

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

**Report No.:** RFBDKX-WTW-P23090577-3

**FCC ID:** EMJOH1

**Product:** Level Bridge

**Brand:** Level

**Model No.:** H1

**Received Date:** 2023/9/25

**Test Date:** 2023/9/28 ~ 2023/10/16

**Issued Date:** 2023/10/24

**Applicant:** PRIMAX ELECTRONICS LTD.

**Address:** No. 669, Ruey Kuang Road, Neihu, Taipei, Taiwan, R.O.C.

**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:**

**Approved by:** Jeremy Lin, **Date:** 2023/10/24  
Jeremy Lin / Project Engineer

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Prepared by : Annie Chang / Senior Specialist

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## Release Control Record

Issue No.	Description	Date Issued
RFBDKX-WTW-P23090577-3	Original release.	2023/10/24

## 1 Certificate

**Product:** Level Bridge

**Brand:** Level

**Test Model:** H1

**Sample Status:** Engineering sample

**Applicant:** PRIMAX ELECTRONICS LTD.

**Test Date:** 2023/9/28 ~ 2023/10/16

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

**Measurement** ANSI C63.10-2013

**procedure:** KDB 558074 D01 15.247 Meas Guidance v05r02

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.

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Standard / Clause	Test Item	Result	Remark
15.247(b)	RF Output Power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
15.247(d)	Conducted Out of Band Emissions	Pass	Meet the requirement of limit.
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -6.47 dB at 0.85981 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -7.4 dB at 928.00 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	-
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	Specification	Expanded Uncertainty (k=2) (±)
RF Output Power	-	1.1 dB
Power Spectral Density	-	1.2 dB
6 dB Bandwidth	-	960 Hz
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.63 dB
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.88 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	2.38 dB
	30 MHz ~ 1 GHz	5.7 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 6 GHz	4.83 dB
	6 GHz ~ 18 GHz	5.37 dB
	18 GHz ~ 40 GHz	5.24 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

### 3 General Information

#### 3.1 General Description

Product	Level Bridge
Brand	Level
Test Model	H1
Status of EUT	Engineering sample
Power Supply Rating	AC I/P: 120V, 60 Hz, 0.2A
Modulation Type	FSK
Transfer Rate	9.6kbit/s
Operating Frequency	906 MHz ~ 924 MHz
Number of Channel	10
Output Power	77.446 mW (18.89 dBm)

Note:

1. There are Bluetooth LE, Zigbee, Thread and Sub-GHz technology used for the EUT.
2. Simultaneously transmission condition.

Condition	Technology		
1	Bluetooth LE	Zigbee	Sub-GHz
2	Thread	Zigbee	Sub-GHz

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

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 Antenna Description of EUT

The antenna information is listed as below.

Gain (dBi)	Antenna Type	Connector Type
-2.33	IFA	NA

\* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

#### 3.3 Channel List

10 channels are provided to this EUT:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	906	6	916
2	908	7	918
3	910	8	920
4	912	9	922
5	914	10	924

### 3.4 Test Mode Applicability and Tested Channel Detail

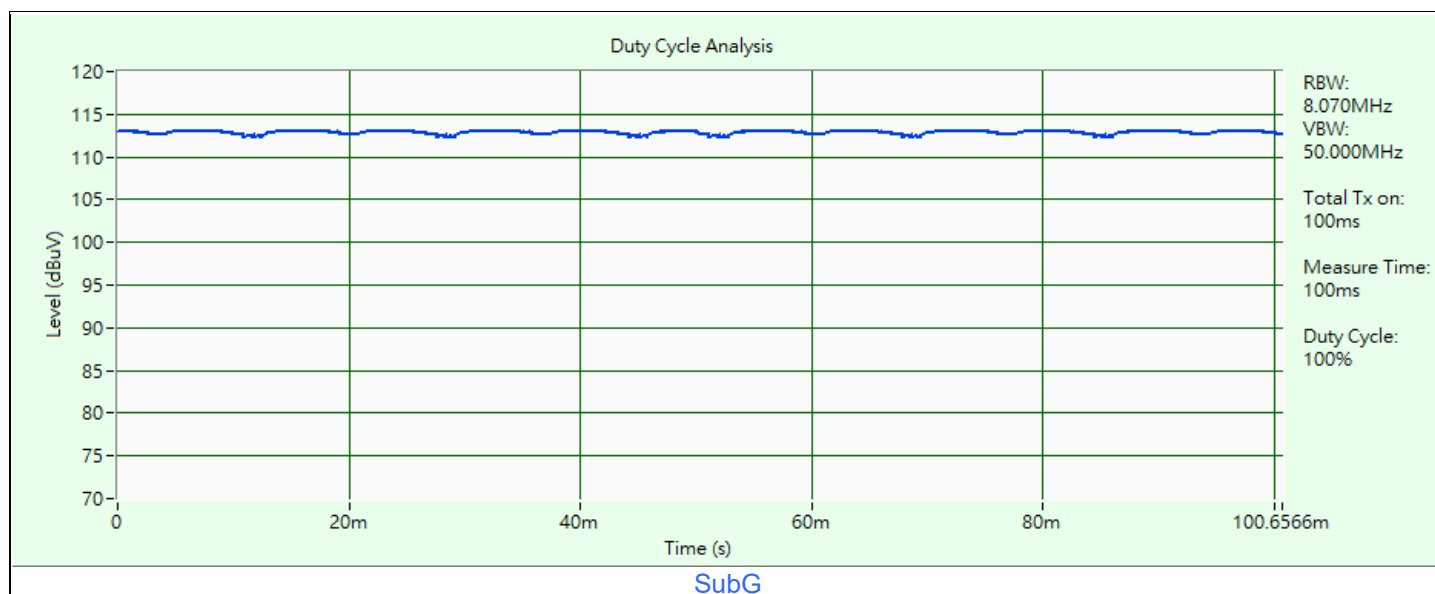
Pre-Scan:	1. EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition.
Worst Case:	1. X-axis/ Y-axis/ Z-axis Worst Condition: X-axis.

Following channel(s) was (were) selected for the final test as listed below:

Test Item	Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power / Power Spectral Density	Sub-GHz	1, 6, 10	FSK	9.6kbit/s
6 dB Bandwidth / Conducted Out of Band Emissions	Sub-GHz	1, 6, 10	FSK	9.6kbit/s
AC Power Conducted Emissions	Sub-GHz	1	FSK	9.6kbit/s
Unwanted Emissions below 1 GHz	Sub-GHz	1, 6, 10	FSK	9.6kbit/s
Unwanted Emissions above 1 GHz	Sub-GHz	1, 6, 10	FSK	9.6kbit/s

### 3.5 Duty Cycle of Test Signal

**Sub-GHz:** Duty cycle = 100 ms / 100 ms x 100% = 100%

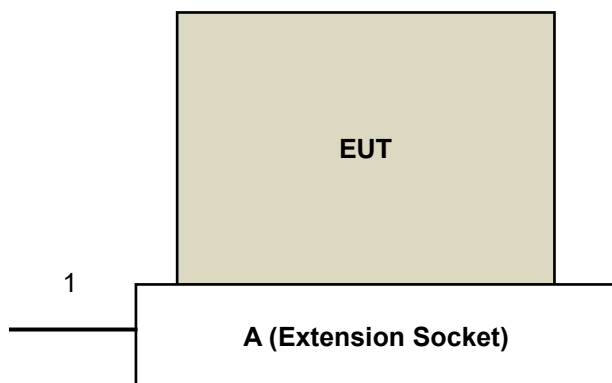




### 3.6 Test Program Used and Operation Descriptions

Controlling software (teraterm-4.80) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

### 3.7 Connection Diagram of EUT and Peripheral Devices



### 3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Extension Socket	N/A	N/A	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	AC cable	1	2	N	0	Provided by Lab

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Power Meter Anritsu	ML2495A	0842014	2023/5/5	2024/5/4
Pulse Power Sensor Anritsu	MA2411B	0738404	2023/5/5	2024/5/4
USB Wideband Power Sensor Keysight	U2021XA	U2021XA_001	2023/6/6	2024/6/5

Notes:

1. The test was performed in LK - Oven
2. Tested Date: 2023/10/4

### 4.2 Power Spectral Density

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030A	MY54490260	2023/7/13	2024/7/12
Signal Analyzer R&S	FSV40	101042	2023/9/5	2024/9/4
		101544	2023/5/9	2024/5/8
Software	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in LK - Oven
2. Tested Date: 2023/10/4

### 4.3 6 dB Bandwidth

Refer to section 4.2 to get information of the instruments.

### 4.4 Conducted Out of Band Emissions

Refer to section 4.2 to get information of the instruments.

#### 4.5 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance LYNICS	0900510	E1-01-305	2023/2/13	2024/2/12
		E1-011285	2023/9/21	2024/9/20
		E1-011286	2023/9/21	2024/9/20
EMI Test Receiver R&S	ESCS 30	100276	2023/4/20	2024/4/19
	ESR3	102412	2022/12/21	2023/12/20
Fixed Attenuator STI	STI02-2200-10	NO.4	2023/9/1	2024/8/31
High Voltage Probe Schwarzbeck	TK9420	00982	2022/12/14	2023/12/13
LISN R&S	ENV216	101197	2023/7/12	2024/7/11
LISN Schwarzbeck	NNLK 8121	8121-731	2023/6/9	2024/6/8
		8121-808	2023/5/2	2024/5/1
	NNLK 8129	8129229	2023/6/27	2024/6/26
	NSLK 8128	8128-244	2022/11/8	2023/11/7
RF Coaxial Cable PEWC	5D-FB	Cable-CO5-01	2023/1/19	2024/1/18
Software BVADT	Cond_V7.3.7.4	N/A	N/A	N/A

Notes:

1. The test was performed in Linkou Conduction 5.
2. Tested Date: 2023/9/28

#### 4.6 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Bi_Log Antenna Schwarzbeck	VULB 9168	137	2023/10/13	2024/10/12
Coupling / Decoupling Network Schwarzbeck	CDNE-M2	00097	2023/5/25	2024/5/24
	CDNE-M3	00091	2023/5/25	2024/5/24
Loop Antenna EMCI	LPA600	270	2023/9/4	2024/9/3
MXE EMI Receiver Agilent	N9038A	MY51210129	2023/3/24	2024/3/23
		MY51210137	2023/6/5	2024/6/4
Preamplifier EMCI	EMC001340	980269	2023/6/27	2024/6/26
Preamplifier HP	8447D	2432A03504	2023/2/16	2024/2/15
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2023/6/27	2024/6/26
Signal Analyzer R&S	FSV40	101544	2023/5/9	2024/5/8
Software BVADT	Radiated_V8.7.08	N/A	N/A	N/A
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: 2023/10/16

#### 4.7 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Band Pass Filter Micro-Tronics	BRM17690	005	2023/5/25	2024/5/24
Boresight antenna tower fixture BV	BAF-02	6	N/A	N/A
High Pass Filter Wainwright	WHK 3.1/18G-10SS	SN 8	2023/5/25	2024/5/24
Horn Antenna EMCO	3115	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
MXE EMI Receiver Agilent	N9038A	MY51210129	2023/3/24	2024/3/23
		MY51210137	2023/6/5	2024/6/4
Notch Filter Micro-Tronics	BRC50703-01	010	2023/5/25	2024/5/24
Preamplifier EMCI	EMC0126545 EMC184045B	980076	2023/2/16	2024/2/15
		980175	2023/9/2	2024/9/1
		980235	2023/2/16	2024/2/15
Preamplifier HP	8449B	3008A01201	2023/2/16	2024/2/15
RF Coaxial Cable EMCI	EMC102-KM-KM-1000 EMC104	200310	2023/3/12	2024/3/11
		190801	2023/9/13	2024/9/12
		190804	2023/9/13	2024/9/12
RF Coaxial Cable HUBER+SUHNER	SF-104	Cable-CH6-01	2023/9/13	2024/9/12
Signal Analyzer R&S	FSV40	101042	2023/9/5	2024/9/4
		101544	2023/5/9	2024/5/8
Software BVADT	Radiated_V7.7.1.1.1	N/A	N/A	N/A
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: 2023/10/2 ~ 2023/10/3

## 5 Limits of Test Items

### 5.1 RF Output Power

For systems using digital modulation in the 902-928 MHz bands: 1 Watt (30 dBm)

### 5.2 Power Spectral Density

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz.

### 5.3 6 dB Bandwidth

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

### 5.4 Conducted Out of Band Emissions

Below 20 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

### 5.5 AC Power Conducted Emissions

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

Notes:

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.

### 5.6 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

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

Notes:

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

## 5.7 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
Above 960	500	3

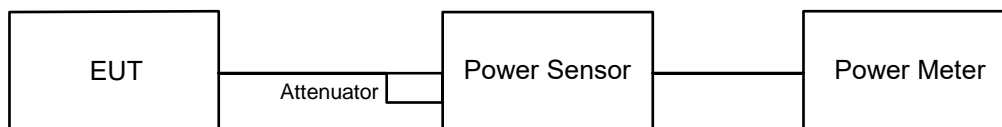
### Notes:

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 1000 MHz, 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 20 dB under any condition of modulation.

## 6 Test Arrangements

### 6.1 RF Output Power

#### 6.1.1 Test Setup



#### 6.1.2 Test Procedure

##### Peak Power:

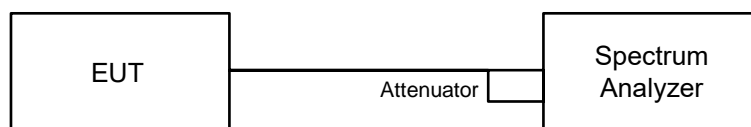
A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

##### Average Power:

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

### 6.2 Power Spectral Density

#### 6.2.1 Test Setup



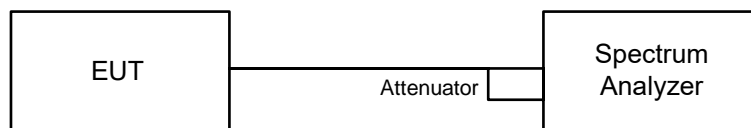
#### 6.2.2 Test Procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to: 3 kHz.
- d. Set the VBW  $\geq 3 \times$  RBW.
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.



## 6.3 6 dB Bandwidth

### 6.3.1 Test Setup

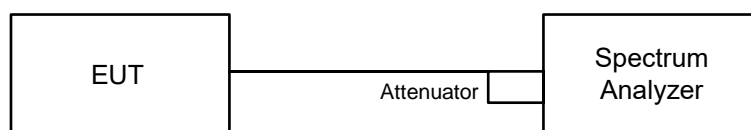


### 6.3.2 Test Procedure

- Set resolution bandwidth (RBW) = 100 kHz.
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

## 6.4 Conducted Out of Band Emissions

### 6.4.1 Test Setup



### 6.4.2 Test Procedure

#### MEASUREMENT PROCEDURE REF

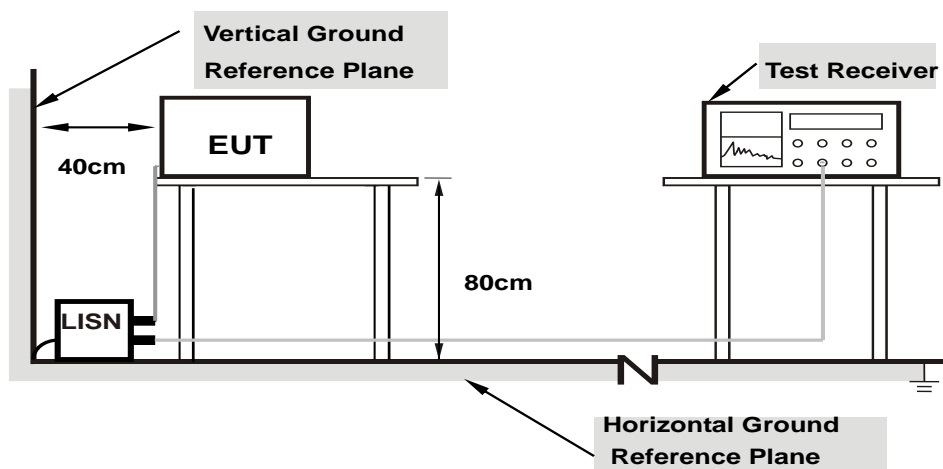
- Set the RBW = 100 kHz.
- Set the VBW  $\geq 300$  kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW  $\geq 300$  kHz.
- Detector = peak.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

## 6.5 AC Power Conducted Emissions

### 6.5.1 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).

### 6.5.2 Test Procedure

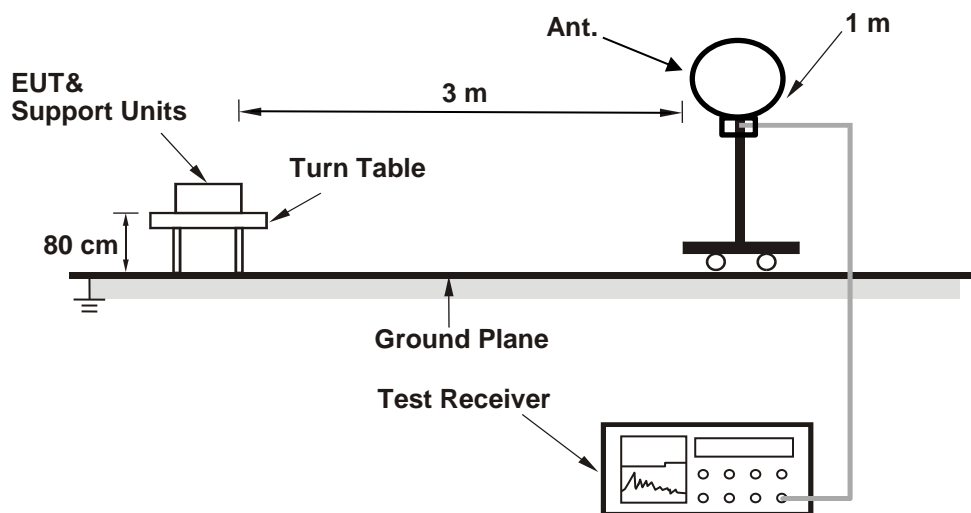
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The 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.

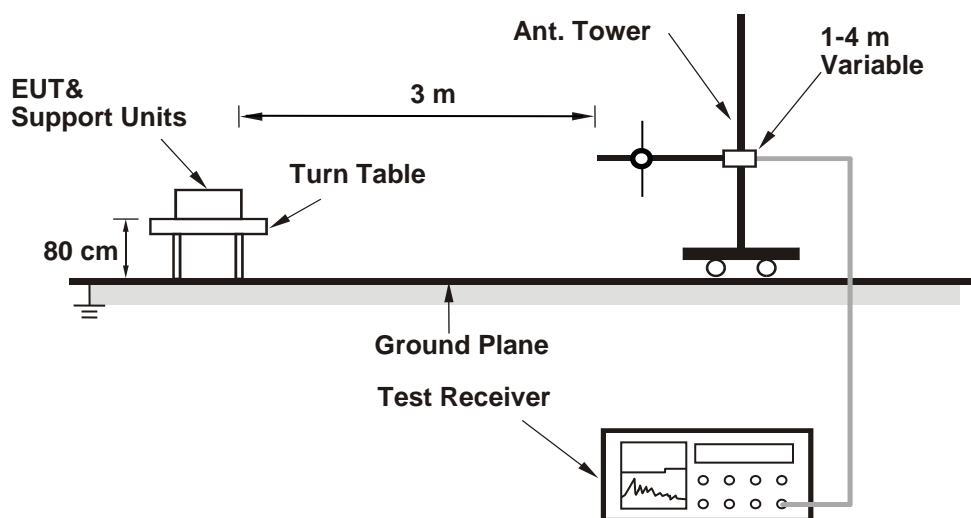
## 6.6 Unwanted Emissions below 1 GHz

### 6.6.1 Test Setup

#### For Radiated emission below 30 MHz



#### For Radiated emission above 30 MHz



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

## 6.6.2 Test Procedure

### For Radiated emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters 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. 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, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

### For Radiated emission above 30 MHz

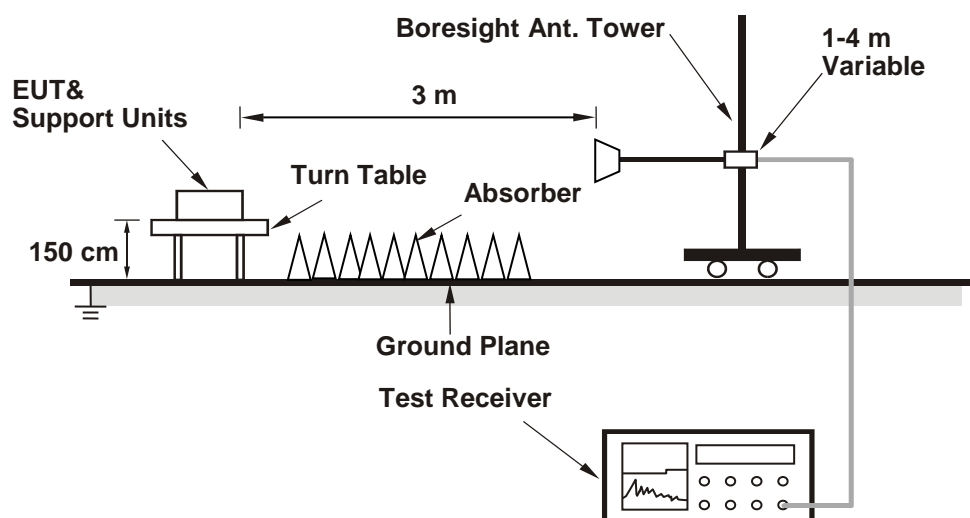
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

## 6.7 Unwanted Emissions above 1 GHz

### 6.7.1 Test Setup



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

### 6.7.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver/spectrum analyzer was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

#### Notes:

- According to ANSI C63.10 section 6.6.4 and 4.1.4.2.2. For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
- For harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10 Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1 GHz.
- All modes of operation were investigated and the worst-case emissions are reported.

## 7 Test Results of Test Item

### 7.1 RF Output Power

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Waydi Tuan
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#### For Peak Power

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
1	906	77.446	18.89	30	Pass
6	916	53.211	17.26	30	Pass
10	924	26.002	14.15	30	Pass

Note: The antenna gain is -2.33 dBi < 6 dBi, so the output power limit shall not be reduced.

#### For Average Power

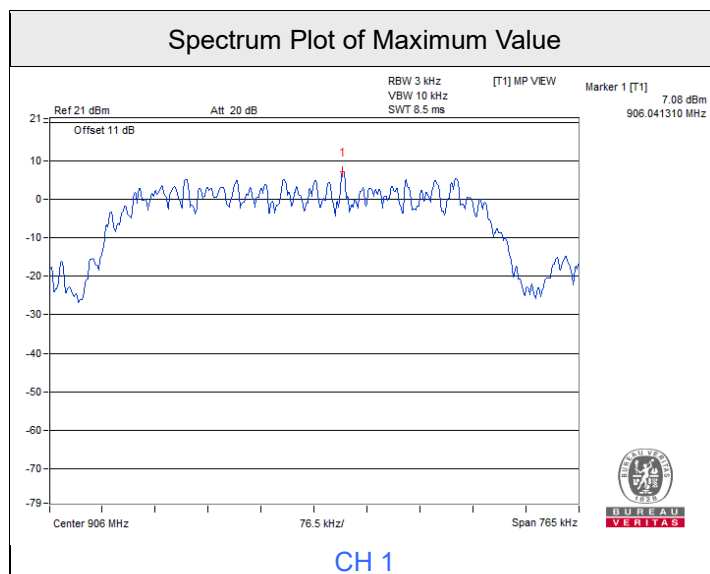
Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	906	76.56	18.84
6	916	53.088	17.25
10	924	25.823	14.12

## 7.2 Power Spectral Density

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Waydi Tuan
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Channel	Freq. (MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
1	906	7.08	8	Pass
6	916	6.17	8	Pass
10	924	2.96	8	Pass

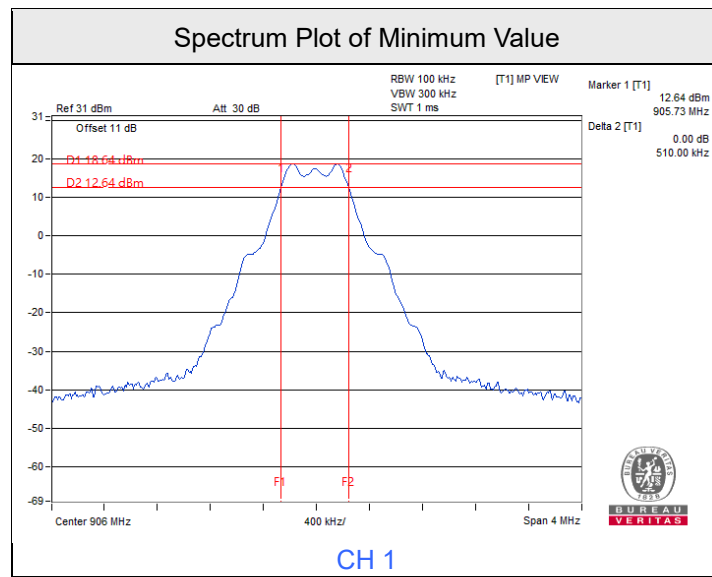
Note: The antenna gain is  $-2.33 \text{ dBi} < 6 \text{ dBi}$ , so the power density limit shall not be reduced.



### 7.3 6 dB Bandwidth

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Waydi Tuan
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Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Test Result
1	906	0.51	0.5	Pass
6	916	0.51	0.5	Pass
10	924	0.51	0.5	Pass

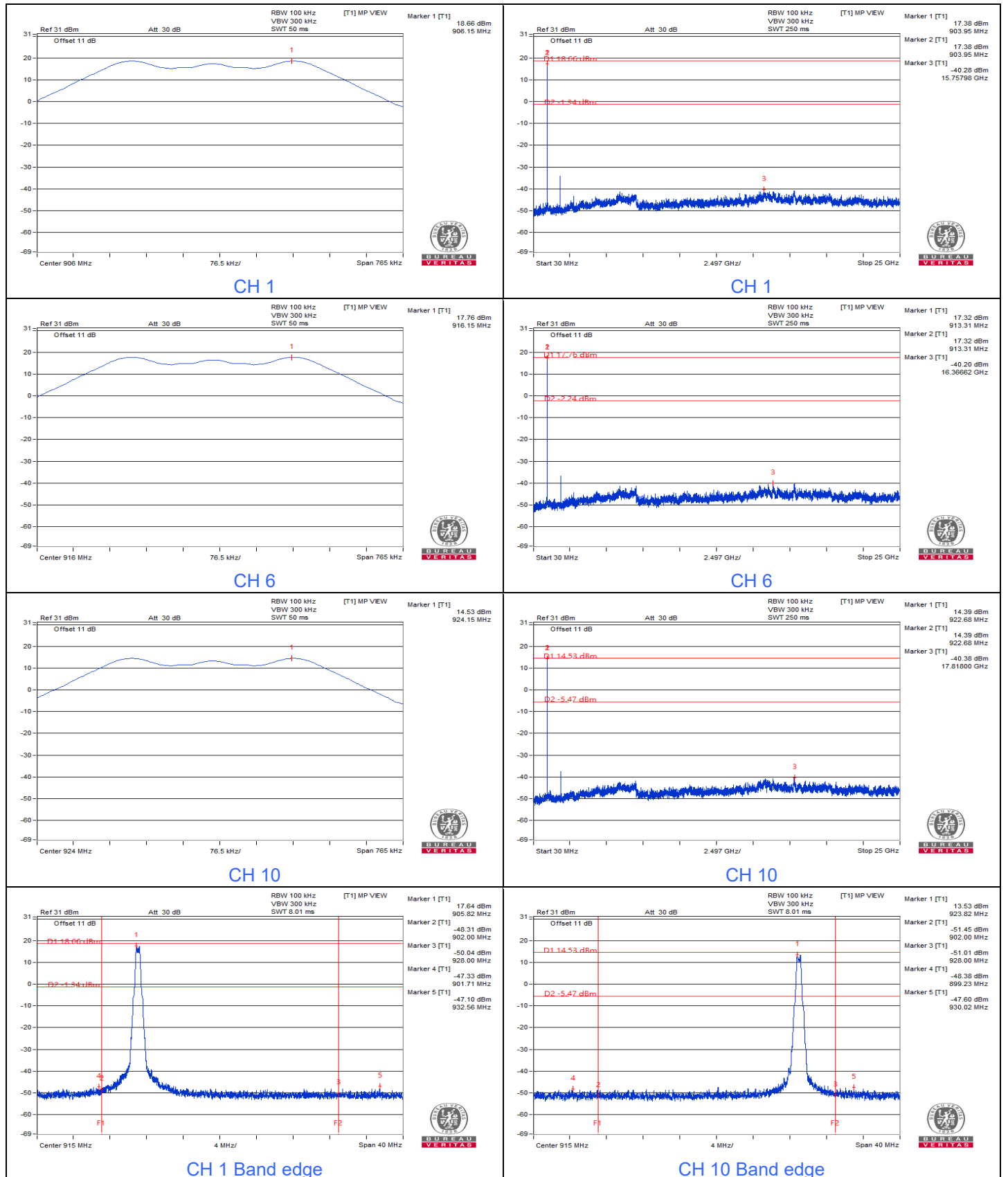






### 7.4 Conducted Out of Band Emissions

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 76% RH	Tested By:	Waydi Tuan
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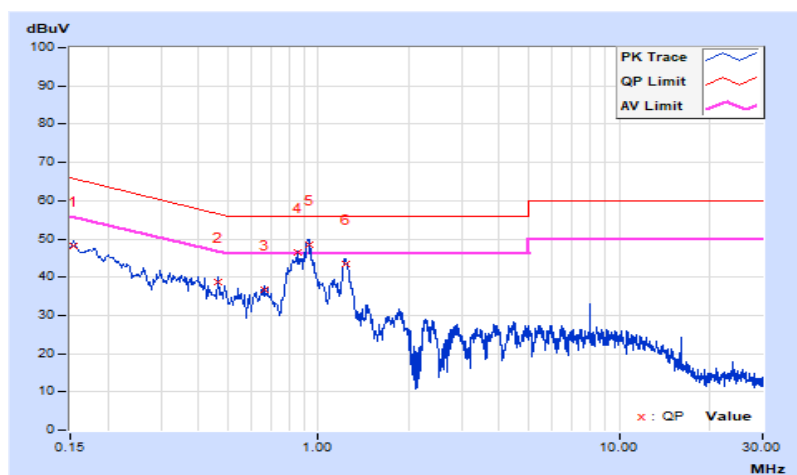
## 7.5 AC Power Conducted Emissions

RF Mode	Sub-GHz	Channel	CH 1 : 906 MHz
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	Jed Wu		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.05	37.99	23.13	48.04	33.18	65.79	55.79	-17.75	-22.61
2	0.46669	10.25	28.40	17.27	38.65	27.52	56.57	46.57	-17.92	-19.05
3	0.66035	10.29	26.29	20.51	36.58	30.80	56.00	46.00	-19.42	-15.20
<b>4</b>	<b>0.85981</b>	<b>10.34</b>	<b>36.10</b>	<b>29.19</b>	<b>46.44</b>	<b>39.53</b>	<b>56.00</b>	<b>46.00</b>	<b>-9.56</b>	<b>-6.47</b>
5	0.93021	10.35	38.01	28.26	48.36	38.61	56.00	46.00	-7.64	-7.39
6	1.23716	10.38	33.03	25.19	43.41	35.57	56.00	46.00	-12.59	-10.43

### 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

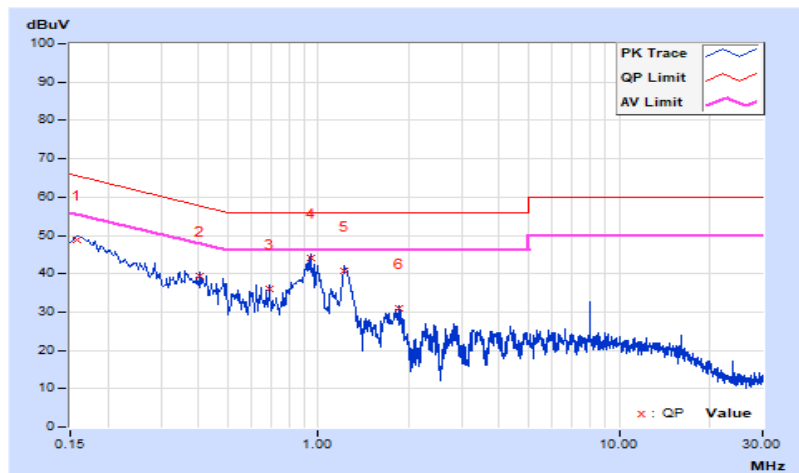


RF Mode	Sub-GHz	Channel	CH 1 : 906 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Jed Wu		

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	0.15719	10.08	38.89	23.20	48.97	33.28	65.61	55.61	-16.64	-22.33
2	0.40421	10.21	29.03	21.71	39.24	31.92	57.77	47.77	-18.53	-15.85
3	0.68773	10.24	25.85	20.67	36.09	30.91	56.00	46.00	-19.91	-15.09
4	0.94194	10.26	33.84	26.49	44.10	36.75	56.00	46.00	-11.90	-9.25
5	1.22742	10.27	30.36	22.45	40.63	32.72	56.00	46.00	-15.37	-13.28
6	1.86103	10.28	20.53	13.79	30.81	24.07	56.00	46.00	-25.19	-21.93

**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



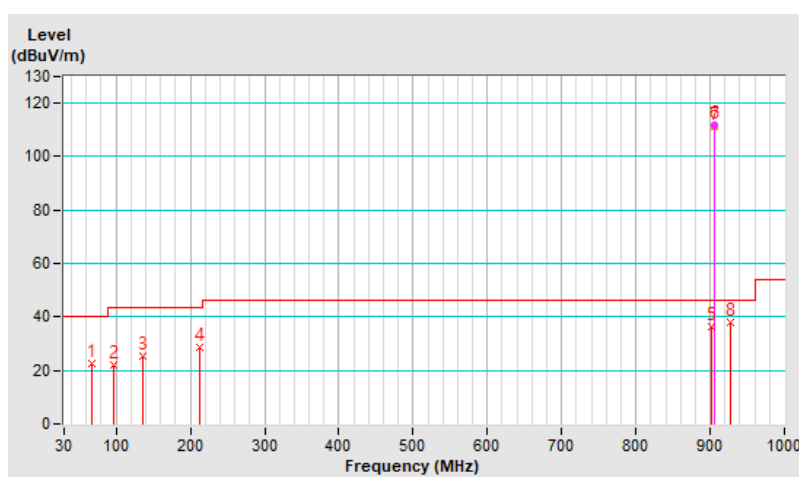
## 7.6 Unwanted Emissions below 1 GHz

<b>RF Mode</b>	Sub-GHz	<b>Channel</b>	CH 1 : 906 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120kHz, DET=Quasi-Peak PK: RB=100 kHz, VB=300 kHz, DET=Peak AV: RB=100 kHz, VB=10 Hz, DET=Peak
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 69% RH
<b>Tested By</b>	Jed Wu		

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	66.47	22.8 QP	40.0	-17.2	1.27 H	277	33.0	-10.2
2	96.43	21.9 QP	43.5	-21.6	1.38 H	229	35.9	-14.0
3	136.55	25.3 QP	43.5	-18.2	1.21 H	246	34.6	-9.3
4	212.68	28.8 QP	43.5	-14.7	1.23 H	221	39.5	-10.7
5	902.00	36.2 QP	46.0	-9.8	1.00 H	227	29.9	6.3
6	*906.00	112.0 PK			1.00 H	227	105.5	6.5
7	*906.00	111.5 AV			1.00 H	227	105.0	6.5
8	928.00	37.9 QP	46.0	-8.1	1.00 H	227	31.0	6.9

### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.
5. " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.

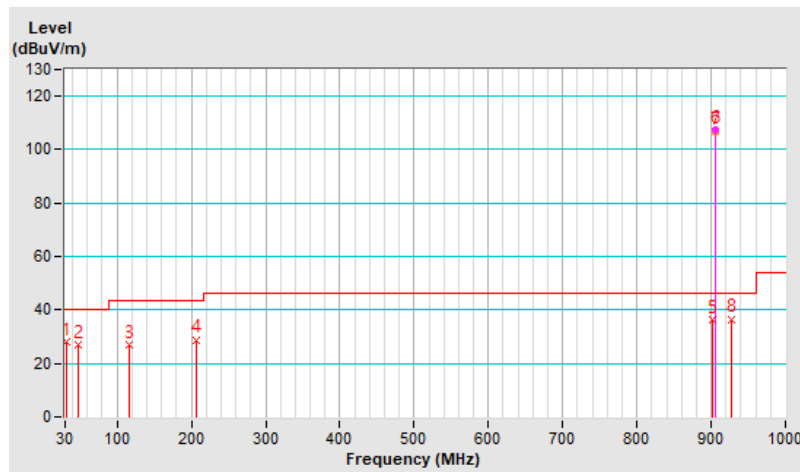


<b>RF Mode</b>	Sub-GHz	<b>Channel</b>	CH 1 : 906 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120kHz, DET=Quasi-Peak PK: RB=100 kHz, VB=300 kHz, DET=Peak AV: RB=100 kHz, VB=10 Hz, DET=Peak
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 69% RH
<b>Tested By</b>	Jed Wu		

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	32.11	28.2 QP	40.0	-11.8	1.11 V	264	39.0	-10.8
2	48.60	27.2 QP	40.0	-12.8	1.05 V	225	36.2	-9.0
3	116.92	27.0 QP	43.5	-16.5	1.37 V	169	38.3	-11.3
4	206.30	28.9 QP	43.5	-14.6	1.31 V	55	39.8	-10.9
5	902.00	36.1 QP	46.0	-9.9	1.93 V	189	29.8	6.3
6	*906.00	107.2 PK			1.93 V	189	100.7	6.5
7	*906.00	106.7 AV			1.93 V	189	100.2	6.5
8	928.00	36.6 QP	46.0	-9.4	1.93 V	189	29.7	6.9

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.

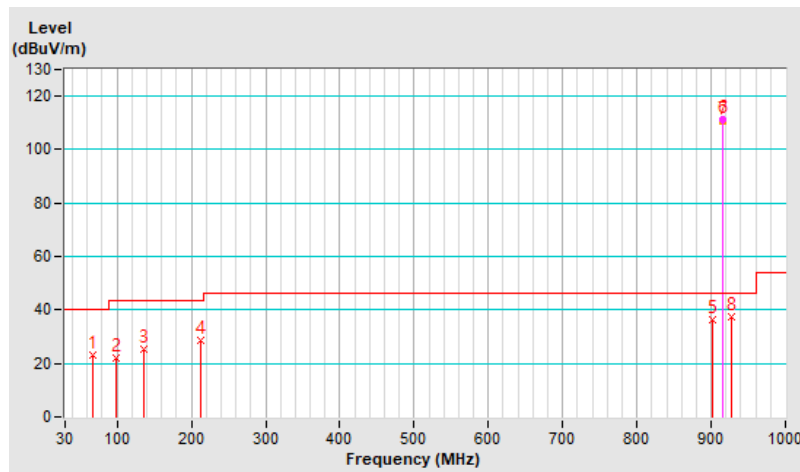


<b>RF Mode</b>	Sub-GHz	<b>Channel</b>	CH 6 : 916 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120kHz, DET=Quasi-Peak PK: RB=100 kHz, VB=300 kHz, DET=Peak AV: RB=100 kHz, VB=10 Hz, DET=Peak
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 69% RH
<b>Tested By</b>	Jed Wu		

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	66.47	23.3 QP	40.0	-16.7	1.27 H	277	33.5	-10.2
2	98.45	21.8 QP	43.5	-21.7	1.68 H	189	35.3	-13.5
3	136.55	25.4 QP	43.5	-18.1	1.21 H	246	34.7	-9.3
4	212.68	28.7 QP	43.5	-14.8	1.23 H	221	39.4	-10.7
5	902.00	36.4 QP	46.0	-9.6	1.00 H	226	30.1	6.3
6	*916.00	111.3 PK			1.00 H	226	104.4	6.9
7	*916.00	110.8 AV			1.00 H	226	103.9	6.9
8	928.00	37.6 QP	46.0	-8.4	1.00 H	226	30.7	6.9

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.

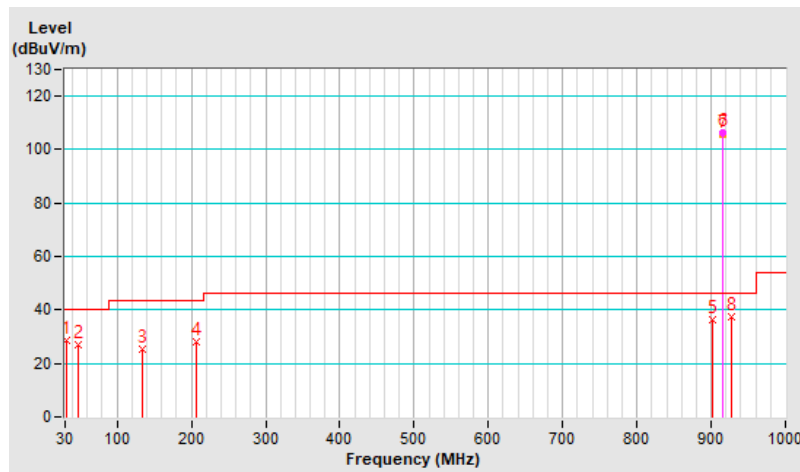


<b>RF Mode</b>	Sub-GHz	<b>Channel</b>	CH 6 : 916 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120kHz, DET=Quasi-Peak PK: RB=100 kHz, VB=300 kHz, DET=Peak AV: RB=100 kHz, VB=10 Hz, DET=Peak
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 69% RH
<b>Tested By</b>	Jed Wu		

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	32.11	28.4 QP	40.0	-11.6	1.15 V	268	39.2	-10.8
2	48.60	26.9 QP	40.0	-13.1	1.10 V	231	35.9	-9.0
3	133.52	25.3 QP	43.5	-18.2	1.69 V	207	34.8	-9.5
4	206.30	28.3 QP	43.5	-15.2	1.28 V	66	39.2	-10.9
5	902.00	36.1 QP	46.0	-9.9	1.84 V	185	29.8	6.3
6	*916.00	106.1 PK			1.84 V	185	99.2	6.9
7	*916.00	105.6 AV			1.84 V	185	98.7	6.9
8	928.00	37.5 QP	46.0	-8.5	1.84 V	185	30.6	6.9

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.

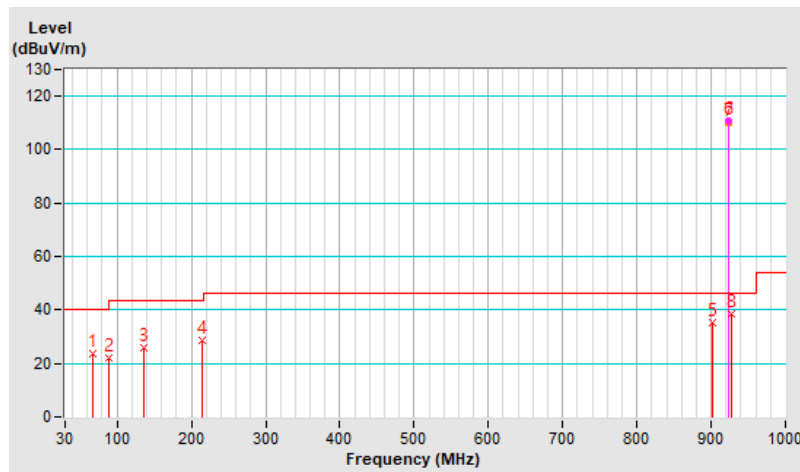


<b>RF Mode</b>	Sub-GHz	<b>Channel</b>	CH 10 : 924 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120kHz, DET=Quasi-Peak PK: RB=100 kHz, VB=300 kHz, DET=Peak AV: RB=100 kHz, VB=10 Hz, DET=Peak
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 69% RH
<b>Tested By</b>	Jed Wu		

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	66.55	23.7 QP	40.0	-16.3	1.31 H	275	33.9	-10.2
2	89.48	22.1 QP	43.5	-21.4	1.58 H	149	36.5	-14.4
3	136.56	26.1 QP	43.5	-17.4	1.18 H	236	35.4	-9.3
4	214.00	28.6 QP	43.5	-14.9	1.25 H	211	39.3	-10.7
5	902.00	35.3 QP	46.0	-10.7	1.00 H	225	29.0	6.3
6	*924.00	110.6 PK			1.00 H	225	103.7	6.9
7	*924.00	110.0 AV			1.00 H	225	103.1	6.9
8	<b>928.00</b>	<b>38.6 QP</b>	<b>46.0</b>	<b>-7.4</b>	<b>1.00 H</b>	<b>225</b>	<b>31.7</b>	<b>6.9</b>

**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 frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.



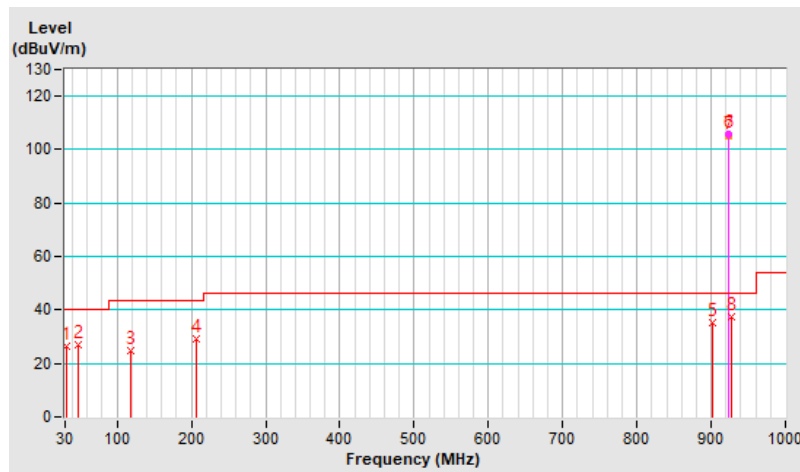


<b>RF Mode</b>	Sub-GHz	<b>Channel</b>	CH 10 : 924 MHz
<b>Frequency Range</b>	30 MHz ~ 1 GHz	<b>Detector Function &amp; Bandwidth</b>	QP: RB=120kHz, DET=Quasi-Peak PK: RB=100 kHz, VB=300 kHz, DET=Peak AV: RB=100 kHz, VB=10 Hz, DET=Peak
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 69% RH
<b>Tested By</b>	Jed Wu		

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	32.22	26.3 QP	40.0	-13.7	1.10 V	265	37.1	-10.8
2	48.62	26.9 QP	40.0	-13.1	1.03 V	225	35.9	-9.0
3	118.79	25.0 QP	43.5	-18.5	1.27 V	183	36.1	-11.1
4	206.31	29.1 QP	43.5	-14.4	1.30 V	77	40.0	-10.9
5	902.00	35.2 QP	46.0	-10.8	1.82 V	183	28.9	6.3
6	*924.00	105.8 PK			1.82 V	183	98.9	6.9
7	*924.00	105.3 AV			1.82 V	183	98.4	6.9
8	928.00	37.6 QP	46.0	-8.4	1.82 V	183	30.7	6.9

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.



## 7.7 Unwanted Emissions above 1 GHz

<b>RF Mode</b>	Sub-GHz	<b>Channel</b>	CH 1 : 906 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 69% RH
<b>Tested By</b>	Jed Wu		

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	#1812.00	52.3 PK			3.78 H	78	56.2	-3.9
2	#1812.00	45.3 AV			3.78 H	78	49.2	-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	#1812.00	56.8 PK			1.44 V	221	60.7	-3.9
2	#1812.00	51.8 AV			1.44 V	221	55.7	-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)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " # ": The radiated frequency is out of the restricted band, the limit was restricted at the Conducted Out of Band Emissions.



<b>RF Mode</b>	Sub-GHz	<b>Channel</b>	CH 6 : 916 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 69% RH
<b>Tested By</b>	Jed Wu		

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	#1832.00	52.4 PK			3.75 H	233	56.0	-3.6
2	#1832.00	46.3 AV			3.75 H	233	49.9	-3.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#1832.00	58.4 PK			1.42 V	239	62.0	-3.6
2	#1832.00	53.0 AV			1.42 V	239	56.6	-3.6

**Remarks:**

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



<b>RF Mode</b>	Sub-GHz	<b>Channel</b>	CH 10 : 924 MHz
<b>Frequency Range</b>	1 GHz ~ 25 GHz	<b>Detector Function &amp; Bandwidth</b>	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=10 Hz, DET=Peak
<b>Input Power</b>	120 Vac, 60 Hz	<b>Environmental Conditions</b>	23°C, 69% RH
<b>Tested By</b>	Jed Wu		

**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	#1848.00	54.0 PK			3.15 H	264	57.3	-3.3
2	#1848.00	48.7 AV			3.15 H	264	52.0	-3.3

**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	#1848.00	58.0 PK			1.42 V	237	61.3	-3.3
2	#1848.00	53.0 AV			1.42 V	237	56.3	-3.3

**Remarks:**

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

## 8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

## 9 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.

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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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