

## FCC Test Report

**Report No.:** RF170509D05

**FCC ID:** B3Q8VD101

**Test Model:** VC-500W

**Received Date:** May 9, 2017

**Test Date:** May 22 ~ 23, 2017

**Issued Date:** Jun. 29, 2017

**Applicant:** Brother Industries, Ltd.

**Address:** 15-1, Naeshiro-cho, Mizuho-ku, Nagoya 467-8561, Japan

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

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)



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### Release Control Record

Issue No.	Description	Date Issued
RF170509D05	Original release.	Jun. 29, 2017

## 1 Certificate of Conformity

**Product:** Color Label Printer

**Brand:** brother

**Test Model:** VC-500W

**Sample Status:** Engineering sample

**Applicant:** Brother Industries, Ltd.

**Test Date:** May 22 ~ 23, 2017

**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 :** Annie Chang , **Date:** Jun. 29, 2017  
Annie Chang / Senior Specialist

**Approved by :** Rex Lai , **Date:** Jun. 29, 2017  
Rex Lai / Assistant 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 -24.97dB at 0.15391MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -5.12dB at 2483.50MHz.
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.

### 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) ( $\pm$ )
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.77 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.54 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.48 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Color Label Printer
Brand	brother
Test Model	VC-500W
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 150Mbps
Operating Frequency	2.412 ~ 2.462GHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
Output Power	155.239mW
Antenna Type	Printed antenna with -3.6dBi gain
Antenna Connector	N/A
Accessory Device	Adapter
Data Cable Supplied	Shielded USB cable (1.2m)

Note:

- The EUT incorporates a SISO function. Physically, the EUT provides 1 completed transmitter and 1 receiver.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (20MHz)	1TX
802.11n (40MHz)	1TX

- The EUT consumes power from a power adapter as the following:

Brand	Model No.	Rating
APD	DA-48T12	AC I/P: 100-240Vac 50-60Hz 1.4A Max. DC O/P: 12V, 4A Non-shielded AC 2 Pin cable (0.65m) Non-shielded DC cable (1.2m) with one ferrite core

- The above EUT information is declared by manufacturer and for more detailed features description, please refer 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 (20MHz):

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 (40MHz):

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 <sup>≥</sup> 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE<sup>≥</sup>1G: Radiated Emission above 1GHz & Bandedge Measurement  
 RE<1G: Radiated Emission below 1GHz  
 PLC: Power Line Conducted Emission  
 APCM: Antenna Port Conducted Measurement

#### 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.

EUT CONFIGURE MODE	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 (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (40MHz)	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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11g	1 to 11	1	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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11g	1 to 11	1	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.

EUT CONFIGURE MODE	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 (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

### Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE <sup>3</sup> 1G	26deg. C, 72%RH	120Vac, 60Hz	Ian Chang
RE<1G	26deg. C, 72%RH	120Vac, 60Hz	Ian Chang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Ian Chang
APCM	25deg. C, 76%RH	120Vac, 60Hz	Saxon Lee

### 3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.



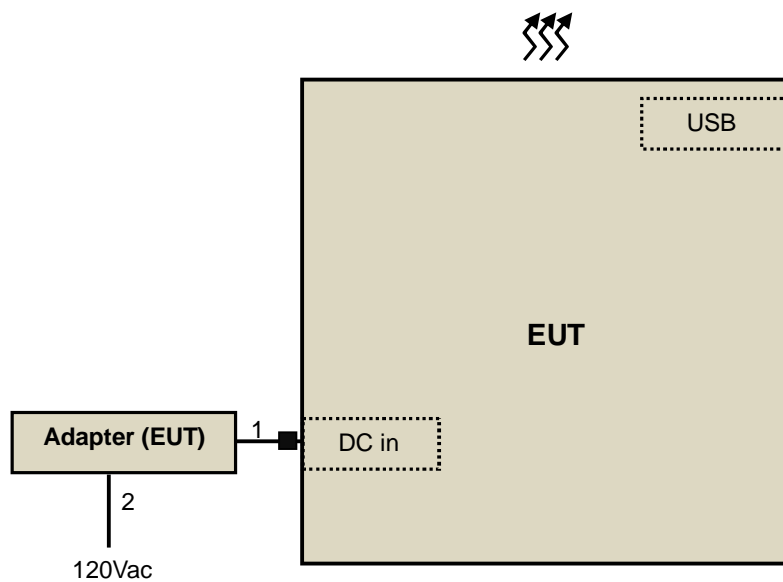
### 3.4 Description of Support Units

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	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.2	N	1	Supplied by client
2.	AC power cord	1	0.65	N	0	Supplied by client

Note: The core(s) is(are) originally attached to the cable(s).

#### 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 DTS Meas Guidance v04**  
**ANSI C63.10-2013**

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

**NOTE:** The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

## 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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 21, 2017	Feb. 20, 2018
HP Preamplifier	8449B	3008A01201	Feb. 22, 2017	Feb. 21, 2018
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 21, 2017	Feb. 20, 2018
Agilent TEST RECEIVER	N9038A	MY51210129	Feb. 08, 2017	Feb. 07, 2018
Schwarzbeck Antenna	VULB 9168	139	Dec. 13, 2016	Dec. 12, 2017
Schwarzbeck Antenna	VHBA 9123	480	May 19, 2017	May 18, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Dec. 30, 2016	Dec. 29, 2017
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Dec. 27, 2016	Dec. 26, 2017
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF104	CABLE-CH6	Aug. 15, 2016	Aug. 14, 2017
SUHNER RF cable With 3dB PAD	SF102	Cable-CH8-3.6m	Aug. 15, 2016	Aug. 14, 2017
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 26, 2016	Jul. 25, 2017
Loop Antenna EMCI	LPA600	270	Aug. 20, 2015	Aug. 19, 2017
EMCO Horn Antenna	3115	00028257	Dec. 15, 2016	Dec. 14, 2017
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 30, 2016	Sep. 29, 2017
Anritsu Power Sensor	MA2411B	0738404	Apr. 24, 2017	Apr. 23, 2018
Anritsu Power Meter	ML2495A	0842014	Apr. 24, 2017	Apr. 23, 2018

- NOTE:**
1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
  2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  3. The test was performed in Chamber No. 6.
  4. The Industry Canada Reference No. IC 7450E-6.
  5. The FCC Site Registration No. is 447212.

#### 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. Both X and Y axes 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 detect 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 1 MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 3 x RBW (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.

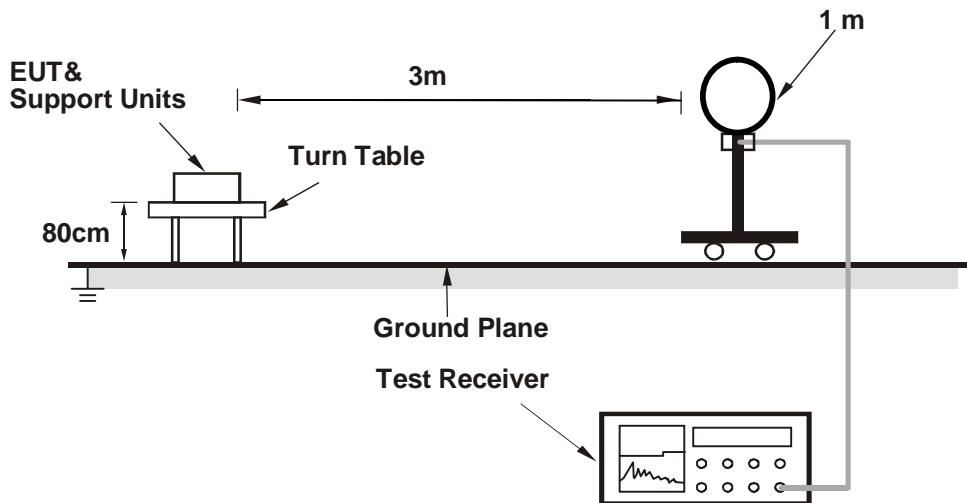
#### 4.1.4 Deviation from Test Standard

No deviation.

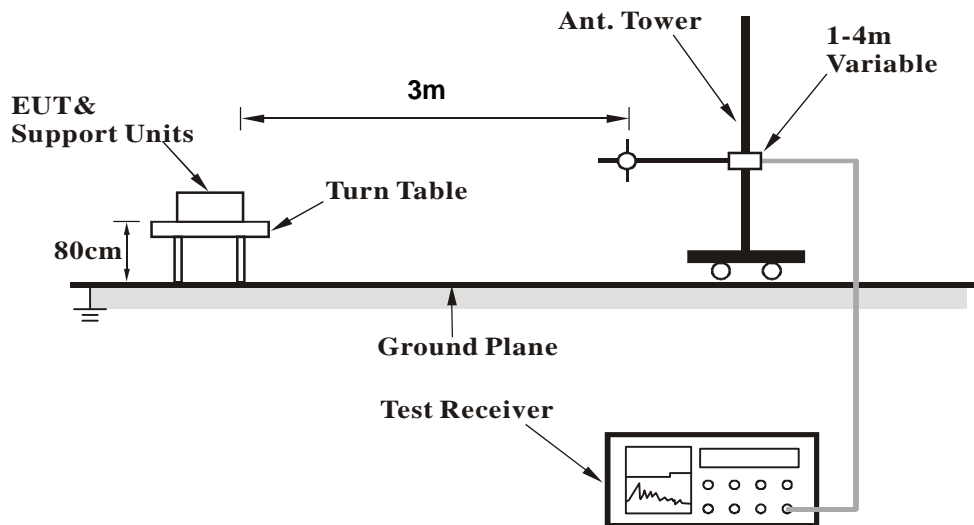


#### 4.1.5 Test Setup

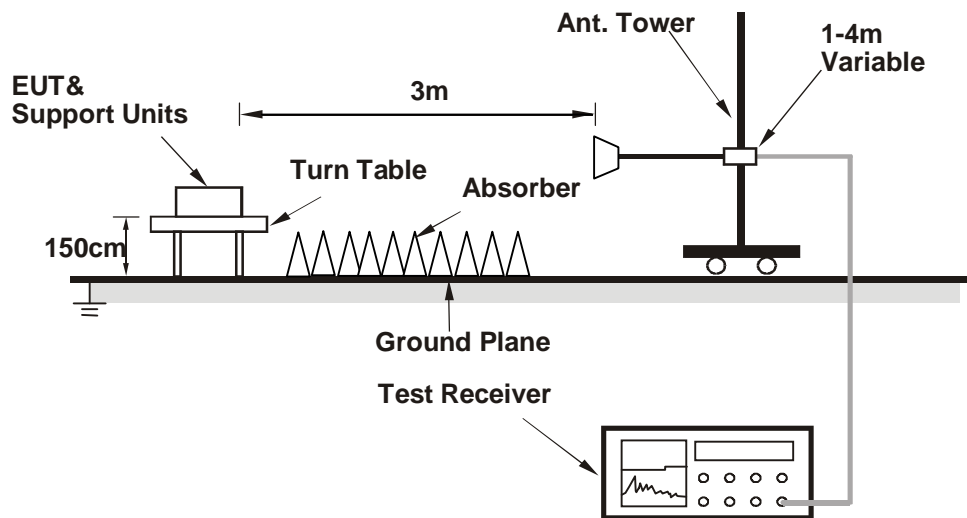
##### For Radiated emission below 30MHz



##### 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. Connected the EUT to adapter
- b. 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	53.66 PK	74.00	-20.34	1.87 H	254	55.56	-1.90
2	2390.00	40.16 AV	54.00	-13.84	1.87 H	254	42.06	-1.90
3	*2412.00	100.59 PK			1.87 H	254	102.35	-1.76
4	*2412.00	97.87 AV			1.87 H	254	99.63	-1.76
5	4824.00	49.93 PK	74.00	-24.07	1.67 H	329	44.76	5.17
6	4824.00	44.67 AV	54.00	-9.33	1.67 H	329	39.50	5.17

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	52.69 PK	74.00	-21.31	3.97 V	37	54.59	-1.90
2	2390.00	38.86 AV	54.00	-15.14	3.97 V	37	40.76	-1.90
3	*2412.00	95.67 PK			3.97 V	37	97.43	-1.76
4	*2412.00	93.12 AV			3.97 V	37	94.88	-1.76
5	4824.00	49.64 PK	74.00	-24.36	3.37 V	232	44.47	5.17
6	4824.00	44.61 AV	54.00	-9.39	3.37 V	232	39.44	5.17

#### 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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	100.81 PK			2.63 H	249	102.42	-1.61
2	*2437.00	98.10 AV			2.63 H	249	99.71	-1.61
3	4874.00	47.59 PK	74.00	-26.41	1.73 H	24	42.38	5.21
4	4874.00	40.96 AV	54.00	-13.04	1.73 H	24	35.75	5.21

**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	95.95 PK			3.96 V	43	97.56	-1.61
2	*2437.00	92.91 AV			3.96 V	43	94.52	-1.61
3	4874.00	47.44 PK	74.00	-26.56	3.42 V	229	42.23	5.21
4	4874.00	40.84 AV	54.00	-13.16	3.42 V	229	35.63	5.21

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	99.33 PK			2.59 H	249	100.79	-1.46
2	*2462.00	96.56 AV			2.59 H	249	98.02	-1.46
3	2483.50	53.64 PK	74.00	-20.36	2.59 H	249	54.97	-1.33
4	2483.50	39.84 AV	54.00	-14.16	2.59 H	249	41.17	-1.33
5	4924.00	46.57 PK	74.00	-27.43	2.04 H	277	41.27	5.30
6	4924.00	38.31 AV	54.00	-15.69	2.04 H	277	33.01	5.30

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	93.78 PK			3.95 V	45	95.24	-1.46
2	*2462.00	91.76 AV			3.95 V	45	93.22	-1.46
3	2483.50	52.80 PK	74.00	-21.20	3.95 V	45	54.13	-1.33
4	2483.50	39.35 AV	54.00	-14.65	3.95 V	45	40.68	-1.33
5	4924.00	46.21 PK	74.00	-27.79	3.46 V	241	40.91	5.30
6	4924.00	37.98 AV	54.00	-16.02	3.46 V	241	32.68	5.30

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
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	68.19 PK	74.00	-5.81	3.01 H	251	70.09	-1.90
2	2390.00	47.46 AV	54.00	-6.54	3.01 H	251	49.36	-1.90
3	*2412.00	107.48 PK			3.01 H	251	109.24	-1.76
4	*2412.00	95.92 AV			3.01 H	251	97.68	-1.76
5	4824.00	45.80 PK	74.00	-28.20	1.54 H	197	40.63	5.17
6	4824.00	32.02 AV	54.00	-21.98	1.54 H	197	26.85	5.17

**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	63.08 PK	74.00	-10.92	3.97 V	34	64.98	-1.90
2	2390.00	44.94 AV	54.00	-9.06	3.97 V	34	46.84	-1.90
3	*2412.00	102.29 PK			3.97 V	34	104.05	-1.76
4	*2412.00	90.62 AV			3.97 V	34	92.38	-1.76
5	4824.00	45.06 PK	74.00	-28.94	2.36 V	66	39.89	5.17
6	4824.00	30.51 AV	54.00	-23.49	2.36 V	66	25.34	5.17

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	106.85 PK			2.97 H	253	108.46	-1.61
2	*2437.00	95.44 AV			2.97 H	253	97.05	-1.61
3	4874.00	45.88 PK	74.00	-28.12	1.78 H	204	40.67	5.21
4	4874.00	31.59 AV	54.00	-22.41	1.78 H	204	26.38	5.21

**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	102.08 PK			3.99 V	34	103.69	-1.61
2	*2437.00	90.28 AV			3.99 V	34	91.89	-1.61
3	4874.00	44.88 PK	74.00	-29.12	2.65 V	341	39.67	5.21
4	4874.00	30.59 AV	54.00	-23.41	2.65 V	341	25.38	5.21

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.77 PK			3.29 H	216	106.23	-1.46
2	*2462.00	93.26 AV			3.29 H	216	94.72	-1.46
<b>3</b>	<b>2483.50</b>	<b>68.88 PK</b>	<b>74.00</b>	<b>-5.12</b>	<b>3.29 H</b>	<b>216</b>	<b>70.21</b>	<b>-1.33</b>
4	2483.50	47.87 AV	54.00	-6.13	3.29 H	216	49.20	-1.33
5	4924.00	45.48 PK	74.00	-28.52	2.31 H	84	40.18	5.30
6	4924.00	31.58 AV	54.00	-22.42	2.31 H	84	26.28	5.30

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	99.80 PK			3.96 V	29	101.26	-1.46
2	*2462.00	88.21 AV			3.96 V	29	89.67	-1.46
3	2483.50	65.43 PK	74.00	-8.57	3.96 V	29	66.76	-1.33
4	2483.50	43.95 AV	54.00	-10.05	3.96 V	29	45.28	-1.33
5	4924.00	45.06 PK	74.00	-28.94	2.10 V	115	39.76	5.30
6	4924.00	30.73 AV	54.00	-23.27	2.10 V	115	25.43	5.30

**REMARKS:**

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



**802.11n (20MHz)**

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

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.63 PK	74.00	-6.37	1.80 H	256	69.53	-1.90
2	2390.00	45.87 AV	54.00	-8.13	1.80 H	256	47.77	-1.90
3	*2412.00	104.37 PK			1.80 H	256	106.13	-1.76
4	*2412.00	92.78 AV			1.80 H	256	94.54	-1.76
5	4824.00	45.85 PK	74.00	-28.15	2.49 H	228	40.68	5.17
6	4824.00	31.84 AV	54.00	-22.16	2.49 H	228	26.67	5.17

**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	63.36 PK	74.00	-10.64	2.96 V	44	65.26	-1.90
2	2390.00	40.46 AV	54.00	-13.54	2.96 V	44	42.36	-1.90
3	*2412.00	98.72 PK			2.96 V	44	100.48	-1.76
4	*2412.00	86.93 AV			2.96 V	44	88.69	-1.76
5	4824.00	44.73 PK	74.00	-29.27	1.37 V	154	39.56	5.17
6	4824.00	30.98 AV	54.00	-23.02	1.37 V	154	25.81	5.17

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	104.85 PK			2.98 H	250	106.46	-1.61
2	*2437.00	93.74 AV			2.98 H	250	95.35	-1.61
3	4874.00	45.76 PK	74.00	-28.24	1.72 H	196	40.55	5.21
4	4874.00	31.90 AV	54.00	-22.10	1.72 H	196	26.69	5.21

**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	98.93 PK			2.86 V	49	100.54	-1.61
2	*2437.00	87.76 AV			2.86 V	49	89.37	-1.61
3	4874.00	44.88 PK	74.00	-29.12	2.69 V	287	39.67	5.21
4	4874.00	31.05 AV	54.00	-22.95	2.69 V	287	25.84	5.21

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	102.72 PK			2.95 H	246	104.18	-1.46
2	*2462.00	91.63 AV			2.95 H	246	93.09	-1.46
3	2483.50	65.57 PK	74.00	-8.43	2.95 H	246	66.90	-1.33
4	2483.50	46.04 AV	54.00	-7.96	2.95 H	246	47.37	-1.33
5	4924.00	45.91 PK	74.00	-28.09	1.66 H	205	40.61	5.30
6	4924.00	32.13 AV	54.00	-21.87	1.66 H	205	26.83	5.30

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	97.30 PK			3.02 V	36	98.76	-1.46
2	*2462.00	86.44 AV			3.02 V	36	87.90	-1.46
3	2483.50	61.10 PK	74.00	-12.90	3.02 V	36	62.43	-1.33
4	2483.50	40.86 AV	54.00	-13.14	3.02 V	36	42.19	-1.33
5	4924.00	44.58 PK	74.00	-29.42	1.23 V	321	39.28	5.30
6	4924.00	30.39 AV	54.00	-23.61	1.23 V	321	25.09	5.30

**REMARKS:**

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

**802.11n (40MHz)**

<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	65.32 PK	74.00	-8.68	3.00 H	250	67.22	-1.90
2	2390.00	48.15 AV	54.00	-5.85	3.00 H	250	50.05	-1.90
3	*2422.00	103.68 PK			3.00 H	250	105.39	-1.71
4	*2422.00	91.19 AV			3.00 H	250	92.90	-1.71
5	4844.00	45.52 PK	74.00	-28.48	2.66 H	300	40.33	5.19
6	4844.00	32.04 AV	54.00	-21.96	2.66 H	300	26.85	5.19

**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	61.46 PK	74.00	-12.54	3.82 V	182	63.36	-1.90
2	2390.00	44.29 AV	54.00	-9.71	3.82 V	182	46.19	-1.90
3	*2422.00	99.70 PK			3.82 V	182	101.41	-1.71
4	*2422.00	86.98 AV			3.82 V	182	88.69	-1.71
5	4844.00	44.26 PK	74.00	-29.74	2.08 V	200	39.07	5.19
6	4844.00	30.19 AV	54.00	-23.81	2.08 V	200	25.00	5.19

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	103.35 PK			2.98 H	249	104.96	-1.61
2	*2437.00	91.10 AV			2.98 H	249	92.71	-1.61
3	4874.00	45.89 PK	74.00	-28.11	1.42 H	105	40.68	5.21
4	4874.00	32.09 AV	54.00	-21.91	1.42 H	105	26.88	5.21

**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	99.25 PK			3.79 V	178	100.86	-1.61
2	*2437.00	86.93 AV			3.79 V	178	88.54	-1.61
3	4874.00	44.84 PK	74.00	-29.16	1.56 V	268	39.63	5.21
4	4874.00	30.27 AV	54.00	-23.73	1.56 V	268	25.06	5.21

**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. The other emission levels were very low against the limit.
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	102.13 PK			2.93 H	249	103.64	-1.51
2	*2452.00	89.68 AV			2.93 H	249	91.19	-1.51
3	2483.50	65.05 PK	74.00	-8.95	2.93 H	249	66.38	-1.33
4	2483.50	48.20 AV	54.00	-5.80	2.93 H	249	49.53	-1.33
5	4904.00	45.96 PK	74.00	-28.04	2.18 H	341	40.72	5.24
6	4904.00	31.89 AV	54.00	-22.11	2.18 H	341	26.65	5.24

**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	98.36 PK			2.78 V	186	99.87	-1.51
2	*2452.00	86.05 AV			2.78 V	186	87.56	-1.51
3	2483.50	60.81 PK	74.00	-13.19	2.78 V	186	62.14	-1.33
4	2483.50	36.56 AV	54.00	-17.44	2.78 V	186	37.89	-1.33
5	4904.00	44.60 PK	74.00	-29.40	1.54 V	37	39.36	5.24
6	4904.00	30.33 AV	54.00	-23.67	1.54 V	37	25.09	5.24

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

**Below 1GHz Data: 802.11g**

<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	67.44	18.56 QP	40.00	-21.44	2.58 H	295	29.54	-10.98
2	153.77	18.01 QP	43.50	-25.49	2.30 H	251	27.00	-8.99
3	201.11	20.16 QP	43.50	-23.34	2.17 H	238	31.73	-11.57
4	265.52	22.49 QP	46.00	-23.51	1.88 H	133	30.98	-8.49
5	348.01	24.13 QP	46.00	-21.87	2.41 H	221	30.75	-6.62
6	545.60	26.81 QP	46.00	-19.19	1.66 H	360	29.15	-2.34

**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	54.98	23.72 QP	40.00	-16.28	1.37 V	213	32.84	-9.12
2	114.54	20.67 QP	43.50	-22.83	2.06 V	316	32.92	-12.25
3	202.42	19.44 QP	43.50	-24.06	1.57 V	338	31.04	-11.60
4	327.74	21.62 QP	46.00	-24.38	1.99 V	168	28.22	-6.60
5	461.84	24.54 QP	46.00	-21.46	2.37 V	207	28.44	-3.90
6	532.70	27.13 QP	46.00	-18.87	1.58 V	92	29.66	-2.53

**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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

## 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.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100276	Apr. 10, 2017	Apr. 09, 2018
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	May 22, 2017	May 21, 2018
LISN With Adapter (for EUT)	AD10	C10Ada-002	May 22, 2017	May 21, 2018
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 23, 2016	Nov. 22, 2017
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 09, 2017	May 08, 2018
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 14, 2017	Feb. 13, 2018
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 18, 2017	May 17, 2018
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 08, 2016	Nov. 07, 2017
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 08, 2016	Nov. 07, 2017

Notes: 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 Shielded Room No. 10.

3. The VCCI Site Registration No. C-1852.



#### 4.2.3 Test Procedures

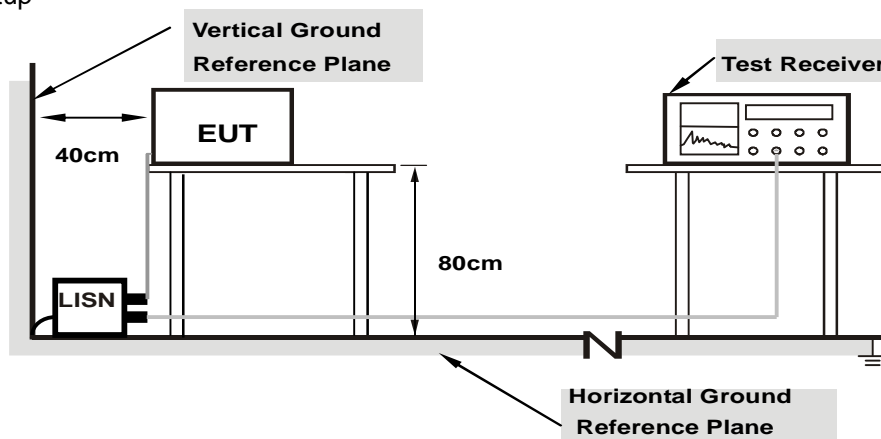
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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:** 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 item 4.1.6.

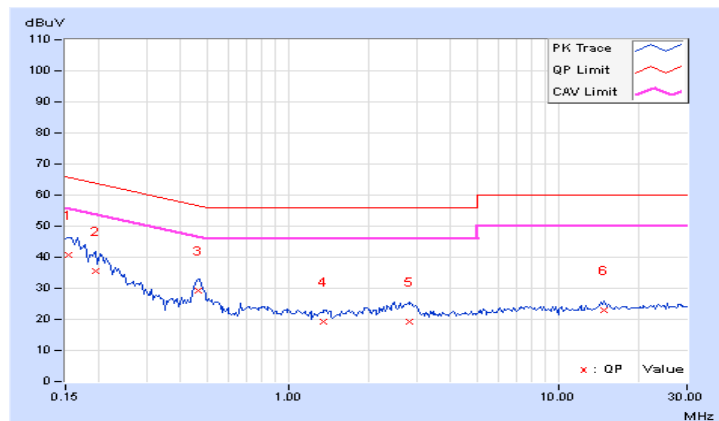
#### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	----------	-------------------	--------------------------------

No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.62	31.20	8.90	40.82	18.52	65.79	55.79	-24.97	-37.27
2	0.19297	9.62	25.88	7.15	35.50	16.77	63.91	53.91	-28.41	-37.14
3	0.46641	9.68	19.70	10.20	29.38	19.88	56.58	46.58	-27.20	-26.70
4	1.35938	9.81	9.59	5.21	19.40	15.02	56.00	46.00	-36.60	-30.98
5	2.80078	9.95	9.25	2.17	19.20	12.12	56.00	46.00	-36.80	-33.88
6	14.75781	10.30	12.70	9.23	23.00	19.53	60.00	50.00	-37.00	-30.47

#### 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

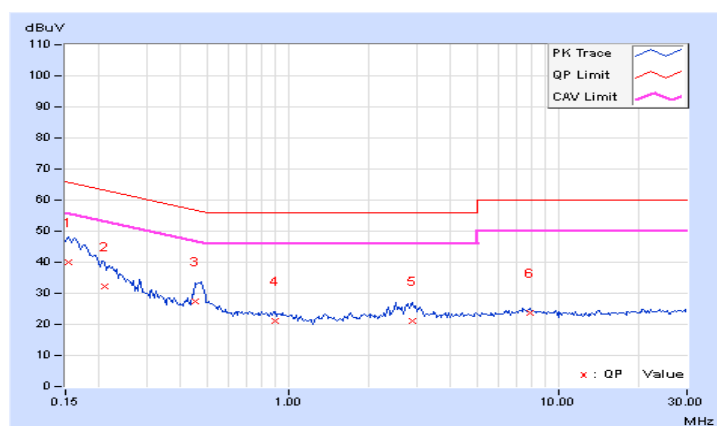


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.66	30.43	8.84	40.09	18.50	65.79	55.79	-25.70	-37.29
2	0.20859	9.66	22.73	4.82	32.39	14.48	63.26	53.26	-30.87	-38.78
3	0.45469	9.71	17.58	8.03	27.29	17.74	56.79	46.79	-29.50	-29.05
4	0.89609	9.77	11.25	3.60	21.02	13.37	56.00	46.00	-34.98	-32.63
5	2.89844	9.99	11.13	1.95	21.12	11.94	56.00	46.00	-34.88	-34.06
6	7.87891	10.22	13.65	5.80	23.87	16.02	60.00	50.00	-36.13	-33.98

**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

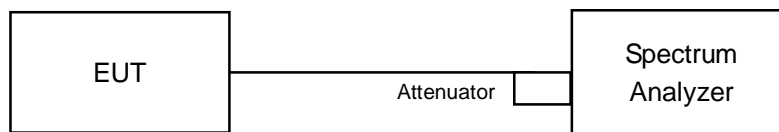


### 4.3 6dB Bandwidth Measurement

#### 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	10.09	0.5	PASS
6	2437	10.10	0.5	PASS
11	2462	10.10	0.5	PASS

##### 802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.61	0.5	PASS
6	2437	16.62	0.5	PASS
11	2462	16.62	0.5	PASS

##### 802.11n (20MHz)

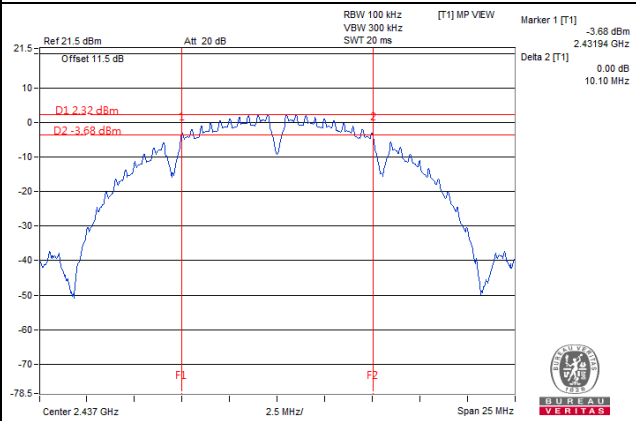
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.83	0.5	PASS
6	2437	17.83	0.5	PASS
11	2462	17.81	0.5	PASS

##### 802.11n (40MHz)

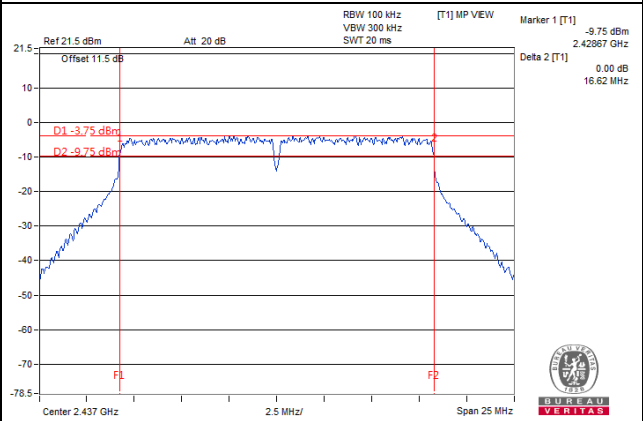
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.42	0.5	PASS
6	2437	36.42	0.5	PASS
9	2452	36.45	0.5	PASS

Spectrum Plot of Worst Value

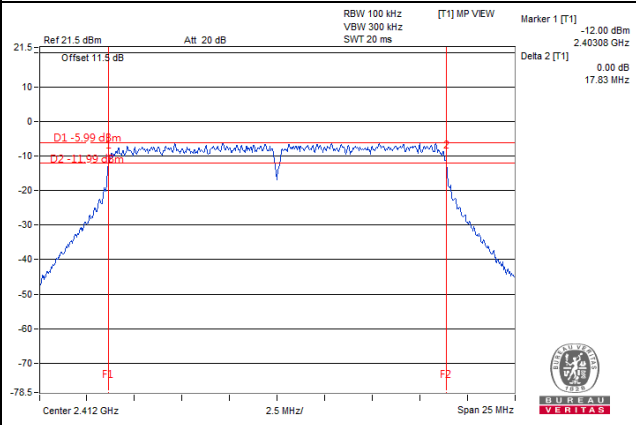
802.11b / CH6



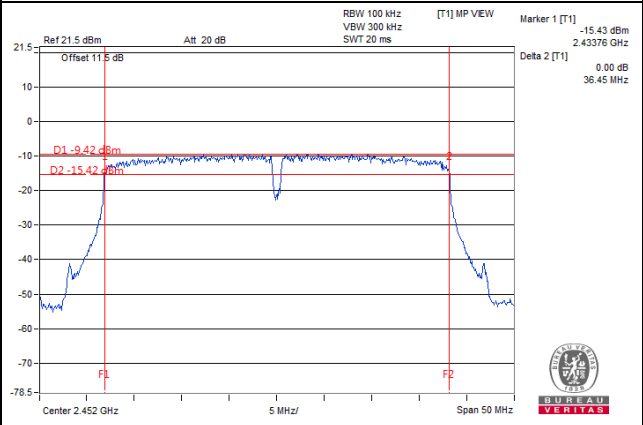
802.11g / CH6



802.11n (20MHz) / CH1



802.11n (40MHz) / CH11

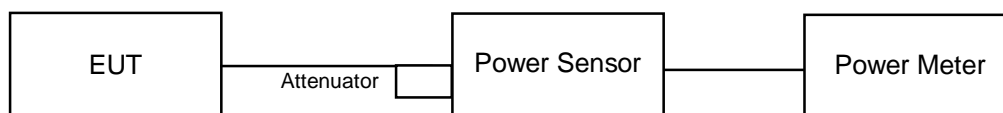


#### 4.4 Conducted Output Power Measurement

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

##### 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	45.186	16.55	30	Pass
6	2437	46.881	16.71	30	Pass
11	2462	44.361	16.47	30	Pass

##### 802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	129.122	21.11	30	Pass
6	2437	134.276	21.28	30	Pass
11	2462	<b>155.239</b>	21.91	30	Pass

##### 802.11n (20MHz)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	77.446	18.89	30	Pass
6	2437	74.989	18.75	30	Pass
11	2462	66.834	18.25	30	Pass

##### 802.11n (40MHz)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	82.794	19.18	30	Pass
6	2437	82.414	19.16	30	Pass
9	2452	81.470	19.11	30	Pass



## FOR AVERAGE POWER

### 802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	26.607	14.25
6	2437	27.353	14.37
11	2462	26.182	14.18

### 802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	16.634	12.21
6	2437	17.418	12.41
11	2462	16.293	12.12

### 802.11n (20MHz)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	10.139	10.06
6	2437	10.789	10.33
11	2462	10.666	10.28

### 802.11n (40MHz)

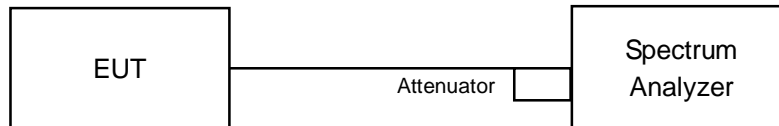
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	10.864	10.36
6	2437	10.641	10.27
9	2452	10.641	10.27

## 4.5 Power Spectral Density Measurement

### 4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

### 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

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d. Set the VBW  $\geq 3 \times \text{RBW}$ .
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. 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	-18.14	8	Pass
6	2437	-17.87	8	Pass
11	2462	-18.73	8	Pass

##### 802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-18.54	8	Pass
6	2437	-18.14	8	Pass
11	2462	-19.44	8	Pass

##### 802.11n (20MHz)

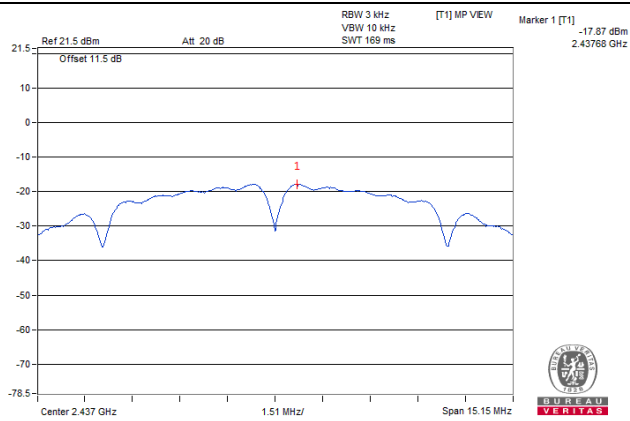
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-20.09	8	Pass
6	2437	-19.67	8	Pass
11	2462	-20.42	8	Pass

##### 802.11n (40MHz)

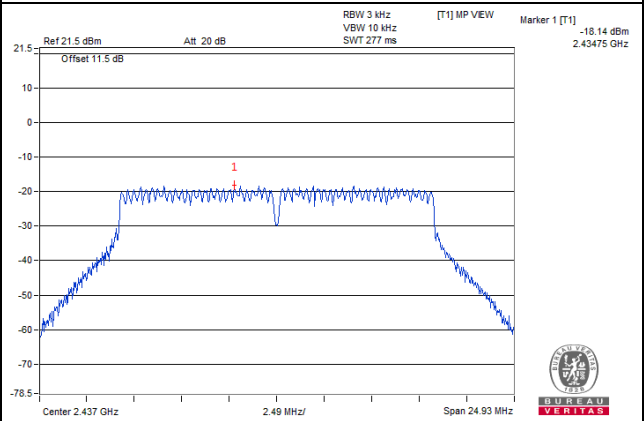
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
3	2422	-20.00	8	Pass
6	2437	-21.63	8	Pass
9	2452	-21.76	8	Pass

### Spectrum Plot of Worst Value

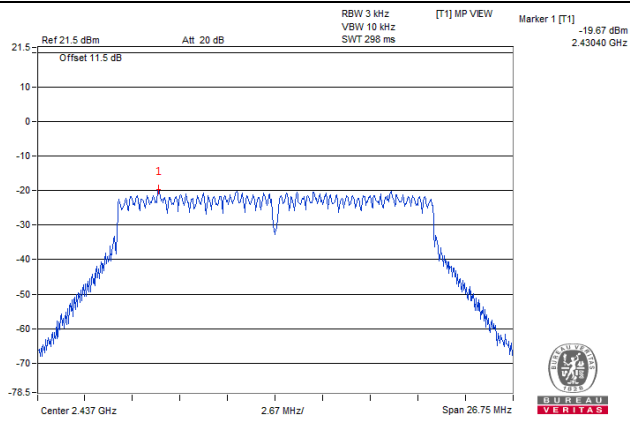
#### 802.11b / CH6



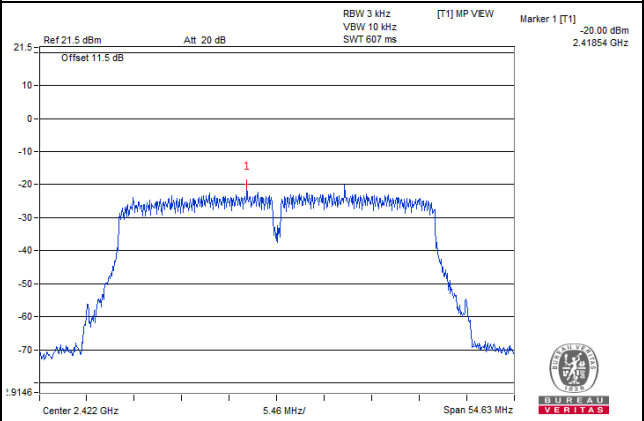
#### 802.11g / CH6



#### 802.11n (20MHz) / CH6



#### 802.11n (40MHz) / CH3

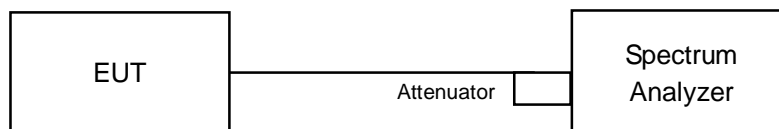


## 4.6 Conducted Out of Band Emission Measurement

### 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

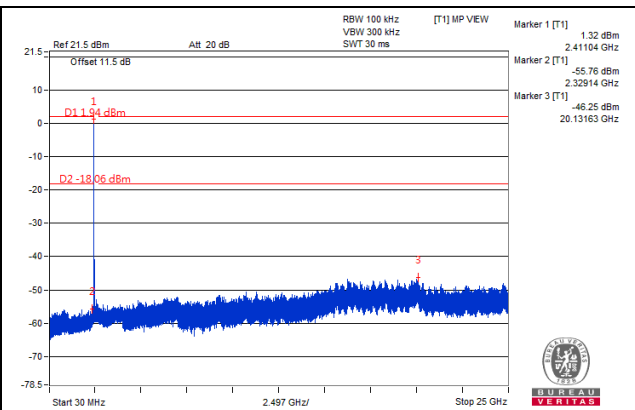
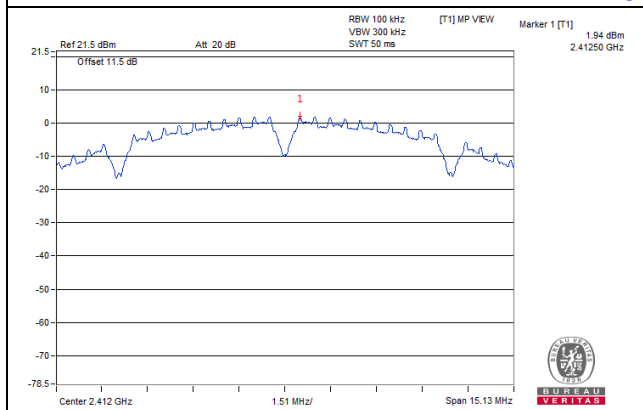
### 4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line

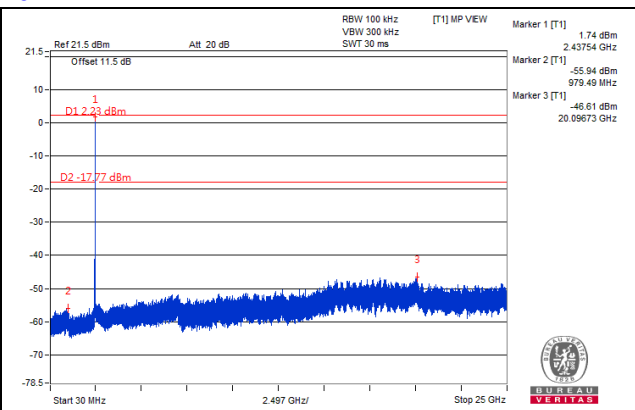
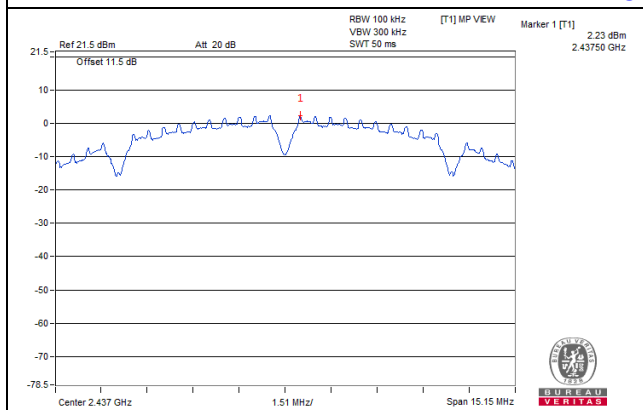
indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

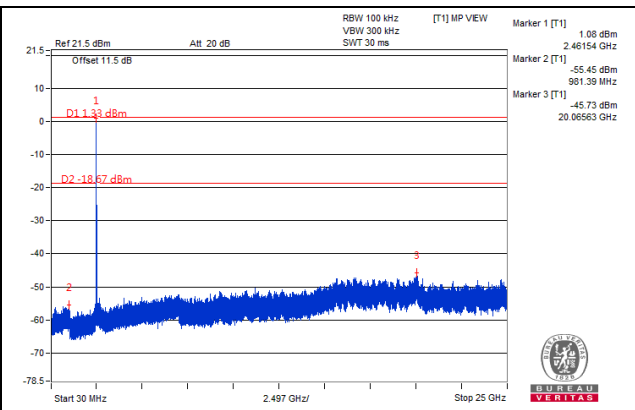
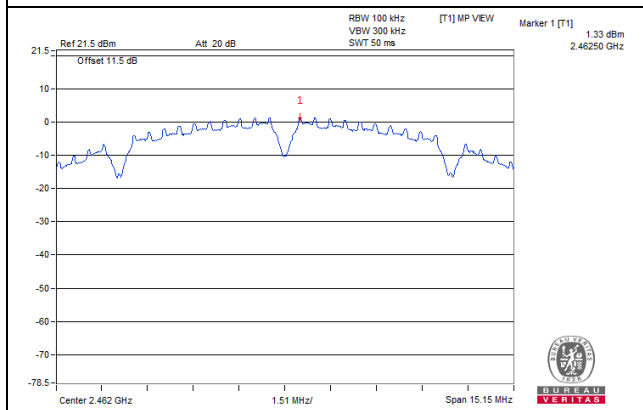
CH 1



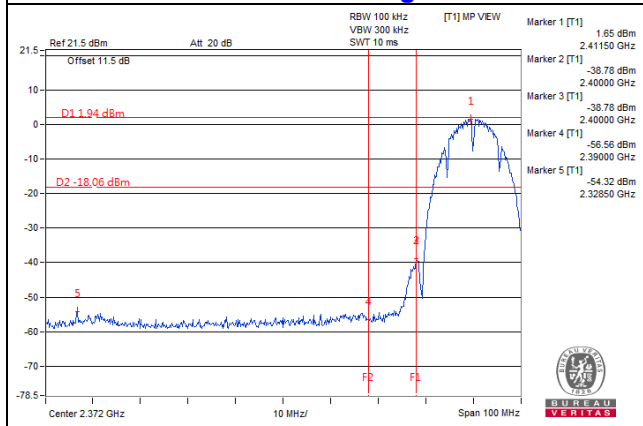
CH 6



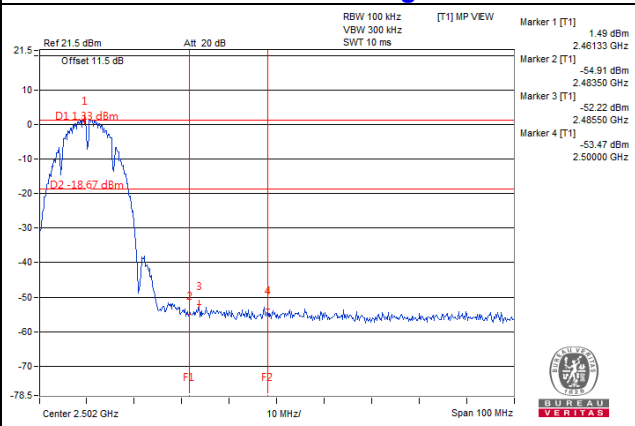
CH 11



CH 1 Band edge

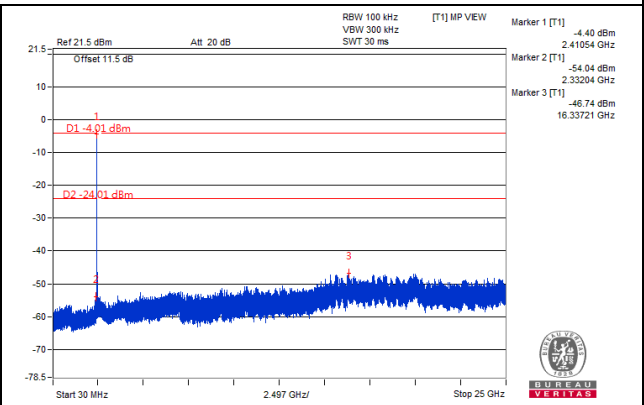
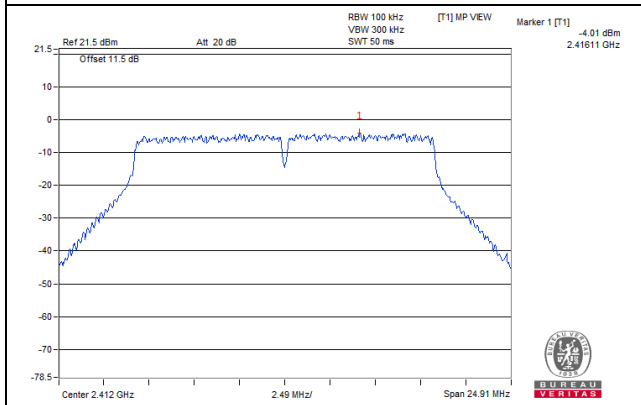


CH 11 Band edge

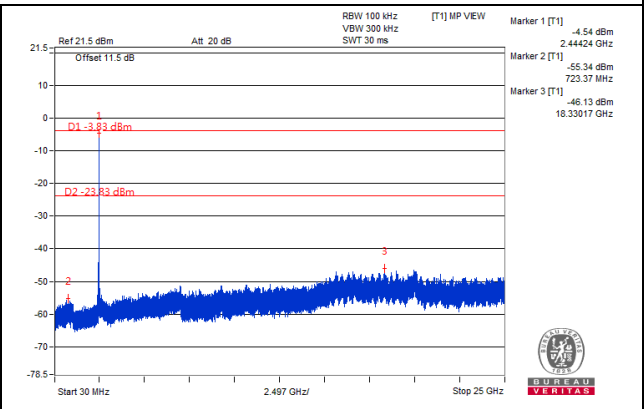
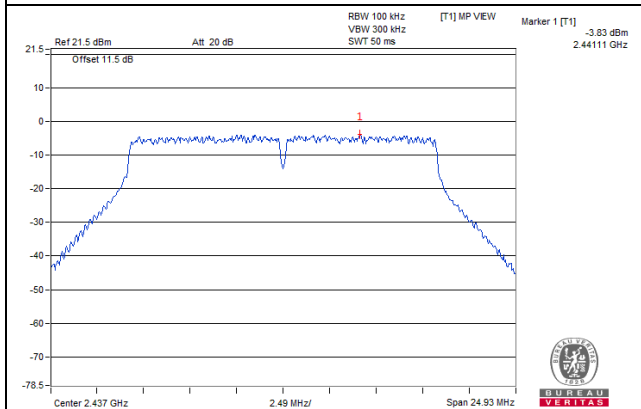


802.11g

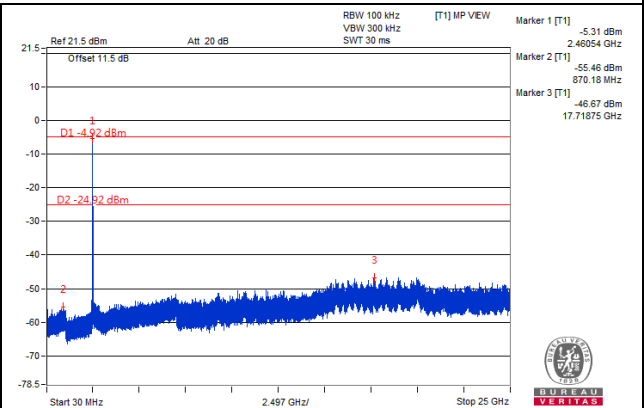
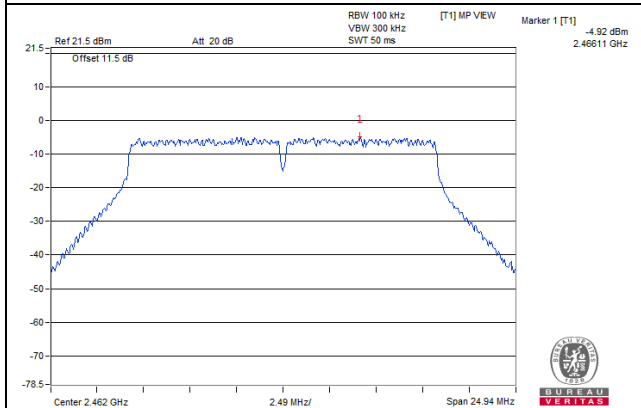
CH 1



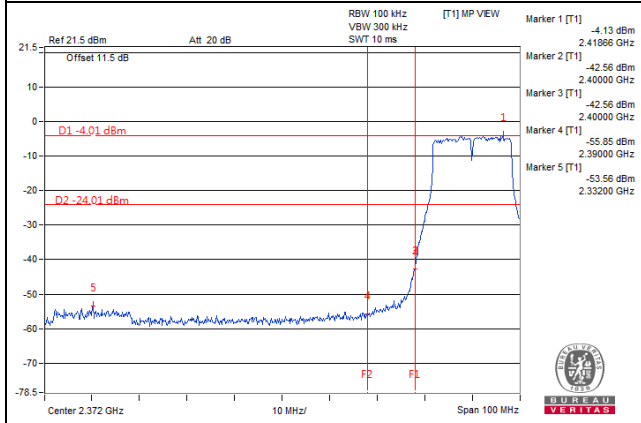
CH 6



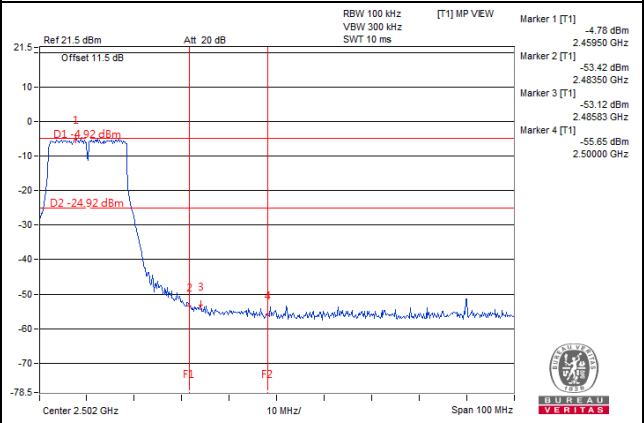
CH 11



CH 1 Band edge



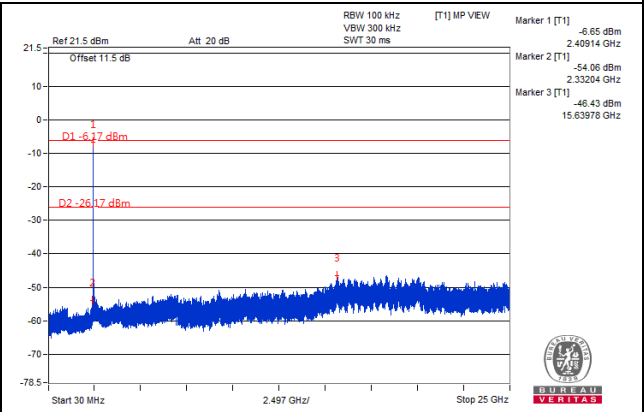
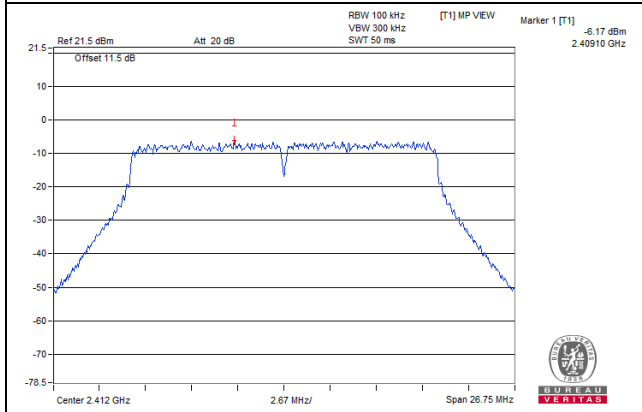
CH 11 Band edge



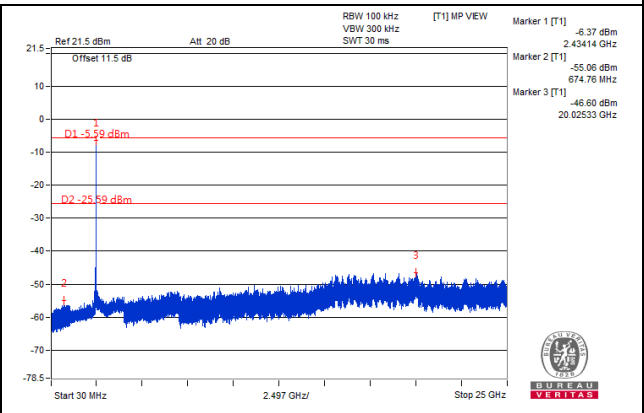
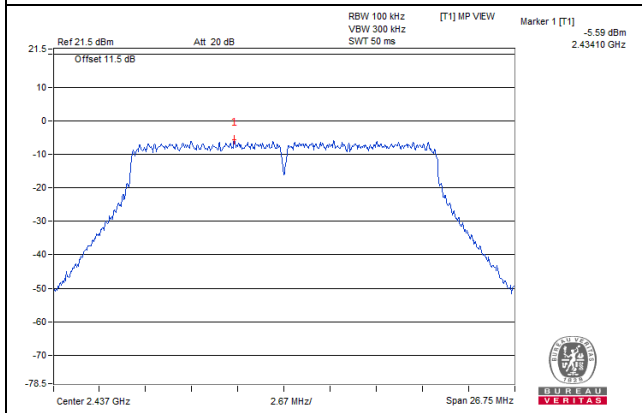


### 802.11n (20MHz)

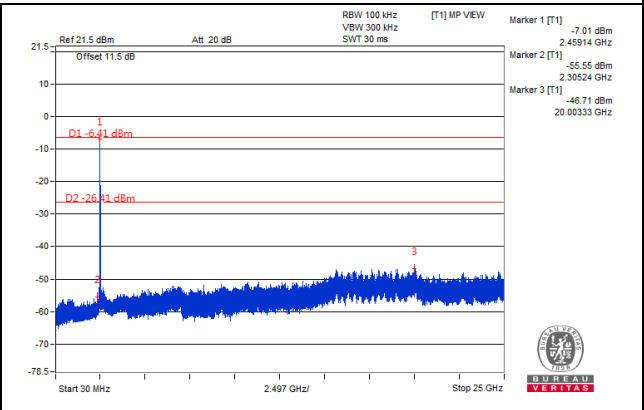
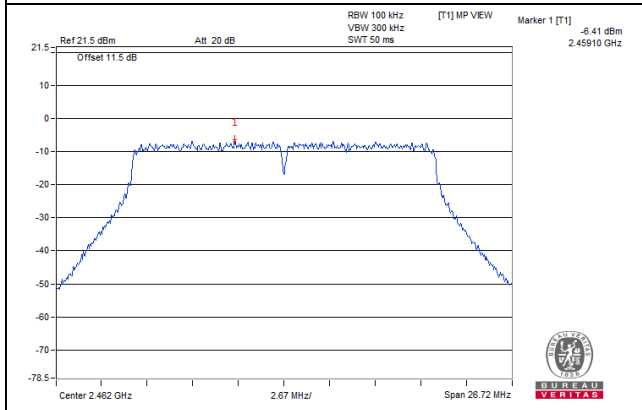
#### CH 1



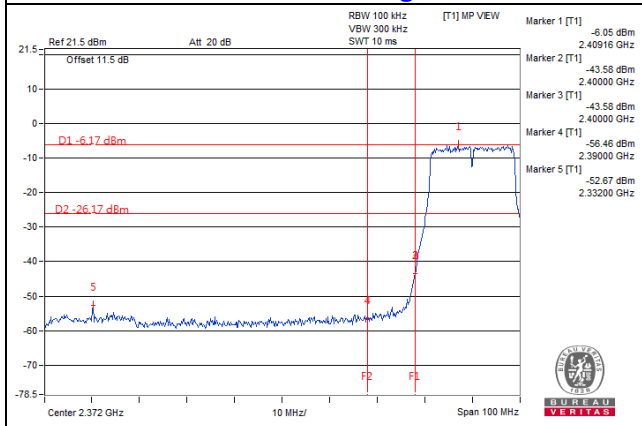
#### CH 6



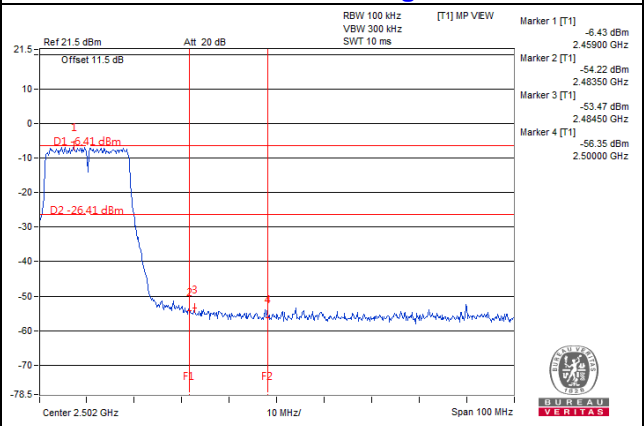
#### CH 11



#### CH 1 Band edge

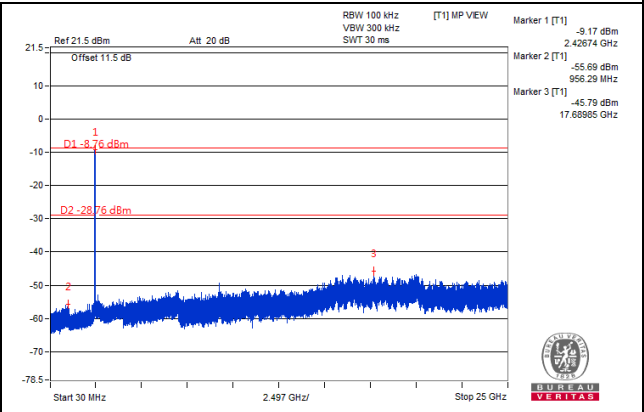
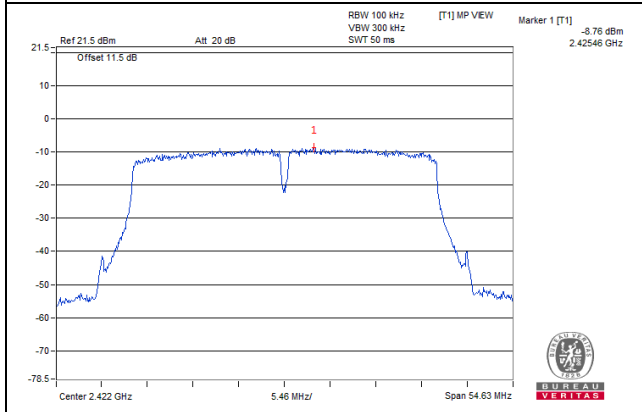


#### CH 11 Band edge

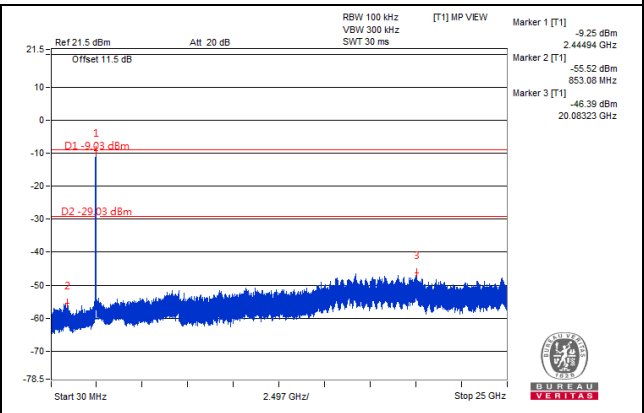
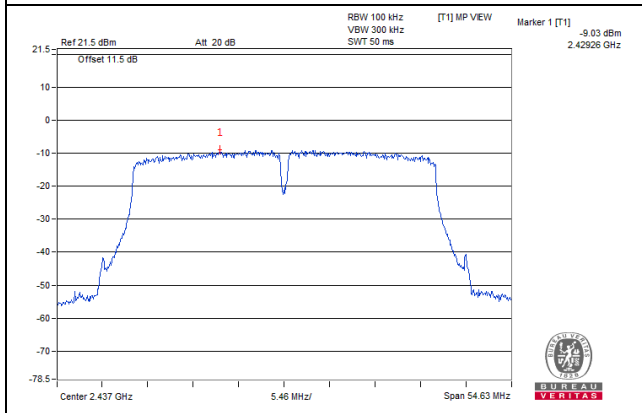


# 802.11n (40MHz)

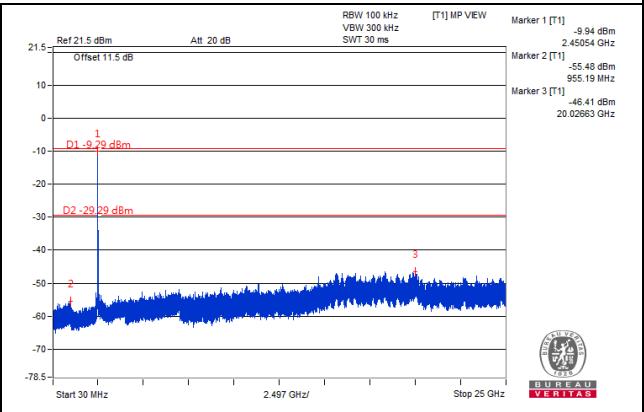
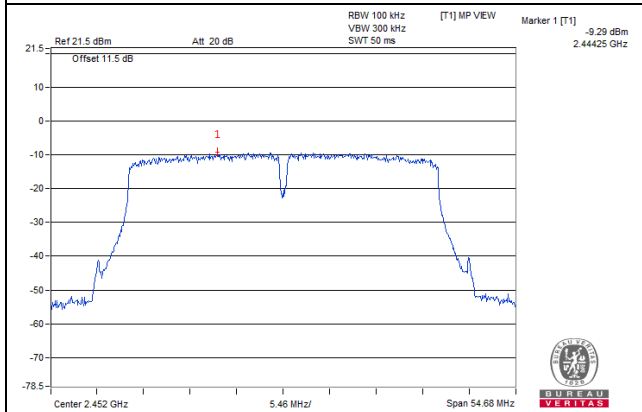
## CH 3



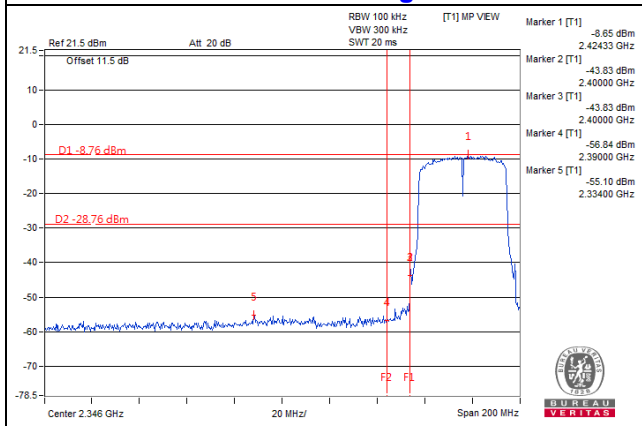
## CH 6



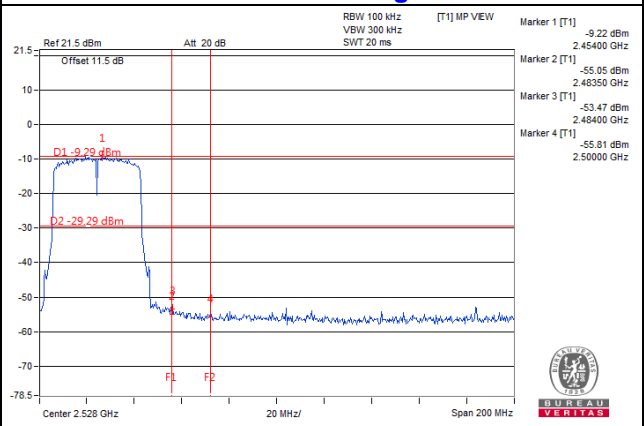
## CH 9



## CH 3 Band edge



## CH 9 Band edge



## 5 Pictures of Test Arrangements

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

## Appendix – Information on 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 accredited and approved according to ISO/IEC 17025.

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

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