FCC Test Report

Report No.:	RF171215C04G
FCC ID:	YZKECWO5211L
Test Model:	ECWO5213-L
Received Date:	Sep. 27, 2018
Test Date:	Oct. 12 ~ Oct. 27, 2018
Issued Date:	Nov. 09, 2018
Applicant:	Edgecore Networks Corporation
Address:	No.1, Creation 3rd Rd., Hsinchu Science Park, East Dist., Hsinchu City 30077, Taiwan, R.O.C.
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 4

1 Certificate of Conformity 5

2 Summary of Test Results 6

2.1 Measurement Uncertainty 6
2.2 Modification Record 6

3 General Information 7

3.1 General Description of EUT 7
3.2 Description of Test Modes 11
3.2.1 Test Mode Applicability and Tested Channel Detail 12
3.3 Duty Cycle of Test Signal 14
3.4 Description of Support Units 15
3.4.1 Configuration of System under Test 15
3.5 General Description of Applied Standards 15

4 Test Types and Results 16

4.1 Radiated Emission and Bandedge Measurement 16
4.1.1 Limits of Radiated Emission and Bandedge Measurement 16
4.1.2 Test Instruments 17
4.1.3 Test Procedures 18
4.1.4 Deviation from Test Standard 18
4.1.5 Test Setup 19
4.1.6 EUT Operating Conditions 20
4.1.7 Test Results 21
4.2 Conducted Emission Measurement 41
4.2.1 Limits of Conducted Emission Measurement 41
4.2.2 Test Instruments 41
4.2.3 Test Procedures 42
4.2.4 Deviation from Test Standard 42
4.2.5 Test Setup 42
4.2.6 EUT Operating Conditions 42
4.2.7 Test Results 43
4.3 6dB Bandwidth Measurement 45
4.3.1 Limits of 6dB Bandwidth Measurement 45
4.3.2 Test Setup 45
4.3.3 Test Instruments 45
4.3.4 Test Procedure 45
4.3.5 Deviation fromTest Standard 45
4.3.6 EUT Operating Conditions 45
4.3.7 Test Result 46
4.4 Conducted Output Power Measurement 48
4.4.1 Limits of Conducted Output Power Measurement 48
4.4.2 Test Setup 48
4.4.3 Test Instruments 48
4.4.4 Test Procedures 48
4.4.5 Deviation from Test Standard 48
4.4.6 EUT Operating Conditions 48
4.4.7 Test Results 49
4.5 Power Spectral Density Measurement 50
4.5.1 Limits of Power Spectral Density Measurement 50
4.5.2 Test Setup 50
4.5.3 Test Instruments 50
4.5.4 Test Procedure 50
4.5.5 Deviation from Test Standard 50
4.5.6 EUT Operating Condition 50

4.5.7 Test Results 51
4.6 Conducted Out of Band Emission Measurement 54
4.6.1 Limits of Conducted Out of Band Emission Measurement 54
4.6.2 Test Setup 54
4.6.3 Test Instruments 54
4.6.4 Test Procedure 54
4.6.5 Deviation from Test Standard 55
4.6.6 EUT Operating Condition 55
4.6.7 Test Results 55
5 Pictures of Test Arrangements 70
Appendix – Information on the Testing Laboratories 71

Release Control Record

Issue No.	Description	Date Issued
RF171215C04G	Original release.	Nov. 09, 2018

1 Certificate of Conformity

Product:	CONCURRENT DUAL-BAND 11AC WAVE 2 AP
Brand:	Edgecore
Test Model:	ECWO5213-L
Sample Status:	Engineering sample
Applicant:	Edgecore Networks Corporation
Test Date:	Oct. 12 ~ Oct. 27, 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 : _____ , **Date:** Nov. 09, 2018

Suntee Liu / Specialist

Approved by : _____ , **Date:** Nov. 09, 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 -17.59dB at 0.37304MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.2dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is IPEX 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	30MHz ~ 200MHz	2.94 dB
Radiated Emissions up to 1 GHz	200MHz ~1000MHz	3.86 dB
	1GHz ~ 18GHz	3.87 dB
Radiated Emissions above 1 GHz	18GHz ~ 40GHz	2.29 dB
	30MHz ~ 200MHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	CONCURRENT DUAL-BAND 11AC WAVE 2 AP
Brand	Edgecore
Test Model	ECWO5213-L
Sample Status	Engineering sample
Power Supply Rating	48Vdc (POE)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps
Operating Frequency	2412~2462MHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7
Output Power	270.432mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	POE
Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of the original report no.: RF171215C04C. The differences compared with the original report are changing model and adding WLAN antenna.
2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS 0~8, Nss=1	2TX	2RX
	MCS 0~8, Nss=2	2TX	2RX
802.11ac (VHT40)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX
802.11ac (VHT80)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX

* The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

* The EUT supports Master mode and Client mode. For 5GHz band 1, Master mode and Client mode test results are presented individually. For the other band, Master mode and Client mode share common test results in test report.

3. There are WLAN, Bluetooth and GPS technology used for the EUT.
4. This device can support different category application which switched by access point mode and client mode by software.
5. The EUT contains certified BT-LE module which FCC ID: RC6-M2-TBT.
6. Simultaneously transmission condition.

Condition	**Technology**		
1	WLAN 2.4GHz	WLAN 5GHz	Bluetooth
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.			

7. The EUT must be supplied with a POE as following table:

No.	Brand	Model No.	Spec.
1	Powertron Electronics corp.	POE1024-480T3A050	AC Input: 100-240Vac, 1.0A, 50-60Hz DC Output: 48V, 0.5A

8. The antennas provided to the EUT, please refer to the following table:

Original antenna

For Model No.: API50c (Internal Patch antenna)				
2.4GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	2400	8.0	Patch	None
	2450	8.2		
	2500	8.0		
2	2400	8.3		
	2450	8.4		
	2500	7.8		
5GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	5150	7.0	Patch	None
	5500	6.8		
	5825	7.3		
2	5150	7.0		
	5500	6.7		
	5825	6.6		
For Model No.: API51c (External Dipole antenna)				
2.4GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	2400	4.87	Dipole	N-type
	2450	4.9		
	2500	4.92		
2	2400	4.87		
	2450	4.9		
	2500	4.92		

5GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	5150	6.87	Dipole	N-type
	5250	6.8		
	5350	6.76		
	5450	6.83		
	5550	6.85		
	5650	6.75		
	5750	6.92		
	5850	6.83		
2	5150	6.87		
	5250	6.8		
	5350	6.76		
	5450	6.83		
	5550	6.85		
	5650	6.75		
	5750	6.92		
	5850	6.83		

Bluetooth antenna spec.			
Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
2400	3.71	PIFA	None
2450	3.79		
2500	3.88		

GPS antenna spec.				
Frequency (MHz)	Peak Gain (dBiC)		Antenna Type	Connecter Type
	Horizontal	Vertical		
1575	2.8	3.8	PIFA	Mini PCI
1575.4	2.7	3.7		
1610	3.9	3.4		

Note: For Bluetooth antenna and GPS antenna, model No.: API50c is as same as API51c.

New antenna

2.4GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	2400~2500	10.9	PIFA	IPEX
2	2400~2500	11.4		

5GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	5150~5825	10.5	PIFA	IPEX
2	5150~5825	10.2		

Note:

1. Max. gain was selected for the final test.

3.2 Description of Test Modes

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

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

7 channels are provided for 802.11n (HT40):

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

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

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)	Remark
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0	-
	802.11g	1 to 11	1, 2, 6, 10, 11	OFDM	BPSK	6.0	
	802.11n (HT20)	1 to 11	1, 2, 6, 9, 10, 11	OFDM	BPSK	6.5	
	802.11n (HT40)	3 to 9	3, 4, 6, 9	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)	Remark
-	802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	-

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)	Remark
-	802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	-

Antenna Port Conducted Measurement:

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

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

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)	Remark
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0	-
	802.11g	1 to 11	1, 2, 6, 10, 11	OFDM	BPSK	6.0	
	802.11n (HT20)	1 to 11	1, 2, 6, 9, 10, 11	OFDM	BPSK	6.5	
	802.11n (HT40)	3 to 9	3, 4, 6, 9	OFDM	BPSK	13.5	

Test Condition:

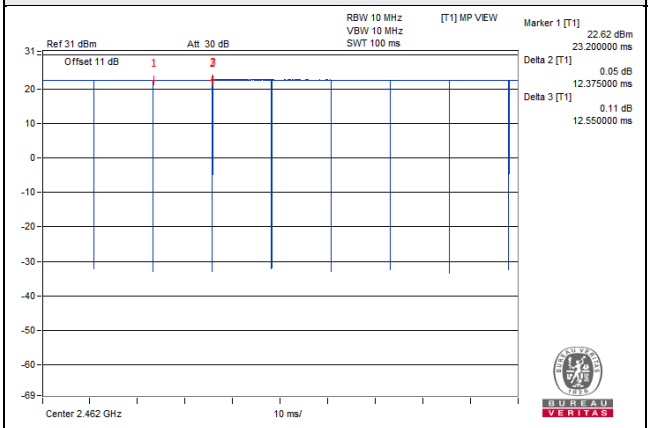
Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	22 deg. C, 67% RH	120Vac, 60Hz	Adair Peng
RE<1G	24 deg. C, 66% RH	120Vac, 60Hz	Willy Cheng
PLC	22 deg. C, 61% RH	120Vac, 60Hz	Willy Cheng
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Chris Lin

3.3 Duty Cycle of Test Signal

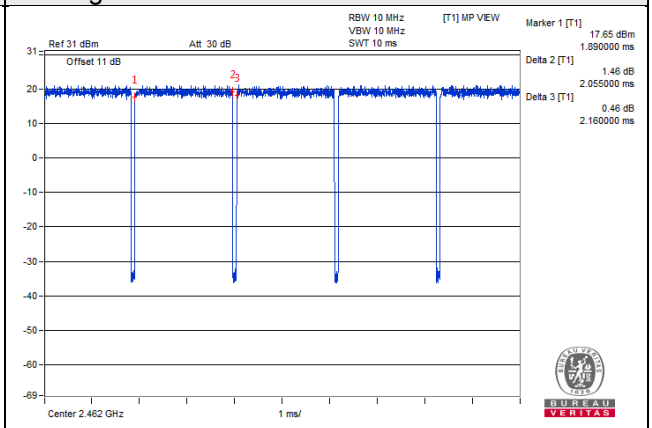
Duty cycle of test signal is ≥ 98%, duty factor is not required.
Duty cycle of test signal is < 98%, duty factor is required.

802.11b: Duty cycle = 12.375/12.55 = 0.986
802.11g: Duty cycle = 2.055/2.16 = 0.951, Duty factor = 10 * log(1/0.951) = 0.22
802.11n (HT20): Duty cycle = 4.993/5.088 = 0.981
802.11n (HT40): Duty cycle = 2.422/2.517 = 0.962, Duty factor = 10 * log(1/0.962) = 0.17

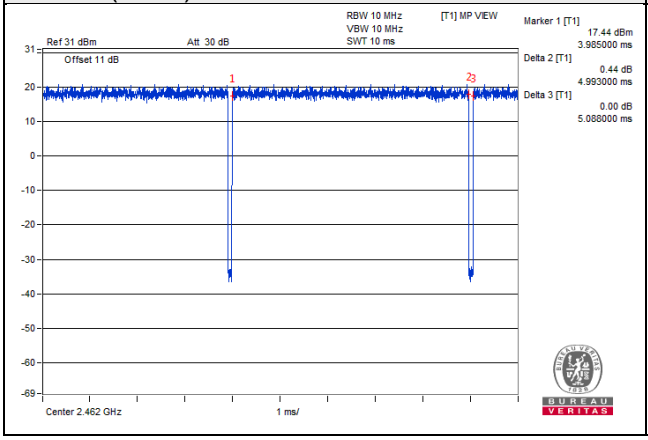
802.11b



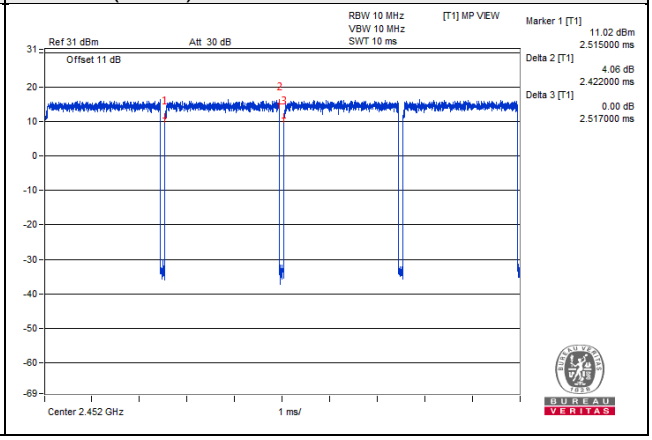
802.11g



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.

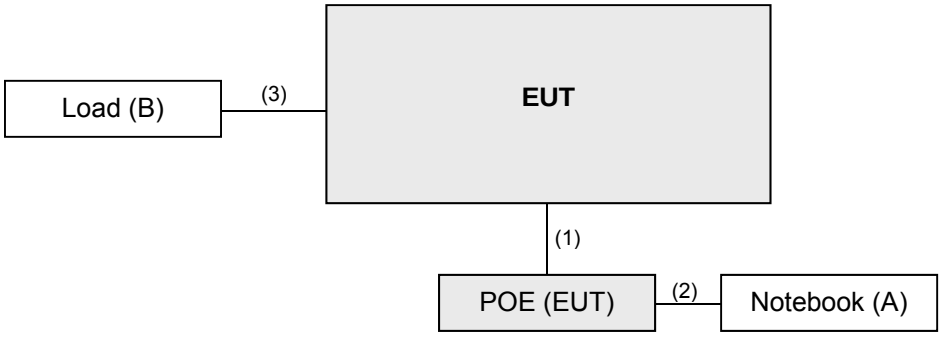
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	6	N	0	-
2.	RJ45, Cat5e	1	1.5	N	0	-
3.	RJ45, Cat5e	1	1.5	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 DTS 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- SM-8000	Cable-CH3-03 (309224+170907)	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 Sensor 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:

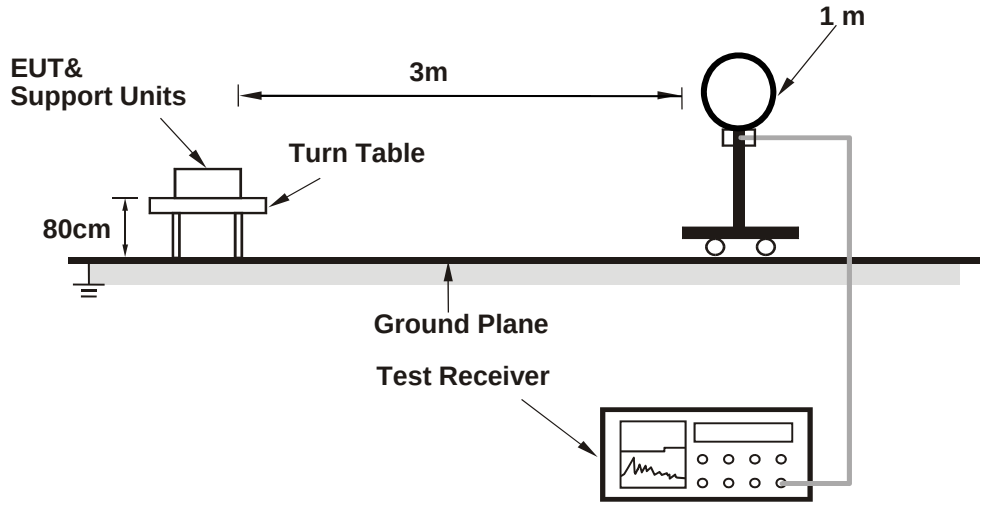
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

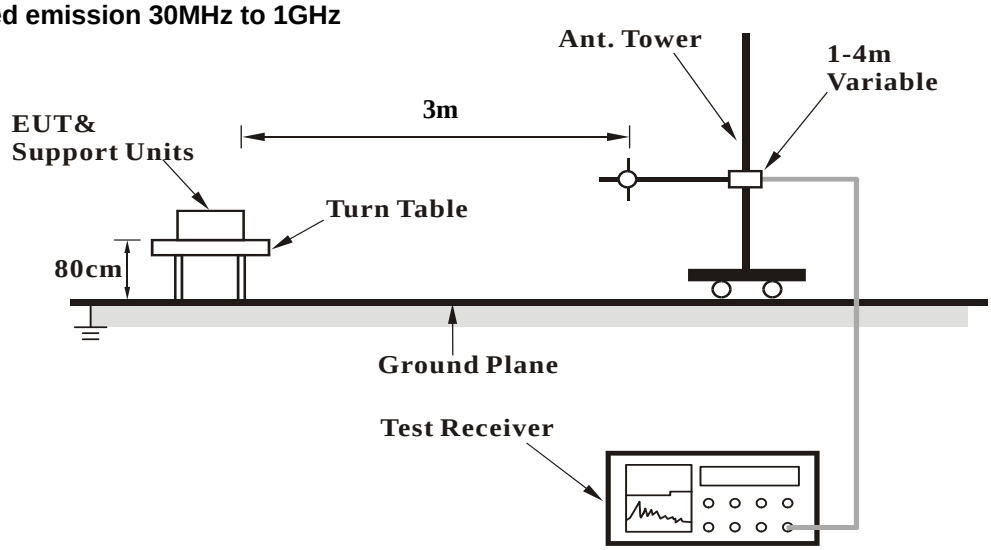
No deviation.

4.1.5 Test Setup

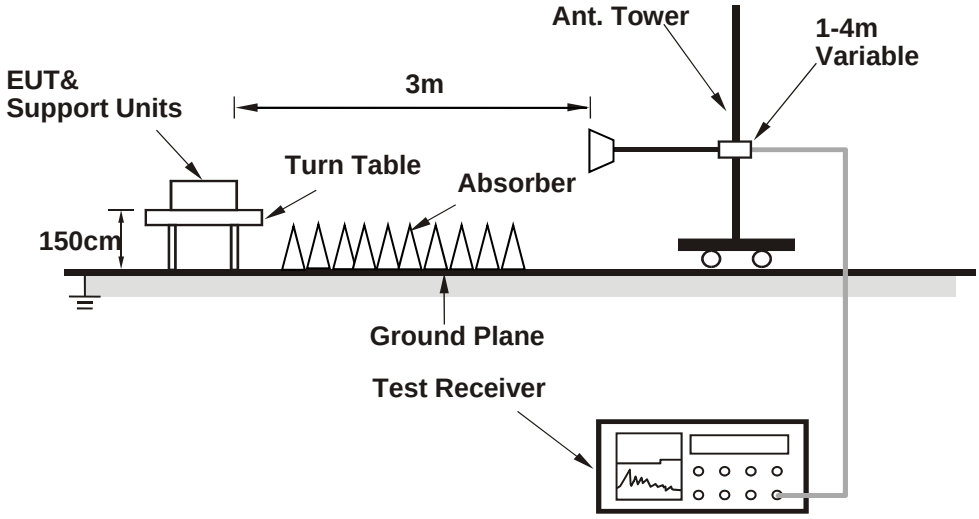
For Radiated emission below 30MHz



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. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".

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	65.1 PK	74.0	-8.9	1.39 H	344	32.1	33.0
2	2390.00	49.7 AV	54.0	-4.3	1.39 H	344	16.7	33.0
3	*2412.00	121.0 PK			1.32 H	351	88.1	32.9
4	*2412.00	116.0 AV			1.32 H	351	83.1	32.9
5	4824.00	53.8 PK	74.0	-20.2	1.93 H	150	50.2	3.6
6	4824.00	47.9 AV	54.0	-6.1	1.93 H	150	44.3	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	59.6 PK	74.0	-14.4	1.13 V	1	26.6	33.0
2	2390.00	47.5 AV	54.0	-6.5	1.13 V	1	14.5	33.0
3	*2412.00	111.1 PK			1.01 V	358	78.2	32.9
4	*2412.00	107.3 AV			1.01 V	358	74.4	32.9
5	4824.00	52.7 PK	74.0	-21.3	1.53 V	157	49.1	3.6
6	4824.00	48.0 AV	54.0	-6.0	1.53 V	157	44.4	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	120.9 PK			1.57 H	351	88.0	32.9
2	*2437.00	115.9 AV			1.57 H	351	83.0	32.9
3	4874.00	54.7 PK	74.0	-19.3	1.30 H	143	51.4	3.3
4	4874.00	50.0 AV	54.0	-4.0	1.30 H	143	46.7	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	111.7 PK			1.36 V	353	78.8	32.9
2	*2437.00	107.9 AV			1.36 V	353	75.0	32.9
3	4874.00	55.0 PK	74.0	-19.0	1.21 V	188	51.7	3.3
4	4874.00	51.5 AV	54.0	-2.5	1.21 V	188	48.2	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	120.0 PK			1.55 H	349	87.2	32.8
2	*2462.00	115.1 AV			1.55 H	349	82.3	32.8
3	2483.50	64.8 PK	74.0	-9.2	1.63 H	357	32.1	32.7
4	2483.50	49.2 AV	54.0	-4.8	1.63 H	357	16.5	32.7
5	4924.00	54.1 PK	74.0	-19.9	2.64 H	158	51.0	3.1
6	4924.00	50.1 AV	54.0	-3.9	2.64 H	158	47.0	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	113.9 PK			1.76 V	348	81.1	32.8
2	*2462.00	110.0 AV			1.76 V	348	77.2	32.8
3	2483.50	62.0 PK	74.0	-12.0	1.53 V	357	29.3	32.7
4	2483.50	49.0 AV	54.0	-5.0	1.53 V	357	16.3	32.7
5	4924.00	54.9 PK	74.0	-19.1	1.23 V	187	51.8	3.1
6	4924.00	51.0 AV	54.0	-3.0	1.23 V	187	47.9	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.5 PK	74.0	-7.5	1.71 H	344	33.5	33.0
2	2390.00	52.5 AV	54.0	-1.5	1.71 H	344	19.5	33.0
3	*2412.00	118.9 PK			1.77 H	350	86.0	32.9
4	*2412.00	107.3 AV			1.77 H	350	74.4	32.9
5	4824.00	49.8 PK	74.0	-24.2	1.69 H	147	46.2	3.6
6	4824.00	43.1 AV	54.0	-10.9	1.69 H	147	39.5	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	59.9 PK	74.0	-14.1	1.71 V	359	26.9	33.0
2	2390.00	47.8 AV	54.0	-6.2	1.71 V	359	14.8	33.0
3	*2412.00	107.2 PK			1.61 V	355	74.3	32.9
4	*2412.00	96.3 AV			1.61 V	355	63.4	32.9
5	4824.00	49.9 PK	74.0	-24.1	1.98 V	99	46.3	3.6
6	4824.00	43.5 AV	54.0	-10.5	1.98 V	99	39.9	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 2	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	67.1 PK	74.0	-6.9	1.75 H	348	34.1	33.0
2	2390.00	52.4 AV	54.0	-1.6	1.75 H	348	19.4	33.0
3	*2417.00	121.6 PK			1.48 H	345	88.7	32.9
4	*2417.00	109.7 AV			1.48 H	345	76.8	32.9
5	4834.00	50.6 PK	74.0	-23.4	1.75 H	141	47.1	3.5
6	4834.00	44.8 AV	54.0	-9.2	1.75 H	141	41.3	3.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.1 PK	74.0	-13.9	1.75 V	351	27.1	33.0
2	2390.00	47.9 AV	54.0	-6.1	1.75 V	351	14.9	33.0
3	*2417.00	110.1 PK			1.73 V	358	77.2	32.9
4	*2417.00	99.0 AV			1.73 V	358	66.1	32.9
5	4834.00	51.0 PK	74.0	-23.0	1.83 V	109	47.5	3.5
6	4834.00	45.0 AV	54.0	-9.0	1.83 V	109	41.5	3.5

Remarks:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	125.6 PK			1.69 H	348	92.7	32.9
2	*2437.00	113.1 AV			1.69 H	348	80.2	32.9
3	2483.50	65.7 PK	74.0	-8.3	1.57 H	348	33.0	32.7
4	2483.50	52.4 AV	54.0	-1.6	1.57 H	348	19.7	32.7
5	4874.00	49.9 PK	74.0	-24.1	1.87 H	183	46.6	3.3
6	4874.00	42.8 AV	54.0	-11.2	1.87 H	183	39.5	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	114.2 PK			1.65 V	357	81.3	32.9
2	*2437.00	102.4 AV			1.65 V	357	69.5	32.9
3	2483.50	59.7 PK	74.0	-14.3	1.60 V	2	27.0	32.7
4	2483.50	47.6 AV	54.0	-6.4	1.60 V	2	14.9	32.7
5	4874.00	50.1 PK	74.0	-23.9	1.00 V	103	46.8	3.3
6	4874.00	43.2 AV	54.0	-10.8	1.00 V	103	39.9	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 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	122.8 PK			1.57 H	348	90.0	32.8
2	*2457.00	110.6 AV			1.57 H	348	77.8	32.8
3	2483.50	67.1 PK	74.0	-6.9	1.59 H	347	34.4	32.7
4	2483.50	52.7 AV	54.0	-1.3	1.59 H	347	20.0	32.7
5	4914.00	51.0 PK	74.0	-23.0	1.79 H	150	47.9	3.1
6	4914.00	43.8 AV	54.0	-10.2	1.79 H	150	40.7	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	*2457.00	111.4 PK			1.69 V	1	78.6	32.8
2	*2457.00	99.8 AV			1.69 V	1	67.0	32.8
3	2483.50	59.3 PK	74.0	-14.7	1.56 V	349	26.6	32.7
4	2483.50	47.2 AV	54.0	-6.8	1.56 V	349	14.5	32.7
5	4914.00	51.4 PK	74.0	-22.6	1.79 V	123	48.3	3.1
6	4914.00	44.3 AV	54.0	-9.7	1.79 V	123	41.2	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	121.3 PK			1.58 H	346	88.5	32.8
2	*2462.00	109.2 AV			1.58 H	346	76.4	32.8
3	2483.50	66.8 PK	74.0	-7.2	1.65 H	346	34.1	32.7
4	2483.50	52.7 AV	54.0	-1.3	1.65 H	346	20.0	32.7
5	4924.00	50.7 PK	74.0	-23.3	1.58 H	146	47.6	3.1
6	4924.00	43.9 AV	54.0	-10.1	1.58 H	146	40.8	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	109.9 PK			1.57 V	353	77.1	32.8
2	*2462.00	98.3 AV			1.57 V	353	65.5	32.8
3	2483.50	59.5 PK	74.0	-14.5	1.53 V	359	26.8	32.7
4	2483.50	47.4 AV	54.0	-6.6	1.53 V	359	14.7	32.7
5	4924.00	51.1 PK	74.0	-22.9	1.95 V	111	48.0	3.1
6	4924.00	44.2 AV	54.0	-9.8	1.95 V	111	41.1	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.1 PK	74.0	-8.9	1.71 H	348	32.1	33.0
2	2390.00	52.4 AV	54.0	-1.6	1.71 H	348	19.4	33.0
3	*2412.00	117.3 PK			1.83 H	347	84.4	32.9
4	*2412.00	105.6 AV			1.83 H	347	72.7	32.9
5	4824.00	51.1 PK	74.0	-22.9	1.85 H	126	47.5	3.6
6	4824.00	45.6 AV	54.0	-8.4	1.85 H	126	42.0	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	60.1 PK	74.0	-13.9	1.55 V	359	27.1	33.0
2	2390.00	47.8 AV	54.0	-6.2	1.55 V	359	14.8	33.0
3	*2412.00	105.5 PK			1.61 V	354	72.6	32.9
4	*2412.00	94.6 AV			1.61 V	354	61.7	32.9
5	4824.00	49.9 PK	74.0	-24.1	1.96 V	95	46.3	3.6
6	4824.00	43.3 AV	54.0	-10.7	1.96 V	95	39.7	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 2	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	67.1 PK	74.0	-6.9	1.81 H	348	34.1	33.0
2	2390.00	52.6 AV	54.0	-1.4	1.81 H	348	19.6	33.0
3	*2417.00	122.1 PK			1.74 H	346	89.2	32.9
4	*2417.00	110.3 AV			1.74 H	346	77.4	32.9
5	4834.00	51.1 PK	74.0	-22.9	1.81 H	130	47.6	3.5
6	4834.00	45.3 AV	54.0	-8.7	1.81 H	130	41.8	3.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.1 PK	74.0	-13.9	1.57 V	1	27.1	33.0
2	2390.00	48.2 AV	54.0	-5.8	1.57 V	1	15.2	33.0
3	*2417.00	110.4 PK			1.66 V	356	77.5	32.9
4	*2417.00	99.4 AV			1.66 V	356	66.5	32.9
5	4834.00	50.0 PK	74.0	-24.0	1.93 V	101	46.5	3.5
6	4834.00	42.8 AV	54.0	-11.2	1.93 V	101	39.3	3.5

Remarks:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	125.3 PK			1.48 H	346	92.4	32.9
2	*2437.00	113.4 AV			1.48 H	346	80.5	32.9
3	2483.50	64.7 PK	74.0	-9.3	1.60 H	347	32.0	32.7
4	2483.50	52.2 AV	54.0	-1.8	1.60 H	347	19.5	32.7
5	4874.00	50.6 PK	74.0	-23.4	1.65 H	144	47.3	3.3
6	4874.00	43.8 AV	54.0	-10.2	1.65 H	144	40.5	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	113.8 PK			1.69 V	356	80.9	32.9
2	*2437.00	102.4 AV			1.69 V	356	69.5	32.9
3	2483.50	60.4 PK	74.0	-13.6	1.55 V	359	27.7	32.7
4	2483.50	47.8 AV	54.0	-6.2	1.55 V	359	15.1	32.7
5	4874.00	49.4 PK	74.0	-24.6	1.99 V	99	46.1	3.3
6	4874.00	41.9 AV	54.0	-12.1	1.99 V	99	38.6	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	122.5 PK			1.56 H	348	89.6	32.9
2	*2452.00	110.9 AV			1.56 H	348	78.0	32.9
3	2483.50	67.0 PK	74.0	-7.0	1.89 H	346	34.3	32.7
4	2483.50	52.7 AV	54.0	-1.3	1.89 H	346	20.0	32.7
5	4904.00	50.2 PK	74.0	-23.8	1.66 H	139	47.1	3.1
6	4904.00	44.1 AV	54.0	-9.9	1.66 H	139	41.0	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	*2452.00	110.9 PK			1.69 V	356	78.0	32.9
2	*2452.00	99.9 AV			1.69 V	356	67.0	32.9
3	2483.50	59.8 PK	74.0	-14.2	1.49 V	2	27.1	32.7
4	2483.50	48.0 AV	54.0	-6.0	1.49 V	2	15.3	32.7
5	4904.00	49.2 PK	74.0	-24.8	1.93 V	100	46.1	3.1
6	4904.00	42.3 AV	54.0	-11.7	1.93 V	100	39.2	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 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	120.7 PK			1.42 H	346	87.9	32.8
2	*2457.00	109.0 AV			1.42 H	346	76.2	32.8
3	2483.50	67.2 PK	74.0	-6.8	2.00 H	349	34.5	32.7
4	2483.50	52.7 AV	54.0	-1.3	2.00 H	349	20.0	32.7
5	4914.00	50.2 PK	74.0	-23.8	1.62 H	144	47.1	3.1
6	4914.00	44.0 AV	54.0	-10.0	1.62 H	144	40.9	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	*2457.00	109.1 PK			1.70 V	349	76.3	32.8
2	*2457.00	98.1 AV			1.70 V	349	65.3	32.8
3	2483.50	60.0 PK	74.0	-14.0	1.60 V	358	27.3	32.7
4	2483.50	48.2 AV	54.0	-5.8	1.60 V	358	15.5	32.7
5	4914.00	49.1 PK	74.0	-24.9	1.89 V	133	46.0	3.1
6	4914.00	42.3 AV	54.0	-11.7	1.89 V	133	39.2	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	120.0 PK			1.54 H	346	87.2	32.8
2	*2462.00	108.1 AV			1.54 H	346	75.3	32.8
3	2483.50	66.0 PK	74.0	-8.0	1.80 H	346	33.3	32.7
4	**2483.50**	**52.8 AV**	**54.0**	**-1.2**	**1.80 H**	**346**	**20.1**	**32.7**
5	4924.00	50.2 PK	74.0	-23.8	1.75 H	129	47.1	3.1
6	4924.00	44.4 AV	54.0	-9.6	1.75 H	129	41.3	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	108.3 PK			1.71 V	356	75.5	32.8
2	*2462.00	97.1 AV			1.71 V	356	64.3	32.8
3	2483.50	59.5 PK	74.0	-14.5	1.49 V	353	26.8	32.7
4	2483.50	47.6 AV	54.0	-6.4	1.49 V	353	14.9	32.7
5	4924.00	49.0 PK	74.0	-25.0	2.02 V	104	45.9	3.1
6	4924.00	42.2 AV	54.0	-11.8	2.02 V	104	39.1	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

802.11n (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	64.1 PK	74.0	-9.9	1.74 H	345	31.1	33.0
2	2390.00	52.2 AV	54.0	-1.8	1.74 H	345	19.2	33.0
3	*2422.00	111.6 PK			1.67 H	347	78.7	32.9
4	*2422.00	100.6 AV			1.67 H	347	67.7	32.9
5	4844.00	50.8 PK	74.0	-23.2	1.80 H	128	47.4	3.4
6	4844.00	45.3 AV	54.0	-8.7	1.80 H	128	41.9	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	59.2 PK	74.0	-14.8	1.71 V	352	26.2	33.0
2	2390.00	47.5 AV	54.0	-6.5	1.71 V	352	14.5	33.0
3	*2422.00	100.8 PK			1.80 V	345	67.9	32.9
4	*2422.00	90.7 AV			1.80 V	345	57.8	32.9
5	4844.00	50.3 PK	74.0	-23.7	2.10 V	83	46.9	3.4
6	4844.00	44.3 AV	54.0	-9.7	2.10 V	83	40.9	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 4	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	65.3 PK	74.0	-8.7	1.83 H	346	32.3	33.0
2	2390.00	52.4 AV	54.0	-1.6	1.83 H	346	19.4	33.0
3	*2427.00	113.3 PK			1.63 H	349	80.5	32.8
4	*2427.00	102.8 AV			1.63 H	349	70.0	32.8
5	4854.00	50.1 PK	74.0	-23.9	1.73 H	139	46.7	3.4
6	4854.00	43.9 AV	54.0	-10.1	1.73 H	139	40.5	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	59.6 PK	74.0	-14.4	1.73 V	359	26.6	33.0
2	2390.00	47.7 AV	54.0	-6.3	1.73 V	359	14.7	33.0
3	*2427.00	102.8 PK			1.79 V	348	70.0	32.8
4	*2427.00	92.9 AV			1.79 V	348	60.1	32.8
5	4854.00	49.6 PK	74.0	-24.4	2.05 V	86	46.2	3.4
6	4854.00	43.0 AV	54.0	-11.0	2.05 V	86	39.6	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.7 PK	74.0	-7.3	1.70 H	345	33.7	33.0
2	2390.00	52.3 AV	54.0	-1.7	1.70 H	345	19.3	33.0
3	*2437.00	115.4 PK			1.45 H	347	82.5	32.9
4	*2437.00	105.0 AV			1.45 H	347	72.1	32.9
5	4874.00	50.8 PK	74.0	-23.2	1.74 H	131	47.5	3.3
6	4874.00	45.4 AV	54.0	-8.6	1.74 H	131	42.1	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	2390.00	59.8 PK	74.0	-14.2	1.69 V	351	26.8	33.0
2	2390.00	47.9 AV	54.0	-6.1	1.69 V	351	14.9	33.0
3	*2437.00	104.6 PK			1.77 V	346	71.7	32.9
4	*2437.00	95.1 AV			1.77 V	346	62.2	32.9
5	4874.00	50.3 PK	74.0	-23.7	2.03 V	88	47.0	3.3
6	4874.00	44.4 AV	54.0	-9.6	2.03 V	88	41.1	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	115.0 PK			1.33 H	347	82.1	32.9
2	*2452.00	104.6 AV			1.33 H	347	71.7	32.9
3	2483.50	66.8 PK	74.0	-7.2	2.01 H	346	34.1	32.7
4	2483.50	52.3 AV	54.0	-1.7	2.01 H	346	19.6	32.7
5	4904.00	50.4 PK	74.0	-23.6	1.75 H	129	47.3	3.1
6	4904.00	45.1 AV	54.0	-8.9	1.75 H	129	42.0	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	*2452.00	104.2 PK			1.81 V	344	71.3	32.9
2	*2452.00	94.7 AV			1.81 V	344	61.8	32.9
3	2483.50	59.3 PK	74.0	-14.7	1.63 V	353	26.6	32.7
4	2483.50	47.3 AV	54.0	-6.7	1.63 V	353	14.6	32.7
5	4904.00	49.7 PK	74.0	-24.3	1.97 V	91	46.6	3.1
6	4904.00	44.2 AV	54.0	-9.8	1.97 V	91	41.1	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

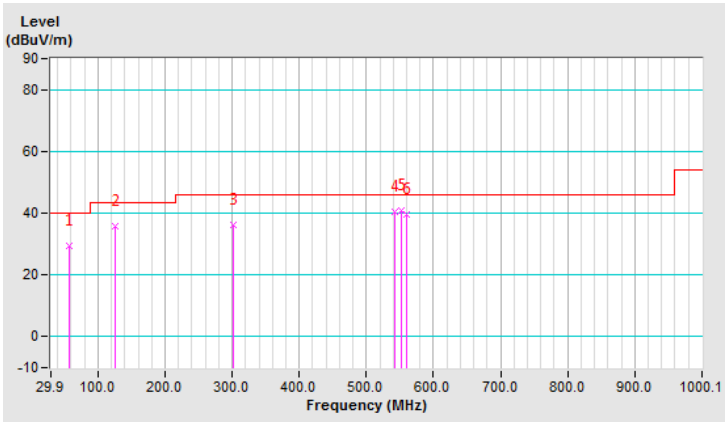
Below 1GHz worst-case data: 802.11n (HT20)

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	29.5 QP	40.0	-10.5	1.99 H	91	39.1	-9.6
2	125.17	35.9 QP	43.5	-7.6	1.49 H	245	47.0	-11.1
3	302.10	36.2 QP	46.0	-9.8	1.00 H	121	43.6	-7.4
4	543.19	40.6 QP	46.0	-5.4	1.49 H	162	43.4	-2.8
5	552.91	40.9 QP	46.0	-5.1	1.49 H	154	43.5	-2.6
6	560.69	39.7 QP	46.0	-6.3	1.49 H	159	42.1	-2.4

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

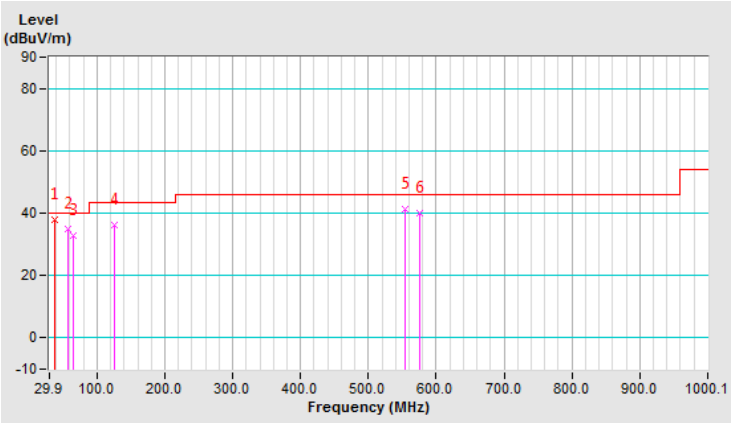


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	37.62	38.0 QP	40.0	-2.0	1.00 V	126	48.4	-10.4
2	57.12	34.8 QP	40.0	-5.2	1.00 V	6	44.4	-9.6
3	64.90	32.9 QP	40.0	-7.1	1.00 V	6	43.2	-10.3
4	125.17	36.1 QP	43.5	-7.4	1.50 V	16	47.2	-11.1
5	554.86	41.2 QP	46.0	-4.8	1.00 V	188	43.8	-2.6
6	576.25	40.0 QP	46.0	-6.0	1.00 V	180	41.9	-1.9

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.



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	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2018	Sep. 04, 2019
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 26, 2018	Feb. 25, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 19, 2018	Aug. 18, 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 1.
3. The VCCI Site Registration No. is C-2040.

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.

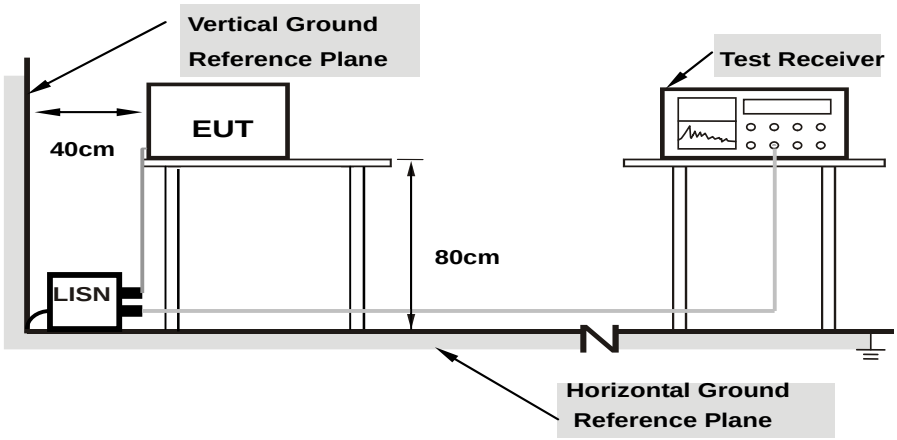
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

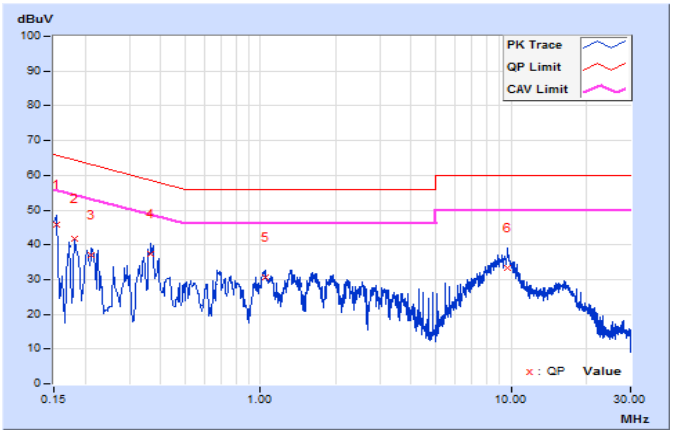
Worst-case data: 802.11n (HT20)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 6		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.67	36.09	20.36	45.76	30.03	65.79	55.79	-20.03	-25.76
2	0.18128	9.67	32.02	17.54	41.69	27.21	64.43	54.43	-22.74	-27.22
3	0.21256	9.67	27.31	13.06	36.98	22.73	63.10	53.10	-26.12	-30.37
4	0.36505	9.66	27.59	16.87	37.25	26.53	58.61	48.61	-21.36	-22.08
5	1.04517	9.65	21.14	11.88	30.79	21.53	56.00	46.00	-25.21	-24.47
6	9.70995	9.84	23.37	17.50	33.21	27.34	60.00	50.00	-26.79	-22.66

Remarks:

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

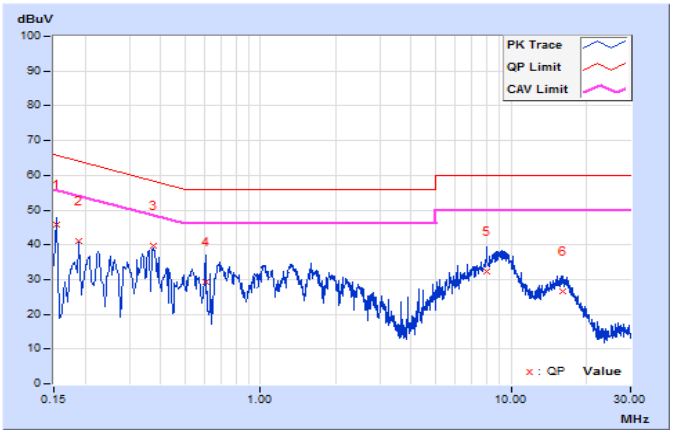


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 6		

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	0.15391	9.68	36.27	21.45	45.95	31.13	65.79	55.79	-19.84	-24.66
2	0.18910	9.67	31.42	18.83	41.09	28.50	64.08	54.08	-22.99	-25.58
3	**0.37304**	**9.67**	**29.91**	**21.17**	**39.58**	**30.84**	**58.43**	**48.43**	**-18.85**	**-17.59**
4	0.60356	9.66	19.65	10.03	29.31	19.69	56.00	46.00	-26.69	-26.31
5	8.00128	9.82	22.34	16.08	32.16	25.90	60.00	50.00	-27.84	-24.10
6	16.07152	9.96	16.53	10.78	26.49	20.74	60.00	50.00	-33.51	-29.26

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.

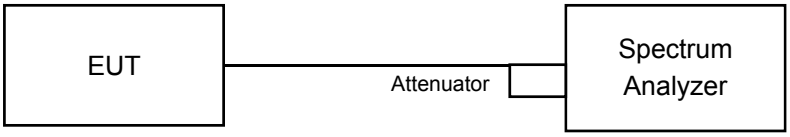


4.3 6dB Bandwidth Measurement

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	8.11	7.61	0.5	Pass
6	2437	8.12	8.13	0.5	Pass
11	2462	8.13	8.13	0.5	Pass

802.11g

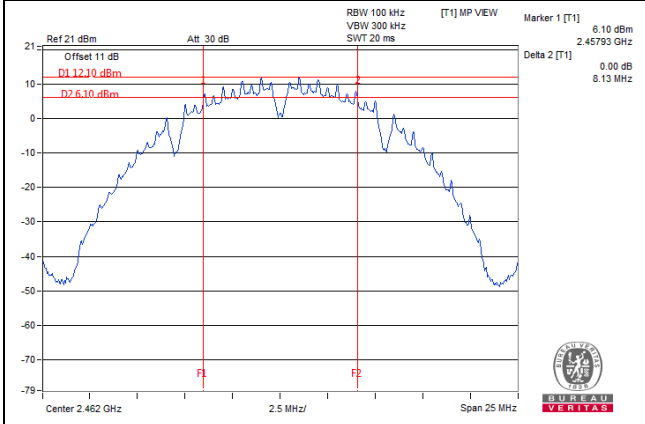
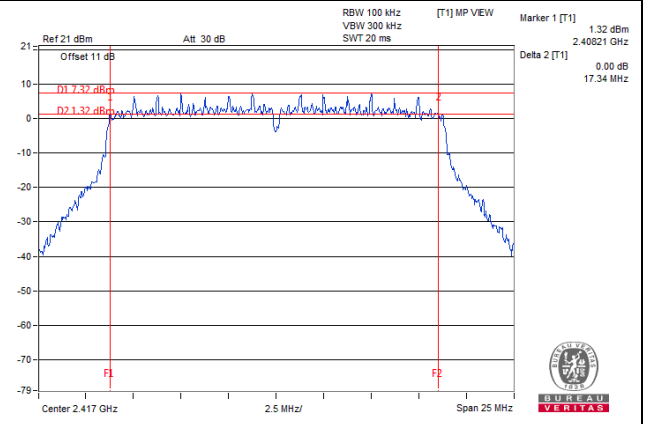
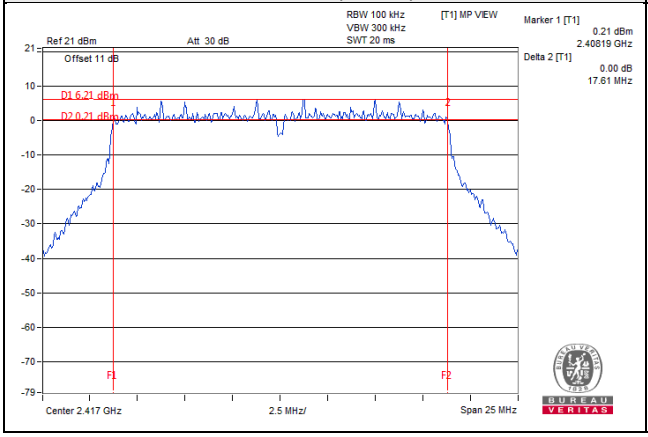
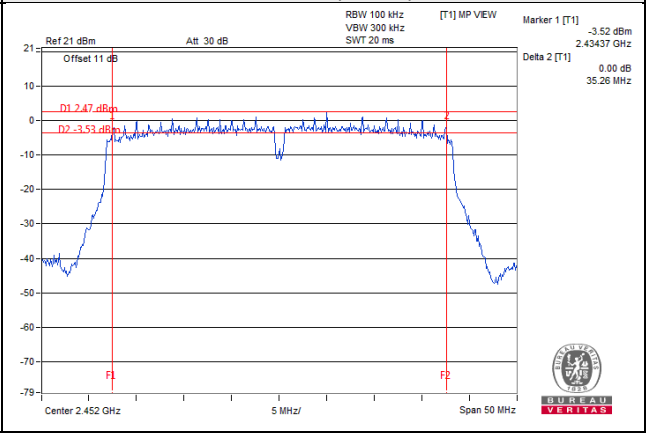
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.36	16.39	0.5	Pass
2	2417	16.36	17.34	0.5	Pass
6	2437	16.36	16.37	0.5	Pass
10	2457	16.36	16.85	0.5	Pass
11	2462	16.37	16.38	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.24	17.60	0.5	Pass
2	2417	17.61	17.56	0.5	Pass
6	2437	17.25	17.36	0.5	Pass
9	2452	17.20	16.97	0.5	Pass
10	2457	17.24	17.23	0.5	Pass
11	2462	17.25	17.19	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.20	35.24	0.5	Pass
4	2427	35.14	35.22	0.5	Pass
6	2437	35.09	35.21	0.5	Pass
9	2452	35.20	35.26	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

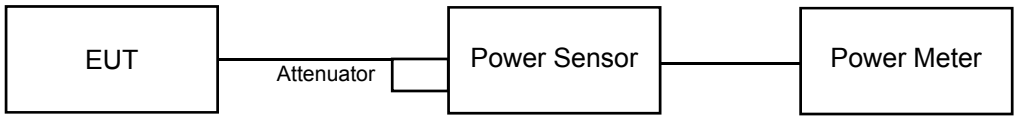
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

Average power sensor was 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

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.81	21.61	265.381	24.24	24.6	Pass
6	2437	20.83	21.50	262.314	24.19	24.6	Pass
11	2462	20.53	21.49	253.909	24.05	24.6	Pass

Note: Max. Gain = 11.4dBi > 6dBi, so the limit shall be reduced to 30-(11.4-6) = 24.6dBm.

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	15.58	15.99	75.860	18.80	24.6	Pass
2	2417	17.72	18.75	134.145	21.28	24.6	Pass
6	2437	20.84	21.55	264.228	24.22	24.6	Pass
10	2457	20.71	21.47	258.042	24.12	24.6	Pass
11	2462	18.02	18.89	140.833	21.49	24.6	Pass

Note: Max. Gain = 11.4dBi > 6dBi, so the limit shall be reduced to 30-(11.4-6) = 24.6dBm.

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	13.77	14.66	53.065	17.25	24.6	Pass
2	2417	18.09	19.11	145.887	21.64	24.6	Pass
6	2437	20.87	21.71	**270.432**	24.32	24.6	Pass
9	2452	18.61	19.37	159.108	22.02	24.6	Pass
10	2457	17.55	17.84	117.699	20.71	24.6	Pass
11	2462	16.21	16.72	88.772	19.48	24.6	Pass

Note: Max. Gain = 11.4dBi > 6dBi, so the limit shall be reduced to 30-(11.4-6) = 24.6dBm.

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	10.69	11.55	26.011	14.15	24.6	Pass
4	2427	12.76	13.49	41.216	16.15	24.6	Pass
6	2437	15.17	15.63	69.444	18.42	24.6	Pass
9	2452	14.87	15.59	66.914	18.26	24.6	Pass

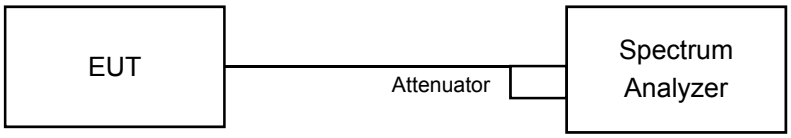
Note: Max. Gain = 11.4dBi > 6dBi, so the limit shall be reduced to 30-(11.4-6) = 24.6dBm.

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as item 4.3.6.

4.5.7 Test Results

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-6.74	3.01	-3.73	-0.41	Pass
	6	2437	-6.87	3.01	-3.86	-0.41	Pass
	11	2462	-7.22	3.01	-4.21	-0.41	Pass
1	1	2412	-5.76	3.01	-2.75	-0.41	Pass
	6	2437	-5.67	3.01	-2.66	-0.41	Pass
	11	2462	-5.49	3.01	-2.48	-0.41	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 11.4dBi + 10log(2) = 14.41dBi > 6dBi, so the limit shall be reduced to 8-(14.41-6) = -0.41dBm.

802.11g

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/10kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-14.99	3.01	0.22	-11.76	-0.41	Pass
	2	2417	-13.11	3.01	0.22	-9.88	-0.41	Pass
	6	2437	-9.80	3.01	0.22	-6.57	-0.41	Pass
	10	2457	-12.44	3.01	0.22	-9.21	-0.41	Pass
	11	2462	-13.76	3.01	0.22	-10.53	-0.41	Pass
1	1	2412	-14.24	3.01	0.22	-11.01	-0.41	Pass
	2	2417	-11.75	3.01	0.22	-8.52	-0.41	Pass
	6	2437	-9.23	3.01	0.22	-6.00	-0.41	Pass
	10	2457	-10.73	3.01	0.22	-7.50	-0.41	Pass
	11	2462	-13.01	3.01	0.22	-9.78	-0.41	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 11.4dBi + 10log(2) = 14.41dBi > 6dBi, so the limit shall be reduced to 8-(14.41-6) = -0.41dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

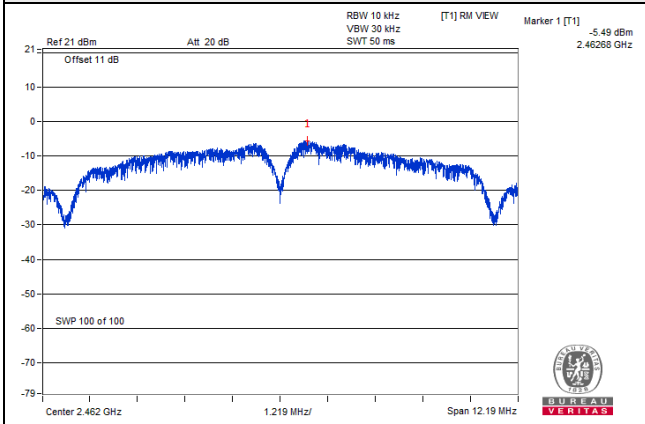
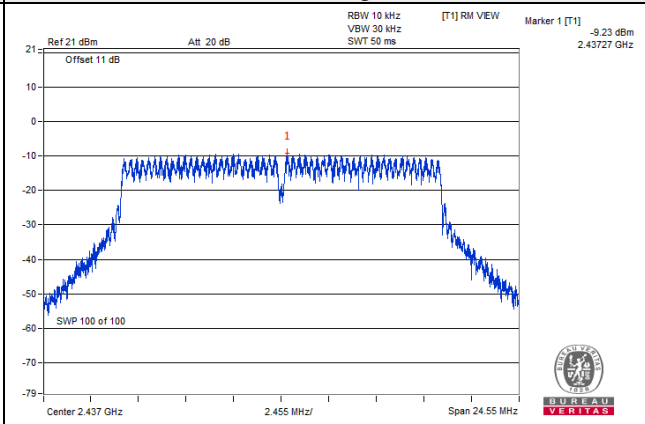
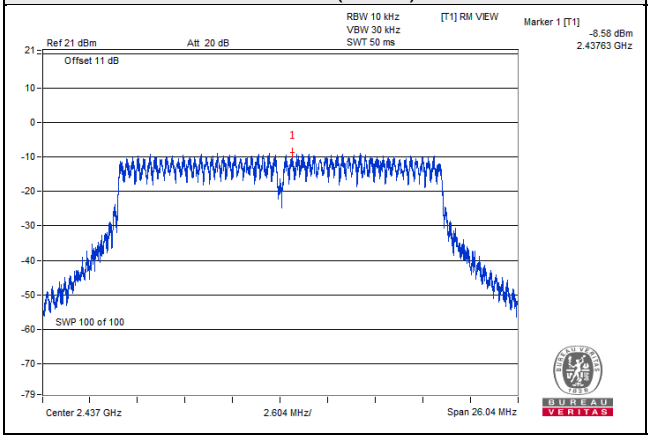
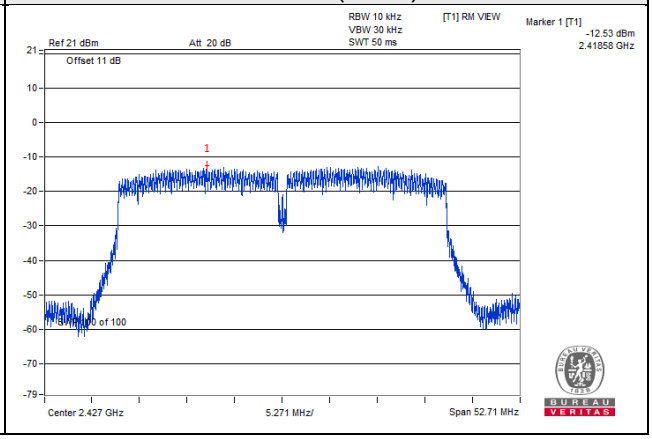
TX chain	Channel	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-16.13	3.01	-13.12	-0.41	Pass
	2	2417	-12.84	3.01	-9.83	-0.41	Pass
	6	2437	-9.06	3.01	-6.05	-0.41	Pass
	9	2452	-11.18	3.01	-8.17	-0.41	Pass
	10	2457	-12.65	3.01	-9.64	-0.41	Pass
	11	2462	-14.64	3.01	-11.63	-0.41	Pass
1	1	2412	-15.46	3.01	-12.45	-0.41	Pass
	2	2417	-11.35	3.01	-8.34	-0.41	Pass
	6	2437	-8.58	3.01	-5.57	-0.41	Pass
	9	2452	-10.47	3.01	-7.46	-0.41	Pass
	10	2457	-11.79	3.01	-8.78	-0.41	Pass
	11	2462	-13.83	3.01	-10.82	-0.41	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 11.4dBi + 10log(2) = 14.41dBi > 6dBi, so the limit shall be reduced to 8-(14.41-6) = -0.41dBm.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/10kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-22.21	3.01	0.17	-19.03	-0.41	Pass
	4	2427	-12.53	3.01	0.17	-9.35	-0.41	
	6	2437	-17.52	3.01	0.17	-14.34	-0.41	Pass
	9	2452	-18.35	3.01	0.17	-15.17	-0.41	Pass
1	3	2422	-21.72	3.01	0.17	-18.54	-0.41	Pass
	4	2427	-19.78	3.01	0.17	-16.60	-0.41	
	6	2437	-17.37	3.01	0.17	-14.19	-0.41	Pass
	9	2452	-17.57	3.01	0.17	-14.39	-0.41	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 11.4dBi + 10log(2) = 14.41dBi > 6dBi, so the limit shall be reduced to 8-(14.41-6) = -0.41dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

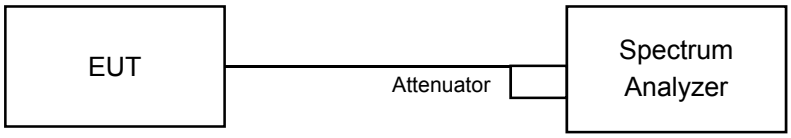
Spectrum Plot of Worst Value	
802.11b	802.11g
	
802.11n (HT20)	802.11n (HT40)
	

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

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

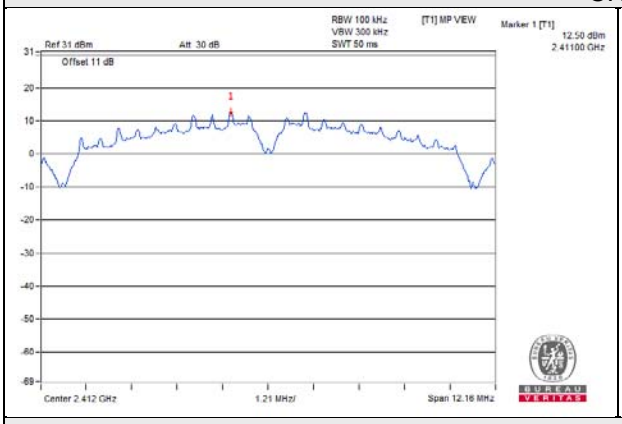
Same as item 4.3.6.

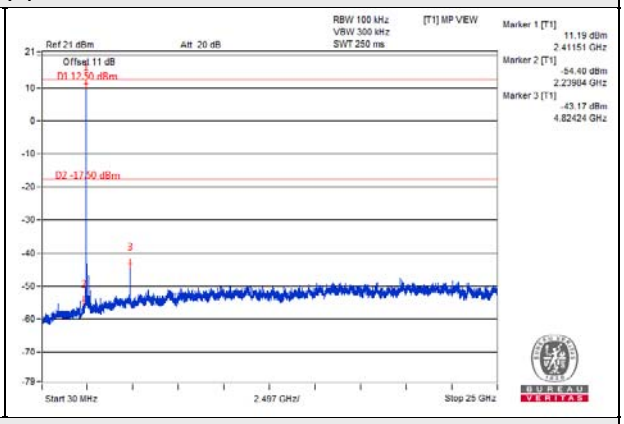
4.6.7 Test Results

The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

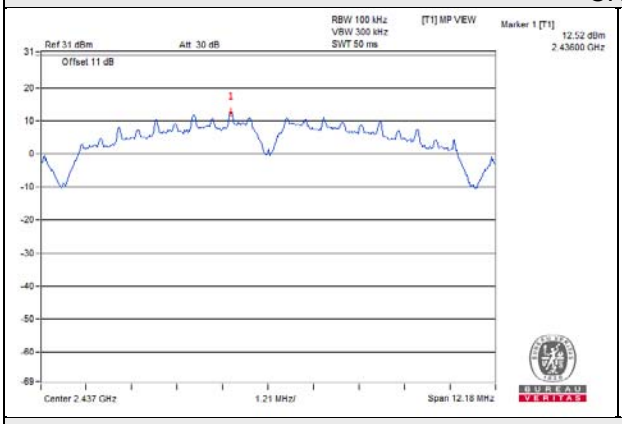
802.11b_Chain 0

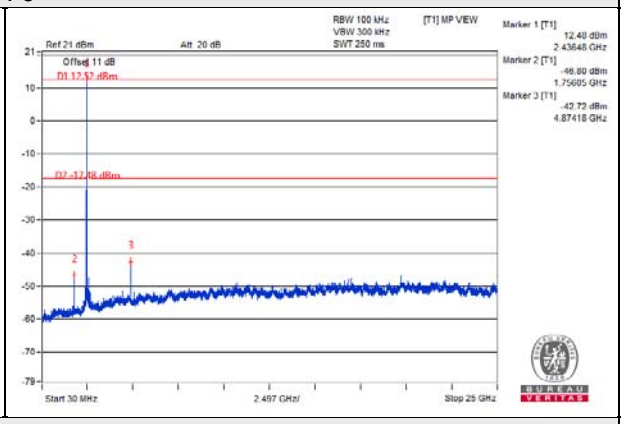
CH 1



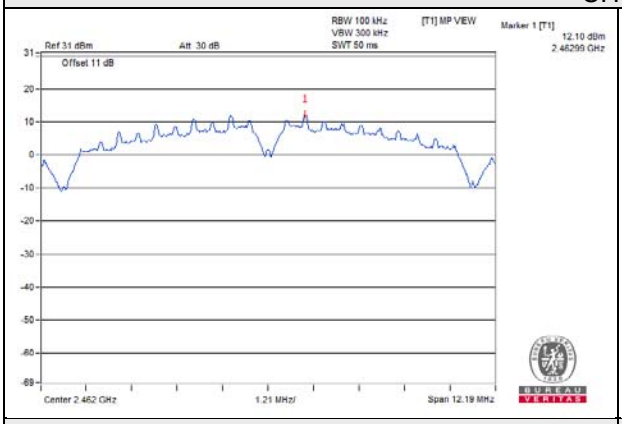


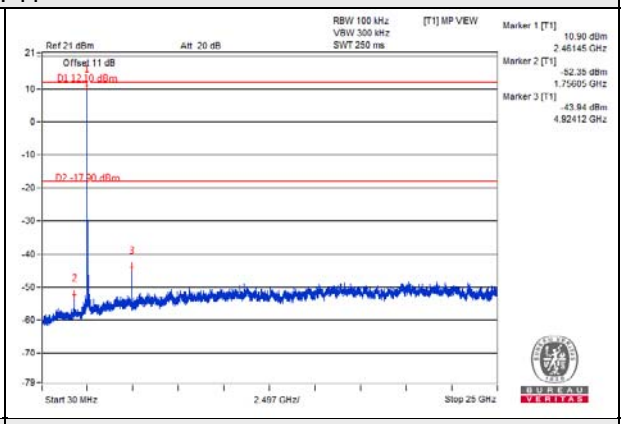
CH 6



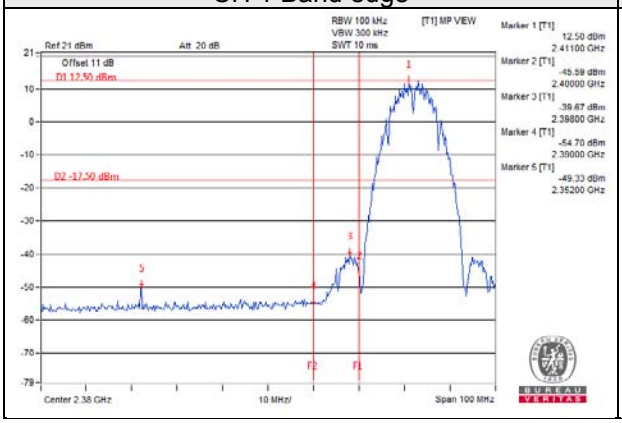


CH 11

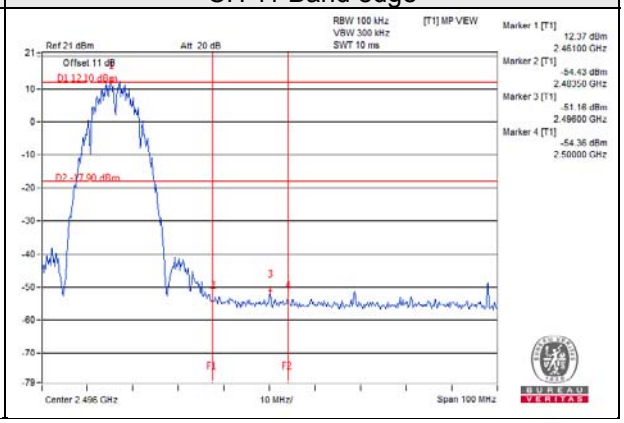




CH 1 Band edge

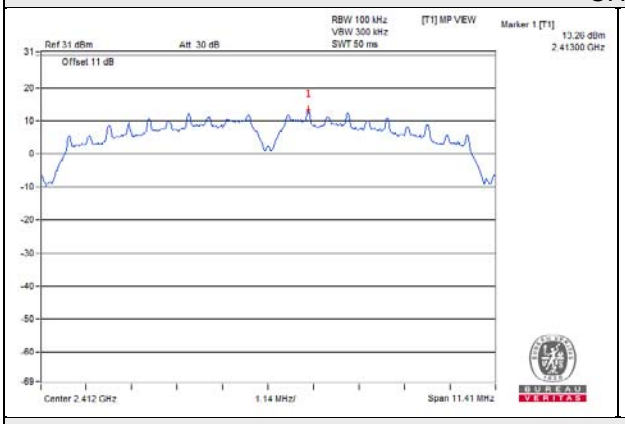


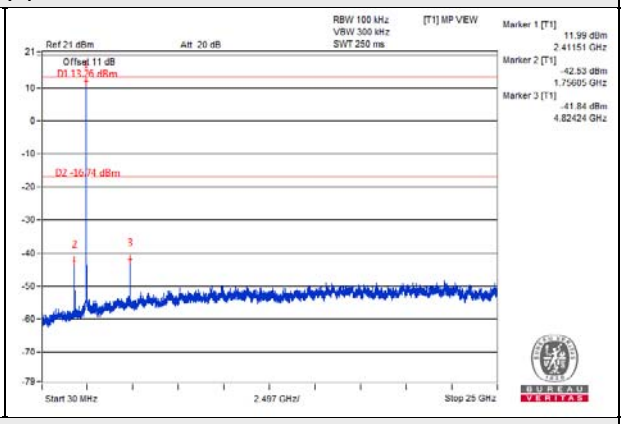
CH 11 Band edge



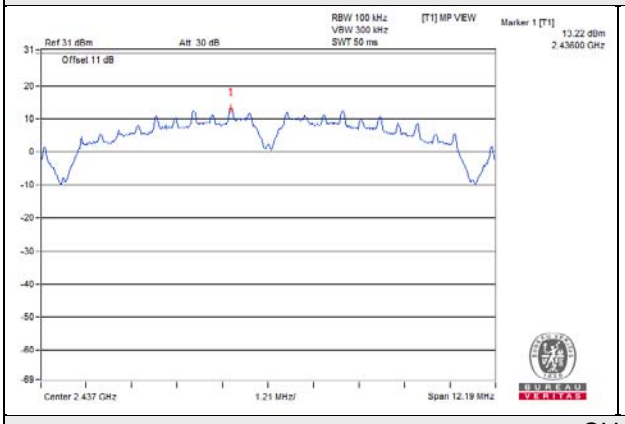
802.11b_Chain 1

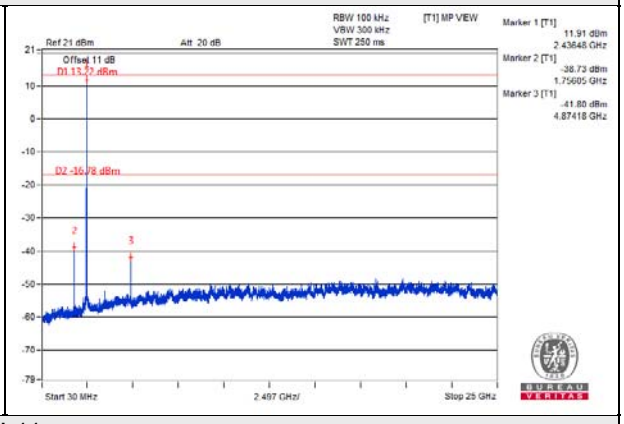
CH 1



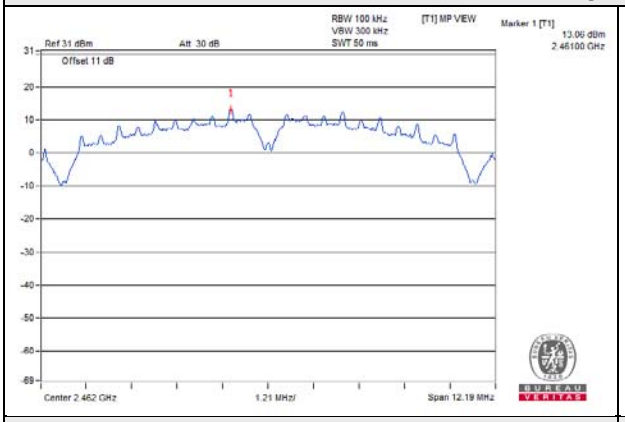


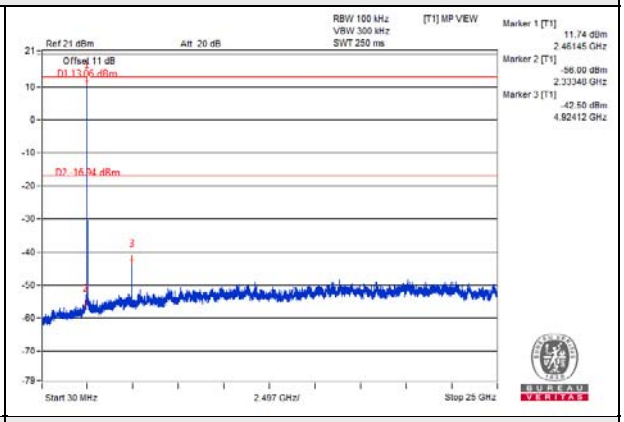
CH 6



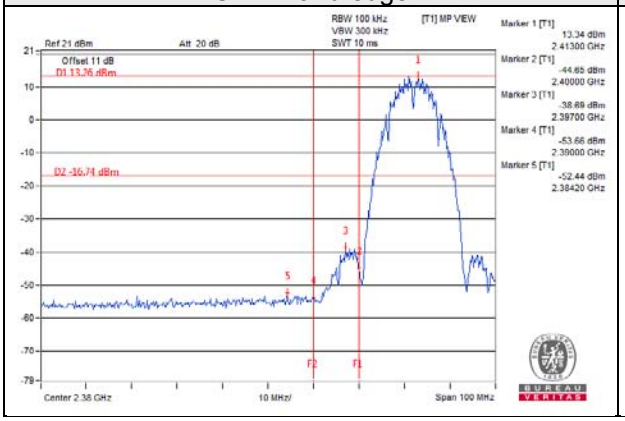


CH 11

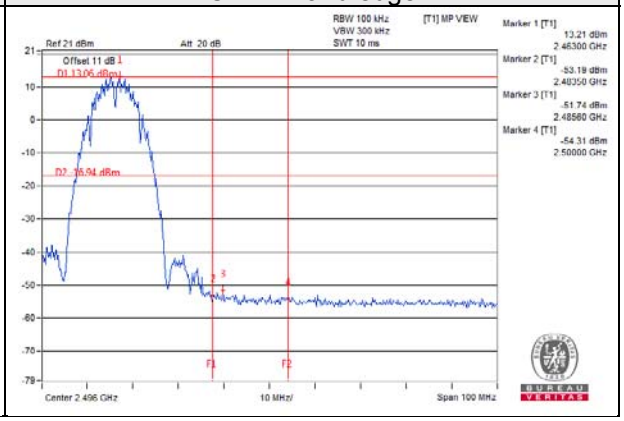




CH 1 Band edge

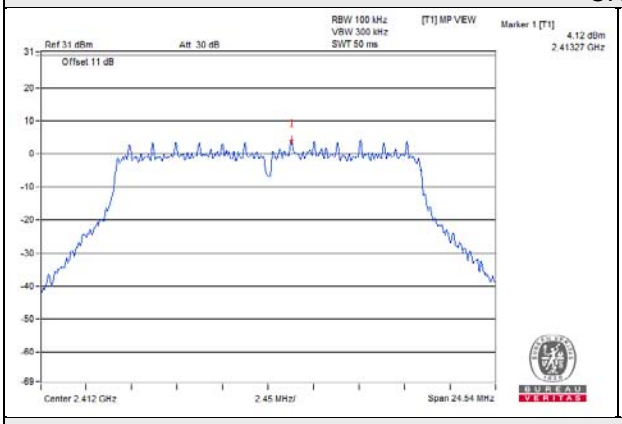


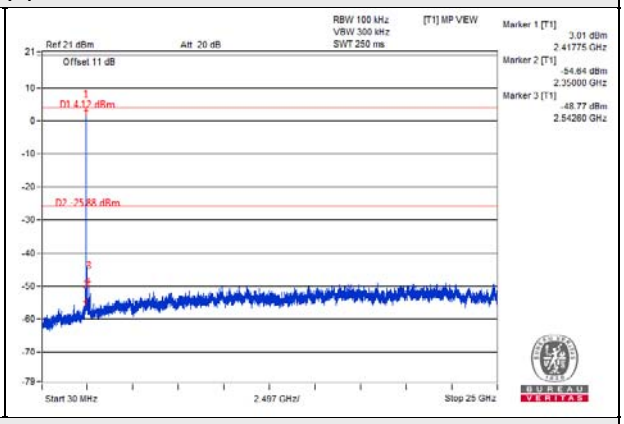
CH 11 Band edge



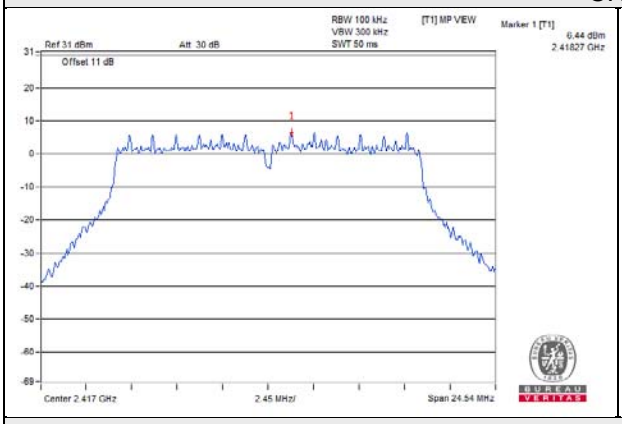
802.11g_Chain 0

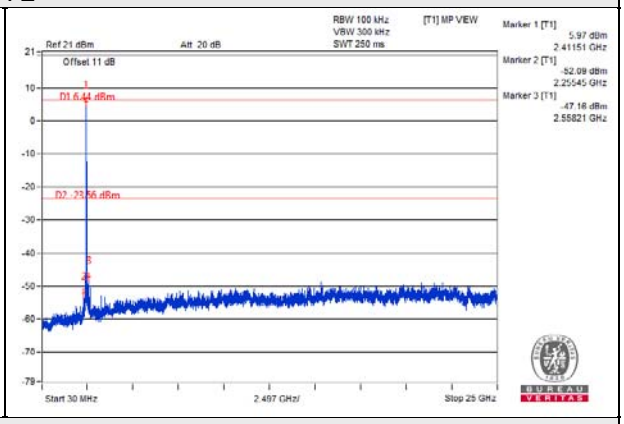
CH 1



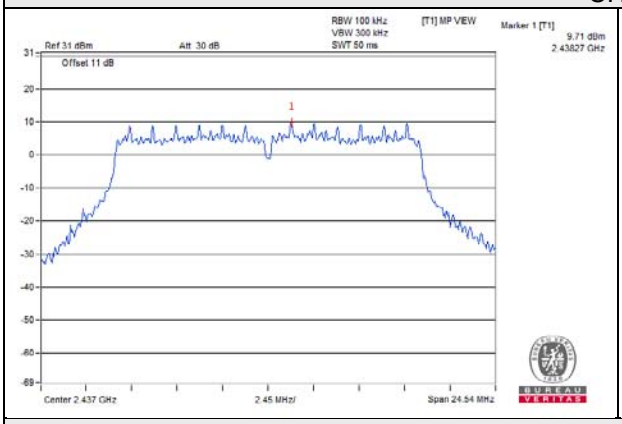


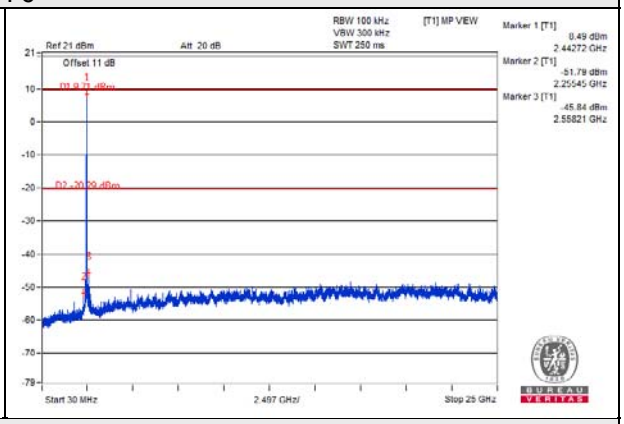
CH 2



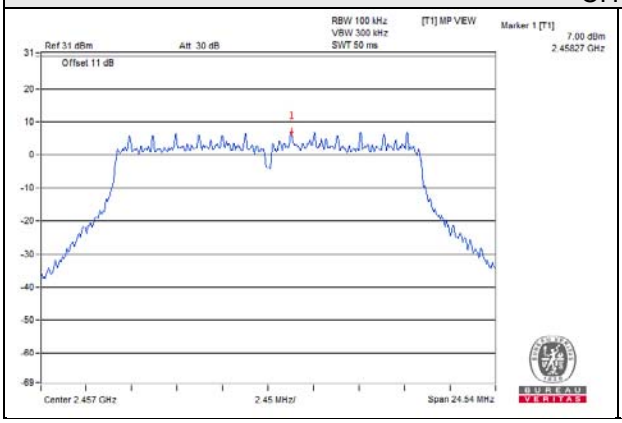


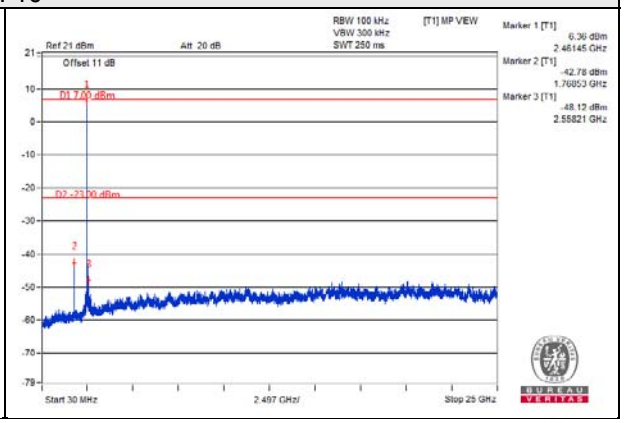
CH 6

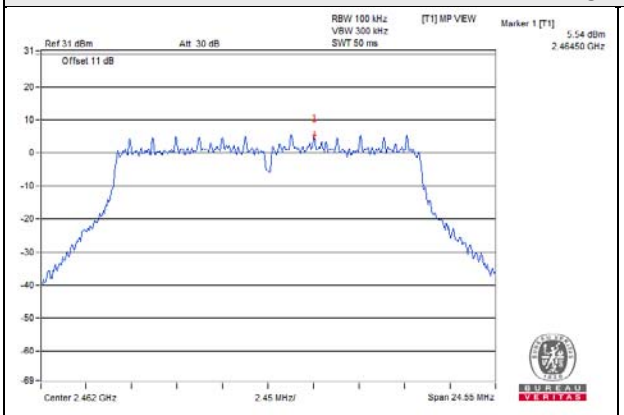
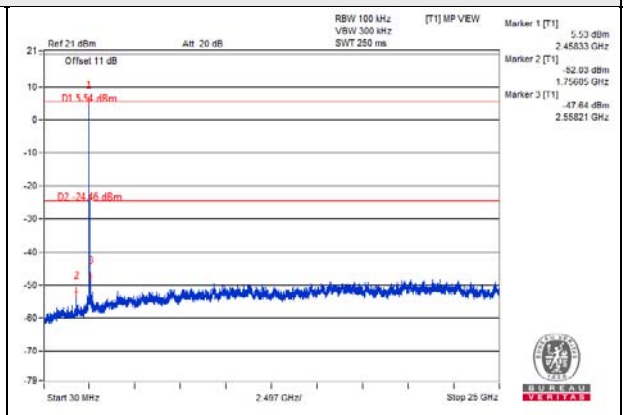
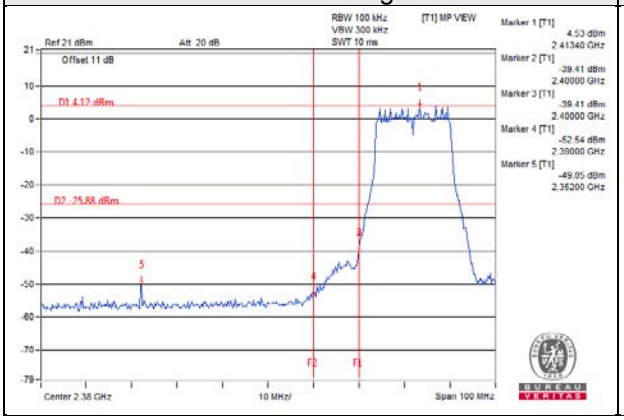
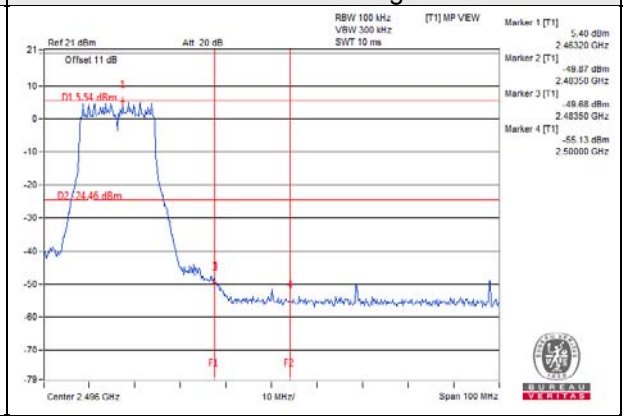




CH 10

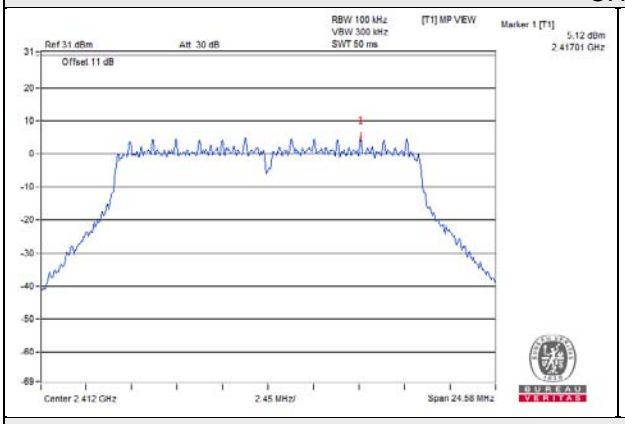


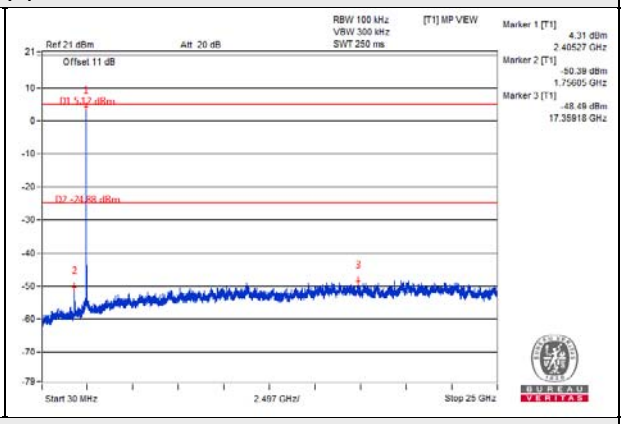


CH 11	
	
CH 1 Band edge	CH 11 Band edge
	

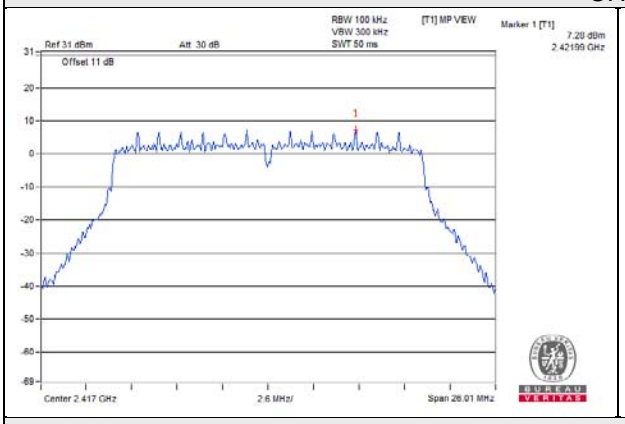
802.11g_Chain 1

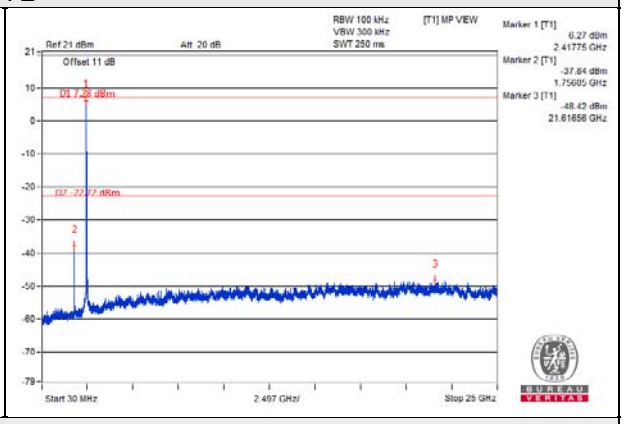
CH 1



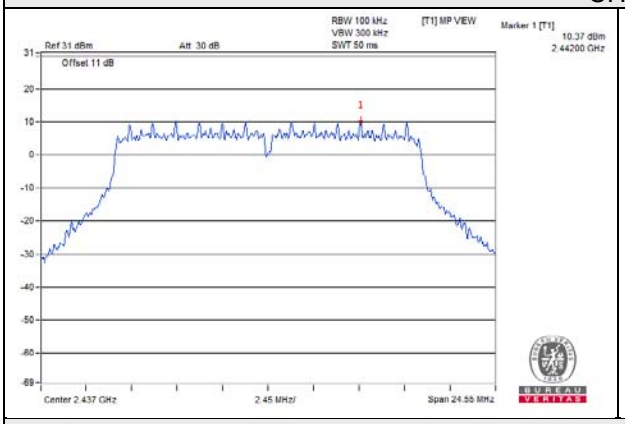


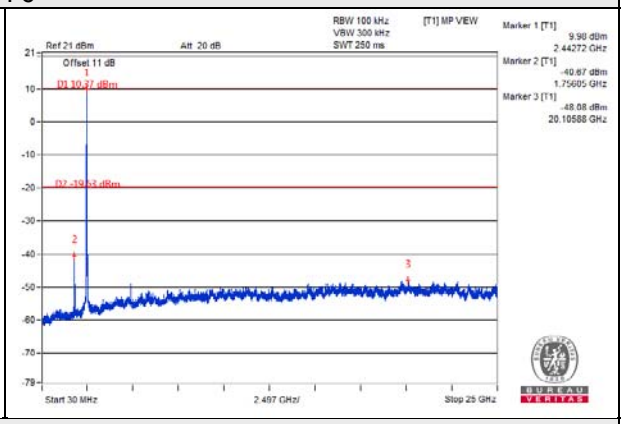
CH 2



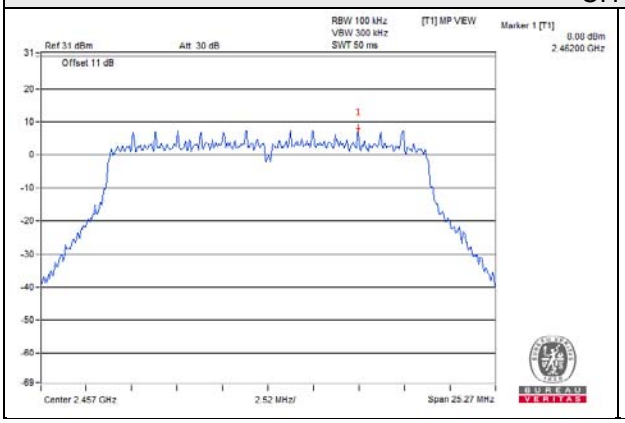


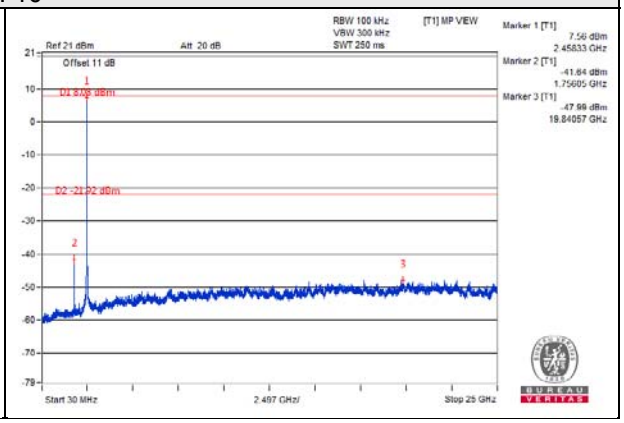
CH 6

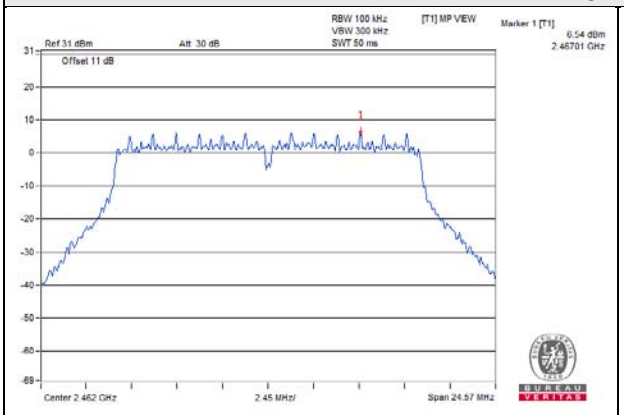
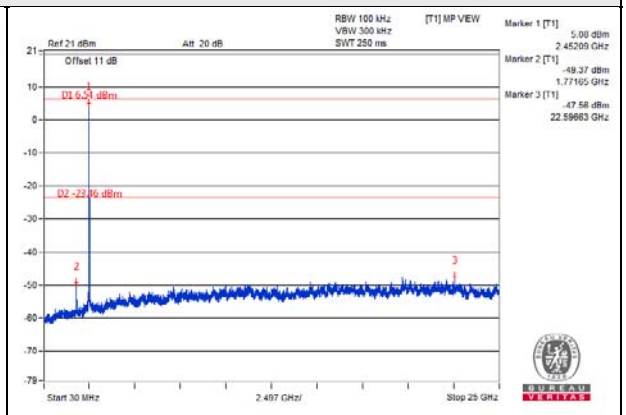
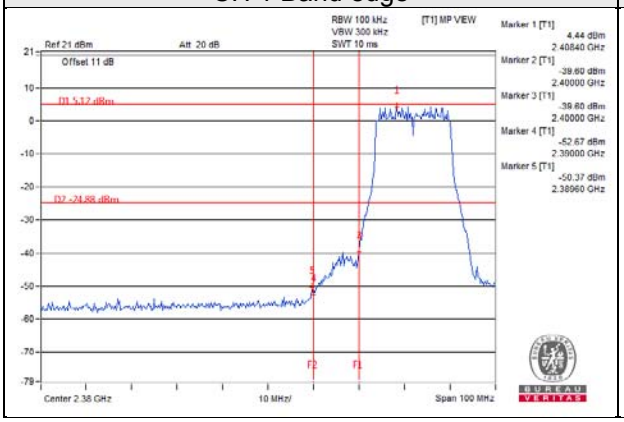
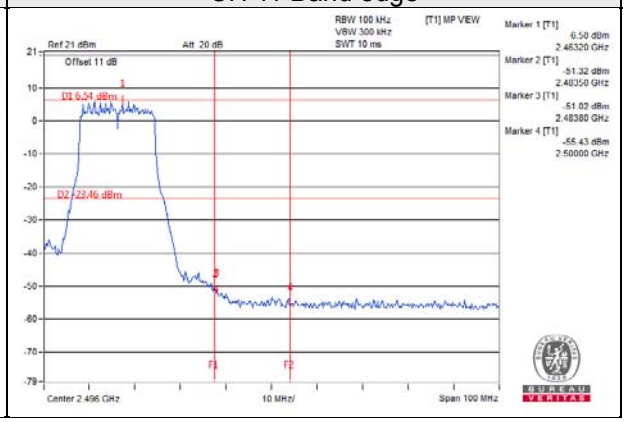




CH 10

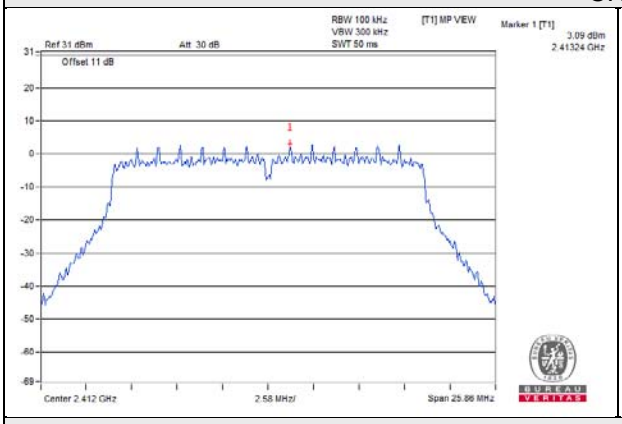


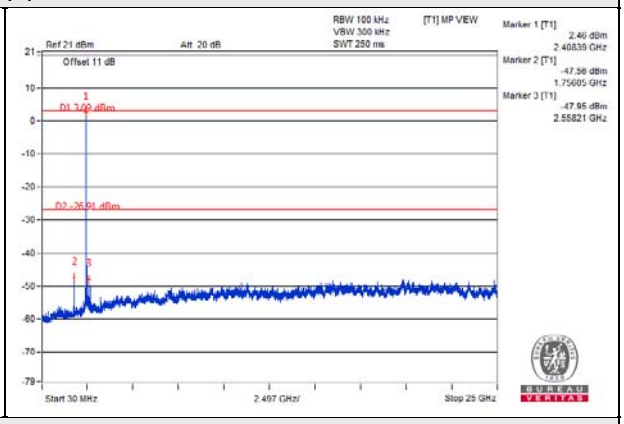


CH 11	
	
CH 1 Band edge	CH 11 Band edge
	

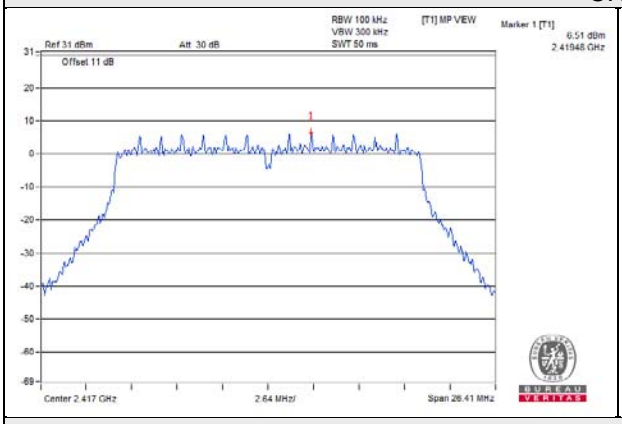
802.11n (HT20)_Chain 0

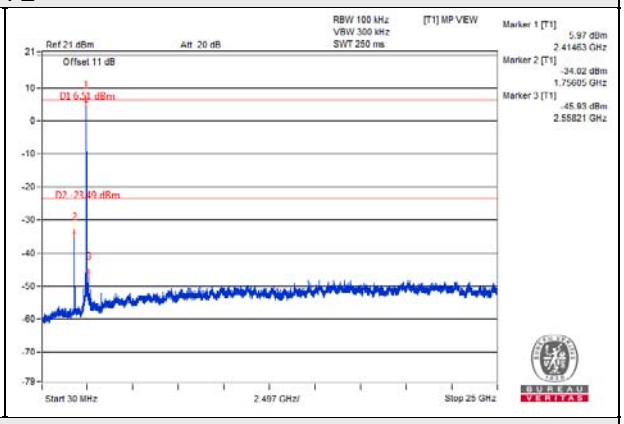
CH 1



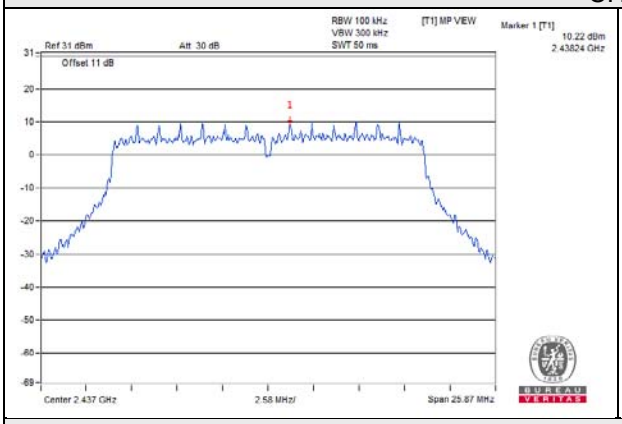


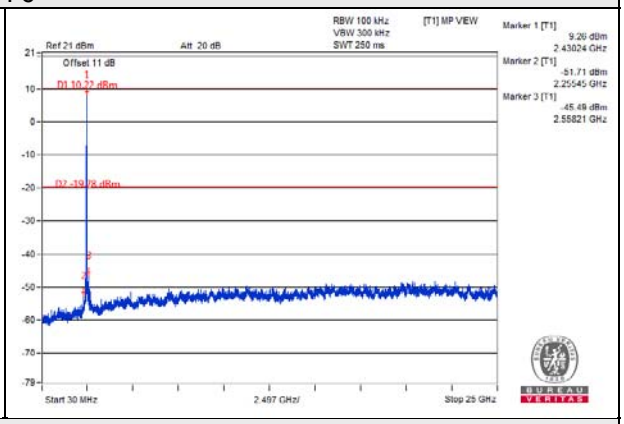
CH 2



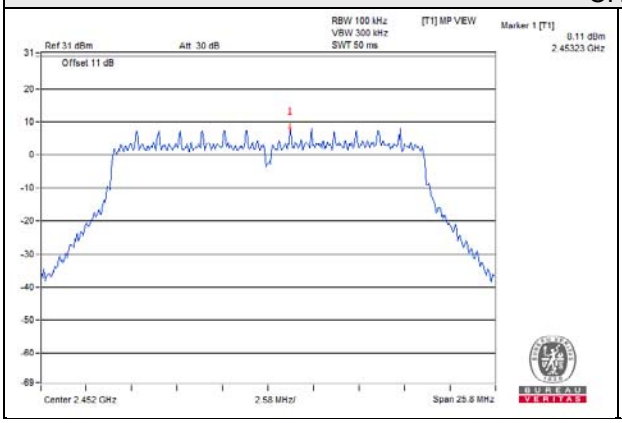


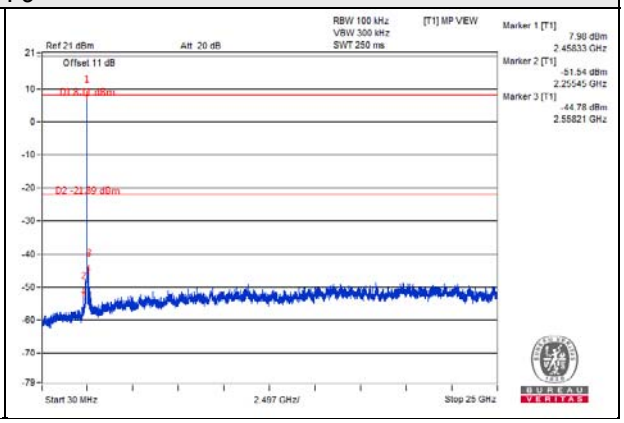
CH 6



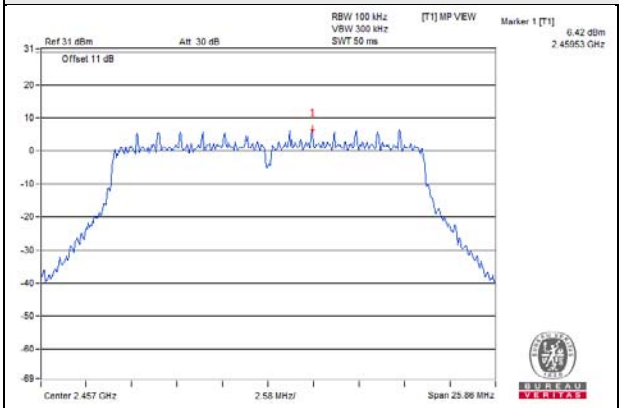


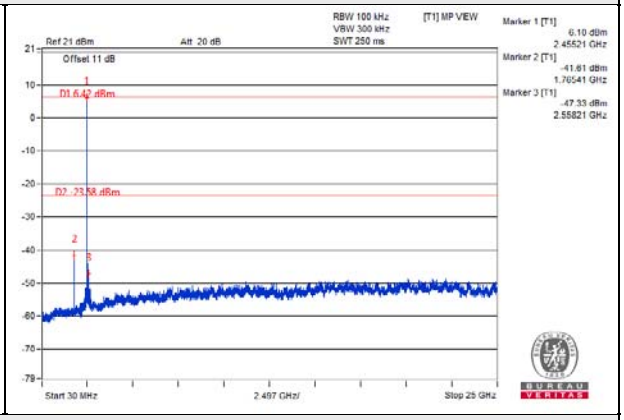
CH 9



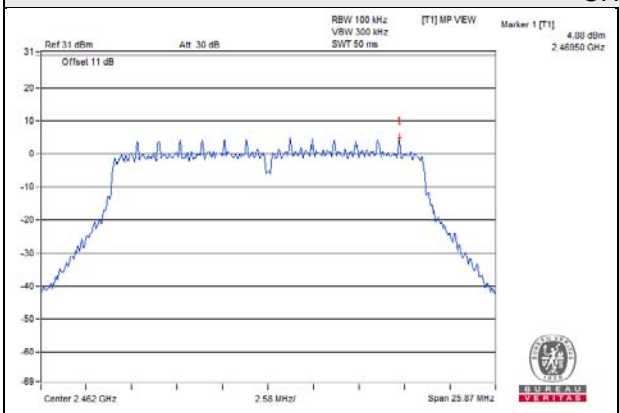


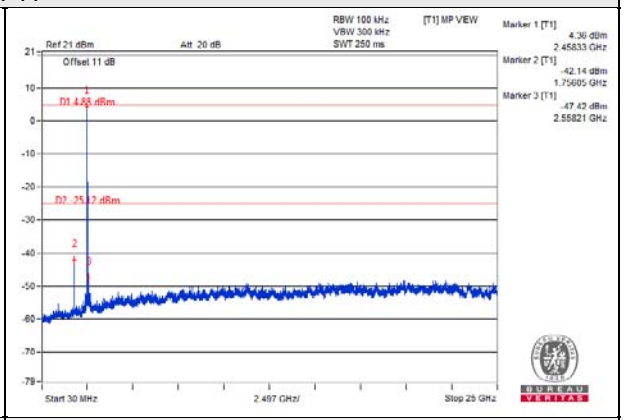
CH 10



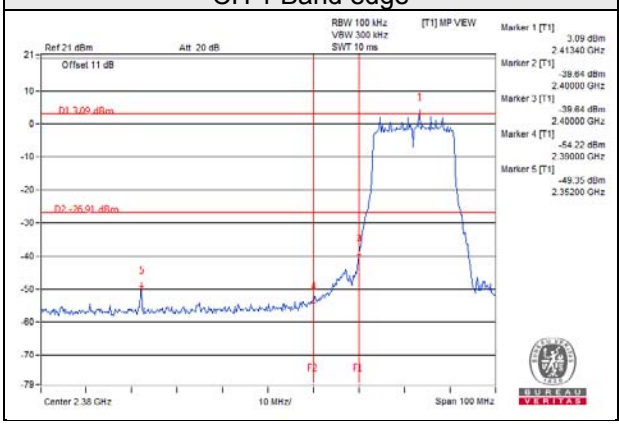


CH 11

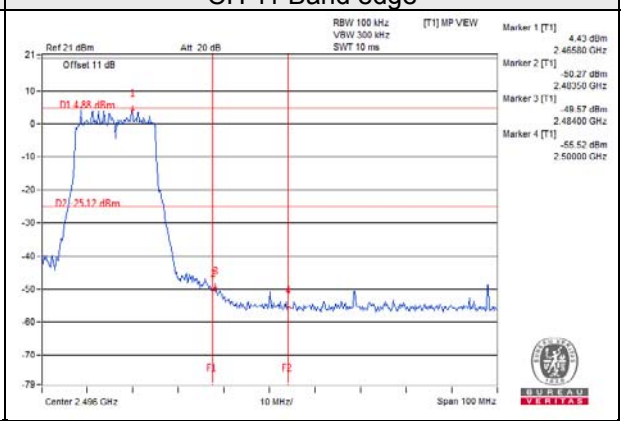




CH 1 Band edge

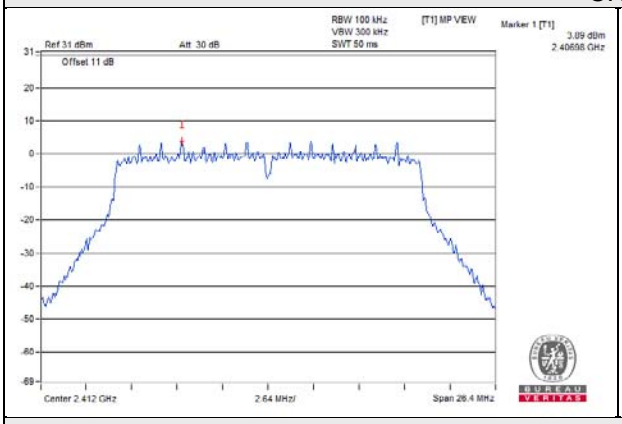


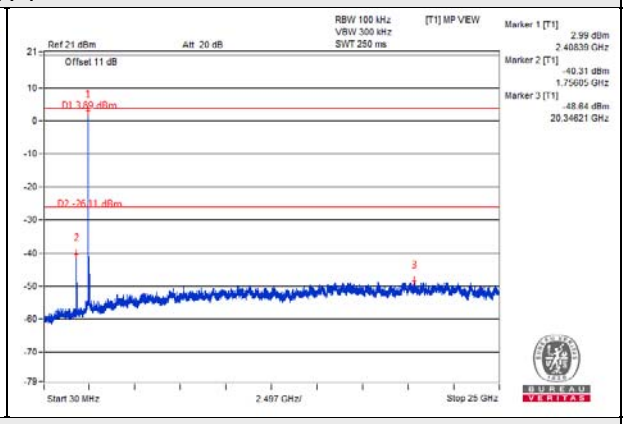
CH 11 Band edge



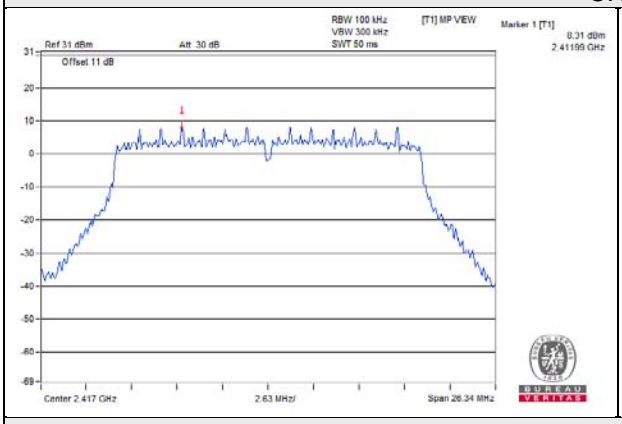
802.11n (HT20)_Chain 1

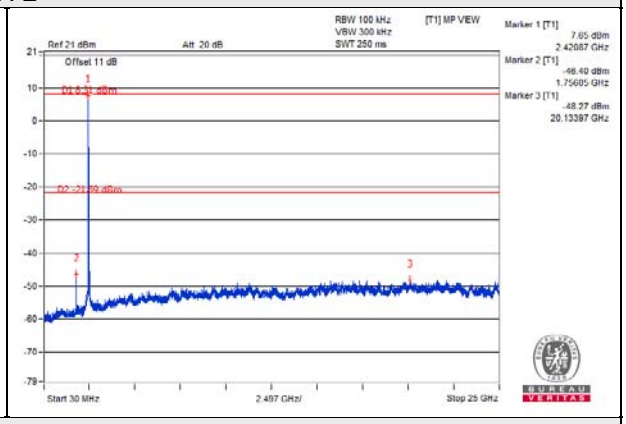
CH 1



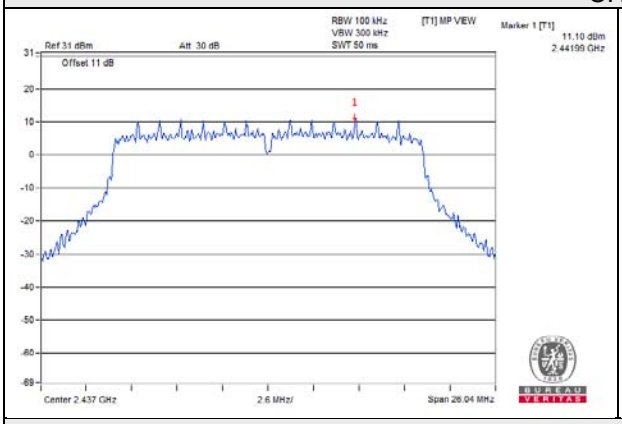


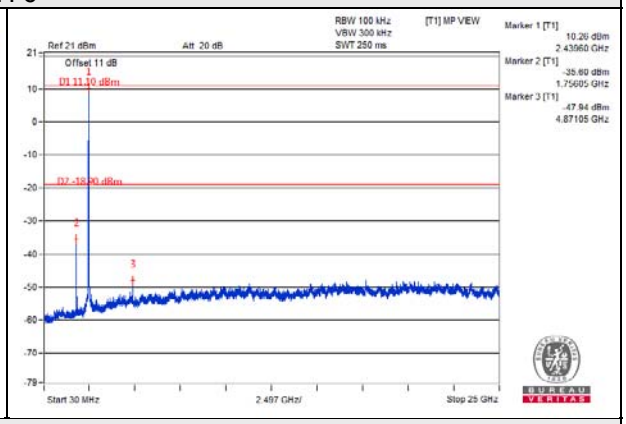
CH 2



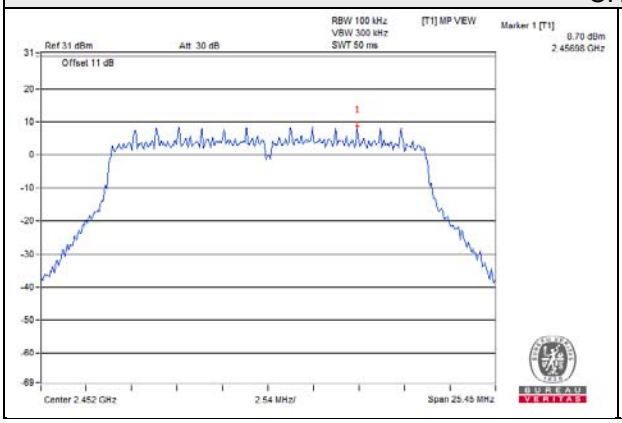


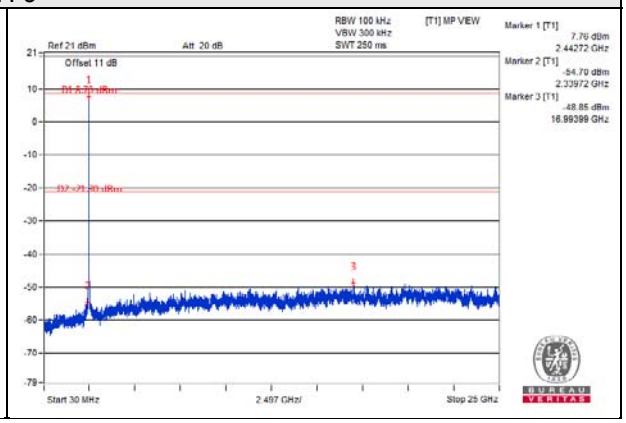
CH 6



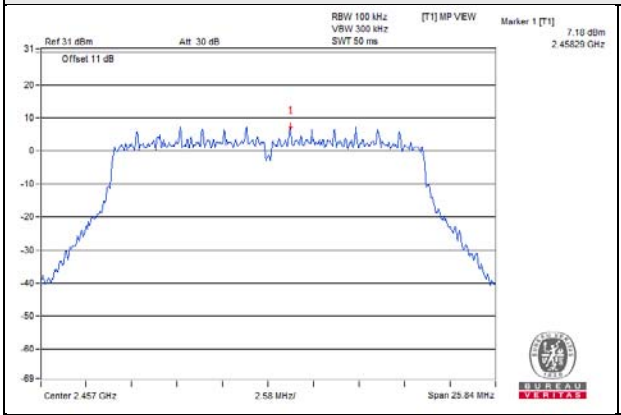


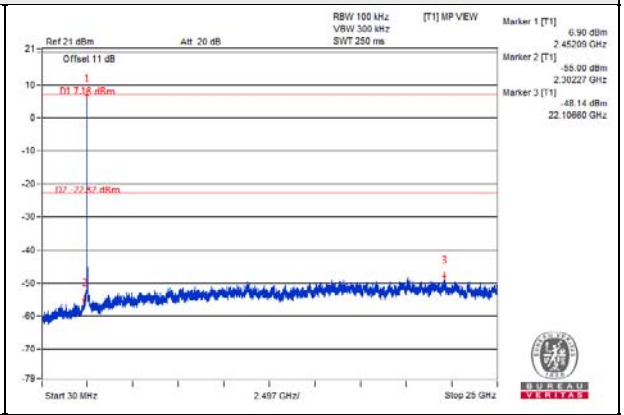
CH 9



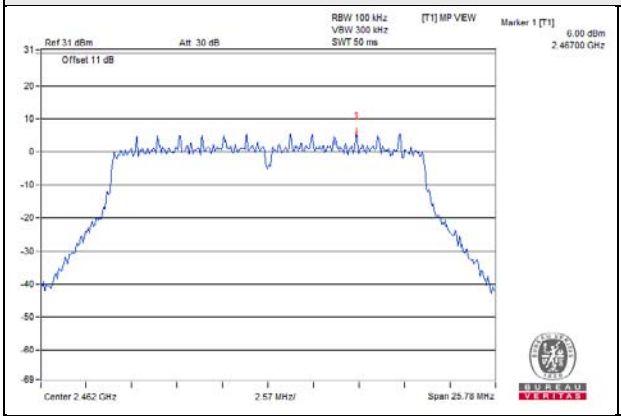


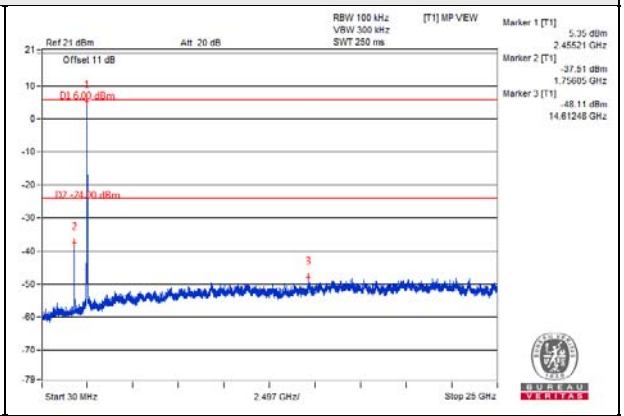
CH 10



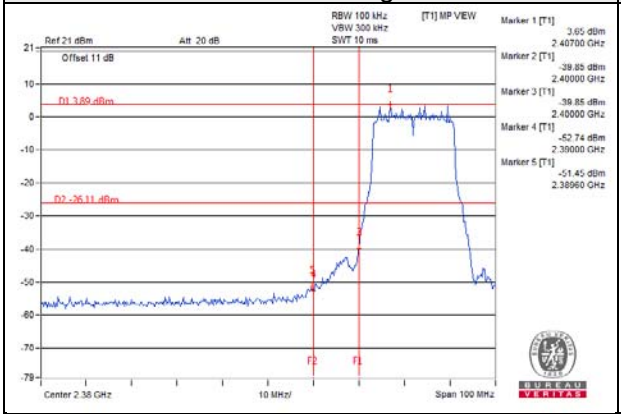


CH 11

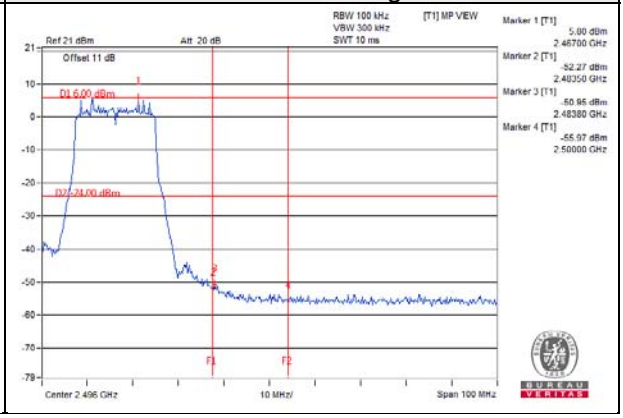




CH 1 Band edge

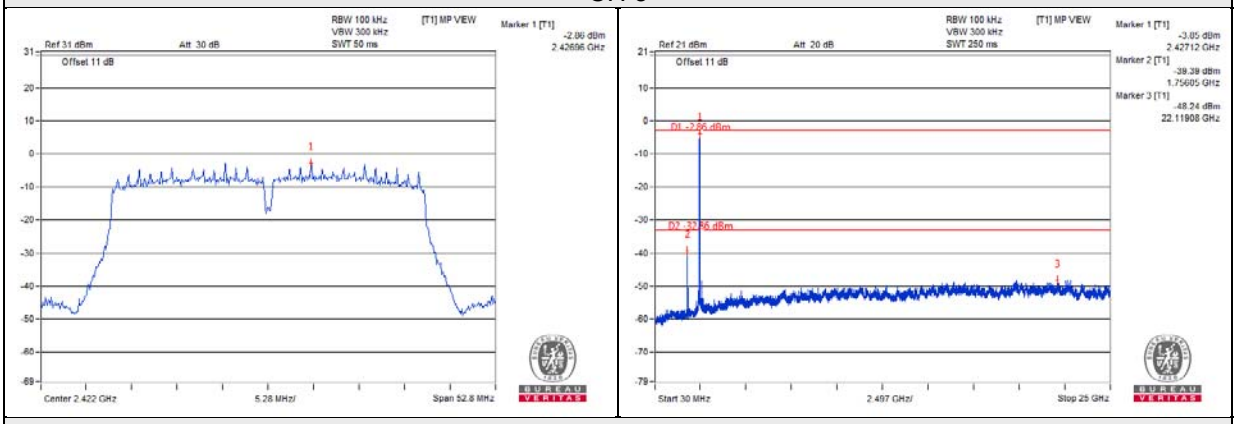


CH 11 Band edge

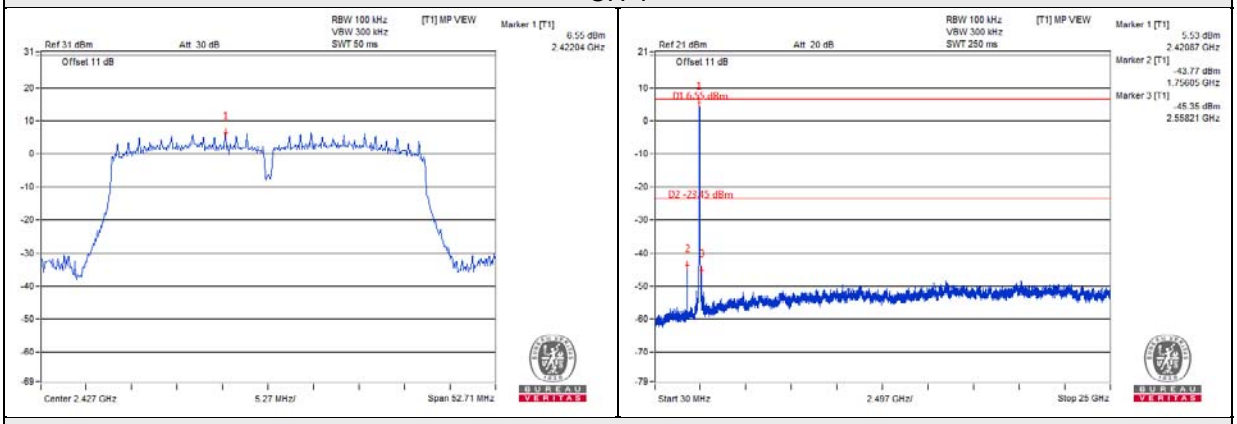


802.11n (HT40)_Chain 0

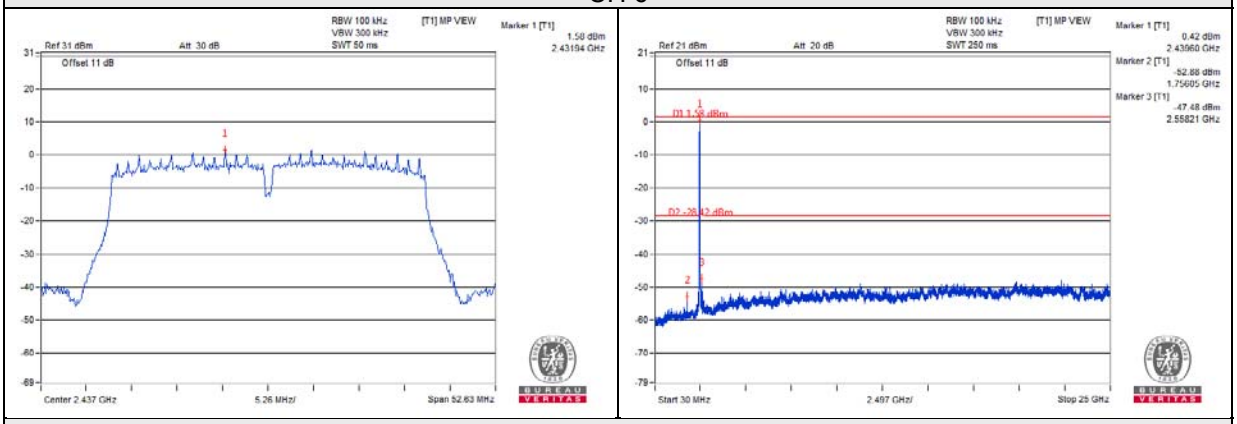
CH 3



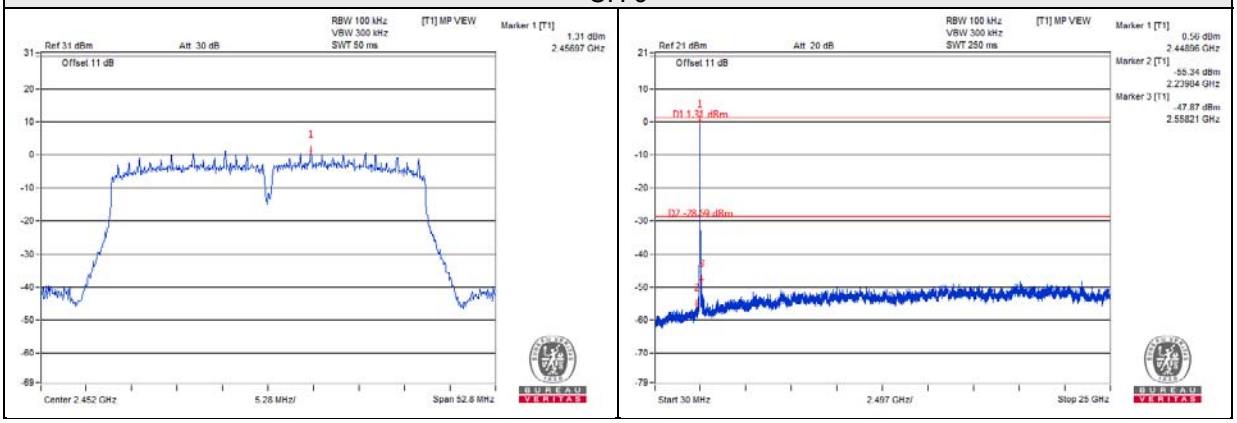
CH 4

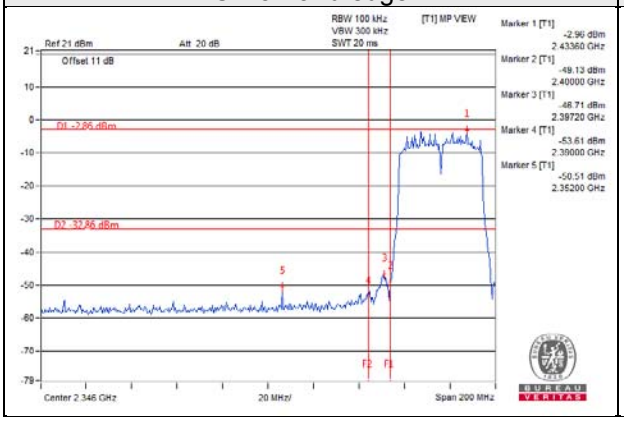
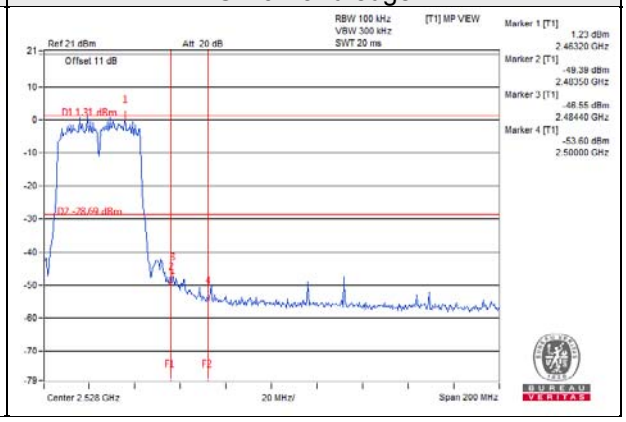


CH 6



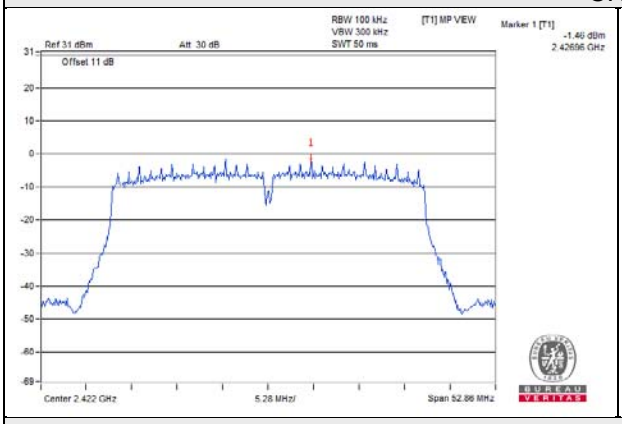
CH 9

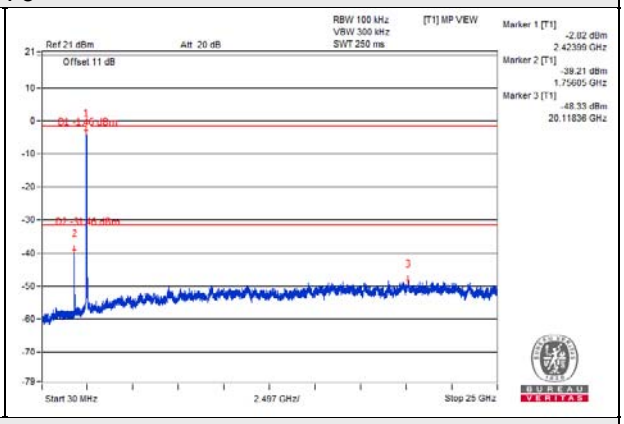


CH 3 Band edge	CH 9 Band edge
	

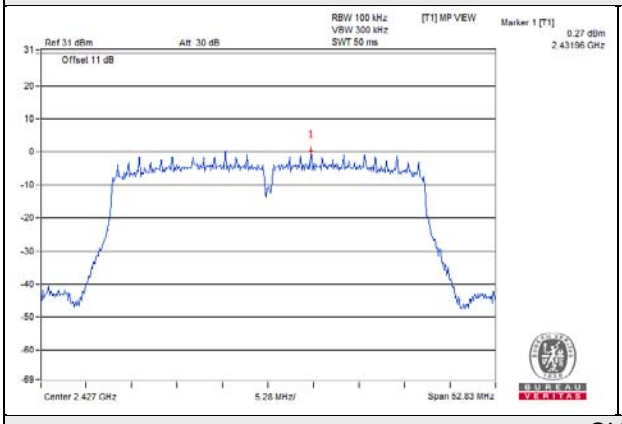
802.11n (HT40)_Chain 1

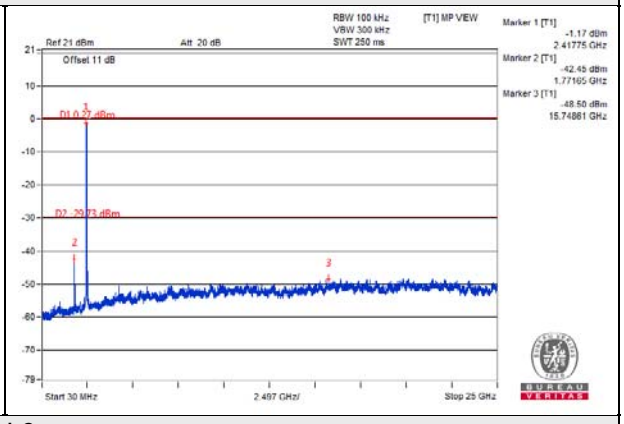
CH 3



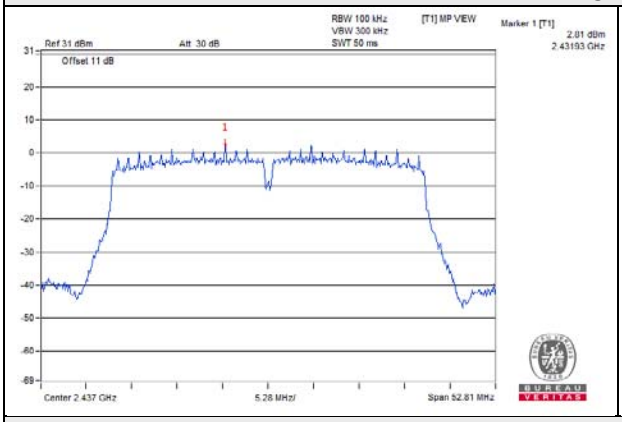


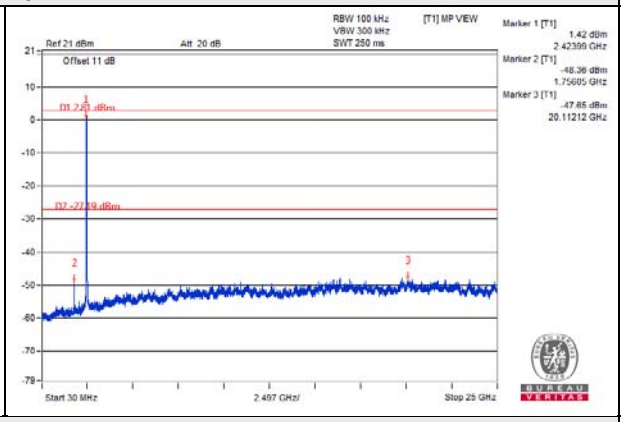
CH 4



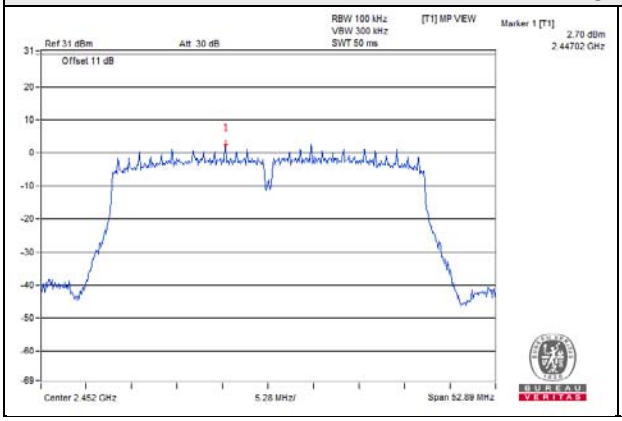


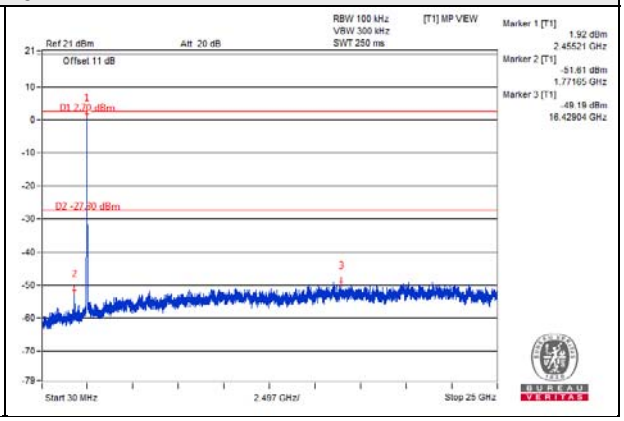
CH 6

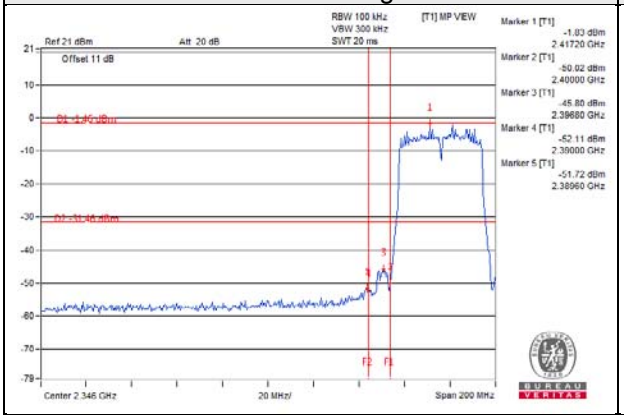
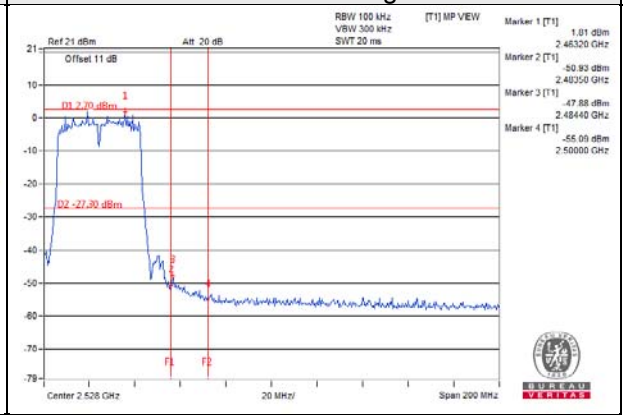




CH 9





CH 3 Band edge	CH 9 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 ---