FCC Test Report

Report No.:	RFBFBE-WTW-P21031123
FCC ID:	I88DX4510-B0
Test Model:	DX4510-B0
Received Date:	Mar. 23, 2021
Test Date:	Mar. 24 to July 29, 2021
Issued Date:	Apr. 15, 2022
Applicant:	Zyxel Communications Corporation
Address:	No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30075, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
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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Release Control Record

Issue No.	Description	Date Issued
RFBFBE-WTW-P21031123	Original release.	Apr. 15, 2022

1 Certificate of Conformity

Product:	AX6000 WiFi6 VDSL2 Bonding Gateway
Brand:	ZYXEL
Test Model:	DX4510-B0
Sample Status:	Engineering sample
Applicant:	Zyxel Communications Corporation
Test Date:	Mar. 24 to July 29, 2021
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:** Apr. 15, 2022

Phoenix Huang / Specialist

Approved by : _____ , **Date:** Apr. 15, 2022

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 -8.90 dB at 0.15391 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.5 dB at 2388.53 MHz, 2390.00 MHz, 2483.50 MHz 4874.00 MHz.
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:

1. For 2.4 GHz band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A.
2. 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	1.9 dB
Conducted emissions	-	2.5 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.5 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.1 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AX6000 WiFi6 VDSL2 Bonding Gateway
Brand	ZYXEL
Test Model	DX4510-B0
Status of EUT	Engineering sample
CPU Model No.	BCM63138UKFSBG
RF Chip Model No.	BCM43684
Version of Firmware	V5.17(ABYL.0)b2
Power Supply Rating	12 Vdc 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 mode 1024QAM for OFDMA in 11ax mode only
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 600 Mbps 802.11ac: up to 3466.7 Mbps 802.11ax: up to 4803.9 Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462 GHz **5GHz:** 5.18~ 5.32 GHz, 5.5 ~ 5.72 GHz, 5.745 ~ 5.825 GHz
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): 25 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 12 802.11ac (VHT80), 802.11ax (HE80): 6 802.11ac (VHT160), 802.11ax (HE160): 2
Output Power	**CDD Mode:** **2.412 ~ 2.462 GHz:** 992.518 mW **5.18 ~ 5.32 GHz:** 978.408 mW **5.5 ~ 5.72 GHz:** 247.904 mW **5.745 ~ 5.825 GHz:** 989.441 mW **Beamforming Mode:** **2.412 ~ 2.462 GHz:** 974.469 mW **5.18 ~ 5.32 GHz:** 978.408 mW **5.5 ~ 5.72 GHz:** 247.904 mW **5.745 ~ 5.825 GHz:** 989.441 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note

Accessory Device	- AC Adaptor x 1 - Ethernet Cable, Non-shielded, 1.8 m - DSL Cable, Non-shielded, 1.8 m

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 uses following adapter.

Adapter 1	
Brand	DVE
Model	DSA-36PFN-12 FUS
Input Power	AC input: 100-240 Vac, 50/60 Hz, 1.0 A
Output Power	DC output: 12 Vdc, 3.0A, 36.0 W
Power Line	DC output cable: Unshielded, 1.5 m
Adapter 2	
Brand	MNC
Model	MAUS-1202503000
Input Power	AC input: 100-240 Vac, 50/60 Hz, 0.8 A
Output Power	DC output: 12 Vdc, 2.5 A
Power Line	DC output cable: Unshielded, 1.5 m
Note: From the above adapters, the worst Radiated Emissions and Conducted Emissions test was found in Adapter 1. Therefore only the test data of the modes were recorded in this report.	

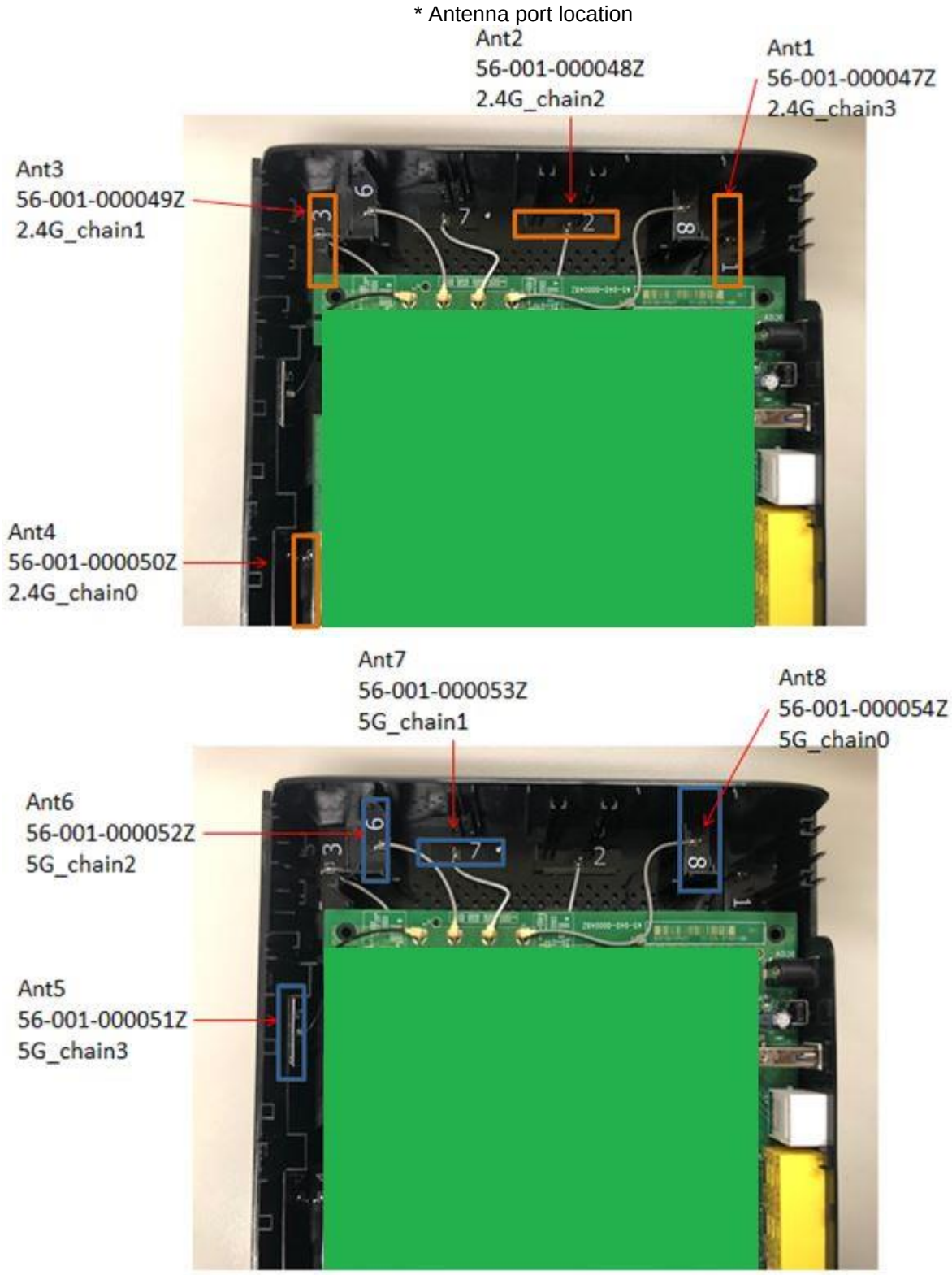
3. The antennas provided to the EUT, please refer to the following table:

Antenna No.	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type	Cable Length (mm)
1	2.4G_Chain 3	WHAYU	56-001-000047Z	2.7	2.4~2.4835	Dipole	i-pex(MHF)	313
2	2.4G_Chain 2	WHAYU	56-001-000048Z	2.31	2.4~2.4835	Dipole	i-pex(MHF)	258
3	2.4G_Chain 1	WHAYU	56-001-000049Z	2.57	2.4~2.4835	Dipole	i-pex(MHF)	263
4	2.4G_Chain 0	WHAYU	56-001-000050Z	2.53	2.4~2.4835	Dipole	i-pex(MHF)	145
5	5G_Chain 3	WHAYU	56-001-000051Z	2.6 2.92 3.31 3.16	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	i-pex(MHF)	59
6	5G_Chain 2	WHAYU	56-001-000052Z	2.99 3.22 3.13 2.18	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	i-pex(MHF)	40
7	5G_Chain 1	WHAYU	56-001-000053Z	3.48 3.09 3.79 2.46	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	i-pex(MHF)	45
8	5G_Chain 0	WHAYU	56-001-000054Z	0.63 2.62 2.61 3.73	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	i-pex(MHF)	80

Note:

1. Antenna Gain refer to “P21031123 Multi-Antenna Systems Directional Gain measurement” files.
2. Maximum Correlated Directional Gain following KDB662911 D03 MIMO Antenna Gain Measurement.

* Antenna port location



4. 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
802.11ac (VHT160)	4TX	4RX
802.11ax (HE20)	4TX	4RX
802.11ax (HE40)	4TX	4RX
802.11ax (HE80)	4TX	4RX
802.11ax (HE160)	4TX	4RX

Note:

1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
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/ac mode is the same as the 802.11ax mode or more lower than it and investigated worst case to representative mode in test report. (Final test mode refer to section 3.2.1)

5. The power setting are list as below:

CDD Mode											
802.11b		802.11g		VHT20		VHT40		802.11ax (HE20)		802.11ax (HE40)	
Freq. (MHz)	Power Setting	Freq. (MHz)	Power Setting	Freq. (MHz)	Power Setting	Freq. (MHz)	Power Setting	Freq. (MHz)	Power Setting	Freq. (MHz)	Power Setting
2412	93	2412	75	2412	68	2422	62	2412	68	2422	62
2437	93	2437	99	2437	98	2437	74	2437	98	2437	74
2462	93	2462	77	2462	74	2452	72	2462	74	2452	72

Beamforming Mode							
VHT20		VHT40		802.11ax (HE20)		802.11ax (HE40)	
Freq. (MHz)	Power Setting	Freq. (MHz)	Power Setting	Freq. (MHz)	Power Setting	Freq. (MHz)	Power Setting
2412	68	2422	62	2412	68	2422	62
2437	98	2437	74	2437	98	2437	74
2462	74	2452	72	2462	74	2452	72

6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
7. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), VHT20, 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, 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.

CDD 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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE PARAMETER
802.11g	1 to 11	6	OFDM	BPSK	6Mb/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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE PARAMETER
802.11g	1 to 11	6	OFDM	BPSK	6Mb/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.

CDD 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:

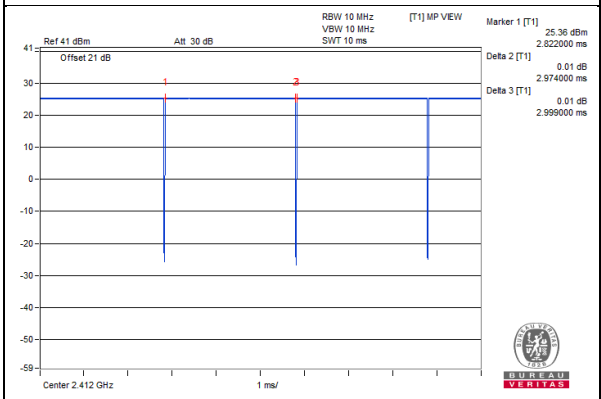
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	22deg. C, 70%RH, 23deg. C, 65%RH, 21deg. C, 66%RH	120Vac, 60Hz	Sampson Chen, Sampson Chen, Gary Cheng
RE<1G	22deg. C, 70%RH	120Vac, 60Hz	Ryan Du
PLC	25deg. C, 75%RH	120Vac, 60Hz	Ryan Du
APCM	25deg. C, 60%RH	120Vac, 60Hz	Kevin Ko

3.3 Duty Cycle of Test Signal

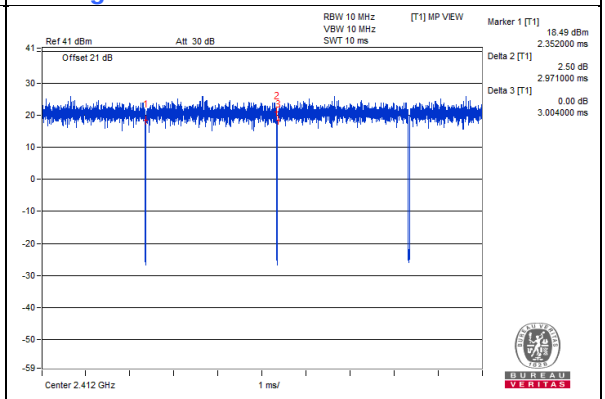
Duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11b: Duty cycle = 2.974 ms/2.999 ms = 0.992
802.11g: Duty cycle = 2.971 ms/3.004 ms = 0.989
802.11ax (HE20): Duty cycle = 3.312 ms/3.351 ms = 0.988
802.11ax (HE40): Duty cycle = 2.497 ms/2.532 ms = 0.986

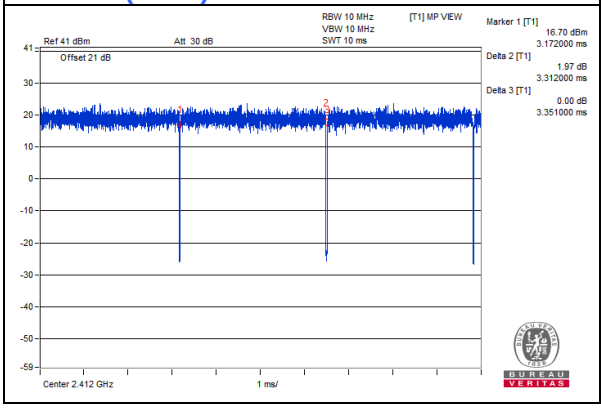
802.11b



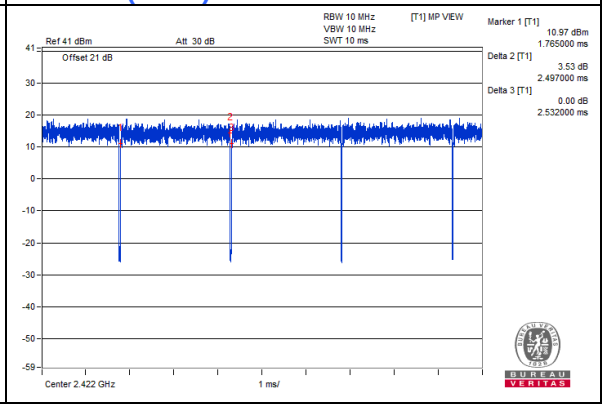
802.11g



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.

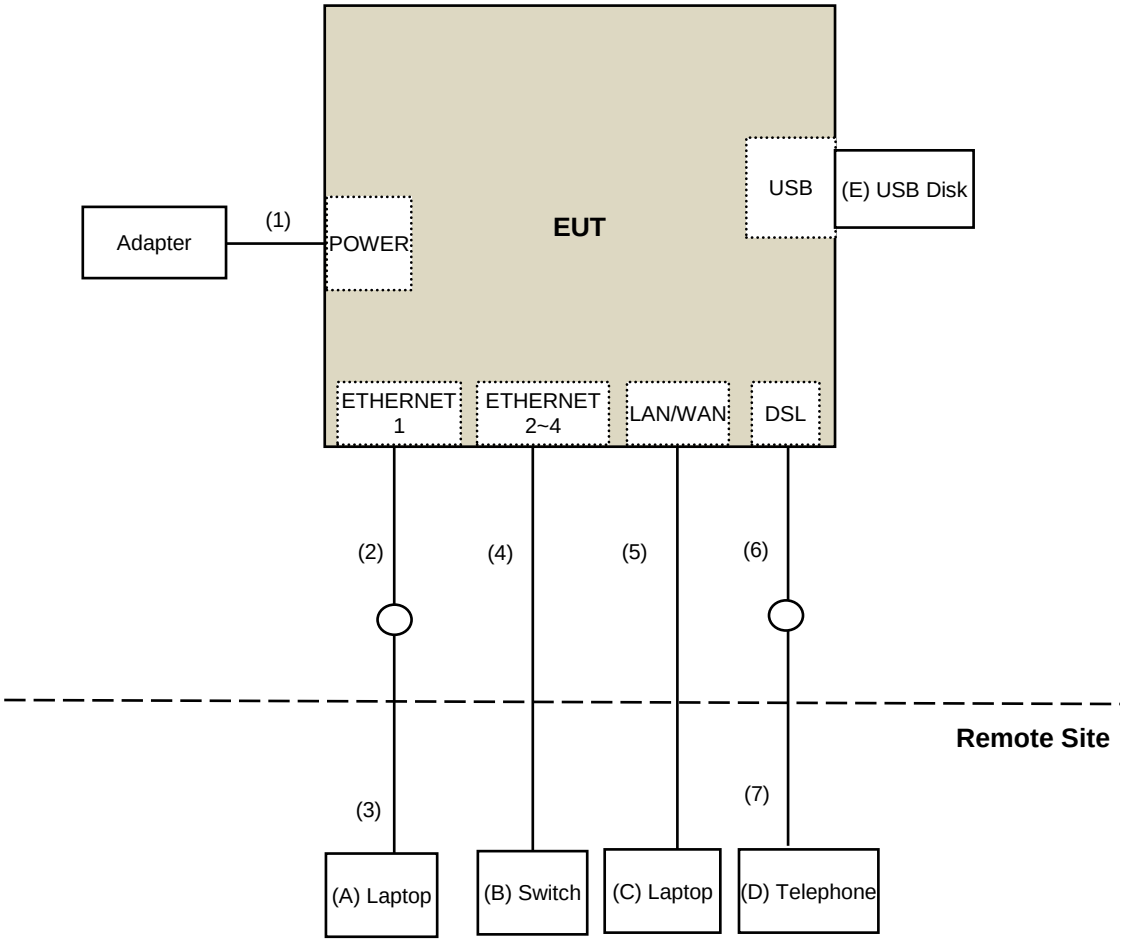
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Lenovo	20U5S01X00 L14	PF-28LKK7	NA	Provided by Lab
B.	Switch	D-Link	DGS-1005D	DR8WC92000523	NA	Provided by Lab
C.	Laptop	DELL	E6420	B92T3R1	DoC	Provided by Lab
D.	Telephone	Remeo	TE-812	97280903	NA	Provided by Lab
E.	USB Disk	SanDisk	BM181225896Z	NA	NA	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	1.5	No	0	Supplied by client
2.	Ethernet Cable	1	1.8	No	0	Supplied by client
3.	RJ-45 Cable	1	10	No	0	Provided by Lab
4.	RJ-45 Cable	3	10	No	0	Provided by Lab
5.	RJ-45 Cable	1	10	No	0	Provided by Lab
6.	RJ-11 Cable	1	1.8	No	0	Supplied by client
7.	RJ-11 Cable	1	10	No	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

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

For Radiated Emission test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210202	Dec. 01, 2020	Nov. 30, 2021
Pre-Amplifier EMCI	EMC001340	980142	May 25, 2020	May 24, 2021
Loop Antenna Electro-Metrics	EM-6879	264	Mar. 05, 2021	Mar. 04, 2022
RF Cable	5D-FB	LOOPCAB-001	Jan. 07, 2021	Jan. 06, 2022
RF Cable	5D-FB	LOOPCAB-002	Jan. 07, 2021	Jan. 06, 2022
Pre-Amplifier EMCI	EMC330N	980701	Mar. 10, 2021	Mar. 09, 2022
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 06, 2020	Nov. 05, 2021
RF Cable	8D	966-4-1	Mar. 17, 2021	Mar. 16, 2022
RF Cable	8D	966-4-2	Mar. 17, 2021	Mar. 16, 2022
RF Cable	8D	966-4-3	Mar. 17, 2021	Mar. 16, 2022
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-03	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 22, 2020	Nov. 21, 2021
Pre-Amplifier EMCI	EMC 12630 SE	980638	Apr. 07, 2021	Apr. 06, 2022
RF Cable	EMC104-SM-SM-1200	160922	Dec. 25, 2020	Dec. 24, 2021
RF Cable	EMC104-SM-SM-2000	180502	Apr. 26, 2021	Apr. 25, 2022
RF Cable	EMC104-SM-SM-6000	180418	Apr. 26, 2021	Apr. 25, 2022
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 22, 2020	Nov. 21, 2021
RF Cable	EMC102-KM-KM-1200	160924	Jan. 11, 2021	Jan. 10, 2022
RF Cable	EMC-KM-KM-4000	200214	Mar. 10, 2021	Mar. 09, 2022
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. Tested Date: May 07 to 08, 2021

For Bandedge test: (for 802.11ax (HE20) CH1 & 802.11ax (HE40))

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210202	Dec. 01, 2020	Nov. 30, 2021
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 22, 2020	Nov. 21, 2021
Pre-Amplifier EMCI	EMC 12630 SE	980638	Apr. 08, 2020	Apr. 07, 2021
RF Cable	EMC104-SM-SM-1200	160922	Dec. 25, 2020	Dec. 24, 2021
RF Cable	EMC104-SM-SM-2000	180502	Apr. 29, 2020	Apr. 28, 2021
RF Cable	EMC104-SM-SM-6000	180418	Apr. 29, 2020	Apr. 28, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 22, 2020	Nov. 21, 2021
RF Cable	EMC102-KM-KM-1200	160924	Jan. 11, 2021	Jan. 10, 2022
RF Cable	EMC-KM-KM-4000	200214	Mar. 10, 2021	Mar. 09, 2022
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. Tested Date: Mar. 24, 2021

For Bandedge test: (for other)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210202	Dec. 01, 2020	Nov. 30, 2021
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 22, 2020	Nov. 21, 2021
Pre-Amplifier EMCI	EMC 12630 SE	980638	Apr. 07, 2021	Apr. 06, 2022
RF Cable	EMC104-SM-SM-1200	160922	Dec. 25, 2020	Dec. 24, 2021
RF Cable	EMC104-SM-SM-2000	180502	Apr. 29, 2020	Apr. 28, 2021
RF Cable	EMC104-SM-SM-6000	180418	Apr. 29, 2020	Apr. 28, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 22, 2020	Nov. 21, 2021
RF Cable	EMC102-KM-KM-1200	160924	Jan. 11, 2021	Jan. 10, 2022
RF Cable	EMC-KM-KM-4000	200214	Mar. 10, 2021	Mar. 09, 2022
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. Tested Date: Apr. 26, 2021

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	101516	Mar. 08, 2021	Mar. 07, 2022
Power meter Anritsu	ML2495A	1529002	June 21, 2021	June 20, 2022
Power sensor Anritsu	MA2411B	1339443	May 31, 2021	May 30, 2022
10dB Attenuator Woken	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

NOTE: 1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: July 29, 2021

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:

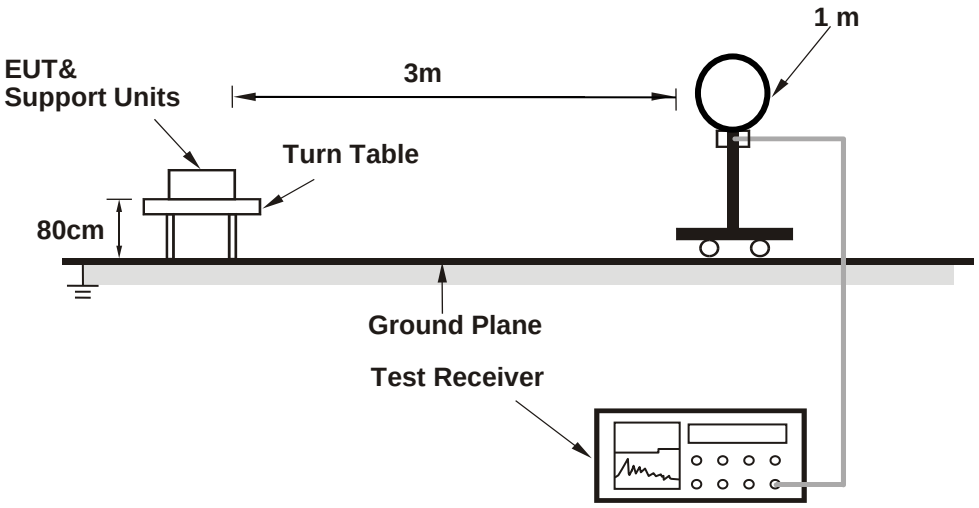
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

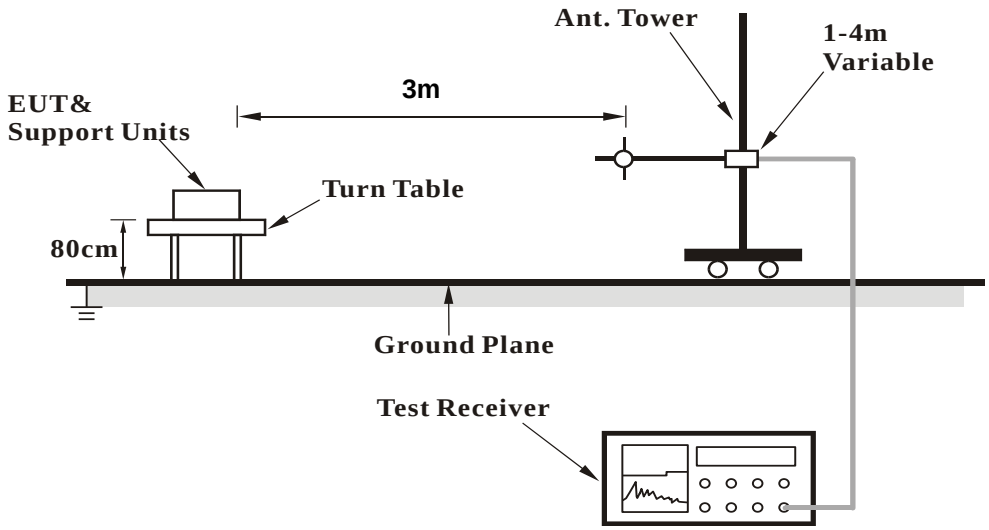
No deviation.

4.1.5 Test Setup

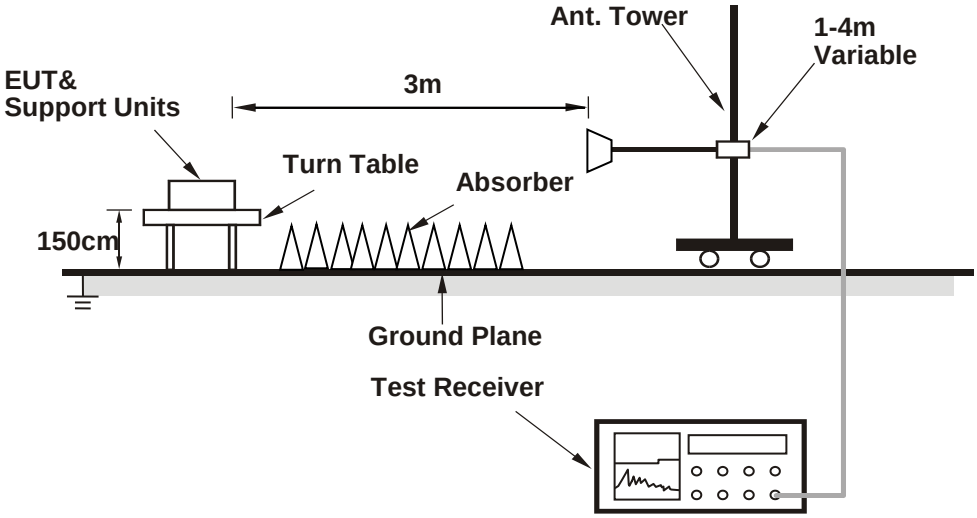
For Radiated emission below 30MHz



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. Placed the EUT on the testing table.
b. Controlling software (accessMTool_3.2.1.0) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

RF Mode	TX 802.11b	Channel	CH 1：2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	57.2 PK	74.0	-16.8	1.57 H	59	61.7	-4.5
2	2390.00	44.7 AV	54.0	-9.3	1.57 H	59	49.2	-4.5
3	*2412.00	114.2 PK			1.57 H	59	118.6	-4.4
4	*2412.00	111.6 AV			1.57 H	59	116.0	-4.4
5	4824.00	53.9 PK	74.0	-20.1	1.35 H	78	53.8	0.1
6	4824.00	53.2 AV	54.0	-0.8	1.35 H	78	53.1	0.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	58.8 PK	74.0	-15.2	1.21 V	88	63.3	-4.5
2	2390.00	47.2 AV	54.0	-6.8	1.21 V	88	51.7	-4.5
3	*2412.00	118.3 PK			1.21 V	88	122.7	-4.4
4	*2412.00	115.6 AV			1.21 V	88	120.0	-4.4
5	4824.00	51.1 PK	74.0	-22.9	2.32 V	56	51.0	0.1
6	4824.00	50.7 AV	54.0	-3.3	2.32 V	56	50.6	0.1

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.

RF Mode	TX 802.11b	Channel	CH 6：2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	52.6 PK	74.0	-21.4	1.59 H	88	57.1	-4.5
2	2390.00	40.7 AV	54.0	-13.3	1.59 H	88	45.2	-4.5
3	*2437.00	114.6 PK			1.59 H	88	119.0	-4.4
4	*2437.00	112.3 AV			1.59 H	88	116.7	-4.4
5	2483.50	54.0 PK	74.0	-20.0	1.59 H	88	58.5	-4.5
6	2483.50	41.3 AV	54.0	-12.7	1.59 H	88	45.8	-4.5
7	4874.00	53.9 PK	74.0	-20.1	1.34 H	70	53.8	0.1
8	**4874.00**	**53.5 AV**	**54.0**	**-0.5**	**1.34 H**	**70**	**53.4**	**0.1**
9	7311.00	47.6 PK	74.0	-26.4	3.69 H	151	41.3	6.3
10	7311.00	43.0 AV	54.0	-11.0	3.69 H	151	36.7	6.3
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	53.9 PK	74.0	-20.1	1.24 V	98	58.4	-4.5
2	2390.00	41.0 AV	54.0	-13.0	1.24 V	98	45.5	-4.5
3	*2437.00	118.8 PK			1.24 V	98	123.2	-4.4
4	*2437.00	115.8 AV			1.24 V	98	120.2	-4.4
5	2483.50	53.3 PK	74.0	-20.7	1.24 V	98	57.8	-4.5
6	2483.50	41.5 AV	54.0	-12.5	1.24 V	98	46.0	-4.5
7	4874.00	52.6 PK	74.0	-21.4	2.27 V	66	52.5	0.1
8	4874.00	51.6 AV	54.0	-2.4	2.27 V	66	51.5	0.1
9	7311.00	50.3 PK	74.0	-23.7	3.43 V	63	44.0	6.3
10	7311.00	47.0 AV	54.0	-7.0	3.43 V	63	40.7	6.3

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.

RF Mode	TX 802.11b	Channel	CH 11：2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	114.8 PK			1.54 H	94	119.2	-4.4
2	*2462.00	112.1 AV			1.54 H	94	116.5	-4.4
3	2483.50	56.6 PK	74.0	-17.4	1.54 H	94	61.1	-4.5
4	2483.50	45.4 AV	54.0	-8.6	1.54 H	94	49.9	-4.5
5	4924.00	54.0 PK	74.0	-20.0	1.29 H	80	53.7	0.3
6	4924.00	53.4 AV	54.0	-0.6	1.29 H	80	53.1	0.3
7	7386.00	47.5 PK	74.0	-26.5	3.63 H	159	40.9	6.6
8	7386.00	42.6 AV	54.0	-11.4	3.63 H	159	36.0	6.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	118.5 PK			1.30 V	117	122.9	-4.4
2	*2462.00	115.8 AV			1.30 V	117	120.2	-4.4
3	2483.50	58.2 PK	74.0	-15.8	1.30 V	117	62.7	-4.5
4	2483.50	48.9 AV	54.0	-5.1	1.30 V	117	53.4	-4.5
5	4924.00	51.9 PK	74.0	-22.1	2.27 V	66	51.6	0.3
6	4924.00	51.2 AV	54.0	-2.8	2.27 V	66	50.9	0.3
7	7386.00	50.0 PK	74.0	-24.0	3.47 V	71	43.4	6.6
8	7386.00	46.9 AV	54.0	-7.1	3.47 V	71	40.3	6.6

Remarks:

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

RF Mode	TX 802.11g	Channel	CH 1：2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	62.9 PK	74.0	-11.1	1.44 H	85	67.4	-4.5
2	2390.00	45.2 AV	54.0	-8.8	1.44 H	85	49.7	-4.5
3	*2412.00	112.6 PK			1.44 H	85	117.0	-4.4
4	*2412.00	102.3 AV			1.44 H	85	106.7	-4.4
5	4824.00	46.4 PK	74.0	-27.6	1.32 H	252	46.3	0.1
6	4824.00	35.6 AV	54.0	-18.4	1.32 H	252	35.5	0.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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**	**73.5 PK**	**74.0**	**-0.5**	**1.52 V**	**64**	**78.0**	**-4.5**
2	2390.00	47.7 AV	54.0	-6.3	1.52 V	64	52.2	-4.5
3	*2412.00	117.0 PK			1.52 V	64	121.4	-4.4
4	*2412.00	107.0 AV			1.52 V	64	111.4	-4.4
5	4824.00	46.3 PK	74.0	-27.7	3.28 V	298	46.2	0.1
6	4824.00	35.6 AV	54.0	-18.4	3.28 V	298	35.5	0.1

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.

RF Mode	TX 802.11g	Channel	CH 6：2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	63.3 PK	74.0	-10.7	1.43 H	80	67.8	-4.5
2	2390.00	45.5 AV	54.0	-8.5	1.43 H	80	50.0	-4.5
3	*2437.00	119.6 PK			1.43 H	80	124.0	-4.4
4	*2437.00	109.2 AV			1.43 H	80	113.6	-4.4
5	2483.50	69.7 PK	74.0	-4.3	1.43 H	80	74.2	-4.5
6	2483.50	46.5 AV	54.0	-7.5	1.43 H	80	51.0	-4.5
7	4874.00	55.5 PK	74.0	-18.5	1.25 H	275	55.4	0.1
8	4874.00	43.5 AV	54.0	-10.5	1.25 H	275	43.4	0.1
9	7311.00	55.8 PK	74.0	-18.2	2.00 H	216	49.5	6.3
10	7311.00	42.1 AV	54.0	-11.9	2.00 H	216	35.8	6.3
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	73.3 PK	74.0	-0.7	1.46 V	54	77.8	-4.5
2	2390.00	47.5 AV	54.0	-6.5	1.46 V	54	52.0	-4.5
3	*2437.00	124.7 PK			1.46 V	54	129.1	-4.4
4	*2437.00	114.3 AV			1.46 V	54	118.7	-4.4
5	2483.50	70.2 PK	74.0	-3.8	1.46 V	54	74.7	-4.5
6	2483.50	48.8 AV	54.0	-5.2	1.46 V	54	53.3	-4.5
7	4874.00	54.3 PK	74.0	-19.7	3.27 V	280	54.2	0.1
8	4874.00	42.5 AV	54.0	-11.5	3.27 V	280	42.4	0.1
9	7311.00	52.1 PK	74.0	-21.9	3.78 V	283	45.8	6.3
10	7311.00	40.7 AV	54.0	-13.3	3.78 V	283	34.4	6.3

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.

RF Mode	TX 802.11g	Channel	CH 11：2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	112.7 PK			1.37 H	90	117.1	-4.4
2	*2462.00	102.5 AV			1.37 H	90	106.9	-4.4
3	2483.50	69.6 PK	74.0	-4.4	1.37 H	90	74.1	-4.5
4	2483.50	46.4 AV	54.0	-7.6	1.37 H	90	50.9	-4.5
5	4924.00	46.9 PK	74.0	-27.1	1.27 H	265	46.6	0.3
6	4924.00	35.9 AV	54.0	-18.1	1.27 H	265	35.6	0.3
7	7386.00	47.6 PK	74.0	-26.4	1.96 H	213	41.0	6.6
8	7386.00	36.8 AV	54.0	-17.2	1.96 H	213	30.2	6.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	117.3 PK			1.49 V	72	121.7	-4.4
2	*2462.00	107.3 AV			1.49 V	72	111.7	-4.4
3	2483.50	70.0 PK	74.0	-4.0	1.49 V	72	74.5	-4.5
4	2483.50	48.6 AV	54.0	-5.4	1.49 V	72	53.1	-4.5
5	2485.50	72.6 PK	74.0	-1.4	1.49 V	72	77.1	-4.5
6	2485.50	45.4 AV	54.0	-8.6	1.49 V	72	49.9	-4.5
7	4924.00	47.5 PK	74.0	-26.5	3.25 V	287	47.2	0.3
8	4924.00	36.3 AV	54.0	-17.7	3.25 V	287	36.0	0.3
9	7386.00	47.1 PK	74.0	-26.9	3.80 V	295	40.5	6.6
10	7386.00	36.7 AV	54.0	-17.3	3.80 V	295	30.1	6.6

Remarks:

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

RF Mode	TX 802.11ax (HE20)	Channel	CH 1：2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	61.0 PK	74.0	-13.0	2.10 H	269	65.5	-4.5
2	2390.00	46.9 AV	54.0	-7.1	2.10 H	269	51.4	-4.5
3	*2412.00	113.4 PK			2.10 H	269	117.8	-4.4
4	*2412.00	99.8 AV			2.10 H	269	104.2	-4.4
5	4824.00	45.7 PK	74.0	-28.3	1.34 H	260	45.6	0.1
6	4824.00	35.0 AV	54.0	-19.0	1.34 H	260	34.9	0.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	70.5 PK	74.0	-3.5	2.48 V	279	75.0	-4.5
2	**2390.00**	**53.5 AV**	**54.0**	**-0.5**	**2.48 V**	**279**	**58.0**	**-4.5**
3	*2412.00	116.9 PK			2.48 V	279	121.3	-4.4
4	*2412.00	104.6 AV			2.48 V	279	109.0	-4.4
5	4824.00	47.1 PK	74.0	-26.9	3.25 V	285	47.0	0.1
6	4824.00	36.4 AV	54.0	-17.6	3.25 V	285	36.3	0.1

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.

RF Mode	TX 802.11ax (HE20)	Channel	CH 6：2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	61.1 PK	74.0	-12.9	2.05 H	277	65.6	-4.5
2	2390.00	47.1 AV	54.0	-6.9	2.05 H	277	51.6	-4.5
3	*2437.00	112.6 PK			2.05 H	277	117.0	-4.4
4	*2437.00	100.2 AV			2.05 H	277	104.6	-4.4
5	2483.50	66.1 PK	74.0	-7.9	2.05 H	277	70.6	-4.5
6	2483.50	47.0 AV	54.0	-7.0	2.05 H	277	51.5	-4.5
7	4874.00	55.0 PK	74.0	-19.0	1.22 H	276	54.9	0.1
8	4874.00	43.2 AV	54.0	-10.8	1.22 H	276	43.1	0.1
9	7311.00	55.8 PK	74.0	-18.2	2.06 H	202	49.5	6.3
10	7311.00	42.0 AV	54.0	-12.0	2.06 H	202	35.7	6.3
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	66.7 PK	74.0	-7.3	1.53 V	55	71.2	-4.5
2	2390.00	52.5 AV	54.0	-1.5	1.53 V	55	57.0	-4.5
3	*2437.00	117.5 PK			1.53 V	55	121.9	-4.4
4	*2437.00	105.0 AV			1.53 V	55	109.4	-4.4
5	2483.50	69.9 PK	74.0	-4.1	1.53 V	55	74.4	-4.5
6	2483.50	51.3 AV	54.0	-2.7	1.53 V	55	55.8	-4.5
7	4874.00	55.0 PK	74.0	-19.0	3.23 V	278	54.9	0.1
8	4874.00	42.9 AV	54.0	-11.1	3.23 V	278	42.8	0.1
9	7311.00	51.6 PK	74.0	-22.4	3.78 V	280	45.3	6.3
10	7311.00	40.4 AV	54.0	-13.6	3.78 V	280	34.1	6.3

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.

RF Mode	TX 802.11ax (HE20)	Channel	CH 11：2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	113.2 PK			2.34 H	53	117.6	-4.4
2	*2462.00	100.9 AV			2.34 H	53	105.3	-4.4
3	2485.50	66.2 PK	74.0	-7.8	2.34 H	53	70.7	-4.5
4	2485.50	46.8 AV	54.0	-7.2	2.34 H	53	51.3	-4.5
5	4924.00	46.2 PK	74.0	-27.8	1.33 H	262	45.9	0.3
6	4924.00	35.5 AV	54.0	-18.5	1.33 H	262	35.2	0.3
7	7386.00	47.2 PK	74.0	-26.8	2.00 H	227	40.6	6.6
8	7386.00	36.6 AV	54.0	-17.4	2.00 H	227	30.0	6.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	117.7 PK			2.38 V	283	122.1	-4.4
2	*2462.00	105.0 AV			2.38 V	283	109.4	-4.4
3	2483.50	73.2 PK	74.0	-0.8	2.38 V	283	77.7	-4.5
4	2483.50	51.8 AV	54.0	-2.2	2.38 V	283	56.3	-4.5
5	4924.00	47.4 PK	74.0	-26.6	3.31 V	282	47.1	0.3
6	4924.00	36.5 AV	54.0	-17.5	3.31 V	282	36.2	0.3
7	7386.00	46.7 PK	74.0	-27.3	3.85 V	295	40.1	6.6
8	7386.00	36.6 AV	54.0	-17.4	3.85 V	295	30.0	6.6

Remarks:

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

RF Mode	TX 802.11ax (HE40)	Channel	CH 3：2422 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2388.53	56.2 PK	74.0	-17.8	2.12 H	294	60.6	-4.4
2	2388.53	46.3 AV	54.0	-7.7	2.12 H	294	50.7	-4.4
3	2390.00	58.3 PK	74.0	-15.7	2.12 H	294	62.8	-4.5
4	2390.00	44.5 AV	54.0	-9.5	2.12 H	294	49.0	-4.5
5	*2422.00	109.2 PK			2.12 H	294	113.6	-4.4
6	*2422.00	94.8 AV			2.12 H	294	99.2	-4.4
7	4844.00	46.5 PK	74.0	-27.5	1.31 H	262	46.4	0.1
8	4844.00	35.6 AV	54.0	-18.4	1.31 H	262	35.5	0.1
9	7266.00	47.2 PK	74.0	-26.8	1.97 H	232	41.0	6.2
10	7266.00	36.7 AV	54.0	-17.3	1.97 H	232	30.5	6.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2388.53	68.6 PK	74.0	-5.4	1.80 V	270	73.0	-4.4
2	**2388.53**	**53.5 AV**	**54.0**	**-0.5**	**1.80 V**	**270**	**57.9**	**-4.4**
3	2390.00	63.6 PK	74.0	-10.4	1.80 V	270	68.1	-4.5
4	2390.00	51.2 AV	54.0	-2.8	1.80 V	270	55.7	-4.5
5	*2422.00	114.1 PK			1.80 V	270	118.5	-4.4
6	*2422.00	100.2 AV			1.80 V	270	104.6	-4.4
7	4844.00	47.4 PK	74.0	-26.6	3.35 V	271	47.3	0.1
8	4844.00	36.5 AV	54.0	-17.5	3.35 V	271	36.4	0.1
9	7266.00	46.6 PK	74.0	-27.4	3.88 V	310	40.4	6.2
10	7266.00	36.2 AV	54.0	-17.8	3.88 V	310	30.0	6.2

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.

RF Mode	TX 802.11ax (HE40)	Channel	CH 6：2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	58.4 PK	74.0	-15.6	2.16 H	283	62.9	-4.5
2	2390.00	45.7 AV	54.0	-8.3	2.16 H	283	50.2	-4.5
3	*2437.00	110.1 PK			2.16 H	283	114.5	-4.4
4	*2437.00	98.0 AV			2.16 H	283	102.4	-4.4
5	2483.50	57.3 PK	74.0	-16.7	2.16 H	283	61.8	-4.5
6	2483.50	44.1 AV	54.0	-9.9	2.16 H	283	48.6	-4.5
7	4874.00	47.0 PK	74.0	-27.0	1.30 H	270	46.9	0.1
8	4874.00	36.0 AV	54.0	-18.0	1.30 H	270	35.9	0.1
9	7311.00	47.5 PK	74.0	-26.5	1.95 H	240	41.2	6.3
10	7311.00	36.7 AV	54.0	-17.3	1.95 H	240	30.4	6.3
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	69.8 PK	74.0	-4.2	1.99 V	284	74.3	-4.5
2	2390.00	53.2 AV	54.0	-0.8	1.99 V	284	57.7	-4.5
3	*2437.00	116.4 PK			1.99 V	284	120.8	-4.4
4	*2437.00	102.2 AV			1.99 V	284	106.6	-4.4
5	2483.50	64.6 PK	74.0	-9.4	1.99 V	284	69.1	-4.5
6	2483.50	47.1 AV	54.0	-6.9	1.99 V	284	51.6	-4.5
7	4874.00	47.0 PK	74.0	-27.0	3.27 V	277	46.9	0.1
8	4874.00	36.0 AV	54.0	-18.0	3.27 V	277	35.9	0.1
9	7311.00	46.8 PK	74.0	-27.2	3.86 V	306	40.5	6.3
10	7311.00	36.6 AV	54.0	-17.4	3.86 V	306	30.3	6.3

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.

RF Mode	TX 802.11ax (HE40)	Channel	CH 9：2452 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	109.8 PK			2.12 H	288	114.2	-4.4
2	*2452.00	97.3 AV			2.12 H	288	101.7	-4.4
3	2483.50	63.3 PK	74.0	-10.7	2.12 H	288	67.8	-4.5
4	2483.50	49.2 AV	54.0	-4.8	2.12 H	288	53.7	-4.5
5	4904.00	46.3 PK	74.0	-27.7	1.27 H	256	46.1	0.2
6	4904.00	35.4 AV	54.0	-18.6	1.27 H	256	35.2	0.2
7	7356.00	46.9 PK	74.0	-27.1	2.02 H	238	40.5	6.4
8	7356.00	36.5 AV	54.0	-17.5	2.02 H	238	30.1	6.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	115.1 PK			1.99 V	278	119.5	-4.4
2	*2452.00	100.7 AV			1.99 V	278	105.1	-4.4
3	2483.50	65.3 PK	74.0	-8.7	1.99 V	278	69.8	-4.5
4	**2483.50**	**53.5 AV**	**54.0**	**-0.5**	**1.99 V**	**278**	**58.0**	**-4.5**
5	4904.00	47.7 PK	74.0	-26.3	3.37 V	270	47.5	0.2
6	4904.00	36.7 AV	54.0	-17.3	3.37 V	270	36.5	0.2
7	7356.00	46.8 PK	74.0	-27.2	3.86 V	281	40.4	6.4
8	7356.00	36.7 AV	54.0	-17.3	3.86 V	281	30.3	6.4

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.

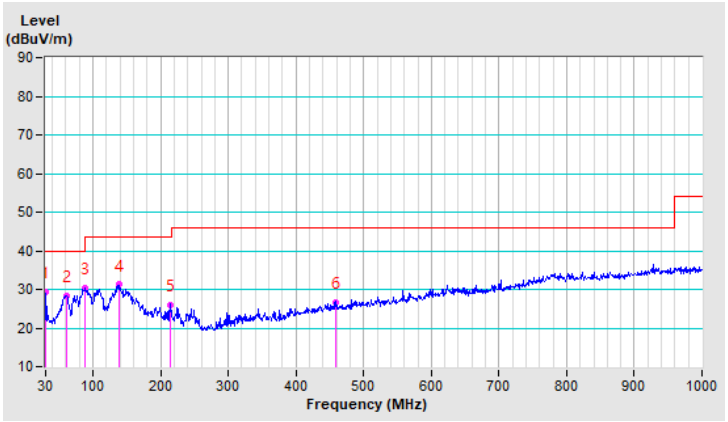
Below 1GHz Data:

RF Mode	TX 802.11g	Channel	CH 6：2437 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.48	29.4 QP	40.0	-10.6	1.50 H	23	43.0	-13.6
2	60.79	28.3 QP	40.0	-11.7	1.50 H	24	41.7	-13.4
3	88.30	30.4 QP	43.5	-13.1	2.50 H	239	48.8	-18.4
4	139.47	31.2 QP	43.5	-12.3	2.00 H	247	43.6	-12.4
5	214.19	26.1 QP	43.5	-17.4	2.00 H	151	41.2	-15.1
6	458.99	26.7 QP	46.0	-19.3	1.50 H	63	32.6	-5.9

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.

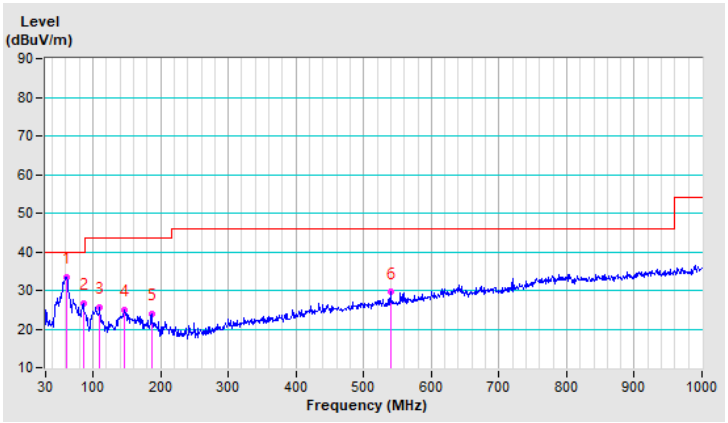


RF Mode	TX 802.11g	Channel	CH 6：2437 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	61.28	33.5 QP	40.0	-6.5	1.00 V	232	47.0	-13.5
2	85.31	26.7 QP	40.0	-13.3	1.50 V	69	45.0	-18.3
3	110.46	25.6 QP	43.5	-17.9	1.00 V	168	40.7	-15.1
4	147.13	25.0 QP	43.5	-18.5	1.50 V	196	36.9	-11.9
5	186.19	23.9 QP	43.5	-19.6	1.00 V	129	38.2	-14.3
6	540.03	29.5 QP	46.0	-16.5	1.00 V	160	33.6	-4.1

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 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. 20, 2020	Oct. 19, 2021
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 27, 2020	Oct. 26, 2021
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 26, 2021	Mar. 25, 2022
50 ohms Terminator	50	3	Oct. 26, 2020	Oct. 25, 2021
RF Cable	5D-FB	COCCAB-001	Sep. 26, 2020	Sep. 25, 2021
Fixed attenuator EMCI	STI02-2200-10	005	Aug. 29, 2020	Aug. 28, 2021
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: May 07, 2021

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.

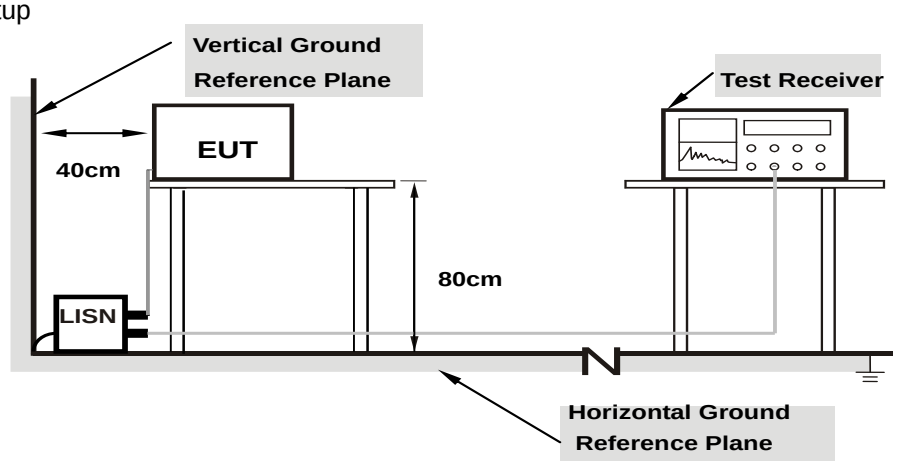
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

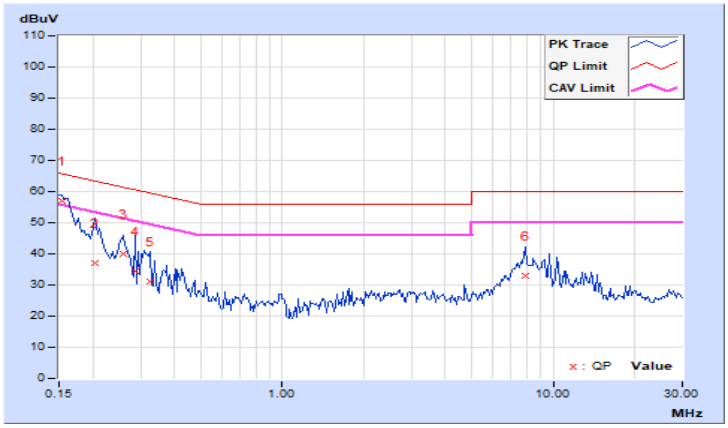
4.2.7 Test Results

RF Mode	TX 802.11g	Channel	CH 6：2437 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

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	**0.15391**	**9.96**	**46.93**	**27.02**	**56.89**	**36.98**	**65.79**	**55.79**	**-8.90**	**-18.81**
2	0.20469	9.99	27.08	19.60	37.07	29.59	63.42	53.42	-26.35	-23.83
3	0.25938	10.00	30.05	5.13	40.05	15.13	61.45	51.45	-21.40	-36.32
4	0.28672	10.00	24.47	5.62	34.47	15.62	60.62	50.62	-26.15	-35.00
5	0.32578	10.01	21.00	4.16	31.01	14.17	59.56	49.56	-28.55	-35.39
6	7.89063	10.57	22.52	15.39	33.09	25.96	60.00	50.00	-26.91	-24.04

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

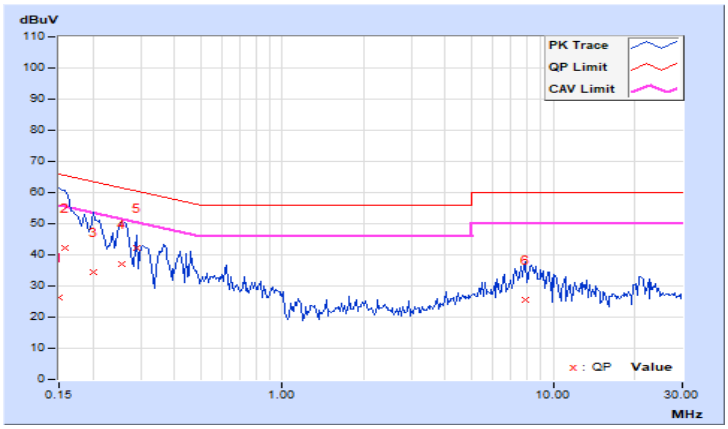


RF Mode	TX 802.11g	Channel	CH 6：2437 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

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	0.15000	9.94	16.38	8.05	26.32	17.99	66.00	56.00	-39.68	-38.01
2	0.15781	9.95	32.44	6.29	42.39	16.24	65.58	55.58	-23.19	-39.34
3	0.20078	9.98	24.29	23.83	34.27	33.81	63.58	53.58	-29.31	-19.77
4	0.25547	9.99	27.18	20.19	37.17	30.18	61.58	51.58	-24.41	-21.40
5	0.29063	9.99	32.38	9.69	42.37	19.68	60.51	50.51	-18.14	-30.83
6	7.93359	10.49	15.02	7.69	25.51	18.18	60.00	50.00	-34.49	-31.82

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

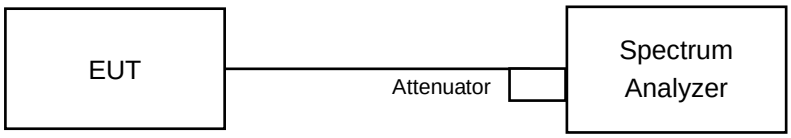


4.3 6dB Bandwidth Measurement

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	7.1	7.1	7.1	7.1	0.5	Pass
6	2437	7.09	7.09	7.09	7.07	0.5	Pass
11	2462	7.09	7.11	7.11	7.1	0.5	Pass

802.11g

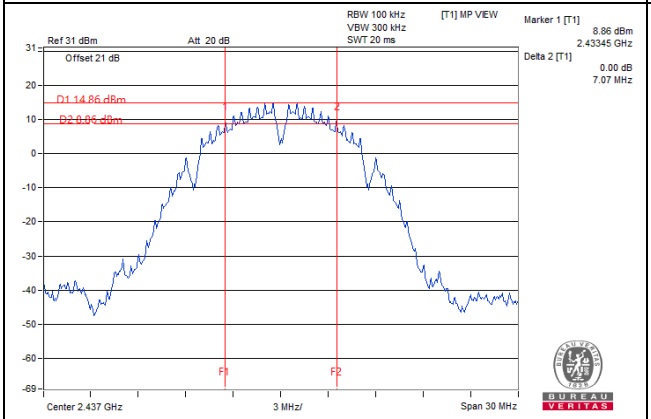
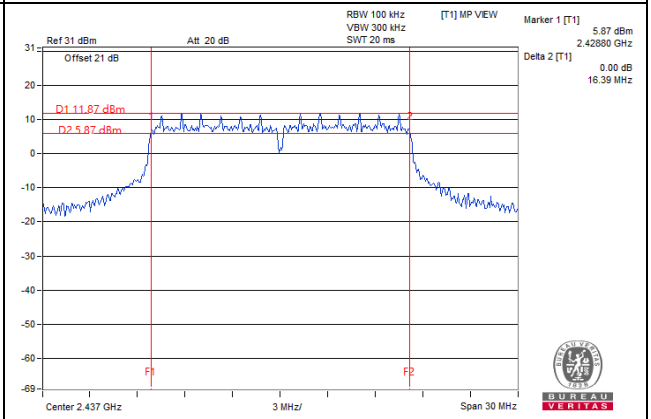
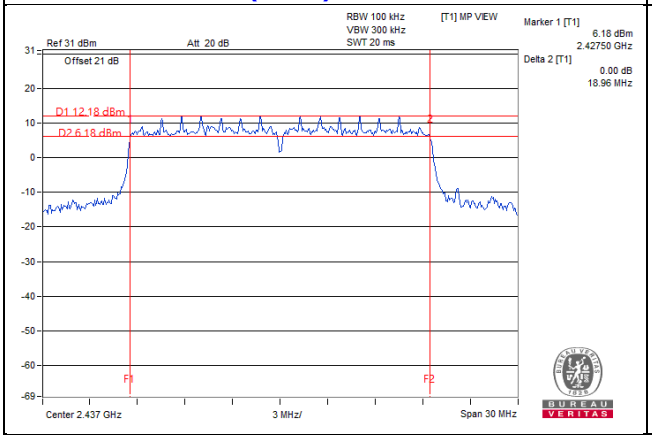
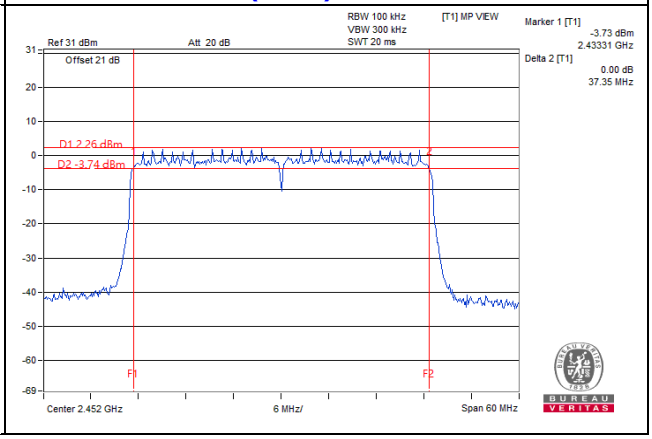
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	16.43	16.47	16.41	16.43	0.5	Pass
6	2437	16.42	16.4	16.4	16.39	0.5	Pass
11	2462	16.46	16.43	16.4	16.41	0.5	Pass

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	19.04	19.06	19.06	0.5	Pass
6	2437	19	18.98	18.96	19.03	0.5	Pass
11	2462	19.04	19.02	19.08	19.06	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	37.59	37.72	37.43	37.93	0.5	Pass
6	2437	37.62	37.72	37.58	37.91	0.5	Pass
9	2452	37.65	37.72	37.35	37.95	0.5	Pass

Spectrum Plot of Worst Value	
802.11b_Chain 3 / CH6	**802.11g_Chain 3 / CH6**
	
802.11ax (HE20)_Chain 2 / CH6	**802.11ax (HE40)_Chain 2 / CH9**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

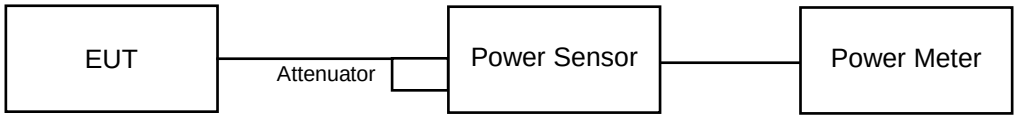
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

CDD Mode

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	22.86	22.63	23.06	22.56	759.032	28.80	30	Pass
6	2437	23.21	22.73	23.14	22.57	783.691	28.94	30	Pass
11	2462	23.17	22.73	22.84	22.60	769.27	28.86	30	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	18.75	18.17	18.48	17.98	273.879	24.38	30	Pass
6	2437	24.08	23.87	24.05	23.78	992.518	29.97	30	Pass
11	2462	19.01	18.34	18.76	18.52	294.133	24.69	30	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	17.32	16.40	16.51	16.03	182.461	22.61	30	Pass
6	2437	24.19	23.07	23.73	23.49	924.595	29.66	30	Pass
11	2462	18.27	17.64	17.89	17.72	245.893	23.91	30	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	15.32	14.76	14.94	14.68	124.529	20.95	30	Pass
6	2437	17.93	17.33	18.23	17.99	245.64	23.90	30	Pass
9	2452	17.51	17.04	17.83	17.34	221.82	23.46	30	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	17.57	16.63	16.72	16.30	192.821	22.85	30	Pass
6	2437	24.40	23.28	24.02	23.69	974.469	29.89	30	Pass
11	2462	18.52	17.84	18.13	17.96	259.465	24.14	30	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	15.61	15.00	15.15	14.92	131.794	21.20	30	Pass
6	2437	18.44	17.57	18.18	18.22	259.111	24.13	30	Pass
9	2452	17.73	17.31	18.07	17.55	234.126	23.69	30	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	17.32	16.40	16.51	16.03	182.461	22.61	30	Pass
6	2437	24.19	23.07	23.73	23.49	924.595	29.66	30	Pass
11	2462	18.27	17.64	17.89	17.72	245.893	23.91	30	Pass

Note: The directional gain = 3.34dBi < 6dBi, so the power limit shall not be reduced.

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	15.32	14.76	14.94	14.68	124.529	20.95	30	Pass
6	2437	17.93	17.33	18.23	17.99	245.64	23.90	30	Pass
9	2452	17.51	17.04	17.83	17.34	221.82	23.46	30	Pass

Note: The directional gain = 3.34dBi < 6dBi, so the power limit shall not be reduced.

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	17.57	16.63	16.72	16.30	192.821	22.85	30	Pass
6	2437	24.40	23.28	24.02	23.69	974.469	29.89	30	Pass
11	2462	18.52	17.84	18.13	17.96	259.465	24.14	30	Pass

Note: The directional gain = 3.34dBi < 6dBi, so the power limit shall not be reduced.

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	15.61	15.00	15.15	14.92	131.794	21.20	30	Pass
6	2437	18.44	17.57	18.18	18.22	259.111	24.13	30	Pass
9	2452	17.73	17.31	18.07	17.55	234.126	23.69	30	Pass

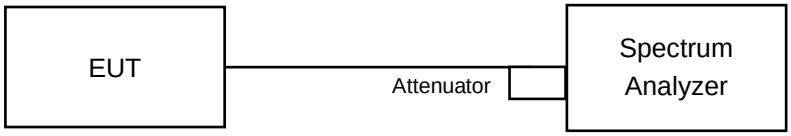
Note: The directional gain = 3.34dBi < 6dBi, so the power limit shall not be reduced.

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

CDD Mode

802.11b

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)				Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
1	2412	-9.43	-8.56	-9.10	-9.01	-2.99	8.00	Pass
6	2437	-9.06	-9.40	-9.41	-8.76	-3.13	8.00	Pass
11	2462	-9.35	-9.28	-9.10	-9.56	-3.30	8.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 3.34dBi < 6dBi, so the power density limit shall not be reduced.

802.11g

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)				Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
1	2412	-15.69	-15.35	-14.95	-14.97	-9.21	8.00	Pass
6	2437	-9.60	-9.62	-9.56	-10.09	-3.69	8.00	Pass
11	2462	-15.38	-15.08	-14.88	-15.62	-9.21	8.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 3.34dBi < 6dBi, so the power density limit shall not be reduced.

802.11ax (HE20)

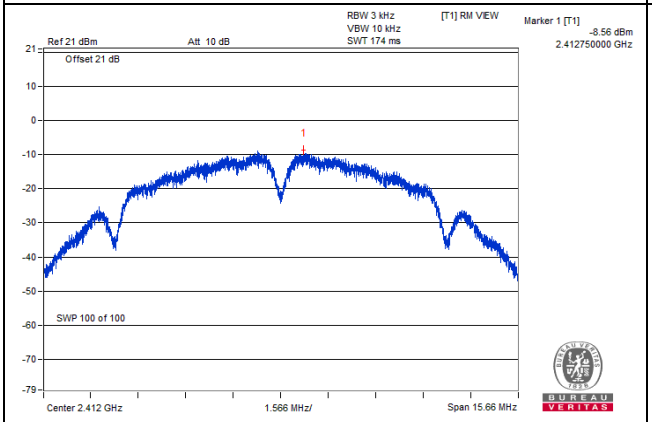
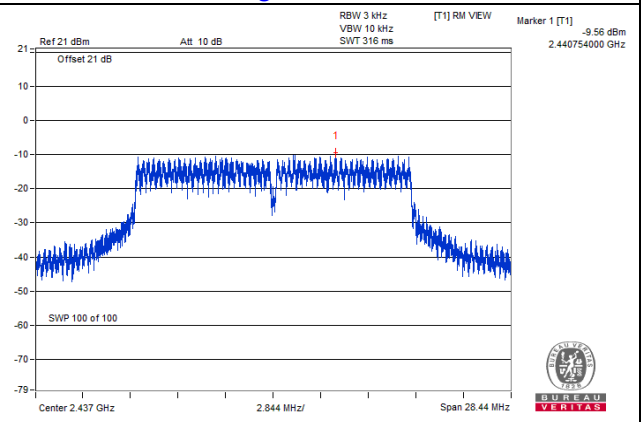
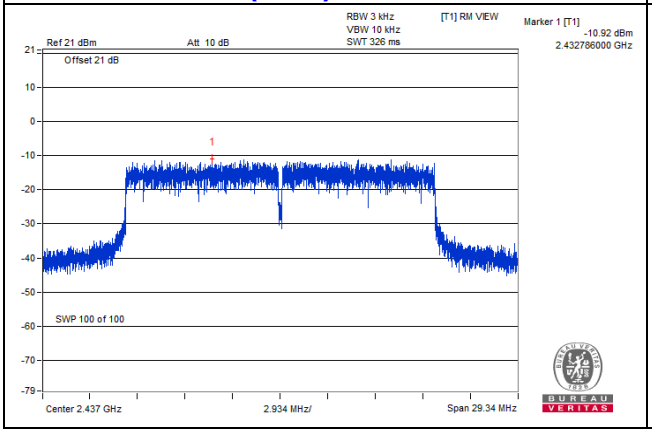
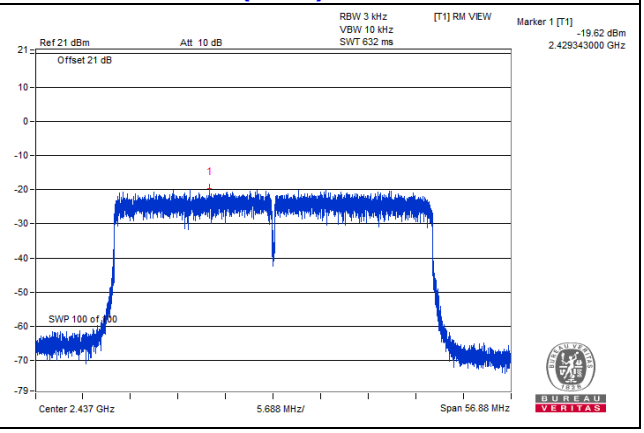
Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)				Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
1	2412	-19.09	-17.93	-17.32	-18.09	-12.04	8.00	Pass
6	2437	-11.22	-11.15	-10.92	-11.01	-5.05	8.00	Pass
11	2462	-17.57	-16.78	-16.35	-16.61	-10.78	8.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 3.34dBi < 6dBi, so the power density limit shall not be reduced.

802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)				Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
3	2422	-23.61	-23.60	-22.94	-22.23	-17.04	8.00	Pass
6	2437	-19.99	-19.62	-20.00	-20.01	-13.88	8.00	Pass
9	2452	-20.90	-20.02	-20.12	-20.41	-14.33	8.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 3.34dBi < 6dBi, so the power density limit shall not be reduced.

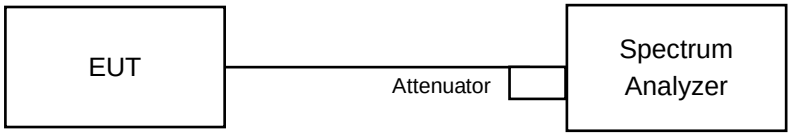
Spectrum Plot of Worst Value	
802.11b_Chain 1 / CH1	**802.11g_Chain 2 / CH6**
	
802.11ax (HE20)_Chain 2 / CH6	**802.11ax (HE40)_Chain 1 / CH6**
	

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

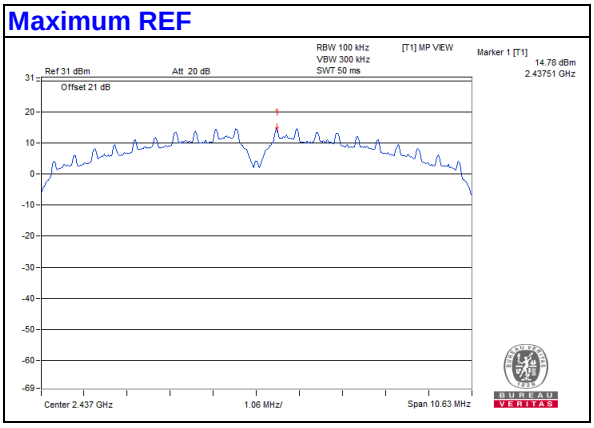
Same as Item 4.3.6

4.6.7 Test Results

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

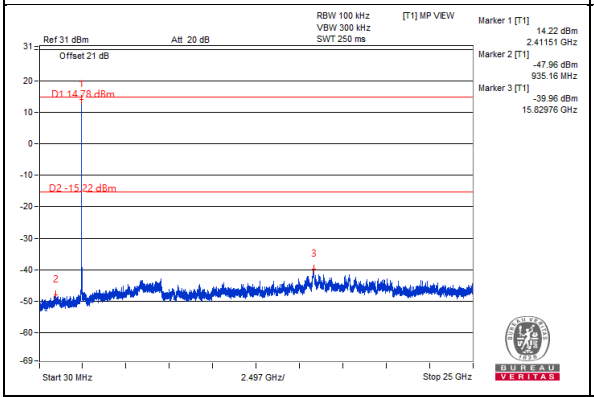
802.11b

Maximum REF

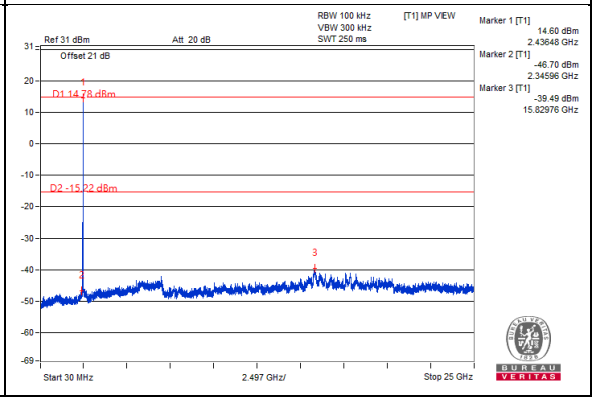


Chain 0

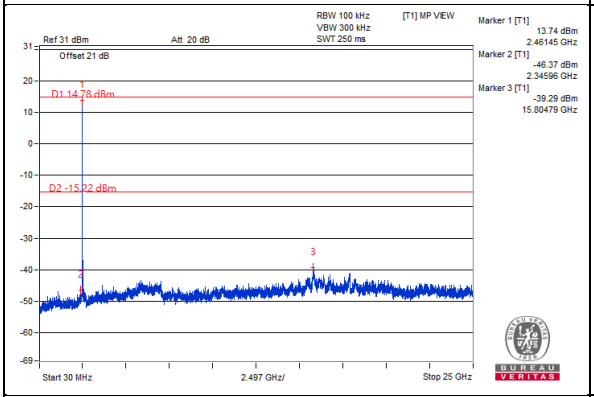
CH 1



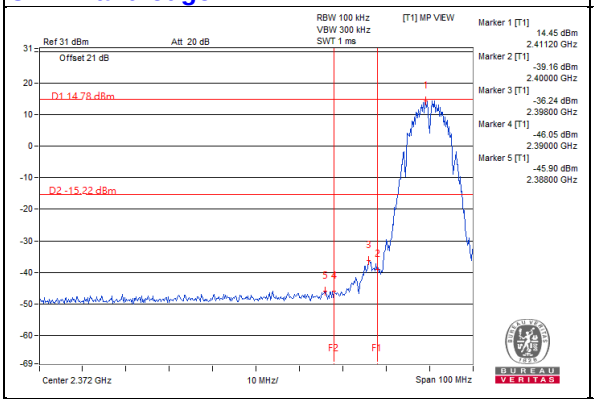
CH 6



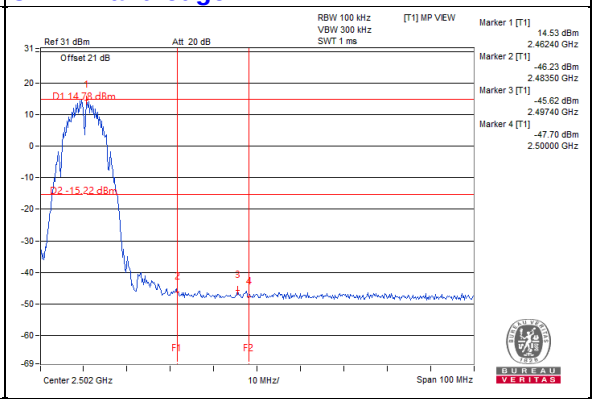
CH 11



CH 1 Band edge

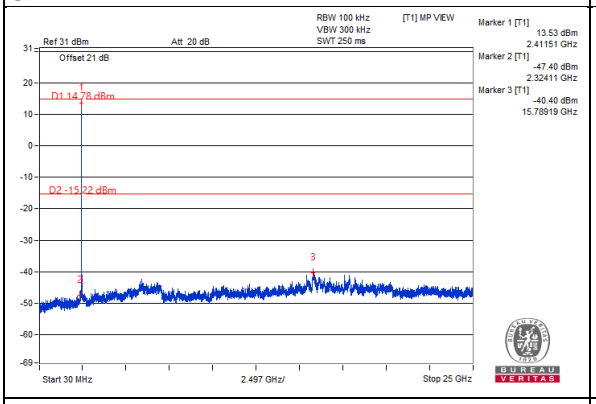


CH 11 Band edge

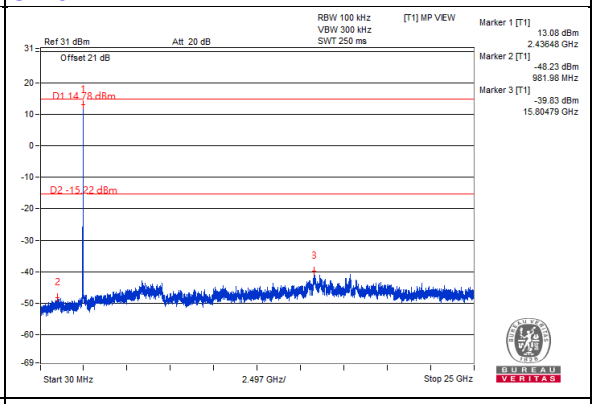


Chain 1

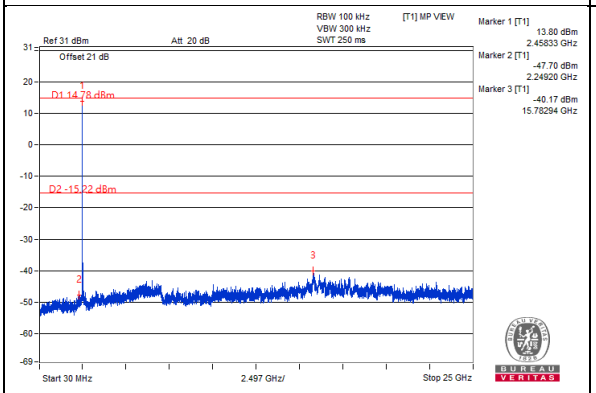
CH 1



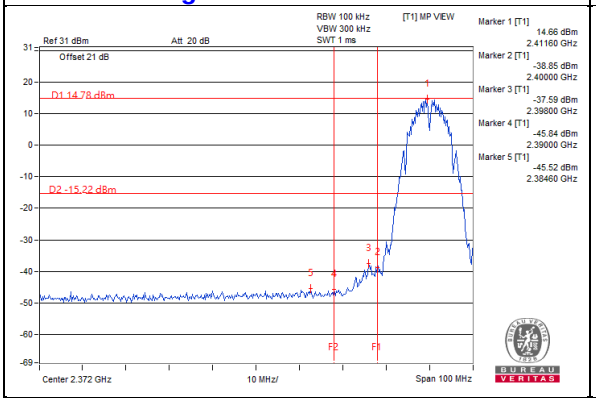
CH 6



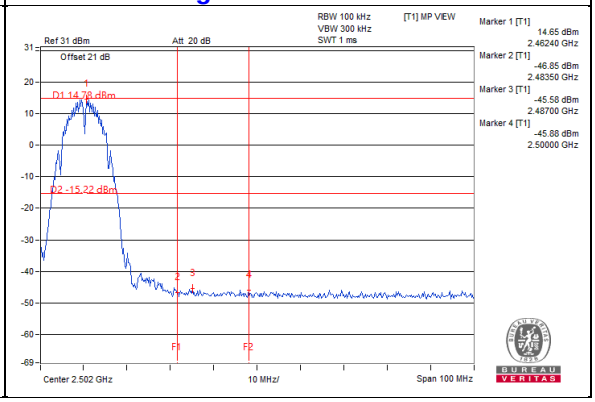
CH 11



CH 1 Band edge

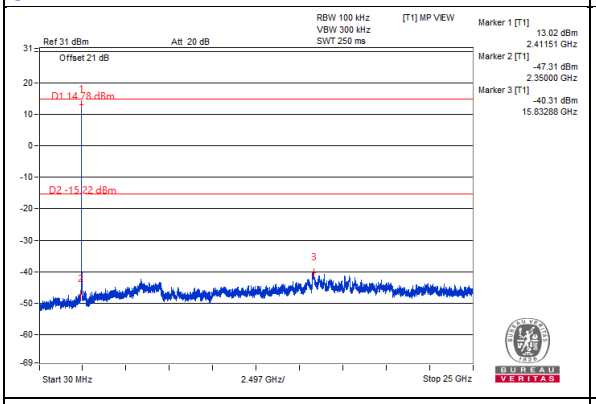


CH 11 Band edge

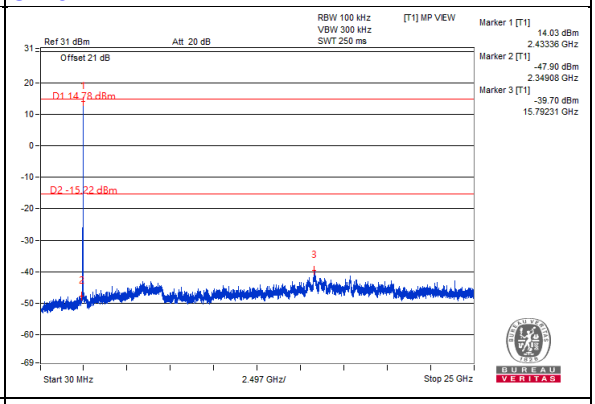


Chain 2

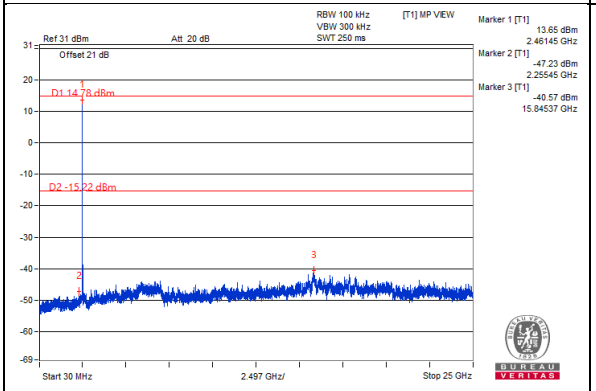
CH 1



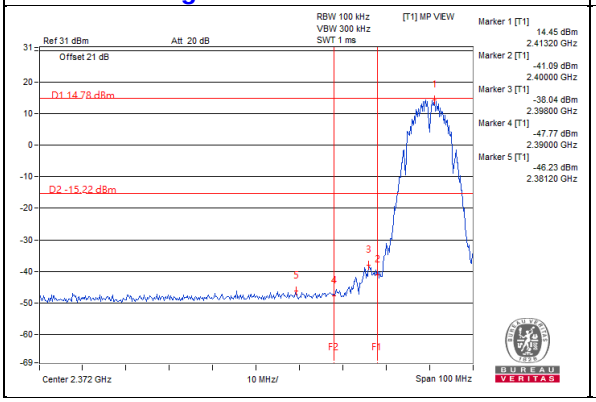
CH 6



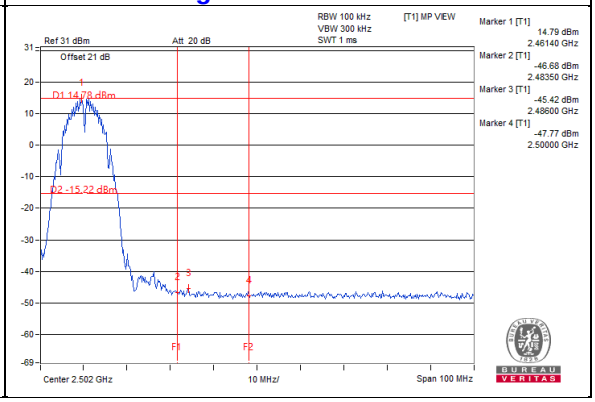
CH 11



CH 1 Band edge

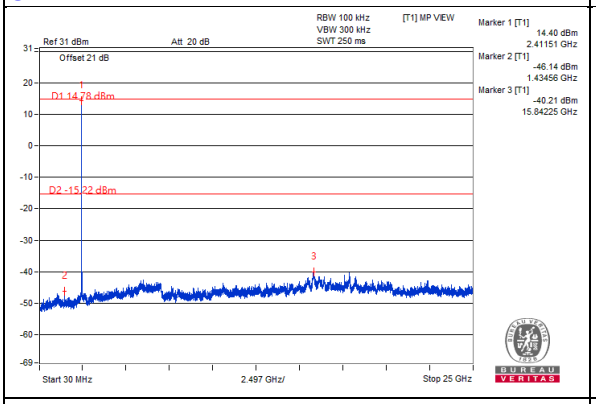


CH 11 Band edge

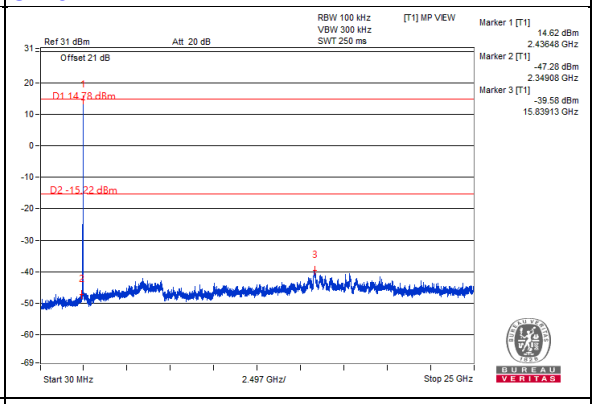


Chain 3

CH 1



CH 6



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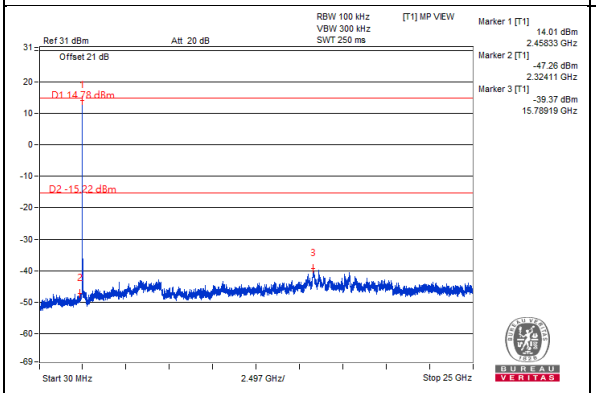

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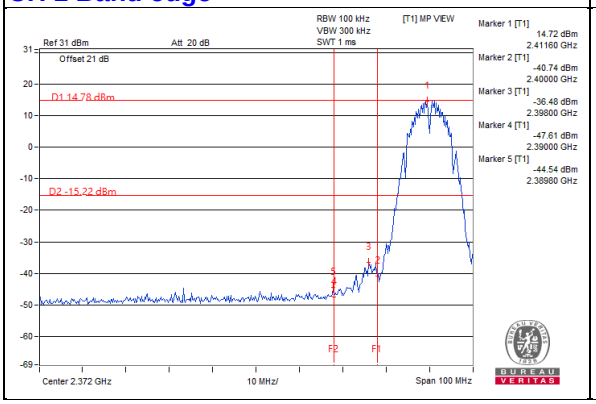
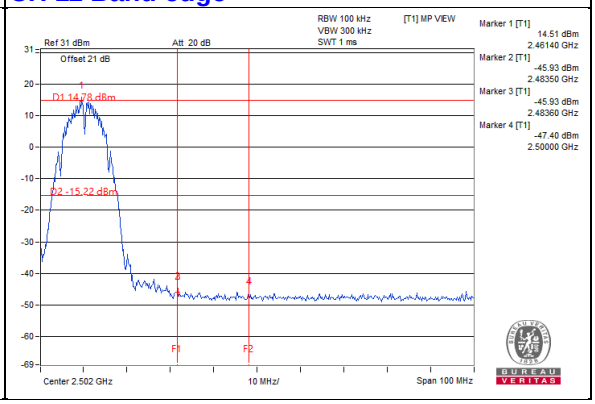
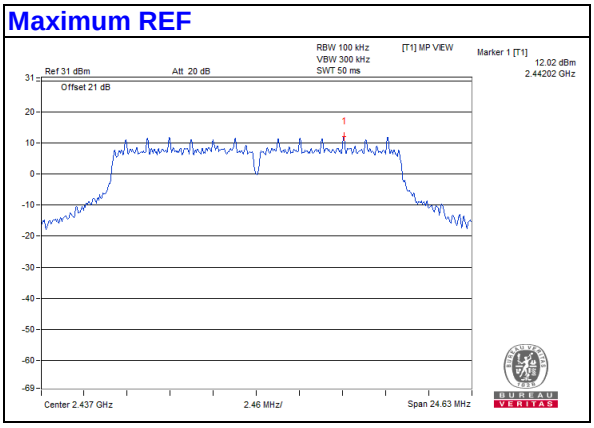


CH 11 Band edge



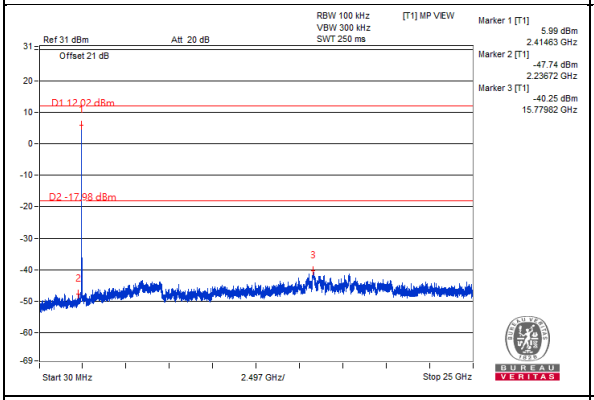
802.11g

Maximum REF

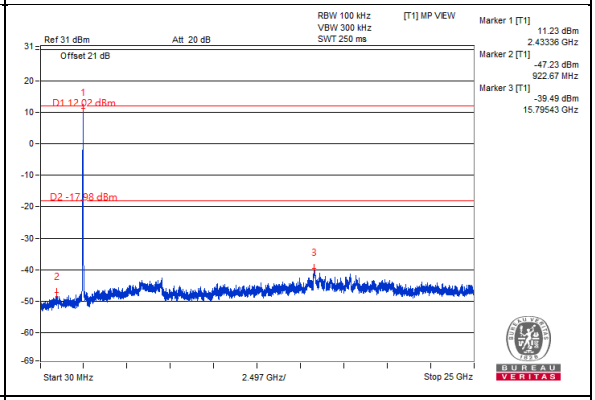


Chain 0

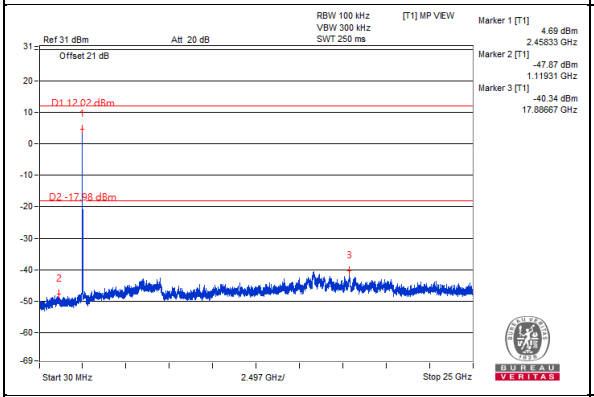
CH 1



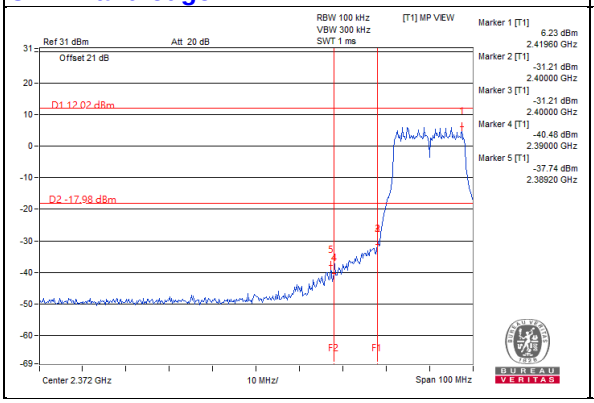
CH 6



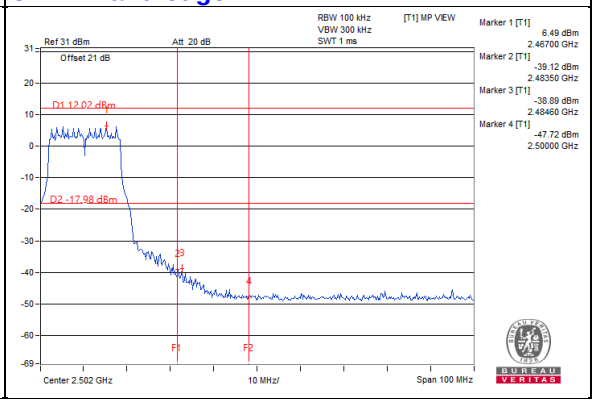
CH 11



CH 1 Band edge

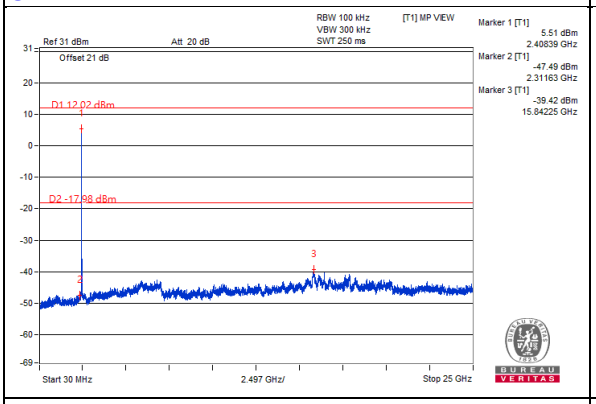


CH 11 Band edge

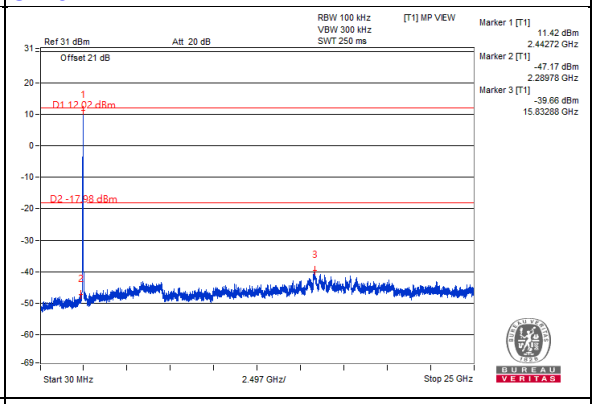


Chain 1

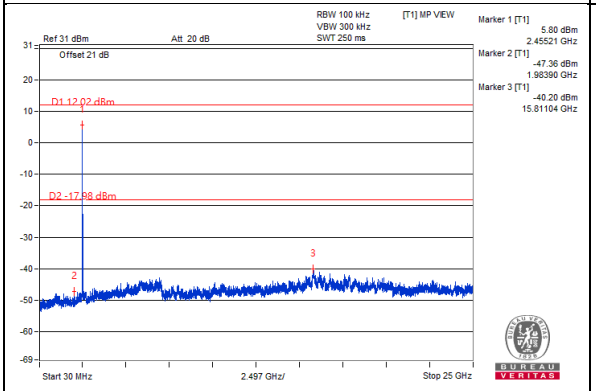
CH 1



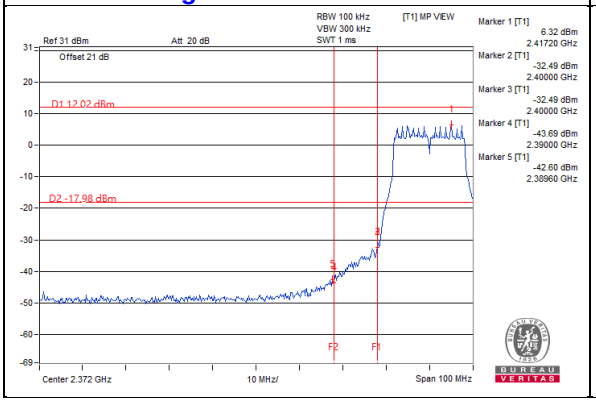
CH 6



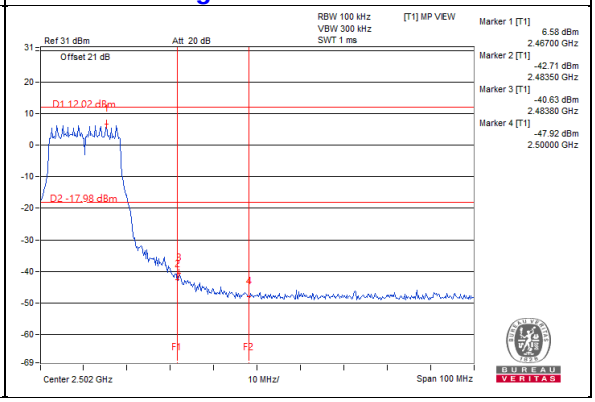
CH 11



CH 1 Band edge

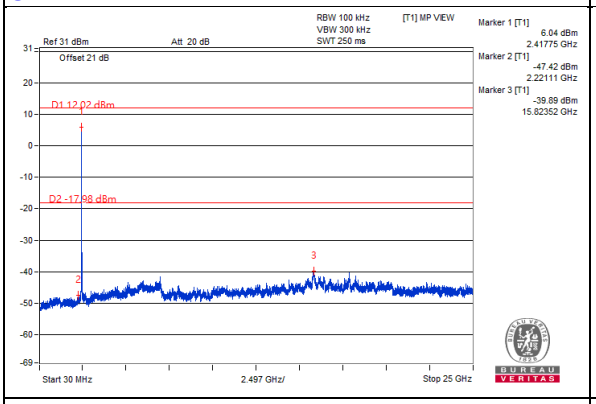


CH 11 Band edge

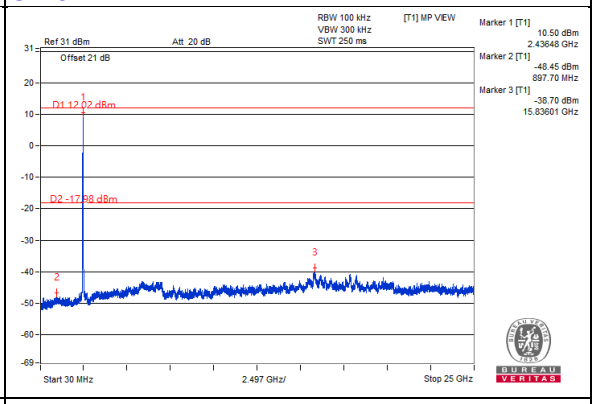


Chain 2

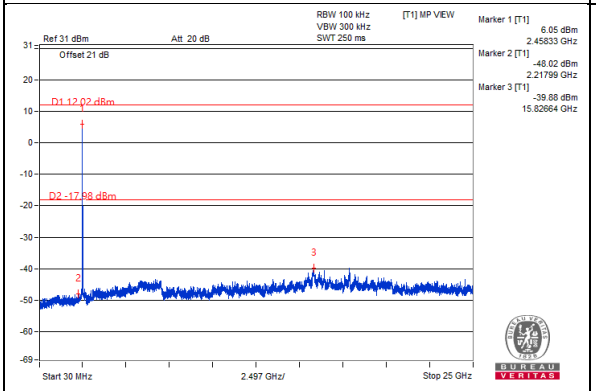
CH 1



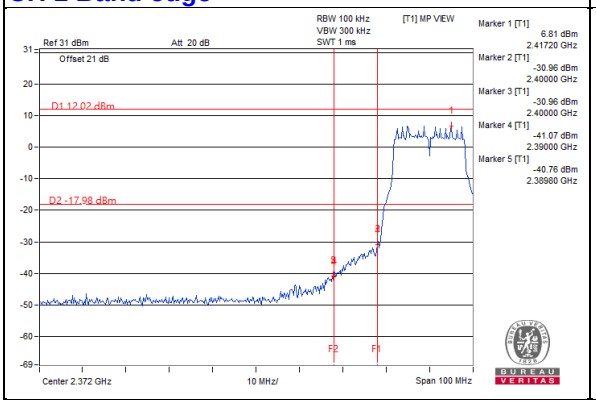
CH 6



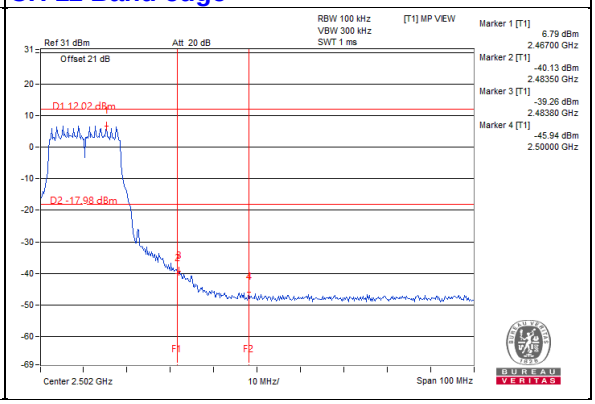
CH 11



CH 1 Band edge

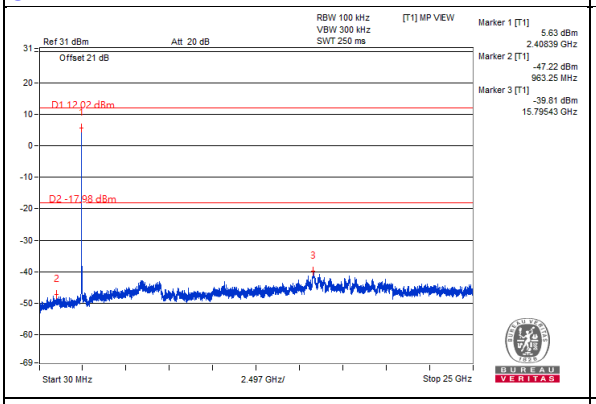


CH 11 Band edge

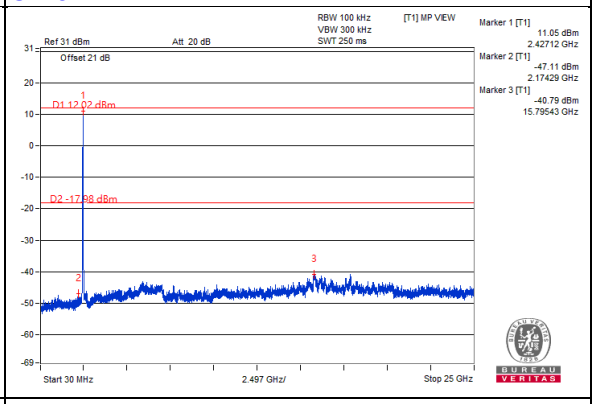


Chain 3

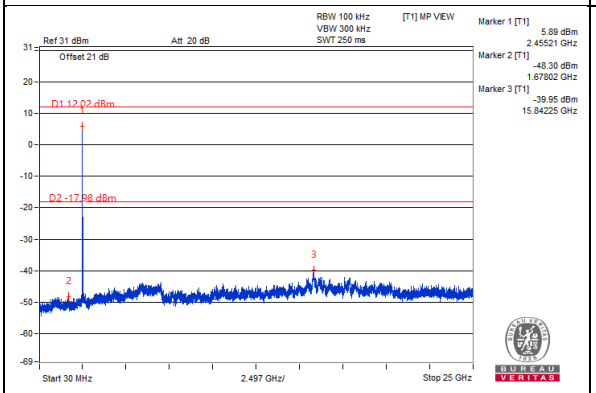
CH 1



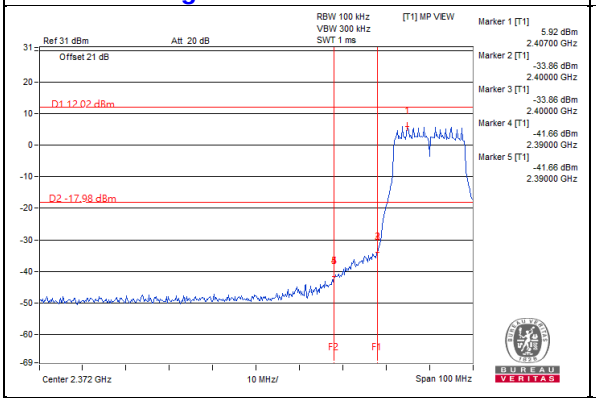
CH 6



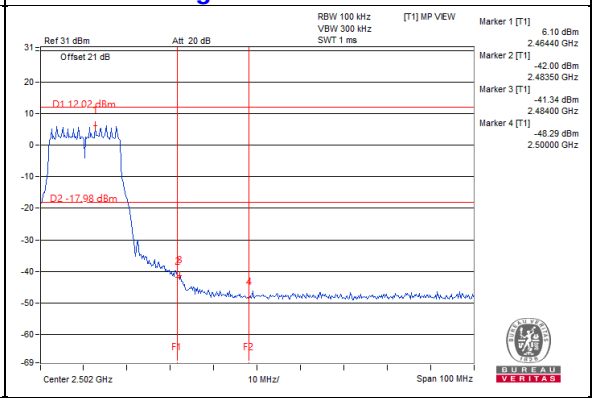
CH 11



CH 1 Band edge

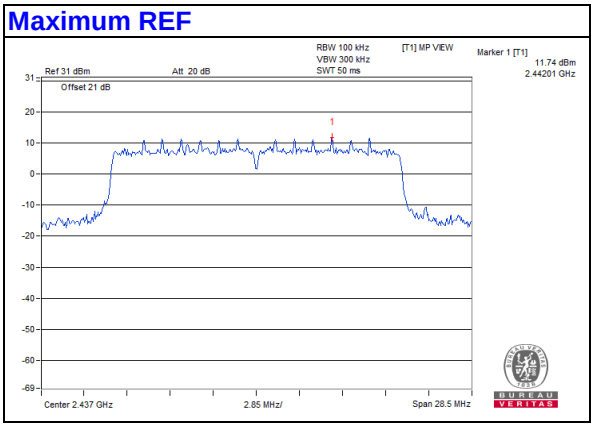


CH 11 Band edge



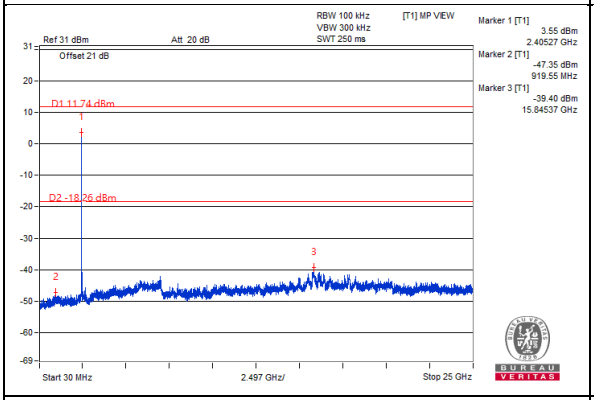
802.11ax (HE20)

Maximum REF

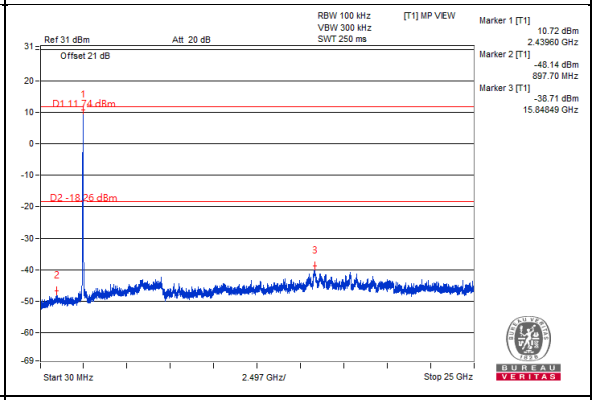


Chain 0

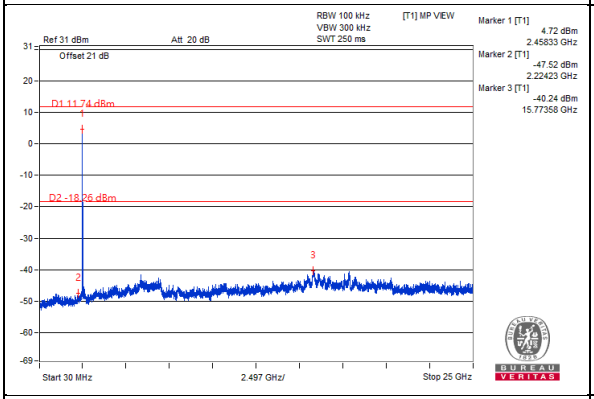
CH 1



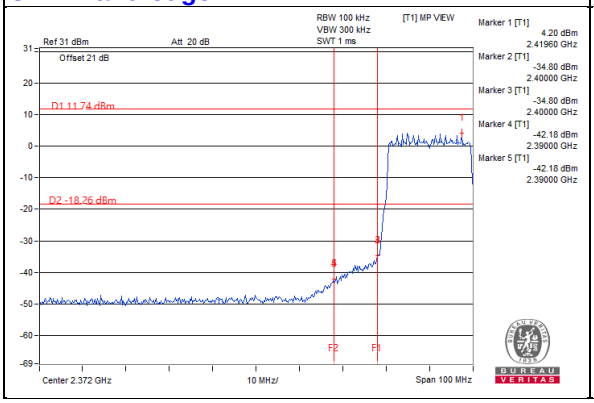
CH 6



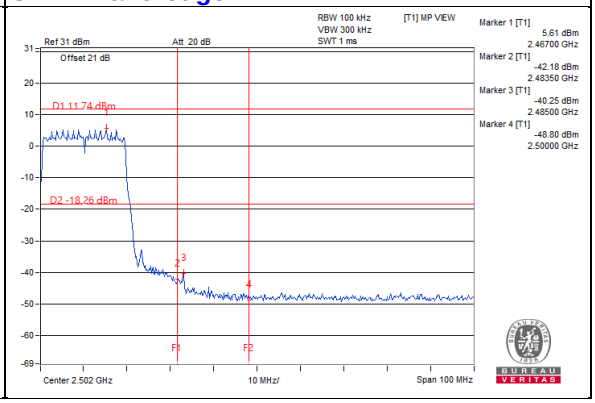
CH 11



CH 1 Band edge

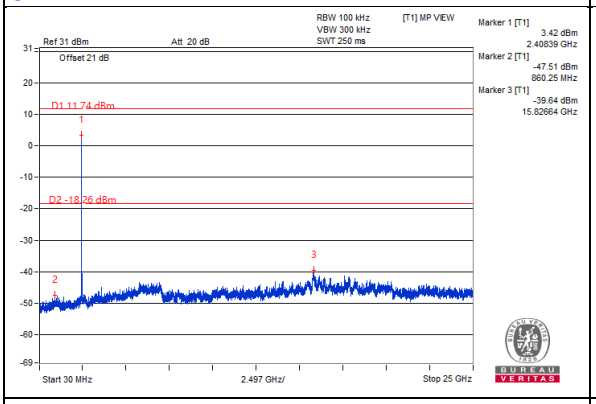


CH 11 Band edge

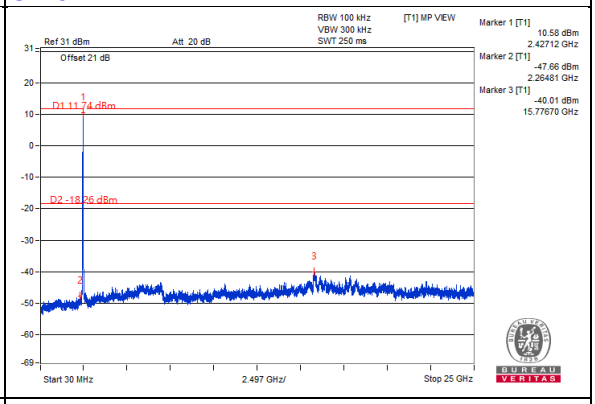


Chain 1

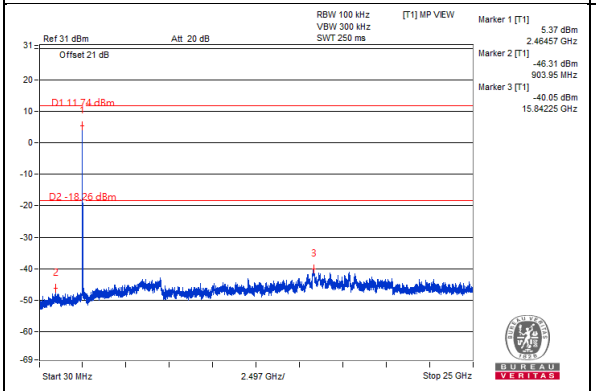
CH 1



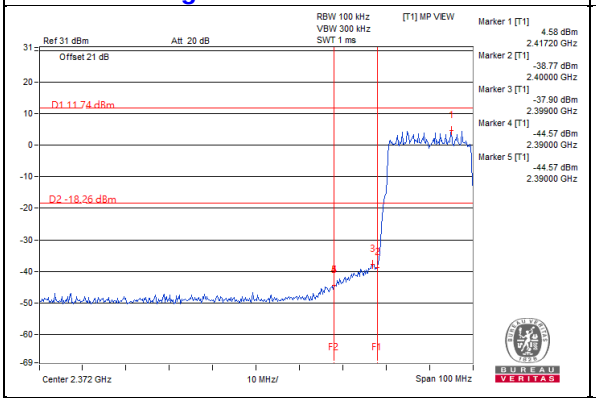
CH 6



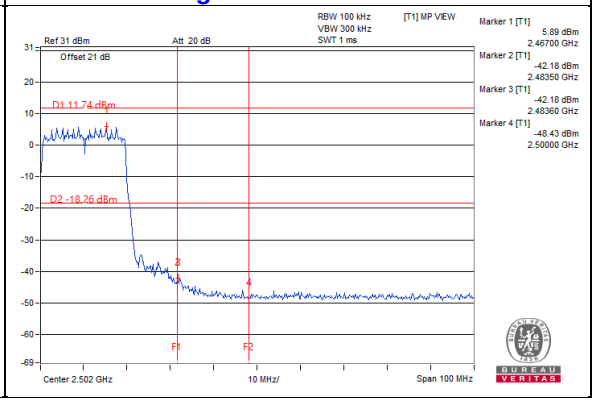
CH 11



CH 1 Band edge

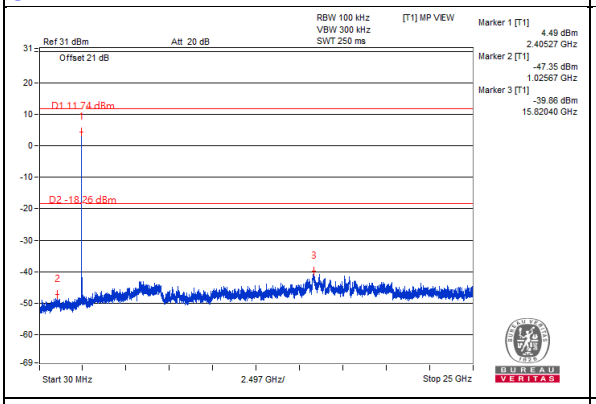


CH 11 Band edge

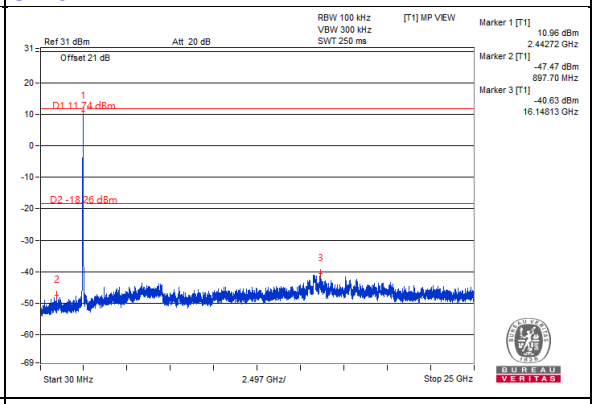


Chain 2

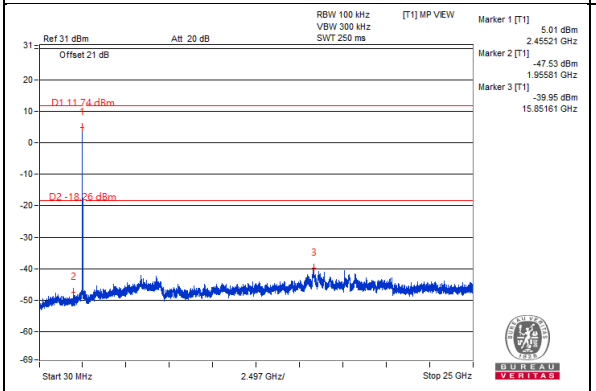
CH 1



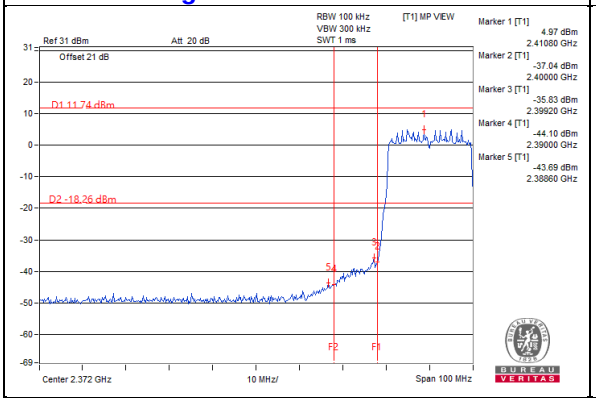
CH 6



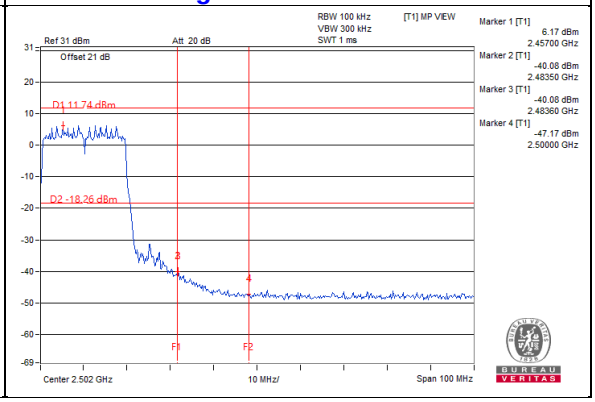
CH 11



CH 1 Band edge

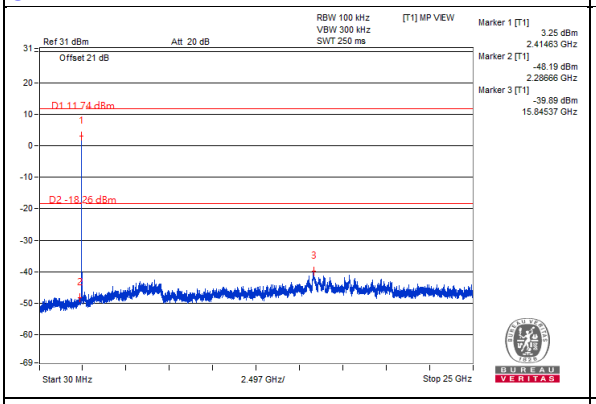


CH 11 Band edge

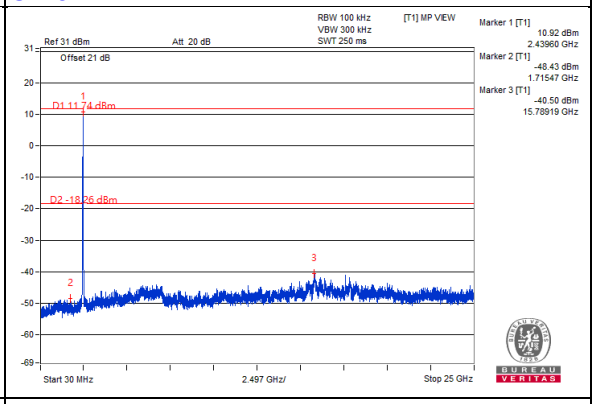


Chain 3

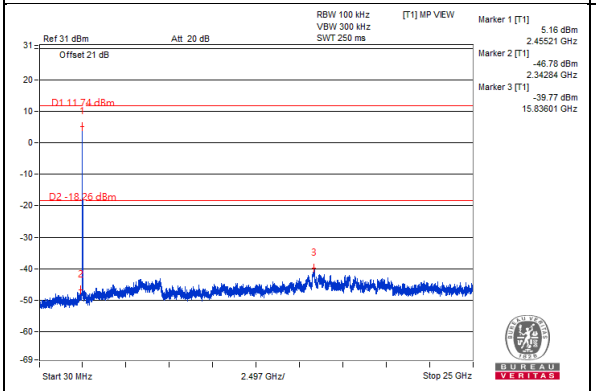
CH 1



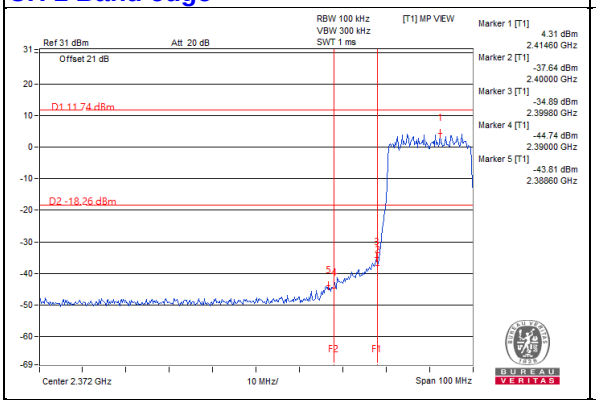
CH 6



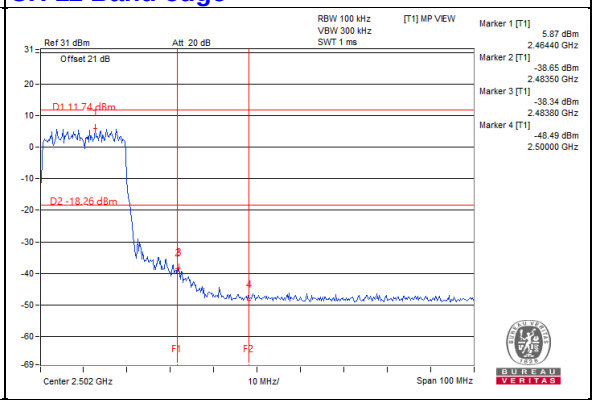
CH 11



CH 1 Band edge

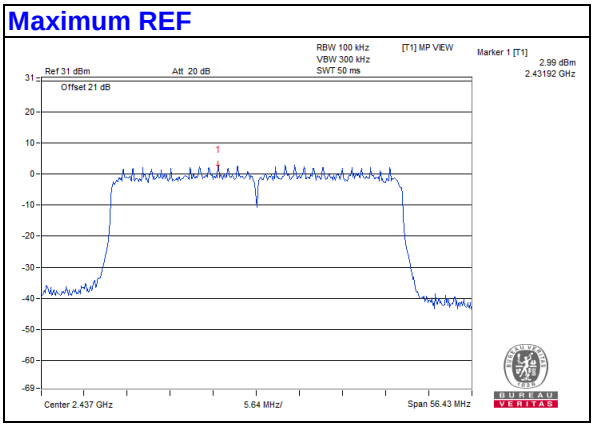


CH 11 Band edge



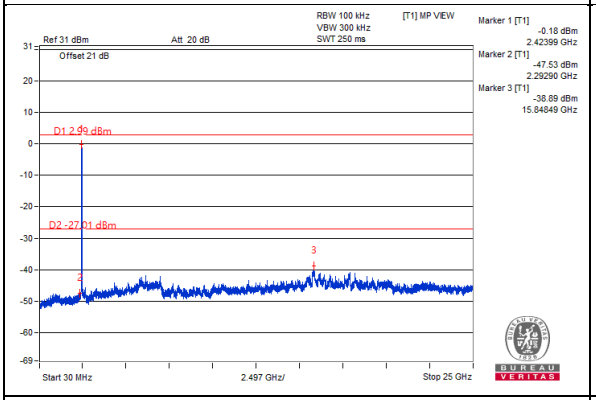
802.11ax (HE40)

Maximum REF

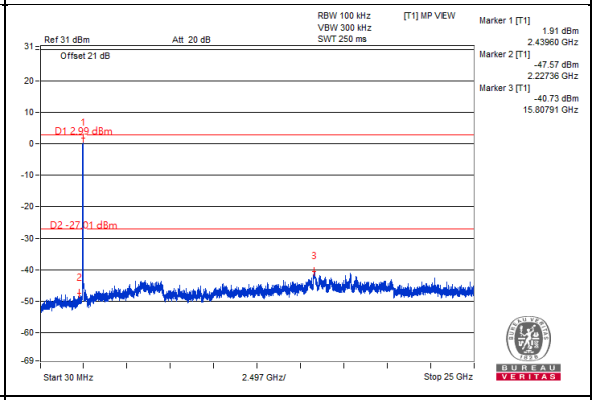


Chain 0

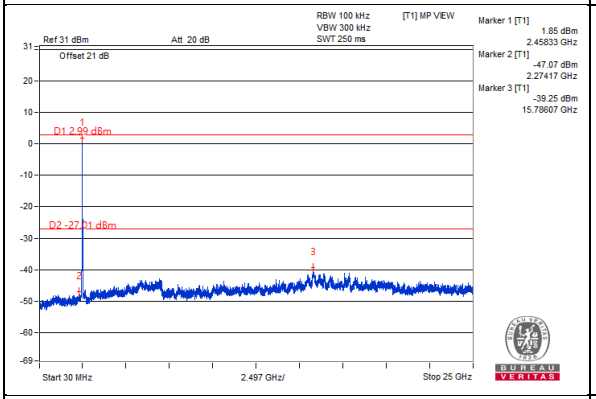
CH 3



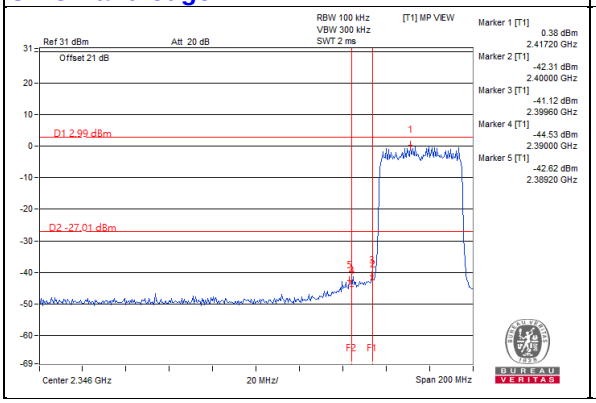
CH 6



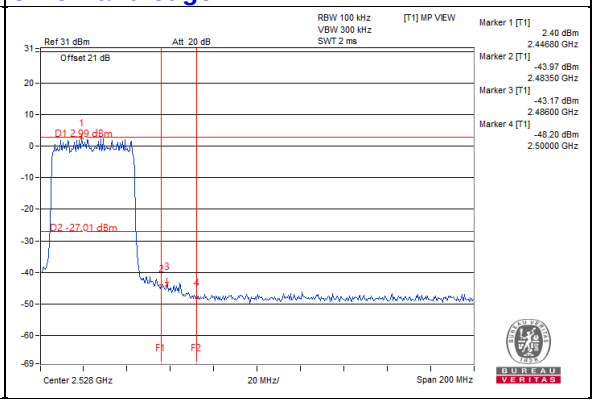
CH 9



CH 3 Band edge

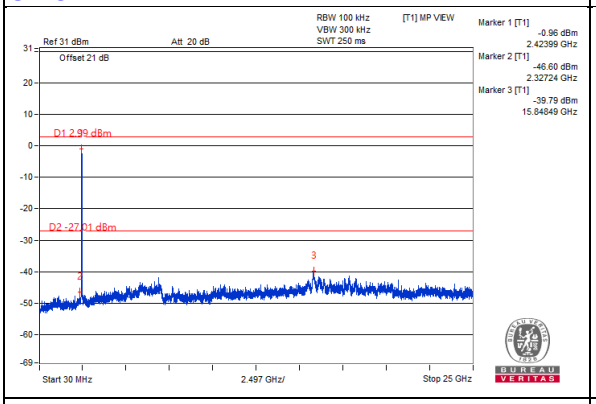


CH 9 Band edge

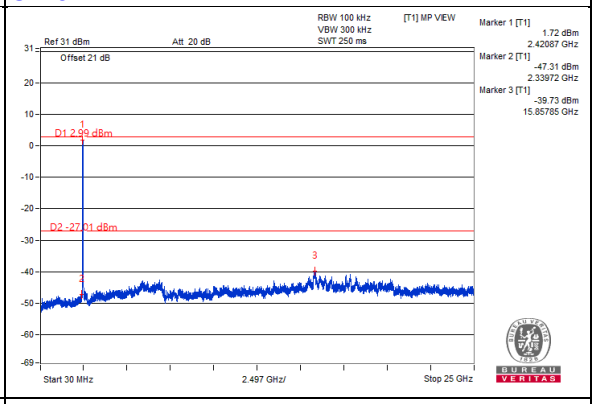


Chain 1

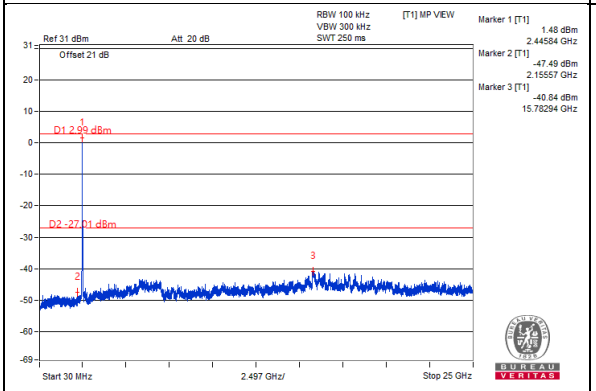
CH 3



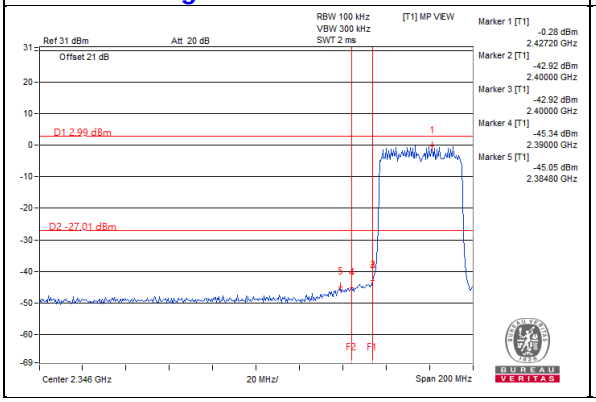
CH 6



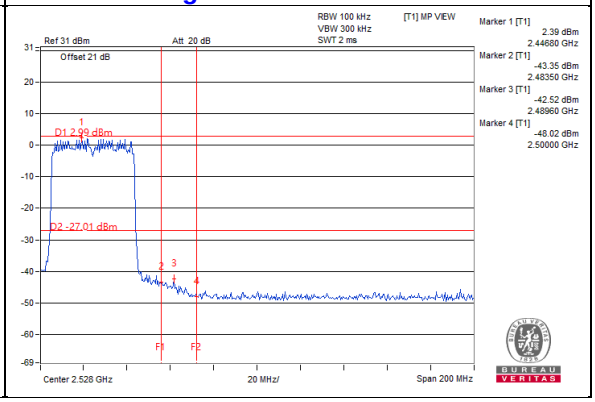
CH 9



CH 3 Band edge

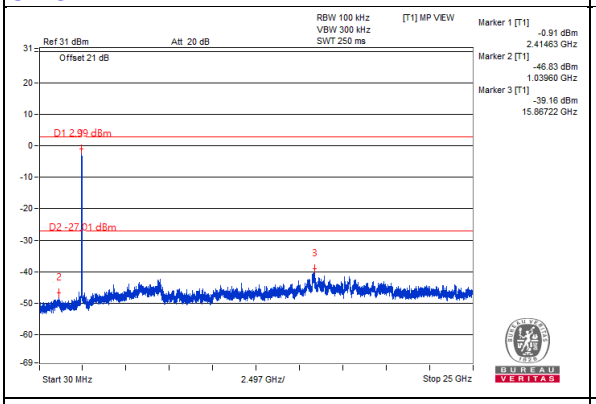


CH 9 Band edge

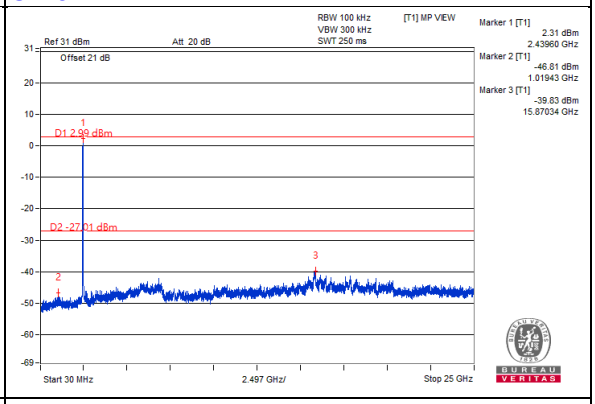


Chain 2

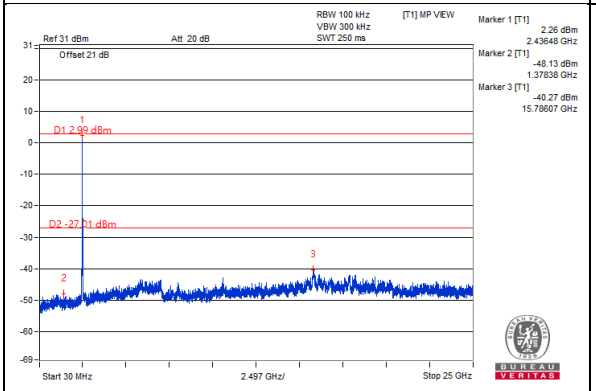
CH 3



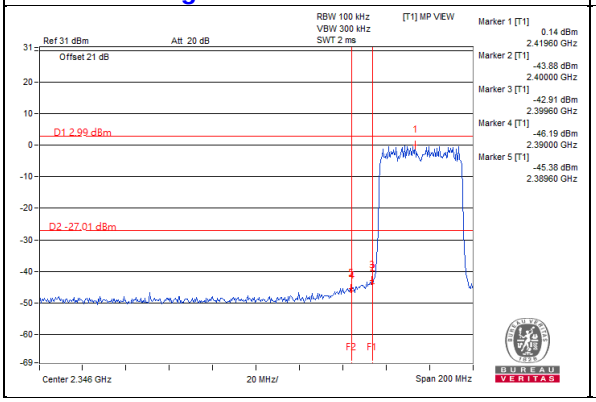
CH 6



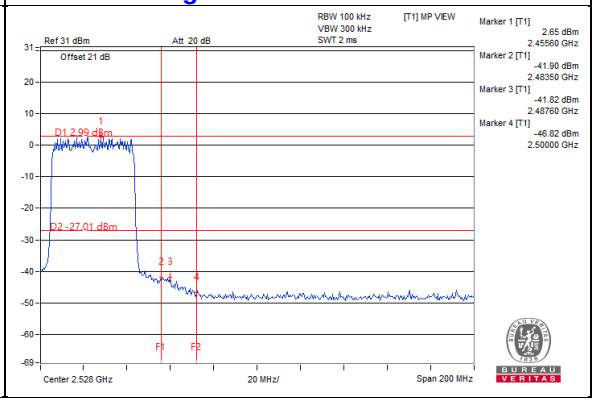
CH 9



CH 3 Band edge

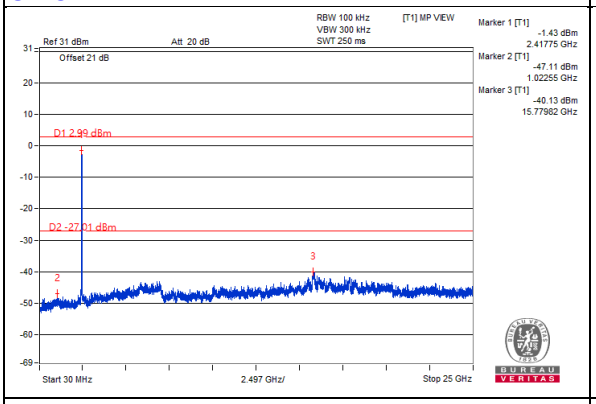


CH 9 Band edge

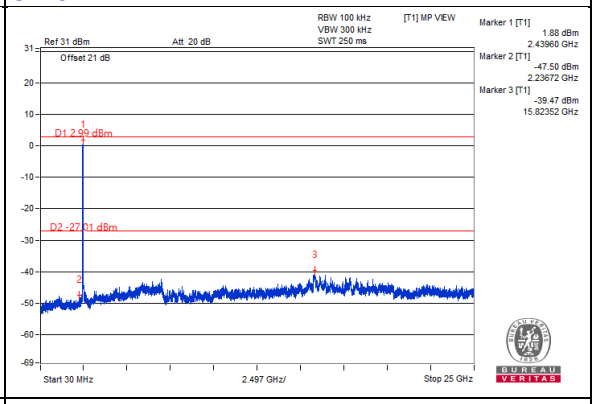


Chain 3

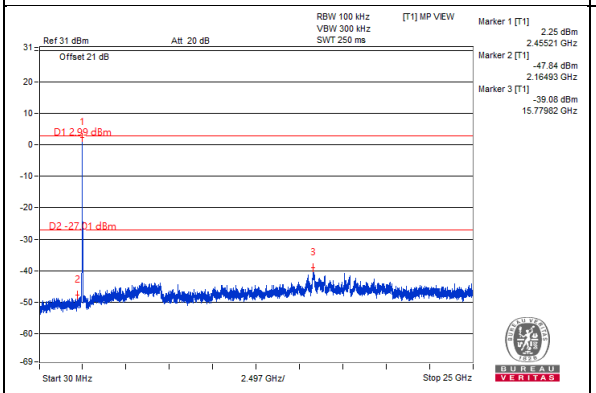
CH 3



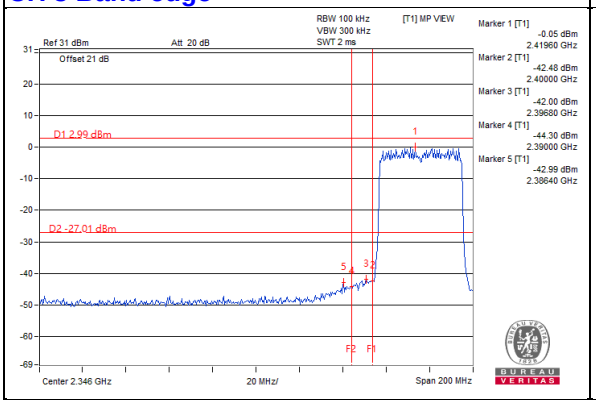
CH 6



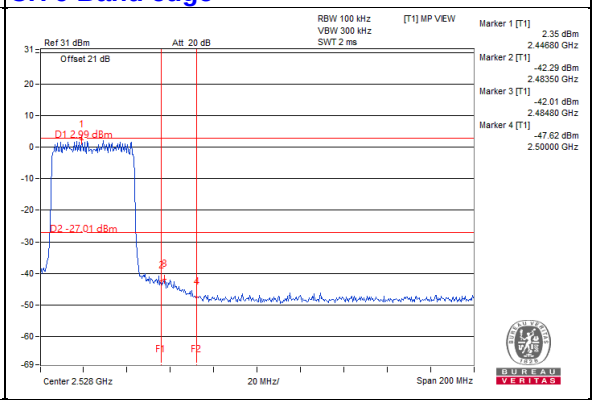
CH 9



CH 3 Band edge



CH 9 Band edge



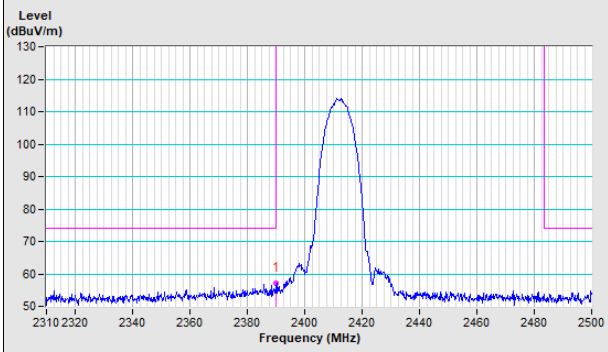
5 Pictures of Test Arrangements

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

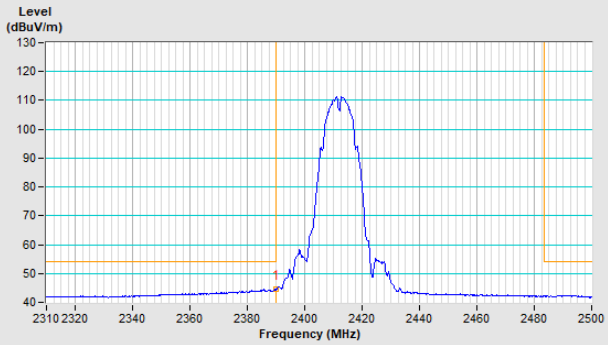
Annex A - Band-Edge Measurement

802.11b Channel 1

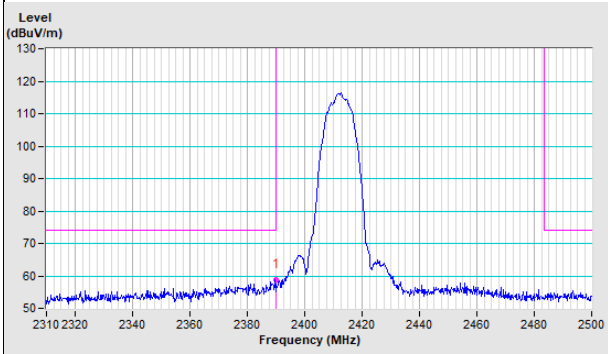
Horizontal (Peak)



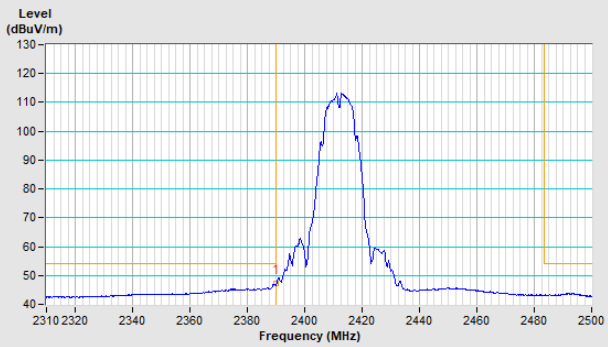
Horizontal (Average)



Vertical (Peak)

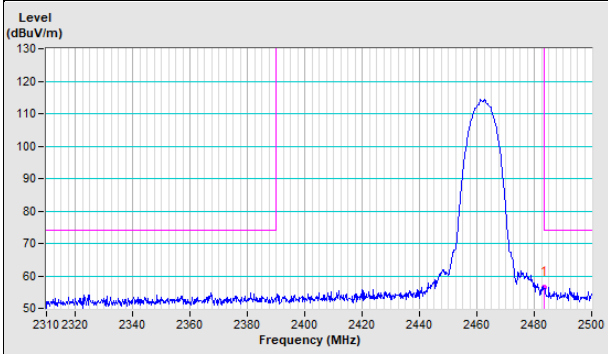


Vertical (Average)

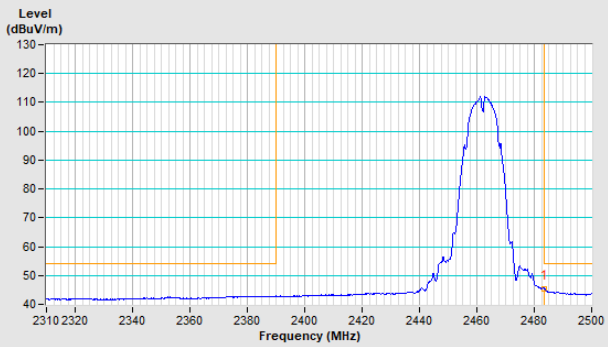


802.11b Channel 11

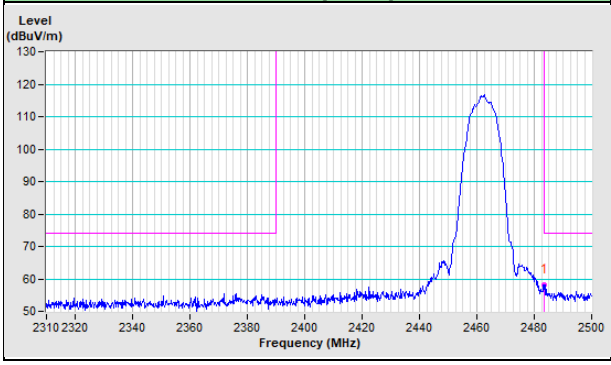
Horizontal (Peak)



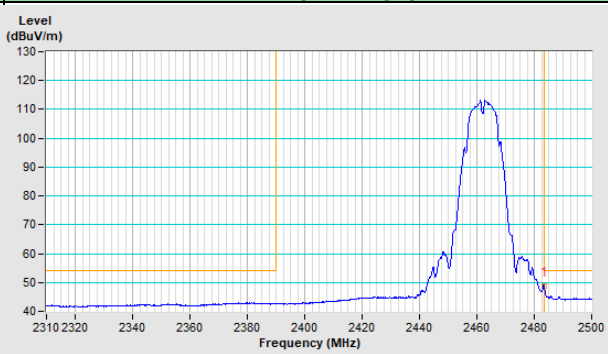
Horizontal (Average)



Vertical (Peak)

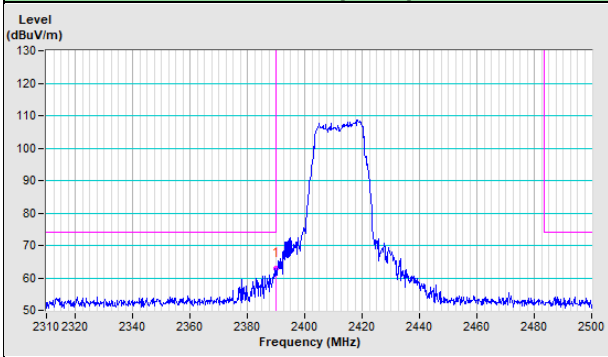


Vertical (Average)

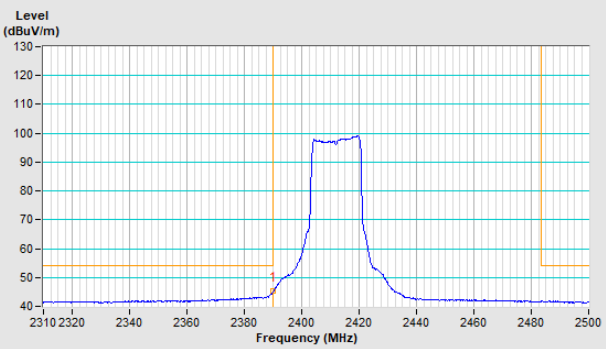


802.11g Channel 1

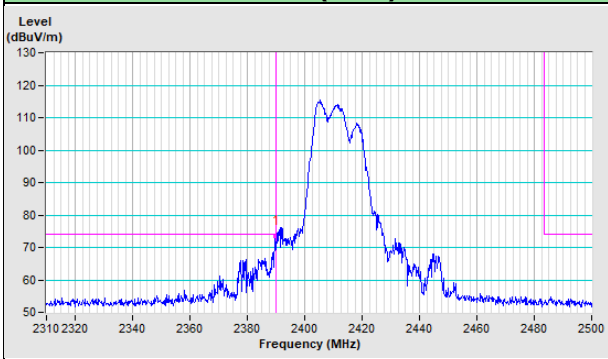
Horizontal (Peak)



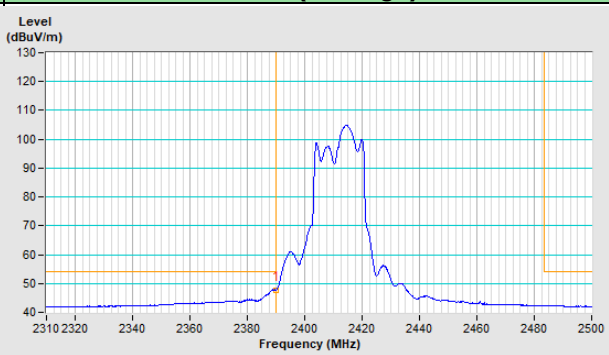
Horizontal (Average)



Vertical (Peak)

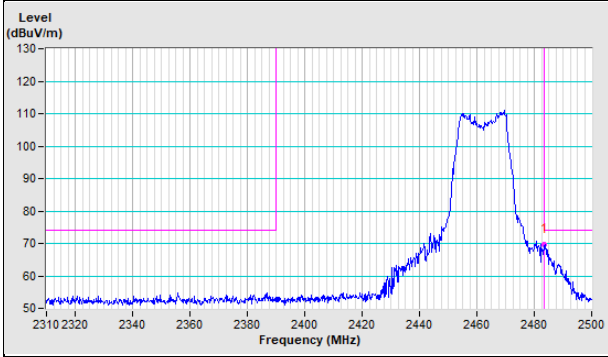


Vertical (Average)

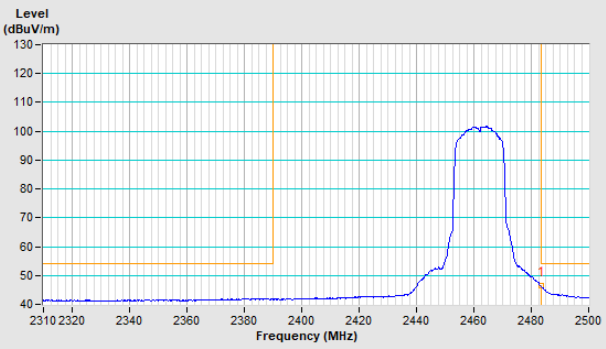


802.11g Channel 11

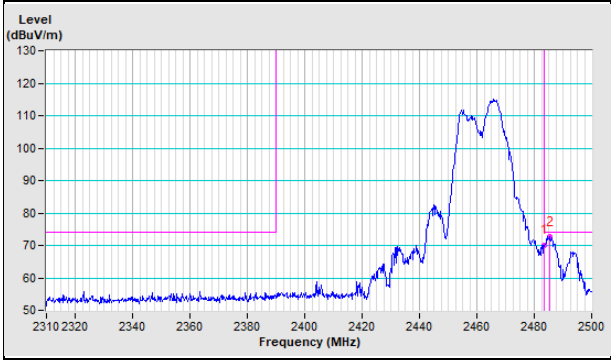
Horizontal (Peak)



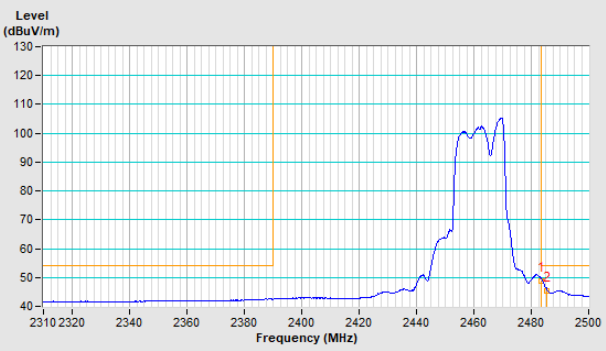
Horizontal (Average)



Vertical (Peak)

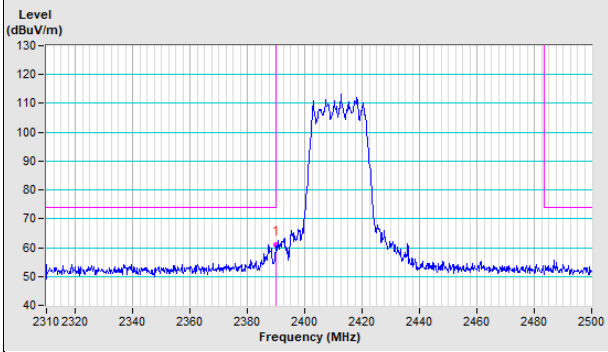


Vertical (Average)

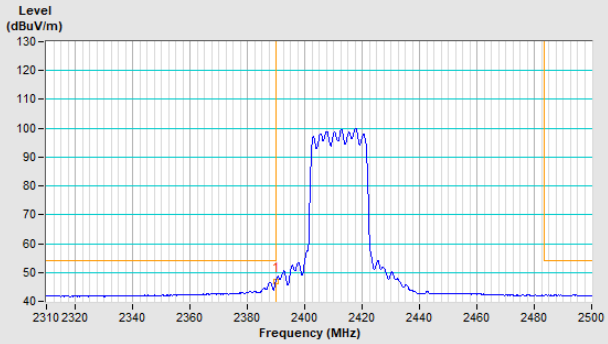


802.11ax (HE20) Channel 1

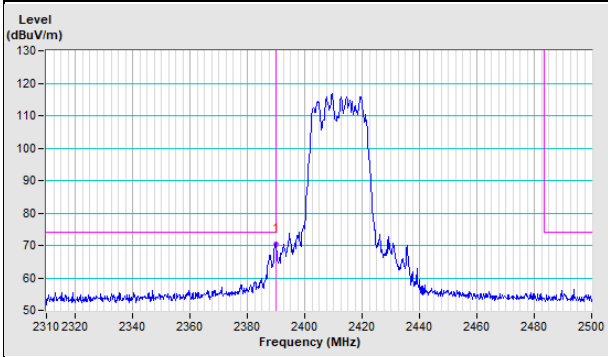
Horizontal (Peak)



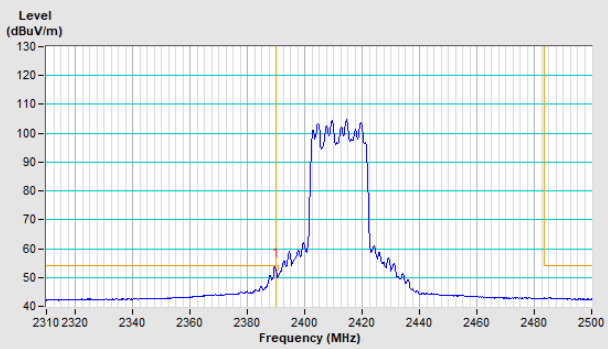
Horizontal (Average)



Vertical (Peak)

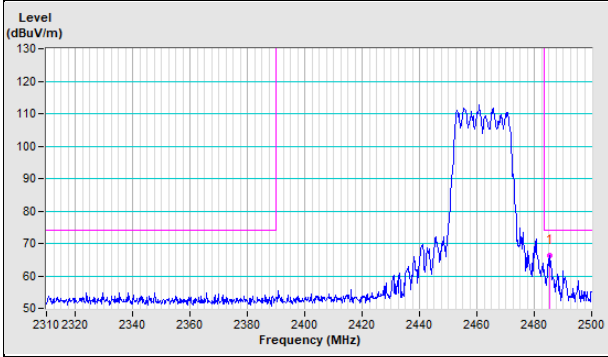


Vertical (Average)

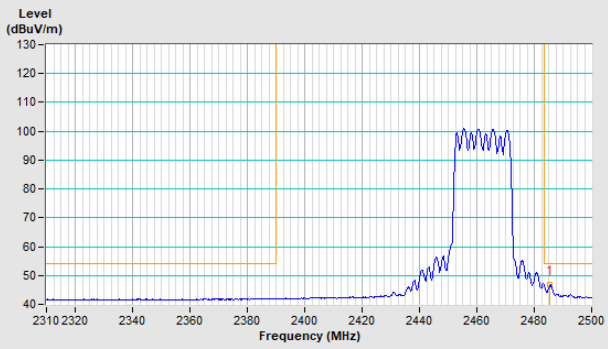


802.11ax (HE20) Channel 11

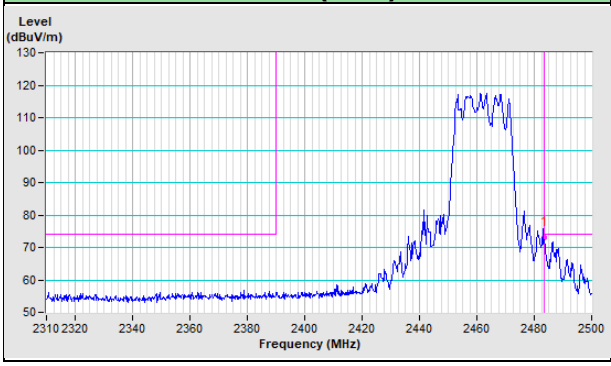
Horizontal (Peak)



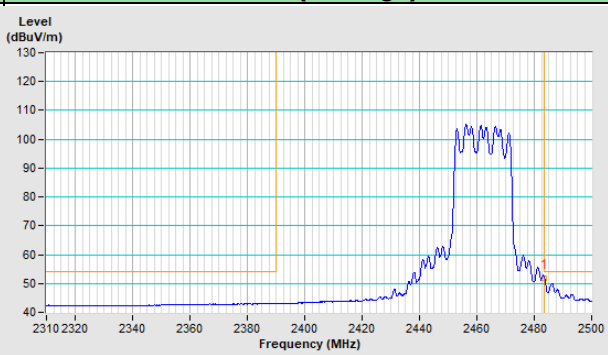
Horizontal (Average)



Vertical (Peak)

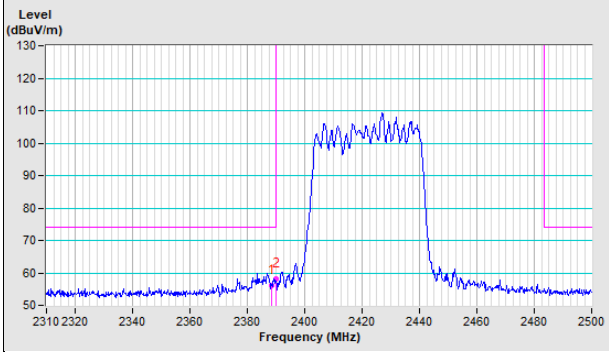


Vertical (Average)

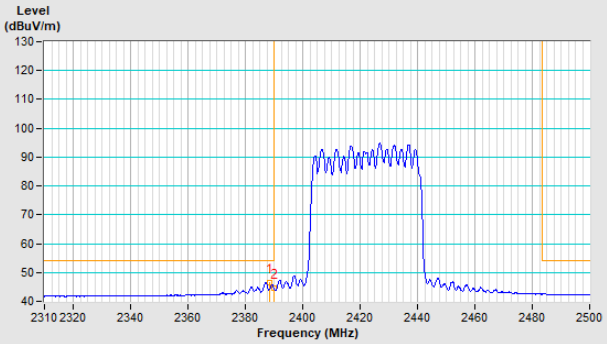


802.11ax (HE40) Channel 3

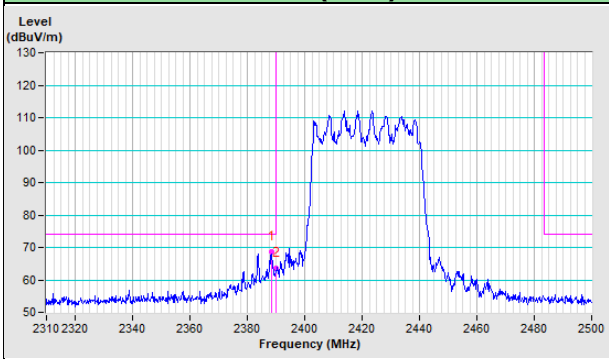
Horizontal (Peak)



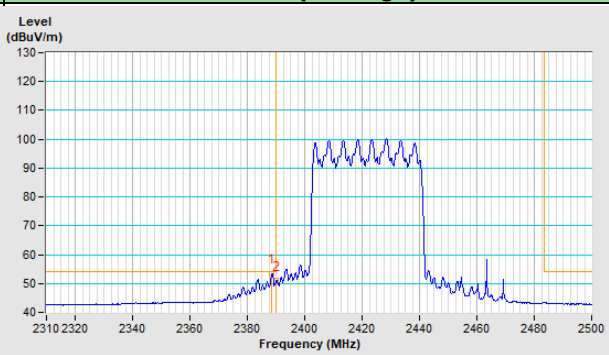
Horizontal (Average)



Vertical (Peak)

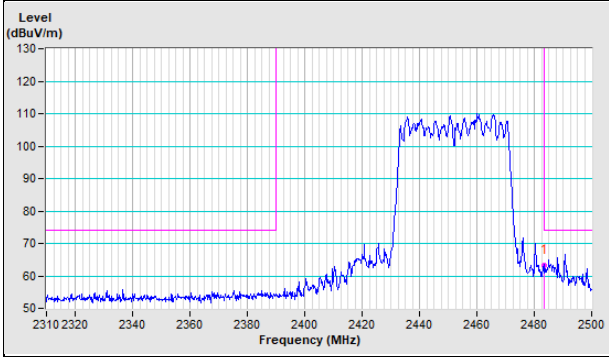


Vertical (Average)

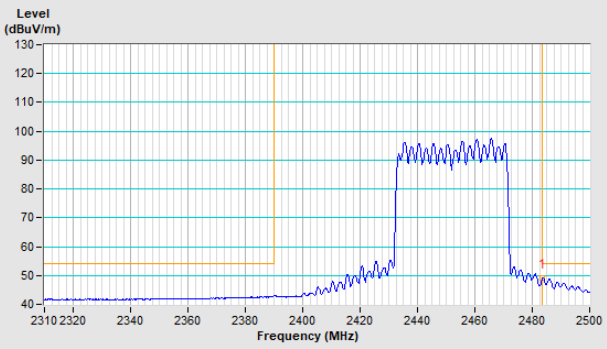


802.11ax (HE40) Channel 9

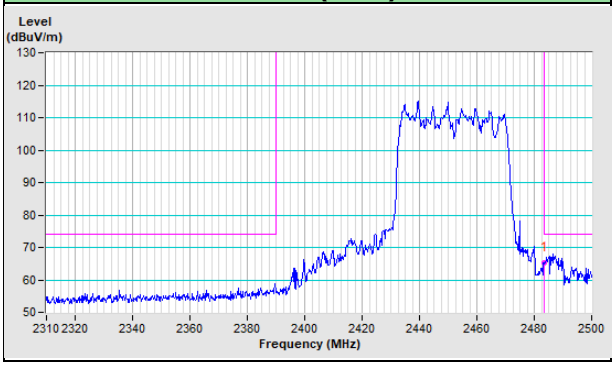
Horizontal (Peak)



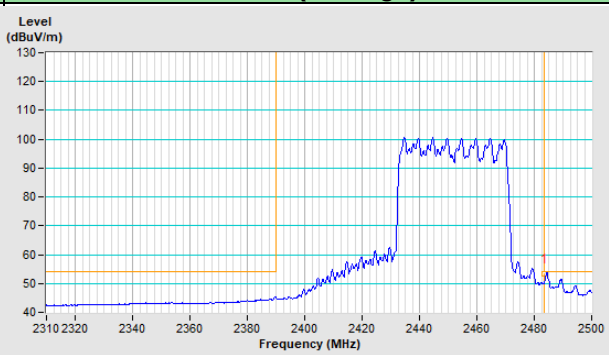
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



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:

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

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

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