

FCC Test Report

Report No.: RF190430E07 R1

FCC ID: PY319200443

Test Model: MC327

Series Model: MC327BL, MC327WL, MC327HW, MC327LW

Received Date: Apr. 30, 2019

Test Date: May 10 to Jun. 18, 2019

Issued Date: Jul. 17, 2019

Applicant: NETGEAR, Inc.

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

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Test Location (1): No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

**FCC Registration /
Designation Number:** 198487 / TW2021

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

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



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Release Control Record

Issue No.	Description	Date Issued
RF190430E07	Original release.	Jun. 20, 2019
RF190430E07 R1	Addition of Model No. MC327.	Jul. 17, 2019

1 Certificate of Conformity

Product: Meural Canvas

Brand: NETGEAR

Test Model: MC327

Series Model: MC327BL, MC327WL, MC327HW, MC327LW

Sample Status: Engineering sample

Applicant: NETGEAR, Inc.

Test Date: May 10 to Jun. 18, 2019

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

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

Prepared by : Annie Chang, **Date:** Jul. 17, 2019
Annie Chang / Senior Specialist

Approved by : Rex Lai, **Date:** Jul. 17, 2019
Rex Lai / Associate Technical 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 -11.31dB at 0.16172MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.10dB 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	Antenna connector is I-PEX not a standard connector.

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

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.42 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Meural Canvas
Brand	NETGEAR
Test Model	MC327
Series Model	MC327BL, MC327WL, MC327HW, MC327LW
Model Difference	Refer to note as below
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	368.978mW
Antenna Type	Dipole antenna with 2.7dBi gain
Antenna Connector	I-PEX
Accessory Device	Adapter
Data Cable Supplied	N/A

Note:

1. All models are listed as below. Model: MC327 is the representative for final test.

Brand	Test Model	Series Model	Exterior color differences
NETGEAR	MC327	MC327BL	BL for black
		MC327WL	WL for white
		MC327HW	HW for hardwood color or walnut
		MC327LW	LW for light wood color or birch

2. 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

3. The EUT uses following adapter. And the **Adapter 1** was the worst case for final test.

Adapter	1	2
Brand	NETGEAR	NETGEAR
Model	AD2067M20	AD2067F10
Input Power	100-240Vac, 1.0A, 50/60Hz	100-120Vac, 1.0A, 50/60Hz
Output Power	12Vdc, 2.5A	12Vdc, 2.5A
Power Line	Non-shielded DC cable (2.4m)	Non-shielded DC cable (2.4m)

4. 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 \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 **Z-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, 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	6	OFDM	BPSK	6

Power Line Conducted Emission Test:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11g	1 to 11	6	OFDM	BPSK	6

Antenna Port Conducted Measurement:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

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\geq1G	23deg. C, 72%RH	120Vac, 60Hz	Dalen Dai
RE<1G	23deg. C, 72%RH	120Vac, 60Hz	Dalen Dai
PLC	23deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 76%RH	120Vac, 60Hz	Saxon Lee

3.3 Duty Cycle of Test Signal

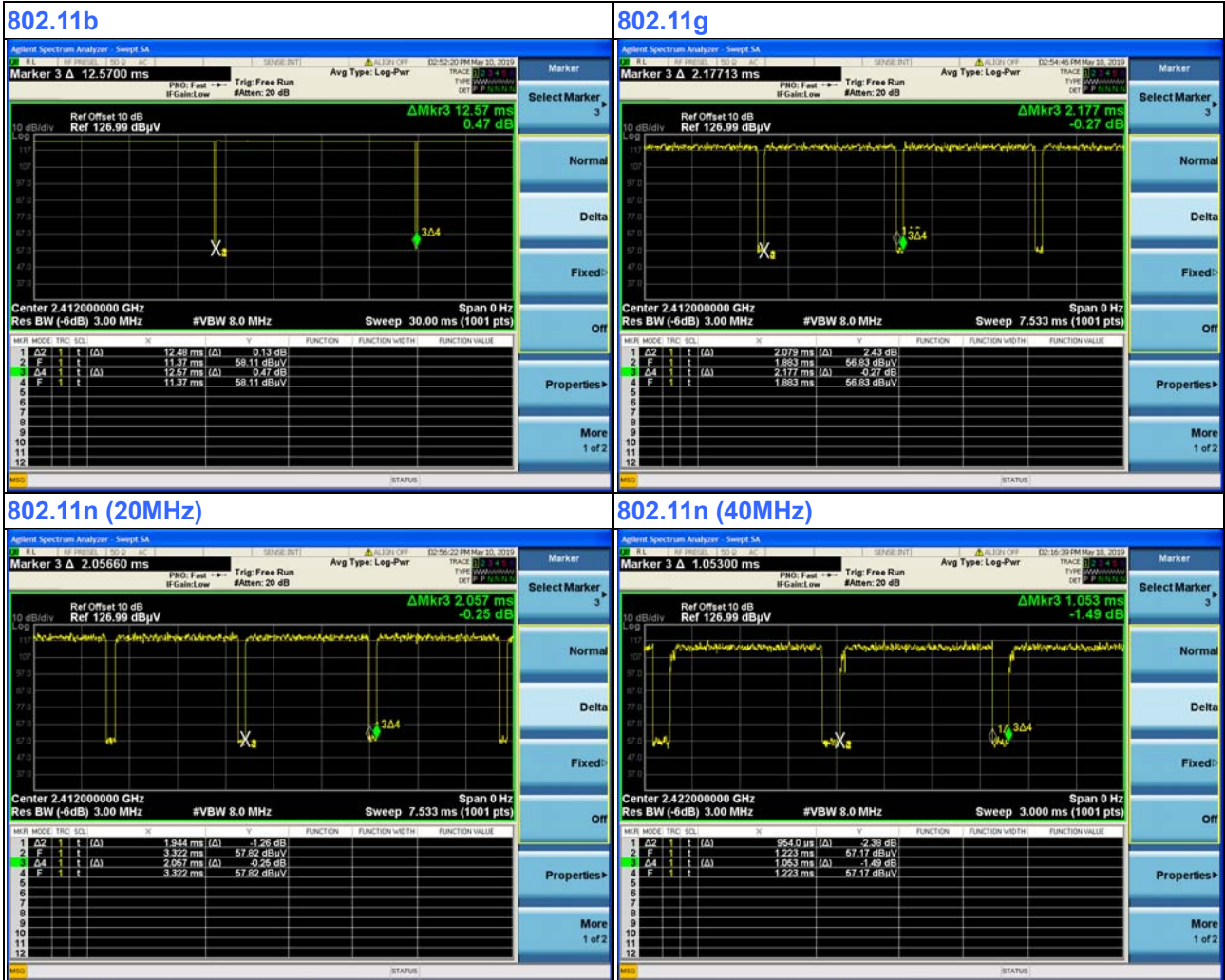
If duty cycle of test signal is $\geq 98\%$, duty factor is not required.
 If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11b: Duty cycle = $12.48/12.57 = 0.993$.

802.11g: Duty cycle = $2.079/2.177 = 0.955$, Duty factor = $10 * \log(1/0.955) = 0.20$

802.11n (20MHz): Duty cycle = $1.944/2.057 = 0.945$, Duty factor = $10 * \log(1/0.945) = 0.25$

802.11n (40MHz): Duty cycle = $0.954/1.053 = 0.906$, Duty factor = $10 * \log(1/0.906) = 0.43$



3.4 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook PC	DELL	E5410	BW33YM1	N/A	Provided by Lab

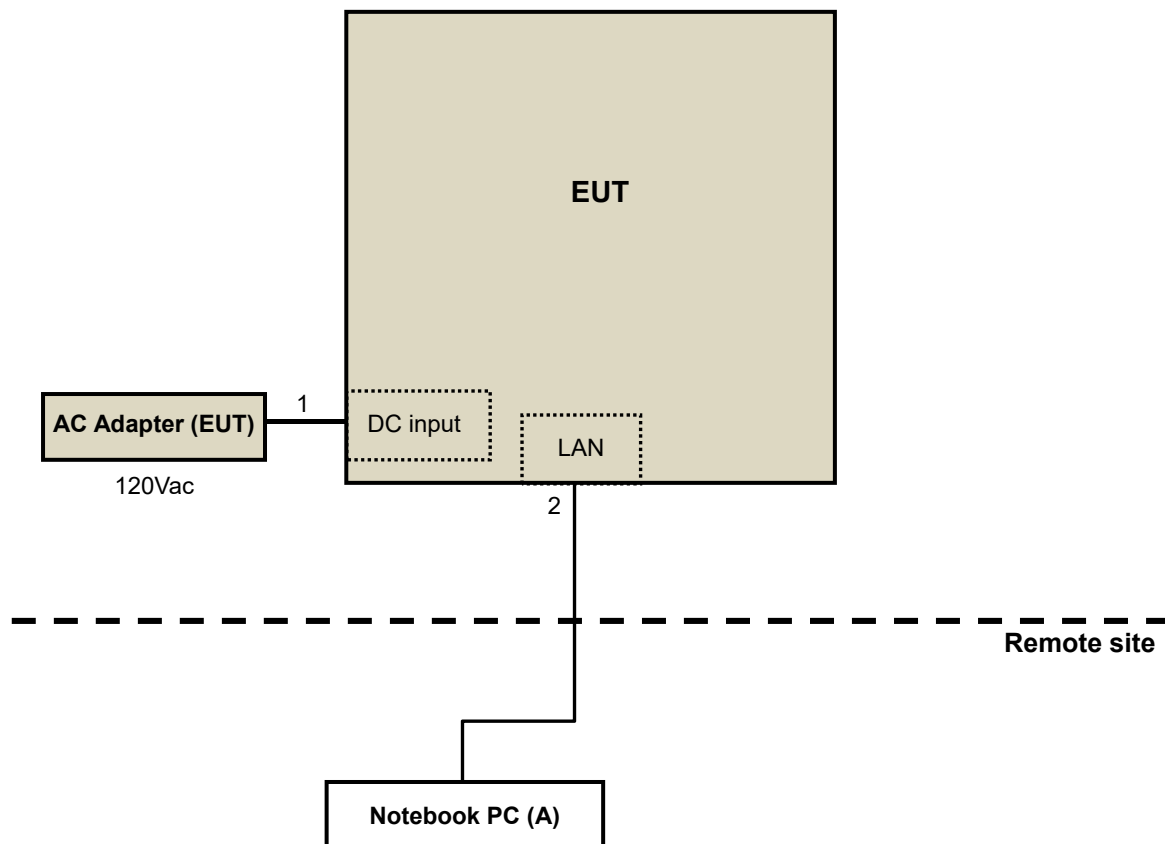
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	2.4	N	0	Supplied by client
2.	LAN cable	1	10	N	0	Provided by Lab

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 15.247 Meas Guidance v05r02

ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least or 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.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
HP Preamplifier	8447D	2432A03504	Feb. 20, 2019	Feb. 19, 2020
HP Preamplifier	8449B	3008A01201	Feb. 21, 2019	Feb. 20, 2020
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 20, 2019	Feb. 19, 2020
Agilent TEST RECEIVER	N9038A	MY51210129	Mar. 05, 2019	Mar. 04, 2020
Schwarzbeck Antenna	VULB 9168	139	Nov. 26, 2018	Nov. 25, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 25, 2018	Nov. 24, 2019
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Nov. 25, 2018	Nov. 24, 2019
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	SF102	Cable-CH6-01	Aug. 13, 2018	Aug. 12, 2019
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8-3.6m	Aug. 13, 2018	Aug. 12, 2019
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Aug. 3, 2018	Aug. 2, 2019
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
EMCO Horn Antenna	3115	00028257	Nov. 25, 2018	Nov. 24, 2019
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 27, 2018	Sep. 26, 2019
Anritsu Power Sensor	MA2411B	0738404	Apr. 16, 2019	Apr. 15, 2020
Anritsu Power Meter	ML2495A	0842014	Apr. 16, 2019	Apr. 15, 2020

- 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.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

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

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

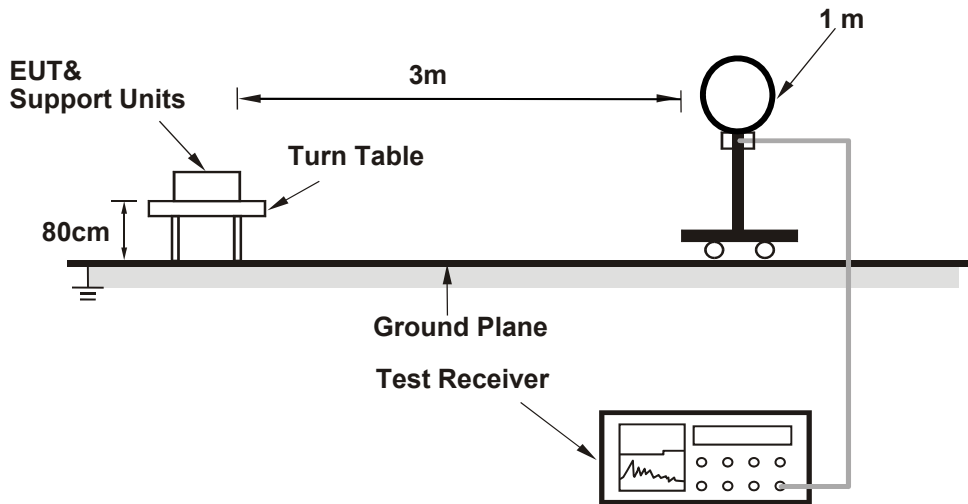
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

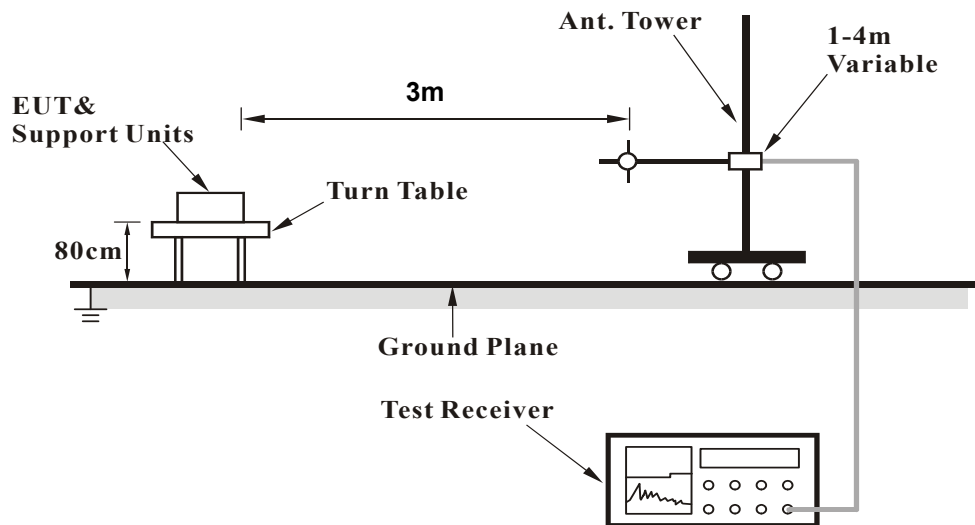
No deviation.

4.1.5 Test Setup

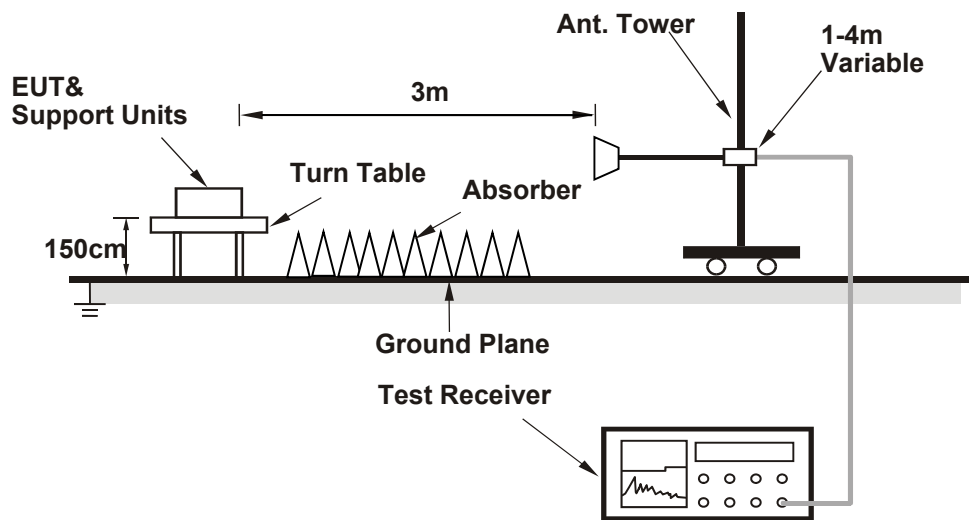
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

- a. Connected the EUT with AC adapter placed on testing table.
- b. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data :

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2387.07	59.45 PK	74.00	-14.55	1.34 H	300	59.67	-0.22
2	2387.07	53.27 AV	54.00	-0.73	1.34 H	300	53.49	-0.22
3	*2412.00	110.72 PK			1.34 H	300	110.93	-0.21
4	*2412.00	108.64 AV			1.34 H	300	108.85	-0.21
5	4824.00	54.60 PK	74.00	-19.40	2.33 H	36	48.22	6.38
6	4824.00	50.45 AV	54.00	-3.55	2.33 H	36	44.07	6.38

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	2386.60	53.47 PK	74.00	-20.53	1.25 V	270	53.69	-0.22
2	2386.60	44.76 AV	54.00	-9.24	1.25 V	270	44.98	-0.22
3	*2412.00	107.52 PK			1.25 V	270	107.73	-0.21
4	*2412.00	104.47 AV			1.25 V	270	104.68	-0.21
5	4824.00	51.74 PK	74.00	-22.26	2.01 V	112	45.36	6.38
6	4824.00	47.65 AV	54.00	-6.35	2.01 V	112	41.27	6.38

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	110.76 PK			1.05 H	204	110.96	-0.20
2	*2437.00	108.31 AV			1.05 H	204	108.51	-0.20
3	4874.00	56.92 PK	74.00	-17.08	1.97 H	43	50.74	6.18
4	4874.00	53.04 AV	54.00	-0.96	1.97 H	43	46.86	6.18

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	104.96 PK			1.28 V	265	105.16	-0.20
2	*2437.00	102.55 AV			1.28 V	265	102.75	-0.20
3	4874.00	54.39 PK	74.00	-19.61	1.98 V	109	48.21	6.18
4	4874.00	52.04 AV	54.00	-1.96	1.98 V	109	45.86	6.18

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	112.47 PK			2.42 H	183	112.65	-0.18
2	*2462.00	109.16 AV			2.42 H	183	109.34	-0.18
3	2490.27	71.13 PK	74.00	-2.87	2.42 H	183	71.28	-0.15
4	2490.27	53.62 AV	54.00	-0.38	2.42 H	183	53.77	-0.15
5	4924.00	53.37 PK	74.00	-20.63	1.69 H	46	47.26	6.11
6	4924.00	49.73 AV	54.00	-4.27	1.69 H	46	43.62	6.11

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	103.11 PK			1.31 V	269	103.29	-0.18
2	*2462.00	100.09 AV			1.31 V	269	100.27	-0.18
3	2490.27	62.73 PK	74.00	-11.27	1.31 V	269	62.88	-0.15
4	2490.27	44.72 AV	54.00	-9.28	1.31 V	269	44.87	-0.15
5	4924.00	51.82 PK	74.00	-22.18	2.01 V	96	45.71	6.11
6	4924.00	47.69 AV	54.00	-6.31	2.01 V	96	41.58	6.11

REMARKS:

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

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.44 PK	74.00	-7.56	1.15 H	198	66.66	-0.22
2	2390.00	53.58 AV	54.00	-0.42	1.15 H	198	53.80	-0.22
3	*2412.00	109.89 PK			1.15 H	198	110.10	-0.21
4	*2412.00	100.21 AV			1.15 H	198	100.42	-0.21
5	4824.00	49.90 PK	74.00	-24.10	2.25 H	33	43.52	6.38
6	4824.00	36.09 AV	54.00	-17.91	2.25 H	33	29.71	6.38

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	62.32 PK	74.00	-11.68	1.33 V	272	62.54	-0.22
2	2390.00	44.04 AV	54.00	-9.96	1.33 V	272	44.26	-0.22
3	*2412.00	101.64 PK			1.33 V	272	101.85	-0.21
4	*2412.00	91.33 AV			1.33 V	272	91.54	-0.21
5	4824.00	46.96 PK	74.00	-27.04	1.98 V	105	40.58	6.38
6	4824.00	32.75 AV	54.00	-21.25	1.98 V	105	26.37	6.38

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	114.21 PK			1.08 H	202	114.41	-0.20
2	*2437.00	104.29 AV			1.08 H	202	104.49	-0.20
3	4874.00	54.36 PK	74.00	-19.64	2.31 H	30	48.18	6.18
4	4874.00	40.82 AV	54.00	-13.18	2.31 H	30	34.64	6.18

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	108.24 PK			1.32 V	264	108.44	-0.20
2	*2437.00	97.34 AV			1.32 V	264	97.54	-0.20
3	4874.00	51.44 PK	74.00	-22.56	2.03 V	109	45.26	6.18
4	4874.00	39.16 AV	54.00	-14.84	2.03 V	109	32.98	6.18

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.23 PK			1.11 H	197	110.41	-0.18
2	*2462.00	100.27 AV			1.11 H	197	100.45	-0.18
3	2483.50	66.57 PK	74.00	-7.43	1.11 H	197	66.73	-0.16
4	2483.50	53.67 AV	54.00	-0.33	1.11 H	197	53.83	-0.16
5	4924.00	46.93 PK	74.00	-27.07	2.27 H	37	40.82	6.11
6	4924.00	33.84 AV	54.00	-20.16	2.27 H	37	27.73	6.11

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.78 PK			1.22 V	276	104.96	-0.18
2	*2462.00	93.99 AV			1.22 V	276	94.17	-0.18
3	2483.50	57.73 PK	74.00	-16.27	1.22 V	276	57.89	-0.16
4	2483.50	44.59 AV	54.00	-9.41	1.22 V	276	44.75	-0.16
5	4924.00	38.90 PK	74.00	-35.10	2.07 V	106	32.79	6.11
6	4924.00	26.99 AV	54.00	-27.01	2.07 V	106	20.88	6.11

REMARKS:

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

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.58 PK	74.00	-6.42	2.51 H	186	67.80	-0.22
2	2390.00	53.80 AV	54.00	-0.20	2.51 H	186	54.02	-0.22
3	*2412.00	109.48 PK			2.51 H	186	109.69	-0.21
4	*2412.00	99.53 AV			2.51 H	186	99.74	-0.21
5	4824.00	47.93 PK	74.00	-26.07	1.87 H	268	41.55	6.38
6	4824.00	34.34 AV	54.00	-19.66	1.87 H	268	27.96	6.38

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	58.52 PK	74.00	-15.48	1.24 V	272	58.74	-0.22
2	2390.00	44.63 AV	54.00	-9.37	1.24 V	272	44.85	-0.22
3	*2412.00	100.67 PK			1.24 V	272	100.88	-0.21
4	*2412.00	90.57 AV			1.24 V	272	90.78	-0.21
5	4824.00	46.06 PK	74.00	-27.94	2.05 V	109	39.68	6.38
6	4824.00	31.85 AV	54.00	-22.15	2.05 V	109	25.47	6.38

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	116.27 PK			2.45 H	181	116.47	-0.20
2	*2437.00	106.46 AV			2.45 H	181	106.66	-0.20
3	4874.00	54.95 PK	74.00	-19.05	1.79 H	40	48.77	6.18
4	4874.00	41.41 AV	54.00	-12.59	1.79 H	40	35.23	6.18

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	107.08 PK			1.26 V	273	107.28	-0.20
2	*2437.00	97.43 AV			1.26 V	273	97.63	-0.20
3	4874.00	53.05 PK	74.00	-20.95	2.10 V	107	46.87	6.18
4	4874.00	39.64 AV	54.00	-14.36	2.10 V	107	33.46	6.18

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	112.89 PK			2.44 H	185	113.07	-0.18
2	*2462.00	102.76 AV			2.44 H	185	102.94	-0.18
3	2483.50	67.00 PK	74.00	-7.00	2.44 H	185	67.16	-0.16
4	2483.50	53.60 AV	54.00	-0.40	2.44 H	185	53.76	-0.16
5	4924.00	48.47 PK	74.00	-25.53	2.36 H	341	42.36	6.11
6	4924.00	35.73 AV	54.00	-18.27	2.36 H	341	29.62	6.11

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	103.97 PK			1.28 V	264	104.15	-0.18
2	*2462.00	93.37 AV			1.28 V	264	93.55	-0.18
3	2483.50	58.29 PK	74.00	-15.71	1.28 V	264	58.45	-0.16
4	2483.50	44.62 AV	54.00	-9.38	1.28 V	264	44.78	-0.16
5	4924.00	46.66 PK	74.00	-27.34	2.07 V	113	40.55	6.11
6	4924.00	33.99 AV	54.00	-20.01	2.07 V	113	27.88	6.11

REMARKS:

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

802.11n (40MHz)

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.47 PK	74.00	-5.53	2.49 H	183	68.69	-0.22
2	2390.00	53.70 AV	54.00	-0.30	2.49 H	183	53.92	-0.22
3	*2422.00	103.19 PK			2.49 H	183	103.39	-0.20
4	*2422.00	93.81 AV			2.49 H	183	94.01	-0.20
5	4844.00	46.85 PK	74.00	-27.15	1.85 H	102	40.56	6.29
6	4844.00	33.95 AV	54.00	-20.05	1.85 H	102	27.66	6.29

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	59.49 PK	74.00	-14.51	1.25 V	271	59.71	-0.22
2	2390.00	44.63 AV	54.00	-9.37	1.25 V	271	44.85	-0.22
3	*2422.00	94.61 PK			1.25 V	271	94.81	-0.20
4	*2422.00	85.29 AV			1.25 V	271	85.49	-0.20
5	4844.00	45.03 PK	74.00	-28.97	2.15 V	118	38.74	6.29
6	4844.00	31.73 AV	54.00	-22.27	2.15 V	118	25.44	6.29

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.39 PK	74.00	-10.61	2.45 H	183	63.61	-0.22
2	2390.00	49.63 AV	54.00	-4.37	2.45 H	183	49.85	-0.22
3	*2437.00	110.08 PK			2.45 H	183	110.28	-0.20
4	*2437.00	100.37 AV			2.45 H	183	100.57	-0.20
5	2483.50	69.93 PK	74.00	-4.07	2.45 H	183	70.09	-0.16
6	2483.50	53.41 AV	54.00	-0.59	2.45 H	183	53.57	-0.16
7	4874.00	47.74 PK	74.00	-26.26	1.88 H	41	41.56	6.18
8	4874.00	34.87 AV	54.00	-19.13	1.88 H	41	28.69	6.18

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.55 PK	74.00	-19.45	1.23 V	274	54.77	-0.22
2	2390.00	40.66 AV	54.00	-13.34	1.23 V	274	40.88	-0.22
3	*2437.00	101.25 PK			1.23 V	274	101.45	-0.20
4	*2437.00	91.21 AV			1.23 V	274	91.41	-0.20
5	2483.50	61.80 PK	74.00	-12.20	1.23 V	274	61.96	-0.16
6	2483.50	44.59 AV	54.00	-9.41	1.23 V	274	44.75	-0.16
7	4874.00	45.84 PK	74.00	-28.16	2.12 V	115	39.66	6.18
8	4874.00	32.73 AV	54.00	-21.27	2.12 V	115	26.55	6.18

REMARKS:

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

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	108.13 PK			2.44 H	181	108.31	-0.18
2	*2452.00	98.97 AV			2.44 H	181	99.15	-0.18
3	2483.50	73.90 PK	74.00	-0.10	2.44 H	181	74.06	-0.16
4	2483.50	53.60 AV	54.00	-0.40	2.44 H	181	53.76	-0.16
5	4904.00	47.66 PK	74.00	-26.34	1.96 H	232	41.56	6.10
6	4904.00	34.79 AV	54.00	-19.21	1.96 H	232	28.69	6.10

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	*2452.00	99.18 PK			1.26 V	268	99.36	-0.18
2	*2452.00	91.45 AV			1.26 V	268	91.63	-0.18
3	2483.50	63.99 PK	74.00	-10.01	1.26 V	268	64.15	-0.16
4	2483.50	44.20 AV	54.00	-9.80	1.26 V	268	44.36	-0.16
5	4904.00	45.97 PK	74.00	-28.03	2.08 V	111	39.87	6.10
6	4904.00	32.55 AV	54.00	-21.45	2.08 V	111	26.45	6.10

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

Below 1GHz Data:

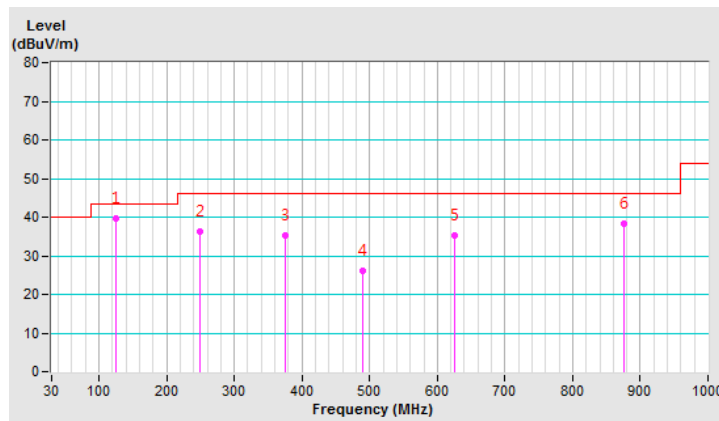
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CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	125.01	39.83 QP	43.50	-3.67	2.41 H	114	48.39	-8.56
2	250.00	36.30 QP	46.00	-9.70	1.55 H	210	43.25	-6.95
3	375.03	35.17 QP	46.00	-10.83	2.87 H	337	38.87	-3.70
4	489.15	26.20 QP	46.00	-19.80	3.65 H	39	27.61	-1.41
5	625.00	35.41 QP	46.00	-10.59	2.22 H	139	33.85	1.56
6	875.02	38.31 QP	46.00	-7.69	1.00 H	358	32.61	5.70

REMARKS:

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



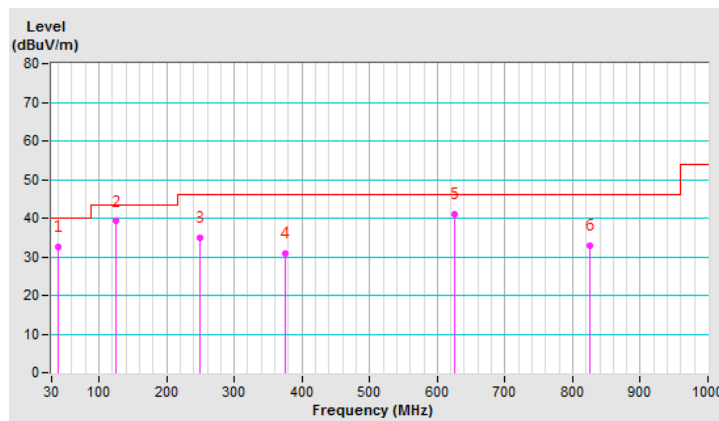
CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	40.48	32.65 QP	40.00	-7.35	1.42 V	231	40.35	-7.70
2	125.01	39.22 QP	43.50	-4.28	2.52 V	53	47.78	-8.56
3	250.00	35.06 QP	46.00	-10.94	3.45 V	76	42.01	-6.95
4	375.03	30.96 QP	46.00	-15.04	1.11 V	223	34.66	-3.70
5	625.00	41.01 QP	46.00	-4.99	2.85 V	111	39.45	1.56
6	825.50	33.01 QP	46.00	-12.99	1.00 V	290	27.90	5.11

REMARKS:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

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

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in Conduction 1. (TAF no.: 2022)

4.2.3 Test Procedures

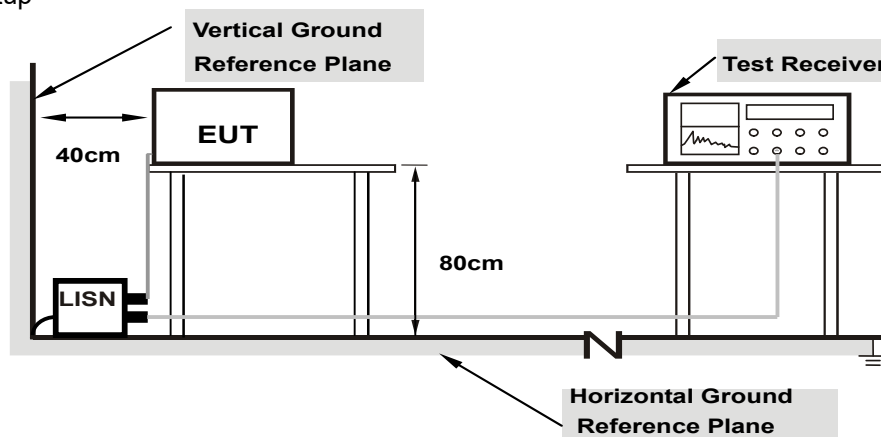
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

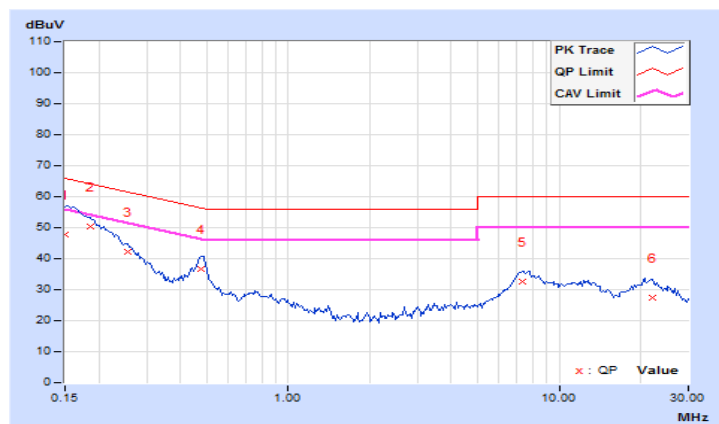
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.15000	10.03	37.74	22.20	47.77	32.23	66.00	56.00	-18.23
2	0.18516	10.04	40.40	25.51	50.44	35.55	64.25	54.25	-13.81	-18.70
3	0.25547	10.06	32.08	18.38	42.14	28.44	61.58	51.58	-19.44	-23.14
4	0.47813	10.09	26.62	19.54	36.71	29.63	56.37	46.37	-19.66	-16.74
5	7.33984	10.53	22.10	15.50	32.63	26.03	60.00	50.00	-27.37	-23.97
6	22.00391	11.41	16.13	10.53	27.54	21.94	60.00	50.00	-32.46	-28.06

REMARKS:

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

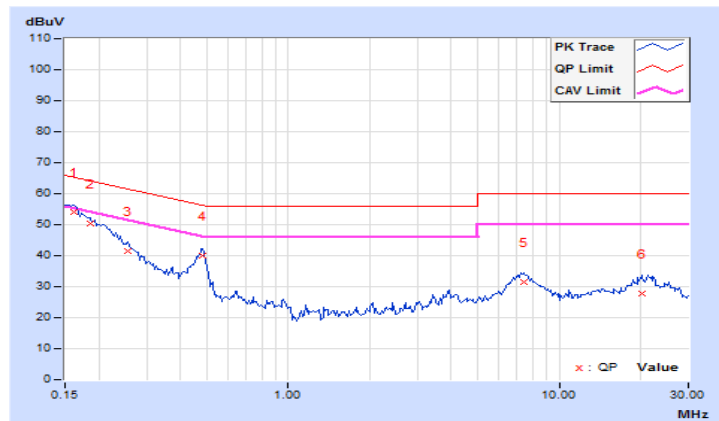


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.16172	9.94	44.13	29.07	54.07	39.01	65.38	55.38	-11.31	-16.37
2	0.18516	9.95	40.56	22.84	50.51	32.79	64.25	54.25	-13.74	-21.46
3	0.25547	9.96	31.52	17.17	41.48	27.13	61.58	51.58	-20.10	-24.45
4	0.48203	9.98	30.09	24.41	40.07	34.39	56.30	46.30	-16.23	-11.91
5	7.39844	10.37	21.28	15.83	31.65	26.20	60.00	50.00	-28.35	-23.80
6	20.10938	11.14	16.68	11.14	27.82	22.28	60.00	50.00	-32.18	-27.72

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.



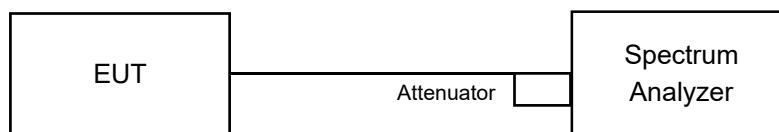
Note: The test, calibration and test results are compliance with the TAF (Certificate # 2022)

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	8.10	0.5	PASS
6	2437	8.05	0.5	PASS
11	2462	8.10	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.18	0.5	PASS
6	2437	15.17	0.5	PASS
11	2462	15.19	0.5	PASS

802.11n (20MHz)

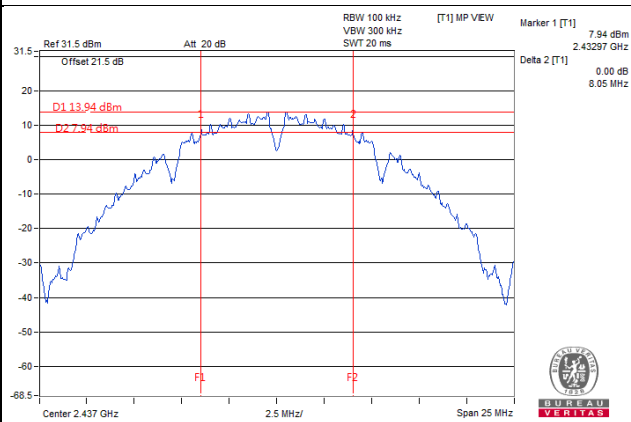
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.18	0.5	Pass
6	2437	15.12	0.5	Pass
11	2462	15.20	0.5	Pass

802.11n (40MHz)

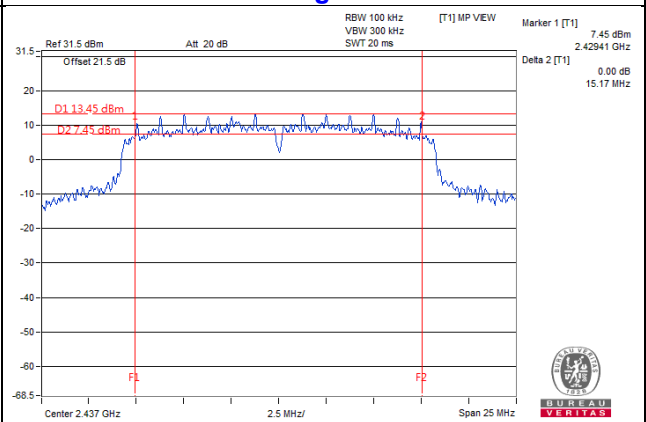
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.21	0.5	Pass
6	2437	35.15	0.5	Pass
9	2452	35.20	0.5	Pass

Spectrum Plot of Worst Value

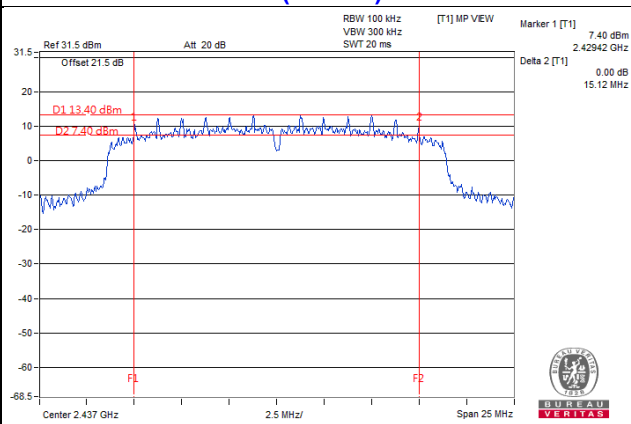
802.11b / CH 6



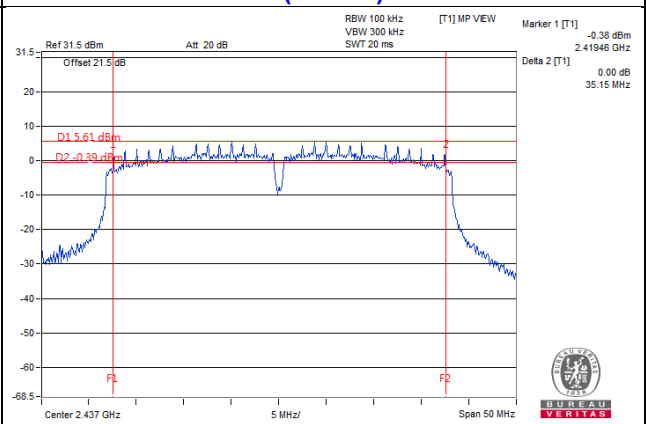
802.11g / CH 6



802.11n (20MHz) / CH 6



802.11n (40MHz) / CH 6

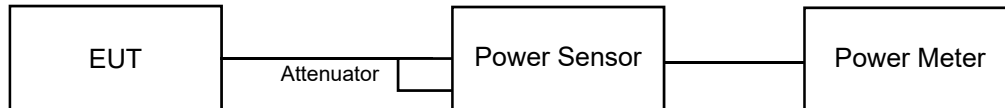


4.4 Conducted Output Power Measurement

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

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

802.11b

Channel	Chan. Freq. (MHz)	Average Power (dBm)	Average Power (mW)	Limit (dBm)	Pass / Fail
1	2412	22.99	199.067	30	Pass
6	2437	22.91	195.434	30	Pass
11	2462	22.31	170.216	30	Pass

802.11g

Channel	Chan. Freq. (MHz)	Average Power (dBm)	Average Power (mW)	Limit (dBm)	Pass / Fail
1	2412	18.17	65.615	30	Pass
6	2437	25.67	368.978	30	Pass
11	2462	18.27	67.143	30	Pass

802.11n (20MHz)

Channel	Chan. Freq. (MHz)	Average Power (dBm)	Average Power (mW)	Limit (dBm)	Pass / Fail
1	2412	17.44	55.463	30	Pass
6	2437	25.56	359.749	30	Pass
11	2462	17.62	57.810	30	Pass

802.11n (40MHz)

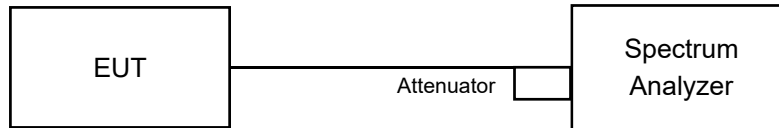
Channel	Chan. Freq. (MHz)	Average Power (dBm)	Average Power (mW)	Limit (dBm)	Pass / Fail
3	2422	13.88	24.434	30	Pass
6	2437	19.24	83.946	30	Pass
9	2452	16.11	40.832	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For AVG. power (duty cycle \geq 98%)

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set span to at least 1.5 times the OBW.
- c) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set VBW $\geq 3 \times \text{RBW}$.
- e) Detector = power averaging (RMS) or sample detector (when RMS not available).
- f) Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- g) Sweep time = auto couple.
- h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- i) Use the peak marker function to determine the maximum amplitude level.

For AVG. power (duty cycle $<$ 98%)

- a) Measure the duty cycle (x).
- b) Set instrument center frequency to DTS channel center frequency.
- c) Set span to at least 1.5 times the OBW.
- d) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- e) Set VBW $\geq 3 \times \text{RBW}$.
- f) Detector = power averaging (RMS) or sample detector (when RMS not available).
- g) Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- h) Sweep time = auto couple.
- i) Do not use sweep triggering. Allow sweep to "free run".
- j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- k) Use the peak marker function to determine the maximum amplitude level.
- l) Add $10 \log (1/x)$, where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time.

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	Frequency (MHz)	PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-4.97	8	Pass
6	2437	-3.70	8	Pass
11	2462	-5.06	8	Pass

802.11g

Channel	Frequency (MHz)	PSD W/O Duty Factor (dBm/10kHz)	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-10.94	0.20	-10.74	8	Pass
6	2437	-5.90	0.20	-5.70	8	Pass
11	2462	-9.91	0.20	-9.71	8	Pass

Note: Refer to section 3.3 for duty cycle spectrum plot.

802.11n (20MHz)

Channel	Frequency (MHz)	PSD W/O Duty Factor (dBm/10kHz)	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-13.41	0.25	-13.16	8	Pass
6	2437	-6.20	0.25	-5.95	8	Pass
11	2462	-10.42	0.25	-10.17	8	Pass

Note: Refer to section 3.3 for duty cycle spectrum plot.

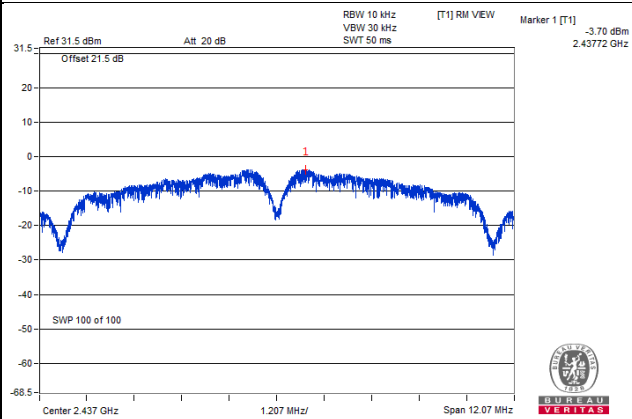
802.11n (40MHz)

Channel	Frequency (MHz)	PSD W/O Duty Factor (dBm/10kHz)	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
3	2422	-19.61	0.43	-19.18	8	Pass
6	2437	-13.88	0.43	-13.45	8	Pass
9	2452	-14.75	0.43	-14.32	8	Pass

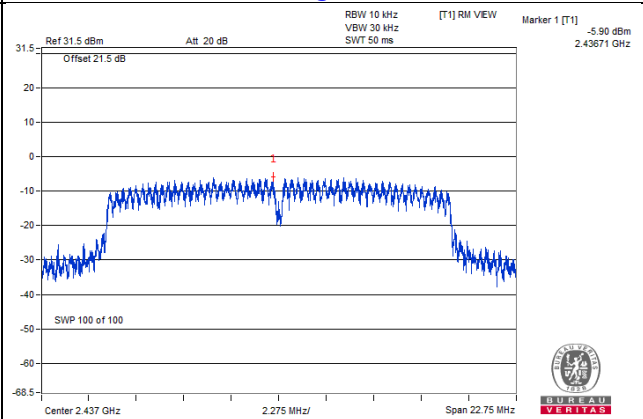
Note: Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

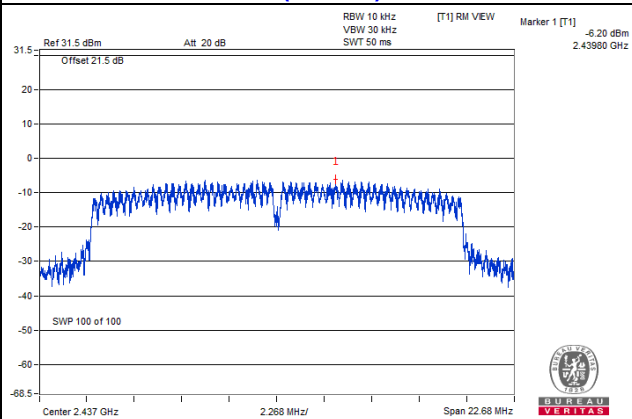
802.11b / CH 6



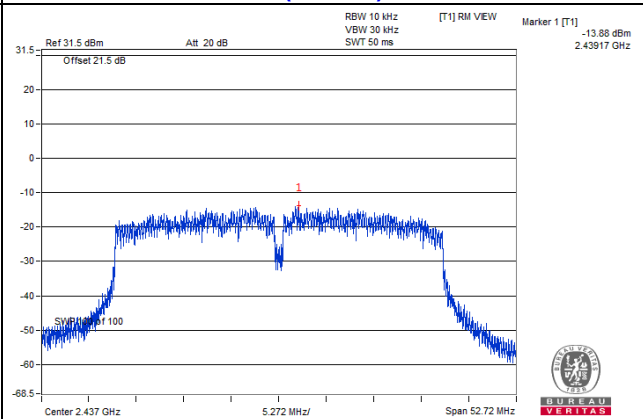
802.11g / CH 6



802.11n (20MHz) / CH 6



802.11n (40MHz) / CH 6

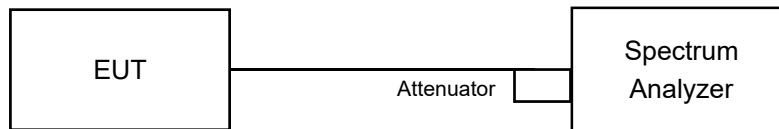


4.6 Conducted Out of Band Emission Measurement

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

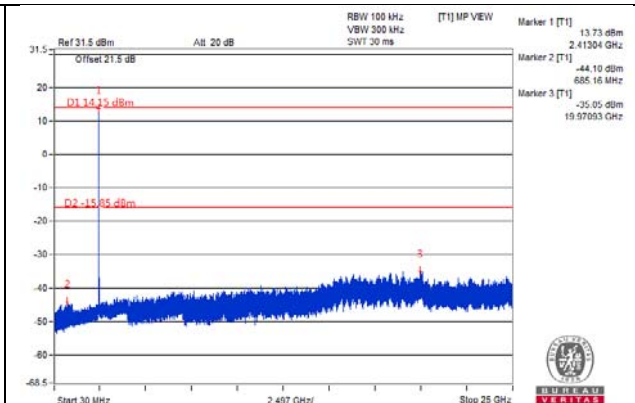
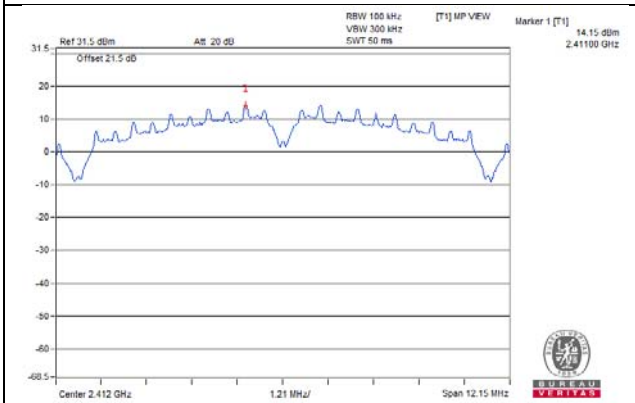
Same as Item 4.3.6

4.6.7 Test Results

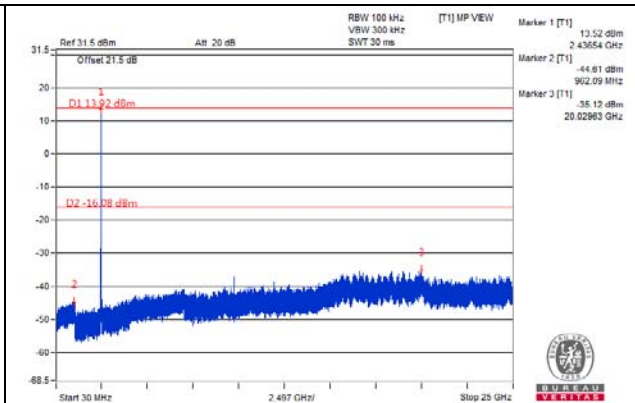
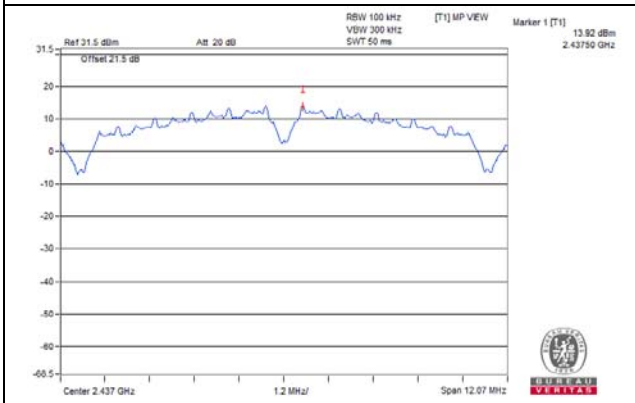
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

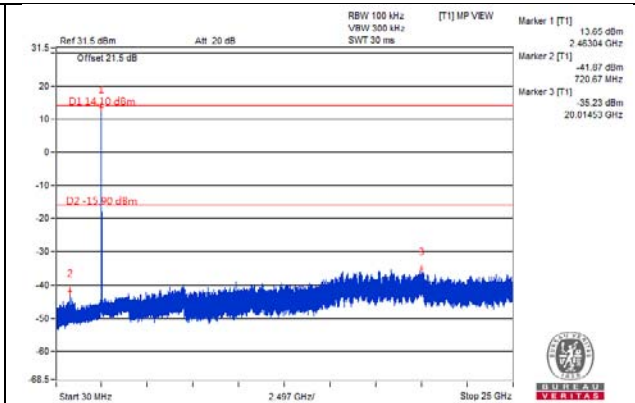
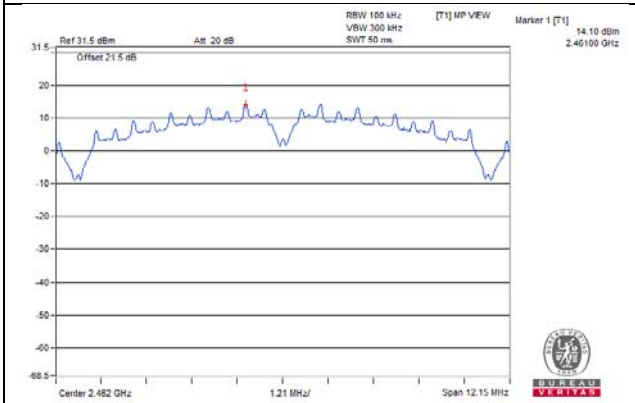
CH 1



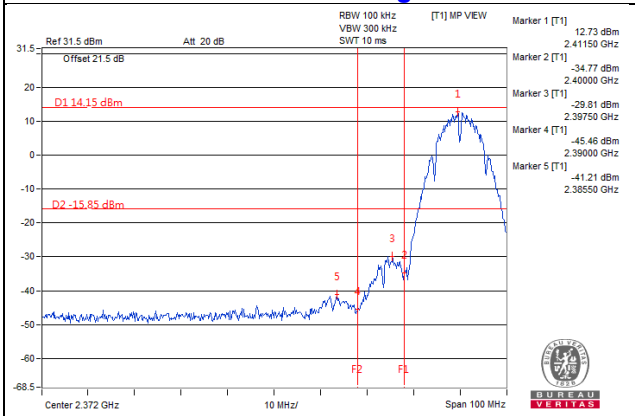
CH 6



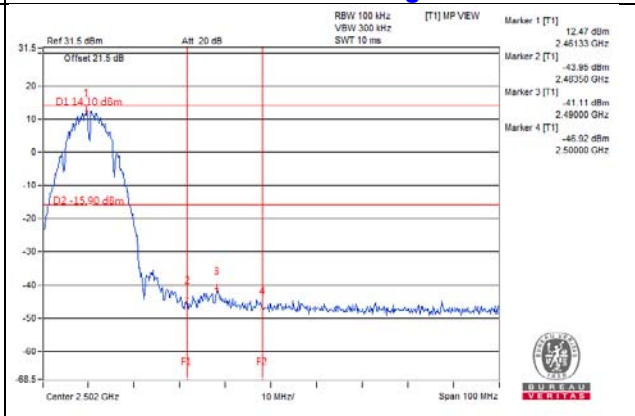
CH 11



CH 1 Band edge

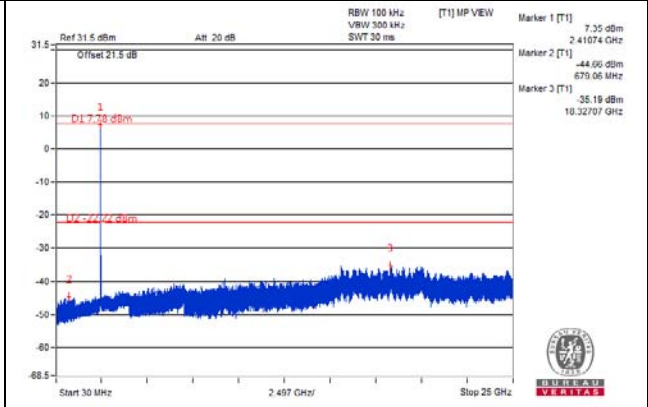
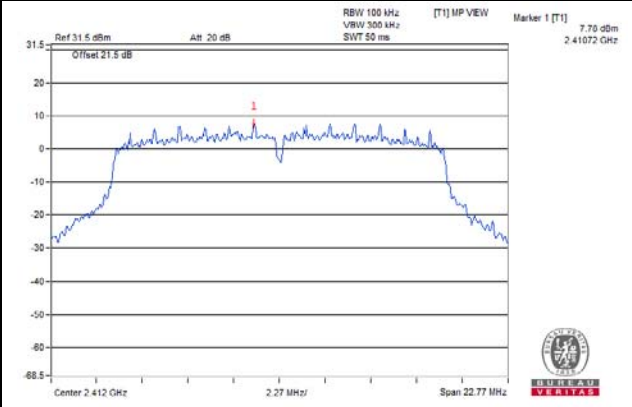


CH 11 Band edge

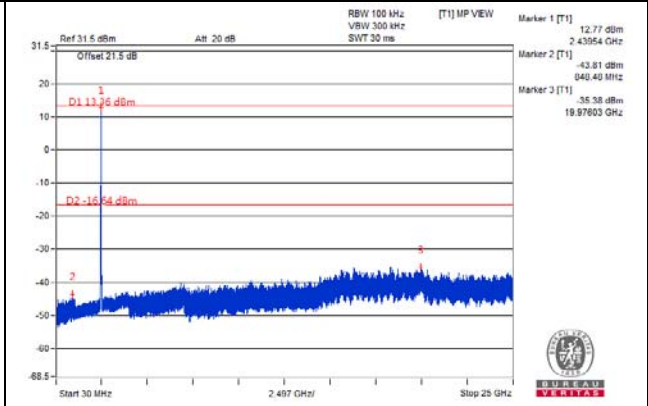
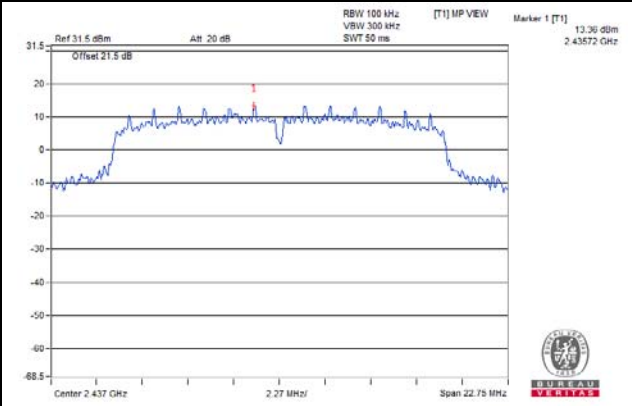


802.11g

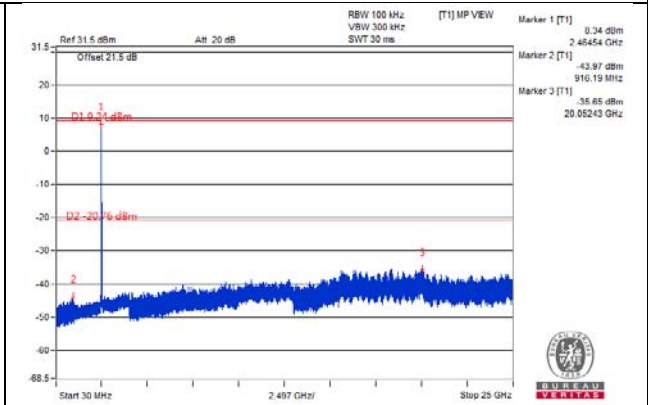
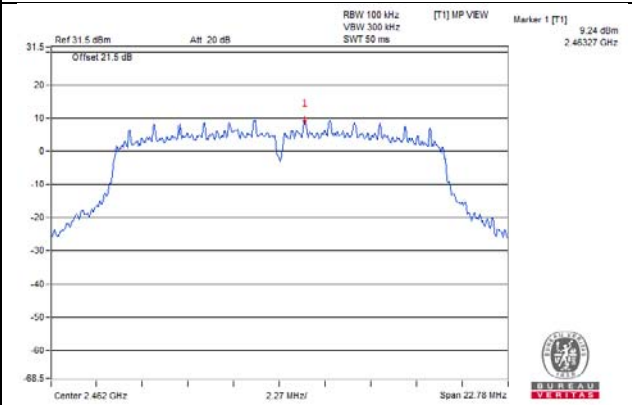
CH 1



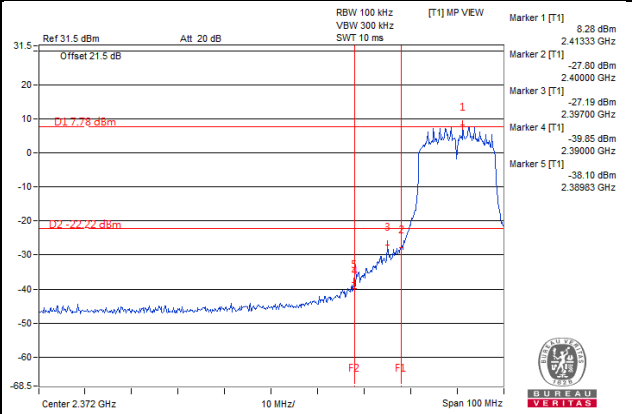
CH 6



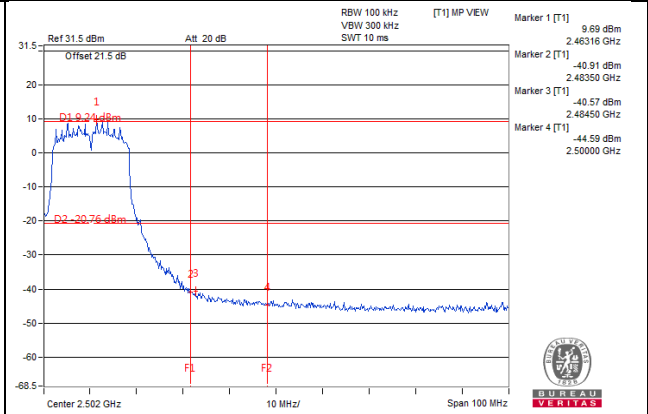
CH 11



CH 1 Band edge

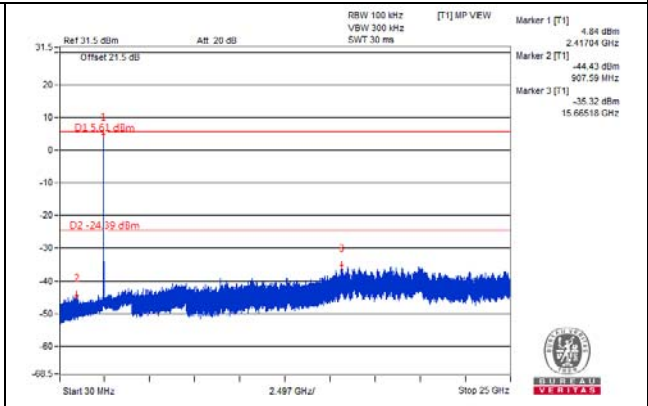
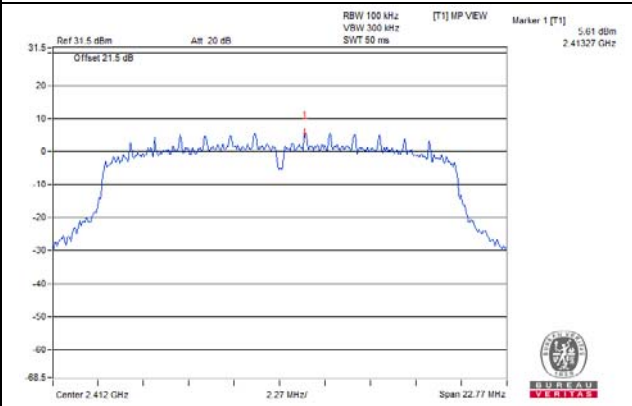


CH 11 Band edge

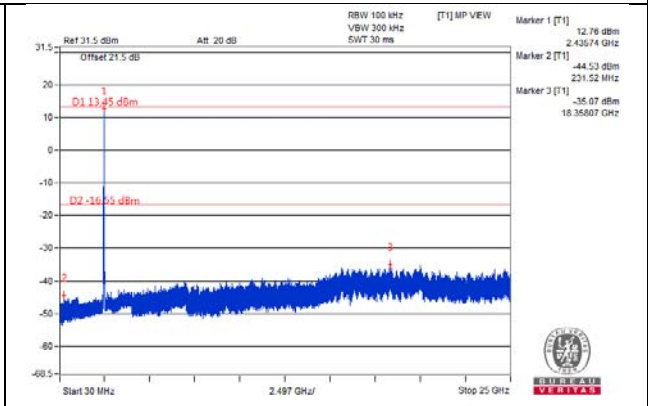
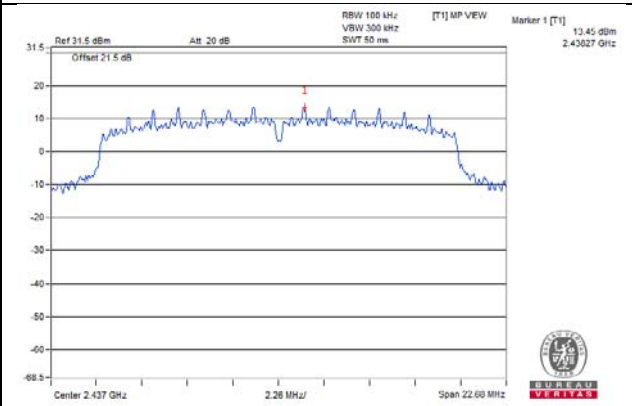


802.11n (20MHz)

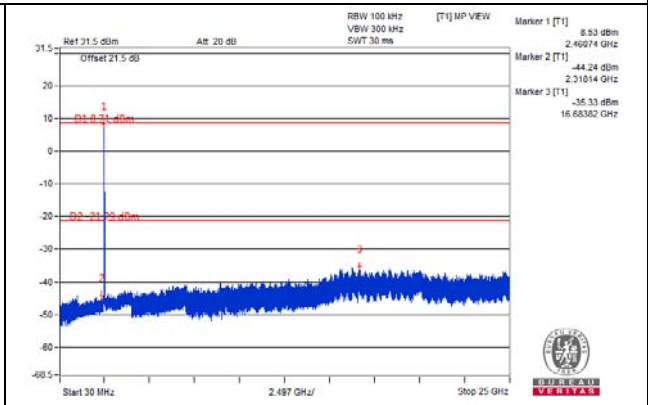
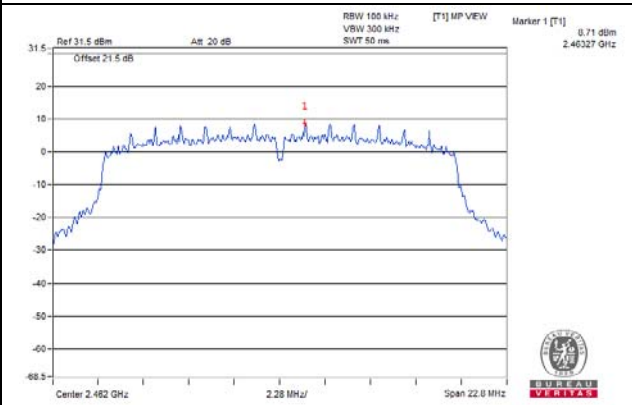
CH 1



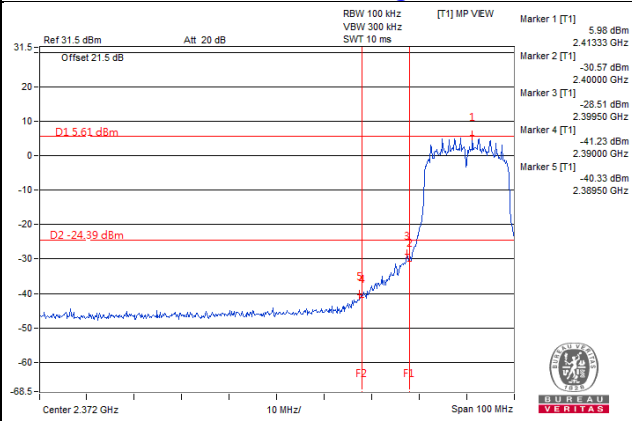
CH 6



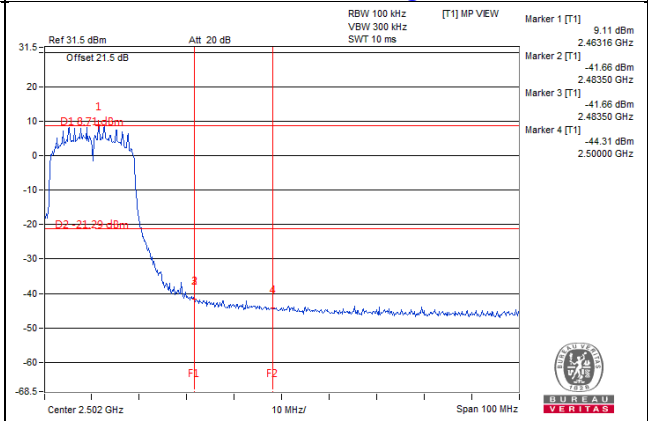
CH 11



CH 1 Band edge

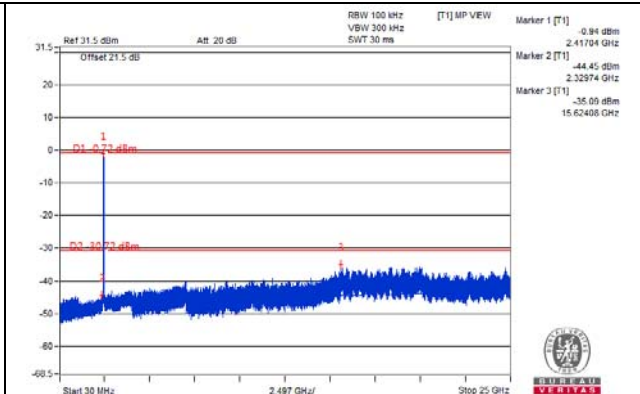
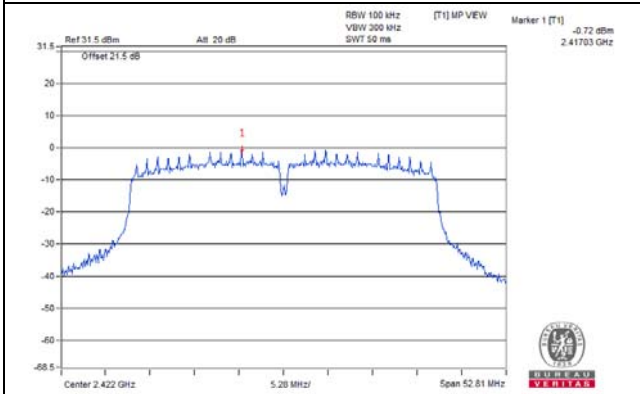


CH 11 Band edge

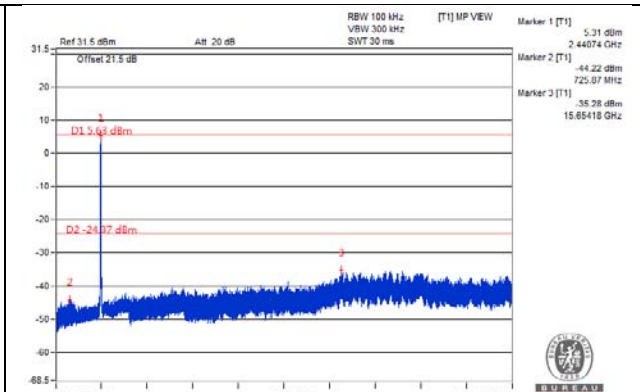
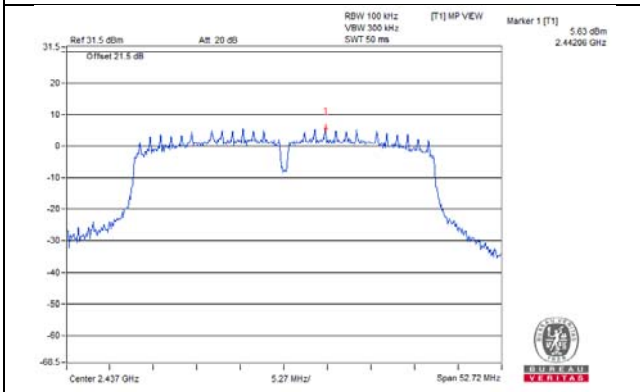


802.11n (40MHz)

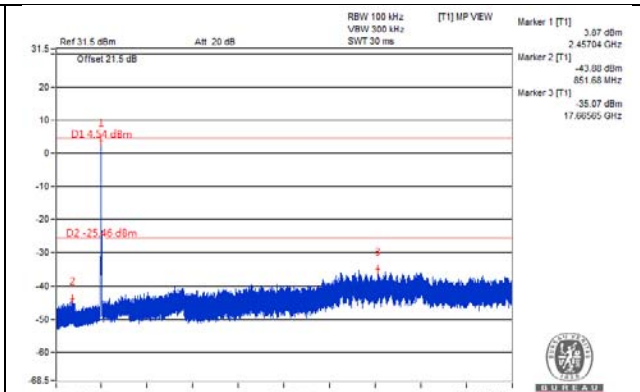
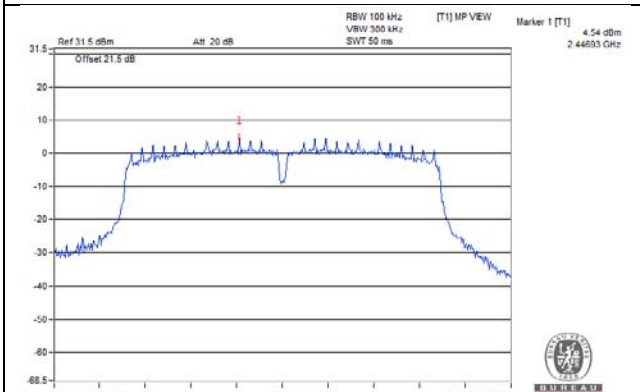
CH 3



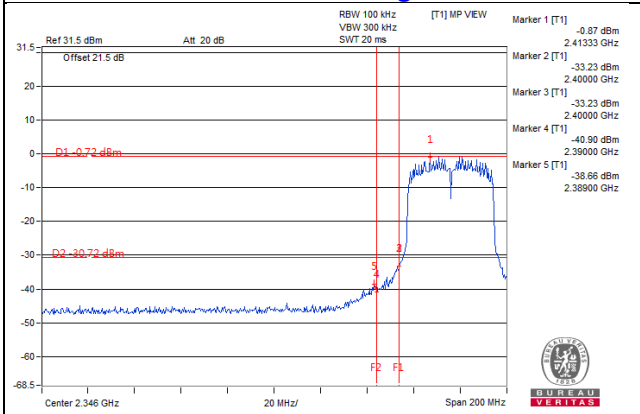
CH 6



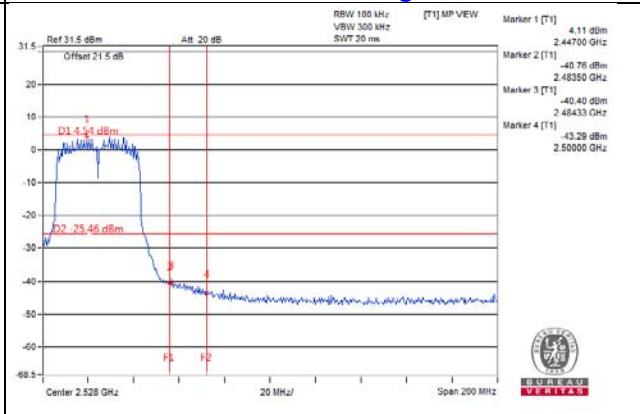
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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Web Site: www.bureauveritas-adt.com

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

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