FCC Test Report

Report No.:	RF180103E09
FCC ID:	2ACFN-QWAAC2600
Test Model:	QWA-AC2600
Series Model:	Refer to section 3.1 for more details
Received Date:	Jan. 03, 2018
Test Date:	Feb. 13 to May 31, 2018
Issued Date:	June 04, 2018
Applicant:	QNAP SYSTEMS, INC.
Address:	2F., No.22, Zhongxing Road, Xizhi District, New Taipei City, 221, 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
RF180103E09	Original release.	June 04, 2018

1 Certificate of Conformity

Product:	QNAP Wireless Adapter
Brand:	QNAP
Test Model:	QWA-AC2600
Series Model:	Refer to section 3.1 for more details
Sample Status:	ENGINEERING SAMPLE
Applicant:	QNAP SYSTEMS, INC.
Test Date:	Feb. 13 to May 31, 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 EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** June 04, 2018

Wendy Wu / Specialist

Approved by : _____ , **Date:** June 04, 2018

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 -10.86dB at 0.16953MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2483.5MHz, 2483.90MHz.
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 R-SMA not a standard connector.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.53 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.08 dB
	6GHz ~ 18GHz	4.98 dB
	18GHz ~ 40GHz	5.19 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	QNAP Wireless Adapter
Brand	QNAP
Test Model	QWA-AC2600
Series Model	Refer to note for more details
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V from host equipment
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:** 2.412 ~ 2.462GHz **5GHz:** 5.18~ 5.24GHz, 5.745 ~ 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:** 969.187mW **Beamforming Mode:** 624.653mW **Master Mode** **CDD Mode:** **5.18 ~ 5.24GHz:** 947.22mW **5.745 ~ 5.825GHz:** 994.253mW **Beamforming Mode:** **5.18 ~ 5.24GHz:** 589.379mW **5.745 ~ 5.825GHz:** 583.419mW **Client Mode** **CDD Mode:** **5.18 ~ 5.24GHz:** 246.503mW **5.745 ~ 5.825GHz:** 994.253mW **Beamforming Mode:** **5.18 ~ 5.24GHz:** 147.532mW **5.745 ~ 5.825GHz:** 583.419mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

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

Brand	Model Name	Packaging Differences	Remark
QNAP	QWA-AC2600	QNAP Brown Box	All series models hardware and software are the same.
	QW-AC2600	QNAP Brown Box, with some maketing labeling difference	
	QWA-AC2600A	QNAP Brown Box, with some maketing labeling difference	
	QWA-AC2600 R2	QNAP Brown Box, with some maketing labeling difference	
	Adapter-WirelessAC2600	packaged with Generic Brown Box (No QNAP logo)	
	SP-AC2600	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	
	SP-AC2600A	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	
	SP-AC2600 R2	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	
	Adapter-2QCA9984	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	
	PCI-AC2600	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	

From the above models, model: **QWA-AC2600** was selected as representative model for the test and its data was 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 antennas provided to the EUT, please refer to the following table:

Antenna Set	Chain No.	Model No.	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connecter Type	*Cable Loss(dB)	excluding cable loss Antenna Gain(dBi)
1	0	98612PRSX000	1.93	2.4~2.4835	Dipole	R-SMA	1.1	3.03
			2.35	5.15~5.85			2.15	4.5
	1	98612PRSX000	1.79	2.4~2.4835	Dipole	R-SMA	1.24	3.03
			2.16	5.15~5.85			2.34	4.5
	2	98612PRSX000	1.94	2.4~2.4835	Dipole	R-SMA	1.09	3.03
			2.31	5.15~5.85			2.19	4.5
	3	98612PRSX000	1.92	2.4~2.4835	Dipole	R-SMA	1.11	3.03
			2.27	5.15~5.85			2.23	4.5

4. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	4TX	4RX
802.11g	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11ac (VHT20)	MCS0~8 Nss=1	4TX	4RX
	MCS0~8 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~8 Nss=4	4TX	4RX
802.11ac (VHT40)	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX
802.11ac (VHT80)	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX

Note:
1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. 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.
3. 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

5. This device can support different category application which switched by access point mode and client mode by software.
6. 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 (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

7 channels are provided for 802.11n (HT40):

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

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, 10, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

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)
802.11g	1 to 11	6	OFDM	BPSK	6

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, 10, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 10, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 4, 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, 10, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 4, 6, 9	OFDM	BPSK	13.5

Test Condition:

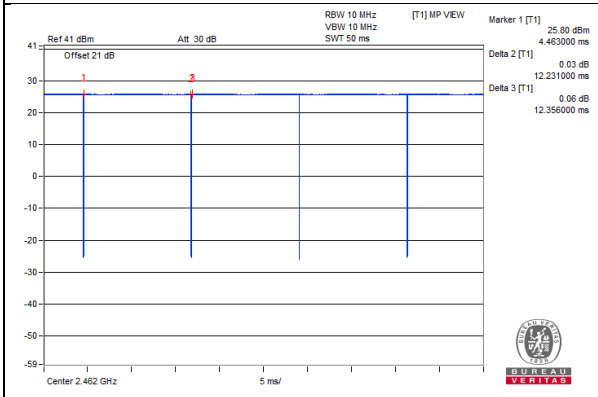
Applicable To	Environmental Conditions	Input Power (System)	Tested By
RE≥1G	23deg. C, 66%RH	120Vac, 60Hz	Frank Chuang
RE<1G	23deg. C, 66%RH	120Vac, 60Hz	Frank Chuang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

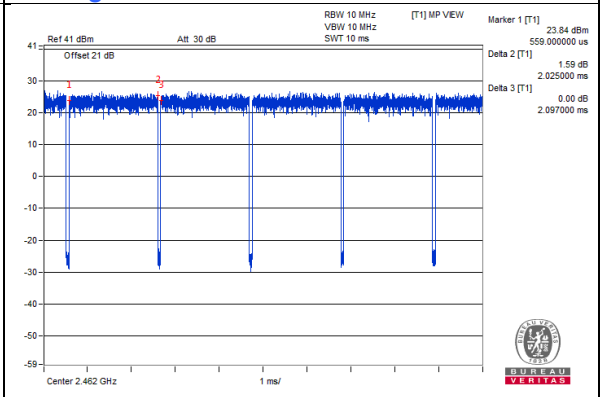
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 12.231 ms/12.356 ms = 0.99
802.11g: Duty cycle = 2.025 ms/2.097 ms = 0.966, Duty factor = 10 * log(1/0.966) = 0.15
802.11n (HT20): Duty cycle = 4.95 ms/5.027 ms = 0.985
802.11n (HT40): Duty cycle = 2.405 ms/2.485 ms = 0.968, Duty factor = 10 * log(1/0.968) = 0.14

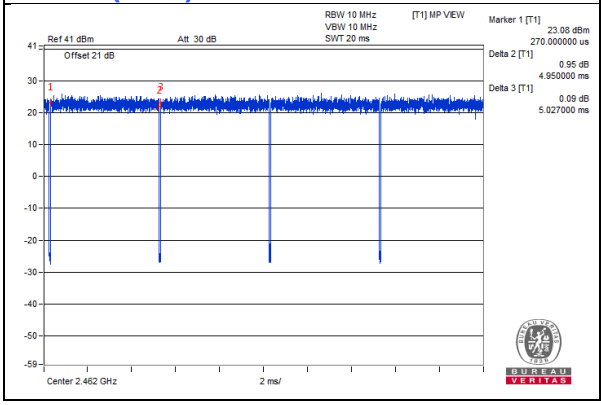
802.11b



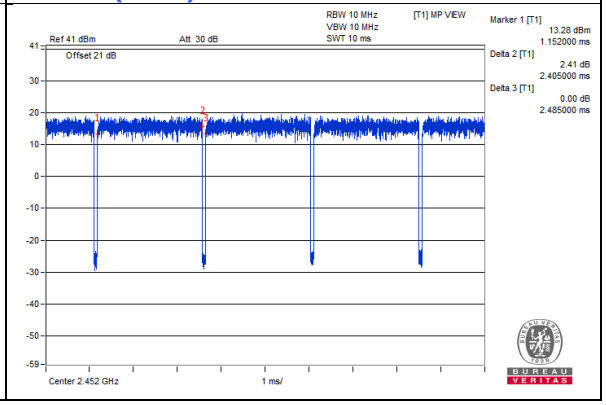
802.11g



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.

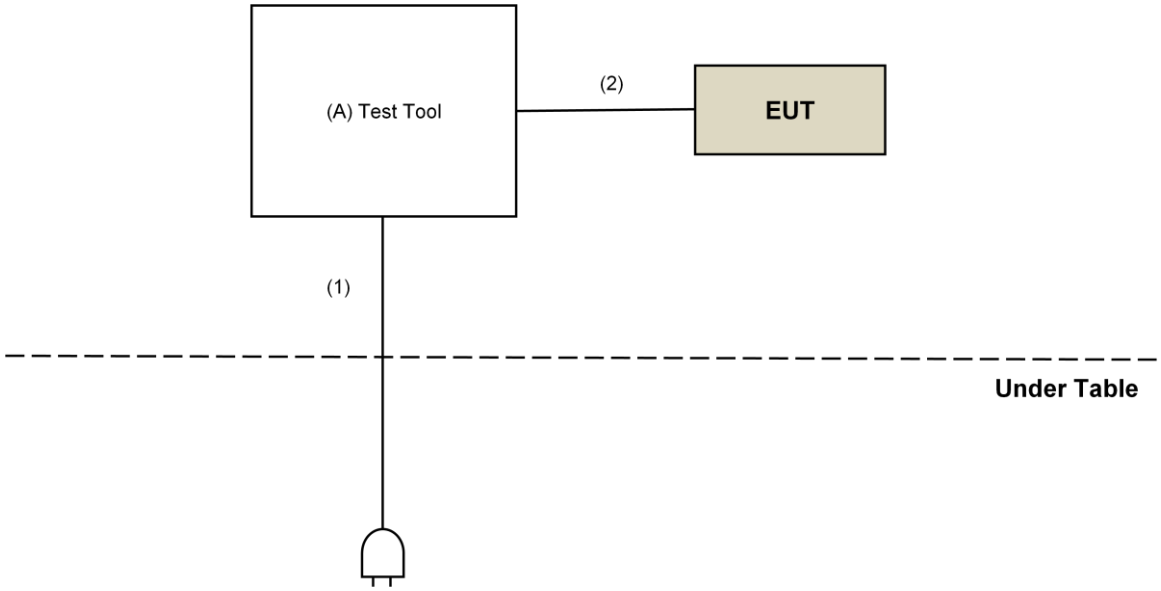
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Test Tool	NA	NA	NA	NA	Supplied by client

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.	AC Cable	1	1.7	No	0	Provided by Lab
2.	Console Cable	1	0.2	No	0	Supplied by client

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 v04
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 below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2017	July 11, 2018
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-3-1 966-3-2 966-3-3	Mar. 20, 2018	Mar. 19, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 03, 2017	Oct. 02, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 3.
4. The CANADA Site Registration No. is 20331-1
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: May 31, 2018

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2017	July 11, 2018
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160922 150317 150322	Jan. 29, 2018	Jan. 28, 2019
Spectrum Analyzer Keysight	N9030A	MY54490679	July 25, 2017	July 24, 2018
Pre-Amplifier EMCI	EMC184045SE	980386	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160924	Jan. 29, 2018	Jan. 28, 2019
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	July 1, 2017	June 30, 2018
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018

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. Tested Date: Feb. 13 to 27, 2018

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. Both X and Y axes 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:

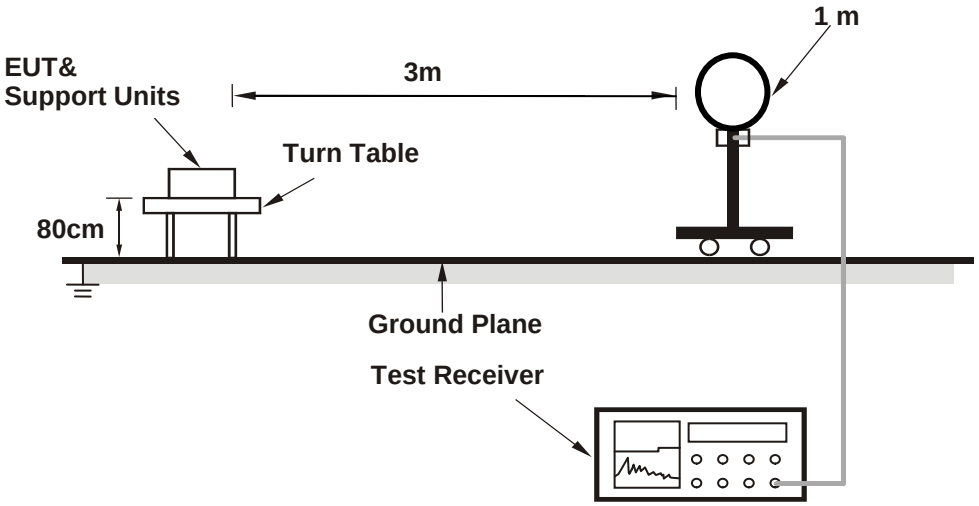
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

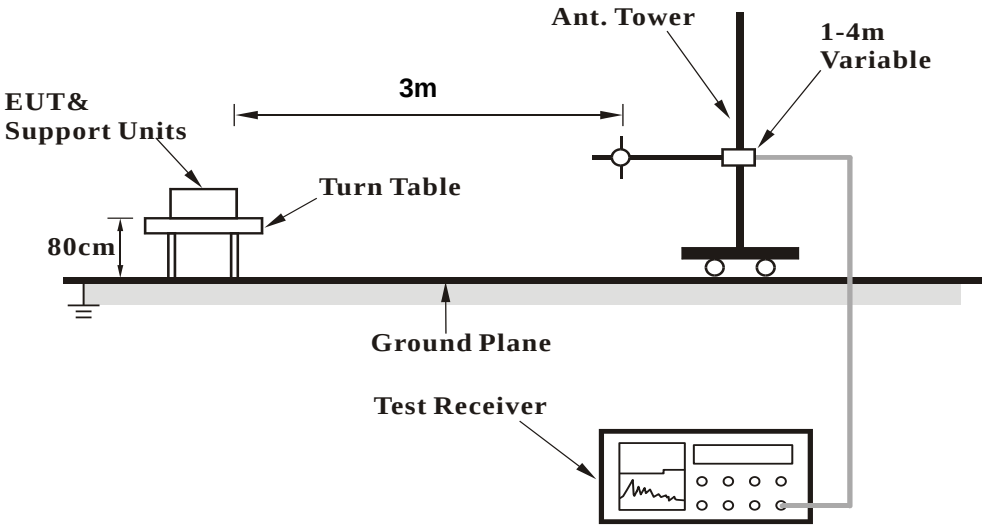
No deviation.

4.1.5 Test Setup

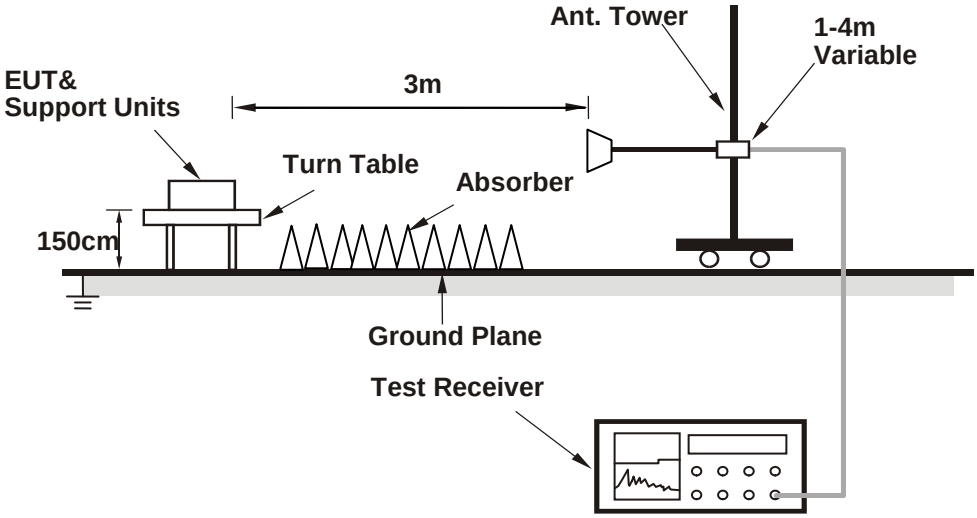
For Radiated emission below 30MHz



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. Placed the EUT on the testing table.
b. Controlling software (QCA Radio Conteol Toolkit_V3.0.264.0) 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	2390.00	62.9 PK	74.0	-11.1	1.28 H	122	64.6	-1.7
2	2390.00	49.6 AV	54.0	-4.4	1.28 H	122	51.3	-1.7
3	*2412.00	108.2 PK			1.19 H	114	110.0	-1.8
4	*2412.00	106.5 AV			1.19 H	114	108.3	-1.8
5	4824.00	39.6 PK	74.0	-34.4	1.39 H	4	36.5	3.1
6	4824.00	33.1 AV	54.0	-20.9	1.39 H	4	30.0	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	2390.00	61.0 PK	74.0	-13.0	2.66 V	10	62.7	-1.7
2	2390.00	53.4 AV	54.0	-0.6	2.66 V	10	55.1	-1.7
3	*2412.00	116.4 PK			2.66 V	10	118.2	-1.8
4	*2412.00	113.2 AV			2.66 V	10	115.0	-1.8
5	4824.00	39.0 PK	74.0	-35.0	1.17 V	284	35.9	3.1
6	4824.00	32.5 AV	54.0	-21.5	1.17 V	284	29.4	3.1

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	56.1 PK	74.0	-17.9	1.23 H	119	57.8	-1.7
2	2390.00	47.2 AV	54.0	-6.8	1.23 H	119	48.9	-1.7
3	*2437.00	110.4 PK			1.23 H	119	112.5	-2.1
4	*2437.00	108.1 AV			1.23 H	119	110.2	-2.1
5	2483.50	54.2 PK	74.0	-19.8	1.23 H	119	56.2	-2.0
6	2483.50	45.6 AV	54.0	-8.4	1.23 H	119	47.6	-2.0
7	4874.00	38.7 PK	74.0	-35.3	1.23 H	96	35.5	3.2
8	4874.00	32.3 AV	54.0	-21.7	1.23 H	96	29.1	3.2
9	7311.00	40.2 PK	74.0	-33.8	1.69 H	305	31.0	9.2
10	7311.00	30.1 AV	54.0	-23.9	1.69 H	305	20.9	9.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.5 PK	74.0	-13.5	2.36 V	67	62.2	-1.7
2	2390.00	52.8 AV	54.0	-1.2	2.36 V	67	54.5	-1.7
3	*2437.00	117.5 PK			2.36 V	67	119.6	-2.1
4	*2437.00	115.3 AV			2.36 V	67	117.4	-2.1
5	2483.50	56.4 PK	74.0	-17.6	2.36 V	67	58.4	-2.0
6	2483.50	48.5 AV	54.0	-5.5	2.36 V	67	50.5	-2.0
7	4874.00	39.8 PK	74.0	-34.2	1.35 V	10	36.6	3.2
8	4874.00	33.4 AV	54.0	-20.6	1.35 V	10	30.2	3.2
9	7311.00	41.0 PK	74.0	-33.0	1.69 V	223	31.8	9.2
10	7311.00	31.2 AV	54.0	-22.8	1.69 V	223	22.0	9.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	111.1 PK			1.24 H	277	113.1	-2.0
2	*2462.00	108.5 AV			1.24 H	277	110.5	-2.0
3	2483.50	62.6 PK	74.0	-11.4	1.24 H	277	64.6	-2.0
4	2483.50	49.5 AV	54.0	-4.5	1.24 H	277	51.5	-2.0
5	4924.00	38.0 PK	74.0	-36.0	1.21 H	128	34.7	3.3
6	4924.00	31.9 AV	54.0	-22.1	1.21 H	128	28.6	3.3
7	7386.00	40.3 PK	74.0	-33.7	2.41 H	292	30.9	9.4
8	7386.00	30.4 AV	54.0	-23.6	2.41 H	292	21.0	9.4
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	*2462.00	117.2 PK			1.54 V	87	119.2	-2.0
2	*2462.00	115.5 AV			1.54 V	87	117.5	-2.0
3	2483.50	63.6 PK	74.0	-10.4	1.54 V	87	65.6	-2.0
4	2483.50	52.5 AV	54.0	-1.5	1.54 V	87	54.5	-2.0
5	4924.00	40.2 PK	74.0	-33.8	1.34 V	241	36.9	3.3
6	4924.00	33.8 AV	54.0	-20.2	1.34 V	241	30.5	3.3
7	7386.00	40.5 PK	74.0	-33.5	1.73 V	339	31.1	9.4
8	7386.00	30.8 AV	54.0	-23.2	1.73 V	339	21.4	9.4

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.

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	62.3 PK	74.0	-11.7	1.47 H	180	64.0	-1.7
2	2390.00	49.2 AV	54.0	-4.8	1.47 H	180	50.9	-1.7
3	*2412.00	112.6 PK			1.47 H	180	114.4	-1.8
4	*2412.00	101.2 AV			1.47 H	180	103.0	-1.8
5	4824.00	41.5 PK	74.0	-32.5	1.23 H	21	38.4	3.1
6	4824.00	30.9 AV	54.0	-23.1	1.23 H	21	27.8	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	2390.00	65.3 PK	74.0	-8.7	3.98 V	313	67.0	-1.7
2	2390.00	53.1 AV	54.0	-0.9	3.98 V	313	54.8	-1.7
3	*2412.00	119.5 PK			3.98 V	313	121.3	-1.8
4	*2412.00	107.7 AV			3.98 V	313	109.5	-1.8
5	4824.00	41.6 PK	74.0	-32.4	1.48 V	184	38.5	3.1
6	4824.00	31.1 AV	54.0	-22.9	1.48 V	184	28.0	3.1

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	61.9 PK	74.0	-12.1	1.43 H	201	63.6	-1.7
2	2390.00	47.1 AV	54.0	-6.9	1.43 H	201	48.8	-1.7
3	*2437.00	113.6 PK			1.43 H	201	115.7	-2.1
4	*2437.00	102.0 AV			1.43 H	201	104.1	-2.1
5	2483.50	58.2 PK	74.0	-15.8	1.43 H	201	60.2	-2.0
6	2483.50	45.3 AV	54.0	-8.7	1.43 H	201	47.3	-2.0
7	4874.00	41.6 PK	74.0	-32.4	1.29 H	29	38.4	3.2
8	4874.00	30.8 AV	54.0	-23.2	1.29 H	29	27.6	3.2
9	7311.00	41.6 PK	74.0	-32.4	1.58 H	254	32.4	9.2
10	7311.00	30.1 AV	54.0	-23.9	1.58 H	254	20.9	9.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.2 PK	74.0	-6.8	2.70 V	209	68.9	-1.7
2	2390.00	51.7 AV	54.0	-2.3	2.70 V	209	53.4	-1.7
3	*2437.00	121.5 PK			2.70 V	209	123.6	-2.1
4	*2437.00	109.1 AV			2.70 V	209	111.2	-2.1
5	2483.50	62.1 PK	74.0	-11.9	2.70 V	209	64.1	-2.0
6	2483.50	48.3 AV	54.0	-5.7	2.70 V	209	50.3	-2.0
7	4874.00	42.3 PK	74.0	-31.7	1.29 V	308	39.1	3.2
8	4874.00	31.6 AV	54.0	-22.4	1.29 V	308	28.4	3.2
9	7311.00	41.7 PK	74.0	-32.3	1.05 V	277	32.5	9.2
10	7311.00	30.2 AV	54.0	-23.8	1.05 V	277	21.0	9.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	113.3 PK			1.47 H	194	115.8	-2.5
2	*2457.00	101.9 AV			1.47 H	194	104.4	-2.5
3	2483.50	63.2 PK	74.0	-10.8	1.47 H	194	65.7	-2.5
4	2483.50	50.3 AV	54.0	-3.7	1.47 H	194	52.8	-2.5
5	4914.00	42.3 PK	74.0	-31.7	1.28 H	39	40.1	2.2
6	4914.00	31.3 AV	54.0	-22.7	1.28 H	39	29.1	2.2
7	7371.00	41.9 PK	74.0	-32.1	1.62 H	255	33.7	8.2
8	7371.00	30.3 AV	54.0	-23.7	1.62 H	255	22.1	8.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2457.00	120.1 PK			2.52 V	161	122.6	-2.5
2	*2457.00	108.2 AV			2.52 V	161	110.7	-2.5
3	2483.50	67.8 PK	74.0	-6.2	2.52 V	161	70.3	-2.5
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**2.52 V**	**161**	**56.4**	**-2.5**
5	4914.00	42.5 PK	74.0	-31.5	1.29 V	310	40.3	2.2
6	4914.00	31.7 AV	54.0	-22.3	1.29 V	310	29.5	2.2
7	7371.00	41.5 PK	74.0	-32.5	1.11 V	273	33.3	8.2
8	7371.00	30.3 AV	54.0	-23.7	1.11 V	273	22.1	8.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	111.3 PK			1.49 H	204	113.3	-2.0
2	*2462.00	100.1 AV			1.49 H	204	102.1	-2.0
3	2483.50	62.1 PK	74.0	-11.9	1.49 H	204	64.1	-2.0
4	2483.50	49.1 AV	54.0	-4.9	1.49 H	204	51.1	-2.0
5	4924.00	41.8 PK	74.0	-32.2	1.37 H	171	38.5	3.3
6	4924.00	30.9 AV	54.0	-23.1	1.37 H	171	27.6	3.3
7	7386.00	42.3 PK	74.0	-31.7	1.33 H	98	32.9	9.4
8	7386.00	30.5 AV	54.0	-23.5	1.33 H	98	21.1	9.4
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	*2462.00	118.5 PK			2.46 V	93	120.5	-2.0
2	*2462.00	107.0 AV			2.46 V	93	109.0	-2.0
3	2483.50	66.4 PK	74.0	-7.6	2.46 V	93	68.4	-2.0
4	2483.50	53.4 AV	54.0	-0.6	2.46 V	93	55.4	-2.0
5	4924.00	41.8 PK	74.0	-32.2	1.34 V	177	38.5	3.3
6	4924.00	31.1 AV	54.0	-22.9	1.34 V	177	27.8	3.3
7	7386.00	41.9 PK	74.0	-32.1	2.15 V	262	32.5	9.4
8	7386.00	30.2 AV	54.0	-23.8	2.15 V	262	20.8	9.4

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.

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	61.1 PK	74.0	-12.9	1.44 H	194	62.8	-1.7
2	2390.00	49.2 AV	54.0	-4.8	1.44 H	194	50.9	-1.7
3	*2412.00	112.8 PK			1.44 H	194	114.6	-1.8
4	*2412.00	101.0 AV			1.44 H	194	102.8	-1.8
5	4824.00	41.4 PK	74.0	-32.6	1.67 H	229	38.3	3.1
6	4824.00	30.6 AV	54.0	-23.4	1.67 H	229	27.5	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	2390.00	66.2 PK	74.0	-7.8	3.98 V	321	67.9	-1.7
2	2390.00	53.6 AV	54.0	-0.4	3.98 V	321	55.3	-1.7
3	*2412.00	119.9 PK			3.98 V	321	121.7	-1.8
4	*2412.00	107.8 AV			3.98 V	321	109.6	-1.8
5	4824.00	41.7 PK	74.0	-32.3	1.69 V	128	38.6	3.1
6	4824.00	31.0 AV	54.0	-23.0	1.69 V	128	27.9	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.

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	62.1 PK	74.0	-11.9	1.40 H	185	63.8	-1.7
2	2390.00	47.5 AV	54.0	-6.5	1.40 H	185	49.2	-1.7
3	*2437.00	113.5 PK			1.40 H	185	115.6	-2.1
4	*2437.00	102.3 AV			1.40 H	185	104.4	-2.1
5	2483.50	57.8 PK	74.0	-16.2	1.40 H	185	59.8	-2.0
6	2483.50	45.2 AV	54.0	-8.8	1.40 H	185	47.2	-2.0
7	4874.00	40.2 PK	74.0	-33.8	1.89 H	347	37.0	3.2
8	4874.00	30.1 AV	54.0	-23.9	1.89 H	347	26.9	3.2
9	7311.00	43.2 PK	74.0	-30.8	1.42 H	154	34.0	9.2
10	7311.00	32.0 AV	54.0	-22.0	1.42 H	154	22.8	9.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.4 PK	74.0	-6.6	2.75 V	210	69.1	-1.7
2	2390.00	51.8 AV	54.0	-2.2	2.75 V	210	53.5	-1.7
3	*2437.00	121.9 PK			2.75 V	210	124.0	-2.1
4	*2437.00	109.3 AV			2.75 V	210	111.4	-2.1
5	2483.50	61.8 PK	74.0	-12.2	2.75 V	210	63.8	-2.0
6	2483.50	48.0 AV	54.0	-6.0	2.75 V	210	50.0	-2.0
7	4874.00	40.8 PK	74.0	-33.2	2.88 V	97	37.6	3.2
8	4874.00	30.5 AV	54.0	-23.5	2.88 V	97	27.3	3.2
9	7311.00	42.8 PK	74.0	-31.2	2.33 V	156	33.6	9.2
10	7311.00	31.9 AV	54.0	-22.1	2.33 V	156	22.7	9.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	113.1 PK			1.52 H	196	115.6	-2.5
2	*2457.00	101.7 AV			1.52 H	196	104.2	-2.5
3	2483.50	63.4 PK	74.0	-10.6	1.52 H	196	65.9	-2.5
4	2483.50	50.3 AV	54.0	-3.7	1.52 H	196	52.8	-2.5
5	4914.00	42.2 PK	74.0	-31.8	1.30 H	29	40.0	2.2
6	4914.00	31.0 AV	54.0	-23.0	1.30 H	29	28.8	2.2
7	7371.00	41.7 PK	74.0	-32.3	1.62 H	253	33.5	8.2
8	7371.00	30.2 AV	54.0	-23.8	1.62 H	253	22.0	8.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2457.00	119.7 PK			2.51 V	169	122.2	-2.5
2	*2457.00	107.8 AV			2.51 V	169	110.3	-2.5
3	2483.50	67.3 PK	74.0	-6.7	2.51 V	162	69.8	-2.5
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**2.51 V**	**162**	**56.4**	**-2.5**
5	4914.00	42.4 PK	74.0	-31.6	1.32 V	311	40.2	2.2
6	4914.00	31.6 AV	54.0	-22.4	1.32 V	311	29.4	2.2
7	7371.00	41.6 PK	74.0	-32.4	1.10 V	258	33.4	8.2
8	7371.00	30.6 AV	54.0	-23.4	1.10 V	258	22.4	8.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	111.3 PK			1.14 H	298	113.3	-2.0
2	*2462.00	100.2 AV			1.14 H	298	102.2	-2.0
3	2483.50	62.0 PK	74.0	-12.0	1.14 H	298	64.0	-2.0
4	2483.50	48.7 AV	54.0	-5.3	1.14 H	298	50.7	-2.0
5	4924.00	40.5 PK	74.0	-33.5	2.30 H	184	37.2	3.3
6	4924.00	30.4 AV	54.0	-23.6	2.30 H	184	27.1	3.3
7	7386.00	43.4 PK	74.0	-30.6	2.04 H	168	34.0	9.4
8	7386.00	32.1 AV	54.0	-21.9	2.04 H	168	22.7	9.4
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	*2462.00	118.7 PK			2.48 V	96	120.7	-2.0
2	*2462.00	107.3 AV			2.48 V	96	109.3	-2.0
3	2483.50	67.2 PK	74.0	-6.8	2.48 V	96	69.2	-2.0
4	2483.50	53.5 AV	54.0	-0.5	2.48 V	96	55.5	-2.0
5	4924.00	41.3 PK	74.0	-32.7	2.83 V	103	38.0	3.3
6	4924.00	30.9 AV	54.0	-23.1	2.83 V	103	27.6	3.3
7	7386.00	43.0 PK	74.0	-31.0	1.54 V	128	33.6	9.4
8	7386.00	32.3 AV	54.0	-21.7	1.54 V	128	22.9	9.4

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.

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	61.8 PK	74.0	-12.2	1.50 H	204	63.5	-1.7
2	2390.00	48.6 AV	54.0	-5.4	1.50 H	204	50.3	-1.7
3	*2422.00	102.7 PK			1.50 H	204	104.7	-2.0
4	*2422.00	92.9 AV			1.50 H	204	94.9	-2.0
5	4844.00	39.3 PK	74.0	-34.7	1.17 H	286	36.2	3.1
6	4844.00	30.4 AV	54.0	-23.6	1.17 H	286	27.3	3.1
7	7266.00	42.1 PK	74.0	-31.9	1.45 H	159	32.9	9.2
8	7266.00	32.0 AV	54.0	-22.0	1.45 H	159	22.8	9.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.2 PK	74.0	-9.8	1.71 V	97	65.9	-1.7
2	2390.00	53.3 AV	54.0	-0.7	1.71 V	97	55.0	-1.7
3	*2422.00	110.1 PK			1.71 V	97	112.1	-2.0
4	*2422.00	99.9 AV			1.71 V	97	101.9	-2.0
5	4844.00	39.0 PK	74.0	-35.0	1.24 V	177	35.9	3.1
6	4844.00	30.9 AV	54.0	-23.1	1.24 V	177	27.8	3.1
7	7266.00	41.8 PK	74.0	-32.2	1.71 V	135	32.6	9.2
8	7266.00	33.1 AV	54.0	-20.9	1.71 V	135	23.9	9.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	62.3 PK	74.0	-11.7	1.46 H	188	64.5	-2.2
2	2390.00	48.9 AV	54.0	-5.1	1.46 H	188	51.1	-2.2
3	*2427.00	104.0 PK			1.46 H	188	106.5	-2.5
4	*2427.00	93.9 AV			1.46 H	188	96.4	-2.5
5	4854.00	39.0 PK	74.0	-35.0	1.23 H	289	36.9	2.1
6	4854.00	30.2 AV	54.0	-23.8	1.23 H	289	28.1	2.1
7	7281.00	42.0 PK	74.0	-32.0	1.46 H	163	33.6	8.4
8	7281.00	32.0 AV	54.0	-22.0	1.46 H	163	23.6	8.4
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	67.2 PK	74.0	-6.8	1.99 V	94	69.4	-2.2
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.99 V**	**94**	**56.1**	**-2.2**
3	*2427.00	111.2 PK			1.99 V	94	113.7	-2.5
4	*2427.00	102.9 AV			1.99 V	94	105.4	-2.5
5	4854.00	39.2 PK	74.0	-34.8	1.22 V	180	37.1	2.1
6	4854.00	31.4 AV	54.0	-22.6	1.22 V	180	29.3	2.1
7	7281.00	41.3 PK	74.0	-32.7	1.69 V	126	32.9	8.4
8	7281.00	32.6 AV	54.0	-21.4	1.69 V	126	24.2	8.4

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	61.7 PK	74.0	-12.3	1.49 H	197	63.4	-1.7
2	2390.00	48.6 AV	54.0	-5.4	1.49 H	197	50.3	-1.7
3	*2437.00	106.9 PK			1.49 H	197	109.0	-2.1
4	*2437.00	97.8 AV			1.49 H	197	99.9	-2.1
5	2483.50	59.8 PK	74.0	-14.2	1.49 H	197	61.8	-2.0
6	2483.50	46.2 AV	54.0	-7.8	1.49 H	197	48.2	-2.0
7	4874.00	39.6 PK	74.0	-34.4	1.22 H	284	36.4	3.2
8	4874.00	30.6 AV	54.0	-23.4	1.22 H	284	27.4	3.2
9	7311.00	42.0 PK	74.0	-32.0	1.32 H	234	32.8	9.2
10	7311.00	31.9 AV	54.0	-22.1	1.32 H	234	22.7	9.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.4 PK	74.0	-9.6	1.94 V	94	66.1	-1.7
2	2390.00	53.7 AV	54.0	-0.3	1.94 V	94	55.4	-1.7
3	*2437.00	113.7 PK			1.94 V	94	115.8	-2.1
4	*2437.00	104.5 AV			1.94 V	94	106.6	-2.1
5	2483.50	62.5 PK	74.0	-11.5	1.94 V	94	64.5	-2.0
6	2483.50	51.2 AV	54.0	-2.8	1.94 V	94	53.2	-2.0
7	4874.00	39.5 PK	74.0	-34.5	2.94 V	268	36.3	3.2
8	4874.00	31.2 AV	54.0	-22.8	2.94 V	268	28.0	3.2
9	7311.00	41.7 PK	74.0	-32.3	1.68 V	142	32.5	9.2
10	7311.00	32.7 AV	54.0	-21.3	1.68 V	142	23.5	9.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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	104.3 PK			1.45 H	207	106.3	-2.0
2	*2452.00	94.5 AV			1.45 H	207	96.5	-2.0
3	2483.50	62.2 PK	74.0	-11.8	1.45 H	207	64.2	-2.0
4	2483.50	48.8 AV	54.0	-5.2	1.45 H	207	50.8	-2.0
5	4904.00	39.8 PK	74.0	-34.2	1.21 H	152	36.5	3.3
6	4904.00	31.0 AV	54.0	-23.0	1.21 H	152	27.7	3.3
7	7356.00	42.2 PK	74.0	-31.8	1.98 H	236	32.8	9.4
8	7356.00	32.3 AV	54.0	-21.7	1.98 H	236	22.9	9.4
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	*2452.00	111.6 PK			1.51 V	96	113.6	-2.0
2	*2452.00	101.5 AV			1.51 V	96	103.5	-2.0
3	2483.50	65.8 PK	74.0	-8.2	1.51 V	96	67.8	-2.0
4	2483.50	53.5 AV	54.0	-0.5	1.51 V	96	55.5	-2.0
5	4904.00	39.3 PK	74.0	-34.7	1.25 V	158	36.0	3.3
6	4904.00	30.7 AV	54.0	-23.3	1.25 V	158	27.4	3.3
7	7356.00	42.2 PK	74.0	-31.8	1.35 V	49	32.8	9.4
8	7356.00	33.1 AV	54.0	-20.9	1.35 V	49	23.7	9.4

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.

Below 1GHz Data:

802.11g

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	37.76	31.8 QP	40.0	-8.2	1.14 H	89	40.3	-8.5
2	167.74	35.2 QP	43.5	-8.3	1.21 H	41	43.4	-8.2
3	241.46	37.8 QP	46.0	-8.2	1.47 H	219	46.9	-9.1
4	399.57	38.2 QP	46.0	-7.8	2.05 H	21	42.7	-4.5
5	608.12	37.3 QP	46.0	-8.7	1.69 H	318	36.8	0.5
6	960.23	38.1 QP	54.0	-15.9	1.38 H	241	32.3	5.8
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	37.58	32.5 QP	40.0	-7.5	1.43 V	259	41.1	-8.6
2	251.31	35.8 QP	46.0	-10.2	1.74 V	211	44.7	-8.9
3	326.56	31.8 QP	46.0	-14.2	2.14 V	25	37.8	-6.0
4	405.23	39.4 QP	46.0	-6.6	2.55 V	182	43.7	-4.3
5	609.26	38.4 QP	46.0	-7.6	1.64 V	205	37.9	0.5
6	969.88	42.6 QP	54.0	-11.4	1.44 V	31	36.8	5.8

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

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	Nov. 01, 2017	Oct. 31, 2018
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Nov. 15, 2017	Nov. 14, 2018
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 03, 2017	June 02, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 22, 2017	Sep. 21, 2018
RF Cable	5D-FB	COCCAB-001	Sep. 29, 2017	Sep. 28, 2018
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 18, 2017	June 17, 2018
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: Feb. 14, 2018

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.

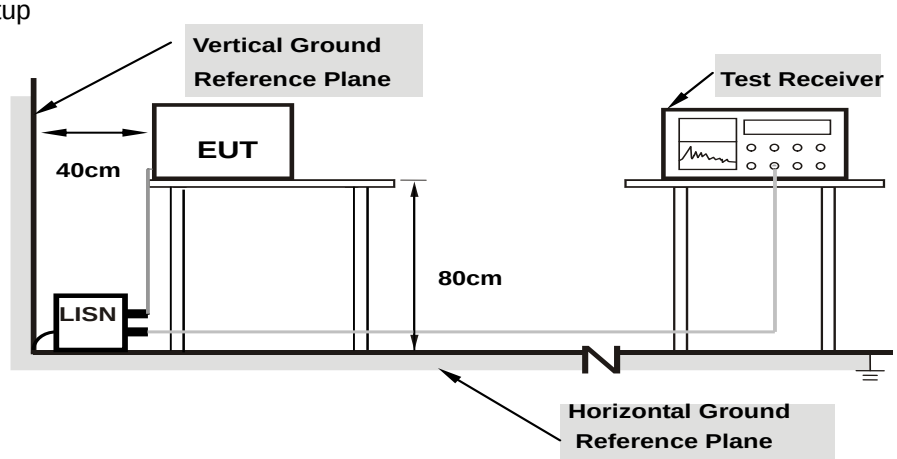
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

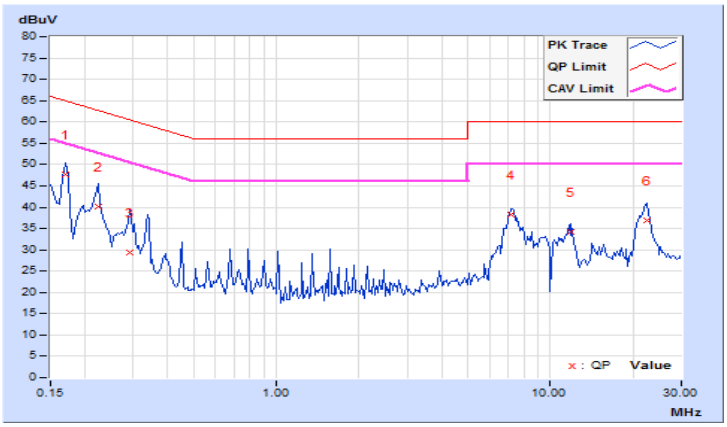
4.2.7 Test Results

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	0.16953	10.13	37.67	33.88	47.80	44.01	64.98	54.98	-17.18	-10.97
2	0.22422	10.15	29.99	23.40	40.14	33.55	62.66	52.66	-22.52	-19.11
3	0.29063	10.16	19.33	-1.86	29.49	8.30	60.51	50.51	-31.02	-42.21
4	7.21484	10.51	27.66	18.54	38.17	29.05	60.00	50.00	-21.83	-20.95
5	11.87891	10.75	23.42	15.14	34.17	25.89	60.00	50.00	-25.83	-24.11
6	22.47266	11.24	25.55	8.44	36.79	19.68	60.00	50.00	-23.21	-30.32

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

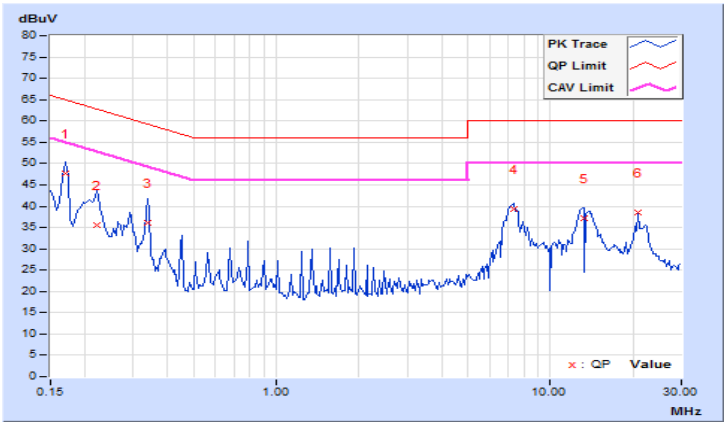


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.16953**	**10.04**	**37.59**	**34.08**	**47.63**	**44.12**	**64.98**	**54.98**	**-17.35**	**-10.86**
2	0.22031	10.04	25.53	17.77	35.57	27.81	62.81	52.81	-27.24	-25.00
3	0.33750	10.07	26.03	17.27	36.10	27.34	59.26	49.26	-23.16	-21.92
4	7.31862	10.38	28.89	26.03	39.27	36.41	60.00	50.00	-20.73	-13.59
5	13.18750	10.67	26.42	12.70	37.09	23.37	60.00	50.00	-22.91	-26.63
6	20.88281	11.02	27.62	23.85	38.64	34.87	60.00	50.00	-21.36	-15.13

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

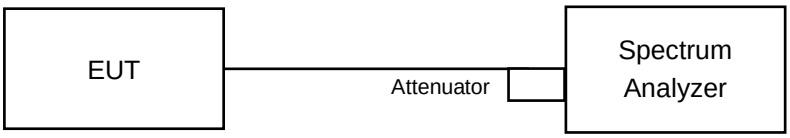


4.3 6dB Bandwidth Measurement

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 Results

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	8.07	8.10	8.55	8.59	0.5	Pass
6	2437	8.07	8.11	8.62	9.07	0.5	Pass
11	2462	8.09	8.55	8.62	8.63	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	16.38	16.39	16.39	16.39	0.5	Pass
6	2437	16.36	16.37	16.38	16.38	0.5	Pass
10	2457	16.40	16.38	16.39	16.36	0.5	Pass
11	2462	16.36	16.35	16.37	16.37	0.5	Pass

802.11n (HT20)

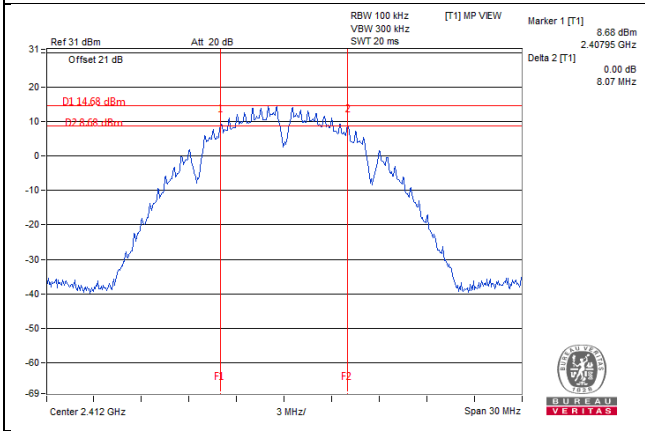
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	17.54	17.57	17.60	17.62	0.5	Pass
6	2437	17.60	17.61	17.61	17.62	0.5	Pass
10	2457	17.57	17.65	17.59	17.54	0.5	Pass
11	2462	17.24	17.18	17.64	17.62	0.5	Pass

802.11n (HT40)

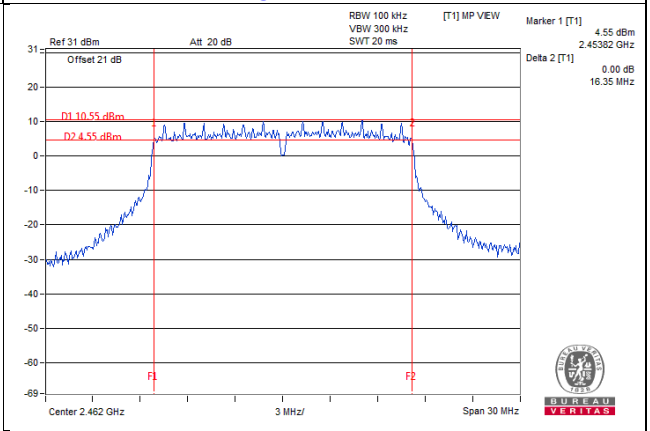
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
3	2422	35.12	33.97	33.91	35.14	0.5	Pass
4	2427	32.71	35.10	35.17	35.21	0.5	Pass
6	2437	35.27	35.15	35.13	33.27	0.5	Pass
9	2452	33.97	35.08	35.21	35.16	0.5	Pass

Spectrum Plot of Worst Value

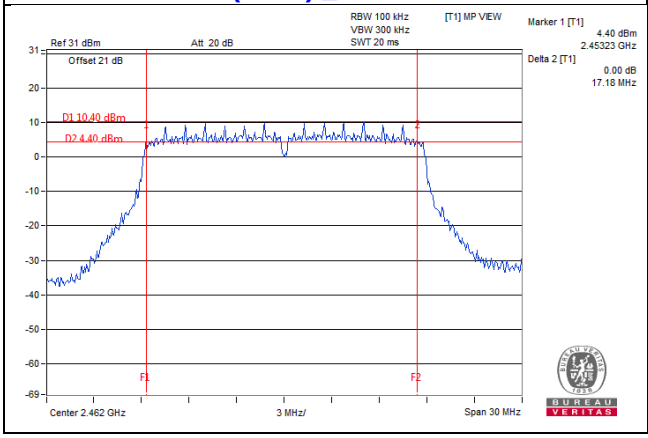
802.11b_Chain 0 / CH1



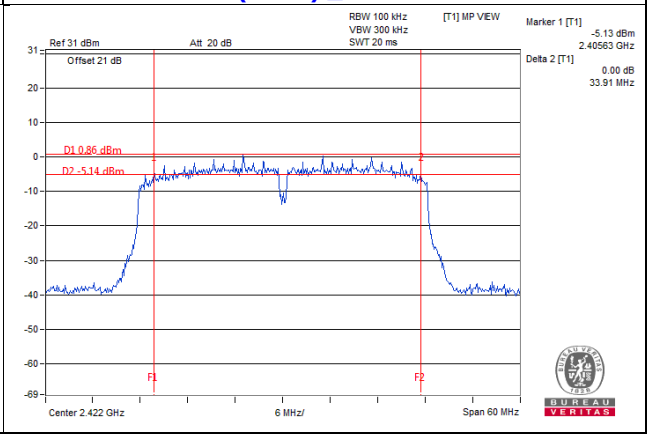
802.11g_Chain 1 / CH11



802.11n (HT20) _Chain 1 / CH11



802.11n (HT40) _Chain 2 / CH3



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

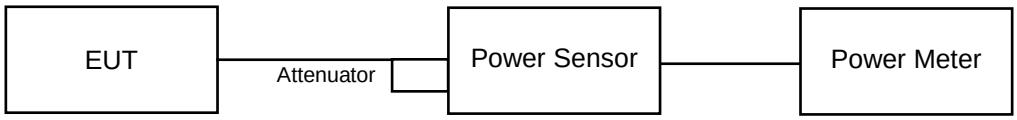
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

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	22.52	23.44	22.53	20.95	702.961	28.47	30.00	Pass
6	2437	23.87	24.58	23.83	22.36	944.592	29.75	30.00	Pass
11	2462	23.22	23.90	23.19	21.72	812.408	29.10	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	21.15	22.39	21.61	20.18	552.806	27.43	30.00	Pass
6	2437	23.55	24.86	23.97	22.72	969.187	29.86	30.00	Pass
10	2457	23.29	23.43	23.48	22.66	840.943	29.25	30.00	Pass
11	2462	19.59	20.88	20.45	18.78	399.879	26.02	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	20.29	22.12	21.32	20.28	512.014	27.09	30.00	Pass
6	2437	23.08	23.99	23.58	22.04	841.837	29.25	30.00	Pass
10	2457	22.31	23.26	23.12	21.89	741.693	28.70	30.00	Pass
11	2462	19.02	20.45	20.07	18.61	364.952	25.62	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	12.66	14.44	13.90	12.24	87.543	19.42	30.00	Pass
4	2427	15.47	17.51	16.98	15.89	180.304	22.56	30.00	Pass
6	2437	17.51	18.99	18.80	16.89	260.337	24.16	30.00	Pass
9	2452	15.17	17.34	16.65	15.13	165.907	22.20	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	20.29	22.12	21.32	20.28	512.014	27.09	28.08	Pass
6	2437	21.57	22.46	22.06	21.59	624.653	27.96	28.08	Pass
10	2457	21.39	22.15	21.75	21.35	587.862	27.69	28.08	Pass
11	2462	19.02	20.45	20.07	18.61	364.952	25.62	28.08	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 7.92dBi > 6dBi , so the power limit shall be reduced to 30-(7.92-6) = 28.08dBm.

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	12.66	14.44	13.90	12.24	87.543	19.42	28.08	Pass
4	2427	15.47	17.51	16.98	15.89	180.304	22.56	28.08	Pass
6	2437	17.51	18.99	18.80	16.89	260.337	24.16	28.08	Pass
9	2452	15.17	17.34	16.65	15.13	165.907	22.20	28.08	Pass

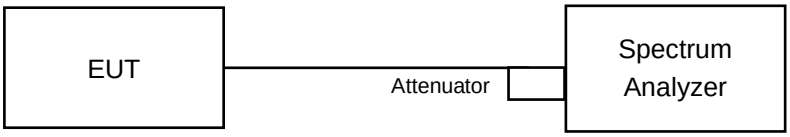
Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 7.92dBi > 6dBi , so the power limit shall be reduced to 30-(7.92-6) = 28.08dBm.

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

For 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.

For 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	-7.02	6.02	-1.00	6.08	Pass
	6	2437	-6.25	6.02	-0.23	6.08	Pass
	11	2462	-7.69	6.02	-1.67	6.08	Pass
1	1	2412	-7.53	6.02	-1.51	6.08	Pass
	6	2437	-6.72	6.02	-0.70	6.08	Pass
	11	2462	-6.65	6.02	-0.63	6.08	Pass
2	1	2412	-8.09	6.02	-2.07	6.08	Pass
	6	2437	-7.02	6.02	-1.00	6.08	Pass
	11	2462	-8.35	6.02	-2.33	6.08	Pass
3	1	2412	-10.59	6.02	-4.57	6.08	Pass
	6	2437	-8.86	6.02	-2.84	6.08	Pass
	11	2462	-9.52	6.02	-3.50	6.08	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 7.92dBi > 6dBi , so the power limit shall be reduced to 8-(7.92-6) = 6.08dBm.

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	-10.35	6.02	0.15	-4.18	6.08	Pass
	6	2437	-8.40	6.02	0.15	-2.23	6.08	Pass
	10	2457	-9.05	6.02	0.15	-2.88	6.08	Pass
	11	2462	-12.64	6.02	0.15	-6.47	6.08	Pass
1	1	2412	-10.36	6.02	0.15	-4.19	6.08	Pass
	6	2437	-8.58	6.02	0.15	-2.41	6.08	Pass
	10	2457	-9.77	6.02	0.15	-3.60	6.08	Pass
	11	2462	-11.10	6.02	0.15	-4.93	6.08	Pass
2	1	2412	-10.69	6.02	0.15	-4.52	6.08	Pass
	6	2437	-9.31	6.02	0.15	-3.14	6.08	Pass
	10	2457	-10.01	6.02	0.15	-3.84	6.08	Pass
	11	2462	-12.21	6.02	0.15	-6.04	6.08	Pass
3	1	2412	-13.03	6.02	0.15	-6.86	6.08	Pass
	6	2437	-10.56	6.02	0.15	-4.39	6.08	Pass
	10	2457	-10.60	6.02	0.15	-4.43	6.08	Pass
	11	2462	-12.91	6.02	0.15	-6.74	6.08	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 7.92dBi > 6dBi , so the power limit shall be reduced to 8-(7.92-6) = 6.08dBm.

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	-12.75	6.02	-6.73	6.08	Pass
	6	2437	-10.26	6.02	-4.24	6.08	Pass
	10	2457	-9.32	6.02	-3.30	6.08	Pass
	11	2462	-13.15	6.02	-7.13	6.08	Pass
1	1	2412	-11.23	6.02	-5.21	6.08	Pass
	6	2437	-9.27	6.02	-3.25	6.08	Pass
	10	2457	-10.49	6.02	-4.47	6.08	Pass
	11	2462	-11.38	6.02	-5.36	6.08	Pass
2	1	2412	-12.08	6.02	-6.06	6.08	Pass
	6	2437	-10.04	6.02	-4.02	6.08	Pass
	10	2457	-10.74	6.02	-4.72	6.08	Pass
	11	2462	-12.91	6.02	-6.89	6.08	Pass
3	1	2412	-12.93	6.02	-6.91	6.08	Pass
	6	2437	-11.77	6.02	-5.75	6.08	Pass
	10	2457	-10.45	6.02	-4.43	6.08	Pass
	11	2462	-14.17	6.02	-8.15	6.08	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 7.92dBi > 6dBi , so the power limit shall be reduced to 8-(7.92-6) = 6.08dBm.

802.11n (HT40)

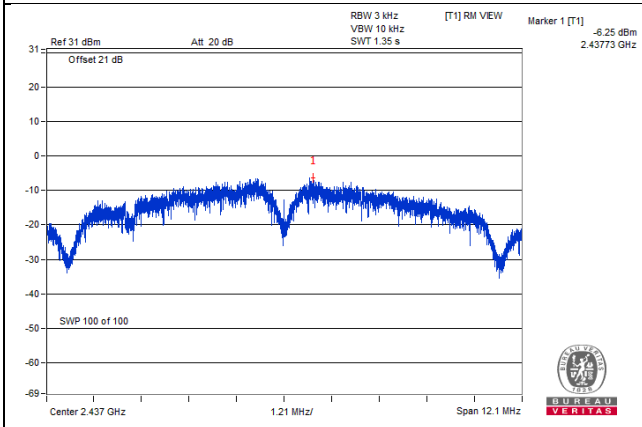
TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=4) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-22.88	6.02	0.14	-16.72	6.08	Pass
	4	2427	-20.50	6.02	0.14	-14.34	6.08	Pass
	6	2437	-17.26	6.02	0.14	-11.10	6.08	Pass
	9	2452	-20.66	6.02	0.14	-14.50	6.08	Pass
1	3	2422	-21.36	6.02	0.14	-15.20	6.08	Pass
	4	2427	-18.56	6.02	0.14	-12.40	6.08	Pass
	6	2437	-15.86	6.02	0.14	-9.70	6.08	Pass
	9	2452	-18.68	6.02	0.14	-12.52	6.08	Pass
2	3	2422	-21.29	6.02	0.14	-15.13	6.08	Pass
	4	2427	-19.79	6.02	0.14	-13.63	6.08	Pass
	6	2437	-17.34	6.02	0.14	-11.18	6.08	Pass
	9	2452	-19.38	6.02	0.14	-13.22	6.08	Pass
3	3	2422	-22.91	6.02	0.14	-16.75	6.08	Pass
	4	2427	-19.67	6.02	0.14	-13.51	6.08	Pass
	6	2437	-18.77	6.02	0.14	-12.61	6.08	Pass
	9	2452	-19.70	6.02	0.14	-13.54	6.08	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 7.92dBi > 6dBi , so the power limit shall be reduced to 8-(7.92-6) = 6.08dBm.

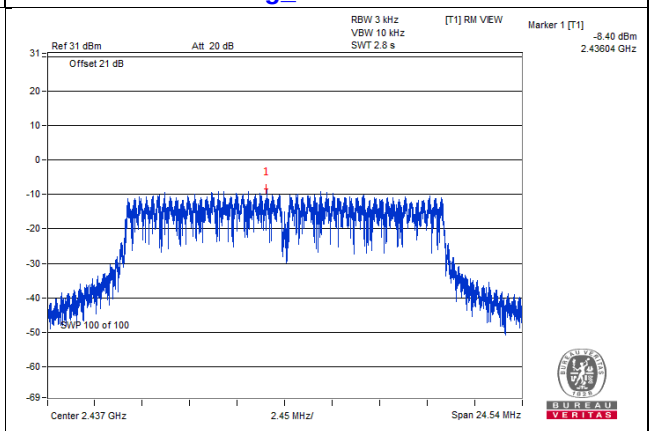
2. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

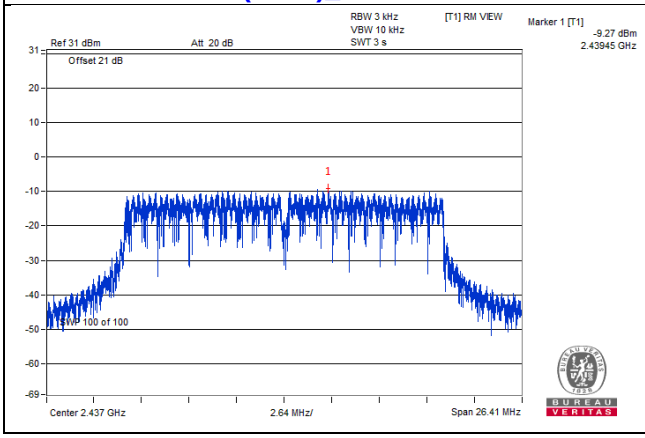
802.11b_Chain 0 / CH6



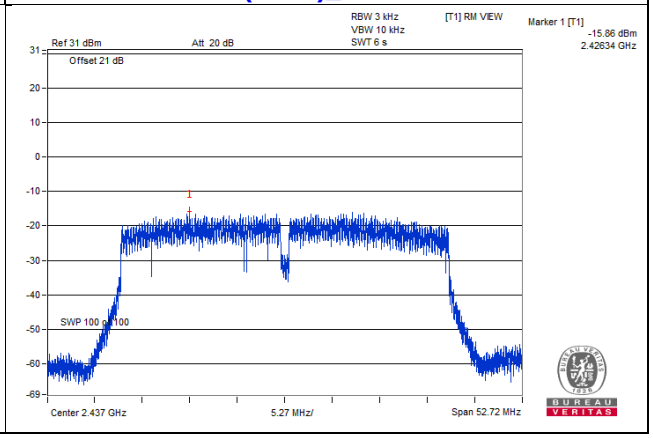
802.11g_Chain 0 / CH6



802.11n (HT20)_Chain 1 / CH6



802.11n (HT40)_Chain 1 / CH6

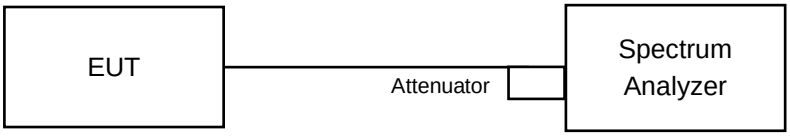


4.6 Conducted Out of Band Emission Measurement

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

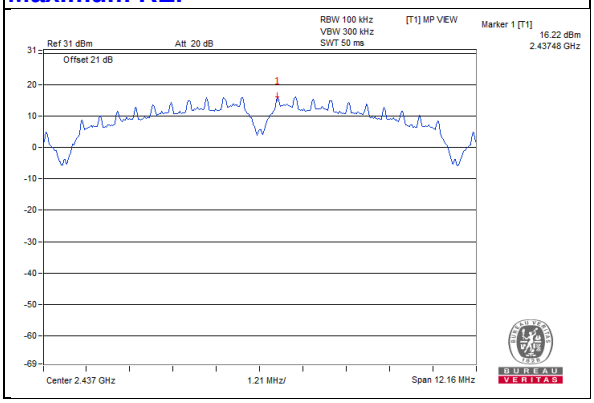
Same as Item 4.3.6

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.

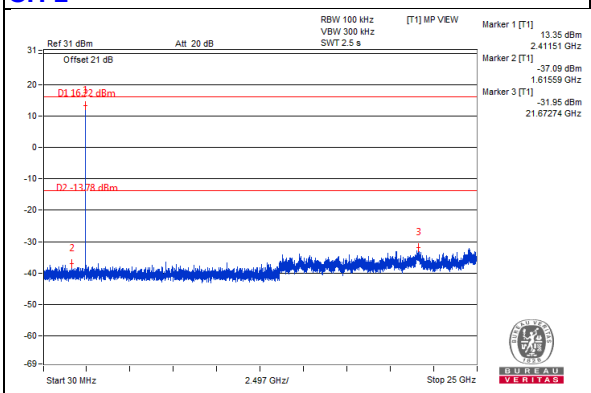
802.11b

Maximum REF

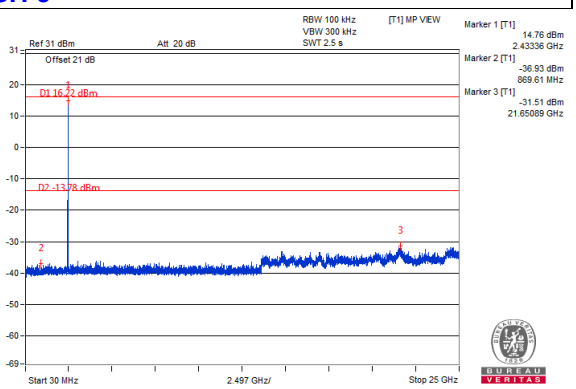


Chain 0

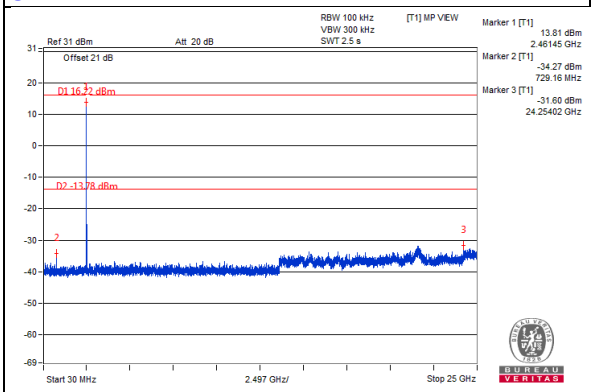
CH 1



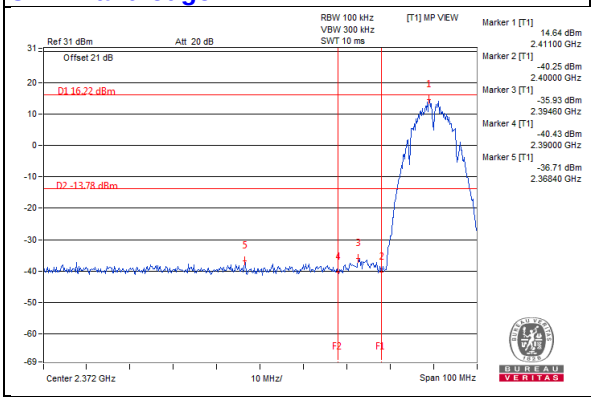
CH 6



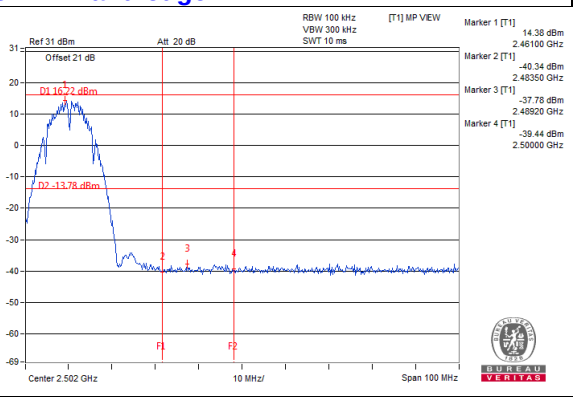
CH 11



CH 1 Band edge

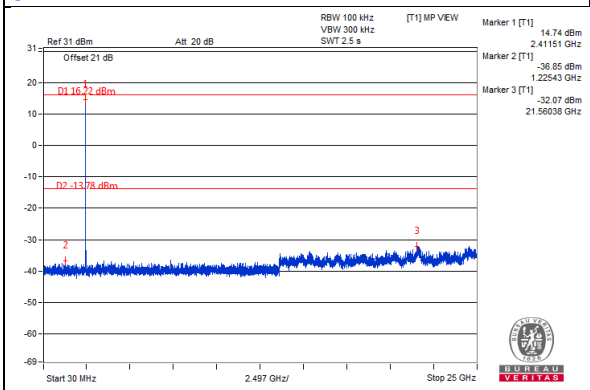


CH 11 Band edge

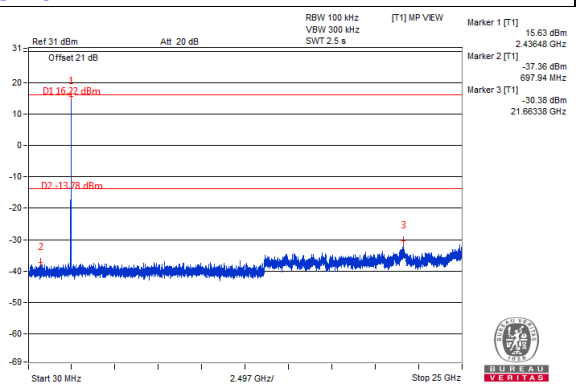


Chain 1

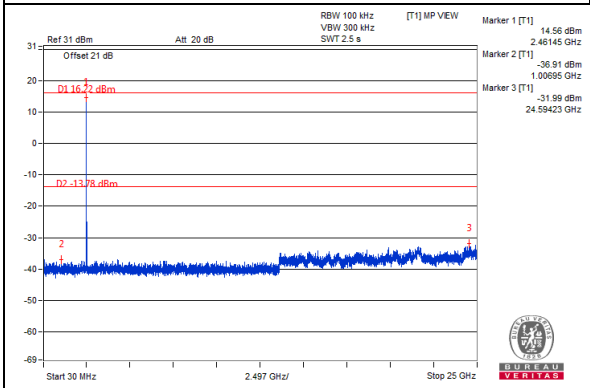
CH 1



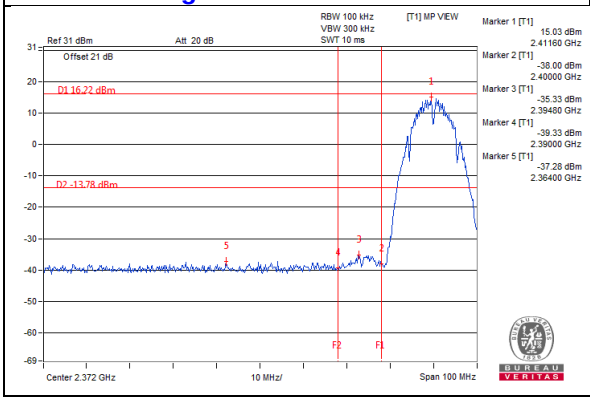
CH 6



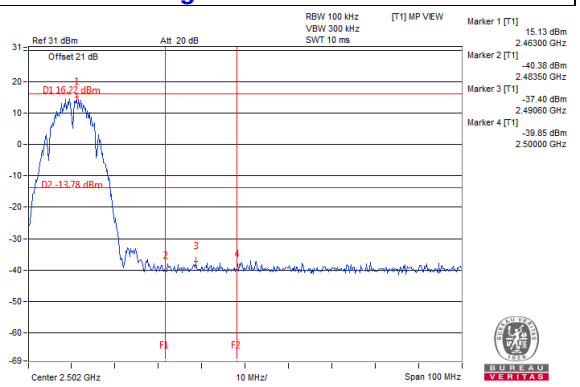
CH 11



CH 1 Band edge

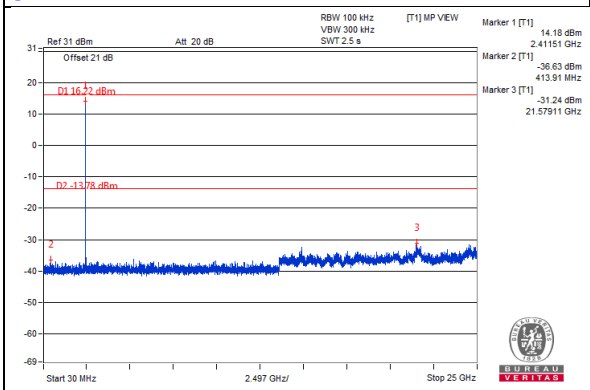


CH 11 Band edge

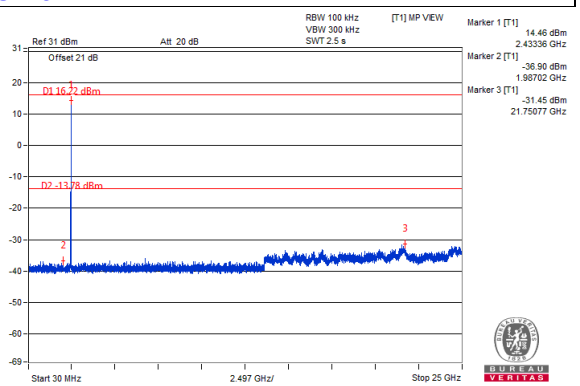


Chain 2

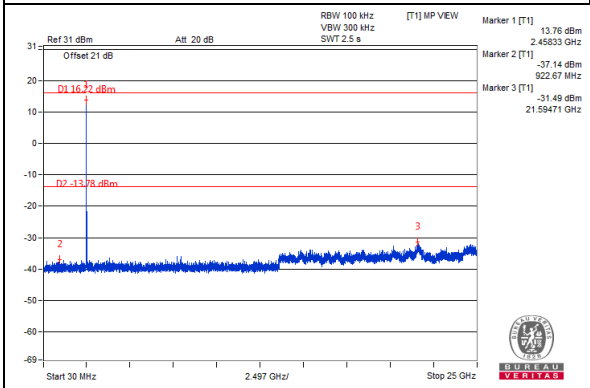
CH 1



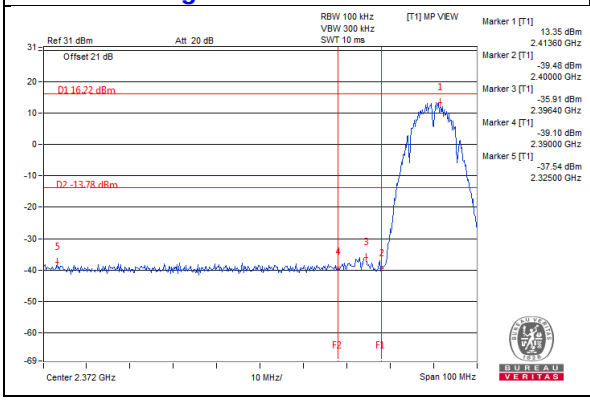
CH 6



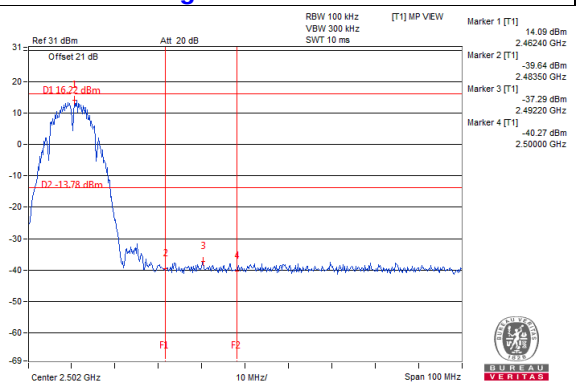
CH 11



CH 1 Band edge

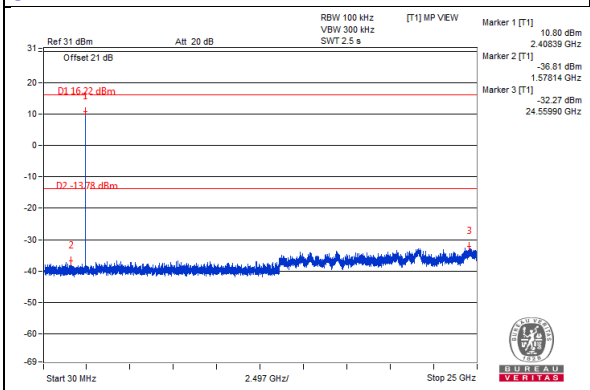


CH 11 Band edge

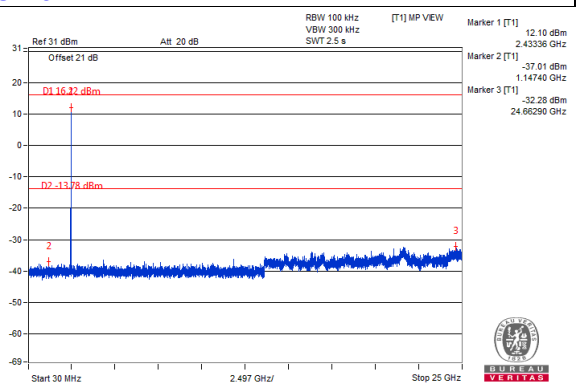


Chain 3

CH 1



CH 6



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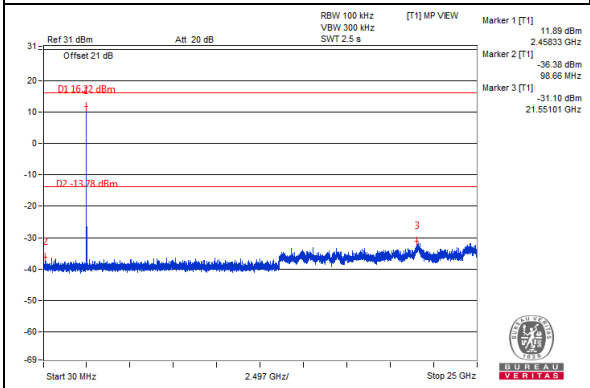
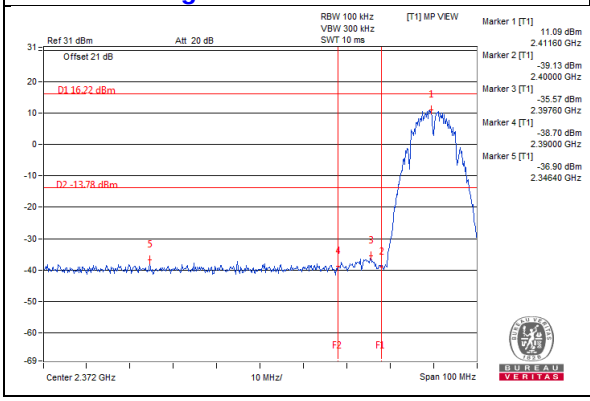
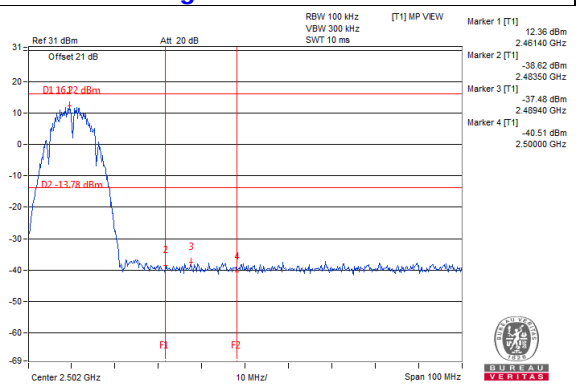


CH 1 Band edge

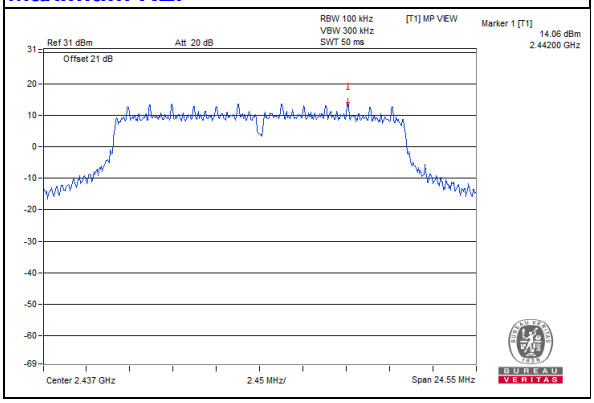


CH 11 Band edge



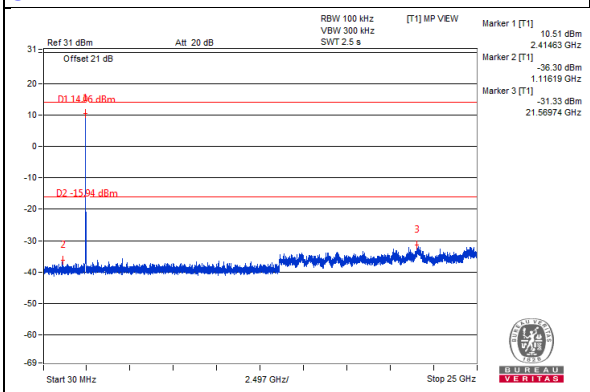
802.11g

Maximum REF

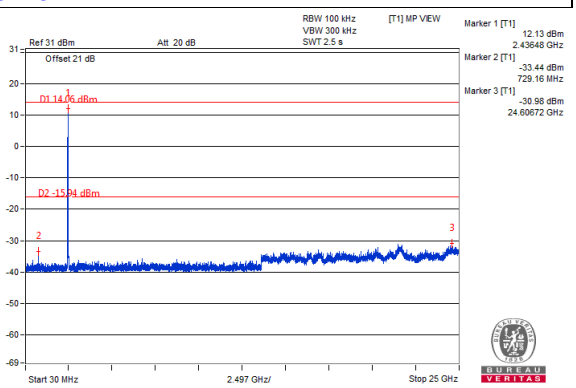


Chain 0

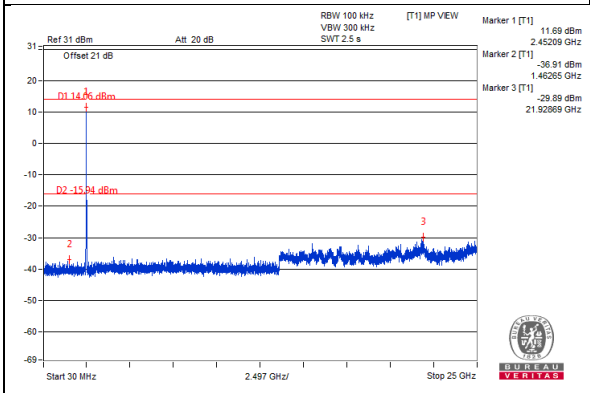
CH 1



CH 6



CH 10



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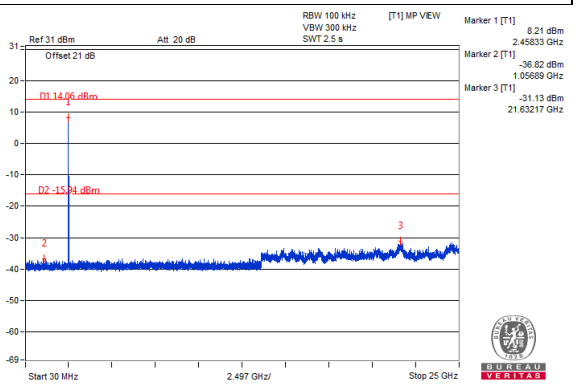
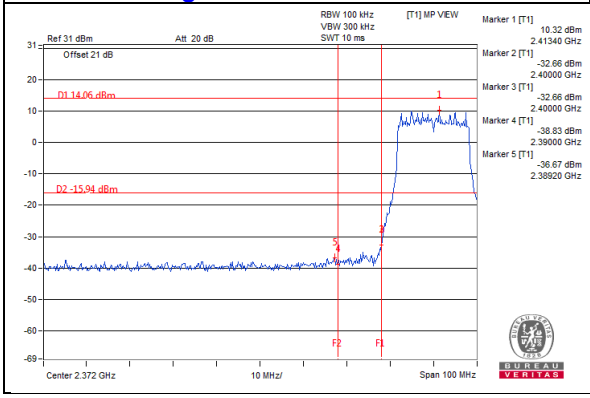


CH 1 Band edge



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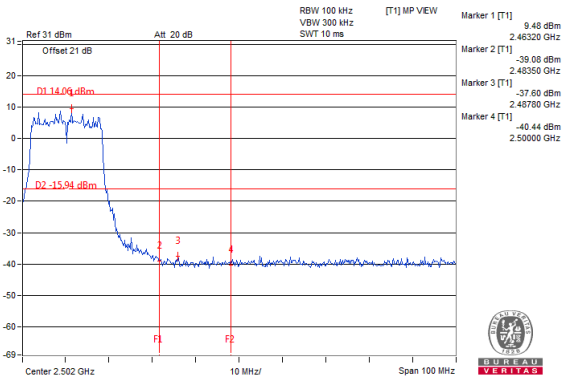
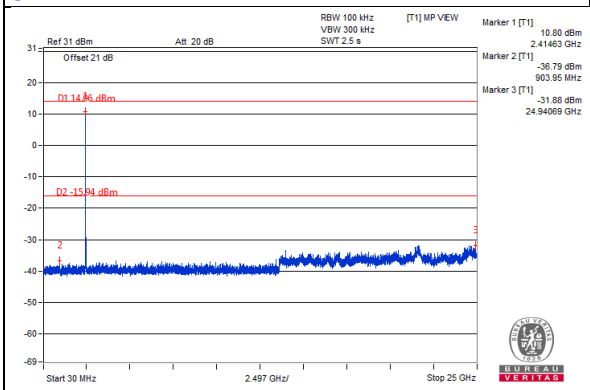
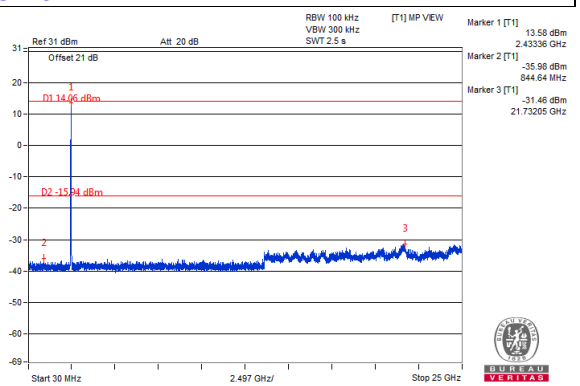


Chain 1

CH 1



CH 6



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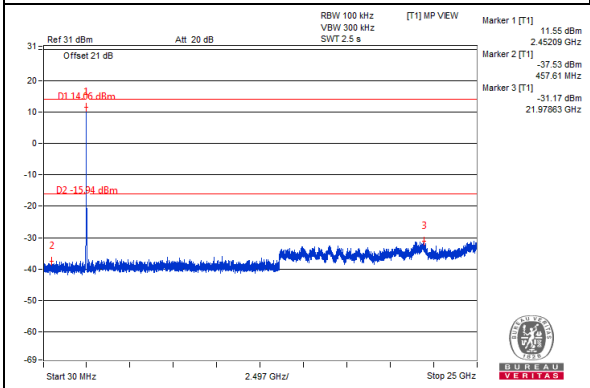

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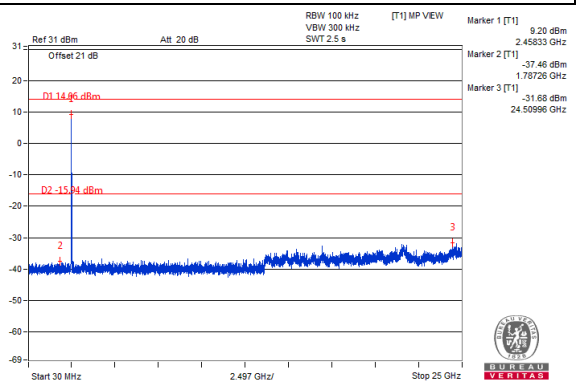
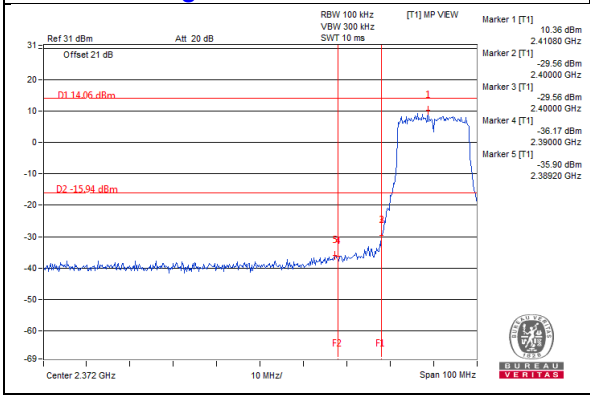
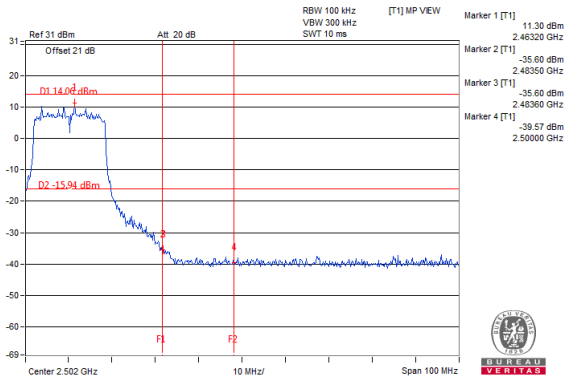


CH 1 Band edge

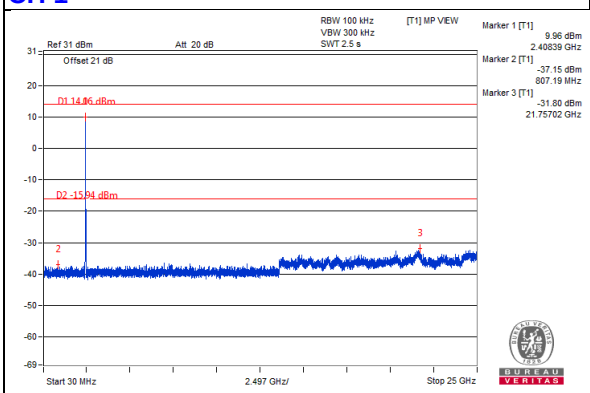


CH 11 Band edge

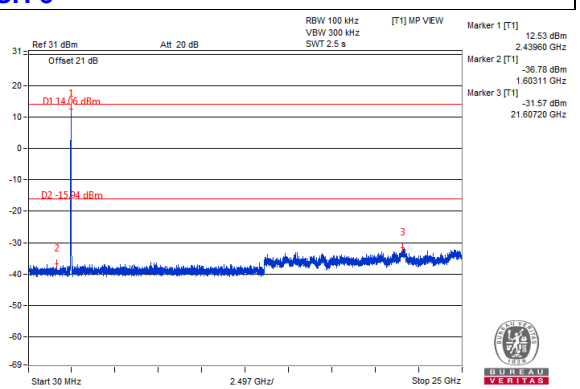


Chain 2

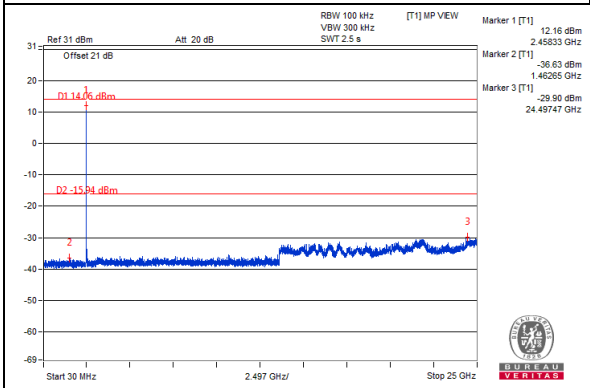
CH 1



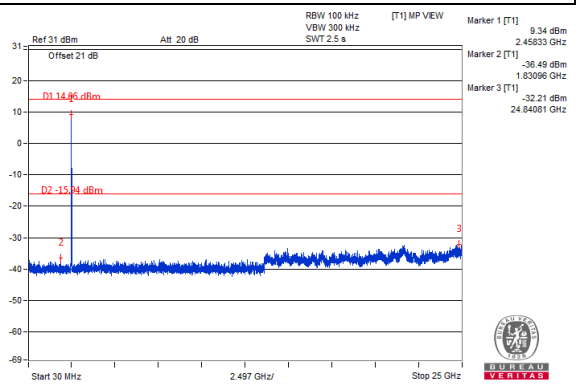
CH 6



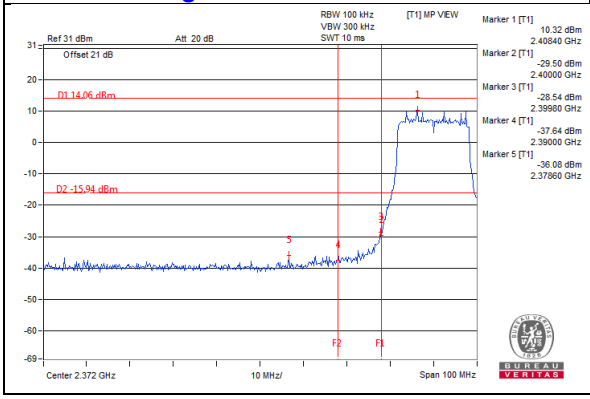
CH 10



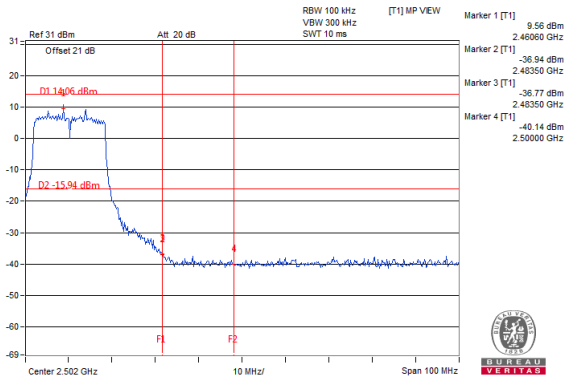
CH 11



CH 1 Band edge

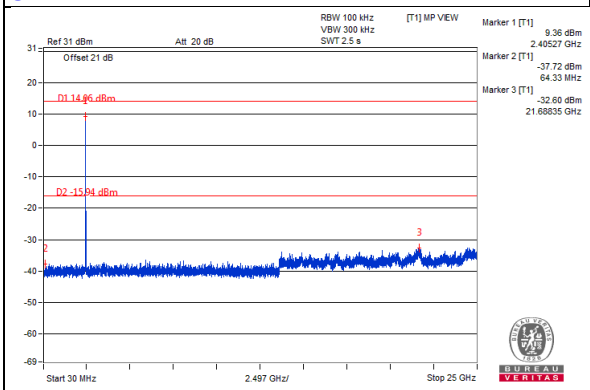


CH 11 Band edge

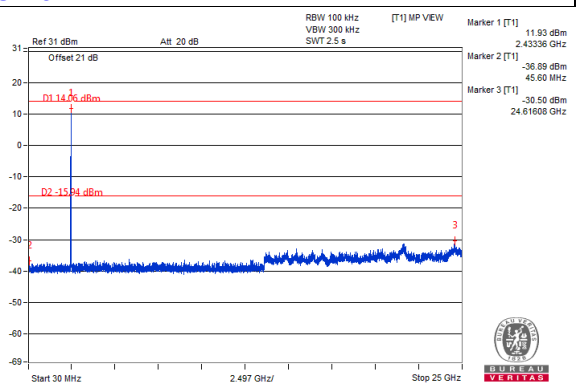


Chain 3

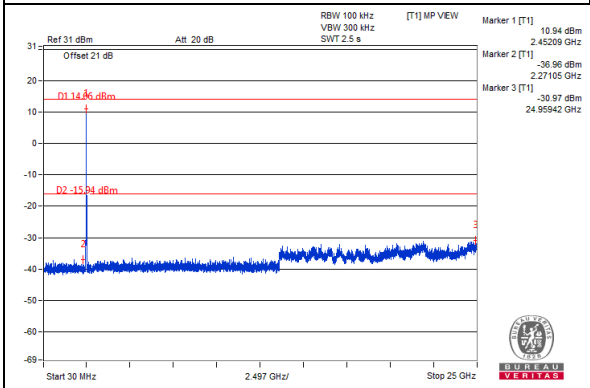
CH 1



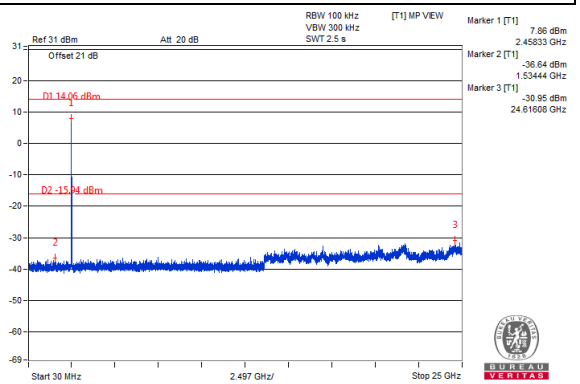
CH 6



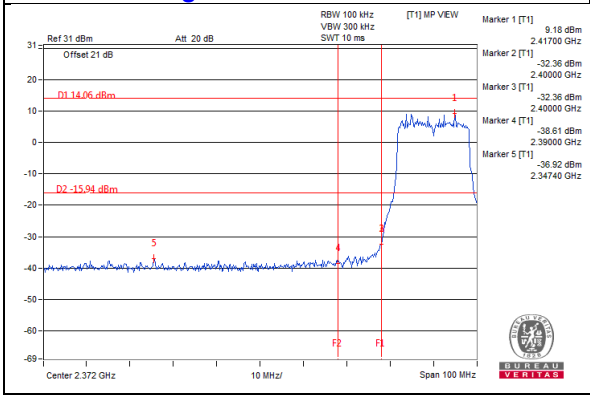
CH 10



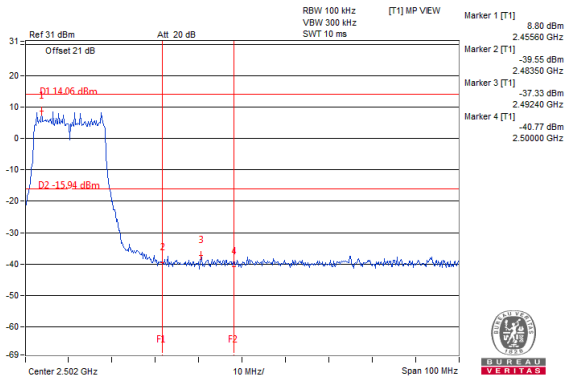
CH 11



CH 1 Band edge

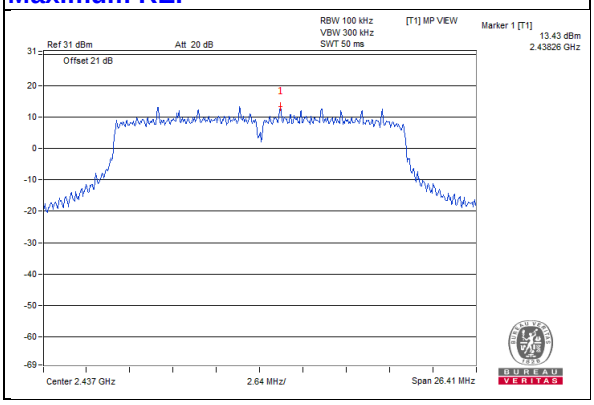


CH 11 Band edge



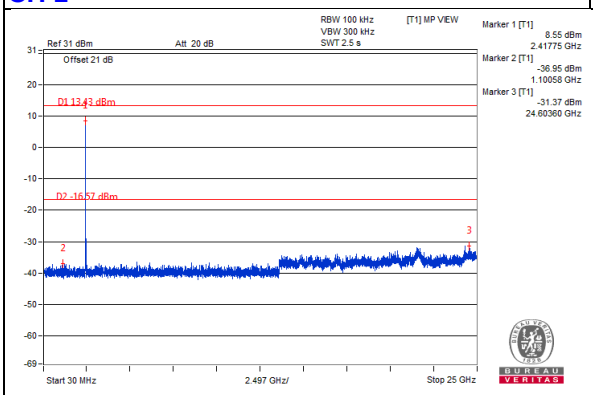
802.11n (HT20)

Maximum REF

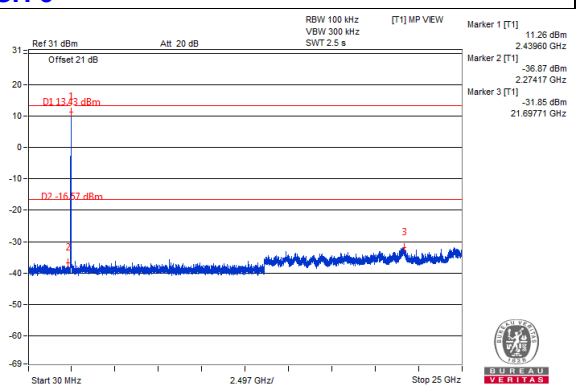


Chain 0

CH 1



CH 6



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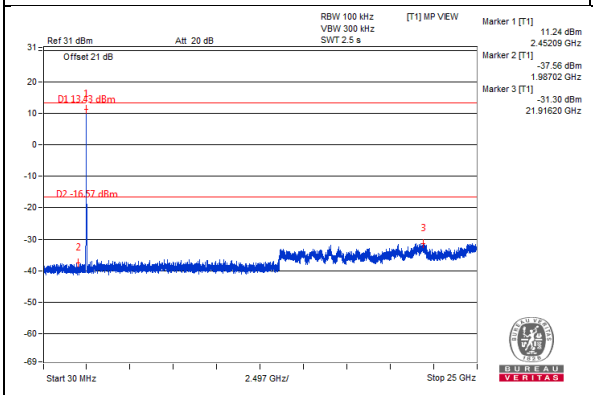
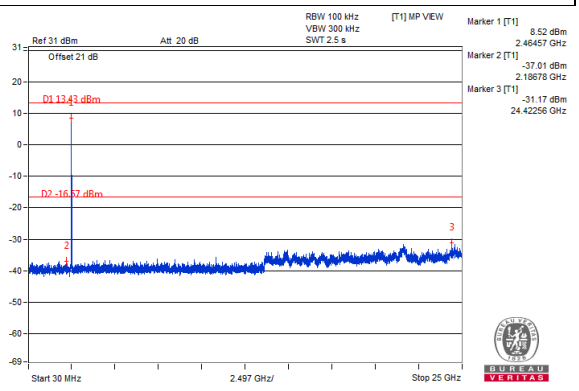


CH 11



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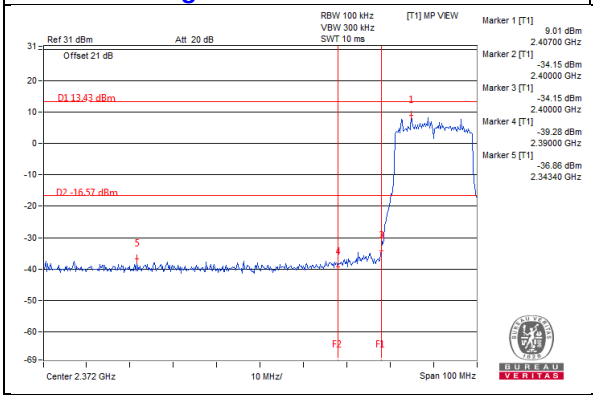

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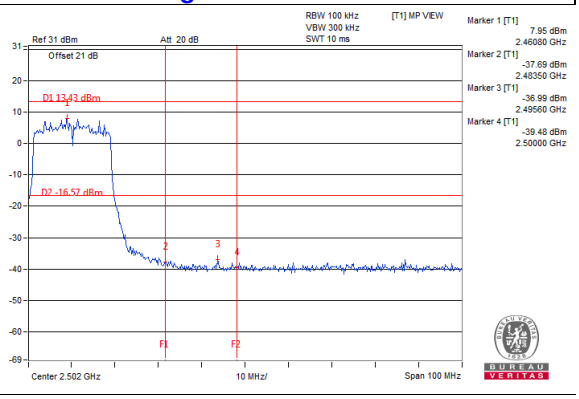
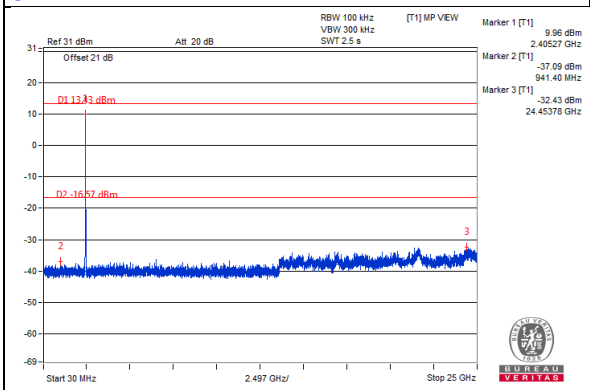


Chain 1

CH 1



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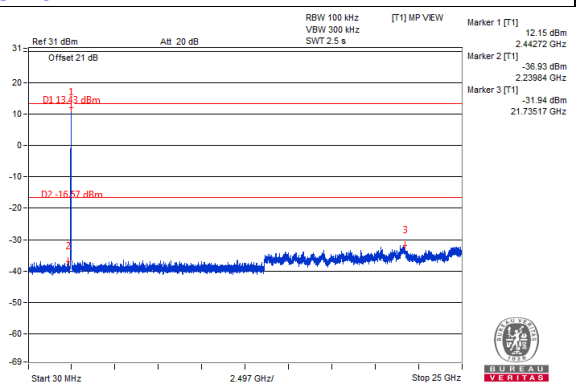

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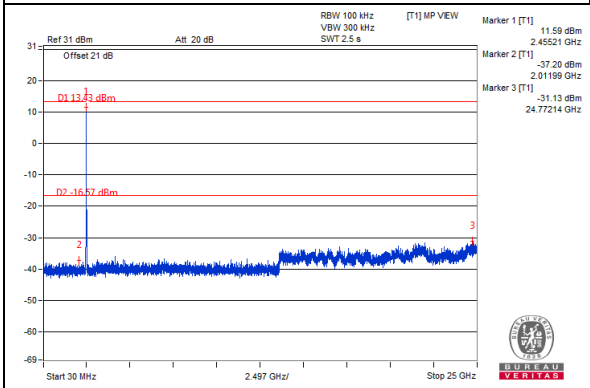

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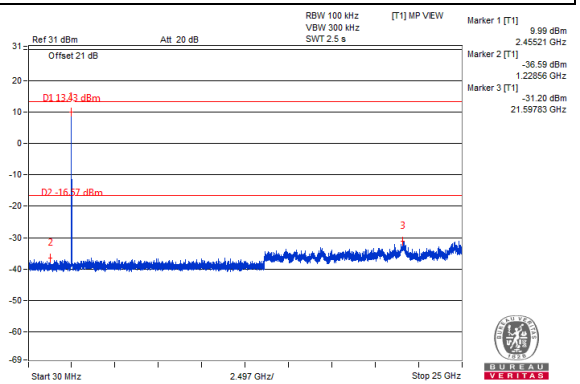

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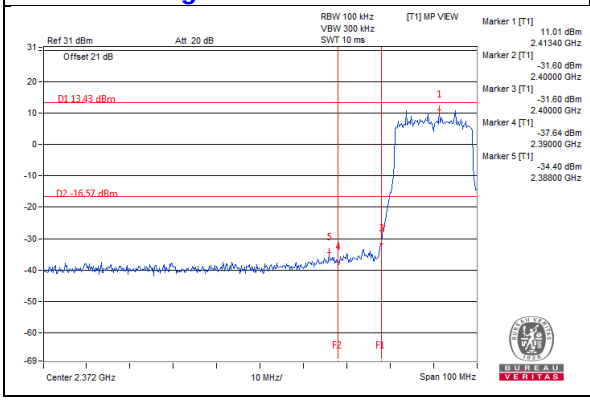

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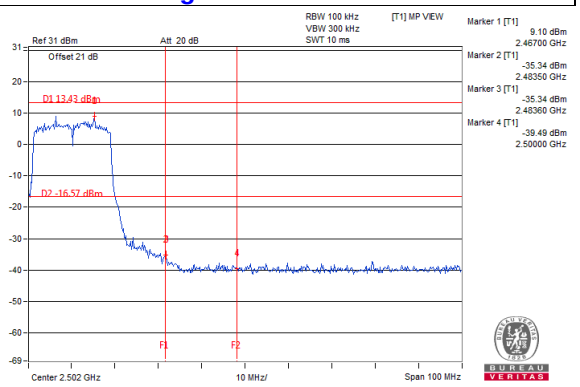
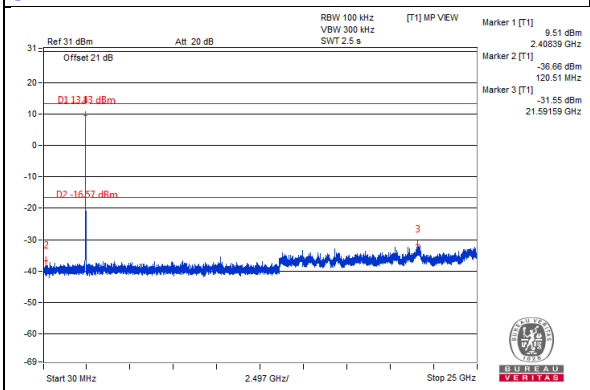
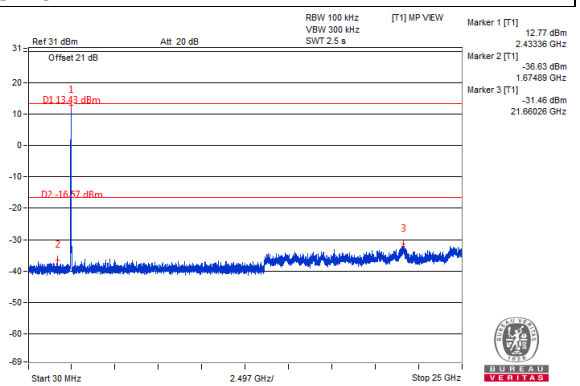


Chain 2

CH 1



CH 6



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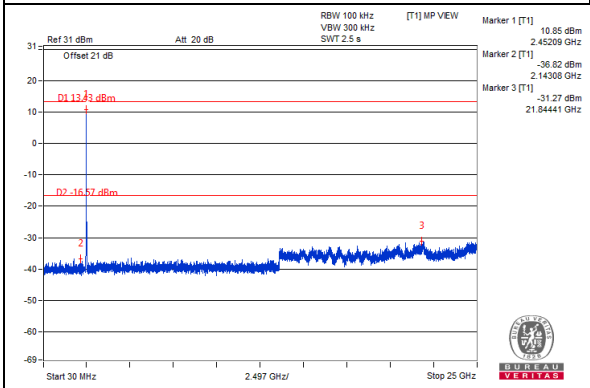

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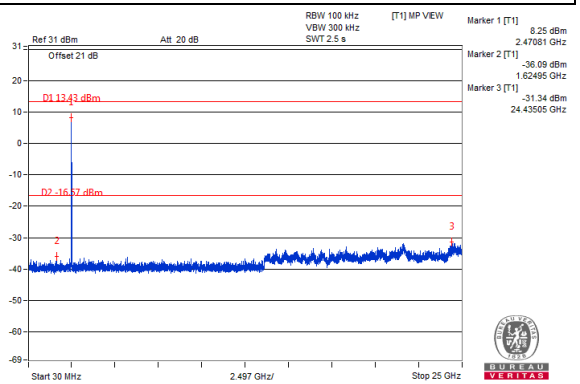

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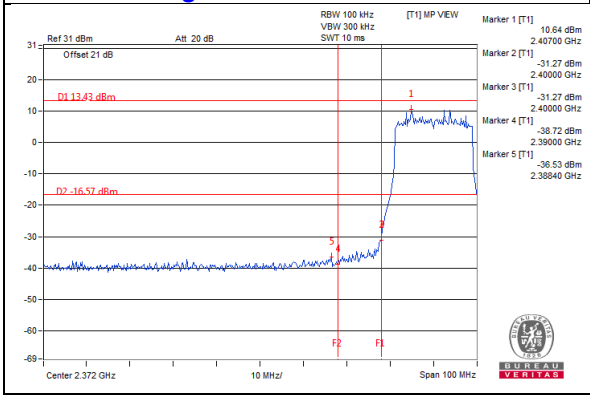

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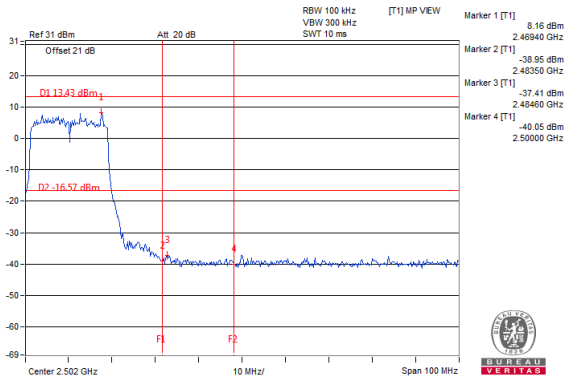
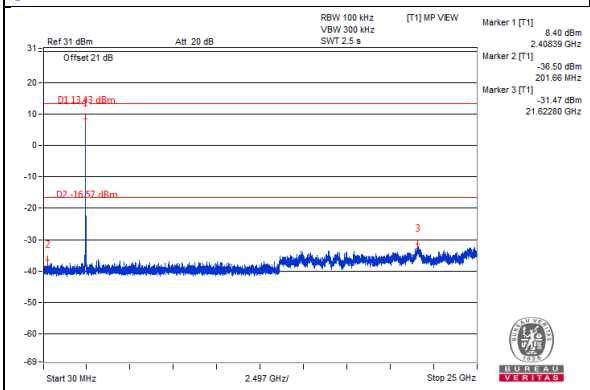


Chain 3

CH 1



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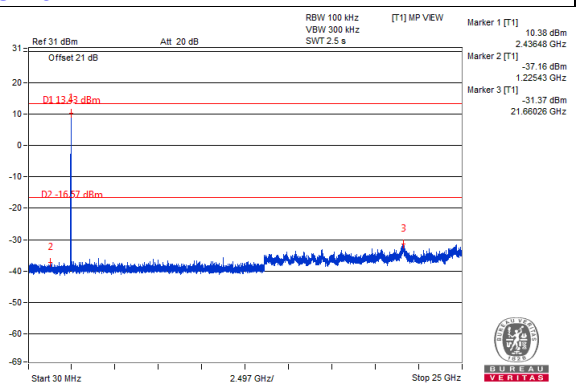

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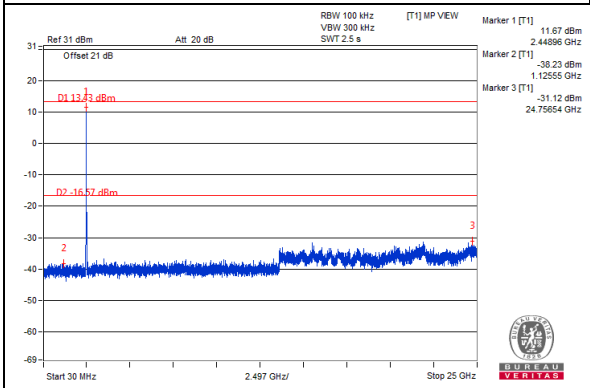

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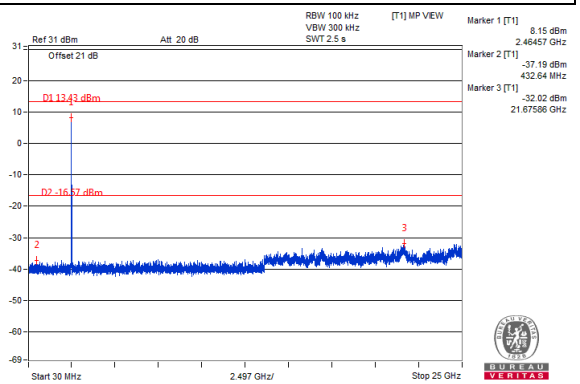

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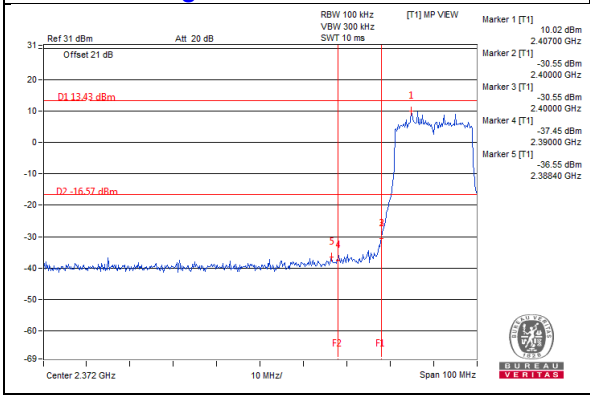
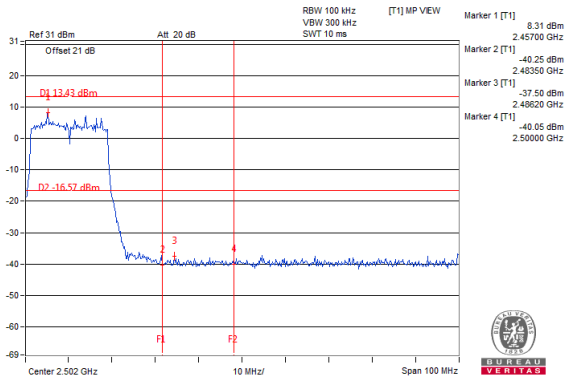
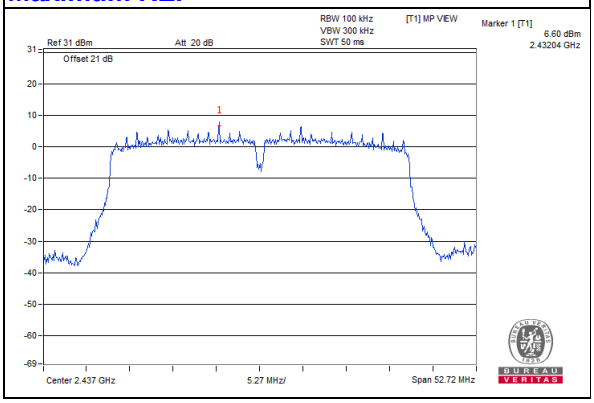


CH 11 Band edge



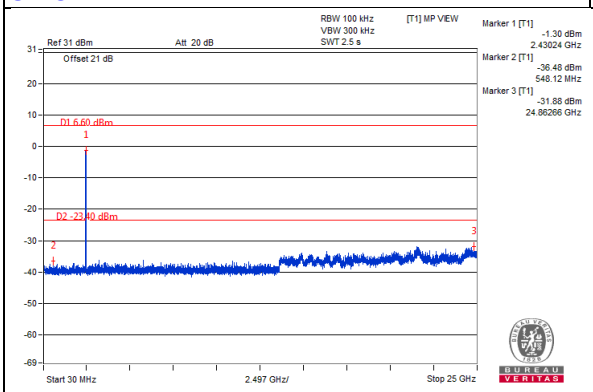
802.11n (HT40)

Maximum REF

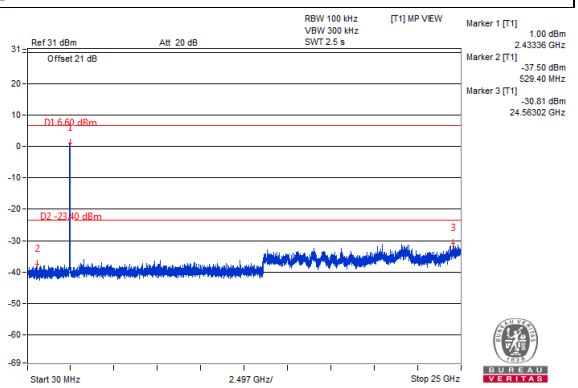


Chain 0

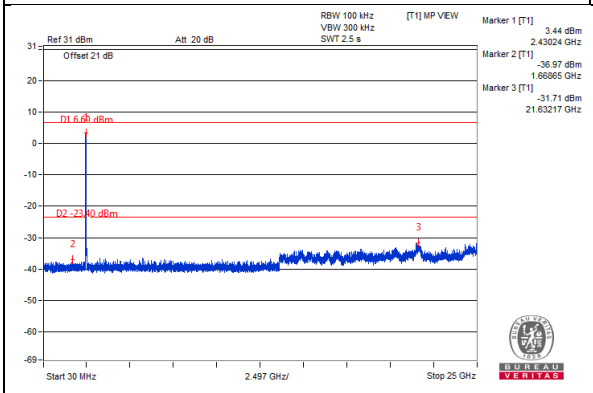
CH 3



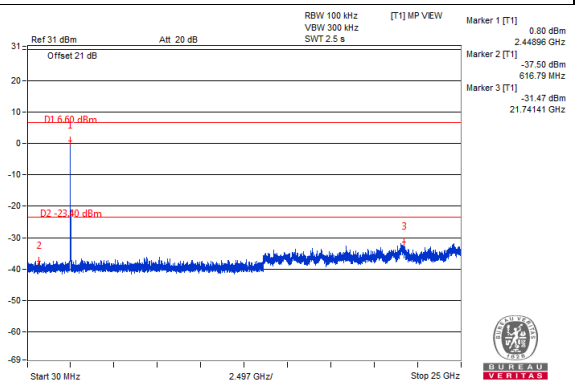
CH 4



CH 6



CH 9



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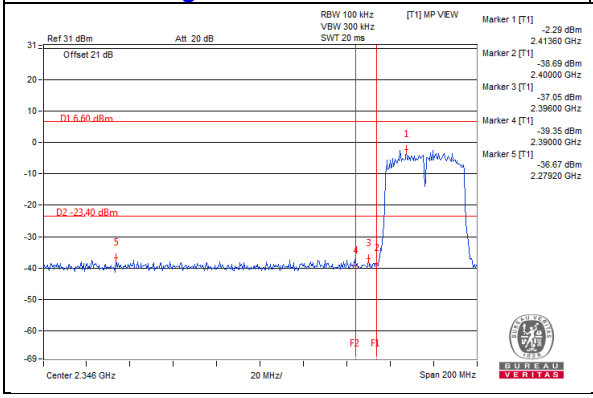

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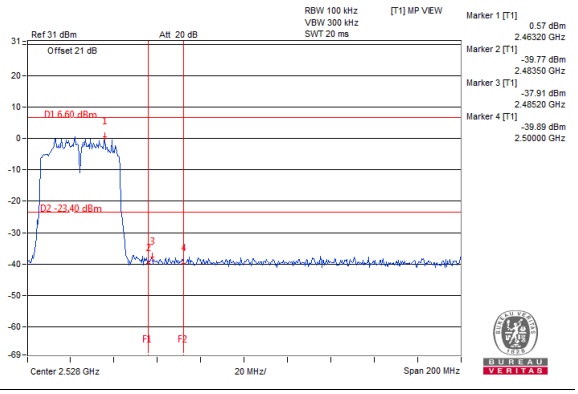
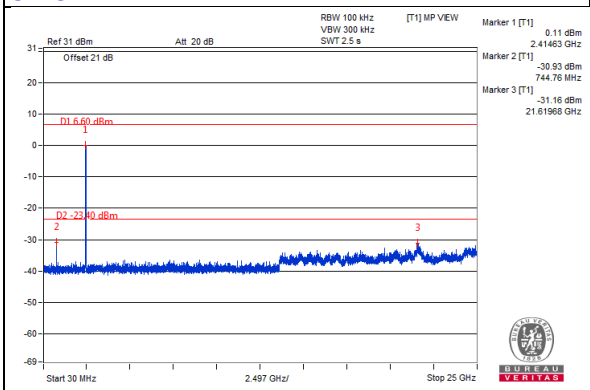


Chain 1

CH 3



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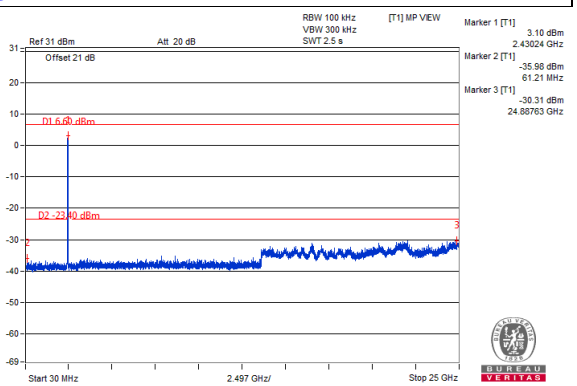

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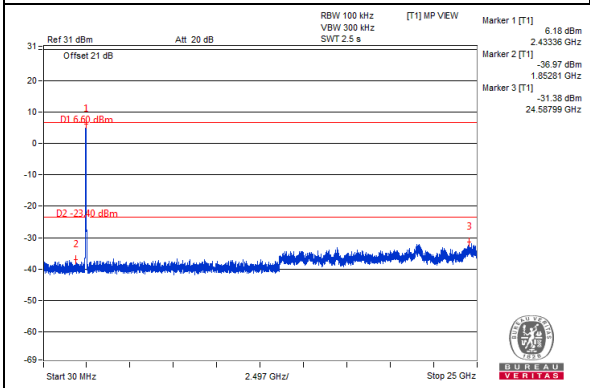
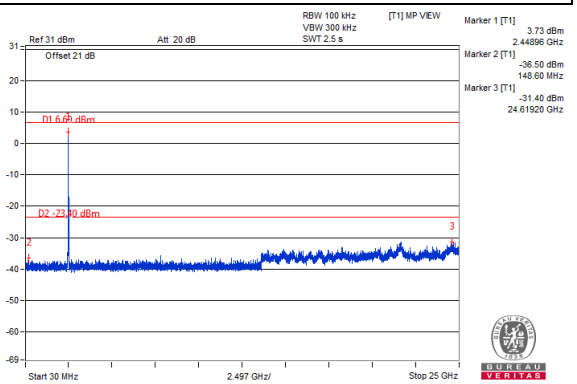
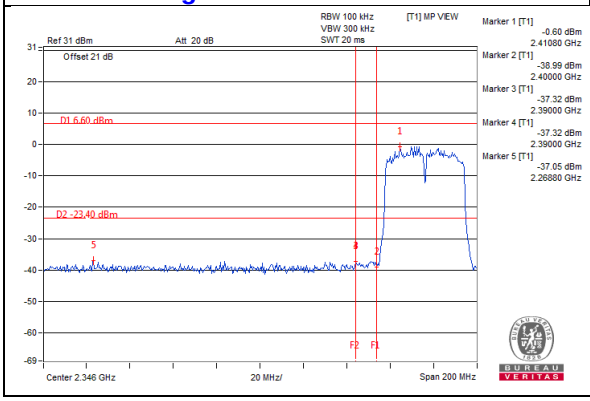


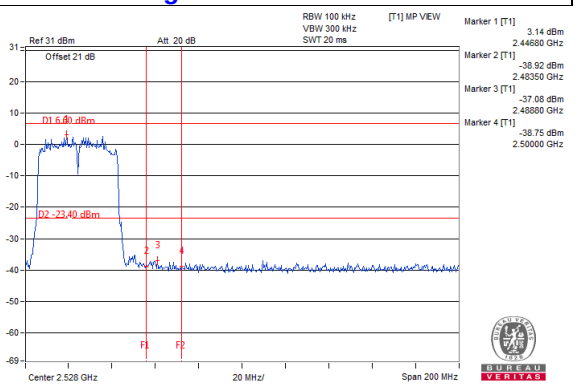
CH 9



CH 3 Band edge

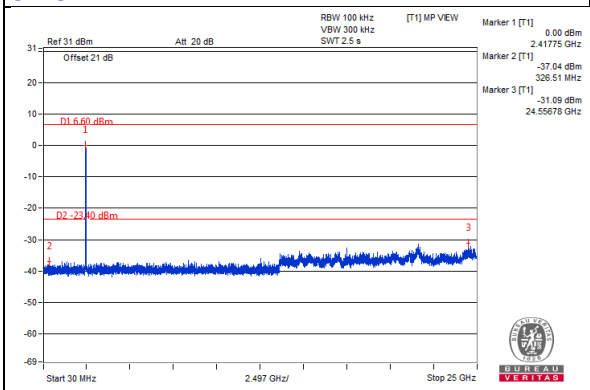


CH 9 Band edge

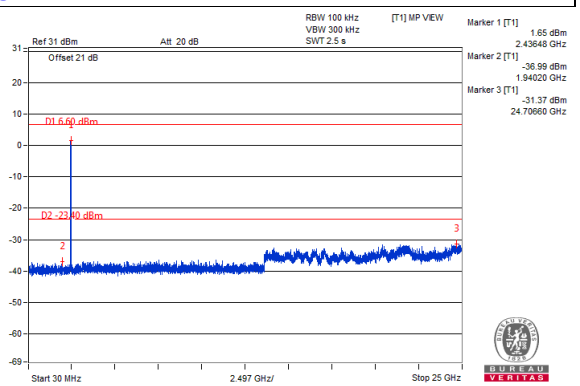


Chain 2

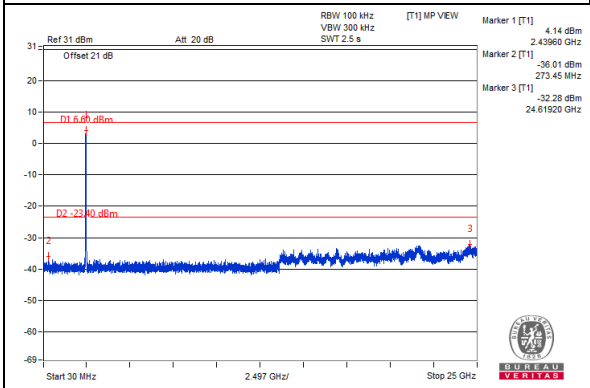
CH 3



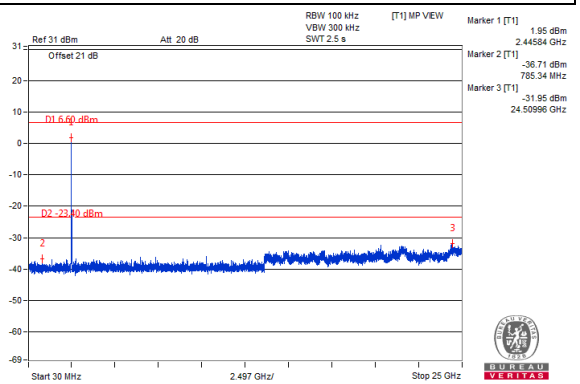
CH 4



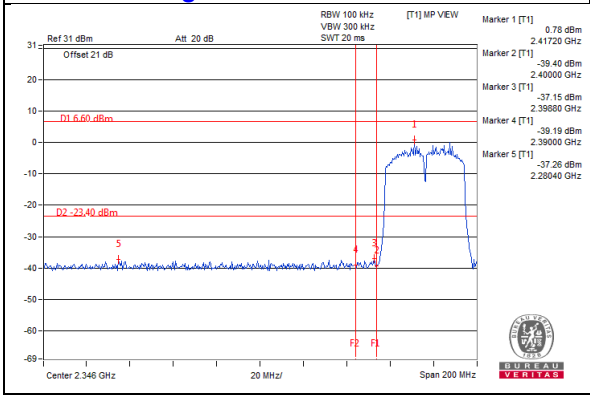
CH 6



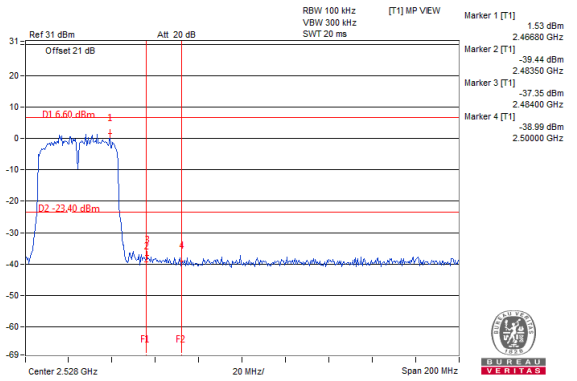
CH 9



CH 3 Band edge

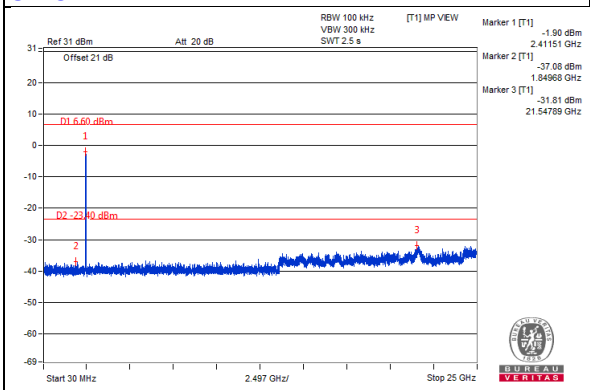


CH 9 Band edge



Chain 3

CH 3



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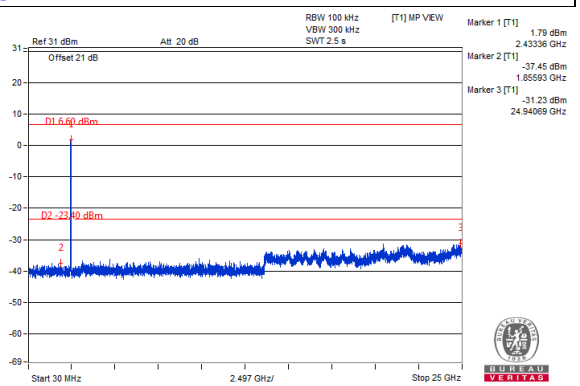
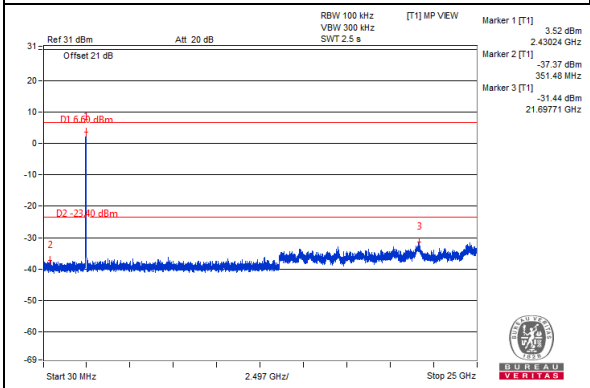
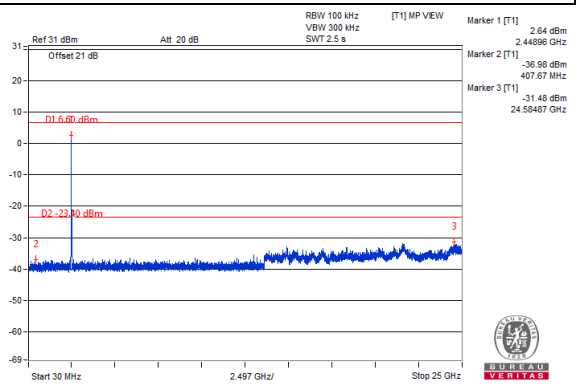


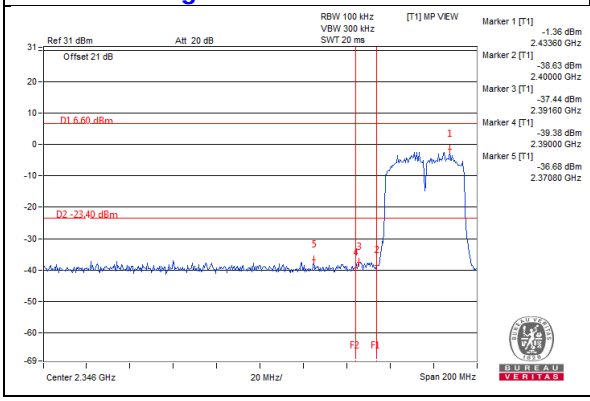
CH 6



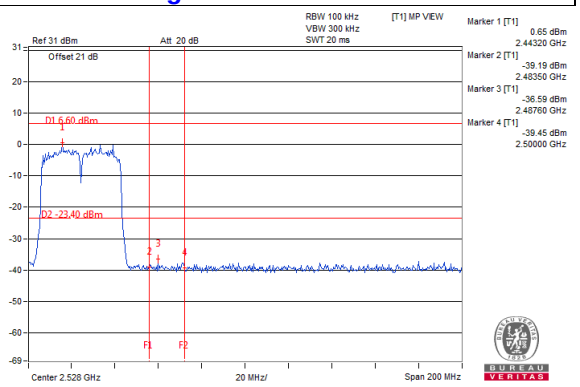
CH 9



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 according to ISO/IEC 17025.

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

Linkou 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.

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