

FCC Test Report

Report No.: RFBDKG-WTW-P24090144-5

FCC ID: JNZVR0039

Test Model: VR0039

Received Date: 2024/12/21

Test Date: 2024/12/26 ~ 2025/1/14

Issued Date: 2025/2/26

Applicant: Logitech Far East Ltd.

Address: #2 Creation Rd. 4, Science-Based Ind. Park Hsinchu Taiwan, R.O.C.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

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Test Location(1): No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, Taiwan

**FCC Registration /
Designation Number(1):** 788550 / TW0003

Test Location(2): No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

**FCC Registration /
Designation Number(2):** 281270 / TW0032



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Release Control Record

Issue No.	Description	Date Issued
RFBDKG-WTW-P24090144-5	Original release.	2025/2/26

1 Certificate of Conformity

Product: Video conference Equipment

Brand: Logitech, logi, logitech

Test Model: VR0039

Sample Status: Engineering sample

Applicant: Logitech Far East Ltd.

Test Date: 2024/12/26 ~ 2025/1/14

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.249)
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 RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen, **Date:** 2025/2/26
Pettie Chen / Senior Specialist

Approved by : Jeremy Lin, **Date:** 2025/2/26
Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.249)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -5.72 dB at 0.63000 MHz.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	Pass	Meet the requirement of limit. Minimum passing margin is -4.6 dB at 53.20 MHz.
15.215	Channel Bandwidth	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	9 kHz ~ 30 MHz	2.90 dB
Radiated Emissions	9 kHz ~ 30 MHz	3 dB
	30 MHz ~ 1 GHz	2.92 dB
	1 GHz ~ 18 GHz	1.76 dB
	18 GHz ~ 40 GHz	1.77 dB
	40 GHz ~ 66 GHz	4.59 dB
	66 GHz ~ 100 GHz	5.37 dB
	Above 100 GHz	5.40 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Video conference Equipment
Brand	Logitech, logi, logitech
Test Model	VR0039
Status of EUT	Engineering sample
Power Supply Rating	120Vac, 60Hz
Modulation Type	FMCW
Operating Frequency	24.2 GHz
Field Strength	83.5 dBuV/m (Average) at 3m
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT uses following accessories.

Item	Brand	Model
Stylus pen	Logitech, logi, logitech	-

2. The antenna information is listed as below.

Antenna Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
6.6	24.15~24.25	Patch antenna	NA

*Due to radiated measurements are made and the antenna gain is already accounted for this device, so provide an antenna datasheet and/or antenna measurement report is not required. The antenna dimensions and pictures (include antenna wire length if have) are stated in EUT photo exhibit.

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

3.2 Description of Test Modes

1 channel is provided for test:

Channel	Frequency (GHz)
1	24.2

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	BW	
-	√	√	√	√	-

Where

RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

BW: 20dB Bandwidth 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.

EUT Configure Mode	Frequency (GHz)	Modulation Type
-	24.2	FMCW

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.

EUT Configure Mode	Frequency (GHz)	Modulation Type
-	24.2	FMCW

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.

EUT Configure Mode	Frequency (GHz)	Modulation Type
-	24.2	FMCW

20dB Bandwidth 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.

EUT Configure Mode	Frequency (GHz)	Modulation Type
-	24.2	FMCW

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Charles Hsiao
	23deg. C, 67%RH		Wade Huang
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Charles Hsiao
PLC	23deg. C, 67%RH	120Vac, 60Hz	Adair Peng
BW	25deg. C, 60%RH	120Vac, 60Hz	Wade Huang

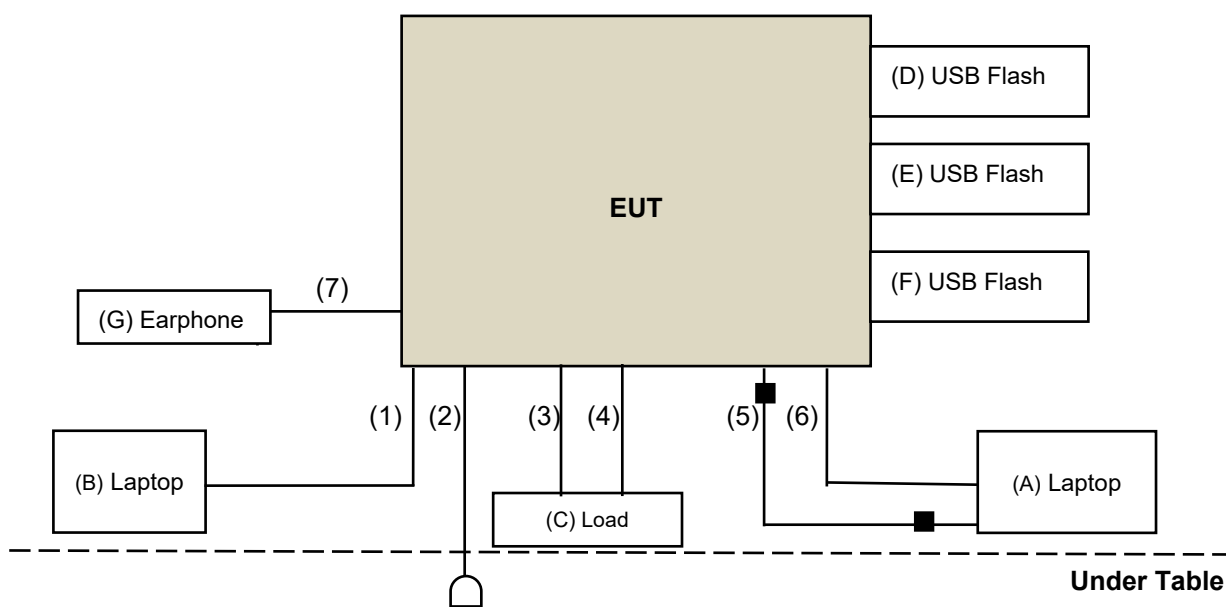
3.3 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Laptop	DELL	14UR-4528LTW	GJ22NC2	N/A	Provided by Lab
B	Laptop	DELL	Inspiron 14R	8LRKKW1	N/A	Provided by Lab
C	Load	N/A	N/A	N/A	N/A	Provided by Lab
D	USB Flash	SanDisk	SDDDC3-032G	N/A	N/A	Provided by Lab
E	USB Flash	SanDisk	SDDDC3-032G	N/A	N/A	Provided by Lab
F	USB Flash	SanDisk	SDDDC3-032G	N/A	N/A	Provided by Lab
G	Earphone	APPLE	MB77PFEB	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	HDMI Cable	1	1.5	Yes	0	Provided by Lab
2	AC Power Cable	1	3	No	0	Supplied by applicant
3	RJ-45 Cable	1	1.5	No	0	Provided by Lab
4	RJ-45 Cable	1	1.5	No	0	Provided by Lab
5	HDMI Cable	1	1.5	Yes	2	Provided by Lab
6	Type C to A Cable	1	1.5	Yes	0	Provided by Lab
7	Earphone cable	1	1.2	No	0	Provided by Lab

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.249)

ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

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

Note:

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

4.1.2 Test Instruments

For below 40GHz test:

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver KEYSIGHT	N9038B	MY60180018	2024/03/13	2025/03/12
BILOG Antenna SCHWARZBECK	VULB9168	9168-995	2024/10/09	2025/10/08
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	2024/11/10	2025/11/09
Loop Antenna EMCI	HLA 6121	45745	2024/08/21	2025/08/20
Preamplifier EMCI	EMC330N	980783	2024/01/15 2025/01/14	2025/01/14 2026/01/13
Preamplifier EMCI	EMC118A45SE	980810	2024/12/26	2025/12/25
Preamplifier EMCI	EMC184045SE	980787	2024/01/15 2025/01/14	2025/01/14 2026/01/13
RF signal cable EMCI	EMC104-SM-SM-(900 0+2000+1000)	201230+ 201242+ 210101	2024/01/15 2025/01/14	2025/01/14 2026/01/13
RF signal cable EMCI	EMCCFD400-NM-NM -(9000+300+500)	201252+ 201250+ 201245	2024/01/15 2025/01/14	2025/01/14 2026/01/13
RF signal cable EMCI	EMC101G-KM-KM-(5 000+3000+2000)	201261+201258+ 201249	2024/01/15 2025/01/14	2025/01/14 2026/01/13
Software BV CPS	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Turn Table Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208675	NA	NA
Antenna Tower KaiTuo	NA	NA	NA	NA
Antenna Tower Controller KaiTuo	KT-2000	NA	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55 190004/MY5519000 7/MY55210005	2024/07/29	2025/07/28
Antenna_Horn oxe89 QUINSTAR	QWH-QPRR00	QWH-QPRR00-1	2024/04/09	2025/04/08
Antenna_Horn Conical Keysight	WR15CH-Conical	RCHO15RL-1	2024/04/09	2025/04/08
RF cable Anritsu	LL403	2019010240001	2024/01/06 2025/01/03	2025/01/05 2026/01/02
Spectrum Analyzer Keysight	N9042B+V3050A	US60360159	2024/04/16	2025/04/15
Antenna_Horn Conical Keysight	WR10CH-Conical	RCHO10RL-1	2024/04/09	2025/04/08

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 WM Chamber 7.
3. Tested date: 2024/12/27 ~ 2025/1/14

For above 40GHz test:

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer Keysight	N9042B	US60360159	2024/04/16	2025/04/15
*OXE89 Horn Antenna (33~55GHz) QuinStar	QWH-QPRR00	QWH-QPRR00-1	2024/04/09	2025/04/08
*Conical Horn Antenna (50~75GHz) Keysight	WR15CH-Conical	RCHO15RL-1	2024/04/09	2025/04/08
*Conical Horn Antenna (75~110GHz) Keysight	WR10CH-Conical	RCHO10RL-1	2024/04/09	2025/04/08
Extension Module_down converter (50-75GHz) 9VDC supply Keysight	N9029AV15	SAX 381	2024/04/16	2025/04/15
Extension Module_down converter (75-110GHz) 9VDC supply Keysight	N9029AV10	SAX 378	2024/04/16	2025/04/15
PSG analog signal generator Keysight	E8257D	MY60020399	2024/01/16	2025/01/15
			2025/01/13	2026/01/12
*Power Meter Keysight (50-110GHz)	U8489A	US59290810	2024/3/8	2025/3/7
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 WM Chamber 7.
3. Tested date: 2024/12/27 ~ 2025/1/14

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: 30MHz ~ 100GHz

- 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 distance at which limits are typically specified is 3 meter; however, closer measurement distances may be utilized.
- c. Begin handheld measurements with the test antenna (horn) at a distance of 1 meter from the EUT, in a horizontally polarized position. Slowly adjust its position, entirely covering the plane 1 meter from the EUT.
- d. Repeat (b) with the horn in a vertically polarized position.
- e. 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.
- f. 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.
- g. 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.
- h. The test-receiver system was set to peak and average detect 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:

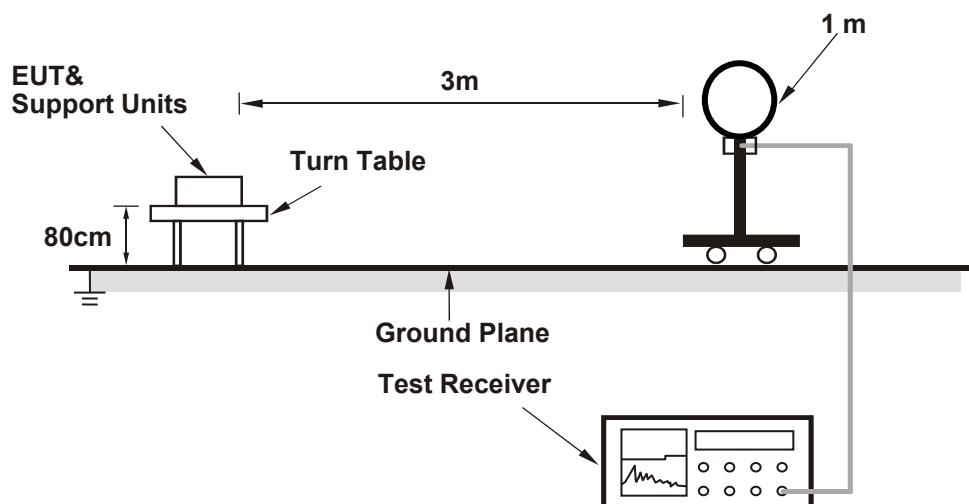
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection (PK) at frequency above 1GHz.
3. For Fundamental frequency and band edge & harmonic: The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle).
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

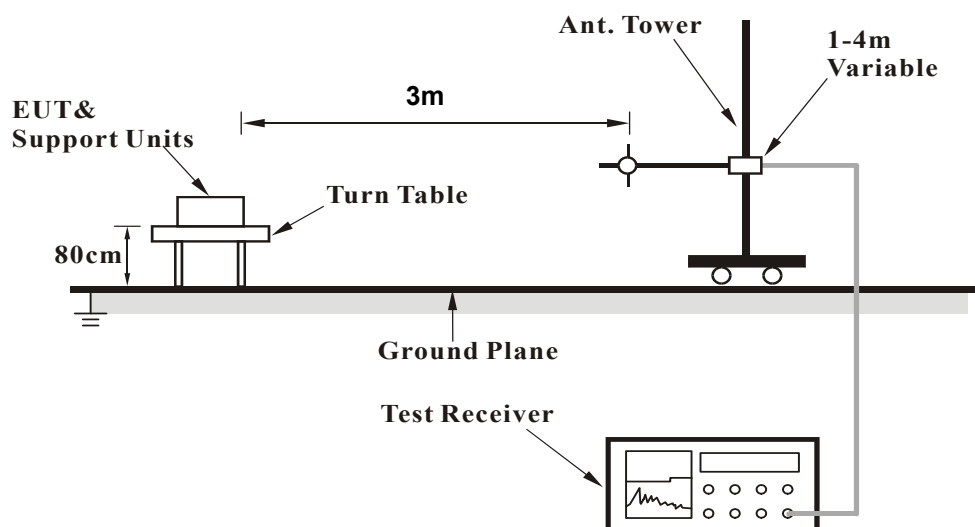
No deviation.

4.1.5 Test Setup

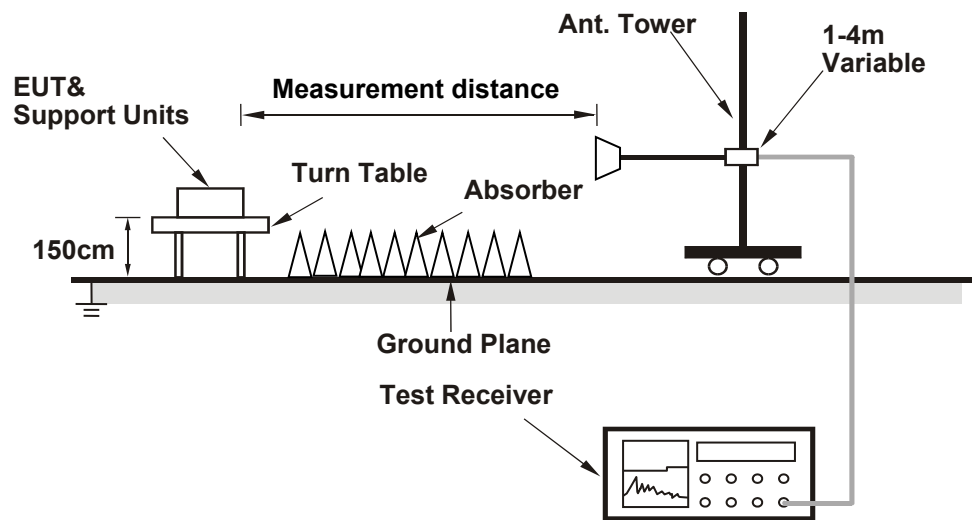
For Radiated emission below 30MHz



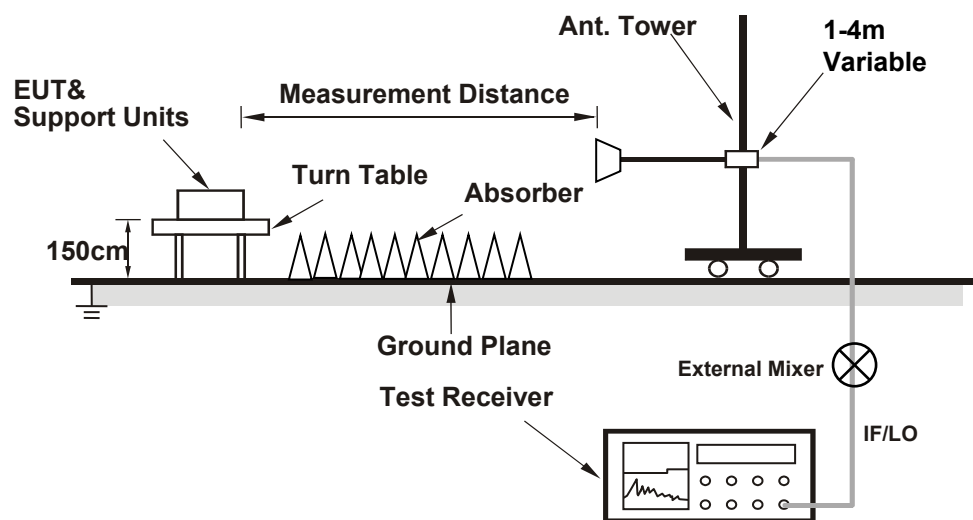
For Radiated emission 30MHz to 1GHz



For Radiated emission 1GHz ~ 40GHz



For Radiated emission above 40GHz



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.
- Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

For 1~18 GHz Data:

RF Mode	TX	Channel	CH 1 : 24.200 GHz
Frequency Range	1GHz ~ 18GHz	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	2967.00	57.3 PK	74.0	-16.7	1.21 H	161	60.8	-3.5
2	2967.00	50.9 AV	54.0	-3.1	1.21 H	161	54.4	-3.5
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	2967.00	57.0 PK	74.0	-17.0	1.46 V	171	60.5	-3.5
2	2967.00	50.8 AV	54.0	-3.2	1.46 V	171	54.3	-3.5

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) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. Field strength limits are specified at a distance of 3 meters

The measurements made at 1 meter distance. The data obtained at 1-meter distance was extrapolate results to the 3-m distance: Test value at 3-meter distance (dBuV) = Test value at 1 meter distance (dBuV) +20log(1/3)(dB) = Test value at 1 meter distance (dBuV) -9.5(dB).

For 18~40 GHz Data:

RF Mode	TX	Channel	CH 1 : 24.200 GHz
Frequency Range	18GHz ~ 40GHz	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	*24200.00	102.4 PK	128.0	-25.6	1.13 H	0	58.5	43.9
2	*24200.00	83.5 AV	108.0	-24.5	1.13 H	0	39.6	43.9
3	35245.00	54.6 PK	74.0	-19.4	1.47 H	103	58.6	-4.0
4	35245.00	43.3 AV	54.0	-10.7	1.47 H	103	47.3	-4.0
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	*24200.00	91.5 PK	128.0	-36.5	1.22 V	0	47.6	43.9
2	*24200.00	72.6 AV	108.0	-35.4	1.22 V	0	28.7	43.9
3	35245.00	54.3 PK	74.0	-19.7	1.71 V	220	58.3	-4.0
4	35245.00	43.1 AV	54.0	-10.9	1.71 V	220	47.1	-4.0

Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20\log(16.994/149.674) = -18.9\text{dB}$
Please see page 22 for plotted duty.
- Field strength limits are specified at a distance of 3 meters
The measurements made at 1 meter distance. The data obtained at 1-meter distance was extrapolate results to the 3-m distance: Test value at 3-meter distance (dBuV) = Test value at 1 meter distance (dBuV) +20log(1/3)(dB) = Test value at 1 meter distance (dBuV) -9.5(dB).

Above 40GHz Data:

RF Mode	TX	Channel	CH 1 : 24.200 GHz
Frequency Range	40GHz ~ 50GHz	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	48400.00	62.8 PK	88.0	-25.2	1.42 H	55	66.7	-3.9
2	48400.00	43.9 AV	68.0	-24.1	1.42 H	55	47.8	-3.9
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	48400.00	53.5 PK	88.0	-34.5	1.10 V	25	57.4	-3.9
2	48400.00	34.6 AV	68.0	-33.4	1.10 V	25	38.5	-3.9

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) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20\log(16.994/149.674) = -18.9\text{dB}$
 Please see page 22 for plotted duty.
6. Field strength limits are specified at a distance of 3 meters
 The measurements made at 1 meter distance. The data obtained at 1-meter distance was extrapolate results to the 3-m distance: Test value at 3-meter distance (dBuV) = Test value at 1 meter distance (dBuV) +20log(1/3)(dB) = Test value at 1 meter distance (dBuV) -9.5(dB).

RF Mode	TX	Channel	CH 1 : 24.200 GHz
Frequency Range	50GHz ~ 75GHz	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	72600.00	52.6 PK	88.0	-35.4	1.51 H	48	54.9	-2.3
2	72600.00	33.7 AV	68.0	-34.3	1.51 H	48	36.0	-2.3
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	72600.00	52.3 PK	88.0	-35.7	1.15 V	36	54.6	-2.3
2	72600.00	33.4 AV	68.0	-34.6	1.15 V	36	35.7	-2.3

Remarks:

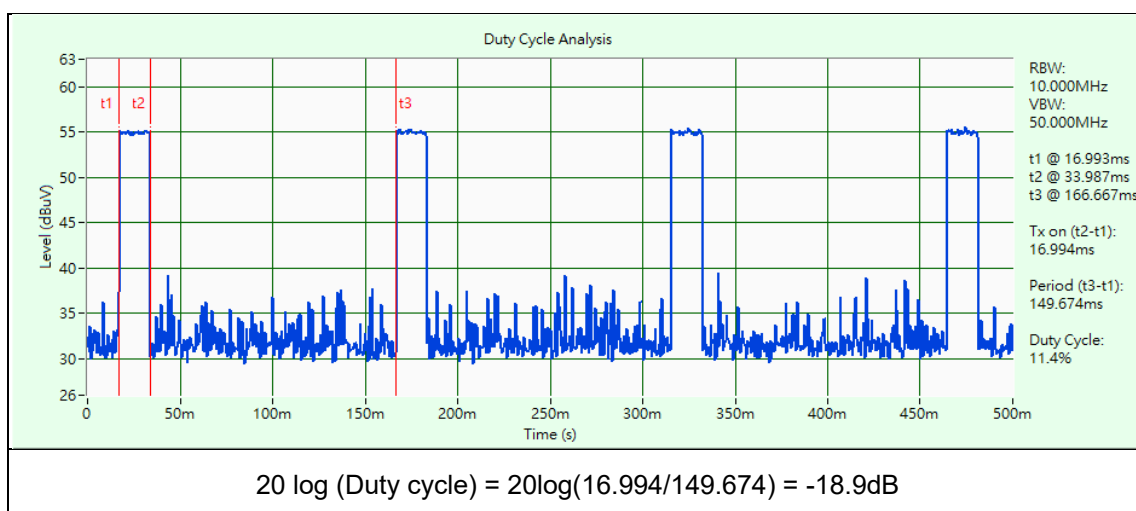
- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20\log(16.994/149.674) = -18.9\text{dB}$
 Please see page 22 for plotted duty.
- Field strength limits are specified at a distance of 3 meters
 The measurements made at 1 meter distance. The data obtained at 1-meter distance was extrapolate results to the 3-m distance: Test value at 3-meter distance (dBuV) = Test value at 1 meter distance (dBuV) +20log(1/3)(dB) = Test value at 1 meter distance (dBuV) -9.5(dB).

RF Mode	TX	Channel	CH 1 : 24.200 GHz
Frequency Range	75GHz ~ 100GHz	Detector Function	Peak (PK) Average (AV)

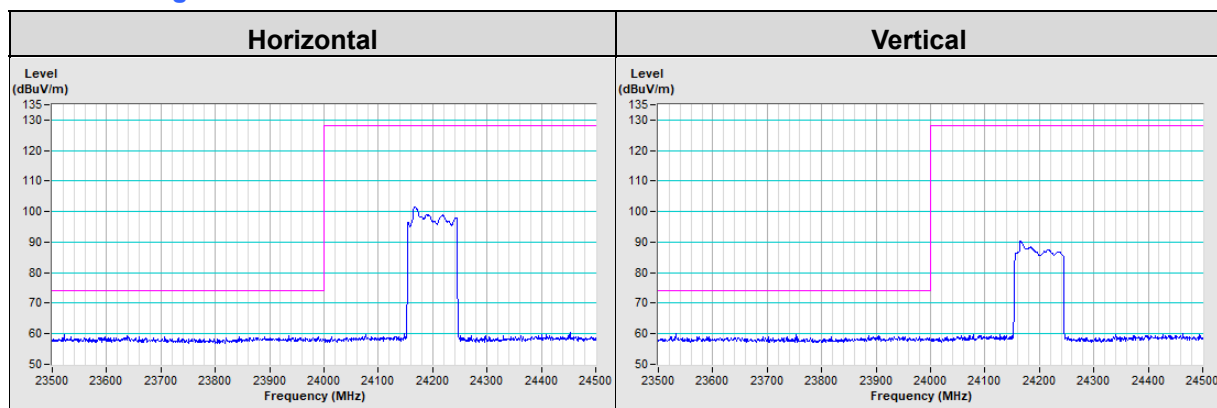
Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	96800.00	60.4 PK	88.0	-27.6	1.59 H	37	50.7	9.7
2	96800.00	41.5 AV	68.0	-26.5	1.59 H	37	31.8	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	96800.00	60.1 PK	88.0	-27.9	1.20 V	41	50.4	9.7
2	96800.00	41.2 AV	68.0	-26.8	1.20 V	41	31.5	9.7

Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20\log(16.994/149.674) = -18.9\text{dB}$
 Please see page 22 for plotted duty.
- Field strength limits are specified at a distance of 3 meters
 The measurements made at 1 meter distance. The data obtained at 1-meter distance was extrapolate results to the 3-m distance: Test value at 3-meter distance (dBuV) = Test value at 1 meter distance (dBuV) +20log(1/3)(dB) = Test value at 1 meter distance (dBuV) -9.5(dB).



Plot of Band Edge



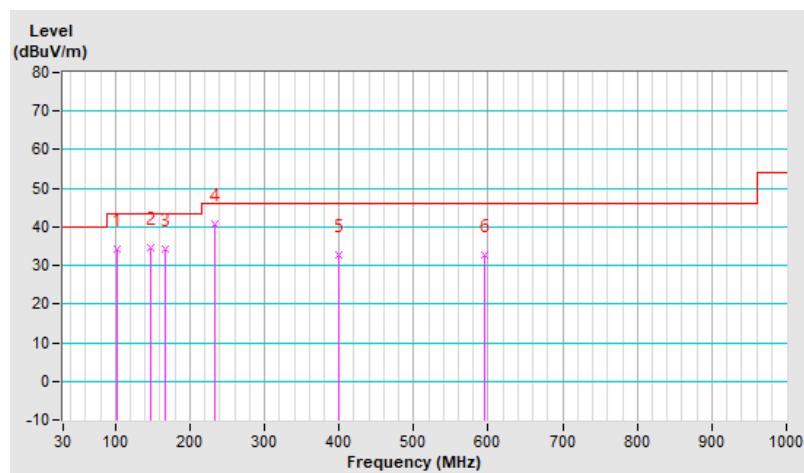
Below 1GHz Data:

RF Mode	TX	Channel	CH 1 : 24.200 GHz
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	101.92	34.2 QP	43.5	-9.3	1.50 H	201	51.5	-17.3
2	147.35	34.8 QP	43.5	-8.7	1.00 H	222	47.9	-13.1
3	167.55	34.4 QP	43.5	-9.1	1.00 H	102	47.9	-13.5
4	233.70	40.7 QP	46.0	-5.3	2.00 H	48	56.2	-15.5
5	398.92	32.6 QP	46.0	-13.4	2.00 H	231	42.9	-10.3
6	595.66	32.6 QP	46.0	-13.4	1.50 H	271	38.7	-6.1

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.

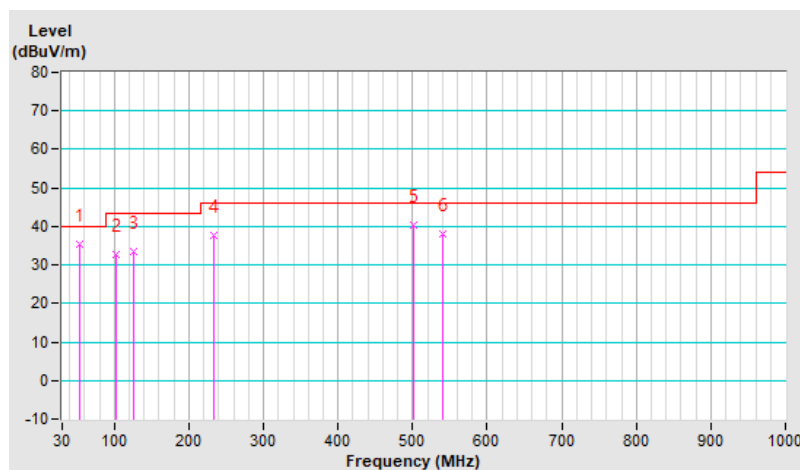


RF Mode	TX	Channel	CH 1 : 24.200 GHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	53.20	35.4 QP	40.0	-4.6	1.00 V	75	48.8	-13.4
2	102.75	32.8 QP	43.5	-10.7	1.50 V	48	50.0	-17.2
3	126.03	33.5 QP	43.5	-10.0	2.00 V	321	48.3	-14.8
4	233.70	37.8 QP	46.0	-8.2	1.50 V	41	53.3	-15.5
5	500.45	40.5 QP	46.0	-5.5	1.00 V	46	48.8	-8.3
6	540.22	38.1 QP	46.0	-7.9	1.50 V	233	45.4	-7.3

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 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 ROHDE & SCHWARZ	ESR3	102412	2024/12/26	2025/12/25
RF signal cable Woken	5D-FB	Cable-cond1-01	2025/01/05	2026/01/04
LISN ROHDE & SCHWARZ (EUT)	ENV216	101196	2024/05/22	2025/05/21
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	2024/09/09	2025/09/08
Software ADT	BV ADT_Conc_ V7.3.7.4	NA	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 HwaYa Shielded Room 2 (Conduction 2).

3. Test Date: 2025/1/13

4.2.3 Test Procedures

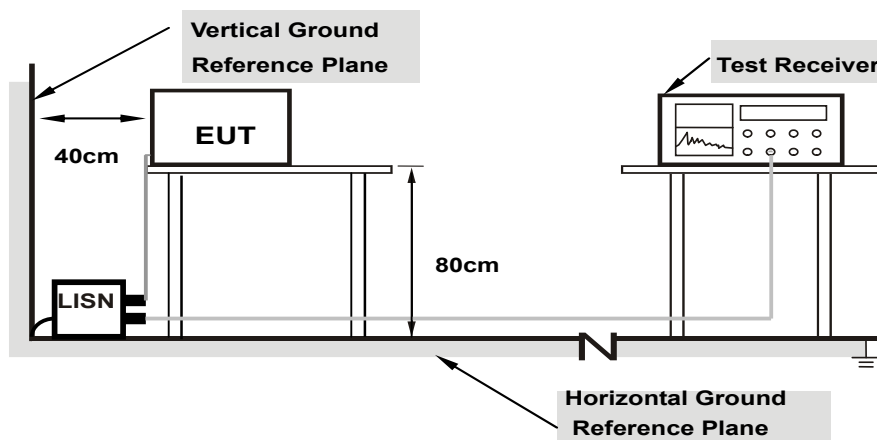
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

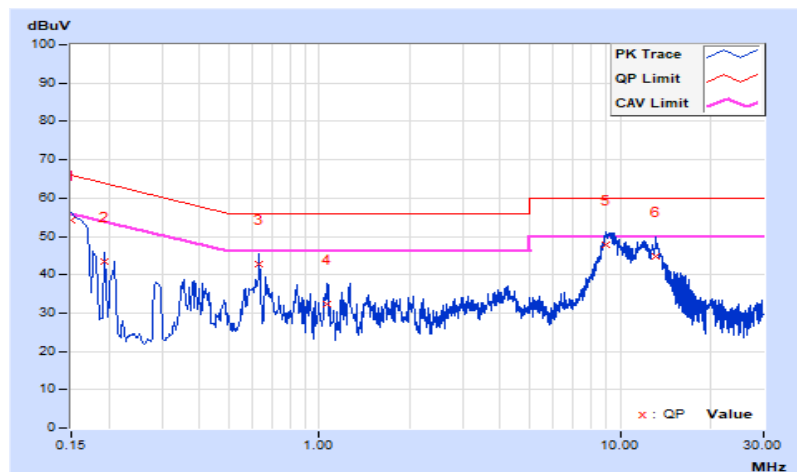
4.2.7 Test Results

RF Mode	TX	Channel	CH 1 : 24.200 GHz
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	0.15000	10.10	44.09	30.59	54.19	40.69	66.00	56.00	-11.81	-15.31
2	0.19400	10.11	33.40	18.04	43.51	28.15	63.86	53.86	-20.35	-25.71
3	0.63000	10.12	32.48	30.08	42.60	40.20	56.00	46.00	-13.40	-5.80
4	1.06200	10.14	22.21	12.61	32.35	22.75	56.00	46.00	-23.65	-23.25
5	9.02200	10.30	37.63	28.97	47.93	39.27	60.00	50.00	-12.07	-10.73
6	13.18553	10.38	34.33	25.22	44.71	35.60	60.00	50.00	-15.29	-14.40

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

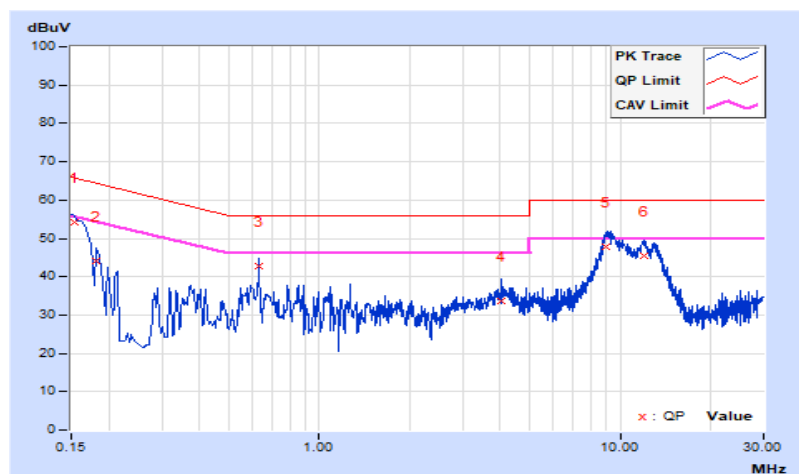


RF Mode	TX	Channel	CH 1 : 24.200 GHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

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	0.15400	10.13	43.92	30.13	54.05	40.26	65.78	55.78	-11.73	-15.52
2	0.18200	10.14	33.88	18.33	44.02	28.47	64.39	54.39	-20.37	-25.92
3	0.63000	10.15	32.60	30.13	42.75	40.28	56.00	46.00	-13.25	-5.72
4	4.05400	10.29	23.48	17.39	33.77	27.68	56.00	46.00	-22.23	-18.32
5	8.95400	10.36	37.53	29.45	47.89	39.81	60.00	50.00	-12.11	-10.19
6	12.03400	10.43	35.19	29.44	45.62	39.87	60.00	50.00	-14.38	-10.13

Remarks:

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



4.3 20dB Bandwidth Measurement

4.3.1 Limits of 20dB bandwidth Measurement

According to 15.215(c), the requirement is to ensure the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.3.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

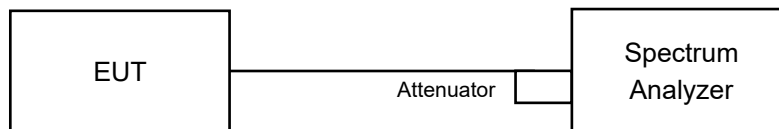
4.3.3 Test Procedures

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3.4 Deviation from Test Standard

No deviation

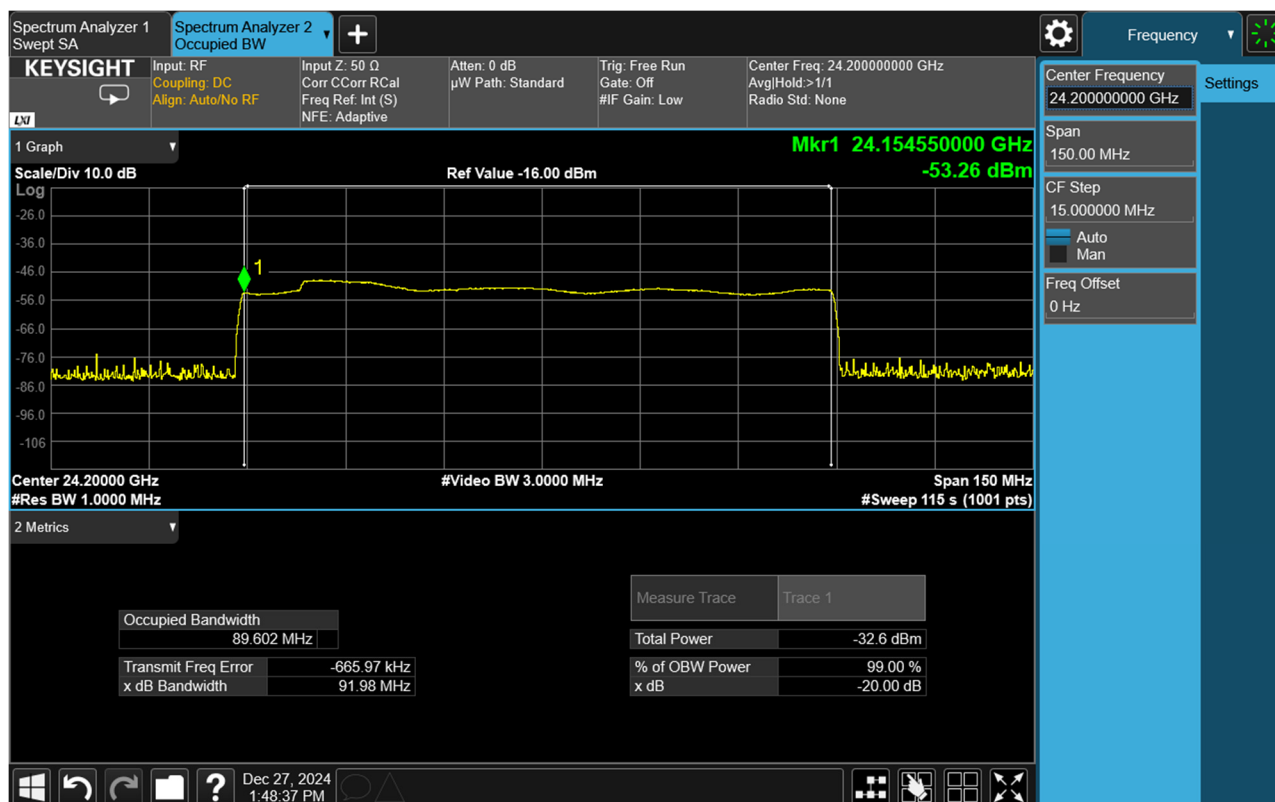
4.3.5 Test Setup



4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously.

4.3.7 Test Results



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

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Tel: 886-3-3183232

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Email: service.adt@bureauveritas.com

Web Site: <http://ee.bureauveritas.com.tw>

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

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