

FCC Test Report (WLAN)

Report No.: RF190919D02

FCC ID: P27NA503S

Test Model: NA503S-4G

Series Model: NA503S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "- " , for marketing purpose)

Received Date: Sep. 19, 2019

Test Date: Sep. 26 to Oct. 21, 2019

Issued Date: Dec. 6, 2019

Applicant: Sercomm Corp.

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

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FCC Registration /
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Release Control Record

Issue No.	Description	Date Issued
RF190919D02	Original release.	Dec. 6, 2019

1 Certificate of Conformity

Product: Multiple RF Home Gateway

Brand: Craftsman

Test Model: NA503S-4G

Series Model: NA503S-4Gxxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "- " , for marketing purpose)

Sample Status: Engineering sample

Applicant: Sercomm Corp.

Test Date: Sep. 26 to Oct. 21, 2019

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

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

Prepared by : Annie Chang, **Date:** Dec. 6, 2019
Annie Chang / Senior Specialist

Approved by : Rex Lai, **Date:** Dec. 6, 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 -13.94dB 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 -1.02dB 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€	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	2.79 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	Multiple RF Home Gateway
Brand	Craftsman
Test Model	NA503S-4G
Series Model	NA503S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "- " , for marketing purpose)
Model Difference	For marking purpose
Status of EUT	Engineering sample
Power Supply Rating	DC 12V from Adapter or DC 7.5V from battery
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 300Mbps
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	599.834mW
Antenna Type	Ant. 3: PIFA Antenna with 2.65dBi gain Ant. 4: PIFA Antenna with 2.94dBi gain
Antenna Connector	I-PEX
Accessory Device	Adapter
Data Cable Supplied	N/A

Note:

1. The EUT provides 2 completed transmitter and 2 receiver.

Modulation Mode	TX Function
802.11b	2TX
802.11g	2TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

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

✧ Operating Mode (EUT + Battery)

✧ Operating + Charging Mode (EUT + Adapter)

The worst emission level was found when the EUT tested under **Operating + Charging Mode (EUT + Adapter)**, therefore, only its test data was recorded in this report.

3. The EUT uses following adapter or battery.

Item	Adapter	Battery
Brand	APD	Simple
Model	WB-24J12FU	NA50X
AC I/P Rating	100-240V, 50-60Hz, 0.7A	-
DC O/P Rating	12V, 2A	7.5V, 2400mAh, 18Wh
Power cord	AC 2 Pin, Non-shielded DC cable (1.5m)	-

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	
-	√	√	√	√	Operating + Charging Mode (EUT + Adapter)

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

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

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)
-	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5

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)
-	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	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$\geq$1G	25deg. C, 77%RH	120Vac, 60Hz	Ian Chang
RE<1G	25deg. C, 77%RH	120Vac, 60Hz	Ian Chang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Ian Chang
APCM	25deg. C, 75%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 = $12.55/12.8 = 0.980$

802.11g: Duty cycle = $2.094/2.23 = 0.939$, Duty factor = $10 * \log(1/0.939) = 0.27$

802.11n (20MHz): Duty cycle = $1.944/2.072 = 0.938$, Duty factor = $10 * \log(1/0.938) = 0.28$

802.11n (40MHz): Duty cycle = $0.955/1.13 = 0.845$, Duty factor = $10 * \log(1/0.845) = 0.73$



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	E6530	9331GV1	N/A	Provided by Lab

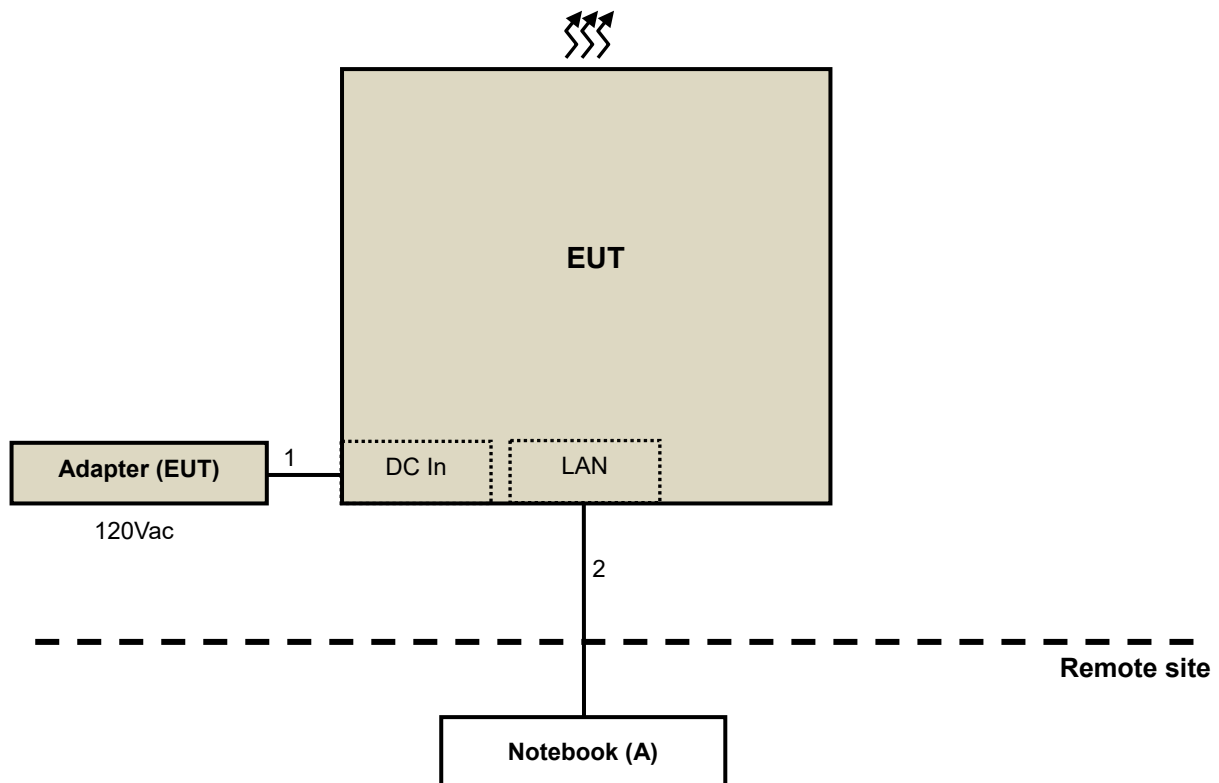
Note:

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	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/ No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.5	N	0	Supplied by client
2.	LAN cable	1	10	N	0	Provided by Lab (RJ45, Cat.5e)

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 and references

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test standard:

FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02
KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 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 Antenna	VHBA 9123	480	Jun. 3, 2019	Jun. 2, 2021
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	Jul. 10, 2019	Jul. 9, 2020
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8-3.6m	Jul. 10, 2019	Jul. 9, 2020
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 11, 2019	Jun. 10, 2020
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 30, 2019	Jul. 29, 2020
Loop Antenna EMCI	LPA600	270	Aug. 23, 2019	Aug. 22, 2021
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. 23, 2019	Sep. 22, 2020
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:

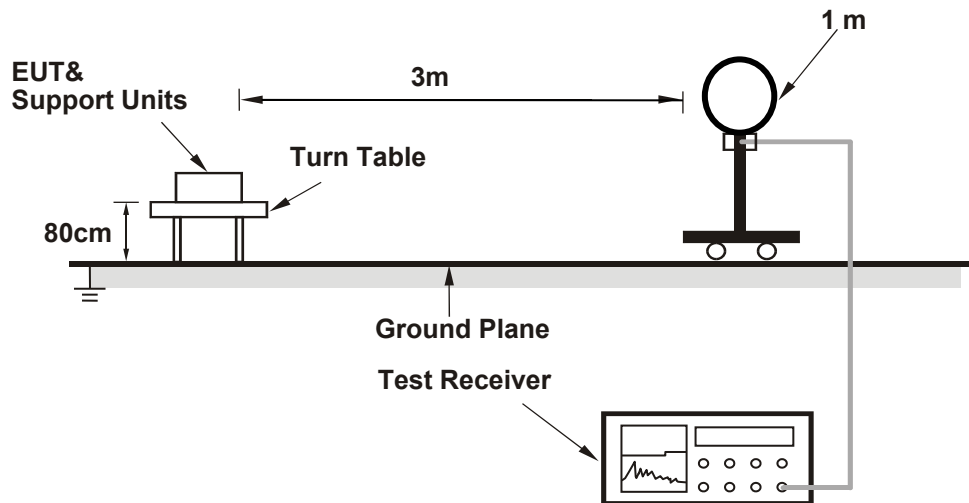
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

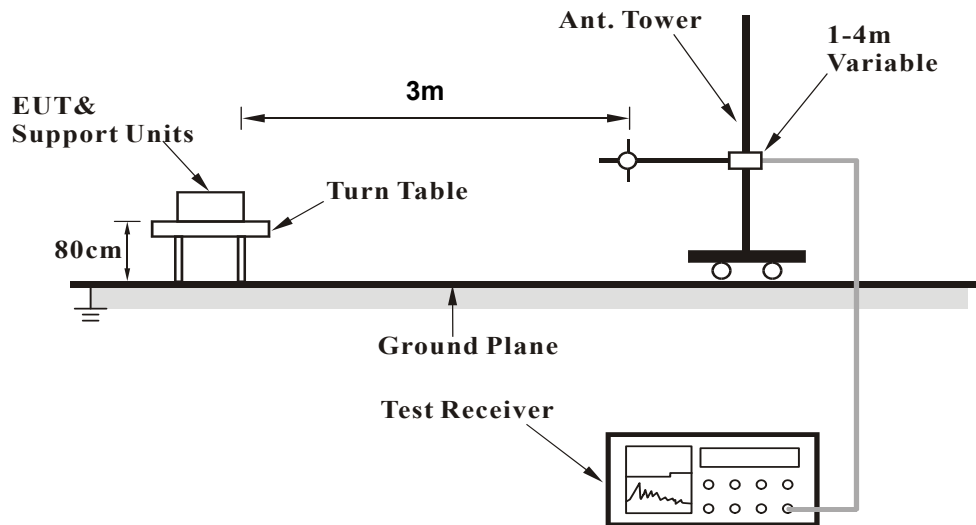
No deviation.

4.1.5 Test Setup

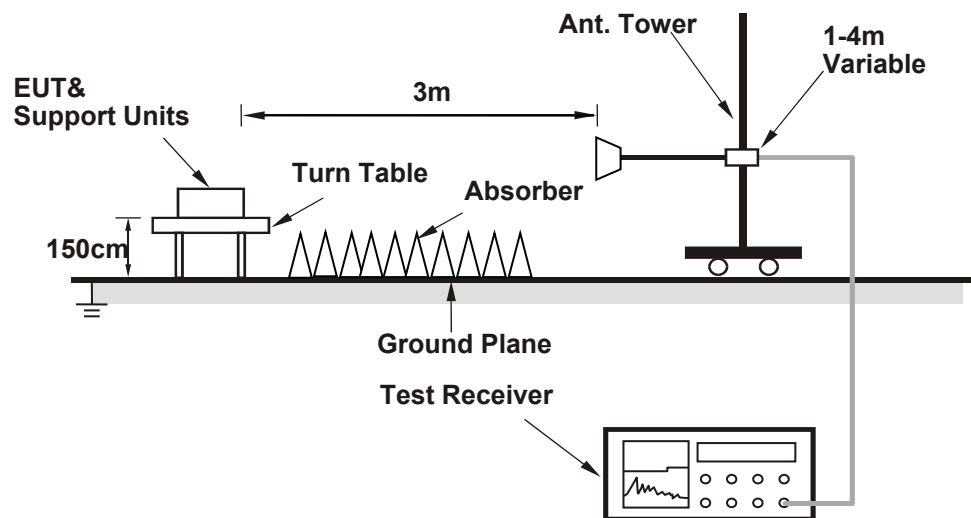
For Radiated emission below 30MHz



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

- Placed the EUT on the testing table.
- Prepared notebook to act as communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the system in full functions.

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	2390.00	56.73 PK	74.00	-17.27	3.84 H	221	56.15	0.58
2	2390.00	44.19 AV	54.00	-9.81	3.84 H	221	43.61	0.58
3	*2412.00	105.79 PK			3.84 H	221	105.14	0.65
4	*2412.00	101.56 AV			3.84 H	221	100.91	0.65
5	4824.00	52.49 PK	74.00	-21.51	3.15 H	230	44.15	8.34
6	4824.00	44.25 AV	54.00	-9.75	3.15 H	230	35.91	8.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.22 PK	74.00	-11.78	1.36 V	234	61.64	0.58
2	2390.00	52.98 AV	54.00	-1.02	1.36 V	234	52.40	0.58
3	*2412.00	114.55 PK			1.36 V	234	113.90	0.65
4	*2412.00	109.80 AV			1.36 V	234	109.15	0.65
5	4824.00	54.30 PK	74.00	-19.70	2.27 V	156	45.96	8.34
6	4824.00	48.36 AV	54.00	-5.64	2.27 V	156	40.02	8.34

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	107.58 PK			3.79 H	219	106.85	0.73
2	*2437.00	101.83 AV			3.79 H	219	101.10	0.73
3	4874.00	53.24 PK	74.00	-20.76	3.19 H	241	44.62	8.62
4	4874.00	44.47 AV	54.00	-9.53	3.19 H	241	35.85	8.62
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	115.42 PK			1.35 V	228	114.69	0.73
2	*2437.00	110.39 AV			1.35 V	228	109.66	0.73
3	4874.00	54.29 PK	74.00	-19.71	2.30 V	164	45.67	8.62
4	4874.00	48.44 AV	54.00	-5.56	2.30 V	164	39.82	8.62

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	106.58 PK			3.80 H	226	105.74	0.84
2	*2462.00	101.07 AV			3.80 H	226	100.23	0.84
3	2483.50	57.65 PK	74.00	-16.35	3.80 H	226	56.69	0.96
4	2483.50	45.77 AV	54.00	-8.23	3.80 H	226	44.81	0.96
5	4924.00	53.27 PK	74.00	-20.73	3.26 H	238	44.51	8.76
6	4924.00	43.45 AV	54.00	-10.55	3.26 H	238	34.69	8.76
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	114.07 PK			1.51 V	229	113.23	0.84
2	*2462.00	109.21 AV			1.51 V	229	108.37	0.84
3	2483.50	62.70 PK	74.00	-11.30	1.51 V	229	61.74	0.96
4	2483.50	52.80 AV	54.00	-1.20	1.51 V	229	51.84	0.96
5	4924.00	54.54 PK	74.00	-19.46	2.30 V	165	45.78	8.76
6	4924.00	48.92 AV	54.00	-5.08	2.30 V	165	40.16	8.76

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	65.70 PK	74.00	-8.30	3.78 H	236	65.12	0.58
2	2390.00	47.09 AV	54.00	-6.91	3.78 H	236	46.51	0.58
3	*2412.00	106.49 PK			3.78 H	236	105.84	0.65
4	*2412.00	96.28 AV			3.78 H	236	95.63	0.65
5	4824.00	48.00 PK	74.00	-26.00	1.18 H	205	39.66	8.34
6	4824.00	34.86 AV	54.00	-19.14	1.18 H	205	26.52	8.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	71.16 PK	74.00	-2.84	1.52 V	270	70.58	0.58
2	2390.00	52.96 AV	54.00	-1.04	1.52 V	270	52.38	0.58
3	*2412.00	114.31 PK			1.52 V	270	113.66	0.65
4	*2412.00	104.20 AV			1.52 V	270	103.55	0.65
5	4824.00	48.97 PK	74.00	-25.03	1.67 V	241	40.63	8.34
6	4824.00	35.52 AV	54.00	-18.48	1.67 V	241	27.18	8.34

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	109.52 PK			3.81 H	225	108.79	0.73
2	*2437.00	99.29 AV			3.81 H	225	98.56	0.73
3	4874.00	47.81 PK	74.00	-26.19	2.54 H	108	39.19	8.62
4	4874.00	35.43 AV	54.00	-18.57	2.54 H	108	26.81	8.62
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	117.15 PK			1.51 V	308	116.42	0.73
2	*2437.00	107.18 AV			1.51 V	308	106.45	0.73
3	4874.00	49.17 PK	74.00	-24.83	1.92 V	134	40.55	8.62
4	4874.00	36.08 AV	54.00	-17.92	1.92 V	134	27.46	8.62

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	104.32 PK			3.82 H	222	103.48	0.84
2	*2462.00	94.47 AV			3.82 H	222	93.63	0.84
3	2483.50	58.84 PK	74.00	-15.16	2.82 H	222	57.88	0.96
4	2483.50	43.12 AV	54.00	-10.88	2.82 H	222	42.16	0.96
5	4924.00	48.10 PK	74.00	-25.90	2.29 H	104	39.34	8.76
6	4924.00	34.95 AV	54.00	-19.05	2.29 H	104	26.19	8.76
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	112.72 PK			1.46 V	233	111.88	0.84
2	*2462.00	102.65 AV			1.46 V	233	101.81	0.84
3	2483.50	70.59 PK	74.00	-3.41	1.46 V	233	69.63	0.96
4	2483.50	52.61 AV	54.00	-1.39	1.46 V	233	51.65	0.96
5	4924.00	48.84 PK	74.00	-25.16	1.52 V	23	40.08	8.76
6	4924.00	35.95 AV	54.00	-18.05	1.52 V	23	27.19	8.76

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	62.77 PK	74.00	-11.23	3.88 H	227	62.19	0.58
2	2390.00	44.96 AV	54.00	-9.04	3.88 H	227	44.38	0.58
3	*2412.00	105.52 PK			3.88 H	227	104.87	0.65
4	*2412.00	95.23 AV			3.88 H	227	94.58	0.65
5	4824.00	48.01 PK	74.00	-25.99	1.17 H	146	39.67	8.34
6	4824.00	35.22 AV	54.00	-18.78	1.17 H	146	26.88	8.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.85 PK	74.00	-3.15	1.51 V	231	70.27	0.58
2	2390.00	52.93 AV	54.00	-1.07	1.51 V	231	52.35	0.58
3	*2412.00	113.46 PK			1.51 V	231	112.81	0.65
4	*2412.00	103.75 AV			1.51 V	231	103.10	0.65
5	4824.00	48.85 PK	74.00	-25.15	2.23 V	205	40.51	8.34
6	4824.00	35.53 AV	54.00	-18.47	2.23 V	205	27.19	8.34

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	110.51 PK			3.89 H	226	109.78	0.73
2	*2437.00	100.69 AV			3.89 H	226	99.96	0.73
3	4874.00	48.06 PK	74.00	-25.94	1.11 H	8	39.44	8.62
4	4874.00	35.25 AV	54.00	-18.75	1.11 H	8	26.63	8.62
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	118.48 PK			1.50 V	233	117.75	0.73
2	*2437.00	108.84 AV			1.50 V	233	108.11	0.73
3	4874.00	48.85 PK	74.00	-25.15	1.53 V	206	40.23	8.62
4	4874.00	36.30 AV	54.00	-17.70	1.53 V	206	27.68	8.62

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	107.39 PK			3.79 H	229	106.55	0.84
2	*2462.00	97.71 AV			3.79 H	229	96.87	0.84
3	2483.50	65.55 PK	74.00	-8.45	3.79 H	229	64.59	0.96
4	2483.50	45.81 AV	54.00	-8.19	3.79 H	229	44.85	0.96
5	4924.00	47.99 PK	74.00	-26.01	2.45 H	84	39.23	8.76
6	4924.00	34.83 AV	54.00	-19.17	2.45 H	84	26.07	8.76
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	115.29 PK			1.48 V	227	114.45	0.84
2	*2462.00	105.72 AV			1.48 V	227	104.88	0.84
3	2483.50	72.88 PK	74.00	-1.12	1.48 V	227	71.92	0.96
4	2483.50	51.98 AV	54.00	-2.02	1.48 V	227	51.02	0.96
5	4924.00	49.36 PK	74.00	-24.64	1.36 V	254	40.60	8.76
6	4924.00	35.85 AV	54.00	-18.15	1.36 V	254	27.09	8.76

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	66.72 PK	74.00	-7.28	3.79 H	229	66.14	0.58
2	2390.00	47.53 AV	54.00	-6.47	3.79 H	229	46.95	0.58
3	*2422.00	101.17 PK			3.79 H	229	100.48	0.69
4	*2422.00	91.25 AV			3.79 H	229	90.56	0.69
5	4844.00	47.50 PK	74.00	-26.50	2.64 H	345	39.09	8.41
6	4844.00	34.84 AV	54.00	-19.16	2.64 H	345	26.43	8.41
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	72.41 PK	74.00	-1.59	1.05 V	232	71.83	0.58
2	2390.00	52.82 AV	54.00	-1.18	1.05 V	232	52.24	0.58
3	*2422.00	109.38 PK			1.05 V	232	108.69	0.69
4	*2422.00	100.17 AV			1.05 V	232	99.48	0.69
5	4844.00	49.05 PK	74.00	-24.95	1.84 V	282	40.64	8.41
6	4844.00	35.78 AV	54.00	-18.22	1.84 V	282	27.37	8.41

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	60.61 PK	74.00	-13.39	3.79 H	236	60.03	0.58
2	2390.00	44.74 AV	54.00	-9.26	3.79 H	236	44.16	0.58
3	*2437.00	102.58 PK			3.79 H	236	101.85	0.73
4	*2437.00	91.76 AV			3.79 H	236	91.03	0.73
5	2483.50	59.40 PK	74.00	-14.60	3.79 H	236	58.44	0.96
6	2483.50	43.06 AV	54.00	-10.94	3.79 H	236	42.10	0.96
7	4874.00	48.35 PK	74.00	-25.65	2.29 H	335	39.73	8.62
8	4874.00	34.65 AV	54.00	-19.35	2.29 H	335	26.03	8.62
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	69.07 PK	74.00	-4.93	1.00 V	248	68.49	0.58
2	2390.00	52.74 AV	54.00	-1.26	1.00 V	248	52.16	0.58
3	*2437.00	110.17 PK			1.00 V	248	109.44	0.73
4	*2437.00	100.94 AV			1.00 V	248	100.21	0.73
5	2483.50	68.25 PK	74.00	-5.75	1.00 V	248	67.29	0.96
6	2483.50	51.14 AV	54.00	-2.86	1.00 V	248	50.18	0.96
7	4874.00	48.67 PK	74.00	-25.33	1.42 V	108	40.05	8.62
8	4874.00	36.23 AV	54.00	-17.77	1.42 V	108	27.61	8.62

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	100.84 PK			3.78 H	220	100.05	0.79
2	*2452.00	91.13 AV			3.78 H	220	90.34	0.79
3	2483.50	65.09 PK	74.00	-8.91	3.78 H	220	64.13	0.96
4	2483.50	45.58 AV	54.00	-8.42	3.78 H	220	44.62	0.96
5	4904.00	48.13 PK	74.00	-25.87	2.38 H	194	39.33	8.80
6	4904.00	34.90 AV	54.00	-19.10	2.38 H	194	26.10	8.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	109.03 PK			1.50 V	228	108.24	0.79
2	*2452.00	99.98 AV			1.50 V	228	99.19	0.79
3	2483.50	72.04 PK	74.00	-1.96	1.50 V	228	71.08	0.96
4	2483.50	52.98 AV	54.00	-1.02	1.50 V	228	52.02	0.96
5	4904.00	48.92 PK	74.00	-25.08	1.87 V	45	40.12	8.80
6	4904.00	36.34 AV	54.00	-17.66	1.87 V	45	27.54	8.80

REMARKS:

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

Below 1GHz Data:

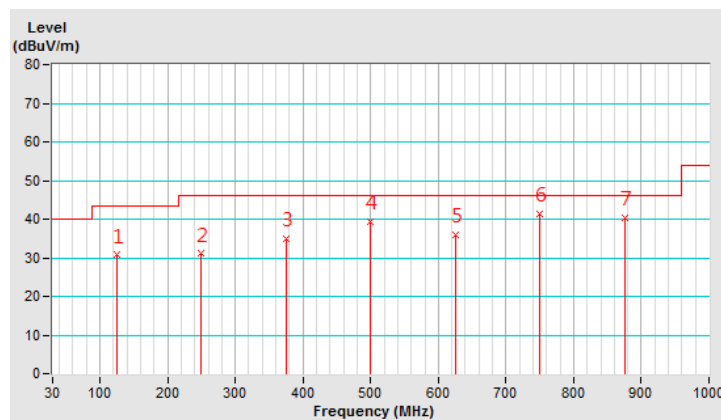
802.11n (20MHz)

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	30.71 QP	43.50	-12.79	2.25 H	102	39.25	-8.54
2	250.00	31.02 QP	46.00	-14.98	1.89 H	245	37.87	-6.85
3	375.03	34.84 QP	46.00	-11.16	2.54 H	268	38.35	-3.51
4	500.01	39.40 QP	46.00	-6.60	2.01 H	360	40.07	-0.67
5	625.05	36.07 QP	46.00	-9.93	1.74 H	121	33.72	2.35
6	750.03	41.29 QP	46.00	-4.71	1.24 H	259	36.75	4.54
7	875.02	40.47 QP	46.00	-5.53	1.62 H	178	34.07	6.40

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.

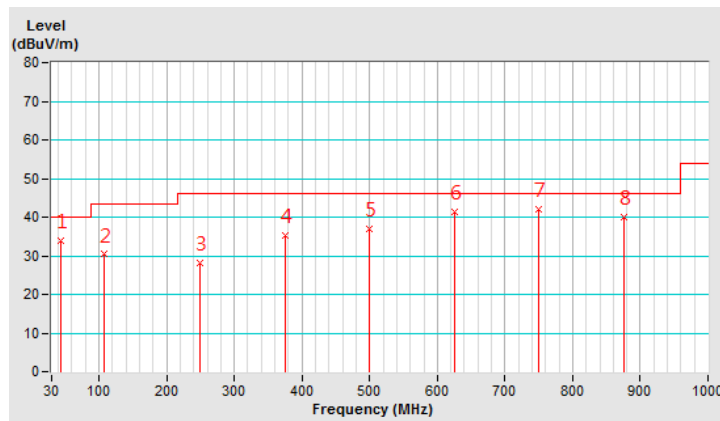


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	42.95	33.91 QP	40.00	-6.09	1.08 V	157	41.40	-7.49
2	106.68	30.35 QP	43.50	-13.15	1.34 V	355	40.75	-10.40
3	250.00	28.26 QP	46.00	-17.74	1.52 V	212	35.11	-6.85
4	375.03	35.36 QP	46.00	-10.64	1.87 V	208	38.87	-3.51
5	500.01	37.05 QP	46.00	-8.95	1.64 V	113	37.72	-0.67
6	625.00	41.40 QP	46.00	-4.60	2.26 V	125	39.05	2.35
7	750.01	42.03 QP	46.00	-3.97	2.78 V	287	37.49	4.54
8	875.02	40.14 QP	46.00	-5.86	1.00 V	315	33.74	6.40

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
ROHDE & SCHWARZ TEST RECEIVER	ESR3	102414	Jan. 17, 2019	Jan. 16, 2020
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101196	Apr. 16, 2019	Apr. 15, 2020
LISN With Adapter (for EUT)	101196	NA	Apr. 16, 2019	Apr. 15, 2020
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 30, 2018	Nov. 29, 2019
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 14, 2019	May 13, 2020
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 13, 2019	Feb. 12, 2020
LYNICS Terminator (For ROHDE & SCHWARZ LISN)	0900510	E1-011484	May 13, 2019	May 12, 2020
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 21, 2018	Nov. 20, 2019
LISN With Adapter (for TV EUT)	100220	NA	Nov. 21, 2018	Nov. 20, 2019

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 Shielded Room No. 10.

4.2.3 Test Procedures

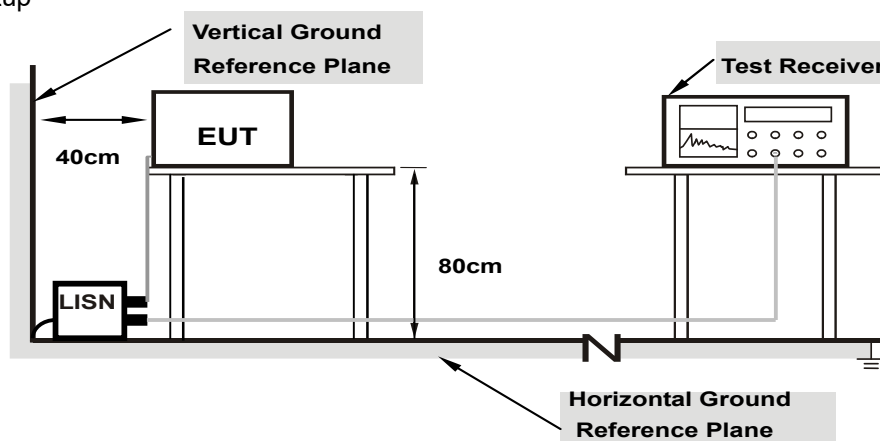
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

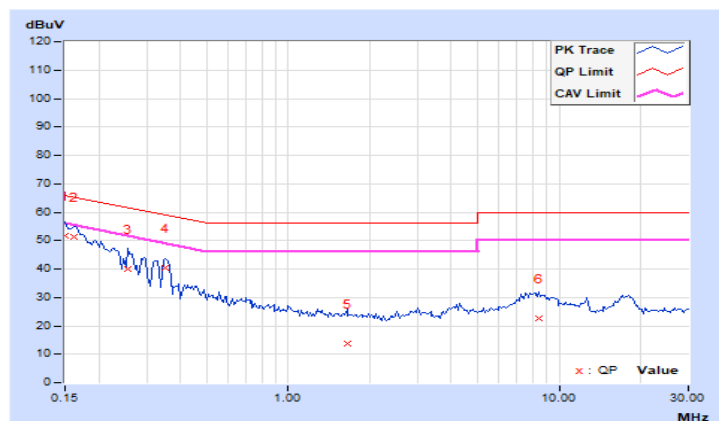
4.2.7 Test Results

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

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	0.15000	9.66	42.15	28.96	51.81	38.62	66.00	56.00	-14.19	-17.38
2	0.16172	9.68	41.76	30.00	51.44	39.68	65.38	55.38	-13.94	-15.70
3	0.25547	9.72	30.35	20.74	40.07	30.46	61.58	51.58	-21.51	-21.12
4	0.34922	9.75	30.83	21.84	40.58	31.59	58.98	48.98	-18.40	-17.39
5	1.64844	9.96	3.83	1.07	13.79	11.03	56.00	46.00	-42.21	-34.97
6	8.43750	10.25	12.27	5.97	22.52	16.22	60.00	50.00	-37.48	-33.78

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.

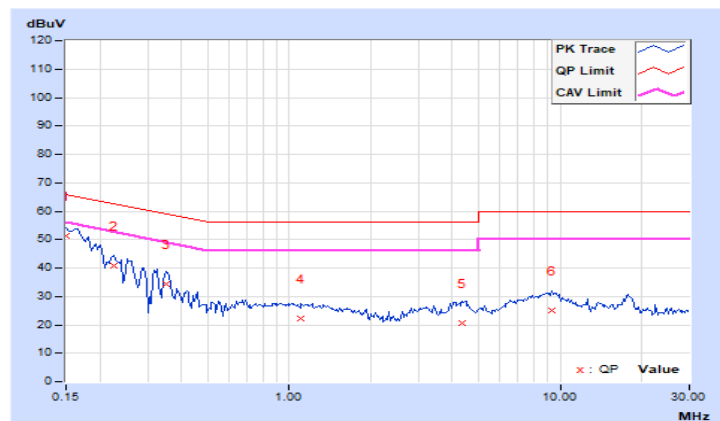


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	-----------------------------------

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	0.15000	9.70	41.57	27.82	51.27	37.52	66.00	56.00	-14.73	-18.48
2	0.22422	9.75	30.93	17.56	40.68	27.31	62.66	52.66	-21.98	-25.35
3	0.34922	9.80	24.55	13.76	34.35	23.56	58.98	48.98	-24.63	-25.42
4	1.10938	9.96	12.42	6.42	22.38	16.38	56.00	46.00	-33.62	-29.62
5	4.36328	10.14	10.38	2.97	20.52	13.11	56.00	46.00	-35.48	-32.89
6	9.32813	10.21	14.83	8.45	25.04	18.66	60.00	50.00	-34.96	-31.34

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.

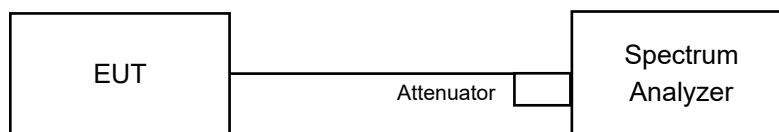


4.3 6dB Bandwidth Measurement

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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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
		Chain 0	Chain 1		
1	2412	10.13	10.14	0.5	PASS
6	2437	10.14	10.13	0.5	PASS
11	2462	10.14	10.13	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.34	16.35	0.5	PASS
6	2437	15.54	15.92	0.5	PASS
11	2462	16.35	16.35	0.5	PASS

802.11n (20MHz)

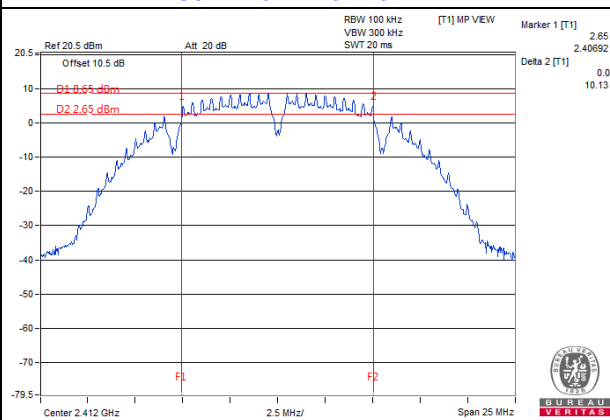
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.04	16.32	0.5	PASS
6	2437	15.79	15.40	0.5	PASS
11	2462	16.57	16.68	0.5	PASS

802.11n (40MHz)

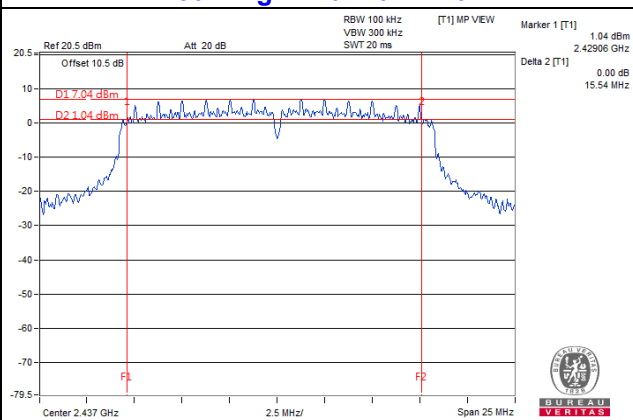
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.25	35.25	0.5	PASS
6	2437	35.26	35.26	0.5	PASS
9	2452	35.26	35.26	0.5	PASS

Spectrum Plot of Worst Value

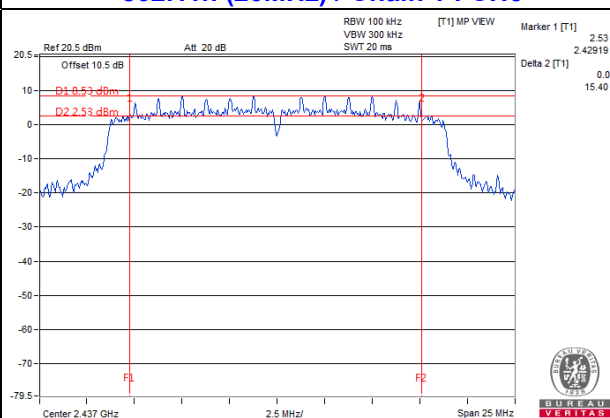
802.11b / Chain 0 : CH1



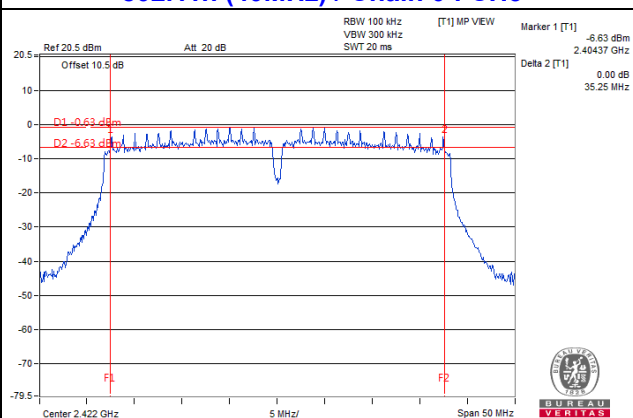
802.11g / Chain 0 : CH6



802.11n (20MHz) / Chain 1 : CH6



802.11n (40MHz) / Chain 0 : CH3



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)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

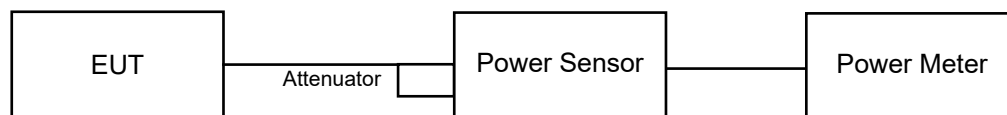
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

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

FOR PEAK POWER

802.11b

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.19	20.46	242.695	23.85	30	Pass
6	2437	22.52	22.89	373.185	25.72	30	Pass
11	2462	21.21	20.98	257.444	24.11	30	Pass

802.11g

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	22.52	22.24	346.143	25.39	30	Pass
6	2437	24.45	24.48	559.155	27.48	30	Pass
11	2462	22.21	22.36	338.528	25.30	30	Pass

802.11n (20MHz)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	22.92	22.26	364.151	25.61	30	Pass
6	2437	24.76	24.78	599.834	27.78	30	Pass
11	2462	21.08	21.43	267.228	24.27	30	Pass

802.11n (40MHz)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	21.96	21.84	309.793	24.91	30	Pass
6	2437	22.29	22.36	341.621	25.34	30	Pass
9	2452	22.32	22.42	345.190	25.38	30	Pass

FOR AVERAGE POWER

802.11b

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.08	18.57	152.855	21.84	30	Pass
6	2437	20.29	20.05	208.063	23.18	30	Pass
11	2462	19.14	19.47	170.547	22.32	30	Pass

802.11g

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	15.64	15.05	68.633	18.37	30	Pass
6	2437	18.31	18.39	136.788	21.36	30	Pass
11	2462	14.75	14.83	60.263	17.80	30	Pass

802.11n (20MHz)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	14.77	14.54	58.437	17.67	30	Pass
6	2437	19.21	19.30	168.482	22.27	30	Pass
11	2462	13.83	14.07	49.682	16.96	30	Pass

802.11n (40MHz)

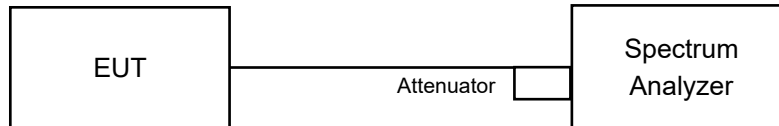
Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	13.47	13.31	43.662	16.40	30	Pass
6	2437	14.78	14.85	60.610	17.83	30	Pass
9	2452	13.15	13.21	41.595	16.19	30	Pass

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 $\geq 98\%$)

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

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

- Measure the duty cycle (x).
- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span/RBW}$.
- Sweep time = auto couple.
- Do not use sweep triggering. Allow sweep to "free run".
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.
- 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

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-4.64	3.01	-1.63	8.00	Pass
	6	2437	-3.89	3.01	-0.88	8.00	Pass
	11	2462	-3.39	3.01	-0.38	8.00	Pass
1	1	2412	-4.67	3.01	-1.66	8.00	Pass
	6	2437	-3.44	3.01	-0.43	8.00	Pass
	11	2462	-4.58	3.01	-1.57	8.00	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / 2] = 5.81\text{dBi} < 6\text{dBi}$, so the PSD limit is not reduced.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-9.64	3.01	-6.63	8.00	Pass
	6	2437	-7.32	3.01	-4.31	8.00	Pass
	11	2462	-10.77	3.01	-7.76	8.00	Pass
1	1	2412	-8.82	3.01	-5.81	8.00	Pass
	6	2437	-7.80	3.01	-4.79	8.00	Pass
	11	2462	-11.19	3.01	-8.18	8.00	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / 2] = 5.81\text{dBi} < 6\text{dBi}$, so the PSD limit is not reduced.

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-11.17	3.01	-8.16	8.00	Pass
	6	2437	-6.52	3.01	-3.51	8.00	Pass
	11	2462	-11.72	3.01	-8.71	8.00	Pass
1	1	2412	-11.46	3.01	-8.45	8.00	Pass
	6	2437	-6.36	3.01	-3.35	8.00	Pass
	11	2462	-11.89	3.01	-8.88	8.00	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / 2] = 5.81\text{dBi} < 6\text{dBi}$, so the PSD limit is not reduced.

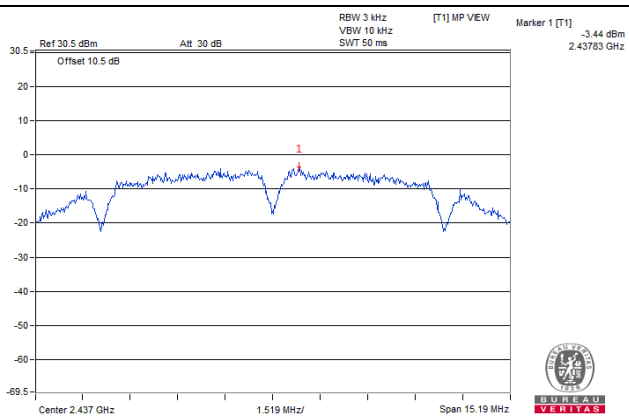
802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-16.39	3.01	-13.38	8.00	Pass
	6	2437	-14.36	3.01	-11.35	8.00	Pass
	9	2452	-15.61	3.01	-12.60	8.00	Pass
1	3	2422	-15.21	3.01	-12.20	8.00	Pass
	6	2437	-14.70	3.01	-11.69	8.00	Pass
	9	2452	-15.59	3.01	-12.58	8.00	Pass

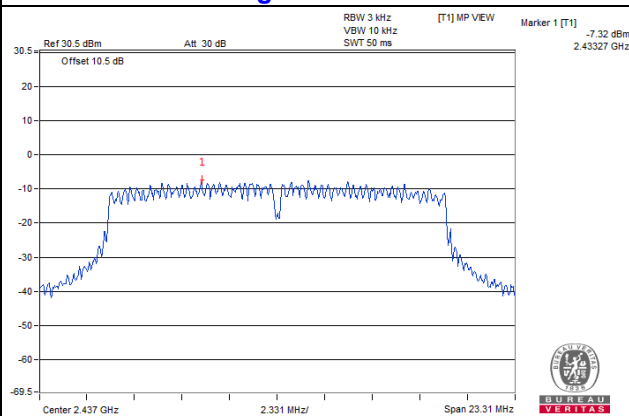
Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / 2] = 5.81\text{dBi} < 6\text{dBi}$, so the PSD limit is not reduced.

Spectrum Plot of Worst Value

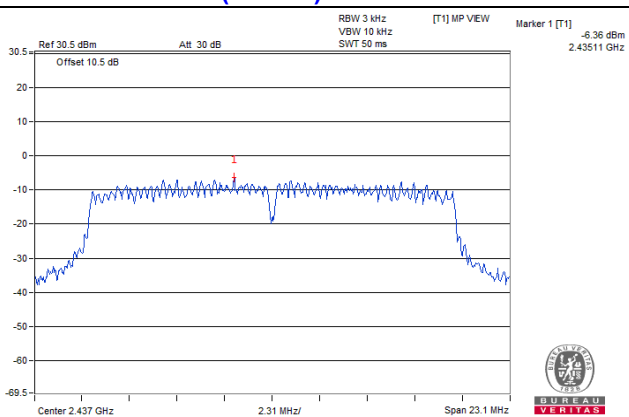
802.11b / Chain 1 : CH6



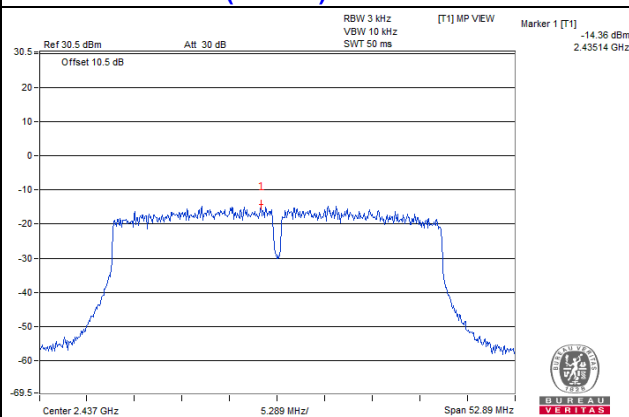
802.11g / Chain 0 : CH6



802.11n (20MHz) / Chain 1 : CH6



802.11n (40MHz) / Chain 0 : CH6

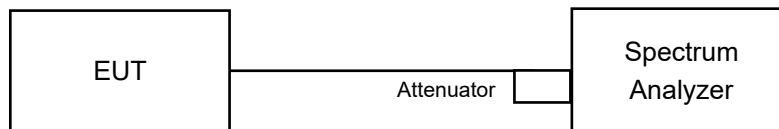


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

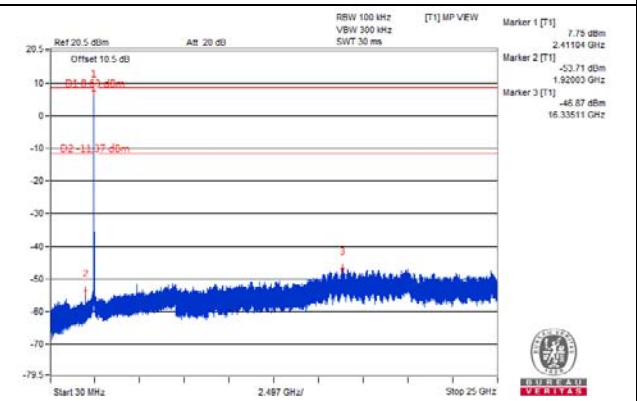
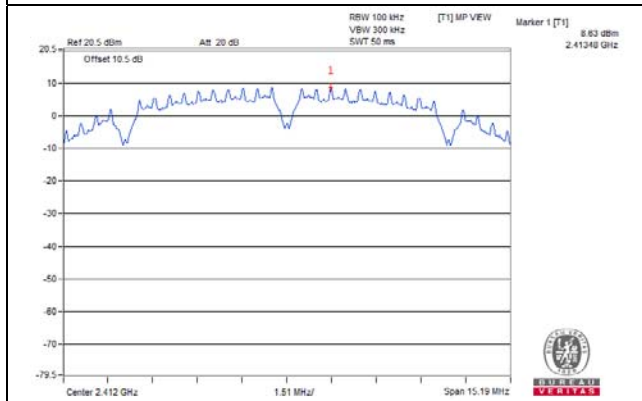
Same as Item 4.3.6

4.6.7 Test Results

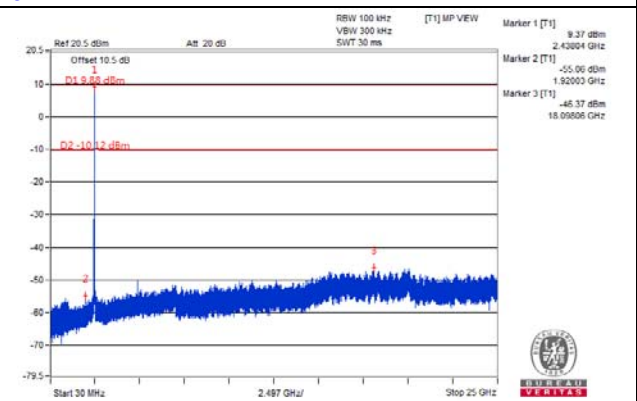
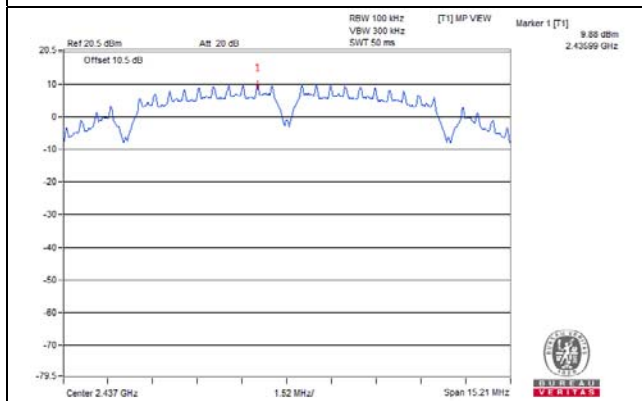
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b: CHAIN 0

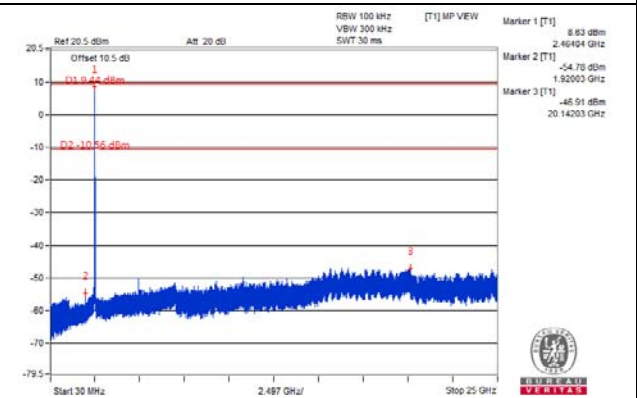
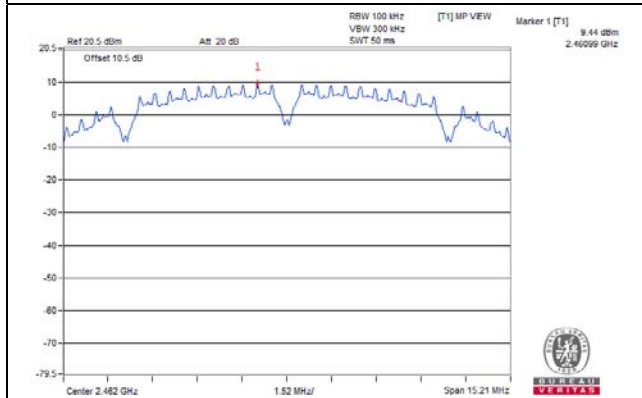
CH 1



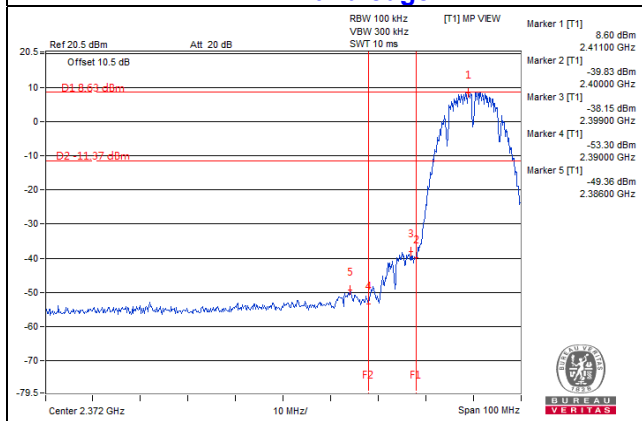
CH 6



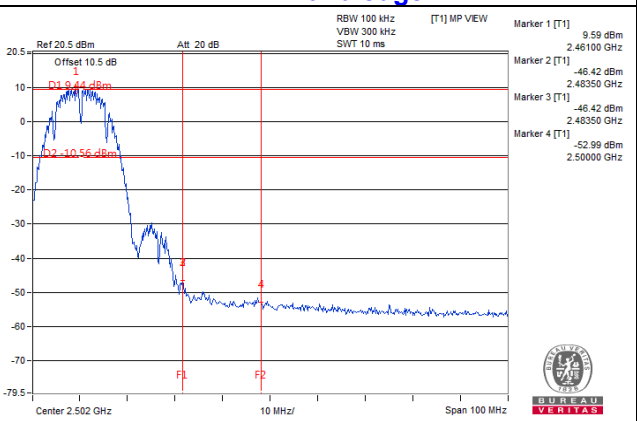
CH 11



CH 1 Band edge

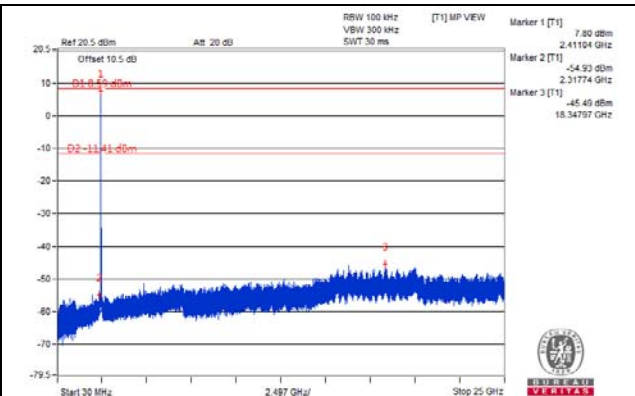
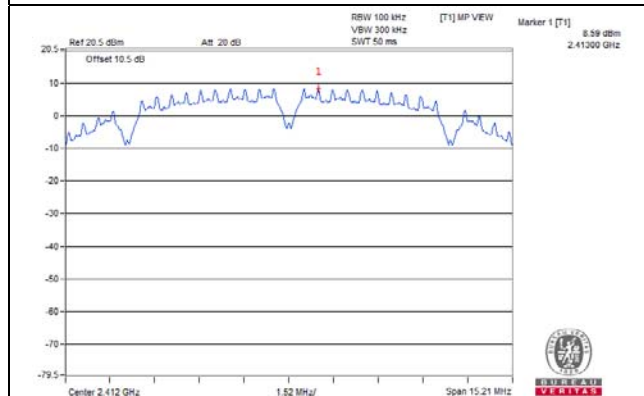


CH 11 Band edge

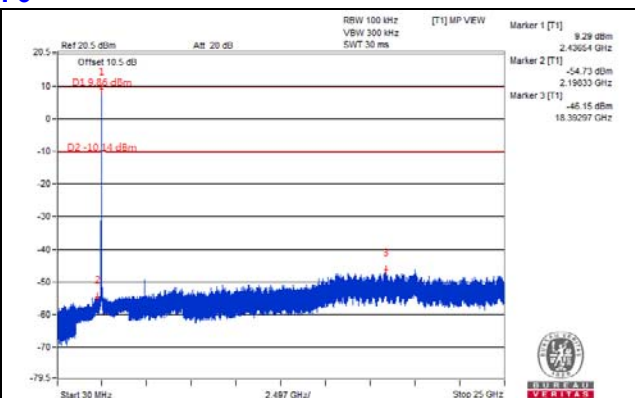
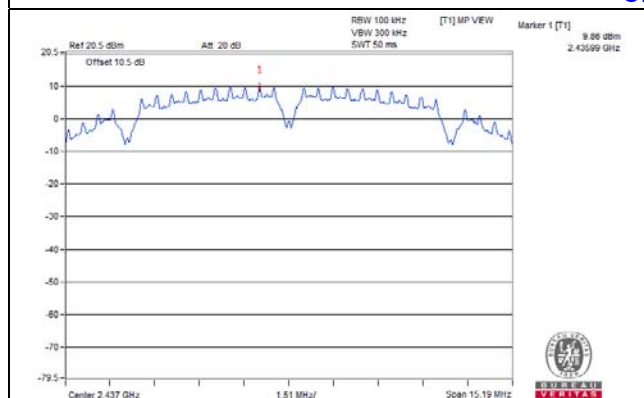


CHAIN 1

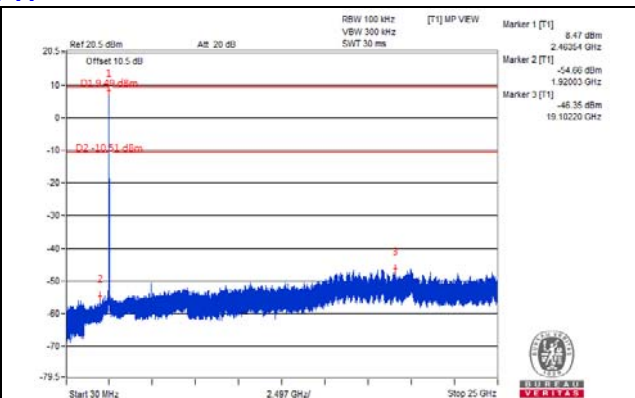
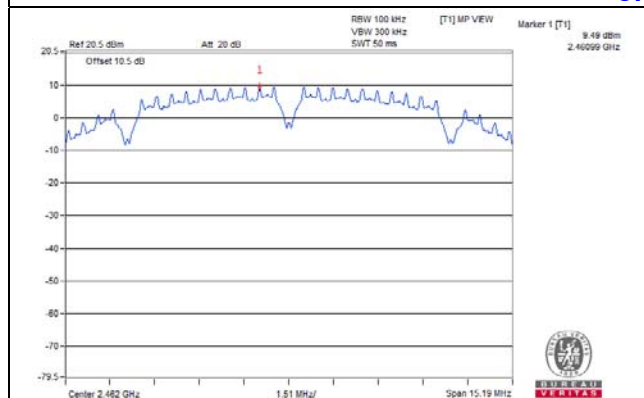
CH 1



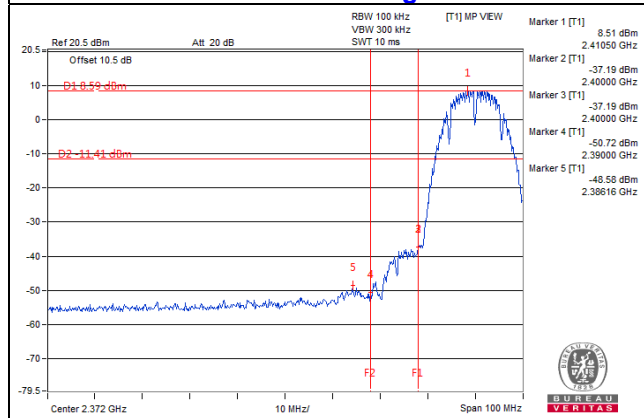
CH 6



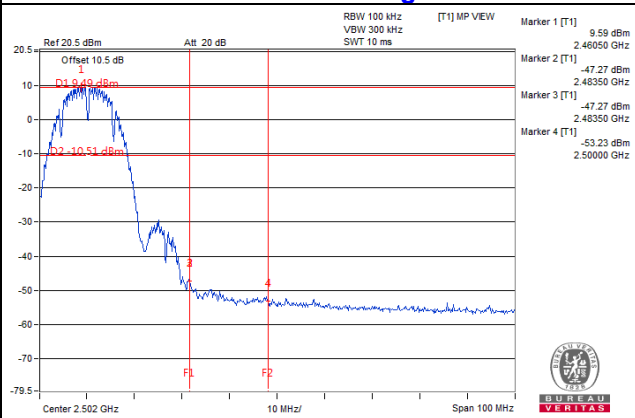
CH 11



CH 1 Band edge

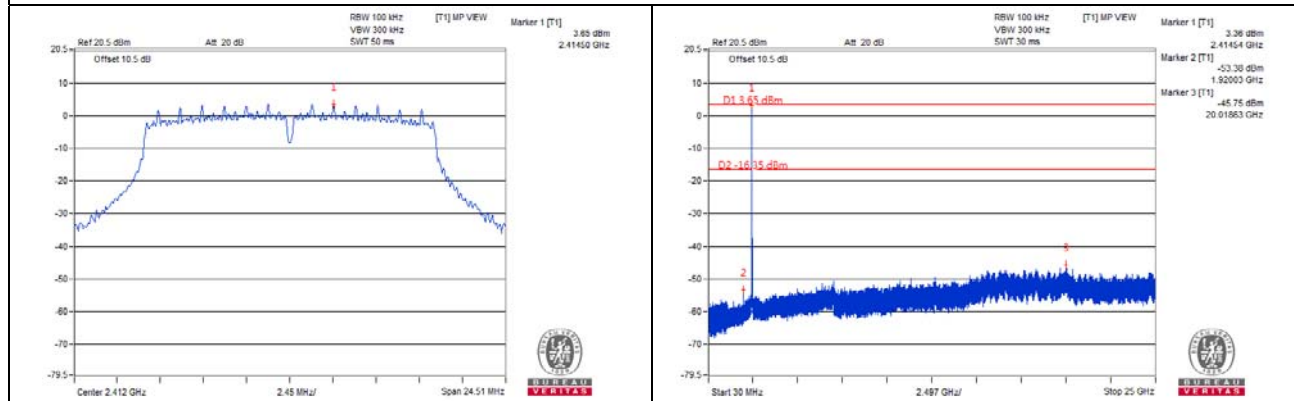


CH 11 Band edge

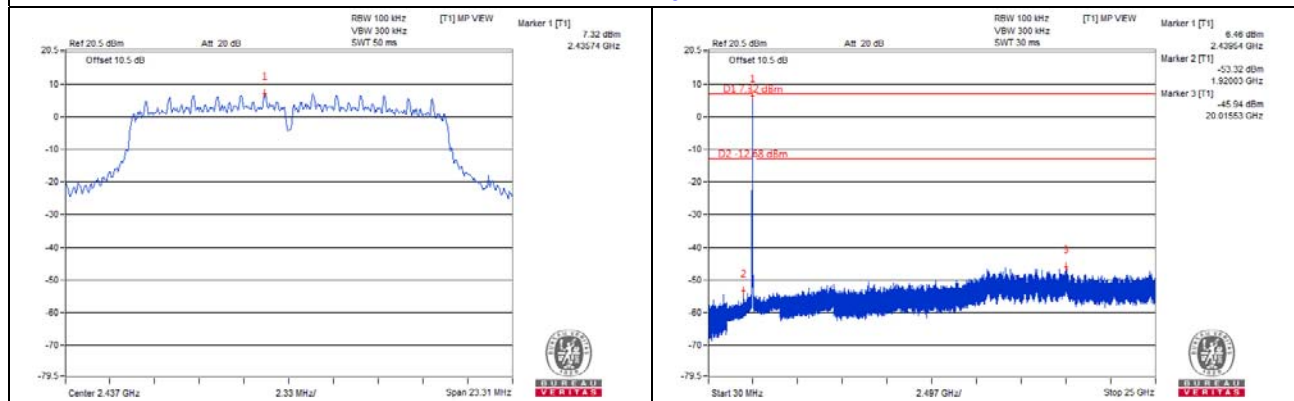


802.11g: CHAIN 0

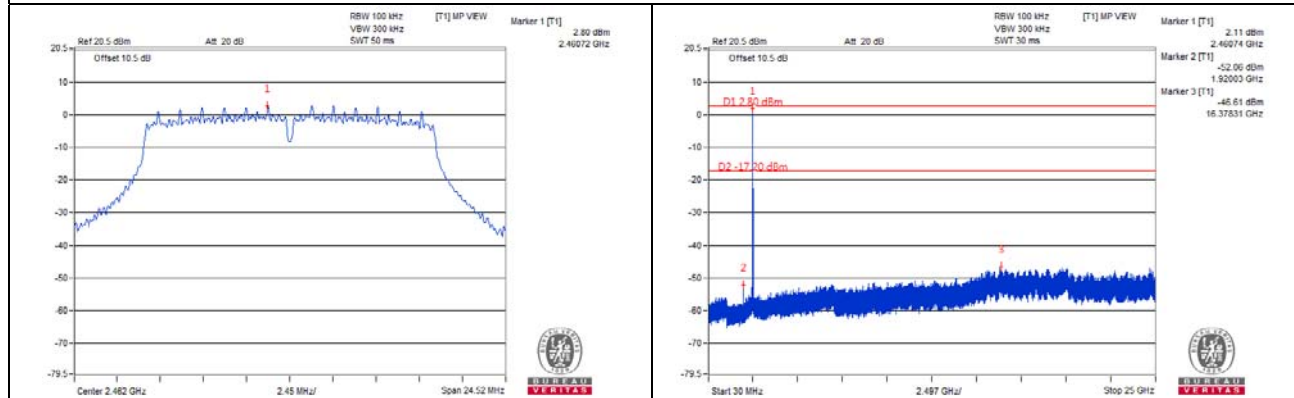
CH 1



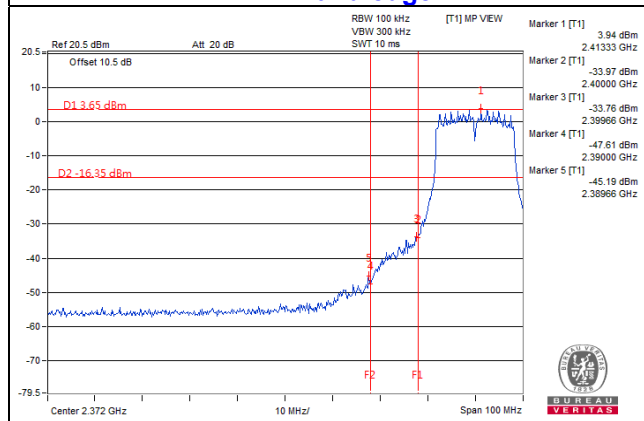
CH 6



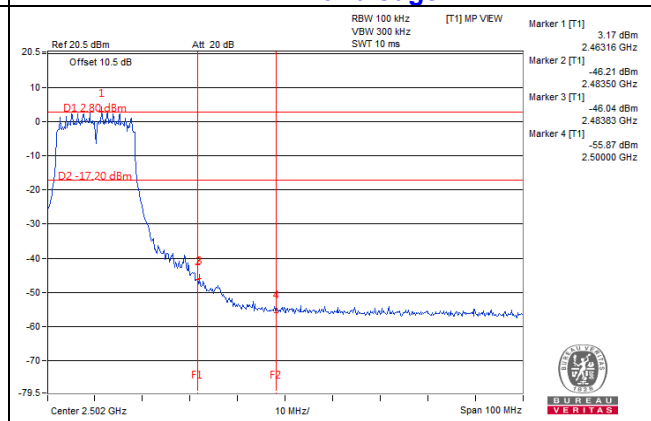
CH 11



CH 1 Band edge

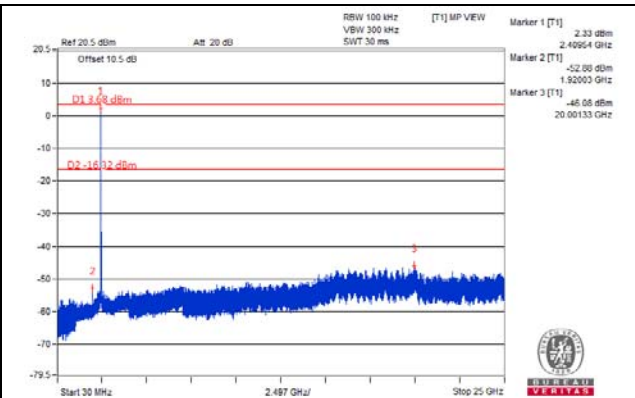
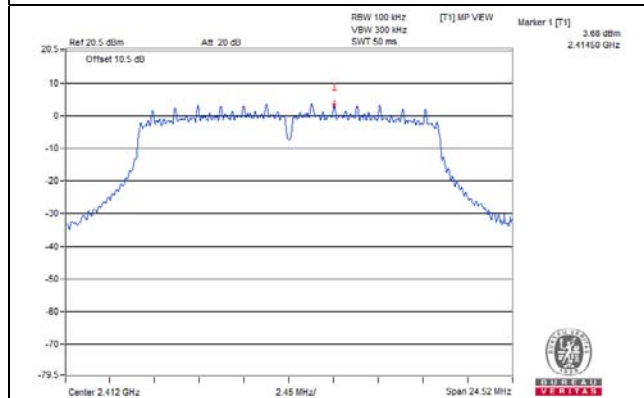


CH 11 Band edge

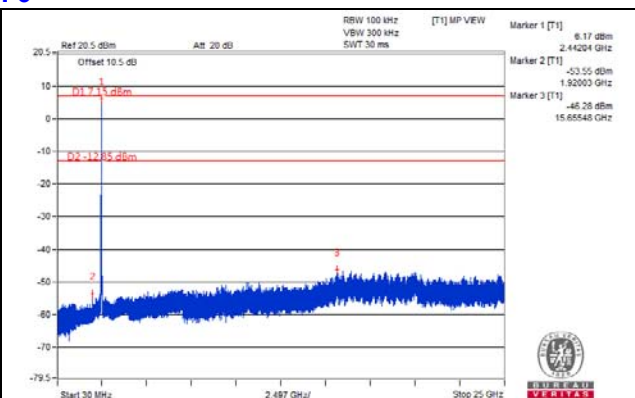
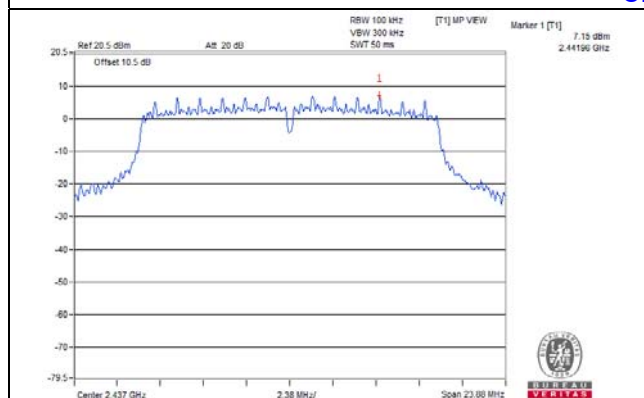


CHAIN 1

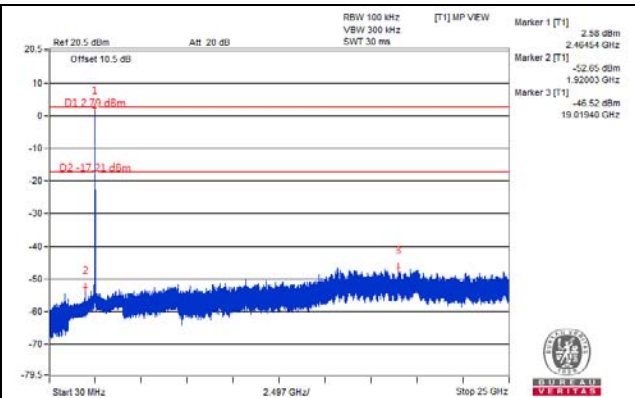
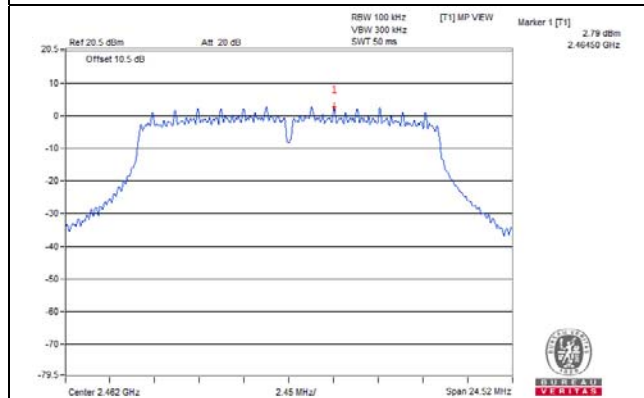
CH 1



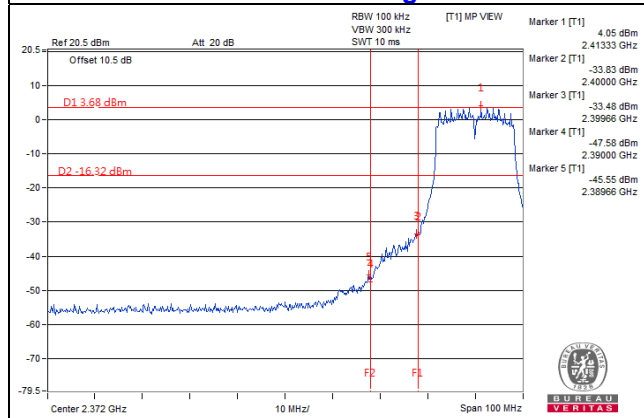
CH 6



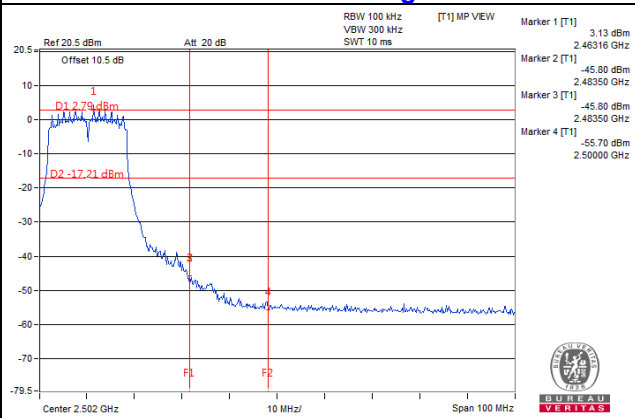
CH 11



CH 1 Band edge

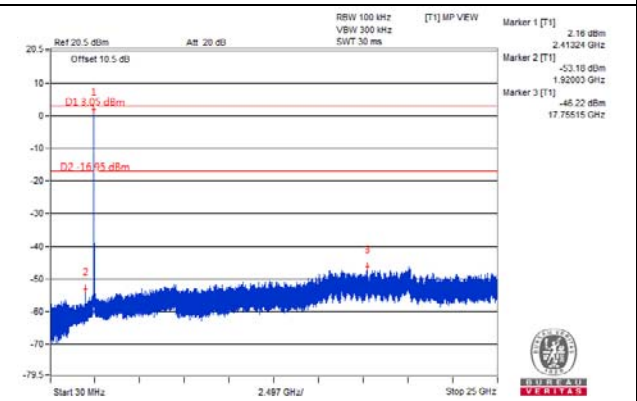
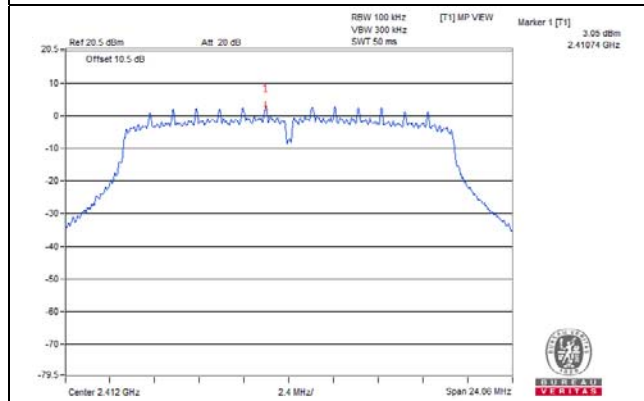


CH 11 Band edge

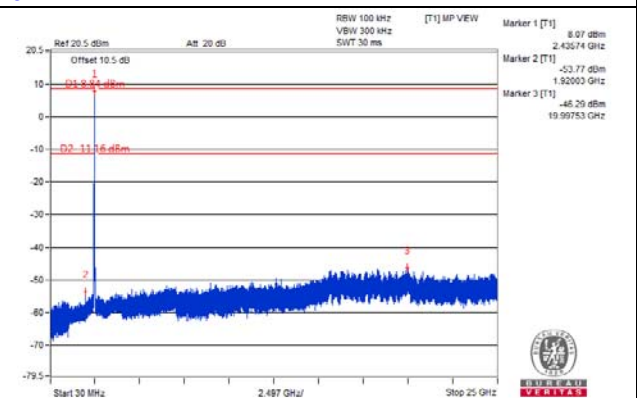
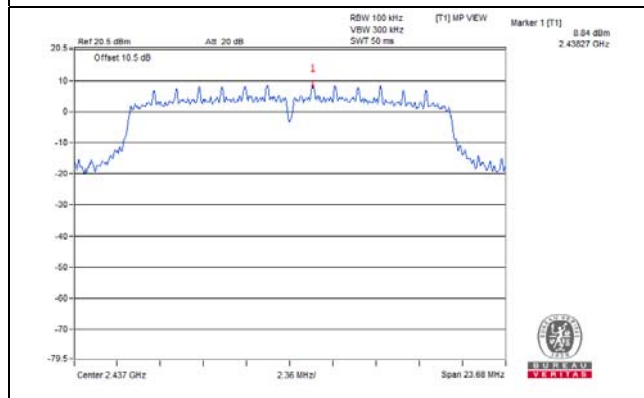


802.11n (20MHz): CHAIN 0

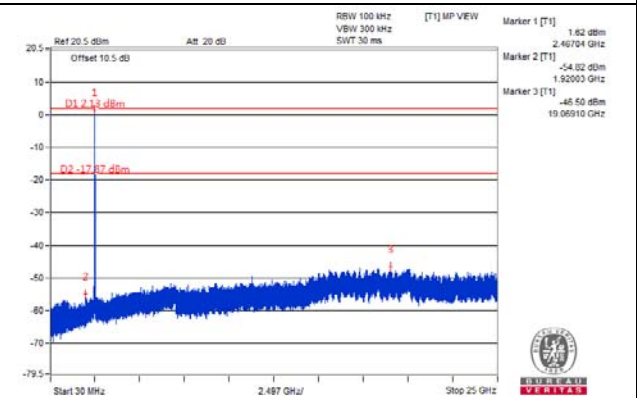
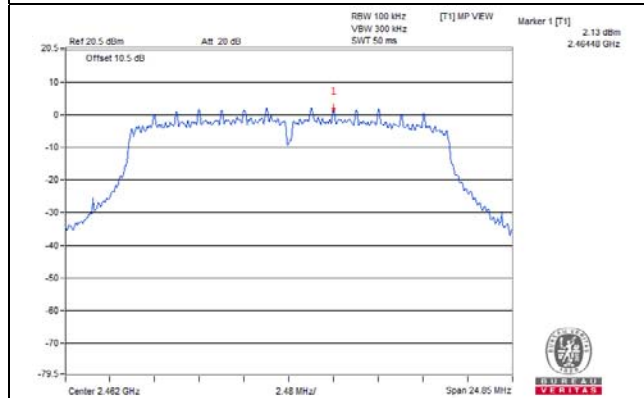
CH 1



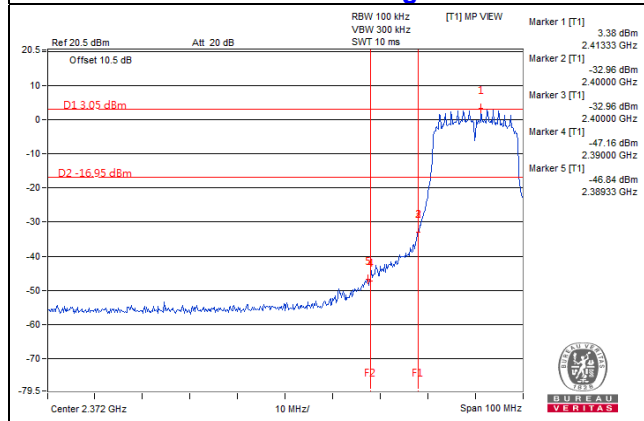
CH 6



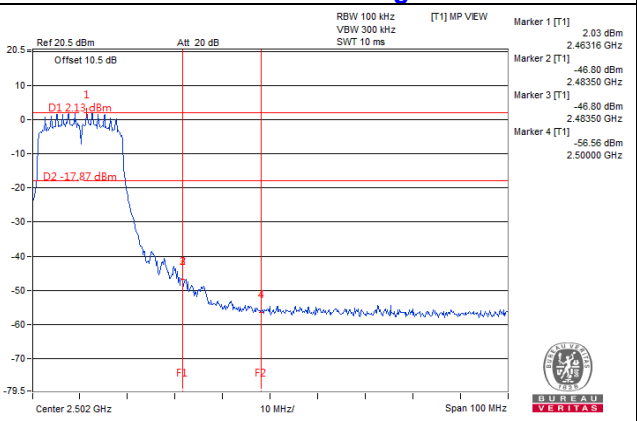
CH 11



CH 1 Band edge

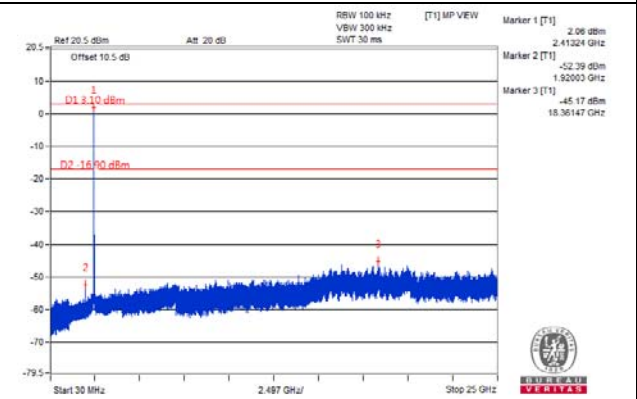
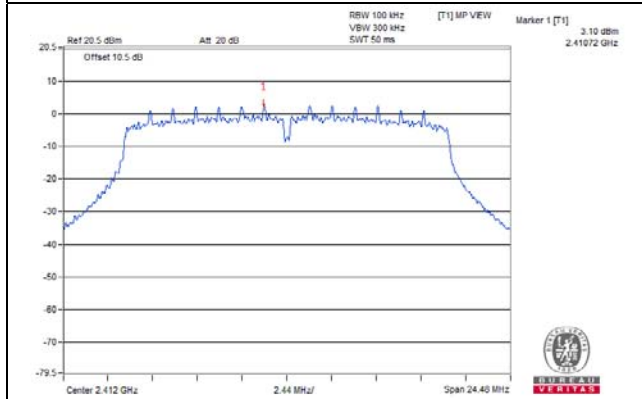


CH 11 Band edge

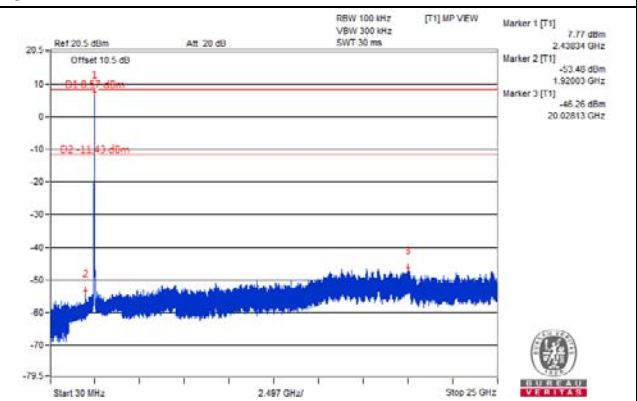
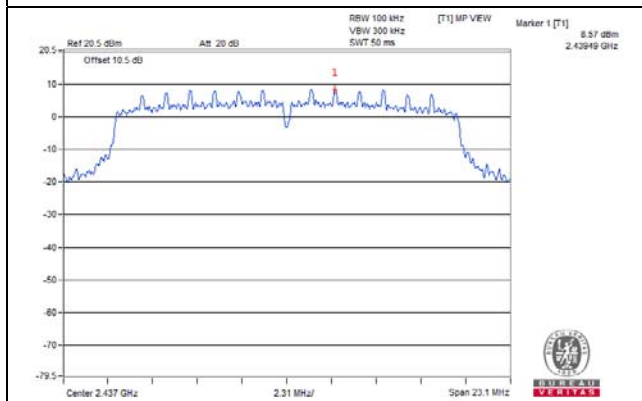


CHAIN 1

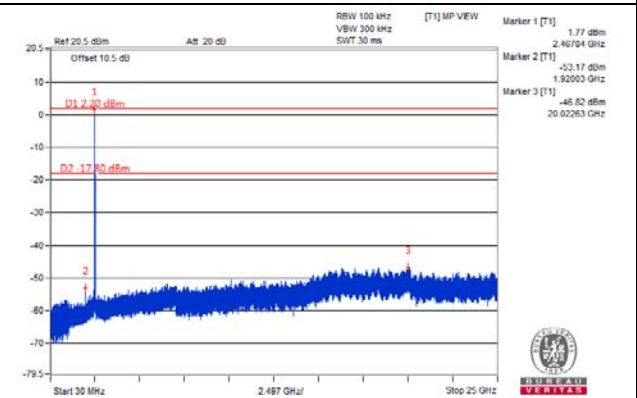
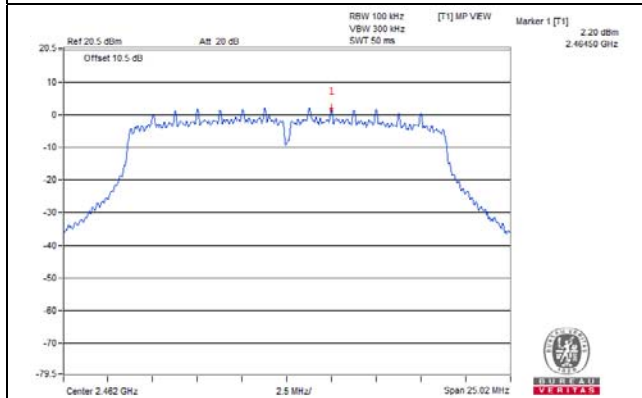
CH 1



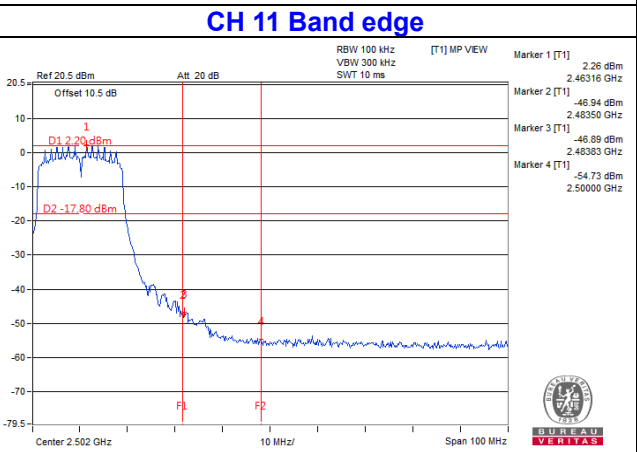
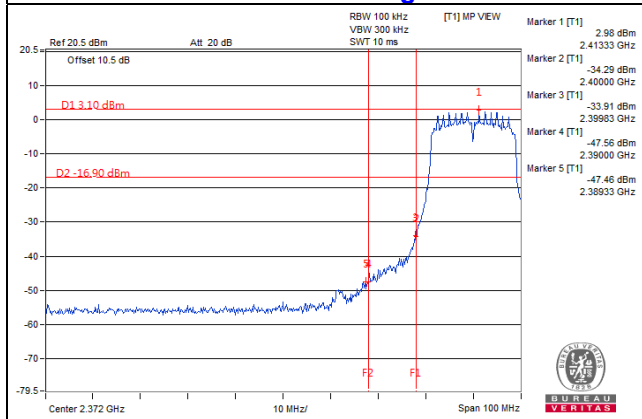
CH 6



CH 11

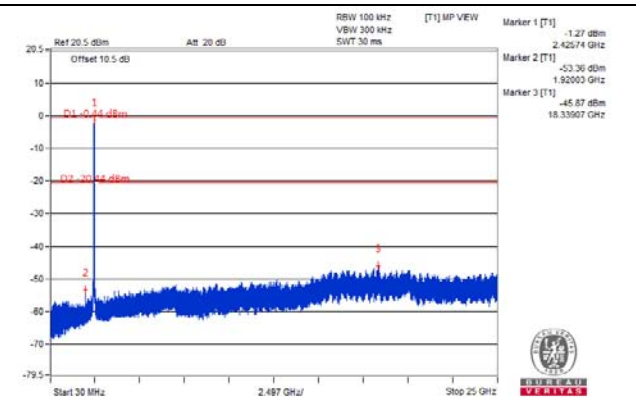
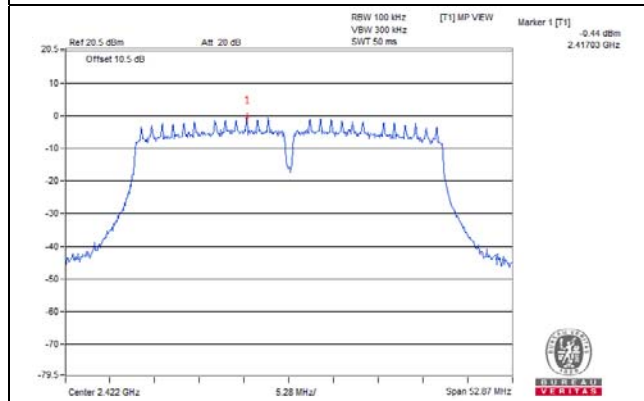


CH 1 Band edge

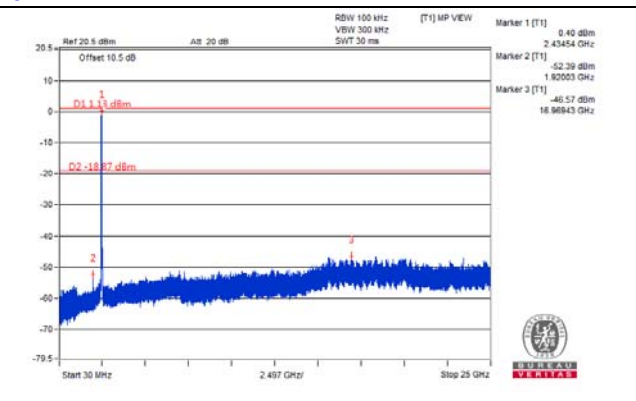
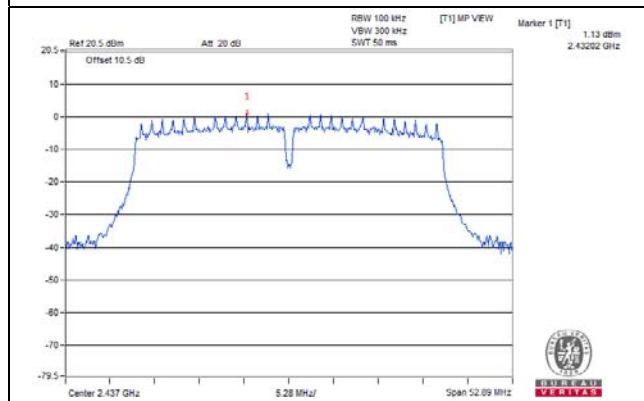


802.11n (40MHz): CHAIN 0

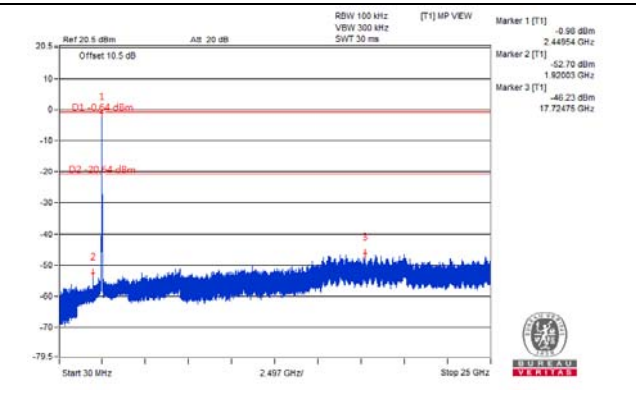
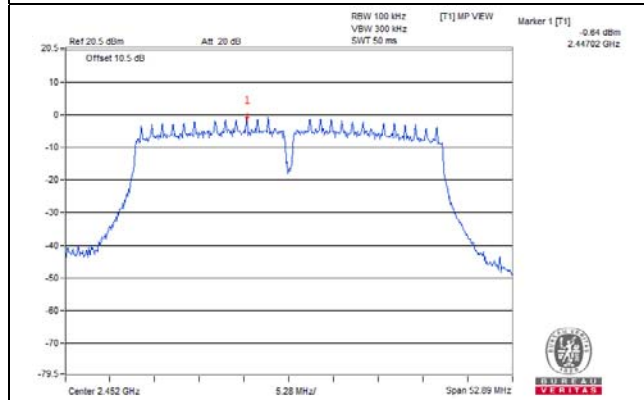
CH 3



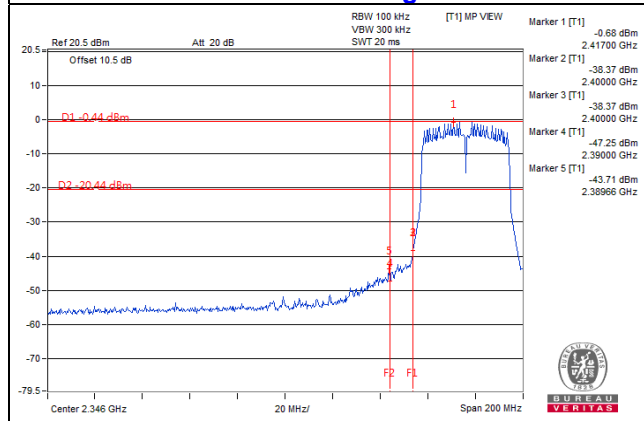
CH 6



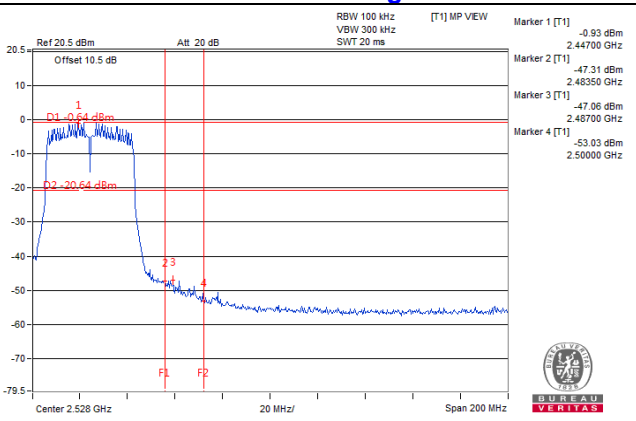
CH 9



CH 3 Band edge

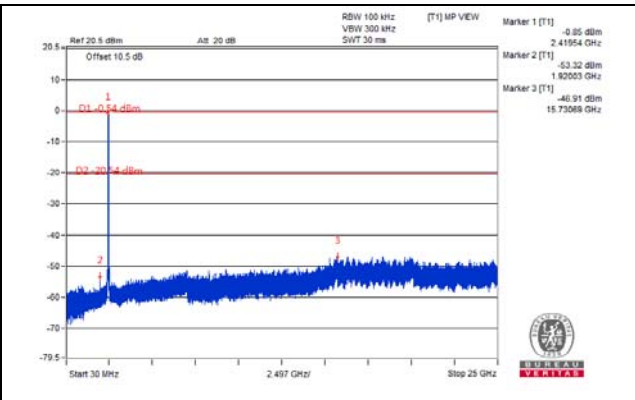
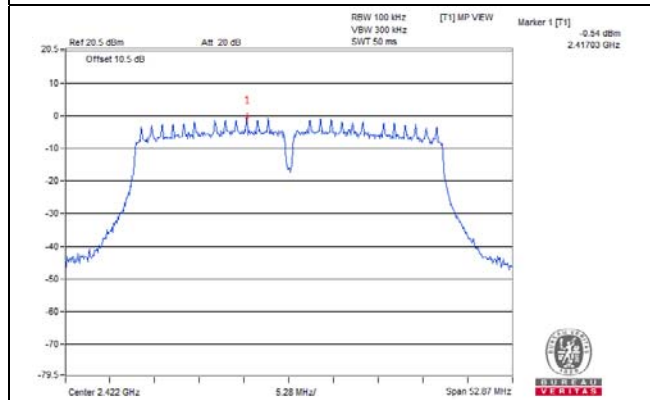


CH 9 Band edge

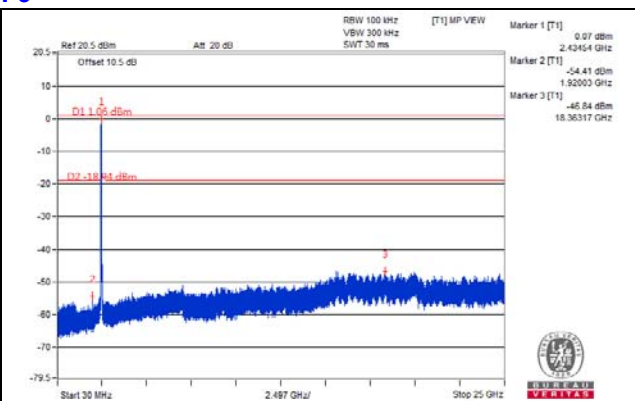
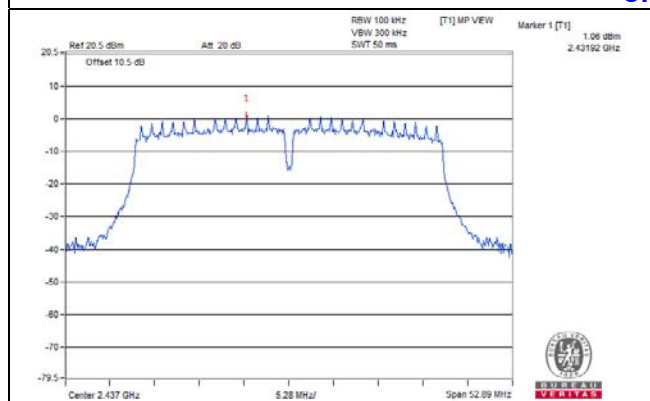


CHAIN 1

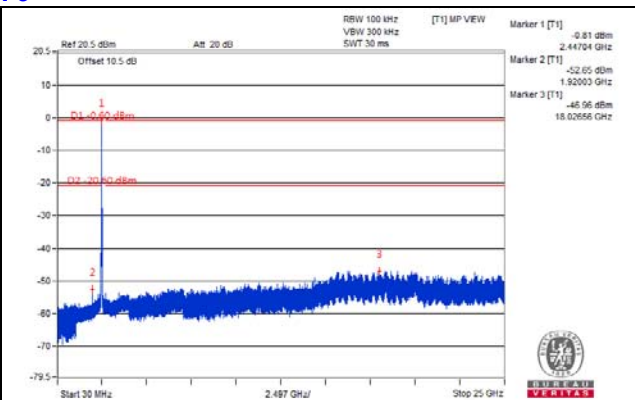
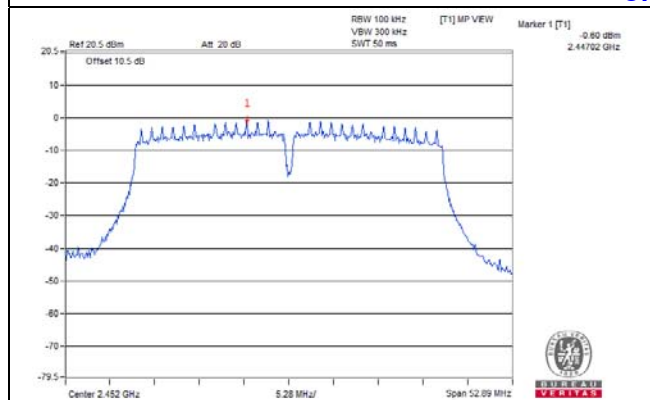
CH 3



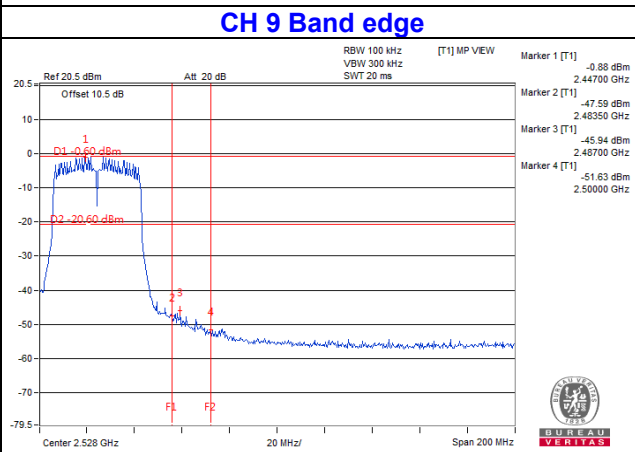
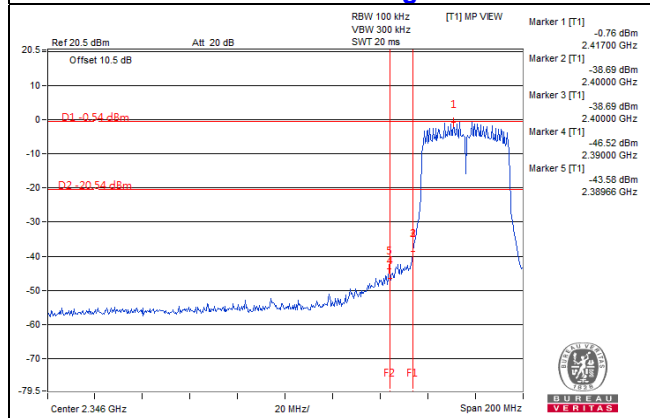
CH 6



CH 9



CH 3 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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Email: service.adt@tw.bureauveritas.com

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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