FCC Test Report

Report No.:	RF150422C24A
FCC ID:	TE7C2600
Test Model:	Archer C2600
Received Date:	Jul. 14, 2015
Test Date:	Oct. 03 ~ Oct. 19, 2015
Issued Date:	Nov. 03, 2015
Applicant:	TP-LINK TECHNOLOGIES CO., LTD.
Address:	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park,Shennan Rd, Nanshan, Shenzhen,China
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
RF150422C24A	Original release	Nov. 03, 2015

1 Certificate of Conformity

Product:	AC2600 Wireless Dual Band Gigabit Router
Brand:	TP-LINK
Test Model:	Archer C2600
Sample Status:	Prototype
Applicant:	TP-LINK TECHNOLOGIES CO., LTD.
Test Date:	Oct. 03 ~ Oct. 19, 2015
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

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:** Nov. 03, 2015

Pettie Chen / Senior Specialist

Approved by : _____ , **Date:** Nov. 03, 2015

Ken Liu / Senior 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 -17.61dB at 13.69922MHz
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.3dB at 5725.00MHz.
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 i-pex MHF not a standard connector.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC2600 Wireless Dual Band Gigabit Router
Brand	TP-LINK
Test Model	Archer C2600
Status of EUT	Prototype
Power Supply Rating	12Vdc from adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 800.0Mbps with 256QAM 802.11ac: up to 1733.3Mbps
Operating Frequency	2412 ~ 2462MHz, 5745 ~ 5825MHz
Number of Channel	2412 ~ 2462MHz: 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) 5745 ~ 5825MHz: 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	2412 ~ 2462MHz: 464.622mW 5745 ~ 5825MHz: 381.102mW
Antenna Type	2412 ~ 2462MHz: Omni-Directional antenna with 3.04dBi gain 5745 ~ 5825MHz: Omni-Directional antenna with 4.15dBi gain
Antenna Connector	i-pex MHF
Accessory Device	1.45m shielded AC power cable without core, adapter
Data Cable Supplied	N/A

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to BV ADT report no.: RF150422C24. The difference compared with the original report is software change to adding beamforming mode. All test data for beamforming mode had been tested and recorded in this report.

2. The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitters and 4 receivers.

Modulation Mode	TX Function	Beamforming
802.11b	4TX	Not Support
802.11g	4TX	Not Support
802.11a	4TX	Not Support
802.11n (HT20) for 2.4GHz	4TX	Support
802.11n (HT40) for 2.4GHz	4TX	Support
802.11n (HT20) for 5GHz	4TX	Not Support
802.11n (HT40) for 5GHz	4TX	Not Support
802.11ac (VHT20)	4TX	Support
802.11ac (VHT40)	4TX	Support
802.11ac (VHT80)	4TX	Support

3. The EUT uses following adapter.

Adapter	
Brand	Huntkey
Model	HKA04812040-7D
Input Power	100-240Vac~1.2A 50/60Hz
Output Power	12.0Vdc / 4.0A
Power Line	1.8m cable without core attached on adapter

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
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz

PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

Note: 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**

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)
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Radiated Emission Test (Below 1GHz):

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (HT20)	1 to 11	6	OFDM	BPSK	7.2

Power Line Conducted Emission Test:

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (HT20)	1 to 11	6	OFDM	BPSK	7.2

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)
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	24deg. C, 70%RH	120Vac, 60Hz	Jones Chang
RE<1G	22deg. C, 72%RH	120Vac, 60Hz	Jones Chang
PLC	18deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Antony Lee

FOR 5.0GHz:

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

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **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 **Z-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)
-	802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	15.0
-	802.11ac (VHT80)	155	155	OFDM	BPSK	117.0

Radiated Emission Test (Below 1GHz):

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11ac (VHT20)	149 to 165	165	OFDM	BPSK	7.2

Power Line Conducted Emission Test:

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11ac (VHT20)	149 to 165	165	OFDM	BPSK	7.2

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)
-	802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	15.0
-	802.11ac (VHT80)	155	155	OFDM	BPSK	117.0

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	24deg. C, 70%RH	120Vac, 60Hz	Jones Chang
RE<1G	22deg. C, 72%RH	120Vac, 60Hz	Jones Chang
PLC	18deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Antony Lee

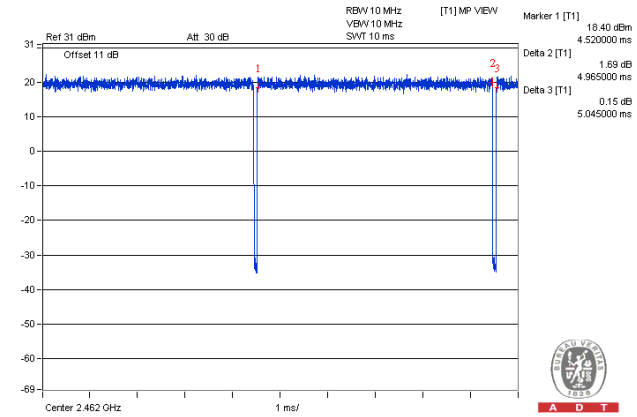
3.3 Duty Cycle of Test Signal

2.4GHz Band:

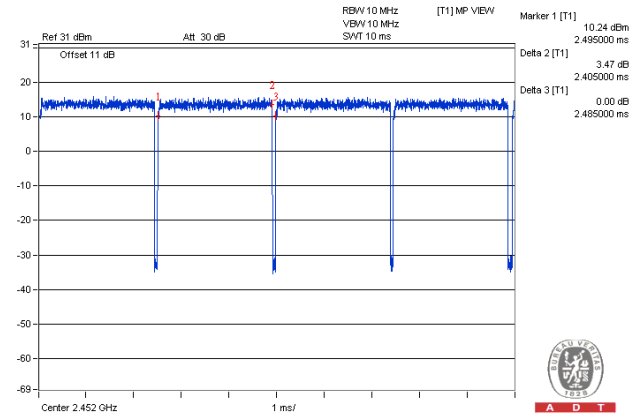
Duty cycle of test signal is > 98%, duty factor is not required
802.11n (HT20): Duty cycle = 4.965/5.045 = 0.984

Duty cycle of test signal is < 98%, duty factor shall be considered.
802.11n (HT40): Duty cycle = 2.405/2.485 = 0.968, Duty factor = 10 * log(1/0.968) = 0.14

802.11n (HT20)



802.11n (HT40)

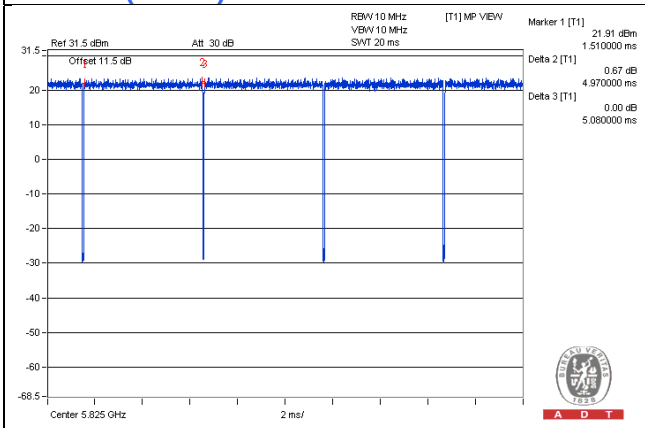


5GHz Band:

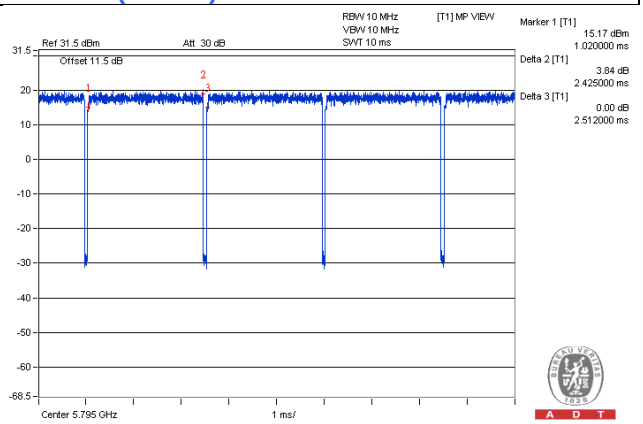
Duty cycle of test signal is < 98 %, duty factor is required

802.11ac (VHT20): Duty cycle = 4.97/5.08= 0.978, Duty factor = 10 * log(1/0.978) = 0.10
802.11ac (VHT40): Duty cycle = 2.425/2.512= 0.965, Duty factor = 10 * log(1/0.965) = 0.15
802.11ac (VHT80): Duty cycle = 1.139/1.222= 0.932, Duty factor = 10 * log(1/0.932) = 0.31

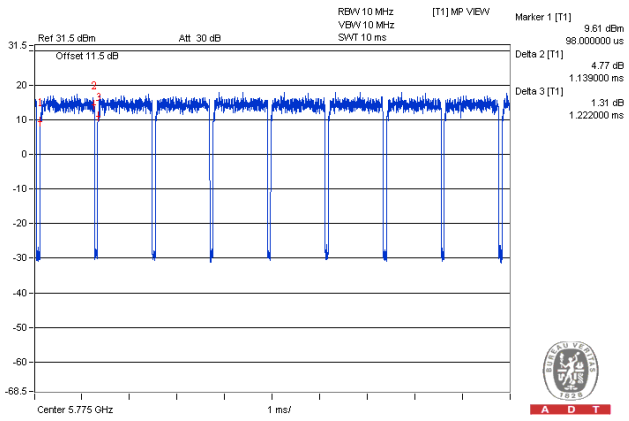
802.11ac (VHT20)



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.

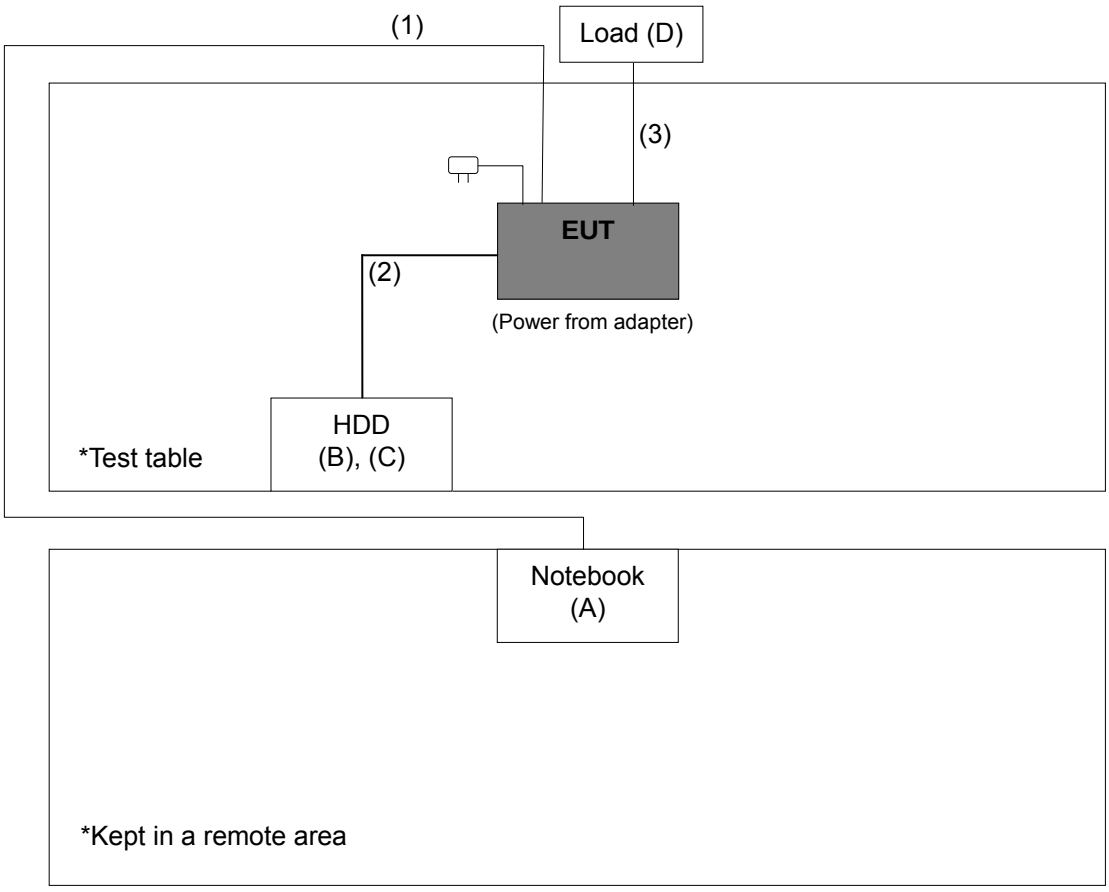
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	D531	CN-0XM006-48643-81 U-2610	QDS-BRCM1020	-
B.	External Hard Disk	WD	WDBACY5000ABL-01	WXS1CC1D3606	NA	-
C.	External Hard Disk	WD	WDBACY5000ABL-01	WX51C1245403	NA	-
D.	Load	NA	NA	NA	NA	-

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ 45	1	10	N	0	-
2.	USB	1	1.8	Y	0	-
3.	RJ 45	4	1.8	N	0	-

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 v03r03
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 10, 2015	Apr. 09, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Sep. 02, 2015	Sep. 01, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	9120D	209	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8447D	2944A10738	Oct.18, 2014	Oct. 17, 2015
			Oct.18, 2015	Oct. 17, 2016
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03(214378)	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03(309224+12738)	Aug. 22, 2015	Aug. 21, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2015	Oct. 17, 2016
High Speed Peak Power Meter	ML2495A	0824011	Jul. 09, 2015	Jul. 08, 2016
Power Sensor	MA2411B	0738171	Jul. 09, 2015	Jul. 08, 2016

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

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) 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:

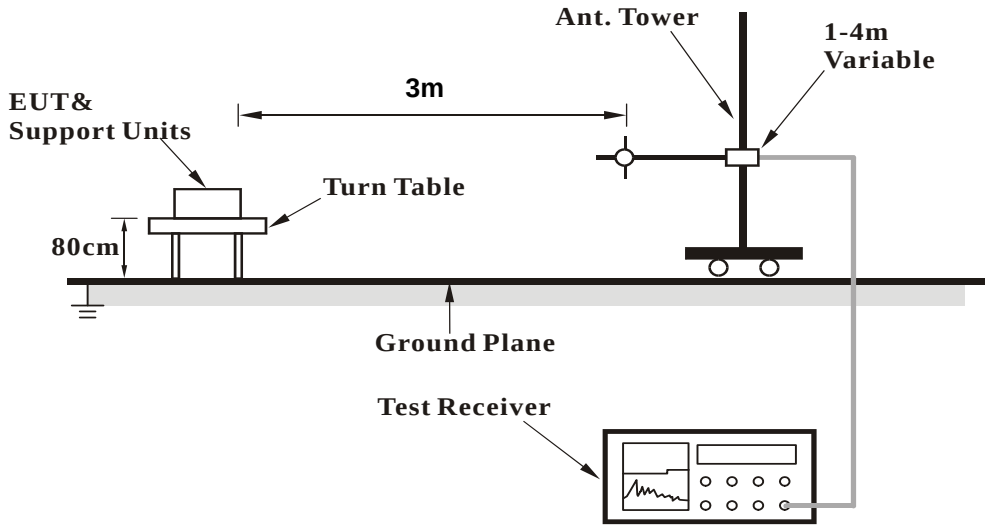
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. 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)).
4. 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.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

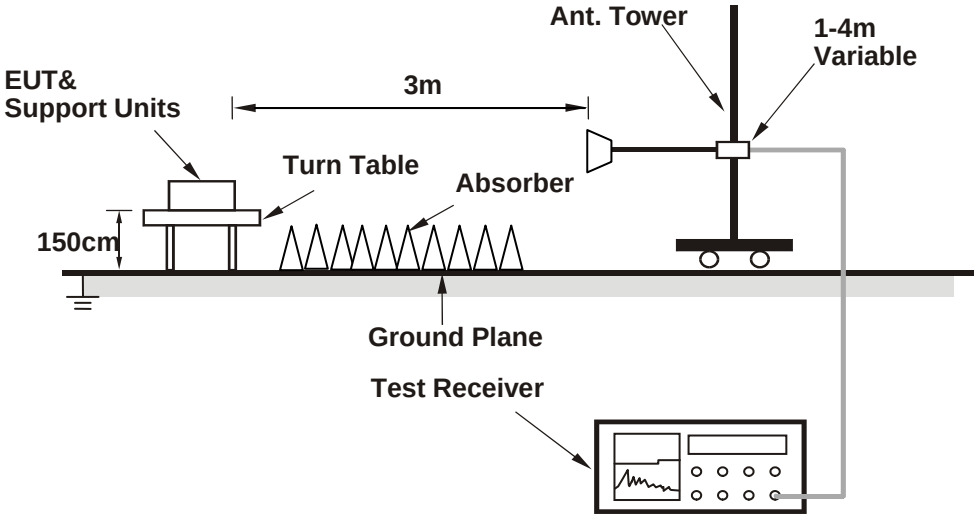
No deviation.

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

4.1.7 Test Results

Above 1GHz data:

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	56.6 PK	74.0	-17.4	1.28 H	56	24.10	32.50
2	2390.00	46.0 AV	54.0	-8.0	1.28 H	56	13.50	32.50
3	*2412.00	100.2 PK			1.28 H	22	67.60	32.60
4	*2412.00	95.6 AV			1.28 H	22	63.00	32.60
5	4824.00	49.4 PK	74.0	-24.6	1.44 H	278	43.30	6.10
6	4824.00	36.6 AV	54.0	-17.4	1.44 H	278	30.50	6.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.6 PK	74.0	-14.4	1.80 V	189	27.10	32.50
2	2390.00	48.3 AV	54.0	-5.7	1.80 V	189	15.80	32.50
3	*2412.00	113.1 PK			1.62 V	312	80.50	32.60
4	*2412.00	105.7 AV			1.62 V	312	73.10	32.60
5	4824.00	50.4 PK	74.0	-23.6	1.62 V	247	44.30	6.10
6	4824.00	38.0 AV	54.0	-16.0	1.62 V	247	31.90	6.10

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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	2390.00	56.4 PK	74.0	-17.6	1.57 H	313	23.90	32.50
2	2390.00	45.5 AV	54.0	-8.5	1.57 H	313	13.00	32.50
3	*2437.00	115.3 PK			1.77 H	326	82.60	32.70
4	*2437.00	103.3 AV			1.77 H	326	70.60	32.70
5	4874.00	49.2 PK	74.0	-24.8	1.49 H	262	43.00	6.20
6	4874.00	37.1 AV	54.0	-16.9	1.49 H	262	30.90	6.20
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	2390.00	62.5 PK	74.0	-11.5	1.71 V	187	30.00	32.50
2	2390.00	51.2 AV	54.0	-2.8	1.71 V	187	18.70	32.50
3	*2437.00	124.4 PK			1.72 V	177	91.70	32.70
4	*2437.00	116.1 AV			1.72 V	177	83.40	32.70
5	4874.00	51.8 PK	74.0	-22.2	1.66 V	283	45.60	6.20
6	4874.00	39.0 AV	54.0	-15.0	1.66 V	283	32.80	6.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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	107.3 PK			1.39 H	191	74.70	32.60
2	*2462.00	101.9 AV			1.39 H	191	69.30	32.60
3	2483.50	58.8 PK	74.0	-15.2	1.33 H	179	26.10	32.70
4	2483.50	46.7 AV	54.0	-7.3	1.33 H	179	14.00	32.70
5	4924.00	49.9 PK	74.0	-24.1	1.22 H	88	43.60	6.30
6	4924.00	36.4 AV	54.0	-17.6	1.22 H	88	30.10	6.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	120.9 PK			1.72 V	192	88.30	32.60
2	*2462.00	111.9 AV			1.72 V	192	79.30	32.60
3	2483.50	65.2 PK	74.0	-8.8	1.60 V	187	32.50	32.70
4	**2483.50**	**53.6 AV**	**54.0**	**-0.4**	**1.60 V**	**187**	**20.90**	**32.70**
5	4924.00	50.5 PK	74.0	-23.5	1.80 V	219	44.20	6.30
6	4924.00	37.9 AV	54.0	-16.1	1.80 V	219	31.60	6.30

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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	59.8 PK	74.0	-14.2	1.39 H	322	27.30	32.50
2	2390.00	48.0 AV	54.0	-6.0	1.39 H	322	15.50	32.50
3	*2422.00	101.9 PK			1.39 H	322	69.30	32.60
4	*2422.00	91.0 AV			1.39 H	322	58.40	32.60
5	4844.00	48.4 PK	74.0	-25.6	1.43 H	250	42.30	6.10
6	4844.00	35.1 AV	54.0	-18.9	1.43 H	250	29.00	6.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.0 PK	74.0	-11.0	1.68 V	186	30.50	32.50
2	2390.00	50.2 AV	54.0	-3.8	1.68 V	186	17.70	32.50
3	*2422.00	109.9 PK			1.78 V	191	77.30	32.60
4	*2422.00	100.7 AV			1.78 V	191	68.10	32.60
5	4844.00	48.9 PK	74.0	-25.1	1.59 V	222	42.80	6.10
6	4844.00	35.7 AV	54.0	-18.3	1.59 V	222	29.60	6.10

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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	2390.00	56.8 PK	74.0	-17.2	1.27 H	320	24.30	32.50
2	2390.00	46.6 AV	54.0	-7.4	1.27 H	320	14.10	32.50
3	*2437.00	105.2 PK			1.27 H	324	72.50	32.70
4	*2437.00	92.4 AV			1.27 H	324	59.70	32.70
5	4874.00	48.4 PK	74.0	-25.6	1.30 H	333	42.20	6.20
6	4874.00	35.4 AV	54.0	-18.6	1.30 H	333	29.20	6.20
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	2390.00	60.4 PK	74.0	-13.6	1.68 V	137	27.90	32.50
2	2390.00	49.4 AV	54.0	-4.6	1.68 V	137	16.90	32.50
3	*2437.00	115.2 PK			1.68 V	185	82.50	32.70
4	*2437.00	103.9 AV			1.68 V	185	71.20	32.70
5	4874.00	49.2 PK	74.0	-24.8	1.77 V	319	43.00	6.20
6	4874.00	36.1 AV	54.0	-17.9	1.77 V	319	29.90	6.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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	104.1 PK			1.21 H	178	71.40	32.70
2	*2452.00	90.0 AV			1.21 H	178	57.30	32.70
3	2483.50	58.0 PK	74.0	-16.0	1.29 H	313	25.30	32.70
4	2483.50	46.9 AV	54.0	-7.1	1.29 H	313	14.20	32.70
5	4904.00	47.6 PK	74.0	-26.4	1.00 H	19	41.50	6.10
6	4904.00	34.5 AV	54.0	-19.5	1.00 H	19	28.40	6.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	111.5 PK			1.49 V	177	78.80	32.70
2	*2452.00	102.8 AV			1.49 V	177	70.10	32.70
3	2483.50	61.8 PK	74.0	-12.2	1.64 V	322	29.10	32.70
4	2483.50	49.7 AV	54.0	-4.3	1.64 V	322	17.00	32.70
5	4904.00	47.8 PK	74.0	-26.2	1.53 V	56	41.70	6.10
6	4904.00	34.9 AV	54.0	-19.1	1.53 V	56	28.80	6.10

Remarks:

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

Below 1GHz worst-case data:

802.11n (HT20)

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	57.12	30.2 QP	40.0	-9.8	2.00 H	40	45.00	-14.80
2	210.72	31.9 QP	43.5	-11.6	1.50 H	194	48.60	-16.70
3	298.21	37.9 QP	46.0	-8.1	1.01 H	125	50.40	-12.50
4	500.42	31.5 QP	46.0	-14.5	2.00 H	255	39.80	-8.30
5	700.68	39.3 QP	46.0	-6.7	1.01 H	267	43.60	-4.30
6	900.94	36.7 QP	46.0	-9.3	1.50 H	280	37.30	-0.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.79	37.2 QP	40.0	-2.8	1.00 V	291	53.10	-15.90
2	53.23	33.1 QP	40.0	-6.9	1.00 V	317	47.60	-14.50
3	298.21	34.8 QP	46.0	-11.2	1.49 V	177	47.30	-12.50
4	624.85	33.7 QP	46.0	-12.3	1.00 V	357	39.10	-5.40
5	700.68	35.2 QP	46.0	-10.8	2.00 V	328	39.50	-4.30
6	904.83	36.5 QP	46.0	-9.5	1.00 V	79	37.00	-0.50

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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
Test Receiver ROHDE & SCHWARZ	ESCS 30	100288	Apr. 27, 2015	Apr. 26, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 30, 2014	Dec. 29, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 21, 2015	Jul. 20, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

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

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

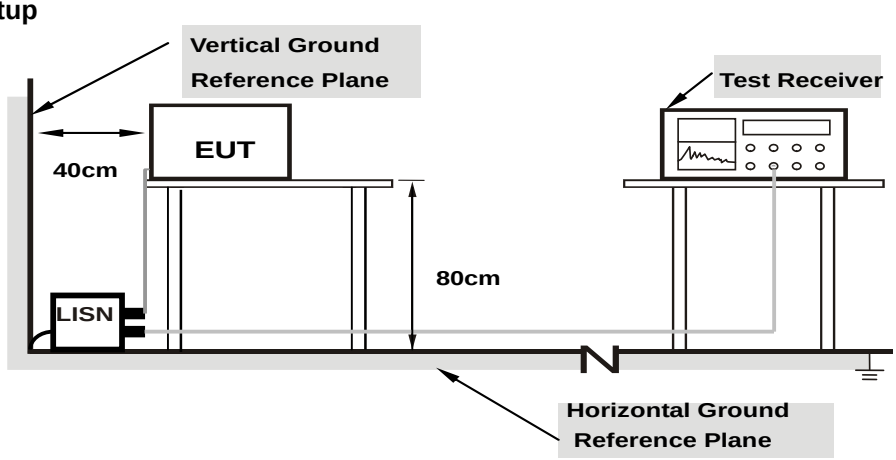
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Note: 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 4.1.6.

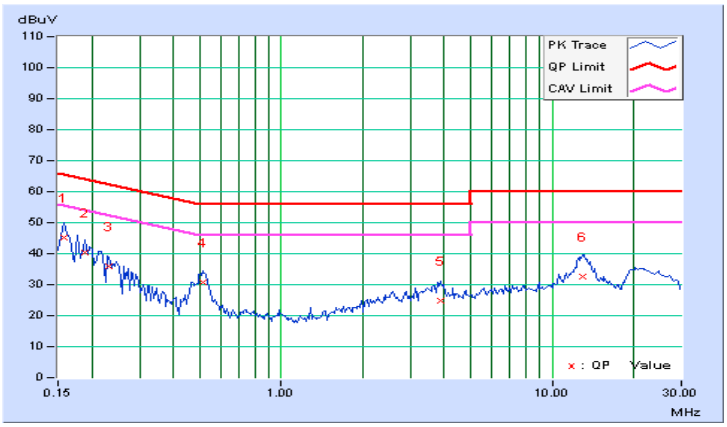
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.91	35.21	23.40	45.12	33.31	65.58	55.58	-20.46	-22.27
2	0.18906	9.91	30.55	10.24	40.46	20.15	64.08	54.08	-23.61	-33.92
3	0.23203	9.92	25.88	12.03	35.80	21.95	62.38	52.38	-26.58	-30.43
4	0.51328	9.94	20.96	12.82	30.90	22.76	56.00	46.00	-25.10	-23.24
5	3.85547	10.18	14.80	6.85	24.98	17.03	56.00	46.00	-31.02	-28.97
6	12.95313	10.44	21.98	16.38	32.42	26.82	60.00	50.00	-27.58	-23.18

Remarks:

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

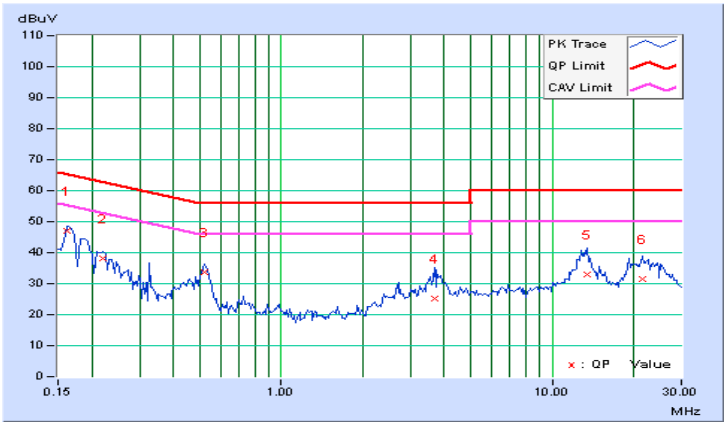


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.92	37.13	24.26	47.05	34.18	65.38	55.38	-18.32	-21.19
2	0.22031	9.93	28.13	16.86	38.06	26.79	62.81	52.81	-24.75	-26.02
3	0.52109	9.96	23.64	14.98	33.60	24.94	56.00	46.00	-22.40	-21.06
4	3.69141	10.20	14.92	6.15	25.12	16.35	56.00	46.00	-30.88	-29.65
5	13.53516	10.57	22.43	14.21	33.00	24.78	60.00	50.00	-27.00	-25.22
6	21.45703	10.74	20.83	16.53	31.57	27.27	60.00	50.00	-28.43	-22.73

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.

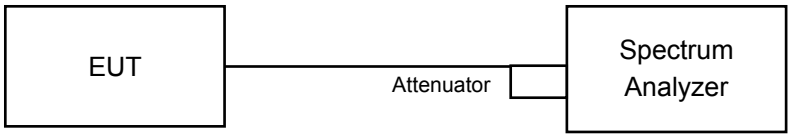


4.3 6dB Bandwidth Measurement

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

558074 D01 DTS Meas Guidance v03r03 section 8.1

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 Result

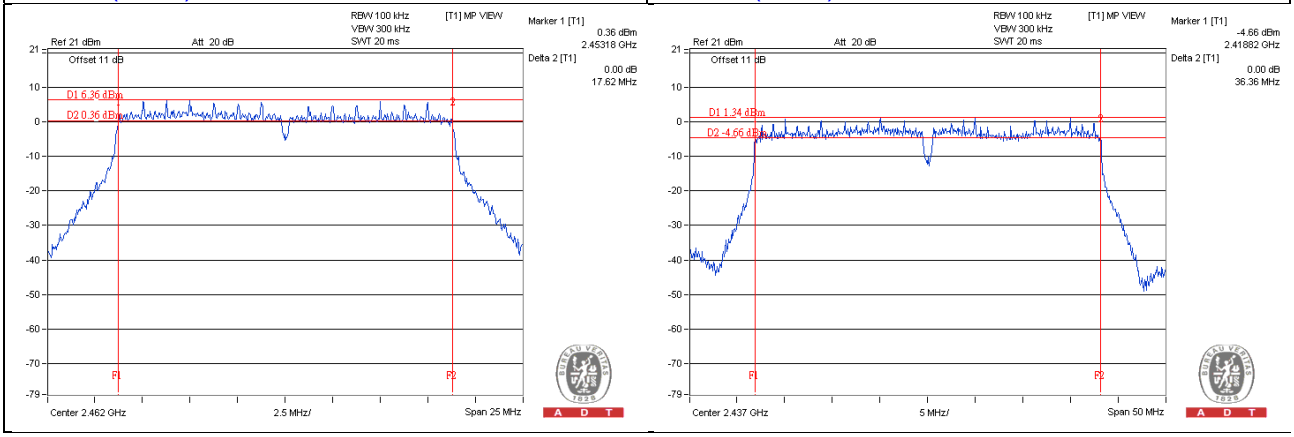
802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	17.17	16.26	17.57	17.61	0.5	Pass
6	2437	17.22	16.96	16.38	17.61	0.5	Pass
11	2462	17.59	17.62	15.16	17.60	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
3	2422	35.33	35.57	35.26	35.18	0.5	Pass
6	2437	36.09	35.67	36.36	35.79	0.5	Pass
9	2452	35.60	36.36	35.74	35.14	0.5	Pass

Spectrum Plot of Worst Value	
802.11n (HT20)	802.11n (HT40)



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

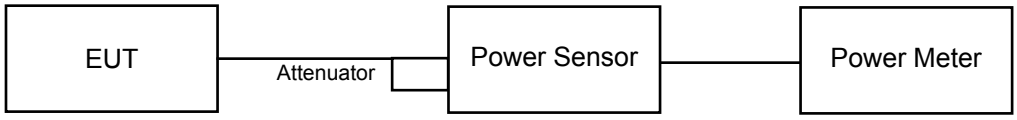
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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 $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) 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

558074 D01 DTS Meas Guidance v03r03 section 9.2.3.2

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

802.11n (HT20)

Chan.	Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	16.16	16.06	16.00	16.02	161.475	22.08	26.94	Pass
6	2437	20.86	20.51	20.74	20.48	**464.622**	26.67	26.94	Pass
11	2462	17.07	16.89	17.06	16.92	199.818	23.01	26.94	Pass

***** Directional gain = 3.04dBi + 10log(4) = 9.06dBi > 6dBi, so the power limit shall be reduced to 30-(9.06-6) = 26.94dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	12.95	12.58	12.53	12.63	74.066	18.70	26.94	Pass
6	2437	15.73	15.51	15.41	15.62	144.203	21.59	26.94	Pass
9	2452	14.12	13.98	13.83	14.04	100.332	20.01	26.94	Pass

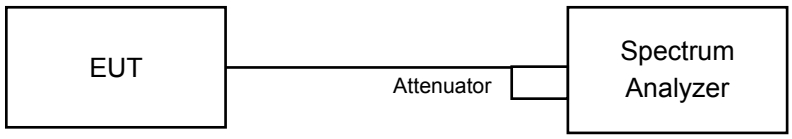
***** Directional gain = 3.04dBi + 10log(4) = 9.06dBi > 6dBi, so the power limit shall be reduced to 30-(9.06-6) = 26.94dBm.

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

558074 D01 DTS Meas Guidance v03r03 section 10.3

For 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 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 Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=4) dB	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-14.90	6.02	-8.88	4.94	Pass
	6	2437	-9.59	6.02	-3.57	4.94	Pass
	11	2462	-14.35	6.02	-8.33	4.94	Pass
1	1	2412	-14.78	6.02	-8.76	4.94	Pass
	6	2437	-10.19	6.02	-4.17	4.94	Pass
	11	2462	-13.49	6.02	-7.47	4.94	Pass
2	1	2412	-15.05	6.02	-9.03	4.94	Pass
	6	2437	-10.74	6.02	-4.72	4.94	Pass
	11	2462	-13.62	6.02	-7.60	4.94	Pass
3	1	2412	-15.24	6.02	-9.22	4.94	Pass
	6	2437	-9.53	6.02	-3.51	4.94	Pass
	11	2462	-14.44	6.02	-8.42	4.94	Pass

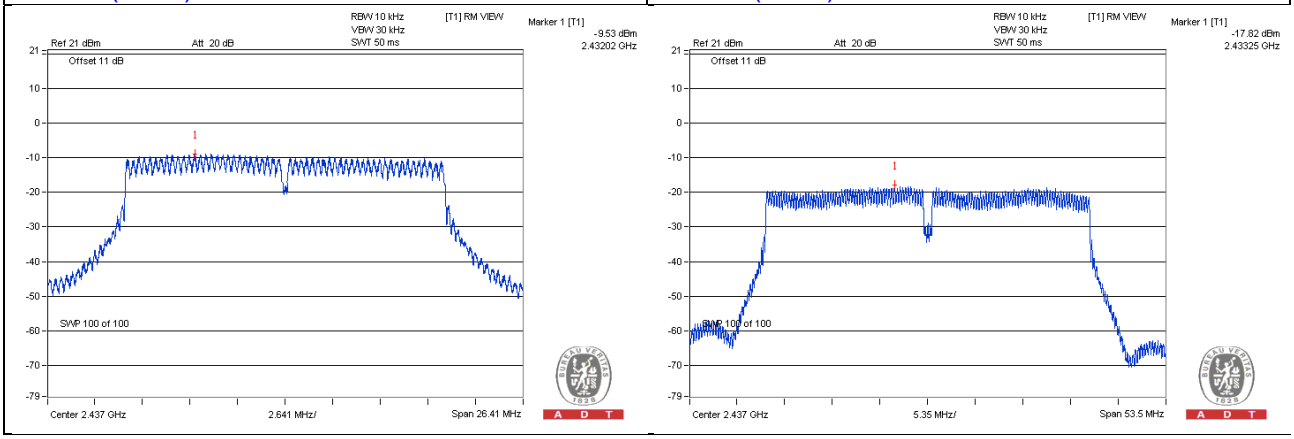
Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 3.04dBi + 10log(4) = 9.06dBi > 6dBi, so the power density limit shall be reduced to 8-(9.06-6) = 4.94dBm.

802.11n (HT40)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=4) dB	Duty Factor	Total PSD with Duty Factor (dBm/10kHz)	Limit (dBm/10kHz)	Pass / Fail
0	3	2422	-21.10	6.02	0.14	-14.94	4.94	Pass
	6	2437	-18.29	6.02	0.14	-12.13	4.94	Pass
	9	2452	-19.28	6.02	0.14	-13.12	4.94	Pass
1	3	2422	-21.02	6.02	0.14	-14.86	4.94	Pass
	6	2437	-17.82	6.02	0.14	-11.66	4.94	Pass
	9	2452	-19.48	6.02	0.14	-13.32	4.94	Pass
2	3	2422	-20.91	6.02	0.14	-14.75	4.94	Pass
	6	2437	-18.80	6.02	0.14	-12.64	4.94	Pass
	9	2452	-20.25	6.02	0.14	-14.09	4.94	Pass
3	3	2422	-20.65	6.02	0.14	-14.49	4.94	Pass
	6	2437	-18.16	6.02	0.14	-12.00	4.94	Pass
	9	2452	-19.71	6.02	0.14	-13.55	4.94	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 3.04dBi + 10log(4) = 9.06dBi > 6dBi, so the power density limit shall be reduced to 8-(9.06-6) = 4.94dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11n (HT20)	802.11n (HT40)

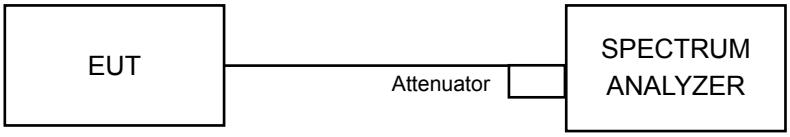


4.6 Conducted Out of Band Emission Measurement

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

558074 D01 DTS Meas Guidance v03r03 section 11.2

a. Set the RBW = 100 kHz.

b. Set the VBW ≥ 300 kHz.

c. Detector = average.

d. Sweep time = auto couple.

e. Trace mode = max hold.

f. Allow trace to fully stabilize.

g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

558074 D01 DTS Meas Guidance v03r03 section 11.3

a. Set RBW = 100 kHz.

b. Set VBW ≥ 300 kHz.

c. Ensure that the number of measurement points ≥ span/RBW

d. According to measurement points to set differ measurement span.

e. Detector = average.

f. Trace Mode = max hold.

g. Sweep = auto couple.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

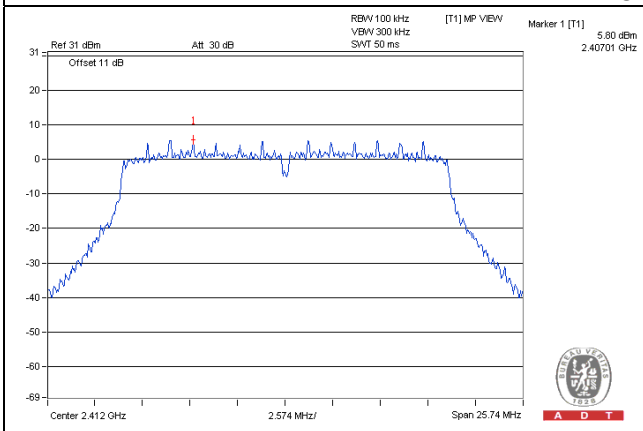
Same as Item 4.3.6

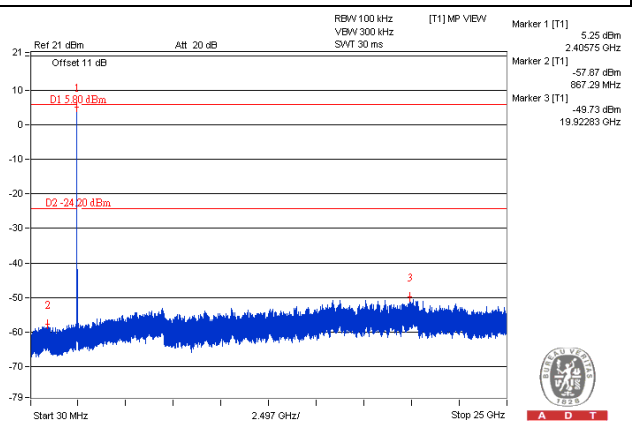
4.6.7 Test Results

The 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.

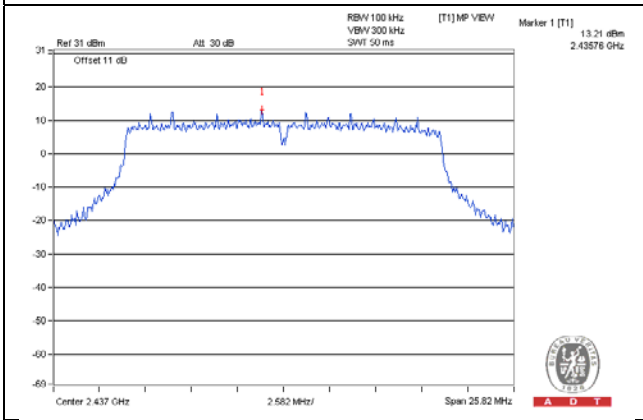
802.11n (HT20)_CHAIN 0

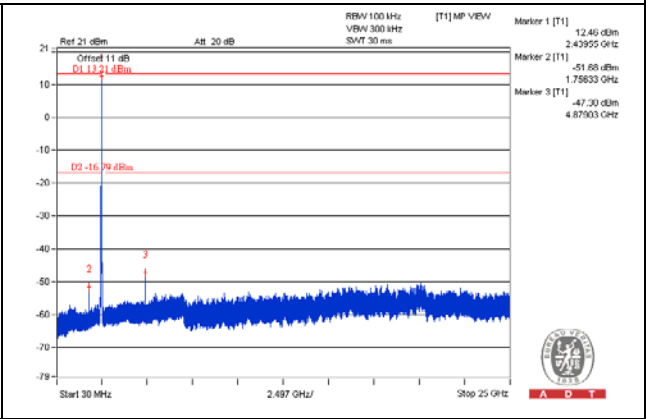
CH 1



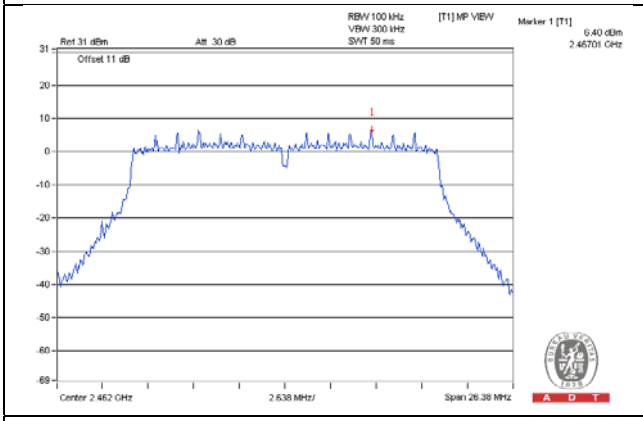


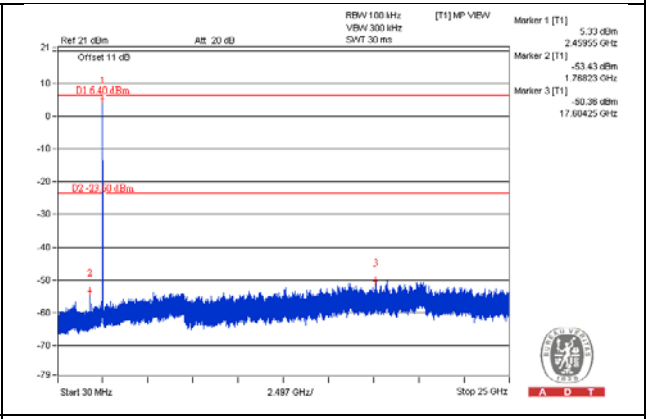
CH 6



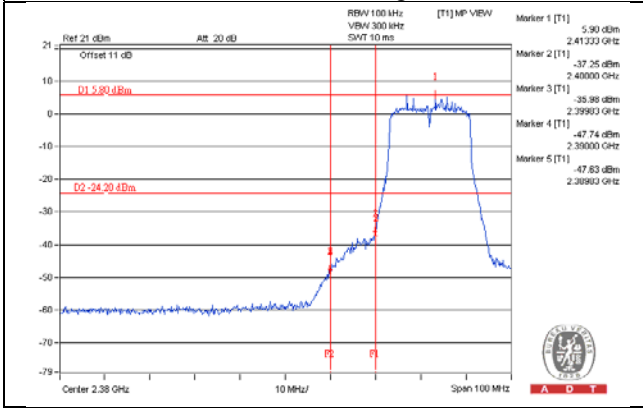


CH 11

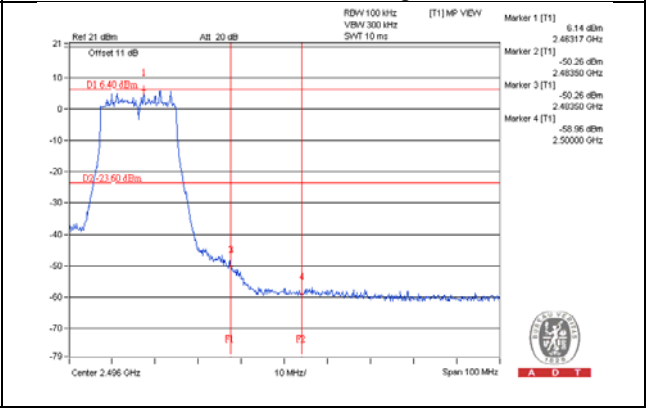




CH 1 Band edge

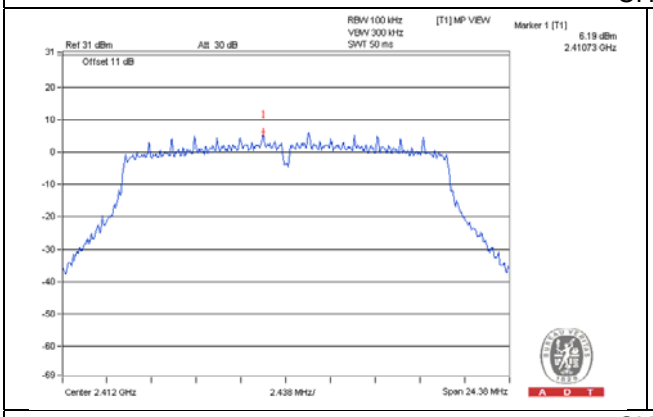


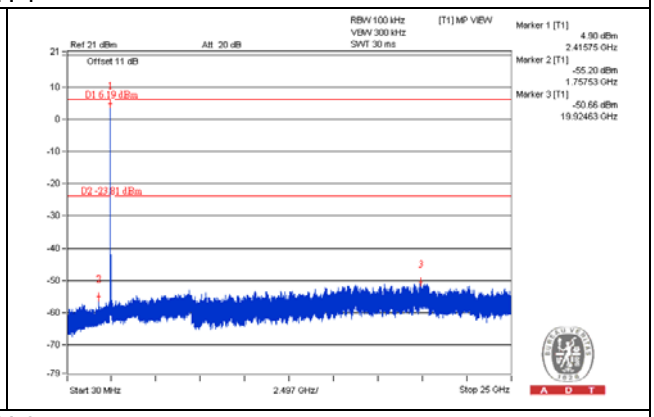
CH 11 Band edge



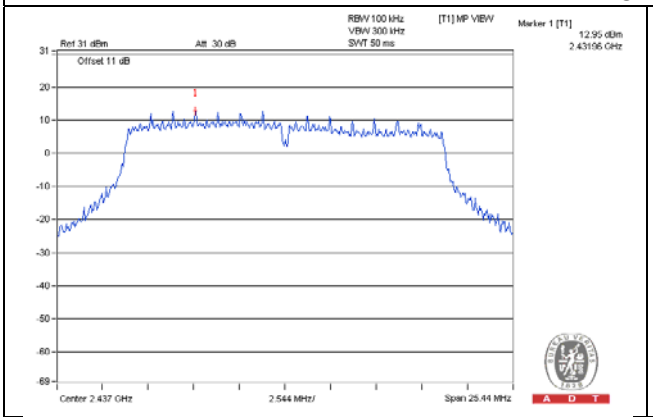
802.11n (HT20)_CHAIN 1

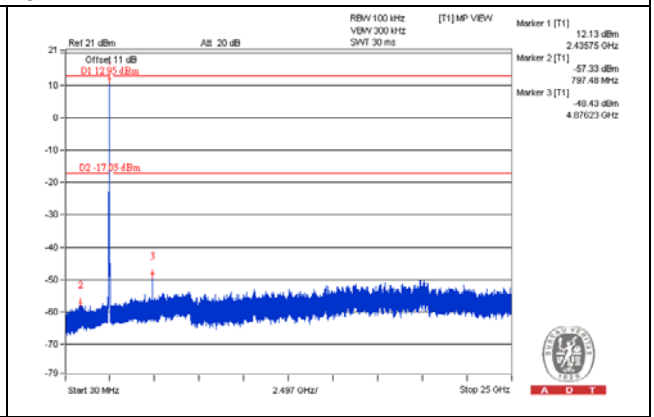
CH 1



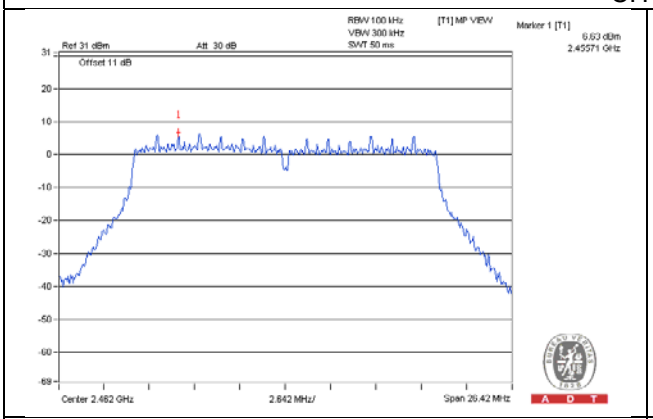


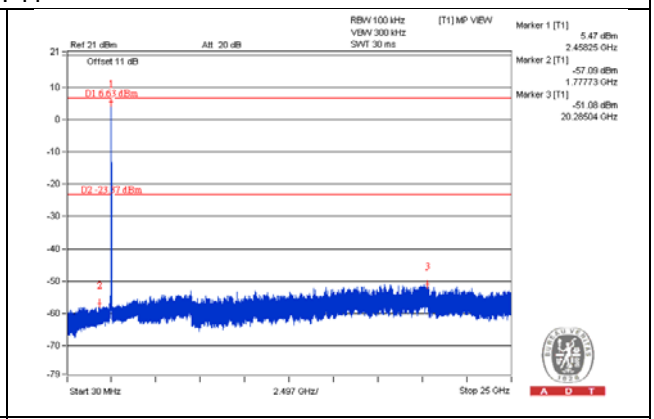
CH 6



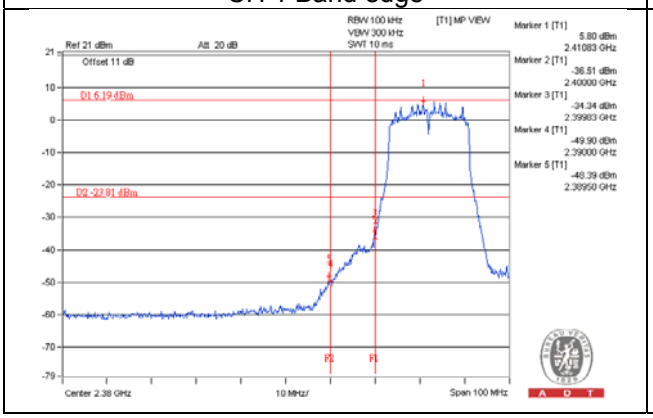


CH 11

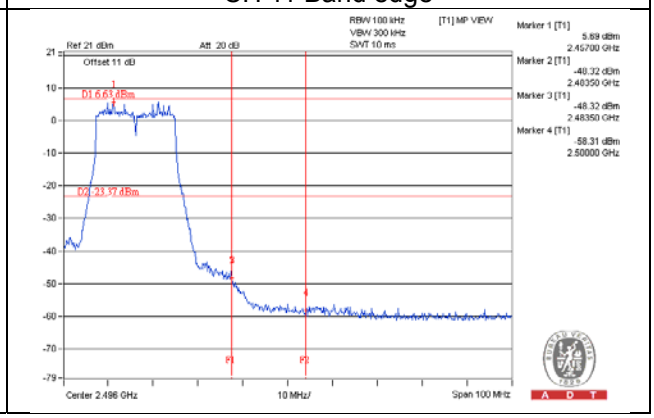




CH 1 Band edge

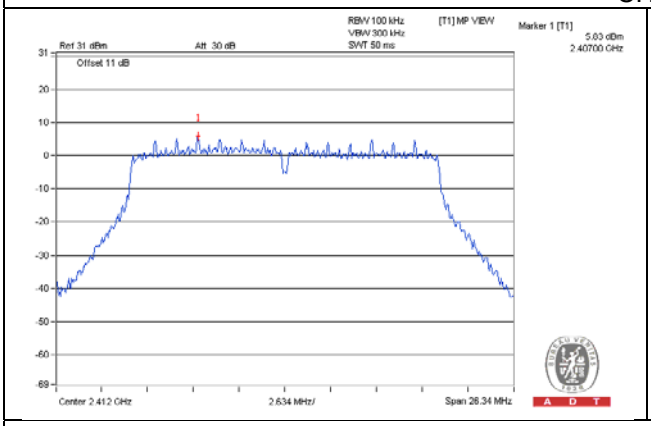


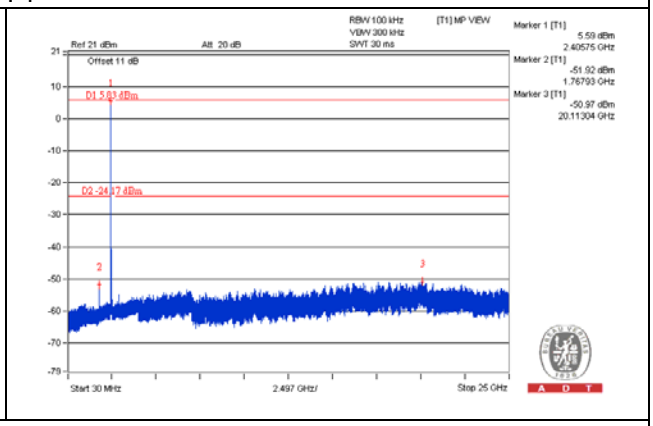
CH 11 Band edge



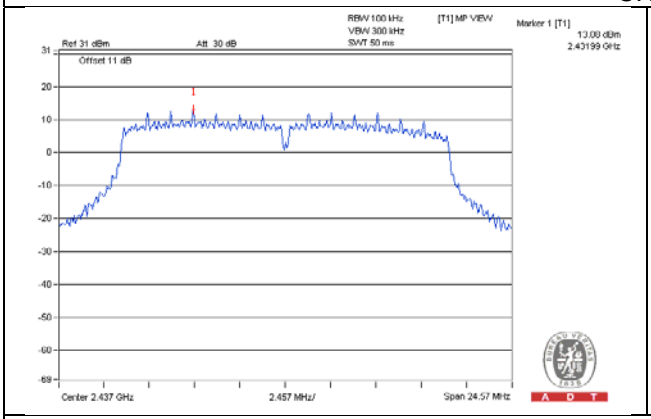
802.11n (HT20)_CHAIN 2

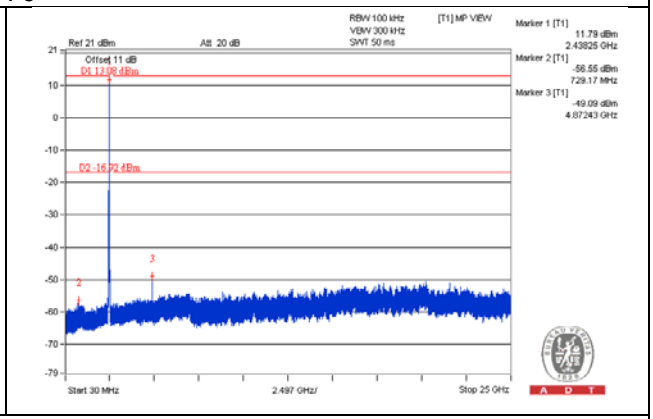
CH 1



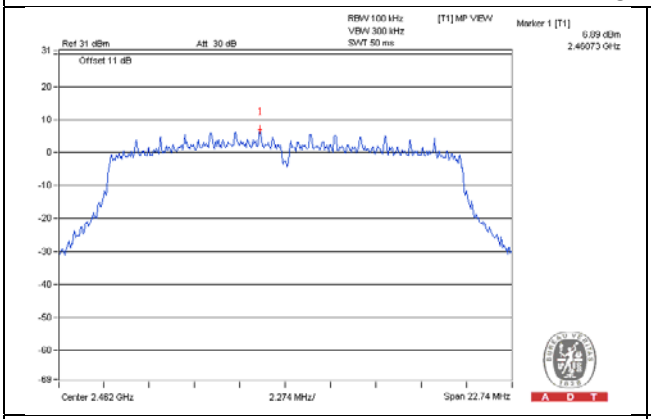


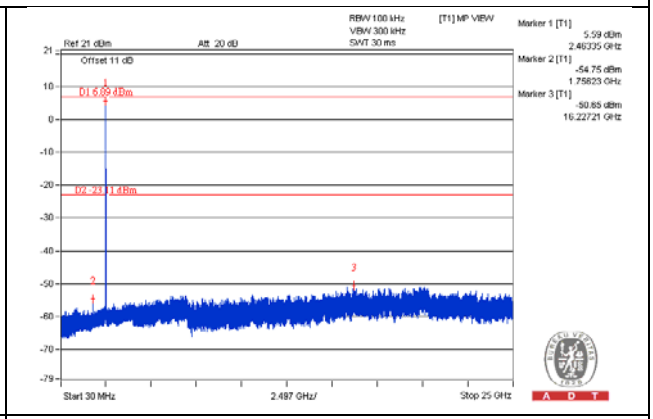
CH 6



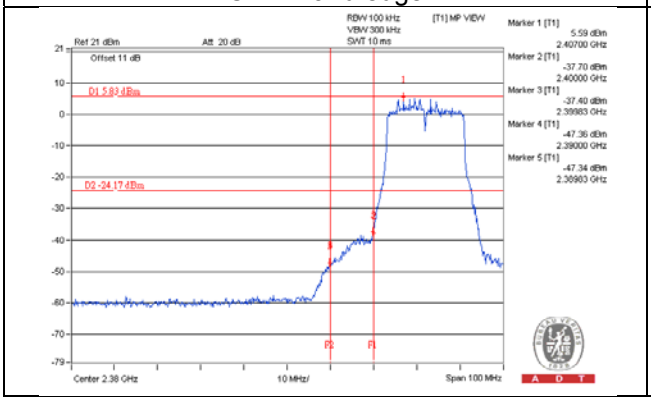


CH 11

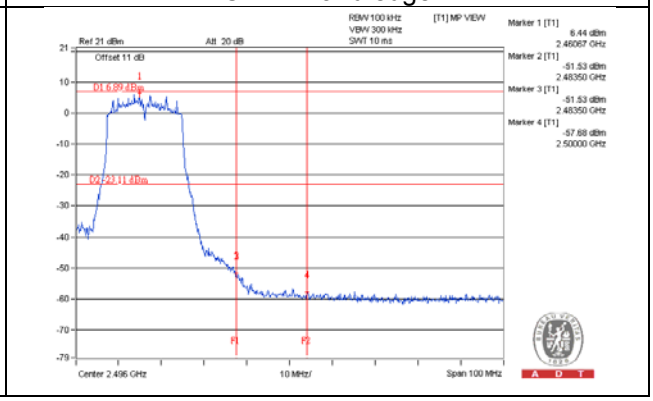




CH 1 Band edge

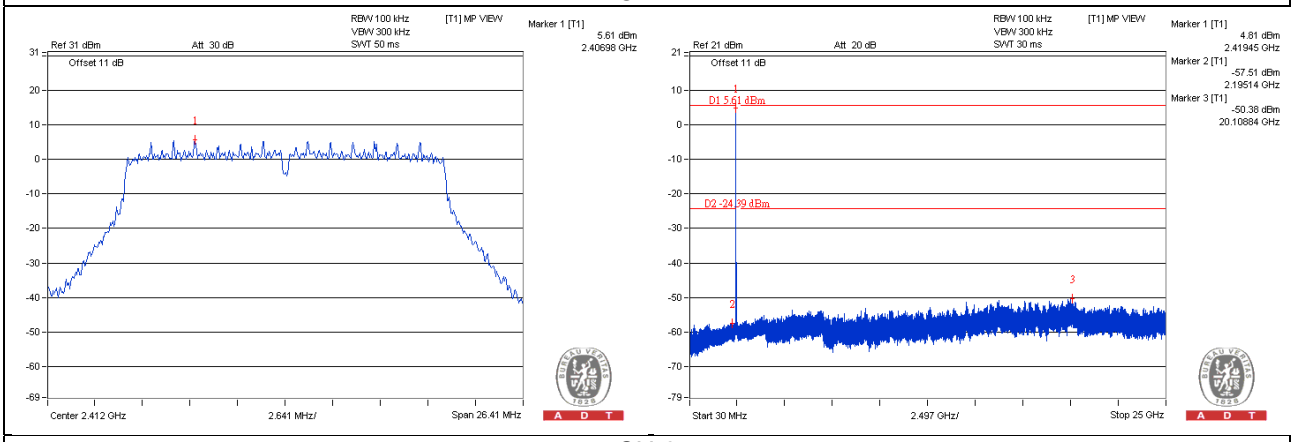


CH 11 Band edge

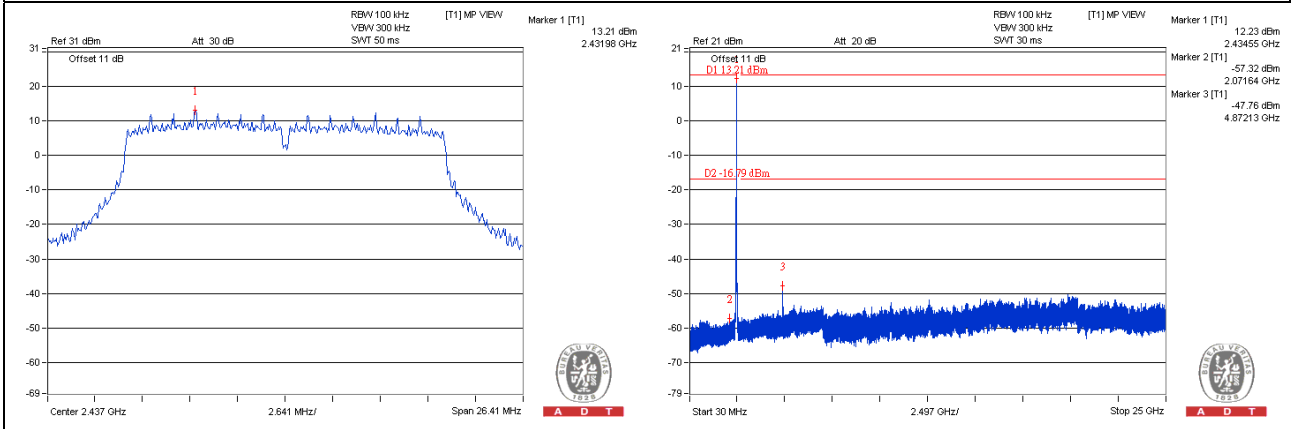


802.11n (HT20)_CHAIN 3

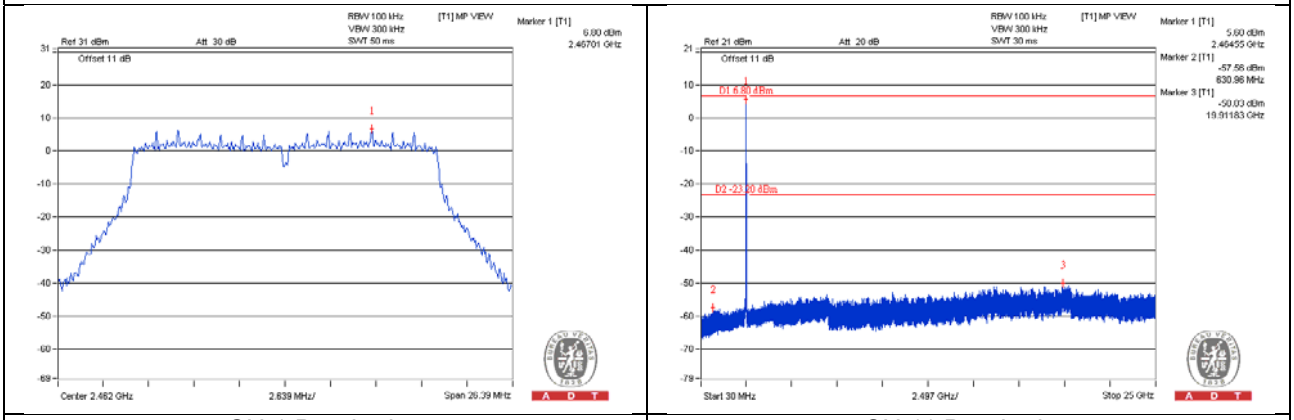
CH 1



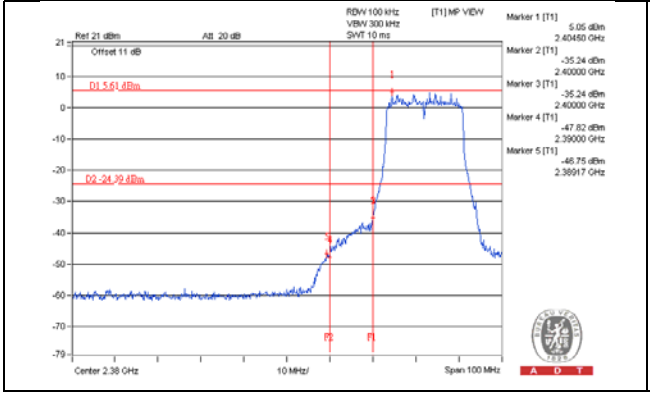
CH 6



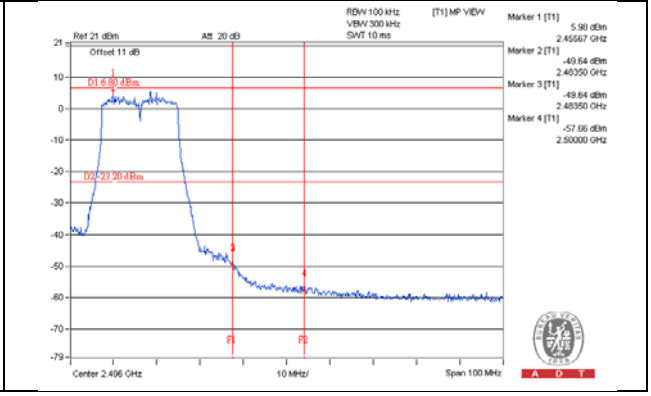
CH 11



CH 1 Band edge

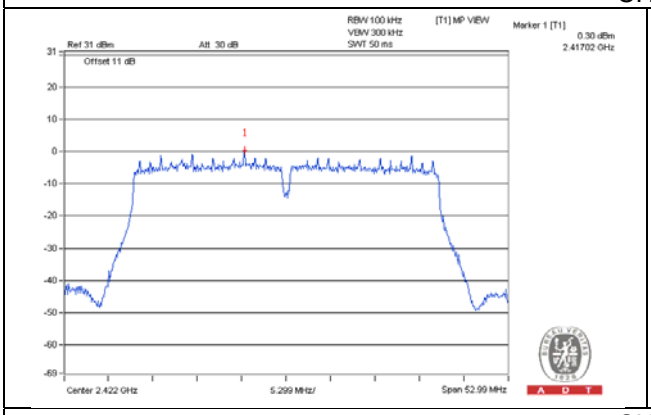


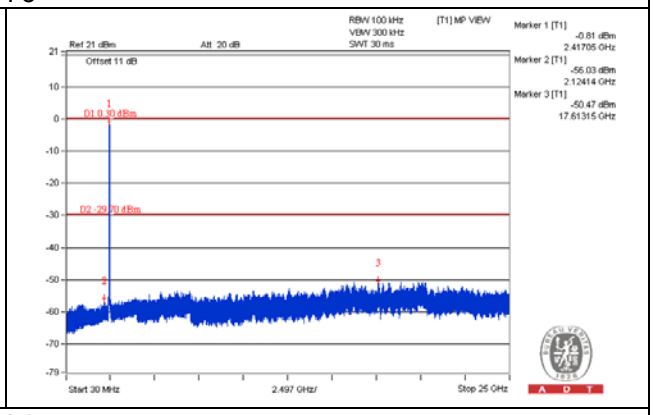
CH 11 Band edge



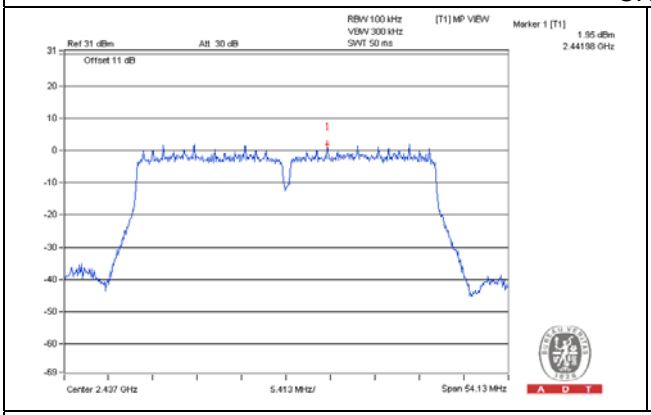
802.11n (HT40)_CHAIN 0

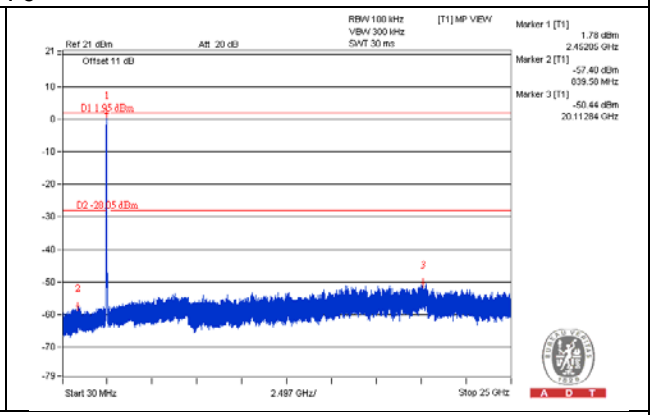
CH 3



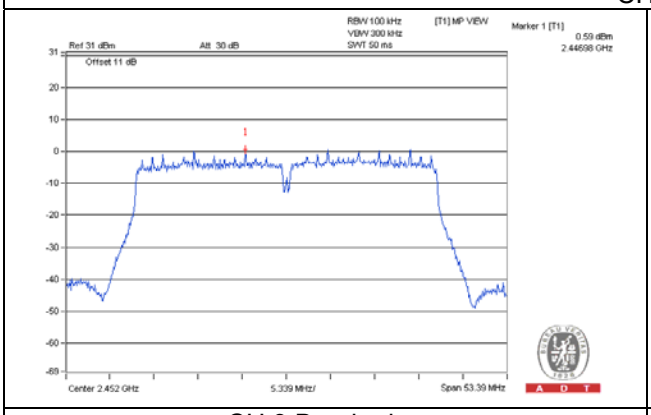


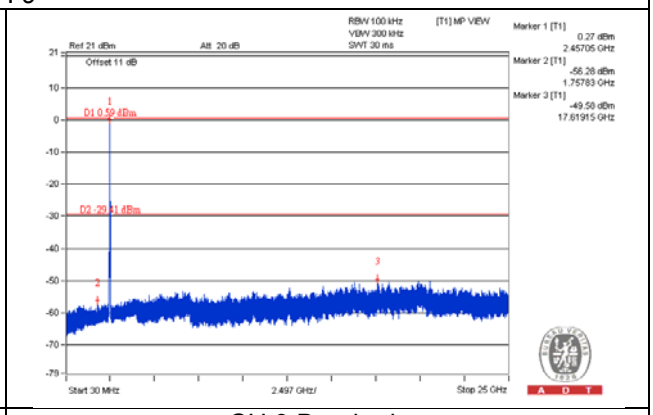
CH 6



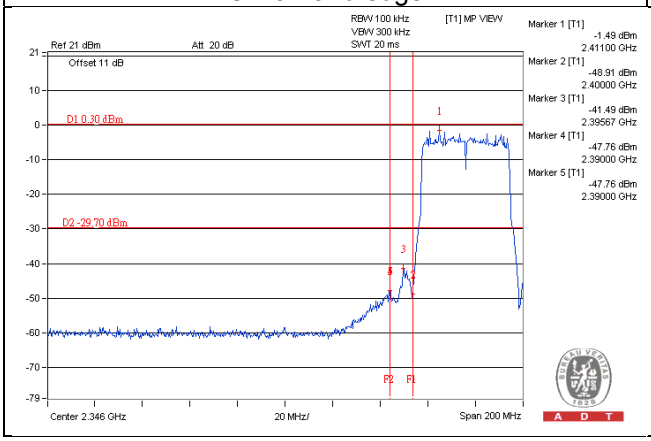


CH 9

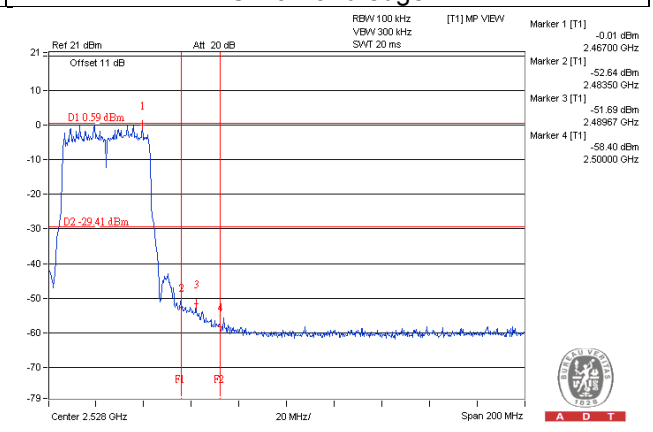




CH 3 Band edge

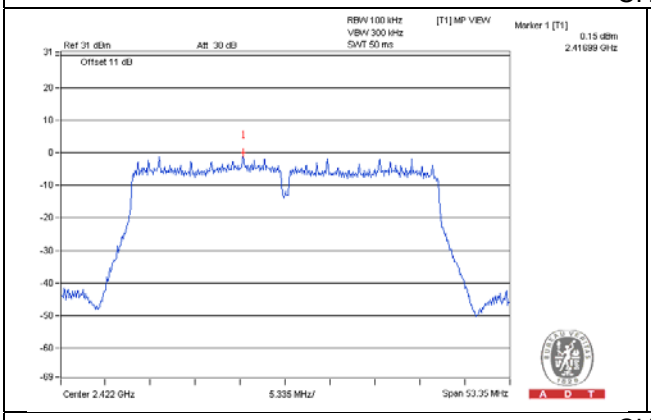


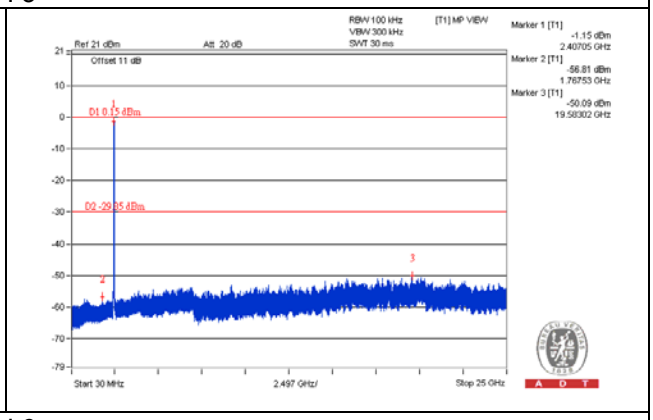
CH 9 Band edge



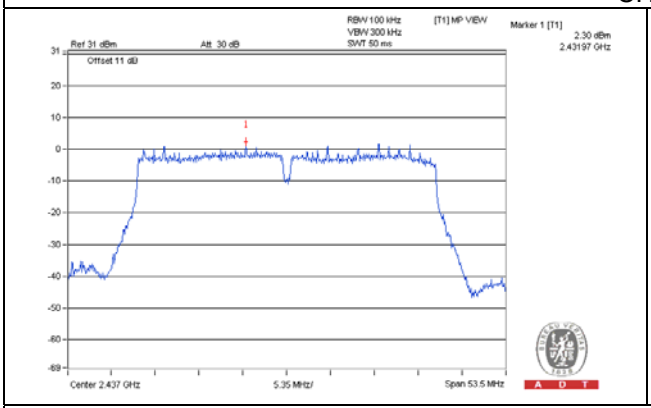
802.11n (HT40)_CHAIN 1

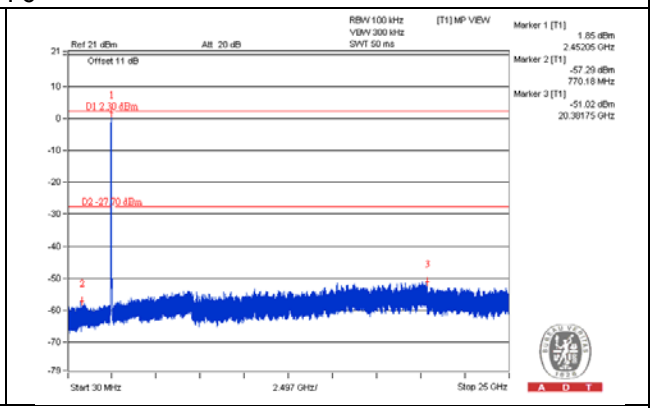
CH 3



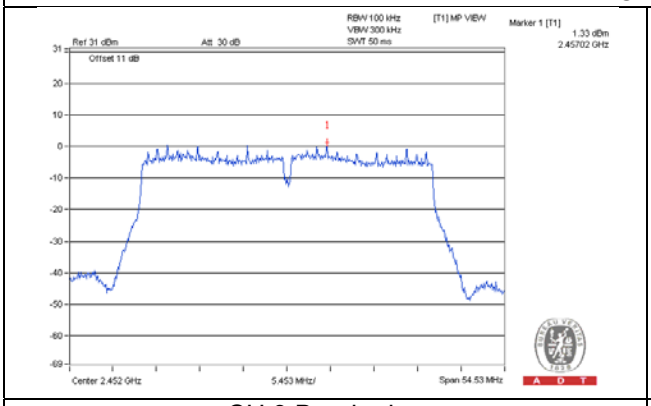


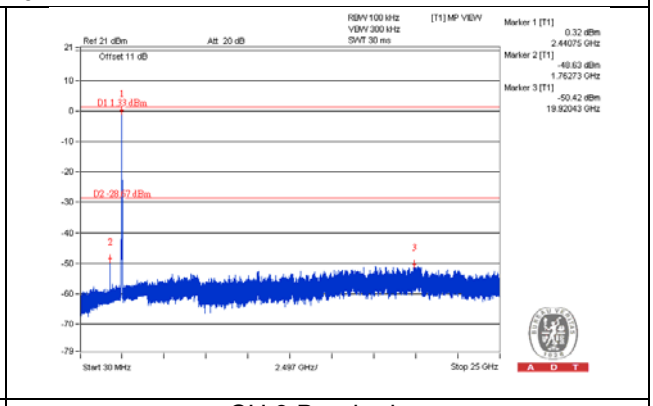
CH 6



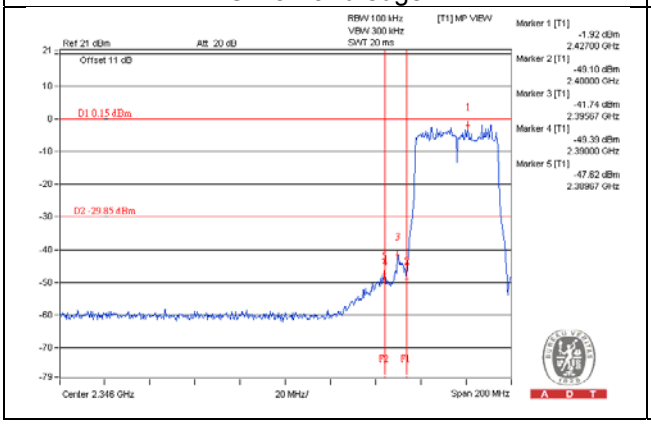


CH 9

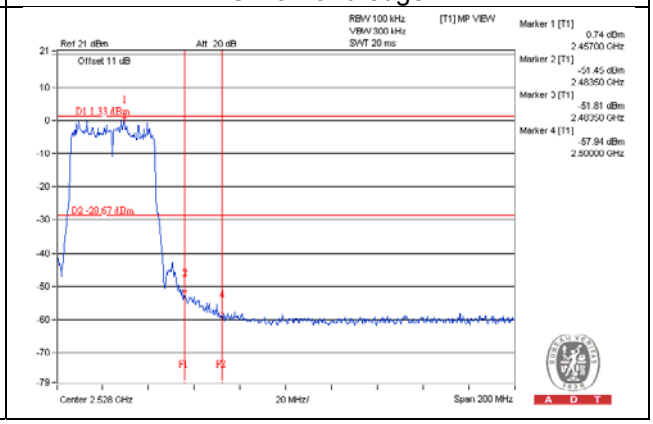




CH 3 Band edge

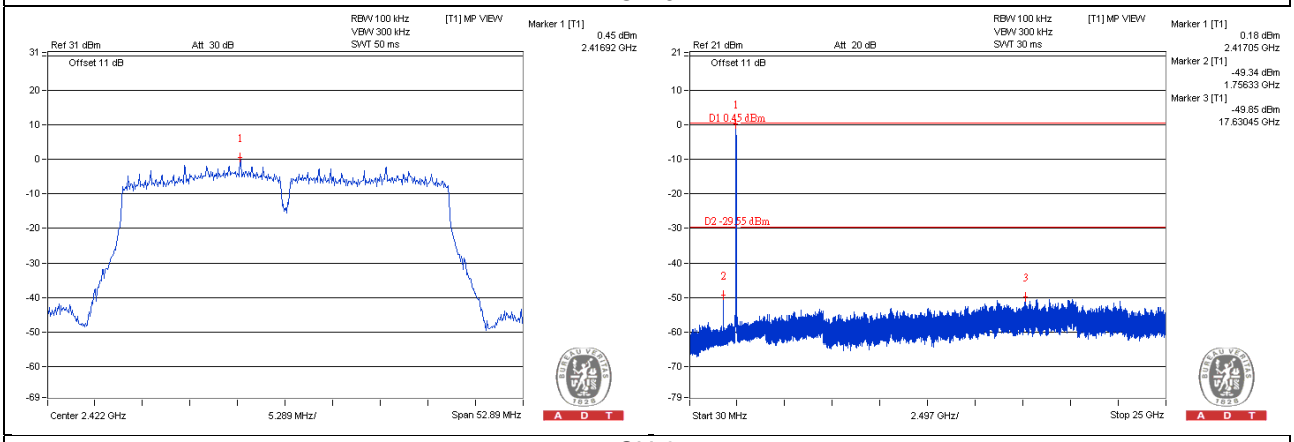


CH 9 Band edge

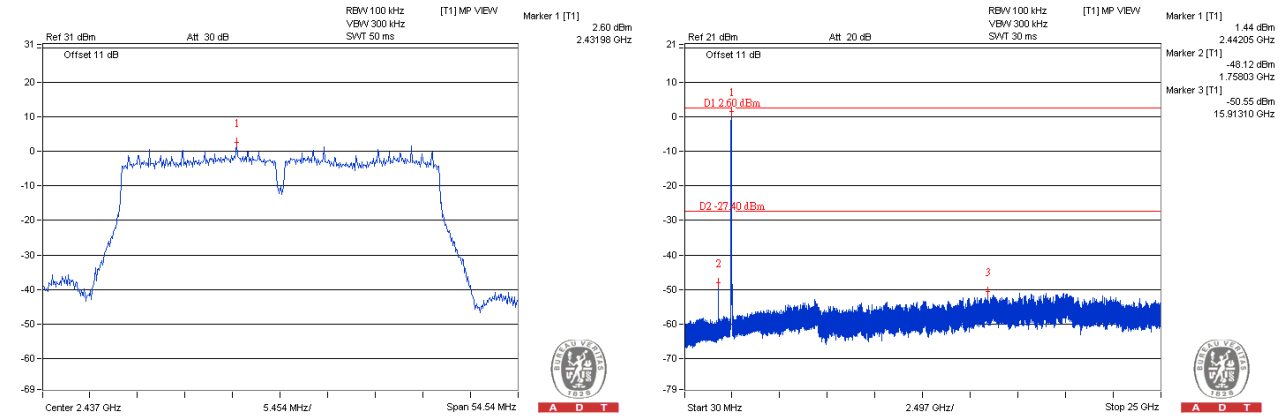


802.11n (HT40)_CHAIN 2

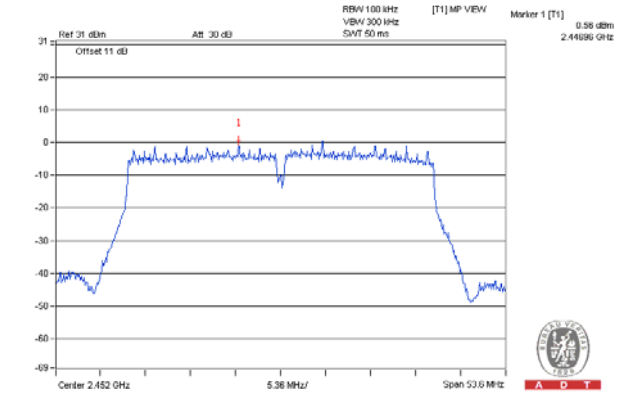
CH 3

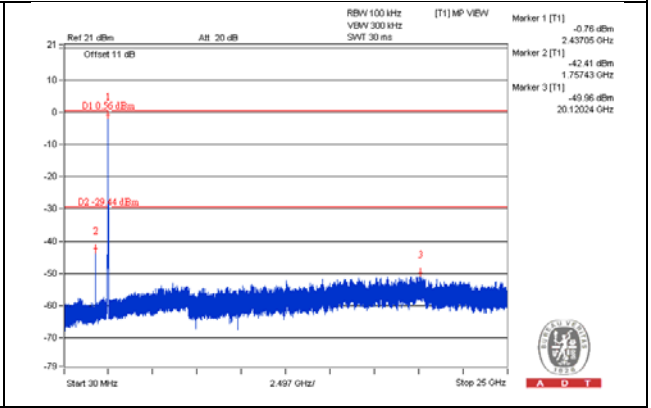


CH 6

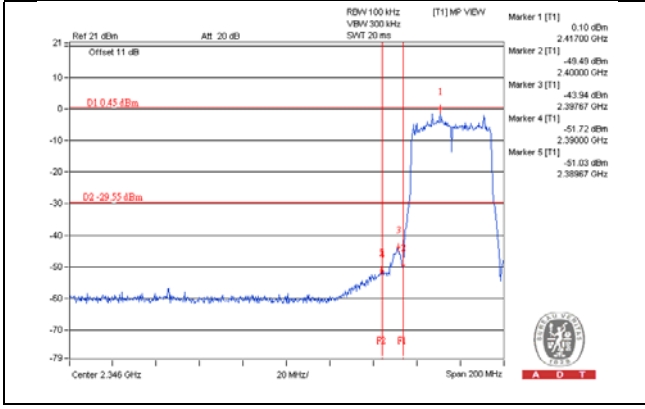


CH 9





CH 3 Band edge



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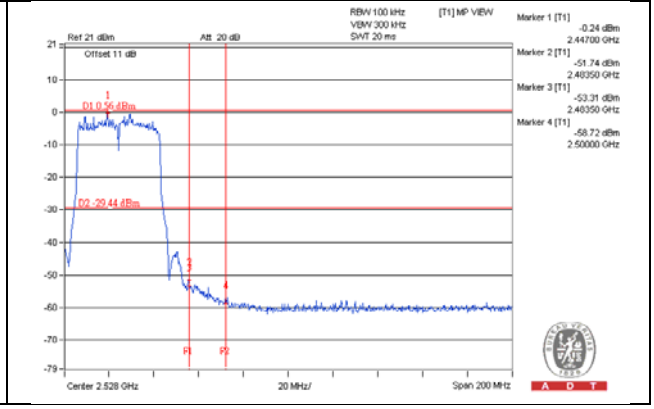
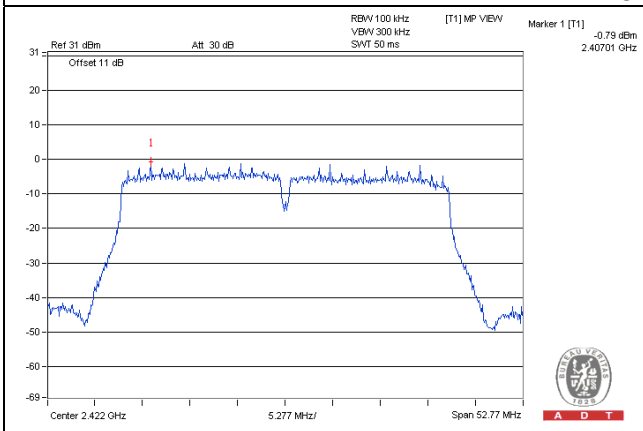
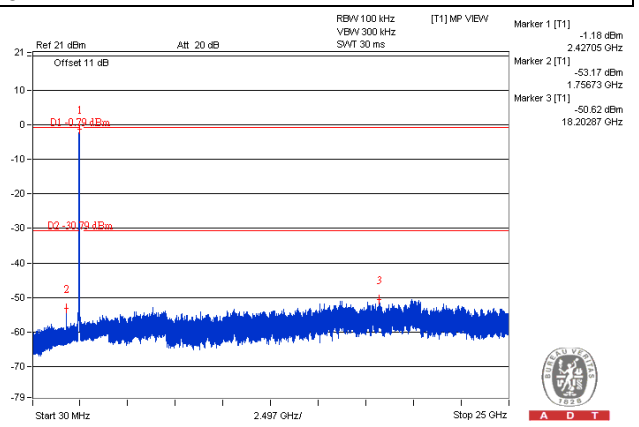


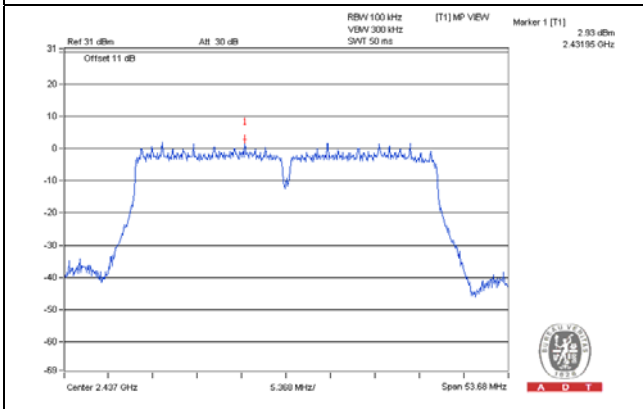
802.11n (HT40)_CHAIN 3

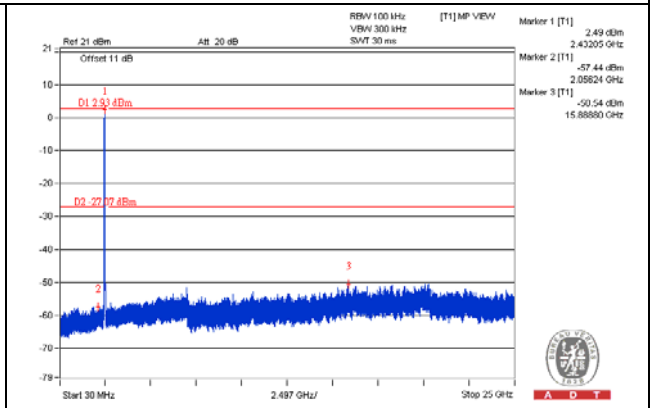
CH 3



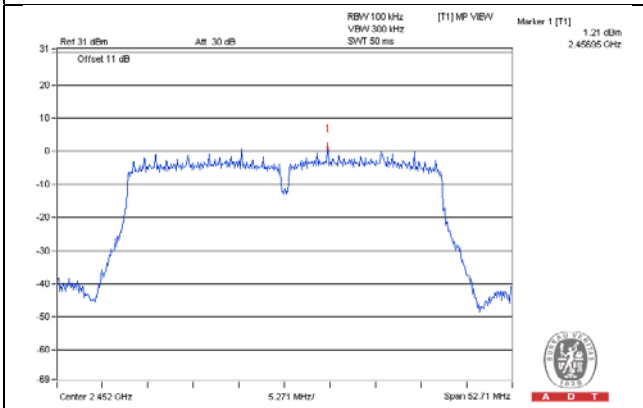


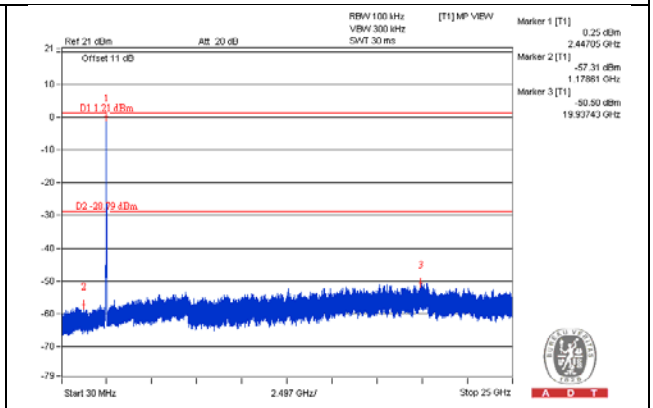
CH 6



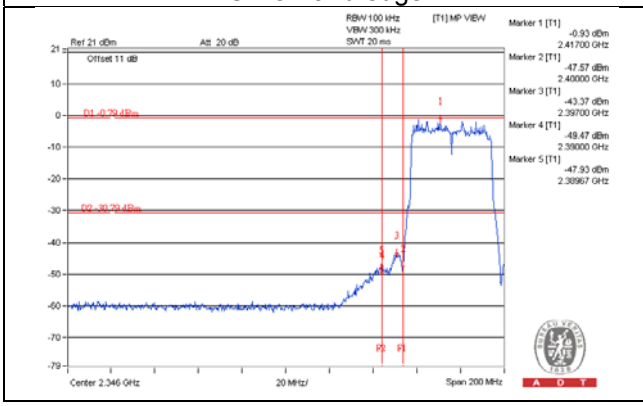


CH 9





CH 3 Band edge



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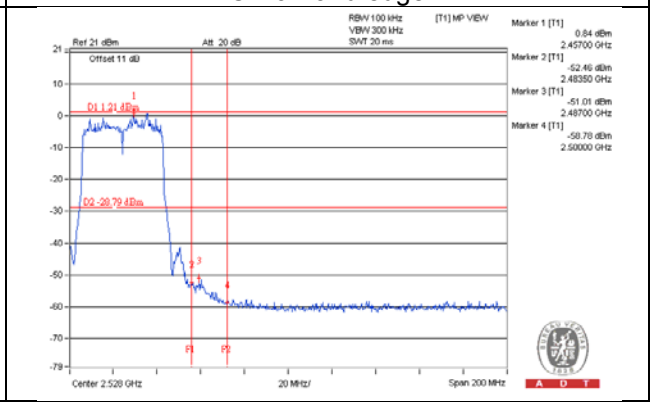


5 Test Types and Results (FOR 5.0GHz BAND)

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 Procedures

Same as item 4.1.3.

5.1.4 Deviation from Test Standard

No deviation.

5.1.5 Test Set Up

Same as item 4.1.5.

5.1.6 EUT Operating Conditions

Same as item 4.1.6.

5.1.7 Test Results

Above 1GHz data:

802.11ac (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	#5725.00	77.1 PK	79.8	-2.7	2.20 H	130	69.90	7.20
2	#5725.00	64.9 AV	67.0	-2.1	2.20 H	130	57.70	7.20
3	*5745.00	109.8 PK			2.22 H	129	69.40	40.40
4	*5745.00	97.0 AV			2.22 H	129	56.60	40.40
5	11490.00	60.7 PK	74.0	-13.3	1.51 H	178	42.40	18.30
6	11490.00	47.6 AV	54.0	-6.4	1.51 H	178	29.30	18.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	95.6 PK	97.7	-2.1	2.21 V	310	88.40	7.20
2	#5725.00	81.4 AV	83.5	-2.1	2.21 V	310	74.20	7.20
3	*5745.00	127.7 PK			2.21 V	310	87.30	40.40
4	*5745.00	113.5 AV			2.21 V	310	73.10	40.40
5	11490.00	62.9 PK	74.0	-11.1	1.44 V	142	44.60	18.30
6	11490.00	50.5 AV	54.0	-3.5	1.44 V	142	32.20	18.30

REMARKS:

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

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	112.1 PK			1.34 H	305	71.60	40.50
2	*5785.00	96.1 AV			1.34 H	305	55.60	40.50
3	11570.00	61.1 PK	74.0	-12.9	2.10 H	112	42.90	18.20
4	11570.00	47.8 AV	54.0	-6.2	2.10 H	112	29.60	18.20
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	*5785.00	129.4 PK			2.47 V	174	88.90	40.50
2	*5785.00	113.2 AV			2.47 V	174	72.70	40.50
3	11570.00	65.1 PK	74.0	-8.9	1.60 V	212	46.90	18.20
4	11570.00	48.9 AV	54.0	-5.1	1.60 V	212	30.70	18.20

REMARKS:

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

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	108.8 PK			2.20 H	99	68.30	40.50
2	*5825.00	95.6 AV			2.20 H	99	55.10	40.50
3	#5850.00	69.6 PK	78.8	-9.2	2.20 H	99	62.10	7.50
4	#5850.00	56.4 AV	65.6	-9.2	2.20 H	99	48.90	7.50
5	11650.00	61.7 PK	74.0	-12.3	1.40 H	182	43.00	18.70
6	11650.00	48.8 AV	54.0	-5.2	1.40 H	182	30.10	18.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	128.0 PK			2.29 V	167	87.50	40.50
2	*5825.00	112.6 AV			2.29 V	167	72.10	40.50
3	#5850.00	88.8 PK	98.0	-9.2	2.29 V	167	81.30	7.50
4	#5850.00	73.4 AV	82.6	-9.2	2.29 V	167	65.90	7.50
5	11650.00	66.0 PK	74.0	-8.0	1.60 V	212	47.30	18.70
6	11650.00	51.2 AV	54.0	-2.8	1.60 V	212	32.50	18.70

REMARKS:

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

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	**#5725.00**	**78.3 PK**	**78.6**	**-0.3**	**1.62 H**	**313**	**71.10**	**7.20**
2	**#5725.00**	**60.9 AV**	**61.2**	**-0.3**	**1.62 H**	**313**	**53.70**	**7.20**
3	*5755.00	108.6 PK			1.62 H	313	68.10	40.50
4	*5755.00	91.2 AV			1.62 H	313	50.70	40.50
5	11510.00	60.7 PK	74.0	-13.3	1.43 H	153	42.50	18.20
6	11510.00	47.8 AV	54.0	-6.2	1.43 H	153	29.60	18.20
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	**#5725.00**	**93.6 PK**	**93.9**	**-0.3**	**2.12 V**	**348**	**86.40**	**7.20**
2	**#5725.00**	**78.0 AV**	**78.3**	**-0.3**	**2.12 V**	**348**	**70.80**	**7.20**
3	*5755.00	123.9 PK			2.12 V	348	83.40	40.50
4	*5755.00	108.3 AV			2.12 V	348	67.80	40.50
5	11510.00	61.3 PK	74.0	-12.7	1.60 V	170	43.10	18.20
6	11510.00	48.3 AV	54.0	-5.7	1.60 V	170	30.10	18.20

REMARKS:

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

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	110.3 PK			1.48 H	247	69.80	40.50
2	*5795.00	94.4 AV			1.48 H	247	53.90	40.50
3	#5850.00	76.8 PK	80.3	-3.5	1.48 H	247	69.30	7.50
4	#5850.00	60.9 AV	64.4	-3.5	1.48 H	247	53.40	7.50
5	11590.00	60.7 PK	74.0	-13.3	1.49 H	155	42.40	18.30
6	11590.00	47.9 AV	54.0	-6.1	1.49 H	155	29.60	18.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	125.8 PK			2.07 V	317	85.30	40.50
2	*5795.00	110.1 AV			2.07 V	317	69.60	40.50
3	#5850.00	92.3 PK	95.8	-3.5	2.07 V	317	84.80	7.50
4	#5850.00	76.6 AV	80.1	-3.5	2.07 V	317	69.10	7.50
5	11590.00	63.8 PK	74.0	-10.2	1.28 V	141	45.50	18.30
6	11590.00	51.1 AV	54.0	-2.9	1.28 V	141	32.80	18.30

REMARKS:

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

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	#5725.00	72.4 PK	72.7	-0.3	1.06 H	123	65.20	7.20
2	#5725.00	59.6 AV	59.9	-0.3	1.06 H	123	52.40	7.20
3	*5775.00	102.7 PK			1.07 H	124	62.20	40.50
4	*5775.00	89.9 AV			1.07 H	124	49.40	40.50
5	#5850.00	65.6 PK	72.7	-7.1	1.11 H	131	58.10	7.50
6	#5850.00	52.8 AV	59.9	-7.1	1.11 H	131	45.30	7.50
7	#11550.00	59.4 PK	74.0	-14.6	1.50 H	160	41.20	18.20
8	#11550.00	46.6 AV	54.0	-7.4	1.50 H	160	28.40	18.20
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	#5725.00	88.0 PK	88.5	-0.5	2.07 V	344	80.80	7.20
2	#5725.00	77.5 AV	78.0	-0.5	2.07 V	344	70.30	7.20
3	*5775.00	118.5 PK			2.07 V	344	78.00	40.50
4	*5775.00	108.0 AV			2.07 V	344	67.50	40.50
5	#5850.00	83.9 PK	88.5	-4.6	2.13 V	356	76.40	7.50
6	#5850.00	73.4 AV	78.0	-4.6	2.13 V	356	65.90	7.50
7	11550.00	60.6 PK	74.0	-13.4	1.29 V	142	42.40	18.20
8	11550.00	47.8 AV	54.0	-6.2	1.29 V	142	29.60	18.20

REMARKS:

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

Below 1GHz worst-case data:

802.11ac (VHT20)

CHANNEL	TX Channel 165	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	70.73	32.8 QP	40.0	-7.2	2.00 H	110	49.10	-16.30
2	278.77	35.4 QP	46.0	-10.6	1.00 H	125	48.40	-13.00
3	311.82	34.9 QP	46.0	-11.1	1.00 H	215	47.00	-12.10
4	500.42	44.3 QP	46.0	-1.7	2.00 H	183	52.60	-8.30
5	725.96	40.4 QP	46.0	-5.6	1.00 H	265	44.10	-3.70
6	751.23	43.8 QP	46.0	-2.2	1.00 H	47	46.90	-3.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.27	38.3 QP	40.0	-1.7	1.50 V	120	54.30	-16.00
2	64.90	38.9 QP	40.0	-1.1	1.00 V	265	54.30	-15.40
3	166.00	30.9 QP	43.5	-12.6	1.00 V	4	45.10	-14.20
4	313.77	32.8 QP	46.0	-13.2	1.49 V	288	44.90	-12.10
5	500.42	40.2 QP	46.0	-5.8	1.99 V	215	48.50	-8.30
6	675.40	35.3 QP	46.0	-10.7	1.49 V	318	40.20	-4.90
7	751.23	38.0 QP	46.0	-8.0	1.49 V	24	41.10	-3.10

REMARKS:

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

5.2 Conducted Emission Measurement

5.2.1 Limits of Conducted Emission Measurement

Frequency (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 Procedures

Same as item 4.2.3.

5.2.4 Deviation from Test Standard

No deviation.

5.2.5 Test Setup

Same as item 4.2.5

5.2.6 EUT Operating Conditions

Same as item 4.1.6.

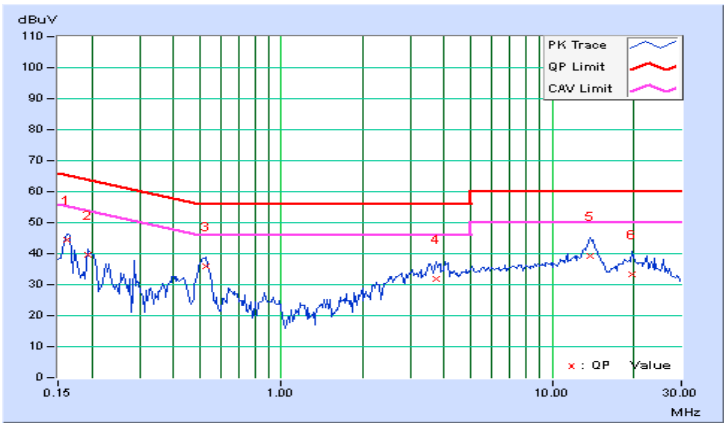
5.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.91	34.66	23.05	44.57	32.96	65.38	55.38	-20.80	-22.41
2	0.19297	9.92	29.55	20.07	39.47	29.99	63.91	53.91	-24.44	-23.92
3	0.52891	9.95	25.88	15.75	35.83	25.70	56.00	46.00	-20.17	-20.30
4	3.71484	10.17	21.68	11.82	31.85	21.99	56.00	46.00	-24.15	-24.01
5	13.78516	10.46	28.72	21.31	39.18	31.77	60.00	50.00	-20.82	-18.23
6	19.79297	10.61	22.80	17.98	33.41	28.59	60.00	50.00	-26.59	-21.41

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.

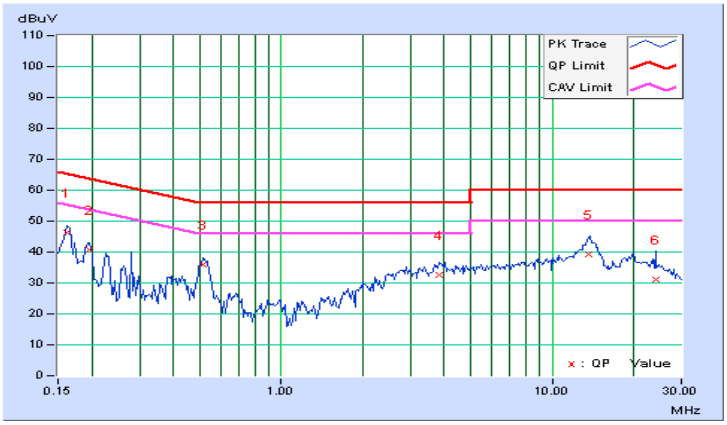


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.92	36.36	23.90	46.28	33.82	65.38	55.38	-19.09	-21.55
2	0.19687	9.93	30.90	20.01	40.83	29.94	63.74	53.74	-22.92	-23.81
3	0.51328	9.96	25.80	17.11	35.76	27.07	56.00	46.00	-20.24	-18.93
4	3.82422	10.21	22.24	14.15	32.45	24.36	56.00	46.00	-23.55	-21.64
5	**13.69922**	**10.57**	**28.84**	**21.82**	**39.41**	**32.39**	**60.00**	**50.00**	**-20.59**	**-17.61**
6	24.21094	10.68	20.47	15.80	31.15	26.48	60.00	50.00	-28.85	-23.52

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

802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	17.60	16.01	17.59	17.60	0.5	Pass
157	5785	17.62	16.57	17.59	17.64	0.5	Pass
165	5825	17.59	17.21	17.58	17.62	0.5	Pass

802.11ac (VHT40)

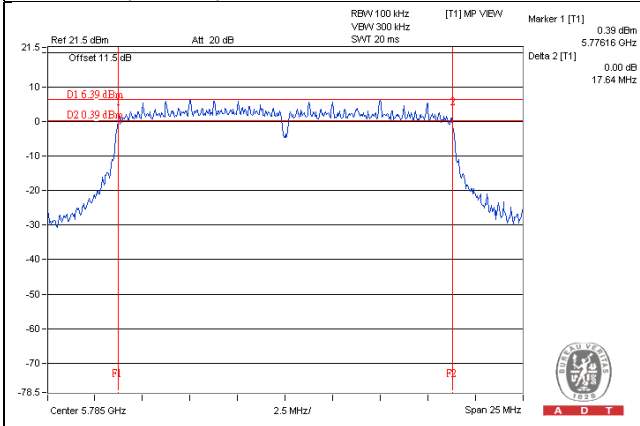
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	36.41	35.28	36.41	36.42	0.5	Pass
159	5795	35.79	35.28	35.82	35.99	0.5	Pass

802.11ac (VHT80)

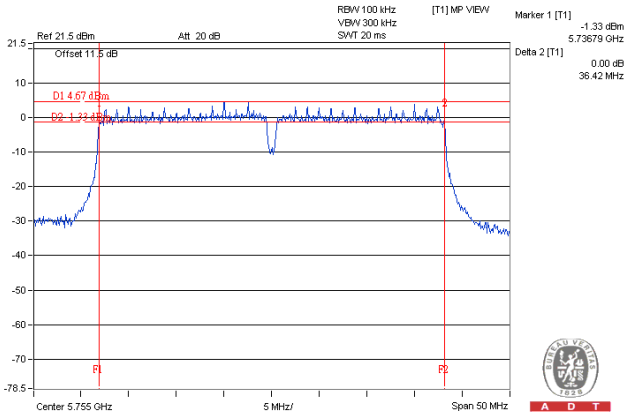
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
155	5775	76.06	76.35	76.41	76.11	0.5	Pass

SPECTRUM PLOT OF WORST VALUE

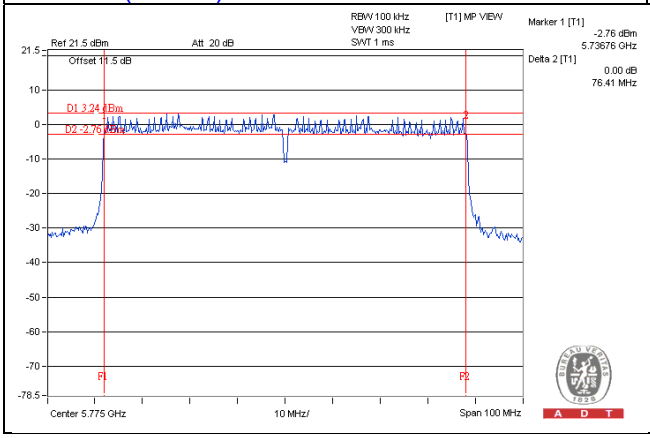
802.11ac (VHT20)



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 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 $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

5.4.2 Test Setup

Same as Item 4.5.2.

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 4.5.4.

5.4.5 Deviation from Test Standard

No deviation.

5.4.6 EUT Operating Conditions

Same as Item 4.5.6.

5.4.7 Test Results

802.11ac (VHT20)

Chan.	Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
149	5745	19.72	18.95	19.18	20.56	368.837	25.67	25.83	Pass
157	5785	19.70	18.80	19.32	20.38	363.834	25.61	25.83	Pass
165	5825	19.54	19.72	19.67	20.20	**381.102**	25.81	25.83	Pass

* Directional gain = 4.15dBi + 10log(4) = 10.17dBi > 6dBi, so the power limit shall be reduced to 30-(10.17-6) = 25.83dBm.

802.11ac (VHT40)

Chan.	Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
151	5755	19.91	19.05	19.55	20.31	375.858	25.75	25.83	Pass
159	5795	19.72	19.08	19.34	20.48	372.253	25.71	25.83	Pass

* Directional gain = 4.15dBi + 10log(4) = 10.17dBi > 6dBi, so the power limit shall be reduced to 30-(10.17-6) = 25.83dBm.

802.11ac (VHT80)

Chan.	Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
155	5775	19.82	19.10	19.45	20.55	378.829	25.78	25.83	Pass

* Directional gain = 4.15dBi + 10log(4) = 10.17dBi > 6dBi, so the power limit shall be reduced to 30-(10.17-6) = 25.83dBm.

5.5 Power Spectral Density Measurement

5.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 Test Setup

Same as item 4.6.2.

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 4.6.4.

5.5.5 Deviation from Test Standard

No deviation.

5.5.6 EUT Operating Condition

Same as Item 4.3.6

5.5.7 Test Results

802.11ac (VHT20)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=4) dB	Duty Factor	Total PSD with Duty Factor (dBm/10kHz)	Limit (dBm/10kHz)	Pass / Fail
0	149	5745	-14.17	6.02	0.10	-8.05	3.83	Pass
	157	5785	-12.85	6.02	0.10	-6.73	3.83	Pass
	165	5825	-10.48	6.02	0.10	-4.36	3.83	Pass
1	149	5745	-10.95	6.02	0.10	-4.83	3.83	Pass
	157	5785	-11.80	6.02	0.10	-5.68	3.83	Pass
	165	5825	-11.75	6.02	0.10	-5.63	3.83	Pass
2	149	5745	-10.15	6.02	0.10	-4.03	3.83	Pass
	157	5785	-10.13	6.02	0.10	-4.01	3.83	Pass
	165	5825	-10.98	6.02	0.10	-4.86	3.83	Pass
3	149	5745	-12.56	6.02	0.10	-6.44	3.83	Pass
	157	5785	-12.86	6.02	0.10	-6.74	3.83	Pass
	165	5825	-13.78	6.02	0.10	-7.66	3.83	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 4.15dBi + 10log(4) = 10.17dBi > 6dBi, so the power density limit shall be reduced to 8-(10.17-6) = 3.83dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT40)

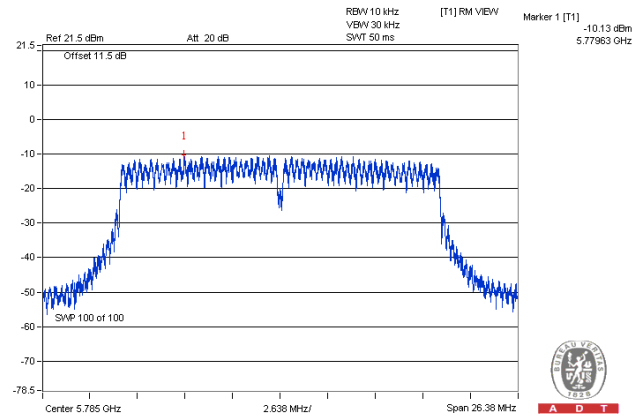
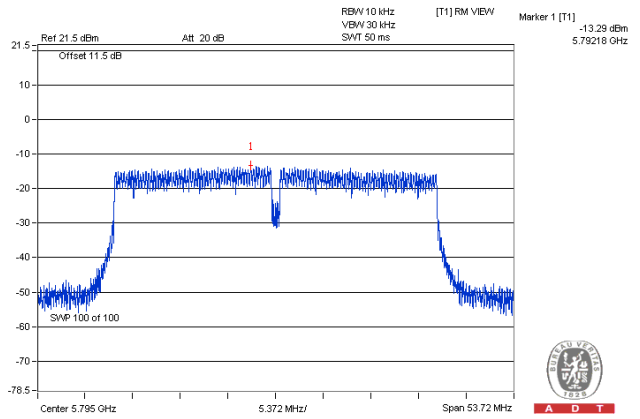
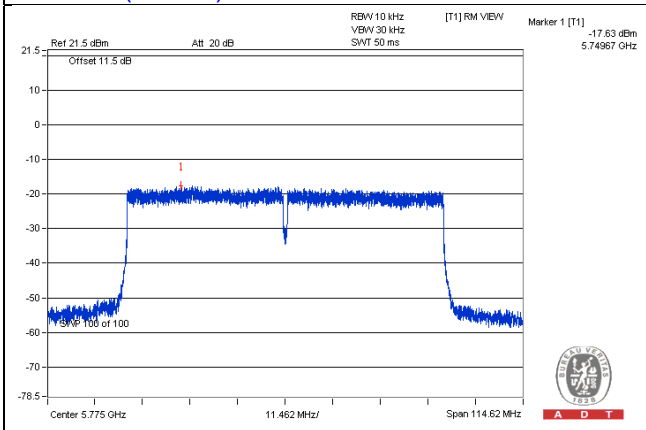
TX chain	Chan.	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=4) dB	Duty Factor	Total PSD with Duty Factor (dBm/10kHz)	Limit (dBm/10kHz)	Pass / Fail
0	151	5755	-17.28	6.02	0.15	-11.11	3.83	Pass
	159	5795	-15.36	6.02	0.15	-9.19	3.83	Pass
1	151	5755	-14.32	6.02	0.15	-8.15	3.83	Pass
	159	5795	-15.10	6.02	0.15	-8.93	3.83	Pass
2	151	5755	-13.72	6.02	0.15	-7.55	3.83	Pass
	159	5795	-13.29	6.02	0.15	-7.12	3.83	Pass
3	151	5755	-15.16	6.02	0.15	-8.99	3.83	Pass
	159	5795	-17.01	6.02	0.15	-10.84	3.83	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 4.15dBi + 10log(4) = 10.17dBi > 6dBi, so the power density limit shall be reduced to 8-(10.17-6) = 3.83dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=4) dB	Duty Factor	Total PSD with Duty Factor (dBm/10kHz)	Limit (dBm/10kHz)	Pass / Fail
0	155	5775	-19.90	6.02	0.31	-13.57	3.83	Pass
1	155	5775	-18.83	6.02	0.31	-12.50	3.83	Pass
2	155	5775	-17.63	6.02	0.31	-11.30	3.83	Pass
3	155	5775	-19.89	6.02	0.31	-13.56	3.83	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 4.15dBi + 10log(4) = 10.17dBi > 6dBi, so the power density limit shall be reduced to 8-(10.17-6) = 3.83dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11ac (VHT20) / Ch 157 / Chain 2	802.11ac (VHT40) / Ch 159 / Chain 2
	
802.11ac (VHT80) / Ch 155 / Chain 2	
	

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 4.7.2

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 4.7.4

5.6.5 Deviation from Test Standard

No deviation.

5.6.6 EUT Operating Condition

Same as Item 4.3.6

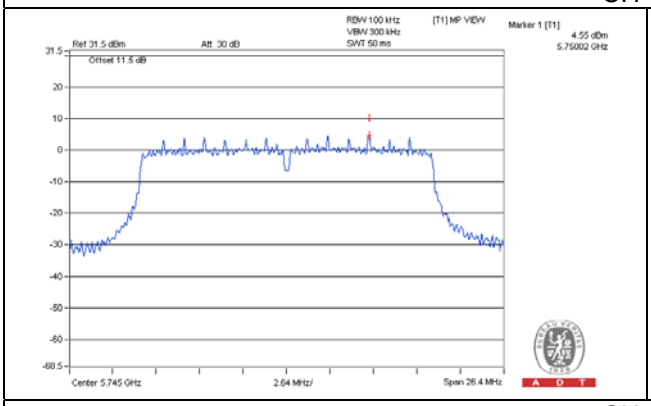
5.6.7 Test Results

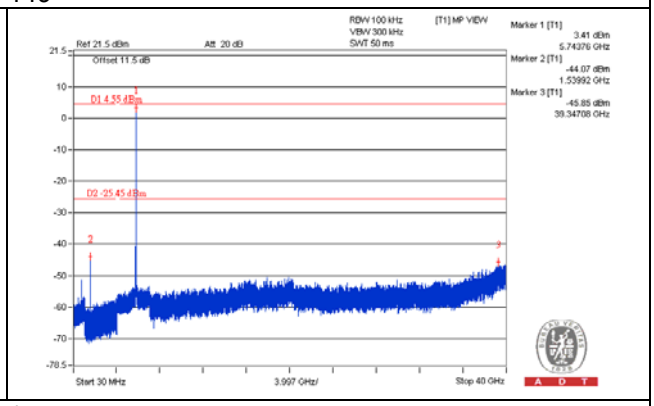
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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

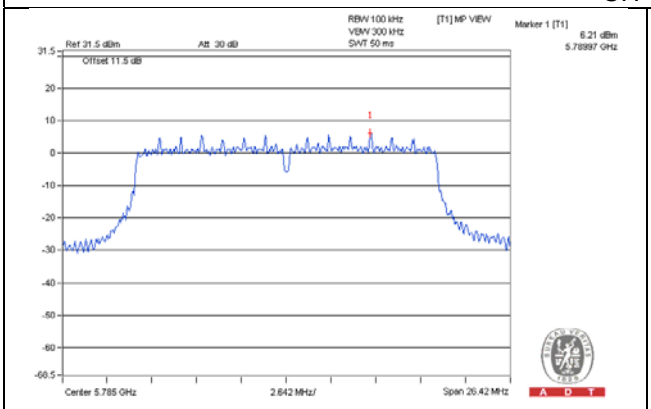
802.11ac (VHT20)_CHAIN 0

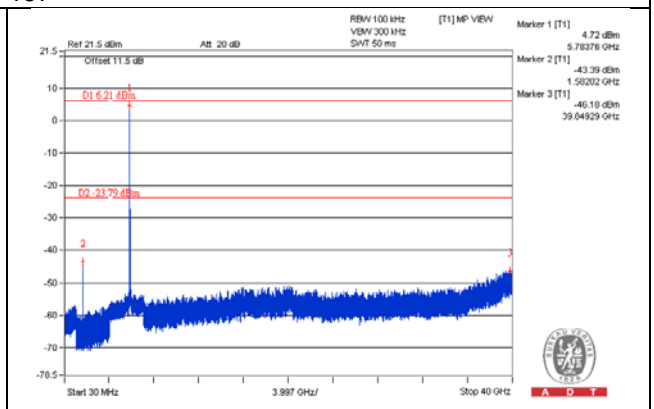
CH 149



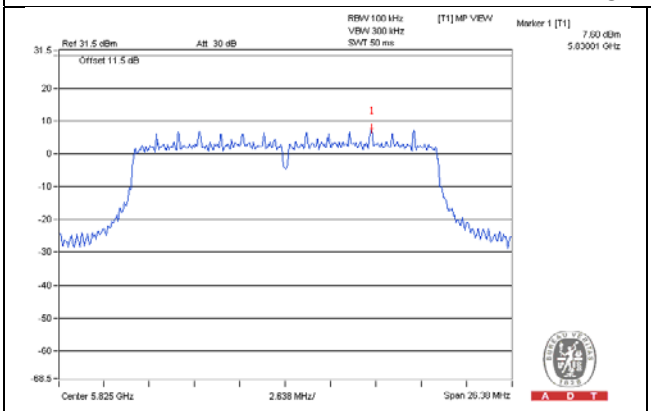


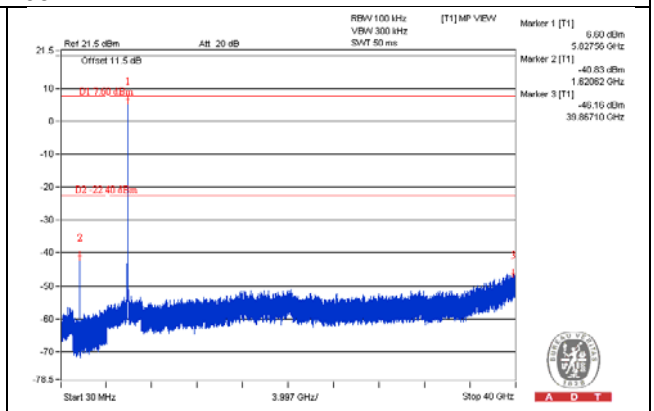
CH 157



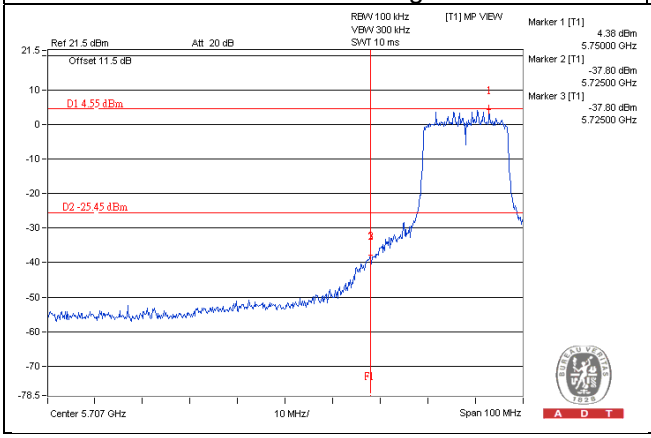


CH 165

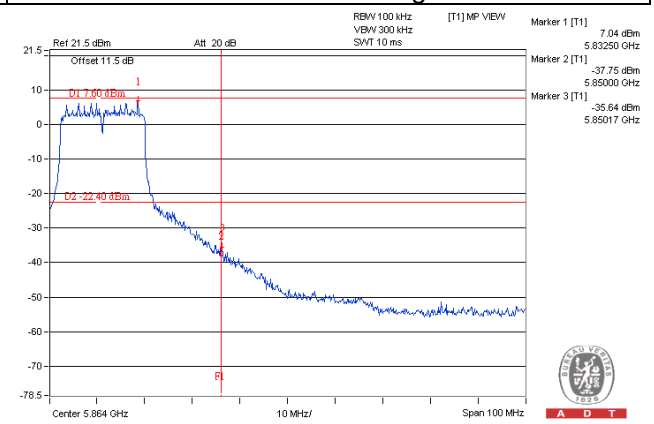




CH 149 Band edge

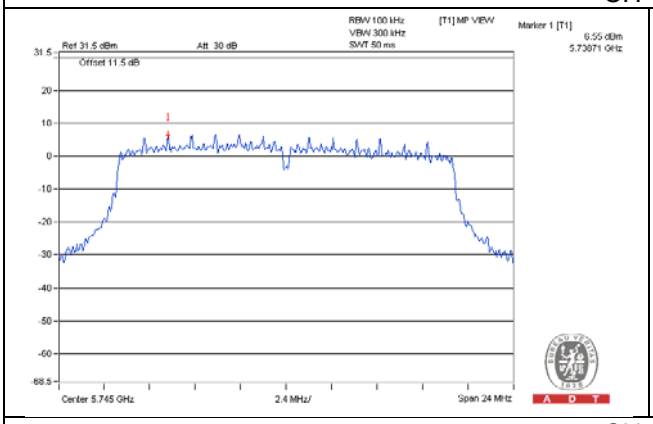


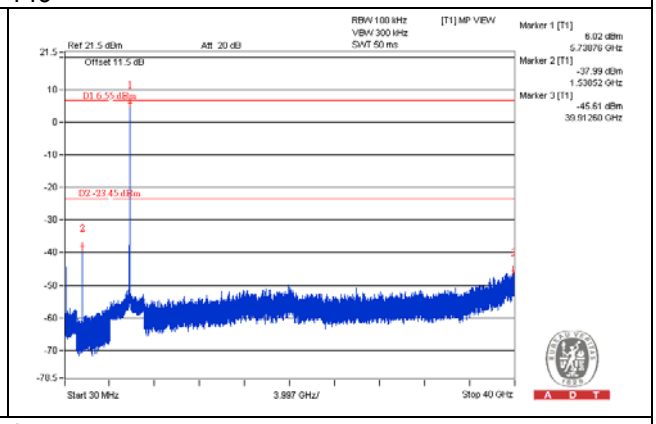
CH 165 Band edge



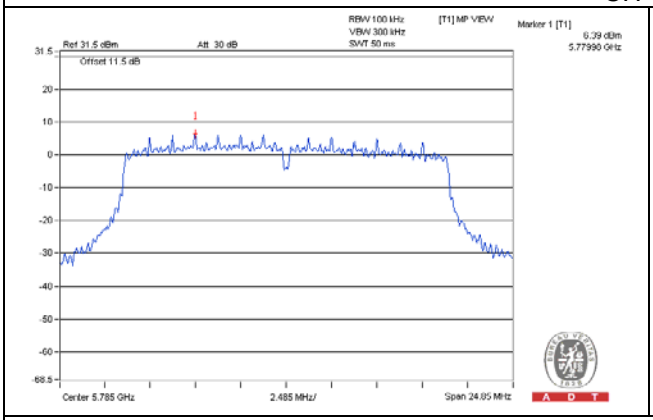
802.11ac (VHT20)_CHAIN 1

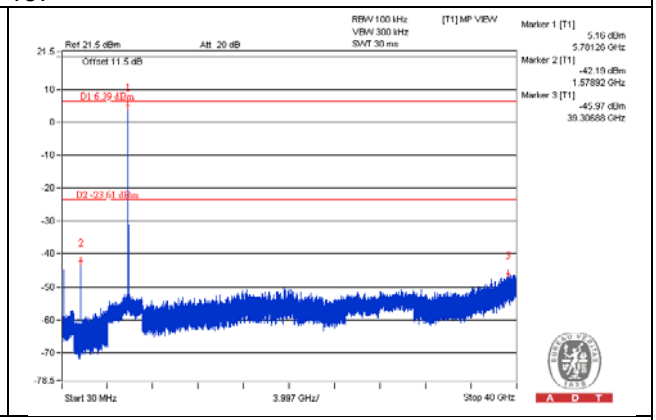
CH 149



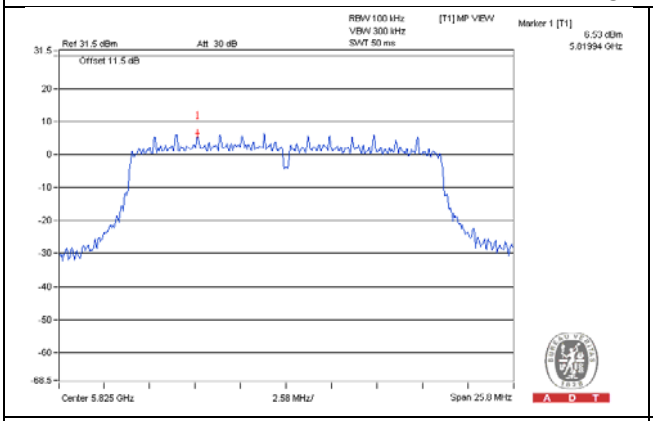


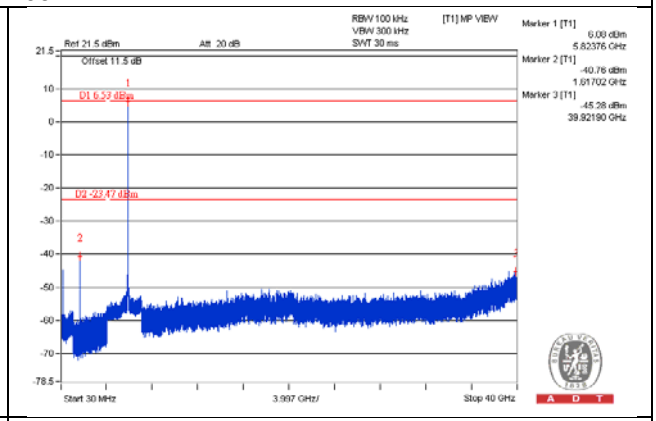
CH 157



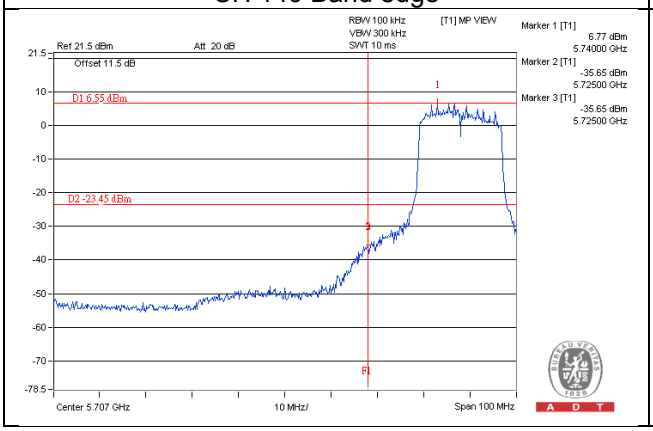


CH 165

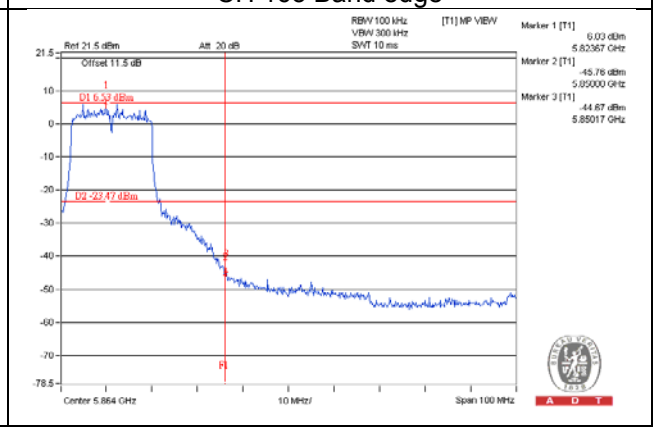




CH 149 Band edge

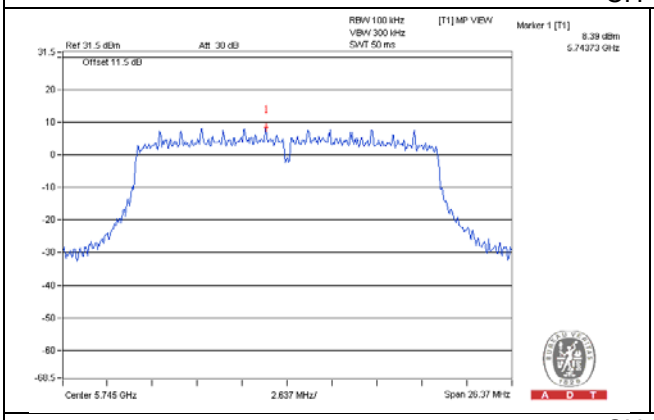


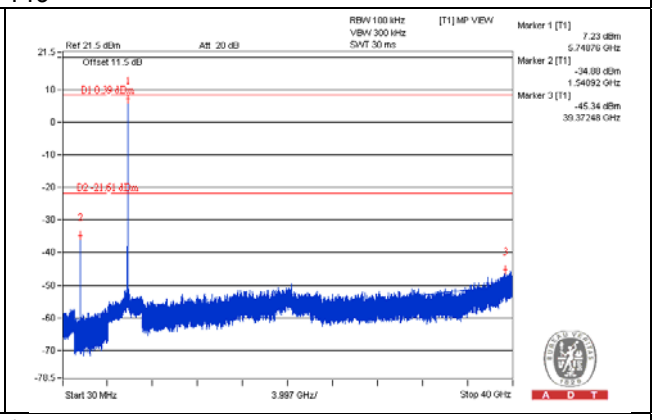
CH 165 Band edge



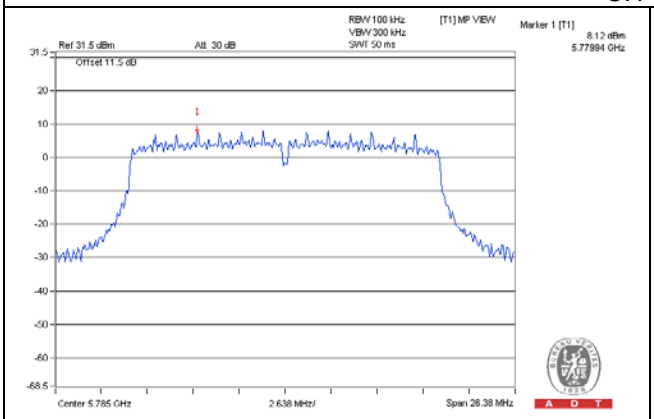
802.11ac (VHT20)_CHAIN 2

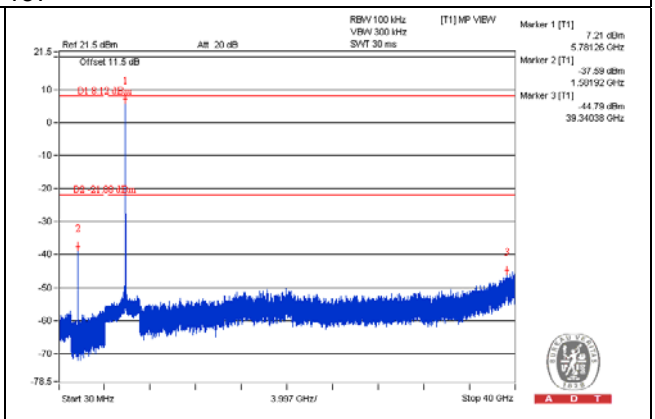
CH 149



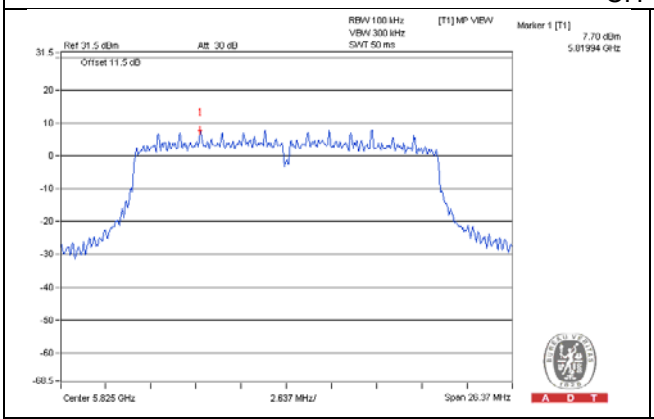


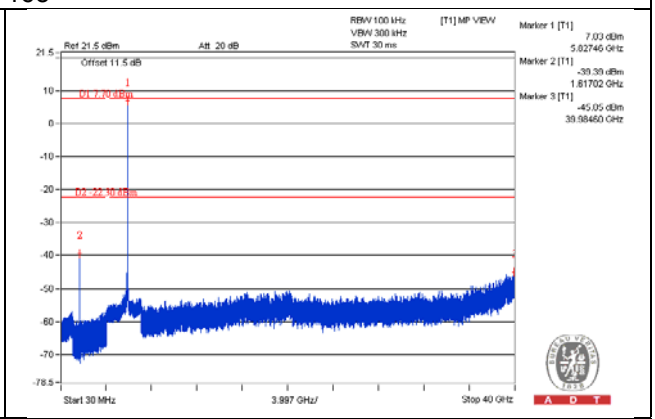
CH 157



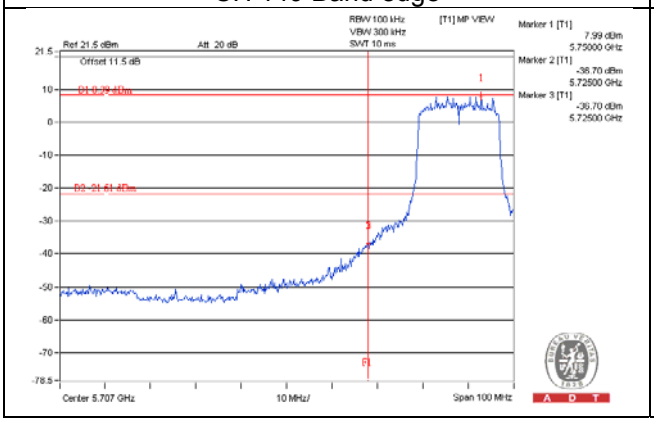


CH 165

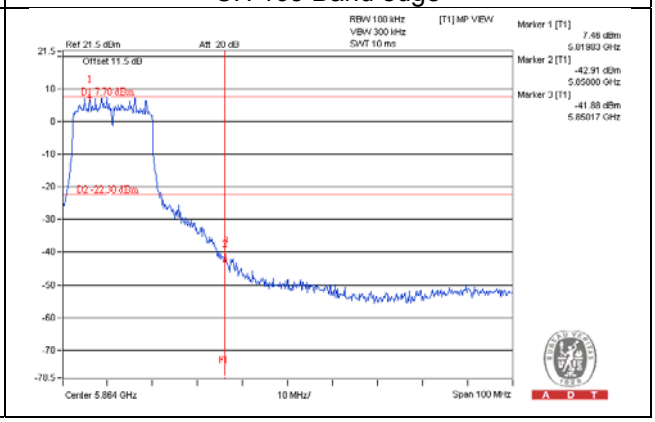




CH 149 Band edge

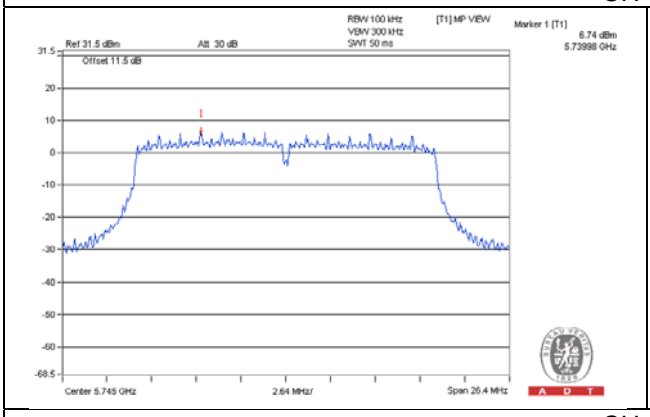


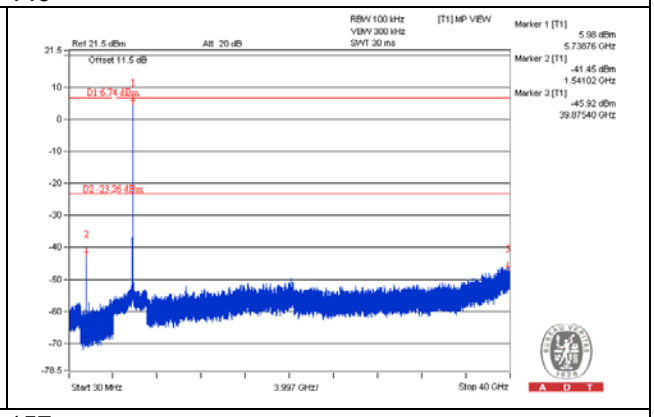
CH 165 Band edge



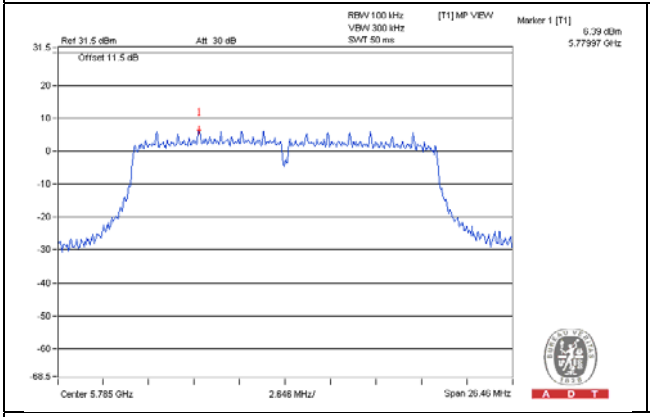
802.11ac (VHT20)_CHAIN 3

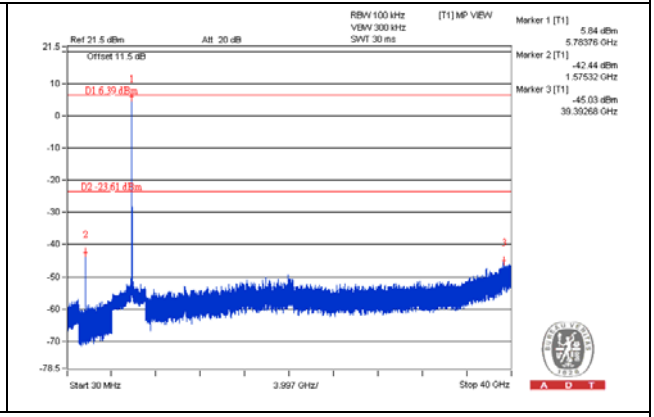
CH 149



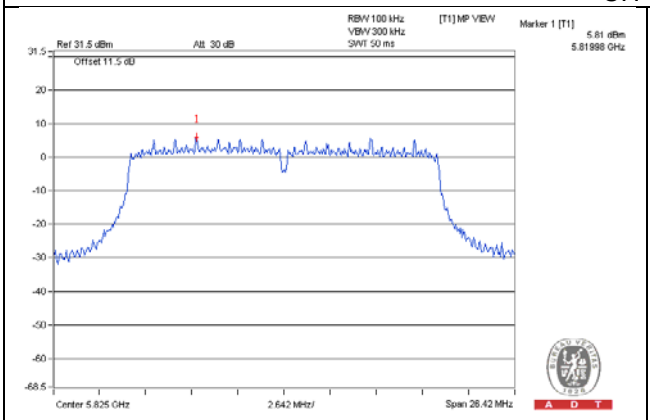


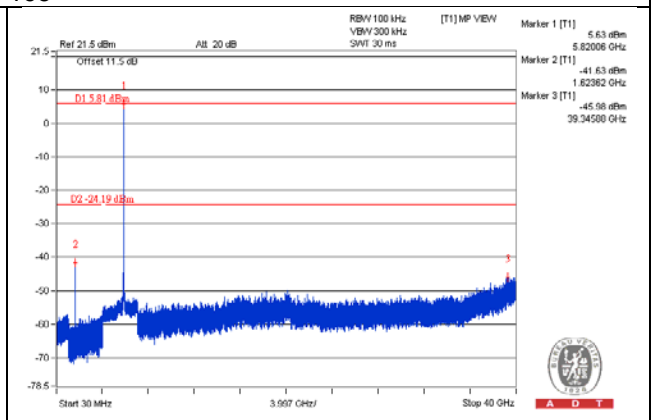
CH 157



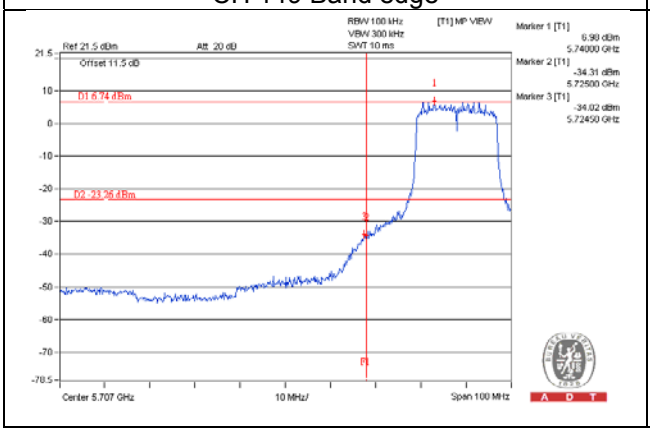


CH 165

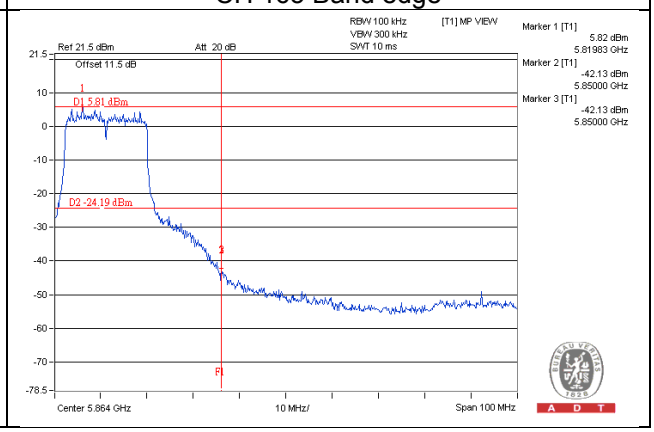




CH 149 Band edge

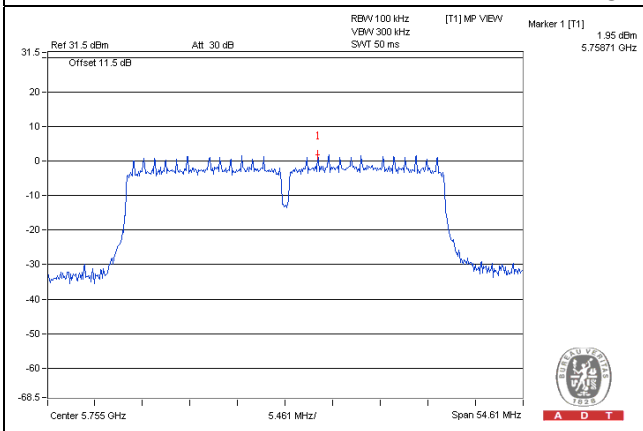


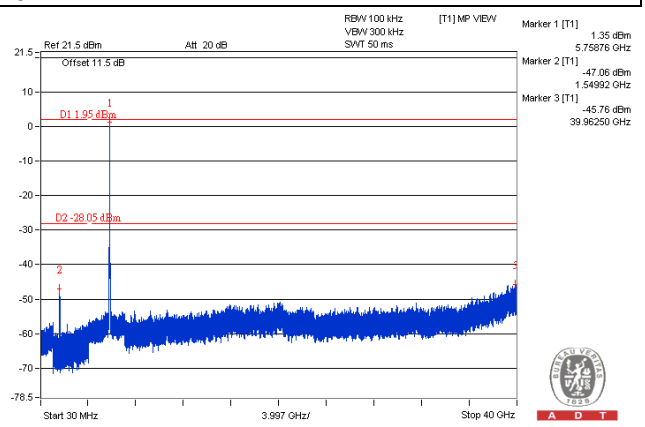
CH 165 Band edge



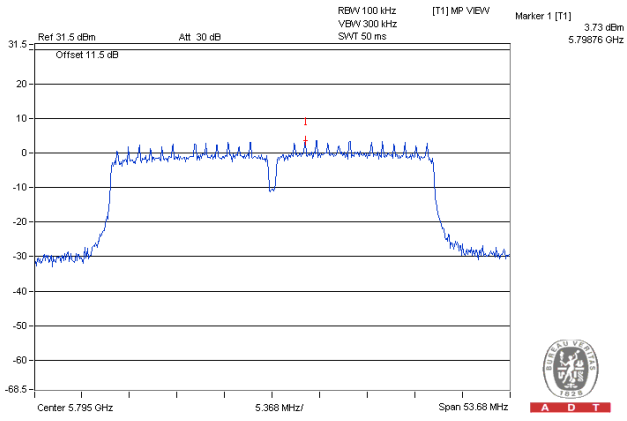
802.11ac (VHT40)_CHAIN 0

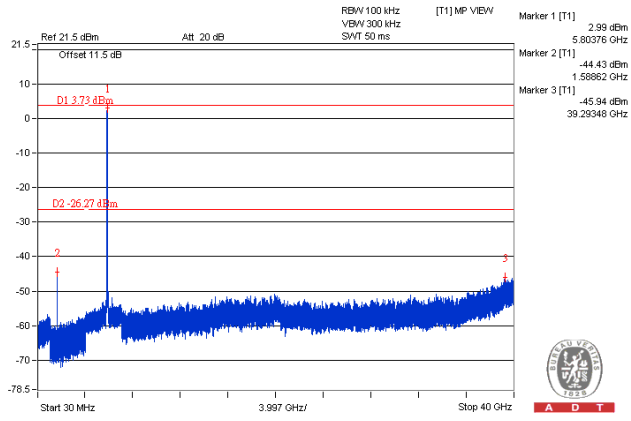
CH 151



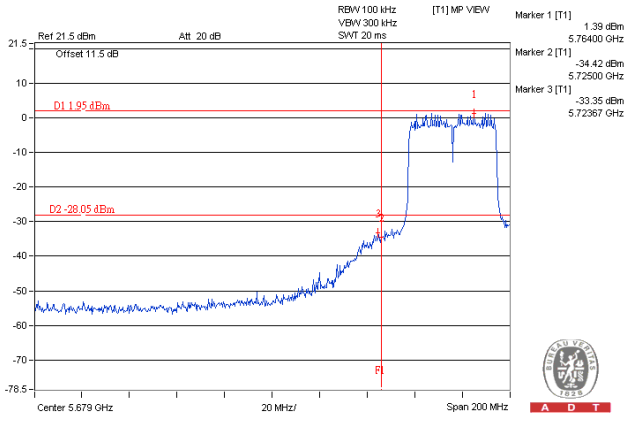


CH 159

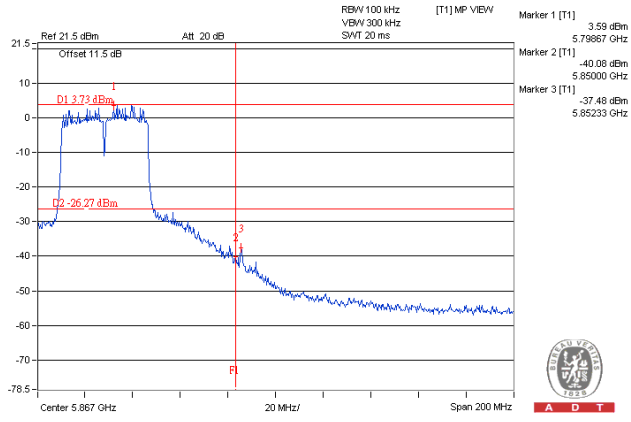




CH 151 Band edge

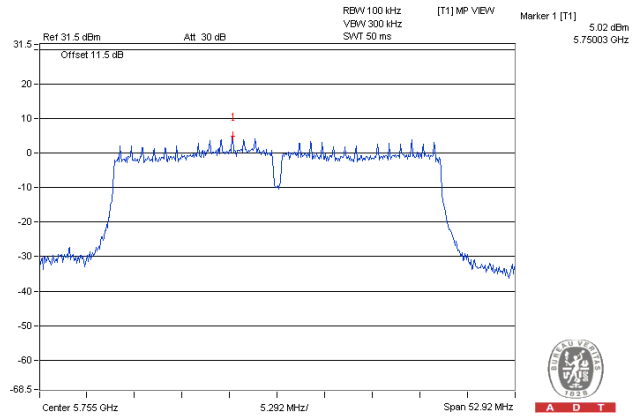


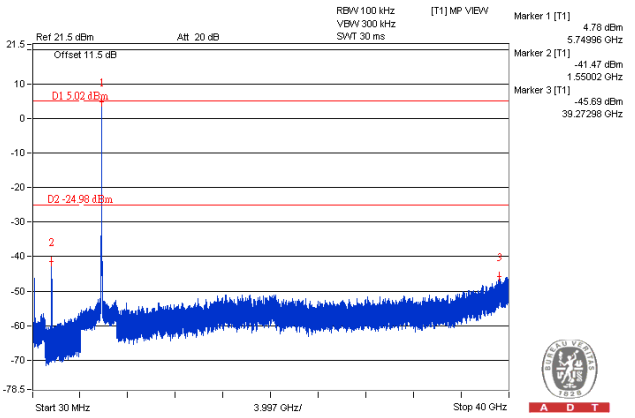
CH 159 Band edge



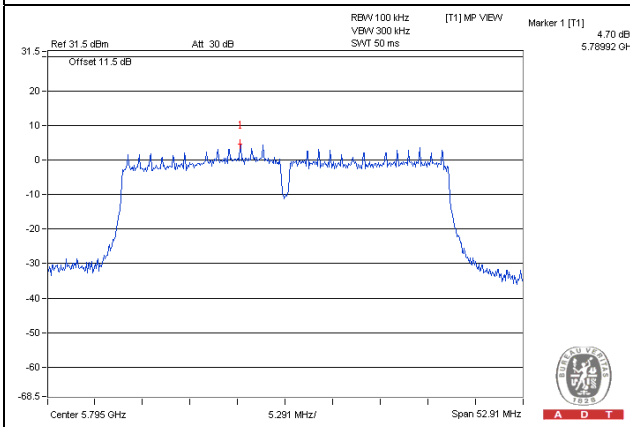
802.11ac (VHT40)_CHAIN 1

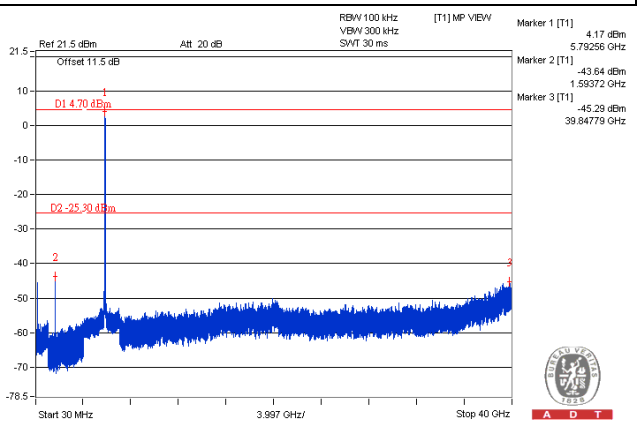
CH 151



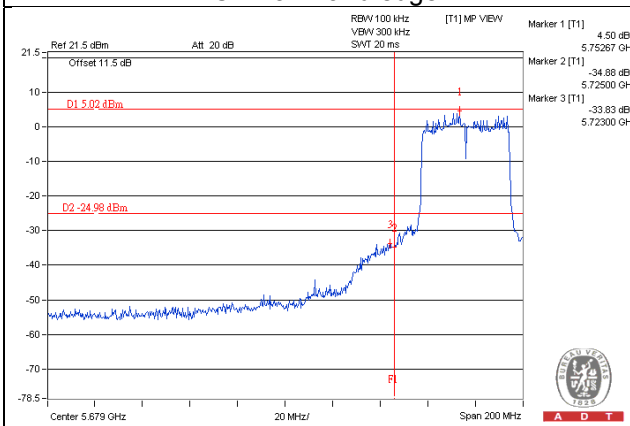


CH 159

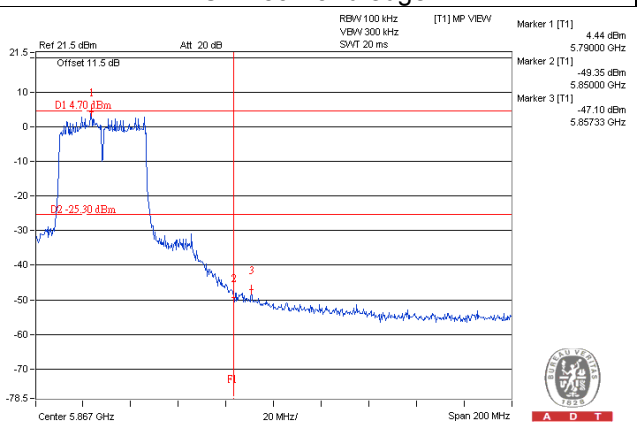




CH 151 Band edge

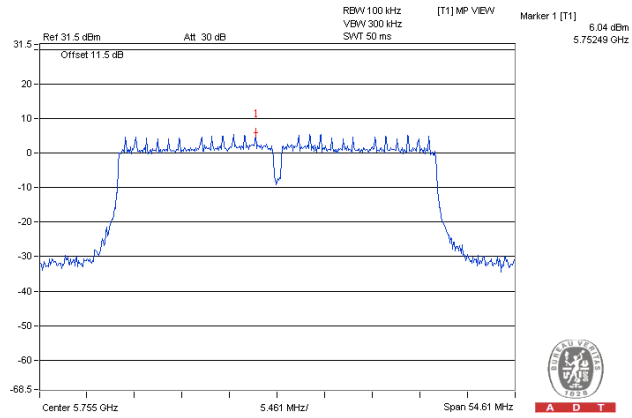


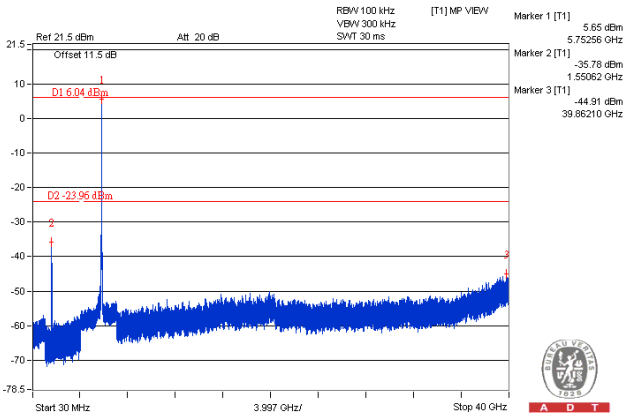
CH 159 Band edge



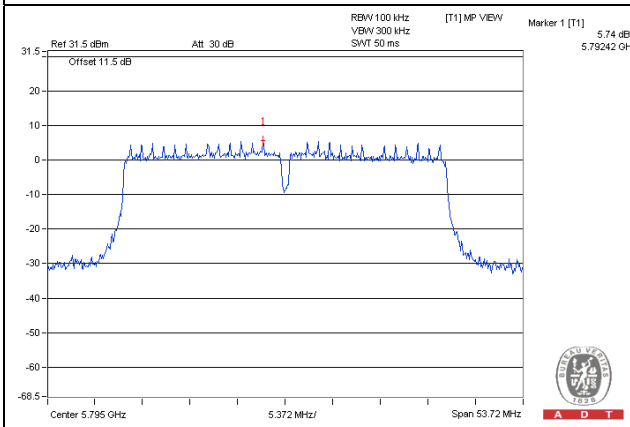
802.11ac (VHT40)_CHAIN 2

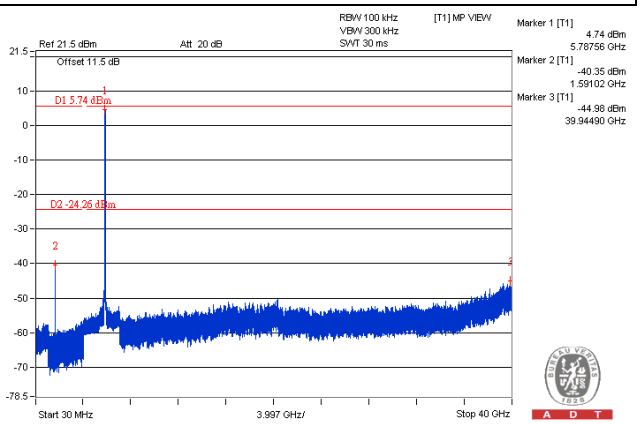
CH 151



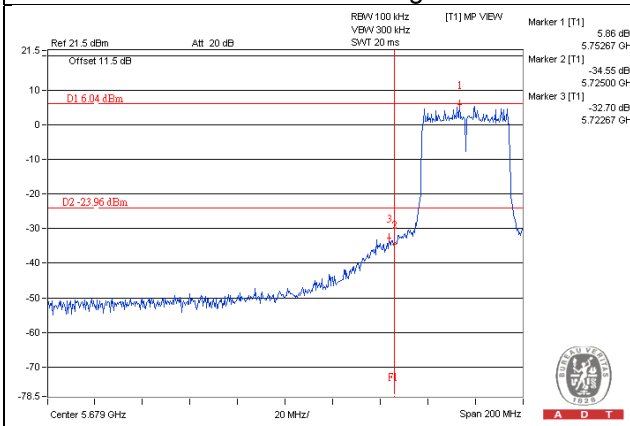


CH 159

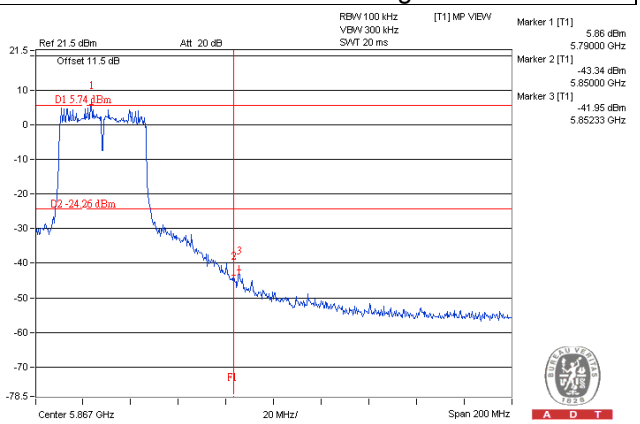




CH 151 Band edge

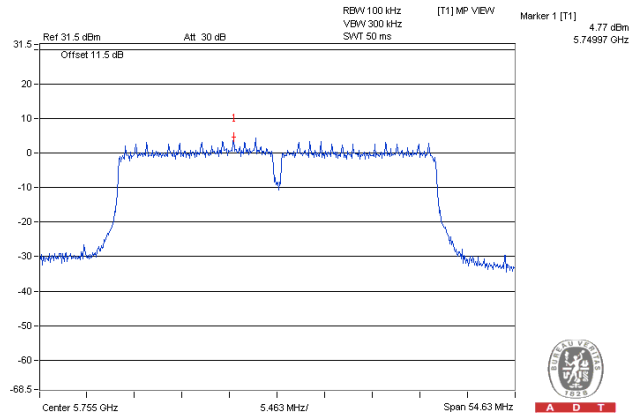


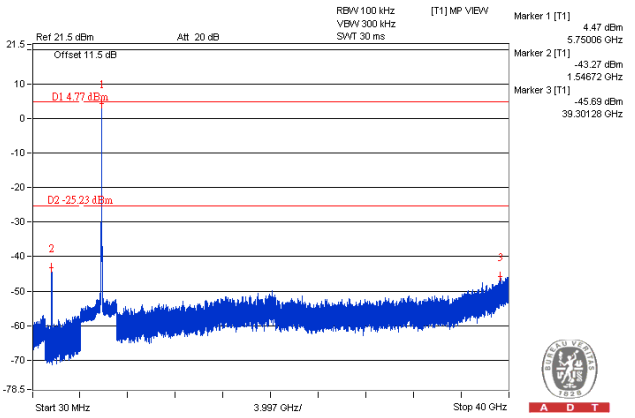
CH 159 Band edge



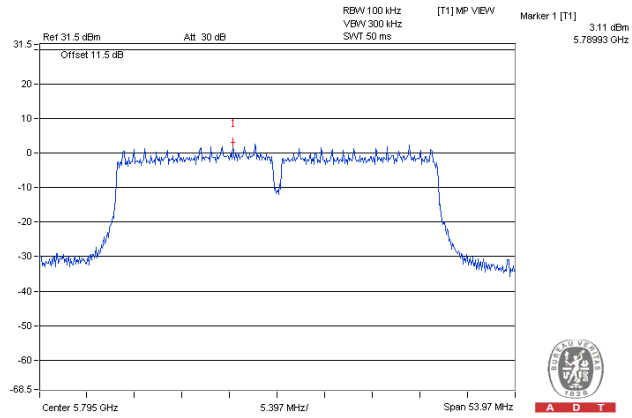
802.11ac (VHT40)_CHAIN 3

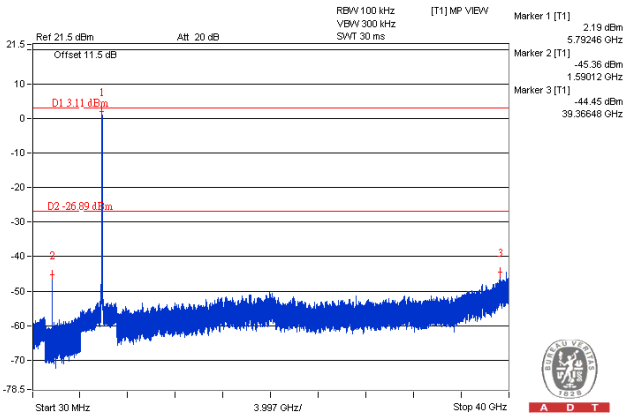
CH 151



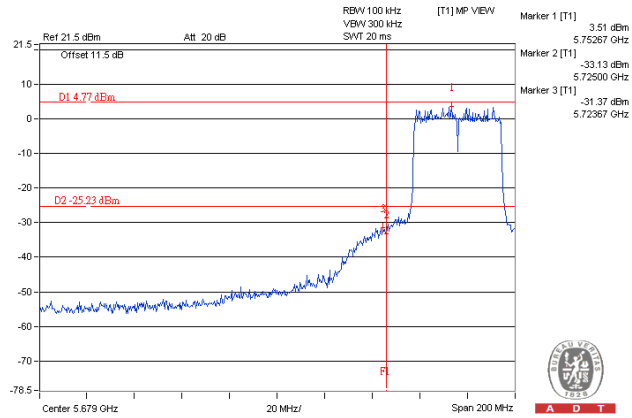


CH 159

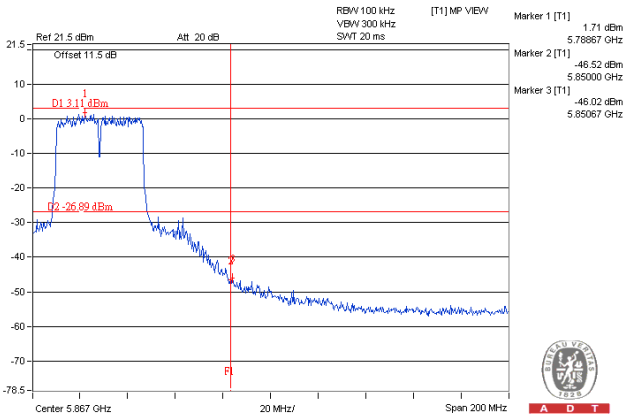




CH 151 Band edge

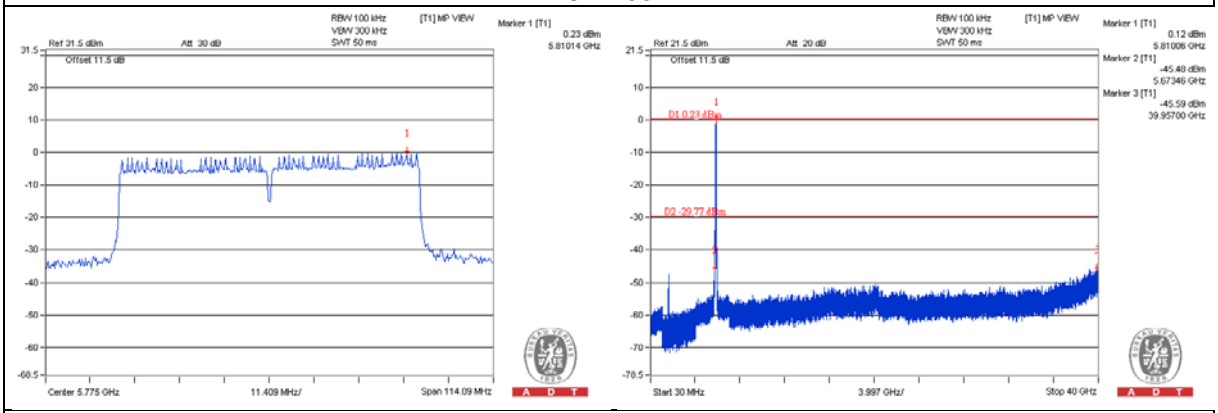


CH 159 Band edge

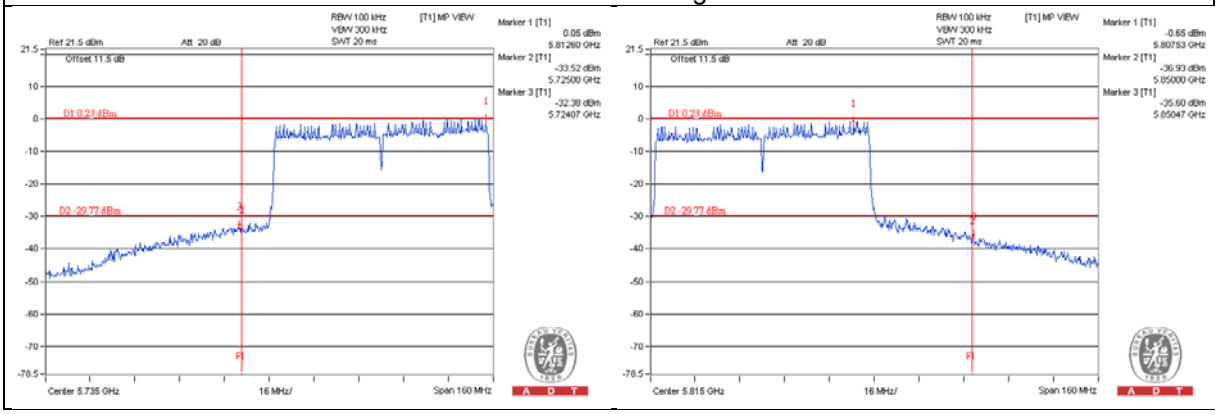


802.11ac (VHT80)_CHAIN 0

CH 155

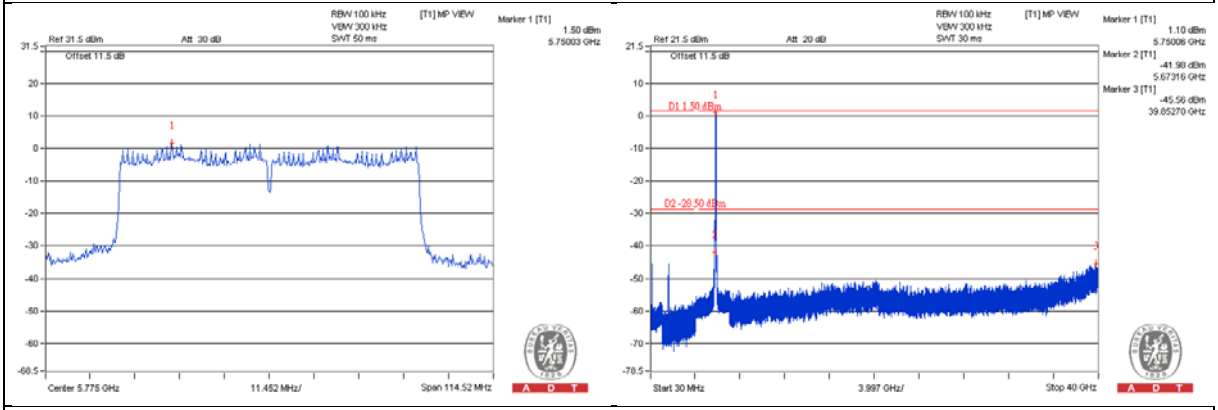


CH 155 Band edge

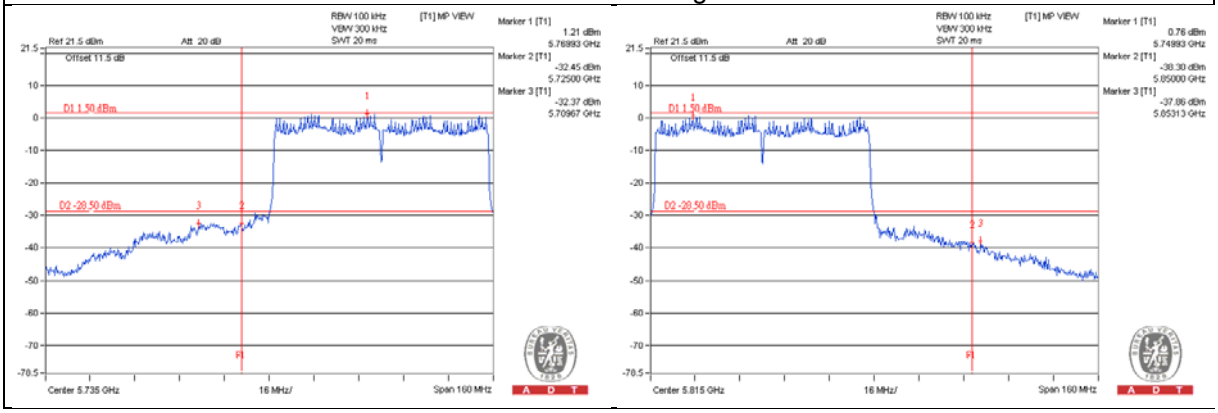


802.11ac (VHT80)_CHAIN 1

CH 155

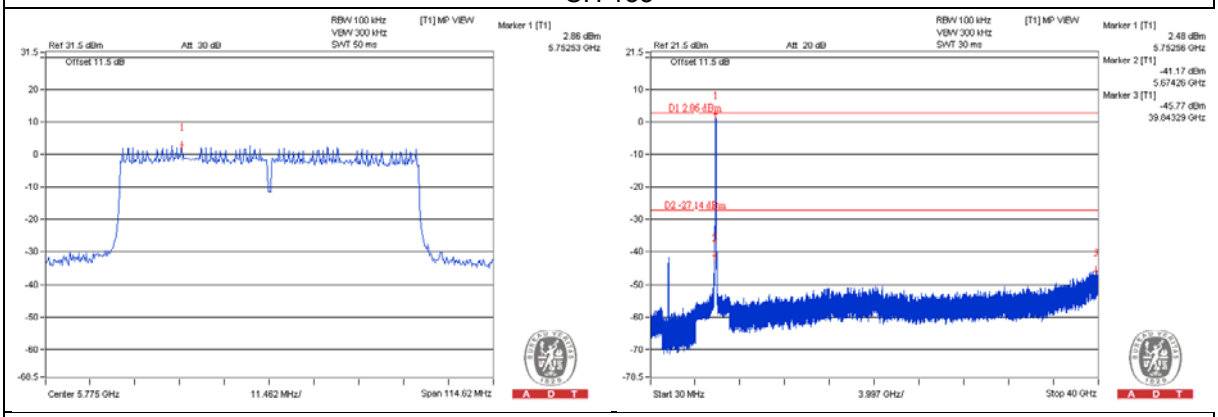


CH 155 Band edge

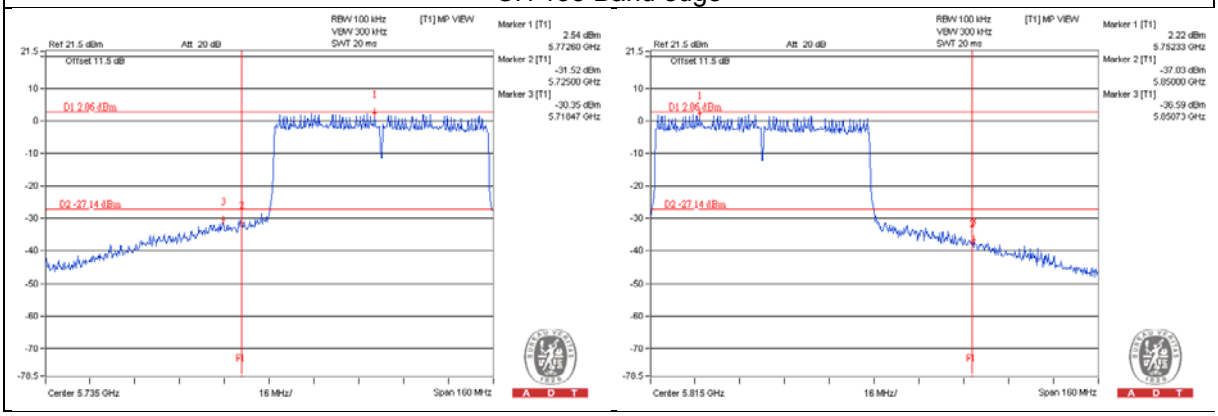


802.11ac (VHT80)_CHAIN 2

CH 155

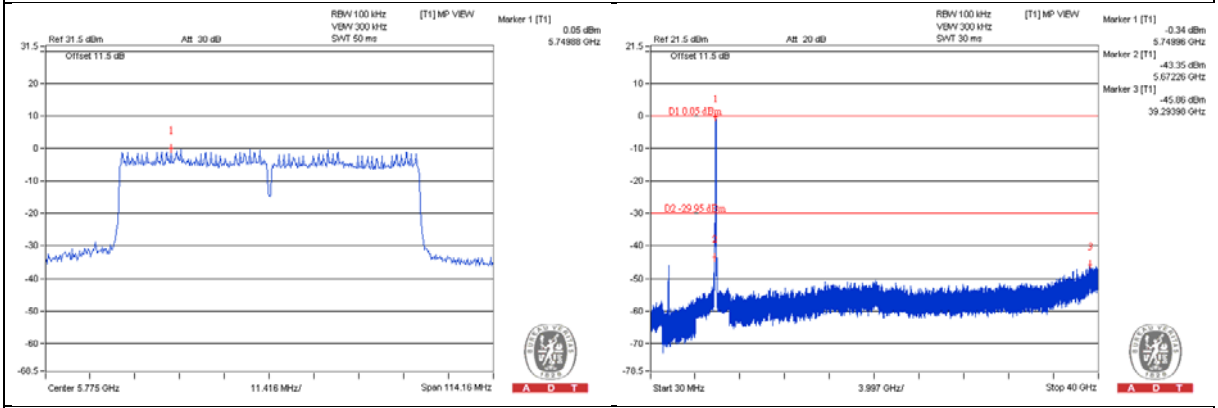


CH 155 Band edge

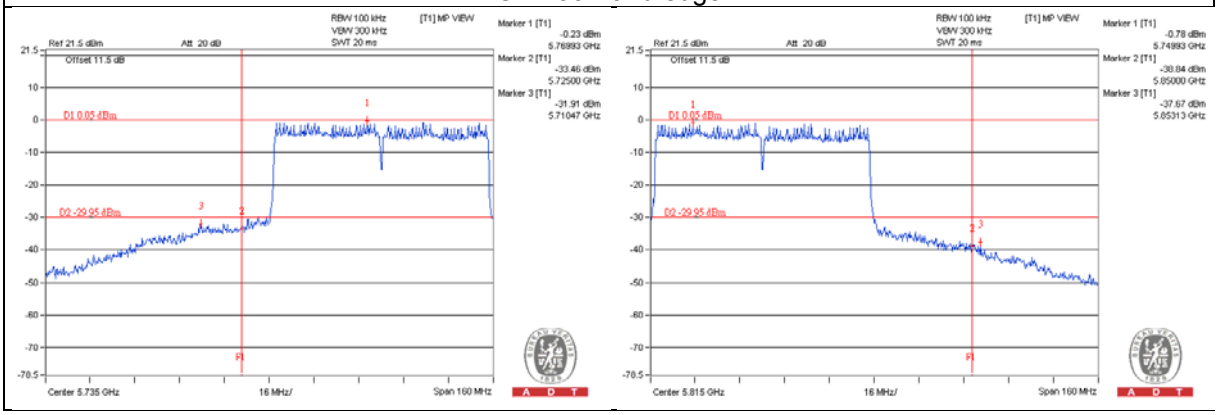


802.11ac (VHT80)_CHAIN 3

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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Tel: 886-2-26052180
Fax: 886-2-26051924

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

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

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