FCC Test Report

Report No.:	RF181219E02
FCC ID:	I88EMG3435Q20B
Test Model:	EMG3435-Q20A
Series Model:	SoMA5200
Received Date:	Dec. 19, 2018
Test Date:	Jan. 23 to 29, 2019
Issued Date:	Mar. 12, 2019
Applicant:	Zyxel Communications Corporation
Address:	No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30075, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location :	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RF181219E02	Original release.	Mar. 12, 2019

1 Certificate of Conformity

Product:	Dual-Band Wireless AC2600 Gigabit Ethernet Gateway
Brand:	ZYXEL
Test Model:	EMG3435-Q20A
Series Model:	SoMA5200
Sample Status:	ENGINEERING SAMPLE
Applicant:	Zyxel Communications Corporation
Test Date:	Jan. 23 to 29, 2019
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10: 2013

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

Prepared by : _____ , **Date:** Mar. 12, 2019

Claire Kuan / Specialist

Approved by : _____ , **Date:** Mar. 12, 2019

May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -17.59dB at 0.45469 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.6dB at 2366.70MHz, 2367.20MHz, 2390.00 MHz, 2484.80MHz, 2494.50MHz, 2500.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is N-Type. (The device is professionally installed)

Note:
Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.1 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.1 dB
	6GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.2 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Dual-Band Wireless AC2600 Gigabit Ethernet Gateway
Brand	ZYXEL
Test Model	EMG3435-Q20A
Series Model	SoMA5200
Sample Status	ENGINEERING SAMPLE
Power Supply Rating	DC 12V from adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733.3Mbps
Operating Frequency	**2.4GHz:** 2.412GHz ~ 2.462GHz **5GHz:** 5.18GHz ~ 5.24GHz, 5.745GHz ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**2.4GHz:** **CDD Mode:** 628.549mW **Beamforming Mode:** 432.562mW **5.18 ~ 5.24GHz** **CDD Mode:** 244.893 mW **Beamforming Mode** 64.774mW **5.745 ~ 5.825GHz** **CDD Mode:** 985.078mW **Beamforming Mode:** 271.155mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	Ethernet Cable x 1 (Unshielded 1.8m)

Note:

1. The EUT has below model names, which are identical to each other in all aspects except for the following:

Brand	Model No.	Difference
ZYXEL	EMG3435-Q20A	The Variation of model number is for strategy of marketing. The circuit of each model is identical.
	SoMA5200	

From the above models, model: **EMG3435-Q20A** was selected as representative model for the test and its data are recorded in this report.

2. Simultaneously transmission condition.

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

3. The EUT must be supplied with a power adapter (for test only, not for sale) as following table:

Brand	Model No.	Spec.
APD	WA-36A12R	AC Input: 100-240Vac, 0.9A, 50/60Hz DC Output: 12V, 3A DC Output Cable: 1.5m unshielded with one core

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

Antenna No.	Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna type	Connector Type
1	Chain 0	WHA YU	C107-511211-A	3.5	2.4~2.4835	Dipole	N type
	Chain 3			6.0	5.15~5.25		
				5.3	5.725~5.85		
2	Chain 1	WHA YU	C107-511211-A	3.5	2.4~2.4835		
	Chain 2			6.0	5.15~5.25		
				5.3	5.725~5.85		
3	Chain 2	WHA YU	C107-511211-A	3.5	2.4~2.4835		
	Chain 1			6.0	5.15~5.25		
				5.3	5.725~5.85		
4	Chain 3	WHA YU	C107-511211-A	3.5	2.4~2.4835		
	Chain 0			6.0	5.15~5.25		
				5.3	5.725~5.85		

5. The EUT incorporates a MIMO function.

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	4TX	4RX
802.11g	4TX	4RX
802.11n (HT20)	4TX	4RX
802.11n (HT40)	4TX	4RX
5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	4TX	4RX
802.11n (HT20)	4TX	4RX
802.11n (HT40)	4TX	4RX
802.11ac (VHT20)	4TX	4RX
802.11ac (VHT40)	4TX	4RX
802.11ac (VHT80)	4TX	4RX

Note:
1. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
2. All of modulation mode support beamforming function except (802.11b/g/a) modulation mode.

6. The power setting are list as below:

For 2.4GHz							
802.11b		802.11g		802.11n (HT20)		802.11n (HT40)	
Frequency (MHz)	Power Setting	Frequency (MHz)	Power Setting	Frequency (MHz)	Power Setting	Frequency (MHz)	Power Setting
2412	18	2412	20.5	2412	20.5	2422	17.5
2437	21.5	2437	21	2437	21	2437	18
2462	18	2462	19	2462	20	2452	15.5
For 5GHz							
802.11a		802.11ac (VHT20)		802.11ac (VHT40)		802.11ac (VHT80)	
Frequency (MHz)	Power Setting	Frequency (MHz)	Power Setting	Frequency (MHz)	Power Setting	Frequency (MHz)	Power Setting
5180	17.5	5180	17.5	5190	16.5	5210	14.5
5200	17.5	5200	17.5	5230	16.5	5775	20
5240	17.5	5240	17.5	5755	22		
5745	23	5745	23	5795	22		
5785	23	5785	23				
5825	23	5825	23				

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

3.2 Description of Test Modes

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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	6	DSSS	DBPSK	1

Power Line Conducted Emission Test:

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

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

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	6	DSSS	DBPSK	1

Antenna Port Conducted Measurement:

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

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

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

CDD Mode					
MODE	**AVAILABLE CHANNEL**	**TESTED CHANNEL**	**MODULATION TECHNOLOGY**	**MODULATION TYPE**	**DATA RATE (Mbps)**
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
Beamforming Mode (output power only)					
MODE	**AVAILABLE CHANNEL**	**TESTED CHANNEL**	**MODULATION TECHNOLOGY**	**MODULATION TYPE**	**DATA RATE (Mbps)**
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

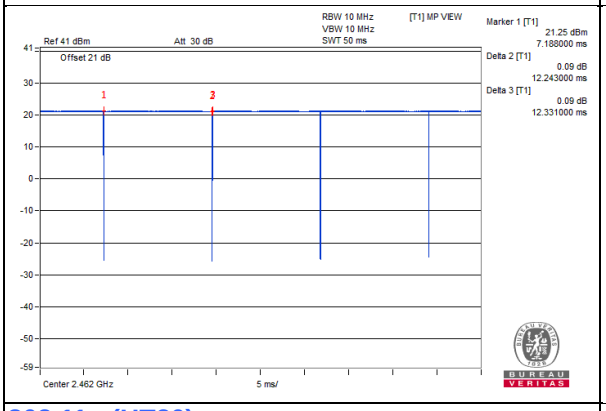
Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	23deg. C, 63%RH	120Vac, 60Hz	Frank CHuang
RE<1G	22deg. C, 70%RH	120Vac, 60Hz	Andy Ho
PLC	23deg. C, 74%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

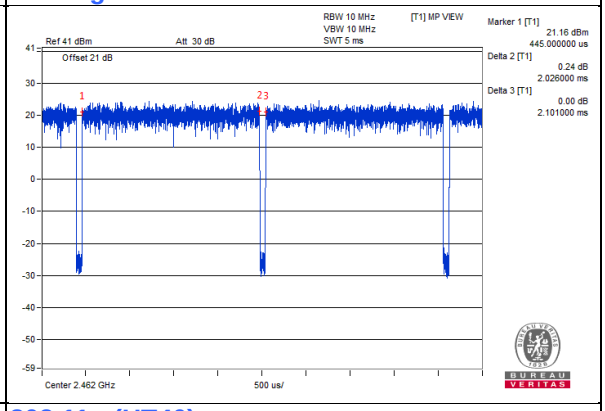
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 12.243/12.331 = 0.993
802.11g: Duty cycle = 2.026/2.101 = 0.964, Duty factor = 10 * log(1/0.964) = 0.16
802.11n (HT20): Duty cycle = 4.948/5.033 = 0.983
802.11n (HT40): Duty cycle = 2.405/2.49 = 0.966, Duty factor = 10 * log(1/0.966) = 0.15

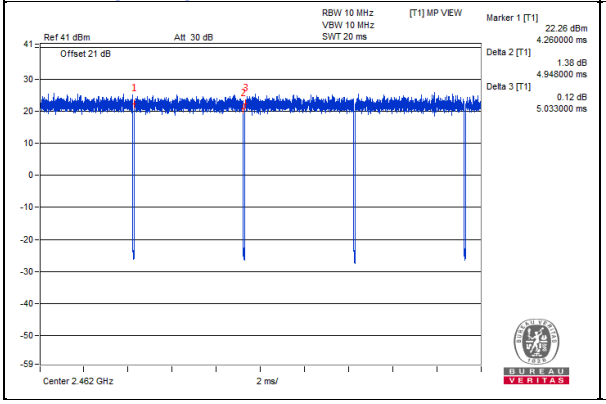
802.11b



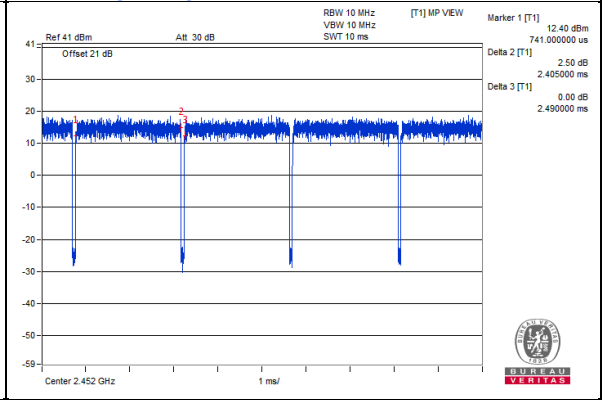
802.11g



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.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
B.	Adapter	APD	WA-36A12R	NA	NA	Supplied by client

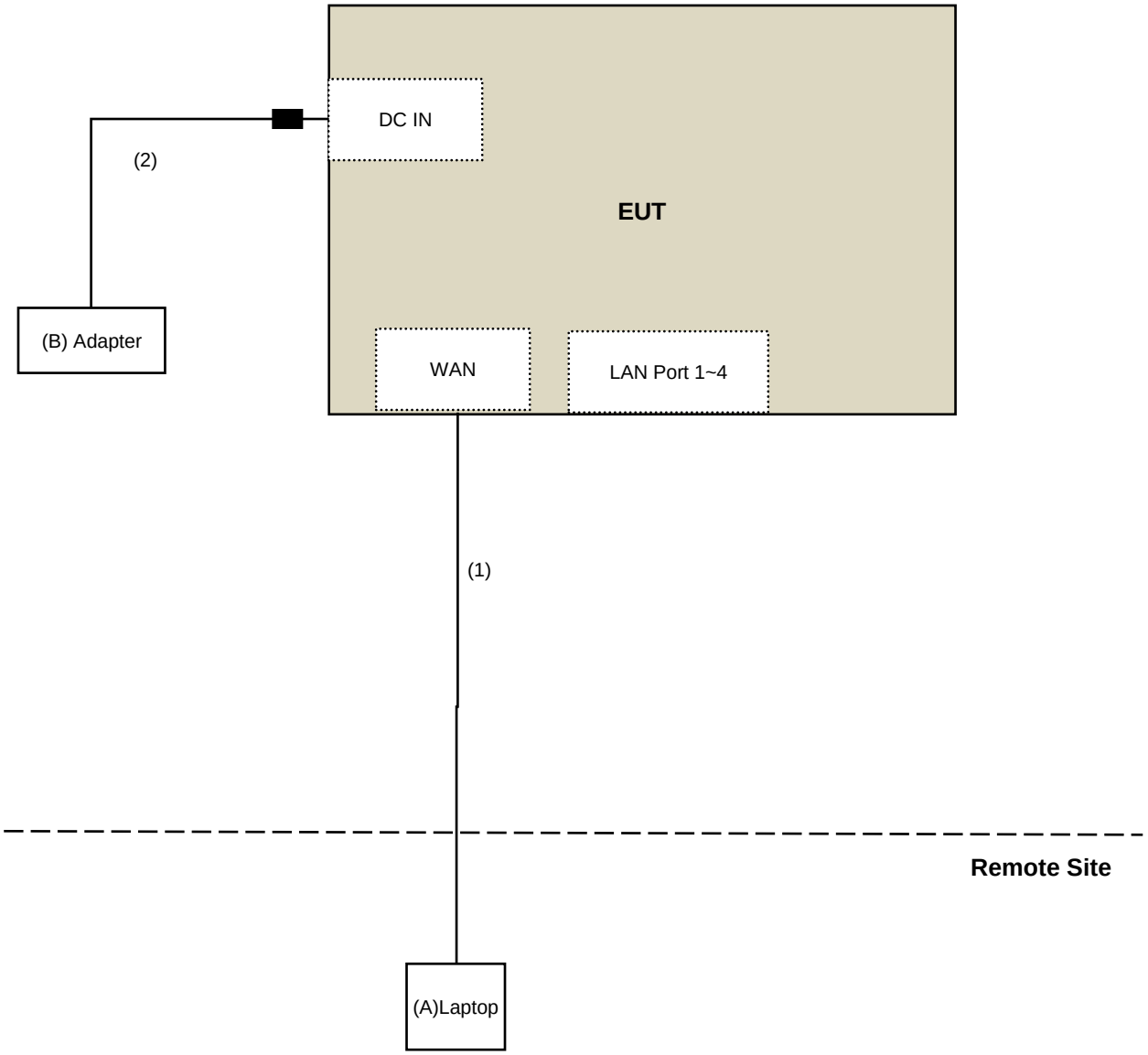
Note:

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

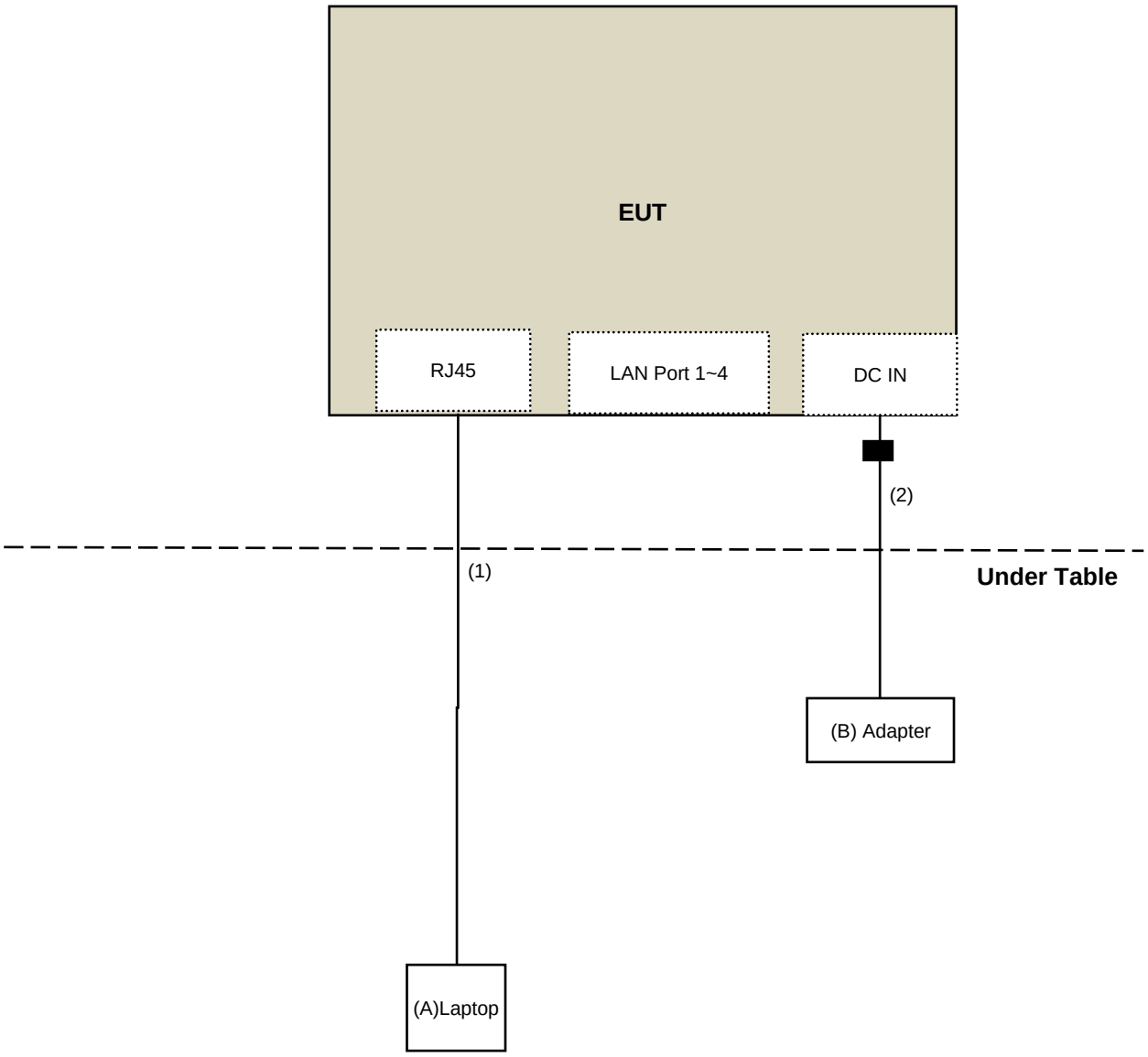
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	DC Cable	1	1.5	No	1	Supplied by client

3.4.1 Configuration of System under Test

For conducted emission test:



For other test items:



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 15.247 Meas Guidance v05
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

For radiated test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2018	July 11, 2019
Pre-Amplifier EMCI	EMC001340	980142	Jan. 25, 2019	Jan. 24, 2020
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-3-1	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-2	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-3	Mar. 20, 2018	Mar. 19, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-1200	160922	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-2000	180601	June 12, 2018	June 11, 2019
RF Cable	EMC104-SM-SM-6000	180602	June 12, 2018	June 11, 2019
Spectrum Analyzer Keysight	N9030A	MY54490679	July 23, 2018	July 22, 2019
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 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 966 Chamber No. 3.
3. The CANADA Site Registration No. is 20331-1
4. Loop antenna was used for all emissions below 30 MHz.
5. Tested Date: Jan. 28 to 29, 2019

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 16, 2018	Apr. 15, 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 966 Chamber No. 3.
3. The CANADA Site Registration No. is 20331-1
4. Loop antenna was used for all emissions below 30 MHz.
5. Tested Date: Jan. 25, 2019

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 detects 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:

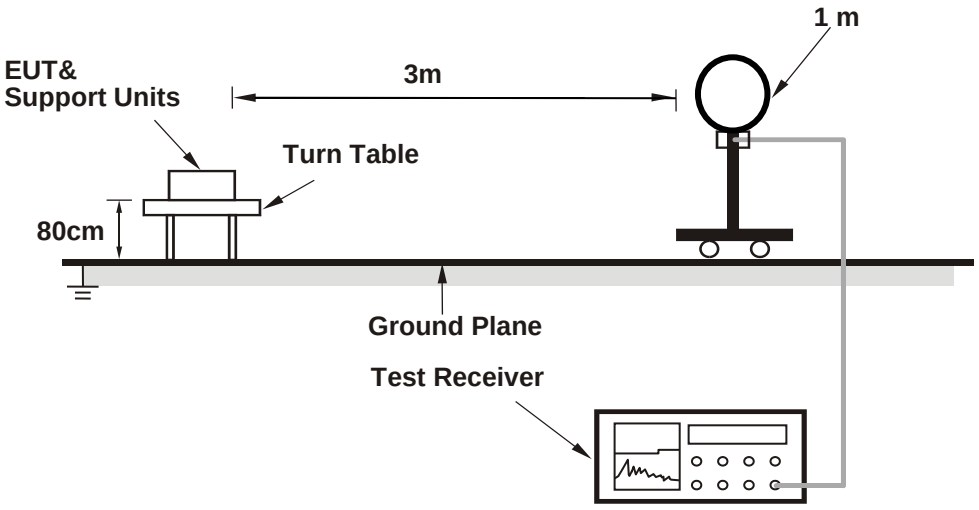
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

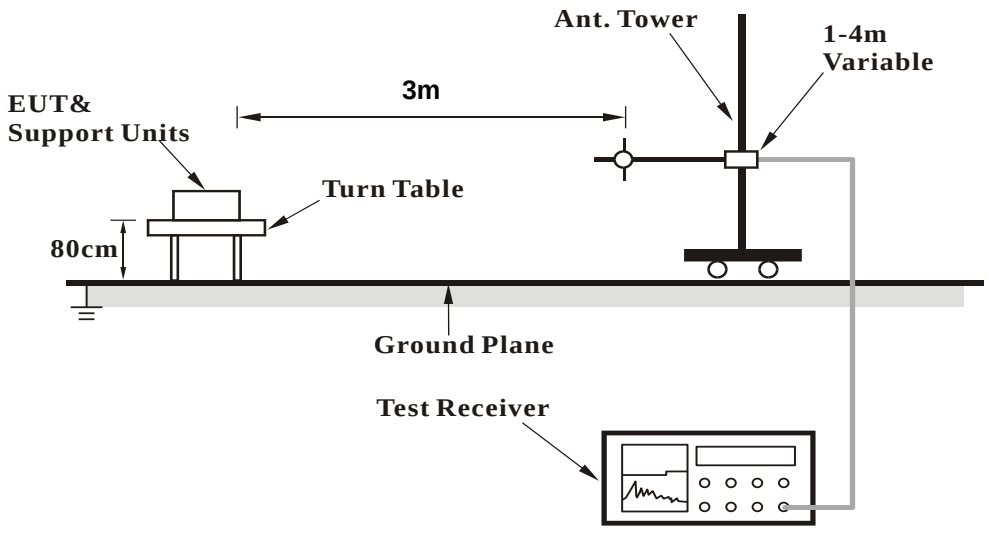
No deviation.

4.1.5 Test Setup

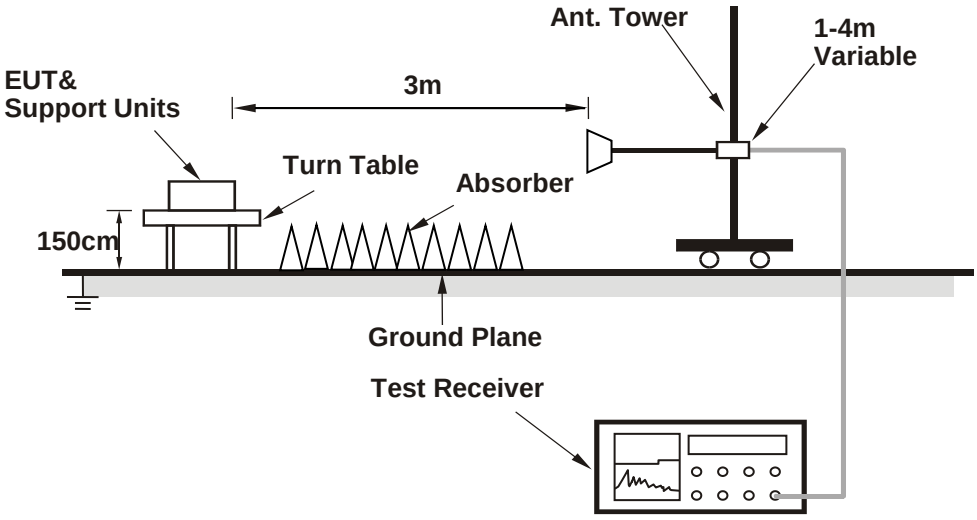
For Radiated emission below 30MHz



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. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (QDART_1.0.38 (Version: V3.0.210.0)) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data：

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2373.20	53.3 PK	74.0	-20.7	1.49 H	261	55.6	-2.3
2	2373.20	44.2 AV	54.0	-9.8	1.49 H	261	46.5	-2.3
3	2390.00	54.1 PK	74.0	-19.9	1.49 H	261	56.5	-2.4
4	2390.00	42.1 AV	54.0	-11.9	1.49 H	261	44.5	-2.4
5	*2412.00	100.7 PK			1.49 H	261	103.0	-2.3
6	*2412.00	98.4 AV			1.49 H	261	100.7	-2.3
7	4824.00	46.1 PK	74.0	-27.9	1.08 H	32	44.2	1.9
8	4824.00	43.7 AV	54.0	-10.3	1.08 H	32	41.8	1.9
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	2373.20	62.0 PK	74.0	-12.0	1.69 V	150	64.3	-2.3
2	2373.20	53.3 AV	54.0	-0.7	1.69 V	150	55.6	-2.3
3	2390.00	55.6 PK	74.0	-18.4	1.69 V	150	58.0	-2.4
4	2390.00	46.9 AV	54.0	-7.1	1.69 V	150	49.3	-2.4
5	*2412.00	119.7 PK			1.69 V	150	122.0	-2.3
6	*2412.00	117.3 AV			1.69 V	150	119.6	-2.3
7	4824.00	49.4 PK	74.0	-24.6	1.61 V	360	47.5	1.9
8	4824.00	47.6 AV	54.0	-6.4	1.61 V	360	45.7	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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

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	53.5 PK	74.0	-20.5	1.41 H	254	55.9	-2.4
2	2390.00	41.6 AV	54.0	-12.4	1.41 H	254	44.0	-2.4
3	*2437.00	107.1 PK			1.41 H	254	109.6	-2.5
4	*2437.00	104.7 AV			1.41 H	254	107.2	-2.5
5	2483.50	53.0 PK	74.0	-21.0	1.41 H	254	55.6	-2.6
6	2483.50	44.1 AV	54.0	-9.9	1.41 H	254	46.7	-2.6
7	4874.00	46.2 PK	74.0	-27.8	1.03 H	38	44.3	1.9
8	4874.00	43.6 AV	54.0	-10.4	1.03 H	38	41.7	1.9
9	7311.00	44.0 PK	74.0	-30.0	1.38 H	3	36.2	7.8
10	7311.00	34.5 AV	54.0	-19.5	1.38 H	3	26.7	7.8
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	60.3 PK	74.0	-13.7	1.00 V	144	62.7	-2.4
2	2390.00	49.2 AV	54.0	-4.8	1.00 V	144	51.6	-2.4
3	*2437.00	125.6 PK			1.00 V	144	128.1	-2.5
4	*2437.00	123.6 AV			1.00 V	144	126.1	-2.5
5	2483.50	58.8 PK	74.0	-15.2	1.00 V	144	61.4	-2.6
6	2483.50	49.7 AV	54.0	-4.3	1.00 V	144	52.3	-2.6
7	4874.00	54.2 PK	74.0	-19.8	1.62 V	355	52.3	1.9
8	4874.00	53.2 AV	54.0	-0.8	1.62 V	355	51.3	1.9
9	7311.00	47.5 PK	74.0	-26.5	1.37 V	347	39.7	7.8
10	7311.00	40.9 AV	54.0	-13.1	1.37 V	347	33.1	7.8

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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	100.8 PK			1.47 H	262	103.3	-2.5
2	*2462.00	98.2 AV			1.47 H	262	100.7	-2.5
3	2483.50	54.4 PK	74.0	-19.6	1.47 H	262	57.0	-2.6
4	2483.50	42.1 AV	54.0	-11.9	1.47 H	262	44.7	-2.6
5	2500.00	56.1 PK	74.0	-17.9	1.47 H	262	58.6	-2.5
6	2500.00	42.2 AV	54.0	-11.8	1.47 H	262	44.7	-2.5
7	4924.00	46.6 PK	74.0	-27.4	1.06 H	31	44.6	2.0
8	4924.00	44.1 AV	54.0	-9.9	1.06 H	31	42.1	2.0
9	7386.00	44.2 PK	74.0	-29.8	1.43 H	12	36.3	7.9
10	7386.00	34.7 AV	54.0	-19.3	1.43 H	12	26.8	7.9
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	119.3 PK			1.43 V	149	121.8	-2.5
2	*2462.00	117.1 AV			1.43 V	149	119.6	-2.5
3	2483.50	56.2 PK	74.0	-17.8	1.43 V	149	58.8	-2.6
4	2483.50	45.5 AV	54.0	-8.5	1.43 V	149	48.1	-2.6
5	2500.00	61.1 PK	74.0	-12.9	1.43 V	149	63.6	-2.5
6	**2500.00**	**53.4 AV**	**54.0**	**-0.6**	**1.43 V**	**149**	**55.9**	**-2.5**
7	4924.00	49.4 PK	74.0	-24.6	1.64 V	359	47.4	2.0
8	4924.00	47.3 AV	54.0	-6.7	1.64 V	359	45.3	2.0
9	7386.00	46.1 PK	74.0	-27.9	1.29 V	348	38.2	7.9
10	7386.00	34.9 AV	54.0	-19.1	1.29 V	348	27.0	7.9

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.
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	2367.20	60.4 PK	74.0	-13.6	1.36 H	245	62.7	-2.3
2	2367.20	45.6 AV	54.0	-8.4	1.36 H	245	47.9	-2.3
3	2390.00	59.8 PK	74.0	-14.2	1.36 H	245	62.2	-2.4
4	2390.00	45.1 AV	54.0	-8.9	1.36 H	245	47.5	-2.4
5	*2412.00	103.5 PK			1.36 H	245	105.8	-2.3
6	*2412.00	93.4 AV			1.36 H	245	95.7	-2.3
7	4824.00	40.9 PK	74.0	-33.1	1.03 H	17	39.0	1.9
8	4824.00	30.5 AV	54.0	-23.5	1.03 H	17	28.6	1.9
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	2367.20	67.1 PK	74.0	-6.9	1.55 V	158	69.4	-2.3
2	**2367.20**	**53.4 AV**	**54.0**	**-0.6**	**1.55 V**	**158**	**55.7**	**-2.3**
3	2390.00	66.7 PK	74.0	-7.3	1.55 V	158	69.1	-2.4
4	2390.00	53.3 AV	54.0	-0.7	1.55 V	158	55.7	-2.4
5	*2412.00	123.7 PK			1.55 V	158	126.0	-2.3
6	*2412.00	113.8 AV			1.55 V	158	116.1	-2.3
7	4824.00	59.7 PK	74.0	-14.3	1.52 V	360	57.8	1.9
8	4824.00	48.3 AV	54.0	-5.7	1.52 V	360	46.4	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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.2 PK	74.0	-14.8	1.46 H	239	61.6	-2.4
2	2390.00	44.6 AV	54.0	-9.4	1.46 H	239	47.0	-2.4
3	*2437.00	103.4 PK			1.46 H	239	105.9	-2.5
4	*2437.00	93.4 AV			1.46 H	239	95.9	-2.5
5	2483.50	53.6 PK	74.0	-20.4	1.46 H	239	56.2	-2.6
6	2483.50	40.1 AV	54.0	-13.9	1.46 H	239	42.7	-2.6
7	4874.00	40.9 PK	74.0	-33.1	1.08 H	18	39.0	1.9
8	4874.00	30.2 AV	54.0	-23.8	1.08 H	18	28.3	1.9
9	7311.00	44.5 PK	74.0	-29.5	1.44 H	17	36.7	7.8
10	7311.00	35.2 AV	54.0	-18.8	1.44 H	17	27.4	7.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.4 PK	74.0	-11.6	1.50 V	157	64.8	-2.4
2	2390.00	53.3 AV	54.0	-0.7	1.50 V	157	55.7	-2.4
3	*2437.00	124.4 PK			1.50 V	157	126.9	-2.5
4	*2437.00	114.1 AV			1.50 V	157	116.6	-2.5
5	2483.50	58.6 PK	74.0	-15.4	1.50 V	157	61.2	-2.6
6	2483.50	45.9 AV	54.0	-8.1	1.50 V	157	48.5	-2.6
7	4874.00	59.8 PK	74.0	-14.2	1.53 V	360	57.9	1.9
8	4874.00	48.1 AV	54.0	-5.9	1.53 V	360	46.2	1.9
9	7311.00	46.1 PK	74.0	-27.9	1.29 V	349	38.3	7.8
10	7311.00	34.9 AV	54.0	-19.1	1.29 V	349	27.1	7.8

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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	103.4 PK			1.44 H	252	105.9	-2.5
2	*2462.00	92.7 AV			1.44 H	252	95.2	-2.5
3	2483.50	53.9 PK	74.0	-20.1	1.44 H	252	56.5	-2.6
4	2483.50	40.3 AV	54.0	-13.7	1.44 H	252	42.9	-2.6
5	2494.50	59.9 PK	74.0	-14.1	1.44 H	252	62.4	-2.5
6	2494.50	44.9 AV	54.0	-9.1	1.44 H	252	47.4	-2.5
7	4924.00	40.6 PK	74.0	-33.4	1.06 H	2	38.6	2.0
8	4924.00	30.2 AV	54.0	-23.8	1.06 H	2	28.2	2.0
9	7386.00	44.5 PK	74.0	-29.5	1.43 H	13	36.6	7.9
10	7386.00	35.5 AV	54.0	-18.5	1.43 H	13	27.6	7.9
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	122.3 PK			1.51 V	156	124.8	-2.5
2	*2462.00	112.5 AV			1.51 V	156	115.0	-2.5
3	2483.50	57.9 PK	74.0	-16.1	1.51 V	156	60.5	-2.6
4	2483.50	45.5 AV	54.0	-8.5	1.51 V	156	48.1	-2.6
5	2494.50	63.8 PK	74.0	-10.2	1.51 V	156	66.3	-2.5
6	**2494.50**	**53.4 AV**	**54.0**	**-0.6**	**1.51 V**	**156**	**55.9**	**-2.5**
7	4924.00	60.4 PK	74.0	-13.6	1.47 V	360	58.4	2.0
8	4924.00	48.4 AV	54.0	-5.6	1.47 V	360	46.4	2.0
9	7386.00	45.6 PK	74.0	-28.4	1.26 V	360	37.7	7.9
10	7386.00	34.6 AV	54.0	-19.4	1.26 V	360	26.7	7.9

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.
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	2366.70	60.0 PK	74.0	-14.0	1.37 H	266	62.3	-2.3
2	2366.70	45.1 AV	54.0	-8.9	1.37 H	266	47.4	-2.3
3	2390.00	60.3 PK	74.0	-13.7	1.37 H	266	62.7	-2.4
4	2390.00	45.6 AV	54.0	-8.4	1.37 H	266	48.0	-2.4
5	*2412.00	104.2 PK			1.37 H	266	106.5	-2.3
6	*2412.00	93.8 AV			1.37 H	266	96.1	-2.3
7	4824.00	40.7 PK	74.0	-33.3	1.14 H	11	38.8	1.9
8	4824.00	29.9 AV	54.0	-24.1	1.14 H	11	28.0	1.9
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	2366.70	68.2 PK	74.0	-5.8	1.56 V	154	70.5	-2.3
2	**2366.70**	**53.4 AV**	**54.0**	**-0.6**	**1.56 V**	**154**	**55.7**	**-2.3**
3	2390.00	67.4 PK	74.0	-6.6	1.56 V	154	69.8	-2.4
4	2390.00	53.1 AV	54.0	-0.9	1.56 V	154	55.5	-2.4
5	*2412.00	123.5 PK			1.56 V	154	125.8	-2.3
6	*2412.00	112.6 AV			1.56 V	154	114.9	-2.3
7	4824.00	60.0 PK	74.0	-14.0	1.56 V	358	58.1	1.9
8	4824.00	48.2 AV	54.0	-5.8	1.56 V	358	46.3	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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.6 PK	74.0	-14.4	1.44 H	254	62.0	-2.4
2	2390.00	44.5 AV	54.0	-9.5	1.44 H	254	46.9	-2.4
3	*2437.00	103.0 PK			1.44 H	254	105.5	-2.5
4	*2437.00	93.1 AV			1.44 H	254	95.6	-2.5
5	2483.50	54.2 PK	74.0	-19.8	1.44 H	254	56.8	-2.6
6	2483.50	40.5 AV	54.0	-13.5	1.44 H	254	43.1	-2.6
7	4874.00	41.1 PK	74.0	-32.9	1.08 H	30	39.2	1.9
8	4874.00	30.5 AV	54.0	-23.5	1.08 H	30	28.6	1.9
9	7311.00	44.7 PK	74.0	-29.3	1.38 H	27	36.9	7.8
10	7311.00	35.4 AV	54.0	-18.6	1.38 H	27	27.6	7.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.2 PK	74.0	-9.8	1.44 V	156	66.6	-2.4
2	**2390.00**	**53.4 AV**	**54.0**	**-0.6**	**1.44 V**	**156**	**55.8**	**-2.4**
3	*2437.00	123.8 PK			1.44 V	156	126.3	-2.5
4	*2437.00	112.9 AV			1.44 V	156	115.4	-2.5
5	2483.50	59.4 PK	74.0	-14.6	1.44 V	156	62.0	-2.6
6	2483.50	48.6 AV	54.0	-5.4	1.44 V	156	51.2	-2.6
7	4874.00	59.8 PK	74.0	-14.2	1.55 V	360	57.9	1.9
8	4874.00	48.4 AV	54.0	-5.6	1.55 V	360	46.5	1.9
9	7311.00	45.4 PK	74.0	-28.6	1.31 V	333	37.6	7.8
10	7311.00	34.4 AV	54.0	-19.6	1.31 V	333	26.6	7.8

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	103.6 PK			1.46 H	261	106.1	-2.5
2	*2462.00	92.8 AV			1.46 H	261	95.3	-2.5
3	2483.50	53.6 PK	74.0	-20.4	1.46 H	261	56.2	-2.6
4	2483.50	40.3 AV	54.0	-13.7	1.46 H	261	42.9	-2.6
5	2494.30	59.9 PK	74.0	-14.1	1.46 H	261	62.4	-2.5
6	2494.30	44.9 AV	54.0	-9.1	1.46 H	261	47.4	-2.5
7	4924.00	41.4 PK	74.0	-32.6	1.02 H	22	39.4	2.0
8	4924.00	30.5 AV	54.0	-23.5	1.02 H	22	28.5	2.0
9	7386.00	44.6 PK	74.0	-29.4	1.41 H	6	36.7	7.9
10	7386.00	35.3 AV	54.0	-18.7	1.41 H	6	27.4	7.9
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	123.4 PK			1.50 V	154	125.9	-2.5
2	*2462.00	111.8 AV			1.50 V	154	114.3	-2.5
3	2483.50	58.7 PK	74.0	-15.3	1.50 V	154	61.3	-2.6
4	2483.50	46.0 AV	54.0	-8.0	1.50 V	154	48.6	-2.6
5	2494.30	64.0 PK	74.0	-10.0	1.50 V	154	66.5	-2.5
6	2494.30	53.3 AV	54.0	-0.7	1.50 V	154	55.8	-2.5
7	4924.00	59.7 PK	74.0	-14.3	1.48 V	360	57.7	2.0
8	4924.00	48.1 AV	54.0	-5.9	1.48 V	360	46.1	2.0
9	7386.00	45.8 PK	74.0	-28.2	1.24 V	340	37.9	7.9
10	7386.00	34.9 AV	54.0	-19.1	1.24 V	340	27.0	7.9

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.
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	2383.10	61.1 PK	74.0	-12.9	1.45 H	257	63.5	-2.4
2	2383.10	45.6 AV	54.0	-8.4	1.45 H	257	48.0	-2.4
3	2390.00	53.7 PK	74.0	-20.3	1.45 H	257	56.1	-2.4
4	2390.00	40.4 AV	54.0	-13.6	1.45 H	257	42.8	-2.4
5	*2422.00	99.4 PK			1.45 H	257	101.8	-2.4
6	*2422.00	88.8 AV			1.45 H	257	91.2	-2.4
7	4844.00	40.6 PK	74.0	-33.4	1.09 H	5	38.7	1.9
8	4844.00	30.2 AV	54.0	-23.8	1.09 H	5	28.3	1.9
9	7266.00	44.3 PK	74.0	-29.7	1.45 H	19	36.2	8.1
10	7266.00	34.8 AV	54.0	-19.2	1.45 H	19	26.7	8.1
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	2383.10	66.2 PK	74.0	-7.8	1.50 V	155	68.6	-2.4
2	2383.10	53.2 AV	54.0	-0.8	1.50 V	155	55.6	-2.4
3	2390.00	64.1 PK	74.0	-9.9	1.50 V	155	66.5	-2.4
4	2390.00	49.2 AV	54.0	-4.8	1.50 V	155	51.6	-2.4
5	*2422.00	119.1 PK			1.50 V	155	121.5	-2.4
6	*2422.00	108.7 AV			1.50 V	155	111.1	-2.4
7	4844.00	54.2 PK	74.0	-19.8	1.58 V	357	52.3	1.9
8	4844.00	43.5 AV	54.0	-10.5	1.58 V	357	41.6	1.9
9	7266.00	46.8 PK	74.0	-27.2	1.28 V	356	38.7	8.1
10	7266.00	35.4 AV	54.0	-18.6	1.28 V	356	27.3	8.1

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.2 PK	74.0	-12.8	1.42 H	252	63.6	-2.4
2	2390.00	45.8 AV	54.0	-8.2	1.42 H	252	48.2	-2.4
3	*2437.00	99.5 PK			1.42 H	252	102.0	-2.5
4	*2437.00	89.1 AV			1.42 H	252	91.6	-2.5
5	2483.50	53.3 PK	74.0	-20.7	1.42 H	252	55.9	-2.6
6	2483.50	39.9 AV	54.0	-14.1	1.42 H	252	42.5	-2.6
7	4874.00	40.9 PK	74.0	-33.1	1.02 H	22	39.0	1.9
8	4874.00	30.1 AV	54.0	-23.9	1.02 H	22	28.2	1.9
9	7311.00	44.1 PK	74.0	-29.9	1.45 H	18	36.3	7.8
10	7311.00	35.1 AV	54.0	-18.9	1.45 H	18	27.3	7.8
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	66.7 PK	74.0	-7.3	1.50 V	155	69.1	-2.4
2	2390.00	53.2 AV	54.0	-0.8	1.50 V	155	55.6	-2.4
3	*2437.00	119.3 PK			1.50 V	155	121.8	-2.5
4	*2437.00	109.1 AV			1.50 V	155	111.6	-2.5
5	2483.50	64.2 PK	74.0	-9.8	1.50 V	155	66.8	-2.6
6	2483.50	45.6 AV	54.0	-8.4	1.50 V	155	48.2	-2.6
7	4874.00	54.6 PK	74.0	-19.4	1.64 V	358	52.7	1.9
8	4874.00	43.7 AV	54.0	-10.3	1.64 V	358	41.8	1.9
9	7311.00	46.4 PK	74.0	-27.6	1.34 V	352	38.6	7.8
10	7311.00	35.0 AV	54.0	-19.0	1.34 V	352	27.2	7.8

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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	96.8 PK			1.41 H	243	99.3	-2.5
2	*2452.00	86.5 AV			1.41 H	243	89.0	-2.5
3	2483.50	59.1 PK	74.0	-14.9	1.41 H	243	61.7	-2.6
4	2483.50	44.3 AV	54.0	-9.7	1.41 H	243	46.9	-2.6
5	2484.80	60.6 PK	74.0	-13.4	1.41 H	243	63.2	-2.6
6	2484.80	45.4 AV	54.0	-8.6	1.41 H	243	48.0	-2.6
7	4904.00	40.4 PK	74.0	-33.6	1.04 H	2	38.4	2.0
8	4904.00	29.7 AV	54.0	-24.3	1.04 H	2	27.7	2.0
9	7356.00	44.2 PK	74.0	-29.8	1.44 H	26	36.3	7.9
10	7356.00	34.7 AV	54.0	-19.3	1.44 H	26	26.8	7.9
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	116.4 PK			1.50 V	155	118.9	-2.5
2	*2452.00	106.4 AV			1.50 V	155	108.9	-2.5
3	2483.50	67.9 PK	74.0	-6.1	1.50 V	155	70.5	-2.6
4	2483.50	52.2 AV	54.0	-1.8	1.50 V	155	54.8	-2.6
5	2484.80	69.6 PK	74.0	-4.4	1.50 V	155	72.2	-2.6
6	**2484.80**	**53.4 AV**	**54.0**	**-0.6**	**1.50 V**	**155**	**56.0**	**-2.6**
7	4904.00	54.3 PK	74.0	-19.7	1.54 V	344	52.3	2.0
8	4904.00	43.7 AV	54.0	-10.3	1.54 V	344	41.7	2.0
9	7356.00	46.5 PK	74.0	-27.5	1.22 V	358	38.6	7.9
10	7356.00	35.3 AV	54.0	-18.7	1.22 V	358	27.4	7.9

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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

Below 1GHz Data:

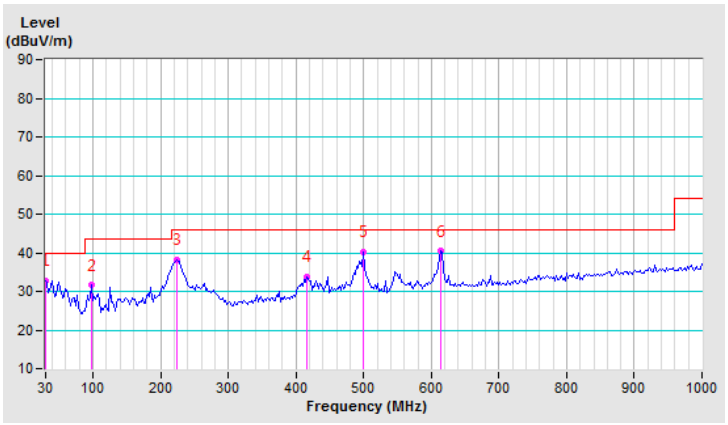
802.11b

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	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	30.00	32.8 QP	40.0	-7.2	3.00 H	302	42.4	-9.6
2	97.90	31.6 QP	43.5	-11.9	2.50 H	115	44.4	-12.8
3	224.00	38.3 QP	46.0	-7.7	2.00 H	208	48.7	-10.4
4	416.06	33.8 QP	46.0	-12.2	1.50 H	114	38.1	-4.3
5	499.48	40.2 QP	46.0	-5.8	1.50 H	314	42.2	-2.0
6	613.94	40.4 QP	46.0	-5.6	1.00 H	203	40.1	0.3

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

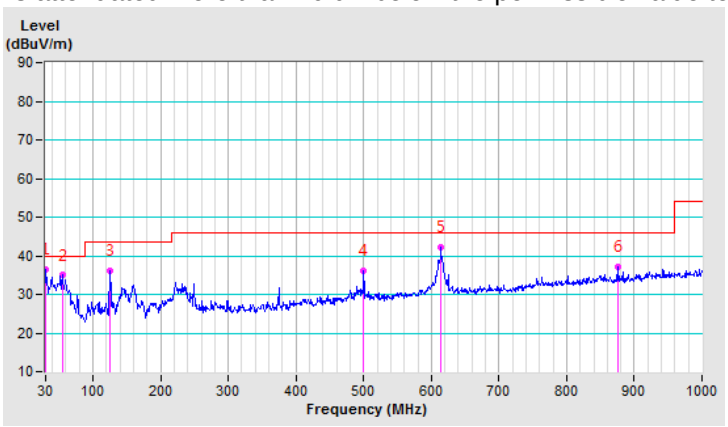


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	30.68	36.5 QP	40.0	-3.5	1.00 V	205	46.3	-9.8
2	55.90	35.0 QP	40.0	-5.0	1.00 V	302	43.9	-8.9
3	125.06	36.1 QP	43.5	-7.4	1.50 V	241	46.1	-10.0
4	499.96	36.1 QP	46.0	-9.9	2.00 V	118	38.1	-2.0
5	613.75	42.2 QP	46.0	-3.8	1.50 V	138	41.9	0.3
6	875.06	37.1 QP	46.0	-8.9	2.00 V	302	32.8	4.3

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB 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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 04, 2018	June 03, 2019
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 16, 2018	Mar. 15, 2019
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:
1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3. Tested Date: Jan. 23, 2019

4.2.3 Test Procedures

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

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

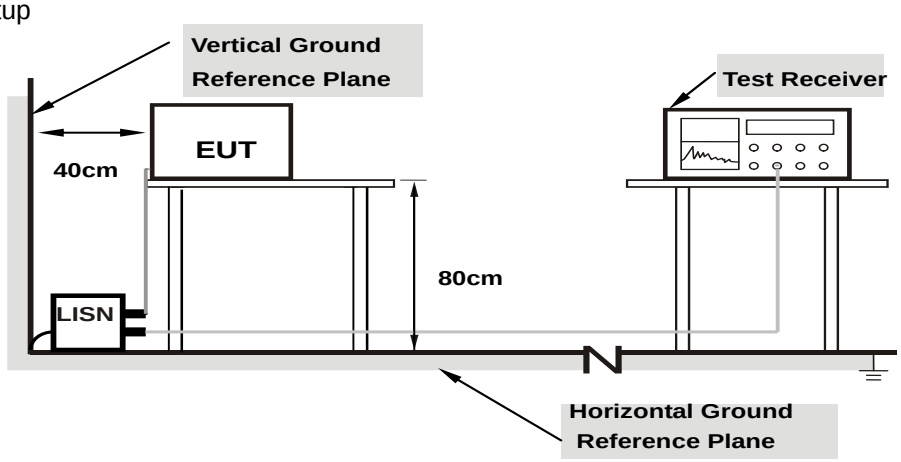
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

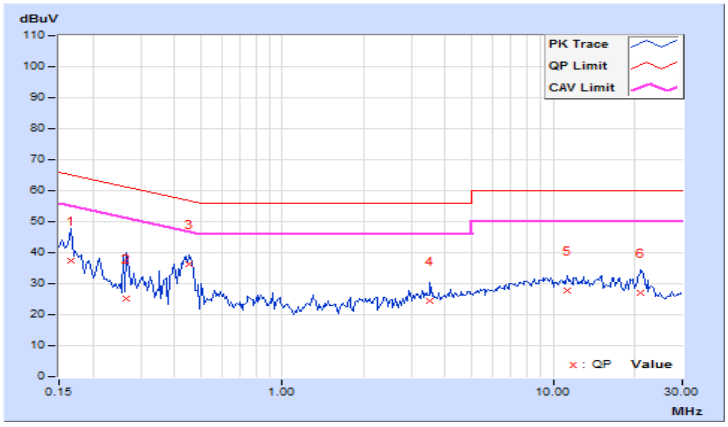
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	10.04	27.31	15.73	37.35	25.77	65.18	55.18	-27.83	-29.41
2	0.26719	10.06	15.08	5.19	25.14	15.25	61.20	51.20	-36.06	-35.95
3	**0.45469**	**10.08**	**26.04**	**19.12**	**36.12**	**29.20**	**56.79**	**46.79**	**-20.67**	**-17.59**
4	3.52344	10.29	14.02	6.10	24.31	16.39	56.00	46.00	-31.69	-29.61
5	11.31250	10.79	16.83	11.56	27.62	22.35	60.00	50.00	-32.38	-27.65
6	21.13672	11.39	15.49	6.88	26.88	18.27	60.00	50.00	-33.12	-31.73

REMARKS:

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

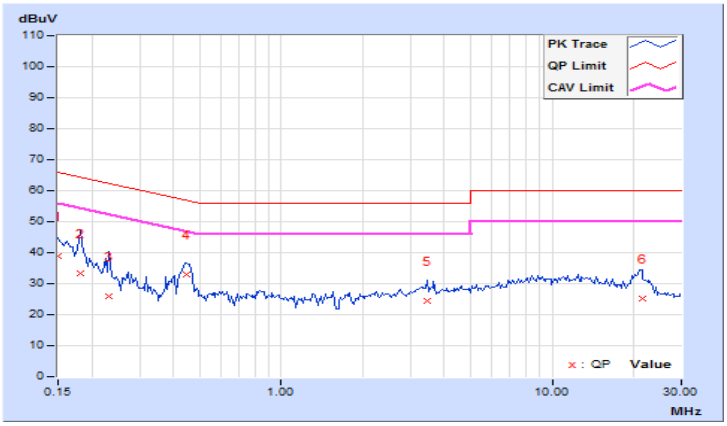


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.94	28.94	13.87	38.88	23.81	66.00	56.00	-27.12	-32.19
2	0.18125	9.95	23.22	11.08	33.17	21.03	64.43	54.43	-31.26	-33.40
3	0.23203	9.95	15.91	0.91	25.86	10.86	62.38	52.38	-36.52	-41.52
4	0.44688	9.98	23.08	13.20	33.06	23.18	56.93	46.93	-23.87	-23.75
5	3.48047	10.14	14.13	7.17	24.27	17.31	56.00	46.00	-31.73	-28.69
6	21.48047	11.16	13.91	5.49	25.07	16.65	60.00	50.00	-34.93	-33.35

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.

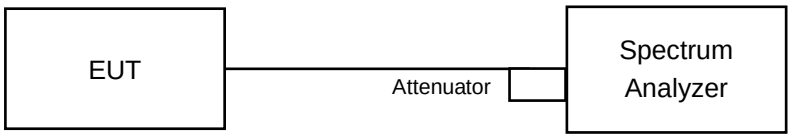


4.3 6dB Bandwidth Measurement

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 from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

CDD Mode

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	8.57	8.12	8.09	8.10	0.5	Pass
6	2437	8.09	8.08	8.08	8.10	0.5	Pass
11	2462	8.09	8.11	8.11	8.10	0.5	Pass

802.11g

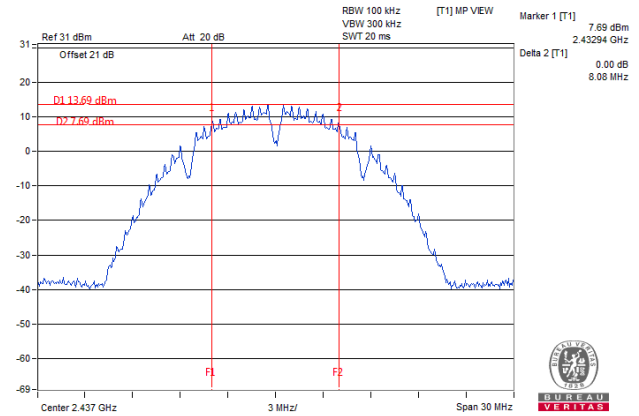
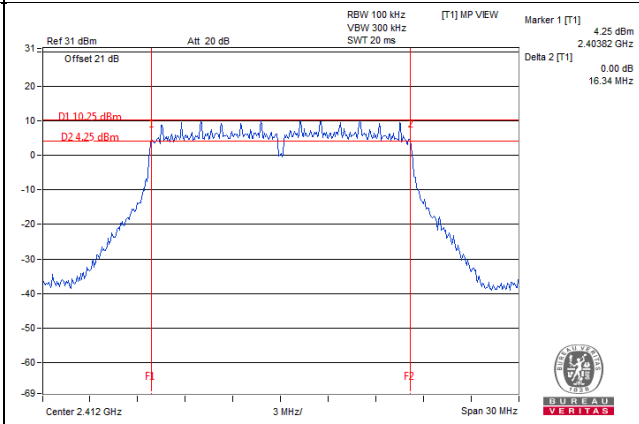
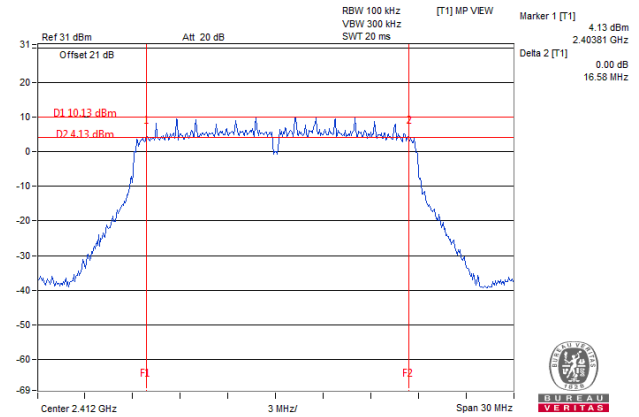
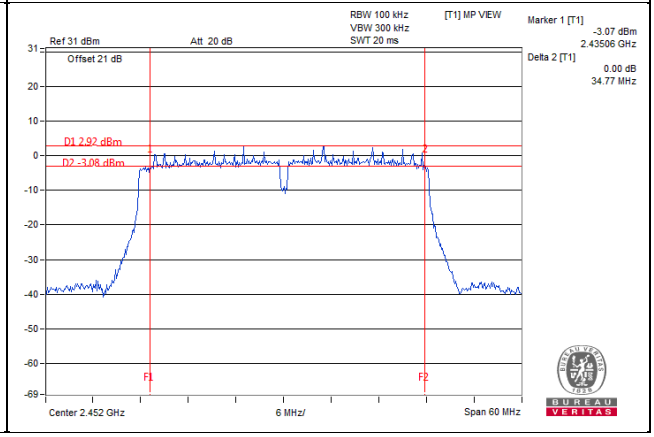
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	16.35	16.34	16.37	16.36	0.5	Pass
6	2437	16.35	16.34	16.35	16.38	0.5	Pass
11	2462	16.35	16.34	16.35	16.34	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	16.97	16.93	16.58	16.87	0.5	Pass
6	2437	17.23	17.21	17.18	16.96	0.5	Pass
11	2462	16.98	16.96	17.35	17.60	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
3	2422	35.51	35.75	35.24	35.52	0.5	Pass
6	2437	35.96	35.37	35.23	35.35	0.5	Pass
9	2452	35.38	35.96	35.38	34.77	0.5	Pass

Spectrum Plot of Worst Value	
802.11b : Chain 1 : CH6	**802.11g : Chain 1 : CH1**
	
HT 20 / Chain 2 : CH1	**HT 40 / Chain 3 : CH9**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

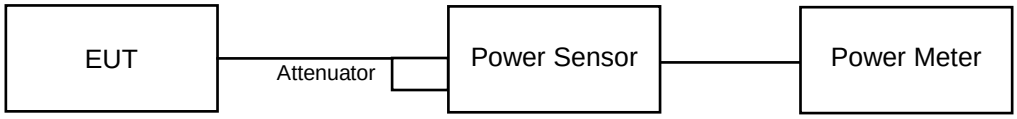
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

CDD Mode

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	18.29	18.97	19.10	18.43	297.285	24.73	30.00	Pass
6	2437	21.88	22.11	22.36	21.45	628.549	27.98	30.00	Pass
11	2462	18.23	18.64	18.82	17.90	277.509	24.43	30.00	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	20.31	20.72	21.17	20.48	468.035	26.70	30.00	Pass
6	2437	20.69	21.22	21.44	20.66	505.383	27.04	30.00	Pass
11	2462	18.67	19.39	19.45	18.74	323.439	25.10	30.00	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	19.98	20.35	20.78	20.21	432.562	26.36	30.00	Pass
6	2437	20.34	20.89	21.07	20.43	469.233	26.71	30.00	Pass
11	2462	19.21	20.03	20.08	19.46	374.228	25.73	30.00	Pass

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	18.12	18.70	18.80	18.08	279.121	24.46	30.00	Pass
6	2437	18.49	19.02	19.39	18.61	309.938	24.91	30.00	Pass
9	2452	15.89	16.44	16.68	15.89	168.244	22.26	30.00	Pass

Beamforming Mode

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	19.98	20.35	20.78	20.21	432.562	26.36	26.48	Pass
6	2437	19.85	20.32	20.55	20.01	417.984	26.21	26.48	Pass
11	2462	19.21	20.03	20.08	19.46	374.228	25.73	26.48	Pass

Note: 1. Directional gain = 3.5dBi + 10log(4) = 9.52dBi > 6dBi , so the power limit shall be reduced to 30-(9.52-6) = 26.48dBm.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	18.12	18.70	18.80	18.08	279.121	24.46	26.48	Pass
6	2437	18.49	19.02	19.39	18.61	309.938	24.91	26.48	Pass
9	2452	15.89	16.44	16.68	15.89	168.244	22.26	26.48	Pass

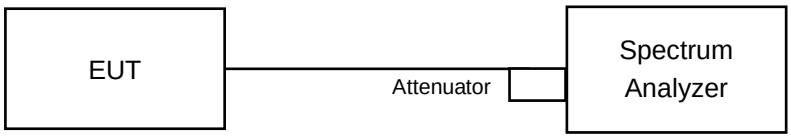
Note: 1. Directional gain = 3.5dBi + 10log(4) = 9.52dBi > 6dBi , so the power limit shall be reduced to 30-(9.52-6) = 26.48dBm.

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

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

802.11b, 802.11n (HT20)

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.

802.11g, 802.11n (HT40)

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/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-12.46	6.02	-6.44	4.48	Pass
	6	2437	-8.63	6.02	-2.61	4.48	Pass
	11	2462	-12.60	6.02	-6.58	4.48	Pass
1	1	2412	-11.05	6.02	-5.03	4.48	Pass
	6	2437	-8.27	6.02	-2.25	4.48	Pass
	11	2462	-11.47	6.02	-5.45	4.48	Pass
2	1	2412	-11.71	6.02	-5.69	4.48	Pass
	6	2437	-8.12	6.02	-2.10	4.48	Pass
	11	2462	-12.33	6.02	-6.31	4.48	Pass
3	1	2412	-11.95	6.02	-5.93	4.48	Pass
	6	2437	-8.92	6.02	-2.90	4.48	Pass
	11	2462	-12.07	6.02	-6.05	4.48	Pass

Note: 1. Directional gain = 3.5dBi + 10log(4) = 9.52dBi > 6dBi , so the power density limit shall be reduced to 8-(9.52-6) = 4.48dBm.

802.11g

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=4) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-11.25	6.02	0.16	-5.07	4.48	Pass
	6	2437	-11.58	6.02	0.16	-5.40	4.48	Pass
	11	2462	-14.42	6.02	0.16	-8.24	4.48	Pass
1	1	2412	-12.31	6.02	0.16	-6.13	4.48	Pass
	6	2437	-10.79	6.02	0.16	-4.61	4.48	Pass
	11	2462	-13.81	6.02	0.16	-7.63	4.48	Pass
2	1	2412	-11.49	6.02	0.16	-5.31	4.48	Pass
	6	2437	-10.61	6.02	0.16	-4.43	4.48	Pass
	11	2462	-13.58	6.02	0.16	-7.40	4.48	Pass
3	1	2412	-11.88	6.02	0.16	-5.70	4.48	Pass
	6	2437	-12.12	6.02	0.16	-5.94	4.48	Pass
	11	2462	-14.01	6.02	0.16	-7.83	4.48	Pass

Note: 1. Directional gain = 3.5dBi + 10log(4) = 9.52dBi > 6dBi , so the power density limit shall be reduced to 8-(9.52-6) = 4.48dBm.

2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-11.73	6.02	-5.71	4.48	Pass
	6	2437	-12.72	6.02	-6.70	4.48	Pass
	11	2462	-13.37	6.02	-7.35	4.48	Pass
1	1	2412	-12.40	6.02	-6.38	4.48	Pass
	6	2437	-12.19	6.02	-6.17	4.48	Pass
	11	2462	-12.92	6.02	-6.90	4.48	Pass
2	1	2412	-12.18	6.02	-6.16	4.48	Pass
	6	2437	-10.99	6.02	-4.97	4.48	Pass
	11	2462	-14.01	6.02	-7.99	4.48	Pass
3	1	2412	-11.82	6.02	-5.80	4.48	Pass
	6	2437	-12.29	6.02	-6.27	4.48	Pass
	11	2462	-13.12	6.02	-7.10	4.48	Pass

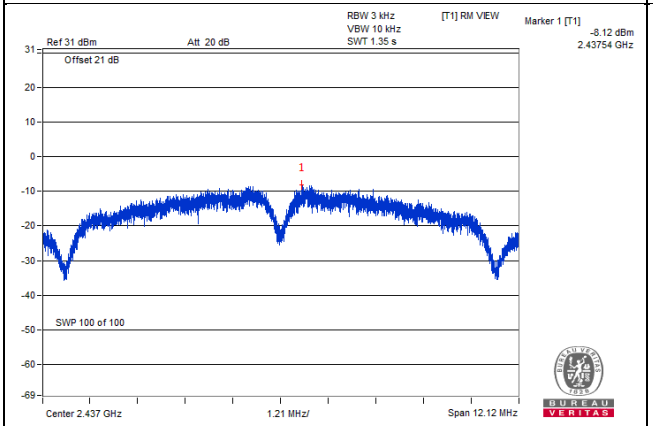
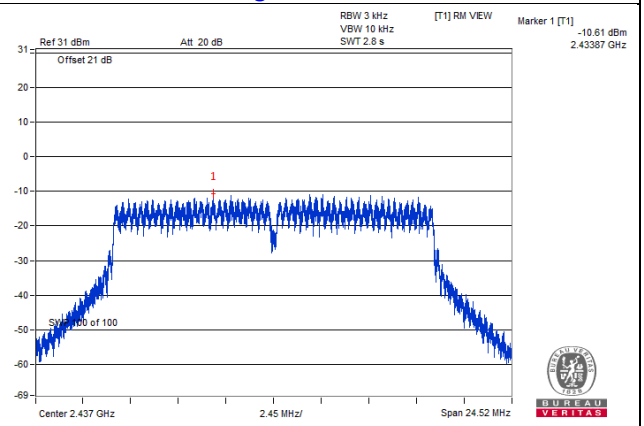
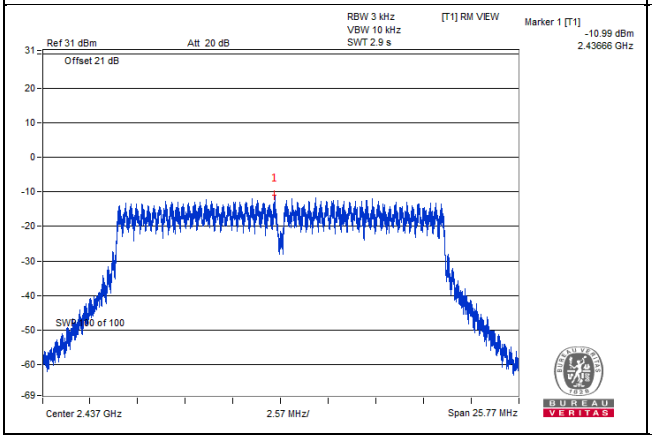
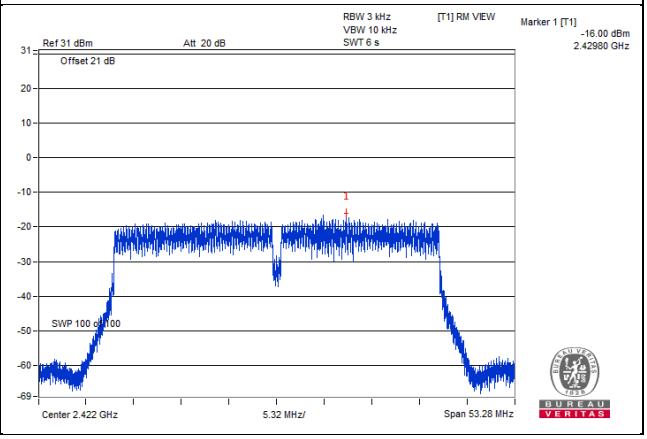
Note: 1. Directional gain = 3.5dBi + 10log(4) = 9.52dBi > 6dBi , so the power density limit shall be reduced to 8-(9.52-6) = 4.48dBm.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=4) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-16.99	6.02	0.15	-10.82	4.48	Pass
	6	2437	-17.27	6.02	0.15	-11.10	4.48	Pass
	9	2452	-20.01	6.02	0.15	-13.84	4.48	Pass
1	3	2422	-16.71	6.02	0.15	-10.54	4.48	Pass
	6	2437	-16.77	6.02	0.15	-10.60	4.48	Pass
	9	2452	-18.91	6.02	0.15	-12.74	4.48	Pass
2	3	2422	-17.54	6.02	0.15	-11.37	4.48	Pass
	6	2437	-16.30	6.02	0.15	-10.13	4.48	Pass
	9	2452	-18.92	6.02	0.15	-12.75	4.48	Pass
3	3	2422	-16.00	6.02	0.15	-9.83	4.48	Pass
	6	2437	-16.73	6.02	0.15	-10.56	4.48	Pass
	9	2452	-20.19	6.02	0.15	-14.02	4.48	Pass

Note: 1. Directional gain = 3.5dBi + 10log(4) = 9.52dBi > 6dBi , so the power density limit shall be reduced to 8-(9.52-6) = 4.48dBm.

2. Refer to section 3.3 for duty cycle spectrum plot.

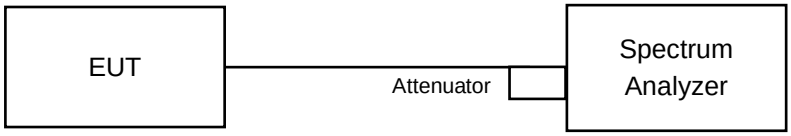
Spectrum Plot of Worst Value	
802.11b / Chain 2 : CH6	**802.11g / Chain 2 : CH6**
	
HT 20 / Chain 2: CH6	**HT 40 / Chain 3: CH3**
	

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

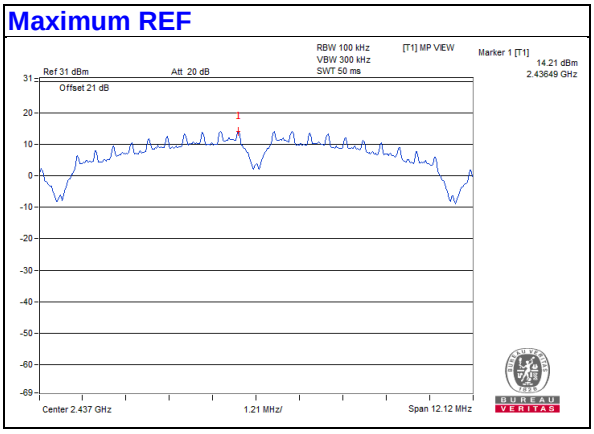
Same as Item 4.3.6

4.6.7 Test Results

The 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.

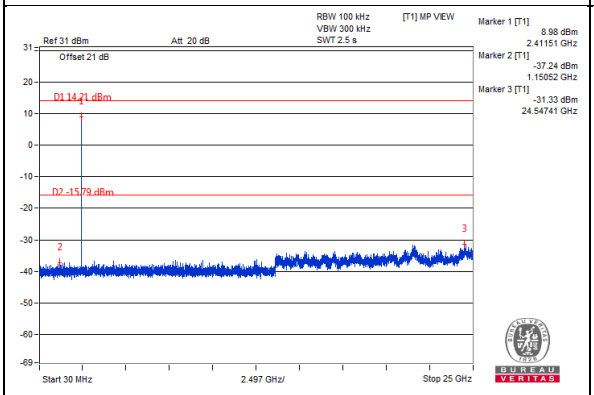
802.11b

Maximum REF

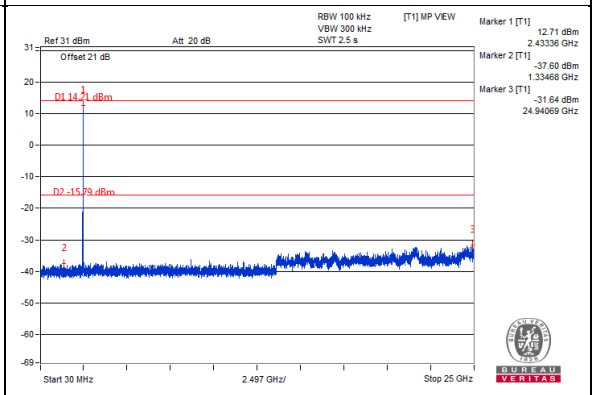


Chain 0

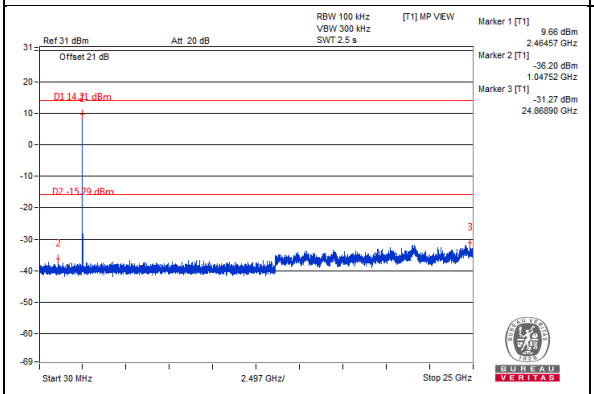
CH 1



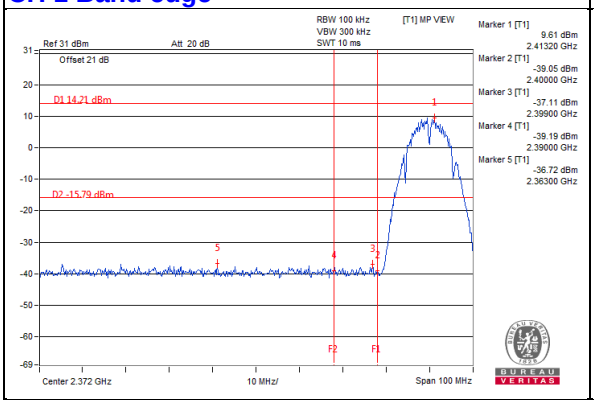
CH 6



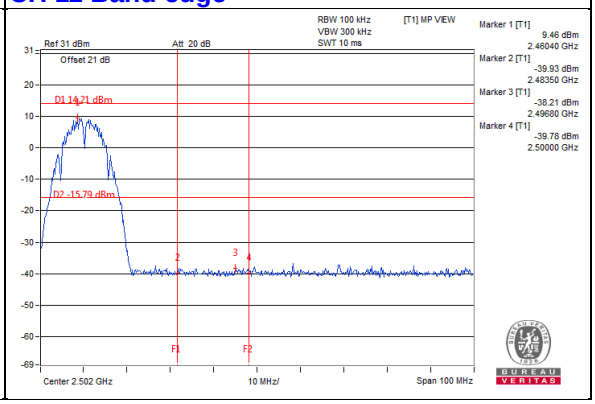
CH 11



CH 1 Band edge

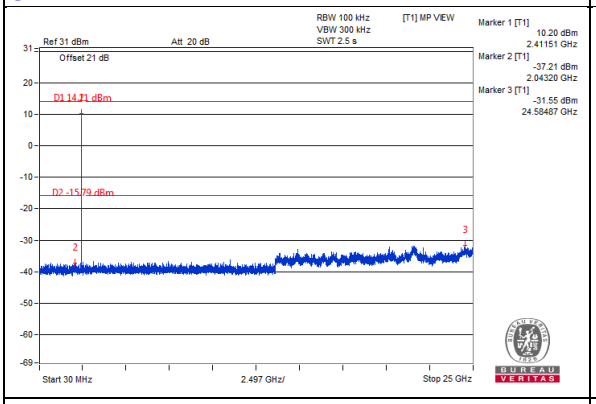


CH 11 Band edge

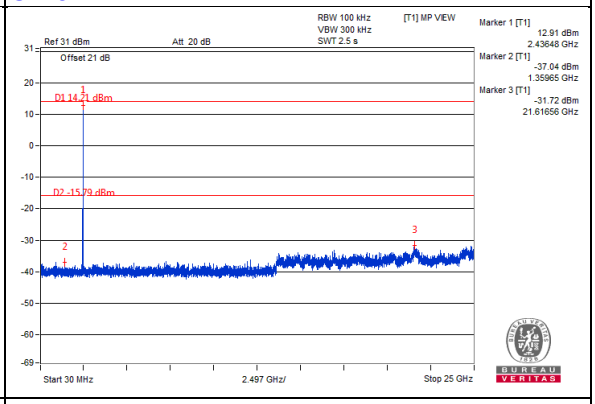


Chain 1

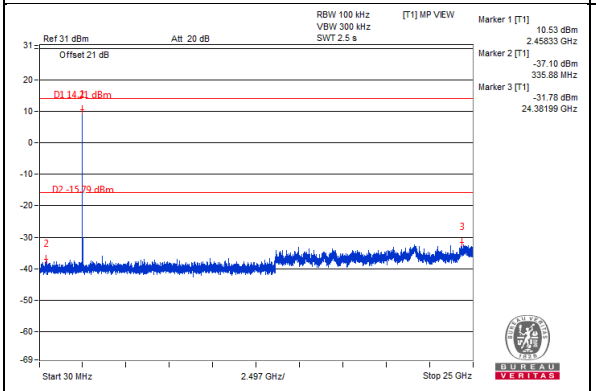
CH 1



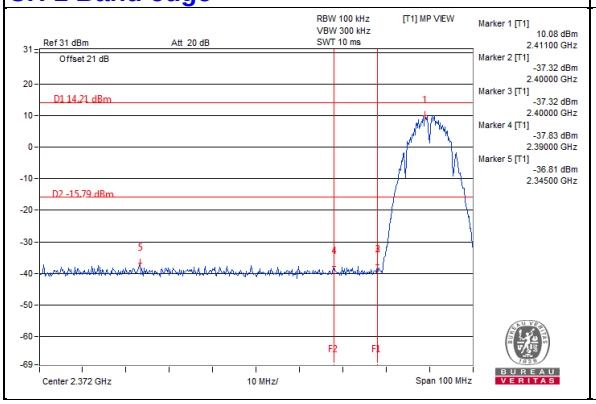
CH 6



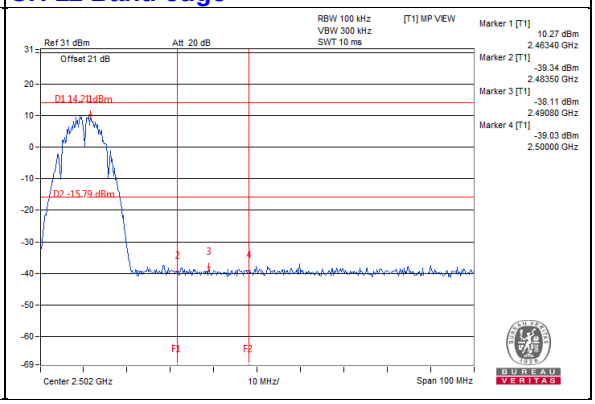
CH 11



CH 1 Band edge

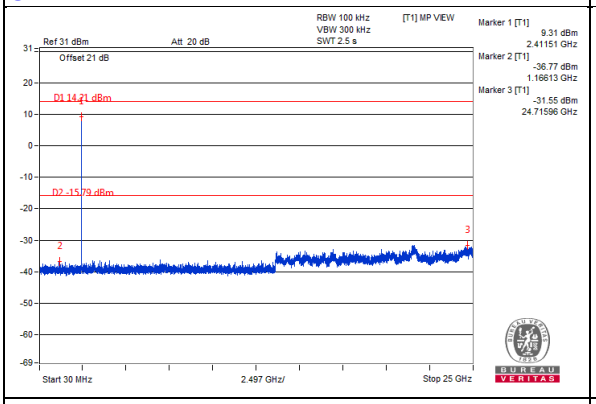


CH 11 Band edge

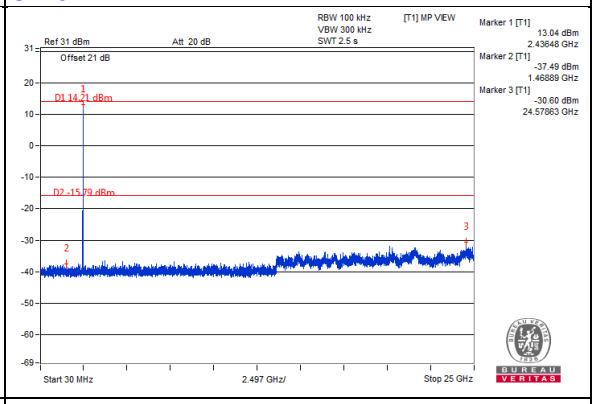


Chain 2

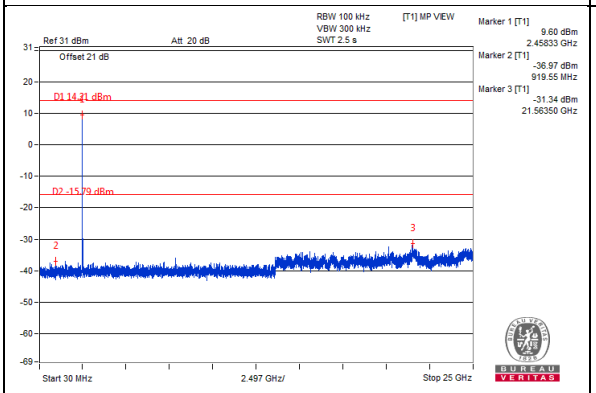
CH 1



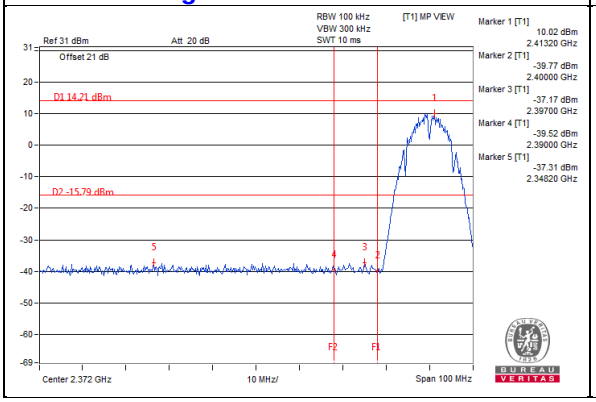
CH 6



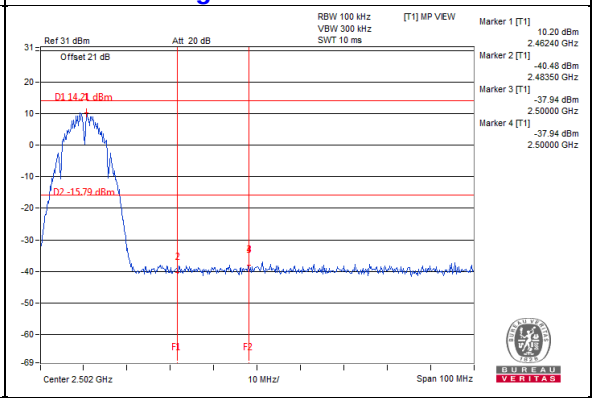
CH 11



CH 1 Band edge

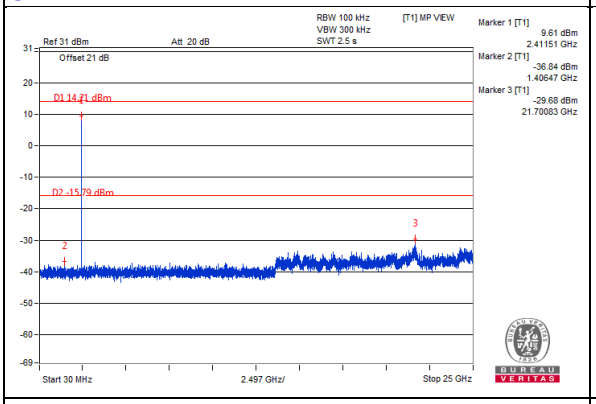


CH 11 Band edge

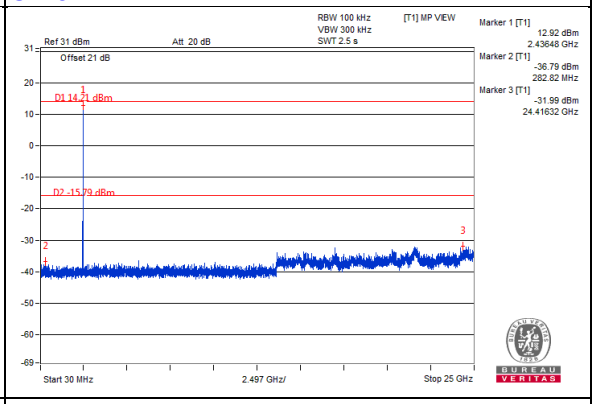


Chain 3

CH 1



CH 6



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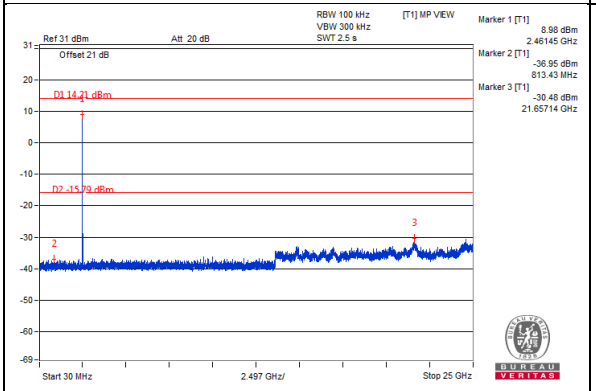

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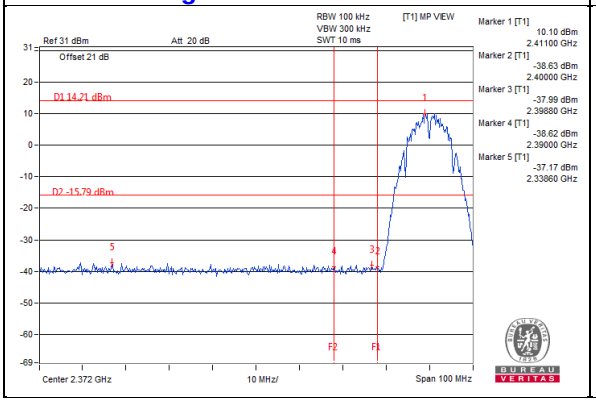

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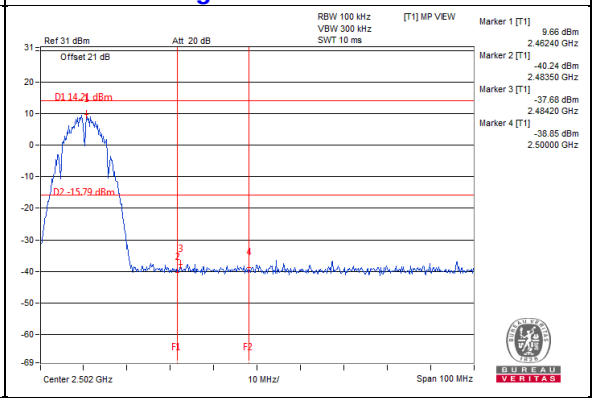
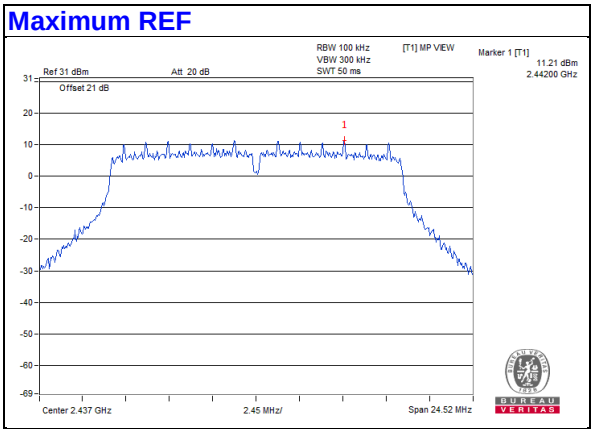


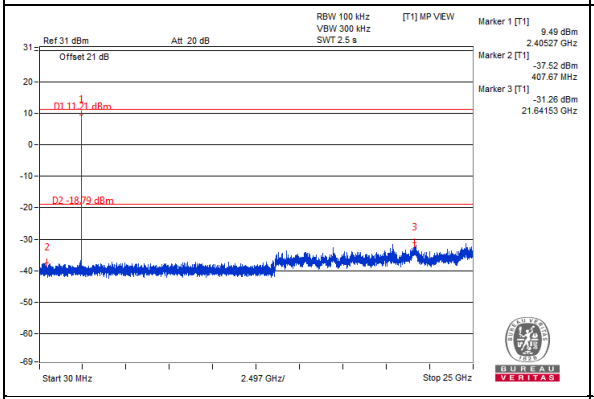
802.11g

Maximum REF

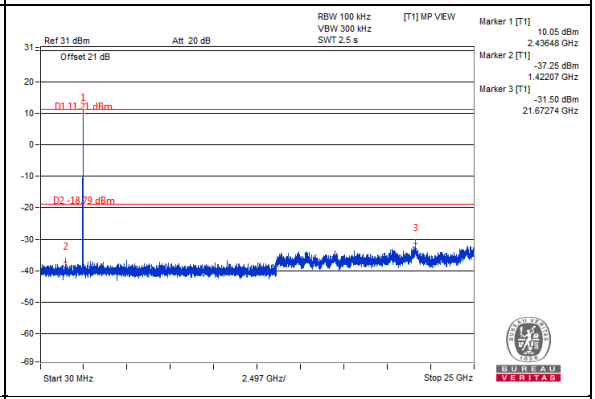


Chain 0

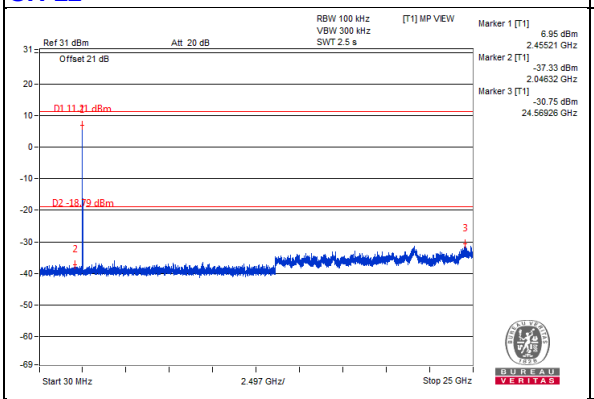
CH 1



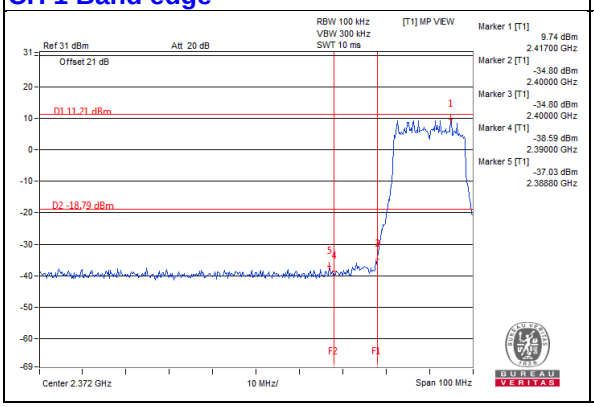
CH 6



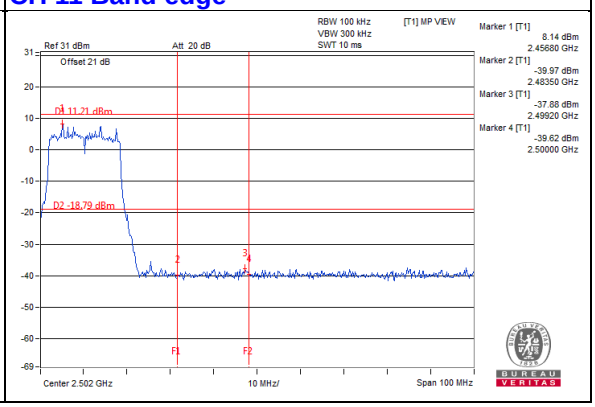
CH 11



CH 1 Band edge

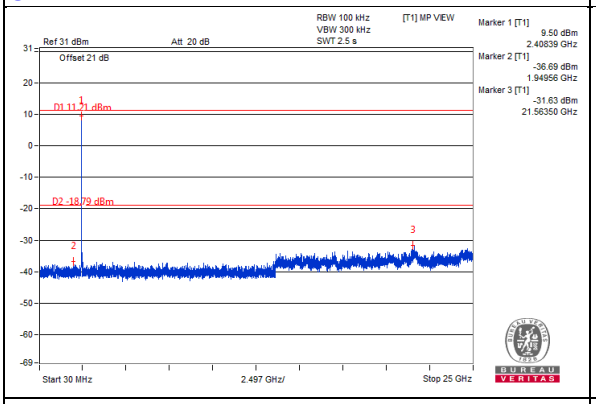


CH 11 Band edge



Chain 1

CH 1



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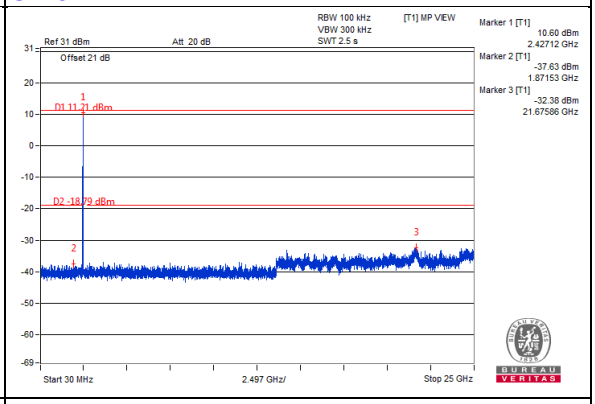
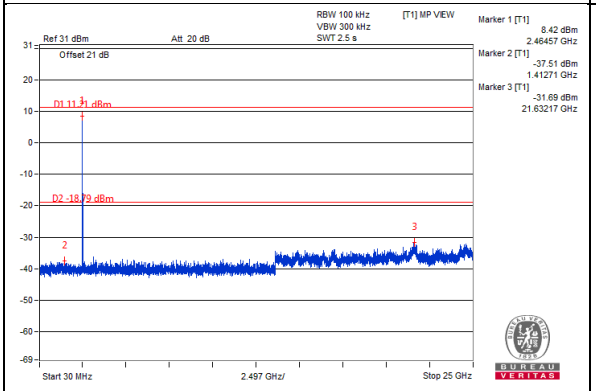
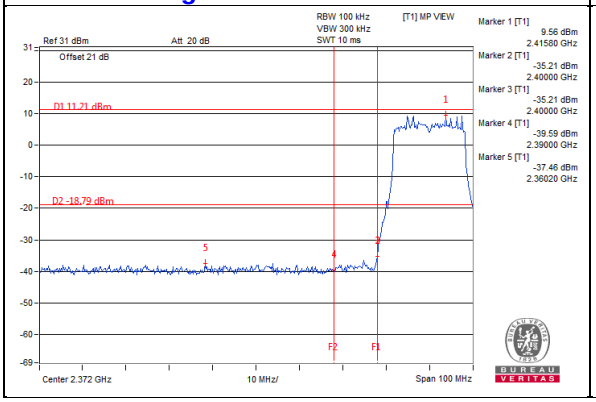


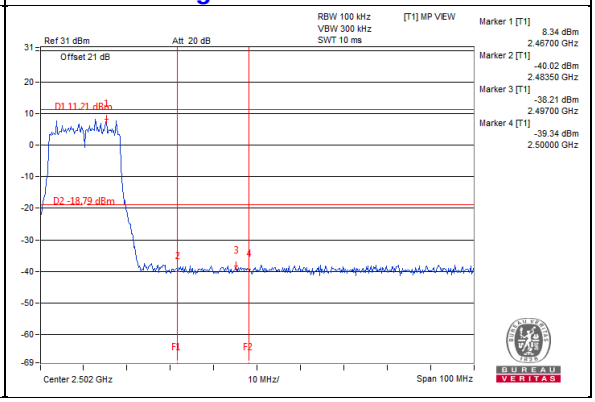
CH 11



CH 1 Band edge

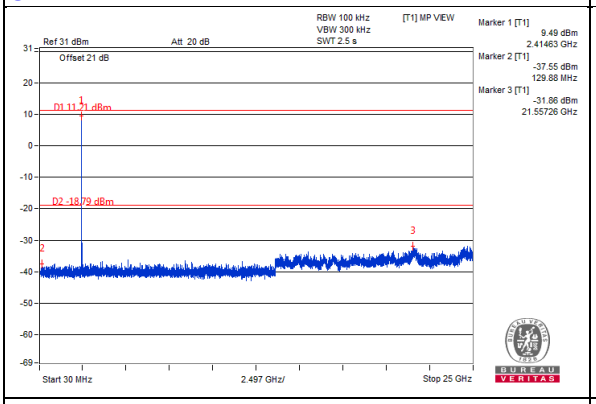


CH 11 Band edge

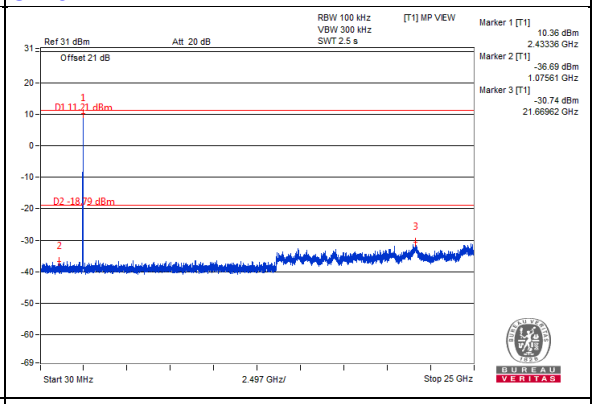


Chain 2

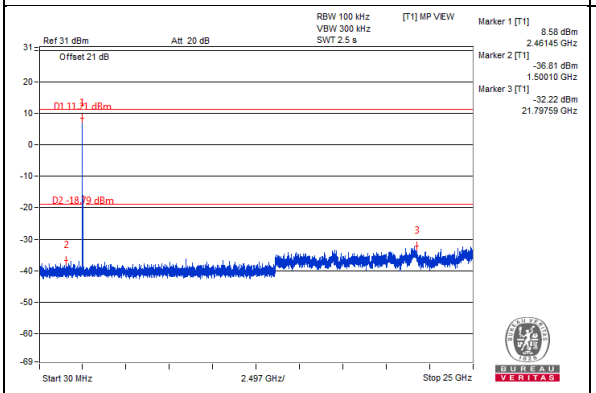
CH 1



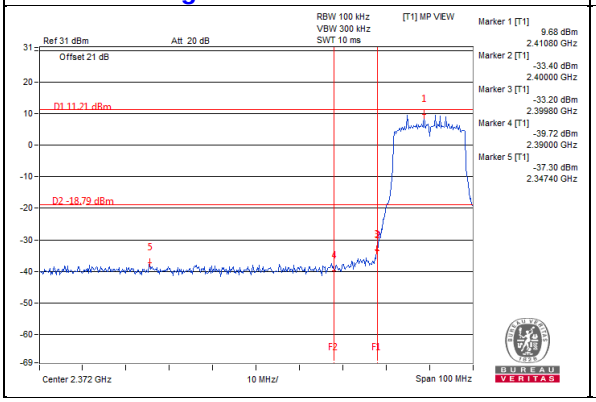
CH 6



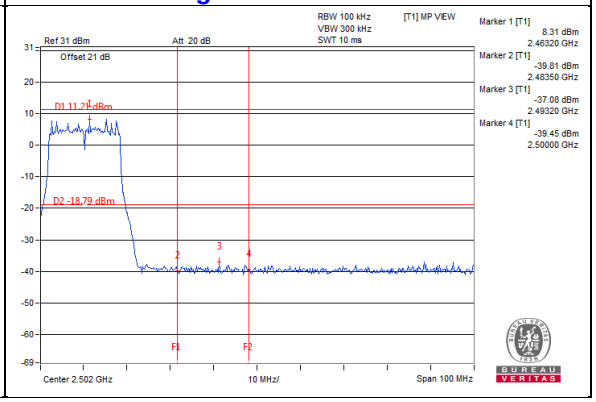
CH 11



CH 1 Band edge

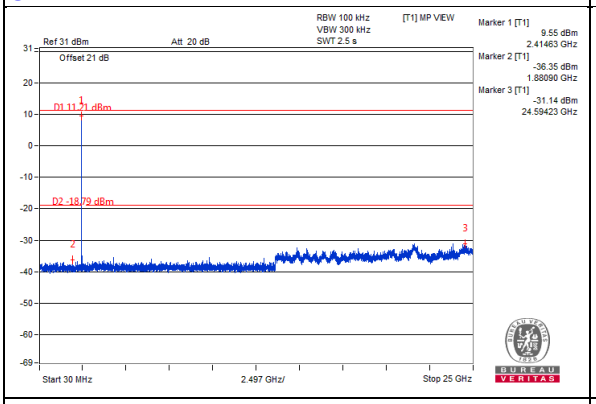


CH 11 Band edge

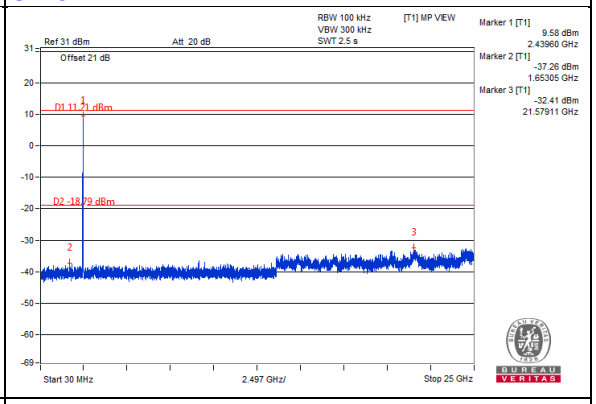


Chain 3

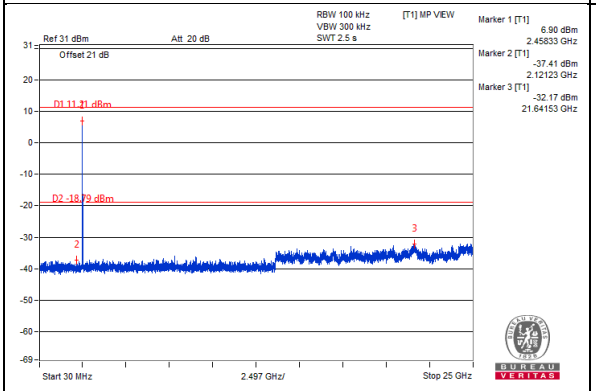
CH 1



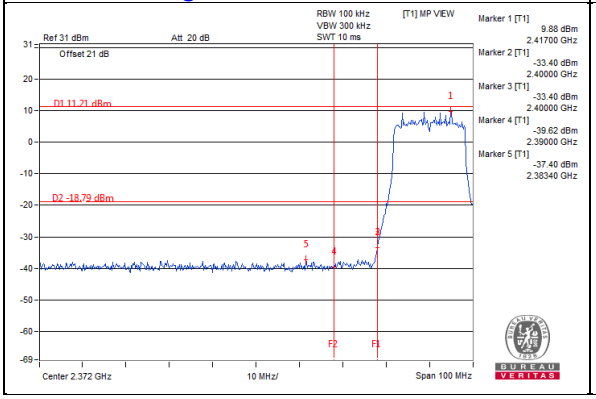
CH 6



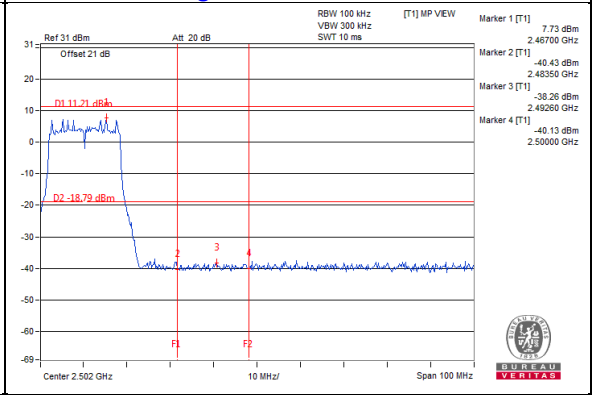
CH 11



CH 1 Band edge

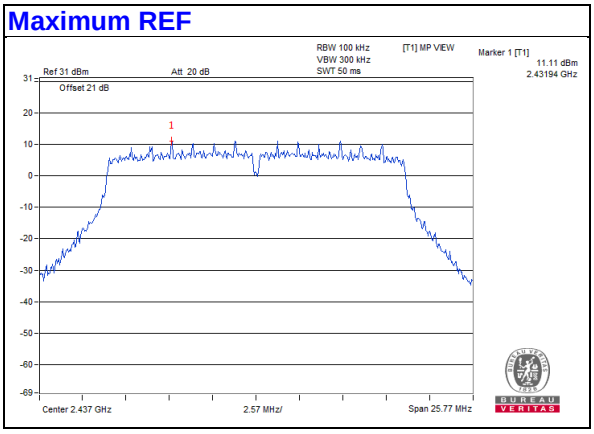


CH 11 Band edge



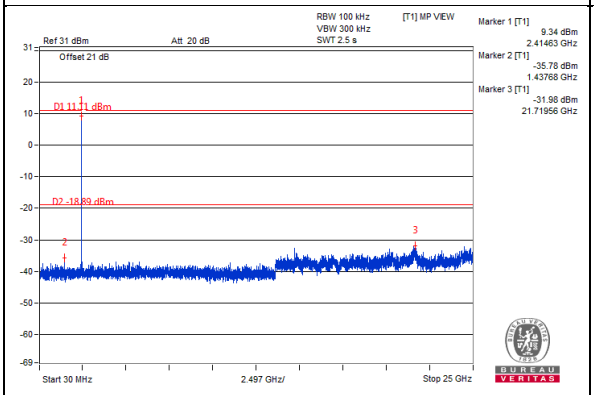
802.11n (HT20)

Maximum REF

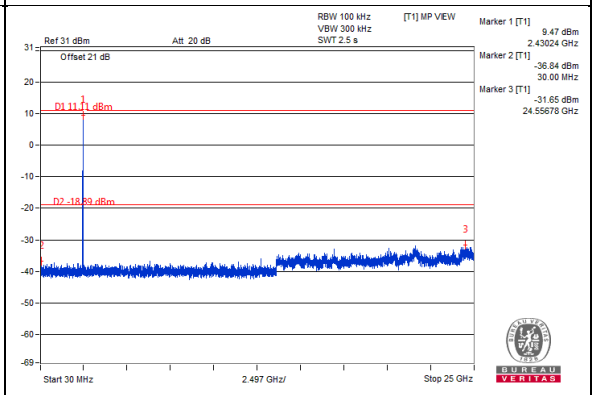


Chain 0

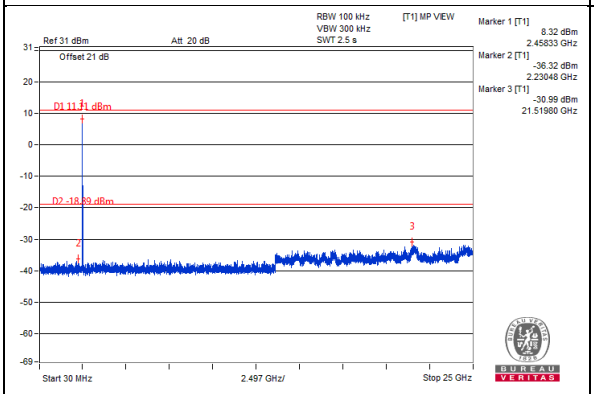
CH 1



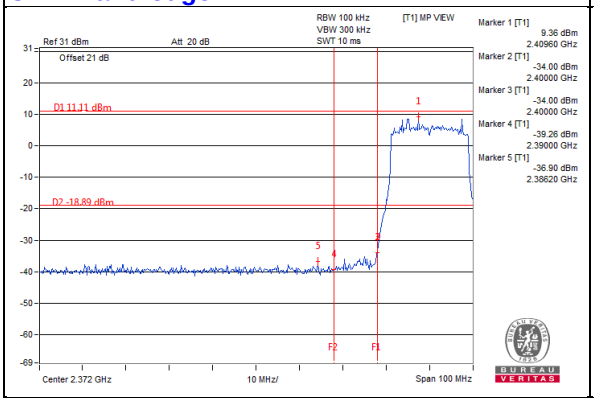
CH 6



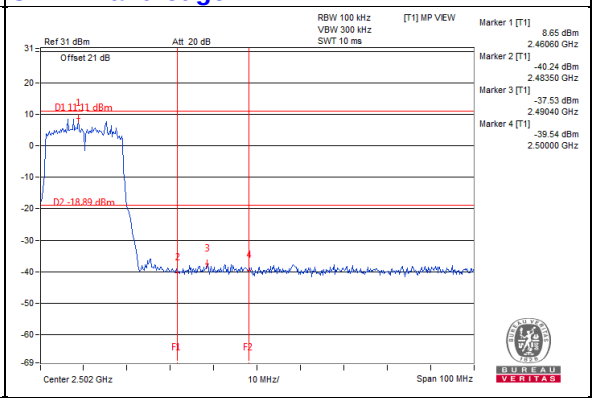
CH 11



CH 1 Band edge

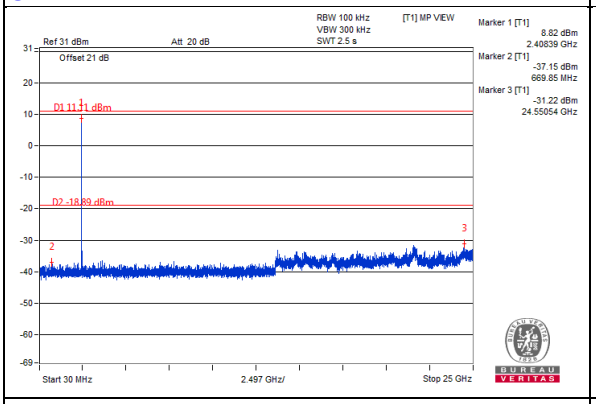


CH 11 Band edge

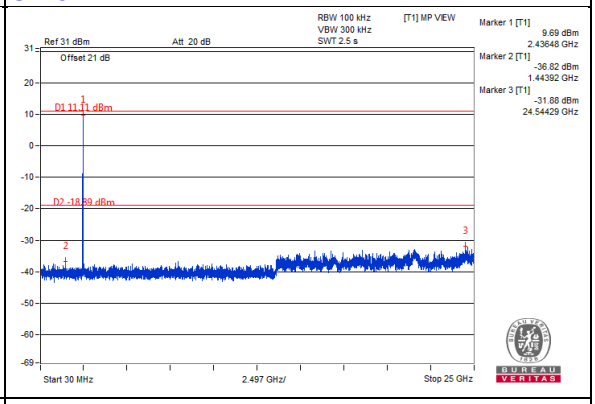


Chain 1

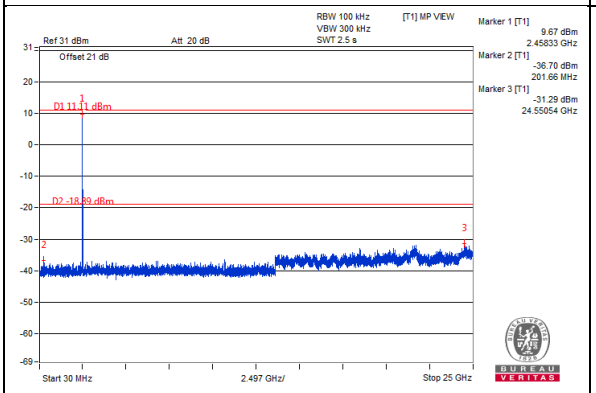
CH 1



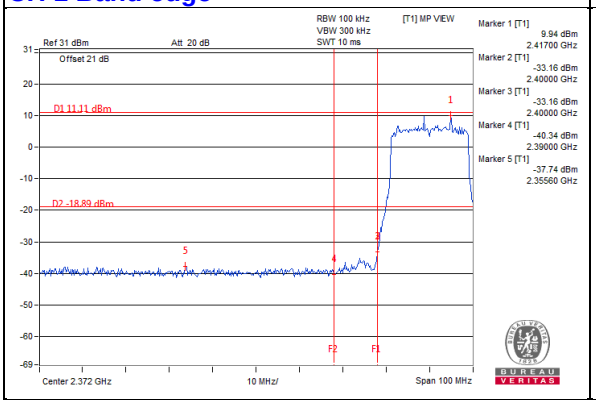
CH 6



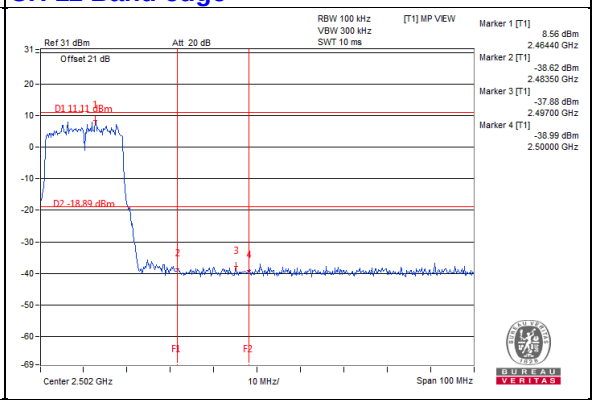
CH 11



CH 1 Band edge

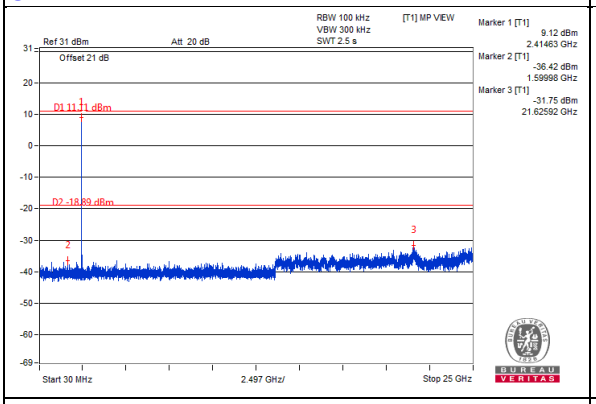


CH 11 Band edge

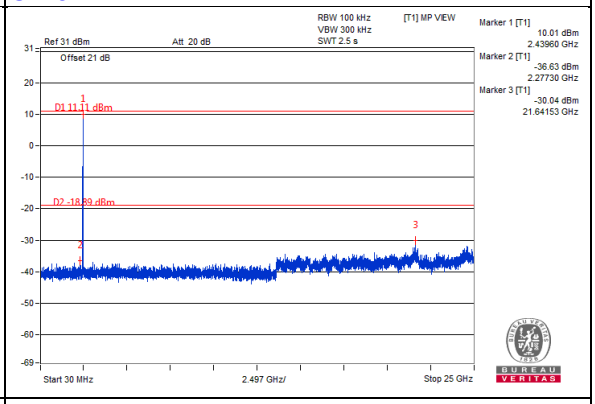


Chain 2

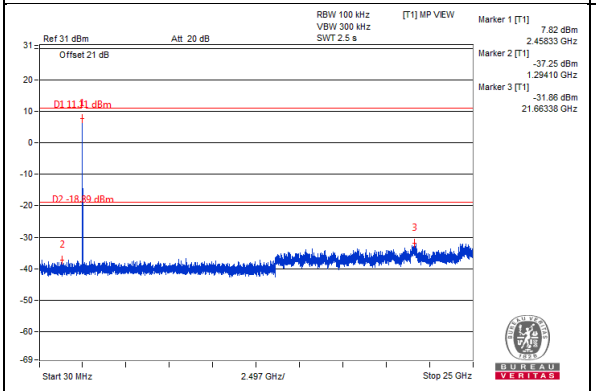
CH 1



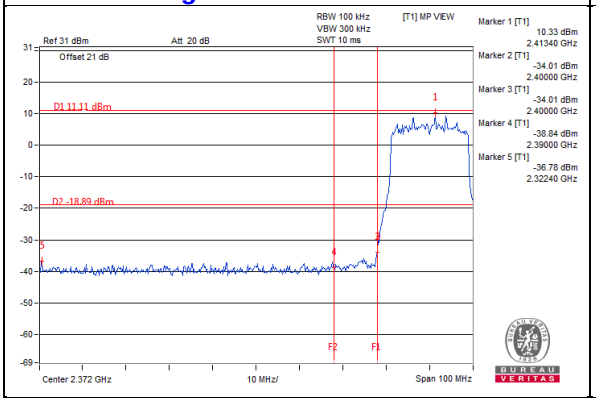
CH 6



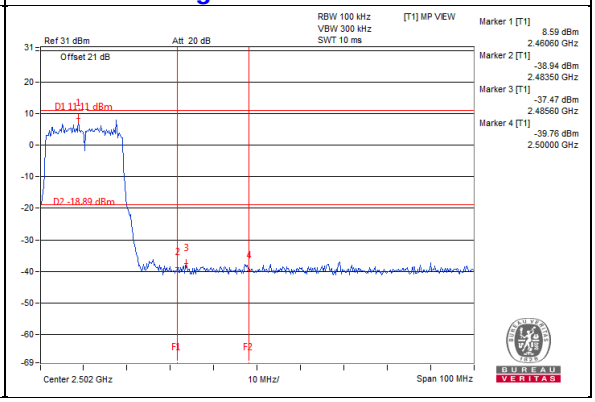
CH 11



CH 1 Band edge

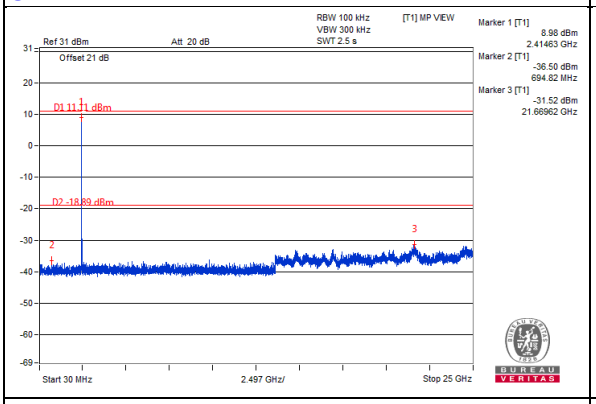


CH 11 Band edge

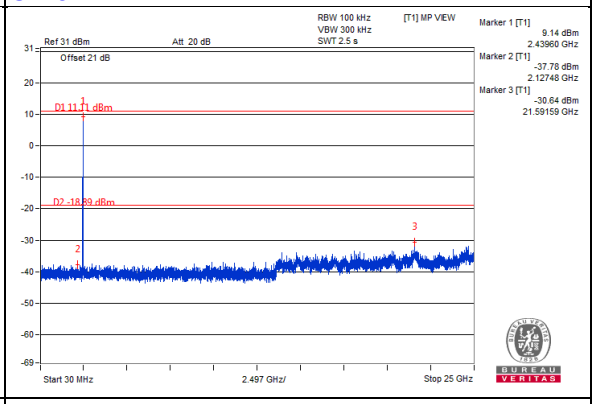


Chain 3

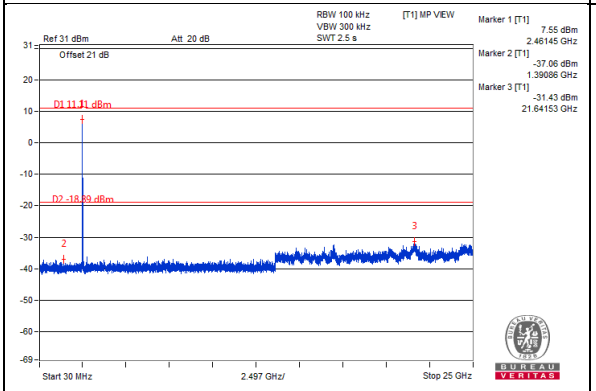
CH 1



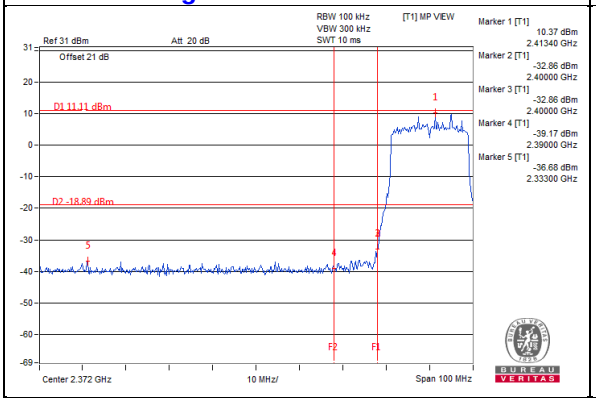
CH 6



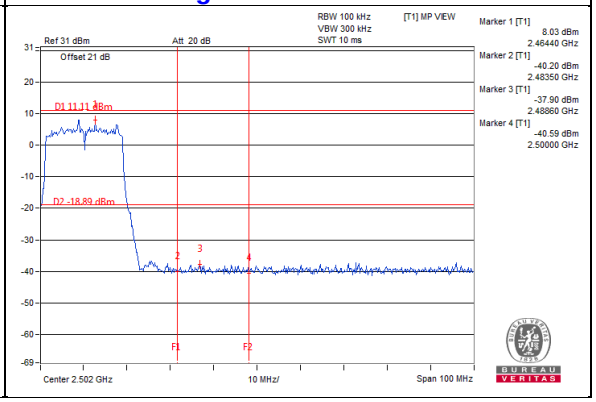
CH 11



CH 1 Band edge

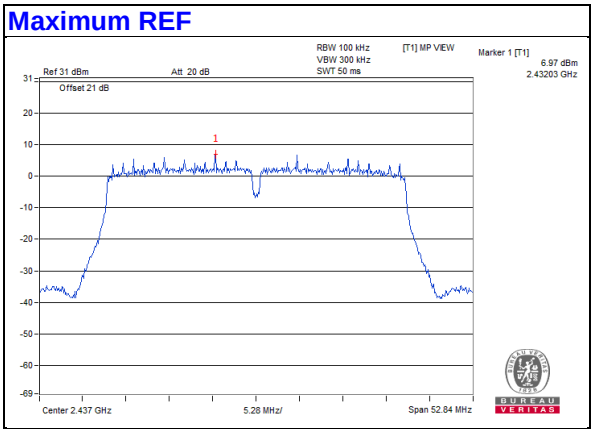


CH 11 Band edge



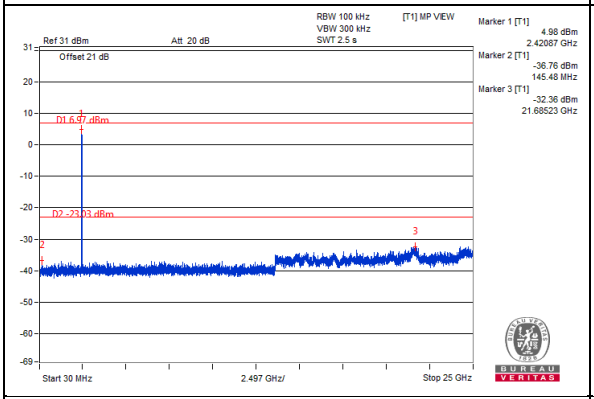
802.11n (HT40)

Maximum REF

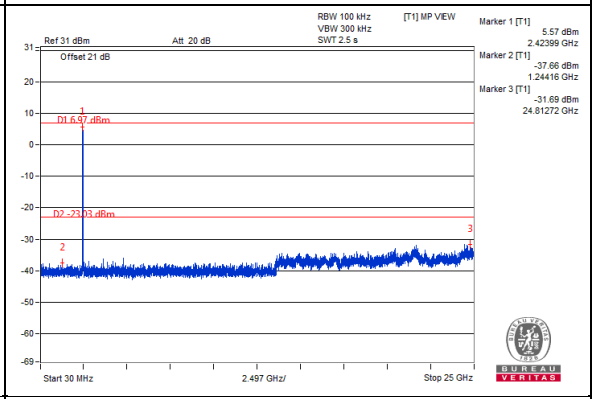


Chain 0

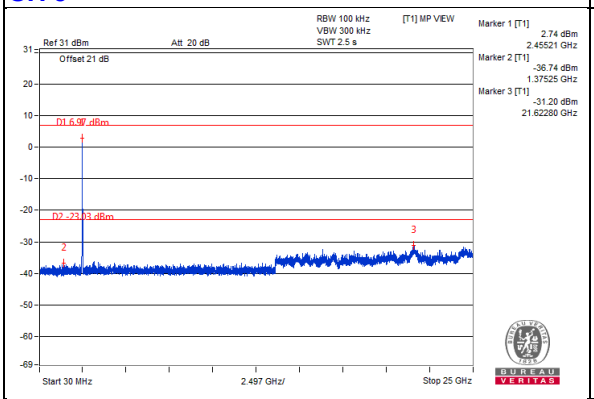
CH 3



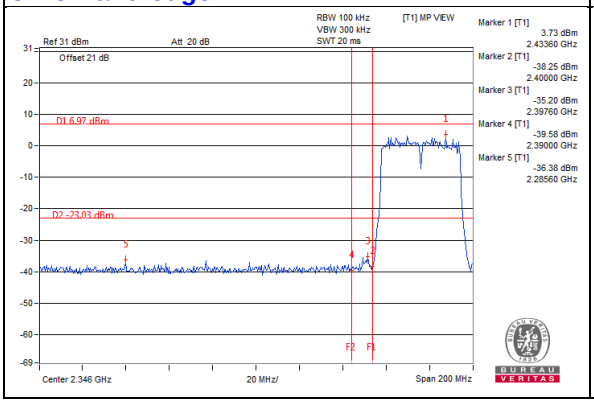
CH 6



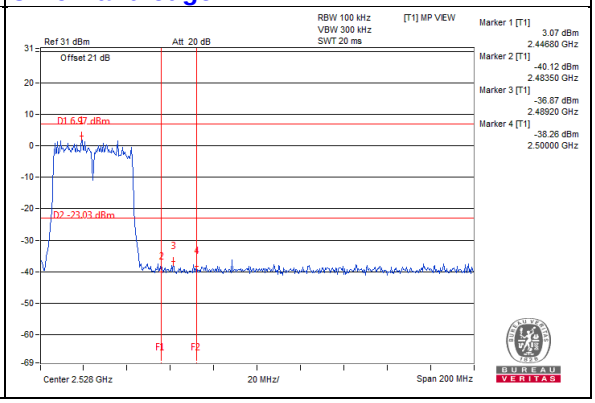
CH 9



CH 3 Band edge

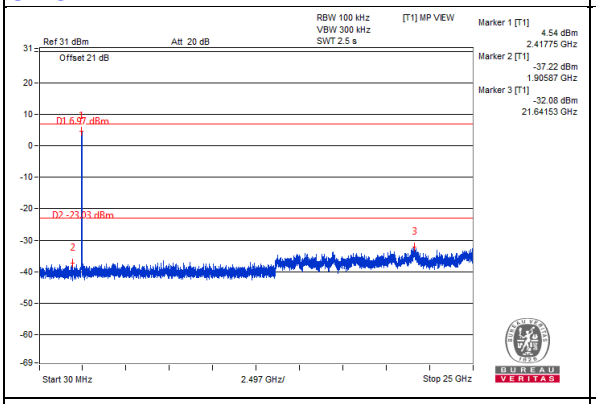


CH 9 Band edge

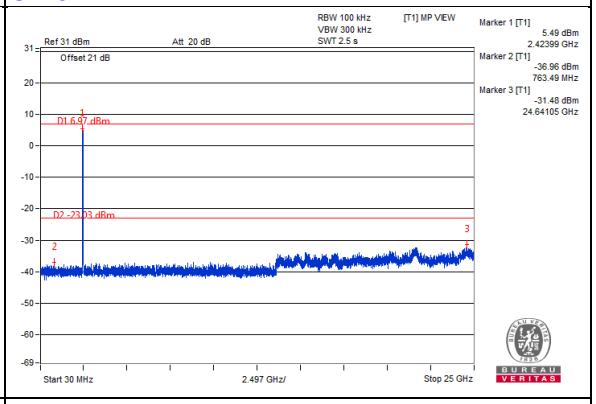


Chain 1

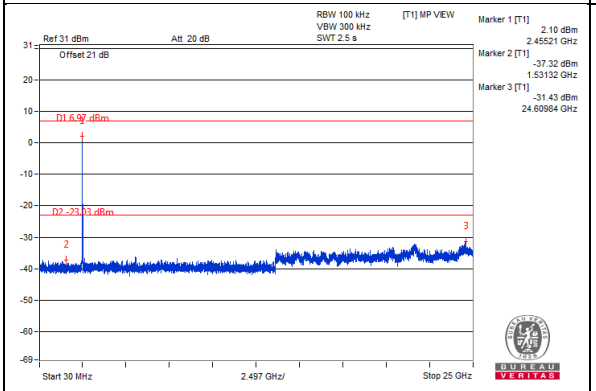
CH 3



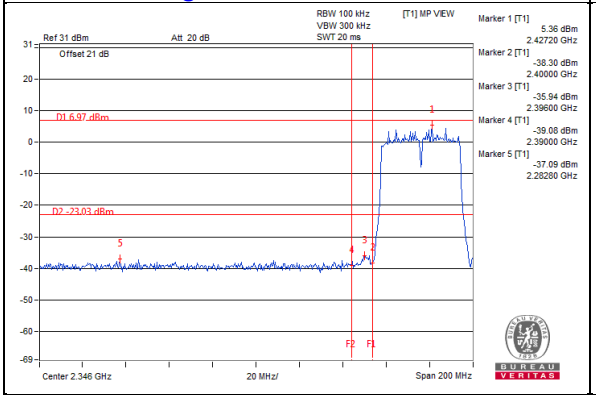
CH 6



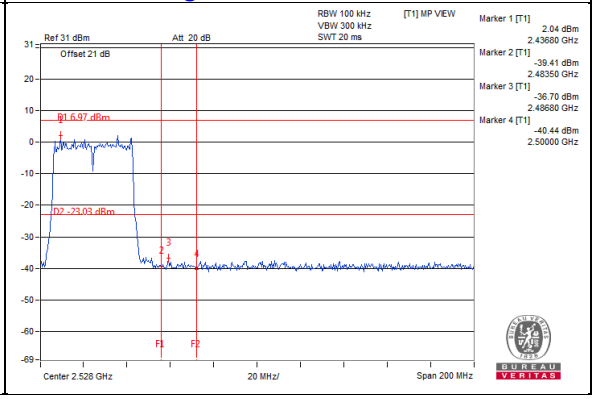
CH 9



CH 3 Band edge

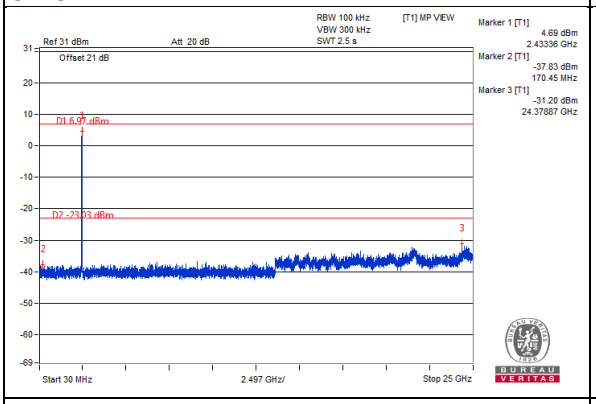


CH 9 Band edge

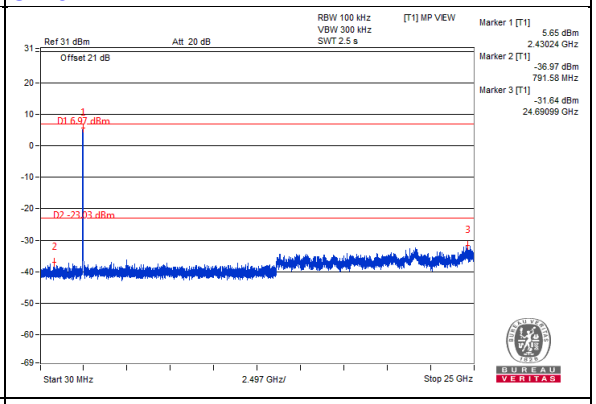


Chain 2

CH 3



CH 6



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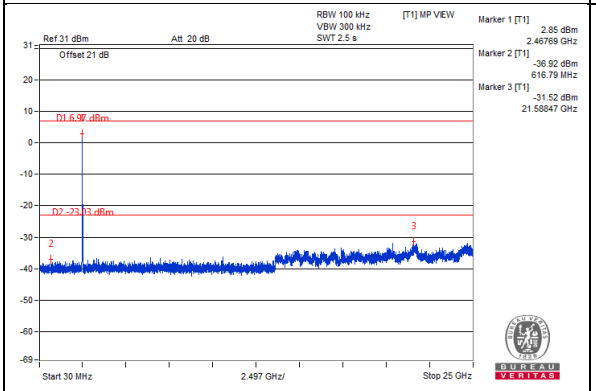

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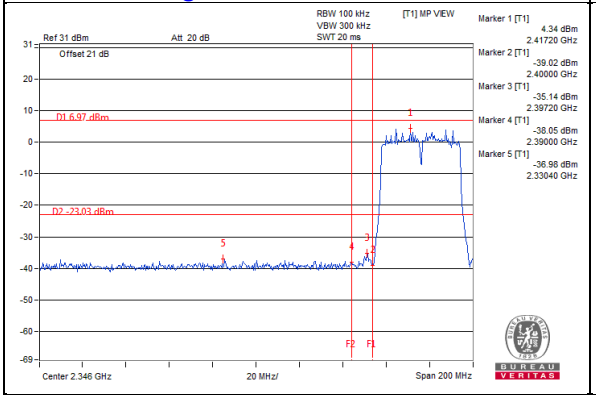
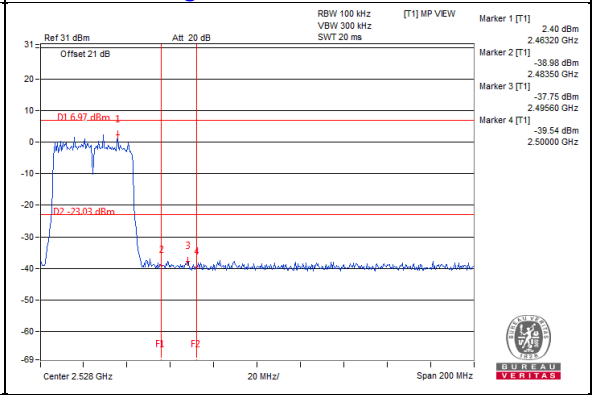
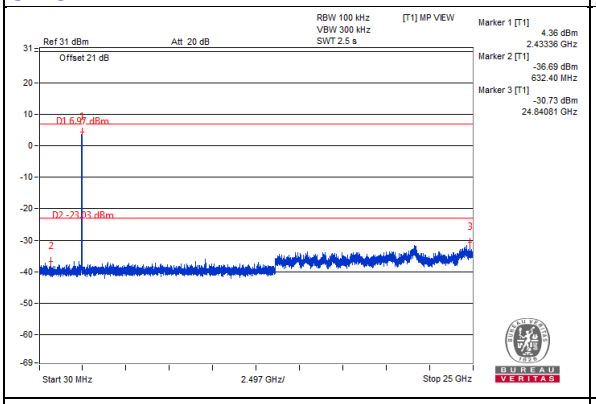


CH 9 Band edge

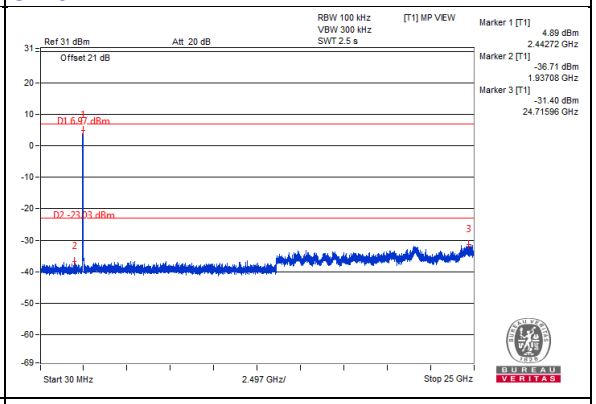


Chain 3

CH 3



CH 6



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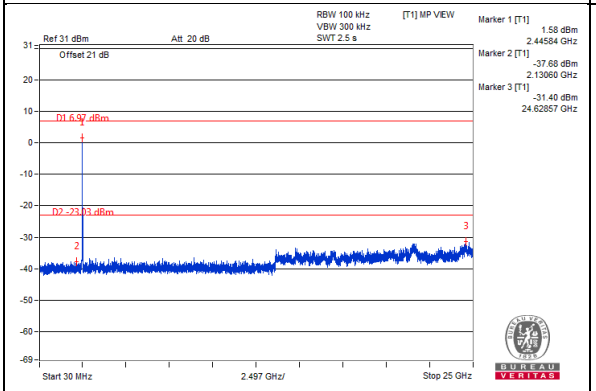

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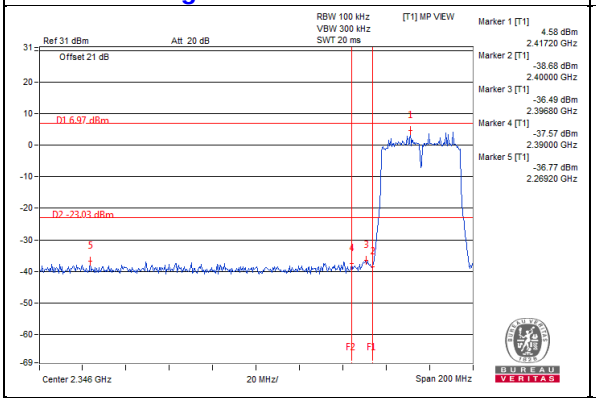

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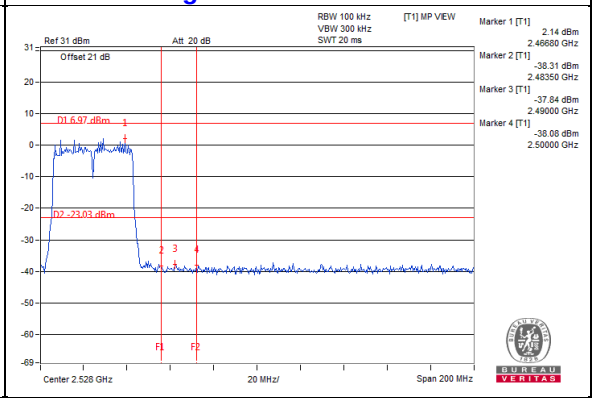

5 Pictures of Test Arrangements

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

Appendix – Information of 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 according to ISO/IEC 17025.

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

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