FCC TEST REPORT (15.247)

REPORT NO.:	RF140224C17D
MODEL NO.:	MR1750
FCC ID:	WT8-MR1750
RECEIVED:	Feb. 24, 2014
TESTED:	Mar. 13 ~ Mar. 20, 2014
ISSUED:	Jan. 07, 2015

APPLICANT:	Open Mesh, Inc.
ADDRESS:	7327 SW Barnes Rd #422, Portland, OR 97225

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

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

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

TABLE OF CONTENTS

RELEASE CONTROL RECORD 5
1. CERTIFICATION 6
2. SUMMARY OF TEST RESULTS 7
2.1 MEASUREMENT UNCERTAINTY 7
3. GENERAL INFORMATION 8
3.1 GENERAL DESCRIPTION OF EUT 8
3.2 DESCRIPTION OF TEST MODES 10
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL 11
3.3 DUTY CYCLE OF TEST SIGNAL 15
3.4 DESCRIPTION OF SUPPORT UNITS 17
3.4.1 CONFIGURATION OF SYSTEM UNDER TEST 18
3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS 19
4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND) 20
4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT 20
4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT 20
4.1.2 TEST INSTRUMENTS 21
4.1.3 TEST PROCEDURES 22
4.1.4 DEVIATION FROM TEST STANDARD 22
4.1.5 TEST SETUP 23
4.1.6 EUT OPERATING CONDITIONS 24
4.1.7 TEST RESULTS 25
4.2 CONDUCTED EMISSION MEASUREMENT 39
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT 39
4.2.2 TEST INSTRUMENTS 39
4.2.3 TEST PROCEDURES 40
4.2.4 DEVIATION FROM TEST STANDARD 40
4.2.5 TEST SETUP 40
4.2.6 EUT OPERATING CONDITIONS 40
4.2.7 TEST RESULTS 41
4.3 6dB BANDWIDTH MEASUREMENT 45
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT 45
4.3.2 TEST SETUP 45
4.3.3 TEST INSTRUMENTS 45
4.3.4 TEST PROCEDURE 45
4.3.5 DEVIATION FROM TEST STANDARD 45
4.3.6 EUT OPERATING CONDITIONS 45
4.3.7 TEST RESULTS 46
4.4 CONDUCTED OUTPUT POWER 48
4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT 48
4.4.2 TEST SETUP 48
4.4.3 TEST INSTRUMENTS 48
4.4.4 TEST PROCEDURES 48
4.4.5 DEVIATION FROM TEST STANDARD 49
4.4.6 EUT OPERATING CONDITIONS 49
4.4.7 TEST RESULTS 50
4.5 POWER SPECTRAL DENSITY MEASUREMENT 51
4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT 51
4.5.2 TEST SETUP 51
4.5.3 TEST INSTRUMENTS 51
4.5.4 TEST PROCEDURE 51

4.5.5 DEVIATION FROM TEST STANDARD....51
4.5.6 EUT OPERATING CONDITION....51
4.5.7 TEST RESULTS....52
4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT....55
4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT....55
4.6.2 TEST SETUP....55
4.6.3 TEST INSTRUMENTS....55
4.6.4 TEST PROCEDURE....56
4.6.5 DEVIATION FROM TEST STANDARD....56
4.6.6 EUT OPERATING CONDITION....56
4.6.7 TEST RESULTS....56
5. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)....69
5.1 RADIATED EMISSION MEASUREMENT....69
5.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT....69
5.1.2 TEST INSTRUMENTS....70
5.1.3 TEST PROCEDURES....70
5.1.4 DEVIATION FROM TEST STANDARD....70
5.1.5 TEST SETUP....70
5.1.6 EUT OPERATING CONDITIONS....70
5.1.7 TEST RESULTS....71
5.2 CONDUCTED EMISSION MEASUREMENT....82
5.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT....82
5.2.2 TEST INSTRUMENTS....82
5.2.3 TEST PROCEDURES....82
5.2.4 DEVIATION FROM TEST STANDARD....82
5.2.5 TEST SETUP....82
5.2.6 EUT OPERATING CONDITIONS....82
5.2.7 TEST RESULTS....83
5.3 6dB BANDWIDTH MEASUREMENT....87
5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT....87
5.3.2 TEST SETUP....87
5.3.3 TEST INSTRUMENTS....87
5.3.4 TEST PROCEDURE....87
5.3.5 DEVIATION FROM TEST STANDARD....87
5.3.6 EUT OPERATING CONDITIONS....87
5.3.7 TEST RESULTS....88
5.4 CONDUCTED OUTPUT POWER....90
5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT....90
5.4.2 TEST SETUP....90
5.4.3 INSTRUMENTS....90
5.4.4 TEST PROCEDURES....91
5.4.5 DEVIATION FROM TEST STANDARD....91
5.4.6 EUT OPERATING CONDITIONS....91
5.4.7 TEST RESULTS....92
5.5 POWER SPECTRAL DENSITY MEASUREMENT....93
5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT....93
5.5.2 TEST SETUP....93
5.5.3 TEST INSTRUMENTS....93
5.5.4 TEST PROCEDURE....93
5.5.5 DEVIATION FROM TEST STANDARD....93
5.5.6 EUT OPERATING CONDITION....93
5.5.7 TEST RESULTS....94
5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT....97

5.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT 97
5.6.2 TEST SETUP.....97
5.6.3 TEST INSTRUMENTS.....97
5.6.4 TEST PROCEDURE.....97
5.6.5 DEVIATION FROM TEST STANDARD.....97
5.6.6 EUT OPERATING CONDITION.....97
5.6.7 TEST RESULTS 97
6. PHOTOGRAPHS OF THE TEST CONFIGURATION.....110
7. INFORMATION ON THE TESTING LABORATORIES 111
8. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....112

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140224C17D	Original release	Jan. 07, 2015

1. CERTIFICATION

PRODUCT:	Wireless a/b/g/n/AC Access Point
MODEL NO.:	MR1750
BRAND:	Open Mesh
APPLICANT:	Open Mesh, Inc.
TESTED:	Mar. 13 ~ Mar. 20, 2014
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)**

The above equipment (model: MR1750) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ **, DATE :** Jan. 07, 2015

Pettie Chen / Senior Specialist

APPROVED BY : _____ **, DATE :** Jan. 07, 2015

Ken Liu / Senior Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -2.01dB at 0.47422MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2483.50, 11570.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is IPEX not a standard connector.

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 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	Wireless a/b/g/n/AC Access Point
MODEL NO.	MR1750
POWER SUPPLY	12Vdc (Adapter) 48Vdc (PoE)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 256QAM, 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 450.0Mbps 802.11ac: up to 1299.9Mbps
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) 1 for 802.11ac (80MHz)
OUTPUT POWER	739.930mW for 2412 ~ 2462MHz 594.385mW for 5745 ~ 5825MHz
ANTENNA TYPE	2.4GHz: PIFA antenna with 4.0dBi gain 5.0GHz: PIFA antenna with 5.0dBi gain
ANTENNA CONNECTOR	IPEX
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

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

MODULATION MODE	TX FUNCTION
802.11b	3TX
802.11g	3TX
802.11a	3TX
802.11n (20MHz) MCS 0-7	3TX
802.11n (20MHz) MCS 8-15	3TX
802.11n (20MHz) MCS 16-23	3TX
802.11n (40MHz) MCS 0-7	3TX
802.11n (40MHz) MCS 8-15	3TX
802.11n (40MHz) MCS 16-23	3TX
802.11ac (20MHz)	3TX
802.11ac (40MHz)	3TX
802.11ac (80MHz)	3TX

* The modulation and bandwidth are similar for 802.11n mode for 20MHz / 40MHz and 802.11ac mode for 20MHz / 40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

2. The EUT consumes power from the following adapter & PoE.

ADAPTER	
BRAND:	Powertron Electronics Corp.
MODEL:	PA1024-2HUB PA1024-2HU PA1024-120HUB200
INPUT:	100-240Vac, 50-60Hz, 0.6A
OUTPUT:	12Vdc, 2.0A, 24W Max
POWER LINE:	1.50m non-shielded cable with one core

POE (Support units only)	
BRAND:	EnGenius
MODEL:	NPE-5818
OUTPUT:	48Vdc, 0.5A
ADAPTER for POE (Support units only)	
BRAND:	Powertron Electronics Corp.
MODEL:	PA1024-480DUB050
INPUT:	100-240V~50-60Hz 0.6A
OUTPUT:	48Vdc, 0.5A, 24W Max
POWER LINE:	1.55m non-shielded cable without core

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

3.2 DESCRIPTION OF TEST MODES

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

1 channel is provided for 802.11ac (80MHz):

CHANNEL	FREQUENCY
155	5775MHz

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	√	√	√	√	Power from adapter
B	-	√	√	-	Power from 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:
The EUT had been pre-tested on the positioned of each 2 axis (X-plane & Z-plane). The worst case was found when positioned on **Z-plane**.
NOTE: "-" 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	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
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	√	√	√	√	Power from adapter
B	-	√	√	-	Power from 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:
The EUT had been pre-tested on the positioned of each 2 axis (X-plane & Z-plane). The worst case was found when positioned on **Z-plane**.
NOTE: "-" 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
A	802.11ac (80MHz)	155	155	OFDM	BPSK	97.5

RADIATED EMISSION TEST (BELOW 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B	802.11a	149 to 165	157	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	802.11a	149 to 165	157	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	802.11a	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
A	802.11ac (80MHz)	155	155	OFDM	BPSK	97.5

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
A	802.11ac (80MHz)	155	155	OFDM	BPSK	97.5

TEST CONDITION:

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

3.3 DUTY CYCLE OF TEST SIGNAL

2.4GHz Band:

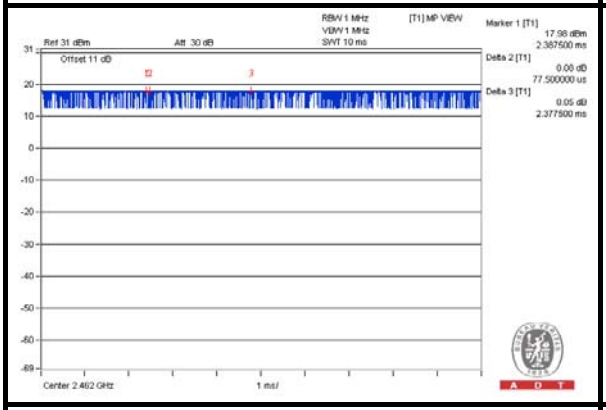
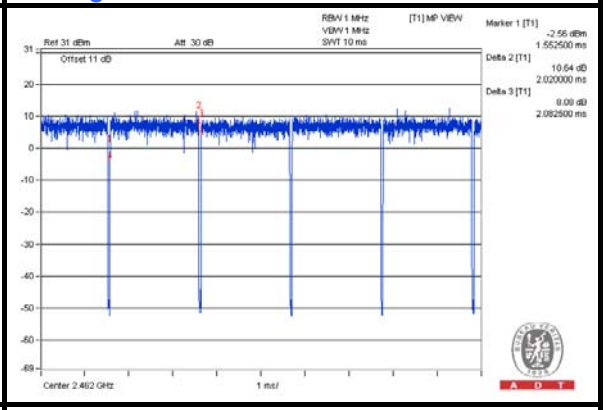
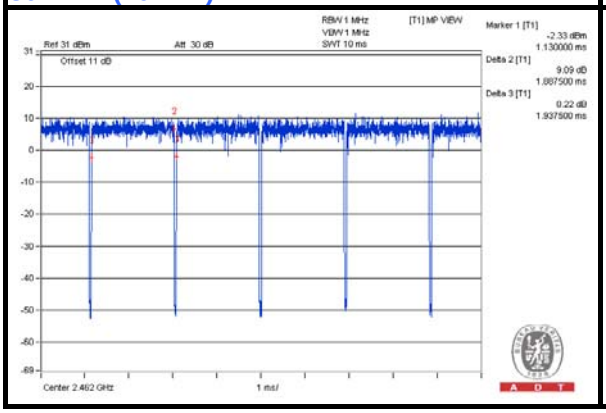
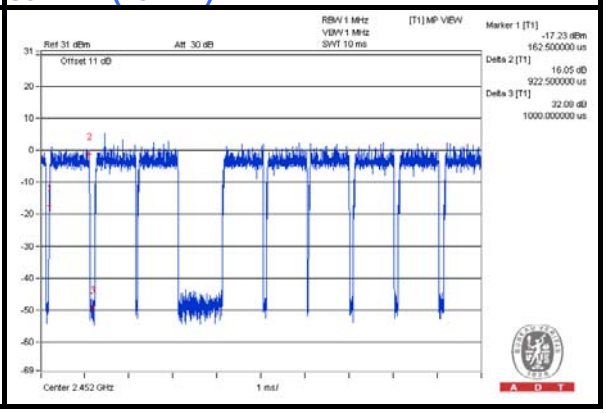
802.11b: Duty cycle of test signal is > 98 %

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

802.11g: Duty cycle = 2.02/2.08 = 0.971, Duty factor = 10 * log(1/0.971) = 0.13

802.11n (20MHz): Duty cycle = 1.88/1.93 = 0.974, Duty factor = 10 * log(1/0.974) = 0.11

802.11n (40MHz): Duty cycle = 0.922/1 = 0.922, Duty factor = 10 * log(1/0.922) = 0.35

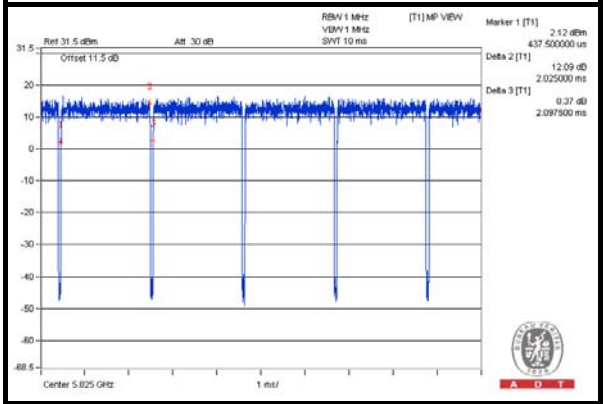
802.11b	802.11g
	
802.11n (20MHz)	**802.11n (40MHz)**
	

5.0GHz Band:

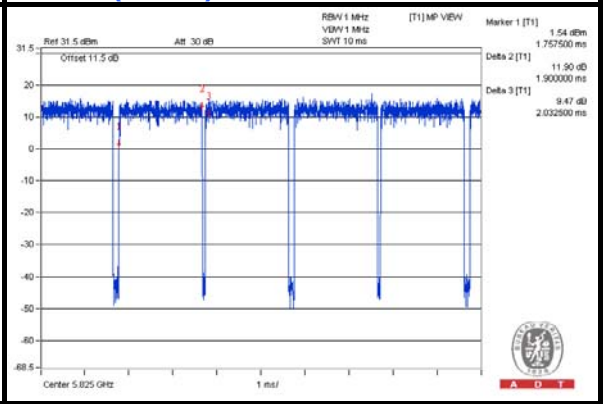
Duty cycle of test signal is < 98%

802.11a: Duty cycle = 2.02/2.09 = 0.967, Duty factor = 10 * log(1/0.967) = 0.15
802.11n (20MHz): Duty cycle = 1.9/2.03 = 0.936, Duty factor = 10 * log(1/0.936) = 0.29
802.11n (40MHz): Duty cycle = 0.925/0.997 = 0.928, Duty factor = 10 * log(1/0.928) = 0.33
802.11ac (80MHz): Duty cycle = 0.452/0.535 = 0.845, Duty factor = 10 * log(1/0.845) = 0.73

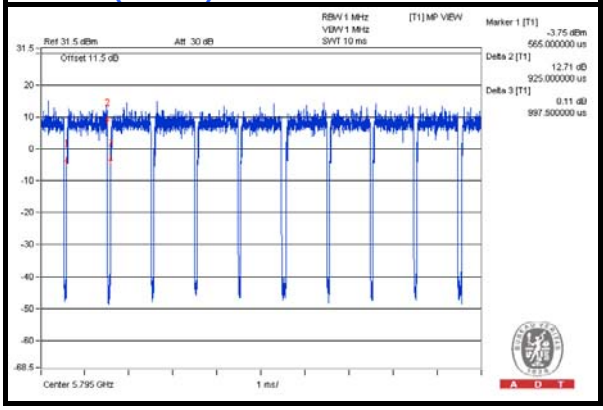
802.11a



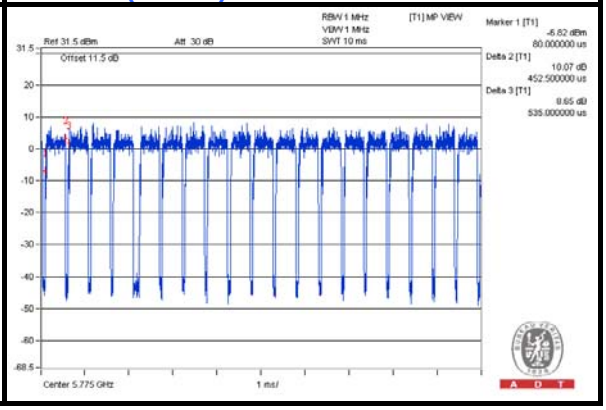
802.11n (20MHz)



802.11n (40MHz)



802.11ac (80MHz)



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.

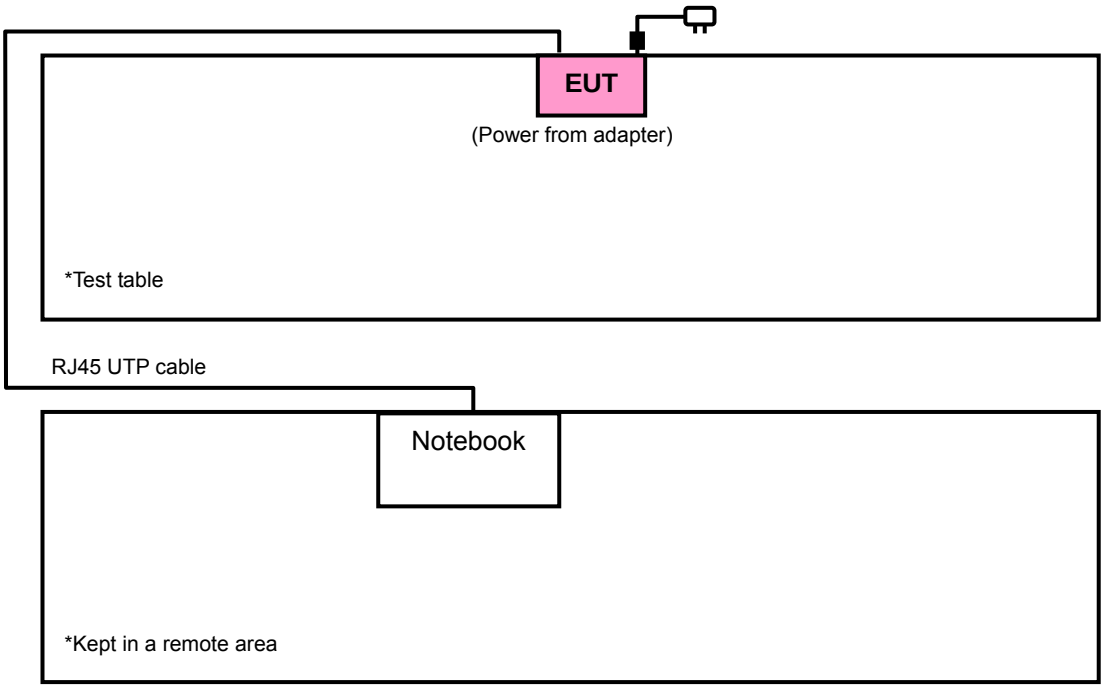
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved
2	POE	EnGenius	NPE-5818	NA	NA
3	ADAPTER	Powertron Electronics Corp.	PA1024-480DUB050	NA	NA

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

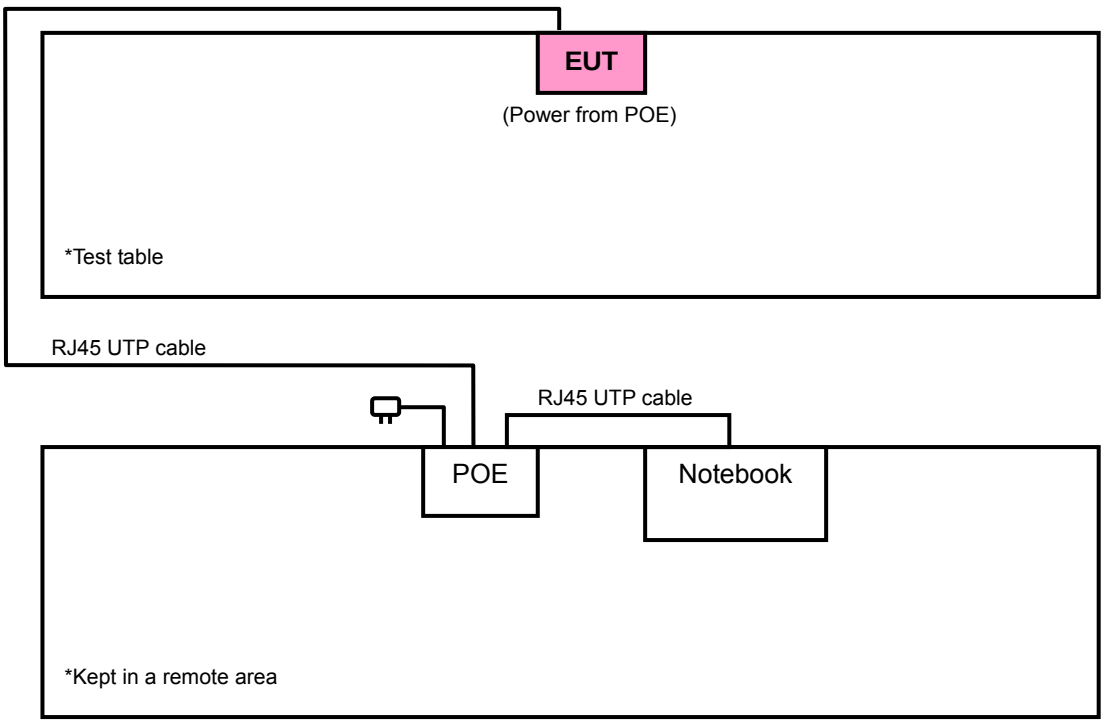
NOTE:
1. All power cords of the above support units are non-shielded (1.8 m).
2. Item 1 acted as a communication partner to transfer data.
3. Items 2-3 were provided by the manufacturer.

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 v03r02
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4. TEST TYPES AND RESULTS (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 30dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Sep. 09, 2013	Sep. 08, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSU 43	100115	Dec. 18, 2013	Dec. 17, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 26, 2014	Feb. 25, 2015
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Jan. 05, 2014	Jan. 04, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8449B	3008A01961	Oct. 28, 2013	Oct. 27, 2014
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	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	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
High Speed Peak Power Meter	ML2495A	0824011	Jul. 29, 2013	Jul. 28, 2014
Power Sensor	MA2411B	0738171	Jul. 29, 2013	Jul. 28, 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 4.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 460141.
5. The IC Site Registration No. is IC7450F-4.

4.1.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 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:

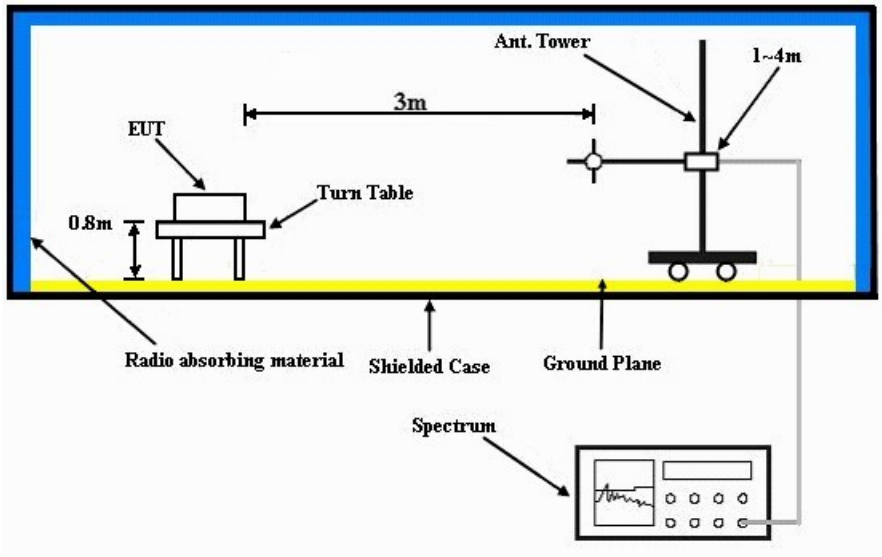
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

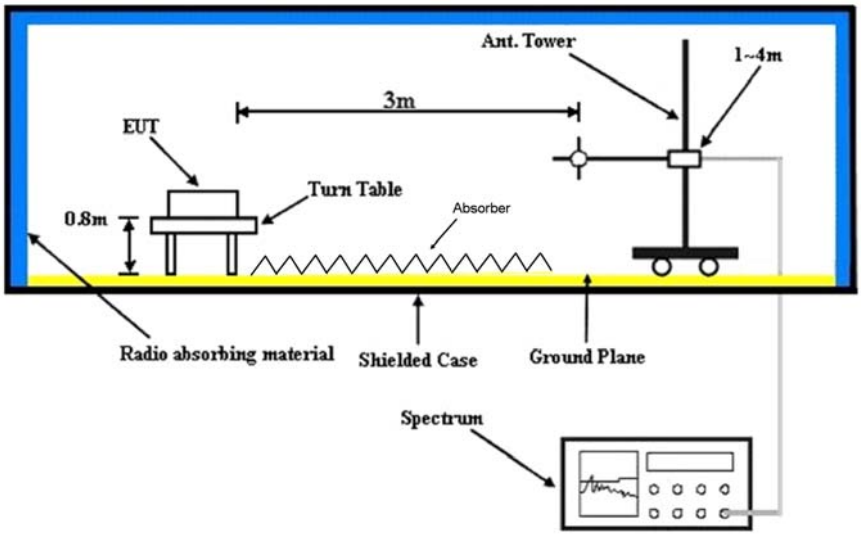
No deviation.

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 notebook to act as communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".

4.1.7 TEST RESULTS

ABOVE 1GHz DATA：

802.11b

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	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	60.2 PK	74.0	-13.8	1.00 H	329	29.20	31.00
2	2390.00	52.2 AV	54.0	-1.8	1.00 H	329	21.20	31.00
3	*2412.00	119.2 PK			1.00 H	39	88.10	31.10
4	*2412.00	115.5 AV			1.00 H	39	84.40	31.10
5	4824.00	48.0 PK	74.0	-26.0	1.01 H	196	43.10	4.90
6	4824.00	39.6 AV	54.0	-14.4	1.01 H	196	34.70	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	59.5 PK	74.0	-14.5	1.08 V	54	28.50	31.00
2	2390.00	51.6 AV	54.0	-2.4	1.08 V	54	20.60	31.00
3	*2412.00	117.4 PK			1.07 V	53	86.30	31.10
4	*2412.00	113.8 AV			1.07 V	53	82.70	31.10
5	4824.00	48.6 PK	74.0	-25.4	1.14 V	322	43.70	4.90
6	4824.00	41.4 AV	54.0	-12.6	1.14 V	322	36.50	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 (SYSTEM)	120Vac, 60 Hz	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	61.3 PK	74.0	-12.7	1.26 H	305	30.30	31.00
2	2390.00	47.1 AV	54.0	-6.9	1.26 H	305	16.10	31.00
3	*2437.00	120.7 PK			1.05 H	345	89.50	31.20
4	*2437.00	117.0 AV			1.05 H	345	85.80	31.20
5	4874.00	49.0 PK	74.0	-25.0	1.14 H	290	44.00	5.00
6	4874.00	40.9 AV	54.0	-13.1	1.14 H	290	35.90	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	62.7 PK	74.0	-11.3	1.94 V	19	31.70	31.00
2	2390.00	46.0 AV	54.0	-8.0	1.94 V	19	15.00	31.00
3	*2437.00	121.0 PK			1.36 V	16	89.80	31.20
4	*2437.00	117.3 AV			1.36 V	16	86.10	31.20
5	4874.00	49.4 PK	74.0	-24.6	1.12 V	341	44.40	5.00
6	4874.00	42.4 AV	54.0	-11.6	1.12 V	341	37.40	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 (SYSTEM)	120Vac, 60 Hz	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	119.4 PK			1.93 H	58	88.10	31.30
2	*2462.00	116.0 AV			1.93 H	58	84.70	31.30
3	2483.50	64.0 PK	74.0	-10.0	1.00 H	330	32.60	31.40
4	2483.50	52.6 AV	54.0	-1.4	1.00 H	330	21.20	31.40
5	4924.00	48.1 PK	74.0	-25.9	1.20 H	326	42.90	5.20
6	4924.00	37.3 AV	54.0	-16.7	1.20 H	326	32.10	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	113.3 PK			1.54 V	36	82.00	31.30
2	*2462.00	110.0 AV			1.54 V	36	78.70	31.30
3	2483.50	59.6 PK	74.0	-14.4	1.06 V	55	28.20	31.40
4	2483.50	52.0 AV	54.0	-2.0	1.06 V	55	20.60	31.40
5	4924.00	48.3 PK	74.0	-25.7	1.00 V	189	43.10	5.20
6	4924.00	39.6 AV	54.0	-14.4	1.00 V	189	34.40	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 (SYSTEM)	120Vac, 60 Hz	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	72.5 PK	74.0	-1.5	1.94 H	324	41.50	31.00
2	2390.00	52.5 AV	54.0	-1.5	1.94 H	324	21.50	31.00
3	*2412.00	117.2 PK			1.01 H	323	86.10	31.10
4	*2412.00	107.3 AV			1.01 H	323	76.20	31.10
5	4824.00	46.5 PK	74.0	-27.5	1.15 H	96	41.60	4.90
6	4824.00	33.3 AV	54.0	-20.7	1.15 H	96	28.40	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	66.8 PK	74.0	-7.2	1.32 V	12	35.80	31.00
2	2390.00	51.5 AV	54.0	-2.5	1.32 V	12	20.50	31.00
3	*2412.00	113.3 PK			1.62 V	18	82.20	31.10
4	*2412.00	104.7 AV			1.62 V	18	73.60	31.10
5	4824.00	45.5 PK	74.0	-28.5	1.15 V	96	40.60	4.90
6	4824.00	33.3 AV	54.0	-20.7	1.15 V	96	28.40	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 (SYSTEM)	120Vac, 60 Hz	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	71.7 PK	74.0	-2.3	1.03 H	318	40.70	31.00
2	2390.00	51.5 AV	54.0	-2.5	1.03 H	318	20.50	31.00
3	*2437.00	120.1 PK			1.00 H	319	88.90	31.20
4	*2437.00	110.5 AV			1.00 H	319	79.30	31.20
5	2483.50	69.8 PK	74.0	-4.2	1.02 H	338	38.40	31.40
6	2483.50	52.9 AV	54.0	-1.1	1.02 H	338	21.50	31.40
7	4874.00	47.8 PK	74.0	-26.2	1.20 H	139	42.80	5.00
8	4874.00	34.3 AV	54.0	-19.7	1.20 H	139	29.30	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	68.9 PK	74.0	-5.1	1.11 V	19	37.90	31.00
2	2390.00	49.7 AV	54.0	-4.3	1.11 V	19	18.70	31.00
3	*2437.00	119.9 PK			1.33 V	20	88.70	31.20
4	*2437.00	110.5 AV			1.33 V	20	79.30	31.20
5	2483.50	70.9 PK	74.0	-3.1	1.08 V	35	39.50	31.40
6	2483.50	51.7 AV	54.0	-2.3	1.08 V	35	20.30	31.40
7	4874.00	47.5 PK	74.0	-26.5	1.10 V	339	42.50	5.00
8	4874.00	33.9 AV	54.0	-20.1	1.10 V	339	28.90	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 (SYSTEM)	120Vac, 60 Hz	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	115.9 PK			1.02 H	333	84.60	31.30
2	*2462.00	105.6 AV			1.02 H	333	74.30	31.30
3	2483.50	72.4 PK	74.0	-1.6	1.00 H	332	41.00	31.40
4	2483.50	51.6 AV	54.0	-2.4	1.00 H	332	20.20	31.40
5	4874.00	48.0 PK	74.0	-26.0	1.10 H	255	43.00	5.00
6	4874.00	34.4 AV	54.0	-19.6	1.10 H	255	29.40	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	*2462.00	113.3 PK			1.05 V	54	82.00	31.30
2	*2462.00	103.6 AV			1.05 V	54	72.30	31.30
3	2483.50	66.9 PK	74.0	-7.1	1.53 V	19	35.50	31.40
4	2483.50	48.7 AV	54.0	-5.3	1.53 V	19	17.30	31.40
5	4874.00	47.1 PK	74.0	-26.9	1.00 V	302	42.10	5.00
6	4874.00	34.0 AV	54.0	-20.0	1.00 V	302	29.00	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.

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	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	72.2 PK	74.0	-1.8	1.01 H	307	41.20	31.00
2	2390.00	52.4 AV	54.0	-1.6	1.01 H	307	21.40	31.00
3	*2412.00	115.8 PK			1.03 H	336	84.70	31.10
4	*2412.00	106.2 AV			1.03 H	336	75.10	31.10
5	4824.00	47.2 PK	74.0	-26.8	1.21 H	217	42.30	4.90
6	4824.00	34.5 AV	54.0	-19.5	1.21 H	217	29.60	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	70.0 PK	74.0	-4.0	1.45 V	23	39.00	31.00
2	2390.00	51.1 AV	54.0	-2.9	1.45 V	23	20.10	31.00
3	*2412.00	114.2 PK			1.38 V	7	83.10	31.10
4	*2412.00	104.3 AV			1.38 V	7	73.20	31.10
5	4824.00	46.6 PK	74.0	-27.4	1.01 V	110	41.70	4.90
6	4824.00	34.1 AV	54.0	-19.9	1.01 V	110	29.20	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 (SYSTEM)	120Vac, 60 Hz	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	2388.00	68.1 PK	74.0	-5.9	1.04 H	329	37.10	31.00
2	2388.00	50.0 AV	54.0	-4.0	1.04 H	329	19.00	31.00
3	*2437.00	120.0 PK			1.03 H	322	88.80	31.20
4	*2437.00	110.3 AV			1.03 H	322	79.10	31.20
5	2483.50	71.9 PK	74.0	-2.1	1.00 H	328	40.50	31.40
6	2483.50	52.8 AV	54.0	-1.2	1.00 H	328	21.40	31.40
7	4874.00	47.7 PK	74.0	-26.3	1.22 H	252	42.70	5.00
8	4874.00	34.4 AV	54.0	-19.6	1.22 H	252	29.40	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	64.5 PK	74.0	-9.5	1.12 V	11	33.50	31.00
2	2390.00	48.5 AV	54.0	-5.5	1.12 V	11	17.50	31.00
3	*2437.00	119.4 PK			1.12 V	28	88.20	31.20
4	*2437.00	110.1 AV			1.12 V	28	78.90	31.20
5	2483.50	65.0 PK	74.0	-9.0	1.09 V	33	33.60	31.40
6	2483.50	50.3 AV	54.0	-3.7	1.09 V	33	18.90	31.40
7	4874.00	47.3 PK	74.0	-26.7	1.02 V	352	42.30	5.00
8	4874.00	34.0 AV	54.0	-20.0	1.02 V	352	29.00	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 (SYSTEM)	120Vac, 60 Hz	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	115.5 PK			1.00 H	336	84.20	31.30
2	*2462.00	105.6 AV			1.00 H	336	74.30	31.30
3	2483.50	72.1 PK	74.0	-1.9	1.00 H	339	40.70	31.40
4	2483.50	51.7 AV	54.0	-2.3	1.00 H	339	20.30	31.40
5	4924.00	47.1 PK	74.0	-26.9	1.09 H	291	41.90	5.20
6	4924.00	34.7 AV	54.0	-19.3	1.09 H	291	29.50	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	113.6 PK			1.08 V	37	82.30	31.30
2	*2462.00	103.6 AV			1.08 V	37	72.30	31.30
3	**2483.50**	**73.0 PK**	**74.0**	**-1.0**	**1.15 V**	**44**	**41.60**	**31.40**
4	2483.50	51.7 AV	54.0	-2.3	1.15 V	44	20.30	31.40
5	4924.00	46.7 PK	74.0	-27.3	1.00 V	201	41.50	5.20
6	4924.00	33.9 AV	54.0	-20.1	1.00 V	201	28.70	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 (SYSTEM)	120Vac, 60 Hz	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	68.7 PK	74.0	-5.3	1.02 H	328	37.70	31.00
2	2390.00	52.6 AV	54.0	-1.4	1.02 H	328	21.60	31.00
3	*2422.00	108.8 PK			1.01 H	339	77.60	31.20
4	*2422.00	99.5 AV			1.01 H	339	68.30	31.20
5	4844.00	47.0 PK	74.0	-27.0	1.11 H	283	42.00	5.00
6	4844.00	33.4 AV	54.0	-20.6	1.11 H	283	28.40	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	67.0 PK	74.0	-7.0	1.10 V	27	36.00	31.00
2	2390.00	48.7 AV	54.0	-5.3	1.10 V	27	17.70	31.00
3	*2422.00	108.3 PK			1.34 V	33	77.10	31.20
4	*2422.00	98.5 AV			1.34 V	33	67.30	31.20
5	4844.00	46.7 PK	74.0	-27.3	1.01 V	303	41.70	5.00
6	4844.00	33.2 AV	54.0	-20.8	1.01 V	303	28.20	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 (SYSTEM)	120Vac, 60 Hz	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	68.2 PK	74.0	-5.8	1.00 H	301	37.20	31.00
2	2390.00	51.4 AV	54.0	-2.6	1.00 H	301	20.40	31.00
3	*2437.00	113.2 PK			1.01 H	332	82.00	31.20
4	*2437.00	103.7 AV			1.01 H	332	72.50	31.20
5	2483.50	72.4 PK	74.0	-1.6	1.00 H	331	41.00	31.40
6	2483.50	51.4 AV	54.0	-2.6	1.00 H	331	20.00	31.40
7	4874.00	46.9 PK	74.0	-27.1	1.10 H	17	41.90	5.00
8	4874.00	33.3 AV	54.0	-20.7	1.10 H	17	28.30	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	66.3 PK	74.0	-7.7	1.10 V	19	35.30	31.00
2	2390.00	47.8 AV	54.0	-6.2	1.10 V	19	16.80	31.00
3	*2437.00	110.0 PK			1.12 V	10	78.80	31.20
4	*2437.00	101.2 AV			1.12 V	10	70.00	31.20
5	2483.50	65.9 PK	74.0	-8.1	1.12 V	13	34.50	31.40
6	2483.50	50.3 AV	54.0	-3.7	1.12 V	13	18.90	31.40
7	4874.00	46.2 PK	74.0	-27.8	1.00 V	273	41.20	5.00
8	4874.00	33.0 AV	54.0	-21.0	1.00 V	273	28.00	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 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	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	110.8 PK			1.00 H	332	79.50	31.30
2	*2452.00	100.9 AV			1.00 H	332	69.60	31.30
3	2483.50	68.8 PK	74.0	-5.2	1.00 H	336	37.40	31.40
4	2483.50	52.6 AV	54.0	-1.4	1.00 H	336	21.20	31.40
5	4904.00	46.4 PK	74.0	-27.6	1.03 H	146	41.30	5.10
6	4904.00	33.1 AV	54.0	-20.9	1.03 H	146	28.00	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	108.0 PK			1.06 V	35	76.70	31.30
2	*2452.00	98.0 AV			1.06 V	35	66.70	31.30
3	2483.50	66.7 PK	74.0	-7.3	1.03 V	46	35.30	31.40
4	2483.50	50.4 AV	54.0	-3.6	1.03 V	46	19.00	31.40
5	4904.00	46.1 PK	74.0	-27.9	1.00 V	206	41.00	5.10
6	4904.00	32.9 AV	54.0	-21.1	1.00 V	206	27.80	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 (SYSTEM)	120Vac, 60 Hz	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	97.95	32.9 QP	43.5	-10.6	1.25 H	149	51.90	-19.00
2	148.50	36.2 QP	43.5	-7.3	1.00 H	277	50.10	-13.90
3	391.54	38.6 QP	46.0	-7.4	1.50 H	277	49.10	-10.50
4	718.18	38.0 QP	46.0	-8.0	1.00 H	340	42.00	-4.00
5	762.90	38.1 QP	46.0	-7.9	1.50 H	163	40.80	-2.70
6	900.94	38.8 QP	46.0	-7.2	1.50 H	240	39.20	-0.40
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	146.56	33.9 QP	43.5	-9.6	1.00 V	349	47.90	-14.00
2	385.70	41.5 QP	46.0	-4.5	1.49 V	295	52.00	-10.50
3	572.36	34.3 QP	46.0	-11.7	1.25 V	312	41.40	-7.10
4	663.74	37.8 QP	46.0	-8.2	1.49 V	149	42.90	-5.10
5	708.46	43.1 QP	46.0	-2.9	1.25 V	159	47.40	-4.30
6	745.40	41.5 QP	46.0	-4.5	1.50 V	328	44.90	-3.40

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	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	29.2 QP	40.0	-10.8	1.50 H	16	43.80	-14.60
2	249.60	28.9 QP	46.0	-17.1	1.00 H	239	43.10	-14.20
3	374.04	30.4 QP	46.0	-15.6	1.00 H	162	41.10	-10.70
4	624.85	31.7 QP	46.0	-14.3	1.50 H	210	37.20	-5.50
5	751.23	32.2 QP	46.0	-13.8	1.00 H	11	35.20	-3.00
6	902.89	41.0 QP	46.0	-5.0	2.00 H	182	41.40	-0.40
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	57.12	29.4 QP	40.0	-10.6	1.50 V	288	44.00	-14.60
2	150.45	27.8 QP	43.5	-15.7	1.00 V	267	41.60	-13.80
3	374.04	27.5 QP	46.0	-18.5	1.25 V	47	38.20	-10.70
4	500.42	27.0 QP	46.0	-19.0	1.25 V	5	35.30	-8.30
5	624.85	30.1 QP	46.0	-15.9	1.99 V	96	35.60	-5.50
6	760.95	29.1 QP	46.0	-16.9	1.25 V	109	31.80	-2.70

REMARKS:

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

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

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	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.

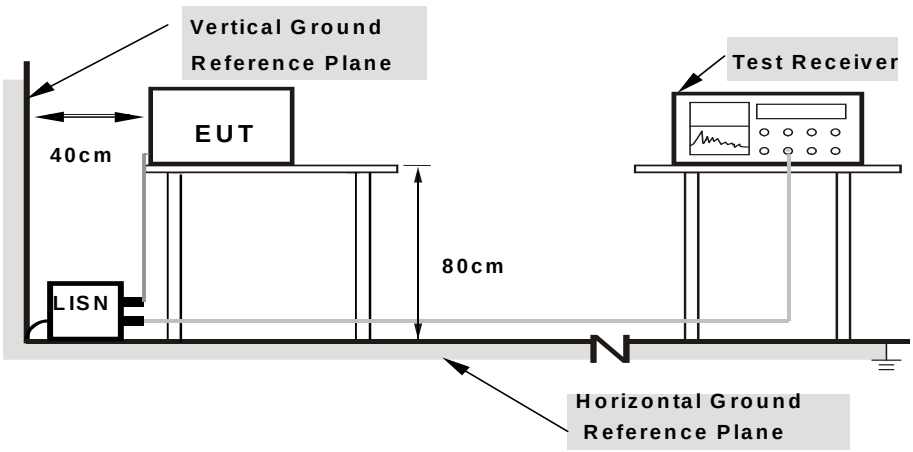
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

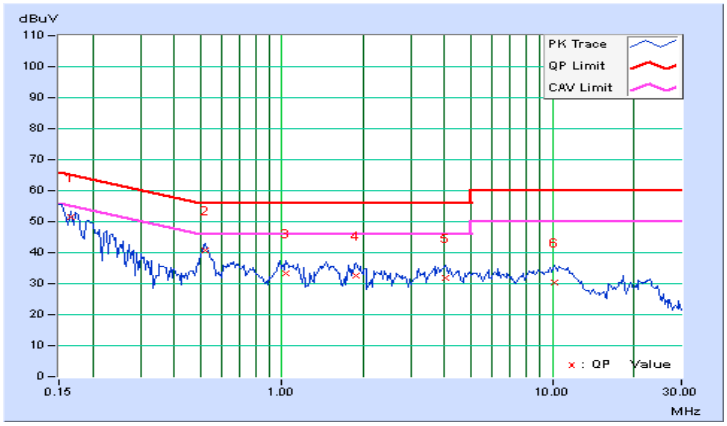
4.2.7 TEST RESULTS

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	0.16562	0.22	51.27	33.63	51.49	33.85	65.18	55.18	-13.68	-21.32
2	0.52109	0.24	40.55	33.60	40.79	33.84	56.00	46.00	-15.21	-12.16
3	1.03906	0.30	33.05	26.87	33.35	27.17	56.00	46.00	-22.65	-18.83
4	1.88672	0.36	32.22	26.91	32.58	27.27	56.00	46.00	-23.42	-18.73
5	4.01172	0.44	31.38	25.24	31.82	25.68	56.00	46.00	-24.18	-20.32
6	10.25000	0.51	29.98	23.84	30.49	24.35	60.00	50.00	-29.51	-25.65

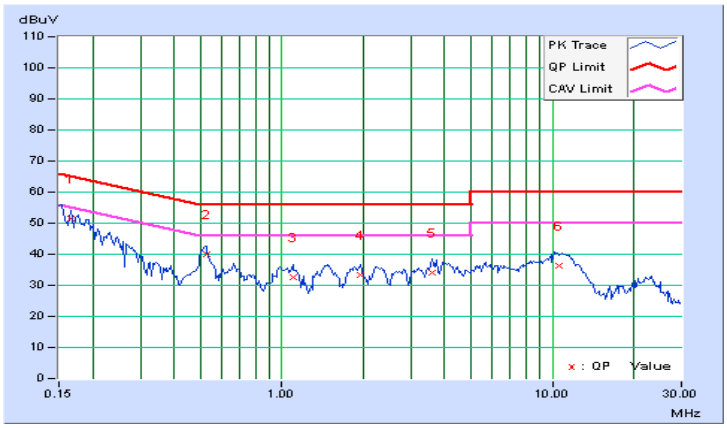
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading 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	0.16562	0.23	51.21	34.02	51.44	34.25	65.18	55.18	-13.74	-20.93
2	0.52500	0.30	39.75	32.26	40.05	32.56	56.00	46.00	-15.95	-13.44
3	1.10547	0.30	32.33	26.22	32.63	26.52	56.00	46.00	-23.37	-19.48
4	1.95313	0.39	32.91	25.85	33.30	26.24	56.00	46.00	-22.70	-19.76
5	3.60156	0.47	33.64	27.55	34.11	28.02	56.00	46.00	-21.89	-17.98
6	10.52734	0.59	35.86	31.21	36.45	31.80	60.00	50.00	-23.55	-18.20

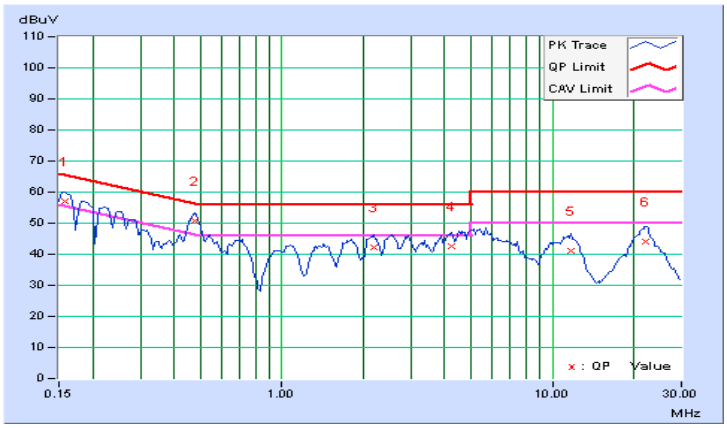
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading 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	0.22	56.97	48.84	57.19	49.06	65.58	55.58	-8.39	-6.52
2	**0.47422**	**0.23**	**50.63**	**44.20**	**50.86**	**44.43**	**56.44**	**46.44**	**-5.58**	**-2.01**
3	2.19531	0.38	41.94	37.59	42.32	37.97	56.00	46.00	-13.68	-8.03
4	4.24609	0.44	42.14	36.35	42.58	36.79	56.00	46.00	-13.42	-9.21
5	11.74609	0.54	40.43	36.00	40.97	36.54	60.00	50.00	-19.03	-13.46
6	22.13281	0.67	43.30	38.74	43.97	39.41	60.00	50.00	-16.03	-10.59

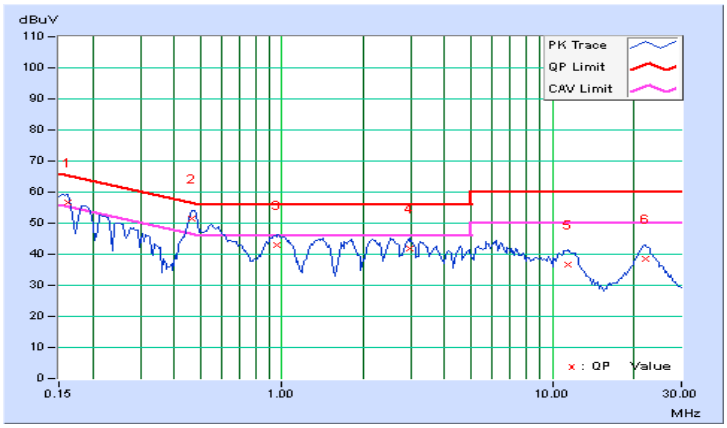
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading 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	0.23	56.27	47.87	56.50	48.10	65.38	55.38	-8.88	-7.28
2	0.46641	0.30	51.23	43.70	51.53	44.00	56.58	46.58	-5.05	-2.58
3	0.95469	0.29	42.72	37.85	43.01	38.14	56.00	46.00	-12.99	-7.86
4	2.95313	0.44	41.29	37.18	41.73	37.62	56.00	46.00	-14.27	-8.38
5	11.35156	0.60	36.23	31.11	36.83	31.71	60.00	50.00	-23.17	-18.29
6	22.03906	0.77	37.74	33.30	38.51	34.07	60.00	50.00	-21.49	-15.93

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.

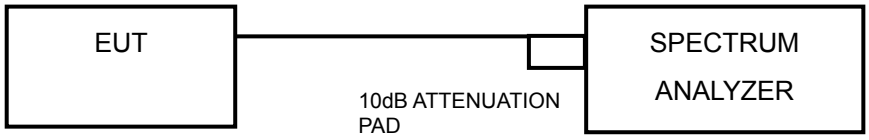


4.3 6dB BANDWIDTH MEASUREMENT

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	CHAIN 2		
1	2412	7.59	7.12	7.09	0.5	PASS
6	2437	7.09	7.10	7.07	0.5	PASS
11	2462	7.11	7.09	7.01	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.46	16.49	16.42	0.5	PASS
6	2437	16.39	16.37	16.41	0.5	PASS
11	2462	16.39	16.40	16.41	0.5	PASS

802.11n (20MHz)

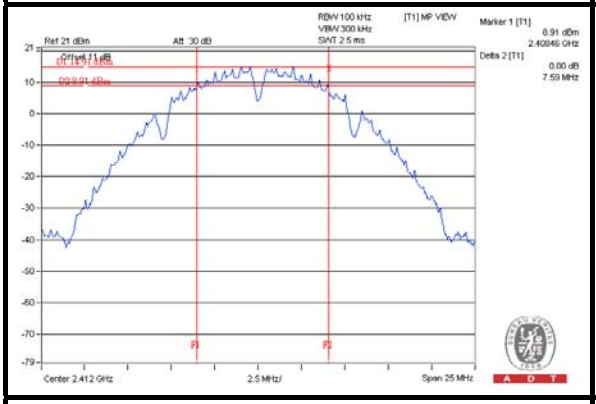
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.66	17.73	17.68	0.5	PASS
6	2437	17.60	17.36	17.60	0.5	PASS
11	2462	17.61	17.63	17.61	0.5	PASS

802.11n (40MHz)

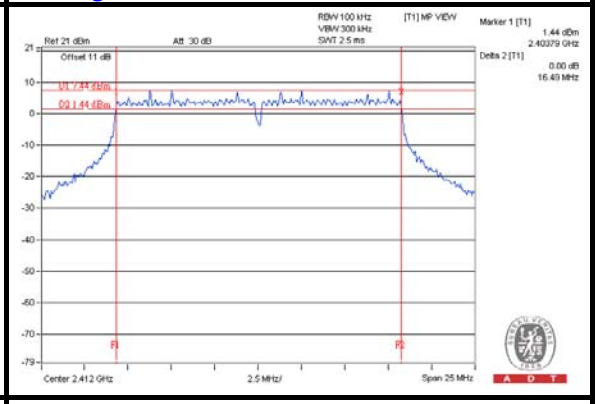
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	36.14	36.10	36.19	0.5	PASS
6	2437	36.13	36.44	36.41	0.5	PASS
9	2452	35.80	36.41	36.33	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

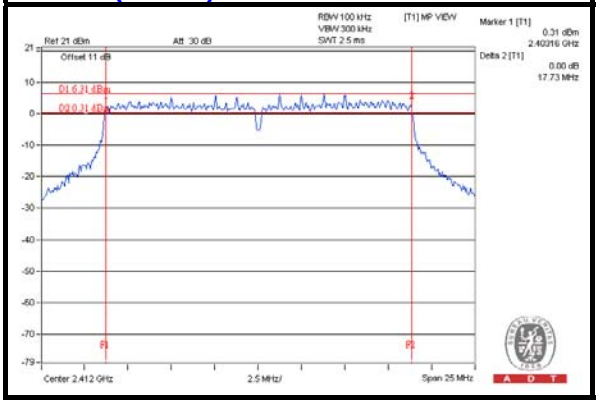
802.11b



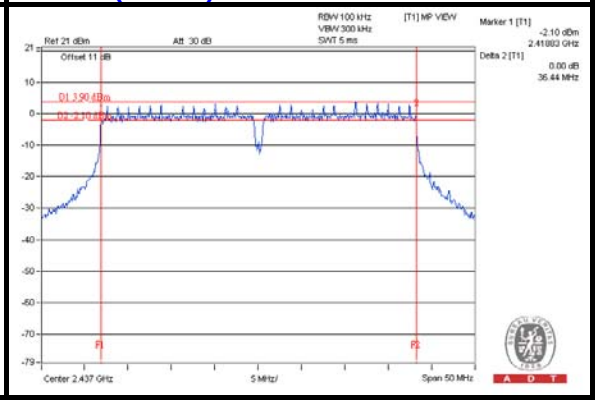
802.11g



802.11n (20MHz)



802.11n (40MHz)



4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

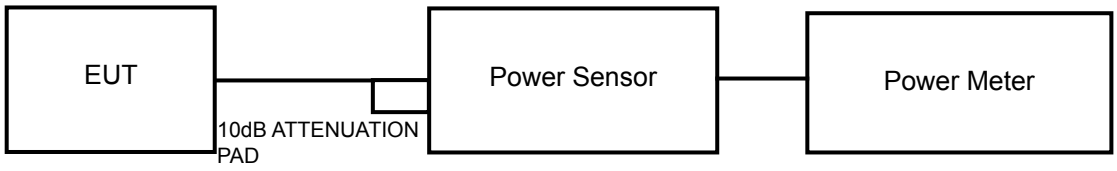
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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

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

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

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

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

4.4.7 TEST RESULTS

FOR AVERAGE POWER

802.11b

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	23.57	22.93	23.44	644.646	28.09	30	PASS
6	2437	23.81	24.37	23.52	738.868	28.69	30	PASS
11	2462	23.04	24.76	23.79	**739.930**	28.69	30	PASS

802.11g

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	18.80	19.33	18.90	239.187	23.79	30	PASS
6	2437	23.29	23.60	23.17	649.882	28.13	30	PASS
11	2462	16.65	16.88	16.72	141.980	21.52	30	PASS

802.11n (20MHz)

CHAN.	FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	17.64	18.18	17.94	186.072	22.70	30	PASS
6	2437	23.19	23.51	22.91	628.271	27.98	30	PASS
11	2462	16.71	17.12	16.70	145.178	21.62	30	PASS

802.11n (40MHz)

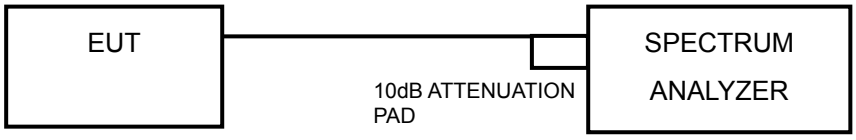
CHAN.	FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	14.51	15.07	14.26	87.055	19.40	30	PASS
6	2437	17.06	17.08	16.90	150.844	21.79	30	PASS
9	2452	13.94	14.14	13.66	73.943	18.69	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST PROCEDURE

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.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-6.17	4.77	-1.40	5.23	PASS
	6	2437	-6.07	4.77	-1.30	5.23	PASS
	11	2462	-7.11	4.77	-2.34	5.23	PASS
1	1	2412	-6.87	4.77	-2.10	5.23	PASS
	6	2437	-5.60	4.77	-0.83	5.23	PASS
	11	2462	-5.21	4.77	-0.44	5.23	PASS
2	1	2412	-5.53	4.77	-0.76	5.23	PASS
	6	2437	-6.47	4.77	-1.70	5.23	PASS
	11	2462	-5.16	4.77	-0.39	5.23	PASS

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

802.11g

TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-14.11	4.77	-9.34	0.13	-9.21	5.23	PASS
	6	2437	-9.97	4.77	-5.20	0.13	-5.07	5.23	PASS
	11	2462	-16.65	4.77	-11.88	0.13	-11.75	5.23	PASS
1	1	2412	-13.51	4.77	-8.74	0.13	-8.61	5.23	PASS
	6	2437	-9.22	4.77	-4.45	0.13	-4.32	5.23	PASS
	11	2462	-15.25	4.77	-10.48	0.13	-10.35	5.23	PASS
2	1	2412	-13.84	4.77	-9.07	0.13	-8.94	5.23	PASS
	6	2437	-10.46	4.77	-5.69	0.13	-5.56	5.23	PASS
	11	2462	-16.69	4.77	-11.92	0.13	-11.79	5.23	PASS

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

802.11n(20MHz)

TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-10.80	4.77	-6.03	0.11	-5.92	5.23	PASS
	6	2437	-10.20	4.77	-5.43	0.11	-5.32	5.23	PASS
	11	2462	-14.03	4.77	-9.26	0.11	-9.15	5.23	PASS
1	1	2412	-14.63	4.77	-9.86	0.11	-9.75	5.23	PASS
	6	2437	-8.91	4.77	-4.14	0.11	-4.03	5.23	PASS
	11	2462	-16.04	4.77	-11.27	0.11	-11.16	5.23	PASS
2	1	2412	-15.19	4.77	-10.42	0.11	-10.31	5.23	PASS
	6	2437	-10.56	4.77	-5.79	0.11	-5.68	5.23	PASS
	11	2462	-17.03	4.77	-12.26	0.11	-12.15	5.23	PASS

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

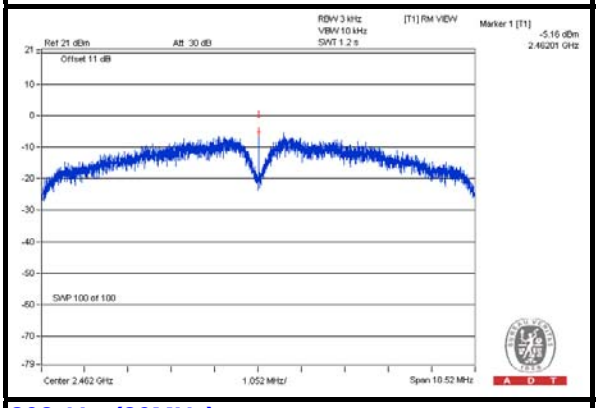
802.11n(40MHz)

TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	3	2422	-22.33	4.77	-17.56	0.35	-17.21	5.23	PASS
	6	2437	-19.86	4.77	-15.09	0.35	-14.74	5.23	PASS
	9	2452	-24.05	4.77	-19.28	0.35	-18.93	5.23	PASS
1	3	2422	-21.32	4.77	-16.55	0.35	-16.20	5.23	PASS
	6	2437	-18.84	4.77	-14.07	0.35	-13.72	5.23	PASS
	9	2452	-22.45	4.77	-17.68	0.35	-17.33	5.23	PASS
2	3	2422	-21.74	4.77	-16.97	0.35	-16.62	5.23	PASS
	6	2437	-19.38	4.77	-14.61	0.35	-14.26	5.23	PASS
	9	2452	-22.36	4.77	-17.59	0.35	-17.24	5.23	PASS

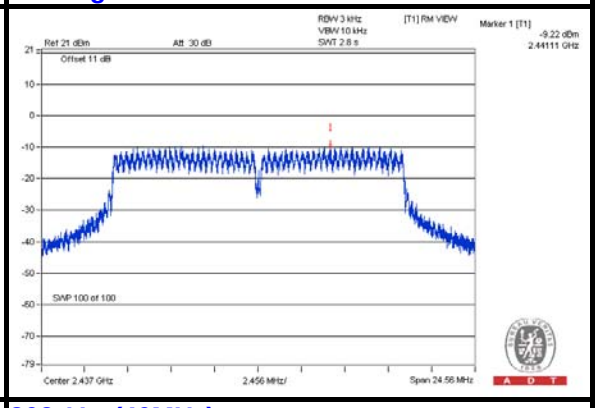
NOTE: Directional gain = 4dBi + 10log(3) = 8.77dBi > 6dBi , so the power density limit shall be reduced to 8-(8.77-6) = 5.23dBm.

SPECTRUM PLOT OF WORST VALUE

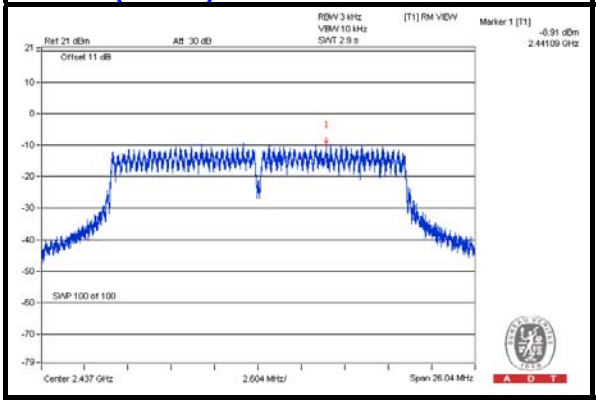
802.11b



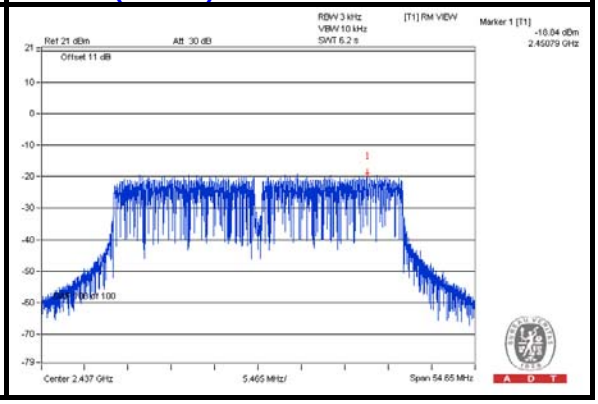
802.11g



802.11n (20MHz)



802.11n (40MHz)

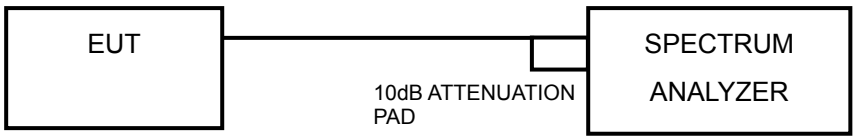


4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

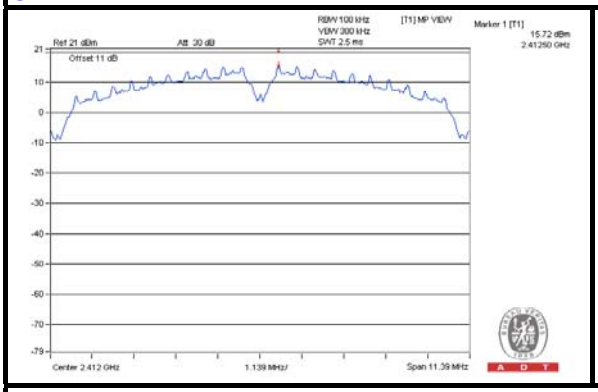
4.6.7 TEST RESULTS

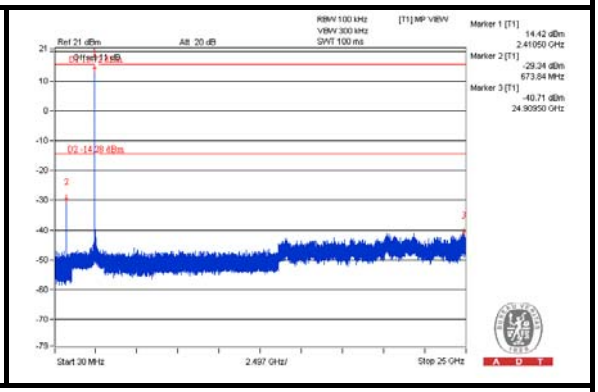
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

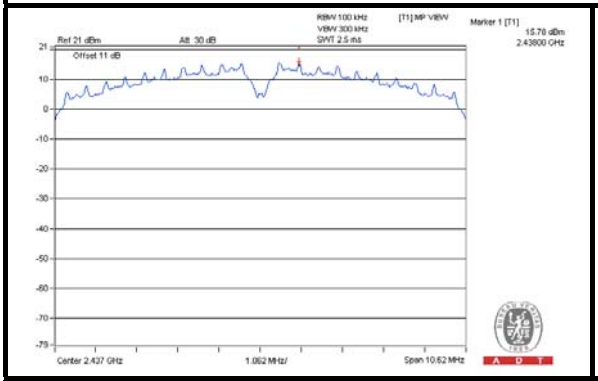
802.11b
CHAIN 0

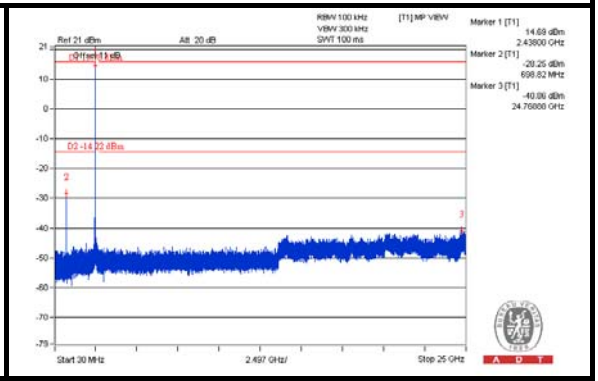
CH 1



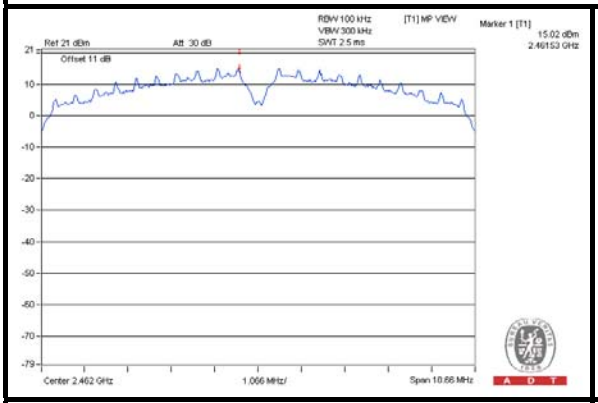


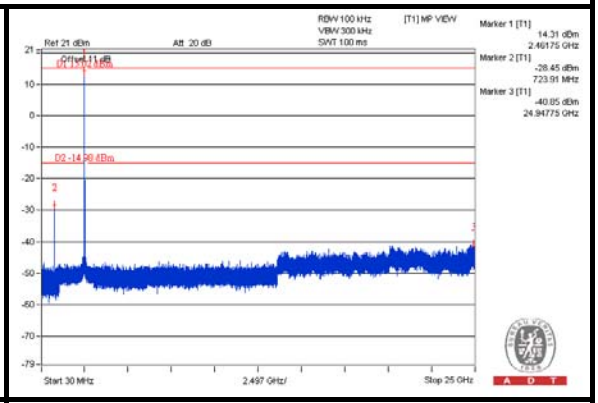
CH 6



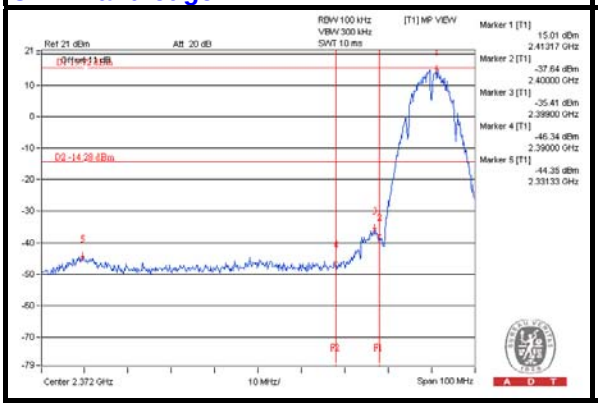


CH 11

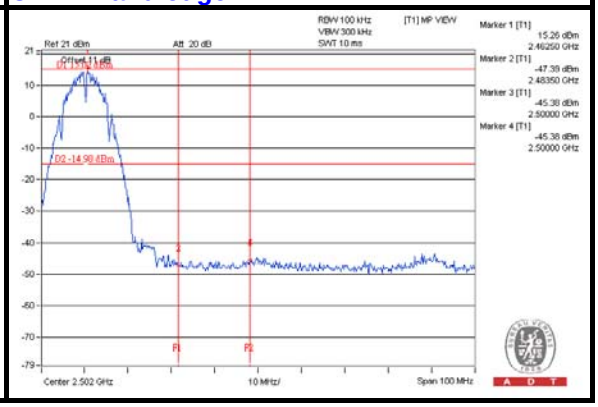




CH 1 Band edge

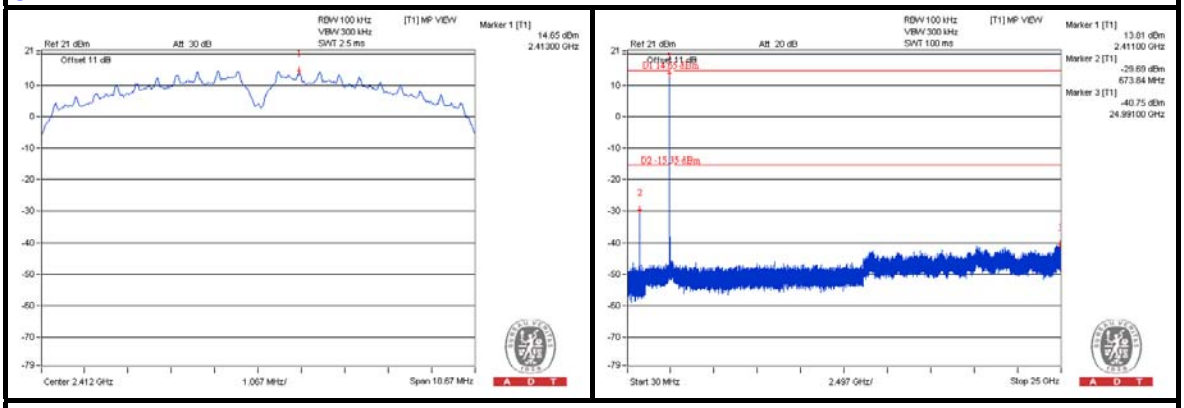


CH 11 Band edge

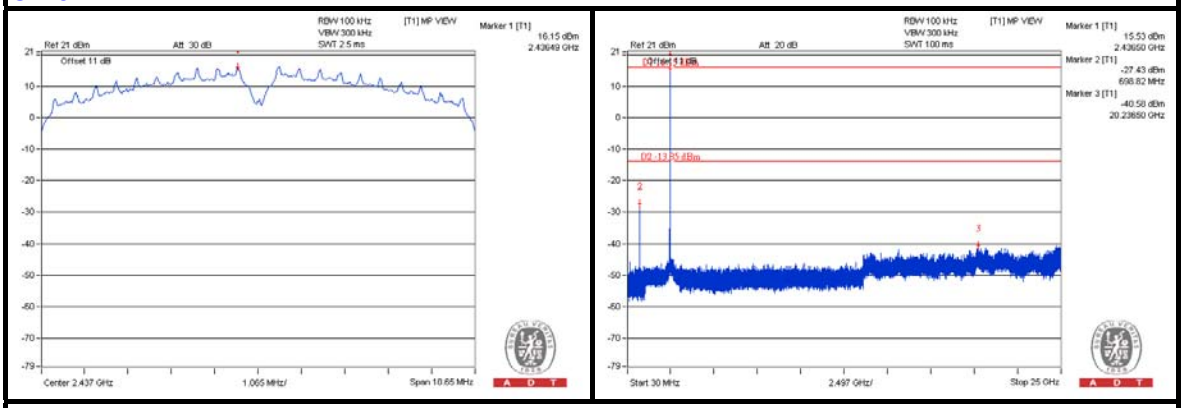


CHAIN 1

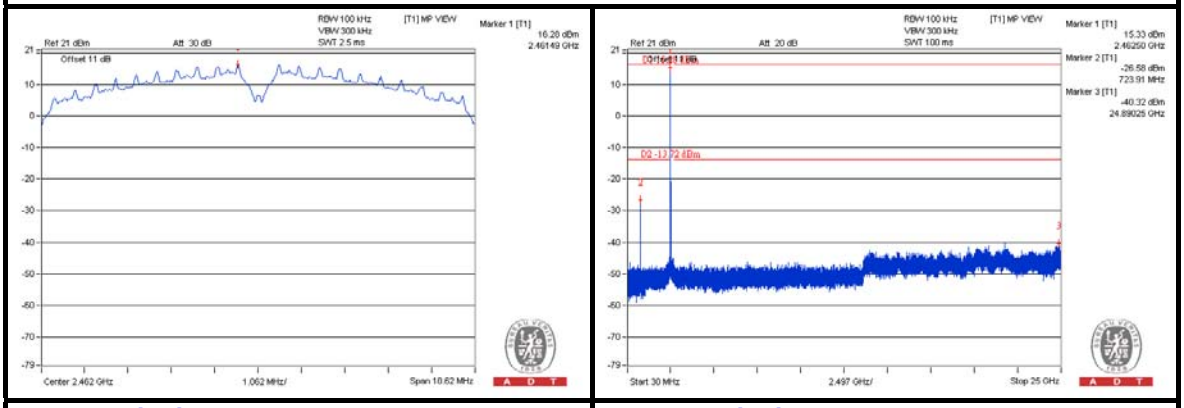
CH 1



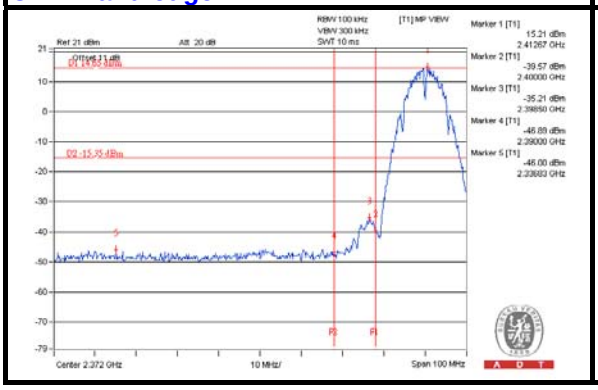
CH 6



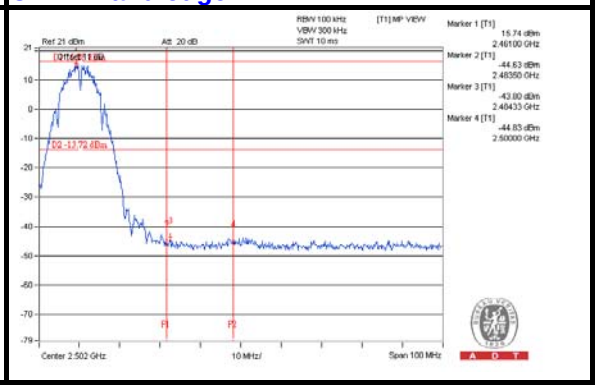
CH 11



CH 1 Band edge

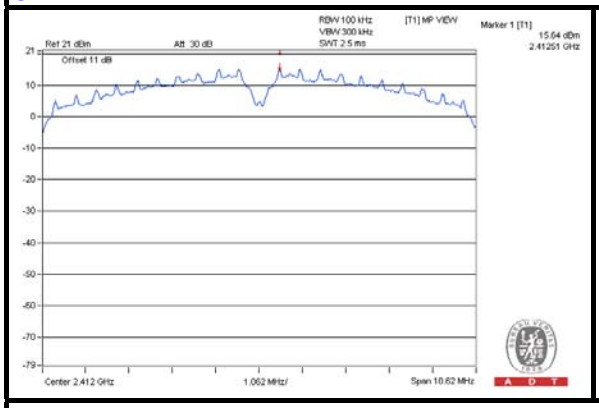


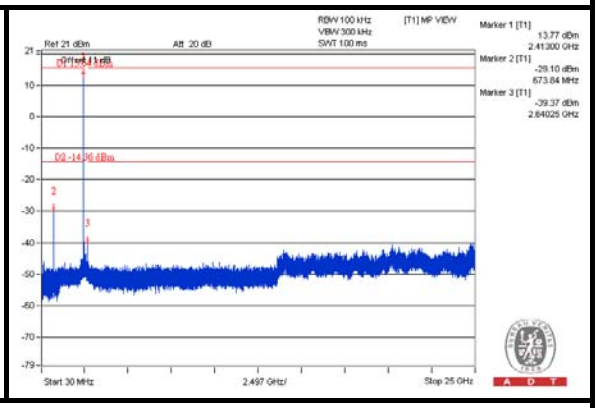
CH 11 Band edge



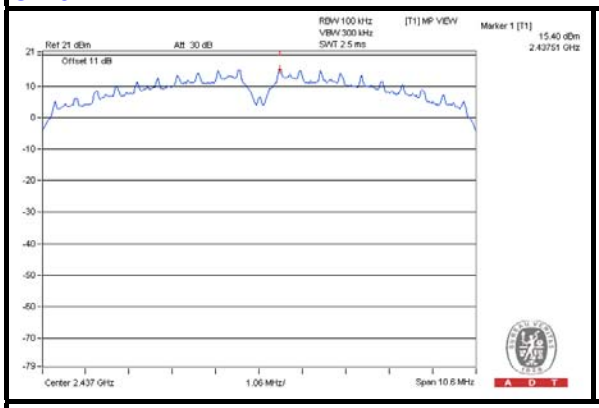
CHAIN 2

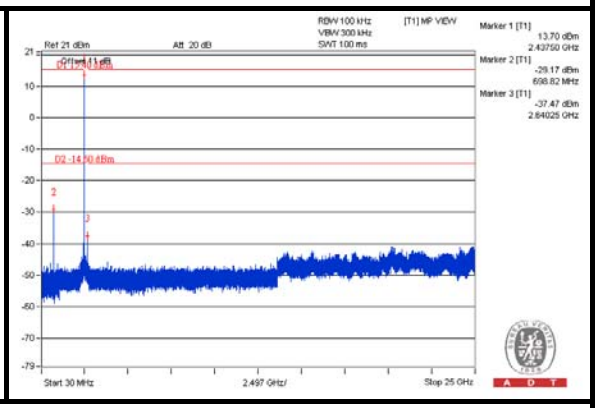
CH 1



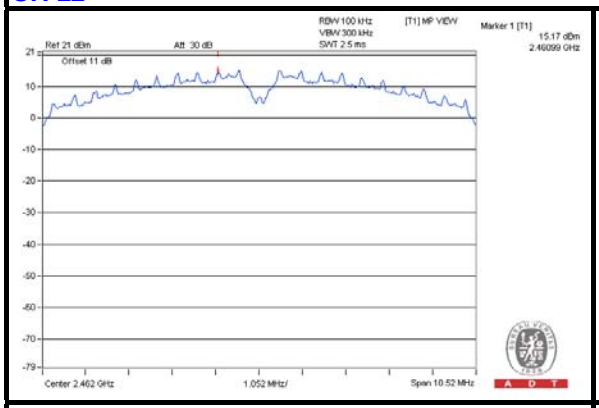


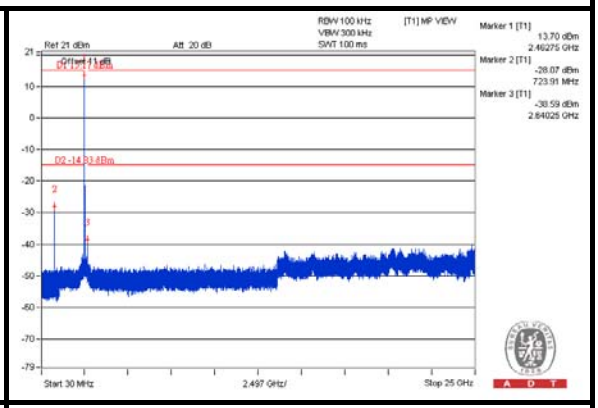
CH 6



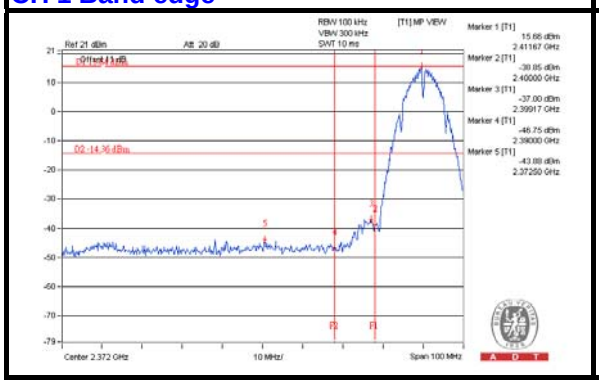


CH 11

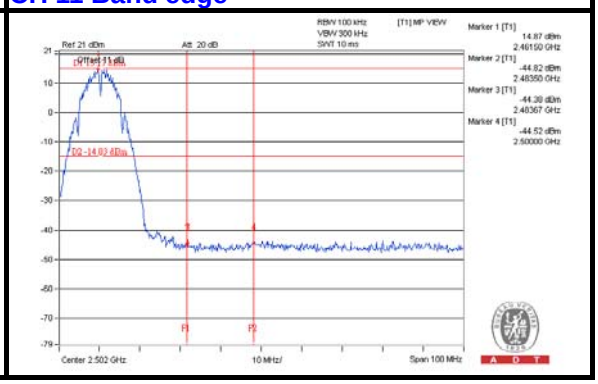




CH 1 Band edge



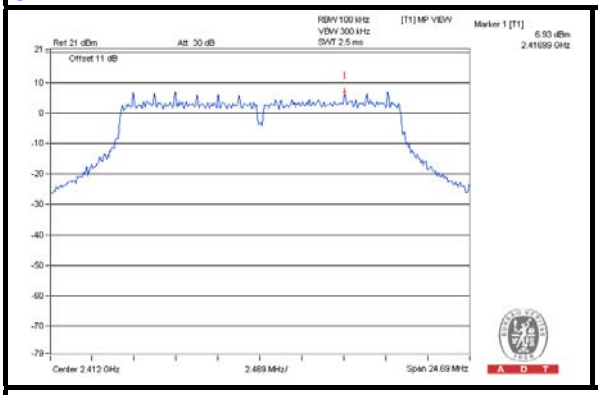
CH 11 Band edge

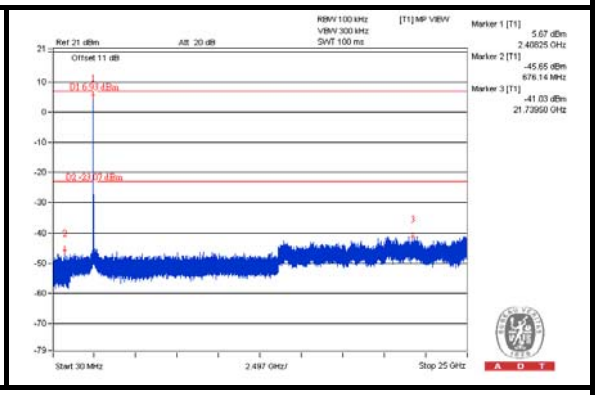


802.11g

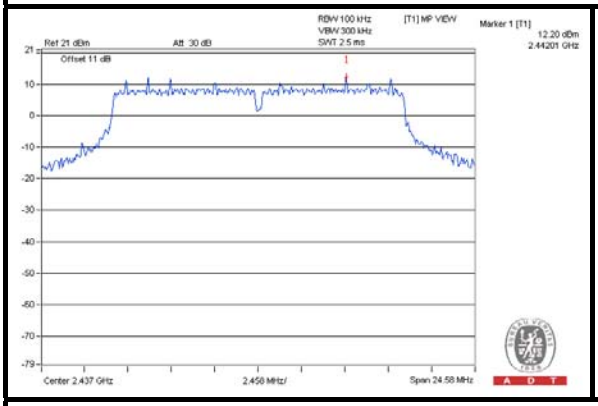
CHAIN 0

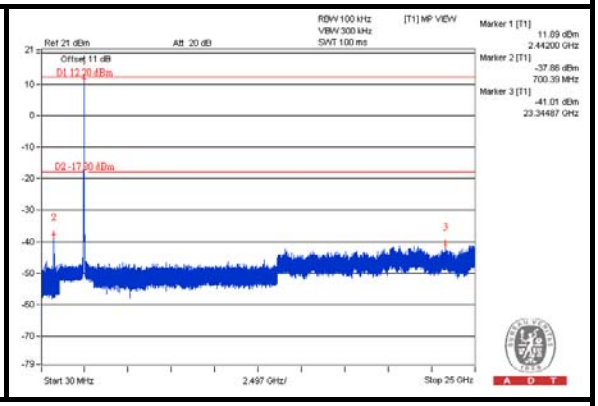
CH 1



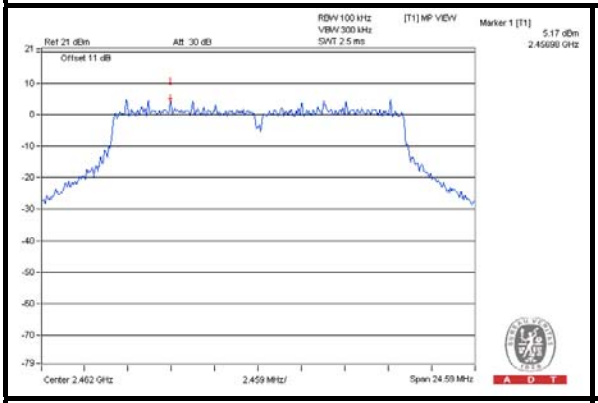


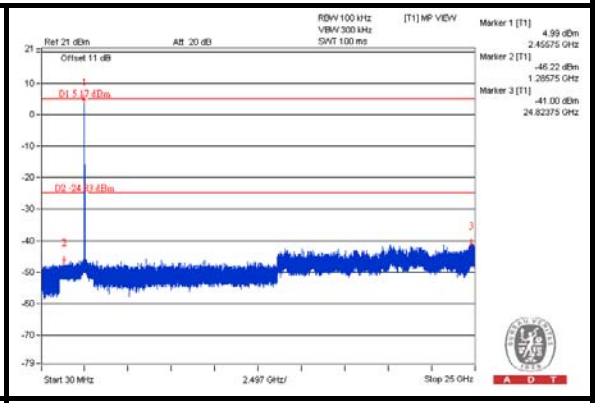
CH 6



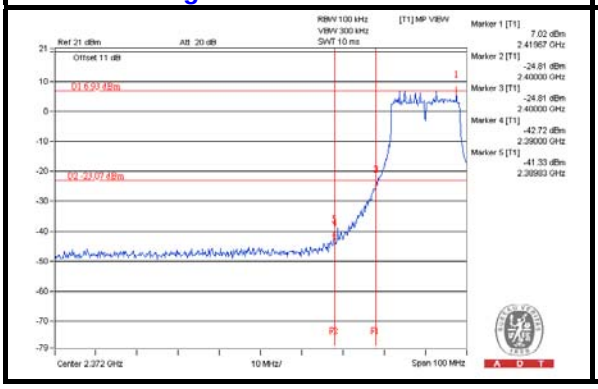


CH 11

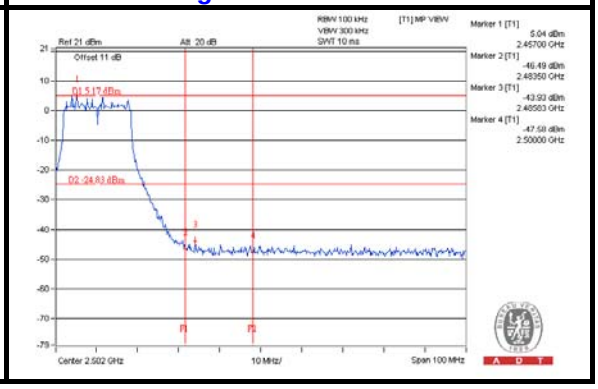




CH 1 Band edge

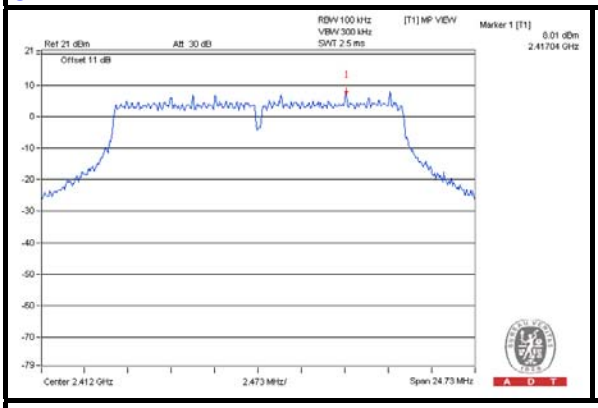


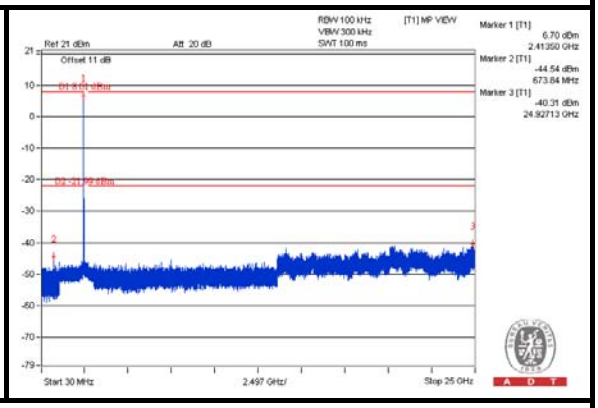
CH 11 Band edge



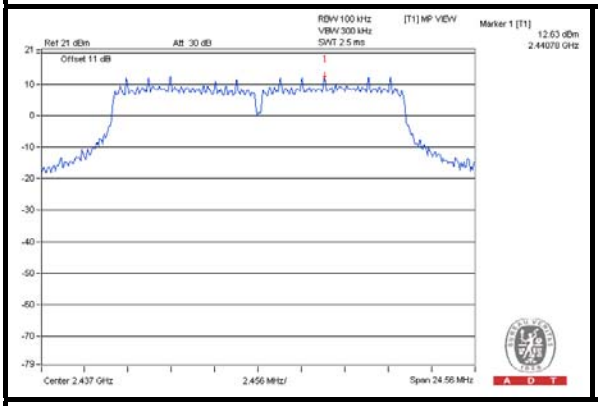
CHAIN 1

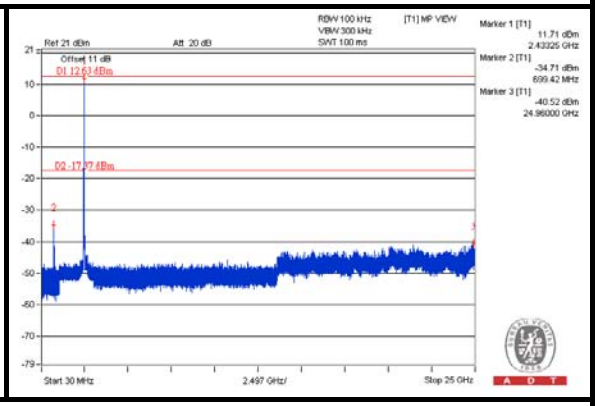
CH 1



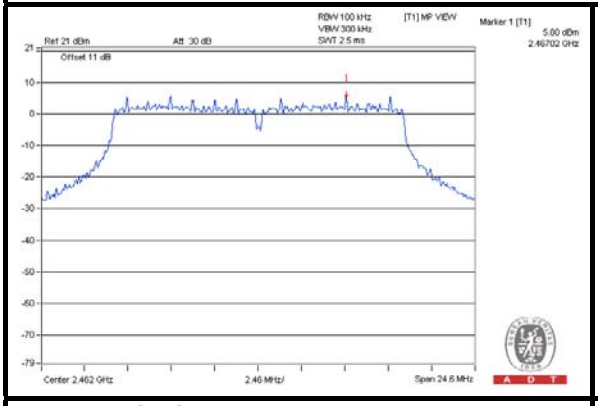


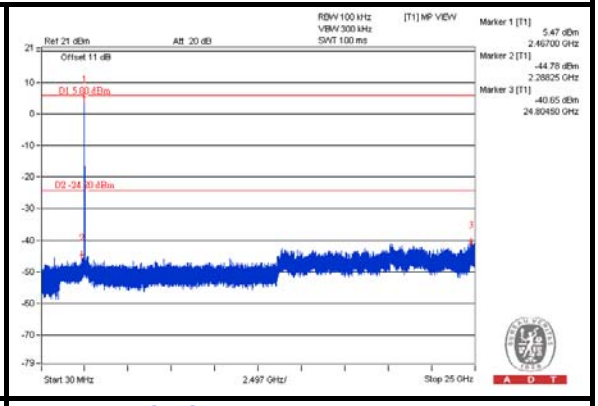
CH 6



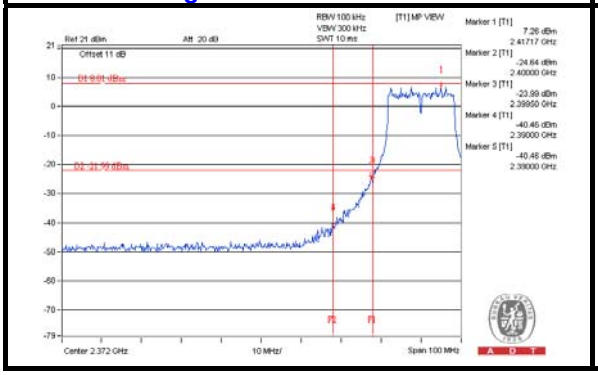


CH 11

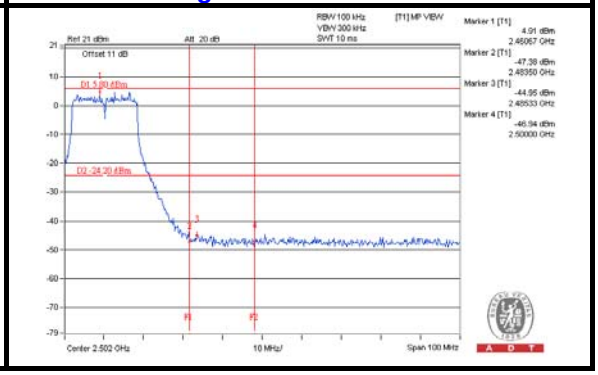




CH 1 Band edge

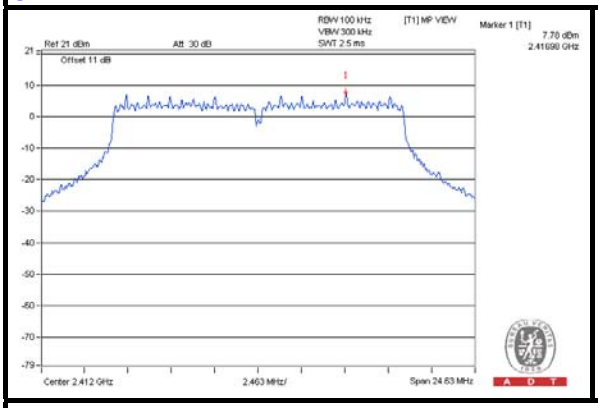


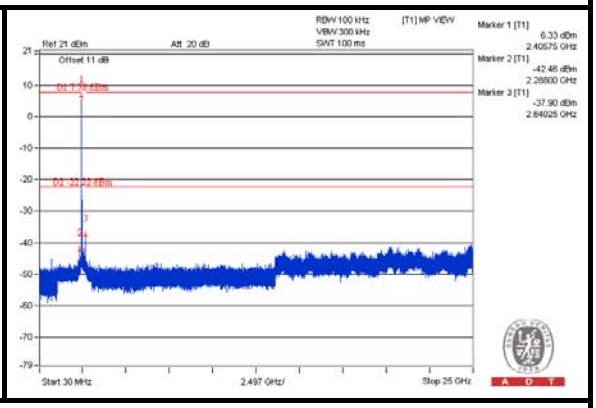
CH 11 Band edge



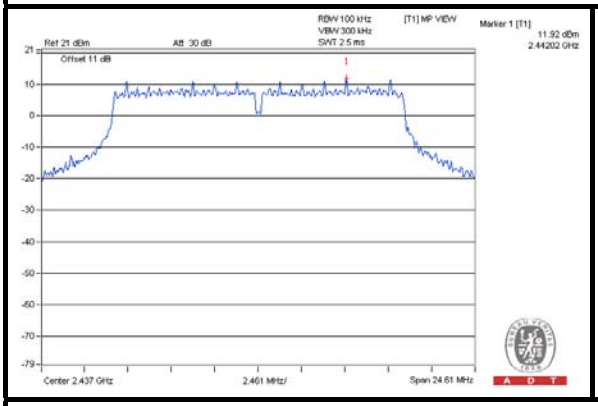
CHAIN 2

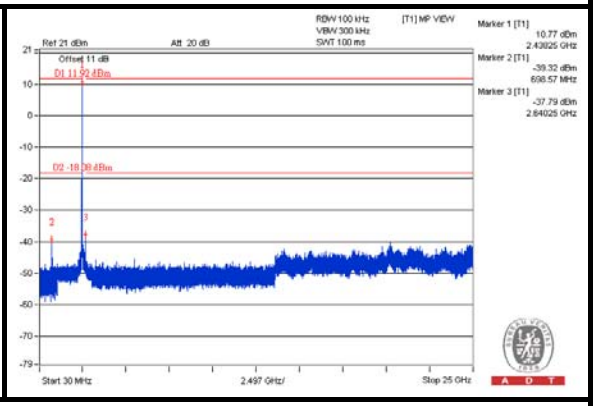
CH 1



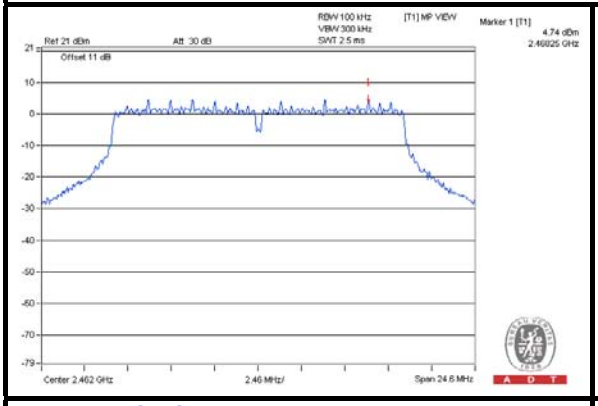


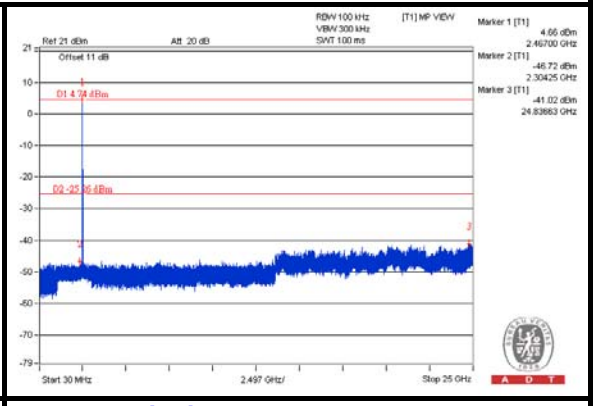
CH 6



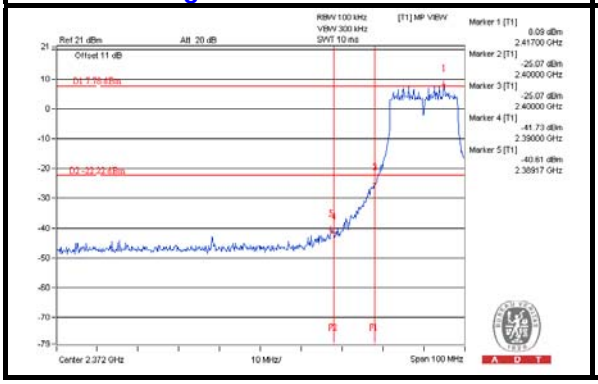


CH 11

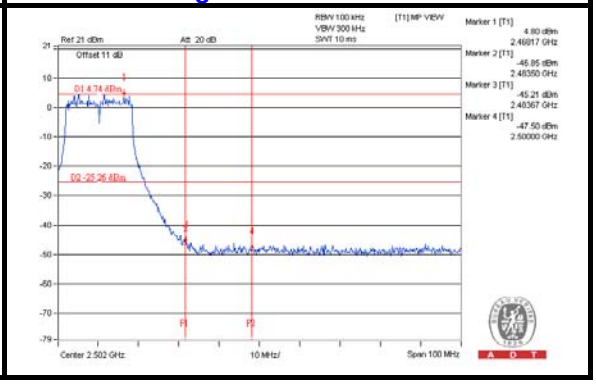




CH 1 Band edge



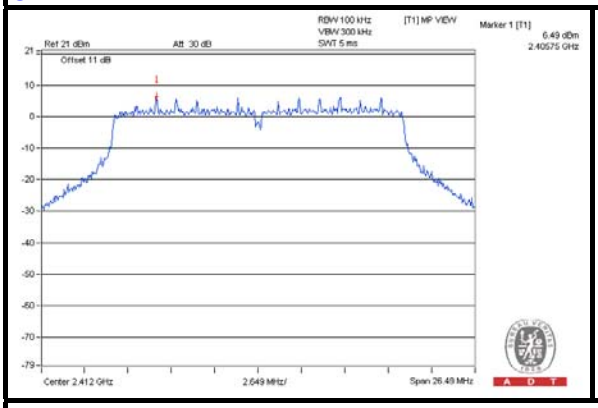
CH 11 Band edge

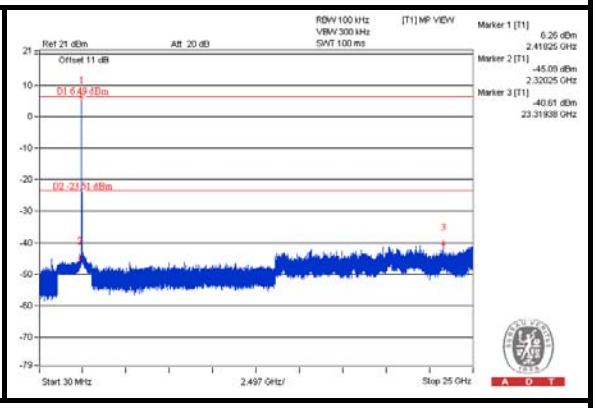


802.11n (20MHz)

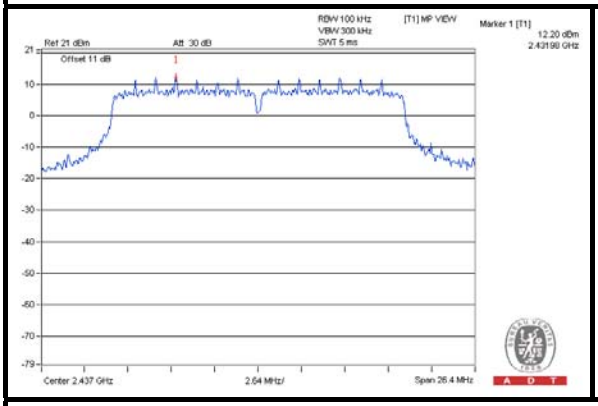
CHAIN 0

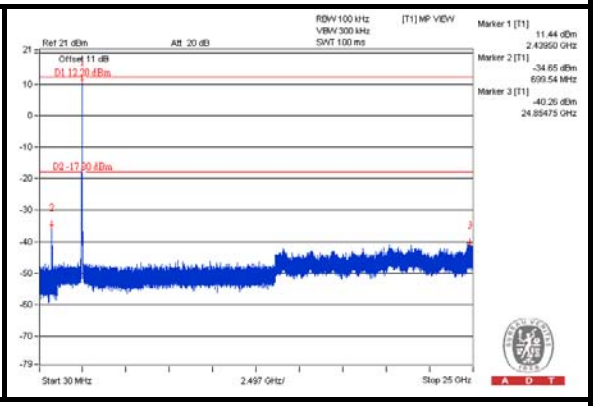
CH 1



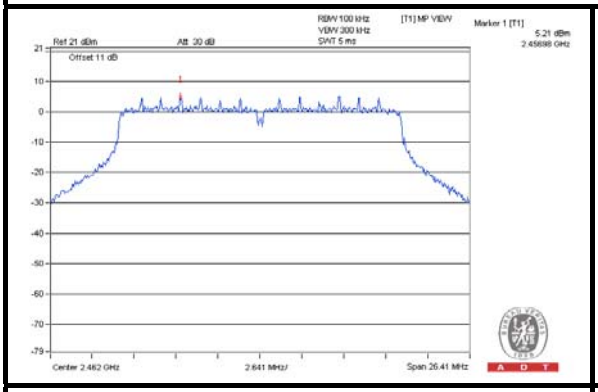


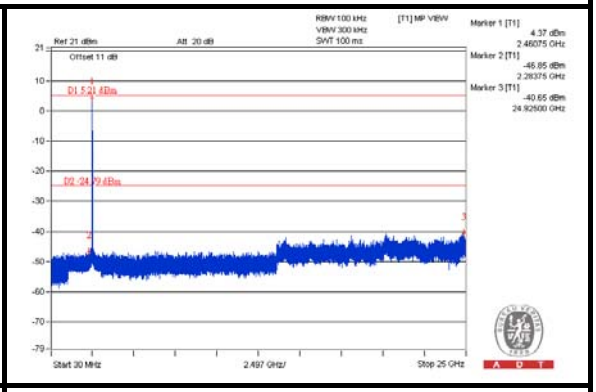
CH 6



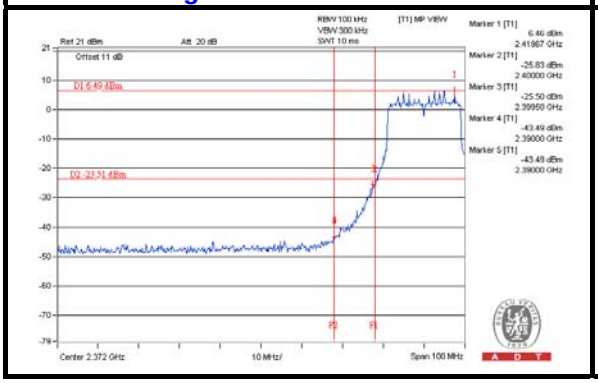


CH 11

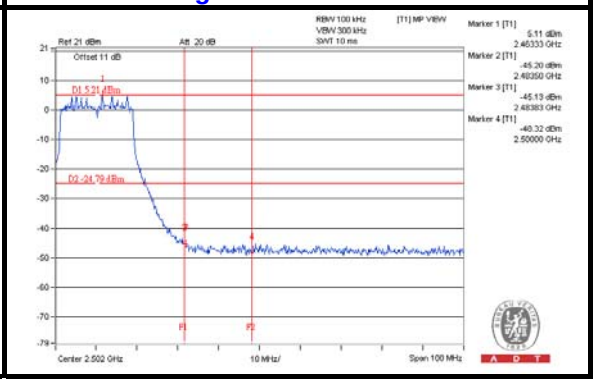




CH 1 Band edge

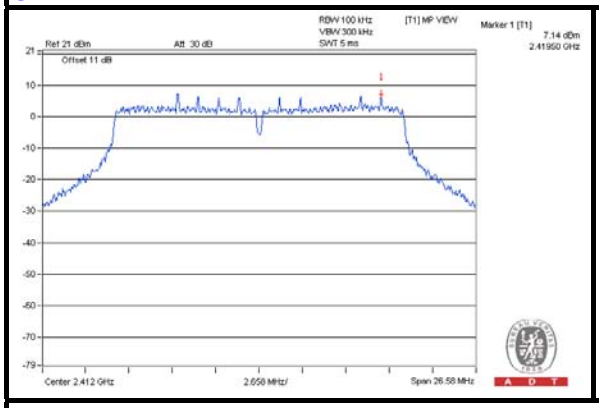


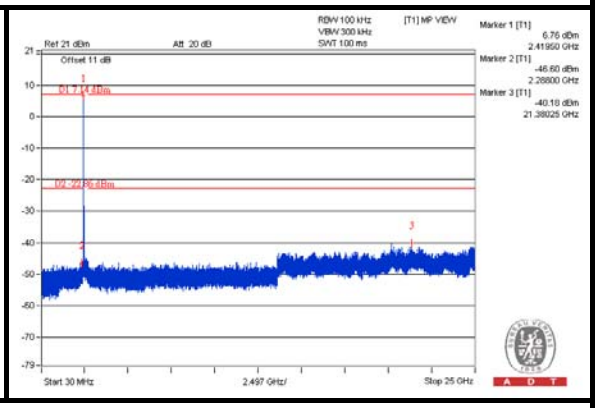
CH 11 Band edge



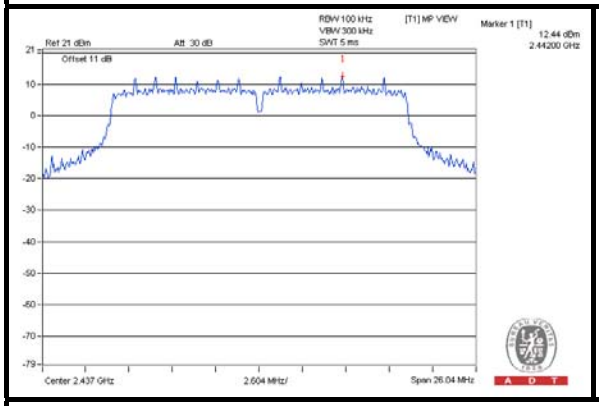
CHAIN 1

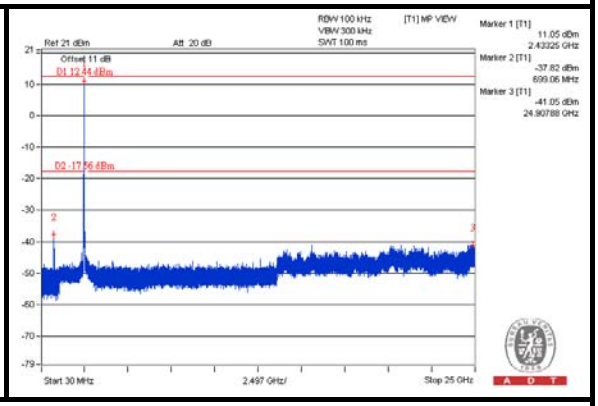
CH 1



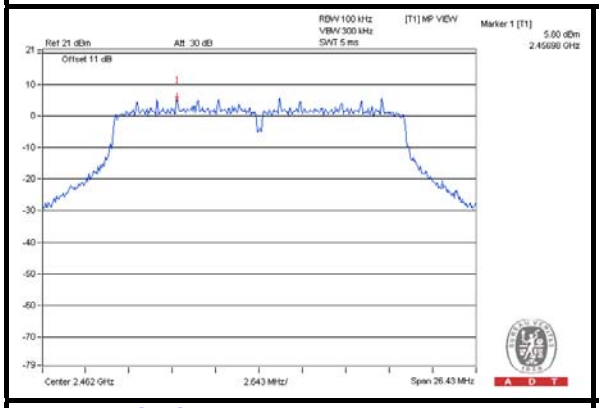


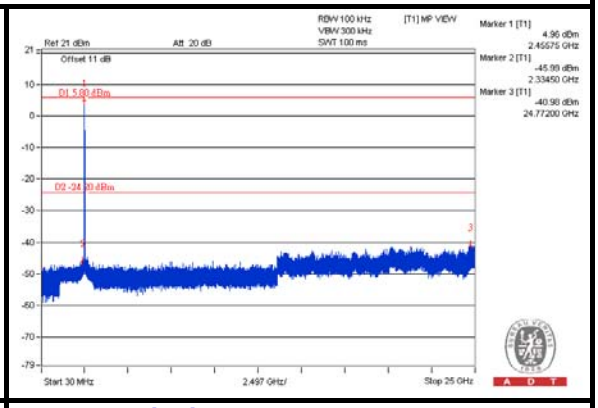
CH 6



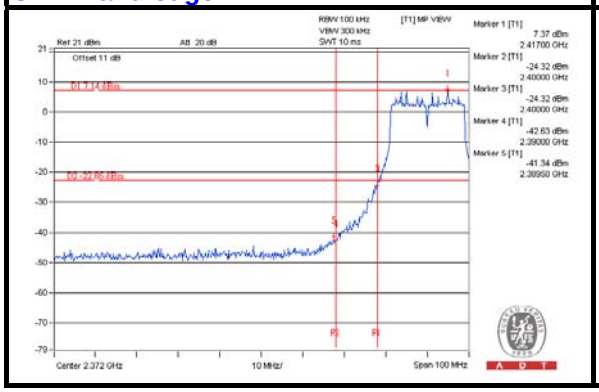


CH 11

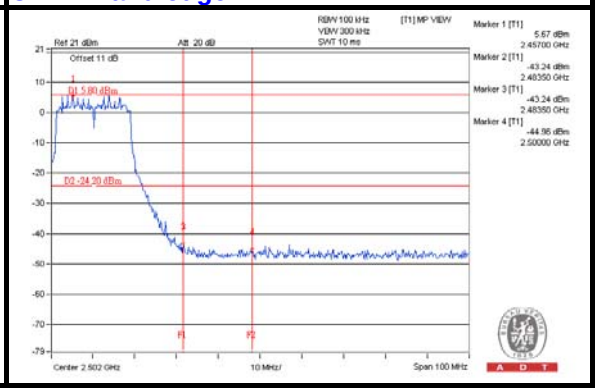




CH 1 Band edge

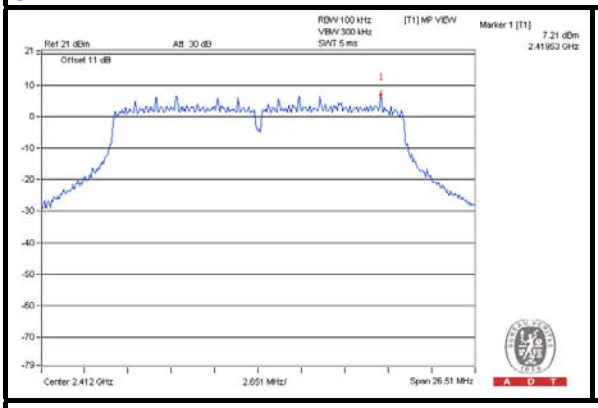


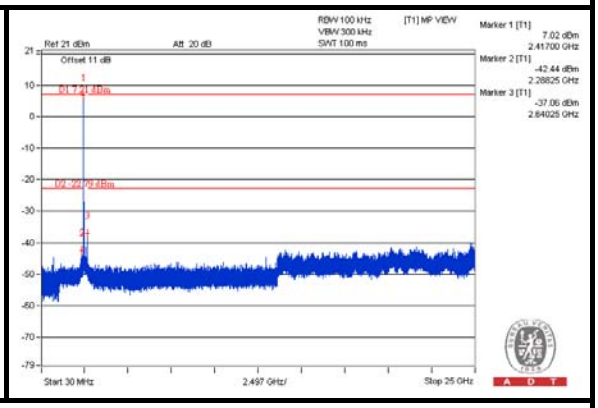
CH 11 Band edge



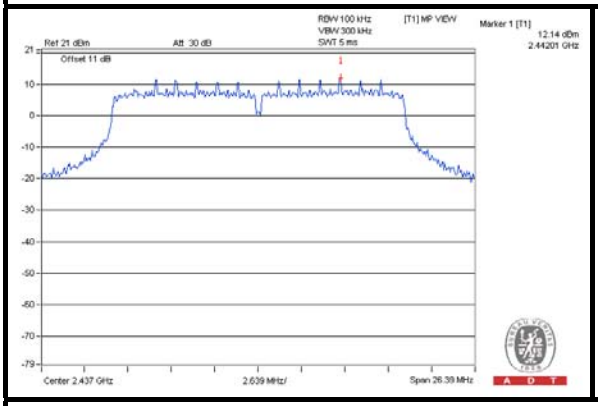
CHAIN 2

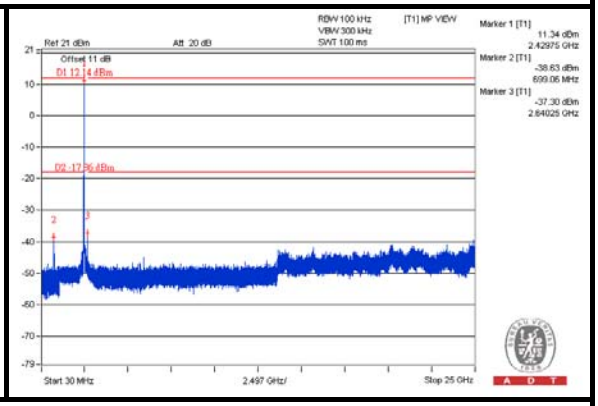
CH 1



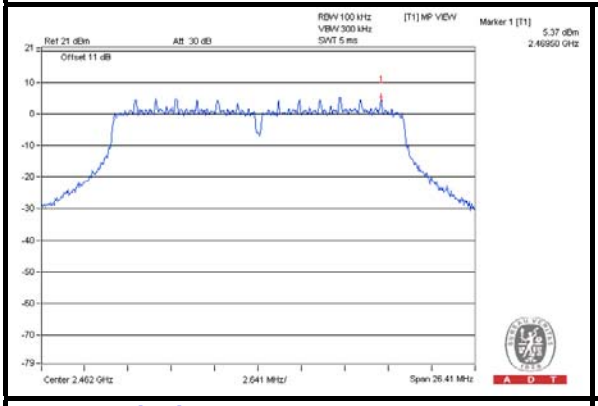


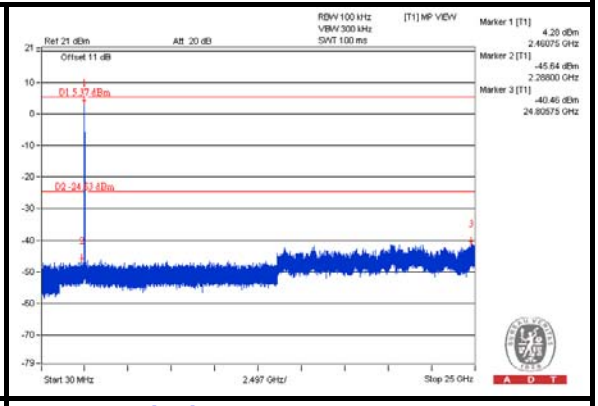
CH 6



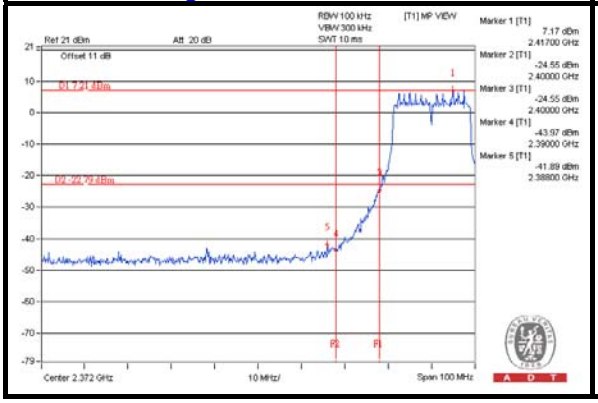


CH 11

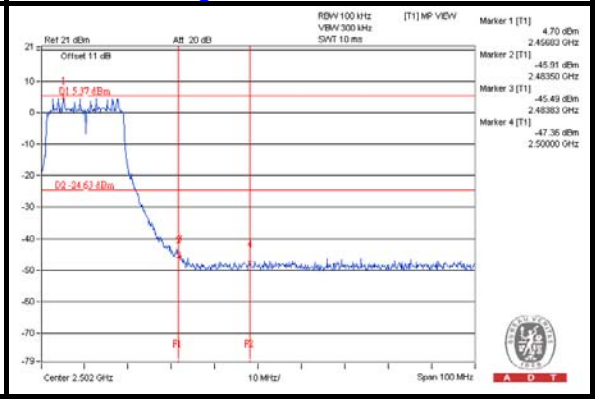




CH 1 Band edge



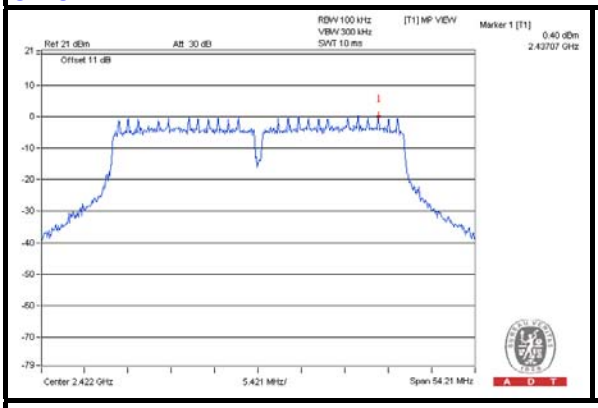
CH 11 Band edge

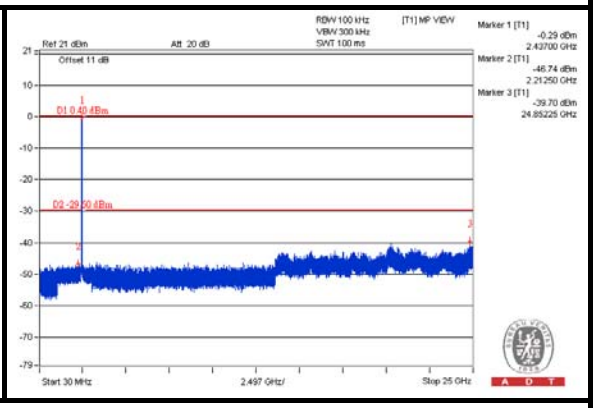


802.11n (40MHz)

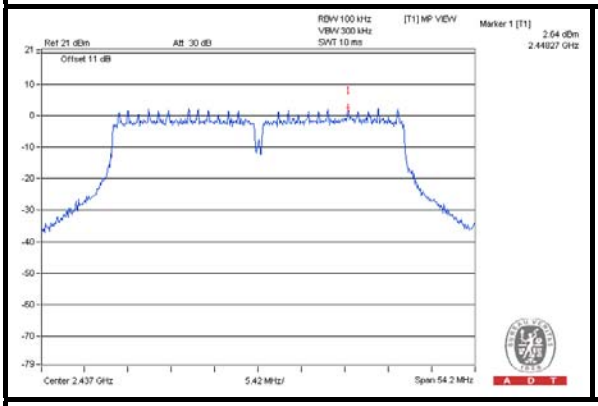
CHAIN 0

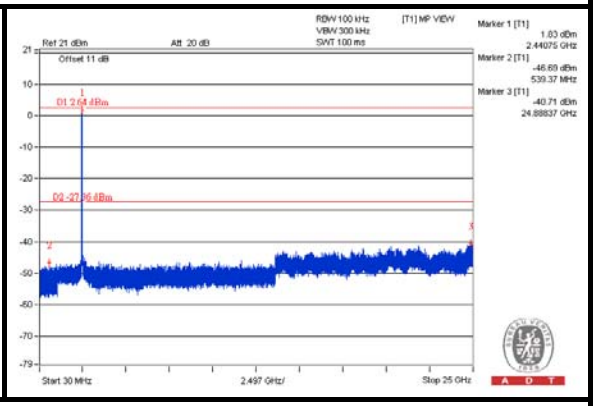
CH 3



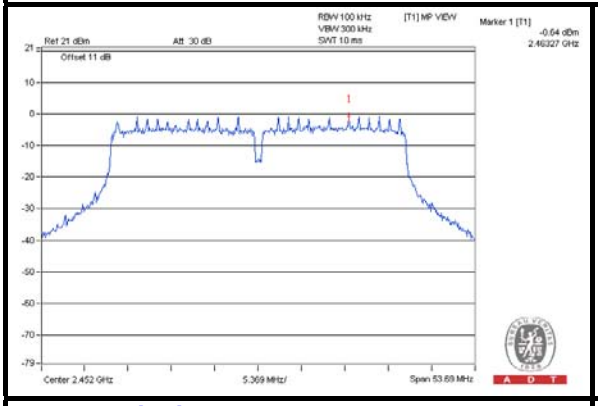


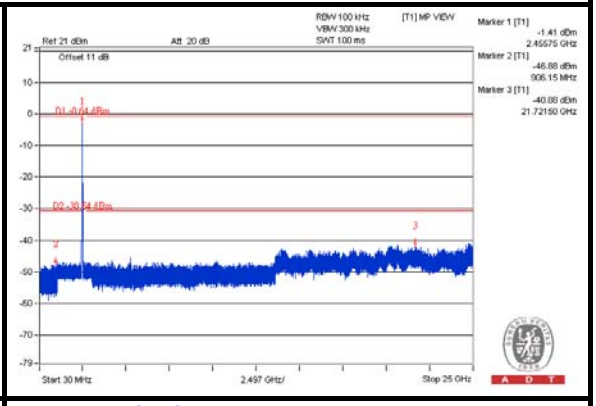
CH 6



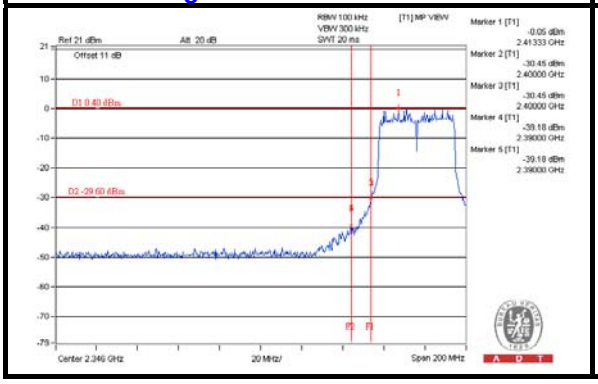


CH 9

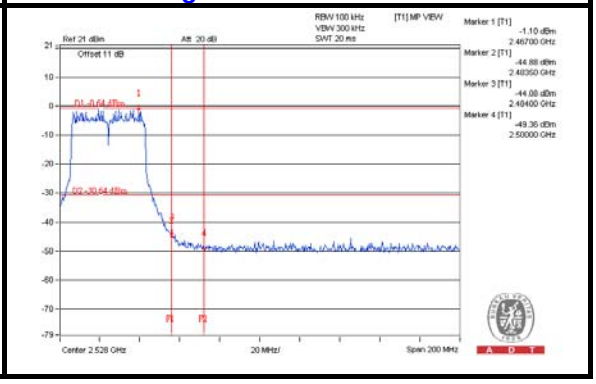




CH 3 Band edge

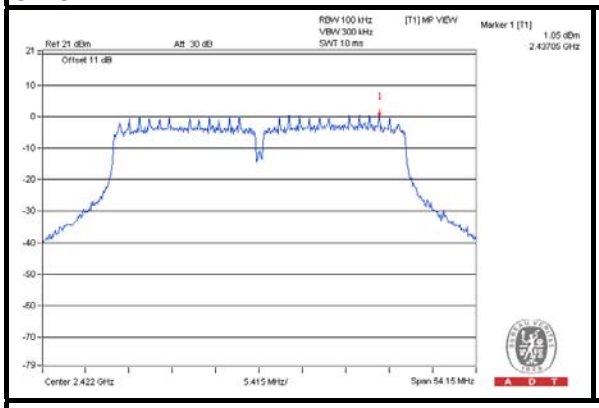


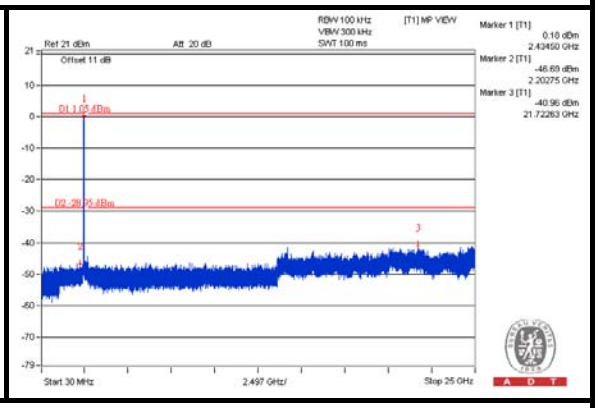
CH 9 Band edge



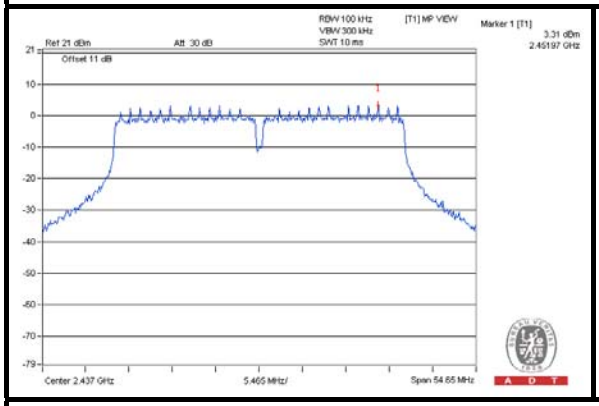
CHAIN 1

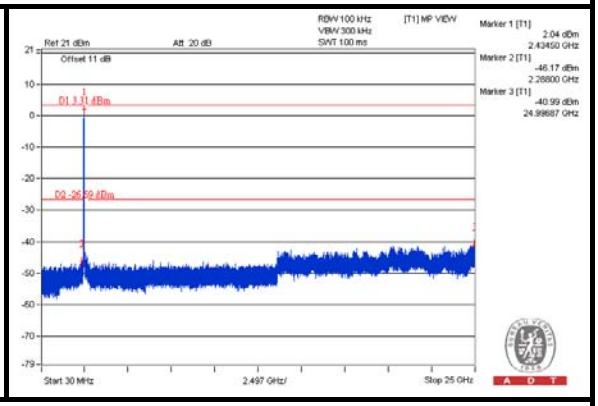
CH 3



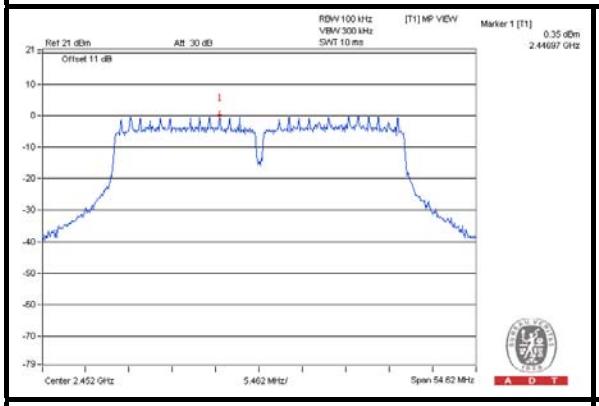


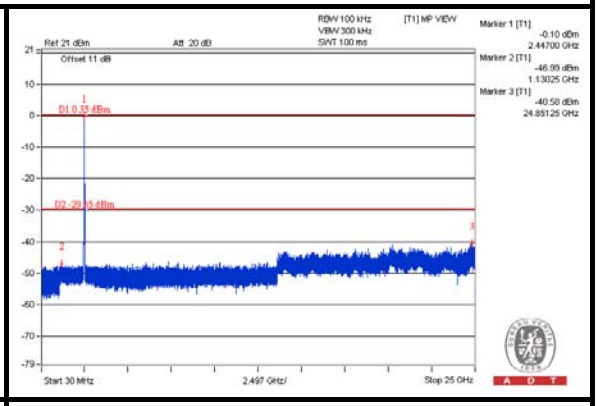
CH 6



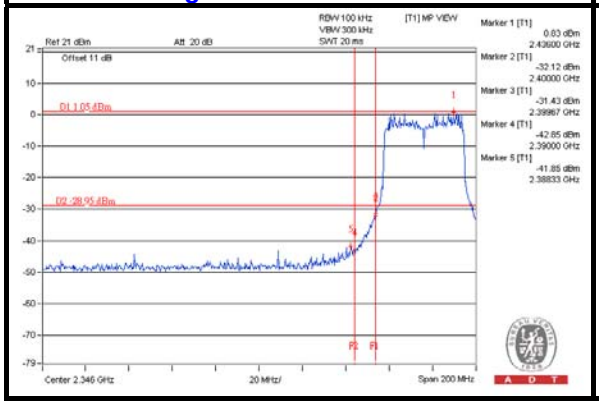


CH 9

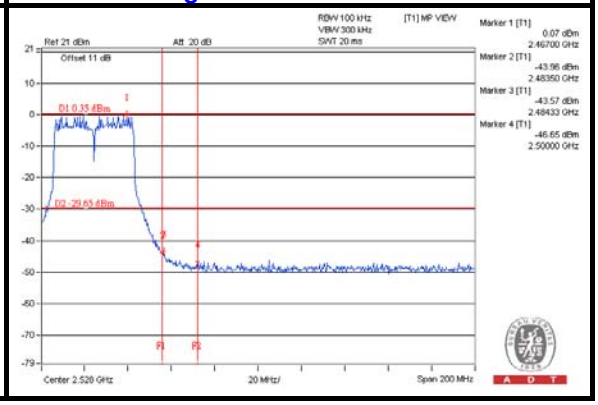




CH 3 Band edge

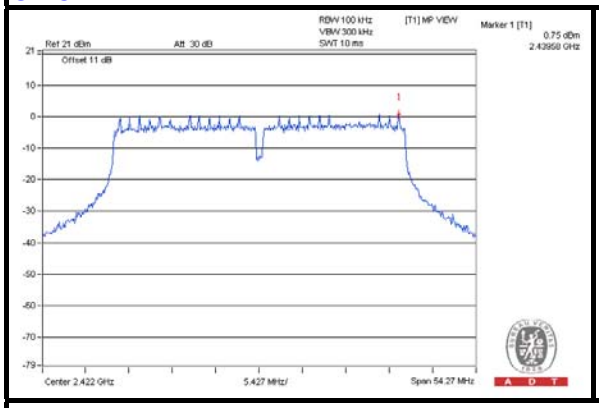


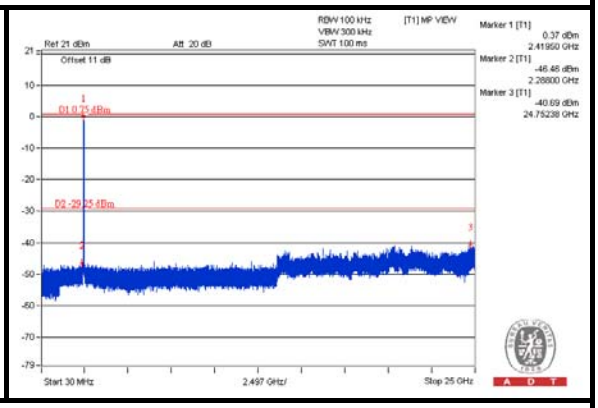
CH 9 Band edge



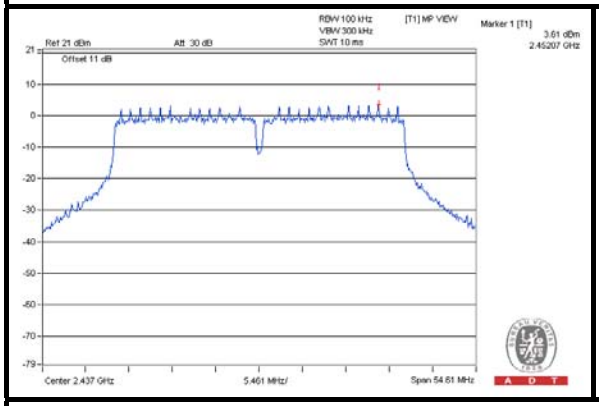
CHAIN 2

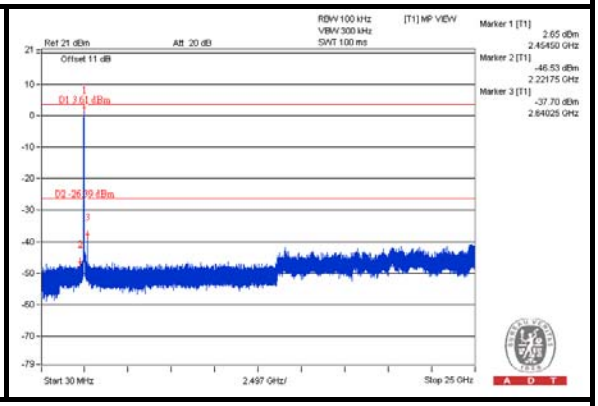
CH 3



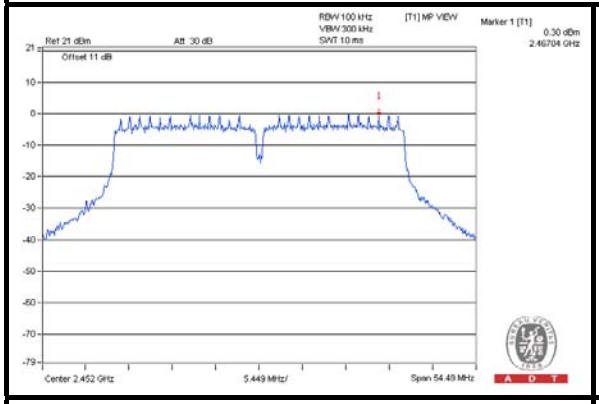


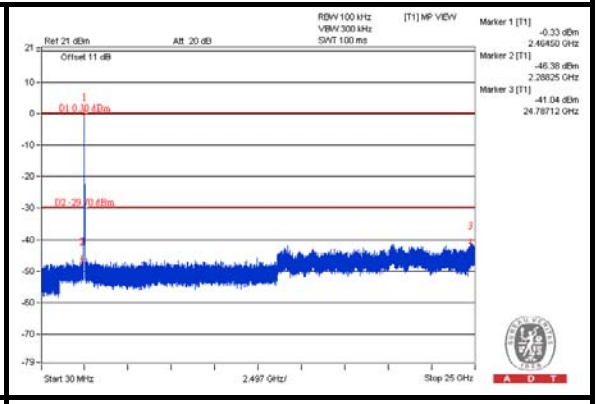
CH 6



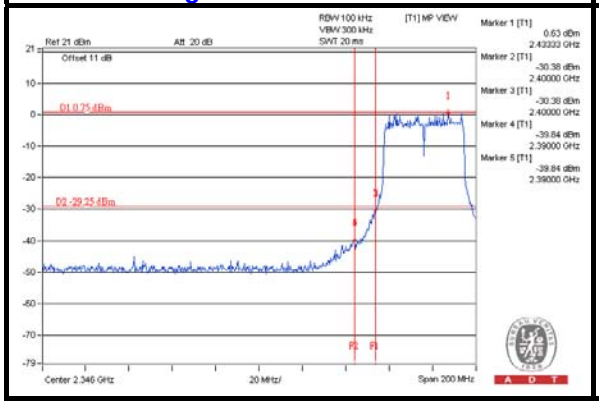


CH 9

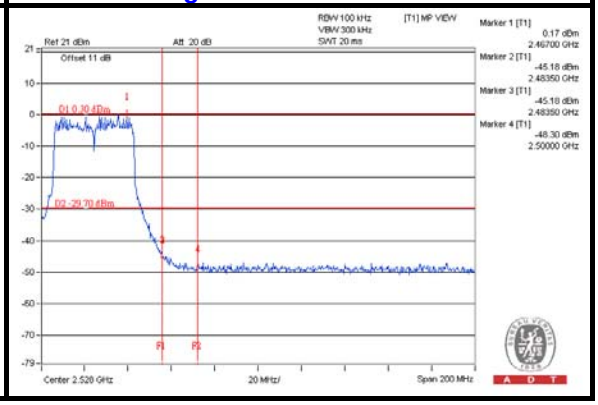




CH 3 Band edge



CH 9 Band edge



5. 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 30dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

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

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 (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Jones Chang

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	*5745.00	118.6 PK			1.23 H	57	80.10	38.50
2	*5745.00	108.3 AV			1.23 H	57	69.80	38.50
3	11490.00	67.9 PK	74.0	-6.1	1.15 H	210	47.50	20.40
4	11490.00	52.4 AV	54.0	-1.6	1.15 H	210	32.00	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	*5745.00	116.6 PK			1.00 V	337	78.10	38.50
2	*5745.00	106.2 AV			1.00 V	337	67.70	38.50
3	11490.00	67.6 PK	74.0	-6.4	1.01 V	322	47.20	20.40
4	11490.00	52.9 AV	54.0	-1.1	1.01 V	322	32.50	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 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Jones Chang

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	119.5 PK			1.24 H	60	80.90	38.60
2	*5785.00	109.4 AV			1.24 H	60	70.80	38.60
3	11570.00	64.6 PK	74.0	-9.4	1.00 H	54	44.20	20.40
4	11570.00	51.1 AV	54.0	-2.9	1.00 H	54	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	118.7 PK			1.00 V	351	80.10	38.60
2	*5785.00	108.8 AV			1.00 V	351	70.20	38.60
3	11570.00	67.3 PK	74.0	-6.7	1.01 V	319	46.90	20.40
4	**11570.00**	**53.0 AV**	**54.0**	**-1.0**	**1.01 V**	**319**	**32.60**	**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 (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Jones Chang

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	118.3 PK			1.12 H	58	79.60	38.70
2	*5825.00	108.4 AV			1.12 H	58	69.70	38.70
3	11650.00	65.0 PK	74.0	-9.0	1.00 H	53	44.70	20.30
4	11650.00	50.6 AV	54.0	-3.4	1.00 H	53	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	117.3 PK			1.00 V	350	78.60	38.70
2	*5825.00	107.3 AV			1.00 V	350	68.60	38.70
3	11650.00	67.4 PK	74.0	-6.6	1.00 V	322	47.10	20.30
4	11650.00	52.2 AV	54.0	-1.8	1.00 V	322	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.

802.11n (20MHz)

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

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	*5745.00	117.9 PK			1.28 H	57	79.40	38.50
2	*5745.00	108.1 AV			1.28 H	57	69.60	38.50
3	11490.00	66.4 PK	74.0	-7.6	1.35 H	347	46.00	20.40
4	11490.00	52.7 AV	54.0	-1.3	1.35 H	347	32.30	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	*5745.00	117.2 PK			1.01 V	337	78.70	38.50
2	*5745.00	107.5 AV			1.01 V	337	69.00	38.50
3	11490.00	66.7 PK	74.0	-7.3	1.01 V	350	46.30	20.40
4	11490.00	52.1 AV	54.0	-1.9	1.01 V	350	31.70	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 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Jones Chang

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	118.1 PK			1.23 H	60	79.50	38.60
2	*5785.00	108.1 AV			1.23 H	60	69.50	38.60
3	11570.00	66.3 PK	74.0	-7.7	1.32 H	344	45.90	20.40
4	**11570.00**	**53.0 AV**	**54.0**	**-1.0**	**1.32 H**	**344**	**32.60**	**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	*5785.00	118.9 PK			1.00 V	345	80.30	38.60
2	*5785.00	108.9 AV			1.00 V	345	70.30	38.60
3	11570.00	66.1 PK	74.0	-7.9	1.00 V	323	45.70	20.40
4	11570.00	51.4 AV	54.0	-2.6	1.00 V	323	31.00	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.

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

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	117.5 PK			1.27 H	346	78.80	38.70
2	*5825.00	107.5 AV			1.27 H	346	68.80	38.70
3	11650.00	66.8 PK	74.0	-7.2	1.02 H	50	46.50	20.30
4	11650.00	52.7 AV	54.0	-1.3	1.02 H	50	32.40	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	115.7 PK			1.00 V	352	77.00	38.70
2	*5825.00	105.8 AV			1.00 V	352	67.10	38.70
3	11650.00	66.3 PK	74.0	-7.7	1.00 V	320	46.00	20.30
4	11650.00	52.7 AV	54.0	-1.3	1.00 V	320	32.40	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.

802.11n (40MHz)

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

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	*5755.00	116.5 PK			1.15 H	67	77.90	38.60
2	*5755.00	106.9 AV			1.15 H	67	68.30	38.60
3	11510.00	64.1 PK	74.0	-9.9	1.41 H	347	43.70	20.40
4	11510.00	51.7 AV	54.0	-2.3	1.41 H	347	31.30	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	*5755.00	116.3 PK			1.00 V	342	77.70	38.60
2	*5755.00	106.4 AV			1.00 V	342	67.80	38.60
3	11510.00	67.0 PK	74.0	-7.0	1.01 V	321	46.60	20.40
4	11510.00	52.4 AV	54.0	-1.6	1.01 V	321	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.

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

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	118.2 PK			1.25 H	62	79.60	38.60
2	*5795.00	107.9 AV			1.25 H	62	69.30	38.60
3	11590.00	67.1 PK	74.0	-6.9	1.40 H	345	46.70	20.40
4	11590.00	51.7 AV	54.0	-2.3	1.40 H	345	31.30	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	115.3 PK			1.00 V	343	76.70	38.60
2	*5795.00	105.7 AV			1.00 V	343	67.10	38.60
3	11590.00	67.3 PK	74.0	-6.7	1.00 V	319	46.90	20.40
4	11590.00	52.7 AV	54.0	-1.3	1.00 V	319	32.30	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.

802.11ac (80MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 155	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Jones Chang

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	*5775.00	112.7 PK			1.33 H	43	74.10	38.60
2	*5775.00	102.5 AV			1.33 H	43	63.90	38.60
3	11550.00	62.9 PK	74.0	-11.1	1.35 H	321	42.50	20.40
4	11550.00	52.1 AV	54.0	-1.9	1.35 H	321	31.70	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	*5775.00	112.1 PK			1.00 V	349	73.50	38.60
2	*5775.00	102.3 AV			1.00 V	349	63.70	38.60
3	11550.00	62.0 PK	74.0	-12.0	1.00 V	319	41.60	20.40
4	11550.00	49.9 AV	54.0	-4.1	1.00 V	319	29.50	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.

BELOW 1GHz WORST-CASE DATA：802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	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	101.84	31.7 QP	43.5	-11.8	1.25 H	151	50.00	-18.30
2	189.33	35.2 QP	43.5	-8.3	1.00 H	266	51.40	-16.20
3	300.16	35.1 QP	46.0	-10.9	1.50 H	94	47.30	-12.20
4	372.09	41.9 QP	46.0	-4.1	1.25 H	25	52.70	-10.80
5	669.57	40.1 QP	46.0	-5.9	1.00 H	203	45.10	-5.00
6	747.34	40.9 QP	46.0	-5.1	1.50 H	66	44.20	-3.30
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	99.89	32.7 QP	43.5	-10.8	1.25 V	179	51.50	-18.80
2	148.50	35.0 QP	43.5	-8.5	1.00 V	297	48.90	-13.90
3	191.28	34.5 QP	43.5	-9.0	1.50 V	51	50.80	-16.30
4	385.70	38.3 QP	46.0	-7.7	1.00 V	288	48.80	-10.50
5	580.13	33.1 QP	46.0	-12.9	1.25 V	305	39.70	-6.60
6	710.40	38.4 QP	46.0	-7.6	1.50 V	338	42.60	-4.20

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Jones Chang
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	29.2 QP	40.0	-10.8	1.50 H	16	43.80	-14.60
2	249.60	28.9 QP	46.0	-17.1	1.00 H	239	43.10	-14.20
3	374.04	30.4 QP	46.0	-15.6	1.00 H	162	41.10	-10.70
4	624.85	31.7 QP	46.0	-14.3	1.50 H	210	37.20	-5.50
5	751.23	32.2 QP	46.0	-13.8	1.00 H	11	35.20	-3.00
6	902.89	41.0 QP	46.0	-5.0	2.00 H	182	41.40	-0.40
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	57.12	29.4 QP	40.0	-10.6	1.50 V	288	44.00	-14.60
2	150.45	27.8 QP	43.5	-15.7	1.00 V	267	41.60	-13.80
3	374.04	27.5 QP	46.0	-18.5	1.25 V	47	38.20	-10.70
4	500.42	27.0 QP	46.0	-19.0	1.25 V	5	35.30	-8.30
5	624.85	30.1 QP	46.0	-15.9	1.99 V	96	35.60	-5.50
6	760.95	29.1 QP	46.0	-16.9	1.25 V	109	31.80	-2.70

REMARKS:

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

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

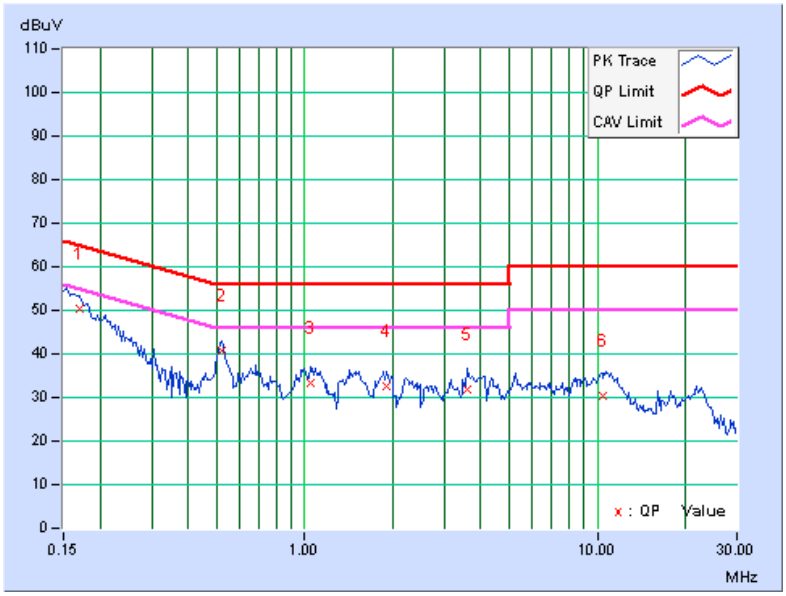
CONDUCTED WORST-CASE DATA：802.11a

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	0.16953	0.22	50.25	34.18	50.47	34.40	64.98	54.98	-14.51	-20.58
2	0.52109	0.24	40.55	33.76	40.79	34.00	56.00	46.00	-15.21	-12.00
3	1.05078	0.30	32.99	27.29	33.29	27.59	56.00	46.00	-22.71	-18.41
4	1.91406	0.36	32.32	26.23	32.68	26.59	56.00	46.00	-23.32	-19.41
5	3.60156	0.43	31.53	25.65	31.96	26.08	56.00	46.00	-24.04	-19.92
6	10.38672	0.52	29.91	23.79	30.43	24.31	60.00	50.00	-29.57	-25.69

REMARKS:

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

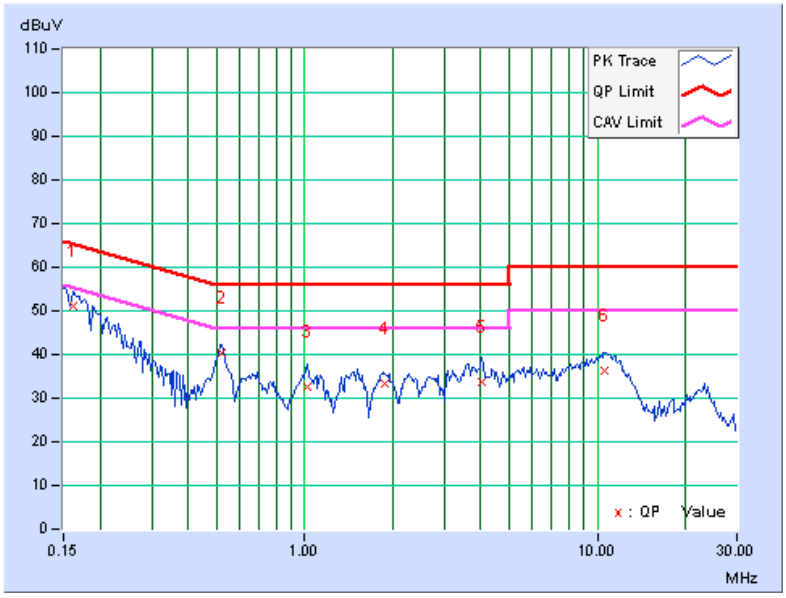


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

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	0.16172	0.23	50.87	31.36	51.10	31.59	65.38	55.38	-14.28	-23.79
2	0.52109	0.30	40.19	33.38	40.49	33.68	56.00	46.00	-15.51	-12.32
3	1.01953	0.29	32.14	26.15	32.43	26.44	56.00	46.00	-23.57	-19.56
4	1.89063	0.38	32.96	26.88	33.34	27.26	56.00	46.00	-22.66	-18.74
5	4.01563	0.49	33.39	27.24	33.88	27.73	56.00	46.00	-22.12	-18.27
6	10.63281	0.59	35.86	31.30	36.45	31.89	60.00	50.00	-23.55	-18.11

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.

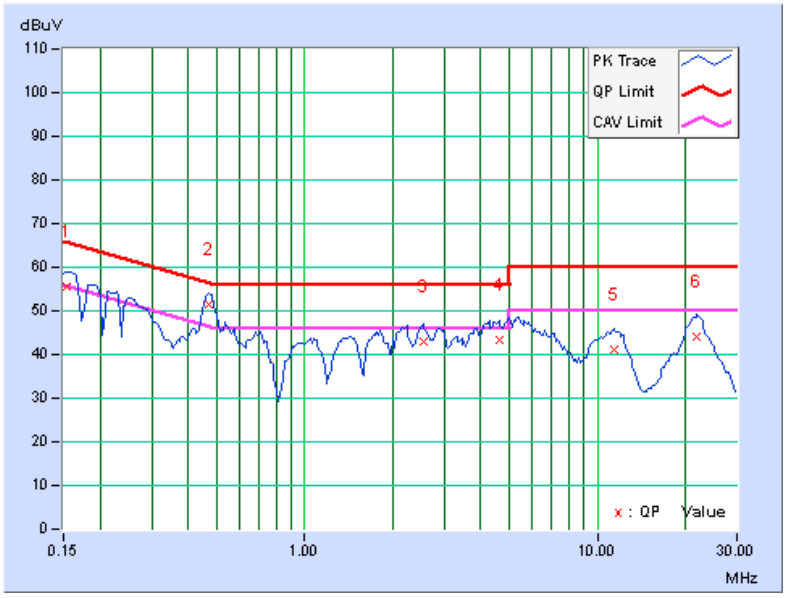


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.15391	0.22	55.50	44.99	55.72	45.21	65.79	55.79	-10.07	-10.58
2	0.47031	0.23	51.11	44.22	51.34	44.45	56.51	46.51	-5.17	-2.06
3	2.53906	0.39	42.70	38.46	43.09	38.85	56.00	46.00	-12.91	-7.15
4	4.60938	0.45	42.99	37.84	43.44	38.29	56.00	46.00	-12.56	-7.71
5	11.42578	0.53	40.62	36.27	41.15	36.80	60.00	50.00	-18.85	-13.20
6	21.93359	0.67	43.37	38.96	44.04	39.63	60.00	50.00	-15.96	-10.37

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.

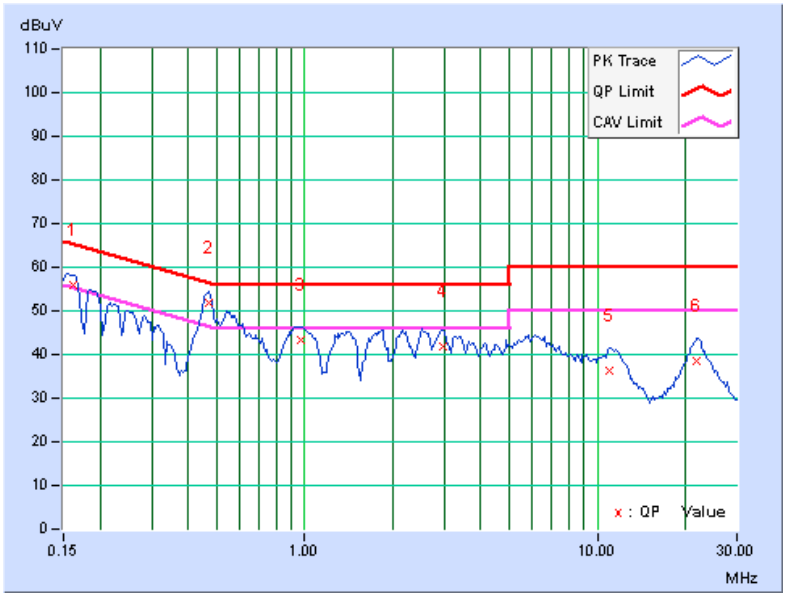


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.23	55.53	48.48	55.76	48.71	65.38	55.38	-9.62	-6.67
2	0.47031	0.30	51.49	44.12	51.79	44.42	56.51	46.51	-4.72	-2.09
3	0.97422	0.29	42.92	37.95	43.21	38.24	56.00	46.00	-12.79	-7.76
4	2.95313	0.44	41.39	37.16	41.83	37.60	56.00	46.00	-14.17	-8.40
5	11.03906	0.60	35.73	30.38	36.33	30.98	60.00	50.00	-23.67	-19.02
6	21.82422	0.77	37.60	33.11	38.37	33.88	60.00	50.00	-21.63	-16.12

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	CHAIN 2		
149	5745	16.43	16.43	16.43	0.5	PASS
157	5785	16.41	16.40	16.40	0.5	PASS
165	5825	16.38	16.43	16.42	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.66	17.66	17.65	0.5	PASS
157	5785	17.63	17.64	17.64	0.5	PASS
165	5825	17.63	17.63	17.64	0.5	PASS

802.11n (40MHz)

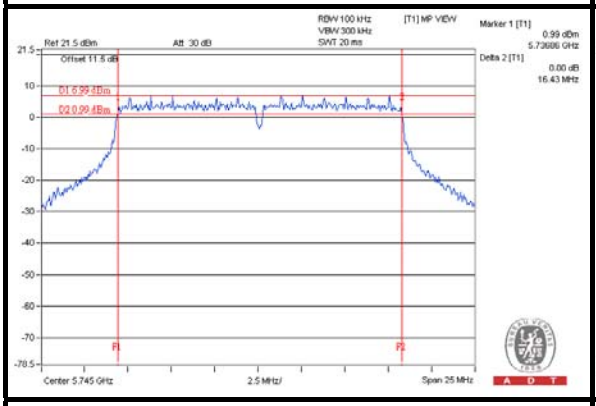
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	36.46	36.44	36.11	0.5	PASS
159	5795	36.37	36.40	36.39	0.5	PASS

802.11ac (80MHz)

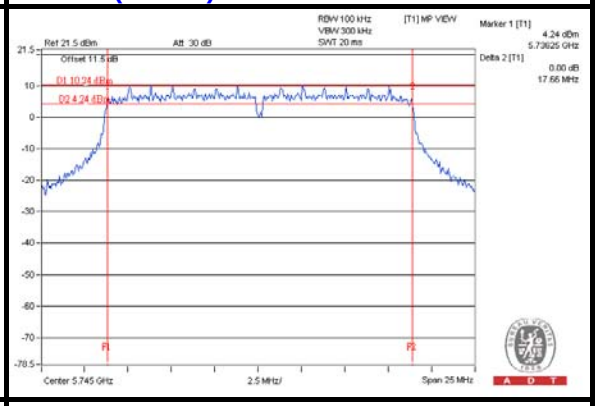
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
155	5775	76.22	75.34	73.60	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

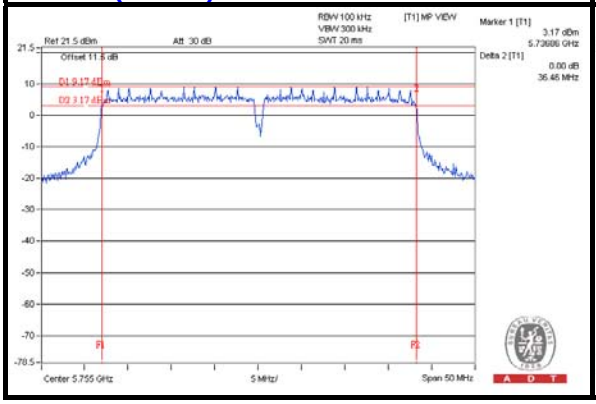
802.11a



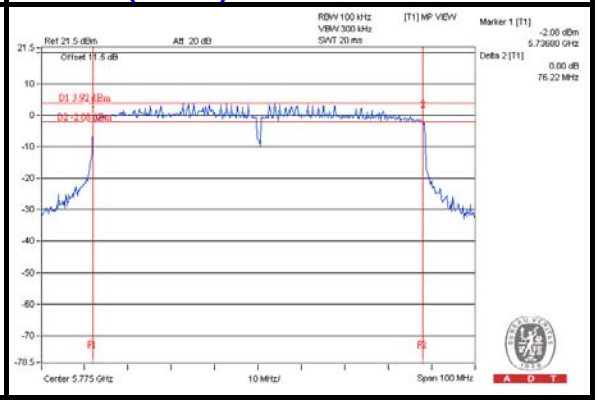
802.11n (20MHz)



802.11n (40MHz)



802.11ac (80MHz)



5.4 CONDUCTED OUTPUT POWER

5.4.1 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,

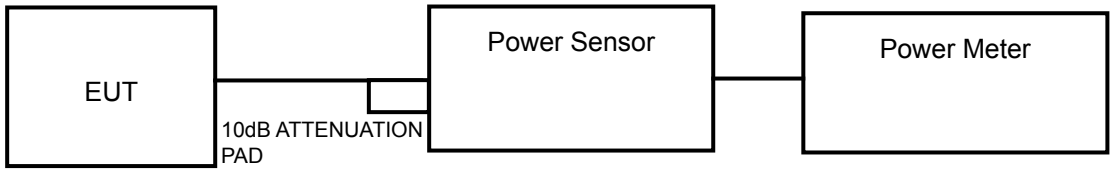
Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

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

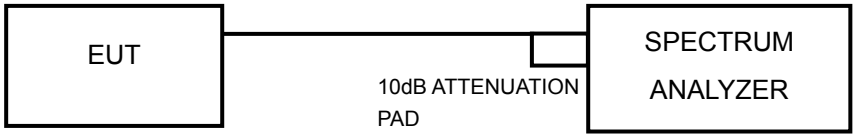
5.4.2 TEST SETUP

FOR POWER OUTPUT MEASUREMENT

For 802.11a, 802.11n (20MHz), 802.11n (40MHz)



For 802.11ac (80MHz)



5.4.3 INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.4.4 TEST PROCEDURES

For 802.11a, 802.11n (20MHz), 802.11n (40MHz)

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

For 802.11ac (80MHz)

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

1) Set the RBW = 1 MHz.
2) Set the VBW ≥ 3 RBW.
3) Set the span ≥ 1.5 x DTS bandwidth.
4) Detector = peak.
5) Sweep time = auto couple.
6) Trace mode = max hold.
7) Allow trace to fully stabilize.
8) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

5.4.5 DEVIATION FROM TEST STANDARD

No deviation.

5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

5.4.7 TEST RESULTS

FOR AVERAGE POWER

802.11a

CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	18.63	19.80	19.40	255.541	24.07	30	PASS
157	5785	22.44	20.83	20.37	405.341	26.08	30	PASS
165	5825	21.93	19.80	19.37	337.951	25.29	30	PASS

802.11n (20MHz)

CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	21.90	20.37	20.30	370.927	25.69	30	PASS
157	5785	22.31	21.03	20.18	401.213	26.03	30	PASS
165	5825	21.90	19.81	19.30	335.715	25.26	30	PASS

802.11n (40MHz)

CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	23.94	22.56	22.21	**594.385**	27.74	30	PASS
159	5795	23.72	22.34	21.63	552.447	27.42	30	PASS

802.11ac (80MHz)

CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
155	5775	22.16	20.57	19.98	378.003	25.77	30	PASS

5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 TEST SETUP

Same as item 4.5.2.

5.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.5.4 TEST PROCEDURE.

Same as item 4.5.4.

5.5.5 DEVIATION FROM TEST STANDARD

No deviation.

5.5.6 EUT OPERATING CONDITION

Same as item 4.3.6.

5.5.7 TEST RESULTS

802.11a

TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	149	5745	-13.98	4.77	-11.30	0.15	-9.06	4.23	PASS
	157	5785	-10.55	4.77	-10.97	0.15	-5.63	4.23	PASS
	165	5825	-10.75	4.77	-11.71	0.15	-5.83	4.23	PASS
1	149	5745	-12.92	4.77	-12.36	0.15	-8.00	4.23	PASS
	157	5785	-12.38	4.77	-13.74	0.15	-7.46	4.23	PASS
	165	5825	-13.82	4.77	-12.99	0.15	-8.90	4.23	PASS
2	149	5745	-13.45	4.77	-12.36	0.15	-8.53	4.23	PASS
	157	5785	-12.68	4.77	-13.74	0.15	-7.76	4.23	PASS
	165	5825	-13.49	4.77	-12.99	0.15	-8.57	4.23	PASS

NOTE: Directional gain = 5.0dBi + 10log(3) = 9.77dBi > 6dBi , so the power density limit shall be reduced to 8-(9.77-6) = 4.23dBm.

802.11n (20MHz)

TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	149	5745	-11.17	4.77	-6.40	0.29	-6.11	4.23	PASS
	157	5785	-11.07	4.77	-6.30	0.29	-6.01	4.23	PASS
	165	5825	-10.40	4.77	-5.63	0.29	-5.34	4.23	PASS
1	149	5745	-12.94	4.77	-8.17	0.29	-7.88	4.23	PASS
	157	5785	-8.78	4.77	-4.01	0.29	-3.72	4.23	PASS
	165	5825	-10.23	4.77	-5.46	0.29	-5.17	4.23	PASS
2	149	5745	-11.48	4.77	-6.71	0.29	-6.42	4.23	PASS
	157	5785	-13.13	4.77	-8.36	0.29	-8.07	4.23	PASS
	165	5825	-13.98	4.77	-9.21	0.29	-8.92	4.23	PASS

NOTE: Directional gain = 5.0dBi + 10log(3) = 9.77dBi > 6dBi , so the power density limit shall be reduced to 8-(9.77-6) = 4.23dBm.

802.11n (40MHz)

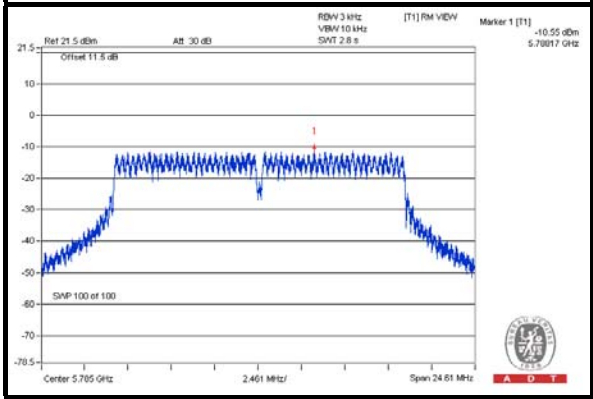
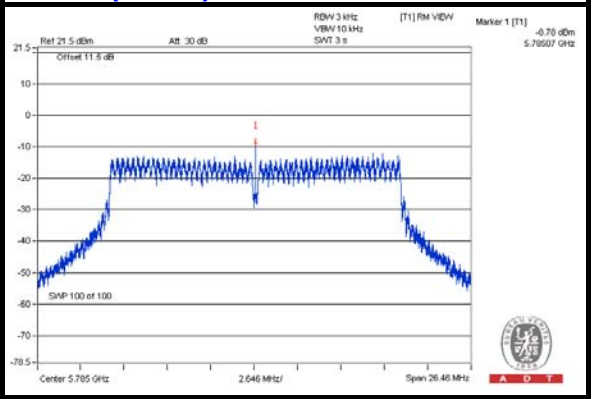
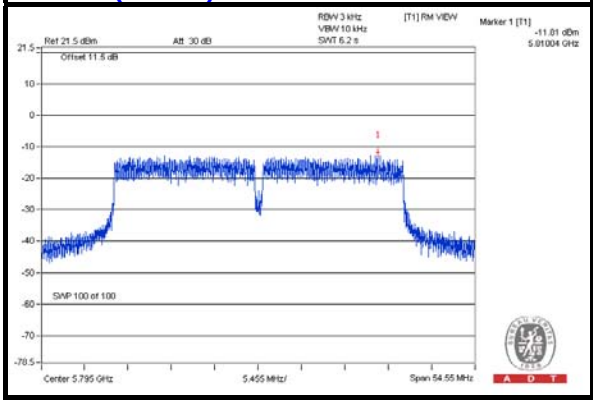
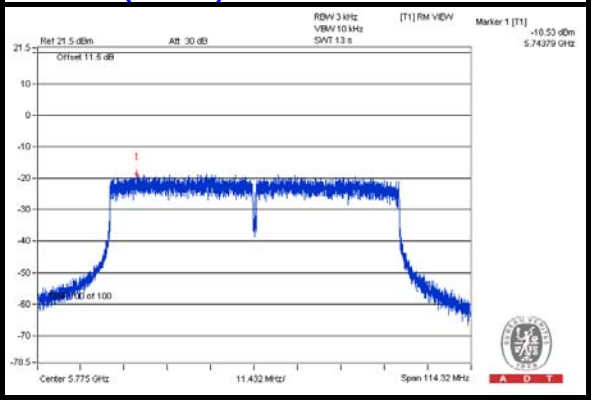
TX chain	Chan.	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD without Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	151	5755	-12.67	4.77	-7.90	0.33	-7.57	4.23	PASS
	159	5795	-11.81	4.77	-7.04	0.33	-6.71	4.23	PASS
1	151	5755	-13.95	4.77	-9.18	0.33	-8.85	4.23	PASS
	159	5795	-13.55	4.77	-8.78	0.33	-8.45	4.23	PASS
2	151	5755	-14.20	4.77	-9.43	0.33	-9.10	4.23	PASS
	159	5795	-13.92	4.77	-9.15	0.33	-8.82	4.23	PASS

NOTE: Directional gain = 5.0dBi + 10log(3) = 9.77dBi > 6dBi , so the power density limit shall be reduced to 8-(9.77-6) = 4.23dBm.

802.11ac (80MHz)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD without Duty Factor (dBm/3kHz)	Duty Factor	Total PSD with Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	155	5775	-18.53	4.77	-13.76	0.73	-13.03	4.23	PASS
1	155	5775	-18.87	4.77	-14.10	0.73	-13.37	4.23	PASS
2	155	5775	-19.04	4.77	-14.27	0.73	-13.54	4.23	PASS

NOTE: Directional gain = 5.0dBi + 10log(3) = 9.77dBi > 6dBi , so the power density limit shall be reduced to 8-(9.77-6) = 4.23dBm.

SPECTRUM PLOT OF WORST VALUE	
802.11a	802.11n (20MHz)
	
802.11n (40MHz)	802.11ac (80MHz)
	

5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

5.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

5.6.2 TEST SETUP

Same as Item 4.6.2

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 4.6.4

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

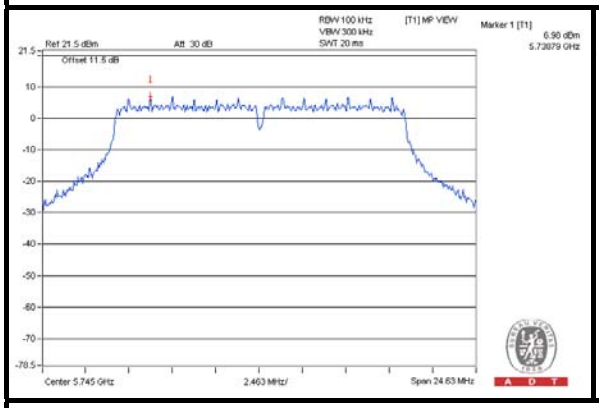
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

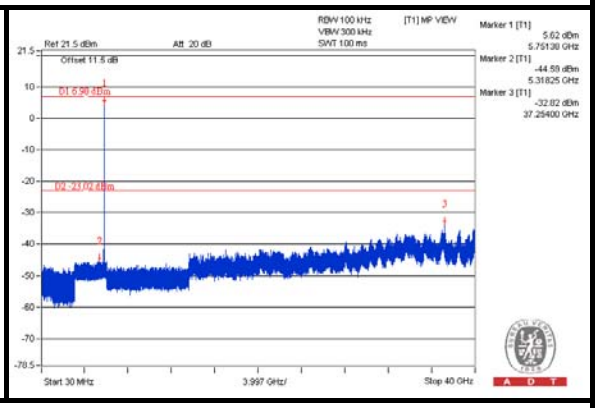
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11a

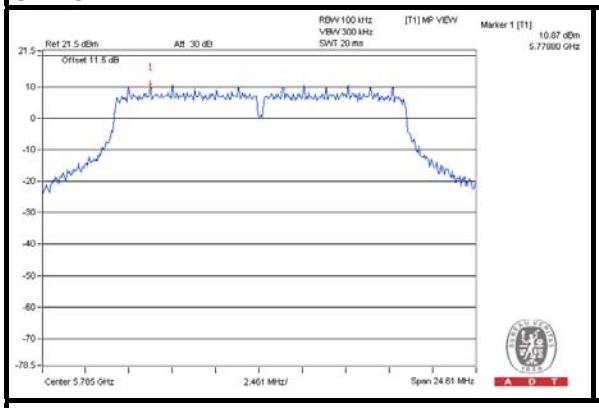
CHAIN 0

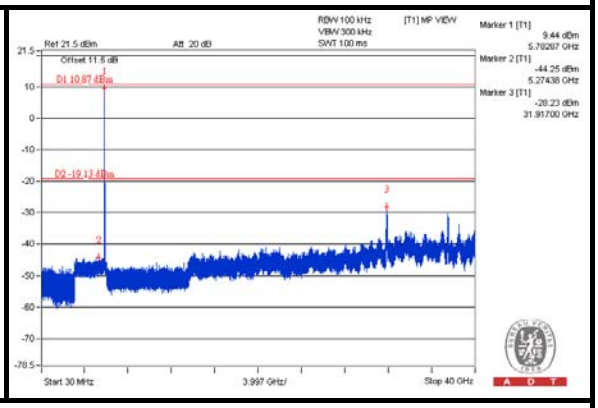
CH 149



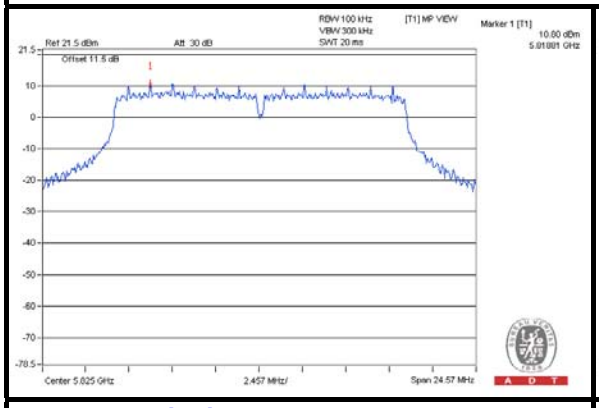


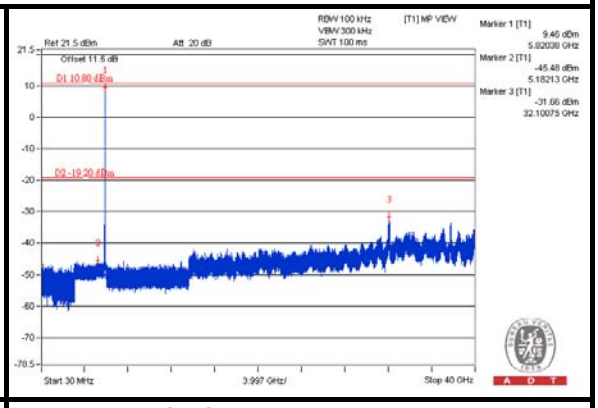
CH 157



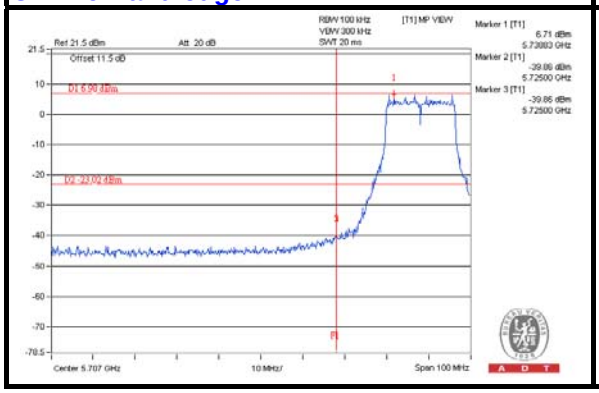


CH 165

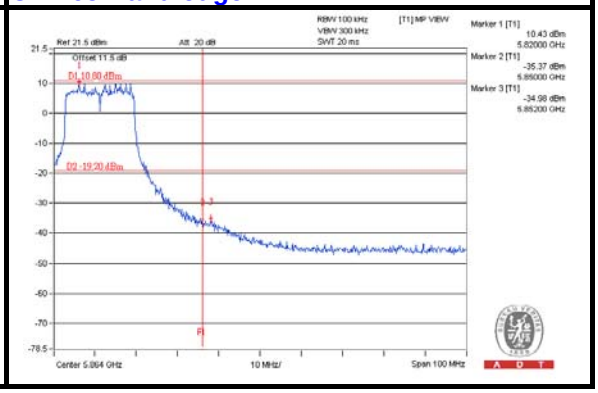




CH 149 Band edge

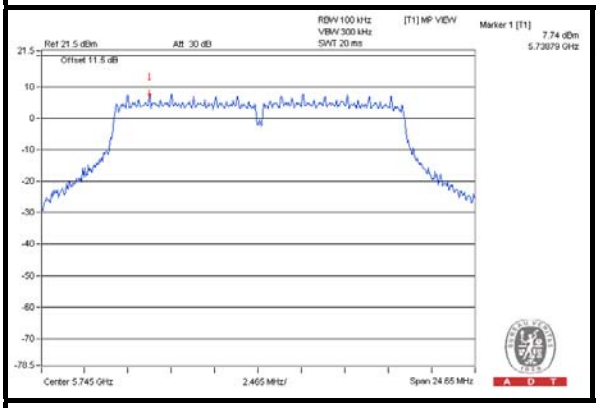


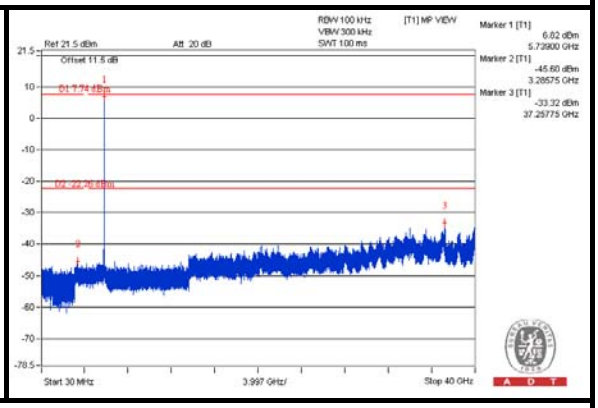
CH 165 Band edge



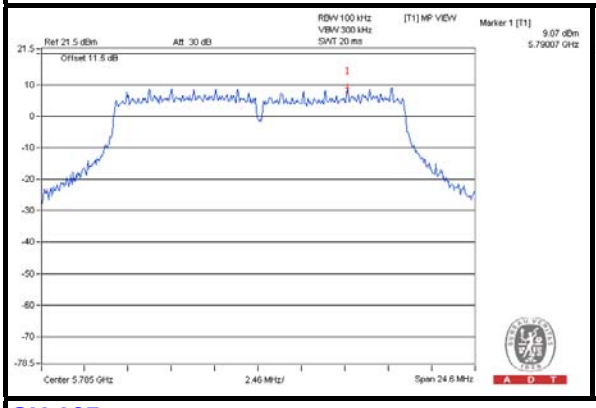
CHAIN 1

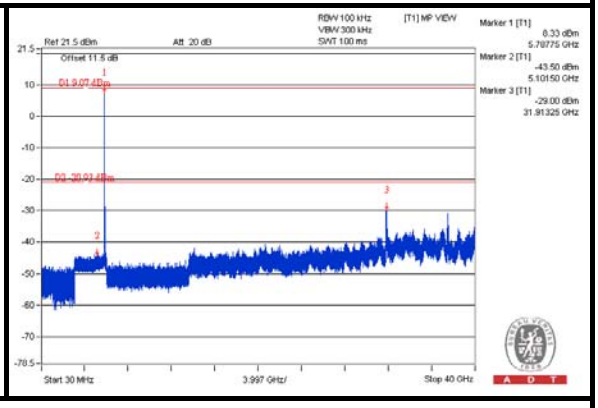
CH 149



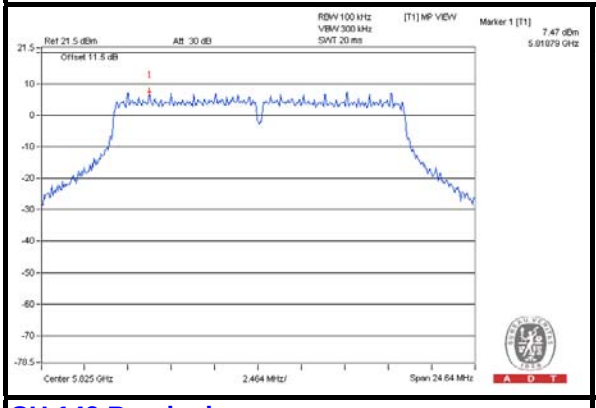


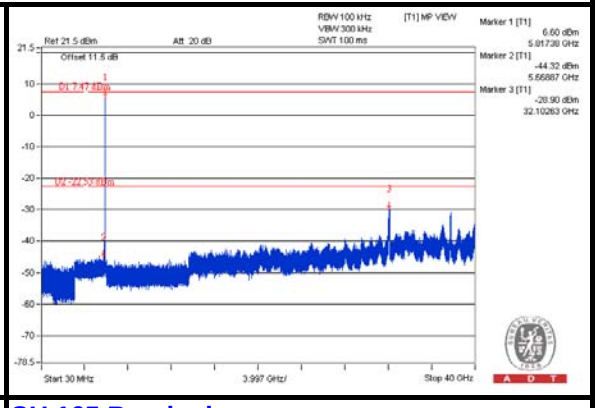
CH 157



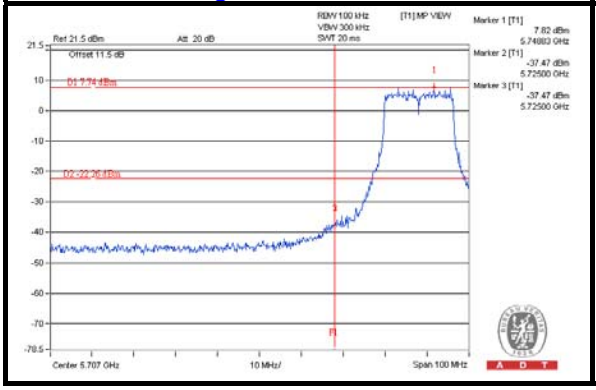


CH 165

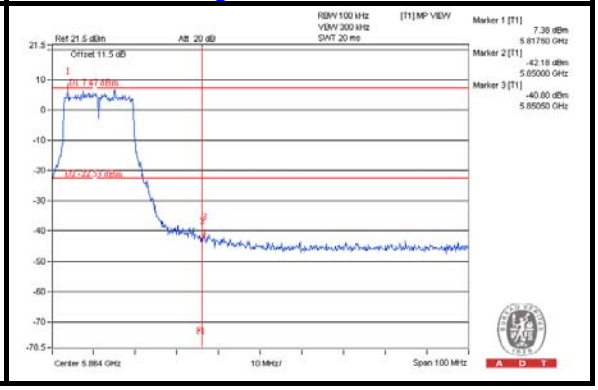




CH 149 Band edge

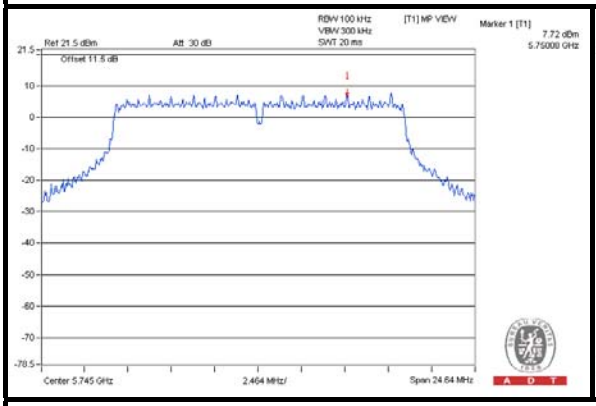


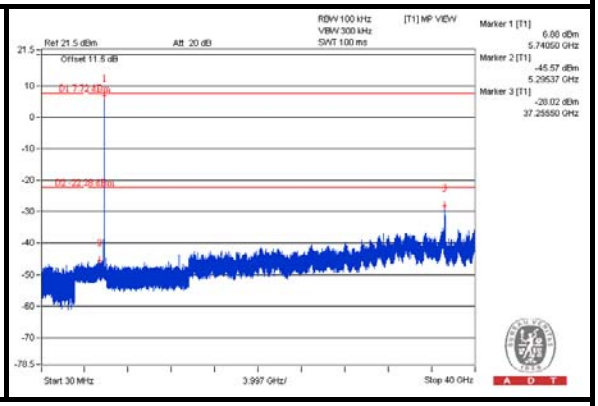
CH 165 Band edge



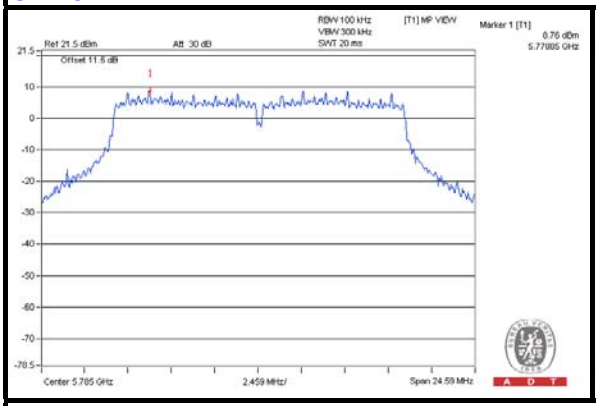
CHAIN 2

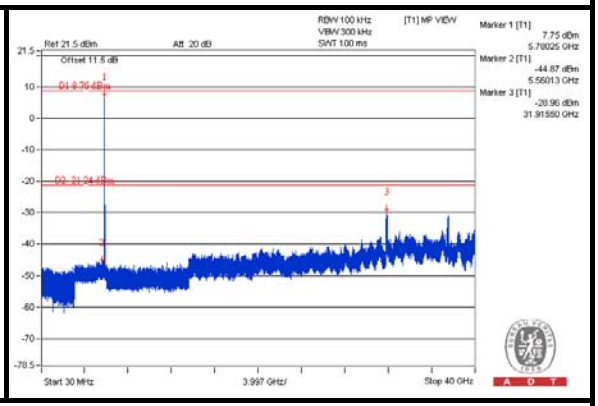
CH 149



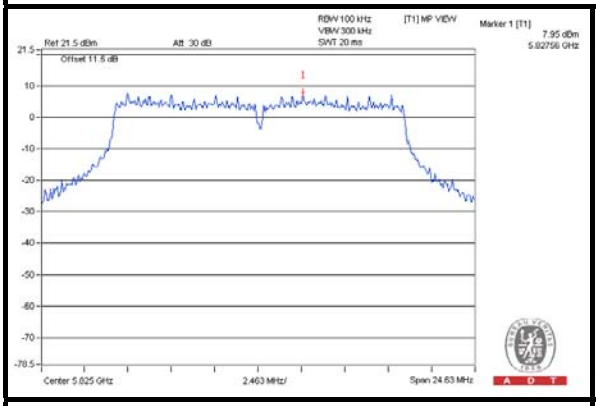


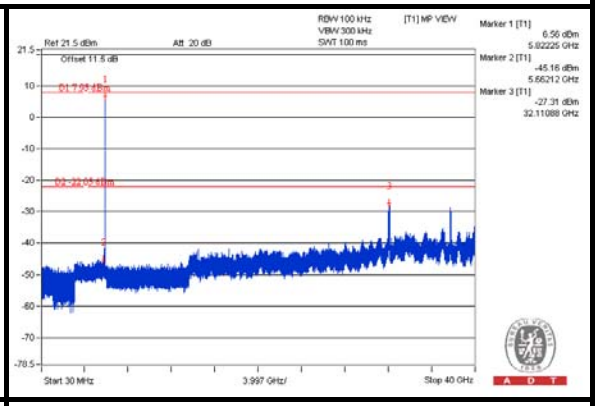
CH 157



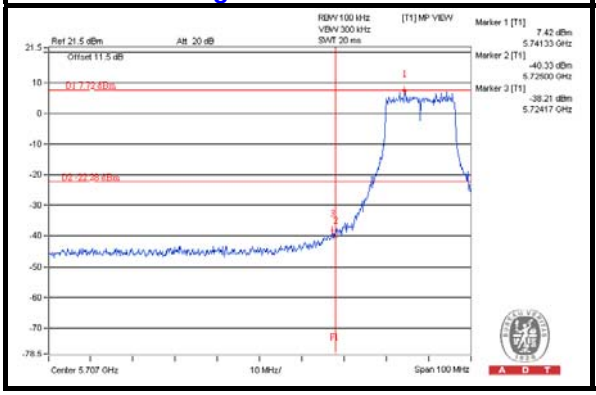


CH 165

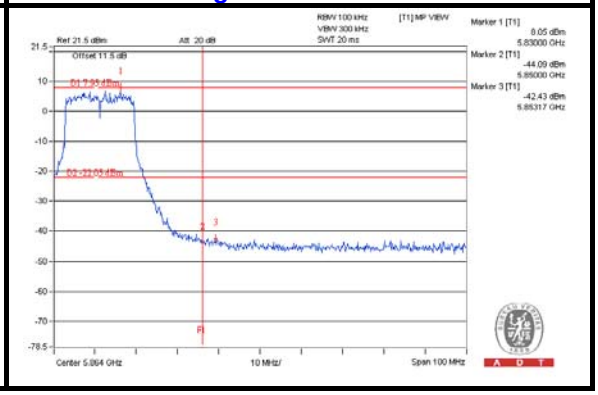




CH 149 Band edge



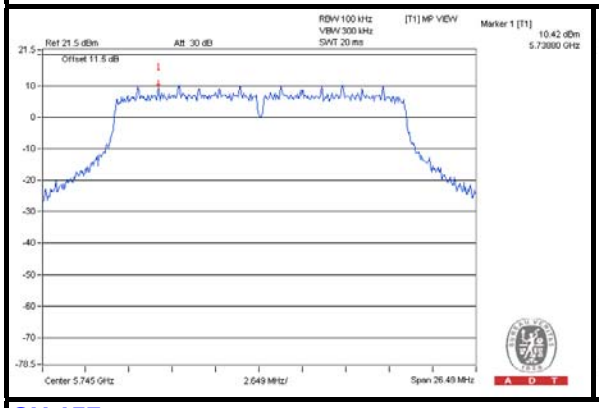
CH 165 Band edge

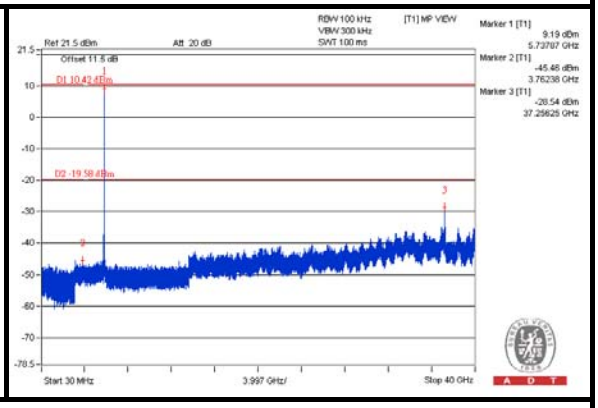


802.11n (20MHz)

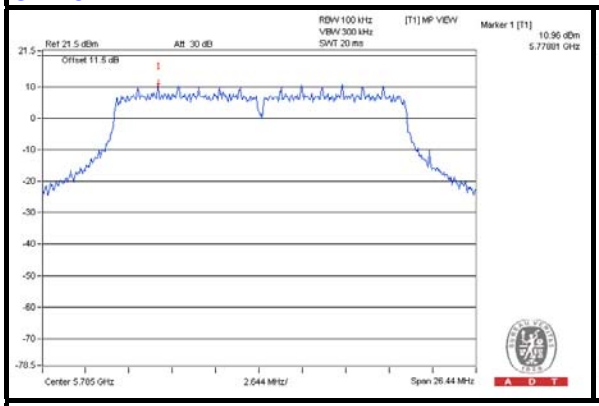
CHAIN 0

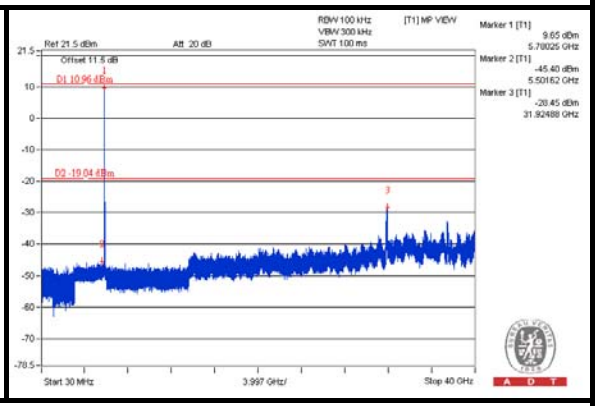
CH 149



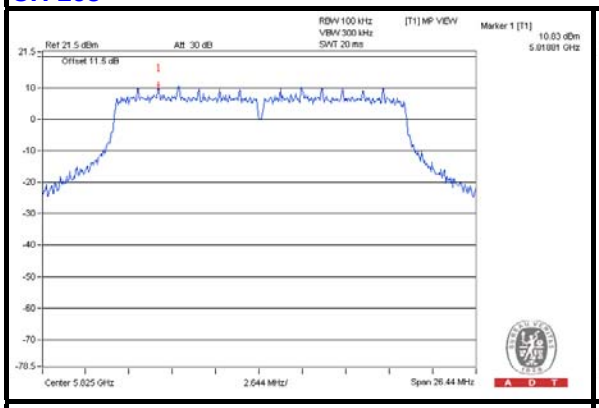


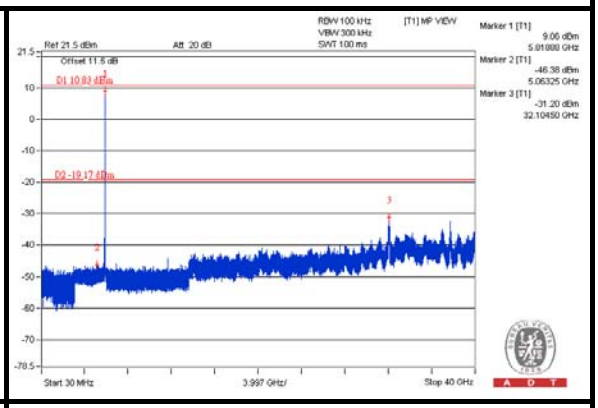
CH 157



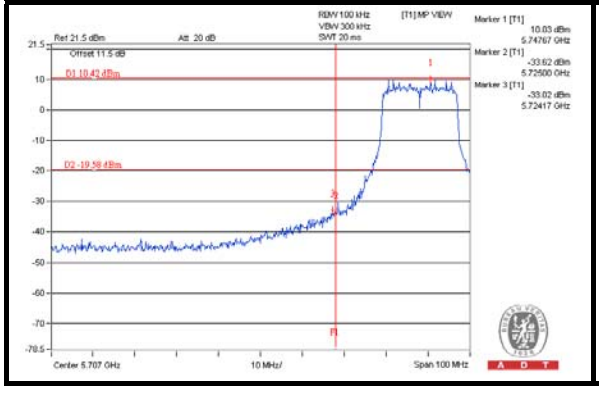


CH 165

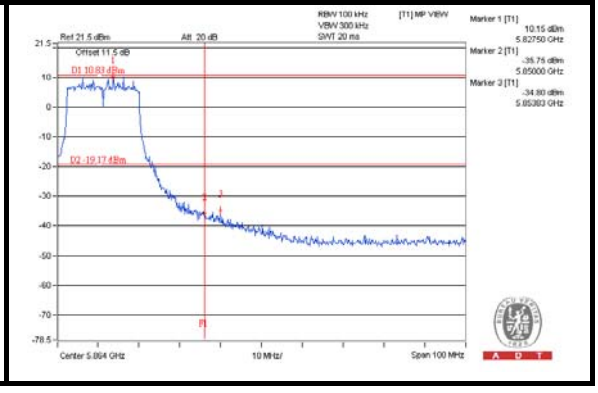




CH 149 Band edge

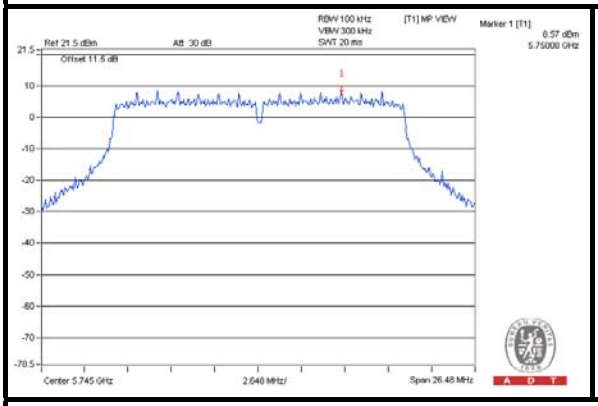


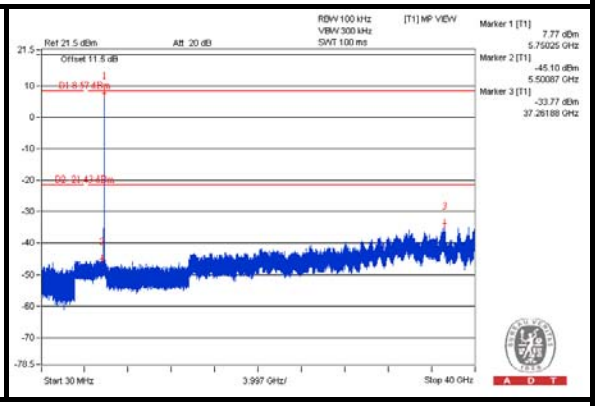
CH 165 Band edge



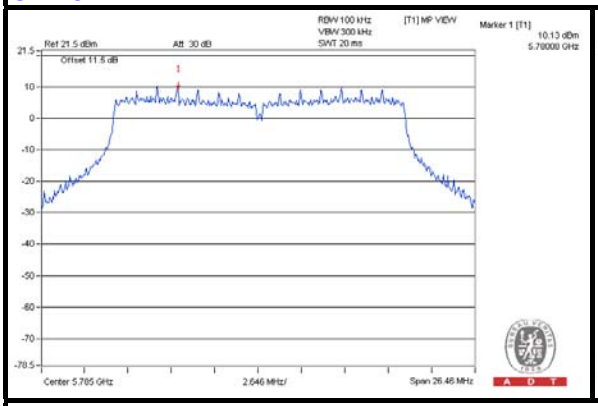
CHAIN 1

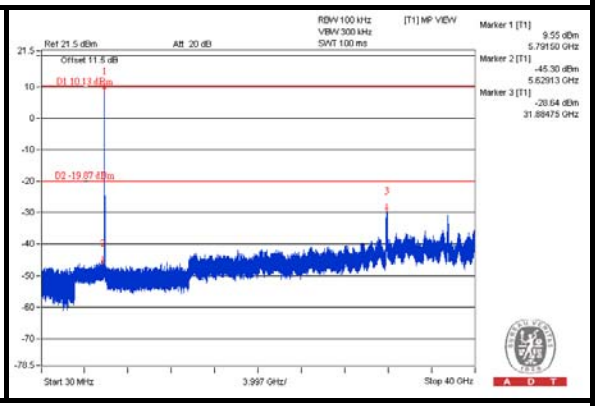
CH 149



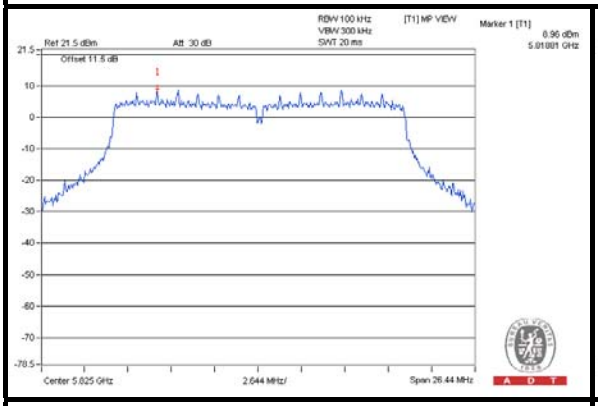


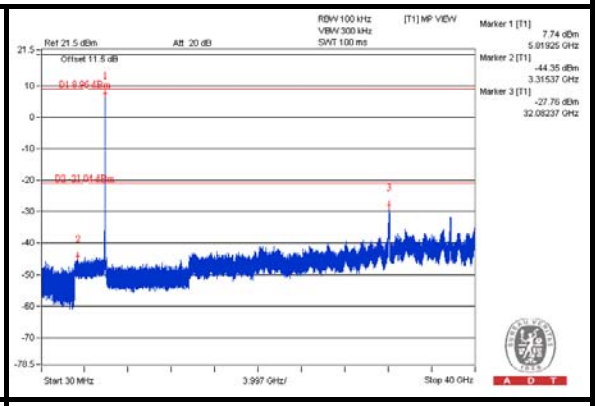
CH 157



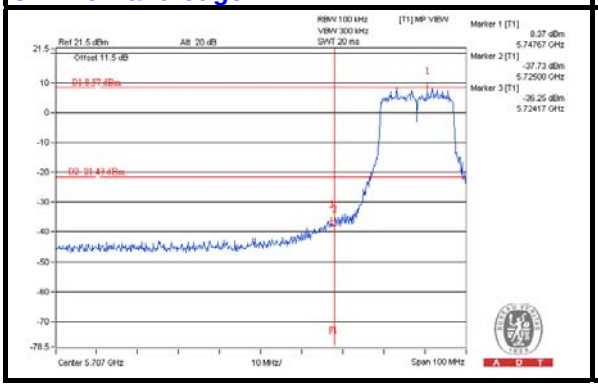


CH 165

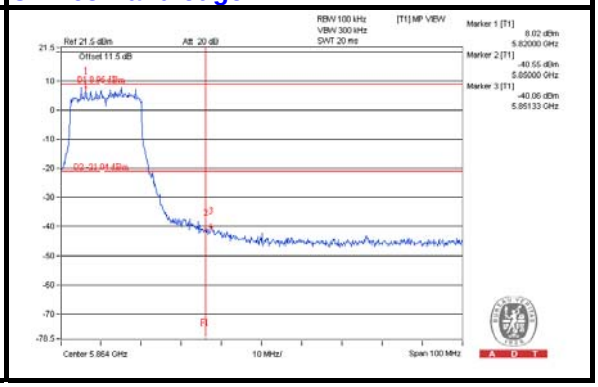




CH 149 Band edge

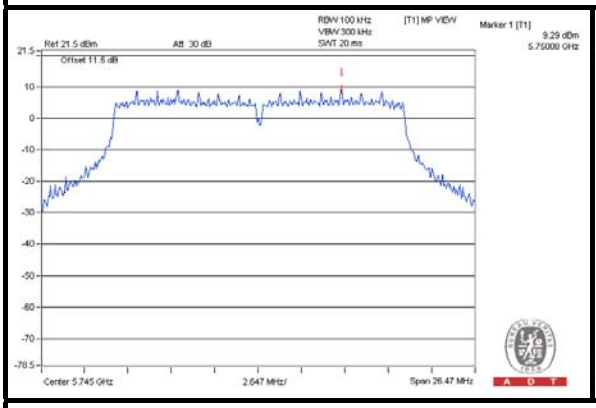


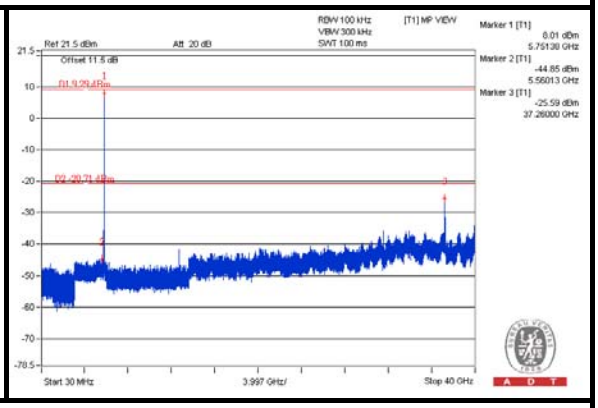
CH 165 Band edge



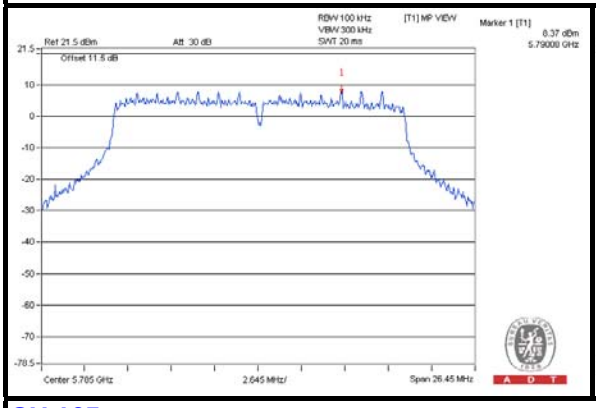
CHAIN 2

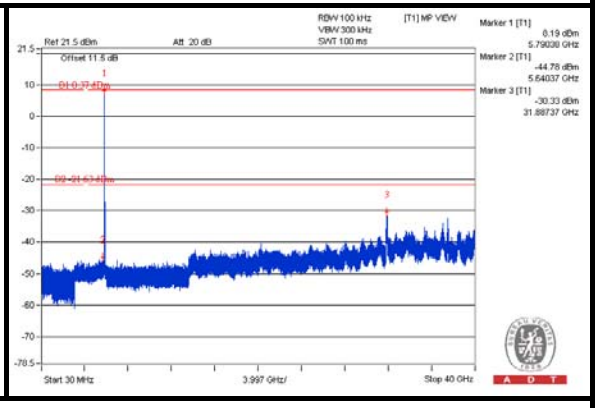
CH 149



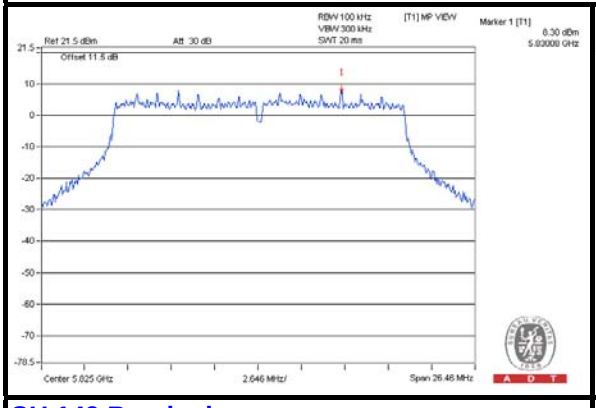


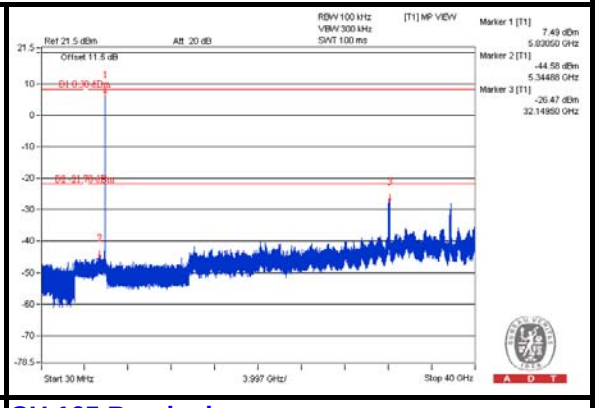
CH 157



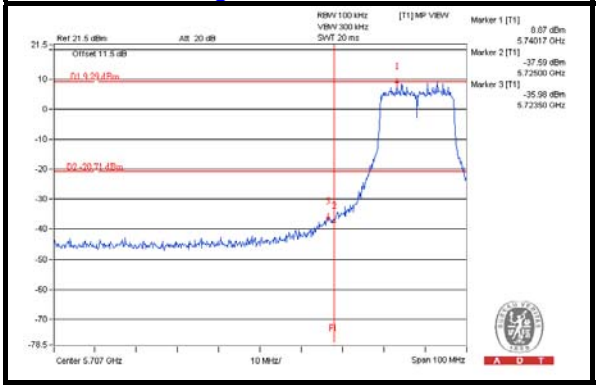


CH 165

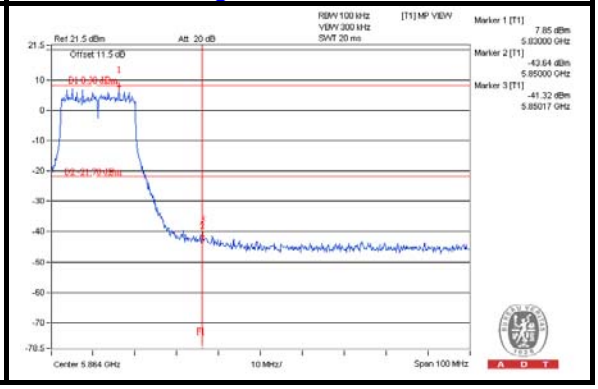




CH 149 Band edge



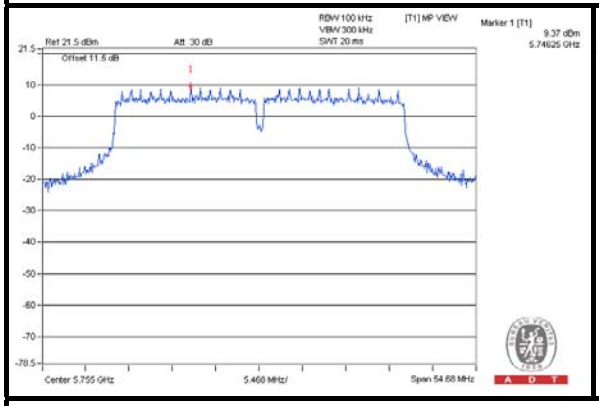
CH 165 Band edge

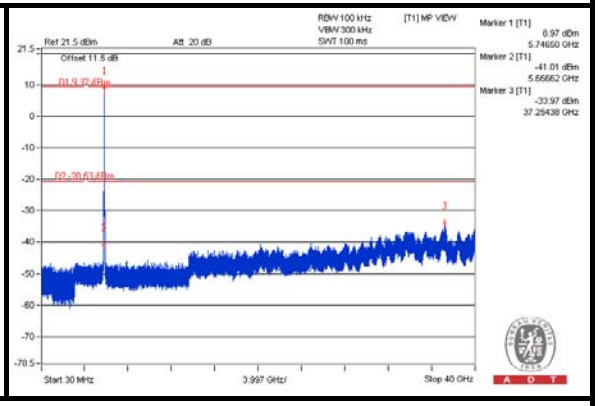


802.11n (40MHz)

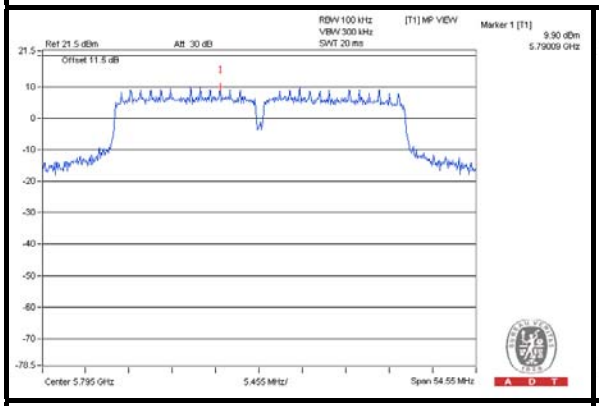
CHAIN 0

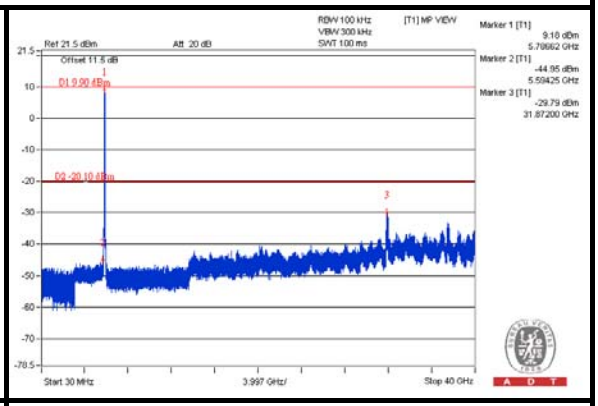
CH 151



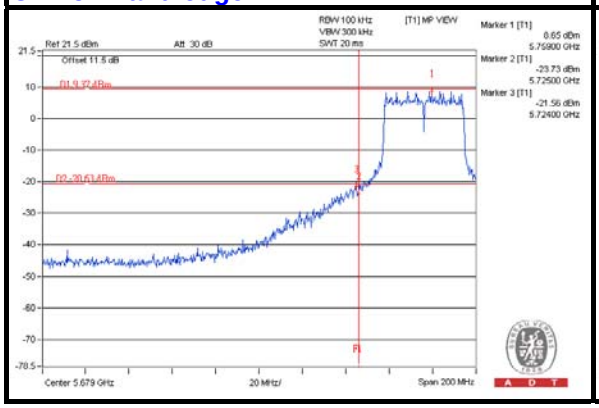


CH 159

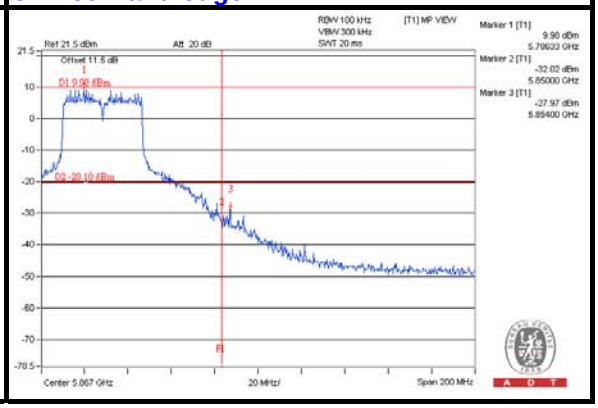




CH 151 Band edge

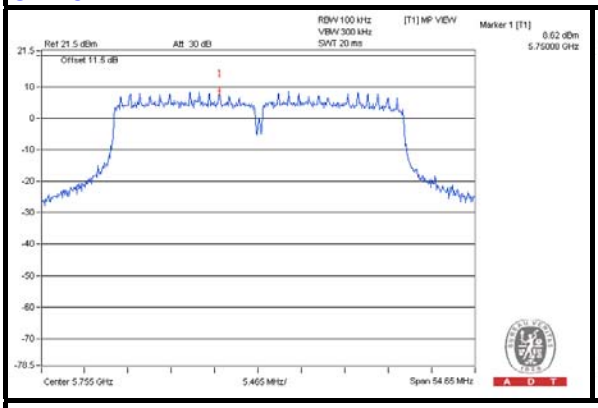


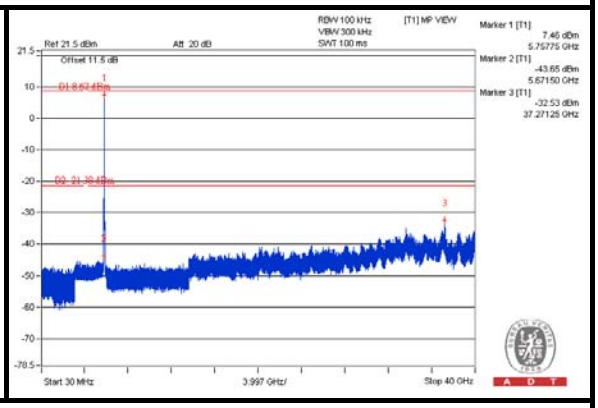
CH 159 Band edge



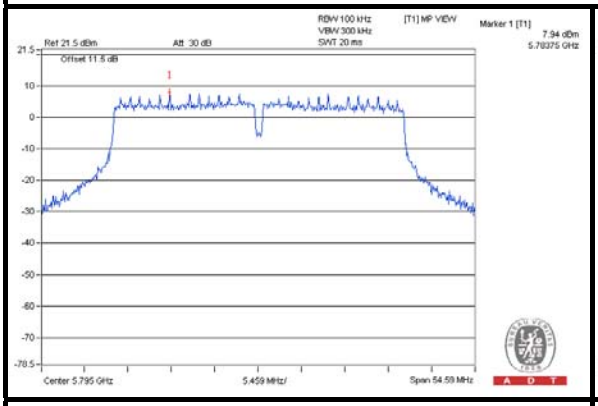
CHAIN 1

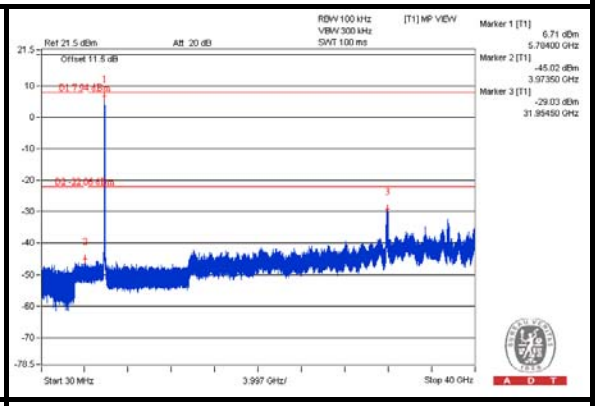
CH 151



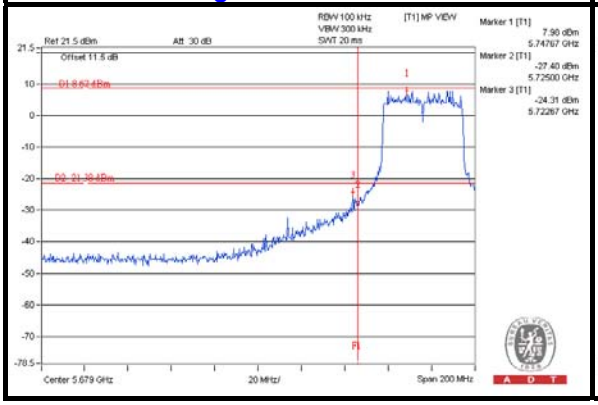


CH 159

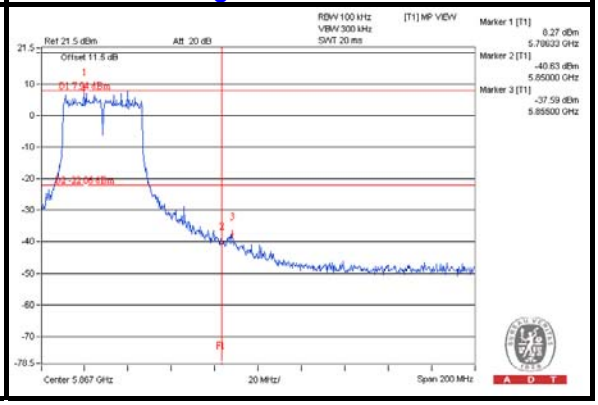




CH 151 Band edge

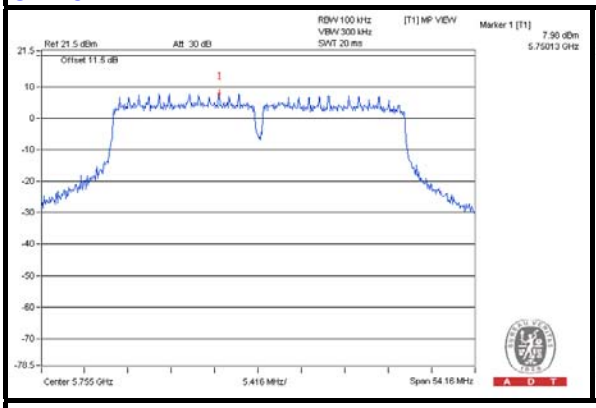


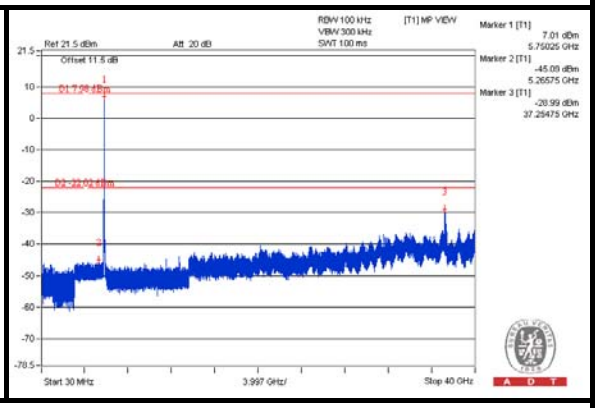
CH 159 Band edge



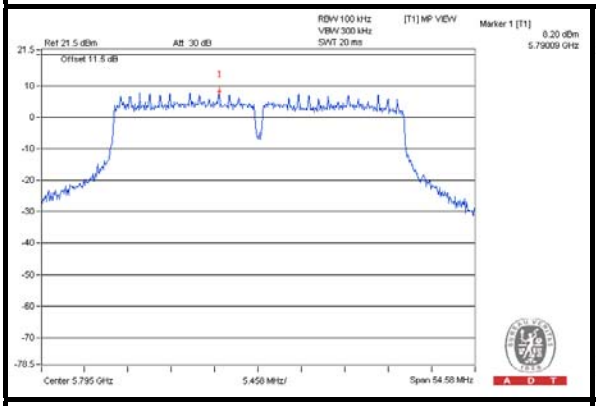
CHAIN 2

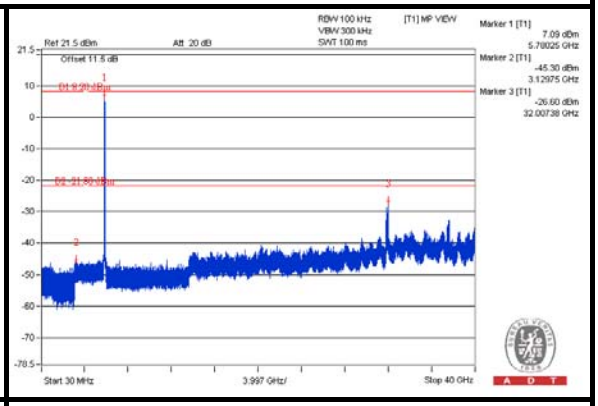
CH 151



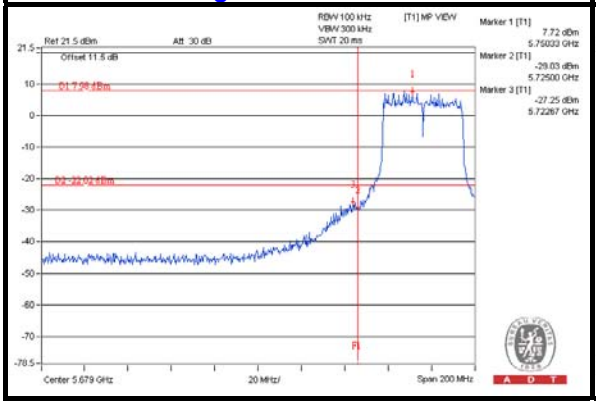


CH 159

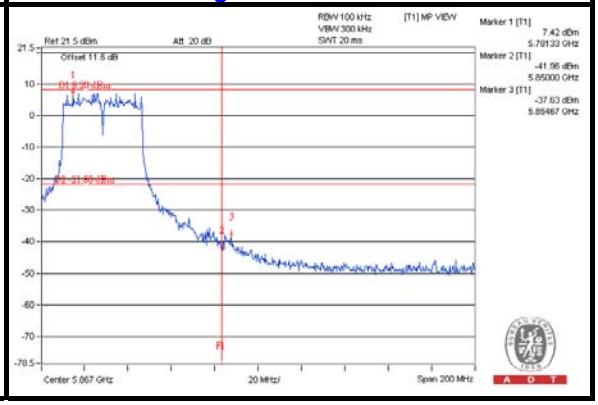




CH 151 Band edge



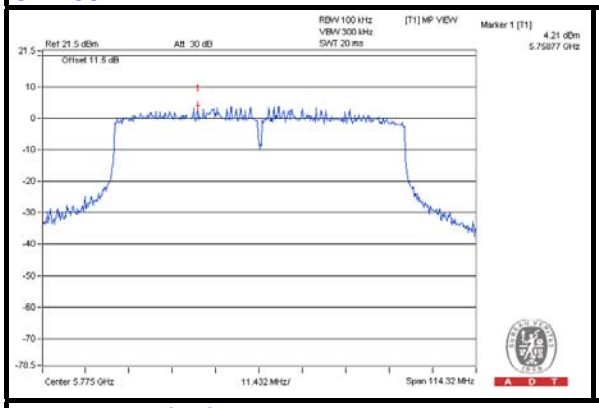
CH 159 Band edge

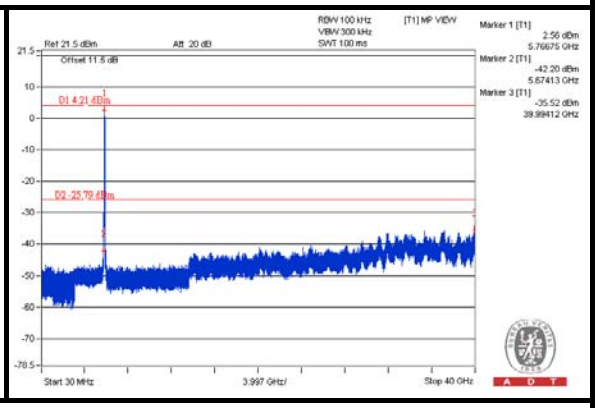


802.11ac (80MHz)

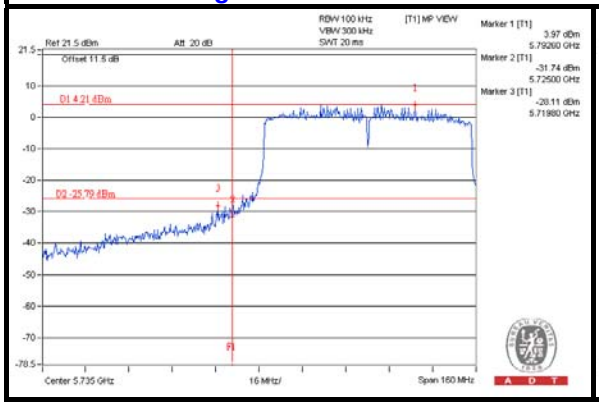
CHAIN 0

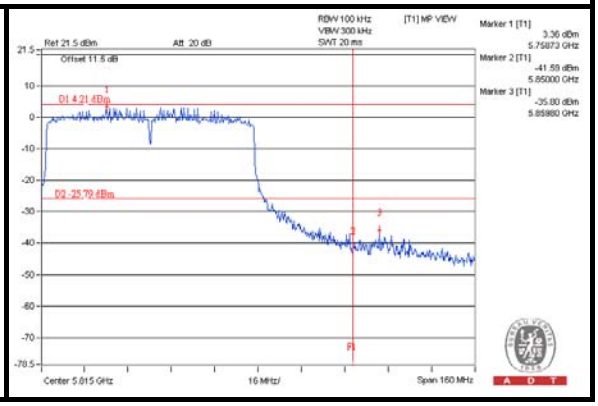
CH 155





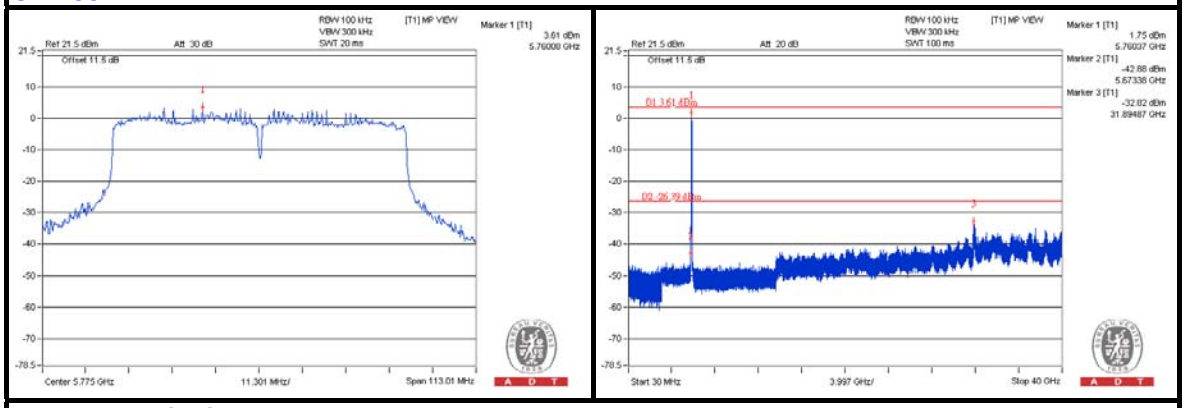
CH 155 Band edge



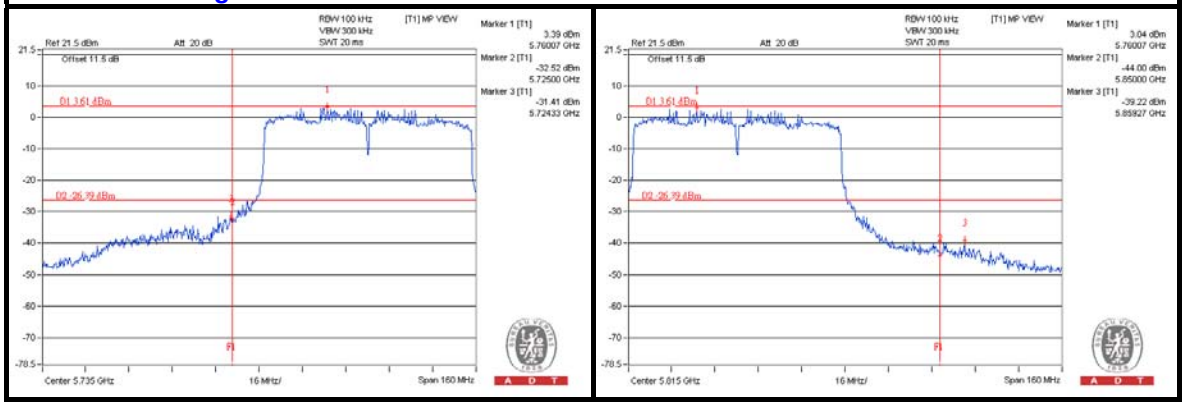


CHAIN 1

CH 155

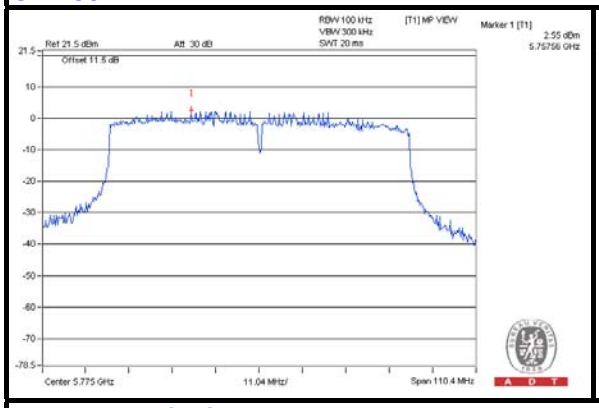


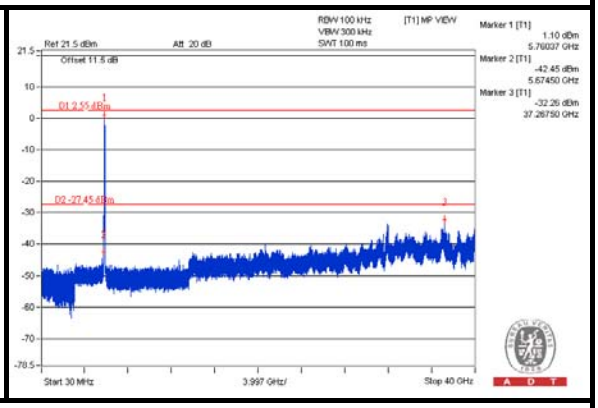
CH 155 Band edge



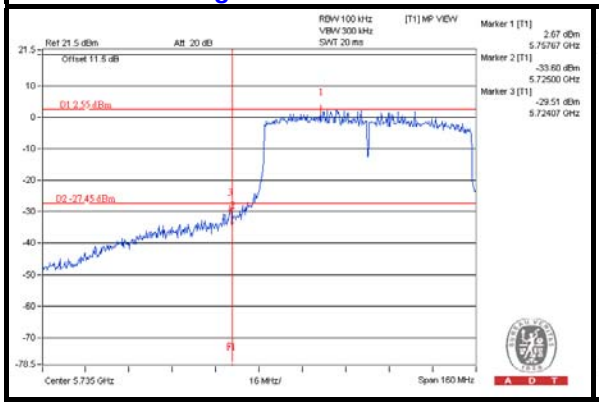
CHAIN 2

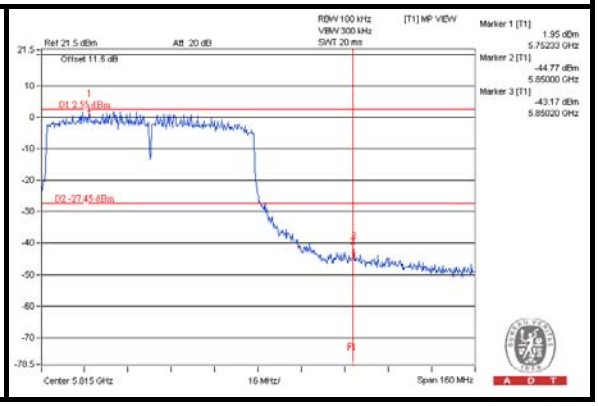
CH 155





CH 155 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:

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

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-5935343
Fax: 886-3-5935342

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

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

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

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---