

## FCC Test Report

**Report No.:** RF190527E01

**FCC ID:** TLZ-CM382

**Test Model:** AW-CM382

**Received Date:** May 27, 2019

**Test Date:** June 11 to 21, 2019

**Issued Date:** July 10, 2019

**Applicant:** AzureWave Technologies, Inc.

**Address:** 8F., No.94, Baozhong Rd. , Xindian Dist., New Taipei City , Taiwan 231

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**FCC Registration /  
Designation Number:** 723255 / TW2022



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### Release Control Record

Issue No.	Description	Date Issued
RF190527E01	Original release.	July 10, 2019

## 1 Certificate of Conformity

**Product:** IEEE 802.11 a/b/g/n/ac MAC/baseband/radio and Bluetooth 5.0 Module

**Brand:** AzureWave

**Test Model:** AW-CM382

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** AzureWave Technologies, Inc.

**Test Date:** June 11 to 21, 2019

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** Wendy Wu , **Date:** July 10, 2019  
Wendy Wu / Specialist

**Approved by :** May Chen , **Date:** July 10, 2019  
May Chen / Manager

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -6.13dB at 0.22031MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.2dB at 2390.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

### Note:

Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 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	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.9 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.1 dB
	6GHz ~ 18GHz	4.9 dB
	18GHz ~ 40GHz	5.2 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	IEEE 802.11 a/b/g/n/ac MAC/baseband/radio and Bluetooth 5.0 Module
Brand	AzureWave
Test Model	AW-CM382
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	5Vdc from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 150Mbps 802.11ac: up to 433.3Mbps
Operating Frequency	<b>2.4GHz:</b> 2.412 ~ 2.462GHz <b>5GHz:</b> 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.50 ~ 5.70GHz, 5.745 ~ 5.825GHz
Number of Channel	<b>2.4GHz:</b> 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 <b>5GHz:</b> 802.11a, 802.11n (HT20), 802.11ac (VHT20): 24 802.11n (HT40), 802.11ac (VHT40): 11 802.11ac (VHT80): 5
Output Power	<b>2.4GHz:</b> 301.301 mW <b>5.18 ~ 5.24GHz:</b> 77.625 mW <b>5.26 ~ 5.32GHz:</b> 82.035 mW <b>5.50 ~ 5.70GHz:</b> 76.384 mW <b>5.745 ~ 5.825GHz:</b> 81.846 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The device of WLAN and Bluetooth technology can't transmit simultaneously, it was used timely shared coexistence technology.
2. The EUT incorporates a SISO function.

2.4GHz Band		
Modulation Mode	TX & RX Configuration	
802.11b	1TX Diversity	1RX
802.11g	1TX Diversity	1RX
802.11n (HT20)	1TX Diversity	1RX
802.11n (HT40)	1TX Diversity	1RX
5GHz Band		
Modulation Mode	TX & RX Configuration	
802.11a	1TX Diversity	1RX
802.11n (HT20)	1TX Diversity	1RX
802.11n (HT40)	1TX Diversity	1RX
802.11ac (VHT20)	1TX Diversity	1RX
802.11ac (VHT40)	1TX Diversity	1RX
802.11ac (VHT80)	1TX Diversity	1RX

Note: The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report.

3. The antennas provided to the EUT, please refer to the following table:

Ant. Set	Transmitter Circuit	Antenna Gain (dBi)	Frequency range (GHz ~ GHz)	Antenna Type	Connector Type
1	Chain 0 (Main)	1	2.4~2.4835	PIFA	None
		6	5.15~5.85		
	Chain 1 (Aux)	1	2.4~2.4835	PIFA	None
		6	5.15~5.85		

Note:

1. From the above Chain 0 and Chain 1 port, The worse case was found in Chain 0. Therefore only the test data of the mode was recorded in this report.
2. For Bluetooth will fix transmission on Chain 0.
4. 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.



### 3.2 Description of Test Modes

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

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

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 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement  
 RE<1G: Radiated Emission below 1GHz  
 PLC: Power Line Conducted Emission  
 APCM: Antenna Port Conducted Measurement

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane (below 1GHz) & Z-plane (above 1GHz)**.

#### **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 and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

#### **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 and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

#### **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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

**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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

**Test Condition:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE $\geq$ 1G	20deg. C, 69%RH	120Vac, 60Hz	Adair Peng
RE $<$ 1G	20deg. C, 64%RH	120Vac, 60Hz	Ryan Du
PLC	23deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	23deg. C, 67%RH	120Vac, 60Hz	Jyunchun Lin

### 3.3 Duty Cycle of Test Signal

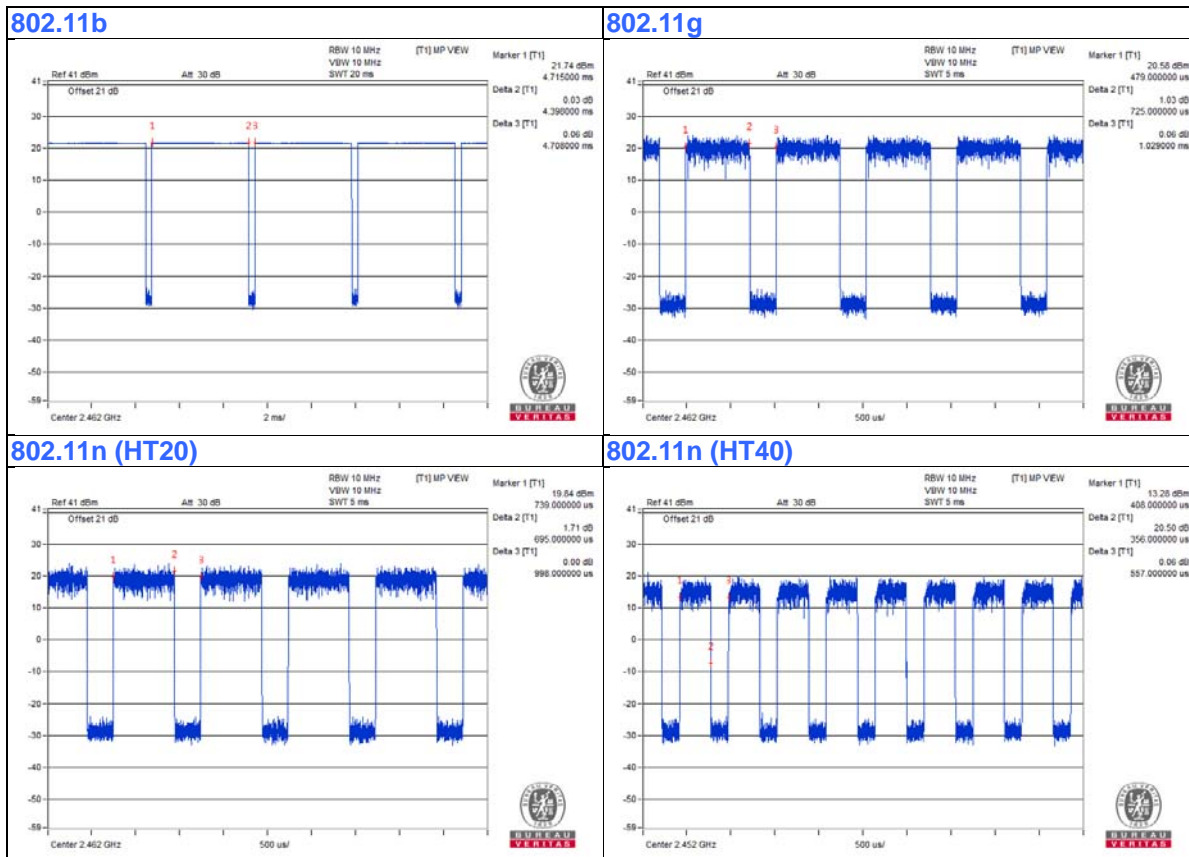
If duty cycle of test signal is < 98%, duty factor shall be considered.

**802.11b:** Duty cycle =  $4.398/4.708 = 0.934$ , Duty factor =  $10 * \log(1/\text{Duty cycle}) = 0.3$

**802.11g:** Duty cycle =  $0.725/1.029 = 0.705$ , Duty factor =  $10 * \log(1/\text{Duty cycle}) = 1.52$

**802.11n (HT20):** Duty cycle =  $0.695/0.998 = 0.969$ , Duty factor =  $10 * \log(1/\text{Duty cycle}) = 1.57$

**802.11n (HT40):** Duty cycle =  $0.356/0.557 = 0.639$ , Duty factor =  $10 * \log(1/\text{Duty cycle}) = 1.94$



### 3.4 Description of Support Units

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

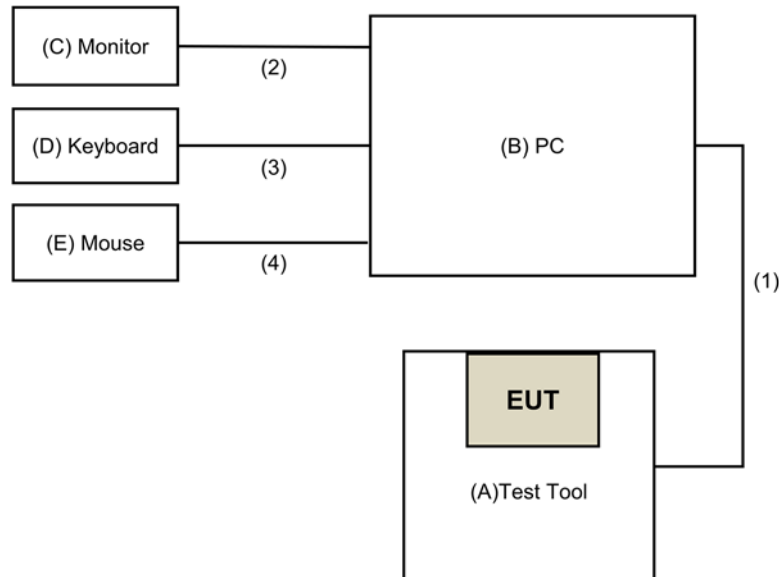
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Test Tool	AzureWave	NA	NA	NA	Supplied by client
B.	PC	lenovo	NA	NA	NA	Provided by Lab
C.	Monitor	Panasonic	TH-L26K10W	9540684	NA	Provided by Lab
D.	Keyboard	SGI	SK-2502U	M990511754	GYUR58SK	Provided by Lab
E.	Mouse	DEXIN	A2U800A	71001832	NIYA2U800A	Provided by Lab

Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Cable	1	1.7	Yes	0	Provided by Lab
2.	VGA Cable	1	1.8	Yes	2	Provided by Lab
3.	USB Cable	1	1.5	Yes	0	Provided by Lab
4.	USB Cable	1	1.8	Yes	0	Provided by Lab

#### 3.4.1 Configuration of System under Test



### 3.5 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 (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.

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

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

## 4.1.2 Test Instruments

**For Radiated Emission test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 05, 2018	July 04, 2019
Pre-Amplifier EMCI	EMC001340	980142	Jan. 25, 2019	Jan. 24, 2020
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Oct. 30, 2018	Oct. 29, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-4-1	Mar. 19, 2019	Mar. 18, 2020
RF Cable	8D	966-4-2	Mar. 19, 2019	Mar. 18, 2020
RF Cable	8D	966-4-3	Mar. 19, 2019	Mar. 18, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980385	Aug. 16, 2018	Aug. 15, 2019
RF Cable	EMC104-SM-SM-1200	160923	Jan. 28, 2019	Jan. 27, 2020
RF Cable	104 RF cable	131215	Jan. 10, 2019	Jan. 09, 2020
RF Cable	EMC104-SM-SM-6000	180418	May 03, 2019	May 02, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: June 19 to 21, 2019



**For other test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020

- NOTE:**
1. The test was performed in Oven room 2.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: June 11, 2019

#### 4.1.3 Test Procedures

##### **For Radiated emission below 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case 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 Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

##### **NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

##### **For Radiated emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. 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. The height of antenna 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### **Note:**

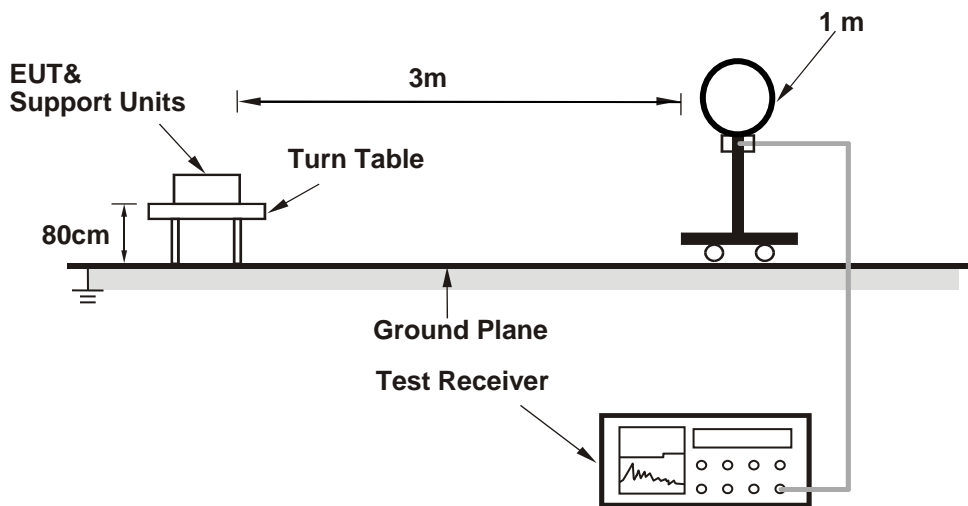
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

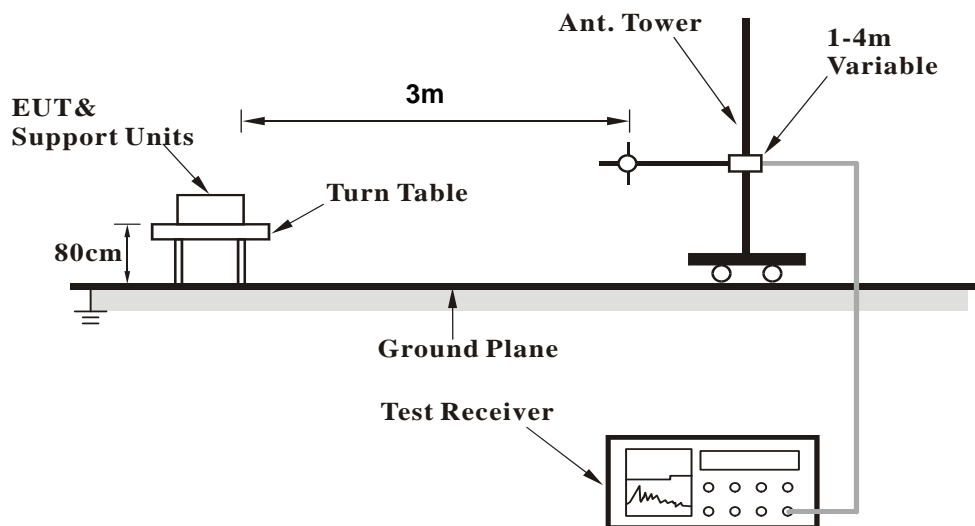
No deviation.

4.1.5 Test Setup

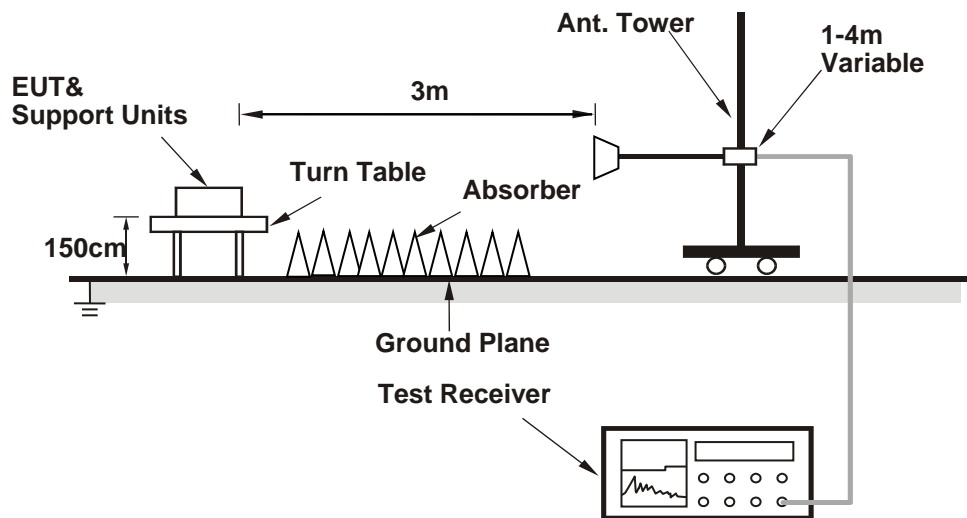
**For Radiated emission below 30MHz**



**For Radiated emission 30MHz to 1GHz**



### For Radiated emission above 1GHz



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

#### 4.1.6 EUT Operating Conditions

- a. Placed the EUT on the testing table
- b. Controlling software (Terminal paste "RF command has been activated to set the EUT under transmission condition continuously at specific channel frequency.

#### 4.1.7 Test Results

#### 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	55.6 PK	74.0	-18.4	3.02 H	164	57.2	-1.6
2	2390.00	44.7 AV	54.0	-9.3	3.02 H	164	46.3	-1.6
3	*2412.00	104.0 PK			3.02 H	164	105.7	-1.7
4	*2412.00	101.3 AV			3.02 H	164	103.0	-1.7
5	4824.00	37.6 PK	74.0	-36.4	1.02 H	196	35.3	2.3
6	4824.00	32.5 AV	54.0	-21.5	1.02 H	196	30.2	2.3

#### 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	57.7 PK	74.0	-16.3	2.00 V	198	59.3	-1.6
2	2390.00	45.2 AV	54.0	-8.8	2.00 V	198	46.8	-1.6
3	*2412.00	104.5 PK			2.00 V	198	106.2	-1.7
4	*2412.00	101.9 AV			2.00 V	198	103.6	-1.7
5	4824.00	39.4 PK	74.0	-34.6	1.49 V	42	37.1	2.3
6	4824.00	33.3 AV	54.0	-20.7	1.49 V	42	31.0	2.3

#### 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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.

<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	102.9 PK			3.13 H	176	104.7	-1.8
2	*2437.00	100.9 AV			3.13 H	176	102.7	-1.8
3	4874.00	39.2 PK	74.0	-34.8	1.11 H	203	36.8	2.4
4	4874.00	32.7 AV	54.0	-21.3	1.11 H	203	30.3	2.4
5	7311.00	41.2 PK	74.0	-32.8	1.53 H	209	32.0	9.2
6	7311.00	33.3 AV	54.0	-20.7	1.53 H	209	24.1	9.2

**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	103.1 PK			1.97 V	184	104.9	-1.8
2	*2437.00	101.0 AV			1.97 V	184	102.8	-1.8
3	4874.00	39.5 PK	74.0	-34.5	1.63 V	39	37.1	2.4
4	4874.00	32.9 AV	54.0	-21.1	1.63 V	39	30.5	2.4
5	7311.00	41.7 PK	74.0	-32.3	1.88 V	229	32.5	9.2
6	7311.00	33.5 AV	54.0	-20.5	1.88 V	229	24.3	9.2

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	103.1 PK			3.08 H	180	104.9	-1.8
2	*2462.00	101.2 AV			3.08 H	180	103.0	-1.8
3	2483.50	57.0 PK	74.0	-17.0	3.08 H	180	58.7	-1.7
4	2483.50	49.9 AV	54.0	-4.1	3.08 H	180	51.6	-1.7
5	4924.00	39.0 PK	74.0	-35.0	1.12 H	210	36.5	2.5
6	4924.00	32.5 AV	54.0	-21.5	1.12 H	210	30.0	2.5
7	7386.00	41.3 PK	74.0	-32.7	1.53 H	195	31.9	9.4
8	7386.00	33.4 AV	54.0	-20.6	1.53 H	195	24.0	9.4

**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	104.0 PK			1.24 V	198	105.8	-1.8
2	*2462.00	101.5 AV			1.24 V	198	103.3	-1.8
3	2483.50	57.5 PK	74.0	-16.5	1.24 V	198	59.2	-1.7
4	2483.50	50.2 AV	54.0	-3.8	1.24 V	198	51.9	-1.7
5	4924.00	39.6 PK	74.0	-34.4	1.47 V	49	37.1	2.5
6	4924.00	33.1 AV	54.0	-20.9	1.47 V	49	30.6	2.5
7	7386.00	41.8 PK	74.0	-32.2	1.81 V	230	32.4	9.4
8	7386.00	34.3 AV	54.0	-19.7	1.81 V	230	24.9	9.4

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	66.3 PK	74.0	-7.7	3.12 H	189	67.9	-1.6
2	2390.00	52.9 AV	54.0	-1.1	3.12 H	189	54.5	-1.6
3	*2412.00	103.2 PK			3.12 H	189	104.9	-1.7
4	*2412.00	101.3 AV			3.12 H	189	103.0	-1.7
5	4824.00	38.6 PK	74.0	-35.4	1.08 H	222	36.3	2.3
6	4824.00	31.5 AV	54.0	-22.5	1.08 H	222	29.2	2.3

**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	73.3 PK	74.0	-0.7	1.50 V	181	74.9	-1.6
2	2390.00	53.5 AV	54.0	-0.5	1.50 V	181	55.1	-1.6
3	*2412.00	104.8 PK			1.50 V	181	106.5	-1.7
4	*2412.00	95.8 AV			1.50 V	181	97.5	-1.7
5	4824.00	38.9 PK	74.0	-35.1	1.57 V	53	36.6	2.3
6	4824.00	32.3 AV	54.0	-21.7	1.57 V	53	30.0	2.3

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.



<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	106.5 PK			3.12 H	178	108.3	-1.8
2	*2437.00	96.5 AV			3.12 H	178	98.3	-1.8
3	4874.00	39.2 PK	74.0	-34.8	1.16 H	213	36.8	2.4
4	4874.00	32.6 AV	54.0	-21.4	1.16 H	213	30.2	2.4
5	7311.00	40.7 PK	74.0	-33.3	1.48 H	223	31.5	9.2
6	7311.00	32.9 AV	54.0	-21.1	1.48 H	223	23.7	9.2

**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	107.2 PK			1.49 V	189	109.0	-1.8
2	*2437.00	97.7 AV			1.49 V	189	99.5	-1.8
3	4874.00	40.1 PK	74.0	-33.9	1.50 V	44	37.7	2.4
4	4874.00	33.0 AV	54.0	-21.0	1.50 V	44	30.6	2.4
5	7311.00	42.3 PK	74.0	-31.7	1.85 V	223	33.1	9.2
6	7311.00	33.1 AV	54.0	-20.9	1.85 V	223	23.9	9.2

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	104.9 PK			3.05 H	185	106.7	-1.8
2	*2462.00	94.5 AV			3.05 H	185	96.3	-1.8
3	2483.50	67.8 PK	74.0	-6.2	3.05 H	185	69.5	-1.7
4	2483.50	51.5 AV	54.0	-2.5	3.05 H	185	53.2	-1.7
5	4924.00	38.7 PK	74.0	-35.3	1.16 H	206	36.2	2.5
6	4924.00	32.5 AV	54.0	-21.5	1.16 H	206	30.0	2.5
7	7386.00	41.2 PK	74.0	-32.8	1.53 H	187	31.8	9.4
8	7386.00	33.5 AV	54.0	-20.5	1.53 H	187	24.1	9.4

**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	105.5 PK			1.20 V	196	107.3	-1.8
2	*2462.00	95.2 AV			1.20 V	196	97.0	-1.8
3	2483.50	73.1 PK	74.0	-0.9	1.20 V	196	74.8	-1.7
4	2483.50	53.5 AV	54.0	-0.5	1.20 V	196	55.2	-1.7
5	4924.00	39.5 PK	74.0	-34.5	1.53 V	49	37.0	2.5
6	4924.00	32.9 AV	54.0	-21.1	1.53 V	49	30.4	2.5
7	7386.00	41.5 PK	74.0	-32.5	1.91 V	235	32.1	9.4
8	7386.00	33.7 AV	54.0	-20.3	1.91 V	235	24.3	9.4

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	66.6 PK	74.0	-7.4	3.17 H	182	68.2	-1.6
2	2390.00	51.3 AV	54.0	-2.7	3.17 H	182	52.9	-1.6
3	*2412.00	103.3 PK			3.17 H	182	105.0	-1.7
4	*2412.00	101.5 AV			3.17 H	182	103.2	-1.7
5	4824.00	38.5 PK	74.0	-35.5	1.04 H	219	36.2	2.3
6	4824.00	31.8 AV	54.0	-22.2	1.04 H	219	29.5	2.3

**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	72.6 PK	74.0	-1.4	1.53 V	190	74.2	-1.6
2	2390.00	53.3 AV	54.0	-0.7	1.53 V	190	54.9	-1.6
3	*2412.00	103.8 PK			1.53 V	190	105.5	-1.7
4	*2412.00	94.0 AV			1.53 V	190	95.7	-1.7
5	4824.00	38.8 PK	74.0	-35.2	1.61 V	55	36.5	2.3
6	4824.00	32.3 AV	54.0	-21.7	1.61 V	55	30.0	2.3

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.

<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	106.3 PK			3.13 H	185	108.1	-1.8
2	*2437.00	96.5 AV			3.13 H	185	98.3	-1.8
3	4874.00	38.7 PK	74.0	-35.3	1.16 H	224	36.3	2.4
4	4874.00	32.3 AV	54.0	-21.7	1.16 H	224	29.9	2.4
5	7311.00	41.2 PK	74.0	-32.8	1.54 H	209	32.0	9.2
6	7311.00	33.4 AV	54.0	-20.6	1.54 H	209	24.2	9.2

**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	107.1 PK			1.59 V	188	108.9	-1.8
2	*2437.00	97.1 AV			1.59 V	188	98.9	-1.8
3	4874.00	40.2 PK	74.0	-33.8	1.53 V	57	37.8	2.4
4	4874.00	32.9 AV	54.0	-21.1	1.53 V	57	30.5	2.4
5	7311.00	41.9 PK	74.0	-32.1	1.91 V	244	32.7	9.2
6	7311.00	34.7 AV	54.0	-19.3	1.91 V	244	25.5	9.2

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	103.9 PK			3.08 H	196	105.7	-1.8
2	*2462.00	93.1 AV			3.08 H	196	94.9	-1.8
3	2483.50	67.9 PK	74.0	-6.1	3.08 H	196	69.6	-1.7
4	2483.50	51.6 AV	54.0	-2.4	3.08 H	196	53.3	-1.7
5	4924.00	38.7 PK	74.0	-35.3	1.20 H	209	36.2	2.5
6	4924.00	32.6 AV	54.0	-21.4	1.20 H	209	30.1	2.5
7	7386.00	40.9 PK	74.0	-33.1	1.53 H	184	31.5	9.4
8	7386.00	33.3 AV	54.0	-20.7	1.53 H	184	23.9	9.4

**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	104.0 PK			1.26 V	203	105.8	-1.8
2	*2462.00	93.8 AV			1.26 V	203	95.6	-1.8
3	2483.50	73.3 PK	74.0	-0.7	1.26 V	203	75.0	-1.7
4	2483.50	53.4 AV	54.0	-0.6	1.26 V	203	55.1	-1.7
5	4924.00	38.3 PK	74.0	-35.7	1.65 V	48	35.8	2.5
6	4924.00	32.9 AV	54.0	-21.1	1.65 V	48	30.4	2.5
7	7386.00	40.9 PK	74.0	-33.1	1.88 V	244	31.5	9.4
8	7386.00	33.5 AV	54.0	-20.5	1.88 V	244	24.1	9.4

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	66.9 PK	74.0	-7.1	3.20 H	175	68.5	-1.6
2	2390.00	51.5 AV	54.0	-2.5	3.20 H	175	53.1	-1.6
3	*2422.00	99.1 PK			3.20 H	175	100.8	-1.7
4	*2422.00	88.5 AV			3.20 H	175	90.2	-1.7
5	4844.00	38.9 PK	74.0	-35.1	1.03 H	234	36.7	2.2
6	4844.00	32.2 AV	54.0	-21.8	1.03 H	234	30.0	2.2
7	7266.00	41.1 PK	74.0	-32.9	1.61 H	190	32.1	9.0
8	7266.00	31.5 AV	54.0	-22.5	1.61 H	190	22.5	9.0

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.5 PK	74.0	-5.5	1.77 V	348	70.1	-1.6
2	2390.00	53.5 AV	54.0	-0.5	1.77 V	348	55.1	-1.6
3	*2422.00	100.2 PK			1.77 V	348	101.9	-1.7
4	*2422.00	90.3 AV			1.77 V	348	92.0	-1.7
5	4844.00	39.3 PK	74.0	-34.7	1.70 V	63	37.1	2.2
6	4844.00	32.7 AV	54.0	-21.3	1.70 V	63	30.5	2.2
7	7266.00	41.5 PK	74.0	-32.5	1.88 V	229	32.5	9.0
8	7266.00	31.7 AV	54.0	-22.3	1.88 V	229	22.7	9.0

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.

<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	2390.00	67.2 PK	74.0	-6.8	3.22 H	163	68.8	-1.6
2	2390.00	51.8 AV	54.0	-2.2	3.22 H	163	53.4	-1.6
3	*2437.00	100.9 PK			3.22 H	163	102.7	-1.8
4	*2437.00	91.9 AV			3.22 H	163	93.7	-1.8
5	4874.00	39.4 PK	74.0	-34.6	1.05 H	220	37.0	2.4
6	4874.00	32.6 AV	54.0	-21.4	1.05 H	220	30.2	2.4
7	7311.00	41.2 PK	74.0	-32.8	1.66 H	182	32.0	9.2
8	7311.00	31.8 AV	54.0	-22.2	1.66 H	182	22.6	9.2

**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	71.2 PK	74.0	-2.8	1.71 V	341	72.8	-1.6
2	<b>2390.00</b>	<b>53.8 AV</b>	<b>54.0</b>	<b>-0.2</b>	<b>1.71 V</b>	<b>341</b>	<b>55.4</b>	<b>-1.6</b>
3	*2437.00	101.3 PK			1.71 V	341	103.1	-1.8
4	*2437.00	92.5 AV			1.71 V	341	94.3	-1.8
5	4874.00	39.9 PK	74.0	-34.1	1.66 V	57	37.5	2.4
6	4874.00	32.8 AV	54.0	-21.2	1.66 V	57	30.4	2.4
7	7311.00	41.3 PK	74.0	-32.7	1.81 V	239	32.1	9.2
8	7311.00	32.0 AV	54.0	-22.0	1.81 V	239	22.8	9.2

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	99.3 PK			3.18 H	190	101.1	-1.8
2	*2452.00	89.5 AV			3.18 H	190	91.3	-1.8
3	2483.50	66.7 PK	74.0	-7.3	3.18 H	190	68.4	-1.7
4	2483.50	51.3 AV	54.0	-2.7	3.18 H	190	53.0	-1.7
5	4904.00	39.0 PK	74.0	-35.0	1.06 H	248	36.5	2.5
6	4904.00	32.1 AV	54.0	-21.9	1.06 H	248	29.6	2.5
7	7356.00	40.8 PK	74.0	-33.2	1.60 H	178	31.6	9.2
8	7356.00	31.0 AV	54.0	-23.0	1.60 H	178	21.8	9.2

**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	100.7 PK			2.88 V	348	102.5	-1.8
2	*2452.00	91.7 AV			2.88 V	348	93.5	-1.8
3	2483.50	70.5 PK	74.0	-3.5	2.88 V	348	72.2	-1.7
4	2483.50	53.5 AV	54.0	-0.5	2.88 V	348	55.2	-1.7
5	4904.00	39.5 PK	74.0	-34.5	1.55 V	51	37.0	2.5
6	4904.00	32.7 AV	54.0	-21.3	1.55 V	51	30.2	2.5
7	7356.00	41.1 PK	74.0	-32.9	1.77 V	229	31.9	9.2
8	7356.00	31.5 AV	54.0	-22.5	1.77 V	229	22.3	9.2

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.



**Below 1GHz Data:**

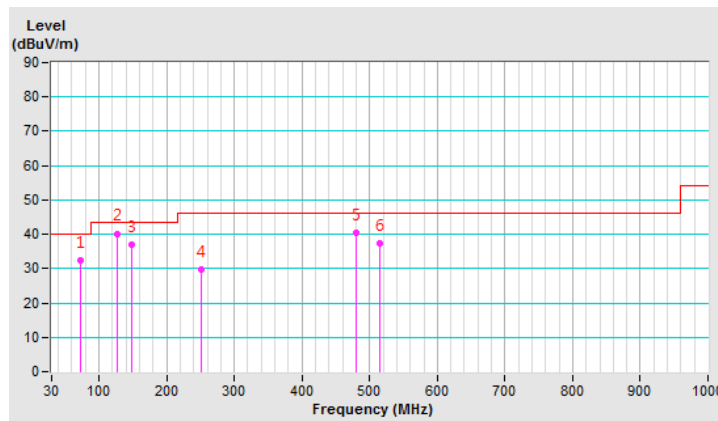
**802.11g**

<b>CHANNEL</b>	TX Channel 6	<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	73.33	32.3 QP	40.0	-7.7	2.00 H	283	43.5	-11.2
2	127.36	40.2 QP	43.5	-3.3	1.50 H	272	49.5	-9.3
3	147.73	37.1 QP	43.5	-6.4	1.00 H	265	45.0	-7.9
4	250.70	29.6 QP	46.0	-16.4	1.00 H	301	38.3	-8.7
5	480.01	40.4 QP	46.0	-5.6	1.00 H	270	42.5	-2.1
6	515.22	37.4 QP	46.0	-8.6	2.50 H	6	38.7	-1.3

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

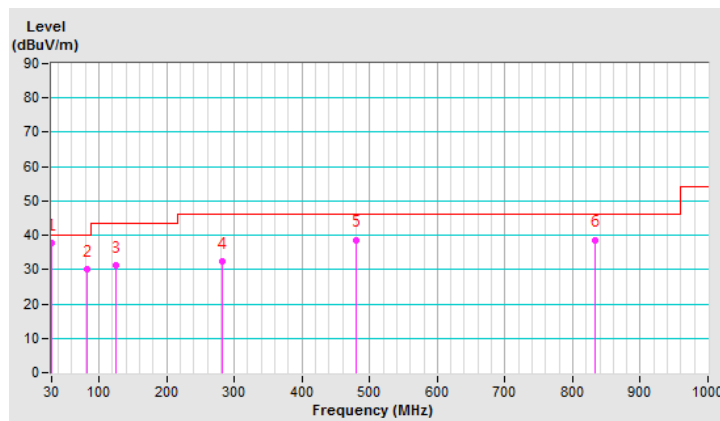


<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9kHz ~ 1GHz		

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	30.15	37.7 QP	40.0	-2.3	1.00 V	250	47.4	-9.7
2	83.23	30.0 QP	40.0	-10.0	1.50 V	232	43.3	-13.3
3	124.48	31.2 QP	43.5	-12.3	1.00 V	336	40.7	-9.5
4	281.30	32.3 QP	46.0	-13.7	1.50 V	262	39.8	-7.5
5	479.96	38.7 QP	46.0	-7.3	1.50 V	162	40.9	-2.2
6	833.21	38.7 QP	46.0	-7.3	1.50 V	322	33.8	4.9

**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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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.

### 4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 14, 2019	Mar. 13, 2020
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3. Tested Date: June 19, 2019

#### 4.2.3 Test Procedures

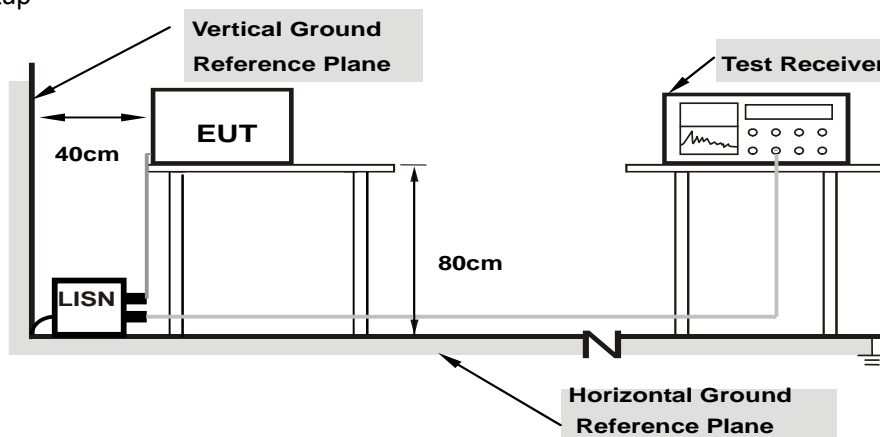
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

#### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5 Test Setup



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

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

#### 4.2.6 EUT Operating Conditions

Same as 4.1.6.

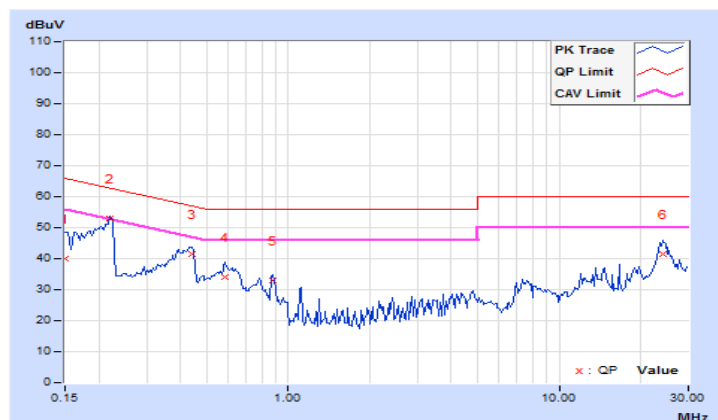
#### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.02	30.01	7.94	40.03	17.96	66.00	56.00	-25.97	-38.04
<b>2</b>	<b>0.22031</b>	<b>10.04</b>	<b>42.79</b>	<b>36.64</b>	<b>52.83</b>	<b>46.68</b>	<b>62.81</b>	<b>52.81</b>	<b>-9.98</b>	<b>-6.13</b>
3	0.43906	10.07	31.31	26.00	41.38	36.07	57.08	47.08	-15.70	-11.01
4	0.58750	10.08	24.12	11.22	34.20	21.30	56.00	46.00	-21.80	-24.70
5	0.87656	10.10	22.73	12.67	32.83	22.77	56.00	46.00	-23.17	-23.23
6	24.03125	11.13	30.29	22.57	41.42	33.70	60.00	50.00	-18.58	-16.30

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

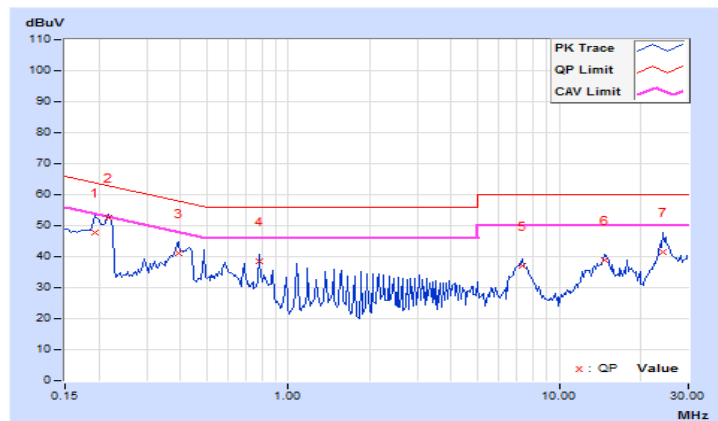


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19297	9.94	37.93	35.22	47.87	45.16	63.91	53.91	-16.04	-8.75
2	0.21641	9.94	42.73	35.30	52.67	45.24	62.96	52.96	-10.29	-7.72
3	0.39219	9.96	30.99	28.65	40.95	38.61	58.02	48.02	-17.07	-9.41
4	0.78281	9.98	28.65	28.03	38.63	38.01	56.00	46.00	-17.37	-7.99
5	7.34375	10.26	26.86	25.10	37.12	35.36	60.00	50.00	-22.88	-14.64
6	14.67969	10.61	28.22	24.42	38.83	35.03	60.00	50.00	-21.17	-14.97
7	24.26563	10.91	30.42	22.86	41.33	33.77	60.00	50.00	-18.67	-16.23

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

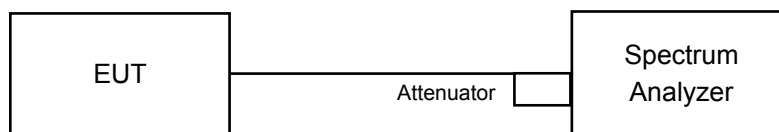


### 4.3 6dB Bandwidth Measurement

#### 4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. 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

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Conditions

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

#### 4.3.7 Test Result

##### 802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	9.07	0.5	PASS
6	2437	9.10	0.5	PASS
11	2462	9.10	0.5	PASS

##### 802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.43	0.5	PASS
6	2437	16.41	0.5	PASS
11	2462	16.40	0.5	PASS

##### 802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.64	0.5	Pass
6	2437	17.64	0.5	Pass
11	2462	17.65	0.5	Pass

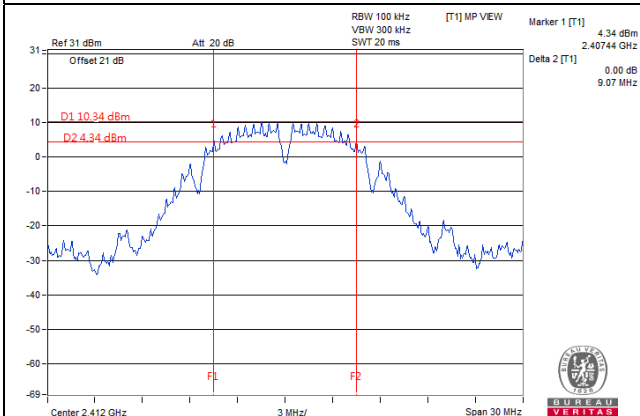
##### 802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.45	0.5	Pass
6	2437	36.42	0.5	Pass
9	2452	36.44	0.5	Pass

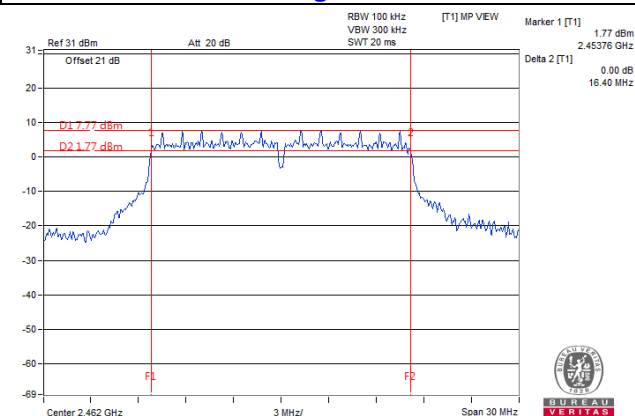


### Spectrum Plot of Worst Value

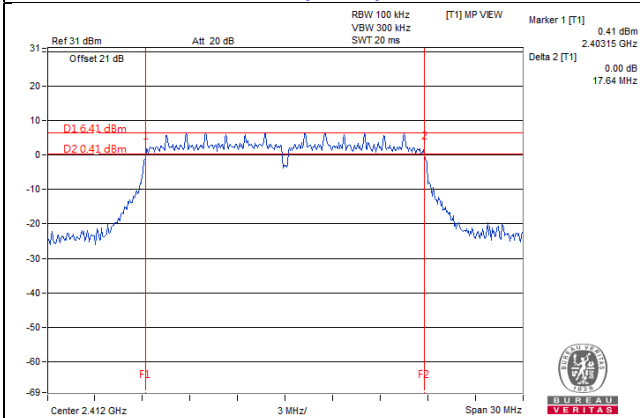
#### 802.11b: CH1



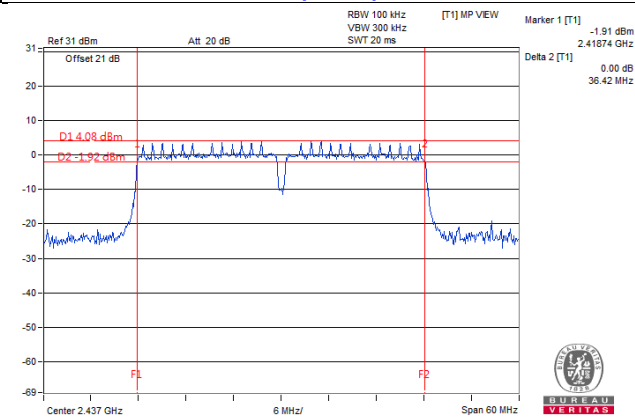
#### 802.11g: CH11



#### 802.11n (HT20): CH1



#### 802.11n (HT40): CH6

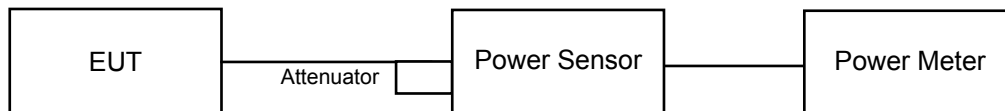


## 4.4 Conducted Output Power Measurement

### 4.4.1 Limits of Conducted Output Power Measurement

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

### 4.4.2 Test Setup



### 4.4.3 Test Instruments

Refer to section 4.1.2 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 power meter was used to read the response of the peak power sensor. Record the power level.

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

### 4.4.5 Deviation from Test Standard

No deviation.

### 4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

#### 4.4.7 Test Results

#### FOR PEAK POWER

##### 802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	143.549	21.57	30	Pass
6	2437	141.579	21.51	30	Pass
11	2462	143.219	21.56	30	Pass

##### 802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	283.139	24.52	30	Pass
6	2437	301.301	24.79	30	Pass
11	2462	291.072	24.64	30	Pass

##### 802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	261.216	24.17	30	Pass
6	2437	298.538	24.75	30	Pass
11	2462	280.543	24.48	30	Pass

##### 802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
3	2422	244.343	23.88	30	Pass
6	2437	267.301	24.27	30	Pass
9	2452	260.016	24.15	30	Pass

## FOR AVERAGE POWER

### 802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	80.538	19.06
6	2437	79.983	19.03
11	2462	80.724	19.07

### 802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	55.719	17.46
6	2437	83.753	19.23
11	2462	63.241	18.01

### 802.11n (HT20)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	48.865	16.89
6	2437	86.099	19.35
11	2462	53.827	17.31

### 802.11n (HT40)

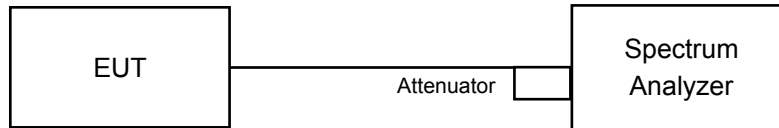
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	31.696	15.01
6	2437	47.098	16.73
9	2452	43.152	16.35

## 4.5 Power Spectral Density Measurement

### 4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- Set the VBW  $\geq 3 \times \text{RBW}$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

### 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	-4.56	8	Pass
6	2437	-3.58	8	Pass
11	2462	-5.35	8	Pass

##### 802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-7.10	8	Pass
6	2437	-7.00	8	Pass
11	2462	-6.90	8	Pass

##### 802.11n (HT20)

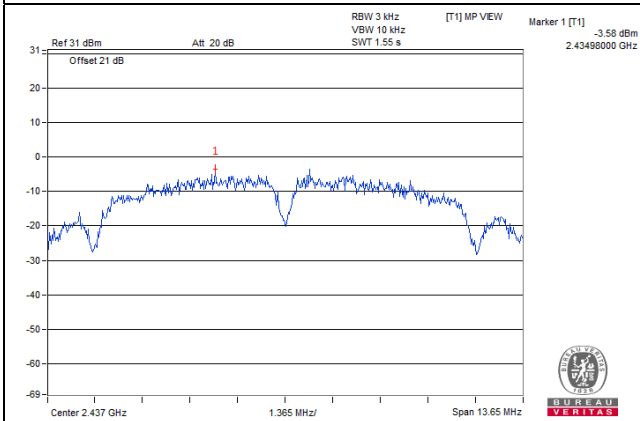
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-8.74	8	Pass
6	2437	-6.78	8	Pass
11	2462	-8.08	8	Pass

##### 802.11n (HT40)

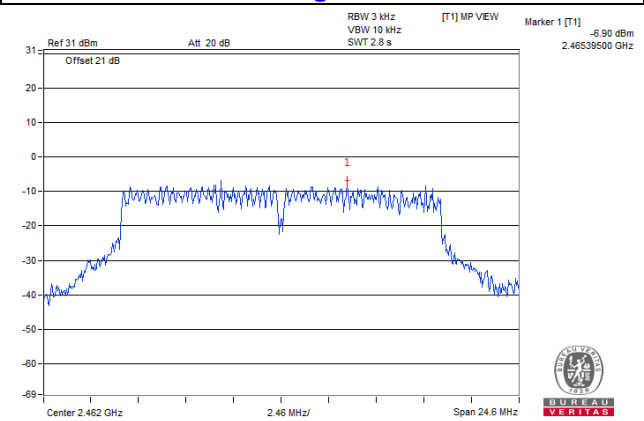
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
3	2422	-13.33	8	Pass
6	2437	-10.69	8	Pass
9	2452	-10.45	8	Pass

### Spectrum Plot of Worst Value

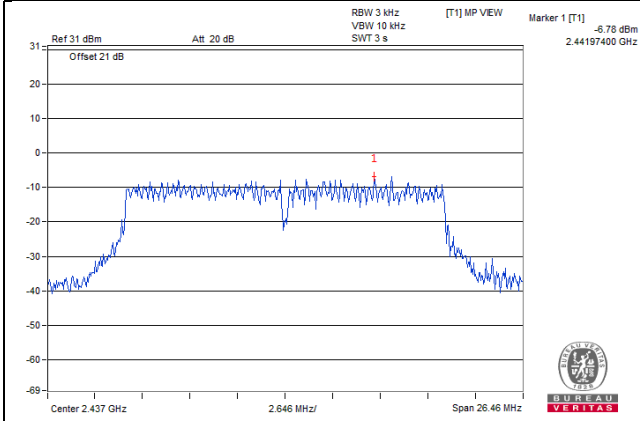
**802.11b: CH6**



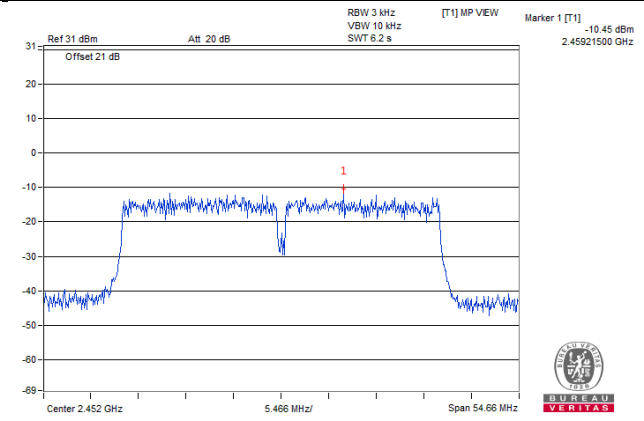
**802.11g: CH11**



**802.11n (HT20): CH6**



**802.11n (HT40): CH9**

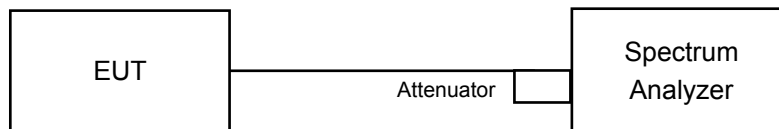


## 4.6 Conducted Out of Band Emission Measurement

### 4.6.1 Limits of Conducted 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 4.1.2 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. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

### 4.6.5 Deviation from Test Standard

No deviation.

### 4.6.6 EUT Operating Condition

Same as Item 4.3.6

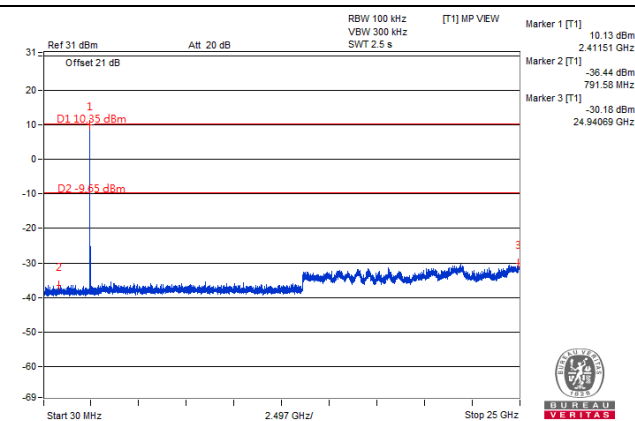
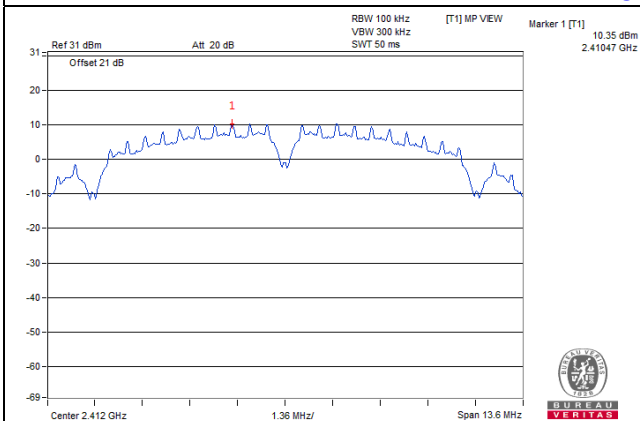
### 4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

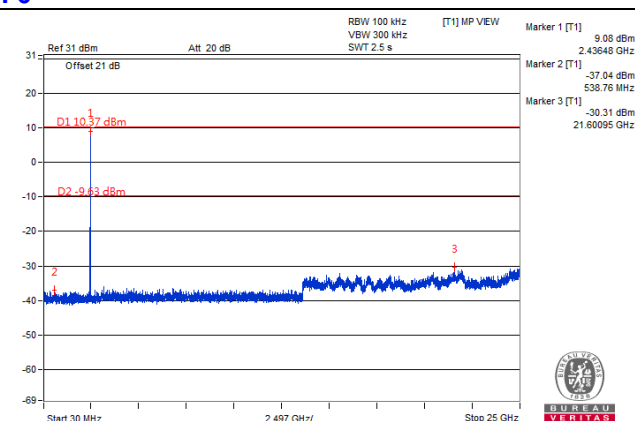
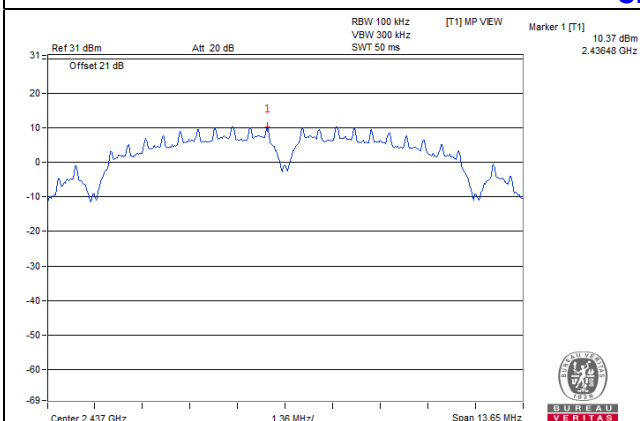
**802.11b**



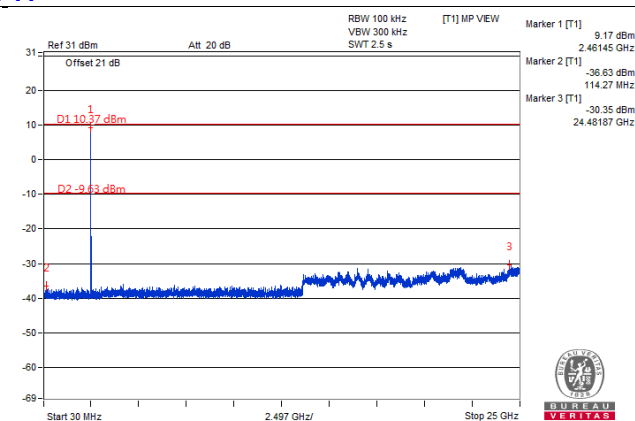
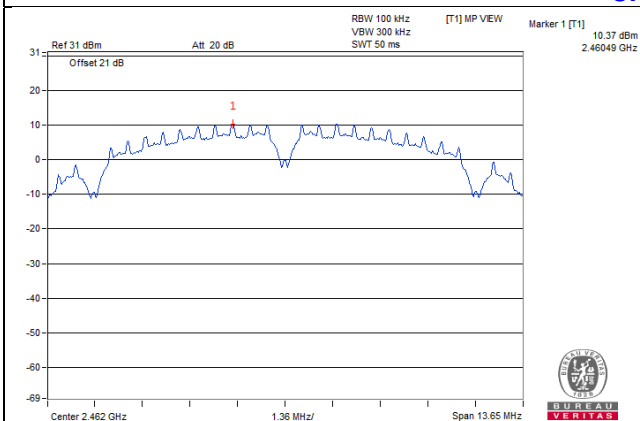
### CH 1



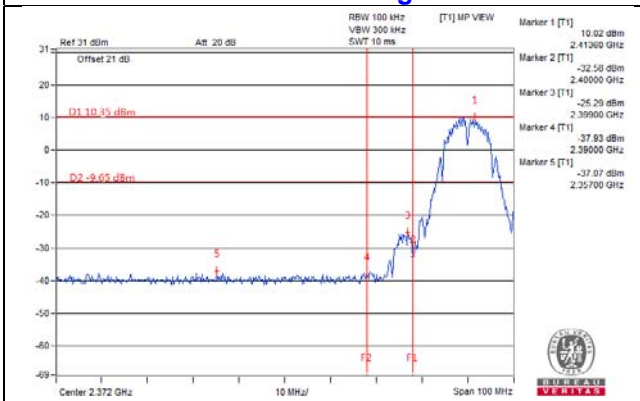
### CH 6



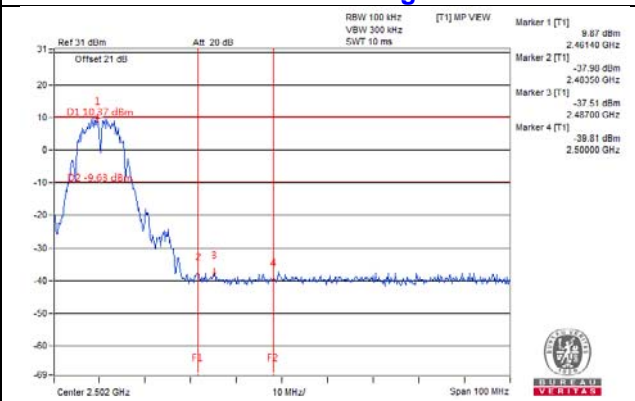
### CH 11



### CH 1 Band edge

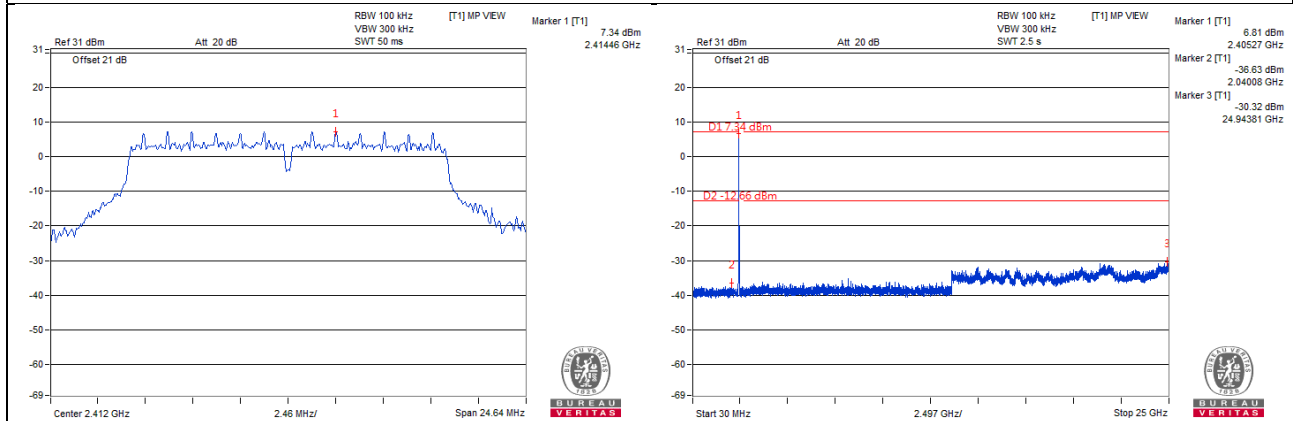


### CH 11 Band edge

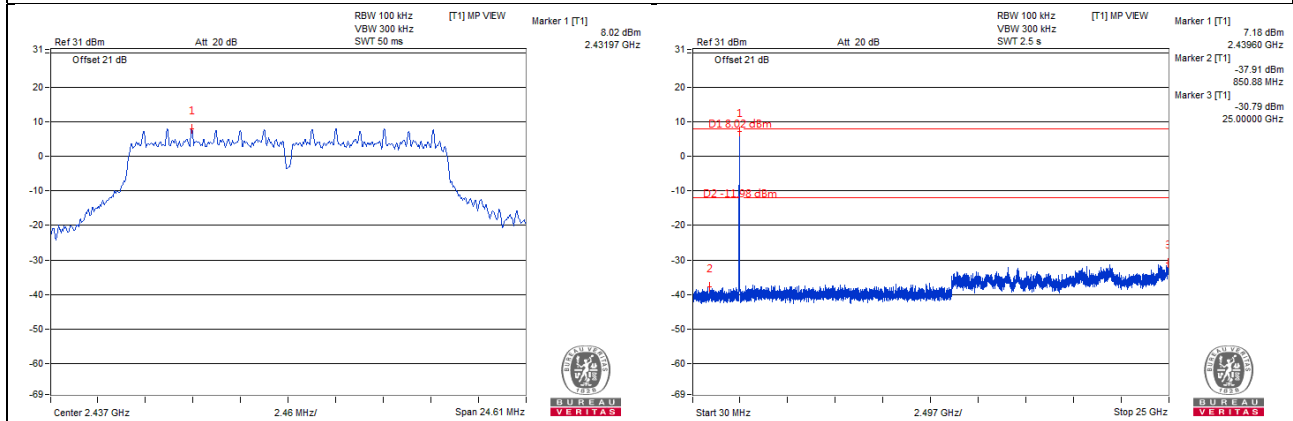


# 802.11g

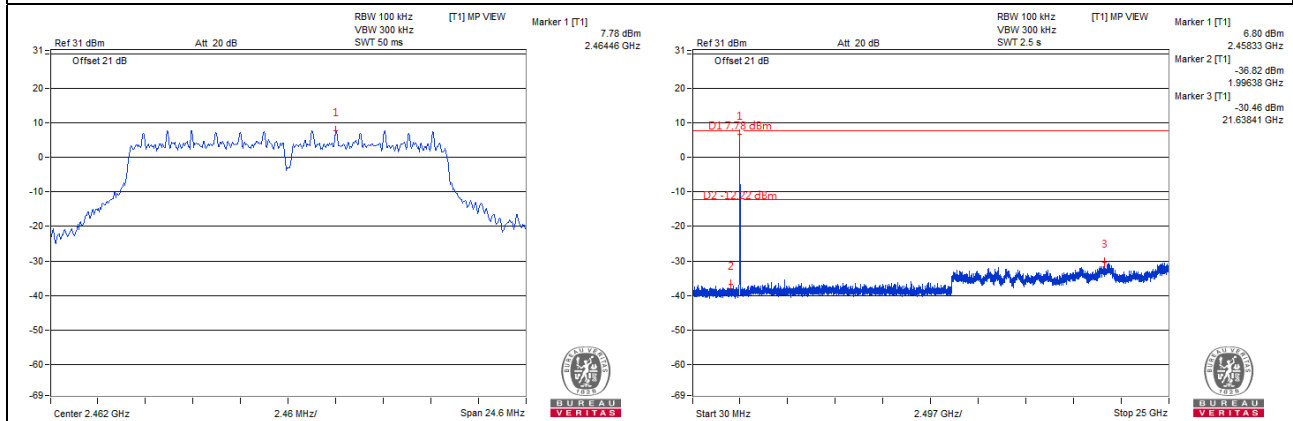
## CH 1



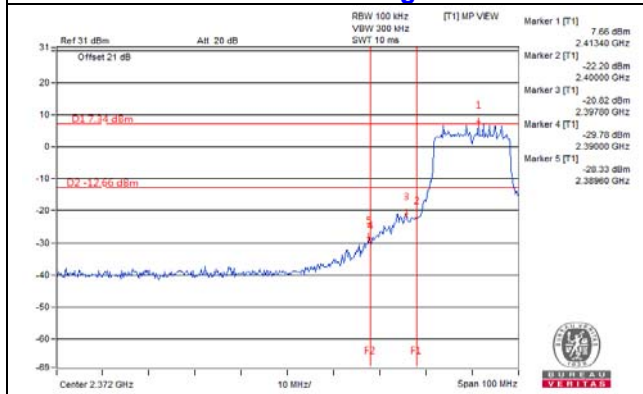
## CH 6



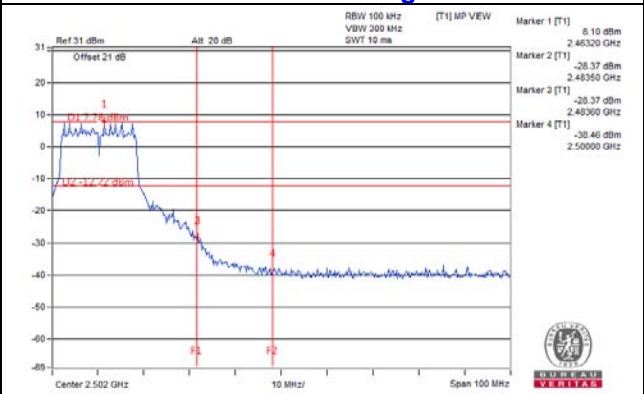
## CH 11



### CH 1 Band edge

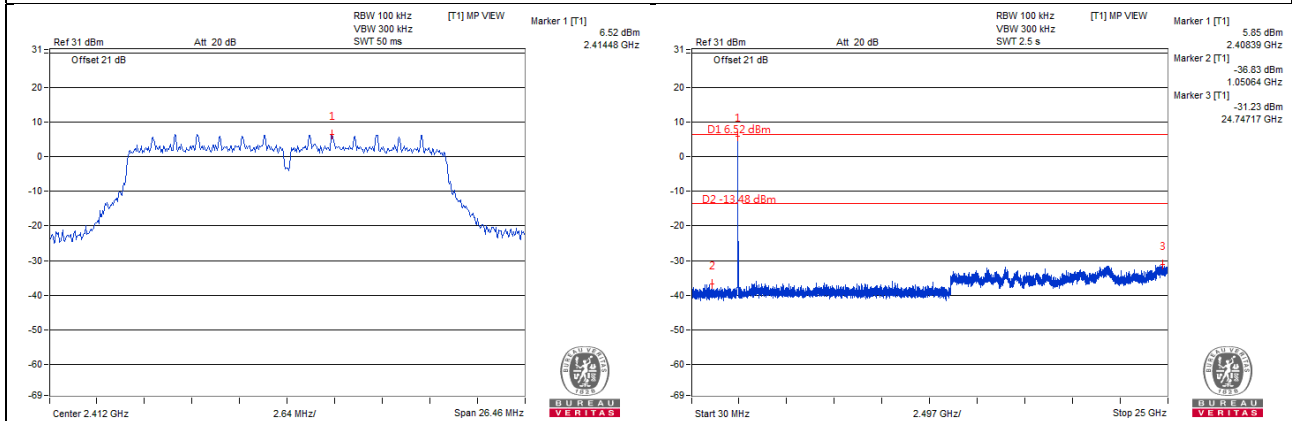


### CH 11 Band edge

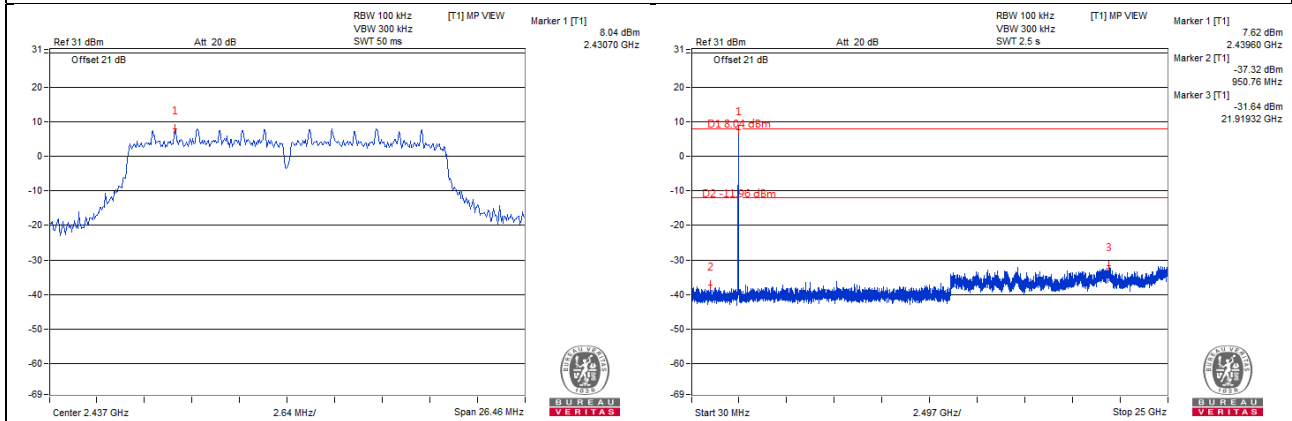


# 802.11n (HT20)

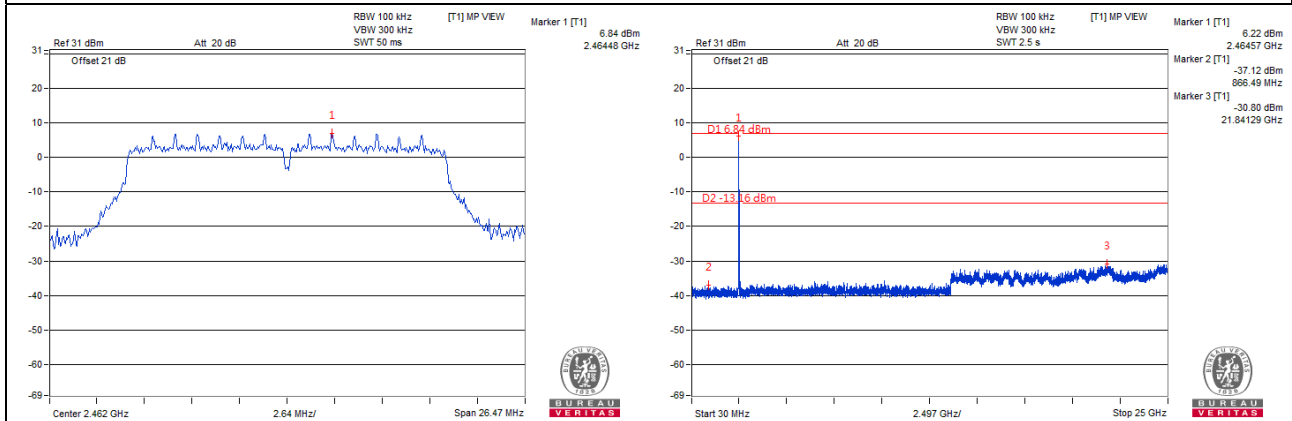
## CH 1



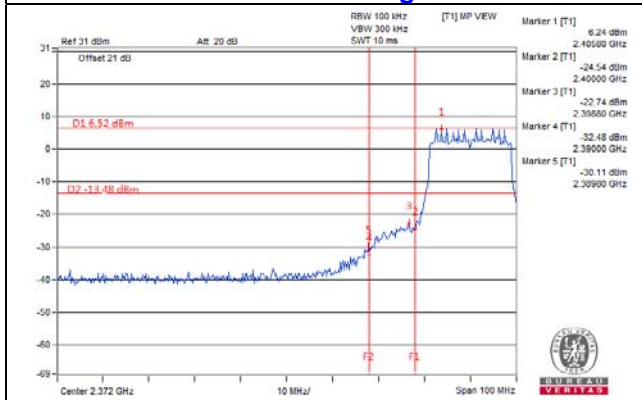
## CH 6



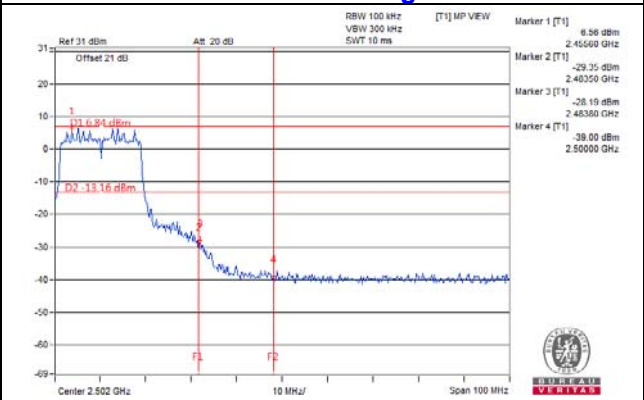
## CH 11



### CH 1 Band edge

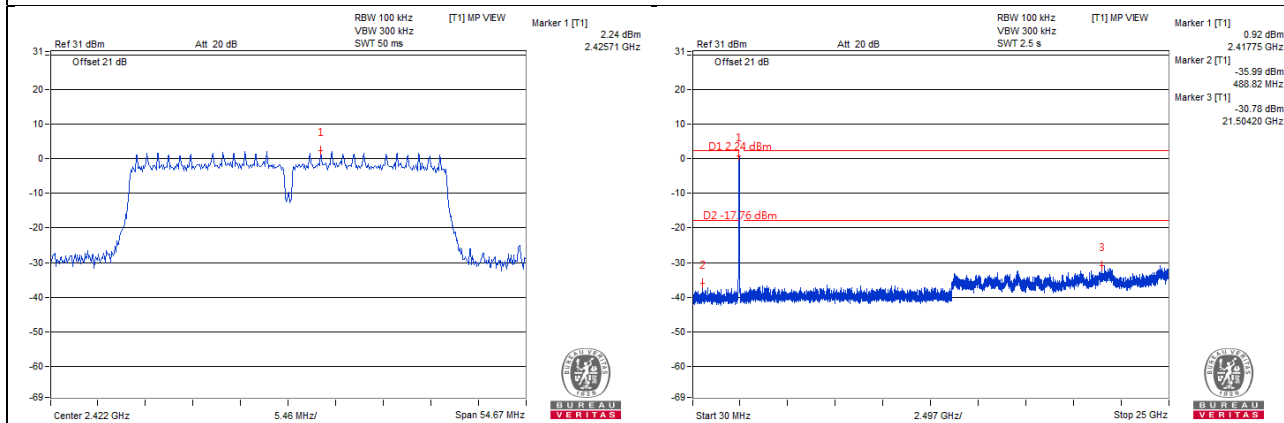


### CH 11 Band edge

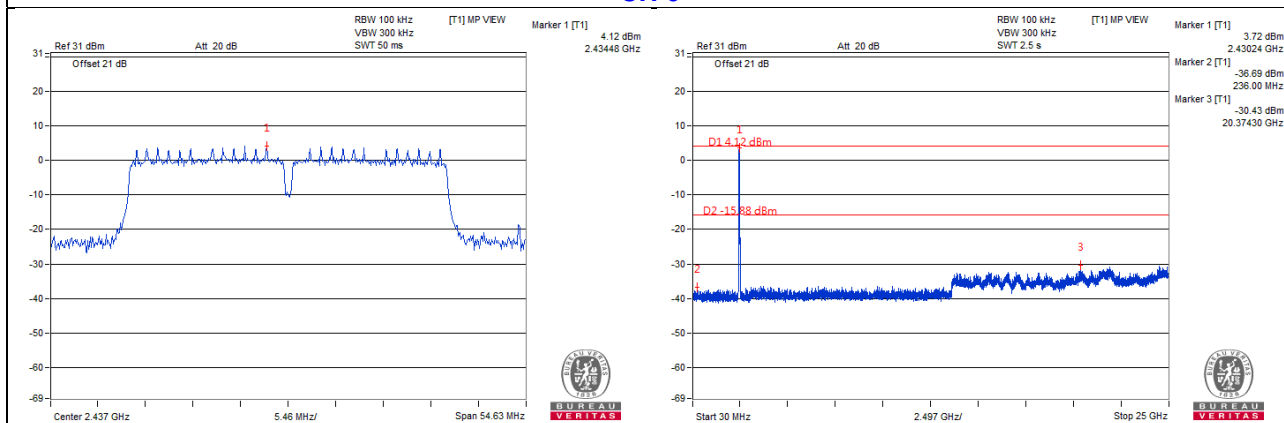


802.11n (HT40)

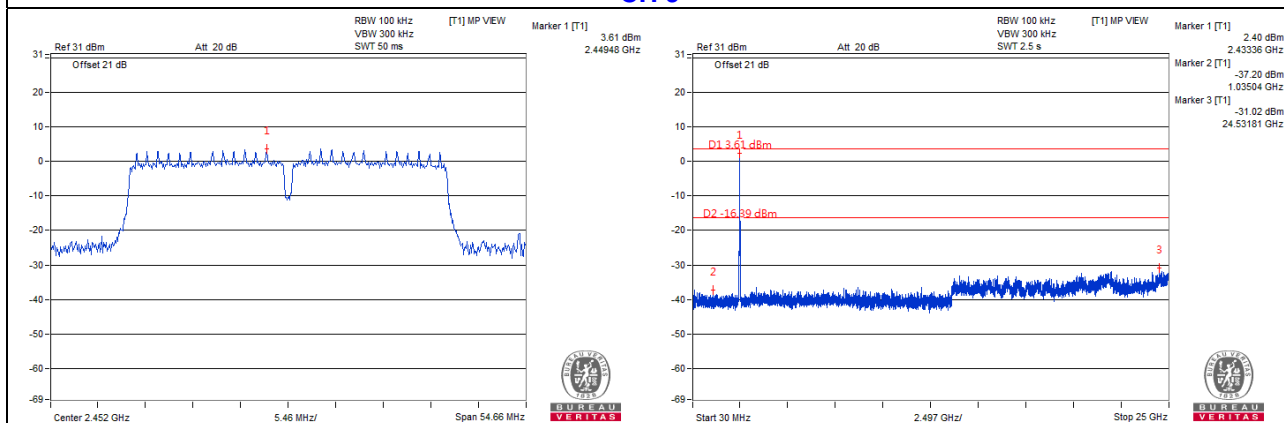
CH 3



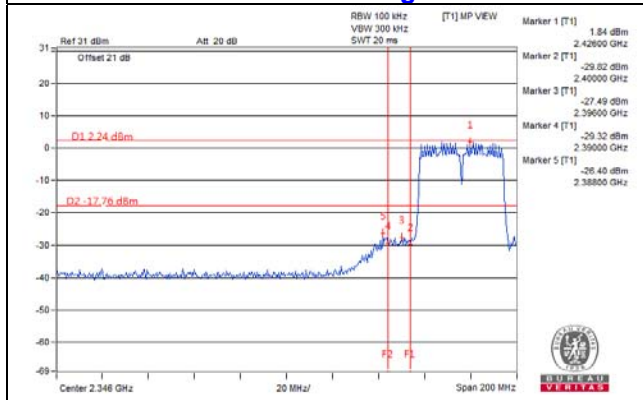
CH 6



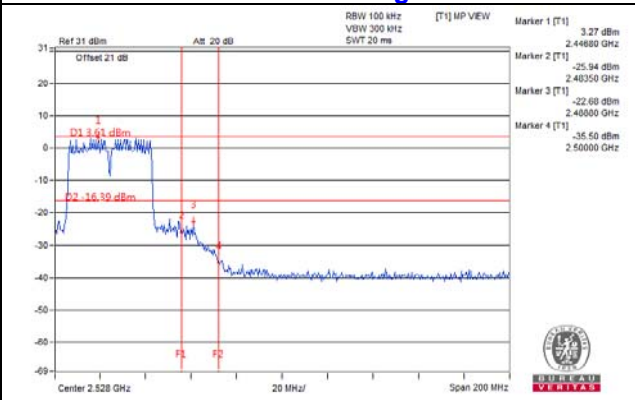
CH 9



CH 3 Band edge



CH 9 Band edge



## 5 Pictures of Test Arrangements

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

## Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

The address and road map of all our labs can be found in our web site also.

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