

FCC Test Report

Report No.: RF170731E08

FCC ID: XHHBNRV520-A

Test Model: BNRV520

Received Date: July 31, 2017

Test Date: Aug. 14 to 16, 2017

Issued Date: Sep. 11, 2017

Applicant: Barnes&Noble.com

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Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Modification Record	6
3 General Information	7
3.1 General Description of EUT	7
3.2 Description of Test Modes	8
3.2.1 Test Mode Applicability and Tested Channel Detail	9
3.3 Duty Cycle of Test Signal	11
3.4 Description of Support Units	12
3.4.1 Configuration of System under Test	13
3.5 General Description of Applied Standards	14
4 Test Types and Results	15
4.1 Radiated Emission and Bandedge Measurement	15
4.1.1 Limits of Radiated Emission and Bandedge Measurement	15
4.1.2 Test Instruments	16
4.1.3 Test Procedures	17
4.1.4 Deviation from Test Standard	17
4.1.5 Test Setup	18
4.1.6 EUT Operating Conditions	19
4.1.7 Test Results	20
4.2 Conducted Emission Measurement	30
4.2.1 Limits of Conducted Emission Measurement	30
4.2.2 Test Instruments	30
4.2.3 Test Procedures	31
4.2.4 Deviation from Test Standard	31
4.2.5 Test Setup	31
4.2.6 EUT Operating Conditions	31
4.2.7 Test Results (Mode 1)	32
4.2.8 Test Results (Mode 2)	34
4.3 6dB Bandwidth Measurement	36
4.3.1 Limits of 6dB Bandwidth Measurement	36
4.3.2 Test Setup	36
4.3.3 Test Instruments	36
4.3.4 Test Procedure	36
4.3.5 Deviation from Test Standard	36
4.3.6 EUT Operating Conditions	36
4.3.7 Test Result	37
4.4 Conducted Output Power Measurement	39
4.4.1 Limits of Conducted Output Power Measurement	39
4.4.2 Test Setup	39
4.4.3 Test Instruments	39
4.4.4 Test Procedures	39
4.4.5 Deviation from Test Standard	39
4.4.6 EUT Operating Conditions	39
4.4.7 Test Results	40
4.5 Power Spectral Density Measurement	42
4.5.1 Limits of Power Spectral Density Measurement	42
4.5.2 Test Setup	42
4.5.3 Test Instruments	42
4.5.4 Test Procedure	42
4.5.5 Deviation from Test Standard	42

4.5.6 EUT Operating Condition	42
4.5.7 Test Results	43
4.6 Conducted Out of Band Emission Measurement	45
4.6.1 Limits of Conducted Out of Band Emission Measurement.....	45
4.6.2 Test Setup.....	45
4.6.3 Test Instruments	45
4.6.4 Test Procedure	45
4.6.5 Deviation from Test Standard	45
4.6.6 EUT Operating Condition	45
4.6.7 Test Results	45
5 Pictures of Test Arrangements.....	49
Appendix – Information on the Testing Laboratories	50

Release Control Record

Issue No.	Description	Date Issued
RF170731E08	Original release.	Sep. 11, 2017

1 Certificate of Conformity

Product: EBOOK READER

Brand: Nook

Test Model: BNRV520

Sample Status: ENGINEERING SAMPLE

Applicant: Barnes&Noble.com

Test Date: Aug. 14 to 16, 2017

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

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

Prepared by :

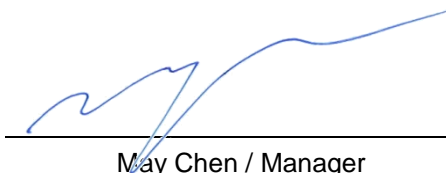


Wendy Wu / Specialist

Date:

Sep. 11, 2017

Approved by :



May Chen / Manager

Date:

Sep. 11, 2017

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 -3.52dB at 0.15MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -8.4dB at 2390MHz.
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 soldering terminal not a standard connector.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.30 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.16 dB
	6GHz ~ 18GHz	4.91 dB
	18GHz ~ 40GHz	5.30 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	EBOOK READER
Brand	Nook
Test Model	BNRV520
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.7~4.2V from battery DC 5V from USB interface
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 72.2Mbps
Operating Frequency	2.412 ~ 2.462GHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20)
Output Power	257.04mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	USB to Micro USB cable (shielded, 1.0m) x 1

Note:

1. The WiFi function will disable automatically when the device is under charging mode.
2. The EUT must be supplied with a battery as following table:

Brand	Model No.	Spec.
TCL	PR-285083	1500mAh ,3.7~4.2V

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

Brand	Model No.	Antenna Type	Antenna Net Gain(dBi)	Antenna Connector	Frequency range (MHz to MHz)	Cable Length (cm)
Walsin Technology Corporation	RFECA3216060AAT	Ceramic antenna	2	soldering terminal	2.4~2.4835	NA

4. For radiated emissions, the EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	Power from adapter
Mode B	Power from Battery

From the above modes, the worst case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.

5. The EUT incorporates a SISO function.

Modulation Mode	Data Rate (MCS)	TX & RX Configuration	
802.11b	1 ~ 11Mbps	1TX	1RX
802.11g	6 ~ 54Mbps	1TX	1RX
802.11n (HT20)	MCS 0~7	1TX	1RX

6. 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 (HT20):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE<1G	PLC	APCM	
1	√	√	√	√	Power from USB interface (Adapter)
2	-	-	√	-	Power from USB interface (Laptop)

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.

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

Radiated Emission Test (Below 1GHz):

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

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

Power Line Conducted Emission Test:

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

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

Antenna Port Conducted Measurement:

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

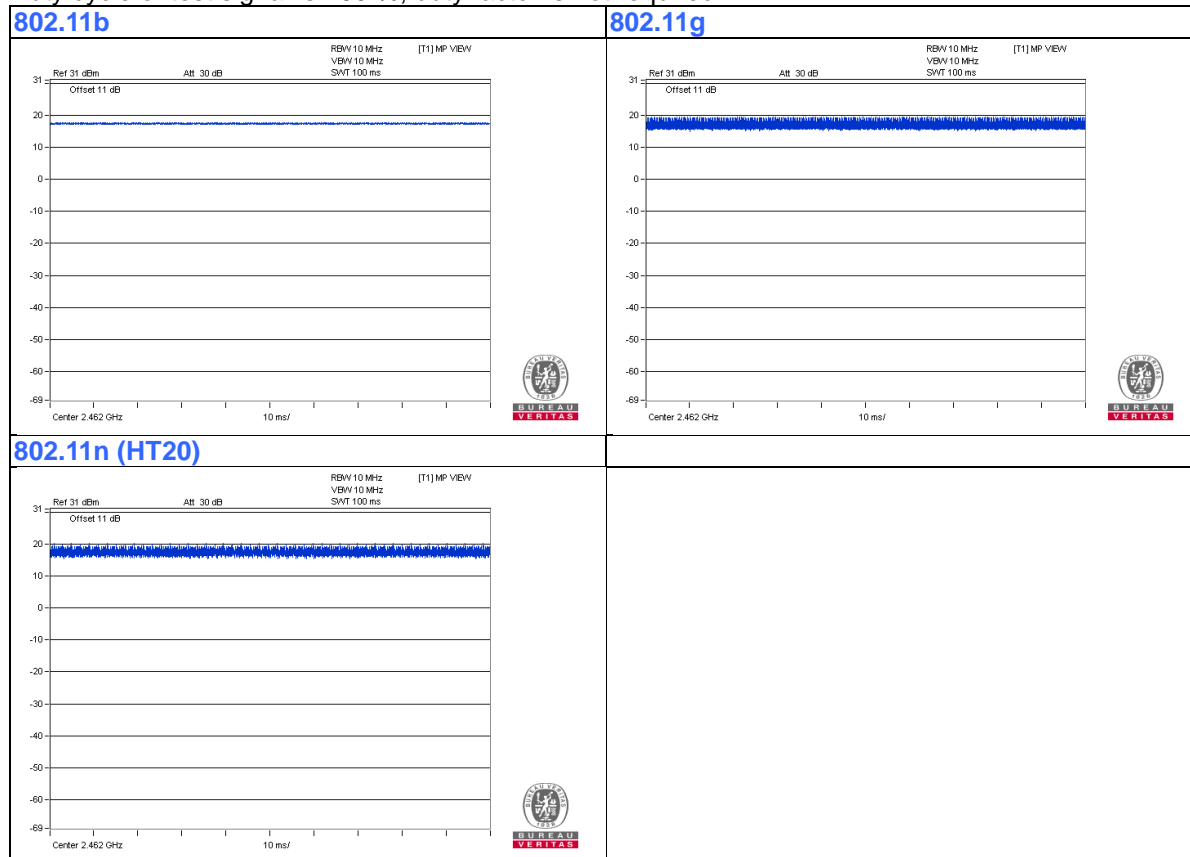
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (system)	TESTED BY
RE \geq 1G	21deg. C, 68%RH	120Vac, 60Hz	Eason Tseng
RE<1G	23deg. C, 65%RH	120Vac, 60Hz	Jyunchun Lin
PLC	25deg. C, 67%RH	120Vac, 60Hz	Jyunchun Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

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



3.4 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	USB Adapter	ASUS	EXA1205UA	NA	NA	Provided by Lab
B.	Laptop	HP	Pavilion 14-ab023TU	5CD5340WXZ	NA	Provided by Lab

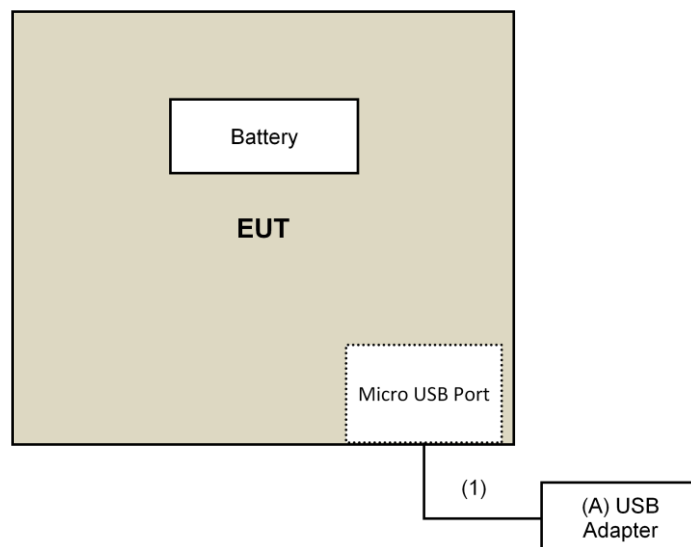
Note:

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

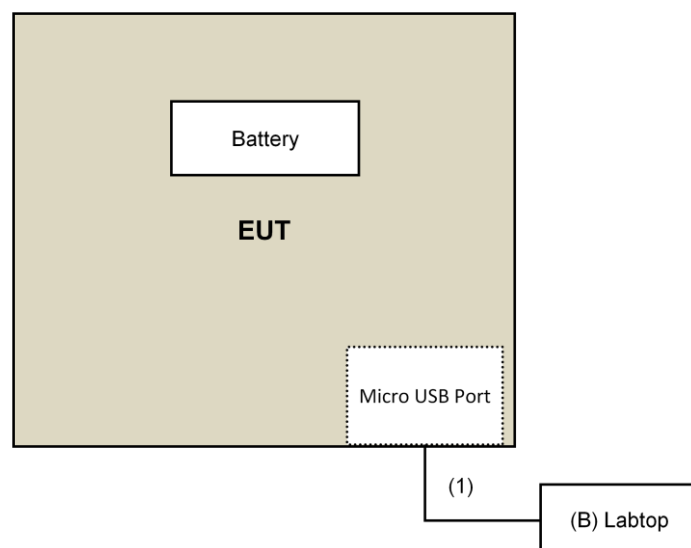
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Micro USB Cable	1	1	Yes	0	Supplied by client

3.4.1 Configuration of System under Test

For Mode 1



For Mode 2



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 DTS Meas Guidance v04
ANSI C63.10-2013

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 10, 2016	Nov. 09, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Dec. 13, 2016	Dec. 12, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 27, 2016	Dec. 26, 2017
Pre-Amplifier EMCI	EMC12630SE	980385	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1 200 EMC104-SM-SM-2 000 EMC104-SM-SM-5 000	160923 150318 150321	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Pre-Amplifier EMCI	EMC184045SE	980387	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated_V8. 7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA
Spectrum Analyzer R&S	FSV40	100964	July 1, 2017	June 30, 2018
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018

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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The CANADA Site Registration No. is 20331-2.
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Aug.16, 2017.

4.1.3 Test Procedures

For Radiated emission below 30MHz

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

NOTE:

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

For Radiated emission above 30MHz

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

Note:

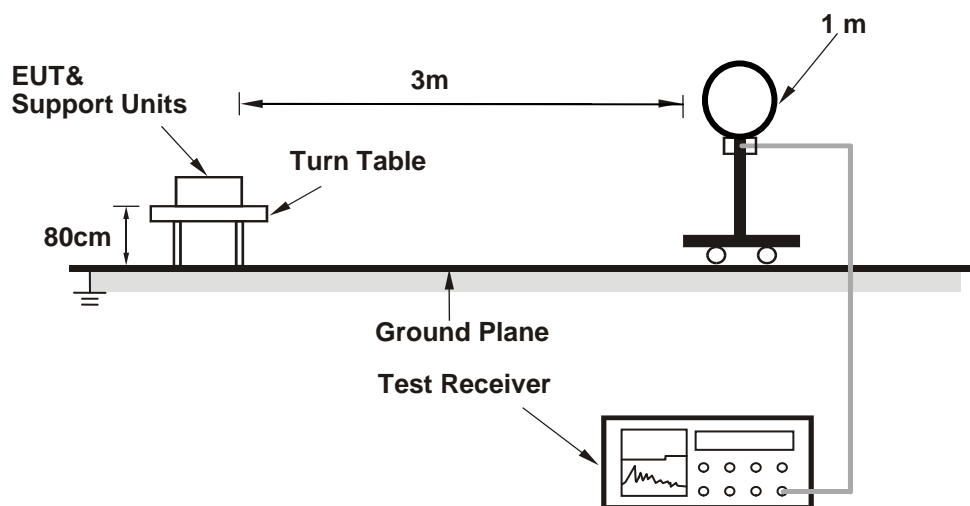
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

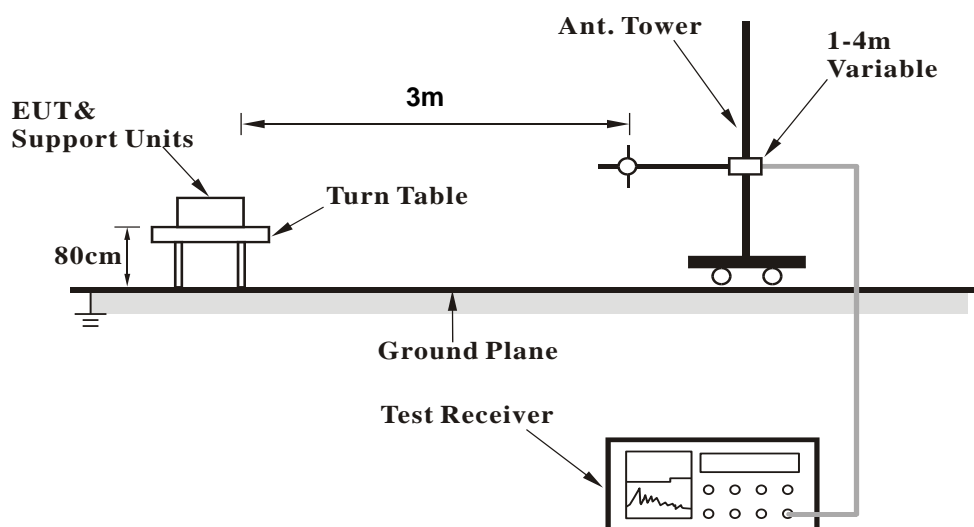
No deviation.

4.1.5 Test Setup

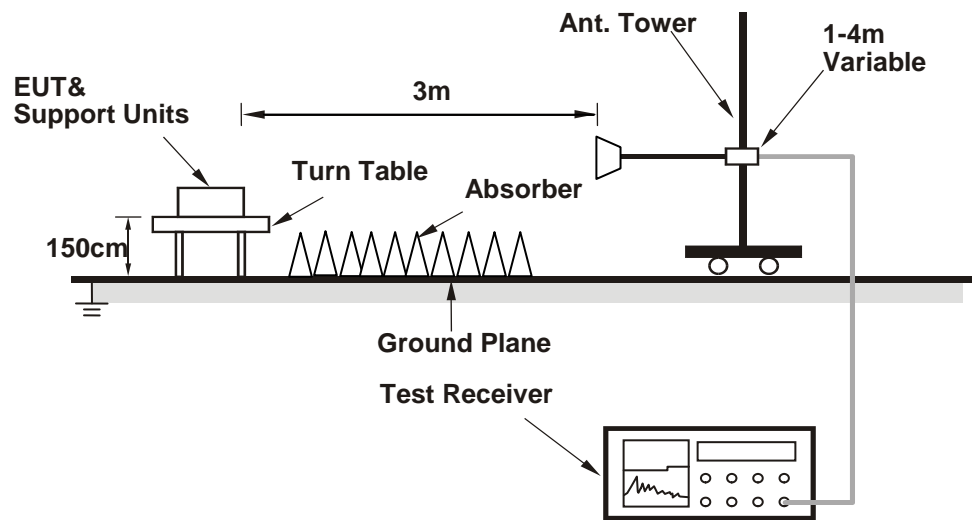
For Radiated emission below 30MHz



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.
- Controlling software (1Tx_WiFi_Mp command .txt) has been activated to set the EUT on specific status.

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	55.7 PK	74.0	-18.3	1.22 H	50	57.0	-1.3
2	2390.00	42.7 AV	54.0	-11.3	1.22 H	50	44.0	-1.3
3	*2412.00	104.2 PK			1.22 H	50	105.3	-1.1
4	*2412.00	101.7 AV			1.22 H	50	102.8	-1.1
5	4824.00	46.7 PK	74.0	-27.3	1.07 H	66	43.5	3.2
6	4824.00	43.2 AV	54.0	-10.8	1.07 H	66	40.0	3.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.3 PK	74.0	-19.7	3.75 V	117	55.6	-1.3
2	2390.00	41.1 AV	54.0	-12.9	3.75 V	117	42.4	-1.3
3	*2412.00	102.5 PK			3.75 V	117	103.6	-1.1
4	*2412.00	101.0 AV			3.75 V	117	102.1	-1.1
5	4824.00	47.2 PK	74.0	-26.8	3.32 V	150	44.0	3.2
6	4824.00	43.8 AV	54.0	-10.2	3.32 V	150	40.6	3.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	103.9 PK			1.16 H	52	105.1	-1.2
2	*2437.00	101.5 AV			1.16 H	52	102.7	-1.2
3	4874.00	46.2 PK	74.0	-27.8	1.18 H	141	42.9	3.3
4	4874.00	42.7 AV	54.0	-11.3	1.18 H	141	39.4	3.3
5	7311.00	44.5 PK	74.0	-29.5	1.37 H	295	34.7	9.8
6	7311.00	39.6 AV	54.0	-14.4	1.37 H	295	29.8	9.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.3 PK			3.71 V	121	103.5	-1.2
2	*2437.00	100.8 AV			3.71 V	121	102.0	-1.2
3	4874.00	47.3 PK	74.0	-26.7	3.29 V	154	44.0	3.3
4	4874.00	43.6 AV	54.0	-10.4	3.29 V	154	40.3	3.3
5	7311.00	49.6 PK	74.0	-24.4	3.48 V	200	39.8	9.8
6	7311.00	44.5 AV	54.0	-9.5	3.48 V	200	34.7	9.8

REMARKS:

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

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	104.4 PK			1.11 H	50	105.5	-1.1
2	*2462.00	101.8 AV			1.11 H	50	102.9	-1.1
3	2483.50	56.8 PK	74.0	-17.2	1.11 H	50	57.8	-1.0
4	2483.50	43.2 AV	54.0	-10.8	1.11 H	50	44.2	-1.0
5	4924.00	46.8 PK	74.0	-27.2	1.19 H	131	43.3	3.5
6	4924.00	43.0 AV	54.0	-11.0	1.19 H	131	39.5	3.5
7	7386.00	44.5 PK	74.0	-29.5	1.33 H	297	34.6	9.9
8	7386.00	39.9 AV	54.0	-14.1	1.33 H	297	30.0	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	102.9 PK			3.80 V	114	104.0	-1.1
2	*2462.00	101.1 AV			3.80 V	114	102.2	-1.1
3	2483.50	55.1 PK	74.0	-18.9	3.80 V	114	56.1	-1.0
4	2483.50	41.8 AV	54.0	-12.2	3.80 V	114	42.8	-1.0
5	4924.00	47.0 PK	74.0	-27.0	3.25 V	150	43.5	3.5
6	4924.00	43.3 AV	54.0	-10.7	3.25 V	150	39.8	3.5
7	7386.00	49.5 PK	74.0	-24.5	3.46 V	195	39.6	9.9
8	7386.00	44.3 AV	54.0	-9.7	3.46 V	195	34.4	9.9

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	61.5 PK	74.0	-12.5	1.49 H	50	62.8	-1.3
2	2390.00	44.4 AV	54.0	-9.6	1.49 H	50	45.7	-1.3
3	*2412.00	104.3 PK			1.49 H	50	105.4	-1.1
4	*2412.00	94.8 AV			1.49 H	50	95.9	-1.1
5	4824.00	45.7 PK	74.0	-28.3	1.25 H	115	42.5	3.2
6	4824.00	33.0 AV	54.0	-21.0	1.25 H	115	29.8	3.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.3 PK	74.0	-13.7	3.76 V	127	61.6	-1.3
2	2390.00	43.2 AV	54.0	-10.8	3.76 V	127	44.5	-1.3
3	*2412.00	103.1 PK			3.76 V	127	104.2	-1.1
4	*2412.00	93.7 AV			3.76 V	127	94.8	-1.1
5	4824.00	46.1 PK	74.0	-27.9	3.39 V	164	42.9	3.2
6	4824.00	33.1 AV	54.0	-20.9	3.39 V	164	29.9	3.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	104.4 PK			1.18 H	51	105.6	-1.2
2	*2437.00	95.1 AV			1.18 H	51	96.3	-1.2
3	4874.00	45.5 PK	74.0	-28.5	1.23 H	127	42.2	3.3
4	4874.00	32.6 AV	54.0	-21.4	1.23 H	127	29.3	3.3
5	7311.00	48.7 PK	74.0	-25.3	1.32 H	304	38.9	9.8
6	7311.00	35.4 AV	54.0	-18.6	1.32 H	304	25.6	9.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.9 PK			3.77 V	122	104.1	-1.2
2	*2437.00	93.2 AV			3.77 V	122	94.4	-1.2
3	4874.00	46.6 PK	74.0	-27.4	3.43 V	164	43.3	3.3
4	4874.00	33.5 AV	54.0	-20.5	3.43 V	164	30.2	3.3
5	7311.00	52.8 PK	74.0	-21.2	3.46 V	204	43.0	9.8
6	7311.00	39.5 AV	54.0	-14.5	3.46 V	204	29.7	9.8

REMARKS:

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

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	103.9 PK			1.15 H	52	105.0	-1.1
2	*2462.00	94.4 AV			1.15 H	52	95.5	-1.1
3	2483.50	59.1 PK	74.0	-14.9	1.15 H	52	60.1	-1.0
4	2483.50	43.9 AV	54.0	-10.1	1.15 H	52	44.9	-1.0
5	4924.00	45.7 PK	74.0	-28.3	1.19 H	136	42.2	3.5
6	4924.00	33.0 AV	54.0	-21.0	1.19 H	136	29.5	3.5
7	7386.00	48.7 PK	74.0	-25.3	1.30 H	313	38.8	9.9
8	7386.00	35.3 AV	54.0	-18.7	1.30 H	313	25.4	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	102.5 PK			3.72 V	125	103.6	-1.1
2	*2462.00	92.8 AV			3.72 V	125	93.9	-1.1
3	2483.50	57.8 PK	74.0	-16.2	3.72 V	125	58.8	-1.0
4	2483.50	42.5 AV	54.0	-11.5	3.72 V	125	43.5	-1.0
5	4924.00	46.8 PK	74.0	-27.2	3.39 V	159	43.3	3.5
6	4924.00	33.4 AV	54.0	-20.6	3.39 V	159	29.9	3.5
7	7386.00	53.3 PK	74.0	-20.7	3.45 V	194	43.4	9.9
8	7386.00	39.9 AV	54.0	-14.1	3.45 V	194	30.0	9.9

REMARKS:

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

802.11n (HT20)

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	63.1 PK	74.0	-10.9	1.22 H	51	64.4	-1.3
2	2390.00	45.6 AV	54.0	-8.4	1.22 H	51	46.9	-1.3
3	*2412.00	104.4 PK			1.22 H	51	105.5	-1.1
4	*2412.00	95.7 AV			1.22 H	51	96.8	-1.1
5	4824.00	45.9 PK	74.0	-28.1	1.23 H	123	42.7	3.2
6	4824.00	33.3 AV	54.0	-20.7	1.23 H	123	30.1	3.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.8 PK	74.0	-12.2	3.78 V	138	63.1	-1.3
2	2390.00	44.3 AV	54.0	-9.7	3.78 V	138	45.6	-1.3
3	*2412.00	103.2 PK			3.78 V	138	104.3	-1.1
4	*2412.00	94.5 AV			3.78 V	138	95.6	-1.1
5	4824.00	46.7 PK	74.0	-27.3	3.43 V	162	43.5	3.2
6	4824.00	33.1 AV	54.0	-20.9	3.43 V	162	29.9	3.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	104.1 PK			1.22 H	52	105.3	-1.2
2	*2437.00	95.4 AV			1.22 H	52	96.6	-1.2
3	4874.00	45.3 PK	74.0	-28.7	1.19 H	136	42.0	3.3
4	4874.00	32.9 AV	54.0	-21.1	1.19 H	136	29.6	3.3
5	7311.00	48.0 PK	74.0	-26.0	1.25 H	307	38.2	9.8
6	7311.00	34.8 AV	54.0	-19.2	1.25 H	307	25.0	9.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.6 PK			3.78 V	126	103.8	-1.2
2	*2437.00	94.2 AV			3.78 V	126	95.4	-1.2
3	4874.00	46.5 PK	74.0	-27.5	3.39 V	175	43.2	3.3
4	4874.00	33.4 AV	54.0	-20.6	3.39 V	175	30.1	3.3
5	7311.00	53.2 PK	74.0	-20.8	3.44 V	197	43.4	9.8
6	7311.00	39.6 AV	54.0	-14.4	3.44 V	197	29.8	9.8

REMARKS:

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

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	104.6 PK			1.13 H	51	105.7	-1.1
2	*2462.00	95.1 AV			1.13 H	51	96.2	-1.1
3	2483.50	60.5 PK	74.0	-13.5	1.13 H	51	61.5	-1.0
4	2483.50	44.7 AV	54.0	-9.3	1.13 H	51	45.7	-1.0
5	4924.00	45.3 PK	74.0	-28.7	1.16 H	151	41.8	3.5
6	4924.00	32.7 AV	54.0	-21.3	1.16 H	151	29.2	3.5
7	7386.00	48.8 PK	74.0	-25.2	1.25 H	313	38.9	9.9
8	7386.00	35.6 AV	54.0	-18.4	1.25 H	313	25.7	9.9
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	103.0 PK			3.72 V	137	104.1	-1.1
2	*2462.00	94.1 AV			3.72 V	137	95.2	-1.1
3	2483.50	59.3 PK	74.0	-14.7	3.72 V	137	60.3	-1.0
4	2483.50	43.5 AV	54.0	-10.5	3.72 V	137	44.5	-1.0
5	4924.00	47.1 PK	74.0	-26.9	3.36 V	163	43.6	3.5
6	4924.00	33.8 AV	54.0	-20.2	3.36 V	163	30.3	3.5
7	7386.00	53.0 PK	74.0	-21.0	3.46 V	184	43.1	9.9
8	7386.00	39.7 AV	54.0	-14.3	3.46 V	184	29.8	9.9

REMARKS:

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

Below 1GHz Data:

802.11g

CHANNEL	TX Channel 1	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	30.00	19.9 QP	40.0	-20.1	1.50 H	254	29.5	-9.6
2	184.11	20.7 QP	43.5	-22.8	1.50 H	53	30.8	-10.1
3	471.96	23.3 QP	46.0	-22.7	2.00 H	110	26.6	-3.3
4	565.83	28.6 QP	46.0	-17.4	1.50 H	360	30.3	-1.7
5	760.77	28.0 QP	46.0	-18.0	1.00 H	150	25.8	2.2
6	932.32	29.4 QP	46.0	-16.6	1.50 H	321	25.0	4.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.02	31.1 QP	40.0	-8.9	1.00 V	307	40.6	-9.5
2	40.40	27.8 QP	40.0	-12.2	1.00 V	168	36.4	-8.6
3	431.99	22.5 QP	46.0	-23.5	2.50 V	353	26.5	-4.0
4	517.47	23.9 QP	46.0	-22.1	1.50 V	162	26.2	-2.3
5	647.84	26.6 QP	46.0	-19.4	2.00 V	0	26.4	0.2
6	918.33	29.3 QP	46.0	-16.7	1.50 V	239	24.9	4.4

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

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

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 03, 2017	June 02, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 29, 2016	Sep. 28, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 18, 2017	June 17, 2018
Software BVADT	BVADT_Cond_V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 1.
3. Tested Date: Aug. 15, 2017.

4.2.3 Test Procedures

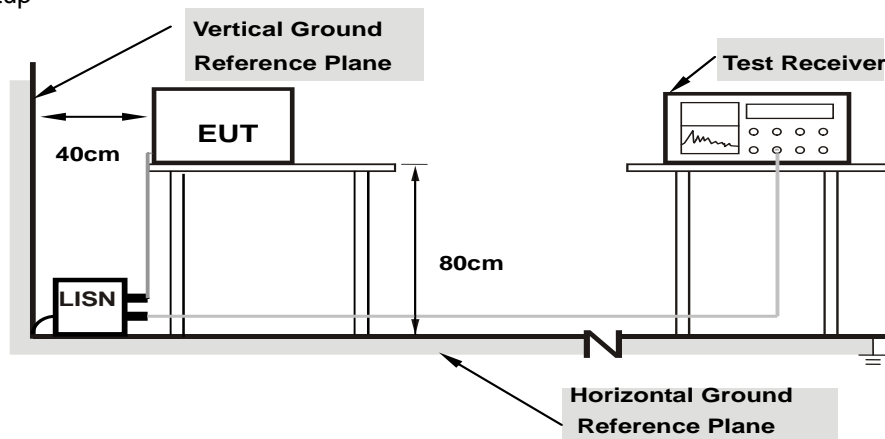
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

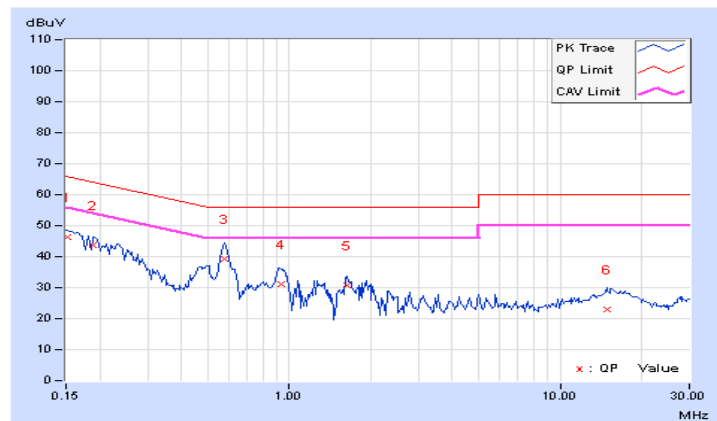
4.2.7 Test Results (Mode 1)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15238	10.07	36.24	27.48	46.31	37.55	65.87	55.87	-19.56	-18.32
2	0.18906	10.06	33.51	22.98	43.57	33.04	64.08	54.08	-20.51	-21.04
3	0.57578	10.12	29.32	20.08	39.44	30.20	56.00	46.00	-16.56	-15.80
4	0.93609	10.14	21.04	12.18	31.18	22.32	56.00	46.00	-24.82	-23.68
5	1.64063	10.14	20.67	11.93	30.81	22.07	56.00	46.00	-25.19	-23.93
6	14.83984	10.95	12.14	4.76	23.09	15.71	60.00	50.00	-36.91	-34.29

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.

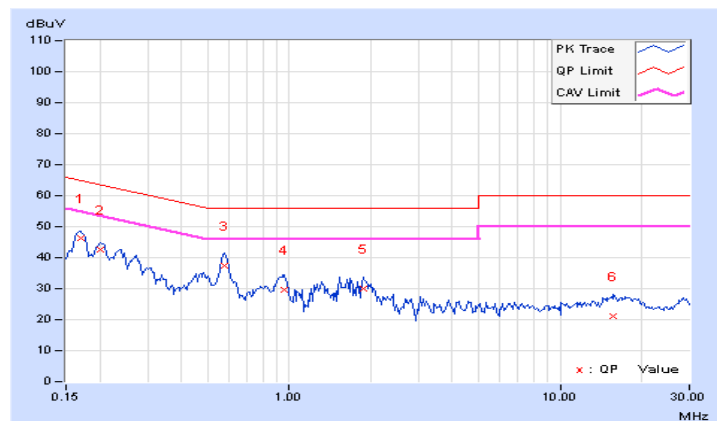


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	10.05	36.32	23.09	46.37	33.14	64.98	54.98	-18.61	-21.84
2	0.20078	10.03	32.64	20.06	42.67	30.09	63.58	53.58	-20.91	-23.49
3	0.57578	10.10	27.47	19.58	37.57	29.68	56.00	46.00	-18.43	-16.32
4	0.96250	10.11	19.61	10.70	29.72	20.81	56.00	46.00	-26.28	-25.19
5	1.87891	10.17	19.71	10.54	29.88	20.71	56.00	46.00	-26.12	-25.29
6	15.61328	10.82	10.32	5.24	21.14	16.06	60.00	50.00	-38.86	-33.94

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.



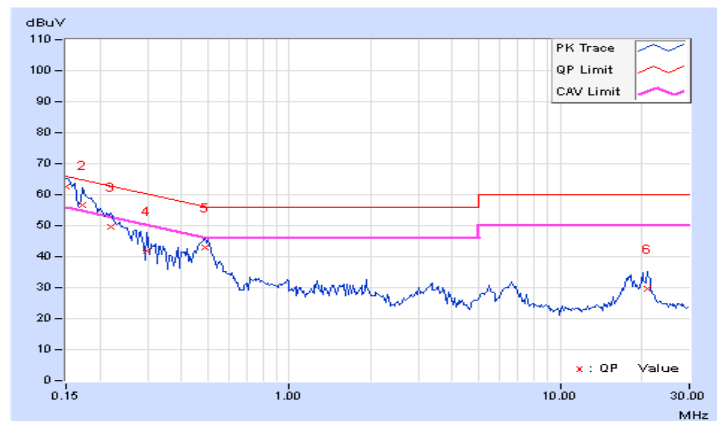
4.2.8 Test Results (Mode 2)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.07	52.41	38.60	62.48	48.67	66.00	56.00	-3.52	-7.33
2	0.17344	10.07	46.63	32.24	56.70	42.31	64.79	54.79	-8.09	-12.48
3	0.22031	10.07	39.58	24.85	49.65	34.92	62.81	52.81	-13.16	-17.89
4	0.29844	10.08	31.87	21.23	41.95	31.31	60.29	50.29	-18.34	-18.98
5	0.48594	10.11	32.99	28.11	43.10	38.22	56.24	46.24	-13.14	-8.02
6	20.93750	11.30	18.28	9.32	29.58	20.62	60.00	50.00	-30.42	-29.38

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.

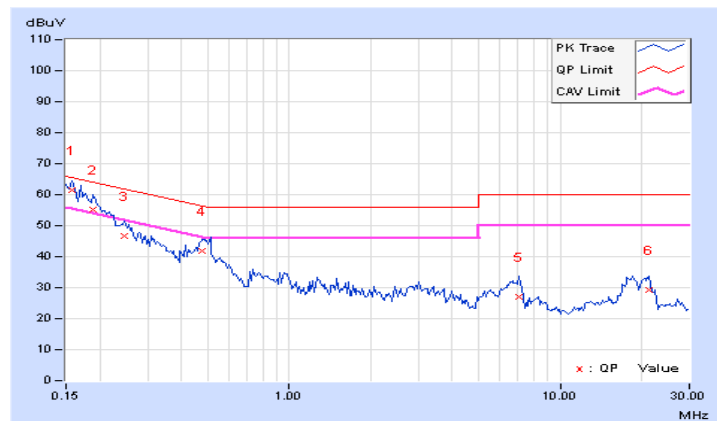


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.06	51.31	36.76	61.37	46.82	65.58	55.58	-4.21	-8.76
2	0.18906	10.04	45.16	30.53	55.20	40.57	64.08	54.08	-8.88	-13.51
3	0.24766	10.05	36.58	23.55	46.63	33.60	61.84	51.84	-15.21	-18.24
4	0.47813	10.10	31.80	28.23	41.90	38.33	56.37	46.37	-14.47	-8.04
5	7.00391	10.39	16.51	11.34	26.90	21.73	60.00	50.00	-33.10	-28.27
6	21.21484	11.00	18.13	12.09	29.13	23.09	60.00	50.00	-30.87	-26.91

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.

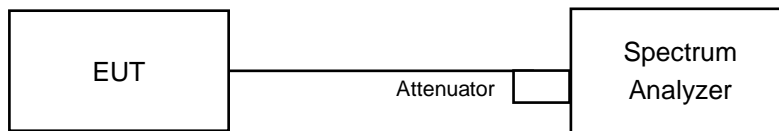


4.3 6dB Bandwidth Measurement

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
1	2412	9.11	0.5	PASS
6	2437	9.11	0.5	PASS
11	2462	9.11	0.5	PASS

802.11g

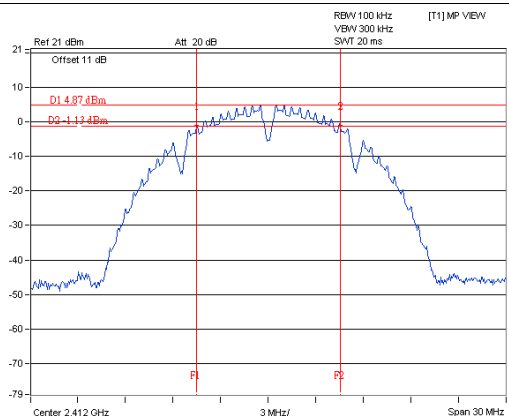
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.60	0.5	PASS
6	2437	16.61	0.5	PASS
11	2462	16.64	0.5	PASS

802.11n (HT20)

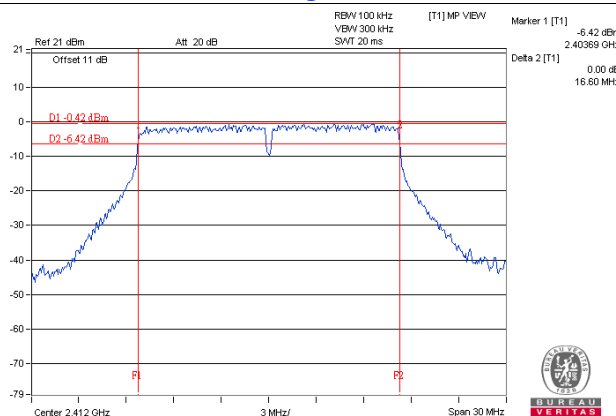
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.79	0.5	Pass
6	2437	17.80	0.5	Pass
11	2462	17.77	0.5	Pass

Spectrum Plot of Worst Value

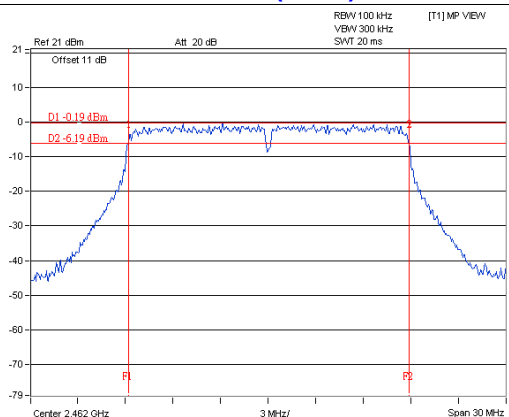
802.11b : CH1



802.11g : CH1



802.11n (HT20) : CH11

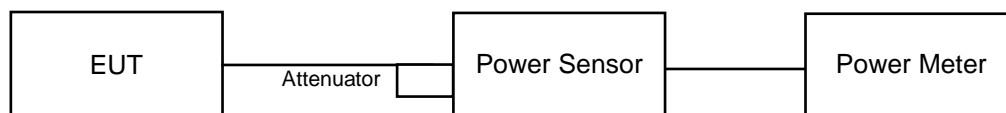


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

FOR PEAK POWER

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	60.534	17.82	30	Pass
6	2437	60.117	17.79	30	Pass
11	2462	58.076	17.64	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	257.04	24.10	30	Pass
6	2437	252.348	24.02	30	Pass
11	2462	249.459	23.97	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	234.423	23.70	30	Pass
6	2437	250.611	23.99	30	Pass
11	2462	247.172	23.93	30	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	32.434	15.11
6	2437	32.063	15.06
11	2462	31.477	14.98

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	29.923	14.76
6	2437	29.107	14.64
11	2462	27.861	14.45

802.11n (HT20)

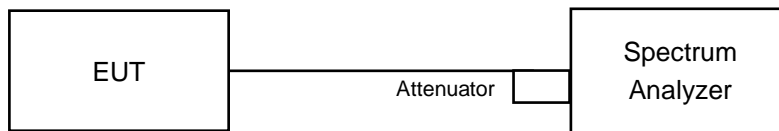
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	29.512	14.70
6	2437	29.376	14.68
11	2462	29.242	14.66

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-15.26	8	Pass
6	2437	-15.15	8	Pass
11	2462	-14.85	8	Pass

802.11g

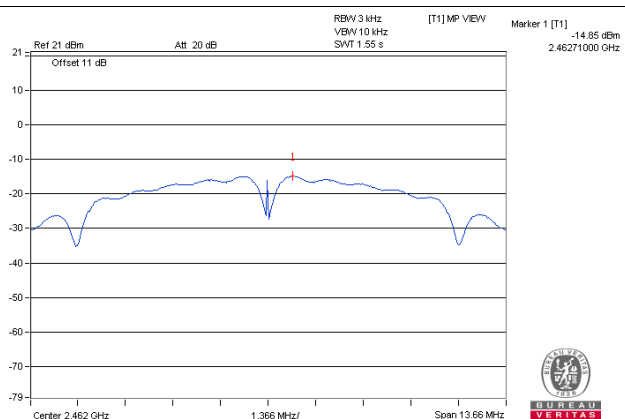
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-14.64	8	Pass
6	2437	-15.08	8	Pass
11	2462	-15.42	8	Pass

802.11n (HT20)

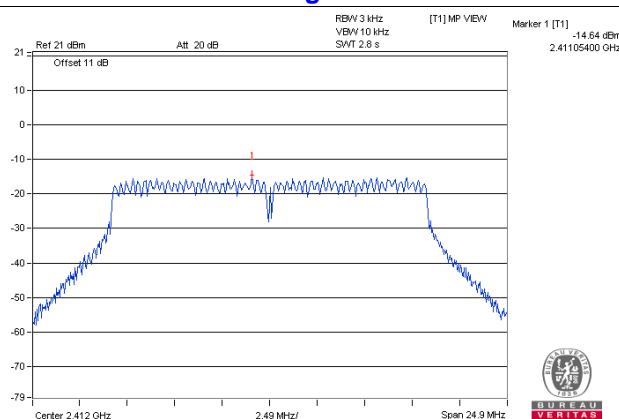
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-14.86	8	Pass
6	2437	-14.60	8	Pass
11	2462	-14.39	8	Pass

Spectrum Plot of Worst Value

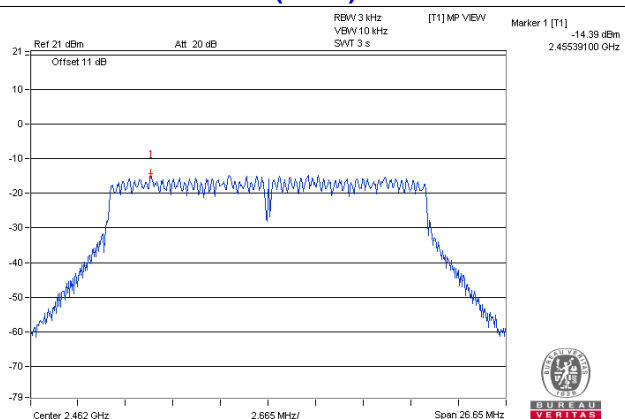
802.11b : CH11



802.11g : CH1



802.11n (HT20) : CH11

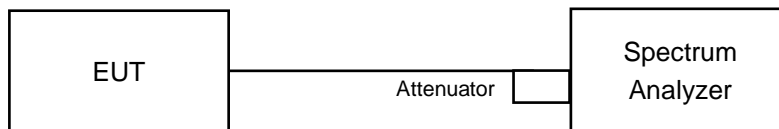


4.6 Conducted Out of Band Emission Measurement

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 OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

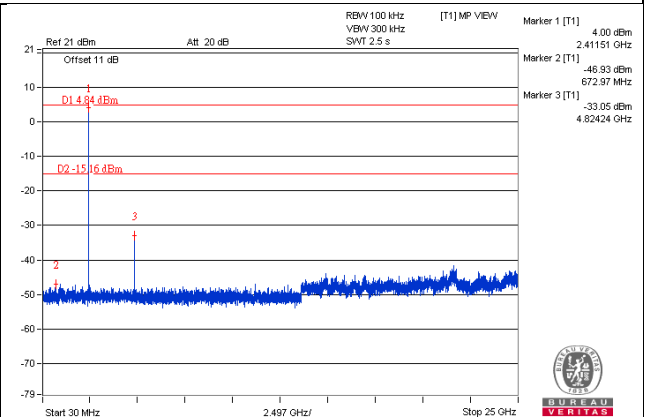
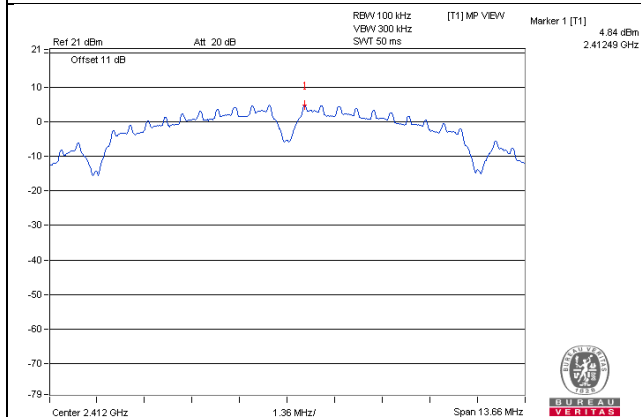
Same as Item 4.3.6

4.6.7 Test Results

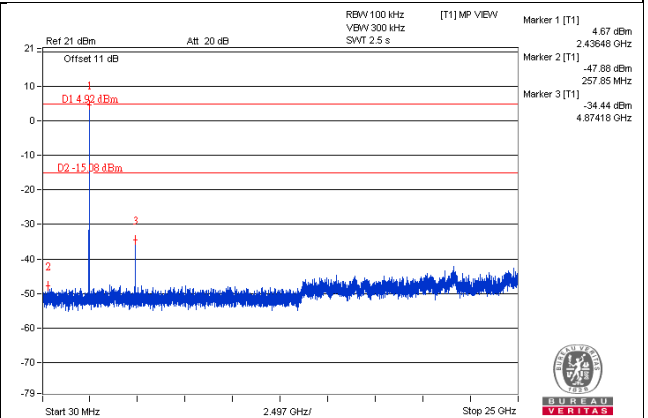
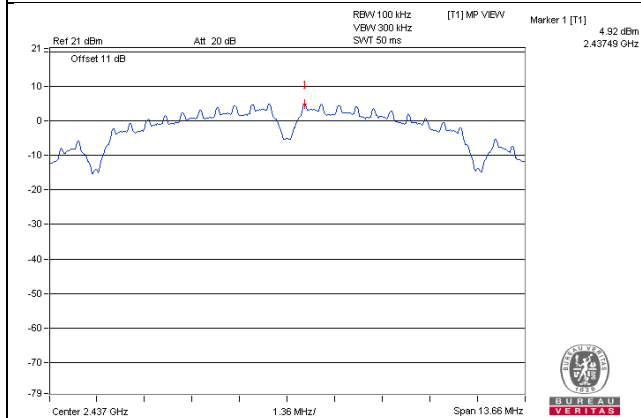
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

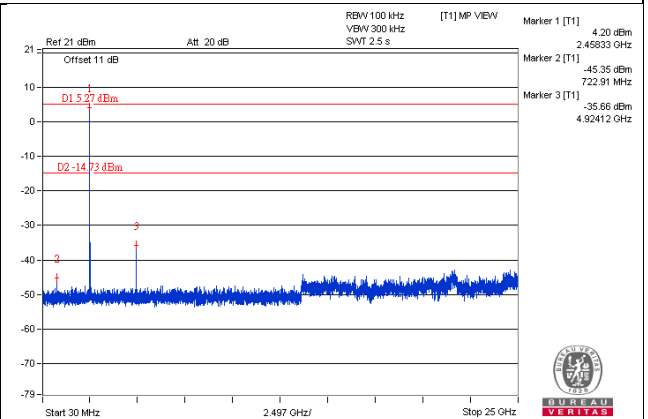
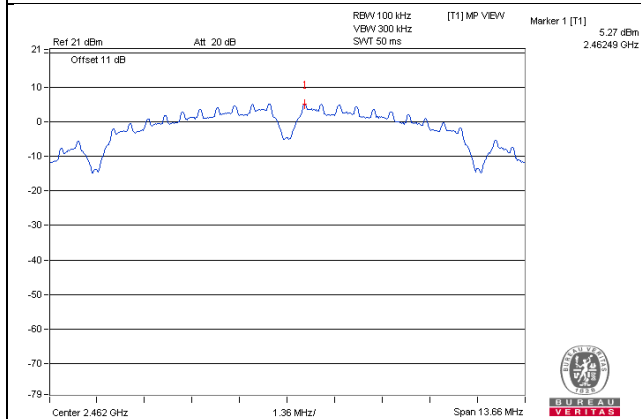
CH 1



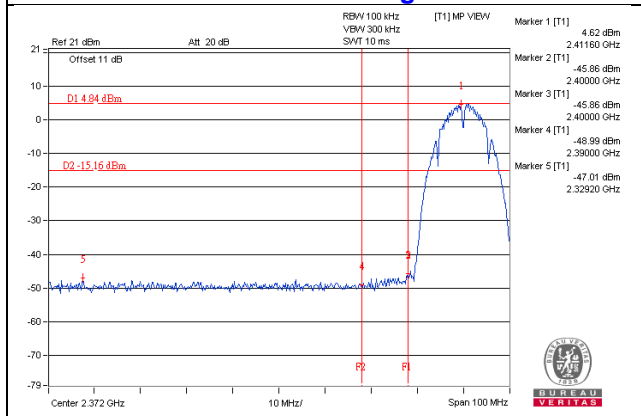
CH 6



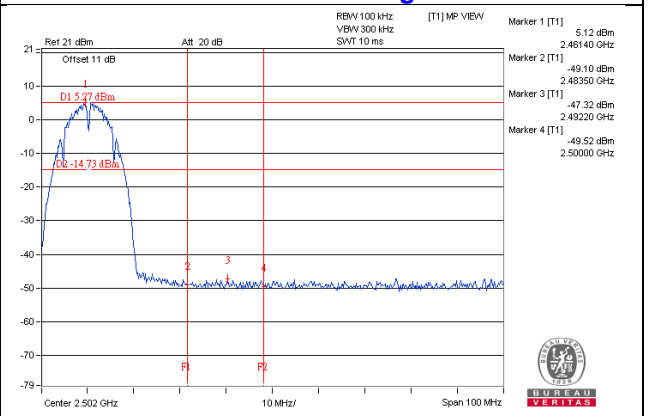
CH 11



CH 1 Band edge

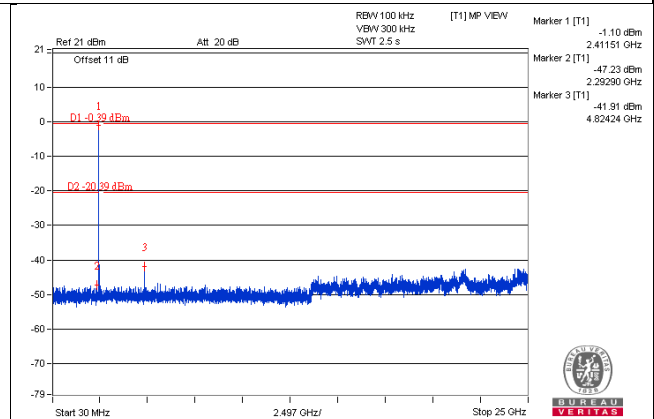
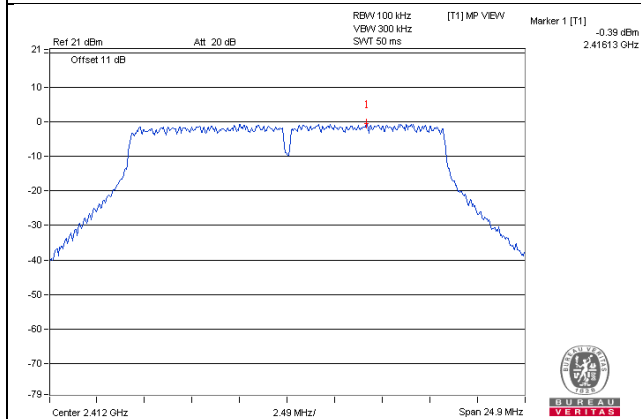


CH 11 Band edge

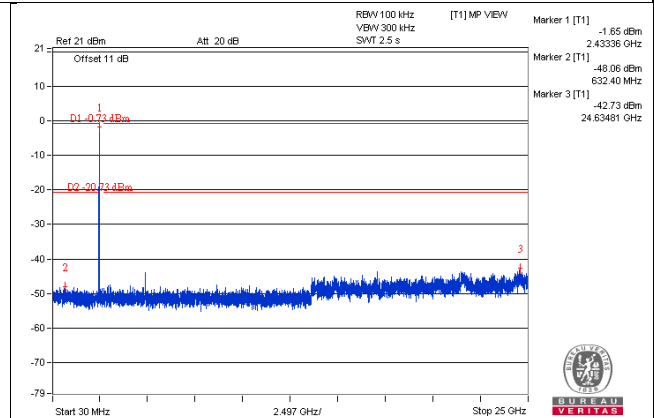
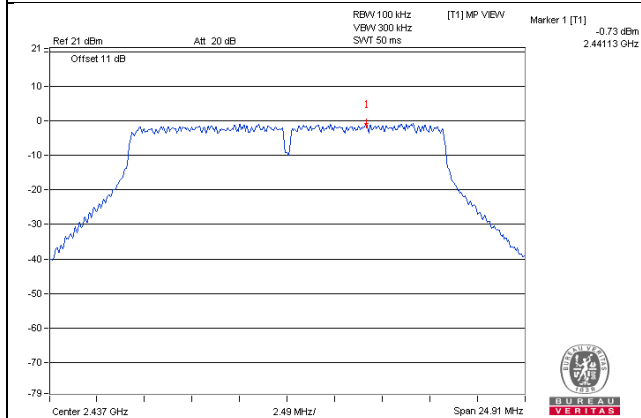


802.11g

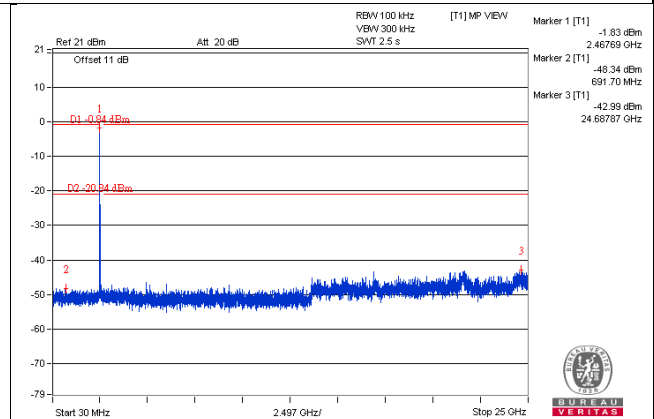
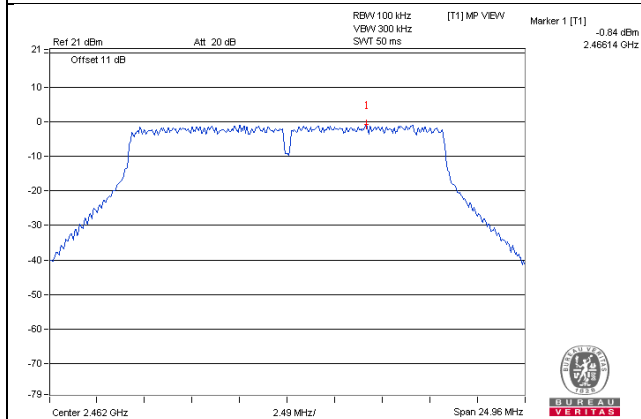
CH 1



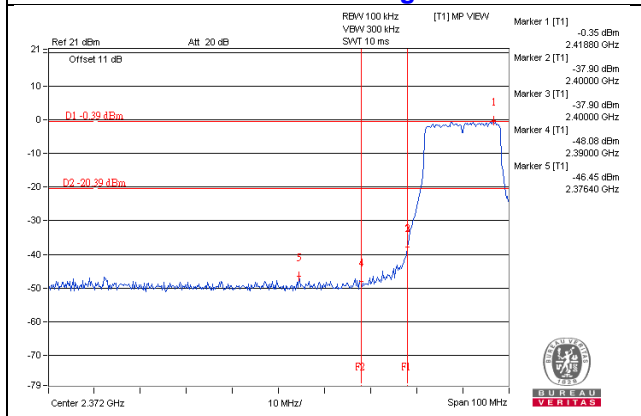
CH 6



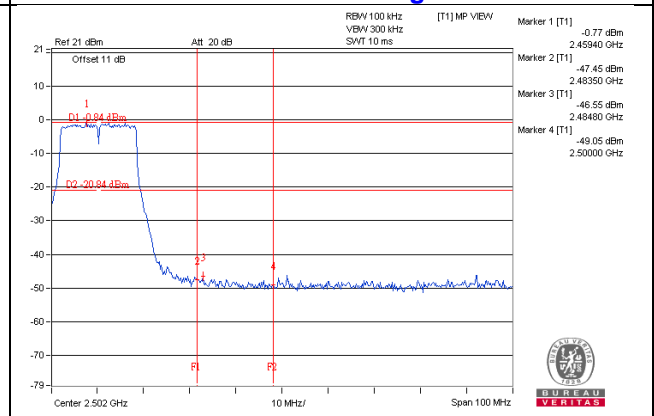
CH 11



CH 1 Band edge

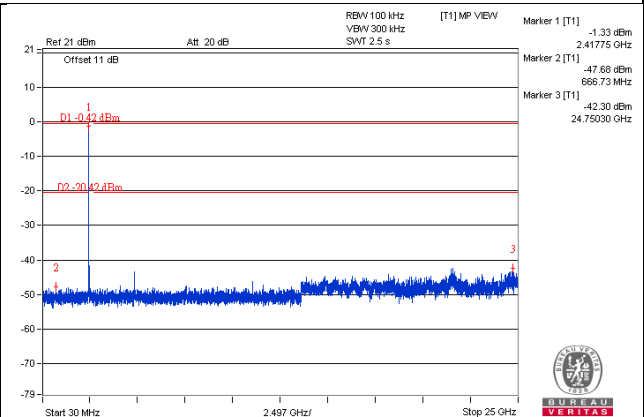
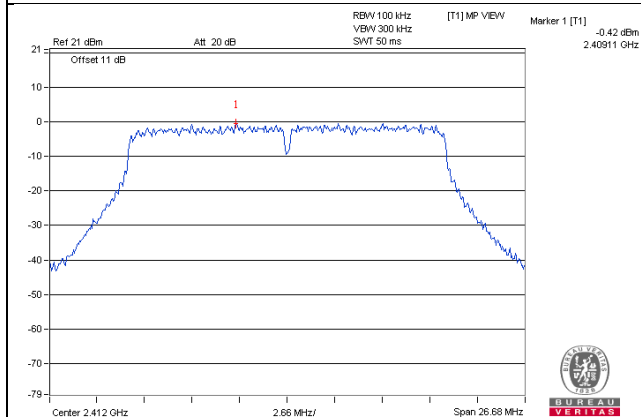


CH 11 Band edge

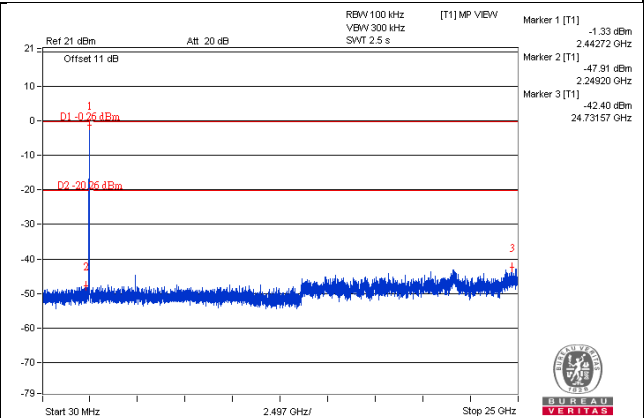
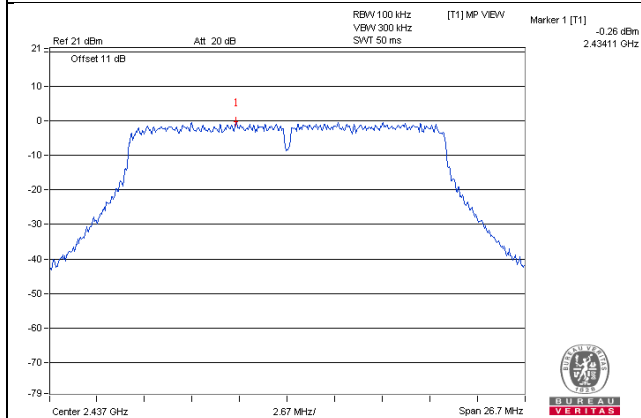


802.11n (HT20)

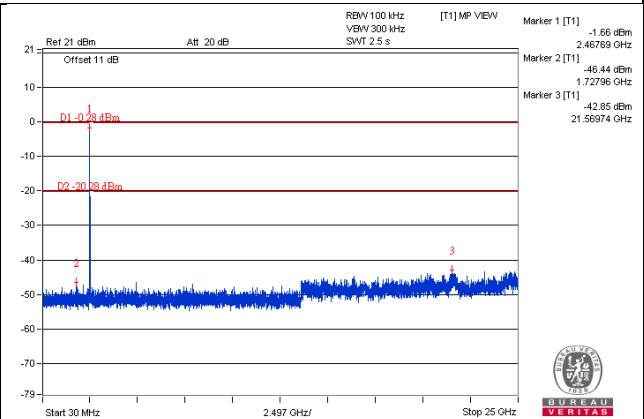
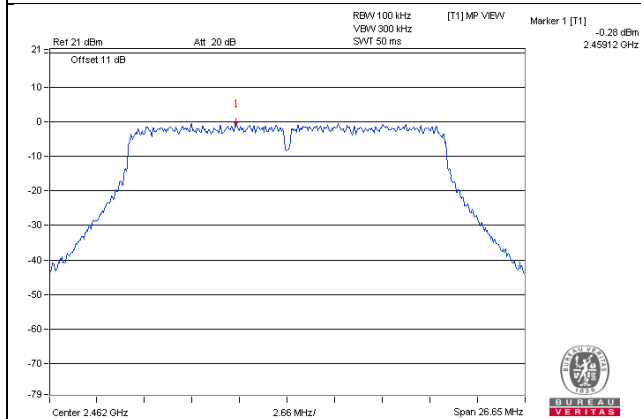
CH 1



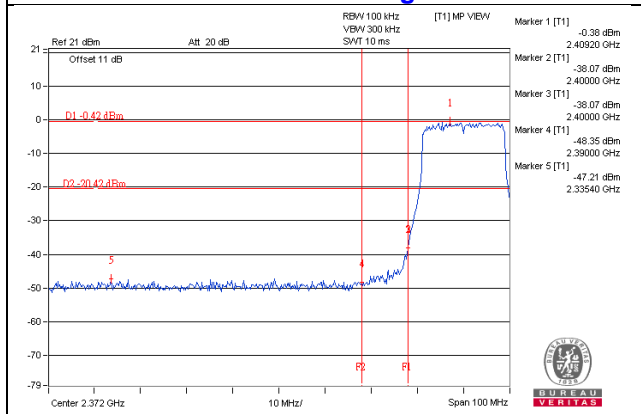
CH 6



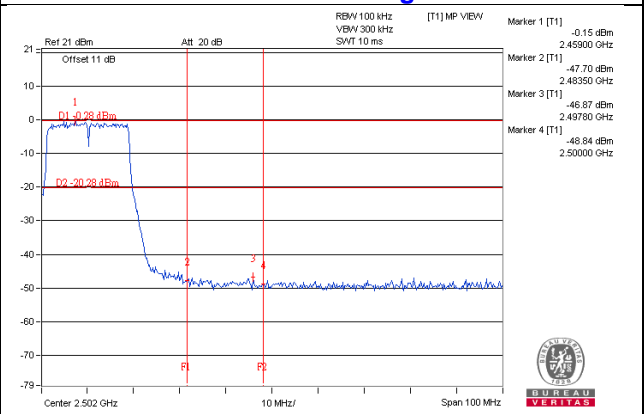
CH 11



CH 1 Band edge



CH 11 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

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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