FCC TEST REPORT
(15.247)

REPORT NO.:	RF141108C01
MODEL NO.:	AP 100X
FCC ID:	2ACTO-AP100X
RECEIVED:	Nov. 08, 2014
TESTED:	Nov. 17 ~ Nov. 26, 2014
ISSUED:	Dec. 02, 2014

APPLICANT:	Sophos Ltd
ADDRESS:	The Pentagon,Abingdon,OX14 3YP,United Kingdom

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.
TEST LOCATION:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF141108C01	Original release.	Dec. 02, 2014

1. CERTIFICATION

PRODUCT:	Sophos wireless Access Point AP 100X
MODEL NO.:	AP 100X
BRAND:	Sophos
APPLICANT:	Sophos Ltd
TESTED:	Nov. 17 ~ Nov. 26, 2014
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)**

The above equipment (model: AP 100X) 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 :** Dec. 02, 2014

Celine Chou / Specialist

APPROVED BY : Ken Liu **, DATE :** Dec. 02, 2014

Ken Liu / Senior Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -5.95dB at 21.66282MHz.
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2390.00 and 2483.50MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is N plug. (The device is professionally installed)

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	UNCERTAINTY
Conducted emissions	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 dB
	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Sophos wireless Access Point AP 100X
MODEL NO.	AP 100X
POWER SUPPLY	54Vdc max from POE
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK
MODULATION TECHNOLOGY	OFDM
TRANSFER RATE	802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 450.0Mbps
OPERATING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
OUTPUT POWER	913.708mW
ANTENNA TYPE	Dipole antenna with 4dBi gain
ANTENNA CONNECTOR	N Plug
DATA CABLE	0.95m shielded ground cable without core
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Bracket

NOTE:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 3 completed transmitters and 3 receivers.

MODULATION MODE	TX FUNCTION
802.11g	1TX
802.11n (20MHz)	3TX
802.11n (40MHz)	3TX

2. The EUT consumes power from the following POE. (provided as support units only)

POE	
BRAND:	Power Desine
MODEL:	PD-9001GR/AC
INPUT:	100-240Vac, 50-60Hz, 0.67A
OUTPUT:	55Vdc, 0.6A

3. 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 802.11g and 802.11n (20MHz):

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 (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane for 802.11g and Y-plant for 802.11n.**

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)
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	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	1	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	1	OFDM	BPSK	6.0

BANDEDGE MEASUREMENT:

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 9	OFDM	BPSK	15.0

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)
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
RE<1G	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
PLC	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Frank Liu

3.3 DUTY CYCLE OF TEST SIGNAL

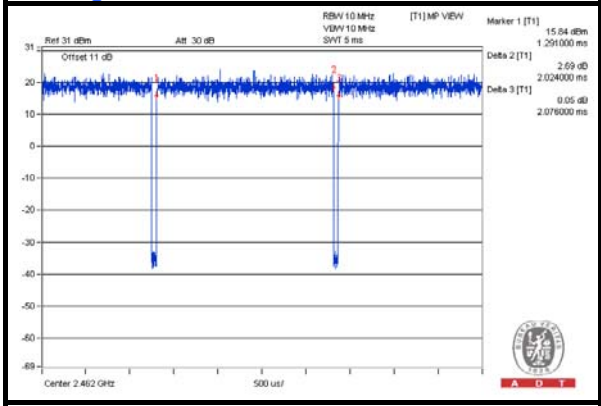
Duty cycle of test signal is < 98%

802.11g: Duty cycle = 2.024/2.076 = 0.975, Duty factor = 10 * log(1/0.975) = 0.11

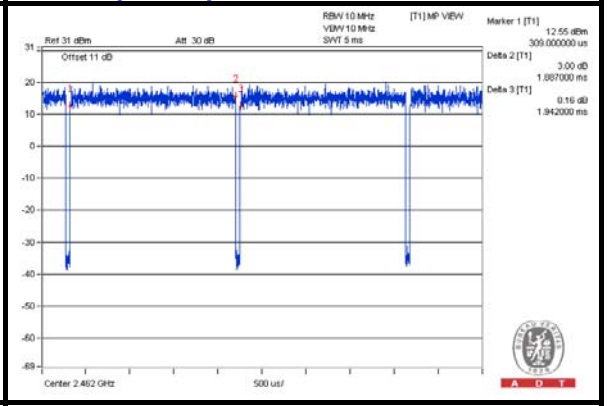
802.11n (20MHz): Duty cycle = 1.887/1.942 = 0.972, Duty factor = 10 * log(1/0.972) = 0.12

802.11n (40MHz): Duty cycle = 0.925/0.972 = 0.952, Duty factor = 10 * log(1/0.952) = 0.22

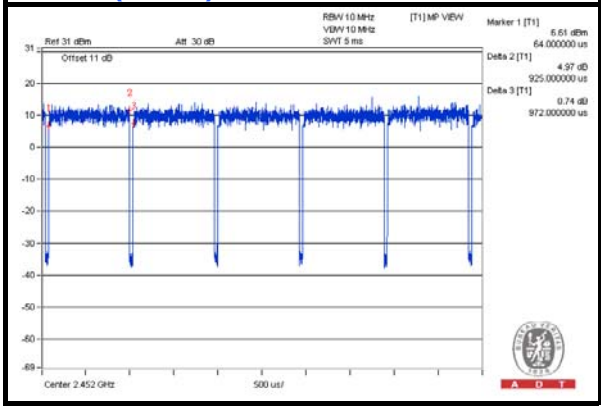
802.11g



802.11n (20MHz)



802.11n (40MHz)



3.4 DESCRIPTION OF SUPPORT UNITS

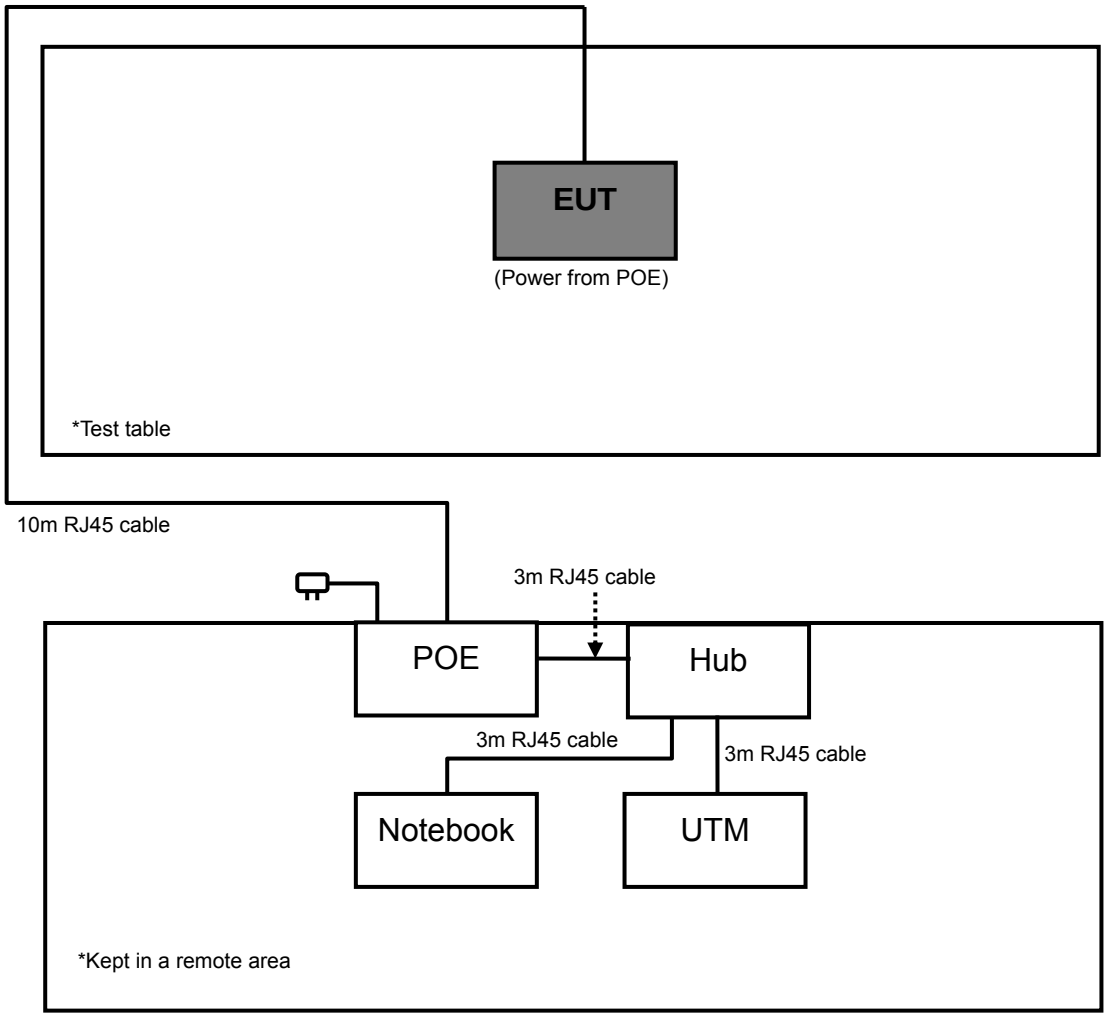
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	HUB	D-Link	DIR-810	NA	NA
2	UTM	SOPHOS	UTM110/120/100 rev.5	NA	NA
3	NOTEBOOK	DELL	D531	CN-0XM006-48643-81 U-2610	QDS-BRCM1020
4	POE	Power Desine	PD-9001GR/AC	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	3m RJ45 Cable.
2	3m RJ45 Cable.
3	3m RJ45 Cable.
4	10m RJ45 Cable.

NOTE:
1. All power cords of the above support units are non-shielded (1.8 m).
2. Item 2 & 4 were provided by the manufacturer.
3. Item 1-4 acted as a communication partner to transfer data.

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 is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It 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	Nov. 29, 2013	Nov. 28, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Feb. 11, 2014	Feb. 10, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Feb. 25, 2014	Feb. 24, 2015
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Aug. 25, 2014	Aug. 24, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 17, 2014	Feb. 16, 2015
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 a 3 meters semi-anechoic chamber. 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. Height of receiving 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

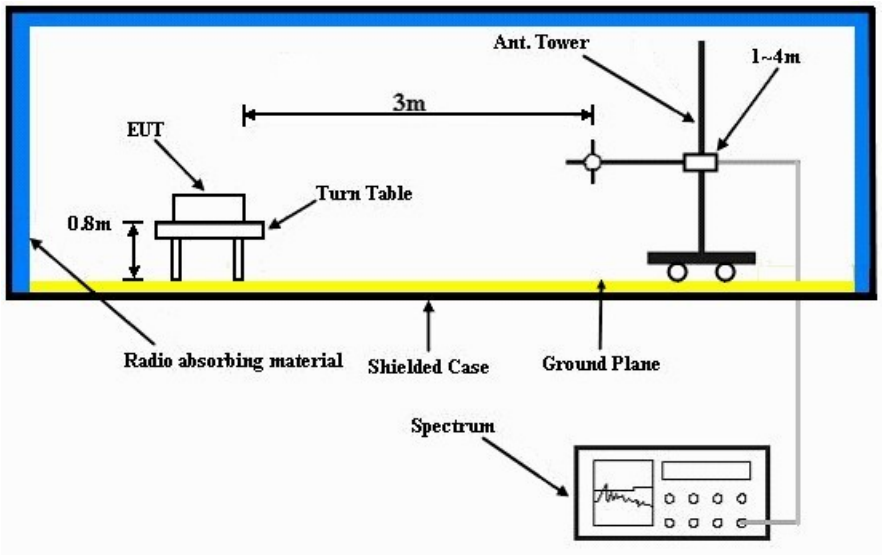
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

4.1.4 DEVIATION FROM TEST STANDARD

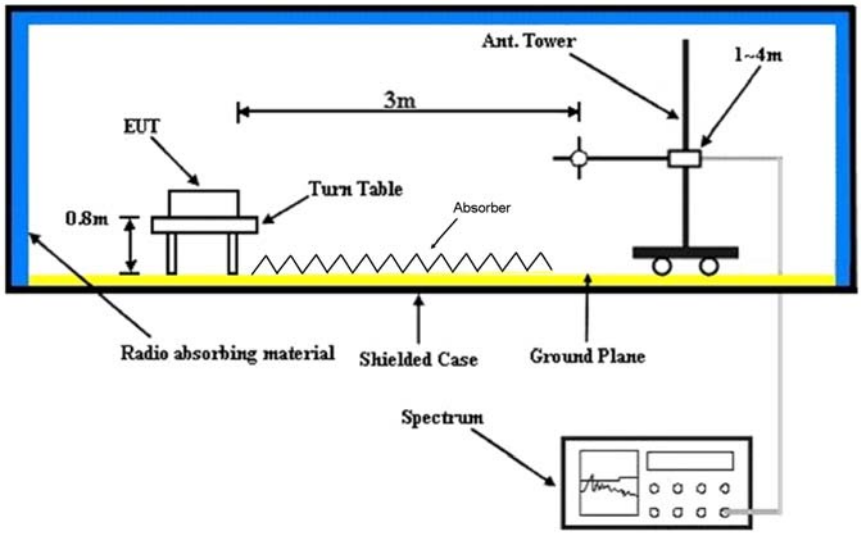
No deviation.

4.1.5 TEST SETUP

Frequency range 30MHz~1GHz



Frequency range above 1GHz



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

4.1.6 EUT OPERATING CONDITIONS

a. Placed the EUT on the testing table.
b. Prepared 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 communication partner sent data to EUT by command "PING".

4.1.7 TEST RESULTS

ABOVE 1GHz WORST-CASE DATA:

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	69.6 PK	74.0	-4.4	1.28 H	89	36.60	33.00
2	**2390.00**	**53.0 AV**	**54.0**	**-1.0**	**1.28 H**	**89**	**20.00**	**33.00**
3	*2412.00	111.3 PK			1.28 H	89	78.20	33.10
4	*2412.00	100.8 AV			1.28 H	89	67.70	33.10
5	4824.00	46.0 PK	74.0	-28.0	1.00 H	272	44.50	1.50
6	4824.00	32.5 AV	54.0	-21.5	1.00 H	272	31.00	1.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	60.5 PK	74.0	-13.5	1.54 V	203	27.50	33.00
2	2390.00	48.5 AV	54.0	-5.5	1.54 V	203	15.50	33.00
3	*2412.00	100.5 PK			1.54 V	203	67.40	33.10
4	*2412.00	90.2 AV			1.54 V	203	57.10	33.10
5	4824.00	45.8 PK	74.0	-28.2	1.00 V	51	44.30	1.50
6	4824.00	32.3 AV	54.0	-21.7	1.00 V	51	30.80	1.50

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.0 PK	74.0	-4.0	1.25 H	86	37.00	33.00
2	**2390.00**	**53.0 AV**	**54.0**	**-1.0**	**1.25 H**	**86**	**20.00**	**33.00**
3	*2437.00	118.1 PK			1.25 H	86	84.80	33.30
4	*2437.00	107.2 AV			1.25 H	86	73.90	33.30
5	2483.50	72.6 PK	74.0	-1.4	1.25 H	86	39.20	33.40
6	2483.50	52.4 AV	54.0	-1.6	1.25 H	86	19.00	33.40
7	4874.00	45.2 PK	74.0	-28.8	1.00 H	267	43.70	1.50
8	4874.00	32.2 AV	54.0	-21.8	1.00 H	267	30.70	1.50
9	7311.00	68.4 PK	74.0	-5.6	1.32 H	168	60.30	8.10
10	7311.00	51.8 AV	54.0	-2.2	1.32 H	168	43.70	8.10
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	62.1 PK	74.0	-11.9	1.45 V	167	29.10	33.00
2	2390.00	48.6 AV	54.0	-5.4	1.45 V	167	15.60	33.00
3	*2437.00	108.5 PK			1.45 V	167	75.20	33.30
4	*2437.00	97.7 AV			1.45 V	167	64.40	33.30
5	2483.50	62.8 PK	74.0	-11.2	1.45 V	167	29.40	33.40
6	2483.50	48.8 AV	54.0	-5.2	1.45 V	167	15.40	33.40
7	4874.00	45.4 PK	74.0	-28.6	1.00 V	25	43.90	1.50
8	4874.00	32.3 AV	54.0	-21.7	1.00 V	25	30.80	1.50
9	7311.00	66.4 PK	74.0	-7.6	1.25 V	207	58.30	8.10
10	7311.00	51.6 AV	54.0	-2.4	1.25 V	207	43.50	8.10

REMARKS:

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

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	112.5 PK			1.24 H	89	79.10	33.40
2	*2462.00	101.2 AV			1.24 H	89	67.80	33.40
3	2483.50	71.9 PK	74.0	-2.1	1.24 H	89	38.50	33.40
4	2483.50	52.4 AV	54.0	-1.6	1.24 H	89	19.00	33.40
5	4924.00	45.8 PK	74.0	-28.2	1.00 H	301	44.20	1.60
6	4924.00	32.0 AV	54.0	-22.0	1.00 H	301	30.40	1.60
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	102.2 PK			1.03 V	219	68.80	33.40
2	*2462.00	91.4 AV			1.03 V	219	58.00	33.40
3	2483.50	62.2 PK	74.0	-11.8	1.03 V	219	28.80	33.40
4	2483.50	48.5 AV	54.0	-5.5	1.03 V	219	15.10	33.40
5	4924.00	45.0 PK	74.0	-29.0	1.00 V	102	43.40	1.60
6	4924.00	32.1 AV	54.0	-21.9	1.00 V	102	30.50	1.60

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

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	67.3 PK	74.0	-6.7	1.14 H	4	34.30	33.00
2	2390.00	52.8 AV	54.0	-1.2	1.14 H	4	19.80	33.00
3	*2412.00	115.7 PK			1.05 H	201	82.60	33.10
4	*2412.00	105.2 AV			1.05 H	201	72.10	33.10
5	4824.00	45.6 PK	74.0	-28.4	1.00 H	25	44.10	1.50
6	4824.00	31.9 AV	54.0	-22.1	1.00 H	25	30.40	1.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	62.1 PK	74.0	-11.9	1.00 V	302	29.10	33.00
2	2390.00	50.3 AV	54.0	-3.7	1.00 V	302	17.30	33.00
3	*2412.00	100.2 PK			1.54 V	90	67.10	33.10
4	*2412.00	90.4 AV			1.54 V	90	57.30	33.10
5	4824.00	45.4 PK	74.0	-28.6	1.00 V	311	43.90	1.50
6	4824.00	31.7 AV	54.0	-22.3	1.00 V	311	30.20	1.50

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.4 PK	74.0	-7.6	1.00 H	199	33.40	33.00
2	2390.00	52.5 AV	54.0	-1.5	1.00 H	199	19.50	33.00
3	*2437.00	117.4 PK			1.00 H	192	84.10	33.30
4	*2437.00	107.8 AV			1.00 H	192	74.50	33.30
5	2483.50	66.7 PK	74.0	-7.3	1.02 H	201	33.30	33.40
6	2483.50	52.7 AV	54.0	-1.3	1.02 H	201	19.30	33.40
7	4874.00	45.1 PK	74.0	-28.9	1.00 H	158	43.60	1.50
8	4874.00	32.2 AV	54.0	-21.8	1.00 H	158	30.70	1.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.2 PK	74.0	-11.8	1.00 V	102	29.20	33.00
2	2390.00	50.5 AV	54.0	-3.5	1.00 V	102	17.50	33.00
3	*2437.00	105.4 PK			1.00 V	210	72.10	33.30
4	*2437.00	95.4 AV			1.00 V	210	62.10	33.30
5	2483.50	63.3 PK	74.0	-10.7	1.00 V	356	29.90	33.40
6	2483.50	50.7 AV	54.0	-3.3	1.00 V	356	17.30	33.40
7	4874.00	45.0 PK	74.0	-29.0	1.00 V	320	43.50	1.50
8	4874.00	31.9 AV	54.0	-22.1	1.00 V	320	30.40	1.50

REMARKS:

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

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	114.2 PK			1.00 H	196	80.80	33.40
2	*2462.00	104.5 AV			1.00 H	196	71.10	33.40
3	2483.50	67.8 PK	74.0	-6.2	1.00 H	188	34.40	33.40
4	**2483.50**	**53.0 AV**	**54.0**	**-1.0**	**1.00 H**	**188**	**19.60**	**33.40**
5	4924.00	45.2 PK	74.0	-28.8	1.00 H	277	43.60	1.60
6	4924.00	32.3 AV	54.0	-21.7	1.00 H	277	30.70	1.60
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	99.6 PK			1.00 V	279	66.20	33.40
2	*2462.00	89.3 AV			1.00 V	279	55.90	33.40
3	2483.50	62.9 PK	74.0	-11.1	1.00 V	347	29.50	33.40
4	2483.50	50.6 AV	54.0	-3.4	1.00 V	347	17.20	33.40
5	4924.00	45.3 PK	74.0	-28.7	1.00 V	126	43.70	1.60
6	4924.00	31.9 AV	54.0	-22.1	1.00 V	126	30.30	1.60

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

802.11n (40MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	70.4 PK	74.0	-3.6	1.00 H	186	37.40	33.00
2	2390.00	52.6 AV	54.0	-1.4	1.00 H	186	19.60	33.00
3	*2422.00	107.8 PK			1.00 H	194	74.60	33.20
4	*2422.00	98.8 AV			1.00 H	194	65.60	33.20
5	4844.00	45.4 PK	74.0	-28.6	1.00 H	123	43.90	1.50
6	4844.00	32.0 AV	54.0	-22.0	1.00 H	123	30.50	1.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	60.6 PK	74.0	-13.4	1.00 V	92	27.60	33.00
2	2390.00	48.6 AV	54.0	-5.4	1.00 V	92	15.60	33.00
3	*2422.00	96.0 PK			1.00 V	209	62.80	33.20
4	*2422.00	86.1 AV			1.00 V	209	52.90	33.20
5	4844.00	46.2 PK	74.0	-27.8	1.00 V	102	44.70	1.50
6	4844.00	31.9 AV	54.0	-22.1	1.00 V	102	30.40	1.50

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.6 PK	74.0	-4.4	1.00 H	176	36.60	33.00
2	**2390.00**	**53.0 AV**	**54.0**	**-1.0**	**1.00 H**	**176**	**20.00**	**33.00**
3	*2437.00	114.1 PK			1.00 H	188	80.80	33.30
4	*2437.00	103.9 AV			1.00 H	188	70.60	33.30
5	2483.50	70.4 PK	74.0	-3.6	1.00 H	195	37.00	33.40
6	2483.50	51.5 AV	54.0	-2.5	1.00 H	195	18.10	33.40
7	4874.00	45.3 PK	74.0	-28.7	1.00 H	232	43.80	1.50
8	4874.00	31.8 AV	54.0	-22.2	1.00 H	232	30.30	1.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.4 PK	74.0	-13.6	1.00 V	294	27.40	33.00
2	2390.00	48.4 AV	54.0	-5.6	1.00 V	294	15.40	33.00
3	*2437.00	99.1 PK			1.00 V	288	65.80	33.30
4	*2437.00	89.5 AV			1.00 V	288	56.20	33.30
5	2483.50	61.4 PK	74.0	-12.6	1.00 V	306	28.00	33.40
6	2483.50	48.6 AV	54.0	-5.4	1.00 V	306	15.20	33.40
7	4874.00	45.7 PK	74.0	-28.3	1.00 V	14	44.20	1.50
8	4874.00	32.1 AV	54.0	-21.9	1.00 V	14	30.60	1.50

REMARKS:

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

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	109.8 PK			1.00 H	187	76.50	33.30
2	*2452.00	101.0 AV			1.00 H	187	67.70	33.30
3	2483.50	70.9 PK	74.0	-3.1	1.00 H	191	37.50	33.40
4	2483.50	52.8 AV	54.0	-1.2	1.00 H	191	19.40	33.40
5	4904.00	45.5 PK	74.0	-28.5	1.00 H	254	43.90	1.60
6	4904.00	32.2 AV	54.0	-21.8	1.00 H	254	30.60	1.60
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	*2452.00	97.4 PK			1.00 V	287	64.10	33.30
2	*2452.00	87.6 AV			1.00 V	287	54.30	33.30
3	2483.50	61.7 PK	74.0	-12.3	1.00 V	295	28.30	33.40
4	2483.50	48.6 AV	54.0	-5.4	1.00 V	295	15.20	33.40
5	4904.00	45.5 PK	74.0	-28.5	1.00 V	63	43.90	1.60
6	4904.00	32.0 AV	54.0	-22.0	1.00 V	63	30.40	1.60

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

BELOW 1GHz WORST-CASE DATA:

802.11g

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	101.51	36.8 QP	43.5	-6.7	1.99 H	115	55.20	-18.40
2	140.37	32.7 QP	43.5	-10.8	1.99 H	272	47.30	-14.60
3	261.62	38.1 QP	46.0	-7.9	1.24 H	128	51.90	-13.80
4	308.25	37.1 QP	46.0	-8.9	1.24 H	128	49.40	-12.30
5	525.88	43.3 QP	46.0	-2.7	1.24 H	165	51.50	-8.20
6	801.03	33.6 QP	46.0	-12.4	1.49 H	222	36.30	-2.70
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	42.44	35.9 QP	40.0	-4.1	1.01 V	166	50.60	-14.70
2	84.41	34.7 QP	40.0	-5.3	1.26 V	229	54.30	-19.60
3	106.17	35.6 QP	43.5	-7.9	1.01 V	274	53.20	-17.60
4	261.62	43.0 QP	46.0	-3.0	2.00 V	30	56.80	-13.80
5	525.88	40.5 QP	46.0	-5.5	1.51 V	167	48.70	-8.20
6	799.47	35.1 QP	46.0	-10.9	1.51 V	159	37.80	-2.70

REMARKS:

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	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.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

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. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 13, 2014	Feb. 12, 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

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

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

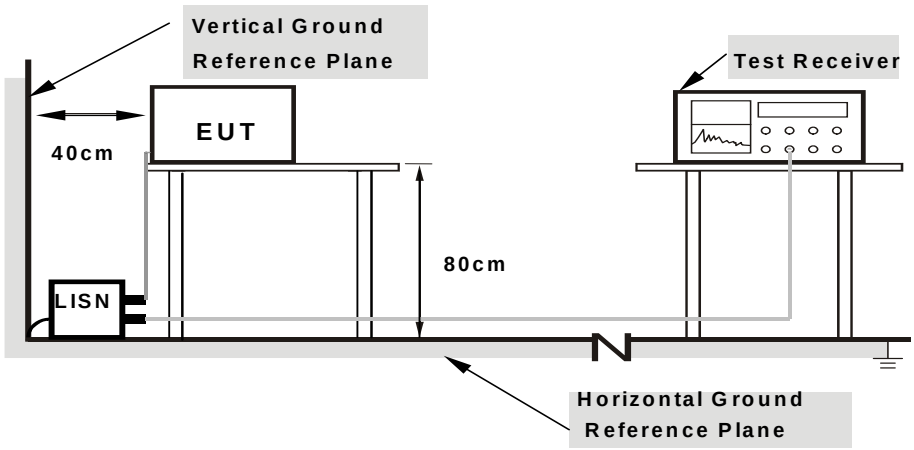
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

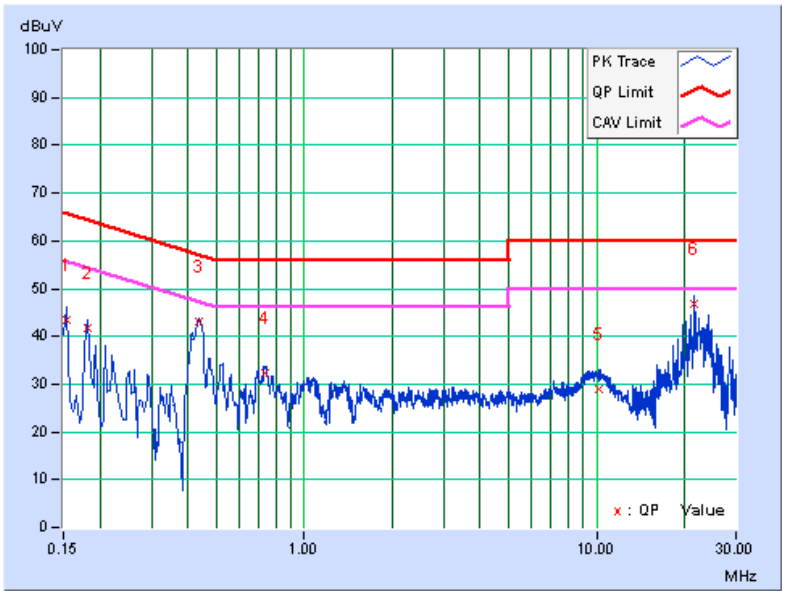
CONDUCTED WORST-CASE DATA：802.11g

PHASE	Line 1	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.08	43.52	31.87	43.60	31.95	65.79	55.79	-22.19	-23.84
2	0.18122	0.07	41.61	31.71	41.68	31.78	64.43	54.43	-22.75	-22.65
3	0.43464	0.08	43.02	36.67	43.10	36.75	57.16	47.16	-14.06	-10.41
4	0.73814	0.10	32.25	25.30	32.35	25.40	56.00	46.00	-23.65	-20.60
5	10.14396	0.52	28.52	23.38	29.04	23.90	60.00	50.00	-30.96	-26.10
6	21.66282	1.09	45.84	42.73	46.93	43.82	60.00	50.00	-13.07	-6.18

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

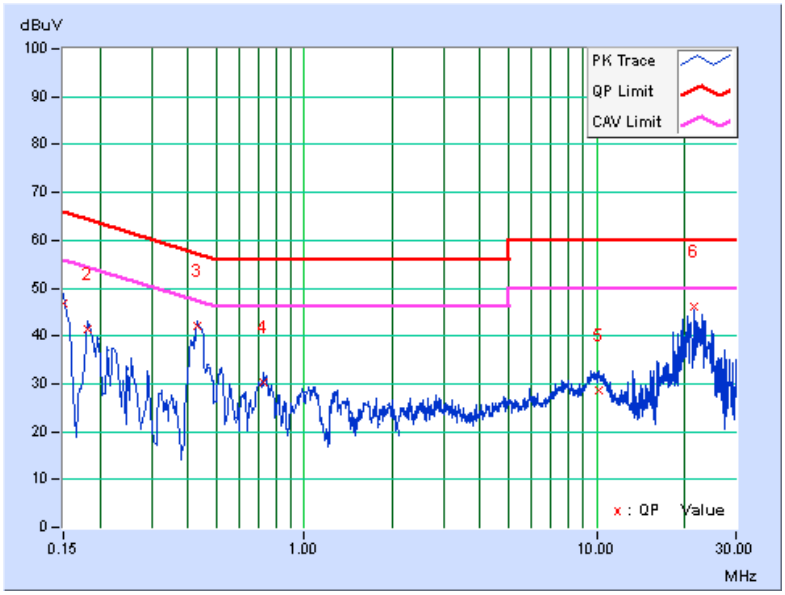


PHASE	Line 2	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	46.80	37.06	46.85	37.11	66.00	56.00	-19.15	-18.89
2	0.18128	0.05	41.42	30.69	41.47	30.74	64.43	54.43	-22.96	-23.69
3	0.43122	0.07	41.94	33.84	42.01	33.91	57.23	47.23	-15.22	-13.32
4	0.72465	0.08	30.15	21.69	30.23	21.77	56.00	46.00	-25.77	-24.23
5	10.19088	0.45	28.10	22.70	28.55	23.15	60.00	50.00	-31.45	-26.85
6	**21.66282**	**0.95**	**45.05**	**43.10**	**46.00**	**44.05**	**60.00**	**50.00**	**-14.00**	**-5.95**

REMARKS:

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

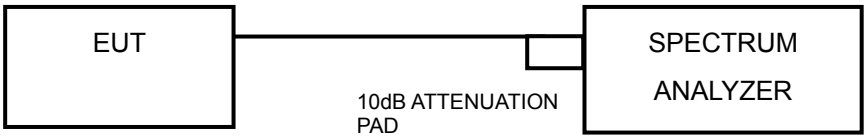


4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 TEST PROCEDURE

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

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11g

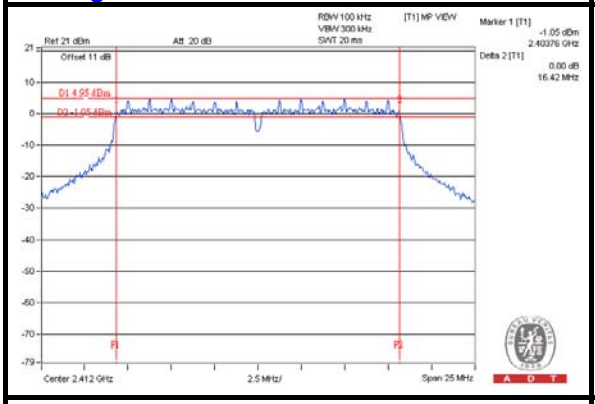
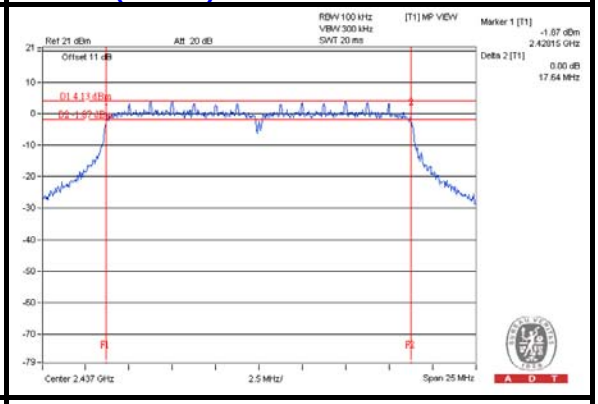
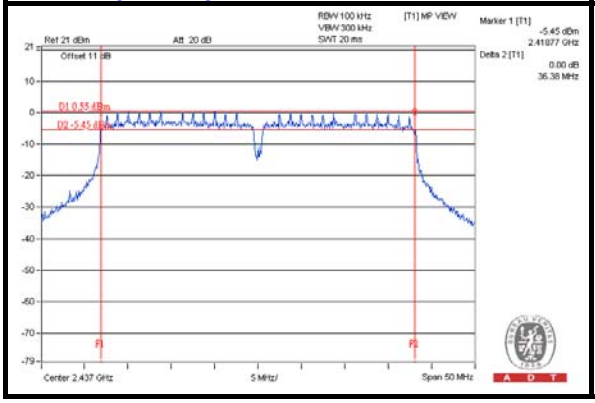
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.42	0.5	PASS
6	2437	16.38	0.5	PASS
11	2462	16.42	0.5	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.63	17.62	17.63	0.5	PASS
6	2437	17.64	17.62	17.61	0.5	PASS
11	2462	17.63	17.64	17.63	0.5	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	36.16	36.22	36.37	0.5	PASS
6	2437	36.17	36.38	36.10	0.5	PASS
9	2452	36.17	36.15	36.14	0.5	PASS

SPECTRUM PLOT OF WORST VALUE	
802.11g	**802.11n (20MHz)**
	
802.11n (40MHz)	
	

4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

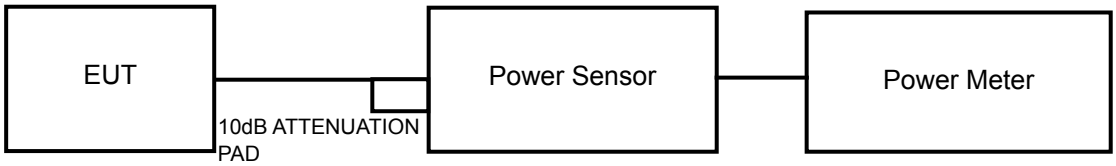
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) 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

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	335.738	25.26	30	PASS
6	2437	755.092	28.78	30	PASS
11	2462	369.828	25.68	30	PASS

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	22.01	21.68	22.20	472.045	26.74	30	PASS
6	2437	24.78	24.56	25.15	**913.708**	29.61	30	PASS
11	2462	22.09	21.75	21.49	452.361	26.55	30	PASS

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	19.05	19.15	19.76	257.201	24.10	30	PASS
6	2437	25.07	24.55	24.47	886.366	29.48	30	PASS
9	2452	19.99	19.61	19.93	289.582	24.62	30	PASS

FOR AVERAGE POWER

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	44.771	16.51
6	2437	203.704	23.09
11	2462	38.815	15.89

802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	11.80	11.62	12.07	45.763	16.61
6	2437	15.72	15.59	15.71	110.788	20.44
11	2462	12.47	12.56	12.37	52.948	17.24

802.11n (40MHz)

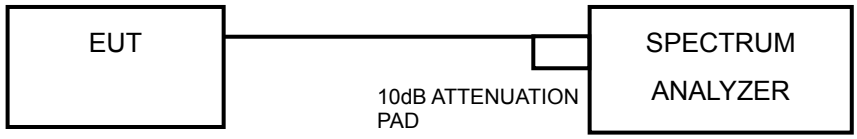
CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	9.54	9.50	9.78	27.414	14.38
6	2437	14.87	15.11	15.14	95.783	19.81
9	2452	10.42	10.23	10.49	32.753	15.15

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

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 × RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) 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

802.11g

Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	PASS /FAIL
1	2412	-9.05	8	PASS
6	2437	-2.29	8	PASS
11	2462	-9.23	8	PASS

802.11n (20MHz)

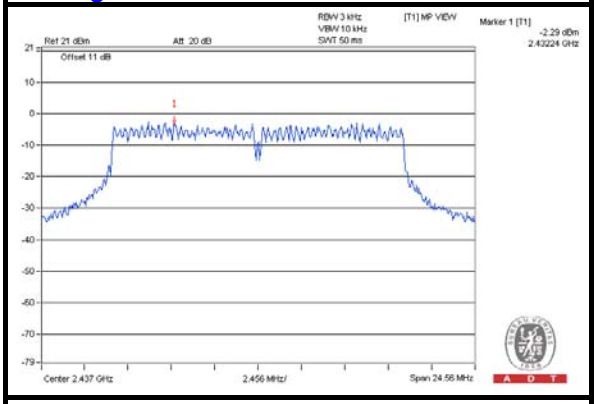
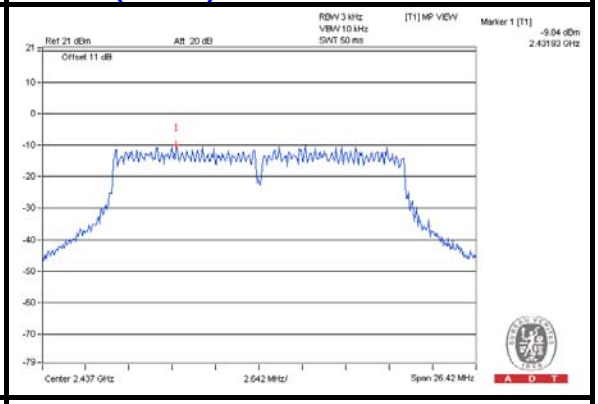
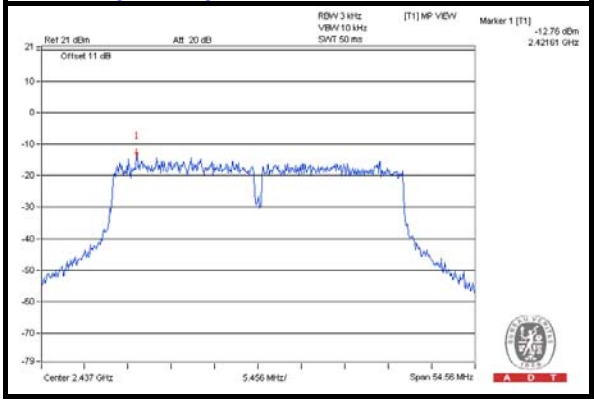
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-13.10	4.77	-8.33	5.23	PASS
	6	2437	-10.45	4.77	-5.68	5.23	PASS
	11	2462	-13.51	4.77	-8.74	5.23	PASS
1	1	2412	-14.61	4.77	-9.84	5.23	PASS
	6	2437	-10.82	4.77	-6.05	5.23	PASS
	11	2462	-13.87	4.77	-9.10	5.23	PASS
2	1	2412	-13.45	4.77	-8.68	5.23	PASS
	6	2437	-9.84	4.77	-5.07	5.23	PASS
	11	2462	-13.80	4.77	-9.03	5.23	PASS

NOTE: Directional gain = 4dBi + 10log(3) = 8.77dBi > 6dBi , so the power density limit shall be reduced to 8-(8.77-6) = 5.23dBm.

802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	3	2422	-19.44	4.77	-14.67	5.23	PASS
	6	2437	-15.43	4.77	-10.66	5.23	PASS
	9	2452	-18.41	4.77	-13.64	5.23	PASS
1	3	2422	-19.41	4.77	-14.64	5.23	PASS
	6	2437	-12.76	4.77	-7.99	5.23	PASS
	9	2452	-18.09	4.77	-13.32	5.23	PASS
2	3	2422	-19.38	4.77	-14.61	5.23	PASS
	6	2437	-13.37	4.77	-8.60	5.23	PASS
	9	2452	-19.06	4.77	-14.29	5.23	PASS

NOTE: Directional gain = 4dBi + 10log(3) = 8.77dBi > 6dBi , so the power density limit shall be reduced to 8-(8.77-6) = 5.23dBm.

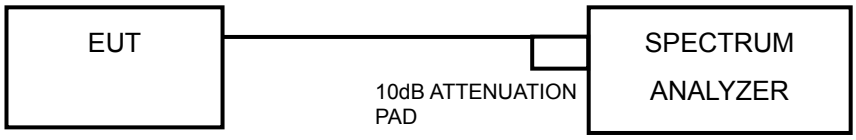
SPECTRUM PLOT OF WORST VALUE	
802.11g	802.11n (20MHz)
	
802.11n (40MHz)	
	

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

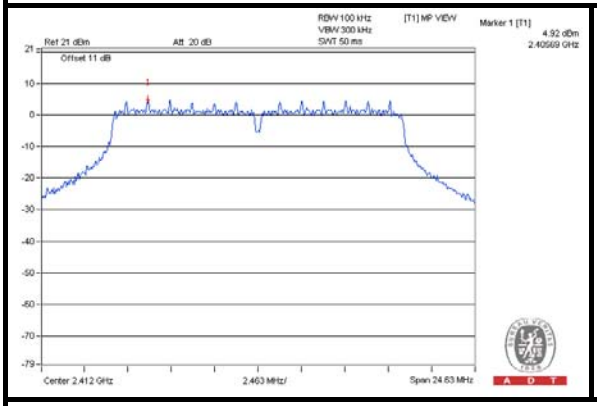
4.6.7 TEST RESULTS

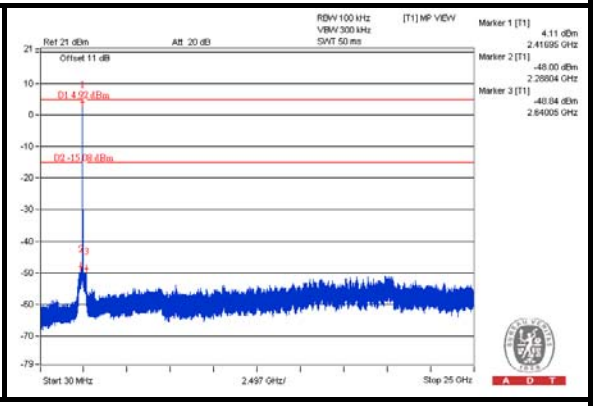
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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

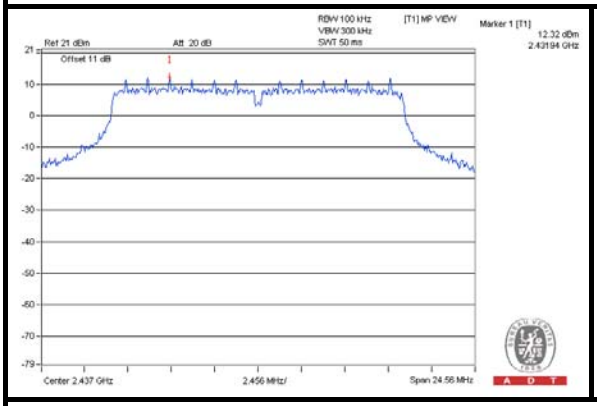
802.11g

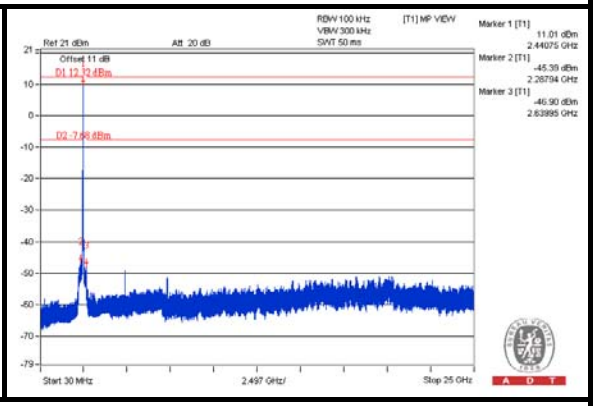
CH 1



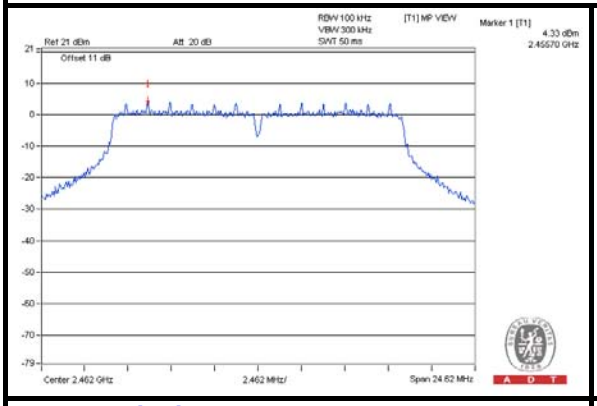


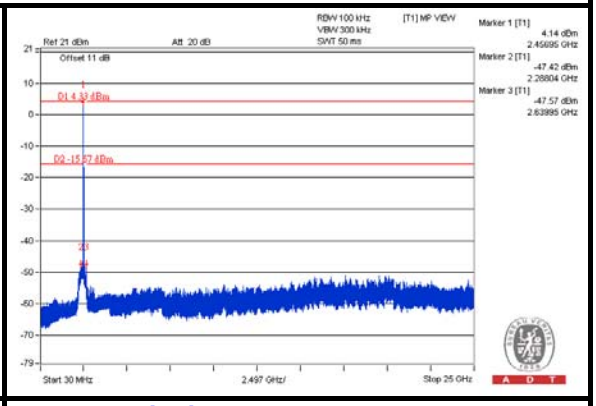
CH 6



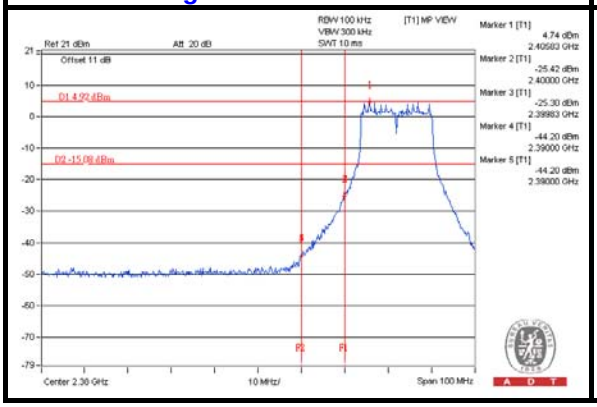


CH 11

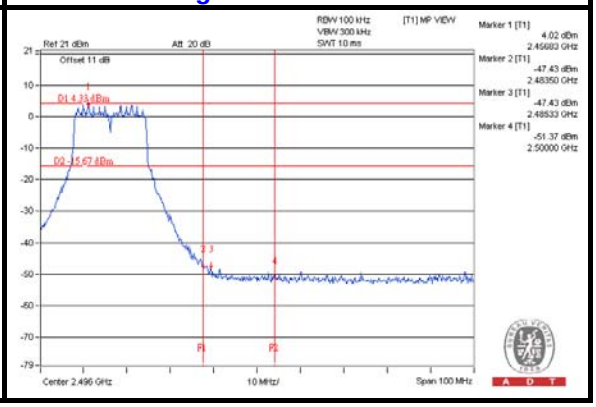




CH 1 Band edge

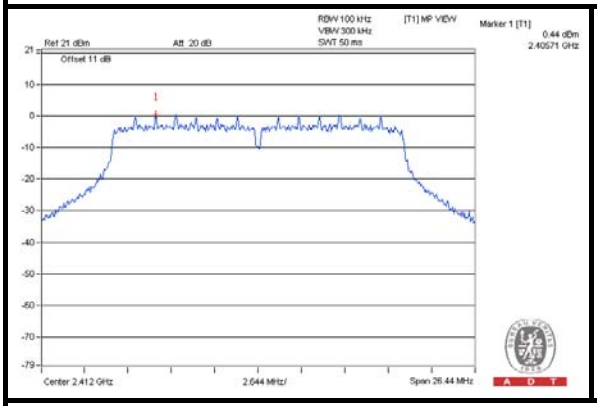


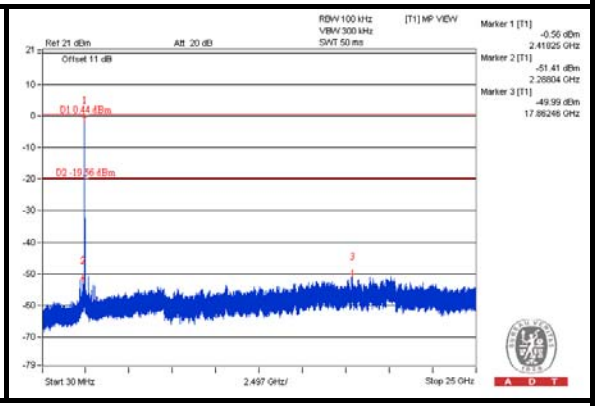
CH 11 Band edge



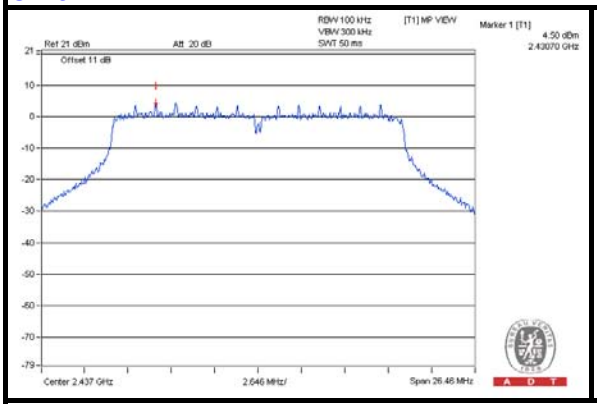
802.11n (20MHz)
CHAIN 0

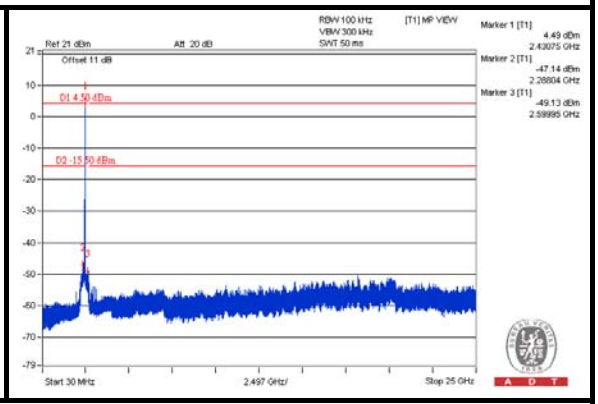
CH 1



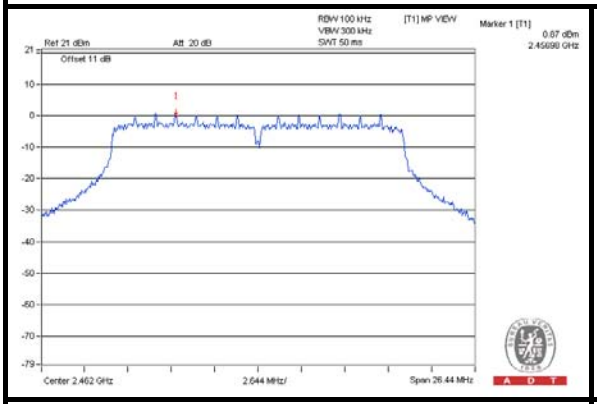


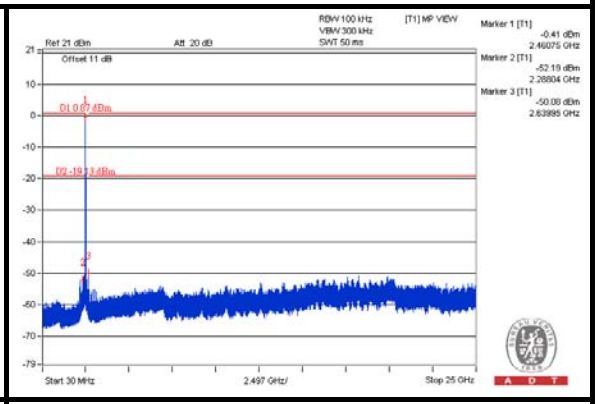
CH 6



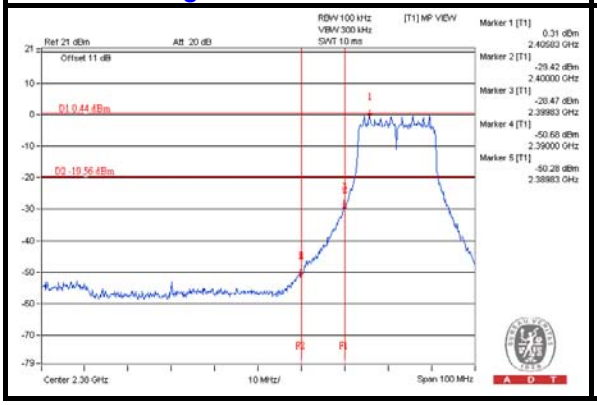


CH 11

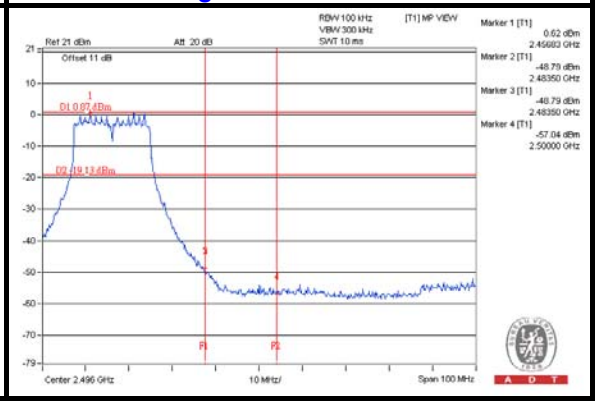




CH 1 Band edge

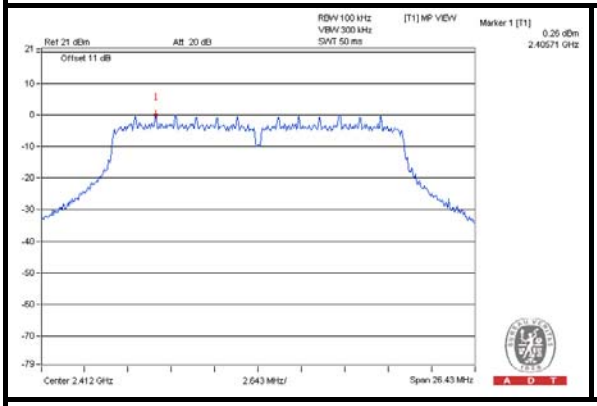


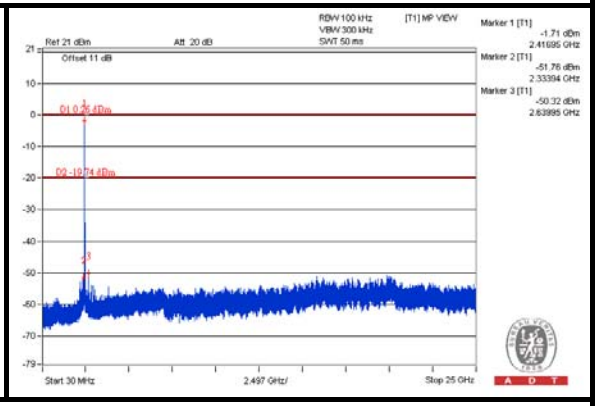
CH 11 Band edge



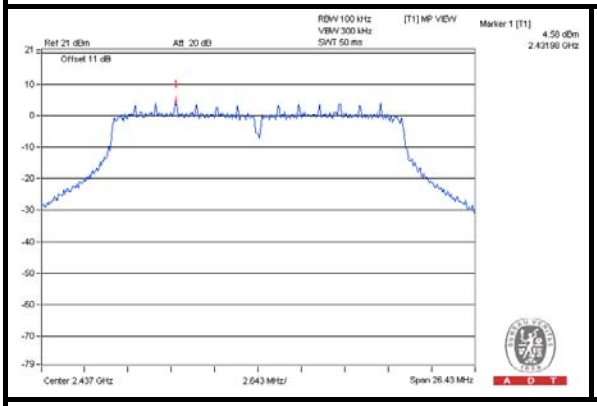
CHAIN 1

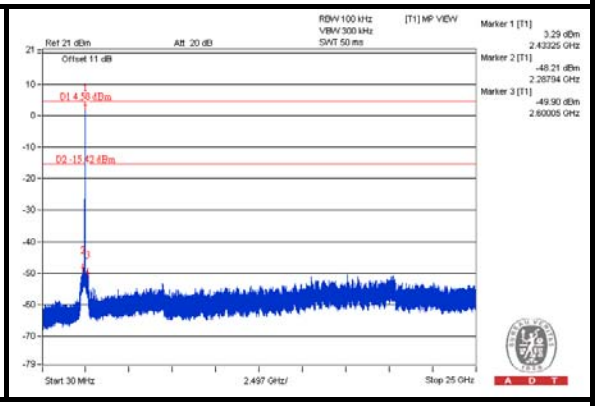
CH 1



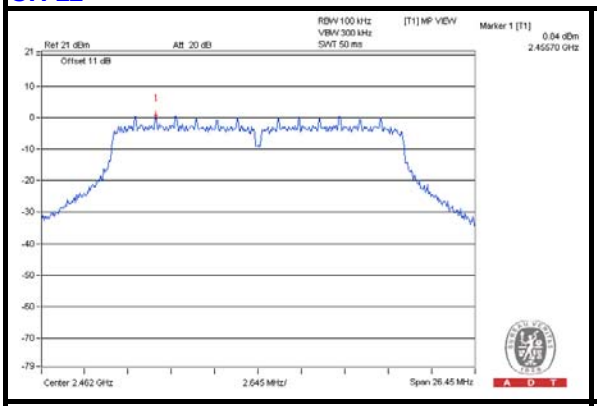


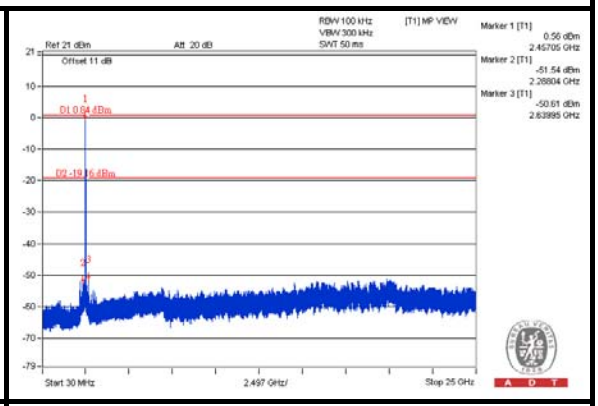
CH 6



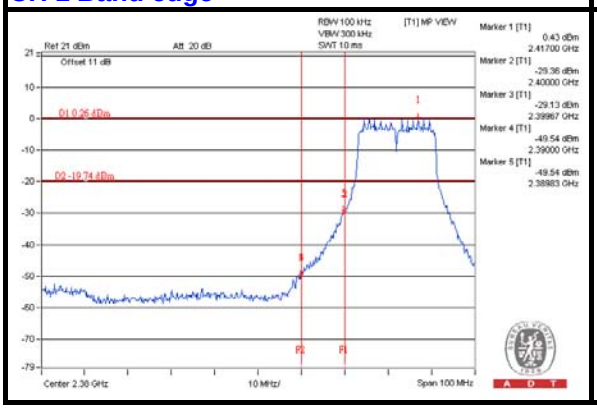


CH 11

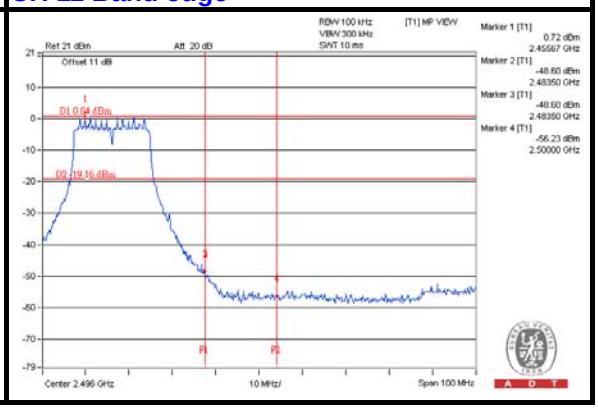




CH 1 Band edge

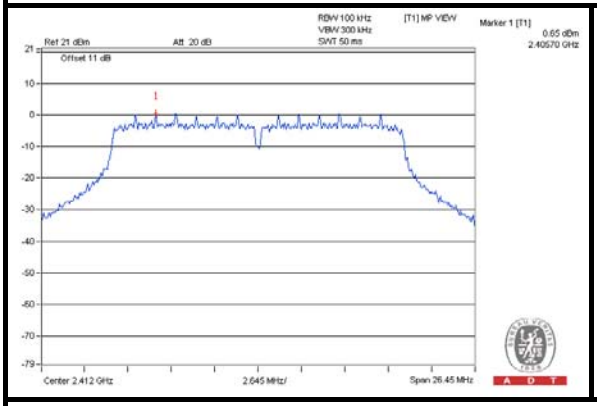


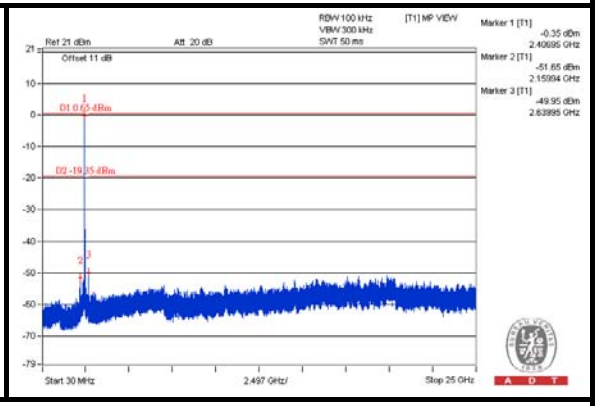
CH 11 Band edge



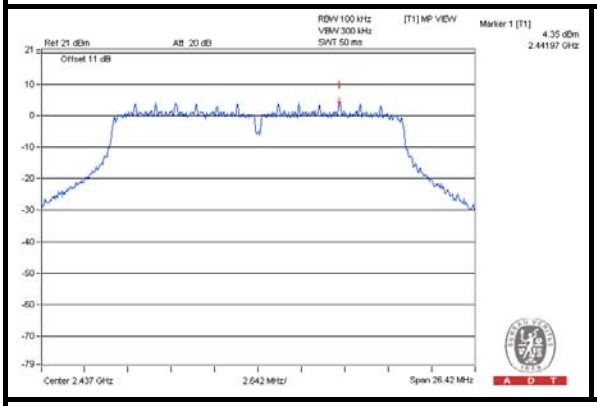
CHAIN 2

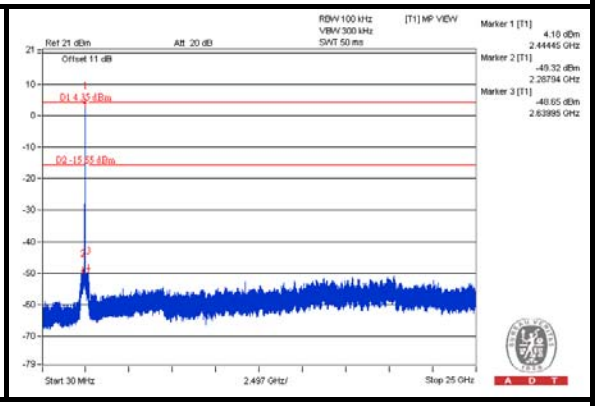
CH 1



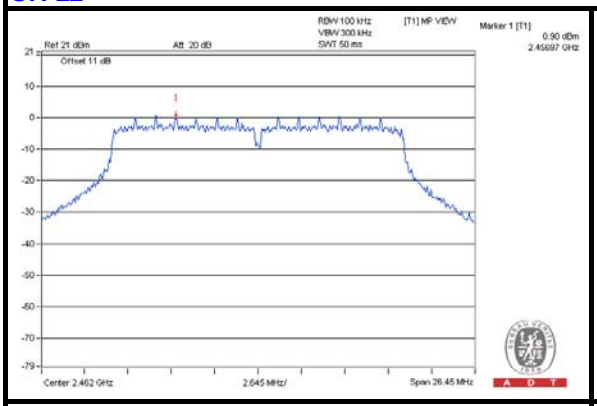


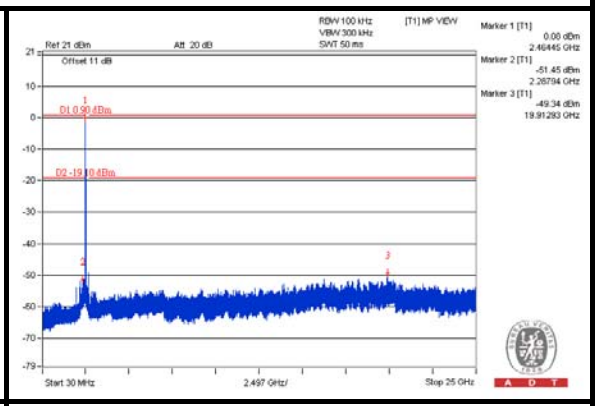
CH 6



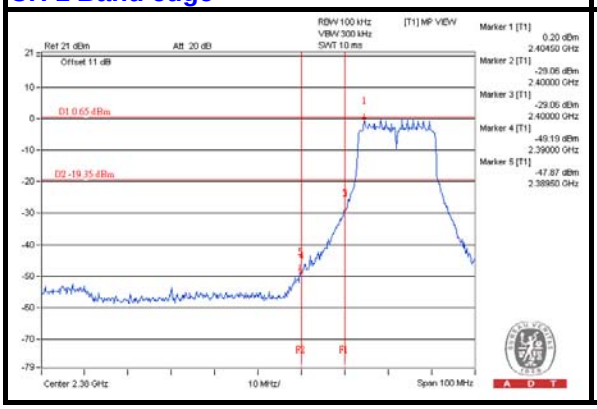


CH 11

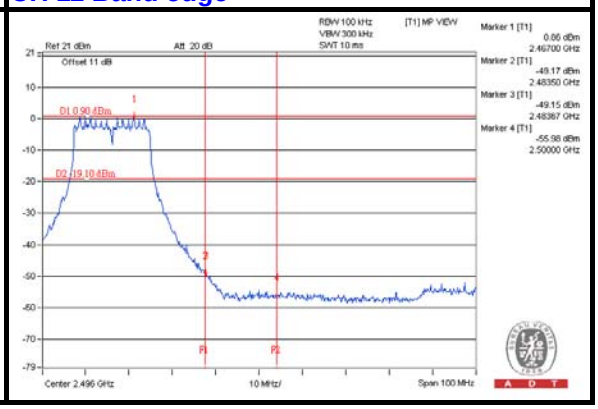




CH 1 Band edge

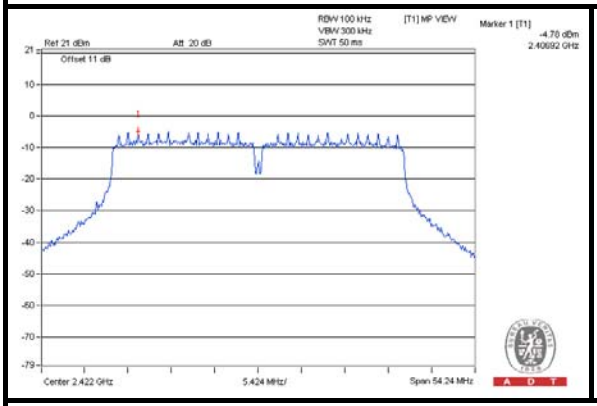


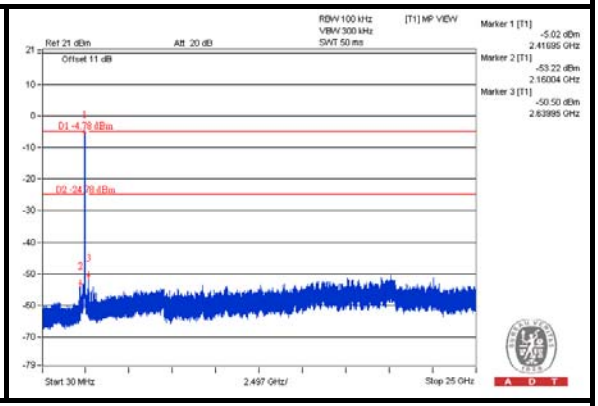
CH 11 Band edge



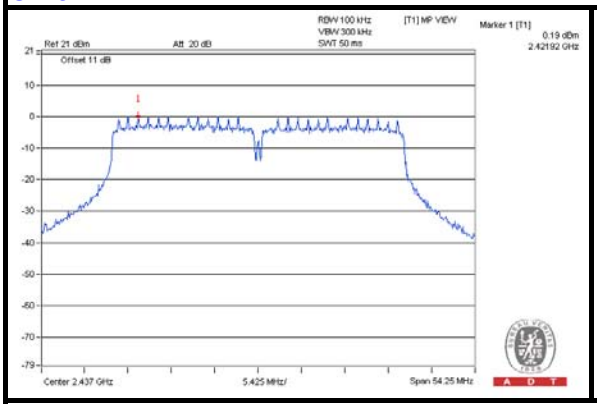
802.11n (40MHz)
CHAIN 0

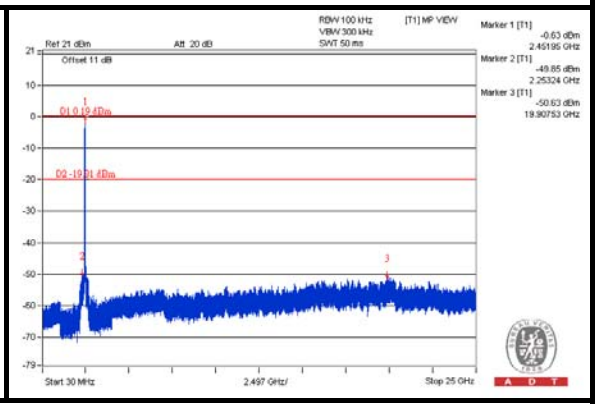
CH 3



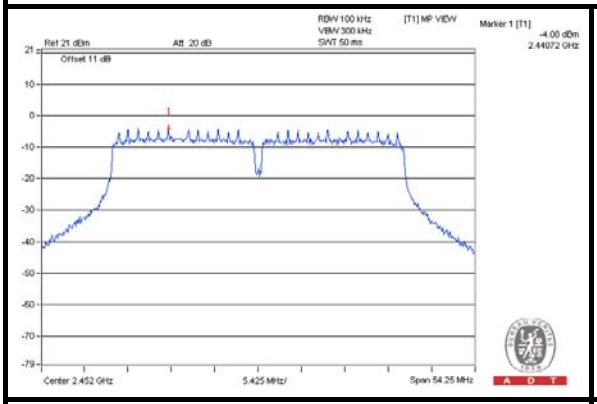


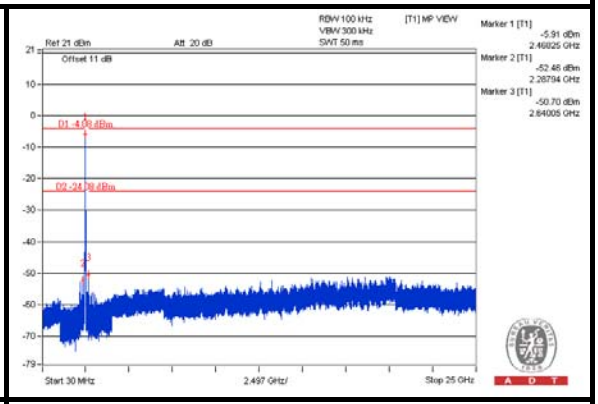
CH 6



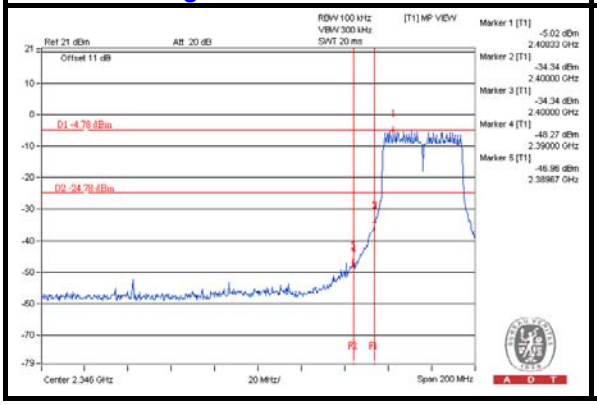


CH 9

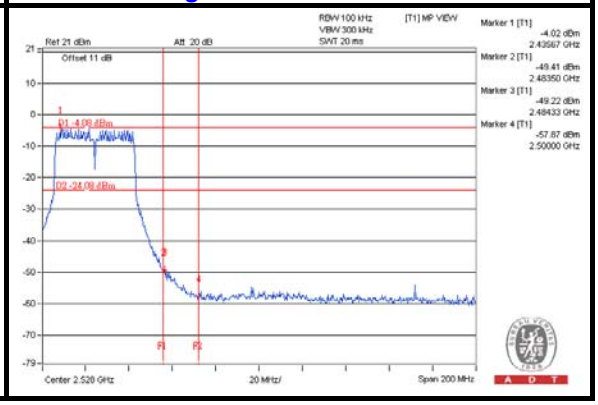




CH 3 Band edge

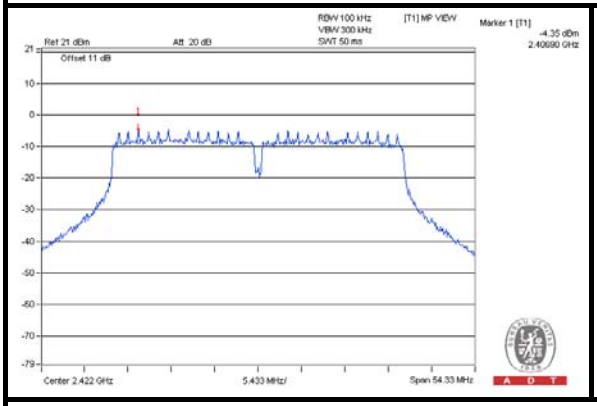


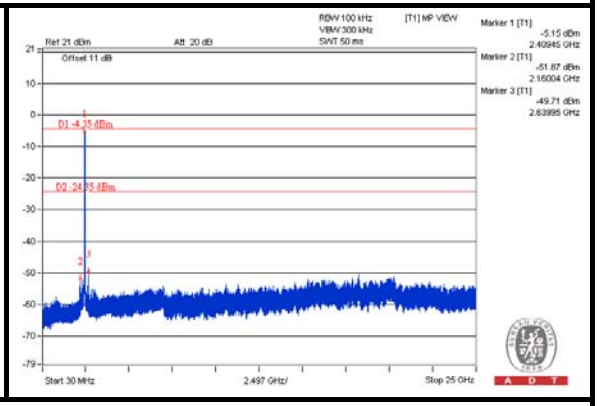
CH 9 Band edge



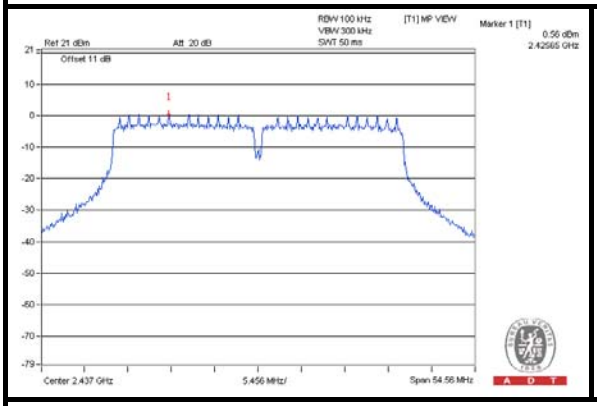
CHAIN 1

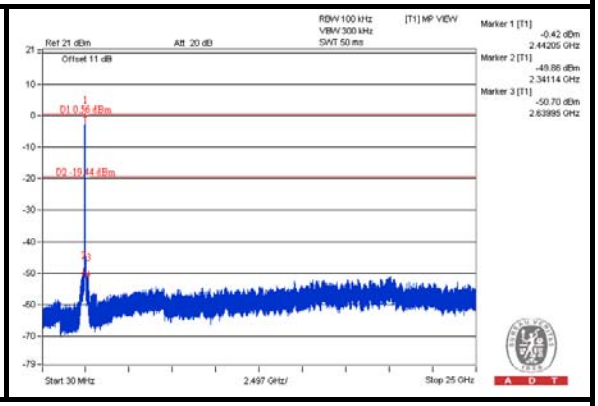
CH 3



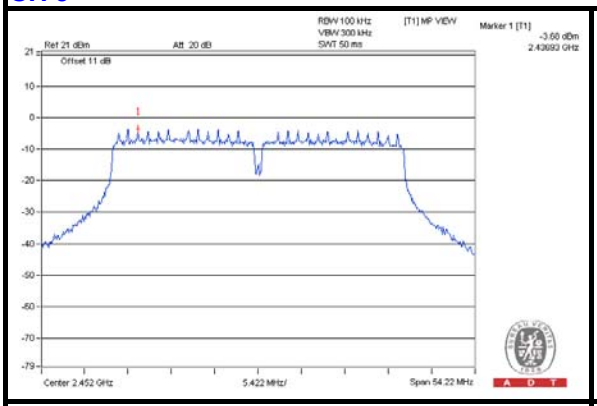


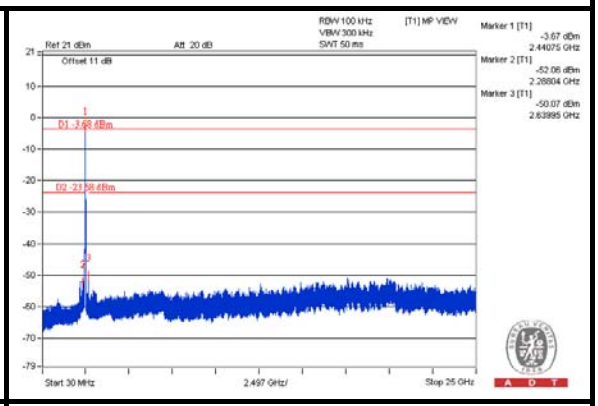
CH 6



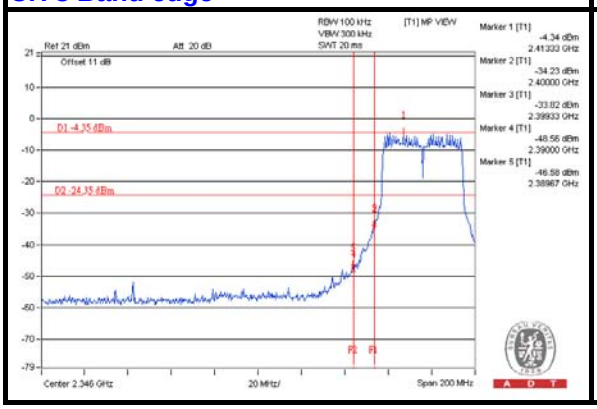


CH 9

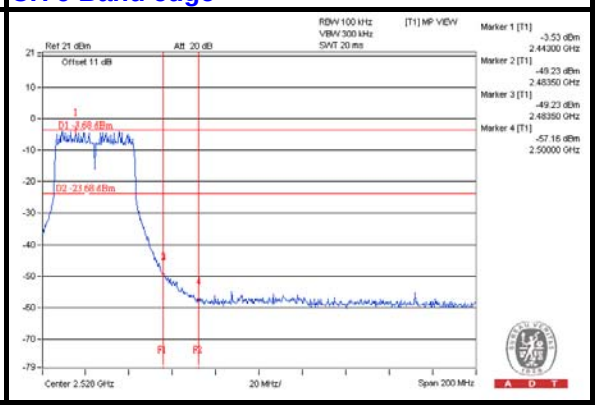




CH 3 Band edge

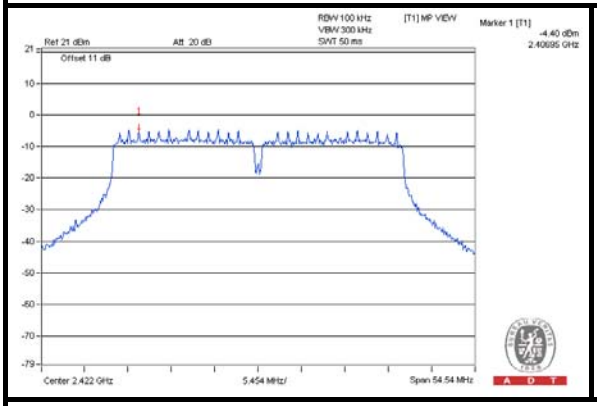


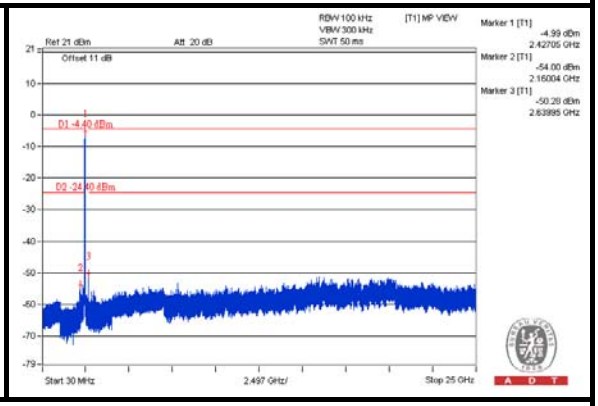
CH 9 Band edge



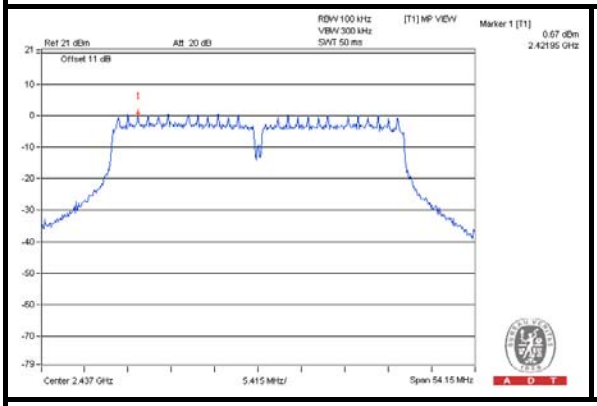
CHAIN 2

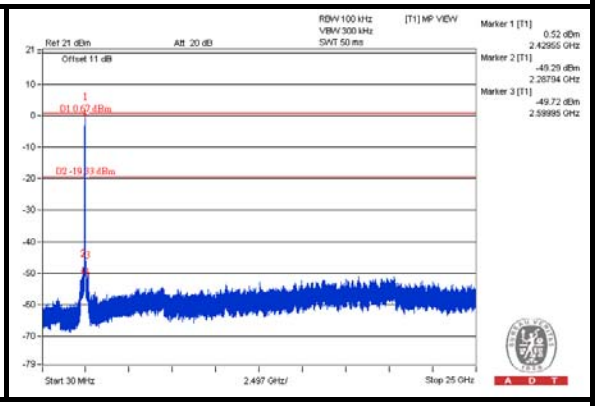
CH 3



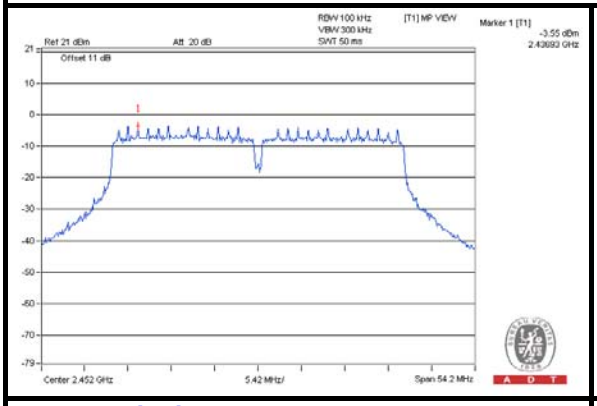


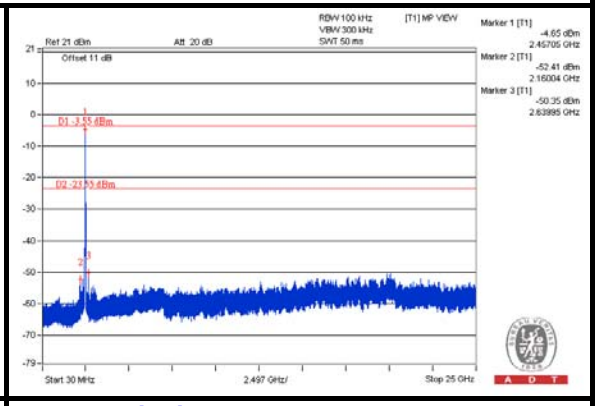
CH 6



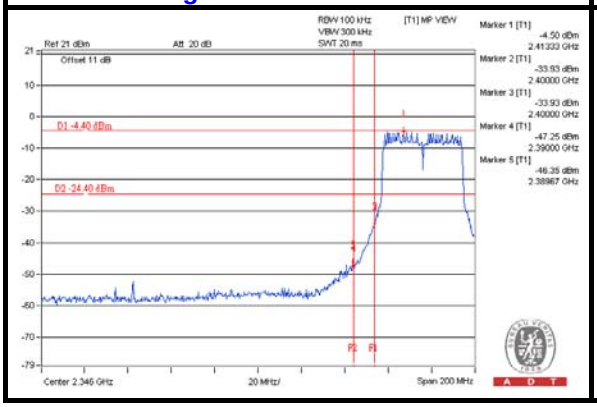


CH 9

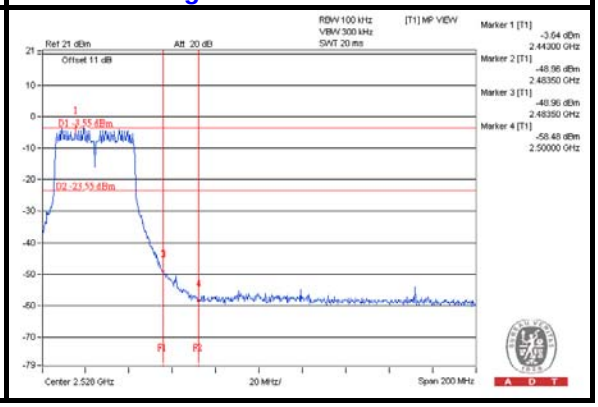




CH 3 Band edge



CH 9 Band edge



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. 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:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab:
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Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab:
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

7. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---