FCC TEST REPORT (15.247)

IC TEST REPORT (RSS-210 Issue 8 (2010-12))

REPORT NO.:	RF140213C04 R1
MODEL NO.:	FORTIAP-221Cxxxxxx (Refer to item 3.1 for more details)
FCC ID:	TVE-121402
IC:	7280B-121402
RECEIVED:	Feb. 13, 2014
TESTED:	Feb. 18 ~ Feb. 25, 2014
ISSUED:	Mar. 06, 2014

APPLICANT:	Fortinet Inc.
ADDRESS:	899 Kifer Road Sunnyvale, CA 94086, USA

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47, 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
RF140213C04	Original release	Feb. 25, 2014
RF140213C04 R1	Updated report title on page 1	Mar. 06, 2014

1. CERTIFICATION

PRODUCT:	Security Wireless Access Point
MODEL NO.:	FORTIAP-221Cxxxxxx (Refer to item 3.1 for more details)
BRAND:	Fortinet
APPLICANT:	Fortinet Inc.
TESTED:	Feb. 18 ~ Feb. 25, 2014
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)**
	Canada RSS-210 Issue 8 (2010-12)
	Canada RSS-Gen Issue 3 (2010-12)
	ANSI C63.10-2009

The above equipment (model: FORTIAP-221C) 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. 06, 2014

Celine Chou / Specialist

APPROVED BY : Ken Liu **, DATE :** Mar. 06, 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); RSS-210; RSS-Gen				
STANDARD SECTION		TEST TYPE	RESULT	REMARK
FCC Part 15C	Canada Standard			
15.207	RSS-Gen 7.2.4	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -4.15dB at 0.48984MHz.
-	RSS-Gen 4.6	Occupied Bandwidth Measurement	PASS	Meet the requirement of limit.
15.247(d) 15.209	RSS-210 A8.5	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 4824.00, 4874.00, 2390.00, 2483.50 and 11650.00MHz.
15.247(d)	RSS-210 A8.5	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a) (2)	RSS-210 A8.2 (a)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	RSS-210 A8.4 (4)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	RSS-210 A8.2 (b)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	-	Antenna Requirement	PASS	No antenna connector is used.

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.34 dB
	200MHz ~1000MHz	3.35 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 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	Security Wireless Access Point
MODEL NO.	FORTIAP-221Cxxxxxx (Refer to note for more details)
POWER SUPPLY	12Vdc (Adapter) 48Vdc (POE)
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 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps
OPERATING FREQUENCY	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5745 ~ 5825MHz
NUMBER OF CHANNEL	2.4GHz: 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) 5.0GHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	995.485mW for 2412 ~ 2462MHz 243.726mW for 5745 ~ 5825MHz
ANTENNA TYPE	Refer to note
ANTENNA CONNECTOR	Refer to note
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	NA

NOTE:

1. The following models are provided to this EUT.

BRAND	MODEL	DESCRIPTION
Fortinet	FORTIAP-221Cxxxxxx	where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only
	FAP-221Cxxxxxx	

* The model FORTIAP-221C was chosen for final test.

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

MODULATION MODE	TX FUNCTION
802.11b	2TX
802.11g	2TX
802.11a	2TX
802.11n (20MHz) (MCS 0-15)	2TX
802.11n (40MHz) (MCS 0-15)	2TX

3. There are 4 antennas for the EUT.

No.	Type	Gain(dBi)		Connector	Remark
		2.4GHz	5GHz		
1	PIFA	2	-	NA	2.4G use
2	PIFA	3.5	-	NA	
3	PIFA	-	4	NA	5G on board use
4	PIFA	-	5	NA	

4. The following adapter, POE & POE's adapter are supports only.

ADAPTER	
BRAND	Powertron Electronics Corp.
MODEL	PA1024-2HUB PA1024-120HUB200
INPUT POWER	100-240Vac, 50-60Hz, 0.6A
OUTPUT POWER	12Vdc, 2.0A, 24W Max
POWER LINE	1.5m cable with one core attached on adapter

POE	
BRAND	EnGenius
MODEL	EPE-48GR
INPUT POWER	48Vdc, 0.8A, 38.4W Max

ADAPTER For POE USED	
BRAND	Ruckus
MODEL	PA1024-4HU
INPUT POWER	100-240Vac, 50-60Hz, 0.6A
OUTPUT POWER	48Vdc, 0.42A, 21W Max
POWER LINE	1.5m cable without core attached on adapter

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 DESCRIPTION OF TEST MODES

FOR 2.4GHz:

11 channels are provided for 802.11b, 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		

FOR 5.0GHz (5745 ~ 5825MHz):

5 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR 2.4GHz:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Powered by adapter
B	-	√	√	-	Powered by POE

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

NOTE:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. "-" means no effect.

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 (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
A	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)
A & B	802.11g	1 to 11	6	OFDM	BPSK	6.0

POWER LINE CONDUCTED EMISSION TEST:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A & B	802.11g	1 to 11	6	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)
A	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
A	802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	7.2
A	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)
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 (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
A	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
PLC	20deg. C, 70%RH	120Vac, 60Hz	Martin Lee
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

FOR 5.0GHz (5745 ~ 5825MHz):

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Powered by adapter
B	-	√	√	-	Powered by POE

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

NOTE:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
2. "-" means no effect.

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	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
A	802.11n (40MHz)	151 to 159	151, 159	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)
A & B	802.11n (20MHz)	149 to 165	165	OFDM	BPSK	7.2

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)
A & B	802.11n (20MHz)	149 to 165	165	OFDM	BPSK	7.2

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)
A	802.11a	149 to 165	149, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 165	OFDM	BPSK	7.2
A	802.11n (40MHz)	151 to 159	151, 159	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)
A	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
A	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
PLC	20deg. C, 70%RH	120Vac, 60Hz	Martin Lee
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

3.3 DUTY CYCLE OF TEST SIGNAL

2.4GHz Band:

802.11b: Duty cycle of test signal is > 98 %

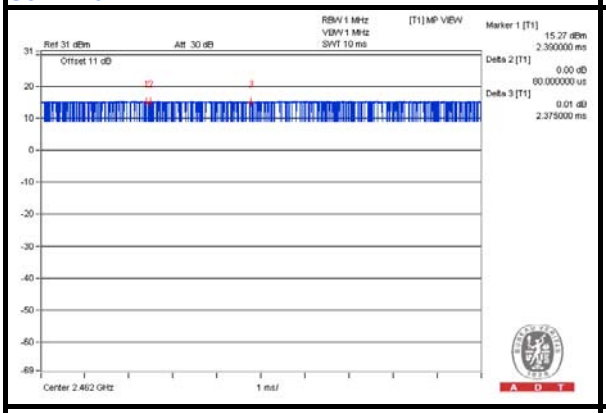
802.11g, 802.11n (20MHz), 802.11n (40MHz): Duty cycle of test signal is < 98 %

802.11g: Duty cycle = 2.023/2.075 = 0.976, Duty factor = 10 * log(1/0.976) = 0.11

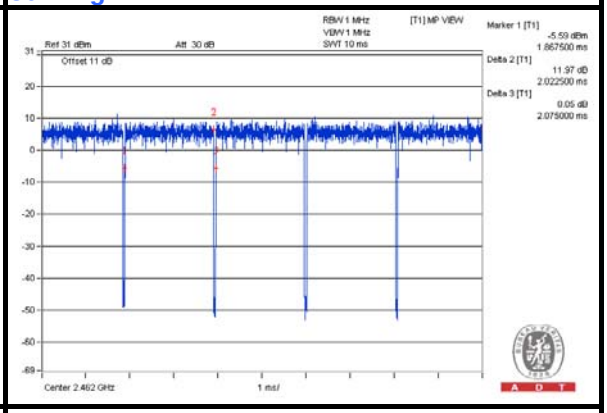
802.11n (20MHz): Duty cycle = 1.885/1.940 = 0.969, Duty factor = 10 * log(1/0.969) = 0.14

802.11n (40MHz): Duty cycle = 0.913/0.960 = 0.951, Duty factor = 10 * log(1/0.951) = 0.22

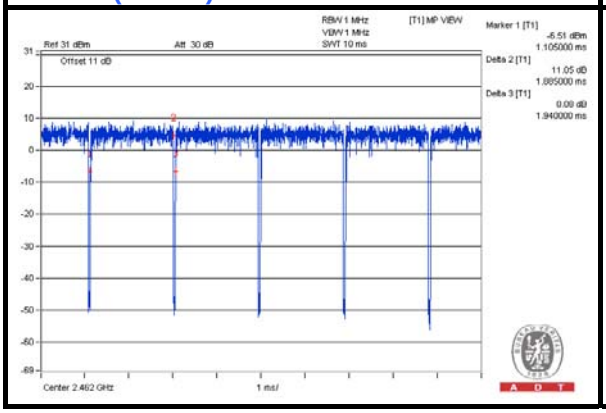
802.11b



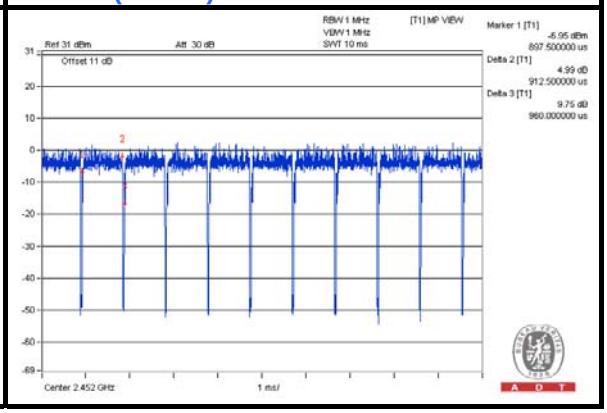
802.11g



802.11n (20MHz)



802.11n (40MHz)



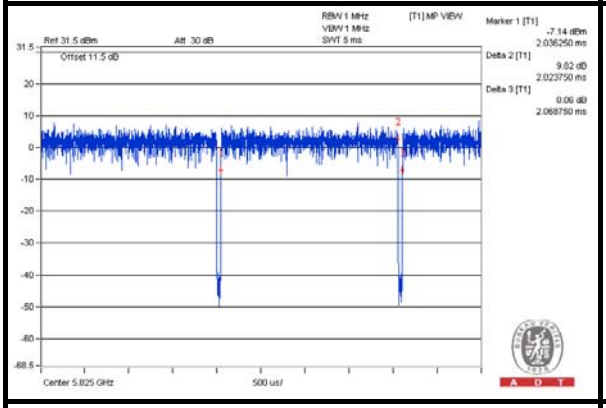
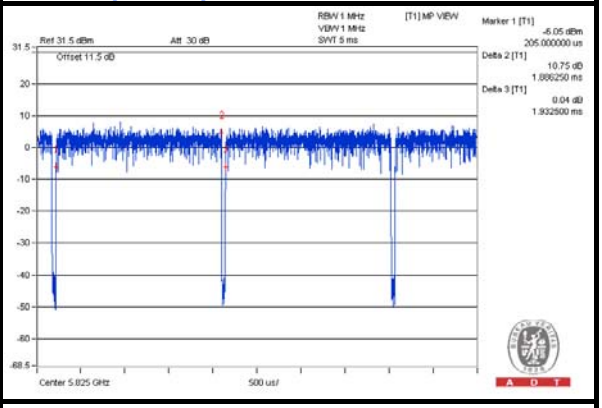
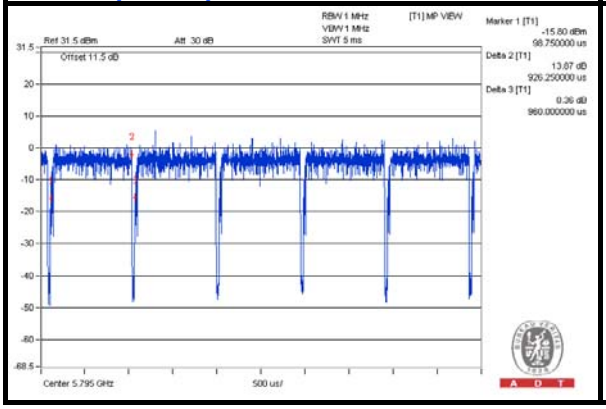
5.0GHz Band:

802.11a: Duty cycle of test signal is > 98 %

802.11n (20MHz), 802.11n (40MHz): Duty cycle of test signal is < 98%

802.11n (20MHz): Duty cycle = 1.886/1.933 = 0.974, Duty factor = 10 * log(1/0.974) = 0.11

802.11n (40MHz): Duty cycle = 0.926/0.960 = 0.965, Duty factor = 10 * log(1/0.965) = 0.15

802.11a	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	NOTEBOOK	DELL	E5410	1HC2XM1	FCC Doc Approved
2	POE	ENGENIUS	EPE-48GR	NA	NA
3	ADAPTER	RUCKUS	PA1024-4HU	NA	NA

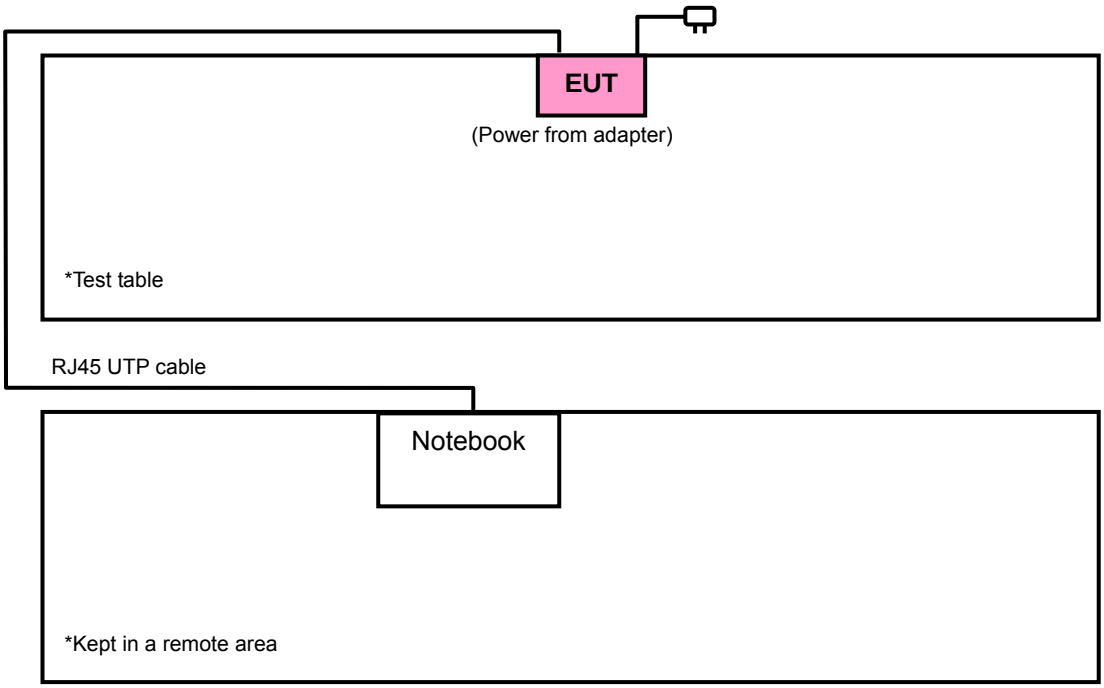
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable for test mode A, 1.8m RJ45 UTP cable for test mode B
2	10m RJ45 UTP cable
3	NA

NOTE:

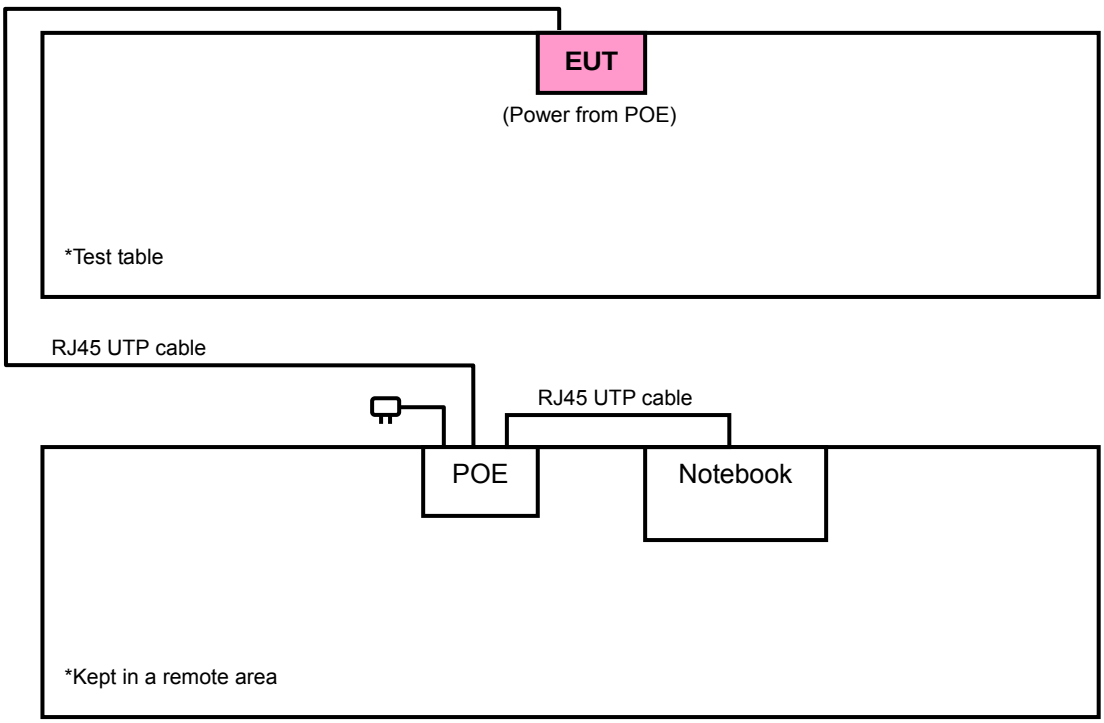
1. All power cords of the above support units are non-shielded (1.8 m).
2. Item 1 acted as a communication partner to transfer data.
3. Items 2-3 were provided by the manufacturer.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST

TEST MODE A



TEST MODE B



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 v03r01
662911 D01 Multiple Transmitter Output v02r01
Canada RSS-210 Issue 8 (2010-12)
Canada RSS-Gen Issue 3 (2010-12)
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 (FOR 2.4GHz BAND)

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	ESIB7	100187	Jan. 02, 2014	Jan. 01, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jan. 31, 2014	Jan. 30, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Mar. 20, 2013	Mar. 19, 2014
HORN Antenna SCHWARZBECK	9120D	209	Sep. 12, 2013	Sep. 11, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8447D	2944A10633	Oct. 07, 2013	Oct. 06, 2014
Preamplifier Agilent	8449B	3008A01964	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/4	Aug. 26, 2013	Aug. 25, 2014
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
High Speed Peak Power Meter	ML2495A	0824012	Aug. 22, 2013	Aug. 21, 2014
Power Sensor	MA2411B	0738171	Jul. 30, 2013	Jul. 29, 2014

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

4.1.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters 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. The antenna is a broadband antenna, and its height 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:

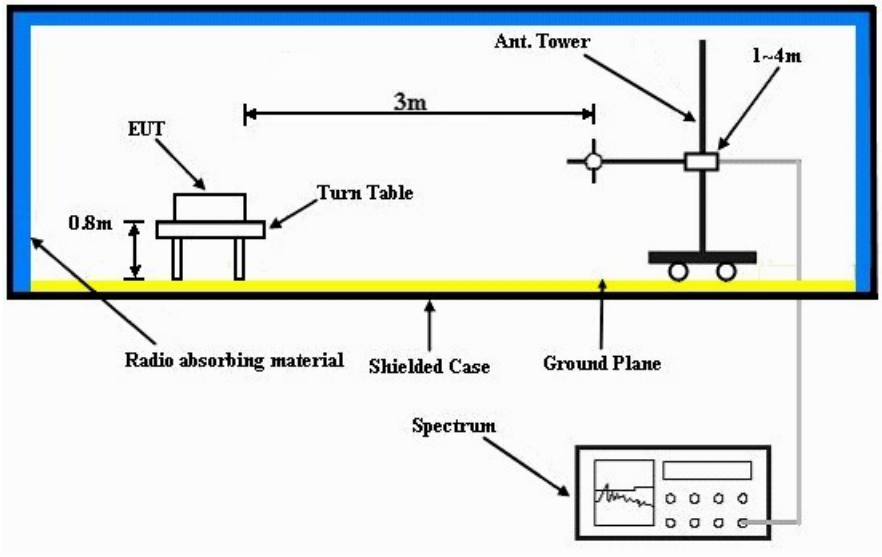
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution 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

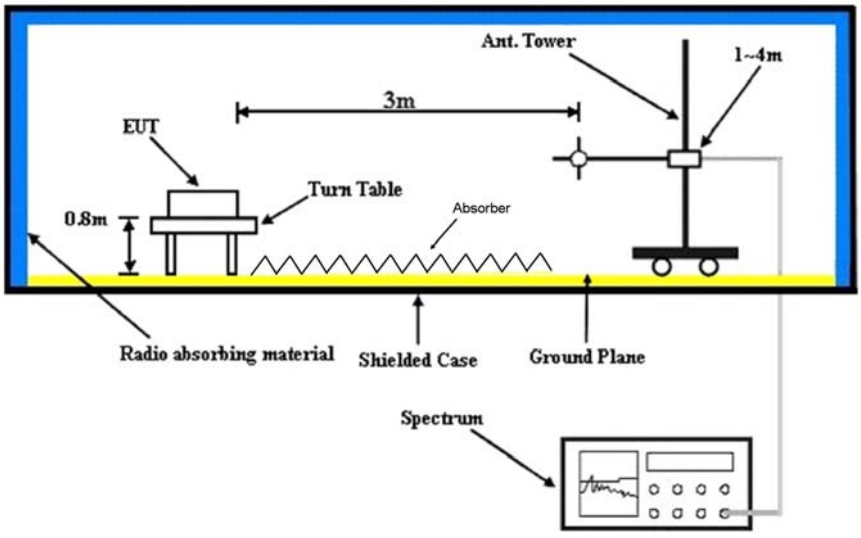
No deviation.

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 notebooks to act as communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and run 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 DATA：

802.11b

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.2 PK	74.0	-16.8	1.10 H	40	26.20	31.00
2	2390.00	46.6 AV	54.0	-7.4	1.10 H	40	15.60	31.00
3	*2412.00	111.8 PK			1.34 H	37	80.70	31.10
4	*2412.00	108.2 AV			1.34 H	37	77.10	31.10
5	4824.00	54.5 PK	74.0	-19.5	1.00 H	4	49.60	4.90
6	4824.00	52.2 AV	54.0	-1.8	1.00 H	4	47.30	4.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	22.9 PK	74.0	-51.1	1.00 V	173	25.30	-2.40
2	2390.00	12.2 AV	54.0	-41.8	1.00 V	173	14.60	-2.40
3	*2412.00	109.6 PK			1.00 V	209	78.50	31.10
4	*2412.00	105.9 AV			1.00 V	209	74.80	31.10
5	4824.00	56.8 PK	74.0	-17.2	1.61 V	75	51.90	4.90
6	**4824.00**	**53.0 AV**	**54.0**	**-1.0**	**1.61 V**	**75**	**48.10**	**4.90**

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	54.6 PK	74.0	-19.4	1.27 H	78	23.60	31.00
2	2390.00	45.6 AV	54.0	-8.4	1.27 H	78	14.60	31.00
3	*2437.00	111.1 PK			1.28 H	80	79.90	31.20
4	*2437.00	107.4 AV			1.28 H	80	76.20	31.20
5	2483.50	55.4 PK	74.0	-18.6	1.27 H	78	24.00	31.40
6	2483.50	44.9 AV	54.0	-9.1	1.27 H	78	13.50	31.40
7	4874.00	54.5 PK	74.0	-19.5	1.74 H	89	49.50	5.00
8	4874.00	52.0 AV	54.0	-2.0	1.74 H	89	47.00	5.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.5 PK	74.0	-18.5	1.00 V	144	24.50	31.00
2	2390.00	44.4 AV	54.0	-9.6	1.00 V	144	13.40	31.00
3	*2437.00	111.4 PK			1.50 V	150	80.20	31.20
4	*2437.00	107.5 AV			1.50 V	150	76.30	31.20
5	2483.50	55.9 PK	74.0	-18.1	1.00 V	175	24.50	31.40
6	2483.50	45.5 AV	54.0	-8.5	1.00 V	175	14.10	31.40
7	4874.00	56.3 PK	74.0	-17.7	1.00 V	77	51.30	5.00
8	**4874.00**	**53.0 AV**	**54.0**	**-1.0**	**1.00 V**	**77**	**48.00**	**5.00**

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	112.7 PK			1.32 H	33	81.40	31.30
2	*2462.00	108.9 AV			1.32 H	33	77.60	31.30
3	2483.50	57.9 PK	74.0	-16.1	1.32 H	33	26.50	31.40
4	2483.50	52.1 AV	54.0	-1.9	1.32 H	33	20.70	31.40
5	4924.00	53.3 PK	74.0	-20.7	1.16 H	60	48.10	5.20
6	4924.00	50.2 AV	54.0	-3.8	1.16 H	60	45.00	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	*2462.00	109.1 PK			1.72 V	232	77.80	31.30
2	*2462.00	105.6 AV			1.72 V	232	74.30	31.30
3	2483.50	58.3 PK	74.0	-15.7	1.15 V	316	26.90	31.40
4	2483.50	47.0 AV	54.0	-7.0	1.15 V	316	15.60	31.40
5	4924.00	54.7 PK	74.0	-19.3	1.15 V	42	49.50	5.20
6	4924.00	52.4 AV	54.0	-1.6	1.15 V	42	47.20	5.20

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

802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	71.8 PK	74.0	-2.2	2.05 H	261	40.80	31.00
2	**2390.00**	**53.0 AV**	**54.0**	**-1.0**	**2.05 H**	**261**	**22.00**	**31.00**
3	*2412.00	108.9 PK			2.08 H	261	77.80	31.10
4	*2412.00	99.7 AV			2.08 H	261	68.60	31.10
5	4824.00	50.9 PK	74.0	-23.1	1.59 H	291	46.00	4.90
6	4824.00	35.1 AV	54.0	-18.9	1.59 H	291	30.20	4.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.4 PK	74.0	-7.6	1.24 V	200	35.40	31.00
2	2390.00	51.1 AV	54.0	-2.9	1.24 V	200	20.10	31.00
3	*2412.00	108.4 PK			1.24 V	200	77.30	31.10
4	*2412.00	98.6 AV			1.24 V	200	67.50	31.10
5	4824.00	50.5 PK	74.0	-23.5	1.00 V	46	45.60	4.90
6	4824.00	38.7 AV	54.0	-15.3	1.00 V	46	33.80	4.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	68.8 PK	74.0	-5.2	1.33 H	286	37.80	31.00
2	2390.00	51.6 AV	54.0	-2.4	1.33 H	286	20.60	31.00
3	*2437.00	115.7 PK			1.30 H	234	84.50	31.20
4	*2437.00	106.3 AV			1.30 H	234	75.10	31.20
5	2483.50	71.4 PK	74.0	-2.6	1.30 H	229	40.00	31.40
6	2483.50	52.5 AV	54.0	-1.5	1.30 H	229	21.10	31.40
7	4874.00	58.8 PK	74.0	-15.2	1.57 H	90	53.80	5.00
8	4874.00	45.0 AV	54.0	-9.0	1.57 H	90	40.00	5.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.8 PK	74.0	-13.2	1.18 V	200	29.80	31.00
2	2390.00	50.0 AV	54.0	-4.0	1.18 V	200	19.00	31.00
3	*2437.00	111.7 PK			1.16 V	7	80.50	31.20
4	*2437.00	102.7 AV			1.16 V	7	71.50	31.20
5	2483.50	65.0 PK	74.0	-9.0	1.18 V	211	33.60	31.40
6	2483.50	52.3 AV	54.0	-1.7	1.18 V	211	20.90	31.40
7	4874.00	64.2 PK	74.0	-9.8	1.00 V	78	59.20	5.00
8	4874.00	49.5 AV	54.0	-4.5	1.00 V	78	44.50	5.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	110.5 PK			1.32 H	216	79.20	31.30
2	*2462.00	101.1 AV			1.32 H	216	69.80	31.30
3	2483.50	72.0 PK	74.0	-2.0	1.32 H	230	40.60	31.40
4	**2483.50**	**53.0 AV**	**54.0**	**-1.0**	**1.32 H**	**230**	**21.60**	**31.40**
5	4924.00	50.1 PK	74.0	-23.9	1.33 H	309	44.90	5.20
6	4924.00	35.0 AV	54.0	-19.0	1.33 H	309	29.80	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	*2462.00	107.3 PK			1.22 V	202	76.00	31.30
2	*2462.00	97.9 AV			1.22 V	202	66.60	31.30
3	2483.50	69.7 PK	74.0	-4.3	1.22 V	205	38.30	31.40
4	2483.50	51.2 AV	54.0	-2.8	1.22 V	205	19.80	31.40
5	4924.00	50.3 PK	74.0	-23.7	1.10 V	289	45.10	5.20
6	4924.00	38.4 AV	54.0	-15.6	1.10 V	289	33.20	5.20

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) – 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)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	71.0 PK	74.0	-3.0	1.66 H	176	40.00	31.00
2	2390.00	52.2 AV	54.0	-1.8	1.66 H	176	21.20	31.00
3	*2412.00	107.6 PK			1.08 H	162	76.50	31.10
4	*2412.00	97.8 AV			1.08 H	162	66.70	31.10
5	4824.00	47.8 PK	74.0	-26.2	1.08 H	204	42.90	4.90
6	4824.00	35.1 AV	54.0	-18.9	1.08 H	204	30.20	4.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.2 PK	74.0	-7.8	1.25 V	221	35.20	31.00
2	2390.00	50.9 AV	54.0	-3.1	1.25 V	221	19.90	31.00
3	*2412.00	106.6 PK			1.25 V	205	75.50	31.10
4	*2412.00	97.6 AV			1.25 V	205	66.50	31.10
5	4824.00	53.8 PK	74.0	-20.2	1.16 V	45	48.90	4.90
6	4824.00	37.1 AV	54.0	-16.9	1.16 V	45	32.20	4.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	1.09 H	158	38.60	31.00
2	2390.00	52.9 AV	54.0	-1.1	1.09 H	158	21.90	31.00
3	*2437.00	115.5 PK			1.08 H	30	84.30	31.20
4	*2437.00	105.5 AV			1.08 H	30	74.30	31.20
5	2483.50	68.4 PK	74.0	-5.6	1.05 H	19	37.00	31.40
6	2483.50	52.6 AV	54.0	-1.4	1.05 H	19	21.20	31.40
7	4874.00	61.8 PK	74.0	-12.2	1.73 H	340	56.80	5.00
8	4874.00	45.3 AV	54.0	-8.7	1.73 H	340	40.30	5.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.9 PK	74.0	-9.1	1.00 V	205	33.90	31.00
2	2390.00	49.3 AV	54.0	-4.7	1.00 V	205	18.30	31.00
3	*2437.00	112.4 PK			1.00 V	205	81.20	31.20
4	*2437.00	102.9 AV			1.00 V	205	71.70	31.20
5	2483.50	67.5 PK	74.0	-6.5	1.00 V	166	36.10	31.40
6	2483.50	51.5 AV	54.0	-2.5	1.00 V	166	20.10	31.40
7	4874.00	64.5 PK	74.0	-9.5	1.00 V	76	59.50	5.00
8	4874.00	48.2 AV	54.0	-5.8	1.00 V	76	43.20	5.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.4 PK			1.06 H	162	76.10	31.30
2	*2462.00	97.6 AV			1.06 H	162	66.30	31.30
3	2483.50	69.4 PK	74.0	-4.6	1.08 H	166	38.00	31.40
4	2483.50	52.7 AV	54.0	-1.3	1.08 H	166	21.30	31.40
5	4924.00	48.4 PK	74.0	-25.6	1.33 H	252	43.20	5.20
6	4924.00	35.6 AV	54.0	-18.4	1.33 H	252	30.40	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	*2462.00	106.6 PK			1.20 V	149	75.30	31.30
2	*2462.00	97.5 AV			1.20 V	149	66.20	31.30
3	2483.50	68.2 PK	74.0	-5.8	1.20 V	176	36.80	31.40
4	2483.50	50.9 AV	54.0	-3.1	1.20 V	176	19.50	31.40
5	4924.00	53.4 PK	74.0	-20.6	1.19 V	325	48.20	5.20
6	4924.00	39.0 AV	54.0	-15.0	1.19 V	325	33.80	5.20

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) – 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)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	72.0 PK	74.0	-2.0	1.31 H	79	41.00	31.00
2	2390.00	52.7 AV	54.0	-1.3	1.31 H	79	21.70	31.00
3	*2422.00	105.5 PK			1.31 H	233	74.30	31.20
4	*2422.00	95.5 AV			1.31 H	233	64.30	31.20
5	4844.00	48.1 PK	74.0	-25.9	1.19 H	198	43.10	5.00
6	4844.00	34.6 AV	54.0	-19.4	1.19 H	198	29.60	5.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.9 PK	74.0	-4.1	1.00 V	192	38.90	31.00
2	2390.00	50.4 AV	54.0	-3.6	1.00 V	192	19.40	31.00
3	*2422.00	102.9 PK			1.00 V	206	71.70	31.20
4	*2422.00	93.9 AV			1.00 V	206	62.70	31.20
5	4844.00	47.9 PK	74.0	-26.1	1.09 V	48	42.90	5.00
6	4844.00	34.2 AV	54.0	-19.8	1.09 V	48	29.20	5.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	66.0 PK	74.0	-8.0	1.07 H	22	35.00	31.00
2	2390.00	52.8 AV	54.0	-1.2	1.07 H	22	21.80	31.00
3	*2437.00	108.4 PK			1.07 H	32	77.20	31.20
4	*2437.00	98.4 AV			1.07 H	32	67.20	31.20
5	2483.50	68.1 PK	74.0	-5.9	1.00 H	36	36.70	31.40
6	**2483.50**	**53.0 AV**	**54.0**	**-1.0**	**1.00 H**	**36**	**21.60**	**31.40**
7	4874.00	48.4 PK	74.0	-25.6	1.06 H	142	43.40	5.00
8	4874.00	35.0 AV	54.0	-19.0	1.06 H	142	30.00	5.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.3 PK	74.0	-10.7	1.00 V	278	32.30	31.00
2	2390.00	49.7 AV	54.0	-4.3	1.00 V	278	18.70	31.00
3	*2437.00	101.6 PK			1.05 V	286	70.40	31.20
4	*2437.00	92.3 AV			1.05 V	286	61.10	31.20
5	2483.50	65.0 PK	74.0	-9.0	1.05 V	209	33.60	31.40
6	2483.50	51.4 AV	54.0	-2.6	1.05 V	209	20.00	31.40
7	4874.00	47.8 PK	74.0	-26.2	1.06 V	130	42.80	5.00
8	4874.00	35.3 AV	54.0	-18.7	1.06 V	130	30.30	5.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	105.0 PK			1.05 H	29	73.70	31.30
2	*2452.00	95.6 AV			1.05 H	29	64.30	31.30
3	2483.50	68.5 PK	74.0	-5.5	1.04 H	30	37.10	31.40
4	2483.50	52.7 AV	54.0	-1.3	1.04 H	30	21.30	31.40
5	4904.00	47.2 PK	74.0	-26.8	1.09 H	359	42.10	5.10
6	4904.00	33.8 AV	54.0	-20.2	1.09 H	359	28.70	5.10
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	*2452.00	101.0 PK			1.00 V	207	69.70	31.30
2	*2452.00	91.4 AV			1.00 V	207	60.10	31.30
3	2483.50	61.8 PK	74.0	-12.2	1.00 V	207	30.40	31.40
4	2483.50	50.3 AV	54.0	-3.7	1.00 V	207	18.90	31.40
5	4904.00	46.9 PK	74.0	-27.1	1.00 V	69	41.80	5.10
6	4904.00	33.3 AV	54.0	-20.7	1.00 V	69	28.20	5.10

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.

BELOW 1GHz WORST-CASE DATA：802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	A		

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	125.17	38.0 QP	43.5	-5.5	1.50 H	75	53.80	-15.80
2	249.60	39.1 QP	46.0	-6.9	1.00 H	97	53.30	-14.20
3	374.04	38.1 QP	46.0	-7.9	1.00 H	219	49.00	-10.90
4	500.42	36.8 QP	46.0	-9.2	1.99 H	200	45.10	-8.30
5	624.85	42.1 QP	46.0	-3.9	1.24 H	196	47.60	-5.50
6	836.78	36.2 QP	46.0	-9.8	1.24 H	321	37.90	-1.70
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	35.73	34.7 QP	40.0	-5.3	1.00 V	97	49.60	-14.90
2	78.51	35.1 QP	40.0	-4.9	1.00 V	175	53.20	-18.10
3	125.17	36.8 QP	43.5	-6.7	1.00 V	86	52.60	-15.80
4	249.60	34.3 QP	46.0	-11.7	1.00 V	58	48.50	-14.20
5	374.04	36.2 QP	46.0	-9.8	1.00 V	163	47.10	-10.90
6	624.85	39.7 QP	46.0	-6.3	1.25 V	138	45.20	-5.50

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	30.2 QP	40.0	-9.8	2.00 H	260	45.10	-14.90
2	162.11	24.9 QP	43.5	-18.6	1.51 H	261	38.60	-13.70
3	249.60	32.2 QP	46.0	-13.8	1.00 H	260	46.40	-14.20
4	304.04	35.8 QP	46.0	-10.2	1.00 H	36	48.00	-12.20
5	624.85	35.6 QP	46.0	-10.4	1.25 H	142	41.10	-5.50
6	850.39	32.2 QP	46.0	-13.8	1.00 H	195	33.60	-1.40
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	43.51	28.1 QP	40.0	-11.9	1.50 V	336	42.50	-14.40
2	125.17	27.3 QP	43.5	-16.2	1.50 V	352	43.10	-15.80
3	249.60	29.8 QP	46.0	-16.2	1.99 V	184	44.00	-14.20
4	434.31	23.9 QP	46.0	-22.1	1.50 V	327	33.50	-9.60
5	624.85	32.3 QP	46.0	-13.7	1.00 V	117	37.80	-5.50
6	848.45	31.6 QP	46.0	-14.4	1.99 V	10	33.00	-1.40

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	ESCS30	100288	Nov. 17, 2013	Nov. 16, 2014
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 23, 2013	Dec. 22, 2014
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 08, 2013	Jul. 07, 2014
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

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

2. The test was performed in HwaYa Shielded Room 2.

3. The VCCI Site Registration No. is C-2047.

4.2.3 TEST PROCEDURES

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

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

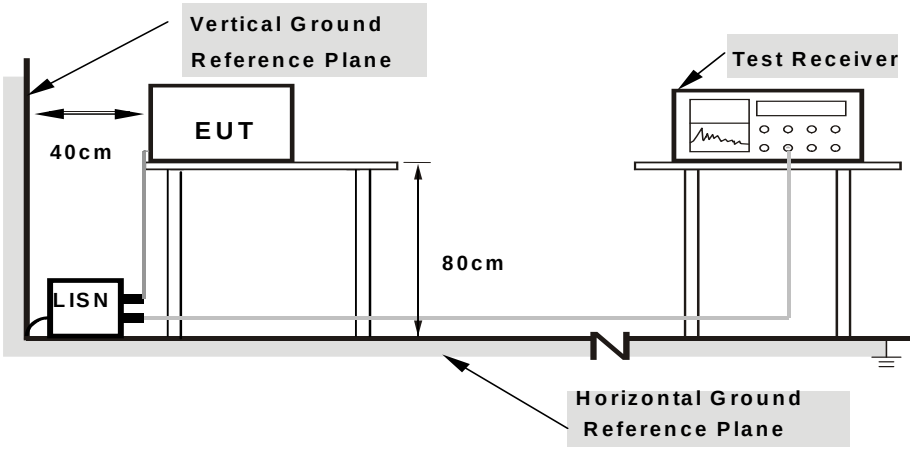
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

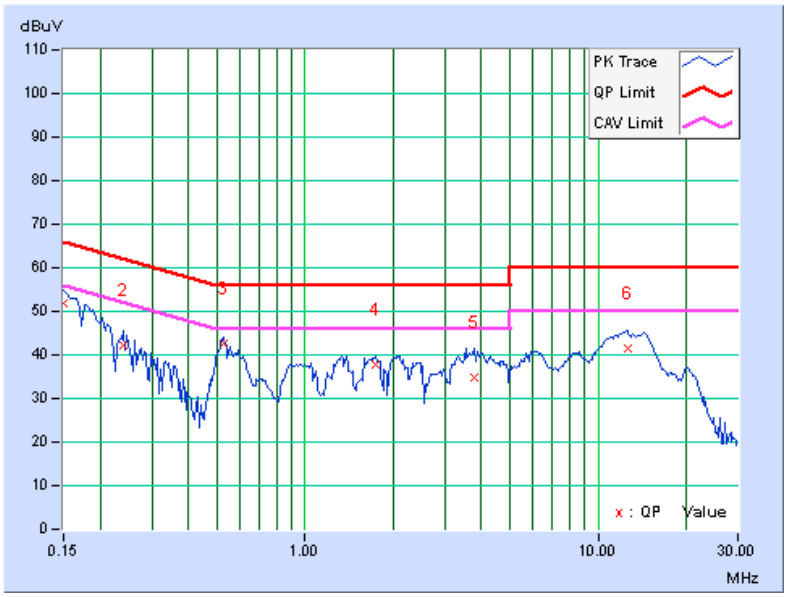
CONDUCTED WORST-CASE DATA：802.11g

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

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	0.26	51.70	33.46	51.96	33.72	66.00	56.00	-14.04	-22.28
2	0.23984	0.28	41.90	28.89	42.18	29.17	62.10	52.10	-19.92	-22.93
3	0.52500	0.31	42.18	36.18	42.49	36.49	56.00	46.00	-13.51	-9.51
4	1.74609	0.35	37.42	32.19	37.77	32.54	56.00	46.00	-18.23	-13.46
5	3.78125	0.42	34.33	26.71	34.75	27.13	56.00	46.00	-21.25	-18.87
6	12.63672	0.52	41.08	35.16	41.60	35.68	60.00	50.00	-18.40	-14.32

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

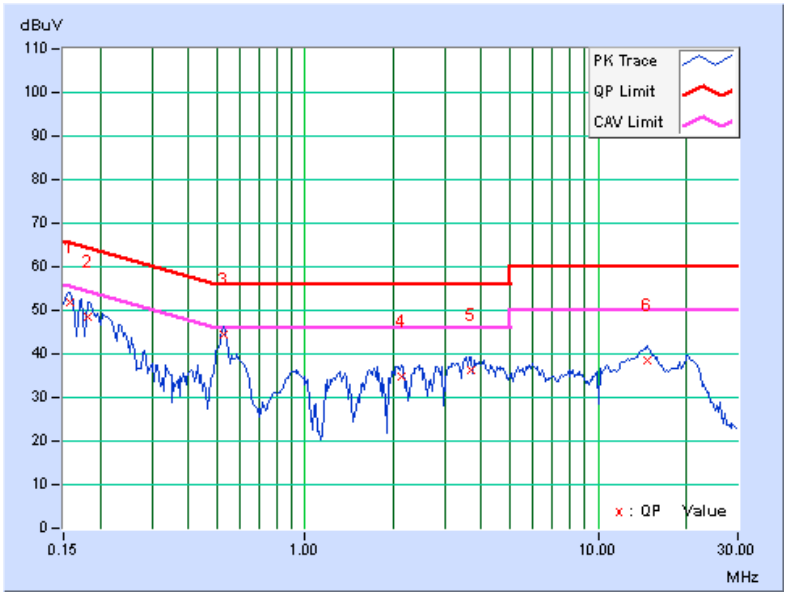


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

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	0.15781	0.27	51.47	38.04	51.74	38.31	65.58	55.58	-13.84	-17.27
2	0.18125	0.27	48.21	35.17	48.48	35.44	64.43	54.43	-15.94	-18.98
3	0.52891	0.31	44.09	37.61	44.40	37.92	56.00	46.00	-11.60	-8.08
4	2.14063	0.37	34.40	27.65	34.77	28.02	56.00	46.00	-21.23	-17.98
5	3.69922	0.43	35.75	28.42	36.18	28.85	56.00	46.00	-19.82	-17.15
6	14.63672	0.56	37.98	33.74	38.54	34.30	60.00	50.00	-21.46	-15.70

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

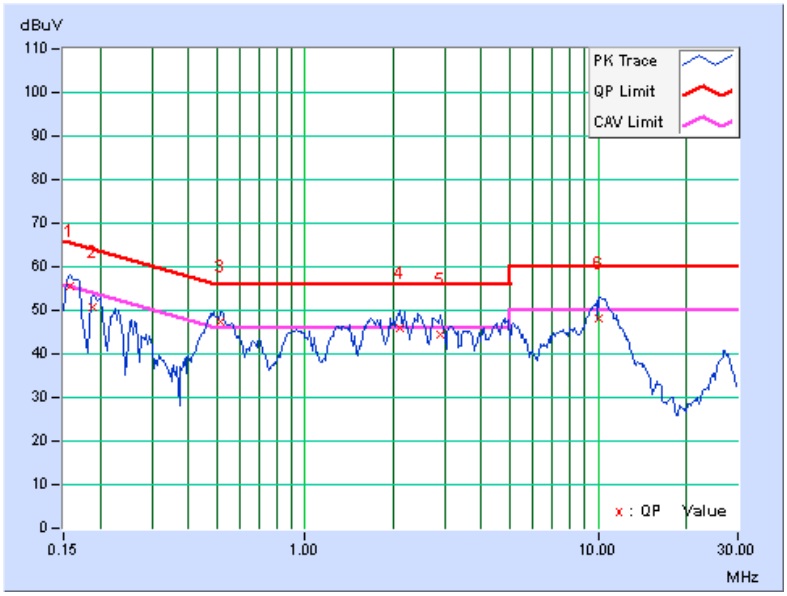


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.15781	0.27	55.27	40.58	55.54	40.85	65.58	55.58	-10.04	-14.73
2	0.18906	0.28	50.29	35.54	50.57	35.82	64.08	54.08	-13.51	-18.26
3	0.51719	0.31	47.18	39.84	47.49	40.15	56.00	46.00	-8.51	-5.85
4	2.12109	0.36	45.64	40.66	46.00	41.02	56.00	46.00	-10.00	-4.98
5	2.88672	0.39	43.98	39.20	44.37	39.59	56.00	46.00	-11.63	-6.41
6	10.03516	0.50	47.72	42.27	48.22	42.77	60.00	50.00	-11.78	-7.23

REMARKS:

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

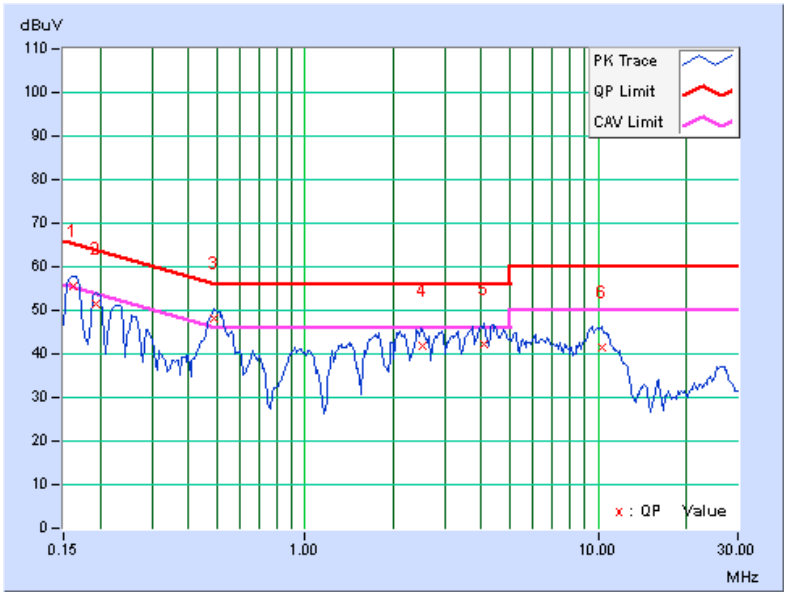


PHASE	Line 2	**6dB BANDWIDTH**	9kHz
TEST MODE	B		

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	0.16172	0.27	55.47	44.53	55.74	44.80	65.38	55.38	-9.64	-10.58
2	0.19297	0.28	51.22	40.11	51.50	40.39	63.91	53.91	-12.41	-13.52
3	**0.48984**	**0.31**	**47.95**	**41.71**	**48.26**	**42.02**	**56.17**	**46.17**	**-7.91**	**-4.15**
4	2.52344	0.39	41.64	36.86	42.03	37.25	56.00	46.00	-13.97	-8.75
5	4.07813	0.44	41.67	36.45	42.11	36.89	56.00	46.00	-13.89	-9.11
6	10.27344	0.52	40.90	34.93	41.42	35.45	60.00	50.00	-18.58	-14.55

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

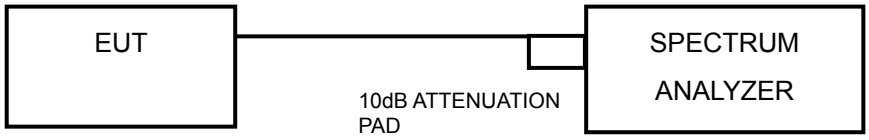


4.3 6dB BANDWIDTH MEASUREMENT

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

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	7.07	7.07	0.5	PASS
6	2437	7.04	7.07	0.5	PASS
11	2462	7.55	7.07	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.40	16.38	0.5	PASS
6	2437	16.38	16.39	0.5	PASS
11	2462	16.38	16.38	0.5	PASS

802.11n (20MHz)

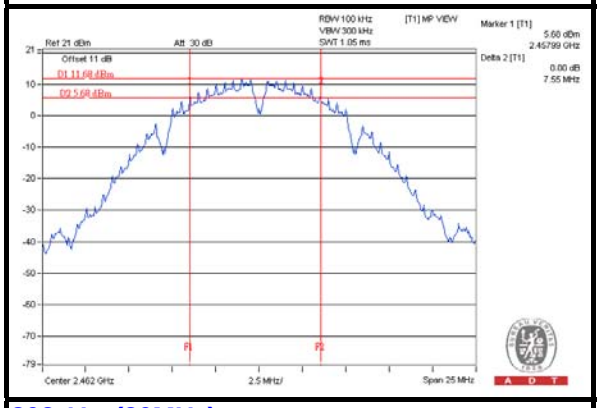
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.65	17.62	0.5	PASS
6	2437	17.59	17.61	0.5	PASS
11	2462	17.61	17.60	0.5	PASS

802.11n (40MHz)

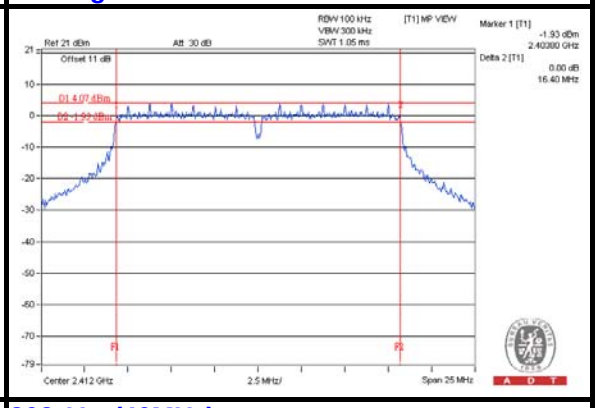
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	36.17	36.20	0.5	PASS
6	2437	36.34	36.38	0.5	PASS
9	2452	36.37	36.38	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

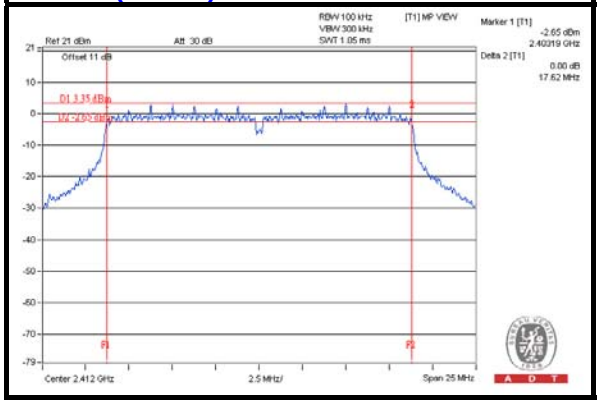
802.11b



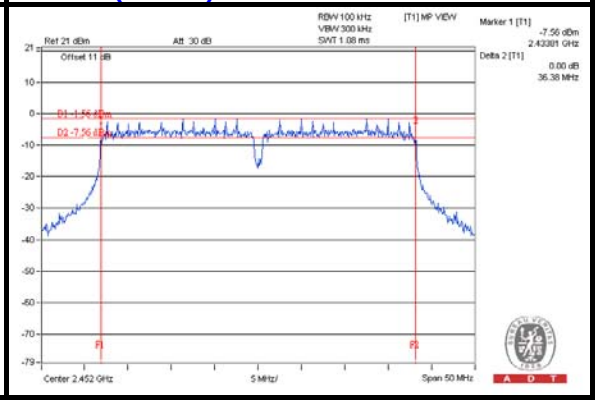
802.11g



802.11n (20MHz)

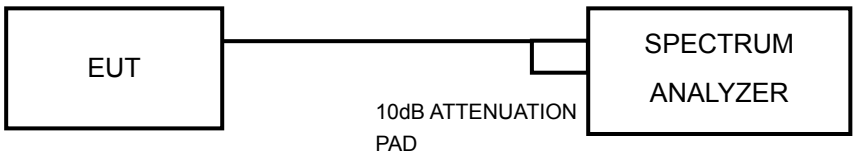


802.11n (40MHz)



4.4 OCCUPIED BANDWIDTH MEASUREMENT

4.4.1 TEST SETUP



4.4.2 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 300 kHz RBW and 1 MHz VBW. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 EUT OPERATING CONDITIONS

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

4.4.6 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
1	2412	11.83	11.74	PASS
6	2437	11.90	12.00	PASS
11	2462	11.90	12.00	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
1	2412	17.04	16.80	PASS
6	2437	20.40	22.60	PASS
11	2462	17.00	16.90	PASS

802.11n (20MHz)

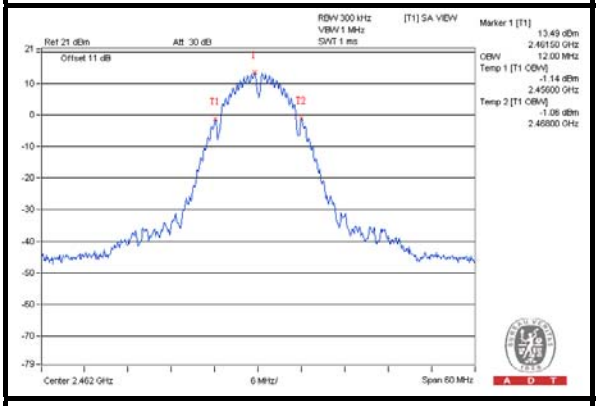
CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
1	2412	18.12	18.12	PASS
6	2437	20.60	22.80	PASS
11	2462	18.20	18.10	PASS

802.11n (40MHz)

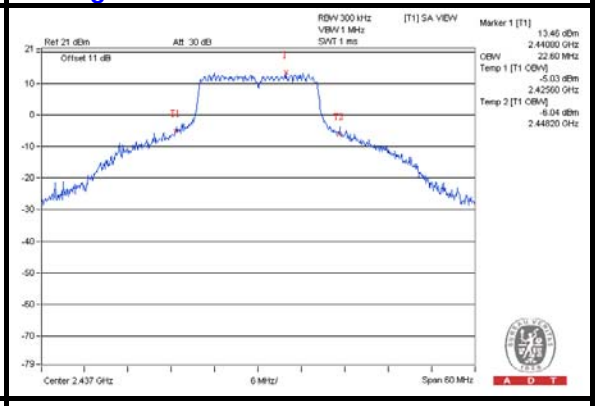
CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
3	2422	37.00	37.00	PASS
6	2437	37.17	37.17	PASS
9	2452	37.17	37.17	PASS

SPECTRUM PLOT OF WORST VALUE

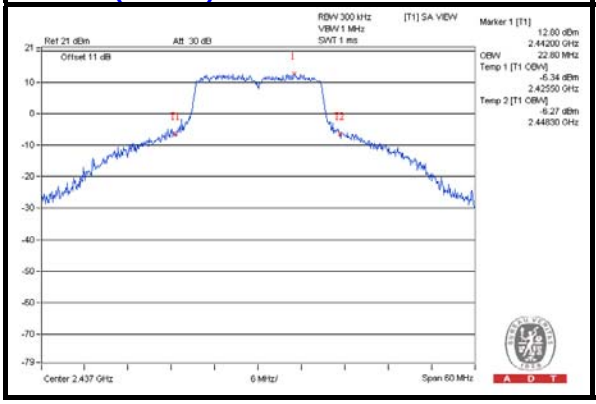
802.11b



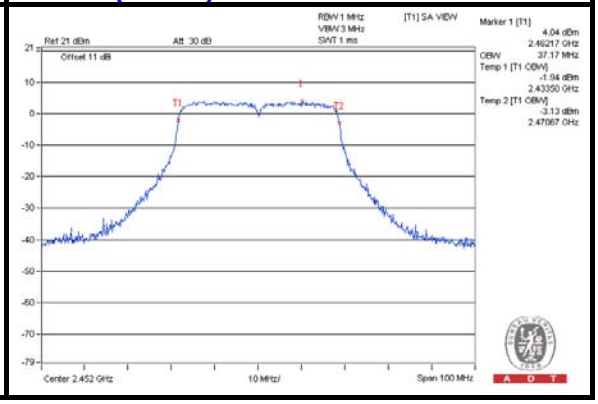
802.11g



802.11n (20MHz)



802.11n (40MHz)



4.5 CONDUCTED OUTPUT POWER

4.5.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

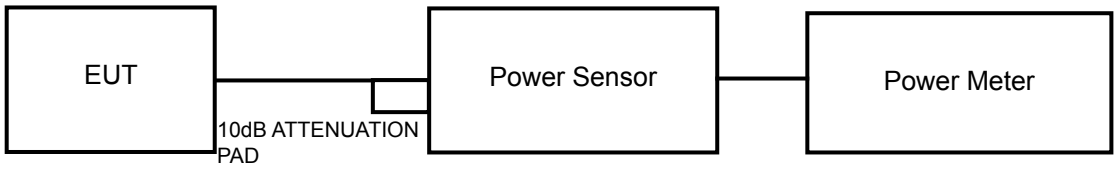
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST 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 peak power level.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

4.5.7 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	22.17	21.88	318.986	25.04	30	PASS
6	2437	23.53	23.78	464.205	26.67	30	PASS
11	2462	23.94	24.22	511.983	27.09	30	PASS

802.11g

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	24.35	24.78	572.878	27.58	30	PASS
6	2437	26.99	26.95	**995.485**	29.98	30	PASS
11	2462	24.35	24.17	533.486	27.27	30	PASS

802.11n (20MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	23.65	24.45	510.351	27.08	30	PASS
6	2437	26.90	26.93	982.953	29.93	30	PASS
11	2462	24.04	24.53	537.305	27.30	30	PASS

802.11n (40MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	23.79	23.46	461.152	26.64	30	PASS
6	2437	24.82	24.22	567.630	27.54	30	PASS
9	2452	23.05	22.90	396.821	25.99	30	PASS

FOR AVERAGE POWER

802.11b

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	19.12	18.90	159.283	22.02
6	2437	20.59	20.88	237.013	23.75
11	2462	20.92	20.99	249.198	23.97

802.11g

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	16.01	16.02	79.896	19.03
6	2437	22.31	22.62	353.026	25.48
11	2462	16.07	16.62	86.378	19.36

802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	15.19	15.33	67.156	18.27
6	2437	21.97	22.22	324.123	25.11
11	2462	15.46	16.00	74.967	18.75

802.11n (40MHz)

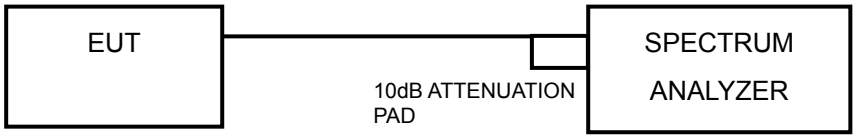
CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
3	2422	14.97	14.58	60.113	17.79
6	2437	16.07	16.59	86.062	19.35
9	2452	13.66	13.47	45.460	16.58

4.6 POWER SPECTRAL DENSITY MEASUREMENT

4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

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

a. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
b. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
c. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

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

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-3.26	3.01	-0.25	8.00	PASS
	6	2437	-2.28	3.01	0.73	8.00	PASS
	11	2462	-1.33	3.01	1.68	8.00	PASS
1	1	2412	-3.55	3.01	-0.54	8.00	PASS
	6	2437	-1.04	3.01	1.97	8.00	PASS
	11	2462	-1.07	3.01	1.94	8.00	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 5.79 < 6dBi, so the limit no need to reduced.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-8.91	3.01	-5.90	8.00	PASS
	6	2437	-2.84	3.01	0.17	8.00	PASS
	11	2462	-8.30	3.01	-5.29	8.00	PASS
1	1	2412	-8.38	3.01	-5.37	8.00	PASS
	6	2437	-1.96	3.01	1.05	8.00	PASS
	11	2462	-9.21	3.01	-6.20	8.00	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 5.79 < 6dBi, so the limit no need to reduced.

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-10.15	3.01	-7.14	8.00	PASS
	6	2437	-4.20	3.01	-1.19	8.00	PASS
	11	2462	-9.89	3.01	-6.88	8.00	PASS
1	1	2412	-9.74	3.01	-6.73	8.00	PASS
	6	2437	-3.79	3.01	-0.78	8.00	PASS
	11	2462	-8.33	3.01	-5.32	8.00	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 5.79 < 6dBi, so the limit no need to reduced.

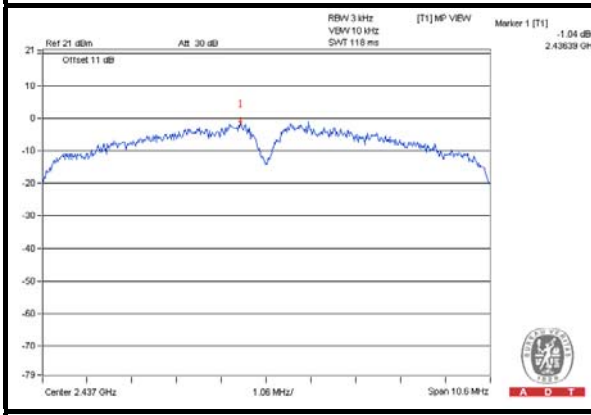
802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-13.44	3.01	-10.43	8.00	PASS
	6	2437	-12.17	3.01	-9.16	8.00	PASS
	9	2452	-15.01	3.01	-12.00	8.00	PASS
1	3	2422	-13.70	3.01	-10.69	8.00	PASS
	6	2437	-11.25	3.01	-8.24	8.00	PASS
	9	2452	-15.21	3.01	-12.20	8.00	PASS

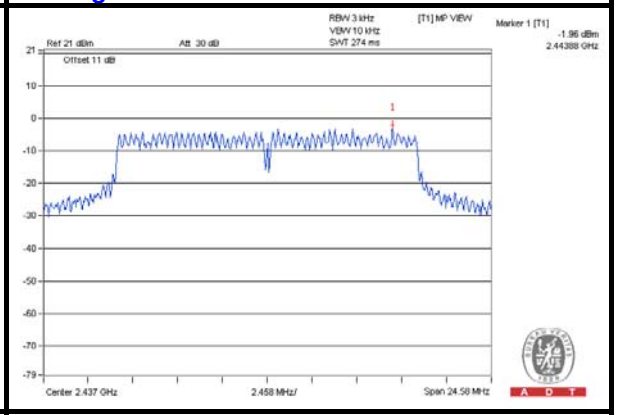
NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 5.79 < 6dBi, so the limit no need to reduced.

SPECTRUM PLOT OF WORST VALUE

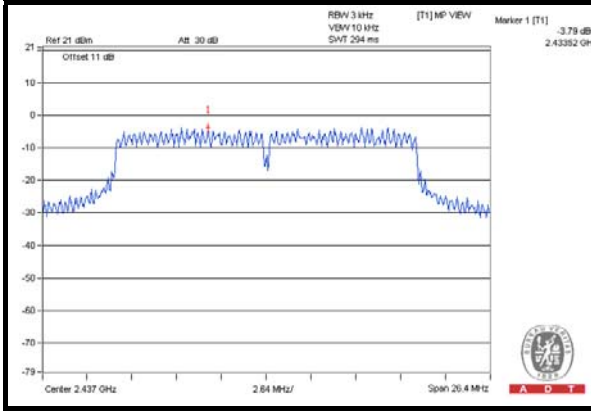
802.11b



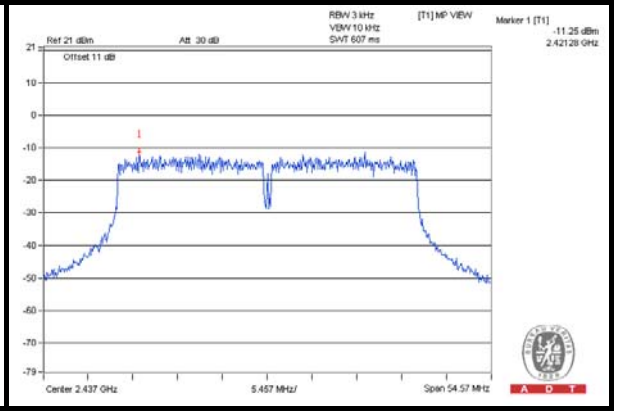
802.11g



802.11n (20MHz)



802.11n (40MHz)

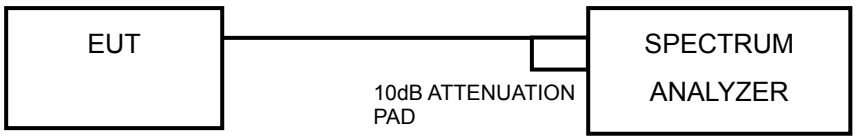


4.7 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.7.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

4.7.2 TEST SETUP



4.7.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.7.4 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. Ensure that the number of measurement points ≥ span/RBW
4. According to measurement points to set differ measurement span.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.

4.7.5 DEVIATION FROM TEST STANDARD

No deviation.

4.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.7.7 TEST RESULTS

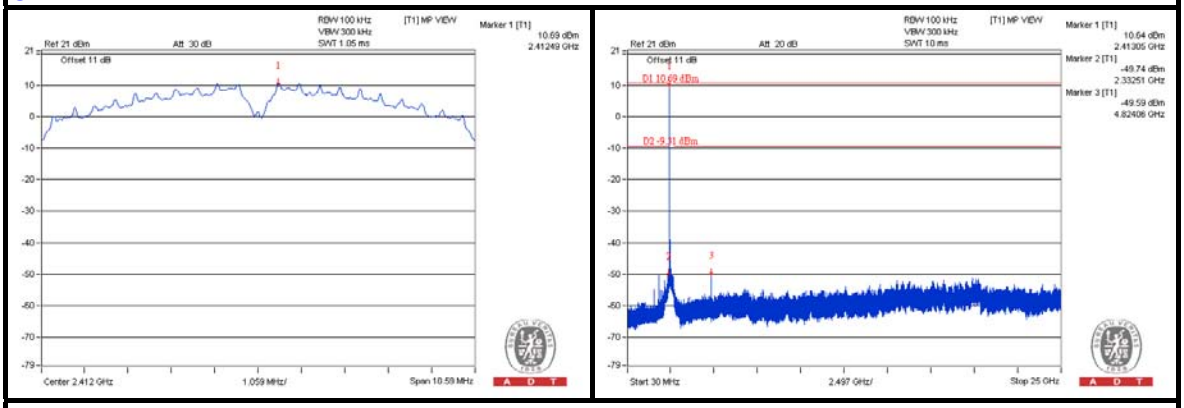
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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.

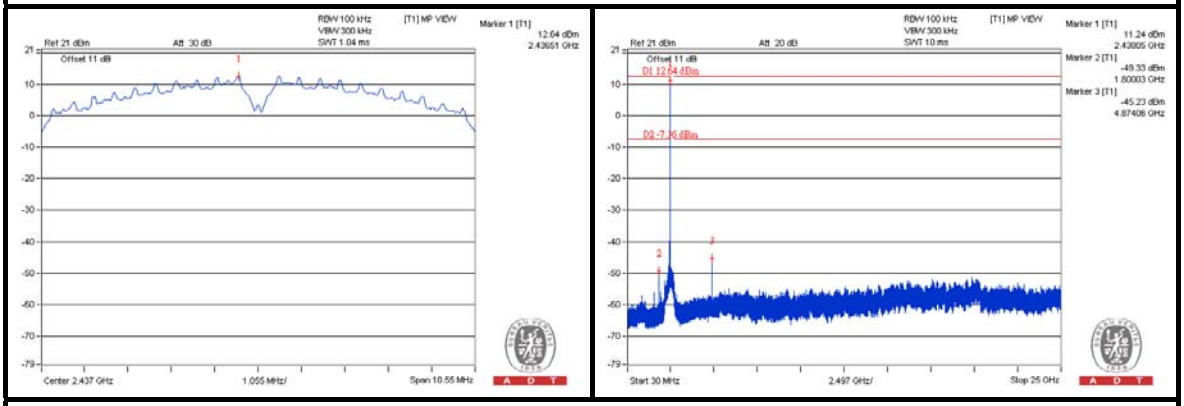
802.11b

CHAIN 0

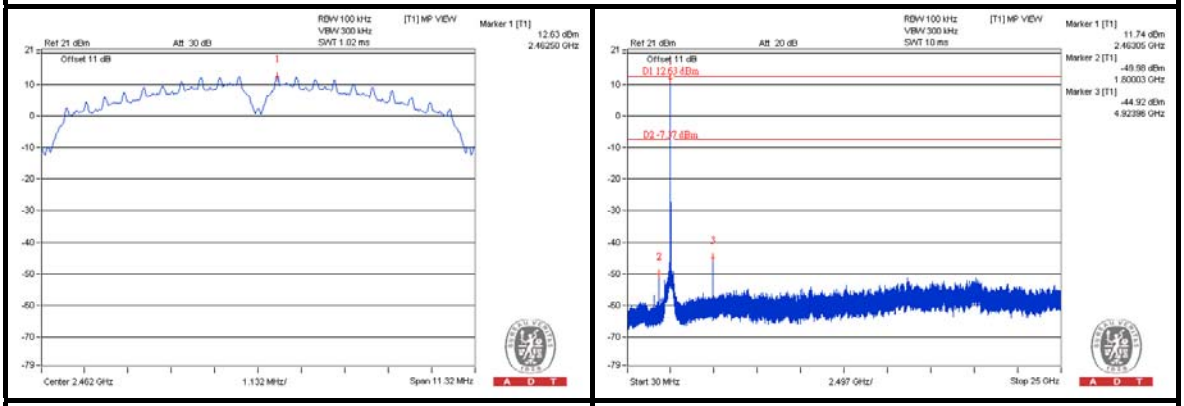
CH 1



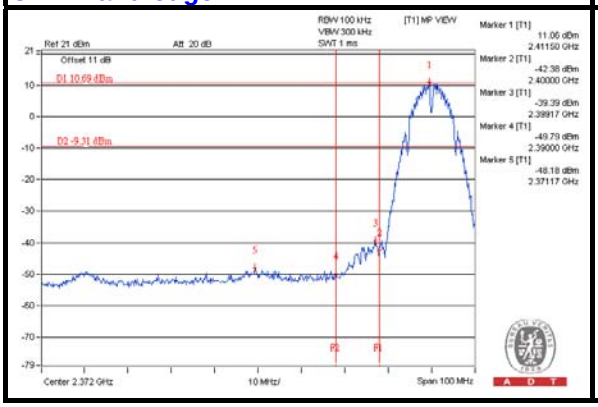
CH 6



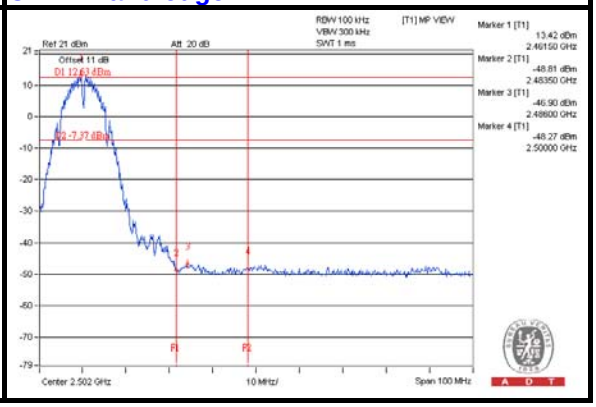
CH 11



CH 1 Band edge

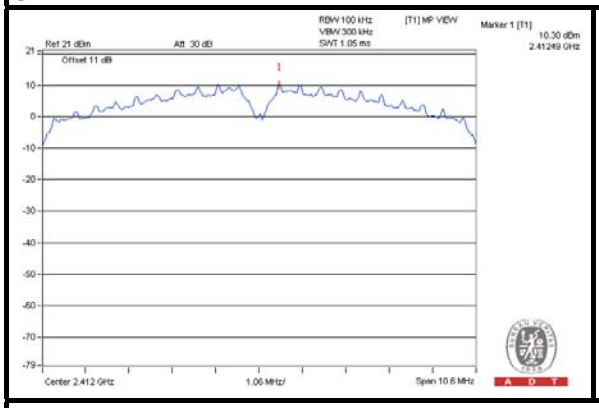


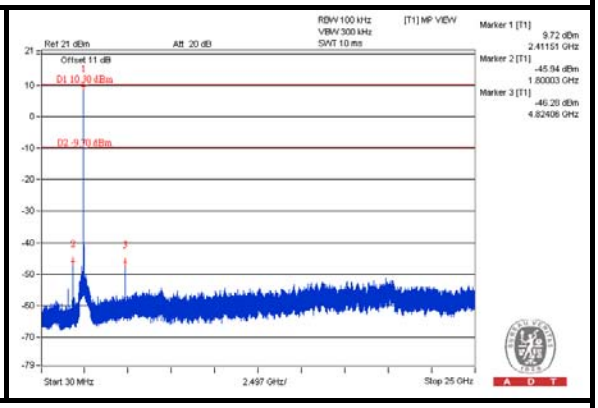
CH 11 Band edge



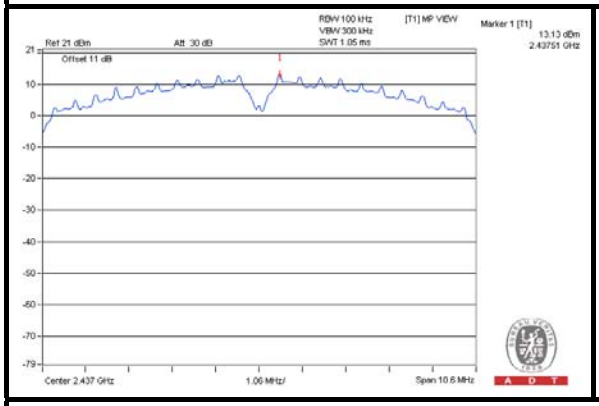
CHAIN 1

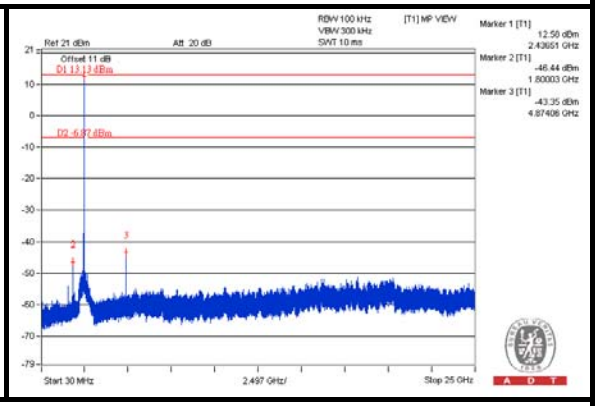
CH 1



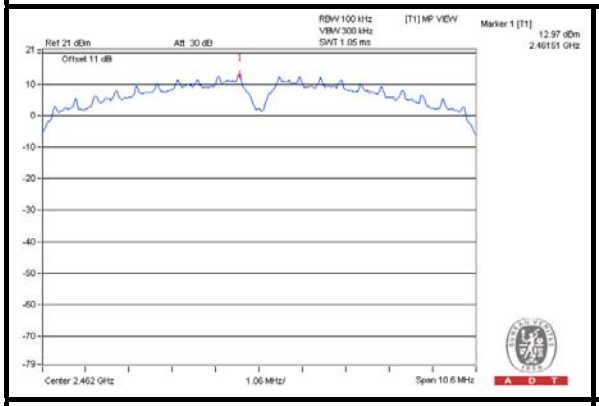


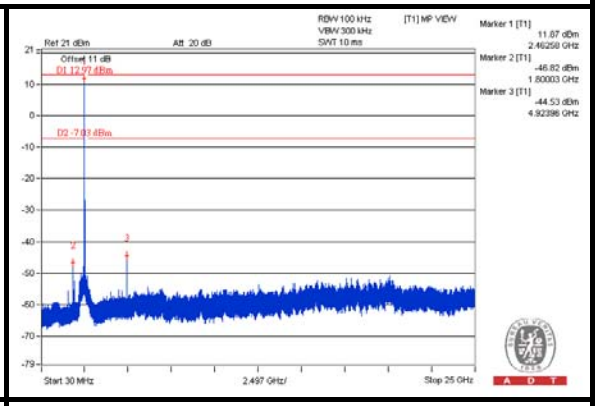
CH 6



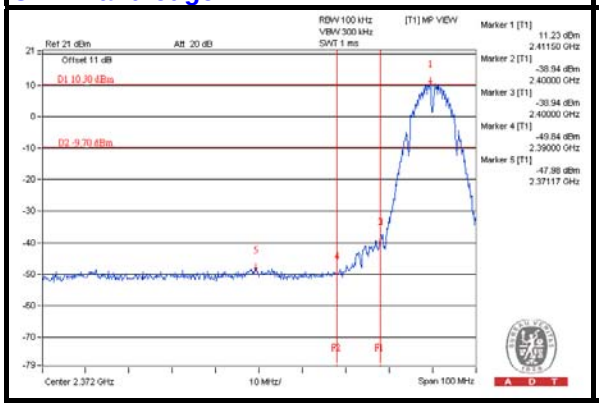


CH 11

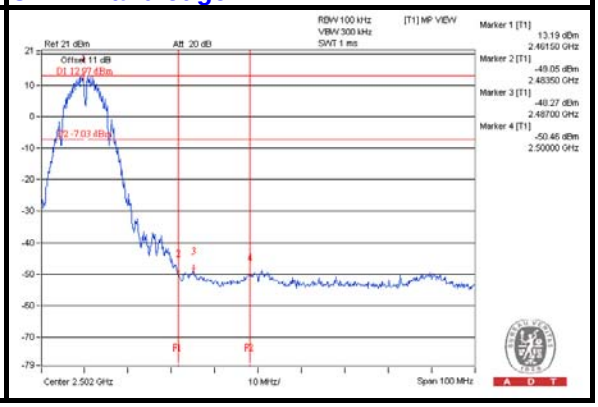




CH 1 Band edge



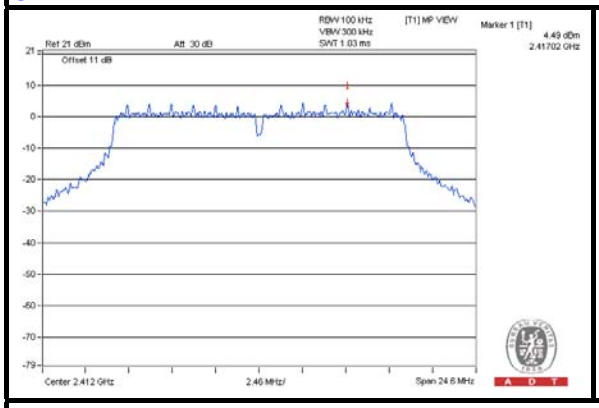
CH 11 Band edge

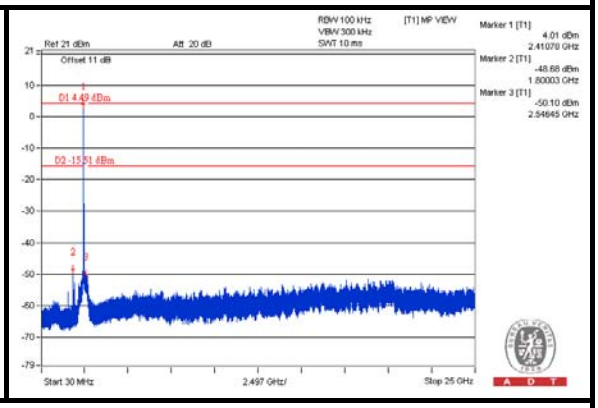


802.11g

CHAIN 0

CH 1





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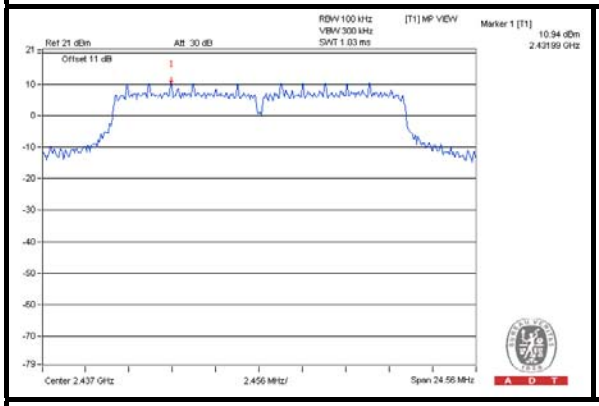

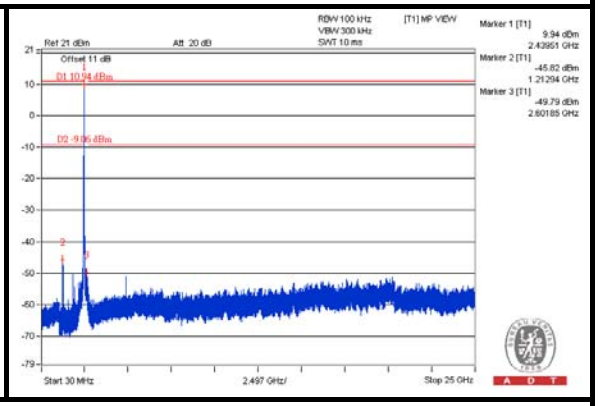

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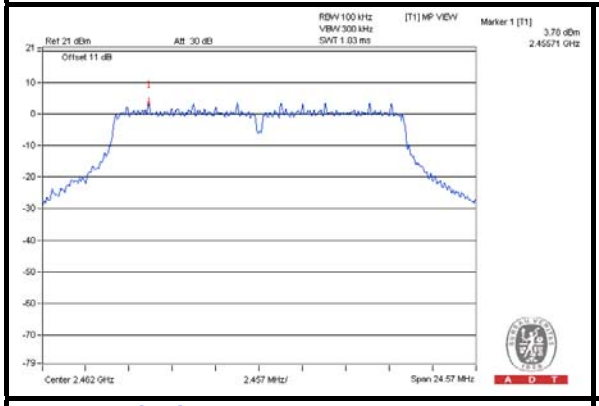
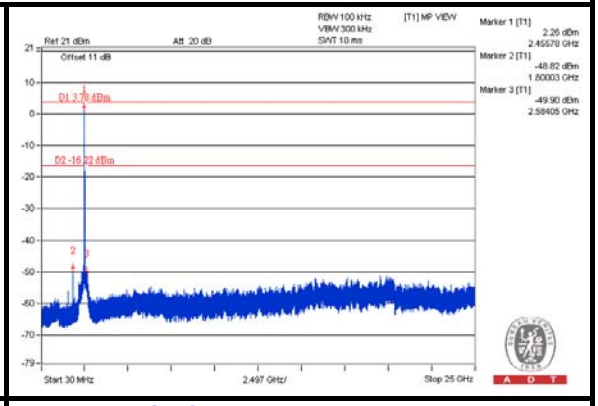
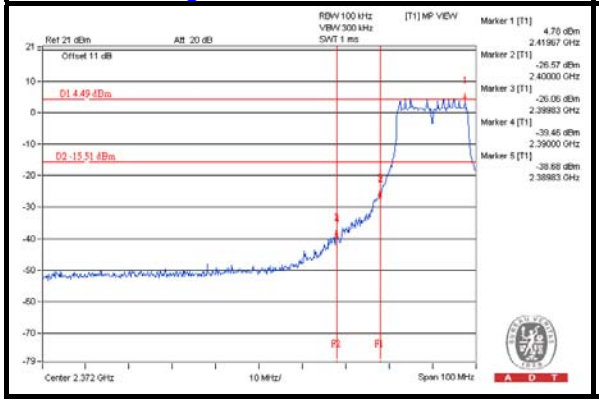
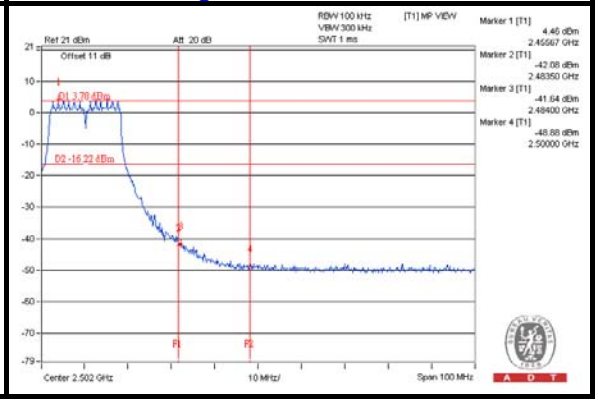




CH 1 Band edge

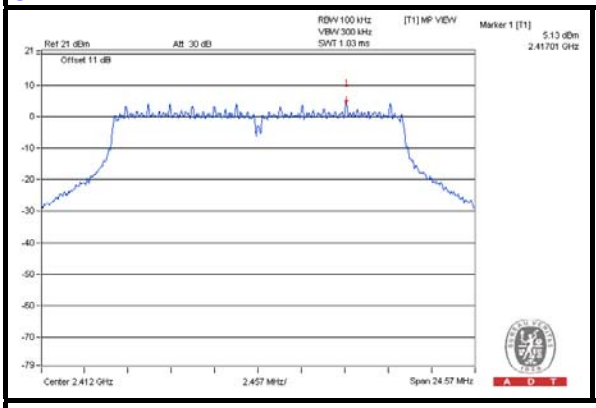


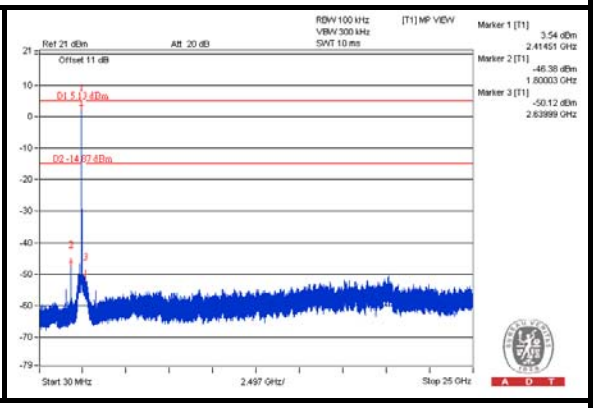
CH 11 Band edge



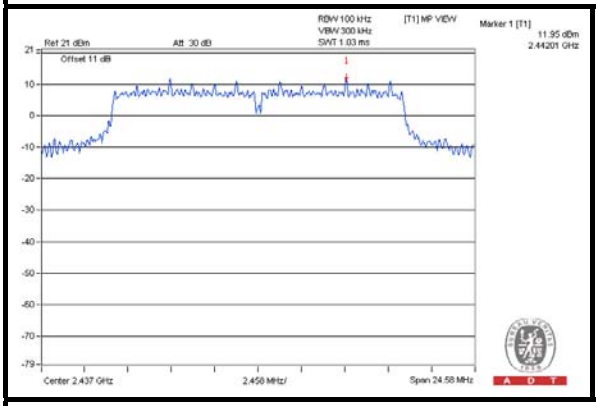
CHAIN 1

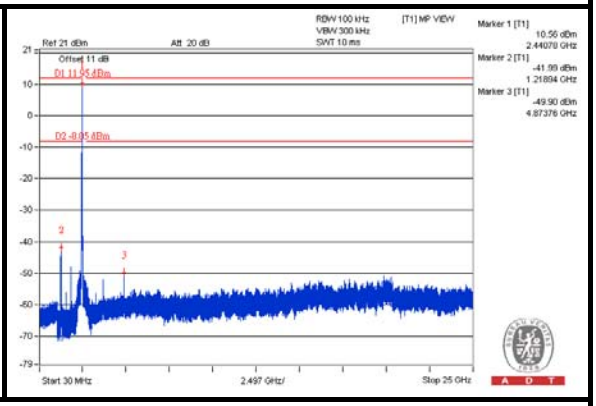
CH 1



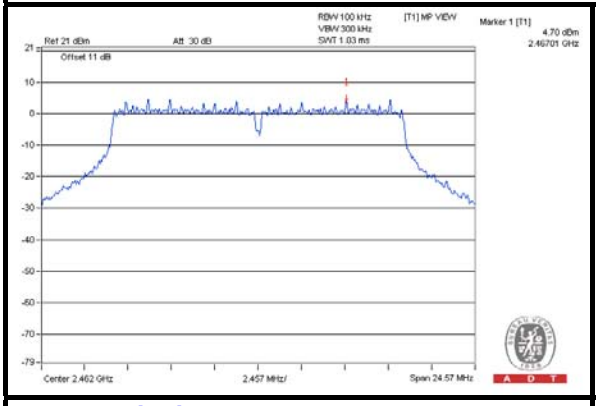


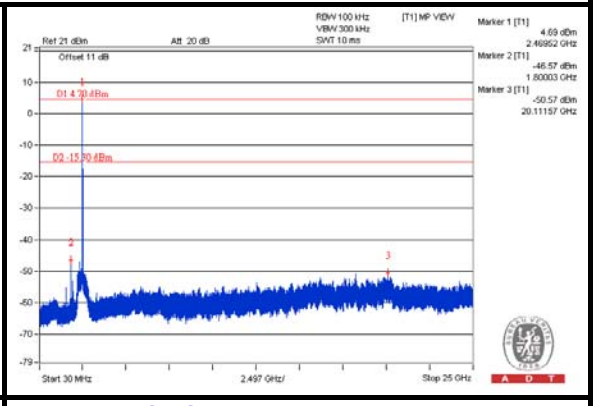
CH 6



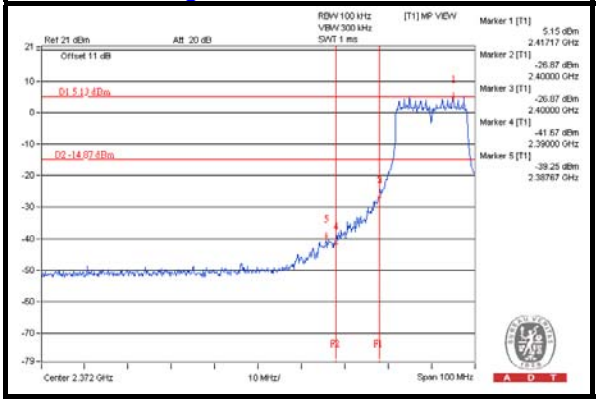


CH 11

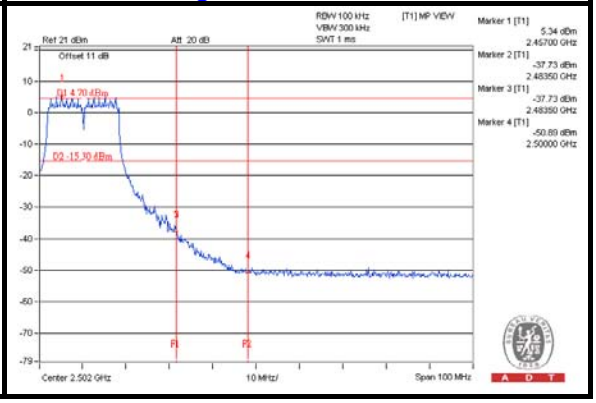




CH 1 Band edge



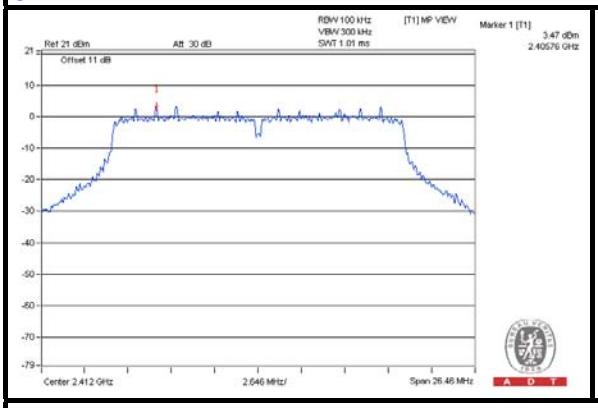
CH 11 Band edge

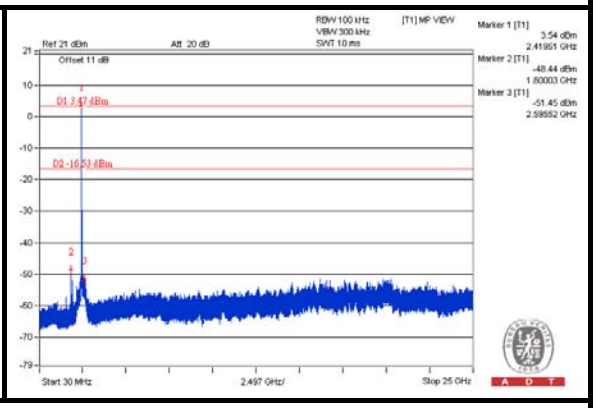


802.11n (20MHz)

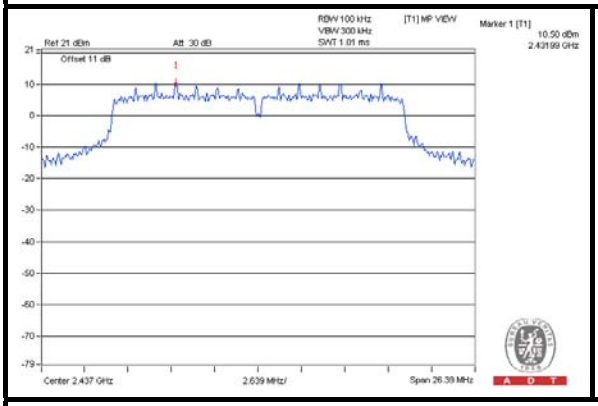
CHAIN 0

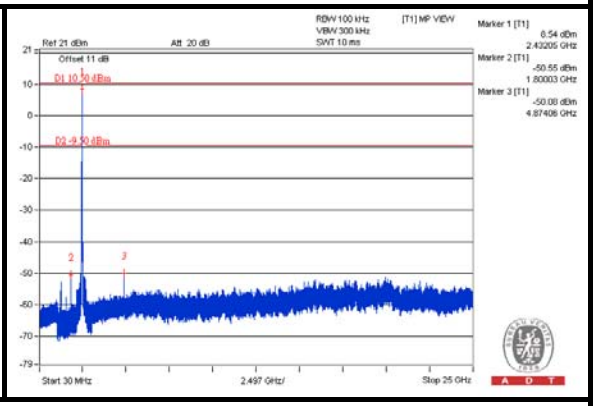
CH 1



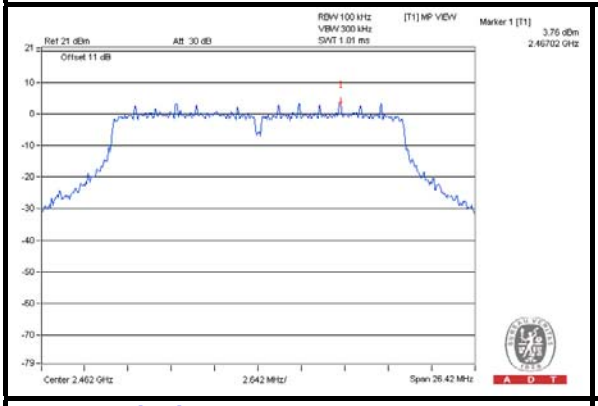


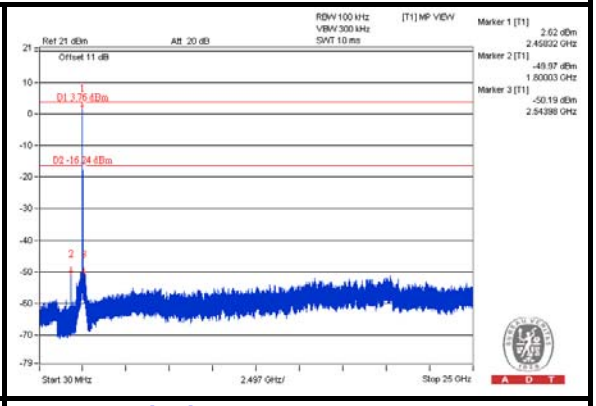
CH 6



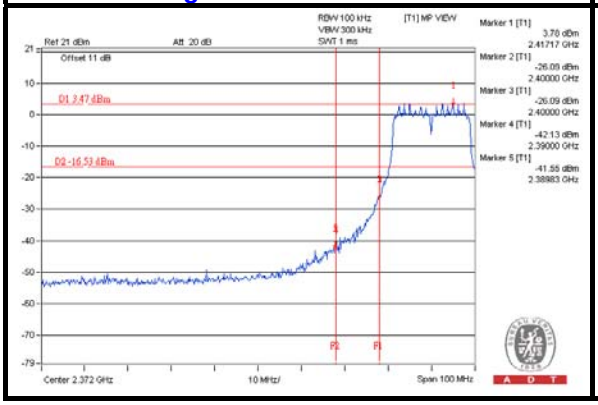


CH 11

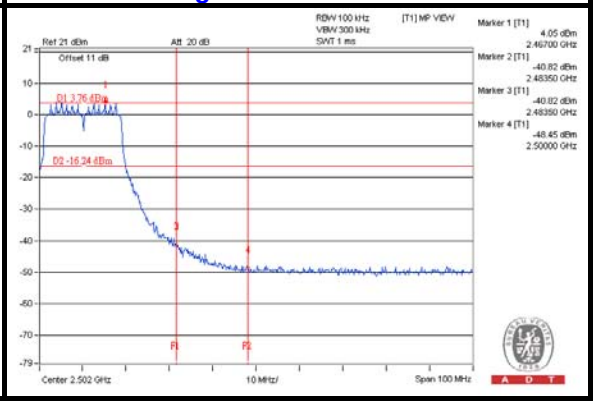




CH 1 Band edge

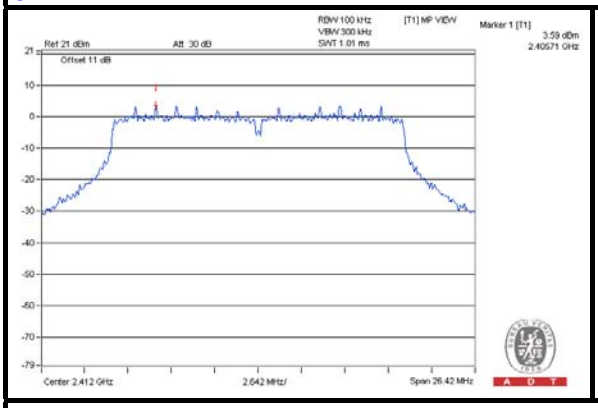


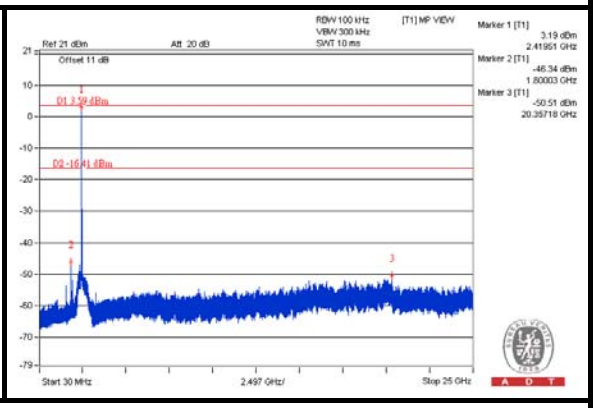
CH 11 Band edge



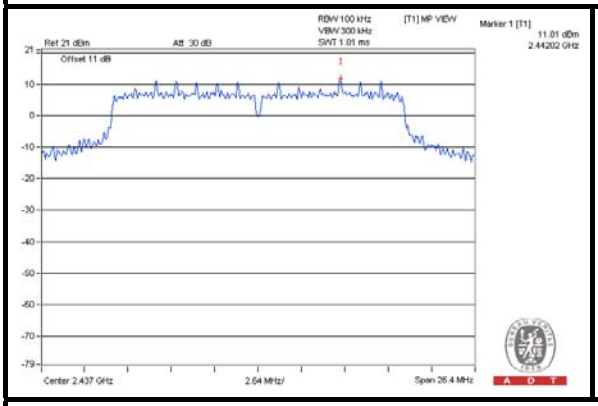
CHAIN 1

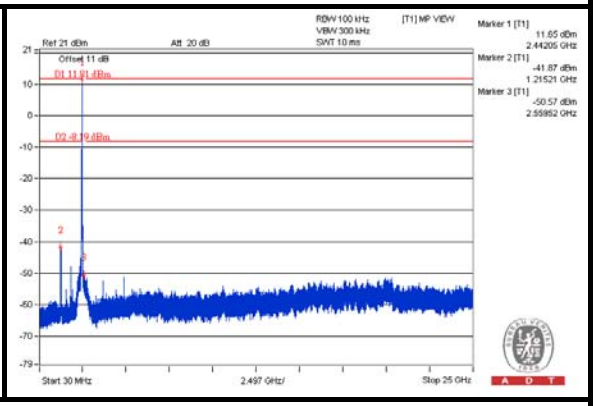
CH 1



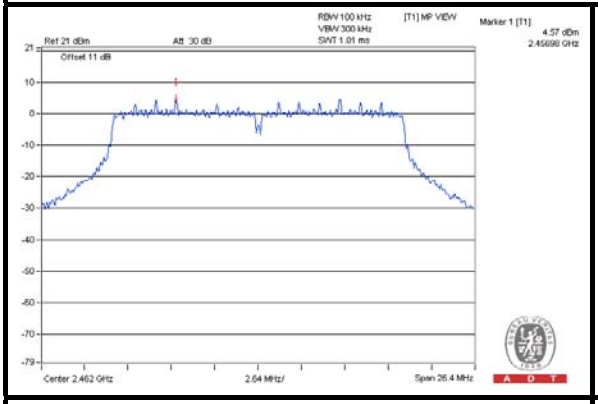


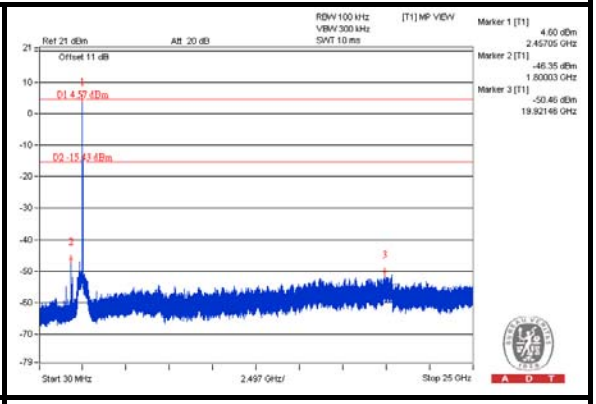
CH 6



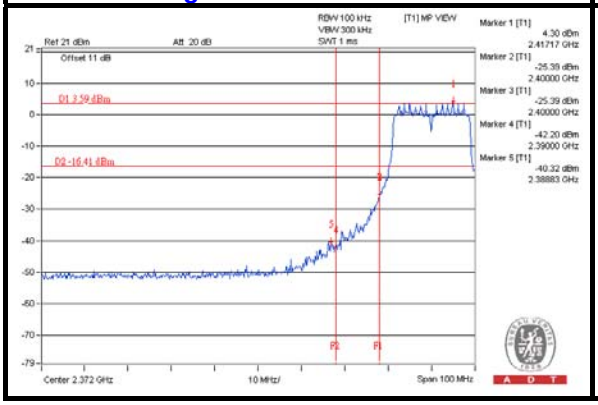


CH 11

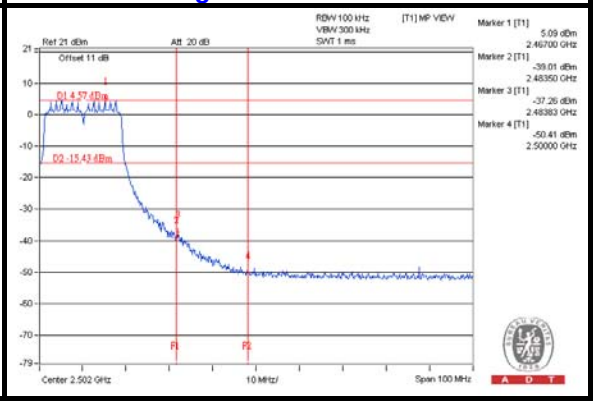




CH 1 Band edge



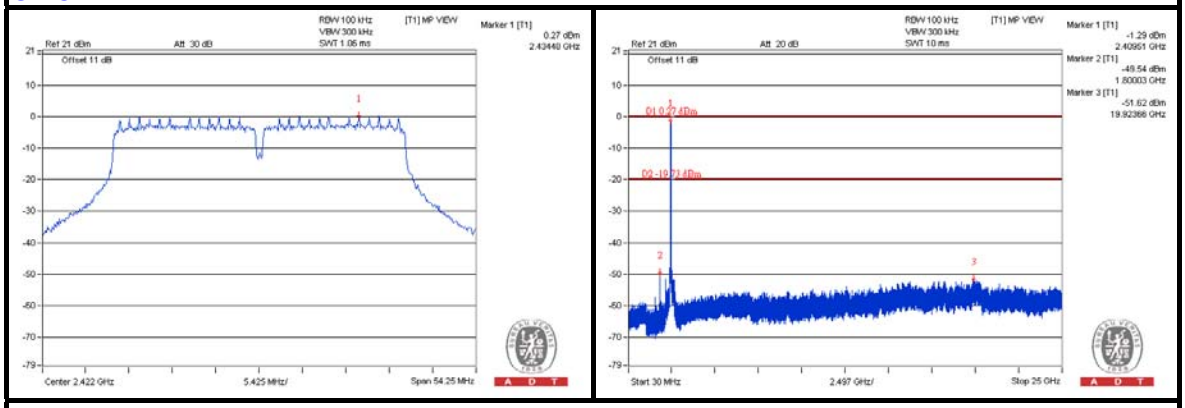
CH 11 Band edge



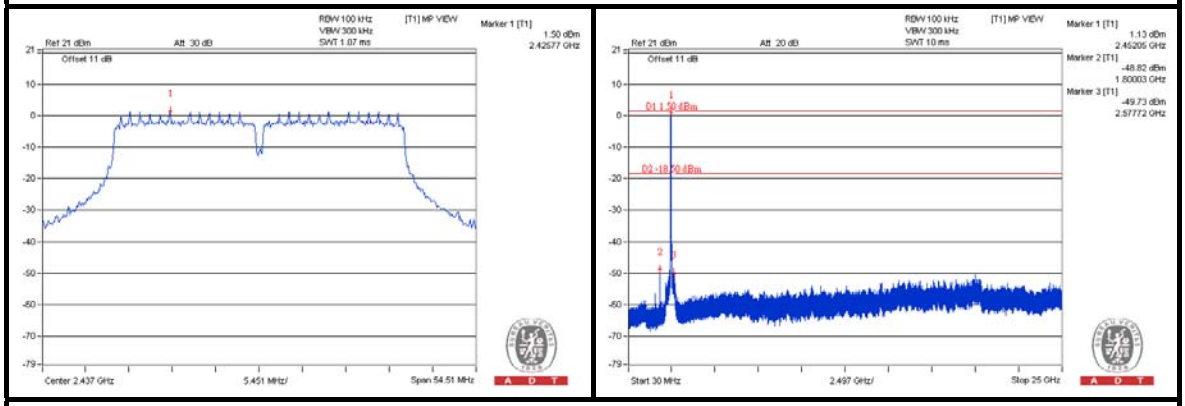
802.11n (40MHz)

CHAIN 0

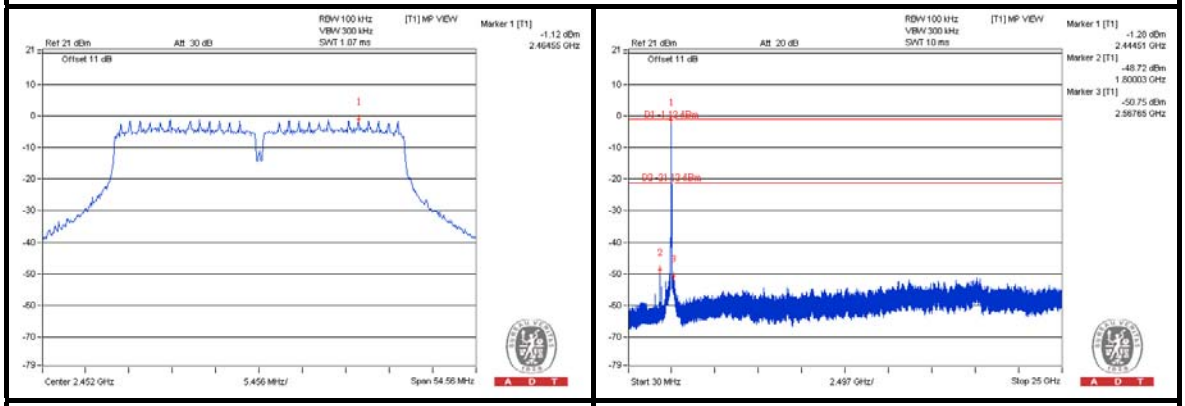
CH 3



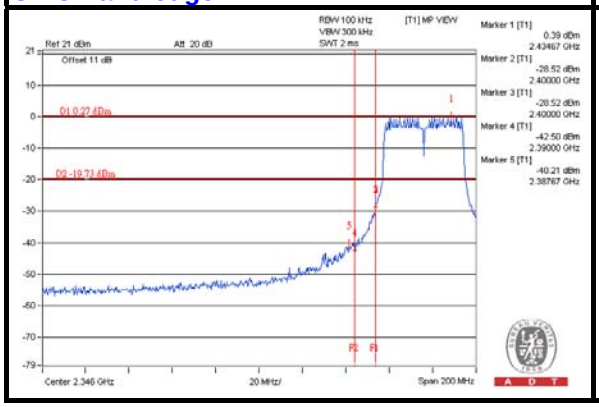
CH 6



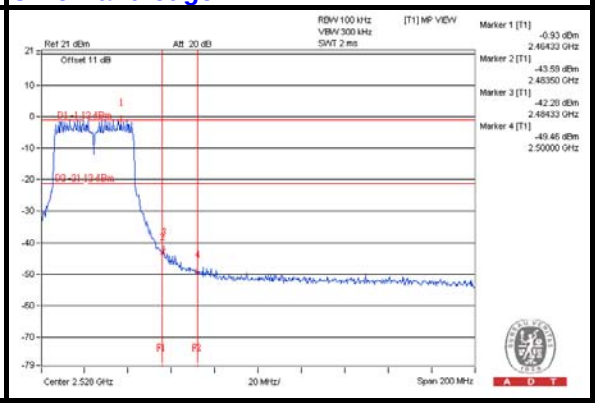
CH 9



CH 3 Band edge

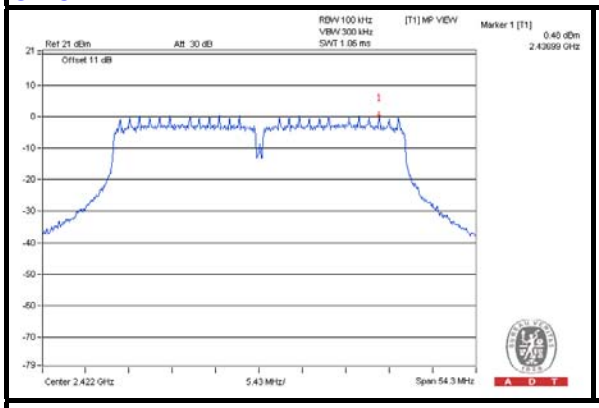


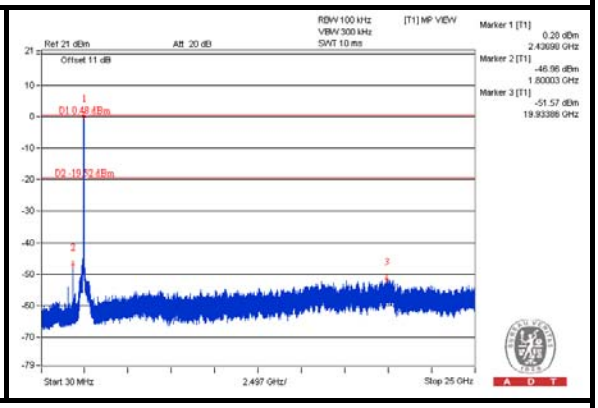
CH 9 Band edge



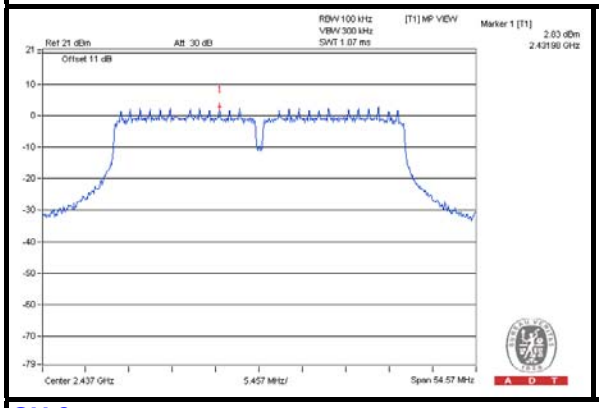
CHAIN 1

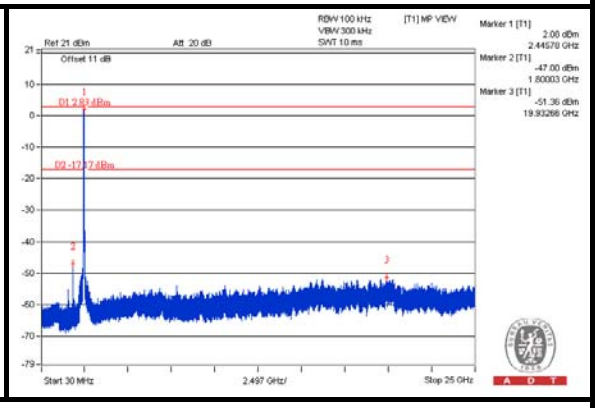
CH 3



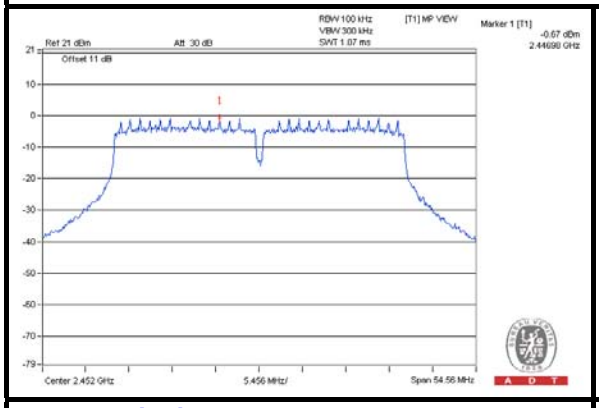


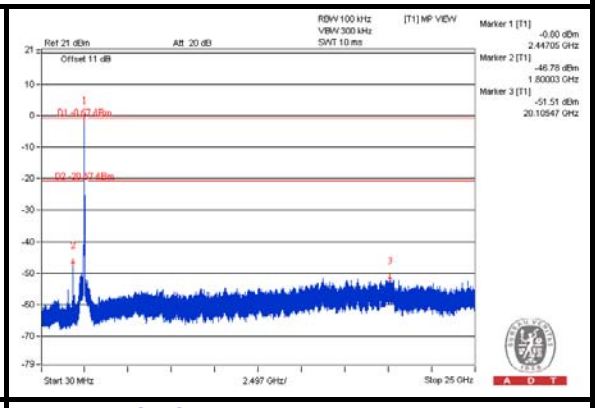
CH 6



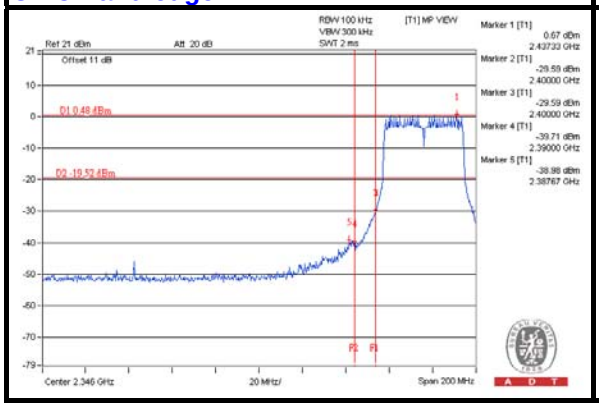


CH 9

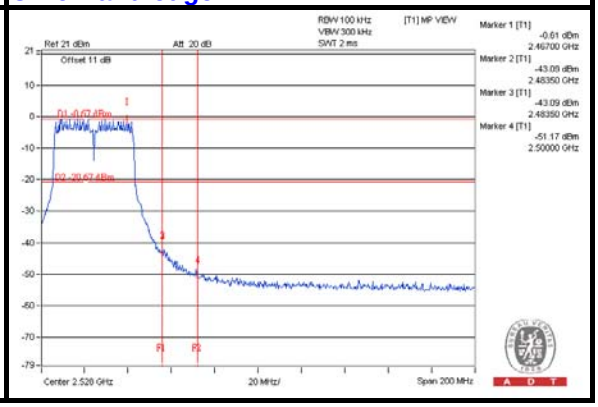




CH 3 Band edge



CH 9 Band edge



5. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)

5.1 RADIATED EMISSION MEASUREMENT

5.1.1 LIMITS OF RADIATED EMISSION 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.

5.1.2 TEST INSTRUMENTS

Same as item 4.1.2.

5.1.3 TEST PROCEDURES

Same as item 4.1.3.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

5.1.5 TEST SETUP

Same as item 4.1.5.

5.1.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

5.1.7 TEST RESULTS

ABOVE 1GHz DATA：

802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	#5725.00	70.0 PK	87.3	-17.3	1.49 H	288	64.00	6.00
2	#5725.00	60.5 AV	77.8	-17.3	1.49 H	288	54.50	6.00
3	*5745.00	107.3 PK			1.23 H	267	68.80	38.50
4	*5745.00	97.8 AV			1.23 H	267	59.30	38.50
5	11490.00	63.8 PK	74.0	-10.2	1.16 H	64	43.40	20.40
6	11490.00	51.6 AV	54.0	-2.4	1.16 H	64	31.20	20.40
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	#5725.00	68.2 PK	85.5	-17.3	1.49 V	288	62.20	6.00
2	#5725.00	57.5 AV	74.8	-17.3	1.49 V	288	51.50	6.00
3	*5745.00	105.5 PK			1.00 V	164	67.00	38.50
4	*5745.00	94.8 AV			1.00 V	164	56.30	38.50
5	11490.00	68.0 PK	74.0	-6.0	1.43 V	320	47.60	20.40
6	11490.00	52.8 AV	54.0	-1.2	1.43 V	320	32.40	20.40

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.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	*5785.00	108.8 PK			1.21 H	269	70.20	38.60
2	*5785.00	99.4 AV			1.21 H	269	60.80	38.60
3	11570.00	63.7 PK	74.0	-10.3	1.19 H	58	43.30	20.40
4	11570.00	50.9 AV	54.0	-3.1	1.19 H	58	30.50	20.40
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	*5785.00	106.3 PK			1.00 V	166	67.70	38.60
2	*5785.00	95.6 AV			1.00 V	166	57.00	38.60
3	11570.00	68.8 PK	74.0	-5.2	1.33 V	320	48.40	20.40
4	11570.00	52.5 AV	54.0	-1.5	1.33 V	320	32.10	20.40

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.
6. The limit value is defined as per 15.247.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	*5825.00	108.4 PK			1.19 H	268	69.70	38.70
2	*5825.00	98.6 AV			1.19 H	268	59.90	38.70
3	#5850.00	63.1 PK	88.4	-25.3	1.00 H	127	56.90	6.20
4	#5850.00	53.3 AV	78.6	-25.3	1.00 H	127	47.10	6.20
5	11650.00	64.0 PK	74.0	-10.0	1.57 H	75	43.70	20.30
6	11650.00	50.6 AV	54.0	-3.4	1.57 H	75	30.30	20.30
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	*5825.00	105.9 PK			1.00 V	164	67.20	38.70
2	*5825.00	95.9 AV			1.00 V	164	57.20	38.70
3	#5850.00	60.6 PK	85.9	-25.3	1.00 V	127	54.40	6.20
4	#5850.00	50.6 AV	75.9	-25.3	1.00 V	127	44.40	6.20
5	11650.00	67.8 PK	74.0	-6.2	1.36 V	323	47.50	20.30
6	**11650.00**	**53.0 AV**	**54.0**	**-1.0**	**1.36 V**	**323**	**32.70**	**20.30**

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.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	#5725.00	70.1 PK	88.0	-17.9	1.22 H	166	64.10	6.00
2	#5725.00	59.9 AV	77.8	-17.9	1.22 H	166	53.90	6.00
3	*5745.00	108.0 PK			1.25 H	270	69.50	38.50
4	*5745.00	97.8 AV			1.25 H	270	59.30	38.50
5	11490.00	65.0 PK	74.0	-9.0	1.00 H	57	44.60	20.40
6	11490.00	50.6 AV	54.0	-3.4	1.00 H	57	30.20	20.40
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	#5725.00	66.4 PK	84.3	-17.9	1.22 V	166	60.40	6.00
2	#5725.00	57.0 AV	74.9	-17.9	1.22 V	166	51.00	6.00
3	*5745.00	104.3 PK			1.00 V	162	65.80	38.50
4	*5745.00	94.9 AV			1.00 V	162	56.40	38.50
5	11490.00	68.4 PK	74.0	-5.6	1.34 V	314	48.00	20.40
6	11490.00	52.2 AV	54.0	-1.8	1.34 V	314	31.80	20.40

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.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	*5785.00	109.9 PK			1.22 H	268	71.30	38.60
2	*5785.00	99.8 AV			1.22 H	268	61.20	38.60
3	11570.00	63.2 PK	74.0	-10.8	1.10 H	69	42.80	20.40
4	11570.00	51.1 AV	54.0	-2.9	1.10 H	69	30.70	20.40
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	*5785.00	105.8 PK			1.20 V	170	67.20	38.60
2	*5785.00	95.5 AV			1.20 V	170	56.90	38.60
3	11570.00	65.6 PK	74.0	-8.4	1.38 V	314	45.20	20.40
4	11570.00	52.3 AV	54.0	-1.7	1.38 V	314	31.90	20.40

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.
6. The limit value is defined as per 15.247.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	*5825.00	108.5 PK			1.21 H	268	69.80	38.70
2	*5825.00	98.4 AV			1.21 H	268	59.70	38.70
3	#5850.00	61.1 PK	88.5	-27.4	1.10 H	137	54.90	6.20
4	#5850.00	51.0 AV	78.4	-27.4	1.10 H	137	44.80	6.20
5	11650.00	63.3 PK	74.0	-10.7	1.15 H	96	43.00	20.30
6	11650.00	50.9 AV	54.0	-3.1	1.15 H	96	30.60	20.30
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	*5825.00	105.7 PK			1.00 V	165	67.00	38.70
2	*5825.00	95.8 AV			1.00 V	165	57.10	38.70
3	#5850.00	58.3 PK	85.7	-27.4	1.10 V	137	52.10	6.20
4	#5850.00	48.4 AV	75.8	-27.4	1.10 V	137	42.20	6.20
5	11650.00	66.2 PK	74.0	-7.8	1.44 V	320	45.90	20.30
6	11650.00	52.2 AV	54.0	-1.8	1.44 V	320	31.90	20.30

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.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	#5725.00	70.0 PK	85.4	-15.4	1.24 H	205	64.00	6.00
2	#5725.00	59.9 AV	75.6	-15.7	1.24 H	205	53.90	6.00
3	*5755.00	105.4 PK			1.33 H	284	66.80	38.60
4	*5755.00	95.6 AV			1.33 H	284	57.00	38.60
5	11510.00	63.3 PK	74.0	-10.7	1.12 H	68	42.90	20.40
6	11510.00	50.6 AV	54.0	-3.4	1.12 H	68	30.20	20.40
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	#5725.00	67.0 PK	82.7	-15.7	1.22 V	262	61.00	6.00
2	#5725.00	57.0 AV	72.7	-15.7	1.22 V	262	51.00	6.00
3	*5755.00	102.7 PK			1.00 V	166	64.10	38.60
4	*5755.00	92.7 AV			1.00 V	166	54.10	38.60
5	11510.00	65.2 PK	74.0	-8.8	1.29 V	318	44.80	20.40
6	11510.00	52.4 AV	54.0	-1.6	1.29 V	318	32.00	20.40

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.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

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	*5795.00	105.0 PK			1.35 H	273	66.40	38.60
2	*5795.00	96.5 AV			1.35 H	273	57.90	38.60
3	#5850.00	57.1 PK	85.0	-27.9	1.30 H	99	50.90	6.20
4	#5850.00	48.6 AV	76.5	-27.9	1.30 H	99	42.40	6.20
5	11590.00	63.4 PK	74.0	-10.6	1.22 H	56	43.00	20.40
6	11590.00	51.0 AV	54.0	-3.0	1.22 H	56	30.60	20.40
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	*5795.00	102.4 PK			1.00 V	166	63.80	38.60
2	*5795.00	92.9 AV			1.00 V	166	54.30	38.60
3	#5850.00	54.5 PK	82.4	-27.9	1.30 V	99	48.30	6.20
4	#5850.00	45.0 AV	72.9	-27.9	1.30 V	99	38.80	6.20
5	11590.00	65.7 PK	74.0	-8.3	1.46 V	325	45.30	20.40
6	11590.00	52.5 AV	54.0	-1.5	1.46 V	325	32.10	20.40

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.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.

BELOW 1GHz WORST-CASE DATA：802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	A		

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	125.17	37.4 QP	43.5	-6.1	1.50 H	65	53.20	-15.80
2	249.60	39.8 QP	46.0	-6.2	1.01 H	88	54.00	-14.20
3	304.04	35.7 QP	46.0	-10.3	1.01 H	61	47.90	-12.20
4	374.04	37.3 QP	46.0	-8.7	1.01 H	191	48.20	-10.90
5	500.42	37.5 QP	46.0	-8.5	2.00 H	210	45.80	-8.30
6	624.85	42.0 QP	46.0	-4.0	1.25 H	196	47.50	-5.50
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	35.73	34.7 QP	40.0	-5.3	1.00 V	71	49.60	-14.90
2	78.51	34.6 QP	40.0	-5.4	1.50 V	139	52.70	-18.10
3	125.17	36.8 QP	43.5	-6.7	1.00 V	79	52.60	-15.80
4	249.60	35.4 QP	46.0	-10.6	1.00 V	59	49.60	-14.20
5	374.04	37.1 QP	46.0	-8.9	1.24 V	173	48.00	-10.90
6	624.85	39.7 QP	46.0	-6.3	1.24 V	132	45.20	-5.50

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	29.7 QP	40.0	-10.3	1.99 H	96	44.60	-14.90
2	249.60	32.1 QP	46.0	-13.9	1.00 H	260	46.30	-14.20
3	304.04	34.6 QP	46.0	-11.4	1.00 H	39	46.80	-12.20
4	374.04	27.3 QP	46.0	-18.7	1.00 H	254	38.20	-10.90
5	624.85	34.9 QP	46.0	-11.1	1.24 H	237	40.40	-5.50
6	875.67	32.0 QP	46.0	-14.0	1.50 H	286	33.00	-1.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	125.17	24.6 QP	43.5	-18.9	1.00 V	222	40.40	-15.80
2	249.60	29.7 QP	46.0	-16.3	2.00 V	210	43.90	-14.20
3	374.04	24.2 QP	46.0	-21.8	1.25 V	186	35.10	-10.90
4	624.85	31.5 QP	46.0	-14.5	1.00 V	116	37.00	-5.50
5	792.06	27.7 QP	46.0	-18.3	1.00 V	256	29.90	-2.20
6	875.67	29.8 QP	46.0	-16.2	1.51 V	193	30.80	-1.00

REMARKS:

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

5.2 CONDUCTED EMISSION MEASUREMENT

5.2.1 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.

5.2.2 TEST INSTRUMENTS

Same as item 4.2.2.

5.2.3 TEST PROCEDURES

Same as item 4.2.3.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

5.2.5 TEST SETUP

Same as item 4.2.5.

5.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

5.2.7 TEST RESULTS

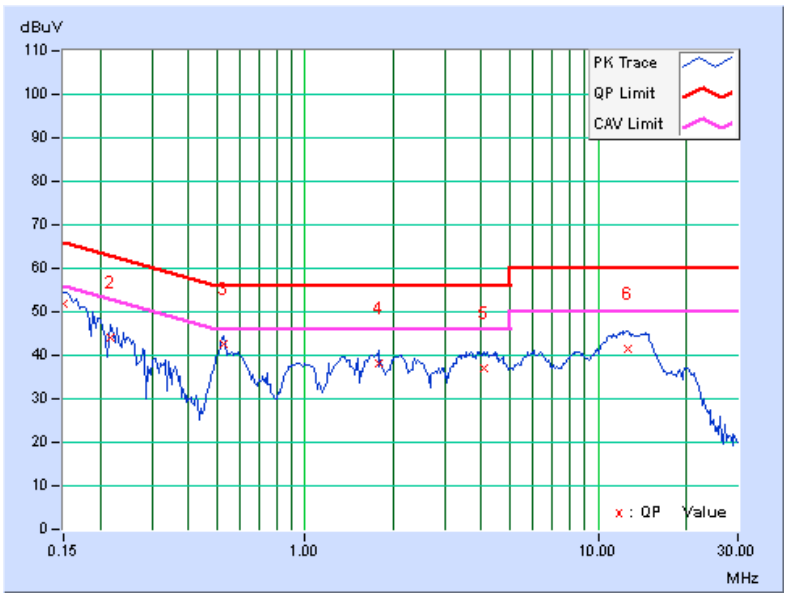
CONDUCTED WORST-CASE DATA：802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

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	0.26	51.42	33.01	51.68	33.27	66.00	56.00	-14.32	-22.73
2	0.21641	0.28	43.92	29.83	44.20	30.11	62.96	52.96	-18.75	-22.84
3	0.52500	0.31	42.24	36.37	42.55	36.68	56.00	46.00	-13.45	-9.32
4	1.77734	0.36	37.72	31.85	38.08	32.21	56.00	46.00	-17.92	-13.79
5	4.06250	0.43	36.60	29.93	37.03	30.36	56.00	46.00	-18.97	-15.64
6	12.67578	0.52	40.99	35.05	41.51	35.57	60.00	50.00	-18.49	-14.43

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

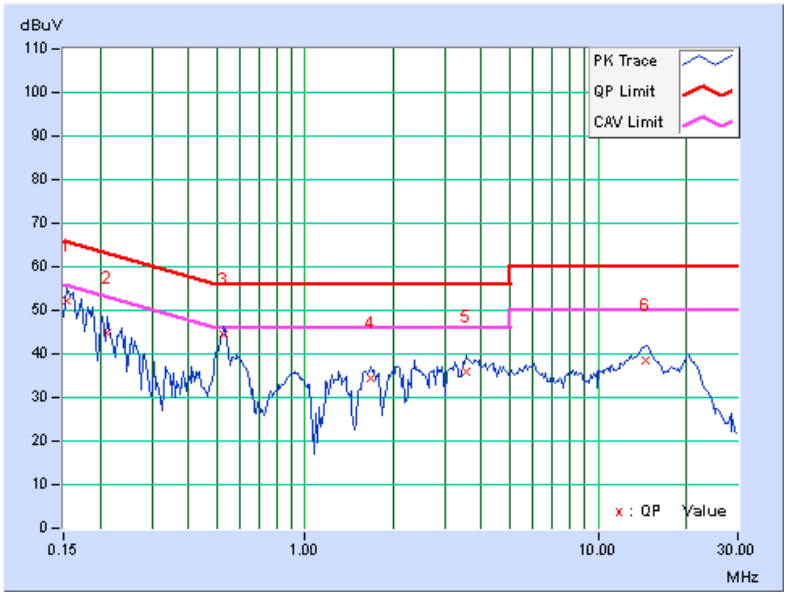


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

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	0.27	51.78	37.55	52.05	37.82	65.79	55.79	-13.74	-17.97
2	0.21250	0.28	44.56	33.61	44.84	33.89	63.11	53.11	-18.27	-19.22
3	0.52891	0.31	44.17	37.63	44.48	37.94	56.00	46.00	-11.52	-8.06
4	1.67188	0.36	34.06	28.90	34.42	29.26	56.00	46.00	-21.58	-16.74
5	3.55078	0.42	35.55	29.67	35.97	30.09	56.00	46.00	-20.03	-15.91
6	14.58984	0.56	37.98	33.77	38.54	34.33	60.00	50.00	-21.46	-15.67

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

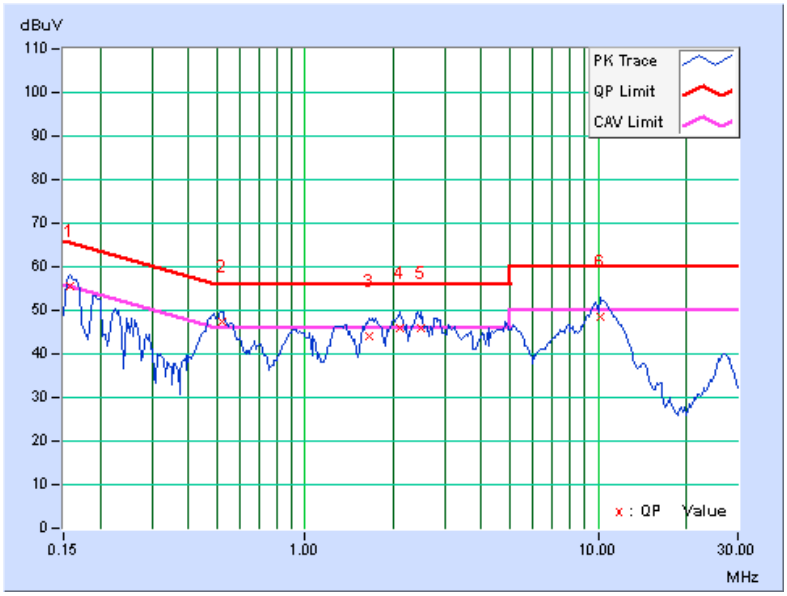


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.15781	0.27	55.33	41.32	55.60	41.59	65.58	55.58	-9.98	-13.99
2	0.51974	0.31	47.02	40.19	47.33	40.50	56.00	46.00	-8.67	-5.50
3	1.65625	0.35	43.80	38.38	44.15	38.73	56.00	46.00	-11.85	-7.27
4	2.09766	0.36	45.66	40.88	46.02	41.24	56.00	46.00	-9.98	-4.76
5	2.50000	0.38	45.52	40.68	45.90	41.06	56.00	46.00	-10.10	-4.94
6	10.24219	0.50	47.87	42.57	48.37	43.07	60.00	50.00	-11.63	-6.93

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

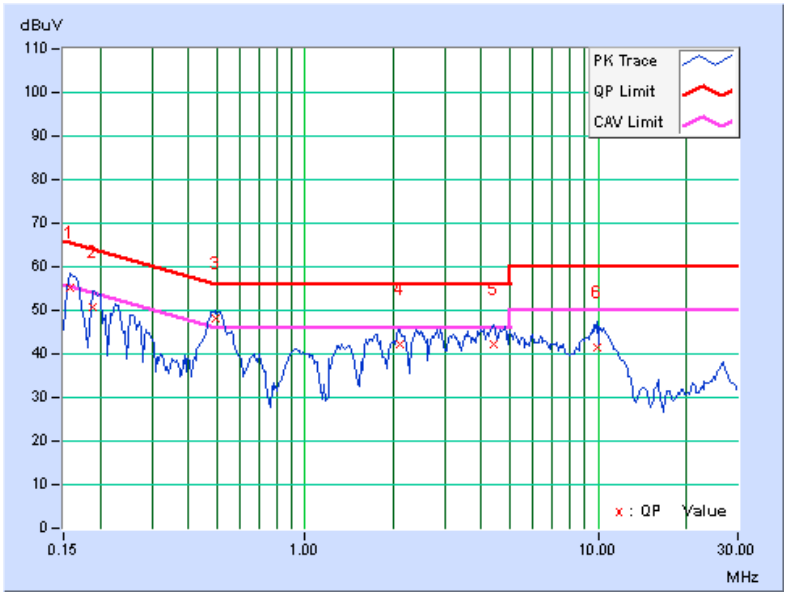


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.15781	0.27	54.97	40.60	55.24	40.87	65.58	55.58	-10.34	-14.71
2	0.18906	0.28	50.33	35.71	50.61	35.99	64.08	54.08	-13.47	-18.09
3	0.49375	0.31	47.88	41.42	48.19	41.73	56.10	46.10	-7.92	-4.38
4	2.12109	0.37	41.70	36.84	42.07	37.21	56.00	46.00	-13.93	-8.79
5	4.37891	0.45	41.91	36.85	42.36	37.30	56.00	46.00	-13.64	-8.70
6	9.98438	0.52	41.03	35.00	41.55	35.52	60.00	50.00	-18.45	-14.48

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



5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

5.3.2 TEST SETUP

Same as item 4.3.2.

5.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.3.4 TEST PROCEDURE

Same as item 4.3.4.

5.3.5 DEVIATION FROM TEST STANDARD

No deviation.

5.3.6 EUT OPERATING CONDITIONS

Same as item 4.3.6.

5.3.7 TEST RESULTS

802.11a

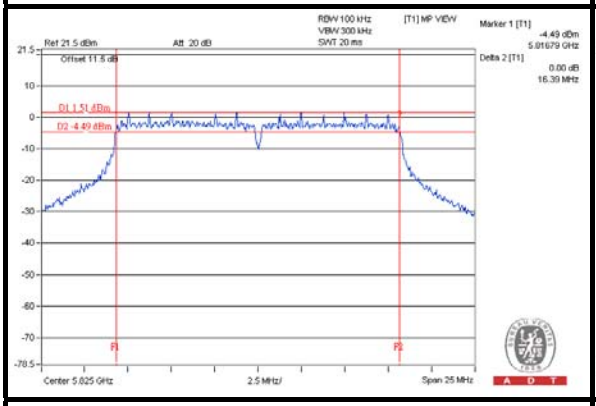
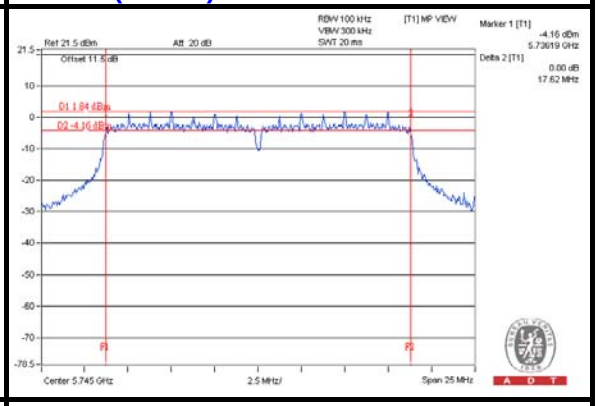
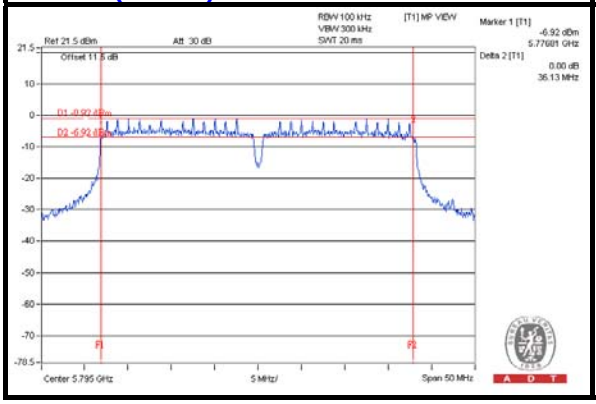
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	16.37	16.37	0.5	PASS
157	5785	16.37	16.39	0.5	PASS
165	5825	16.39	16.38	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	17.60	17.62	0.5	PASS
157	5785	17.59	17.55	0.5	PASS
165	5825	17.58	17.61	0.5	PASS

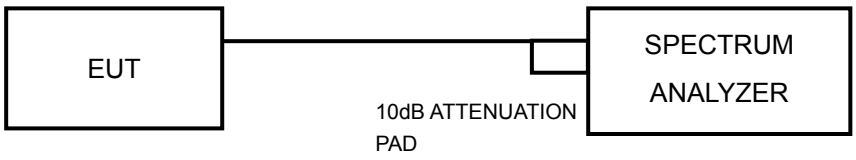
802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	36.09	36.12	0.5	PASS
159	5795	35.95	36.13	0.5	PASS

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

5.4 OCCUPIED BANDWIDTH MEASUREMENT

5.4.1 TEST SETUP



5.4.2 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.4.3 TEST PROCEDURE

Same as item 4.4.3.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation.

5.4.5 EUT OPERATING CONDITIONS

Same as item 4.4.5.

5.4.6 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
149	5745	16.92	16.92	PASS
157	5785	17.00	17.00	PASS
165	5825	16.90	17.00	PASS

802.11n (20MHz)

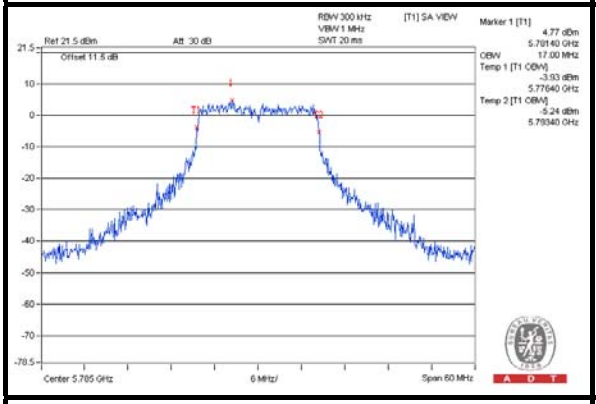
CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
149	5745	18.12	18.12	PASS
157	5785	18.00	18.10	PASS
165	5825	18.10	18.10	PASS

802.11n (40MHz)

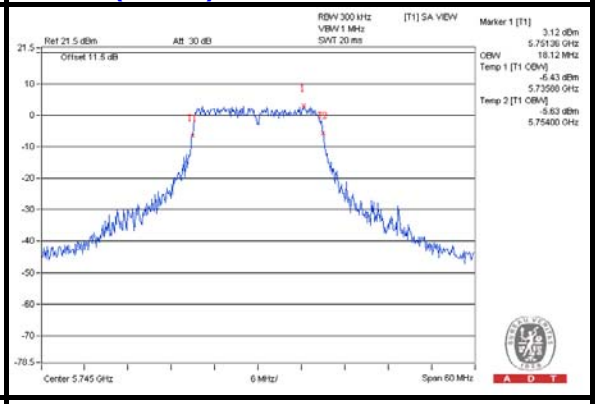
CHANNEL	FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
151	5755	37.20	37.00	PASS
159	5795	37.33	37.00	PASS

SPECTRUM PLOT OF WORST VALUE

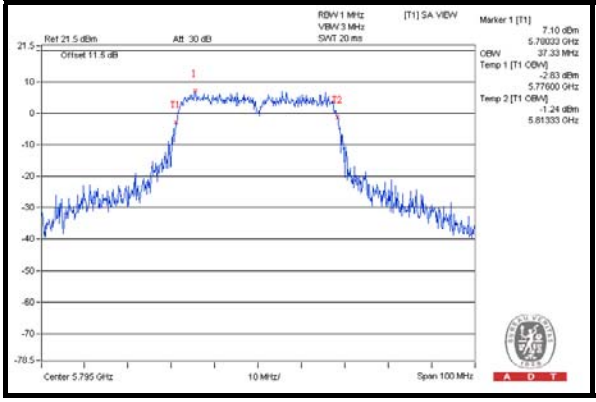
802.11a



802.11n (20MHz)



802.11n (40MHz)



5.5 CONDUCTED OUTPUT POWER

5.5.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 5725 –5850 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.

5.5.2 TEST SETUP

Same as Item 4.4.2.

5.5.3 INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.5.4 TEST PROCEDURES

Same as Item 4.4.4.

5.5.5 DEVIATION FROM TEST STANDARD

No deviation.

5.5.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

5.5.7 TEST RESULTS

FOR PEAK POWER

802.11a

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	20.58	20.28	220.948	23.44	30	PASS
157	5785	21.19	19.98	231.063	23.64	30	PASS
165	5825	20.85	20.43	232.027	23.66	30	PASS

802.11n (20MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	20.54	20.35	221.633	23.46	30	PASS
157	5785	20.89	20.46	233.917	23.69	30	PASS
165	5825	21.33	20.33	**243.726**	23.87	30	PASS

802.11n (40MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
151	5755	21.11	20.34	237.265	23.75	30	PASS
159	5795	21.16	20.51	243.077	23.86	30	PASS

FOR AVERAGE POWER

802.11a

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
149	5745	13.41	13.76	45.696	16.60
157	5785	13.90	13.58	47.350	16.75
165	5825	14.11	13.52	48.254	16.84

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
149	5745	13.70	13.73	47.047	16.73
157	5785	14.29	13.99	51.914	17.15
165	5825	14.21	13.30	47.743	16.79

802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
151	5755	15.14	14.71	62.239	17.94
159	5795	14.50	14.39	55.663	17.46

5.6 POWER SPECTRAL DENSITY MEASUREMENT

5.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.6.2 TEST SETUP

Same as item 4.5.2.

5.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.6.4 TEST PROCEDURE.

Same as item 4.5.4.

5.6.5 DEVIATION FROM TEST STANDARD

No deviation.

5.6.6 EUT OPERATING CONDITION

Same as item 4.3.6.

5.6.7 TEST RESULTS

802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-13.04	3.01	-10.03	6.48	PASS
	157	5785	-12.26	3.01	-9.25	6.48	PASS
	165	5825	-12.55	3.01	-9.54	6.48	PASS
1	149	5745	-12.37	3.01	-9.36	6.48	PASS
	157	5785	-12.79	3.01	-9.78	6.48	PASS
	165	5825	-13.68	3.01	-10.67	6.48	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 7.52, so the power density limit shall be reduced to 8-(7.52-6) = 6.48dBm.

802.11n (20MHz)

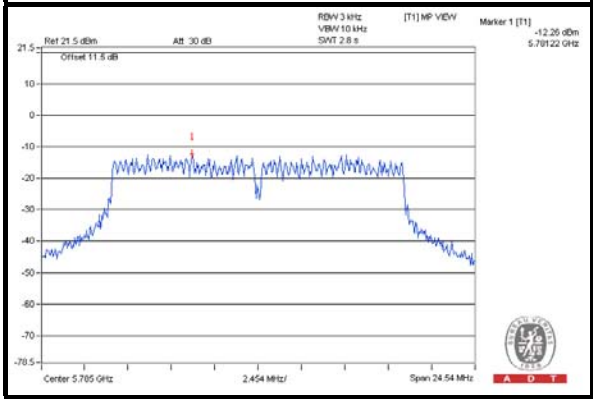
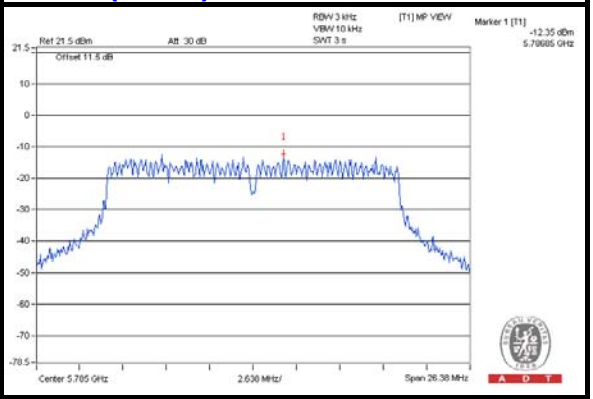
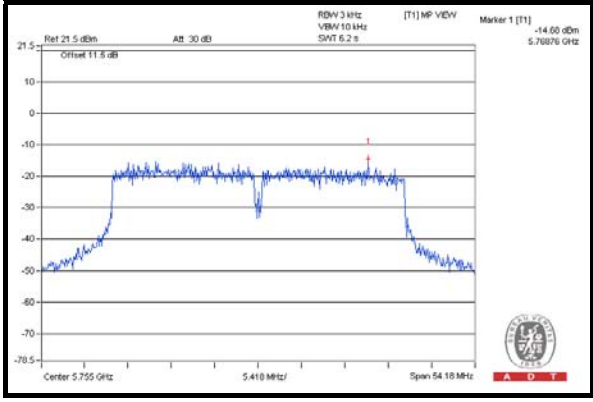
TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-13.46	3.01	-10.45	6.48	PASS
	157	5785	-12.35	3.01	-9.34	6.48	PASS
	165	5825	-12.44	3.01	-9.43	6.48	PASS
1	149	5745	-13.34	3.01	-10.33	6.48	PASS
	157	5785	-13.18	3.01	-10.17	6.48	PASS
	165	5825	-13.66	3.01	-10.65	6.48	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 7.52, so the power density limit shall be reduced to 8-(7.52-6) = 6.48dBm.

802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-14.94	3.01	-11.93	6.48	PASS
	159	5795	-15.73	3.01	-12.72	6.48	PASS
1	151	5755	-14.68	3.01	-11.67	6.48	PASS
	159	5795	-14.84	3.01	-11.83	6.48	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 7.52, so the power density limit shall be reduced to 8-(7.52-6) = 6.48dBm.

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

5.7 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

5.7.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

5.7.2 TEST SETUP

Same as Item 4.6.2

5.7.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.7.4 TEST PROCEDURE

Same as Item 4.6.4

5.7.5 DEVIATION FROM TEST STANDARD

No deviation.

5.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

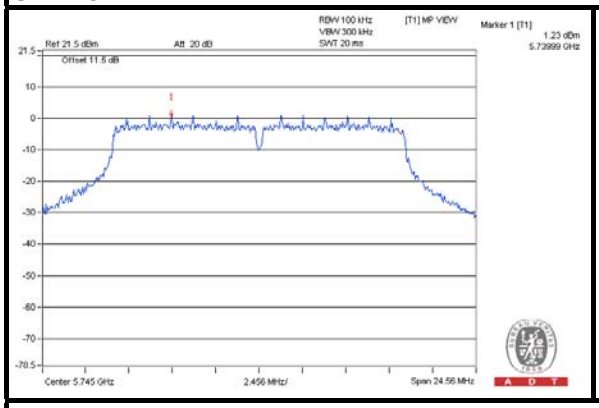
5.7.7 TEST RESULTS

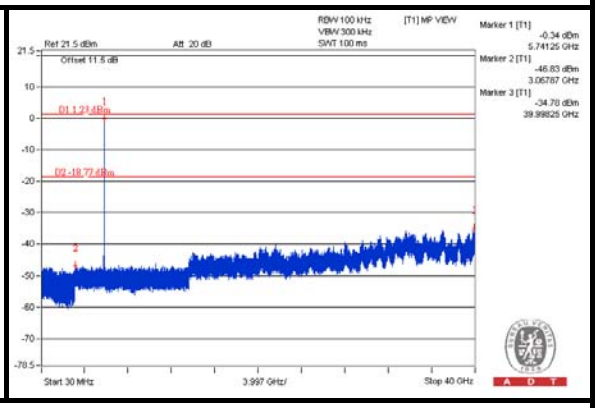
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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.

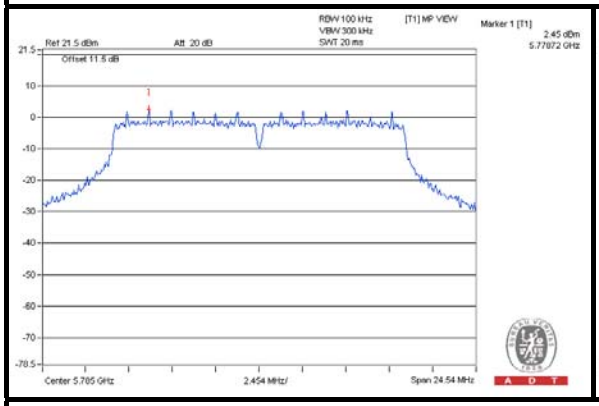
802.11a
CHAIN 0

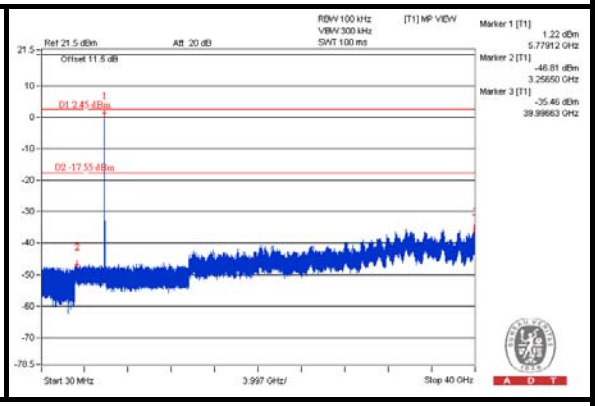
CH 149



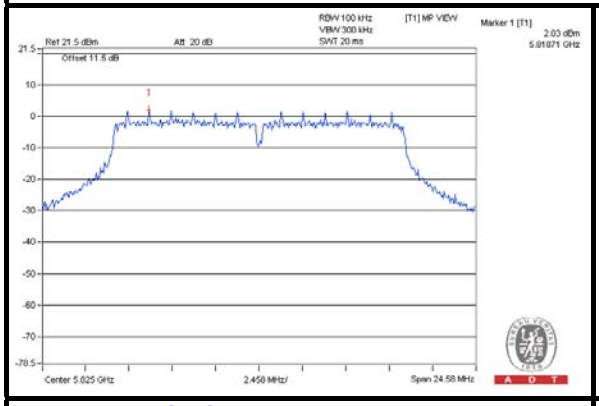


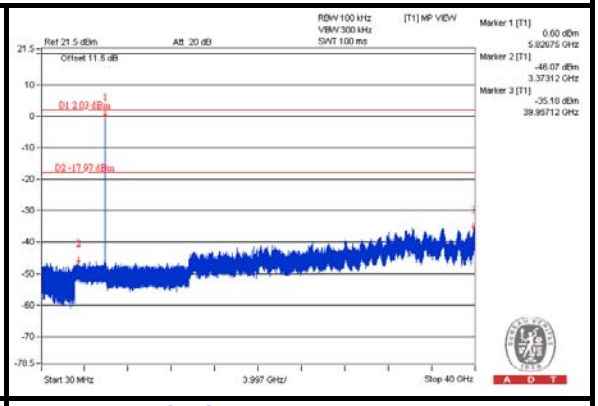
CH 157



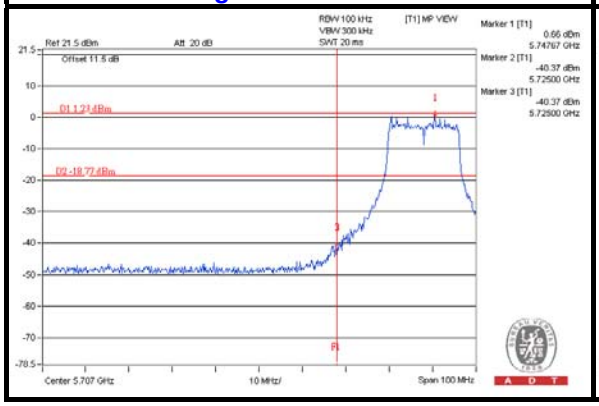


CH 165

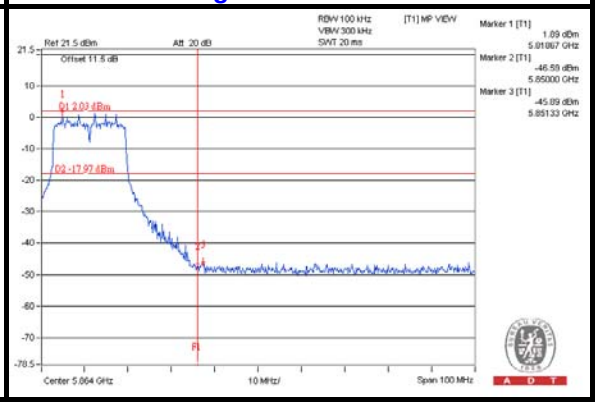




CH 149 Band edge

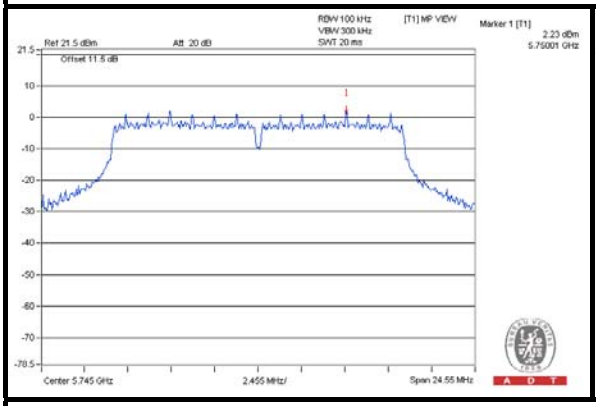


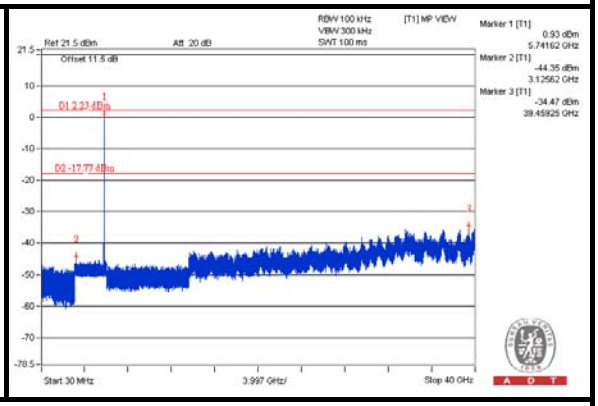
CH 165 Band edge



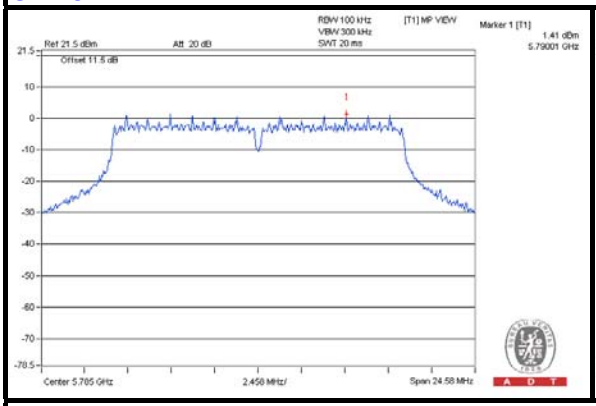
CHAIN 1

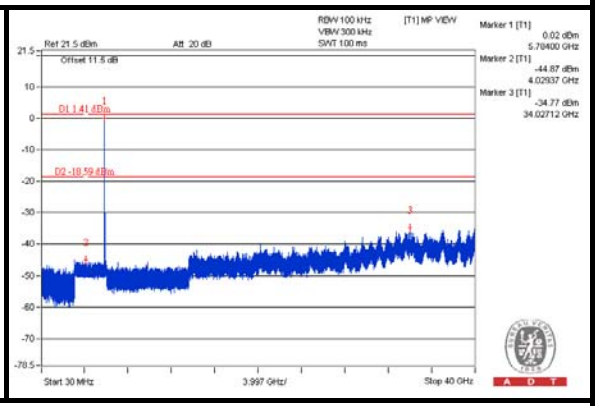
CH 149



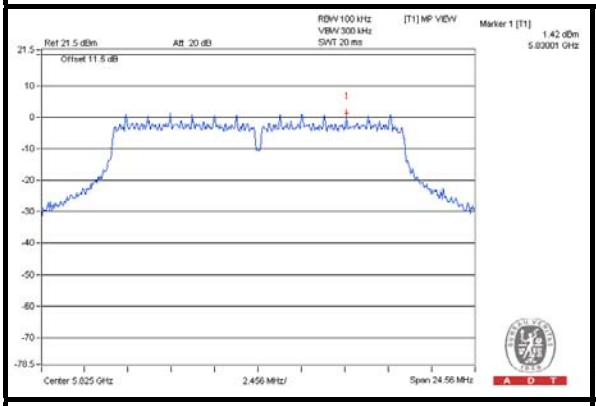


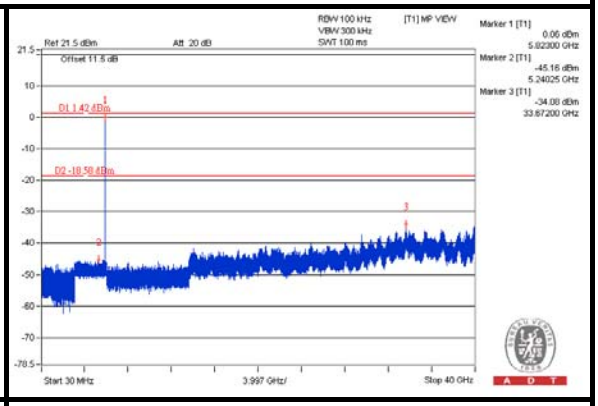
CH 157



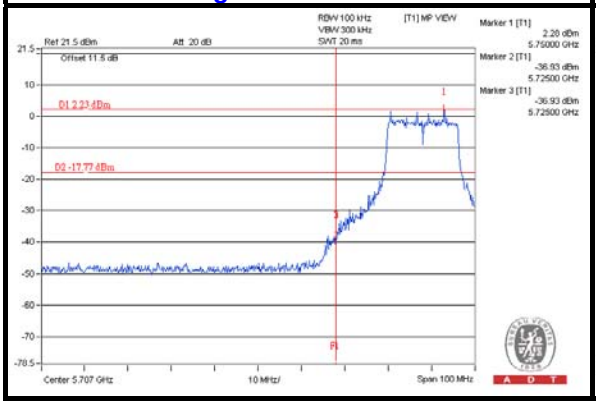


CH 165

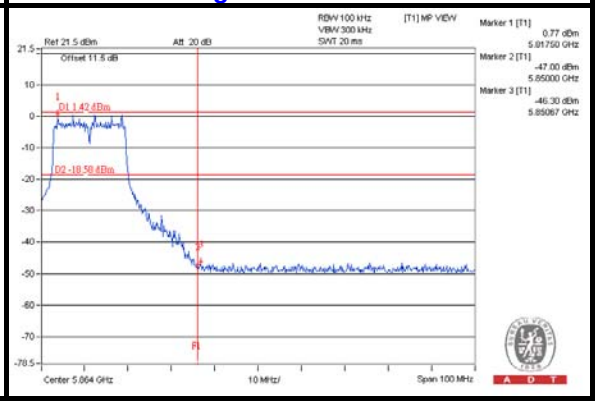




CH 149 Band edge

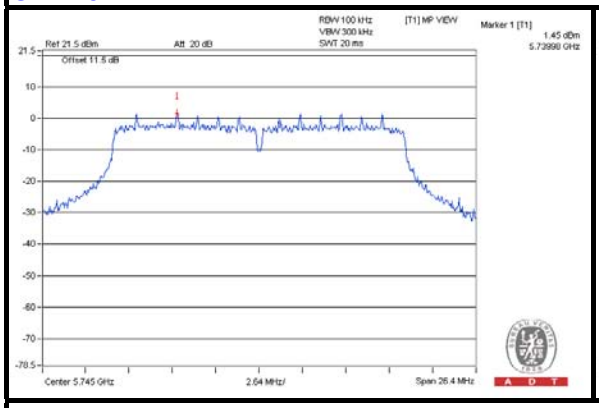


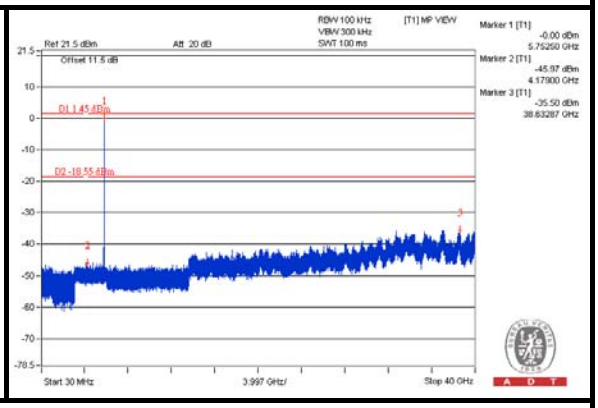
CH 165 Band edge



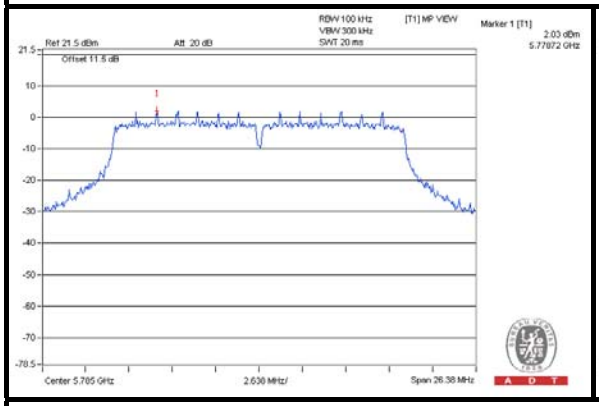
802.11n (20MHz)
CHAIN 0

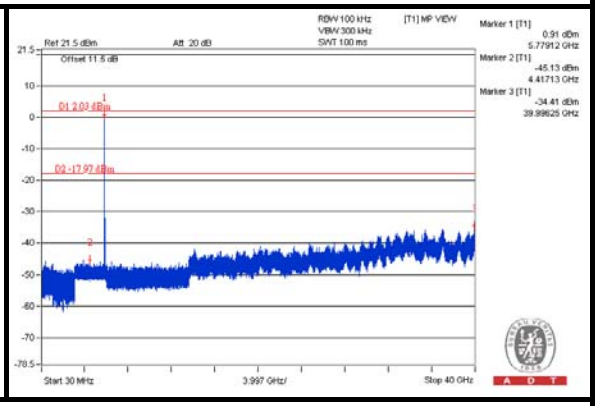
CH 149



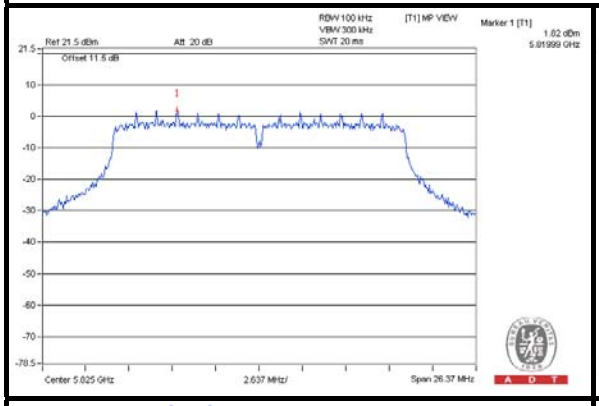


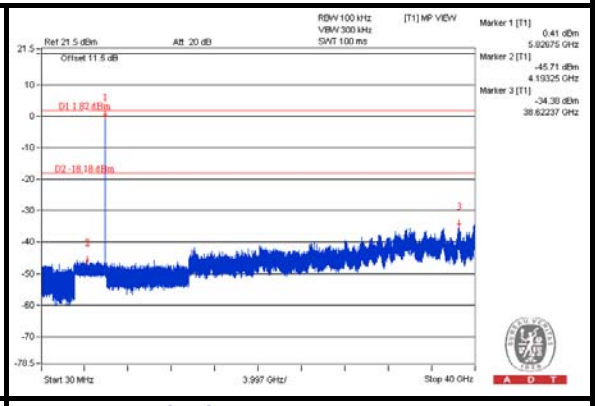
CH 157



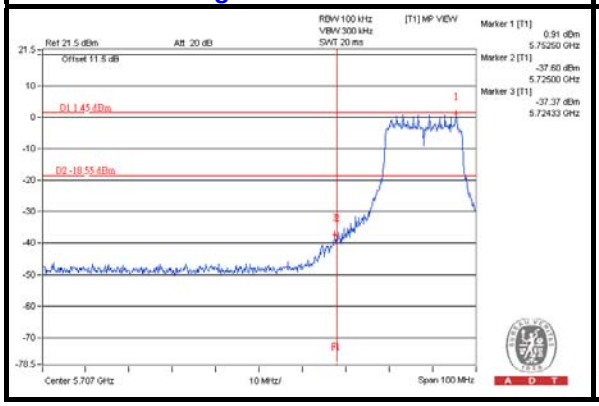


CH 165

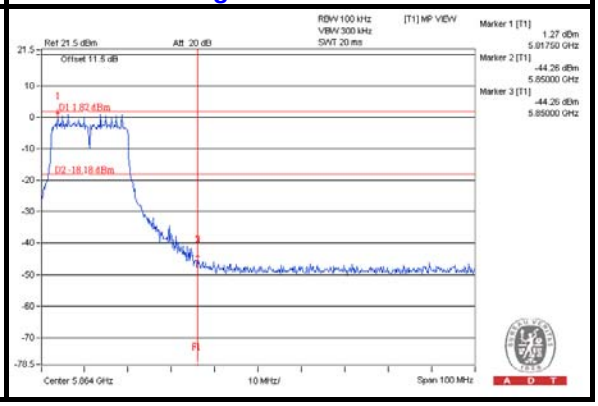




CH 149 Band edge

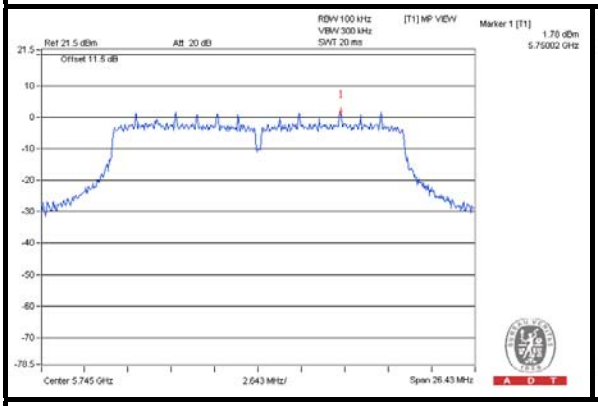


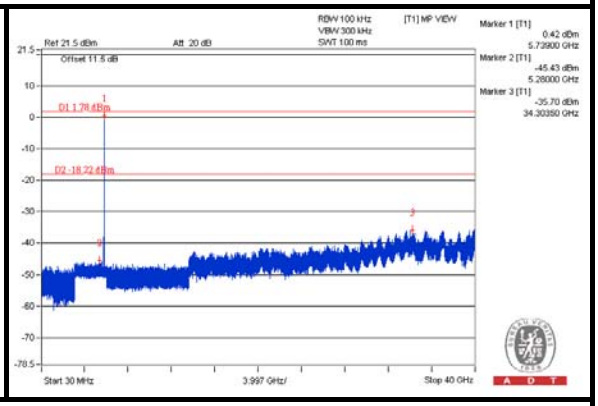
CH 165 Band edge



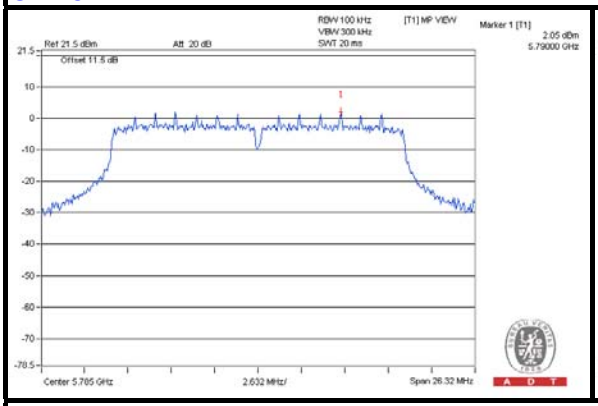
CHAIN 1

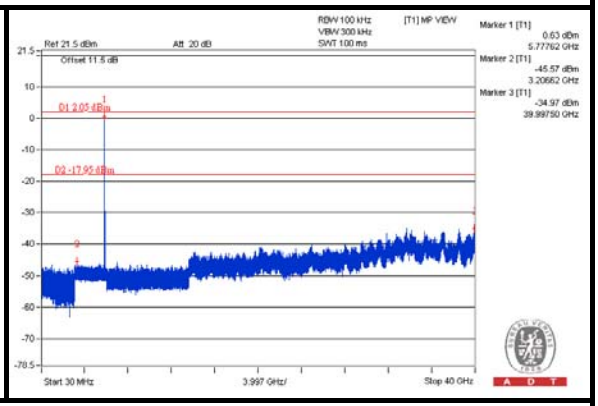
CH 149



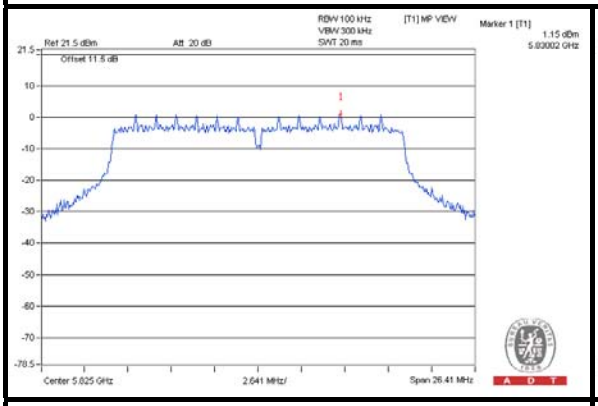


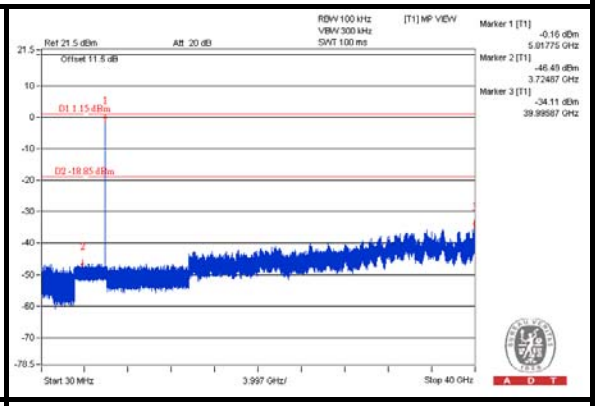
CH 157



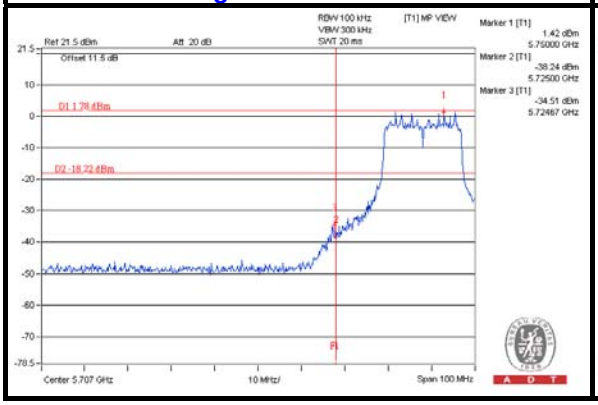


CH 165

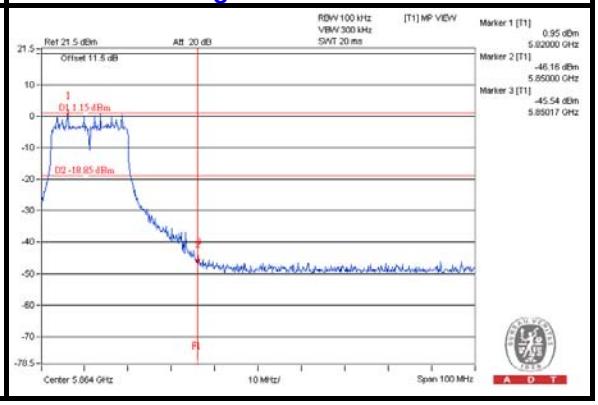




CH 149 Band edge

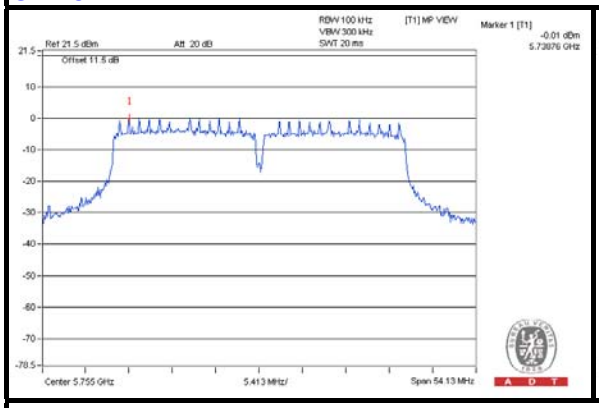


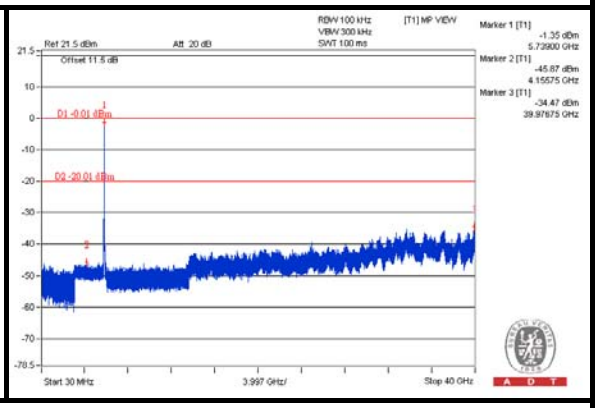
CH 165 Band edge



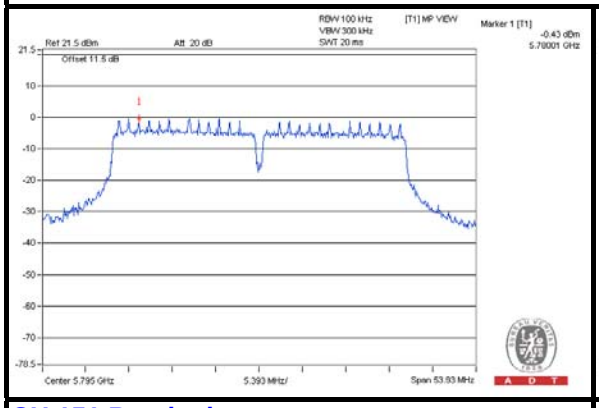
802.11n (40MHz)
CHAIN 0

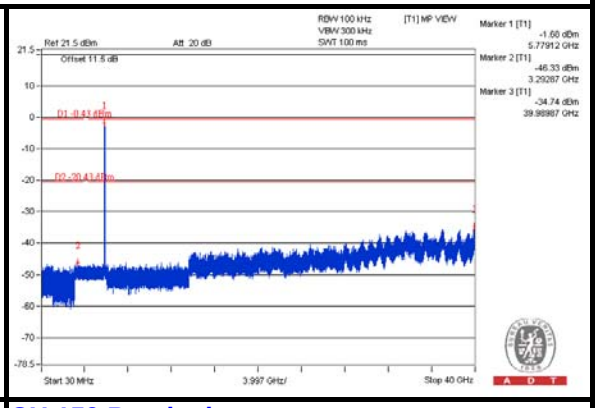
CH 151



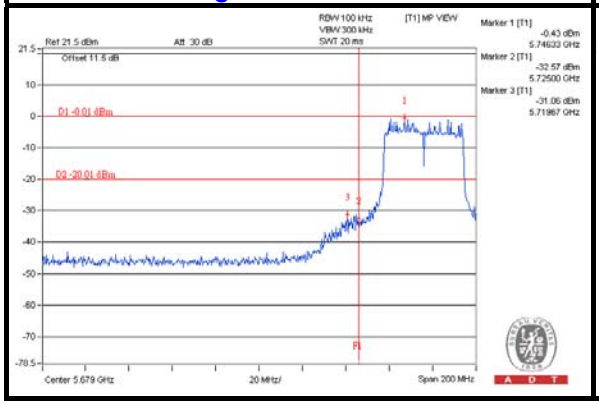


CH 159

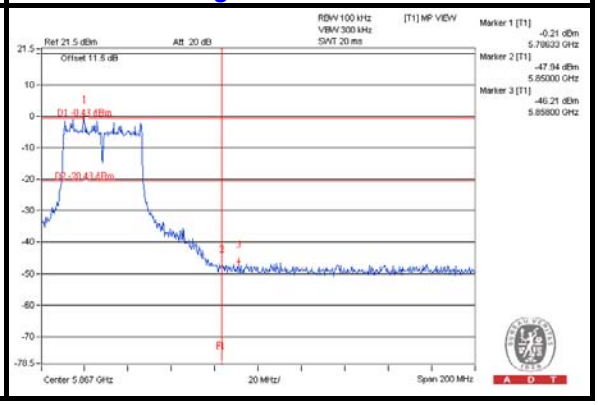




CH 151 Band edge

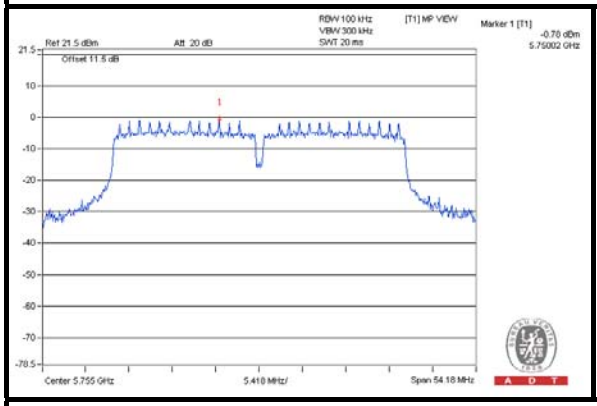


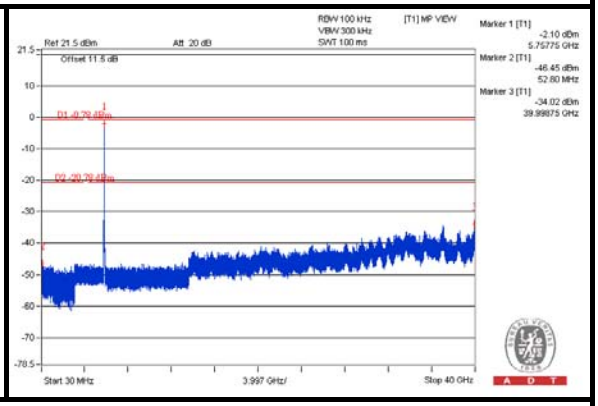
CH 159 Band edge



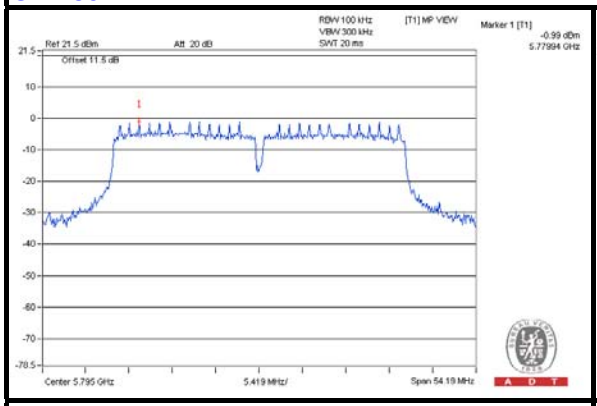
CHAIN 1

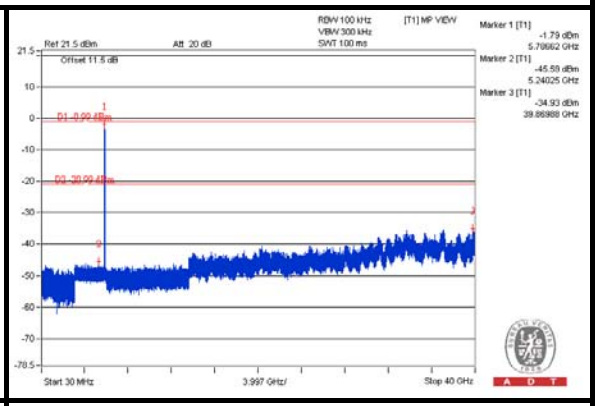
CH 151



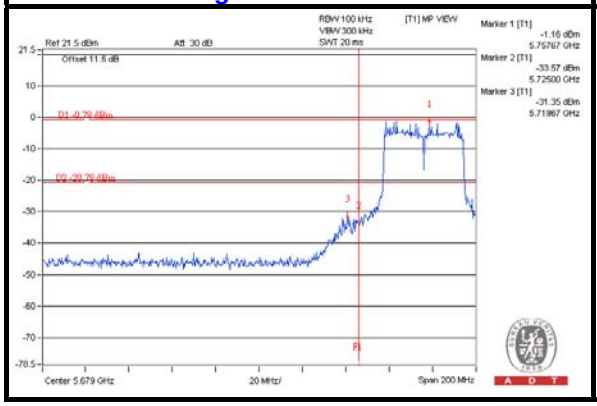


CH 159

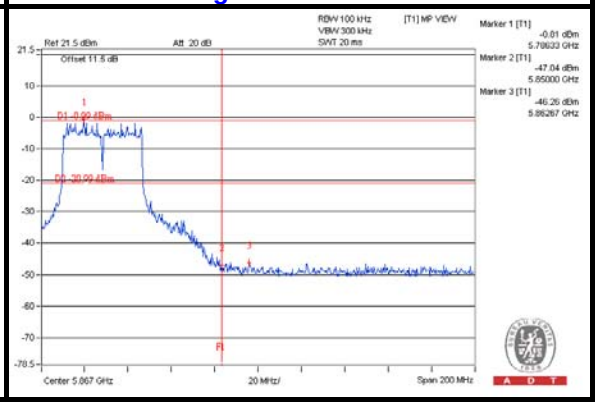




CH 151 Band edge



CH 159 Band edge



6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

7. 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.

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

No modifications were made to the EUT by the lab during the test.

---END---