

FCC Test Report

Report No.: RFBEDV-WTW-P24010339-1

FCC ID: U9K-CM0210

Test Model: CM021

Received Date: Jan. 16, 2024

Test Date: Feb. 21 ~ Apr. 22, 2024

Issued Date: May 03, 2024

Applicant: SimpliSafe, Inc

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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FCC Registration /
Designation Number: 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RFBEDV-WTW-P24010339-1	Original Release	May 03, 2024

1 Certificate of Conformity

Product: Outdoor camera

Brand: SimpliSafe

Test Model: CM021

Sample Status: Engineering Sample

Applicant: SimpliSafe, Inc

Test Date: Feb. 21 ~ Apr. 22, 2024

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.231)
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:** May 03, 2024
Pettie Chen / Senior Specialist

Approved by : Jeremy Lin, **Date:** May 03, 2024
Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.231)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -5.16 dB at 0.74200 MHz.
15.209 15.231(b)	Radiated Emission Test	Pass	Meet the requirement of limit. Minimum passing margin is -0.8 dB at 433.92 MHz.
15.231(c)	Emission Bandwidth Measurement	Pass	Meet the requirement of limit.
15.231(a)	De-activation	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) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.88 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 1 GHz	3.64 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

FW default SubGHz PA Power setting: -4
 SubGHz PA power setting modified to +2
 FW default SubGHz PA power setting will be updated to +2

3 General Information

3.1 General Description of EUT

Product	Outdoor camera
Brand	SimpliSafe
Test Model	CM021
Sample Status	Engineering Sample
Power Supply Rating	3.65Vdc from battery 5Vdc from adapter
Modulation Type	FSK
Operating Frequency	433.92MHz
Field Strength	80.0 dBuV/m
Antenna Type	Loop Antenna with -6.60 dBi gain
Antenna Connector	NA
Accessory Device	Refer to Note as below
Cable Supplied	Refer to Note as below
FW Version	4.24.0.1380.97181ca
FW Hash	97181ca
Serial Number	F12949DC
HW Version	PCA-10355:B
Radio PA Setting	Default: -4 Modified to: +2
SubGHz Data rate	Up to 4.8 kbps
Frequency Deviation	+/- 13kHz
Maximum message type	Event
Maximum message length (bytes / milliseconds)	64 bytes / 106 ms

Note:

1. The EUT uses following accessories.

Battery	
Brand	Simplisafe
Model	SSCAM-BAT1
Manufacturer	Getac
Rating	3.65V, 21.9Wh
AC Adapter	
Brand	Simplisafe
Model	CMCBL1
Manufacturer	LUXSHARE
Part Number	ASM-10296-00
Power	I/P: 100-240V, 0.35A O/P: 5V, 2A
USB Cable	
Brand	RAPID
Model	MIRCO USB TO TYPE A
Manufacturer	RAPID
Part Number	RS-2007-609
Signal Line	0.1 meter

Power cord	
Brand	Simplisafe
Manufacturer	LUXSHARE
Part Number	MEC-10572-00
Signal Line	7.62 meter

2. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or User's Manual.
3. The DSC and DTS bands cannot transmit simultaneously.

3.2 Description of Test Modes

Test Mode	Mode Initiation	Mode Description
1	Send CLI command "mfg radio fcc-test-type+event --tx_interval=4"	Device will transmit an Event message every 2 seconds

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to					Description
	RE \geq 1G	RE $<$ 1G	PLC	EB	DT	
-	√	√	√	√	√	-

Where RE \geq 1G: Radiated Emission above 1GHz RE $<$ 1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission EB: 20dB Bandwidth measurement

DT: Deactivation Time 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	Available Channel	Tested Channel	Modulation Type
-	1	1	FSK

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	Available Channel	Tested Channel	Modulation Type
-	1	1	FSK

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	Available Channel	Tested Channel	Modulation Type
-	1	1	FSK

Emission 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	Available Channel	Tested Channel	Modulation Type
-	1	1	FSK

Deactivation Time 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.

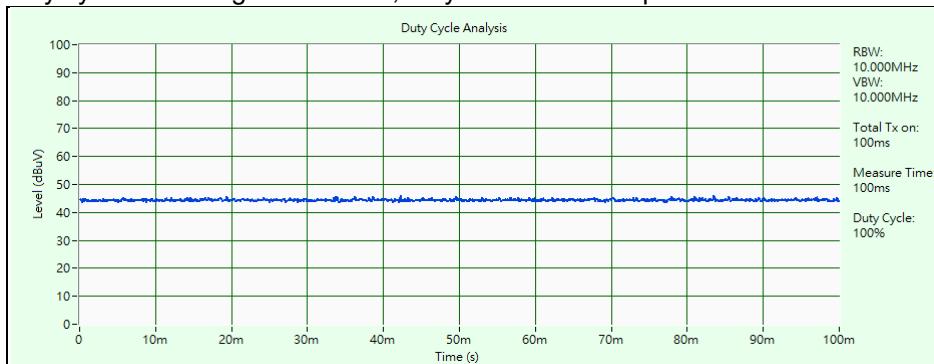
EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1	1	FSK

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	23 deg. C, 67 % RH	120 Vac, 60 Hz	Luis Lee
RE<1G	23 deg. C, 67 % RH	120 Vac, 60 Hz	Luis Lee
PLC	23 deg. C, 67 % RH	120 Vac, 60 Hz	Adair Peng
EB/DT	23 deg. C, 67 % RH	120 Vac, 60 Hz	Luis Lee

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.



3.4 Description of Support Units

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

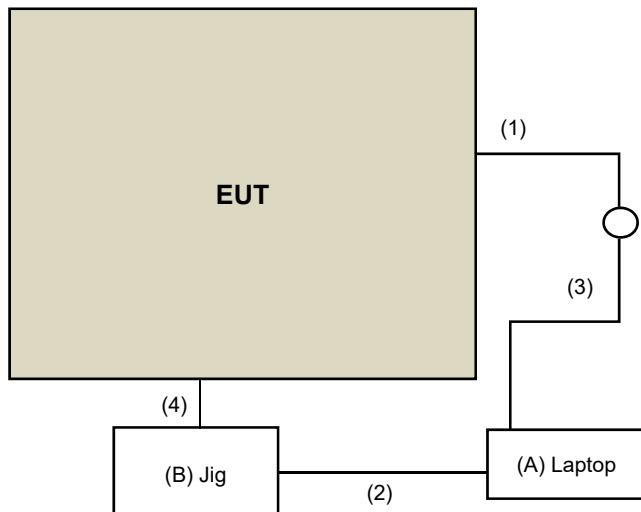
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Laptop	DELL	E5430	2RL3YW1	N/A	Provided by Lab
B	Jig	N/A	N/A	N/A	N/A	Supplied by applicant

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Cable	1	0.1	Y	0	Supplied by applicant
2.	USB Cable	1	1.5	Y	0	Supplied by applicant
3.	USB Cable Extender	1	1	Y	0	Provided by Lab
4.	Cable	1	0.1	N	0	Supplied by applicant

3.4.1 Configuration of System under Test

Worst case orientation: Camera upright, lens facing forward

Worst case accessory configuration: Long cable plugged in



3.5 General Description of Applied Standards

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

Test standard:

FCC Part 15, Subpart C (15.231)

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 Measurement

4.1.1 Limits of Radiated Emission Measurement

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	uV/meter	dBuV/meter	uV/meter	dBuV/meter
40.66 ~ 40.70	2250	67.04	225	48.04
70 ~ 130	1250	61.94	125	41.94
130 ~ 174	1250 ~ 3750	61.94 ~ 71.48	125 ~ 375	41.94 ~ 51.48
174 ~ 260	3750	71.48	375	51.48
260 ~ 470	3750 ~ 12500	71.48 ~ 81.94	375 ~ 1250	51.48 ~ 61.94
Above 470	12500	81.94	1250	61.94

Note:

1. Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = $56.81818(F)-6136.3636$; for the band 260-470 MHz, uV/m at 3 meters = $41.66667(F)-7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.
2. The above field strength limits are specified at a distance of 3meters. The tighter limits apply at the band edges.

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	$2400/F(\text{kHz})$	300
0.490 ~ 1.705	$24000/F(\text{kHz})$	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) = $20 \log_{10}$ Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Antenna Tower inn-co GmbH	MA 4000	010303	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-155	2023/10/13	2024/10/12
EMI Test Receiver R&S	ESR3	102782	2023/12/7	2024/12/6
Preamplifier Agilent	8447D	2944A10631	2023/5/7	2024/5/6
RF Coaxial Cable Woken	8D-FB	Cable-CH4-01	2023/7/8	2024/7/7
Signal & Spectrum Analyzer R&S	FSW43	101582	2023/4/13	2024/4/12
Software BV ADT	ADT_Radiated_V7.6.15.9.5	N/A	N/A	N/A
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A
Antenna Tower inn-co GmbH	MA 4000	010303	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	5	N/A	N/A
EMI Test Receiver R&S	ESR3	102782	2023/12/7	2024/12/6
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-408	2023/11/12	2024/11/11
		9170-480	2023/11/12	2024/11/11
		BBHA9170241	2023/10/16	2024/10/15
		BBHA9170243	2023/11/12	2024/11/11
Preamplifier EMCI	EMC 184045	980116	2023/9/27	2024/9/26
Preamplifier Keysight	83017A	MY53270295	2023/5/7	2024/5/6
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	2023/7/8	2024/7/7
	EMC102-KM-KM-3000	150929	2023/7/8	2024/7/7
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03(250724)	2023/5/7	2024/5/6
	SUCOFLEX 104	MY 13380+295012/04	2023/5/7	2024/5/6

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 HY - 966 chamber 3.

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 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:

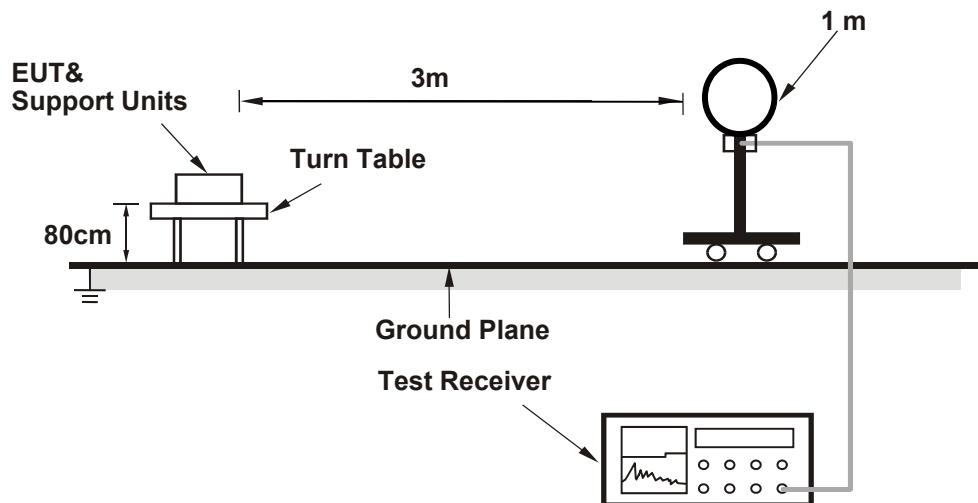
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) or Average detection (AV) and Peak detection (PK) at frequency below 1GHz. If average emission measurements are employed, the provisions in § 15.35 for averaging pulsed emissions and for limiting peak emissions apply.
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 1 MHz and the video bandwidth is 3 MHz for Average detection (AV) (RMS) 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

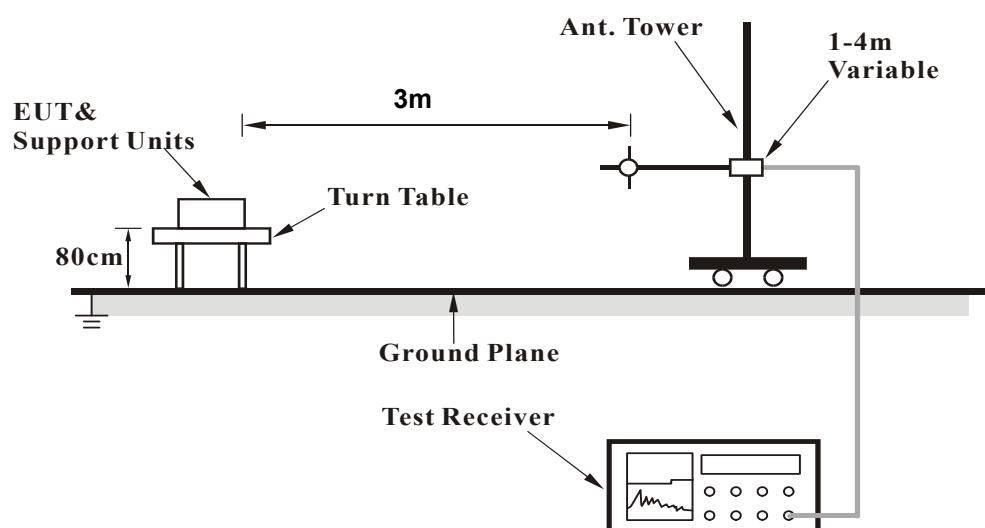
No deviation.

4.1.5 Test Set Up

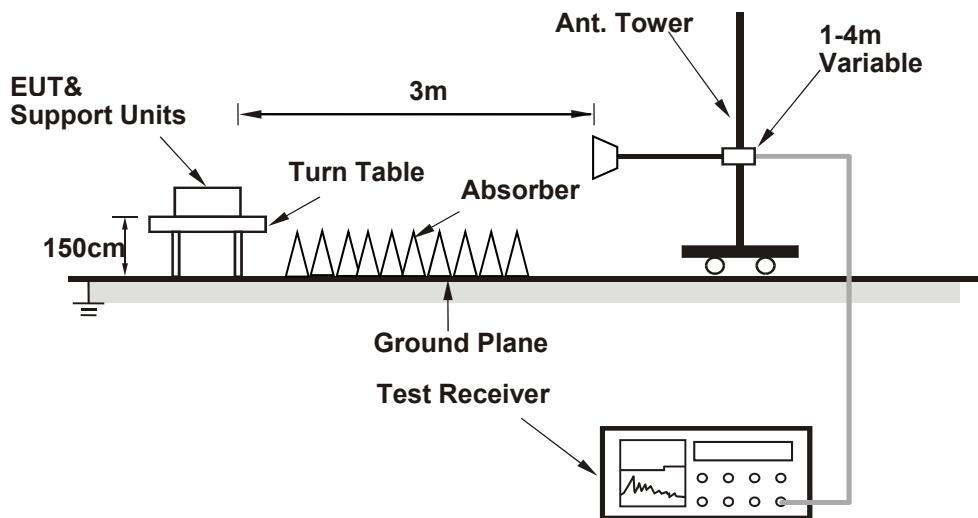
Radiated emission below 30MHz



Radiated emission 30MHz to 1GHz



Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

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

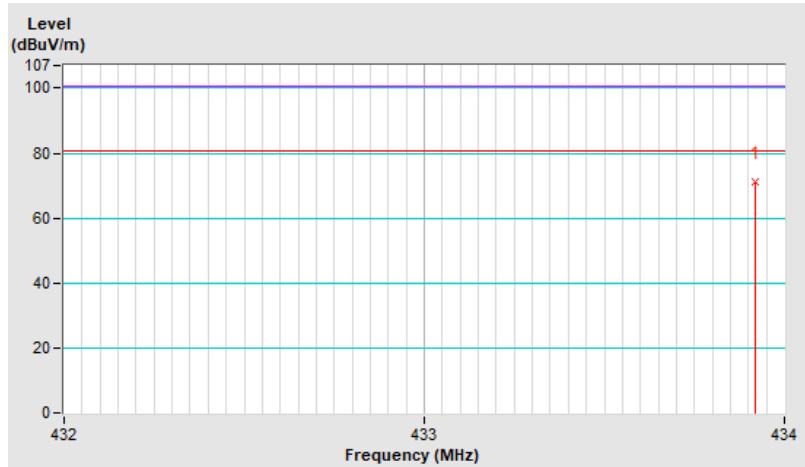
4.1.7 Test Results

EUT Test Condition		Measurement Detail		
Channel		Frequency Range		433.92MHz
Input Power		Detector Function		Quasi-Peak (QP)

Antenna Polarity & Test Distance: Horizontal at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	433.92	71.2 QP	80.8	-9.6	1.70 H	352	52.5	18.7

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.

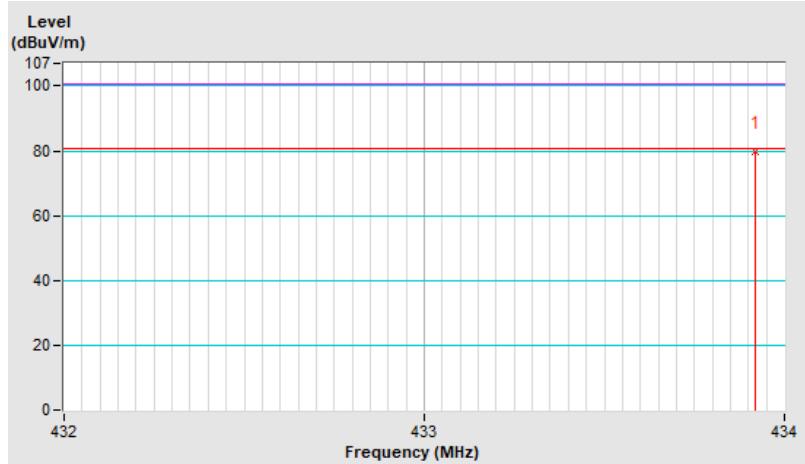


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	433.92MHz
Input Power	120 Vac, 60 Hz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance: Vertical at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	433.92	80.0 QP	80.8	-0.8	1.12 V	268	61.3	18.7

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.

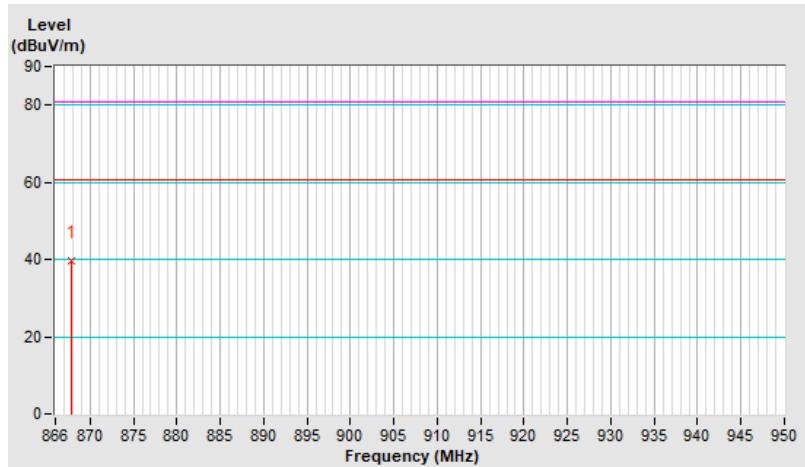


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	120 Vac, 60 Hz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance: Horizontal At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	867.84	39.6 QP	60.8	-21.2	1.40 H	146	35.9	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.

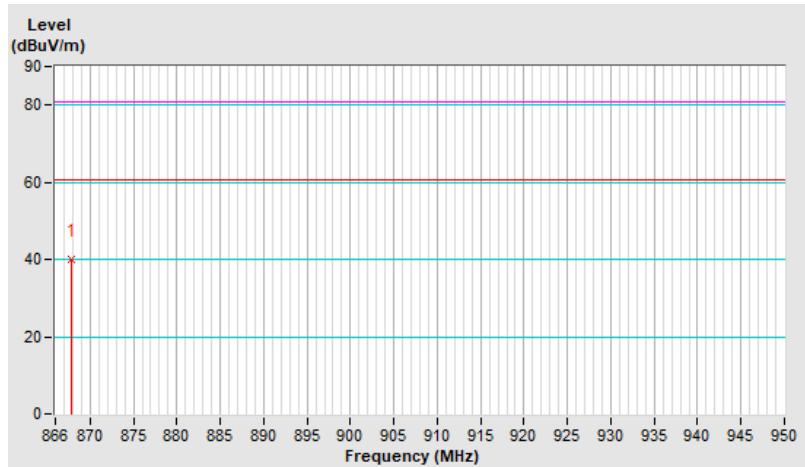


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	120 Vac, 60 Hz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance: Vertical At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	867.84	39.9 QP	60.8	-20.9	1.17 V	231	36.2	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.

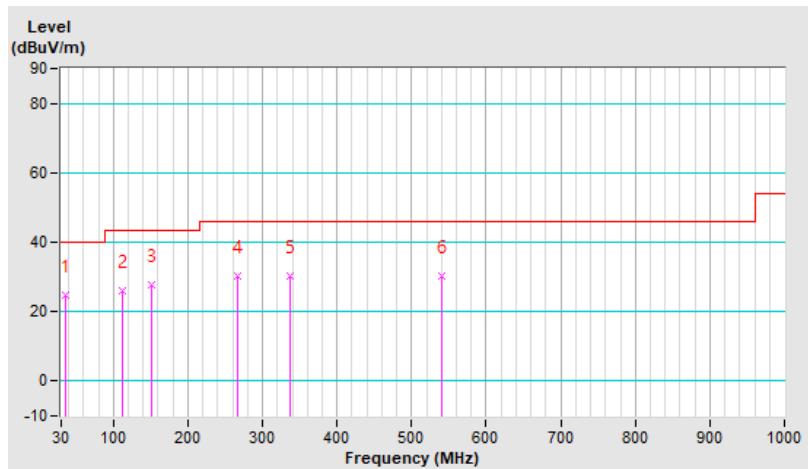


EUT Test Condition		Measurement Detail		
Channel	Channel 1	Frequency Range	Below 1000MHz	
Input Power	120 Vac, 60 Hz	Detector Function	Quasi-Peak (QP)	

Antenna Polarity & Test Distance: Horizontal At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	35.62	24.6 QP	40.0	-15.4	1.00 H	319	34.5	-9.9
2	111.54	26.0 QP	43.5	-17.5	1.49 H	282	37.7	-11.7
3	150.90	27.6 QP	43.5	-15.9	1.49 H	94	36.2	-8.6
4	266.17	30.3 QP	46.0	-15.7	1.00 H	171	38.8	-8.5
5	336.46	30.4 QP	46.0	-15.6	1.00 H	127	37.2	-6.8
6	540.30	30.1 QP	46.0	-15.9	1.49 H	148	33.3	-3.2

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. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

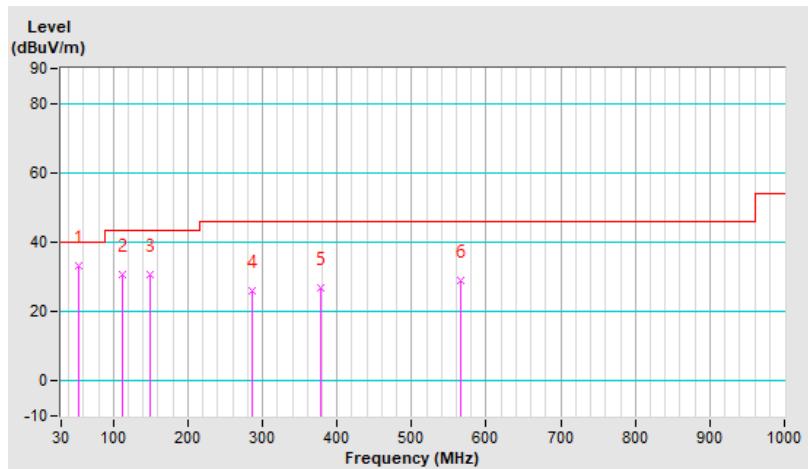


EUT Test Condition		Measurement Detail		
Channel	Channel 1	Frequency Range	Below 1000MHz	
Input Power	120 Vac, 60 Hz	Detector Function	Quasi-Peak (QP)	

Antenna Polarity & Test Distance: Vertical At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	52.49	33.2 QP	40.0	-6.8	1.01 V	19	41.8	-8.6
2	112.94	30.7 QP	43.5	-12.8	1.01 V	14	42.2	-11.5
3	149.49	30.8 QP	43.5	-12.7	1.01 V	40	39.4	-8.6
4	285.86	25.9 QP	46.0	-20.1	1.01 V	190	33.7	-7.8
5	378.64	26.8 QP	46.0	-19.2	1.49 V	5	32.8	-6.0
6	565.61	29.1 QP	46.0	-16.9	1.01 V	158	31.8	-2.7

Remarks:

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

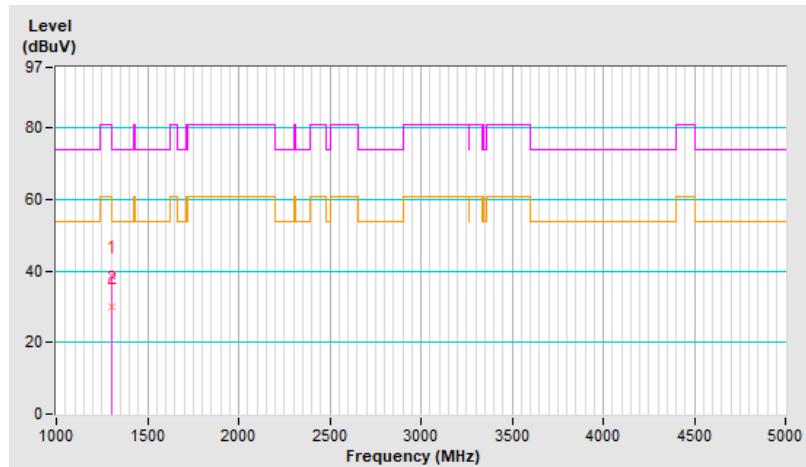


EUT Test Condition		Measurement Detail		
Channel		Channel 1		Frequency Range 1GHz ~ 5GHz
Input Power		120 Vac, 60 Hz		Detector Function Peak (PK) Average (AV)

Antenna Polarity & Test Distance: Horizontal at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1301.76	38.6 PK	74.0	-35.4	1.90 H	199	41.5	-2.9
2	1301.76	30.2 AV	54.0	-23.8	1.90 H	199	33.1	-2.9

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.

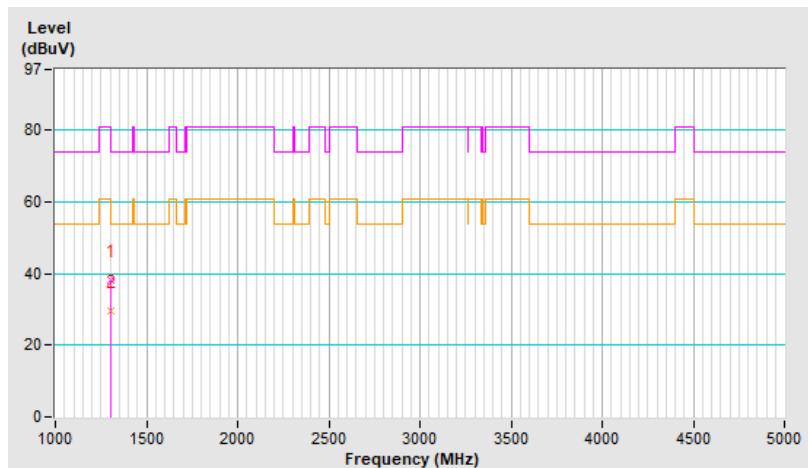


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1GHz ~ 5GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance: Vertical at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1301.76	38.4 PK	74.0	-35.6	2.19 V	238	41.3	-2.9
2	1301.76	29.6 AV	54.0	-24.4	2.19 V	238	32.5	-2.9

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.



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 0.50 MHz.

4.2.2 Test Instruments

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance HUBER+SUHNER	E1-011315	13	2023/11/22	2024/11/21
50 ohm terminal resistance	E1-011279	04	2023/11/22	2024/11/21
	E1-011280	05	2023/11/22	2024/11/21
DC-LISN Schwarzbeck	NNBM 8126G	8126G-069	2023/11/7	2024/11/6
EMI Test Receiver R&S	ESCI	100613	2023/12/4	2024/12/3
Fixed Attenuator Mini-Circuits	HAT-10+	PAD-COND1-01	2024/1/6	2025/1/5
LISN R&S	ESH3-Z5	100311	2023/9/6	2024/9/5
		100312	2023/9/12	2024/9/11
RF Coaxial Cable Woken	5D-FB	Cable-cond1-01	2024/1/6	2025/1/5
Software BVADT	BVADT_Cond_ V7.4.1.0	N/A	N/A	N/A
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2023/8/31	2024/8/30

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 1.
 3. The VCCI Site Registration No. is C-12040.
 4. Test date: 2024/3/29

4.2.3 Test Procedures

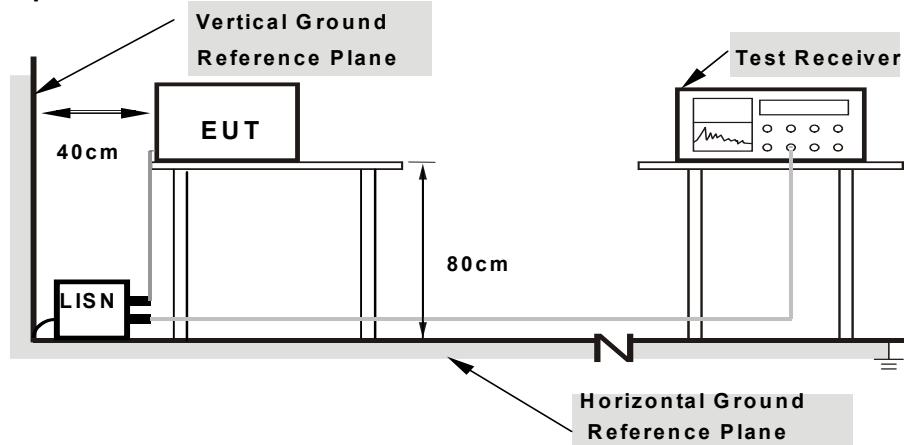
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note:

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

4.2.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Set the EUT under transmission condition continuously at specific channel frequency.

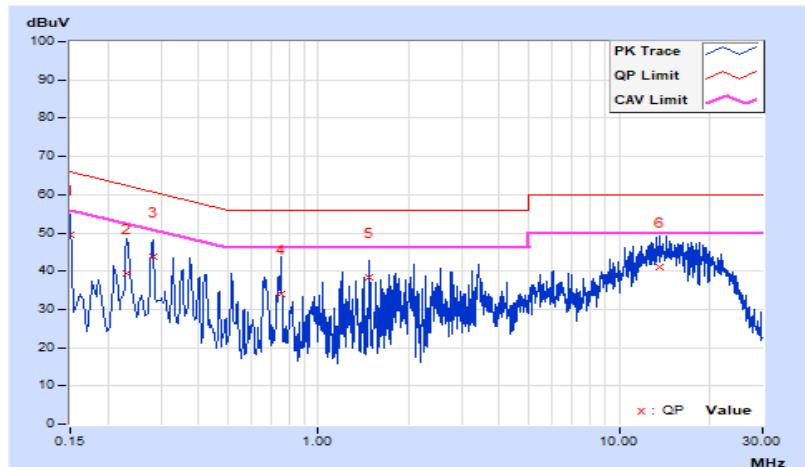
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23 °C, 67% RH
Tested by	Adair Peng		

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.
	0.15000	9.68	39.73	20.63	49.41	30.31	66.00	56.00	-16.59	-25.69
2	0.23000	9.72	29.77	13.80	39.49	23.52	62.45	52.45	-22.96	-28.93
3	0.28200	9.75	33.87	17.47	43.62	27.22	60.76	50.76	-17.14	-23.54
4	0.75400	9.84	24.03	10.20	33.87	20.04	56.00	46.00	-22.13	-25.96
5	1.48600	9.88	28.46	16.78	38.34	26.66	56.00	46.00	-17.66	-19.34
6	13.62600	10.12	31.08	21.07	41.20	31.19	60.00	50.00	-18.80	-18.81

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



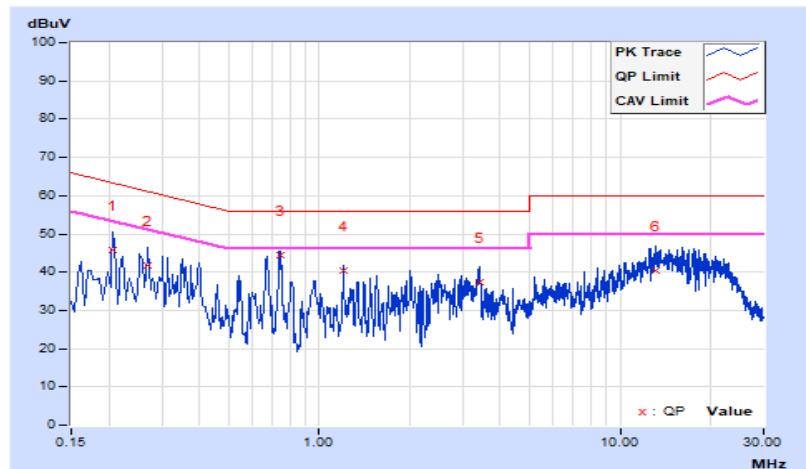
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23 °C, 67% RH
Tested by	Adair Peng		

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	0.20600	9.70	36.02	21.77	45.72	31.47	63.37	53.37	-17.65	-21.90
2	0.27000	9.75	32.09	17.50	41.84	27.25	61.12	51.12	-19.28	-23.87
3	0.74200	9.87	34.68	30.97	44.55	40.84	56.00	46.00	-11.45	-5.16
4	1.20200	9.91	30.49	25.81	40.40	35.72	56.00	46.00	-15.60	-10.28
5	3.40200	9.99	27.28	18.13	37.27	28.12	56.00	46.00	-18.73	-17.88
6	13.11400	10.16	30.37	18.50	40.53	28.66	60.00	50.00	-19.47	-21.34

Remarks:

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



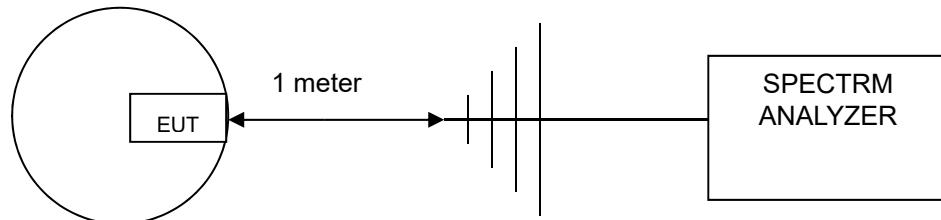
4.3 20dB Bandwidth Measurement

4.3.1 Limits of 20dB Bandwidth Measurement

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for device operating above 70 MHz and below 900 MHz.

Fundamental Frequency (MHz)	Limit of Emission Bandwidth (kHz)
433.92	1085 kHz

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 Procedures

- The EUT was placed on the turn table.
- The signal was coupled to the spectrum analyzer through an antenna.
- Set the resolution bandwidth to 1kHz and video bandwidth to 3kHz then select Peak function to scan the channel frequency.
- The emission bandwidth was measured and recorded.

4.3.5 Deviation from Test Standard

No deviation.

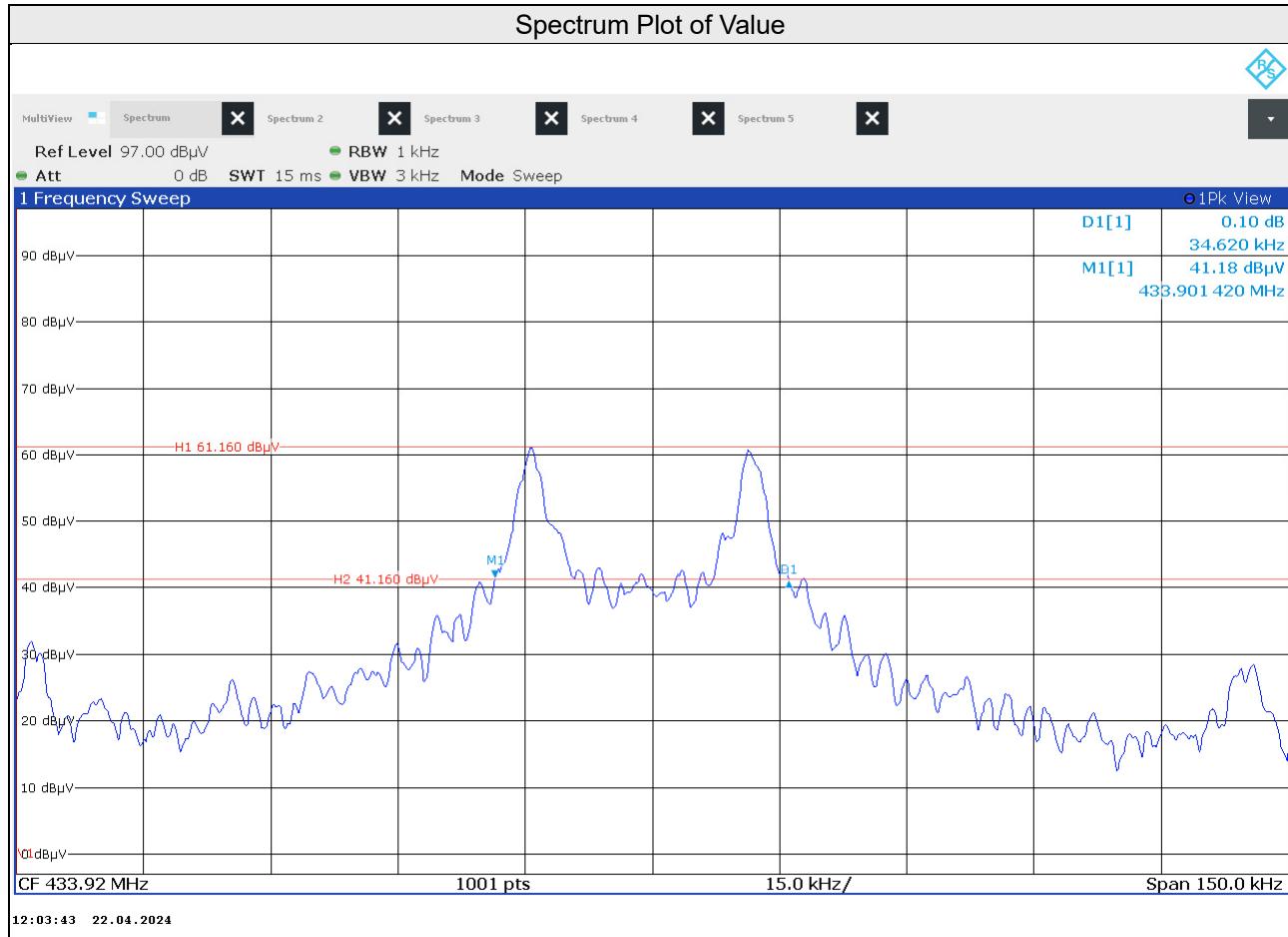
4.3.6 EUT Operating Conditions

Same as Item 4.1.6.

4.3.7 Test Results

Channel	Frequency (MHz)	20dB Bandwidth (kHz)	Maximum Limit (kHz)	Pass / Fail
1	433.92	34.620	1085	Pass

*Limit: 433.92MHz * 0.25% = 1085 kHz

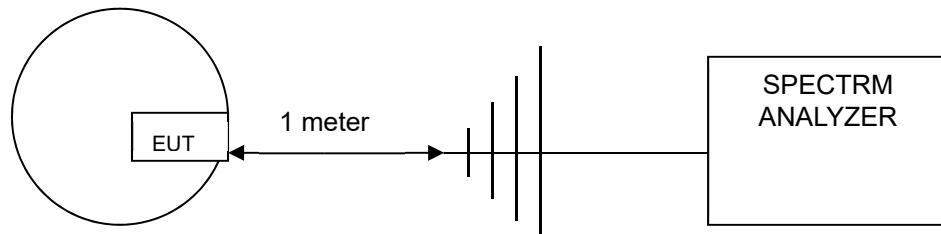


4.4 Deactivation Time Measurement

4.4.1 Limits of Deactivation Time Measurement

A transmitter activated automatically shall cease transmission within 5 seconds after activation.

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

- a. The EUT was placed on the turning table.
- b. The signal was coupled to the spectrum analyzer through an antenna.
- c. Set the resolution bandwidth to 1kHz and video bandwidth to 3kHz. The spectrum analyser was turned to the centre frequency of the transmitter's and the analyser's marker function was used to determine the duration of transmission.
- d. The transmission duration was measured and recorded.

4.4.5 Deviation from Test Standard

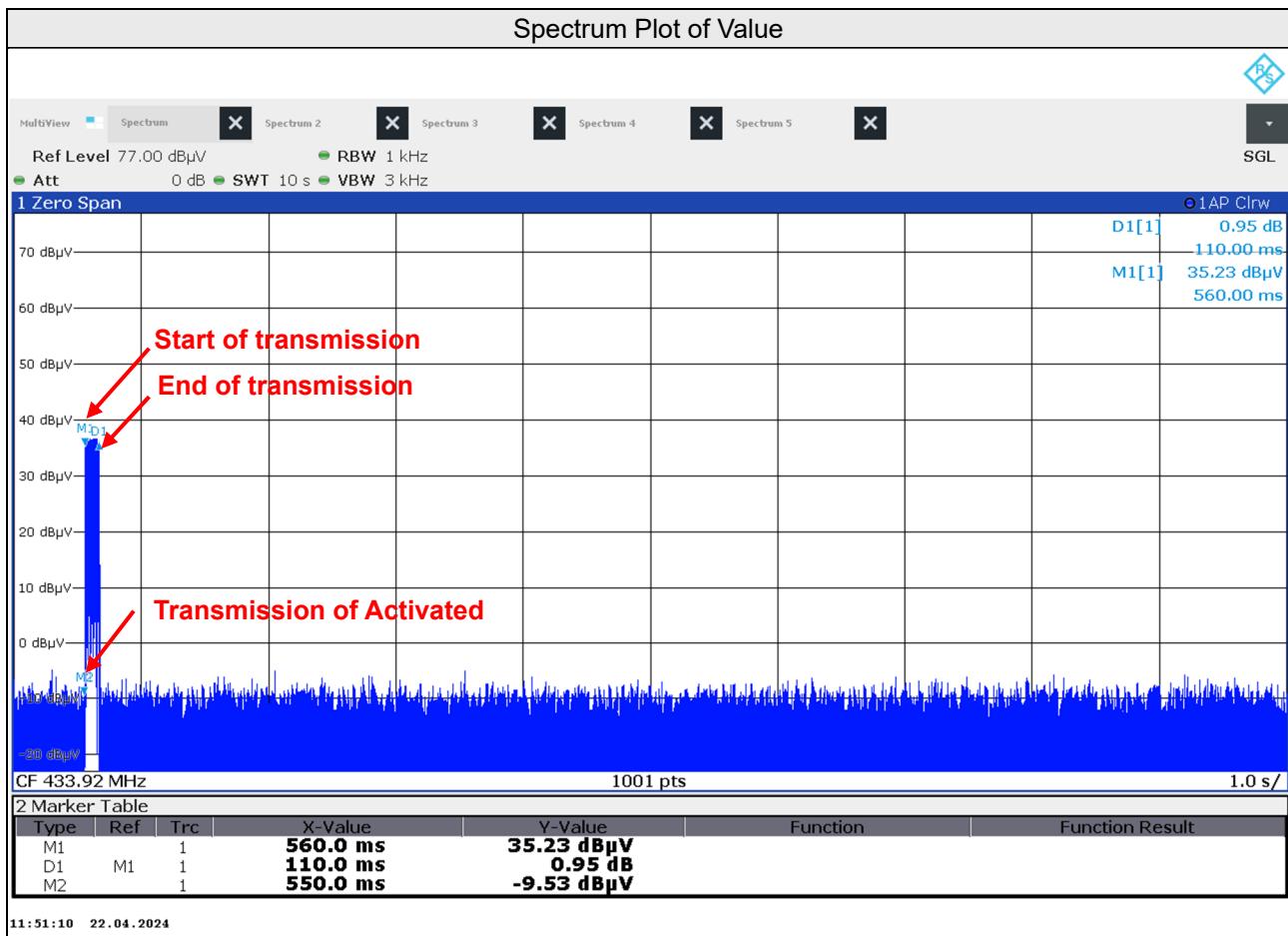
No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.1.6.

4.4.7 Test Results

Push Button	Frequency (MHz)	Maximum Limit (Sec)	Pass/Fail
1	433.92	5	Pass



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

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