

FCC Test Report

Report No.: RFB DHL-WTW-P22030883-1

FCC ID: U9K-CM0060

Product: Smart Alarm Wireless Indoor Security Camera

Brand: **SimpliSafe**

Model No.: CM006

Received Date: 2022/3/22

Test Date: 2022/11/17 ~ 2022/11/30

Issued Date: 2022/12/15

Applicant: SimpliSafe Inc

Address: 294 Washington St
Floor 9
Boston 02108

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

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

FCC Registration / 198487 / TW2021

Designation Number:



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Release Control Record

Issue No.	Description	Date Issued
RFBDHL-WTW-P22030883-1	Original Release	2022/12/15

1 Certificate of Conformity

Product: Smart Alarm Wireless Indoor Security Camera

Brand: **SimpliSafe**

Test Model: CM006

Sample Status: Engineering sample

Applicant: SimpliSafe Inc

Test Date: 2022/11/17 ~ 2022/11/30

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 :

Jessica Cheng

Date: 2022/12/15

Jessica Cheng / Senior Specialist

Approved by :

Jeremy Lin

Date: 2022/12/15

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 -12.90 dB at 0.44925 MHz
15.209 15.231(b)	Radiated Emission Test	Pass	Meet the requirement of limit. Minimum passing margin is -2.9 dB at 81.30 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) (\pm)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	3.00 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	5.7 dB
	30MHz ~ 200MHz	4.61 dB
	200MHz ~ 1000MHz	5.41 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	3.00 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Smart Alarm Wireless Indoor Security Camera
Brand	SimpliSafe
Test Model	CM006
Sample Status	Engineering sample
Power Supply Rating	4.2V Li battery 5Vdc from Micro USB port
Modulation Type	FSK
Operating Frequency	433.92MHz
Field Strength	77.8 dBuV/m
Antenna Type	Metal Stamping Antenna with -7.2 dBi gain
Antenna Connector	NA
Accessory Device	NA
Data Cable Supplied	Micro-B USB cable (3m)

Note:

1. There are WiFi 2.4G and Sub-G 433MHz technology used for the EUT.
2. WiFi 2.4G and Sub-G 433MHz technologies cannot transmit at same time.
3. 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.
4. For Radiated Emissions test of charging mode, following modes were pre-tested:
 - ✧ Charging Mode (Powered from Adapter)
 - ✧ Charging Mode (Powered from Notebook)
 The worst emission level was found when the EUT tested under **Charging Mode (Powered from Adapter)**, therefore, only its test data was recorded in this report.
5. 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 to this EUT

Channel	Freq. (MHz)
1	433.92

3.2.1 Test Mode Applicability and Tested Channel Data

EUT Configure Mode	Applicable to					Description
	RE ≥ 1G	RE < 1G	PLC	EB	DT	
A	√	√	-	√	√	Battery
B	-	√	√	-	-	Charging with Adapter
C	-	-	√	-	-	Charging with Laptop

Where RE≥1G: Radiated Emission above 1GHz RE<1G: Radiated Emission below 1GHz
 PLC: Power Line Conducted Emission EB: 20dB Bandwidth measurement
 DT: Deactivation Time measurement

Note: The antenna had been pre-tested on the positioned of each 3 axis. The worst cases were found when positioned on Z-plane.

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
A	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
A	1	1	FSK
B	-	-	-

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
B	-	-	-
C	-	-	-

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
A	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.

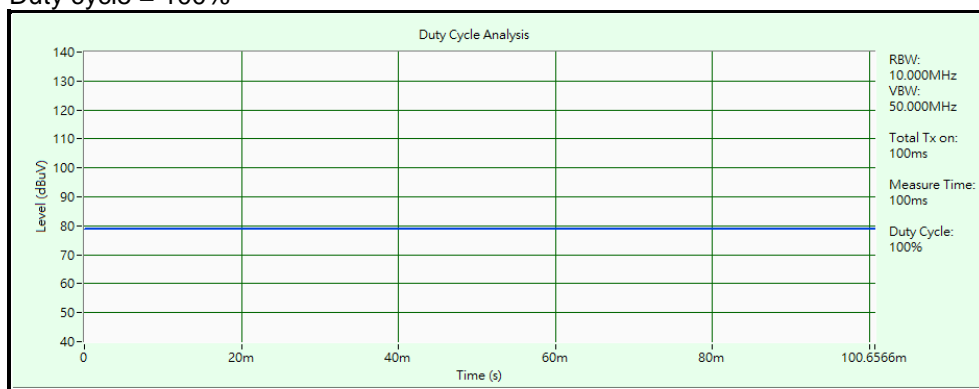
EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
A	1	1	FSK

Test Condition:

Applicable to	EUT Configure Mode	Environmental Conditions	Input Power	Tested by
RE \geq 1G	A	23 deg. C, 66 % RH	4.2Vdc	Greg Lin
RE<1G	A	23 deg. C, 66 % RH	4.2Vdc	Edison Lee
	B	21 deg. C, 67 % RH	120 Vac, 60 Hz	Ian Chang
PLC	B	25 deg. C, 75 % RH	120 Vac, 60 Hz	Ian Chang
	C	25 deg. C, 75 % RH	120 Vac, 60 Hz (System)	Ian Chang
EB/DT	A	25 deg. C, 76 % RH	4.2Vdc	Dalen Dai

3.1 Duty Cycle of Test Signal

Duty cycle = 100%



3.2 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	Adapter	Ktec	KSC-10A-050150HU	N/A	N/A	Supplied by applicant
B	Laptop	Lenovo	80WG	YD01YRC9	N/A	Provided by Lab
C	NB adapter	Lenovo	PA-1450-55LL	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	Micro-B USB cable	1	3	N	0	Accessory of EUT
2	NB Adapter Cable	1	1.8	N	0	Provided by Lab

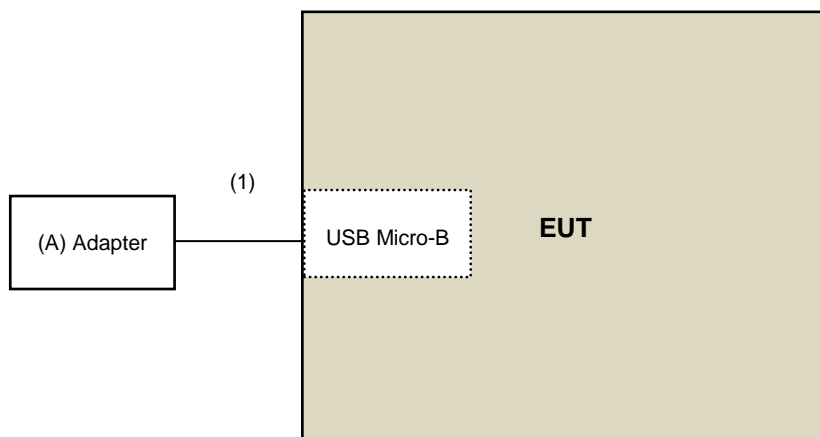
3.2.1 Configuration of System under Test

Mode A



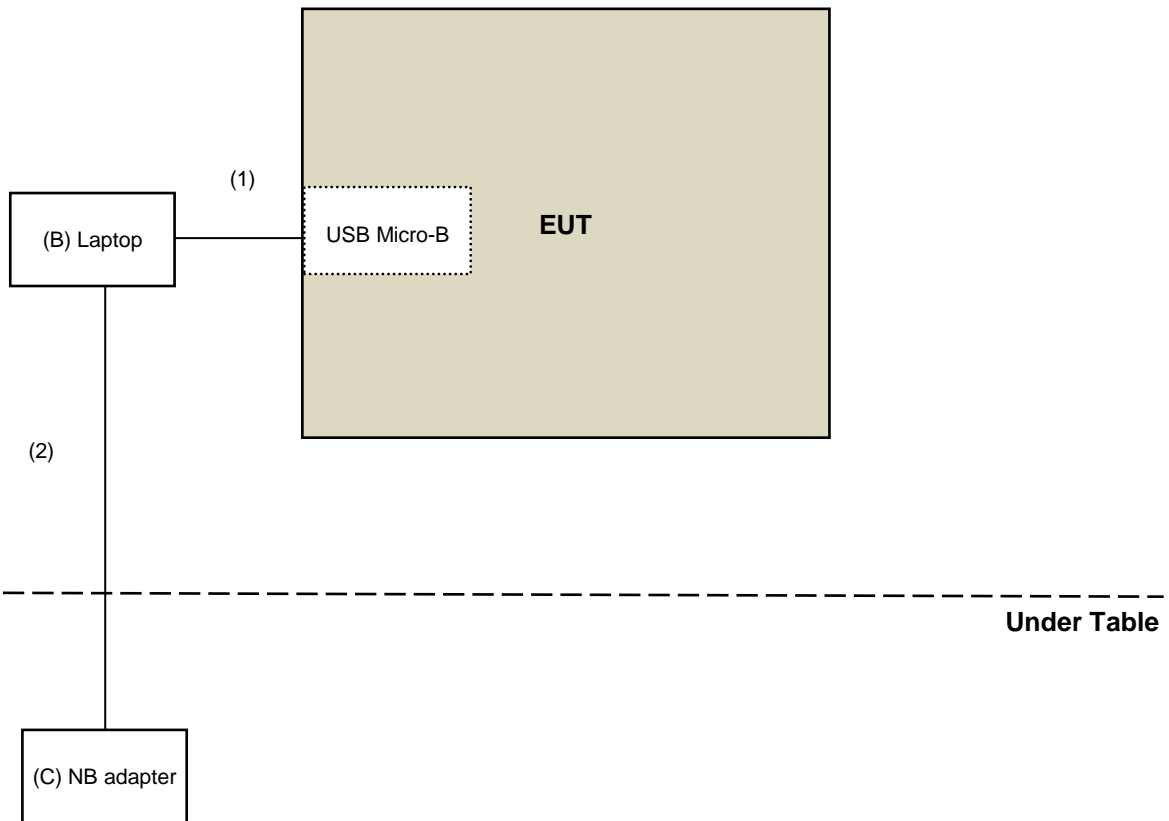
Under Table

Mode B



Under Table

Mode C



3.3 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:

- 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 = $41.6667(F)-7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.
- 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:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = $20 \log$ Emission level (uV/m).
- 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

Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
* LOOP ANTENNA EMCI	LPA600	270	2021/9/2	2023/9/1
Bi_Log Antenna Schwarzbeck	VULB 9168	137	2022/10/21	2023/10/20
Coupling/Dcoupling Network Schwarzbeck	CDNE-M2	00097	2022/6/1	2023/5/31
	CDNE-M3	00091	2022/6/1	2023/5/31
Pre_Amplifier HP	8447D	2432A03504	2022/2/17	2023/2/16
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2022/6/30	2023/6/29
Software BVADT	Radiated_V7.7.1.1.1	N/A	N/A	N/A
	Radiated_V8.7.08	N/A	N/A	N/A
Spectrum Analyzer R&S	FSV40	101544	2022/5/9	2023/5/8
Test Receiver Agilent	N9038A	MY51210129	2022/4/8	2023/4/7
		MY51210137	2022/6/9	2023/6/8
Tower ADT	AT100	0306	N/A	N/A
Turn Table ADT	TT100	0306	N/A	N/A

Notes:

- * The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA
- The test was performed in Linkou 966 Chamber 6 (CH 6) , The test site validated date: 2021/11/4 (NSA)
- Tested Date: 2022/11/18 ~ 2022/11/28

Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Band Pass Filter MICRO-TRONICS	BRM17690	005	2022/5/26	2023/5/25
Boresight antenna tower fixture BV	BAF-02	6	N/A	N/A
High Pass Filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	2022/5/26	2023/5/25
Horn Antenna EMCO	3115	00027024	2022/11/13	2023/11/12
		00028257	2022/11/13	2023/11/12
Horn Antenna ETS-Lindgren	3117-PA	00215857	2022/11/13	2023/11/12
Horn Antenna Schwarzbeck	BBHA 9170	212	2022/10/20	2023/10/19
Notch Filter MICRO-TRONICS	BRC50703-01	010	2022/5/26	2023/5/25
Pre-amplifier HP	8449B	3008A01201	2022/2/17	2023/2/16
Pre-amplifier (18GHz-40GHz) EMCI	EMC184045B	980175	2022/9/3	2023/9/2
Pre Amplifier EMCI	EMC0126545	980076	2022/2/17	2023/2/16
	EMC184045B	980235	2022/2/17	2023/2/16
RF Coaxial Cable EM	EM102-KMKM-3.5+1M	EM102-KMKM-3.5+1M-01	2022/7/7	2023/7/6
RF Coaxial Cable HUBER SUHNER	SF-104	Cable-CH6-01	2022/9/20	2023/9/19
Software BVADT	Radiated_V7.7.1.1.1	N/A	N/A	N/A
	Radiated_V8.7.08	N/A	N/A	N/A
Spectrum Analyzer Agilent	E4446A	MY51100009	2022/6/27	2023/6/26
Spectrum Analyzer KEYSIGHT	N9030A	MY54490260	2022/7/14	2023/7/13
Spectrum Analyzer R&S	FSV40	101042	2022/9/5	2023/9/4
		101544	2022/5/9	2023/5/8
Test Receiver Agilent	N9038A	MY51210129	2022/4/8	2023/4/7
		MY51210137	2022/6/9	2023/6/8
Tower ADT	AT100	0306	N/A	N/A
Turn Table ADT	TT100	0306	N/A	N/A

Notes:

1. The test was performed in Linkou 966 Chamber 6 (CH 6).
2. Tested Date: 2022/11/17

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:

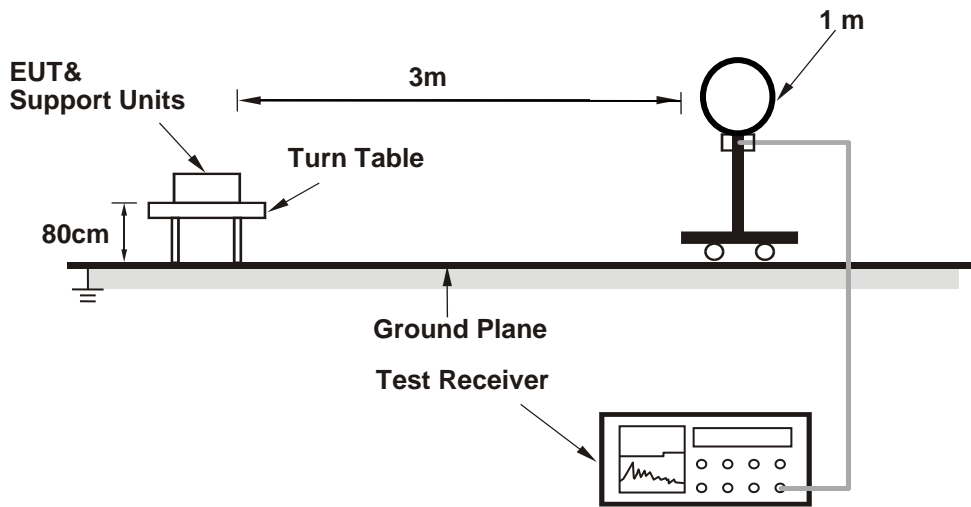
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) or Average detection (AV) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK)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

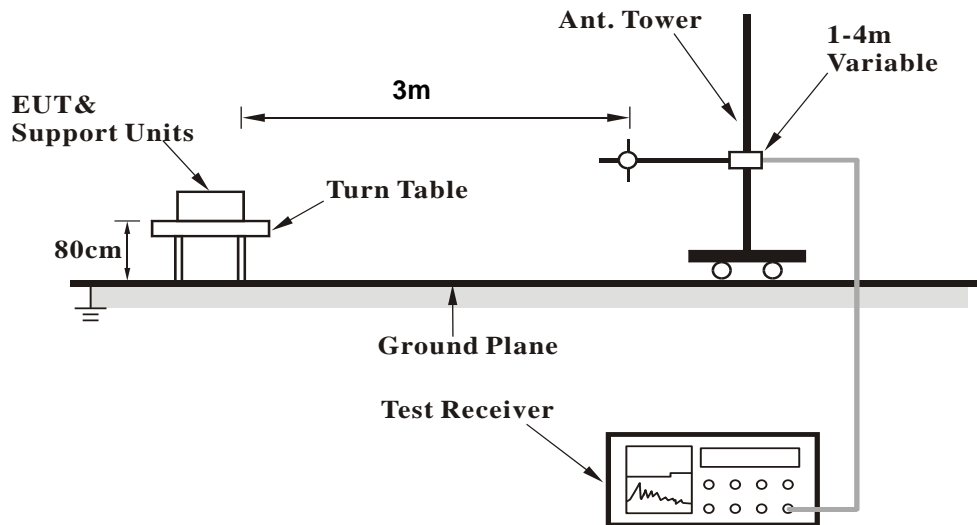
No deviation.

4.1.5 Test Set Up

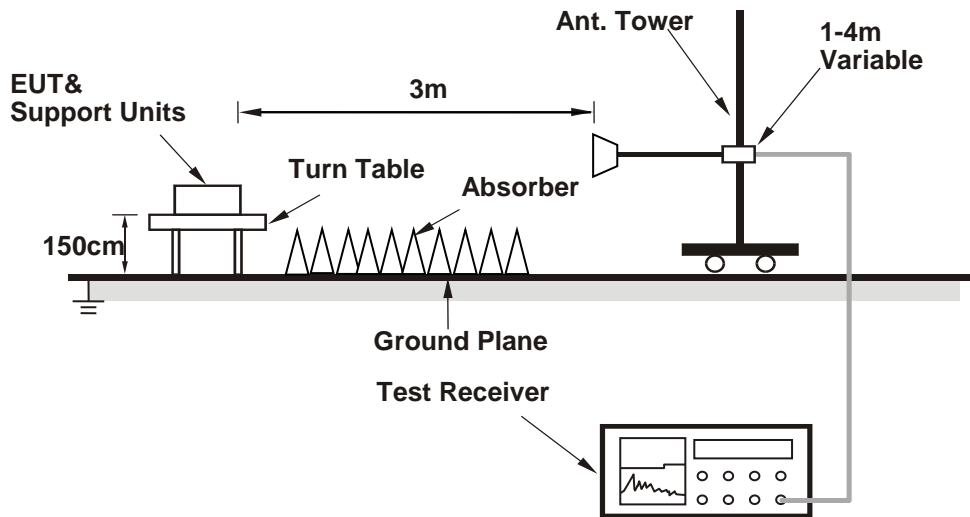
Radiated emission below 30MHz



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

Mode A- Operating Mode

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

Mode B - Charging Mode

- a. Connected the EUT to Adapter.
- b. Set the EUT under charging condition.

4.1.7 Test Results

Mode A

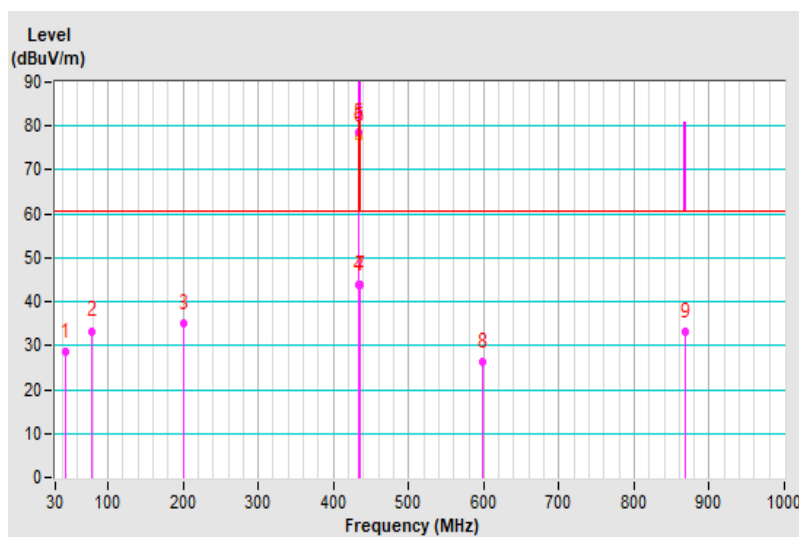
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	4.2 Vdc	Environmental Conditions	21°C, 67% RH
Tested By	Ian Chang		

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	43.21	28.60 QP	60.80	-32.20	1.34 H	235	37.40	-8.80
2	78.34	33.40 QP	60.80	-27.40	1.65 H	255	46.20	-12.80
3	201.00	35.10 QP	60.80	-25.70	1.52 H	251	45.70	-10.60
4	432.92	43.70 QP	60.80	-17.10	2.93 H	0	46.10	-2.40
5	*433.92	78.60 PK	100.80	-22.20	1.00 H	79	81.00	-2.40
6	*433.92	77.80 AV	80.80	-3.00	1.00 H	79	80.20	-2.40
7	434.92	43.90 QP	60.80	-16.90	1.58 H	0	46.20	-2.30
8	598.89	26.30 QP	60.80	-34.50	1.54 H	178	25.20	1.10
9	867.84	33.20 QP	80.80	-47.60	4.00 H	19	27.20	6.00

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
5. " * ": Fundamental frequency

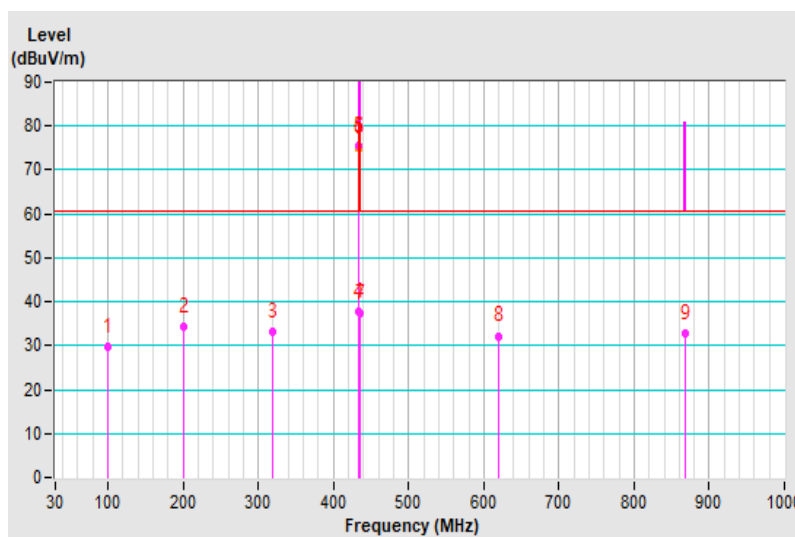


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	4.2 Vdc	Environmental Conditions	21°C, 67% RH
Tested By	Ian Chang		

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	99.62	29.80 QP	60.80	-31.00	2.23 V	269	42.60	-12.80
2	200.22	34.20 QP	60.80	-26.60	2.15 V	102	44.80	-10.60
3	318.23	33.20 QP	60.80	-27.60	1.66 V	289	38.50	-5.30
4	432.92	37.60 QP	60.80	-23.20	2.55 V	147	40.00	-2.40
5	*433.92	75.40 PK	100.80	-25.40	1.18 V	195	77.80	-2.40
6	*433.92	75.10 AV	80.80	-5.70	1.18 V	195	77.50	-2.40
7	434.92	37.50 QP	60.80	-23.30	1.59 V	242	39.80	-2.30
8	620.34	32.20 QP	60.80	-28.60	2.21 V	153	30.70	1.50
9	867.84	32.70 QP	80.80	-48.10	1.00 V	360	26.70	6.00

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
5. " * ": Fundamental frequency



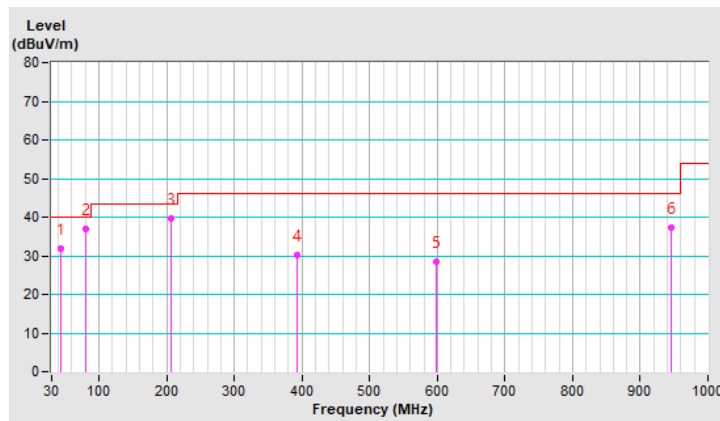
Mode B

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	5 Vdc	Environmental Conditions	21°C, 67% RH
Tested By	Ian Chang		

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	44.44	31.8 QP	40.0	-8.2	2.00 H	101	40.5	-8.7
2	81.30	37.1 QP	40.0	-2.9	2.38 H	140	50.6	-13.5
3	207.40	39.8 QP	43.5	-3.7	2.60 H	161	50.2	-10.4
4	392.24	30.3 QP	46.0	-15.7	1.54 H	188	33.9	-3.6
5	599.28	28.4 QP	46.0	-17.6	3.86 H	285	27.3	1.1
6	946.54	37.3 QP	46.0	-8.7	2.90 H	191	29.3	8.0

Remarks:

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

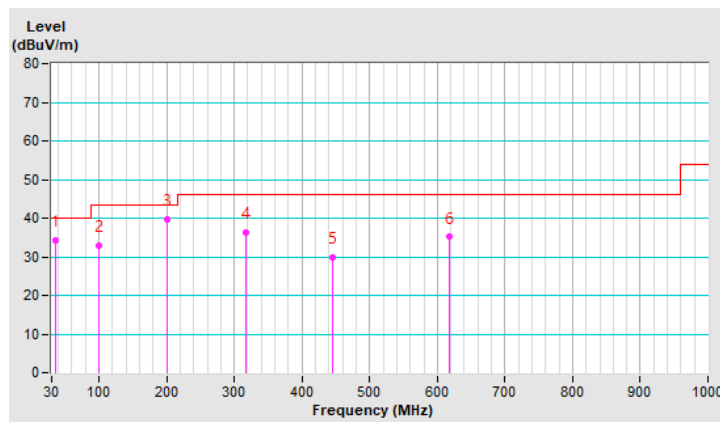


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz
Input Power	5 Vdc	Environmental Conditions	21°C, 67% RH
Tested By	Ian Chang		

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	36.68	34.4 QP	40.0	-5.6	3.63 V	337	44.2	-9.8
2	100.70	32.8 QP	43.5	-10.7	3.27 V	302	45.5	-12.7
3	201.58	39.7 QP	43.5	-3.8	2.99 V	274	50.3	-10.6
4	317.98	36.2 QP	46.0	-9.8	2.01 V	177	41.5	-5.3
5	444.26	29.9 QP	46.0	-16.1	1.96 V	230	32.1	-2.2
6	618.68	35.1 QP	46.0	-10.9	2.60 V	235	33.6	1.5

Remarks:

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



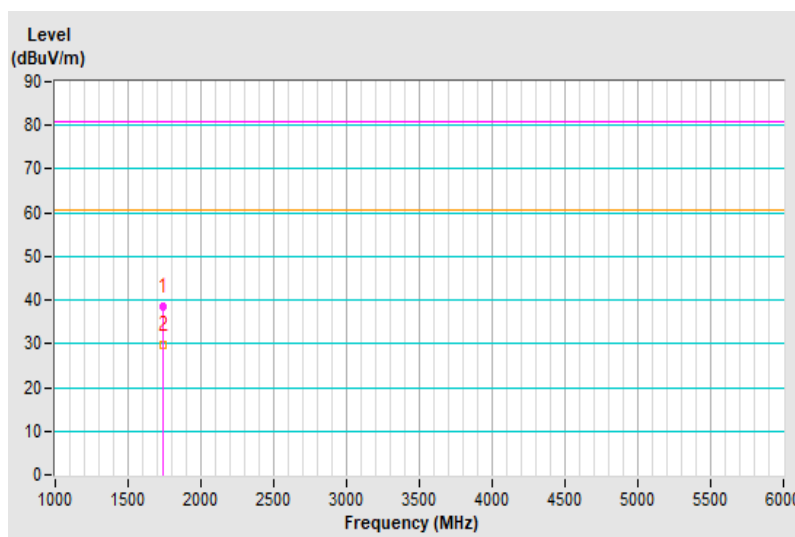
Mode A

Frequency Range	1GHz ~ 6GHz	Detector Function & Resolution Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	4.2 Vdc	Environmental Conditions	21°C, 67% RH
Tested By	Ian Chang		

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	1735.68	38.4 PK	80.8	-42.4	1.64 H	263	42.6	-4.2
2	1735.68	29.7 AV	60.8	-31.1	1.64 H	263	33.9	-4.2

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

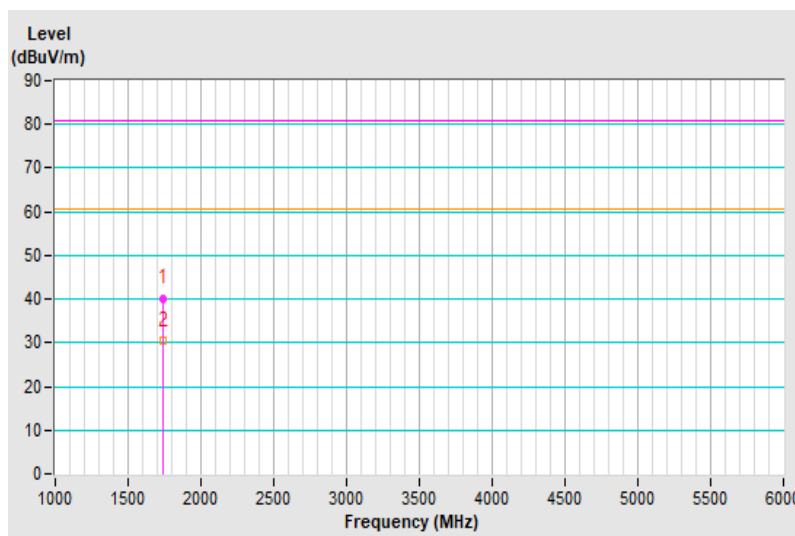


Frequency Range	1GHz ~ 6GHz	Detector Function & Resolution Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz
Input Power	4.2 Vdc	Environmental Conditions	21°C, 67% RH
Tested By	Ian Chang		

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	1735.68	40.2 PK	80.8	-40.6	2.15 V	123	44.4	-4.2
2	1735.68	30.4 AV	60.8	-30.4	2.15 V	123	34.6	-4.2

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



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 LYNICS	0900510	E1-011285	2022/9/19	2023/9/18
		E1-011286	2022/9/19	2023/9/18
50 Ohms Terminator LYNICS	0900510	E1-01-305	2022/2/9	2023/2/8
Attenuator STI	STI02-2200-10	NO.4	2022/9/2	2023/9/1
DC LISN R&S	ESH3-Z6	100219	2022/8/2	2023/8/1
		844950/018	2022/8/2	2023/8/1
DC LISN Schwarzbeck	NNLK 8121	8121-808	2022/4/29	2023/4/28
High Voltage Probe Schwarzbeck	TK9420	00982	2021/12/24	2022/12/23
Isolation Transformer Erika Fiedler	D-65396	017	2022/9/8	2023/9/7
LISN R&S	ENV216	101196	2022/5/24	2023/5/23
LISN Schwarzbeck	NNLK 8121	8121-731	2022/5/26	2023/5/25
		8121-00759	2022/8/18	2023/8/17
	NNLK8129	8129229	2022/6/8	2023/6/7
	NSLK 8128	8128-244	2022/11/8	2023/11/7
RF Coaxial Cable Commate	5D-FB	Cable-CO5-01	2022/1/28	2023/1/27
Software BVADT	Cond_V7.3.7.4	N/A	N/A	N/A
Test Receiver R&S	ESR3	102412	2022/1/22	2023/1/21

Notes:

1. The test was performed in Linkou Conduction 5.
2. Tested Date: 2022/11/30

4.2.3 Test Procedures

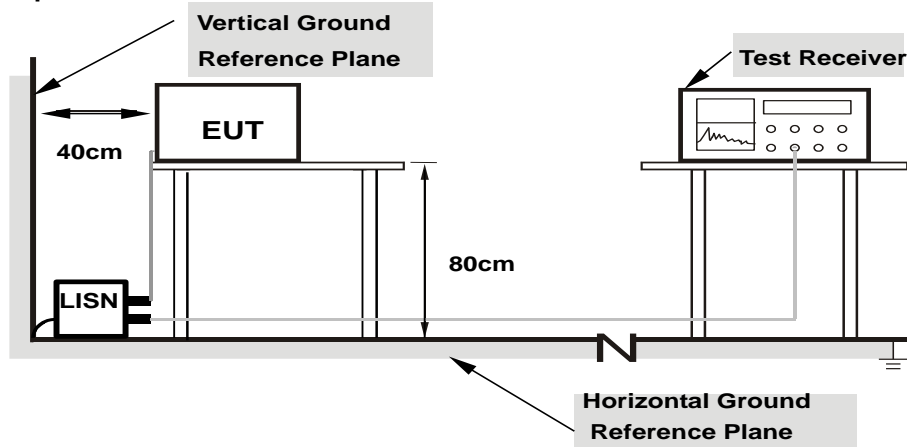
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling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

4.2.6 EUT Operating Conditions

Mode B & C- Charging Mode

- Connected the EUT to Adapter or Notebook PC.
- Set the EUT under charging condition.

4.2.7 Test Results

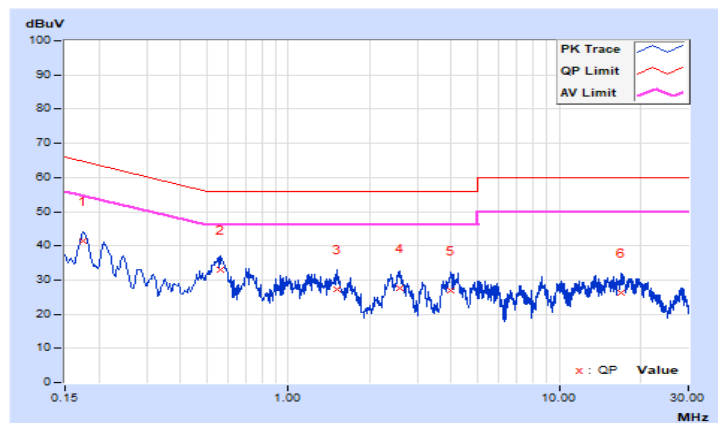
Mode B

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Ian Chang		

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	0.17394	9.93	31.49	16.78	41.42	26.71	64.77	54.77	-23.35	-28.06
2	0.56384	9.95	23.02	13.35	32.97	23.30	56.00	46.00	-23.03	-22.70
3	1.50548	10.01	17.41	7.48	27.42	17.49	56.00	46.00	-28.58	-28.51
4	2.57480	10.06	17.53	7.36	27.59	17.42	56.00	46.00	-28.41	-28.58
5	3.97928	10.12	16.96	6.80	27.08	16.92	56.00	46.00	-28.92	-29.08
6	17.00192	10.55	15.73	4.19	26.28	14.74	60.00	50.00	-33.72	-35.26

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

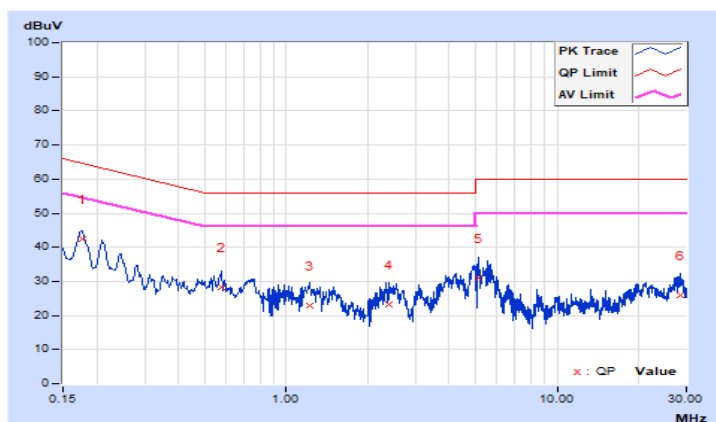


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Ian Chang		

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	0.17793	9.94	32.54	17.25	42.48	27.19	64.58	54.58	-22.10	-27.39
2	0.57980	9.97	18.31	9.48	28.28	19.45	56.00	46.00	-27.72	-26.55
3	1.21817	10.00	12.99	4.21	22.99	14.21	56.00	46.00	-33.01	-31.79
4	2.39126	10.06	13.09	4.54	23.15	14.60	56.00	46.00	-32.85	-31.40
5	5.13167	10.18	20.64	6.70	30.82	16.88	60.00	50.00	-29.18	-33.12
6	28.36544	10.62	15.26	4.69	25.88	15.31	60.00	50.00	-34.12	-34.69

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



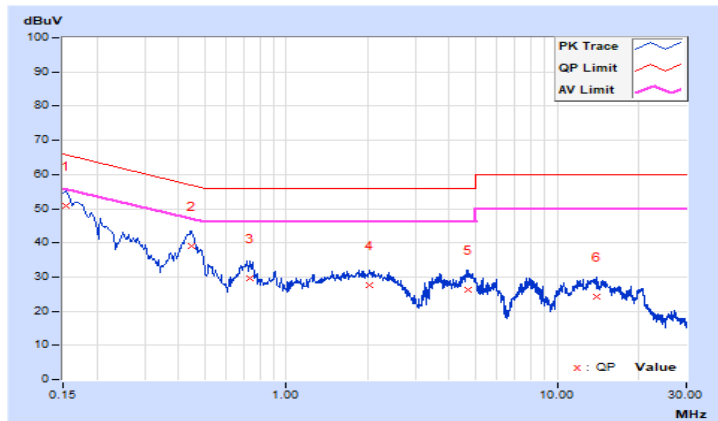
Mode C

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Ian Chang		

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	0.15399	9.93	41.07	22.70	51.00	32.63	65.78	55.78	-14.78	-23.15
2	0.44526	9.94	29.27	23.40	39.21	33.34	56.96	46.96	-17.75	-13.62
3	0.73142	9.96	19.51	13.56	29.47	23.52	56.00	46.00	-26.53	-22.48
4	2.04014	10.03	17.46	12.93	27.49	22.96	56.00	46.00	-28.51	-23.04
5	4.71344	10.15	16.06	7.71	26.21	17.86	56.00	46.00	-29.79	-28.14
6	13.92164	10.49	13.75	8.67	24.24	19.16	60.00	50.00	-35.76	-30.84

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

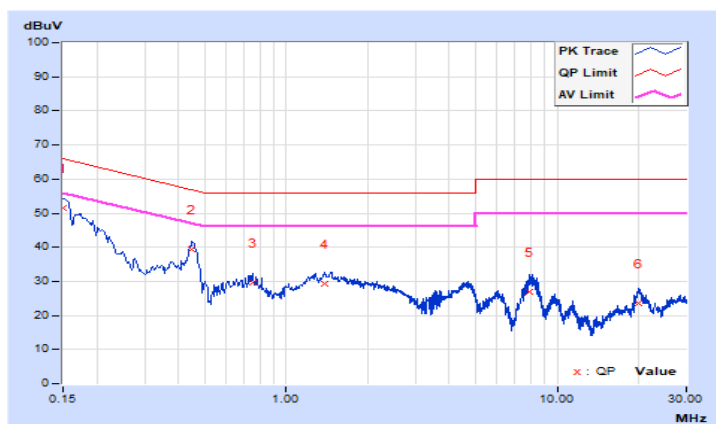


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Ian Chang		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.94	41.60	23.25	51.54	33.19	66.00	56.00	-14.46	-22.81
2	0.44925	9.96	29.41	24.03	39.37	33.99	56.89	46.89	-17.52	-12.90
3	0.75137	9.98	19.54	13.50	29.52	23.48	56.00	46.00	-26.48	-22.52
4	1.38179	10.01	19.15	14.63	29.16	24.64	56.00	46.00	-26.84	-21.36
5	7.86931	10.28	16.60	9.76	26.88	20.04	60.00	50.00	-33.12	-29.96
6	19.88669	10.57	13.09	8.77	23.66	19.34	60.00	50.00	-36.34	-30.66

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



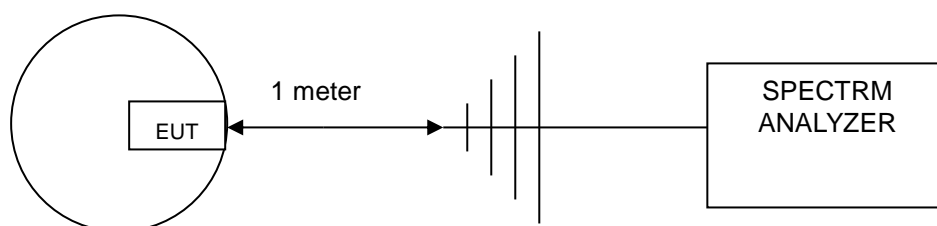
4.3 20dB Bandwidth Measurement

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	1084.80

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

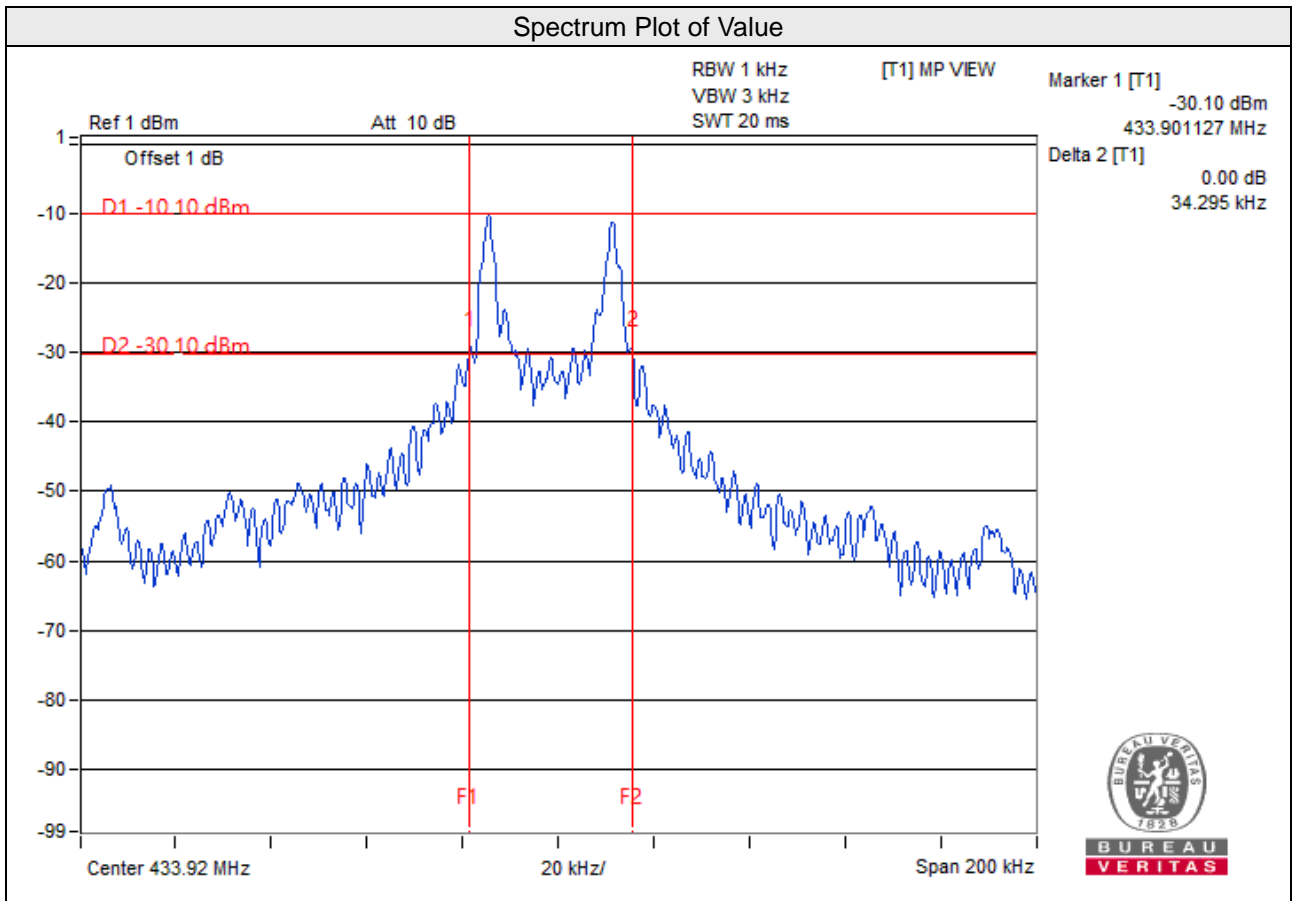
Same as Item 4.1.6.

4.3.7 Test Results

Mode A

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Maximum Limit (MHz)	Pass / Fail
1	433.92	0.03	1.0848	Pass

*Limit: 433.92MHz * 0.25% = 1084.80kHz

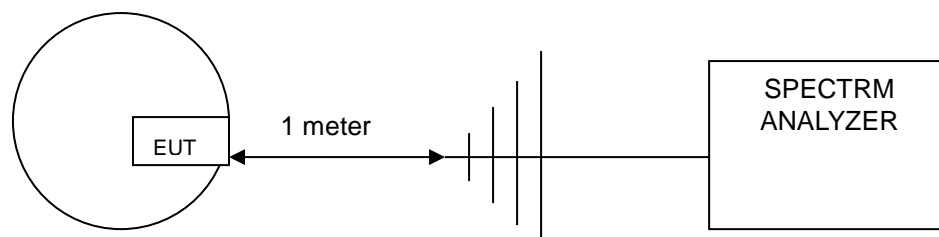


4.4 Deactivation Time Measurement

4.4.1 Limits of Deactivation Time Measurement

A transmitter activated manually 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

- The EUT was placed on the turning table.
- The signal was coupled to the spectrum analyzer through an antenna.
- 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.
- The transmission duration was measured and recorded.

4.4.5 Deviation from Test Standard

No deviation.

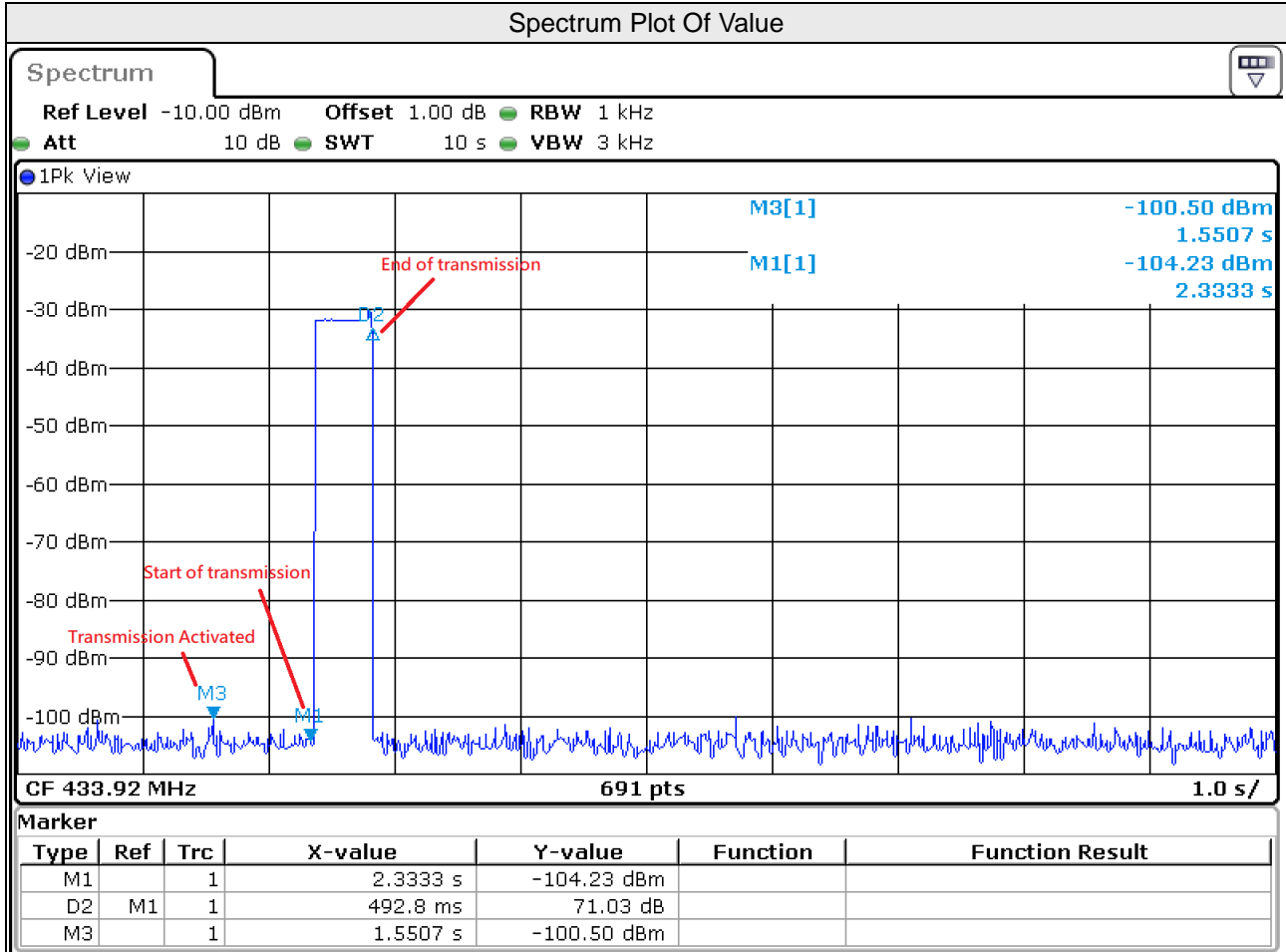
4.4.6 EUT Operating Conditions

Same as Item 4.1.6.

4.4.7 Test Results

Mode A

Push Button	Frequency (MHz)	Transmission Time(Sec)	Maximum Limit (Sec)	Pass/Fail
1	433.92	0.4928	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 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: <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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