FCC Test Report

Report No.:	RF160530C24
FCC ID:	A8J-ENS620EXT
Test Model:	ENS620EXT
Received Date:	May 30, 2016
Test Date:	Jun. 06 ~ Jul. 11, 2016
Issued Date:	Jul. 20, 2016
Applicant:	EnGenius Technologies
Address:	1580 Scenic Avenue, Costa Mesa, CA92626
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

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Release Control Record

Issue No.	Description	Date Issued
RF160530C24	Original release.	Jul. 20, 2016

1 Certificate of Conformity

Product: AC1300 Dual Concurrent Outdoor Access Point

Brand: EnGenius

Test Model: ENS620EXT

Sample Status: Engineering sample

Applicant: EnGenius Technologies

Test Date: Jun. 06 ~ Jul. 11, 2016

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 : _____ , **Date:** Jul. 20, 2016
Pettie Chen / Senior Specialist

Approved by : _____ , **Date:** Jul. 20, 2016
Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -7.03dB at 0.35703MHz.
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 2390.0MHz.
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 RSMA 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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC1300 Dual Concurrent Outdoor Access Point
Brand	EnGenius
Test Model	ENS620EXT
Sample Status	Engineering sample
Power Supply Rating	24Vdc (POE)
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	CDD Mode: 393.060mW Beamforming Mode: 314.093mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	POE
Cable Supplied	NA

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	Beamforming Mode	TX Function
802.11b	Not Support	2TX
802.11g	Not Support	2TX
802.11n (HT20)	Support	2TX
802.11n (HT40)	Support	2TX

2. The EUT uses the following POE.

POE	
Brand	EnGenius
Model	EPA2410GP
Input Power	100-240Vac ~ 0.4A,50-60Hz
Output Power	24Vdc, 1A
Power Line	0.55m non-shielded AC power cable without core

3. The following antenna was provided to the EUT.

Ant. Type	Dipole	
Connecter Type	RSMA	
Antenna Gain(dBi)		
2400MHz	2450MHz	2500MHz
5.08	5.13	5.17
5150MHz	5550MHz	5850MHz
5.12	5.09	5.17

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 & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission APCM: Antenna Port Conducted Measurement

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	Date Rate (Mbps)
CDD Mode						
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	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
Beamforming Mode						
-	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	Date Rate (Mbps)
CDD Mode						
-	802.11b	1 to 13	1	DSSS	DBPSK	1

Power Line Conducted Emission Test:

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

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Date Rate (Mbps)
CDD Mode						
-	802.11b	1 to 13	1	DSSS	DBPSK	1

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Date Rate (Mbps)
CDD Mode						
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	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
Beamforming Mode						
-	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≥1G	16 deg. C, 70% RH	120Vac, 60Hz	Nick Hsu
RE<1G	16 deg. C, 70% RH	120Vac, 60Hz	Jones Chang
PLC	20 deg. C, 70% RH	120Vac, 60Hz	Jones Chang
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Antony Lee

3.3 Duty Cycle of Test Signal

CDD Mode

Duty cycle of test signal is > 98%, duty factor is not required

Duty cycle of test signal is < 98 %, duty factor is required

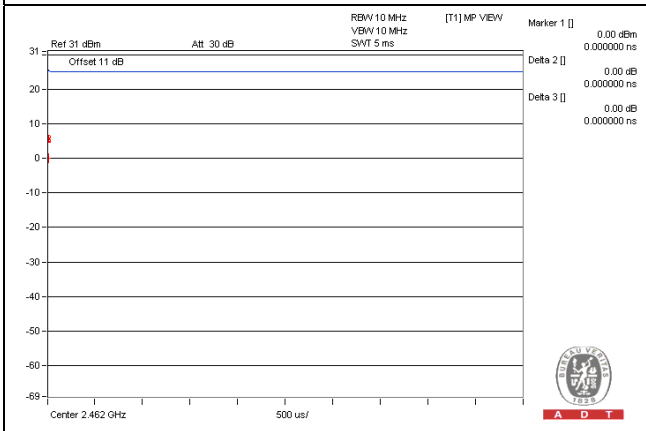
802.11b: Duty cycle = 100%

802.11g: Duty cycle = 2.062/2.147 = 0.96, Duty factor = 10 * log(1/0.96) = 0.18

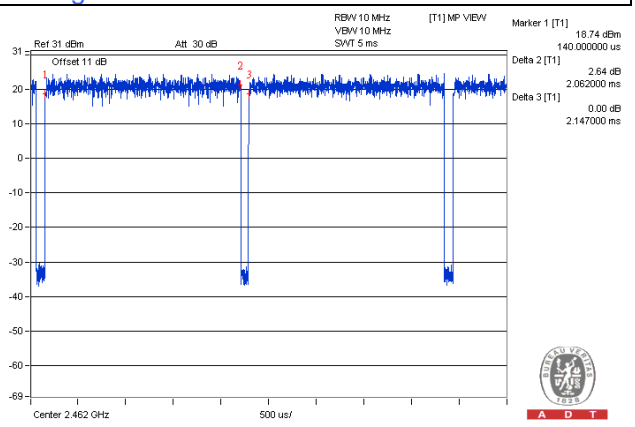
802.11n (HT20): Duty cycle = 4.998/5.098 = 0.98

802.11n (HT40): Duty cycle = 2.428/2.529 = 0.96, Duty factor = 10 * log(1/0.96) = 0.18

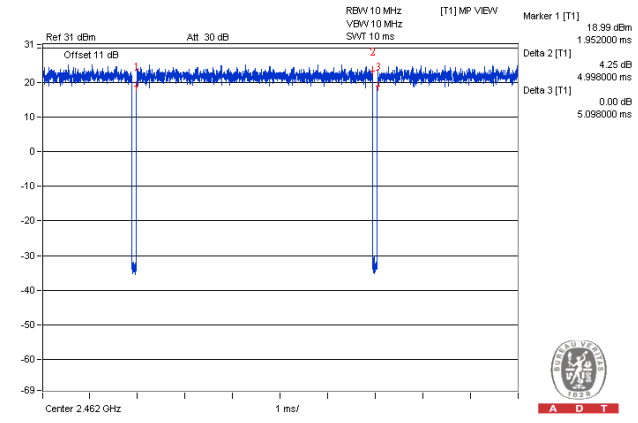
802.11b



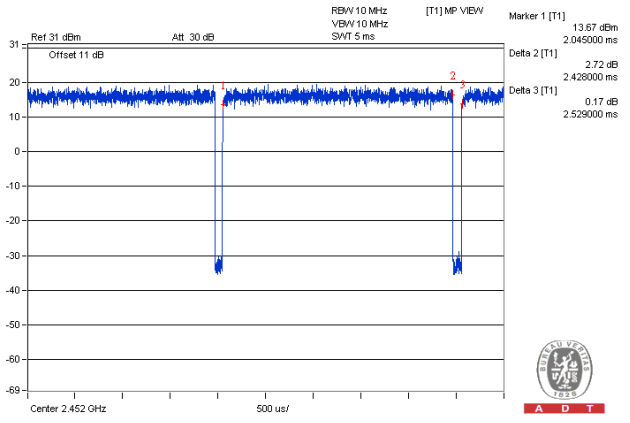
802.11g



802.11n (HT20)



802.11n (HT40)

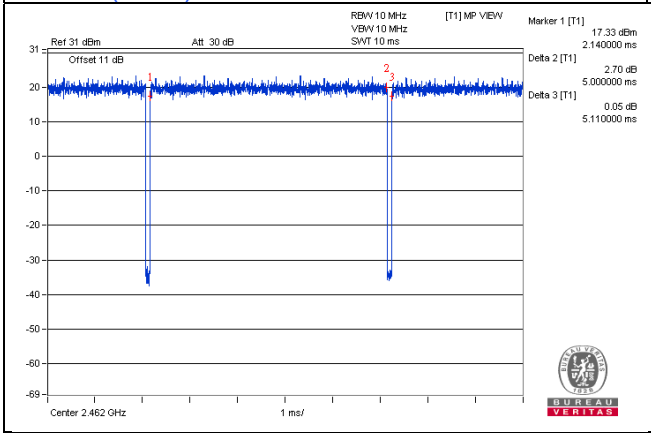
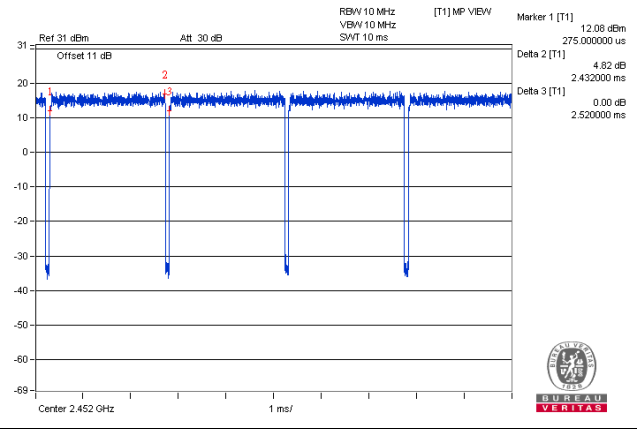


Beamforming Mode

Duty cycle of test signal is < 98 %, duty factor is required

802.11n (HT20): Duty cycle = 5/5.11 = 0.978, Duty factor = 10 * log(1/0.978) = 0.09

802.11n (HT40): Duty cycle = 2.432/2.52 = 0.965, Duty factor = 10 * log(1/0.965) = 0.15

802.11n (HT20)	802.11n (HT40)
	

3.4 Description of Support Units

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

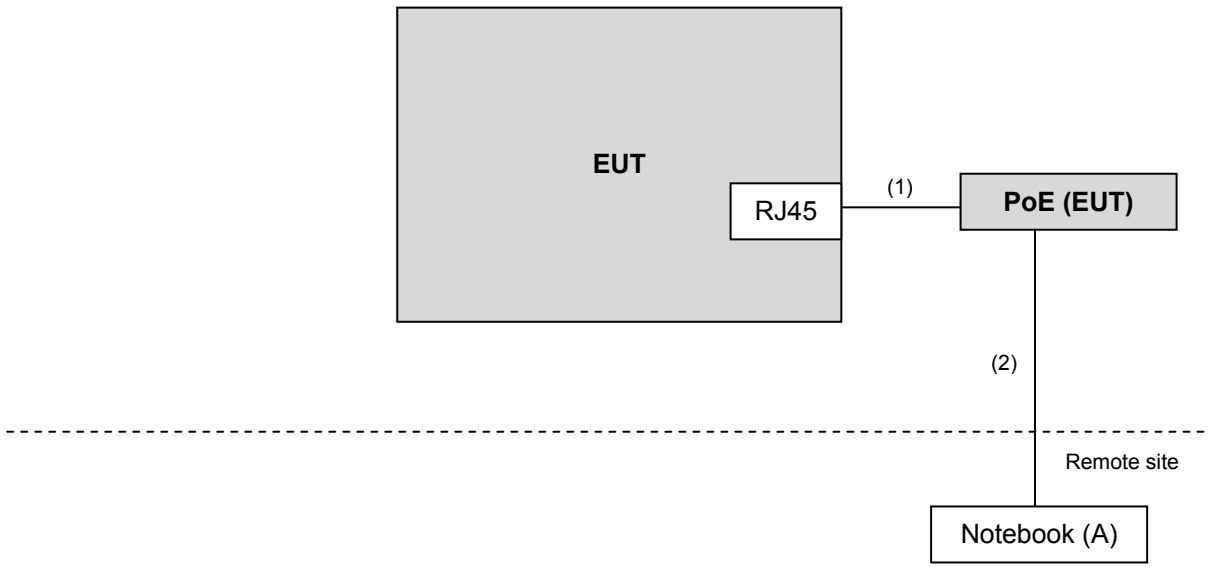
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	D531	CN-0XM006-48643-81 U-2973	QDS-BRCM1020	-

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45	1	1.8	N	0	-
2.	RJ45	1	10	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specification of the EUT declared by 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 v03r05
KDB 662911 D01 Multiple Transmitter Output v02r01
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 30dB below the highest level of the desired power:

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 30dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 18, 2016	Apr. 17, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Sep. 02, 2015	Sep. 01, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	9120D	209	Jan. 20, 2016	Jan. 19, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Preamplifier Agilent	8447D	2944A10738	Oct.18, 2015	Oct. 17, 2016
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (214378)	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03 (309224+12738)	Aug. 22, 2015	Aug. 21, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2015	Oct. 17, 2016
High Speed Peak Power Meter	ML2495A	1232003	Oct. 07, 2015	Oct. 06, 2016
Power Sensor	MA2411B	1207333	Oct. 07, 2015	Oct. 06, 2016

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 988962.
5. The IC Site Registration No. is IC 7450F-3.

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 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:

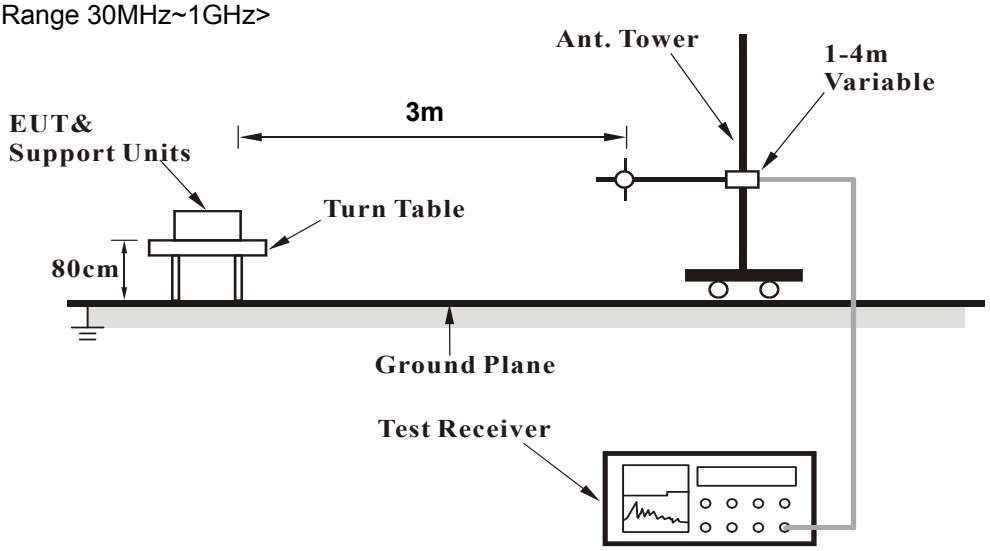
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

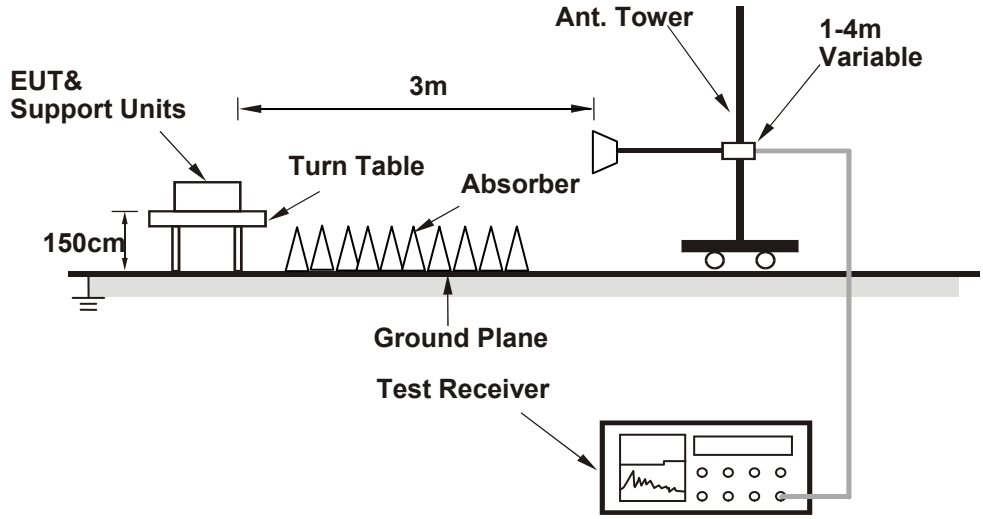
No deviation.

4.1.5 Test Setup

<Frequency Range 30MHz~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

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

4.1.7 Test Results

Above 1GHz Data：

CDD Mode

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.5 PK	74.0	-17.5	1.63 H	155	23.70	32.80
2	2390.00	45.0 AV	54.0	-9.0	1.63 H	155	12.20	32.80
3	*2412.00	104.6 PK			1.46 H	145	71.70	32.90
4	*2412.00	100.8 AV			1.46 H	145	67.90	32.90
5	4824.00	50.1 PK	74.0	-23.9	1.50 H	353	44.20	5.90
6	4824.00	43.0 AV	54.0	-11.0	1.50 H	353	37.10	5.90
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	60.6 PK	74.0	-13.4	1.58 V	0	27.80	32.80
2	2390.00	52.7 AV	54.0	-1.3	1.58 V	0	19.90	32.80
3	*2412.00	118.8 PK			1.65 V	157	85.90	32.90
4	*2412.00	114.9 AV			1.65 V	157	82.00	32.90
5	4824.00	49.8 PK	74.0	-24.2	1.46 V	186	43.90	5.90
6	4824.00	43.6 AV	54.0	-10.4	1.46 V	186	37.70	5.90

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.6 PK			1.49 H	223	74.70	32.90
2	*2437.00	103.8 AV			1.49 H	223	70.90	32.90
3	4874.00	51.0 PK	74.0	-23.0	1.66 H	352	45.00	6.00
4	4874.00	43.7 AV	54.0	-10.3	1.66 H	352	37.70	6.00
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	119.8 PK			1.64 V	126	86.90	32.90
2	*2437.00	115.9 AV			1.64 V	126	83.00	32.90
3	4874.00	50.8 PK	74.0	-23.2	1.33 V	193	44.80	6.00
4	4874.00	44.8 AV	54.0	-9.2	1.33 V	193	38.80	6.00

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	107.2 PK			1.50 H	157	74.30	32.90
2	*2462.00	103.4 AV			1.50 H	157	70.50	32.90
3	2483.50	56.6 PK	74.0	-17.4	1.66 H	129	23.60	33.00
4	2483.50	45.0 AV	54.0	-9.0	1.66 H	129	12.00	33.00
5	4924.00	50.9 PK	74.0	-23.1	1.46 H	353	44.90	6.00
6	4924.00	44.6 AV	54.0	-9.4	1.46 H	353	38.60	6.00
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	119.6 PK			1.49 V	161	86.70	32.90
2	*2462.00	115.8 AV			1.49 V	161	82.90	32.90
3	2483.50	62.3 PK	74.0	-11.7	1.52 V	186	29.30	33.00
4	2483.50	52.4 AV	54.0	-1.6	1.52 V	186	19.40	33.00
5	4924.00	49.3 PK	74.0	-24.7	1.53 V	187	43.30	6.00
6	4924.00	41.5 AV	54.0	-12.5	1.53 V	187	35.50	6.00

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.5 PK	74.0	-15.5	1.29 H	150	25.70	32.80
2	2390.00	46.3 AV	54.0	-7.7	1.29 H	150	13.50	32.80
3	*2412.00	104.9 PK			1.32 H	151	72.00	32.90
4	*2412.00	94.2 AV			1.32 H	151	61.30	32.90
5	4824.00	50.9 PK	74.0	-23.1	2.19 H	30	45.00	5.90
6	4824.00	44.7 AV	54.0	-9.3	2.19 H	30	38.80	5.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.7 PK	74.0	-6.3	1.59 V	353	34.90	32.80
2	2390.00	52.7 AV	54.0	-1.3	1.59 V	353	19.90	32.80
3	*2412.00	116.9 PK			1.62 V	166	84.00	32.90
4	*2412.00	106.5 AV			1.62 V	166	73.60	32.90
5	4824.00	50.7 PK	74.0	-23.3	1.47 V	339	44.80	5.90
6	4824.00	44.9 AV	54.0	-9.1	1.47 V	339	39.00	5.90

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.4 PK	74.0	-17.6	1.70 H	140	23.60	32.80
2	2390.00	45.0 AV	54.0	-9.0	1.70 H	140	12.20	32.80
3	*2437.00	107.1 PK			1.71 H	159	74.20	32.90
4	*2437.00	97.0 AV			1.71 H	159	64.10	32.90
5	2483.50	57.3 PK	74.0	-16.7	1.55 H	155	24.30	33.00
6	2483.50	45.6 AV	54.0	-8.4	1.55 H	155	12.60	33.00
7	4874.00	49.6 PK	74.0	-24.4	1.52 H	349	43.60	6.00
8	4874.00	41.5 AV	54.0	-12.5	1.52 H	349	35.50	6.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.1 PK	74.0	-6.9	1.58 V	152	34.30	32.80
2	2390.00	50.6 AV	54.0	-3.4	1.58 V	152	17.80	32.80
3	*2437.00	120.2 PK			1.59 V	353	87.30	32.90
4	*2437.00	110.2 AV			1.59 V	353	77.30	32.90
5	2483.50	66.8 PK	74.0	-7.2	1.93 V	187	33.80	33.00
6	2483.50	52.3 AV	54.0	-1.7	1.93 V	187	19.30	33.00
7	4874.00	48.4 PK	74.0	-25.6	1.31 V	177	42.40	6.00
8	4874.00	37.2 AV	54.0	-16.8	1.31 V	177	31.20	6.00

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	104.8 PK			1.30 H	149	71.90	32.90
2	*2462.00	94.9 AV			1.30 H	149	62.00	32.90
3	2483.50	58.1 PK	74.0	-15.9	1.41 H	146	25.10	33.00
4	2483.50	46.0 AV	54.0	-8.0	1.41 H	146	13.00	33.00
5	4924.00	51.5 PK	74.0	-22.5	2.22 H	37	45.50	6.00
6	4924.00	45.6 AV	54.0	-8.4	2.22 H	37	39.60	6.00
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	117.3 PK			1.61 V	152	84.40	32.90
2	*2462.00	106.6 AV			1.61 V	152	73.70	32.90
3	2483.50	68.4 PK	74.0	-5.6	1.59 V	153	35.40	33.00
4	2483.50	52.4 AV	54.0	-1.6	1.59 V	153	19.40	33.00
5	4924.00	48.6 PK	74.0	-25.4	1.60 V	7	42.60	6.00
6	4924.00	38.8 AV	54.0	-15.2	1.60 V	7	32.80	6.00

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.7 PK	74.0	-17.3	1.34 H	130	23.90	32.80
2	2390.00	44.9 AV	54.0	-9.1	1.34 H	130	12.10	32.80
3	*2412.00	102.4 PK			1.49 H	150	69.50	32.90
4	*2412.00	92.3 AV			1.49 H	150	59.40	32.90
5	4824.00	50.4 PK	74.0	-23.6	1.67 H	351	44.50	5.90
6	4824.00	42.9 AV	54.0	-11.1	1.67 H	351	37.00	5.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.9 PK	74.0	-6.1	1.63 V	229	35.10	32.80
2	2390.00	52.2 AV	54.0	-1.8	1.63 V	229	19.40	32.80
3	*2412.00	115.0 PK			1.50 V	147	82.10	32.90
4	*2412.00	105.0 AV			1.50 V	147	72.10	32.90
5	4824.00	50.1 PK	74.0	-23.9	2.93 V	310	44.20	5.90
6	4824.00	41.2 AV	54.0	-12.8	2.93 V	310	35.30	5.90

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.4 PK	74.0	-17.6	1.45 H	134	23.60	32.80
2	2390.00	45.1 AV	54.0	-8.9	1.45 H	134	12.30	32.80
3	*2437.00	108.0 PK			1.71 H	158	75.10	32.90
4	*2437.00	97.4 AV			1.71 H	158	64.50	32.90
5	2483.50	59.7 PK	74.0	-14.3	1.64 H	160	26.70	33.00
6	2483.50	45.9 AV	54.0	-8.1	1.64 H	160	12.90	33.00
7	4874.00	49.6 PK	74.0	-24.4	1.41 H	347	43.60	6.00
8	4874.00	41.8 AV	54.0	-12.2	1.41 H	347	35.80	6.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.3 PK	74.0	-3.7	1.45 V	163	37.50	32.80
2	2390.00	51.0 AV	54.0	-3.0	1.45 V	163	18.20	32.80
3	*2437.00	120.1 PK			1.70 V	6	87.20	32.90
4	*2437.00	109.3 AV			1.70 V	6	76.40	32.90
5	2483.50	70.2 PK	74.0	-3.8	1.54 V	166	37.20	33.00
6	2483.50	52.2 AV	54.0	-1.8	1.54 V	166	19.20	33.00
7	4874.00	48.0 PK	74.0	-26.0	1.30 V	174	42.00	6.00
8	4874.00	37.4 AV	54.0	-16.6	1.30 V	174	31.40	6.00

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	104.0 PK			1.48 H	147	71.10	32.90
2	*2462.00	93.7 AV			1.48 H	147	60.80	32.90
3	2483.50	57.8 PK	74.0	-16.2	1.61 H	136	24.80	33.00
4	2483.50	45.7 AV	54.0	-8.3	1.61 H	136	12.70	33.00
5	4924.00	51.3 PK	74.0	-22.7	1.52 H	352	45.30	6.00
6	4924.00	43.6 AV	54.0	-10.4	1.52 H	352	37.60	6.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	115.5 PK			1.42 V	145	82.60	32.90
2	*2462.00	105.2 AV			1.42 V	145	72.30	32.90
3	2483.50	67.3 PK	74.0	-6.7	1.38 V	214	34.30	33.00
4	2483.50	52.7 AV	54.0	-1.3	1.38 V	214	19.70	33.00
5	4924.00	48.1 PK	74.0	-25.9	1.50 V	356	42.10	6.00
6	4924.00	38.7 AV	54.0	-15.3	1.50 V	356	32.70	6.00

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

802.11n (HT40)

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

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	57.1 PK	74.0	-16.9	1.84 H	164	24.30	32.80
2	2390.00	45.5 AV	54.0	-8.5	1.84 H	164	12.70	32.80
3	*2422.00	96.8 PK			1.68 H	156	63.90	32.90
4	*2422.00	87.4 AV			1.68 H	156	54.50	32.90
5	4844.00	50.4 PK	74.0	-23.6	1.64 H	355	44.60	5.80
6	4844.00	43.0 AV	54.0	-11.0	1.64 H	355	37.20	5.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.0 PK	74.0	-9.0	1.56 V	150	32.20	32.80
2	2390.00	52.3 AV	54.0	-1.7	1.56 V	150	19.50	32.80
3	*2422.00	108.4 PK			1.65 V	141	75.50	32.90
4	*2422.00	98.8 AV			1.65 V	141	65.90	32.90
5	4844.00	48.3 PK	74.0	-25.7	1.49 V	3	42.50	5.80
6	4844.00	37.6 AV	54.0	-16.4	1.49 V	3	31.80	5.80

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	57.4 PK	74.0	-16.6	1.50 H	172	24.60	32.80
2	2390.00	45.4 AV	54.0	-8.6	1.50 H	172	12.60	32.80
3	*2437.00	100.3 PK			1.67 H	153	67.40	32.90
4	*2437.00	91.3 AV			1.67 H	153	58.40	32.90
5	4874.00	50.9 PK	74.0	-23.1	1.63 H	352	44.90	6.00
6	4874.00	43.7 AV	54.0	-10.3	1.63 H	352	37.70	6.00
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	65.1 PK	74.0	-8.9	1.38 V	147	32.30	32.80
2	2390.00	52.2 AV	54.0	-1.8	1.38 V	147	19.40	32.80
3	*2437.00	112.1 PK			1.52 V	12	79.20	32.90
4	*2437.00	103.2 AV			1.52 V	12	70.30	32.90
5	4874.00	47.8 PK	74.0	-26.2	1.43 V	2	41.80	6.00
6	4874.00	37.6 AV	54.0	-16.4	1.43 V	2	31.60	6.00

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	99.8 PK			1.27 H	151	66.80	33.00
2	*2452.00	90.7 AV			1.27 H	151	57.70	33.00
3	2483.50	57.4 PK	74.0	-16.6	1.30 H	147	24.40	33.00
4	2483.50	46.2 AV	54.0	-7.8	1.30 H	147	13.20	33.00
5	4904.00	50.6 PK	74.0	-23.4	1.53 H	350	44.70	5.90
6	4904.00	44.1 AV	54.0	-9.9	1.53 H	350	38.20	5.90
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	111.7 PK			1.60 V	157	78.70	33.00
2	*2452.00	102.5 AV			1.60 V	157	69.50	33.00
3	2483.50	63.8 PK	74.0	-10.2	1.46 V	177	30.80	33.00
4	2483.50	52.7 AV	54.0	-1.3	1.46 V	177	19.70	33.00
5	4904.00	48.3 PK	74.0	-25.7	1.51 V	9	42.40	5.90
6	4904.00	38.1 AV	54.0	-15.9	1.51 V	9	32.20	5.90

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

Beamforming Mode

802.11n (HT20)

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

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	57.4 PK	74.0	-16.6	1.42 H	160	24.60	32.80
2	2390.00	45.9 AV	54.0	-8.1	1.42 H	160	13.10	32.80
3	*2412.00	102.7 PK			1.56 H	168	69.80	32.90
4	*2412.00	91.2 AV			1.56 H	168	58.30	32.90
5	4824.00	51.2 PK	74.0	-22.8	1.06 H	36	45.30	5.90
6	4824.00	44.3 AV	54.0	-9.7	1.06 H	36	38.40	5.90
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	64.7 PK	74.0	-9.3	1.55 V	151	31.90	32.80
2	2390.00	52.2 AV	54.0	-1.8	1.55 V	151	19.40	32.80
3	*2412.00	114.9 PK			1.60 V	167	82.00	32.90
4	*2412.00	102.8 AV			1.60 V	167	69.90	32.90
5	4824.00	49.1 PK	74.0	-24.9	1.35 V	166	43.20	5.90
6	4824.00	38.1 AV	54.0	-15.9	1.35 V	166	32.20	5.90

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.8 PK	74.0	-17.2	1.58 H	159	24.00	32.80
2	2390.00	45.8 AV	54.0	-8.2	1.58 H	159	13.00	32.80
3	*2437.00	108.9 PK			1.51 H	165	76.00	32.90
4	*2437.00	96.6 AV			1.51 H	165	63.70	32.90
5	2483.50	57.9 PK	74.0	-16.1	1.64 H	151	24.90	33.00
6	2483.50	46.1 AV	54.0	-7.9	1.64 H	151	13.10	33.00
7	4874.00	51.6 PK	74.0	-22.4	1.04 H	34	45.60	6.00
8	4874.00	45.6 AV	54.0	-8.4	1.04 H	34	39.60	6.00
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	63.0 PK	74.0	-11.0	1.90 V	345	30.20	32.80
2	2390.00	49.9 AV	54.0	-4.1	1.90 V	345	17.10	32.80
3	*2437.00	119.7 PK			1.51 V	341	86.80	32.90
4	*2437.00	108.2 AV			1.51 V	341	75.30	32.90
5	2483.50	64.7 PK	74.0	-9.3	1.96 V	335	31.70	33.00
6	2483.50	51.3 AV	54.0	-2.7	1.96 V	335	18.30	33.00
7	4874.00	48.8 PK	74.0	-25.2	1.18 V	188	42.80	6.00
8	4874.00	41.0 AV	54.0	-13.0	1.18 V	188	35.00	6.00

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	104.0 PK			1.88 H	160	71.10	32.90
2	*2462.00	91.3 AV			1.88 H	160	58.40	32.90
3	2483.50	59.1 PK	74.0	-14.9	1.93 H	158	26.10	33.00
4	2483.50	47.0 AV	54.0	-7.0	1.93 H	158	14.00	33.00
5	4924.00	52.4 PK	74.0	-21.6	1.00 H	29	46.40	6.00
6	4924.00	45.9 AV	54.0	-8.1	1.00 H	29	39.90	6.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	115.3 PK			1.54 V	5	82.40	32.90
2	*2462.00	104.1 AV			1.54 V	5	71.20	32.90
3	2483.50	68.4 PK	74.0	-5.6	1.96 V	346	35.40	33.00
4	2483.50	52.3 AV	54.0	-1.7	1.96 V	346	19.30	33.00
5	4924.00	49.8 PK	74.0	-24.2	1.51 V	159	43.80	6.00
6	4924.00	38.8 AV	54.0	-15.2	1.51 V	159	32.80	6.00

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

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.8 PK	74.0	-17.2	1.69 H	220	24.00	32.80
2	2390.00	45.5 AV	54.0	-8.5	1.69 H	220	12.70	32.80
3	*2422.00	98.1 PK			1.90 H	160	65.20	32.90
4	*2422.00	91.6 AV			1.90 H	160	58.70	32.90
5	4844.00	50.1 PK	74.0	-23.9	1.34 H	341	44.30	5.80
6	4844.00	43.0 AV	54.0	-11.0	1.34 H	341	37.20	5.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.0 PK	74.0	-7.0	1.53 V	9	34.20	32.80
2	**2390.00**	**52.9 AV**	**54.0**	**-1.1**	**1.53 V**	**9**	**20.10**	**32.80**
3	*2422.00	111.7 PK			1.43 V	25	78.80	32.90
4	*2422.00	106.5 AV			1.43 V	25	73.60	32.90
5	4844.00	48.8 PK	74.0	-25.2	1.58 V	169	43.00	5.80
6	4844.00	37.4 AV	54.0	-16.6	1.58 V	169	31.60	5.80

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.6 PK	74.0	-17.4	1.61 H	213	23.80	32.80
2	2390.00	45.6 AV	54.0	-8.4	1.61 H	213	12.80	32.80
3	*2437.00	102.7 PK			1.32 H	140	69.80	32.90
4	*2437.00	91.4 AV			1.32 H	140	58.50	32.90
5	4874.00	50.7 PK	74.0	-23.3	1.50 H	342	44.70	6.00
6	4874.00	42.3 AV	54.0	-11.7	1.50 H	342	36.30	6.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	71.2 PK	74.0	-2.8	1.69 V	0	38.40	32.80
2	2390.00	52.3 AV	54.0	-1.7	1.69 V	0	19.50	32.80
3	*2437.00	114.5 PK			1.56 V	222	81.60	32.90
4	*2437.00	103.5 AV			1.56 V	222	70.60	32.90
5	4874.00	48.5 PK	74.0	-25.5	1.56 V	290	42.50	6.00
6	4874.00	45.3 AV	54.0	-8.7	1.56 V	290	39.30	6.00

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	101.4 PK			1.37 H	144	68.40	33.00
2	*2452.00	90.0 AV			1.37 H	144	57.00	33.00
3	2483.50	57.6 PK	74.0	-16.4	1.67 H	148	24.60	33.00
4	2483.50	46.5 AV	54.0	-7.5	1.67 H	148	13.50	33.00
5	4904.00	51.5 PK	74.0	-22.5	1.11 H	36	45.60	5.90
6	4904.00	45.5 AV	54.0	-8.5	1.11 H	36	39.60	5.90
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	112.7 PK			1.47 V	74	79.70	33.00
2	*2452.00	100.7 AV			1.47 V	74	67.70	33.00
3	2483.50	67.6 PK	74.0	-6.4	1.50 V	17	34.60	33.00
4	2483.50	52.6 AV	54.0	-1.4	1.50 V	17	19.60	33.00
5	4904.00	54.2 PK	74.0	-19.8	1.25 V	180	48.30	5.90
6	4904.00	49.2 AV	54.0	-4.8	1.25 V	180	43.30	5.90

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

Below 1GHz Worst-Case Data: 802.11b

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	57.12	32.4 QP	40.0	-7.6	2.00 H	59	47.00	-14.60
2	84.34	31.6 QP	40.0	-8.4	2.00 H	139	51.00	-19.40
3	132.95	32.7 QP	43.5	-10.8	1.50 H	258	48.00	-15.30
4	208.77	30.9 QP	43.5	-12.6	1.00 H	267	47.30	-16.40
5	533.47	27.2 QP	46.0	-18.8	1.50 H	145	34.90	-7.70
6	836.78	37.8 QP	46.0	-8.2	1.00 H	11	39.30	-1.50
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	60.07	37.6 QP	40.0	-2.4	1.50 V	12	52.30	-14.70
2	134.89	31.4 QP	43.5	-12.1	1.00 V	200	46.50	-15.10
3	208.77	32.2 QP	43.5	-11.3	1.99 V	341	48.60	-16.40
4	249.60	30.0 QP	46.0	-16.0	1.99 V	326	44.20	-14.20
5	799.84	37.1 QP	46.0	-8.9	1.00 V	13	39.20	-2.10
6	836.78	36.8 QP	46.0	-9.2	1.00 V	6	38.30	-1.50

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)
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
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Dec. 23, 2015	Dec. 22, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 11, 2016	Jan. 10, 2017
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 21, 2015	Jul. 20, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

a. 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.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

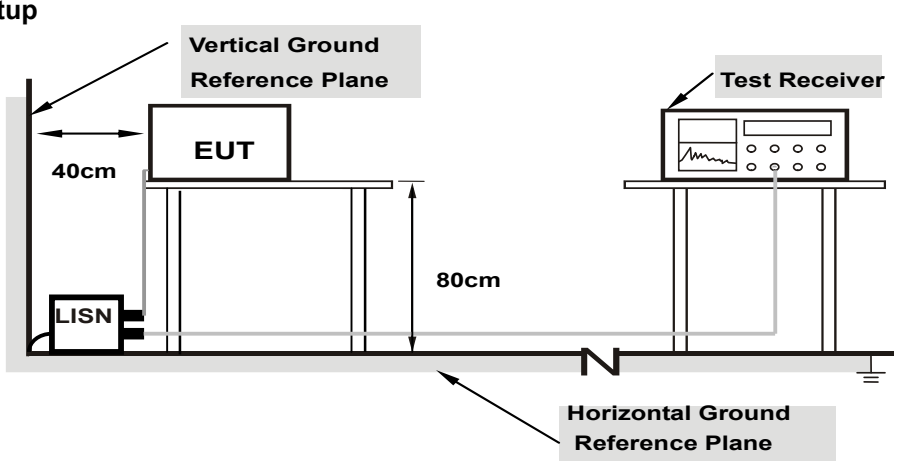
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

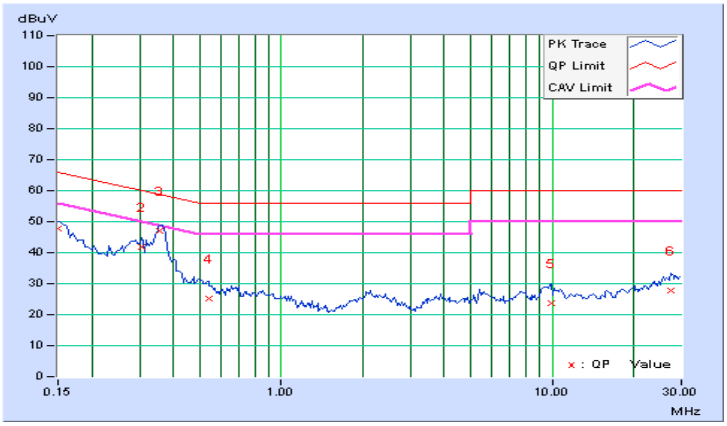
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.12	37.84	25.71	47.96	35.83	66.00	56.00	-18.04	-20.17
2	0.30625	10.18	31.55	24.44	41.73	34.62	60.07	50.07	-18.34	-15.45
3	**0.35703**	**10.18**	**36.77**	**31.59**	**46.95**	**41.77**	**58.80**	**48.80**	**-11.85**	**-7.03**
4	0.54063	10.20	14.85	8.31	25.05	18.51	56.00	46.00	-30.95	-27.49
5	9.91797	10.49	13.08	8.22	23.57	18.71	60.00	50.00	-36.43	-31.29
6	27.55469	10.46	17.35	12.29	27.81	22.75	60.00	50.00	-32.19	-27.25

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.

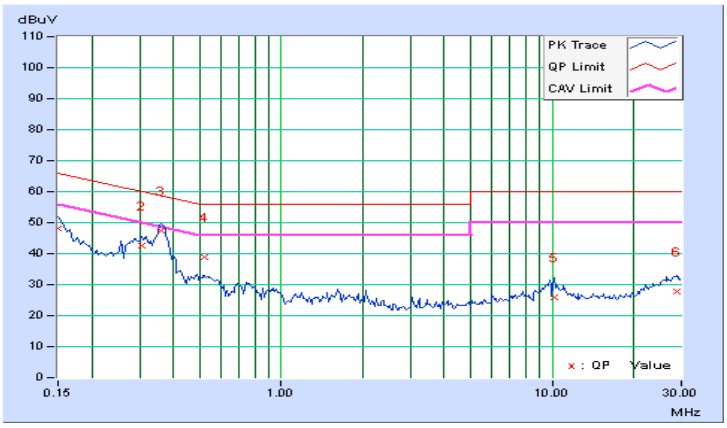


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.13	37.98	25.91	48.11	36.04	66.00	56.00	-17.89	-19.96
2	0.30625	10.18	32.42	25.66	42.60	35.84	60.07	50.07	-17.47	-14.23
3	0.36094	10.18	37.09	31.47	47.27	41.65	58.71	48.71	-11.44	-7.06
4	0.52109	10.19	28.86	22.10	39.05	32.29	56.00	46.00	-16.95	-13.71
5	10.13281	10.56	15.31	10.32	25.87	20.88	60.00	50.00	-34.13	-29.12
6	28.78125	10.57	17.23	11.74	27.80	22.31	60.00	50.00	-32.20	-27.69

REMARKS:

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

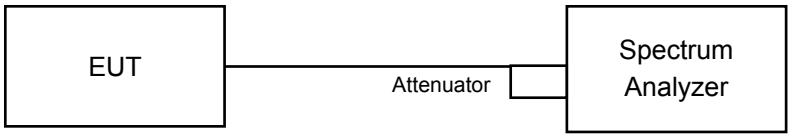


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Result

CDD Mode

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	8.11	8.09	0.5	PASS
6	2437	8.11	8.10	0.5	PASS
11	2462	7.62	7.81	0.5	PASS

802.11g

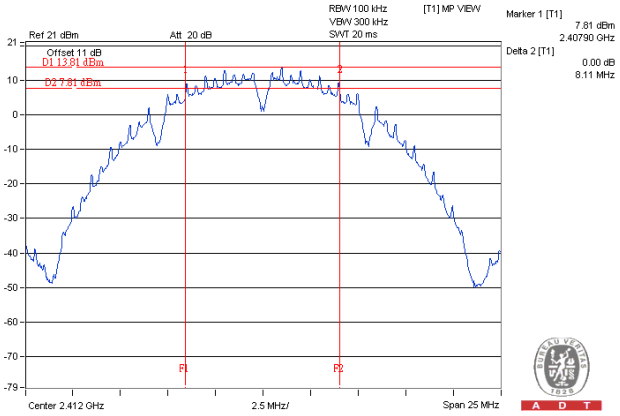
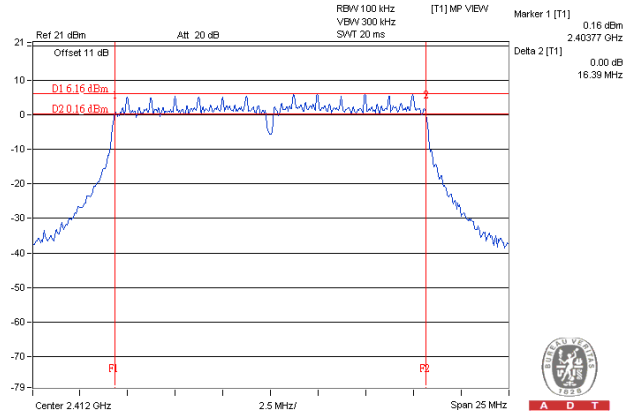
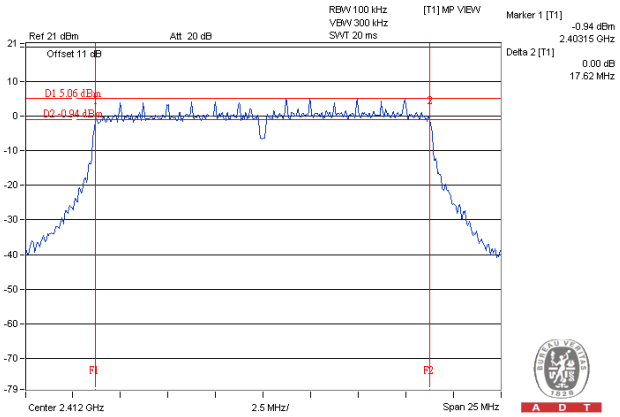
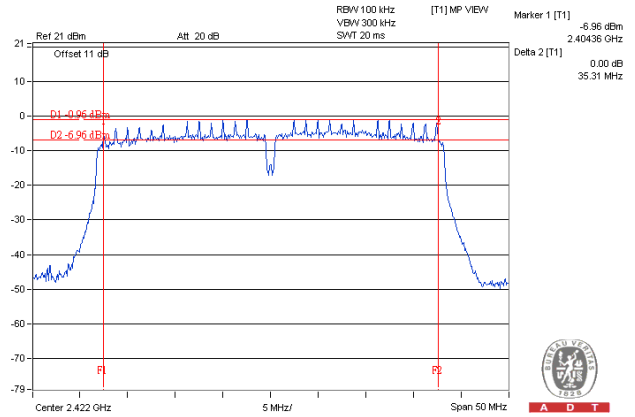
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.39	16.37	0.5	PASS
6	2437	16.35	15.35	0.5	PASS
11	2462	16.38	15.75	0.5	PASS

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.62	17.60	0.5	PASS
6	2437	17.59	15.99	0.5	PASS
11	2462	17.61	15.13	0.5	PASS

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.31	35.22	0.5	PASS
6	2437	35.23	35.22	0.5	PASS
9	2452	35.21	35.18	0.5	PASS

Spectrum Plot of Worst Value	
802.11b	802.11g
	
802.11n (HT20)	802.11n (HT40)
	

Beamforming Mode

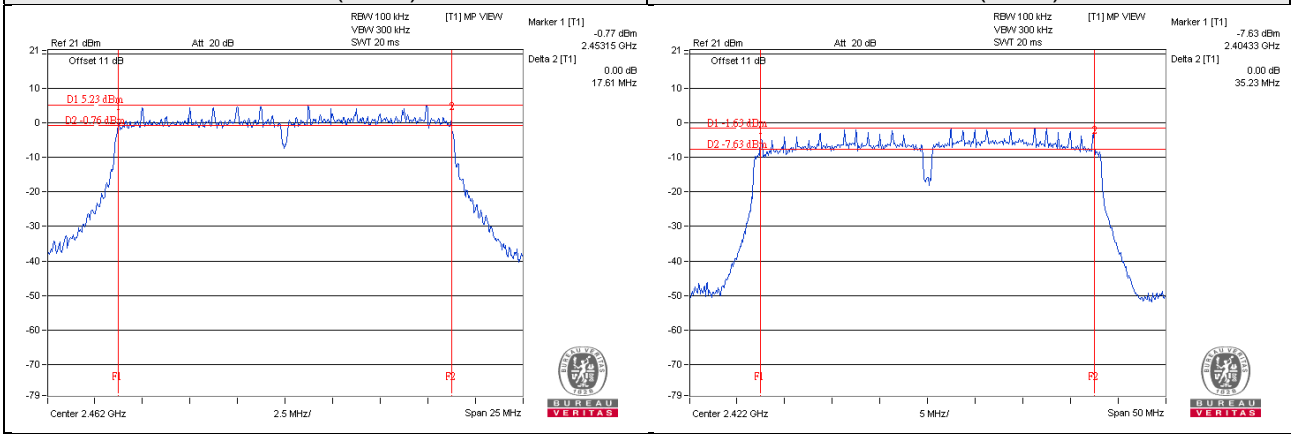
802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.57	16.96	0.5	PASS
6	2437	17.22	15.76	0.5	PASS
11	2462	17.61	16.29	0.5	PASS

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.23	32.78	0.5	PASS
6	2437	35.12	35.16	0.5	PASS
9	2452	35.23	35.17	0.5	PASS

Spectrum Plot of Worst Value	
802.11n (HT20)	802.11n (HT40)



4.4 Conducted Output Power Measurement

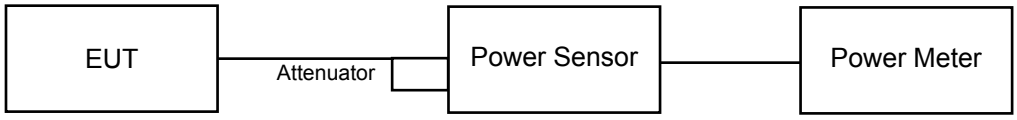
4.4.1 Limits of Conducted Output Power Measurement

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

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as item 4.3.6.

4.4.7 Test Results

For Average Power

CDD Mode

802.11b

Chan.	Freq. (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.65	22.65	330.295	25.19	30	Pass
6	2437	21.74	23.87	**393.060**	25.94	30	Pass
11	2462	22.31	22.65	354.293	25.49	30	Pass

802.11g

Chan.	Freq. (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	16.88	17.95	111.126	20.46	30	Pass
6	2437	22.63	22.89	377.767	25.77	30	Pass
11	2462	17.79	17.82	120.651	20.82	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	16.12	16.95	90.471	19.57	30	Pass
6	2437	22.35	23.16	378.805	25.78	30	Pass
11	2462	17.13	17.56	108.658	20.36	30	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	12.97	13.85	44.081	16.44	30	Pass
6	2437	17.31	17.92	115.771	20.64	30	Pass
9	2452	15.95	16.27	81.719	19.12	30	Pass

Beamforming Mode

802.11n (HT20)

Chan.	Freq. (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	14.27	15.39	61.324	17.88	30	Pass
6	2437	21.52	22.36	**314.093**	24.97	30	Pass
11	2462	15.88	16.56	84.016	19.24	30	Pass

802.11n (HT40)

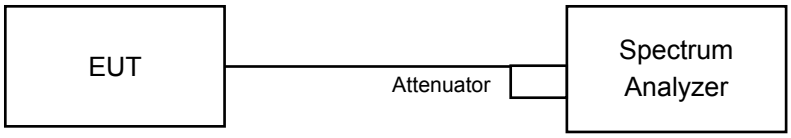
Chan.	Freq. (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	11.89	12.65	33.861	15.30	30	Pass
6	2437	16.19	16.87	90.232	19.55	30	Pass
9	2452	14.27	14.74	56.515	17.52	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For AVG. power (duty cycle ≥ 98%)
a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.

For AVG. power (duty cycle < 98%)
a) Measure the duty cycle (x).
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 times the OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as item 4.3.6

4.5.7 Test Results

CDD Mode

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-4.74	3.01	-1.73	5.82	Pass
	6	2437	-3.00	3.01	0.01	5.82	Pass
	11	2462	-4.53	3.01	-1.52	5.82	Pass
1	1	2412	-4.29	3.01	-1.28	5.82	Pass
	6	2437	-2.98	3.01	0.03	5.82	Pass
	11	2462	-4.04	3.01	-1.03	5.82	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.17dBi + 10log(2) = 8.18dBi > 6dBi, so the power density limit shall be reduced to 8-(8.18-6) = 5.82dBm.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-13.19	3.01	0.18	-10.00	5.82	Pass
	6	2437	-7.89	3.01	0.18	-4.70	5.82	Pass
	11	2462	-12.35	3.01	0.18	-9.16	5.82	Pass
1	1	2412	-11.72	3.01	0.18	-8.53	5.82	Pass
	6	2437	-6.49	3.01	0.18	-3.30	5.82	Pass
	11	2462	-11.77	3.01	0.18	-8.58	5.82	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.17dBi + 10log(2) = 8.18dBi > 6dBi, so the power density limit shall be reduced to 8-(8.18-6) = 5.82dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

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	-13.80	3.01	-10.79	5.82	Pass
	6	2437	-6.89	3.01	-3.88	5.82	Pass
	11	2462	-12.38	3.01	-9.37	5.82	Pass
1	1	2412	-11.34	3.01	-8.33	5.82	Pass
	6	2437	-6.21	3.01	-3.20	5.82	Pass
	11	2462	-10.85	3.01	-7.84	5.82	Pass

Note:

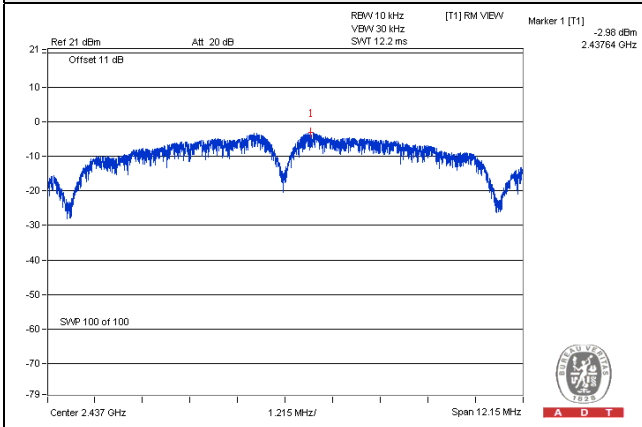
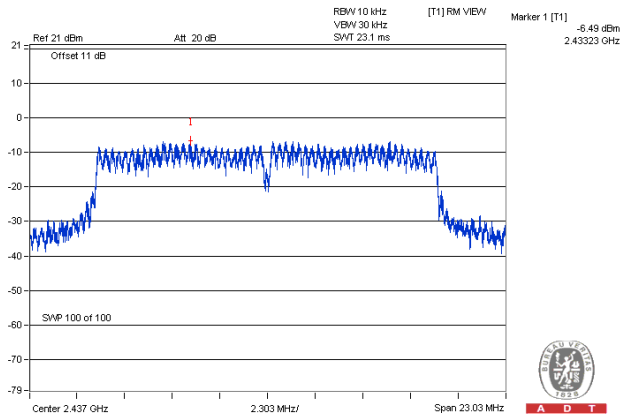
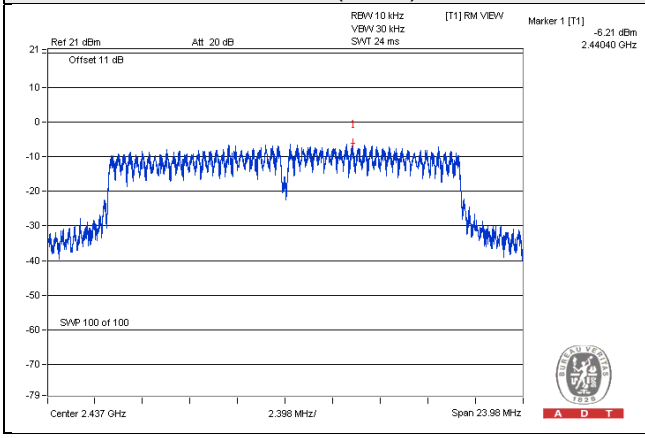
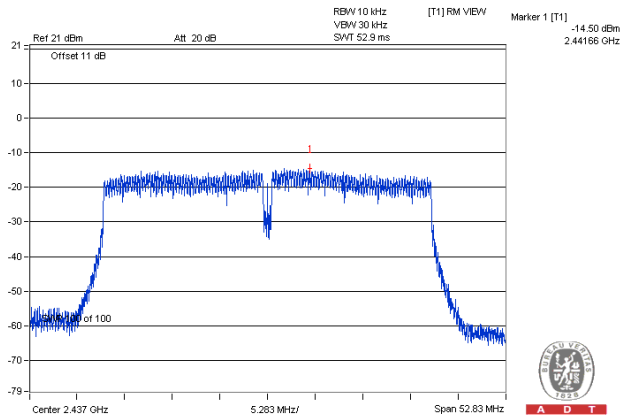
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.17dBi + 10log(2) = 8.18dBi > 6dBi, so the power density limit shall be reduced to 8-(8.18-6) = 5.82dBm.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	Pass /Fail
0	3	2422	-19.70	3.01	0.18	-16.51	5.82	Pass
	6	2437	-15.23	3.01	0.18	-12.04	5.82	Pass
	9	2452	-16.52	3.01	0.18	-13.33	5.82	Pass
1	3	2422	-18.66	3.01	0.18	-15.47	5.82	Pass
	6	2437	-14.50	3.01	0.18	-11.31	5.82	Pass
	9	2452	-15.84	3.01	0.18	-12.65	5.82	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.17dBi + 10log(2) = 8.18dBi > 6dBi, so the power density limit shall be reduced to 8-(8.18-6) = 5.82dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11b	802.11g
	
802.11n (HT20)	802.11n (HT40)
	

Beamforming Mode

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-15.16	3.01	0.09	-12.06	5.82	Pass
	6	2437	-8.08	3.01	0.09	-4.98	5.82	Pass
	11	2462	-13.66	3.01	0.09	-10.56	5.82	Pass
1	1	2412	-13.21	3.01	0.09	-10.11	5.82	Pass
	6	2437	-6.67	3.01	0.09	-3.57	5.82	Pass
	11	2462	-12.22	3.01	0.09	-9.12	5.82	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.17dBi + 10log(2) = 8.18dBi > 6dBi, so the power density limit shall be reduced to 8-(8.18-6) = 5.82dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

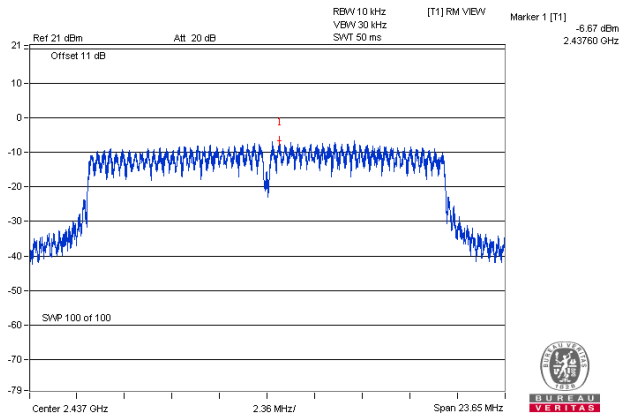
802.11n (HT40)

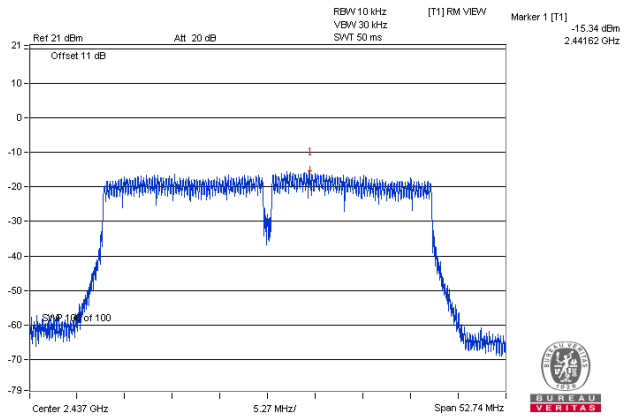
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	Pass /Fail
0	3	2422	-20.70	3.01	0.15	-17.54	5.82	Pass
	6	2437	-15.90	3.01	0.15	-12.74	5.82	Pass
	9	2452	-17.91	3.01	0.15	-14.75	5.82	Pass
1	3	2422	-18.94	3.01	0.15	-15.78	5.82	Pass
	6	2437	-15.34	3.01	0.15	-12.18	5.82	Pass
	9	2452	-17.08	3.01	0.15	-13.92	5.82	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.17dBi + 10log(2) = 8.18dBi > 6dBi, so the power density limit shall be reduced to 8-(8.18-6) = 5.82dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11n (HT20)	802.11n (HT40)



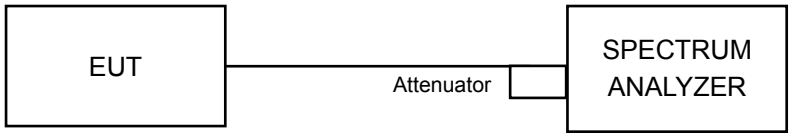


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 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 ≥ 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

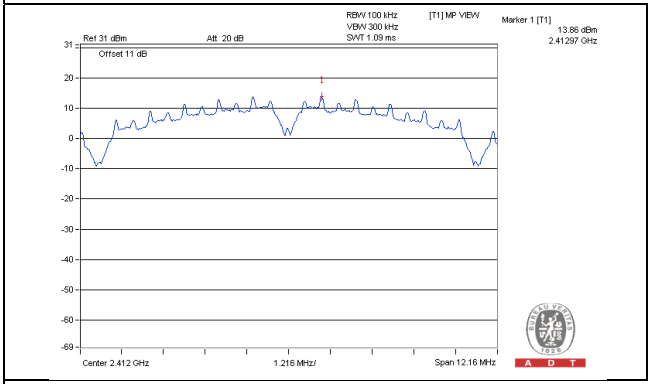
4.6.7 Test Results

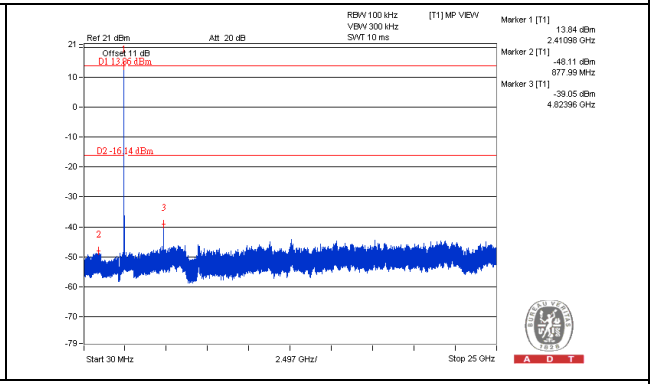
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

CDD Mode

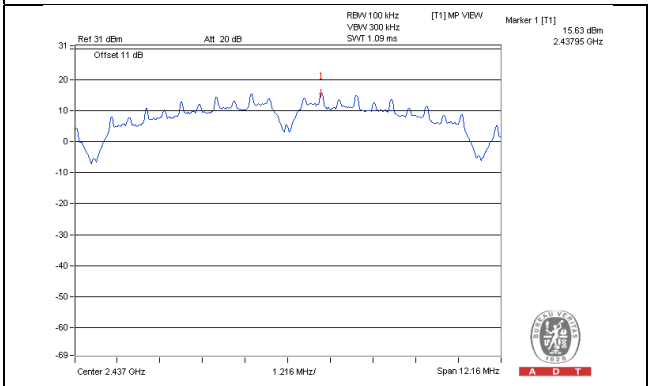
802.11b_CHAIN 0

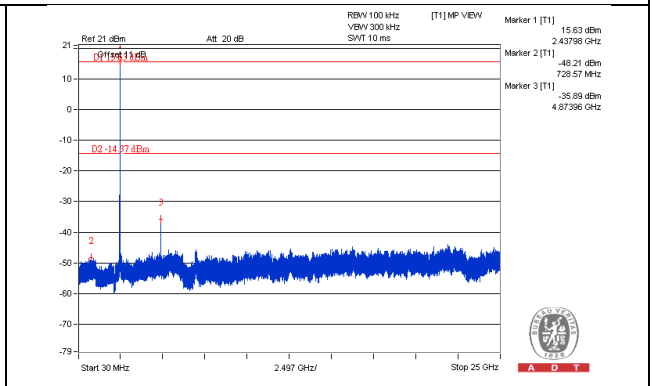
CH 1



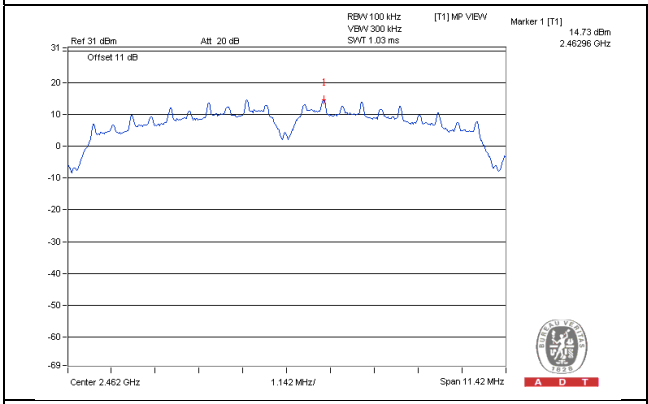


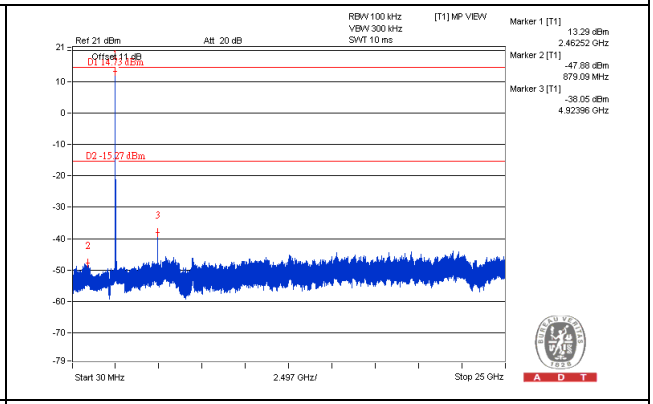
CH 6



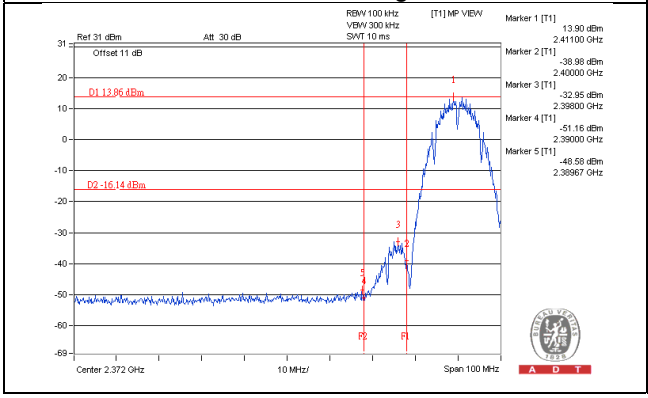


CH 11

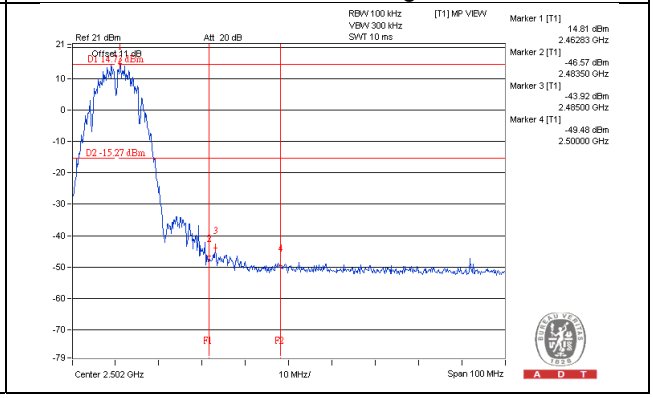




CH 1 Band edge

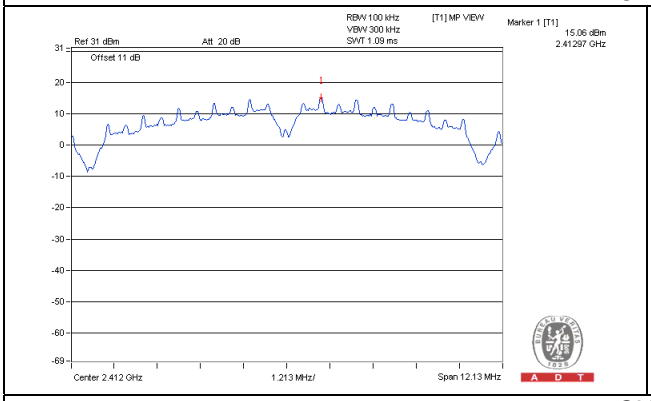


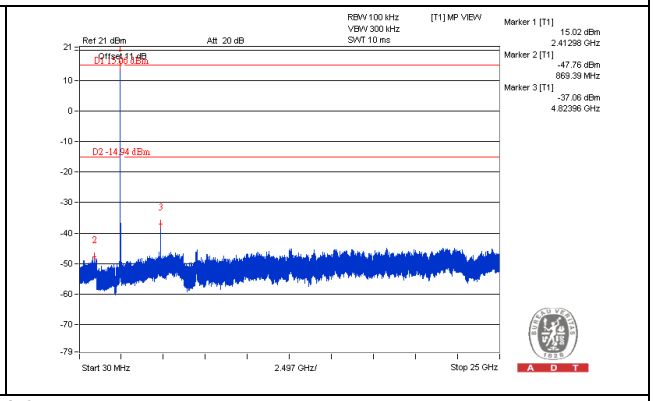
CH 11 Band edge



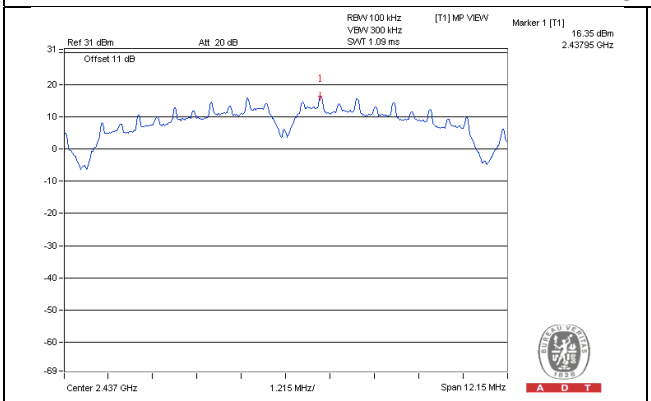
802.11b_CHAIN 1

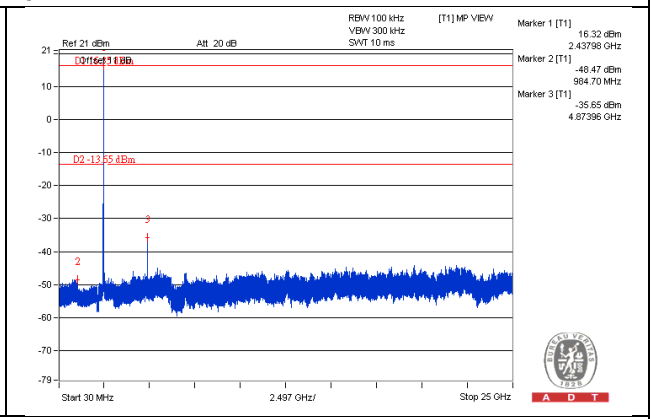
CH 1



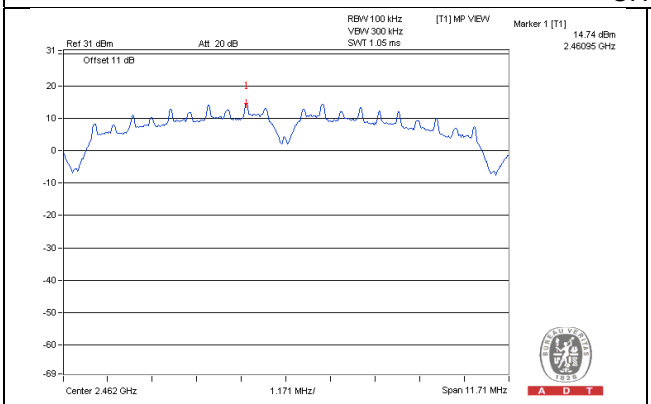


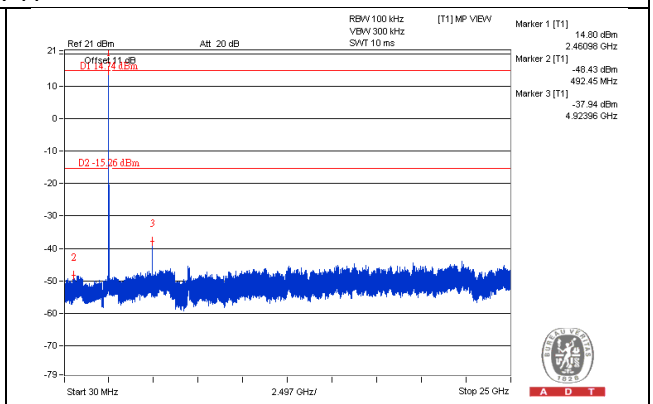
CH 6



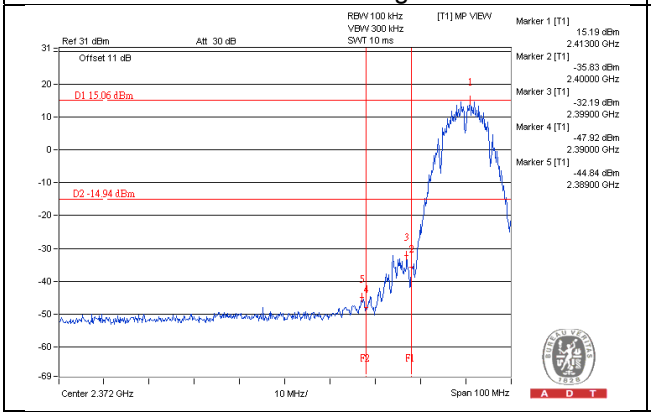


CH 11

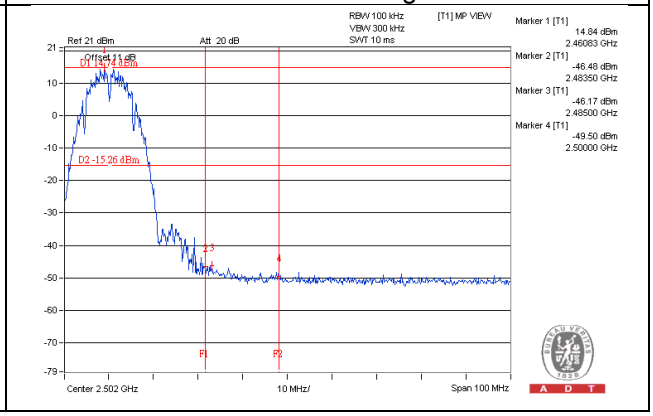




CH 1 Band edge

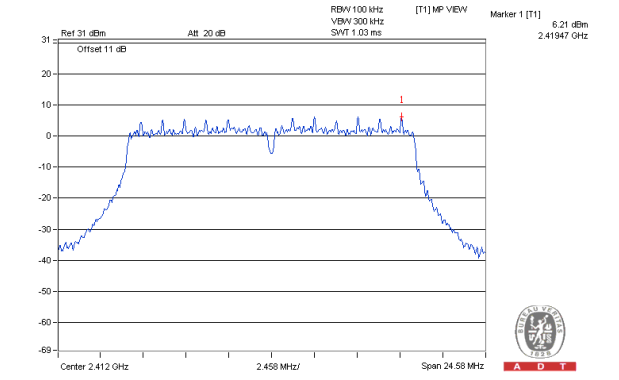


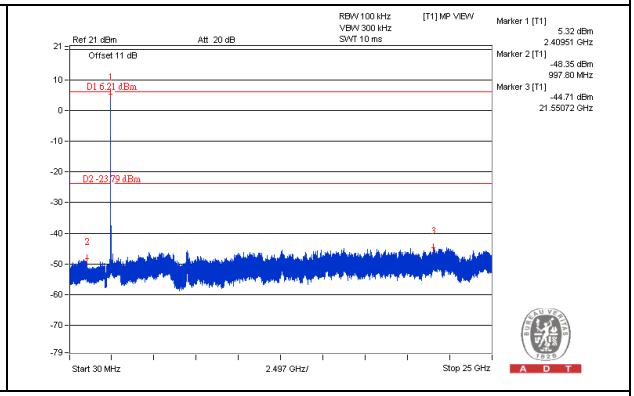
CH 11 Band edge



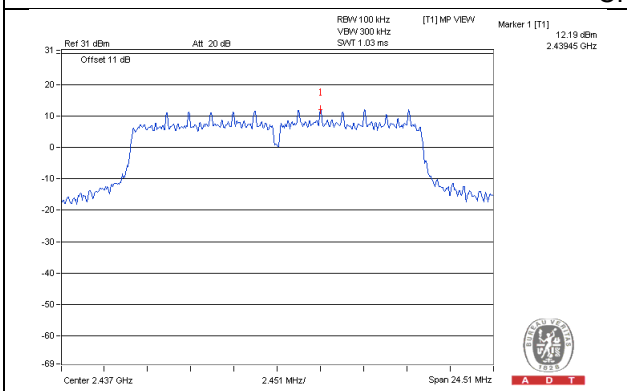
802.11g_CHAIN 0

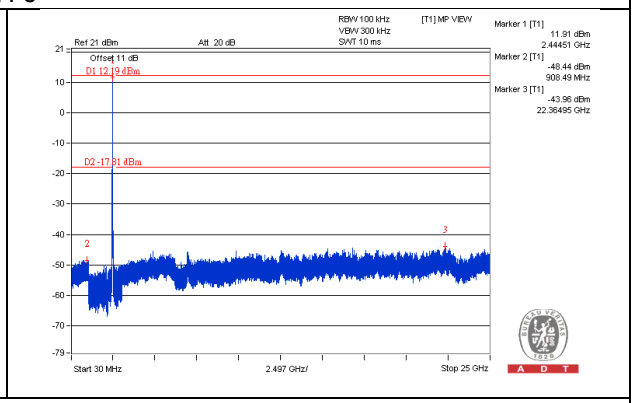
CH 1



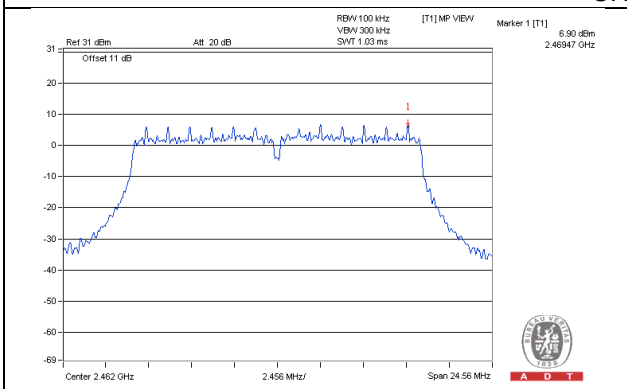


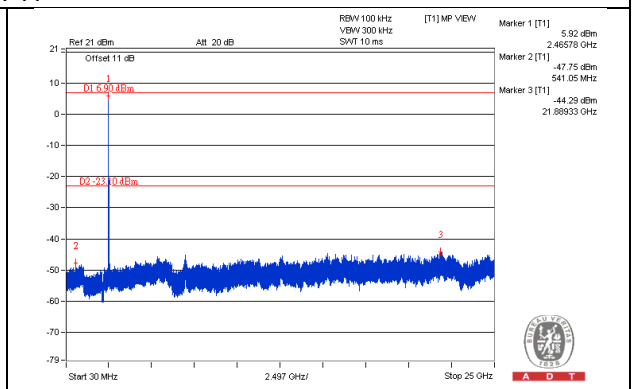
CH 6



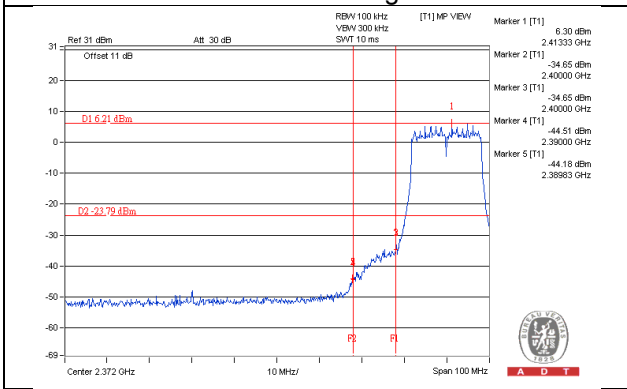


CH 11

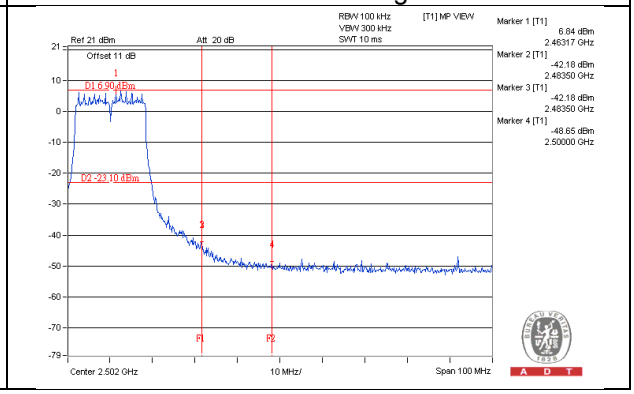




CH 1 Band edge

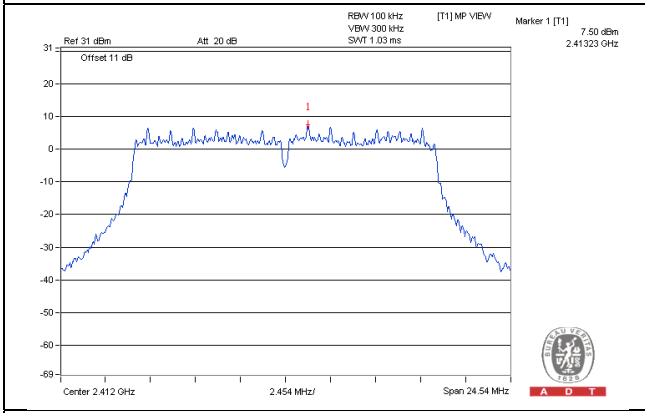


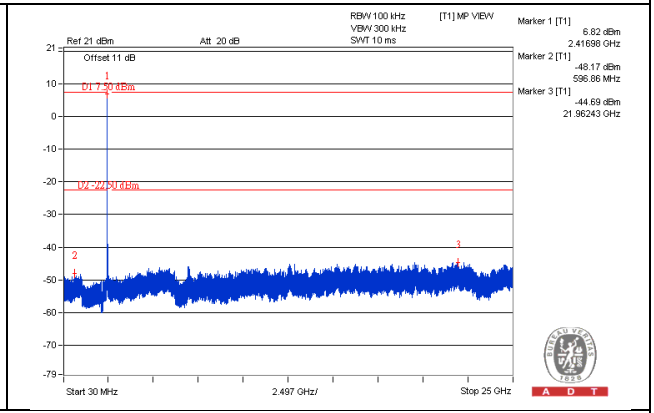
CH 11 Band edge



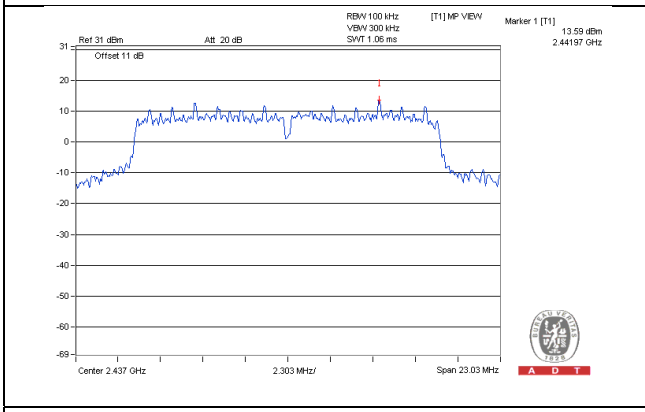
802.11g_CHAIN 1

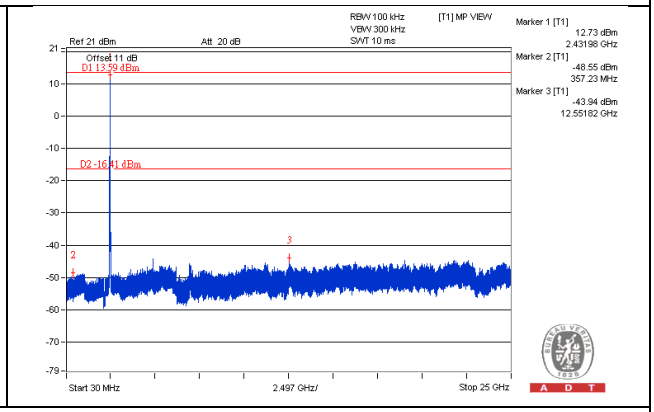
CH 1



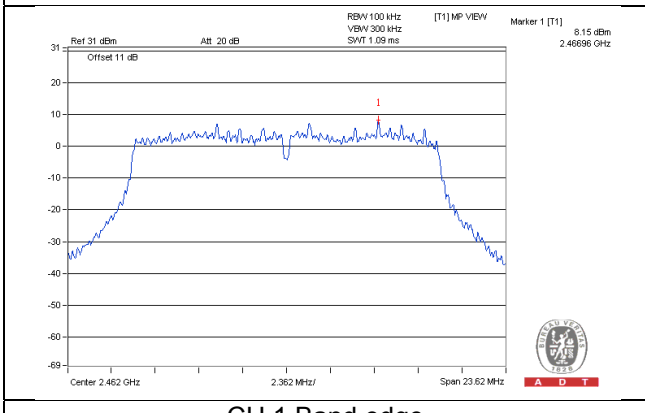


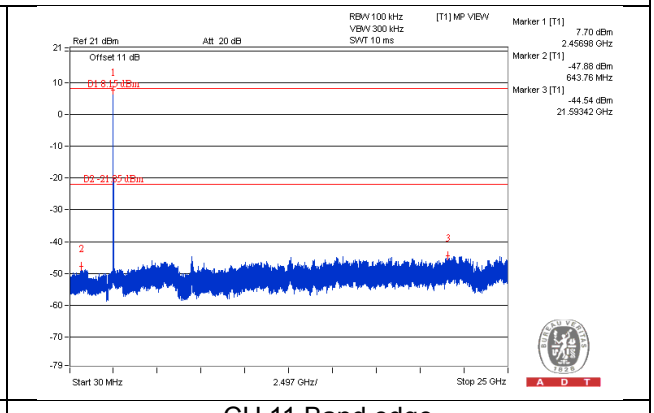
CH 6



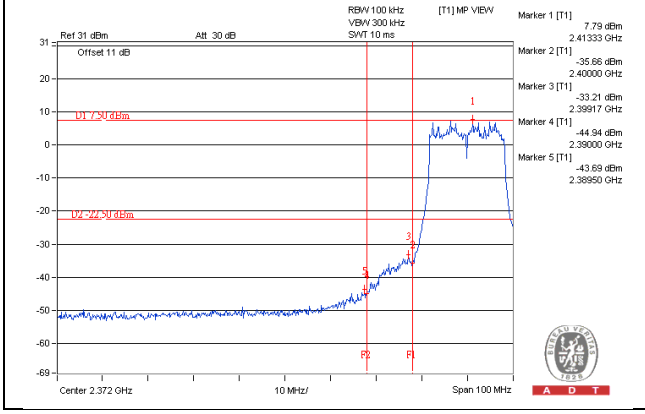


CH 11

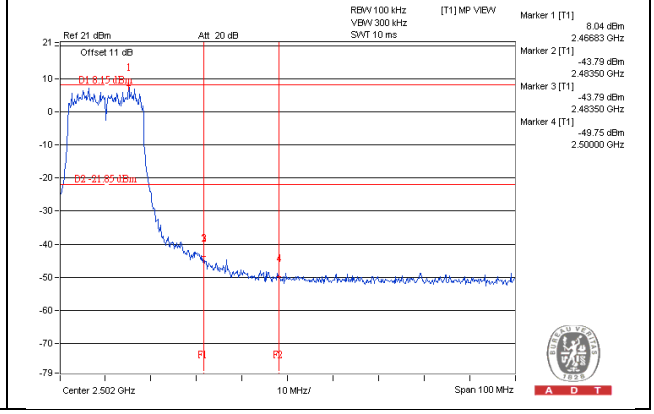




CH 1 Band edge

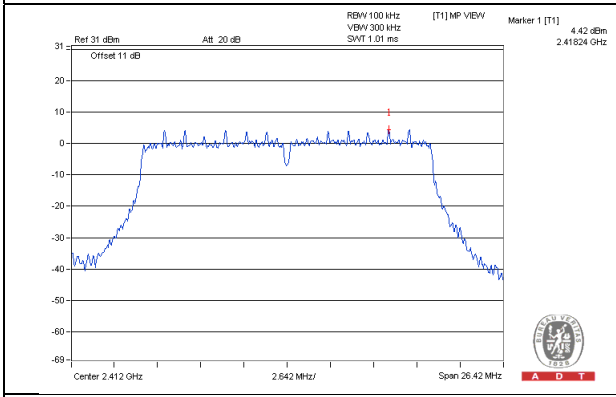


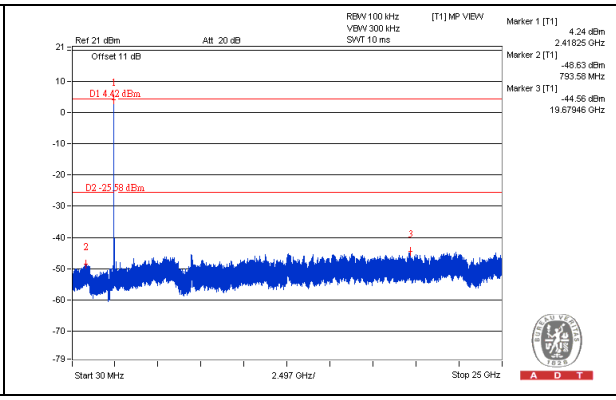
CH 11 Band edge



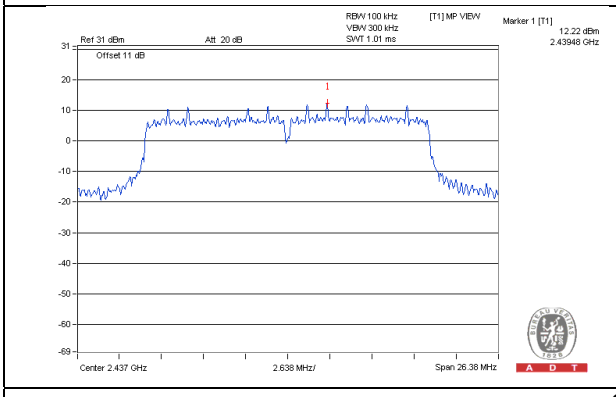
802.11n (HT20)_CHAIN 0

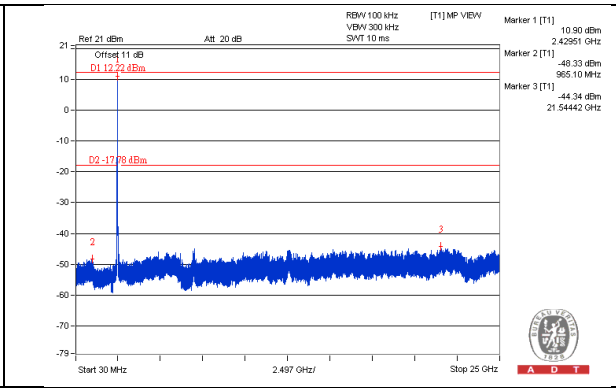
CH 1



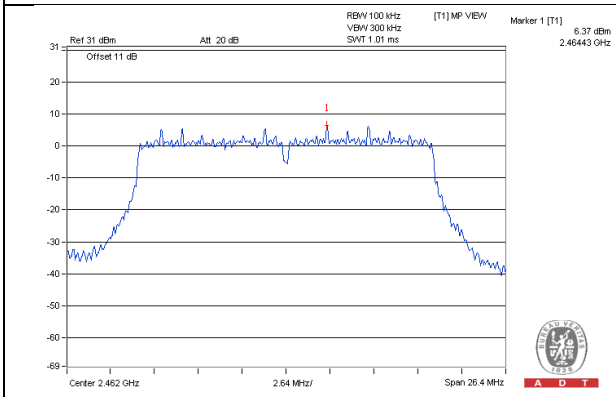


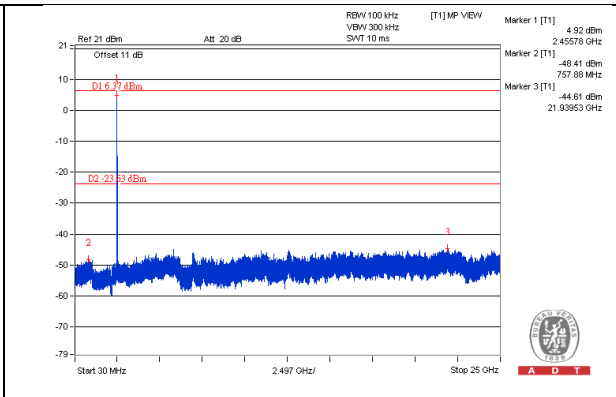
CH 6



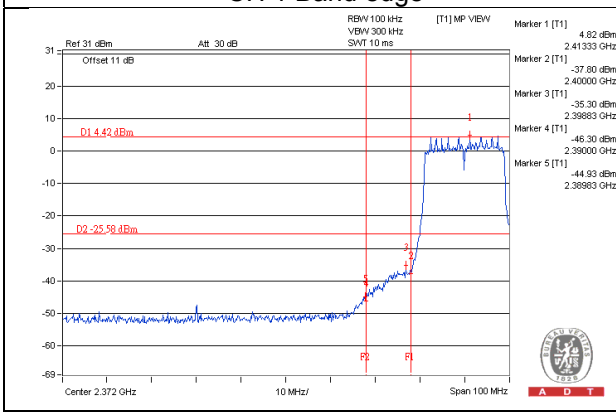


CH 11

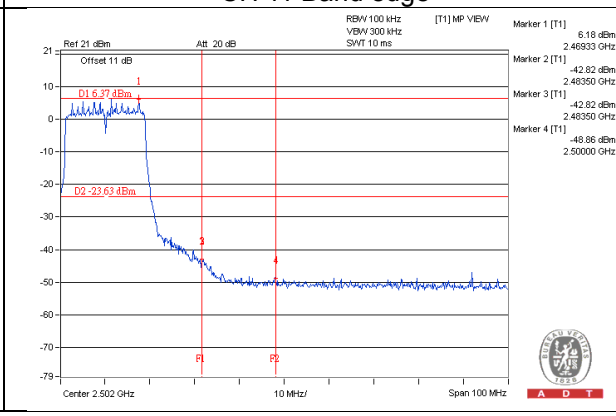




CH 1 Band edge

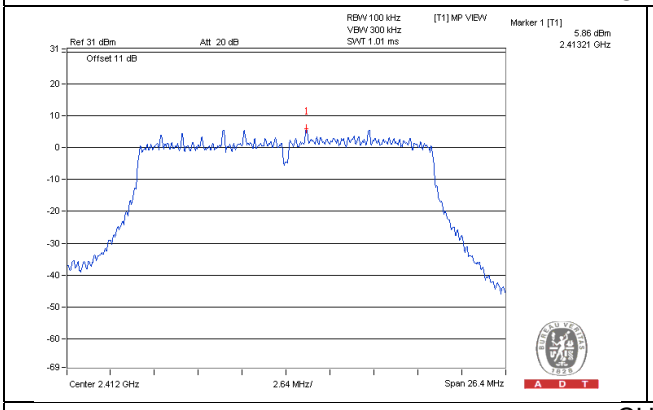


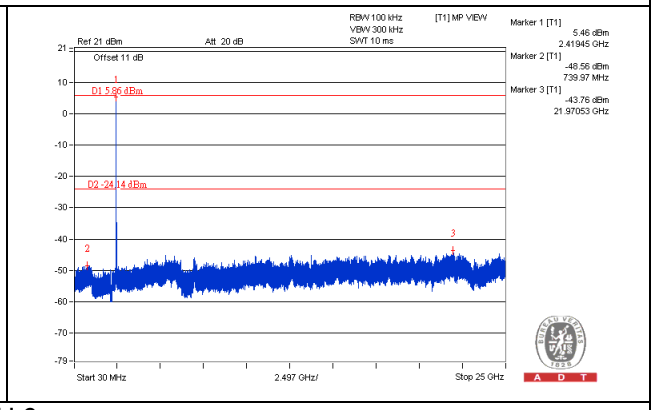
CH 11 Band edge



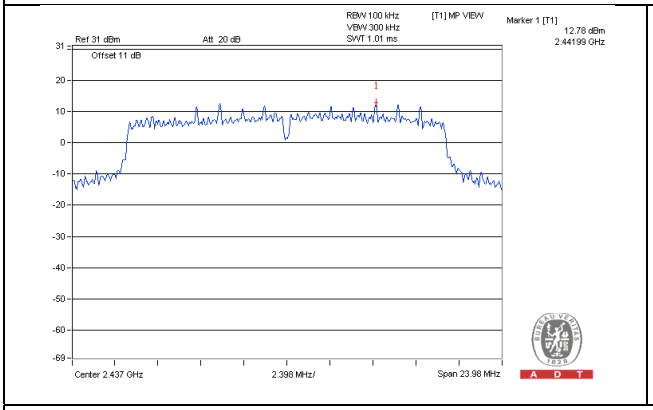
802.11n (HT20)_CHAIN 1

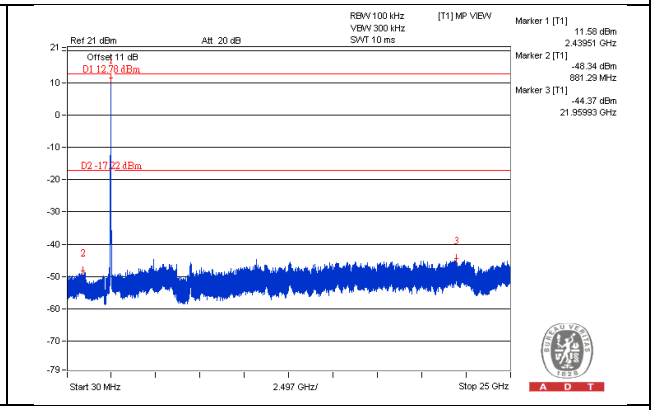
CH 1



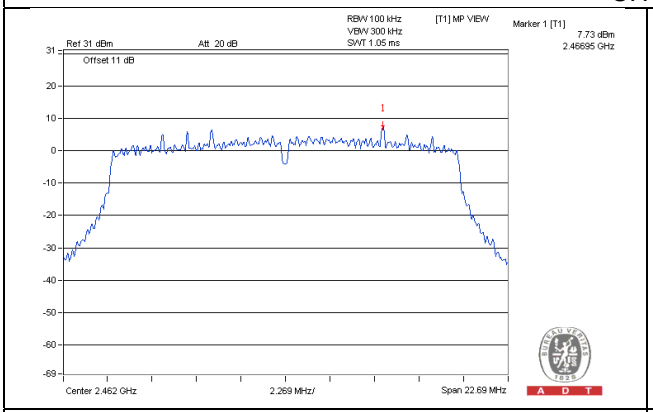


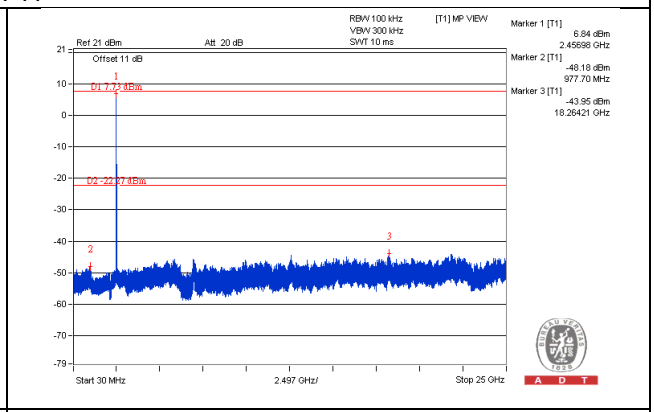
CH 6



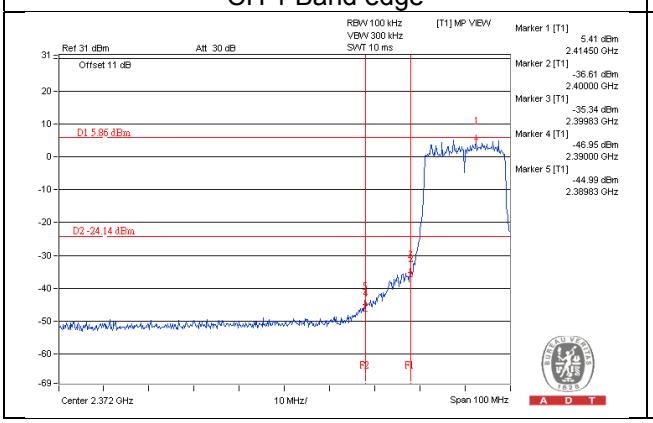


CH 11

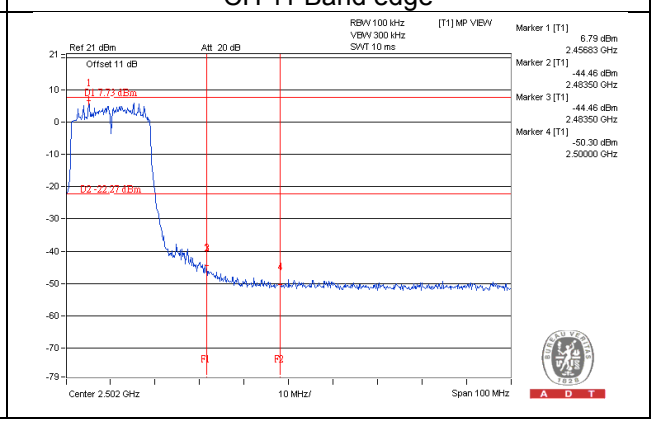




CH 1 Band edge

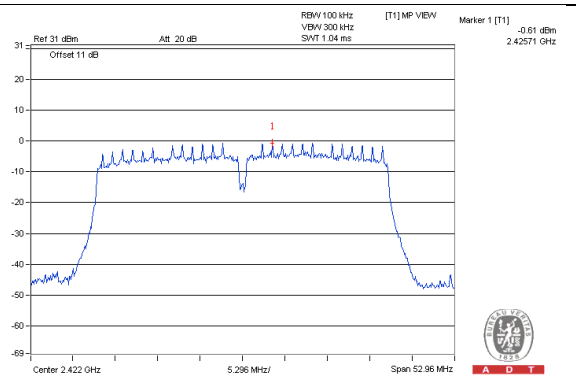


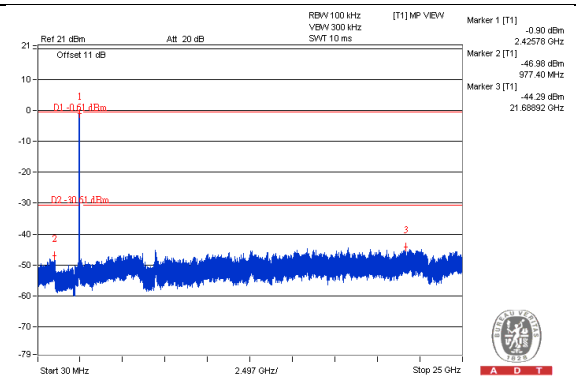
CH 11 Band edge



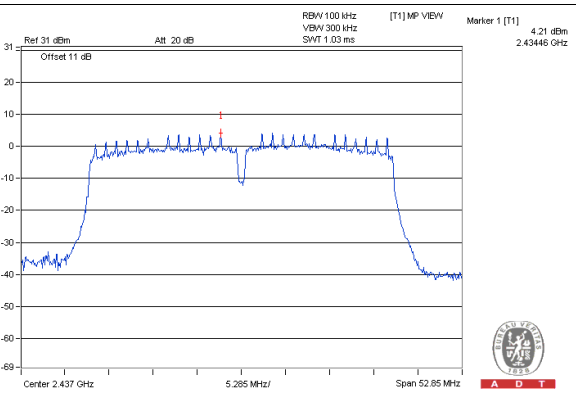
802.11n (HT40)_CHAIN 0

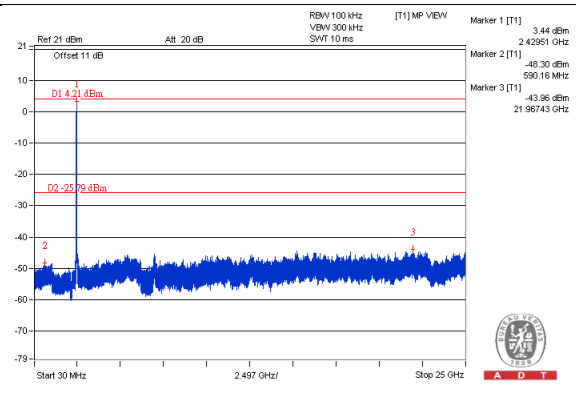
CH 3



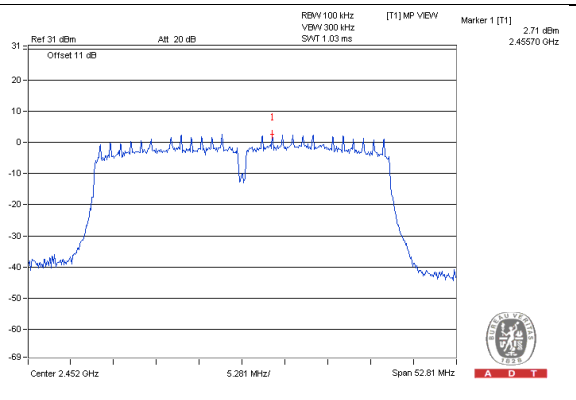


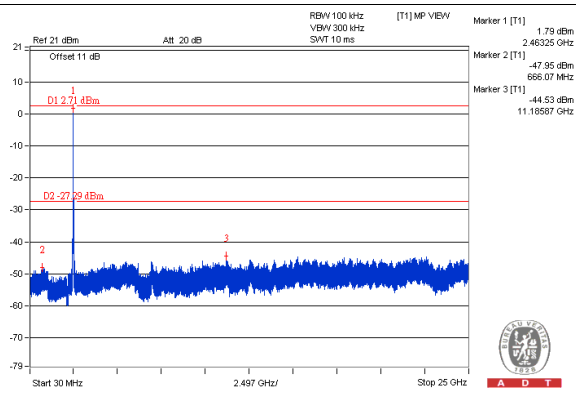
CH 6



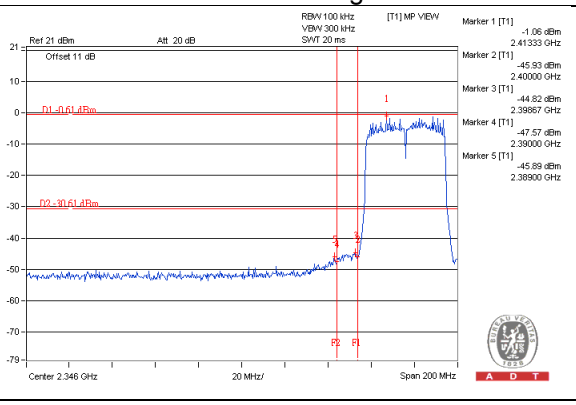


CH 9

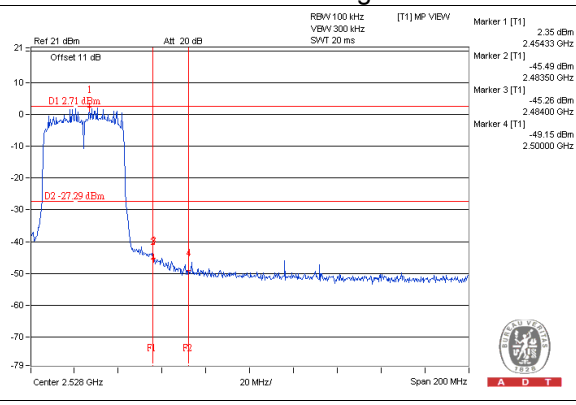




CH 3 Band edge

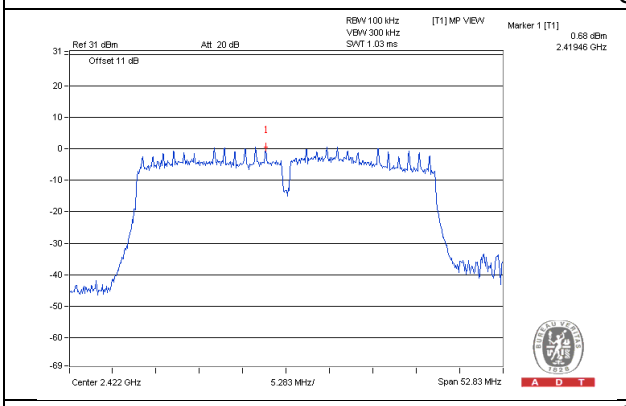


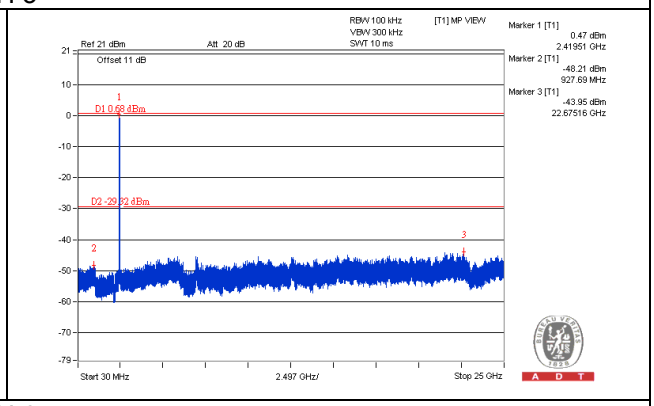
CH 9 Band edge



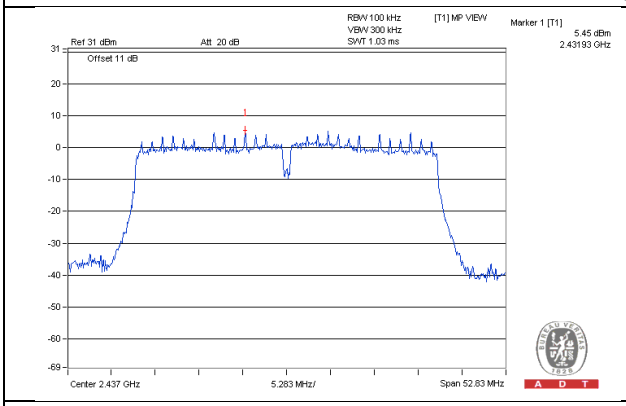
802.11n (HT40)_CHAIN 1

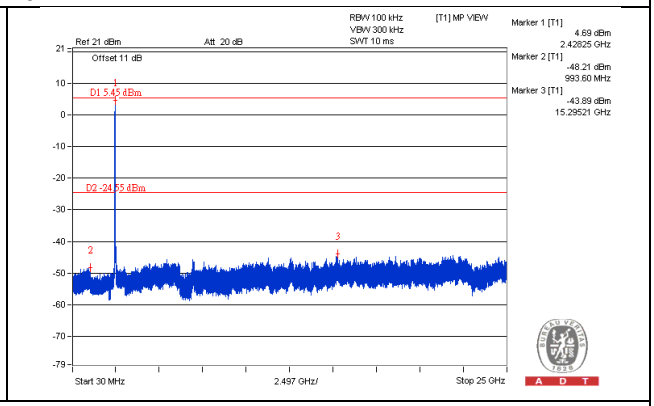
CH 3



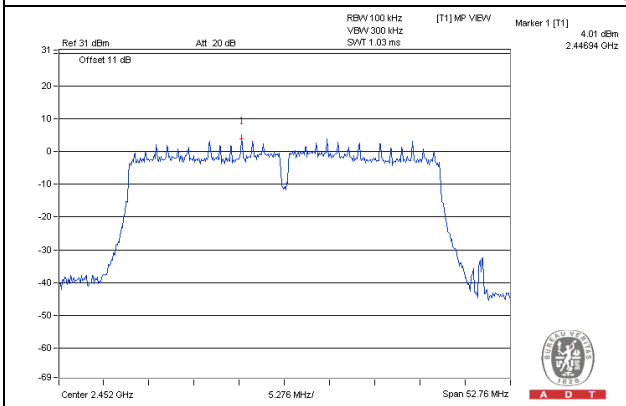


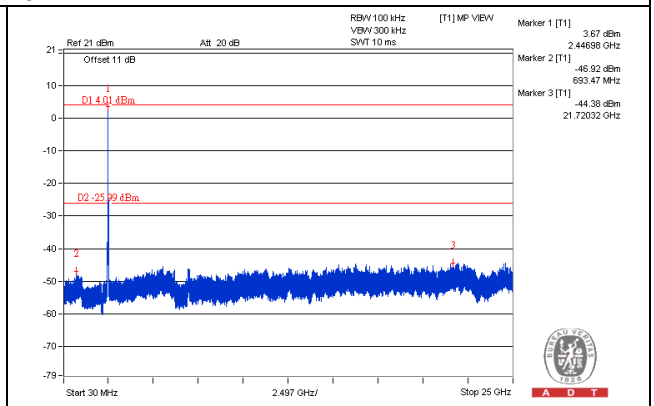
CH 6



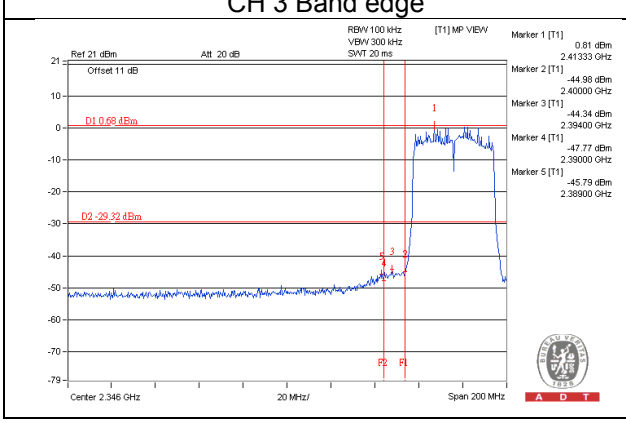


CH 9

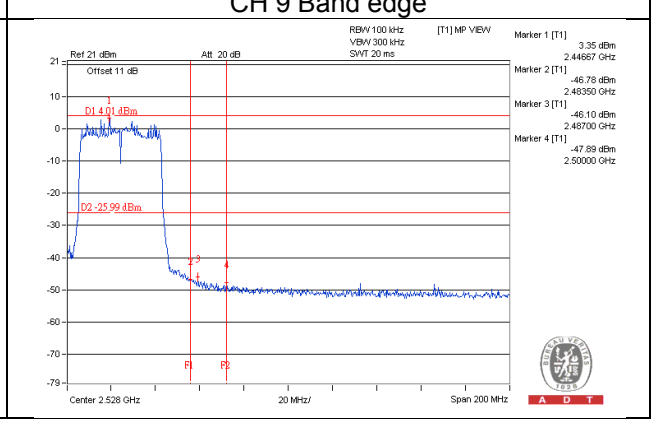




CH 3 Band edge



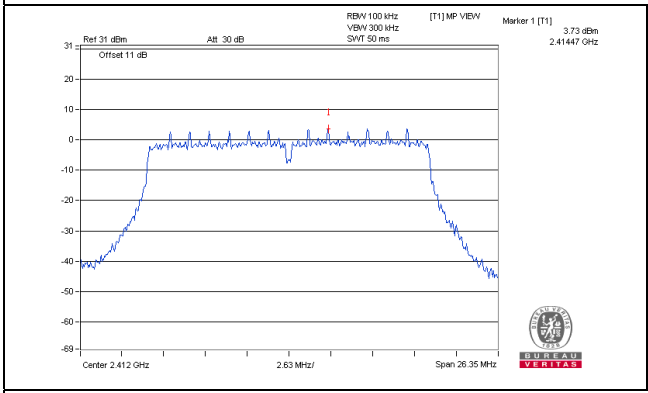
CH 9 Band edge

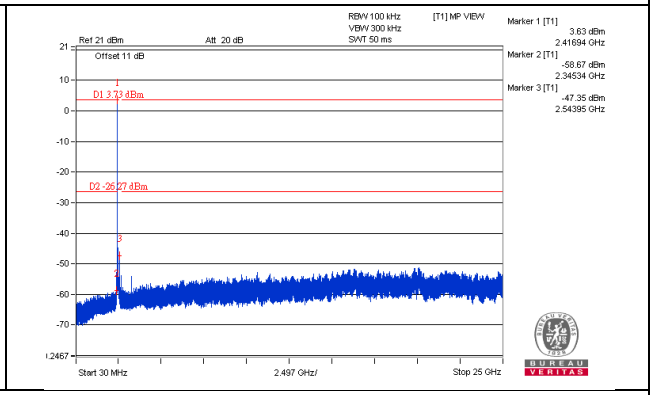


Beamforming Mode

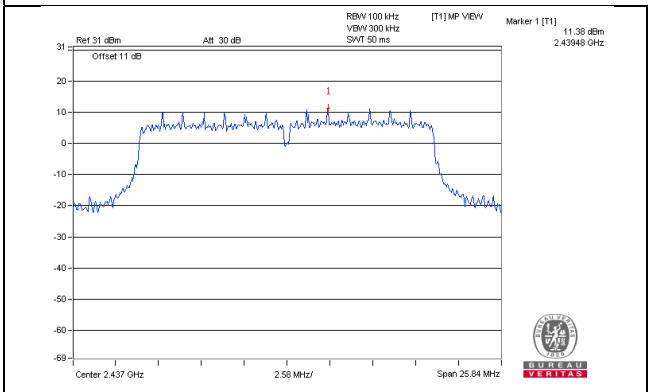
802.11n (HT20)_CHAIN 0

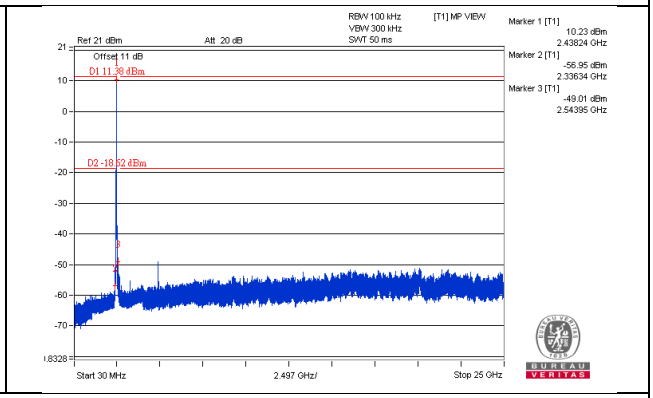
CH 1



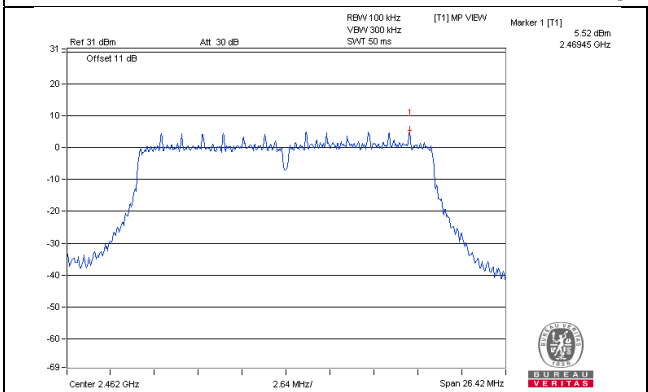


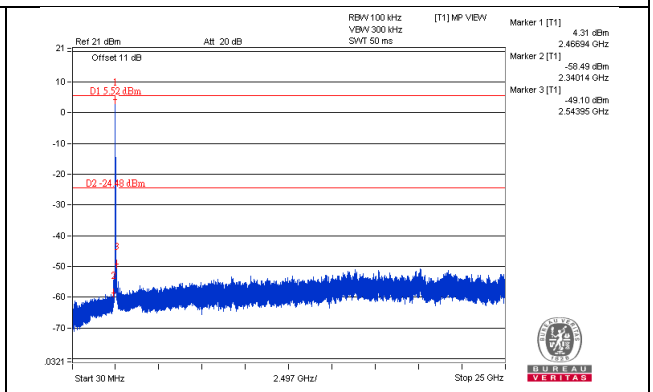
CH 6



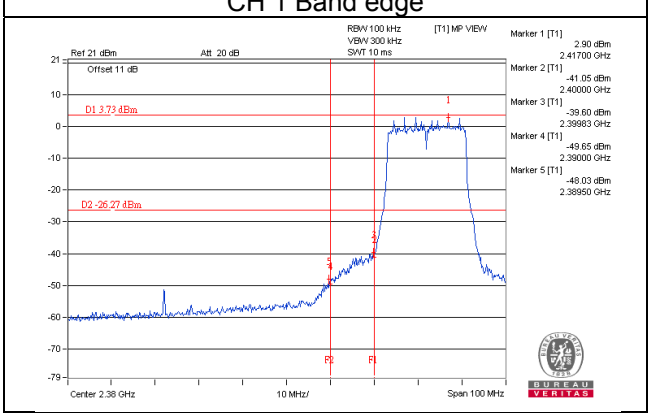


CH 11

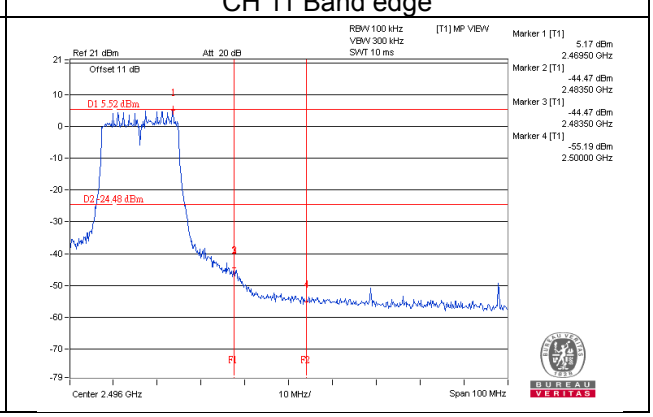




CH 1 Band edge

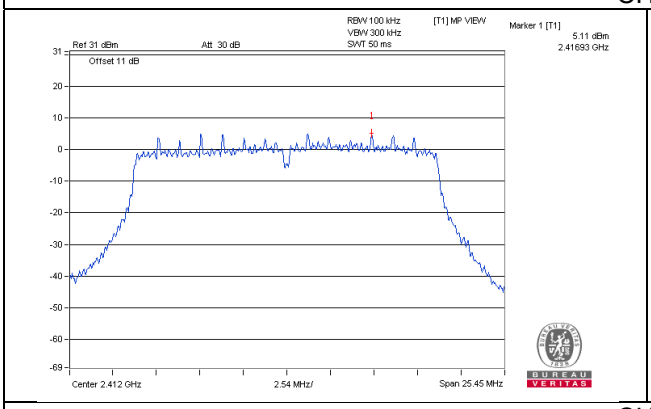


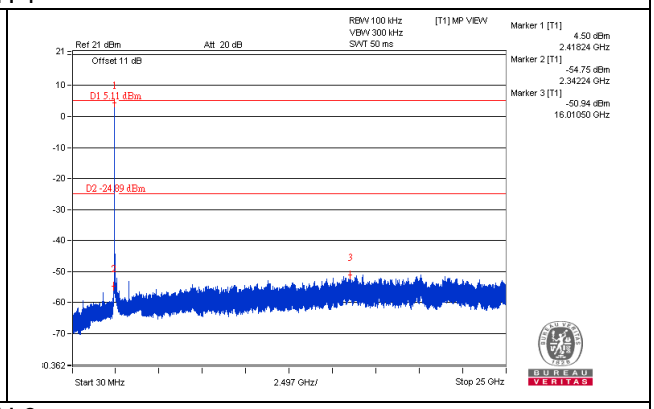
CH 11 Band edge



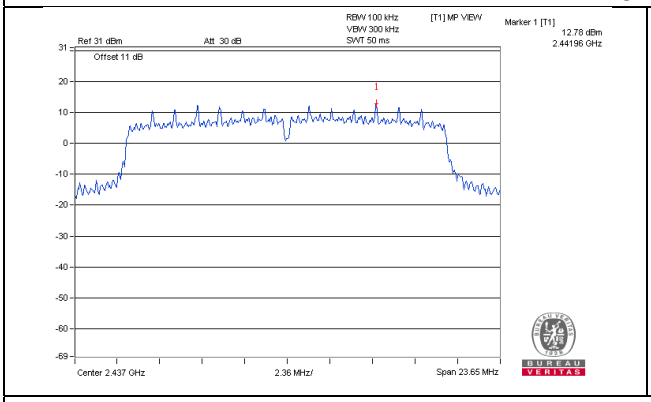
802.11n (HT20)_CHAIN 1

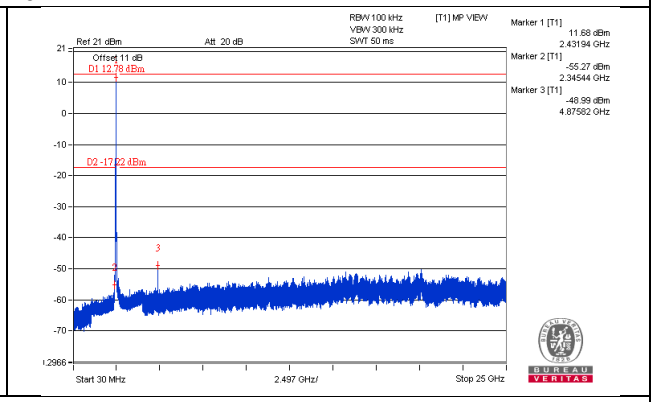
CH 1



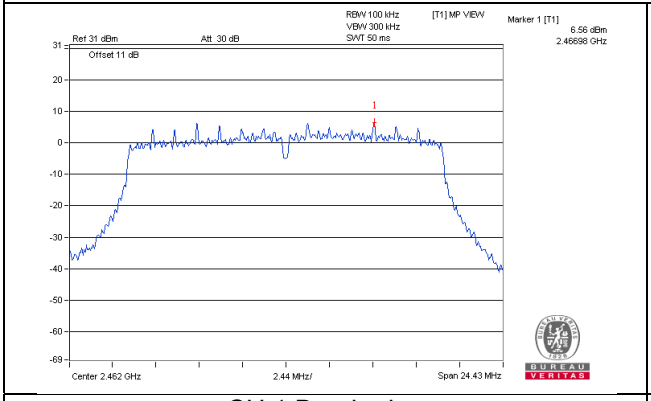


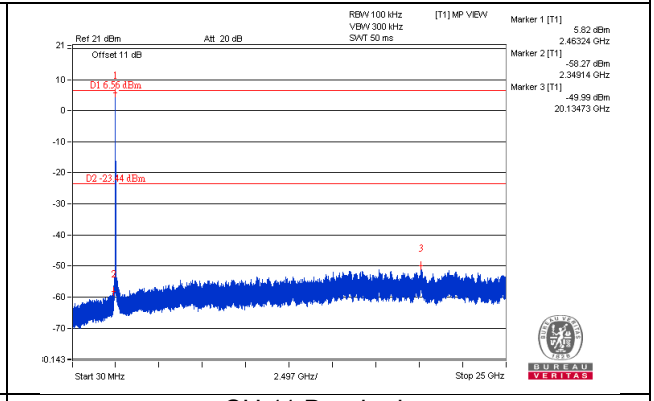
CH 6



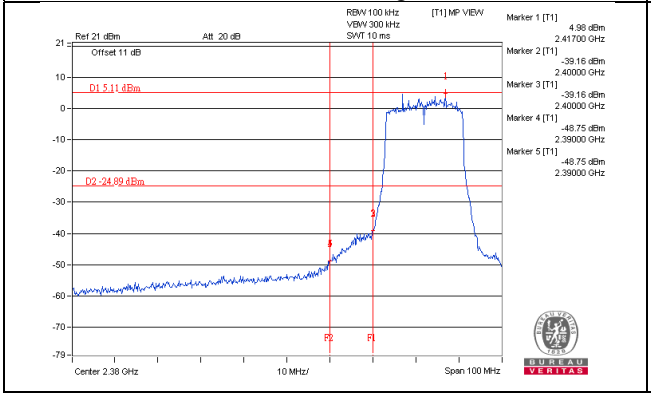


CH 11

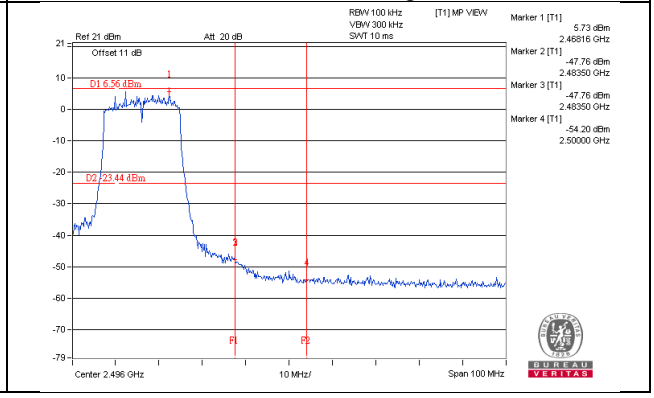




CH 1 Band edge

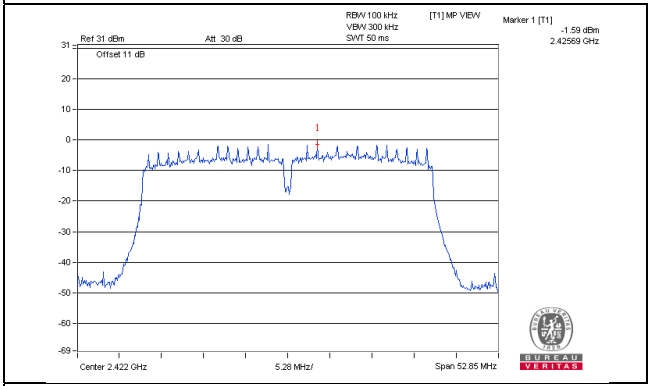


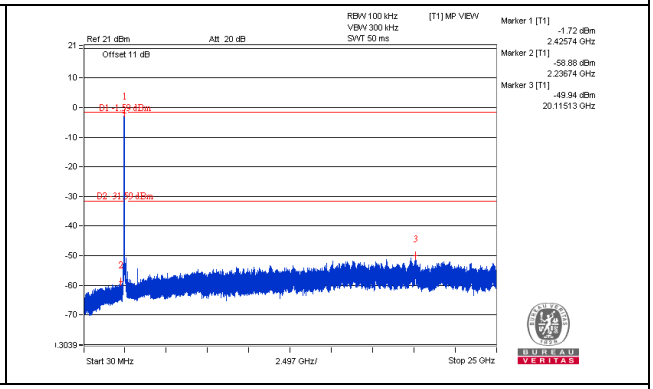
CH 11 Band edge



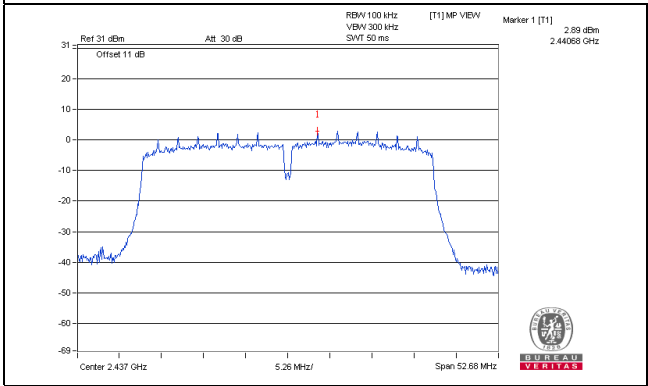
802.11n (HT40)_CHAIN 0

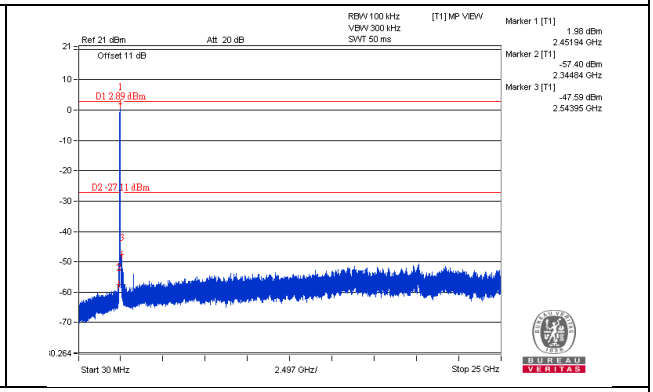
CH 3



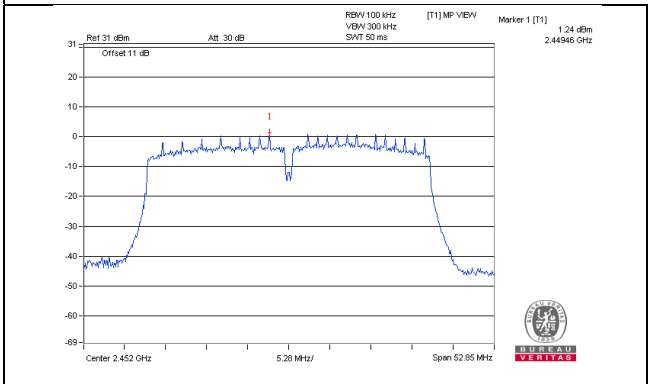


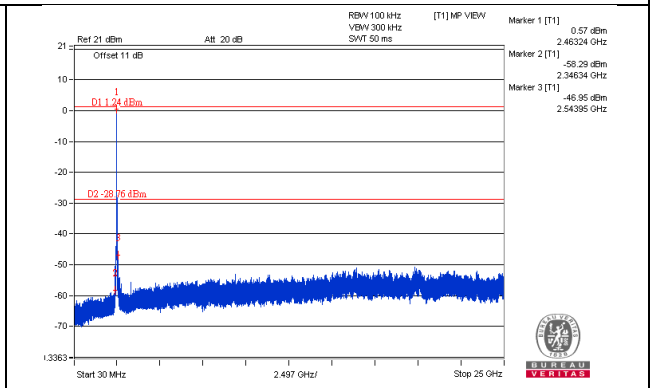
CH 6



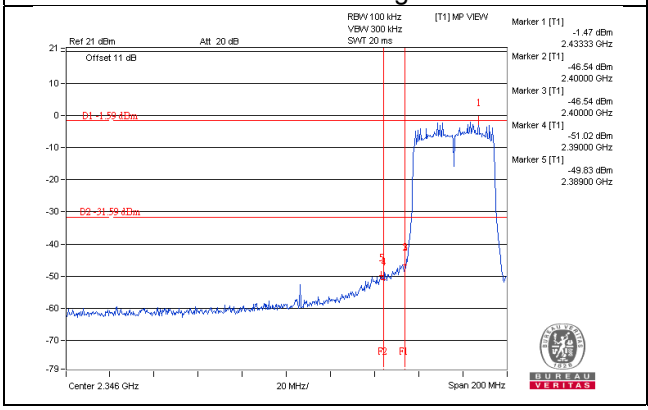


CH 9

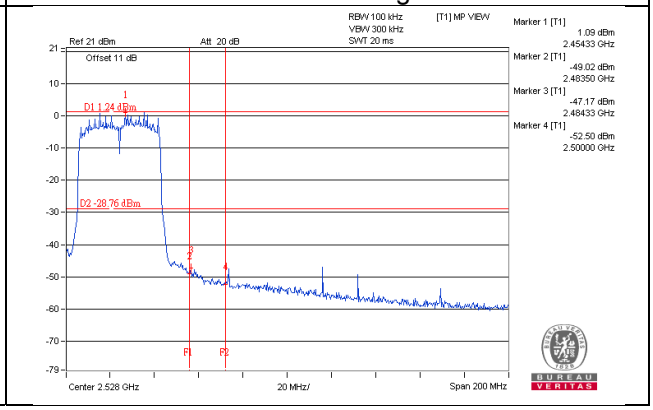




CH 3 Band edge

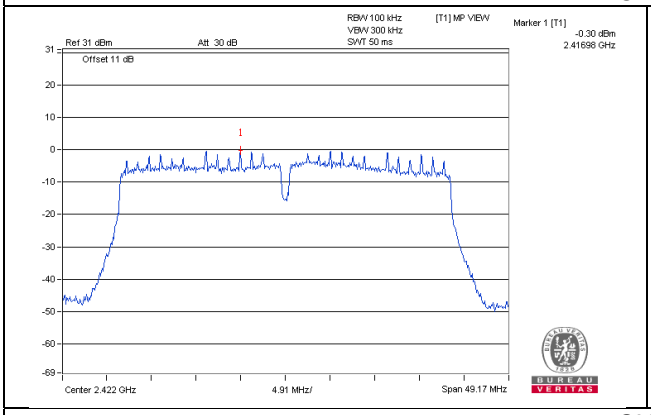


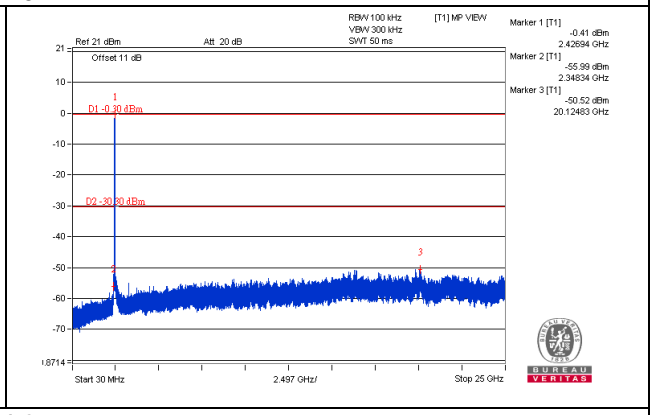
CH 9 Band edge



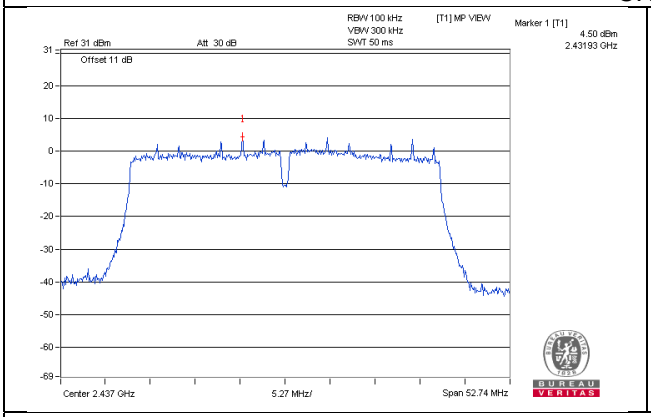
802.11n (HT40)_CHAIN 1

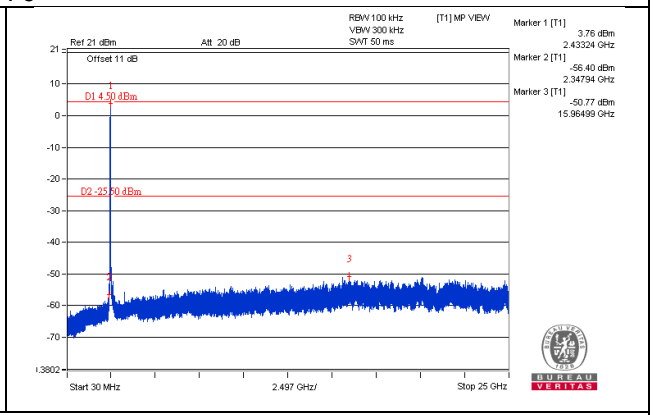
CH 3



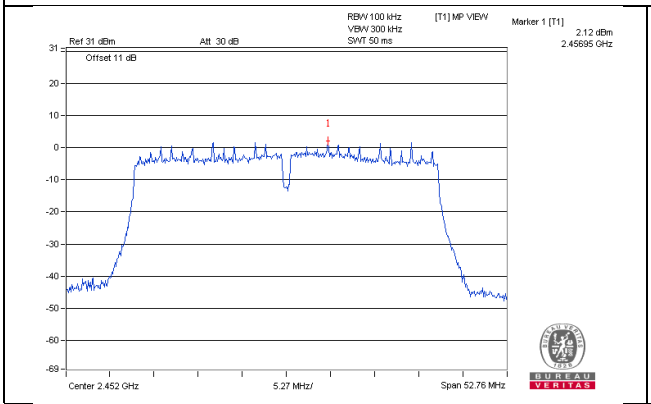


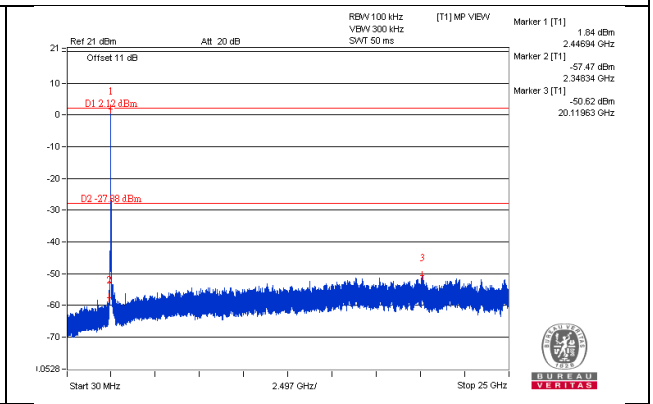
CH 6



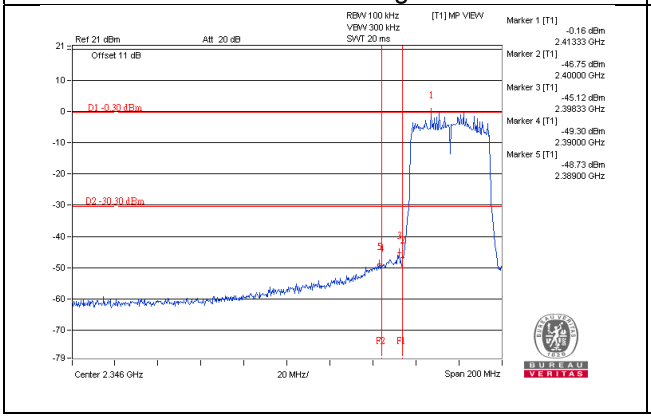


CH 9

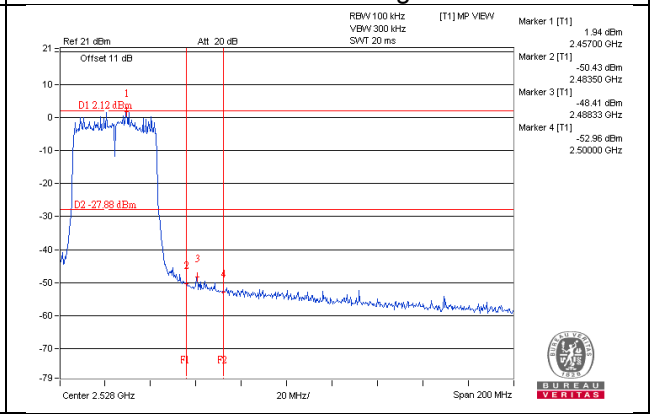




CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information 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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