

FCC Test Report

Report No.: RFBCKS-WTW-P23010439-3

FCC ID: 2AAAS-CP07

Test Model: CP07

Received Date: 2023/1/29

Test Date: 2023/2/24 ~ 2023/4/24

Issued Date: 2023/4/26

Applicant: Vivint, Inc.

Address: 4931 N. 300 W., Provo, UT 84604 USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

| Issue No. | Description | Date Issued |
|------------------------|-------------------|-------------|
| RFBCKS-WTW-P23010439-3 | Original release. | 2023/4/26 |

1 Certificate of Conformity

Product: Vivint Smart Hub Pro

Brand: Vivint

Test Model: CP07

Sample Status: Engineering sample

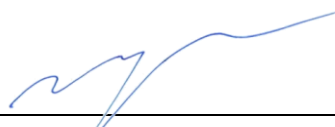
Applicant: Vivint, Inc.

Test Date: 2023/2/24 ~ 2023/4/24

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.249)
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :  _____, **Date:** 2023/4/26
Claire Kuan / Specialist

Approved by :  _____, **Date:** 2023/4/26
May Chen / Manager

2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (SECTION 15.249) | | | |
|--|--|--------|---|
| FCC Clause | Test Item | Result | Remarks |
| 15.207 | AC Power Conducted Emission | Pass | Meet the requirement of limit. Minimum passing margin is -10.46 dB at 0.43129 MHz. |
| 15.209 15.249 15.249 (d) | Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209 | Pass | Meet the requirement of limit. Minimum passing margin is -1.0 dB at 908.40 MHz. |
| 15.215 (c) | 20dB Bandwidth | Pass | Meet the requirement of limit |
| 15.203 | Antenna Requirement | Pass | No antenna connector is used. |

Note:

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

2.1 Measurement Uncertainty

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

| Measurement | Frequency | Expanded Uncertainty (k=2) (\pm) |
|--------------------------------|------------------|--------------------------------------|
| Radiated Emissions up to 1 GHz | 9 kHz ~ 30 MHz | 3.1 dB |
| | 30 MHz ~ 1 GHz | 5.5 dB |
| Radiated Emissions above 1 GHz | 1 GHz ~ 18 GHz | 5.1 dB |
| | 18 GHz ~ 40 GHz | 5.3 dB |
| | 40 GHz ~ 100 GHz | 3.1 dB |

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

| | |
|---------------------|--------------------------|
| Product | Vivint Smart Hub Pro |
| Brand | Vivint |
| Test Model | CP07 |
| Status of EUT | Engineering sample |
| Power Supply Rating | 12Vdc from power adapter |
| Modulation Type | FSK |
| Transfer Rate | 9.6/40/100 kbit/s |
| Operating Frequency | 908.4 ~ 916MHz |
| Number of Channel | 3 |
| Antenna Type | Refer to Note |
| Antenna Connector | Refer to Note |
| Accessory Device | Refer to Note |
| Cable Supplied | NA |

Note:

1. The EUT uses following accessories.

| Battery 1 | | |
|--------------|------------------------|---|
| Brand | Model | Specification |
| EVE | HB1021 | Power Rating : 3.6V |
| AC Adapter 1 | | |
| Brand | Model | Specification |
| ZB-Power | ZB-H120020A-88 | AC Input : 100-240V, 50/60Hz, 0.6A DC Output : 12V, 2.0A DC Output Cable : 1.51m Plug : US |
| AC Adapter 2 | | |
| Brand | Model | Specification |
| Honor | ADS-24FUD-12 12024EPCU | AC Input : 100-240V, 50/60Hz, 0.6A DC Output : 12V, 2.0A DC Output Cable : 1.51m Plug : US |

Note: From the above adapters, the radiated emissions & conducted emissions worse case was found in **AC Adapter 2**. Therefore only the test data of the mode was recorded in this report.

| SIM Card | |
|----------|-------|
| | Brand |
| | VZW |
| SIM Card | |
| | Brand |
| | AT&T |

2. There are Bluetooth, WLAN (2.4 GHz & 5 GHz), WWAN(LTE), Z-wave and DECT technology used for the EUT.

3. Simultaneously transmission condition.

| Condition | Technology | | | |
|-----------|----------------|-----------|--------|------|
| 1 | Bluetooth | WWAN | Z-wave | DECT |
| 2 | WLAN (2.4 GHz) | Bluetooth | Z-wave | DECT |
| 3 | WLAN (5 GHz) | Bluetooth | Z-wave | DECT |

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

4. The antenna information is listed as below.

| RF Chain NO. | Brand | Model | Antenna Net Gain(dBi) | Frequency range | Antenna Type | Connector Type |
|------------------|-------|------------------|-----------------------|-----------------|--------------|----------------|
| WLAN (chain 0) | WNC | 95XKAB15.GA4 | 2.76 | 2.4~2.4835GHz | Dipole | ipex(MHF) |
| | | | 2.65 | 5.15~5.85GHz | | |
| WLAN (chain 1) | WNC | 95XKAB15.GA5 | 2.90 | 2.4~2.4835GHz | Dipole | ipex(MHF) |
| | | | 2.06 | 5.15~5.85GHz | | |
| BT 2.4G | WNC | On board | 0.15 | 2.4~2.4835GHz | PIFA | none |
| Z-Wave | WNC | 48XKAB2C.0GAFHYE | 0.77 | 908-916MHz | PIFA | none |
| 345MHz (Rx Only) | WNC | 3S.004KJ.111 | 1.02 | 345 MHz | Dipole | none |
| LTE Main | WNC | 48XKAB20.0GAFHYE | 1.23 | 1850 -1910MHz | PIFA | none |
| | | | 0.21 | 1710-1755MHz | | |
| | | | 0.41 | 824-849 MHz | | |
| | | | 0.00 | 698-716MHz | | |
| | | | 0.22 | 777-787MHz | | |
| LTE AUX | WNC | 95XKAB15.GA3 | 1.12 | 1850 -1910MHz | PIFA | ipex(MHF) |
| | | | 0.80 | 1710-1755MHz | | |
| | | | -1.14 | 824-849 MHz | | |
| | | | -3.42 | 698-716MHz | | |
| | | | -2.04 | 777-787MHz | | |
| DECT (ANT0) | WNC | 95XKAB15.0GA | 3.40 | 1920MHz-1930MHz | Dipole | none |
| DECT (ANT1) | WNC | 95XKAB15.0GA | 3.60 | 1920MHz-1930MHz | Dipole | none |

5. The EUT contains certified WWAN module which FCC ID: XMR201909EG91NAX (Brand: QUECTEL; Model: EG91-NAX).

6. 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.

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

3.2 Description of Test Modes

3 channels are provided to this EUT:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------------|---------|--------------------|
| 1 | 908.4 (40kbit/s) | 3 | 916 (100kbit/s) |
| 2 | 908.42 (9.6kbit/s) | | |

3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT CONFIGURE MODE | APPLICABLE TO | | | | DESCRIPTION |
|--------------------|---------------|-----------|-----|----|-------------|
| | RE \geq 1G | RE $<$ 1G | PLC | BW | |
| - | √ | √ | √ | √ | - |

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

PLC: Power Line Conducted Emission

BW: 20dB Bandwidth Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned **X-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.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1 to 3 | 1, 2, 3 | 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.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1 to 3 | 1, 2, 3 | 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.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1 to 3 | 2 | FSK |

20dB Bandwidth Measurement:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- 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.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1 to 3 | 1, 2, 3 | FSK |

Test Condition:

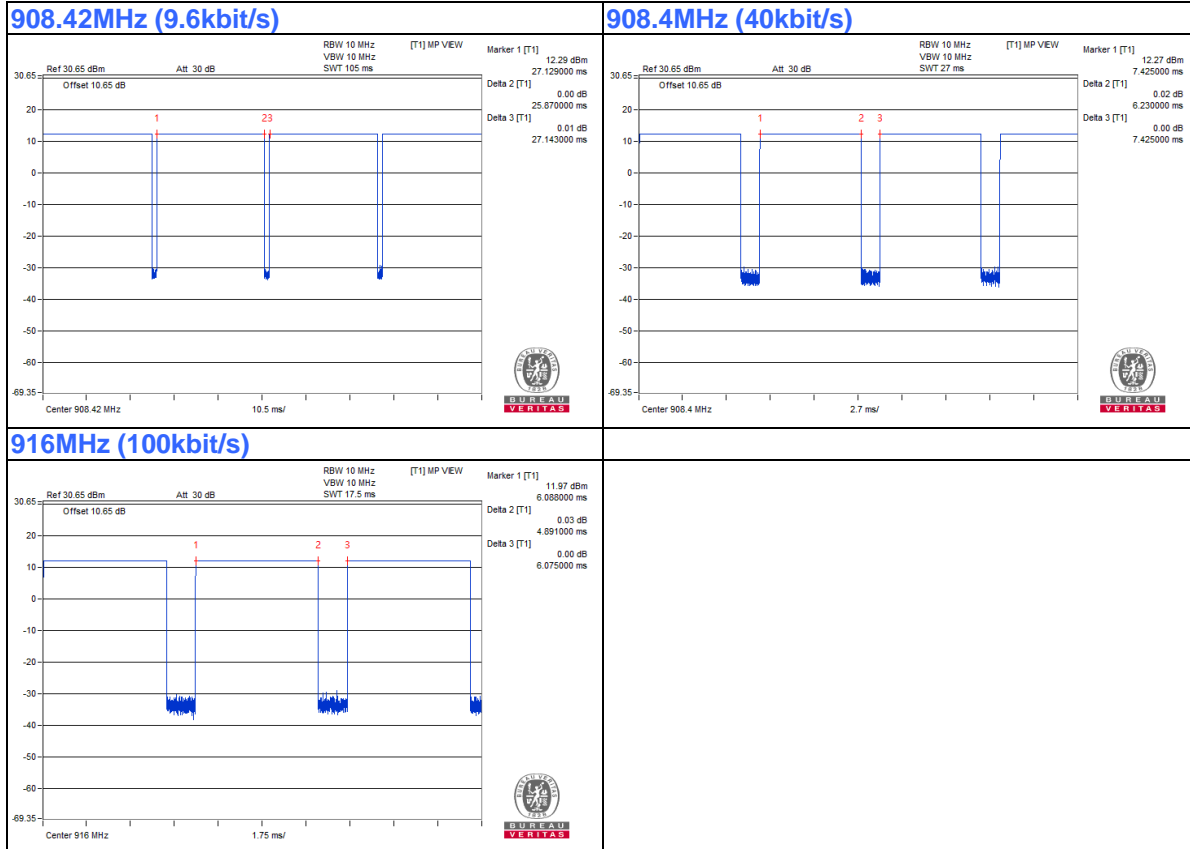
| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---------------|--------------------------|--------------|------------|
| RE \geq 1G | 24deg. C, 68%RH | 120Vac, 60Hz | Tom Yang |
| RE $<$ 1G | 26deg. C, 68%RH | 120Vac, 60Hz | Tom Yang |
| PLC | 25deg. C, 75%RH | 120Vac, 60Hz | Carter Lin |
| BW | 25deg. C, 60%RH | 120Vac, 60Hz | John Peng |

3.3 Duty Cycle of Test Signal

908.42MHz (9.6kbit/s): Duty cycle = 25.87 ms / 27.143 ms x 100% = 95.3%, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 0.21 \text{ dB}$

908.4MHz (40kbit/s): Duty cycle = 6.23 ms / 7.425 ms x 100% = 83.9%, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 0.76 \text{ dB}$

916MHz (100kbit/s): Duty cycle = 4.891 ms / 6.075 ms x 100% = 80.5%, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 0.94 \text{ dB}$



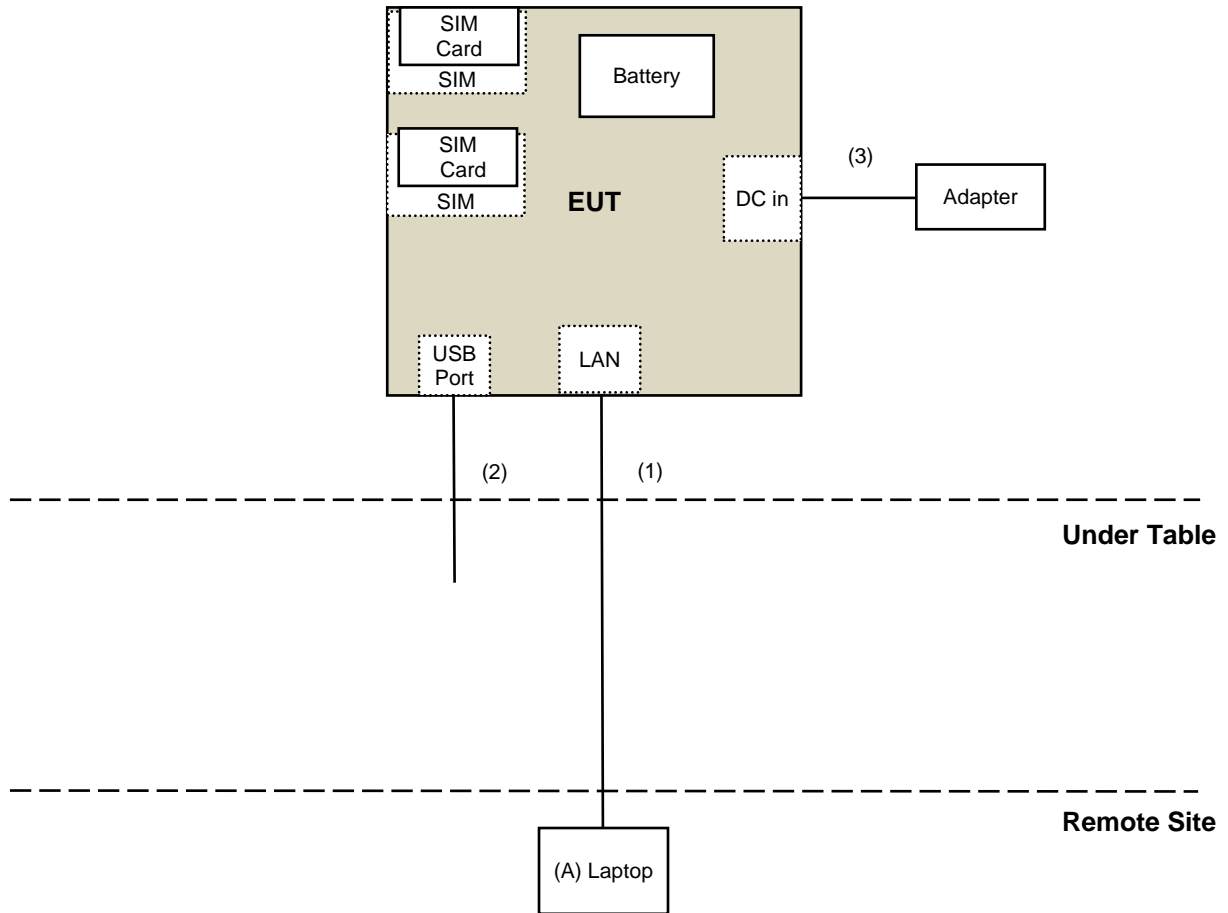
3.4 Description of Support Units

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

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|----|---------|--------|-------------------|------------|--------|-----------------|
| A | Laptop | Lenovo | 20U5S01X00 L14 | PF-1ANPYA | N/A | Provided by Lab |

| ID | Cable Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|--------------------|------|------------|--------------------|--------------|-----------------------|
| 1 | RJ 45 | 1 | 10 | No | 0 | Provided by Lab |
| 2 | Micro USB Cable | 1 | 1 | No | 0 | Provided by Lab |
| 3 | DC Cable | 1 | 1.51 | No | 0 | Supplied by applicant |

3.4.1 Configuration of System under Test



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:

FCC Part 15, Subpart C (15.249)

ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

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

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

Note:

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

4.1.2 Test Instruments

For radiated emission test:

| Description & Manufacturer | Model No. | Serial No. | Calibrated Date | Calibrated Until |
|---|----------------------|-------------|-----------------|------------------|
| Spectrum Analyzer KEYSIGHT | N9030B | MY57142938 | 2022/4/26 | 2023/4/25 |
| Software | ADT_Radiated_V8.7.08 | NA | NA | NA |
| Boresight Antenna Tower & Turn Table Max-Full | MF-7802BS | MF780208530 | NA | NA |
| Pre_Amplifier Agilent | 8447D | 2944A10636 | 2023/3/12 | 2024/3/11 |
| LOOP ANTENNA Electro-Metrics | EM-6879 | 264 | 2023/2/21 | 2024/2/20 |
| RF Coaxial Cable JYEBO | 5D-FB | LOOPCAB-001 | 2022/12/19 | 2023/12/18 |
| RF Coaxial Cable JYEBO | 5D-FB | LOOPCAB-002 | 2022/12/19 | 2023/12/18 |
| Pre_Amplifier EMCI | EMC330N | 980701 | 2023/2/18 | 2024/2/17 |
| Trilog Broadband Antenna Schwarzbeck | VULB 9168 | 9168-406 | 2022/10/21 | 2023/10/20 |
| RF Coaxial Cable COMMATE/PEWC | 8D | 966-4-1 | 2023/2/18 | 2024/2/17 |
| RF Coaxial Cable COMMATE/PEWC | 8D | 966-4-2 | 2023/2/18 | 2024/2/17 |
| RF Coaxial Cable COMMATE/PEWC | 8D | 966-4-3 | 2023/2/18 | 2024/2/17 |
| Fixed attenuator Mini-Circuits | UNAT-5+ | PAD-ATT5-03 | 2022/12/28 | 2023/12/27 |
| Horn Antenna Schwarzbeck | BBHA 9120D | 9120D-783 | 2022/11/13 | 2023/11/12 |
| Pre_Amplifier EMCI | EMC12630SE | 980688 | 2022/10/4 | 2023/10/3 |
| RF Cable-Frequency Range : 1-26.5GHz EMCI | EMC104-SM-SM-1200 | 160922 | 2022/12/15 | 2023/12/14 |
| RF Coaxial Cable EMCI | EMC104-SM-SM-2000 | 180502 | 2022/4/25 | 2023/4/24 |
| RF Coaxial Cable EMCI | EMC104-SM-SM-6000 | 210704 | 2022/11/4 | 2023/11/3 |
| Pre_Amplifier EMCI | EMC184045SE | 980387 | 2022/12/28 | 2023/12/27 |
| Horn Antenna Schwarzbeck | BBHA 9170 | 9170-739 | 2022/11/13 | 2023/11/12 |
| RF Cable-Frequency range: 1-40GHz EMCI | EMC102-KM-KM-1200 | 160924 | 2022/12/28 | 2023/12/27 |
| RF Coaxial Cable EMCI | EMC-KM-KM-4000 | 200214 | 2023/2/20 | 2024/2/19 |

Note: 1. The test was performed in 966 Chamber No. 4.

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

3. Tested Date: 2023/4/24

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission 30MHz to 10GHz

- 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:

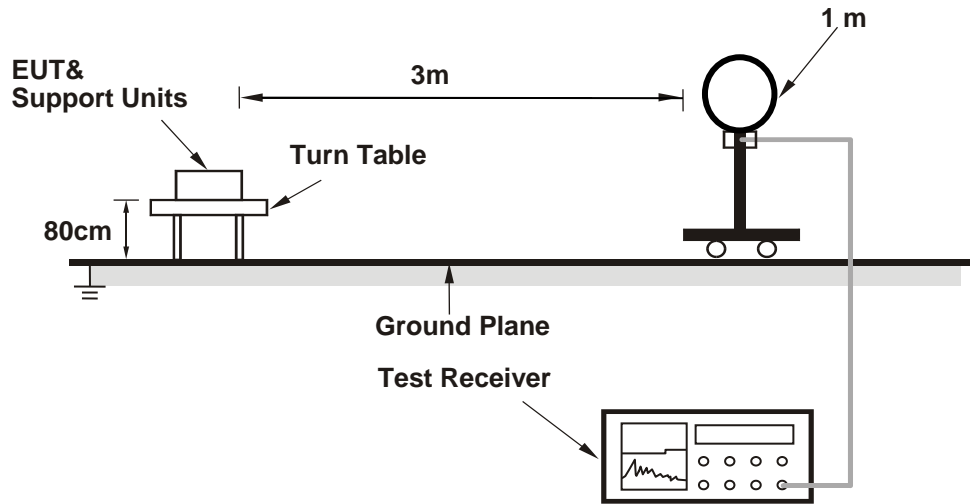
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

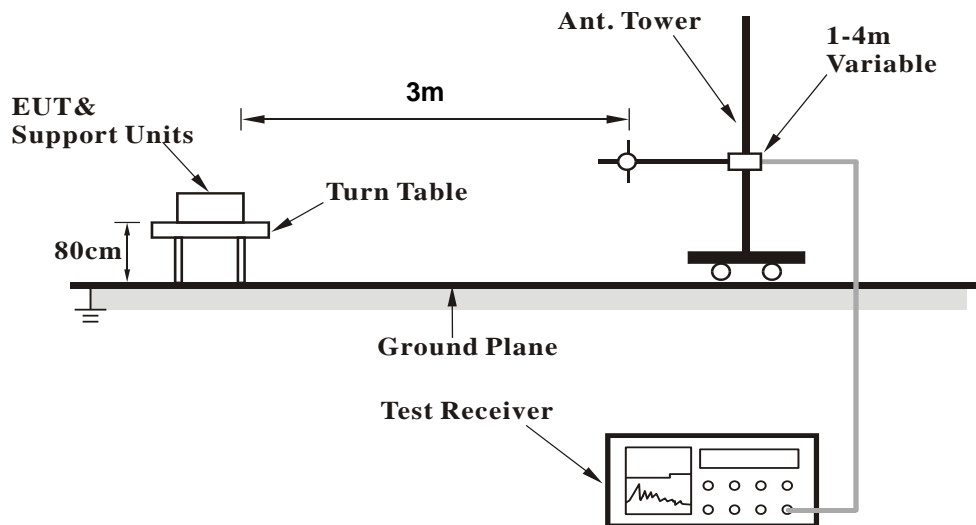
No deviation.

4.1.5 Test Setup

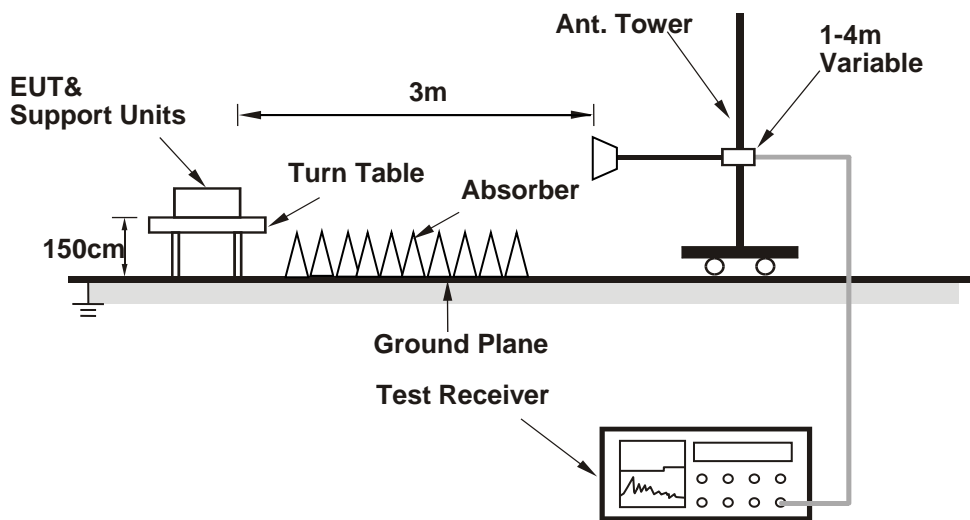
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission 1GHz to 10GHz



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

4.1.6 EUT Operating Conditions

- a. Placed the EUT on the testing table.
- b. Controlling software (Putty.exe paste zwave_command.txt) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

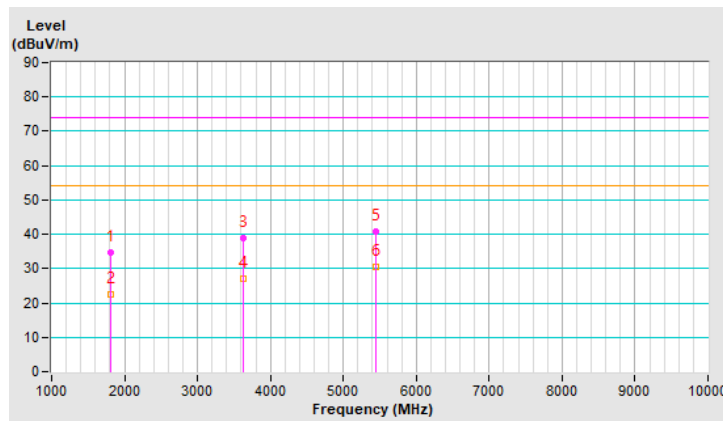
4.1.7 Test Results
Above 1GHz Data :

| | | | |
|------------------------|----------------|--|---|
| RF Mode | Zwave | Channel | CH 1 : 908.4 MHz |
| Frequency Range | 1 GHz ~ 10 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 200 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 22°C, 72% RH |
| Tested By | Tom Yang | | |

| 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 | 1816.80 | 34.7 PK | 74.0 | -39.3 | 1.86 H | 42 | 38.3 | -3.6 |
| 2 | 1816.80 | 22.6 AV | 54.0 | -31.4 | 1.86 H | 42 | 26.2 | -3.6 |
| 3 | 3633.60 | 38.9 PK | 74.0 | -35.1 | 1.63 H | 202 | 37.9 | 1.0 |
| 4 | 3633.60 | 27.2 AV | 54.0 | -26.8 | 1.63 H | 202 | 26.2 | 1.0 |
| 5 | 5450.40 | 40.8 PK | 74.0 | -33.2 | 1.54 H | 301 | 36.4 | 4.4 |
| 6 | 5450.40 | 30.4 AV | 54.0 | -23.6 | 1.54 H | 301 | 26.0 | 4.4 |

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.

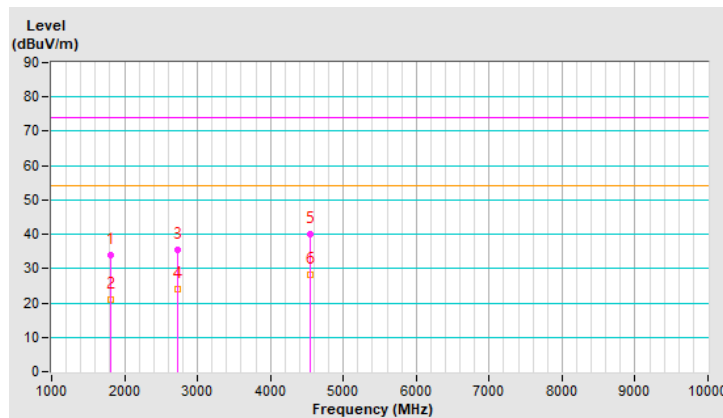


| | | | |
|------------------------|----------------|--|---|
| RF Mode | Zwave | Channel | CH 1 : 908.4 MHz |
| Frequency Range | 1 GHz ~ 10 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 200 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 22°C, 72% RH |
| Tested By | Tom Yang | | |

| 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 | 1816.80 | 33.9 PK | 74.0 | -40.1 | 1.42 V | 168 | 37.5 | -3.6 |
| 2 | 1816.80 | 21.1 AV | 54.0 | -32.9 | 1.42 V | 168 | 24.7 | -3.6 |
| 3 | 2725.20 | 35.3 PK | 74.0 | -38.7 | 1.63 V | 243 | 35.9 | -0.6 |
| 4 | 2725.20 | 24.0 AV | 54.0 | -30.0 | 1.63 V | 243 | 24.6 | -0.6 |
| 5 | 4542.00 | 40.1 PK | 74.0 | -33.9 | 2.00 V | 106 | 37.4 | 2.7 |
| 6 | 4542.00 | 28.2 AV | 54.0 | -25.8 | 2.00 V | 106 | 25.5 | 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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.



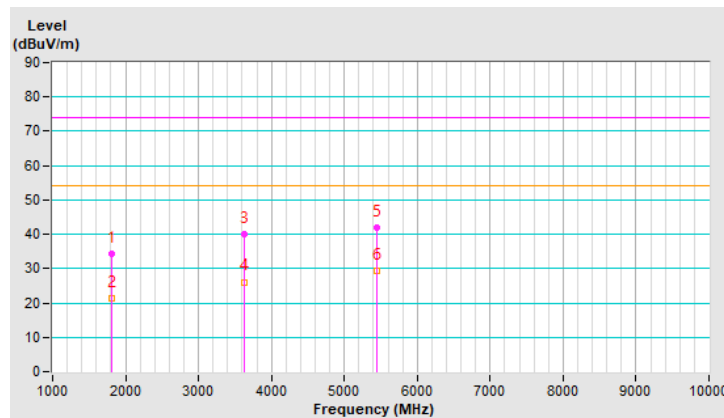
| | | | |
|------------------------|----------------|--|---|
| RF Mode | Zwave | Channel | CH 2 : 908.42 MHz |
| Frequency Range | 1 GHz ~ 10 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 200 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 22°C, 72% RH |
| Tested By | Tom Yang | | |

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 | 1816.84 | 34.1 PK | 74.0 | -39.9 | 1.82 H | 61 | 37.7 | -3.6 |
| 2 | 1816.84 | 21.4 AV | 54.0 | -32.6 | 1.82 H | 61 | 25.0 | -3.6 |
| 3 | 3633.68 | 40.1 PK | 74.0 | -33.9 | 1.70 H | 231 | 39.1 | 1.0 |
| 4 | 3633.68 | 26.1 AV | 54.0 | -27.9 | 1.70 H | 231 | 25.1 | 1.0 |
| 5 | 5450.52 | 41.9 PK | 74.0 | -32.1 | 1.65 H | 288 | 37.5 | 4.4 |
| 6 | 5450.52 | 29.3 AV | 54.0 | -24.7 | 1.65 H | 288 | 24.9 | 4.4 |

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.

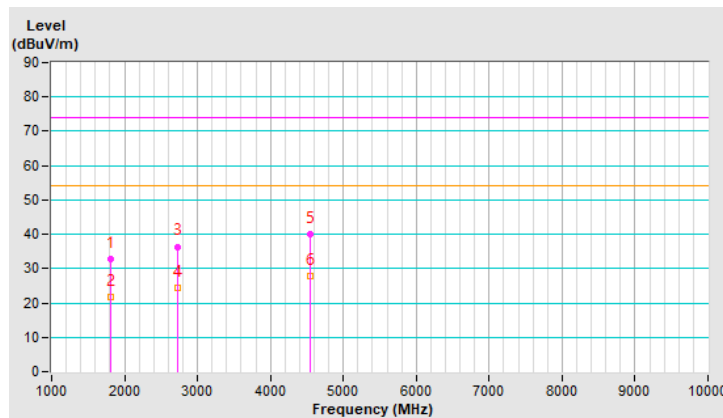


| | | | |
|------------------------|----------------|--|---|
| RF Mode | Zwave | Channel | CH 2 : 908.42 MHz |
| Frequency Range | 1 GHz ~ 10 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 200 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 22°C, 72% RH |
| Tested By | Tom Yang | | |

| 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 | 1816.84 | 32.9 PK | 74.0 | -41.1 | 1.40 V | 147 | 36.5 | -3.6 |
| 2 | 1816.84 | 21.7 AV | 54.0 | -32.3 | 1.40 V | 147 | 25.3 | -3.6 |
| 3 | 2725.26 | 36.4 PK | 74.0 | -37.6 | 1.59 V | 223 | 37.0 | -0.6 |
| 4 | 2725.26 | 24.4 AV | 54.0 | -29.6 | 1.59 V | 223 | 25.0 | -0.6 |
| 5 | 4542.10 | 39.9 PK | 74.0 | -34.1 | 1.81 V | 122 | 37.2 | 2.7 |
| 6 | 4542.10 | 27.9 AV | 54.0 | -26.1 | 1.81 V | 122 | 25.2 | 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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.



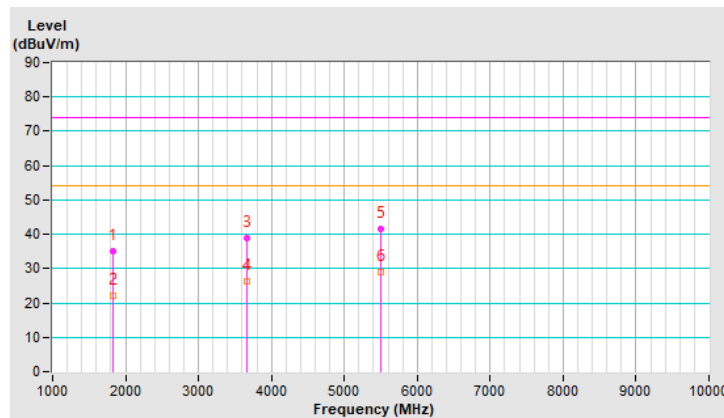
| | | | |
|------------------------|----------------|--|---|
| RF Mode | Zwave | Channel | CH 3 : 916 MHz |
| Frequency Range | 1 GHz ~ 10 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 200 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 22°C, 72% RH |
| Tested By | Tom Yang | | |

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 | 35.1 PK | 74.0 | -38.9 | 1.35 H | 219 | 38.6 | -3.5 |
| 2 | 1832.00 | 22.0 AV | 54.0 | -32.0 | 1.35 H | 219 | 25.5 | -3.5 |
| 3 | 3664.00 | 38.8 PK | 74.0 | -35.2 | 1.44 H | 157 | 37.7 | 1.1 |
| 4 | 3664.00 | 26.2 AV | 54.0 | -27.8 | 1.44 H | 157 | 25.1 | 1.1 |
| 5 | 5496.00 | 41.6 PK | 74.0 | -32.4 | 1.78 H | 257 | 37.1 | 4.5 |
| 6 | 5496.00 | 29.0 AV | 54.0 | -25.0 | 1.78 H | 257 | 24.5 | 4.5 |

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.

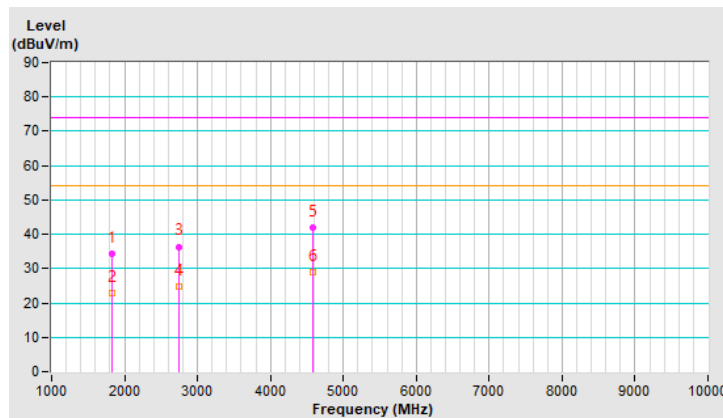


| | | | |
|------------------------|----------------|--|---|
| RF Mode | Zwave | Channel | CH 3 : 916 MHz |
| Frequency Range | 1 GHz ~ 10 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 200 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 22°C, 72% RH |
| Tested By | Tom Yang | | |

| 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 | 34.4 PK | 74.0 | -39.6 | 1.59 V | 183 | 37.9 | -3.5 |
| 2 | 1832.00 | 22.7 AV | 54.0 | -31.3 | 1.59 V | 183 | 26.2 | -3.5 |
| 3 | 2748.00 | 36.4 PK | 74.0 | -37.6 | 1.81 V | 235 | 36.9 | -0.5 |
| 4 | 2748.00 | 24.8 AV | 54.0 | -29.2 | 1.81 V | 235 | 25.3 | -0.5 |
| 5 | 4580.00 | 42.0 PK | 74.0 | -32.0 | 2.09 V | 77 | 39.2 | 2.8 |
| 6 | 4580.00 | 28.9 AV | 54.0 | -25.1 | 2.09 V | 77 | 26.1 | 2.8 |

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.



Below 1GHz Data:

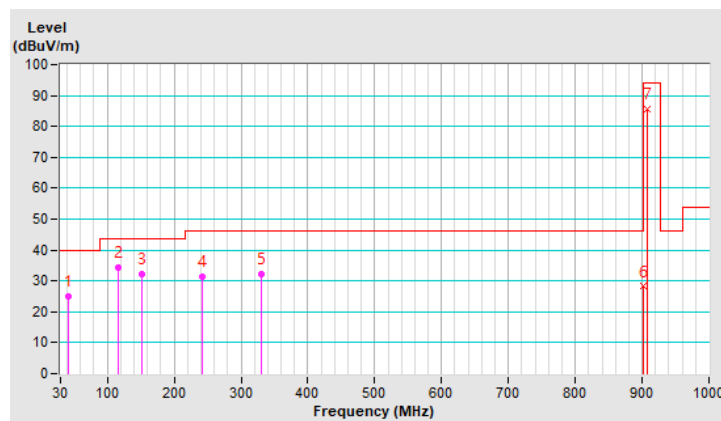
| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | Zwave | Channel | CH 1 : 908.4 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 26°C, 68% RH |
| Tested By | Tom Yang | | |

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 | 42.12 | 25.2 QP | 40.0 | -14.8 | 2.00 H | 231 | 38.0 | -12.8 |
| 2 | 115.93 | 34.5 QP | 43.5 | -9.0 | 3.00 H | 299 | 49.0 | -14.5 |
| 3 | 150.82 | 32.3 QP | 43.5 | -11.2 | 2.00 H | 237 | 44.2 | -11.9 |
| 4 | 242.94 | 31.3 QP | 46.0 | -14.7 | 1.50 H | 257 | 44.4 | -13.1 |
| 5 | 330.24 | 32.1 QP | 46.0 | -13.9 | 1.00 H | 285 | 42.0 | -9.9 |
| 6 | 902.00 | 28.2 QP | 46.0 | -17.8 | 1.58 H | 175 | 24.9 | 3.3 |
| 7 | *908.40 | 85.5 QP | 94.0 | -8.5 | 1.58 H | 175 | 82.1 | 3.4 |

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.
5. " * ": Fundamental frequency.

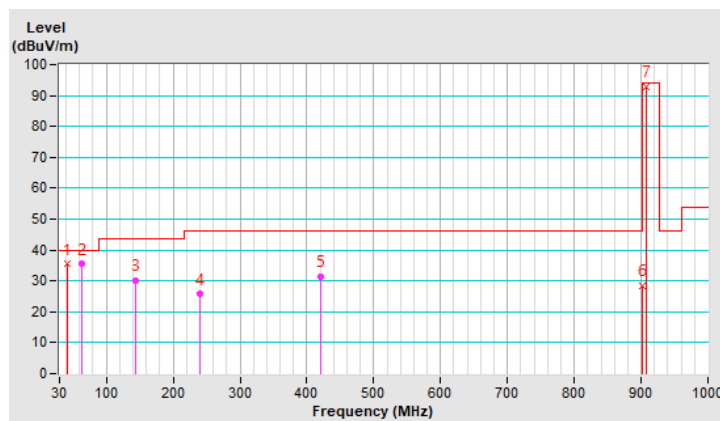


| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | Zwave | Channel | CH 1 : 908.4 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 26°C, 68% RH |
| Tested By | Tom Yang | | |

| 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 | 42.12 | 35.4 QP | 40.0 | -4.6 | 1.00 V | 284 | 48.2 | -12.8 |
| 2 | 63.40 | 35.4 QP | 40.0 | -4.6 | 1.50 V | 137 | 48.9 | -13.5 |
| 3 | 143.00 | 30.2 QP | 43.5 | -13.3 | 1.00 V | 299 | 42.3 | -12.1 |
| 4 | 240.61 | 25.7 QP | 46.0 | -20.3 | 1.50 V | 339 | 38.9 | -13.2 |
| 5 | 420.46 | 31.5 QP | 46.0 | -14.5 | 1.50 V | 358 | 38.6 | -7.1 |
| 6 | 902.00 | 28.6 QP | 46.0 | -17.4 | 1.22 V | 244 | 25.3 | 3.3 |
| 7 | *908.40 | 93.0 QP | 94.0 | -1.0 | 1.22 V | 244 | 89.6 | 3.4 |

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.
5. " * ": Fundamental frequency.



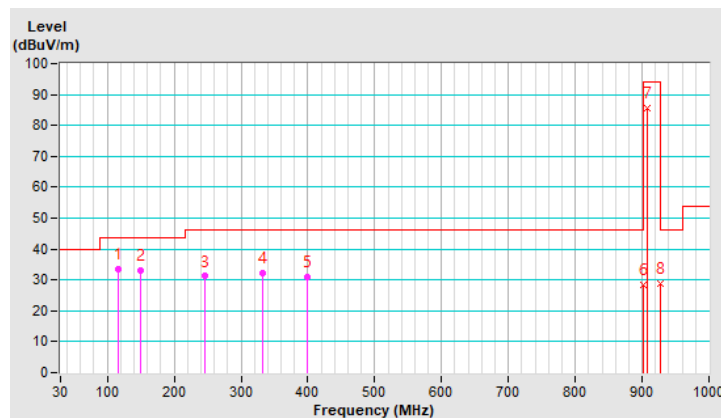
| | | | |
|------------------------|----------------|--|-------------------|
| RF Mode | Zwave | Channel | CH 2 : 908.42 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 26°C, 68% RH |
| Tested By | Tom Yang | | |

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 | 116.80 | 33.5 QP | 43.5 | -10.0 | 1.50 H | 294 | 47.9 | -14.4 |
| 2 | 149.17 | 33.2 QP | 43.5 | -10.3 | 1.50 H | 254 | 45.1 | -11.9 |
| 3 | 246.65 | 31.2 QP | 46.0 | -14.8 | 1.00 H | 333 | 44.1 | -12.9 |
| 4 | 332.22 | 32.4 QP | 46.0 | -13.6 | 1.00 H | 333 | 42.2 | -9.8 |
| 5 | 398.94 | 31.0 QP | 46.0 | -15.0 | 1.50 H | 55 | 38.9 | -7.9 |
| 6 | 902.00 | 28.5 QP | 46.0 | -17.5 | 1.67 H | 175 | 25.2 | 3.3 |
| 7 | *908.42 | 85.6 QP | 94.0 | -8.4 | 1.67 H | 175 | 82.2 | 3.4 |
| 8 | 928.00 | 28.9 QP | 46.0 | -17.1 | 1.67 H | 175 | 25.1 | 3.8 |

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.
5. " * ": Fundamental frequency.



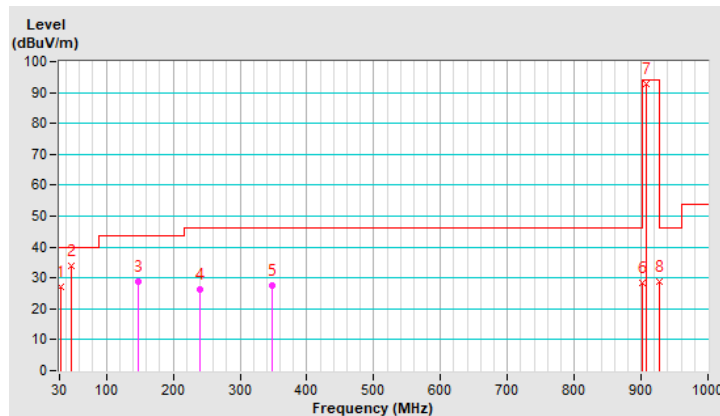
| | | | |
|------------------------|----------------|--|-------------------|
| RF Mode | Zwave | Channel | CH 2 : 908.42 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 26°C, 68% RH |
| Tested By | Tom Yang | | |

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 | 31.45 | 27.2 QP | 40.0 | -12.8 | 1.00 V | 194 | 41.0 | -13.8 |
| 2 | 48.11 | 33.8 QP | 40.0 | -6.2 | 2.00 V | 135 | 46.3 | -12.5 |
| 3 | 147.69 | 28.7 QP | 43.5 | -14.8 | 1.00 V | 299 | 40.7 | -12.0 |
| 4 | 241.02 | 26.3 QP | 46.0 | -19.7 | 1.50 V | 333 | 39.5 | -13.2 |
| 5 | 347.44 | 27.6 QP | 46.0 | -18.4 | 2.00 V | 5 | 37.2 | -9.6 |
| 6 | 902.00 | 28.5 QP | 46.0 | -17.5 | 1.29 V | 235 | 25.2 | 3.3 |
| 7 | *908.42 | 92.9 QP | 94.0 | -1.1 | 1.29 V | 235 | 89.5 | 3.4 |
| 8 | 928.00 | 28.9 QP | 46.0 | -17.1 | 1.29 V | 235 | 25.1 | 3.8 |

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.
5. " * ": Fundamental frequency.



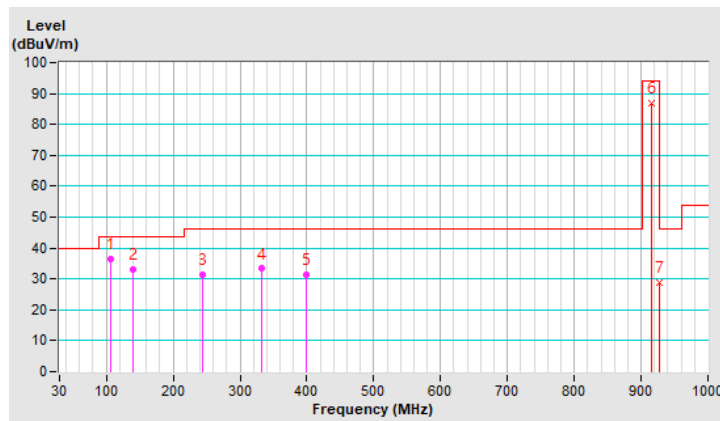
| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | Zwave | Channel | CH 3 : 916 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 26°C, 68% RH |
| Tested By | Tom Yang | | |

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 | 107.04 | 36.5 QP | 43.5 | -7.0 | 3.00 H | 294 | 51.8 | -15.3 |
| 2 | 140.31 | 33.1 QP | 43.5 | -10.4 | 1.50 H | 255 | 45.4 | -12.3 |
| 3 | 244.50 | 31.3 QP | 46.0 | -14.7 | 1.50 H | 284 | 44.4 | -13.1 |
| 4 | 332.50 | 33.3 QP | 46.0 | -12.7 | 1.00 H | 309 | 43.1 | -9.8 |
| 5 | 400.07 | 31.5 QP | 46.0 | -14.5 | 1.00 H | 58 | 39.4 | -7.9 |
| 6 | *916.00 | 86.9 QP | 94.0 | -7.1 | 1.55 H | 164 | 83.3 | 3.6 |
| 7 | 928.00 | 28.9 QP | 46.0 | -17.1 | 1.55 H | 164 | 25.1 | 3.8 |

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.
5. " * ": Fundamental frequency.

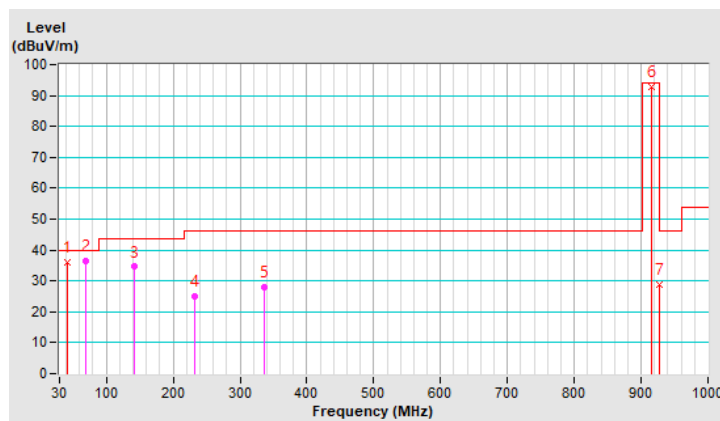


| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | Zwave | Channel | CH 3 : 916 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 26°C, 68% RH |
| Tested By | Tom Yang | | |

| 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 | 42.16 | 36.1 QP | 40.0 | -3.9 | 1.00 V | 133 | 48.9 | -12.8 |
| 2 | 68.81 | 36.4 QP | 40.0 | -3.6 | 1.00 V | 95 | 51.0 | -14.6 |
| 3 | 142.17 | 34.6 QP | 43.5 | -8.9 | 1.50 V | 294 | 46.8 | -12.2 |
| 4 | 232.02 | 25.2 QP | 46.0 | -20.8 | 1.00 V | 239 | 39.3 | -14.1 |
| 5 | 337.00 | 27.9 QP | 46.0 | -18.1 | 1.00 V | 10 | 37.7 | -9.8 |
| 6 | *916.00 | 92.9 QP | 94.0 | -1.1 | 1.19 V | 220 | 89.3 | 3.6 |
| 7 | 928.00 | 28.9 QP | 46.0 | -17.1 | 1.19 V | 230 | 25.1 | 3.8 |

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.
5. " * ": Fundamental frequency.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

| Frequency (MHz) | Conducted Limit (dBuV) | |
|-----------------|------------------------|---------|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Calibrated Date | Calibrated Until |
|----------------------------------|---------------------|------------|-----------------|------------------|
| TEST RECEIVER R&S | ESCS 30 | 847124/029 | 2022/10/14 | 2023/10/13 |
| LISN R&S | ESH3-Z5 | 848773/004 | 2022/10/18 | 2023/10/17 |
| 50 ohm terminal resistance NA | NA | EMC-01 | 2022/9/27 | 2023/9/26 |
| RF Coaxial Cable JYEBO | 5D-FB | COCCAB-001 | 2022/8/24 | 2023/8/23 |
| Fixed attenuator STI | STI02-2200-10 | 005 | 2022/8/24 | 2023/8/23 |
| Software BVADT | BVADT_Cond_V7.3.7.4 | NA | NA | NA |

Note: 1. The test was performed in Conduction 1.

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

3. Tested Date: 2023/2/24

4.2.3 Test Procedures

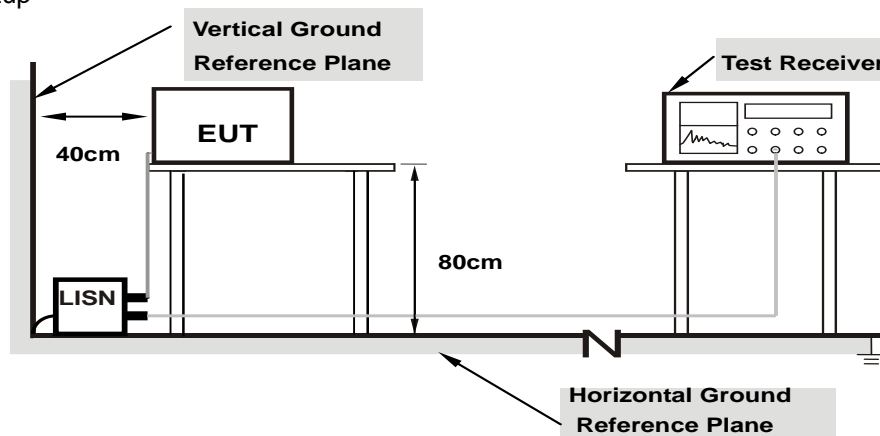
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

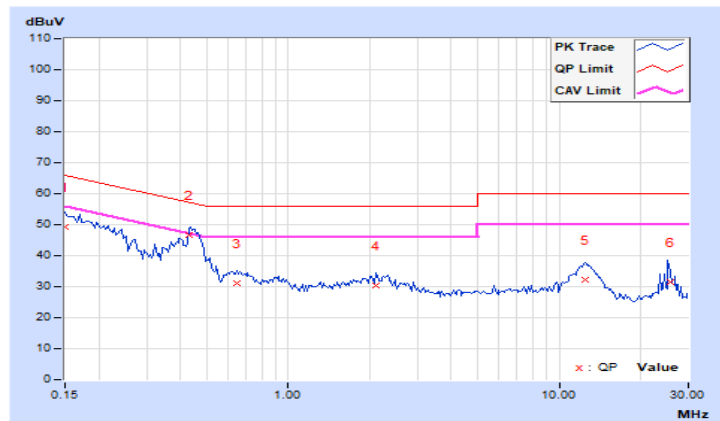
4.2.7 Test Results

| | | | |
|------------------------|----------------|---|---------------------------------------|
| RF Mode | Zwave | Channel | CH 2 : 908.42 MHz |
| Frequency Range | 150kHz ~ 30MHz | 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 | Carter Lin | | |

| Phase Of Power : Line (L) | | | | | | | | | | |
|---------------------------|-----------------|------------------------|----------------------|--------------|-----------------------|--------------|--------------|--------------|---------------|---------------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15000 | 9.96 | 39.31 | 21.86 | 49.27 | 31.82 | 66.00 | 56.00 | -16.73 | -24.18 |
| 2 | 0.43129 | 9.97 | 36.80 | 24.48 | 46.77 | 34.45 | 57.23 | 47.23 | -10.46 | -12.78 |
| 3 | 0.65000 | 9.98 | 21.24 | 13.29 | 31.22 | 23.27 | 56.00 | 46.00 | -24.78 | -22.73 |
| 4 | 2.11712 | 10.06 | 20.19 | 13.51 | 30.25 | 23.57 | 56.00 | 46.00 | -25.75 | -22.43 |
| 5 | 12.40623 | 10.64 | 21.76 | 14.46 | 32.40 | 25.10 | 60.00 | 50.00 | -27.60 | -24.90 |
| 6 | 25.87501 | 11.19 | 20.25 | 13.34 | 31.44 | 24.53 | 60.00 | 50.00 | -28.56 | -25.47 |

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

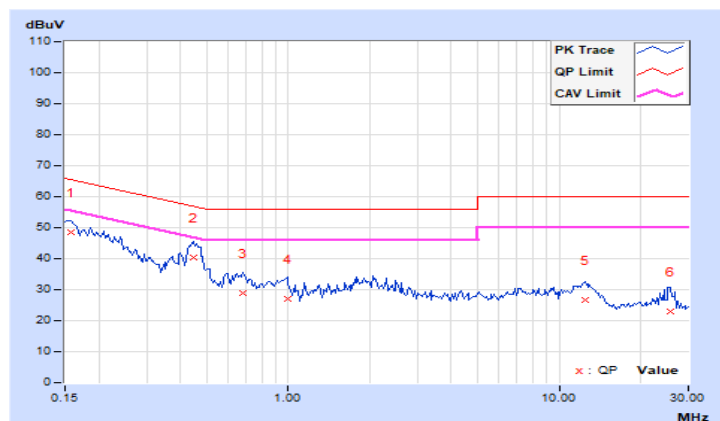


| | | | |
|------------------------|----------------|---|---------------------------------------|
| RF Mode | Zwave | Channel | CH 2 : 908.42 MHz |
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9 kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 25°C, 75% RH |
| Tested By | Carter Lin | | |

| 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 | 0.15789 | 9.93 | 38.47 | 22.19 | 48.40 | 32.12 | 65.57 | 55.57 | -17.17 | -23.45 |
| 2 | 0.44680 | 9.94 | 30.53 | 25.57 | 40.47 | 35.51 | 56.93 | 46.93 | -16.46 | -11.42 |
| 3 | 0.68123 | 9.95 | 18.81 | 10.85 | 28.76 | 20.80 | 56.00 | 46.00 | -27.24 | -25.20 |
| 4 | 0.98986 | 9.97 | 16.90 | 9.69 | 26.87 | 19.66 | 56.00 | 46.00 | -29.13 | -26.34 |
| 5 | 12.43752 | 10.48 | 16.08 | 11.58 | 26.56 | 22.06 | 60.00 | 50.00 | -33.44 | -27.94 |
| 6 | 25.87104 | 10.86 | 12.11 | 6.79 | 22.97 | 17.65 | 60.00 | 50.00 | -37.03 | -32.35 |

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 20dB bandwidth shall be specified in operating frequency band.

4.3.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Calibrated Date | Calibrated Until |
|----------------------------|----------------------------------|---------------|-----------------|------------------|
| Spectrum Analyzer R&S | FSV40 | 101516 | 2022/3/7 | 2023/3/6 |
| Attenuator WOKEN | MDCS18N-10 | MDCS18N-10-01 | 2022/4/5 | 2023/4/4 |
| Software | ADT_RF Test Software V6.6.5.4 | NA | NA | NA |

Note: 1. The test was performed in Oven room 2.

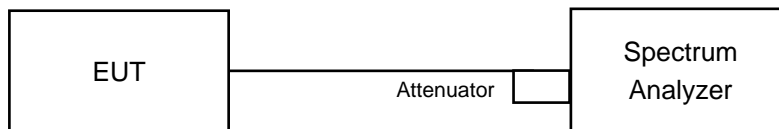
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

3. Tested Date: 2023/3/2

4.3.3 Test Procedure

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3 MHz RBW and 10 MHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3.4 Test Setup



4.3.5 Deviation from Test Standard

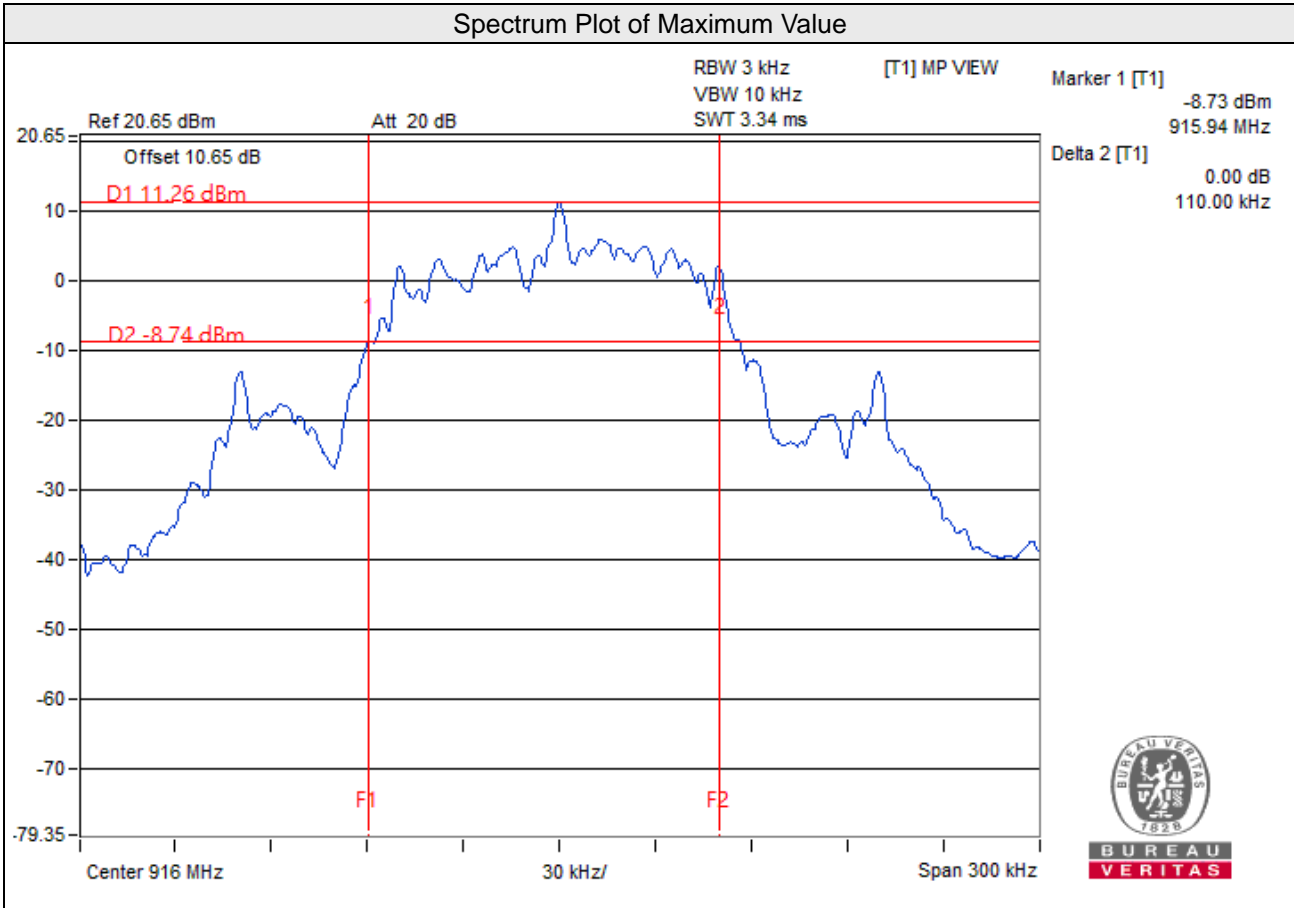
No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Results

| Frequency (GHz) | 20dB Bandwidth (MHz) |
|-----------------|----------------------|
| 908.4 | 0.09 |
| 908.42 | 0.09 |
| 916 | 0.11 |



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: www.bureauveritas-adt.com

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

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