FCC Test Report

Report No.: RF150415D03

FCC ID: PY315200306

Test Model: D7000

Received Date: Apr. 15, 2015

Test Date: Apr. 20 ~ May 15, 2015

Issued Date: May 18, 2015

Applicant: NETGEAR INC.

Address: 350 East Plumeria Drive, San Jose, CA 95134, USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

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Release Control Record

Issue No.	Description	Date Issued
RF150415D03	Original release.	May 18, 2015

1 Certificate of Conformity

Product: AC1900 WiFi VDSL/ADSL Modem Router

Brand: NETGEAR

Test Model: D7000

Sample Status: Engineering sample

Applicant: NETGEAR INC.

Test Date: Apr. 20 ~ May 15, 2015

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2009

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

Prepared by : _____ , **Date:** May 18, 2015
Celia Chen / Senior Specialist

Approved by : _____ , **Date:** May 18, 2015
Rex Lai / Assistant Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.86dB at 0.55625MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.4dB at 2390.00MHz, 2483.50MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is R-SMA not a standard connector.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.43 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	4.00 dB
Radiated Emissions above 1 GHz	1GHz ~ 40GHz	3.36 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC1900 WiFi VDSL/ADSL Modem Router
Brand	NETGEAR
Test Model	D7000
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from Adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only.
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11/5.5/2/1Mbps 802.11a/g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 450Mbps 802.11ac: up to 1299.9Mbps
Operating Frequency	**2.4GHz:** 2412 ~ 2462MHz **5.0GHz:** 5745 ~ 5825MHz
Number of Channel	**2.4GHz:** 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) **5.0GHz:** 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
Output Power	**2.4GHz** 802.11b: 896.412mW 802.11g: 746.230mW 802.11n (HT20): 749.062mW 802.11n (HT40): 248.623mW **5.0GHz** **CDD Mode:** 802.11a: 920.667mW **Beamforming Mode:** 802.11ac (VHT20): 810.096mW 802.11ac (VHT40): 824.373mW 802.11ac (VHT80): 430.303mW
Antenna Type	**2.4GHz:** Dipole antenna with 1dBi gain **5.0GHz:** Dipole antenna with 2dBi gain
Antenna Connector	R-SMA connector
Accessory Device	Adapter
Data Cable Supplied	Non-shielded DC cable (1.8m) Non-shielded RJ11 cable (1.5m) Non-shielded RJ45 cable (1.5m)

Note:

1. The EUT provides 3 completed transmitters and 3 receivers.

Modulation Mode	TX Function		
	2.4GHz	5.0GHz (Non-Beamforming)	5.0GHz (Beamforming)
802.11b	3TX	-	-
802.11g	3TX	-	-
802.11a	-	3TX	-
802.11n (HT20)	3TX	3TX	-
802.11n (HT40)	3TX	3TX	-
802.11ac (VHT20)	-	3TX	3TX
802.11ac (VHT40)	-	3TX	3TX
802.11ac (VHT80)	-	3TX	3TX

Note: The modulation and bandwidth are similar for 802.11n mode for HT20 (HT40) and 802.11ac mode for VHT20 (VHT40), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

2. The EUT uses following adapter.

Adapter	1	2	3
Brand	NETGEAR	NETGEAR	NETGEAR
Model	AD898020	AD898220	AD898120
AC Input Power	100-240V, 50/60Hz, 1.0A	100-240V, 50/60Hz, 1.0A	100-240V, 50/60Hz, 1.0A
DC Output Power	12V, 3.5A	12V, 3.5A	12V, 3.5A
Plug Type	EU Plug	UK Plug	AU Plug
The adapter 1-3 are identical with each other except for their plug type difference			

Adapter	4
Brand	NETGEAR
Model	MU42-3120350-A1
AC Input Power	100-240V, 50/60Hz, 1.5A
DC Output Power	12V, 3.5A
Plug Type	US Plug

Adapter	5	6	7	8
Brand	NETGEAR	NETGEAR	NETGEAR	NETGEAR
Model	2ABN42F NA	2AAF042F GE	2AAF042F AU	2AAF042F UK
AC Input Power	100-240V, 50/60Hz, 1.3A	100-240V, 50/60Hz, 1.3A	100-240V, 50/60Hz, 1.3A	100-240V, 50/60Hz, 1.3A
DC Output Power	12.0V, 3.5A	12.0V, 3.5A	12.0V, 3.5A	12.0V, 3.5A
Plug Type	US Plug	EU Plug	AU Plug	UK Plug
The adapter 5-8 are identical with each other except for their plug type difference				

After pre-tested above adapters, **adapter 1** was selected as a representative one and therefore only its test data was recorded in this report.

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

3.2 Description of Test Modes

FOR 2.4GHz:

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

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

7 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

FOR 5.0GHz (5745 ~ 5825MHz):

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

FOR 2.4GHz:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE³1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE³1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	19.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	40.5

Radiated Emission Test (Below 1GHz):

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	6	DSSS	DBPSK	1.0

Power Line Conducted Emission Test:

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	6	DSSS	DBPSK	1.0

Bandedge Measurement:

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	19.5
-	802.11n (HT40)	3 to 9	3, 9	OFDM	BPSK	40.5

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	19.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	40.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE^{3}1G	24deg. C, 72%RH	120Vac, 60Hz	Dalen Dai
RE<1G	24deg. C, 72%RH	120Vac, 60Hz	Dalen Dai
PLC	22deg. C, 71%RH	120Vac, 60Hz	Aaron You
APCM	25deg. C, 60%RH	120Vac, 60Hz	Saxon Lee

FOR 5.0 GHz (5745 ~ 5825MHz):

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE³1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE³1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

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.

CDD MODE						
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
Beamforming MODE						
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	19.5
-	802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	40.5
-	802.11ac (VHT80)	155	155	OFDM	BPSK	87.9

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.

CDD MODE						
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	157	OFDM	BPSK	6.0

Power Line Conducted Emission Test:

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

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

CDD MODE						
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	157	OFDM	BPSK	6.0

Bandedge Measurement:

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

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

CDD MODE						
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 165	OFDM	BPSK	6.0
Beamforming MODE						
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11ac (VHT20)	149 to 165	149, 165	OFDM	BPSK	19.5
-	802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	40.5
-	802.11ac (VHT80)	155	155	OFDM	BPSK	87.9

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.

CDD MODE						
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
Beamforming MODE						
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	19.5
-	802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	40.5
-	802.11ac (VHT80)	155	155	OFDM	BPSK	87.9

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE³1G	24deg. C, 72%RH	120Vac, 60Hz	Dalen Dai
RE<1G	24deg. C, 72%RH	120Vac, 60Hz	Dalen Dai
PLC	24deg. C, 70%RH	120Vac, 60Hz	Aaron You
APCM	25deg. C, 60%RH	120Vac, 60Hz	Saxon Lee

3.3 Duty Cycle of Test Signal

For 2.4GHz:

If duty cycle of test signal is < 98%, duty factor shall be considered.

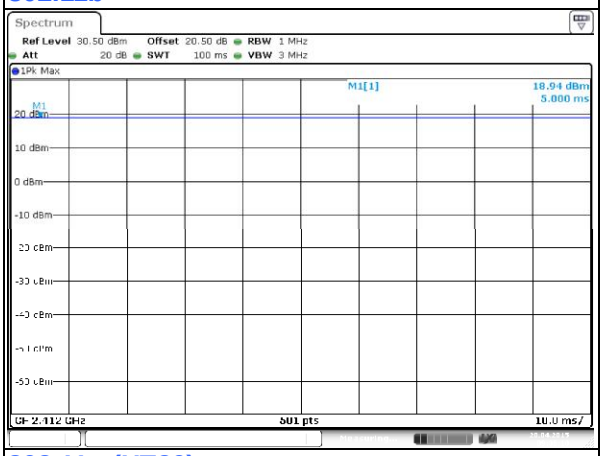
802.11b: Duty cycle of test signal is 100 %, duty factor is not required.

802.11g: Duty cycle = 2.04/2.18 = 0.936, Duty factor = 10 * log(1/0.936) = 0.29

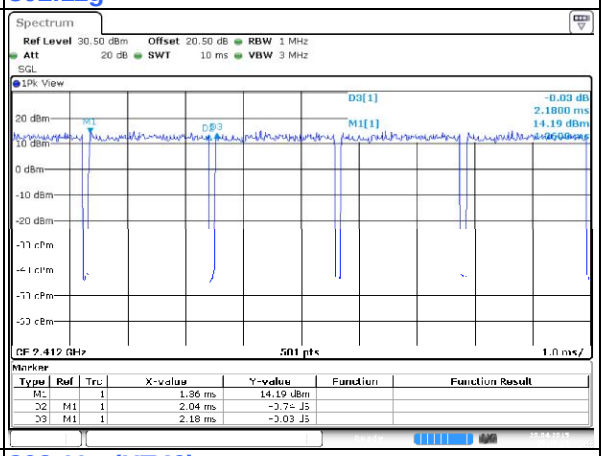
802.11n (HT20): Duty cycle = 0.652/0.776 = 0.84, Duty factor = 10 * log(1/0.84) = 0.76

802.11n (HT40): Duty cycle = 0.316/0.452 = 0.699, Duty factor = 10 * log(1/0.699) = 1.55

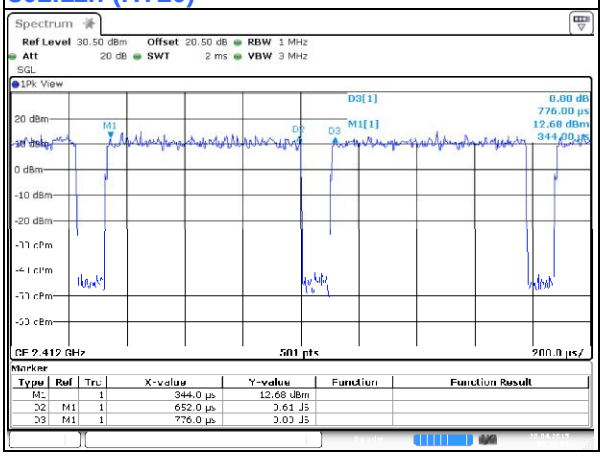
802.11b



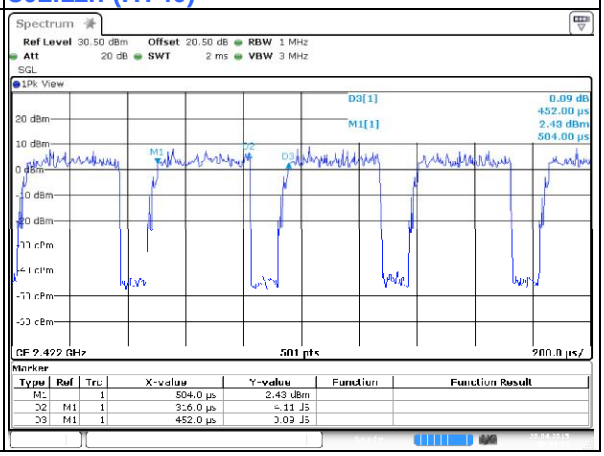
802.11g



802.11n (HT20)



802.11n (HT40)



For 5GHz (5745 ~ 5825MHz):

If duty cycle of test signal is < 98%, duty factor shall be considered.

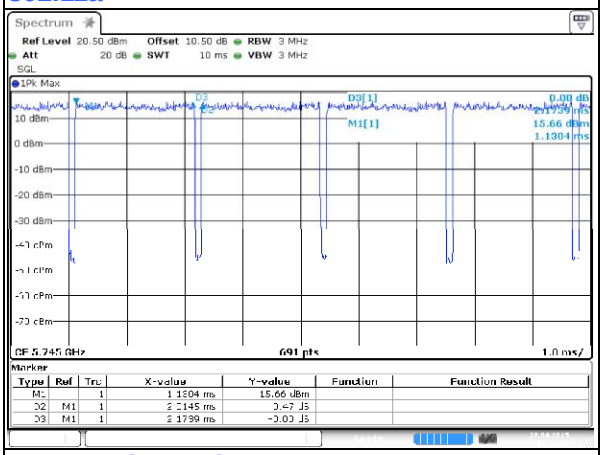
802.11a: Duty cycle = 2.014/2.173 = 0.927, Duty factor = 10 * log(1/0.927) = 0.33

802.11ac (VHT20): Duty cycle = 0.612/0.721 = 0.849, Duty factor = 10 * log(1/0.849) = 0.71

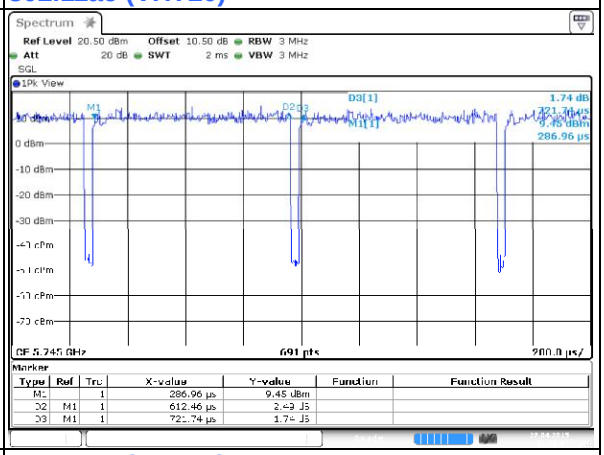
802.11ac (VHT40): Duty cycle = 0.321/0.358 = 0.897, Duty factor = 10 * log(1/0.897) = 0.47

802.11ac (VHT80): Duty cycle = 0.182/0.22 = 0.827, Duty factor = 10 * log(1/0.827) = 0.82

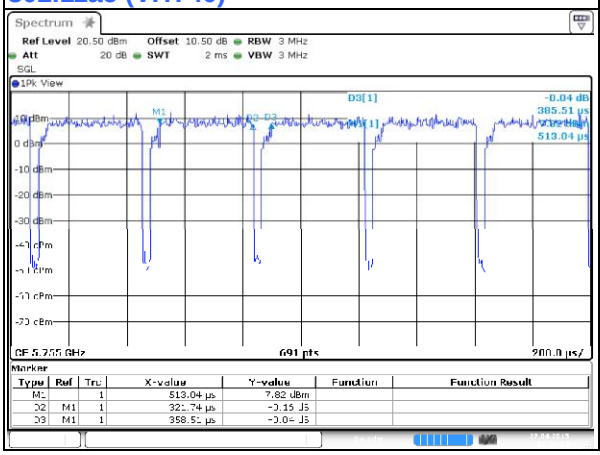
802.11a



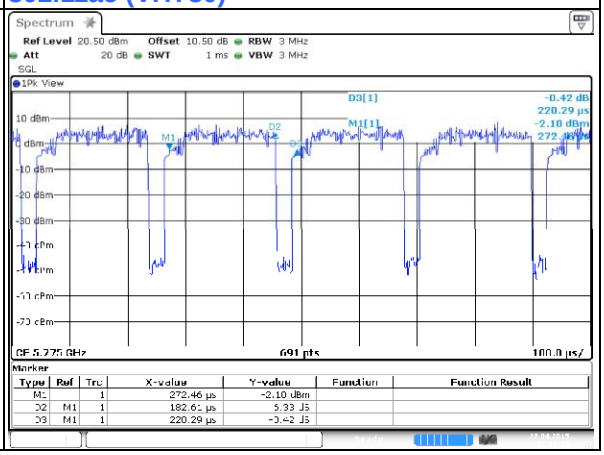
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	EUT	NETGEAR	D7000	-	-	-
B.	AC ADAPTER	NETGEAR	AD898020	N/A	FCC DoC Approved	Supplied by client
C.	LOAD	N/A	N/A	N/A	N/A	Provided by Lab
D.	NOTEBOOK COMPUTER	DELL	PP27L	8SNZ12S	FCC DoC Approved	Provided by Lab
E.	USB 3.0 Hard Disk	WD	WDBACY5000ABL-PESN	WX11E91KL726	FCC DoC Approved	Provided by Lab
	USB 3.0 Hard Disk	WD	WDBACY5000ABL-PESN	WXH1A91A6872	FCC DoC Approved	Provided by Lab

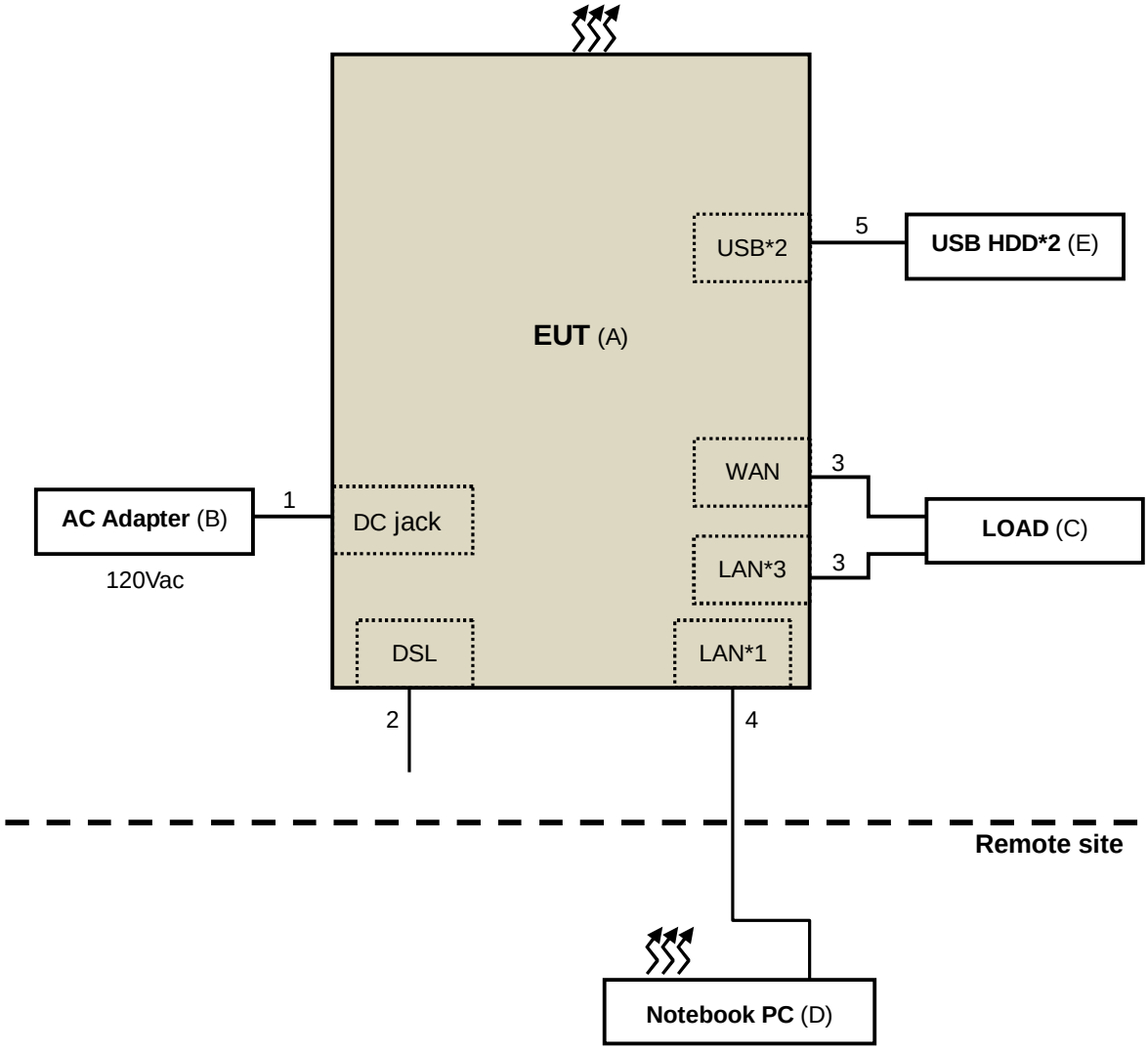
Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.8	N	0	Supplied by client
2.	RJ11 cable	1	1.5	N	0	Supplied by client
3.	RJ45 cable	4	1.8	N	0	Provided by Lab
4.	RJ45 cable	1	10	N	0	Provided by Lab
5.	USB cable	2	0.5	Y	0	Provided by Lab

Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
558074 D01 DTS Meas Guidance v03r02
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2009

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4 Test Types and Results (For 2.4GHz band)

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 26, 2015	Feb. 25, 2016
HP Preamplifier	8449B	3008A01201	Feb. 26, 2015	Feb. 25, 2016
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Mar. 01, 2015	Feb. 28, 2016
Agilent Spectrum	E4446A	MY51100050	Oct. 24, 2014	Oct. 23, 2015
Agilent TEST RECEIVER	N9038A	MY51210129	Jan. 20, 2015	Jan. 19, 2016
Schwarzbeck Antenna	VULB 9168	139	Feb. 04, 2015	Feb. 03, 2016
Schwarzbeck Antenna	VHBA 9123	480	May 29, 2013	May 28, 2015
Schwarzbeck Horn Antenna	BBHA-9170	212	Feb. 09, 2015	Feb. 08, 2016
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Feb. 10, 2015	Feb. 09, 2016
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V7.6.15.9.4	NA	NA	NA
SUHNER RF cable	SF104	CABLE-CH6	Aug. 15, 2014	Aug. 14, 2015
SUHNER RF cable	SF102	Cable-CH8-3.6m	Aug. 15, 2014	Aug. 14, 2015
EMCO Horn Antenna	3115	00028257	Feb. 05, 2015	Feb. 04, 2016
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 29, 2014	Sep. 28, 2015
Anritsu Power Sensor	MA2411B	0738404	Apr. 21, 2015	Apr. 20, 2016
Anritsu Power Meter	ML2495A	0842014	Apr. 21, 2015	Apr. 20, 2016

NOTE:
1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

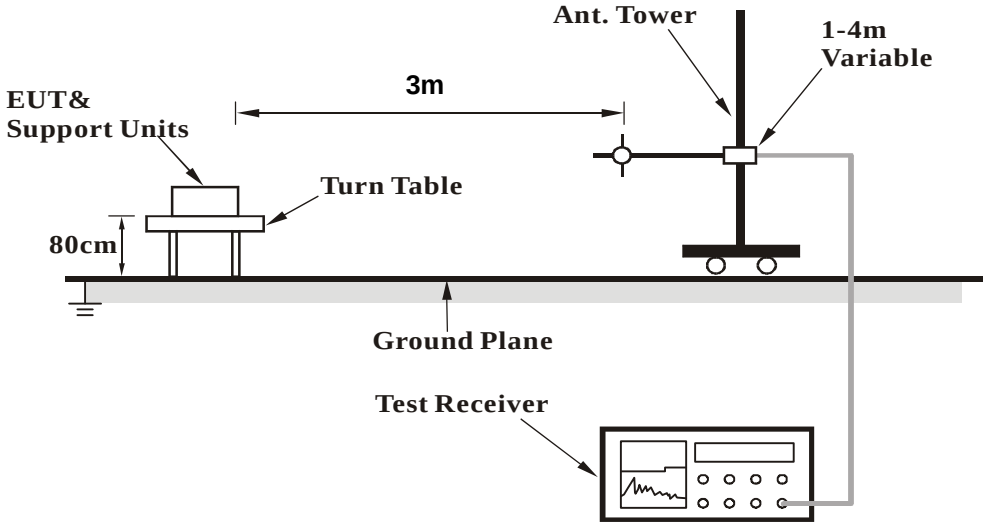
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution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

4.1.4 Deviation from Test Standard

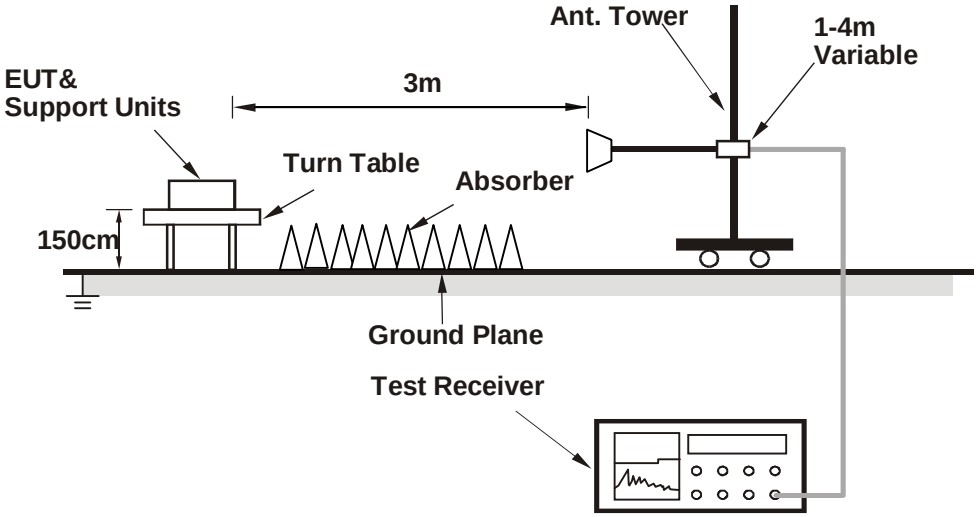
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

a. Placed the EUT on the testing table.
b. Prepared notebooks to act as communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via 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".
e. The necessary accessories enable the system in full functions.

4.1.7 Test Results

Above 1GHz Data：

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	61.6 PK	74.0	-12.4	1.24 H	69	65.94	-4.34
2	2390.00	48.9 AV	54.0	-5.2	1.24 H	69	53.19	-4.34
3	*2412.00	109.4 PK			1.24 H	69	113.61	-4.21
4	*2412.00	105.3 AV			1.24 H	69	109.52	-4.21
5	4824.00	49.6 PK	74.0	-24.4	1.46 H	192	46.65	2.95
6	4824.00	44.1 AV	54.0	-9.9	1.46 H	192	41.17	2.95
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	64.4 PK	74.0	-9.6	1.75 V	16	68.72	-4.34
2	2390.00	53.4 AV	54.0	-0.6	1.75 V	16	57.74	-4.34
3	*2412.00	120.1 PK			1.75 V	16	124.32	-4.21
4	*2412.00	116.2 AV			1.75 V	16	120.37	-4.21
5	4824.00	55.5 PK	74.0	-18.5	2.04 V	334	52.57	2.95
6	4824.00	51.2 AV	54.0	-2.8	2.04 V	334	48.29	2.95

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	110.2 PK			1.23 H	69	114.27	-4.09
2	*2437.00	106.0 AV			1.23 H	69	110.13	-4.09
3	4874.00	50.9 PK	74.0	-23.1	1.59 H	196	47.80	3.06
4	4874.00	45.2 AV	54.0	-8.9	1.59 H	196	42.09	3.06
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	121.0 PK			1.72 V	19	125.08	-4.09
2	*2437.00	116.9 AV			1.72 V	19	120.95	-4.09
3	4874.00	56.2 PK	74.0	-17.8	1.98 V	68	53.17	3.06
4	4874.00	52.1 AV	54.0	-1.9	1.98 V	68	49.08	3.06

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	108.1 PK			1.27 H	65	112.09	-3.95
2	*2462.00	104.0 AV			1.27 H	65	107.93	-3.95
3	2483.50	61.3 PK	74.0	-12.7	1.27 H	65	65.18	-3.85
4	2483.50	49.6 AV	54.0	-4.4	1.27 H	65	53.49	-3.85
5	4924.00	48.5 PK	74.0	-25.5	1.51 H	194	45.29	3.21
6	4924.00	42.9 AV	54.0	-11.1	1.51 H	194	39.71	3.21
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	118.4 PK			1.88 V	10	122.38	-3.95
2	*2462.00	114.3 AV			1.88 V	10	118.27	-3.95
3	2483.50	65.1 PK	74.0	-8.9	1.88 V	10	68.95	-3.85
4	2483.50	53.4 AV	54.0	-0.6	1.88 V	10	57.27	-3.85
5	4924.00	53.8 PK	74.0	-20.2	2.01 V	74	50.61	3.21
6	4924.00	49.1 AV	54.0	-4.9	2.01 V	74	45.93	3.21

REMARKS:

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

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.3 PK	74.0	-7.7	1.00 H	251	70.64	-4.34
2	2390.00	49.5 AV	54.0	-4.5	1.00 H	251	53.86	-4.34
3	*2412.00	108.9 PK			1.00 H	251	113.09	-4.21
4	*2412.00	99.3 AV			1.00 H	251	103.47	-4.21
5	4824.00	48.2 PK	74.0	-25.8	1.08 H	227	45.25	2.95
6	4824.00	33.9 AV	54.0	-20.1	1.08 H	227	30.94	2.95
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	72.6 PK	74.0	-1.5	1.95 V	17	76.89	-4.34
2	2390.00	53.3 AV	54.0	-0.7	1.95 V	17	57.62	-4.34
3	*2412.00	117.4 PK			1.95 V	17	121.63	-4.21
4	*2412.00	107.6 AV			1.95 V	17	111.77	-4.21
5	4824.00	49.8 PK	74.0	-24.2	1.42 V	30	46.81	2.95
6	4824.00	35.5 AV	54.0	-18.5	1.42 V	30	32.56	2.95

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	115.9 PK			1.03 H	277	119.98	-4.09
2	*2437.00	105.6 AV			1.03 H	277	109.64	-4.09
3	4874.00	48.9 PK	74.0	-25.1	1.24 H	293	45.81	3.06
4	4874.00	34.8 AV	54.0	-19.2	1.24 H	293	31.75	3.06
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	123.8 PK			2.55 V	171	127.84	-4.09
2	*2437.00	113.4 AV			2.55 V	171	117.53	-4.09
3	4874.00	50.7 PK	74.0	-23.3	1.10 V	167	47.62	3.06
4	4874.00	37.8 AV	54.0	-16.3	1.10 V	167	34.69	3.06

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.0 PK			1.02 H	265	110.96	-3.95
2	*2462.00	96.8 AV			1.02 H	265	100.78	-3.95
3	2483.50	63.6 PK	74.0	-10.4	1.02 H	265	67.46	-3.85
4	2483.50	49.4 AV	54.0	-4.6	1.02 H	265	53.29	-3.85
5	4924.00	47.8 PK	74.0	-26.2	1.31 H	277	44.63	3.21
6	4924.00	33.6 AV	54.0	-20.4	1.31 H	277	30.41	3.21
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	114.6 PK			2.07 V	353	118.54	-3.95
2	*2462.00	104.6 AV			2.07 V	353	108.53	-3.95
3	2483.50	72.6 PK	74.0	-1.4	2.07 V	353	76.48	-3.85
4	2483.50	53.4 AV	54.0	-0.6	2.07 V	353	57.23	-3.85
5	4924.00	49.5 PK	74.0	-24.5	1.25 V	84	46.31	3.21
6	4924.00	35.1 AV	54.0	-18.9	1.25 V	84	31.88	3.21

REMARKS:

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

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.7 PK	74.0	-10.3	1.00 H	155	68.07	-4.34
2	2390.00	48.5 AV	54.0	-5.5	1.00 H	155	52.82	-4.34
3	*2412.00	108.0 PK			1.00 H	155	112.24	-4.21
4	*2412.00	95.6 AV			1.00 H	155	99.81	-4.21
5	4824.00	47.6 PK	74.0	-26.4	1.00 H	265	44.69	2.95
6	4824.00	33.2 AV	54.0	-20.8	1.00 H	265	30.26	2.95
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.8 PK	74.0	-3.2	1.48 V	199	75.13	-4.34
2	**2390.00**	**53.6 AV**	**54.0**	**-0.4**	**1.48 V**	**199**	**57.91**	**-4.34**
3	*2412.00	116.5 PK			1.48 V	199	120.72	-4.21
4	*2412.00	104.3 AV			1.48 V	199	108.55	-4.21
5	4824.00	48.2 PK	74.0	-25.8	1.34 V	105	45.27	2.95
6	4824.00	34.4 AV	54.0	-19.6	1.34 V	105	31.46	2.95

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	113.3 PK			1.02 H	161	117.34	-4.09
2	*2437.00	99.9 AV			1.02 H	161	103.97	-4.09
3	4874.00	49.0 PK	74.0	-25.1	1.12 H	294	45.89	3.06
4	4874.00	35.1 AV	54.0	-18.9	1.12 H	294	32.05	3.06
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	121.6 PK			1.47 V	201	125.72	-4.09
2	*2437.00	108.7 AV			1.47 V	201	112.83	-4.09
3	4874.00	50.2 PK	74.0	-23.8	1.27 V	96	47.18	3.06
4	4874.00	36.6 AV	54.0	-17.4	1.27 V	96	33.52	3.06

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.0 PK			1.03 H	145	109.93	-3.95
2	*2462.00	92.8 AV			1.03 H	145	96.77	-3.95
3	2483.50	61.6 PK	74.0	-12.4	1.03 H	145	65.49	-3.85
4	2483.50	48.7 AV	54.0	-5.3	1.03 H	145	52.57	-3.85
5	4924.00	46.7 PK	74.0	-27.3	1.00 H	291	43.51	3.21
6	4924.00	33.1 AV	54.0	-20.9	1.00 H	291	29.88	3.21
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	113.4 PK			1.49 V	197	117.37	-3.95
2	*2462.00	101.0 AV			1.49 V	197	104.95	-3.95
3	2483.50	71.0 PK	74.0	-3.0	1.49 V	197	74.89	-3.85
4	**2483.50**	**53.6 AV**	**54.0**	**-0.4**	**1.49 V**	**197**	**57.48**	**-3.85**
5	4924.00	48.1 PK	74.0	-25.9	1.29 V	83	44.93	3.21
6	4924.00	34.4 AV	54.0	-19.6	1.29 V	83	31.15	3.21

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.7 PK	74.0	-9.3	1.17 H	207	69.07	-4.34
2	2390.00	48.6 AV	54.0	-5.5	1.17 H	207	52.89	-4.34
3	*2422.00	104.7 PK			1.17 H	207	108.81	-4.16
4	*2422.00	91.6 AV			1.17 H	207	95.74	-4.16
5	4844.00	47.8 PK	74.0	-26.2	1.01 H	254	44.81	2.99
6	4844.00	34.6 AV	54.0	-19.5	1.01 H	254	31.56	2.99
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	73.5 PK	74.0	-0.5	1.32 V	203	77.82	-4.34
2	2390.00	52.2 AV	54.0	-1.8	1.32 V	203	56.56	-4.34
3	*2422.00	113.3 PK			1.32 V	203	117.44	-4.16
4	*2422.00	98.6 AV			1.32 V	203	102.79	-4.16
5	4844.00	48.4 PK	74.0	-25.6	1.56 V	129	45.38	2.99
6	4844.00	35.2 AV	54.0	-18.8	1.56 V	129	32.17	2.99

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	103.8 PK			1.21 H	210	107.92	-4.09
2	*2437.00	91.1 AV			1.21 H	210	95.14	-4.09
3	2483.50	65.1 PK	74.0	-8.9	1.21 H	210	68.91	-3.85
4	2483.50	48.5 AV	54.0	-5.5	1.21 H	210	52.37	-3.85
5	4874.00	47.7 PK	74.0	-26.3	1.03 H	277	44.63	3.06
6	4874.00	34.3 AV	54.0	-19.7	1.03 H	277	31.27	3.06
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	113.5 PK			2.06 V	350	117.56	-4.09
2	*2437.00	99.6 AV			2.06 V	350	103.64	-4.09
3	2483.50	73.5 PK	74.0	-0.5	2.06 V	350	77.32	-3.85
4	2483.50	51.4 AV	54.0	-2.6	2.06 V	350	55.27	-3.85
5	4874.00	48.6 PK	74.0	-25.4	1.41 V	139	45.53	3.06
6	4874.00	35.5 AV	54.0	-18.5	1.41 V	139	32.41	3.06

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	101.9 PK			1.30 H	223	105.92	-4.01
2	*2452.00	87.9 AV			1.30 H	223	91.87	-4.01
3	2483.50	66.1 PK	74.0	-7.9	1.30 H	223	69.94	-3.85
4	2483.50	49.6 AV	54.0	-4.4	1.30 H	223	53.49	-3.85
5	4904.00	48.0 PK	74.0	-26.0	1.05 H	307	44.85	3.14
6	4904.00	34.6 AV	54.0	-19.4	1.05 H	307	31.43	3.14
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	110.4 PK			1.44 V	196	114.42	-4.01
2	*2452.00	96.4 AV			1.44 V	196	100.36	-4.01
3	2483.50	73.1 PK	74.0	-0.9	1.44 V	196	76.99	-3.85
4	2483.50	53.5 AV	54.0	-0.5	1.44 V	196	57.38	-3.85
5	4904.00	49.1 PK	74.0	-25.0	1.22 V	277	45.91	3.14
6	4904.00	35.7 AV	54.0	-18.3	1.22 V	277	32.56	3.14

REMARKS:

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

Below 1GHz Data:

802.11b

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	35.04	22.8 QP	40.0	-17.2	1.46 H	102	38.12	-15.28
2	109.35	33.9 QP	43.5	-9.6	1.68 H	269	51.17	-17.28
3	167.77	27.0 QP	43.5	-16.5	1.33 H	177	40.67	-13.65
4	195.92	25.8 QP	43.5	-17.7	2.27 H	111	42.14	-16.31
5	371.19	24.4 QP	46.0	-21.6	1.74 H	67	35.39	-10.99
6	532.46	36.9 QP	46.0	-9.1	1.92 H	159	44.85	-7.95
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	35.07	36.2 QP	40.0	-3.8	1.77 V	187	51.50	-15.27
2	107.99	34.4 QP	43.5	-9.1	1.35 V	178	51.87	-17.43
3	166.96	26.6 QP	43.5	-16.9	1.62 V	73	40.30	-13.66
4	350.58	28.9 QP	46.0	-17.1	1.88 V	118	40.53	-11.63
5	532.41	37.6 QP	46.0	-8.4	1.93 V	118	45.55	-7.95
6	874.95	27.4 QP	46.0	-18.6	2.17 V	48	29.44	-2.08

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 (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100292	Dec. 18, 2014	Dec. 17, 2015
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	100104	Dec. 04, 2014	Dec. 03, 2015
LISN With Adapter (for EUT)	AD10	C09Ada-001	Dec. 04, 2014	Dec. 03, 2015
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	847265/023	Oct. 21, 2014	Oct. 20, 2015
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 08, 2014	May 07, 2015
Software	ADT_Cond_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C09.01	Feb. 24, 2015	Feb. 23, 2016
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 20, 2014	May 19, 2015
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 20, 2014	Nov. 19, 2015
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 20, 2014	Nov. 19, 2015

Notes: 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 Shielded Room No. 9.
3. The VCCI Site Registration No. C-1312.

4.2.3 Test Procedures

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

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

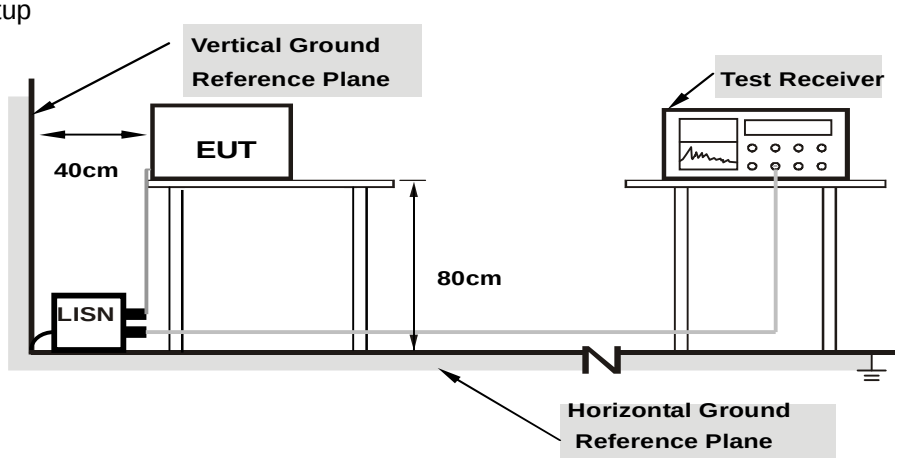
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as item 4.1.6.

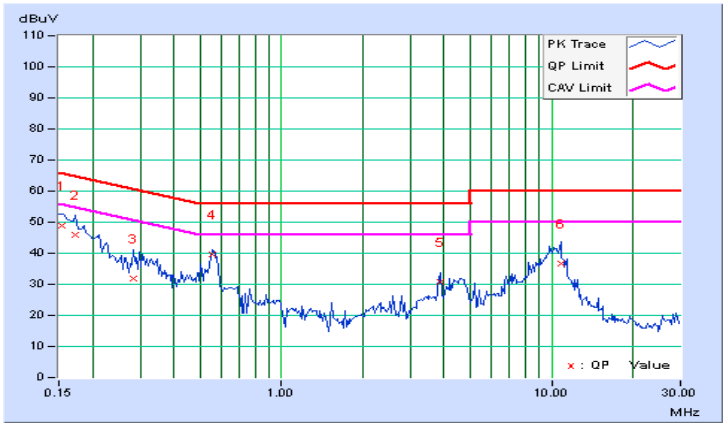
4.2.7 Test Results

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

No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.22	48.67	33.79	48.89	34.01	65.79	55.79	-16.90	-21.78
2	0.17344	0.23	45.55	32.20	45.78	32.43	64.79	54.79	-19.02	-22.37
3	0.28281	0.28	31.73	18.88	32.01	19.16	60.73	50.73	-28.73	-31.58
4	**0.55625**	**0.36**	**39.27**	**34.78**	**39.63**	**35.14**	**56.00**	**46.00**	**-16.37**	**-10.86**
5	3.88672	0.67	29.92	19.47	30.59	20.14	56.00	46.00	-25.41	-25.86
6	10.80078	0.98	35.66	30.08	36.64	31.06	60.00	50.00	-23.36	-18.94

Remarks:

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

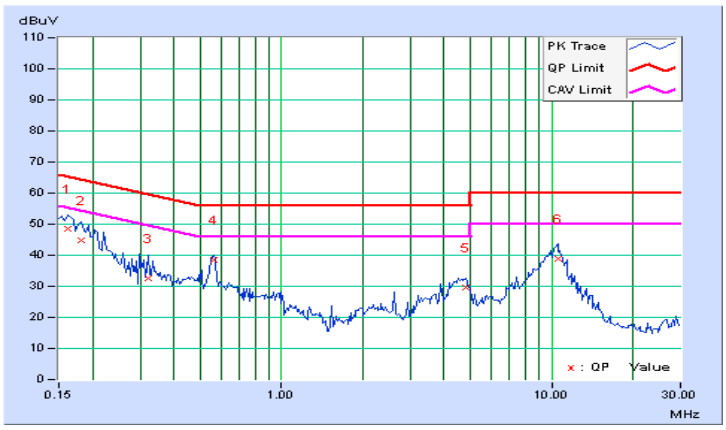


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.22	48.14	34.01	48.36	34.23	65.38	55.38	-17.01	-21.14
2	0.18125	0.24	44.67	32.78	44.91	33.02	64.43	54.43	-19.52	-21.41
3	0.32188	0.29	32.43	25.74	32.72	26.03	59.66	49.66	-26.94	-23.63
4	0.56016	0.35	38.30	33.22	38.65	33.57	56.00	46.00	-17.35	-12.43
5	4.78906	0.70	29.01	20.83	29.71	21.53	56.00	46.00	-26.29	-24.47
6	10.51953	0.91	38.06	32.52	38.97	33.43	60.00	50.00	-21.03	-16.57

Remarks:

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

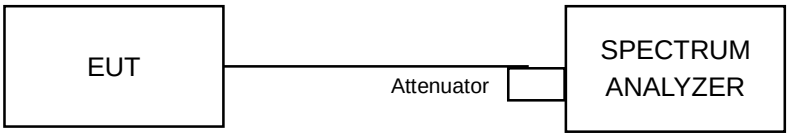


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Results

802.11b

Channel	Frequency (MHz)	6db Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	8.57	8.58	8.58	0.5	PASS
6	2437	8.61	8.10	9.07	0.5	PASS
11	2462	8.10	8.58	8.10	0.5	PASS

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Channel	Frequency (MHz)	6db Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.39	16.41	16.39	0.5	PASS
6	2437	16.39	16.38	16.42	0.5	PASS
11	2462	16.38	16.37	16.39	0.5	PASS

802.11n (HT20)

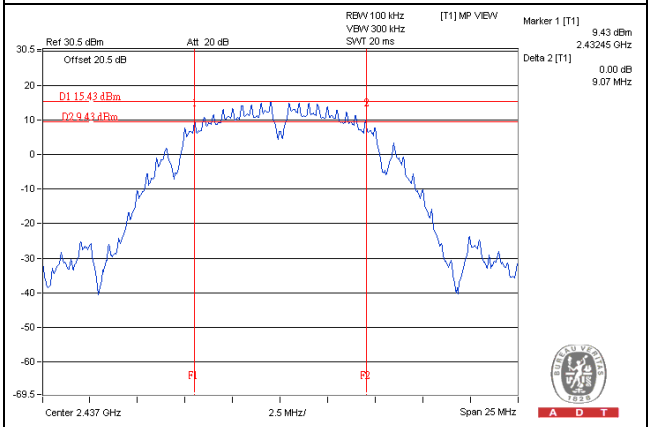
Channel	Frequency (MHz)	6db Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.29	17.67	17.03	0.5	Pass
6	2437	17.63	17.63	17.66	0.5	Pass
11	2462	17.61	17.66	17.61	0.5	Pass

802.11n (HT40)

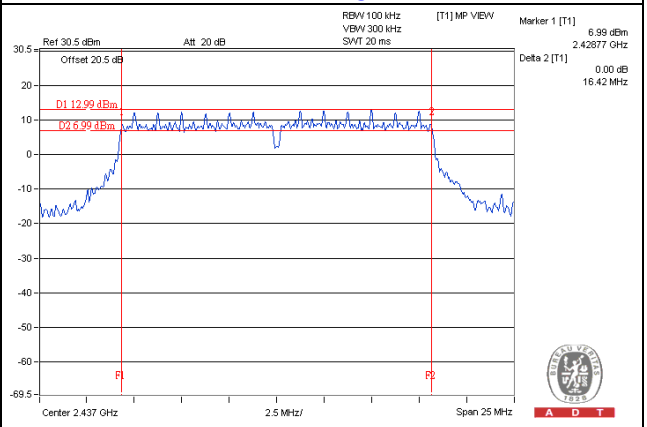
Channel	Frequency (MHz)	6db Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	35.87	35.93	35.86	0.5	Pass
6	2437	36.18	35.89	36.10	0.5	Pass
9	2452	35.82	36.45	35.88	0.5	Pass

Spectrum Plot of Worst Value

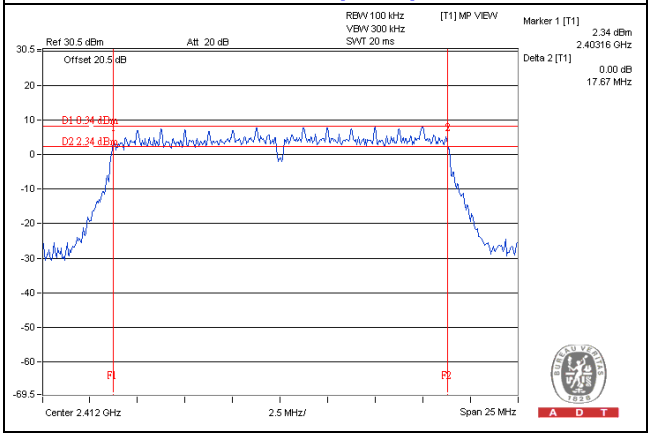
802.11b



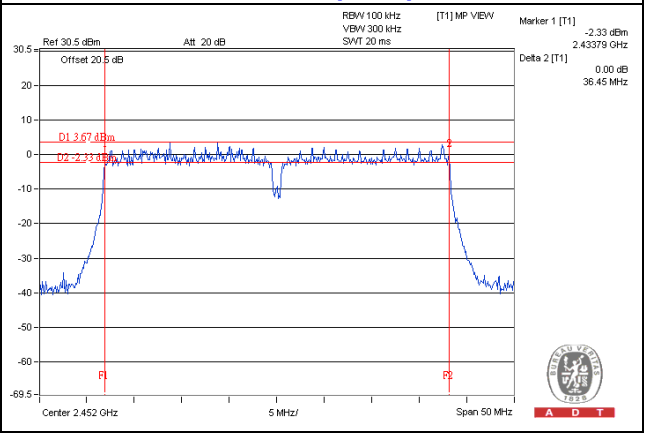
802.11g



802.11n (HT20)



802.11n (HT40)



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

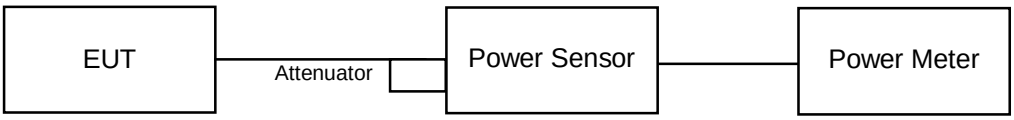
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	23.94	23.90	23.76	730.897	28.64	30	Pass
6	2437	24.82	24.78	24.66	**896.412**	29.53	30	Pass
11	2462	23.02	23.00	22.90	594.957	27.74	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	19.73	19.63	19.50	274.930	24.39	30	Pass
6	2437	24.06	23.85	23.96	**746.230**	28.73	30	Pass
11	2462	17.63	17.51	17.03	164.773	22.17	30	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	19.54	19.48	19.32	264.173	24.22	30	Pass
6	2437	24.04	24.01	23.87	**749.062**	28.75	30	Pass
11	2462	17.31	17.26	17.01	157.272	21.97	30	Pass

802.11n (HT40)

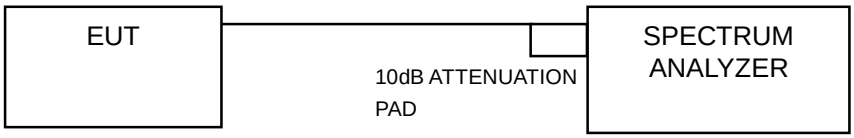
Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	18.78	18.59	18.28	215.084	23.33	30	Pass
6	2437	19.34	19.29	18.91	**248.623**	23.96	30	Pass
9	2452	16.52	16.48	16.04	129.517	21.12	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For AVG. power (duty cycle ≥ 98%)
a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.

For AVG. power (duty cycle < 98%)
a) Measure the duty cycle (x).
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 times the OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as Item 4.3.6

4.5.7 Test Results

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	1.98	4.77	6.75	8.00	Pass
	6	2437	1.96	4.77	6.73	8.00	Pass
	11	2462	1.78	4.77	6.55	8.00	Pass
1	1	2412	1.59	4.77	6.36	8.00	Pass
	6	2437	2.04	4.77	6.81	8.00	Pass
	11	2462	0.95	4.77	5.72	8.00	Pass
2	1	2412	0.98	4.77	5.75	8.00	Pass
	6	2437	2.29	4.77	7.06	8.00	Pass
	11	2462	0.95	4.77	5.72	8.00	Pass

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-5.28	4.77	-0.22	8.00	Pass
	6	2437	-0.43	4.77	4.63	8.00	Pass
	11	2462	-7.26	4.77	-2.20	8.00	Pass
1	1	2412	-6.10	4.77	-1.04	8.00	Pass
	6	2437	-0.68	4.77	4.38	8.00	Pass
	11	2462	-7.35	4.77	-2.29	8.00	Pass
2	1	2412	-5.50	4.77	-0.44	8.00	Pass
	6	2437	-0.96	4.77	4.10	8.00	Pass
	11	2462	-8.08	4.77	-3.02	8.00	Pass

802.11n (HT20)

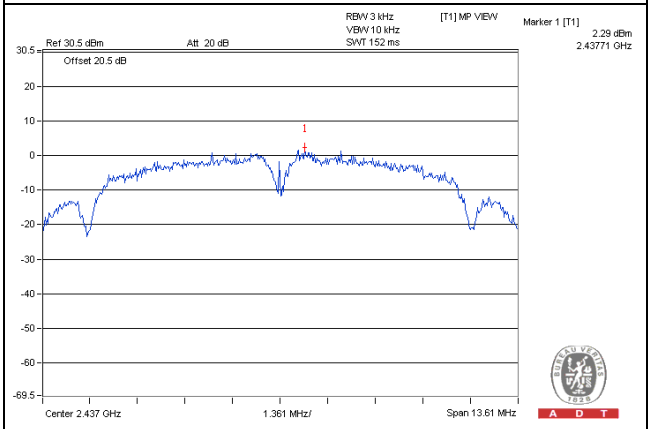
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-4.94	4.77	0.59	8.00	Pass
	6	2437	-1.02	4.77	4.51	8.00	Pass
	11	2462	-8.43	4.77	-2.90	8.00	Pass
1	1	2412	-5.59	4.77	-0.06	8.00	Pass
	6	2437	-0.63	4.77	4.90	8.00	Pass
	11	2462	-8.50	4.77	-2.97	8.00	Pass
2	1	2412	-5.76	4.77	-0.23	8.00	Pass
	6	2437	-1.52	4.77	4.01	8.00	Pass
	11	2462	-8.54	4.77	-3.01	8.00	Pass

802.11n (HT40)

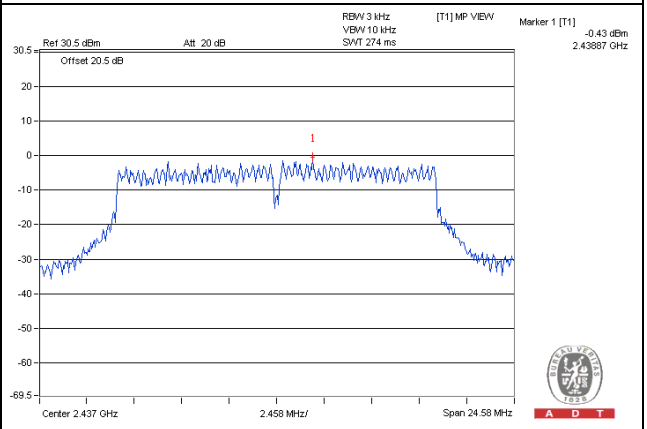
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	3	2422	-7.83	4.77	-1.51	8.00	Pass
	6	2437	-8.22	4.77	-1.90	8.00	Pass
	9	2452	-12.55	4.77	-6.23	8.00	Pass
1	3	2422	-9.21	4.77	-2.89	8.00	Pass
	6	2437	-7.95	4.77	-1.63	8.00	Pass
	9	2452	-12.69	4.77	-6.37	8.00	Pass
2	3	2422	-9.35	4.77	-3.03	8.00	Pass
	6	2437	-9.93	4.77	-3.61	8.00	Pass
	9	2452	-11.48	4.77	-5.16	8.00	Pass

Spectrum Plot of Worst Value

802.11b



802.11g



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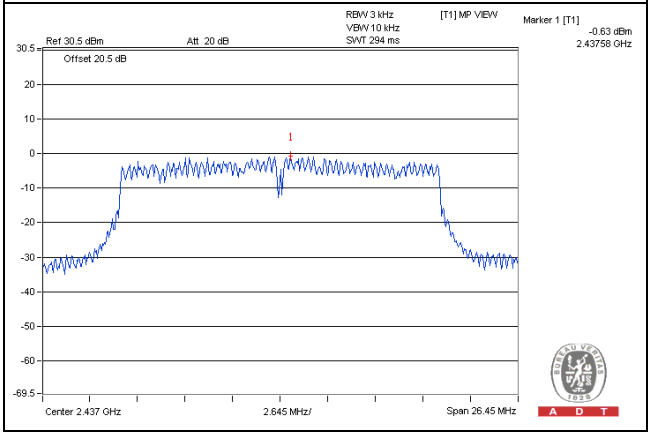
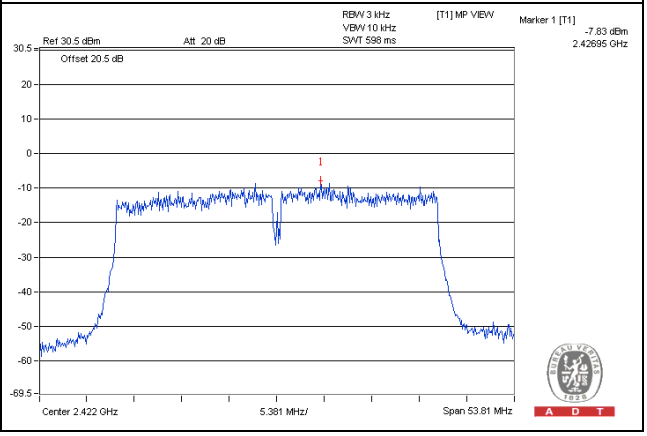


802.11n (HT40)

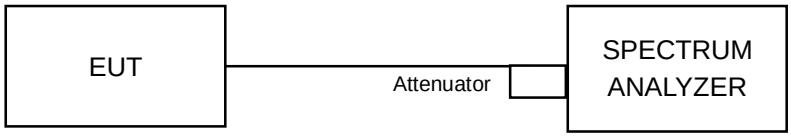


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Conditions

Same as Item 4.3.6

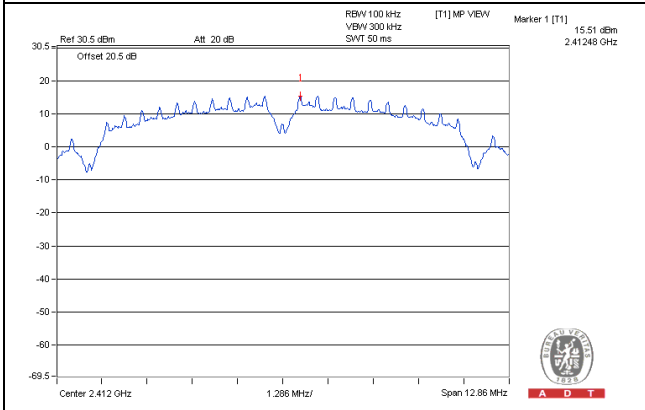
4.6.7 Test Results

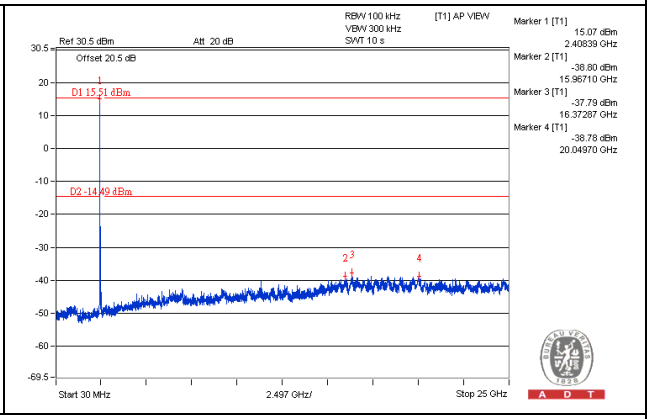
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

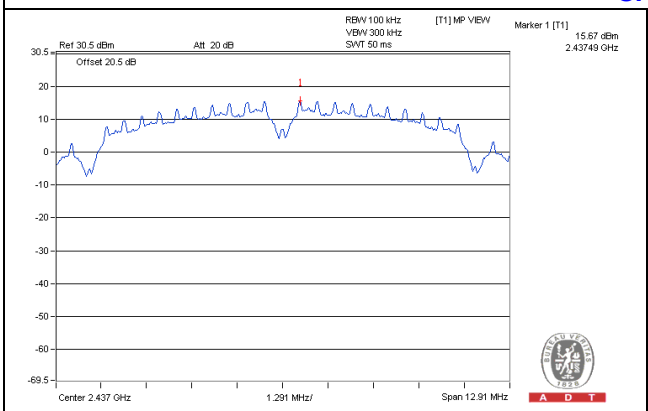
CHAIN 0

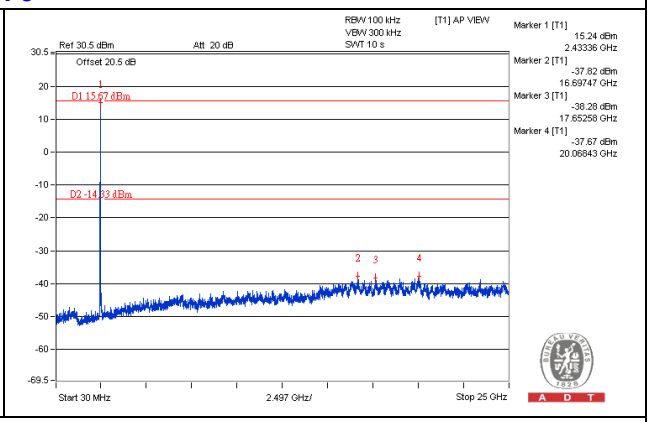
CH 1



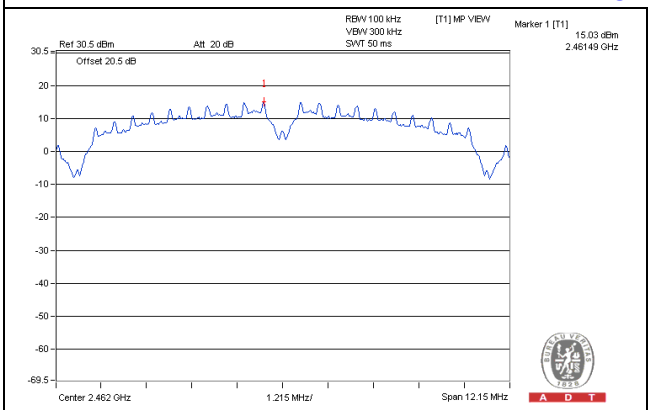


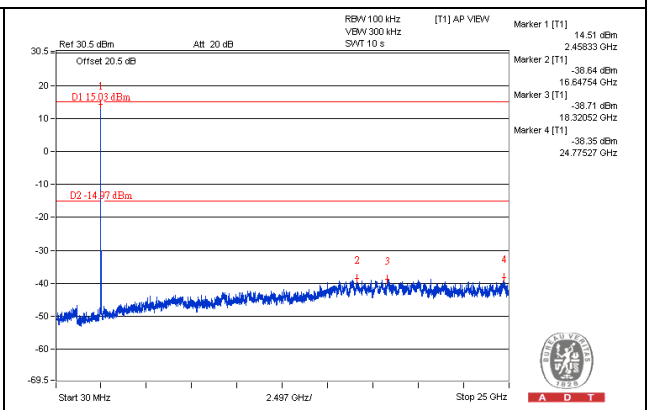
CH 6



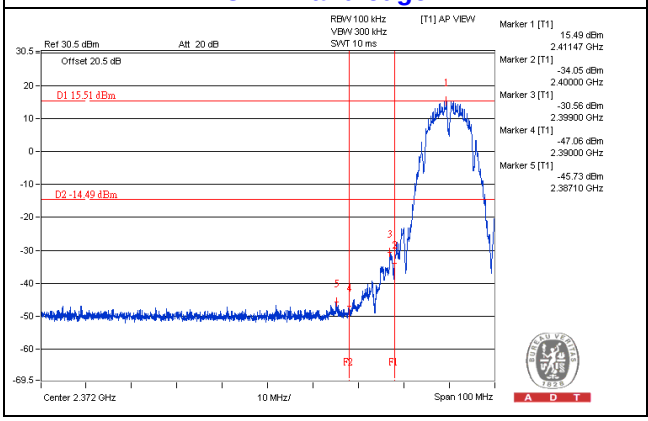


CH 11

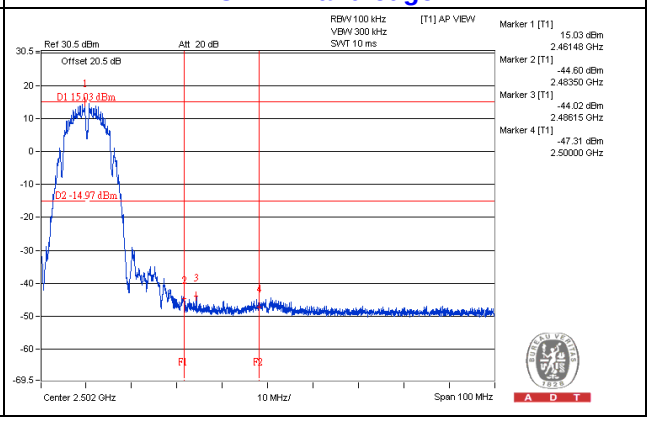




CH 1 Band edge

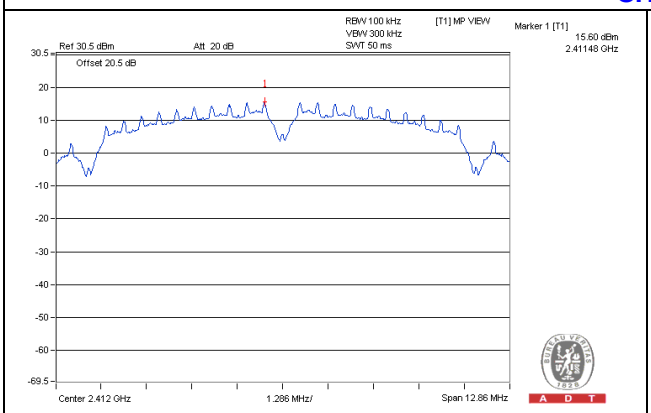


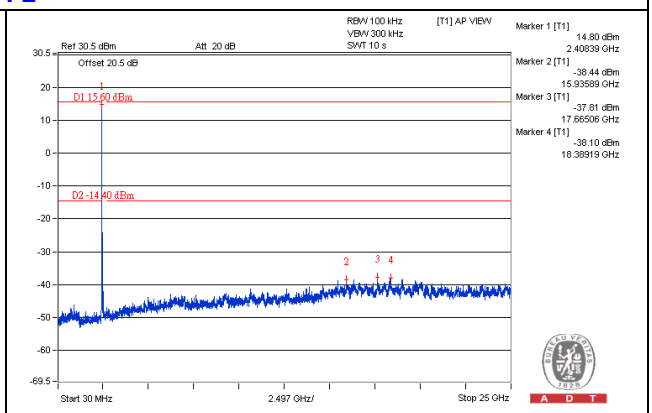
CH 11 Band edge



CHAIN 1

CH 1





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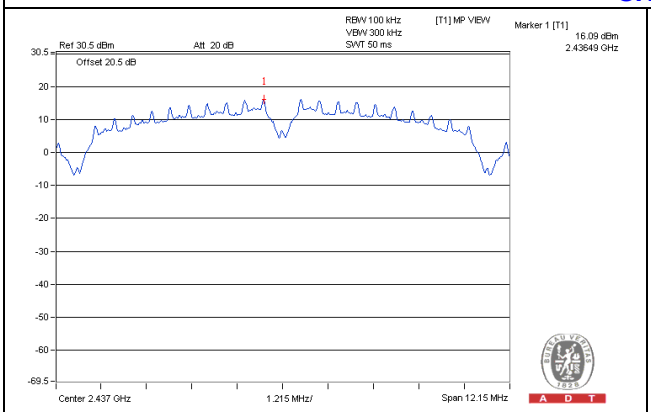
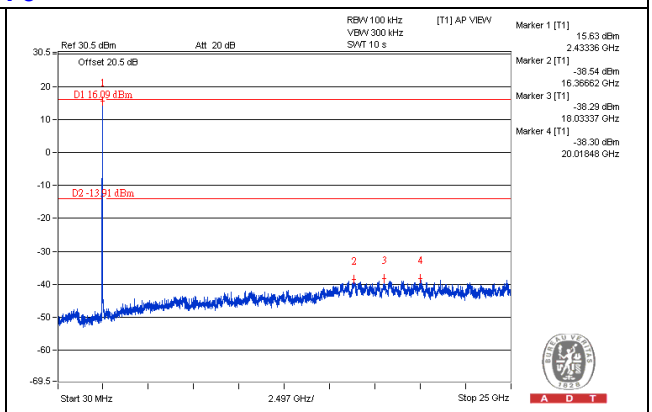
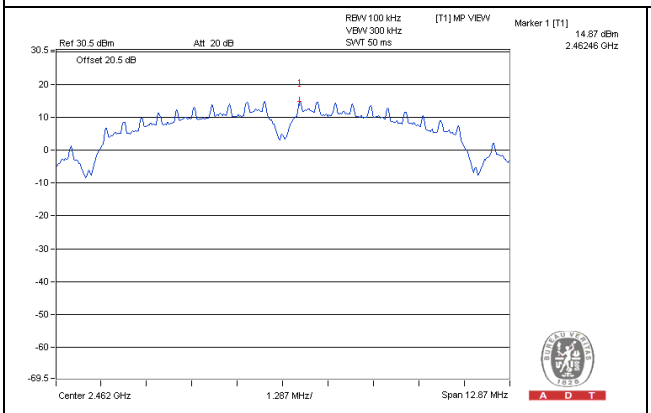
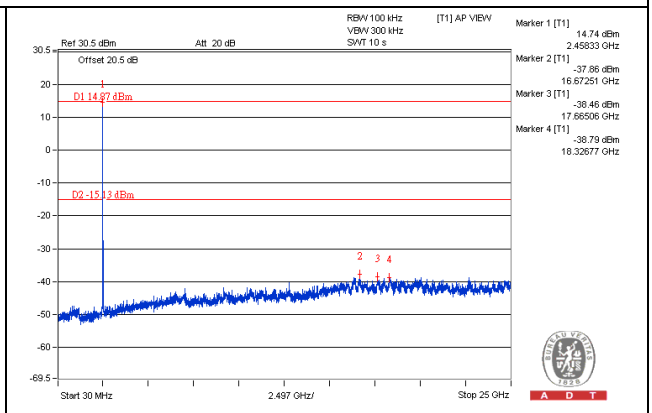


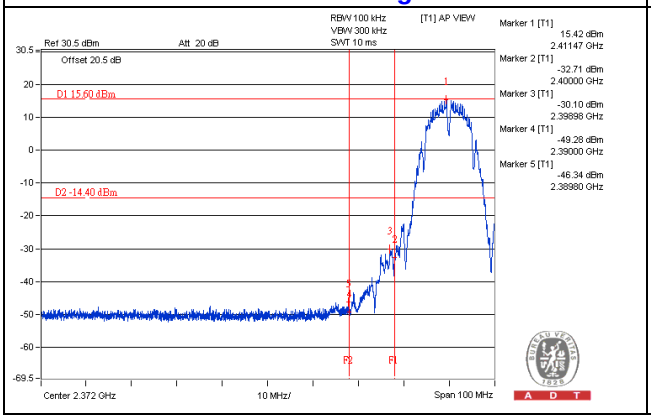


CH 11

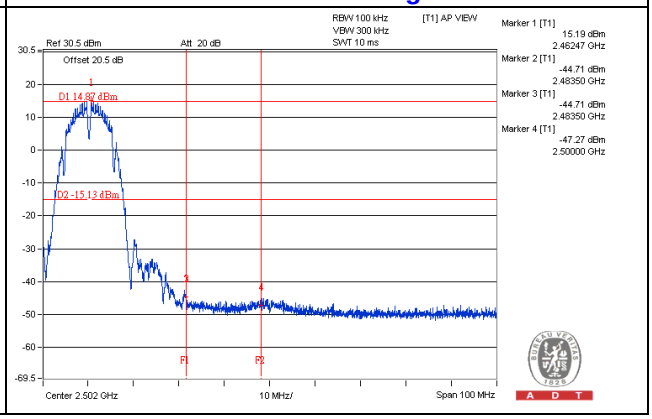




CH 1 Band edge

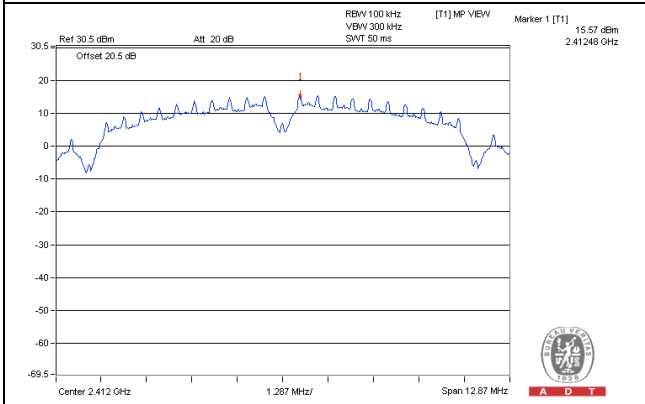


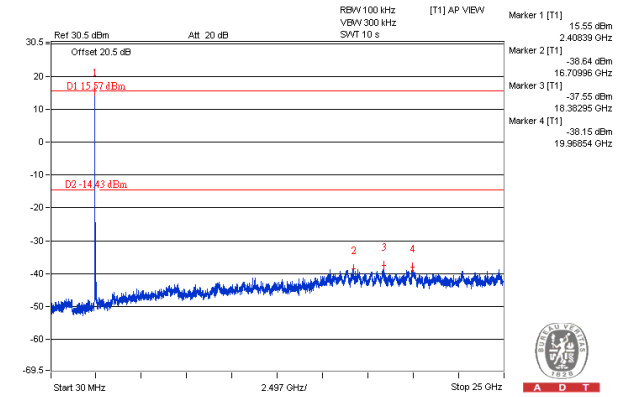
CH 11 Band edge



CHAIN 2

CH 1





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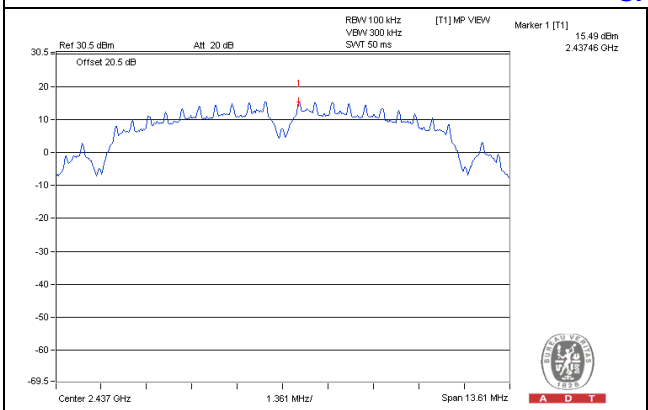
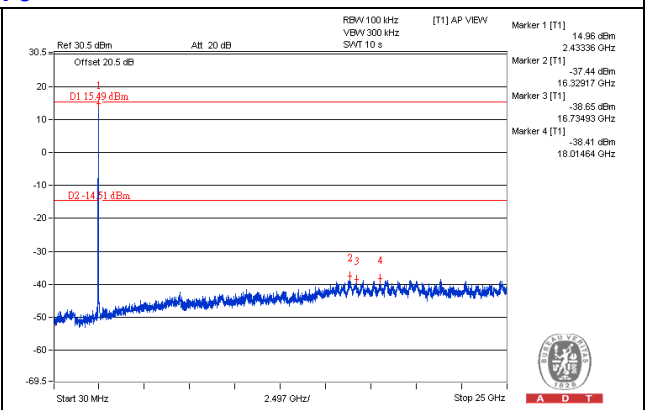
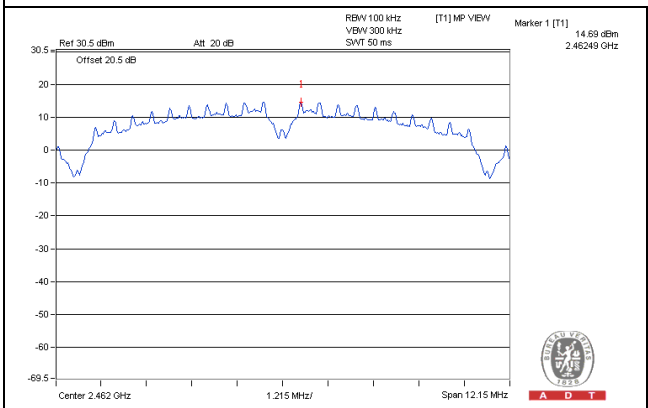
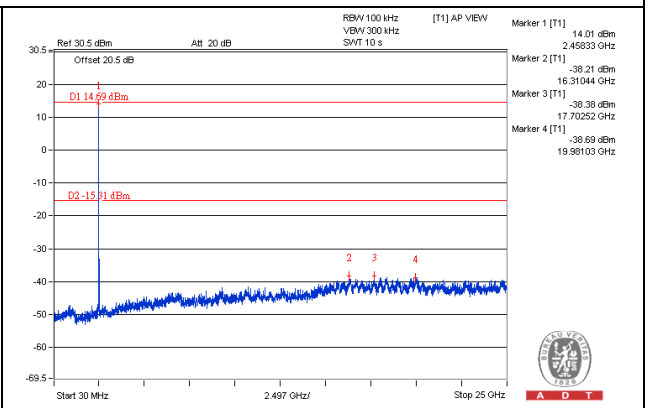


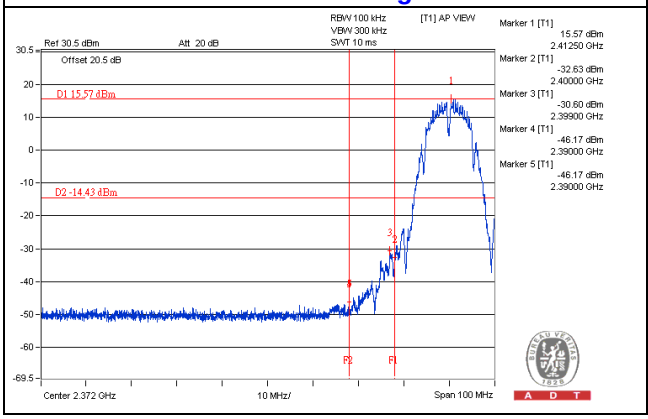


CH 11

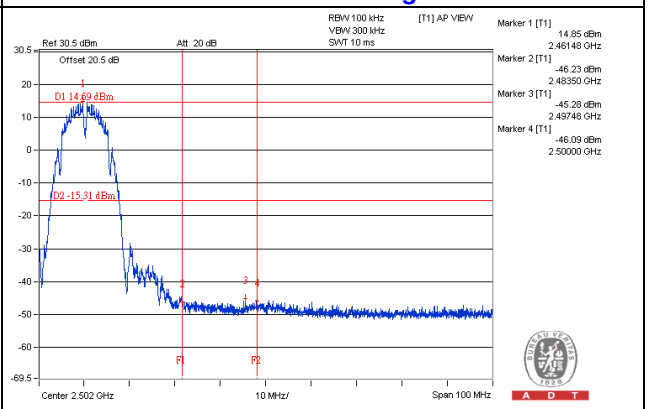




CH 1 Band edge

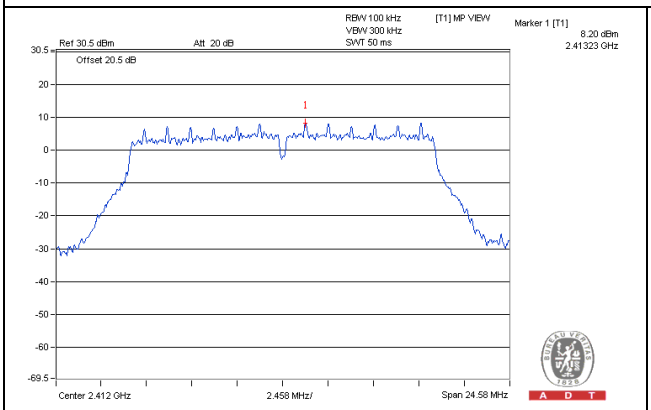


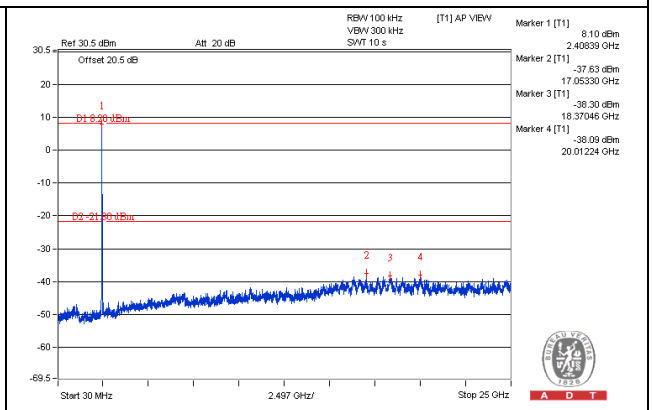
CH 11 Band edge



802.11g
CHAIN 0

CH 1





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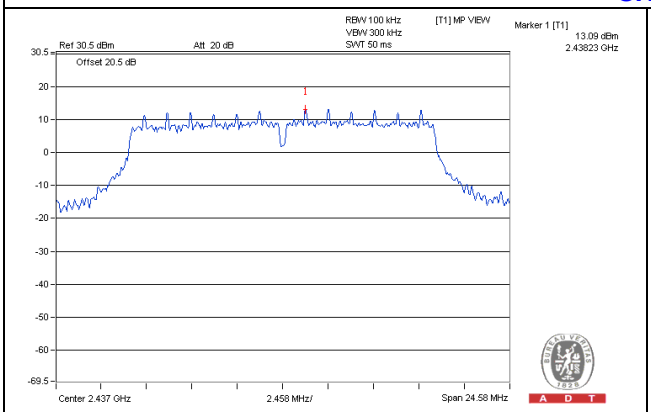

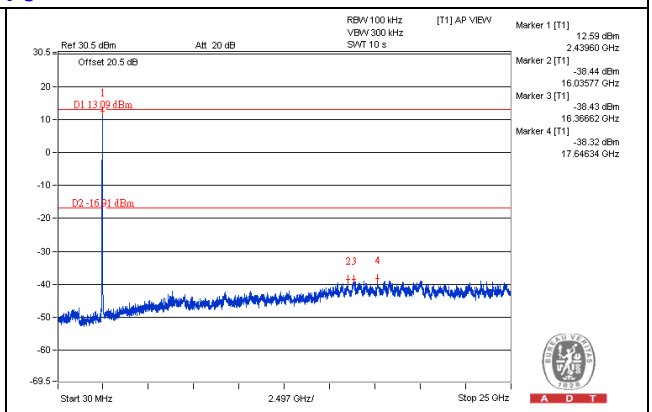

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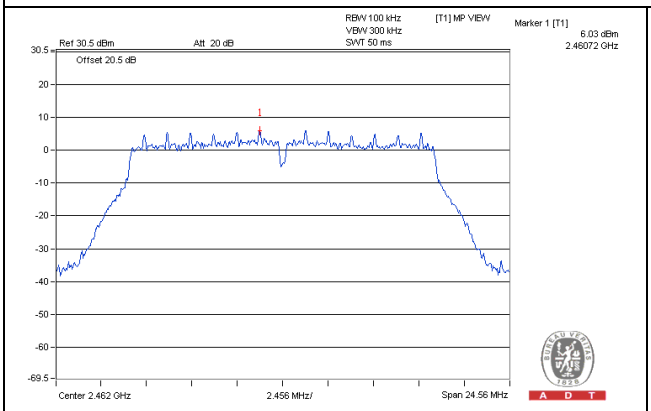

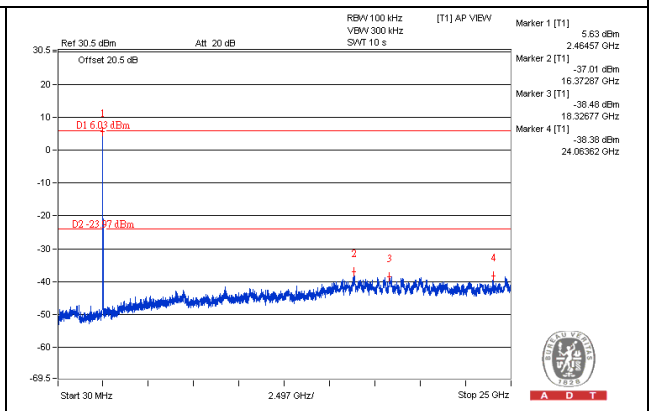

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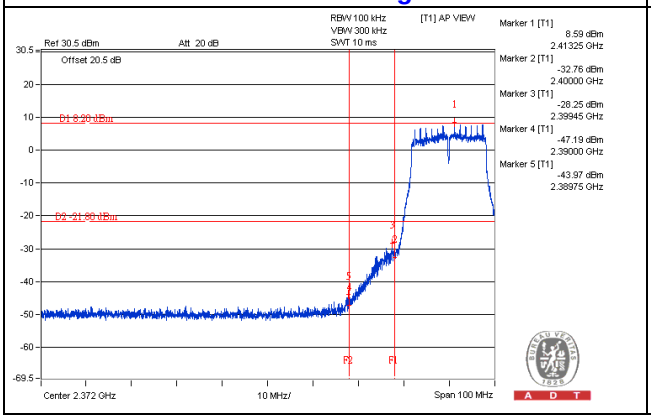

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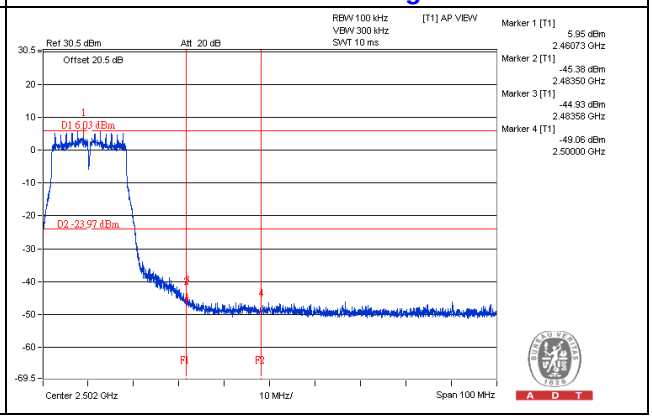
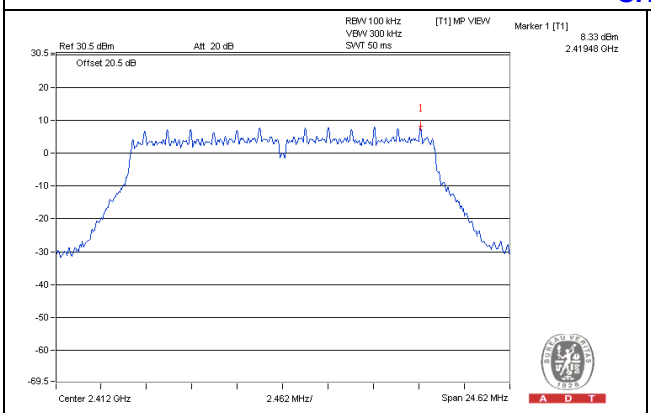
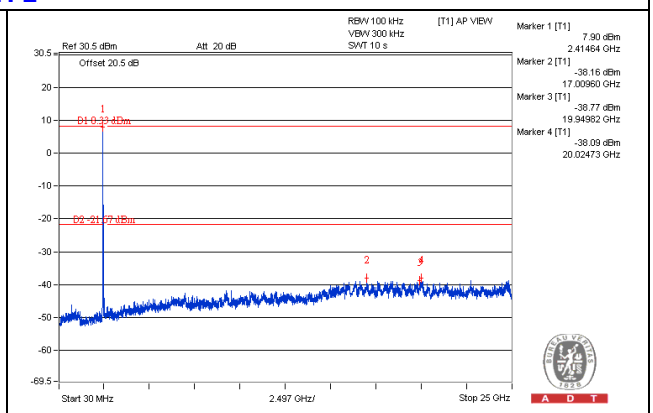


CHAIN 1

CH 1





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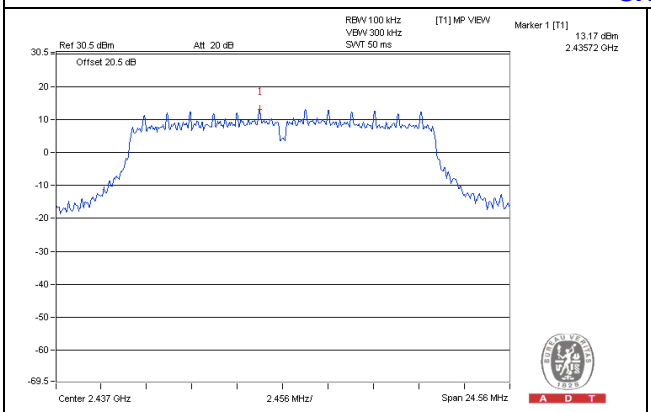

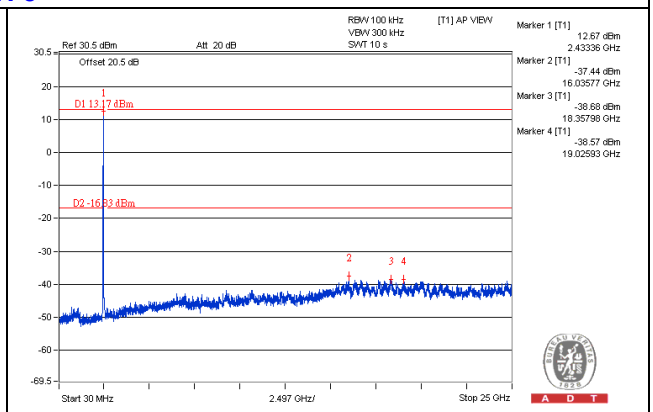

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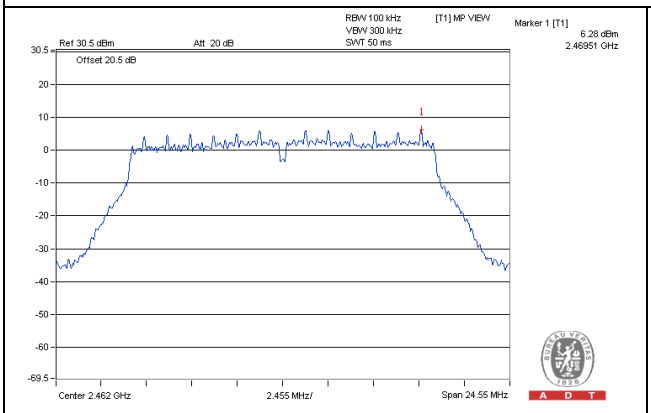

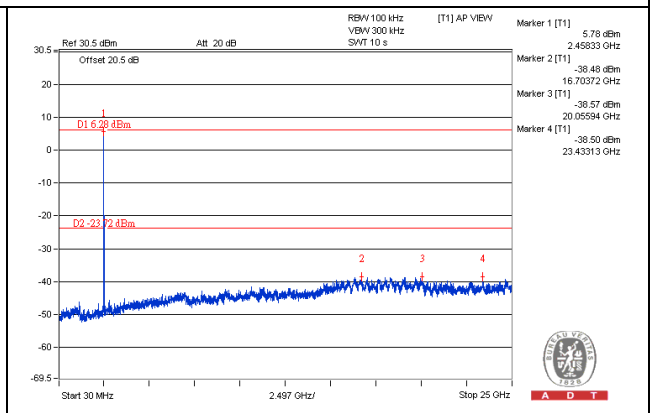

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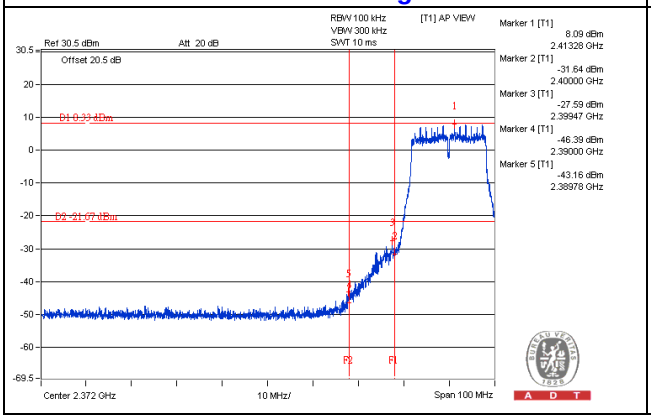

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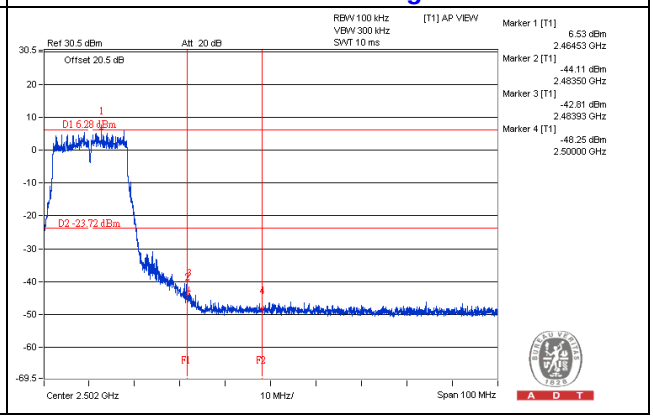
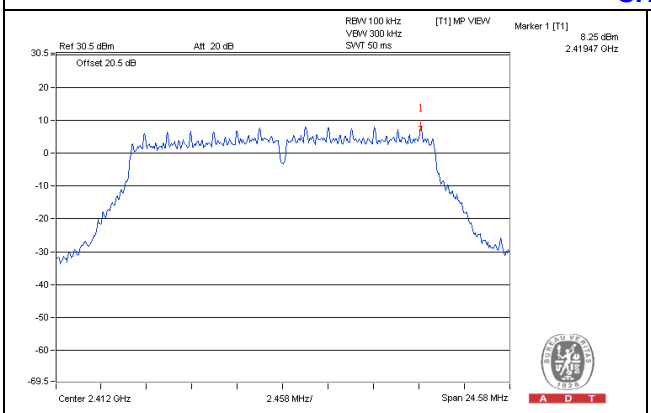
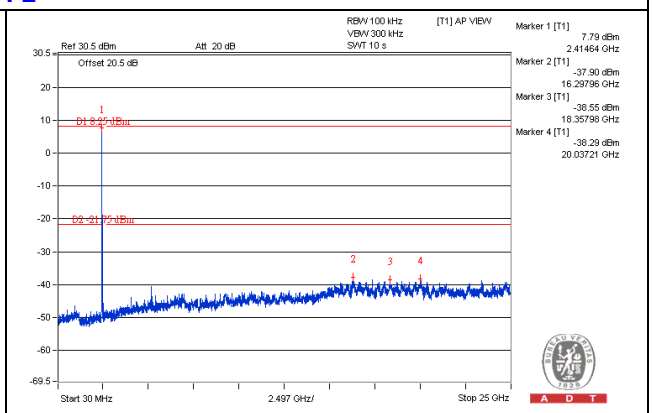


CHAIN 2

CH 1





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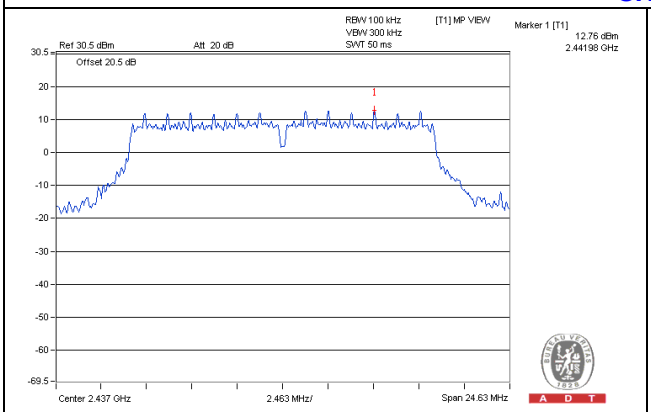

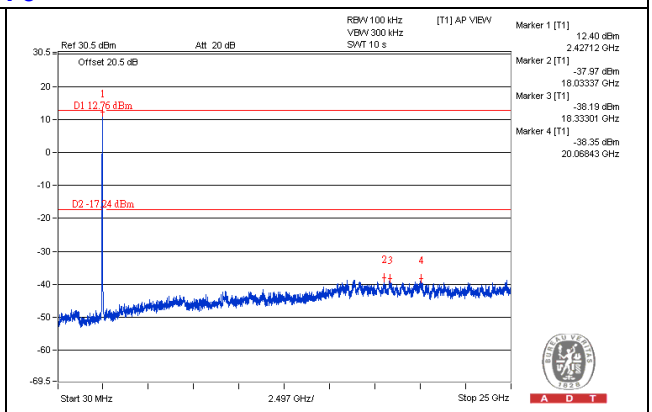

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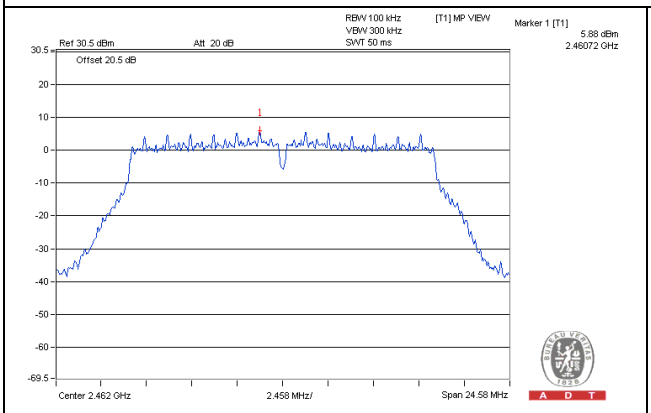

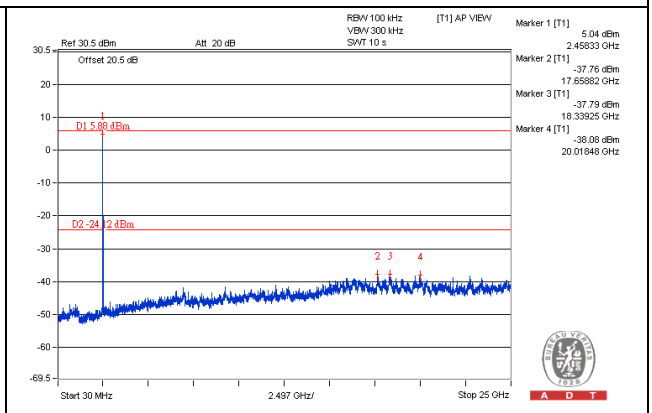

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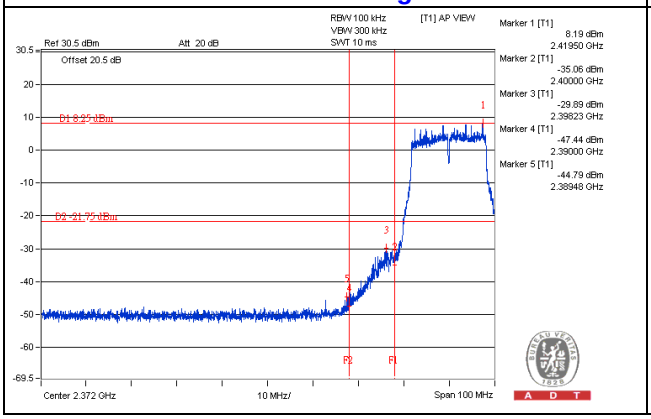

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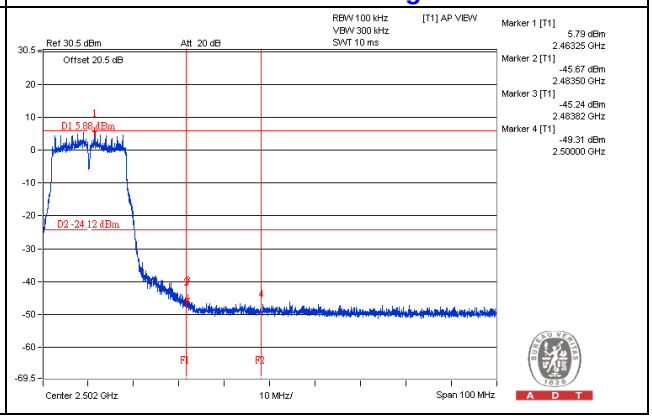

802.11n (HT20)
CHAIN 0

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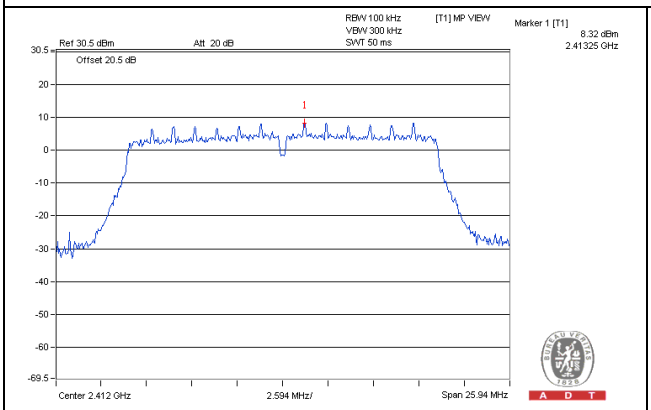

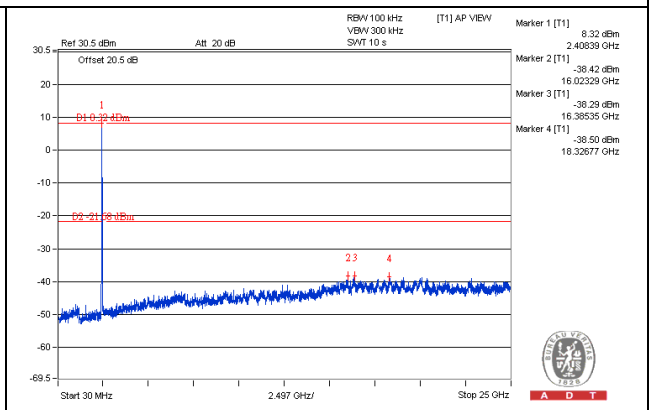

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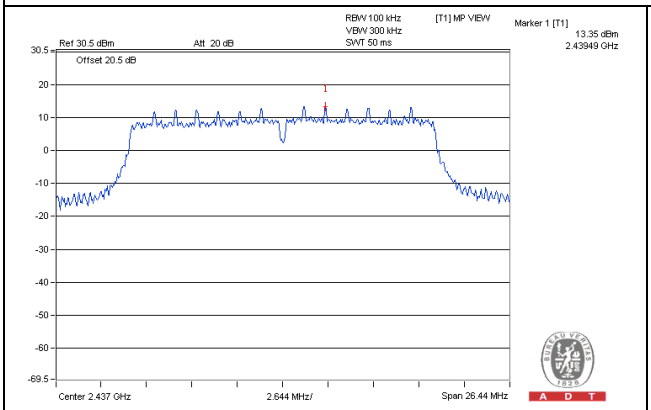

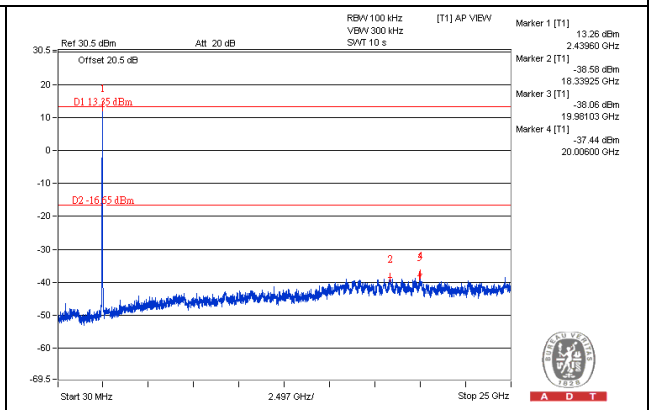

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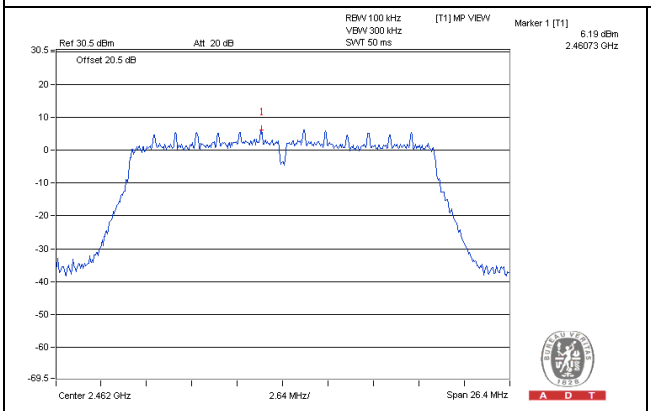

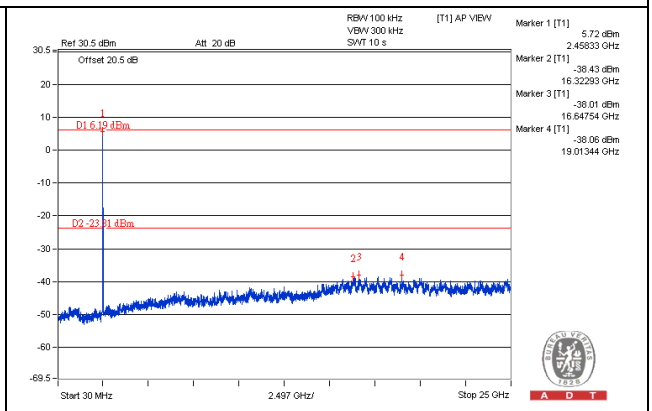

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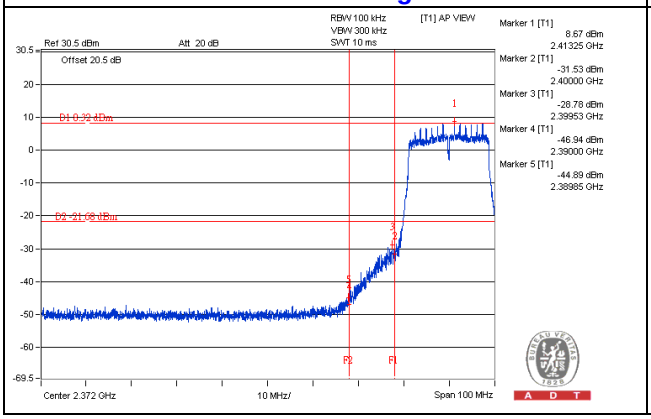

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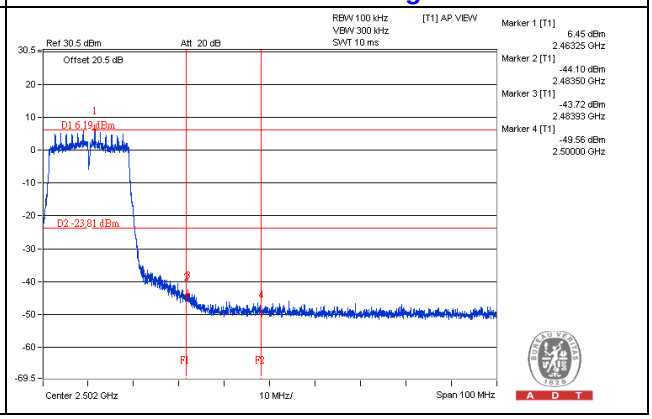
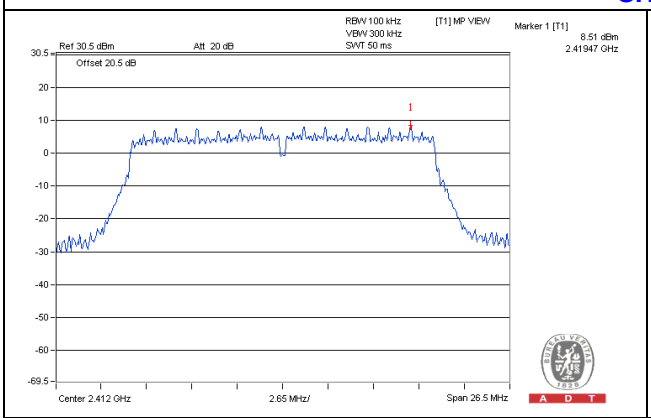
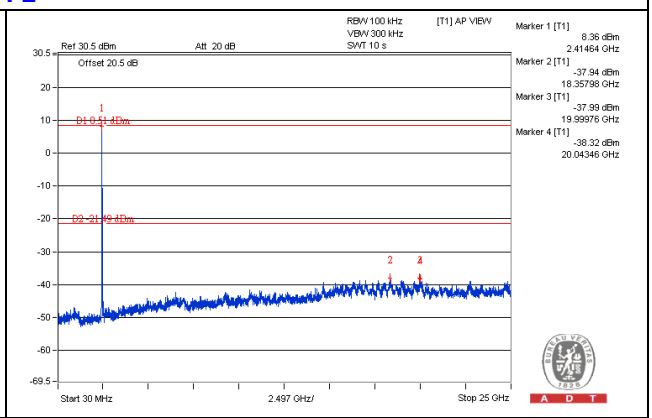


CHAIN 1

CH 1





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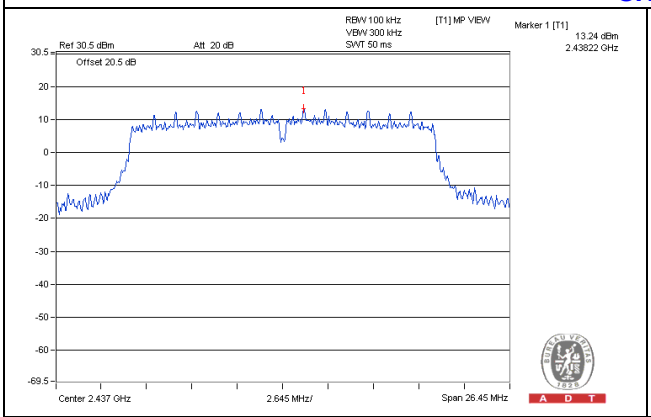

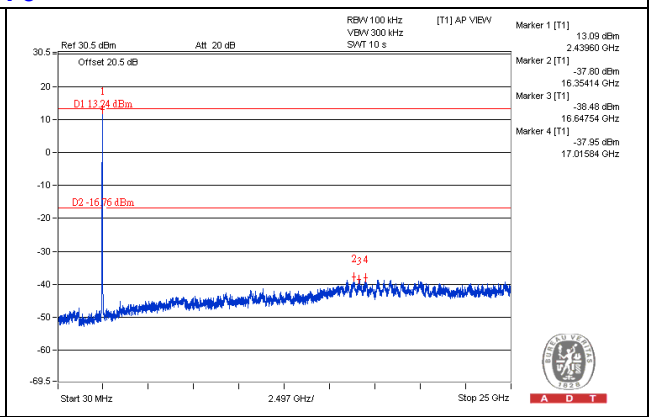

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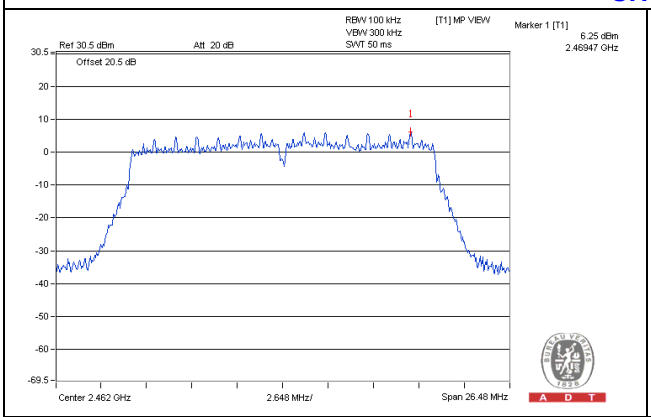

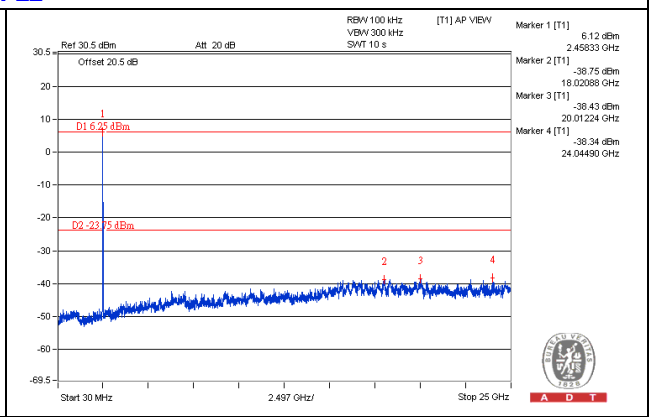

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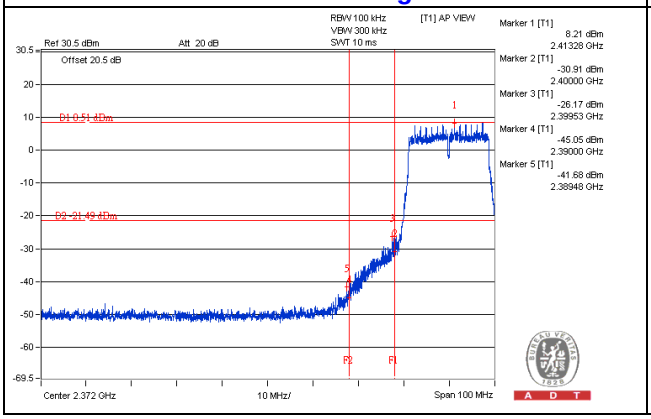

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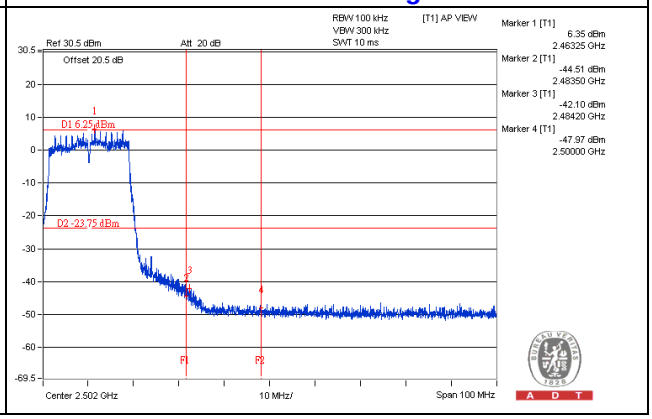

CHAIN 2

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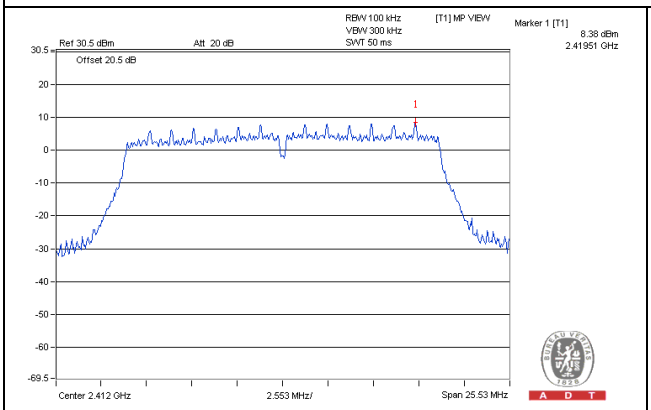

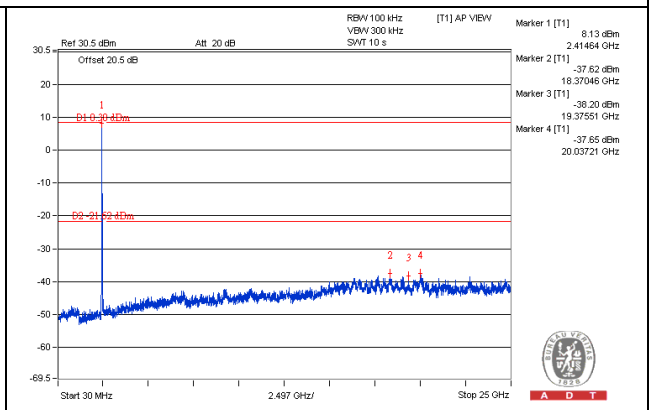

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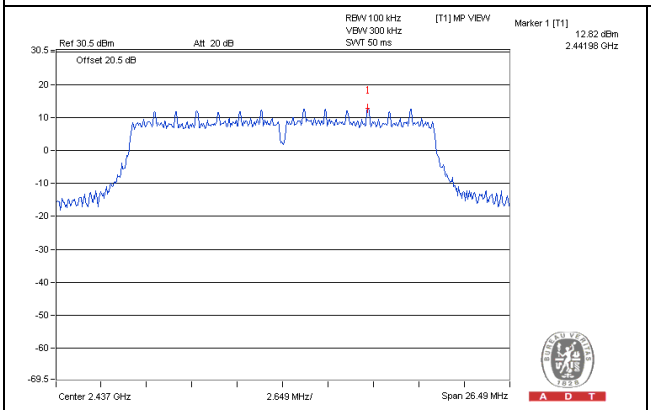

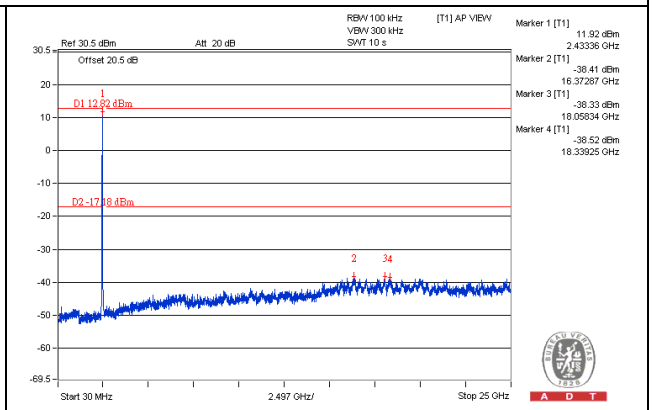

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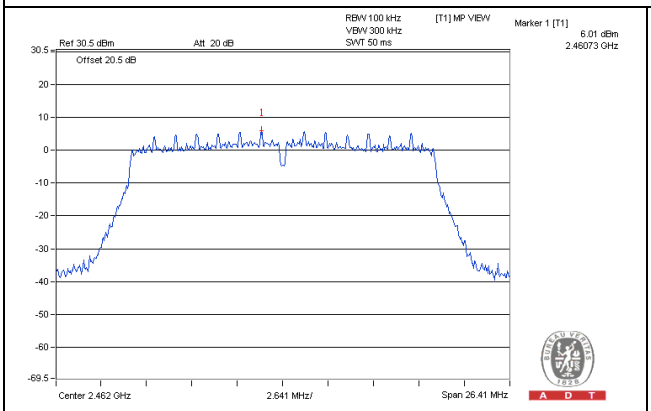

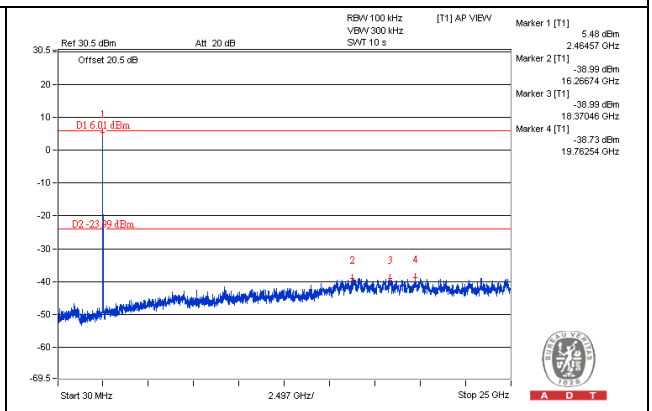

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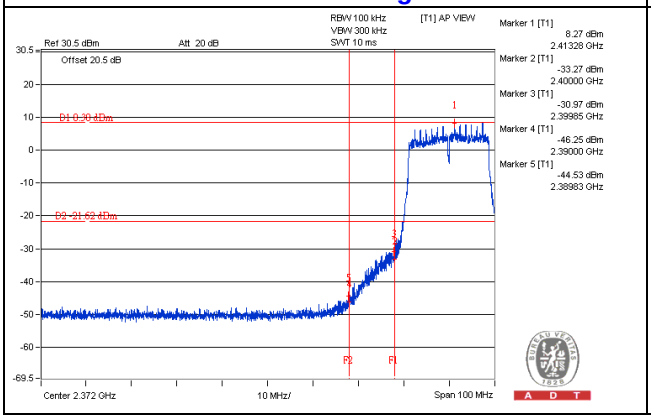

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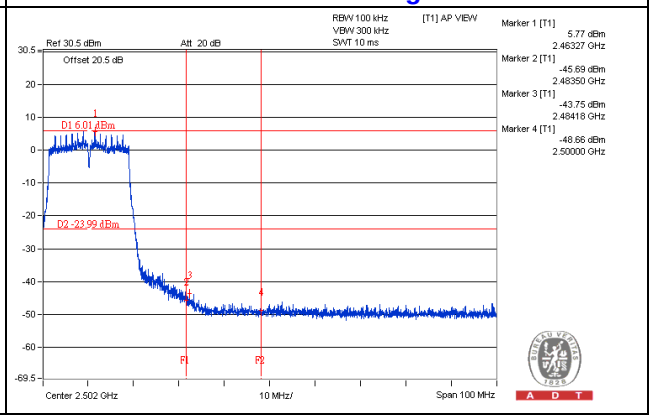

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CHAIN 0

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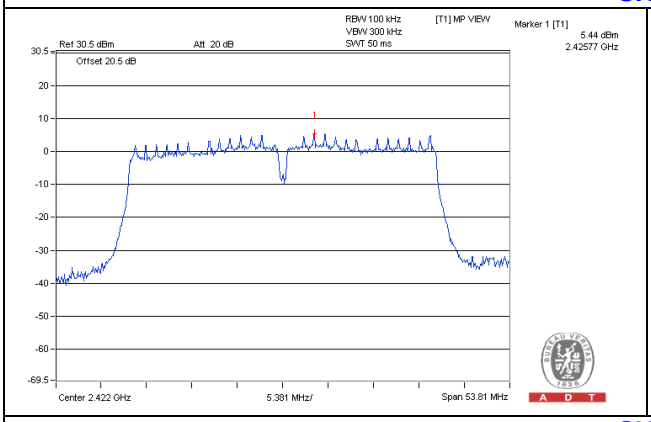
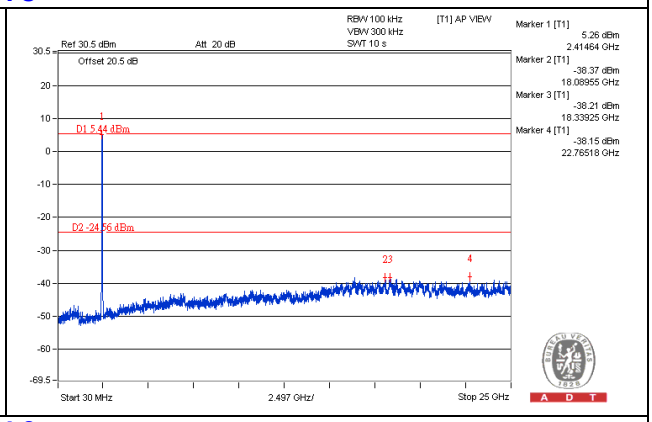
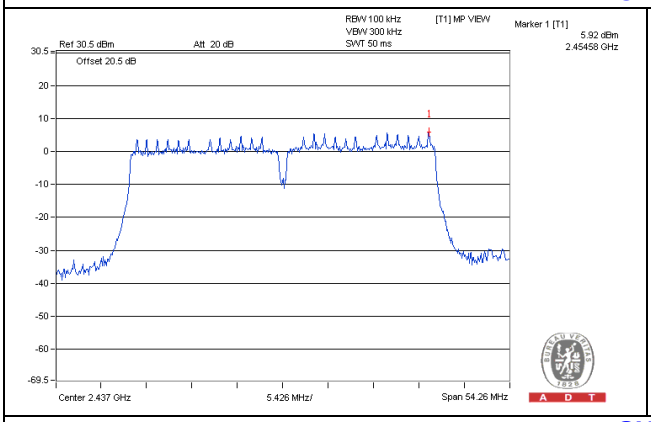
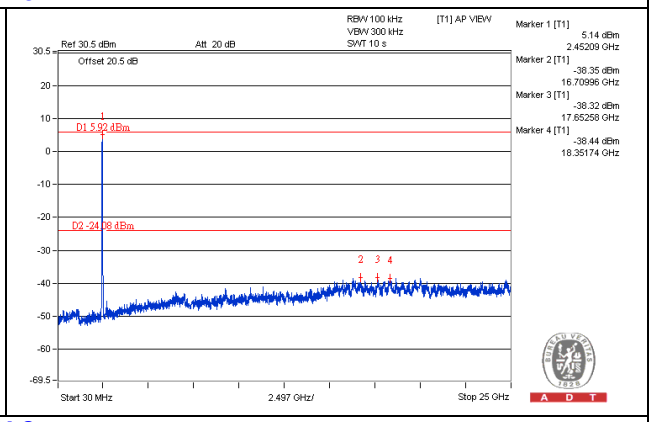


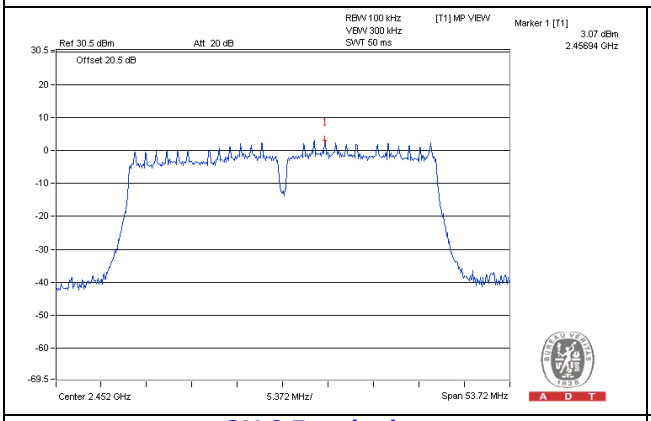


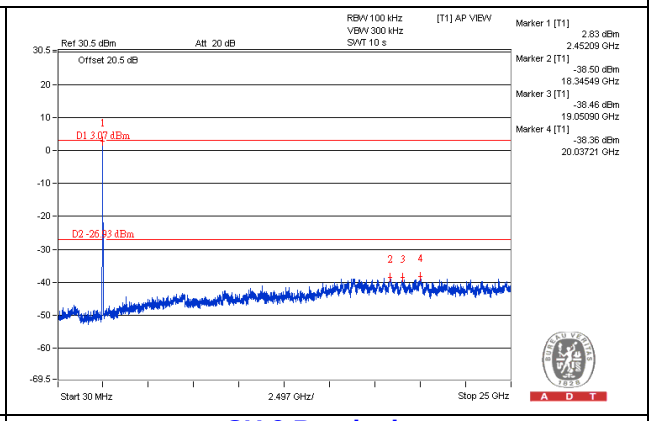
CH 6





CH 9





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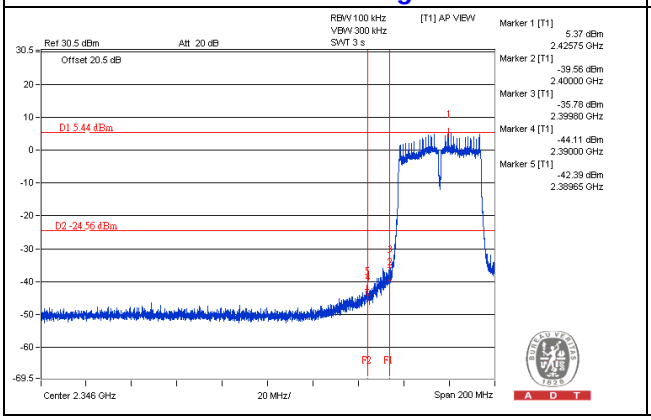
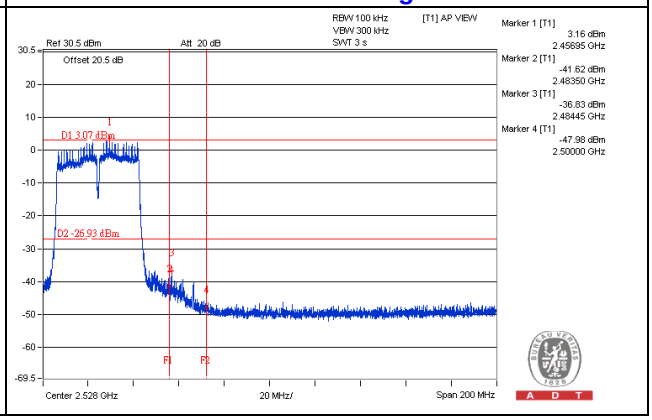
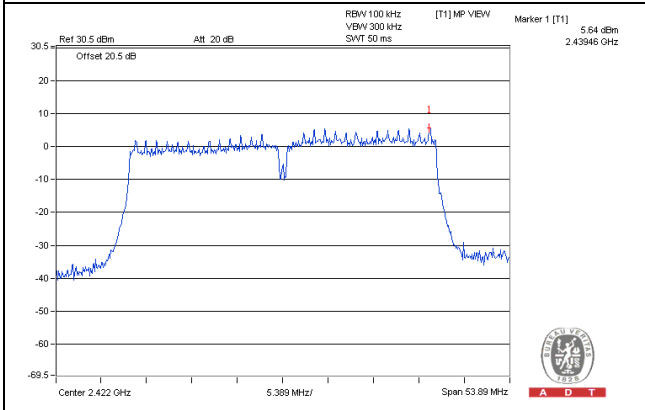


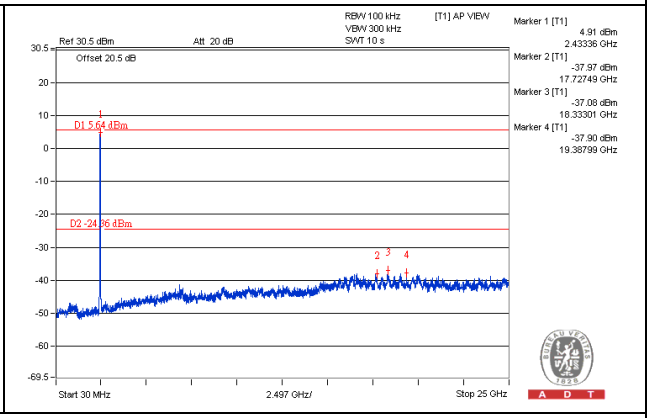
CH 9 Band edge



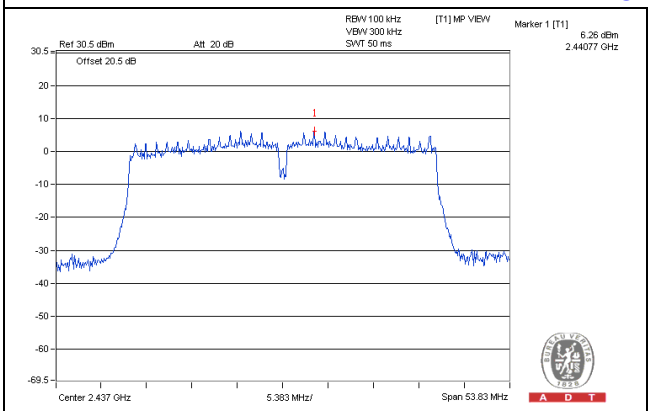
CHAIN 1

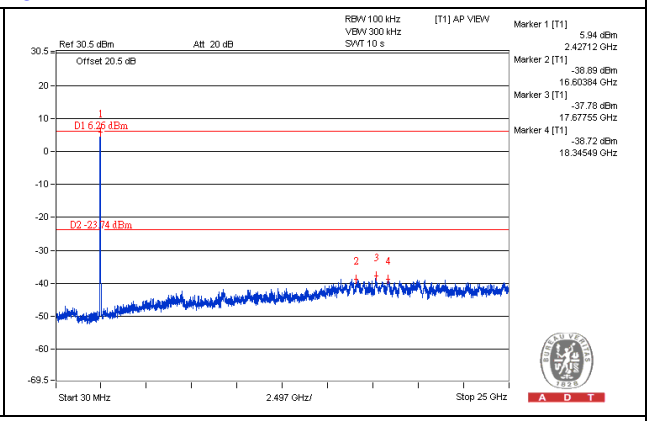
CH 3



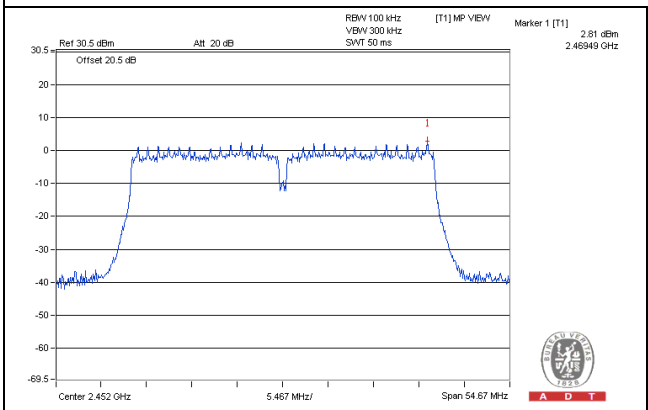


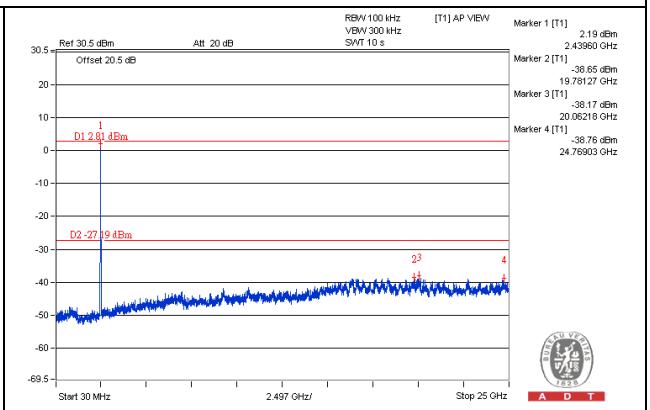
CH 6



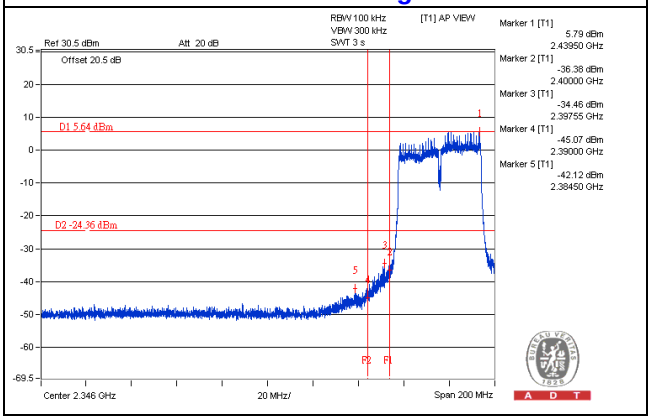


CH 9

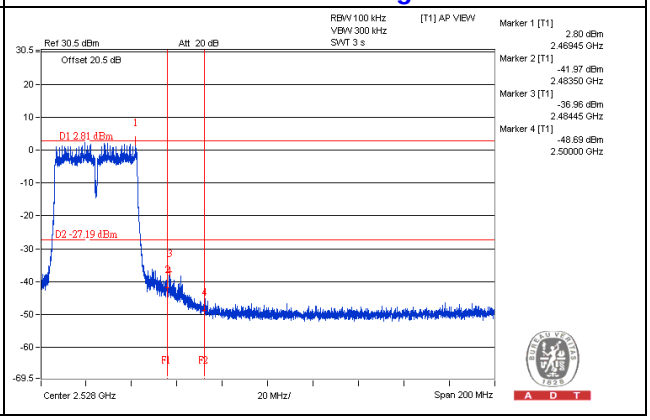




CH 3 Band edge

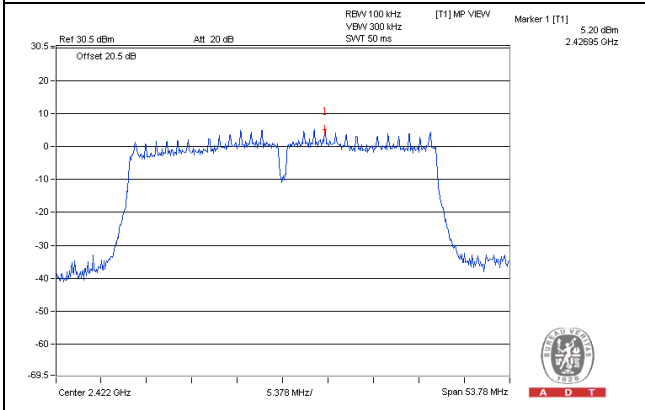


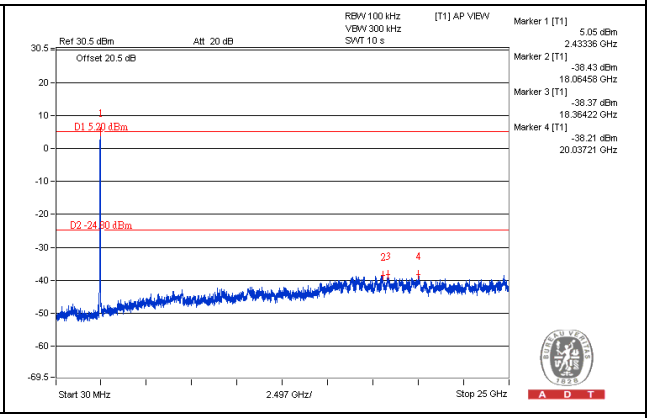
CH 9 Band edge



CHAIN 2

CH 3





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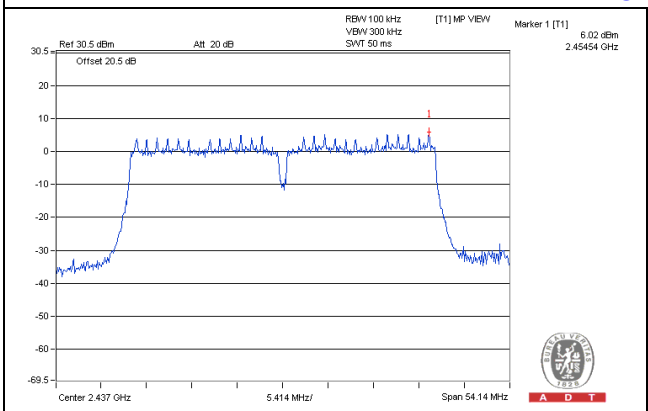
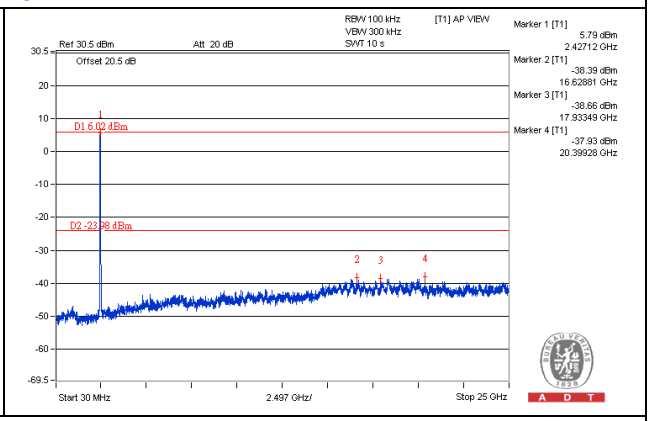
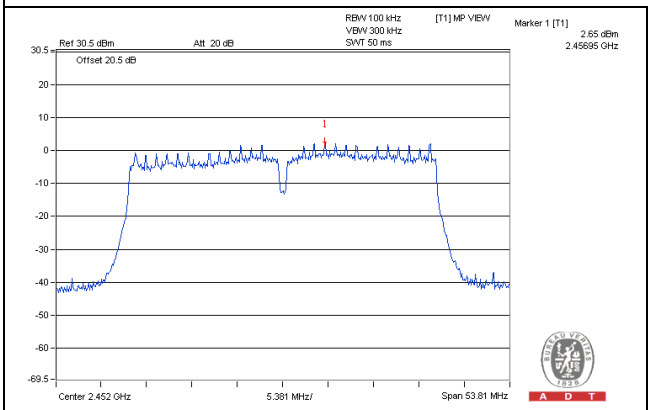
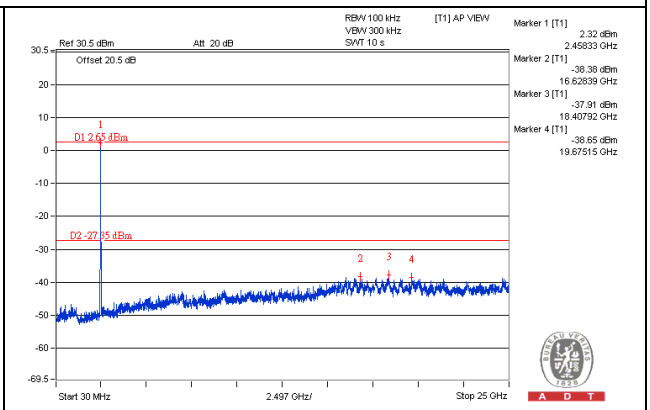


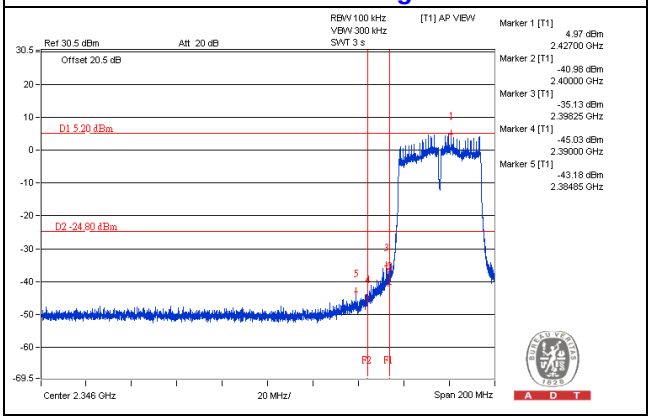


CH 9

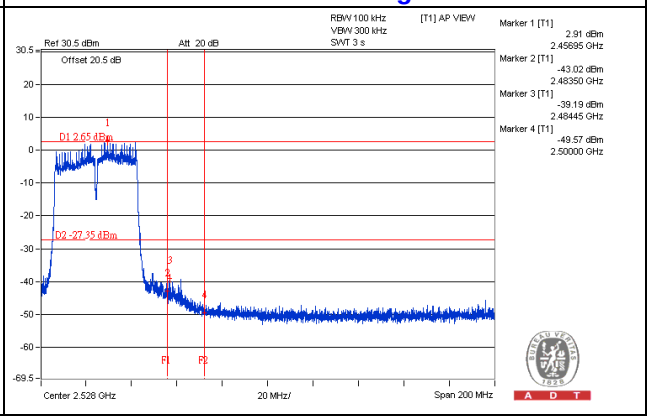




CH 3 Band edge



CH 9 Band edge



5 Test Types and Results (For 5GHz band)

5.1 Radiated Emission and Bandedge Measurement

5.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

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

5.1.2 Test Instruments

Same as item 4.1.2.

5.1.3 Test Procedure

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 :

CDD MODE

802.11a

CHANNEL	TX Channel 149	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	*5745.00	105.9 PK			1.00 H	232	101.26	4.66
2	*5745.00	96.2 AV			1.00 H	232	91.58	4.66
3	11490.00	57.7 PK	74.0	-16.4	1.22 H	217	43.99	13.66
4	11490.00	44.7 AV	54.0	-9.3	1.22 H	217	31.05	13.66
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	*5745.00	119.0 PK			1.89 V	327	114.35	4.66
2	*5745.00	109.6 AV			1.89 V	327	104.92	4.66
3	11490.00	64.3 PK	74.0	-9.7	1.62 V	11	50.63	13.66
4	11490.00	52.4 AV	54.0	-1.6	1.62 V	11	38.77	13.66

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.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	107.9 PK			1.00 H	238	103.17	4.72
2	*5785.00	97.7 AV			1.00 H	238	92.94	4.72
3	11570.00	57.1 PK	74.0	-16.9	1.00 H	227	43.19	13.90
4	11570.00	44.6 AV	54.0	-9.4	1.00 H	227	30.71	13.90
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	*5785.00	121.7 PK			1.93 V	332	116.93	4.72
2	*5785.00	111.5 AV			1.93 V	332	106.74	4.72
3	11570.00	62.0 PK	74.0	-12.0	1.91 V	354	48.12	13.90
4	11570.00	47.7 AV	54.0	-6.3	1.91 V	354	33.76	13.90

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	107.5 PK			1.16 H	240	102.74	4.79
2	*5825.00	97.7 AV			1.16 H	240	92.86	4.79
3	11650.00	56.9 PK	74.0	-17.2	1.00 H	179	43.29	13.56
4	11650.00	44.2 AV	54.0	-9.8	1.00 H	179	30.61	13.56
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	121.4 PK			2.02 V	229	116.58	4.79
2	*5825.00	111.4 AV			2.02 V	229	106.61	4.79
3	11650.00	61.9 PK	74.0	-12.1	1.76 V	341	48.36	13.56
4	11650.00	47.5 AV	54.0	-6.5	1.76 V	341	33.91	13.56

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.

Beamforming MODE

802.11ac (VHT20)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5745.00	106.5 PK			1.00 H	241	101.84	4.66
2	*5745.00	96.1 AV			1.00 H	241	91.45	4.66
3	11490.00	57.2 PK	74.0	-16.8	1.43 H	209	43.58	13.66
4	11490.00	44.0 AV	54.0	-10.1	1.43 H	209	30.29	13.66
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5745.00	119.6 PK			2.25 V	313	114.91	4.66
2	*5745.00	109.6 AV			2.25 V	313	104.98	4.66
3	11490.00	64.9 PK	74.0	-9.1	2.38 V	346	51.22	13.66
4	11490.00	51.9 AV	54.0	-2.1	2.38 V	346	38.27	13.66

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.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	107.6 PK			1.00 H	241	102.88	4.72
2	*5785.00	97.6 AV			1.00 H	241	92.83	4.72
3	11570.00	54.9 PK	74.0	-19.1	1.00 H	241	41.02	13.90
4	11570.00	42.5 AV	54.0	-11.5	1.00 H	241	28.63	13.90
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	*5785.00	122.0 PK			2.16 V	313	117.27	4.72
2	*5785.00	111.0 AV			2.16 V	313	106.29	4.72
3	11570.00	61.0 PK	74.0	-13.1	2.39 V	327	47.05	13.90
4	11570.00	47.1 AV	54.0	-6.9	2.39 V	327	33.21	13.90

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	105.3 PK			1.00 H	243	100.55	4.79
2	*5825.00	96.3 AV			1.00 H	243	91.48	4.79
3	11650.00	53.8 PK	74.0	-20.2	1.45 H	217	40.26	13.56
4	11650.00	41.9 AV	54.0	-12.1	1.45 H	217	28.31	13.56
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	121.6 PK			2.21 V	311	116.76	4.79
2	*5825.00	111.5 AV			2.21 V	311	106.75	4.79
3	11650.00	60.7 PK	74.0	-13.3	2.43 V	336	47.13	13.56
4	11650.00	46.7 AV	54.0	-7.4	2.43 V	336	33.09	13.56

REMARKS:

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

802.11ac (VHT40)

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5755.00	105.7 PK			1.36 H	243	100.98	4.67
2	*5755.00	96.2 AV			1.36 H	243	91.48	4.67
3	11510.00	55.8 PK	74.0	-18.2	1.39 H	234	42.11	13.67
4	11510.00	43.4 AV	54.0	-10.6	1.39 H	234	29.73	13.67
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5755.00	115.9 PK			2.10 V	317	111.23	4.67
2	*5755.00	105.5 AV			2.10 V	317	100.86	4.67
3	11510.00	61.6 PK	74.0	-12.4	2.38 V	330	47.93	13.67
4	11510.00	47.7 AV	54.0	-6.3	2.38 V	330	34.02	13.67

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.

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	107.3 PK			1.00 H	232	102.60	4.74
2	*5795.00	94.9 AV			1.00 H	232	90.11	4.74
3	11590.00	55.1 PK	74.0	-18.9	1.52 H	228	41.15	13.98
4	11590.00	42.6 AV	54.0	-11.4	1.52 H	228	28.65	13.98
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	120.7 PK			2.02 V	315	115.99	4.74
2	*5795.00	108.9 AV			2.02 V	315	104.19	4.74
3	11590.00	61.3 PK	74.0	-12.7	2.44 V	347	47.35	13.98
4	11590.00	47.8 AV	54.0	-6.2	2.44 V	347	33.78	13.98

REMARKS:

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

802.11ac (VHT80)

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5775.00	100.5 PK			1.00 H	240	95.77	4.72
2	*5775.00	89.5 AV			1.00 H	240	84.80	4.72
3	11550.00	54.7 PK	74.0	-19.3	1.55 H	216	40.89	13.82
4	11550.00	42.5 AV	54.0	-11.5	1.55 H	216	28.66	13.82
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5775.00	114.1 PK			2.10 V	314	109.42	4.72
2	*5775.00	102.4 AV			2.10 V	314	97.69	4.72
3	11550.00	60.7 PK	74.0	-13.3	2.50 V	351	46.85	13.82
4	11550.00	46.8 AV	54.0	-7.2	2.50 V	351	32.97	13.82

REMARKS:

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

Below 1GHz Data:

CDD MODE

802.11a

CHANNEL	TX Channel 157	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	106.44	33.5 QP	43.5	-10.0	1.53 H	267	51.01	-17.52
2	169.97	27.4 QP	43.5	-16.1	1.49 H	190	41.28	-13.86
3	201.11	28.5 QP	43.5	-15.0	2.17 H	110	44.79	-16.30
4	334.68	26.2 QP	46.0	-19.8	2.08 H	142	37.80	-11.61
5	532.46	37.2 QP	46.0	-8.8	1.77 H	172	45.12	-7.95
6	861.69	27.2 QP	46.0	-18.8	1.65 H	43	29.42	-2.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	34.96	36.4 QP	40.0	-3.6	1.85 V	182	51.72	-15.28
2	107.45	34.2 QP	43.5	-9.3	1.73 V	215	51.69	-17.47
3	147.52	27.4 QP	43.5	-16.1	1.94 V	79	41.14	-13.74
4	329.18	31.4 QP	46.0	-14.6	1.66 V	138	42.99	-11.63
5	532.46	37.3 QP	46.0	-8.7	1.71 V	118	45.29	-7.95
6	828.73	27.2 QP	46.0	-18.8	1.22 V	88	29.74	-2.56

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 T

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

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

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

5.2.2 Test Instruments

Same as item 4.2.2.

5.2.3 Test Procedure

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.

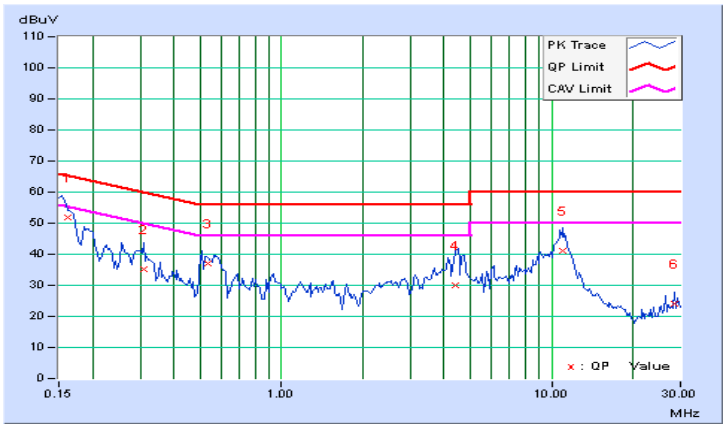
5.2.7 Test Results

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

No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16283	0.21	51.62	43.75	51.83	43.96	65.32	55.32	-13.49	-11.36
2	0.31011	0.25	34.88	23.43	35.13	23.68	59.97	49.97	-24.84	-26.29
3	0.53155	0.29	36.71	31.22	37.00	31.51	56.00	46.00	-19.00	-14.49
4	4.40629	0.57	29.43	20.31	30.00	20.88	56.00	46.00	-26.00	-25.12
5	11.00786	0.80	40.22	35.02	41.02	35.82	60.00	50.00	-18.98	-14.18
6	28.62473	1.13	22.91	20.55	24.04	21.68	60.00	50.00	-35.96	-28.32

Remarks:

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

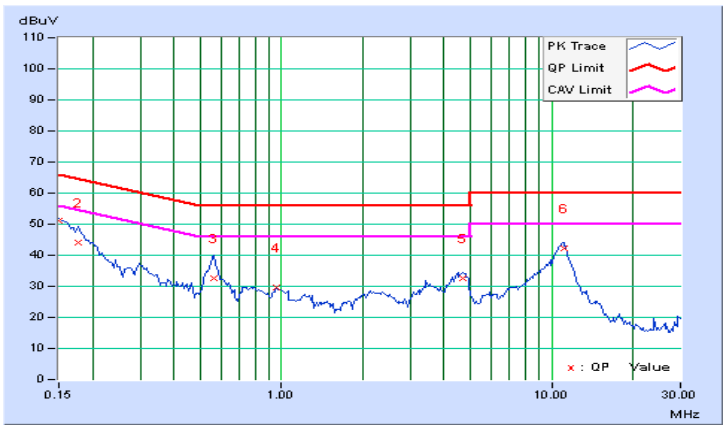


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15005	0.21	50.77	43.72	50.98	43.93	66.00	56.00	-15.02	-12.07
2	0.17711	0.22	44.01	27.55	44.23	27.77	64.62	54.62	-20.39	-26.85
3	0.56021	0.31	32.33	28.12	32.64	28.43	56.00	46.00	-23.36	-17.57
4	0.96259	0.37	29.25	24.51	29.62	24.88	56.00	46.00	-26.38	-21.12
5	4.69135	0.59	31.89	23.66	32.48	24.25	56.00	46.00	-23.52	-21.75
6	11.10128	0.77	41.37	35.89	42.14	36.66	60.00	50.00	-17.86	-13.34

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 0.5 MHz.

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 fromTest Standard

No deviation.

5.3.6 EUT Operating Conditions

Same as item 4.3.6.

5.3.7 Test Result

CDD MODE

802.11a

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	16.38	16.38	16.38	0.5	PASS
157	5785	16.40	16.37	16.39	0.5	PASS
165	5825	16.40	16.39	16.38	0.5	PASS

Beamforming MODE

802.11ac (VHT20)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.63	17.62	17.63	0.5	PASS
157	5785	17.63	17.62	17.63	0.5	PASS
165	5825	17.64	17.64	17.63	0.5	PASS

802.11ac (VHT40)

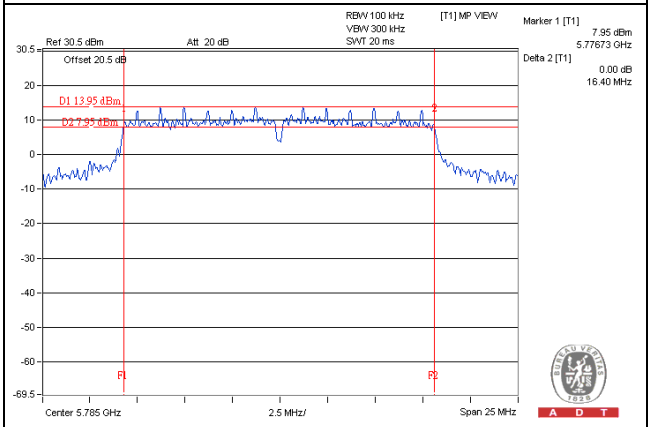
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	36.40	36.39	36.41	0.5	PASS
159	5795	36.39	36.16	36.36	0.5	PASS

802.11ac (VHT80)

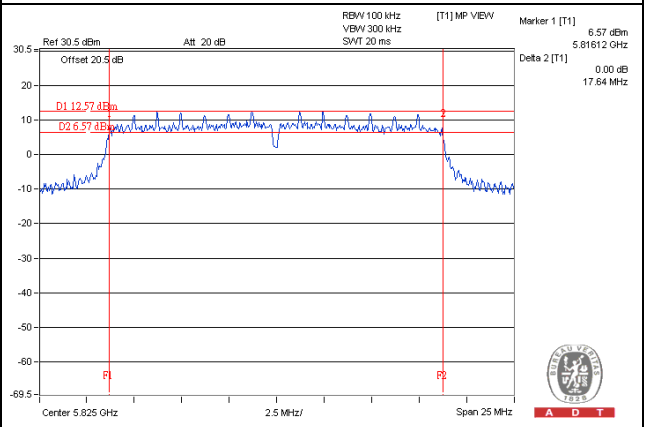
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
155	5775	75.82	75.92	75.79	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

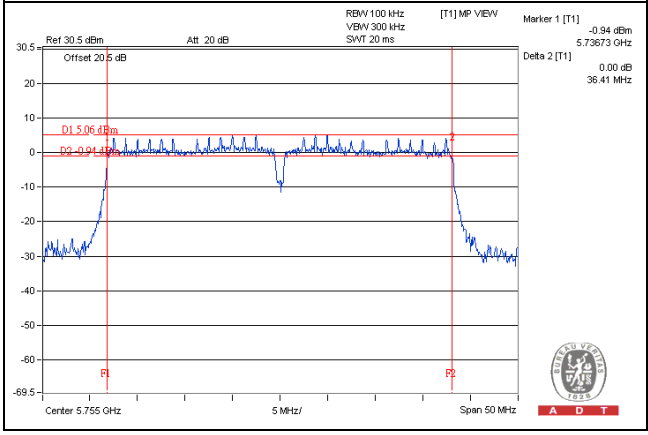
802.11a



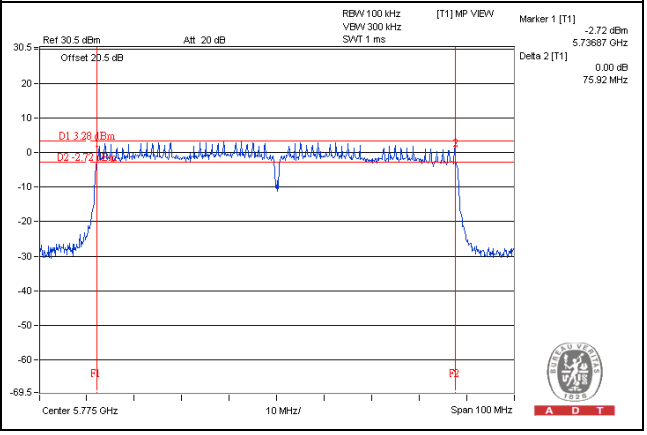
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



5.4 Conducted Output Power

5.4.1 Limits OF Conducted Output Power Measurement

For systems using digital modulation in the 5725 –5850 MHz bands: 1 Watt (30dBm)

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

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

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

5.4.2 Test Setup

Same as Item 4.4.2.

5.4.3 Test 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 4.4.6.

5.4.7 Test Results

CDD MODE

802.11a

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	25.55	24.47	24.21	902.453	29.55	30	PASS
157	5785	25.52	24.69	24.31	**920.667**	29.64	30	PASS
165	5825	25.49	24.55	24.27	906.400	29.57	30	PASS

Beamforming MODE

802.11ac (VHT20)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	24.81	23.92	23.93	796.467	29.01	29.23	PASS
157	5785	24.93	23.99	23.95	**810.096**	29.09	29.23	PASS
165	5825	24.90	23.94	23.97	806.231	29.06	29.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the conducted power limit shall be reduced to 30-(6.77-6) = 29.23dBm.

802.11ac (VHT40)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	23.22	22.51	22.24	555.626	27.45	29.23	PASS
159	5795	24.77	24.31	24.06	**824.373**	29.16	29.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the conducted power limit shall be reduced to 30-(6.77-6) = 29.23dBm.

802.11ac (VHT80)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
155	5775	22.07	21.59	20.97	**430.303**	26.34	29.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the conducted power limit shall be reduced to 30-(6.77-6) = 29.23dBm.

5.5 Power Spectral Density Measurement

5.5.1 Limits OF Power Spectral Density Measurement

Same as item 4.5.1.

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 Conditions

Same as Item 4.3.6

5.5.7 Test Results

CDD MODE

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	-0.51	4.77	4.59	7.23	PASS
	157	5785	-0.19	4.77	4.91	7.23	PASS
	165	5825	-0.84	4.77	4.26	7.23	PASS
1	149	5745	-1.09	4.77	4.01	7.23	PASS
	157	5785	-1.63	4.77	3.47	7.23	PASS
	165	5825	-0.67	4.77	4.43	7.23	PASS
2	149	5745	-0.63	4.77	4.47	7.23	PASS
	157	5785	-2.00	4.77	3.10	7.23	PASS
	165	5825	-2.04	4.77	3.06	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

Beamforming MODE

802.11ac (VHT20)

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	-3.34	4.77	2.14	7.23	PASS
	157	5785	-0.35	4.77	5.13	7.23	PASS
	165	5825	-2.41	4.77	3.07	7.23	PASS
1	149	5745	-5.99	4.77	-0.51	7.23	PASS
	157	5785	-1.93	4.77	3.55	7.23	PASS
	165	5825	-1.67	4.77	3.81	7.23	PASS
2	149	5745	-5.64	4.77	-0.16	7.23	PASS
	157	5785	-2.16	4.77	3.32	7.23	PASS
	165	5825	-2.68	4.77	2.80	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

802.11ac (VHT40)

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	-8.32	4.77	-3.08	7.23	PASS
	159	5795	-3.28	4.77	1.96	7.23	PASS
1	151	5755	-8.98	4.77	-3.74	7.23	PASS
	159	5795	-4.28	4.77	0.96	7.23	PASS
2	151	5755	-9.20	4.77	-3.96	7.23	PASS
	159	5795	-5.33	4.77	-0.09	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

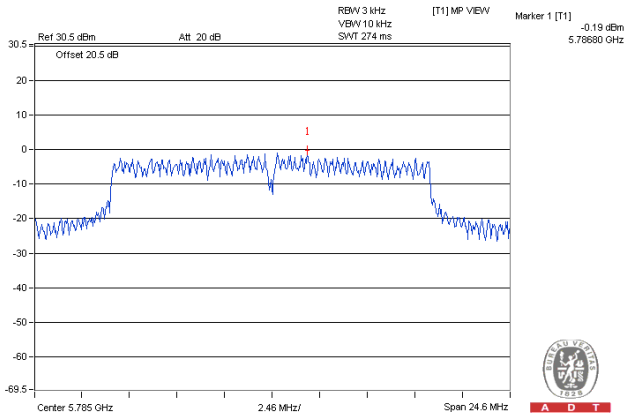
802.11ac (VHT80)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	155	5775	-10.12	4.77	-4.53	7.23	PASS
1	155	5775	-11.77	4.77	-6.18	7.23	PASS
2	155	5775	-11.76	4.77	-6.17	7.23	PASS

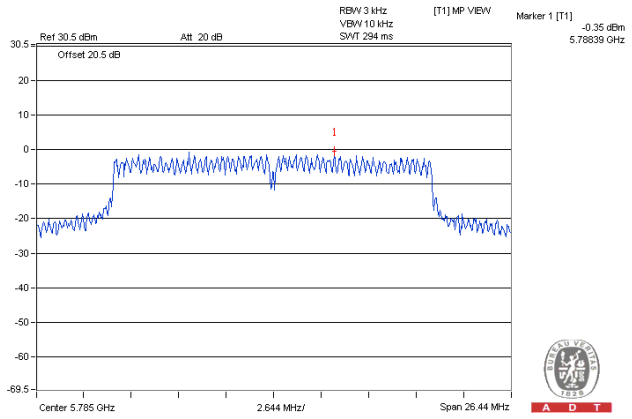
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

SPECTRUM PLOT OF WORST VALUE

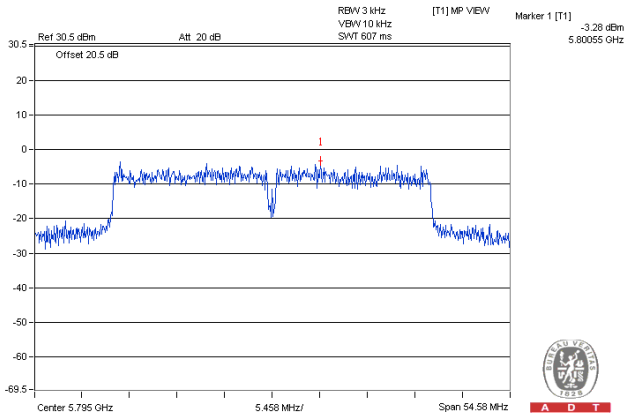
802.11a



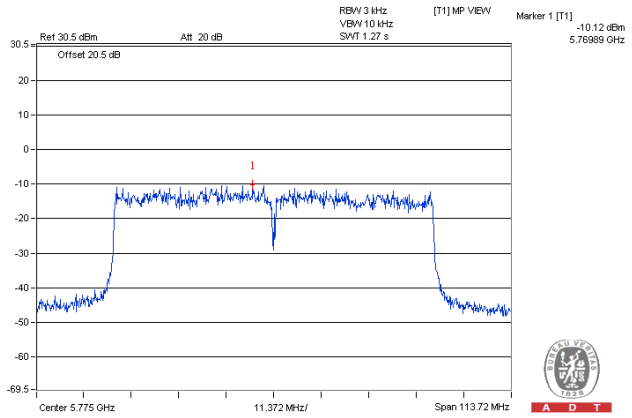
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



5.6 Conducted Out of Band Emission Measurement

5.6.1 Limits of Conducted Out of Band Emission Measurement

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

5.6.2 Test Setup

Same as Item 4.6.2

5.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

5.6.4 Test Procedure

Same as Item 4.6.4

5.6.5 Deviation from Test Standard

No deviation.

5.6.6 EUT Operating Conditions

Same as Item 4.3.6

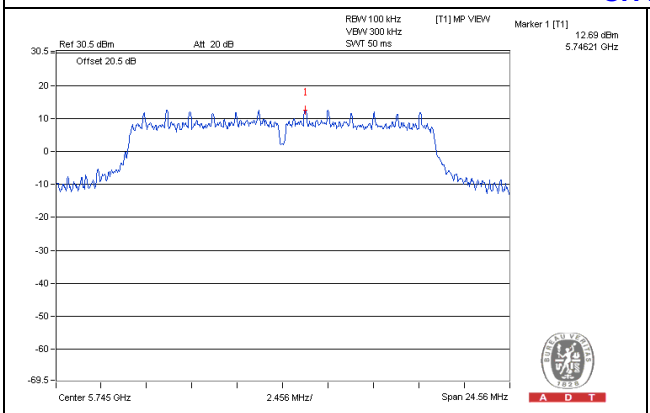
5.6.7 Test Results

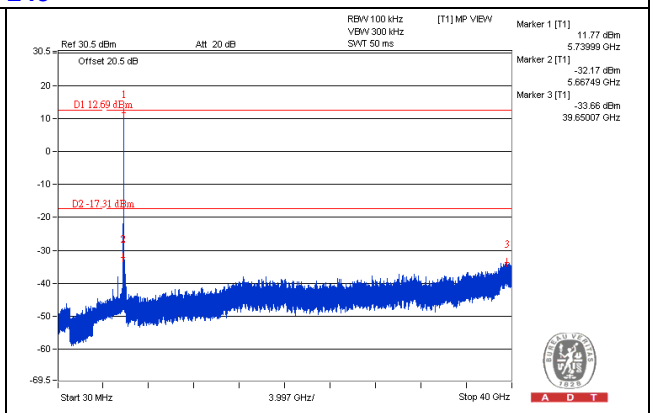
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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

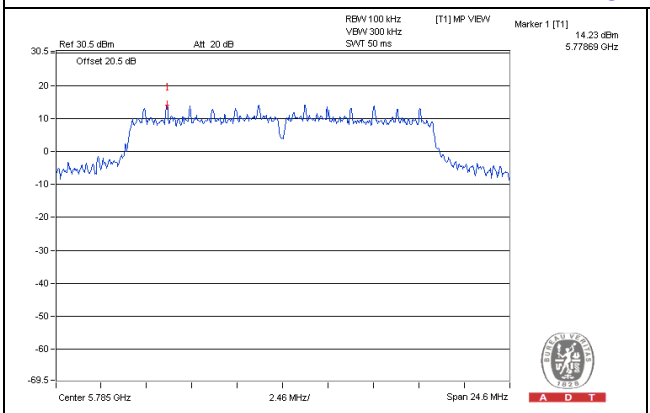
802.11a
CHAIN 0

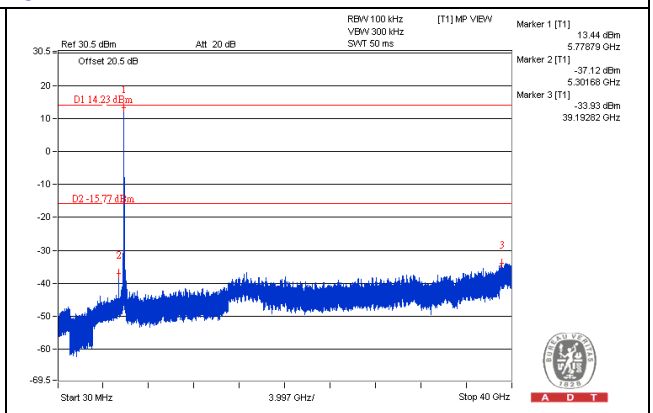
CH 149



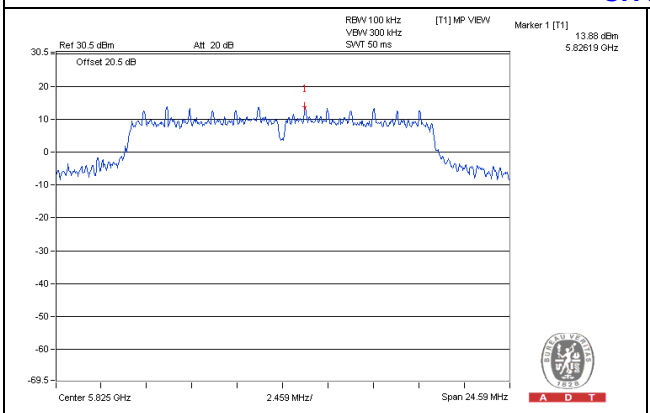


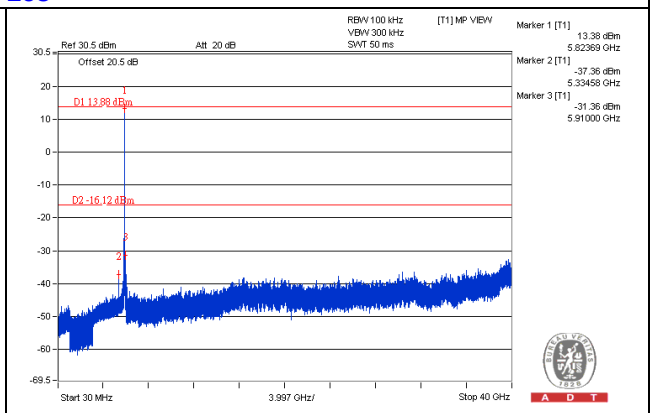
CH 157



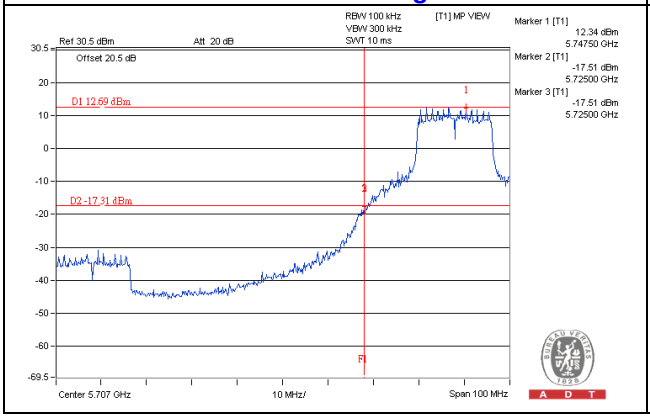


CH 165

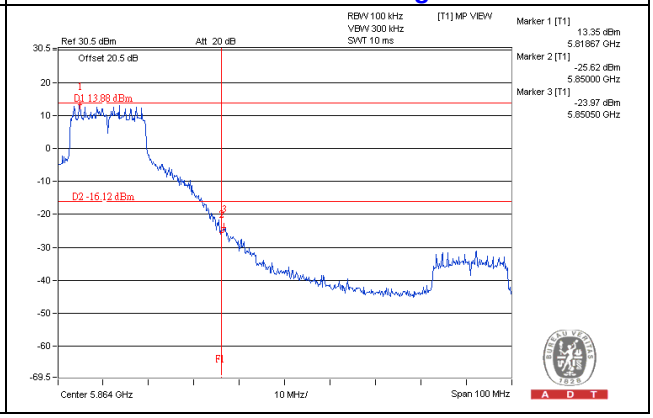




CH 149 Band edge

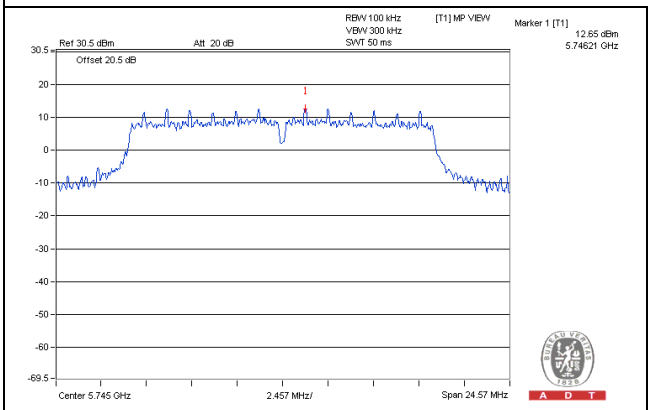


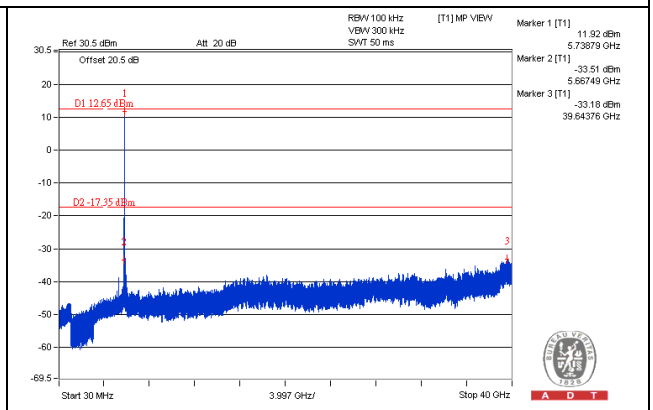
CH 165 Band edge



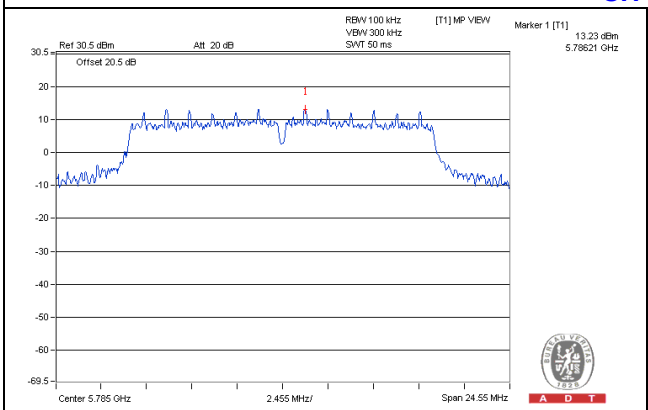
CHAIN 1

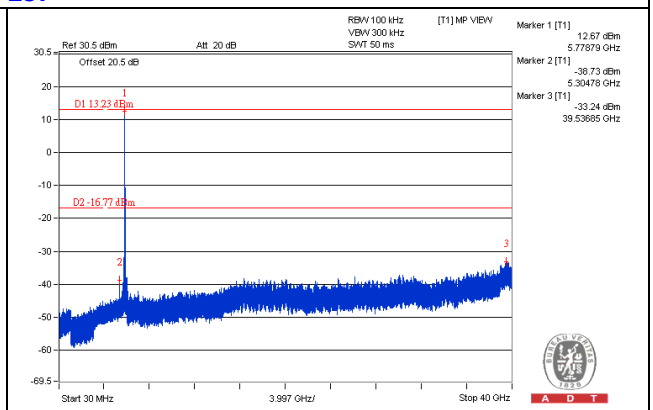
CH 149



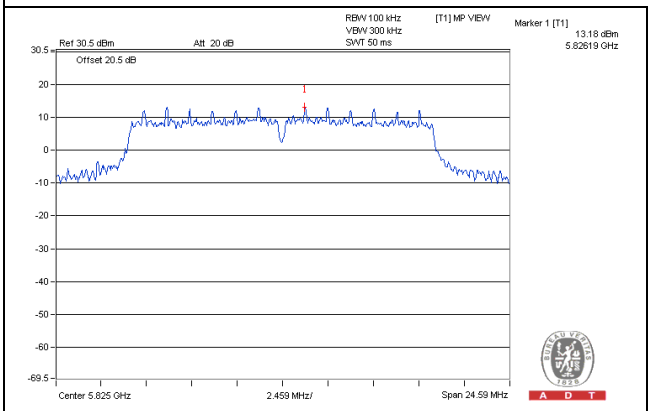


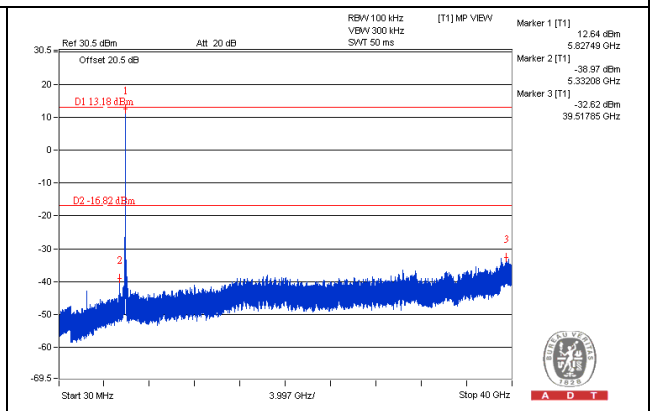
CH 157



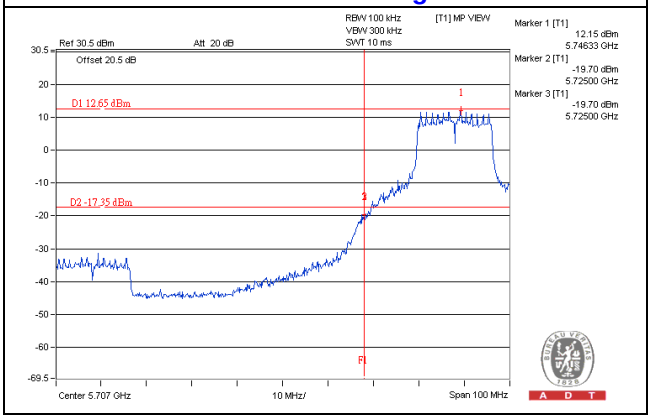


CH 165

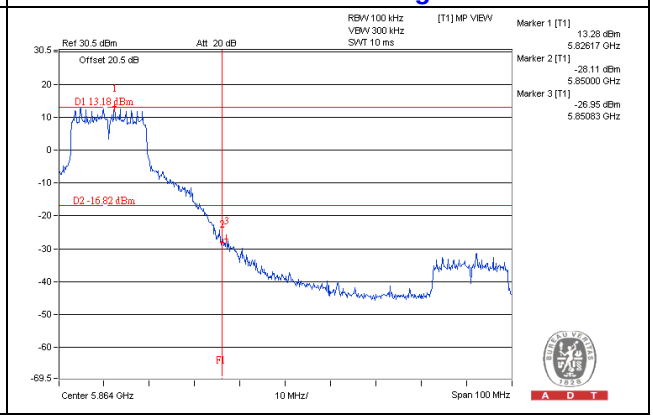




CH 149 Band edge

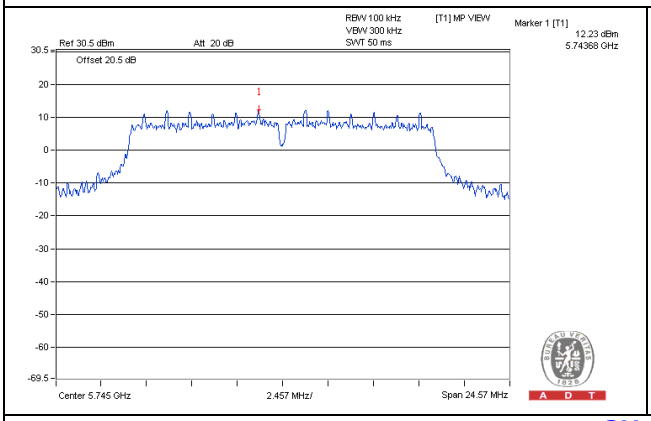


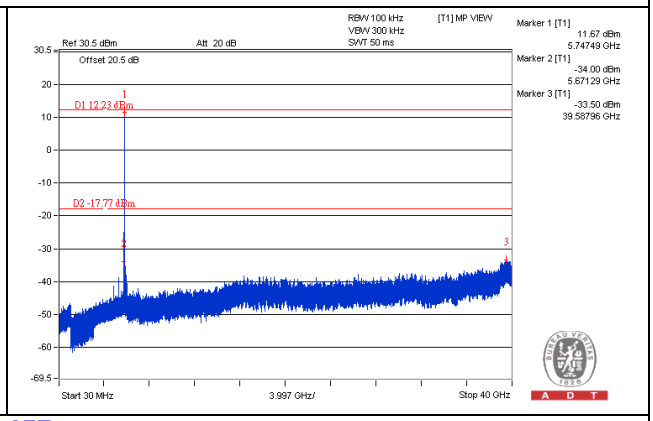
CH 165 Band edge



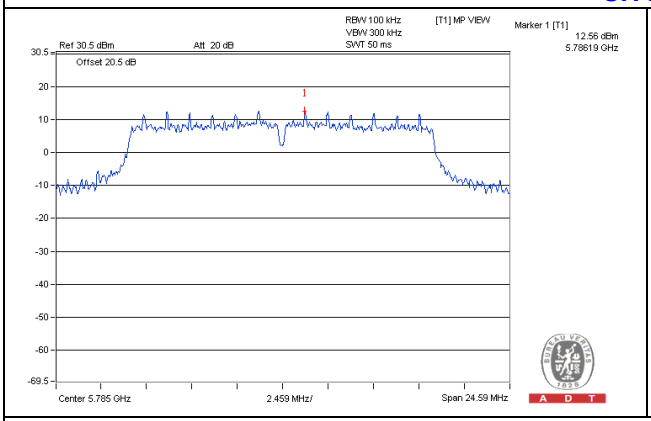
CHAIN 2

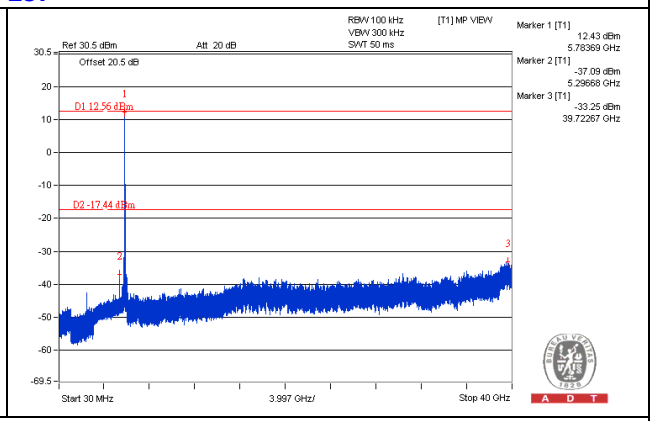
CH 149



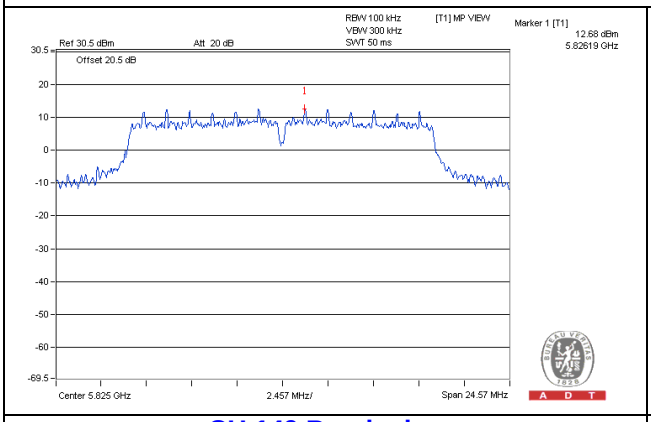


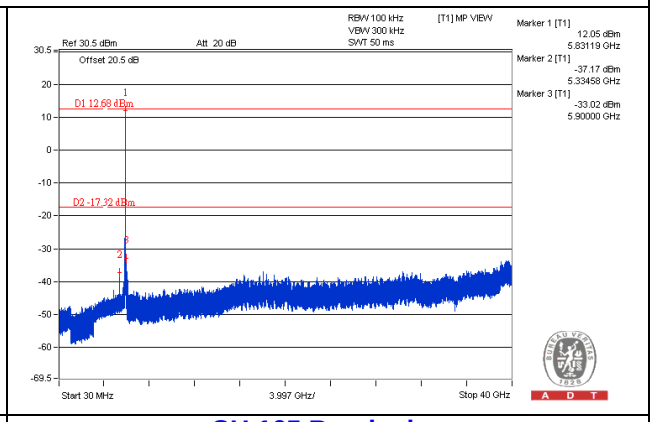
CH 157



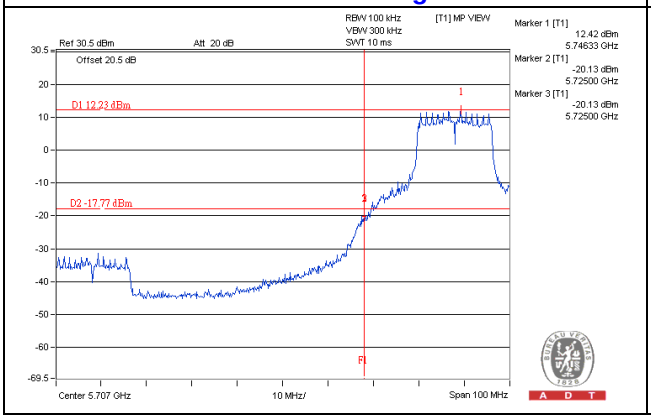


CH 165

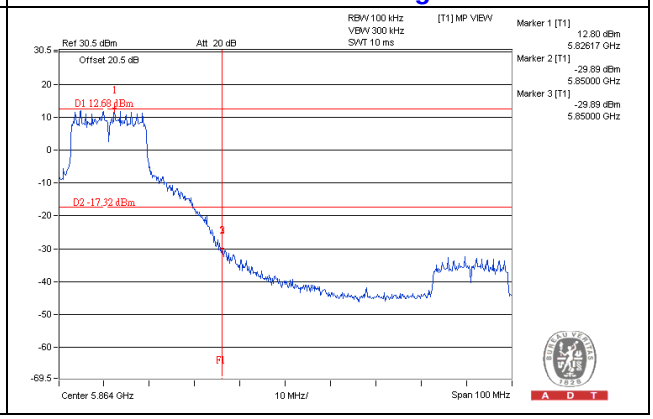




CH 149 Band edge

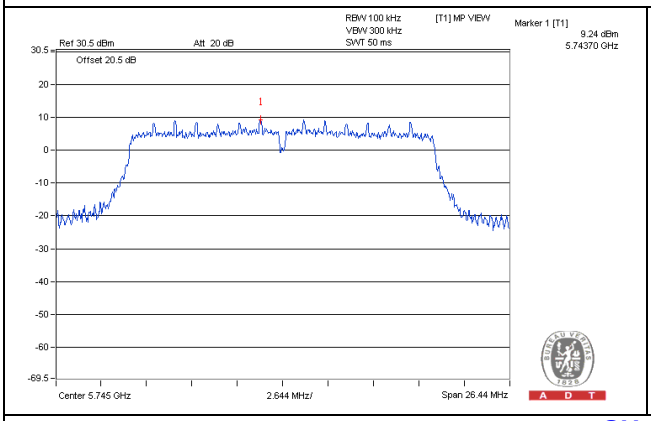


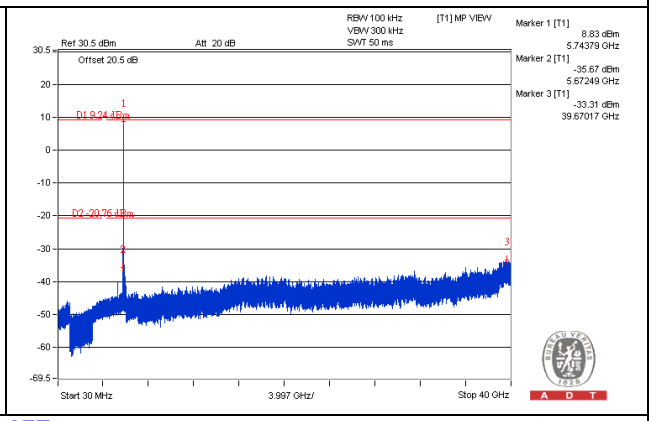
CH 165 Band edge



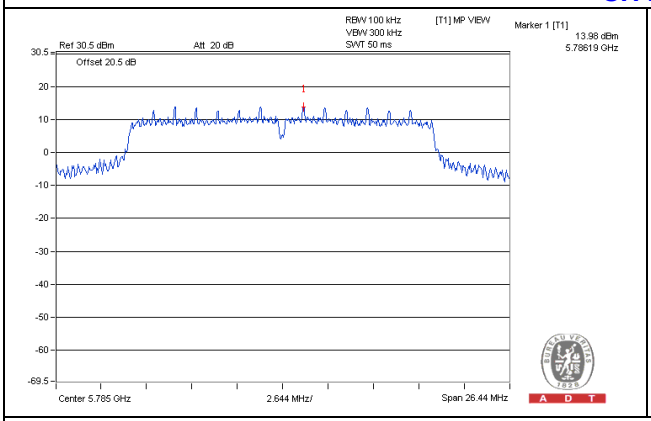
802.11ac (VHT20)
CHAIN 0

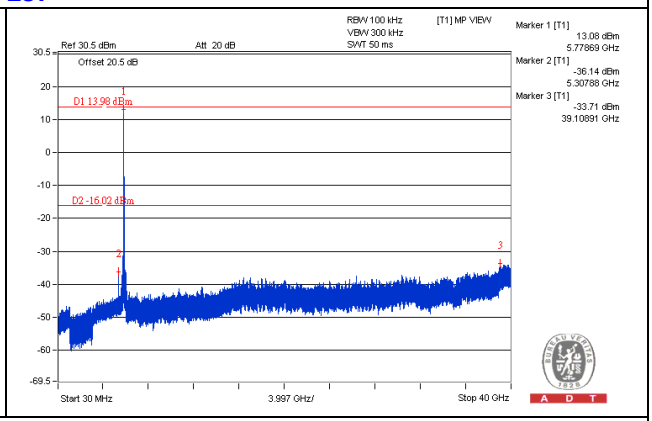
CH 149



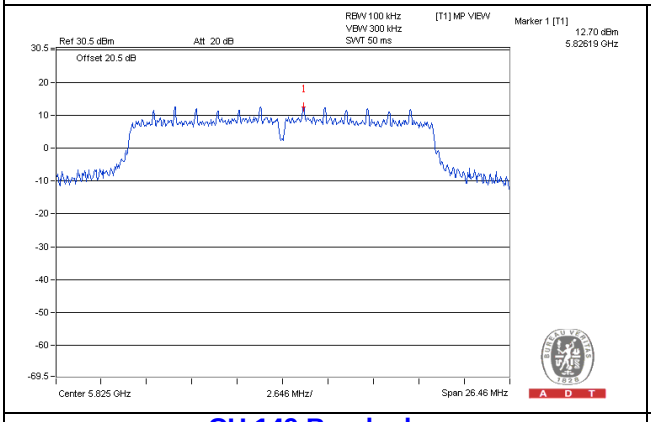


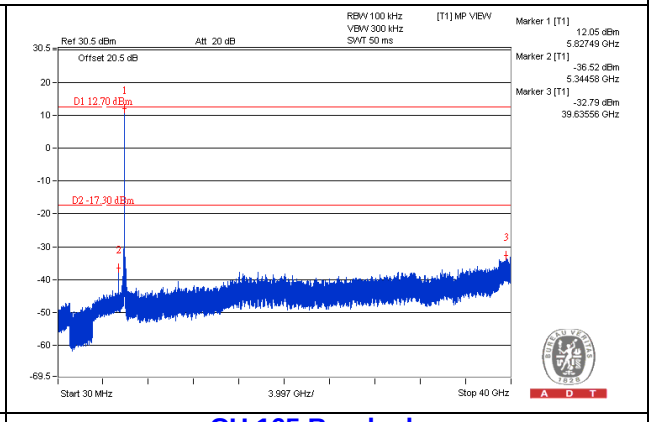
CH 157



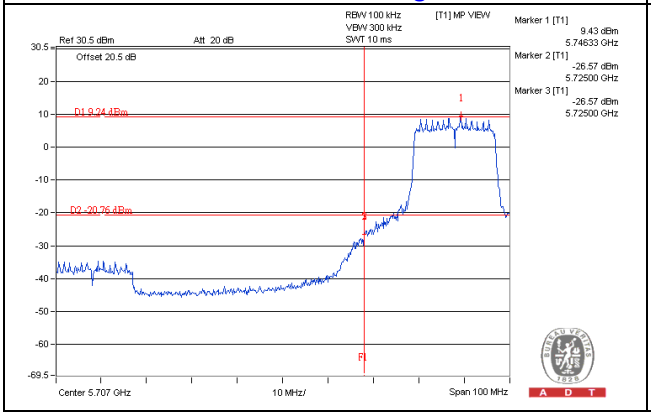


CH 165

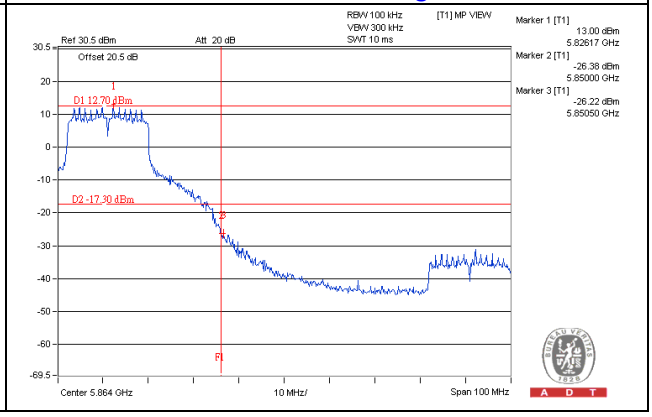




CH 149 Band edge

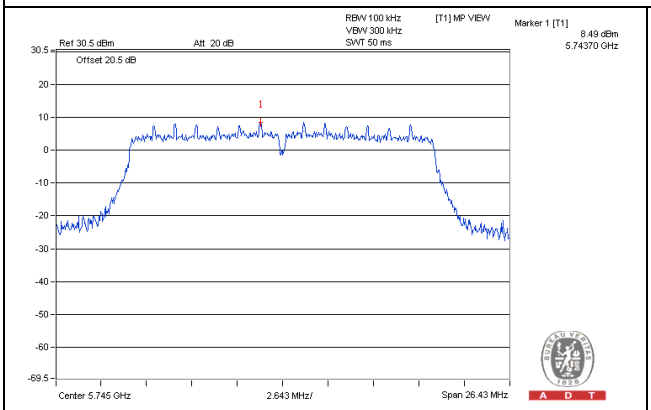


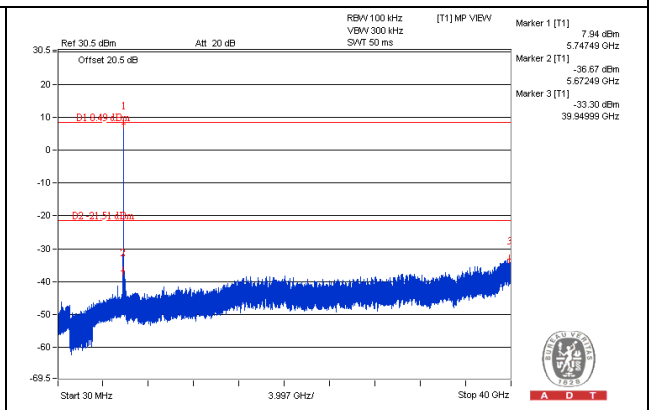
CH 165 Band edge



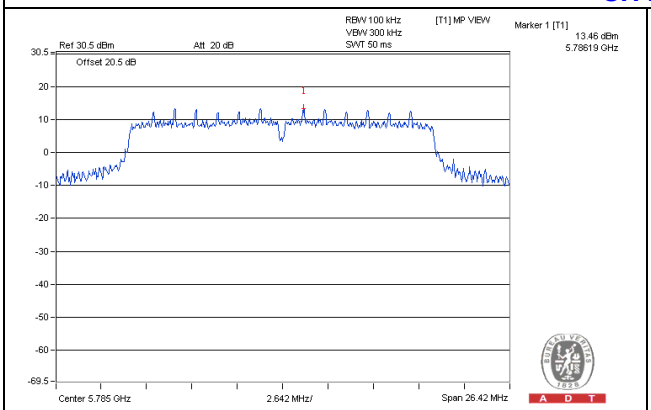
CHAIN 1

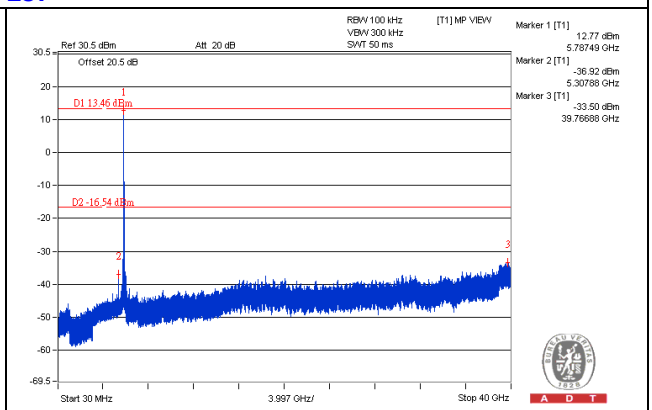
CH 149



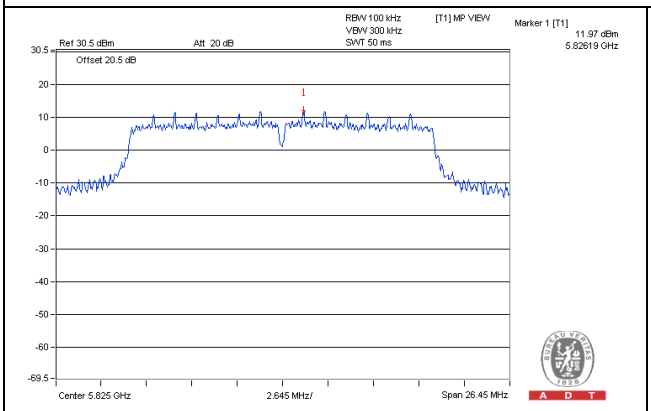


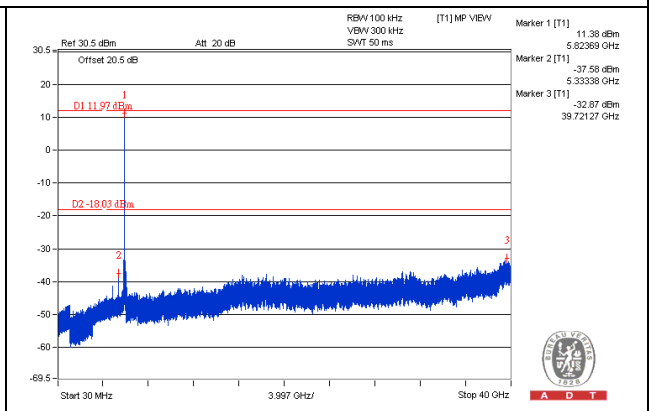
CH 157



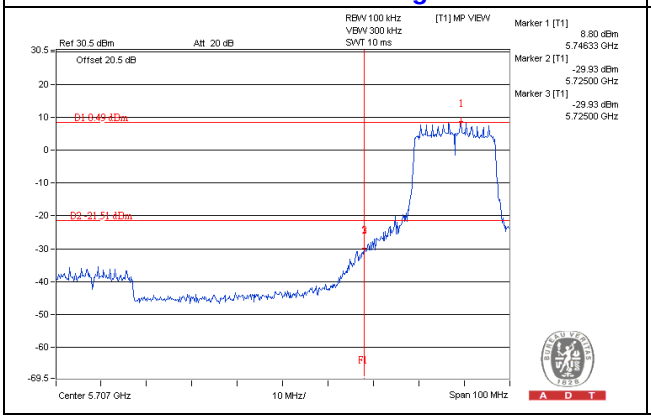


CH 165

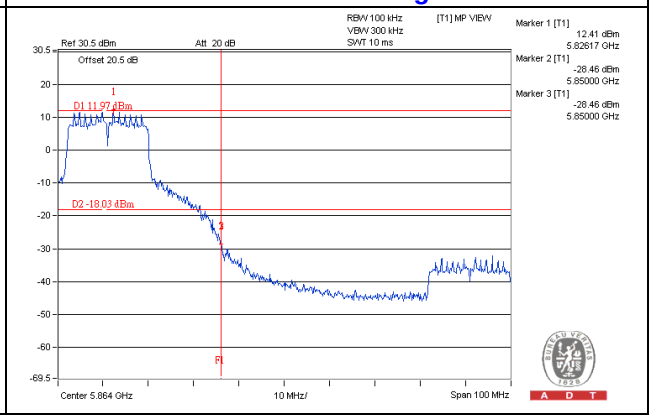




CH 149 Band edge

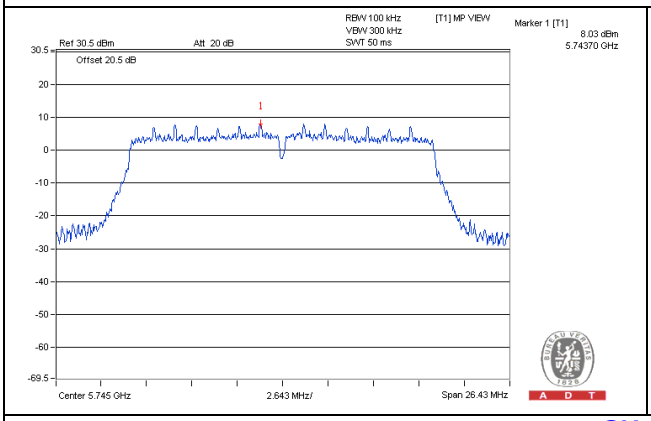


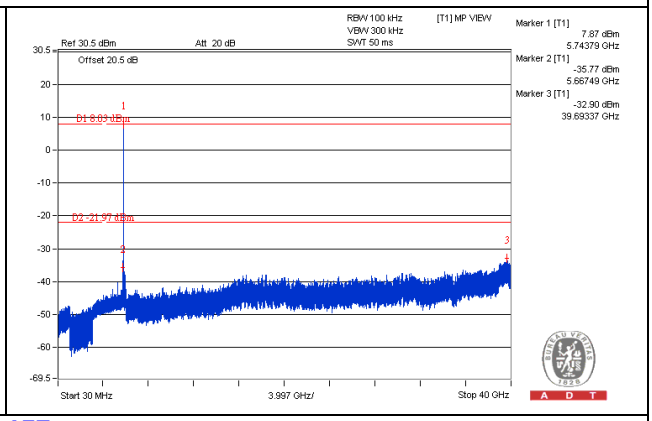
CH 165 Band edge



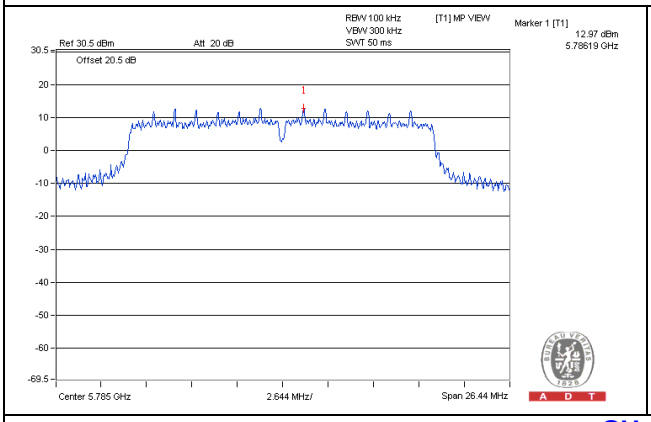
CHAIN 2

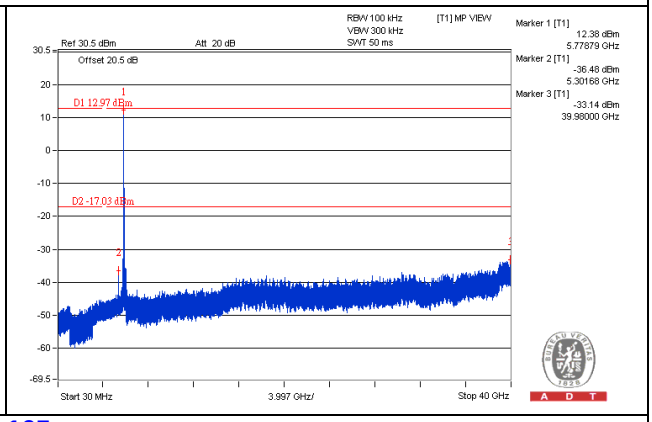
CH 149



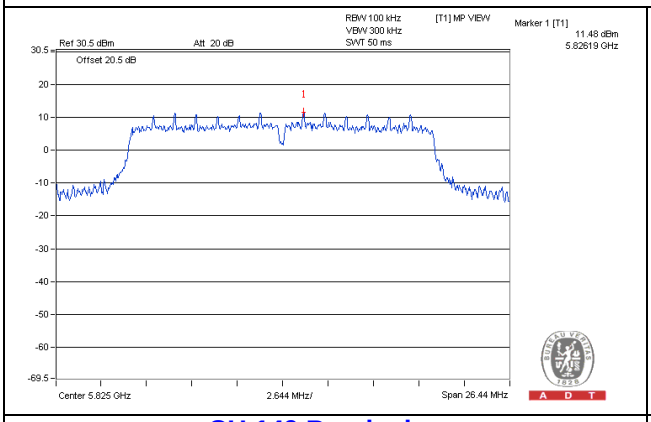


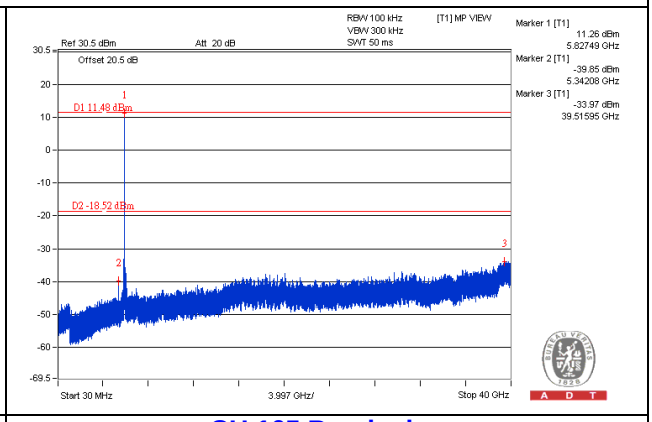
CH 157



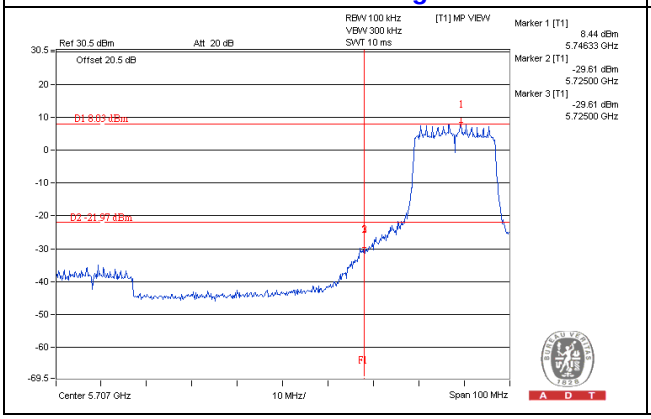


CH 165

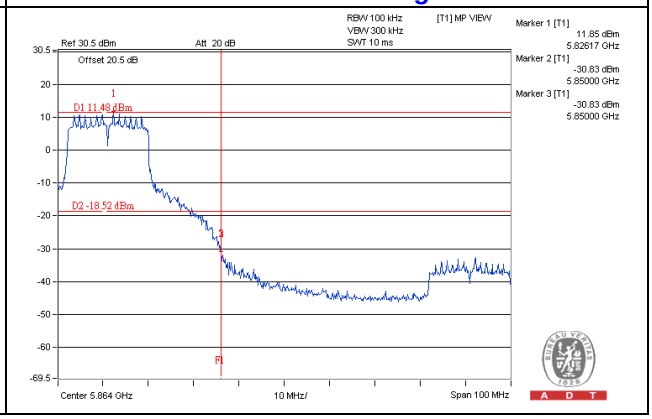




CH 149 Band edge

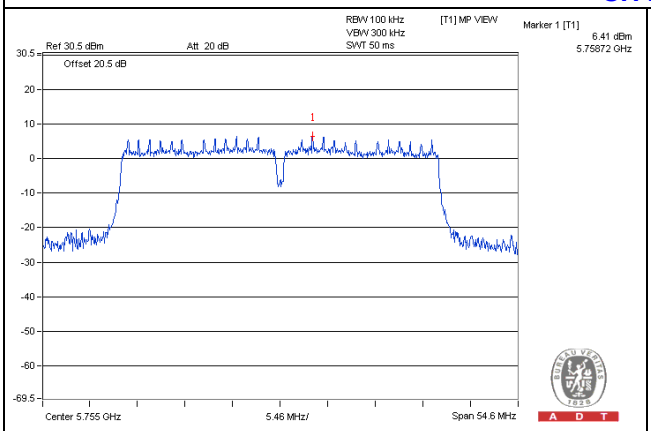


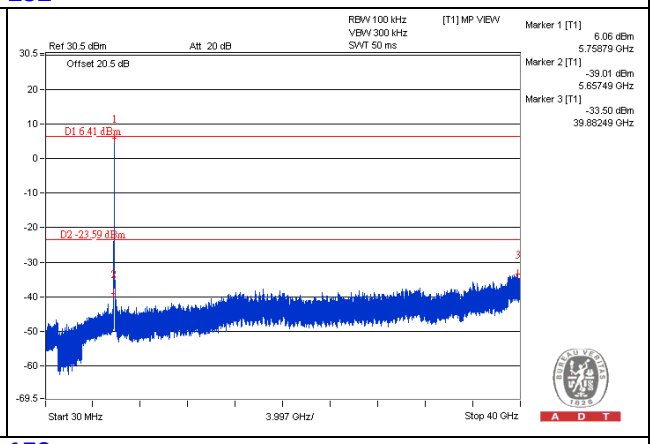
CH 165 Band edge



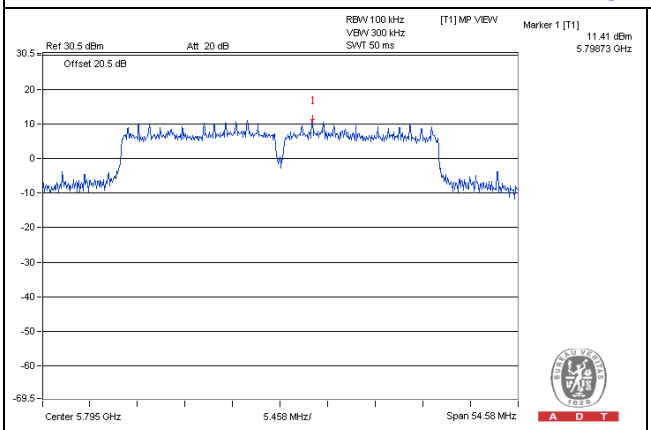
802.11ac (VHT40)
CHAIN 0

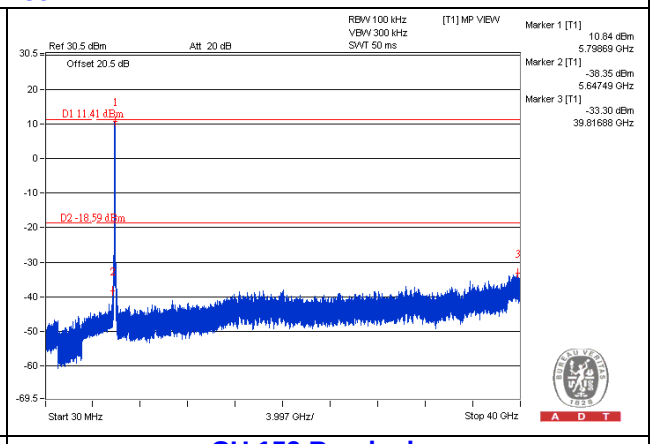
CH 151



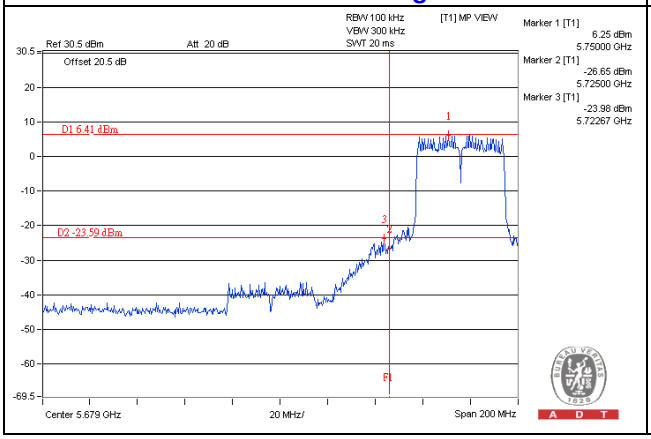


CH 159

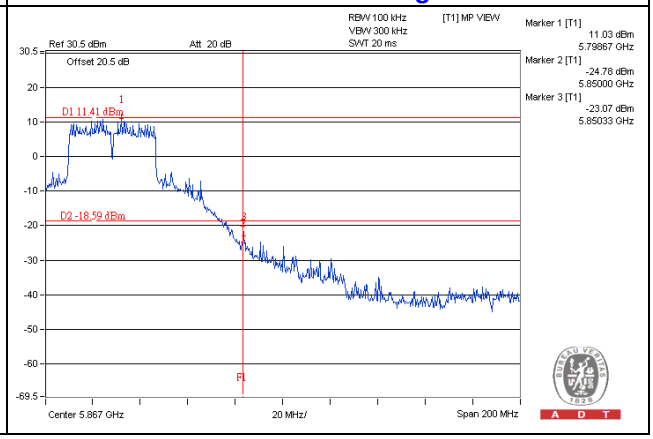




CH 151 Band edge

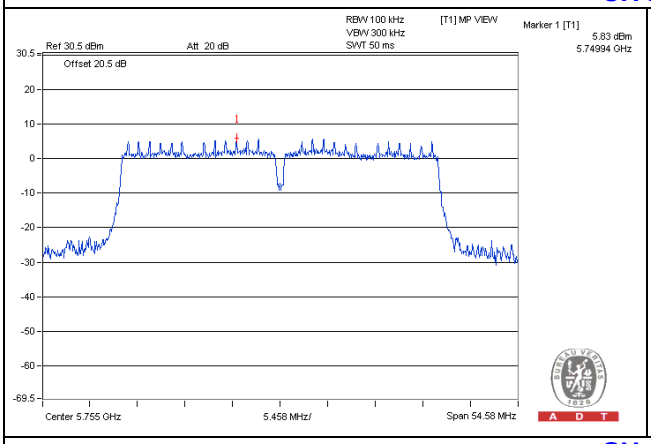


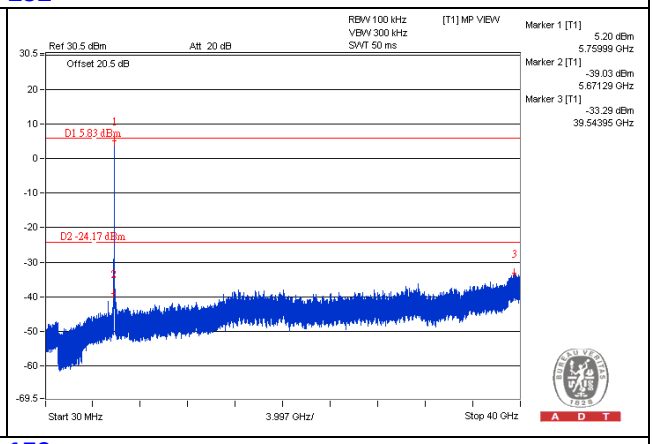
CH 159 Band edge



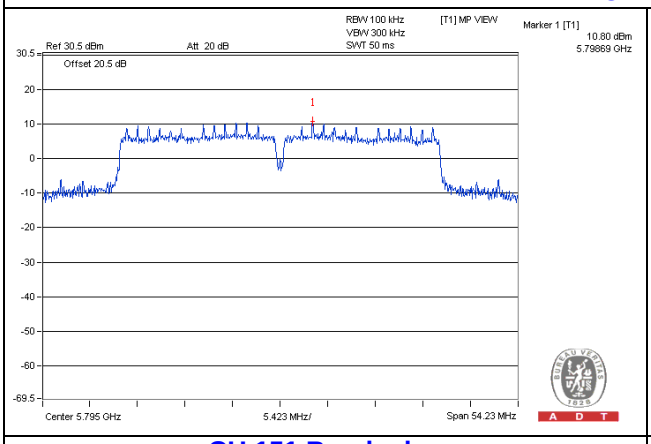
CHAIN 1

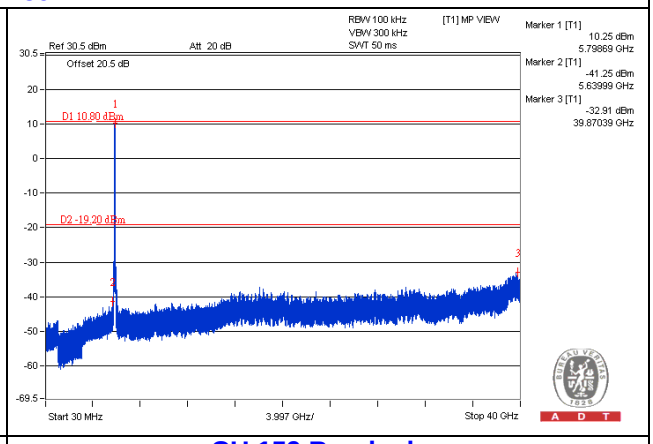
CH 151



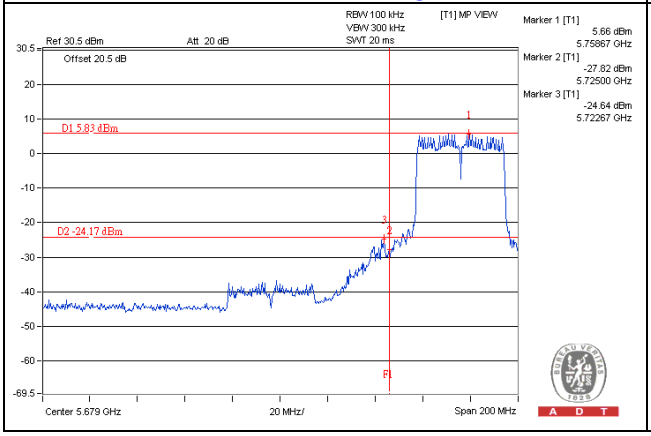


CH 159

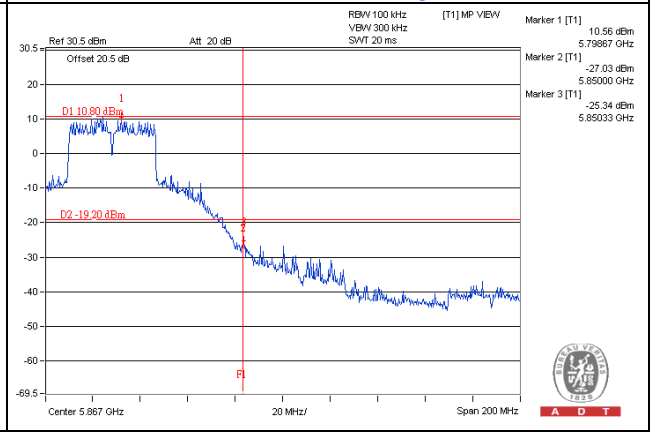




CH 151 Band edge

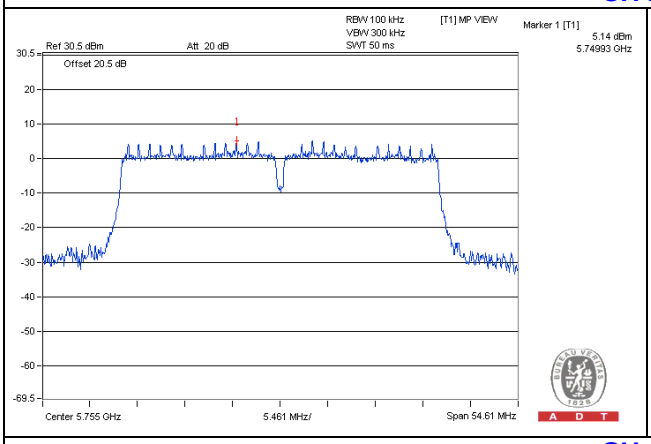


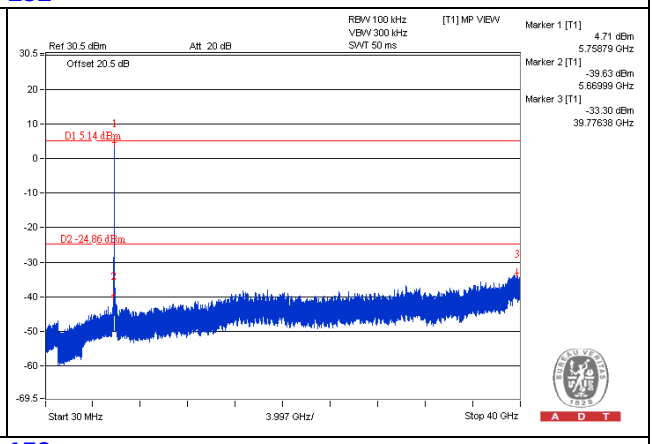
CH 159 Band edge



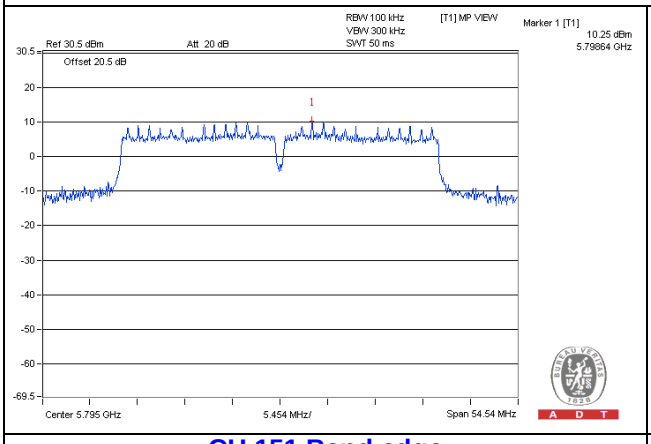
CHAIN 2

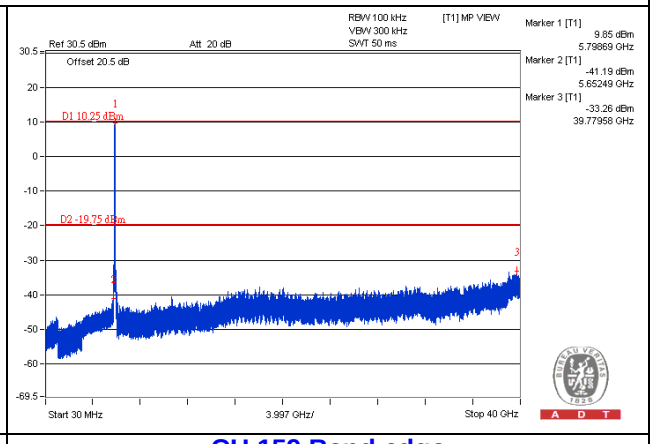
CH 151



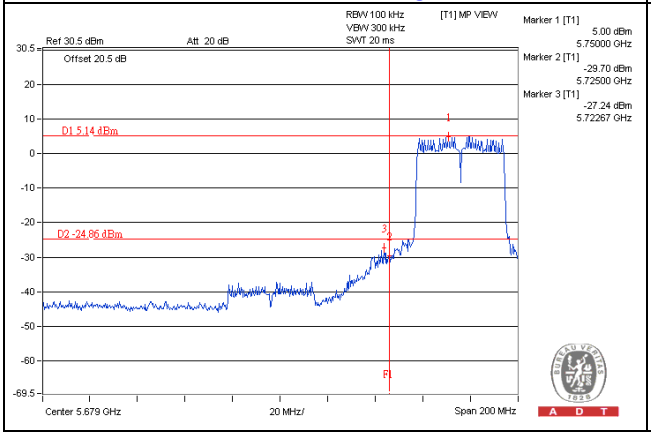


CH 159

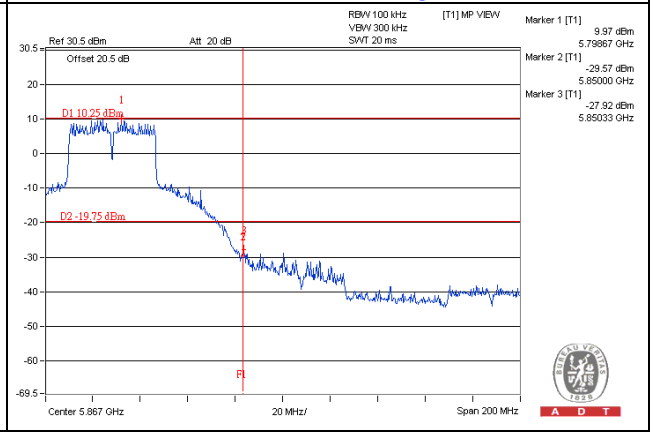




CH 151 Band edge

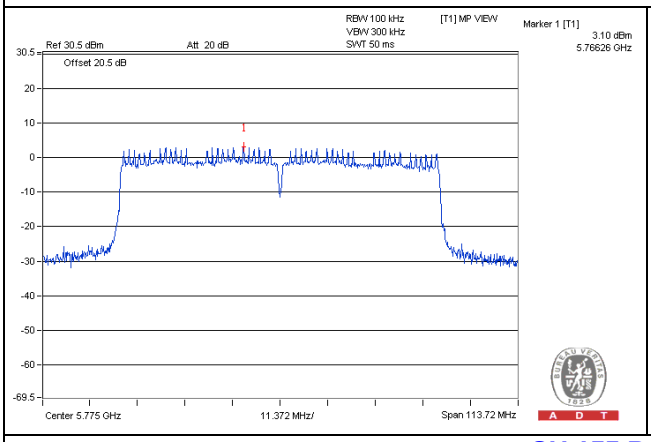


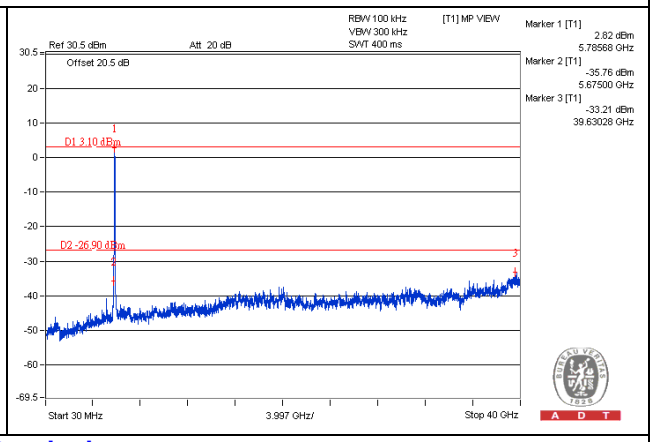
CH 159 Band edge



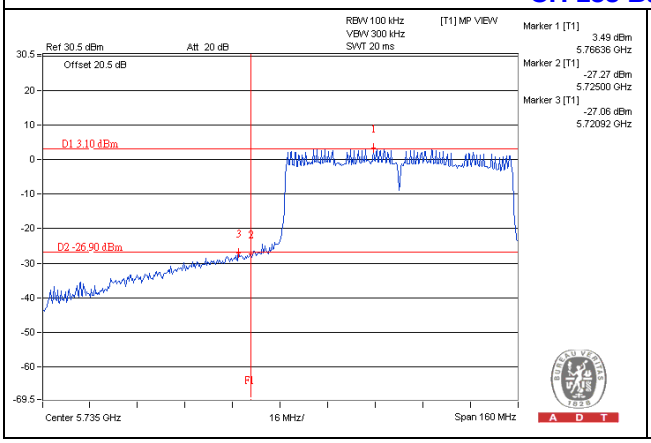
802.11ac (VHT80)
CHAIN 0

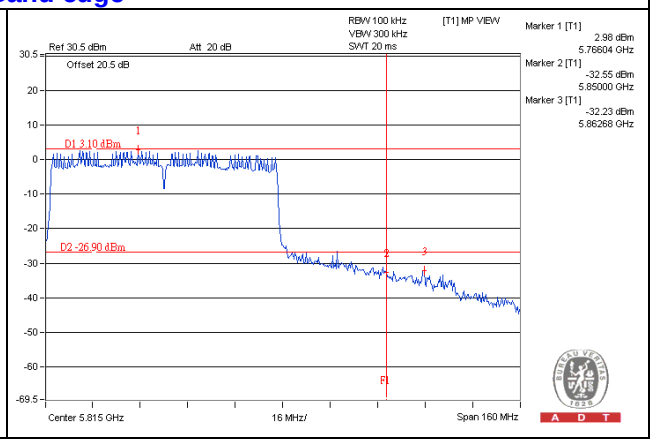
CH 155





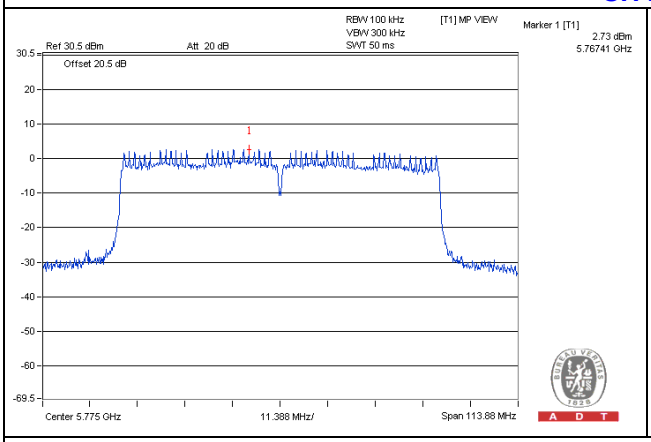
CH 155 Band edge

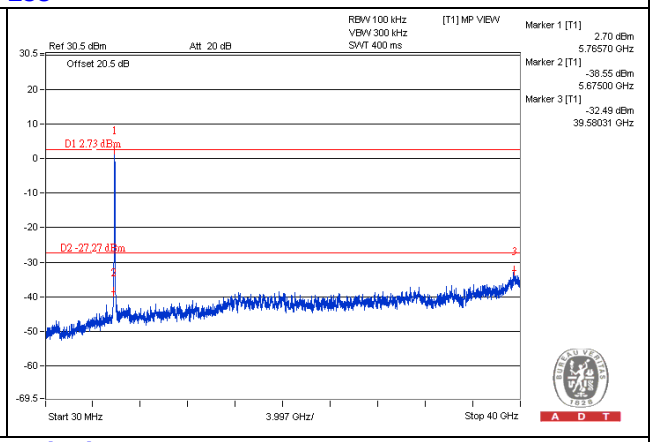




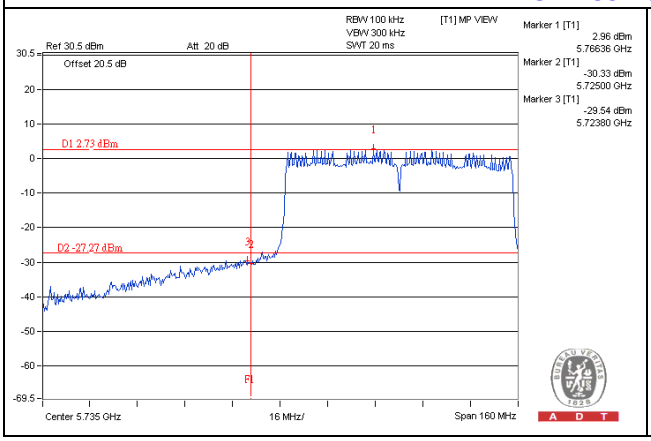
CHAIN 1

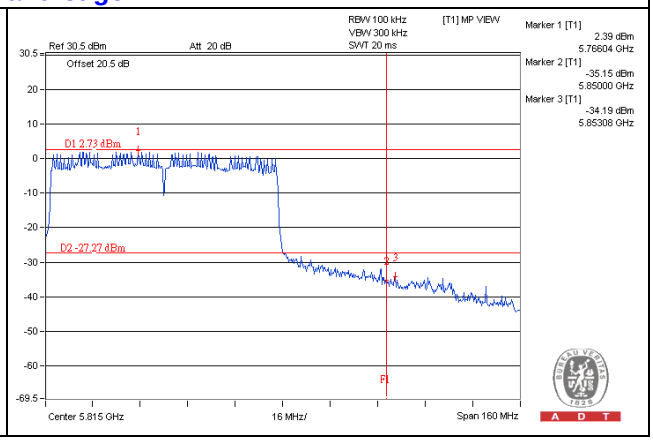
CH 155





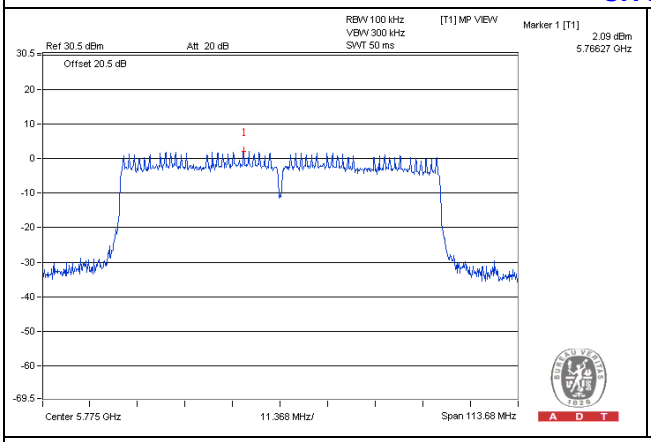
CH 155 Band edge

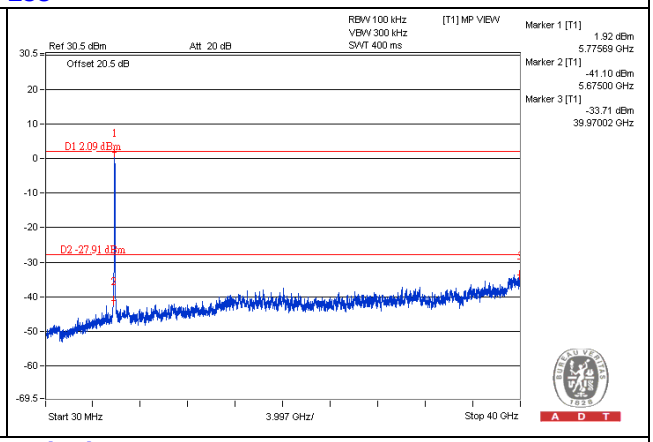




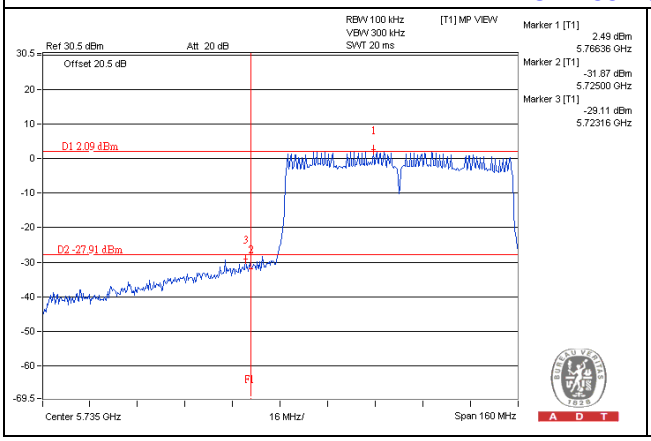
CHAIN 2

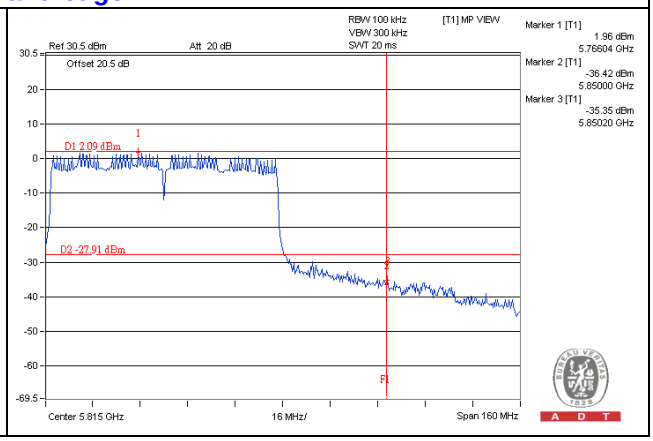
CH 155





CH 155 Band edge





6 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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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.

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