Report No.:	RF191111E03
FCC ID:	RRKC4000XG
Test Model:	C4000XG
Received Date:	Nov. 11, 2019
Test Date:	Dec. 02, 2019
Issued Date:	Dec. 13, 2019
Applicant:	Alpha Networks Inc.
Address:	No.8 Li-shing 7th Rd., Science-based Industrial Park, Hsinchu, Taiwan, R.O.C.
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
Test Location :	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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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

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 19
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 48
4.5.1 Limits of Power Spectral Density Measurement 48
4.5.2 Test Setup 48
4.5.3 Test Instruments 48
4.5.4 Test Procedure 48
4.5.5 Deviation from Test Standard 48
4.5.6 EUT Operating Condition 48
4.5.7 Test Results 49

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 66

Appendix – Information of the Testing Laboratories 67

Release Control Record

Issue No.	Description	Date Issued
RF191111E03	Original release.	Dec. 13, 2019

1 Certificate of Conformity

Product: Wireless Gateway

Brand: CenturyLink

Test Model: C4000XG

Sample Status: ENGINEERING SAMPLE

Applicant: Alpha Networks Inc.

Test Date: Dec. 02, 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:** Dec. 13, 2019
Joyce Kuo / Specialist

Approved by : _____ , **Date:** Dec. 13, 2019
Clark Lin / Technical 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 -8.10dB at 0.16172 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00MHz, 2483.50MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is 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
Conducted Emissions	-	3.1 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.0 dB
	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	Wireless Gateway
Brand	CenturyLink
Test Model	C4000XG
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:** 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 9 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 4 802.11ac (VHT80), 802.11ax (HE80): 2
Output Power	**Non-Beamforming Mode:** **2.4GHz:** 965.166mW **5.18 ~ 5.24GHz:** 928.785mW **5.745 ~ 5.825GHz:** 959.035mW **Beamforming Mode:** **2.4GHz:** 685.873mW **5.18 ~ 5.24GHz:** 478.507mW **5.745 ~ 5.825GHz:** 593.326mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	RJ45 Cable x2 (Brand: Nien-Yi/ Hunter, unshielded, 1.83m)

Note:

1. 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.		

2. The EUT must be supplied with a power adapter as following table:

No.	Brand	Model No.	Spec.	Plug
1	Asian Power Devices Inc	WA-48B12FU	AC Input: 100-240Vac, 1.5A, 50/60Hz DC Output: 12V, 4A DC Output Cable: 1.83m, Unshielded	US
2	LEADER ELECTRONICS INC.	ML48AY120400-A1	AC Input: 100-120Vac, 1.5A, 50/60Hz DC Output: 12V, 4A DC Output Cable: 1.83m, Unshielded	US
From the above adapters, the Emissions worse case was found in **Adapter 1**. Therefore only the test data of the mode was recorded in this report.				

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

1st source

Antenna NO.	Brand	Model	Antenna Type	Connector Type	Cable Length(mm)
2.4G-1	Hongbo	290-20433	PCB	i-pex(MHF)	295
2.4G-2	Hongbo	290-20434	PCB	i-pex(MHF)	340
2.4G-3	Hongbo	290-20435	PCB	i-pex(MHF)	220
2.4G-4	Hongbo	290-20436	PCB	i-pex(MHF)	240
5G-1	Hongbo	290-20437	PCB	i-pex(MHF)	125
5G-2	Hongbo	290-20438	PCB	i-pex(MHF)	220
5G-3	Hongbo	290-20439	PCB	i-pex(MHF)	240
5G-4	Hongbo	290-20440	PCB	i-pex(MHF)	175
*5G-5	Hongbo	290-20441	PCB	i-pex(MHF)	350

*Reserved for future permissive change. (Not evaluation for 5G-5 antenna)

2nd source

Antenna NO.	Brand	Model	Antenna Type	Connector Type	Cable Length(mm)
2.4G-1	Walsin	RFPCA351129IMAB401	PCB	i-pex(MHF)	295
2.4G-2	Walsin	RFPCA351134IMAB401	PCB	i-pex(MHF)	340
2.4G-3	Walsin	RFPCA351122IMAB401	PCB	i-pex(MHF)	220
2.4G-4	Walsin	RFPCA351124IMAB401	PCB	i-pex(MHF)	240
5G-1	Walsin	RFPCA201112IM5B401	PCB	i-pex(MHF)	125
5G-2	Walsin	RFPCA201122IM5B401	PCB	i-pex(MHF)	220
5G-3	Walsin	RFPCA201124IM5B401	PCB	i-pex(MHF)	240
5G-4	Walsin	RFPCA201117IM5B401	PCB	i-pex(MHF)	175
*5G-5	Walsin	RFPCA201135IM5B401	PCB	i-pex(MHF)	350

*Reserved for future permissive change. (Not evaluation for 5G-5 antenna)

From the above brand, brand: H**ongbo** was selected as representative model for the test and its data was recorded in this report.

4. The directional antenna gain, please refer to the following table:

Frequency Range (GHz)	Directional Antenna Gain (dBi)	Antenna Type	Antenna Connector
2.4 ~ 2.5	7.4	PCB	i-pex(MHF)
5.15 ~ 5.25	9.1		
5.25 ~ 5.35	8.4		
5.47 ~ 5.725	8.3		
5.725 ~ 5.85	8.1		
Note: More detailed information, please refer to antenna specification.			

5. The EUT incorporates a MIMO function:

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	1Tx Fixed Chain 3	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

Note:
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), VHT mode for 20MHz (40MHz) and 802.11ax mode for 20MHz (40MHz), therefore the manufacturer will control the power for 802.11n mode is the same as the VHT or more lower than it and investigated worst case to representative mode in test report. (Final test mode refer to section 3.2.1)

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

3.2 Description of Test Modes

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

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

7 channels are provided for 802.11n (HT40), VHT40 and 802.11ax (HE40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

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

Radiated Emission Test (Above 1GHz):

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

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

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	1 Mb/s
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6 Mb/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
802.11g	1 to 11	6	OFDM	BPSK	6 Mb/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
802.11g	1 to 11	6	OFDM	BPSK	6 Mb/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	1 Mb/s
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6 Mb/s
802.11n (HT20) (Output power only)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
802.11n (HT40) (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**
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
802.11n (HT40)	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:

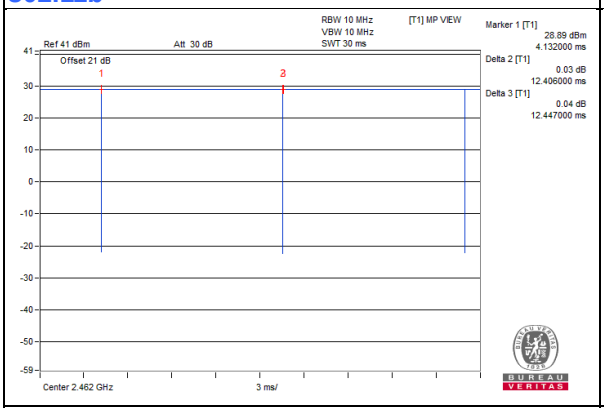
Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	25deg. C, 69%RH	120Vac, 60Hz	Tom Yang
RE<1G	24deg. C, 65%RH	120Vac, 60Hz	Tom Yang
PLC	23deg. C, 76%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

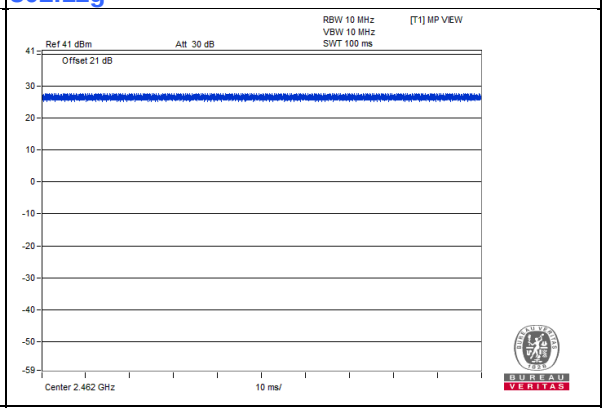
If duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11b: Duty cycle = 12.406 ms/12.447 ms = 0.997
802.11g: Duty cycle = Duty cycle of test signal is 100 %
802.11n (HT20): Duty cycle = 3.784 ms/3.827 ms = 0.989
802.11n (HT40): Duty cycle = 1.912 ms/1.93 ms = 0.991
802.11ax (HE20) : Duty cycle = 3.784 ms/3.827 ms = 0.989
802.11ax (HE40) : Duty cycle = 1.912 ms/1.93 ms = 0.991

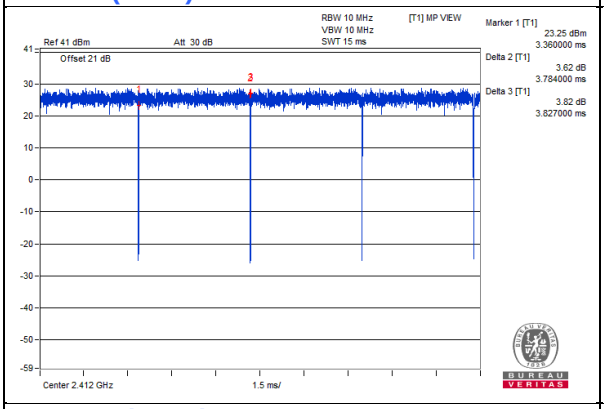
802.11b



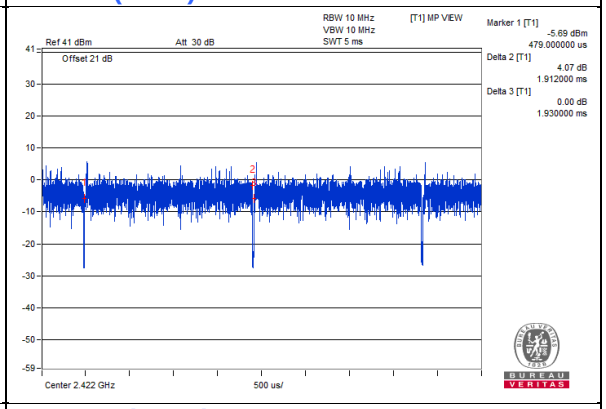
802.11g



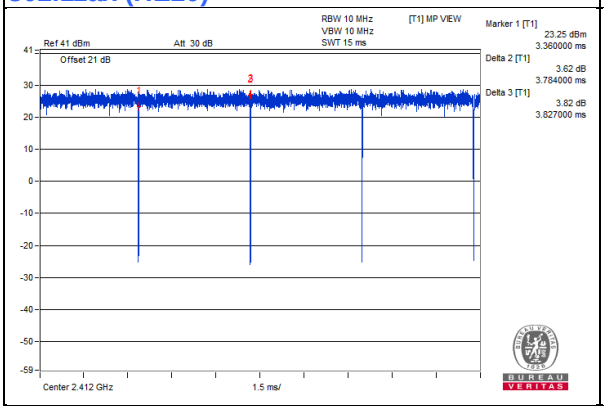
802.11n (HT20)



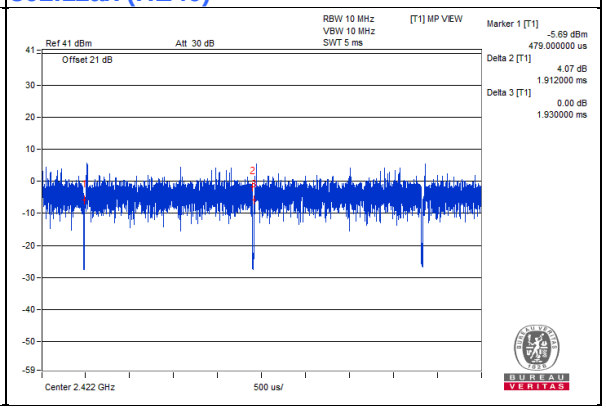
802.11n (HT40)



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.

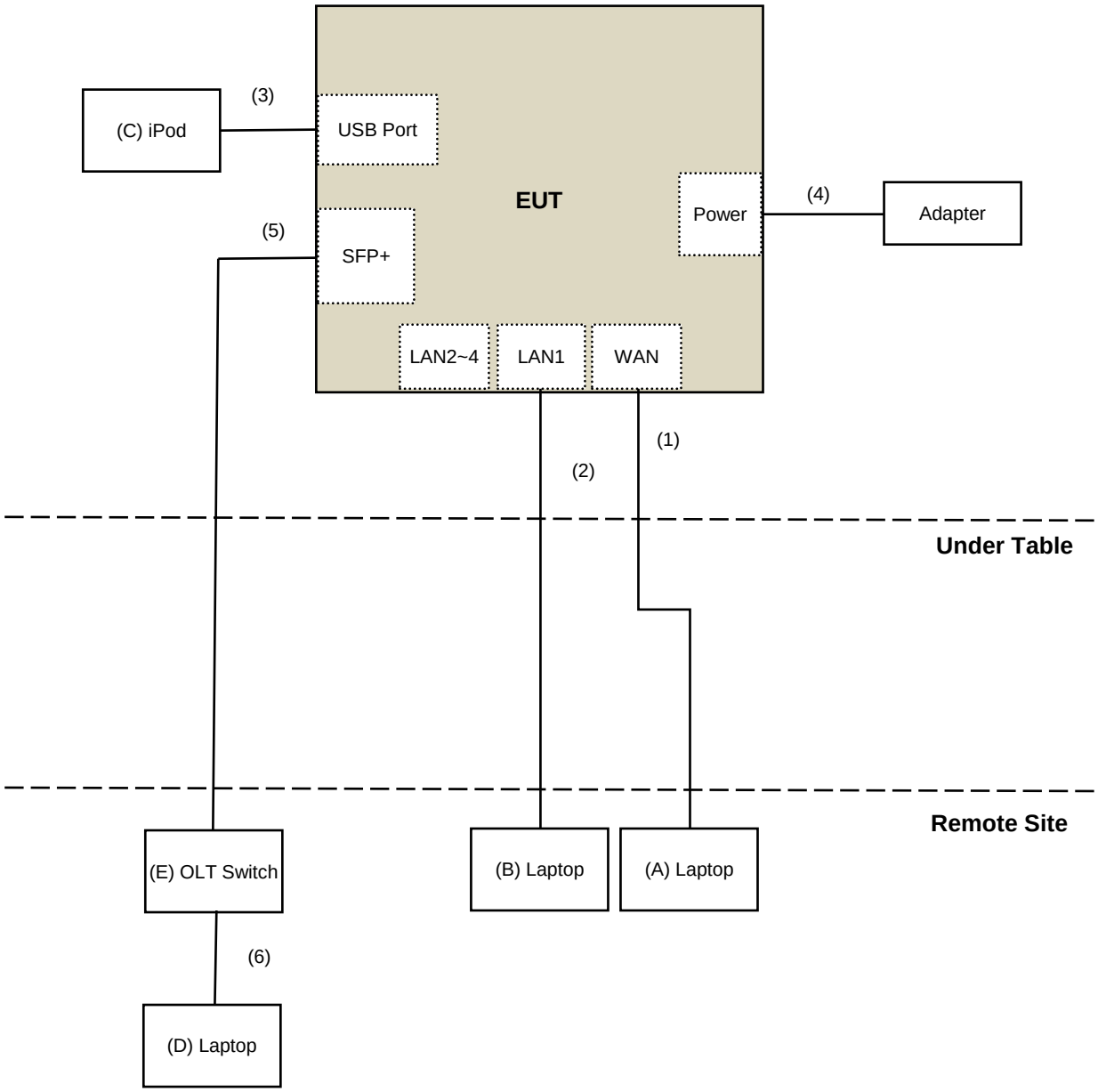
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
B.	Laptop	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
C.	iPod	Apple	MC749TA/A	CC4DM9M8DFDM	NA	Provided by Lab
D.	Laptop	Lenovo	81A4	YD02YN7P	PD93165NGU	Provided by Lab
E.	OLT Switch	Alpha	NA	NA	NA	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.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	USB Cable	1	0.1	Yes	0	Provided by Lab
4.	DC Cable	1	1.83	No	0	Supplied by client
5.	Fiber Cable	1	10	No	0	Provided by Lab
6.	RJ-45 Cable	1	1.8	No	0	Provided by Lab

3.4.1 Configuration of System under Test



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:

Test standard:

FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013

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

References Test Guidance :

KDB 558074 D01 15.247 Meas Guidance v05r02
KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

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. 23, 2019	Oct. 22, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 11, 2019	Nov. 10, 2020
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. 26, 2019	Sep. 25, 2020
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 24, 2019	Nov. 23, 2020
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. 24, 2019	Nov. 23, 2020
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: Dec. 02, 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:

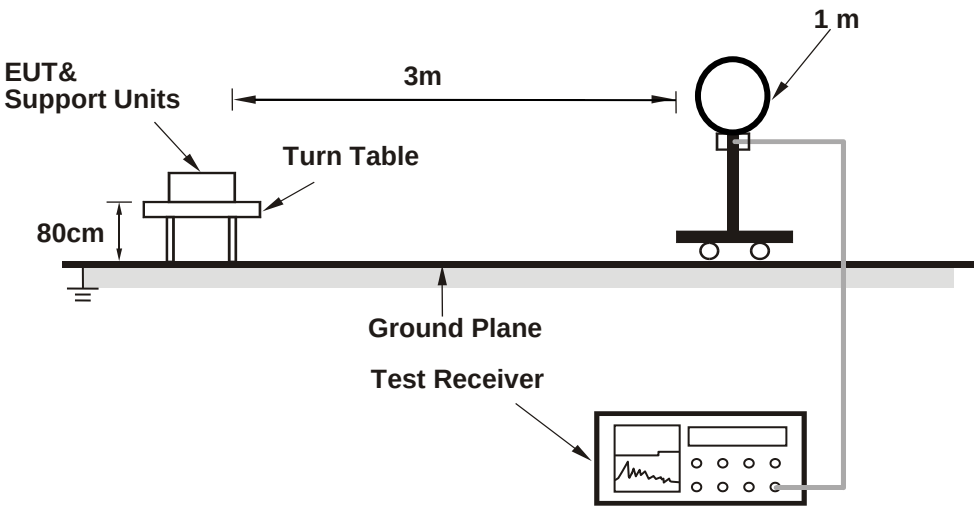
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

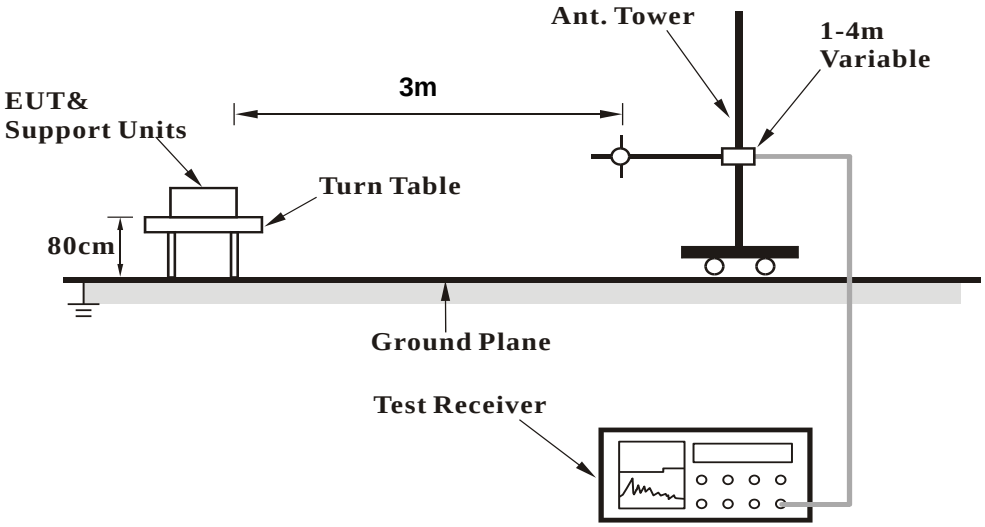
No deviation.

4.1.5 Test Setup

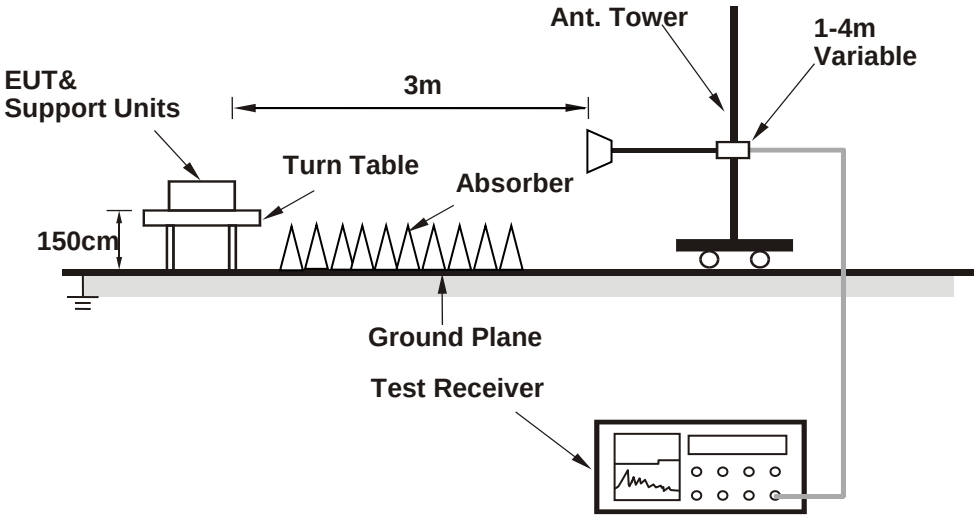
For Radiated emission below 30MHz



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 (Intel DUT Ver.610.23 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	55.1 PK	74.0	-18.9	2.43 H	349	56.8	-1.7
2	2390.00	48.3 AV	54.0	-5.7	2.43 H	349	50.0	-1.7
3	*2412.00	107.2 PK			2.43 H	349	109.0	-1.8
4	*2412.00	105.5 AV			2.43 H	349	107.3	-1.8
5	4824.00	49.4 PK	74.0	-24.6	1.61 H	156	47.3	2.1
6	4824.00	45.8 AV	54.0	-8.2	1.61 H	156	43.7	2.1
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	60.5 PK	74.0	-13.5	3.03 V	248	62.2	-1.7
2	2390.00	53.6 AV	54.0	-0.4	3.03 V	248	55.3	-1.7
3	*2412.00	117.3 PK			3.03 V	248	119.1	-1.8
4	*2412.00	116.4 AV			3.03 V	248	118.2	-1.8
5	4824.00	45.4 PK	74.0	-28.6	2.29 V	42	43.3	2.1
6	4824.00	42.3 AV	54.0	-11.7	2.29 V	42	40.2	2.1

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. 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	51.3 PK	74.0	-22.7	2.13 H	179	53.0	-1.7
2	2390.00	45.9 AV	54.0	-8.1	2.13 H	179	47.6	-1.7
3	*2437.00	116.9 PK			2.13 H	179	118.7	-1.8
4	*2437.00	107.4 AV			2.13 H	179	109.2	-1.8
5	2483.50	53.1 PK	74.0	-20.9	2.13 H	179	54.8	-1.7
6	2483.50	45.1 AV	54.0	-8.9	2.13 H	179	46.8	-1.7
7	4874.00	49.0 PK	74.0	-25.0	2.08 H	61	46.8	2.2
8	4874.00	45.9 AV	54.0	-8.1	2.08 H	61	43.7	2.2
9	7311.00	54.6 PK	74.0	-19.4	1.39 H	150	45.6	9.0
10	7311.00	32.6 AV	54.0	-21.4	1.39 H	150	23.6	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	2357.00	60.5 PK	74.0	-13.5	2.17 V	219	62.3	-1.8
2	2357.00	53.7 AV	54.0	-0.3	2.17 V	219	55.5	-1.8
3	2390.00	56.2 PK	74.0	-17.8	2.72 V	219	57.9	-1.7
4	2390.00	50.7 AV	54.0	-3.3	2.72 V	219	52.4	-1.7
5	*2437.00	117.5 PK			2.72 V	219	119.3	-1.8
6	*2437.00	115.7 AV			2.72 V	219	117.5	-1.8
7	2483.50	58.4 PK	74.0	-15.6	2.72 V	219	60.1	-1.7
8	2483.50	50.2 AV	54.0	-3.8	2.72 V	219	51.9	-1.7
9	4874.00	45.8 PK	74.0	-28.2	2.53 V	127	43.6	2.2
10	4874.00	43.4 AV	54.0	-10.6	2.53 V	127	41.2	2.2
11	7311.00	43.1 PK	74.0	-30.9	2.58 V	38	34.1	9.0
12	7311.00	31.5 AV	54.0	-22.5	2.58 V	38	22.5	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 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	112.6 PK			1.65 H	299	114.4	-1.8
2	*2462.00	110.9 AV			1.65 H	299	112.7	-1.8
3	2483.50	57.6 PK	74.0	-16.4	1.65 H	299	59.3	-1.7
4	2483.50	49.8 AV	54.0	-4.2	1.65 H	299	51.5	-1.7
5	4924.00	49.7 PK	74.0	-24.3	2.69 H	346	47.4	2.3
6	4924.00	45.4 AV	54.0	-8.6	2.69 H	346	43.1	2.3
7	7386.00	54.7 PK	74.0	-19.3	2.60 H	255	45.4	9.3
8	7386.00	32.6 AV	54.0	-21.4	2.60 H	255	23.3	9.3
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	*2462.00	117.8 PK			2.70 V	253	119.6	-1.8
2	*2462.00	115.9 AV			2.70 V	253	117.7	-1.8
3	2483.50	60.8 PK	74.0	-13.2	2.70 V	253	62.5	-1.7
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**2.70 V**	**253**	**55.6**	**-1.7**
5	4924.00	46.8 PK	74.0	-27.2	1.11 V	323	44.5	2.3
6	4924.00	42.6 AV	54.0	-11.4	1.11 V	323	40.3	2.3
7	7386.00	44.2 PK	74.0	-29.8	2.29 V	351	34.9	9.3
8	7386.00	31.7 AV	54.0	-22.3	2.29 V	351	22.4	9.3

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.

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	64.2 PK	74.0	-9.8	1.91 H	117	65.9	-1.7
2	2390.00	48.7 AV	54.0	-5.3	1.91 H	117	50.4	-1.7
3	*2412.00	110.6 PK			1.91 H	117	112.4	-1.8
4	*2412.00	102.6 AV			1.91 H	117	104.4	-1.8
5	4824.00	49.0 PK	74.0	-25.0	1.86 H	252	46.9	2.1
6	4824.00	45.7 AV	54.0	-8.3	1.86 H	252	43.6	2.1
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	69.5 PK	74.0	-4.5	2.01 V	31	71.2	-1.7
2	2390.00	53.4 AV	54.0	-0.6	2.01 V	31	55.1	-1.7
3	*2412.00	120.7 PK			2.01 V	31	122.5	-1.8
4	*2412.00	111.8 AV			2.01 V	31	113.6	-1.8
5	4824.00	46.9 PK	74.0	-27.1	1.77 V	168	44.8	2.1
6	4824.00	43.0 AV	54.0	-11.0	1.77 V	168	40.9	2.1

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. 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	60.2 PK	74.0	-13.8	1.08 H	356	61.9	-1.7
2	2390.00	48.3 AV	54.0	-5.7	1.08 H	356	50.0	-1.7
3	*2437.00	115.3 PK			1.08 H	356	117.1	-1.8
4	*2437.00	106.1 AV			1.08 H	356	107.9	-1.8
5	2483.50	59.1 PK	74.0	-14.9	1.08 H	356	60.8	-1.7
6	2483.50	46.9 AV	54.0	-7.1	1.08 H	356	48.6	-1.7
7	4874.00	48.6 PK	74.0	-25.4	2.68 H	280	46.4	2.2
8	4874.00	45.6 AV	54.0	-8.4	2.68 H	280	43.4	2.2
9	7311.00	54.6 PK	74.0	-19.4	1.56 H	222	45.6	9.0
10	7311.00	32.3 AV	54.0	-21.7	1.56 H	222	23.3	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	65.9 PK	74.0	-8.1	1.73 V	347	67.6	-1.7
2	2390.00	53.5 AV	54.0	-0.5	1.73 V	347	55.2	-1.7
3	*2437.00	125.1 PK			1.73 V	347	126.9	-1.8
4	*2437.00	116.2 AV			1.73 V	347	118.0	-1.8
5	2483.50	64.4 PK	74.0	-9.6	1.73 V	347	66.1	-1.7
6	2483.50	51.3 AV	54.0	-2.7	1.73 V	347	53.0	-1.7
7	4874.00	45.3 PK	74.0	-28.7	2.16 V	349	43.1	2.2
8	4874.00	42.4 AV	54.0	-11.6	2.16 V	349	40.2	2.2
9	7311.00	43.9 PK	74.0	-30.1	2.53 V	134	34.9	9.0
10	7311.00	32.6 AV	54.0	-21.4	2.53 V	134	23.6	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 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	110.6 PK			1.94 H	175	112.4	-1.8
2	*2462.00	102.5 AV			1.94 H	175	104.3	-1.8
3	2483.50	65.9 PK	74.0	-8.1	1.94 H	175	67.6	-1.7
4	2483.50	48.6 AV	54.0	-5.4	1.94 H	175	50.3	-1.7
5	4924.00	49.9 PK	74.0	-24.1	1.98 H	125	47.6	2.3
6	4924.00	46.6 AV	54.0	-7.4	1.98 H	125	44.3	2.3
7	7386.00	55.8 PK	74.0	-18.2	1.57 H	149	46.5	9.3
8	7386.00	31.6 AV	54.0	-22.4	1.57 H	149	22.3	9.3
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	*2462.00	121.7 PK			1.90 V	148	123.5	-1.8
2	*2462.00	112.8 AV			1.90 V	148	114.6	-1.8
3	2483.50	70.7 PK	74.0	-3.3	1.90 V	148	72.4	-1.7
4	2483.50	53.5 AV	54.0	-0.5	1.90 V	148	55.2	-1.7
5	4924.00	45.5 PK	74.0	-28.5	2.50 V	30	43.2	2.3
6	4924.00	42.2 AV	54.0	-11.8	2.50 V	30	39.9	2.3
7	7386.00	44.4 PK	74.0	-29.6	2.60 V	194	35.1	9.3
8	7386.00	31.5 AV	54.0	-22.5	2.60 V	194	22.2	9.3

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.

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	59.9 PK	74.0	-14.1	1.60 H	120	61.6	-1.7
2	2390.00	48.2 AV	54.0	-5.8	1.60 H	120	49.9	-1.7
3	*2412.00	109.6 PK			1.60 H	120	111.4	-1.8
4	*2412.00	101.8 AV			1.60 H	120	103.6	-1.8
5	4824.00	49.1 PK	74.0	-24.9	2.07 H	140	47.0	2.1
6	4824.00	45.2 AV	54.0	-8.8	2.07 H	140	43.1	2.1
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	65.8 PK	74.0	-8.2	1.98 V	21	67.5	-1.7
2	2390.00	53.2 AV	54.0	-0.8	1.98 V	21	54.9	-1.7
3	*2412.00	120.6 PK			1.98 V	21	122.4	-1.8
4	*2412.00	112.5 AV			1.98 V	21	114.3	-1.8
5	4824.00	45.3 PK	74.0	-28.7	2.45 V	166	43.2	2.1
6	4824.00	42.4 AV	54.0	-11.6	2.45 V	166	40.3	2.1

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. 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	59.1 PK	74.0	-14.9	1.11 H	271	60.8	-1.7
2	2390.00	48.2 AV	54.0	-5.8	1.11 H	271	49.9	-1.7
3	*2437.00	111.5 PK			1.11 H	271	113.3	-1.8
4	*2437.00	102.5 AV			1.11 H	271	104.3	-1.8
5	2483.50	58.1 PK	74.0	-15.9	1.11 H	271	59.8	-1.7
6	2483.50	45.6 AV	54.0	-8.4	1.11 H	271	47.3	-1.7
7	4874.00	49.1 PK	74.0	-24.9	2.50 H	190	46.9	2.2
8	4874.00	45.2 AV	54.0	-8.8	2.50 H	190	43.0	2.2
9	7311.00	54.7 PK	74.0	-19.3	1.90 H	236	45.7	9.0
10	7311.00	31.9 AV	54.0	-22.1	1.90 H	236	22.9	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	65.8 PK	74.0	-8.2	1.92 V	351	67.5	-1.7
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.92 V**	**351**	**55.6**	**-1.7**
3	*2437.00	123.9 PK			1.92 V	351	125.7	-1.8
4	*2437.00	115.9 AV			1.92 V	351	117.7	-1.8
5	2483.50	63.0 PK	74.0	-11.0	1.92 V	351	64.7	-1.7
6	2483.50	50.5 AV	54.0	-3.5	1.92 V	351	52.2	-1.7
7	4874.00	46.2 PK	74.0	-27.8	1.74 V	229	44.0	2.2
8	4874.00	42.5 AV	54.0	-11.5	1.74 V	229	40.3	2.2
9	7311.00	43.4 PK	74.0	-30.6	2.27 V	354	34.4	9.0
10	7311.00	32.3 AV	54.0	-21.7	2.27 V	354	23.3	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 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	109.2 PK			2.60 H	210	111.0	-1.8
2	*2462.00	99.5 AV			2.60 H	210	101.3	-1.8
3	2483.50	62.1 PK	74.0	-11.9	2.60 H	210	63.8	-1.7
4	2483.50	49.6 AV	54.0	-4.4	2.60 H	210	51.3	-1.7
5	4924.00	49.1 PK	74.0	-24.9	2.13 H	22	46.8	2.3
6	4924.00	45.5 AV	54.0	-8.5	2.13 H	22	43.2	2.3
7	7386.00	55.3 PK	74.0	-18.7	1.97 H	89	46.0	9.3
8	7386.00	31.5 AV	54.0	-22.5	1.97 H	89	22.2	9.3
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	*2462.00	119.6 PK			1.95 V	55	121.4	-1.8
2	*2462.00	110.4 AV			1.95 V	55	112.2	-1.8
3	2483.50	68.9 PK	74.0	-5.1	1.95 V	55	70.6	-1.7
4	2483.50	53.2 AV	54.0	-0.8	1.95 V	55	54.9	-1.7
5	4924.00	46.1 PK	74.0	-27.9	1.06 V	150	43.8	2.3
6	4924.00	43.9 AV	54.0	-10.1	1.06 V	150	41.6	2.3
7	7386.00	43.2 PK	74.0	-30.8	1.32 V	214	33.9	9.3
8	7386.00	32.3 AV	54.0	-21.7	1.32 V	214	23.0	9.3

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.

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	54.9 PK	74.0	-19.1	2.15 H	51	56.6	-1.7
2	2390.00	46.2 AV	54.0	-7.8	2.15 H	51	47.9	-1.7
3	*2422.00	99.6 PK			2.15 H	51	101.4	-1.8
4	*2422.00	89.2 AV			2.15 H	51	91.0	-1.8
5	4844.00	49.1 PK	74.0	-24.9	1.85 H	118	47.0	2.1
6	4844.00	46.7 AV	54.0	-7.3	1.85 H	118	44.6	2.1
7	7266.00	54.5 PK	74.0	-19.5	2.07 H	170	45.7	8.8
8	7266.00	32.2 AV	54.0	-21.8	2.07 H	170	23.4	8.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.6 PK	74.0	-12.4	2.06 V	29	63.3	-1.7
2	2390.00	53.1 AV	54.0	-0.9	2.06 V	29	54.8	-1.7
3	*2422.00	110.1 PK			2.06 V	29	111.9	-1.8
4	*2422.00	103.8 AV			2.06 V	29	105.6	-1.8
5	4844.00	46.5 PK	74.0	-27.5	1.80 V	167	44.4	2.1
6	4844.00	43.5 AV	54.0	-10.5	1.80 V	167	41.4	2.1
7	7266.00	44.7 PK	74.0	-29.3	1.03 V	59	35.9	8.8
8	7266.00	32.2 AV	54.0	-21.8	1.03 V	59	23.4	8.8

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. 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	58.7 PK	74.0	-15.3	2.64 H	325	60.4	-1.7
2	2390.00	48.3 AV	54.0	-5.7	2.64 H	325	50.0	-1.7
3	*2437.00	102.3 PK			2.64 H	325	104.1	-1.8
4	*2437.00	99.6 AV			2.64 H	325	101.4	-1.8
5	2483.50	54.5 PK	74.0	-19.5	2.64 H	325	56.2	-1.7
6	2483.50	45.2 AV	54.0	-8.8	2.64 H	325	46.9	-1.7
7	4874.00	49.8 PK	74.0	-24.2	1.56 H	107	47.6	2.2
8	4874.00	45.6 AV	54.0	-8.4	1.56 H	107	43.4	2.2
9	7311.00	54.2 PK	74.0	-19.8	1.99 H	126	45.2	9.0
10	7311.00	32.2 AV	54.0	-21.8	1.99 H	126	23.2	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	64.7 PK	74.0	-9.3	2.24 V	36	66.4	-1.7
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**2.24 V**	**36**	**55.6**	**-1.7**
3	*2437.00	115.2 PK			2.24 V	36	117.0	-1.8
4	*2437.00	108.5 AV			2.24 V	36	110.3	-1.8
5	2483.50	60.5 PK	74.0	-13.5	2.24 V	36	62.2	-1.7
6	2483.50	50.1 AV	54.0	-3.9	2.24 V	36	51.8	-1.7
7	4874.00	46.7 PK	74.0	-27.3	1.09 V	347	44.5	2.2
8	4874.00	43.6 AV	54.0	-10.4	1.09 V	347	41.4	2.2
9	7311.00	44.2 PK	74.0	-29.8	1.95 V	220	35.2	9.0
10	7311.00	31.5 AV	54.0	-22.5	1.95 V	220	22.5	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 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			1.50 H	149	106.1	-1.8
2	*2452.00	98.6 AV			1.50 H	149	100.4	-1.8
3	2483.50	59.1 PK	74.0	-14.9	1.50 H	149	60.8	-1.7
4	2483.50	46.8 AV	54.0	-7.2	1.50 H	149	48.5	-1.7
5	4904.00	48.3 PK	74.0	-25.7	1.77 H	260	46.1	2.2
6	4904.00	45.6 AV	54.0	-8.4	1.77 H	260	43.4	2.2
7	7356.00	55.4 PK	74.0	-18.6	1.79 H	311	46.3	9.1
8	7356.00	32.2 AV	54.0	-21.8	1.79 H	311	23.1	9.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	113.9 PK			2.02 V	58	115.7	-1.8
2	*2452.00	107.5 AV			2.02 V	58	109.3	-1.8
3	2483.50	65.5 PK	74.0	-8.5	2.02 V	58	67.2	-1.7
4	2483.50	53.8 AV	54.0	-0.2	2.02 V	58	55.5	-1.7
5	4904.00	45.2 PK	74.0	-28.8	1.92 V	33	43.0	2.2
6	4904.00	43.0 AV	54.0	-11.0	1.92 V	33	40.8	2.2
7	7356.00	44.8 PK	74.0	-29.2	1.92 V	177	35.7	9.1
8	7356.00	32.0 AV	54.0	-22.0	1.92 V	177	22.9	9.1

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

Below 1GHz Data:

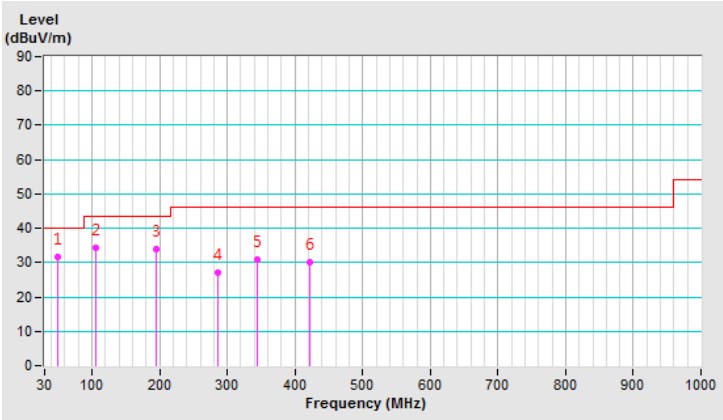
802.11g

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	48.91	31.8 QP	40.0	-8.2	1.50 H	98	39.8	-8.0
2	106.46	34.2 QP	43.5	-9.3	3.00 H	276	45.3	-11.1
3	195.31	33.8 QP	43.5	-9.7	1.50 H	92	44.6	-10.8
4	286.86	27.2 QP	46.0	-18.8	1.00 H	115	34.5	-7.3
5	345.23	30.9 QP	46.0	-15.1	1.00 H	37	36.9	-6.0
6	421.25	30.1 QP	46.0	-15.9	2.00 H	236	33.8	-3.7

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.

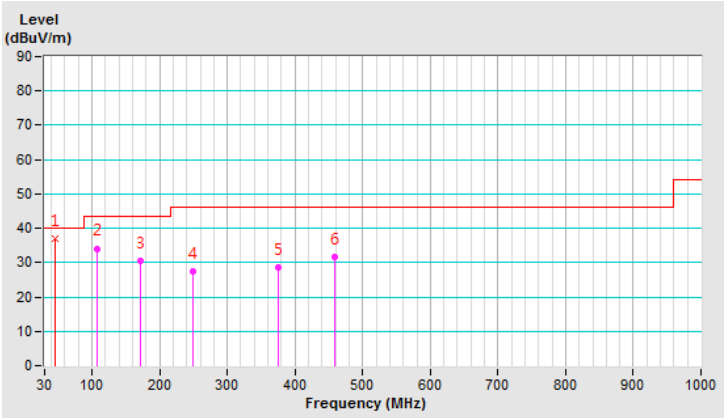


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	45.64	36.9 QP	40.0	-3.1	1.00 V	20	44.9	-8.0
2	108.38	34.1 QP	43.5	-9.4	1.00 V	272	44.8	-10.7
3	172.32	30.4 QP	43.5	-13.1	1.00 V	307	39.0	-8.6
4	250.00	27.6 QP	46.0	-18.4	1.00 V	151	36.4	-8.8
5	375.03	28.7 QP	46.0	-17.3	2.00 V	201	33.6	-4.9
6	459.32	31.7 QP	46.0	-14.3	1.00 V	262	34.2	-2.5

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	50	3	Oct. 23, 2019	Oct. 22, 2020
RF Cable	5D-FB	COCCAB-001	Sep. 27, 2019	Sep. 26, 2020
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: Dec. 02, 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.

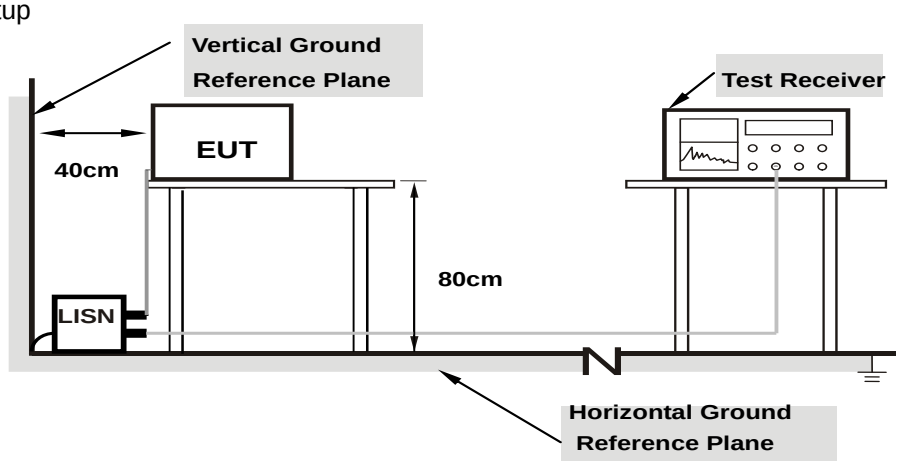
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

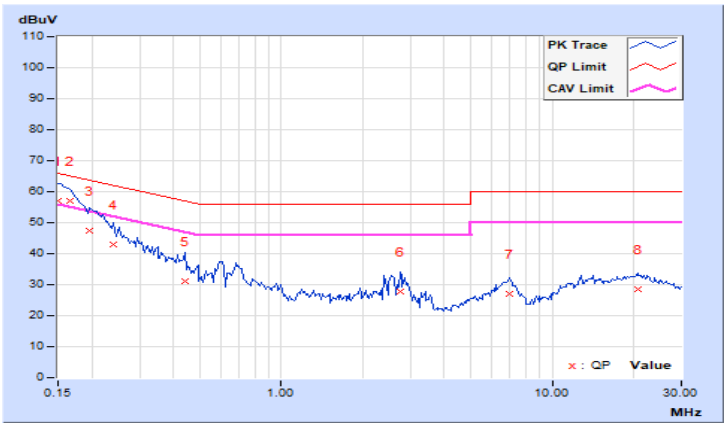
4.2.7 Test Results

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	9.97	46.91	31.82	56.88	41.79	66.00	56.00	-9.12	-14.21
2	0.16562	9.97	47.03	32.83	57.00	42.80	65.18	55.18	-8.18	-12.38
3	0.19687	9.97	37.47	24.82	47.44	34.79	63.74	53.74	-16.30	-18.95
4	0.23984	9.97	32.93	21.34	42.90	31.31	62.10	52.10	-19.20	-20.79
5	0.43906	9.98	21.21	13.42	31.19	23.40	57.08	47.08	-25.89	-23.68
6	2.75391	10.10	17.57	7.88	27.67	17.98	56.00	46.00	-28.33	-28.02
7	6.97656	10.32	16.81	11.26	27.13	21.58	60.00	50.00	-32.87	-28.42
8	20.69531	11.07	17.56	12.52	28.63	23.59	60.00	50.00	-31.37	-26.41

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

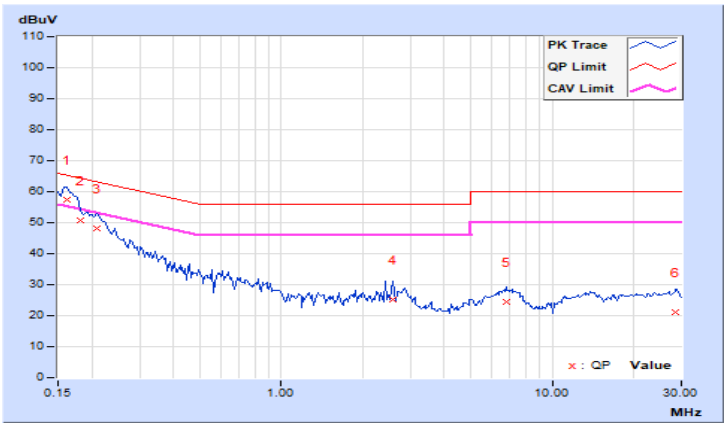


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	**0.16172**	**9.97**	**47.31**	**33.06**	**57.28**	**43.03**	**65.38**	**55.38**	**-8.10**	**-12.35**
2	0.18125	9.97	40.64	26.40	50.61	36.37	64.43	54.43	-13.82	-18.06
3	0.20859	9.97	38.32	24.76	48.29	34.73	63.26	53.26	-14.97	-18.53
4	2.57031	10.08	15.16	5.45	25.24	15.53	56.00	46.00	-30.76	-30.47
5	6.78906	10.26	14.34	8.86	24.60	19.12	60.00	50.00	-35.40	-30.88
6	28.49219	10.94	10.02	4.72	20.96	15.66	60.00	50.00	-39.04	-34.34

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

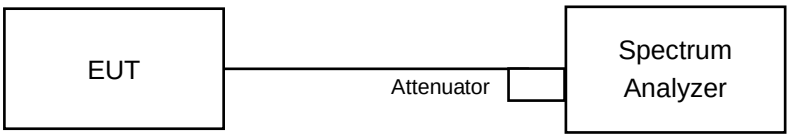


4.3 6dB Bandwidth Measurement

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

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
		Chain 3		
1	2412	8.12	0.5	Pass
6	2437	8.13	0.5	Pass
11	2462	8.11	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	16.57	16.58	16.56	16.59	0.5	Pass
6	2437	16.57	16.62	16.58	16.61	0.5	Pass
11	2462	16.60	16.61	16.60	16.61	0.5	Pass

802.11ax (HE20)

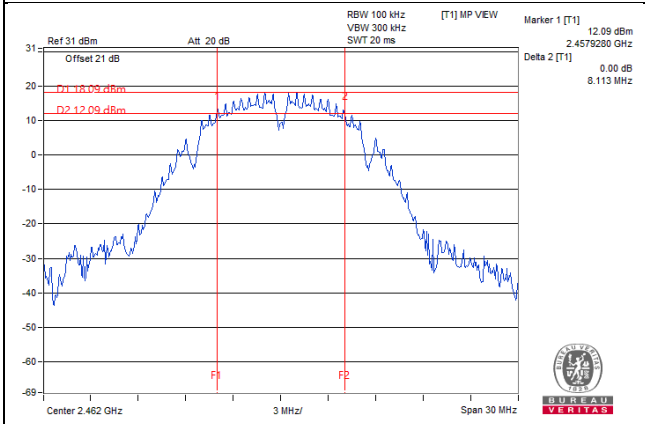
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	19.07	19.10	19.13	19.09	0.5	Pass
6	2437	19.03	19.11	19.15	19.10	0.5	Pass
11	2462	19.09	19.12	19.12	19.10	0.5	Pass

802.11ax (HE40)

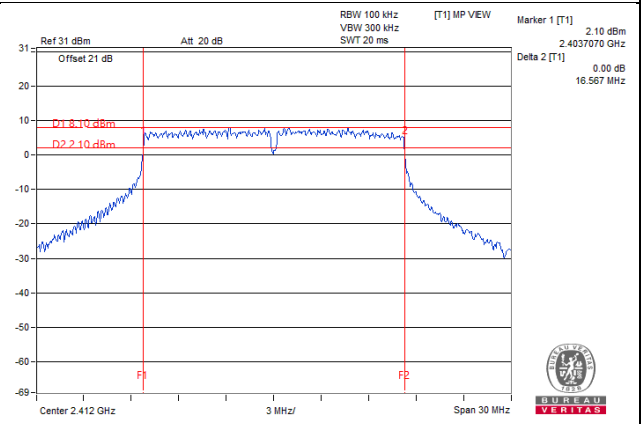
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
3	2422	38.31	38.27	38.33	38.33	0.5	Pass
6	2437	38.29	38.34	38.30	38.27	0.5	Pass
9	2452	38.32	38.30	38.31	38.34	0.5	Pass

Spectrum Plot of Worst Value

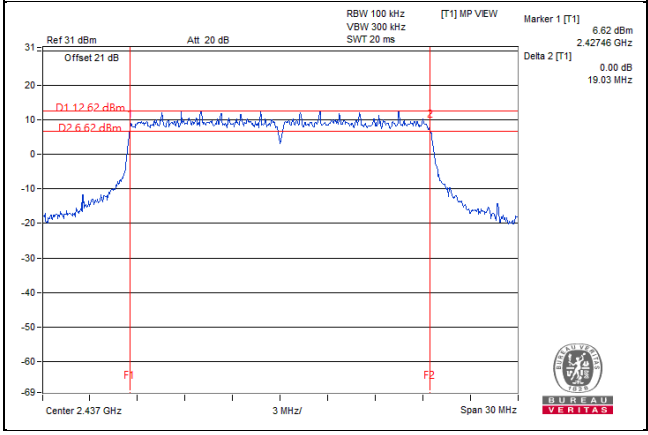
802.11b / Chain 3 : CH11



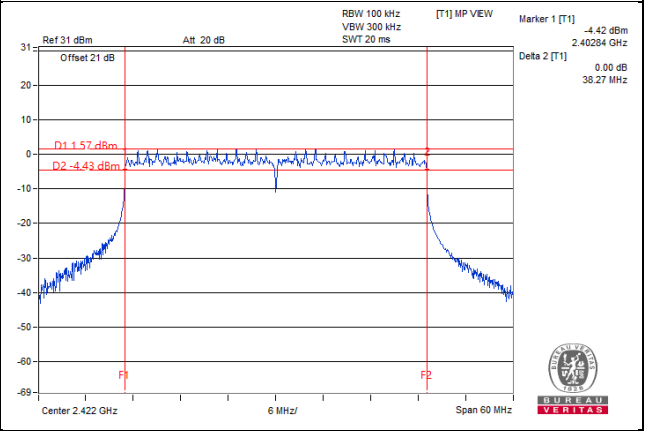
802.11g / Chain 2 : CH1



802.11ax (HE20) / Chain 0 : CH6



802.11ax (HE40) / Chain 1 : CH3



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

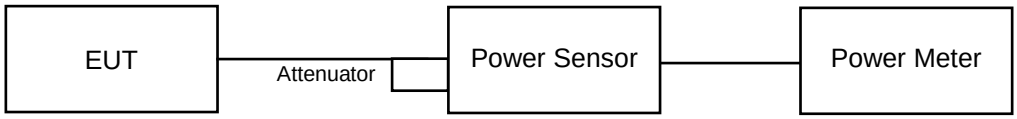
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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 3				
1	2412	27.31	538.27	27.31	30.00	Pass
6	2437	27.12	515.229	27.12	30.00	Pass
11	2462	26.97	497.737	26.97	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	22.69	22.26	23.03	22.87	748.598	28.74	30.00	Pass
6	2437	23.94	23.36	24.19	23.77	965.166	29.85	30.00	Pass
11	2462	22.73	22.10	22.95	22.48	723.933	28.60	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	22.23	21.68	21.81	21.84	618.802	27.92	30.00	Pass
6	2437	24.03	23.50	23.88	23.52	946.05	29.76	30.00	Pass
11	2462	20.58	19.89	20.41	20.05	422.846	26.26	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	15.89	15.70	15.86	16.10	155.255	21.91	30.00	Pass
6	2437	21.22	20.57	20.98	21.12	501.193	27.00	30.00	Pass
9	2452	19.86	18.86	19.55	19.59	354.889	25.50	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	22.48	21.94	22.03	22.11	655.469	28.17	30.00	Pass
6	2437	24.10	23.52	23.90	23.54	953.36	29.79	30.00	Pass
11	2462	20.82	20.10	20.63	20.31	446.12	26.49	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	16.12	15.95	16.13	16.31	164.057	22.15	30.00	Pass
6	2437	21.43	20.84	21.21	21.37	529.552	27.24	30.00	Pass
9	2452	20.10	19.12	19.77	19.83	374.99	25.74	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	22.23	21.68	21.81	21.84	618.802	27.92	28.60	Pass
6	2437	22.23	22.21	22.09	21.93	651.213	28.14	28.60	Pass
11	2462	20.58	19.89	20.41	20.05	422.846	26.26	28.60	Pass

Note: 1. Directional gain = 7.4dBi > 6dBi , so the power limit shall be reduced to 30-(7.4-6) = 28.60dBm.

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	15.89	15.70	15.86	16.10	155.255	21.91	28.60	Pass
6	2437	21.22	20.57	20.98	21.12	501.193	27.00	28.60	Pass
9	2452	19.86	18.86	19.55	19.59	354.889	25.50	28.60	Pass

Note: 1. Directional gain = 7.4dBi > 6dBi , so the power limit shall be reduced to 30-(7.4-6) = 28.60dBm.

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	22.48	21.94	22.03	22.11	655.469	28.17	28.60	Pass
6	2437	22.43	22.45	22.35	22.13	685.873	28.36	28.60	Pass
11	2462	20.82	20.10	20.63	20.31	446.12	26.49	28.60	Pass

Note: 1. Directional gain = 7.4dBi > 6dBi , so the power limit shall be reduced to 30-(7.4-6) = 28.60dBm.

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	16.12	15.95	16.13	16.31	164.057	22.15	28.60	Pass
6	2437	21.43	20.84	21.21	21.37	529.552	27.24	28.60	Pass
9	2452	20.10	19.12	19.77	19.83	374.99	25.74	28.60	Pass

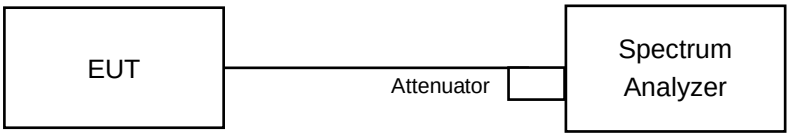
Note: 1. Directional gain = 7.4dBi > 6dBi , so the power limit shall be reduced to 30-(7.4-6) = 28.60dBm.

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 (dBm/3kHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
3	1	2412	-4.12	-4.12	8.00	Pass
	6	2437	-3.62	-3.62	8.00	Pass
	11	2462	-2.74	-2.74	8.00	Pass

Note: 1. Antenna gain = 5.72dBi < 6dBi, so the power density limit shall not be reduced.

802.11g

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	-10.33	6.02	-4.31	6.60	Pass
	6	2437	-8.71	6.02	-2.69	6.60	Pass
	11	2462	-10.22	6.02	-4.20	6.60	Pass
1	1	2412	-10.49	6.02	-4.47	6.60	Pass
	6	2437	-8.51	6.02	-2.49	6.60	Pass
	11	2462	-10.43	6.02	-4.41	6.60	Pass
2	1	2412	-9.15	6.02	-3.13	6.60	Pass
	6	2437	-8.47	6.02	-2.45	6.60	Pass
	11	2462	-9.71	6.02	-3.69	6.60	Pass
3	1	2412	-10.47	6.02	-4.45	6.60	Pass
	6	2437	-8.71	6.02	-2.69	6.60	Pass
	11	2462	-10.30	6.02	-4.28	6.60	Pass

Note: 1. Directional gain = 7.4dBi > 6dBi, so the power density limit shall be reduced to 8-(7.4-6) = 6.60dBm.

802.11ax (HE20)

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	-13.14	6.02	-7.12	6.60	Pass
	6	2437	-11.38	6.02	-5.36	6.60	Pass
	11	5462	-14.82	6.02	-8.80	6.60	Pass
1	1	2412	-12.11	6.02	-6.09	6.60	Pass
	6	2437	-11.57	6.02	-5.55	6.60	Pass
	11	5462	-14.44	6.02	-8.42	6.60	Pass
2	1	2412	-12.72	6.02	-6.70	6.60	Pass
	6	2437	-11.36	6.02	-5.34	6.60	Pass
	11	5462	-14.91	6.02	-8.89	6.60	Pass
3	1	2412	-13.26	6.02	-7.24	6.60	Pass
	6	2437	-11.74	6.02	-5.72	6.60	Pass
	11	5462	-15.06	6.02	-9.04	6.60	Pass

Note: 1. Directional gain = 7.4dBi > 6dBi, so the power density limit shall be reduced to 8-(7.4-6) = 6.60dBm.

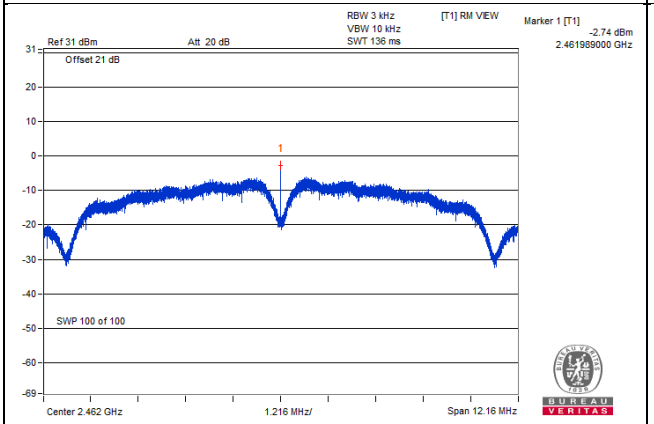
802.11ax (HE40)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-20.98	6.02	-14.96	6.60	Pass
	6	2437	-15.70	6.02	-9.68	6.60	Pass
	9	2452	-17.59	6.02	-11.57	6.60	Pass
1	3	2422	-21.82	6.02	-15.80	6.60	Pass
	6	2437	-16.44	6.02	-10.42	6.60	Pass
	9	2452	-17.69	6.02	-11.67	6.60	Pass
2	3	2422	-21.38	6.02	-15.36	6.60	Pass
	6	2437	-15.43	6.02	-9.41	6.60	Pass
	9	2452	-17.90	6.02	-11.88	6.60	Pass
3	3	2422	-20.31	6.02	-14.29	6.60	Pass
	6	2437	-16.24	6.02	-10.22	6.60	Pass
	9	2452	-17.84	6.02	-11.82	6.60	Pass

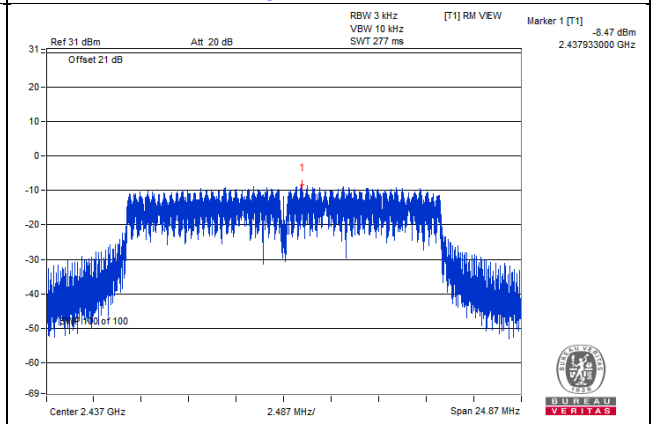
Note: 1. Directional gain = 7.4dBi > 6dBi, so the power density limit shall be reduced to 8-(7.4-6) = 6.60dBm.

Spectrum Plot of Worst Value

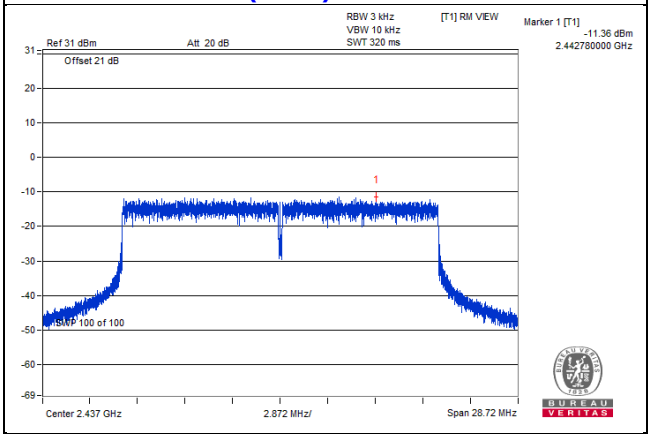
802.11b / Chain 3: CH11



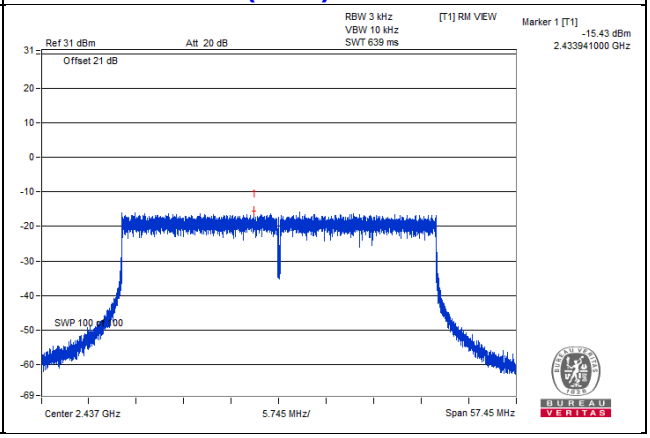
802.11g / Chain 2 : CH6



802.11ax (HE20) / Chain 2: CH6



802.11ax (HE40) / Chain 2: CH6

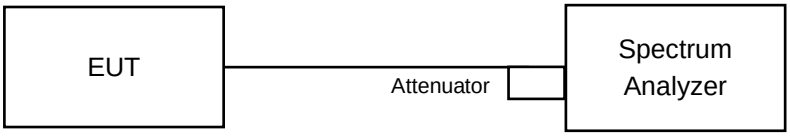


4.6 Conducted Out of Band Emission Measurement

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

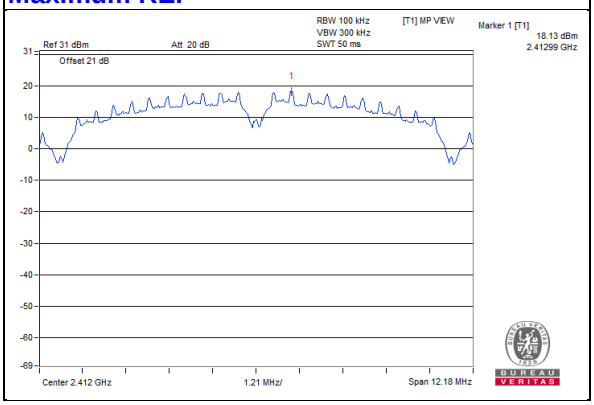
Same as Item 4.3.6

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.

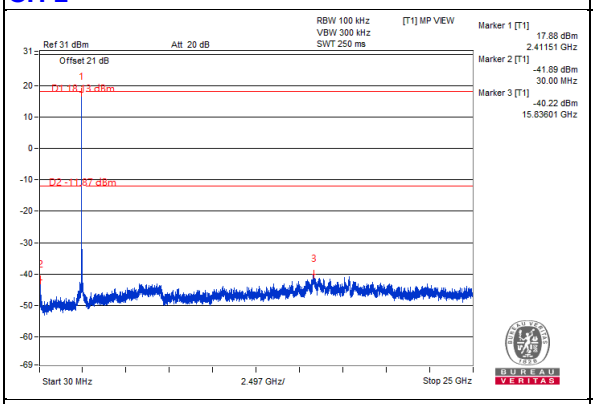
802.11b

Maximum REF

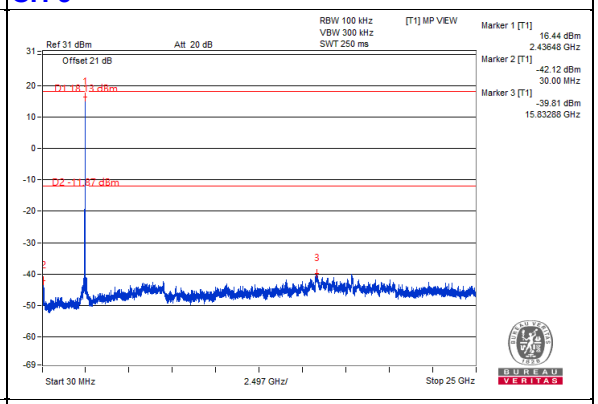


Chain 3

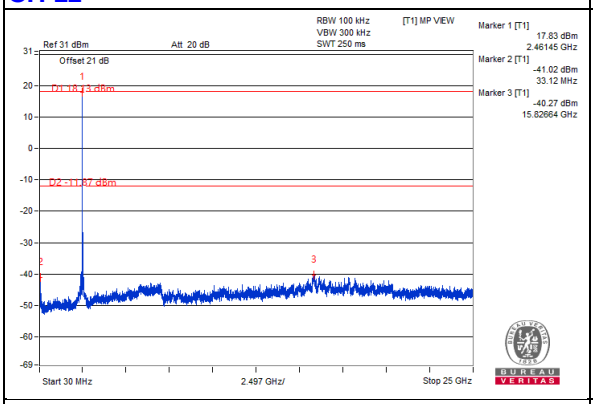
CH 1



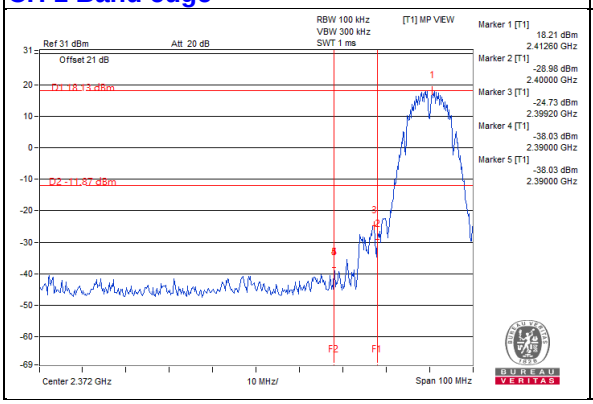
CH 6



CH 11



CH 1 Band edge



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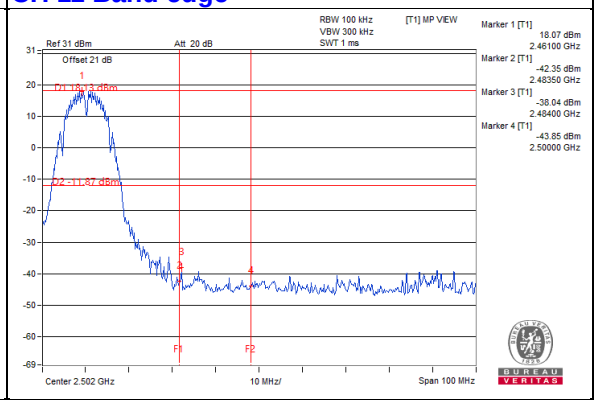
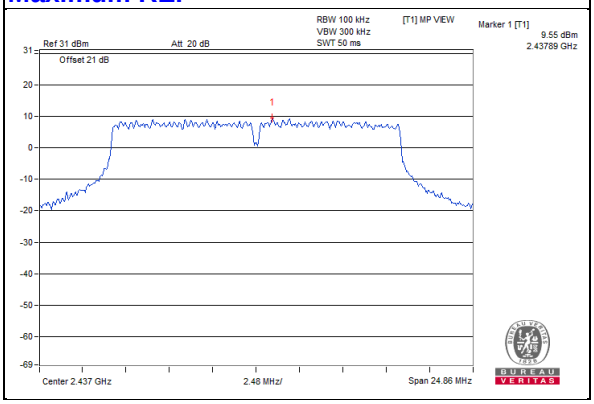


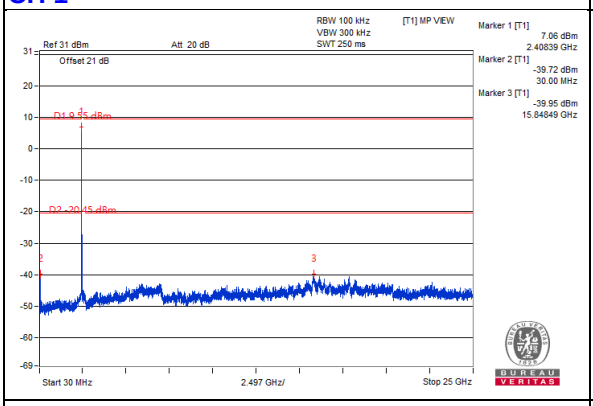
802.11g

Maximum REF



Chain 0

CH 1



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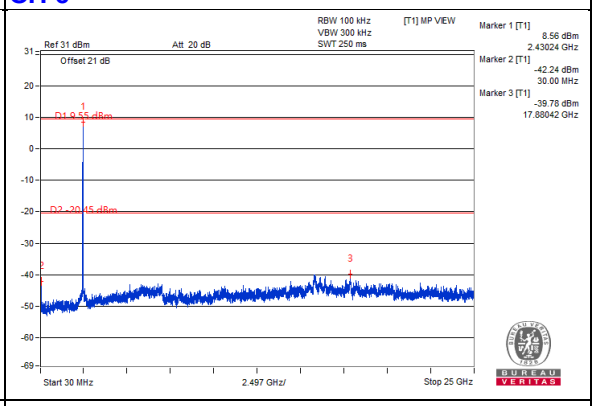

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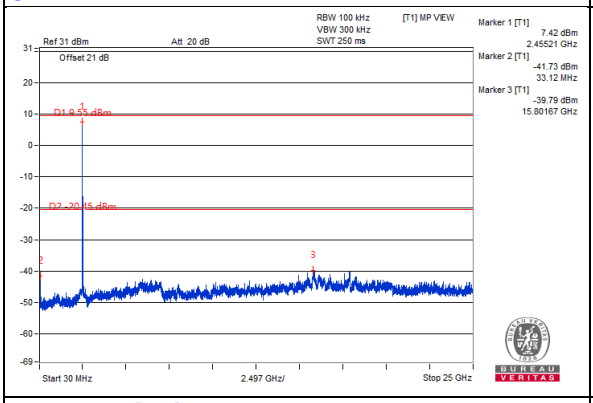

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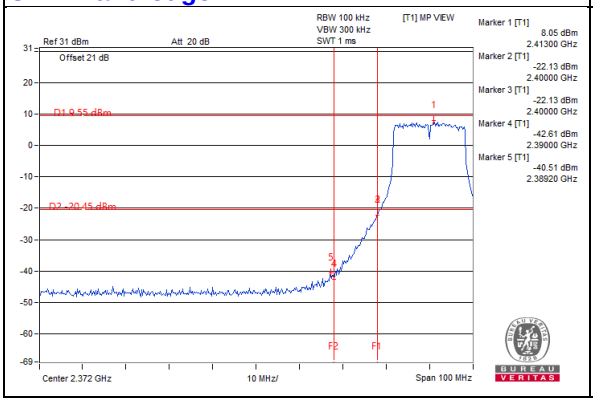

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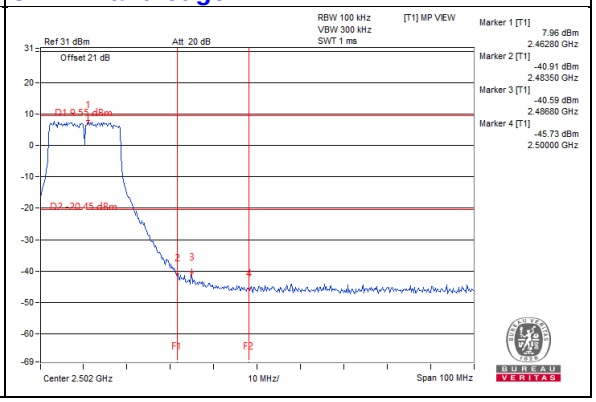

Chain 1

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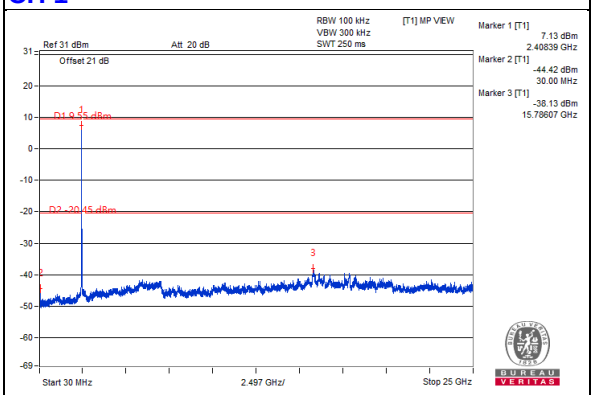

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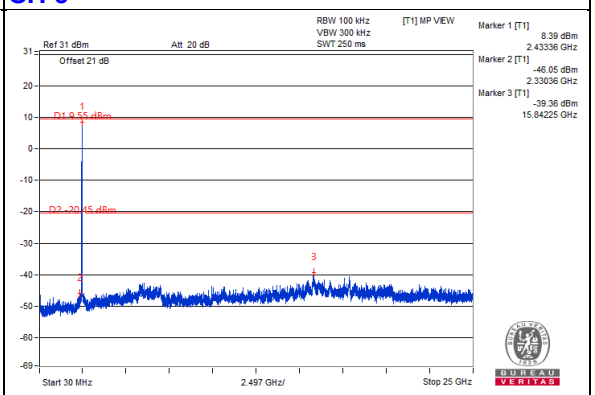

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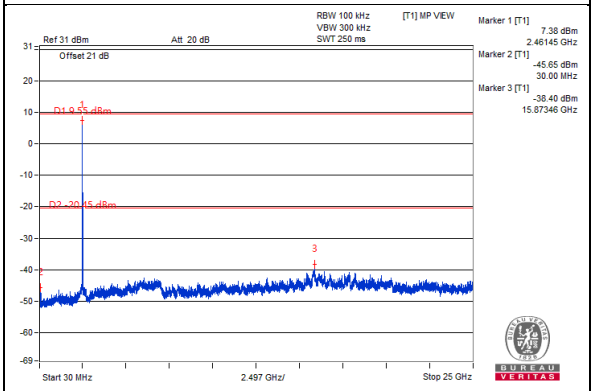

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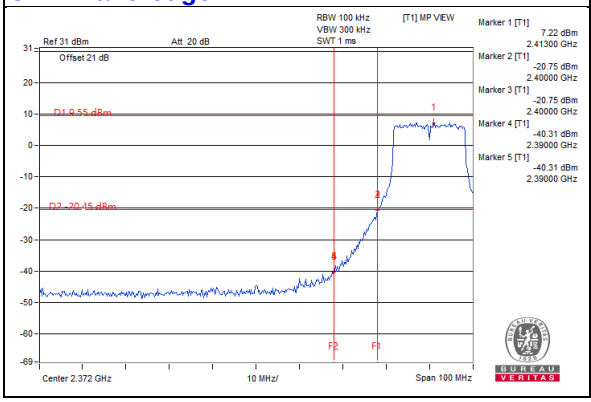

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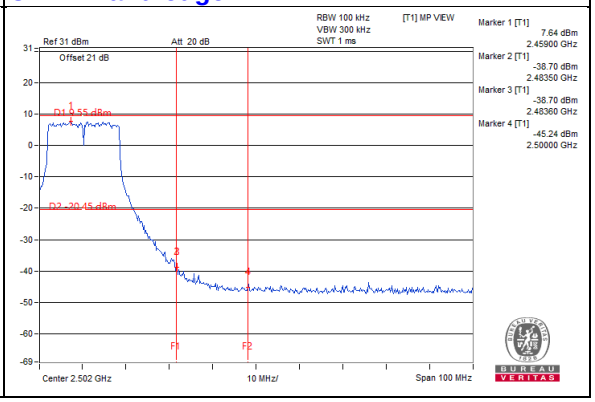
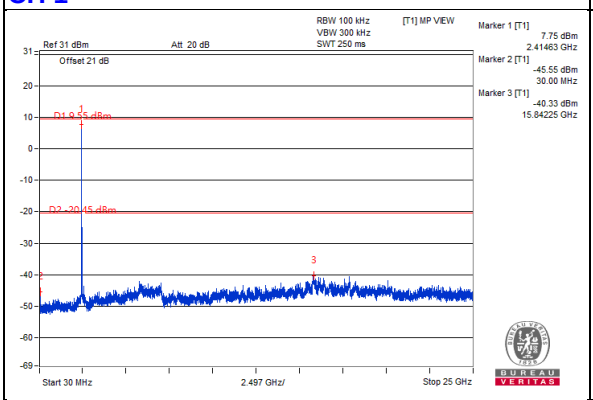


Chain 2

CH 1



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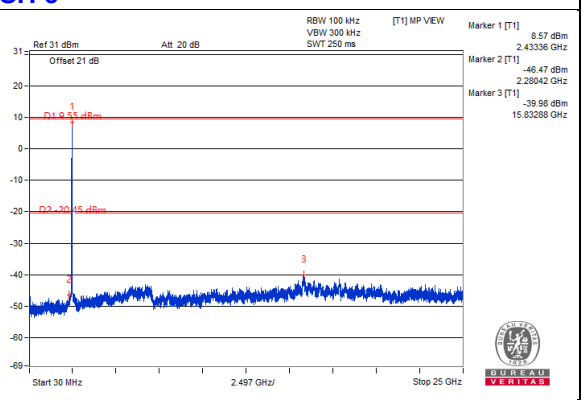

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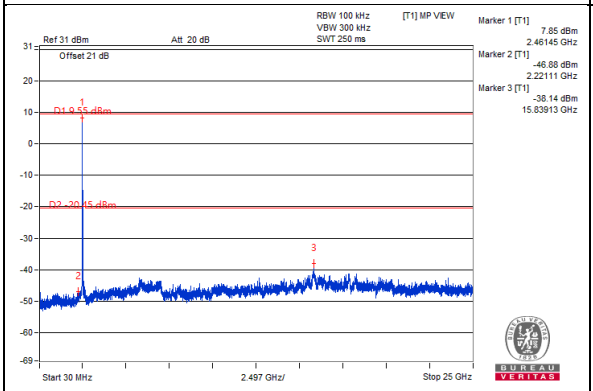

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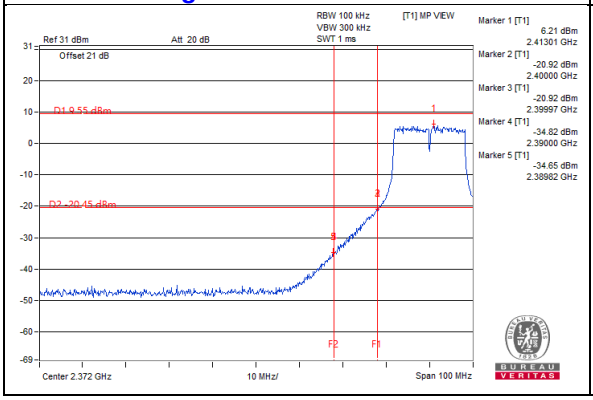

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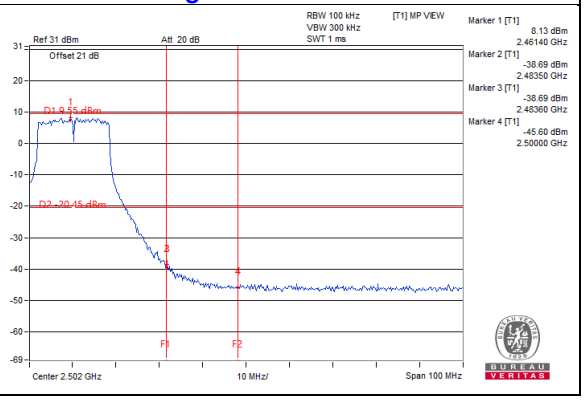
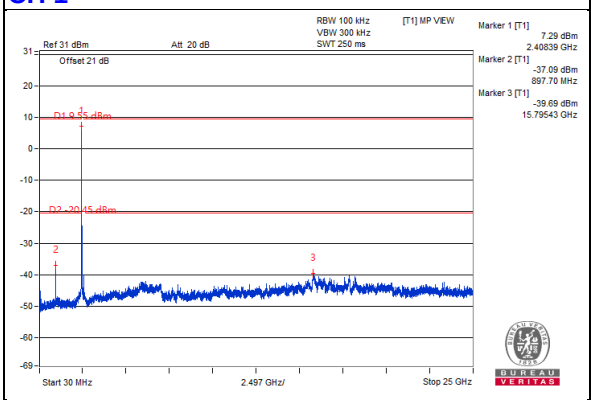


Chain 3

CH 1



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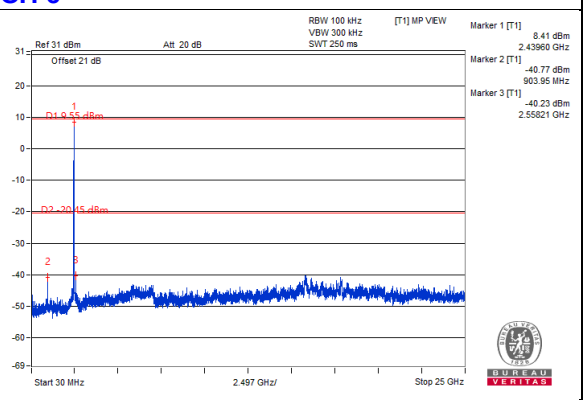

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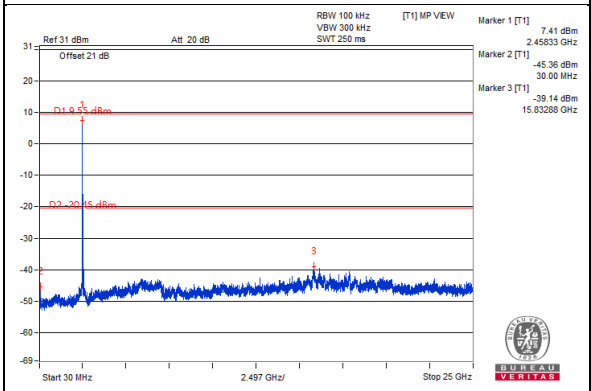

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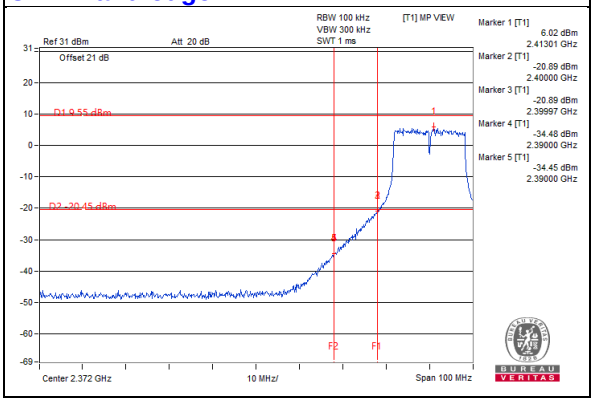

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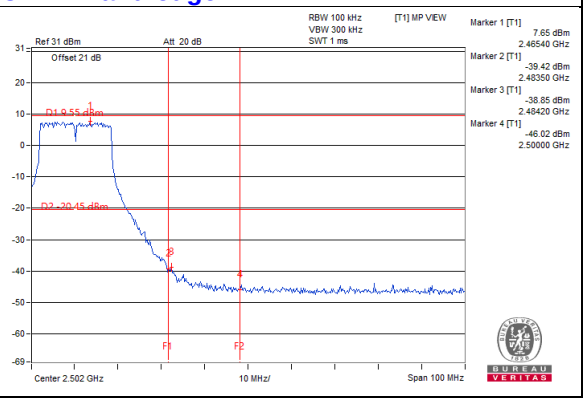
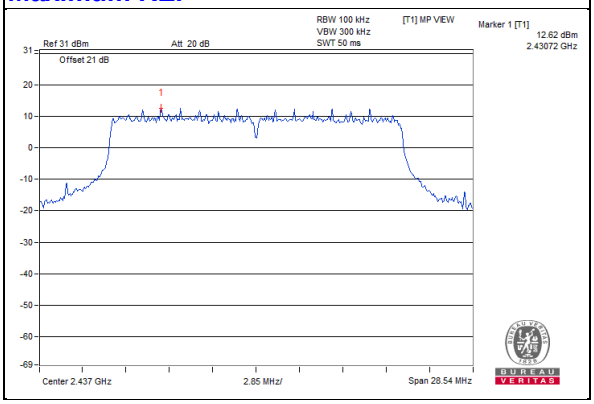


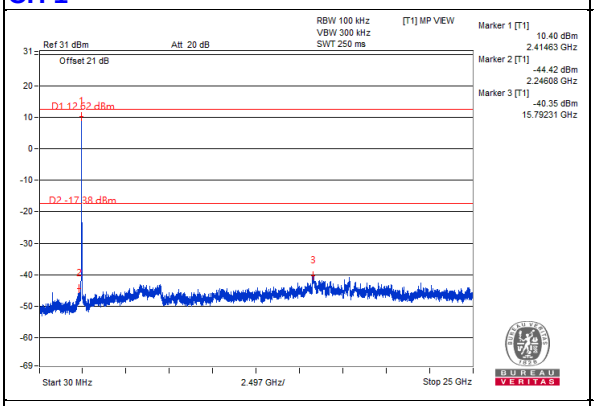
802.11ax (HE20)

Maximum REF

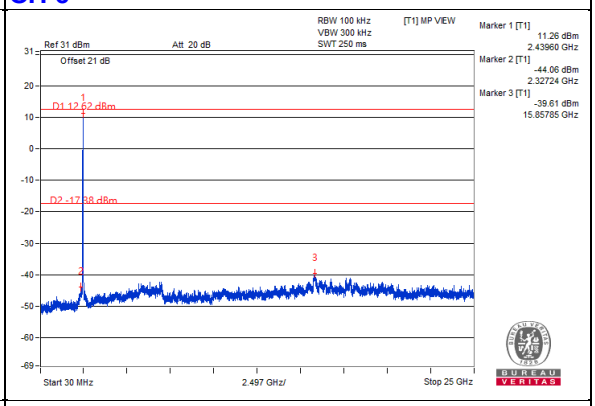


Chain 0

CH 1



CH 6



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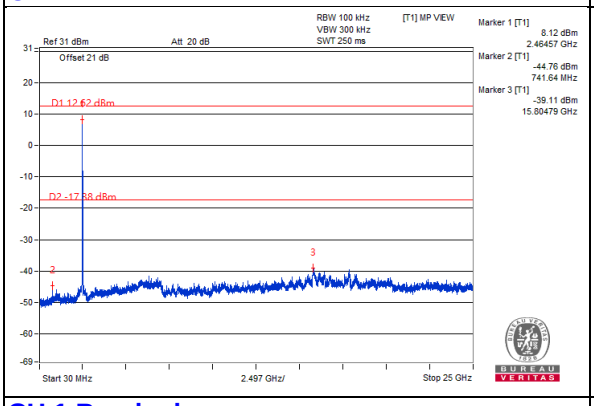

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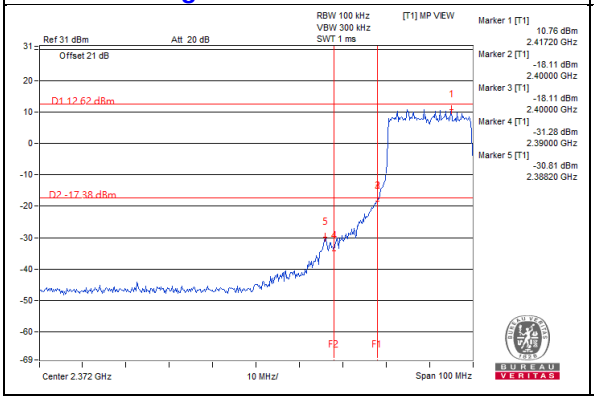

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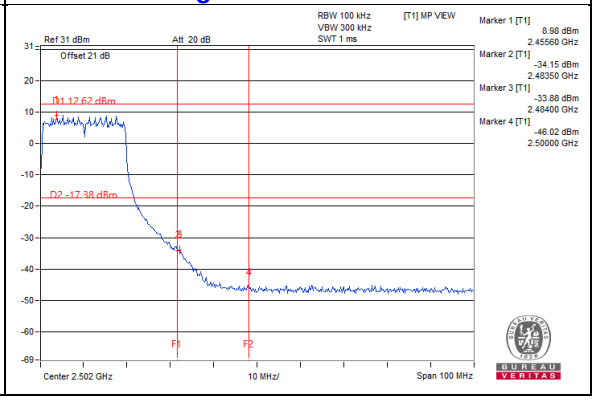
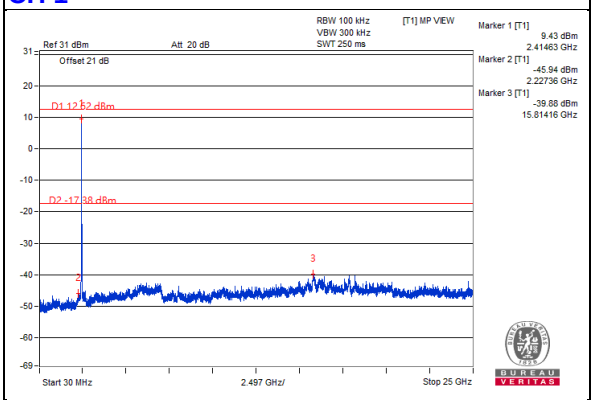
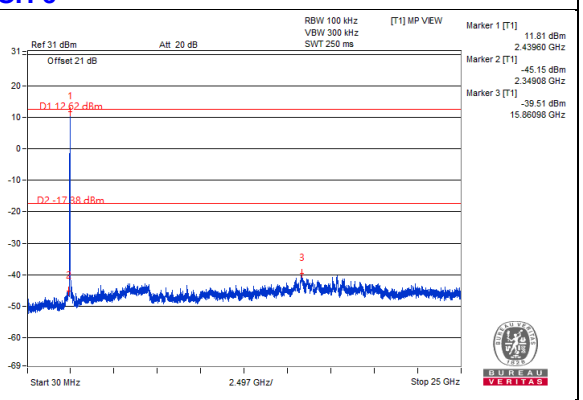


Chain 1

CH 1



CH 6



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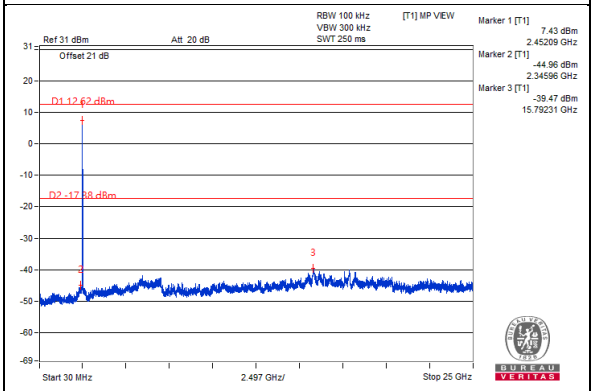
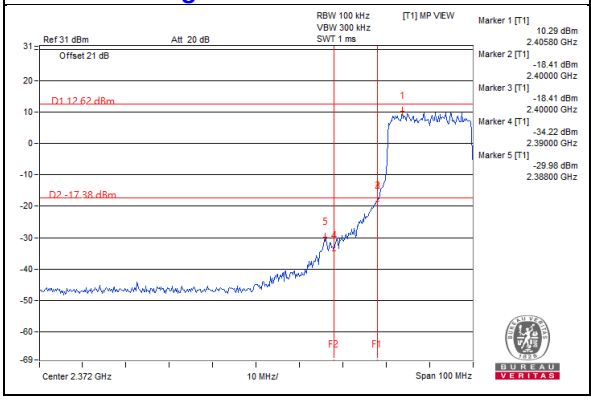
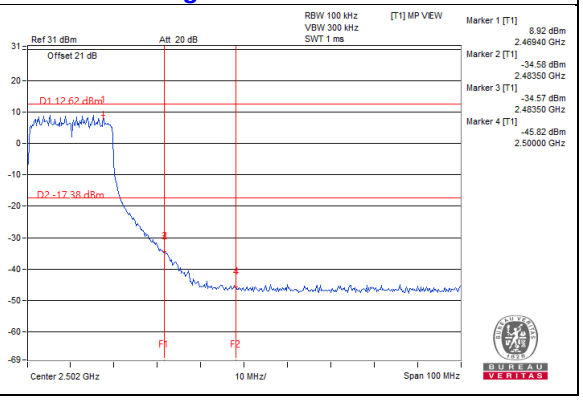


CH 1 Band edge

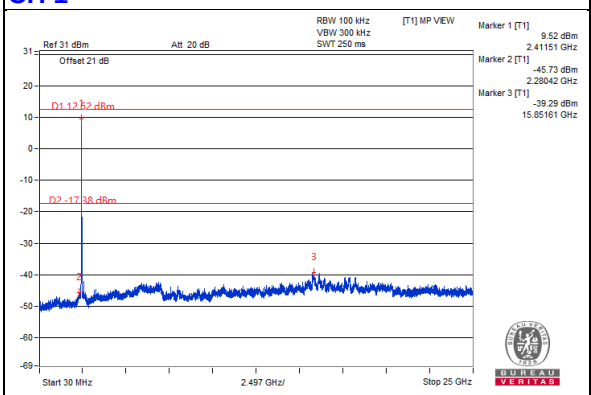


CH 11 Band edge

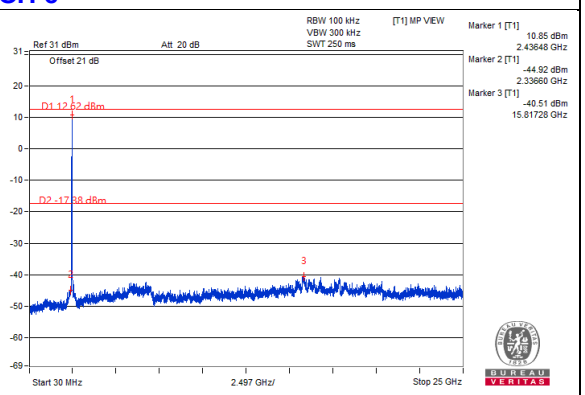


Chain 2

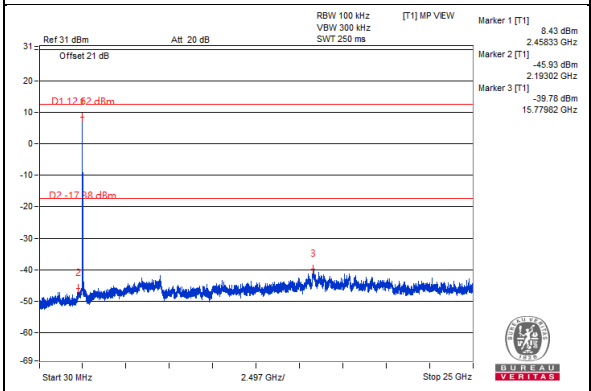
CH 1



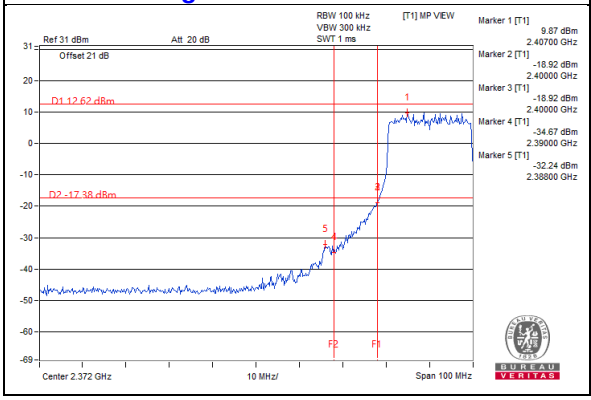
CH 6



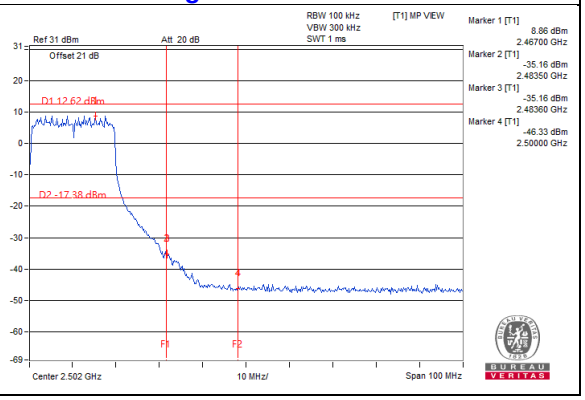
CH 11



CH 1 Band edge

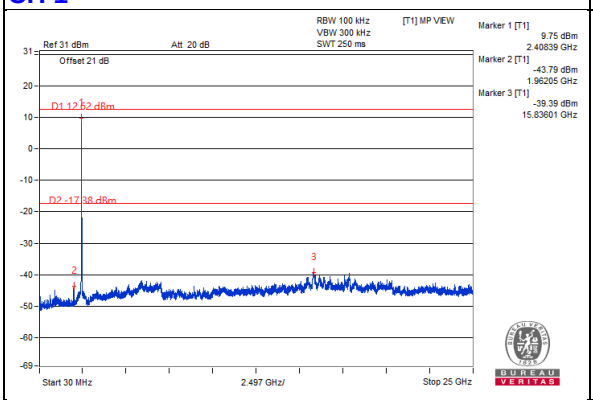


CH 11 Band edge

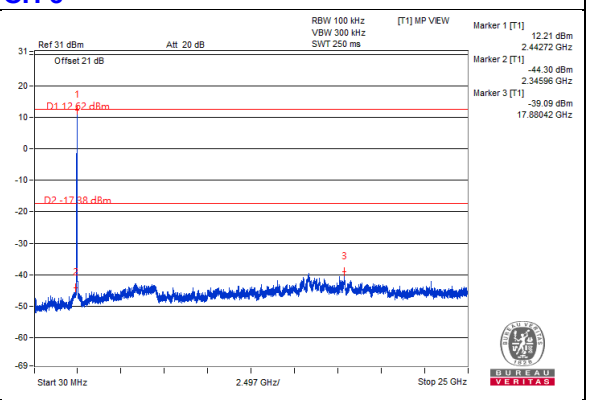


Chain 3

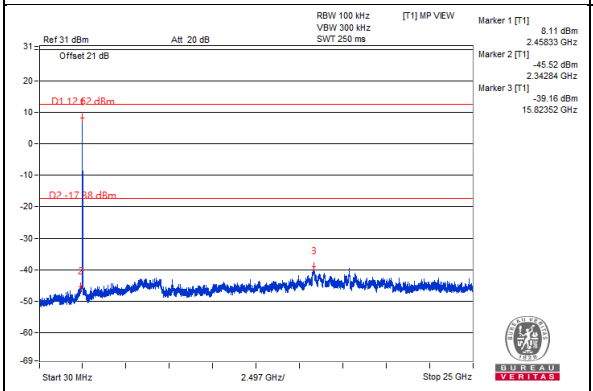
CH 1



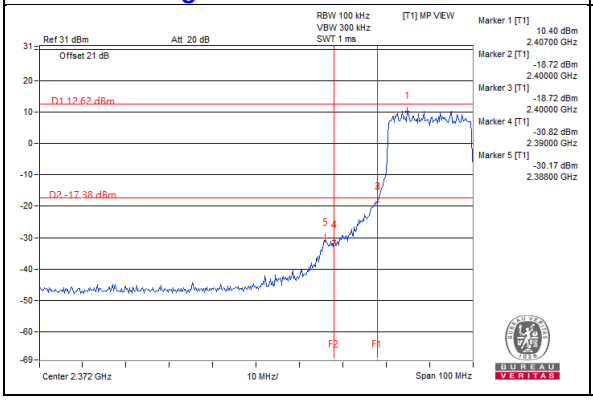
CH 6



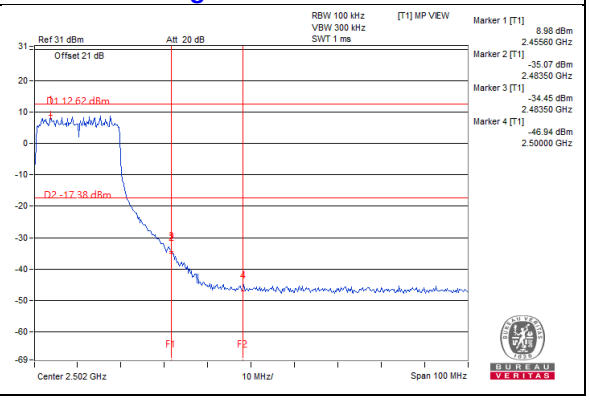
CH 11



CH 1 Band edge

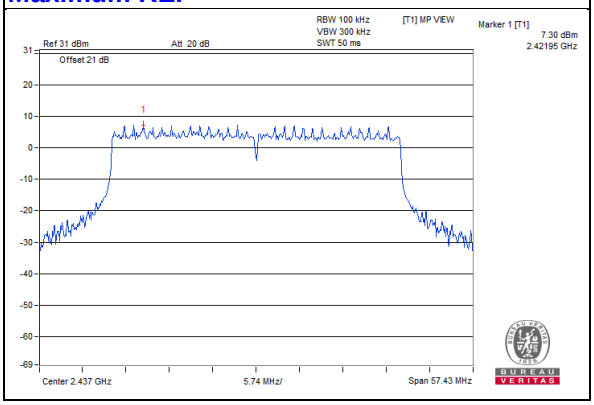


CH 11 Band edge



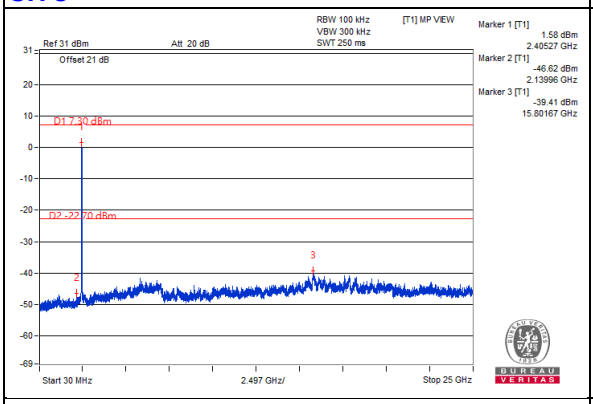
802.11ax (HE40)

Maximum REF

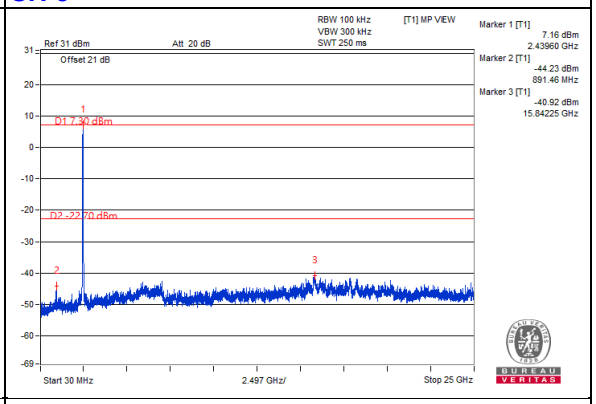


Chain 0

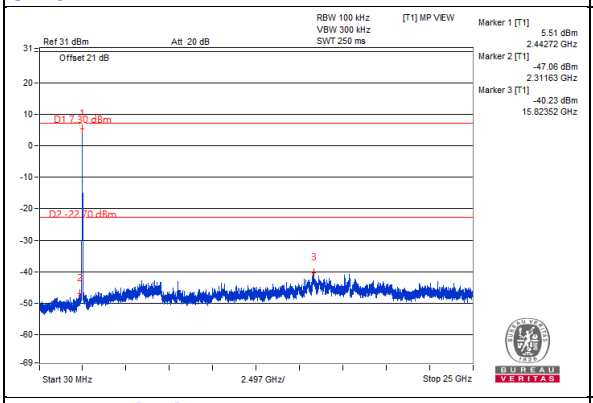
CH 3



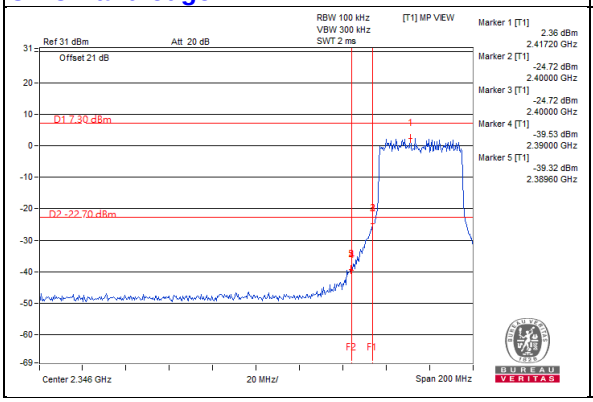
CH 6



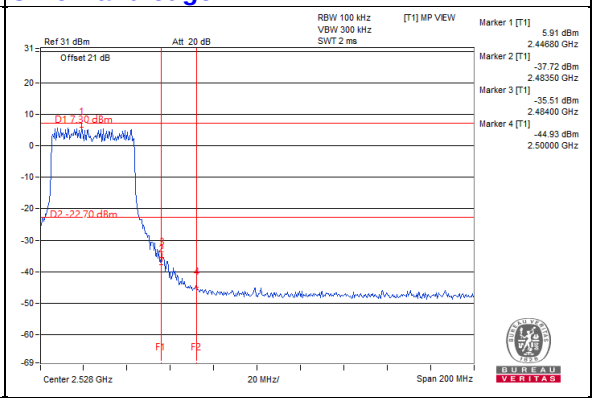
CH 9



CH 3 Band edge

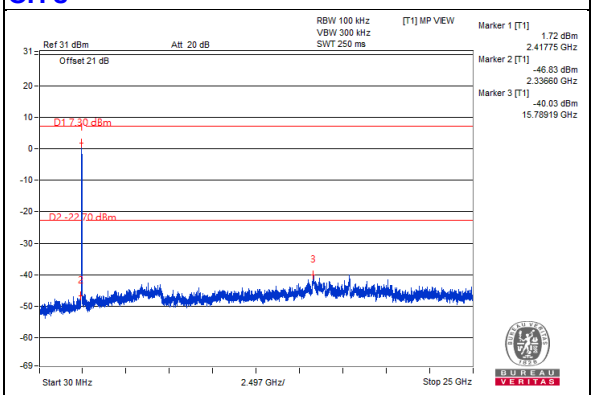


CH 9 Band edge

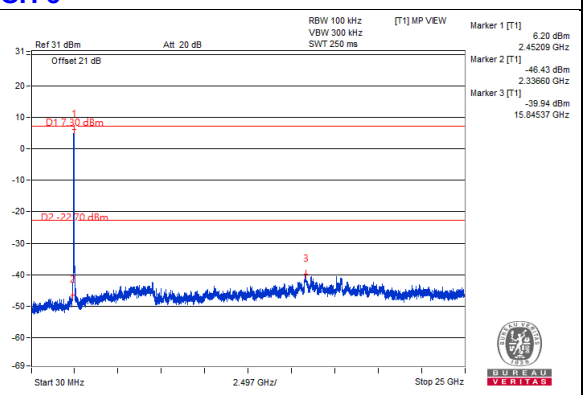


Chain 1

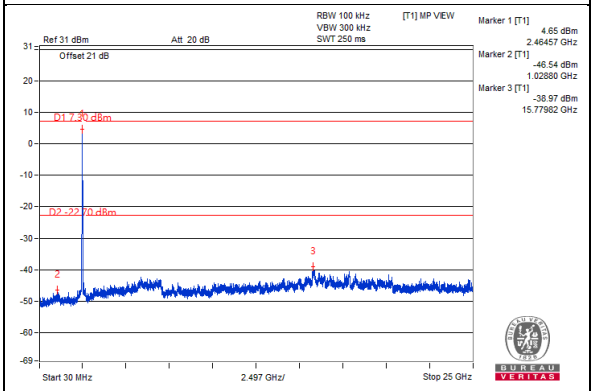
CH 3



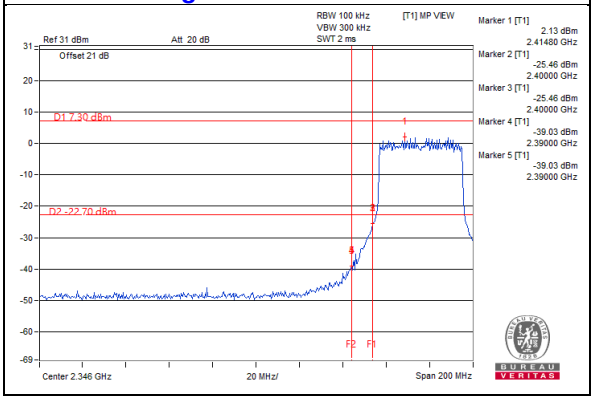
CH 6



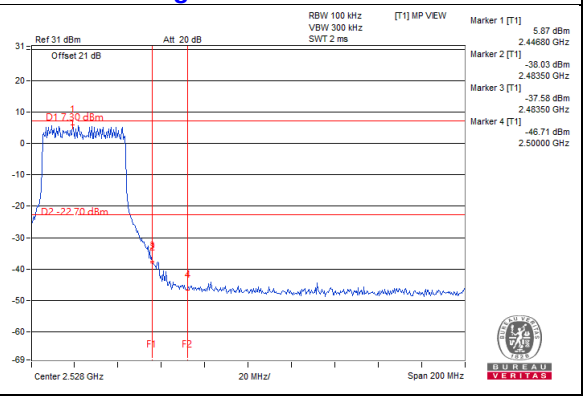
CH 9



CH 3 Band edge

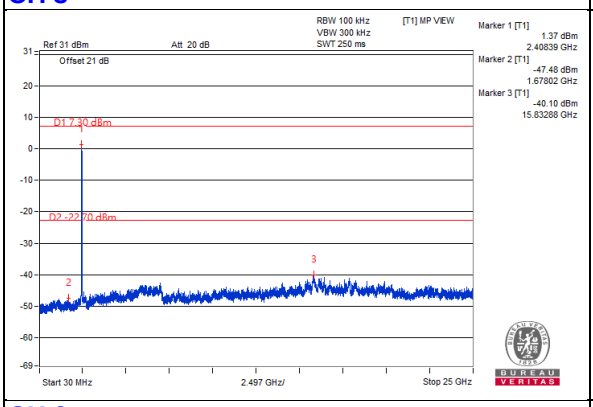


CH 9 Band edge

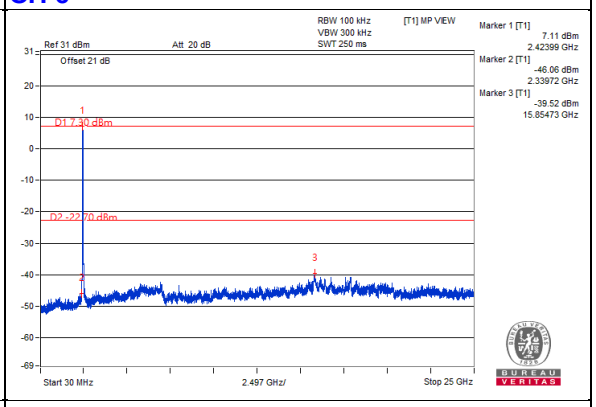


Chain 2

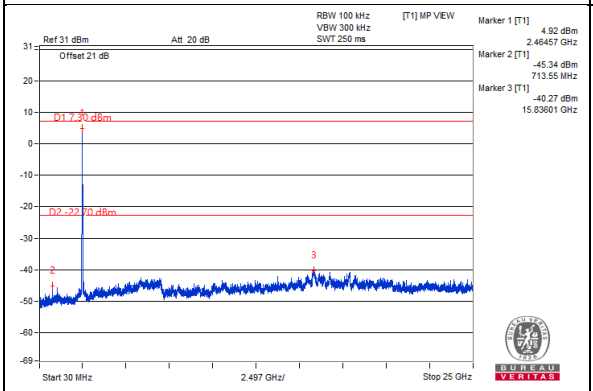
CH 3



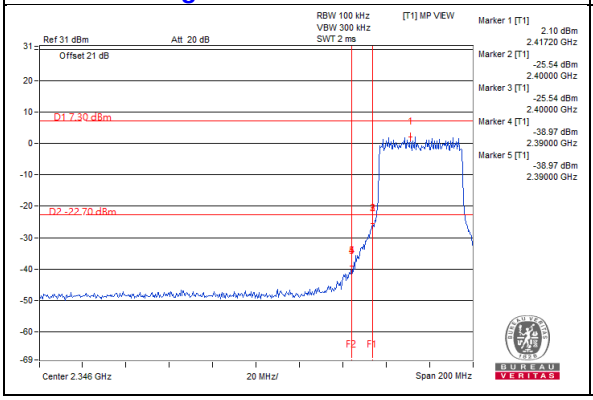
CH 6



CH 9



CH 3 Band edge



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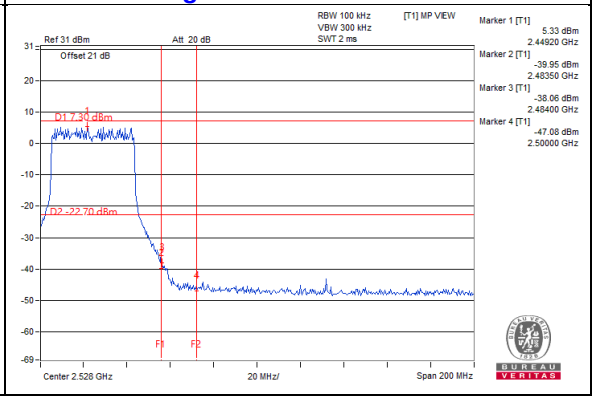
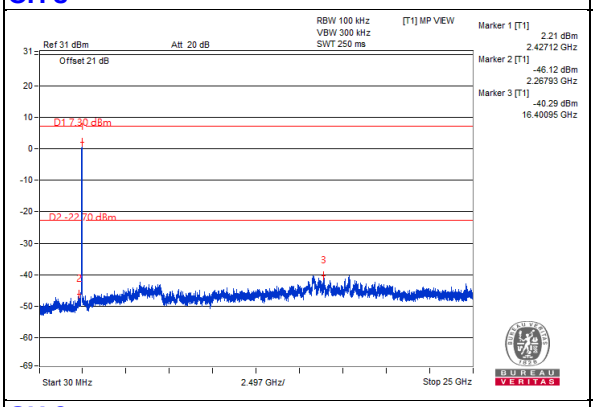
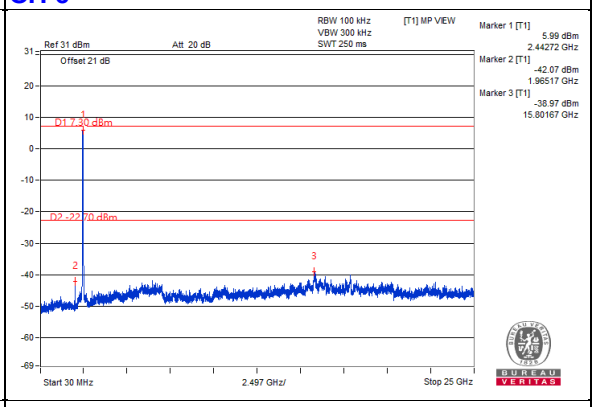


Chain 3

CH 3



CH 6



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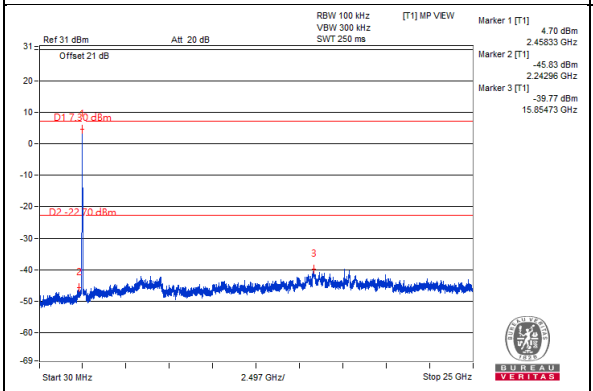

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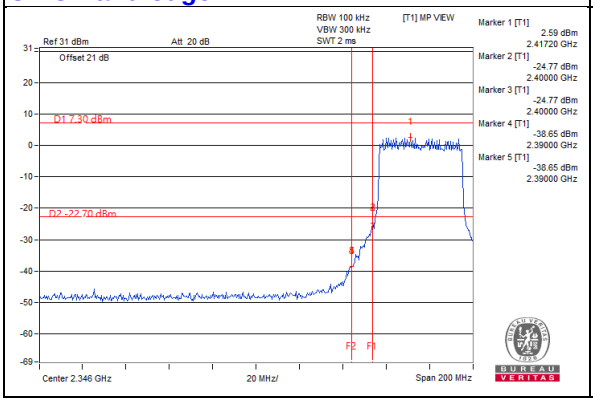

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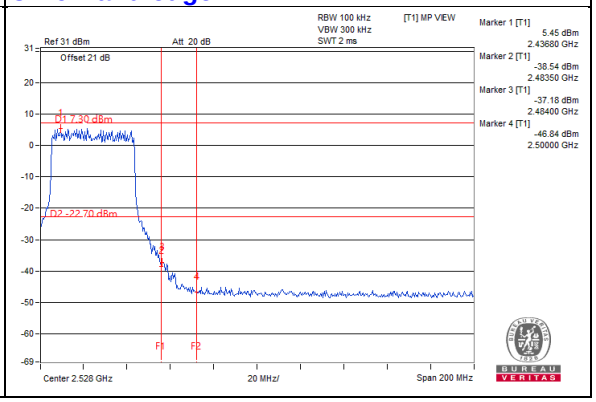

5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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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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