

FCC Test Report

Report No.: RF150204C08

FCC ID: GZ5NVG34NX4

Test Model: NVG348BQ

Series Model: NVG348Q, NVG343BQ

Received Date: Feb. 04, 2015

Test Date: Feb. 07 ~ Mar. 04, 2015

Issued Date: Mar. 09, 2015

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Release Control Record

Issue No.	Description	Date Issued
RF150204C08	Original release.	Mar. 09, 2015

1 Certificate of Conformity

Product: NVG34X Series VDSL2 Gateway

Brand: ARRIS

Test Model: NVG348BQ

Series Model: NVG348Q, NVG343BQ

Sample Status: Engineering sample

Applicant: ARRIS Group, Inc.

Test Date: Feb. 07 ~ Mar. 04, 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 :


Pettie Chen / Senior Specialist

Date:

Mar. 09, 2015

Approved by :



Ken Liu / Senior Manager

Date:

Mar. 09, 2015

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 -25.67dB at 0.63484MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2390.00, 4924.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex not a standard connector.

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	3.63 dB
	200MHz ~ 1000MHz	3.64 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	NVG34X Series VDSL2 Gateway
Brand	ARRIS
Test Model	NVG348BQ
Series Model	NVG348Q, NVG343BQ
Model Difference	Refer to Note
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:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	471.712mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter
Data Cable Supplied	NA

Note:

1. All models are listed as below.

Brand	Model	Difference	
		VoIP	Bonding
ARRIS	NVG348BQ	With	With
	NVG348Q	With	Without
	NVG343BQ	Without	With

*Model: NVG348BQ is the main test model.

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

Modulation Mode	TX Function	Beamforming mode
802.11b	1TX (Ant. 1)	Not support
802.11g	2TX	Not support
802.11n (HT20)	2TX	Not support
802.11n (HT40)	2TX	Not support

3. The EUT uses following adapter.

Adapter	
Brand	DVE
Model	DSA-24PFD-15
Input Power	100-120Vac~50/60Hz, 0.8A
Output Power	+12Vdc, 2A
Power Line	2.0m non-shielded cable without core attached on adapter

4. The following antennas were provided to the EUT.

Antenna Type	Dipole		
Antenna Connector	i-pex (MHF)		
Gain (dBi)	Frequency (MHz)		
	2400	2450	2500
Ant. 1	5.7	5.1	4.7
Ant. 2	2.8	2.5	2.2

5. 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 & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

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

Radiated Emission Test (Above 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

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	6.0

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	6.0

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	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	20deg. C, 70%RH	120Vac, 60Hz	Tank Wu
RE<1G	22deg. C, 61%RH	120Vac, 60Hz	Tank Wu
PLC	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Nick Chen

3.3 Duty Cycle of Test Signal

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

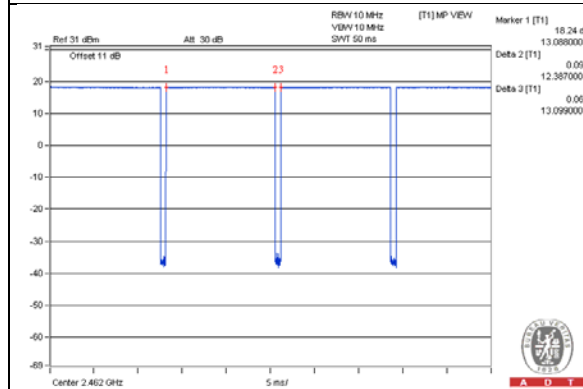
802.11b: Duty cycle = $12.387/13.099 = 0.946$, Duty factor = $10 * \log(1/0.964) = 0.16$

802.11g: Duty cycle = $2.062/2.172 = 0.949$, Duty factor = $10 * \log(1/0.949) = 0.227$

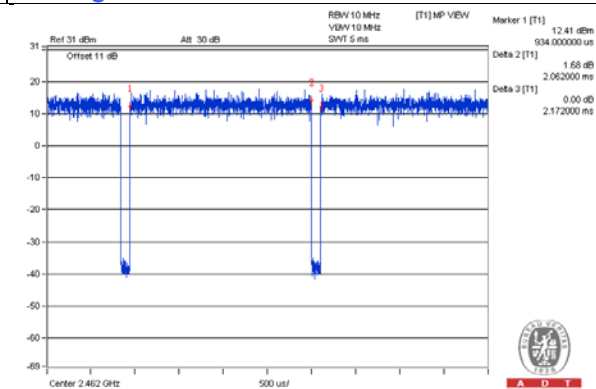
802.11n (HT20): Duty cycle = $1.918/2.019 = 0.95$, Duty factor = $10 * \log(1/0.95) = 0.223$

802.11n (HT40): Duty cycle = $0.938/1.04 = 0.902$, Duty factor = $10 * \log(1/0.902) = 0.448$

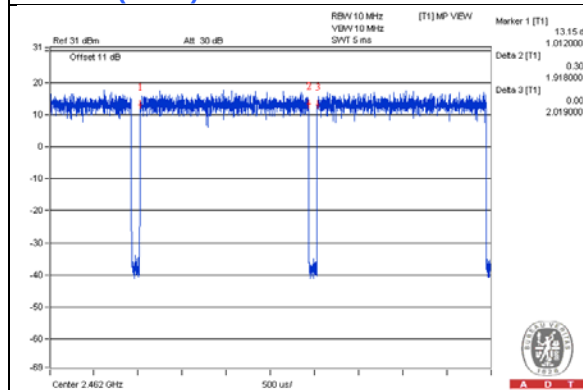
802.11b



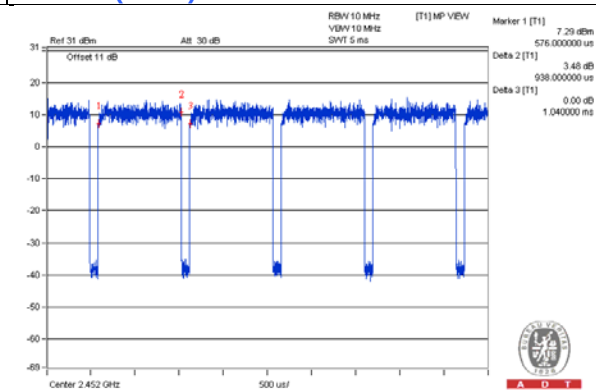
802.11g



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.	USB Flash	Transcend	V85	569992-8209	FCC DoC Approved	
B.	Notebook	DELL	Inspiron N4030	JCDJZM1	FCC DoC Approved	

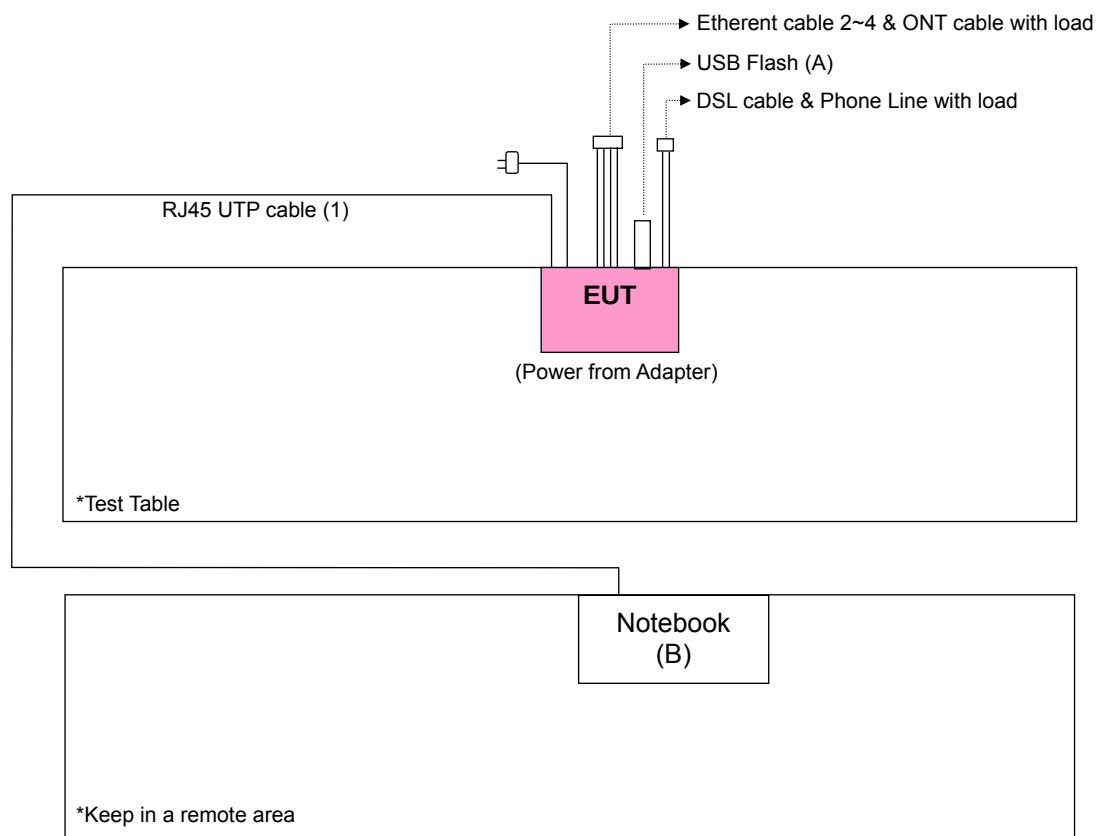
Note:

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

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

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.

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Dec. 01, 2014	Nov. 30, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Jul. 25, 2014	Jul. 24, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Feb. 06, 2015	Feb. 05, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	Aug. 26, 2014	Aug. 25, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Feb. 04, 2015	Feb. 04, 2016
Preamplifier Agilent	8449B	3008A01911	Aug. 09, 2014	Aug. 08, 2015
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	248780/4 309222/4 274092/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable Worken	8D-FB	Cable-CH9-01	Aug. 11, 2014	Aug. 10, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	NA	NA	NA
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015

- 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 9.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 215374.
5. The IC Site Registration No. is IC 7450F-9.

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:

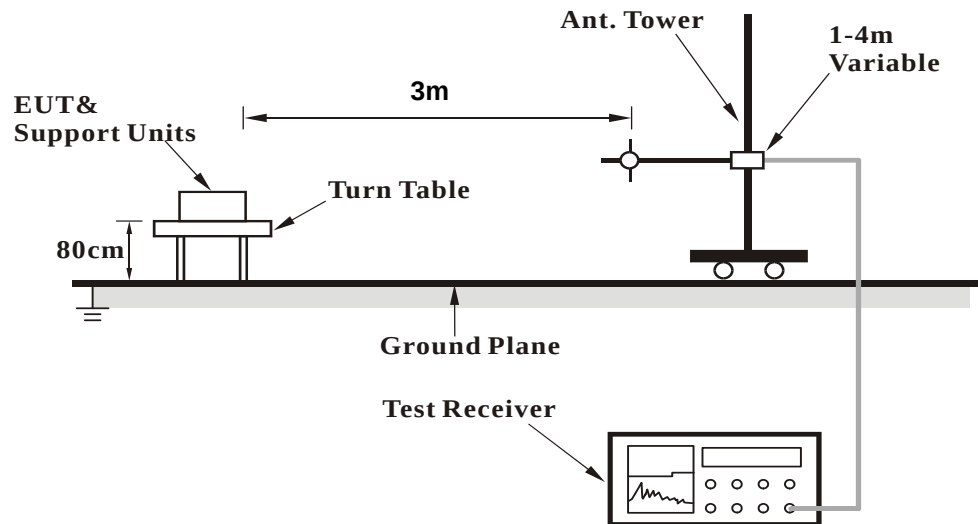
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution 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

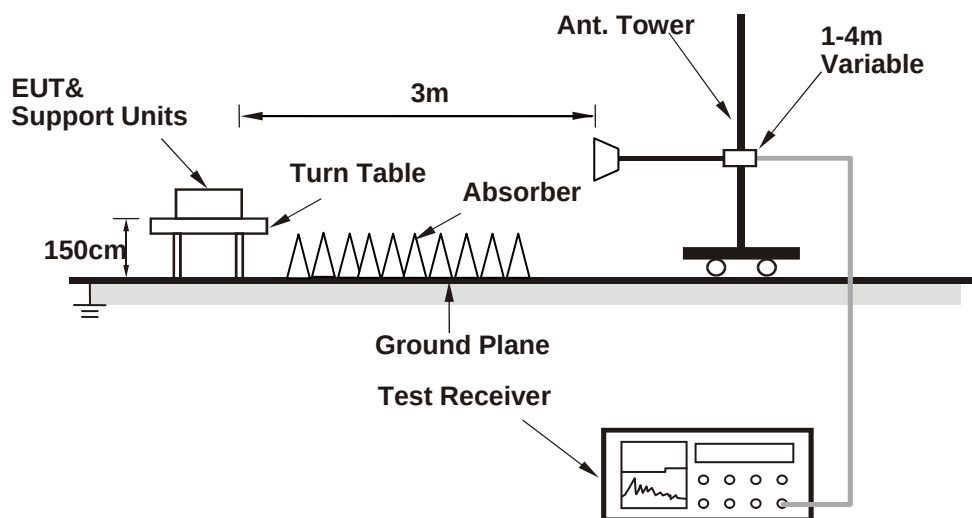
No deviation.

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

- a. Placed the EUT on the testing table.
- b. Prepared notebook to act as 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 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	57.3 PK	74.0	-16.7	1.00 H	345	24.30	33.00
2	2390.00	46.0 AV	54.0	-8.0	1.00 H	345	13.00	33.00
3	*2412.00	94.8 PK			1.00 H	345	61.70	33.10
4	*2412.00	90.7 AV			1.00 H	345	57.60	33.10
5	4824.00	55.5 PK	74.0	-18.5	1.40 H	287	53.70	1.80
6	4824.00	51.5 AV	54.0	-2.5	1.40 H	287	49.70	1.80
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	57.6 PK	74.0	-16.4	1.03 V	43	24.60	33.00
2	2390.00	46.5 AV	54.0	-7.5	1.03 V	43	13.50	33.00
3	*2412.00	105.9 PK			1.03 V	43	72.80	33.10
4	*2412.00	101.9 AV			1.03 V	43	68.80	33.10
5	4824.00	56.7 PK	74.0	-17.3	1.07 V	290	54.90	1.80
6	4824.00	52.9 AV	54.0	-1.1	1.07 V	290	51.10	1.80

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)
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	94.4 PK			1.00 H	344	61.10	33.30
2	*2437.00	90.8 AV			1.00 H	344	57.50	33.30
3	4874.00	52.8 PK	74.0	-21.2	1.13 H	80	50.90	1.90
4	4874.00	47.8 AV	54.0	-6.2	1.13 H	80	45.90	1.90
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	*2437.00	105.3 PK			1.81 V	41	72.00	33.30
2	*2437.00	101.5 AV			1.81 V	41	68.20	33.30
3	4874.00	55.8 PK	74.0	-18.2	1.14 V	290	53.90	1.90
4	4874.00	52.4 AV	54.0	-1.6	1.14 V	290	50.50	1.90

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 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	93.8 PK			1.00 H	342	60.40	33.40
2	*2462.00	90.3 AV			1.00 H	342	56.90	33.40
3	2483.50	59.1 PK	74.0	-14.9	1.00 H	342	25.70	33.40
4	2483.50	46.3 AV	54.0	-7.7	1.00 H	342	12.90	33.40
5	4924.00	55.5 PK	74.0	-18.5	1.00 H	202	53.50	2.00
6	4924.00	51.7 AV	54.0	-2.3	1.00 H	202	49.70	2.00
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	104.7 PK			1.61 V	6	71.30	33.40
2	*2462.00	100.7 AV			1.61 V	6	67.30	33.40
3	2483.50	60.0 PK	74.0	-14.0	1.61 V	6	26.60	33.40
4	2483.50	47.5 AV	54.0	-6.5	1.61 V	6	14.10	33.40
5	4924.00	56.5 PK	74.0	-17.5	1.10 V	79	54.50	2.00
6	4924.00	53.0 AV	54.0	-1.0	1.10 V	79	51.00	2.00

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.

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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	58.8 PK	74.0	-15.2	1.73 H	290	25.80	33.00
2	2390.00	46.8 AV	54.0	-7.2	1.73 H	290	13.80	33.00
3	*2412.00	98.2 PK			1.01 H	230	65.10	33.10
4	*2412.00	89.1 AV			1.01 H	230	56.00	33.10
5	4824.00	53.6 PK	74.0	-20.4	1.23 H	261	51.80	1.80
6	4824.00	39.2 AV	54.0	-14.8	1.23 H	261	37.40	1.80
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	71.3 PK	74.0	-2.7	1.80 V	21	38.30	33.00
2	2390.00	52.6 AV	54.0	-1.4	1.80 V	21	19.60	33.00
3	*2412.00	111.6 PK			1.78 V	350	78.50	33.10
4	*2412.00	101.4 AV			1.78 V	350	68.30	33.10
5	4824.00	58.4 PK	74.0	-15.6	1.07 V	298	56.60	1.80
6	4824.00	42.9 AV	54.0	-11.1	1.07 V	298	41.10	1.80

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)
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	99.2 PK			1.14 H	345	65.90	33.30
2	*2437.00	89.1 AV			1.14 H	345	55.80	33.30
3	2483.50	58.7 PK	74.0	-15.3	1.01 H	117	25.30	33.40
4	2483.50	46.4 AV	54.0	-7.6	1.01 H	117	13.00	33.40
5	4874.00	56.7 PK	74.0	-17.3	1.41 H	262	54.80	1.90
6	4874.00	42.3 AV	54.0	-11.7	1.41 H	262	40.40	1.90
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	*2437.00	113.0 PK			1.20 V	46	79.70	33.30
2	*2437.00	102.2 AV			1.20 V	46	68.90	33.30
3	2483.50	72.9 PK	74.0	-1.1	1.96 V	30	39.50	33.40
4	2483.50	52.6 AV	54.0	-1.4	1.96 V	30	19.20	33.40
5	4874.00	56.3 PK	74.0	-17.7	1.08 V	289	54.40	1.90
6	4874.00	42.2 AV	54.0	-11.8	1.08 V	289	40.30	1.90

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 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	92.9 PK			1.00 H	346	59.50	33.40
2	*2462.00	83.9 AV			1.00 H	346	50.50	33.40
3	2483.50	59.1 PK	74.0	-14.9	1.26 H	254	25.70	33.40
4	2483.50	46.8 AV	54.0	-7.2	1.26 H	254	13.40	33.40
5	4924.00	51.1 PK	74.0	-22.9	1.00 H	203	49.10	2.00
6	4924.00	38.8 AV	54.0	-15.2	1.00 H	203	36.80	2.00
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	107.6 PK			1.92 V	12	74.20	33.40
2	*2462.00	97.4 AV			1.92 V	12	64.00	33.40
3	2483.50	73.0 PK	74.0	-1.0	1.22 V	66	39.60	33.40
4	2483.50	52.2 AV	54.0	-1.8	1.22 V	66	18.80	33.40
5	4924.00	50.6 PK	74.0	-23.4	1.24 V	78	48.60	2.00
6	4924.00	39.2 AV	54.0	-14.8	1.24 V	78	37.20	2.00

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.

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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	58.2 PK	74.0	-15.8	1.55 H	303	25.20	33.00
2	2390.00	46.2 AV	54.0	-7.8	1.55 H	303	13.20	33.00
3	*2412.00	97.6 PK			1.72 H	292	64.50	33.10
4	*2412.00	87.8 AV			1.72 H	292	54.70	33.10
5	4824.00	52.1 PK	74.0	-21.9	1.38 H	148	50.30	1.80
6	4824.00	37.4 AV	54.0	-16.6	1.38 H	148	35.60	1.80
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	69.1 PK	74.0	-4.9	1.78 V	36	36.10	33.00
2	2390.00	53.0 AV	54.0	-1.0	1.78 V	36	20.00	33.00
3	*2412.00	109.8 PK			1.98 V	18	76.70	33.10
4	*2412.00	100.4 AV			1.98 V	18	67.30	33.10
5	4824.00	56.6 PK	74.0	-17.4	1.00 V	291	54.80	1.80
6	4824.00	39.3 AV	54.0	-14.7	1.00 V	291	37.50	1.80

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)
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	95.5 PK			1.00 H	349	62.20	33.30
2	*2437.00	86.2 AV			1.00 H	349	52.90	33.30
3	4874.00	50.5 PK	74.0	-23.5	1.12 H	85	48.60	1.90
4	4874.00	37.8 AV	54.0	-16.2	1.12 H	85	35.90	1.90
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	*2437.00	109.6 PK			1.91 V	33	76.30	33.30
2	*2437.00	100.8 AV			1.91 V	33	67.50	33.30
3	4874.00	55.9 PK	74.0	-18.1	1.00 V	292	54.00	1.90
4	4874.00	39.8 AV	54.0	-14.2	1.00 V	292	37.90	1.90

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 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	92.5 PK			1.16 H	345	59.10	33.40
2	*2462.00	82.9 AV			1.16 H	345	49.50	33.40
3	2483.50	58.4 PK	74.0	-15.6	1.32 H	53	25.00	33.40
4	2483.50	46.8 AV	54.0	-7.2	1.32 H	53	13.40	33.40
5	4924.00	49.2 PK	74.0	-24.8	1.00 H	202	47.20	2.00
6	4924.00	37.2 AV	54.0	-16.8	1.00 H	202	35.20	2.00
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	105.7 PK			1.95 V	31	72.30	33.40
2	*2462.00	96.5 AV			1.95 V	31	63.10	33.40
3	2483.50	72.8 PK	74.0	-1.2	1.06 V	36	39.40	33.40
4	2483.50	51.6 AV	54.0	-2.4	1.06 V	36	18.20	33.40
5	4924.00	51.1 PK	74.0	-22.9	1.13 V	336	49.10	2.00
6	4924.00	38.7 AV	54.0	-15.3	1.13 V	336	36.70	2.00

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)
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	58.2 PK	74.0	-15.8	1.30 H	231	25.20	33.00
2	2390.00	46.2 AV	54.0	-7.8	1.30 H	231	13.20	33.00
3	*2422.00	89.9 PK			1.01 H	163	56.70	33.20
4	*2422.00	80.8 AV			1.01 H	163	47.60	33.20
5	4844.00	47.9 PK	74.0	-26.1	1.30 H	147	46.10	1.80
6	4844.00	37.8 AV	54.0	-16.2	1.30 H	147	36.00	1.80
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	69.8 PK	74.0	-4.2	1.81 V	6	36.80	33.00
2	2390.00	52.9 AV	54.0	-1.1	1.81 V	6	19.90	33.00
3	*2422.00	104.8 PK			1.68 V	34	71.60	33.20
4	*2422.00	95.1 AV			1.68 V	34	61.90	33.20
5	4844.00	48.0 PK	74.0	-26.0	1.24 V	292	46.20	1.80
6	4844.00	37.9 AV	54.0	-16.1	1.24 V	292	36.10	1.80

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)
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	89.2 PK			1.00 H	235	55.90	33.30
2	*2437.00	80.4 AV			1.00 H	235	47.10	33.30
3	2483.50	59.5 PK	74.0	-14.5	1.02 H	347	26.10	33.40
4	2483.50	46.7 AV	54.0	-7.3	1.02 H	347	13.30	33.40
5	4874.00	50.7 PK	74.0	-23.3	1.68 H	257	48.80	1.90
6	4874.00	38.5 AV	54.0	-15.5	1.68 H	257	36.60	1.90
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	*2437.00	104.5 PK			1.05 V	11	71.20	33.30
2	*2437.00	94.5 AV			1.05 V	11	61.20	33.30
3	2483.50	69.4 PK	74.0	-4.6	1.17 V	34	36.00	33.40
4	2483.50	52.6 AV	54.0	-1.4	1.17 V	34	19.20	33.40
5	4874.00	48.5 PK	74.0	-25.5	1.00 V	91	46.60	1.90
6	4874.00	37.1 AV	54.0	-16.9	1.00 V	91	35.20	1.90

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 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	87.1 PK			1.00 H	164	53.80	33.30
2	*2452.00	77.9 AV			1.00 H	164	44.60	33.30
3	2483.50	59.6 PK	74.0	-14.4	1.00 H	358	26.20	33.40
4	2483.50	46.8 AV	54.0	-7.2	1.00 H	358	13.40	33.40
5	4904.00	48.1 PK	74.0	-25.9	1.04 H	182	46.10	2.00
6	4904.00	35.8 AV	54.0	-18.2	1.04 H	182	33.80	2.00
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	*2452.00	101.5 PK			1.16 V	37	68.20	33.30
2	*2452.00	91.7 AV			1.16 V	37	58.40	33.30
3	2483.50	69.5 PK	74.0	-4.5	1.18 V	38	36.10	33.40
4	2483.50	52.5 AV	54.0	-1.5	1.18 V	38	19.10	33.40
5	4904.00	47.6 PK	74.0	-26.4	1.32 V	266	45.60	2.00
6	4904.00	35.6 AV	54.0	-18.4	1.32 V	266	33.60	2.00

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.

Below 1GHz Worst-Case Data

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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	92.08	29.9 QP	43.5	-13.6	2.00 H	267	49.80	-19.90
2	171.62	27.7 QP	43.5	-15.8	1.00 H	270	42.20	-14.50
3	383.08	36.6 QP	46.0	-9.4	2.00 H	160	47.50	-10.90
4	625.58	36.5 QP	46.0	-9.5	1.25 H	233	42.30	-5.80
5	875.84	36.6 QP	46.0	-9.4	1.25 H	280	38.50	-1.90
6	1000.00	33.7 QP	54.0	-20.3	1.00 H	66	33.70	0.00
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	35.82	33.7 QP	40.0	-6.3	1.00 V	111	49.30	-15.60
2	51.34	34.6 QP	40.0	-5.4	1.24 V	25	49.00	-14.40
3	92.08	34.2 QP	43.5	-9.3	1.00 V	242	54.10	-19.90
4	196.84	28.4 QP	43.5	-15.1	1.00 V	11	45.20	-16.80
5	383.08	38.1 QP	46.0	-7.9	1.49 V	178	49.00	-10.90
6	1000.00	36.6 QP	54.0	-17.4	1.24 V	56	36.60	0.00

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

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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100612	Sep. 30, 2014	Sep. 29, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	847265/023	Oct. 21, 2014	Oct. 20, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 2015
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 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

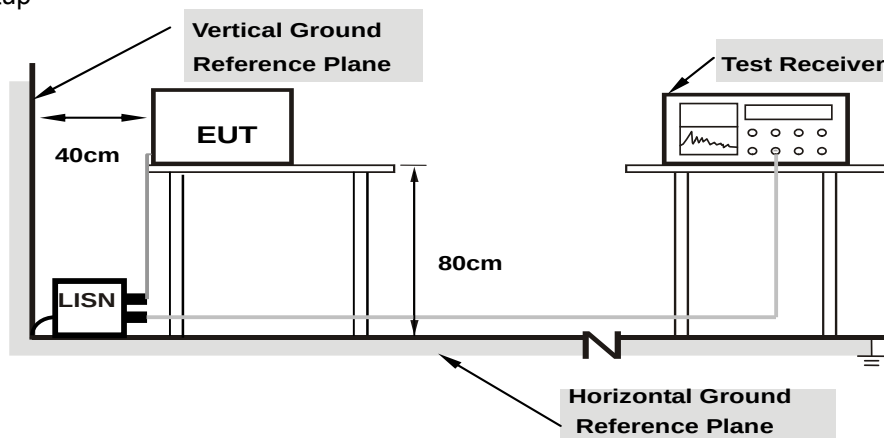
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

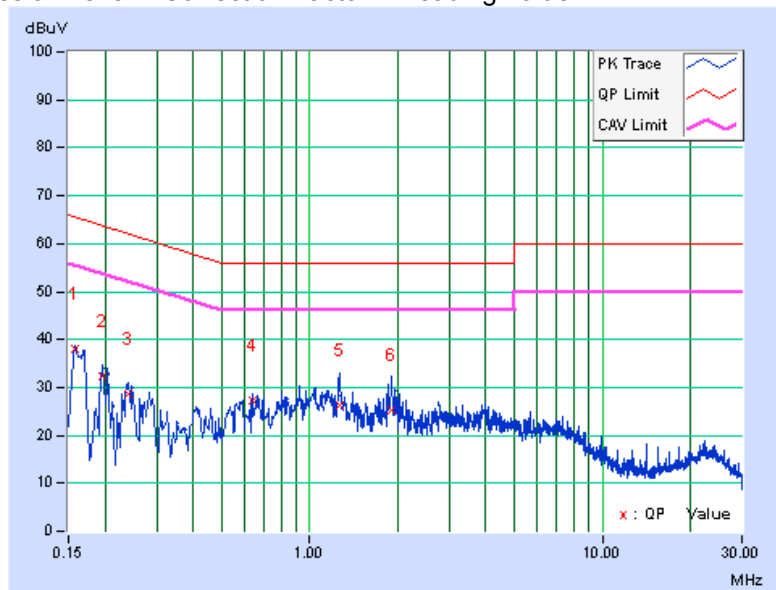
4.2.7 Test Results

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

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	0.08	38.04	26.07	38.12	26.15	65.58	55.58	-27.46	-29.43
2	0.19692	0.07	32.37	18.62	32.44	18.69	63.74	53.74	-31.30	-35.05
3	0.23898	0.07	28.49	18.67	28.56	18.74	62.13	52.13	-33.57	-33.39
4	0.63484	0.09	27.24	20.24	27.33	20.33	56.00	46.00	-28.67	-25.67
5	1.26351	0.12	26.30	18.19	26.42	18.31	56.00	46.00	-29.58	-27.69
6	1.90950	0.15	25.06	19.62	25.21	19.77	56.00	46.00	-30.79	-26.23

REMARKS:

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

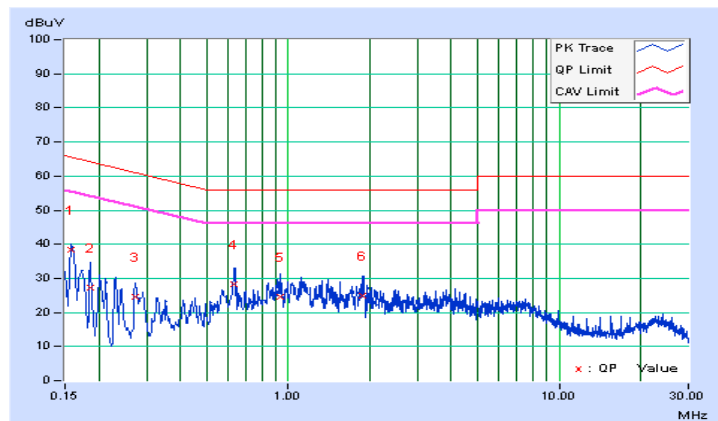


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15802	0.05	38.17	26.11	38.22	26.16	65.57	55.57	-27.35	-29.41
2	0.18519	0.05	27.37	7.72	27.42	7.77	64.25	54.25	-36.83	-46.48
3	0.27120	0.06	24.52	11.51	24.58	11.57	61.08	51.08	-36.50	-39.51
4	0.63186	0.08	28.09	19.32	28.17	19.40	56.00	46.00	-27.83	-26.60
5	0.93982	0.09	24.38	16.87	24.47	16.96	56.00	46.00	-31.53	-29.04
6	1.88588	0.13	24.80	16.16	24.93	16.29	56.00	46.00	-31.07	-29.71

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.

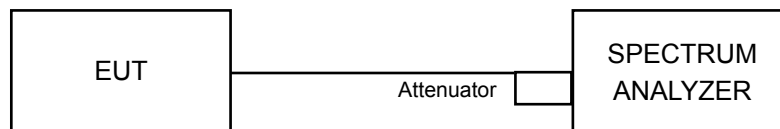


4.3 6dB Bandwidth Measurement

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	8.12	0.5	PASS
6	2437	8.11	0.5	PASS
11	2462	8.10	0.5	PASS

802.11g

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 (HT20)

Channel	Frequency (MHz)	6db Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1		
1	2412	15.14	15.74	0.5	PASS
6	2437	15.94	15.74	0.5	PASS
11	2462	15.13	16.34	0.5	PASS

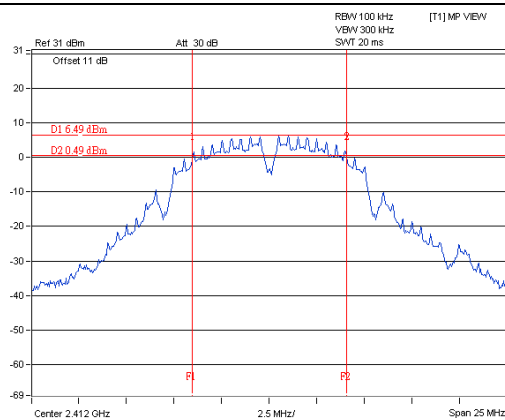
802.11n (HT40)

Channel	Frequency (MHz)	6db Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1		
3	2422	35.81	35.89	0.5	PASS
6	2437	35.82	35.83	0.5	PASS
9	2452	35.90	36.44	0.5	PASS

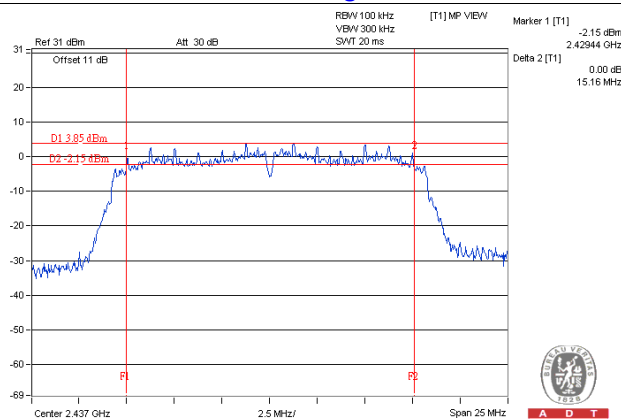
Spectrum Plot of Worst Value

802.11b

802.11g



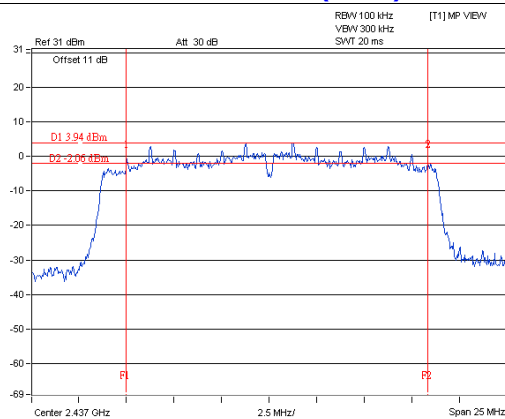
A D T



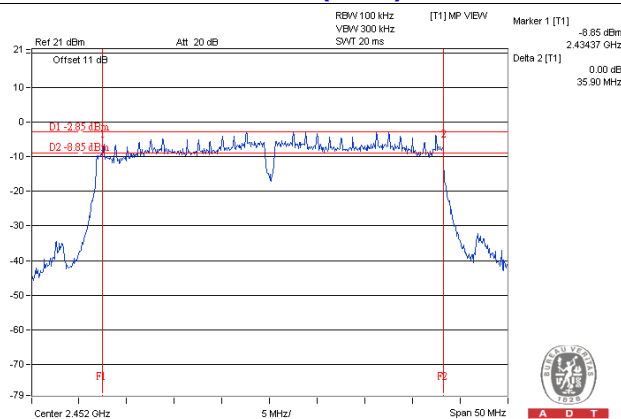
A D T

802.11n (HT20)

802.11n (HT40)



A D T



A D T

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,

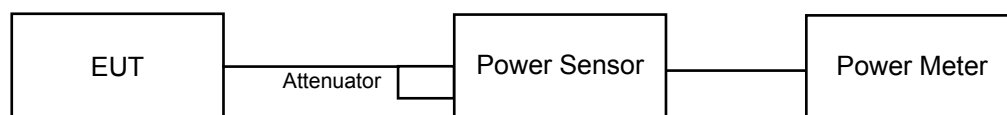
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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	75.336	18.77	30	Pass
6	2437	76.033	18.81	30	Pass
11	2462	79.799	19.02	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	24.06	21.93	410.638	26.13	30	Pass
6	2437	23.22	24.18	471.712	26.74	30	Pass
11	2462	19.00	20.01	179.664	22.54	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	22.44	22.47	351.992	25.47	30	Pass
6	2437	24.02	22.69	438.128	26.42	30	Pass
11	2462	20.21	21.01	231.137	23.64	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	21.61	20.11	247.442	23.93	30	Pass
6	2437	21.25	21.53	275.585	24.40	30	Pass
9	2452	20.99	20.02	226.065	23.54	30	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	31.915	15.04
6	2437	31.915	15.04
11	2462	32.584	15.13

802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	14.61	13.50	51.294	17.10
6	2437	15.10	14.86	62.979	17.99
11	2462	10.18	9.30	18.934	12.77

802.11n (HT20)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	13.70	13.06	43.672	16.40
6	2437	14.26	13.21	47.610	16.78
11	2462	10.77	10.18	22.363	13.50

802.11n (HT40)

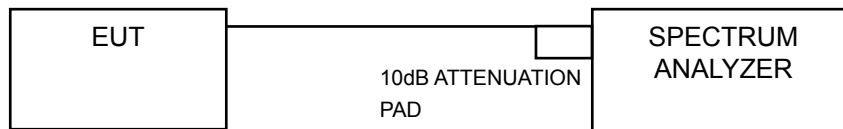
Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	12.06	11.11	28.981	14.62
6	2437	12.75	11.92	34.396	15.37
9	2452	11.15	10.01	23.055	13.63

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	-7.79	8	Pass
6	2437	-7.78	8	Pass
11	2462	-6.99	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	-9.92	3.01	-6.91	6.62	Pass
	6	2437	-9.82	3.01	-6.81	6.62	Pass
	11	2462	-14.59	3.01	-11.58	6.62	Pass
1	1	2412	-12.07	3.01	-9.06	6.62	Pass
	6	2437	-10.11	3.01	-7.10	6.62	Pass
	11	2462	-14.99	3.01	-11.98	6.62	Pass

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 7.38 \text{ dBi} > 6 \text{ dBi}$, so the power density limit shall be reduced to $8 - (7.38 - 6) = 6.62 \text{ dBm}$.

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	-10.84	3.01	-7.83	6.62	Pass
	6	2437	-10.21	3.01	-7.20	6.62	Pass
	11	2462	-14.17	3.01	-11.16	6.62	Pass
1	1	2412	-12.32	3.01	-9.31	6.62	Pass
	6	2437	-11.32	3.01	-8.31	6.62	Pass
	11	2462	-15.11	3.01	-12.10	6.62	Pass

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 7.38 \text{ dBi} > 6 \text{ dBi}$, so the power density limit shall be reduced to $8 - (7.38 - 6) = 6.62 \text{ dBm}$.

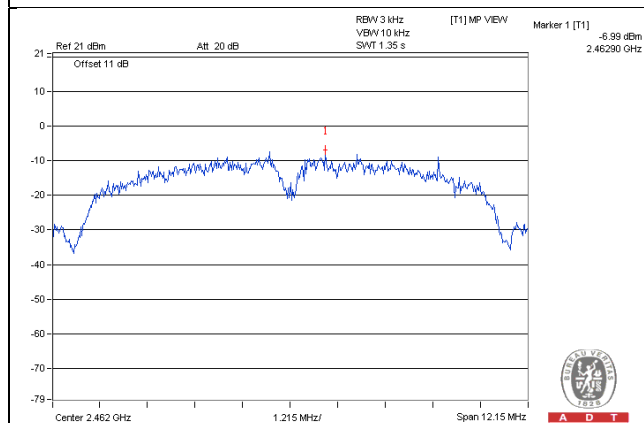
802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	3	2422	-16.13	3.01	-13.12	6.62	Pass
	6	2437	-16.16	3.01	-13.15	6.62	Pass
	9	2452	-17.08	3.01	-14.07	6.62	Pass
1	3	2422	-16.76	3.01	-13.75	6.62	Pass
	6	2437	-16.98	3.01	-13.97	6.62	Pass
	9	2452	-18.44	3.01	-15.43	6.62	Pass

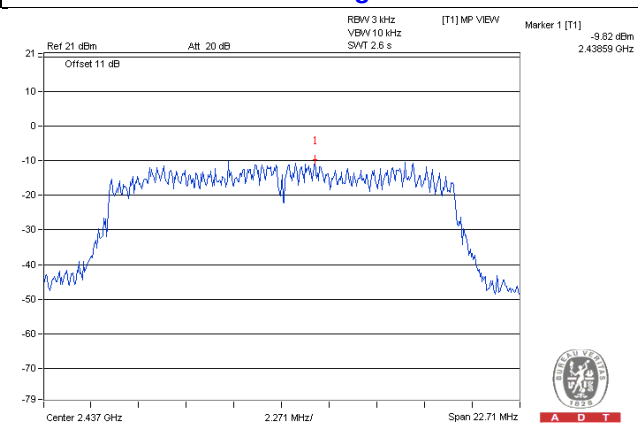
NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2] = 7.38 \text{ dBi} > 6 \text{ dBi}$, so the power density limit shall be reduced to $8 - (7.38 - 6) = 6.62 \text{ dBm}$.

Spectrum Plot of Worst Value

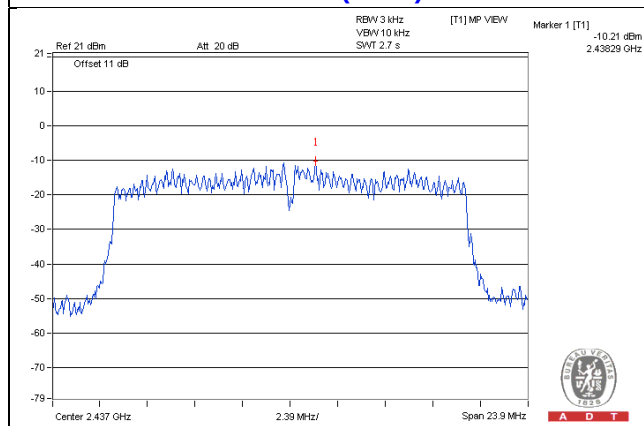
802.11b



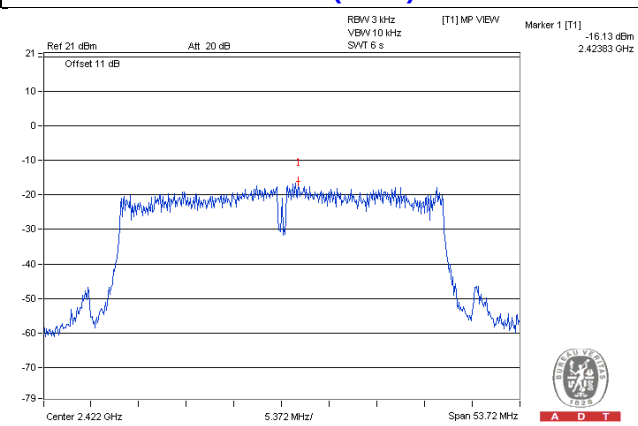
802.11g



802.11n (HT20)



802.11n (HT40)

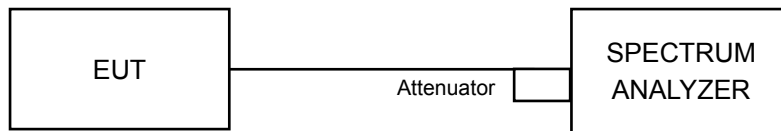


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

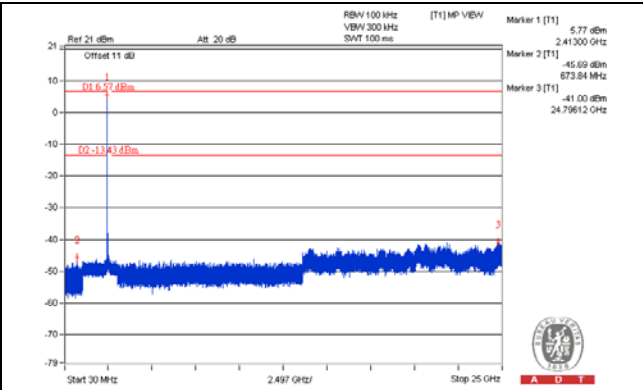
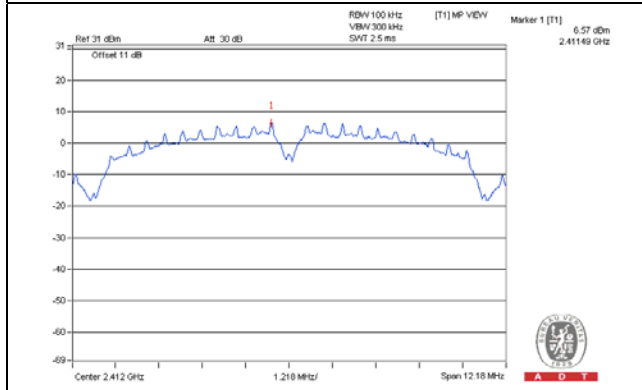
Same as Item 4.3.6

4.6.7 Test Results

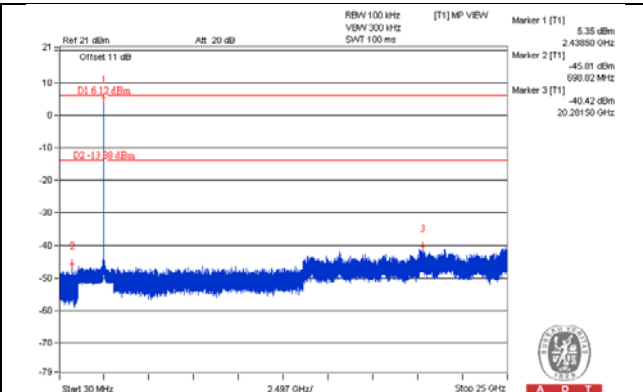
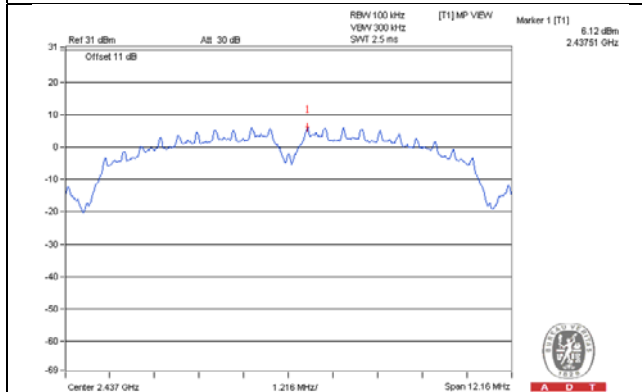
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

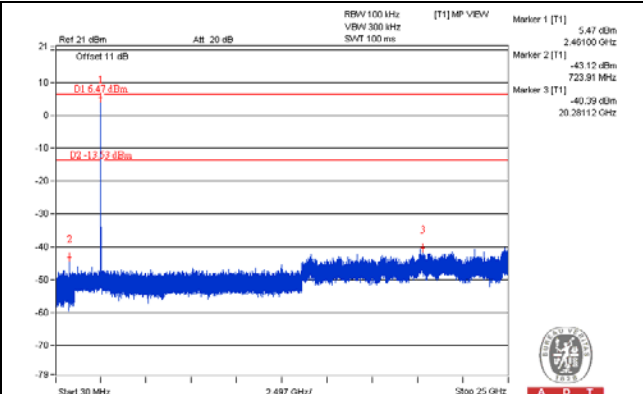
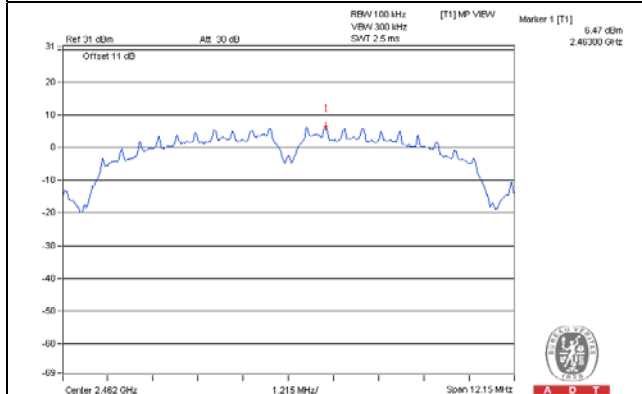
CH 1



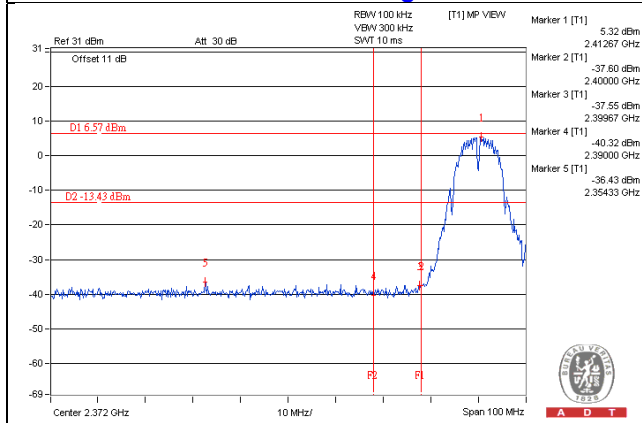
CH 6



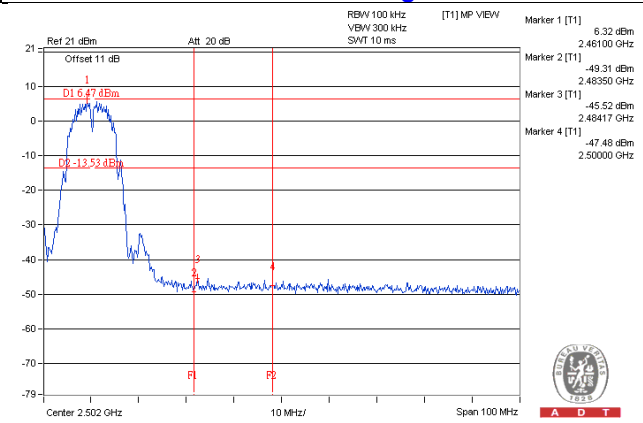
CH 11



CH 1 Band edge

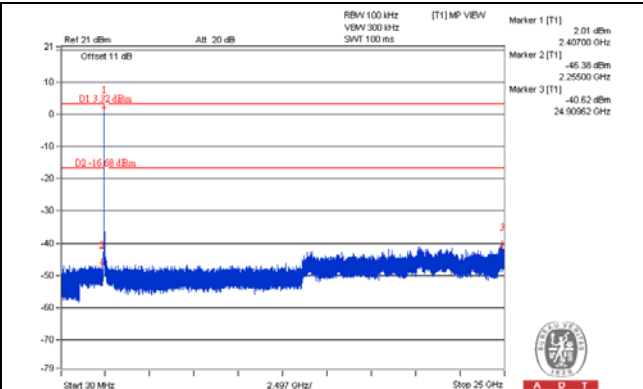
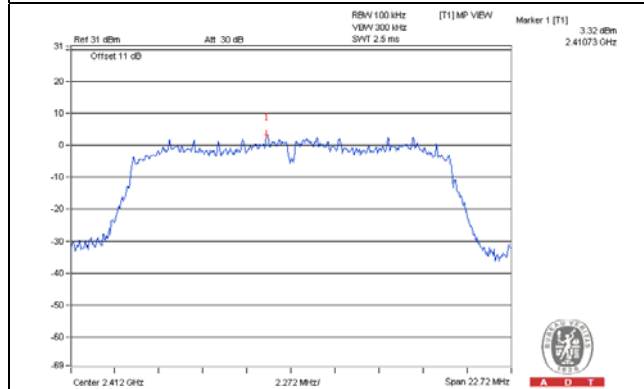


CH 11 Band edge

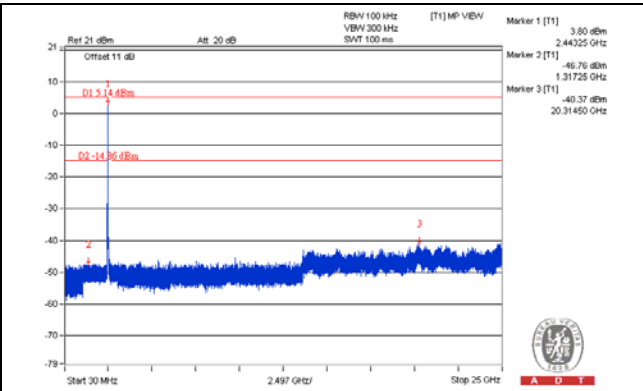
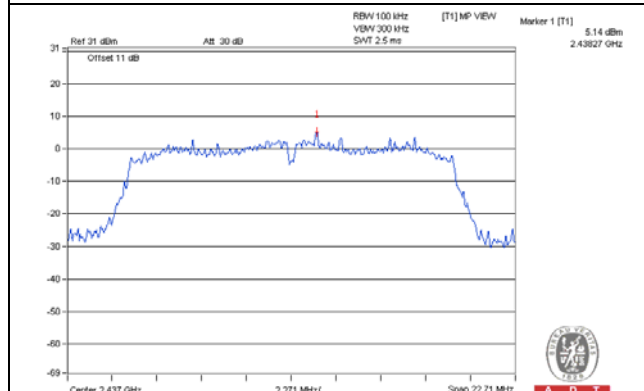


802.11g CHAIN 0

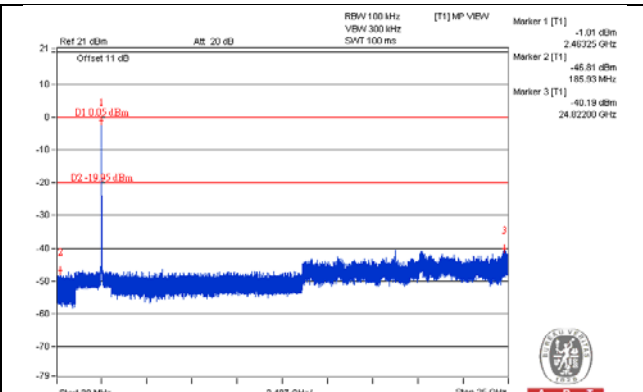
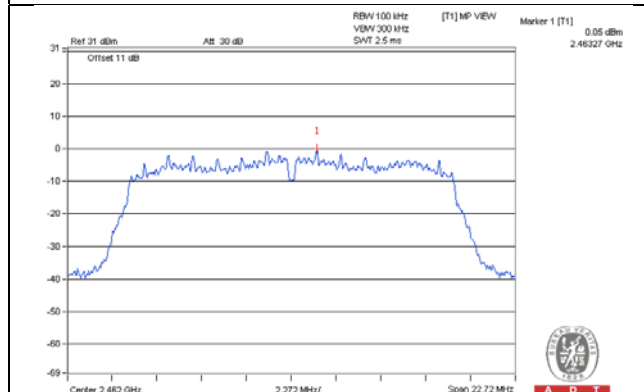
CH 1



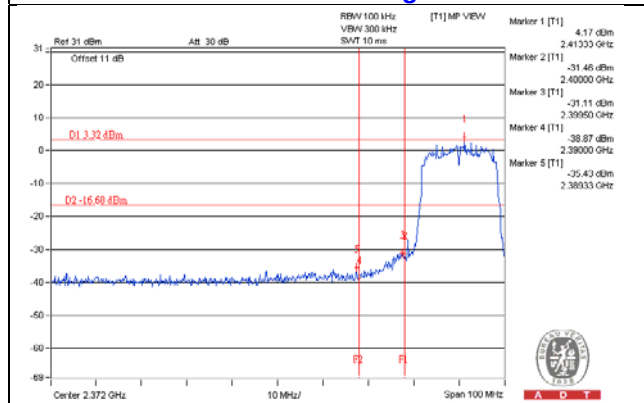
CH 6



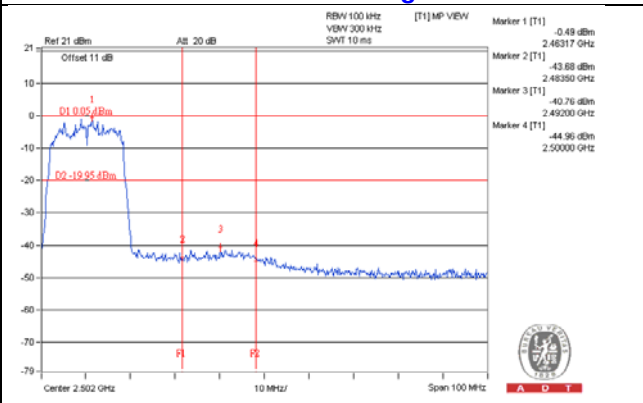
CH 11



CH 1 Band edge

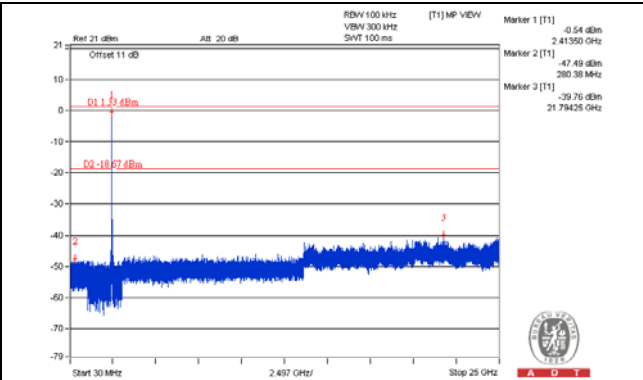
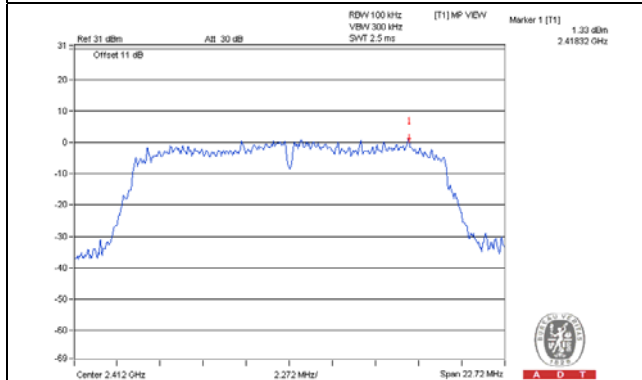


CH 11 Band edge

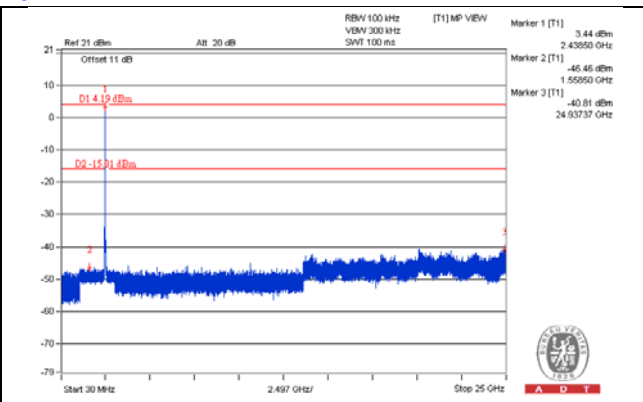
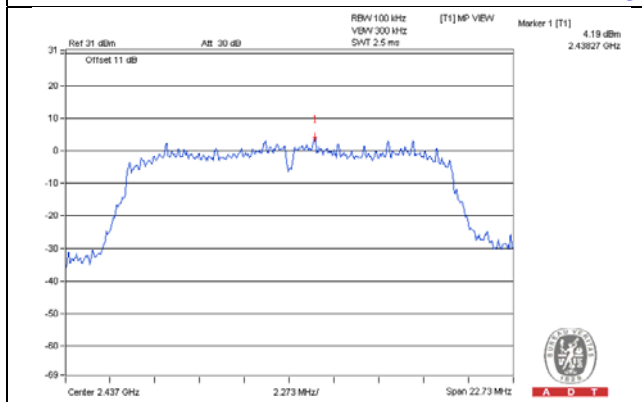


CHAIN 1

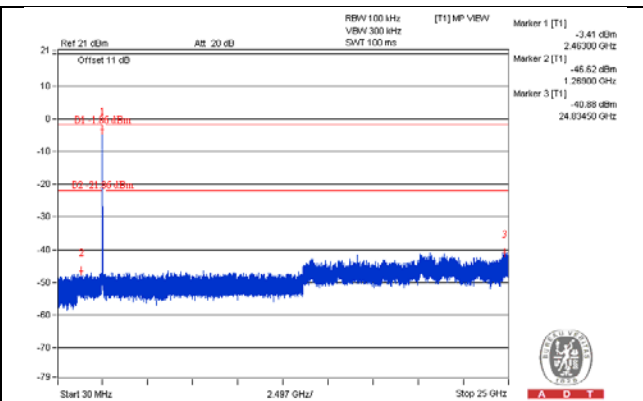
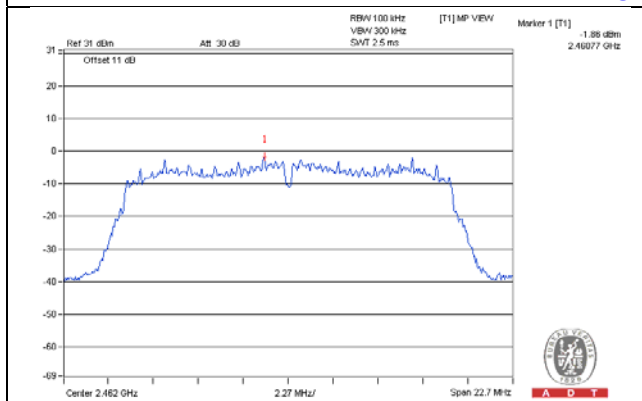
CH 1



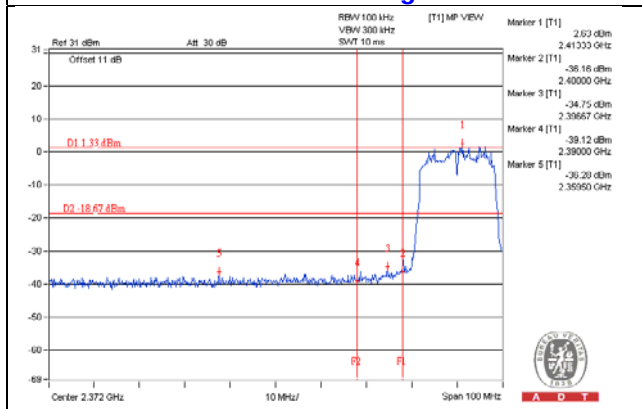
CH 6



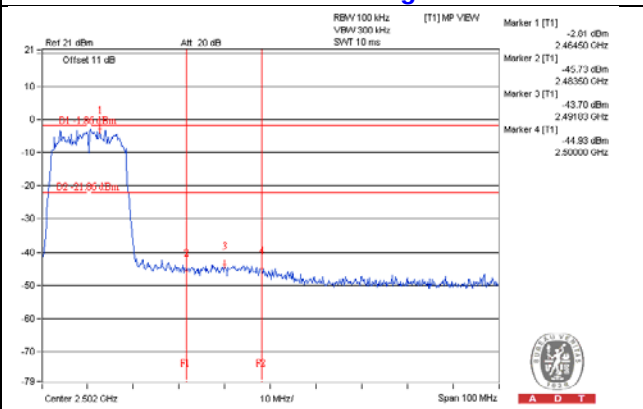
CH 11



CH 1 Band edge

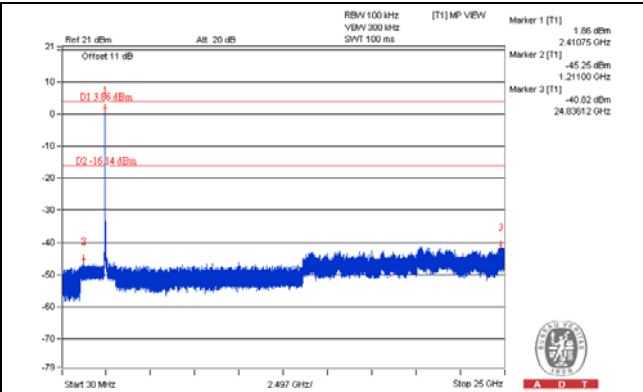
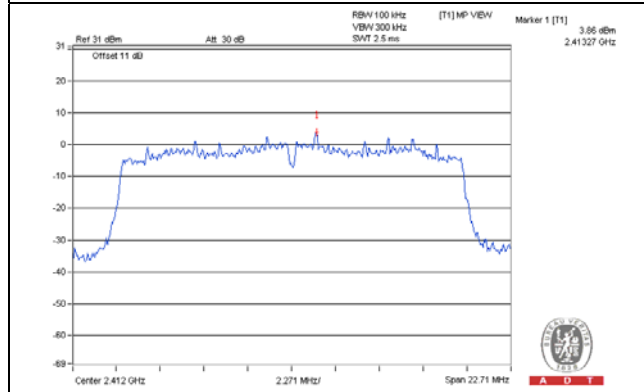


CH 11 Band edge

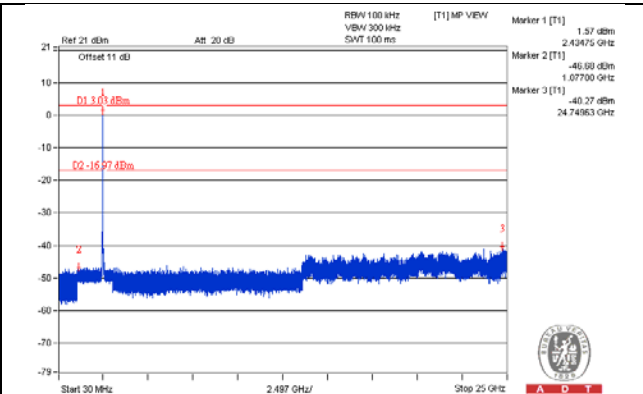
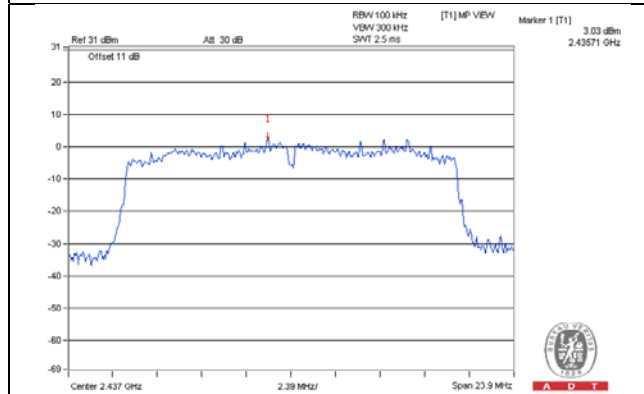


802.11n (HT20) CHAIN 0

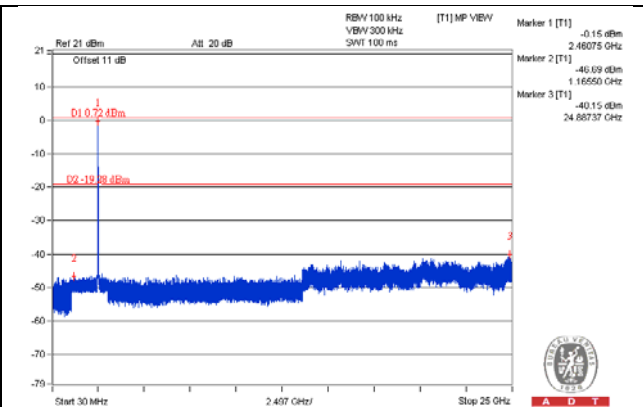
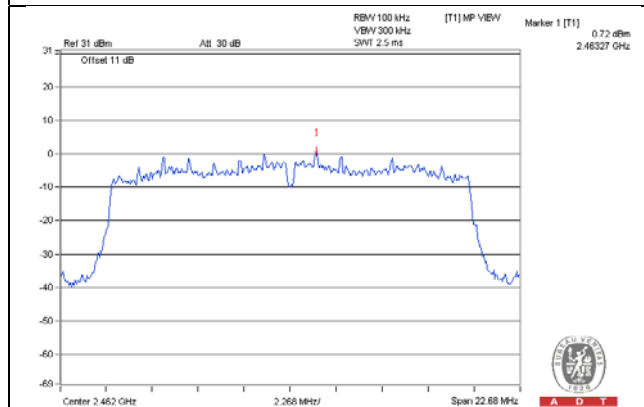
CH 1



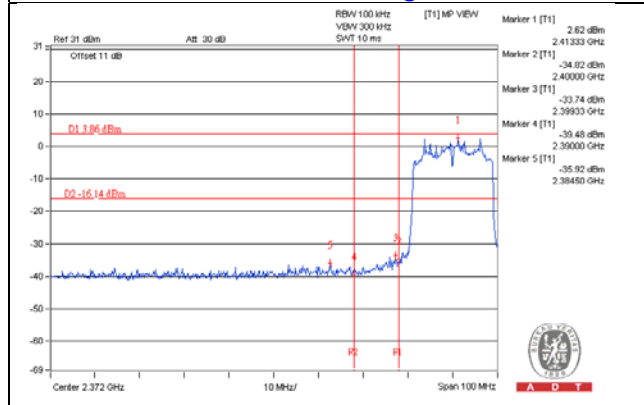
CH 6



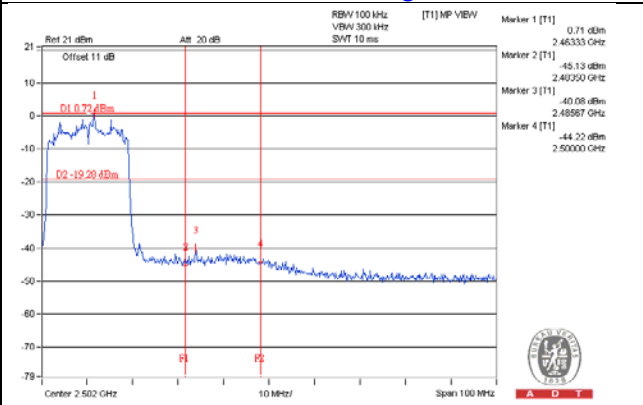
CH 11



CH 1 Band edge

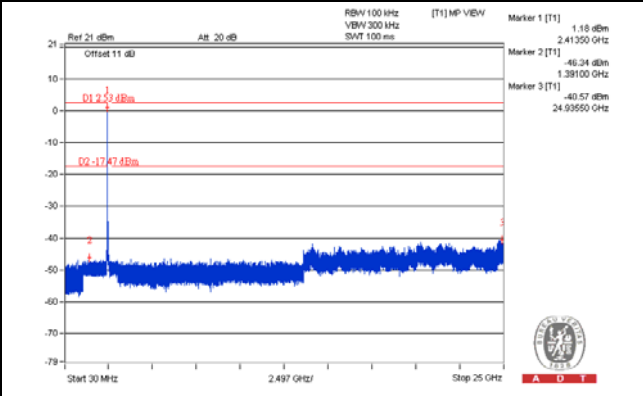
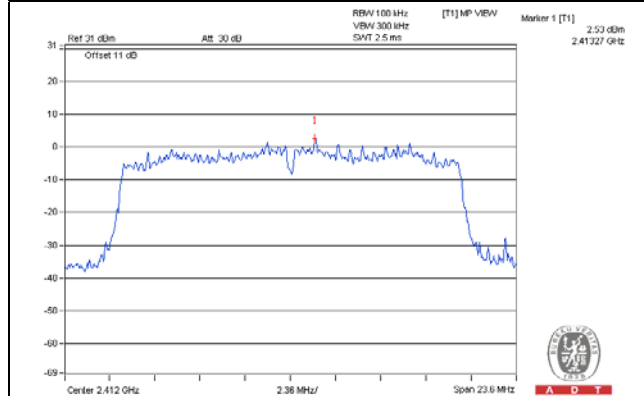


CH 11 Band edge

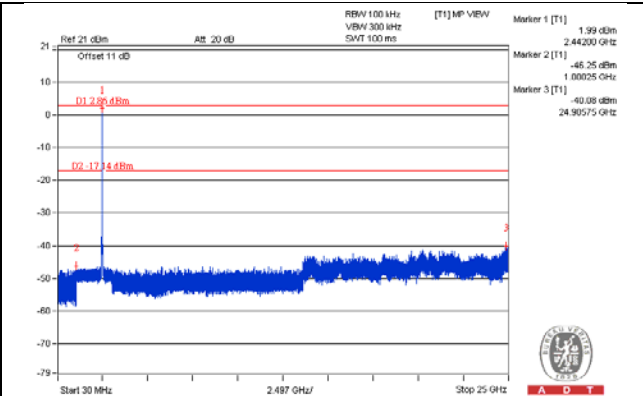
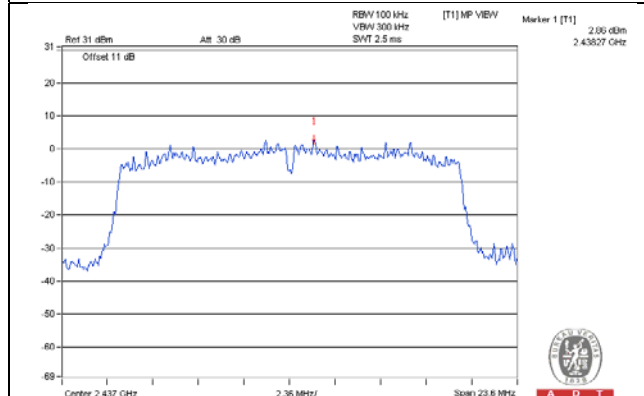


CHAIN 1

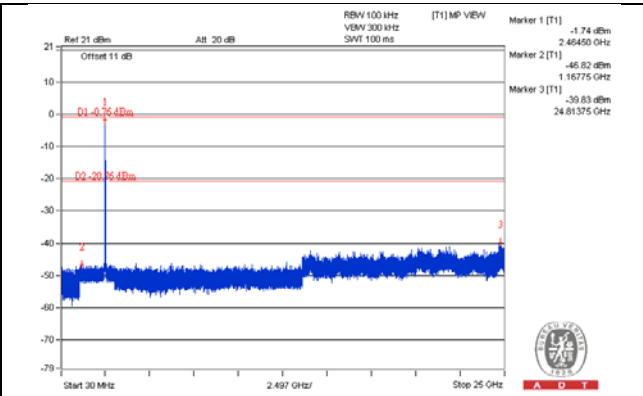
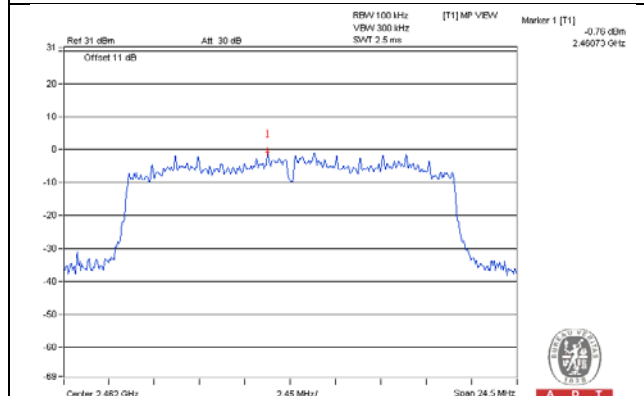
CH 1



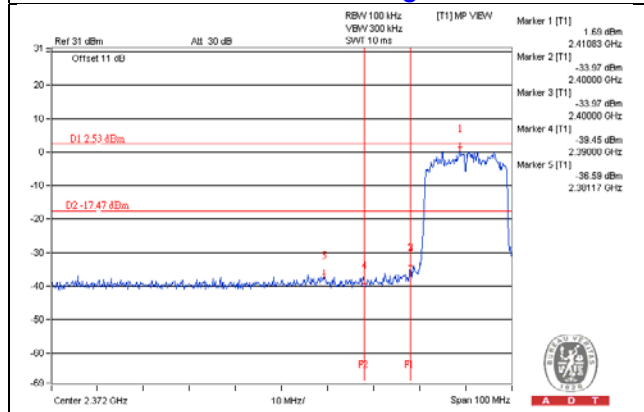
CH 6



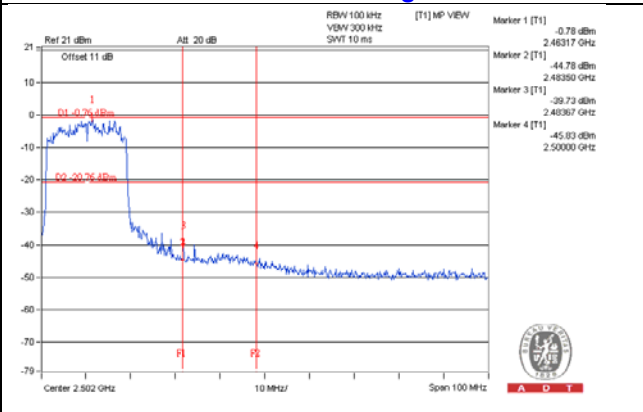
CH 11



CH 1 Band edge

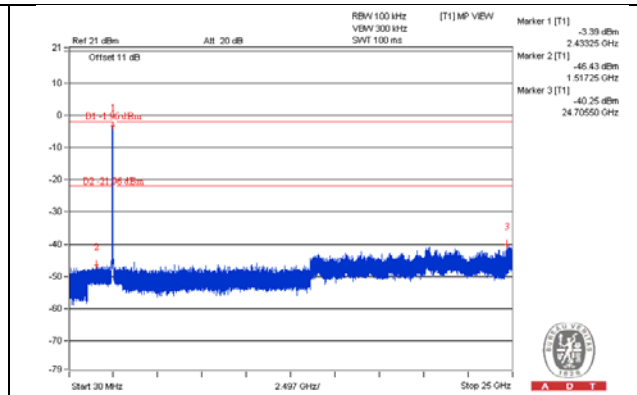
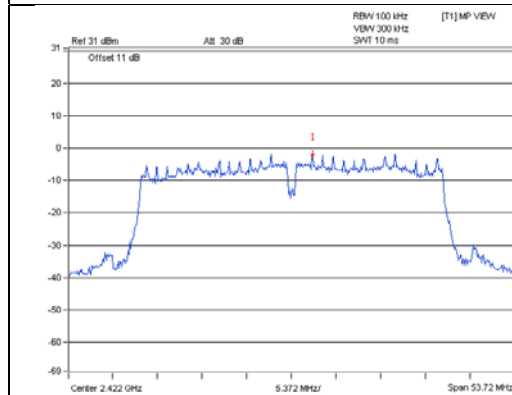


CH 11 Band edge

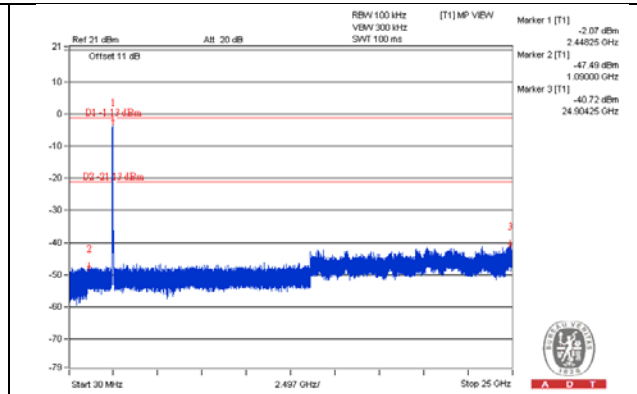
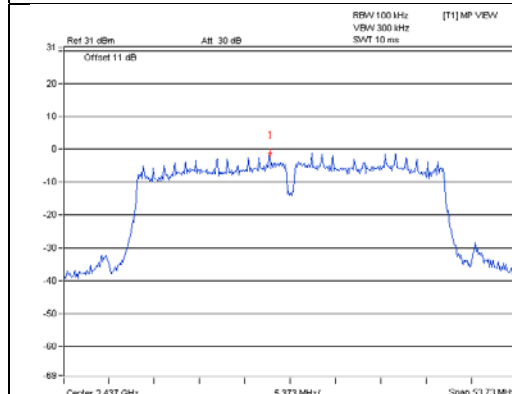


802.11n (HT40) CHAIN 0

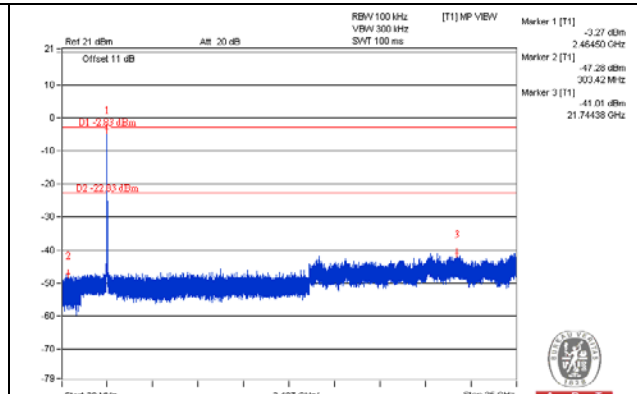
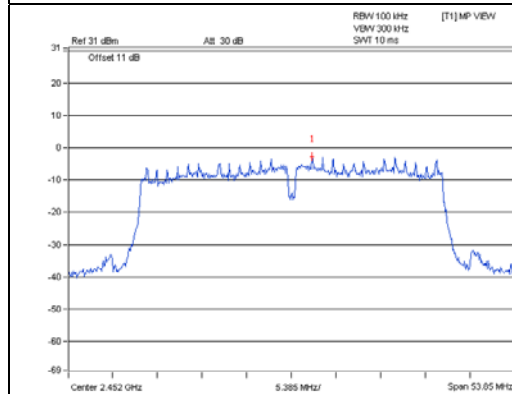
CH 3



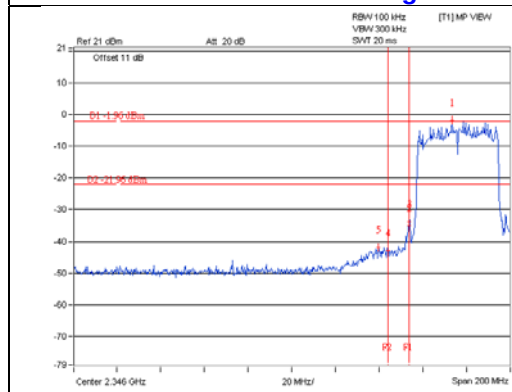
CH 6



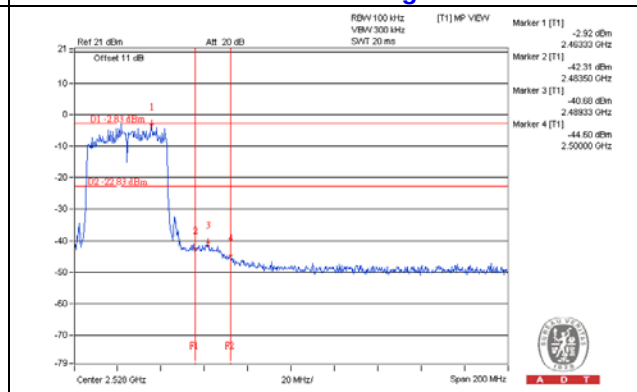
CH 9



CH 3 Band edge

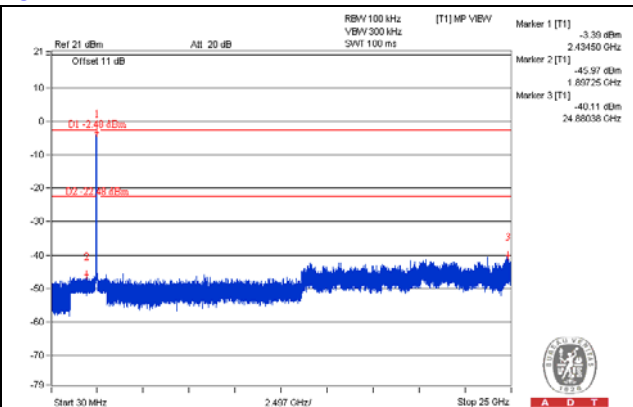
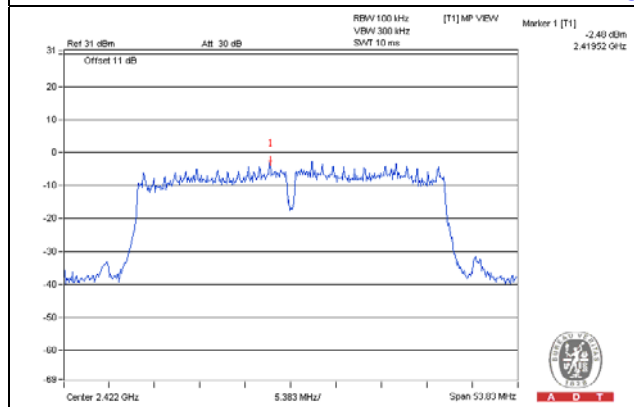


CH 9 Band edge

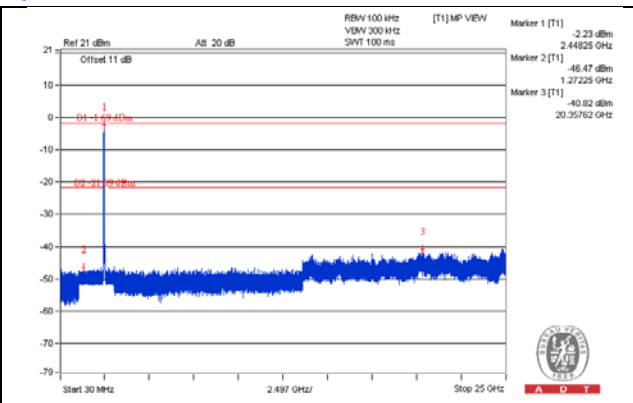
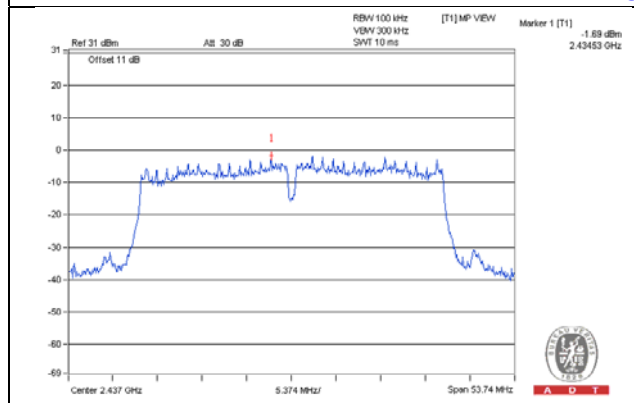


CHAIN 1

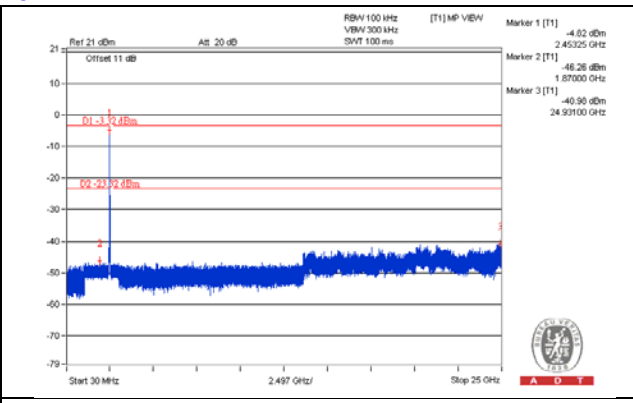
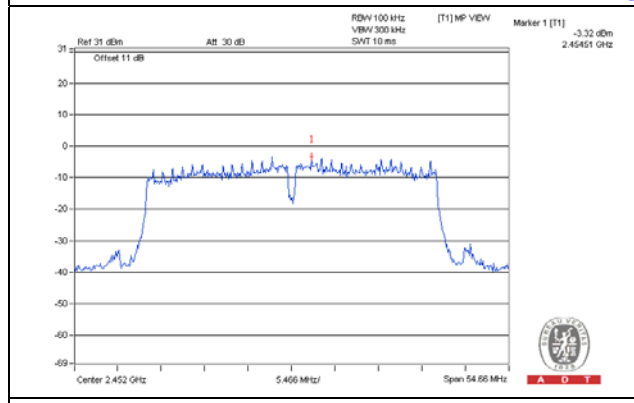
CH 3



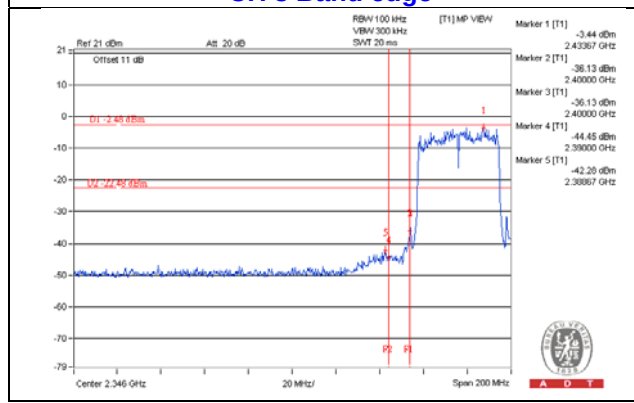
CH 6



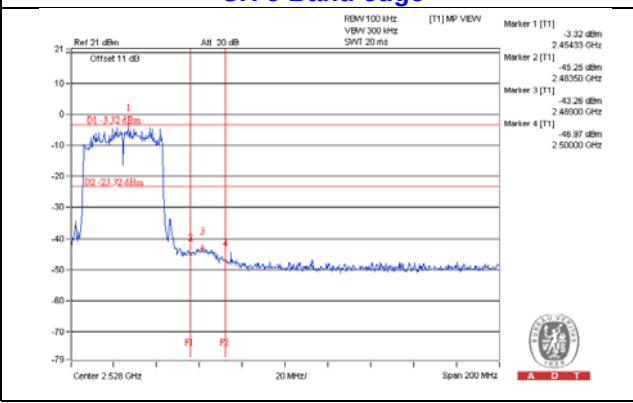
CH 9



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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