

FCC TEST REPORT (15.247)

REPORT NO.: RF130511C01B

MODEL NO.: EMG2926-Q10A

FCC ID: I88EMG2926Q10A

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TESTED: May 23, 2013 ~ Feb. 08, 2014

ISSUED: Feb. 14, 2014

APPLICANT: ZyXEL Communications Corporation

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130511C01B	Original release	Feb. 14, 2014



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1. CERTIFICATION

PRODUCT: Dual-Band Wireless AC/N Gigabit Ethernet Gateway
MODEL NO.: EMG2926-Q10A
BRAND: ZyXEL
APPLICANT: ZyXEL Communications Corporation
TESTED: May 23, 2013 ~ Feb. 08, 2014
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10-2009

The above equipment (model: EMG2926-Q10A) 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 : Ivy Lin , **DATE :** Feb. 14, 2014
Ivy Lin / Specialist

APPROVED BY : Ken Liu , **DATE :** Feb. 14, 2014
Ken Liu / Senior Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -14.12dB at 0.27109MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 2483.50MHz & 4874.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is I-PEX not a standard connector.

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.34 dB
	200MHz ~1000MHz	3.35 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Dual-Band Wireless AC/N Gigabit Ethernet Gateway
MODEL NO.	EMG2926-Q10A
POWER SUPPLY	12Vdc (Adapter)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only.
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 450.0Mbps 802.11ac: up to 1.3Gbps
OPERATING FREQUENCY	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5745 ~ 5825MHz
NUMBER OF CHANNEL	2.4GHz: 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) 5.0GHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 1 for 802.11ac (80MHz)
OUTPUT POWER	830.032mW for 2412 ~ 2462MHz 501.310mW for 5745 ~ 5825MHz
ANTENNA TYPE	PCB antenna with 2dBi gain
ANTENNA CONNECTOR	I-PEX
DATA CABLE	N/A
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

1. The EUT incorporates a MIMO function. The EUT provides 3 completed transmitters and 3 receivers.

MODULATION MODE	TX FUNCTION
802.11b	3TX
802.11g	3TX
802.11a	3TX
802.11n (20MHz)	3TX
802.11n (40MHz)	3TX
802.11ac (80MHz)	3TX

2. The EUT consumes power from the following adapter.

BRAND:	DVE
MODEL:	DSA-24PFD-15 FUS 120200
INPUT:	100-240Vac, 50/60Hz, 0.8A
OUTPUT:	+12Vdc, 2A
POWER LINE:	DC 1.5m power cable w/o core attached on adapter

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

3.2 DESCRIPTION OF TEST MODES

FOR 2.4GHz:

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

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

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

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

FOR 5.0GHz (5745 ~ 5825MHz):

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

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

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

CHANNEL	FREQUENCY
155	5775MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR 2.4GHz:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

RADIATED EMISSION TEST (ABOVE 1GHz):

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

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

RADIATED EMISSION TEST (BELOW 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11g	1 to 11	11	OFDM	BPSK	6.0

POWER LINE CONDUCTED EMISSION TEST:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11g	1 to 11	11	OFDM	BPSK	6.0

BANDEDGE MEASUREMENT:

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

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

ANTENNA PORT CONDUCTED MEASUREMENT:

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

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

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Martin Lee
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Antony Lee

FOR 5.0GHz (5745 ~ 5825MHz):

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

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

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)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0
-	802.11ac (80MHz)	155	155	OFDM	BPSK	87.8

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)
-	802.11a	149 to 165	149	OFDM	BPSK	6.0

POWER LINE CONDUCTED EMISSION TEST:

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

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

BANDEDGE MEASUREMENT:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 165	OFDM	BPSK	7.2
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0
-	802.11ac (80MHz)	155	155	OFDM	BPSK	87.8

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)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0
-	802.11ac (80MHz)	155	155	OFDM	BPSK	87.8

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Martin Lee
RE $<$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Antony Lee

3.3 DUTY CYCLE OF TEST SIGNAL

2.4GHz Band:

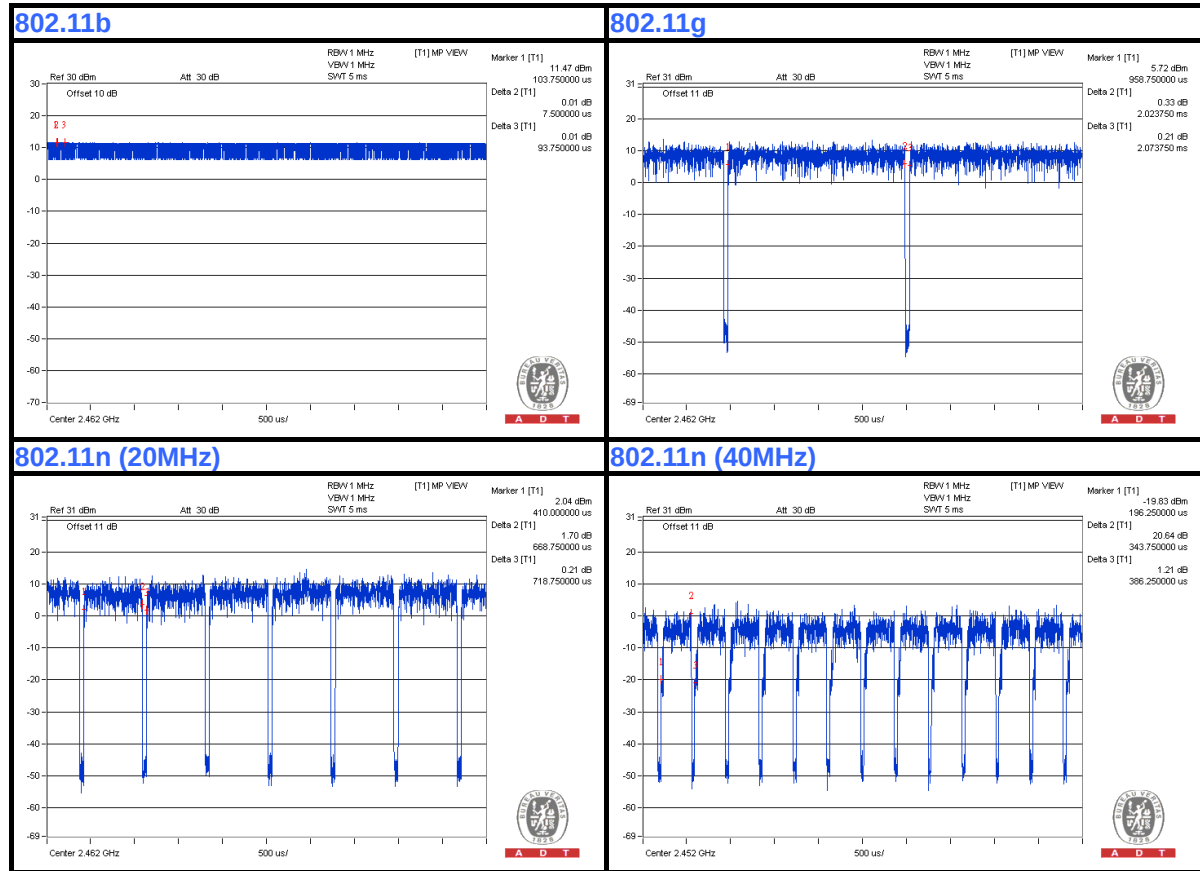
802.11b: Duty cycle of test signal is > 98 %.

Duty cycle of test signal is < 98%

802.11g: Duty cycle = $2.02375/2.07375 = 0.976$, Duty factor = $10 * \log(1/0.976) = 0.11$

802.11n (20MHz): Duty cycle = $668.75/718.75 = 0.930$, Duty factor = $10 * \log(1/0.930) = 0.32$

802.11n (40MHz): Duty cycle = $343.75/386.25 = 0.890$, Duty factor = $10 * \log(1/0.890) = 0.51$



5GHz Band:

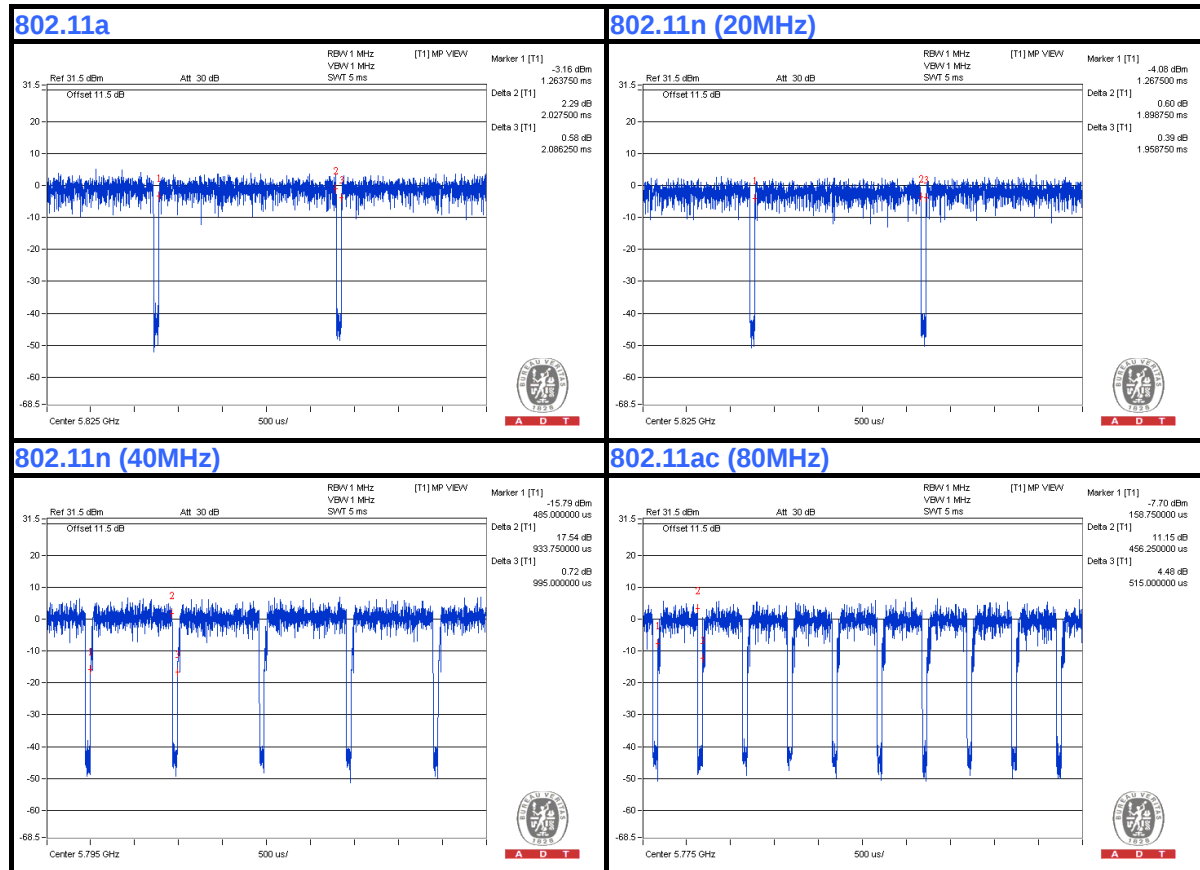
Duty cycle of test signal is < 98%

802.11a: Duty cycle = $2.02750/2.08625 = 0.972$, Duty factor = $10 * \log(1/0.972) = 0.12$

802.11n (20MHz): Duty cycle = $1.89875/1.95875 = 0.969$, Duty factor = $10 * \log(1/0.969) = 0.14$

802.11n (40MHz): Duty cycle = $933.75/995.0 = 0.938$, Duty factor = $10 * \log(1/0.938) = 0.28$

802.11ac (80MHz): Duty cycle = $456.25/515.00 = 0.886$, Duty factor = $10 * \log(1/0.886) = 0.53$



3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

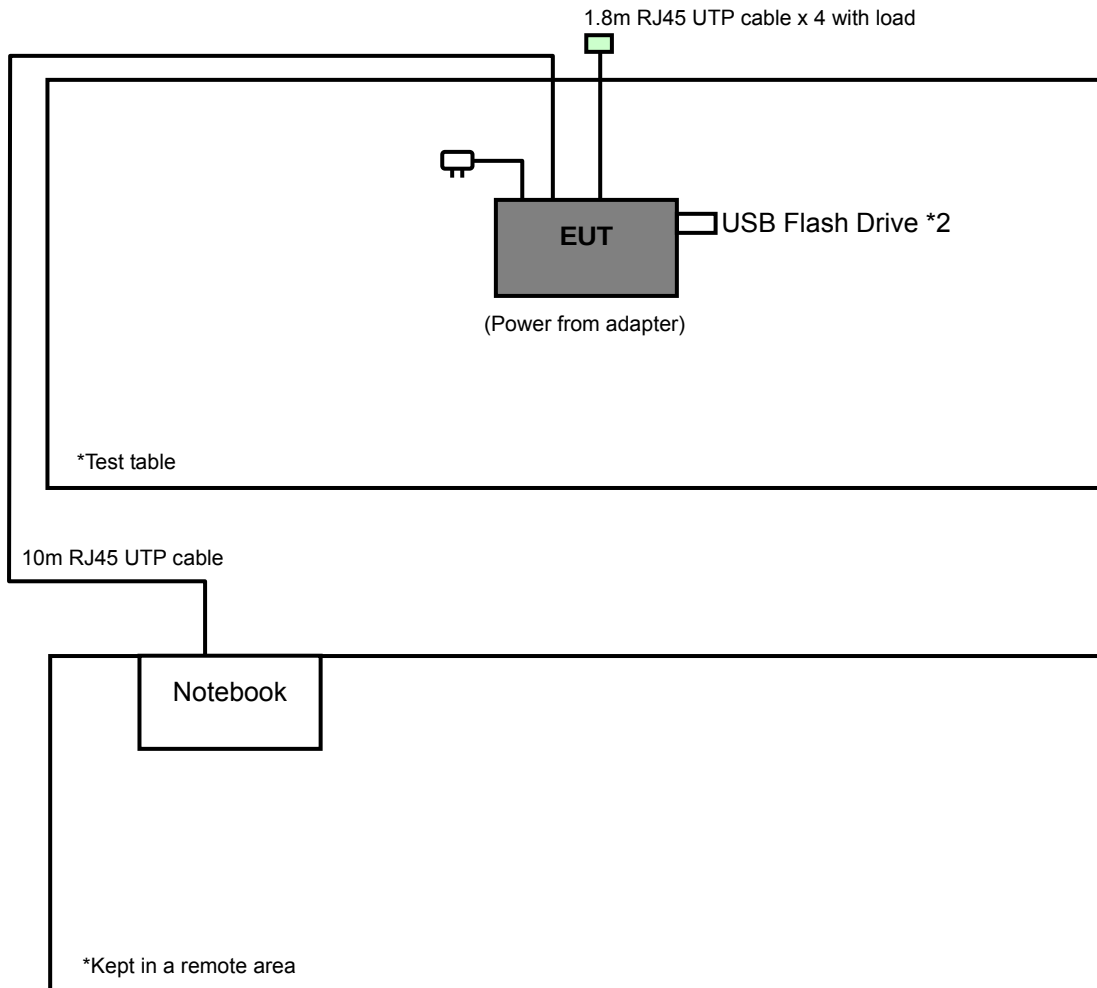
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	USB FLASH DRIVE	Transcend	V85	538455 4490	NA
2	USB FLASH DRIVE	Transcend	V85	569992-8208	NA
3	NOTEBOOK	DELL	E5520	8Y4DMQ1	FCC DoC Approved
4	NOTEBOOK	DELL	E5410	1HC2XM1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA
3	10m RJ45 UTP cable.
4	10m RJ45 UTP cable.

NOTE:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 3 acted as a communication partner to transfer data. (Radiated emission below 1GHz)
3. Item 4 acted as a communication partner to transfer data. (Radiated emission below 1GHz and conducted emission tests)

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST





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3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r01

662911 D01 Multiple Transmitter Output v02

ANSI C63.10-2009

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

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

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

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

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

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

NOTE:

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

4.1.2 TEST INSTRUMENTS

All test items except for radiated emission below 1GHz: Test date: May 23 ~ Jun. 21, 2013

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100212	Aug. 06, 2012	Aug. 05, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jan. 31, 2013	Jan. 30, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Mar. 20, 2013	Mar. 19, 2014
HORN Antenna SCHWARZBECK	9120D	209	Sep. 03, 2012	Sep. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Preamplifier Agilent	8447D	2944A10633	Oct. 25, 2012	Oct. 24, 2013
Preamplifier Agilent	8449B	3008A01964	Oct. 25, 2012	Oct. 24, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/4	Aug. 28, 2012	Aug. 27, 2013
Software BV ADT	ADT_Radiated_ V7.6.15.9.3	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 25, 2012	Oct. 24, 2013
High Speed Peak Power Meter	ML2495A	0824012	Aug. 22, 2012	Aug. 21, 2013
Power Sensor	MA2411B	0738171	Jul. 30, 2012	Jul. 29, 2013

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

Radiated emission below 1GHz: Test date: Feb. 08, 2014

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Jan. 02, 2014	Jan. 01, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Aug. 23, 2013	Aug. 22, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Mar. 20, 2013	Mar. 19, 2014
HORN Antenna SCHWARZBECK	9120D	209	Sep. 12, 2013	Sep. 11, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8447D	2944A10633	Oct. 07, 2013	Oct. 06, 2014
Preamplifier Agilent	8449B	3008A01964	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/4	Aug. 26, 2013	Aug. 25, 2014
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA

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

4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

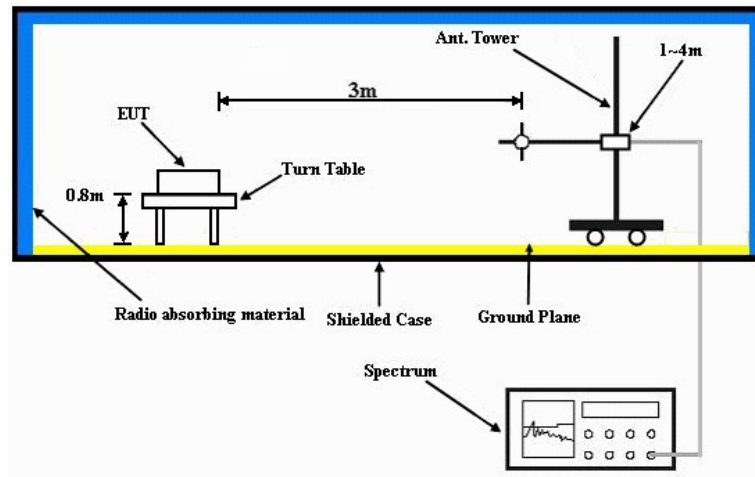
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $> 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

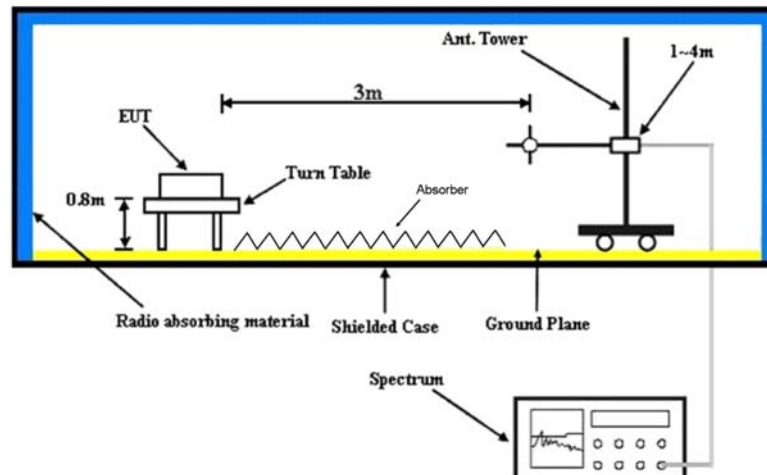
No deviation.

4.1.5 TEST SETUP

Frequency range 30MHz~1GHz



Frequency range above 1GHz



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

4.1.6 EUT OPERATING CONDITIONS

- Placed the EUT on the testing table.
- Prepared notebook to act as communication partner and placed it outside of testing area.
- 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.
- The communication partner sent data to EUT by command "PING".
- The necessary accessories enabled the system in full functions.

4.1.7 TEST RESULTS

ABOVE 1GHz DATA :

802.11b

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

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	2360.00	57.8 PK	74.0	-16.2	1.00 H	347	27.10	30.70
2	2360.00	51.0 AV	54.0	-3.0	1.00 H	347	20.30	30.70
3	2390.00	54.7 PK	74.0	-19.3	1.21 H	341	23.90	30.80
4	2390.00	46.3 AV	54.0	-7.7	1.21 H	341	15.50	30.80
5	*2412.00	109.9 PK			1.21 H	341	79.00	30.90
6	*2412.00	106.4 AV			1.21 H	341	75.50	30.90
7	#2640.00	59.1 PK	89.9	-30.8	1.07 H	46	27.40	31.70
8	#2640.00	53.6 AV	86.4	-32.8	1.07 H	46	21.90	31.70
9	4824.00	51.4 PK	74.0	-22.6	1.21 H	60	14.40	37.00
10	4824.00	47.8 AV	54.0	-6.2	1.21 H	60	10.80	37.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2360.00	55.5 PK	74.0	-18.5	1.05 V	99	24.80	30.70
2	2360.00	46.3 AV	54.0	-7.7	1.05 V	99	15.60	30.70
3	2390.00	55.5 PK	74.0	-18.5	1.00 V	276	24.70	30.80
4	2390.00	45.9 AV	54.0	-8.1	1.00 V	276	15.10	30.80
5	*2412.00	108.6 PK			1.00 V	277	77.70	30.90
6	*2412.00	105.4 AV			1.00 V	277	74.50	30.90
7	#2640.00	57.9 PK	88.6	-30.7	1.00 V	199	26.20	31.70
8	#2640.00	51.8 AV	85.4	-33.6	1.00 V	199	20.10	31.70
9	4824.00	55.9 PK	74.0	-18.1	1.00 V	343	18.90	37.00
10	4824.00	52.5 AV	54.0	-1.5	1.00 V	343	15.50	37.00

REMARKS:

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



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

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	2288.00	54.7 PK	74.0	-19.3	1.50 H	360	24.30	30.40
2	2288.00	45.0 AV	54.0	-9.0	1.50 H	360	14.60	30.40
3	*2437.00	110.4 PK			1.15 H	49	79.40	31.00
4	*2437.00	77.0 AV			1.15 H	49	46.00	31.00
5	4874.00	52.5 PK	74.0	-21.5	1.46 H	277	15.40	37.10
6	4874.00	49.5 AV	54.0	-4.5	1.46 H	277	12.40	37.10
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	2288.00	56.6 PK	74.0	-17.4	1.27 V	85	26.20	30.40
2	2288.00	48.6 AV	54.0	-5.4	1.27 V	85	18.20	30.40
3	*2437.00	111.1 PK			1.09 V	174	80.10	31.00
4	*2437.00	107.8 AV			1.09 V	174	76.80	31.00
5	4874.00	55.9 PK	74.0	-18.1	1.30 V	31	18.80	37.10
6	4874.00	52.9 AV	54.0	-1.1	1.30 V	31	15.80	37.10

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.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.0 PK			1.42 H	31	78.90	31.10
2	*2462.00	106.3 AV			1.42 H	31	75.20	31.10
3	2483.50	56.9 PK	74.0	-17.1	1.42 H	31	25.70	31.20
4	2483.50	46.3 AV	54.0	-7.7	1.42 H	31	15.10	31.20
5	4924.00	51.1 PK	74.0	-22.9	1.42 H	9	13.90	37.20
6	4924.00	47.7 AV	54.0	-6.3	1.42 H	9	10.50	37.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	108.4 PK			1.00 V	262	77.30	31.10
2	*2462.00	104.9 AV			1.00 V	262	73.80	31.10
3	2483.50	57.0 PK	74.0	-17.0	1.00 V	262	25.80	31.20
4	2483.50	46.4 AV	54.0	-7.6	1.00 V	262	15.20	31.20
5	4924.00	55.5 PK	74.0	-18.5	1.01 V	347	18.30	37.20
6	4924.00	52.8 AV	54.0	-1.2	1.01 V	347	15.60	37.20

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.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.2 PK	74.0	-4.8	1.44 H	0	38.40	30.80
2	2390.00	52.4 AV	54.0	-1.6	1.44 H	0	21.60	30.80
3	*2412.00	109.6 PK			1.43 H	39	78.70	30.90
4	*2412.00	100.9 AV			1.43 H	39	70.00	30.90
5	4824.00	52.2 PK	74.0	-21.8	1.41 H	283	15.20	37.00
6	4824.00	37.6 AV	54.0	-16.4	1.41 H	283	0.60	37.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.5 PK	74.0	-8.5	1.49 V	71	34.70	30.80
2	2390.00	49.8 AV	54.0	-4.2	1.49 V	71	19.00	30.80
3	*2412.00	109.8 PK			1.49 V	71	78.90	30.90
4	*2412.00	100.2 AV			1.49 V	71	69.30	30.90
5	4824.00	53.7 PK	74.0	-20.3	1.43 V	32	16.70	37.00
6	4824.00	39.4 AV	54.0	-14.6	1.43 V	32	2.40	37.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Martin Lee

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	2360.00	60.7 PK	74.0	-13.3	1.00 H	348	30.00	30.70
2	2360.00	51.2 AV	54.0	-2.8	1.00 H	348	20.50	30.70
3	*2437.00	111.6 PK			1.15 H	43	80.60	31.00
4	*2437.00	102.4 AV			1.15 H	43	71.40	31.00
5	4874.00	53.9 PK	74.0	-20.1	1.14 H	41	16.80	37.10
6	4874.00	40.0 AV	54.0	-14.0	1.14 H	41	2.90	37.10
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	2360.00	59.9 PK	74.0	-14.1	1.25 V	96	29.20	30.70
2	2360.00	51.4 AV	54.0	-2.6	1.25 V	96	20.70	30.70
3	*2437.00	109.1 PK			1.43 V	64	78.10	31.00
4	*2437.00	101.0 AV			1.43 V	64	70.00	31.00
5	4874.00	57.1 PK	74.0	-16.9	1.14 V	7	20.00	37.10
6	4874.00	42.1 AV	54.0	-11.9	1.14 V	7	5.00	37.10

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.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.6 PK			1.43 H	34	79.50	31.10
2	*2462.00	101.6 AV			1.43 H	34	70.50	31.10
3	2483.50	72.3 PK	74.0	-1.7	1.43 H	34	41.10	31.20
4	2483.50	52.7 AV	54.0	-1.3	1.43 H	34	21.50	31.20
5	4924.00	54.0 PK	74.0	-20.0	1.30 H	286	16.80	37.20
6	4924.00	39.7 AV	54.0	-14.3	1.30 H	286	2.50	37.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.9 PK			1.00 V	71	79.80	31.10
2	*2462.00	101.5 AV			1.00 V	71	70.40	31.10
3	2483.50	70.1 PK	74.0	-3.9	1.00 V	71	38.90	31.20
4	2483.50	52.5 AV	54.0	-1.5	1.00 V	71	21.30	31.20
5	4924.00	57.6 PK	74.0	-16.4	1.00 V	348	20.40	37.20
6	4924.00	43.9 AV	54.0	-10.1	1.00 V	348	6.70	37.20

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.



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802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.6 PK	74.0	-7.4	1.47 H	329	35.80	30.80
2	2390.00	52.7 AV	54.0	-1.3	1.47 H	329	21.90	30.80
3	*2412.00	109.8 PK			1.47 H	329	78.90	30.90
4	*2412.00	99.5 AV			1.47 H	329	68.60	30.90
5	4824.00	48.7 PK	74.0	-25.3	1.30 H	277	11.70	37.00
6	4824.00	35.6 AV	54.0	-18.4	1.30 H	277	-1.40	37.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.3 PK	74.0	-4.7	1.20 V	61	38.50	30.80
2	2390.00	52.4 AV	54.0	-1.6	1.20 V	61	21.60	30.80
3	*2412.00	110.2 PK			1.20 V	61	79.30	30.90
4	*2412.00	100.2 AV			1.20 V	61	69.30	30.90
5	4824.00	50.9 PK	74.0	-23.1	1.28 V	30	13.90	37.00
6	4824.00	38.1 AV	54.0	-15.9	1.28 V	30	1.10	37.00

REMARKS:

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



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	110.0 PK			1.17 H	107	79.00	31.00
2	*2437.00	100.3 AV			1.17 H	107	69.30	31.00
3	#2480.00	59.1 PK	90.0	-30.9	1.16 H	337	27.90	31.20
4	#2480.00	51.4 AV	80.3	-28.9	1.16 H	337	20.20	31.20
5	4874.00	54.5 PK	74.0	-19.5	1.15 H	44	17.40	37.10
6	4874.00	41.2 AV	54.0	-12.8	1.15 H	44	4.10	37.10
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	*2437.00	110.3 PK			1.44 V	89	79.30	31.00
2	*2437.00	100.9 AV			1.44 V	89	69.90	31.00
3	#2480.00	60.8 PK	90.3	-29.5	1.00 V	57	29.60	31.20
4	#2480.00	51.6 AV	80.9	-29.3	1.00 V	57	20.40	31.20
5	4874.00	57.3 PK	74.0	-16.7	1.15 V	78	20.20	37.10
6	4874.00	42.3 AV	54.0	-11.7	1.15 V	78	5.20	37.10

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.
6. "#":The radiated frequency is out the restricted band.



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.2 PK			1.42 H	35	79.10	31.10
2	*2462.00	99.9 AV			1.42 H	35	68.80	31.10
3	2483.50	72.8 PK	74.0	-1.2	1.42 H	35	41.60	31.20
4	2483.50	51.6 AV	54.0	-2.4	1.42 H	35	20.40	31.20
5	4924.00	51.6 PK	74.0	-22.4	1.29 H	283	14.40	37.20
6	4924.00	37.7 AV	54.0	-16.3	1.29 H	283	0.50	37.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.4 PK			1.00 V	74	79.30	31.10
2	*2462.00	101.4 AV			1.00 V	74	70.30	31.10
3	2483.50	72.9 PK	74.0	-1.1	1.11 V	77	41.70	31.20
4	2483.50	52.2 AV	54.0	-1.8	1.00 V	74	21.00	31.20
5	4924.00	56.4 PK	74.0	-17.6	1.00 V	347	19.20	37.20
6	4924.00	41.8 AV	54.0	-12.2	1.00 V	347	4.60	37.20

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.



A D T

802.11n (40MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.8 PK	74.0	-8.2	1.21 H	338	35.00	30.80
2	2390.00	52.8 AV	54.0	-1.2	1.21 H	338	22.00	30.80
3	*2422.00	103.6 PK			1.21 H	338	72.70	30.90
4	*2422.00	93.6 AV			1.21 H	338	62.70	30.90
5	4844.00	44.4 PK	74.0	-29.6	1.00 H	57	7.40	37.00
6	4844.00	32.7 AV	54.0	-21.3	1.00 H	57	-4.30	37.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.4 PK	74.0	-9.6	1.22 V	52	33.60	30.80
2	2390.00	50.3 AV	54.0	-3.7	1.22 V	52	19.50	30.80
3	*2422.00	104.5 PK			1.26 V	250	73.60	30.90
4	*2422.00	95.6 AV			1.26 V	250	64.70	30.90
5	4844.00	45.1 PK	74.0	-28.9	1.24 V	345	8.10	37.00
6	4844.00	34.1 AV	54.0	-19.9	1.24 V	345	-2.90	37.00

REMARKS:

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



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.8 PK			1.00 H	28	75.80	31.00
2	*2437.00	97.0 AV			1.00 H	28	66.00	31.00
3	4874.00	46.3 PK	74.0	-27.7	1.00 H	26	9.20	37.10
4	4874.00	34.5 AV	54.0	-19.5	1.00 H	26	-2.60	37.10
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	*2437.00	108.2 PK			1.44 V	81	77.20	31.00
2	*2437.00	97.5 AV			1.44 V	81	66.50	31.00
3	4874.00	47.2 PK	74.0	-26.8	1.54 V	26	10.10	37.10
4	4874.00	36.2 AV	54.0	-17.8	1.54 V	26	-0.90	37.10

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.



A D T

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

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	106.3 PK			1.40 H	36	75.20	31.10
2	*2452.00	96.7 AV			1.40 H	36	65.60	31.10
3	2483.50	72.2 PK	74.0	-1.8	1.40 H	36	41.00	31.20
4	2483.50	51.6 AV	54.0	-2.4	1.40 H	36	20.40	31.20
5	4904.00	46.5 PK	74.0	-27.5	1.00 H	28	9.30	37.20
6	4904.00	34.8 AV	54.0	-19.2	1.00 H	28	-2.40	37.20
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	*2452.00	108.0 PK			1.42 V	78	76.90	31.10
2	*2452.00	97.5 AV			1.42 V	78	66.40	31.10
3	2483.50	70.3 PK	74.0	-3.7	1.42 V	78	39.10	31.20
4	2483.50	51.7 AV	54.0	-2.3	1.42 V	78	20.50	31.20
5	4904.00	47.5 PK	74.0	-26.5	1.47 V	25	10.30	37.20
6	4904.00	36.7 AV	54.0	-17.3	1.47 V	25	-0.50	37.20

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.



A D T

BELOW 1GHz WORST-CASE DATA : 802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	25.9 QP	40.0	-14.1	1.25 H	58	40.80	-14.90
2	249.60	27.8 QP	46.0	-18.2	1.00 H	234	42.00	-14.20
3	360.43	33.2 QP	46.0	-12.8	1.50 H	15	44.50	-11.30
4	440.14	27.9 QP	46.0	-18.1	1.25 H	332	37.30	-9.40
5	624.85	31.9 QP	46.0	-14.1	1.00 H	131	37.40	-5.50
6	751.23	32.8 QP	46.0	-13.2	1.50 H	18	35.80	-3.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	62.95	30.8 QP	40.0	-9.2	1.25 V	286	45.50	-14.70
2	103.78	26.1 QP	43.5	-17.4	1.00 V	341	44.20	-18.10
3	300.16	25.1 QP	46.0	-20.9	1.50 V	291	37.40	-12.30
4	624.85	35.2 QP	46.0	-10.8	1.25 V	185	40.70	-5.50
5	875.67	35.2 QP	46.0	-10.8	1.50 V	162	36.20	-1.00
6	959.27	39.3 QP	46.0	-6.7	1.00 V	198	38.50	0.80

REMARKS:

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

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

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

4.2.2 TEST INSTRUMENTS

Tested Date: Feb. 08, 2014

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Nov. 17, 2013	Nov. 16, 2014
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 23, 2013	Dec. 22, 2014
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 08, 2013	Jul. 07, 2014
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

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

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

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

4.2.3 TEST PROCEDURES

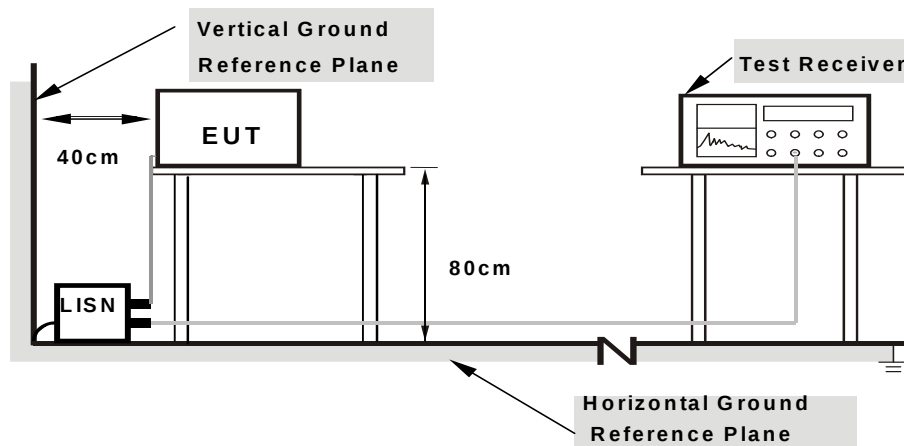
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

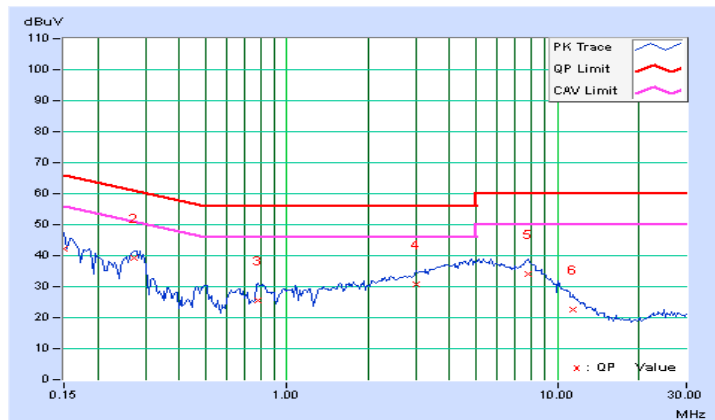
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA : 802.11g

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.26	41.99	24.55	42.25	24.81	66.00	56.00	-23.75	-31.19
2	0.27109	0.29	38.99	36.32	39.28	36.61	61.08	51.08	-21.81	-14.48
3	0.77891	0.33	25.22	17.05	25.55	17.38	56.00	46.00	-30.45	-28.62
4	3.00781	0.40	30.44	24.22	30.84	24.62	56.00	46.00	-25.16	-21.38
5	7.77734	0.47	33.50	28.68	33.97	29.15	60.00	50.00	-26.03	-20.85
6	11.41016	0.51	22.05	17.39	22.56	17.90	60.00	50.00	-37.44	-32.10

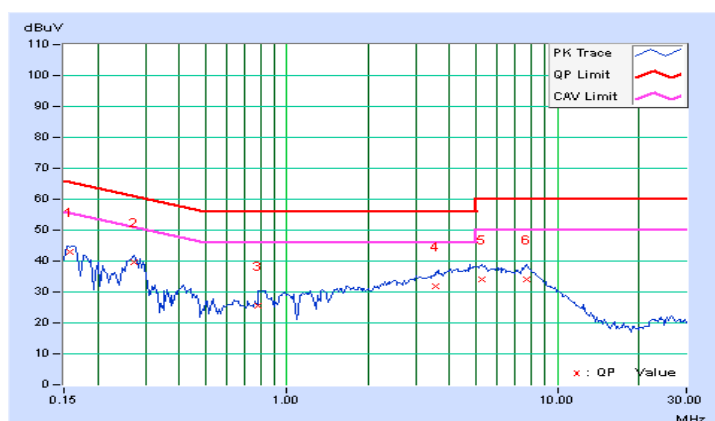
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor +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



PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	0.27	42.61	31.72	42.88	31.99	65.58	55.58	-22.70	-23.59
2	0.27109	0.29	39.46	36.68	39.75	36.97	61.08	51.08	-21.34	-14.12
3	0.78672	0.33	25.37	18.72	25.70	19.05	56.00	46.00	-30.30	-26.95
4	3.54688	0.42	31.36	25.75	31.78	26.17	56.00	46.00	-24.22	-19.83
5	5.28125	0.46	33.54	28.54	34.00	29.00	60.00	50.00	-26.00	-21.00
6	7.69141	0.49	33.47	28.63	33.96	29.12	60.00	50.00	-26.04	-20.88

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

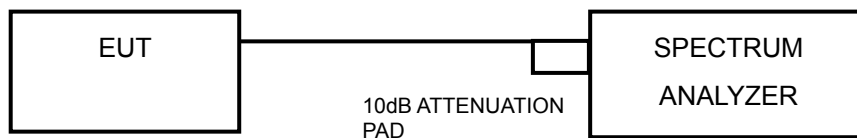


4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 TEST PROCEDURE

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

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	6.09	5.66	5.60	0.5	PASS
6	2437	6.09	6.11	6.13	0.5	PASS
11	2462	6.12	5.60	6.08	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.64	16.63	16.61	0.5	PASS
6	2437	16.65	16.63	16.62	0.5	PASS
11	2462	16.63	16.61	16.59	0.5	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.88	17.89	17.86	0.5	PASS
6	2437	17.88	17.84	17.84	0.5	PASS
11	2462	17.88	17.85	17.85	0.5	PASS

802.11n (40MHz)

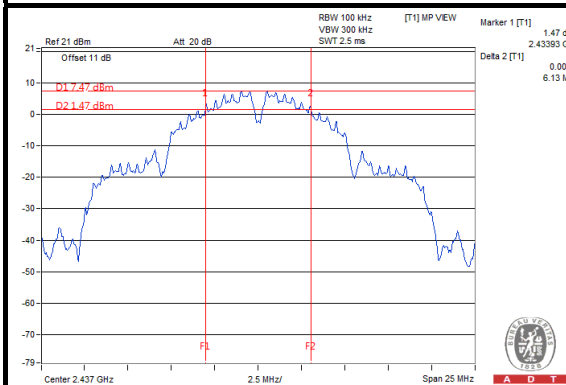
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	36.62	36.61	36.59	0.5	PASS
6	2437	36.61	36.60	36.61	0.5	PASS
9	2452	36.64	36.63	36.59	0.5	PASS



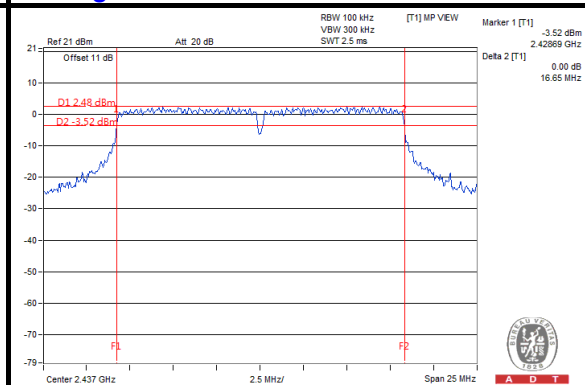
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SPECTRUM PLOT OF WORST VALUE

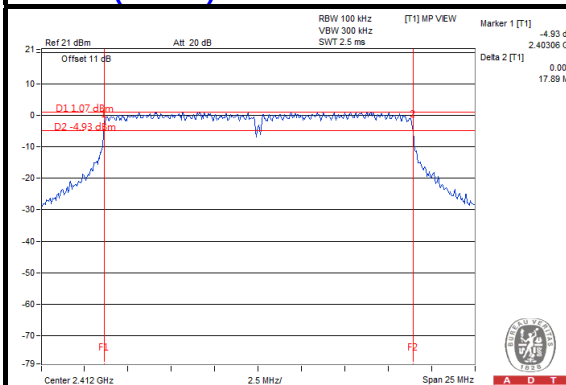
802.11b



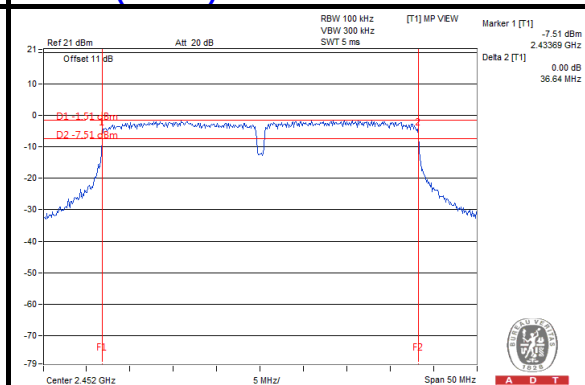
802.11g



802.11n (20MHz)



802.11n (40MHz)



4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

Per KDB 662911 D01 Multiple Transmitter Output v02 Method of conducted output power measurement on IEEE 802.11 devices,

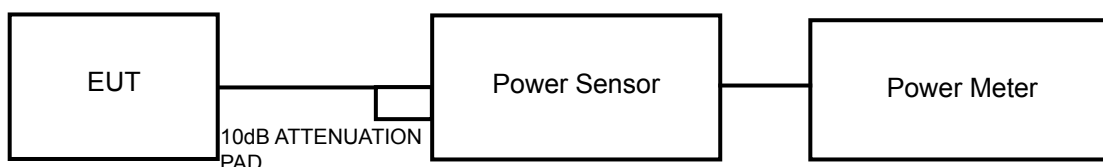
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = $5 \log(NANT/NSS)$ dB or 3 dB, whichever is less for 20-MHz channel widths with $NANT \geq 5$.

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

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

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



A D T

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

4.4.7 TEST RESULTS

FOR PEAK POWER

802.11b

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	20.66	19.93	20.14	318.090	25.03	30	PASS
6	2437	19.23	19.45	19.39	258.754	24.13	30	PASS
11	2462	19.50	18.97	19.18	250.805	23.99	30	PASS

802.11g

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	23.58	23.65	23.82	700.764	28.46	30	PASS
6	2437	23.66	24.60	23.10	724.851	28.60	30	PASS
11	2462	24.20	24.74	24.30	830.032	29.19	30	PASS

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	24.40	24.89	23.30	797.538	29.02	30	PASS
6	2437	24.21	23.99	23.75	751.381	28.76	30	PASS
11	2462	23.23	23.96	23.19	667.713	28.25	30	PASS

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	21.87	21.87	22.25	475.510	26.77	30	PASS
6	2437	23.39	23.73	22.69	640.101	28.06	30	PASS
9	2452	22.29	22.75	22.44	533.187	27.27	30	PASS

FOR AVERAGE POWER

802.11b

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.84	16.28	16.50	135.436	21.32
6	2437	15.61	15.74	15.76	111.559	20.48
11	2462	15.88	15.29	15.55	108.424	20.35

802.11g

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.57	16.09	16.76	133.462	21.25
6	2437	16.62	16.82	16.29	136.564	21.35
11	2462	17.00	16.86	16.64	144.780	21.61

802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.63	15.95	16.25	127.551	21.06
6	2437	16.54	16.82	16.08	133.717	21.26
11	2462	16.40	16.35	16.19	128.395	21.09

802.11n (40MHz)

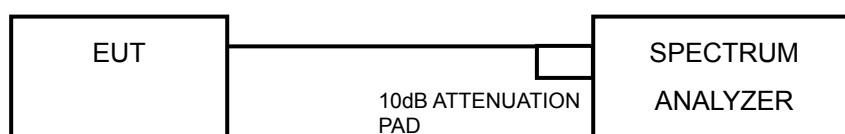
CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	14.03	13.67	13.59	71.430	18.54
6	2437	15.90	15.57	15.55	110.855	20.45
9	2452	15.14	14.84	14.74	92.923	19.68

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST PROCEDURE

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

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-5.30	4.77	-0.53	7.23	PASS
	6	2437	-6.18	4.77	-1.41	7.23	PASS
	11	2462	-6.11	4.77	-1.34	7.23	PASS
1	1	2412	0.81	4.77	5.58	7.23	PASS
	6	2437	-5.72	4.77	-0.95	7.23	PASS
	11	2462	-5.54	4.77	-0.77	7.23	PASS
2	1	2412	-6.14	4.77	-1.37	7.23	PASS
	6	2437	-6.99	4.77	-2.22	7.23	PASS
	11	2462	-5.32	4.77	-0.55	7.23	PASS

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

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-9.19	4.77	-4.42	7.23	PASS
	6	2437	-7.96	4.77	-3.19	7.23	PASS
	11	2462	-9.20	4.77	-4.43	7.23	PASS
1	1	2412	-10.16	4.77	-5.39	7.23	PASS
	6	2437	-9.62	4.77	-4.85	7.23	PASS
	11	2462	-8.07	4.77	-3.30	7.23	PASS
2	1	2412	-8.88	4.77	-4.11	7.23	PASS
	6	2437	-8.84	4.77	-4.07	7.23	PASS
	11	2462	-8.71	4.77	-3.94	7.23	PASS

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

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-9.25	4.77	-4.48	7.23	PASS
	6	2437	-7.38	4.77	-2.61	7.23	PASS
	11	2462	-9.90	4.77	-5.13	7.23	PASS
1	1	2412	-8.26	4.77	-3.49	7.23	PASS
	6	2437	-10.80	4.77	-6.03	7.23	PASS
	11	2462	-10.92	4.77	-6.15	7.23	PASS
2	1	2412	-9.85	4.77	-5.08	7.23	PASS
	6	2437	-9.93	4.77	-5.16	7.23	PASS
	11	2462	-9.21	4.77	-4.44	7.23	PASS

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

802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-14.20	4.77	-9.43	7.23	PASS
	6	2437	-13.71	4.77	-8.94	7.23	PASS
	9	2452	-12.63	4.77	-7.86	7.23	PASS
1	3	2422	-15.16	4.77	-10.39	7.23	PASS
	6	2437	-12.76	4.77	-7.99	7.23	PASS
	9	2452	-13.37	4.77	-8.60	7.23	PASS
2	3	2422	-15.91	4.77	-11.14	7.23	PASS
	6	2437	-14.17	4.77	-9.40	7.23	PASS
	9	2452	-14.43	4.77	-9.66	7.23	PASS

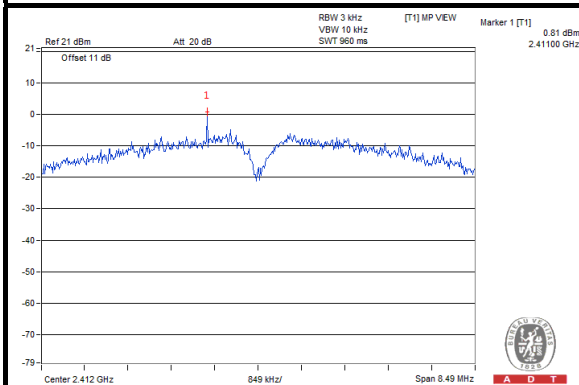
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) =7.23dBm.



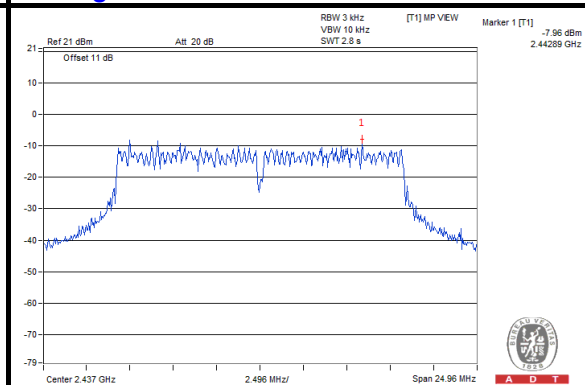
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SPECTRUM PLOT OF WORST VALUE

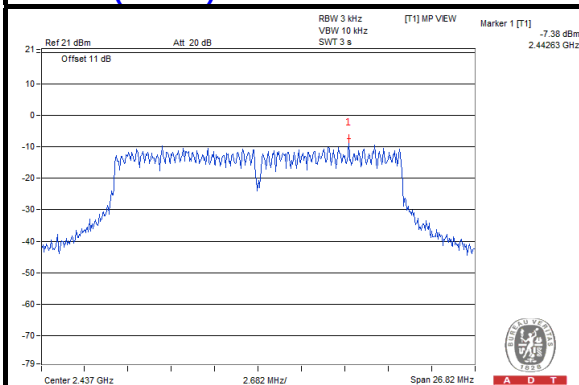
802.11b



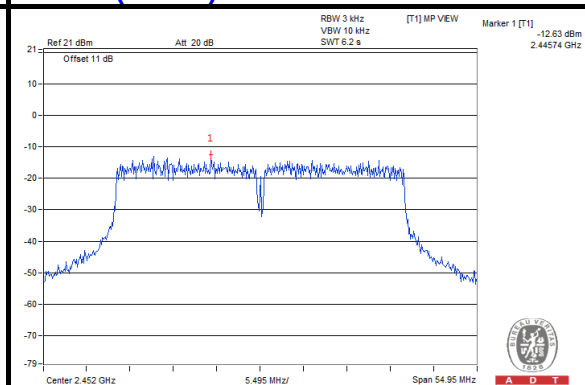
802.11g



802.11n (20MHz)



802.11n (40MHz)

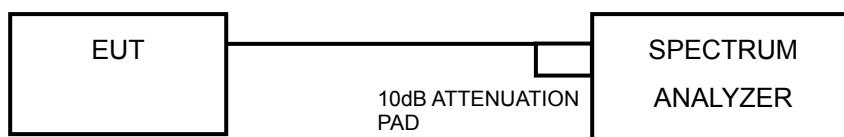


4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Set span to encompass the spectrum to be examined.
4. Detector = peak.
5. Trace Mode = max hold.
6. 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

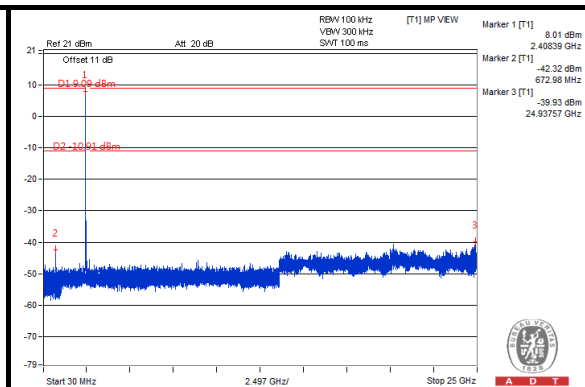
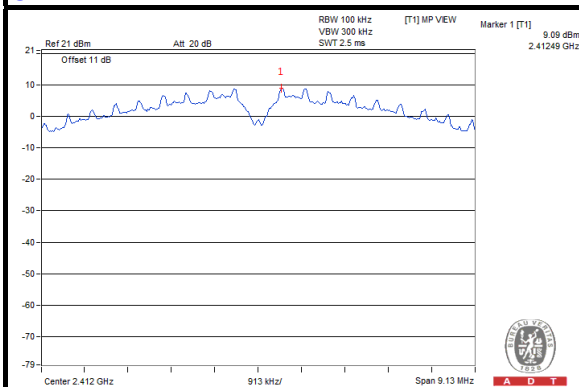
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



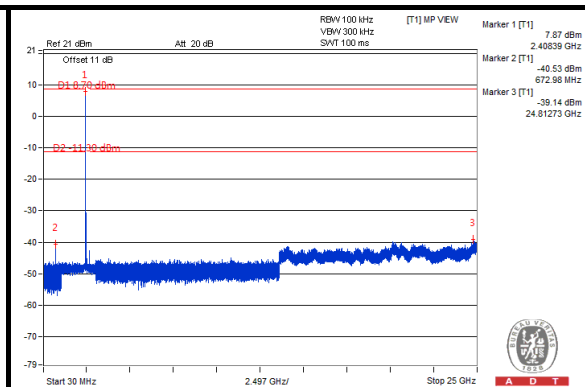
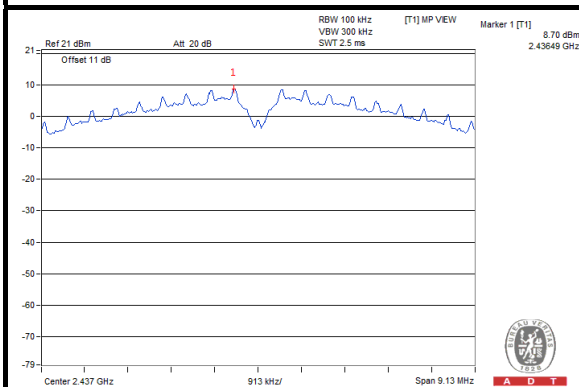
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802.11b: CHAIN 0

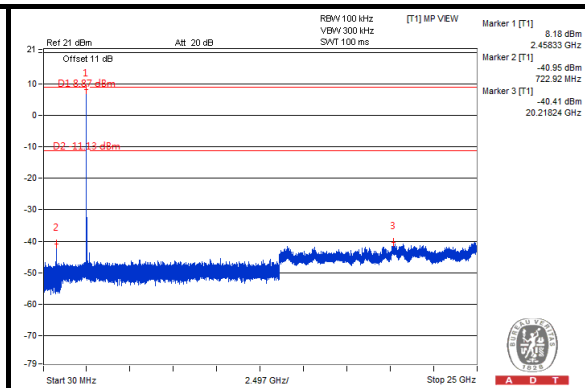
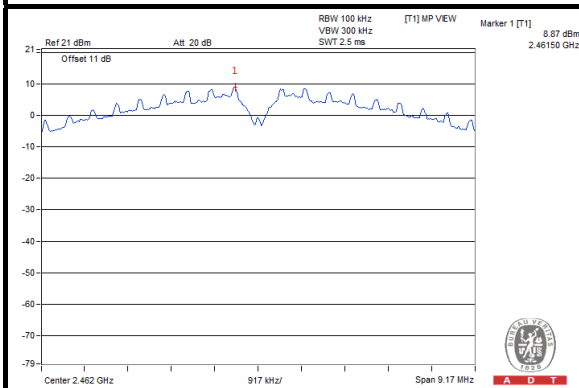
CH 1



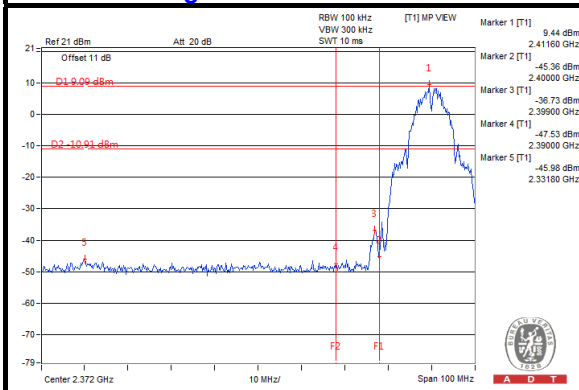
CH 6



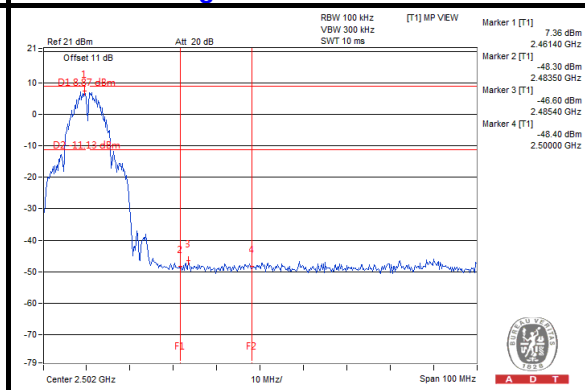
CH 11



CH 1 Band edge



CH 11 Band edge

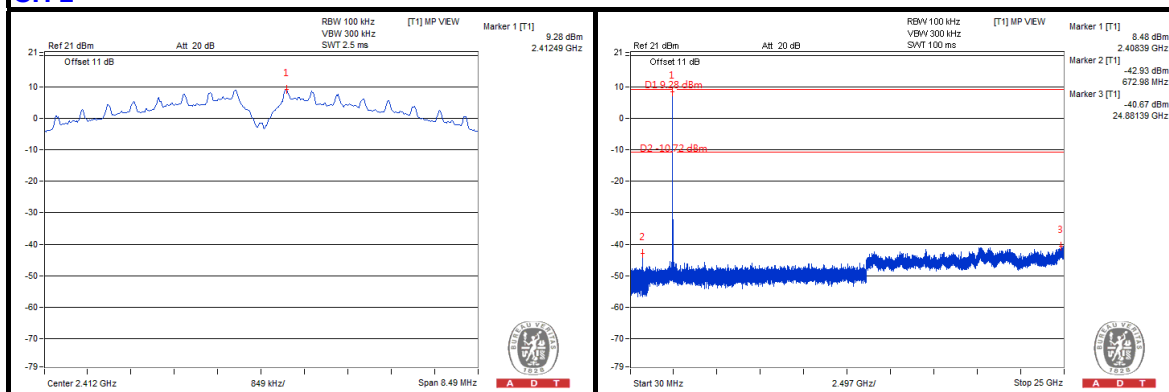




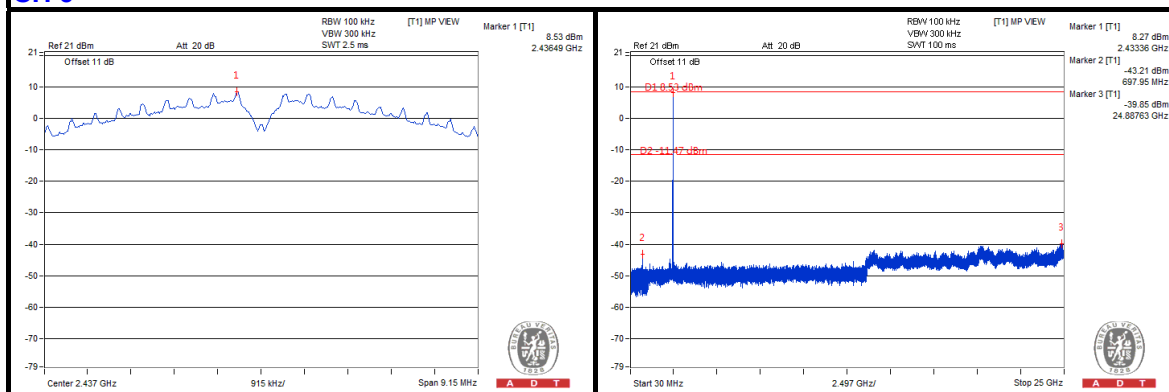
A D T

CHAIN 1

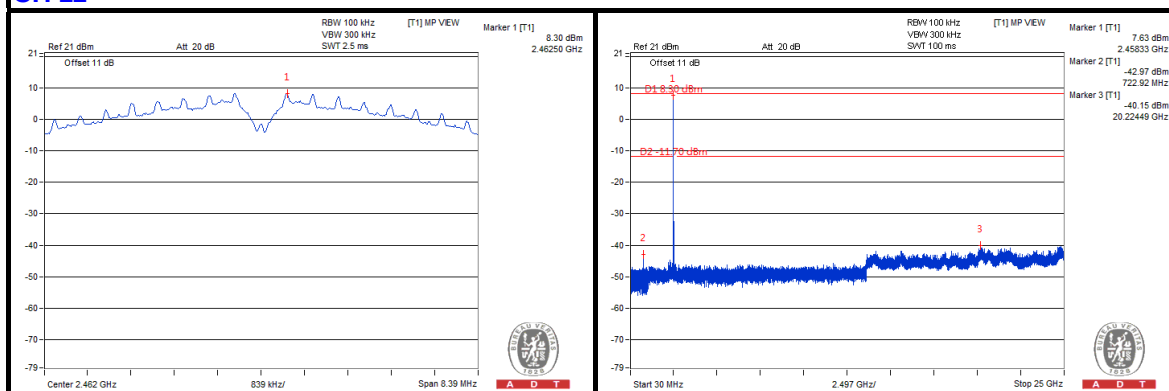
CH 1



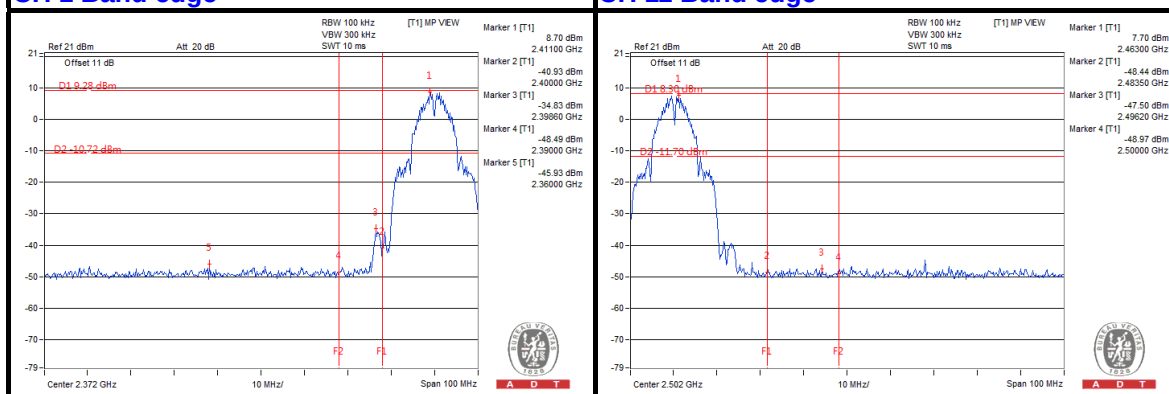
CH 6



CH 11



CH 1 Band edge

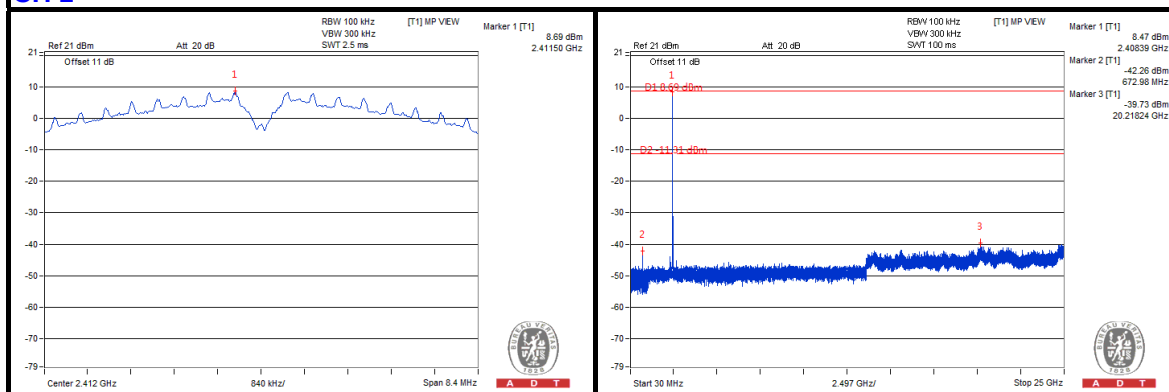




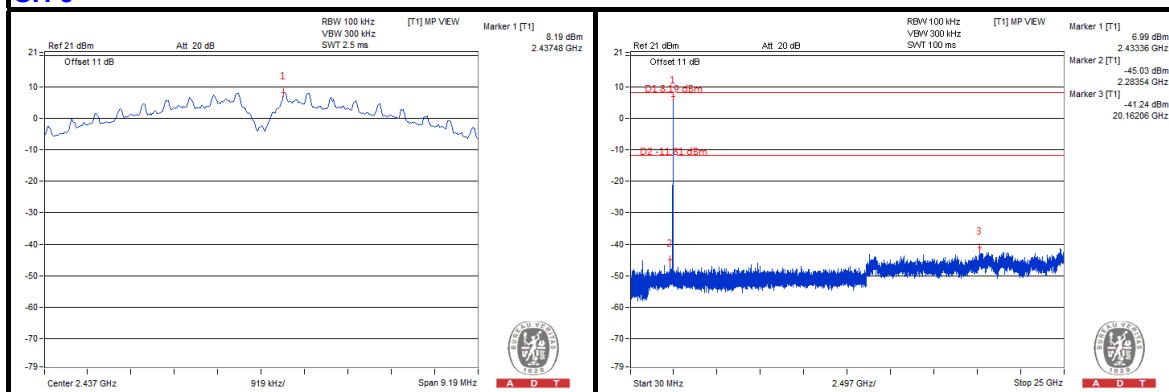
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CHAIN 2

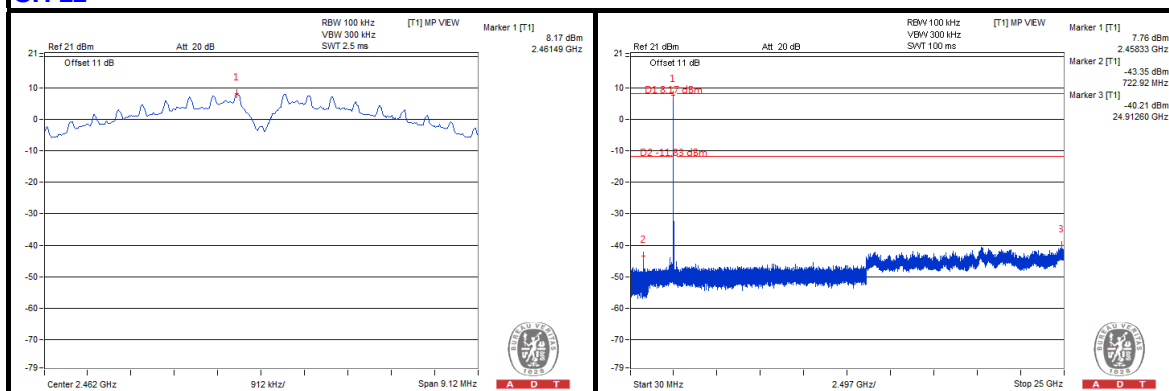
CH 1



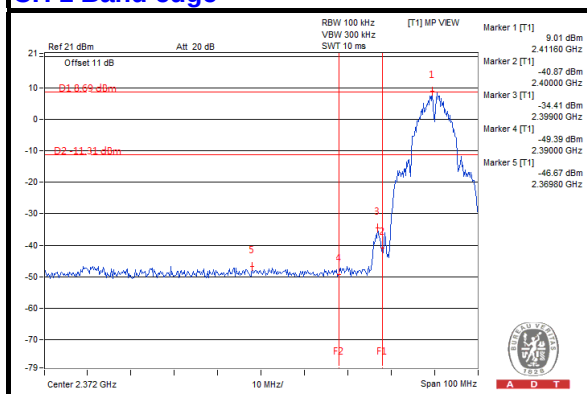
CH 6



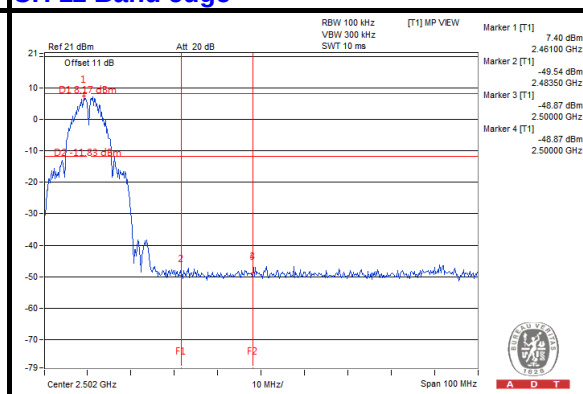
CH 11



CH 1 Band edge



CH 11 Band edge

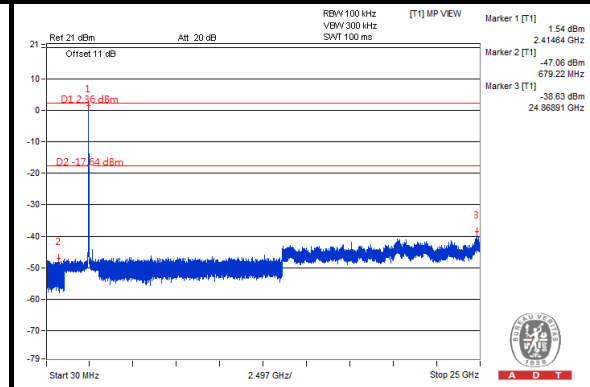
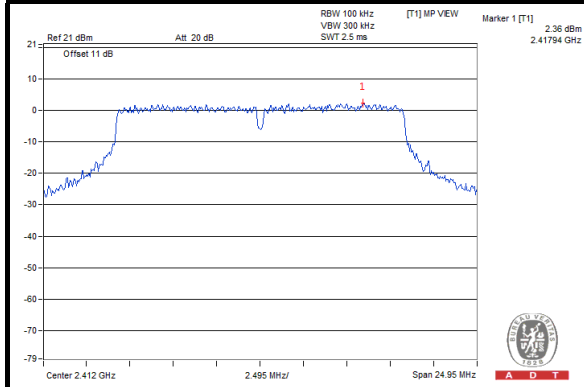




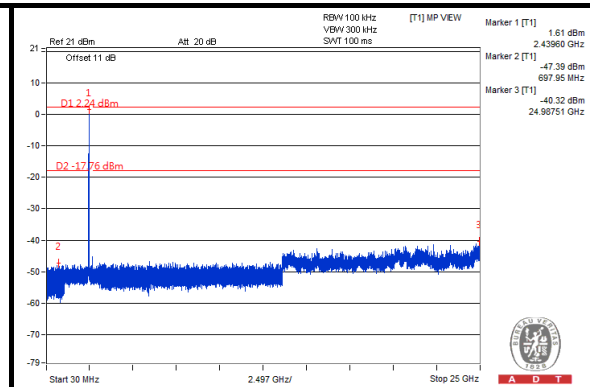
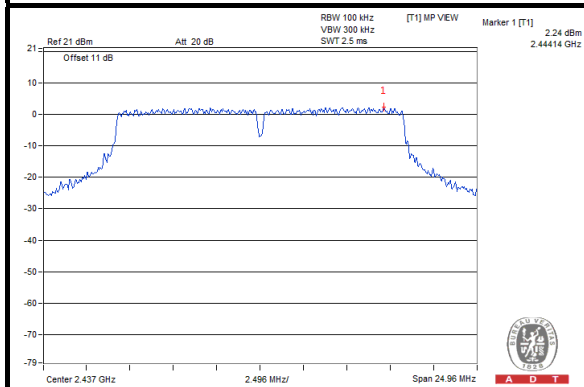
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802.11g: CHAIN 0

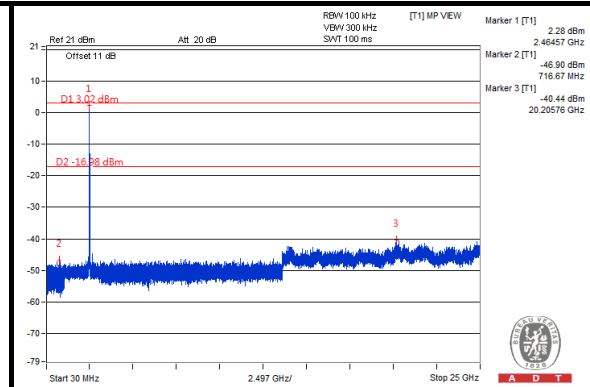
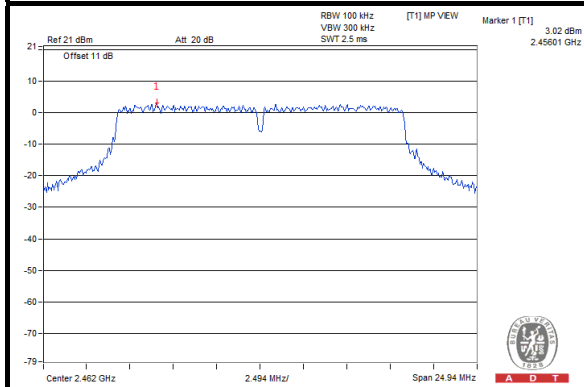
CH 1



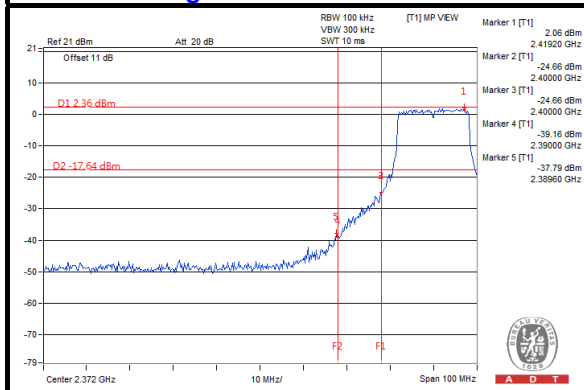
CH 6



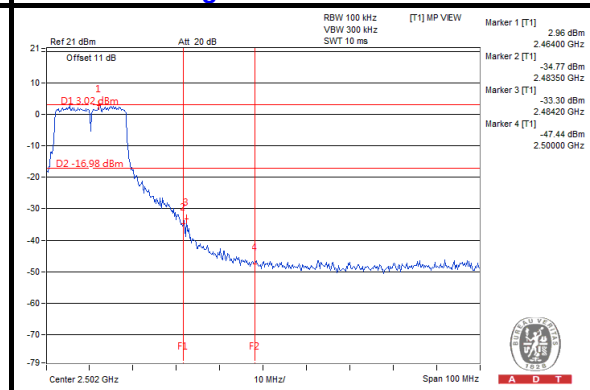
CH 11



CH 1 Band edge



CH 11 Band edge

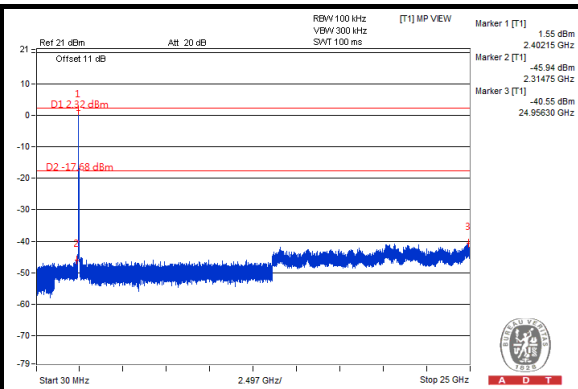
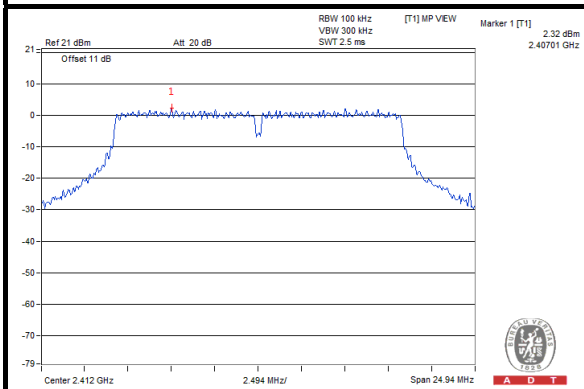




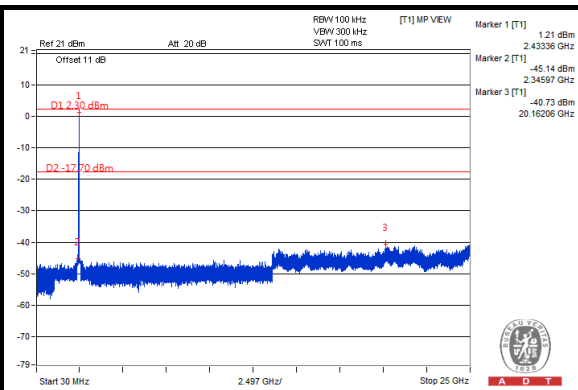
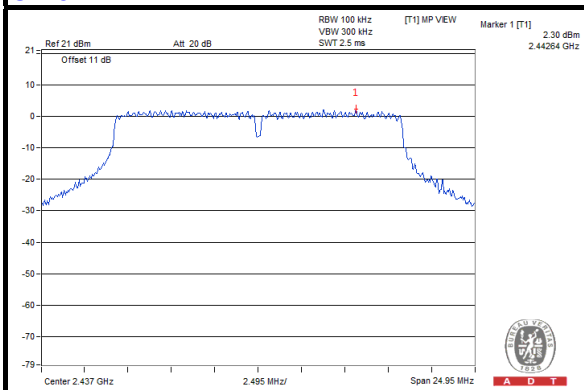
A D T

CHAIN 1

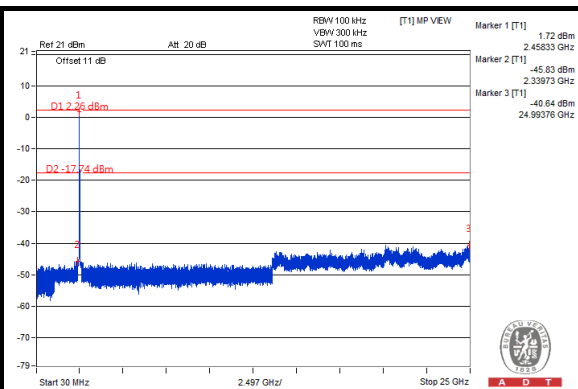
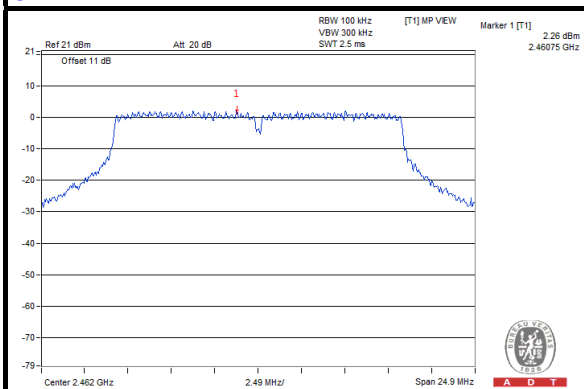
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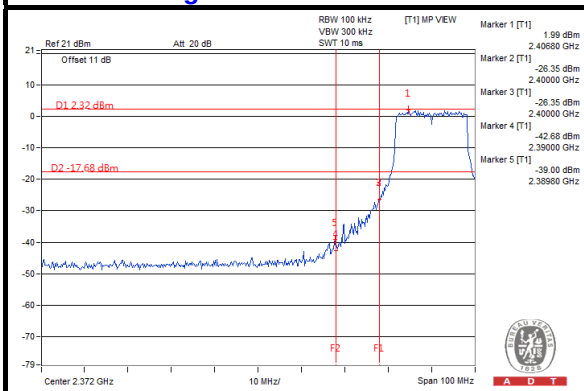
CH 6



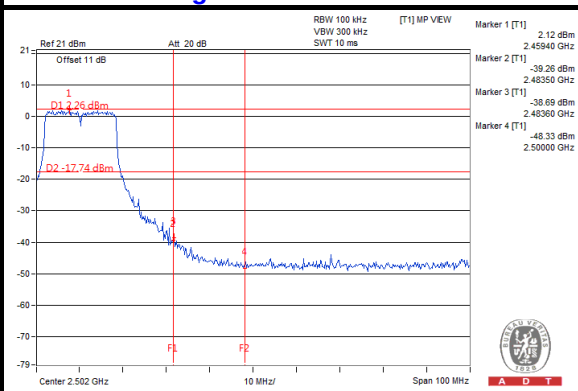
CH 11



CH 1 Band edge



CH 11 Band edge

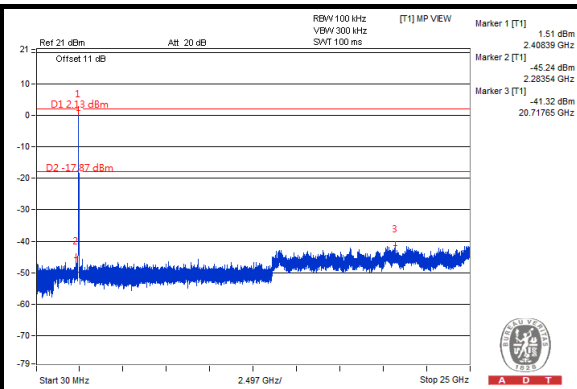
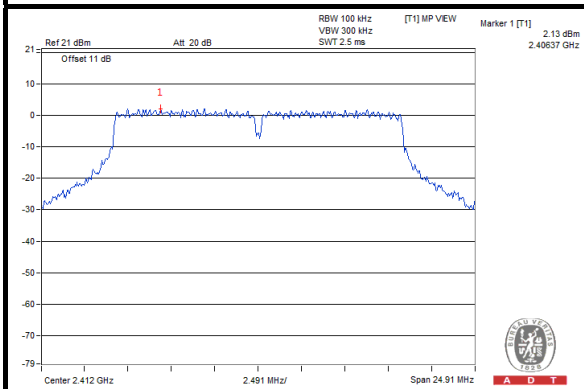




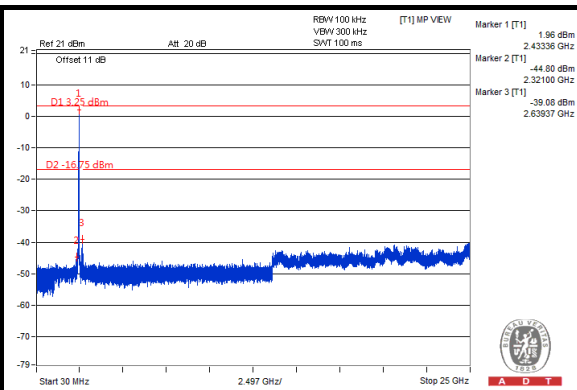
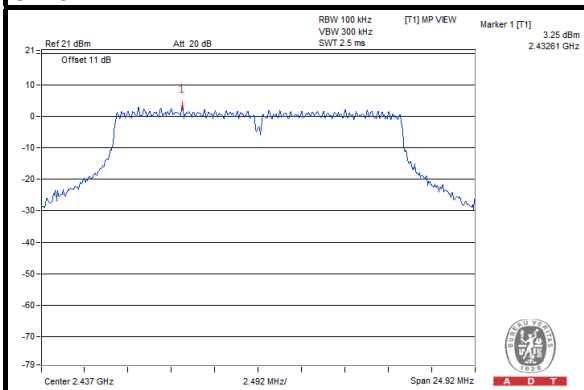
A D T

CHAIN 2

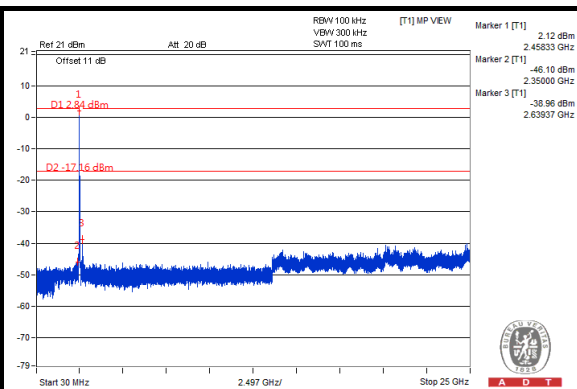
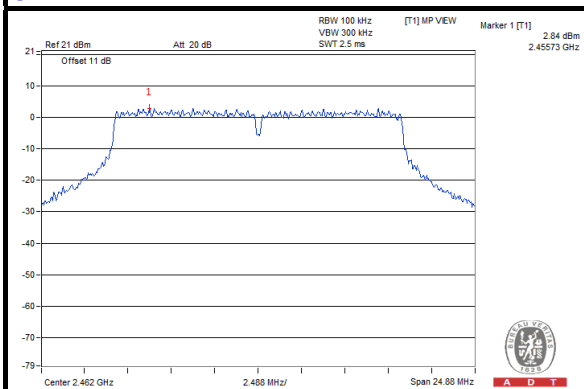
CH 1



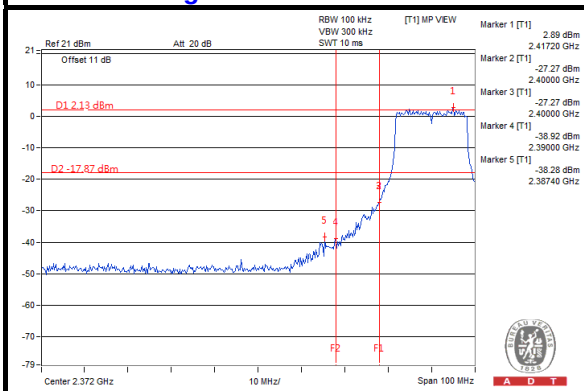
CH 6



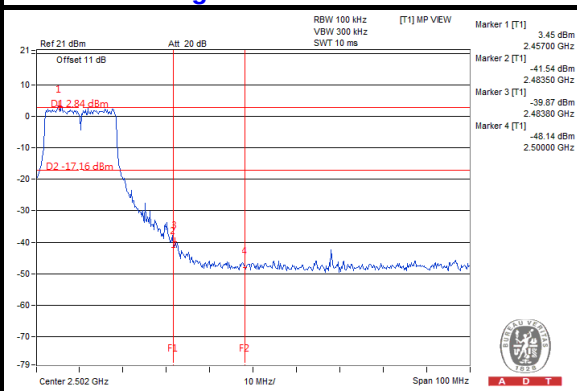
CH 11



CH 1 Band edge



CH 11 Band edge

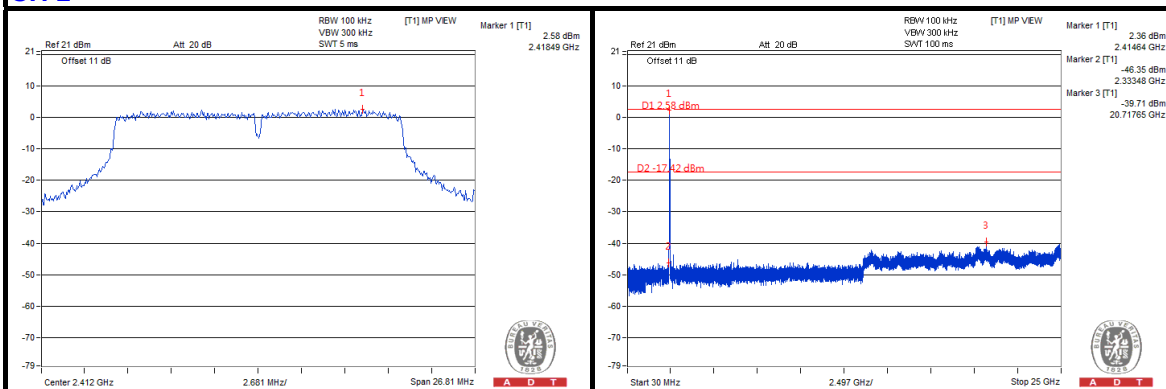




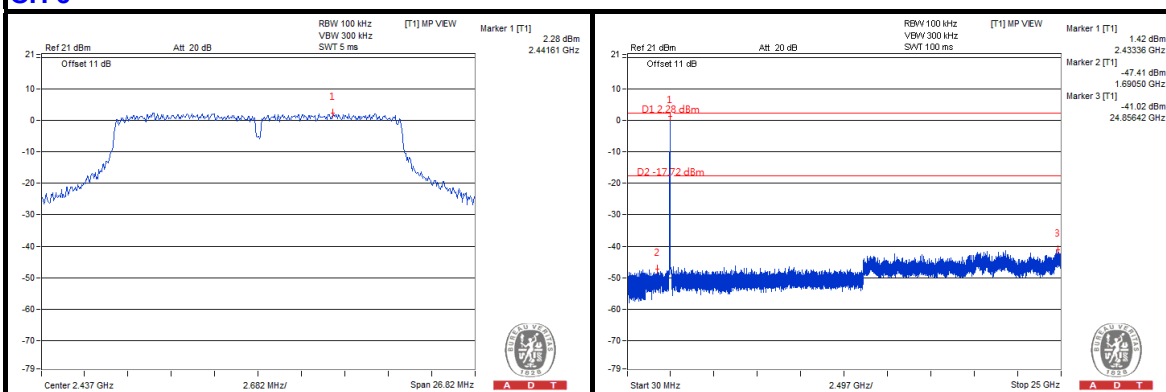
A D T

802.11n (20MHz): CHAIN 0

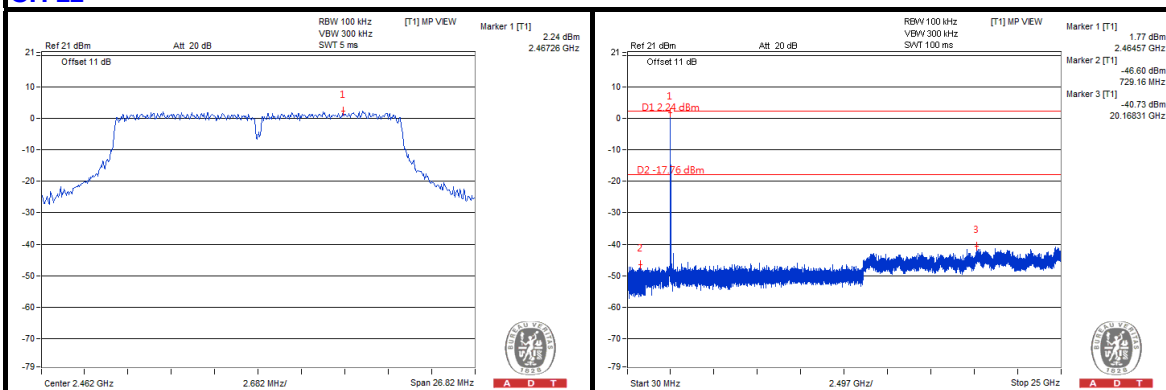
CH 1



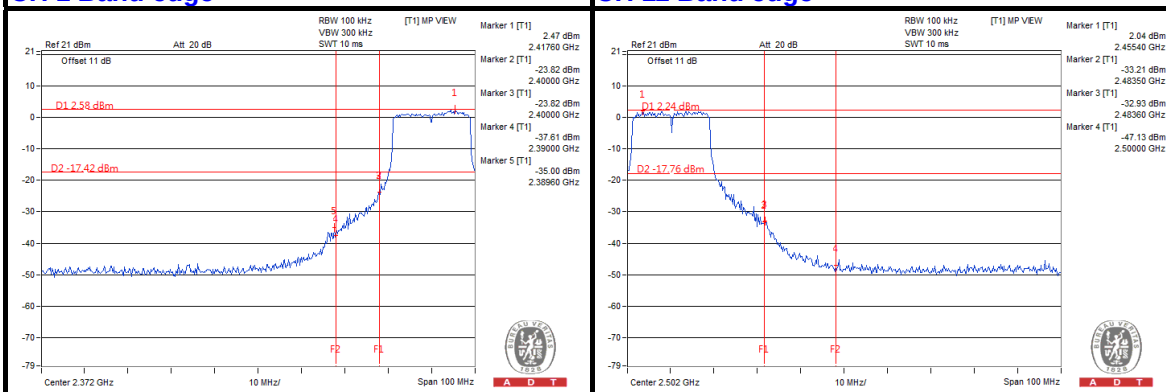
CH 6



CH 11



CH 1 Band edge

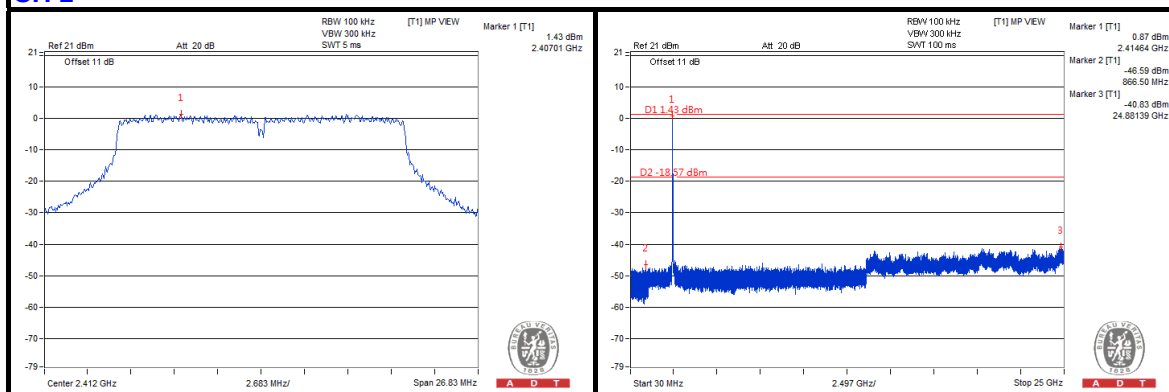




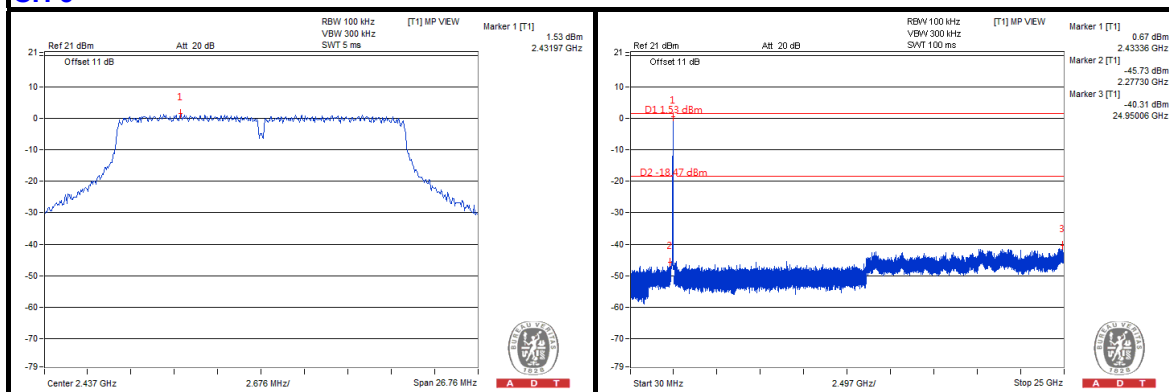
A D T

CHAIN 1

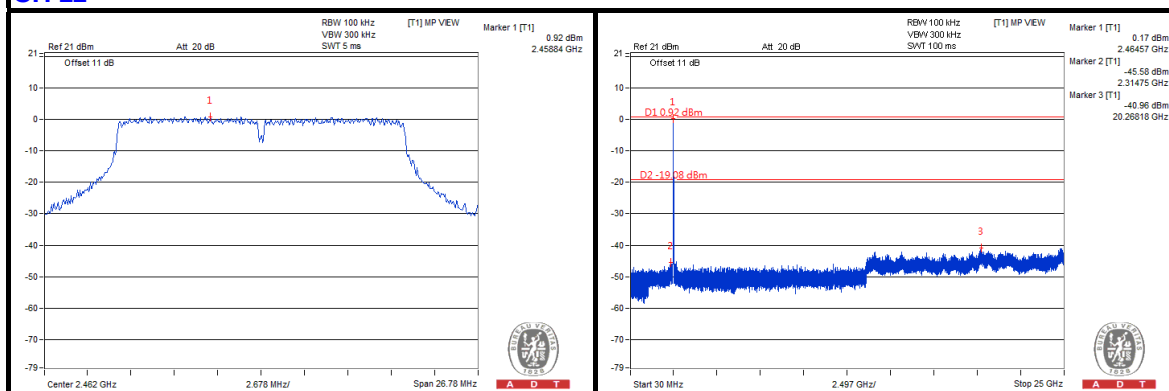
CH 1



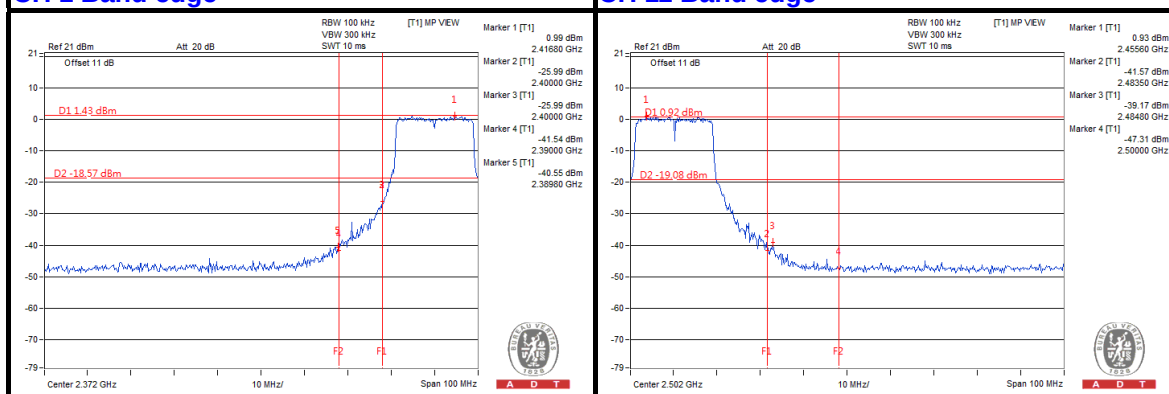
CH 6



CH 11



CH 1 Band edge

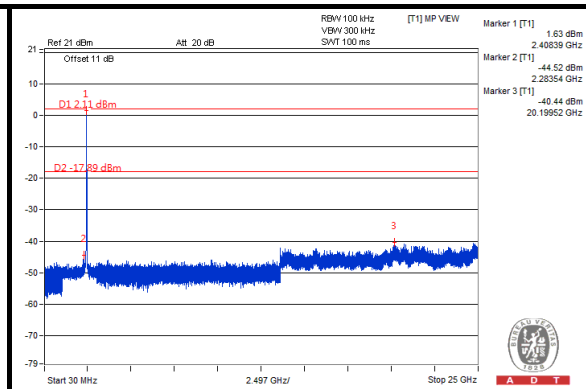
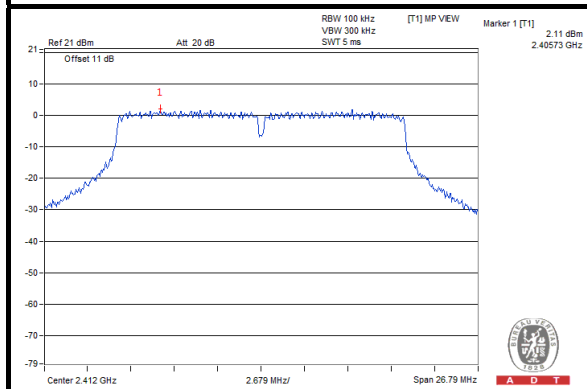




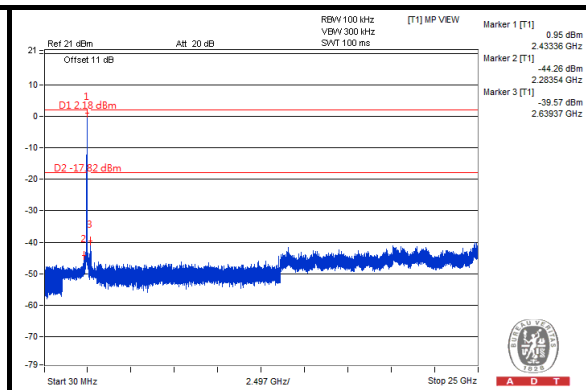
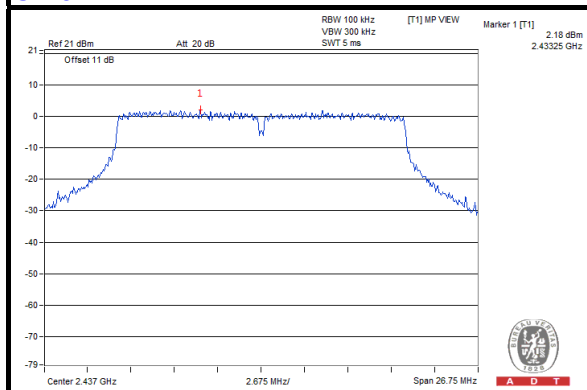
A D T

CHAIN 2

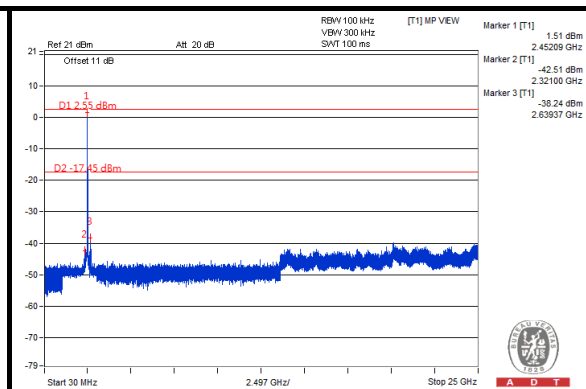
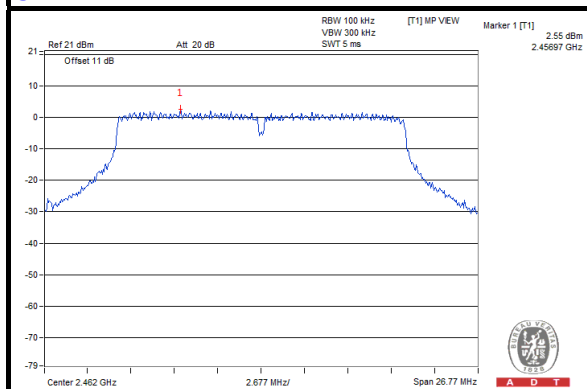
CH 1



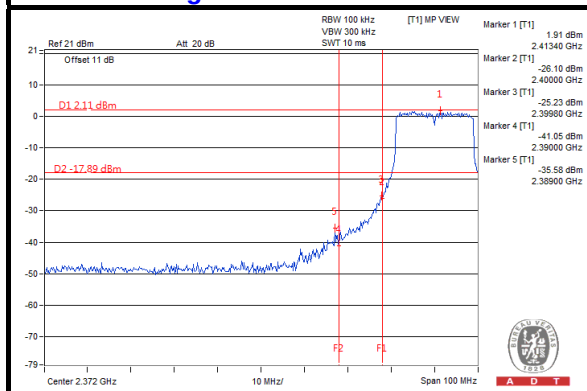
CH 6



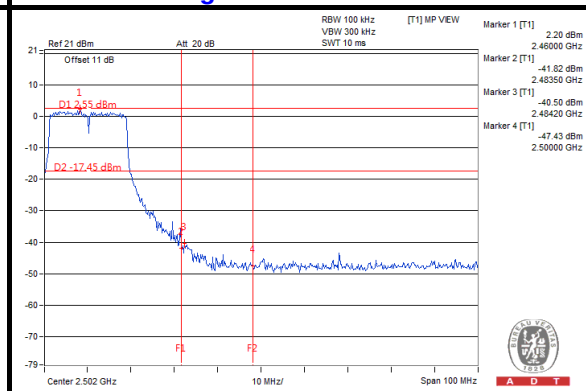
CH 11



CH 1 Band edge



CH 11 Band edge

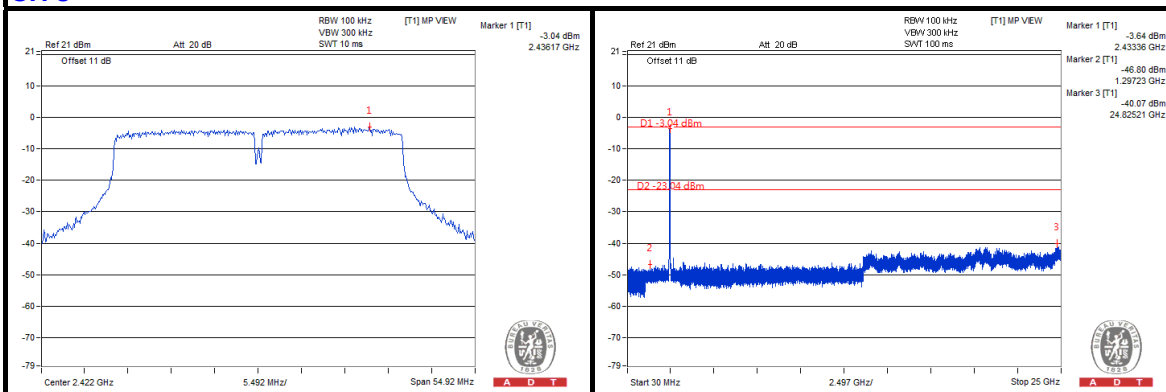




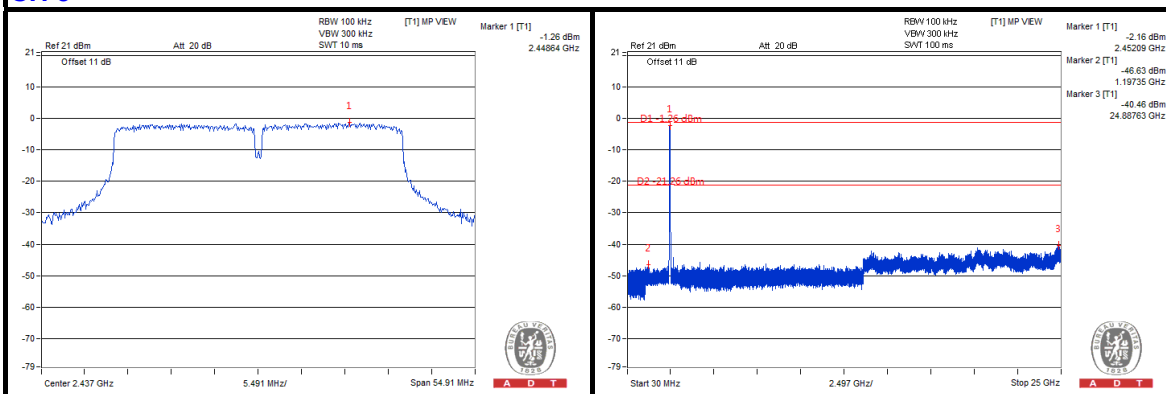
A D T

802.11n (40MHz): CHAIN 0

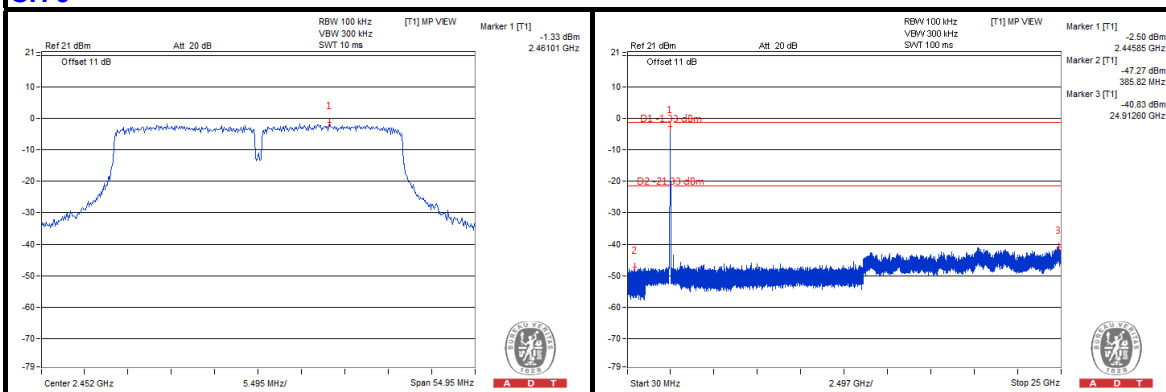
CH 3



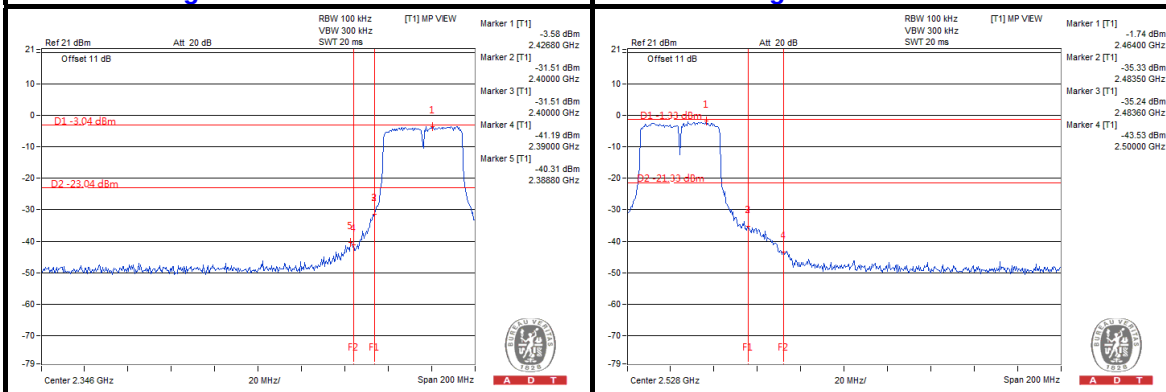
CH 6



CH 9



CH 3 Band edge

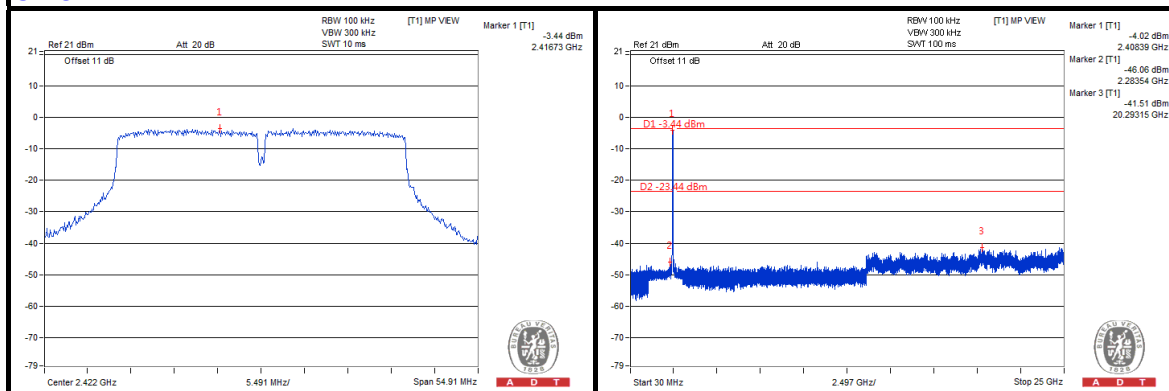




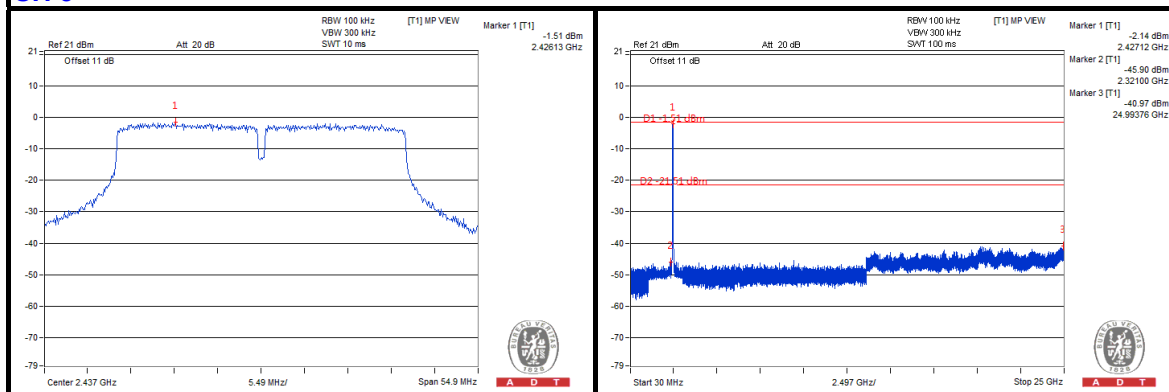
A D T

CHAIN 1

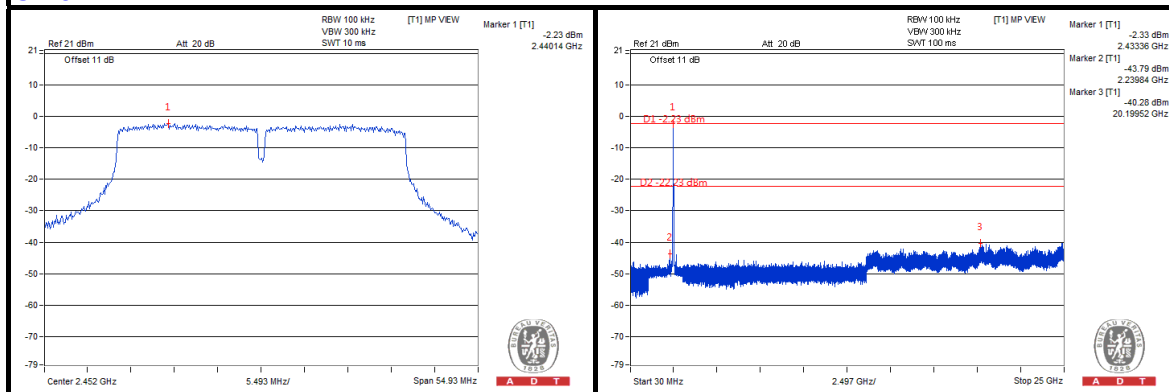
CH 3



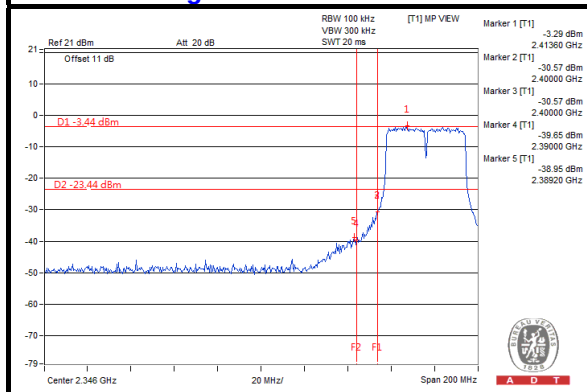
CH 6



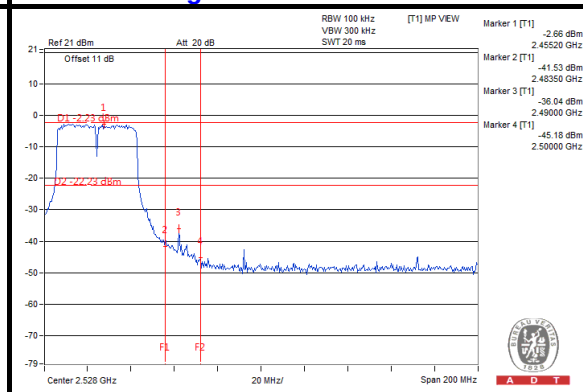
CH 9



CH 3 Band edge



CH 9 Band edge

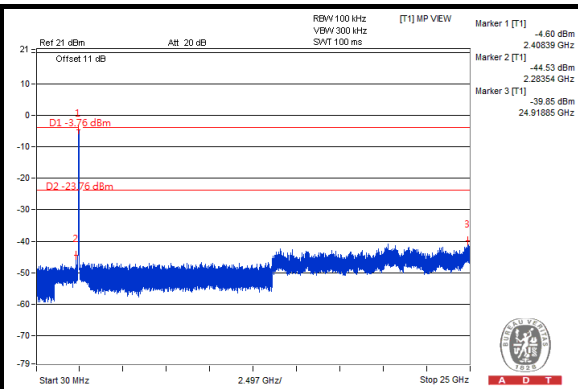
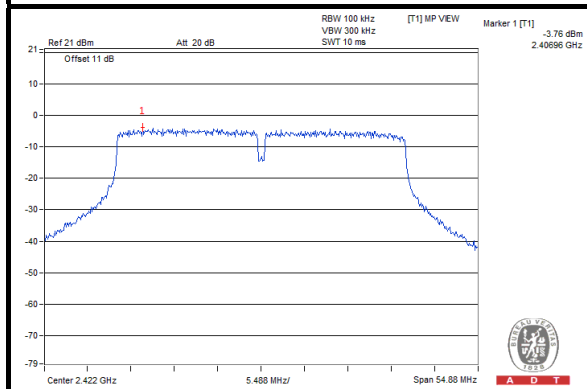




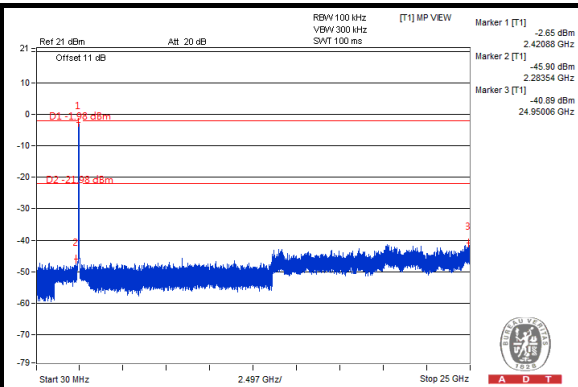
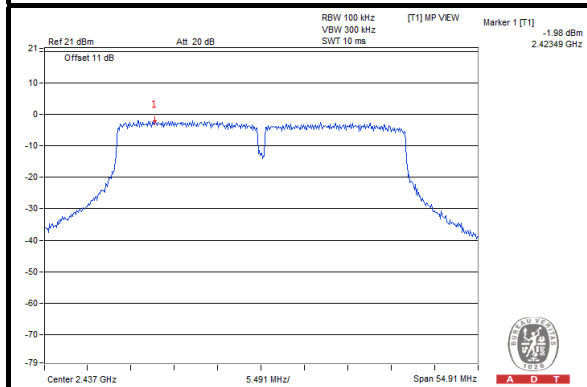
A D T

CHAIN 2

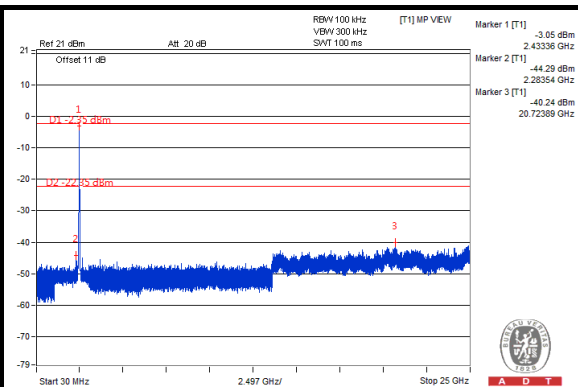
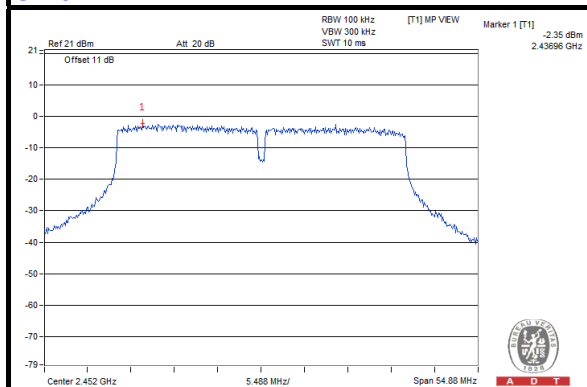
CH 3



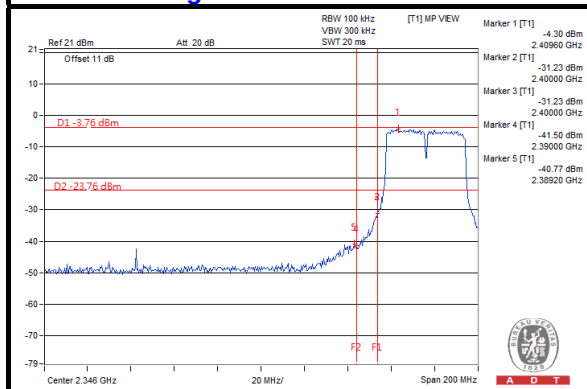
CH 6



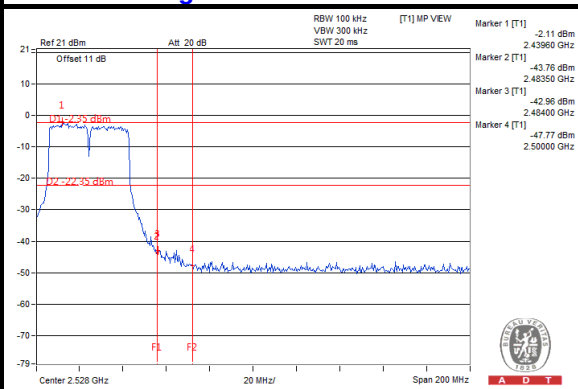
CH 9



CH 3 Band edge



CH 9 Band edge



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

5.1 RADIATED EMISSION MEASUREMENT

5.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

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

NOTE:

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



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5.1.2 TEST INSTRUMENTS

Same as item 4.1.2.

5.1.3 TEST PROCEDURES

Same as item 4.1.3.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

5.1.5 TEST SETUP

Same as item 4.1.5.

5.1.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

5.1.7 TEST RESULTS

ABOVE 1GHz DATA :

802.11a

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

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	74.4 PK	93.9	-19.5	1.22 H	9	35.70	38.70
2	#5725.00	64.8 AV	84.3	-19.5	1.22 H	9	26.10	38.70
3	*5745.00	113.9 PK			1.22 H	9	75.20	38.70
4	*5745.00	104.3 AV			1.22 H	9	65.60	38.70
5	11490.00	62.2 PK	74.0	-11.8	1.45 H	336	12.70	49.50
6	11490.00	48.6 AV	54.0	-5.4	1.45 H	336	-0.90	49.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	75.7 PK	95.2	-19.5	1.22 V	10	37.00	38.70
2	#5725.00	65.8 AV	85.3	-19.5	1.22 V	10	27.10	38.70
3	*5745.00	115.2 PK			1.22 V	10	76.50	38.70
4	*5745.00	105.3 AV			1.22 V	10	66.60	38.70
5	11490.00	60.3 PK	74.0	-13.7	1.18 V	166	10.80	49.50
6	11490.00	48.0 AV	54.0	-6.0	1.18 V	166	-1.50	49.50

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



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

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	114.2 PK			1.32 H	10	75.40	38.80
2	*5785.00	104.5 AV			1.32 H	10	65.70	38.80
3	11570.00	62.1 PK	74.0	-11.9	1.64 H	28	12.70	49.40
4	11570.00	48.5 AV	54.0	-5.5	1.64 H	28	-0.90	49.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	115.5 PK			1.32 V	14	76.70	38.80
2	*5785.00	105.4 AV			1.32 V	14	66.60	38.80
3	11570.00	60.8 PK	74.0	-13.2	1.87 V	63	11.40	49.40
4	11570.00	48.3 AV	54.0	-5.7	1.87 V	63	-1.10	49.40

REMARKS:

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



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

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	114.9 PK			1.01 H	6	76.00	38.90
2	*5825.00	104.7 AV			1.01 H	6	65.80	38.90
3	#5850.00	74.1 PK	94.9	-20.8	1.01 H	6	35.20	38.90
4	#5850.00	63.9 AV	84.7	-20.8	1.01 H	6	25.00	38.90
5	11650.00	62.5 PK	74.0	-11.5	1.10 H	325	13.20	49.30
6	11650.00	49.1 AV	54.0	-4.9	1.10 H	325	-0.20	49.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	115.6 PK			1.31 V	24	76.70	38.90
2	*5825.00	105.8 AV			1.31 V	24	66.90	38.90
3	#5850.00	74.8 PK	95.6	-20.8	1.31 V	24	35.90	38.90
4	#5850.00	65.0 AV	85.8	-20.8	1.31 V	24	26.10	38.90
5	11650.00	60.2 PK	74.0	-13.8	1.45 V	25	10.90	49.30
6	11650.00	48.1 AV	54.0	-5.9	1.45 V	25	-1.20	49.30

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



A D T

802.11n (20MHz)

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

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	76.1 PK	94.7	-18.6	1.10 H	9	37.40	38.70
2	#5725.00	66.3 AV	84.9	-18.6	1.10 H	9	27.60	38.70
3	*5745.00	114.7 PK			1.10 H	9	76.00	38.70
4	*5745.00	104.9 AV			1.10 H	9	66.20	38.70
5	11490.00	58.1 PK	74.0	-15.9	1.12 H	113	8.60	49.50
6	11490.00	45.9 AV	54.0	-8.1	1.12 H	113	-3.60	49.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	76.4 PK	95.0	-18.6	1.12 V	10	37.70	38.70
2	#5725.00	66.4 AV	85.0	-18.6	1.12 V	10	27.70	38.70
3	*5745.00	115.0 PK			1.12 V	10	76.30	38.70
4	*5745.00	105.0 AV			1.12 V	10	66.30	38.70
5	11490.00	59.6 PK	74.0	-14.4	1.12 V	163	10.10	49.50
6	11490.00	48.4 AV	54.0	-5.6	1.12 V	163	-1.10	49.50

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



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

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	114.9 PK			1.14 H	10	76.10	38.80
2	*5785.00	105.2 AV			1.14 H	10	66.40	38.80
3	11570.00	58.5 PK	74.0	-15.5	1.63 H	325	9.10	49.40
4	11570.00	46.3 AV	54.0	-7.7	1.63 H	325	-3.10	49.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	115.1 PK			1.14 V	8	76.30	38.80
2	*5785.00	105.3 AV			1.14 V	8	66.50	38.80
3	11570.00	59.9 PK	74.0	-14.1	1.20 V	62	10.50	49.40
4	11570.00	48.6 AV	54.0	-5.4	1.20 V	62	-0.80	49.40

REMARKS:

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



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

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	114.1 PK			1.02 H	65	75.20	38.90
2	*5825.00	104.5 AV			1.02 H	65	65.60	38.90
3	#5850.00	75.1 PK	94.1	-19.0	1.02 H	65	36.20	38.90
4	#5850.00	65.5 AV	84.5	-19.0	1.02 H	65	26.60	38.90
5	11650.00	57.9 PK	74.0	-16.1	1.36 H	109	8.60	49.30
6	11650.00	46.3 AV	54.0	-7.7	1.36 H	109	-3.00	49.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	114.8 PK			1.11 V	10	75.90	38.90
2	*5825.00	104.8 AV			1.11 V	10	65.90	38.90
3	#5850.00	75.8 PK	94.8	-19.0	1.11 V	10	36.90	38.90
4	#5850.00	65.8 AV	84.8	-19.0	1.11 V	10	26.90	38.90
5	11650.00	61.5 PK	74.0	-12.5	1.12 V	198	12.20	49.30
6	11650.00	49.7 AV	54.0	-4.3	1.12 V	198	0.40	49.30

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



A D T

802.11n (40MHz)

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

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	74.6 PK	91.6	-17.0	1.04 H	11	35.90	38.70
2	#5725.00	62.2 AV	79.2	-17.0	1.04 H	11	23.50	38.70
3	*5755.00	111.6 PK			1.04 H	11	72.90	38.70
4	*5755.00	99.2 AV			1.04 H	11	60.50	38.70
5	11510.00	58.1 PK	74.0	-15.9	1.04 H	52	8.60	49.50
6	11510.00	45.6 AV	54.0	-8.4	1.04 H	52	-3.90	49.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	74.1 PK	91.1	-17.0	1.22 V	10	35.40	38.70
2	#5725.00	61.4 AV	78.4	-17.0	1.22 V	10	22.70	38.70
3	*5755.00	111.1 PK			1.22 V	10	72.40	38.70
4	*5755.00	98.4 AV			1.22 V	10	59.70	38.70
5	11510.00	56.8 PK	74.0	-17.2	1.25 V	25	7.30	49.50
6	11510.00	46.5 AV	54.0	-7.5	1.25 V	25	-3.00	49.50

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



A D T

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

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	109.0 PK			1.23 H	10	70.20	38.80
2	*5795.00	97.6 AV			1.23 H	10	58.80	38.80
3	#5850.00	66.8 PK	89.0	-22.2	1.23 H	10	27.90	38.90
4	#5850.00	55.4 AV	77.6	-22.2	1.23 H	10	16.50	38.90
5	11590.00	57.3 PK	74.0	-16.7	1.06 H	98	7.90	49.40
6	11590.00	46.1 AV	54.0	-7.9	1.06 H	98	-3.30	49.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	110.2 PK			1.10 V	12	71.40	38.80
2	*5795.00	99.0 AV			1.10 V	12	60.20	38.80
3	#5850.00	68.0 PK	90.2	-22.2	1.10 V	12	29.10	38.90
4	#5850.00	56.8 AV	79.0	-22.2	1.10 V	12	17.90	38.90
5	11590.00	56.9 PK	74.0	-17.1	1.27 V	78	7.50	49.40
6	11590.00	44.8 AV	54.0	-9.2	1.27 V	78	-4.60	49.40

REMARKS:

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



A D T

802.11ac (80MHz)

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

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	80.2 PK	90.4	-10.2	1.03 H	350	41.50	38.70
2	#5725.00	67.2 AV	77.4	-10.2	1.03 H	350	28.50	38.70
3	*5775.00	110.4 PK			1.03 H	350	71.60	38.80
4	*5775.00	97.4 AV			1.03 H	350	58.60	38.80
5	11550.00	56.4 PK	74.0	-17.6	1.36 H	258	6.90	49.50
6	11550.00	44.1 AV	54.0	-9.9	1.36 H	258	-5.40	49.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	78.1 PK	88.3	-10.2	1.03 V	9	39.40	38.70
2	#5725.00	67.0 AV	77.2	-10.2	1.03 V	9	28.30	38.70
3	*5775.00	108.3 PK			1.03 V	9	69.50	38.80
4	*5775.00	97.2 AV			1.03 V	9	58.40	38.80
5	11550.00	57.1 PK	74.0	-16.9	1.00 V	0	7.60	49.50
6	11550.00	45.0 AV	54.0	-9.0	1.00 V	0	-4.50	49.50

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



A D T

BELOW 1GHz WORST-CASE DATA : 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	27deg. C, 72%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	30.1 QP	40.0	-9.9	1.74 H	150	17.10	13.00
2	96.01	32.5 QP	43.5	-11.0	1.74 H	92	22.80	9.70
3	374.04	30.3 QP	46.0	-15.7	1.00 H	130	13.50	16.80
4	500.42	28.7 QP	46.0	-17.3	2.00 H	169	8.80	19.90
5	599.58	31.2 QP	46.0	-14.8	1.49 H	165	8.70	22.50
6	624.85	32.2 QP	46.0	-13.8	1.00 H	197	9.30	22.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.68	31.1 QP	40.0	-8.9	1.50 V	11	17.30	13.80
2	105.73	29.7 QP	43.5	-13.8	1.00 V	123	19.10	10.60
3	374.04	27.9 QP	46.0	-18.1	1.00 V	162	11.10	16.80
4	500.42	27.7 QP	46.0	-18.3	3.00 V	152	7.80	19.90
5	624.85	34.5 QP	46.0	-11.5	1.00 V	157	11.60	22.90
6	875.67	31.4 QP	46.0	-14.6	1.00 V	211	4.40	27.00

REMARKS:

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

5.2 CONDUCTED EMISSION MEASUREMENT

5.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

5.2.2 TEST INSTRUMENTS

Same as item 4.2.2.

5.2.3 TEST PROCEDURES

Same as item 4.2.3.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

5.2.5 TEST SETUP

Same as item 4.2.5.

5.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

5.2.7 TEST RESULTS

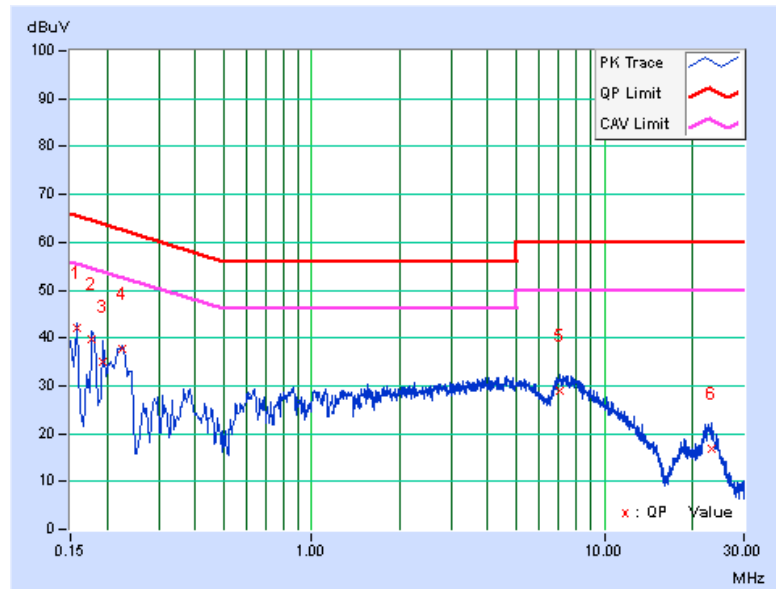
CONDUCTED WORST-CASE DATA : 802.11a

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15800	0.16	41.96	29.68	42.12	29.84	65.57	55.57	-23.45	-25.73
2	0.17801	0.16	39.52	28.86	39.68	29.02	64.58	54.58	-24.90	-25.56
3	0.19400	0.16	34.71	22.65	34.87	22.81	63.86	53.86	-28.99	-31.05
4	0.22565	0.17	37.45	32.86	37.62	33.03	62.61	52.61	-24.99	-19.58
5	7.08600	0.56	28.49	23.55	29.05	24.11	60.00	50.00	-30.95	-25.89
6	23.23400	1.39	15.59	8.78	16.98	10.17	60.00	50.00	-43.02	-39.83

REMARKS:

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

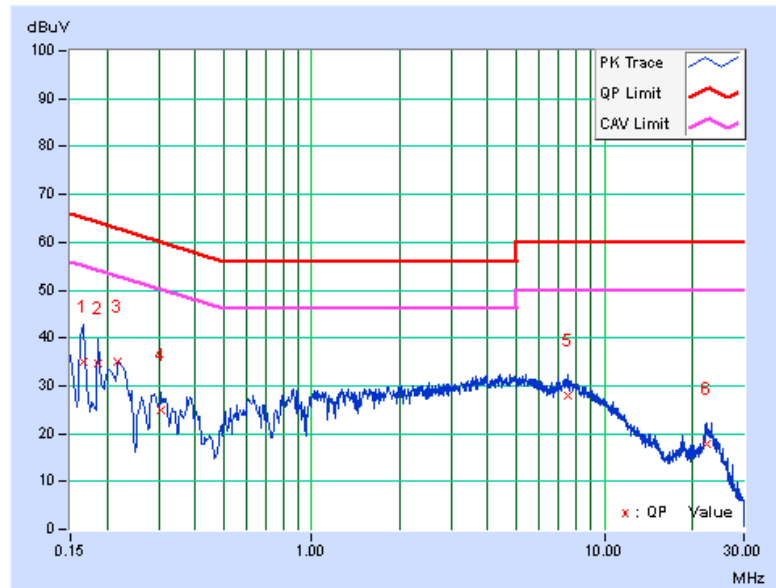


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16600	0.17	34.74	16.27	34.91	16.44	65.16	55.16	-30.25	-38.72
2	0.18600	0.17	34.47	20.05	34.64	20.22	64.21	54.21	-29.57	-33.99
3	0.21805	0.18	34.81	26.90	34.99	27.08	62.89	52.89	-27.91	-25.82
4	0.30630	0.21	24.77	17.13	24.98	17.34	60.07	50.07	-35.09	-32.73
5	7.55800	0.51	27.39	22.59	27.90	23.10	60.00	50.00	-32.10	-26.90
6	22.41400	1.02	16.77	9.86	17.79	10.88	60.00	50.00	-42.21	-39.12

REMARKS:

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



5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

5.3.2 TEST SETUP

Same as item 4.3.2.

5.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.3.4 TEST PROCEDURE

Same as item 4.3.4.

5.3.5 DEVIATION FROM TEST STANDARD

No deviation.

5.3.6 EUT OPERATING CONDITIONS

Same as item 4.3.6.

5.3.7 TEST RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	16.32	15.22	16.38	0.5	PASS
157	5785	16.36	15.49	16.36	0.5	PASS
165	5825	16.07	15.76	16.37	0.5	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.33	16.33	16.95	0.5	PASS
157	5785	16.34	15.82	17.34	0.5	PASS
165	5825	16.88	16.01	17.57	0.5	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	35.96	36.42	36.41	0.5	PASS
159	5795	35.93	36.46	36.47	0.5	PASS

802.11ac (80MHz)

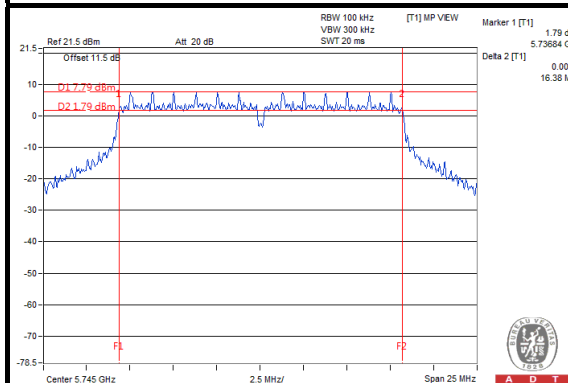
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
155	5775	72.75	75.89	75.33	0.5	PASS



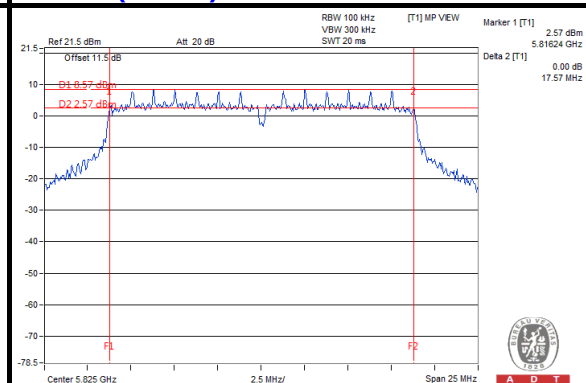
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SPECTRUM PLOT OF WORST VALUE

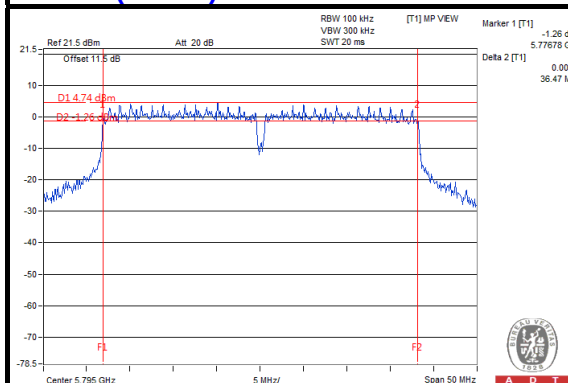
802.11a



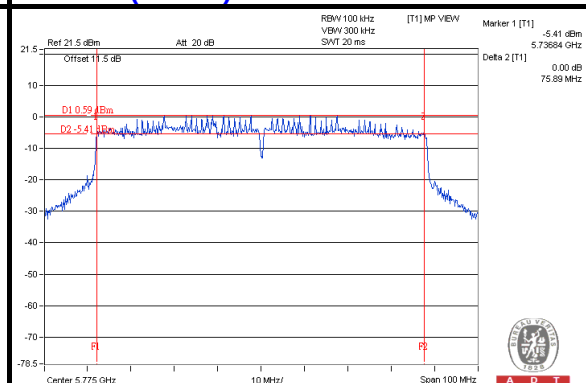
802.11n (20MHz)



802.11n (40MHz)



802.11ac (80MHz)



5.4 CONDUCTED OUTPUT POWER

5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

Per KDB 662911 D01 Multiple Transmitter Output v02 Method of conducted output power measurement on IEEE 802.11 devices,

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

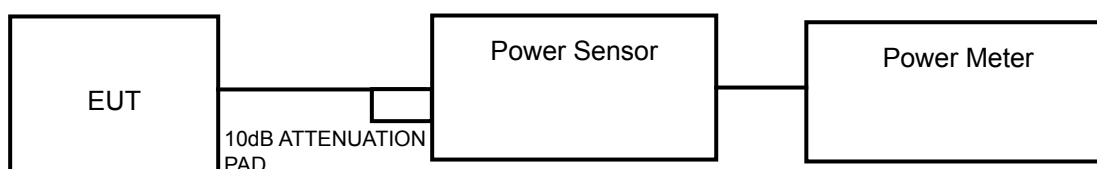
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = $5 \log(NANT/NSS)$ dB or 3 dB, whichever is less for 20-MHz channel widths with $NANT \geq 5$.

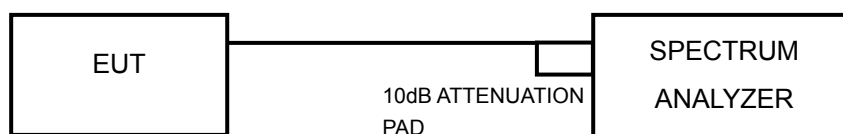
For power measurements on all other devices: Array Gain = $10 \log(NANT/NSS)$ dB.

5.4.2 TEST SETUP

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



For 802.11ac (80MHz)



5.4.3 INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.4.4 TEST PROCEDURES

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

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

For 802.11ac (80MHz)

Method SA-1

- 1) Set the analyzer span to a minimum of 1.5 times the EBW.
- 2) Set the RBW = 1 MHz.
- 3) Set the VBW = 3 MHz.
- 4) Number of measurement points in the sweep. $2 \times (\text{span/RBW})$.
- 5) Sweep time = auto couple.
- 6) Detector = power averaging (RMS) or sample.
- 7) Employ trace averaging in power averaging (RMS) mode over a minimum of 100 traces.
- 8) Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges.

5.4.5 DEVIATION FROM TEST STANDARD

No deviation.

5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

5.4.7 TEST RESULTS

FOR PEAK POWER

802.11a

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	21.95	22.69	22.01	501.310	27.00	30	PASS
157	5785	22.33	21.87	21.74	474.096	26.76	30	PASS
165	5825	22.77	21.79	21.71	488.494	26.89	30	PASS

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	22.05	22.54	22.07	500.863	27.00	30	PASS
157	5785	22.34	21.96	21.69	476.003	26.78	30	PASS
165	5825	22.67	22.03	21.65	490.733	26.91	30	PASS

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	21.45	22.21	21.84	458.735	26.62	30	PASS
159	5795	21.34	21.71	22.03	443.984	26.47	30	PASS

802.11ac (80MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
155	5775	22.00	21.70	21.90	461.282	26.64	30	PASS

FOR AVERAGE POWER

802.11a

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.57	18.21	17.73	182.663	22.62
157	5785	17.90	17.68	17.54	177.028	22.48
165	5825	18.28	17.58	17.44	180.041	22.55

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.67	18.17	17.63	182.037	22.60
157	5785	17.84	17.65	17.64	177.100	22.48
165	5825	18.18	17.78	17.54	182.499	22.61

802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	16.78	17.40	17.18	154.837	21.90
159	5795	16.74	17.08	17.31	152.083	21.82

802.11ac (80MHz)

CHANNEL	FREQUENCY (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1	CHAIN 2		
155	5775	17.13	16.79	17.24	152.361	21.83

5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 TEST SETUP

Same as item 4.5.2.

5.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.5.4 TEST PROCEDURE.

Same as item 4.5.4.

5.5.5 DEVIATION FROM TEST STANDARD

No deviation.

5.5.6 EUT OPERATING CONDITION

Same as item 4.3.6.

5.5.7 TEST RESULTS

802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-7.94	4.77	-3.17	7.23	PASS
	157	5785	-8.43	4.77	-3.66	7.23	PASS
	165	5825	-8.21	4.77	-3.44	7.23	PASS
1	149	5745	-6.27	4.77	-1.50	7.23	PASS
	157	5785	-6.78	4.77	-2.01	7.23	PASS
	165	5825	-7.71	4.77	-2.94	7.23	PASS
2	149	5745	-5.76	4.77	-0.99	7.23	PASS
	157	5785	-7.85	4.77	-3.08	7.23	PASS
	165	5825	-6.68	4.77	-1.91	7.23	PASS

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

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-7.77	4.77	-3.00	7.23	PASS
	157	5785	-7.18	4.77	-2.41	7.23	PASS
	165	5825	-8.35	4.77	-3.58	7.23	PASS
1	149	5745	-7.99	4.77	-3.22	7.23	PASS
	157	5785	-7.92	4.77	-3.15	7.23	PASS
	165	5825	-7.63	4.77	-2.86	7.23	PASS
2	149	5745	-8.39	4.77	-3.62	7.23	PASS
	157	5785	-8.37	4.77	-3.60	7.23	PASS
	165	5825	-8.18	4.77	-3.41	7.23	PASS

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

**A D T****802.11n (40MHz)**

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-11.92	4.77	-7.15	7.23	PASS
	159	5795	-12.29	4.77	-7.52	7.23	PASS
1	151	5755	-11.20	4.77	-6.43	7.23	PASS
	159	5795	-12.07	4.77	-7.30	7.23	PASS
2	151	5755	-11.51	4.77	-6.74	7.23	PASS
	159	5795	-11.43	4.77	-6.66	7.23	PASS

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

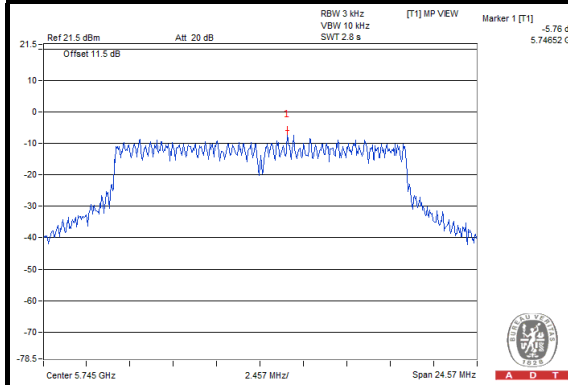
802.11ac (80MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	155	5775	-15.59	4.77	-10.82	7.23	PASS
1	155	5775	-14.83	4.77	-10.06	7.23	PASS
2	155	5775	-14.97	4.77	-10.20	7.23	PASS

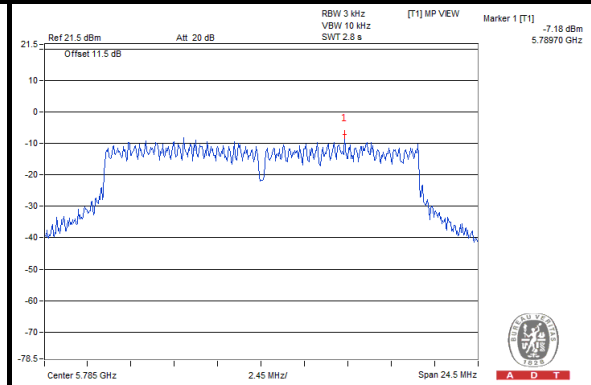
NOTE: Directional gain = $2\text{dBi} + 10\log(3) = 6.77\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8-(6.77-6) = 7.23\text{dBm}$.

SPECTRUM PLOT OF WORST VALUE

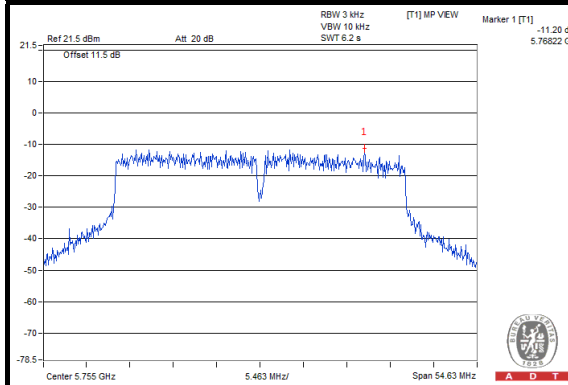
802.11a



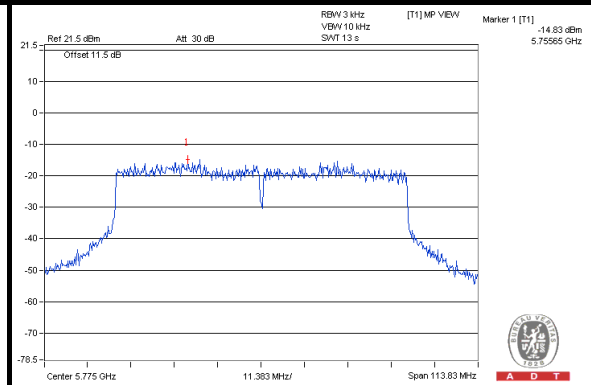
802.11n (20MHz)



802.11n (40MHz)



802.11ac (80MHz)



5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

5.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

5.6.2 TEST SETUP

Same as Item 4.6.2

5.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.6.4 TEST PROCEDURE

Same as Item 4.6.4

5.6.5 DEVIATION FROM TEST STANDARD

No deviation.

5.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

5.6.7 TEST RESULTS

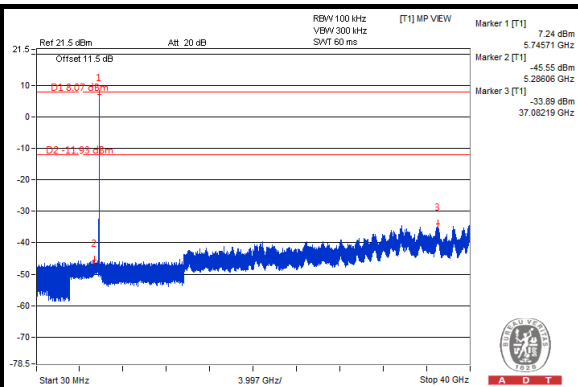
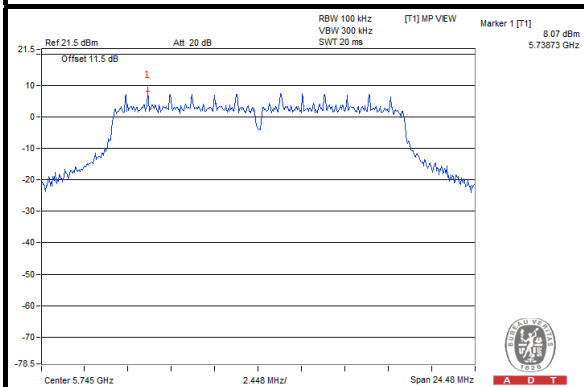
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



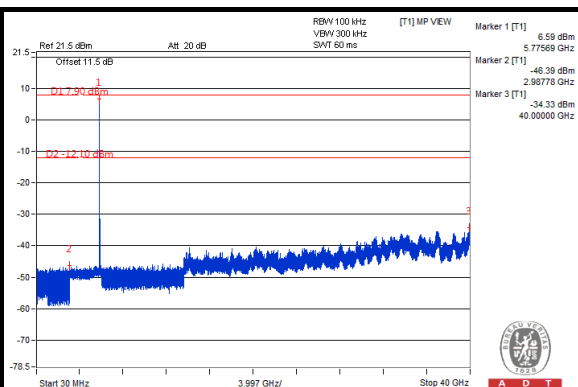
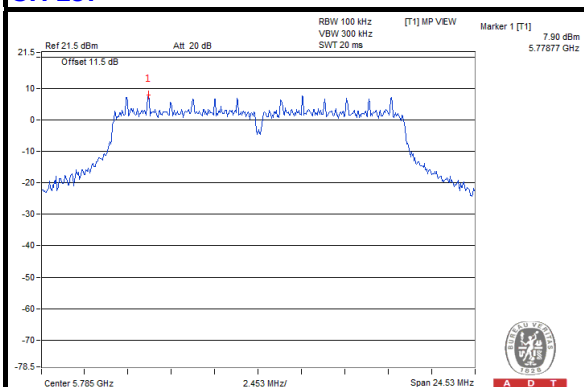
A D T

802.11a: CHAIN 0

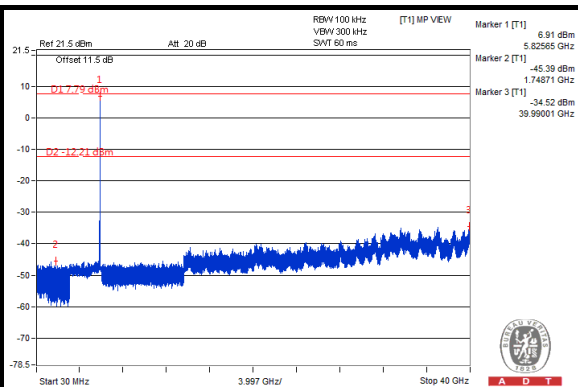
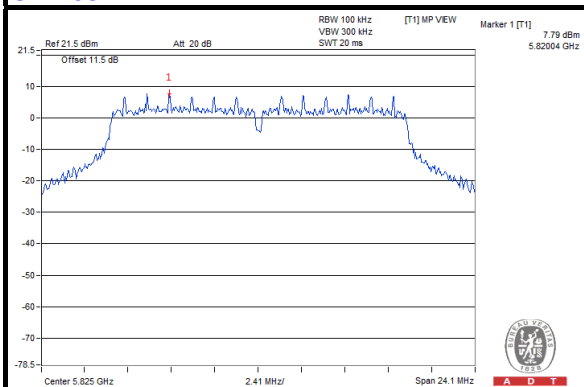
CH 149



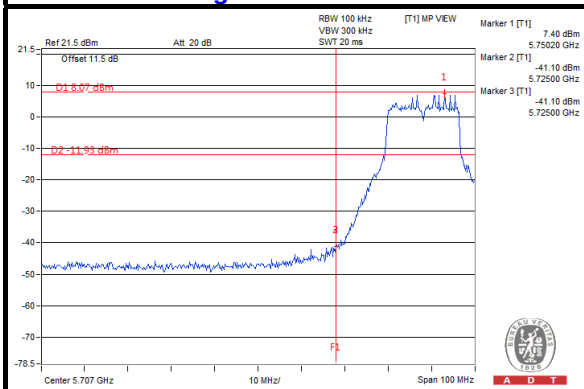
CH 157



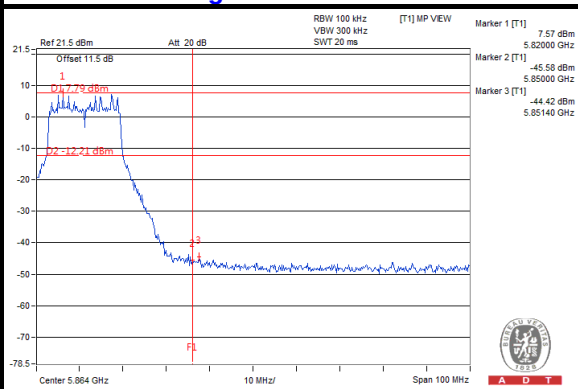
CH 165



CH 149 Band edge



CH 165 Band edge

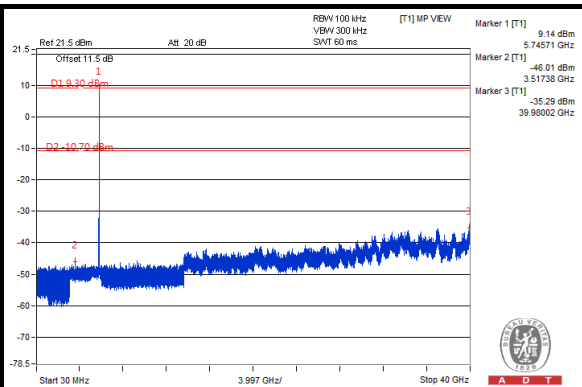
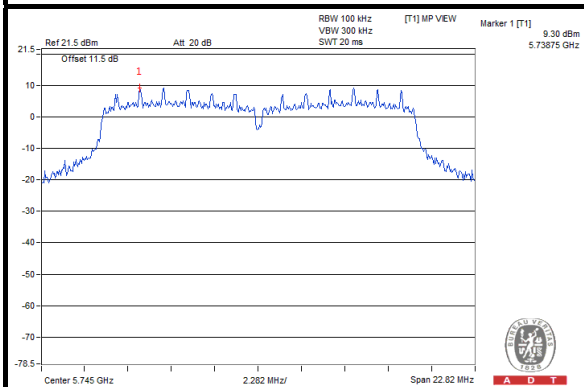




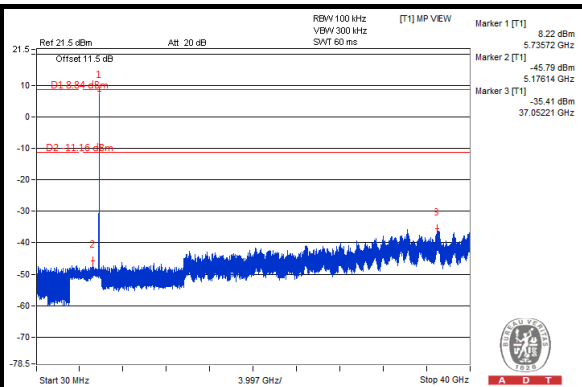
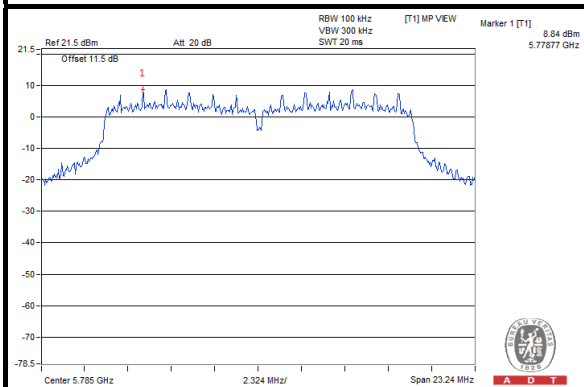
A D T

CHAIN 1

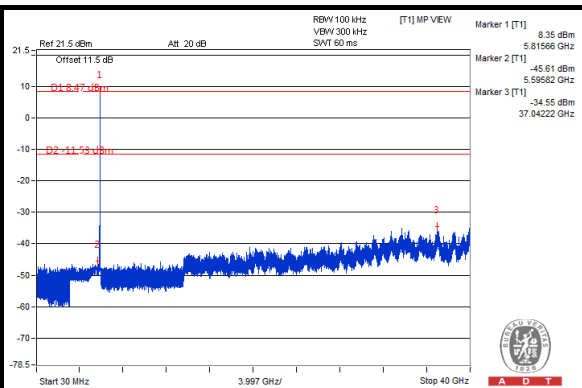
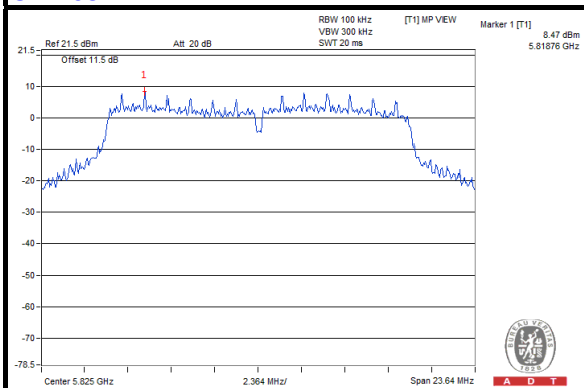
CH 149



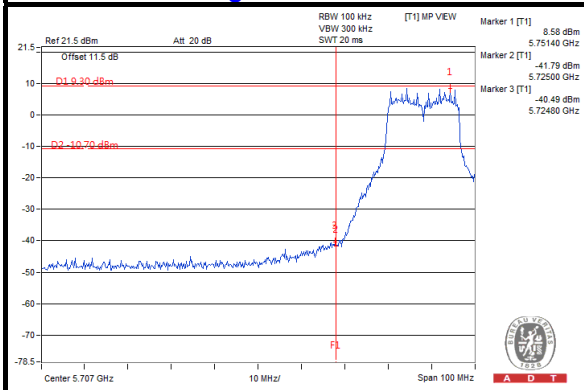
CH 157



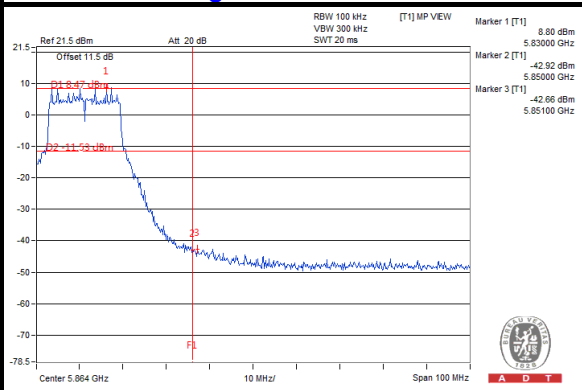
CH 165



CH 149 Band edge



CH 165 Band edge

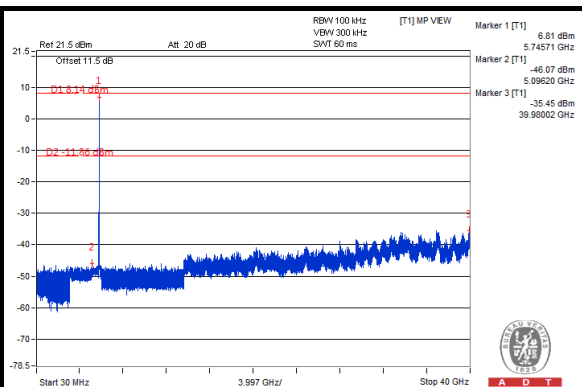
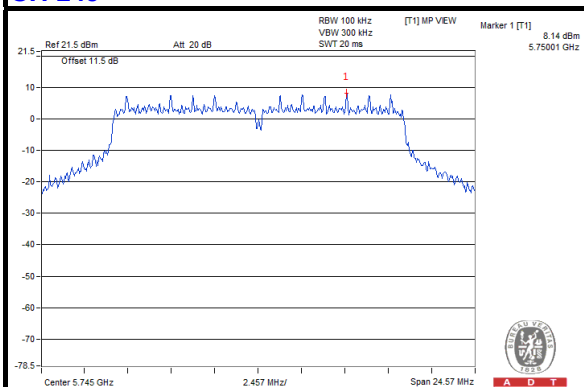




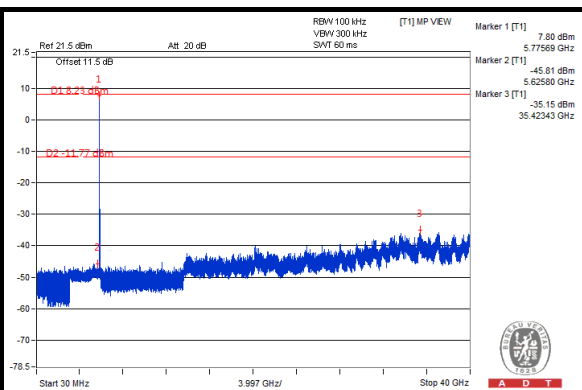
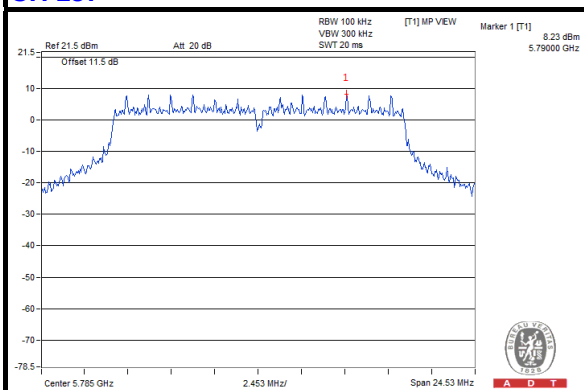
A D T

CHAIN 2

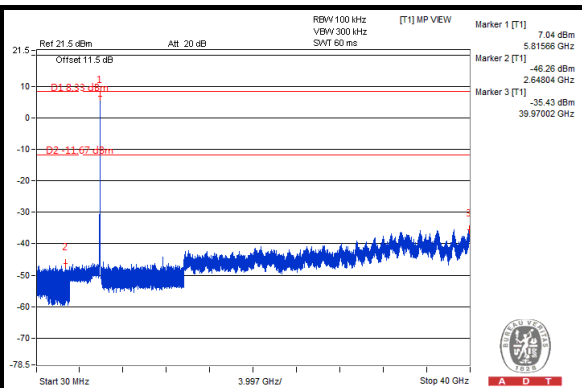
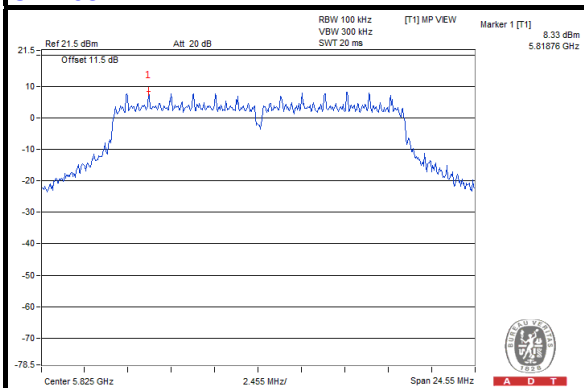
CH 149



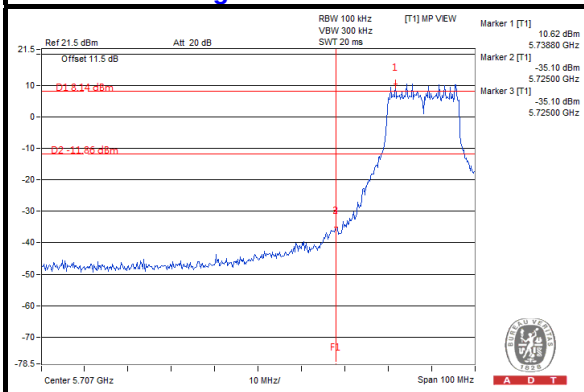
CH 157



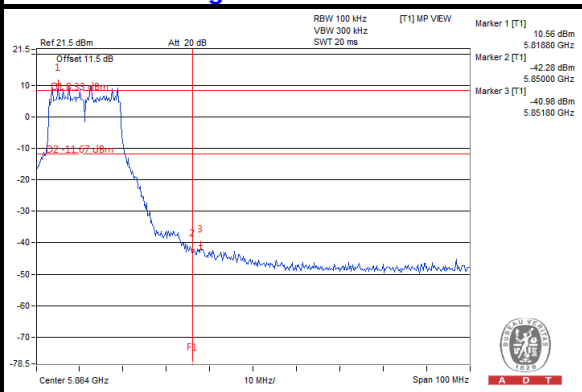
CH 165



CH 149 Band edge



CH 165 Band edge

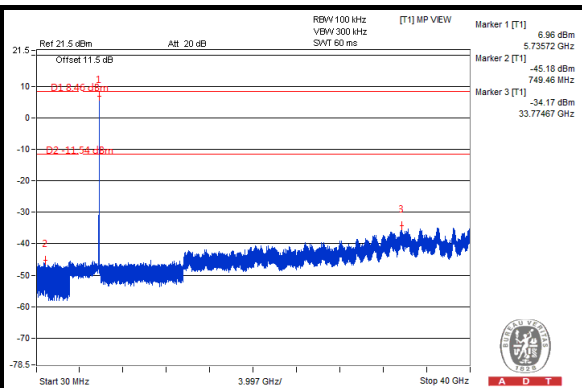
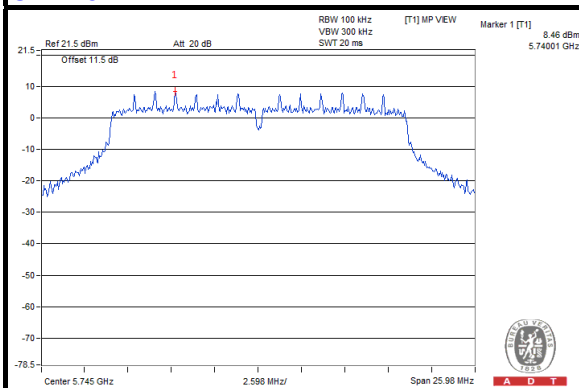




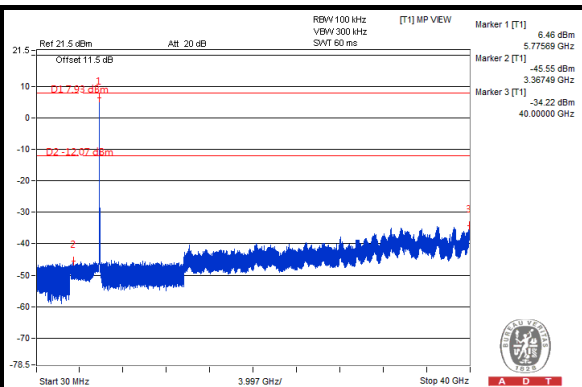
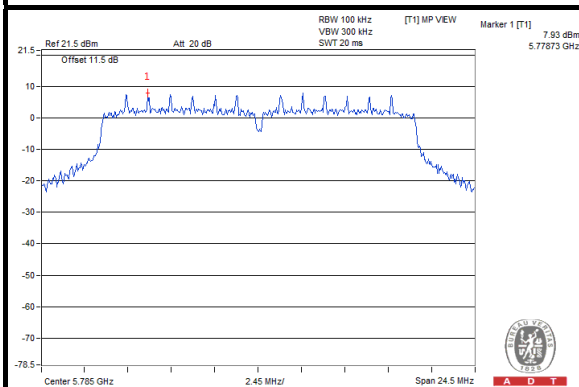
A D T

802.11n (20MHz): CHAIN 0

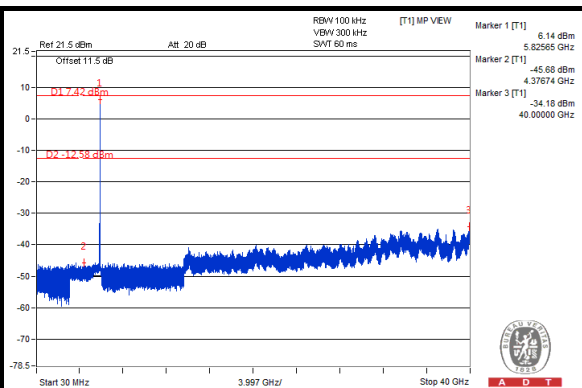
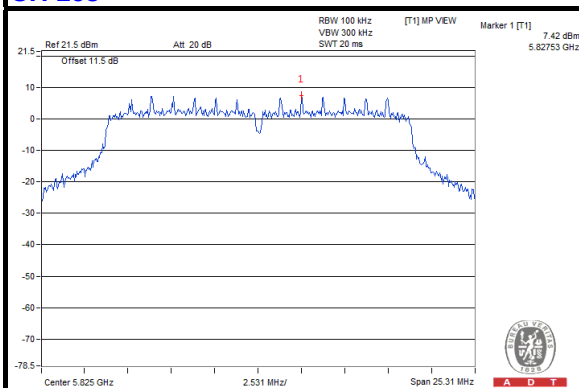
CH 149



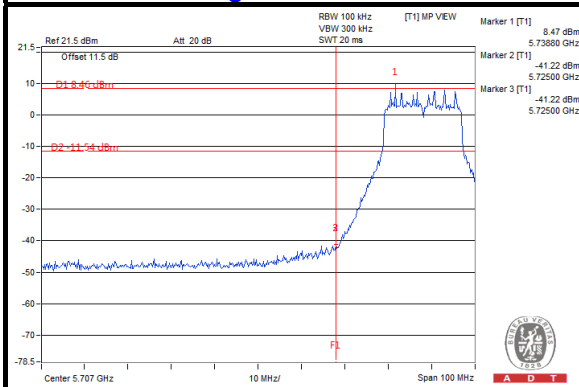
CH 157



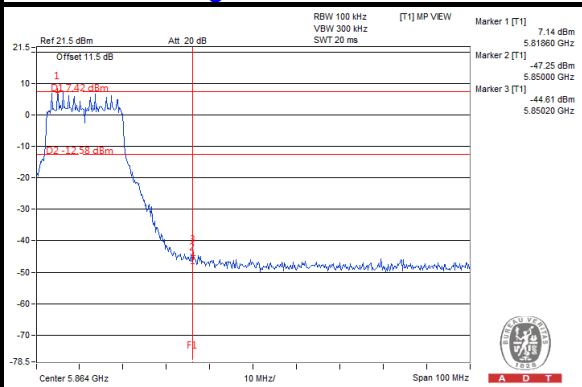
CH 165



CH 149 Band edge



CH 165 Band edge

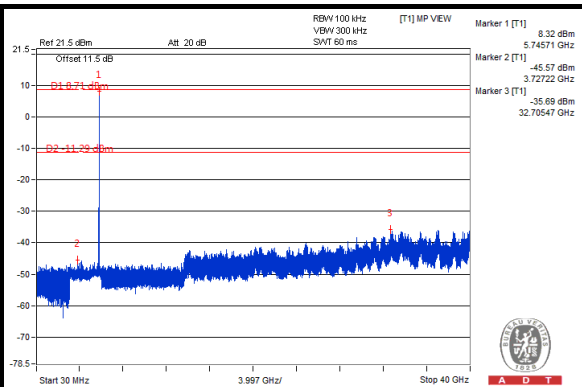
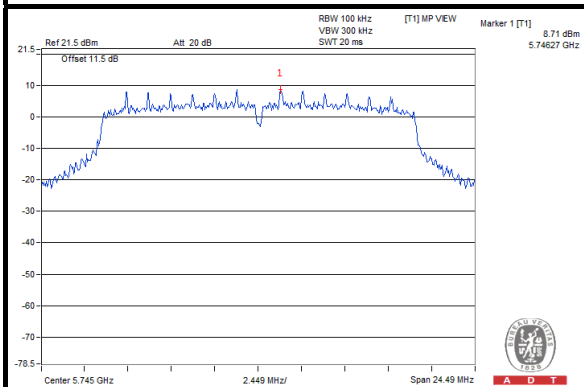




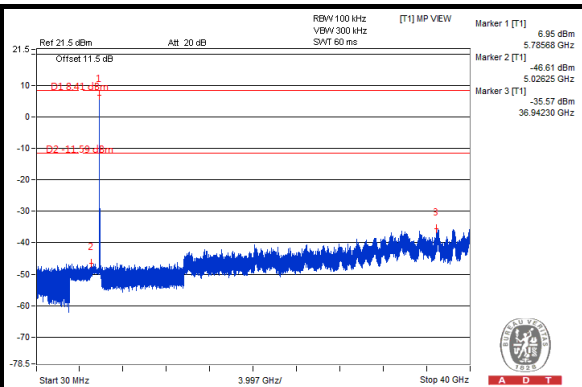
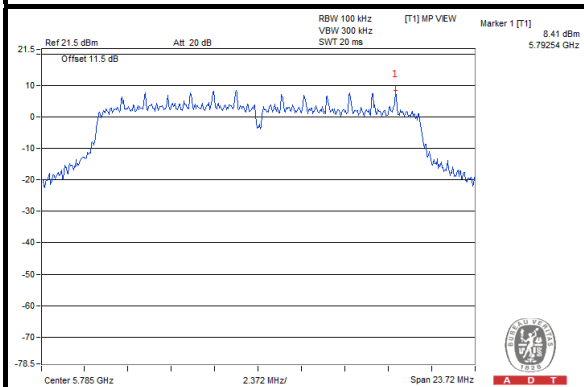
A D T

CHAIN 1

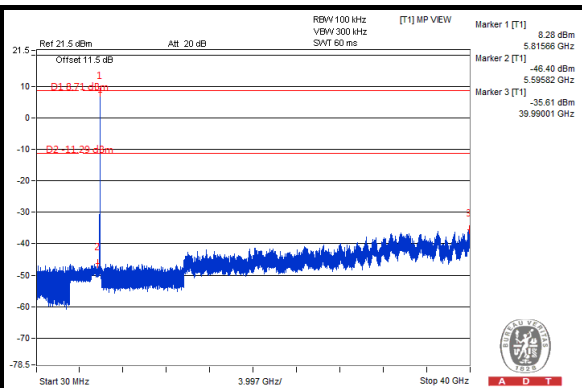
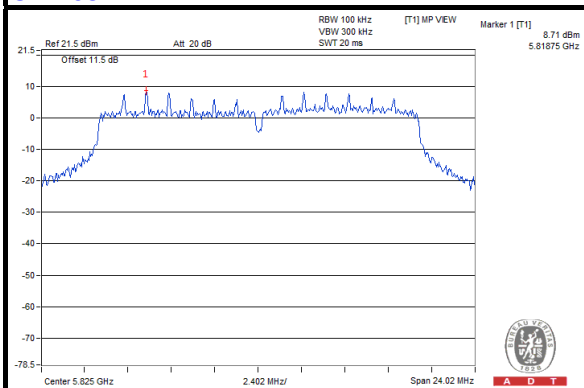
CH 149



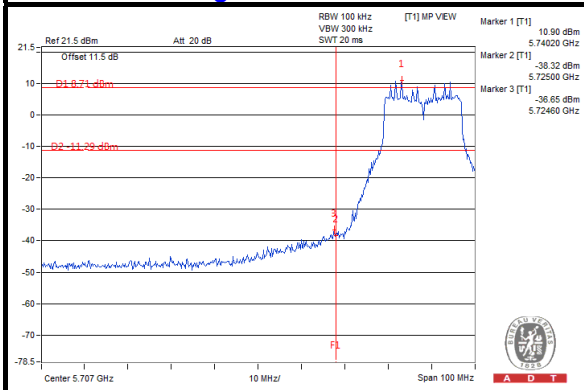
CH 157



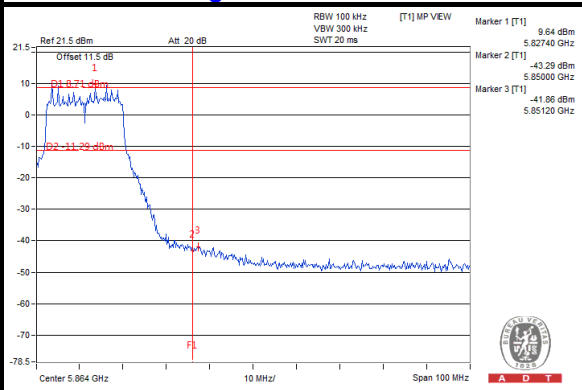
CH 165



CH 149 Band edge



CH 165 Band edge

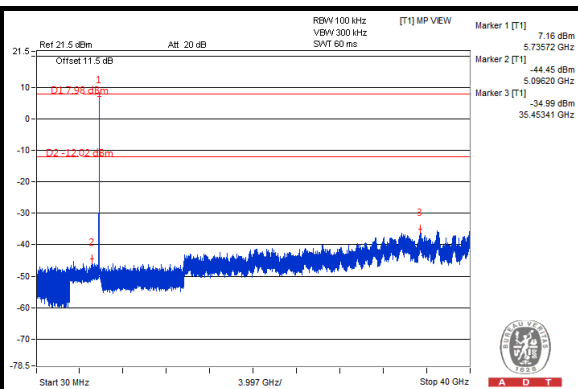
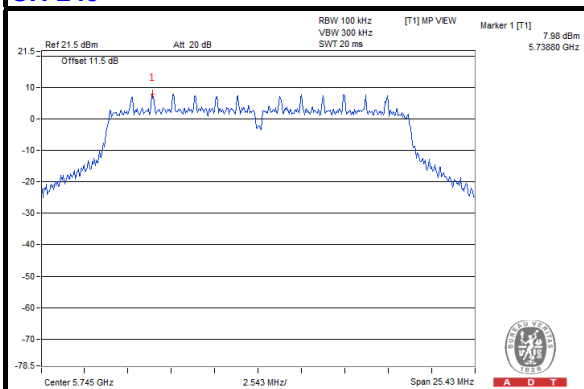




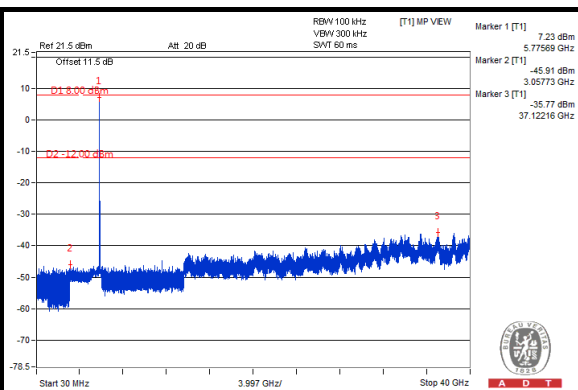
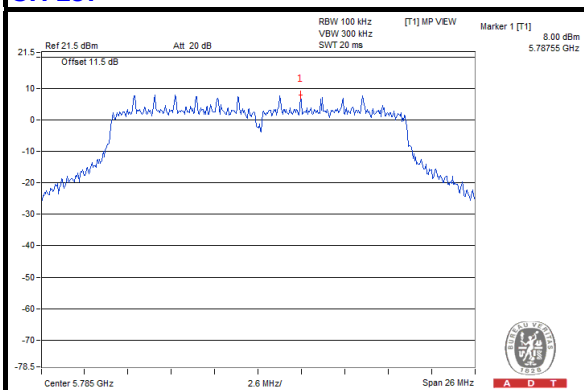
A D T

CHAIN 2

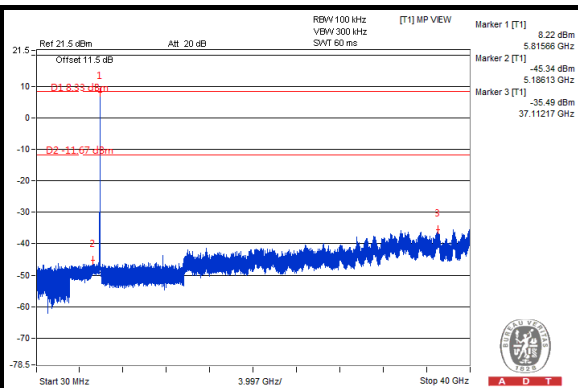
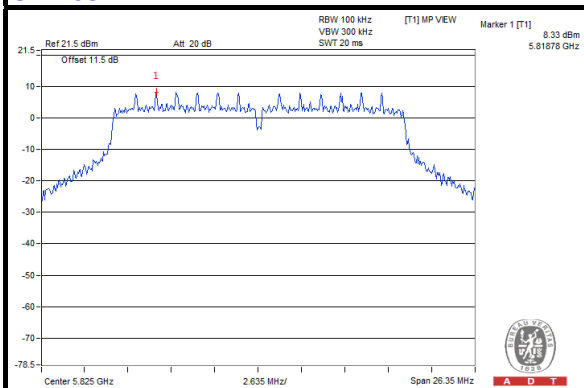
CH 149



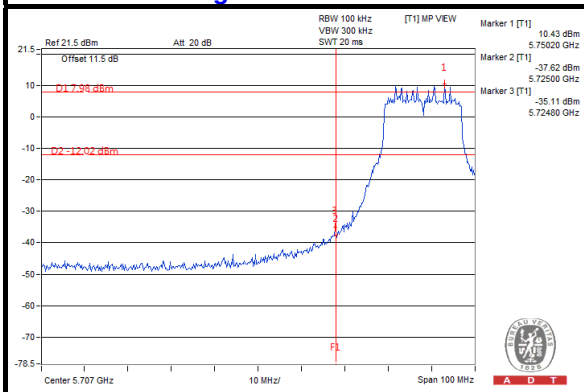
CH 157



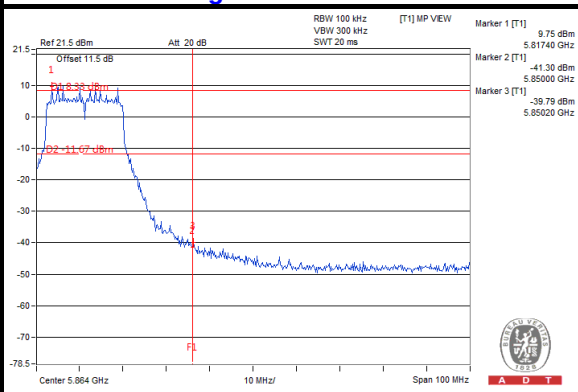
CH 165



CH 149 Band edge



CH 165 Band edge

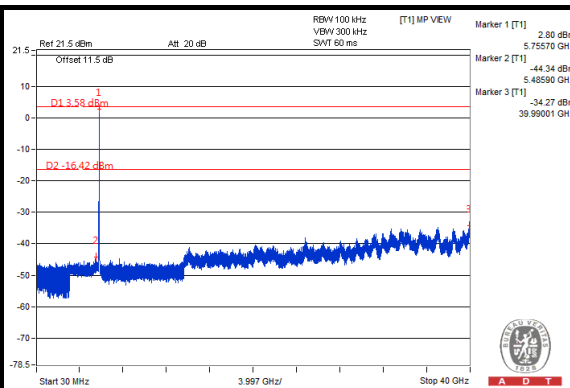
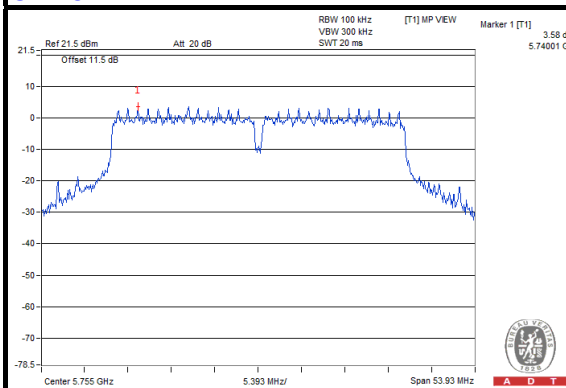




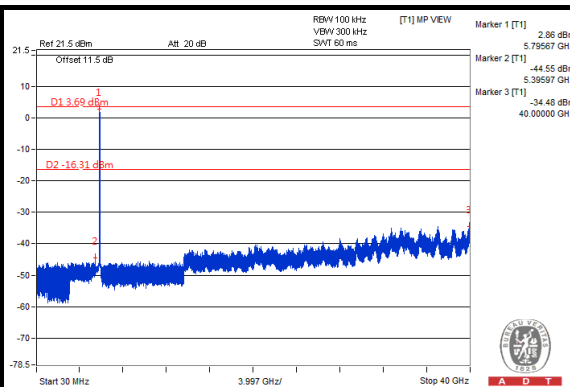
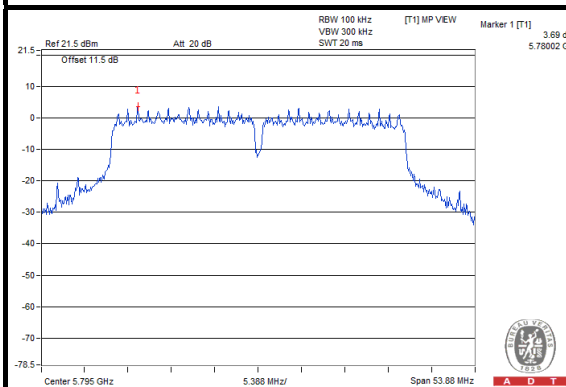
A D T

802.11n (40MHz): CHAIN 0

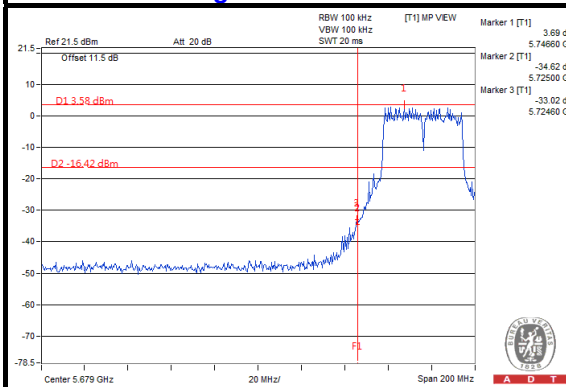
CH 151



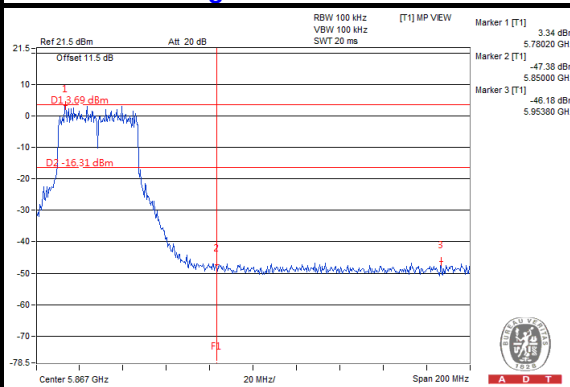
CH 159



CH 151 Band edge



CH 159 Band edge

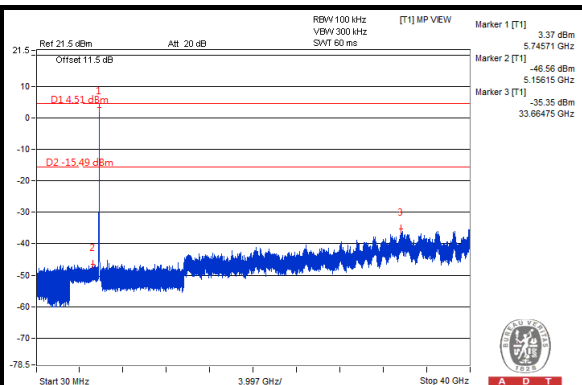
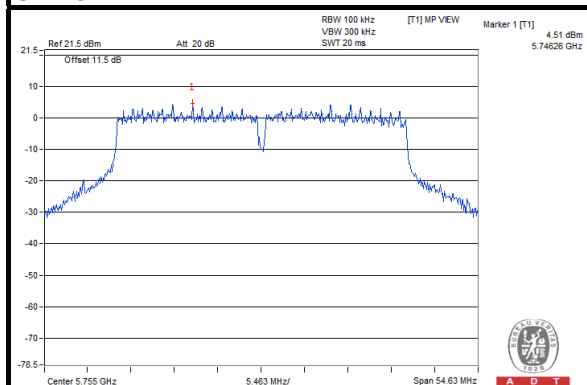




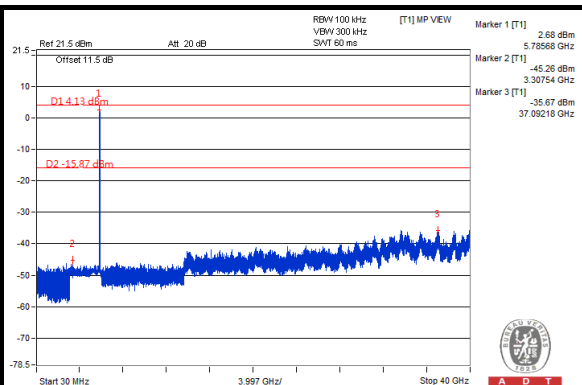
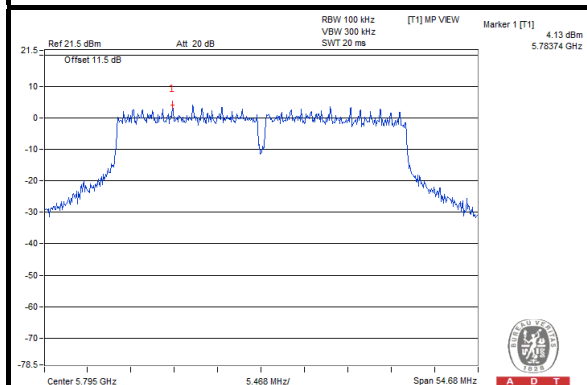
A D T

CHAIN 1

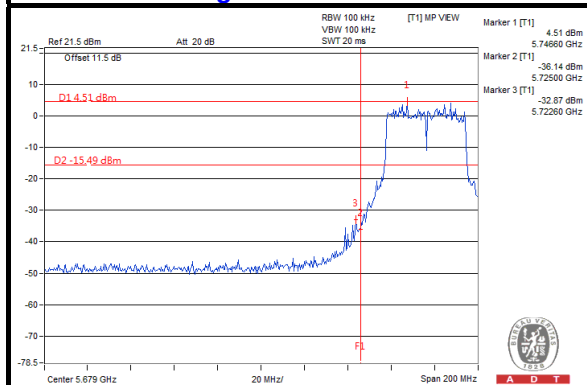
CH 151



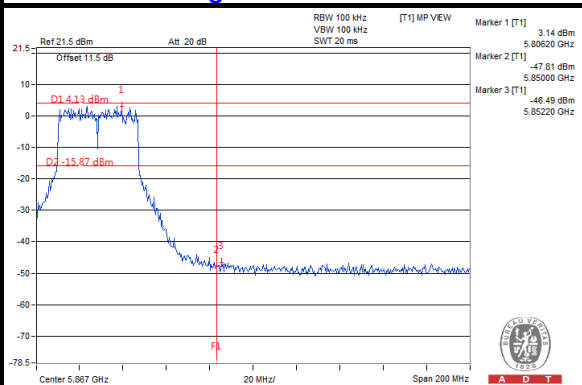
CH 159



CH 151 Band edge



CH 159 Band edge

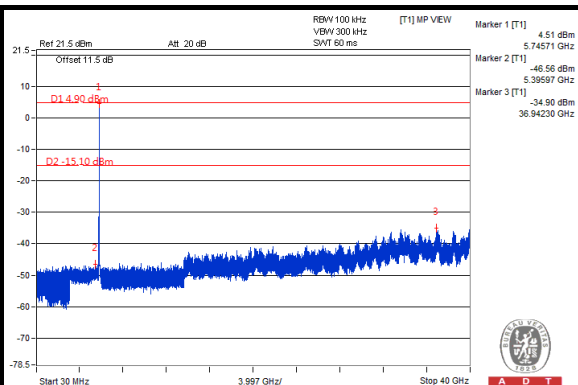
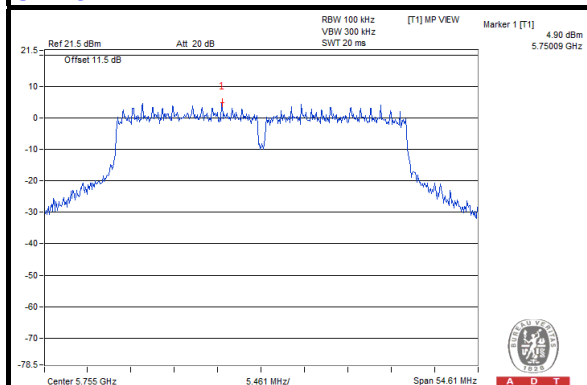




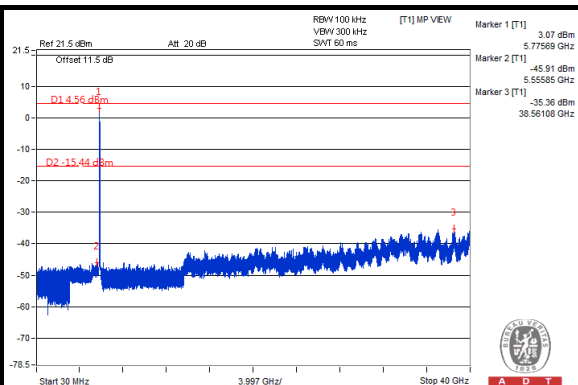
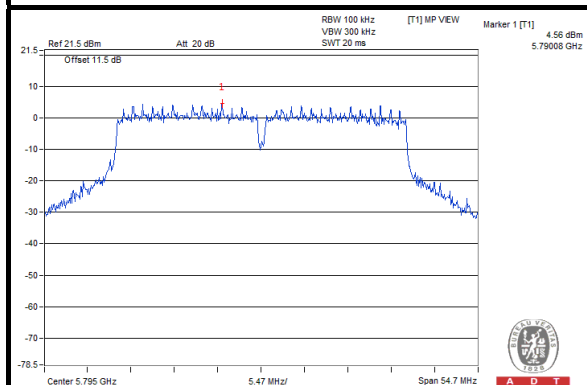
A D T

CHAIN 2

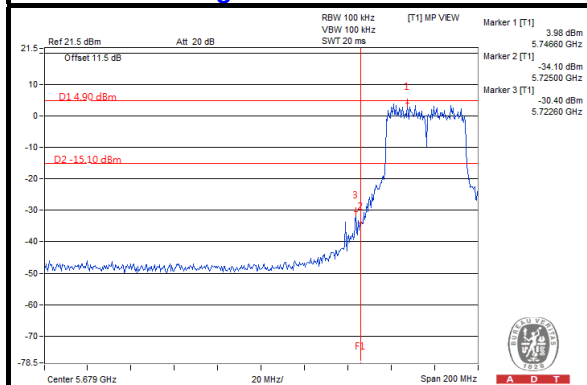
CH 151



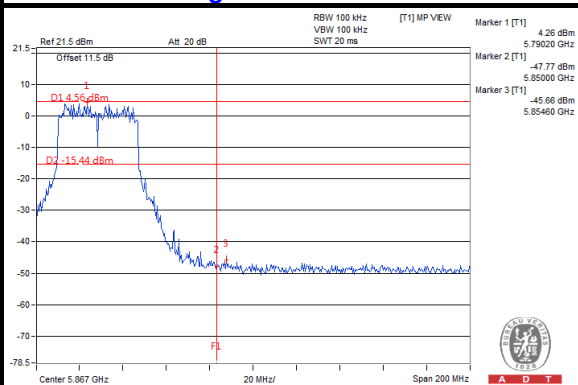
CH 159



CH 151 Band edge



CH 159 Band edge



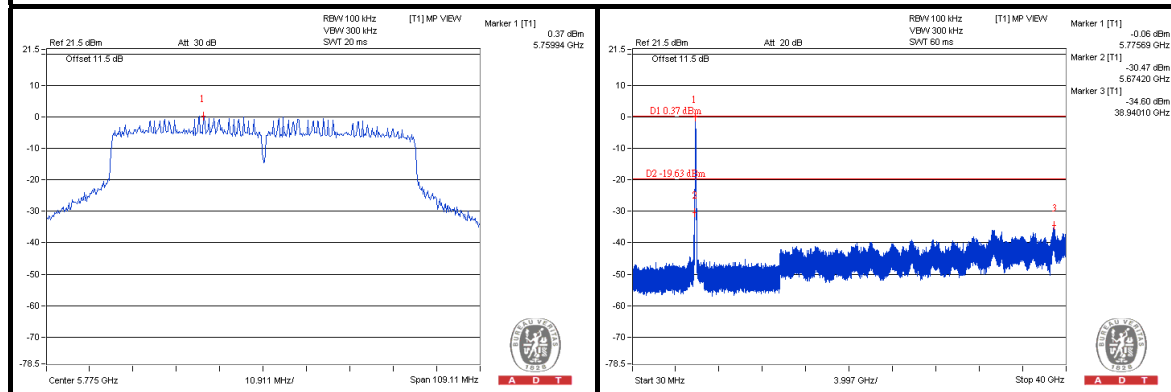


A D T

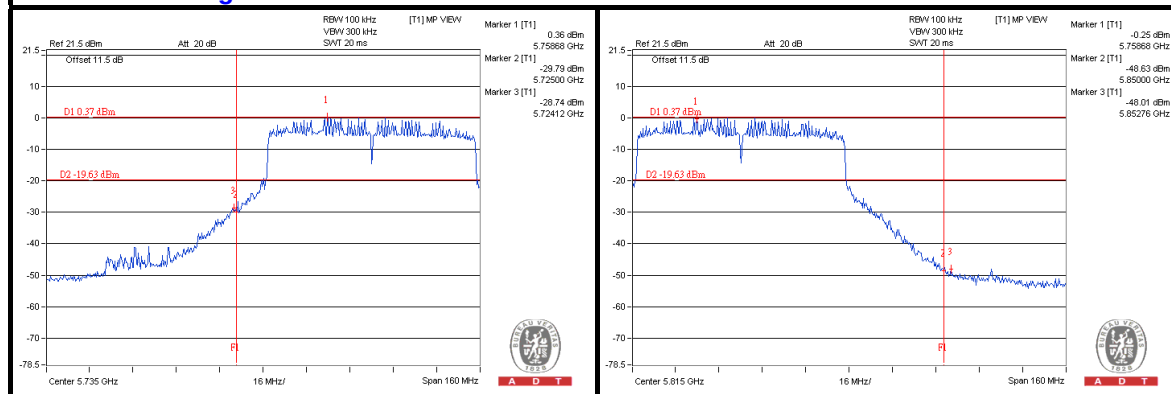
802.11ac (80MHz)

CHAIN 0

CH 155



CH 155 Band edge

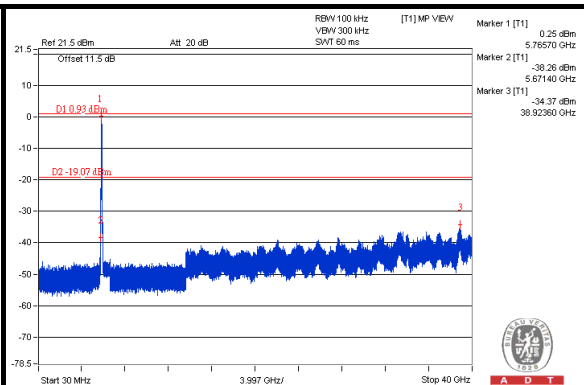
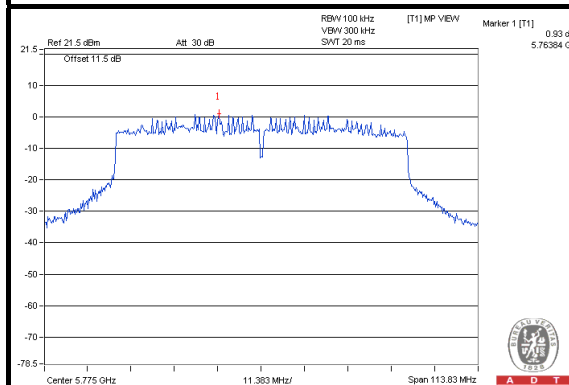




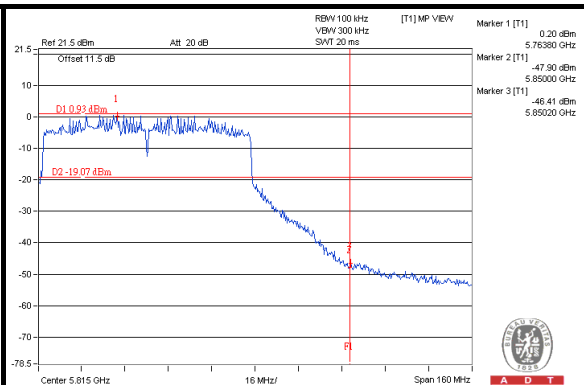
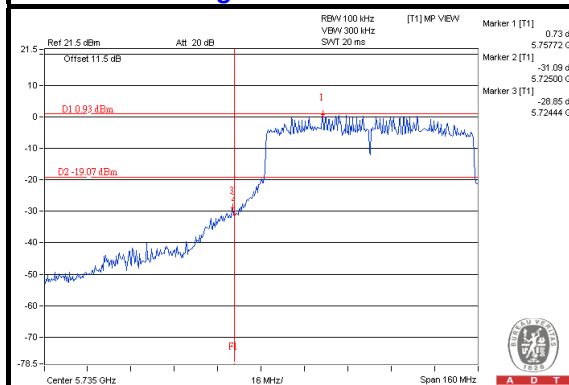
A D T

CHAIN 1

CH 155



CH 155 Band edge

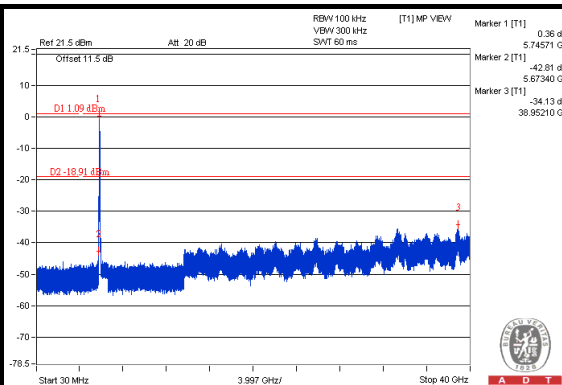
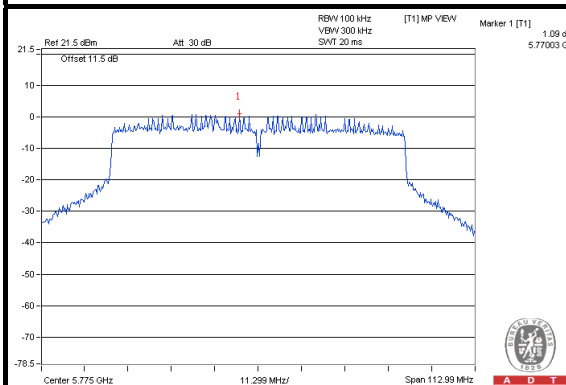




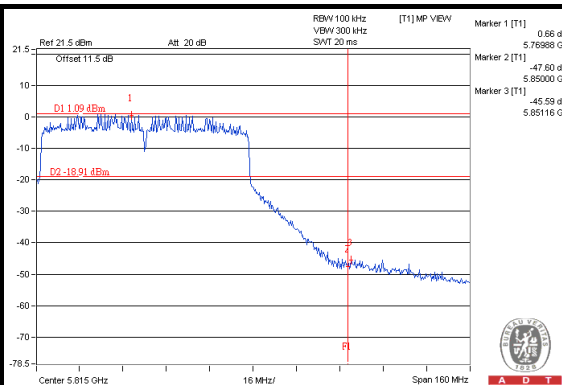
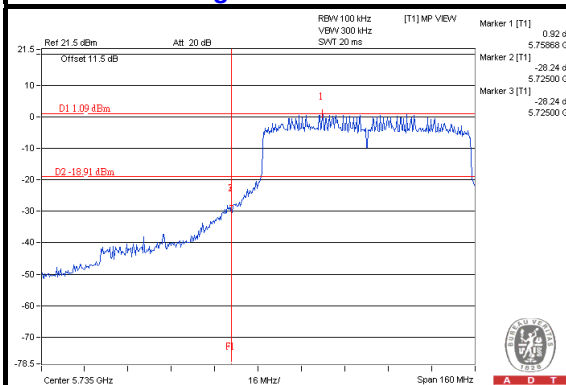
A D T

CHAIN 2

CH 155



CH 155 Band edge





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6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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7. INFORMATION ON THE TESTING LABORATORIES

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

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

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

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

---END---