

FCC TEST REPORT (15.247)

REPORT NO.: RF131125C08

MODEL NO.: AT-TQ3600, AT-TQ3600-01
(Refer to item 3.1 for more details)

FCC ID: RSL-TQ3600

RECEIVED: Nov. 25, 2013

TESTED: Dec. 02 ~ Dec. 05, 2013

ISSUED: Dec. 13, 2013

APPLICANT: Allied Telesis R&D Center K.K.

ADDRESS: 2nd. TOC Bldg. 7-21-11 Nishi-Gotanda,
Shinagawa-ku, Tokyo Japan, 141-0031

ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist.,
New Taipei City, Taiwan, R.O.C.

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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



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.



A D T

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.....	16
3.4 DESCRIPTION OF SUPPORT UNITS	18
3.4.1 CONFIGURATION OF SYSTEM UNDER TEST	19
3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS	21
4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND).....	22
4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT	22
4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT	22
4.1.2 TEST INSTRUMENTS.....	23
4.1.3 TEST PROCEDURES	24
4.1.4 DEVIATION FROM TEST STANDARD.....	24
4.1.5 TEST SETUP.....	25
4.1.6 EUT OPERATING CONDITIONS	26
4.1.7 TEST RESULTS	27
4.2 CONDUCTED EMISSION MEASUREMENT	41
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	41
4.2.2 TEST INSTRUMENTS.....	41
4.2.3 TEST PROCEDURES	42
4.2.4 DEVIATION FROM TEST STANDARD.....	42
4.2.5 TEST SETUP.....	42
4.2.6 EUT OPERATING CONDITIONS	42
4.2.7 TEST RESULTS	43
4.3 6dB BANDWIDTH MEASUREMENT.....	47
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT	47
4.3.2 TEST SETUP.....	47
4.3.3 TEST INSTRUMENTS.....	47
4.3.4 TEST PROCEDURE.....	47
4.3.5 DEVIATION FROM TEST STANDARD.....	47
4.3.6 EUT OPERATING CONDITIONS	47



4.3.7	TEST RESULTS	48
4.4	CONDUCTED OUTPUT POWER.....	50
4.4.1	LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT	50
4.4.2	TEST SETUP.....	50
4.4.3	TEST INSTRUMENTS.....	50
4.4.4	TEST PROCEDURES	50
4.4.5	DEVIATION FROM TEST STANDARD.....	51
4.4.6	EUT OPERATING CONDITIONS	51
4.4.7	TEST RESULTS	52
4.5	POWER SPECTRAL DENSITY MEASUREMENT	54
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	54
4.5.2	TEST SETUP	54
4.5.3	TEST INSTRUMENTS.....	54
4.5.4	TEST PROCEDURE.....	54
4.5.5	DEVIATION FROM TEST STANDARD.....	54
4.5.6	EUT OPERATING CONDITION.....	54
4.5.7	TEST RESULTS	55
4.6	CONDUCTED OUT OF BAND EMISSION MEASUREMENT	58
4.6.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT	58
4.6.2	TEST SETUP	58
4.6.3	TEST INSTRUMENTS.....	58
4.6.4	TEST PROCEDURE.....	59
4.6.5	DEVIATION FROM TEST STANDARD.....	59
4.6.6	EUT OPERATING CONDITION.....	59
4.6.7	TEST RESULTS	59
5.	TEST TYPES AND RESULTS (FOR 5.0GHz BAND).....	70
5.1	RADIATED EMISSION MEASUREMENT	70
5.1.1	LIMITS OF RADIATED EMISSION MEASUREMENT	70
5.1.2	TEST INSTRUMENTS.....	71
5.1.3	TEST PROCEDURES	71
5.1.4	DEVIATION FROM TEST STANDARD.....	71
5.1.5	TEST SETUP	71
5.1.6	EUT OPERATING CONDITIONS	71
5.1.7	TEST RESULTS	72
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



A D T

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	90
5.4.5	DEVIATION FROM TEST STANDARD	90
5.4.6	EUT OPERATING CONDITIONS	90
5.4.7	TEST RESULTS	91
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	96
5.6.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT	96
5.6.2	TEST SETUP	96
5.6.3	TEST INSTRUMENTS	96
5.6.4	TEST PROCEDURE	96
5.6.5	DEVIATION FROM TEST STANDARD	96
5.6.6	EUT OPERATING CONDITION	96
5.6.7	TEST RESULTS	96
6.	PHOTOGRAPHS OF THE TEST CONFIGURATION	106
7.	INFORMATION ON THE TESTING LABORATORIES	107
8.	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	108



A D T

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF131125C08	Original release	Dec. 13, 2013



A D T

1. CERTIFICATION

PRODUCT: Wireless access point with PoE powered device function

MODEL NO.: AT-TQ3600, AT-TQ3600-01 (Refer to item 3.1 for more details)

BRAND:  Allied Telesis™

APPLICANT: Allied Telesis R&D Center K.K.

TESTED: Dec. 02 ~ Dec. 05, 2013

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: FCC Part 15, Subpart C (Section 15.247)

ANSI C63.10-2009

The above equipment (model: AT-TQ3600) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Celine Chou , **DATE :** Dec. 13, 2013
Celine Chou / Specialist

APPROVED BY : Ken Liu , **DATE :** Dec. 13, 2013
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 -10.90dB at 18.55308MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.2dB at 2390.00MHz.
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 I-PEX (MHF) not a standard connector.

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 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 access point with PoE powered device function
MODEL NO.	AT-TQ3600, AT-TQ3600-01 (Refer to note for more details)
POWER SUPPLY	12Vdc (Adapter) 48Vdc (PoE)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 450.0Mbps
OPERATING FREQUENCY	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5745 ~ 5825MHz
NUMBER OF CHANNEL	2.4GHz: 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) 5.0GHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	769.986mW for 2412 ~ 2462MHz 511.945mW for 5745 ~ 5825MHz
ANTENNA TYPE	Refer to note
ANTENNA CONNECTOR	Refer to note
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

- The following models are provided to this EUT.

Brand	Model	Description
Allied Telesis	AT-TQ3600	All models are electrically identical, except appearance of EUT, please refer to external photo for more details.
	AT-TQ3600-01	

* The model of the AT-TQ3600 was chosen for final test.

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

MODULATION MODE	TX FUNCTION
802.11b	1TX
802.11g	3TX
802.11a	3TX
802.11n (20MHz) (MCS 16 ~ 23)	3TX
802.11n (40MHz) (MCS 16 ~ 23)	3TX

3. The EUT consumes power from the following adapter.

ADAPTER	
BRAND:	Elementech International Co., Ltd.
MODEL:	AU12412030
INPUT:	100-240Vac, 50/60Hz, 0.6A
OUTPUT:	12Vdc, 2A
POWER LINE:	1.8m non-shielded cable with one core

4. The EUT with follow antennas gain is listed as table below.

Antenna Item	Antenna Type	Connector	Gain(dBi)	
			2.4GHz	5GHz
1	PIFA	I-PEX (MHF)	4.75	7.34
2			4.50	5.61
3			3.85	6.09

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

3.2 DESCRIPTION OF TEST MODES

FOR 2.4GHz:

11 channels are provided for 802.11b, 802.11g and 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

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

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

FOR 5.0GHz (5745 ~ 5825MHz):

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

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR 2.4GHz:

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

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

NOTE:

- 802.11b: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
- 802.11g, 802.11n (20MHz), 802.11n (40MHz): The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.
- "-" 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	21.7
A	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	45.0

RADIATED EMISSION TEST (BELOW 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A & B	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	21.7

POWER LINE CONDUCTED EMISSION TEST:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A & B	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	21.7

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	21.7
A	802.11n (40MHz)	3 to 9	3, 9	OFDM	BPSK	45.0

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	21.7
A	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	45.0



A D T

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 67%RH	120Vac, 60Hz	Alan Wu
RE<1G	25deg. C, 67%RH	120Vac, 60Hz 48Vdc	Alan Wu
PLC	26deg. C, 67%RH	120Vac, 60Hz 48Vdc	Cedric Wu
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

FOR 5.0GHz (5745 ~ 5825MHz):

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

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

NOTE:

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

RADIATED EMISSION TEST (ABOVE 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	21.7
A	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	45.0

RADIATED EMISSION TEST (BELOW 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A & B	802.11n (40MHz)	151 to 159	151	OFDM	BPSK	45.0

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	802.11n (40MHz)	151 to 159	151	OFDM	BPSK	45.0

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	21.7
A	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	45.0

ANTENNA PORT CONDUCTED MEASUREMENT:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	21.7
A	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	45.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	24deg. C, 66%RH	120Vac, 60Hz	Alan Wu
RE<1G	25deg. C, 67%RH	120Vac, 60Hz 48Vdc	Alan Wu
PLC	26deg. C, 67%RH	120Vac, 60Hz 48Vdc	Cedric Wu
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

3.3 DUTY CYCLE OF TEST SIGNAL

2.4GHz Band:

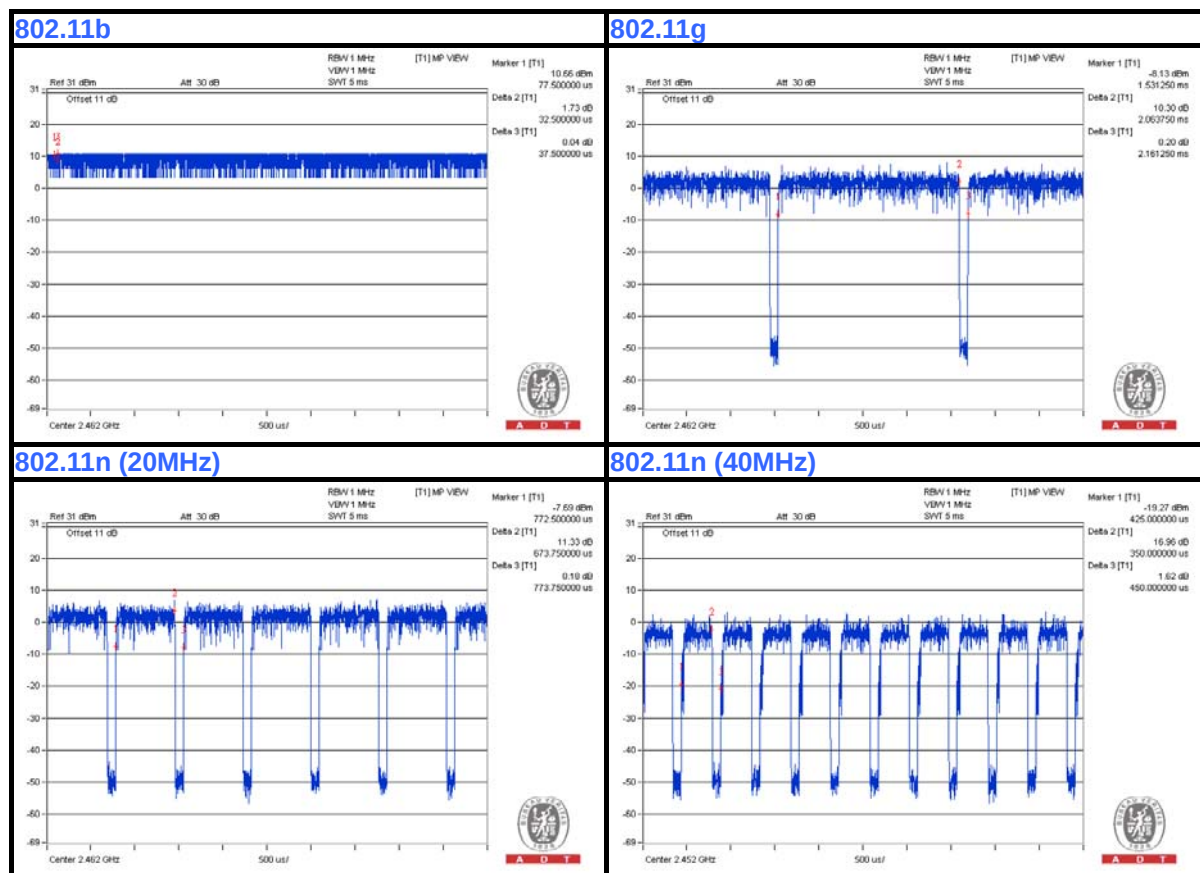
802.11b: Duty cycle of test signal is > 98 %

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

802.11g: Duty cycle = $2.064/2.161 = 0.954$, Duty factor = $10 * \log(1/0.954) = 0.20$

802.11n (20MHz): Duty cycle = $0.674/0.774 = 0.871$, Duty factor = $10 * \log(1/0.871) = 0.60$

802.11n (40MHz): Duty cycle = $0.350/0.450 = 0.778$, Duty factor = $10 * \log(1/0.778) = 1.09$



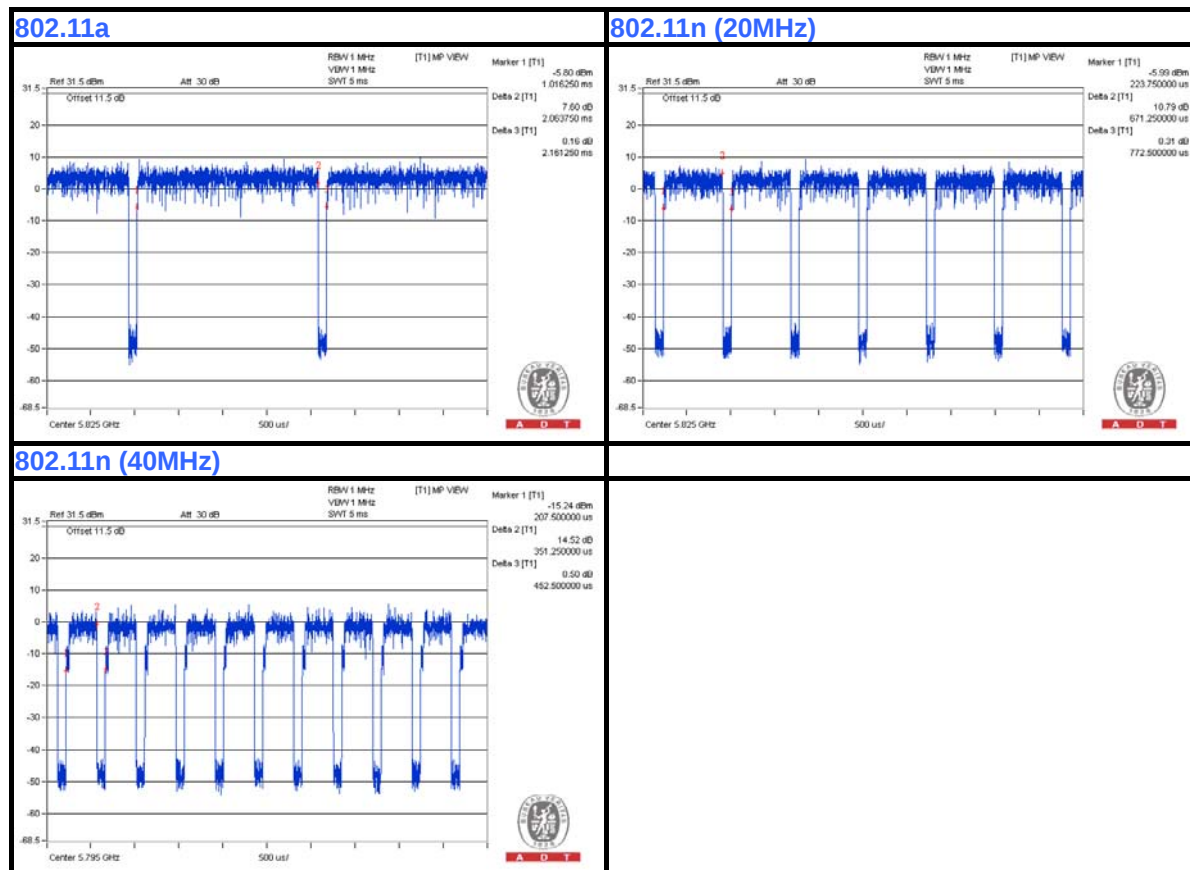
5GHz Band:

Duty cycle of test signal is < 98%

802.11a: Duty cycle = $2.064/2.161 = 0.954$, Duty factor = $10 * \log(1/0.954) = 0.20$

802.11n (20MHz): Duty cycle = $0.671/0.772 = 0.869$, Duty factor = $10 * \log(1/0.869) = 0.61$

802.11n (40MHz): Duty cycle = $0.351/0.453 = 0.777$, Duty factor = $10 * \log(1/0.777) = 0.10$



**A D T**

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	D531	CN-0XM006-48643-8 1U-2610	QDS-BRCM1020
2	POE	Allied Telesis	AT-GS950/10PS	NA	NA

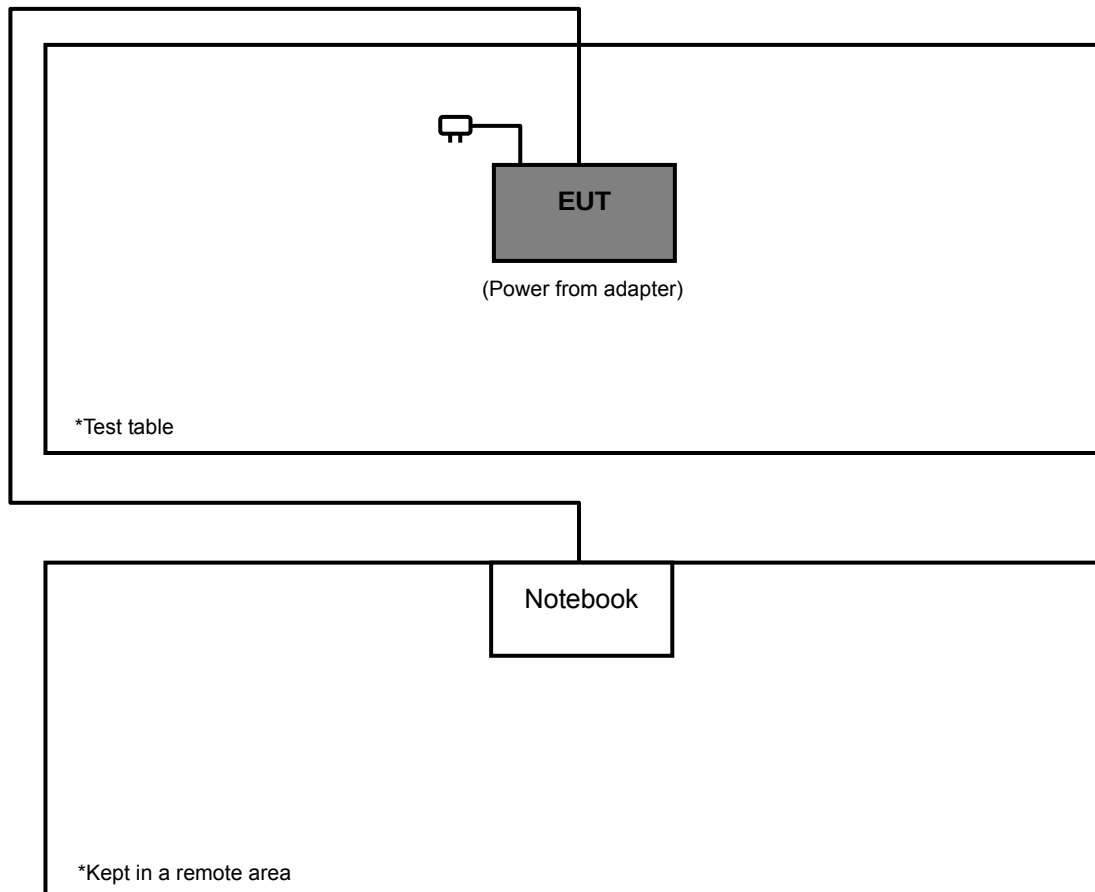
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	3m RJ45 Cable for test mode A, 1.8m RJ45 Cable for test mode B
2	3m RJ45 Cable

NOTE:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as a communication partner to transfer data.
3. Item 2 for mode B tested only.

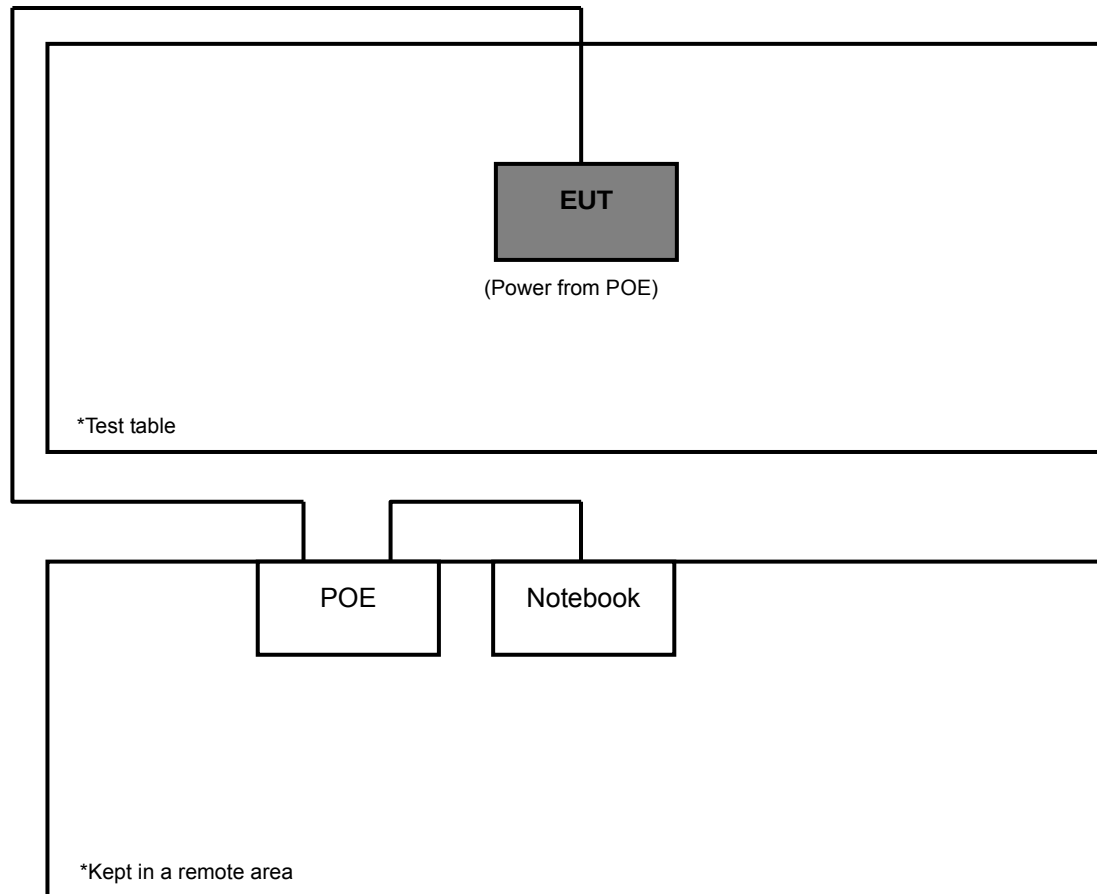
3.4.1 CONFIGURATION OF SYSTEM UNDER TEST

TEST MODE A





TEST MODE B





A D T

3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r01

662911 D01 Multiple Transmitter Output v02

ANSI C63.10-2009

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

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

4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND)

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

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

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

NOTE:

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Nov. 16, 2013	Nov. 15, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jan. 28, 2013	Jan. 27, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Mar. 22, 2013	Mar. 21, 2014
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Sep. 12, 2013	Sep. 11, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8449B	3008A01911	Aug. 22, 2013	Aug. 21, 2014
Preamplifier Agilent	8447D	2944A10638	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	248780/4 309222/4 274092/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable Worken	5D-FB	Cable-HYCH9-01	Aug. 11, 2013	Aug. 10, 2014
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	NA	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
High Speed Peak Power Meter	ML2495A	0824012	Aug. 22, 2013	Aug. 21, 2014
Power Sensor	MA2411B	0738171	Jul. 30, 2013	Jul. 29, 2014

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 9.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 215374.
 5. The IC Site Registration No. is IC 7450F-9.

4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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:

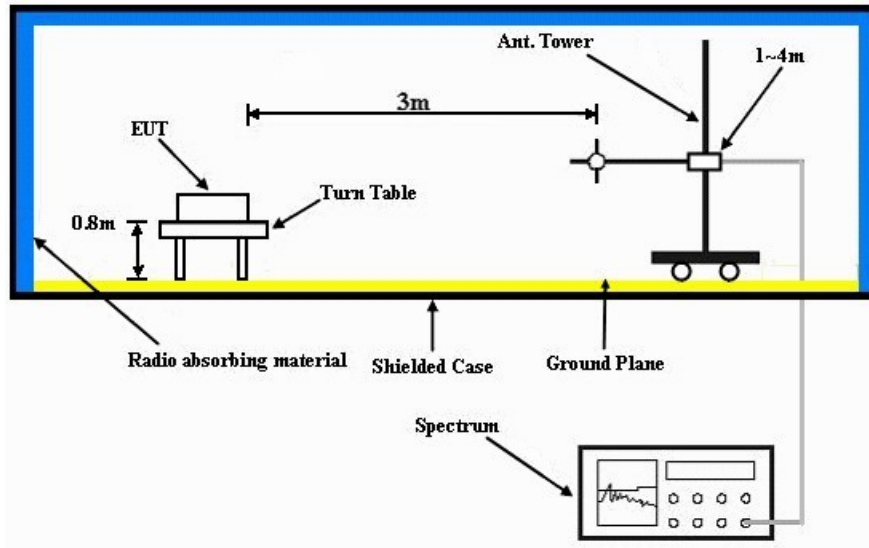
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

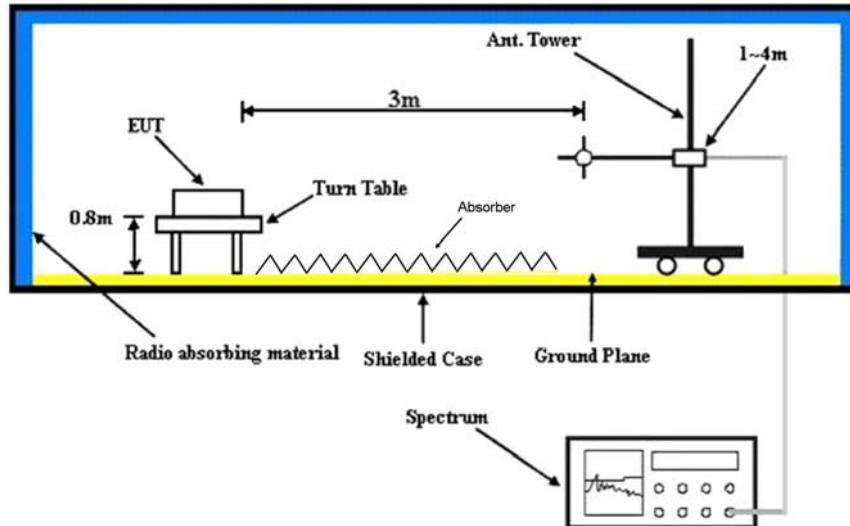
No deviation.

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".



A D T

4.1.7 TEST RESULTS

ABOVE 1GHz DATA :

802.11b

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.9 PK	74.0	-15.1	1.51 H	269	25.50	33.40
2	2390.00	47.9 AV	54.0	-6.1	1.51 H	269	14.50	33.40
3	*2412.00	109.1 PK			1.56 H	261	75.60	33.50
4	*2412.00	105.5 AV			1.56 H	261	72.00	33.50
5	4824.00	51.6 PK	74.0	-22.4	1.00 H	72	48.00	3.60
6	4824.00	42.1 AV	54.0	-11.9	1.00 H	72	38.50	3.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.4 PK	74.0	-14.6	1.04 V	184	26.00	33.40
2	2390.00	48.5 AV	54.0	-5.5	1.04 V	184	15.10	33.40
3	*2412.00	109.7 PK			1.03 V	187	76.20	33.50
4	*2412.00	106.0 AV			1.03 V	187	72.50	33.50
5	4824.00	51.2 PK	74.0	-22.8	1.00 V	175	47.60	3.60
6	4824.00	43.6 AV	54.0	-10.4	1.00 V	175	40.00	3.60

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	109.4 PK			1.71 H	258	75.90	33.50
2	*2437.00	105.6 AV			1.71 H	258	72.10	33.50
3	4874.00	51.8 PK	74.0	-22.2	1.23 H	112	48.00	3.80
4	4874.00	42.3 AV	54.0	-11.7	1.23 H	112	38.50	3.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	110.0 PK			1.07 V	187	76.50	33.50
2	*2437.00	106.2 AV			1.07 V	187	72.70	33.50
3	4874.00	51.9 PK	74.0	-22.1	1.00 V	193	48.10	3.80
4	4874.00	44.5 AV	54.0	-9.5	1.00 V	193	40.70	3.80

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

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	109.2 PK			1.58 H	262	75.60	33.60
2	*2462.00	105.2 AV			1.58 H	262	71.60	33.60
3	2483.50	59.2 PK	74.0	-14.8	1.56 H	263	25.50	33.70
4	2483.50	46.4 AV	54.0	-7.6	1.56 H	263	12.70	33.70
5	4924.00	51.6 PK	74.0	-22.4	1.00 H	74	47.70	3.90
6	4924.00	41.6 AV	54.0	-12.4	1.00 H	74	37.70	3.90
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	*2462.00	109.8 PK			1.06 V	187	76.20	33.60
2	*2462.00	106.1 AV			1.06 V	187	72.50	33.60
3	2483.50	59.0 PK	74.0	-15.0	1.06 V	184	25.30	33.70
4	2483.50	48.1 AV	54.0	-5.9	1.06 V	184	14.40	33.70
5	4924.00	51.3 PK	74.0	-22.7	1.00 V	229	47.40	3.90
6	4924.00	43.9 AV	54.0	-10.1	1.00 V	229	40.00	3.90

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.



A D T

802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	72.0 PK	74.0	-2.0	1.39 H	249	38.60	33.40
2	2390.00	52.3 AV	54.0	-1.7	1.39 H	249	18.90	33.40
3	*2412.00	111.5 PK			1.36 H	273	78.00	33.50
4	*2412.00	102.0 AV			1.36 H	273	68.50	33.50
5	4824.00	48.1 PK	74.0	-25.9	1.00 H	74	44.50	3.60
6	4824.00	35.3 AV	54.0	-18.7	1.00 H	74	31.70	3.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.5 PK	74.0	-5.5	1.00 V	199	35.10	33.40
2	2390.00	50.4 AV	54.0	-3.6	1.00 V	199	17.00	33.40
3	*2412.00	111.3 PK			1.00 V	197	77.80	33.50
4	*2412.00	101.8 AV			1.00 V	197	68.30	33.50
5	4824.00	47.2 PK	74.0	-26.8	1.00 V	176	43.60	3.60
6	4824.00	34.6 AV	54.0	-19.4	1.00 V	176	31.00	3.60

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	112.0 PK			1.00 H	200	78.50	33.50
2	*2437.00	102.4 AV			1.00 H	200	68.90	33.50
3	4874.00	51.6 PK	74.0	-22.4	1.00 H	177	47.80	3.80
4	4874.00	39.0 AV	54.0	-15.0	1.00 H	177	35.20	3.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	112.4 PK			1.00 V	199	78.90	33.50
2	*2437.00	102.4 AV			1.00 V	199	68.90	33.50
3	4874.00	50.7 PK	74.0	-23.3	1.00 V	162	46.90	3.80
4	4874.00	38.1 AV	54.0	-15.9	1.00 V	162	34.30	3.80

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.3 PK			1.00 H	222	76.70	33.60
2	*2462.00	101.1 AV			1.00 H	222	67.50	33.60
3	2483.50	69.8 PK	74.0	-4.2	1.00 H	228	36.10	33.70
4	2483.50	52.4 AV	54.0	-1.6	1.00 H	228	18.70	33.70
5	4924.00	49.2 PK	74.0	-24.8	1.00 H	69	45.30	3.90
6	4924.00	36.7 AV	54.0	-17.3	1.00 H	69	32.80	3.90
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	*2462.00	110.2 PK			1.00 V	199	76.60	33.60
2	*2462.00	100.2 AV			1.00 V	199	66.60	33.60
3	2483.50	65.9 PK	74.0	-8.1	1.00 V	174	32.20	33.70
4	2483.50	49.0 AV	54.0	-5.0	1.00 V	174	15.30	33.70
5	4924.00	48.6 PK	74.0	-25.4	1.00 V	173	44.70	3.90
6	4924.00	36.6 AV	54.0	-17.4	1.00 V	173	32.70	3.90

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.



A D T

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

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	65.2 PK	74.0	-8.8	1.31 H	255	31.80	33.40
2	2390.00	52.5 AV	54.0	-1.5	1.31 H	255	19.10	33.40
3	*2412.00	110.9 PK			1.30 H	252	77.40	33.50
4	*2412.00	101.0 AV			1.30 H	252	67.50	33.50
5	4824.00	49.5 PK	74.0	-24.5	1.00 H	174	45.90	3.60
6	4824.00	36.5 AV	54.0	-17.5	1.00 H	174	32.90	3.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.4 PK	74.0	-8.6	1.00 V	189	32.00	33.40
2	2390.00	50.3 AV	54.0	-3.7	1.00 V	189	16.90	33.40
3	*2412.00	110.5 PK			1.00 V	174	77.00	33.50
4	*2412.00	99.9 AV			1.00 V	174	66.40	33.50
5	4824.00	48.0 PK	74.0	-26.0	1.00 V	163	44.40	3.60
6	4824.00	36.2 AV	54.0	-17.8	1.00 V	163	32.60	3.60

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	111.6 PK			1.00 H	217	78.10	33.50
2	*2437.00	101.9 AV			1.00 H	217	68.40	33.50
3	4874.00	51.5 PK	74.0	-22.5	1.00 H	179	47.70	3.80
4	4874.00	39.3 AV	54.0	-14.7	1.00 H	179	35.50	3.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	111.5 PK			1.00 V	180	78.00	33.50
2	*2437.00	101.9 AV			1.00 V	180	68.40	33.50
3	4874.00	51.5 PK	74.0	-22.5	1.00 V	163	47.70	3.80
4	4874.00	38.5 AV	54.0	-15.5	1.00 V	163	34.70	3.80

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.5 PK			1.00 H	223	76.90	33.60
2	*2462.00	99.9 AV			1.00 H	223	66.30	33.60
3	2483.50	69.2 PK	74.0	-4.8	1.02 H	221	35.50	33.70
4	2483.50	52.6 AV	54.0	-1.4	1.02 H	221	18.90	33.70
5	4924.00	49.3 PK	74.0	-24.7	1.00 H	170	45.40	3.90
6	4924.00	37.1 AV	54.0	-16.9	1.00 H	170	33.20	3.90
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	*2462.00	109.9 PK			1.00 V	169	76.30	33.60
2	*2462.00	99.7 AV			1.00 V	169	66.10	33.60
3	2483.50	69.7 PK	74.0	-4.3	1.00 V	169	36.00	33.70
4	2483.50	51.8 AV	54.0	-2.2	1.00 V	169	18.10	33.70
5	4924.00	48.6 PK	74.0	-25.4	1.00 V	175	44.70	3.90
6	4924.00	37.2 AV	54.0	-16.8	1.00 V	175	33.30	3.90

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.



A D T

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.4 PK	74.0	-6.6	1.37 H	255	34.00	33.40
2	2390.00	52.8 AV	54.0	-1.2	1.37 H	255	19.40	33.40
3	*2422.00	106.5 PK			1.38 H	274	73.00	33.50
4	*2422.00	95.8 AV			1.38 H	274	62.30	33.50
5	4844.00	47.4 PK	74.0	-26.6	1.00 H	177	43.70	3.70
6	4844.00	33.8 AV	54.0	-20.2	1.00 H	177	30.10	3.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.0 PK	74.0	-8.0	1.00 V	199	32.60	33.40
2	2390.00	51.5 AV	54.0	-2.5	1.00 V	199	18.10	33.40
3	*2422.00	105.4 PK			1.00 V	166	71.90	33.50
4	*2422.00	94.8 AV			1.00 V	166	61.30	33.50
5	4844.00	46.2 PK	74.0	-27.8	1.00 V	168	42.50	3.70
6	4844.00	33.7 AV	54.0	-20.3	1.00 V	168	30.00	3.70

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. “ * ”: Fundamental frequency.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	110.0 PK			1.02 H	226	76.50	33.50
2	*2437.00	99.7 AV			1.02 H	226	66.20	33.50
3	2483.50	67.1 PK	74.0	-6.9	1.17 H	220	33.40	33.70
4	2483.50	52.2 AV	54.0	-1.8	1.17 H	220	18.50	33.70
5	4874.00	49.5 PK	74.0	-24.5	1.00 H	178	45.70	3.80
6	4874.00	37.3 AV	54.0	-16.7	1.00 H	178	33.50	3.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	110.5 PK			1.00 V	171	77.00	33.50
2	*2437.00	99.7 AV			1.00 V	171	66.20	33.50
3	2483.50	69.8 PK	74.0	-4.2	1.00 V	170	36.10	33.70
4	2483.50	52.5 AV	54.0	-1.5	1.00 V	170	18.80	33.70
5	4874.00	49.2 PK	74.0	-24.8	1.00 V	158	45.40	3.80
6	4874.00	36.6 AV	54.0	-17.4	1.00 V	158	32.80	3.80

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu

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	108.0 PK			1.31 H	280	74.40	33.60
2	*2452.00	97.0 AV			1.31 H	280	63.40	33.60
3	2483.50	67.4 PK	74.0	-6.6	1.39 H	284	33.70	33.70
4	2483.50	52.6 AV	54.0	-1.4	1.39 H	284	18.90	33.70
5	4904.00	47.1 PK	74.0	-26.9	1.00 H	84	43.20	3.90
6	4904.00	35.7 AV	54.0	-18.3	1.00 H	84	31.80	3.90
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	*2452.00	107.6 PK			1.00 V	173	74.00	33.60
2	*2452.00	96.5 AV			1.00 V	173	62.90	33.60
3	2483.50	67.5 PK	74.0	-6.5	1.00 V	172	33.80	33.70
4	2483.50	51.7 AV	54.0	-2.3	1.00 V	172	18.00	33.70
5	4904.00	46.5 PK	74.0	-27.5	1.00 V	164	42.60	3.90
6	4904.00	35.3 AV	54.0	-18.7	1.00 V	164	31.40	3.90

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.



A D T

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu
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	97.90	31.0 QP	43.5	-12.5	1.99 H	76	50.10	-19.10
2	156.10	40.6 QP	43.5	-2.9	1.99 H	260	54.80	-14.20
3	202.66	34.5 QP	43.5	-9.0	1.00 H	243	51.20	-16.70
4	222.06	32.8 QP	46.0	-13.2	1.00 H	116	49.10	-16.30
5	662.44	31.3 QP	46.0	-14.7	1.25 H	11	36.70	-5.40
6	726.46	28.0 QP	46.0	-18.0	1.00 H	145	32.40	-4.40
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	49.40	33.6 QP	40.0	-6.4	1.00 V	18	48.30	-14.70
2	136.70	32.0 QP	43.5	-11.5	1.00 V	26	46.80	-14.80
3	158.04	34.5 QP	43.5	-9.0	1.99 V	175	48.80	-14.30
4	204.60	29.6 QP	43.5	-13.9	1.00 V	164	46.30	-16.70
5	330.70	25.6 QP	46.0	-20.4	1.49 V	175	37.10	-11.50
6	662.44	29.4 QP	46.0	-16.6	1.99 V	162	34.80	-5.40

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu
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	99.84	33.9 QP	43.5	-9.6	2.00 H	103	52.60	-18.70
2	156.10	41.9 QP	43.5	-1.6	1.00 H	104	56.10	-14.20
3	625.58	31.4 QP	46.0	-14.6	1.00 H	138	37.20	-5.80
4	662.44	31.3 QP	46.0	-14.7	1.24 H	183	36.70	-5.40
5	749.74	29.9 QP	46.0	-16.1	1.00 H	213	33.70	-3.80
6	875.84	38.2 QP	46.0	-7.8	1.24 H	258	39.70	-1.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	43.58	37.3 QP	40.0	-2.7	1.24 V	15	51.70	-14.40
2	152.22	40.7 QP	43.5	-2.8	1.24 V	43	54.40	-13.70
3	200.72	32.7 QP	43.5	-10.8	1.24 V	202	49.40	-16.70
4	625.58	32.1 QP	46.0	-13.9	1.49 V	8	37.90	-5.80
5	749.74	30.4 QP	46.0	-15.6	1.24 V	199	34.20	-3.80
6	875.84	37.3 QP	46.0	-8.7	1.00 V	250	38.80	-1.50

REMARKS:

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

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. 28, 2012	Dec. 27, 2013
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 21, 2012	Dec. 20, 2013
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 17, 2013	Jul. 16, 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

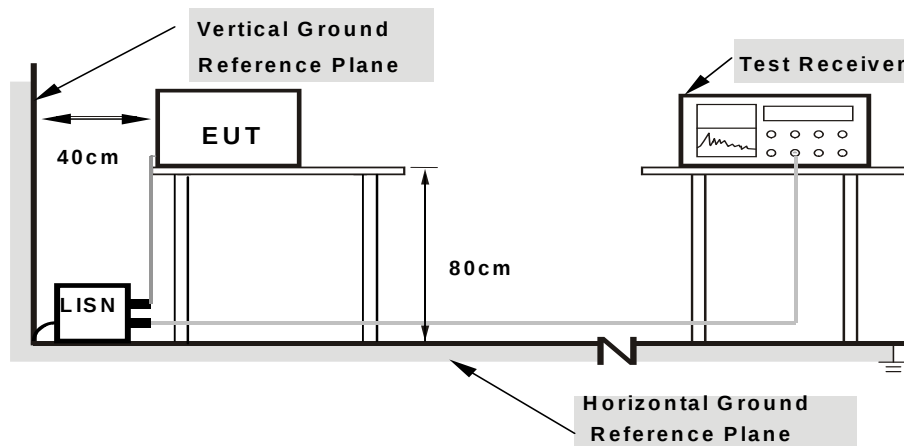
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

NOTE: 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 cm 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

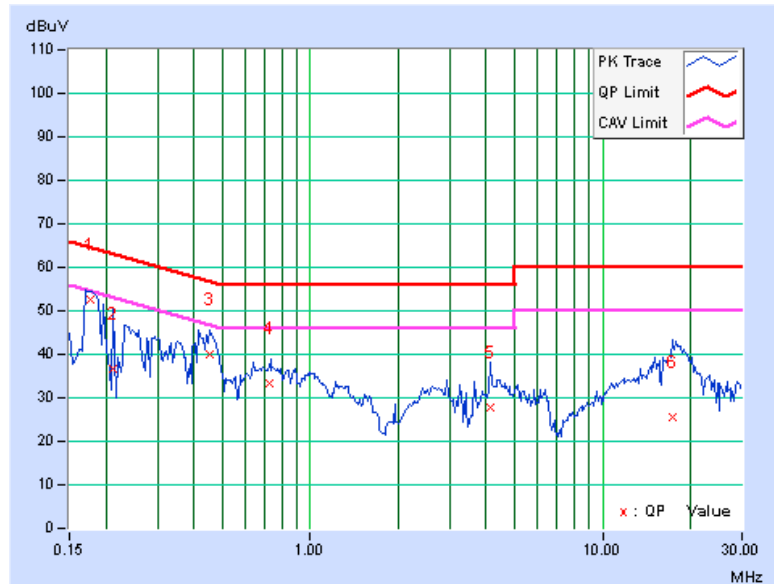
CONDUCTED WORST-CASE DATA : 802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	0.19	52.39	42.80	52.58	42.99	64.61	54.61	-12.03	-11.62
2	0.21250	0.20	36.47	13.23	36.67	13.43	63.11	53.11	-26.44	-39.68
3	0.45078	0.23	39.60	18.70	39.83	18.93	56.86	46.86	-17.03	-27.93
4	0.72422	0.26	33.18	25.06	33.44	25.32	56.00	46.00	-22.56	-20.68
5	4.14844	0.40	27.49	19.46	27.89	19.86	56.00	46.00	-28.11	-26.14
6	17.32422	0.67	24.81	18.67	25.48	19.34	60.00	50.00	-34.52	-30.66

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

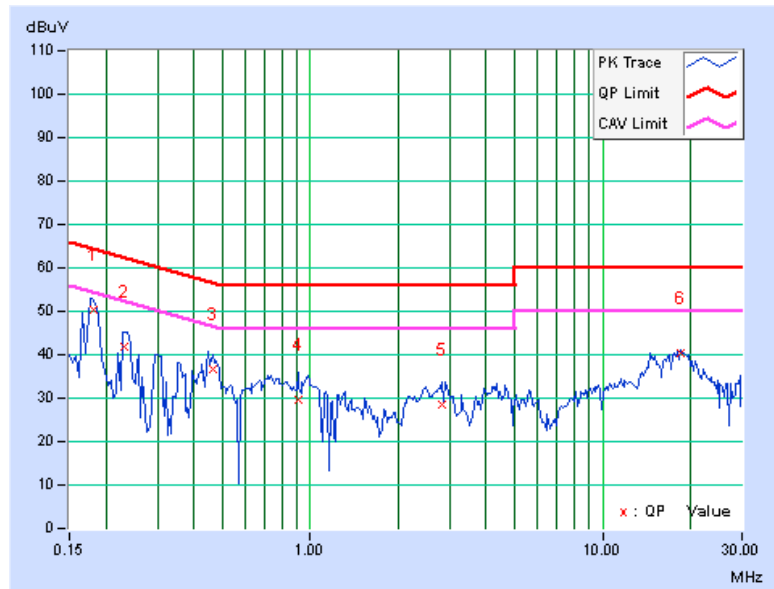


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	0.19	50.05	39.73	50.24	39.92	64.43	54.43	-14.19	-14.51
2	0.23203	0.20	41.56	30.44	41.76	30.64	62.38	52.38	-20.61	-21.73
3	0.46641	0.27	36.41	26.94	36.68	27.21	56.58	46.58	-19.90	-19.37
4	0.90781	0.26	29.35	19.49	29.61	19.75	56.00	46.00	-26.39	-26.25
5	2.82031	0.37	28.16	19.52	28.53	19.89	56.00	46.00	-27.47	-26.11
6	18.55308	0.78	39.44	38.32	40.22	39.10	60.00	50.00	-19.78	-10.90

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

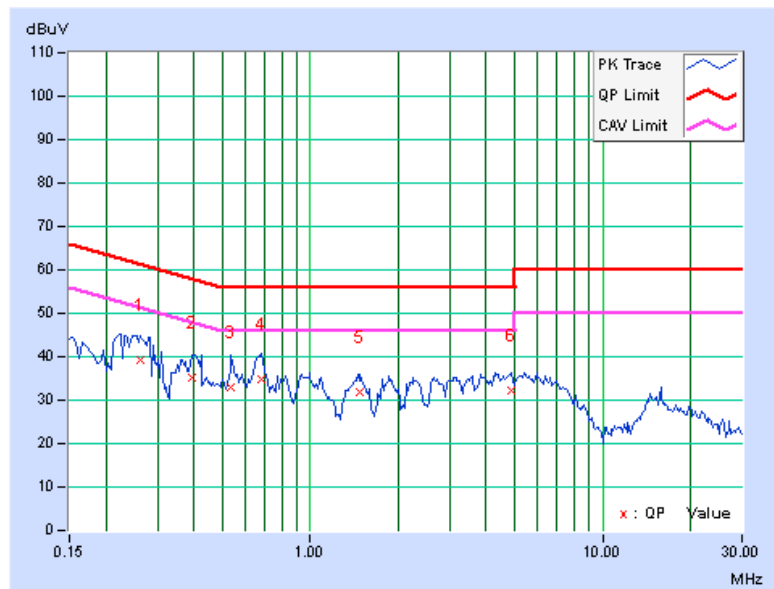


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.26328	0.29	39.09	27.75	39.38	28.04	61.33	51.33	-21.95	-23.29
2	0.39219	0.30	34.99	26.69	35.29	26.99	58.02	48.02	-22.73	-21.03
3	0.53672	0.31	32.69	25.46	33.00	25.77	56.00	46.00	-23.00	-20.23
4	0.67734	0.32	34.43	27.36	34.75	27.68	56.00	46.00	-21.25	-18.32
5	1.48438	0.35	31.52	26.72	31.87	27.07	56.00	46.00	-24.13	-18.93
6	4.87500	0.44	31.63	25.52	32.07	25.96	56.00	46.00	-23.93	-20.04

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

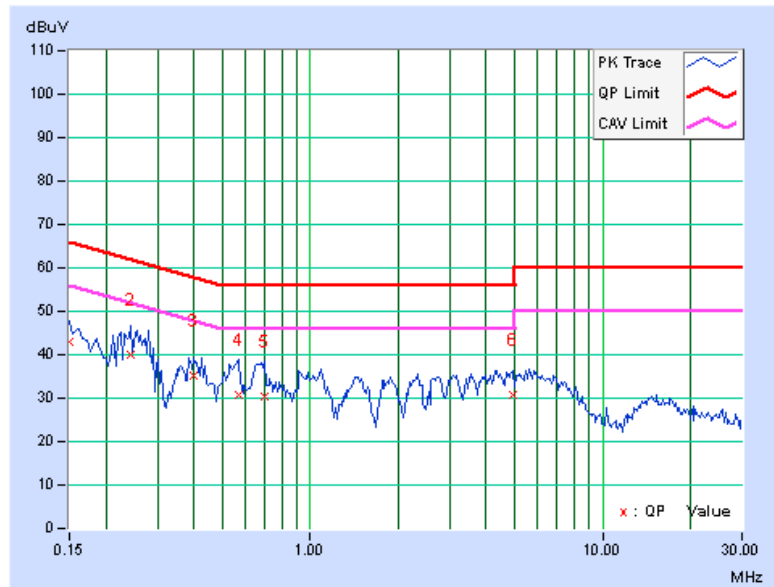


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.26	42.68	34.07	42.94	34.33	66.00	56.00	-23.06	-21.67
2	0.24375	0.28	39.60	30.97	39.88	31.25	61.97	51.97	-22.08	-20.71
3	0.40000	0.30	34.74	26.36	35.04	26.66	57.85	47.85	-22.81	-21.19
4	0.56797	0.31	30.41	24.17	30.72	24.48	56.00	46.00	-25.28	-21.52
5	0.70078	0.32	30.15	23.69	30.47	24.01	56.00	46.00	-25.53	-21.99
6	4.94141	0.45	30.19	23.69	30.64	24.14	56.00	46.00	-25.36	-21.86

REMARKS:

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

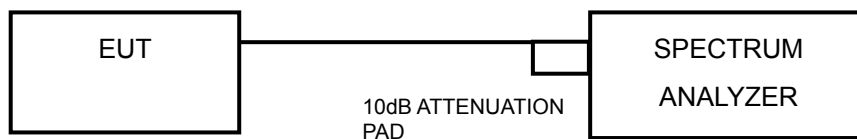


4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 TEST PROCEDURE

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

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.12	0.5	PASS
6	2437	8.10	0.5	PASS
11	2462	8.12	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	16.45	16.45	0.5	PASS
6	2437	16.46	16.45	16.45	0.5	PASS
11	2462	16.46	16.45	16.45	0.5	PASS

802.11n (20MHz)

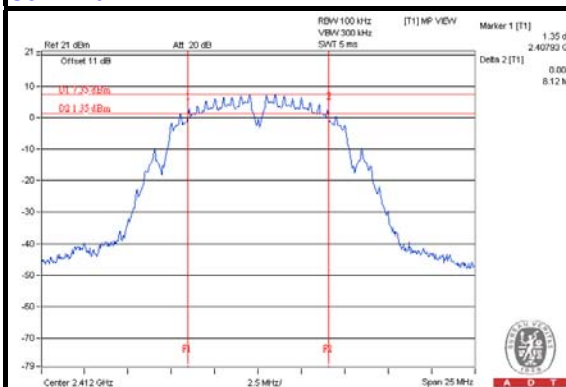
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.66	17.67	17.67	0.5	PASS
6	2437	17.66	17.67	17.66	0.5	PASS
11	2462	17.66	17.67	17.67	0.5	PASS

802.11n (40MHz)

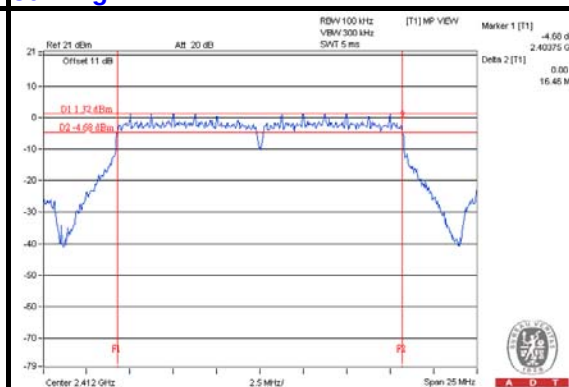
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	36.43	36.51	36.35	0.5	PASS
6	2437	36.38	36.46	36.40	0.5	PASS
9	2452	36.43	36.51	36.35	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

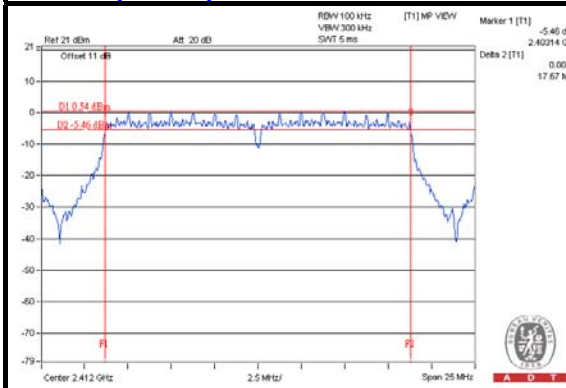
802.11b



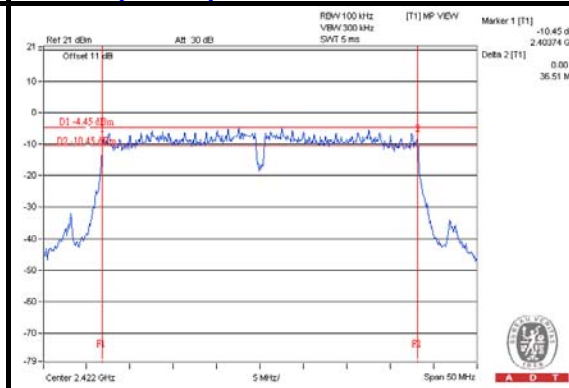
802.11g



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 v02 Method of conducted output power measurement on IEEE 802.11 devices,

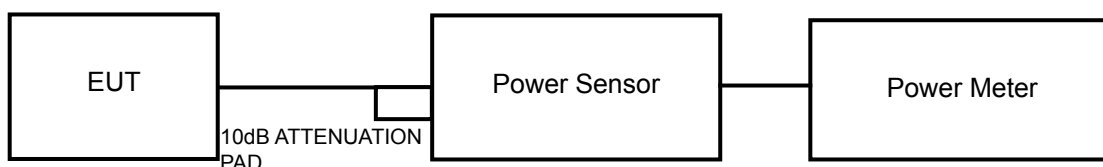
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

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 $NANT \geq 5$.

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

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

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



A D T

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

4.4.7 TEST RESULTS

FOR PEAK POWER

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	120.504	20.81	30	PASS
6	2437	124.165	20.94	30	PASS
11	2462	123.880	20.93	30	PASS

802.11g

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	22.86	22.01	22.21	518.393	27.15	30	PASS
6	2437	23.89	23.77	24.28	751.055	28.76	30	PASS
11	2462	23.72	22.26	22.72	590.840	27.71	30	PASS

802.11n (20MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	23.16	21.89	22.07	522.604	27.18	30	PASS
6	2437	24.33	24.03	23.91	769.986	28.86	30	PASS
11	2462	23.48	22.57	22.72	590.629	27.71	30	PASS

802.11n (40MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	19.92	19.78	18.99	272.485	24.35	30	PASS
6	2437	23.11	23.33	23.26	631.758	28.01	30	PASS
9	2452	21.86	21.56	22.71	483.319	26.84	30	PASS



A D T

FOR AVERAGE POWER

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	49.659	16.96
6	2437	51.523	17.12
11	2462	48.084	16.82

802.11g

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	14.17	13.96	13.72	74.561	18.73
6	2437	16.88	16.82	16.93	146.154	21.65
11	2462	14.86	14.33	14.43	85.455	19.32

802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	14.37	13.92	14.22	78.437	18.95
6	2437	17.01	16.95	16.77	147.313	21.68
11	2462	14.65	14.18	14.56	83.932	19.24

802.11n (40MHz)

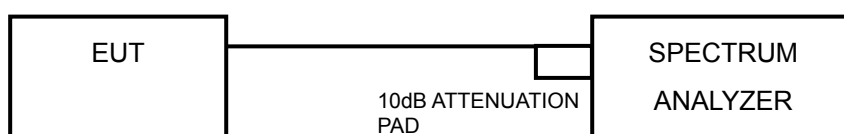
CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	10.94	10.67	10.47	35.228	15.47
6	2437	15.78	15.45	16.22	114.798	20.60
9	2452	13.33	12.88	13.45	63.068	18.00

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST PROCEDURE

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

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-6.99	8	PASS
6	2437	-5.75	8	PASS
11	2462	-6.99	8	PASS

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-12.70	4.77	-7.93	4.85	PASS
	6	2437	-9.11	4.77	-4.34	4.85	PASS
	11	2462	-12.70	4.77	-7.93	4.85	PASS
1	1	2412	-13.66	4.77	-8.89	4.85	PASS
	6	2437	-10.38	4.77	-5.61	4.85	PASS
	11	2462	-13.66	4.77	-8.89	4.85	PASS
2	1	2412	-14.30	4.77	-9.53	4.85	PASS
	6	2437	-10.91	4.77	-6.14	4.85	PASS
	11	2462	-14.30	4.77	-9.53	4.85	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 9.15 > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (9.15 - 6) = 4.85\text{dBm}$.

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-12.96	4.77	-8.19	8	PASS
	6	2437	-10.69	4.77	-5.92	8	PASS
	11	2462	-12.96	4.77	-8.19	8	PASS
1	1	2412	-13.34	4.77	-8.57	8	PASS
	6	2437	-10.82	4.77	-6.05	8	PASS
	11	2462	-13.34	4.77	-8.57	8	PASS
2	1	2412	-14.20	4.77	-9.43	8	PASS
	6	2437	-10.10	4.77	-5.33	8	PASS
	11	2462	-14.20	4.77	-9.43	8	PASS

NOTE:

- 802.11n transmit signals are completely uncorrelated.
- Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N_{ANT}] = 4.38 < 6\text{dBi}$, so the power density limit no need to reduced.

802.11n (40MHz)

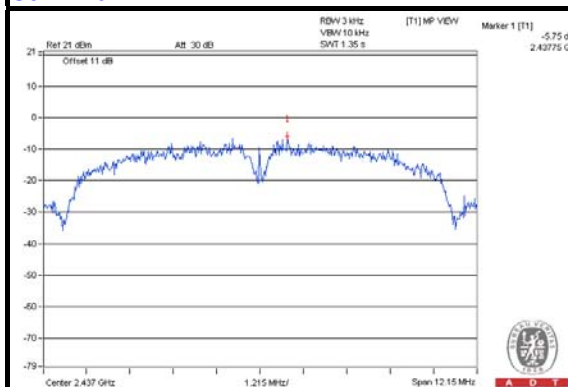
TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-18.68	4.77	-13.91	8	PASS
	6	2437	-13.91	4.77	-9.14	8	PASS
	9	2452	-18.68	4.77	-13.91	8	PASS
1	3	2422	-19.01	4.77	-14.24	8	PASS
	6	2437	-13.55	4.77	-8.78	8	PASS
	9	2452	-19.01	4.77	-14.24	8	PASS
2	3	2422	-19.63	4.77	-14.86	8	PASS
	6	2437	-14.59	4.77	-9.82	8	PASS
	9	2452	-19.63	4.77	-14.86	8	PASS

NOTE:

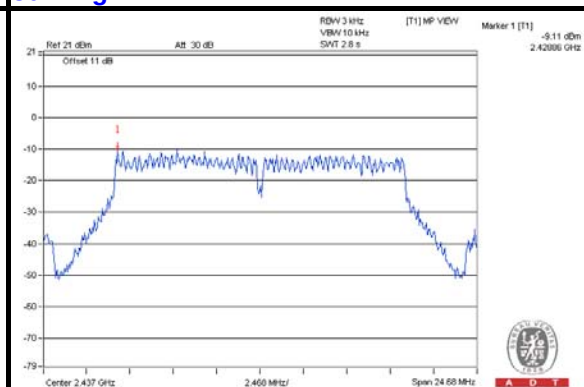
- 802.11n transmit signals are completely uncorrelated.
- Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N_{ANT}] = 4.38 < 6\text{dBi}$, so the power density limit no need to reduced.

SPECTRUM PLOT OF WORST VALUE

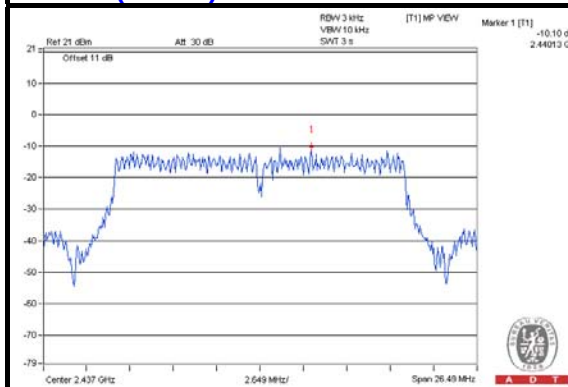
802.11b



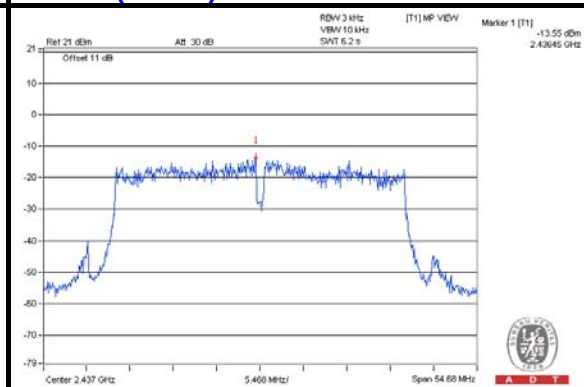
802.11g



802.11n (20MHz)



802.11n (40MHz)

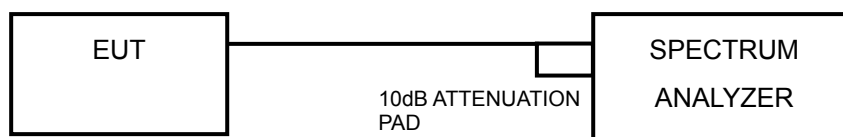


4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Ensure that the number of measurement points $\geq$ span/RBW
4. According to measurement points to set differ measurement span.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.7 TEST RESULTS

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

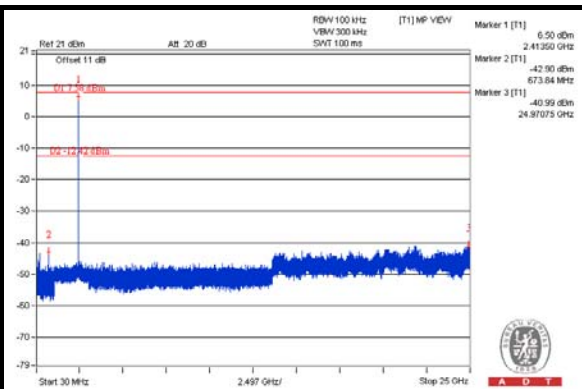
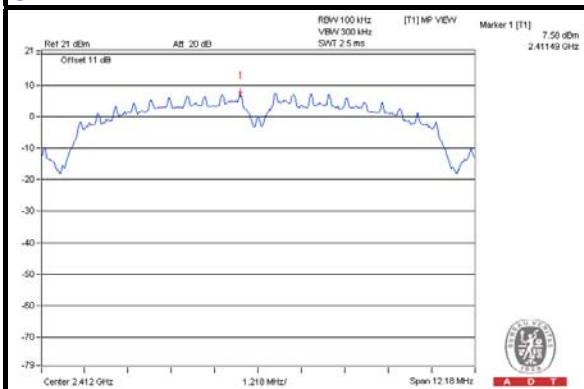
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



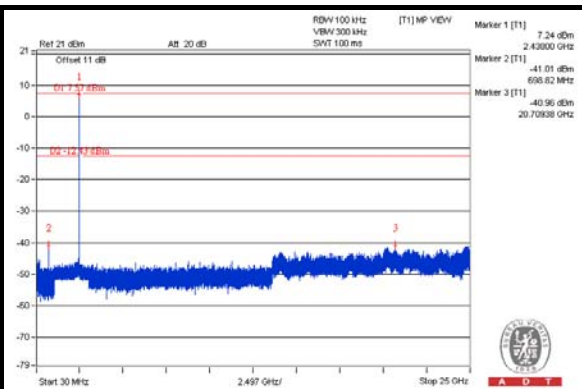
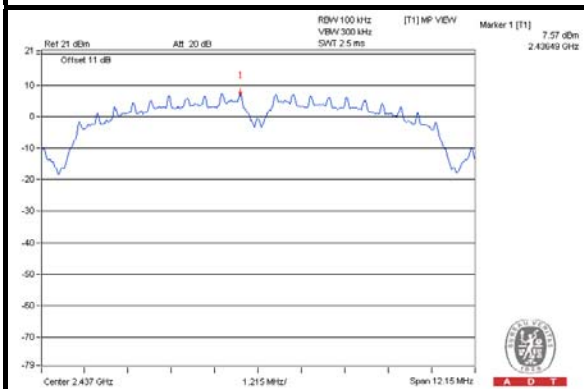
A D T

802.11b

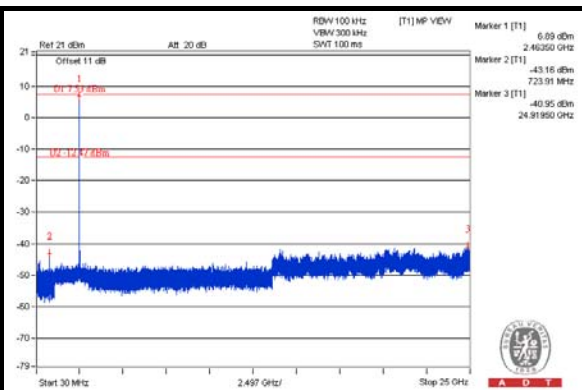
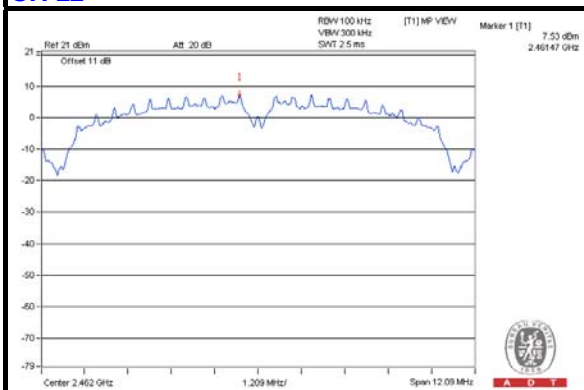
CH 1



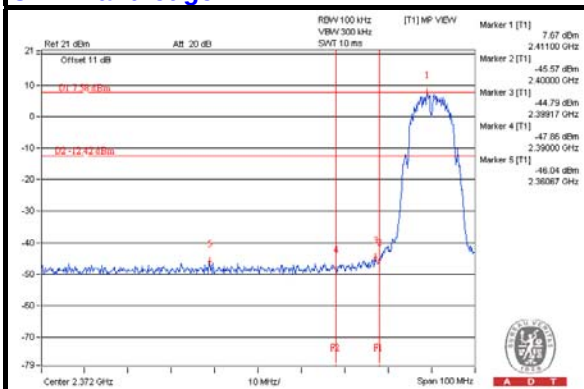
CH 6



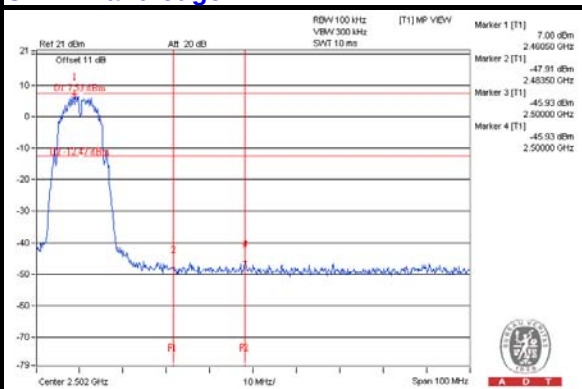
CH 11



CH 1 Band edge



CH 11 Band edge

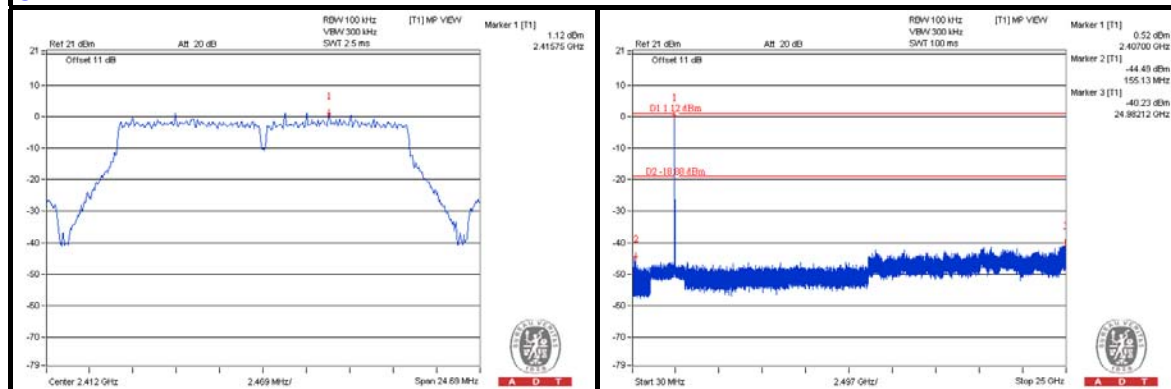




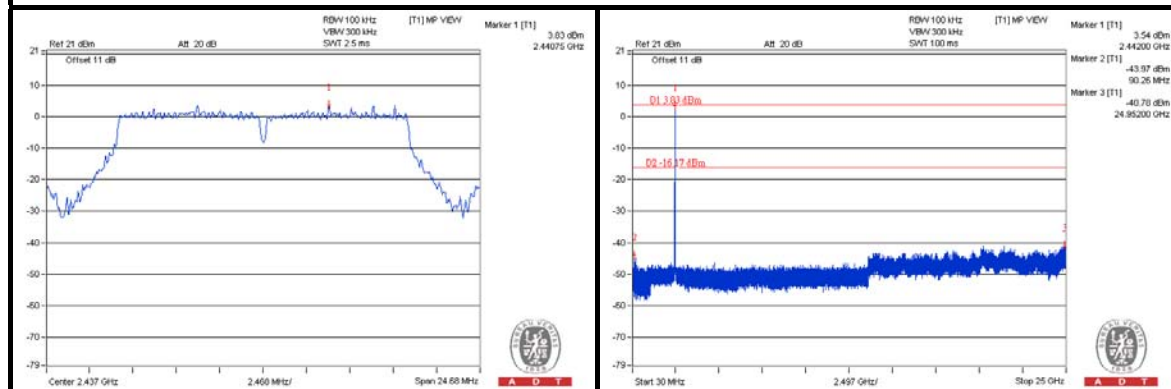
A D T

802.11g
CHAIN 0

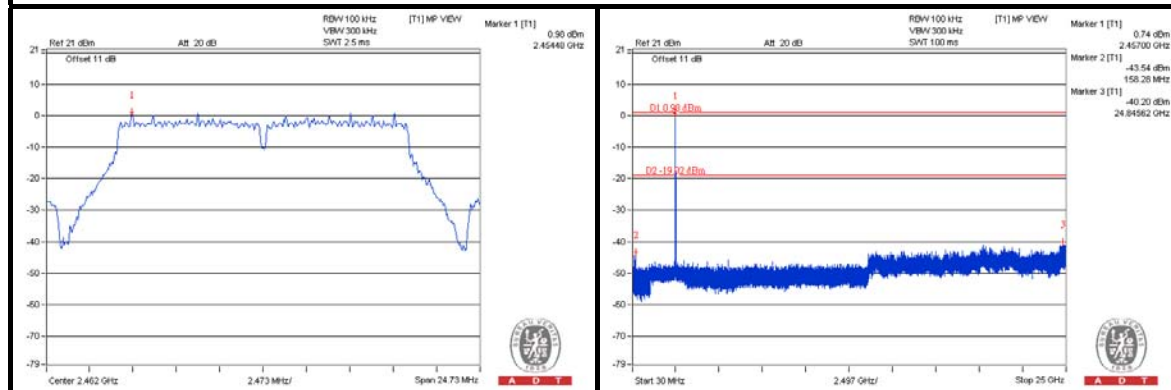
CH 1



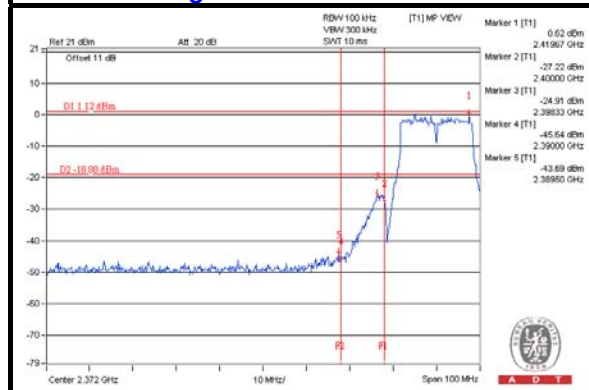
CH 6



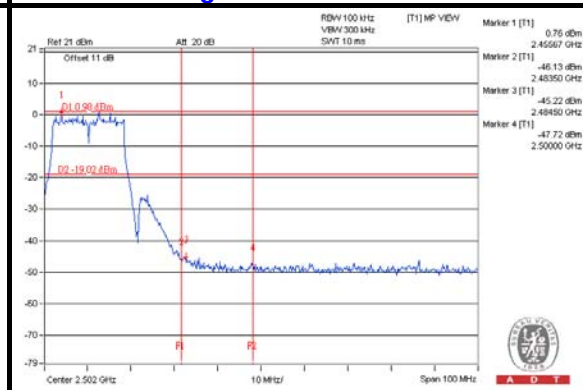
CH 11



CH 1 Band edge



CH 11 Band edge

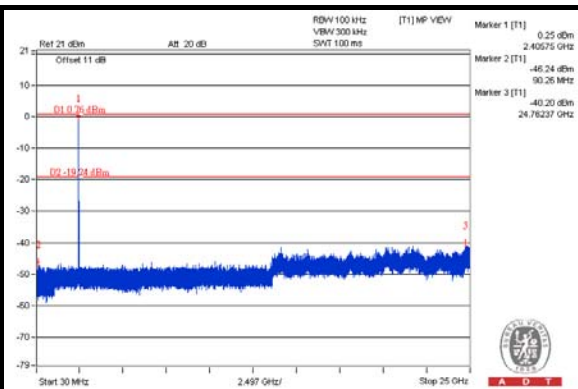
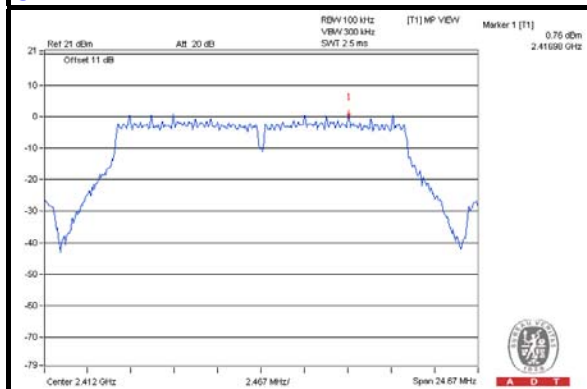




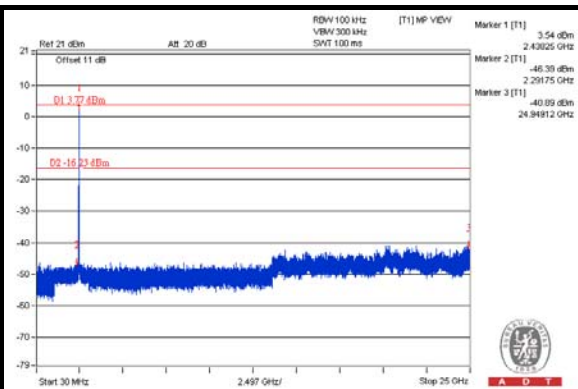
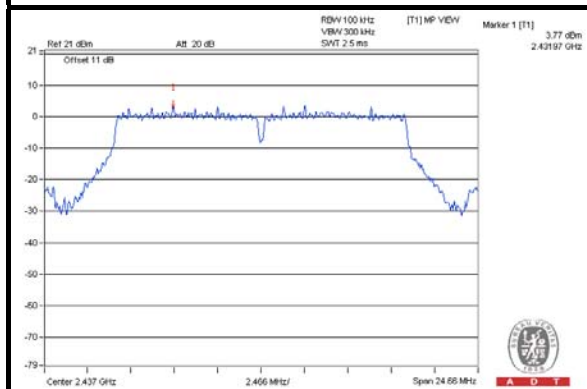
A D T

CHAIN 1

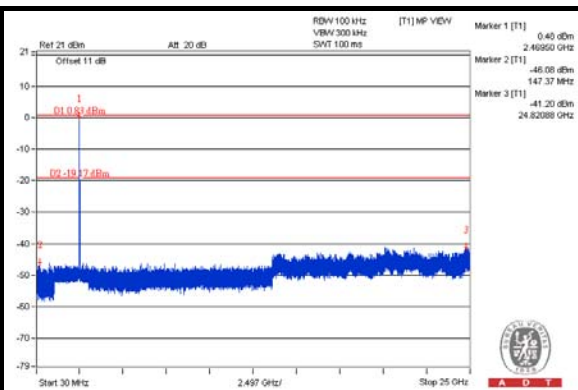
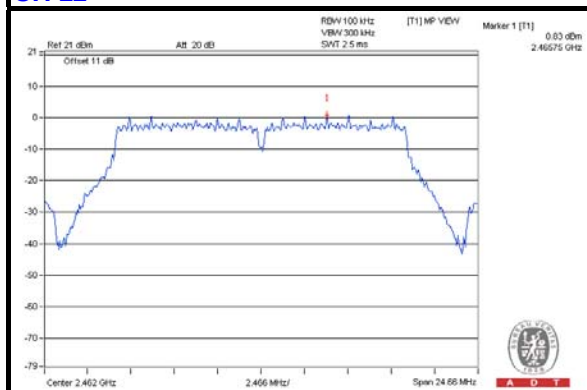
CH 1



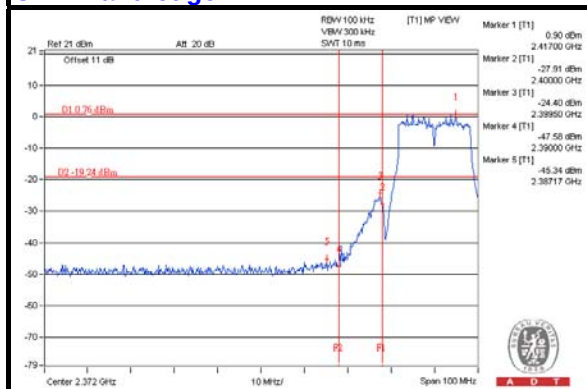
CH 6



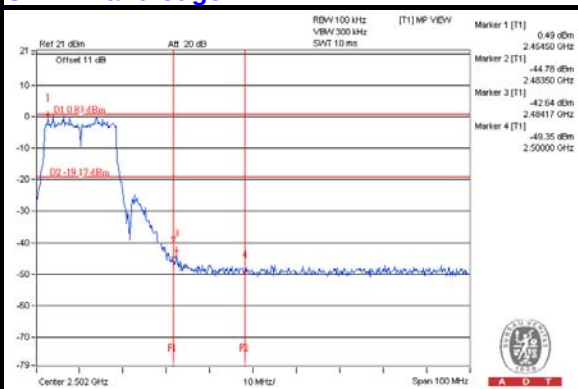
CH 11



CH 1 Band edge



CH 11 Band edge

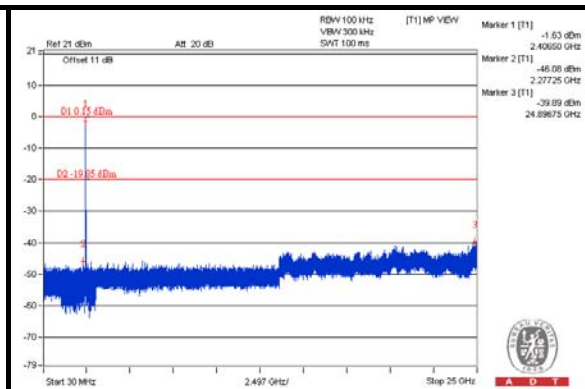
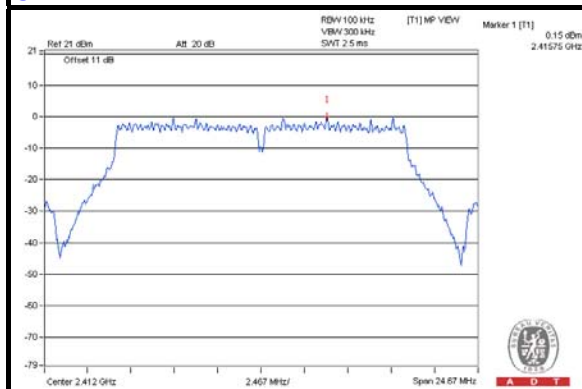




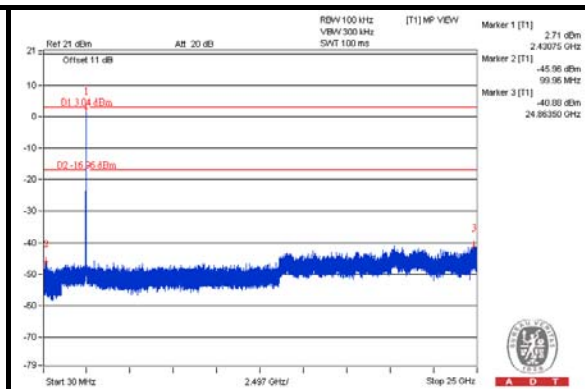
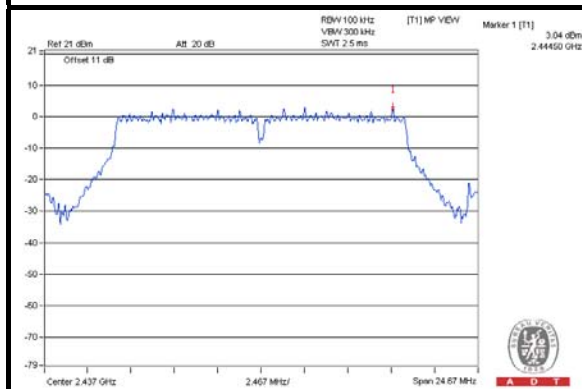
A D T

CHAIN 2

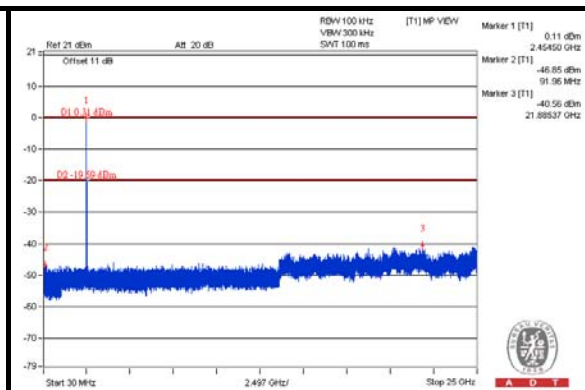
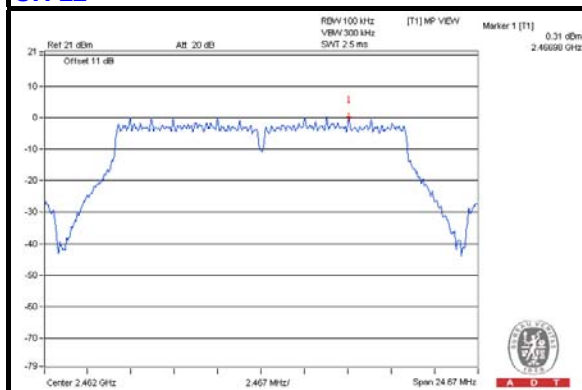
CH 1



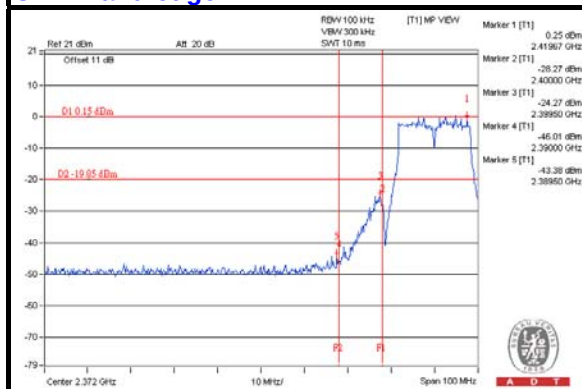
CH 6



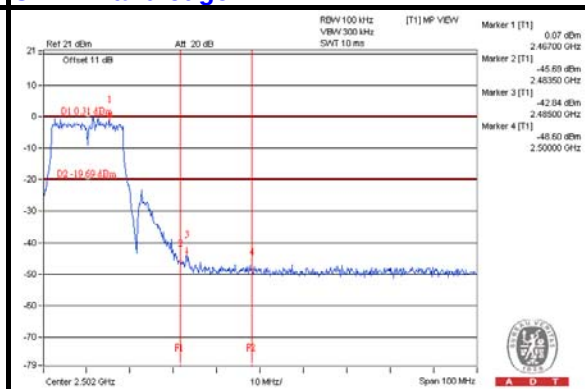
CH 11



CH 1 Band edge



CH 11 Band edge

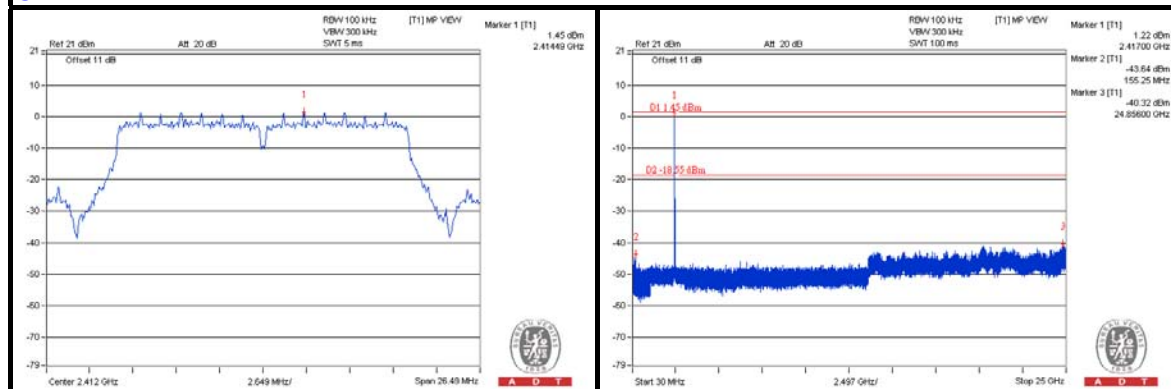




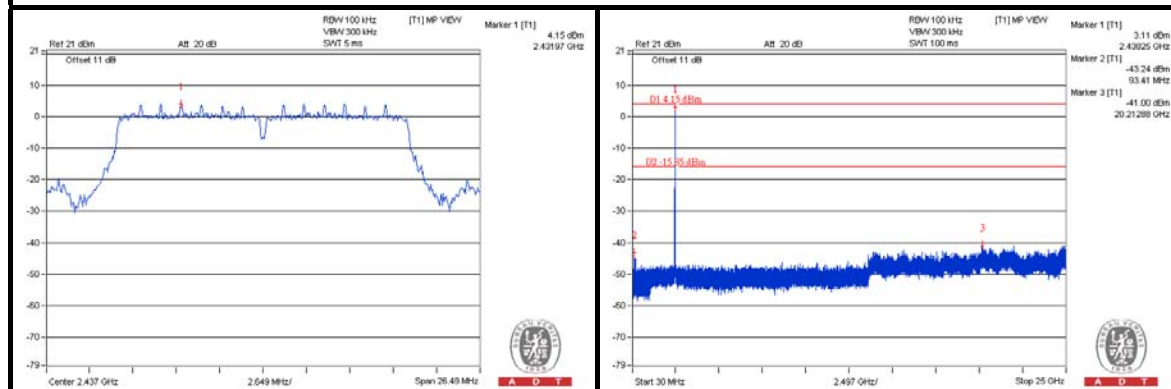
A D T

802.11n (20MHz) CHAIN 0

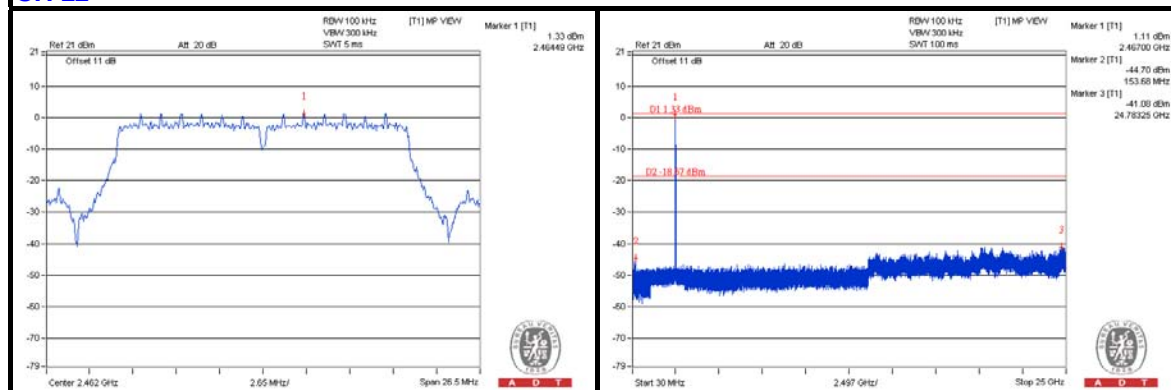
CH 1



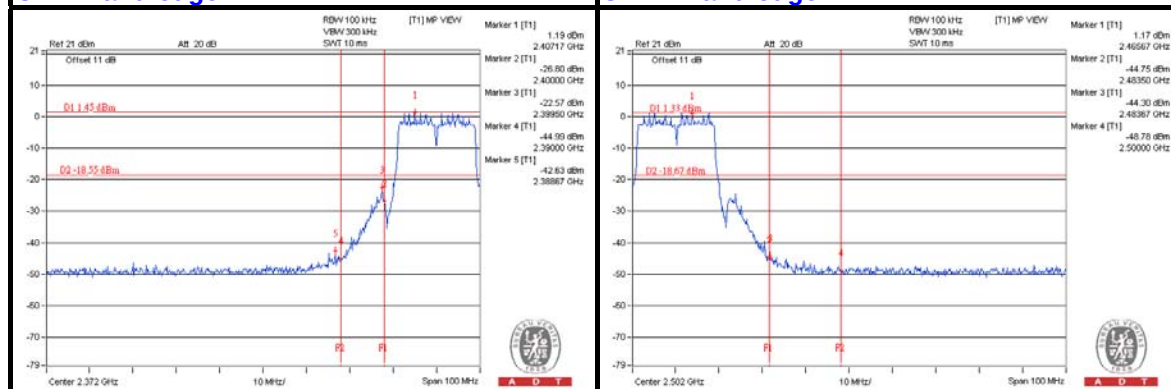
CH 6



CH 11



CH 1 Band edge

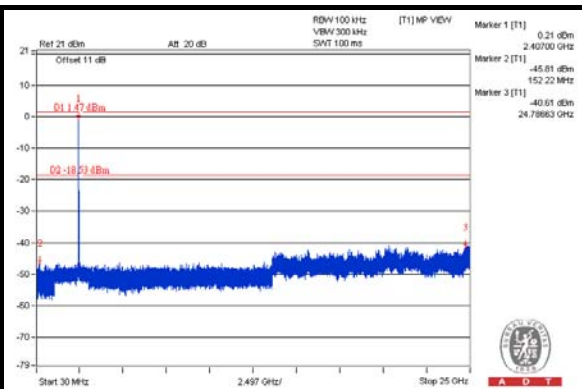
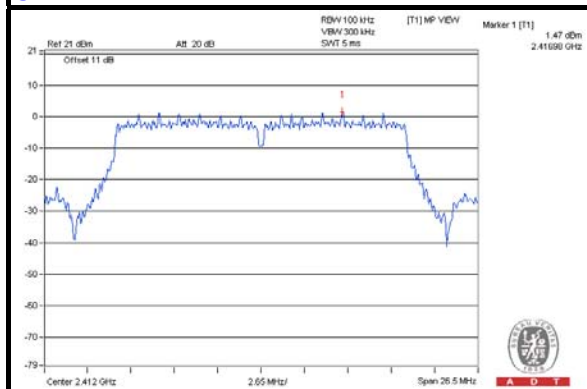




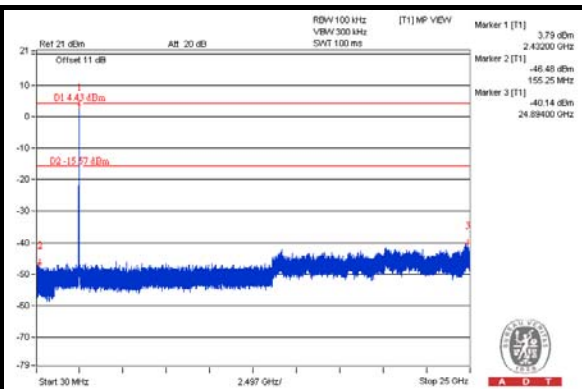
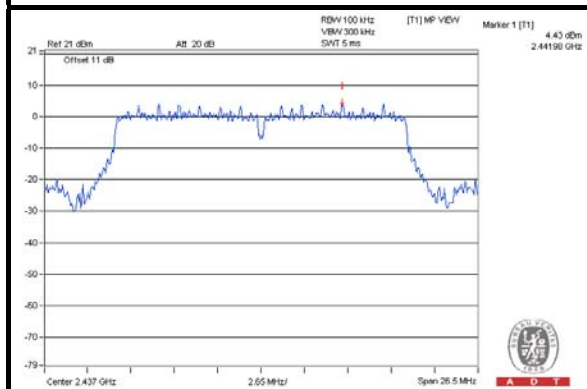
A D T

CHAIN 1

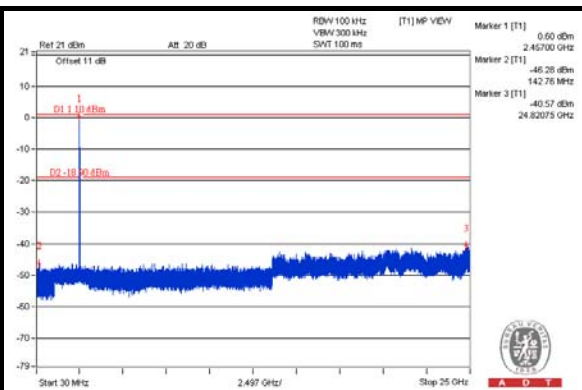
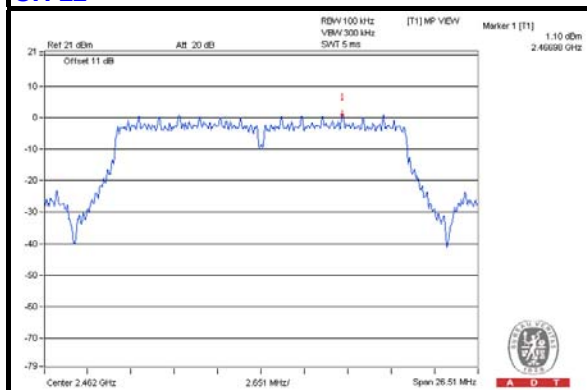
CH 1



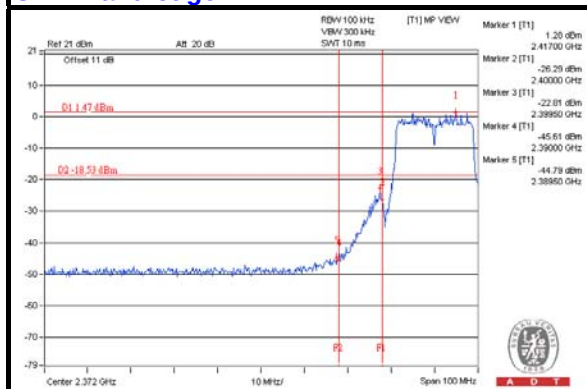
CH 6



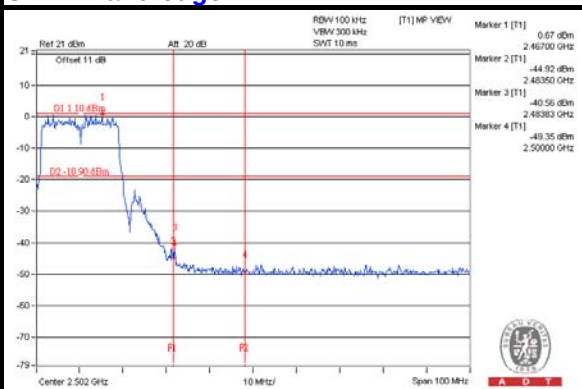
CH 11



CH 1 Band edge



CH 11 Band edge

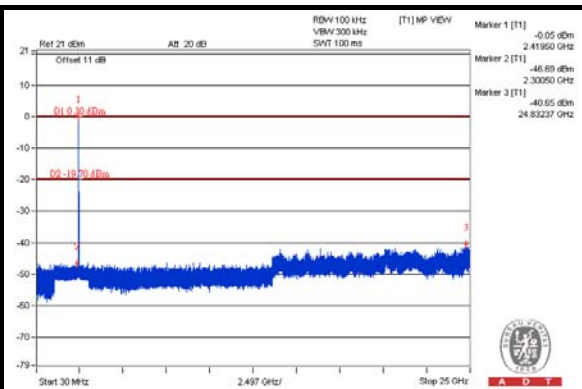
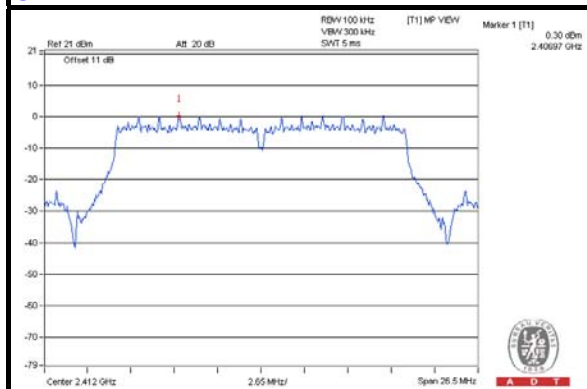




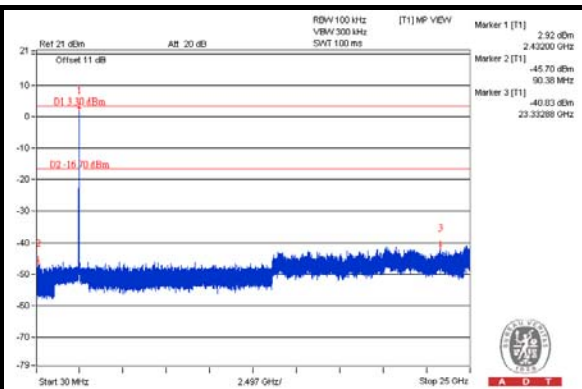
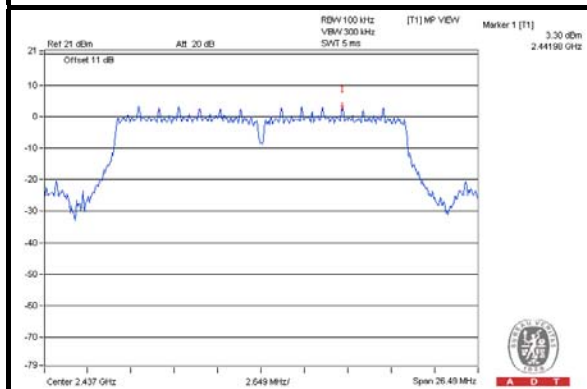
A D T

CHAIN 2

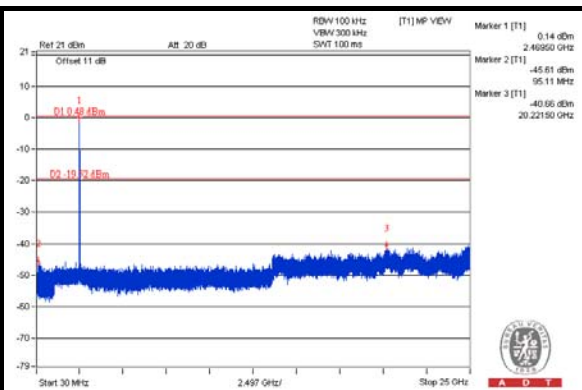
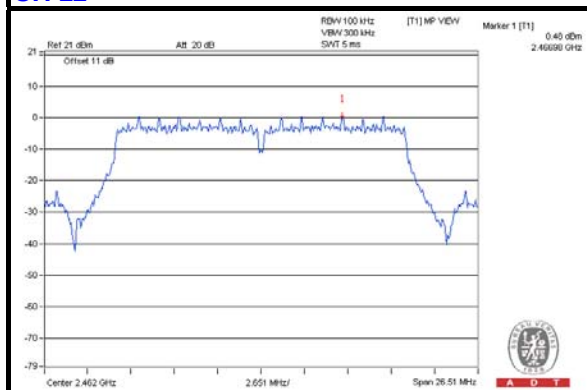
CH 1



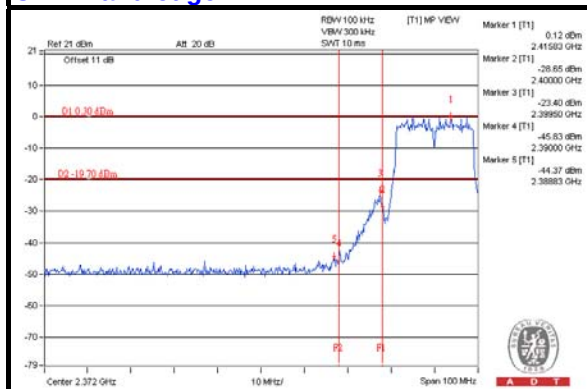
CH 6



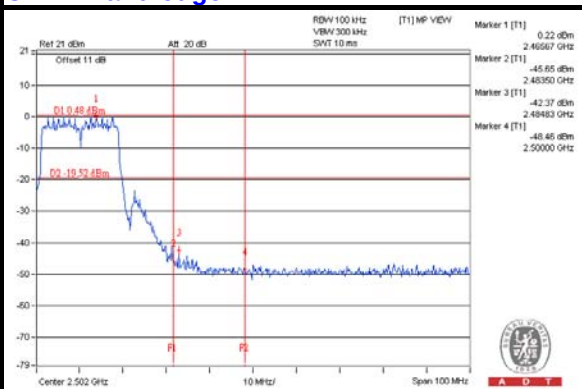
CH 11



CH 1 Band edge



CH 11 Band edge

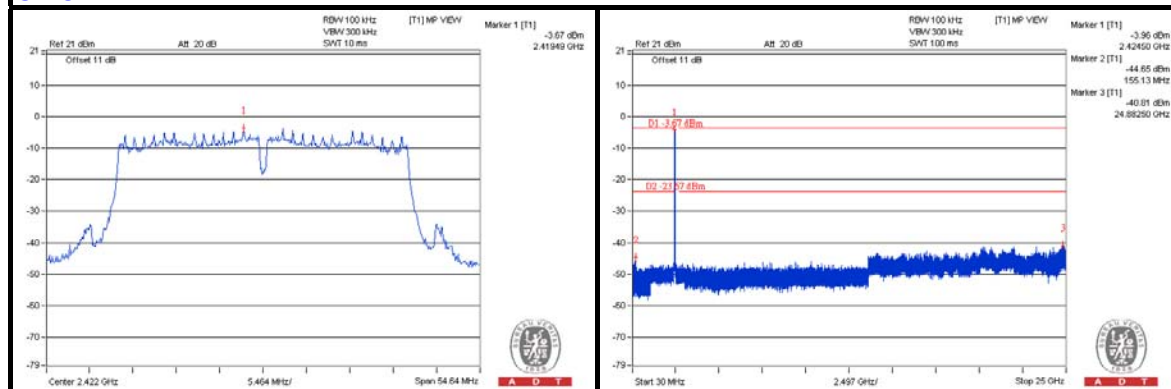




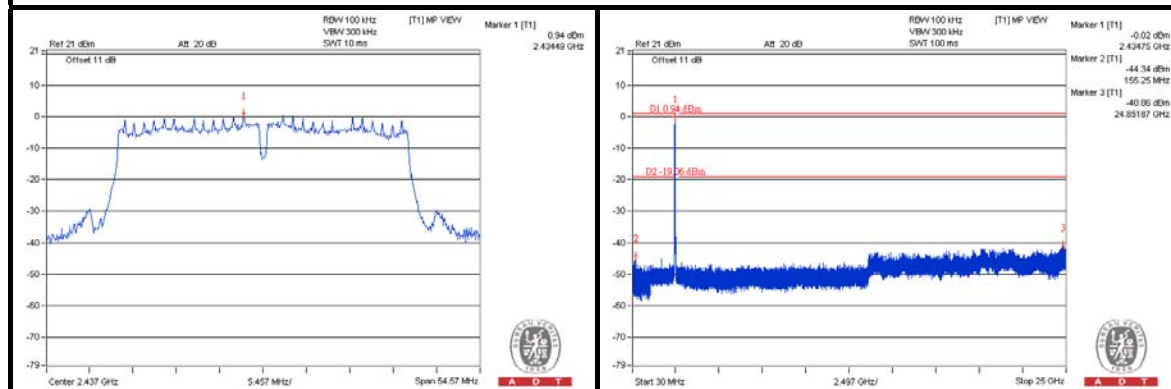
A D T

802.11n (40MHz)
CHAIN 0

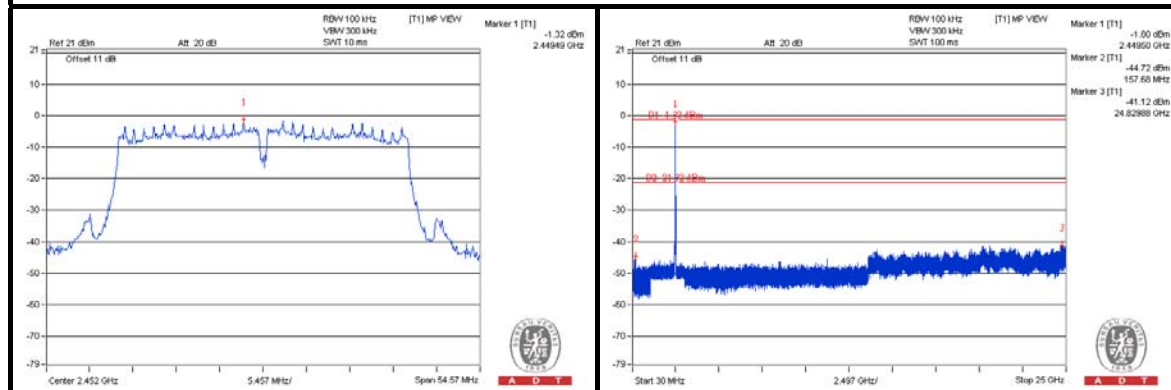
CH 3



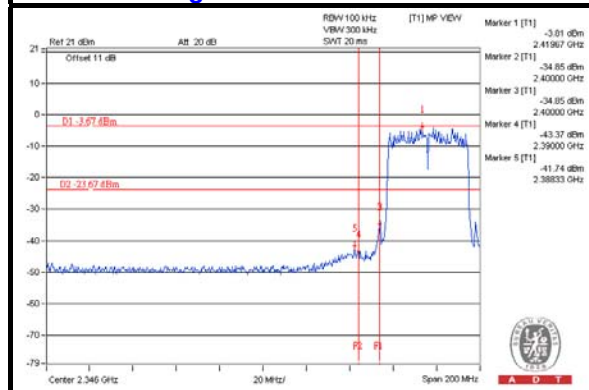
CH 6



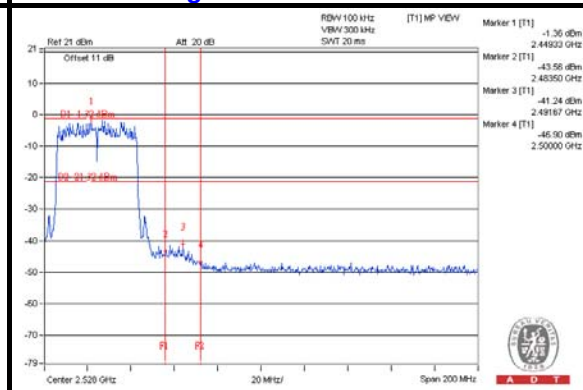
CH 9



CH 3 Band edge

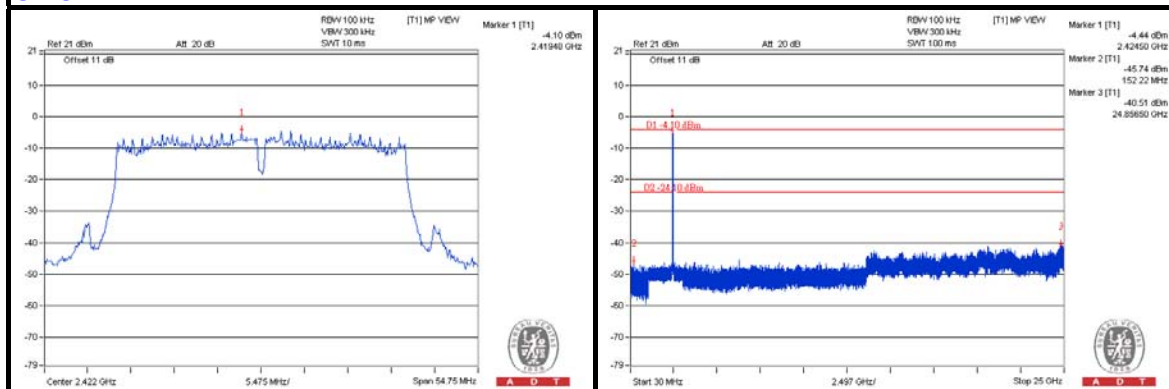


CH 9 Band edge

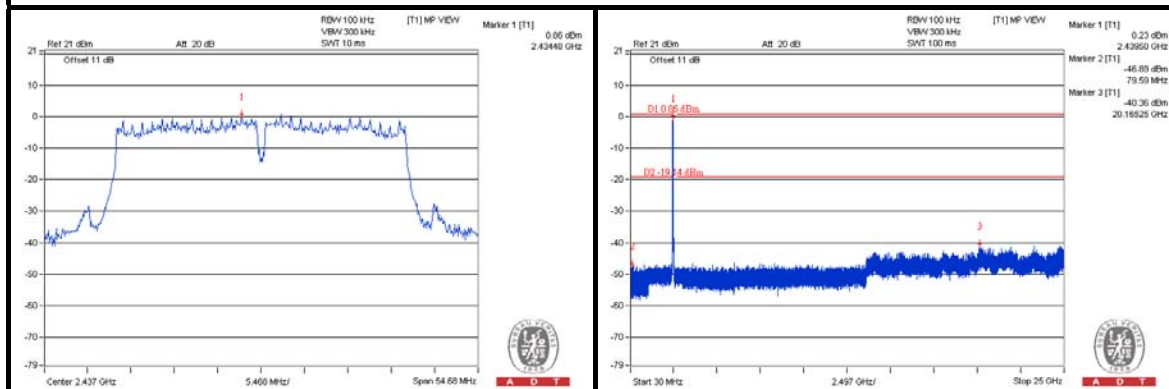


CHAIN 1

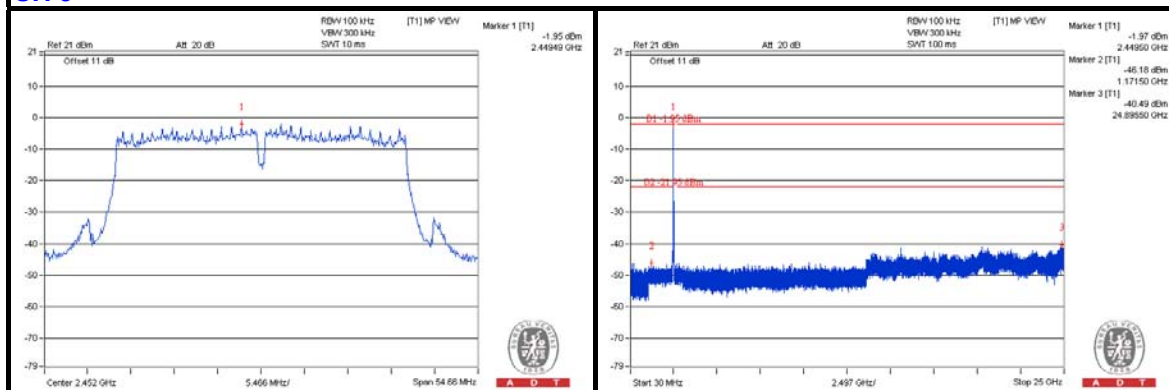
CH 3



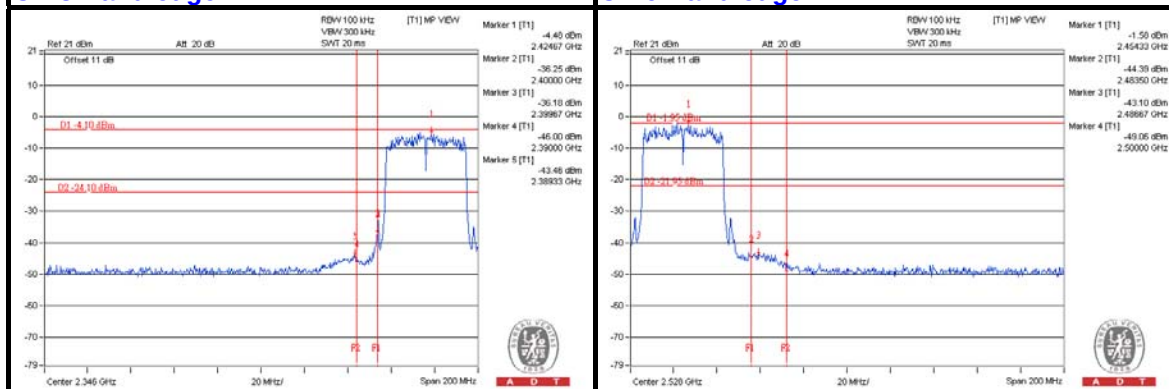
CH 6



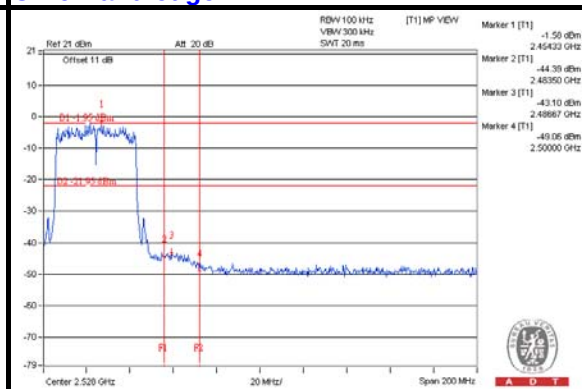
CH 9



CH 3 Band edge



CH 9 Band edge

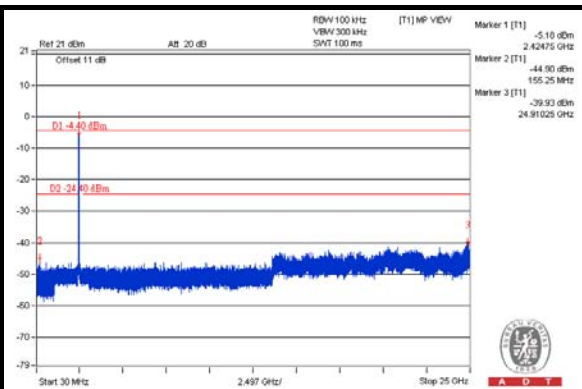
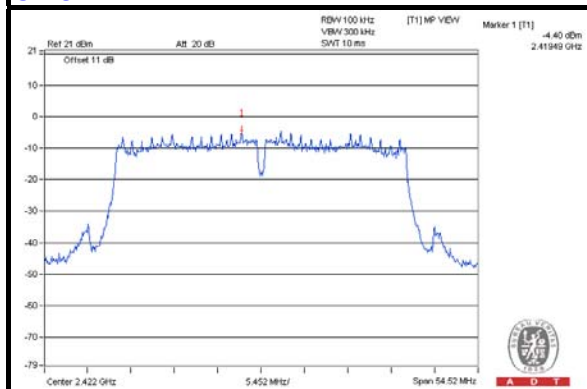




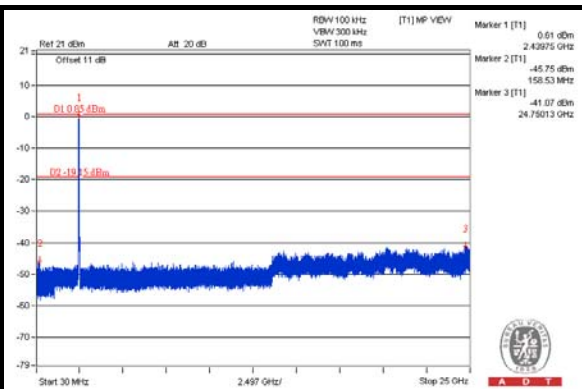
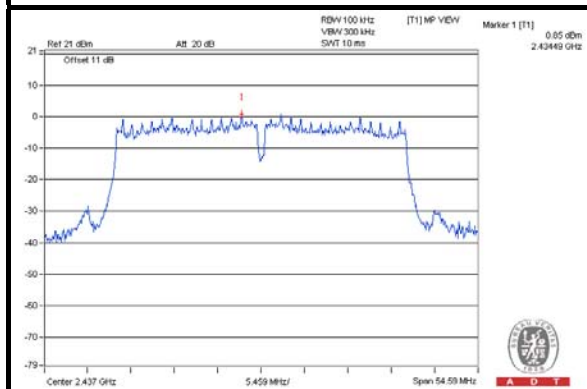
A D T

CHAIN 2

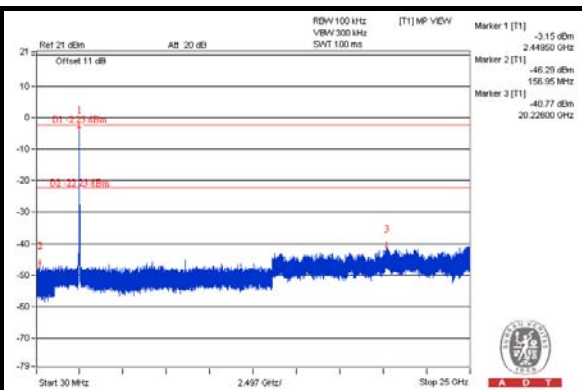
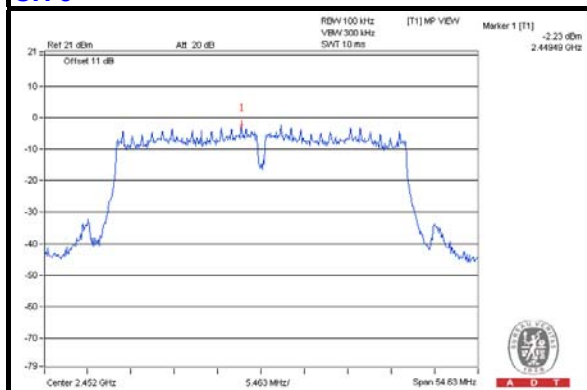
CH 3



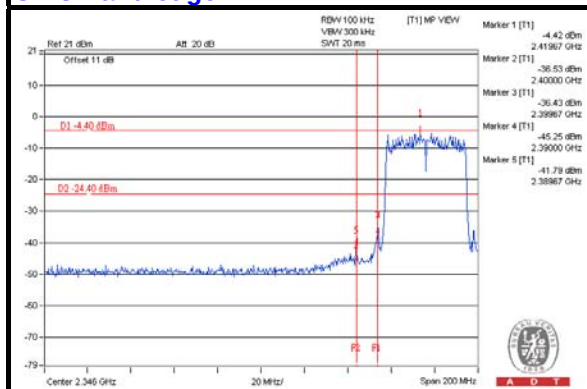
CH 6



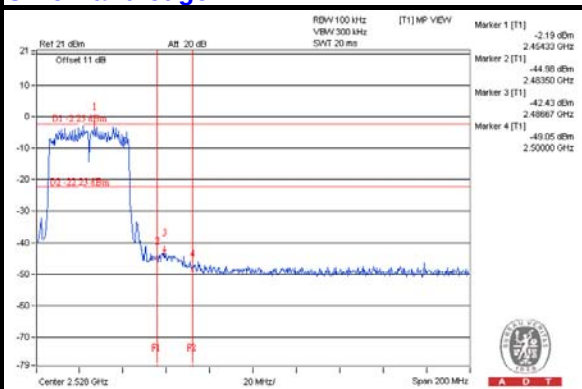
CH 9



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 20dB below the highest level of the desired power:

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

NOTE:

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



A D T

5.1.2 TEST INSTRUMENTS

Same as item 4.1.2.

5.1.3 TEST PROCEDURES

Same as item 4.1.3.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

5.1.5 TEST SETUP

Same as item 4.1.5.

5.1.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

5.1.7 TEST RESULTS

ABOVE 1GHz DATA :

802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	70.1 PK	93.1	-23.0	1.00 H	211	64.90	5.20
2	#5725.00	60.3 AV	83.3	-23.0	1.00 H	211	55.10	5.20
3	*5745.00	113.1 PK			1.00 H	215	70.90	42.20
4	*5745.00	103.3 AV			1.00 H	215	61.10	42.20
5	11490.00	58.1 PK	74.0	-15.9	1.00 H	199	44.80	13.30
6	11490.00	45.3 AV	54.0	-8.7	1.00 H	199	32.00	13.30
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	#5725.00	71.9 PK	94.9	-23.0	1.00 V	198	66.70	5.20
2	#5725.00	61.9 AV	84.9	-23.0	1.00 V	198	56.70	5.20
3	*5745.00	114.9 PK			1.00 V	195	72.70	42.20
4	*5745.00	104.9 AV			1.00 V	195	62.70	42.20
5	11490.00	59.2 PK	74.0	-14.8	1.00 V	187	45.90	13.30
6	11490.00	45.7 AV	54.0	-8.3	1.00 V	187	32.40	13.30

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”:The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH	TESTED BY	Alan Wu

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	112.9 PK			1.00 H	216	107.70	5.20
2	*5785.00	102.8 AV			1.00 H	216	97.60	5.20
3	11570.00	57.4 PK	74.0	-16.6	1.00 H	197	44.00	13.40
4	11570.00	45.2 AV	54.0	-8.8	1.00 H	197	31.80	13.40
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	113.6 PK			1.00 V	194	71.40	42.20
2	*5785.00	104.1 AV			1.00 V	194	61.90	42.20
3	11570.00	58.6 PK	74.0	-15.4	1.00 V	184	45.20	13.40
4	11570.00	45.6 AV	54.0	-8.4	1.00 V	184	32.20	13.40

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.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH	TESTED BY	Alan Wu

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	111.4 PK			1.00 H	195	69.10	42.30
2	*5825.00	101.4 AV			1.00 H	195	59.10	42.30
3	#5850.00	62.9 PK	91.4	-28.5	1.00 H	197	57.70	5.20
4	#5850.00	52.9 AV	81.4	-28.5	1.00 H	197	47.70	5.20
5	11650.00	57.2 PK	74.0	-16.8	1.00 H	191	43.50	13.70
6	11650.00	45.9 AV	54.0	-8.1	1.00 H	191	32.20	13.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	113.9 PK			1.00 V	196	71.60	42.30
2	*5825.00	104.0 AV			1.00 V	196	61.70	42.30
3	#5850.00	65.4 PK	93.9	-28.5	1.00 V	192	60.20	5.20
4	#5850.00	55.5 AV	84.0	-28.5	1.00 V	192	50.30	5.20
5	11650.00	58.4 PK	74.0	-15.6	1.00 V	184	44.70	13.70
6	11650.00	46.3 AV	54.0	-7.7	1.00 V	184	32.60	13.70

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. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”:The radiated frequency is out the restricted band.



A D T

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	68.7 PK	90.3	-21.6	1.00 H	193	63.50	5.20
2	#5725.00	56.4 AV	78.0	-21.6	1.00 H	193	51.20	5.20
3	*5745.00	110.3 PK			1.00 H	193	68.10	42.20
4	*5745.00	98.0 AV			1.00 H	193	55.80	42.20
5	11490.00	58.2 PK	74.0	-15.8	1.00 H	196	44.90	13.30
6	11490.00	46.2 AV	54.0	-7.8	1.00 H	196	32.90	13.30
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	#5725.00	72.4 PK	94.0	-21.6	1.00 V	212	67.20	5.20
2	#5725.00	59.7 AV	81.3	-21.6	1.00 V	212	54.50	5.20
3	*5745.00	114.0 PK			1.00 V	214	71.80	42.20
4	*5745.00	101.3 AV			1.00 V	214	59.10	42.20
5	11490.00	59.3 PK	74.0	-14.7	1.00 V	180	46.00	13.30
6	11490.00	46.6 AV	54.0	-7.4	1.00 V	180	33.30	13.30

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”:The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH	TESTED BY	Alan Wu

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	110.4 PK			1.00 H	213	68.20	42.20
2	*5785.00	97.9 AV			1.00 H	213	55.70	42.20
3	11570.00	58.3 PK	74.0	-15.7	1.00 H	193	44.90	13.40
4	11570.00	46.2 AV	54.0	-7.8	1.00 H	193	32.80	13.40
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	113.1 PK			1.00 V	211	70.90	42.20
2	*5785.00	100.5 AV			1.00 V	211	58.30	42.20
3	11570.00	59.4 PK	74.0	-14.6	1.00 V	185	46.00	13.40
4	11570.00	46.6 AV	54.0	-7.4	1.00 V	185	33.20	13.40

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.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH	TESTED BY	Alan Wu

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	110.5 PK			1.00 H	199	68.20	42.30
2	*5825.00	98.2 AV			1.00 H	199	55.90	42.30
3	#5850.00	63.2 PK	90.5	-27.3	1.00 H	193	58.00	5.20
4	#5850.00	50.9 AV	78.2	-27.3	1.00 H	193	45.70	5.20
5	11650.00	58.8 PK	74.0	-15.2	1.00 H	192	45.10	13.70
6	11650.00	46.2 AV	54.0	-7.8	1.00 H	192	32.50	13.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	112.5 PK			1.00 V	207	70.20	42.30
2	*5825.00	100.3 AV			1.00 V	207	58.00	42.30
3	#5850.00	65.2 PK	92.5	-27.3	1.00 V	200	60.00	5.20
4	#5850.00	53.0 AV	80.3	-27.3	1.00 V	200	47.80	5.20
5	11650.00	59.9 PK	74.0	-14.1	1.00 V	185	46.20	13.70
6	11650.00	46.6 AV	54.0	-7.4	1.00 V	185	32.90	13.70

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. “ * ”: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”:The radiated frequency is out the restricted band.



A D T

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	72.5 PK	87.7	-15.2	1.00 H	190	67.30	5.20
2	#5725.00	62.1 AV	77.3	-15.2	1.00 H	190	56.90	5.20
3	*5755.00	107.7 PK			1.00 H	196	65.50	42.20
4	*5755.00	97.3 AV			1.00 H	196	55.10	42.20
5	11510.00	57.2 PK	74.0	-16.8	1.00 H	196	43.90	13.30
6	11510.00	44.2 AV	54.0	-9.8	1.00 H	196	30.90	13.30
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	#5725.00	76.4 PK	91.6	-15.2	1.00 V	200	71.20	5.20
2	#5725.00	65.0 AV	80.2	-15.2	1.00 V	200	59.80	5.20
3	*5755.00	111.6 PK			1.00 V	203	69.40	42.20
4	*5755.00	100.2 AV			1.00 V	203	58.00	42.20
5	11510.00	58.4 PK	74.0	-15.6	1.00 V	185	45.10	13.30
6	11510.00	44.8 AV	54.0	-9.2	1.00 V	185	31.50	13.30

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 66%RH	TESTED BY	Alan Wu

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	108.8 PK			1.01 H	199	66.60	42.20
2	*5795.00	98.0 AV			1.01 H	199	55.80	42.20
3	#5850.00	60.7 PK	88.8	-28.1	1.03 H	193	55.50	5.20
4	#5850.00	49.9 AV	78.0	-28.1	1.03 H	193	44.70	5.20
5	11590.00	56.9 PK	74.0	-17.1	1.00 H	194	43.40	13.50
6	11590.00	44.9 AV	54.0	-9.1	1.00 H	194	31.40	13.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	110.6 PK			1.00 V	210	68.40	42.20
2	*5795.00	99.8 AV			1.00 V	210	57.60	42.20
3	#5850.00	62.5 PK	90.6	-28.1	1.00 V	205	57.30	5.20
4	#5850.00	51.7 AV	79.8	-28.1	1.00 V	205	46.50	5.20
5	11590.00	58.1 PK	74.0	-15.9	1.00 V	188	44.60	13.50
6	11590.00	45.4 AV	54.0	-8.6	1.00 V	188	31.90	13.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”:The radiated frequency is out the restricted band.

BELOW 1GHz WORST-CASE DATA : 802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu
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	101.78	23.7 QP	43.5	-19.8	1.99 H	284	42.20	-18.50
2	156.10	40.3 QP	43.5	-3.2	1.49 H	237	54.50	-14.20
3	218.18	34.4 QP	46.0	-11.6	1.24 H	103	51.00	-16.60
4	375.32	26.4 QP	46.0	-19.6	1.99 H	235	37.30	-10.90
5	625.58	33.3 QP	46.0	-12.7	1.00 H	211	39.10	-5.80
6	662.44	31.9 QP	46.0	-14.1	1.00 H	226	37.30	-5.40
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	49.40	31.8 QP	40.0	-8.2	1.00 V	270	46.50	-14.70
2	70.74	27.1 QP	40.0	-12.9	1.00 V	281	43.00	-15.90
3	156.10	35.8 QP	43.5	-7.7	1.00 V	32	50.00	-14.20
4	375.32	26.3 QP	46.0	-19.7	1.26 V	13	37.20	-10.90
5	625.58	32.4 QP	46.0	-13.6	2.00 V	190	38.20	-5.80
6	662.44	32.1 QP	46.0	-13.9	1.26 V	8	37.50	-5.40

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	48Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	TESTED BY	Alan Wu
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	99.84	33.1 QP	43.5	-10.4	1.99 H	141	51.80	-18.70
2	156.10	41.8 QP	43.5	-1.7	1.49 H	92	56.00	-14.20
3	375.32	28.7 QP	46.0	-17.3	1.99 H	356	39.60	-10.90
4	625.58	32.9 QP	46.0	-13.1	1.00 H	197	38.70	-5.80
5	662.44	31.1 QP	46.0	-14.9	1.00 H	215	36.50	-5.40
6	875.84	34.8 QP	46.0	-11.2	1.24 H	146	36.30	-1.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	43.58	36.8 QP	40.0	-3.2	1.00 V	305	51.20	-14.40
2	140.58	35.5 QP	43.5	-8.0	1.00 V	79	50.00	-14.50
3	154.16	39.8 QP	43.5	-3.7	1.00 V	9	53.60	-13.80
4	625.58	30.4 QP	46.0	-15.6	1.00 V	43	36.20	-5.80
5	662.44	28.0 QP	46.0	-18.0	1.75 V	272	33.40	-5.40
6	875.84	37.2 QP	46.0	-8.8	1.00 V	125	38.70	-1.50

REMARKS:

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

5.2 CONDUCTED EMISSION MEASUREMENT

5.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

5.2.2 TEST INSTRUMENTS

Same as item 4.2.2.

5.2.3 TEST PROCEDURES

Same as item 4.2.3.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

5.2.5 TEST SETUP

Same as item 4.2.5.

5.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

5.2.7 TEST RESULTS

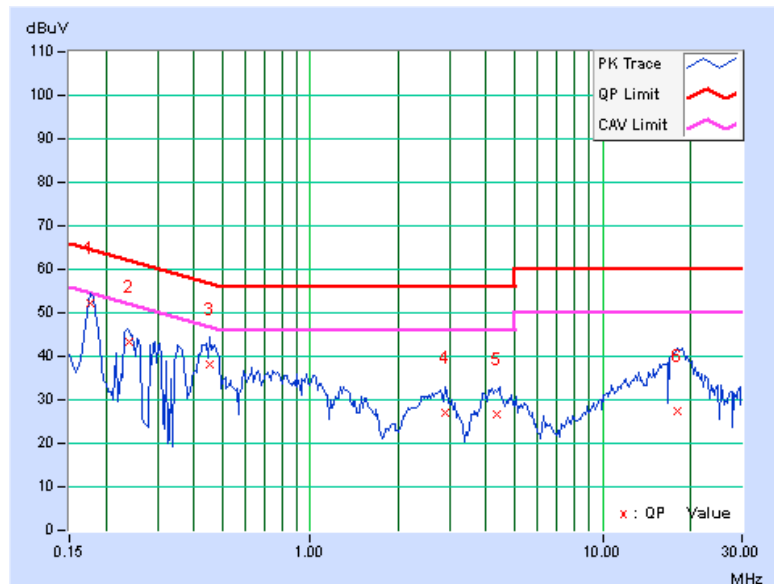
CONDUCTED WORST-CASE DATA : 802.11n (40MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	0.19	51.90	43.45	52.09	43.64	64.61	54.61	-12.52	-10.97
2	0.23984	0.20	43.29	38.00	43.49	38.20	62.10	52.10	-18.61	-13.90
3	0.45469	0.23	38.07	19.50	38.30	19.73	56.79	46.79	-18.49	-27.06
4	2.91016	0.36	26.76	17.95	27.12	18.31	56.00	46.00	-28.88	-27.69
5	4.37109	0.41	26.31	17.88	26.72	18.29	56.00	46.00	-29.28	-27.71
6	18.02344	0.68	26.81	20.37	27.49	21.05	60.00	50.00	-32.51	-28.95

REMARKS:

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

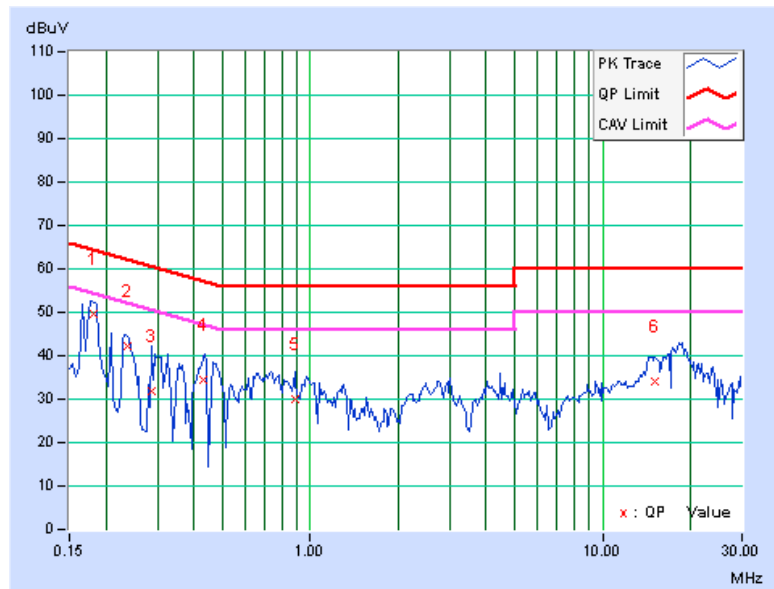


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	0.19	49.28	39.75	49.47	39.94	64.43	54.43	-14.96	-14.49
2	0.23594	0.20	42.04	34.54	42.24	34.74	62.24	52.24	-19.99	-17.49
3	0.28672	0.22	31.79	16.81	32.01	17.03	60.62	50.62	-28.60	-33.58
4	0.43125	0.27	34.33	21.27	34.60	21.54	57.23	47.23	-22.63	-25.69
5	0.88438	0.26	29.74	21.31	30.00	21.57	56.00	46.00	-26.00	-24.43
6	15.12109	0.70	33.42	27.54	34.12	28.24	60.00	50.00	-25.88	-21.76

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

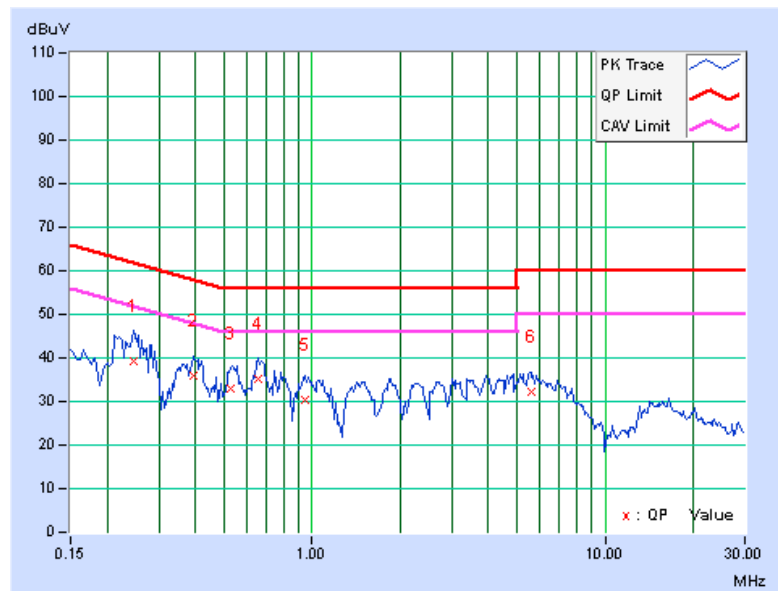


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.24766	0.24	39.16	29.15	39.40	29.39	61.84	51.84	-22.44	-22.45
2	0.39219	0.22	35.72	26.79	35.94	27.01	58.02	48.02	-22.08	-21.01
3	0.52891	0.24	32.65	24.59	32.89	24.83	56.00	46.00	-23.11	-21.17
4	0.65781	0.25	34.73	28.02	34.98	28.27	56.00	46.00	-21.02	-17.73
5	0.95078	0.29	30.13	24.39	30.42	24.68	56.00	46.00	-25.58	-21.32
6	5.57813	0.46	31.93	25.95	32.39	26.41	60.00	50.00	-27.61	-23.59

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

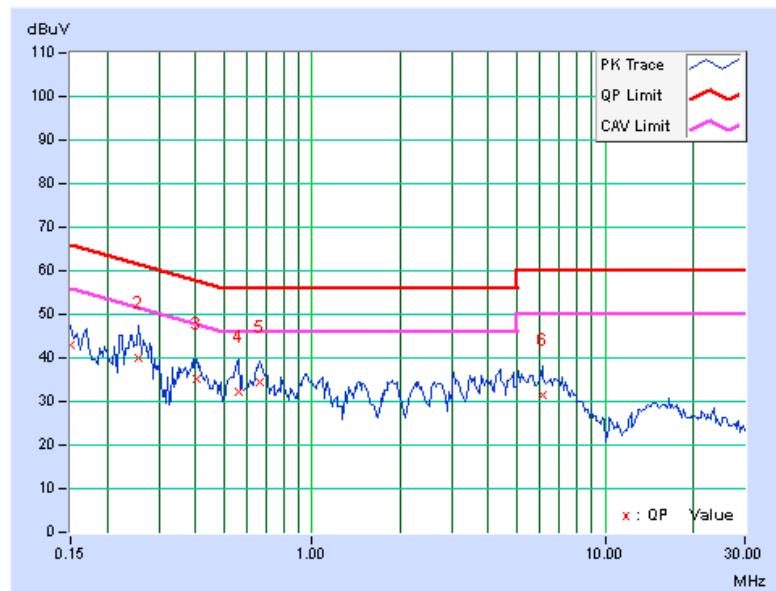


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.26	42.64	33.83	42.90	34.09	66.00	56.00	-23.10	-21.91
2	0.25547	0.29	39.69	29.73	39.98	30.02	61.58	51.58	-21.60	-21.56
3	0.40391	0.30	34.90	25.72	35.20	26.02	57.77	47.77	-22.57	-21.75
4	0.56016	0.31	31.75	24.07	32.06	24.38	56.00	46.00	-23.94	-21.62
5	0.66172	0.32	34.26	27.50	34.58	27.82	56.00	46.00	-21.42	-18.18
6	6.10938	0.47	31.13	24.83	31.60	25.30	60.00	50.00	-28.40	-24.70

REMARKS:

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



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	16.47	16.44	16.49	0.5	PASS
157	5785	16.46	16.43	16.45	0.5	PASS
165	5825	16.45	16.46	16.46	0.5	PASS

802.11n (20MHz)

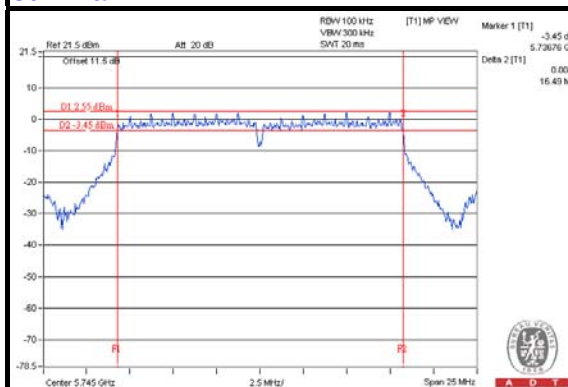
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.66	17.66	17.66	0.5	PASS
157	5785	17.66	17.67	17.66	0.5	PASS
165	5825	17.65	17.66	17.66	0.5	PASS

802.11n (40MHz)

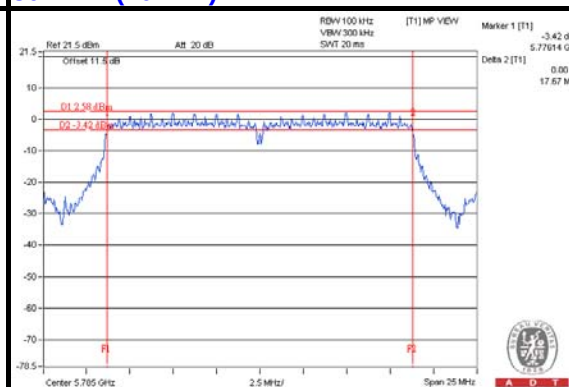
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	36.42	36.45	36.41	0.5	PASS
159	5795	36.43	36.49	36.42	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

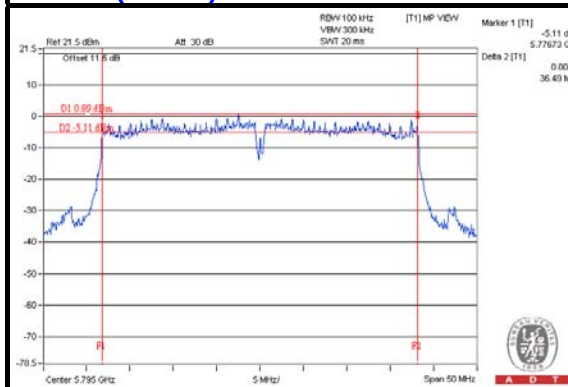
802.11a



802.11n (20MHz)



802.11n (40MHz)



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 v02 Method of conducted output power measurement on IEEE 802.11 devices,

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

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 $NANT \geq 5$.

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

5.4.2 TEST SETUP

Same as Item 4.4.2.

5.4.3 INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.4.4 TEST PROCEDURES

Same as Item 4.4.4.

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 PEAK POWER

802.11a

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	22.12	22.14	21.94	482.927	26.84	28.66	PASS
157	5785	21.92	22.25	21.67	470.370	26.72	28.66	PASS
165	5825	21.88	21.96	21.76	461.174	26.64	28.66	PASS

NOTE: Directional gain = 7.34 > 6dBi, so the power limit shall be reduced to $30-(7.34-6) = 28.66\text{dBm}$.

802.11n (20MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	22.25	22.15	21.62	477.150	26.79	28.66	PASS
157	5785	21.81	22.42	21.66	472.842	26.75	28.66	PASS
165	5825	21.99	22.47	21.91	489.968	26.90	28.66	PASS

NOTE: Directional gain = 7.34 > 6dBi, so the power limit shall be reduced to $30-(7.34-6) = 28.66\text{dBm}$.

802.11n (40MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	22.41	22.19	22.36	511.945	27.09	28.66	PASS
159	5795	22.55	22.11	21.99	500.567	26.99	28.66	PASS

NOTE: Directional gain = 7.34 > 6dBi, so the power limit shall be reduced to $30-(7.34-6) = 28.66\text{dBm}$.



A D T

FOR AVERAGE POWER

802.11a

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	14.52	14.41	14.22	82.344	19.16
157	5785	14.39	14.29	14.24	80.878	19.08
165	5825	14.28	14.26	14.31	80.438	19.05

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	14.41	14.41	14.52	83.526	19.22
157	5785	14.28	14.11	14.39	80.034	19.03
165	5825	14.08	14.27	14.13	78.198	18.93

802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	14.31	14.67	14.72	85.934	19.34
159	5795	14.25	14.48	14.48	82.715	19.18

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	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-10.17	4.77	-5.40	2.85	PASS
	157	5785	-10.80	4.77	-6.03	2.85	PASS
	165	5825	-11.53	4.77	-6.76	2.85	PASS
1	149	5745	-11.91	4.77	-7.14	2.85	PASS
	157	5785	-11.79	4.77	-7.02	2.85	PASS
	165	5825	-10.83	4.77	-6.06	2.85	PASS
2	149	5745	-10.72	4.77	-5.95	2.85	PASS
	157	5785	-11.62	4.77	-6.85	2.85	PASS
	165	5825	-10.64	4.77	-5.87	2.85	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 11.15 > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (11.15 - 6) = 2.85\text{dBm}$.

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-12.49	4.77	-7.72	7.59	PASS
	157	5785	-11.93	4.77	-7.16	7.59	PASS
	165	5825	-11.93	4.77	-7.16	7.59	PASS
1	149	5745	-11.96	4.77	-7.19	7.59	PASS
	157	5785	-11.96	4.77	-7.19	7.59	PASS
	165	5825	-11.81	4.77	-7.04	7.59	PASS
2	149	5745	-12.41	4.77	-7.64	7.59	PASS
	157	5785	-11.42	4.77	-6.65	7.59	PASS
	165	5825	-12.48	4.77	-7.71	7.59	PASS

NOTE:

- 802.11n transmit signals are completely uncorrelated.
- Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N_{ANT}] = 6.41 > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (6.41 - 6) = 7.59 \text{ dBm}$.

802.11n (40MHz)

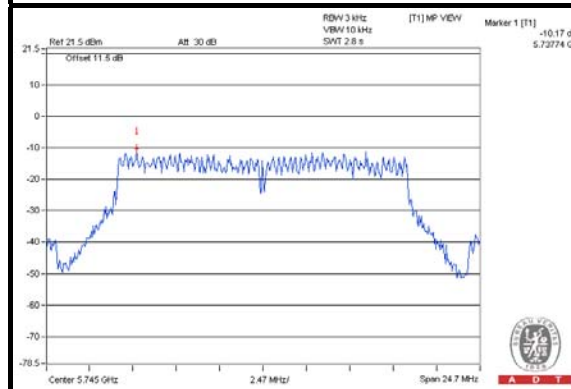
TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-13.42	4.77	-8.65	7.59	PASS
	159	5795	-14.39	4.77	-9.62	7.59	PASS
1	151	5755	-13.76	4.77	-8.99	7.59	PASS
	159	5795	-13.26	4.77	-8.49	7.59	PASS
2	151	5755	-14.09	4.77	-9.32	7.59	PASS
	159	5795	-14.17	4.77	-9.40	7.59	PASS

NOTE:

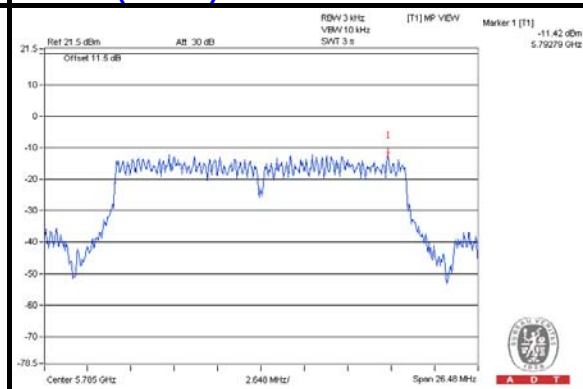
- 802.11n transmit signals are completely uncorrelated.
- Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N_{ANT}] = 6.41 > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (6.41 - 6) = 7.59 \text{ dBm}$.

SPECTRUM PLOT OF WORST VALUE

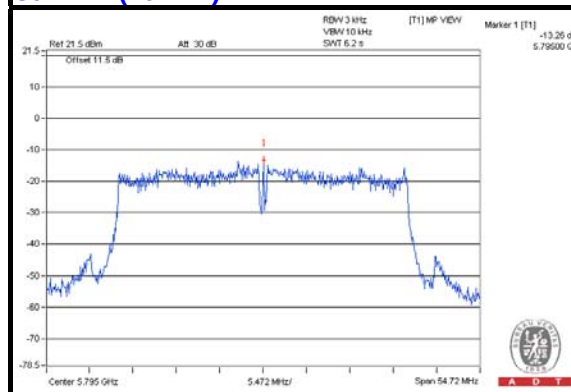
802.11a



802.11n (20MHz)



802.11n (40MHz)



5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

5.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

Below -20dB 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 $10\log(N)$ since the limit is relative emission limit.

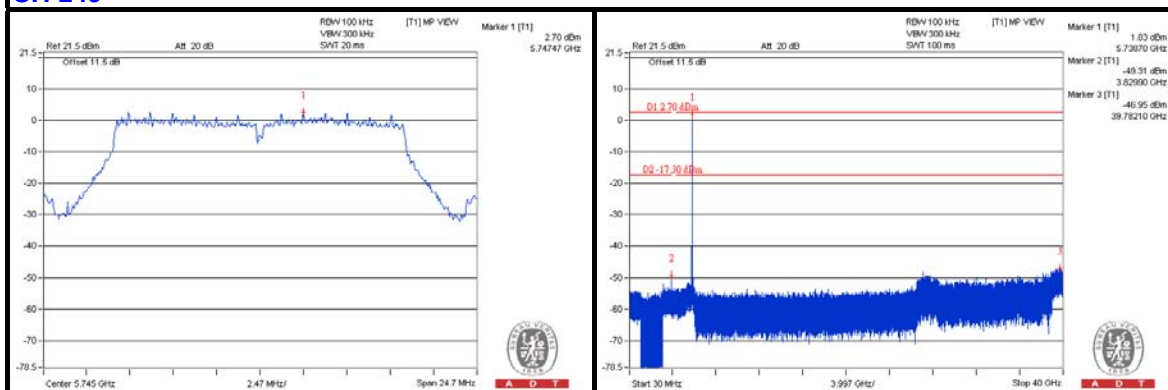
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



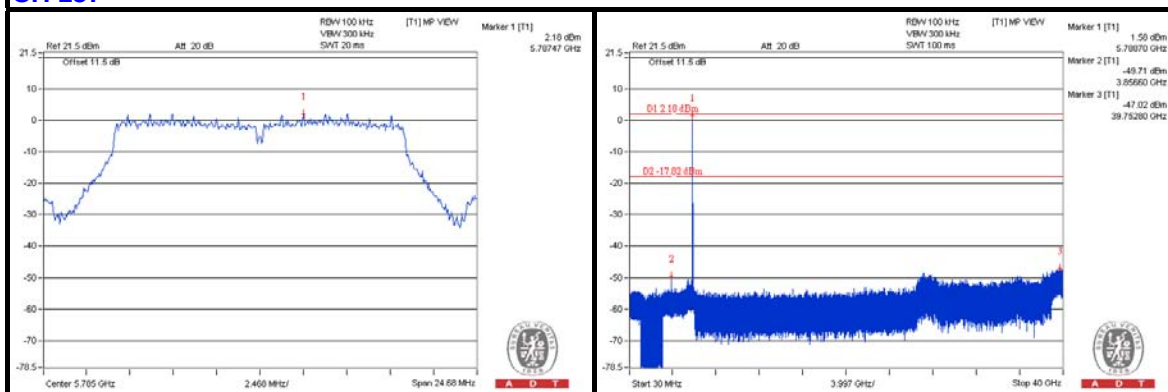
A D T

802.11a
CHAIN 0

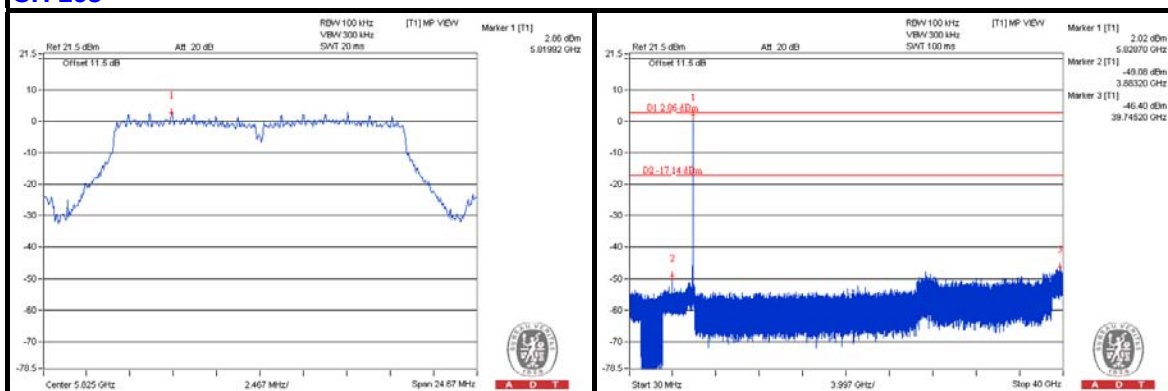
CH 149



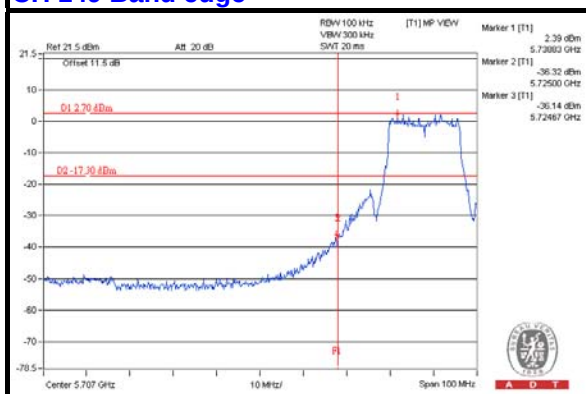
CH 157



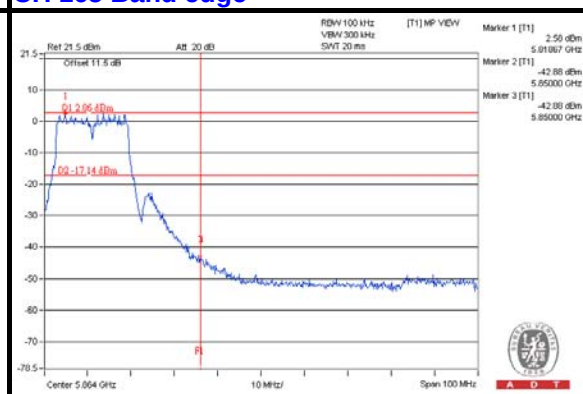
CH 165



CH 149 Band edge



CH 165 Band edge

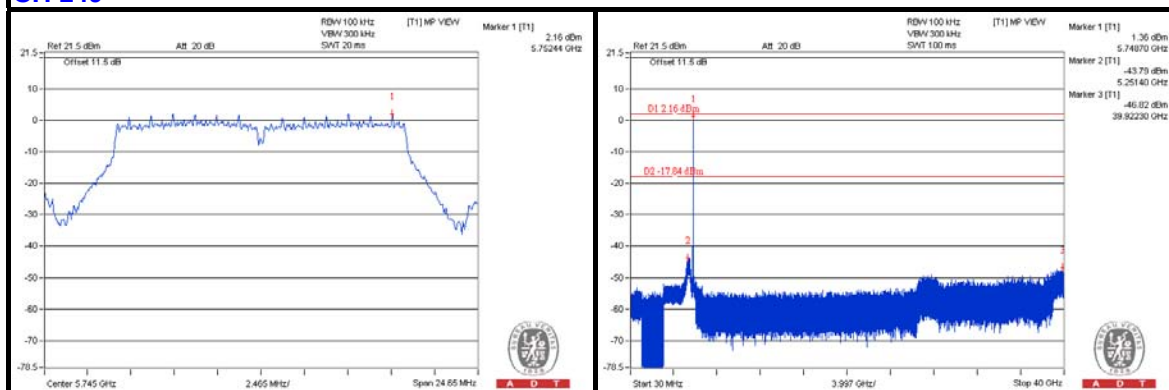




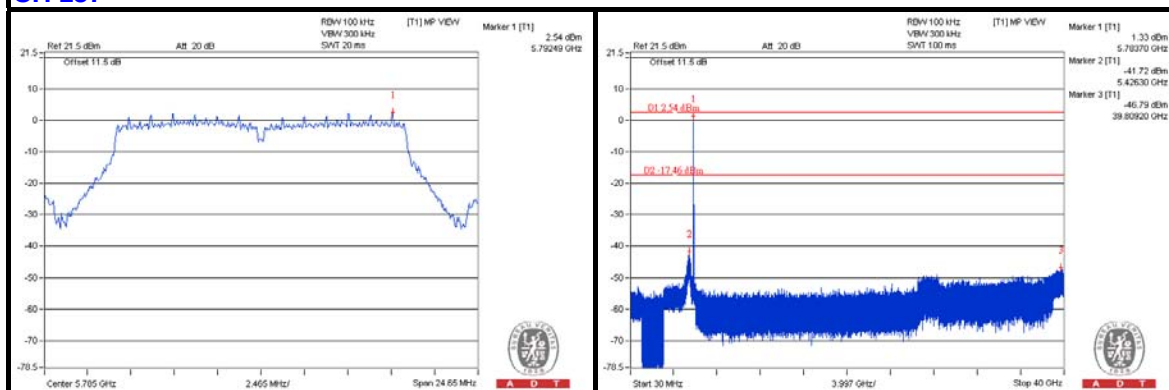
A D T

CHAIN 1

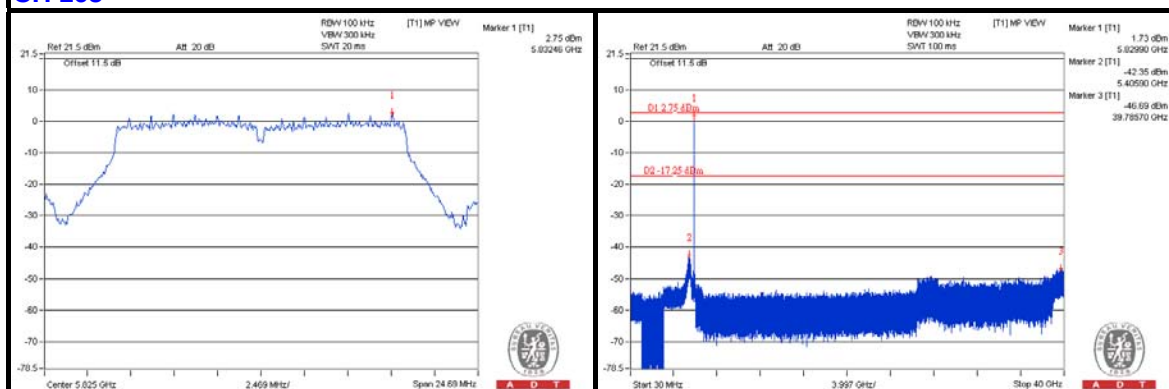
CH 149



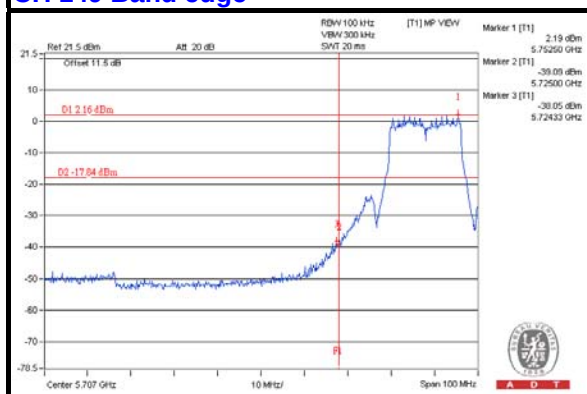
CH 157



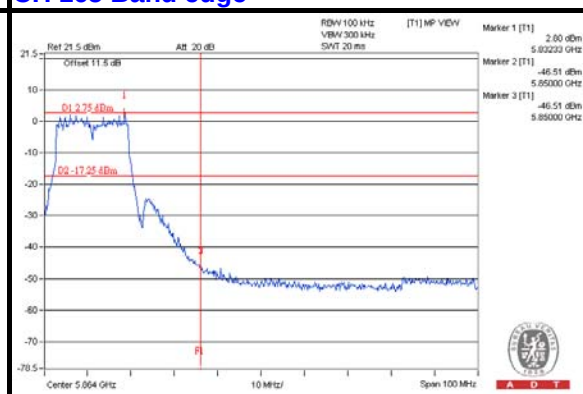
CH 165



CH 149 Band edge



CH 165 Band edge

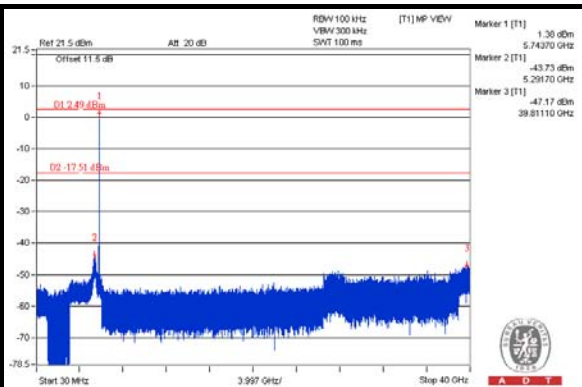
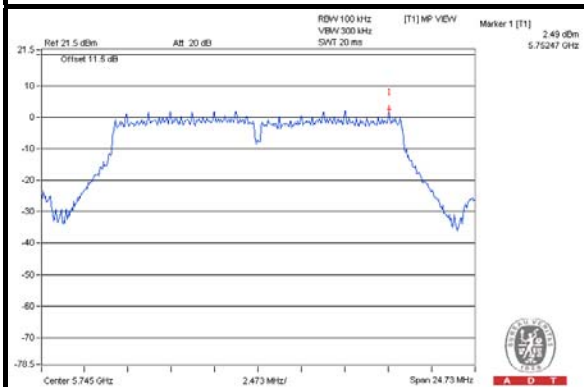




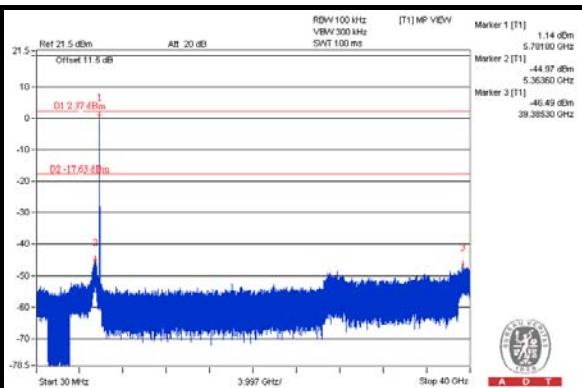
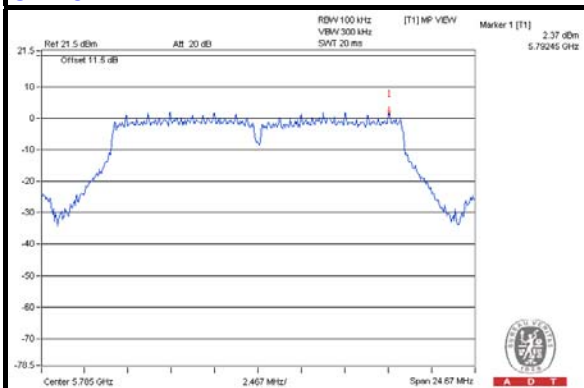
A D T

CHAIN 2

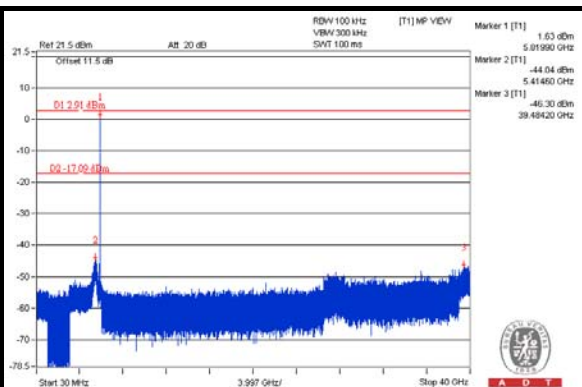
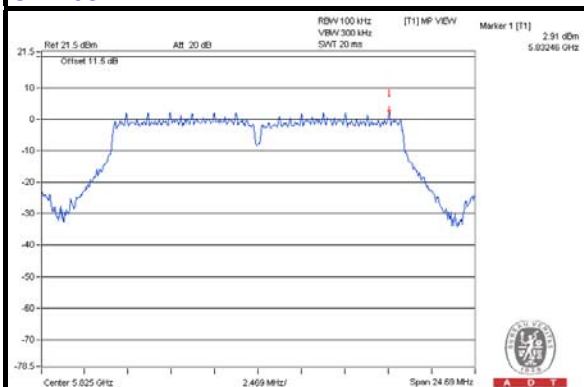
CH 149



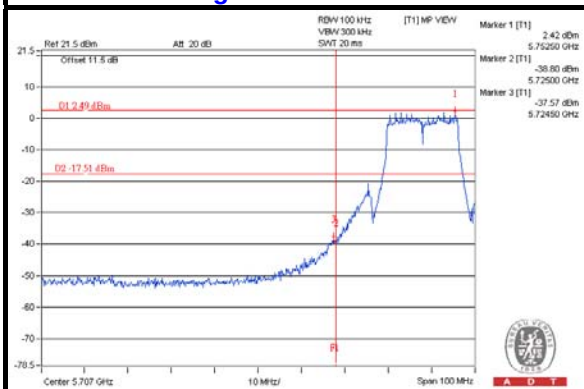
CH 157



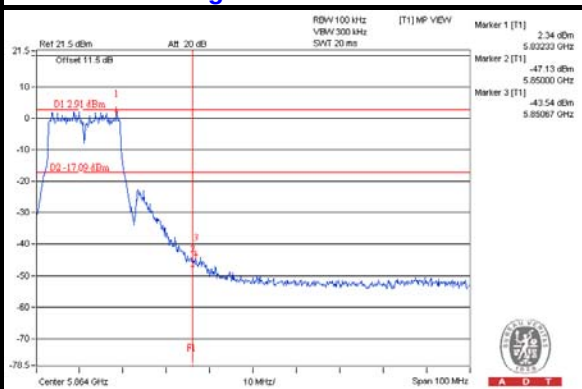
CH 165



CH 149 Band edge



CH 165 Band edge

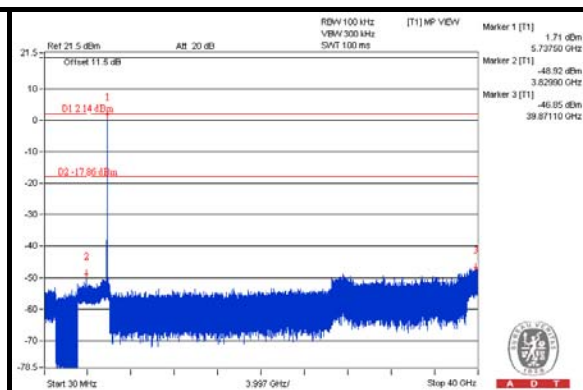
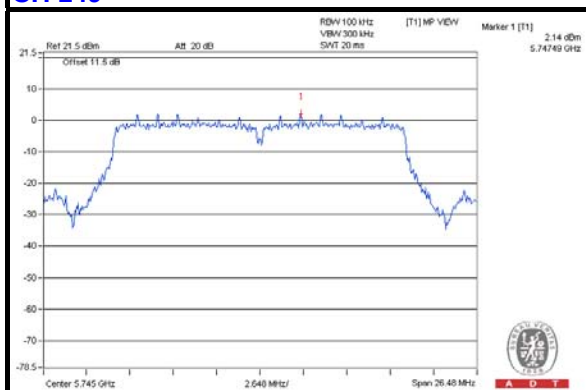




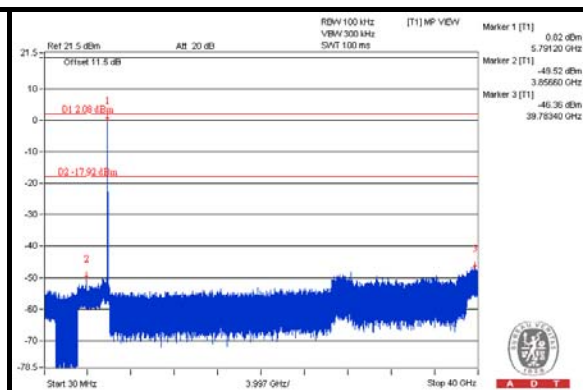
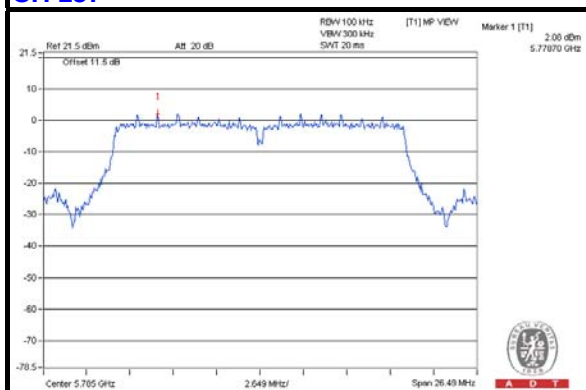
A D T

802.11n (20MHz)
CHAIN 0

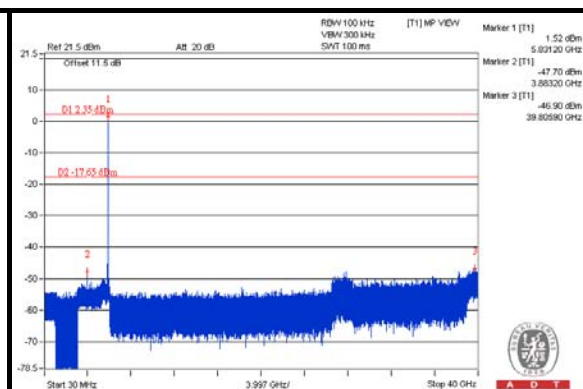
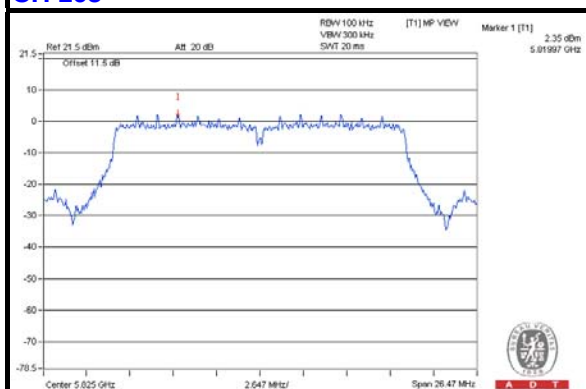
CH 149



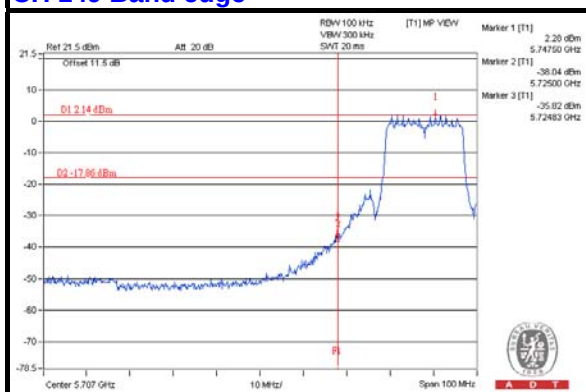
CH 157



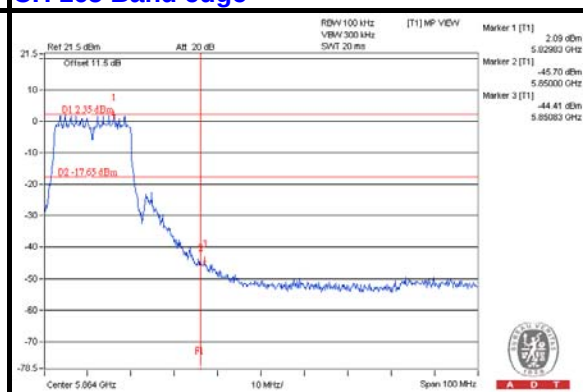
CH 165



CH 149 Band edge



CH 165 Band edge

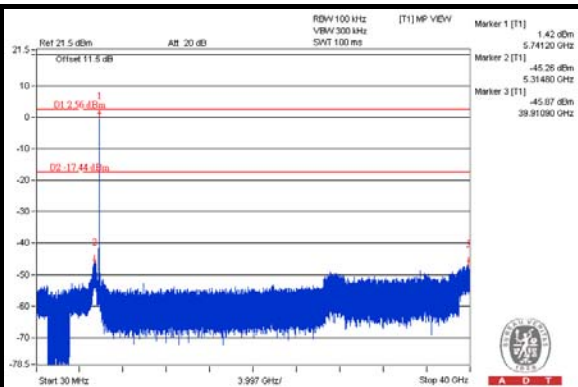
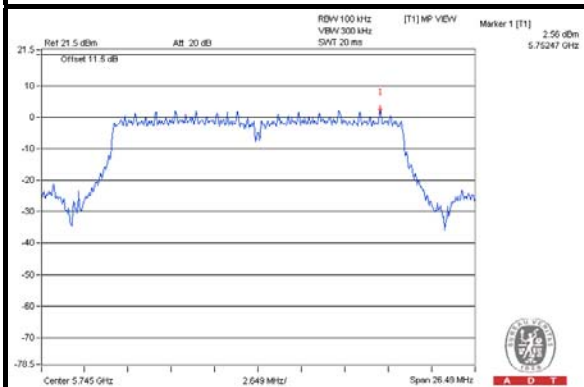




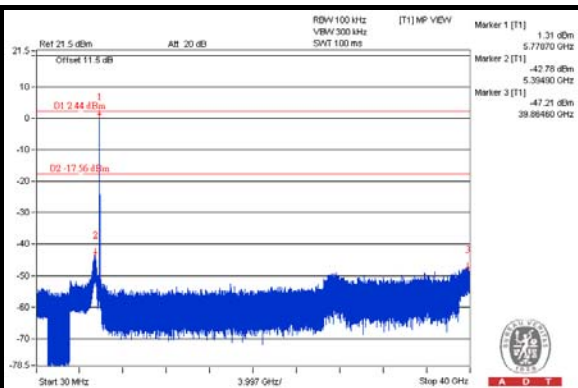
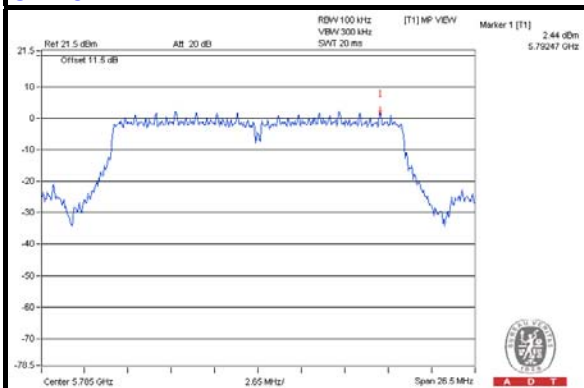
A D T

CHAIN 1

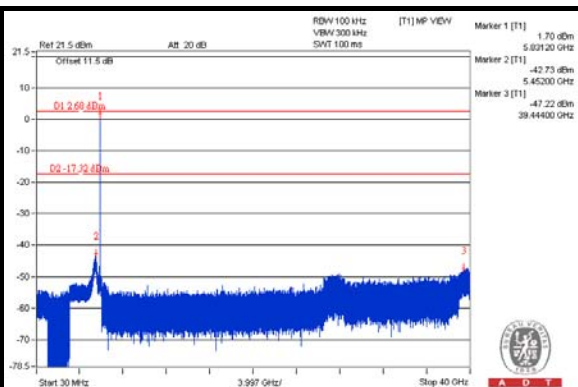
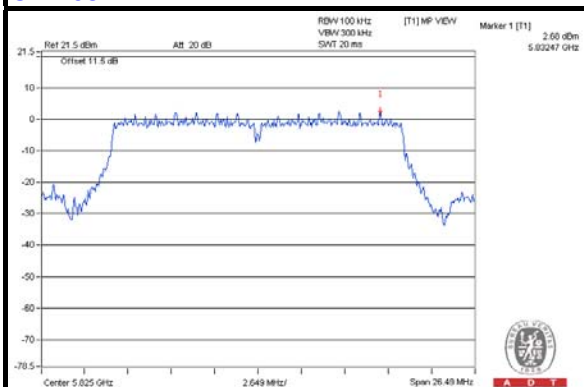
CH 149



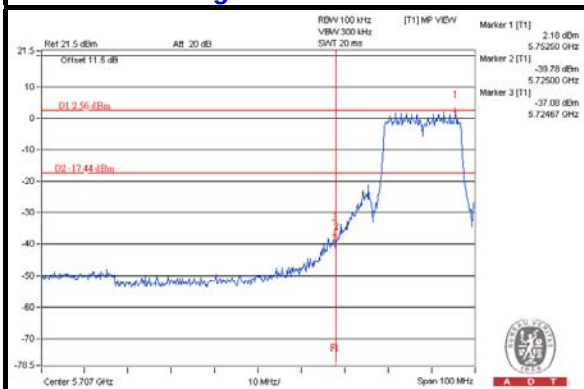
CH 157



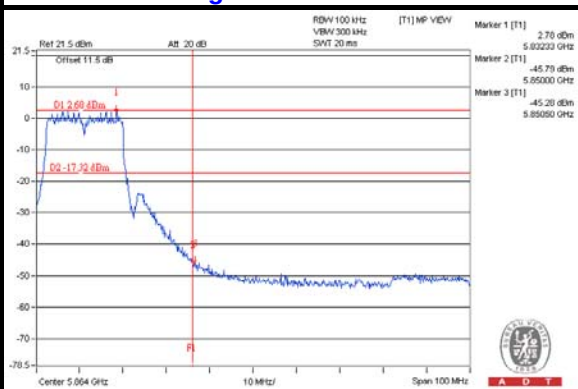
CH 165



CH 149 Band edge



CH 165 Band edge

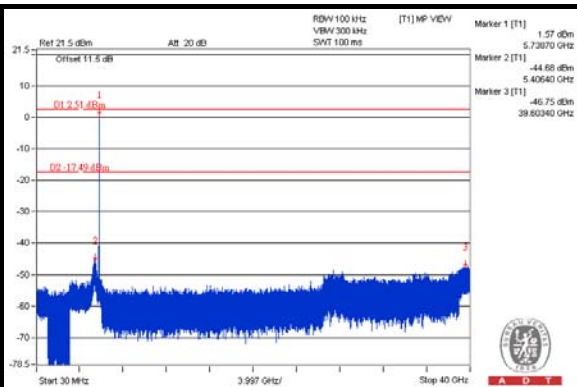
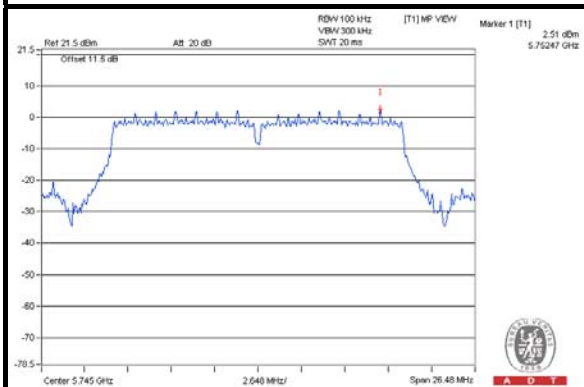




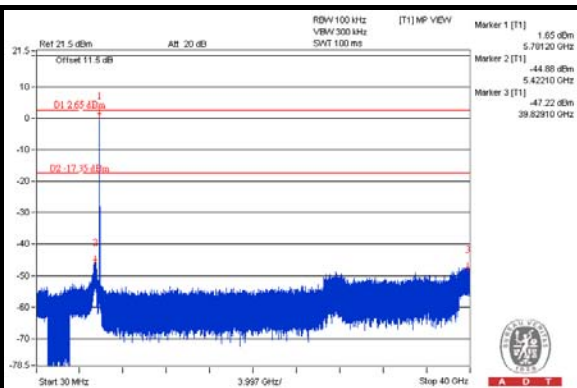
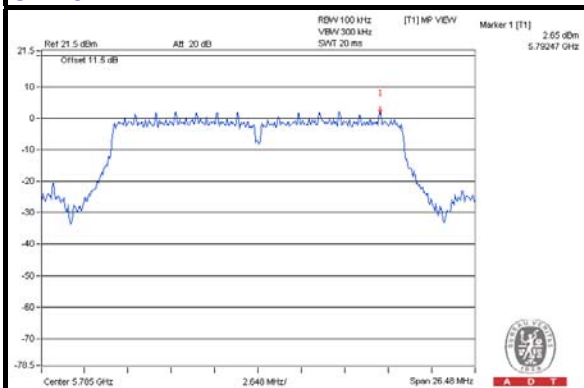
A D T

CHAIN 2

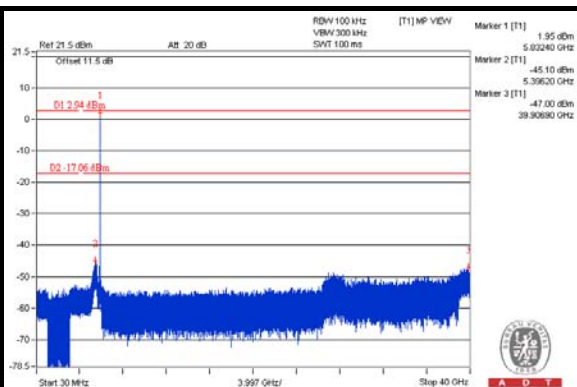
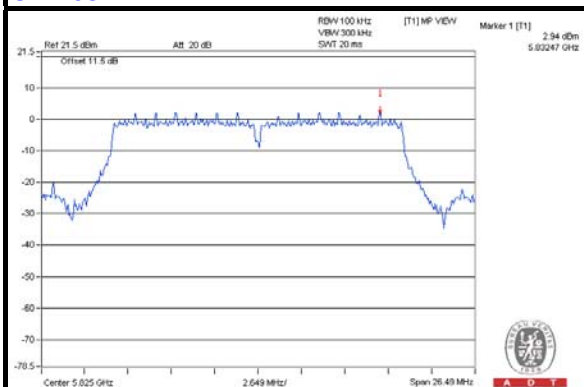
CH 149



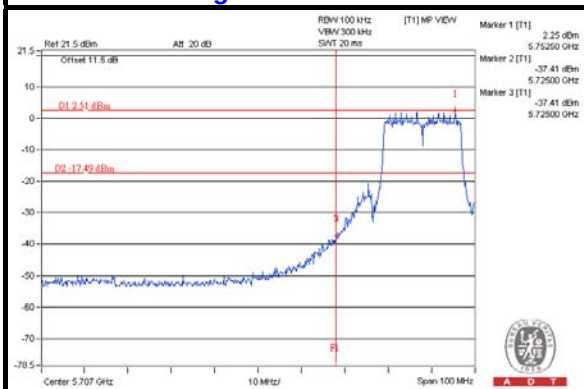
CH 157



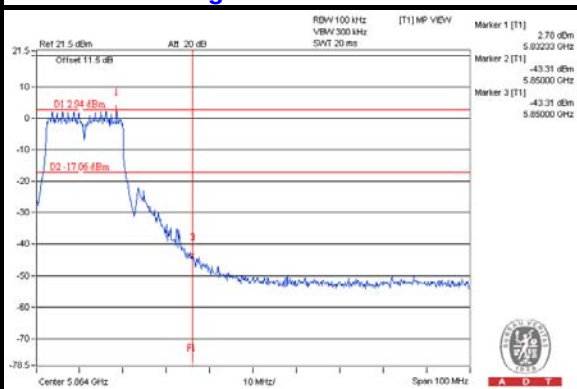
CH 165



CH 149 Band edge



CH 165 Band edge

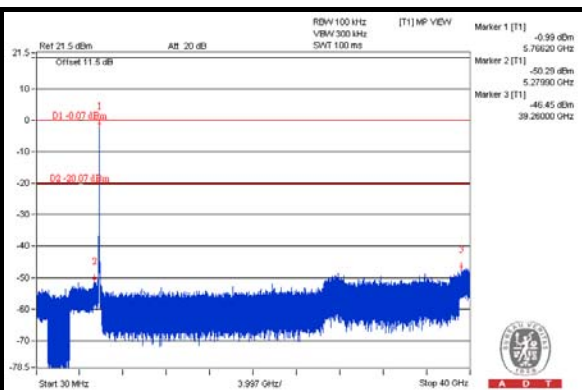
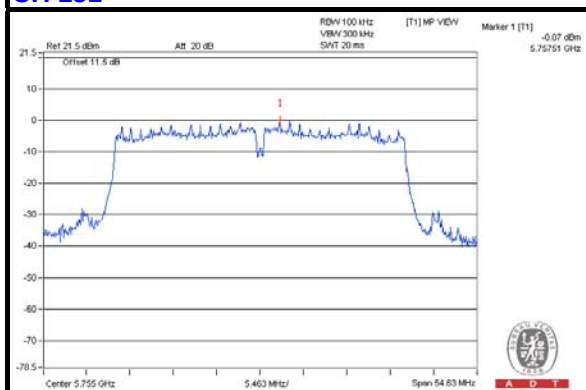




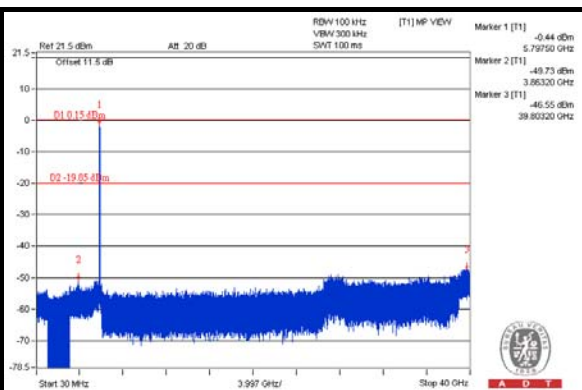
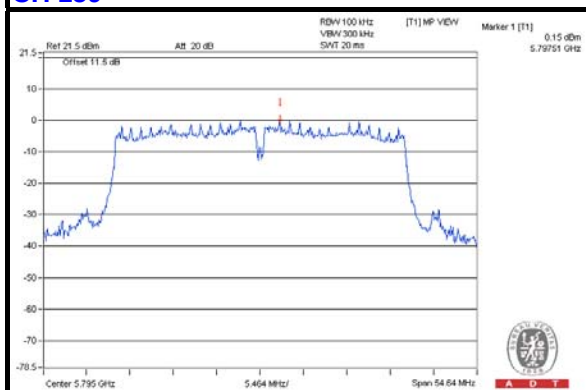
A D T

802.11n (40MHz)
CHAIN 0

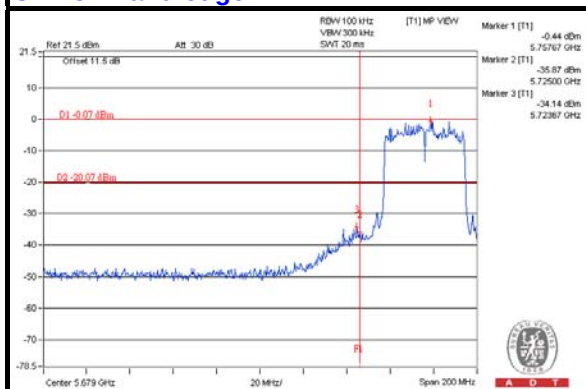
CH 151



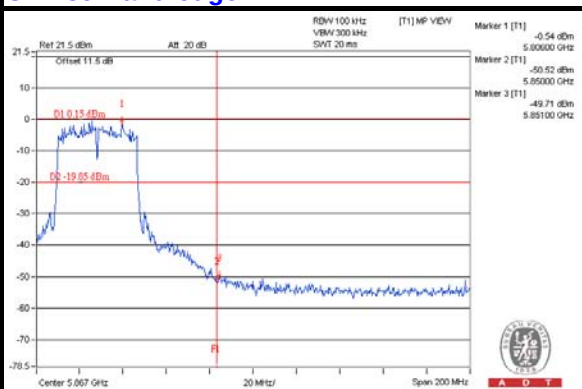
CH 159



CH 151 Band edge



CH 159 Band edge

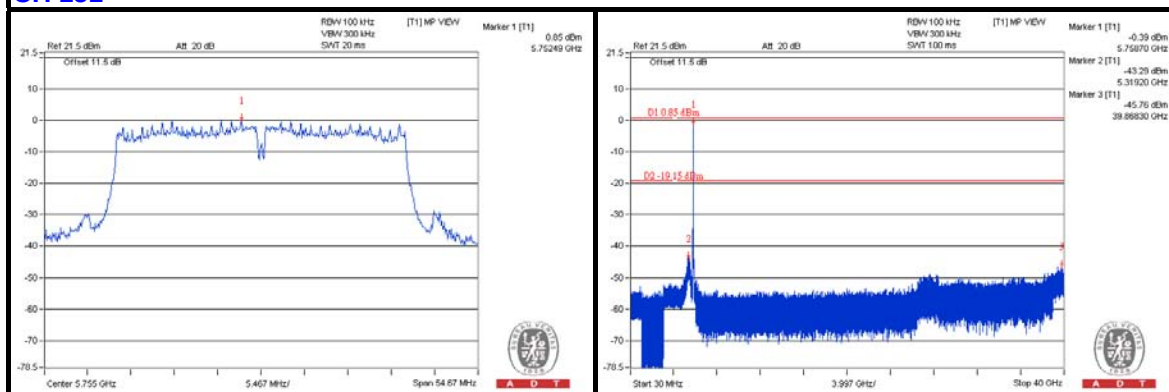




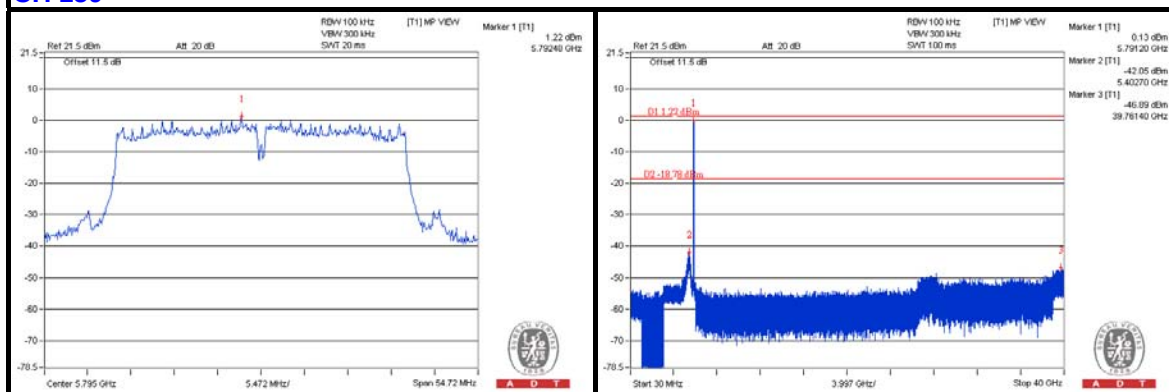
A D T

CHAIN 1

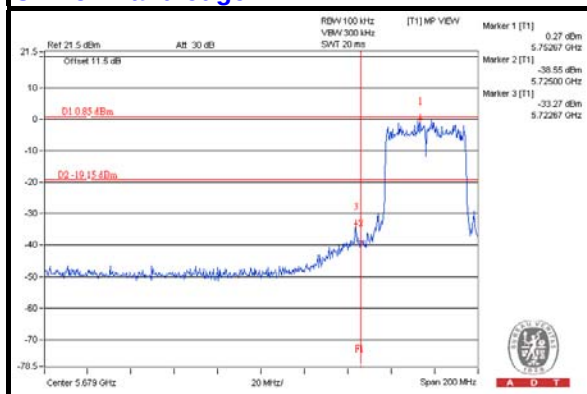
CH 151



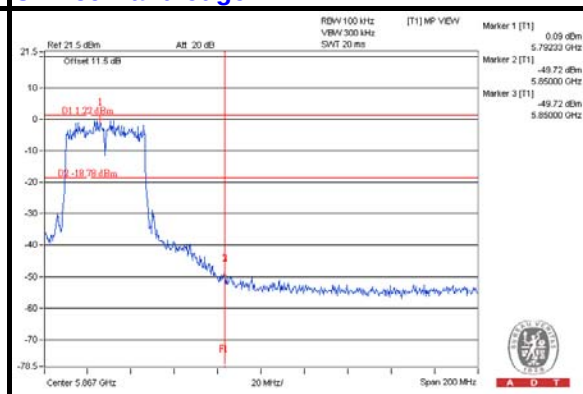
CH 159



CH 151 Band edge



CH 159 Band edge

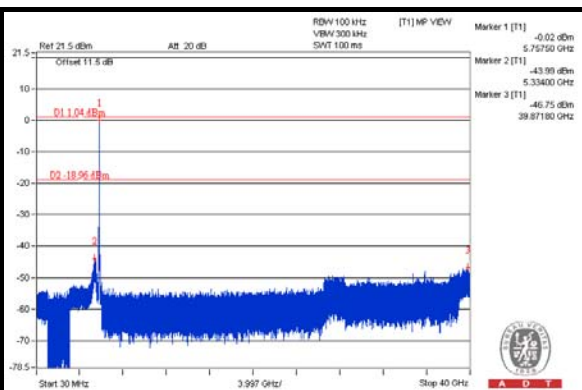
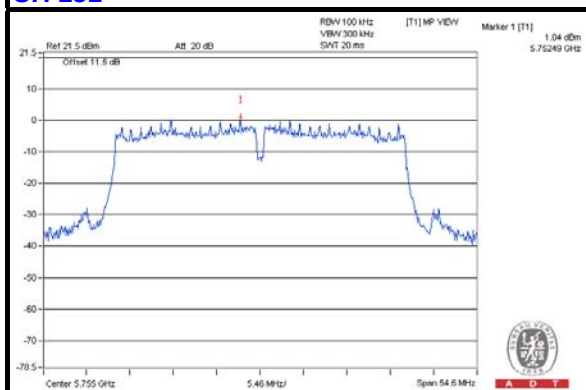




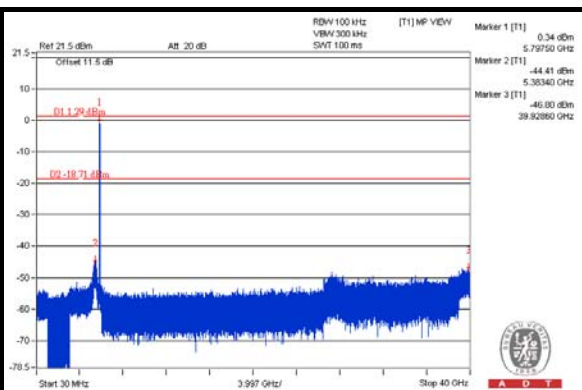
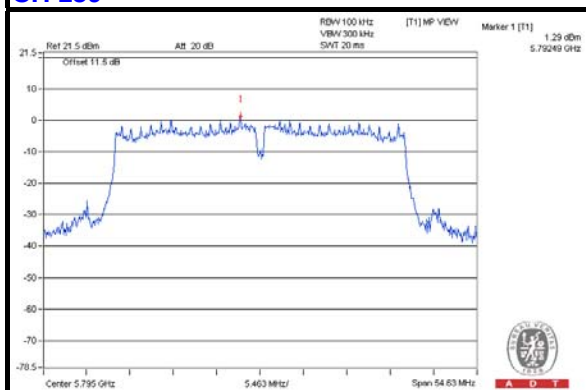
A D T

CHAIN 2

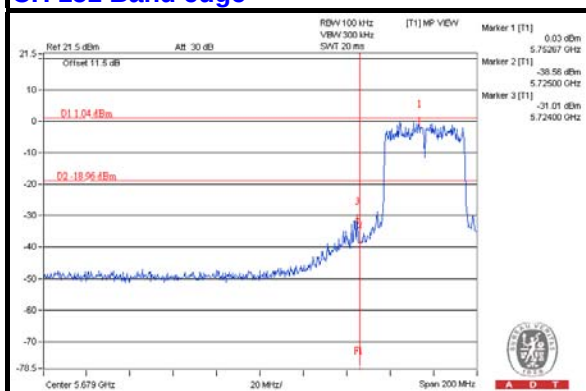
CH 151



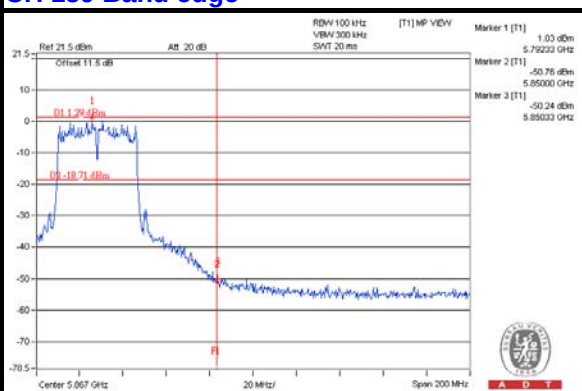
CH 159



CH 151 Band edge



CH 159 Band edge





A D T

6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



A D T

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 Lab

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom 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.



A D T

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---