FCC Test Report

Report No.:	RF180912C10
FCC ID:	M82-ZENOCCU000
Model:	ZenoCCU
Received Date:	Aug. 28, 2018
Test Date:	Nov. 06 ~ Nov. 22, 2018
Issued Date:	Nov. 27, 2018
Applicant:	ADVANTECH CO., LTD
Address:	No. 1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei, Taiwan 114
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF180912C10	Original release	Nov. 27, 2018

1 Certificate of Conformity

Product:	IPC
Brand:	Zenoway
Model:	ZenoCCU
Sample Status:	Engineering Sample
Applicant:	ADVANTECH CO., LTD
Test Date:	Nov. 06 ~ Nov. 22, 2018
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

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

Prepared by : Pettie Chen , **Date:** Nov. 27, 2018

Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Nov. 27, 2018

Bruce Chen / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -13.00dB at 0.16093MHz
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -2.1dB at 2483.50, 4874.00MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is RP-SMA(M) 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	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	IPC
Brand	Zenoway
Model	ZenoCCU
Sample Status	Engineering sample
Power Supply Rating	9-60Vdc
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps
Operating Frequency	2412 ~ 2472MHz
Number of Channel	13 for 802.11b, 802.11g, 802.11n (HT20) 9 for 802.11n (HT40)
Output Power	153.182mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Data Cable Supplied	NA

Note:

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

Band	Modulation Mode	TX Function
2.4GHz	802.11b	2TX
	802.11g	2TX
	802.11n (HT20)	2TX
	802.11n (HT40)	2TX

2. The EUT uses following antenna.

Antenna 1							
Type	Monopole						
Connector	RP-SMA(M)						
Straight position							
Frequency (MHz)	2400	2450	2500	5150	5350	5750	5850
Gain (dBi)	1.04	1.25	0.82	0.85	1.38	0.28	1.04
Bent position 90°							
Frequency (MHz)	2400	2450	2500	5150	5350	5750	5850
Gain (dBi)	1.19	1.57	2.57	0.66	1.03	0.59	1.19

Antenna 2		
Type	Monopole	
Connector	SMA Male Reverse	
Frequency (MHz)	2400~2500	5150~5850
Gain (dBi)	1.64	-2.9

* The antenna 1 (Bent position) is the worst case for final tests.

3. The computing device complies with Part 15 class A rules and SDoC report is issued separately.

3.2 Description of Test Modes

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

Channel	Frequency	Channel	Frequency
1	2412MHz	8	2447MHz
2	2417MHz	9	2452MHz
3	2422MHz	10	2457MHz
4	2427MHz	11	2462MHz
5	2432MHz	12	2467MHz
6	2437MHz	13	2472MHz
7	2442MHz		

9 channels are provided for 802.11n (HT40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

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

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

Radiated Emission Test (Above 1GHz):

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 11	3, 6, 9, 10, 11	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

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

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

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

Power Line Conducted Emission Test:

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

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

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

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 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 11	3, 6, 9, 10, 11	OFDM	BPSK	13.5

Test Condition:

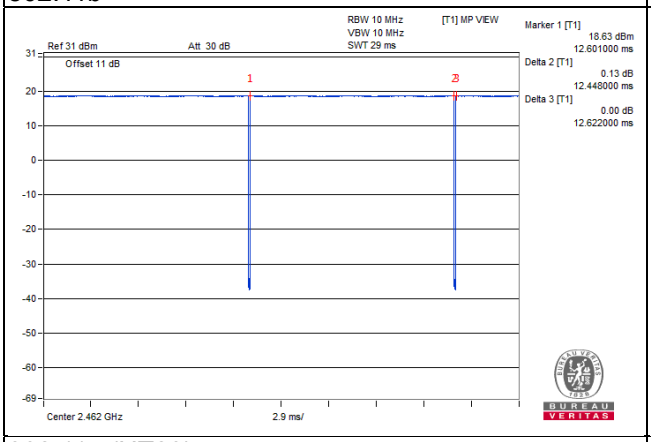
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	24deg. C, 66%RH	120Vac, 60Hz	Adair Peng
RE<1G	24deg. C, 66%RH	120Vac, 60Hz	Adair Peng
PLC	25deg. C, 66%RH	120Vac, 60Hz	Willy Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Frank Liu

3.3 Duty Cycle of Test Signal

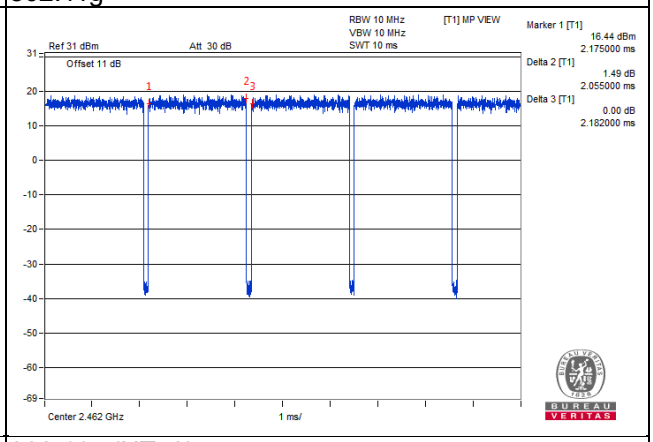
Duty cycle of test signal is > 98%, duty factor is not required.
Duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 12.448/12.622 = 0.986
802.11g: Duty cycle = 2.055/2.182 = 0.942, Duty factor = 10 * log(1/0.942) = 0.26
802.11n (HT20): Duty cycle = 1.917/2.035 = 0.942, Duty factor = 10 * log(1/0.942) = 0.26
802.11n (HT40): Duty cycle = 0.942/1.057 = 0.891, Duty factor = 10 * log(1/0.891) = 0.50

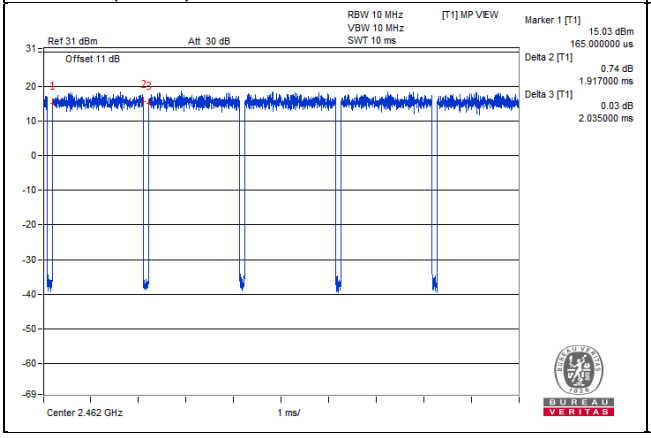
802.11b



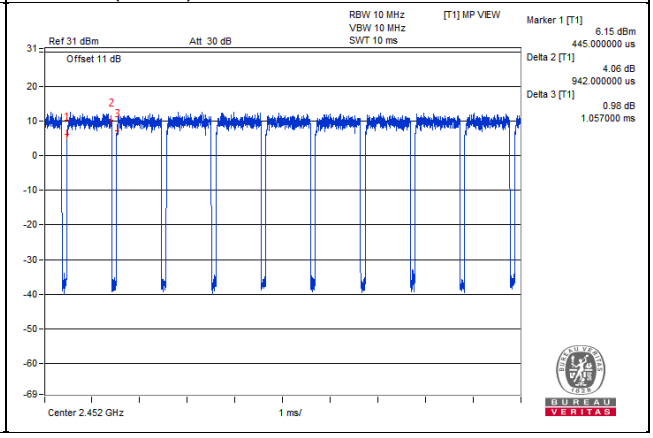
802.11g



802.11n (HT20)



802.11n (HT40)



3.4 Description of Support Units

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

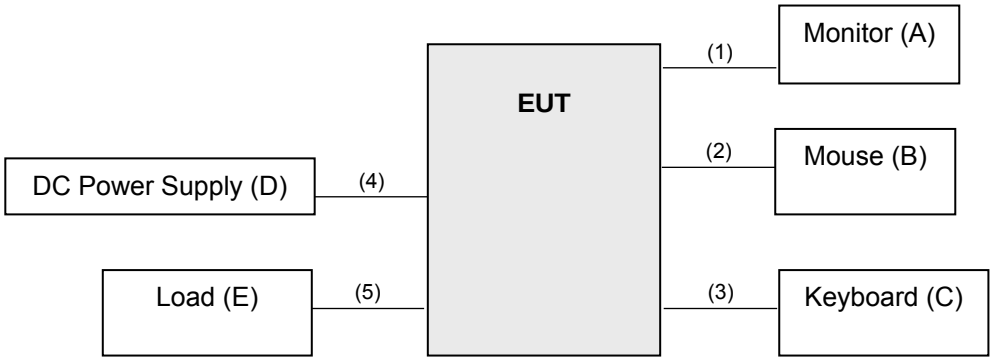
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Monitor	ViewSonic	VX2457-MHD	UG0182942330	FCC DoC Approved	-
B.	Mouse	DELL	MS111-P	CN-011D3V-71581-1CJ-0936	FCC DoC Approved	-
C.	Keyboard	DELL	RT7D50	CN-0J4624-37172-44T-000M	FCC DoC Approved	-
D.	DC Power Supply	Topward	33010D	807748	NA	-
E.	Load	NA	NA	NA	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Display cable	1	1.6	N	0	-
2.	USB cable	1	1.6	Y	0	-
3.	USB cable	1	1.6	Y	0	-
4.	Power cable	1	1.0	N	0	-
5.	RJ45 cable	3	1.6	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

KDB 558074 D01 15.247 Meas Guidance v05

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

Note:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 29, 2018	May 28, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 12, 2017	Dec. 11, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	9120D	209	Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2018	Aug. 20, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Apr. 03, 2018	Apr. 02, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-S M-8000	Cable-CH3-03 (309224+170907)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable WOKEN	8D-FB	Cable-CH3-01	Aug. 21, 2018	Aug. 20, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Meter KEYSIGHT	U2021XA	MY55050005/MY5519 0004/MY55190007/MY 55210005	Jul. 17, 2018	Jul. 16, 2019

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC 7450F-3.

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

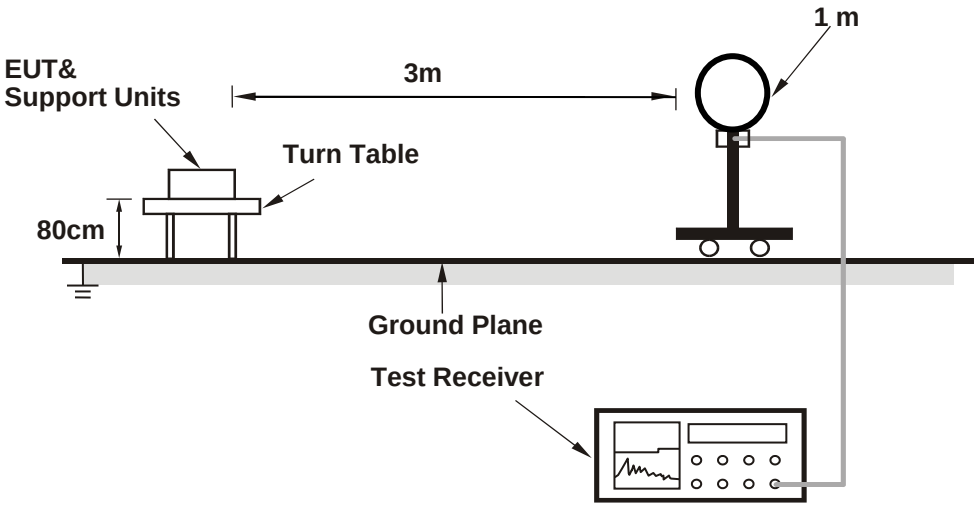
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (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

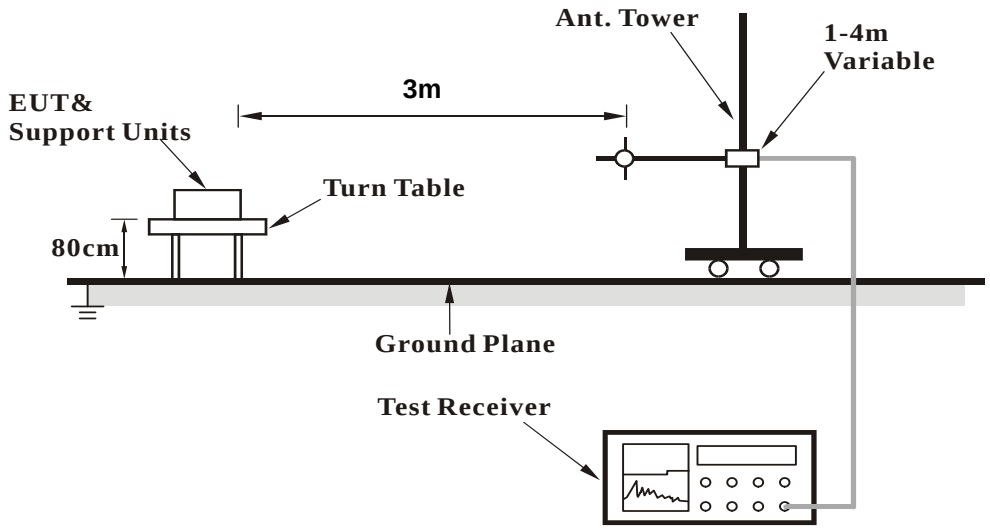
No deviation.

4.1.5 Test Set Up

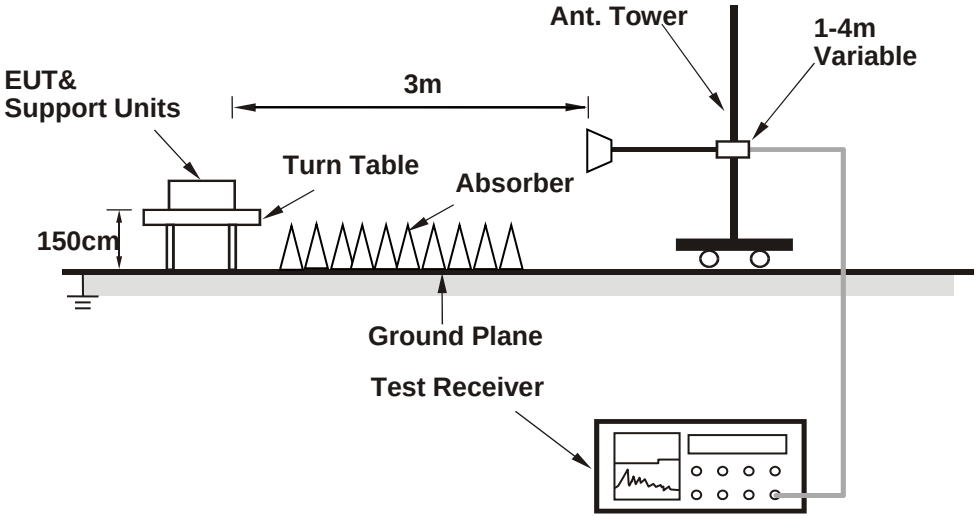
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz worst-Case data:

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.5 PK	74.0	-13.5	1.09 H	40	27.5	33.0
2	2390.00	49.5 AV	54.0	-4.5	1.09 H	40	16.5	33.0
3	*2412.00	110.4 PK			1.11 H	47	77.5	32.9
4	*2412.00	106.5 AV			1.11 H	47	73.6	32.9
5	4824.00	55.1 PK	74.0	-18.9	1.29 H	163	51.5	3.6
6	4824.00	51.8 AV	54.0	-2.2	1.29 H	163	48.2	3.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.5 PK	74.0	-14.5	3.73 V	39	26.5	33.0
2	2390.00	47.3 AV	54.0	-6.7	3.73 V	39	14.3	33.0
3	*2412.00	107.5 PK			3.80 V	27	74.6	32.9
4	*2412.00	103.9 AV			3.80 V	27	71.0	32.9
5	4824.00	54.7 PK	74.0	-19.3	2.62 V	175	51.1	3.6
6	4824.00	51.3 AV	54.0	-2.7	2.62 V	175	47.7	3.6

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	110.2 PK			1.55 H	41	77.3	32.9
2	*2437.00	106.6 AV			1.55 H	41	73.7	32.9
3	4874.00	55.1 PK	74.0	-18.9	1.33 H	141	51.8	3.3
4	**4874.00**	**51.9 AV**	**54.0**	**-2.1**	**1.33 H**	**141**	**48.6**	**3.3**
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	108.7 PK			3.12 V	198	75.8	32.9
2	*2437.00	104.9 AV			3.12 V	198	72.0	32.9
3	4874.00	54.5 PK	74.0	-19.5	3.13 V	174	51.2	3.3
4	4874.00	51.4 AV	54.0	-2.6	3.13 V	174	48.1	3.3

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.2 PK			1.19 H	40	77.4	32.8
2	*2462.00	107.9 AV			1.19 H	40	75.1	32.8
3	2483.50	60.1 PK	74.0	-13.9	1.26 H	45	27.4	32.7
4	2483.50	48.2 AV	54.0	-5.8	1.26 H	45	15.5	32.7
5	4924.00	54.7 PK	74.0	-19.3	1.25 H	152	51.6	3.1
6	4924.00	51.8 AV	54.0	-2.2	1.25 H	152	48.7	3.1
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	106.8 PK			1.00 V	198	74.0	32.8
2	*2462.00	103.7 AV			1.00 V	198	70.9	32.8
3	2483.50	59.2 PK	74.0	-14.8	2.88 V	203	26.5	32.7
4	2483.50	47.8 AV	54.0	-6.2	2.88 V	203	15.1	32.7
5	4924.00	54.2 PK	74.0	-19.8	3.08 V	175	51.1	3.1
6	4924.00	51.1 AV	54.0	-2.9	3.08 V	175	48.0	3.1

REMARKS:

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

CHANNEL	TX Channel 12	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2467.00	106.4 PK			2.28 H	249	73.6	32.8
2	*2467.00	102.6 AV			2.28 H	249	69.8	32.8
3	2483.50	61.3 PK	74.0	-12.7	2.46 H	244	28.6	32.7
4	2483.50	51.1 AV	54.0	-2.9	2.46 H	244	18.4	32.7
5	4934.00	51.4 PK	74.0	-22.6	3.94 H	27	48.2	3.2
6	4934.00	46.1 AV	54.0	-7.9	3.94 H	27	42.9	3.2
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	*2467.00	104.0 PK			2.77 V	153	71.2	32.8
2	*2467.00	100.0 AV			2.77 V	153	67.2	32.8
3	2483.50	60.3 PK	74.0	-13.7	2.69 V	160	27.6	32.7
4	2483.50	49.0 AV	54.0	-5.0	2.69 V	160	16.3	32.7
5	4934.00	55.1 PK	74.0	-18.9	2.94 V	179	51.9	3.2
6	4934.00	51.8 AV	54.0	-2.2	2.94 V	179	48.6	3.2

REMARKS:

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

CHANNEL	TX Channel 13	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2472.00	102.3 PK			2.24 H	246	69.6	32.7
2	*2472.00	98.5 AV			2.24 H	246	65.8	32.7
3	2483.50	61.3 PK	74.0	-12.7	2.23 H	245	28.6	32.7
4	2483.50	49.9 AV	54.0	-4.1	2.23 H	245	17.2	32.7
5	4944.00	48.4 PK	74.0	-25.6	3.95 H	26	45.2	3.2
6	4944.00	37.1 AV	54.0	-16.9	3.95 H	26	33.9	3.2
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	*2472.00	101.5 PK			2.73 V	166	68.8	32.7
2	*2472.00	97.3 AV			2.73 V	166	64.6	32.7
3	2483.50	59.8 PK	74.0	-14.2	2.69 V	155	27.1	32.7
4	2483.50	48.5 AV	54.0	-5.5	2.69 V	155	15.8	32.7
5	4944.00	51.1 PK	74.0	-22.9	3.02 V	181	47.9	3.2
6	4944.00	42.7 AV	54.0	-11.3	3.02 V	181	39.5	3.2

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.

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.7 PK	74.0	-12.3	1.19 H	39	28.7	33.0
2	2390.00	50.8 AV	54.0	-3.2	1.19 H	39	17.8	33.0
3	*2412.00	110.1 PK			1.15 H	45	77.2	32.9
4	*2412.00	100.4 AV			1.15 H	45	67.5	32.9
5	4824.00	52.6 PK	74.0	-21.4	1.06 H	135	49.0	3.6
6	4824.00	38.5 AV	54.0	-15.5	1.06 H	135	34.9	3.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.9 PK	74.0	-11.1	3.63 V	187	29.9	33.0
2	2390.00	50.9 AV	54.0	-3.1	3.63 V	187	17.9	33.0
3	*2412.00	110.2 PK			3.58 V	201	77.3	32.9
4	*2412.00	100.1 AV			3.58 V	201	67.2	32.9
5	4824.00	49.0 PK	74.0	-25.0	1.06 V	189	45.4	3.6
6	4824.00	36.1 AV	54.0	-17.9	1.06 V	189	32.5	3.6

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	113.8 PK			1.41 H	48	80.9	32.9
2	*2437.00	103.5 AV			1.41 H	48	70.6	32.9
3	4874.00	55.2 PK	74.0	-18.8	1.17 H	137	51.9	3.3
4	4874.00	41.1 AV	54.0	-12.9	1.17 H	137	37.8	3.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	111.1 PK			3.59 V	148	78.2	32.9
2	*2437.00	101.3 AV			3.59 V	148	68.4	32.9
3	4874.00	54.3 PK	74.0	-19.7	2.14 V	176	51.0	3.3
4	4874.00	40.4 AV	54.0	-13.6	2.14 V	176	37.1	3.3

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	109.2 PK			1.52 H	40	76.4	32.8
2	*2462.00	99.1 AV			1.52 H	40	66.3	32.8
3	2483.50	64.8 PK	74.0	-9.2	1.61 H	52	32.1	32.7
4	2483.50	51.2 AV	54.0	-2.8	1.61 H	52	18.5	32.7
5	4924.00	49.2 PK	74.0	-24.8	1.46 H	127	46.1	3.1
6	4924.00	36.1 AV	54.0	-17.9	1.46 H	127	33.0	3.1
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	107.6 PK			3.16 V	171	74.8	32.8
2	*2462.00	97.7 AV			3.16 V	171	64.9	32.8
3	2483.50	65.4 PK	74.0	-8.6	3.23 V	166	32.7	32.7
4	2483.50	51.2 AV	54.0	-2.8	3.23 V	166	18.5	32.7
5	4924.00	50.9 PK	74.0	-23.1	2.24 V	162	47.8	3.1
6	4924.00	37.0 AV	54.0	-17.0	2.24 V	162	33.9	3.1

REMARKS:

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

CHANNEL	TX Channel 12	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2467.00	105.3 PK			3.28 H	283	72.5	32.8
2	*2467.00	94.8 AV			3.28 H	283	62.0	32.8
3	2483.50	65.5 PK	74.0	-8.5	3.21 H	284	32.8	32.7
4	**2483.50**	**51.9 AV**	**54.0**	**-2.1**	**3.21 H**	**284**	**19.2**	**32.7**
5	4934.00	48.1 PK	74.0	-25.9	3.96 H	29	44.9	3.2
6	4934.00	34.4 AV	54.0	-19.6	3.96 H	29	31.2	3.2
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	*2467.00	102.9 PK			3.10 V	164	70.1	32.8
2	*2467.00	92.9 AV			3.10 V	164	60.1	32.8
3	2483.50	64.4 PK	74.0	-9.6	3.01 V	159	31.7	32.7
4	2483.50	51.3 AV	54.0	-2.7	3.01 V	159	18.6	32.7
5	4934.00	48.2 PK	74.0	-25.8	3.03 V	181	45.0	3.2
6	4934.00	35.0 AV	54.0	-19.0	3.03 V	181	31.8	3.2

REMARKS:

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

CHANNEL	TX Channel 13	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2472.00	95.9 PK			3.23 H	281	63.2	32.7
2	*2472.00	85.2 AV			3.23 H	281	52.5	32.7
3	2483.50	63.8 PK	74.0	-10.2	3.31 H	285	31.1	32.7
4	2483.50	50.2 AV	54.0	-3.8	3.31 H	285	17.5	32.7
5	4944.00	47.5 PK	74.0	-26.5	3.93 H	26	44.3	3.2
6	4944.00	34.1 AV	54.0	-19.9	3.93 H	26	30.9	3.2
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	*2472.00	93.5 PK			3.11 V	165	60.8	32.7
2	*2472.00	83.2 AV			3.11 V	165	50.5	32.7
3	2483.50	62.7 PK	74.0	-11.3	3.09 V	157	30.0	32.7
4	2483.50	49.7 AV	54.0	-4.3	3.09 V	157	17.0	32.7
5	4944.00	48.1 PK	74.0	-25.9	3.09 V	179	44.9	3.2
6	4944.00	34.4 AV	54.0	-19.6	3.09 V	179	31.2	3.2

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.

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.9 PK	74.0	-10.1	1.34 H	45	30.9	33.0
2	2390.00	51.7 AV	54.0	-2.3	1.34 H	45	18.7	33.0
3	*2412.00	109.1 PK			1.47 H	48	76.2	32.9
4	*2412.00	98.8 AV			1.47 H	48	65.9	32.9
5	4824.00	50.4 PK	74.0	-23.6	1.34 H	76	46.8	3.6
6	4824.00	36.2 AV	54.0	-17.8	1.34 H	76	32.6	3.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.1 PK	74.0	-10.9	2.88 V	189	30.1	33.0
2	2390.00	50.6 AV	54.0	-3.4	2.88 V	189	17.6	33.0
3	*2412.00	107.6 PK			2.87 V	183	74.7	32.9
4	*2412.00	97.4 AV			2.87 V	183	64.5	32.9
5	4824.00	50.6 PK	74.0	-23.4	2.13 V	199	47.0	3.6
6	4824.00	36.7 AV	54.0	-17.3	2.13 V	199	33.1	3.6

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	112.4 PK			1.36 H	49	79.5	32.9
2	*2437.00	102.4 AV			1.36 H	49	69.5	32.9
3	4874.00	54.7 PK	74.0	-19.3	1.25 H	81	51.4	3.3
4	4874.00	39.1 AV	54.0	-14.9	1.25 H	81	35.8	3.3
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	110.8 PK			2.89 V	180	77.9	32.9
2	*2437.00	101.1 AV			2.89 V	180	68.2	32.9
3	4874.00	55.1 PK	74.0	-18.9	1.98 V	199	51.8	3.3
4	4874.00	39.3 AV	54.0	-14.7	1.98 V	199	36.0	3.3

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.0 PK			1.21 H	49	74.2	32.8
2	*2462.00	96.8 AV			1.21 H	49	64.0	32.8
3	2483.50	64.3 PK	74.0	-9.7	1.37 H	50	31.6	32.7
4	2483.50	51.6 AV	54.0	-2.4	1.37 H	50	18.9	32.7
5	4924.00	48.0 PK	74.0	-26.0	1.71 H	150	44.9	3.1
6	4924.00	34.2 AV	54.0	-19.8	1.71 H	150	31.1	3.1
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	105.2 PK			2.87 V	184	72.4	32.8
2	*2462.00	95.3 AV			2.87 V	184	62.5	32.8
3	2483.50	61.8 PK	74.0	-12.2	3.03 V	188	29.1	32.7
4	2483.50	49.2 AV	54.0	-4.8	3.03 V	188	16.5	32.7
5	4924.00	48.1 PK	74.0	-25.9	2.03 V	177	45.0	3.1
6	4924.00	34.5 AV	54.0	-19.5	2.03 V	177	31.4	3.1

REMARKS:

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

CHANNEL	TX Channel 12	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2467.00	105.5 PK			3.25 H	282	72.7	32.8
2	*2467.00	94.6 AV			3.25 H	282	61.8	32.8
3	2483.50	65.2 PK	74.0	-8.8	3.21 H	269	32.5	32.7
4	2483.50	51.6 AV	54.0	-2.4	3.21 H	269	18.9	32.7
5	4934.00	48.1 PK	74.0	-25.9	3.89 H	29	44.9	3.2
6	4934.00	34.1 AV	54.0	-19.9	3.89 H	29	30.9	3.2
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	*2467.00	103.1 PK			3.12 V	165	70.3	32.8
2	*2467.00	92.7 AV			3.12 V	165	59.9	32.8
3	2483.50	64.0 PK	74.0	-10.0	3.01 V	170	31.3	32.7
4	2483.50	50.9 AV	54.0	-3.1	3.01 V	170	18.2	32.7
5	4934.00	48.5 PK	74.0	-25.5	3.09 V	183	45.3	3.2
6	4934.00	34.6 AV	54.0	-19.4	3.09 V	183	31.4	3.2

REMARKS:

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

CHANNEL	TX Channel 13	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2472.00	94.8 PK			3.26 H	281	62.1	32.7
2	*2472.00	83.9 AV			3.26 H	281	51.2	32.7
3	2483.50	63.8 PK	74.0	-10.2	3.22 H	283	31.1	32.7
4	2483.50	50.3 AV	54.0	-3.7	3.22 H	283	17.6	32.7
5	4944.00	48.0 PK	74.0	-26.0	3.93 H	27	44.8	3.2
6	4944.00	34.0 AV	54.0	-20.0	3.93 H	27	30.8	3.2
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	*2472.00	92.5 PK			3.13 V	162	59.8	32.7
2	*2472.00	81.8 AV			3.13 V	162	49.1	32.7
3	2483.50	62.8 PK	74.0	-11.2	3.14 V	169	30.1	32.7
4	2483.50	49.8 AV	54.0	-4.2	3.14 V	169	17.1	32.7
5	4944.00	48.5 PK	74.0	-25.5	2.99 V	183	45.3	3.2
6	4944.00	34.4 AV	54.0	-19.6	2.99 V	183	31.2	3.2

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.

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.2 PK	74.0	-7.8	1.53 H	50	33.2	33.0
2	2390.00	49.1 AV	54.0	-4.9	1.53 H	50	16.1	33.0
3	*2422.00	101.7 PK			1.43 H	46	68.8	32.9
4	*2422.00	92.1 AV			1.43 H	46	59.2	32.9
5	4844.00	47.1 PK	74.0	-26.9	1.44 H	78	43.7	3.4
6	4844.00	33.3 AV	54.0	-20.7	1.44 H	78	29.9	3.4
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	65.0 PK	74.0	-9.0	3.13 V	189	32.0	33.0
2	2390.00	48.7 AV	54.0	-5.3	3.13 V	189	15.7	33.0
3	*2422.00	100.4 PK			2.97 V	180	67.5	32.9
4	*2422.00	90.9 AV			2.97 V	180	58.0	32.9
5	4844.00	46.6 PK	74.0	-27.4	1.91 V	178	43.2	3.4
6	4844.00	32.7 AV	54.0	-21.3	1.91 V	178	29.3	3.4

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	104.9 PK			1.39 H	47	72.0	32.9
2	*2437.00	95.3 AV			1.39 H	47	62.4	32.9
3	2483.50	64.5 PK	74.0	-9.5	1.13 H	46	31.8	32.7
4	2483.50	51.7 AV	54.0	-2.3	1.13 H	46	19.0	32.7
5	4874.00	48.0 PK	74.0	-26.0	1.08 H	127	44.7	3.3
6	4874.00	35.2 AV	54.0	-18.8	1.08 H	127	31.9	3.3
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	103.1 PK			3.27 V	184	70.2	32.9
2	*2437.00	93.8 AV			3.27 V	184	60.9	32.9
3	2483.50	61.8 PK	74.0	-12.2	3.01 V	179	29.1	32.7
4	2483.50	49.5 AV	54.0	-4.5	3.01 V	179	16.8	32.7
5	4874.00	47.5 PK	74.0	-26.5	2.01 V	177	44.2	3.3
6	4874.00	34.6 AV	54.0	-19.4	2.01 V	177	31.3	3.3

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	100.7 PK			1.28 H	48	67.8	32.9
2	*2452.00	90.9 AV			1.28 H	48	58.0	32.9
3	2483.50	64.3 PK	74.0	-9.7	1.41 H	49	31.6	32.7
4	2483.50	50.5 AV	54.0	-3.5	1.41 H	49	17.8	32.7
5	4904.00	46.4 PK	74.0	-27.6	1.24 H	77	43.3	3.1
6	4904.00	34.0 AV	54.0	-20.0	1.24 H	77	30.9	3.1
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	98.9 PK			2.85 V	182	66.0	32.9
2	*2452.00	89.6 AV			2.85 V	182	56.7	32.9
3	2483.50	62.7 PK	74.0	-11.3	2.78 V	179	30.0	32.7
4	2483.50	49.6 AV	54.0	-4.4	2.78 V	179	16.9	32.7
5	4904.00	47.4 PK	74.0	-26.6	1.89 V	182	44.3	3.1
6	4904.00	33.6 AV	54.0	-20.4	1.89 V	182	30.5	3.1

REMARKS:

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

CHANNEL	TX Channel 10	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2457.00	101.0 PK			3.27 H	282	68.2	32.8
2	*2457.00	91.4 AV			3.27 H	282	58.6	32.8
3	2483.50	67.1 PK	74.0	-6.9	3.25 H	267	34.4	32.7
4	2483.50	51.5 AV	54.0	-2.5	3.25 H	267	18.8	32.7
5	4914.00	48.2 PK	74.0	-25.8	3.89 H	30	45.1	3.1
6	4914.00	34.2 AV	54.0	-19.8	3.89 H	30	31.1	3.1
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	*2457.00	98.5 PK			3.09 V	165	65.7	32.8
2	*2457.00	89.3 AV			3.09 V	165	56.5	32.8
3	2483.50	66.0 PK	74.0	-8.0	3.11 V	166	33.3	32.7
4	2483.50	50.7 AV	54.0	-3.3	3.11 V	166	18.0	32.7
5	4914.00	48.4 PK	74.0	-25.6	3.09 V	183	45.3	3.1
6	4914.00	34.6 AV	54.0	-19.4	3.09 V	183	31.5	3.1

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	92.3 PK			3.26 H	283	59.5	32.8
2	*2462.00	82.9 AV			3.26 H	283	50.1	32.8
3	2483.50	64.8 PK	74.0	-9.2	3.20 H	278	32.1	32.7
4	2483.50	50.6 AV	54.0	-3.4	3.20 H	278	17.9	32.7
5	4924.00	47.9 PK	74.0	-26.1	3.91 H	29	44.8	3.1
6	4924.00	34.1 AV	54.0	-19.9	3.91 H	29	31.0	3.1
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	89.9 PK			3.16 V	169	57.1	32.8
2	*2462.00	80.9 AV			3.16 V	169	48.1	32.8
3	2483.50	63.7 PK	74.0	-10.3	3.13 V	166	31.0	32.7
4	2483.50	49.9 AV	54.0	-4.1	3.13 V	166	17.2	32.7
5	4924.00	48.4 PK	74.0	-25.6	2.97 V	189	45.3	3.1
6	4924.00	34.5 AV	54.0	-19.5	2.97 V	189	31.4	3.1

REMARKS:

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

Below 1GHz worst-case data:

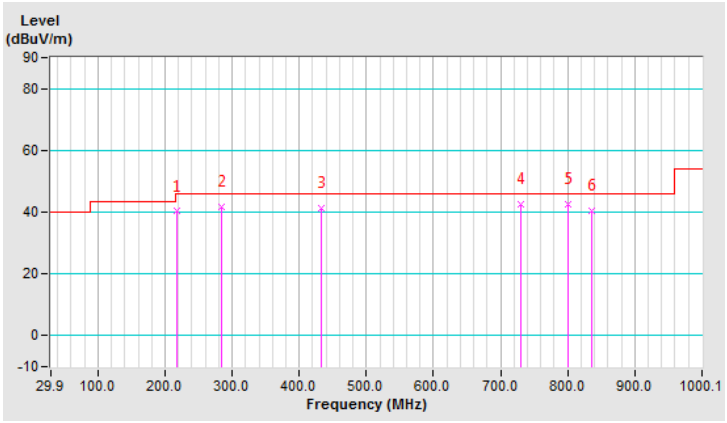
802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	218.50	40.2 QP	46.0	-5.8	1.49 H	168	51.5	-11.3
2	284.60	41.8 QP	46.0	-4.2	1.00 H	234	49.4	-7.6
3	432.37	41.1 QP	46.0	-4.9	1.49 H	156	45.6	-4.5
4	729.84	42.5 QP	46.0	-3.5	2.00 H	107	41.2	1.3
5	799.84	42.4 QP	46.0	-3.6	1.00 H	128	40.1	2.3
6	834.84	40.6 QP	46.0	-5.4	1.49 H	106	37.7	2.9

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

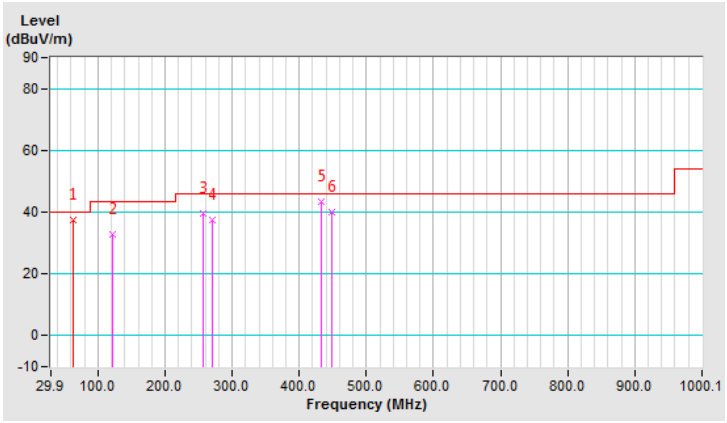


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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	62.49	37.3 QP	40.0	-2.7	1.00 V	289	47.3	-10.0
2	121.28	32.7 QP	43.5	-10.8	1.00 V	18	43.9	-11.2
3	257.38	39.4 QP	46.0	-6.6	1.49 V	145	48.6	-9.2
4	270.99	37.3 QP	46.0	-8.7	1.49 V	183	45.6	-8.3
5	432.37	43.5 QP	46.0	-2.5	1.00 V	137	48.0	-4.5
6	447.92	39.8 QP	46.0	-6.2	1.00 V	131	44.0	-4.2

Remarks:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102412	Feb. 08, 2018	Feb. 07, 2019
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 05, 2018	Sep. 04, 2019
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Feb. 05, 2018	Feb. 04, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 13, 2018	Aug. 12, 2019
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

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

4.2.3 Test Procedures

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

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

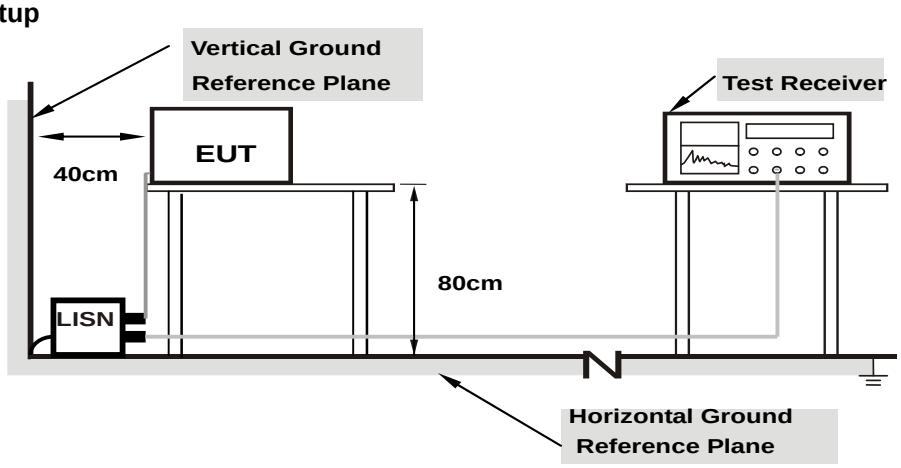
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

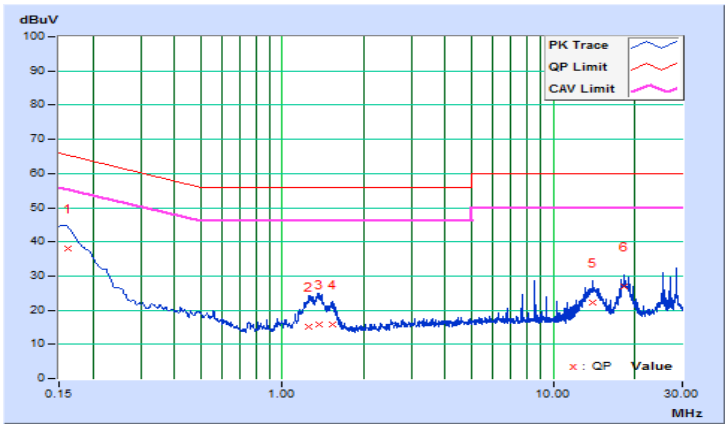
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16125	10.05	27.93	10.55	37.98	20.60	65.40	55.40	-27.42	-34.80
2	1.25532	10.07	5.13	2.53	15.20	12.60	56.00	46.00	-40.80	-33.40
3	1.36275	10.07	5.83	1.66	15.90	11.73	56.00	46.00	-40.10	-34.27
4	1.54240	10.08	5.66	2.22	15.74	12.30	56.00	46.00	-40.26	-33.70
5	13.97625	10.39	11.93	6.43	22.32	16.82	60.00	50.00	-37.68	-33.18
6	18.24450	10.48	16.44	13.01	26.92	23.49	60.00	50.00	-33.08	-26.51

Remarks:

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

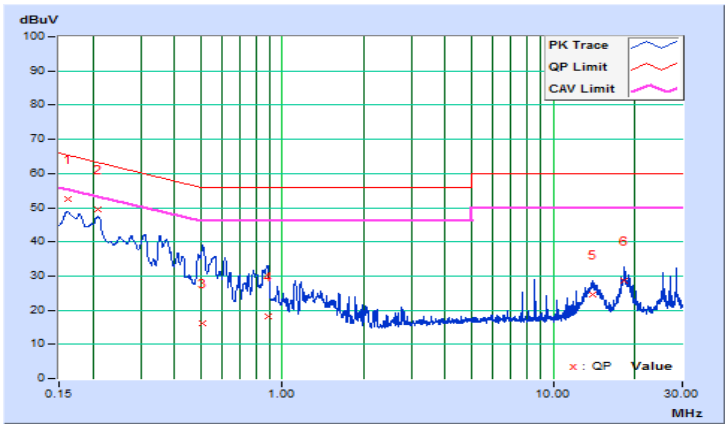


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.16093**	**10.06**	**42.36**	**13.71**	**52.42**	**23.77**	**65.42**	**55.42**	**-13.00**	**-31.65**
2	0.20846	10.07	39.59	12.26	49.66	22.33	63.27	53.27	-13.61	-30.94
3	0.50751	10.07	6.03	2.33	16.10	12.40	56.00	46.00	-39.90	-33.60
4	0.88350	10.08	8.13	3.13	18.21	13.21	56.00	46.00	-37.79	-32.79
5	13.98975	10.49	13.99	9.76	24.48	20.25	60.00	50.00	-35.52	-29.75
6	18.24225	10.62	18.10	14.20	28.72	24.82	60.00	50.00	-31.28	-25.18

Remarks:

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

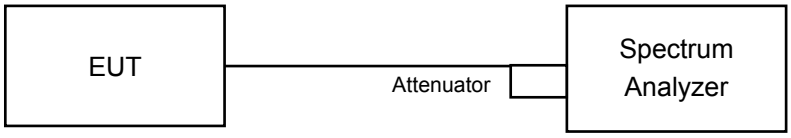


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100kHz

b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = peak.

c. Trace mode = max hold.

d. Sweep = auto couple.

e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	8.10	8.10	0.5	Pass
6	2437	7.61	8.10	0.5	Pass
11	2462	8.11	7.61	0.5	Pass
12	2467	7.66	7.68	0.5	Pass
13	2472	8.12	7.62	0.5	Pass

802.11g

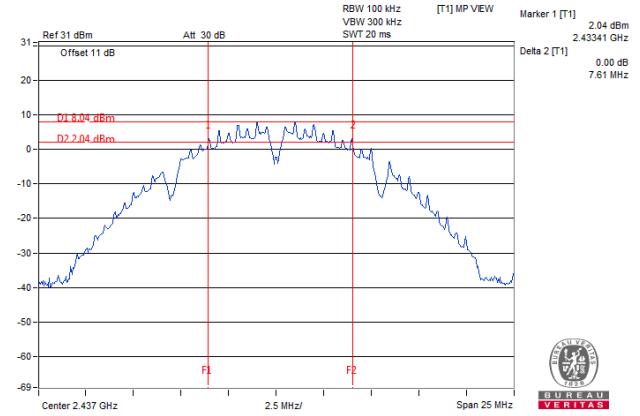
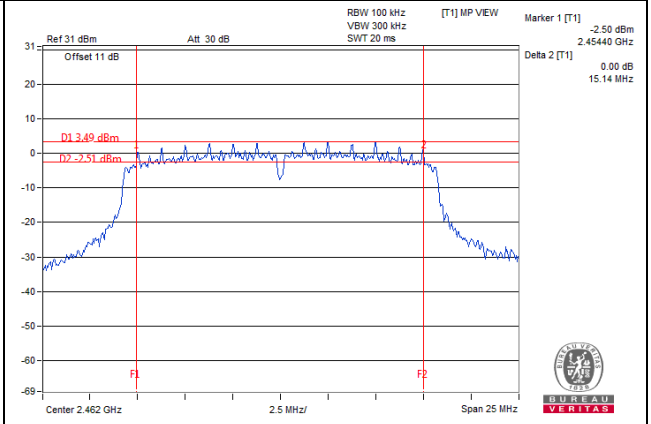
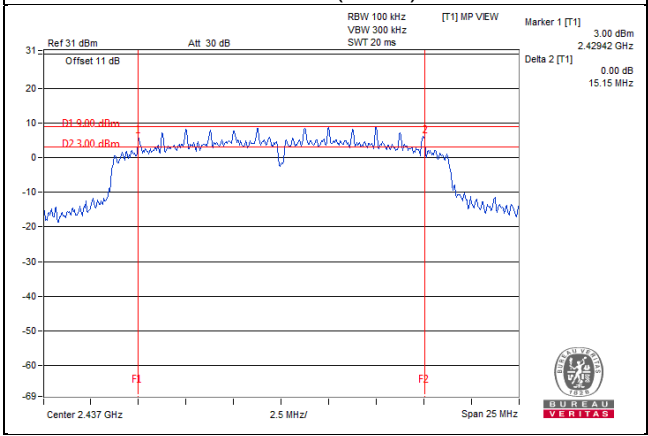
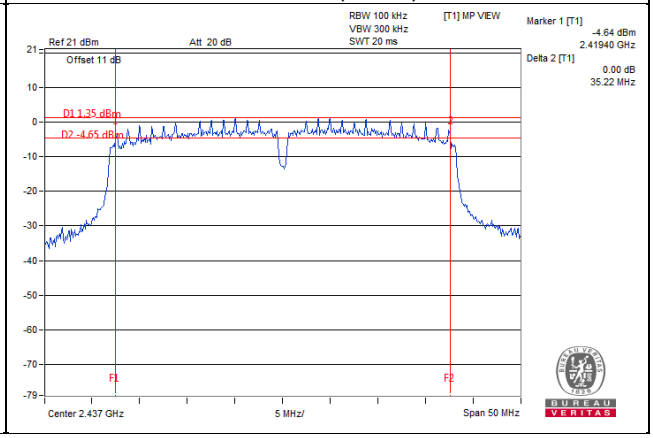
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.21	15.19	0.5	Pass
6	2437	15.20	15.19	0.5	Pass
11	2462	15.14	15.18	0.5	Pass
12	2467	15.20	15.17	0.5	Pass
13	2472	15.19	15.21	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.18	15.20	0.5	Pass
6	2437	15.15	15.15	0.5	Pass
11	2462	15.19	15.17	0.5	Pass
12	2467	15.16	15.18	0.5	Pass
13	2472	15.19	15.17	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.25	35.24	0.5	Pass
6	2437	35.22	35.23	0.5	Pass
9	2452	35.24	35.26	0.5	Pass
10	2457	35.27	35.24	0.5	Pass
11	2462	35.24	35.25	0.5	Pass

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

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

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

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

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

4.4.2 Test Setup

4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

802.11b

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	16.31	16.57	88.150	19.45	30	Pass
6	2437	16.22	16.93	91.196	19.60	30	Pass
11	2462	16.72	16.92	96.193	19.83	30	Pass
12	2467	17.23	17.33	106.920	20.29	30	Pass
13	2472	10.24	10.51	21.814	13.39	30	Pass

802.11g

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	15.27	15.41	68.405	18.35	30	Pass
6	2437	18.01	18.56	135.020	21.30	30	Pass
11	2462	14.13	14.44	53.679	17.30	30	Pass
12	2467	11.39	12.00	29.621	14.72	30	Pass
13	2472	1.68	2.37	3.198	5.05	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	14.90	15.28	64.632	18.10	30	Pass
6	2437	18.51	19.15	**153.182**	21.85	30	Pass
11	2462	13.03	13.42	42.070	16.24	30	Pass
12	2467	11.41	11.82	29.041	14.63	30	Pass
13	2472	0.40	1.00	2.355	3.72	30	Pass

802.11n (HT40)

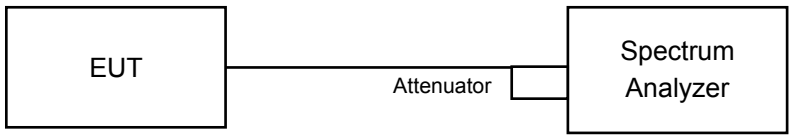
Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	10.91	11.55	26.620	14.25	30	Pass
6	2437	14.75	15.46	65.010	18.13	30	Pass
9	2452	10.10	10.71	22.009	13.43	30	Pass
10	2457	9.88	10.33	20.516	13.12	30	Pass
11	2462	1.83	2.20	3.184	5.03	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For duty cycle ≥ 98%

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

For duty cycle < 98%

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

TX chain	Chan.	Frequency (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-10.76	3.01	-7.75	8.00	Pass
	6	2437	-10.80	3.01	-7.79	8.00	Pass
	11	2462	-11.26	3.01	-8.25	8.00	Pass
	12	2467	-10.27	3.01	-7.26	8.00	Pass
	13	2472	-16.37	3.01	-13.36	8.00	Pass
1	1	2412	-11.51	3.01	-8.50	8.00	Pass
	6	2437	-10.75	3.01	-7.74	8.00	Pass
	11	2462	-11.55	3.01	-8.54	8.00	Pass
	12	2467	-10.02	3.01	-7.01	8.00	Pass
	13	2472	-16.66	3.01	-13.65	8.00	Pass

Note:
1. Method c of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 2.57dBi +10log(2) = 5.58dBi<6dBi, so the power density limit no need to reduced.

802.11g

TX chain	Channel	Frequency (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Duty Factor	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-15.24	3.01	0.26	-11.97	8.00	Pass
	6	2437	-12.12	3.01	0.26	-8.85	8.00	Pass
	11	2462	-16.48	3.01	0.26	-13.21	8.00	Pass
	12	2467	-18.58	3.01	0.26	-15.31	8.00	Pass
	13	2472	-28.64	3.01	0.26	-25.37	8.00	Pass
1	1	2412	-15.29	3.01	0.26	-12.02	8.00	Pass
	6	2437	-11.96	3.01	0.26	-8.69	8.00	Pass
	11	2462	-16.12	3.01	0.26	-12.85	8.00	Pass
	12	2467	-18.89	3.01	0.26	-15.62	8.00	Pass
	13	2472	-28.53	3.01	0.26	-25.26	8.00	Pass

Note:
1. Method c of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 2.57dBi +10log(2) = 5.58dBi<6dBi, so the power density limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

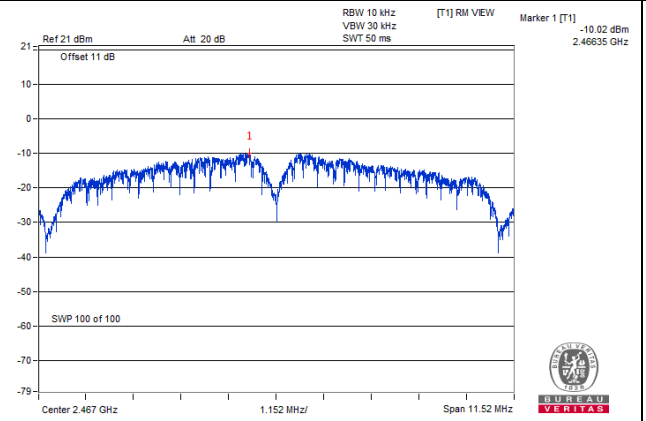
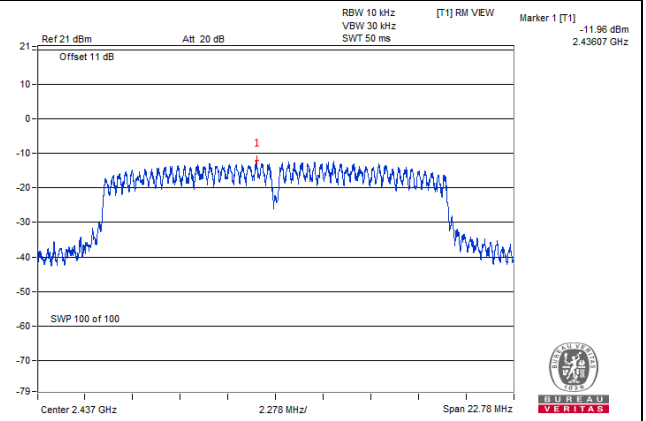
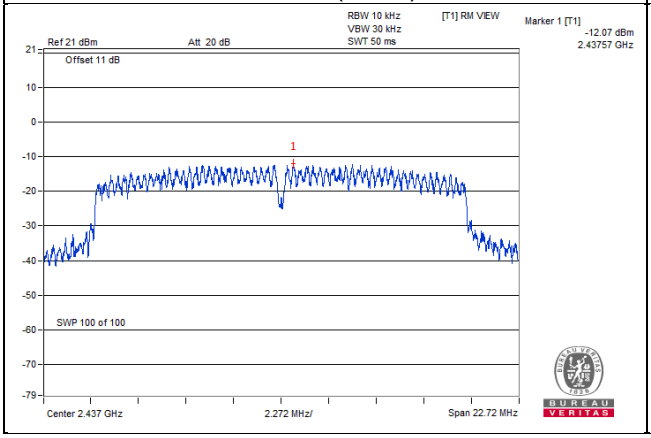
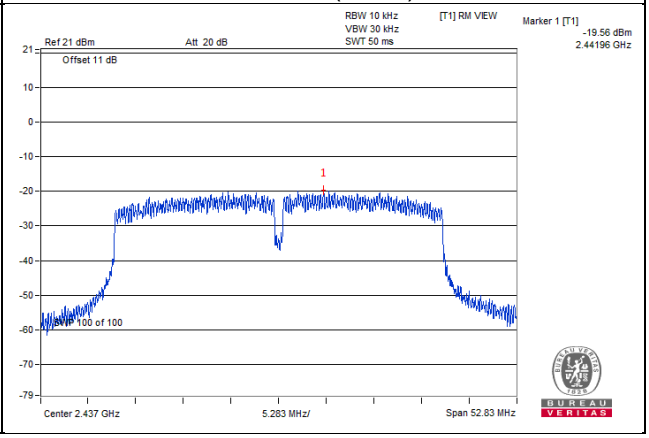
TX chain	Channel	Frequency (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Duty Factor	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-16.13	3.01	0.26	-12.86	8.00	Pass
	6	2437	-12.15	3.01	0.26	-8.88	8.00	Pass
	11	2462	-17.50	3.01	0.26	-14.23	8.00	Pass
	12	2467	-18.98	3.01	0.26	-15.71	8.00	Pass
	13	2472	-29.93	3.01	0.26	-26.66	8.00	Pass
1	1	2412	-15.83	3.01	0.26	-12.56	8.00	Pass
	6	2437	-12.07	3.01	0.26	-8.80	8.00	Pass
	11	2462	-17.55	3.01	0.26	-14.28	8.00	Pass
	12	2467	-18.36	3.01	0.26	-15.09	8.00	Pass
	13	2472	-29.59	3.01	0.26	-26.32	8.00	Pass

Note:
1. Method c of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 2.57dBi +10log(2) = 5.58dBi<6dBi, so the power density limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

TX chain	Channel	Frequency (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Duty Factor	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	3	2422	-23.28	3.01	0.50	-19.77	8.00	Pass
	6	2437	-19.56	3.01	0.50	-16.05	8.00	Pass
	9	2452	-24.47	3.01	0.50	-20.96	8.00	Pass
	10	2457	-24.46	3.01	0.50	-20.95	8.00	Pass
	11	2462	-32.62	3.01	0.50	-29.11	8.00	Pass
1	3	2422	-23.51	3.01	0.50	-20.00	8.00	Pass
	6	2437	-19.84	3.01	0.50	-16.33	8.00	Pass
	9	2452	-23.65	3.01	0.50	-20.14	8.00	Pass
	10	2457	-24.35	3.01	0.50	-20.84	8.00	Pass
	11	2462	-32.31	3.01	0.50	-28.80	8.00	Pass

Note:
1. Method c of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 2.57dBi +10log(2) = 5.58dBi<6dBi, so the power density limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

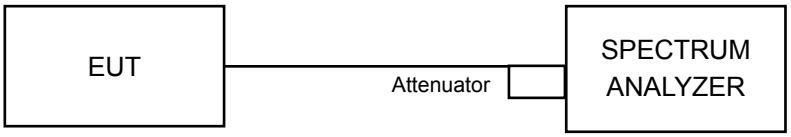
Spectrum Plot of Worst Value	
802.11b	802.11g
	
802.11n (HT20)	802.11n (HT40)
	

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set the RBW = 100 kHz.

b. Set the VBW ≥ 300 kHz.

c. Detector = peak.

d. Sweep time = auto couple.

e. Trace mode = max hold.

f. Allow trace to fully stabilize.

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

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.

b. Set VBW ≥ 300 kHz.

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

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

e. Detector = peak.

f. Trace Mode = max hold.

g. Sweep = auto couple.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

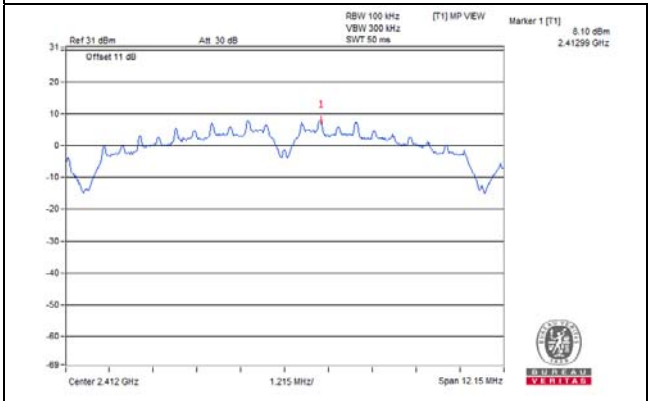
Same as Item 4.3.6

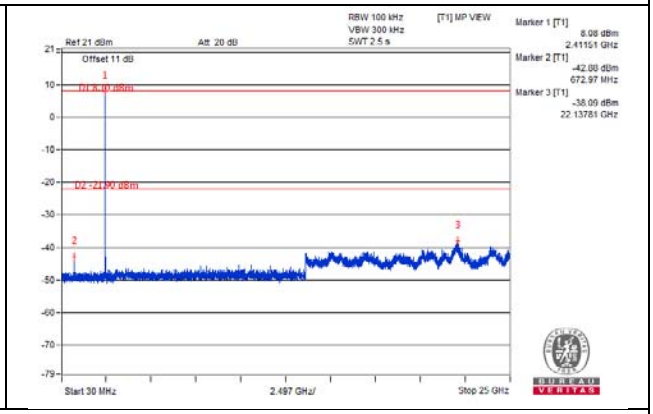
4.6.7 Test Results

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

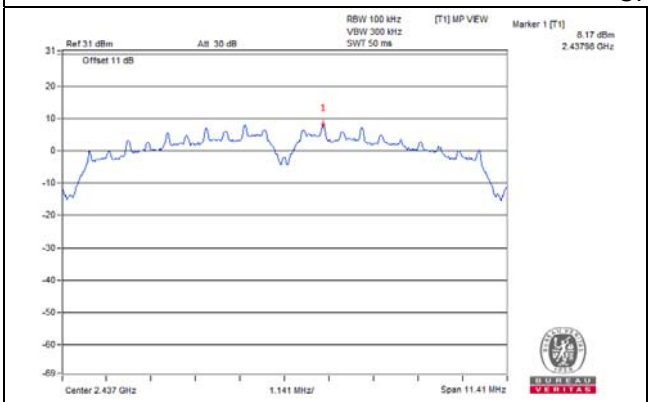
802.11b_Chain 0

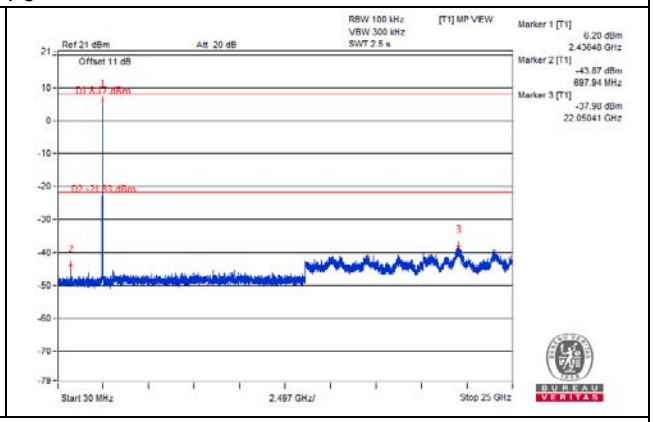
CH 1



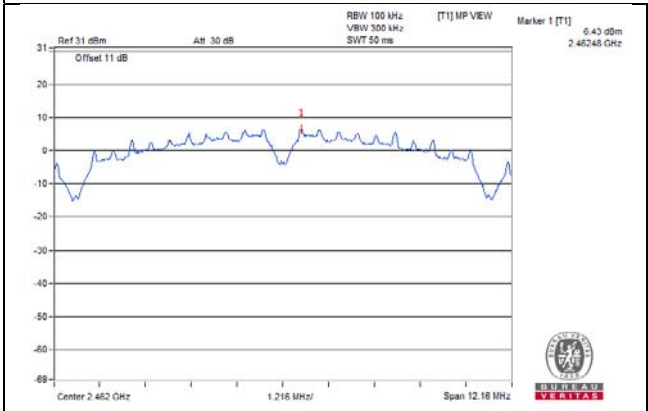


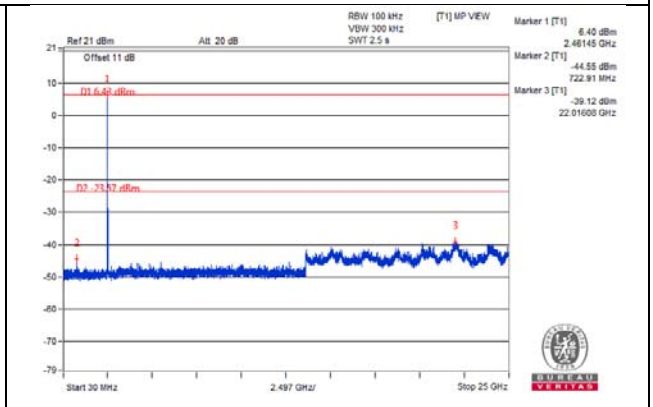
CH 6



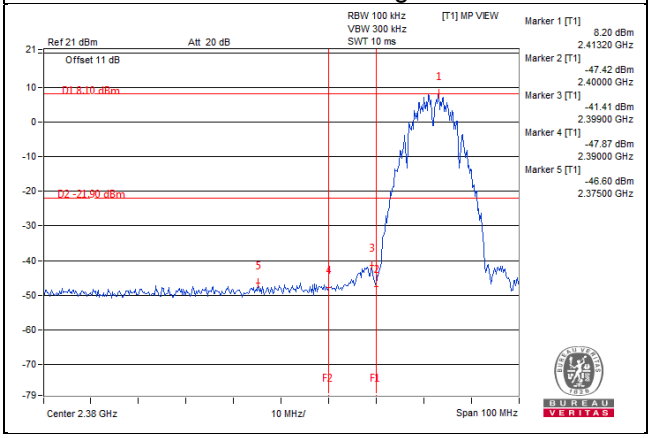


CH 11

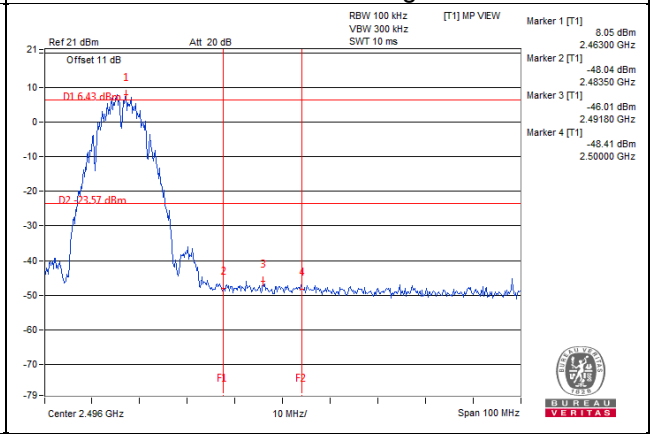




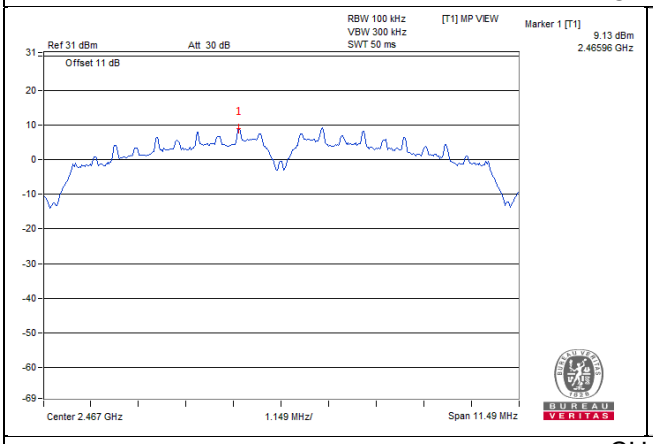
CH 1 Band edge

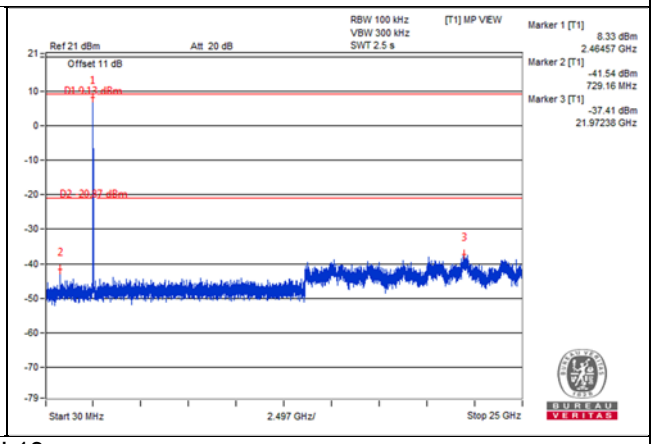


CH 11 Band edge

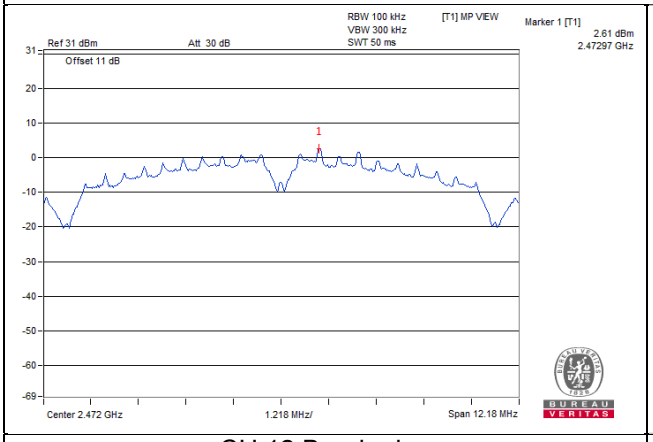


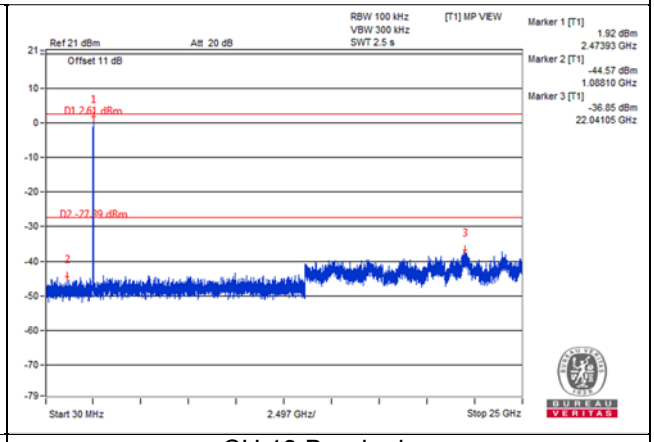
CH 12



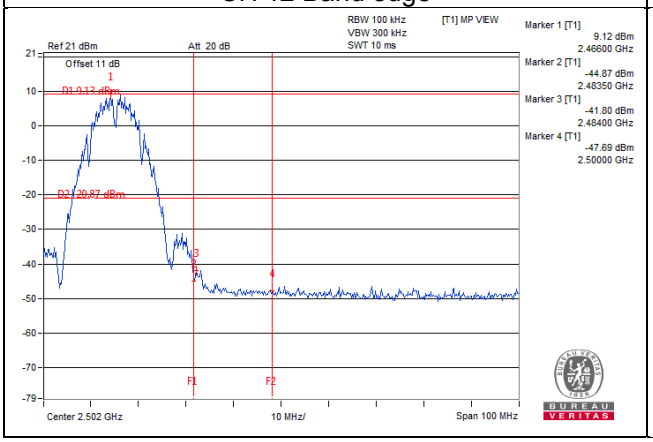


CH 13

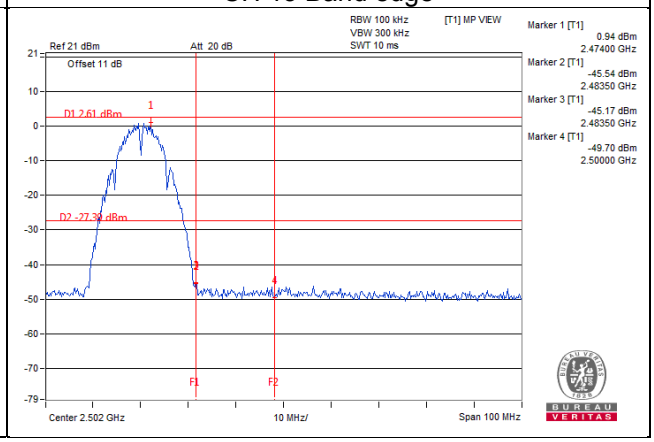




CH 12 Band edge

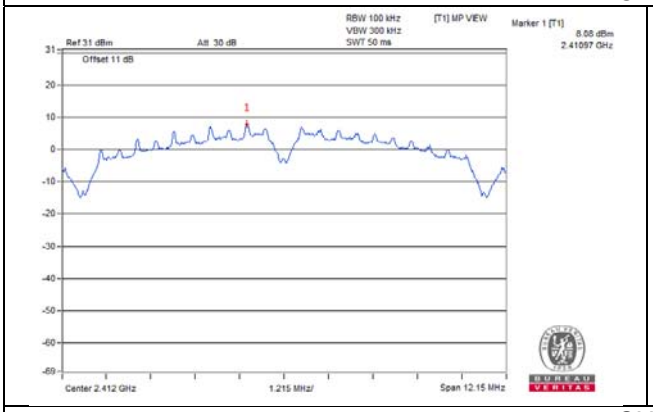


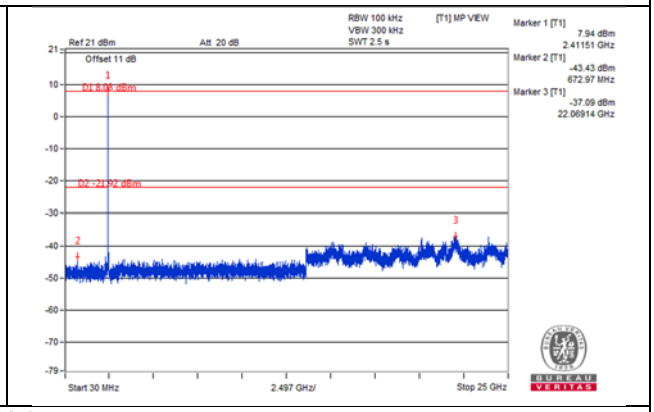
CH 13 Band edge



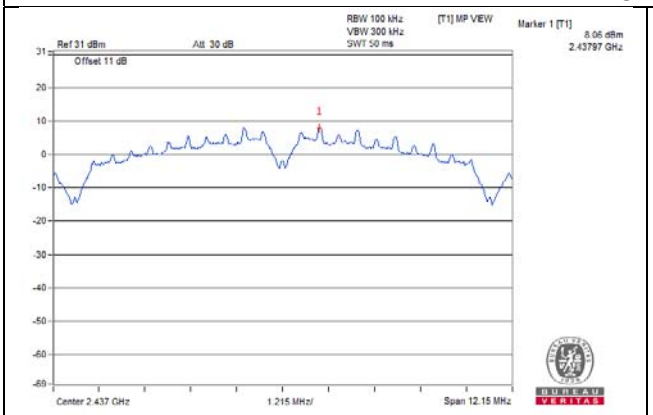
802.11b_Chain 1

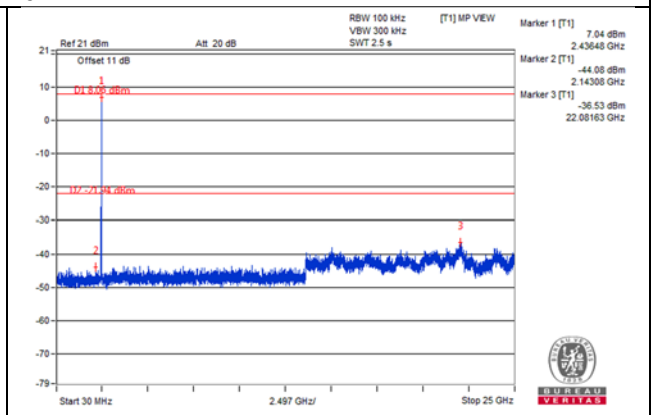
CH 1



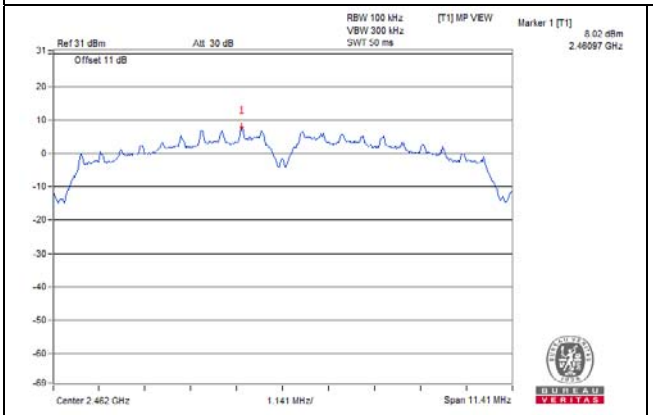


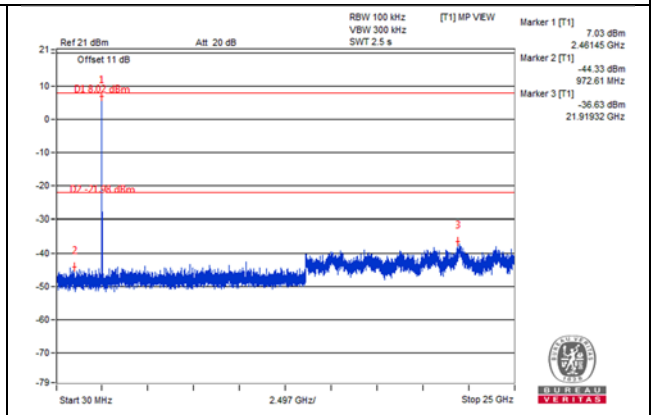
CH 6



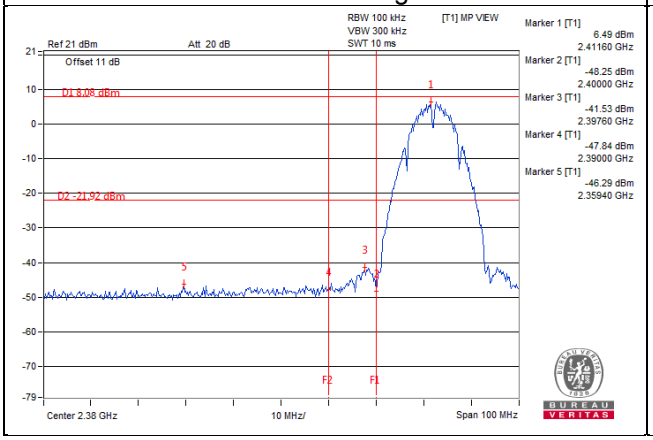


CH 11

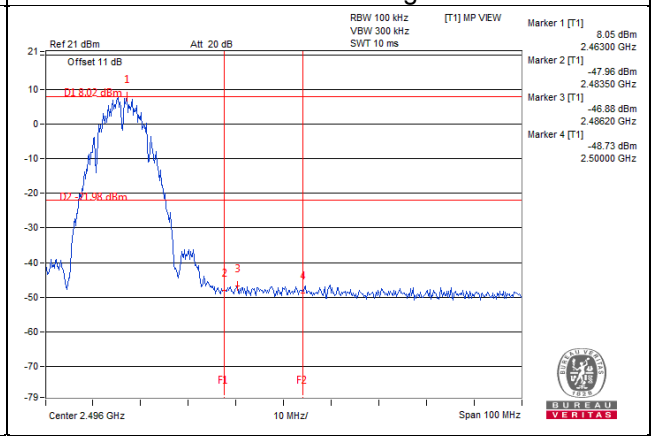




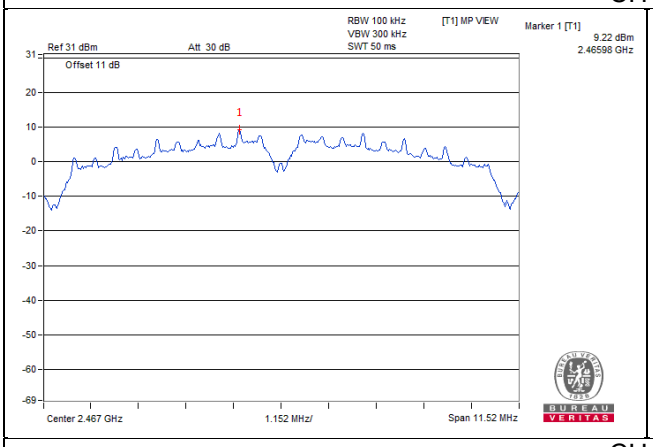
CH 1 Band edge

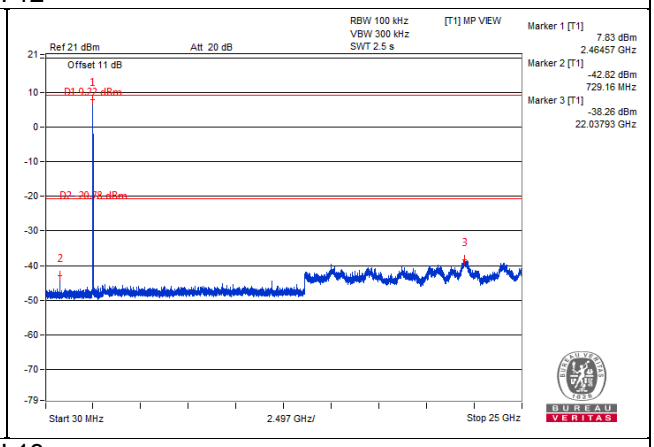


CH 11 Band edge

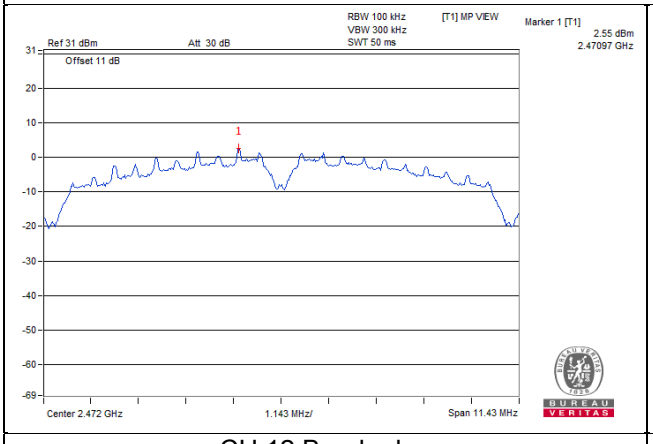


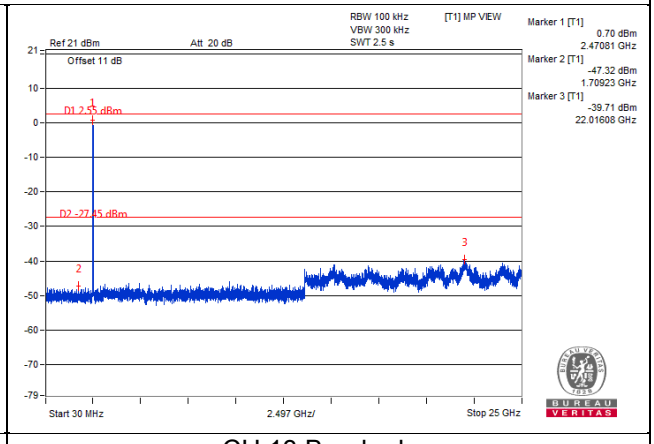
CH 12



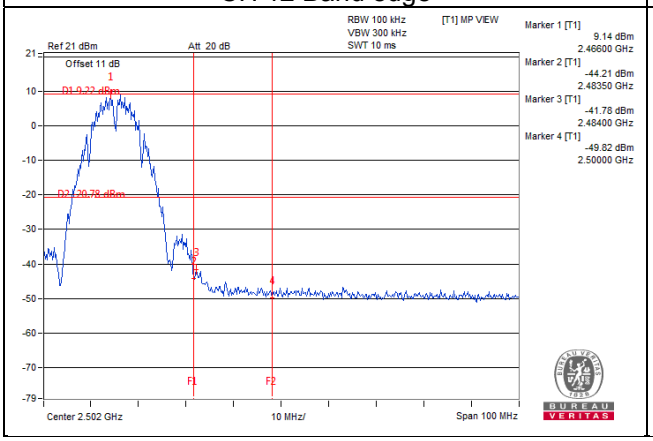


CH 13

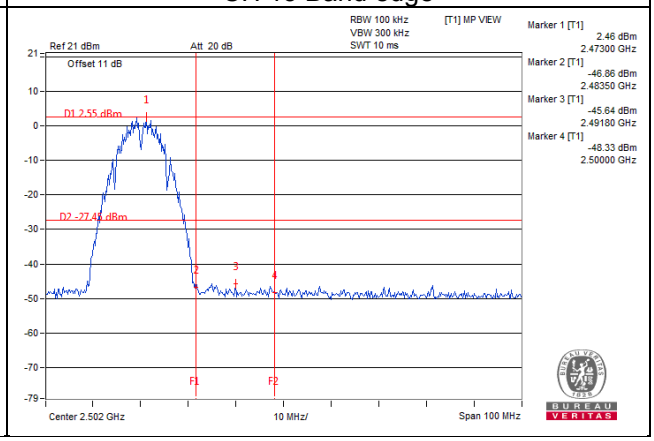




CH 12 Band edge

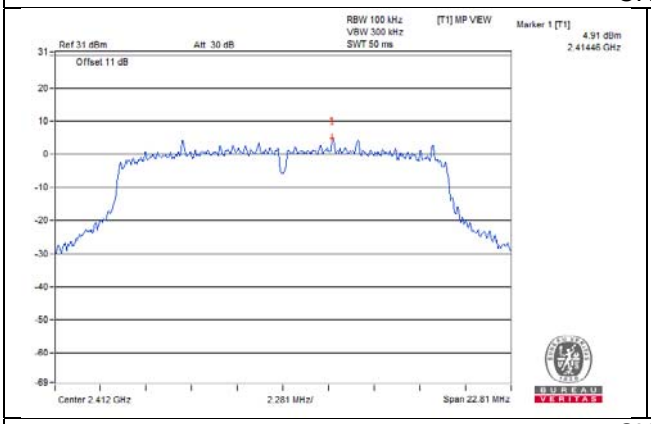


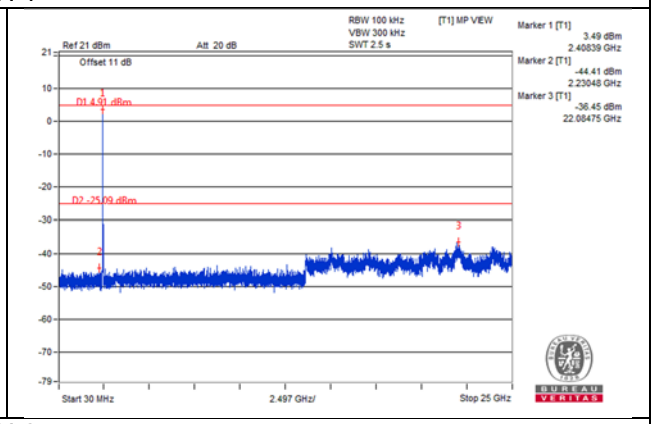
CH 13 Band edge



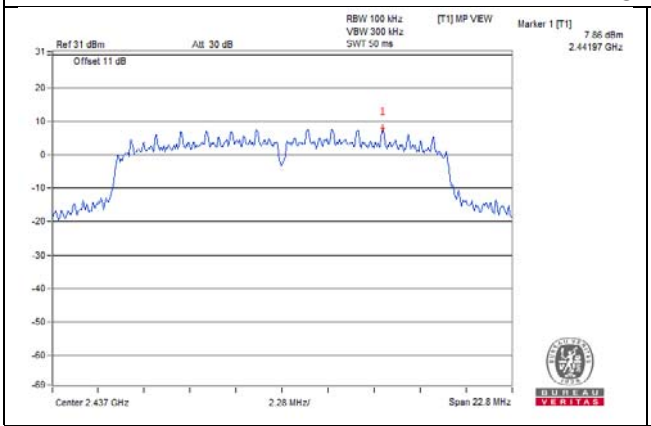
802.11g_Chain 0

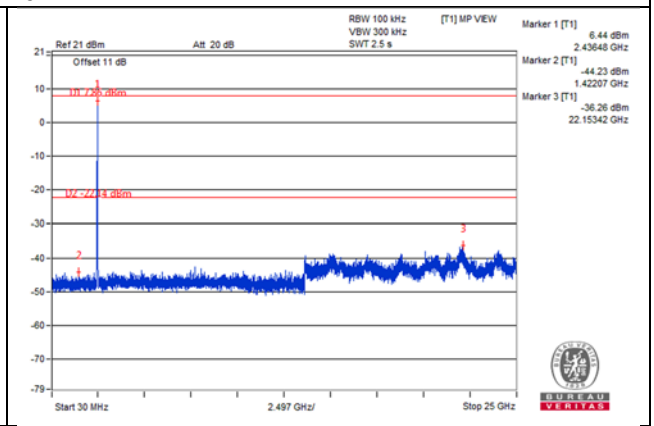
CH 1



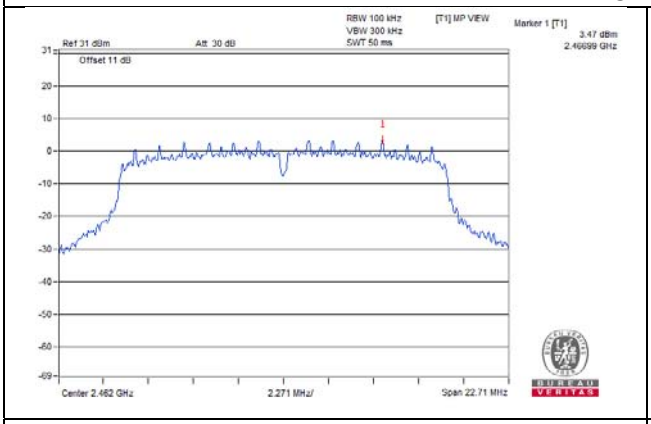


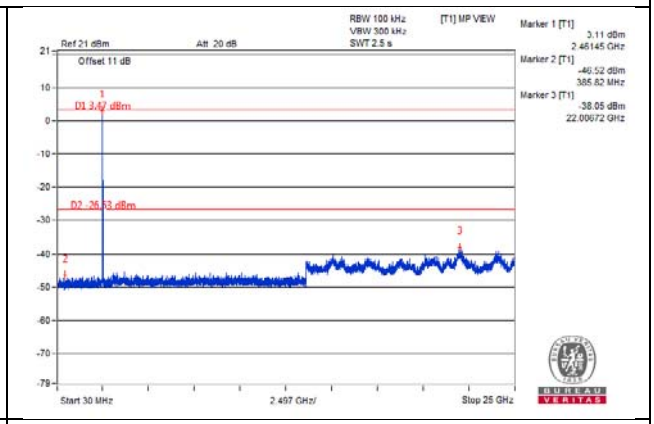
CH 6



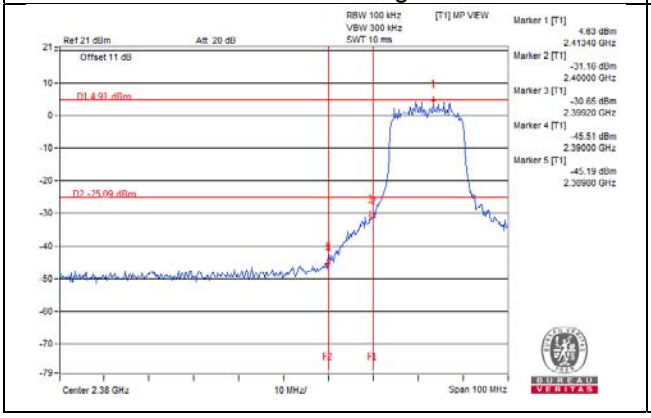


CH 11

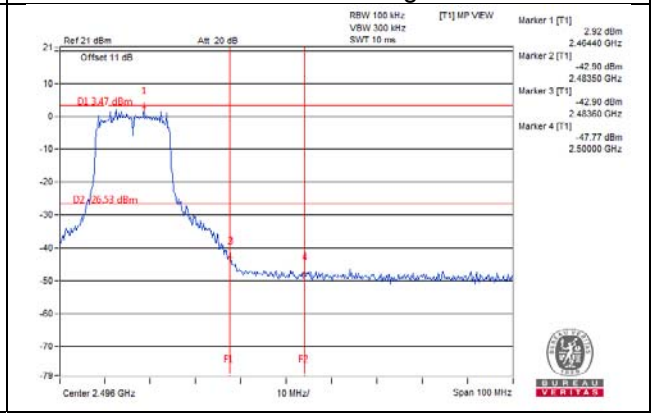




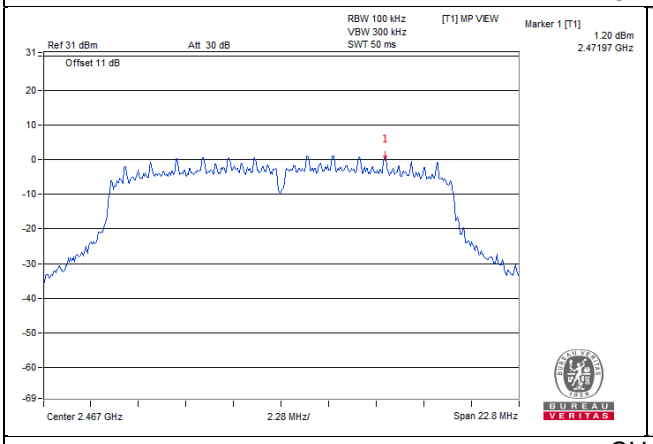
CH 1 Band edge

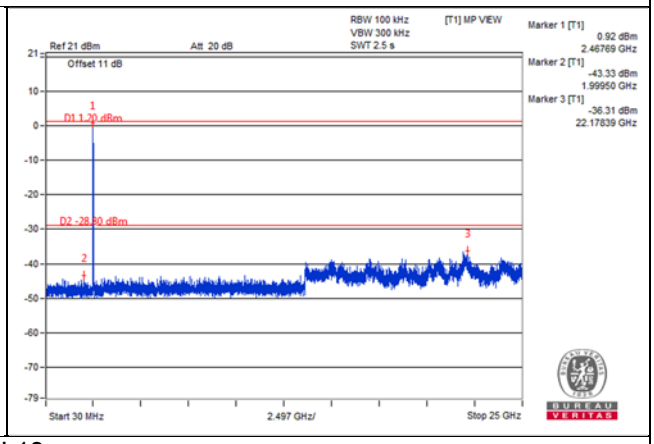


CH 11 Band edge

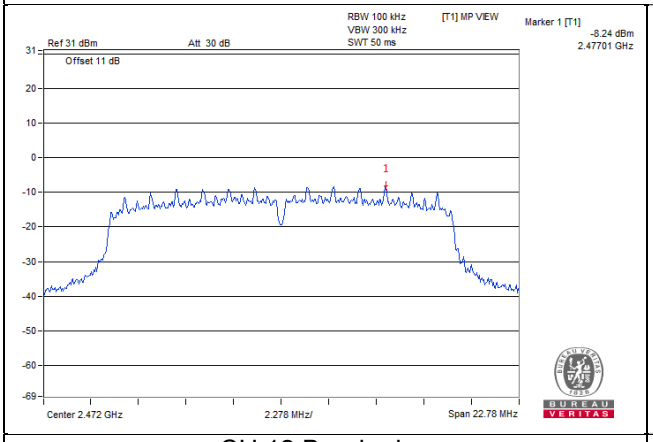


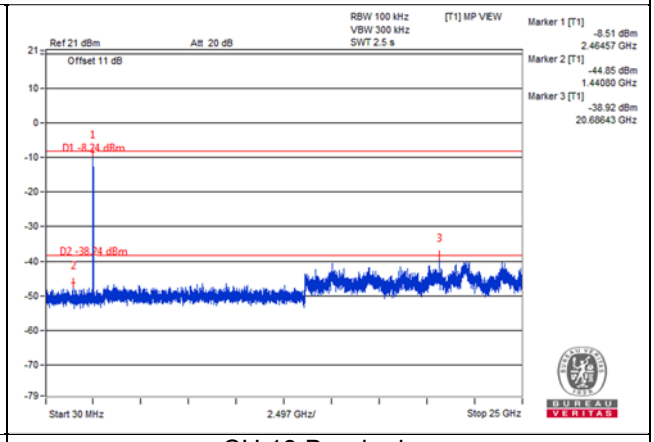
CH 12



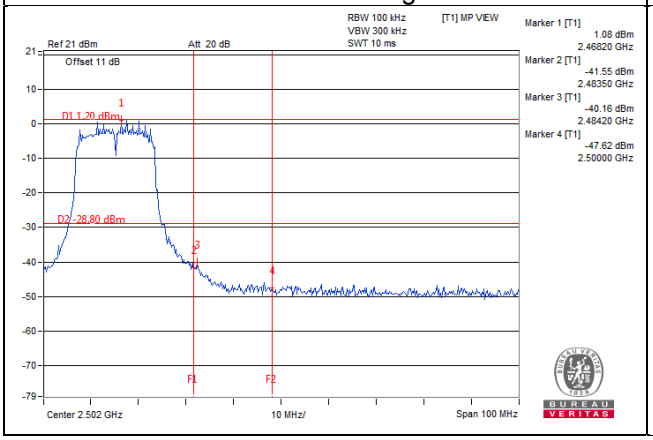


CH 13

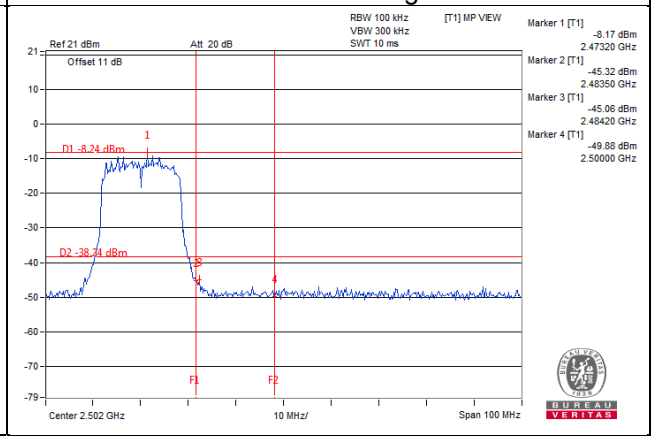




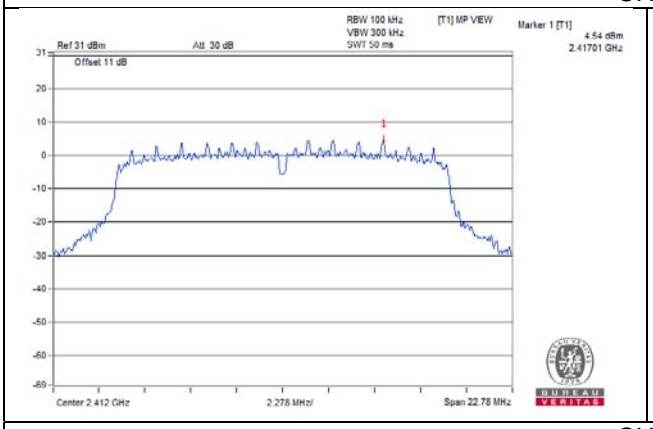
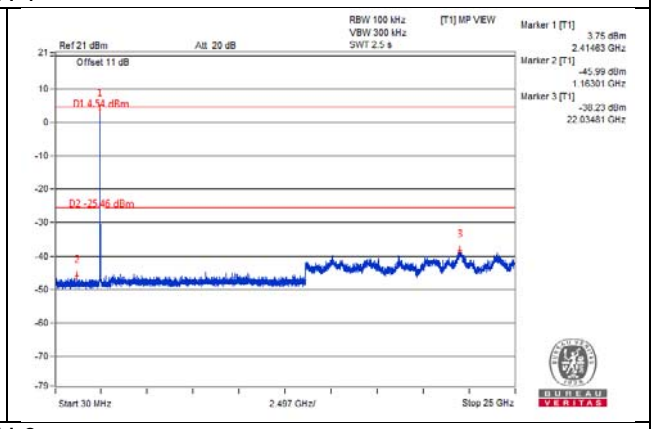
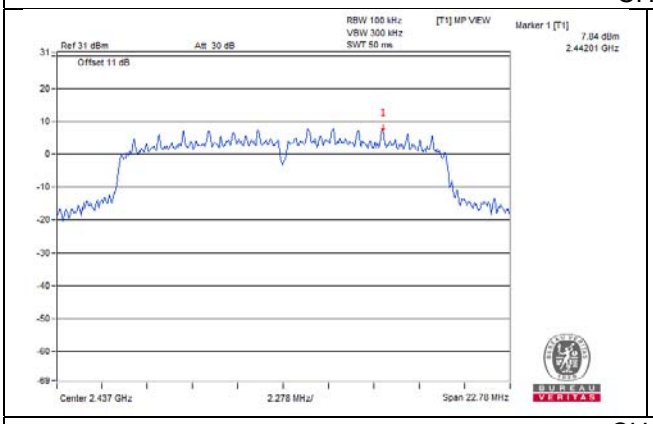
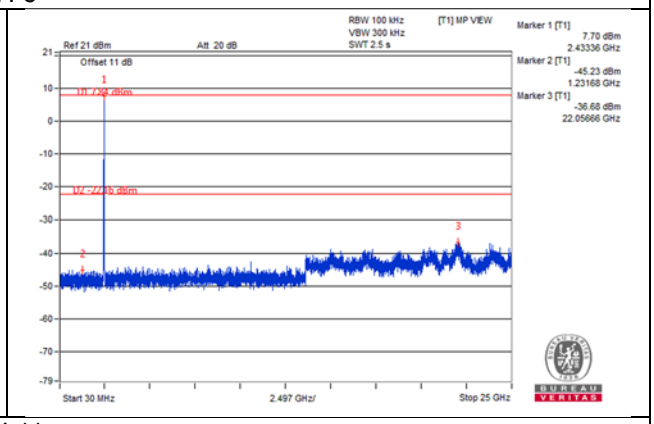
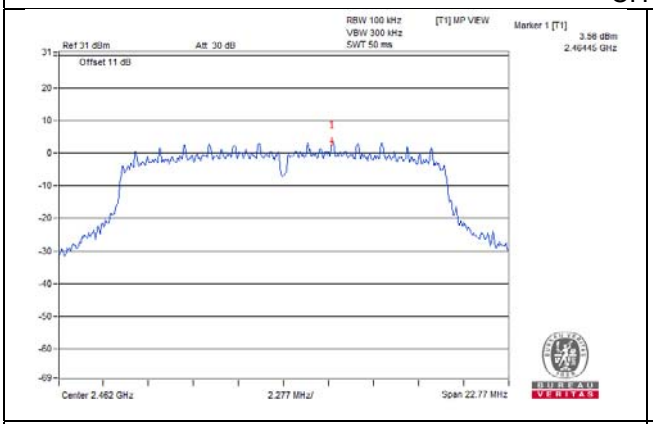
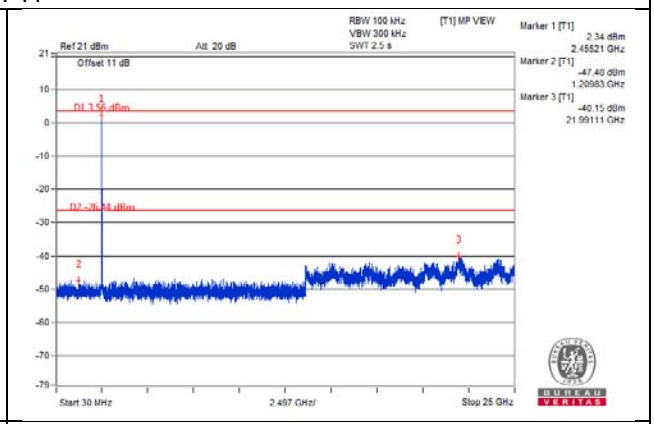
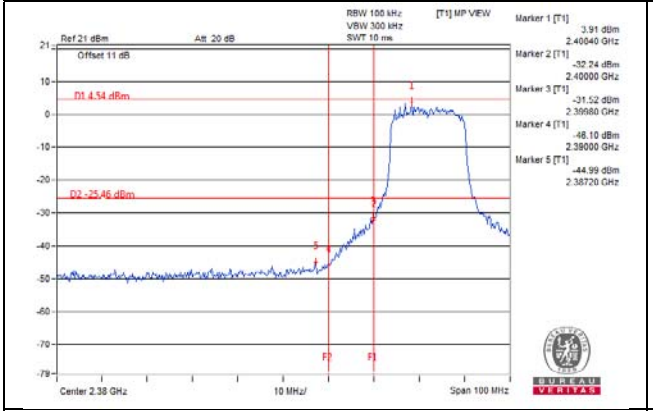
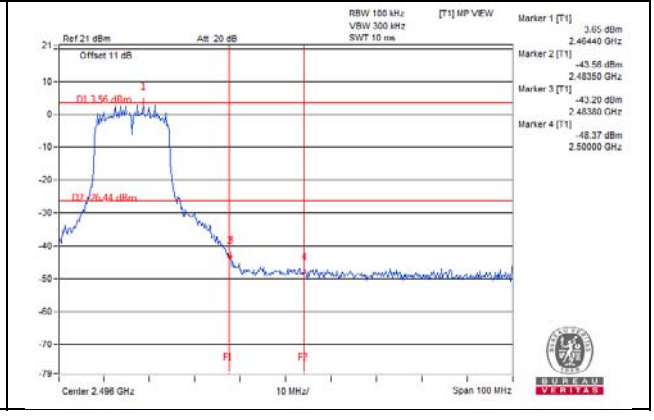
CH 12 Band edge



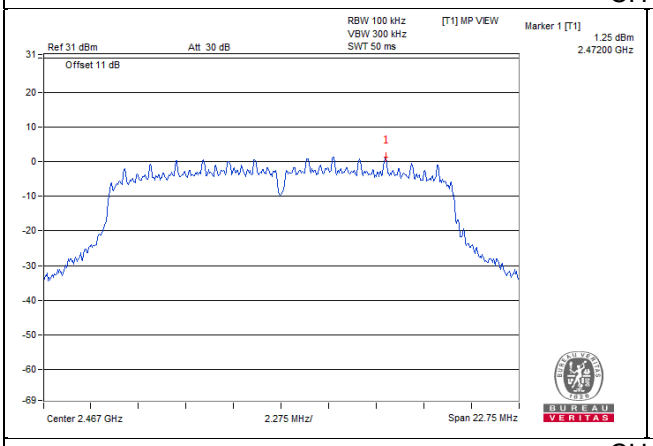
CH 13 Band edge

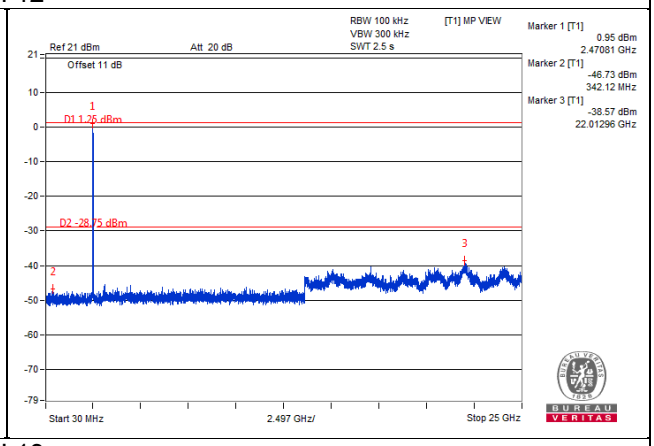


802.11g_Chain 1

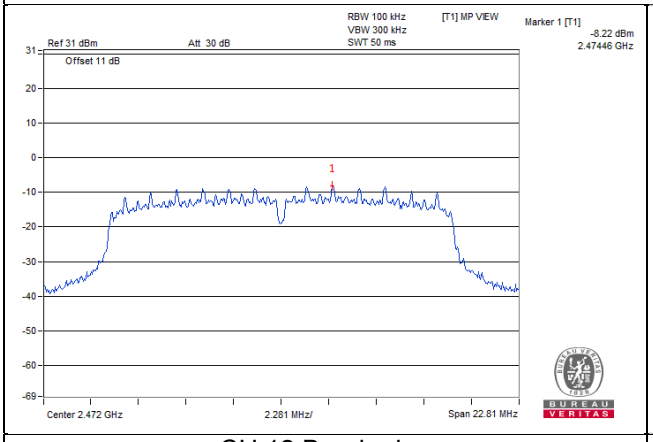
CH 1	
	
CH 6	
	
CH 11	
	
CH 1 Band edge	**CH 11 Band edge**
	

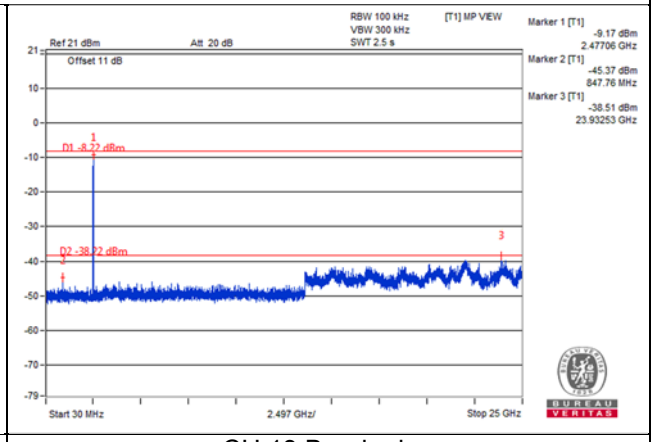
CH 12



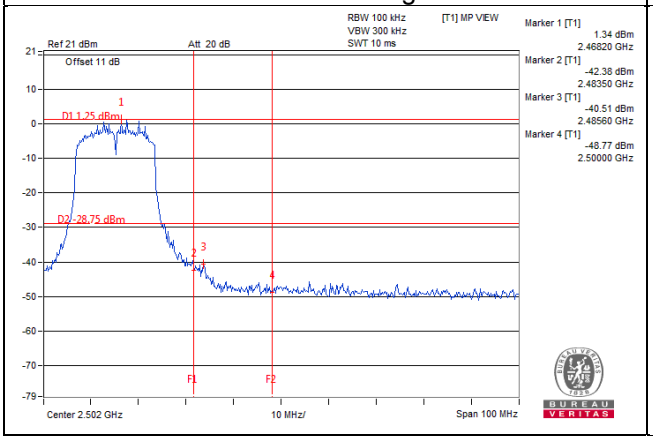


CH 13

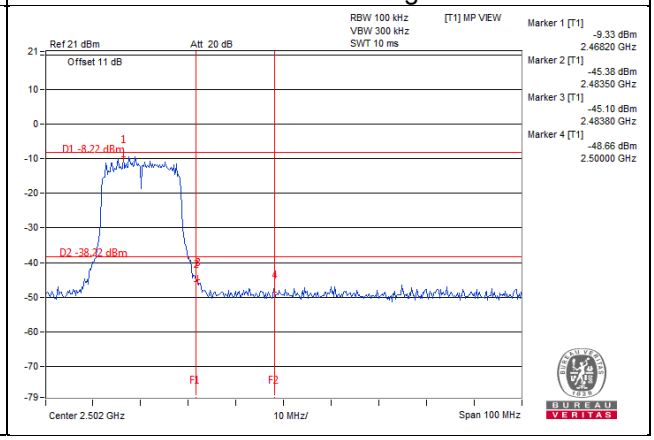




CH 12 Band edge

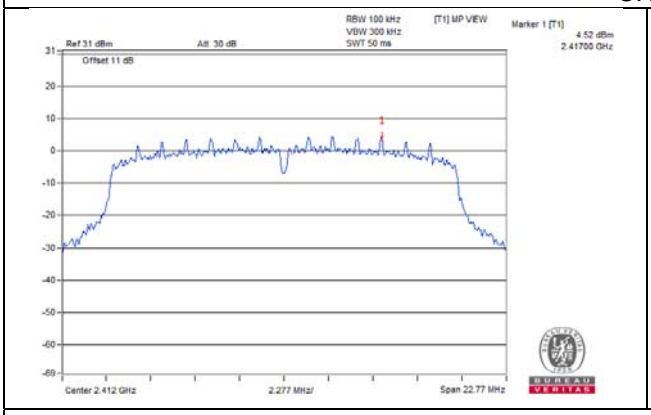


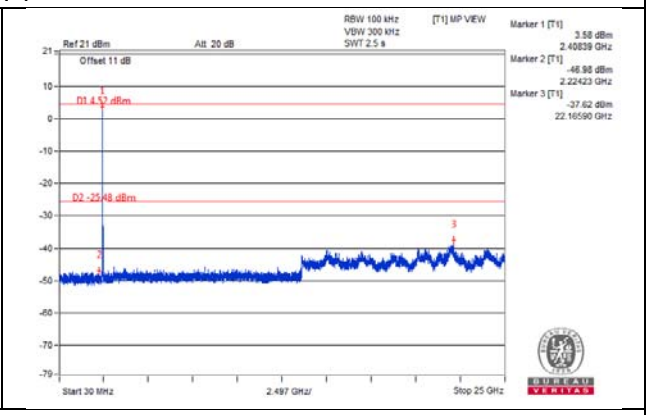
CH 13 Band edge



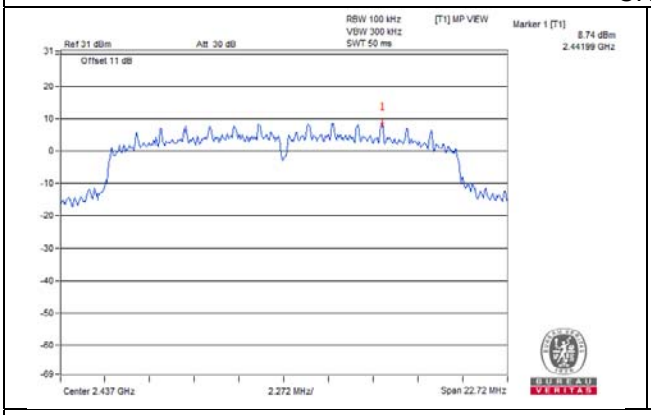
802.11n (HT20)_Chain 0

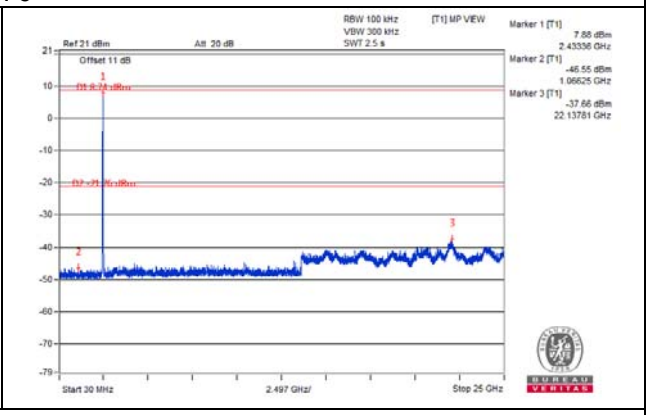
CH 1



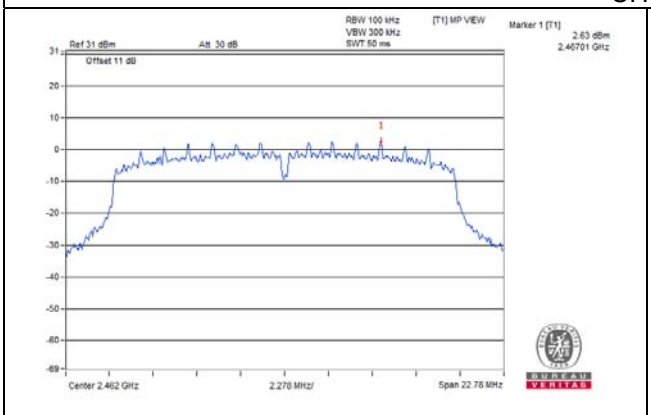


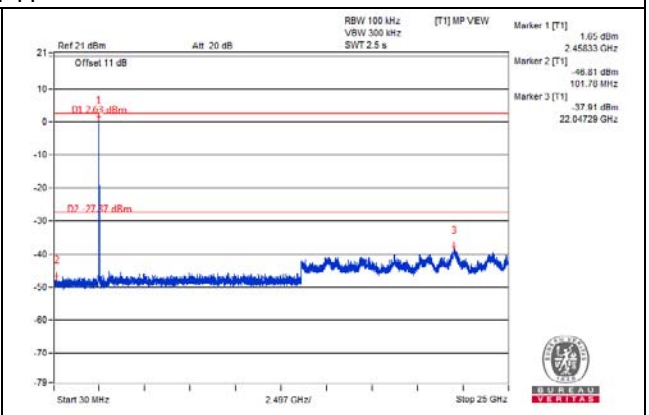
CH 6



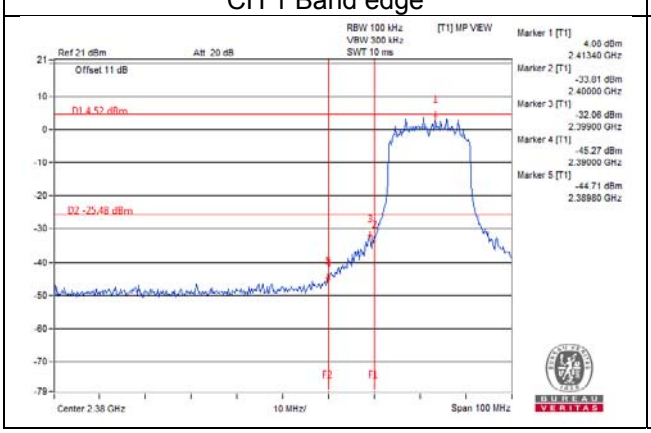


CH 11

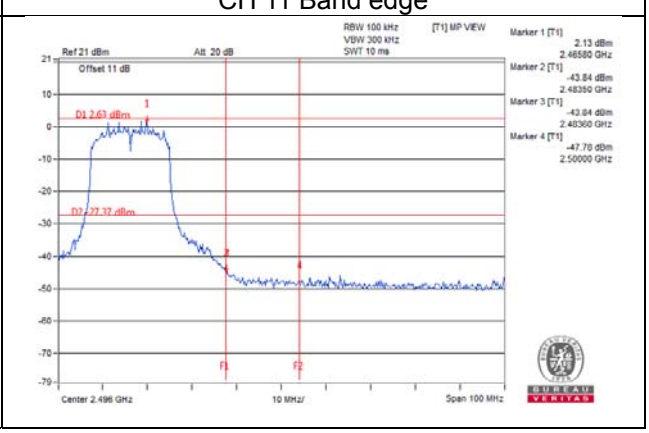




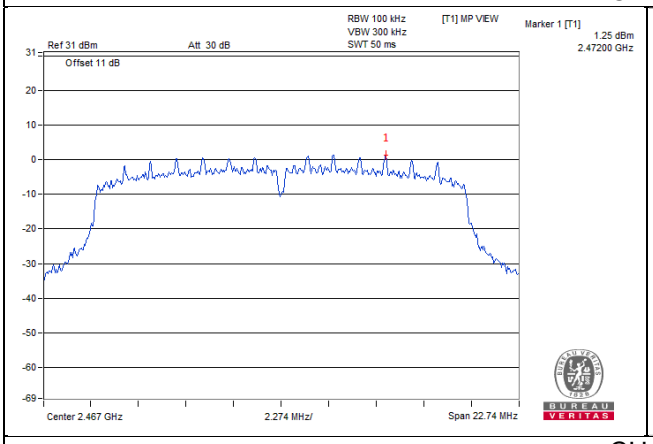
CH 1 Band edge

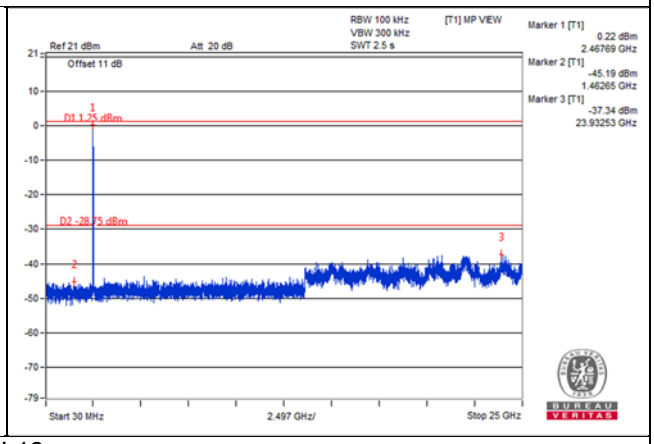


CH 11 Band edge

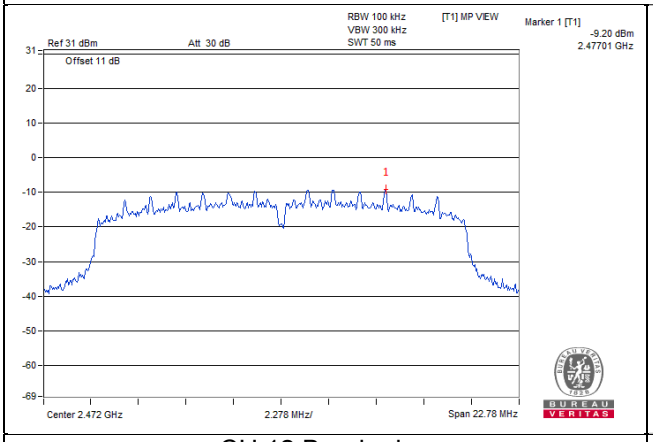


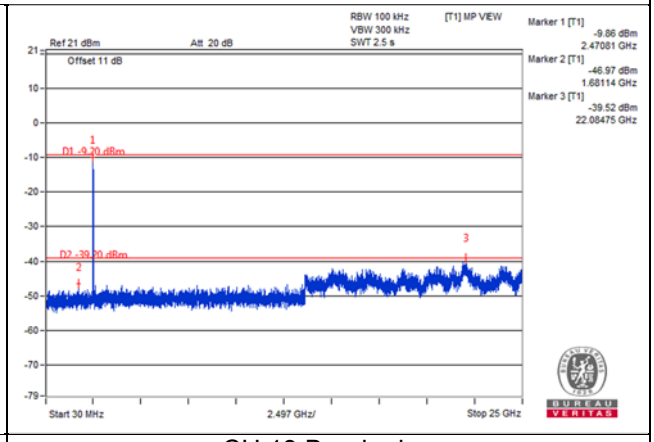
CH 12



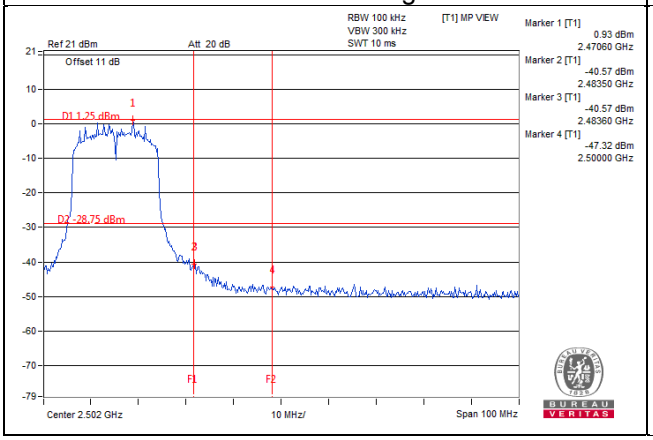


CH 13

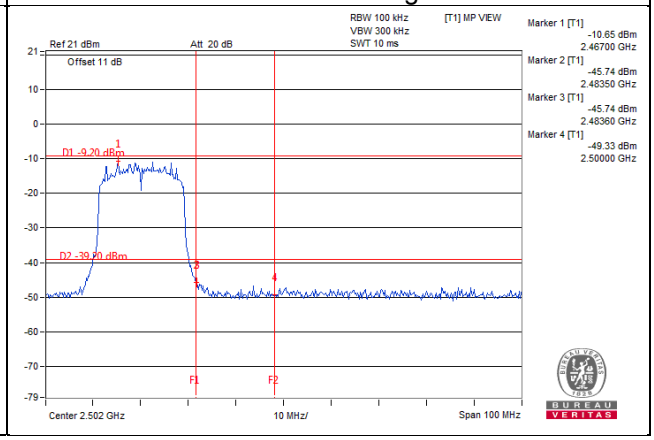




CH 12 Band edge

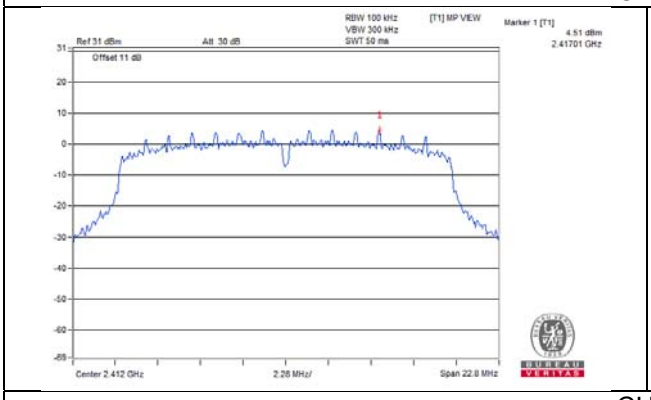


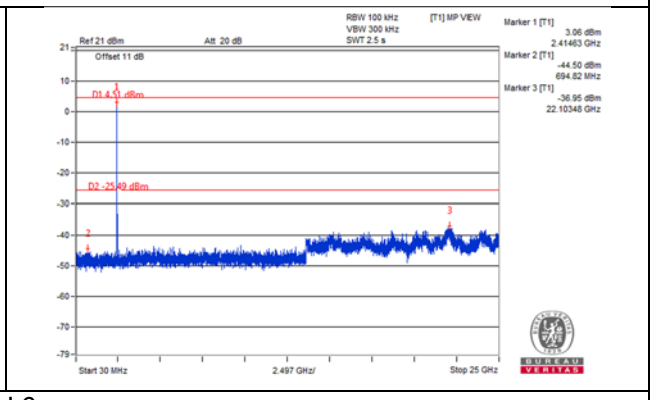
CH 13 Band edge



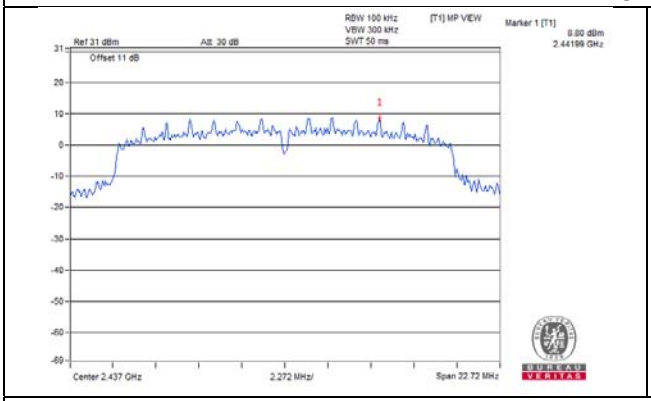
802.11n (HT20)_Chain 1

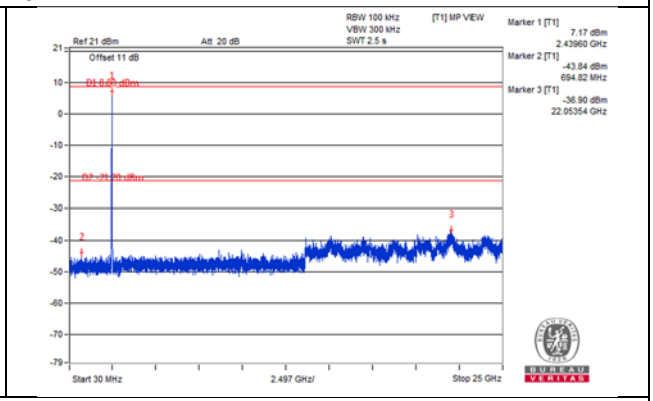
CH 1



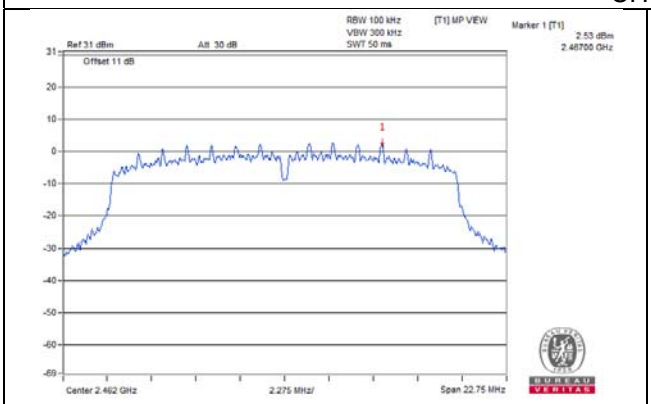


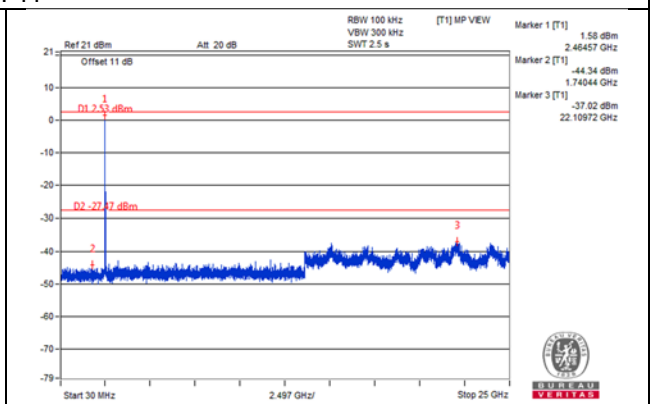
CH 6



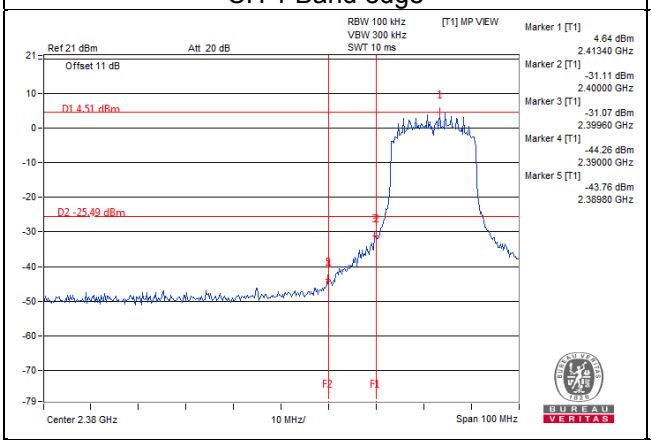


CH 11

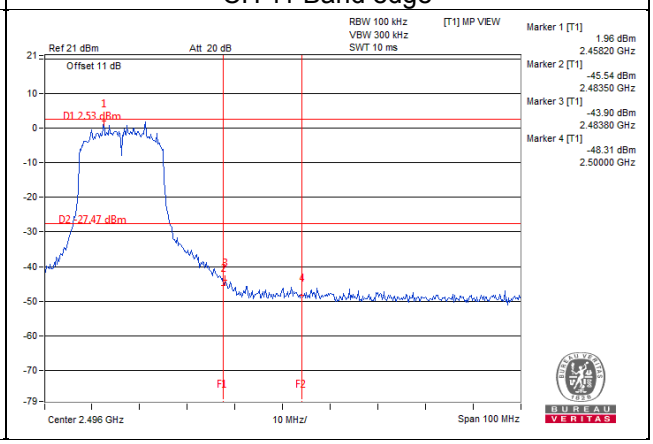




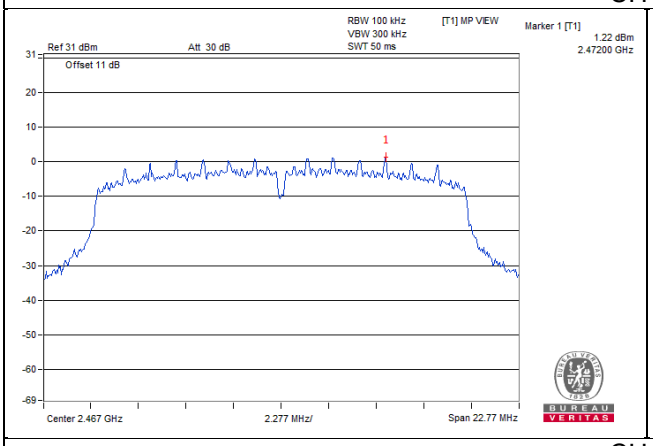
CH 1 Band edge

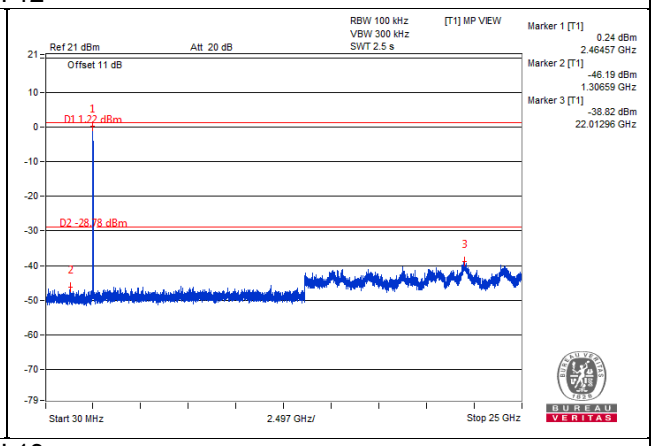


CH 11 Band edge

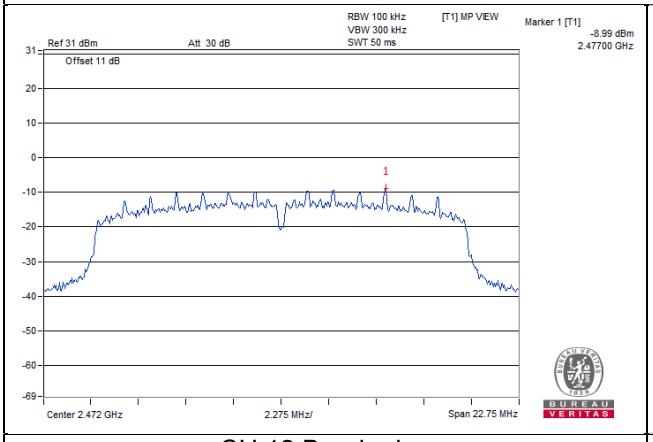


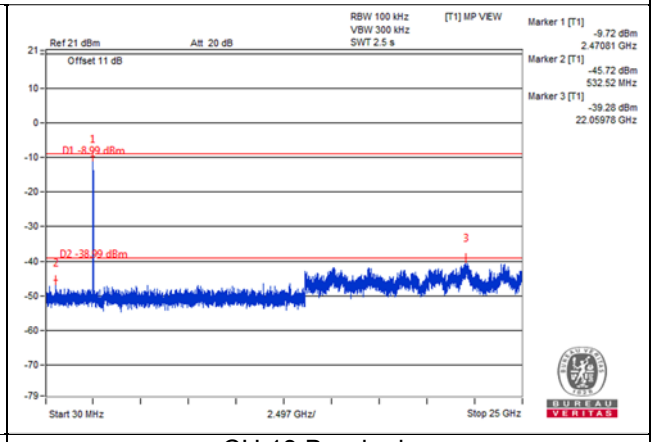
CH 12



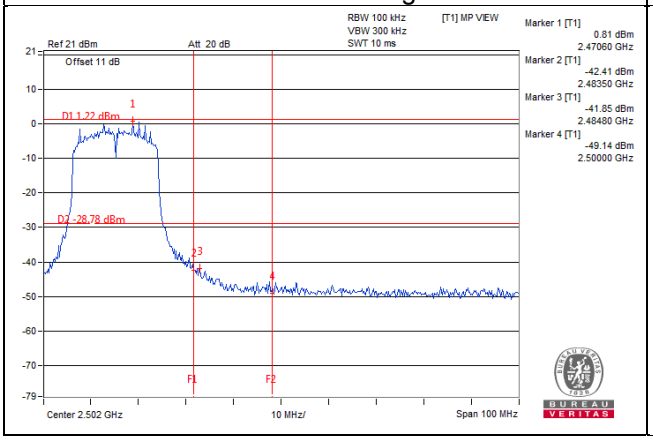


CH 13

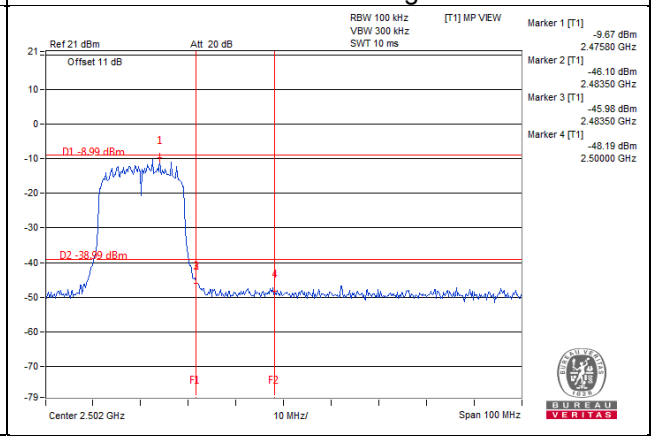




CH 12 Band edge

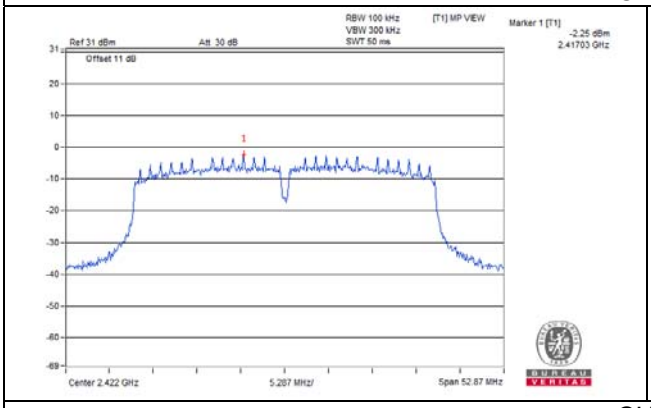


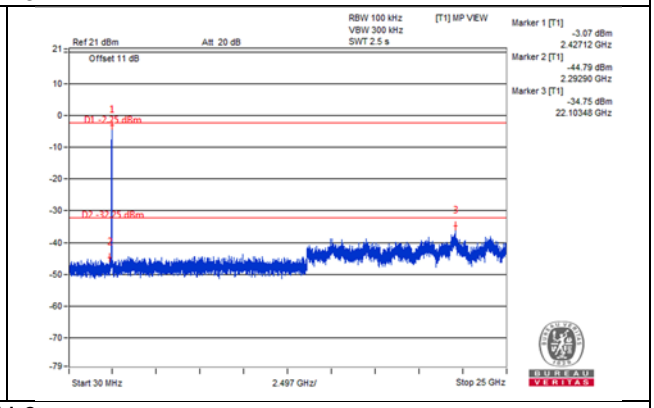
CH 13 Band edge



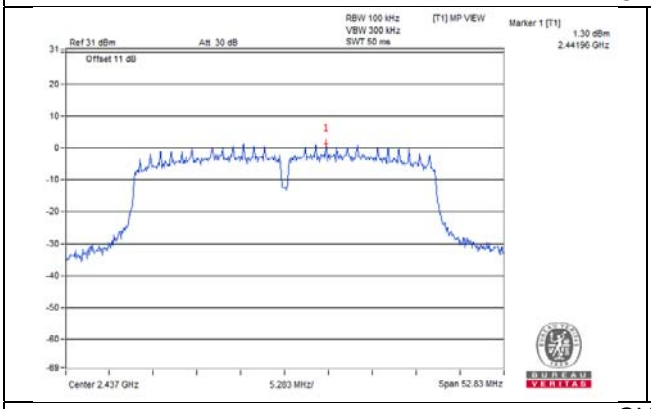
802.11n (HT40)_Chain 0

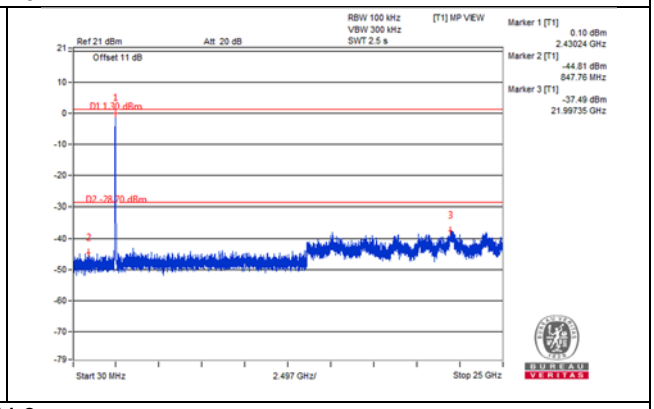
CH 3



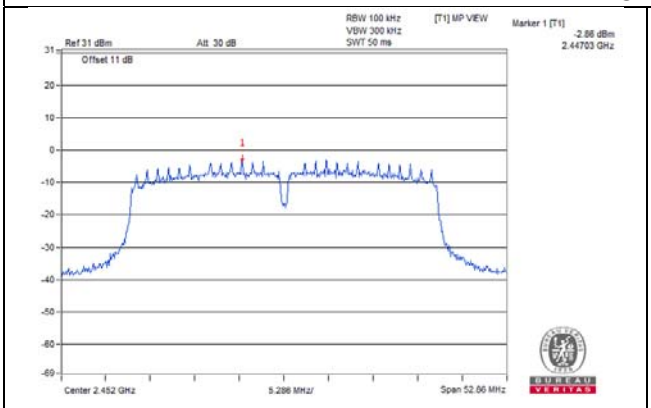


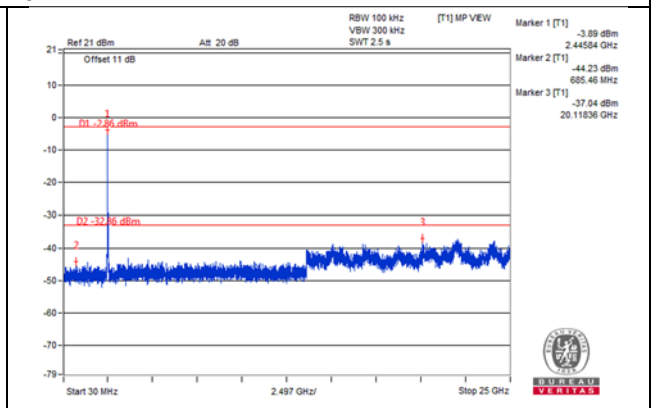
CH 6



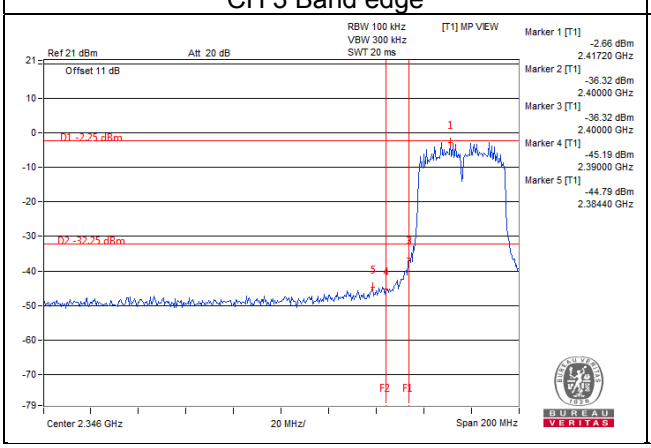


CH 9

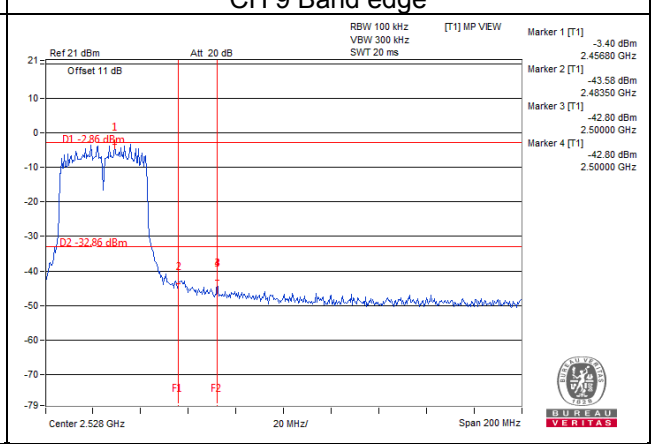




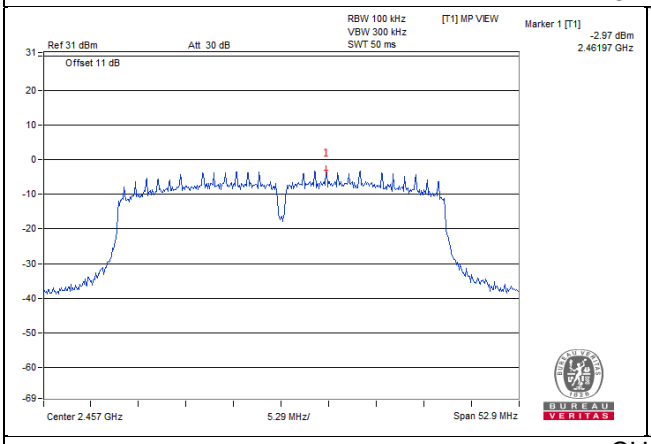
CH 3 Band edge

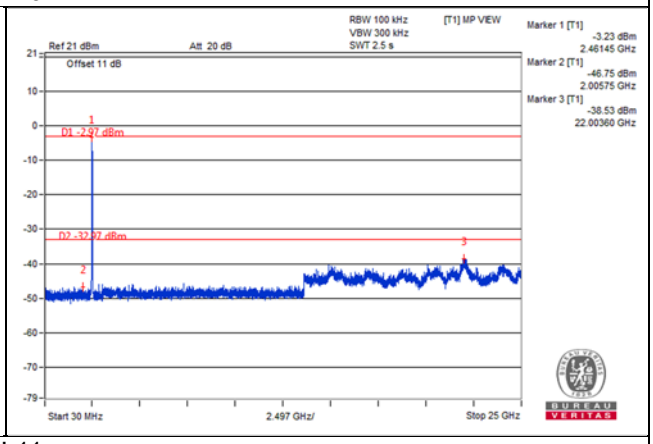


CH 9 Band edge

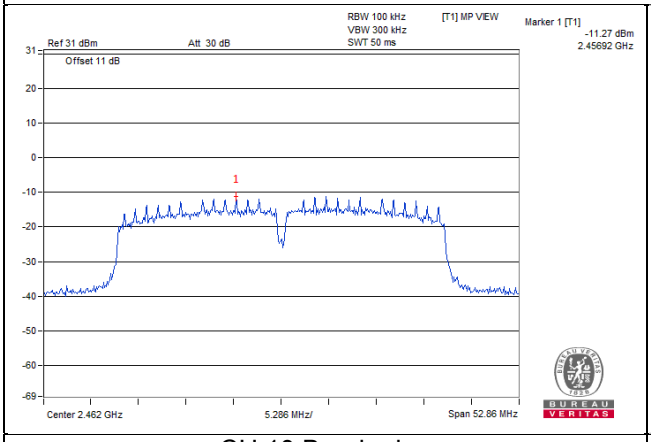


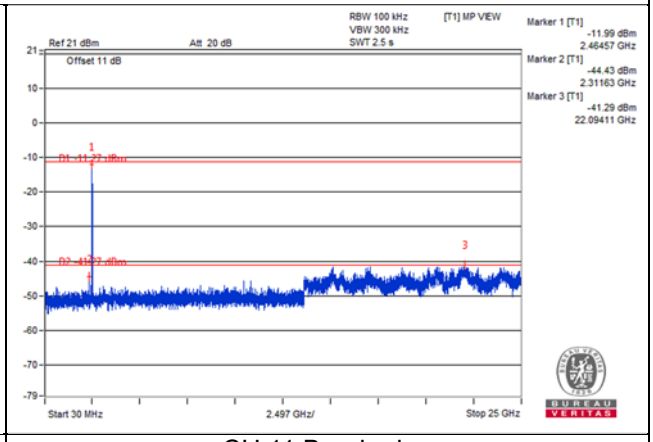
CH 10



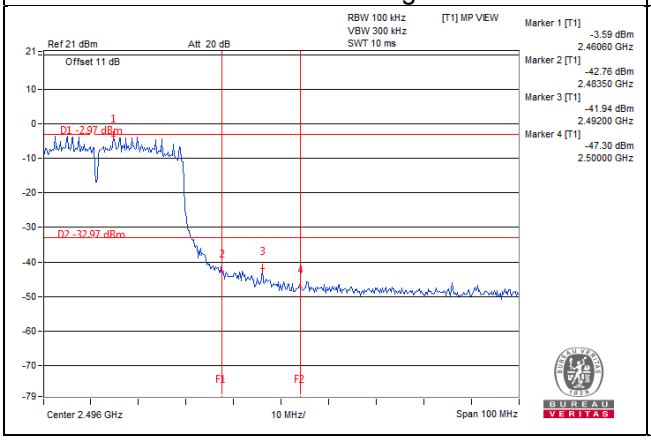


CH 11

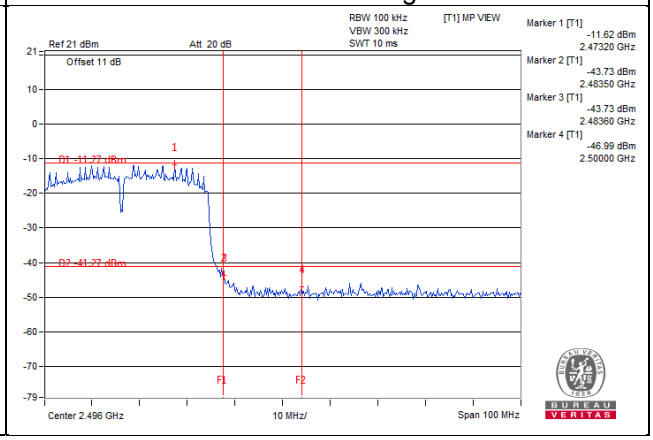




CH 10 Band edge

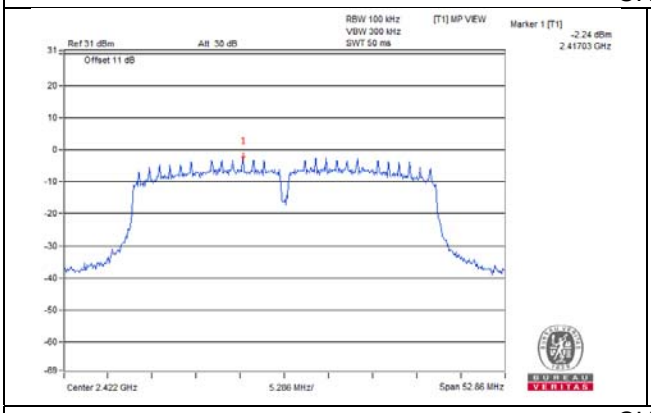


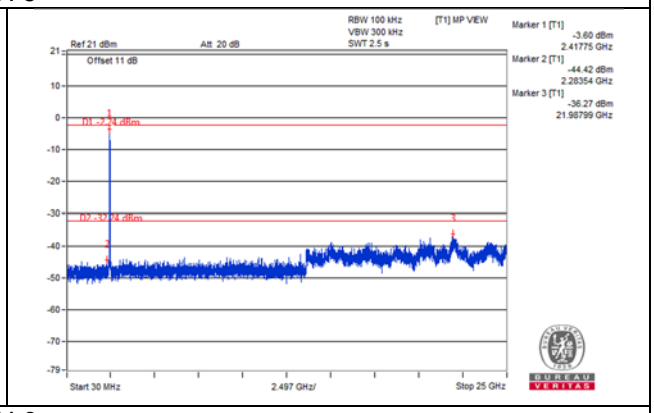
CH 11 Band edge



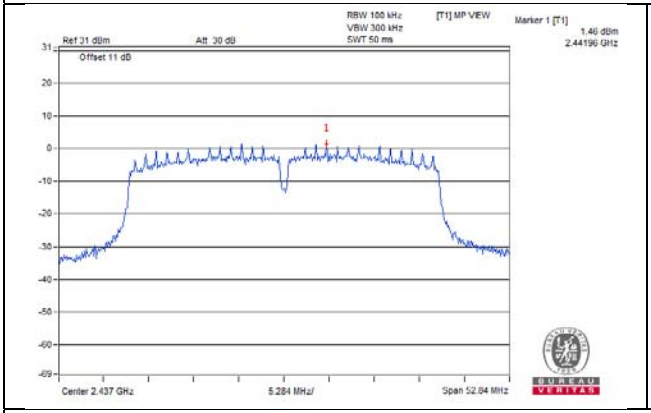
802.11n (HT40)_Chain 1

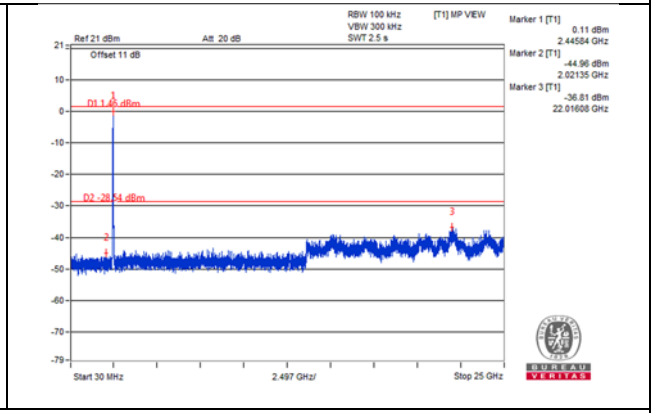
CH 3



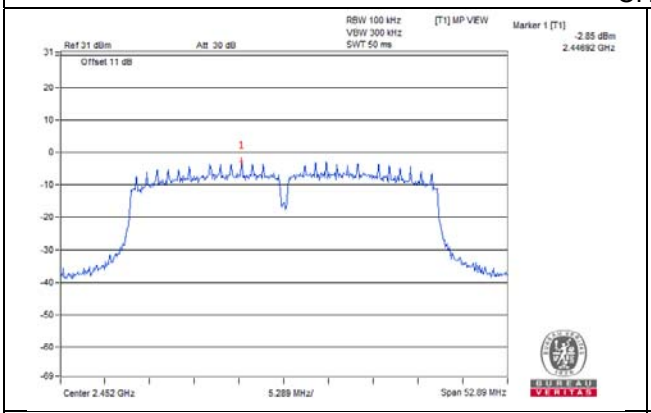


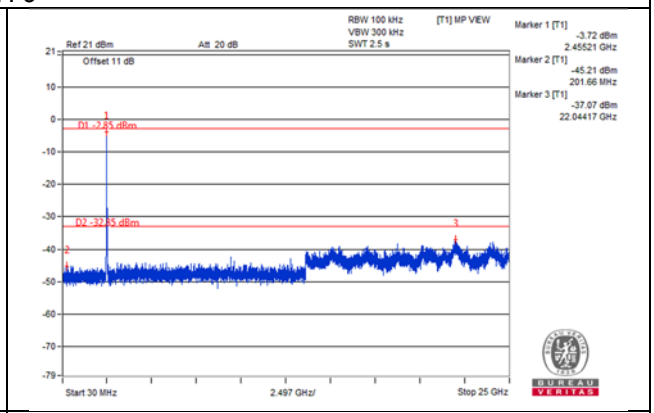
CH 6



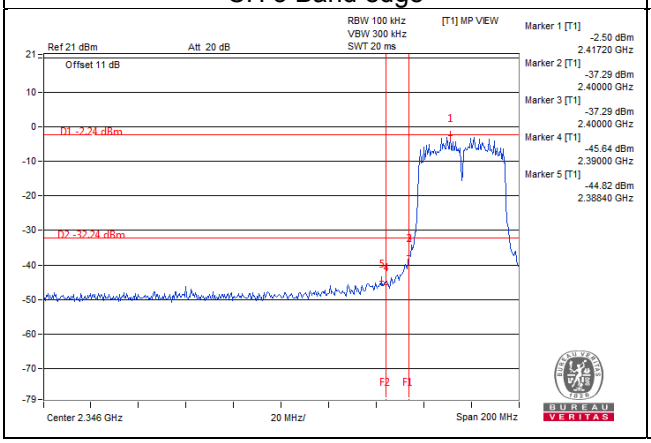


CH 9

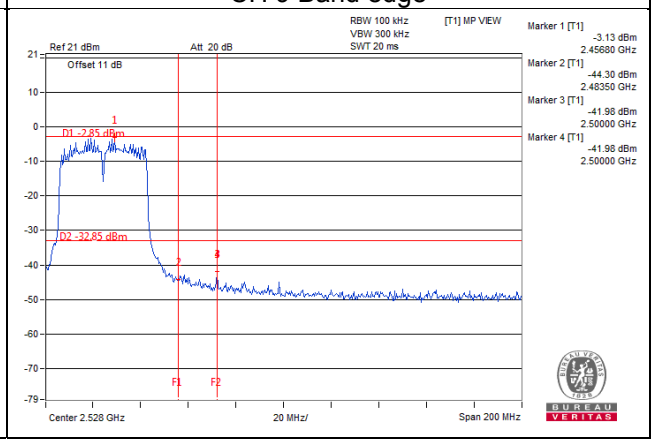




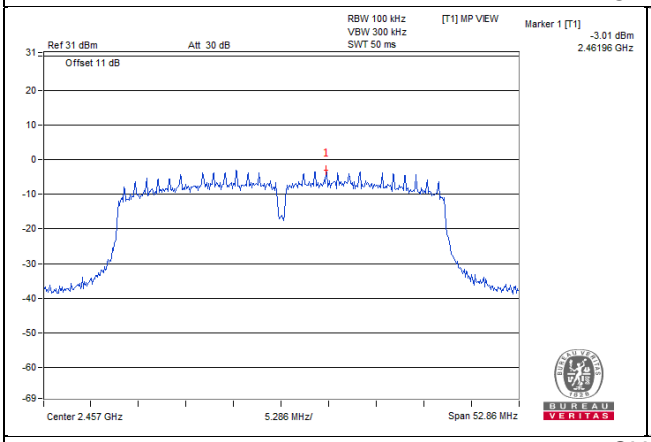
CH 3 Band edge

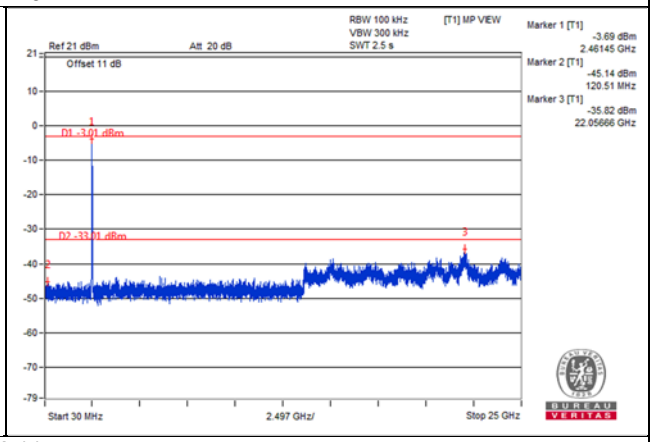


CH 9 Band edge

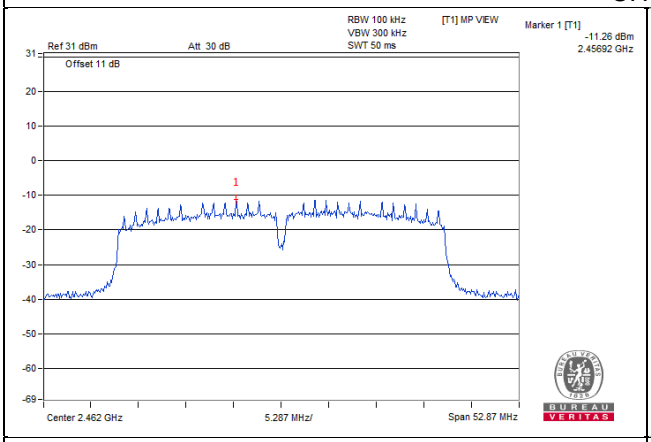


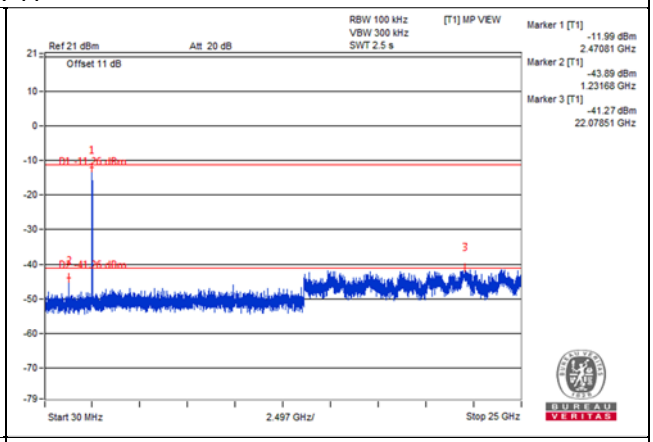
CH 10



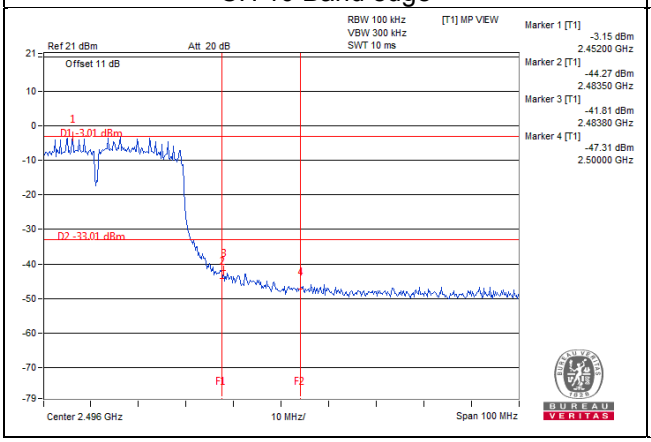


CH 11

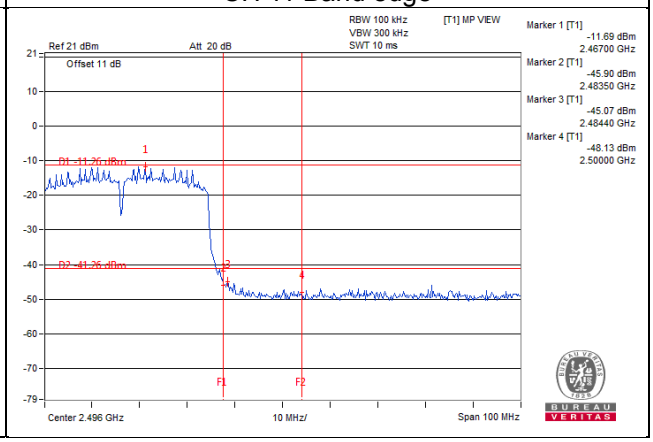




CH 10 Band edge



CH 11 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

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

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

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

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

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

--- END ---