

FCC Test Report

Report No.: RFBFBE-WTW-P21070660

FCC ID: I88C3000Z

Test Model: VMG4927-B50A

Series Model: C3000Z, EMG6726-B10A

Received Date: 2021/7/19

Test Date: 2021/8/20 ~ 2021/8/24

Issued Date: 2021/10/8

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
RFBFBE-WTW-P21070660	Original release.	2021/10/8

1 Certificate of Conformity

Product: Dual-Band Wireless AC/N VDSL2 Bonding Gateway;
WiFi-N VDSL2 4-port Combo WAN CPE;
Dual-Band Wireless AC/N Gigabit Ethernet Gateway

Brand: ZYXEL

Test Model: VMG4927-B50A

Series Model: C3000Z, EMG6726-B10A

Sample Status: Engineering sample

Applicant: Zyxel Communications Corporation

Test Date: 2021/8/20 ~ 2021/8/24

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 : Phoenix Huang , **Date:** 2021/10/8
Phoenix Huang / Specialist

Approved by : Clark Lin , **Date:** 2021/10/8
Clark Lin / Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Refer to Note 1 below
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.1 dB at 2390.00 MHz and 2483.50 MHz.
15.247(d)	Antenna Port Emission	Pass	Refer to Note 1 below
15.247(a)(2)	6dB bandwidth	Pass	Refer to Note 1 below
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Refer to Note 1 below
15.203	Antenna Requirement	Pass	Antenna connector is i-pex(MHF) not a standard connector.

Note:

1. Only Radiated Emission and Conducted power test items were performed for this addendum. The others testing data refer to original test report.
2. For 2.4 GHz band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A.
3. 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) ($\pm$)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.4 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.0 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	Dual-Band Wireless AC/N VDSL2 Bonding Gateway; WiFi-N VDSL2 4-port Combo WAN CPE; Dual-Band Wireless AC/N Gigabit Ethernet Gateway
Brand	ZYXEL
Test Model	VMG4927-B50A
Series Model	C3000Z, EMG6726-B10A
Status of EUT	Engineering sample
RF Chip Model No.	2.4GHz: BCM43602 5GHz: BCM4366E
Version of Firmware	V5.13(ABLY.6)b3
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 VHT mode
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to 450 Mbps VHT: up to 600 Mbps
Operating Frequency	2.412 ~ 2.462 GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7
Output Power	CDD Mode: 913.738 mW Beamforming Mode: 499.752 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	- Adapter x 1 - RJ-45 Cable x 1 (Unshielded, 1.8 m) - RJ-11 Cable x 1 (Unshielded, 3.6 m)

Note:

- This report is prepared for FCC class II permissive change. The difference compared with the original design is as the following:
 - ◆ Add 2nd source for 2.4GHz/5GHz FEM (pin-for-pin compatible, same function, no change in radio parameters) (Refer to Note 5).
 - ◆ Add 2.4GHz/5GHz antennas (Refer to Note 6).
 - ◆ Change 2.4GHz all antenna location and 5GHz (JC0) antenna location.
 - ◆ The EUT has below model names and product, which are identical to each other in all aspects except for the following.

Product	Model	Interface						Remark
		WAN	LAN	DSL	USB	Wi-Fi 2.4G 3x3	Wi-Fi 5G 4x4	
WiFi-N VDSL2 4-port Combo WAN CPE	C3000Z	x1	x4	x1	x1(2.0)	V	V	-
Dual-Band Wireless AC/N VDSL2 Bonding Gateway	VMG4927-B50A	x1	x4	x1	x1(2.0)	V	V	1. Different housing 2. Different FW GUI login screen
Dual-Band Wireless AC/N Gigabit Ethernet Gateway	EMG6726-B10A	x1	x4	NA	x1(2.0)	V	V	1. Different housing 2. Different FW GUI login screen 3. Different main chip (Main chip: BCM63138UKFSBG & BCM63139UKFSBG, Different DSL function) 4. Layout and schematic will be the same as VMG4927-B50A.

From the above models, model: VMG4927-B50A were selected as representative model for the test and its data was recorded in this report.

- According to above conditions, only Radiated Emission and Conducted power test items need to be performed. And all data was verified to meet the requirements.
- Simultaneously transmission condition.

Condition	Technology	
1	WLAN (2.4 GHz)	WLAN (5 GHz)

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

- The EUT must be supplied from a power adapter as following table:

No.	Brand	Model	Spec.	Remark
1	UMEC	UP0251M-12PA	Input: 100-240 Vac, 50/60 Hz, 0.6 A Output: 12 Vdc, 2 A DC output cable (Unshielded, 1.8 m)	
2	MNC	MAUS-120200	Input: 100-240 Vac, 50/60 Hz, 0.7 A Output: 12 Vdc, 2 A DC output cable (Unshielded, 1.8 m)	
3	DVE	DSA-24PFS-12 FUS 120200	Input: 100-240 Vac, 50/60 Hz, 0.8 A Output: 12 Vdc, 2 A DC output cable (Unshielded, 1.8 m)	
4	Actiontec	CDS024T-W120U	Input: 100-240 Vac, 50/60 Hz, 0.58 A Output: 12 Vdc, 2 A DC output cable (Unshielded, 1.8 m)	For C3000Z only

Note: From the above adapters, the worst Radiated Emissions and AC Power Conducted Emission was found in **Adapter 3**. Therefore only the test data of the mode was recorded in this report.

5. The EUT must be supplied from a FEM as following table:

	Brand	Model
2.4G Main source	RFMD	RFFM4252
2.4G 2nd source	RICHWAVE	RTC7625HE-1
5G Main source	RFMD	RFFM4552
5G 2nd source	RICHWAVE	RTC66529

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

Original

2.4GHz Antenna

Antenna No.	PCB No.	Brand	Model	Antenna Gain (dBi) <Including cable loss>	Frequency Range (GHz)	Antenna Type	Antenna Connector	Cable Length (mm)
1	WJ1	Airgain	65-031-049008B	4.5	2.4~2.4835	Dipole	None	295
2	WJ0	Airgain	65-031-049007B	4.1	2.4~2.4835	Dipole	None	320
3	WJ2	Airgain	65-031-049009B	3.1	2.4~2.4835	Dipole	None	270

5GHz Antenna

Antenna No.	PCB No.	Brand	Model	Antenna Gain (dBi) <Including cable loss>	Frequency Range (GHz)	Antenna Type	Antenna Connector	Cable Length (mm)
1	JC2	Airgain	65-031-049003B	4.4	5.15~5.85	Dipole	i-pex(MHF)	50
2	JC3	Airgain	65-031-049004B	4.8	5.15~5.85	Dipole	i-pex(MHF)	85
3	JC1	Airgain	65-031-049005B	4.4	5.15~5.85	Dipole	i-pex(MHF)	50
4	JC0	Airgain	65-031-049006B	4.4	5.15~5.85	Dipole	i-pex(MHF)	65

Newly

2.4GHz Antenna

Antenna No.	PCB No.	Brand	Model	Antenna Gain (dBi) <Including cable loss>	Frequency Range (GHz)	Antenna Type	Antenna Connector	Cable Length (mm)
1	WJ1	be-comfortable	56-001-000106Z	3.42	2.4~2.4835	Dipole	None	295
2	WJ0	be-comfortable	56-001-000108Z	3.31	2.4~2.4835	Dipole	None	320
3	WJ2	be-comfortable	56-001-000107Z	3.25	2.4~2.4835	Dipole	None	270

5GHz Antenna

Antenna No.	PCB No.	Brand	Model	Antenna Gain (dBi) <Including cable loss>	Frequency Range (GHz)	Antenna Type	Antenna Connector	Cable Length (mm)
1	JC2	be-comfortable	56-001-000109Z	3.83	5.15~5.85	Dipole	i-pex(MHF)	50
2	JC3	be-comfortable	56-001-000111Z	3.73	5.15~5.85	Dipole	i-pex(MHF)	85
3	JC1	be-comfortable	56-001-000109Z	3.74	5.15~5.85	Dipole	i-pex(MHF)	50
4	JC0	be-comfortable	56-001-000110Z	3.66	5.15~5.85	Dipole	i-pex(MHF)	85

Note:

1. For power test item: Max. gain was selected for the final test.
2. For Radiated Emission test item: Newly antenna was selected for the final test.

7. The EUT incorporates a MIMO function.

2.4GHz Band		
MODULATION MODE	TX & RX CONFIGURATION	
802.11b	3TX	3RX
802.11g	3TX	3RX
802.11n (HT20)	3TX	3RX
802.11n (HT40)	3TX	3RX
VHT20	3TX	3RX
VHT40	3TX	3RX

Note:

1. All of modulation mode support beamforming function except 802.11b/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) and VHT mode for 20MHz (40MHz), therefore the manufacturer will control the power for 802.11n mode is the same as the VHT 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)

8. The power setting are list as below:

CDD Mode								Beamforming Mode			
802.11b		802.11g		VHT20		VHT40		VHT20		VHT40	
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	84	2412	72	2412	68	2422	62	2412	68	2422	62
2437	100	2437	100	2437	95	2437	70	2437	89	2437	70
2462	82	2462	66	2462	64	2452	53	2462	64	2452	53

9. 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.

10. 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:

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:

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 $\geq$ 1G	RE<1G	APCM	
-	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
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.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
VHT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
VHT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	6	DSSS	DBPSK	1

Antenna Port Conducted Measurement:

- ☒ 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.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
VHT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
VHT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE$\geq$1G	20deg. C, 70%RH	120Vac, 60Hz	Ryan Du
RE<1G	25deg. C, 66%RH	120Vac, 60Hz	Ryan Du
APCM	25deg. C, 60%RH	120Vac, 60Hz	Kevin Ko

3.3 Duty Cycle of Test Signal

If duty cycle of test signal is $\geq 98\%$, duty factor is not required.

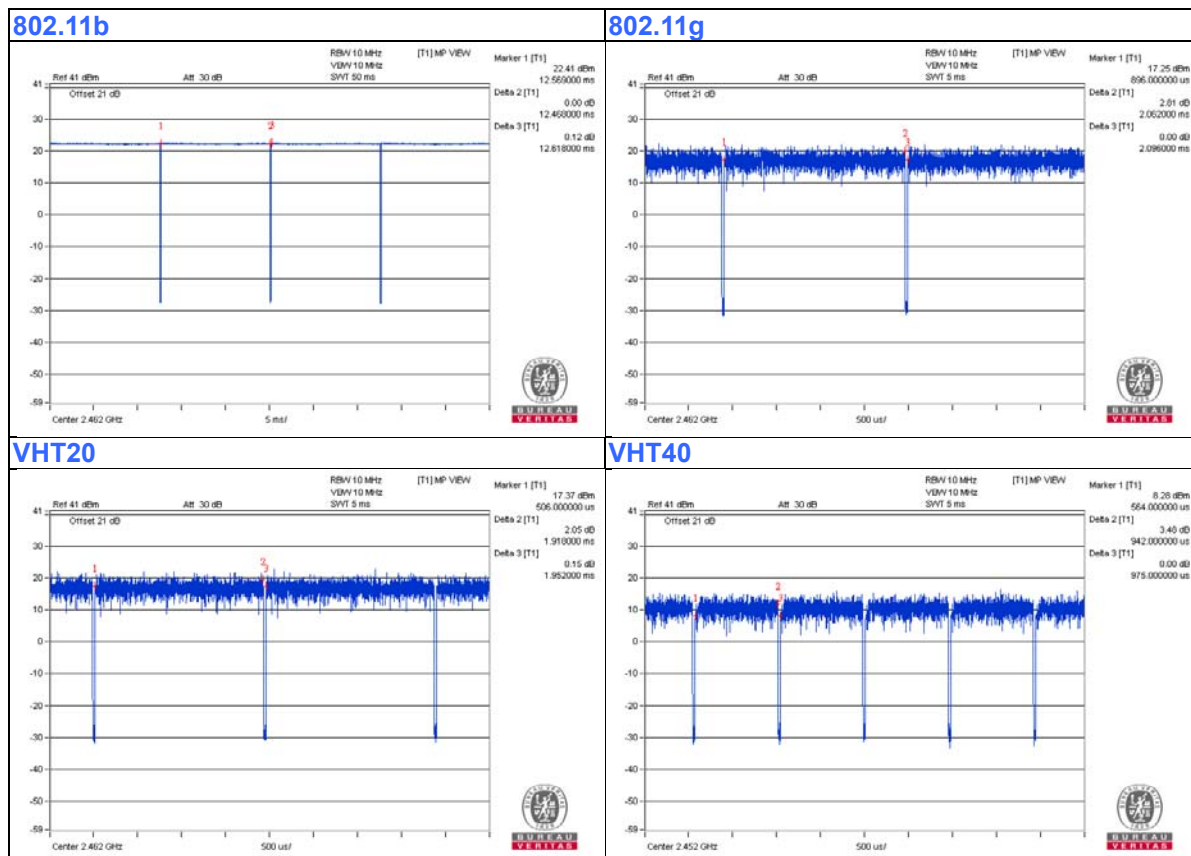
If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11b: Duty cycle = $12.468/12.618 = 0.988$

802.11g: Duty cycle = $2.062/2.096 = 0.984$

VHT20: Duty cycle = $1.918/1.952 = 0.983$

VHT40: Duty cycle = $0.942/0.975 = 0.966$, Duty factor = $10 * \log(1/\text{Duty cycle}) = 0.15 \text{ dB}$



3.4 Description of Support Units

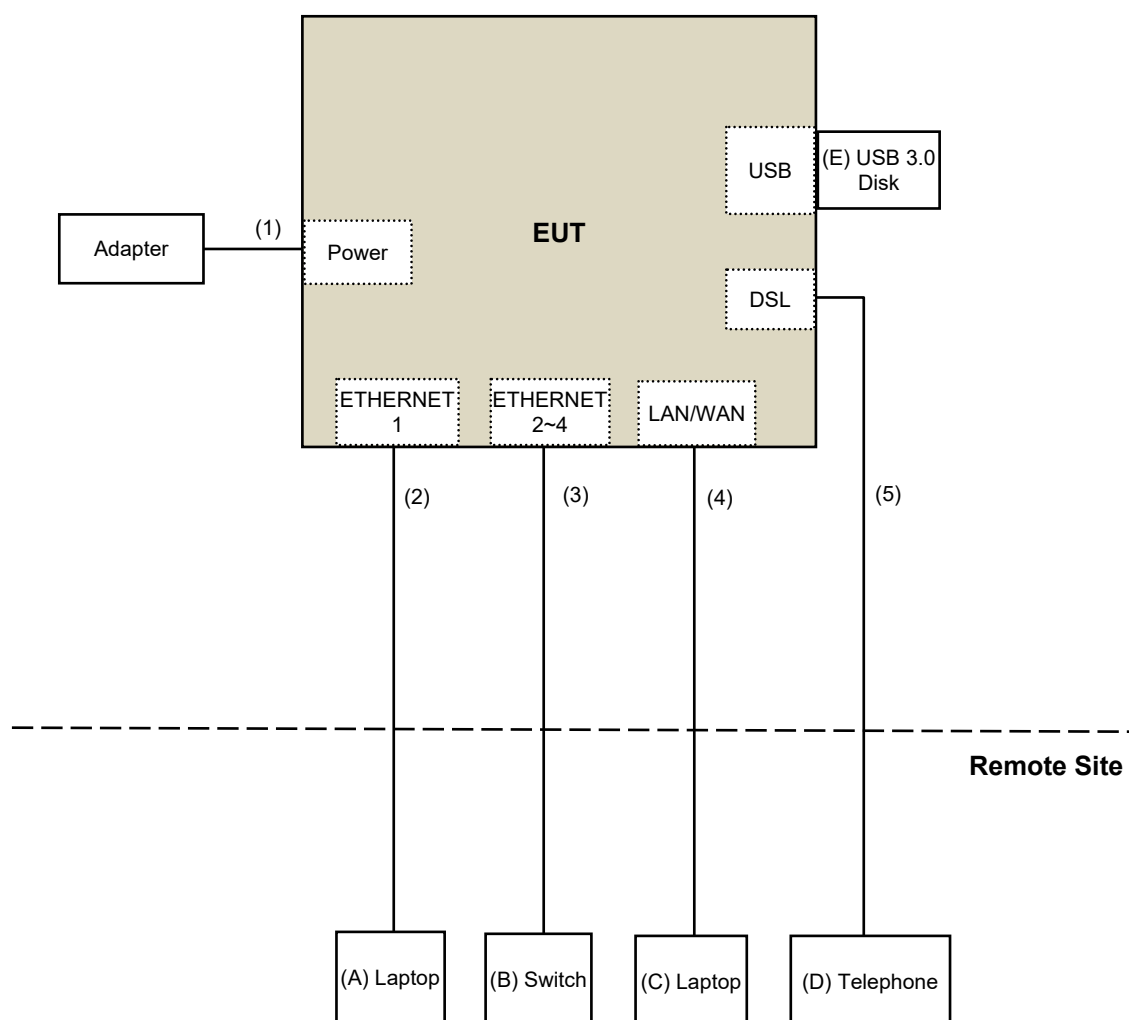
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Lenovo	81A4	YD02YN76	PD93165NGU	Provided by Lab
B.	Switch	D-Link	DGS-1005D	DR8WC92000523	NA	Provided by Lab
C.	Laptop	Lenovo	20U5S01X00 L14	PF-28LKK7	NA	Provided by Lab
D.	Telephone	WONDER	WD-303	7C17KA 04011	NA	Provided by Lab
E.	USB 3.0 Disk	SanDisk	BM181225896Z	NA	NA	Provided by Lab

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.8	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	3	10	No	0	Provided by Lab
4.	RJ-45 Cable	1	10	No	0	Provided by Lab
5.	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	MY50010156	2021/7/22	2022/7/21
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Pre_Amplifier EMCI	EMC001340	980142	2021/5/24	2022/5/23
LOOP ANTENNA Electro-Metrics	EM-6879	264	2021/3/5	2022/3/4
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-001	2021/1/7	2022/1/6
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-002	2021/1/7	2022/1/6
Pre_Amplifier Mini-Circuits	ZFL-1000VH2	QA0838008	2020/10/20	2021/10/19
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	2020/11/5	2021/11/4
RF Coaxial Cable COMMATE/PEWC	8D	966-3-1	2021/3/16	2022/3/15
RF Coaxial Cable COMMATE/PEWC	8D	966-3-2	2021/3/16	2022/3/15
RF Coaxial Cable COMMATE/PEWC	8D	966-3-3	2021/3/16	2022/3/15
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	2020/9/24	2021/9/23
Horn Antenna Schwarzbeck	BBHA9120-D	9120D-406	2020/11/22	2021/11/21
Pre_Amplifier EMCI	EMC12630SE	980384	2021/1/11	2022/1/10
RF Coaxial Cable EMCI	EMC104-SM-SM-1500	180504	2021/4/26	2022/4/25
RF Coaxial Cable EMCI	EMC104-SM-SM-2000	180601	2021/6/8	2022/6/7
RF Coaxial Cable EMCI	EMC104-SM-SM-6000	210201	2021/5/13	2022/5/12
Fix tool for Boresight antenna tower LIOW GUU	FBA-01	FBA_SIP01	NA	NA
Spectrum Analyzer Keysight	N9030A	MY54490679	2021/7/9	2022/7/8
Pre_Amplifier EMCI	EMC184045SE	980387	2021/1/11	2022/1/10
SHF-EHF Horn Schwarzbeck	BBHA 9170	BBHA9170519	2020/11/22	2021/11/21
RF Cable-Frequency range: 1-40GHz EMCI	EMC102-KM-KM-1200	160924	2021/1/11	2022/1/10
RF cable (40GHz) EMCI	EMC-KM-KM-4000	200214	2021/3/10	2022/3/9

- Note: 1. The test was performed in 966 Chamber No. 3.
 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: 2021/8/20 ~ 2021/8/23

For other test items:

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Spectrum Analyzer R&S	FSV40	101516	2021/3/8	2022/3/7
Power Meter Anritsu	ML2495A	1529002	2021/6/21	2022/6/20
Pulse Power Sensor Anritsu	MA2411B	1339443	2021/5/31	2022/5/30
Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	2021/4/13	2022/4/12
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: 2021/8/24

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:

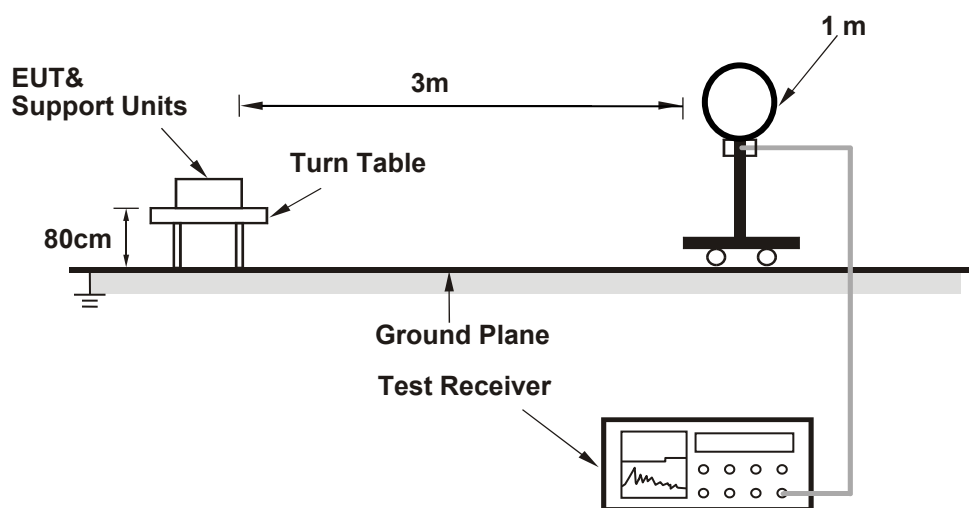
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) 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

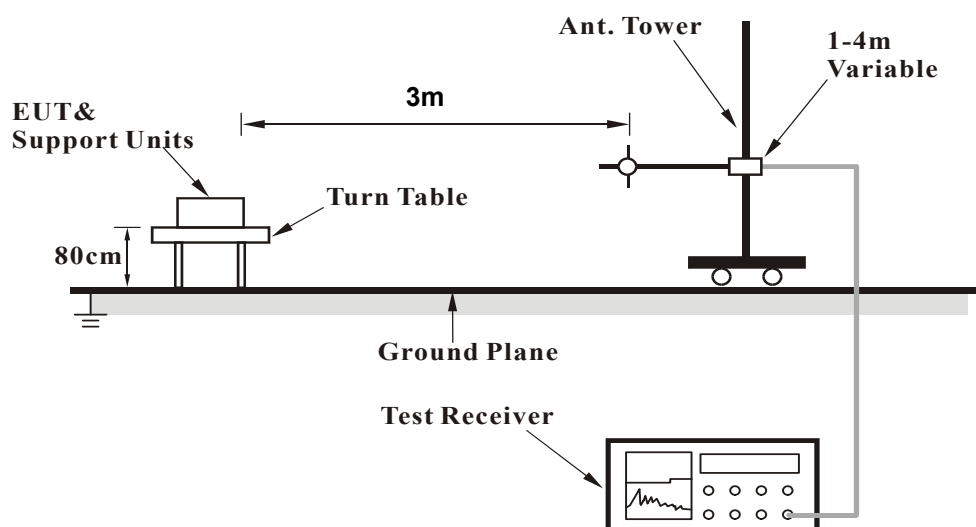
No deviation.

4.1.5 Test Setup

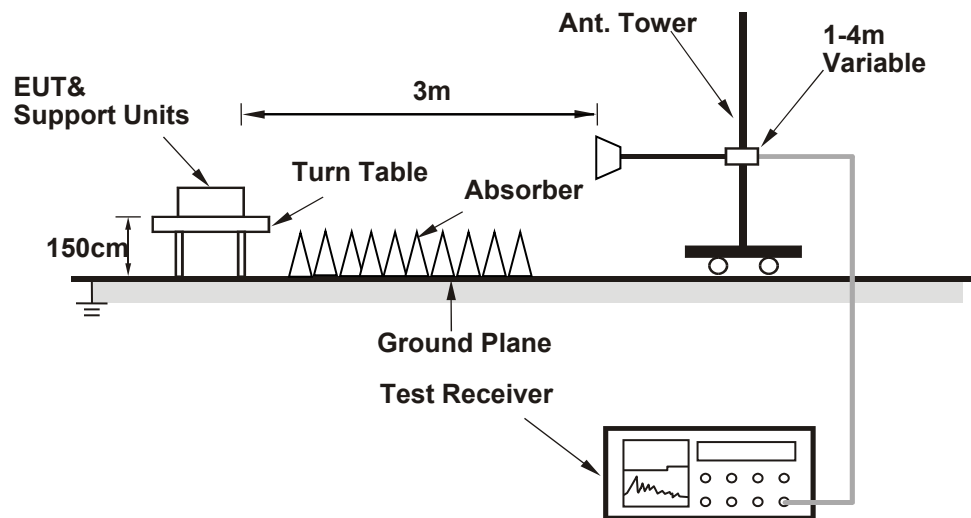
For Radiated emission below 30MHz



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

- Placed the EUT on the testing table.
- 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	57.1 PK	74.0	-16.9	1.77 H	223	58.3	-1.2
2	2390.00	45.2 AV	54.0	-8.8	1.77 H	223	46.4	-1.2
3	*2412.00	112.1 PK			1.77 H	223	113.3	-1.2
4	*2412.00	109.9 AV			1.77 H	223	111.1	-1.2
5	4824.00	44.3 PK	74.0	-29.7	1.52 H	318	40.6	3.7
6	4824.00	42.6 AV	54.0	-11.4	1.52 H	318	38.9	3.7
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	61.7 PK	74.0	-12.3	1.52 V	332	62.9	-1.2
2	2390.00	53.9 AV	54.0	-0.1	1.52 V	332	55.1	-1.2
3	*2412.00	113.2 PK			1.52 V	332	114.4	-1.2
4	*2412.00	111.8 AV			1.52 V	332	113.0	-1.2
5	4824.00	46.5 PK	74.0	-27.5	3.17 V	314	42.8	3.7
6	4824.00	45.4 AV	54.0	-8.6	3.17 V	314	41.7	3.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	56.8 PK	74.0	-17.2	1.83 H	212	58.0	-1.2
2	2390.00	45.1 AV	54.0	-8.9	1.83 H	212	46.3	-1.2
3	*2437.00	115.9 PK			1.83 H	212	117.1	-1.2
4	*2437.00	103.8 AV			1.83 H	212	105.0	-1.2
5	2483.50	58.0 PK	74.0	-16.0	1.83 H	212	59.2	-1.2
6	2483.50	45.8 AV	54.0	-8.2	1.83 H	212	47.0	-1.2
7	3655.50	37.4 PK	74.0	-36.6	1.65 H	317	36.2	1.2
8	3655.50	28.2 AV	54.0	-25.8	1.65 H	317	27.0	1.2
9	3996.00	46.3 PK	74.0	-27.7	1.75 H	229	44.4	1.9
10	3996.00	43.3 AV	54.0	-10.7	1.75 H	229	41.4	1.9
11	4874.00	47.2 PK	74.0	-26.8	1.53 H	313	43.4	3.8
12	4874.00	45.5 AV	54.0	-8.5	1.53 H	313	41.7	3.8
13	7311.00	52.9 PK	74.0	-21.1	2.45 H	211	43.2	9.7
14	7311.00	49.2 AV	54.0	-4.8	2.45 H	211	39.5	9.7
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	56.8 PK	74.0	-17.2	1.57 V	327	58.0	-1.2
2	2390.00	45.1 AV	54.0	-8.9	1.57 V	327	46.3	-1.2
3	*2437.00	117.3 PK			1.57 V	327	118.5	-1.2
4	*2437.00	115.7 AV			1.57 V	327	116.9	-1.2
5	2483.50	57.7 PK	74.0	-16.3	1.57 V	327	58.9	-1.2
6	2483.50	45.3 AV	54.0	-8.7	1.57 V	327	46.5	-1.2
7	3655.50	38.2 PK	74.0	-35.8	1.49 V	233	37.0	1.2
8	3655.50	32.5 AV	54.0	-21.5	1.49 V	233	31.3	1.2
9	3996.00	49.4 PK	74.0	-24.6	1.00 V	273	47.5	1.9
10	3996.00	47.5 AV	54.0	-6.5	1.00 V	273	45.6	1.9
11	4874.00	49.3 PK	74.0	-24.7	3.16 V	307	45.5	3.8
12	4874.00	48.3 AV	54.0	-5.7	3.16 V	307	44.5	3.8
13	7311.00	51.8 PK	74.0	-22.2	1.59 V	93	42.1	9.7
14	7311.00	47.4 AV	54.0	-6.6	1.59 V	93	37.7	9.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	112.8 PK			1.64 H	222	114.0	-1.2
2	*2462.00	110.3 AV			1.64 H	222	111.5	-1.2
3	2483.50	58.3 PK	74.0	-15.7	1.64 H	222	59.5	-1.2
4	2483.50	46.1 AV	54.0	-7.9	1.64 H	222	47.3	-1.2
5	4924.00	44.0 PK	74.0	-30.0	1.57 H	316	40.1	3.9
6	4924.00	42.3 AV	54.0	-11.7	1.57 H	316	38.4	3.9
7	7386.00	50.1 PK	74.0	-23.9	2.42 H	215	40.4	9.7
8	7386.00	46.6 AV	54.0	-7.4	2.42 H	215	36.9	9.7
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	113.7 PK			1.37 V	326	114.9	-1.2
2	*2462.00	111.2 AV			1.37 V	326	112.4	-1.2
3	2483.50	66.9 PK	74.0	-7.1	1.37 V	326	68.1	-1.2
4	2483.50	53.8 AV	54.0	-0.2	1.37 V	326	55.0	-1.2
5	4924.00	47.1 PK	74.0	-26.9	3.14 V	319	43.2	3.9
6	4924.00	45.8 AV	54.0	-8.2	3.14 V	319	41.9	3.9
7	7386.00	48.5 PK	74.0	-25.5	1.58 V	81	38.8	9.7
8	7386.00	44.0 AV	54.0	-10.0	1.58 V	81	34.3	9.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	64.5 PK	74.0	-9.5	1.84 H	222	65.7	-1.2
2	2390.00	48.2 AV	54.0	-5.8	1.84 H	222	49.4	-1.2
3	*2412.00	109.8 PK			1.84 H	222	111.0	-1.2
4	*2412.00	102.0 AV			1.84 H	222	103.2	-1.2
5	4824.00	43.7 PK	74.0	-30.3	1.48 H	316	40.0	3.7
6	4824.00	42.3 AV	54.0	-11.7	1.48 H	316	38.6	3.7
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	67.4 PK	74.0	-6.6	1.48 V	114	68.6	-1.2
2	2390.00	49.3 AV	54.0	-4.7	1.48 V	114	50.5	-1.2
3	*2412.00	110.0 PK			1.48 V	114	111.2	-1.2
4	*2412.00	102.6 AV			1.48 V	114	103.8	-1.2
5	4824.00	45.9 PK	74.0	-28.1	3.20 V	314	42.2	3.7
6	4824.00	44.9 AV	54.0	-9.1	3.20 V	314	41.2	3.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	57.3 PK	74.0	-16.7	1.87 H	227	58.5	-1.2
2	2390.00	45.4 AV	54.0	-8.6	1.87 H	227	46.6	-1.2
3	*2437.00	112.2 PK			1.87 H	227	113.4	-1.2
4	*2437.00	109.9 AV			1.87 H	227	111.1	-1.2
5	2483.50	57.9 PK	74.0	-16.1	1.87 H	227	59.1	-1.2
6	2483.50	45.7 AV	54.0	-8.3	1.87 H	227	46.9	-1.2
7	4874.00	43.6 PK	74.0	-30.4	1.58 H	326	39.8	3.8
8	4874.00	42.0 AV	54.0	-12.0	1.58 H	326	38.2	3.8
9	7311.00	50.3 PK	74.0	-23.7	2.44 H	221	40.6	9.7
10	7311.00	47.0 AV	54.0	-7.0	2.44 H	221	37.3	9.7
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	56.8 PK	74.0	-17.2	1.49 V	105	58.0	-1.2
2	2390.00	45.1 AV	54.0	-8.9	1.49 V	105	46.3	-1.2
3	*2437.00	112.2 PK			1.49 V	105	113.4	-1.2
4	*2437.00	110.0 AV			1.49 V	105	111.2	-1.2
5	2483.50	57.7 PK	74.0	-16.3	1.49 V	105	58.9	-1.2
6	2483.50	45.5 AV	54.0	-8.5	1.49 V	105	46.7	-1.2
7	4874.00	47.4 PK	74.0	-26.6	3.13 V	321	43.6	3.8
8	4874.00	46.2 AV	54.0	-7.8	3.13 V	321	42.4	3.8
9	7311.00	48.7 PK	74.0	-25.3	1.53 V	68	39.0	9.7
10	7311.00	44.4 AV	54.0	-9.6	1.53 V	68	34.7	9.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	109.3 PK			1.91 H	220	110.5	-1.2
2	*2462.00	101.5 AV			1.91 H	220	102.7	-1.2
3	2483.50	61.3 PK	74.0	-12.7	1.91 H	220	62.5	-1.2
4	2483.50	49.8 AV	54.0	-4.2	1.91 H	220	51.0	-1.2
5	4924.00	43.8 PK	74.0	-30.2	1.59 H	316	39.9	3.9
6	4924.00	42.1 AV	54.0	-11.9	1.59 H	316	38.2	3.9
7	7386.00	50.5 PK	74.0	-23.5	2.39 H	201	40.8	9.7
8	7386.00	47.1 AV	54.0	-6.9	2.39 H	201	37.4	9.7
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	109.9 PK			1.98 V	242	111.1	-1.2
2	*2462.00	102.5 AV			1.98 V	242	103.7	-1.2
3	2483.50	65.1 PK	74.0	-8.9	1.98 V	242	66.3	-1.2
4	2483.50	51.3 AV	54.0	-2.7	1.98 V	242	52.5	-1.2
5	4924.00	47.3 PK	74.0	-26.7	3.13 V	310	43.4	3.9
6	4924.00	45.9 AV	54.0	-8.1	3.13 V	310	42.0	3.9
7	7386.00	47.8 PK	74.0	-26.2	1.62 V	93	38.1	9.7
8	7386.00	43.5 AV	54.0	-10.5	1.62 V	93	33.8	9.7

Remarks:

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

RF Mode	TX VHT20	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	64.0 PK	74.0	-10.0	1.83 H	216	65.2	-1.2
2	2390.00	50.3 AV	54.0	-3.7	1.83 H	216	51.5	-1.2
3	*2412.00	110.4 PK			1.83 H	216	111.6	-1.2
4	*2412.00	100.8 AV			1.83 H	216	102.0	-1.2
5	4824.00	43.6 PK	74.0	-30.4	1.62 H	302	39.9	3.7
6	4824.00	42.0 AV	54.0	-12.0	1.62 H	302	38.3	3.7
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	2389.07	71.9 PK	74.0	-2.1	1.58 V	246	73.1	-1.2
2	2389.07	53.8 AV	54.0	-0.2	1.58 V	246	55.0	-1.2
3	*2412.00	113.5 PK			1.58 V	246	114.7	-1.2
4	*2412.00	103.7 AV			1.58 V	246	104.9	-1.2
5	2713.49	58.1 PK	74.0	-15.9	1.68 V	132	58.7	-0.6
6	2713.49	49.7 AV	54.0	-4.3	1.68 V	132	50.3	-0.6
7	4824.00	47.5 PK	74.0	-26.5	3.14 V	317	43.8	3.7
8	4824.00	46.3 AV	54.0	-7.7	3.14 V	317	42.6	3.7

Remarks:

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

RF Mode	TX VHT20	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	57.5 PK	74.0	-16.5	1.86 H	210	58.7	-1.2
2	2390.00	45.5 AV	54.0	-8.5	1.86 H	210	46.7	-1.2
3	*2437.00	118.9 PK			1.86 H	210	120.1	-1.2
4	*2437.00	108.8 AV			1.86 H	210	110.0	-1.2
5	2483.50	62.7 PK	74.0	-11.3	1.86 H	210	63.9	-1.2
6	2483.50	48.8 AV	54.0	-5.2	1.86 H	210	50.0	-1.2
7	4874.00	43.4 PK	74.0	-30.6	1.56 H	333	39.6	3.8
8	4874.00	41.9 AV	54.0	-12.1	1.56 H	333	38.1	3.8
9	7311.00	50.2 PK	74.0	-23.8	2.39 H	209	40.5	9.7
10	7311.00	47.0 AV	54.0	-7.0	2.39 H	209	37.3	9.7
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	63.5 PK	74.0	-10.5	1.46 V	324	64.7	-1.2
2	2390.00	48.8 AV	54.0	-5.2	1.46 V	324	50.0	-1.2
3	*2437.00	119.4 PK			1.46 V	324	120.6	-1.2
4	*2437.00	109.1 AV			1.46 V	324	110.3	-1.2
5	2483.50	71.1 PK	74.0	-2.9	1.46 V	324	72.3	-1.2
6	2483.50	53.8 AV	54.0	-0.2	1.46 V	324	55.0	-1.2
7	2741.60	56.8 PK	74.0	-17.2	1.37 V	83	57.4	-0.6
8	2741.60	46.1 AV	54.0	-7.9	1.37 V	83	46.7	-0.6
9	4874.00	46.8 PK	74.0	-27.2	3.16 V	328	43.0	3.8
10	4874.00	45.9 AV	54.0	-8.1	3.16 V	328	42.1	3.8
11	7311.00	49.2 PK	74.0	-24.8	1.54 V	61	39.5	9.7
12	7311.00	44.8 AV	54.0	-9.2	1.54 V	61	35.1	9.7

Remarks:

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

RF Mode	TX VHT20	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	109.7 PK			1.66 H	220	110.9	-1.2
2	*2462.00	99.9 AV			1.66 H	220	101.1	-1.2
3	2483.50	63.0 PK	74.0	-11.0	1.66 H	220	64.2	-1.2
4	2483.50	50.7 AV	54.0	-3.3	1.66 H	220	51.9	-1.2
5	4924.00	43.4 PK	74.0	-30.6	1.54 H	334	39.5	3.9
6	4924.00	41.8 AV	54.0	-12.2	1.54 H	334	37.9	3.9
7	7386.00	50.0 PK	74.0	-24.0	2.45 H	219	40.3	9.7
8	7386.00	46.6 AV	54.0	-7.4	2.45 H	219	36.9	9.7
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	#2308.03	56.5 PK	74.0	-17.5	1.73 V	201	57.5	-1.0
2	#2308.03	45.9 AV	54.0	-8.1	1.73 V	201	46.9	-1.0
3	*2462.00	112.5 PK			1.49 V	245	113.7	-1.2
4	*2462.00	102.6 AV			1.49 V	245	103.8	-1.2
5	2483.50	70.3 PK	74.0	-3.7	1.49 V	245	71.5	-1.2
6	2483.50	53.8 AV	54.0	-0.2	1.49 V	245	55.0	-1.2
7	2769.81	58.1 PK	74.0	-15.9	1.59 V	117	58.6	-0.5
8	2769.81	50.0 AV	54.0	-4.0	1.59 V	117	50.5	-0.5
9	4924.00	47.6 PK	74.0	-26.4	3.18 V	333	43.7	3.9
10	4924.00	46.3 AV	54.0	-7.7	3.18 V	333	42.4	3.9
11	7386.00	48.1 PK	74.0	-25.9	1.55 V	77	38.4	9.7
12	7386.00	44.0 AV	54.0	-10.0	1.55 V	77	34.3	9.7

Remarks:

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

RF Mode	TX VHT40	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	2387.28	61.4 PK	74.0	-12.6	1.78 H	217	62.6	-1.2
2	2387.28	50.6 AV	54.0	-3.4	1.78 H	217	51.8	-1.2
3	*2422.00	106.7 PK			1.78 H	217	107.9	-1.2
4	*2422.00	96.6 AV			1.78 H	217	97.8	-1.2
5	4844.00	43.4 PK	74.0	-30.6	1.57 H	347	39.6	3.8
6	4844.00	41.7 AV	54.0	-12.3	1.57 H	347	37.9	3.8
7	7266.00	49.6 PK	74.0	-24.4	2.44 H	234	40.1	9.5
8	7266.00	46.5 AV	54.0	-7.5	2.44 H	234	37.0	9.5
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	2388.73	67.5 PK	74.0	-6.5	1.50 V	254	68.7	-1.2
2	2388.73	53.7 AV	54.0	-0.3	1.50 V	254	54.9	-1.2
3	*2422.00	109.1 PK			1.50 V	254	110.3	-1.2
4	*2422.00	98.9 AV			1.50 V	254	100.1	-1.2
5	4844.00	47.5 PK	74.0	-26.5	3.19 V	324	43.7	3.8
6	4844.00	46.5 AV	54.0	-7.5	3.19 V	324	42.7	3.8
7	7266.00	47.5 PK	74.0	-26.5	1.52 V	65	38.0	9.5
8	7266.00	43.7 AV	54.0	-10.3	1.52 V	65	34.2	9.5

Remarks:

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

RF Mode	TX VHT40	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	57.6 PK	74.0	-16.4	1.76 H	231	58.8	-1.2
2	2390.00	45.7 AV	54.0	-8.3	1.76 H	231	46.9	-1.2
3	*2437.00	109.4 PK			1.76 H	231	110.6	-1.2
4	*2437.00	99.7 AV			1.76 H	231	100.9	-1.2
5	2483.50	63.3 PK	74.0	-10.7	1.76 H	231	64.5	-1.2
6	2483.50	49.2 AV	54.0	-4.8	1.76 H	231	50.4	-1.2
7	4874.00	43.3 PK	74.0	-30.7	1.55 H	345	39.5	3.8
8	4874.00	41.5 AV	54.0	-12.5	1.55 H	345	37.7	3.8
9	7311.00	50.6 PK	74.0	-23.4	2.48 H	228	40.9	9.7
10	7311.00	47.0 AV	54.0	-7.0	2.48 H	228	37.3	9.7
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	65.3 PK	74.0	-8.7	1.50 V	247	66.5	-1.2
2	2390.00	47.9 AV	54.0	-6.1	1.50 V	247	49.1	-1.2
3	*2437.00	110.6 PK			1.50 V	247	111.8	-1.2
4	*2437.00	100.9 AV			1.50 V	247	102.1	-1.2
5	2483.50	72.2 PK	74.0	-1.8	1.50 V	247	73.4	-1.2
6	2483.50	53.9 AV	54.0	-0.1	1.50 V	247	55.1	-1.2
7	4874.00	47.7 PK	74.0	-26.3	3.22 V	349	43.9	3.8
8	4874.00	46.6 AV	54.0	-7.4	3.22 V	349	42.8	3.8
9	7311.00	48.0 PK	74.0	-26.0	1.57 V	62	38.3	9.7
10	7311.00	43.7 AV	54.0	-10.3	1.57 V	62	34.0	9.7

Remarks:

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

RF Mode	TX VHT40	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	105.8 PK			3.19 H	310	107.0	-1.2
2	*2452.00	95.5 AV			3.19 H	310	96.7	-1.2
3	2487.71	64.8 PK	74.0	-9.2	3.19 H	310	66.0	-1.2
4	2487.71	51.6 AV	54.0	-2.4	3.19 H	310	52.8	-1.2
5	4904.00	43.9 PK	74.0	-30.1	1.59 H	322	40.0	3.9
6	4904.00	42.2 AV	54.0	-11.8	1.59 H	322	38.3	3.9
7	7356.00	49.5 PK	74.0	-24.5	2.41 H	223	39.6	9.9
8	7356.00	46.2 AV	54.0	-7.8	2.41 H	223	36.3	9.9
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	107.0 PK			1.49 V	245	108.2	-1.2
2	*2452.00	97.9 AV			1.49 V	245	99.1	-1.2
3	2483.50	67.7 PK	74.0	-6.3	1.49 V	245	68.9	-1.2
4	2483.50	53.6 AV	54.0	-0.4	1.49 V	245	54.8	-1.2
5	4904.00	47.3 PK	74.0	-26.7	3.23 V	343	43.4	3.9
6	4904.00	45.8 AV	54.0	-8.2	3.23 V	343	41.9	3.9
7	7356.00	48.1 PK	74.0	-25.9	1.57 V	78	38.2	9.9
8	7356.00	44.0 AV	54.0	-10.0	1.57 V	78	34.1	9.9

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.
5. " * ": Fundamental frequency.

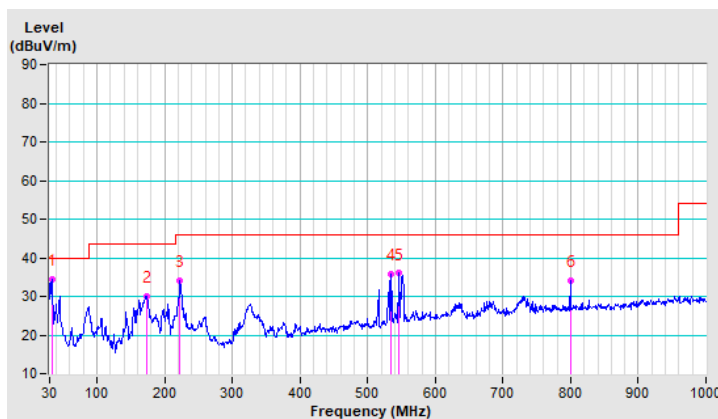
Below 1GHz Data:

RF Mode	TX 802.11b	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	33.40	34.5 QP	40.0	-5.5	3.00 H	36	43.8	-9.3
2	173.63	30.1 QP	43.5	-13.4	1.50 H	265	38.6	-8.5
3	222.40	34.0 QP	46.0	-12.0	1.50 H	86	44.5	-10.5
4	534.98	35.7 QP	46.0	-10.3	1.50 H	46	36.2	-0.5
5	546.67	36.0 QP	46.0	-10.0	1.50 H	114	36.3	-0.3
6	799.21	34.2 QP	46.0	-11.8	1.00 H	102	29.3	4.9

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.

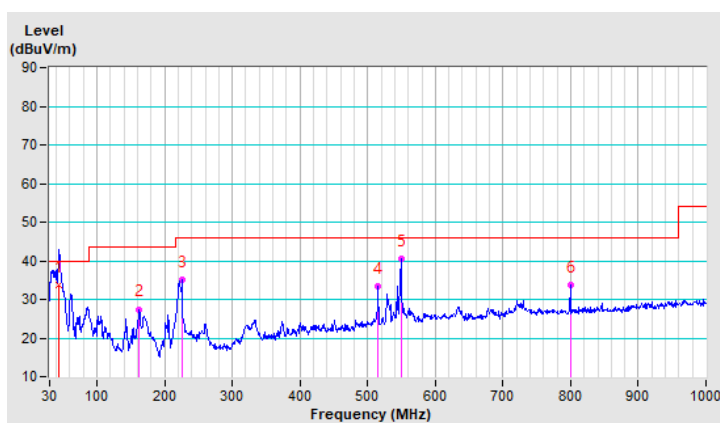


RF Mode	TX 802.11b	Channel	CH 6 : 2437 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	43.80	33.6 QP	40.0	-6.4	1.50 V	37	41.9	-8.3
2	162.43	27.5 QP	43.5	-16.0	1.50 V	65	35.4	-7.9
3	226.13	35.0 QP	46.0	-11.0	1.50 V	12	45.4	-10.4
4	514.83	33.3 QP	46.0	-12.7	2.00 V	360	34.0	-0.7
5	549.14	40.4 QP	46.0	-5.6	1.00 V	360	40.6	-0.2
6	799.23	33.6 QP	46.0	-12.4	1.00 V	360	28.7	4.9

Remarks:

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



4.2 Conducted Output Power Measurement

4.2.1 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,

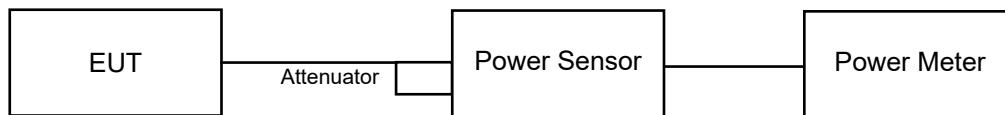
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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.

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 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.

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Conditions

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

4.2.7 Test Results

CDD Mode

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1	Chain 2				
1	2412	20.89	20.83	20.92	367.398	25.65	30	Pass
6	2437	24.88	24.76	24.87	913.738	29.61	30	Pass
11	2462	19.74	19.71	19.79	283.009	24.52	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1	Chain 2				
1	2412	17.84	17.78	18.07	184.914	22.67	30	Pass
6	2437	24.16	23.81	24.41	777.109	28.90	30	Pass
11	2462	16.03	15.86	16.14	119.749	20.78	30	Pass

VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1	Chain 2				
1	2412	17.64	17.14	17.36	164.287	22.16	30	Pass
6	2437	23.85	23.17	24.15	710.168	28.51	30	Pass
11	2462	15.83	15.79	16.12	117.14	20.69	30	Pass

VHT40

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1	Chain 2				
3	2422	15.52	15.08	15.27	101.507	20.06	30	Pass
6	2437	17.48	17.09	17.16	159.144	22.02	30	Pass
9	2452	13.34	12.58	13.06	59.921	17.78	30	Pass

Beamforming Mode

VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1	Chain 2				
1	2412	17.64	17.14	17.36	164.287	22.16	27.31	Pass
6	2437	22.34	21.63	22.62	499.752	26.99	27.31	Pass
11	2462	15.83	15.79	16.12	117.14	20.69	27.31	Pass

Note: The directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2 / 3] = 8.69 \text{ dBi} > 6 \text{ dBi}$, so the output power limit shall be reduced to $30 - (8.69 - 6) = 27.31 \text{ dBm}$.

VHT40

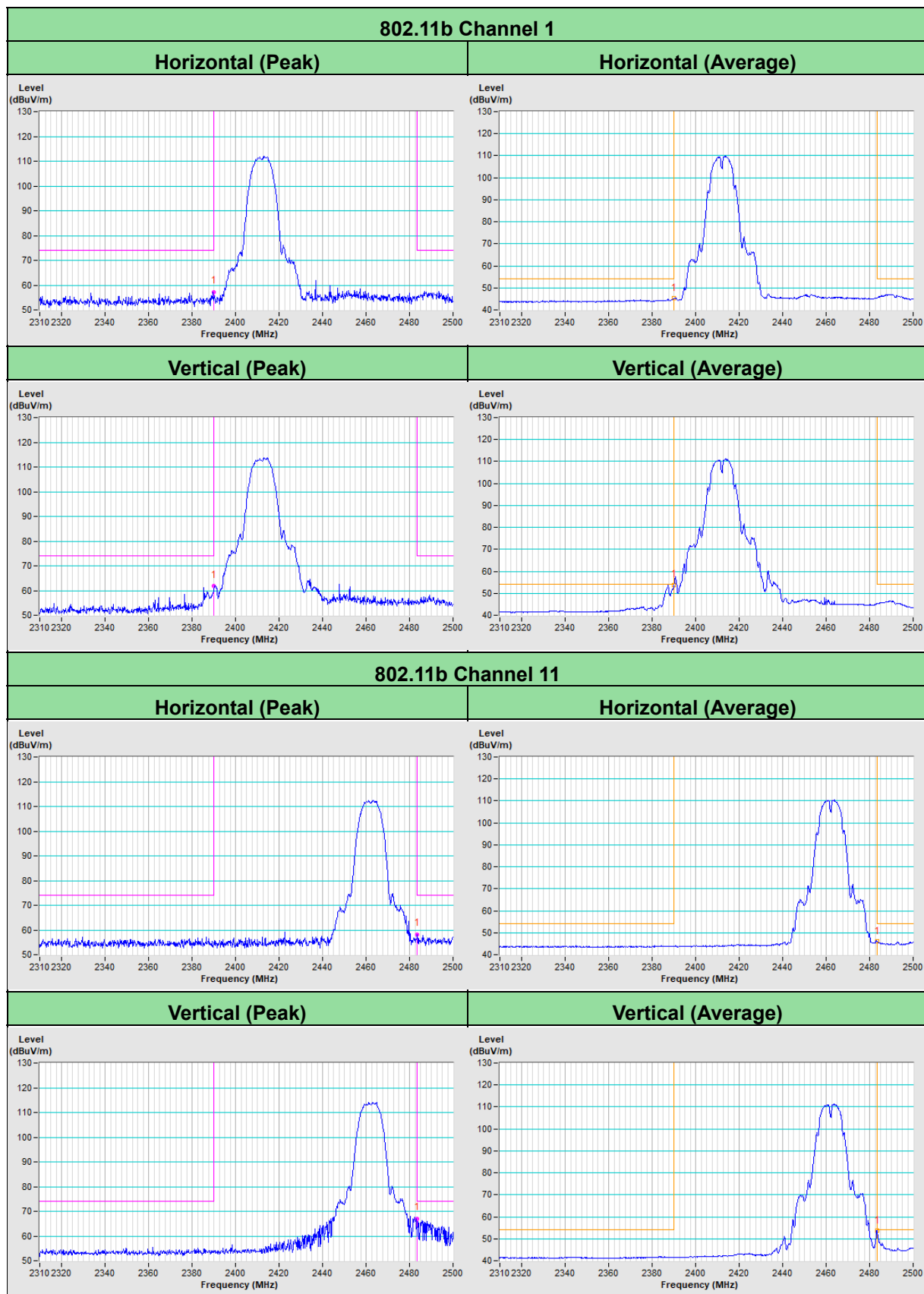
Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1	Chain 2				
3	2422	15.52	15.08	15.27	101.507	20.06	27.31	Pass
6	2437	17.48	17.09	17.16	159.144	22.02	27.31	Pass
9	2452	13.34	12.58	13.06	59.921	17.78	27.31	Pass

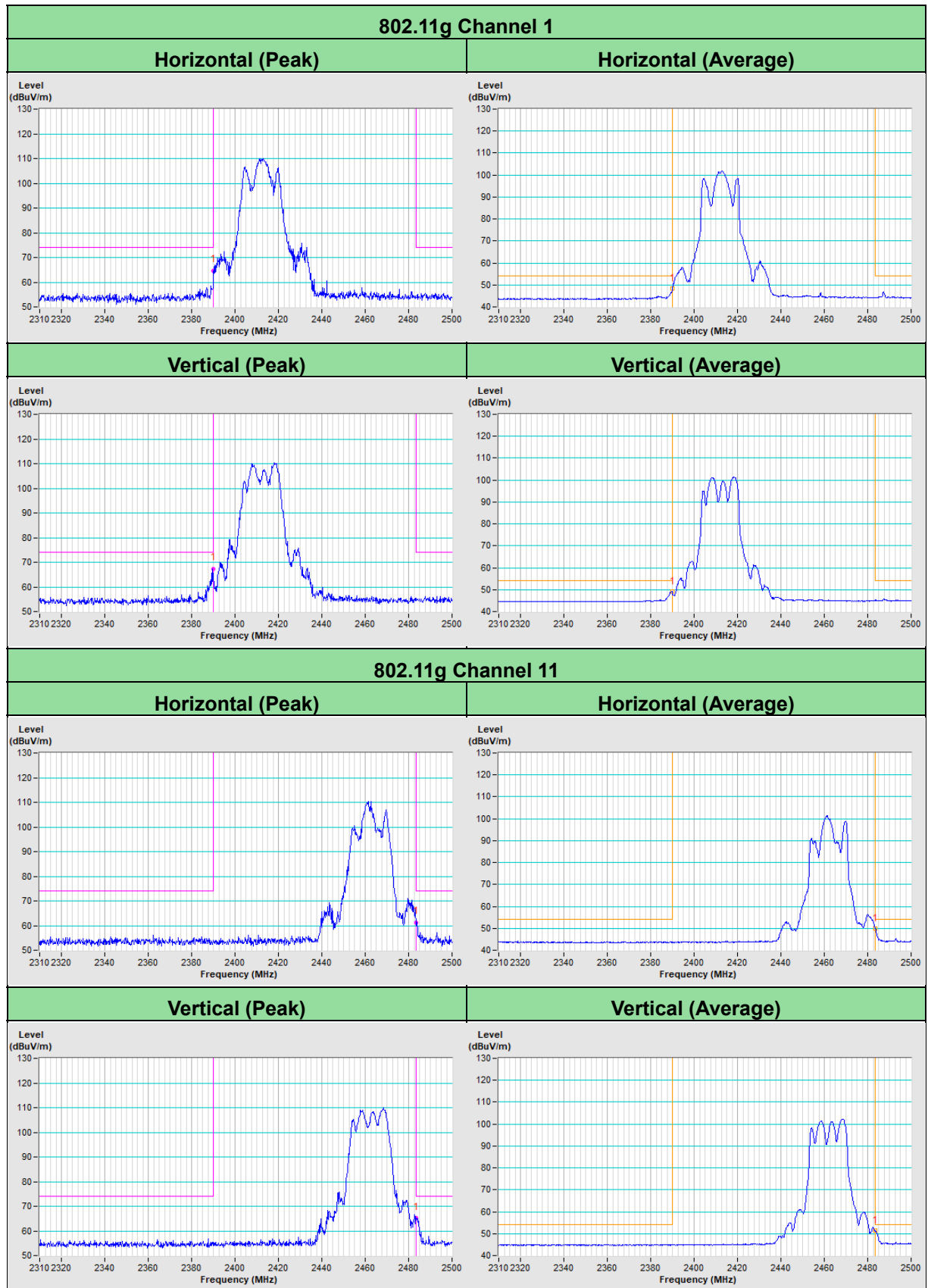
Note: The directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2 / 3] = 8.69 \text{ dBi} > 6 \text{ dBi}$, so the output power limit shall be reduced to $30 - (8.69 - 6) = 27.31 \text{ dBm}$.

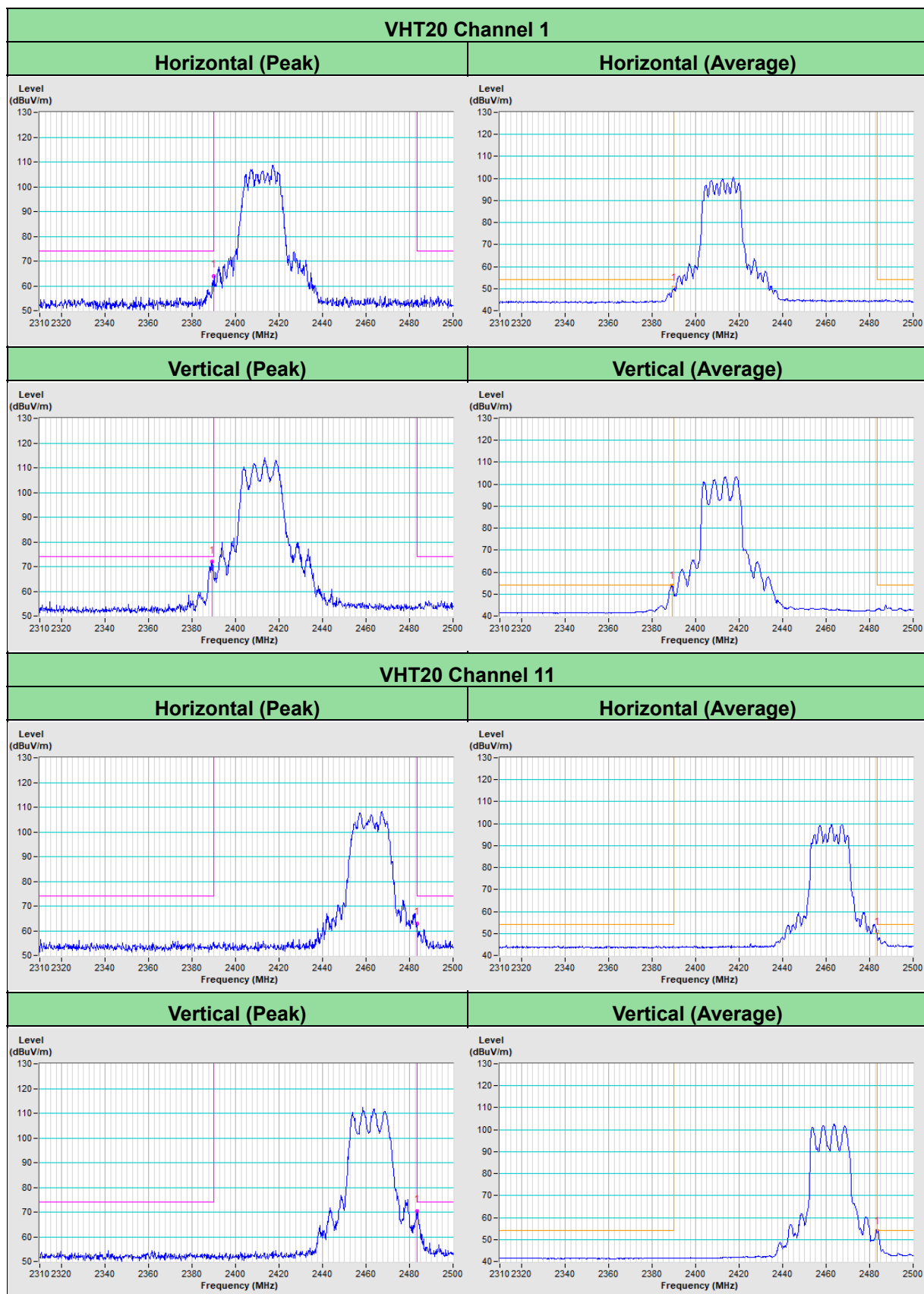
5 Pictures of Test Arrangements

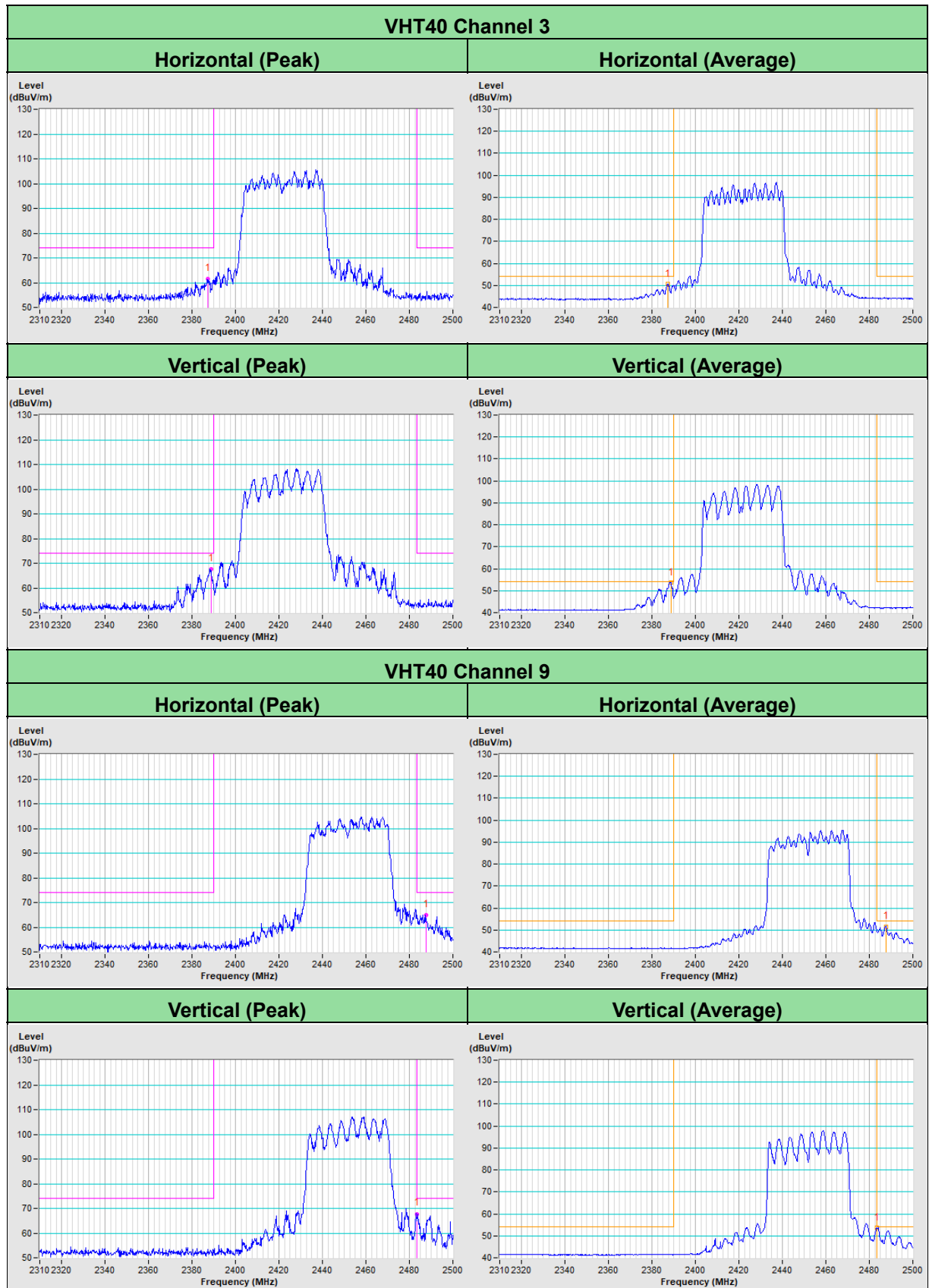
Please refer to the attached file (Test Setup Photo).

Annex A - Band-Edge Measurement









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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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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