

## FCC Test Report

**Report No.:** RF180131D03

**FCC ID:** KA2CS2800LHA1

**Test Model:** DCS-2800LH

**Received Date:** Jan. 31, 2018

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**Issued Date:** Mar. 2, 2018

**Applicant:** D-Link Corporation

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## Table of Contents

<b>Release Control Record</b> .....	<b>4</b>
<b>1 Certificate of Conformity</b> .....	<b>5</b>
<b>2 Summary of Test Results</b> .....	<b>6</b>
2.1 Measurement Uncertainty .....	6
2.2 Modification Record .....	6
<b>3 General Information</b> .....	<b>7</b>
3.1 General Description of EUT .....	7
3.2 Description of Test Modes .....	8
3.2.1 Test Mode Applicability and Tested Channel Detail .....	9
3.3 Duty Cycle of Test Signal .....	11
3.4 Description of Support Units .....	12
3.4.1 Configuration of System under Test .....	12
3.5 General Description of Applied Standards .....	13
<b>4 Test Types and Results</b> .....	<b>14</b>
4.1 Radiated Emission and Bandedge Measurement.....	14
4.1.1 Limits of Radiated Emission and Bandedge Measurement .....	14
4.1.2 Test Instruments .....	15
4.1.3 Test Procedures.....	16
4.1.4 Deviation from Test Standard .....	16
4.1.5 Test Setup.....	17
4.1.6 EUT Operating Conditions.....	18
4.1.7 Test Results .....	19
4.2 Conducted Emission Measurement .....	35
4.2.1 Limits of Conducted Emission Measurement .....	35
4.2.2 Test Instruments .....	35
4.2.3 Test Procedures.....	36
4.2.4 Deviation from Test Standard .....	36
4.2.5 Test Setup.....	36
4.2.6 EUT Operating Conditions.....	36
4.2.7 Test Results .....	37
4.3 6dB Bandwidth Measurement .....	39
4.3.1 Limits of 6dB Bandwidth Measurement .....	39
4.3.2 Test Setup.....	39
4.3.3 Test Instruments .....	39
4.3.4 Test Procedure .....	39
4.3.5 Deviation from Test Standard .....	39
4.3.6 EUT Operating Conditions.....	39
4.3.7 Test Result.....	40
4.4 Conducted Output Power Measurement.....	42
4.4.1 Limits of Conducted Output Power Measurement .....	42
4.4.2 Test Setup.....	42
4.4.3 Test Instruments .....	42
4.4.4 Test Procedures.....	42
4.4.5 Deviation from Test Standard .....	42
4.4.6 EUT Operating Conditions.....	42
4.4.7 Test Results .....	43
4.5 Power Spectral Density Measurement.....	44
4.5.1 Limits of Power Spectral Density Measurement.....	44
4.5.2 Test Setup.....	44
4.5.3 Test Instruments .....	44
4.5.4 Test Procedure .....	44
4.5.5 Deviation from Test Standard .....	44

4.5.6 EUT Operating Condition .....	44
4.5.7 Test Results .....	45
4.6 Conducted Out of Band Emission Measurement.....	47
4.6.1 Limits of Conducted Out of Band Emission Measurement.....	47
4.6.2 Test Setup.....	47
4.6.3 Test Instruments .....	47
4.6.4 Test Procedure .....	47
4.6.5 Deviation from Test Standard .....	47
4.6.6 EUT Operating Condition .....	47
4.6.7 Test Results .....	47
<b>5 Pictures of Test Arrangements.....</b>	<b>51</b>
<b>Appendix – Information on the Testing Laboratories .....</b>	<b>52</b>

### Release Control Record

Issue No.	Description	Date Issued
RF180131D03	Original release.	Mar. 2, 2018



## 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 -26.21dB at 0.15781MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.52dB 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	Antenna connector is I-REX not a standard connector.

### 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	Wi-Fi Battery Camera
Brand	D-Link Corporation
Test Model	DCS-2800LH
Status of EUT	Engineering sample
Power Supply Rating	5Vdc from adapter or 3.7Vdc from Battery
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 72Mbps
Operating Frequency	2.412 ~ 2.462GHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (20MHz)
Output Power	231.739mW
Antenna Type	PIFA Antenna with 1.93dBi gain
Antenna Connector	I-PEX
Accessory Device	N/A
Data Cable Supplied	N/A

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

- The EUT use following adapter and battery:

Adapter		
Brand	Model No.	Specification
D-Link	WB-10E05R	AC I/P: 100-240Vac 50-60Hz 0.4A Max. DC O/P: 5Vdc 2A AC (2 Pin), Shielded Mini USB Port cable (2.8m).
Battery		
Brand	Model No.	Specification
COPPERCELL TECHNOLOGY CO., LTD.	LG18650F1L	3.7Vdc, 6700mAh 24.79Wh

- The EUT was pre-tested with the following modes:

- EUT Operating Mode + powered from Adapter
  - EUT Operating Mode + powered from Battery
- The worst emission level was found when the EUT tested under **EUT Operating Mode + powered from Adapter** therefore, only its test data was recorded in this report.

- 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		

### 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 Y-plane.

#### 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, 2, 6, 10, 11	DSSS	DBPSK	1
-	802.11g	1 to 11	1, 2, 6, 10, 11	OFDM	BPSK	6
-	802.11n (20MHz)	1 to 11	1, 2, 6, 10, 11	OFDM	BPSK	6.5

#### 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)
-	802.11b	1 to 11	6	DSSS	DBPSK	1

#### 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)
-	802.11b	1 to 11	6	DSSS	DBPSK	1

### 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
<b>Output Power</b>						
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 2, 6, 10, 11	DSSS	DBPSK	1
-	802.11g	1 to 11	1, 2, 6, 10, 11	OFDM	BPSK	6
-	802.11n (20MHz)	1 to 11	1, 2, 6, 10, 11	OFDM	BPSK	6.5

### Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	16deg. C, 84%RH	120Vac, 60Hz	James Wei
RE $<$ 1G	16deg. C, 84%RH	120Vac, 60Hz	James Wei
PLC	20deg. C, 80%RH	120Vac, 60Hz	Startaly Wu
APCM	25deg. C, 76%RH	120Vac, 60Hz	Saxon Lee

### 3.3 Duty Cycle of Test Signal

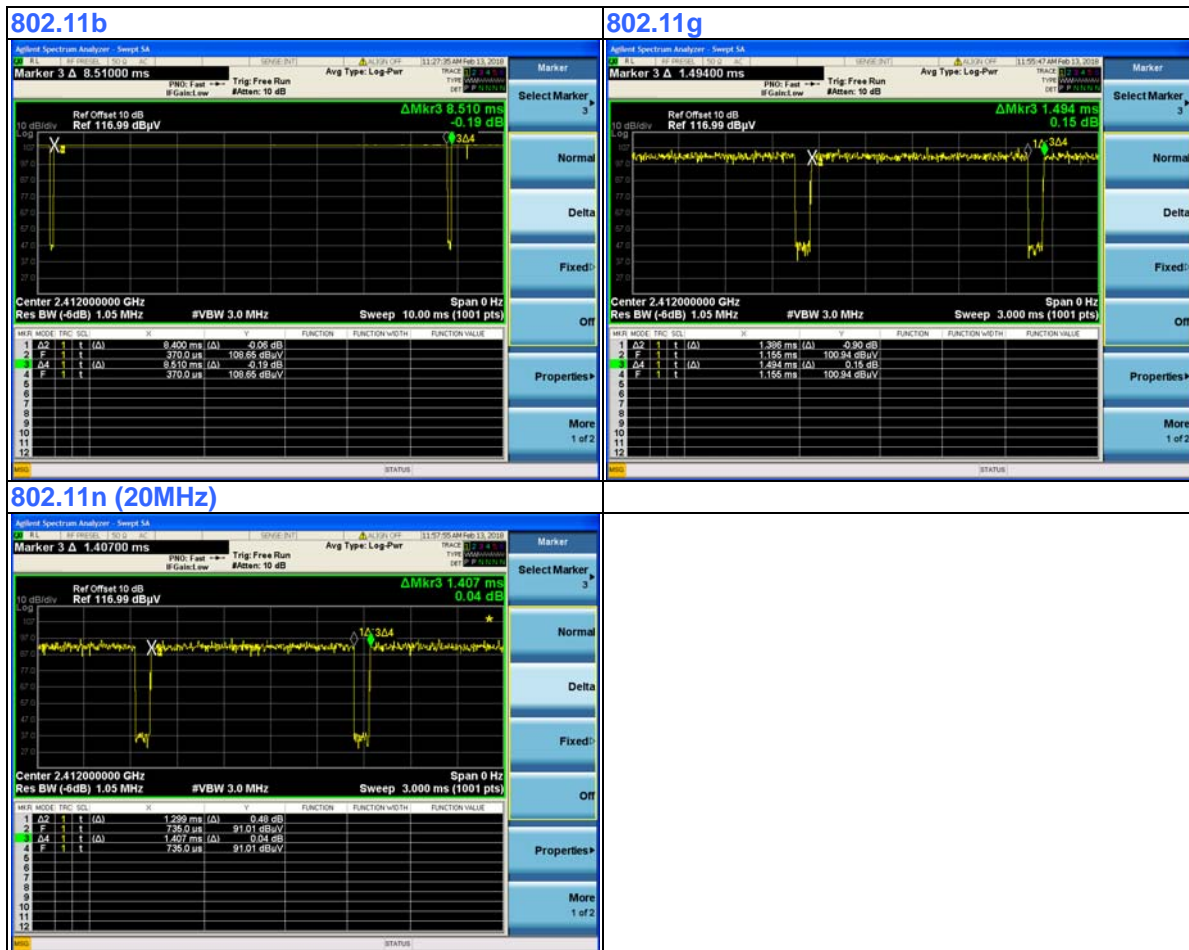
If duty cycle of test signal is  $\geq 98\%$ , duty factor is not required.

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

**802.11b:** Duty cycle of test signal is 98.7 %

**802.11g:** Duty cycle =  $1.386/1.494 = 0.928$ , Duty factor =  $10 * \log(1/0.928) = 0.325$

**802.11n (20MHz):** Duty cycle =  $1.299/1.407 = 0.923$ , Duty factor =  $10 * \log(1/0.923) = 0.348$



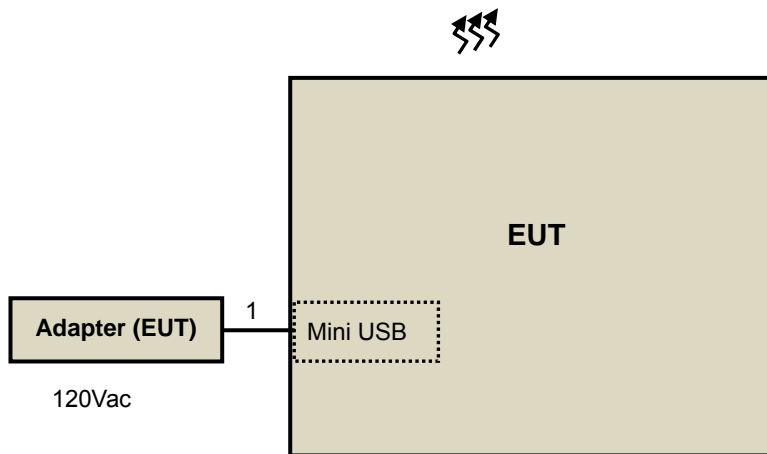
### 3.4 Description of Support Units

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.	Mini USB cable	1	2.8	Y	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.

## 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 30dB 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
			Feb. 21, 2018	Feb. 20, 2019
HP Preamplifier	8449B	3008A01201	Feb. 22, 2017	Feb. 21, 2018
			Feb. 22, 2018	Feb. 21, 2019
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 21, 2017	Feb. 20, 2018
			Feb. 21, 2018	Feb. 20, 2019
Agilent TEST RECEIVER	N9038A	MY51210129	Feb. 6, 2018	Feb. 5, 2019
Schwarzbeck Antenna	VULB 9168	139	Nov. 29, 2017	Nov. 28, 2018
Schwarzbeck Antenna	VHBA 9123	480	May 19, 2017	May 18, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Dec. 1, 2017	Nov. 30, 2018
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Dec. 1, 2017	Nov. 30, 2018
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. 14, 2017	Aug. 13, 2018
SUHNER RF cable With 3dB PAD	SF102	Cable-CH8-3.6m	Aug. 14, 2017	Aug. 13, 2018
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	May 31,2017	May 30,2018
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 26, 2017	Jul. 25, 2018
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
EMCO Horn Antenna	3115	00028257	Nov. 30, 2017	Nov. 29, 2018
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 29, 2017	Sep. 28, 2018
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.

#### 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:**

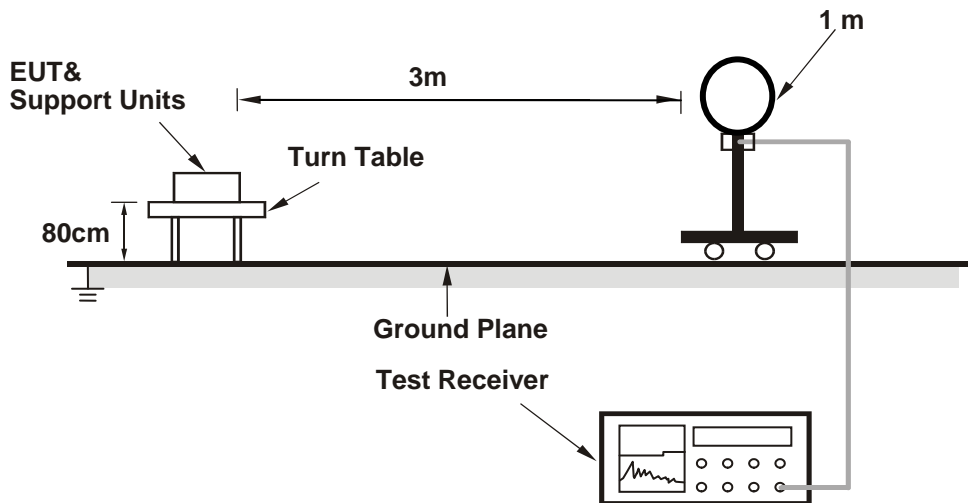
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

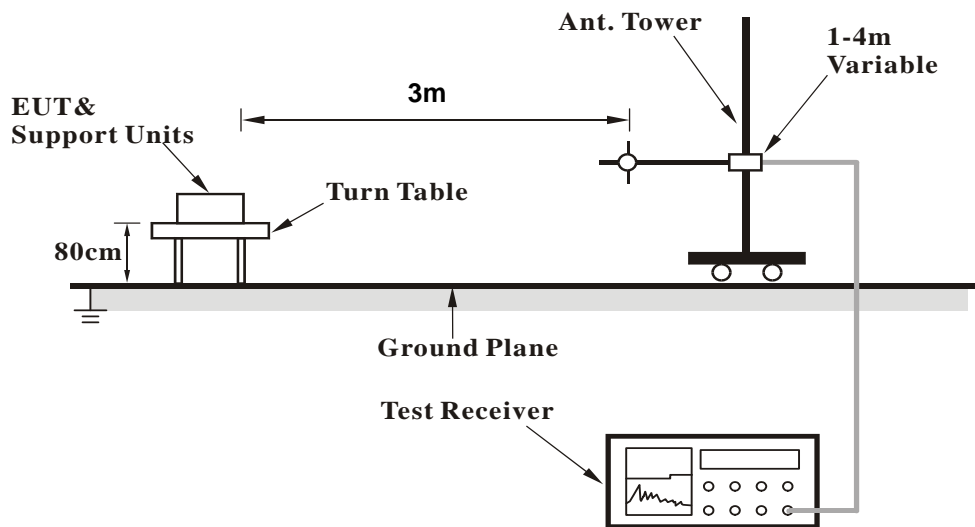
No deviation.

#### 4.1.5 Test Setup

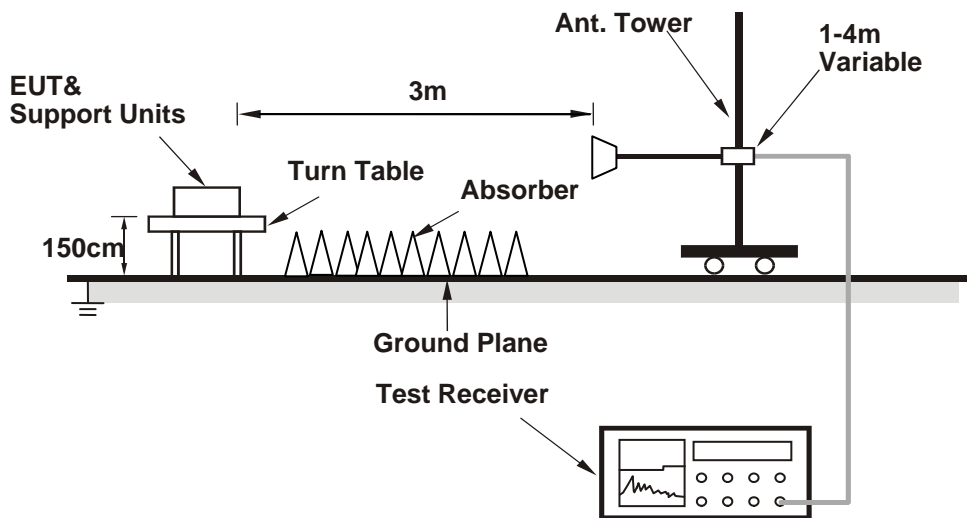
##### For Radiated emission below 30MHz



##### 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 with the 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	58.74 PK	74.00	-15.26	3.24 H	5	60.72	-1.98
2	2390.00	49.93 AV	54.00	-4.07	3.24 H	5	51.91	-1.98
3	*2412.00	105.45 PK			3.24 H	5	107.57	-2.12
4	*2412.00	102.55 AV			3.24 H	5	104.67	-2.12
5	4824.00	44.27 PK	74.00	-29.73	2.77 H	109	40.17	4.10
6	4824.00	35.65 AV	54.00	-18.35	2.77 H	109	31.55	4.10

**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	61.69 PK	74.00	-12.31	1.18 V	353	63.67	-1.98
2	2390.00	52.85 AV	54.00	-1.15	1.18 V	353	54.83	-1.98
3	*2412.00	107.12 PK			1.18 V	353	109.24	-2.12
4	*2412.00	104.22 AV			1.18 V	353	106.34	-2.12
5	4824.00	45.93 PK	74.00	-28.07	3.64 V	214	41.83	4.10
6	4824.00	37.60 AV	54.00	-16.40	3.64 V	214	33.50	4.10

**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 2	<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	56.74 PK	74.00	-17.26	2.53 H	281	58.72	-1.98
2	2390.00	49.90 AV	54.00	-4.10	2.53 H	281	51.88	-1.98
3	*2417.00	104.73 PK			2.53 H	281	106.89	-2.16
4	*2417.00	102.05 AV			2.53 H	281	104.21	-2.16

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.97 PK	74.00	-14.03	1.70 V	220	61.95	-1.98
2	2390.00	52.85 AV	54.00	-1.15	1.70 V	220	54.83	-1.98
3	*2417.00	106.48 PK			1.70 V	220	108.64	-2.16
4	*2417.00	103.47 AV			1.70 V	220	105.63	-2.16

**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	105.38 PK			3.22 H	8	107.66	-2.28
2	*2437.00	102.44 AV			3.22 H	8	104.72	-2.28
3	4874.00	44.51 PK	74.00	-29.49	2.65 H	118	40.29	4.22
4	4874.00	35.81 AV	54.00	-18.19	2.65 H	118	31.59	4.22

**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	107.13 PK			1.48 V	349	109.41	-2.28
2	*2437.00	104.24 AV			1.48 V	349	106.52	-2.28
3	4874.00	46.12 PK	74.00	-27.88	3.66 V	205	41.90	4.22
4	4874.00	37.90 AV	54.00	-16.10	3.66 V	205	33.68	4.22

**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 10	<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	*2457.00	104.91 PK			2.81 H	109	107.18	-2.27
2	*2457.00	101.95 AV			2.81 H	109	104.22	-2.27
3	2483.50	58.24 PK	74.00	-15.76	2.81 H	109	60.18	-1.94
4	2483.50	50.27 AV	54.00	-3.73	2.81 H	109	52.21	-1.94

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2457.00	106.44 PK			1.86 V	224	108.71	-2.27
2	*2457.00	103.45 AV			1.86 V	224	105.72	-2.27
3	2483.50	60.52 PK	74.00	-13.48	1.86 V	224	62.46	-1.94
4	2483.50	53.08 AV	54.00	-0.92	1.86 V	224	55.02	-1.94

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	105.08 PK			3.31 H	69	107.29	-2.21
2	*2462.00	102.17 AV			3.31 H	69	104.38	-2.21
3	2483.50	57.89 PK	74.00	-16.11	3.31 H	69	59.83	-1.94
4	2483.50	50.15 AV	54.00	-3.85	3.31 H	69	52.09	-1.94
5	4924.00	44.47 PK	74.00	-29.53	2.91 H	52	40.33	4.14
6	4924.00	36.32 AV	54.00	-17.68	2.91 H	52	32.18	4.14

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.79 PK			1.87 V	220	109.00	-2.21
2	*2462.00	103.78 AV			1.87 V	220	105.99	-2.21
3	2483.50	59.79 PK	74.00	-14.21	1.87 V	220	61.73	-1.94
4	2483.50	52.92 AV	54.00	-1.08	1.87 V	220	54.86	-1.94
5	4924.00	46.76 PK	74.00	-27.24	3.55 V	188	42.62	4.14
6	4924.00	38.32 AV	54.00	-15.68	3.55 V	188	34.18	4.14

**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	67.52 PK	74.00	-6.48	1.26 H	13	69.50	-1.98
2	2390.00	51.92 AV	54.00	-2.08	1.26 H	13	53.90	-1.98
3	*2412.00	103.71 PK			1.26 H	13	105.83	-2.12
4	*2412.00	93.50 AV			1.26 H	13	95.62	-2.12
5	4824.00	43.38 PK	74.00	-30.62	3.11 H	81	39.28	4.10
6	4824.00	30.54 AV	54.00	-23.46	3.11 H	81	26.44	4.10

**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	69.35 PK	74.00	-4.65	1.33 V	2	71.33	-1.98
2	2390.00	52.80 AV	54.00	-1.20	1.33 V	2	54.78	-1.98
3	*2412.00	104.65 PK			1.33 V	2	106.77	-2.12
4	*2412.00	94.28 AV			1.33 V	2	96.40	-2.12
5	4824.00	44.23 PK	74.00	-29.77	1.19 V	181	40.13	4.10
6	4824.00	31.72 AV	54.00	-22.28	1.19 V	181	27.62	4.10

**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 2	<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	64.73 PK	74.00	-9.27	1.53 H	29	66.71	-1.98
2	2390.00	51.31 AV	54.00	-2.69	1.53 H	29	53.29	-1.98
3	*2417.00	105.65 PK			1.53 H	29	107.81	-2.16
4	*2417.00	94.47 AV			1.53 H	29	96.63	-2.16

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.05 PK	74.00	-7.95	1.88 V	241	68.03	-1.98
2	2390.00	52.84 AV	54.00	-1.16	1.88 V	241	54.82	-1.98
3	*2417.00	106.57 PK			1.88 V	241	108.73	-2.16
4	*2417.00	95.57 AV			1.88 V	241	97.73	-2.16

**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	104.82 PK			1.13 H	29	107.10	-2.28
2	*2437.00	94.83 AV			1.13 H	29	97.11	-2.28
3	4874.00	44.41 PK	74.00	-29.59	1.82 H	255	40.19	4.22
4	4874.00	31.44 AV	54.00	-22.56	1.82 H	255	27.22	4.22

**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	106.65 PK			1.89 V	222	108.93	-2.28
2	*2437.00	95.66 AV			1.89 V	222	97.94	-2.28
3	4874.00	45.50 PK	74.00	-28.50	2.51 V	161	41.28	4.22
4	4874.00	32.24 AV	54.00	-21.76	2.51 V	161	28.02	4.22

**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 10	<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	*2457.00	105.75 PK			1.59 H	33	108.02	-2.27
2	*2457.00	95.28 AV			1.59 H	33	97.55	-2.27
3	2483.50	67.57 PK	74.00	-6.43	1.59 H	33	69.51	-1.94
4	2483.50	51.39 AV	54.00	-2.61	1.59 H	33	53.33	-1.94

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2457.00	107.32 PK			1.84 V	217	109.59	-2.27
2	*2457.00	96.37 AV			1.84 V	217	98.64	-2.27
3	2483.50	69.27 PK	74.00	-4.73	1.84 V	217	71.21	-1.94
4	2483.50	52.42 AV	54.00	-1.58	1.84 V	217	54.36	-1.94

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	101.92 PK			1.31 H	0	104.13	-2.21
2	*2462.00	91.50 AV			1.31 H	0	93.71	-2.21
3	2483.50	67.50 PK	74.00	-6.50	1.31 H	0	69.44	-1.94
4	2483.50	51.33 AV	54.00	-2.67	1.31 H	0	53.27	-1.94
5	4924.00	43.33 PK	74.00	-30.67	1.28 H	182	39.19	4.14
6	4924.00	30.52 AV	54.00	-23.48	1.28 H	182	26.38	4.14

**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	102.93 PK			1.31 V	0	105.14	-2.21
2	*2462.00	91.98 AV			1.31 V	0	94.19	-2.21
3	2483.50	68.90 PK	74.00	-5.10	1.31 V	0	70.84	-1.94
4	2483.50	52.80 AV	54.00	-1.20	1.31 V	0	54.74	-1.94
5	4924.00	44.26 PK	74.00	-29.74	1.28 V	182	40.12	4.14
6	4924.00	31.73 AV	54.00	-22.27	1.28 V	182	27.59	4.14

**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	69.23 PK	74.00	-4.77	2.15 H	21	71.21	-1.98
2	2390.00	52.19 AV	54.00	-1.81	2.15 H	21	54.17	-1.98
3	*2412.00	103.96 PK			2.15 H	21	106.08	-2.12
4	*2412.00	93.12 AV			2.15 H	21	95.24	-2.12
5	4824.00	43.03 PK	74.00	-30.97	1.00 H	24	38.93	4.10
6	4824.00	30.91 AV	54.00	-23.09	1.00 H	24	26.81	4.10

**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	70.09 PK	74.00	-3.91	1.18 V	0	72.07	-1.98
2	2390.00	52.85 AV	54.00	-1.15	1.18 V	0	54.83	-1.98
3	*2412.00	104.32 PK			1.18 V	0	106.44	-2.12
4	*2412.00	93.47 AV			1.18 V	0	95.59	-2.12
5	4824.00	43.82 PK	74.00	-30.18	2.21 V	194	39.72	4.10
6	4824.00	31.39 AV	54.00	-22.61	2.21 V	194	27.29	4.10

**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 2	<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	66.13 PK	74.00	-7.87	2.38 H	33	68.11	-1.98
2	2390.00	52.83 AV	54.00	-1.17	2.38 H	33	54.81	-1.98
3	*2417.00	106.01 PK			2.38 H	33	108.17	-2.16
4	*2417.00	95.39 AV			2.38 H	33	97.55	-2.16

**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	67.28 PK	74.00	-6.72	1.86 V	202	69.26	-1.98
2	<b>2390.00</b>	<b>53.48 AV</b>	<b>54.00</b>	<b>-0.52</b>	<b>1.86 V</b>	<b>202</b>	<b>55.46</b>	<b>-1.98</b>
3	*2417.00	106.64 PK			1.86 V	202	108.80	-2.16
4	*2417.00	95.77 AV			1.86 V	202	97.93	-2.16

**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	107.00 PK			2.29 H	67	109.28	-2.28
2	*2437.00	96.83 AV			2.29 H	67	99.11	-2.28
3	4874.00	43.61 PK	74.00	-30.39	1.00 H	57	39.39	4.22
4	4874.00	31.23 AV	54.00	-22.77	1.00 H	57	27.01	4.22

**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	108.52 PK			1.50 V	218	110.80	-2.28
2	*2437.00	97.39 AV			1.50 V	218	99.67	-2.28
3	4874.00	44.83 PK	74.00	-29.17	2.51 V	162	40.61	4.22
4	4874.00	32.05 AV	54.00	-21.95	2.51 V	162	27.83	4.22

**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 10	<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	*2457.00	107.14 PK			2.47 H	51	109.41	-2.27
2	*2457.00	96.37 AV			2.47 H	51	98.64	-2.27
3	2483.50	69.08 PK	74.00	-4.92	2.47 H	51	71.02	-1.94
4	2483.50	51.90 AV	54.00	-2.10	2.47 H	51	53.84	-1.94

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2457.00	107.75 PK			1.86 V	218	110.02	-2.27
2	*2457.00	96.91 AV			1.86 V	218	99.18	-2.27
3	2483.50	70.27 PK	74.00	-3.73	1.86 V	218	72.21	-1.94
4	2483.50	52.82 AV	54.00	-1.18	1.86 V	218	54.76	-1.94

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	102.62 PK			2.14 H	18	104.83	-2.21
2	*2462.00	91.80 AV			2.14 H	18	94.01	-2.21
3	2483.50	67.97 PK	74.00	-6.03	2.14 H	18	69.91	-1.94
4	2483.50	51.97 AV	54.00	-2.03	2.14 H	18	53.91	-1.94
5	4924.00	41.73 PK	74.00	-32.27	1.00 H	22	37.59	4.14
6	4924.00	30.31 AV	54.00	-23.69	1.00 H	22	26.17	4.14

**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	102.96 PK			1.67 V	353	105.17	-2.21
2	*2462.00	92.07 AV			1.67 V	353	94.28	-2.21
3	2483.50	68.91 PK	74.00	-5.09	1.67 V	353	70.85	-1.94
4	2483.50	52.82 AV	54.00	-1.18	1.67 V	353	54.76	-1.94
5	4924.00	42.66 PK	74.00	-31.34	2.09 V	196	38.52	4.14
6	4924.00	31.15 AV	54.00	-22.85	2.09 V	196	27.01	4.14

**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 WORST-CASE DATA**
**802.11b**

<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	80.73	26.65 QP	40.00	-13.35	2.27 H	245	40.34	-13.69
2	144.02	34.11 QP	43.50	-9.39	2.03 H	278	43.37	-9.26
3	540.03	40.36 QP	46.00	-5.64	2.11 H	38	42.44	-2.08
4	719.52	37.91 QP	46.00	-8.09	1.06 H	352	36.22	1.69
5	877.59	42.21 QP	46.00	-3.79	1.72 H	128	37.82	4.39
6	952.42	41.87 QP	46.00	-4.13	1.43 H	116	35.89	5.98

**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	80.73	31.41 QP	40.00	-8.59	1.19 V	284	45.10	-13.69
2	123.51	32.06 QP	43.50	-11.44	2.71 V	167	43.08	-11.02
3	537.65	38.08 QP	46.00	-7.92	2.29 V	188	40.23	-2.15
4	720.54	36.09 QP	46.00	-9.91	1.02 V	218	34.38	1.71
5	877.63	39.57 QP	46.00	-6.43	2.85 V	216	35.18	4.39
6	989.77	40.08 QP	54.00	-13.92	1.73 V	167	33.62	6.46

**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. 9, 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, 2017	Nov. 22, 2018
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 9, 2017	May 8, 2018
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 14, 2018	Feb. 13, 2019
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. 14, 2017	Nov. 13, 2018
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 14, 2017	Nov. 13, 2018

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.

#### 4.2.3 Test Procedures

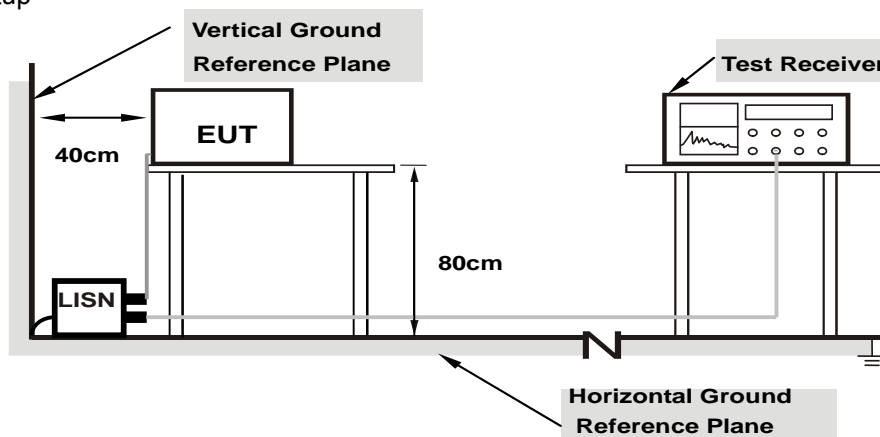
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

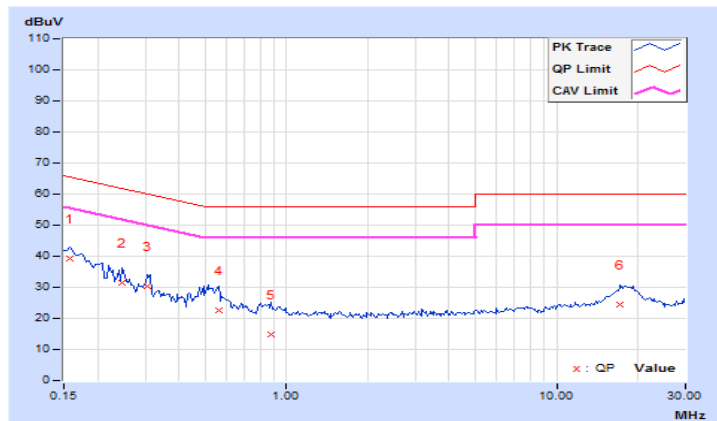
#### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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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.
<b>1</b>	<b>0.15781</b>	<b>9.68</b>	<b>29.69</b>	<b>17.11</b>	<b>39.37</b>	<b>26.79</b>	<b>65.58</b>	<b>55.58</b>	<b>-26.21</b>	<b>-28.79</b>
2	0.24766	9.71	21.90	11.14	31.61	20.85	61.84	51.84	-30.23	-30.99
3	0.30625	9.73	20.65	13.24	30.38	22.97	60.07	50.07	-29.69	-27.10
4	0.56406	9.79	12.73	3.87	22.52	13.66	56.00	46.00	-33.48	-32.34
5	0.88047	9.85	4.87	2.90	14.72	12.75	56.00	46.00	-41.28	-33.25
6	17.25781	10.34	13.94	6.33	24.28	16.67	60.00	50.00	-35.72	-33.33

#### 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

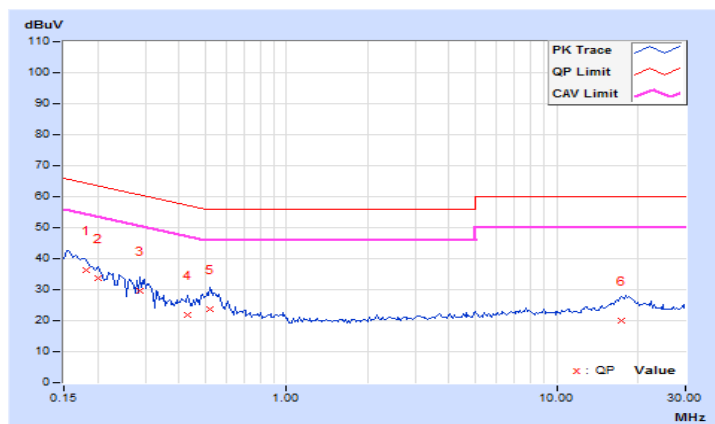


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	9.71	26.53	13.36	36.24	23.07	64.43	54.43	-28.19	-31.36
2	0.20078	9.72	24.11	8.77	33.83	18.49	63.58	53.58	-29.75	-35.09
3	0.28672	9.76	19.88	8.51	29.64	18.27	60.62	50.62	-30.98	-32.35
4	0.43125	9.81	11.93	5.30	21.74	15.11	57.23	47.23	-35.49	-32.12
5	0.52109	9.83	13.82	5.95	23.65	15.78	56.00	46.00	-32.35	-30.22
6	17.44141	10.38	9.46	1.19	19.84	11.57	60.00	50.00	-40.16	-38.43

**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

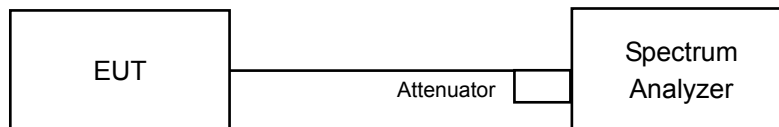


### 4.3 6dB Bandwidth Measurement

#### 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	8.07	0.5	PASS
6	2437	9.58	0.5	PASS
11	2462	8.59	0.5	PASS

##### 802.11g

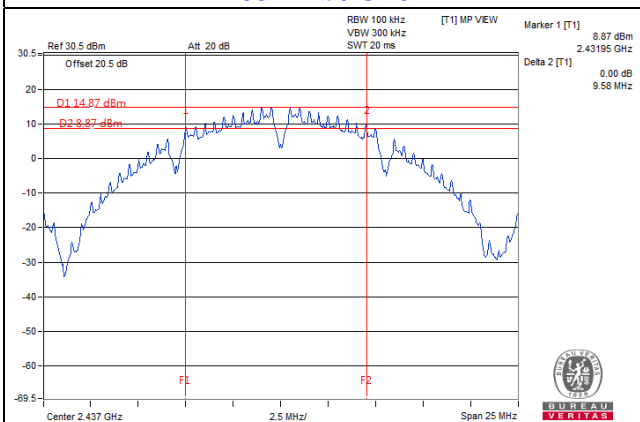
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.42	0.5	PASS
6	2437	16.45	0.5	PASS
11	2462	16.43	0.5	PASS

##### 802.11n (20MHz)

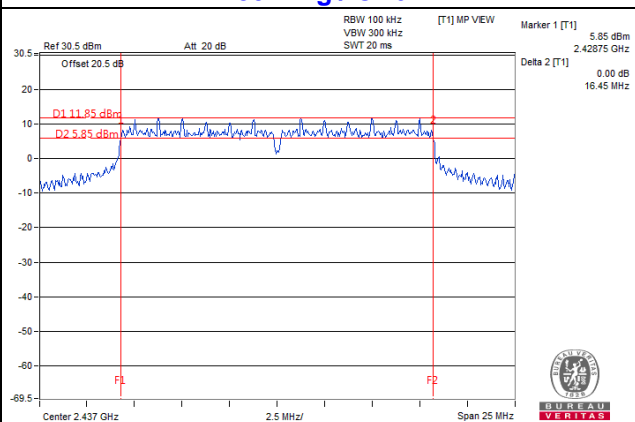
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.67	0.5	PASS
6	2437	17.65	0.5	PASS
11	2462	17.68	0.5	PASS

Spectrum Plot of Worst Value

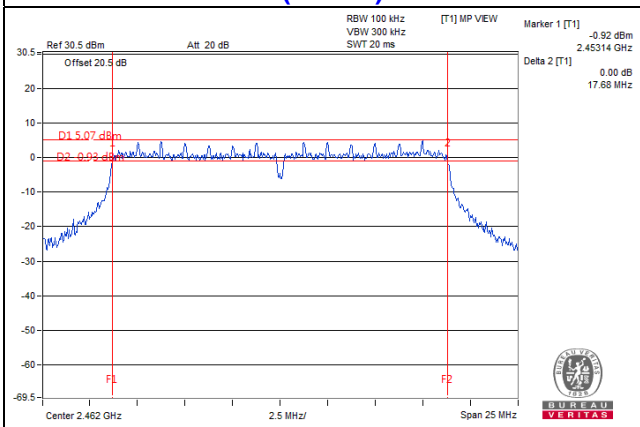
802.11b / CH6



802.11g / CH6



802.11n (20MHz) / CH11

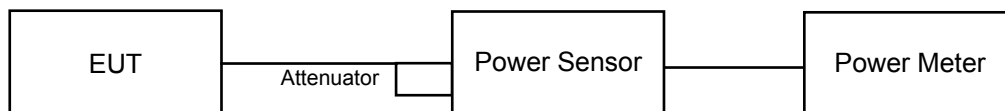


## 4.4 Conducted Output Power Measurement

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

##### 802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	170.608	22.32
2	2417	197.697	22.96
6	2437	<b>231.739</b>	23.65
10	2457	222.844	23.48
11	2462	209.894	23.22

##### 802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	58.884	17.70
2	2417	146.893	21.67
6	2437	229.615	23.61
10	2457	225.944	23.54
11	2462	66.988	18.26

##### 802.11n (20MHz)

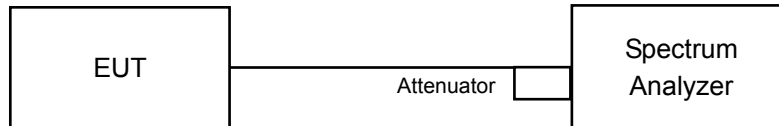
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	50.582	17.04
2	2417	132.13	21.21
6	2437	230.144	23.62
10	2457	185.78	22.69
11	2462	65.313	18.15

## 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 = power averaging (RMS) or sample detector (when RMS not available).
- 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	-5.47	8	Pass
6	2437	-4.73	8	Pass
11	2462	-5.25	8	Pass

##### 802.11g

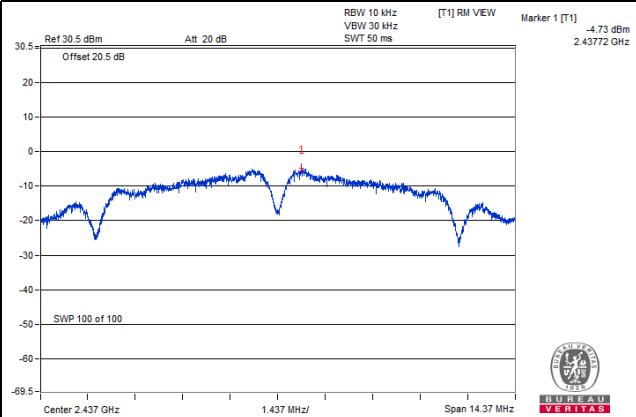
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-14.61	8	Pass
6	2437	-8.80	8	Pass
11	2462	-13.52	8	Pass

##### 802.11n (20MHz)

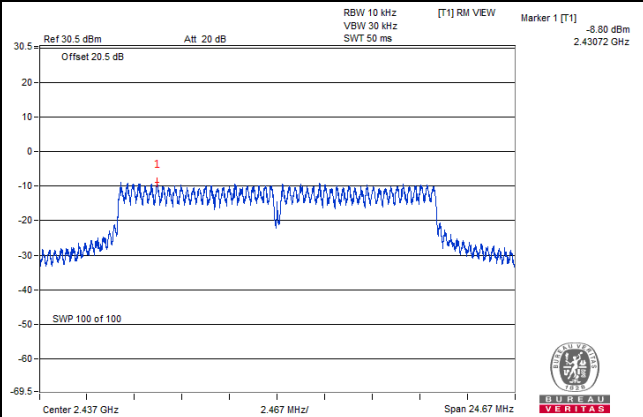
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-16.30	8	Pass
6	2437	-9.66	8	Pass
11	2462	-15.10	8	Pass

### Spectrum Plot of Worst Value

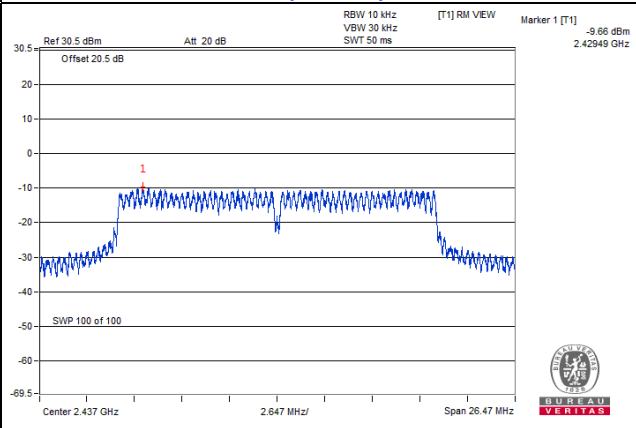
#### 802.11b / CH6



#### 802.11g / CH6



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

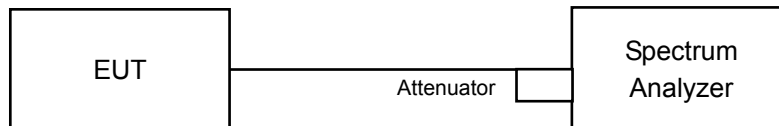


## 4.6 Conducted Out of Band Emission Measurement

### 4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB 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

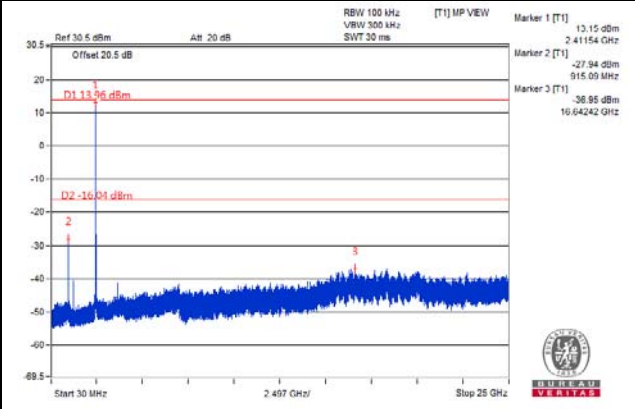
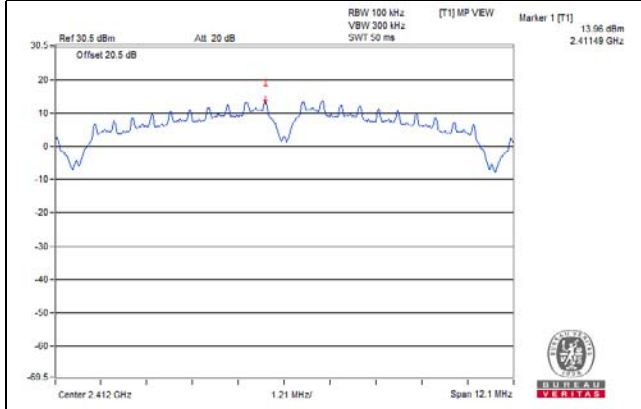
Same as Item 4.3.6

### 4.6.7 Test Results

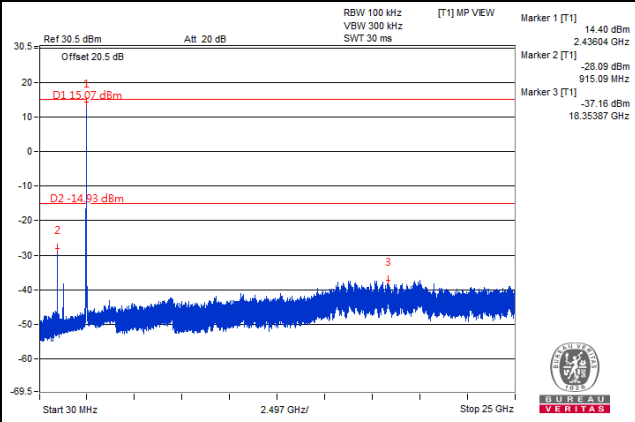
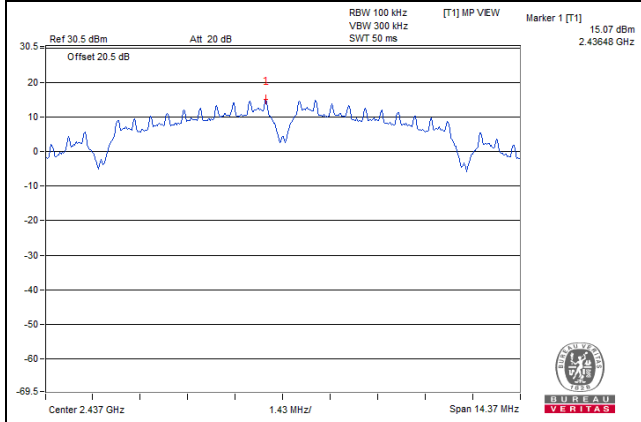
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

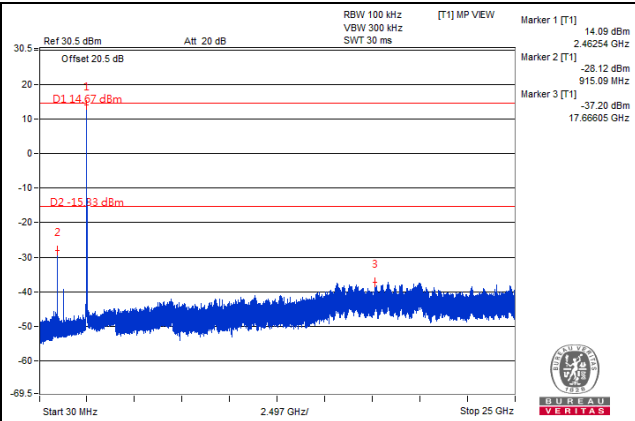
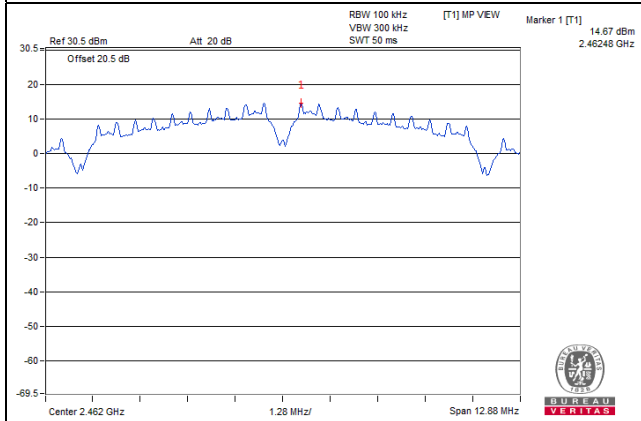
CH 1



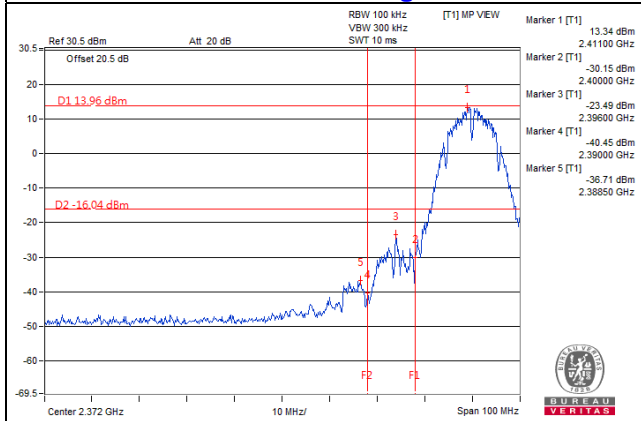
CH 6



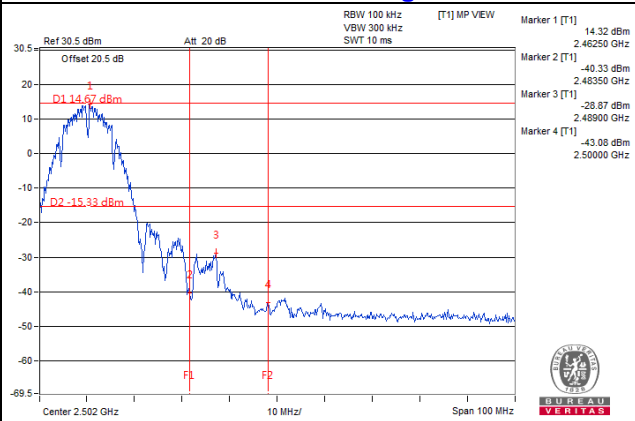
CH 11



CH 1 Band edge

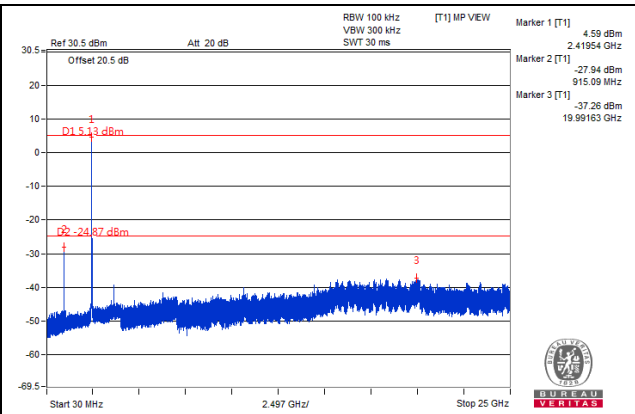
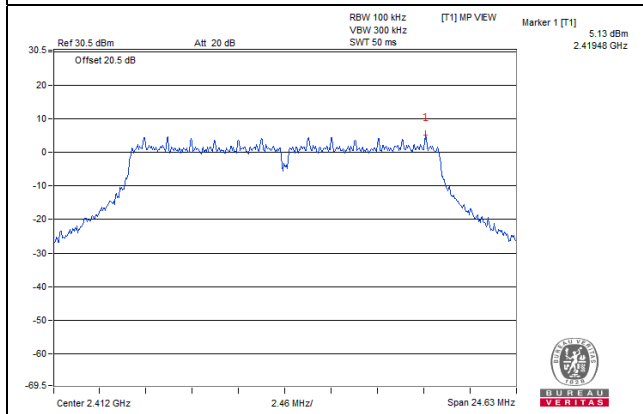


CH 11 Band edge

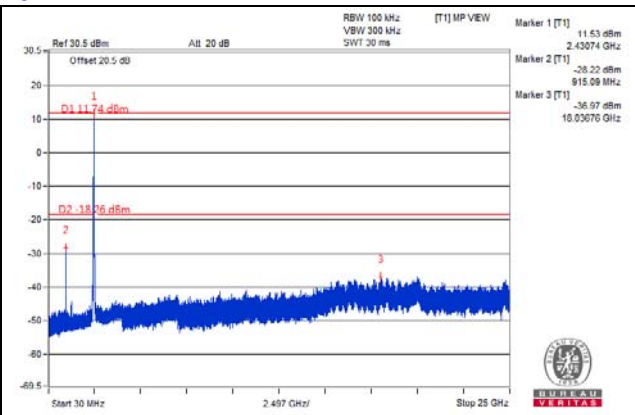
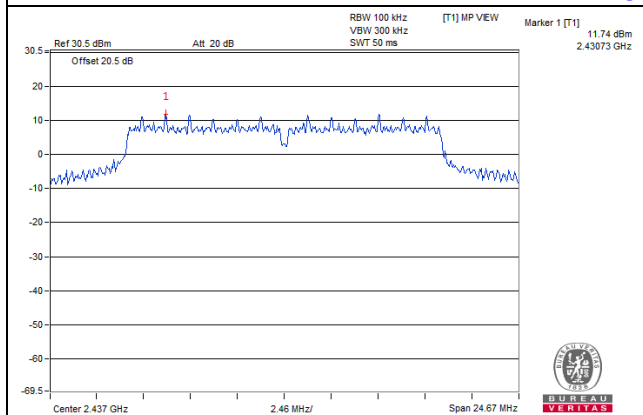


802.11g

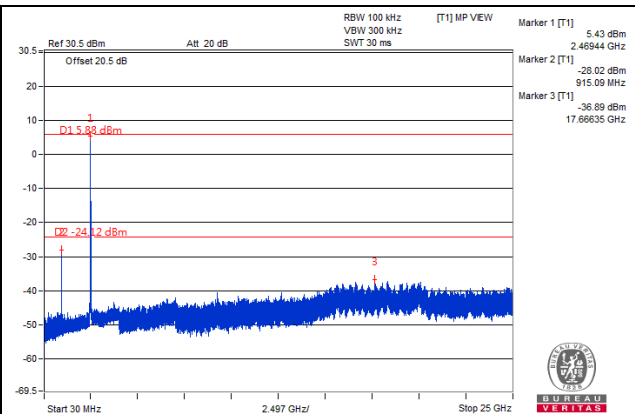
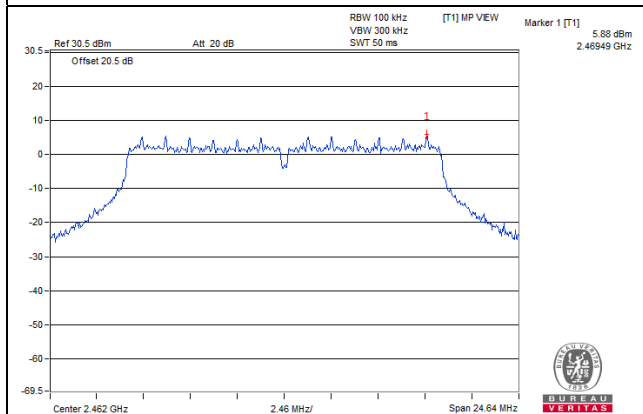
CH 1



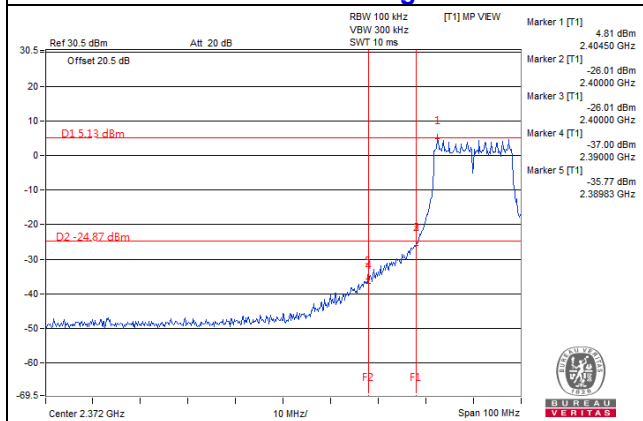
CH 6



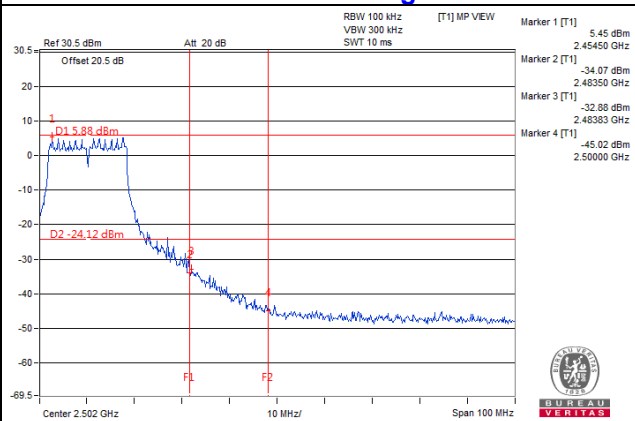
CH 11



CH 1 Band edge

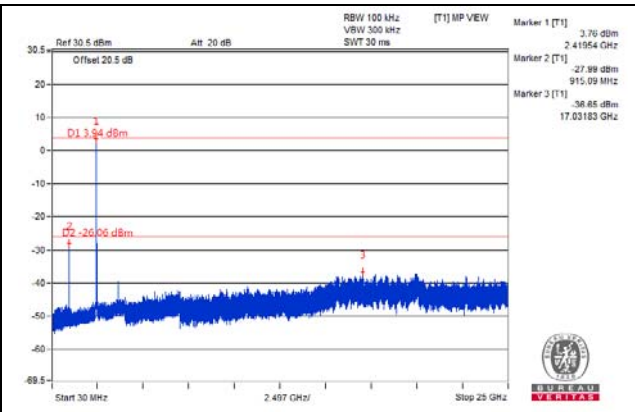
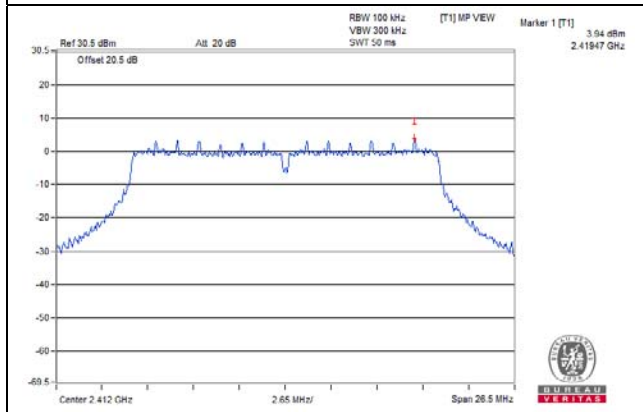


CH 11 Band edge

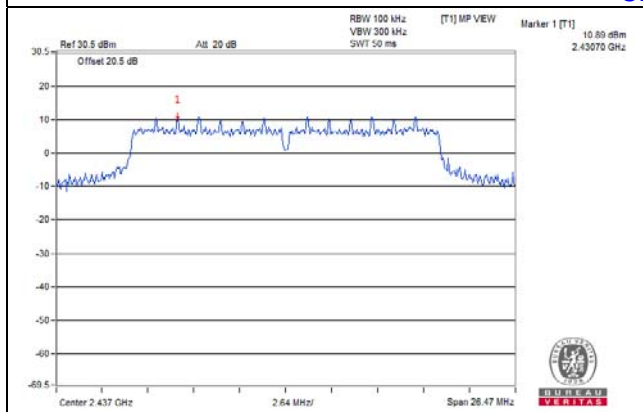


802.11n (20MHz)

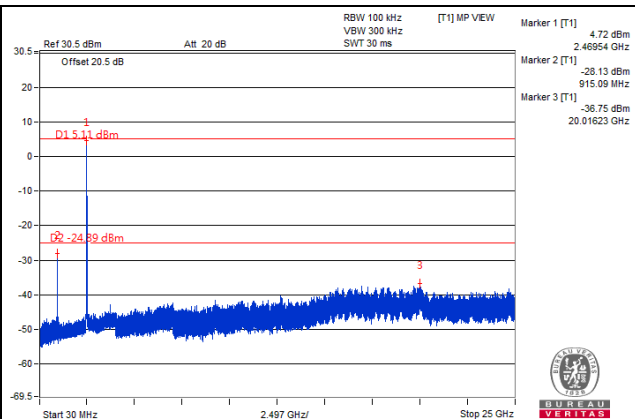
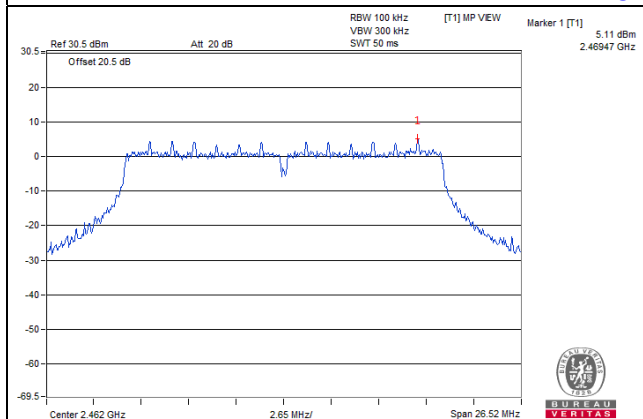
CH 1



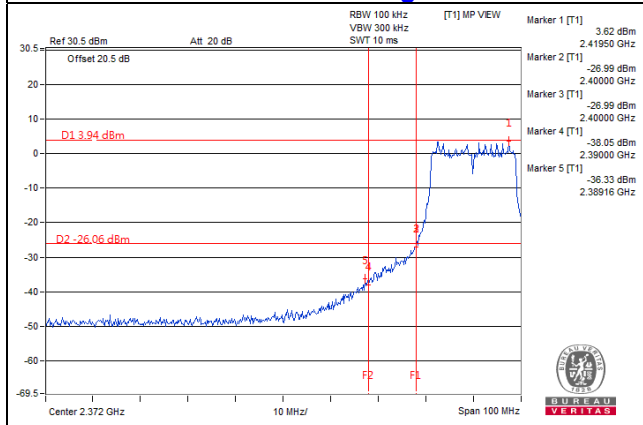
CH 6



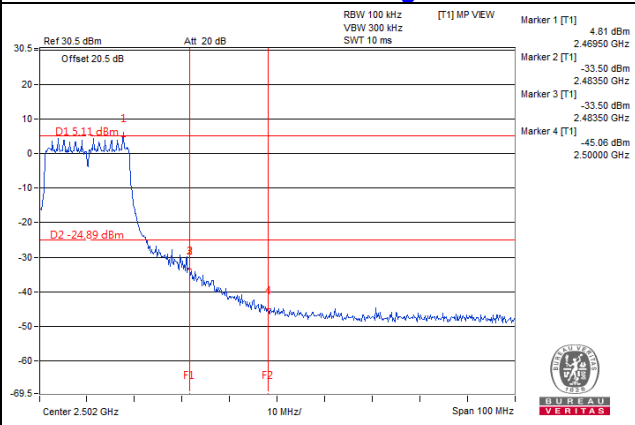
CH 11



CH 1 Band edge



CH 11 Band edge



## 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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