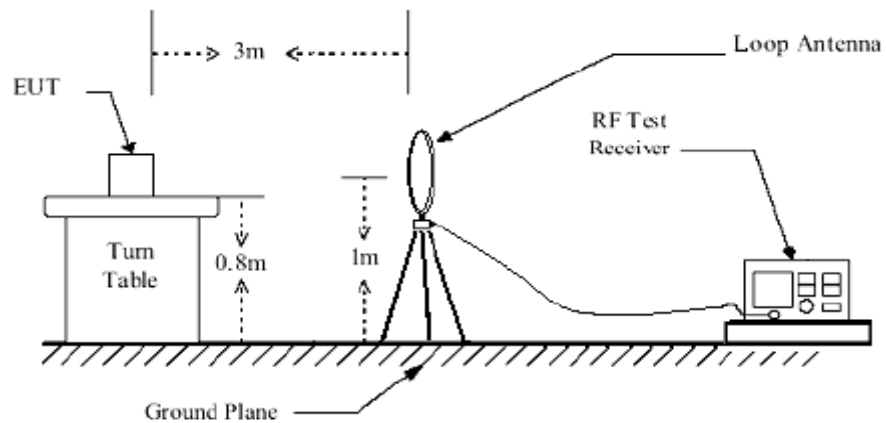


#### 4.2.4 DEVIATION FROM TEST STANDARD

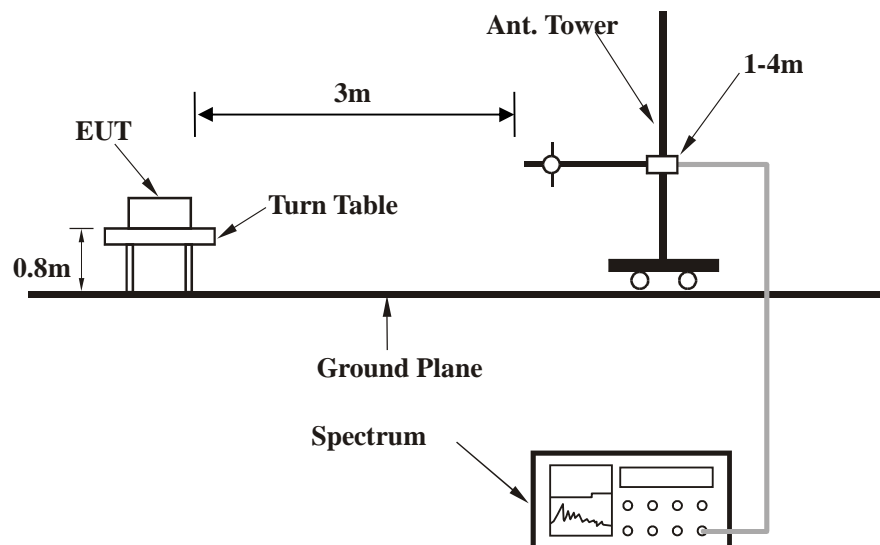
No deviation.

#### 4.2.5 TEST SETUP

##### Below 30MHz test setup

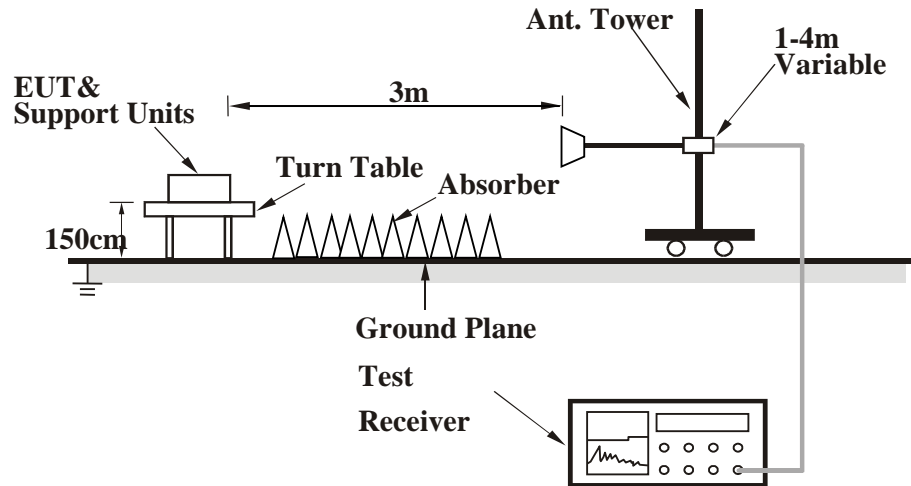


##### Below 1GHz test setup



**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).

#### 4.2.6 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.

### 4.2.7 TEST RESULTS

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

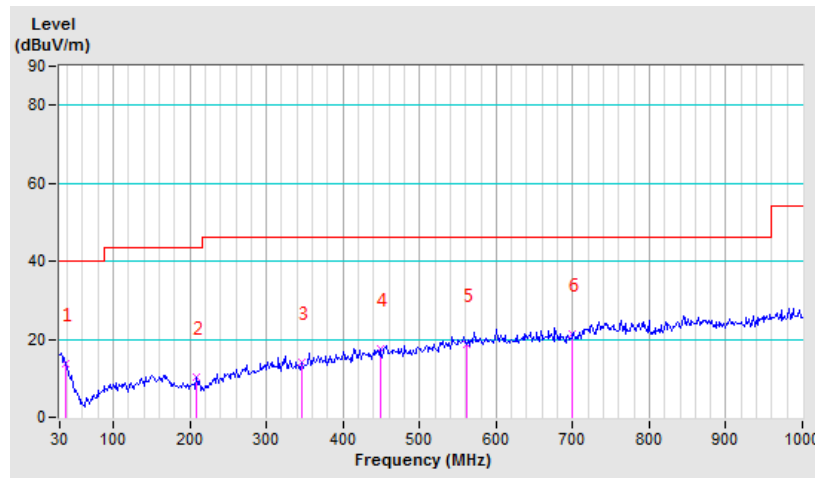
**802.11b**

<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	37.77	13.74 QP	40.00	-26.26	1.00 H	152	28.85	-15.11
2	208.77	10.29 QP	43.50	-33.21	1.00 H	303	29.84	-19.55
3	347.12	13.95 QP	46.00	-32.05	1.00 H	179	26.87	-12.92
4	448.16	17.44 QP	46.00	-28.56	1.00 H	204	28.09	-10.65
5	561.63	18.57 QP	46.00	-27.43	1.00 H	82	26.00	-7.43
6	699.98	21.48 QP	46.00	-24.52	1.00 H	77	27.03	-5.55

**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.

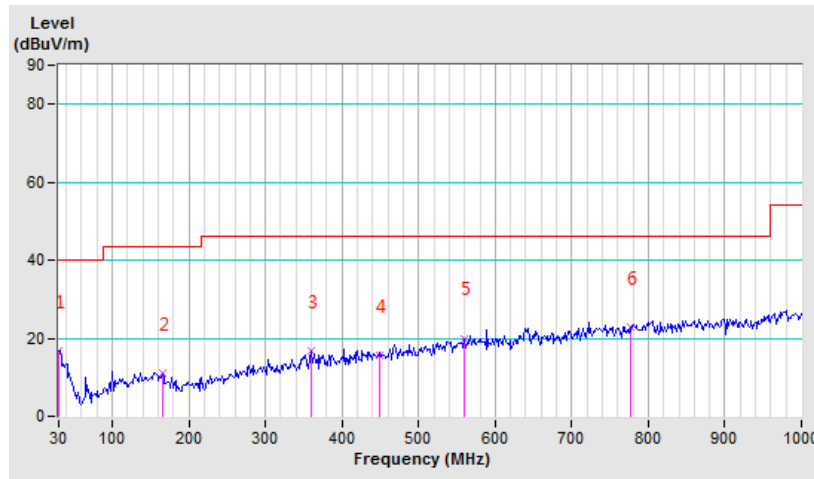


<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9KHz ~ 1GHz		

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	30.00	16.69 QP	40.00	-23.31	1.00 V	61	28.83	-12.14
2	165.24	11.15 QP	43.50	-32.35	1.00 V	46	28.69	-17.54
3	359.55	16.73 QP	46.00	-29.27	1.00 V	34	29.14	-12.41
4	448.16	15.66 QP	46.00	-30.34	1.00 V	23	26.31	-10.65
5	560.08	19.98 QP	46.00	-26.02	1.00 V	12	27.44	-7.46
6	776.15	22.98 QP	46.00	-23.02	1.00 V	2	26.53	-3.55

**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	44.69 PK	74.00	-29.31	1.00 H	78	41.16	3.53
2	2390.00	32.79 AV	54.00	-21.21	1.00 H	78	29.26	3.53
3	*2412.00	109.07 PK			1.00 H	78	105.42	3.65
4	*2412.00	99.34 AV			1.00 H	78	95.69	3.65
5	4824.00	52.29 PK	74.00	-21.71	1.00 H	73	44.24	8.05
6	4824.00	36.85 AV	54.00	-17.15	1.00 H	73	28.80	8.05
7	#7236.00	55.44 PK	74.00	-18.56	1.00 H	73	41.87	13.57
8	#7236.00	42.92 AV	54.00	-11.08	1.00 H	73	29.35	13.57
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	49.02 PK	74.00	-24.98	1.24 V	187	45.49	3.53
2	2390.00	36.36 AV	54.00	-17.64	1.24 V	187	32.83	3.53
3	*2412.00	107.32 PK			1.24 V	187	103.67	3.65
4	*2412.00	97.93 AV			1.24 V	187	94.28	3.65
5	4824.00	52.71 PK	74.00	-21.29	1.00 V	33	44.66	8.05
6	4824.00	37.64 AV	54.00	-16.36	1.00 V	33	29.59	8.05
7	#7236.00	55.95 PK	74.00	-18.05	1.00 V	33	42.38	13.57
8	#7236.00	43.17 AV	54.00	-10.83	1.00 V	33	29.60	13.57

**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.



Test Report No.: RF2009WDG0427-2

<b>CHANNEL</b>	TX Channel 6	<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	*2437.00	109.02 PK			1.76 H	126	105.25	3.77
2	*2437.00	99.19 AV			1.76 H	126	95.42	3.77
3	4874.00	52.41 PK	74.00	-21.59	1.00 H	150	44.18	8.23
4	4874.00	36.54 AV	54.00	-17.46	1.00 H	150	28.31	8.23
5	7311.00	55.67 PK	74.00	-18.33	1.00 H	135	41.87	13.80
6	7311.00	42.91 AV	54.00	-11.09	1.00 H	135	29.11	13.80

**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	104.34 PK			1.72 V	185	100.57	3.77
2	*2437.00	94.77 AV			1.72 V	185	91.00	3.77
3	4874.00	52.84 PK	74.00	-21.16	1.00 V	150	44.61	8.23
4	4874.00	37.91 AV	54.00	-16.09	1.00 V	150	29.68	8.23
5	7311.00	54.97 PK	74.00	-19.03	1.00 V	155	41.17	13.80
6	7311.00	42.67 AV	54.00	-11.33	1.00 V	155	28.87	13.80

**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.





Test Report No.: RF2009WDG0427-2

<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	111.35 PK			1.00 H	125	107.46	3.89
2	*2462.00	102.12 AV			1.00 H	125	98.23	3.89
3	2483.50	51.47 PK	74.00	-22.53	1.00 H	125	47.47	4.00
4	2483.50	37.16 AV	54.00	-16.84	1.00 H	125	33.16	4.00
5	4924.00	51.74 PK	74.00	-22.26	1.00 H	288	43.34	8.40
6	4924.00	36.74 AV	54.00	-17.26	1.00 H	288	28.34	8.40
7	7386.00	56.24 PK	74.00	-17.76	1.00 H	288	42.21	14.03
8	7386.00	43.71 AV	54.00	-10.29	1.00 H	288	29.68	14.03
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	106.84 PK			1.68 V	264	102.95	3.89
2	*2462.00	97.51 AV			1.68 V	264	93.62	3.89
3	2483.50	46.65 PK	74.00	-27.35	1.68 V	264	42.65	4.00
4	2483.50	34.31 AV	54.00	-19.69	1.68 V	264	30.31	4.00
5	4924.00	51.85 PK	74.00	-22.15	1.00 V	337	43.45	8.40
6	4924.00	38.91 AV	54.00	-15.09	1.00 V	337	30.51	8.40
7	7386.00	58.65 PK	74.00	-15.35	1.00 V	255	44.62	14.03
8	7386.00	45.99 AV	54.00	-8.01	1.00 V	255	31.96	14.03

**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	54.91 PK	74.00	-19.09	1.00 H	180	51.38	3.53
2	2390.00	41.96 AV	54.00	-12.04	1.00 H	180	38.43	3.53
3	*2412.00	106.84 PK			1.00 H	180	103.19	3.65
4	*2412.00	96.21 AV			1.00 H	180	92.56	3.65
5	4824.00	52.74 PK	74.00	-21.26	1.00 H	75	44.69	8.05
6	4824.00	37.84 AV	54.00	-16.16	1.00 H	75	29.79	8.05
7	#7236.00	55.54 PK	74.00	-18.46	1.00 H	75	41.97	13.57
8	#7236.00	43.42 AV	54.00	-10.58	1.00 H	75	29.85	13.57
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	54.06 PK	74.00	-19.94	1.88 V	162	50.53	3.53
2	2390.00	39.79 AV	54.00	-14.21	1.88 V	162	36.26	3.53
3	*2412.00	103.82 PK			1.88 V	162	100.17	3.65
4	*2412.00	54.06 AV			1.88 V	162	50.41	3.65
5	4824.00	51.64 PK	74.00	-22.36	1.00 V	22	43.59	8.05
6	4824.00	37.40 AV	54.00	-16.60	1.00 V	22	29.35	8.05
7	#7236.00	55.47 PK	74.00	-18.53	1.00 V	22	41.90	13.57
8	#7236.00	43.74 AV	54.00	-10.26	1.00 V	22	30.17	13.57

**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.



Test Report No.: RF2009WDG0427-2

<b>CHANNEL</b>	TX Channel 6	<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	*2437.00	105.83 PK			1.00 H	161	102.06	3.77
2	*2437.00	94.93 AV			1.00 H	161	91.16	3.77
3	4874.00	51.54 PK	74.00	-22.46	1.00 H	150	43.31	8.23
4	4874.00	35.57 AV	54.00	-18.43	1.00 H	150	27.34	8.23
5	7311.00	56.24 PK	74.00	-17.76	1.00 H	130	42.44	13.80
6	7311.00	45.71 AV	54.00	-8.29	1.00 H	130	31.91	13.80

**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	104.82 PK			1.83 V	162	101.05	3.77
2	*2437.00	93.83 AV			1.83 V	162	90.06	3.77
3	4874.00	52.64 PK	74.00	-21.36	1.00 V	158	44.41	8.23
4	4874.00	35.70 AV	54.00	-18.30	1.00 V	158	27.47	8.23
5	7311.00	56.84 PK	74.00	-17.16	1.00 V	156	43.04	13.80
6	7311.00	42.95 AV	54.00	-11.05	1.00 V	156	29.15	13.80

**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.



Test Report No.: RF2009WDG0427-2

<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	108.75 PK			1.00 H	130	104.86	3.89
2	*2462.00	98.19 AV			1.00 H	130	94.30	3.89
3	2483.50	64.56 PK	74.00	-9.44	1.00 H	130	60.56	4.00
4	2483.50	48.45 AV	54.00	-5.55	1.00 H	130	44.45	4.00
5	4924.00	52.34 PK	74.00	-21.66	1.00 H	288	43.94	8.40
6	4924.00	35.48 AV	54.00	-18.52	1.00 H	288	27.08	8.40
7	7386.00	56.37 PK	74.00	-17.63	1.00 H	288	42.34	14.03
8	7386.00	43.15 AV	54.00	-10.85	1.00 H	288	29.12	14.03
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	104.51 PK			1.40 V	95	100.62	3.89
2	*2462.00	93.96 AV			1.40 V	95	90.07	3.89
3	2483.50	60.07 PK	74.00	-13.93	1.40 V	95	56.07	4.00
4	2483.50	44.43 AV	54.00	-9.57	1.40 V	95	40.43	4.00
5	4874.00	52.37 PK	74.00	-21.63	1.00 V	47	44.14	8.23
6	4874.00	35.62 AV	54.00	-18.38	1.00 V	47	27.39	8.23
7	7386.00	56.24 PK	74.00	-17.76	1.00 V	47	42.21	14.03
8	7386.00	43.14 AV	54.00	-10.86	1.00 V	47	29.11	14.03

**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	60.21 PK	74.00	-13.79	1.01 H	138	56.68	3.53
2	2390.00	42.14 AV	54.00	-11.86	1.01 H	138	38.61	3.53
3	*2412.00	106.52 PK			1.01 H	138	102.87	3.65
4	*2412.00	94.78 AV			1.01 H	138	91.13	3.65
5	4824.00	52.47 PK	74.00	-21.53	1.00 H	281	44.42	8.05
6	4824.00	34.80 AV	54.00	-19.20	1.00 H	281	26.75	8.05
7	#7236.00	56.94 PK	74.00	-17.06	1.00 H	281	43.37	13.57
8	#7236.00	42.58 AV	54.00	-11.42	1.00 H	281	29.01	13.57

**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	56.50 PK	74.00	-17.50	1.28 V	183	52.97	3.53
2	2390.00	40.37 AV	54.00	-13.63	1.28 V	183	36.84	3.53
3	*2412.00	104.36 PK			1.28 V	183	100.71	3.65
4	*2412.00	93.44 AV			1.28 V	183	89.79	3.65
5	4824.00	53.54 PK	74.00	-20.46	1.00 V	19	45.49	8.05
6	4824.00	37.24 AV	54.00	-16.76	1.00 V	19	29.19	8.05
7	#7236.00	55.84 PK	74.00	-18.16	1.00 V	19	42.27	13.57
8	#7236.00	42.32 AV	54.00	-11.68	1.00 V	19	28.75	13.57

**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.



Test Report No.: RF2009WDG0427-2

<b>CHANNEL</b>	TX Channel 6	<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	*2437.00	107.52 PK			1.00 H	155	103.75	3.77
2	*2437.00	96.84 AV			1.00 H	155	93.07	3.77
3	4874.00	52.41 PK	74.00	-21.59	1.00 H	130	44.18	8.23
4	4874.00	34.82 AV	54.00	-19.18	1.00 H	130	26.59	8.23
5	7311.00	55.91 PK	74.00	-18.09	1.00 H	145	42.11	13.80
6	7311.00	41.71 AV	54.00	-12.29	1.00 H	145	27.91	13.80
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	104.24 PK			1.00 V	186	100.47	3.77
2	*2437.00	94.52 AV			1.00 V	186	90.75	3.77
3	4874.00	52.67 PK	74.00	-21.33	1.00 V	180	44.44	8.23
4	4874.00	37.25 AV	54.00	-16.75	1.00 V	180	29.02	8.23
5	7311.00	56.74 PK	74.00	-17.26	1.00 V	199	42.94	13.80
6	7311.00	42.91 AV	54.00	-11.09	1.00 V	199	29.11	13.80

**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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<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	108.47 PK			1.00 H	131	104.58	3.89
2	*2462.00	98.09 AV			1.00 H	131	94.20	3.89
3	2483.50	67.70 PK	74.00	-6.30	1.00 H	131	63.70	4.00
4	2483.50	49.83 AV	54.00	-4.17	1.00 H	131	45.83	4.00
5	4924.00	52.59 PK	74.00	-21.41	1.00 H	288	44.19	8.40
6	4924.00	37.24 AV	54.00	-16.76	1.00 H	288	28.84	8.40
7	7386.00	56.47 PK	74.00	-17.53	1.00 H	288	42.44	14.03
8	7386.00	43.55 AV	54.00	-10.45	1.00 H	288	29.52	14.03
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	104.12 PK			1.41 V	184	100.23	3.89
2	*2462.00	93.76 AV			1.41 V	184	89.87	3.89
3	2483.50	62.28 PK	74.00	-11.72	1.41 V	184	58.28	4.00
4	2483.50	45.33 AV	54.00	-8.67	1.41 V	184	41.33	4.00
5	4924.00	52.36 PK	74.00	-21.64	1.00 V	47	43.96	8.40
6	4924.00	37.52 AV	54.00	-16.48	1.00 V	47	29.12	8.40
7	7386.00	54.52 PK	74.00	-19.48	1.00 V	47	40.49	14.03
8	7386.00	42.84 AV	54.00	-11.16	1.00 V	47	28.81	14.03

**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 HT40

<b>CHANNEL</b>	TX Channel 3	<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	58.94 PK	74.00	-15.06	1.00 H	138	55.41	3.53
2	2390.00	46.29 AV	54.00	-7.71	1.00 H	138	42.76	3.53
3	*2422.00	103.95 PK			1.00 H	138	100.25	3.70
4	*2422.00	58.94 AV			1.00 H	138	55.24	3.70
5	4844.00	53.67 PK	74.00	-20.33	1.00 H	73	45.55	8.12
6	4844.00	36.75 AV	54.00	-17.25	1.00 H	73	28.63	8.12
7	7266.00	56.74 PK	74.00	-17.26	1.00 H	73	43.08	13.66
8	7266.00	43.25 AV	54.00	-10.75	1.00 H	73	29.59	13.66
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	59.16 PK	74.00	-14.84	1.47 V	186	55.63	3.53
2	2390.00	46.59 AV	54.00	-7.41	1.47 V	186	43.06	3.53
3	*2422.00	102.13 PK			1.47 V	186	98.43	3.70
4	*2422.00	90.50 AV			1.47 V	186	86.80	3.70
5	4844.00	53.12 PK	74.00	-20.88	1.00 V	25	45.00	8.12
6	4844.00	38.10 AV	54.00	-15.90	1.00 V	25	29.98	8.12
7	7266.00	57.24 PK	74.00	-16.76	1.00 V	25	43.58	13.66
8	7266.00	42.64 AV	54.00	-11.36	1.00 V	25	28.98	13.66

**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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<b>CHANNEL</b>	TX Channel 6	<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	*2437.00	106.47 PK			1.00 H	242	102.70	3.77
2	*2437.00	95.17 AV			1.00 H	242	91.40	3.77
3	4874.00	53.67 PK	74.00	-20.33	1.00 H	140	45.44	8.23
4	4874.00	34.94 AV	54.00	-19.06	1.00 H	140	26.71	8.23
5	7311.00	56.74 PK	74.00	-17.26	1.00 H	55	42.94	13.80
6	7311.00	42.74 AV	54.00	-11.26	1.00 H	55	28.94	13.80
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	104.67 PK			1.00 V	193	100.90	3.77
2	*2437.00	91.51 AV			1.00 V	193	87.74	3.77
3	4874.00	52.37 PK	74.00	-21.63	1.00 V	188	44.14	8.23
4	4874.00	35.94 AV	54.00	-18.06	1.00 V	188	27.71	8.23
5	7311.00	56.74 PK	74.00	-17.26	1.00 V	150	42.94	13.80
6	7311.00	43.84 AV	54.00	-10.16	1.00 V	150	30.04	13.80

**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 9	<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	*2452.00	100.40 PK			1.47 H	165	96.56	3.84
2	*2452.00	90.24 AV			1.47 H	165	86.40	3.84
3	2483.50	57.35 PK	74.00	-16.65	1.47 H	165	53.35	4.00
4	2483.50	45.21 AV	54.00	-8.79	1.47 H	165	41.21	4.00
5	4904.00	52.67 PK	74.00	-21.33	1.00 H	285	44.34	8.33
6	4904.00	38.54 AV	54.00	-15.46	1.00 H	285	30.21	8.33
7	7356.00	54.28 PK	74.00	-19.72	1.00 H	285	40.34	13.94
8	7356.00	41.58 AV	54.00	-12.42	1.00 H	285	27.64	13.94

**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	*2452.00	95.73 PK			1.04 V	163	91.89	3.84
2	*2452.00	84.50 AV			1.04 V	163	80.66	3.84
3	2483.50	50.91 PK	74.00	-23.09	1.04 V	163	46.91	4.00
4	2483.50	39.35 AV	54.00	-14.65	1.04 V	163	35.35	4.00
5	4904.00	53.42 PK	74.00	-20.58	1.00 V	140	45.09	8.33
6	4904.00	38.41 AV	54.00	-15.59	1.00 V	140	30.08	8.33
7	7356.00	54.35 PK	74.00	-19.65	1.00 V	140	40.41	13.94
8	7356.00	41.25 AV	54.00	-12.75	1.00 V	140	27.31	13.94

**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	MY55060016	May 21,21
Power Sensor	Keysight	U2021XA	MY55060018	May 21,21
Power Meter	Anritsu	ML2495A	1139001	Mar. 11,21
Power Sensor	Anritsu	MA2411B	1531155	Mar. 11,21
Digital Multimeter	FLUKE	15B	A1220010DG	Oct.16, 20
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Nov. 14,20
Oscilloscope	Agilent	DSO9254A	MY51260160	Sep. 17,20
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Mar. 12,21
Signal Generator	Agilent	N5183A	MY50140980	Sep. 18,20
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Sep. 11,20
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	May 19,21
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A
DC Source	Keysight	E3642A	MY56146098	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

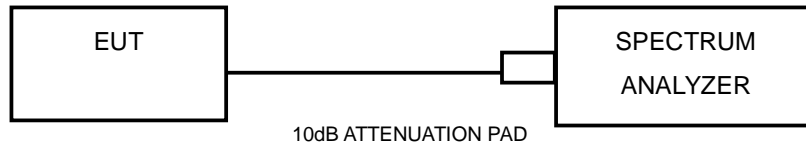
1. Set resolution bandwidth (RBW) = 100KHz
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and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



#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4.5 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	8.71	0.5	PASS
6	2437	8.75	0.5	PASS
11	2462	8.75	0.5	PASS

##### 802.11g

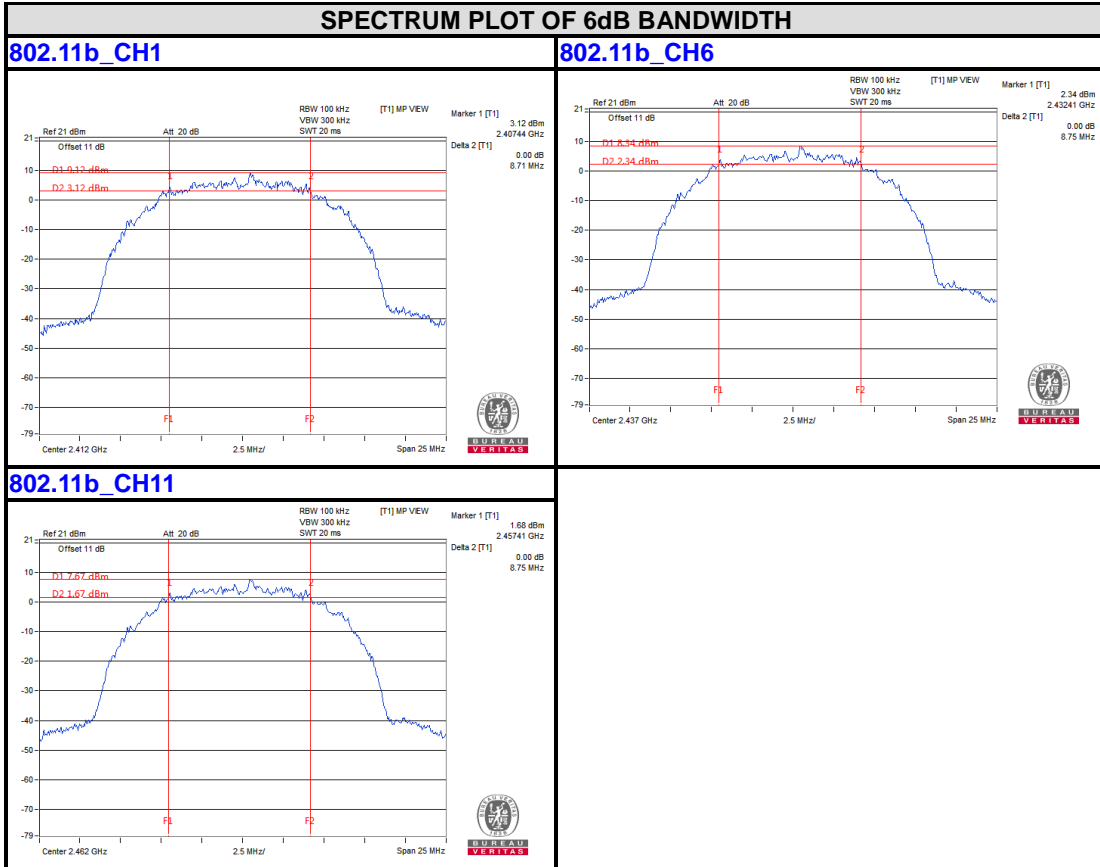
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.42	0.5	PASS
6	2437	16.42	0.5	PASS
11	2462	16.42	0.5	PASS

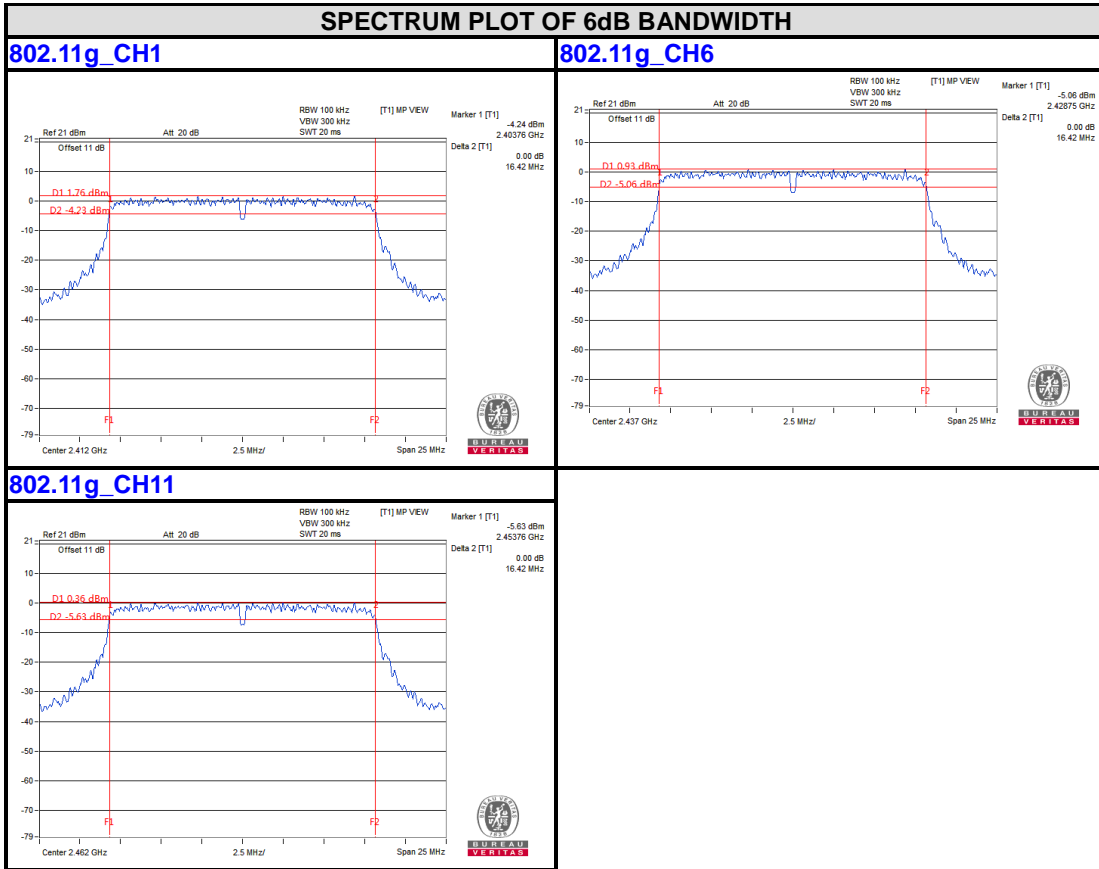
##### 802.11n HT20

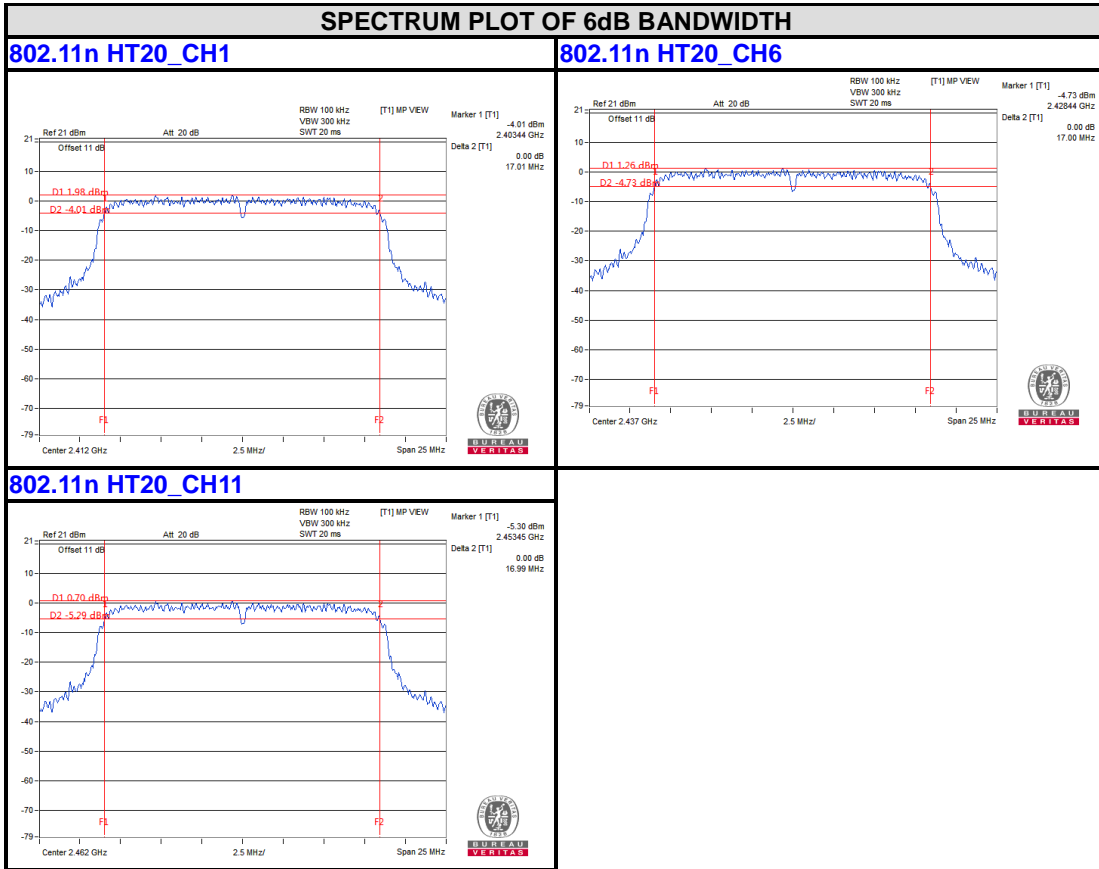
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.01	0.5	PASS
6	2437	17.00	0.5	PASS
11	2462	16.99	0.5	PASS

##### 802.11n HT40

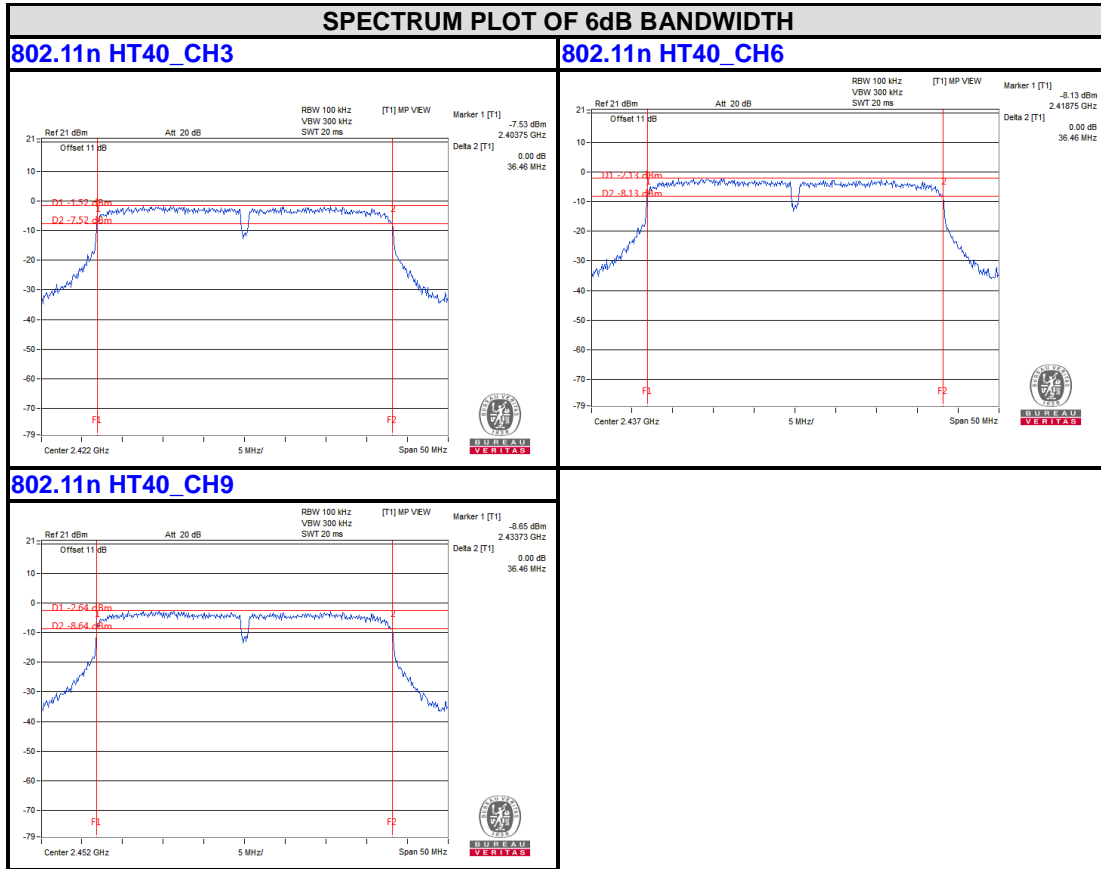
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	36.46	0.5	PASS
6	2437	36.46	0.5	PASS
9	2452	36.46	0.5	PASS









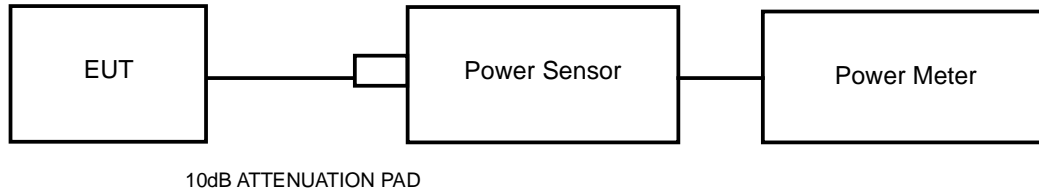


#### 4.4 CONDUCTED OUTPUT POWER

##### 4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

##### 4.4.2 TEST SETUP



##### 4.4.3 TEST INSTRUMENTS

Refer to section 4.3.2 to get information of above instrument.

##### 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 PEAK OUTPUT POWER

###### 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	19.72	93.756	1	PASS
6	2437	19.85	96.605	1	PASS
11	2462	19.72	93.756	1	PASS

###### 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	23.66	232.274	1	PASS
6	2437	23.74	236.592	1	PASS
11	2462	23.64	231.206	1	PASS

###### 802.11n HT20

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	23.66	232.274	1	PASS
6	2437	23.73	236.048	1	PASS
11	2462	23.79	239.332	1	PASS

###### 02.11n HT40

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
3	2422	23.67	232.809	1	PASS
6	2437	23.62	230.144	1	PASS
9	2452	23.64	231.206	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	16.27	42.364
6	2437	16.28	42.462
11	2462	<b>16.60</b>	<b>45.709</b>

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
1	2412	15.84	38.371
6	2437	15.87	38.637
11	2462	<b>15.97</b>	<b>39.537</b>

802.11n HT20

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
1	2412	15.87	38.637
6	2437	15.88	38.726
11	2462	<b>15.99</b>	<b>39.719</b>

802.11n HT40

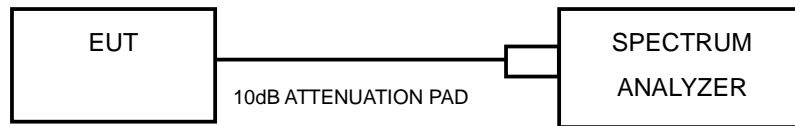
CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVG. POWER (mW)
3	2422	<b>15.93</b>	<b>39.174</b>
6	2437	15.84	38.371
9	2452	15.88	38.726

## 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

Refer to section 4.3.2 to get information of above instrument.

### 4.5.4 TEST PROCEDURE

- Set instrument center frequency to DTS channel center frequency.
- Set span to 1.5 times the DTS bandwidth.
- Set RBW to: 3KHz
- Set VBW  $\geq 3 \times$  RBW.
- Detector = peak
- Ensure that the number of measurement points in the sweep  $\geq 2 \times$  span/RBW.
- Sweep time = auto couple.
- 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

Same as item 4.3.6.

#### 4.5.7 TEST RESULTS

##### 802.11b

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-7.04	8.00	PASS
6	2437	-7.83	8.00	PASS
11	2462	-8.41	8.00	PASS

##### 802.11g

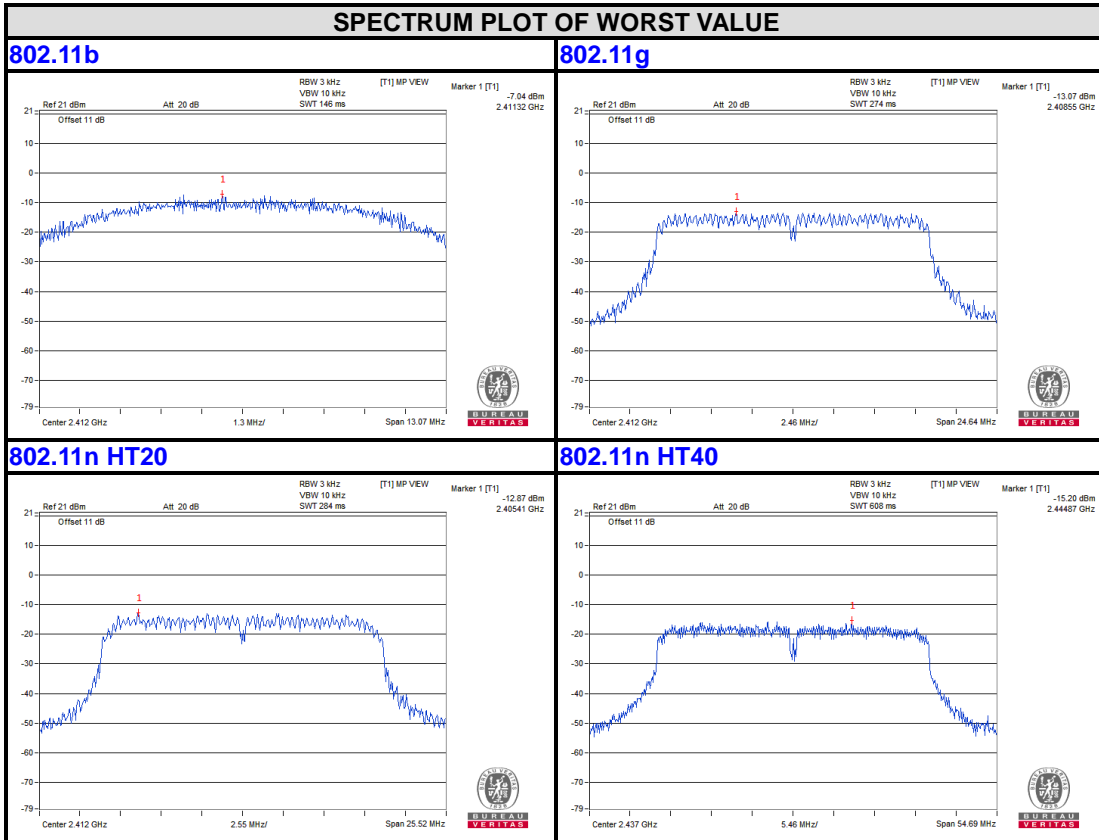
Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-13.07	8.00	PASS
6	2437	-13.78	8.00	PASS
11	2462	-14.50	8.00	PASS

##### 802.11n HT20

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-12.87	8.00	PASS
6	2437	-13.80	8.00	PASS
11	2462	-13.86	8.00	PASS

##### 802.11n HT40

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
3	2422	-15.36	8.00	PASS
6	2437	-15.20	8.00	PASS
9	2452	-16.30	8.00	PASS

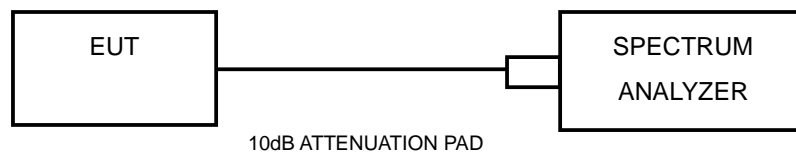


## 4.6 OUT OF BAND EMISSION MEASUREMENT

### 4.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

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

### 4.6.2 TEST SETUP



### 4.6.3 TEST INSTRUMENTS

Refer to section 4.3.2 to get information of above instrument.

### 4.6.4 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.





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### 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.

#### 4.6.5 DEVIATION FROM TEST STANDARD

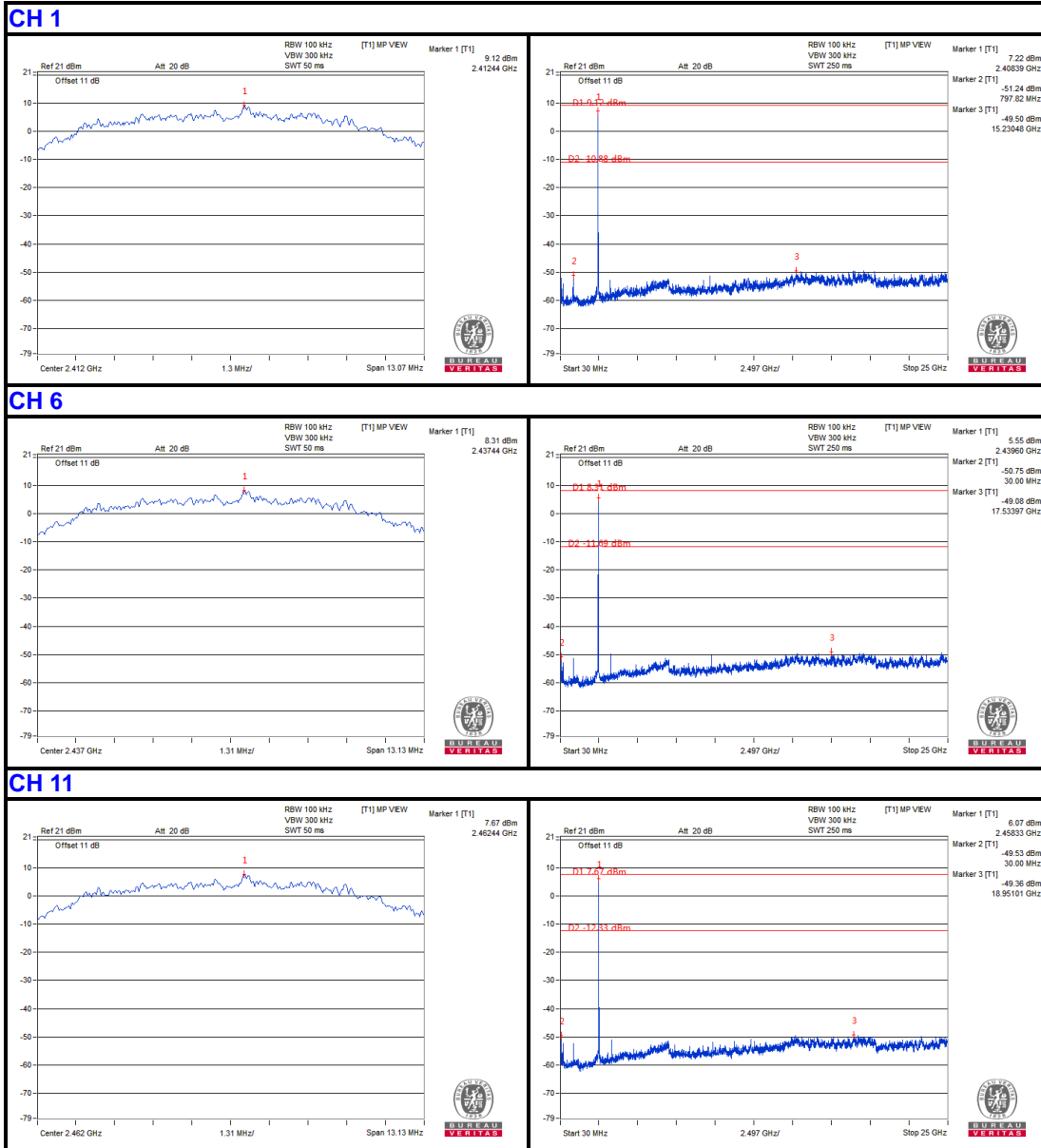
No deviation.

#### 4.6.6 EUT OPERATING CONDITION

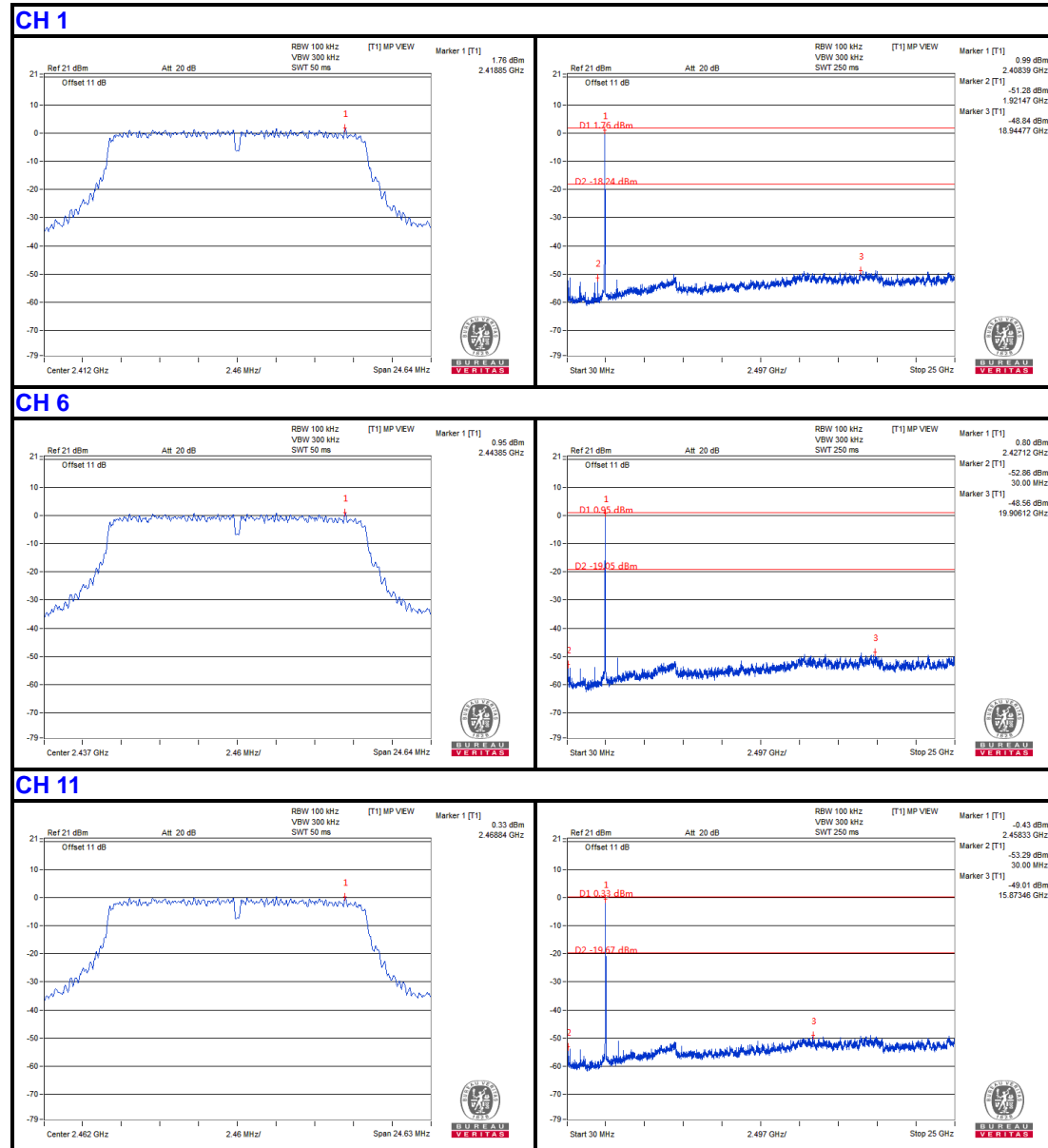
Same as item 4.3.6

### 4.6.7 TEST RESULTS

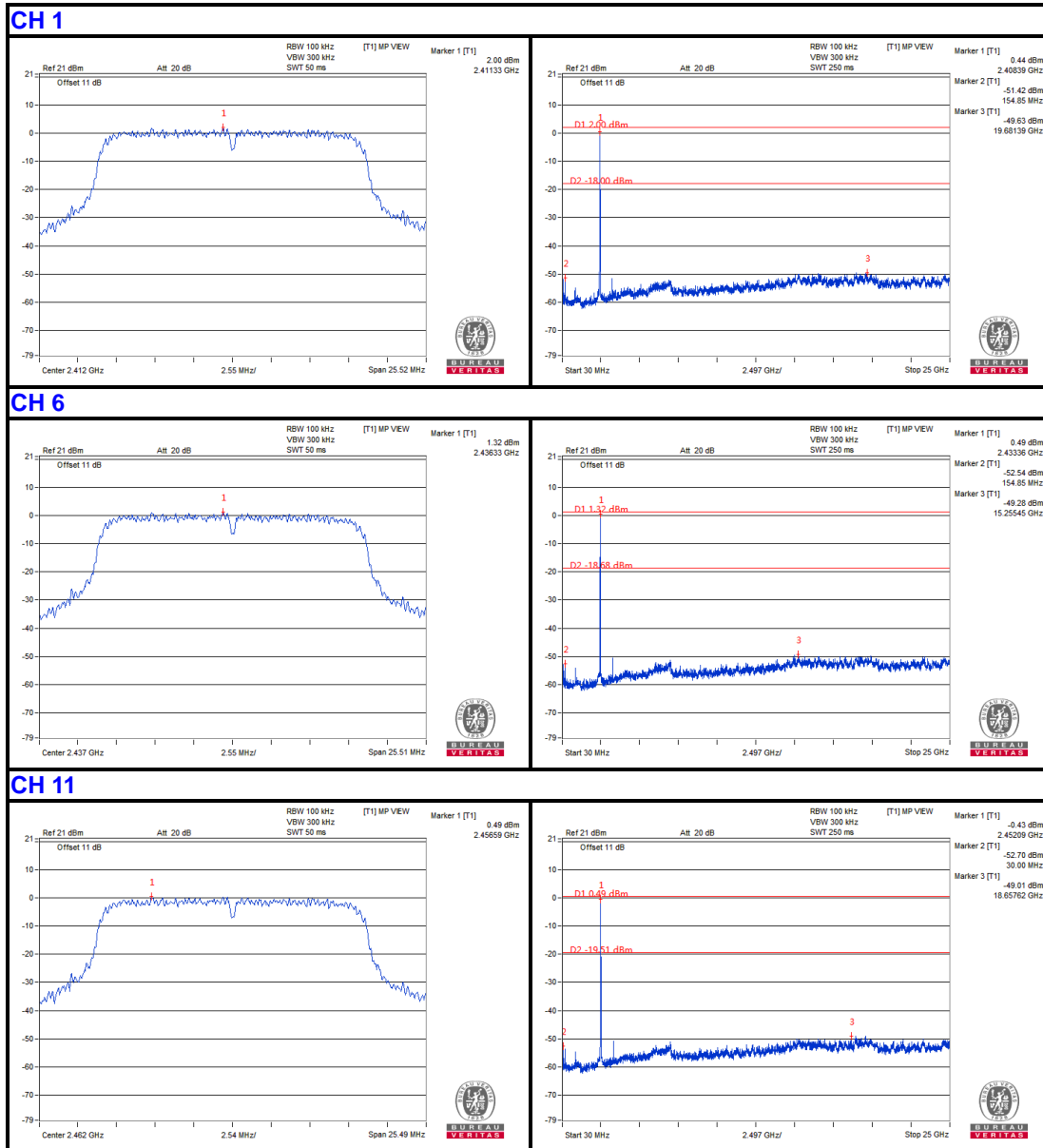
#### 802.11b



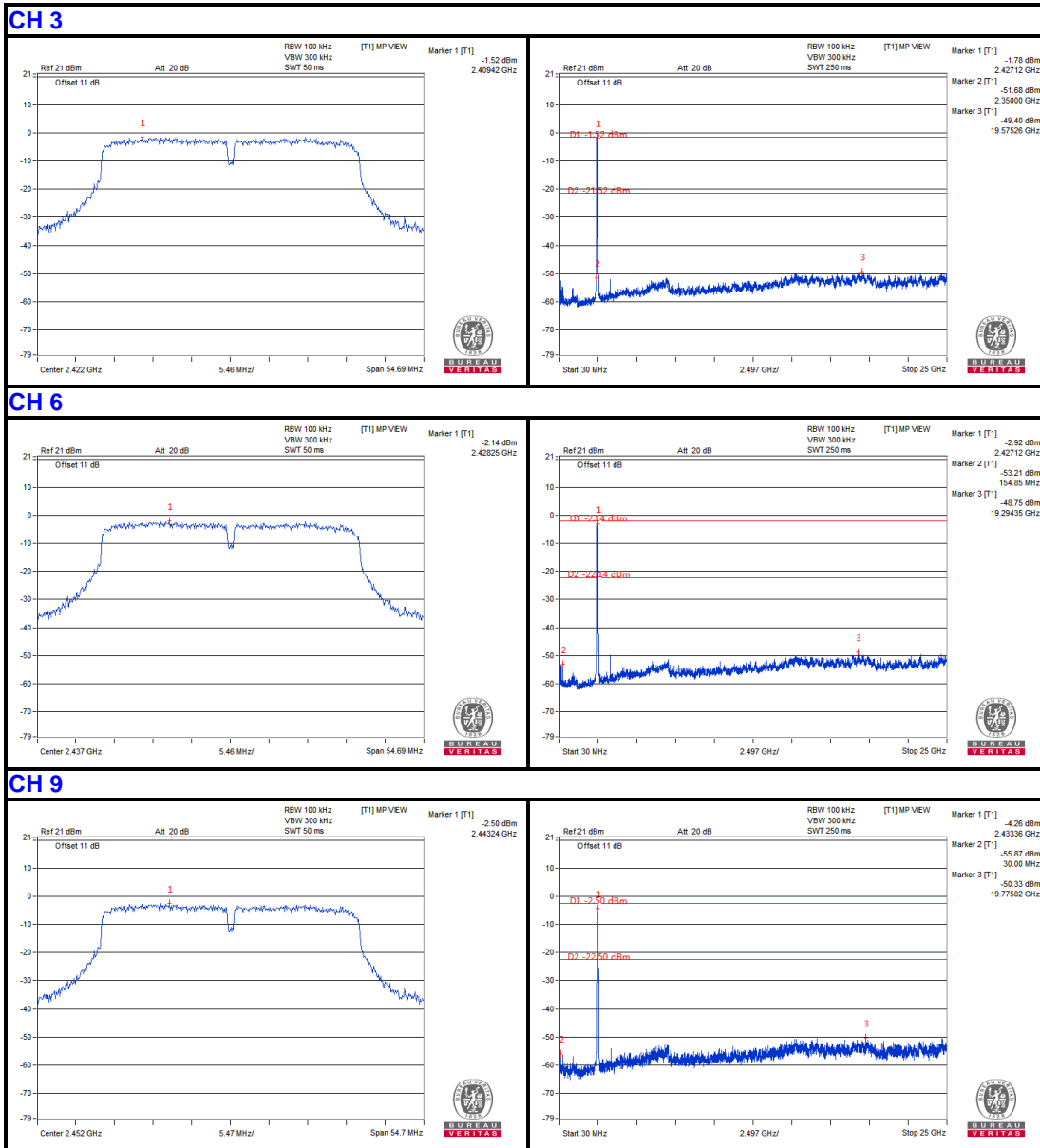
802.11g



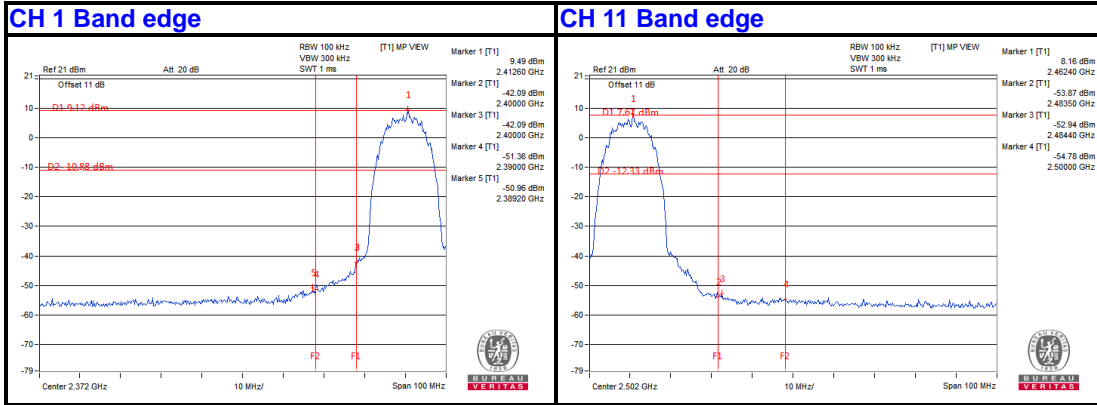
802.11n HT20



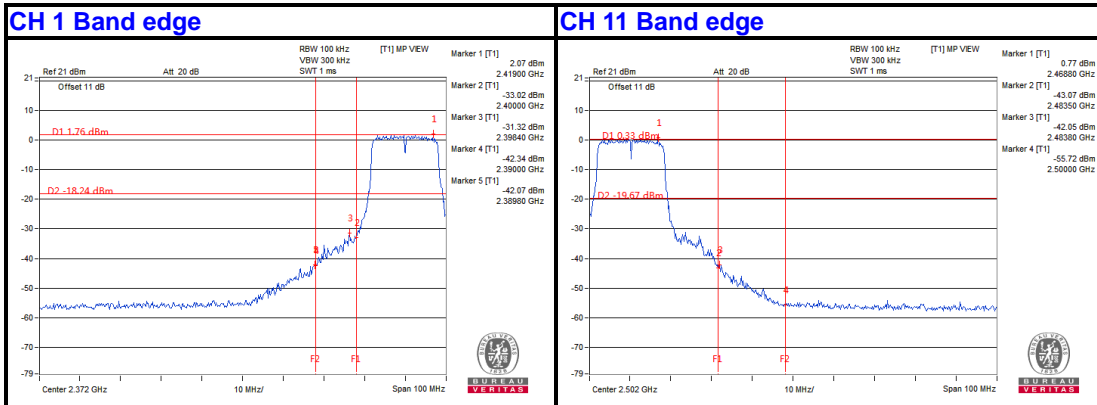
802.11n HT40



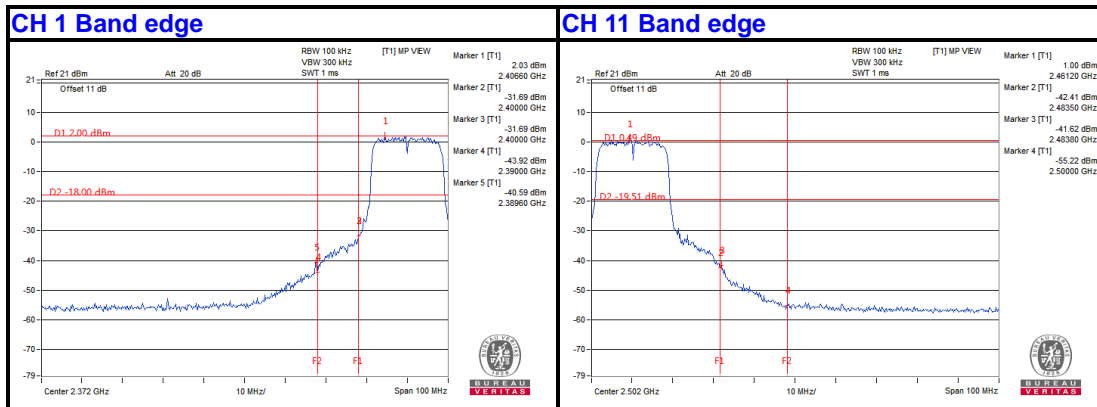
802.11b



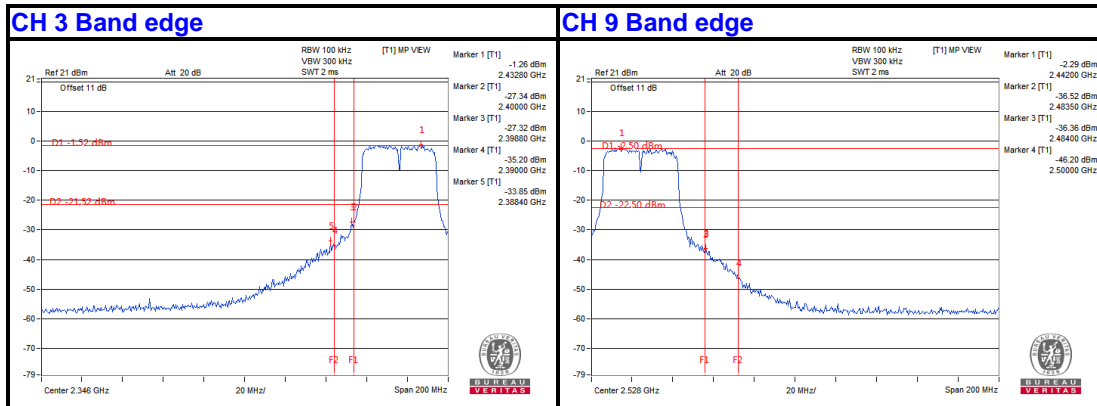
802.11g



802.11n HT20



802.11n HT40





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## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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





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## 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---