FCC Test Report

Report No.:	RF190716E02
FCC ID:	PY319200453
Test Model:	RBR850
Series Model:	RBS850
Received Date:	July 17, 2019
Test Date:	Aug. 21 to 23, 2019
Issued Date:	Sep. 02, 2019
Applicant:	NETGEAR, Inc.
Address:	350 East Plumeria Drive San Jose, CA 95134
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

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record 4

1 Certificate of Conformity 5

2 Summary of Test Results 6

2.1 Measurement Uncertainty 6
2.2 Modification Record 6

3 General Information 7

3.1 General Description of EUT 7
3.2 Description of Test Modes 10
3.2.1 Test Mode Applicability and Tested Channel Detail 11
3.3 Duty Cycle of Test Signal 13
3.4 Description of Support Units 14
3.4.1 Configuration of System under Test 15
3.5 General Description of Applied Standards 16

4 Test Types and Results 17

4.1 Radiated Emission and Bandedge Measurement 17
4.1.1 Limits of Radiated Emission and Bandedge Measurement 17
4.1.2 Test Instruments 18
4.1.3 Test Procedures 19
4.1.4 Deviation from Test Standard 20
4.1.5 Test Setup 20
4.1.6 EUT Operating Conditions 21
4.1.7 Test Results 22
4.2 Conducted Emission Measurement 36
4.2.1 Limits of Conducted Emission Measurement 36
4.2.2 Test Instruments 36
4.2.3 Test Procedures 37
4.2.4 Deviation from Test Standard 37
4.2.5 Test Setup 37
4.2.6 EUT Operating Conditions 37
4.2.7 Test Results 38
4.3 6dB Bandwidth Measurement 40
4.3.1 Limits of 6dB Bandwidth Measurement 40
4.3.2 Test Setup 40
4.3.3 Test Instruments 40
4.3.4 Test Procedure 40
4.3.5 Deviation from Test Standard 40
4.3.6 EUT Operating Conditions 40
4.3.7 Test Result 41
4.4 Conducted Output Power Measurement 43
4.4.1 Limits of Conducted Output Power Measurement 43
4.4.2 Test Setup 43
4.4.3 Test Instruments 43
4.4.4 Test Procedures 43
4.4.5 Deviation from Test Standard 43
4.4.6 EUT Operating Conditions 43
4.4.7 Test Results 44
4.5 Power Spectral Density Measurement 47
4.5.1 Limits of Power Spectral Density Measurement 47
4.5.2 Test Setup 47
4.5.3 Test Instruments 47
4.5.4 Test Procedure 47
4.5.5 Deviation from Test Standard 47
4.5.6 EUT Operating Condition 47

4.5.7 Test Results 48
4.6 Conducted Out of Band Emission Measurement 52
4.6.1 Limits of Conducted Out of Band Emission Measurement 52
4.6.2 Test Setup 52
4.6.3 Test Instruments 52
4.6.4 Test Procedure 52
4.6.5 Deviation from Test Standard 52
4.6.6 EUT Operating Condition 52
4.6.7 Test Results 52
5 Pictures of Test Arrangements 69
Appendix – Information of the Testing Laboratories 70

Release Control Record

Issue No.	Description	Date Issued
RF190716E02	Original release.	Sep. 02, 2019

1 Certificate of Conformity

Product:	Orbi Router
Brand:	NETGEAR
Test Model:	RBR850
Series Moel:	RBS850
Sample Status:	ENGINEERING SAMPLE
Applicant:	NETGEAR, Inc.
Test Date:	Aug. 21 to 23, 2019
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10: 2013

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

Prepared by : _____ , **Date:** Sep. 02, 2019

Wendy Wu / Specialist

Approved by : _____ , **Date:** Sep. 02, 2019

May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -11.77dB at 0.34141MHz.
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 2493.90MHz, 2483.50MHz, and 2390.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.9 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.1 dB
	6GHz ~ 18GHz	4.9 dB
	18GHz ~ 40GHz	5.2 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Orbi Router
Brand	NETGEAR
Test Model	RBR850
Series Model	RBS850
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT20/40 in 2.4GHz 1024QAM for OFDMA in 11ax HE mode
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733.3Mbps 802.11ax: up to 2401.9Mbps
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), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7 **5GHz (U-NII-1):** 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 4 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 2 802.11ac (VHT80), 802.11ax (HE80): 1 **5GHz (U-NII-3):** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
Output Power	**Non-Beamforming Mode:** **2.412 ~ 2.462 GHz:** 992.435 mW **5.18 ~ 5.24GHz:** 924.661mW **5.745 ~ 5.825GHz:** 993.367mW **Beamforming Mode:** **2.412 ~ 2.462 GHz:** 986.685 mW **5.18 ~ 5.24GHz:** 896.804mW **5.745 ~ 5.825GHz:** 885.339mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	RJ45 cable x 1 (Unshielded, 1.8m)

Note:

1. All models are listed as below.

Product	Model	Difference
Orbi Router	RBR850	Function:Master With Internet port x 1
Orbi Satellite	RBS850	Function:Master+Client Without Internet port

From the above models, model: **RBR850** was the worst case and it was selected as representative model for the test and its data was recorded in this report.

2. The EUT has below radios as following table:

Radio 1	**Radio 2**	**Radio 3**
WLAN(2.4GHz)	WLAN 5GHz (low band)	WLAN 5GHz (high band)

3. Simultaneously transmission condition.

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

4. The EUT must be supplied power adapter and following different models could be chosen as following table:

No.	Brand	Model No.	P/N	Spec.
1	NETGEAR	2ABN042F	332-11507-01	Input: 100-240Vac, 1.3A, 50/60Hz Output: 12V, 3.5A DC Output cable: Unshielded, 1.8m
2	NETGEAR	AD2150F10	332-11093-01	Input: 100-120Vac, 1.0A, 50/60Hz Output: 12V, 3.5A DC Output cable: Unshielded, 1.8m

For conducted and radiated emissions test, the EUT was pre-tested with adapter 1 & 2, the conducted emission worst case was found in adapter 1 and the radiated emission worst case was found in adapter 2. Therefore the test and its data was recorded in this report.

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

Frequency Range (GHz)	Directional Antenna Gain (dBi)	Antenna Type	Antenna Connector
2.4~2.4835	6.01	Dipole	i-pex(MHF)
5.15~5.25	6.22		
5.25~5.35	6.37		
5.47~5.725	6.29		
5.725~5.85	6.52		
Note: More detailed information, please refer to opearating description.			

6. The EUT incorporates a MIMO function:

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	4TX	4RX
802.11g	4TX	4RX
802.11n (HT20)	4TX	4RX
802.11n (HT40)	4TX	4RX
VHT20	4TX	4RX
VHT40	4TX	4RX
802.11ax (HE20)	4TX	4RX
802.11ax (HE40)	4TX	4RX
5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	4TX	4RX
802.11n (HT20)	4TX	4RX
802.11n (HT40)	4TX	4RX
802.11ac (VHT20)	4TX	4RX
802.11ac (VHT40)	4TX	4RX
802.11ac (VHT80)	4TX	4RX
802.11ax (HE20)	4TX	4RX
802.11ax (HE40)	4TX	4RX
802.11ax (HE80)	4TX	4RX

N ote:
1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. The EUT support Beamforming and non-beamforming mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
3. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz), 802.11ac mode for 20MHz (40MHz, 80MHz) and 802.11ax mode for 20MHz (40MHz, 80MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

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

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), VHT20 and 802.11ax (HE20):

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), VHT40 and 802.11ax (HE40):

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.

Non-Beamforming Mode					
Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1Mb/s
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6Mb/s
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

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.

Non-Beamforming Mode					
Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
802.11b	1 to 11	6	DSSS	DBPSK	1Mb/s

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.

Non-Beamforming Mode					
Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
802.11b	1 to 11	6	DSSS	DBPSK	1Mb/s

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.

Non-Beamforming Mode					
Mode	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate Parameter**
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1Mb/s
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6Mb/s
VHT20 (Output power only)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
VHT40 (Output power only)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0
Beamforming Mode (output power only)					
Mode	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate Parameter**
VHT20	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
VHT40	3 to 9	3, 6, 9	OFDM	BPSK	MCS0
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

Test Condition:

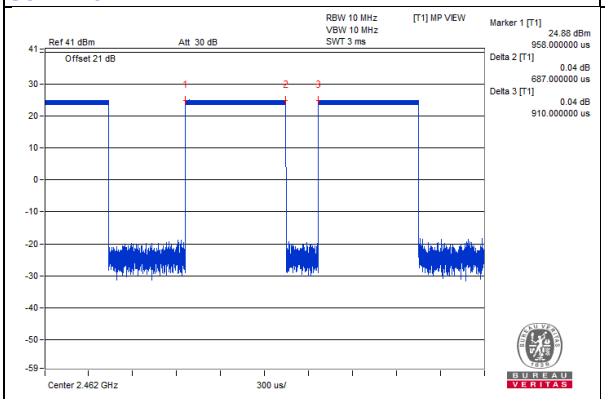
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	22deg. C, 69%RH	120Vac, 60Hz	Robert Cheng
RE<1G	23deg. C, 71%RH	120Vac, 60Hz	Ryan Du
PLC	24deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

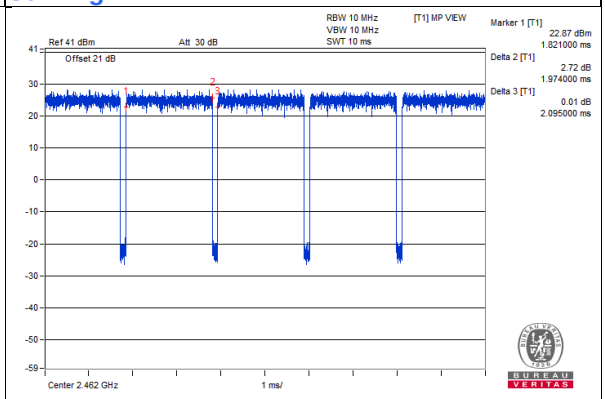
Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11b: Duty cycle = 0.687/0.91 = 0.755, Duty factor = 10 * log(1/Duty cycle) = 1.22
802.11g: Duty cycle = 1.974/2.095 = 0.942, Duty factor = 10 * log(1/Duty cycle) = 0.26
VHT20: Duty cycle = 5.422/5.662 = 0.958, Duty factor = 10 * log(1/Duty cycle) = 0.19
VHT40: Duty cycle = 5.428/5.688 = 0.954, Duty factor = 10 * log(1/Duty cycle) = 0.2
802.11ax (HE20): Duty cycle = 5.452/5.742 = 0.949, Duty factor = 10 * log(1/Duty cycle) = 0.23
802.11ax (HE40): Duty cycle = 5.442/5.775 = 0.942, Duty factor = 10 * log(1/Duty cycle) = 0.26

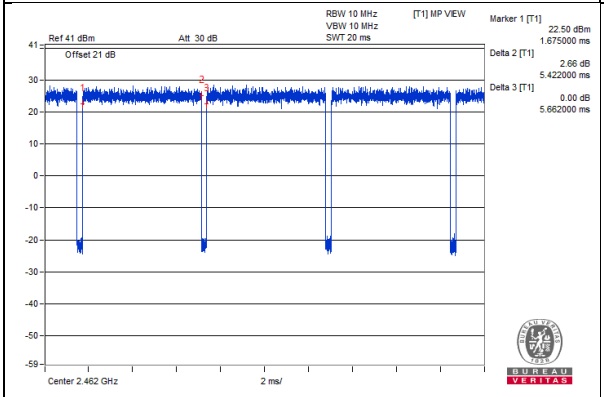
802.11b



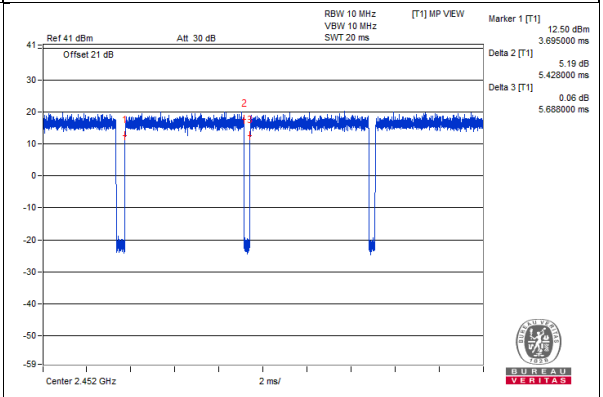
802.11g



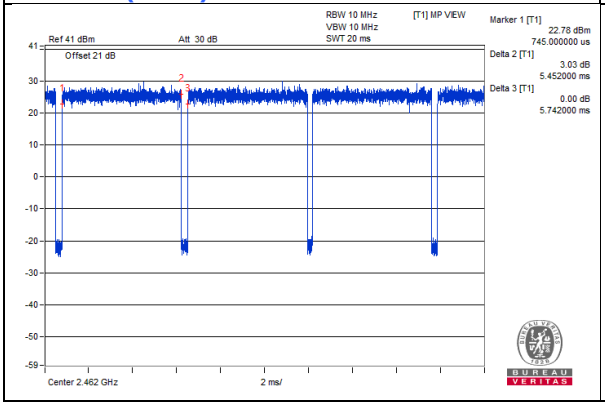
VHT20



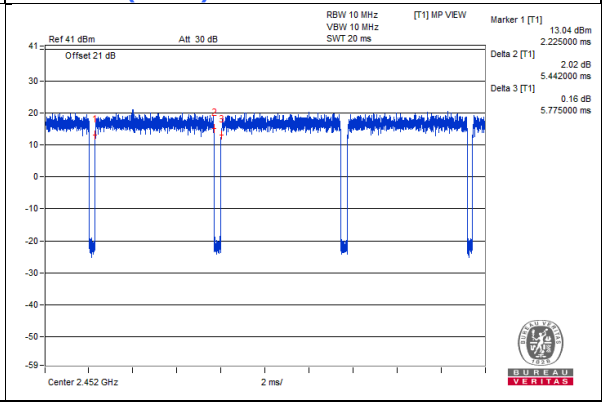
VHT40



802.11ax (HE20)



802.11ax (HE40)



3.4 Description of Support Units

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

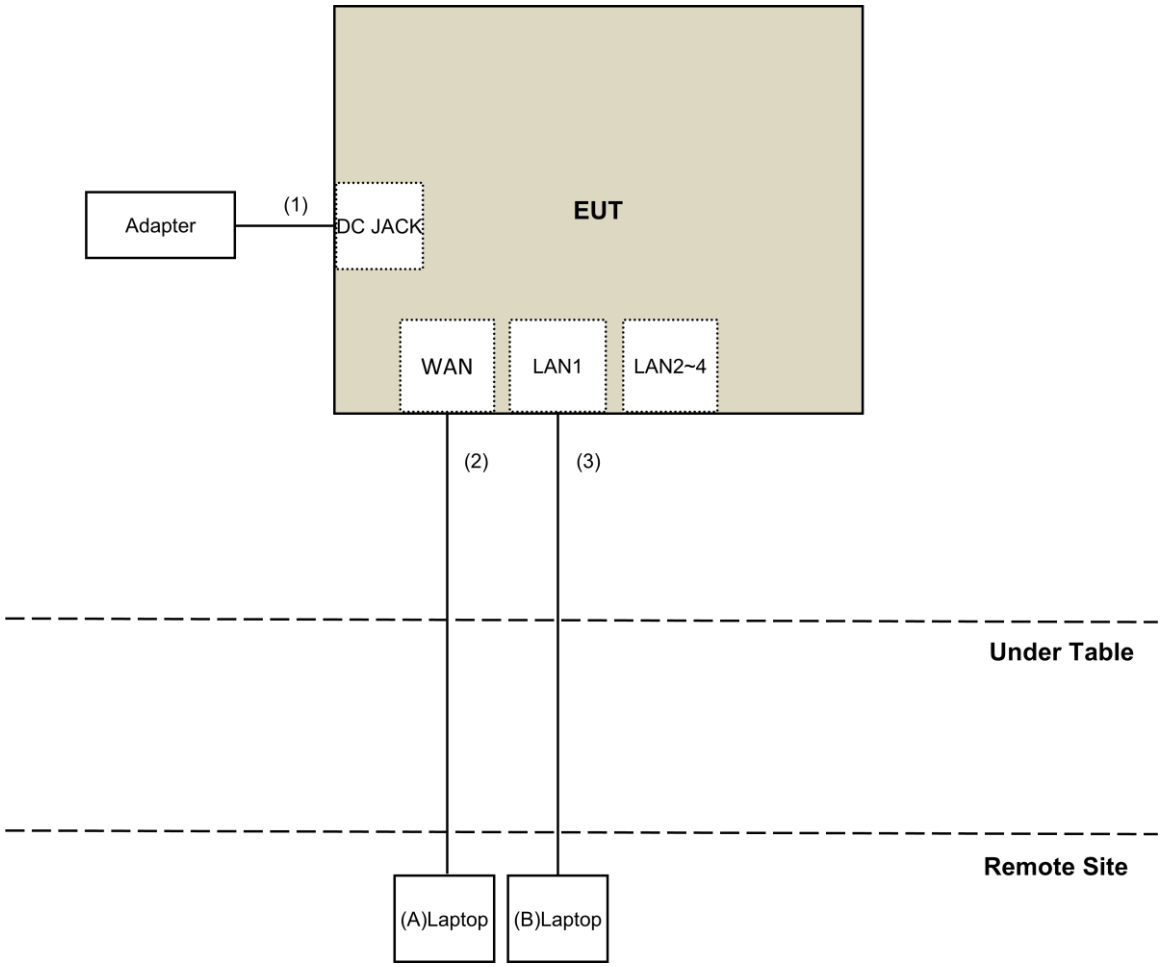
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	Inspiron 7570	DW3CSJ2	R43004	Provided by Lab
B.	Laptop	DELL	E6420	482T3R1	FCC DoC	Provided by Lab

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.	DC Cable	1	1.8	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	1	10	No	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 15.247 Meas Guidance v05r02
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

Note:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 03, 2019	July 02, 2020
Pre-Amplifier EMCI	EMC001340	980142	May 30, 2019	May 29, 2020
Loop Antenna Electro-Metrics	EM-6879	264	Jan. 22, 2019	Jan. 21, 2020
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Oct. 30, 2018	Oct. 29, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-4-1	Mar. 19, 2019	Mar. 18, 2020
RF Cable	8D	966-4-2	Mar. 19, 2019	Mar. 18, 2020
RF Cable	8D	966-4-3	Mar. 19, 2019	Mar. 18, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980385	Aug. 15, 2019	Aug. 14, 2020
RF Cable	EMC104-SM-SM-1200	160923	Jan. 28, 2019	Jan. 27, 2020
RF Cable	104 RF cable	131215	Jan. 10, 2019	Jan. 09, 2020
RF Cable	EMC104-SM-SM-6000	180418	May 03, 2019	May 02, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 04, 2019	June 03, 2020
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020

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. 4.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Aug. 22 to 23, 2019

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

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

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

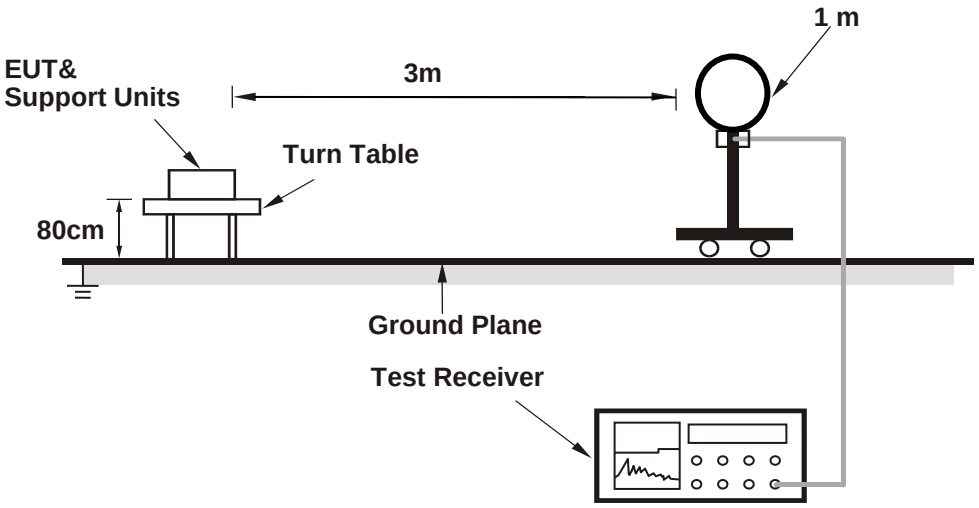
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

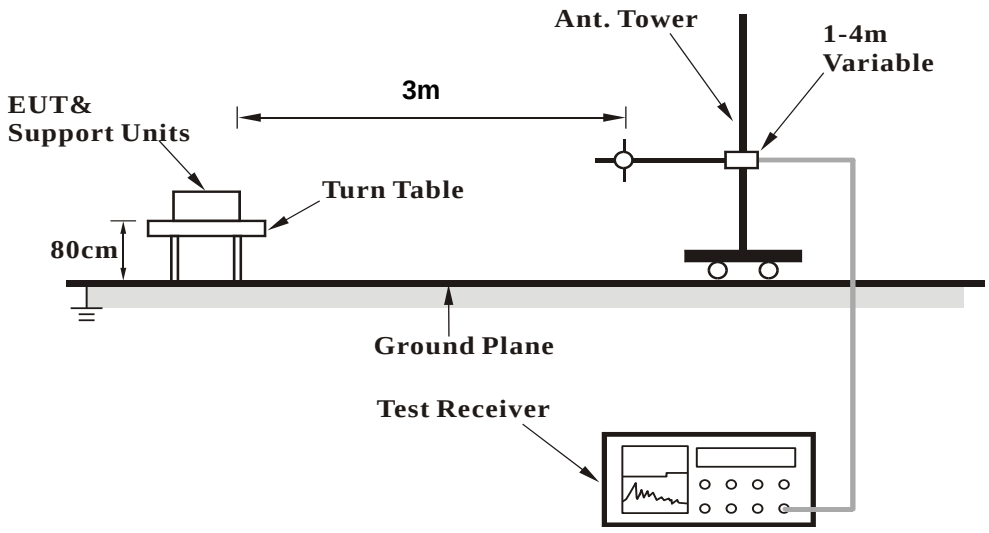
No deviation.

4.1.5 Test Setup

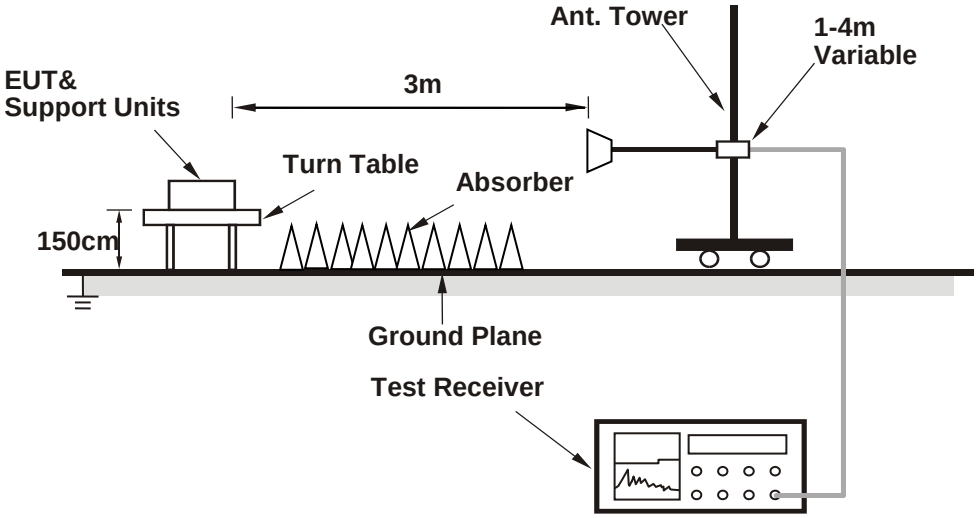
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (QSPR (5.0-00140)) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

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	56.0 PK	74.0	-18.0	2.11 H	156	57.6	-1.6
2	2390.00	43.8 AV	54.0	-10.2	2.11 H	156	45.4	-1.6
3	*2412.00	112.7 PK			2.11 H	156	114.4	-1.7
4	*2412.00	110.1 AV			2.11 H	156	111.8	-1.7
5	4824.00	52.4 PK	74.0	-21.6	2.30 H	223	50.1	2.3
6	4824.00	50.3 AV	54.0	-3.7	2.30 H	223	48.0	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.3 PK	74.0	-17.7	3.13 V	45	57.9	-1.6
2	2390.00	44.0 AV	54.0	-10.0	3.13 V	45	45.6	-1.6
3	*2412.00	122.6 PK			3.13 V	45	124.3	-1.7
4	*2412.00	120.0 AV			3.13 V	45	121.7	-1.7
5	4824.00	53.3 PK	74.0	-20.7	2.14 V	217	51.0	2.3
6	4824.00	51.8 AV	54.0	-2.2	2.14 V	217	49.5	2.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	55.9 PK	74.0	-18.1	2.09 H	147	57.5	-1.6
2	2390.00	43.2 AV	54.0	-10.8	2.09 H	147	44.8	-1.6
3	*2437.00	112.3 PK			2.09 H	147	114.1	-1.8
4	*2437.00	110.0 AV			2.09 H	147	111.8	-1.8
5	2483.50	59.0 PK	74.0	-15.0	2.09 H	147	60.7	-1.7
6	2483.50	45.5 AV	54.0	-8.5	2.09 H	147	47.2	-1.7
7	4874.00	49.9 PK	74.0	-24.1	1.83 H	233	47.5	2.4
8	4874.00	47.7 AV	54.0	-6.3	1.83 H	233	45.3	2.4
9	7311.00	45.1 PK	74.0	-28.9	1.62 H	266	35.9	9.2
10	7311.00	33.8 AV	54.0	-20.2	1.62 H	266	24.6	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	56.4 PK	74.0	-17.6	2.79 V	69	58.0	-1.6
2	2390.00	43.8 AV	54.0	-10.2	2.79 V	69	45.4	-1.6
3	*2437.00	123.7 PK			2.79 V	69	125.5	-1.8
4	*2437.00	121.3 AV			2.79 V	69	123.1	-1.8
5	2483.50	59.4 PK	74.0	-14.6	2.79 V	69	61.1	-1.7
6	2483.50	46.0 AV	54.0	-8.0	2.79 V	69	47.7	-1.7
7	4874.00	54.6 PK	74.0	-19.4	1.93 V	216	52.2	2.4
8	4874.00	53.5 AV	54.0	-0.5	1.93 V	216	51.1	2.4
9	7311.00	45.6 PK	74.0	-28.4	1.70 V	181	36.4	9.2
10	7311.00	34.6 AV	54.0	-19.4	1.70 V	181	25.4	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	119.5 PK			2.06 H	159	121.3	-1.8
2	*2462.00	107.4 AV			2.06 H	159	109.2	-1.8
3	2483.50	57.1 PK	74.0	-16.9	2.06 H	159	58.8	-1.7
4	2483.50	44.9 AV	54.0	-9.1	2.06 H	159	46.6	-1.7
5	2488.70	49.8 PK	74.0	-24.2	2.08 H	138	51.5	-1.7
6	2488.70	47.5 AV	54.0	-6.5	2.08 H	138	49.2	-1.7
7	4924.00	52.1 PK	74.0	-21.9	2.21 H	224	49.6	2.5
8	4924.00	50.2 AV	54.0	-3.8	2.21 H	224	47.7	2.5
9	7386.00	56.0 PK	74.0	-18.0	1.77 H	265	46.6	9.4
10	7386.00	43.9 AV	54.0	-10.1	1.77 H	265	34.5	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	119.7 PK			2.32 V	38	121.5	-1.8
2	*2462.00	117.3 AV			2.32 V	38	119.1	-1.8
3	2483.50	58.9 PK	74.0	-15.1	2.32 V	38	60.6	-1.7
4	2483.50	45.7 AV	54.0	-8.3	2.32 V	38	47.4	-1.7
5	2488.70	61.9 PK	74.0	-12.1	2.32 V	38	63.6	-1.7
6	2488.70	53.7 AV	54.0	-0.3	2.32 V	38	55.4	-1.7
7	4924.00	52.6 PK	74.0	-21.4	3.05 V	211	50.1	2.5
8	4924.00	50.7 AV	54.0	-3.3	3.05 V	211	48.2	2.5
9	7386.00	56.9 PK	74.0	-17.1	1.60 V	177	47.5	9.4
10	7386.00	44.2 AV	54.0	-9.8	1.60 V	177	34.8	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	55.2 PK	74.0	-18.8	2.37 H	146	56.8	-1.6
2	2390.00	44.4 AV	54.0	-9.6	2.37 H	146	46.0	-1.6
3	*2412.00	113.3 PK			2.37 H	146	115.0	-1.7
4	*2412.00	104.9 AV			2.37 H	146	106.6	-1.7
5	4824.00	52.0 PK	74.0	-22.0	2.27 H	212	49.7	2.3
6	4824.00	50.0 AV	54.0	-4.0	2.27 H	212	47.7	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.6 PK	74.0	-17.4	2.79 V	66	58.2	-1.6
2	2390.00	44.6 AV	54.0	-9.4	2.79 V	66	46.2	-1.6
3	*2412.00	123.9 PK			2.79 V	66	125.6	-1.7
4	*2412.00	115.0 AV			2.79 V	66	116.7	-1.7
5	4824.00	52.7 PK	74.0	-21.3	3.01 V	203	50.4	2.3
6	4824.00	50.6 AV	54.0	-3.4	3.01 V	203	48.3	2.3

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.1 PK	74.0	-18.9	2.34 H	147	56.7	-1.6
2	2390.00	44.2 AV	54.0	-9.8	2.34 H	147	45.8	-1.6
3	*2437.00	113.6 PK			2.34 H	147	115.4	-1.8
4	*2437.00	105.1 AV			2.34 H	147	106.9	-1.8
5	2483.50	64.5 PK	74.0	-9.5	2.34 H	147	66.2	-1.7
6	2483.50	49.9 AV	54.0	-4.1	2.34 H	147	51.6	-1.7
7	4874.00	52.4 PK	74.0	-21.6	2.22 H	239	50.0	2.4
8	4874.00	50.6 AV	54.0	-3.4	2.22 H	239	48.2	2.4
9	7311.00	55.9 PK	74.0	-18.1	1.81 H	266	46.7	9.2
10	7311.00	43.6 AV	54.0	-10.4	1.81 H	266	34.4	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	55.8 PK	74.0	-18.2	2.86 V	64	57.4	-1.6
2	2390.00	43.6 AV	54.0	-10.4	2.86 V	64	45.2	-1.6
3	*2437.00	124.5 PK			2.86 V	64	126.3	-1.8
4	*2437.00	115.6 AV			2.86 V	64	117.4	-1.8
5	2483.50	64.8 PK	74.0	-9.2	2.86 V	64	66.5	-1.7
6	2483.50	50.2 AV	54.0	-3.8	2.86 V	64	51.9	-1.7
7	4874.00	52.0 PK	74.0	-22.0	3.08 V	205	49.6	2.4
8	4874.00	50.2 AV	54.0	-3.8	3.08 V	205	47.8	2.4
9	7311.00	56.9 PK	74.0	-17.1	1.60 V	187	47.7	9.2
10	7311.00	44.0 AV	54.0	-10.0	1.60 V	187	34.8	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	117.4 PK			2.33 H	152	119.2	-1.8
2	*2462.00	98.2 AV			2.33 H	152	100.0	-1.8
3	2483.50	64.0 PK	74.0	-10.0	2.33 H	152	65.7	-1.7
4	2483.50	49.2 AV	54.0	-4.8	2.33 H	152	50.9	-1.7
5	4924.00	49.0 PK	74.0	-25.0	2.20 H	243	46.5	2.5
6	4924.00	47.5 AV	54.0	-6.5	2.20 H	243	45.0	2.5
7	7386.00	55.2 PK	74.0	-18.8	1.85 H	267	45.8	9.4
8	7386.00	42.8 AV	54.0	-11.2	1.85 H	267	33.4	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	117.1 PK			2.77 V	86	118.9	-1.8
2	*2462.00	107.9 AV			2.77 V	86	109.7	-1.8
3	2483.50	69.5 PK	74.0	-4.5	2.77 V	86	71.2	-1.7
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**2.77 V**	**86**	**55.6**	**-1.7**
5	4924.00	49.1 PK	74.0	-24.9	3.13 V	202	46.6	2.5
6	4924.00	47.6 AV	54.0	-6.4	3.13 V	202	45.1	2.5
7	7386.00	54.6 PK	74.0	-19.4	1.56 V	168	45.2	9.4
8	7386.00	41.8 AV	54.0	-12.2	1.56 V	168	32.4	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11ax (HE20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.0 PK	74.0	-11.0	2.34 H	158	64.6	-1.6
2	2390.00	47.6 AV	54.0	-6.4	2.34 H	158	49.2	-1.6
3	*2412.00	114.1 PK			2.34 H	158	115.8	-1.7
4	*2412.00	105.5 AV			2.34 H	158	107.2	-1.7
5	4824.00	49.7 PK	74.0	-24.3	2.14 H	242	47.4	2.3
6	4824.00	48.0 AV	54.0	-6.0	2.14 H	242	45.7	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.3 PK	74.0	-9.7	2.63 V	34	65.9	-1.6
2	2390.00	49.0 AV	54.0	-5.0	2.63 V	34	50.6	-1.6
3	*2412.00	128.2 PK			2.63 V	34	129.9	-1.7
4	*2412.00	115.3 AV			2.63 V	34	117.0	-1.7
5	4824.00	49.4 PK	74.0	-24.6	3.16 V	215	47.1	2.3
6	4824.00	47.6 AV	54.0	-6.4	3.16 V	215	45.3	2.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	56.0 PK	74.0	-18.0	2.35 H	148	57.6	-1.6
2	2390.00	42.9 AV	54.0	-11.1	2.35 H	148	44.5	-1.6
3	*2437.00	113.9 PK			2.35 H	148	115.7	-1.8
4	*2437.00	105.1 AV			2.35 H	148	106.9	-1.8
5	2483.50	63.7 PK	74.0	-10.3	2.35 H	148	65.4	-1.7
6	2483.50	48.1 AV	54.0	-5.9	2.35 H	148	49.8	-1.7
7	4874.00	48.4 PK	74.0	-25.6	2.23 H	259	46.0	2.4
8	4874.00	47.2 AV	54.0	-6.8	2.23 H	259	44.8	2.4
9	7311.00	55.5 PK	74.0	-18.5	1.82 H	252	46.3	9.2
10	7311.00	43.2 AV	54.0	-10.8	1.82 H	252	34.0	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	56.3 PK	74.0	-17.7	2.63 V	10	57.9	-1.6
2	2390.00	43.2 AV	54.0	-10.8	2.63 V	10	44.8	-1.6
3	*2437.00	128.9 PK			2.63 V	10	130.7	-1.8
4	*2437.00	116.6 AV			2.63 V	10	118.4	-1.8
5	2483.50	67.5 PK	74.0	-6.5	2.63 V	10	69.2	-1.7
6	2483.50	51.2 AV	54.0	-2.8	2.63 V	10	52.9	-1.7
7	4874.00	49.3 PK	74.0	-24.7	3.12 V	207	46.9	2.4
8	4874.00	47.2 AV	54.0	-6.8	3.12 V	207	44.8	2.4
9	7311.00	53.8 PK	74.0	-20.2	1.61 V	155	44.6	9.2
10	7311.00	41.3 AV	54.0	-12.7	1.61 V	155	32.1	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.4 PK			2.33 H	160	112.2	-1.8
2	*2462.00	98.3 AV			2.33 H	160	100.1	-1.8
3	2483.50	63.2 PK	74.0	-10.8	2.33 H	160	64.9	-1.7
4	2483.50	47.8 AV	54.0	-6.2	2.33 H	160	49.5	-1.7
5	4924.00	46.9 PK	74.0	-27.1	2.32 H	249	44.4	2.5
6	4924.00	45.3 AV	54.0	-8.7	2.32 H	249	42.8	2.5
7	7386.00	54.6 PK	74.0	-19.4	1.83 H	251	45.2	9.4
8	7386.00	42.4 AV	54.0	-11.6	1.83 H	251	33.0	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	118.3 PK			1.51 V	46	120.1	-1.8
2	*2462.00	106.3 AV			1.51 V	46	108.1	-1.8
3	2483.50	68.2 PK	74.0	-5.8	1.51 V	46	69.9	-1.7
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**1.51 V**	**46**	**55.6**	**-1.7**
5	4924.00	46.1 PK	74.0	-27.9	3.16 V	196	43.6	2.5
6	4924.00	44.3 AV	54.0	-9.7	3.16 V	196	41.8	2.5
7	7386.00	54.2 PK	74.0	-19.8	1.57 V	160	44.8	9.4
8	7386.00	41.3 AV	54.0	-12.7	1.57 V	160	31.9	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11ax (HE40)

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	63.7 PK	74.0	-10.3	2.30 H	148	65.3	-1.6
2	2390.00	47.9 AV	54.0	-6.1	2.30 H	148	49.5	-1.6
3	*2422.00	114.0 PK			2.30 H	148	115.7	-1.7
4	*2422.00	101.9 AV			2.30 H	148	103.6	-1.7
5	4844.00	48.9 PK	74.0	-25.1	2.26 H	237	46.7	2.2
6	4844.00	47.6 AV	54.0	-6.4	2.26 H	237	45.4	2.2
7	7266.00	55.8 PK	74.0	-18.2	1.84 H	277	46.8	9.0
8	7266.00	43.1 AV	54.0	-10.9	1.84 H	277	34.1	9.0
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	70.3 PK	74.0	-3.7	2.10 V	8	71.9	-1.6
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**2.10 V**	**8**	**55.5**	**-1.6**
3	*2422.00	123.8 PK			2.10 V	8	125.5	-1.7
4	*2422.00	111.8 AV			2.10 V	8	113.5	-1.7
5	4844.00	49.0 PK	74.0	-25.0	3.20 V	190	46.8	2.2
6	4844.00	46.8 AV	54.0	-7.2	3.20 V	190	44.6	2.2
7	7266.00	53.6 PK	74.0	-20.4	1.62 V	179	44.6	9.0
8	7266.00	41.0 AV	54.0	-13.0	1.62 V	179	32.0	9.0

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.5 PK	74.0	-18.5	2.28 H	143	57.1	-1.6
2	2390.00	43.3 AV	54.0	-10.7	2.28 H	143	44.9	-1.6
3	*2437.00	113.6 PK			2.28 H	143	115.4	-1.8
4	*2437.00	100.1 AV			2.28 H	143	101.9	-1.8
5	2483.50	55.6 PK	74.0	-18.4	2.28 H	143	57.3	-1.7
6	2483.50	43.5 AV	54.0	-10.5	2.28 H	143	45.2	-1.7
7	2493.90	63.8 PK	74.0	-10.2	2.28 H	143	65.5	-1.7
8	2493.90	48.2 AV	54.0	-5.8	2.28 H	143	49.9	-1.7
9	4874.00	48.5 PK	74.0	-25.5	2.30 H	252	46.1	2.4
10	4874.00	47.3 AV	54.0	-6.7	2.30 H	252	44.9	2.4
11	7311.00	56.0 PK	74.0	-18.0	1.83 H	270	46.8	9.2
12	7311.00	43.5 AV	54.0	-10.5	1.83 H	270	34.3	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	55.8 PK	74.0	-18.2	1.75 V	30	57.4	-1.6
2	2390.00	43.6 AV	54.0	-10.4	1.75 V	30	45.2	-1.6
3	*2437.00	123.2 PK			1.75 V	30	125.0	-1.8
4	*2437.00	109.7 AV			1.75 V	30	111.5	-1.8
5	2483.50	56.0 PK	74.0	-18.0	1.75 V	30	57.7	-1.7
6	2483.50	44.0 AV	54.0	-10.0	1.75 V	30	45.7	-1.7
7	2493.90	68.0 PK	74.0	-6.0	1.75 V	30	69.7	-1.7
8	**2493.90**	**53.9 AV**	**54.0**	**-0.1**	**1.75 V**	**30**	**55.6**	**-1.7**
9	4874.00	48.8 PK	74.0	-25.2	3.23 V	180	46.4	2.4
10	4874.00	46.4 AV	54.0	-7.6	3.23 V	180	44.0	2.4
11	7311.00	53.4 PK	74.0	-20.6	1.59 V	180	44.2	9.2
12	7311.00	40.6 AV	54.0	-13.4	1.59 V	180	31.4	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	106.2 PK			2.30 H	143	108.0	-1.8
2	*2452.00	94.5 AV			2.30 H	143	96.3	-1.8
3	2483.50	55.3 PK	74.0	-18.7	2.30 H	143	57.0	-1.7
4	2483.50	43.0 AV	54.0	-11.0	2.30 H	143	44.7	-1.7
5	2486.70	64.1 PK	74.0	-9.9	2.30 H	143	65.8	-1.7
6	2486.70	48.3 AV	54.0	-5.7	2.30 H	143	50.0	-1.7
7	4904.00	46.9 PK	74.0	-27.1	2.25 H	265	44.4	2.5
8	4904.00	45.2 AV	54.0	-8.8	2.25 H	265	42.7	2.5
9	7356.00	54.8 PK	74.0	-19.2	1.87 H	266	45.6	9.2
10	7356.00	43.1 AV	54.0	-10.9	1.87 H	266	33.9	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	*2452.00	114.0 PK			1.96 V	26	115.8	-1.8
2	*2452.00	102.4 AV			1.96 V	26	104.2	-1.8
3	2483.50	55.5 PK	74.0	-18.5	1.96 V	26	57.2	-1.7
4	2483.50	43.2 AV	54.0	-10.8	1.96 V	26	44.9	-1.7
5	2486.70	68.7 PK	74.0	-5.3	1.96 V	26	70.4	-1.7
6	2486.70	53.6 AV	54.0	-0.4	1.96 V	26	55.3	-1.7
7	4904.00	47.0 PK	74.0	-27.0	3.18 V	205	44.5	2.5
8	4904.00	44.8 AV	54.0	-9.2	3.18 V	205	42.3	2.5
9	7356.00	54.1 PK	74.0	-19.9	1.56 V	137	44.9	9.2
10	7356.00	41.3 AV	54.0	-12.7	1.56 V	137	32.1	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

Below 1GHz Data:

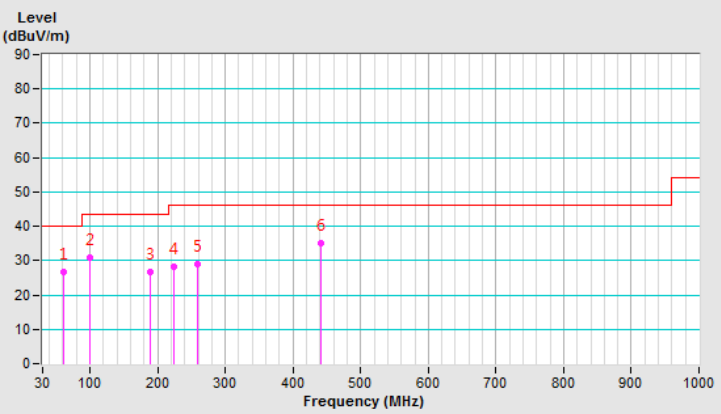
802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	61.34	26.6 QP	40.0	-13.4	1.00 H	293	35.7	-9.1
2	100.54	30.7 QP	43.5	-12.8	1.50 H	225	42.6	-11.9
3	189.48	26.8 QP	43.5	-16.7	1.50 H	99	36.9	-10.1
4	223.36	28.2 QP	46.0	-17.8	1.50 H	266	38.4	-10.2
5	259.83	28.9 QP	46.0	-17.1	2.00 H	44	37.3	-8.4
6	441.68	35.1 QP	46.0	-10.9	1.50 H	221	37.8	-2.7

REMARKS:

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

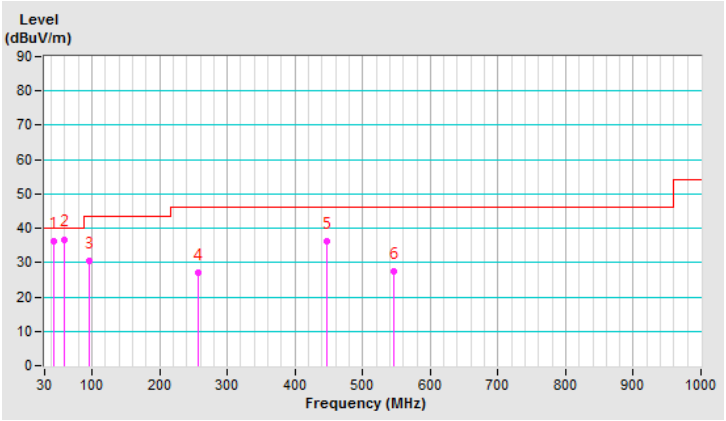


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	43.04	36.3 QP	40.0	-3.7	1.00 V	314	44.7	-8.4
2	59.98	36.8 QP	40.0	-3.2	1.00 V	348	45.4	-8.6
3	96.57	30.5 QP	43.5	-13.0	1.00 V	236	43.0	-12.5
4	256.02	27.2 QP	46.0	-18.8	1.50 V	196	35.8	-8.6
5	448.02	36.3 QP	46.0	-9.7	1.50 V	112	38.9	-2.6
6	545.68	27.5 QP	46.0	-18.5	1.00 V	309	28.4	-0.9

REMARKS:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 14, 2019	Mar. 13, 2020
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: Aug. 21, 2019

4.2.3 Test Procedures

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

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

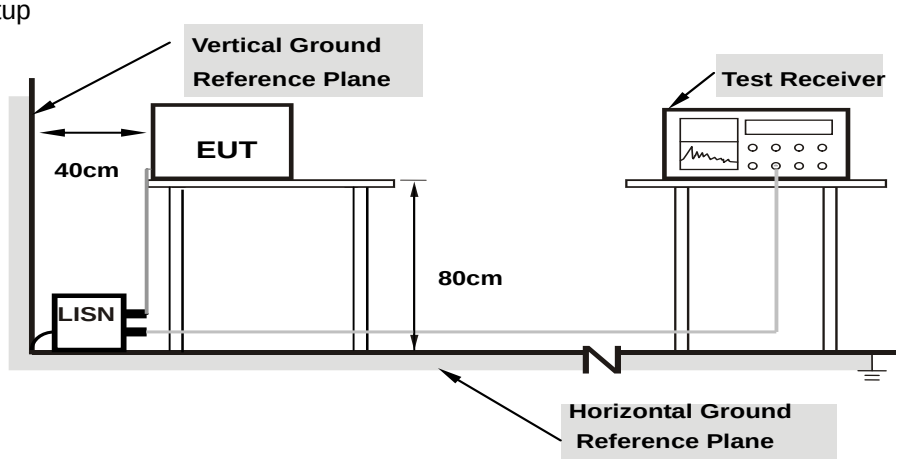
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

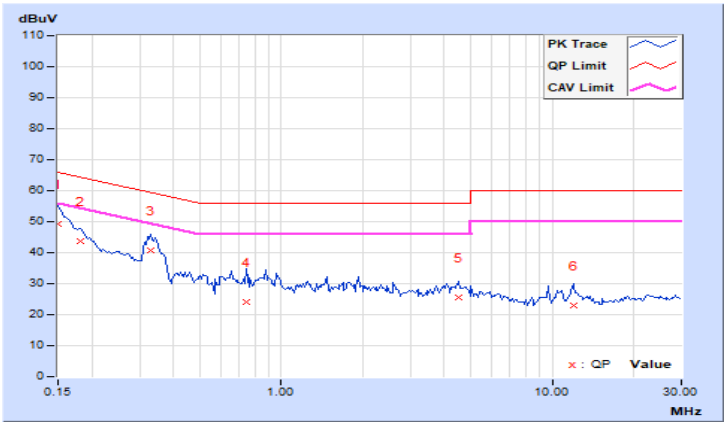
4.2.7 Test Results

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.96	39.30	22.41	49.26	32.37	66.00	56.00	-16.74	-23.63
2	0.18125	9.97	33.58	18.59	43.55	28.56	64.43	54.43	-20.88	-25.87
3	0.32969	9.98	30.65	21.62	40.63	31.60	59.46	49.46	-18.83	-17.86
4	0.74766	10.01	14.13	5.76	24.14	15.77	56.00	46.00	-31.86	-30.23
5	4.51172	10.29	15.26	8.72	25.55	19.01	56.00	46.00	-30.45	-26.99
6	12.02734	10.79	12.28	7.15	23.07	17.94	60.00	50.00	-36.93	-32.06

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

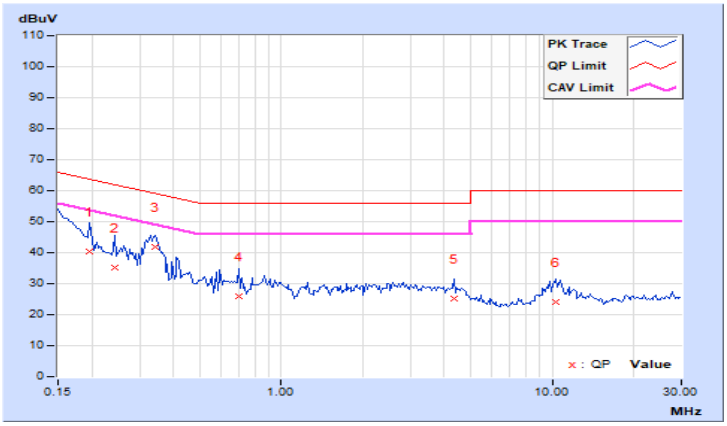


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19687	9.95	30.38	13.73	40.33	23.68	63.74	53.74	-23.41	-30.06
2	0.24375	9.95	25.40	13.05	35.35	23.00	61.97	51.97	-26.62	-28.97
3	**0.34141**	**9.96**	**31.97**	**27.44**	**41.93**	**37.40**	**59.17**	**49.17**	**-17.24**	**-11.77**
4	0.70078	9.99	15.79	8.27	25.78	18.26	56.00	46.00	-30.22	-27.74
5	4.35547	10.21	14.99	9.13	25.20	19.34	56.00	46.00	-30.80	-26.66
6	10.38281	10.57	13.51	8.69	24.08	19.26	60.00	50.00	-35.92	-30.74

Remarks:

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

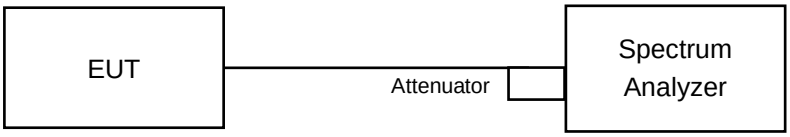


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

CDD Mode

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	8.06	8.08	8.05	8.10	0.5	Pass
6	2437	7.58	7.59	8.09	8.08	0.5	Pass
11	2462	8.05	8.08	7.60	8.09	0.5	Pass

802.11g

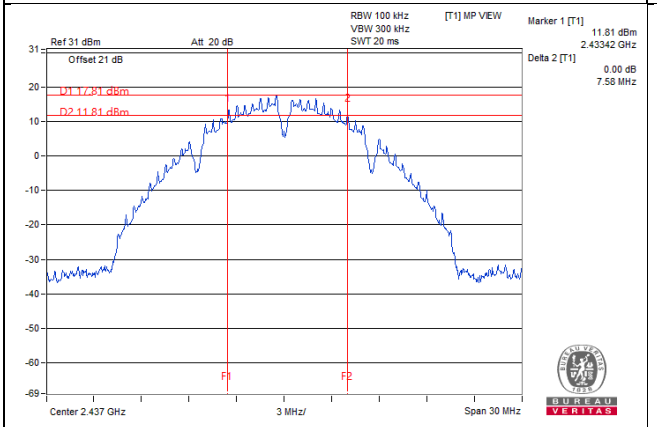
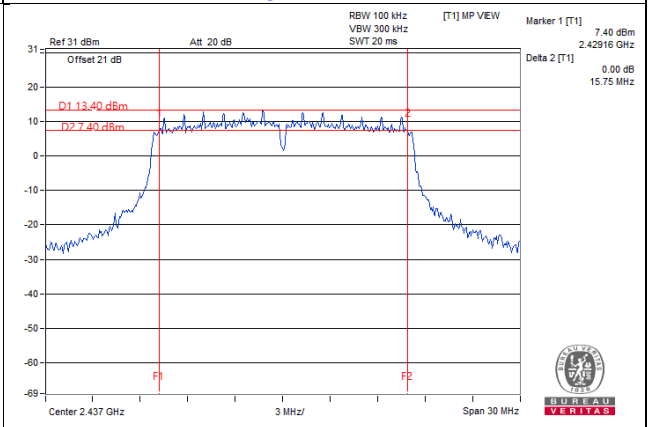
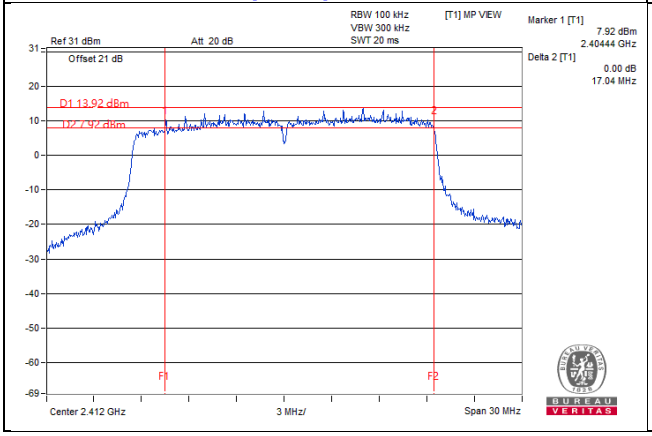
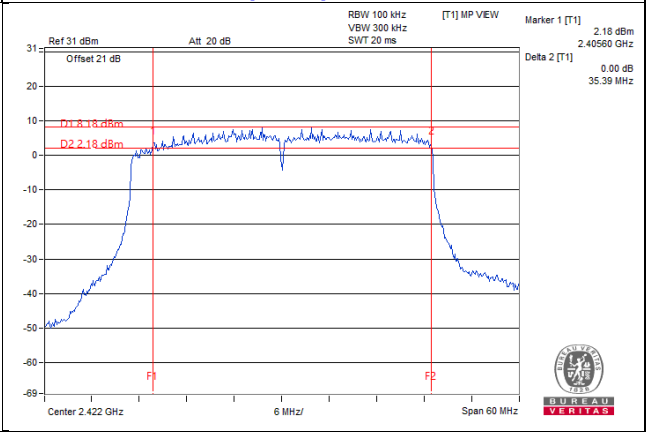
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	15.94	16.00	15.97	15.77	0.5	Pass
6	2437	16.34	15.75	16.34	16.36	0.5	Pass
11	2462	16.35	15.77	16.01	16.36	0.5	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	18.71	18.95	17.04	18.59	0.5	Pass
6	2437	18.92	18.60	18.89	18.84	0.5	Pass
11	2462	18.81	18.74	19.03	19.02	0.5	Pass

802.11ax (HE40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
3	2422	35.39	36.60	36.55	36.44	0.5	Pass
6	2437	38.00	37.55	38.09	37.96	0.5	Pass
9	2452	38.13	38.01	38.07	37.94	0.5	Pass

Spectrum Plot of Worst Value	
802.11b_Chain 0 / CH6	**802.11g_Chain 1 / CH6**
	
802.11ax (HE20)_Chain 2 / CH1	**802.11ax (HE40)_Chain 0 / CH3**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

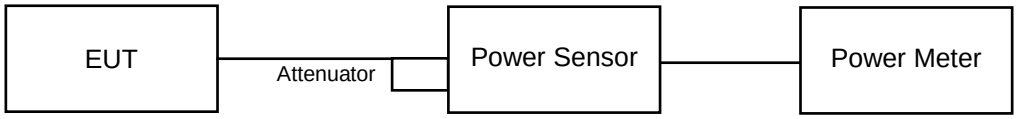
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

Non-Beamforming 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	23.96	24.15	23.73	23.81	985.386	29.94	30.00	Pass
6	2437	23.77	23.76	24.05	24.19	992.435	29.97	30.00	Pass
11	2462	21.51	21.95	21.37	22.15	599.401	27.78	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	23.72	24.02	23.72	24.04	976.871	29.90	30.00	Pass
6	2437	23.57	23.55	23.77	23.74	928.798	29.68	30.00	Pass
11	2462	22.47	22.72	22.48	22.63	723.914	28.60	30.00	Pass

VHT20

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	23.71	24.11	23.46	24.35	986.685	29.94	30.00	Pass
6	2437	23.51	23.63	23.72	23.82	931.559	29.69	30.00	Pass
11	2462	21.68	22.22	21.97	21.96	628.39	27.98	30.00	Pass

VHT40

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	21.09	21.97	21.68	22.24	600.652	27.79	30.00	Pass
6	2437	19.38	19.52	19.67	19.63	360.748	25.57	30.00	Pass
9	2452	15.36	15.48	15.08	15.56	137.86	21.39	30.00	Pass

802.11ax (HE20)

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	23.71	24.11	23.46	24.35	986.685	29.94	30.00	Pass
6	2437	23.51	23.63	23.72	23.82	931.559	29.69	30.00	Pass
11	2462	21.68	22.22	21.97	21.96	628.39	27.98	30.00	Pass

802.11ax (HE40)

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	21.09	21.97	21.68	22.24	600.652	27.79	30.00	Pass
6	2437	19.38	19.52	19.67	19.63	360.748	25.57	30.00	Pass
9	2452	15.36	15.48	15.08	15.56	137.86	21.39	30.00	Pass

Beamforming Mode

VHT20

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	23.71	24.11	23.46	24.35	986.685	29.94	29.99	Pass
6	2437	23.51	23.63	23.72	23.82	931.559	29.69	29.99	Pass
11	2462	21.68	22.22	21.97	21.96	628.39	27.98	29.99	Pass

Note: 1. The directional gain = 6.01dBi > 6dBi , so the power limit shall be reduced to 30.00-(6.01-6) = 29.99dBm.

VHT40

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	21.09	21.97	21.68	22.24	600.652	27.79	29.99	Pass
6	2437	19.38	19.52	19.67	19.63	360.748	25.57	29.99	Pass
9	2452	15.36	15.48	15.08	15.56	137.86	21.39	29.99	Pass

Note: 1. The directional gain = 6.01dBi > 6dBi , so the power limit shall be reduced to 30.00-(6.01-6) = 29.99dBm.

802.11ax (HE20)

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	23.71	24.11	23.46	24.35	986.685	29.94	29.99	Pass
6	2437	23.51	23.63	23.72	23.82	931.559	29.69	29.99	Pass
11	2462	21.68	22.22	21.97	21.96	628.39	27.98	29.99	Pass

Note: 1. The directional gain = 6.01dBi > 6dBi , so the power limit shall be reduced to 30.00-(6.01-6) = 29.99dBm.

802.11ax (HE40)

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	21.09	21.97	21.68	22.24	600.652	27.79	29.99	Pass
6	2437	19.38	19.52	19.67	19.63	360.748	25.57	29.99	Pass
9	2452	15.36	15.48	15.08	15.56	137.86	21.39	29.99	Pass

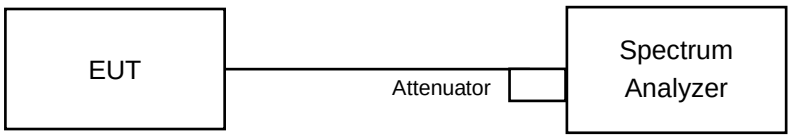
Note: 1. The directional gain = 6.01dBi > 6dBi , so the power limit shall be reduced to 30.00-(6.01-6) = 29.99dBm.

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

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.

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 W/O Duty Factor (dBm/3kHz)	10 log (N=4) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-11.12	6.02	1.22	-3.88	7.99	Pass
	6	2437	-10.04	6.02	1.22	-2.80	7.99	Pass
	11	2462	-11.22	6.02	1.22	-3.98	7.99	Pass
1	1	2412	-11.31	6.02	1.22	-4.07	7.99	Pass
	6	2437	-10.13	6.02	1.22	-2.89	7.99	Pass
	11	2462	-11.05	6.02	1.22	-3.81	7.99	Pass
2	1	2412	-11.79	6.02	1.22	-4.55	7.99	Pass
	6	2437	-9.25	6.02	1.22	-2.01	7.99	Pass
	11	2462	-11.53	6.02	1.22	-4.29	7.99	Pass
3	1	2412	-10.49	6.02	1.22	-3.25	7.99	Pass
	6	2437	-10.05	6.02	1.22	-2.81	7.99	Pass
	11	2462	-11.04	6.02	1.22	-3.80	7.99	Pass

Note: 1. The directional gain = 6.01dBi > 6dBi , so the power limit shall be reduced to 8-(6.01-6) = 7.99dBm.

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

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	-9.15	6.02	0.26	-2.87	7.99	Pass
	6	2437	-9.07	6.02	0.26	-2.79	7.99	Pass
	11	2462	-10.67	6.02	0.26	-4.39	7.99	Pass
1	1	2412	-8.98	6.02	0.26	-2.70	7.99	Pass
	6	2437	-8.91	6.02	0.26	-2.63	7.99	Pass
	11	2462	-11.23	6.02	0.26	-4.95	7.99	Pass
2	1	2412	-9.05	6.02	0.26	-2.77	7.99	Pass
	6	2437	-9.83	6.02	0.26	-3.55	7.99	Pass
	11	2462	-11.32	6.02	0.26	-5.04	7.99	Pass
3	1	2412	-8.34	6.02	0.26	-2.06	7.99	Pass
	6	2437	-9.40	6.02	0.26	-3.12	7.99	Pass
	11	2462	-10.68	6.02	0.26	-4.40	7.99	Pass

Note: 1. The directional gain = 6.01dBi > 6dBi , so the power limit shall be reduced to 8-(6.01-6) = 7.99dBm.

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

802.11ax (HE20)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=4) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-11.91	6.02	0.23	-5.66	7.99	Pass
	6	2437	-12.30	6.02	0.23	-6.05	7.99	Pass
	11	2462	-13.99	6.02	0.23	-7.74	7.99	Pass
1	1	2412	-11.63	6.02	0.23	-5.38	7.99	Pass
	6	2437	-12.39	6.02	0.23	-6.14	7.99	Pass
	11	2462	-14.56	6.02	0.23	-8.31	7.99	Pass
2	1	2412	-11.93	6.02	0.23	-5.68	7.99	Pass
	6	2437	-12.11	6.02	0.23	-5.86	7.99	Pass
	11	2462	-14.81	6.02	0.23	-8.56	7.99	Pass
3	1	2412	-11.80	6.02	0.23	-5.55	7.99	Pass
	6	2437	-12.45	6.02	0.23	-6.20	7.99	Pass
	11	2462	-14.83	6.02	0.23	-8.58	7.99	Pass

Note: 1. The directional gain = 6.01dBi > 6dBi , so the power limit shall be reduced to 8-(6.01-6) = 7.99dBm.

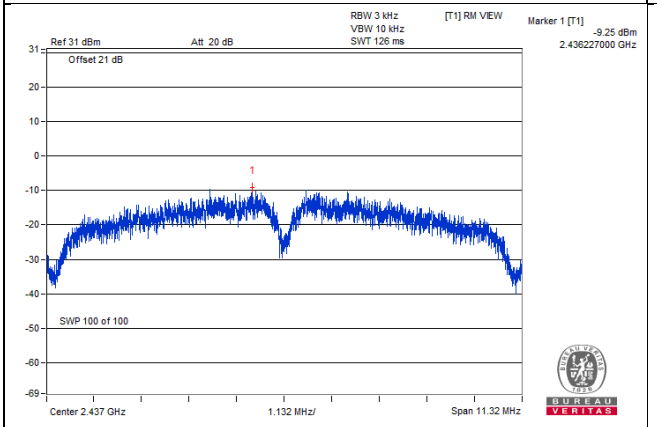
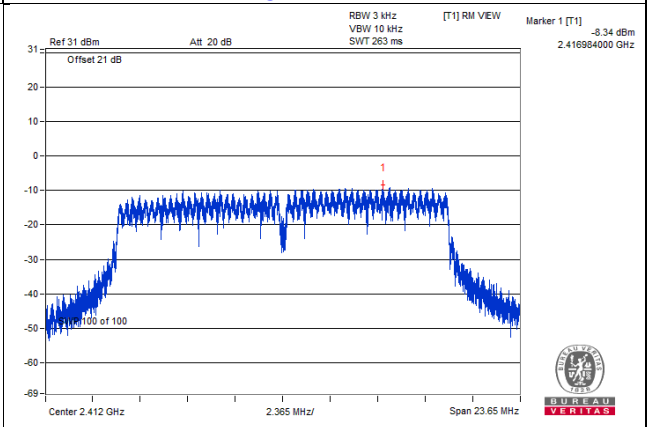
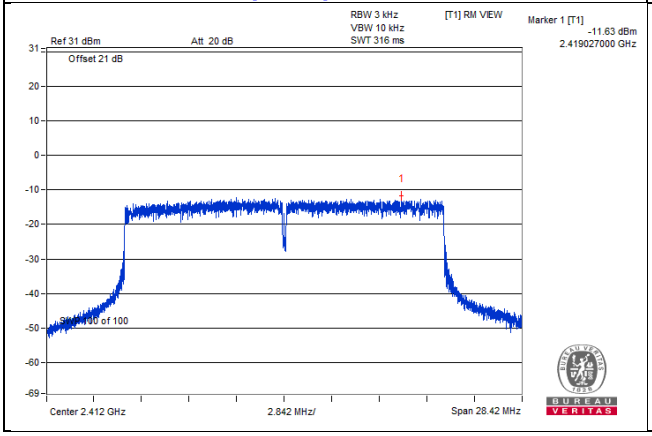
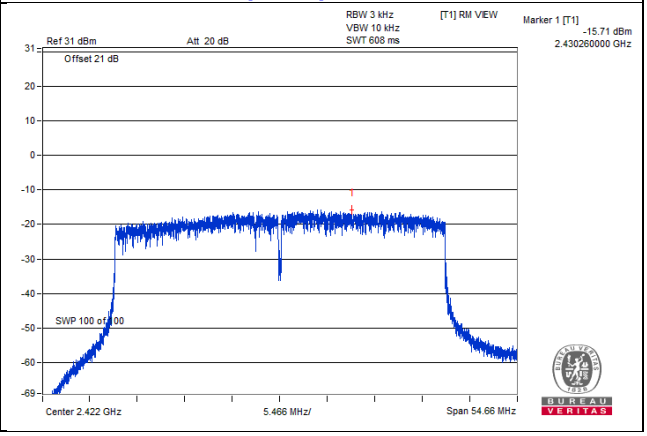
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE40)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=4) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-16.40	6.02	0.26	-10.12	7.99	Pass
	6	2437	-18.85	6.02	0.26	-12.57	7.99	Pass
	9	2452	-22.68	6.02	0.26	-16.40	7.99	Pass
1	3	2422	-16.24	6.02	0.26	-9.96	7.99	Pass
	6	2437	-18.86	6.02	0.26	-12.58	7.99	Pass
	9	2452	-23.27	6.02	0.26	-16.99	7.99	Pass
2	3	2422	-16.14	6.02	0.26	-9.86	7.99	Pass
	6	2437	-17.93	6.02	0.26	-11.65	7.99	Pass
	9	2452	-23.20	6.02	0.26	-16.92	7.99	Pass
3	3	2422	-15.71	6.02	0.26	-9.43	7.99	Pass
	6	2437	-18.97	6.02	0.26	-12.69	7.99	Pass
	9	2452	-23.75	6.02	0.26	-17.47	7.99	Pass

Note: 1. The directional gain = 6.01dBi > 6dBi , so the power limit shall be reduced to 8-(6.01-6) = 7.99dBm.

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

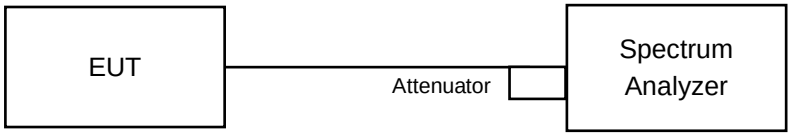
Spectrum Plot of Worst Value	
802.11b_Chain 2 / CH6	**802.11g_Chain 3 / CH1**
	
802.11ax (HE20)_Chain 1 / CH1	**802.11ax (HE40)_Chain 3 / CH3**
	

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

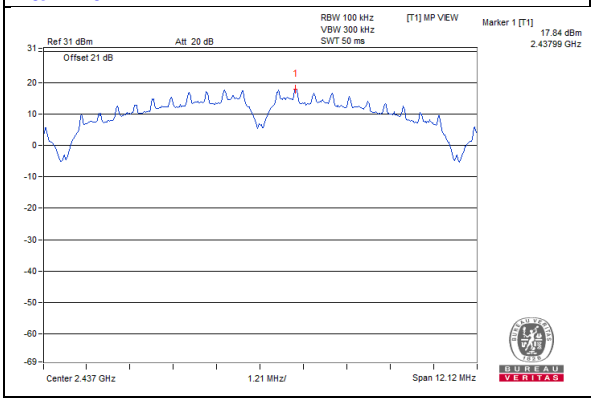
Same as Item 4.3.6

4.6.7 Test Results

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

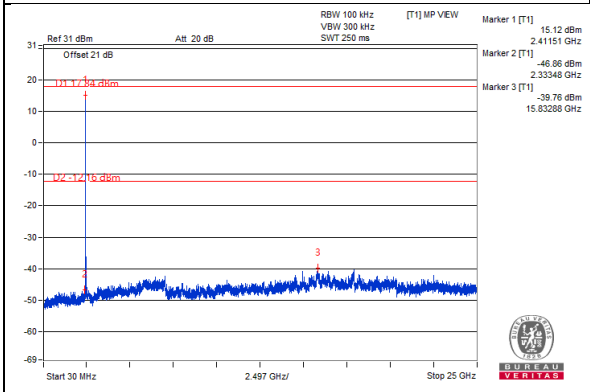
802.11b

Maximum REF

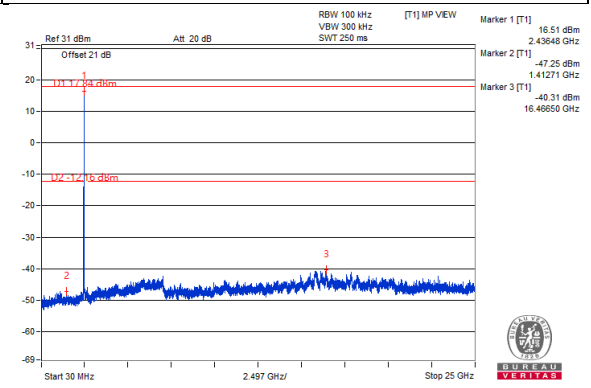


Chain 0

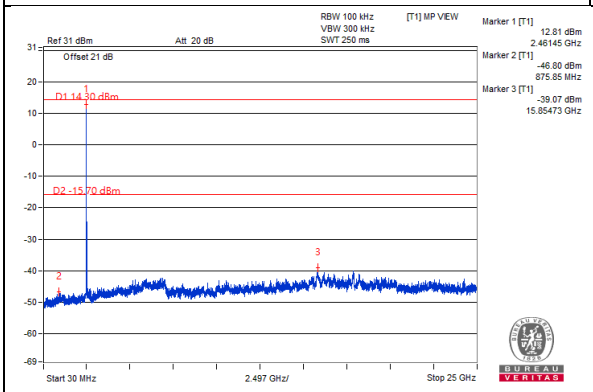
CH 1



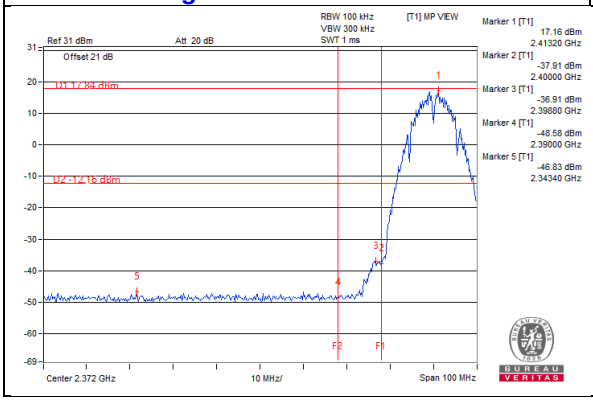
CH 6



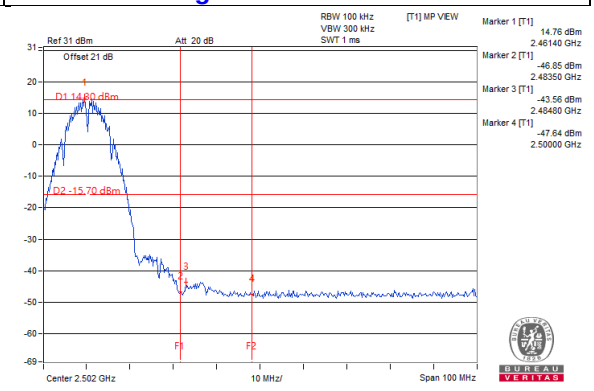
CH 11



CH 1 Band edge

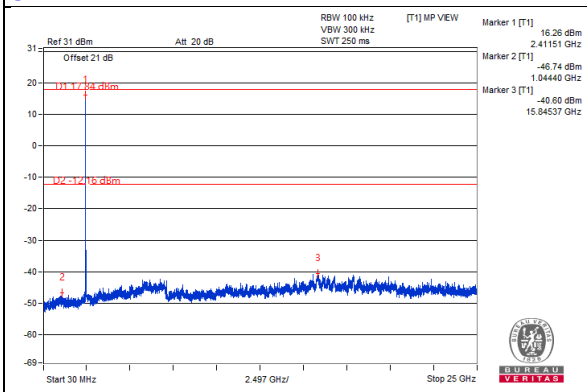


CH 11 Band edge

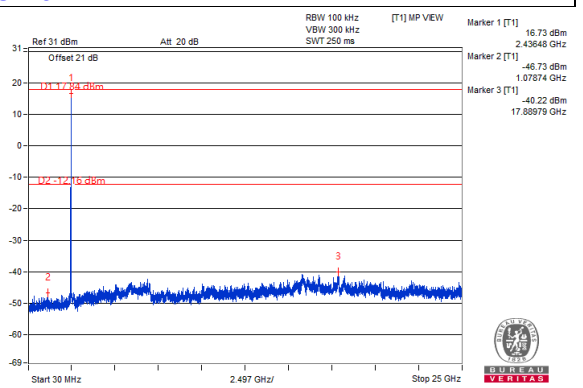


Chain 1

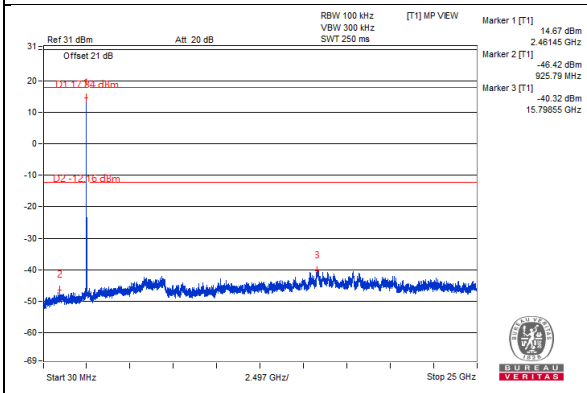
CH 1



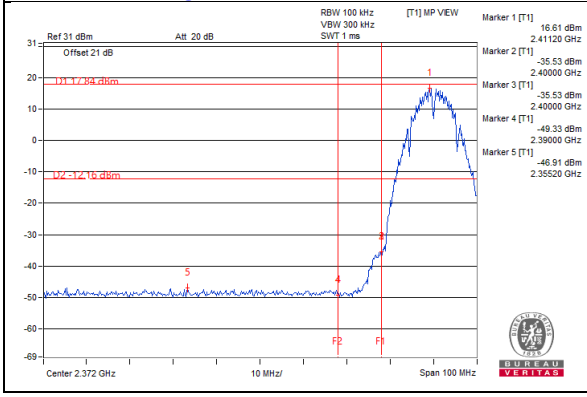
CH 6



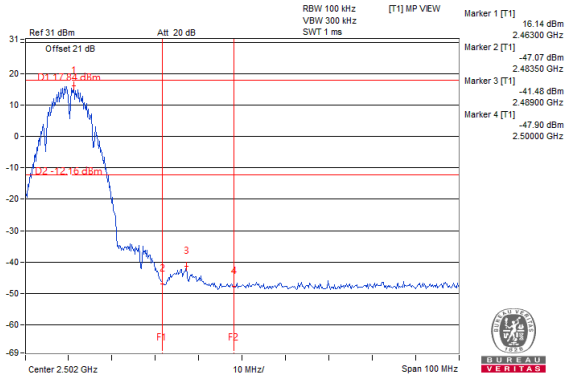
CH 11



CH 1 Band edge

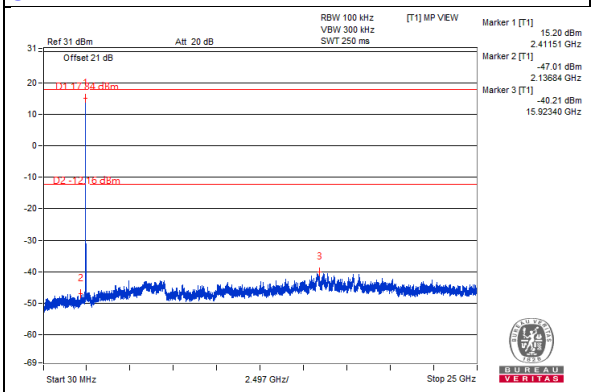


CH 11 Band edge

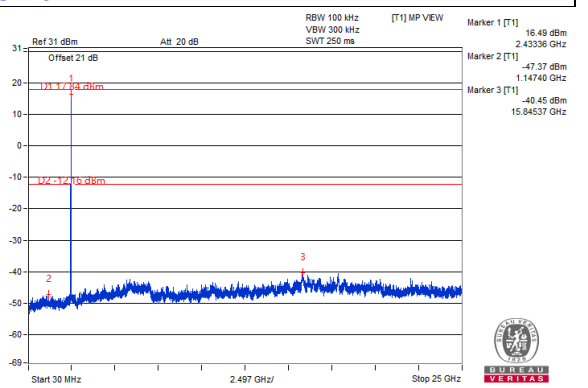


Chain 2

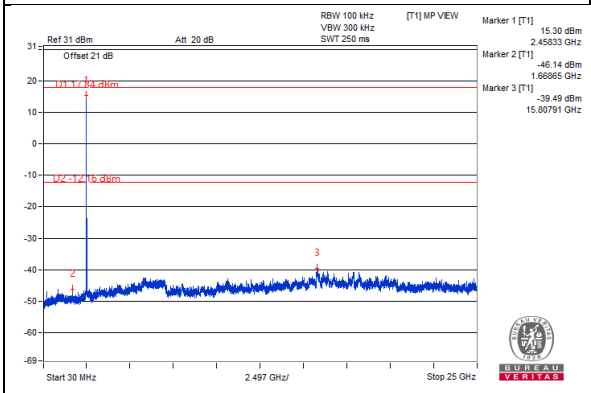
CH 1



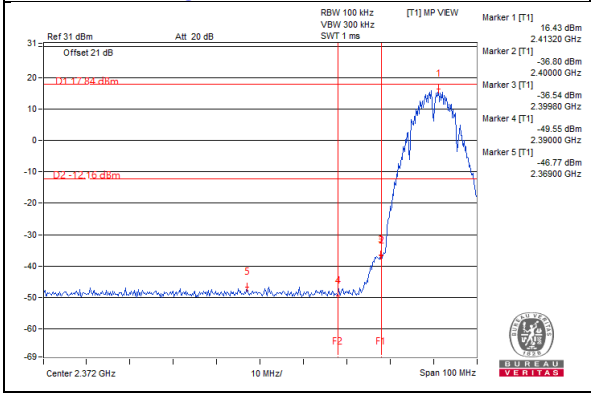
CH 6



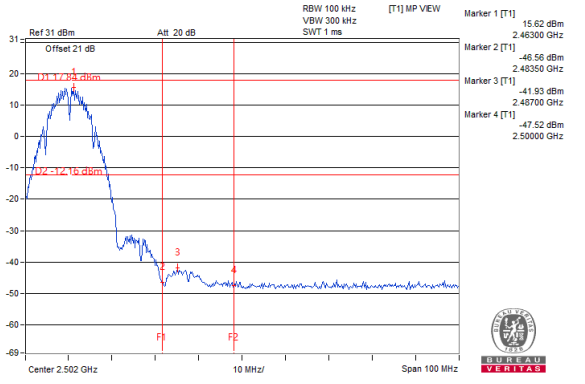
CH 11



CH 1 Band edge

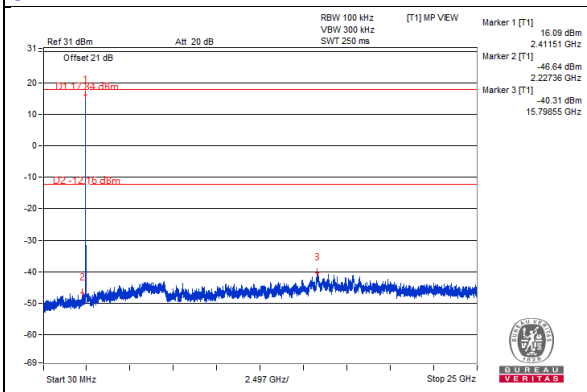


CH 11 Band edge

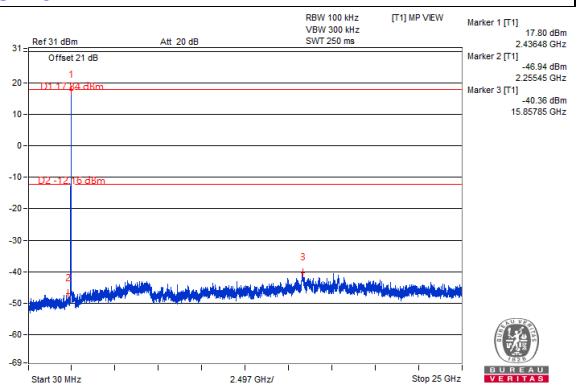


Chain 3

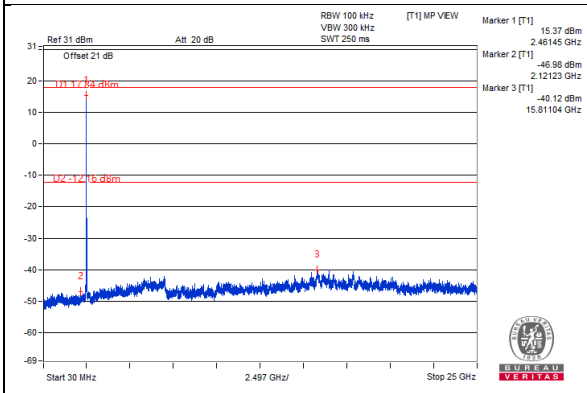
CH 1



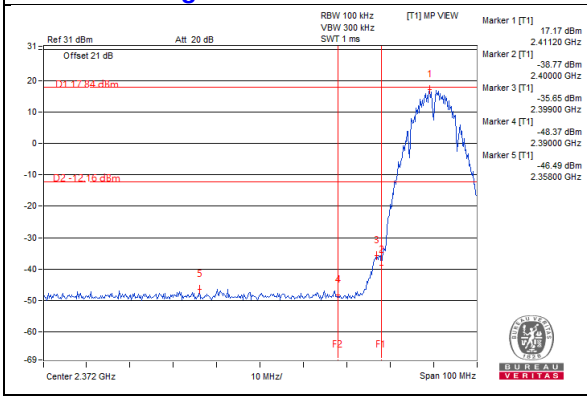
CH 6



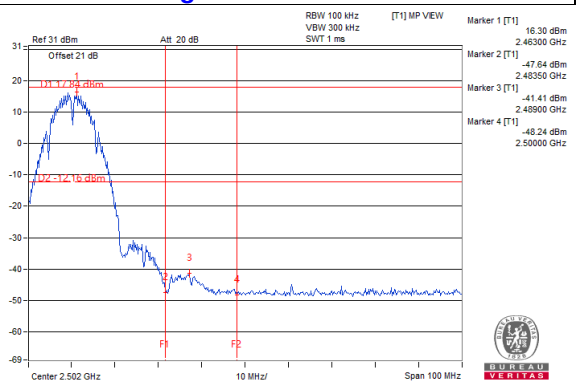
CH 11



CH 1 Band edge

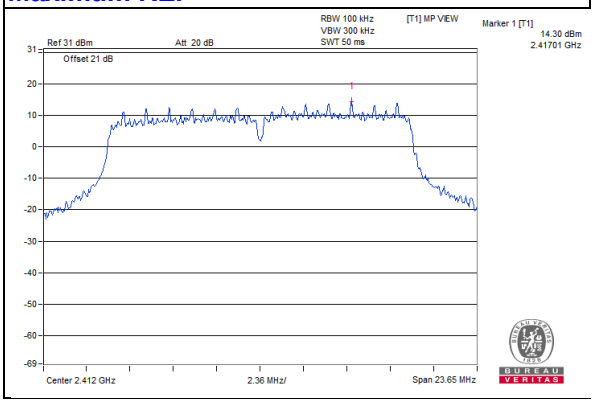


CH 11 Band edge



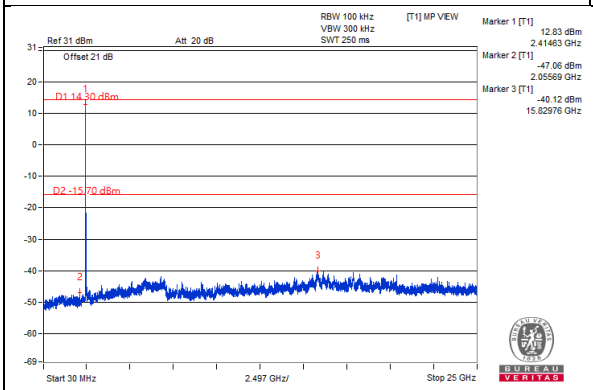
802.11g

Maximum REF

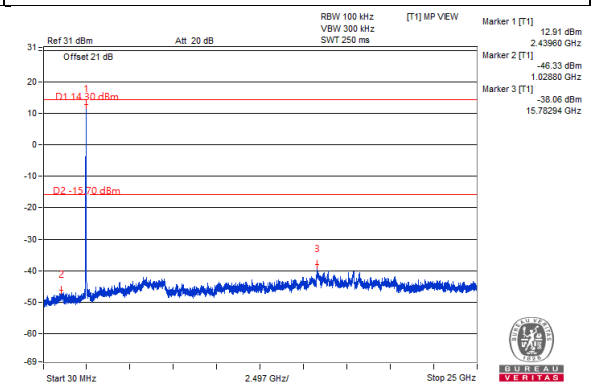


Chain 0

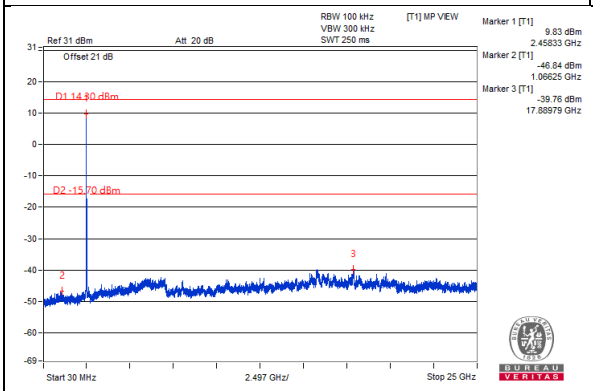
CH 1



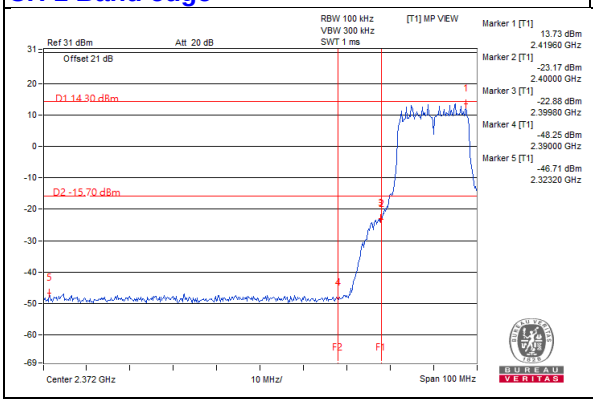
CH 6



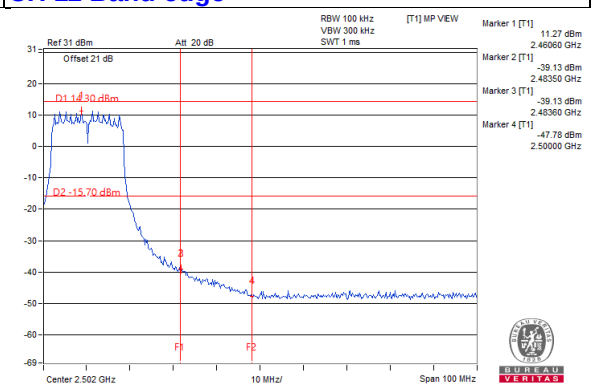
CH 11



CH 1 Band edge

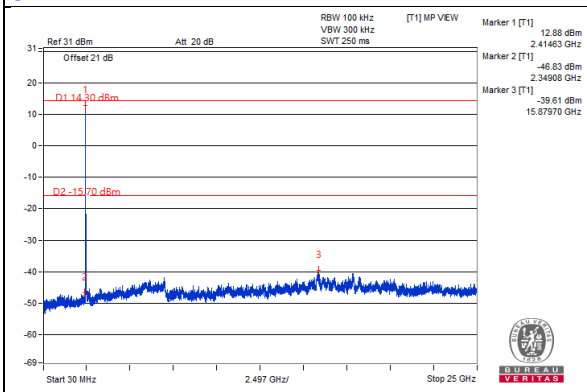


CH 11 Band edge

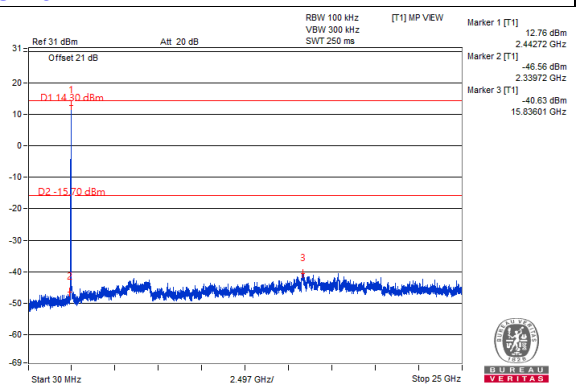


Chain 1

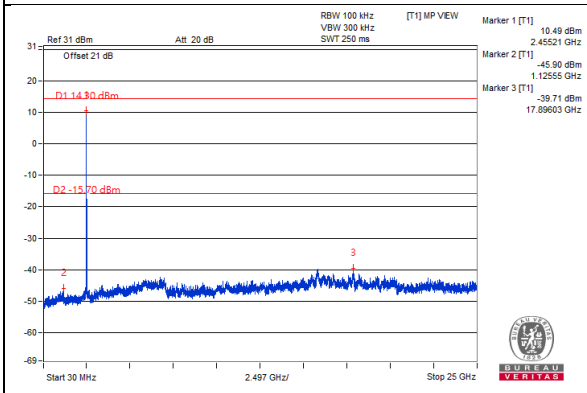
CH 1



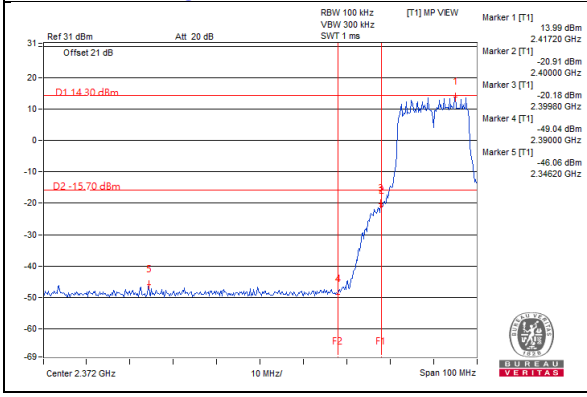
CH 6



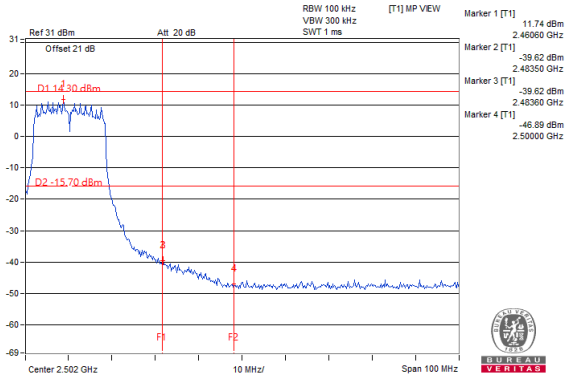
CH 11



CH 1 Band edge

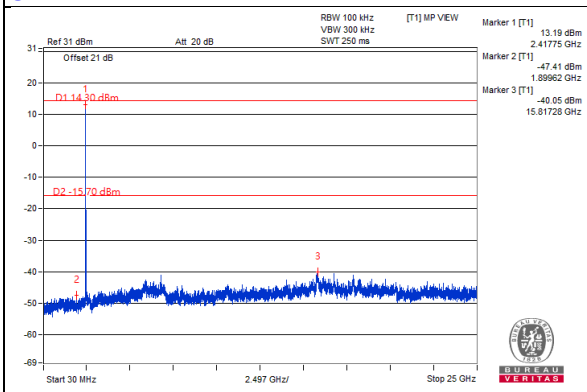


CH 11 Band edge

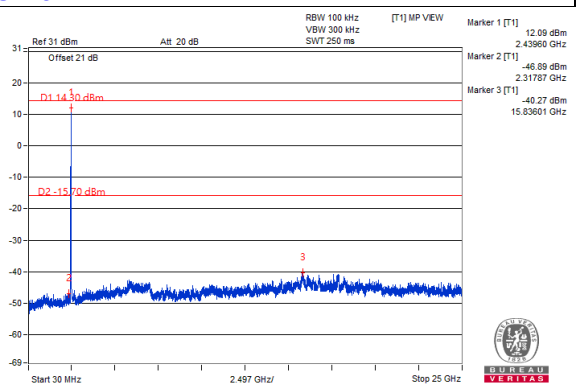


Chain 2

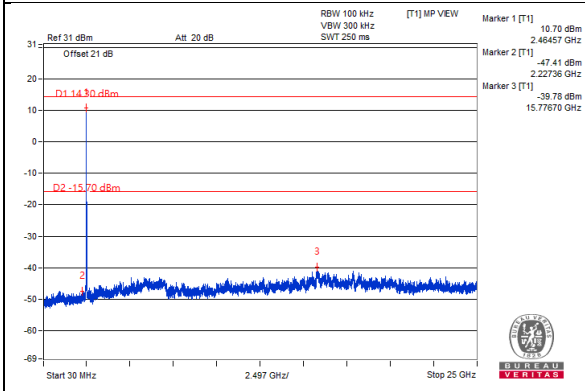
CH 1



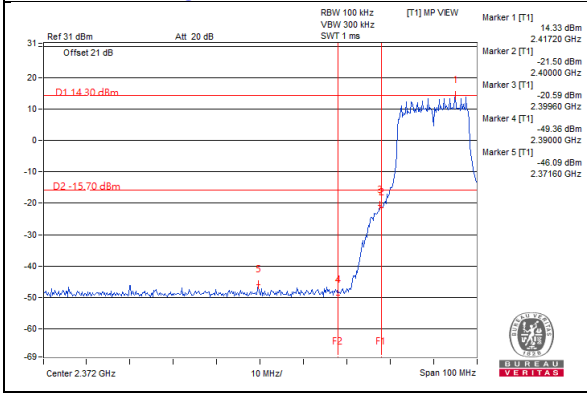
CH 6



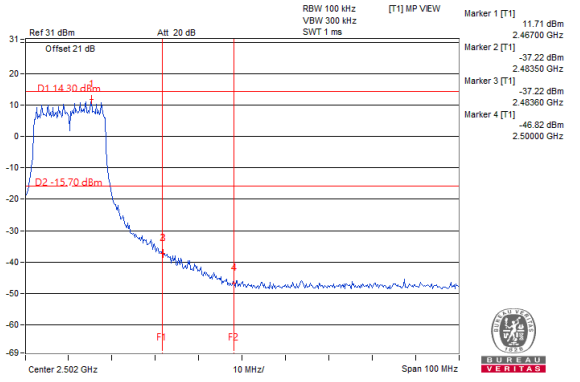
CH 11



CH 1 Band edge

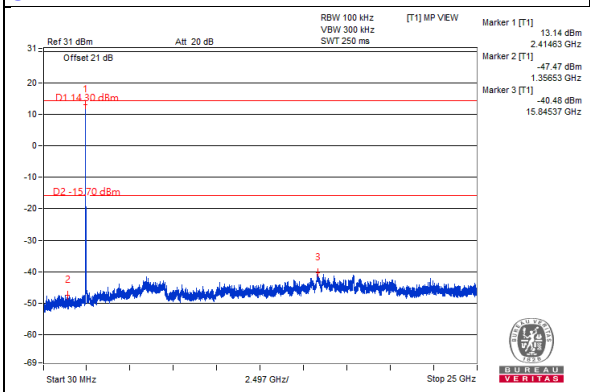


CH 11 Band edge

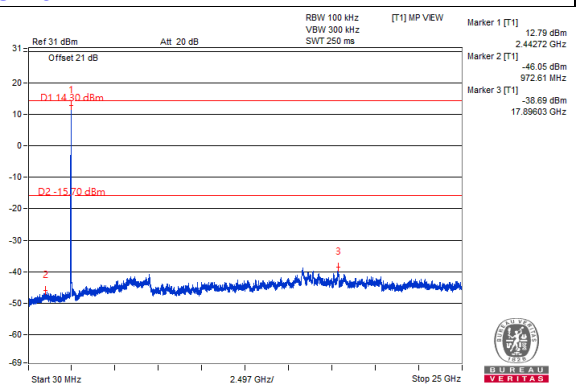


Chain 3

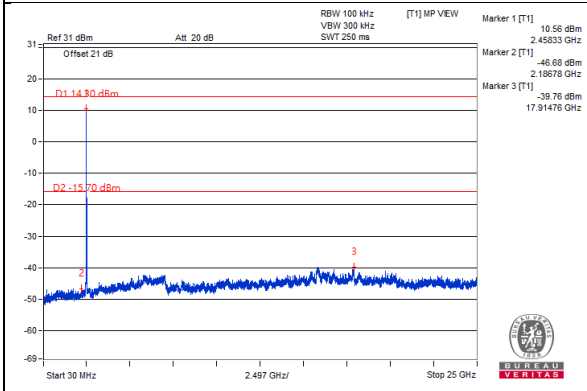
CH 1



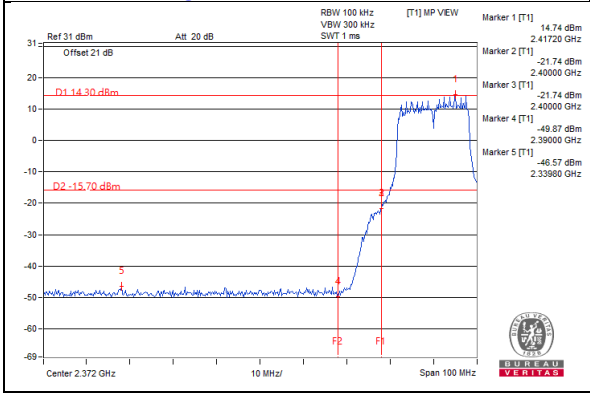
CH 6



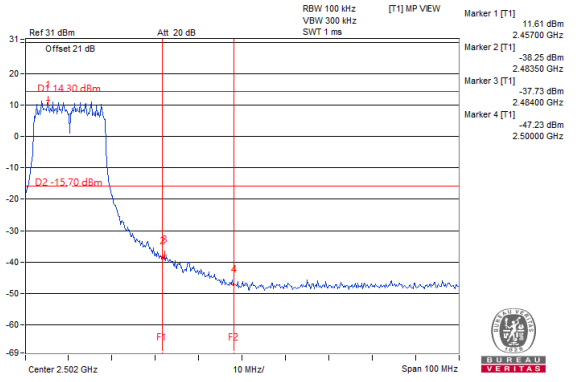
CH 11



CH 1 Band edge

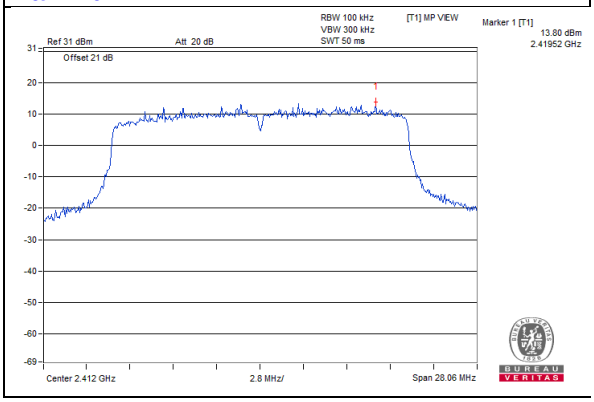


CH 11 Band edge



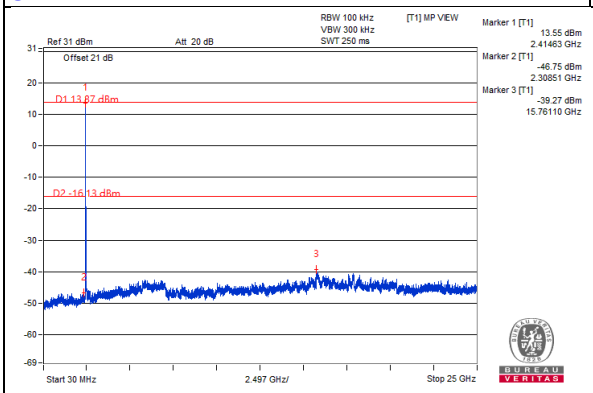
802.11ax (HE20)

Maximum REF

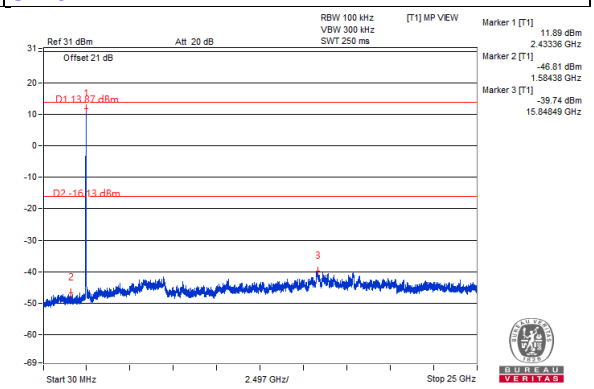


Chain 0

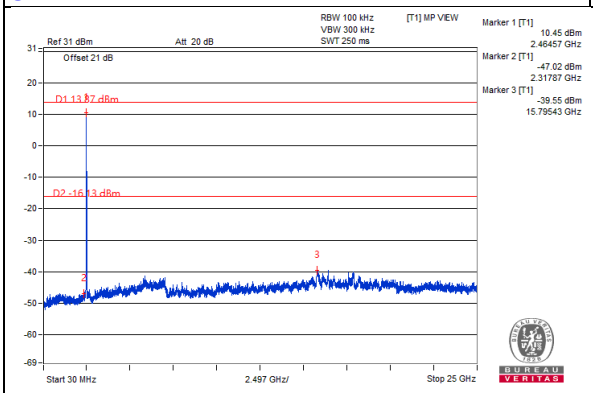
CH 1



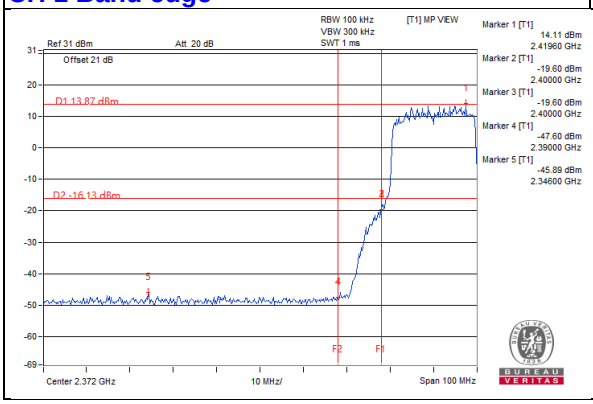
CH 6



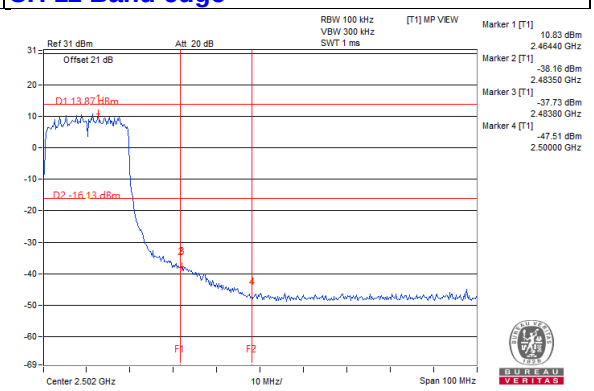
CH 11



CH 1 Band edge

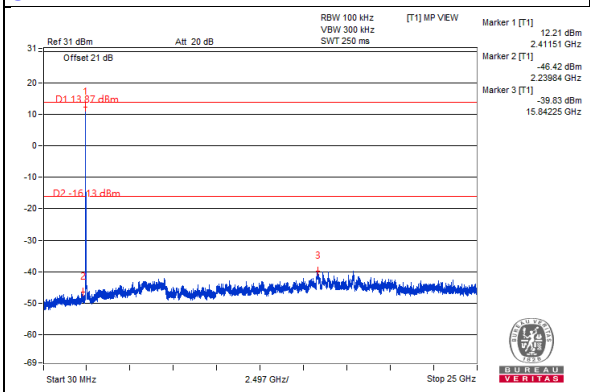


CH 11 Band edge

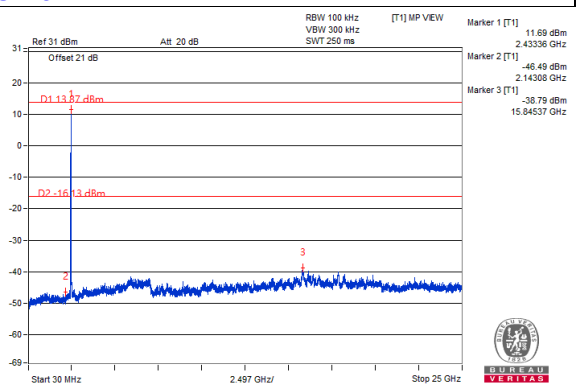


Chain 1

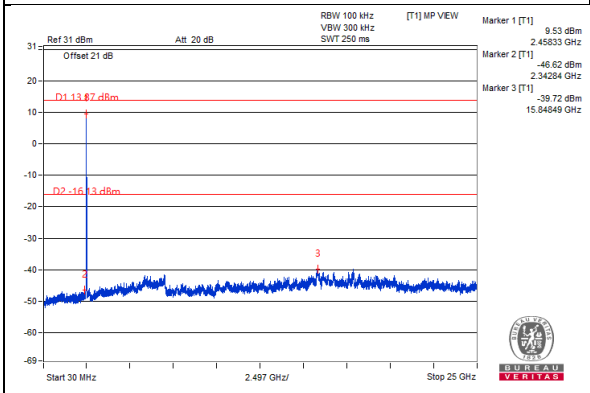
CH 1



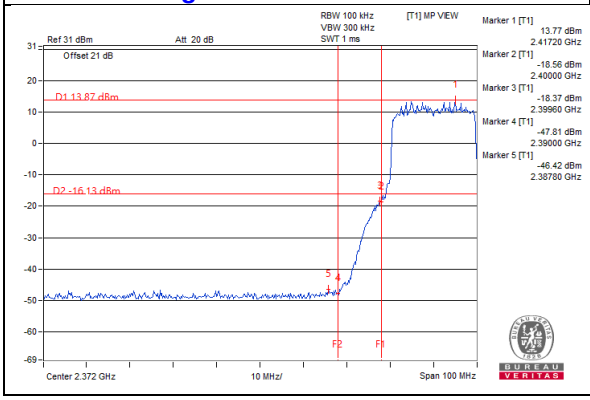
CH 6



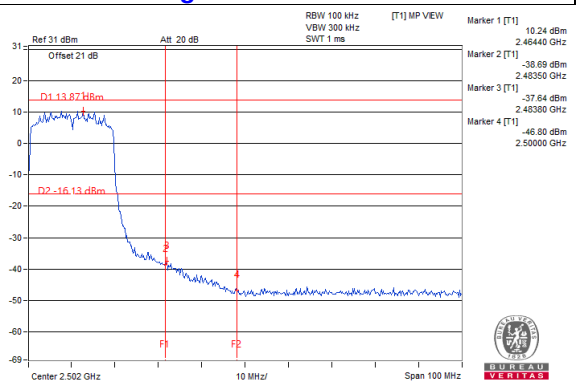
CH 11



CH 1 Band edge

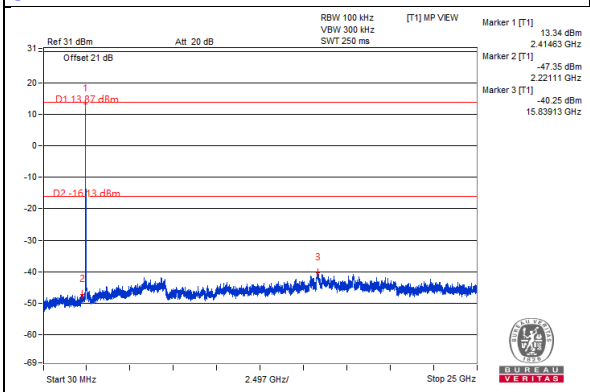


CH 11 Band edge

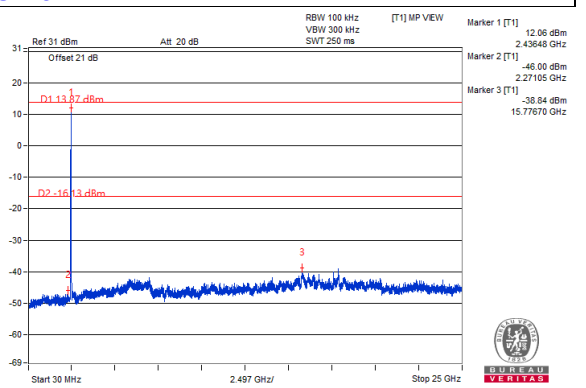


Chain 2

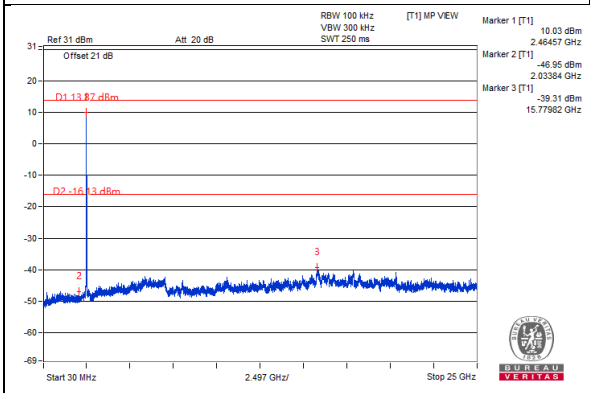
CH 1



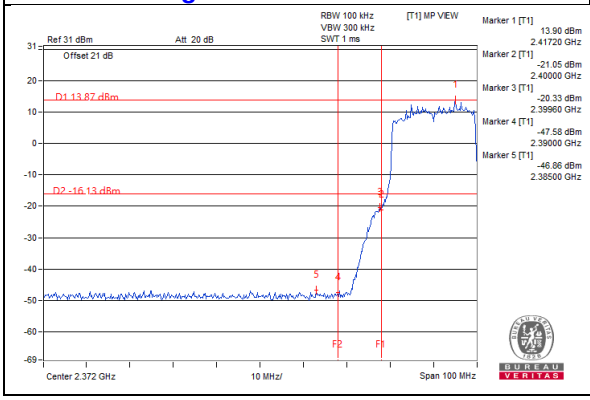
CH 6



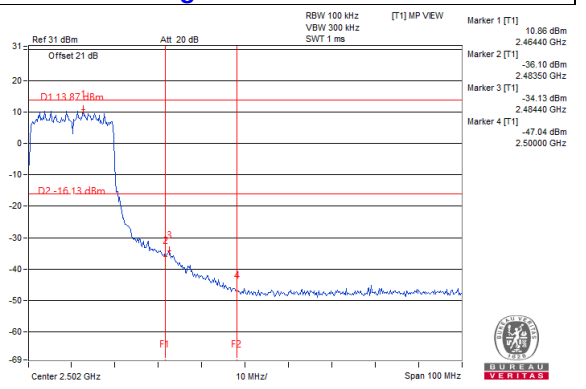
CH 11



CH 1 Band edge

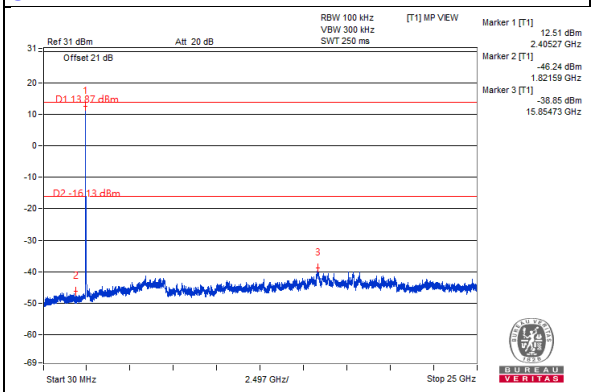


CH 11 Band edge

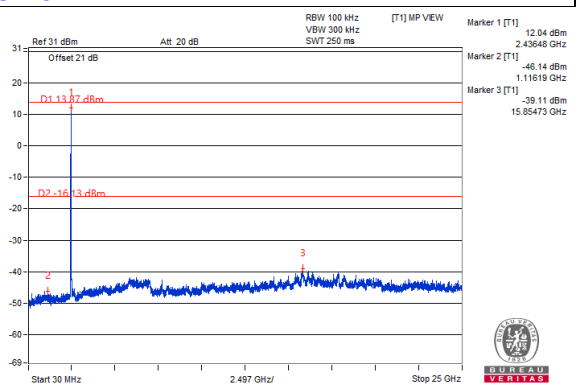


Chain 3

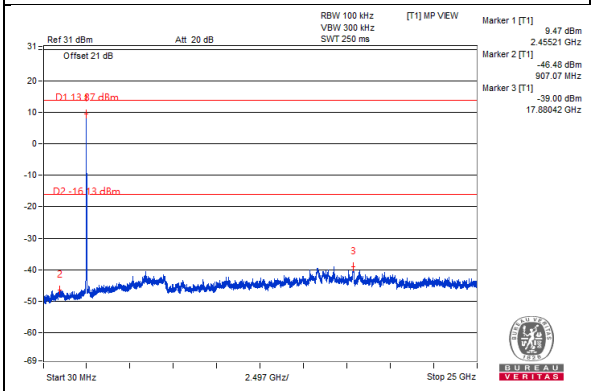
CH 1



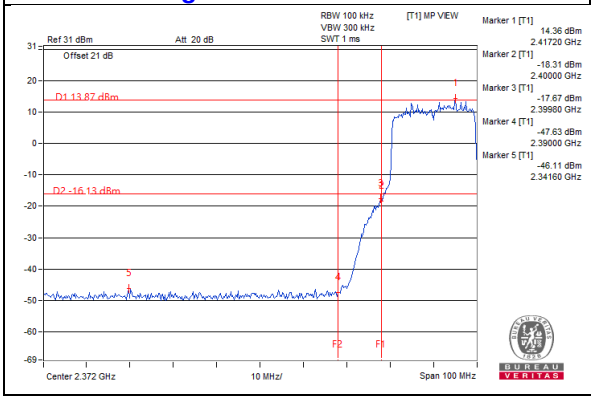
CH 6



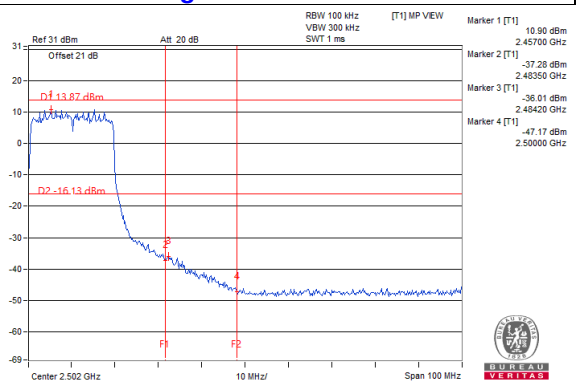
CH 11



CH 1 Band edge

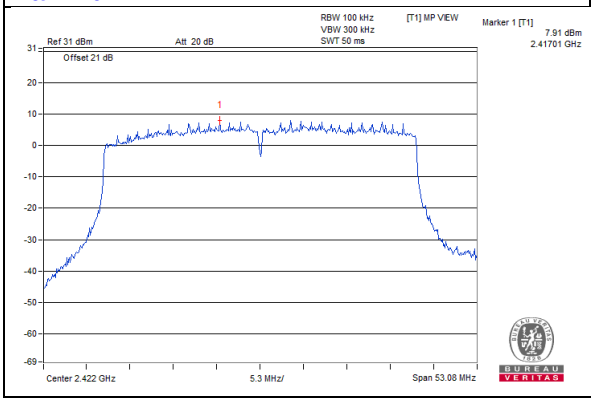


CH 11 Band edge



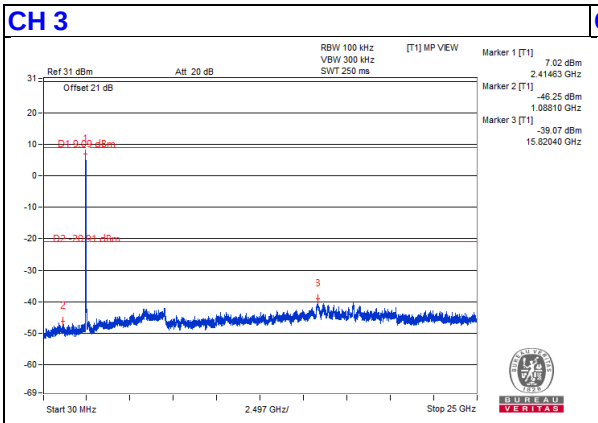
802.11ax (HE40)

Maximum REF

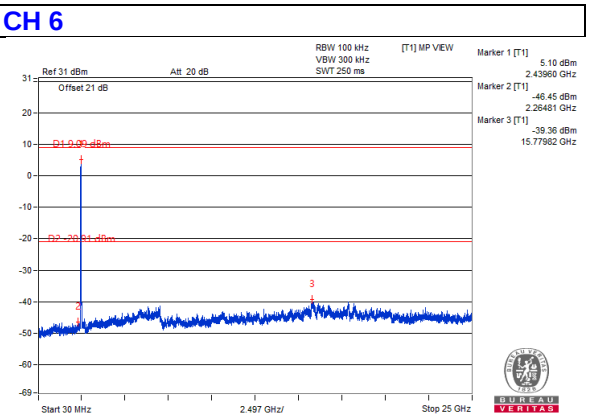


Chain 0

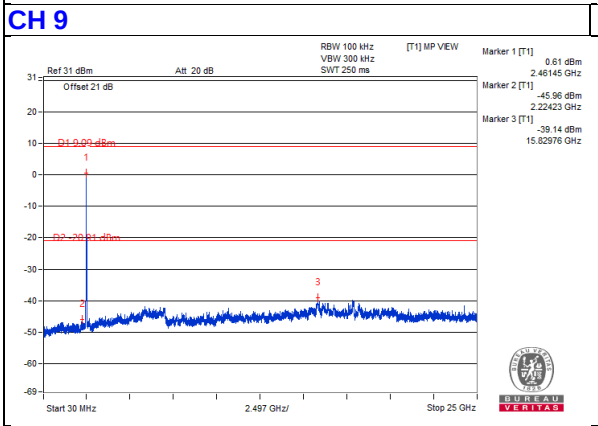
CH 3



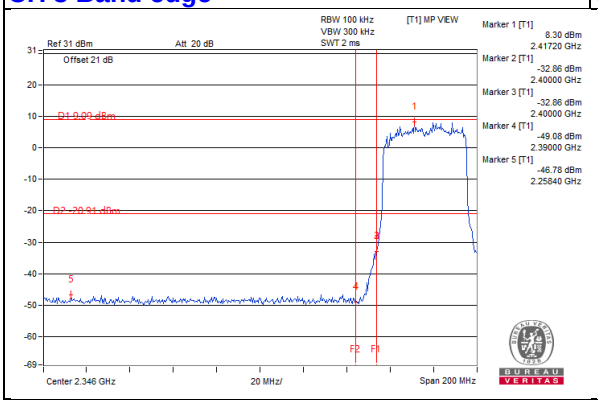
CH 6



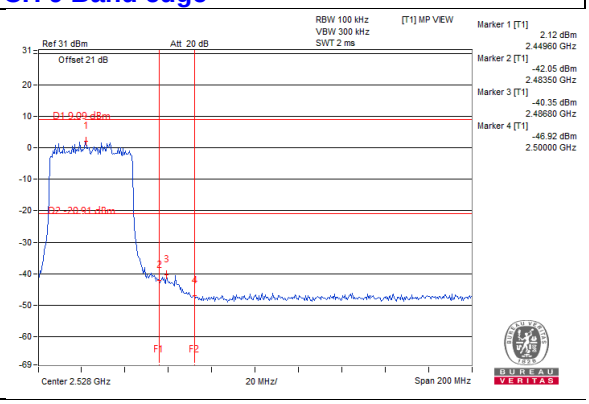
CH 9



CH 3 Band edge

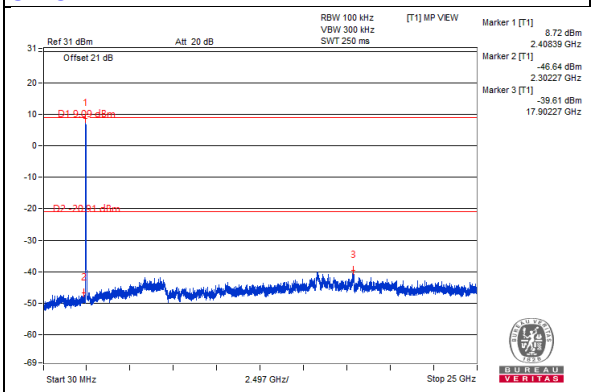


CH 9 Band edge

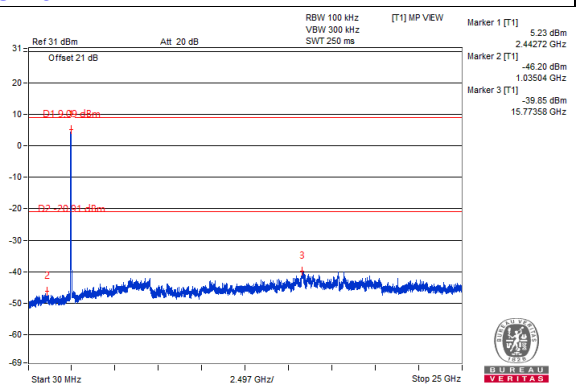


Chain 1

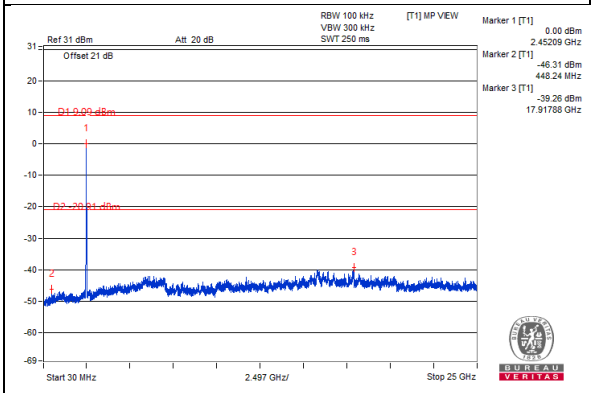
CH 3



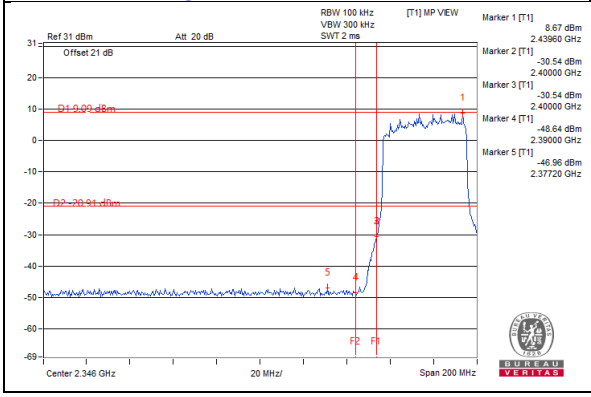
CH 6



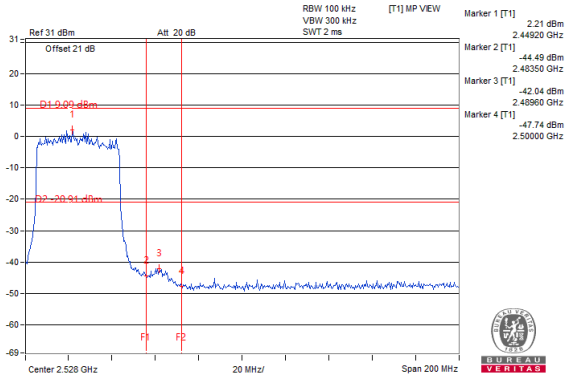
CH 9



CH 3 Band edge

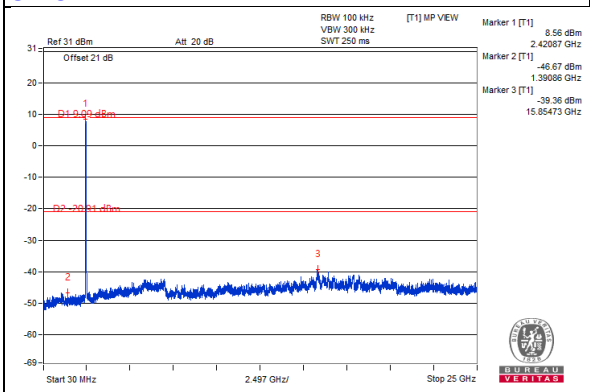


CH 9 Band edge

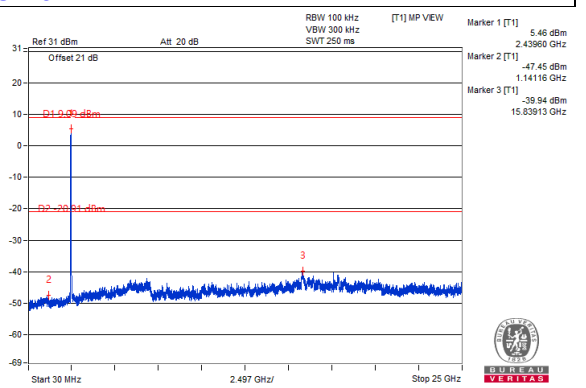


Chain 2

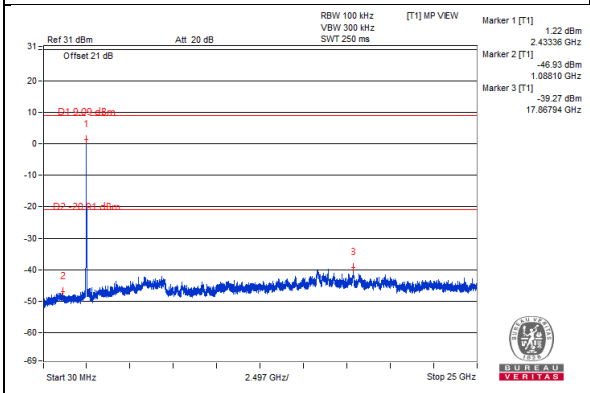
CH 3



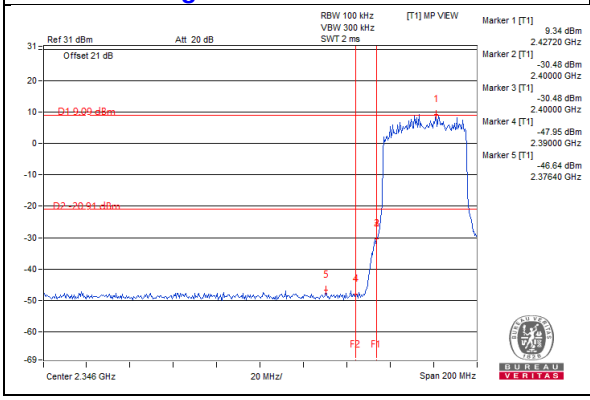
CH 6



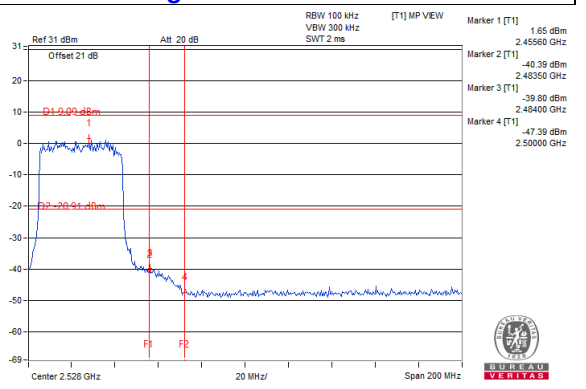
CH 9



CH 3 Band edge

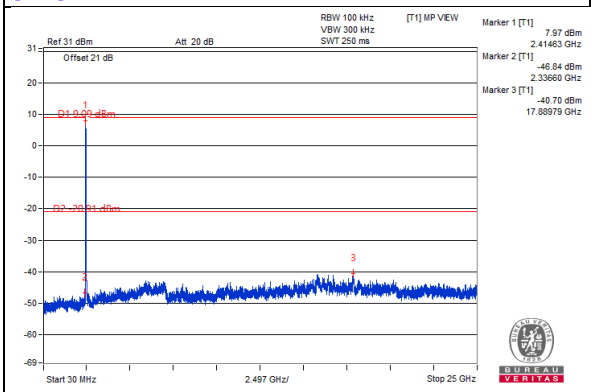


CH 9 Band edge

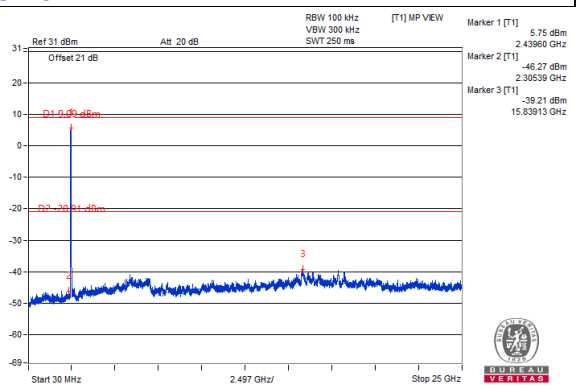


Chain 3

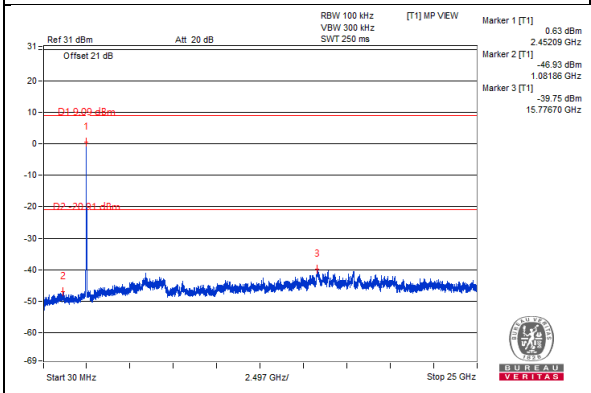
CH 3



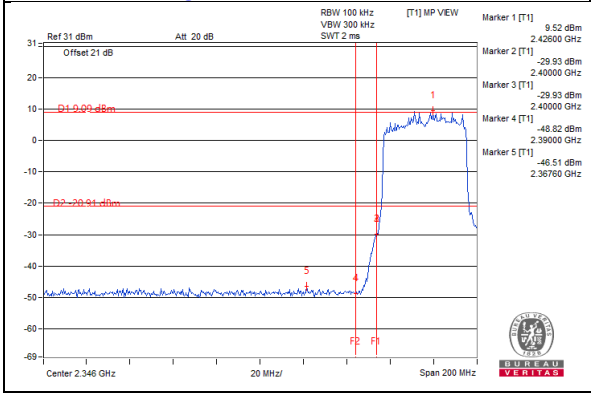
CH 6



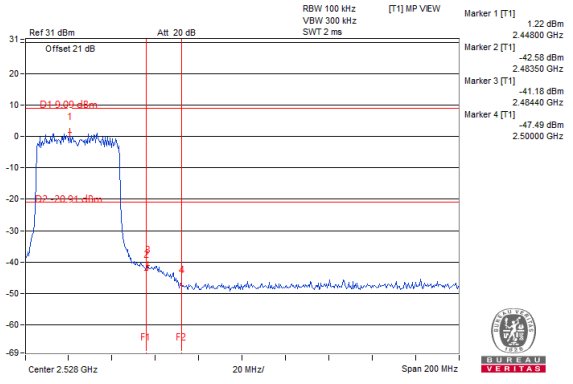
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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

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

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

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

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

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

--- END ---