

FCC Test Report

Report No.: RF150212E01

FCC ID: Q87-RE6700

Test Model: RE6700

Received Date: Feb. 12, 2015

Test Date: Feb. 16 ~ Mar. 16, 2015

Issued Date: Mar. 18, 2015

Applicant: Linksys LLC

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A D T

Release Control Record

Issue No.	Description	Date Issued
RF150212E01	Original release	Mar. 18, 2015

1 Certificate of Conformity

Product: Wireless Extender

Brand: Linksys

Test Model: RE6700

Sample Status: Engineering sample

Applicant: Linksys LLC

Test Date: Feb. 16 ~ Mar. 16, 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 : Celine Chou , **Date:** Mar. 18, 2015
Celine Chou / Specialist

Approved by : Ken Liu , **Date:** Mar. 18, 2015
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 -3.45dB at 0.47813MHz.
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.2dB at 55.13MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2390.00MHz.
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(MHF) 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	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 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	Wireless Extender
Brand	Linksys
Test Model	RE6700
Status of EUT	Engineering sample
Driver Version	1.0.00.012
Power Supply Rating	Refer to note
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 300Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	751.073mW
Antenna Type	Dipole antenna with 3.97dBi gain
Antenna Connector	i-pex(MHF)
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. According to the applicant's requirement, two test samples were tested for conducted emission only.
2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

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

* For 2.4GHz Band, the EUT doesn't support Beamforming mode.

3. The EUT internal following power supply.

Brand	HON-KWANG
Model	HK-XX18-A12
Input Power	100-240Vac, 47-63Hz, 0.8A
Output Power	12Vdc, 1.5A

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	
A	√	√	-	√	Sample 1
B	-	-	√	-	Sample 2
C	-	-	√	-	Sample 3

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 **X-plane**.

Radiated Emission Test (Above 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
A	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1 to 11	1	DSSS	DBPSK	1.0

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)
B ,C	802.11b	1 to 11	1	DSSS	DBPSK	1.0

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.

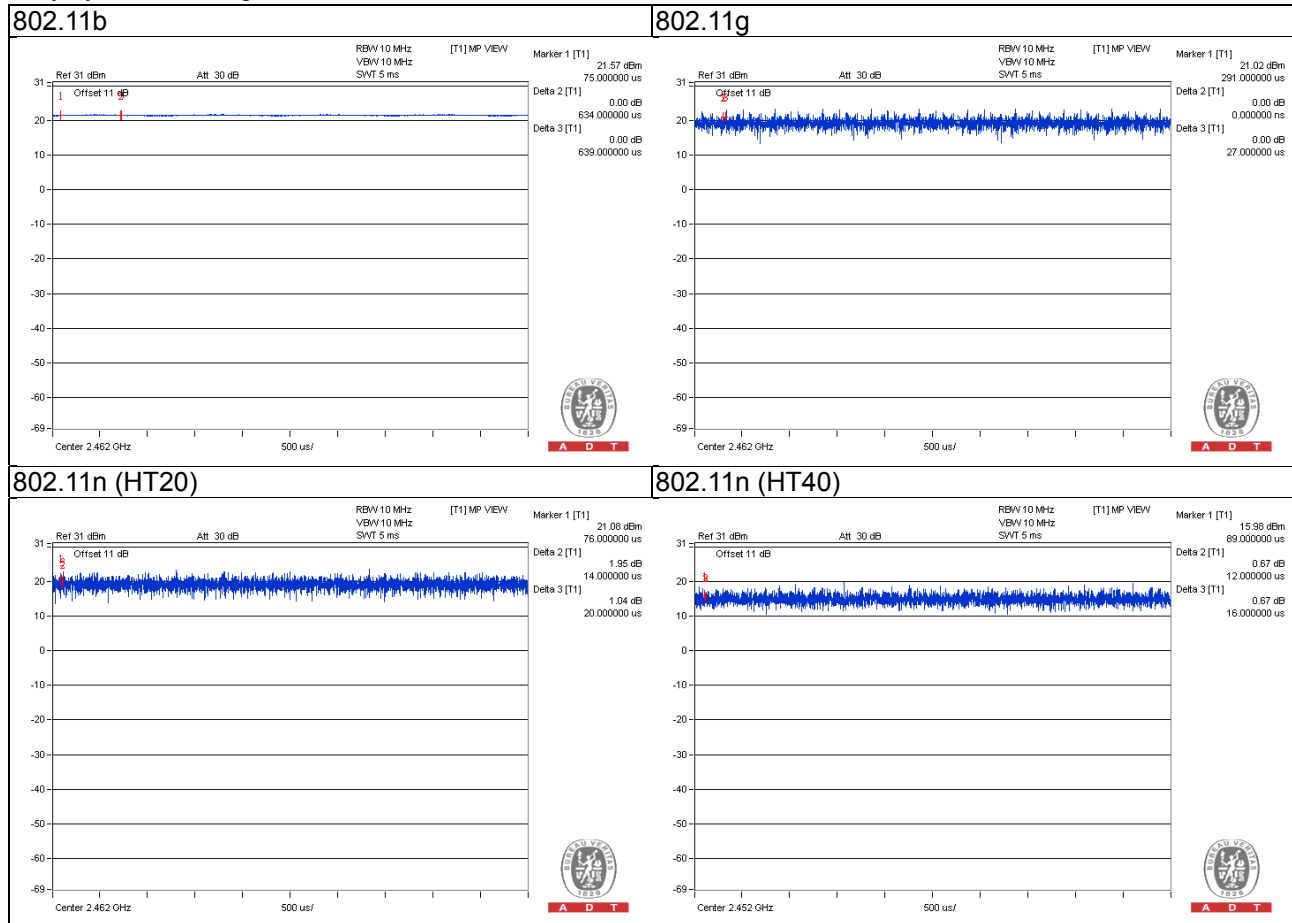
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
A	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
RE<1G	26deg. C, 65%RH	120Vac, 60Hz	Alan Wu
PLC	25deg. C, 70%RH	120Vac, 60Hz	Barry Lee
APCM	25deg. C, 60%RH	120Vac, 60Hz	Nick Hsu

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is > 98%.



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.

For radiated emission

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Light Bulb	Yeh Chiang	250W	NA	NA	-
B.	Notebook	DELL	E5410	6RP2YM1	FCC DoC Approved	-
C.	Earphone	PHILIPS	SBC HL150	NA	NA	-

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	AC	1	1.8	No	0	-
2.	RJ 45	1	10	No	0	-
3.	Audio	1	1.8	No	0	-

For conducted emission

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Light Bulb	You Sheng	250W	NA	NA	-
B.	Notebook	DELL	PP27L	7YLB32S	FCC DoC Approved	-
C.	AP Router	D-Link	DIR-810L	QBXP1D4002851	FCC DoC Approved	-
D.	Notebook	DELL	E5420	CHHYLQ1	FCC DoC Approved	-
E.	Notebook	DELL	PP32LA	HSLB32S	FCC DoC Approved	-
F.	Earphone	Hawk	HKC920	H001	FCC DoC Approved	-

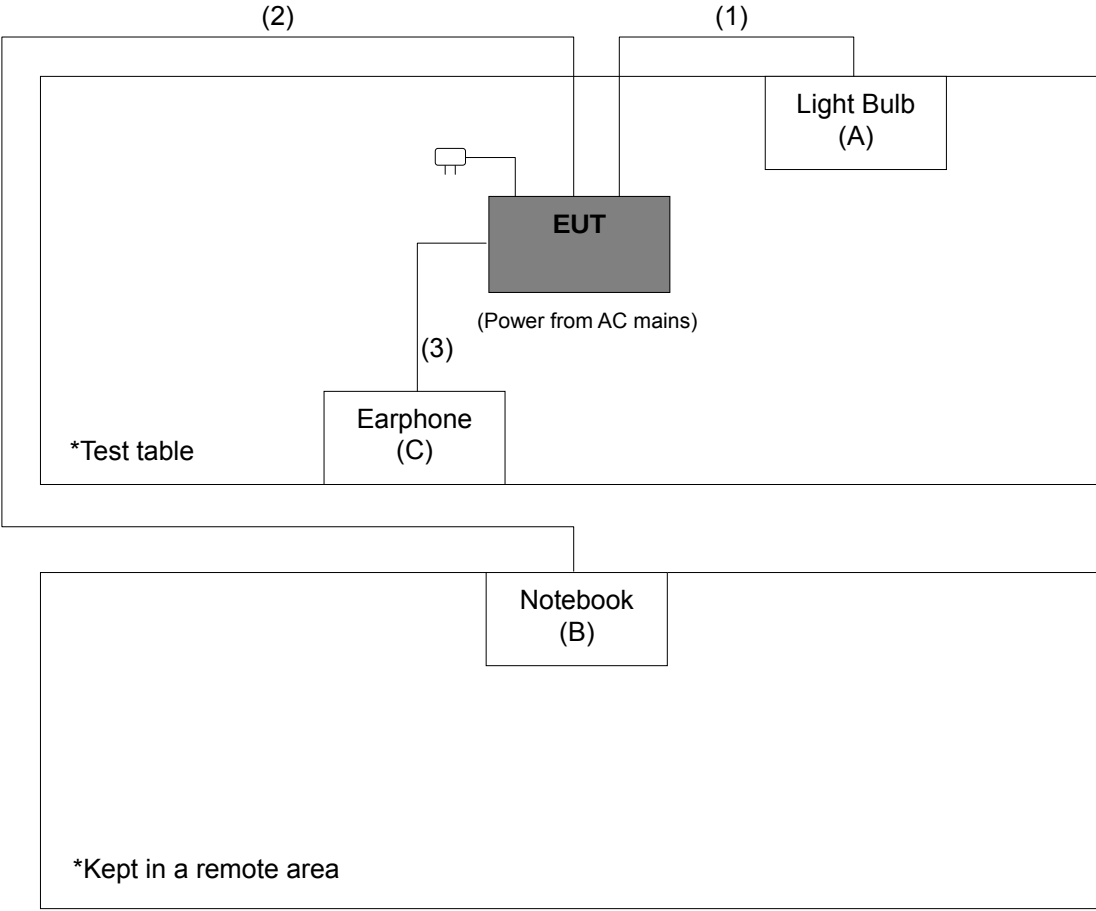
Note:

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

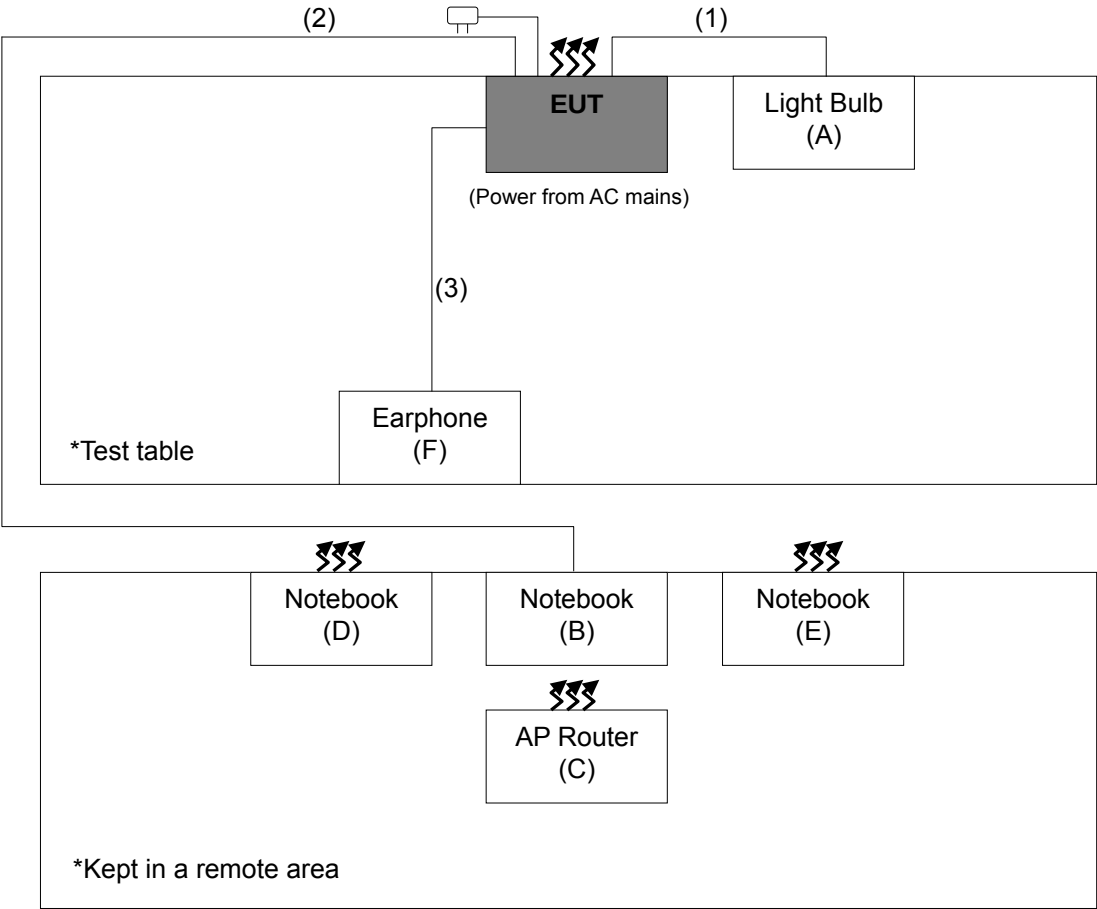
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	AC	1	0.7	No	0	-
2.	RJ45	1	10	No	0	-
3.	Audio	1	1.5	No	0	-

3.4.1 Configuration of System under Test

For radiated emission



For conducted emission



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	ESCI	100424	Oct. 06, 2014	Oct. 05, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSU 43	100115	Dec. 18, 2014	Dec. 17, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 06, 2015	Feb. 05, 2016
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8449B	3008A01961	Oct. 18, 2014	Oct. 17, 2015
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 09, 2014	Aug. 08, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	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 4.
 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 460141.
 5. The IC Site Registration No. is IC7450F-4.

4.1.3 Test Procedures

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

Note:

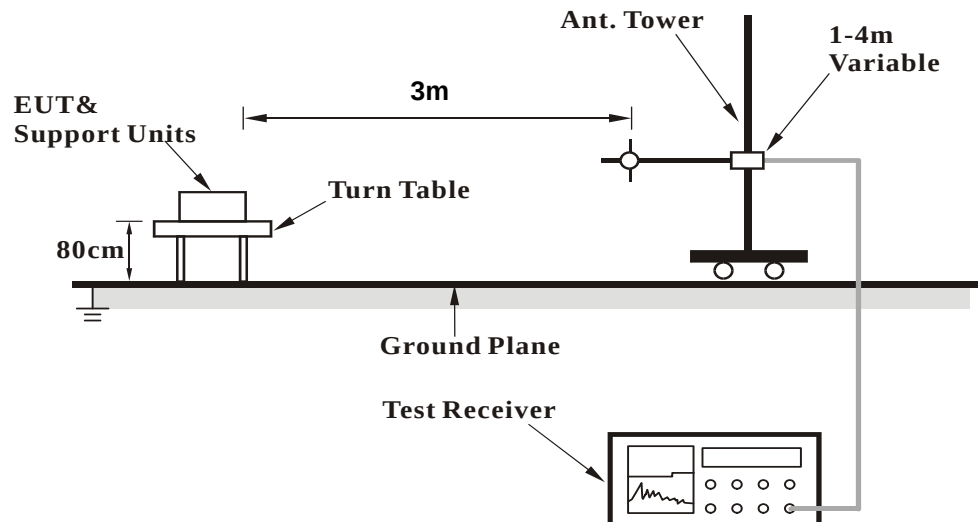
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution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

4.1.4 Deviation from Test Standard

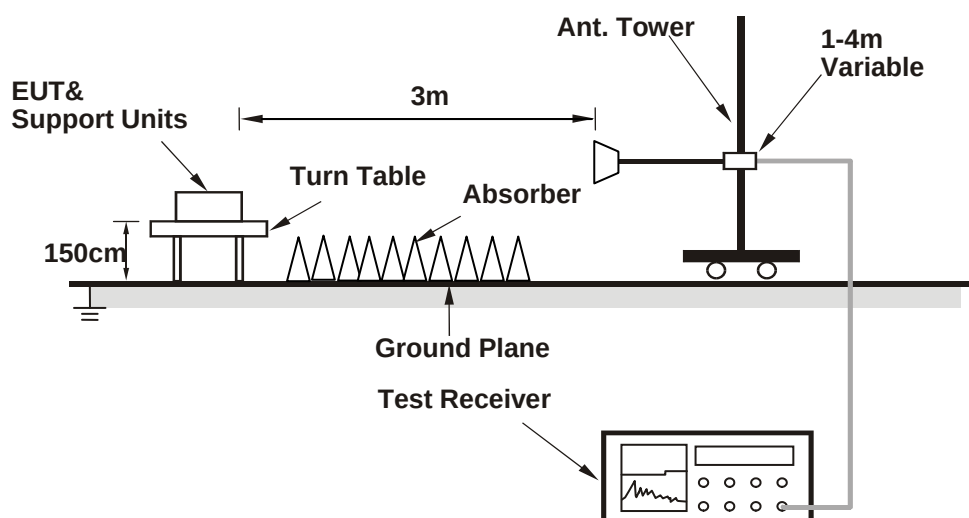
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

Above 1GHz data:

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.9 PK	74.0	-18.1	1.07 H	118	23.70	32.20
2	2390.00	44.9 AV	54.0	-9.1	1.07 H	118	12.70	32.20
3	*2412.00	99.0 PK			1.38 H	223	66.80	32.20
4	*2412.00	95.1 AV			1.38 H	223	62.90	32.20
5	4824.00	52.4 PK	74.0	-21.6	1.56 H	190	46.80	5.60
6	4824.00	48.0 AV	54.0	-6.0	1.56 H	190	42.40	5.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.8 PK	74.0	-14.2	2.28 V	274	27.60	32.20
2	2390.00	50.5 AV	54.0	-3.5	2.28 V	274	18.30	32.20
3	*2412.00	108.2 PK			2.68 V	4	76.00	32.20
4	*2412.00	104.4 AV			2.68 V	4	72.20	32.20
5	4824.00	51.7 PK	74.0	-22.3	1.59 V	2	46.10	5.60
6	4824.00	47.3 AV	54.0	-6.7	1.59 V	2	41.70	5.60

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	99.9 PK			1.02 H	227	67.70	32.20
2	*2437.00	96.0 AV			1.02 H	227	63.80	32.20
3	4874.00	50.5 PK	74.0	-23.5	1.41 H	189	44.90	5.60
4	4874.00	44.5 AV	54.0	-9.5	1.41 H	189	38.90	5.60
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	107.6 PK			2.32 V	359	75.40	32.20
2	*2437.00	103.6 AV			2.32 V	359	71.40	32.20
3	4874.00	53.3 PK	74.0	-20.7	1.73 V	288	47.70	5.60
4	4874.00	47.8 AV	54.0	-6.2	1.73 V	288	42.20	5.60

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	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	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	102.2 PK			1.82 H	176	69.90	32.30
2	*2462.00	98.4 AV			1.82 H	176	66.10	32.30
3	2483.50	56.0 PK	74.0	-18.0	1.02 H	21	23.60	32.40
4	2483.50	45.2 AV	54.0	-8.8	1.02 H	21	12.80	32.40
5	4924.00	50.0 PK	74.0	-24.0	1.00 H	115	44.40	5.60
6	4924.00	41.9 AV	54.0	-12.1	1.00 H	115	36.30	5.60
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	108.6 PK			1.17 V	251	76.30	32.30
2	*2462.00	104.7 AV			1.17 V	251	72.40	32.30
3	2483.50	57.1 PK	74.0	-16.9	2.13 V	19	24.70	32.40
4	2483.50	46.7 AV	54.0	-7.3	2.13 V	19	14.30	32.40
5	4924.00	50.9 PK	74.0	-23.1	1.61 V	272	45.30	5.60
6	4924.00	45.1 AV	54.0	-8.9	1.61 V	272	39.50	5.60

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)
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	58.0 PK	74.0	-16.0	1.00 H	222	25.80	32.20
2	2390.00	47.1 AV	54.0	-6.9	1.00 H	222	14.90	32.20
3	*2412.00	98.8 PK			2.01 H	223	66.60	32.20
4	*2412.00	88.6 AV			2.01 H	223	56.40	32.20
5	4824.00	47.2 PK	74.0	-26.8	1.16 H	47	41.60	5.60
6	4824.00	35.9 AV	54.0	-18.1	1.16 H	47	30.30	5.60
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	67.3 PK	74.0	-6.7	1.24 V	111	35.10	32.20
2	2390.00	53.0 AV	54.0	-1.0	1.24 V	111	20.80	32.20
3	*2412.00	109.4 PK			2.12 V	275	77.20	32.20
4	*2412.00	99.8 AV			2.12 V	275	67.60	32.20
5	4824.00	47.6 PK	74.0	-26.4	1.23 V	64	42.00	5.60
6	4824.00	35.9 AV	54.0	-18.1	1.23 V	64	30.30	5.60

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	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	104.9 PK			2.24 H	179	72.70	32.20
2	*2437.00	95.6 AV			2.24 H	179	63.40	32.20
3	4874.00	47.7 PK	74.0	-26.3	1.17 H	48	42.10	5.60
4	4874.00	36.3 AV	54.0	-17.7	1.17 H	48	30.70	5.60
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			1.07 V	264	77.40	32.20
2	*2437.00	100.2 AV			1.07 V	264	68.00	32.20
3	4874.00	48.2 PK	74.0	-25.8	1.23 V	64	42.60	5.60
4	4874.00	36.2 AV	54.0	-17.8	1.23 V	64	30.60	5.60

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	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	103.2 PK			2.43 H	175	70.90	32.30
2	*2462.00	93.8 AV			2.43 H	175	61.50	32.30
3	2483.50	59.3 PK	74.0	-14.7	2.04 H	226	26.90	32.40
4	2483.50	47.4 AV	54.0	-6.6	2.04 H	226	15.00	32.40
5	4924.00	47.1 PK	74.0	-26.9	1.04 H	77	41.50	5.60
6	4924.00	35.6 AV	54.0	-18.4	1.04 H	77	30.00	5.60
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	108.8 PK			1.08 V	263	76.50	32.30
2	*2462.00	99.9 AV			1.08 V	263	67.60	32.30
3	2483.50	69.4 PK	74.0	-4.6	1.19 V	265	37.00	32.40
4	2483.50	52.2 AV	54.0	-1.8	1.19 V	265	19.80	32.40
5	4924.00	47.6 PK	74.0	-26.4	1.23 V	64	42.00	5.60
6	4924.00	36.2 AV	54.0	-17.8	1.23 V	64	30.60	5.60

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	61.1 PK	74.0	-12.9	1.70 H	172	28.90	32.20
2	2390.00	48.0 AV	54.0	-6.0	1.70 H	172	15.80	32.20
3	*2412.00	100.2 PK			2.03 H	222	68.00	32.20
4	*2412.00	90.6 AV			2.03 H	222	58.40	32.20
5	4824.00	47.2 PK	74.0	-26.8	1.23 H	64	41.60	5.60
6	4824.00	36.0 AV	54.0	-18.0	1.23 H	64	30.40	5.60
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	67.8 PK	74.0	-6.2	1.23 V	115	35.60	32.20
2	2390.00	52.5 AV	54.0	-1.5	1.23 V	115	20.30	32.20
3	*2412.00	110.4 PK			1.88 V	268	78.20	32.20
4	*2412.00	101.0 AV			1.88 V	268	68.80	32.20
5	4824.00	47.5 PK	74.0	-26.5	1.23 V	64	41.90	5.60
6	4824.00	35.9 AV	54.0	-18.1	1.23 V	64	30.30	5.60

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	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	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	102.6 PK			1.90 H	171	70.40	32.20
2	*2437.00	93.4 AV			1.90 H	171	61.20	32.20
3	4874.00	47.2 PK	74.0	-26.8	1.28 H	74	41.60	5.60
4	4874.00	36.0 AV	54.0	-18.0	1.28 H	74	30.40	5.60
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	110.2 PK			2.09 V	272	78.00	32.20
2	*2437.00	100.9 AV			2.09 V	272	68.70	32.20
3	4874.00	48.2 PK	74.0	-25.8	1.23 V	64	42.60	5.60
4	4874.00	36.2 AV	54.0	-17.8	1.23 V	64	30.60	5.60

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	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	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	102.6 PK			2.43 H	178	70.30	32.30
2	*2462.00	92.8 AV			2.43 H	178	60.50	32.30
3	2483.50	62.6 PK	74.0	-11.4	1.00 H	228	30.20	32.40
4	2483.50	47.6 AV	54.0	-6.4	1.00 H	228	15.20	32.40
5	4824.00	47.5 PK	74.0	-26.5	1.23 H	64	41.90	5.60
6	4824.00	35.9 AV	54.0	-18.1	1.23 H	64	30.30	5.60
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	110.7 PK			2.40 V	288	78.40	32.30
2	*2462.00	101.2 AV			2.40 V	288	68.90	32.30
3	2483.50	68.6 PK	74.0	-5.4	2.21 V	288	36.20	32.40
4	2483.50	52.6 AV	54.0	-1.4	2.21 V	288	20.20	32.40
5	4924.00	47.5 PK	74.0	-26.5	1.23 V	64	41.90	5.60
6	4924.00	37.2 AV	54.0	-16.8	1.23 V	64	31.60	5.60

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 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	58.5 PK	74.0	-15.5	1.04 H	223	26.30	32.20
2	2390.00	47.3 AV	54.0	-6.7	1.04 H	223	15.10	32.20
3	*2422.00	94.6 PK			1.02 H	225	62.30	32.30
4	*2422.00	84.5 AV			1.02 H	225	52.20	32.30
5	4844.00	47.9 PK	74.0	-26.1	1.05 H	74	42.30	5.60
6	4844.00	36.8 AV	54.0	-17.2	1.05 H	74	31.20	5.60
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	66.2 PK	74.0	-7.8	2.24 V	354	34.00	32.20
2	2390.00	53.0 AV	54.0	-1.0	2.24 V	354	20.80	32.20
3	*2422.00	103.5 PK			2.73 V	271	71.20	32.30
4	*2422.00	93.8 AV			2.73 V	271	61.50	32.30
5	4844.00	47.6 PK	74.0	-26.4	1.23 V	64	42.00	5.60
6	4844.00	35.9 AV	54.0	-18.1	1.23 V	64	30.30	5.60

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	2390.00	56.8 PK	74.0	-17.2	1.23 H	64	24.60	32.20
2	2390.00	45.9 AV	54.0	-8.1	1.23 H	64	13.70	32.20
3	*2437.00	100.6 PK			1.66 H	171	68.40	32.20
4	*2437.00	90.4 AV			1.66 H	171	58.20	32.20
5	4874.00	47.1 PK	74.0	-26.9	1.23 H	64	41.50	5.60
6	4874.00	36.8 AV	54.0	-17.2	1.23 H	64	31.20	5.60
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	65.7 PK	74.0	-8.3	2.10 V	1	33.50	32.20
2	2390.00	53.0 AV	54.0	-1.0	2.10 V	1	20.80	32.20
3	*2437.00	107.7 PK			2.04 V	269	75.50	32.20
4	*2437.00	98.1 AV			2.04 V	269	65.90	32.20
5	4874.00	47.5 PK	74.0	-26.5	1.23 V	64	41.90	5.60
6	4874.00	36.2 AV	54.0	-17.8	1.23 V	64	30.60	5.60

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	100.8 PK			2.01 H	179	68.60	32.20
2	*2452.00	91.8 AV			2.01 H	179	59.60	32.20
3	2483.50	60.4 PK	74.0	-13.6	1.91 H	223	28.10	32.30
4	2483.50	46.7 AV	54.0	-7.3	1.91 H	223	14.40	32.30
5	4904.00	47.1 PK	74.0	-26.9	1.23 H	64	41.90	5.20
6	4904.00	36.2 AV	54.0	-17.8	1.23 H	64	31.00	5.20
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	107.0 PK			1.07 V	259	74.70	32.30
2	*2452.00	97.6 AV			1.07 V	259	65.30	32.30
3	2483.50	69.7 PK	74.0	-4.3	1.21 V	273	37.30	32.40
4	2483.50	52.7 AV	54.0	-1.3	1.21 V	273	20.30	32.40
5	4904.00	47.2 PK	74.0	-26.8	1.23 V	64	41.60	5.60
6	4904.00	35.9 AV	54.0	-18.1	1.23 V	64	30.30	5.60

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	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	57.07	31.6 QP	40.0	-8.4	1.24 H	256	46.00	-14.40
2	375.29	39.5 QP	46.0	-6.5	1.00 H	152	50.70	-11.20
3	499.48	38.3 QP	46.0	-7.7	1.00 H	152	47.20	-8.90
4	625.60	35.9 QP	46.0	-10.1	1.24 H	232	42.20	-6.30
5	749.79	38.3 QP	46.0	-7.7	3.00 H	301	41.90	-3.60
6	875.91	38.7 QP	46.0	-7.3	1.00 H	166	40.90	-2.20
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	55.13	37.8 QP	40.0	-2.2	1.00 V	351	52.00	-14.20
2	101.69	35.2 QP	43.5	-8.3	1.00 V	268	53.60	-18.40
3	375.29	35.8 QP	46.0	-10.2	2.00 V	181	47.00	-11.20
4	625.60	37.1 QP	46.0	-8.9	1.00 V	143	43.40	-6.30
5	749.79	37.6 QP	46.0	-8.4	1.25 V	197	41.20	-3.60
6	875.91	40.1 QP	46.0	-5.9	1.25 V	71	42.30	-2.20

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	ESCS 30	100287	Apr. 09, 2014	Apr. 08, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-523	Sep. 29, 2014	Sep. 28, 2015
RF Cable (JYEBAO)	5D-FB	COACAB-001	May 26, 2014	May 25, 2015
50 ohms Terminator	50	3	Oct. 17, 2014	Oct. 16, 2015
50 ohms Terminator	N/A	EMC-04	Oct. 21, 2014	Oct. 20, 2015
Software ADT	BV ADT_Cond_V7.3.7 .3	NA	NA	NA
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100072	June 10, 2014	June 09, 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 Lin Kou Shielded Room No. A. (NVLAP LAB CODE: 200838-0)
3. The VCCI Site Registration No. is C-817.

4.2.3 Test Procedures

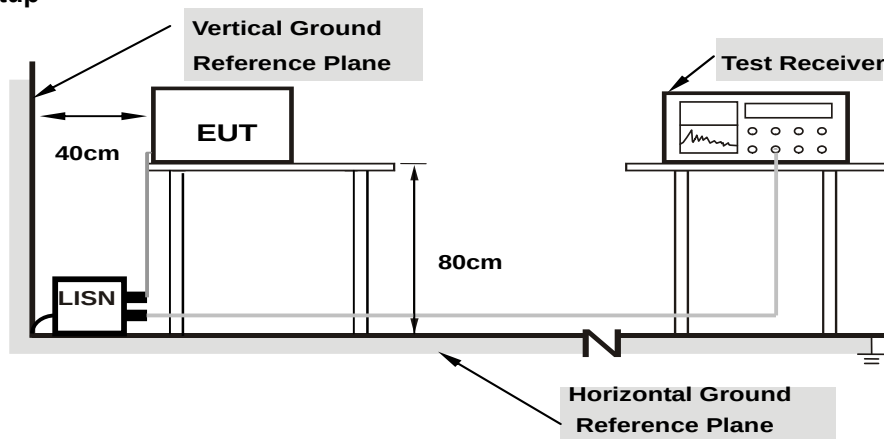
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

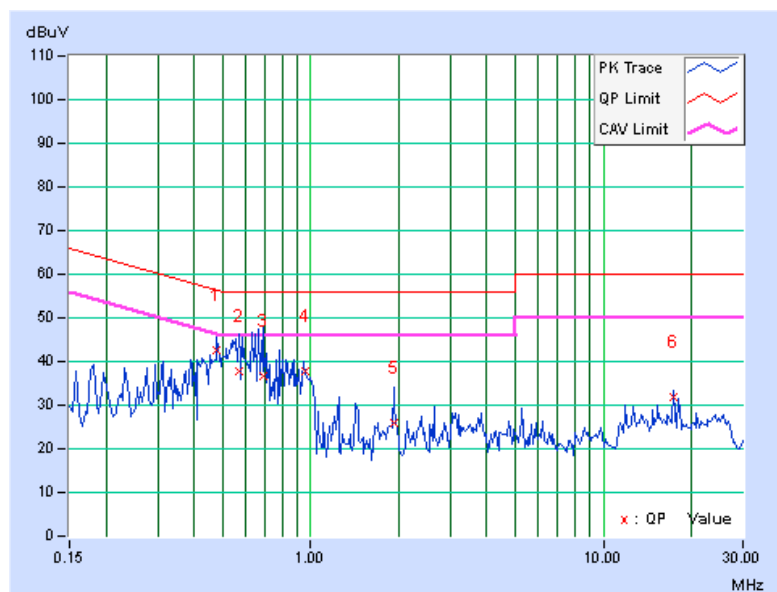
4.2.7 Test Results

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

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	0.47813	0.09	42.54	40.90	42.63	40.99	56.37	46.37	-13.74	-5.38
2	0.56797	0.10	37.70	13.82	37.80	13.92	56.00	46.00	-18.20	-32.08
3	0.68516	0.10	36.50	23.52	36.60	23.62	56.00	46.00	-19.40	-22.38
4	0.95516	0.11	37.54	36.20	37.65	36.31	56.00	46.00	-18.35	-9.69
5	1.92969	0.16	25.90	18.40	26.06	18.56	56.00	46.00	-29.94	-27.44
6	17.40234	0.61	31.38	29.38	31.99	29.99	60.00	50.00	-28.01	-20.01

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.

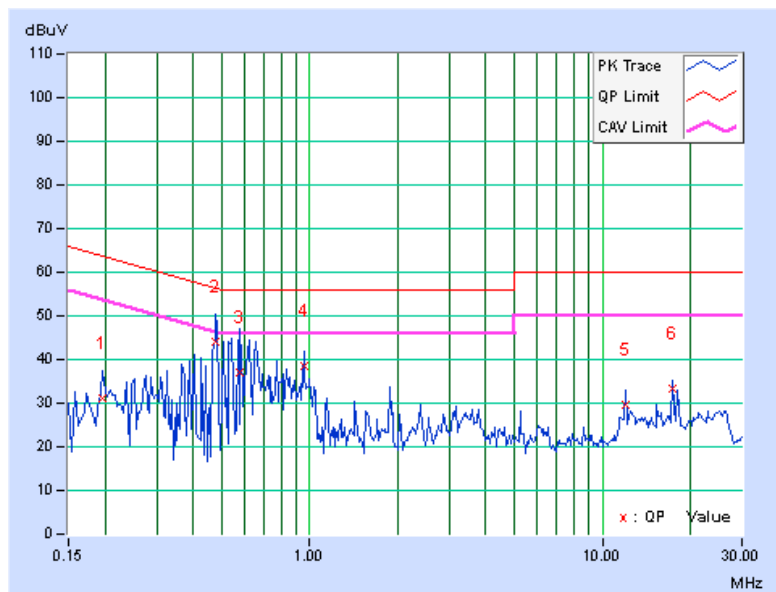


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test mode	B		

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	0.19687	0.07	30.96	25.32	31.03	25.39	63.74	53.74	-32.71	-28.35
2	0.47813	0.08	44.06	42.84	44.14	42.92	56.37	46.37	-12.23	-3.45
3	0.57969	0.08	37.10	21.60	37.18	21.68	56.00	46.00	-18.82	-24.32
4	0.95469	0.09	38.60	37.46	38.69	37.55	56.00	46.00	-17.31	-8.45
5	11.95313	0.45	29.22	24.52	29.67	24.97	60.00	50.00	-30.33	-25.03
6	17.41406	0.59	32.64	30.10	33.23	30.69	60.00	50.00	-26.77	-19.31

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.

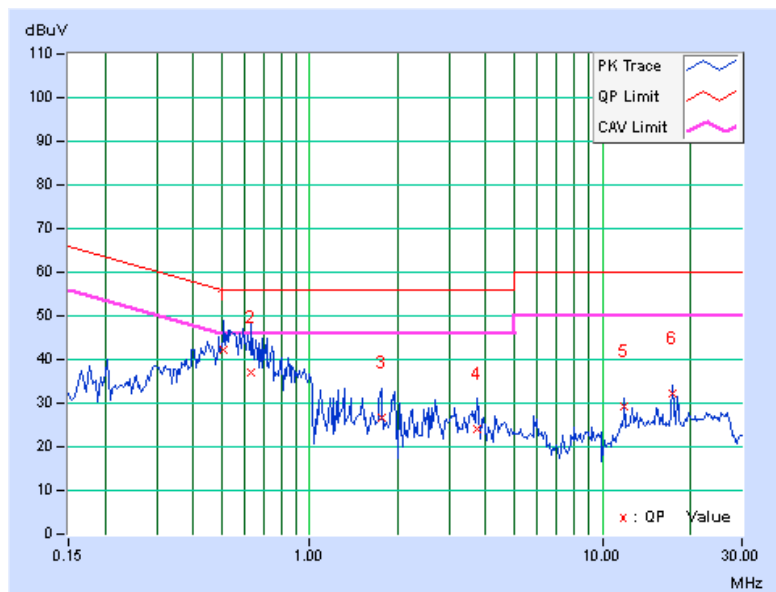


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test mode	C		

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	0.50938	0.09	42.24	40.28	42.33	40.37	56.00	46.00	-13.67	-5.63
2	0.63438	0.10	36.90	17.74	37.00	17.84	56.00	46.00	-19.00	-28.16
3	1.75391	0.15	26.54	18.70	26.69	18.85	56.00	46.00	-29.31	-27.15
4	3.73047	0.23	24.00	17.08	24.23	17.31	56.00	46.00	-31.77	-28.69
5	11.93750	0.48	28.72	24.30	29.20	24.78	60.00	50.00	-30.80	-25.22
6	17.39844	0.61	31.78	28.60	32.39	29.21	60.00	50.00	-27.61	-20.79

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.

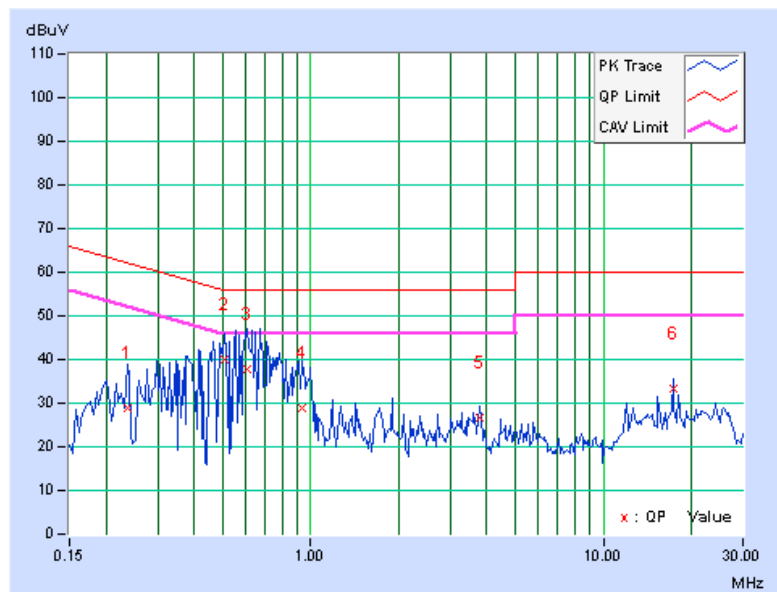


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test mode	C		

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	0.23594	0.07	28.86	14.10	28.93	14.17	62.24	52.24	-33.31	-38.07
2	0.50766	0.08	39.86	38.28	39.94	38.36	56.00	46.00	-16.06	-7.64
3	0.60703	0.08	37.86	22.88	37.94	22.96	56.00	46.00	-18.06	-23.04
4	0.93906	0.09	28.74	19.90	28.83	19.99	56.00	46.00	-27.17	-26.01
5	3.76172	0.20	26.38	21.46	26.58	21.66	56.00	46.00	-29.42	-24.34
6	17.40625	0.59	32.56	29.66	33.15	30.25	60.00	50.00	-26.85	-19.75

Remarks:

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

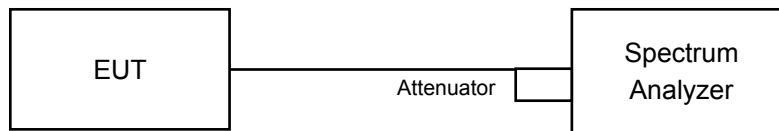


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	10.12	10.12	0.5	Pass
6	2437	10.12	10.08	0.5	Pass
11	2462	10.09	10.10	0.5	Pass

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.64	16.62	0.5	Pass
6	2437	16.63	16.64	0.5	Pass
11	2462	16.61	16.64	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.77	17.77	0.5	Pass
6	2437	17.78	17.77	0.5	Pass
11	2462	17.70	17.81	0.5	Pass

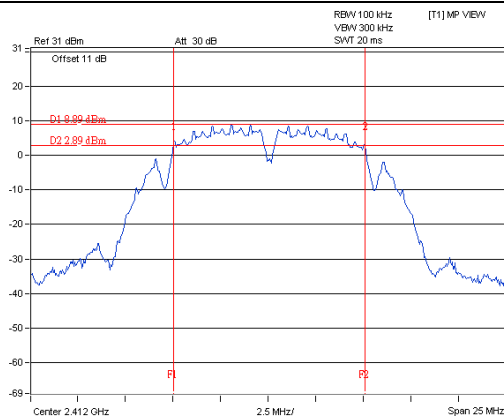
802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.67	36.59	0.5	Pass
6	2437	36.58	36.61	0.5	Pass
9	2452	36.62	36.59	0.5	Pass

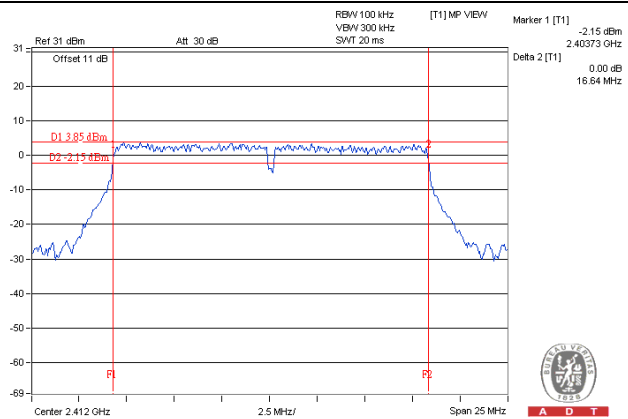
Spectrum Plot of Worst Value

802.11b

802.11g



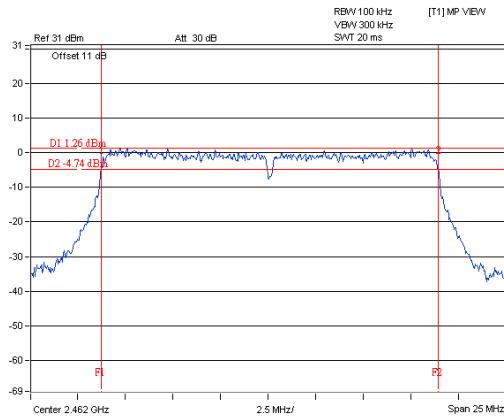
A D T



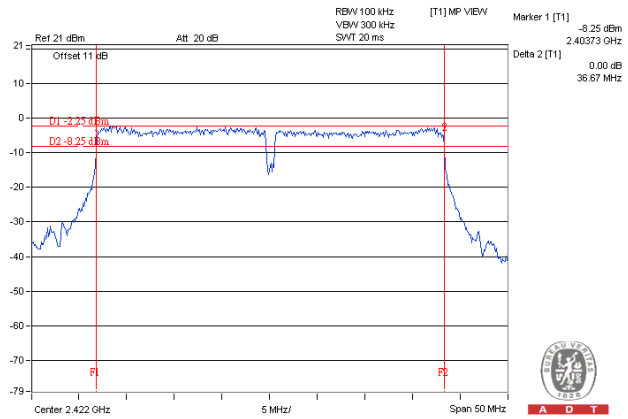
A D T

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,

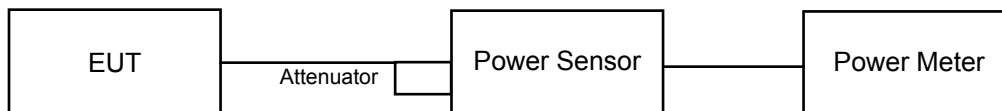
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	24.37	23.12	478.643	26.80	30	Pass
6	2437	23.82	22.24	408.485	26.11	30	Pass
11	2462	23.14	21.27	340.031	25.32	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	25.63	25.86	751.073	28.76	30	Pass
6	2437	25.26	25.05	655.628	28.17	30	Pass
11	2462	25.27	25.67	705.490	28.48	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	25.13	25.43	674.977	28.29	30	Pass
6	2437	25.61	24.42	640.609	28.07	30	Pass
11	2462	25.41	24.24	612.997	27.87	30	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	23.62	22.36	402.331	26.05	30	Pass
6	2437	25.36	24.62	633.292	28.02	30	Pass
9	2452	24.42	23.35	492.966	26.93	30	Pass

For Average Power

802.11b

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	21.45	19.85	236.242	23.73
6	2437	20.81	18.87	197.594	22.96
11	2462	20.02	17.79	160.579	22.06

802.11g

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	20.31	19.31	192.709	22.85
6	2437	19.16	17.50	138.648	21.42
11	2462	19.74	17.15	146.069	21.65

802.11n (HT20)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	19.30	18.10	149.679	21.75
6	2437	19.18	17.73	142.087	21.53
11	2462	19.20	17.33	137.251	21.38

802.11n (HT40)

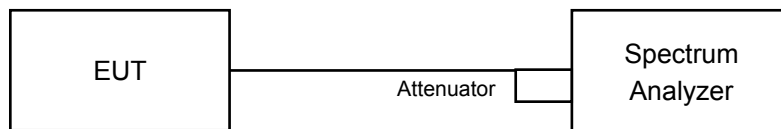
Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	16.70	14.70	76.286	18.82
6	2437	19.30	17.69	143.863	21.58
9	2452	18.01	16.41	106.993	20.29

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

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass / Fail
0	1	2412	-9.71	3.01	-6.70	7.02	Pass
	6	2437	-10.37	3.01	-7.36	7.02	Pass
	11	2462	-10.01	3.01	-7.00	7.02	Pass
1	1	2412	-10.29	3.01	-7.28	7.02	Pass
	6	2437	-11.20	3.01	-8.19	7.02	Pass
	11	2462	-12.18	3.01	-9.17	7.02	Pass

Note: Directional gain = $3.97\text{dBi} + 10\log(2) = 6.98\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8-(6.98-6) = 7.02\text{dBm}$.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass / Fail
0	1	2412	-10.24	3.01	-7.23	7.02	Pass
	6	2437	-9.37	3.01	-6.36	7.02	Pass
	11	2462	-10.79	3.01	-7.78	7.02	Pass
1	1	2412	-11.59	3.01	-8.58	7.02	Pass
	6	2437	-10.36	3.01	-7.35	7.02	Pass
	11	2462	-12.69	3.01	-9.68	7.02	Pass

Note: Directional gain = $3.97\text{dBi} + 10\log(2) = 6.98\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8-(6.98-6) = 7.02\text{dBm}$.

802.11n (HT20)

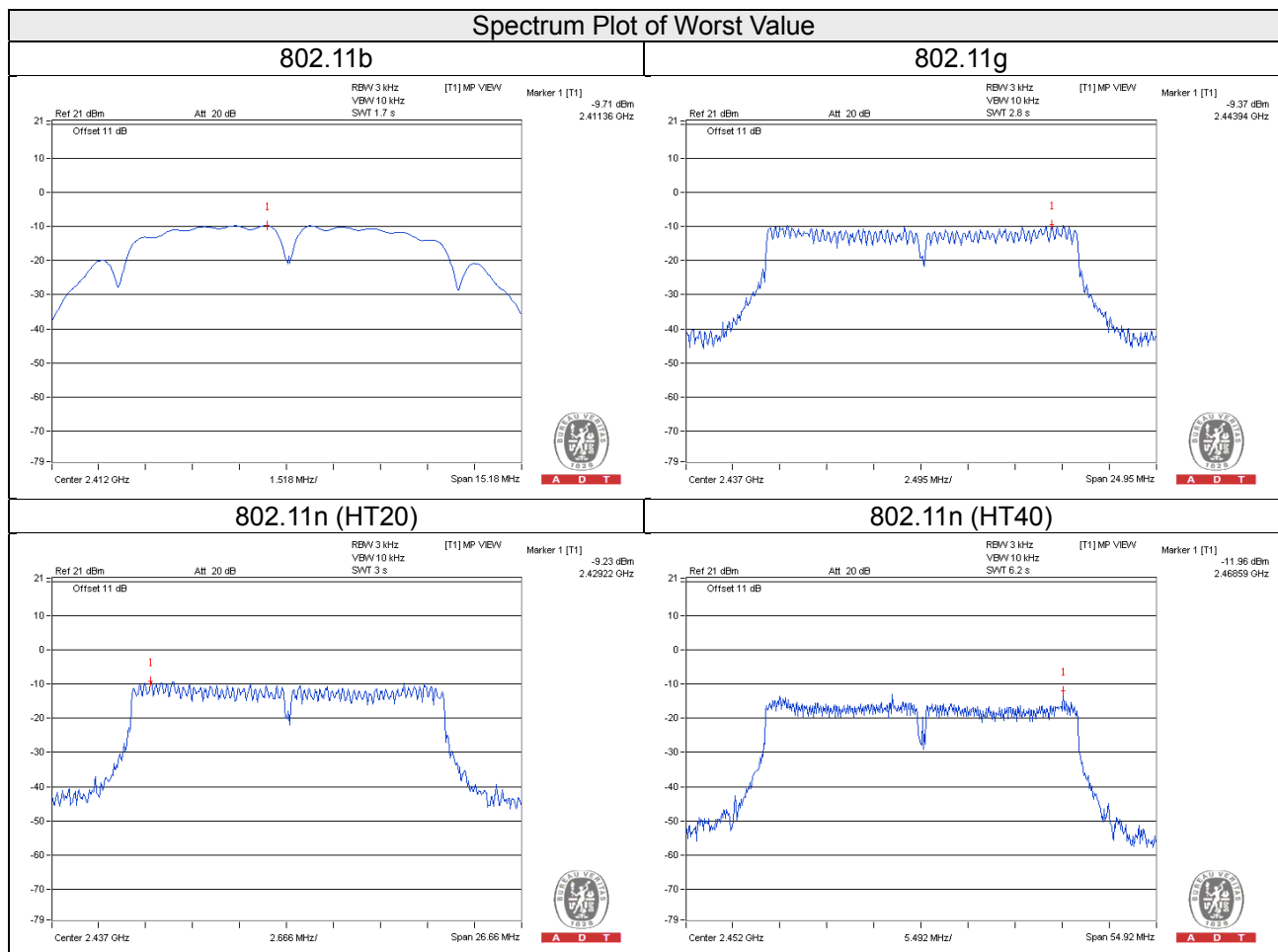
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass / Fail
0	1	2412	-10.84	3.01	-7.83	7.02	Pass
	6	2437	-9.23	3.01	-6.22	7.02	Pass
	11	2462	-10.07	3.01	-7.06	7.02	Pass
1	1	2412	-12.11	3.01	-9.10	7.02	Pass
	6	2437	-10.73	3.01	-7.72	7.02	Pass
	11	2462	-12.35	3.01	-9.34	7.02	Pass

Note: Directional gain = $3.97\text{dBi} + 10\log(2) = 6.98\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8-(6.98-6) = 7.02\text{dBm}$.

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	-14.81	3.01	-11.80	7.02	Pass
	6	2437	-12.16	3.01	-9.15	7.02	Pass
	9	2452	-11.96	3.01	-8.95	7.02	Pass
1	3	2422	-16.69	3.01	-13.68	7.02	Pass
	6	2437	-13.79	3.01	-10.78	7.02	Pass
	9	2452	-14.00	3.01	-10.99	7.02	Pass

Note: Directional gain = 3.97dBi + 10log(2) = 6.98dBi > 6dBi , so the power density limit shall be reduced to 8-(6.98-6) = 7.02dBm.

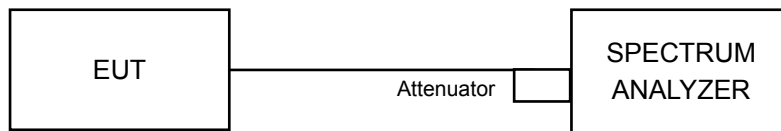


4.6 Conducted Out of Band Emission Measurement

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

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

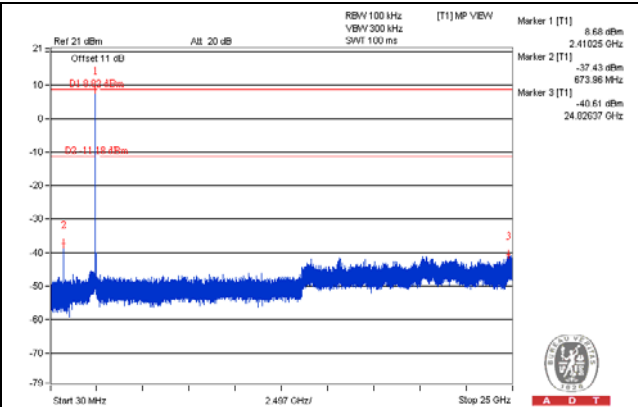
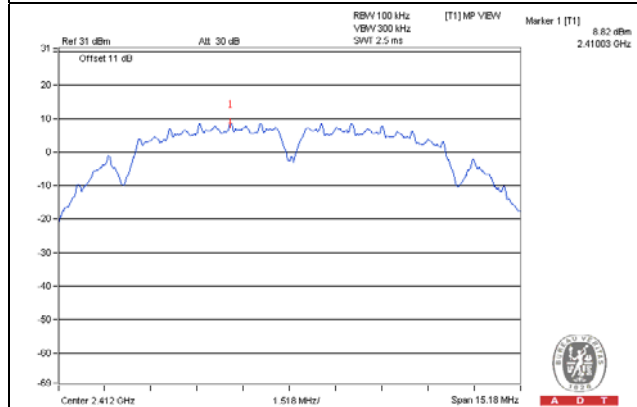
4.6.6 EUT Operating Condition

Same as Item 4.3.6

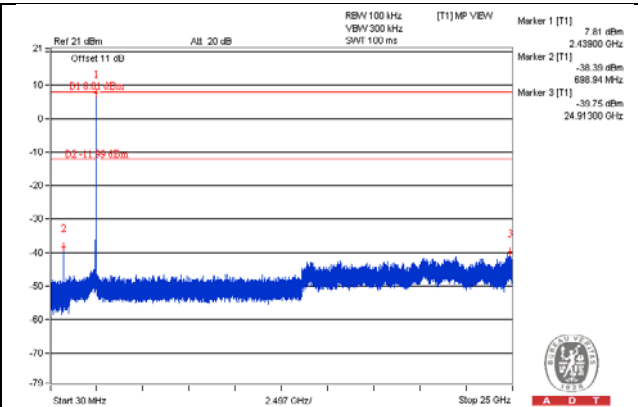
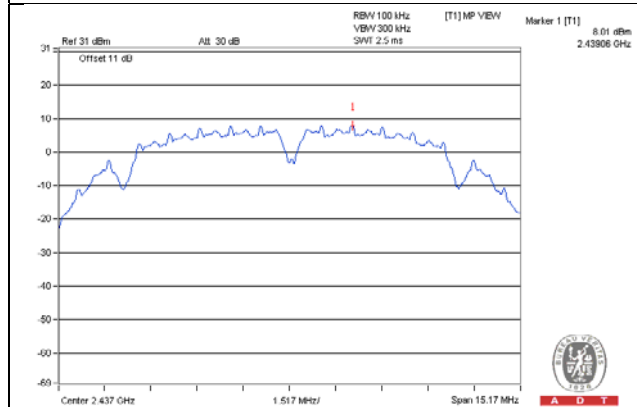
4.6.7 Test Results

802.11b_CHAIN 0

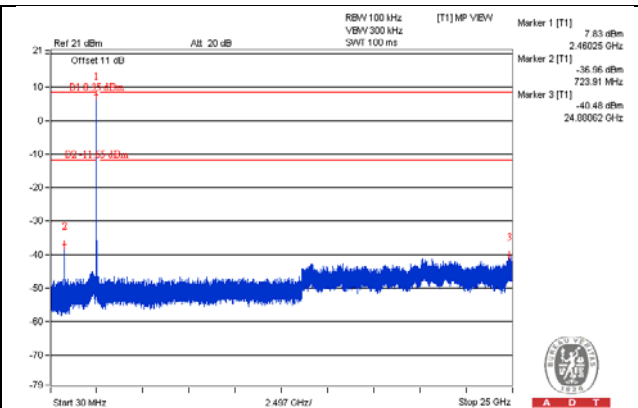
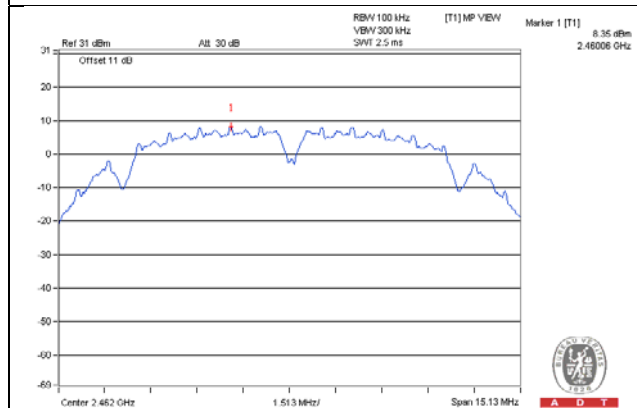
CH 1



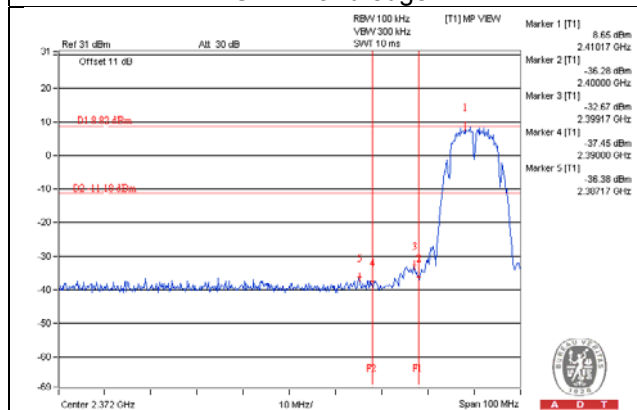
CH 6



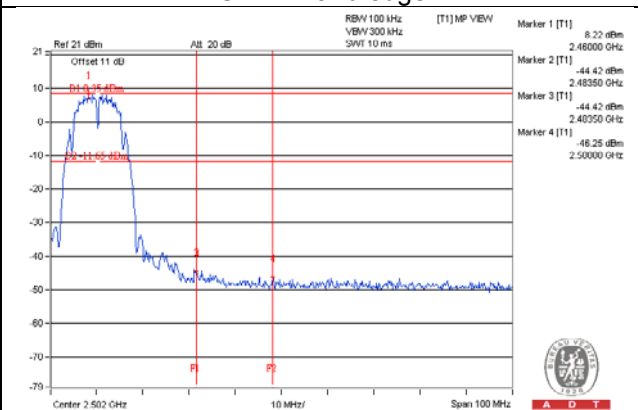
CH 11



CH 1 Band edge

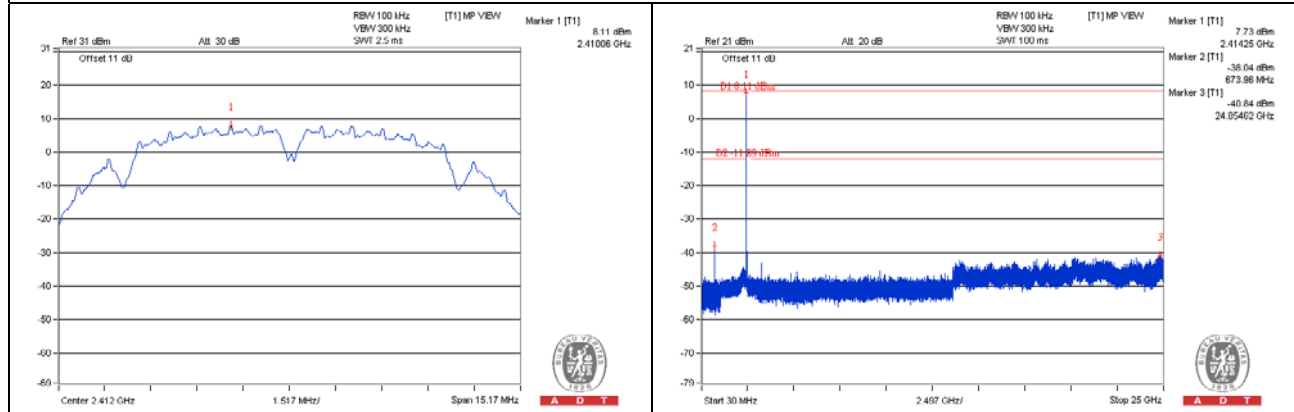


CH 11 Band edge

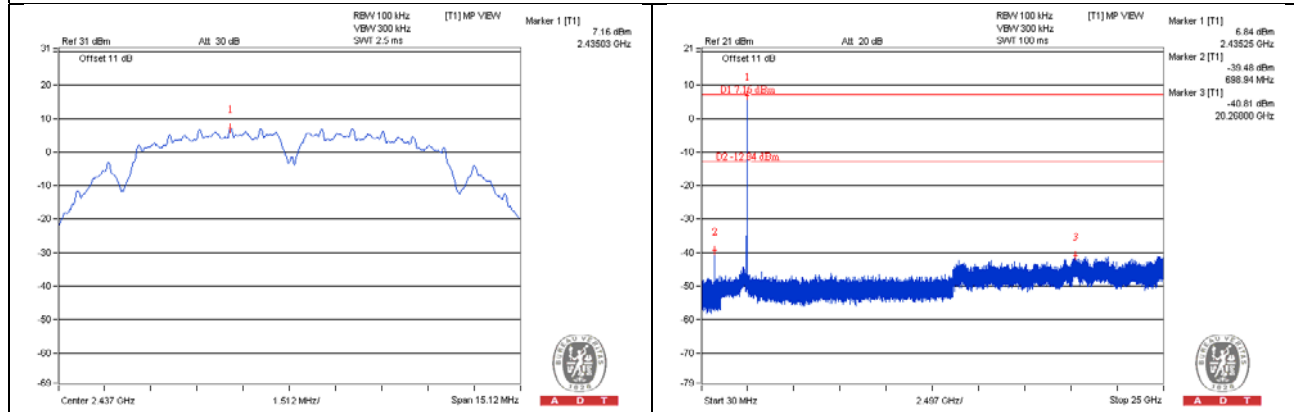


802.11b_CHAIN 1

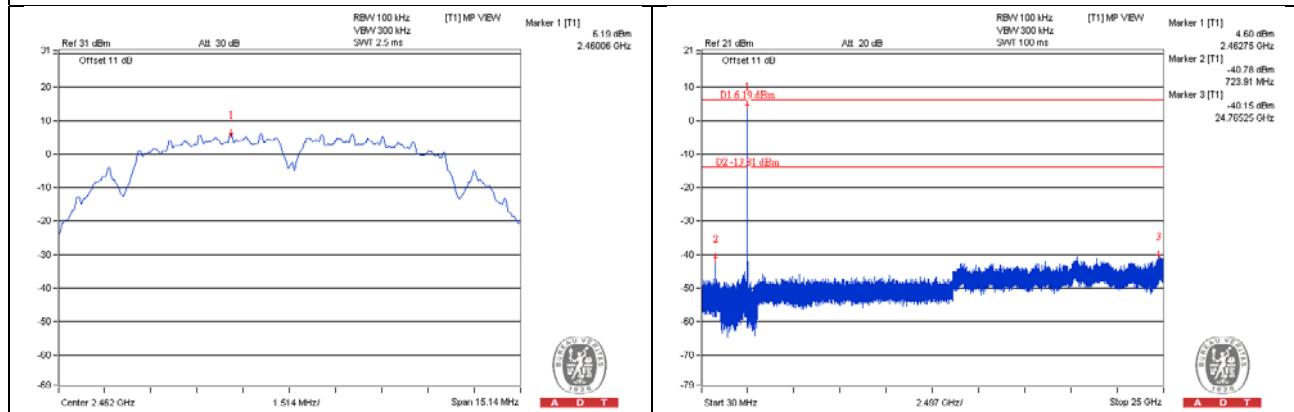
CH 1



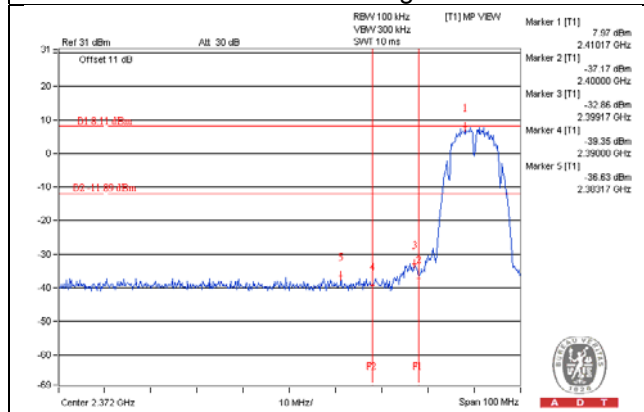
CH 6



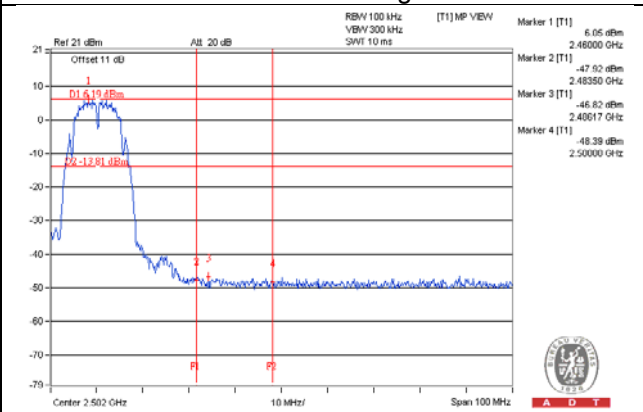
CH 11



CH 1 Band edge

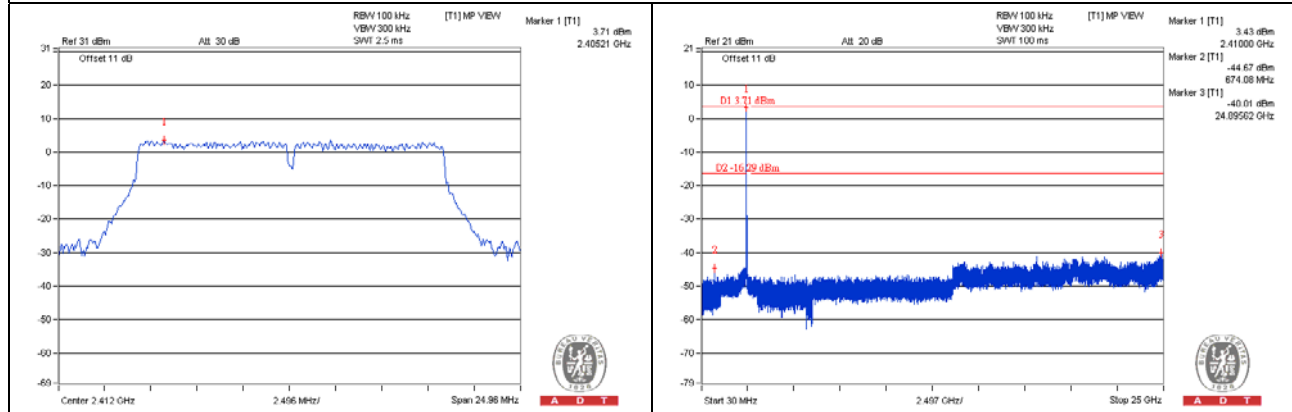


CH 11 Band edge

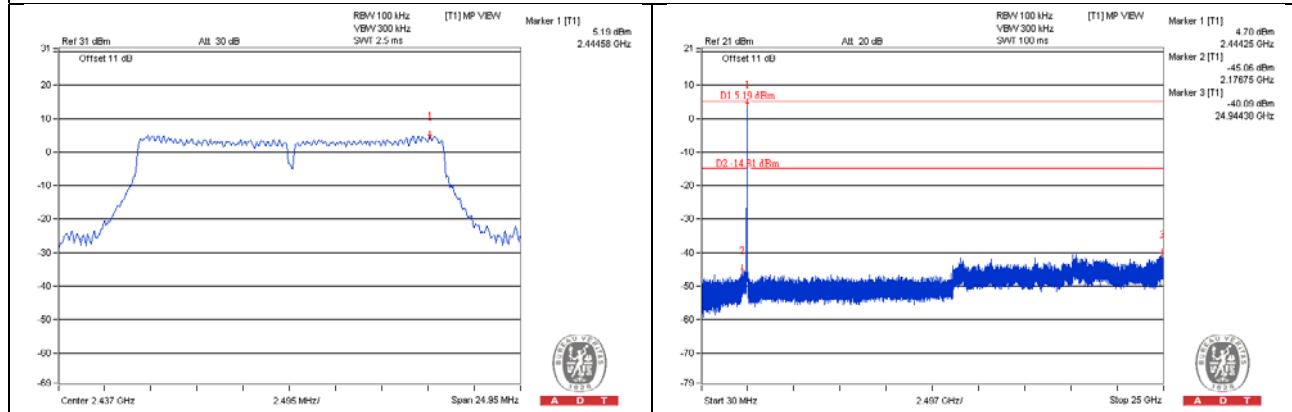


802.11g_CHAIN 0

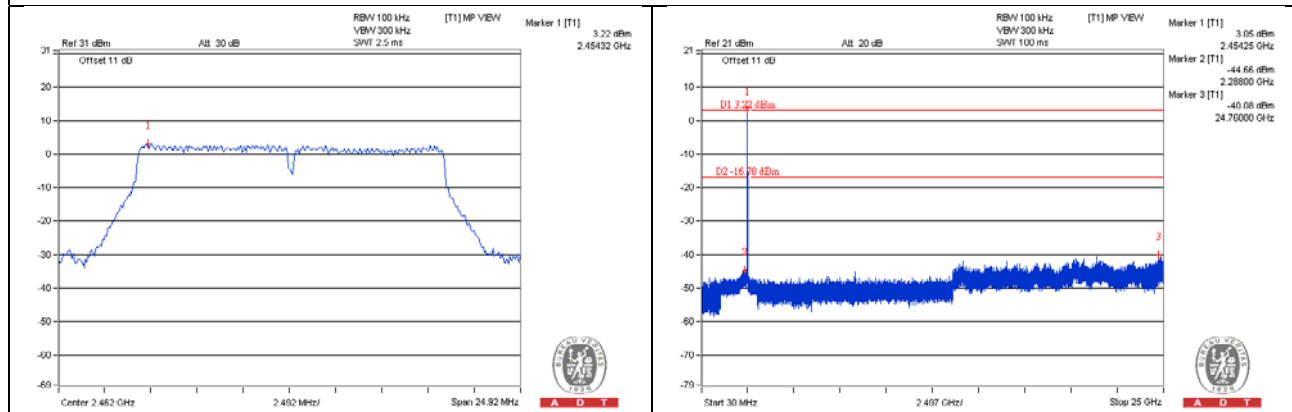
CH 1



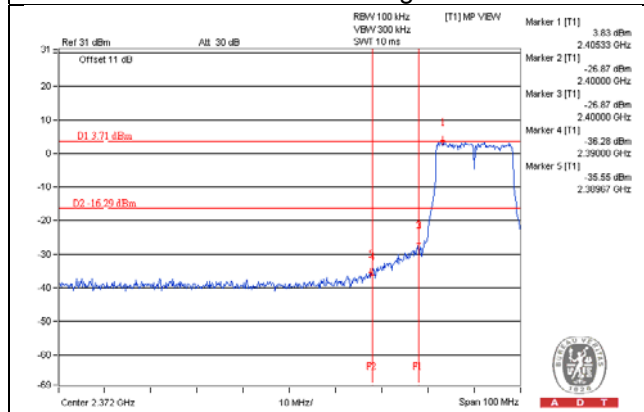
CH 6



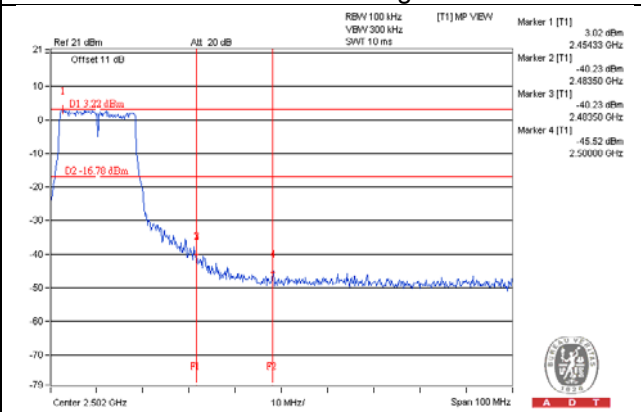
CH 11



CH 1 Band edge

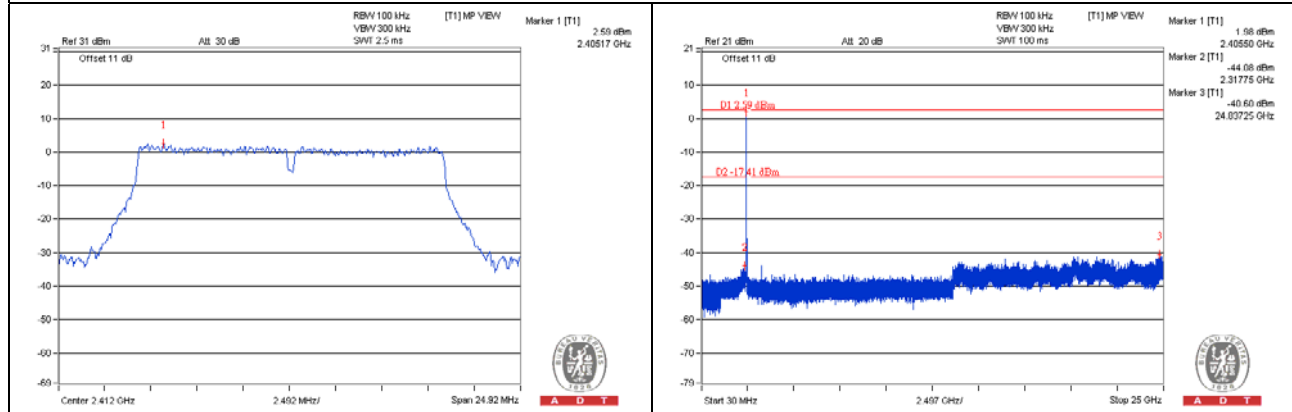


CH 11 Band edge

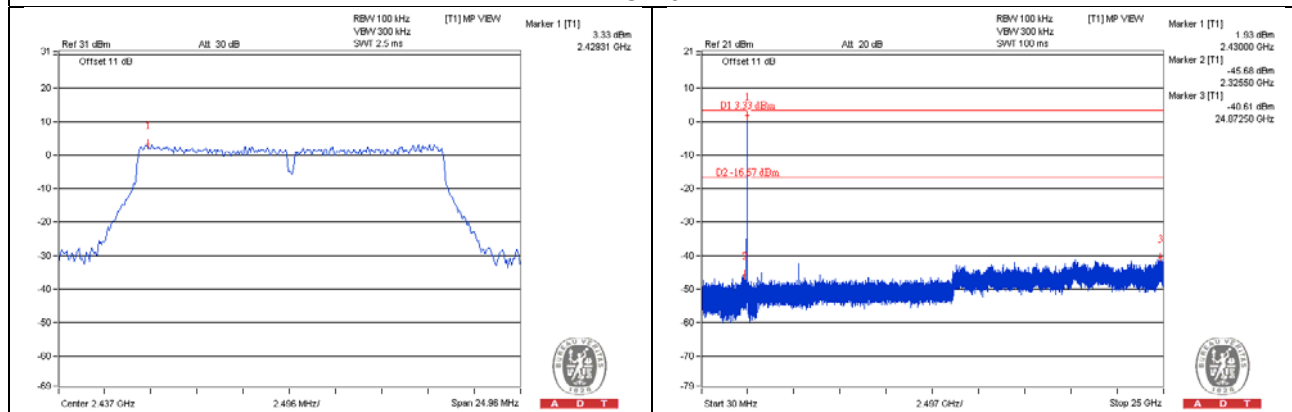


802.11g_CHAIN 1

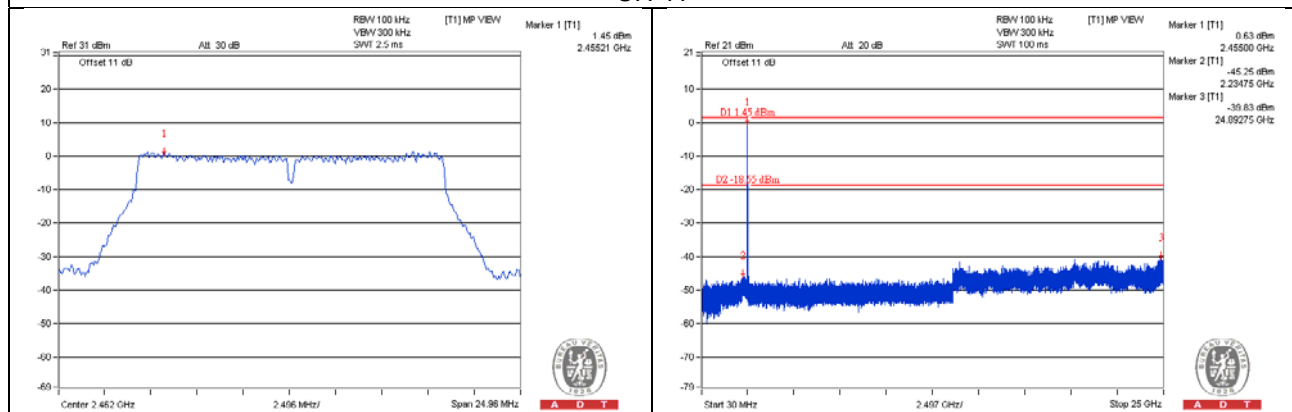
CH 1



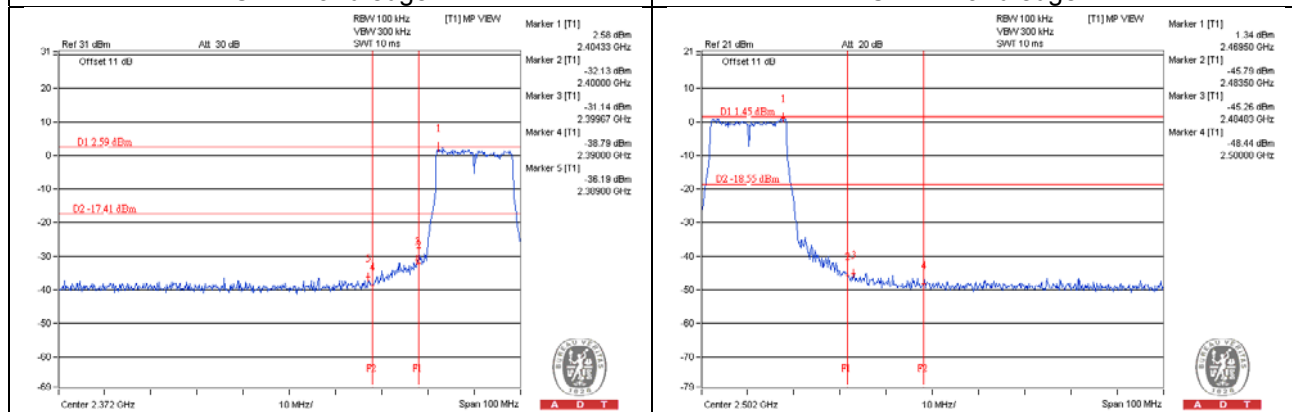
CH 6



CH 11

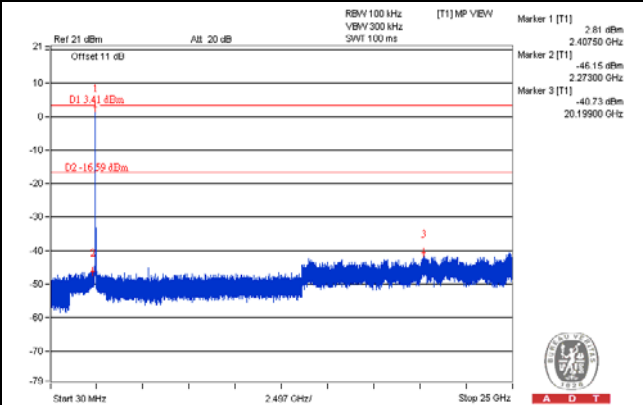
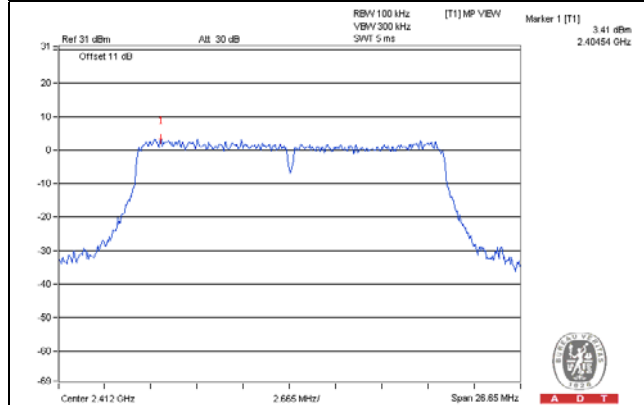


CH 1 Band edge

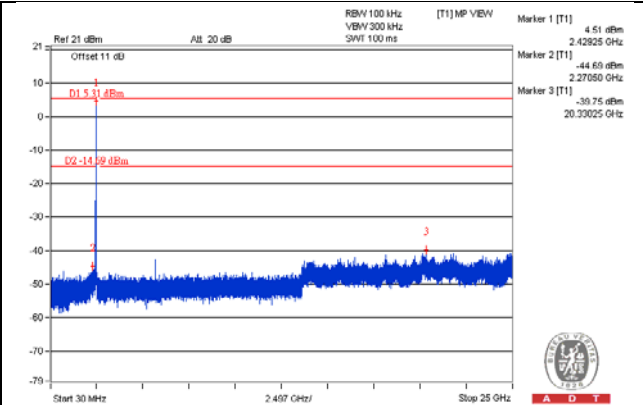
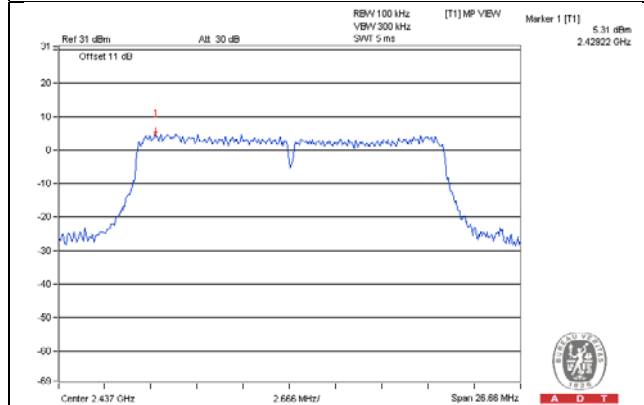


802.11n (HT20)_ CHAIN 0

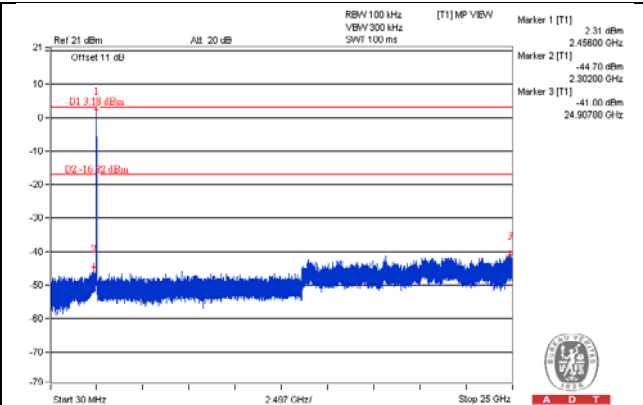
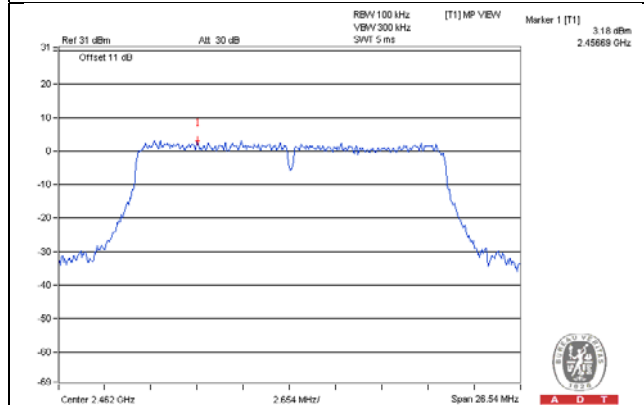
CH 1



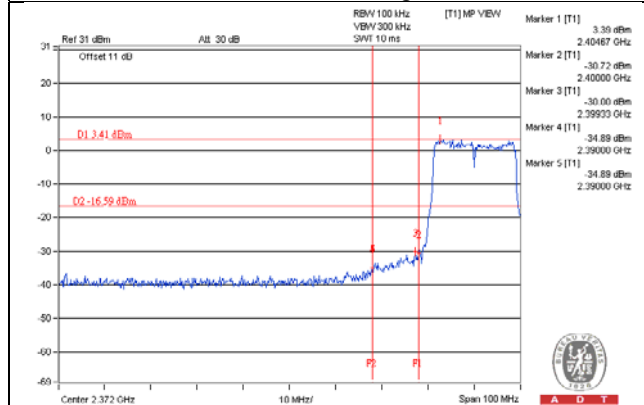
CH 6



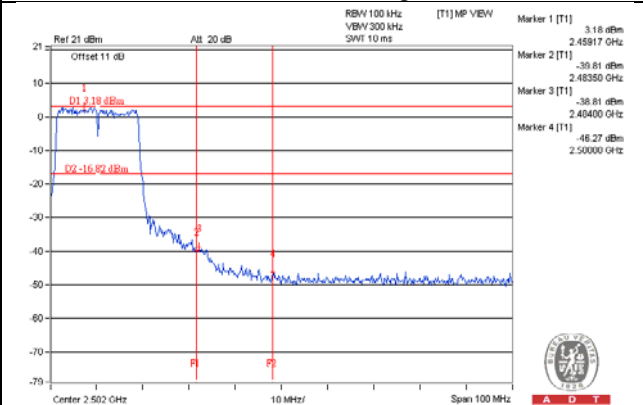
CH 11



CH 1 Band edge

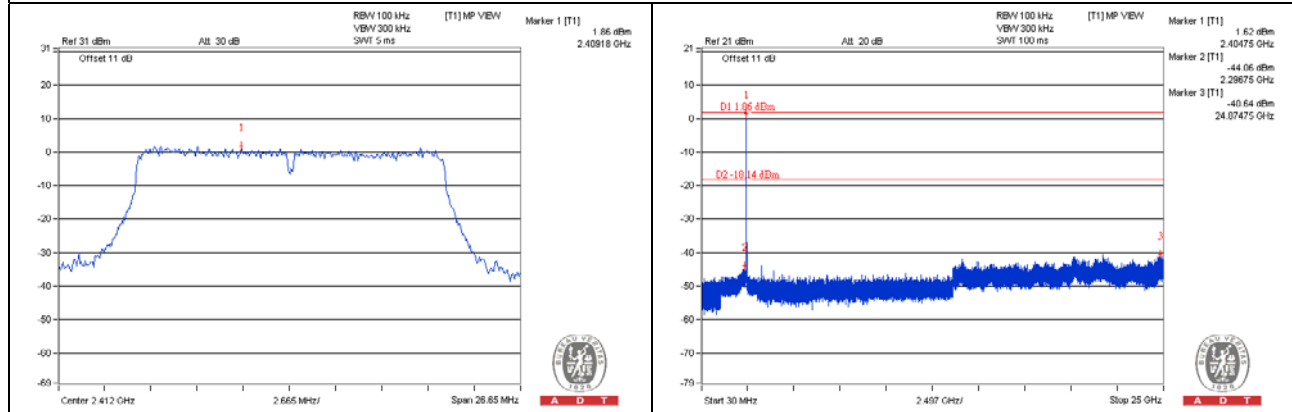


CH 11 Band edge

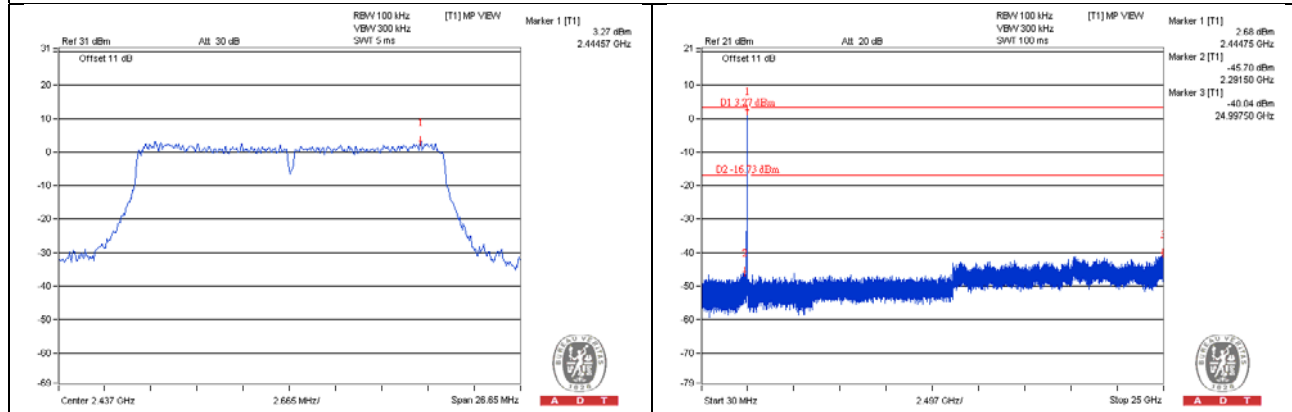


802.11n (HT20)_ CHAIN 1

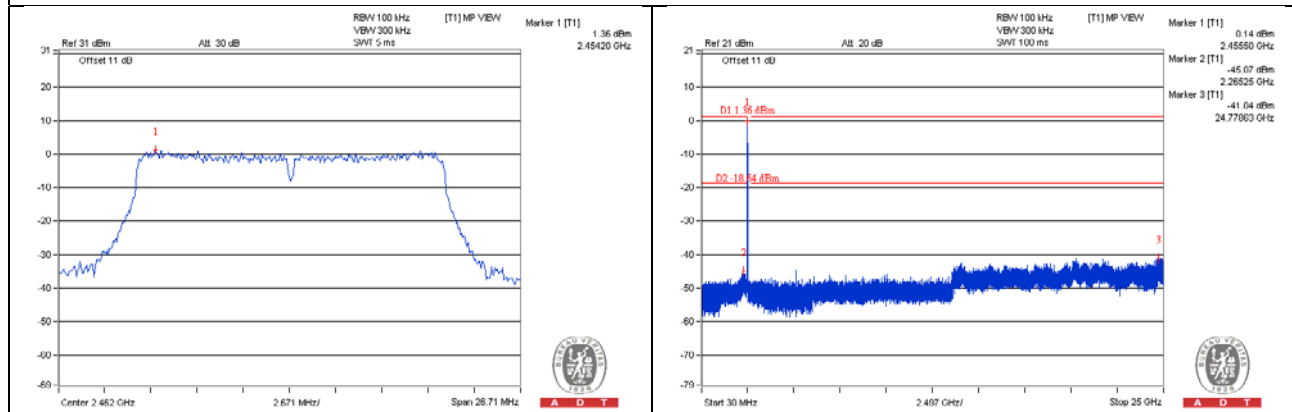
CH 1



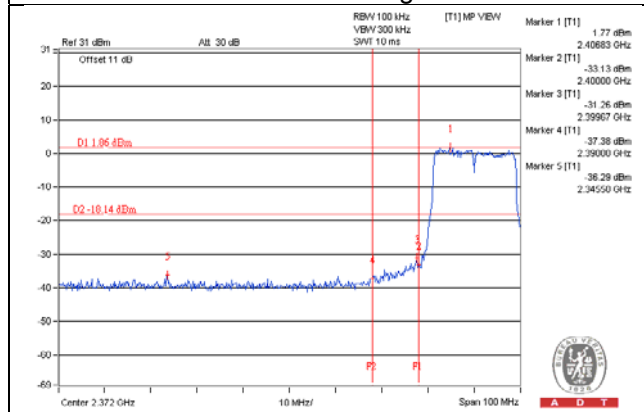
CH 6



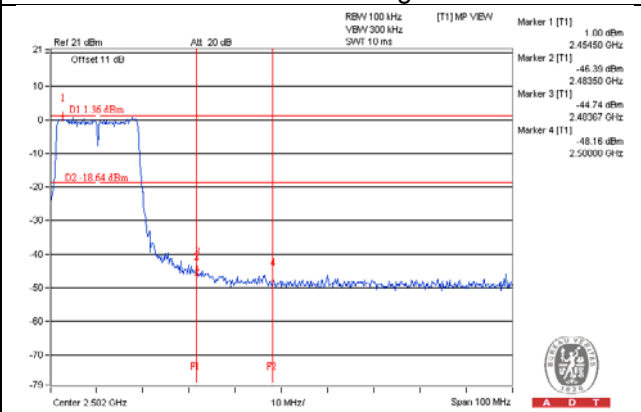
CH 11



CH 1 Band edge

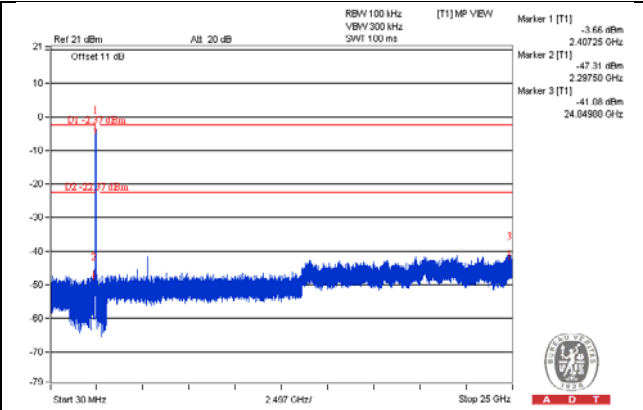
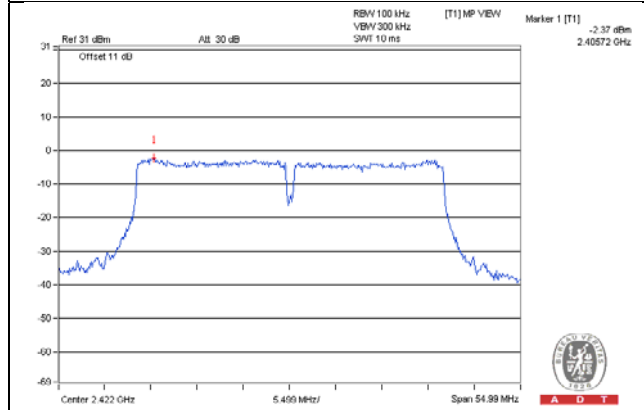


CH 11 Band edge

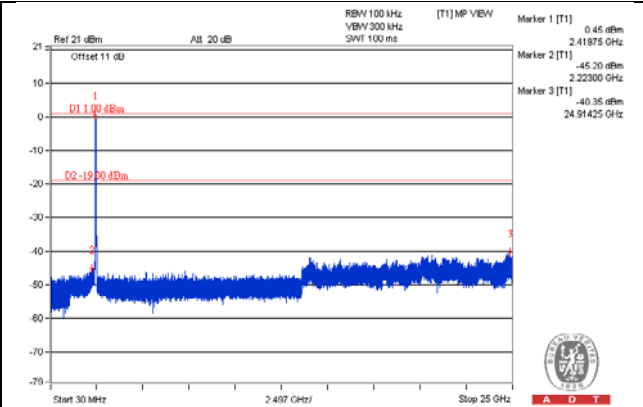
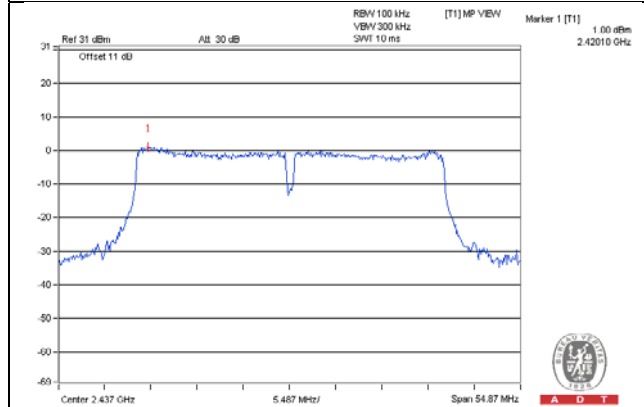


802.11n (HT40)_ CHAIN 0

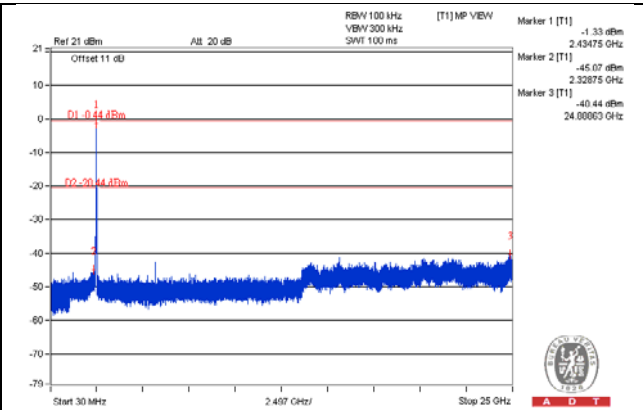
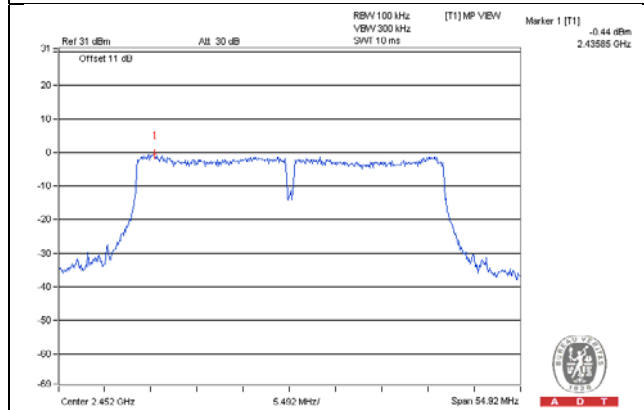
CH 3



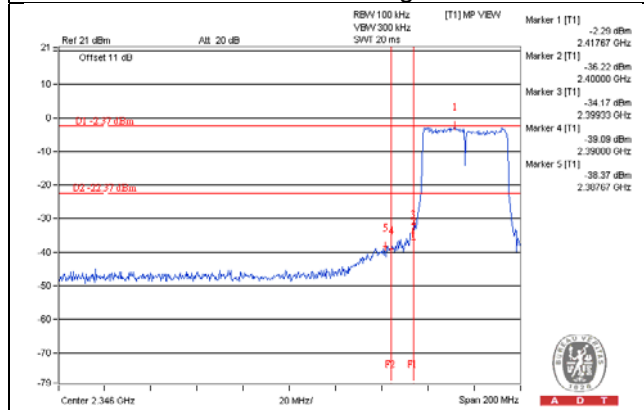
CH 6



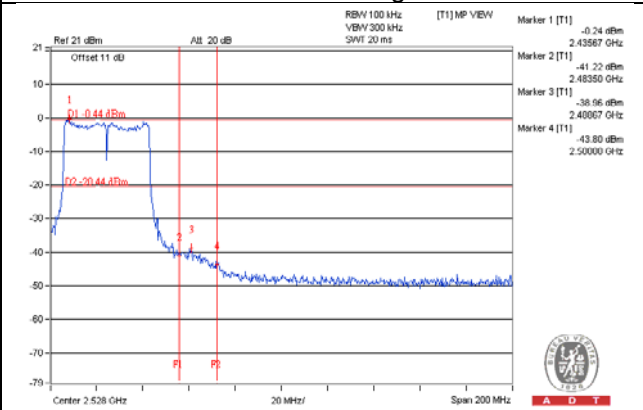
CH 9



CH 3 Band edge

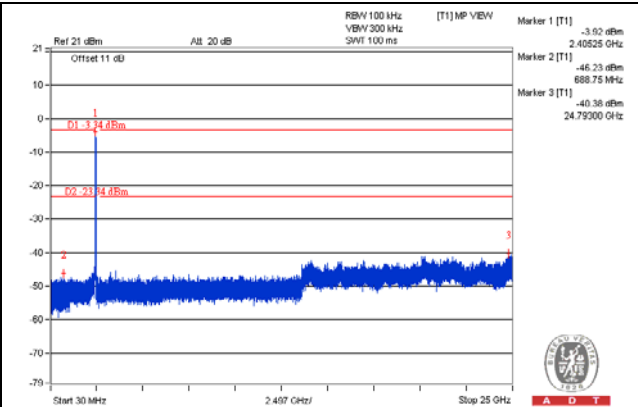
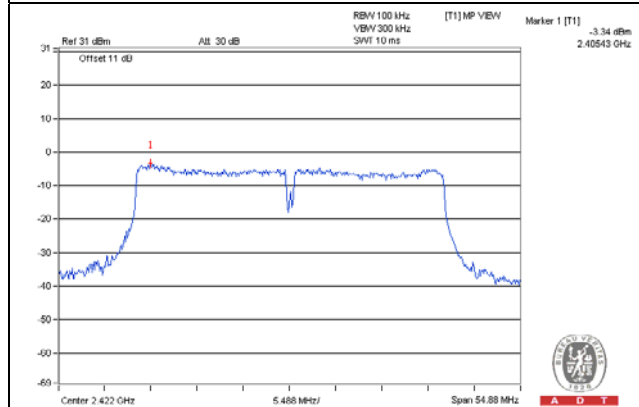


CH 9 Band edge

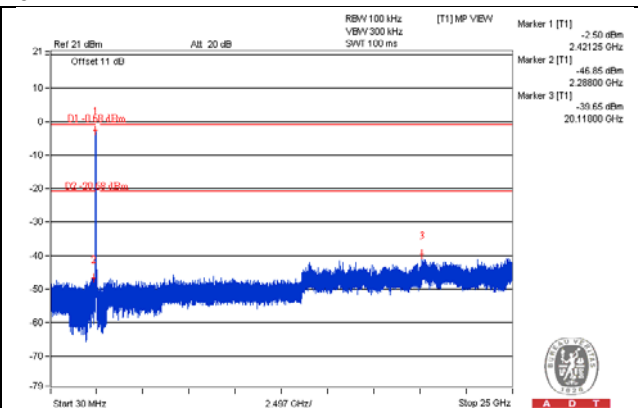
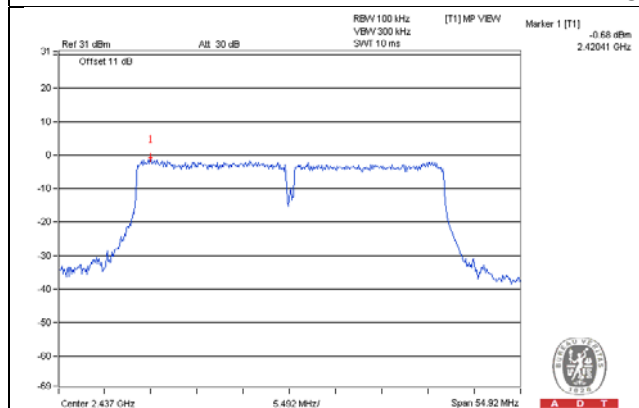


802.11n (HT40)_ CHAIN 0

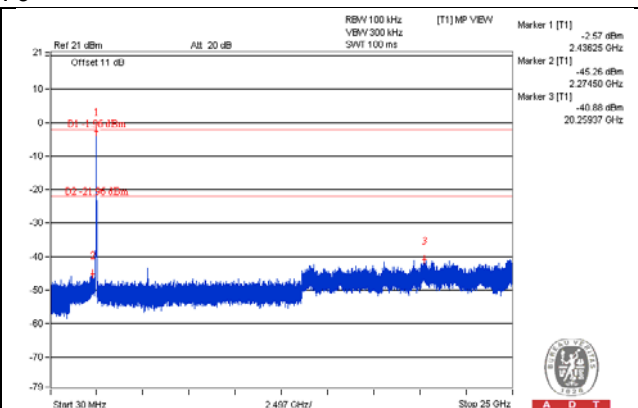
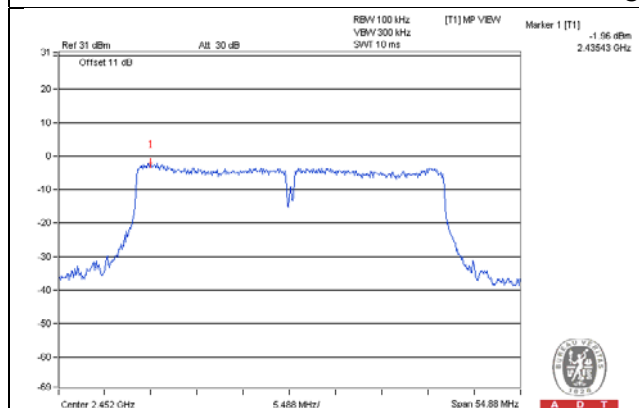
CH 3



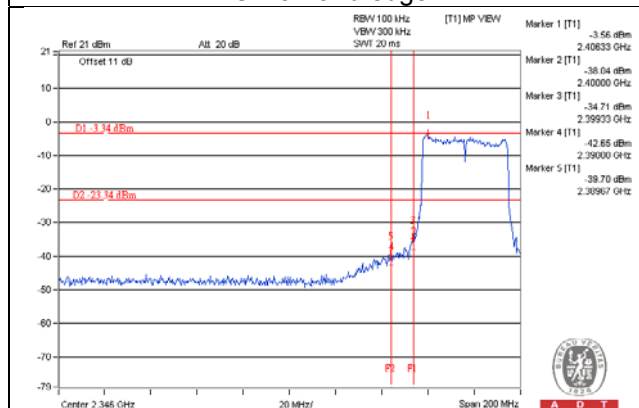
CH 6



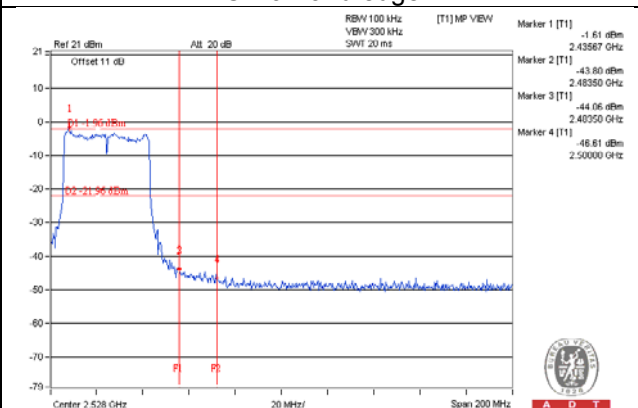
CH 9



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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