

FCC Test Report

Report No.: RF150413D15

FCC ID: PD5-RV132W

Test Model: RV132W

Received Date: Apr. 13, 2015

Test Date: Apr. 27 ~ May 18, 2015

Issued Date: May 22, 2015

Applicant: Delta Networks, Inc.

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

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Release Control Record

Issue No.	Description	Date Issued
RF150413D15	Original release.	May 22, 2015

1 Certificate of Conformity

Product: Wireless-N VPN Router

Brand: CISCO

Test Model: RV132W

Sample Status: Engineering sample

Applicant: Delta Networks, Inc.

Test Date: Apr. 27 ~ May 18, 2015

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2009

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

Prepared by : Annie Chang , **Date:** May 22, 2015
Annie Chang / Supervisor

Approved by : Rex Lai , **Date:** May 22, 2015
Rex Lai / Assistant Manage

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 -10.15dB at 0.44297MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 2390.00 & 2483.50MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expended Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.43 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	4.00 dB
Radiated Emissions above 1 GHz	1GHz ~ 40GHz	3.36 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless-N VPN Router
Brand	CISCO
Test Model	RV132W
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from Adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	720.422mW
Antenna Type	Printed antenna with 3.10dBi gain
Antenna Connector	N/A
Accessory Device	Adapter, Stand
Data Cable Supplied	LAN cable (1.5m) RJ11 cable (1.7m) Console cable (1.7m) (LAN to RS232)

Note:

- The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	TX Function
802.11b	1TX
802.11g	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX

- The EUT uses following adapter.

Brand	DVE
Model	DSA-12PFT-12
Input Power	100-240V, 50-60Hz, 0.3A
Output Power	+12V, 1A
Power Line	AC 2-Pin, Non-Shielded DC cable (1.5m)

- 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		

7 channels are provided for 802.11n (HT40):

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≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz **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 X, Z 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 (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

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

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

Power Line Conducted Emission Test:

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

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

Bandedge Measurement:

- ☒ 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, 11	DSSS	DBPSK	1
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6
-	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 9	OFDM	BPSK	13.5

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 (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	22deg. C, 76%RH	120Vac, 60Hz	Aaron You
RE $<$ 1G	22deg. C, 76%RH	120Vac, 60Hz	Aaron You
PLC	22deg. C, 71%RH	120Vac, 60Hz	Aaron You
APCM	25deg. C, 60%RH	120Vac, 60Hz	Saxon Lee

3.3 Duty Cycle of Test Signal

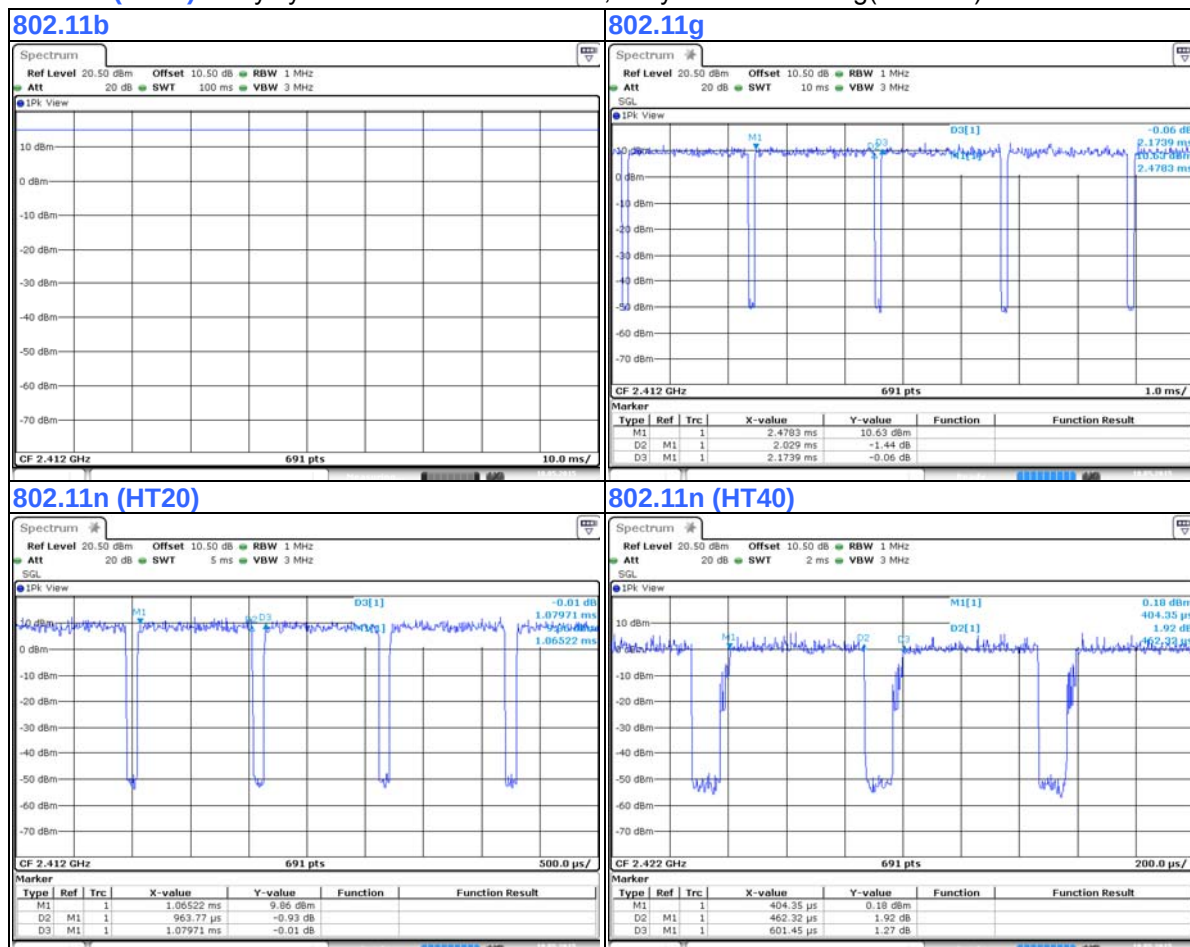
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle of test signal is 100 %, duty factor is not required.

802.11g: Duty cycle = $2.029/2.173 = 0.934$, Duty factor = $10 * \log(1/0.934) = 0.30$

802.11n (HT20): Duty cycle = $0.936/1.079 = 0.892$, Duty factor = $10 * \log(1/0.892) = 0.50$

802.11n (HT40): Duty cycle = $0.462/0.601 = 0.769$, Duty factor = $10 * \log(1/0.769) = 1.14$



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.	EUT	CISCO	RV132W	-	-	-
B.	Adapter	DVE	DSA-12PFT-12	N/A	FCC DoC Approved	Supplied by client
C.	USB 3.0 Hard Disk	WD	WDBACY5000ABL-PESN	WX81E81SKT67	FCC DoC Approved	Provided by Lab
D.	LOAD	N/A	N/A	N/A	N/A	Provided by Lab
E.	NOTEBOOK PC	DELL	PP27L	8SNZ12S	FCC DoC Approved	Provided by Lab

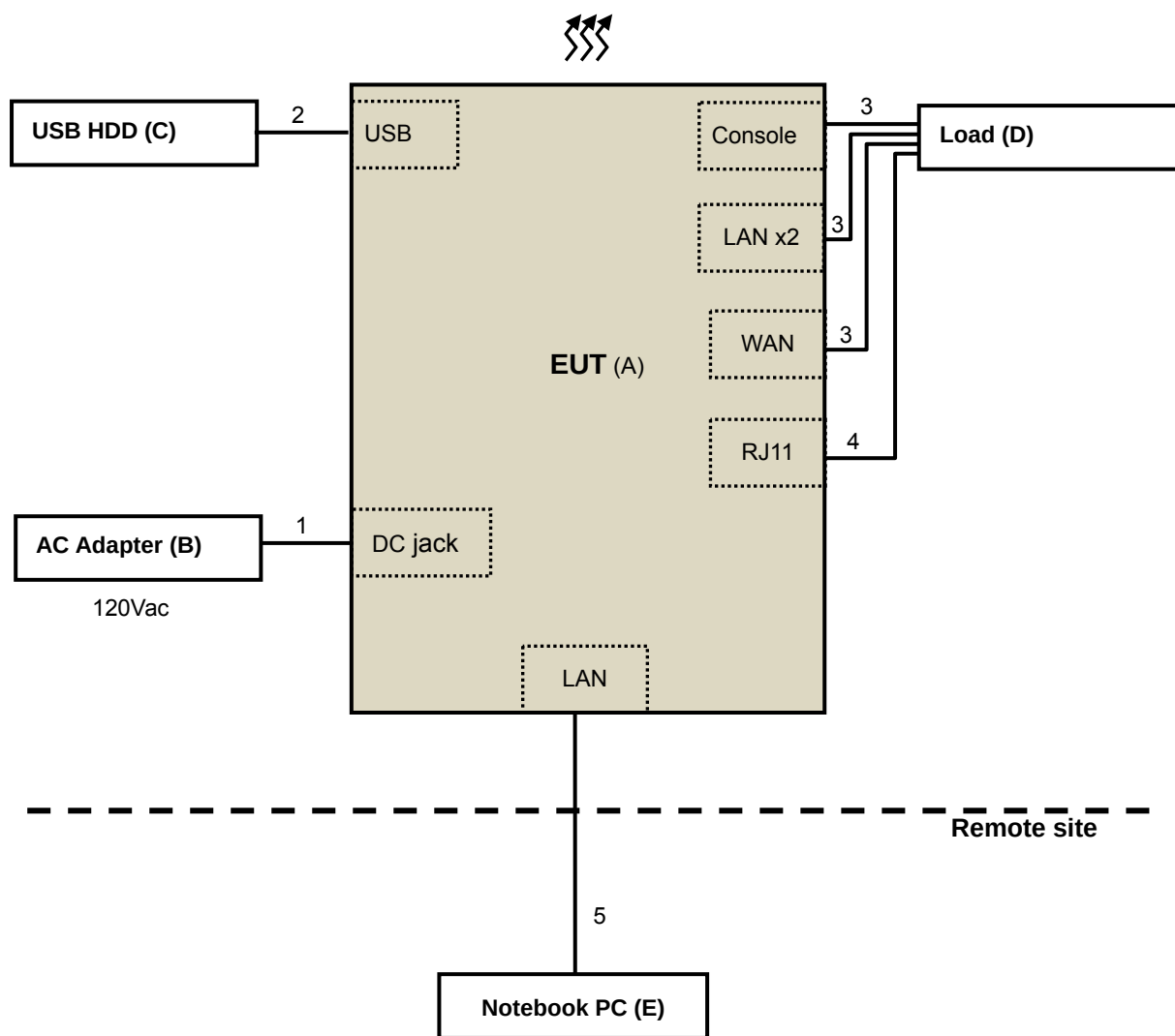
Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.5	N	0	Supplied by client
2.	USB cable	1	0.5	Y	0	Provided by Lab
3.	LAN cable	4	1.8	N	0	Provided by Lab
4.	RJ11 cable	1	1.8	N	0	Provided by Lab
5.	LAN cable	1	10	N	0	Provided by Lab

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r02

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2009

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 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. 26, 2015	Feb. 25, 2016
HP Preamplifier	8449B	3008A01201	Feb. 26, 2015	Feb. 25, 2016
MITEQ Preamplifier	AMF-6F-260400-3 3-8P	892164	Mar. 01, 2015	Feb. 28, 2016
Agilent Spectrum	E4446A	MY51100050	Oct. 24, 2014	Oct. 23, 2015
Agilent TEST RECEIVER	N9038A	MY51210129	Jan. 20, 2015	Jan. 19, 2016
Schwarzbeck Antenna	VULB 9168	139	Feb. 04, 2015	Feb. 03, 2016
Schwarzbeck Antenna	VHBA 9123	480	May 29, 2013	May 28, 2015
Schwarzbeck Horn Antenna	BBHA-9170	212	Feb. 09, 2015	Feb. 08, 2016
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Feb. 10, 2015	Feb. 09, 2016
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V7. 6.15.9.4	NA	NA	NA
SUHNER RF cable	SF104	CABLE-CH6	Aug. 15, 2014	Aug. 14, 2015
SUHNER RF cable	SF102	Cable-CH8-3.6m	Aug. 15, 2014	Aug. 14, 2015
EMCO Horn Antenna	3115	00028257	Feb. 05, 2015	Feb. 04, 2016
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 29, 2014	Sep. 28, 2015
Anritsu Power Sensor	MA2411B	0738404	Apr. 21, 2015	Apr. 20, 2016
Anritsu Power Meter	ML2495A	0842014	Apr. 21, 2015	Apr. 20, 2016

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

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters 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:

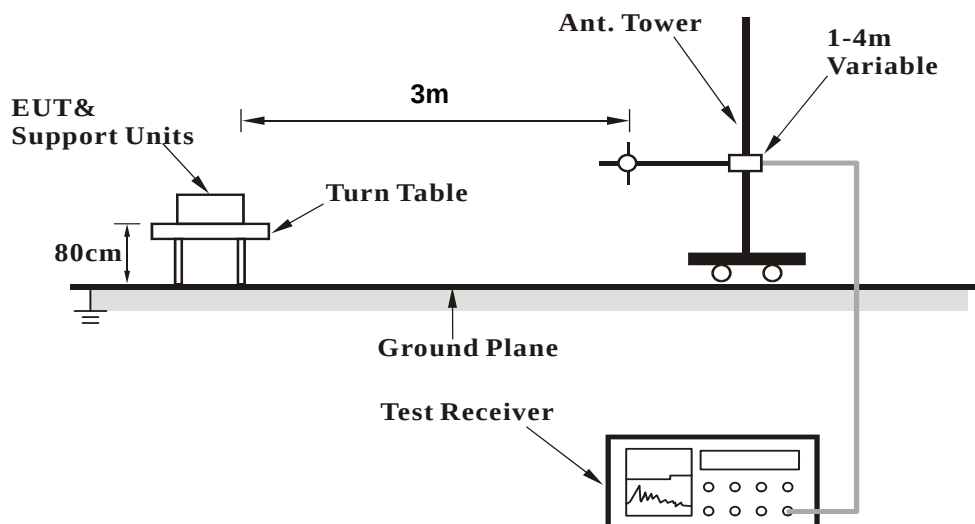
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
6. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

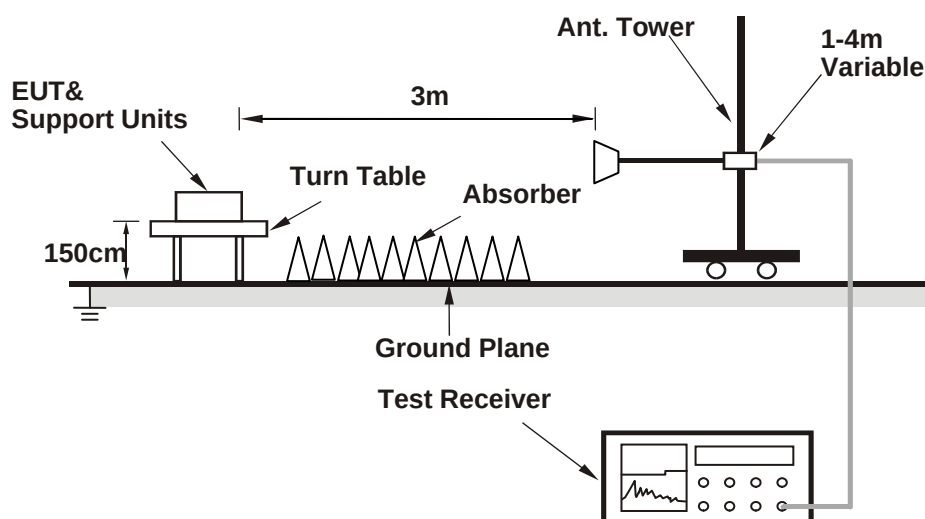
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1GHz>



<Frequency Range 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 RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".
- 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	61.9 PK	74.0	-12.1	1.35 H	0	66.23	-4.34
2	2390.00	52.9 AV	54.0	-1.1	1.35 H	0	57.22	-4.34
3	*2412.00	109.8 PK			1.35 H	0	114.05	-4.21
4	*2412.00	105.2 AV			1.35 H	0	109.38	-4.21
5	4824.00	45.5 PK	74.0	-28.5	1.08 H	356	42.59	2.95
6	4824.00	38.3 AV	54.0	-15.7	1.08 H	356	35.35	2.95
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	56.1 PK	74.0	-17.9	1.14 V	119	60.48	-4.34
2	2390.00	47.9 AV	54.0	-6.1	1.14 V	119	52.27	-4.34
3	*2412.00	100.2 PK			1.14 V	119	104.38	-4.21
4	*2412.00	95.6 AV			1.14 V	119	99.81	-4.21
5	4824.00	46.6 PK	74.0	-27.4	1.50 V	274	43.61	2.95
6	4824.00	40.0 AV	54.0	-14.0	1.50 V	274	37.09	2.95

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	2390.00	55.0 PK	74.0	-19.0	1.51 H	3	59.38	-4.34
2	2390.00	39.3 AV	54.0	-14.7	1.51 H	3	43.61	-4.34
3	*2437.00	111.7 PK			1.51 H	3	115.77	-4.09
4	*2437.00	106.4 AV			1.51 H	3	110.51	-4.09
5	2483.50	58.2 PK	74.0	-15.8	1.51 H	3	62.01	-3.85
6	2483.50	45.1 AV	54.0	-8.9	1.51 H	3	48.97	-3.85
7	4874.00	46.7 PK	74.0	-27.3	1.05 H	351	43.67	3.06
8	4874.00	40.0 AV	54.0	-14.0	1.05 H	351	36.94	3.06

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	51.6 PK	74.0	-22.4	1.17 V	128	55.93	-4.34
2	2390.00	38.3 AV	54.0	-15.7	1.17 V	128	42.64	-4.34
3	*2437.00	101.0 PK			1.17 V	128	105.12	-4.09
4	*2437.00	96.0 AV			1.17 V	128	100.06	-4.09
5	2483.50	52.8 PK	74.0	-21.2	1.17 V	128	56.63	-3.85
6	2483.50	39.0 AV	54.0	-15.0	1.17 V	128	42.89	-3.85
7	4874.00	48.0 PK	74.0	-26.0	1.44 V	277	44.93	3.06
8	4874.00	41.6 AV	54.0	-12.4	1.44 V	277	38.52	3.06

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	108.8 PK			1.32 H	8	112.75	-3.95
2	*2462.00	104.0 AV			1.32 H	8	107.95	-3.95
3	2483.50	62.3 PK	74.0	-11.7	1.32 H	8	66.14	-3.85
4	2483.50	52.9 AV	54.0	-1.1	1.32 H	8	56.73	-3.85
5	4924.00	45.2 PK	74.0	-28.8	1.02 H	339	41.98	3.21
6	4924.00	36.9 AV	54.0	-17.1	1.02 H	339	33.71	3.21
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	99.0 PK			1.11 V	108	102.96	-3.95
2	*2462.00	94.2 AV			1.11 V	108	98.13	-3.95
3	2483.50	56.0 PK	74.0	-18.0	1.11 V	108	59.89	-3.85
4	2483.50	47.9 AV	54.0	-6.1	1.11 V	108	51.73	-3.85
5	4924.00	47.0 PK	74.0	-27.0	1.66 V	254	43.76	3.21
6	4924.00	39.0 AV	54.0	-15.0	1.66 V	254	35.82	3.21

REMARKS:

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

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	72.9 PK	74.0	-1.2	1.19 H	287	77.19	-4.34
2	2390.00	52.3 AV	54.0	-1.7	1.19 H	287	56.63	-4.34
3	*2412.00	111.6 PK			1.19 H	287	115.82	-4.21
4	*2412.00	98.4 AV			1.19 H	287	102.64	-4.21
5	4824.00	46.8 PK	74.0	-27.2	1.27 H	225	43.86	2.95
6	4824.00	33.1 AV	54.0	-20.9	1.27 H	225	30.19	2.95
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	65.9 PK	74.0	-8.1	1.14 V	110	70.21	-4.34
2	2390.00	46.5 AV	54.0	-7.5	1.14 V	110	50.88	-4.34
3	*2412.00	102.0 PK			1.14 V	110	106.20	-4.21
4	*2412.00	89.1 AV			1.14 V	110	93.30	-4.21
5	4824.00	45.5 PK	74.0	-28.5	1.19 V	241	42.55	2.95
6	4824.00	32.8 AV	54.0	-21.2	1.19 V	241	29.83	2.95

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": 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	69.4 PK	74.0	-4.6	1.68 H	0	73.70	-4.34
2	2390.00	49.5 AV	54.0	-4.5	1.68 H	0	53.87	-4.34
3	*2437.00	116.4 PK			1.68 H	0	120.51	-4.09
4	*2437.00	103.7 AV			1.68 H	0	107.82	-4.09
5	2483.50	71.5 PK	74.0	-2.5	1.68 H	0	75.32	-3.85
6	2483.50	52.4 AV	54.0	-1.6	1.68 H	0	56.28	-3.85
7	4874.00	46.9 PK	74.0	-27.1	1.34 H	208	43.84	3.06
8	4874.00	33.7 AV	54.0	-20.3	1.34 H	208	30.62	3.06

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	55.6 PK	74.0	-18.4	2.56 V	47	59.98	-4.34
2	2390.00	41.8 AV	54.0	-12.2	2.56 V	47	46.15	-4.34
3	*2437.00	106.4 PK			2.56 V	47	110.51	-4.09
4	*2437.00	92.9 AV			2.56 V	47	96.98	-4.09
5	2483.50	60.3 PK	74.0	-13.7	2.56 V	47	64.17	-3.85
6	2483.50	43.4 AV	54.0	-10.6	2.56 V	47	47.29	-3.85
7	4874.00	45.8 PK	74.0	-28.2	1.07 V	228	42.71	3.06
8	4874.00	33.0 AV	54.0	-21.0	1.07 V	228	29.95	3.06

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	109.9 PK			1.49 H	352	113.80	-3.95
2	*2462.00	96.6 AV			1.49 H	352	100.59	-3.95
3	2483.50	72.2 PK	74.0	-1.8	1.49 H	352	76.09	-3.85
4	2483.50	52.1 AV	54.0	-1.9	1.49 H	352	55.97	-3.85
5	4924.00	46.2 PK	74.0	-27.8	1.18 H	230	42.98	3.21
6	4924.00	33.4 AV	54.0	-20.6	1.18 H	230	30.22	3.21
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	98.7 PK			2.56 V	182	102.65	-3.95
2	*2462.00	84.7 AV			2.56 V	182	88.68	-3.95
3	2483.50	58.7 PK	74.0	-15.4	2.56 V	182	62.50	-3.85
4	2483.50	44.1 AV	54.0	-9.9	2.56 V	182	47.98	-3.85
5	4924.00	45.9 PK	74.0	-28.1	1.38 V	197	42.66	3.21
6	4924.00	32.9 AV	54.0	-21.1	1.38 V	197	29.70	3.21

REMARKS:

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

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	72.9 PK	74.0	-1.1	1.54 H	351	77.28	-4.34
2	2390.00	52.5 AV	54.0	-1.5	1.54 H	351	56.80	-4.34
3	*2412.00	108.5 PK			1.54 H	351	112.68	-4.21
4	*2412.00	99.1 AV			1.54 H	351	103.30	-4.21
5	4824.00	46.7 PK	74.0	-27.3	1.08 H	237	43.73	2.95
6	4824.00	33.5 AV	54.0	-20.5	1.08 H	237	30.57	2.95
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.8 PK	74.0	-14.2	1.14 V	47	64.12	-4.34
2	2390.00	44.1 AV	54.0	-9.9	1.14 V	47	48.47	-4.34
3	*2412.00	97.6 PK			1.14 V	47	101.82	-4.21
4	*2412.00	94.9 AV			1.14 V	47	99.14	-4.21
5	4824.00	45.8 PK	74.0	-28.2	1.30 V	199	42.88	2.95
6	4824.00	32.7 AV	54.0	-21.3	1.30 V	199	29.75	2.95

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	116.6 PK			1.65 H	344	120.67	-4.09
2	*2437.00	106.0 AV			1.65 H	344	110.12	-4.09
3	4874.00	47.1 PK	74.0	-26.9	1.44 H	211	44.02	3.06
4	4874.00	33.6 AV	54.0	-20.4	1.44 H	211	30.55	3.06
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	105.0 PK			1.00 V	46	109.12	-4.09
2	*2437.00	95.6 AV			1.00 V	46	99.69	-4.09
3	4874.00	45.9 PK	74.0	-28.1	1.61 V	241	42.83	3.06
4	4874.00	33.2 AV	54.0	-20.8	1.61 V	241	30.11	3.06

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	107.0 PK			1.98 H	346	110.96	-3.95
2	*2462.00	97.7 AV			1.98 H	346	101.61	-3.95
3	2483.50	70.1 PK	74.0	-3.9	1.98 H	346	73.98	-3.85
4	2483.50	52.9 AV	54.0	-1.1	1.98 H	346	56.74	-3.85
5	4924.00	46.9 PK	74.0	-27.1	1.03 H	330	43.69	3.21
6	4924.00	33.7 AV	54.0	-20.3	1.03 H	330	30.46	3.21
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	98.8 PK			1.70 V	118	102.76	-3.95
2	*2462.00	87.6 AV			1.70 V	118	91.59	-3.95
3	2483.50	65.3 PK	74.0	-8.7	1.70 V	118	69.17	-3.85
4	2483.50	50.5 AV	54.0	-3.5	1.70 V	118	54.32	-3.85
5	4924.00	46.8 PK	74.0	-27.2	1.40 V	281	43.59	3.21
6	4924.00	33.4 AV	54.0	-20.6	1.40 V	281	30.22	3.21

REMARKS:

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

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	72.3 PK	74.0	-1.7	1.50 H	353	76.68	-4.34
2	2390.00	52.8 AV	54.0	-1.2	1.50 H	353	57.10	-4.34
3	*2422.00	106.1 PK			1.50 H	353	110.21	-4.16
4	*2422.00	95.9 AV			1.50 H	353	100.08	-4.16
5	4844.00	46.7 PK	74.0	-27.3	1.34 H	271	43.75	2.99
6	4844.00	33.7 AV	54.0	-20.3	1.34 H	271	30.74	2.99
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	60.7 PK	74.0	-13.3	1.00 V	46	65.05	-4.34
2	2390.00	44.5 AV	54.0	-9.5	1.00 V	46	48.83	-4.34
3	*2422.00	94.3 PK			1.00 V	46	98.44	-4.16
4	*2422.00	85.6 AV			1.00 V	46	89.76	-4.16
5	4844.00	45.8 PK	74.0	-28.2	1.25 V	220	42.85	2.99
6	4844.00	33.5 AV	54.0	-20.5	1.25 V	220	30.50	2.99

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": 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	108.9 PK			1.49 H	354	113.02	-4.09
2	*2437.00	98.3 AV			1.49 H	354	102.41	-4.09
3	4874.00	47.2 PK	74.0	-26.8	1.26 H	208	44.11	3.06
4	4874.00	33.6 AV	54.0	-20.4	1.26 H	208	30.55	3.06
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	97.3 PK			2.56 V	46	101.34	-4.09
2	*2437.00	88.4 AV			2.56 V	46	92.49	-4.09
3	4874.00	45.9 PK	74.0	-28.1	1.77 V	162	42.87	3.06
4	4874.00	33.3 AV	54.0	-20.7	1.77 V	162	30.22	3.06

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 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	105.1 PK			1.77 H	0	109.08	-4.01
2	*2452.00	94.6 AV			1.77 H	0	98.57	-4.01
3	2483.50	66.4 PK	74.0	-7.6	1.77 H	0	70.27	-3.85
4	2483.50	52.9 AV	54.0	-1.1	1.77 H	0	56.78	-3.85
5	4904.00	46.0 PK	74.0	-28.0	1.30 H	262	42.89	3.14
6	4904.00	33.7 AV	54.0	-20.3	1.30 H	262	30.55	3.14
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	98.2 PK			1.57 V	120	102.21	-4.01
2	*2452.00	86.8 AV			1.57 V	120	90.79	-4.01
3	2483.50	61.7 PK	74.0	-12.3	1.57 V	120	65.59	-3.85
4	2483.50	46.8 AV	54.0	-7.2	1.57 V	120	50.66	-3.85
5	4904.00	45.3 PK	74.0	-28.8	1.44 V	290	42.11	3.14
6	4904.00	33.3 AV	54.0	-20.7	1.44 V	290	30.20	3.14

REMARKS:

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

Below 1GHz Data: 802.11g

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	39.55	32.8 QP	40.0	-7.2	1.29 H	160	47.32	-14.54
2	200.04	35.2 QP	43.5	-8.3	1.61 H	223	51.52	-16.28
3	433.37	39.9 QP	46.0	-6.1	1.96 H	7	49.42	-9.50
4	640.03	39.5 QP	46.0	-6.5	1.37 H	209	45.25	-5.78
5	750.08	39.0 QP	46.0	-7.0	2.08 H	352	42.91	-3.94
6	833.35	39.1 QP	46.0	-6.9	1.52 H	360	41.62	-2.48
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	34.66	33.1 QP	40.0	-6.9	1.74 V	124	48.38	-15.31
2	104.79	37.3 QP	43.5	-6.2	1.52 V	138	54.91	-17.65
3	250.01	39.9 QP	46.0	-6.2	1.80 V	47	54.14	-14.29
4	500.02	39.2 QP	46.0	-6.8	1.66 V	108	47.72	-8.49
5	583.34	39.7 QP	46.0	-6.3	1.45 V	117	46.56	-6.87
6	833.35	39.6 QP	46.0	-6.4	1.09 V	145	42.07	-2.48

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100292	Dec. 18, 2014	Dec. 17, 2015
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	100104	Dec. 04, 2014	Dec. 03, 2015
LISN With Adapter (for EUT)	AD10	C09Ada-001	Dec. 04, 2014	Dec. 03, 2015
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	847265/023	Oct. 21, 2014	Oct. 20, 2015
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 06, 2015	May 05, 2016
Software	ADT_Cond_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C09.01	Feb. 24, 2015	Feb. 23, 2016
SUHNTER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 19, 2015	May 18, 2016
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 20, 2014	Nov. 19, 2015
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 20, 2014	Nov. 19, 2015

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

2. The test was performed in Shielded Room No. 9.

3. The VCCI Site Registration No. C-1312.

4.2.3 Test Procedures

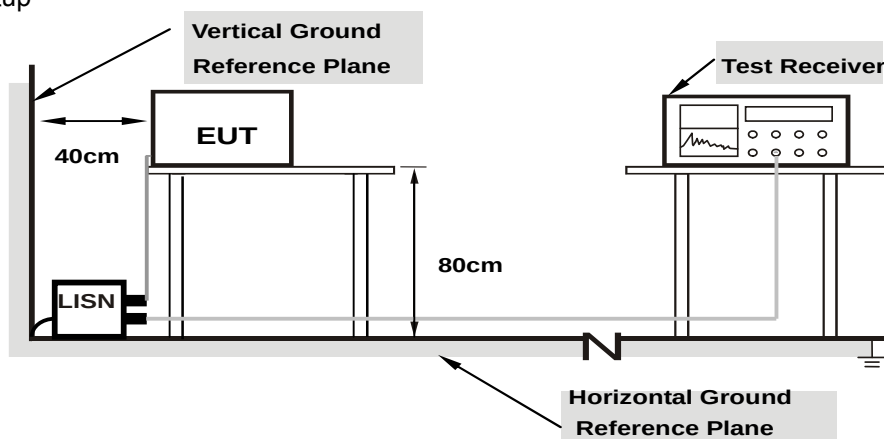
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

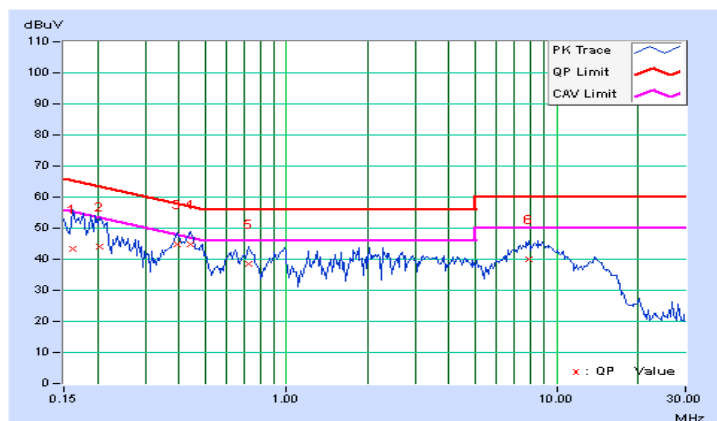
4.2.7 Test Results

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

No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.22	42.96	25.32	43.18	25.54	65.38	55.38	-22.19	-29.83
2	0.20469	0.24	43.88	30.91	44.12	31.15	63.42	53.42	-19.30	-22.27
3	0.39219	0.33	44.43	34.36	44.76	34.69	58.02	48.02	-13.26	-13.33
4	0.44297	0.34	44.46	36.52	44.80	36.86	57.01	47.01	-12.21	-10.15
5	0.72422	0.39	38.21	29.90	38.60	30.29	56.00	46.00	-17.40	-15.71
6	7.89453	0.85	39.00	30.77	39.85	31.62	60.00	50.00	-20.15	-18.38

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

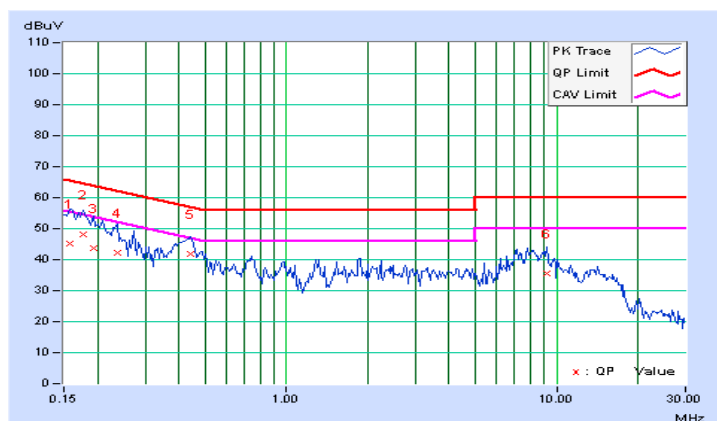


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	0.22	44.99	22.78	45.21	23.00	65.58	55.58	-20.37	-32.58
2	0.17734	0.23	47.87	31.93	48.10	32.16	64.61	54.61	-16.51	-22.45
3	0.19297	0.25	43.37	22.91	43.62	23.16	63.91	53.91	-20.29	-30.75
4	0.23594	0.26	41.87	26.16	42.13	26.42	62.24	52.24	-20.11	-25.82
5	0.43906	0.33	41.46	34.23	41.79	34.56	57.08	47.08	-15.29	-12.52
6	9.18359	0.86	34.68	28.07	35.54	28.93	60.00	50.00	-24.46	-21.07

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

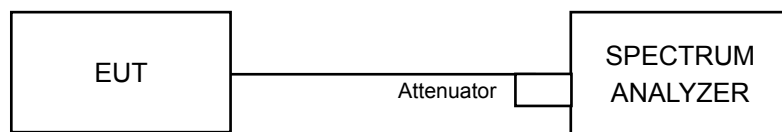


4.3 6dB Bandwidth Measurement

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	8.11	0.5	PASS
6	2437	8.11	0.5	PASS
11	2462	8.12	0.5	PASS

802.11g

Channel	Frequency (MHz)	6db Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1		
1	2412	15.11	15.14	0.5	PASS
6	2437	15.15	15.14	0.5	PASS
11	2462	15.15	15.14	0.5	PASS

802.11n (HT20)

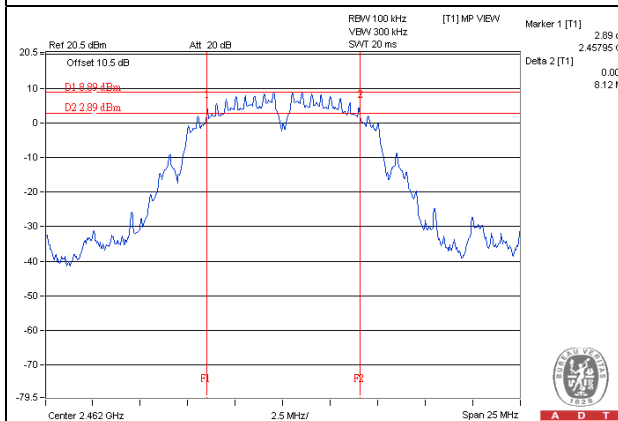
Channel	Frequency (MHz)	6db Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1		
1	2412	15.15	15.15	0.5	Pass
6	2437	15.14	15.16	0.5	Pass
11	2462	15.15	15.14	0.5	Pass

802.11n (HT40)

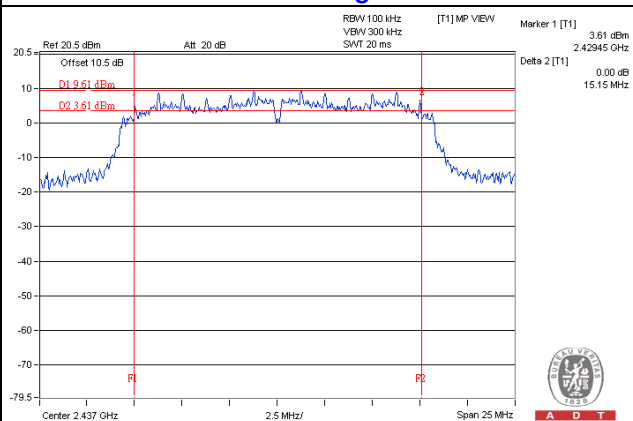
Channel	Frequency (MHz)	6db Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1		
3	2422	35.37	35.76	0.5	Pass
6	2437	35.24	35.51	0.5	Pass
9	2452	35.24	35.24	0.5	Pass

Spectrum Plot of Worst Value

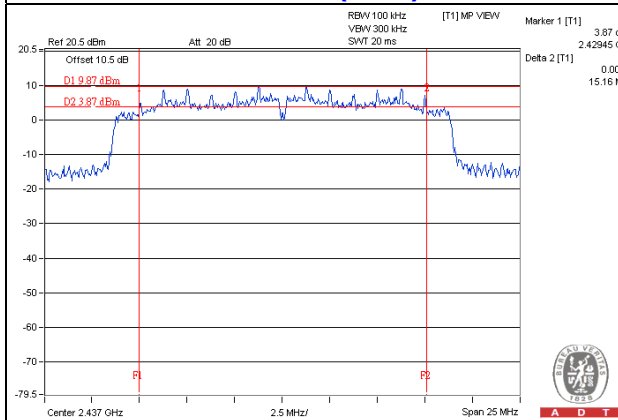
802.11b



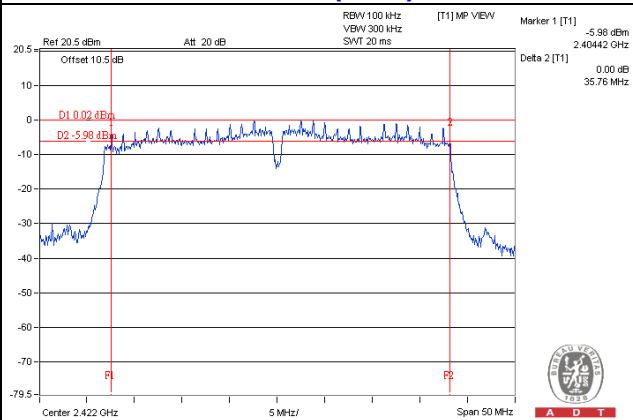
802.11g



802.11n (HT20)



802.11n (HT40)



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,

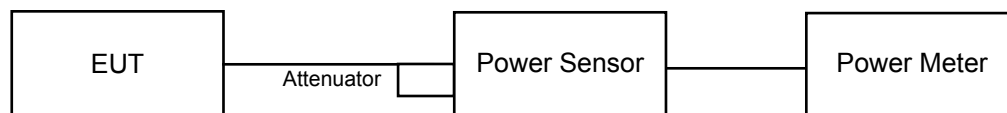
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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	224.905	23.52	30	Pass
6	2437	285.759	24.56	30	Pass
11	2462	130.017	21.14	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	24.95	23.76	550.292	27.41	30	Pass
6	2437	25.78	25.34	720.422	28.58	30	Pass
11	2462	22.21	21.96	323.377	25.10	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	23.56	22.25	394.866	25.96	30	Pass
6	2437	25.60	25.31	702.703	28.47	30	Pass
11	2462	21.72	20.38	257.738	24.11	30	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	23.56	22.25	394.866	25.96	30	Pass
6	2437	25.60	25.31	702.703	28.47	30	Pass
9	2452	22.12	21.20	294.756	24.69	30	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	83.946	19.24
6	2437	128.825	21.10
11	2462	57.280	17.58

802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	15.93	15.17	72.059	18.58
6	2437	20.32	19.95	206.502	23.15
11	2462	14.02	13.13	45.794	16.61

802.11n (HT20)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	14.52	13.49	50.650	17.05
6	2437	20.31	19.34	193.300	22.86
11	2462	13.63	12.24	39.816	16.00

802.11n (HT40)

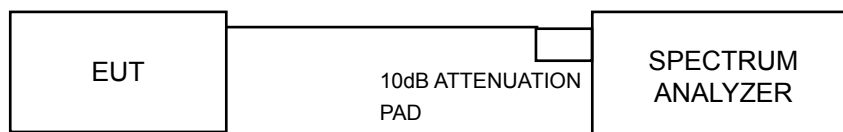
Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	13.98	12.20	41.599	16.19
6	2437	15.67	15.09	69.183	18.40
9	2452	12.28	11.07	29.698	14.73

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- 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)	Limit (dBm)	Pass /Fail
1	2412	-2.47	8	Pass
6	2437	-2.18	8	Pass
11	2462	-4.13	8	Pass

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-9.16	3.01	-6.15	7.89	Pass
	6	2437	-4.56	3.01	-1.55	7.89	Pass
	11	2462	-10.54	3.01	-7.53	7.89	Pass
1	1	2412	-10.30	3.01	-7.29	7.89	Pass
	6	2437	-4.43	3.01	-1.42	7.89	Pass
	11	2462	-12.13	3.01	-9.12	7.89	Pass

NOTE: Directional gain = 3.10dBi + 10log(2) = 6.11dBi > 6dBi , so the power density limit shall be reduced to 8-(6.11-6) = 7.89Bm.

802.11n (HT20)

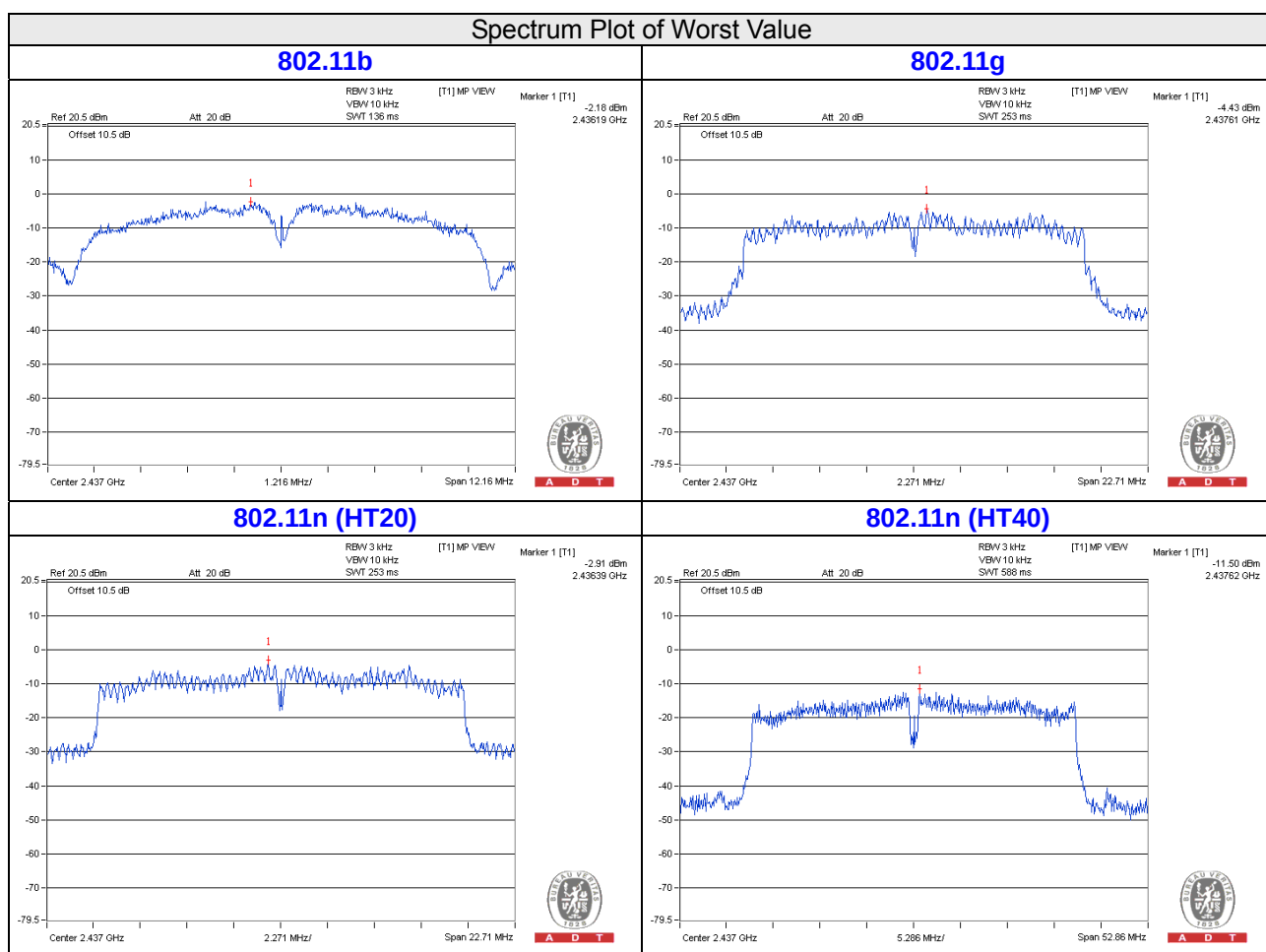
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-10.61	3.01	-7.60	7.89	Pass
	6	2437	-2.91	3.01	0.10	7.89	Pass
	11	2462	-11.05	3.01	-8.04	7.89	Pass
1	1	2412	-11.15	3.01	-8.14	7.89	Pass
	6	2437	-3.83	3.01	-0.82	7.89	Pass
	11	2462	-11.81	3.01	-8.80	7.89	Pass

NOTE: Directional gain = 3.10dBi + 10log(2) = 6.11dBi > 6dBi , so the power density limit shall be reduced to 8-(6.11-6) = 7.89Bm.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	3	2422	-13.33	3.01	-10.32	7.89	Pass
	6	2437	-11.50	3.01	-8.49	7.89	Pass
	9	2452	-15.74	3.01	-12.73	7.89	Pass
1	3	2422	-14.98	3.01	-11.97	7.89	Pass
	6	2437	-13.30	3.01	-10.29	7.89	Pass
	9	2452	-16.63	3.01	-13.62	7.89	Pass

NOTE: Directional gain = 3.10dBi + 10log(2) = 6.11dBi > 6dBi , so the power density limit shall be reduced to 8-(6.11-6) = 7.89Bm.

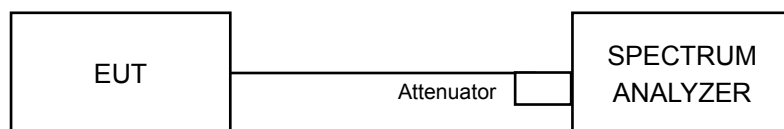


4.6 Conducted Out of Band Emission Measurement

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

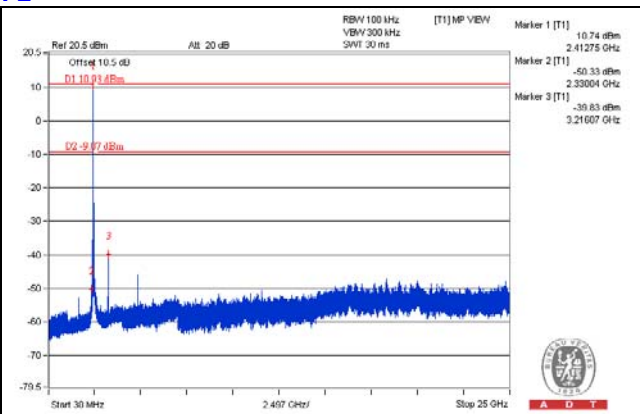
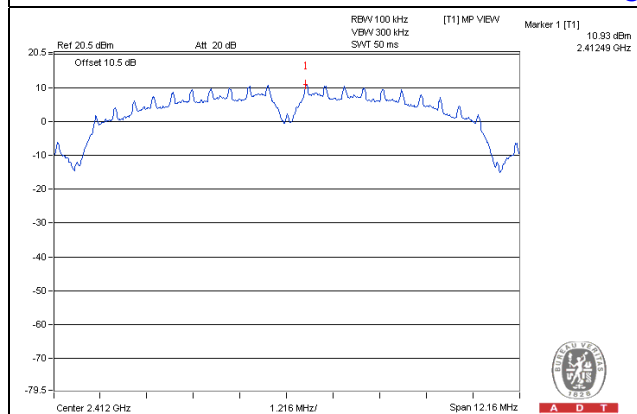
Same as Item 4.3.6

4.6.7 Test Results

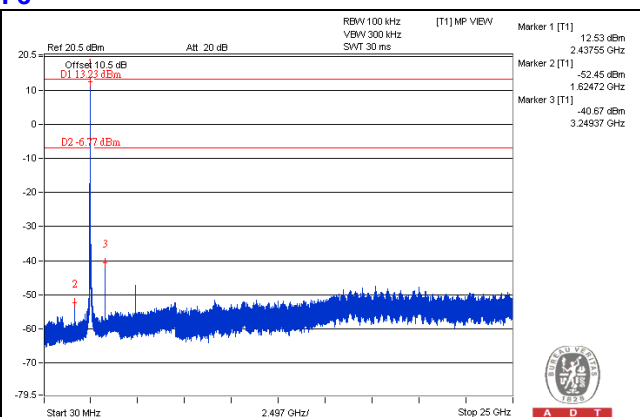
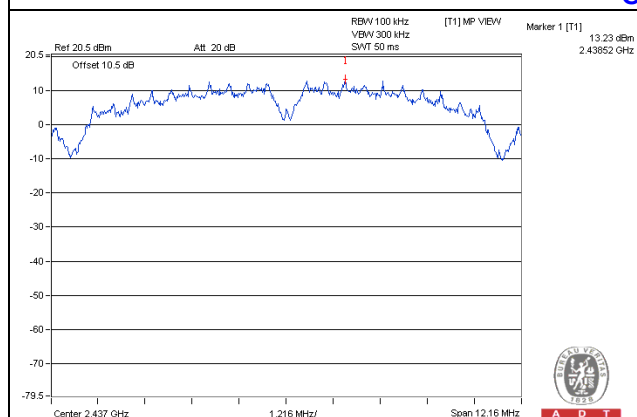
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

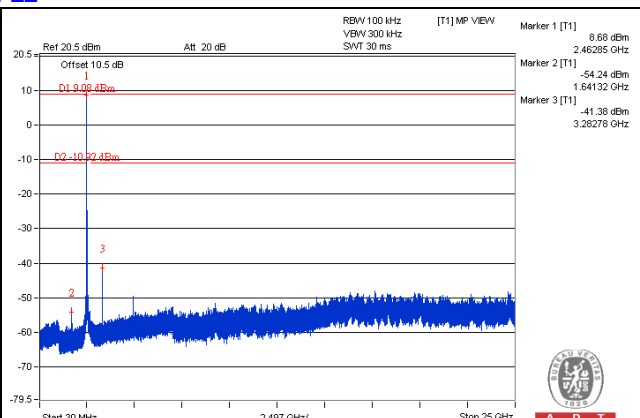
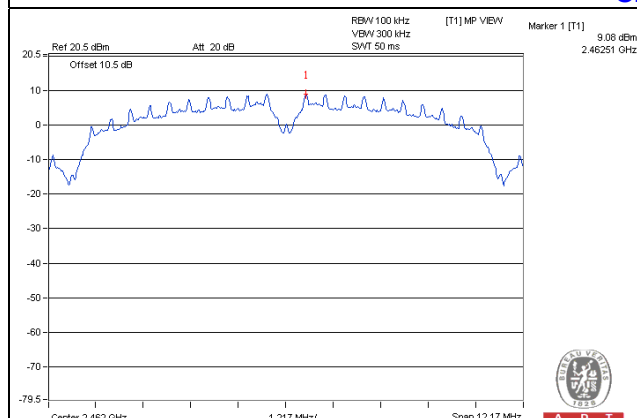
CH 1



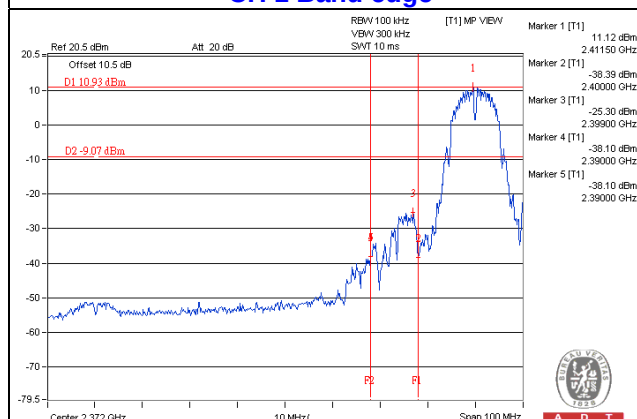
CH 6



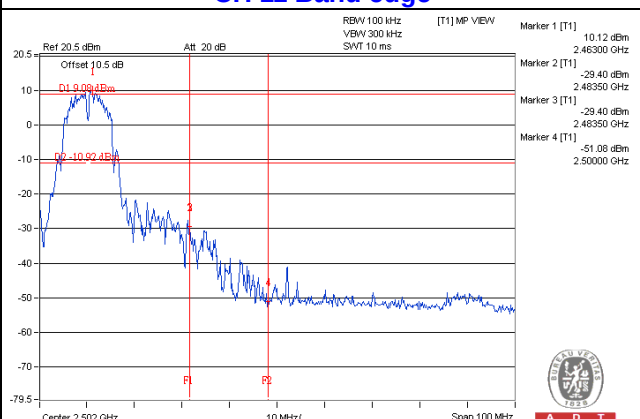
CH 11



CH 1 Band edge

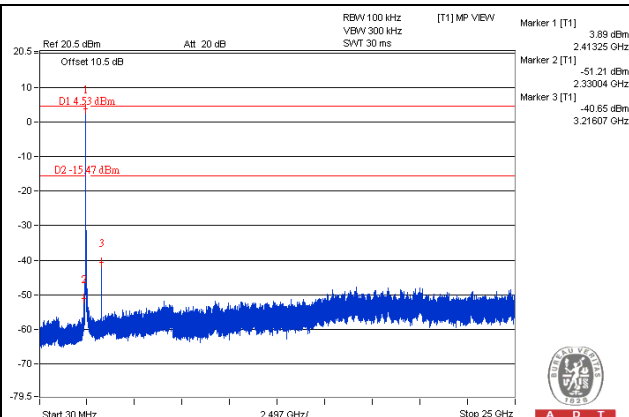
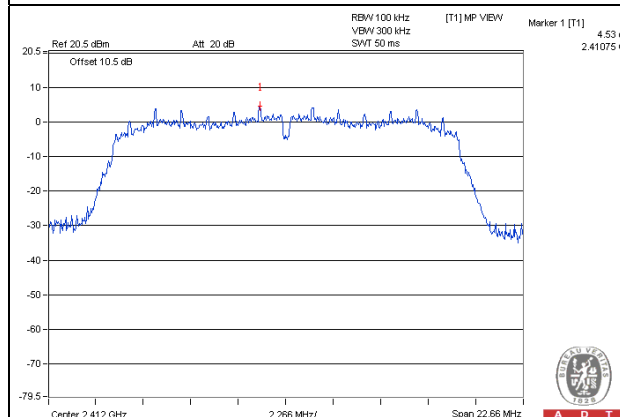


CH 11 Band edge

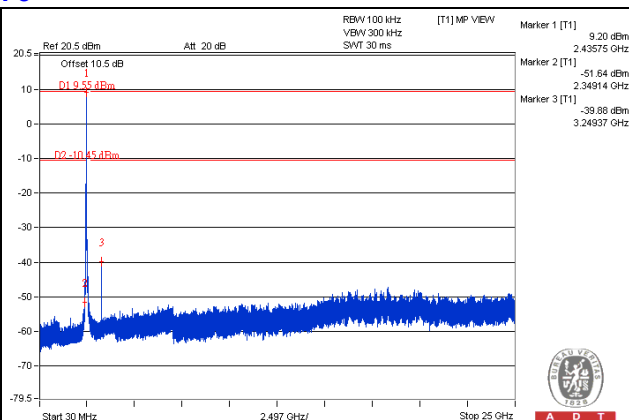
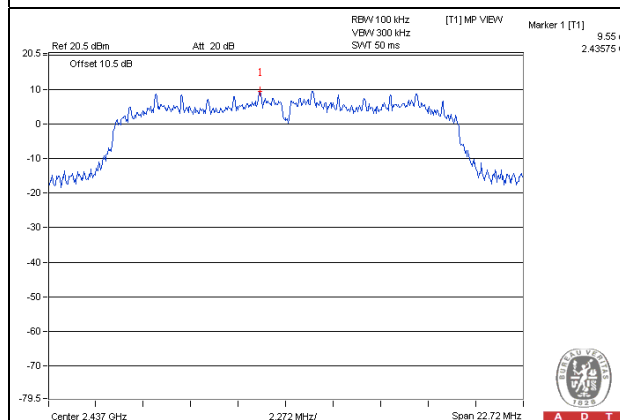


802.11g: CHAIN 0

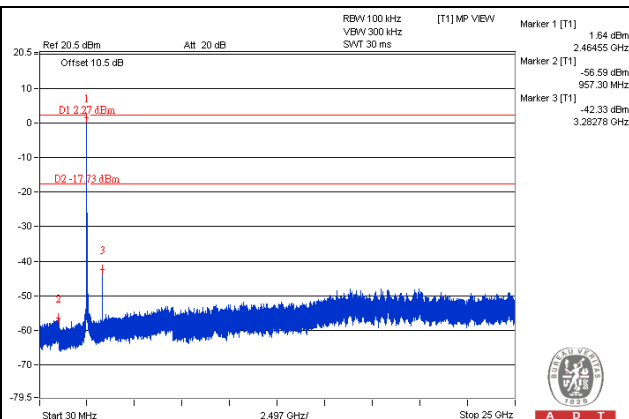
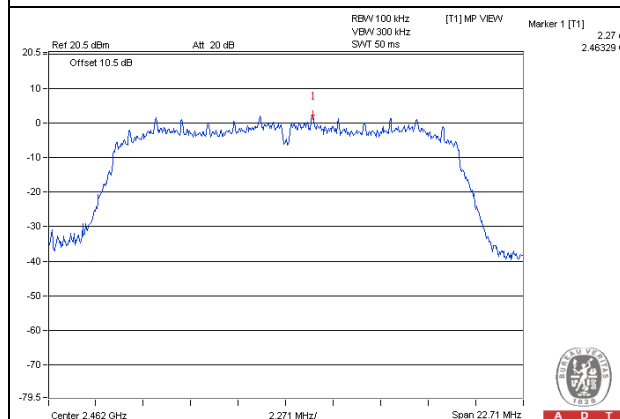
CH 1



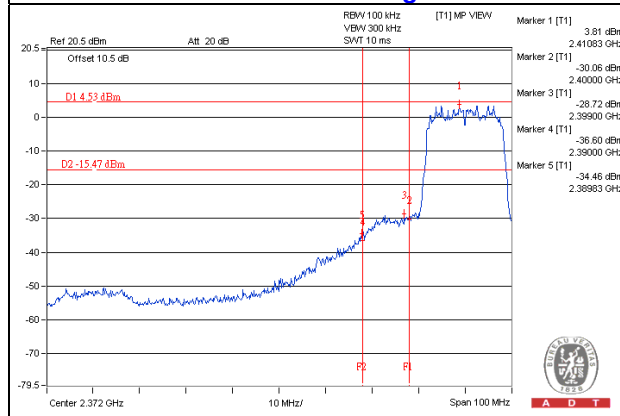
CH 6



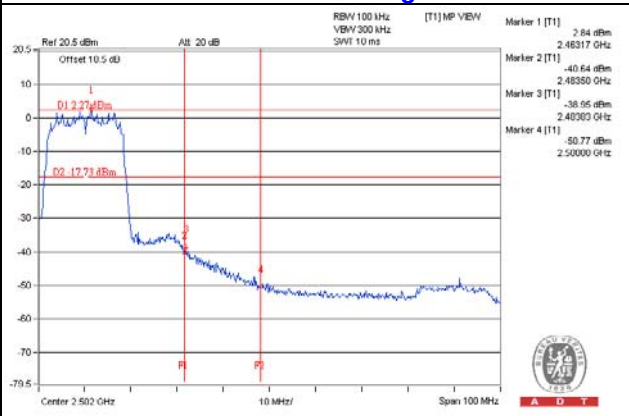
CH 11



CH 1 Band edge



CH 11 Band edge

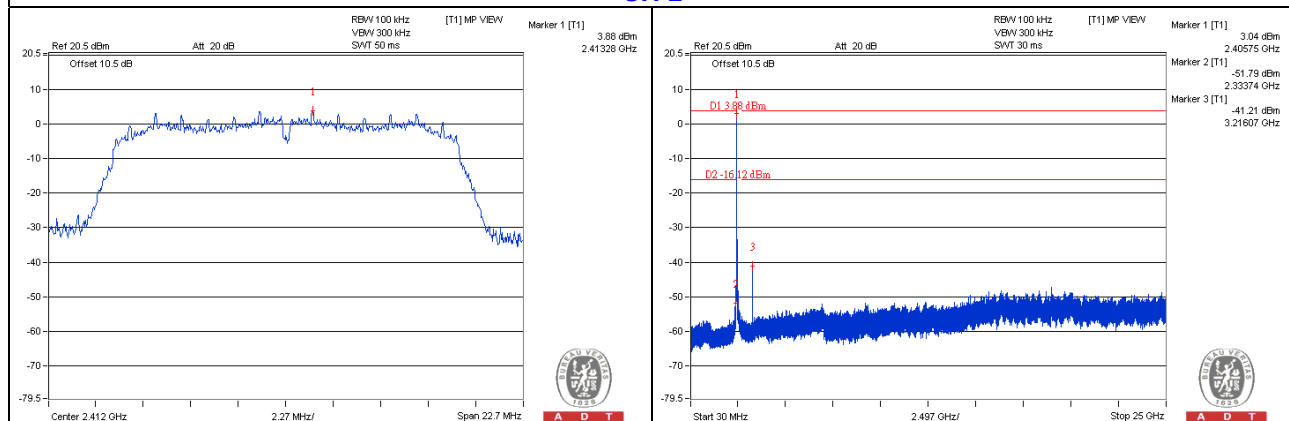




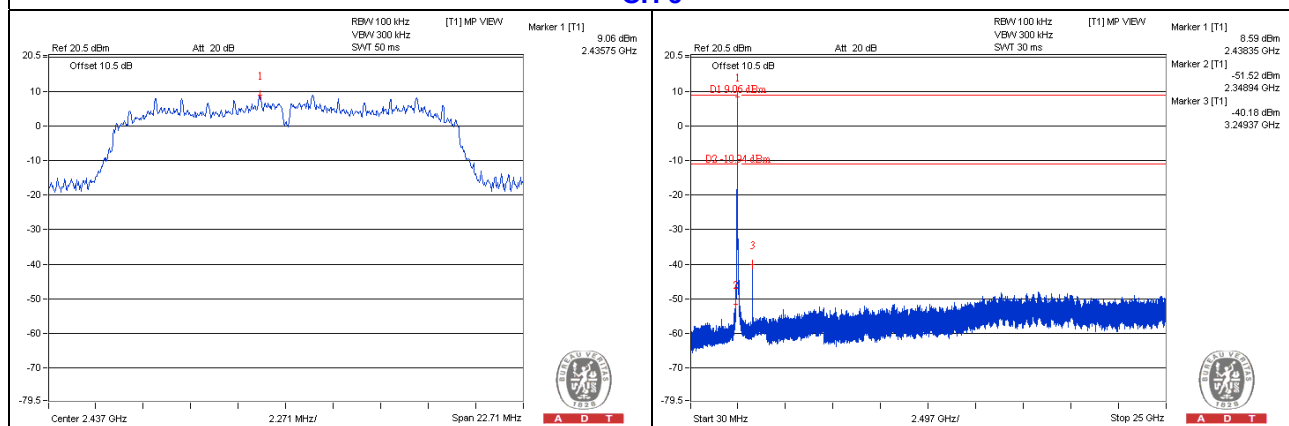
A D T

CHAIN 1

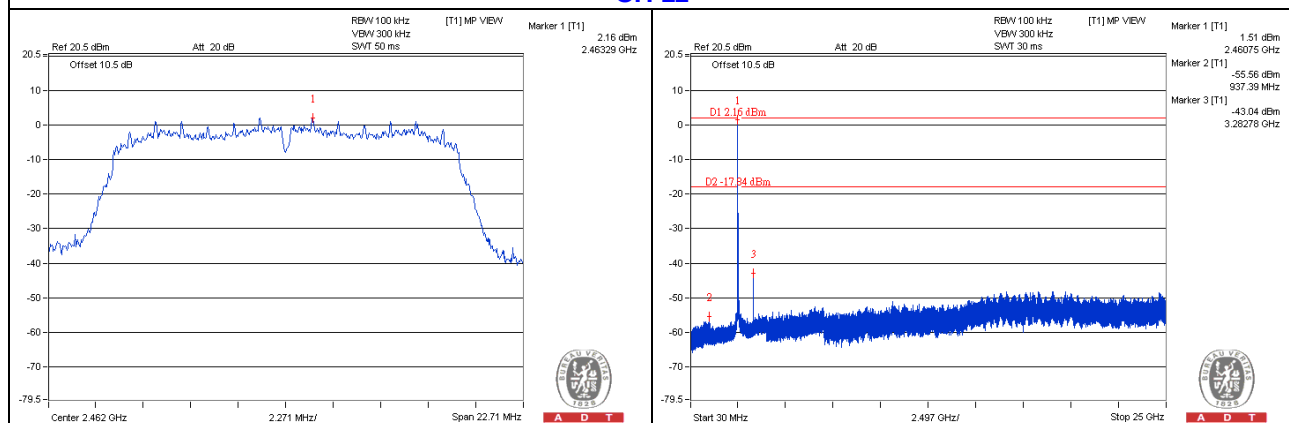
CH 1



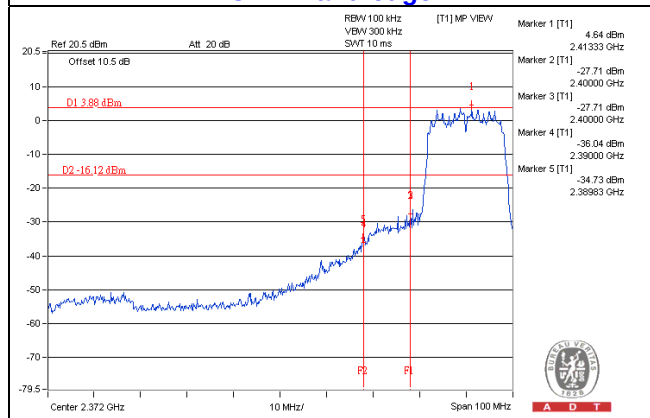
CH 6



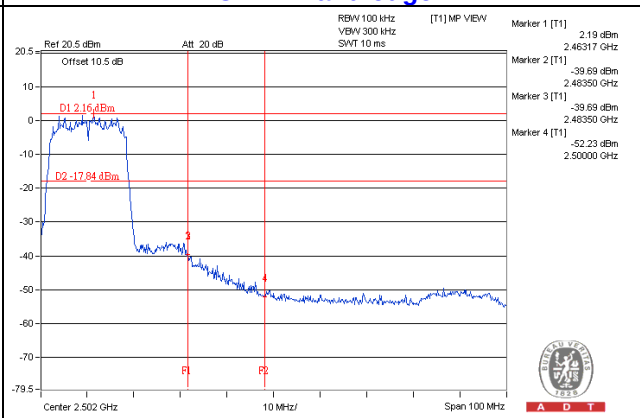
CH 11



CH 1 Band edge



CH 11 Band edge

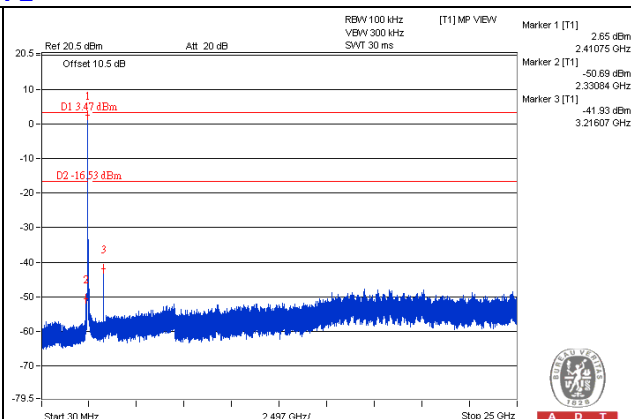
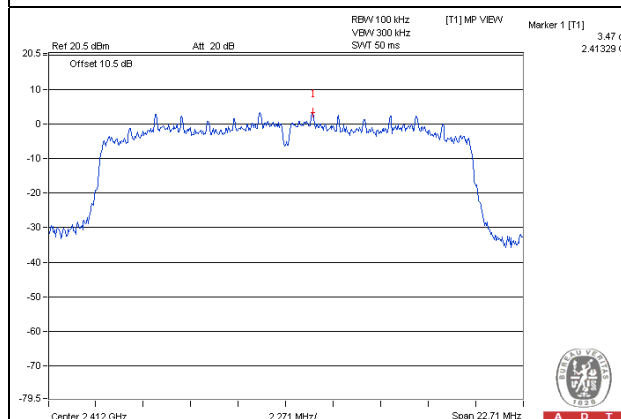




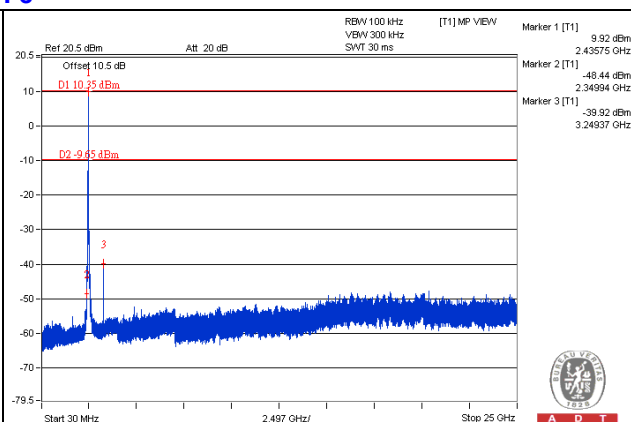
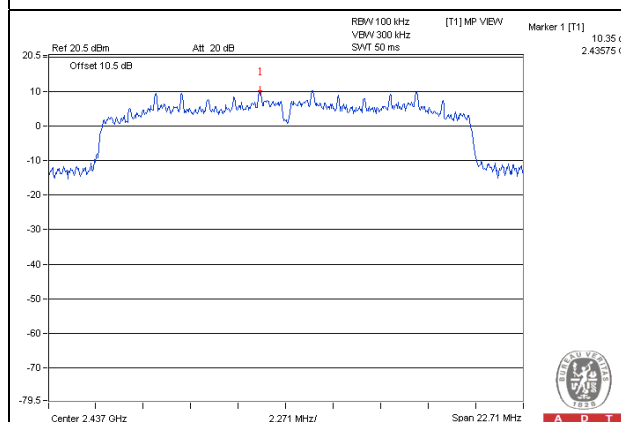
A D T

802.11n (HT20): CHAIN 0

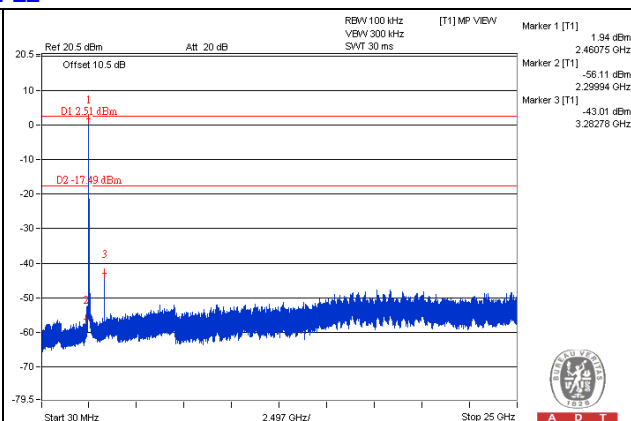
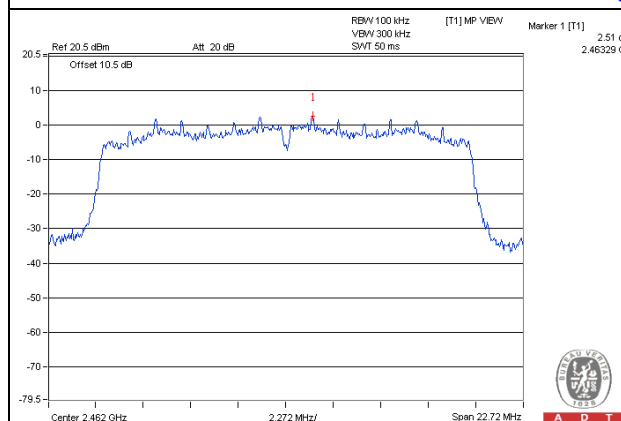
CH 1



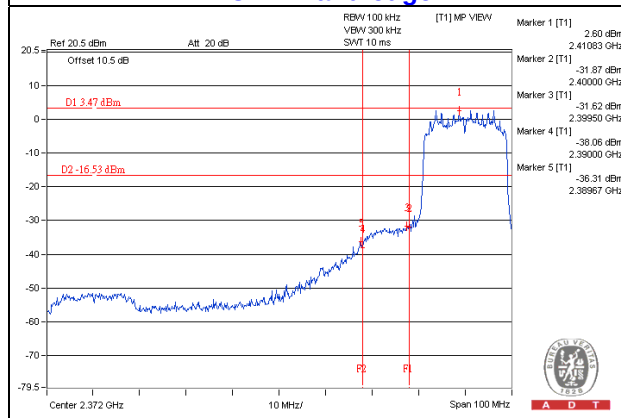
CH 6



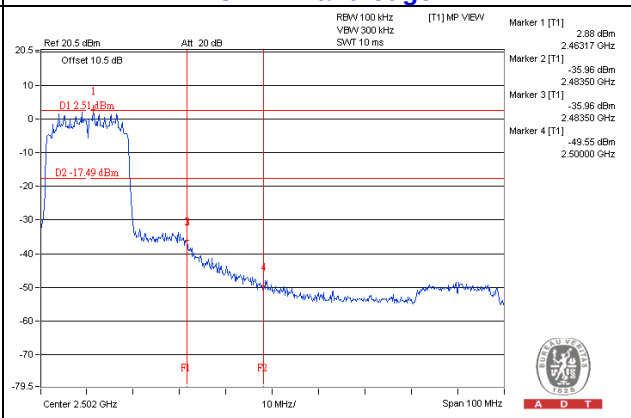
CH 11



CH 1 Band edge

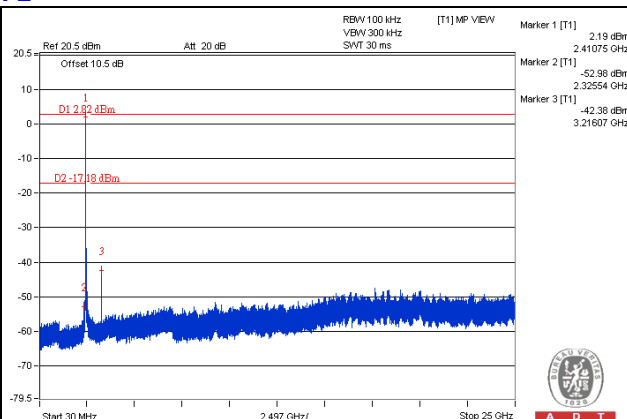
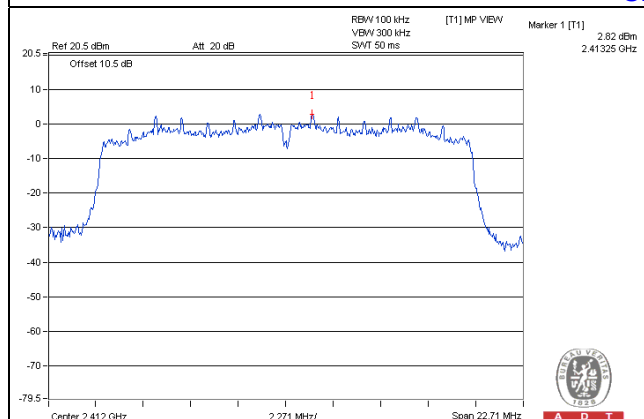


CH 11 Band edge

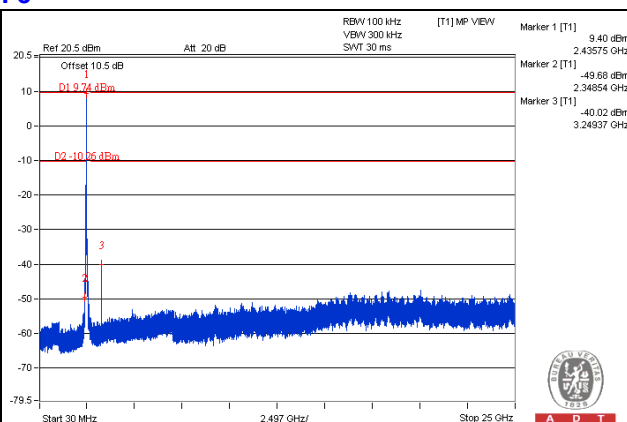
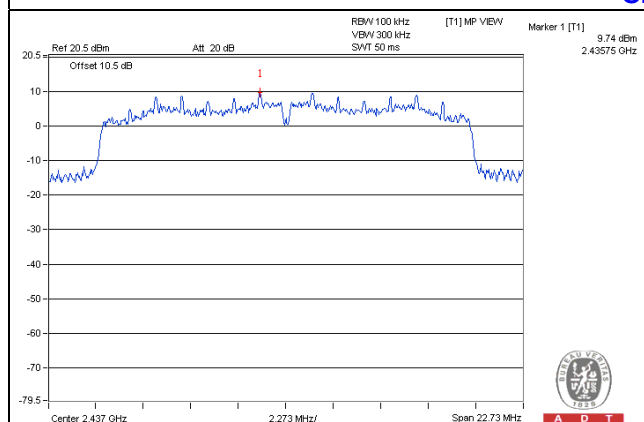


CHAIN 1

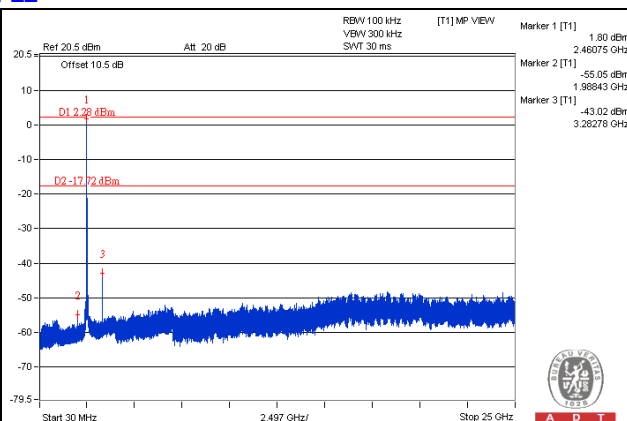
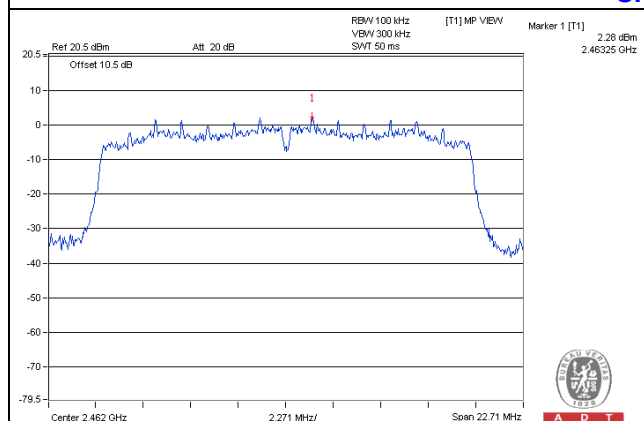
CH 1



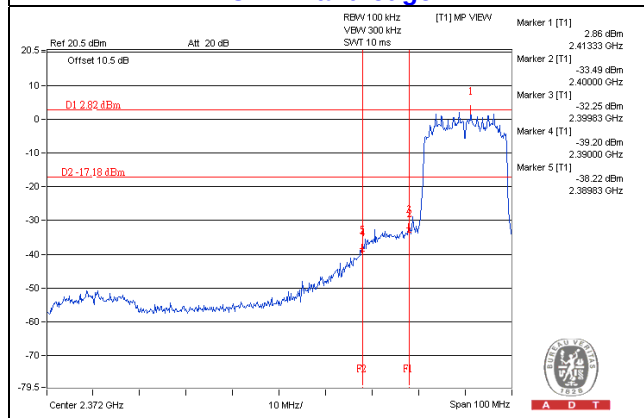
CH 6



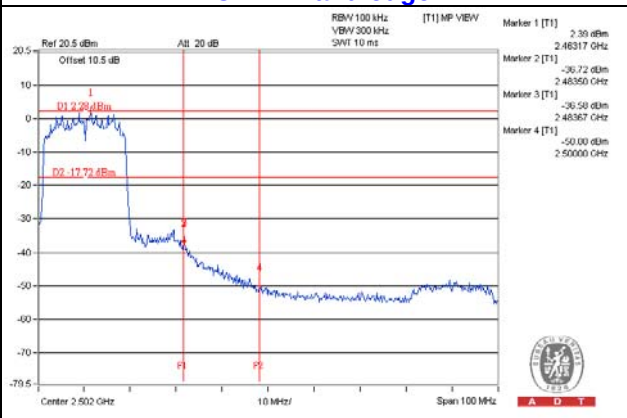
CH 11



CH 1 Band edge

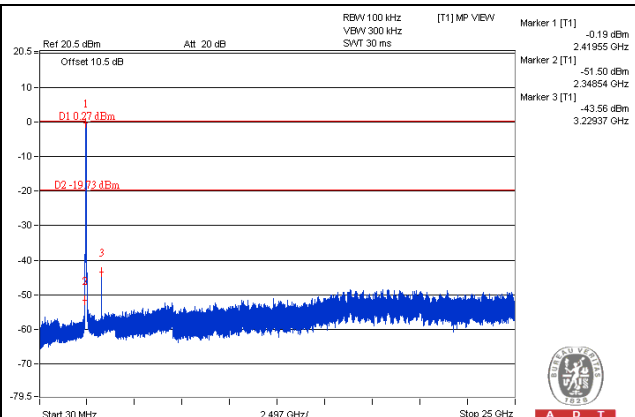
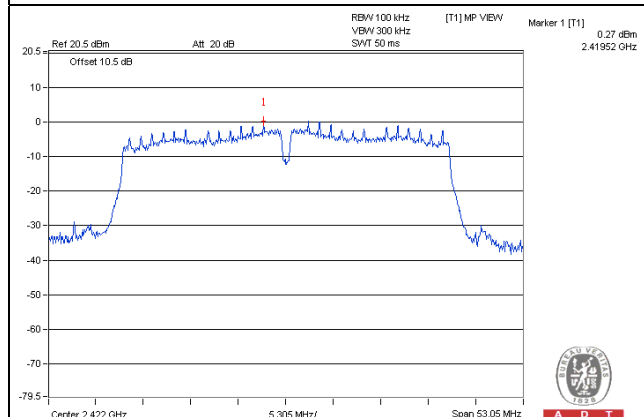


CH 11 Band edge

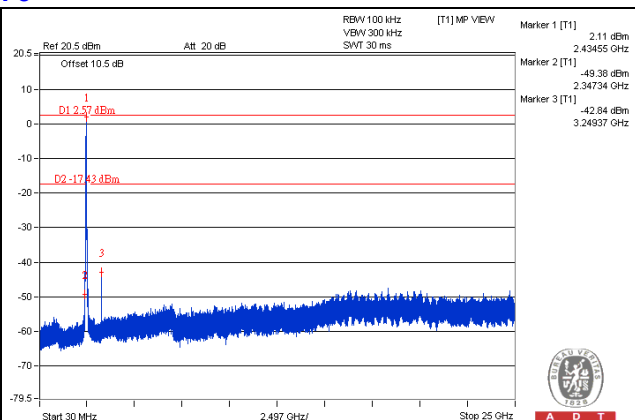
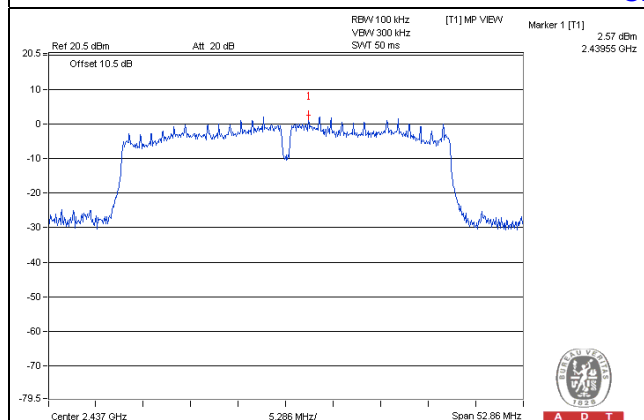


802.11n (HT40): CHAIN 0

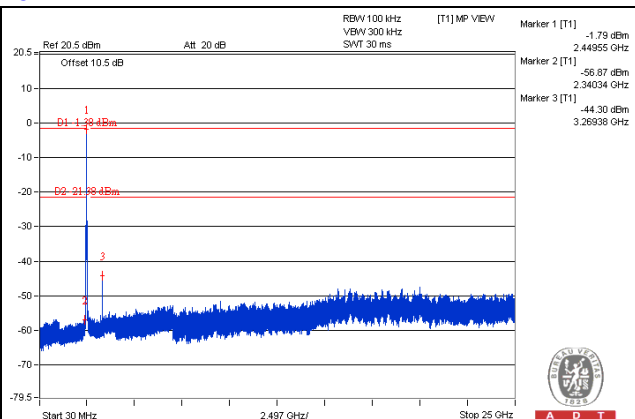
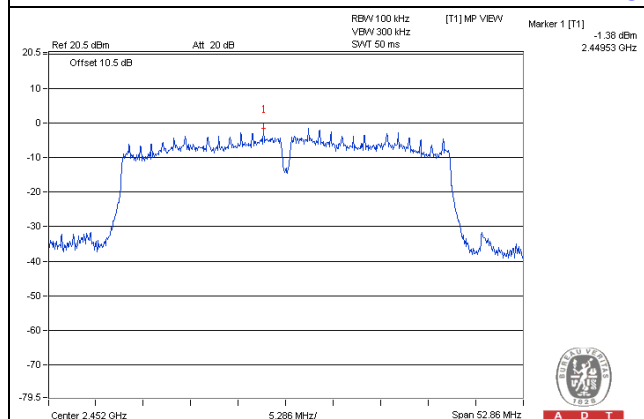
CH 3



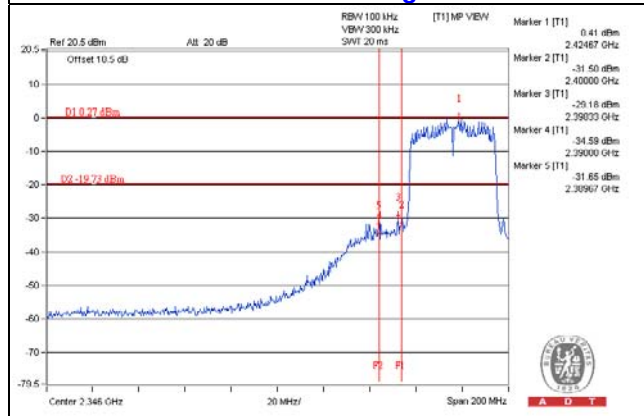
CH 6



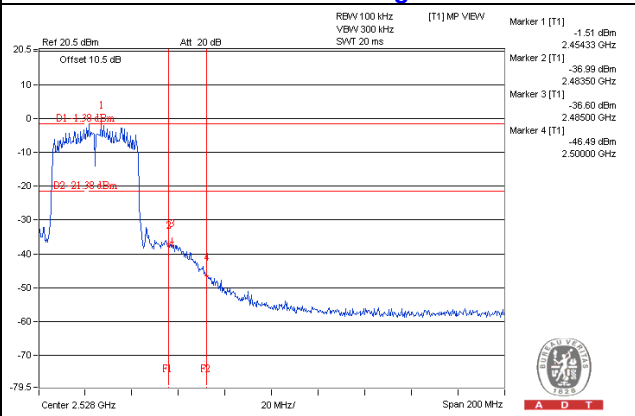
CH 9



CH 3 Band edge

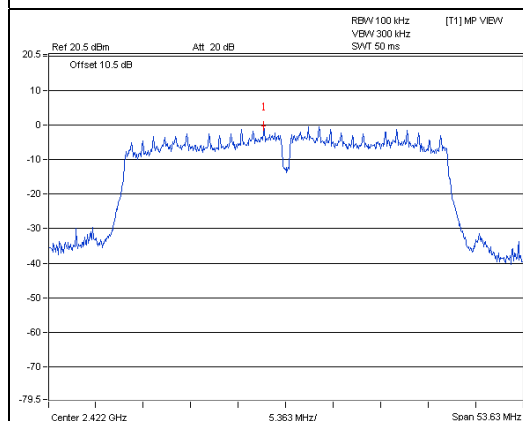


CH 9 Band edge

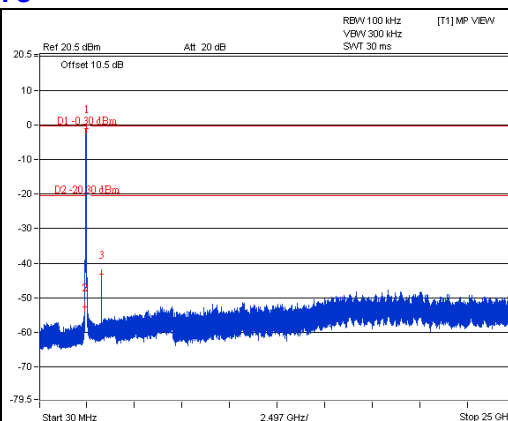


CHAIN 1

CH 3

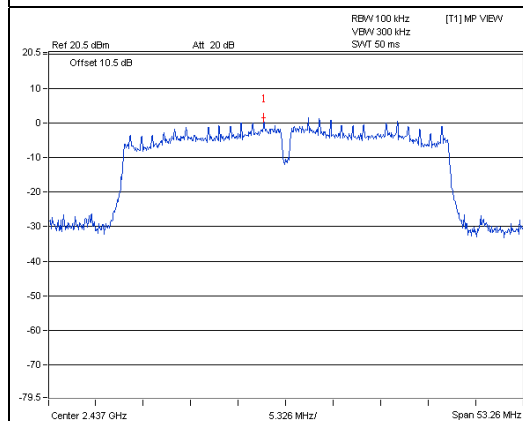


A D T

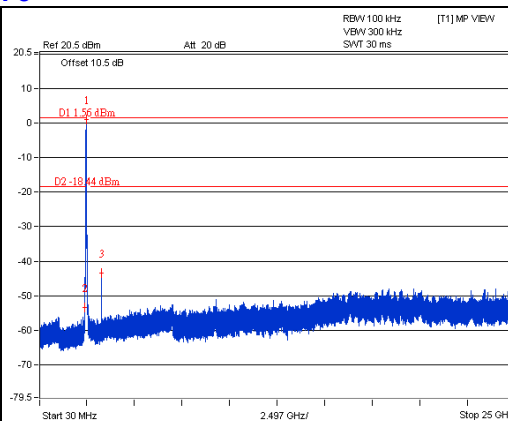


A D T

CH 6

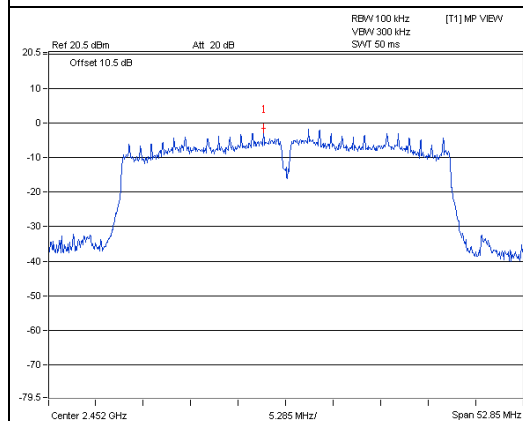


A D T

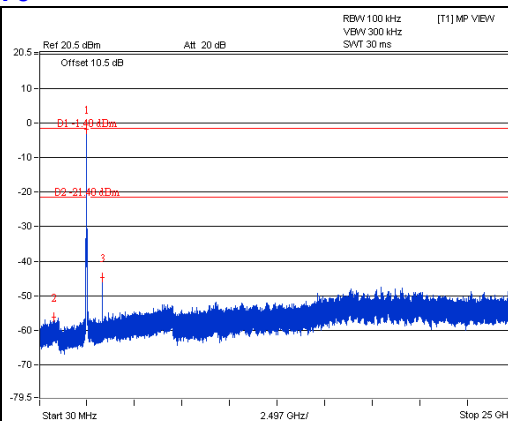


A D T

CH 9

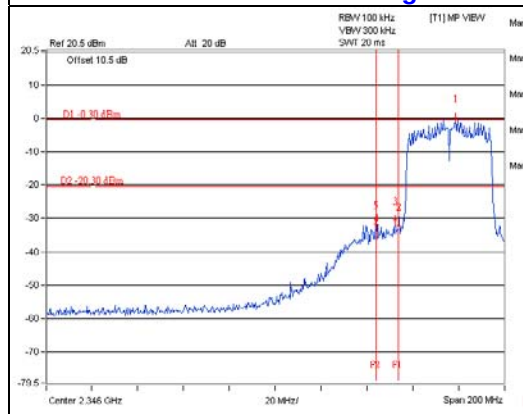


A D T



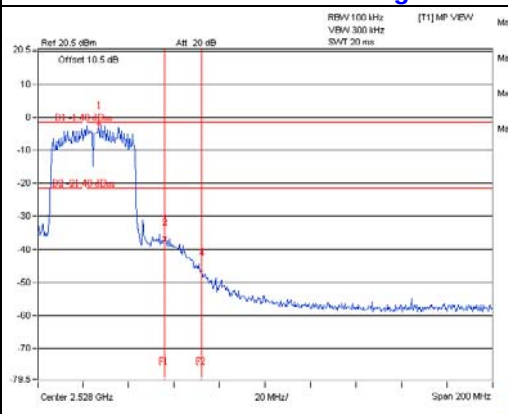
A D T

CH 3 Band edge



A D T

CH 9 Band edge



A D T

5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

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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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