

FCC Test Report

(802.15.4)

Report No.: RFCDBM-WTW-P22030865-2

FCC ID: QOQ-GM240P

Test Model: MGM240P22A, MGM240P32A, MGM240P32N

Series Model: BGM240P22A, BGM240P32A, BGM240P32N
(refer to item 3.1 for more details)

Received Date: Mar. 22, 2022

Test Date: Apr. 07 ~ Apr. 19, 2022

Issued Date: Aug. 15, 2022

Applicant: Silicon Laboratories Finland Oy

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

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

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



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Release Control Record

| Issue No. | Description | Date Issued |
|------------------------|------------------|---------------|
| RFCDBM-WTW-P22030865-2 | Original Release | Aug. 15, 2022 |

1 Certificate of Conformity

Product: Bluetooth Low Energy and 802.15.4 wireless radio module

Brand: Silicon Labs

Test Model: MGM240P22A, MGM240P32A, MGM240P32N

Series Model: BGM240P22A, BGM240P32A, BGM240P32N (refer to item 3.1 for more details)

Sample Status: Engineering samples fully representing the production modules

Applicant: Silicon Laboratories Finland Oy

Test Date: Apr. 07 ~ Apr. 19, 2022

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

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

Prepared by : Gina Liu , **Date:** Aug. 15, 2022
Gina Liu / Specialist

Approved by : Jeremy Lin , **Date:** Aug. 15, 2022
Jeremy Lin / Project Engineer

2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (Section 15.247) | | | |
|--|--|--------|---|
| FCC Clause | Test Item | Result | Remarks |
| 15.207 | AC Power Conducted Emission | Pass | Meet the requirement of limit. Minimum passing margin is -17.11 dB at 0.16148 MHz. |
| 15.205 / 15.209 / 15.247(d) | Radiated Emissions and Band Edge Measurement | Pass | Meet the requirement of limit. Minimum passing margin is -0.20 dB at 2483.50 MHz. |
| 15.247(d) | Antenna Port Emission | Pass | Meet the requirement of limit. |
| 15.247(a)(2) | 6 dB Bandwidth | Pass | Meet the requirement of limit. |
| 15.247(b) | Conducted power | Pass | Meet the requirement of limit. |
| 15.247(e) | Power Spectral Density | Pass | Meet the requirement of limit. |
| 15.203 | Antenna Requirement | Pass | MGM240P22A and MGM240P32A: these modules use an integral antenna, therefore comply with the requirement of 15.203 (see section 1.4 for details) / MGM240P32N: this module comes with a RF pin only, no own RF connector, and no external antenna is sold with it. |

Note:

- For 2.4G band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

| Measurement | Frequency | Expanded Uncertainty (k=2) (±) |
|------------------------------------|--------------------|--------------------------------|
| Conducted Emissions at mains ports | 150 kHz ~ 30 MHz | 2.79 dB |
| Radiated Emissions up to 1 GHz | 9 kHz ~ 30 MHz | 3.00 dB |
| | 30 MHz ~ 200 MHz | 2.91 dB |
| | 200 MHz ~ 1000 MHz | 2.92 dB |
| Radiated Emissions above 1 GHz | 1 GHz ~ 18 GHz | 1.76 dB |
| | 18 GHz ~ 40 GHz | 1.77 dB |

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

| | |
|------------------------------|--|
| Product | Bluetooth Low Energy and 802.15.4 wireless radio module |
| Brand | Silicon Labs |
| Test Model | MGM240P22A, MGM240P32A, MGM240P32N |
| Series Model | BGM240P22A, BGM240P32A, BGM240P32N |
| Model Difference | Refer to Note as below |
| Status of EUT | Engineering samples fully representing the production modules |
| Power Supply Rating | 5.0 Vdc from host equipment 1.8 ~ 3.8 Vdc from DC power supply |
| Modulation Type | O-QPSK |
| Modulation Technology | DSSS |
| Transfer Rate | 250 kbps |
| Operating Frequency | 2405 ~ 2480 MHz |
| Number of Channel | 16 |
| Output Power | 95.719 mW |
| Antenna Type | Refer to Note as below |
| Antenna Connector | MGM240P22A and MGM240P32A: N/A (have integral antenna) / MGM240P32N: N/A (has RF pin) |
| Accessory Device | NA |
| Data Cable Supplied | NA |

Note:

- All models are listed as below. Model MGM240P22A, MGM240P32A and MGM240P32N are the representative for final test.

| Product Spec. | Model | | |
|---|---|--|--|
| | MGM240P22A (covers BGM240P22A) | MGM240P32A (covers BGM240P32A) | MGM240P32N (covers BGM240P32N) |
| | Low-Power/ Bluetooth Low Energy and 802.15.4 (802.15.4 being disabled for BGM240P22A) | High-Power/ Bluetooth Low Energy and 802.15.4 (802.15.4 being disabled for BGM240P32A) | High-Power/ Bluetooth Low Energy and 802.15.4 (802.15.4 being disabled for BGM240P32N) |
| Max nominal RF TX power, as declared by manufacturer | 10dBm | 20dBm | 20dBm |
| Antenna type | integral antenna | integral antenna | RF pin |
| Hardware | <p>MGM240P22A (and BGM240P22A) --> hardware variants with integral antenna and 10dBm max power, to be tested as DTS for both 802.15.4 and Bluetooth Low Energy</p> <p>MGM240P32A (and BGM240P32A) --> hardware variants with integral antenna and 20dBm max power, to be tested as DTS for 802.15.4 and FHSS for Bluetooth Low Energy</p> <p>MGM240P32N (and BGM240P32N) --> hardware variants with RF pin and 20dBm max power, to be tested as DTS for 802.15.4 and FHSS for Bluetooth Low Energy</p> <p>These three hardware variants should be RF tested separately, because PAs are configured differently and also antenna matching components are different between them, meaning for example that conducted RF measurements cannot be assumed to deliver the exact same results across the three samples.</p> <p>MGM modules are the ones under testing as they support both 802.15.4 and Bluetooth Low Energy,</p> | | |

whereas the BGM modules are the series models because they are exactly the same except for the 802.15.4 being disabled.

1. The antenna information is listed as below.

| No. | Type | Connector | Gain (dBi) | Remark |
|-----|-------------------------------------|-----------|------------|---|
| 1 | Integral antenna | NA | 1.82 | For model: MGM240P22A, MGM240P32A, BGM240P22A, BGM240P32A |
| 2 | External reference dipole antenna** | RP-SMA | 2.80 | For model: MGM240P32N, BGM240P32N |

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

** The dipole antenna is not sold with the EUT, but is used during testing as a reference antenna for radiated measurements of the parts with the RF pin.

2. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

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

4. Power setting is as below:

| Test Mode: MGM240P22A | | Test Mode: MGM240P32A | | Test Mode: MGM240P32N | |
|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|
| Channel | Power Setting | Channel | Power Setting | Channel | Power Setting |
| 11 | 100 | 11 | 200 | 11 | 200 |
| 18 | 100 | 18 | 200 | 18 | 200 |
| 26 | 100 | 25 | 200 | 25 | 200 |
| - | - | 26 | 115 | 26 | 140 |

5. BT LE (DTS/FHSS) and 802.15.4 modes technology cannot transmit at same time.

3.2 Description of Test Modes

16 channels are provided to this EUT:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 11 | 2405 | 19 | 2445 |
| 12 | 2410 | 20 | 2450 |
| 13 | 2415 | 21 | 2455 |
| 14 | 2420 | 22 | 2460 |
| 15 | 2425 | 23 | 2465 |
| 16 | 2430 | 24 | 2470 |
| 17 | 2435 | 25 | 2475 |
| 18 | 2440 | 26 | 2480 |

3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT Configure Mode | Applicable To | | | | Description |
|--------------------|---------------|-------|-----|------|-------------------------------|
| | RE \geq 1G | RE<1G | PLC | APCM | |
| A | √ | √ | √ | √ | MGM240P22A / integral antenna |
| B | √ | √ | √ | √ | MGM240P32A / integral antenna |
| C | √ | √ | √ | √ | MGM240P32N / Dipole antenna |

Where **RE \geq 1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz
PLC: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane** for Mode A / Mode C and **X-plane** for Mode B.

NOTE: "-" means no effect.

Radiated Emission Test (Above 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Available Channel | Tested Channel | Modulation Type |
|--------------------|-------------------|----------------|-----------------|
| A | 11 to 26 | 11, 18, 26 | O-QPSK |
| B, C | 11 to 26 | 11, 18, 25, 26 | O-QPSK |

Radiated Emission Test (Below 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Available Channel | Tested Channel | Modulation Type |
|--------------------|-------------------|----------------|-----------------|
| A | 11 to 26 | 11 | O-QPSK |
| B | 11 to 26 | 25 | O-QPSK |
| C | 11 to 26 | 18 | O-QPSK |

Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Available Channel | Tested Channel | Modulation Type |
|--------------------|-------------------|----------------|-----------------|
| A | 11 to 26 | 11 | O-QPSK |
| B | 11 to 26 | 25 | O-QPSK |
| C | 11 to 26 | 18 | O-QPSK |

Bandedge Measurement:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Available Channel | Tested Channel | Modulation Type |
|--------------------|-------------------|----------------|-----------------|
| A | 11 to 26 | 11, 18, 26 | O-QPSK |
| B, C | 11 to 26 | 11, 18, 25, 26 | O-QPSK |

Antenna Port Conducted 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.

| EUT Configure Mode | Available Channel | Tested Channel | Modulation Type |
|--------------------|-------------------|----------------|-----------------|
| A | 11 to 26 | 11, 18, 26 | O-QPSK |
| B, C | 11 to 26 | 11, 18, 25, 26 | O-QPSK |

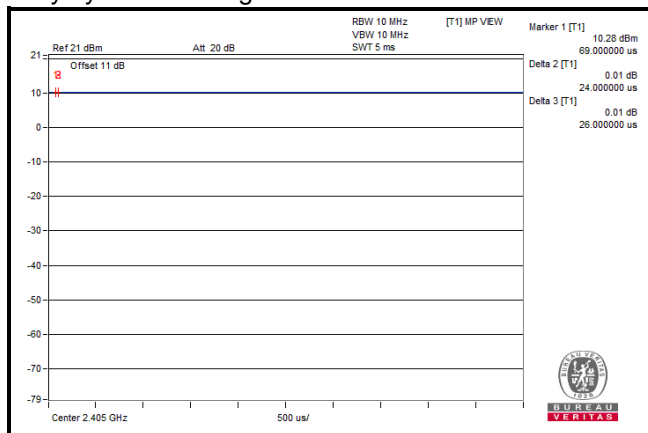
Test Condition:

| Applicable To | Environmental Conditions | Input Power | Tested by |
|---------------|--------------------------|-------------------------|------------|
| RE≥1G | 25 deg. C, 65 % RH | 120 Vac, 60 Hz (System) | Wade Huang |
| RE<1G | 23deg. C, 66% RH | 120 Vac, 60 Hz (System) | Wade Huang |
| PLC | 25 deg. C, 69 % RH | 120 Vac, 60 Hz (System) | Wade Huang |
| APCM | 25 deg. C, 60% RH | 120 Vac, 60 Hz (System) | Alan Wu |

3.3 Duty Cycle of Test Signal

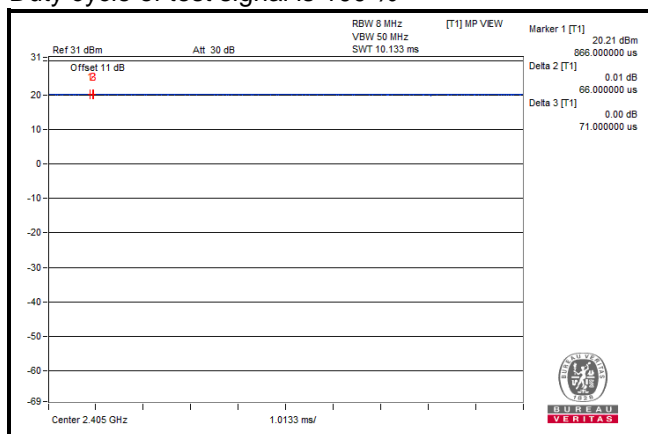
Mode A

Duty cycle of test signal is 100 %



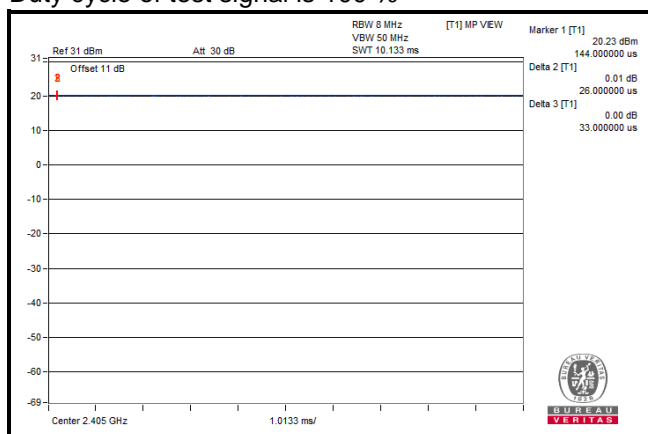
Mode B

Duty cycle of test signal is 100 %



Mode C

Duty cycle of test signal is 100 %



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.

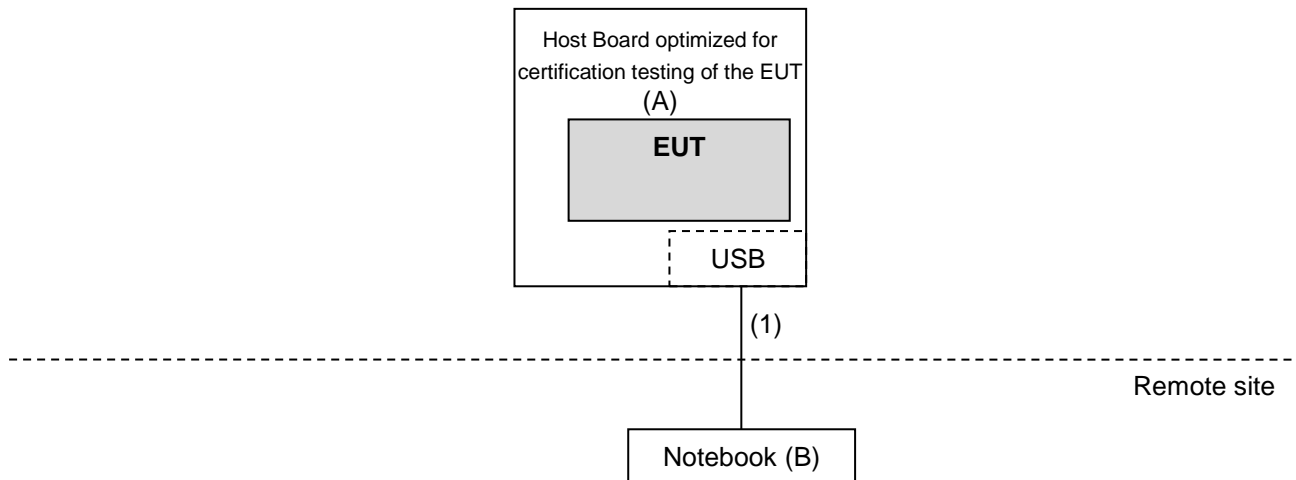
| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|----|---|--------------|-----------|------------|------------------|--------------------|
| A. | Host Board optimized for certification testing of the EUT | Silicon Labs | NA | NA | NA | Provided by client |
| B. | Notebook | DELL | E5430 | BPJVKV1 | FCC DoC Approved | - |

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item B acted as communication partners to transfer data.

| ID | Cable Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|--------------------|------|------------|--------------------|--------------|--------------------|
| 1. | USB Cable | 1 | 1.5 | Y | 0 | Provided by client |

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test Standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions 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 |

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 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.

4.1.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|--------------------------------------|--|-------------------------------------|---------------|---------------|
| Test Receiver KEYSIGHT | N9038B | MY60180018 | Feb. 18, 2022 | Feb. 17, 2023 |
| Spectrum Analyzer KEYSIGHT | N9020B | MY60110462 | Dec. 21, 2021 | Dec. 20, 2022 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-995 | Oct. 28, 2021 | Oct. 27, 2022 |
| HORN Antenna RF SPIN | DRH18-E | 210104A18E | Nov. 14, 2021 | Nov. 13, 2022 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | 9170-995 | Nov. 14, 2021 | Nov. 13, 2022 |
| Loop Antenna EMCI | EM-6879 | 269 | Sep. 16, 2021 | Sep. 15, 2022 |
| Loop Antenna TESEQ | HLA 6121 | 45745 | Jul. 21, 2021 | Jul. 20, 2022 |
| Preamplifier EMCI | EMC330N | 980783 | Jan. 17, 2022 | Jan. 16, 2023 |
| Preamplifier EMCI | EMC118A45SE | 980810 | Dec. 30, 2021 | Dec. 29, 2022 |
| Preamplifier EMCI | EMC184045SE | 980787 | Jan. 17, 2022 | Jan. 16, 2023 |
| RF signal cable EMCI | EMC104-SM-SM-(9 000+3000+2000+1 000) | 201230+ 201242+201238+ 210101 | Jan. 17, 2022 | Jan. 16, 2023 |
| RF signal cable EMCI | EMCCFD400-NM-N M-(9000+3000+500 ++500) | 201252+ 201250+201247+ 201245 | Jan. 17, 2022 | Jan. 16, 2023 |
| RF signal cable EMCI | EMC101G-KM-KM- (5000+3000+2000) | 201259+201256+20125 3 | Jan. 17, 2022 | Jan. 16, 2023 |
| Software BV CPS | ADT_Radiated_V7. 6.15.9.5 | NA | NA | NA |
| Turn Table Max-Full | MFT-151SS-0.5T | NA | NA | NA |
| Turn Table Controller Max-Full | MF-7802BS | MF780208675 | NA | NA |
| Antenna Tower KaiTuo | NA | NA | NA | NA |
| Antenna Tower Controller KaiTuo | KT-2000 | NA | NA | NA |
| Wideband Power Sensor KEYSIGHT | N1923A | MY58020002 | Jan. 17, 2022 | Jan. 16, 2023 |
| Peak Power Analyzer KEYSIGHT | 8990B | MY51000485 | Jan. 18, 2022 | Jan. 17, 2023 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSV40 | 100979 | Mar. 25, 2022 | Mar. 24, 2023 |

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in WM Chamber 7.

4.1.3 Test Procedures

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 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 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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:

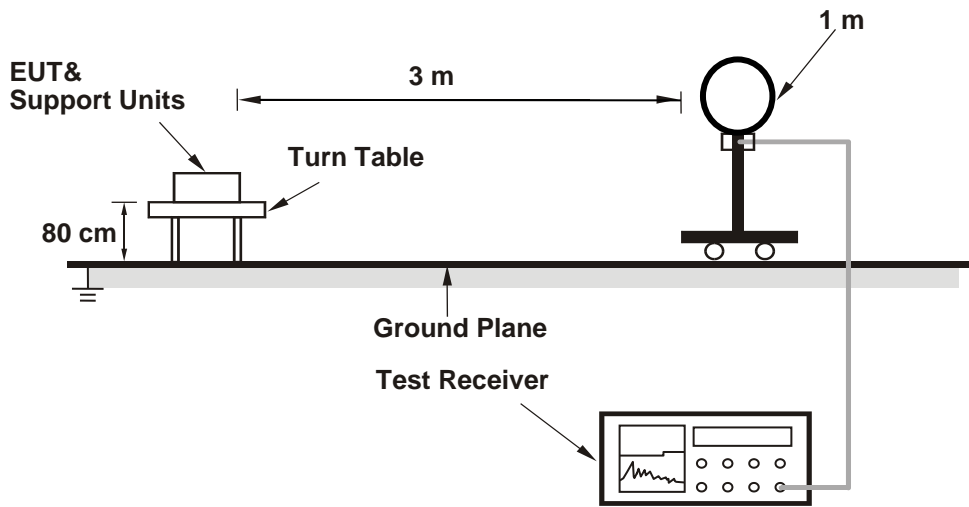
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.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

4.1.4 Deviation from Test Standard

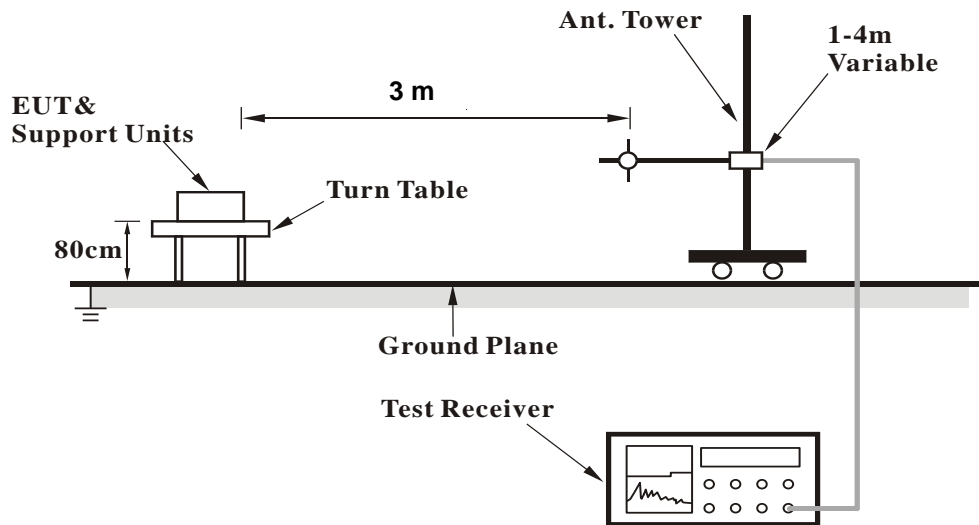
No deviation.

4.1.5 Test Set Up

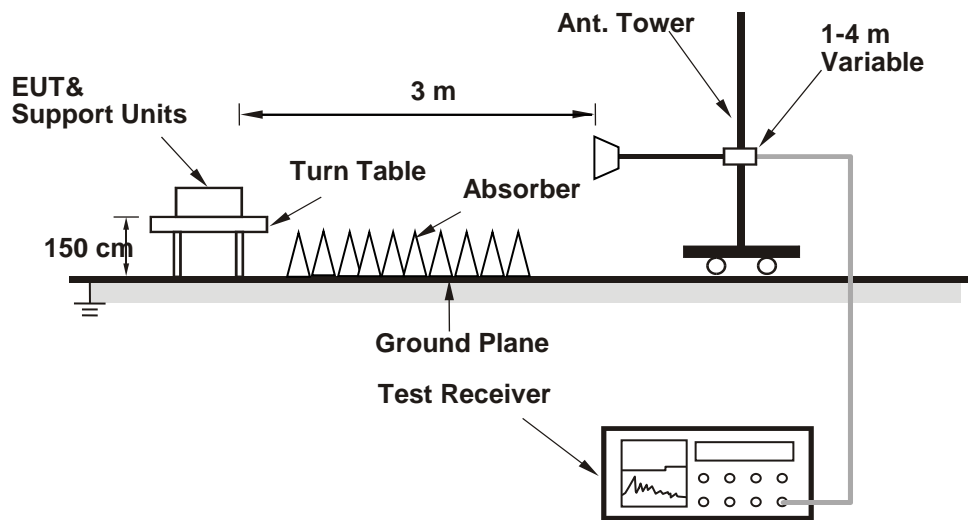
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



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 a testing table.
- b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Mode A

Above 1 GHz Data :

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 11 : 2405 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/4/7 |

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 | 2390.00 | 57.68 PK | 74.00 | -16.32 | 1.36 H | 14 | 25.75 | 31.93 |
| 2 | 2390.00 | 44.44 AV | 54.00 | -9.56 | 1.36 H | 14 | 12.51 | 31.93 |
| 3 | *2405.00 | 108.86 PK | | | 1.36 H | 14 | 76.95 | 31.91 |
| 4 | *2405.00 | 105.17 AV | | | 1.36 H | 14 | 73.26 | 31.91 |
| 5 | 4810.00 | 48.35 PK | 74.00 | -25.65 | 1.50 H | 223 | 46.26 | 2.09 |
| 6 | 4810.00 | 37.22 AV | 54.00 | -16.78 | 1.50 H | 223 | 35.13 | 2.09 |

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 | 2390.00 | 57.31 PK | 74.00 | -16.69 | 1.47 V | 305 | 25.38 | 31.93 |
| 2 | 2390.00 | 44.54 AV | 54.00 | -9.46 | 1.47 V | 305 | 12.61 | 31.93 |
| 3 | *2405.00 | 102.08 PK | | | 1.47 V | 305 | 70.17 | 31.91 |
| 4 | *2405.00 | 98.65 AV | | | 1.47 V | 305 | 66.74 | 31.91 |
| 5 | 4810.00 | 47.78 PK | 74.00 | -26.22 | 1.89 V | 47 | 45.69 | 2.09 |
| 6 | 4810.00 | 37.68 AV | 54.00 | -16.32 | 1.89 V | 47 | 35.59 | 2.09 |

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. " * " : Fundamental frequency.

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 18 : 2440 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/4/7 |

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 | *2440.00 | 108.60 PK | | | 1.22 H | 14 | 76.77 | 31.83 |
| 2 | *2440.00 | 104.98 AV | | | 1.22 H | 14 | 73.15 | 31.83 |
| 3 | 4880.00 | 45.25 PK | 74.00 | -28.75 | 1.50 H | 237 | 43.12 | 2.13 |
| 4 | 4880.00 | 34.75 AV | 54.00 | -19.25 | 1.50 H | 237 | 32.62 | 2.13 |

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 | *2440.00 | 102.48 PK | | | 1.51 V | 297 | 70.65 | 31.83 |
| 2 | *2440.00 | 98.78 AV | | | 1.51 V | 297 | 66.95 | 31.83 |
| 3 | 4880.00 | 44.95 PK | 74.00 | -29.05 | 1.90 V | 50 | 42.82 | 2.13 |
| 4 | 4880.00 | 34.30 AV | 54.00 | -19.70 | 1.90 V | 50 | 32.17 | 2.13 |

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. " * " : Fundamental frequency.

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 26 : 2480 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/4/7 |

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 | *2480.00 | 108.81 PK | | | 1.15 H | 15 | 76.94 | 31.87 |
| 2 | *2480.00 | 105.22 AV | | | 1.15 H | 15 | 73.35 | 31.87 |
| 3 | 2483.50 | 66.13 PK | 74.00 | -7.87 | 1.15 H | 15 | 34.26 | 31.87 |
| 4 | 2483.50 | 53.41 AV | 54.00 | -0.59 | 1.15 H | 15 | 21.54 | 31.87 |
| 5 | 4960.00 | 45.18 PK | 74.00 | -28.82 | 1.51 H | 235 | 42.93 | 2.25 |
| 6 | 4960.00 | 33.54 AV | 54.00 | -20.46 | 1.51 H | 235 | 31.29 | 2.25 |

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 | *2480.00 | 102.97 PK | | | 1.59 V | 304 | 71.10 | 31.87 |
| 2 | *2480.00 | 99.40 AV | | | 1.59 V | 304 | 67.53 | 31.87 |
| 3 | 2483.50 | 61.96 PK | 74.00 | -12.04 | 1.59 V | 304 | 30.09 | 31.87 |
| 4 | 2483.50 | 48.75 AV | 54.00 | -5.25 | 1.59 V | 304 | 16.88 | 31.87 |
| 5 | 4960.00 | 46.23 PK | 74.00 | -27.77 | 1.85 V | 52 | 43.98 | 2.25 |
| 6 | 4960.00 | 33.48 AV | 54.00 | -20.52 | 1.85 V | 52 | 31.23 | 2.25 |

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. " * " : Fundamental frequency.

Below 1 GHz Worst-Case Data:

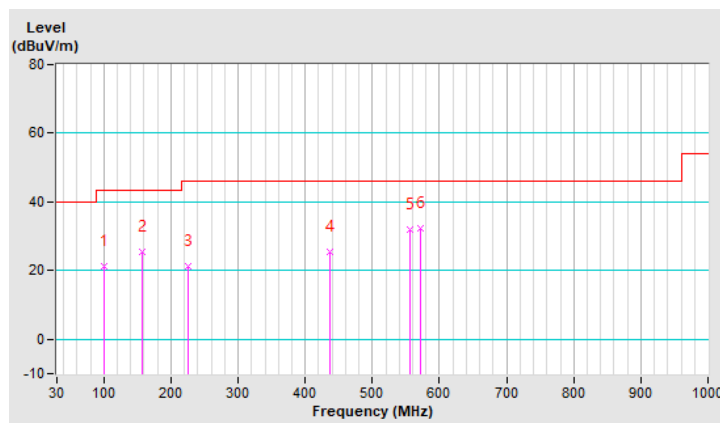
| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | TX 802.15.4 | Channel | CH 11 : 2405 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 66% RH |
| Tested By | Wade Huang | Test Date | 2022/4/11 |

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 | 99.84 | 21.26 QP | 43.50 | -22.24 | 1.99 H | 221 | 38.97 | -17.71 |
| 2 | 158.04 | 25.60 QP | 43.50 | -17.90 | 1.99 H | 276 | 38.74 | -13.14 |
| 3 | 225.94 | 21.33 QP | 46.00 | -24.67 | 1.51 H | 3 | 37.97 | -16.64 |
| 4 | 437.40 | 25.56 QP | 46.00 | -20.44 | 1.01 H | 267 | 34.82 | -9.26 |
| 5 | 556.71 | 32.10 QP | 46.00 | -13.90 | 1.51 H | 76 | 39.14 | -7.04 |
| 6 | 572.23 | 32.22 QP | 46.00 | -13.78 | 1.51 H | 76 | 38.90 | -6.68 |

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.

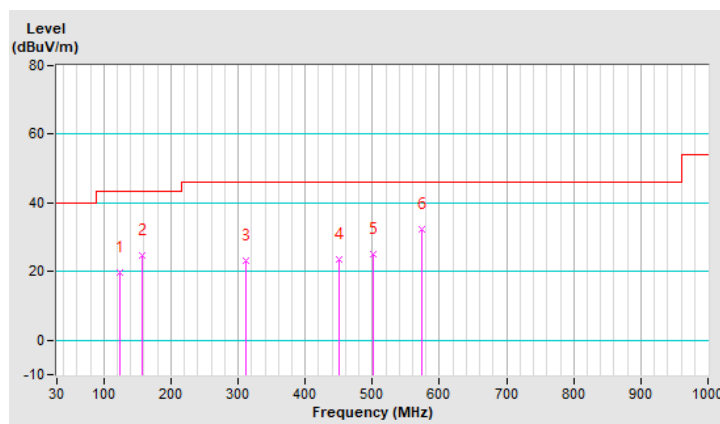


| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | TX 802.15.4 | Channel | CH 11 : 2405 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 66% RH |
| Tested By | Wade Huang | Test Date | 2022/4/11 |

| 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 | 124.09 | 19.66 QP | 43.50 | -23.84 | 1.49 V | 184 | 34.80 | -15.14 |
| 2 | 157.07 | 24.73 QP | 43.50 | -18.77 | 1.01 V | 2 | 37.88 | -13.15 |
| 3 | 312.27 | 23.07 QP | 46.00 | -22.93 | 1.49 V | 152 | 35.75 | -12.68 |
| 4 | 450.98 | 23.68 QP | 46.00 | -22.32 | 1.49 V | 18 | 32.66 | -8.98 |
| 5 | 500.45 | 25.06 QP | 46.00 | -20.94 | 1.01 V | 36 | 33.27 | -8.21 |
| 6 | 573.20 | 32.37 QP | 46.00 | -13.63 | 1.01 V | 193 | 39.01 | -6.64 |

Remarks:

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



Mode B

Above 1 GHz Data :

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 11 : 2405 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/4/8 |

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 | 2366.64 | 59.19 PK | 74.00 | -14.81 | 1.37 H | 25 | 27.24 | 31.95 |
| 2 | 2366.64 | 47.33 AV | 54.00 | -6.67 | 1.37 H | 25 | 15.38 | 31.95 |
| 3 | *2405.00 | 119.40 PK | | | 1.37 H | 25 | 87.49 | 31.91 |
| 4 | *2405.00 | 115.78 AV | | | 1.37 H | 25 | 83.87 | 31.91 |
| 5 | 4810.00 | 48.69 PK | 74.00 | -25.31 | 1.72 H | 88 | 46.60 | 2.09 |
| 6 | 4810.00 | 38.87 AV | 54.00 | -15.13 | 1.72 H | 88 | 36.78 | 2.09 |

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 | 2366.64 | 58.12 PK | 74.00 | -15.88 | 3.77 V | 89 | 26.17 | 31.95 |
| 2 | 2366.64 | 44.78 AV | 54.00 | -9.22 | 3.77 V | 89 | 12.83 | 31.95 |
| 3 | *2405.00 | 111.58 PK | | | 3.77 V | 89 | 79.67 | 31.91 |
| 4 | *2405.00 | 108.04 AV | | | 3.77 V | 89 | 76.13 | 31.91 |
| 5 | 4810.00 | 50.00 PK | 74.00 | -24.00 | 3.60 V | 162 | 47.91 | 2.09 |
| 6 | 4810.00 | 38.90 AV | 54.00 | -15.10 | 3.60 V | 162 | 36.81 | 2.09 |

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. " * " : Fundamental frequency.

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 18 : 2440 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/4/8 |

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 | *2440.00 | 118.36 PK | | | 1.31 H | 23 | 86.53 | 31.83 |
| 2 | *2440.00 | 114.75 AV | | | 1.31 H | 23 | 82.92 | 31.83 |
| 3 | 4880.00 | 50.68 PK | 74.00 | -23.32 | 1.81 H | 141 | 48.55 | 2.13 |
| 4 | 4880.00 | 39.71 AV | 54.00 | -14.29 | 1.81 H | 141 | 37.58 | 2.13 |

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 | *2440.00 | 111.02 PK | | | 3.52 V | 65 | 79.19 | 31.83 |
| 2 | *2440.00 | 107.40 AV | | | 3.52 V | 65 | 75.57 | 31.83 |
| 3 | 4880.00 | 49.01 PK | 74.00 | -24.99 | 3.16 V | 184 | 46.88 | 2.13 |
| 4 | 4880.00 | 37.30 AV | 54.00 | -16.70 | 3.16 V | 184 | 35.17 | 2.13 |

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. " * ": Fundamental frequency.

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 25 : 2475 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/4/8 |

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 | *2475.00 | 119.42 PK | | | 1.55 H | 48 | 87.57 | 31.85 |
| 2 | *2475.00 | 115.85 AV | | | 1.55 H | 48 | 84.00 | 31.85 |
| 3 | 2483.50 | 63.44 PK | 74.00 | -10.56 | 1.55 H | 48 | 31.57 | 31.87 |
| 4 | 2483.50 | 52.24 AV | 54.00 | -1.76 | 1.55 H | 48 | 20.37 | 31.87 |
| 5 | 4950.00 | 48.55 PK | 74.00 | -25.45 | 1.71 H | 138 | 46.31 | 2.24 |
| 6 | 4950.00 | 37.63 AV | 54.00 | -16.37 | 1.71 H | 138 | 35.39 | 2.24 |

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 | *2475.00 | 111.06 PK | | | 3.47 V | 65 | 79.21 | 31.85 |
| 2 | *2475.00 | 107.55 AV | | | 3.47 V | 65 | 75.70 | 31.85 |
| 3 | 2483.50 | 59.21 PK | 74.00 | -14.79 | 3.47 V | 65 | 27.34 | 31.87 |
| 4 | 2483.50 | 46.61 AV | 54.00 | -7.39 | 3.47 V | 65 | 14.74 | 31.87 |
| 5 | 4950.00 | 48.75 PK | 74.00 | -25.25 | 3.21 V | 180 | 46.51 | 2.24 |
| 6 | 4950.00 | 36.94 AV | 54.00 | -17.06 | 3.21 V | 180 | 34.70 | 2.24 |

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. " * ": Fundamental frequency.

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 26 : 2480 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/6/9 |

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 | *2480.00 | 109.43 PK | | | 1.35 H | 26 | 77.56 | 31.87 |
| 2 | *2480.00 | 105.78 AV | | | 1.35 H | 26 | 73.91 | 31.87 |
| 3 | 2483.50 | 65.61 PK | 74.00 | -8.39 | 1.35 H | 26 | 33.74 | 31.87 |
| 4 | 2483.50 | 53.80 AV | 54.00 | -0.20 | 1.35 H | 26 | 21.93 | 31.87 |
| 5 | 4960.00 | 49.25 PK | 74.00 | -24.75 | 1.76 H | 140 | 47.00 | 2.25 |
| 6 | 4960.00 | 36.75 AV | 54.00 | -17.25 | 1.76 H | 140 | 34.50 | 2.25 |

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 | *2480.00 | 102.47 PK | | | 3.39 V | 62 | 70.60 | 31.87 |
| 2 | *2480.00 | 98.47 AV | | | 3.39 V | 62 | 66.60 | 31.87 |
| 3 | 2483.50 | 59.47 PK | 74.00 | -14.53 | 3.39 V | 62 | 27.60 | 31.87 |
| 4 | 2483.50 | 48.87 AV | 54.00 | -5.13 | 3.39 V | 62 | 17.00 | 31.87 |
| 5 | 4960.00 | 48.45 PK | 74.00 | -25.55 | 3.11 V | 190 | 46.20 | 2.25 |
| 6 | 4960.00 | 36.25 AV | 54.00 | -17.75 | 3.11 V | 190 | 34.00 | 2.25 |

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. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

Below 1 GHz Worst-Case Data:

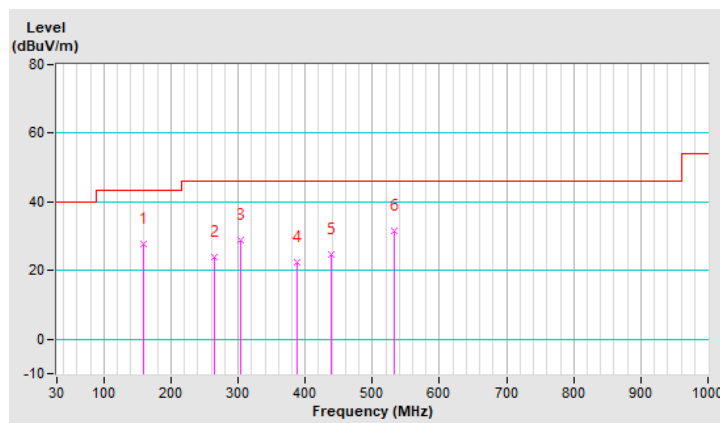
| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | TX 802.15.4 | Channel | CH 25 : 2475 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 66% RH |
| Tested By | Wade Huang | Test Date | 2022/4/11 |

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 | 159.98 | 27.59 QP | 43.50 | -15.91 | 1.51 H | 85 | 40.77 | -13.18 |
| 2 | 264.74 | 23.82 QP | 46.00 | -22.18 | 1.51 H | 266 | 38.01 | -14.19 |
| 3 | 303.54 | 28.80 QP | 46.00 | -17.20 | 1.01 H | 159 | 41.75 | -12.95 |
| 4 | 387.93 | 22.31 QP | 46.00 | -23.69 | 1.99 H | 143 | 32.97 | -10.66 |
| 5 | 438.37 | 24.72 QP | 46.00 | -21.28 | 1.99 H | 117 | 33.95 | -9.23 |
| 6 | 533.43 | 31.54 QP | 46.00 | -14.46 | 1.51 H | 220 | 39.11 | -7.57 |

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.

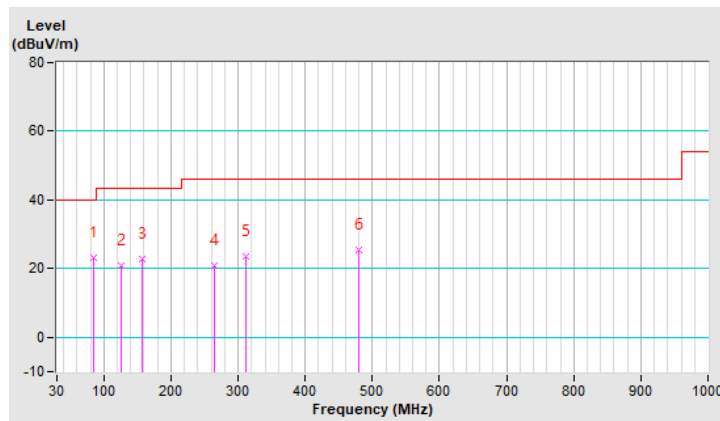


| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | TX 802.15.4 | Channel | CH 25 : 2475 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 66% RH |
| Tested By | Wade Huang | Test Date | 2022/4/11 |

| 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 | 84.32 | 23.14 QP | 40.00 | -16.86 | 1.00 V | 212 | 42.18 | -19.04 |
| 2 | 126.03 | 20.71 QP | 43.50 | -22.79 | 1.00 V | 323 | 35.53 | -14.82 |
| 3 | 158.04 | 22.81 QP | 43.50 | -20.69 | 1.49 V | 319 | 35.95 | -13.14 |
| 4 | 264.74 | 21.00 QP | 46.00 | -25.00 | 1.00 V | 38 | 35.19 | -14.19 |
| 5 | 311.30 | 23.54 QP | 46.00 | -22.46 | 1.99 V | 4 | 36.26 | -12.72 |
| 6 | 479.11 | 25.58 QP | 46.00 | -20.42 | 1.00 V | 158 | 34.22 | -8.64 |

Remarks:

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



Mode C

Above 1 GHz Data :

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 11 : 2405 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/4/9 |

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 | 2366.80 | 57.39 PK | 74.00 | -16.61 | 1.66 H | 39 | 25.44 | 31.95 |
| 2 | 2366.80 | 44.55 AV | 54.00 | -9.45 | 1.66 H | 39 | 12.60 | 31.95 |
| 3 | *2405.00 | 108.07 PK | | | 1.66 H | 39 | 76.16 | 31.91 |
| 4 | *2405.00 | 104.51 AV | | | 1.66 H | 39 | 72.60 | 31.91 |
| 5 | 4810.00 | 50.84 PK | 74.00 | -23.16 | 3.35 H | 62 | 48.75 | 2.09 |
| 6 | 4810.00 | 41.35 AV | 54.00 | -12.65 | 3.35 H | 62 | 39.26 | 2.09 |

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 | 2366.80 | 58.61 PK | 74.00 | -15.39 | 3.23 V | 70 | 26.66 | 31.95 |
| 2 | 2366.80 | 46.72 AV | 54.00 | -7.28 | 3.23 V | 70 | 14.77 | 31.95 |
| 3 | *2405.00 | 117.22 PK | | | 3.23 V | 70 | 85.31 | 31.91 |
| 4 | *2405.00 | 113.61 AV | | | 3.23 V | 70 | 81.70 | 31.91 |
| 5 | 4810.00 | 50.83 PK | 74.00 | -23.17 | 1.47 V | 272 | 48.74 | 2.09 |
| 6 | 4810.00 | 40.85 AV | 54.00 | -13.15 | 1.47 V | 272 | 38.76 | 2.09 |

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. " * " : Fundamental frequency.

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 18 : 2440 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/4/9 |

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 | *2440.00 | 108.43 PK | | | 1.60 H | 41 | 76.60 | 31.83 |
| 2 | *2440.00 | 104.85 AV | | | 1.60 H | 41 | 73.02 | 31.83 |
| 3 | 4880.00 | 50.55 PK | 74.00 | -23.45 | 3.29 H | 65 | 48.42 | 2.13 |
| 4 | 4880.00 | 39.88 AV | 54.00 | -14.12 | 3.29 H | 65 | 37.75 | 2.13 |

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 | *2440.00 | 117.43 PK | | | 3.13 V | 71 | 85.60 | 31.83 |
| 2 | *2440.00 | 113.79 AV | | | 3.13 V | 71 | 81.96 | 31.83 |
| 3 | 4880.00 | 50.19 PK | 74.00 | -23.81 | 1.43 V | 272 | 48.06 | 2.13 |
| 4 | 4880.00 | 40.08 AV | 54.00 | -13.92 | 1.43 V | 272 | 37.95 | 2.13 |

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. " * ": Fundamental frequency.

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 25 : 2475 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/4/9 |

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 | *2475.00 | 109.18 PK | | | 1.55 H | 39 | 77.33 | 31.85 |
| 2 | *2475.00 | 105.58 AV | | | 1.55 H | 39 | 73.73 | 31.85 |
| 3 | 2483.50 | 58.70 PK | 74.00 | -15.30 | 1.55 H | 39 | 26.83 | 31.87 |
| 4 | 2483.50 | 46.27 AV | 54.00 | -7.73 | 1.55 H | 39 | 14.40 | 31.87 |
| 5 | 4950.00 | 47.93 PK | 74.00 | -26.07 | 2.87 H | 100 | 45.69 | 2.24 |
| 6 | 4950.00 | 37.93 AV | 54.00 | -16.07 | 2.87 H | 100 | 35.69 | 2.24 |

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 | *2475.00 | 116.64 PK | | | 2.26 V | 75 | 84.79 | 31.85 |
| 2 | *2475.00 | 113.05 AV | | | 2.26 V | 75 | 81.20 | 31.85 |
| 3 | 2483.50 | 63.38 PK | 74.00 | -10.62 | 2.26 V | 75 | 31.51 | 31.87 |
| 4 | 2483.50 | 50.17 AV | 54.00 | -3.83 | 2.26 V | 75 | 18.30 | 31.87 |
| 5 | 4950.00 | 48.54 PK | 74.00 | -25.46 | 1.73 V | 275 | 46.30 | 2.24 |
| 6 | 4950.00 | 38.07 AV | 54.00 | -15.93 | 1.73 V | 275 | 35.83 | 2.24 |

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. " * ": Fundamental frequency.

| | | | |
|------------------------|----------------|--|--|
| RF Mode | TX 802.15.4 | Channel | CH 26 : 2480 MHz |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | (PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 10 Hz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 68% RH |
| Tested By | Wade Huang | Test Date | 2022/6/9 |

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 | *2480.00 | 99.27 PK | | | 1.69 H | 48 | 67.40 | 31.87 |
| 2 | *2480.00 | 95.27 AV | | | 1.69 H | 48 | 63.40 | 31.87 |
| 3 | 2483.50 | 58.67 PK | 74.00 | -15.33 | 1.69 H | 48 | 26.80 | 31.87 |
| 4 | 2483.50 | 47.37 AV | 54.00 | -6.63 | 1.69 H | 48 | 15.50 | 31.87 |
| 5 | 4960.00 | 47.05 PK | 74.00 | -26.95 | 3.09 H | 62 | 44.80 | 2.25 |
| 6 | 4960.00 | 37.45 AV | 54.00 | -16.55 | 3.09 H | 62 | 35.20 | 2.25 |

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 | *2480.00 | 107.74 PK | | | 3.11 V | 76 | 75.87 | 31.87 |
| 2 | *2480.00 | 104.12 AV | | | 3.11 V | 76 | 72.25 | 31.87 |
| 3 | 2483.50 | 65.33 PK | 74.00 | -8.67 | 3.11 V | 76 | 33.46 | 31.87 |
| 4 | 2483.50 | 53.30 AV | 54.00 | -0.70 | 3.11 V | 76 | 21.43 | 31.87 |
| 5 | 4960.00 | 47.26 PK | 74.00 | -26.74 | 1.57 V | 277 | 45.01 | 2.25 |
| 6 | 4960.00 | 37.66 AV | 54.00 | -16.34 | 1.57 V | 277 | 35.41 | 2.25 |

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. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.

Below 1 GHz Worst-Case Data:

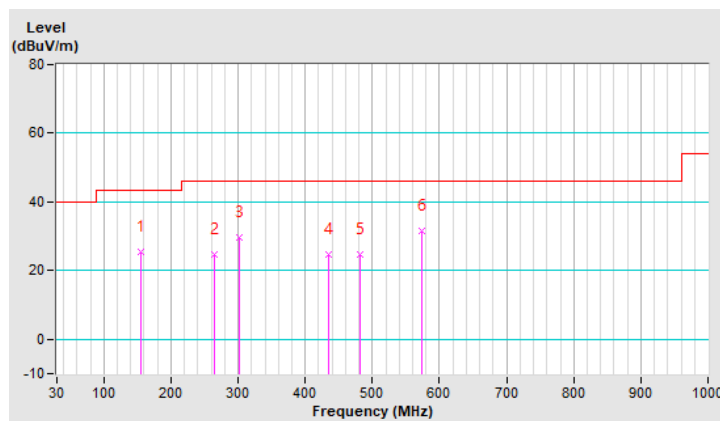
| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | TX 802.15.4 | Channel | CH 18 : 2440 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 66% RH |
| Tested By | Wade Huang | Test Date | 2022/4/11 |

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 | 156.10 | 25.58 QP | 43.50 | -17.92 | 1.99 H | 97 | 38.78 | -13.20 |
| 2 | 263.77 | 24.80 QP | 46.00 | -21.20 | 1.51 H | 279 | 39.04 | -14.24 |
| 3 | 302.57 | 29.50 QP | 46.00 | -16.50 | 1.01 H | 156 | 42.47 | -12.97 |
| 4 | 435.46 | 24.81 QP | 46.00 | -21.19 | 1.51 H | 121 | 34.14 | -9.33 |
| 5 | 481.05 | 24.76 QP | 46.00 | -21.24 | 1.99 H | 105 | 33.38 | -8.62 |
| 6 | 573.20 | 31.54 QP | 46.00 | -14.46 | 1.51 H | 167 | 38.18 | -6.64 |

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.

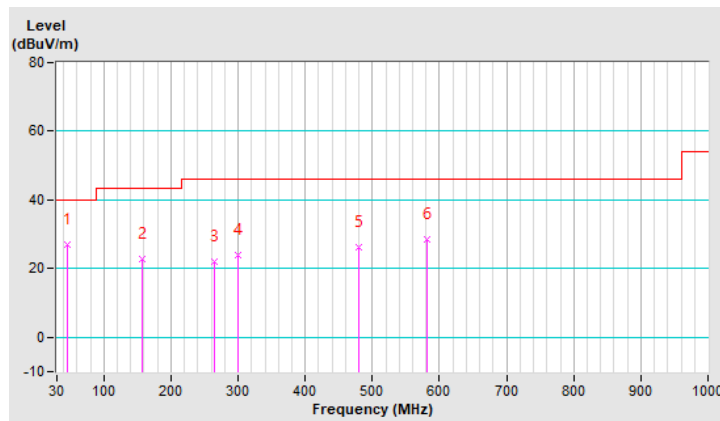


| | | | |
|------------------------|----------------|--|------------------|
| RF Mode | TX 802.15.4 | Channel | CH 18 : 2440 MHz |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | (QP) RB = 120kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 23°C, 66% RH |
| Tested By | Wade Huang | Test Date | 2022/4/11 |

| 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 | 46.49 | 26.88 QP | 40.00 | -13.12 | 1.00 V | 61 | 40.14 | -13.26 |
| 2 | 157.07 | 22.74 QP | 43.50 | -20.76 | 1.00 V | 345 | 35.89 | -13.15 |
| 3 | 264.74 | 22.11 QP | 46.00 | -23.89 | 2.00 V | 231 | 36.30 | -14.19 |
| 4 | 300.63 | 24.07 QP | 46.00 | -21.93 | 1.00 V | 302 | 37.09 | -13.02 |
| 5 | 480.08 | 26.37 QP | 46.00 | -19.63 | 1.00 V | 171 | 35.00 | -8.63 |
| 6 | 581.93 | 28.65 QP | 46.00 | -17.35 | 1.49 V | 224 | 35.04 | -6.39 |

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.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.2.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Date of Calibration | Due Date of Calibration |
|---|--------------------------|----------------|---------------------|-------------------------|
| Test Receiver ROHDE & SCHWARZ | ESR3 | 102412 | Jan. 22, 2022 | Jan. 21, 2023 |
| RF Coaxial Cable WORKEN | 5D-FB | Cable-cond2-01 | Sep. 4, 2021 | Sep. 3, 2022 |
| LISN/AMN ROHDE & SCHWARZ (EUT) | ESH2-Z5 | 100100 | Feb. 17, 2022 | Feb. 16, 2023 |
| LISN/AMN ROHDE & SCHWARZ (Peripheral) | ESH3-Z5 | 100312 | Sep. 17, 2021 | Sep. 16, 2022 |
| Software ADT | BV ADT_Cond_ V7.3.7.4 | NA | NA | NA |

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 2.
 3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

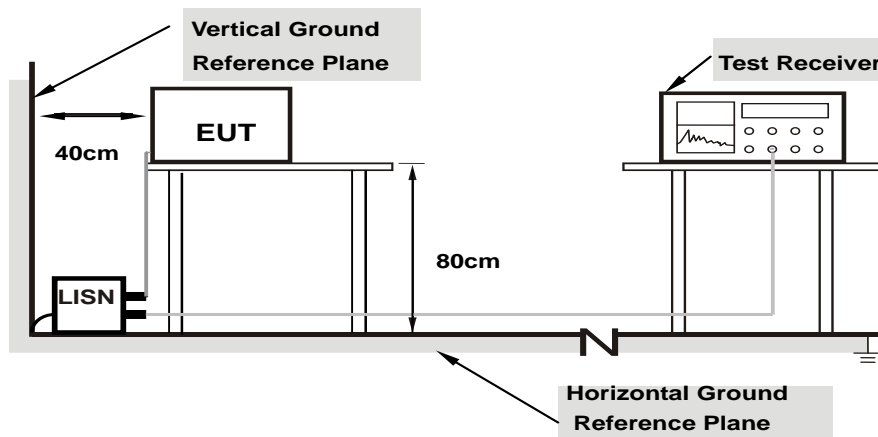
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance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

Note: All modes of operation were investigated and the worst-case emissions are reported.

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

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.2.7 Test Results

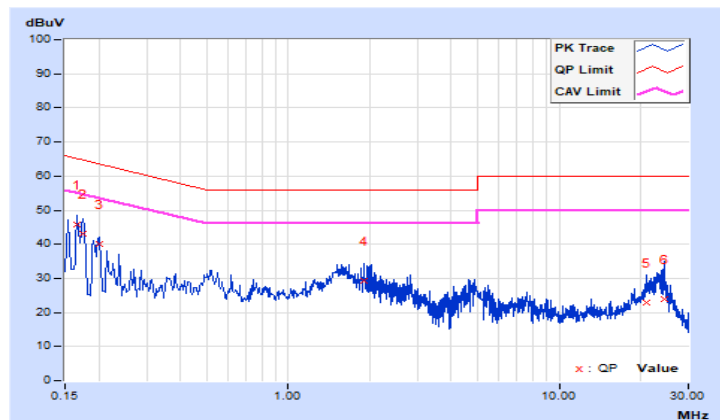
Mode A

| | | | |
|------------------------|------------------|---|--------------------------------------|
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 25°C, 69% RH |
| Tested by | Wade Huang | Test Date | 2022/4/11 |

| 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 | 0.16600 | 10.13 | 35.64 | 22.90 | 45.77 | 33.03 | 65.16 | 55.16 | -19.39 | -22.13 |
| 2 | 0.17400 | 10.13 | 32.93 | 15.61 | 43.06 | 25.74 | 64.77 | 54.77 | -21.71 | -29.03 |
| 3 | 0.20095 | 10.14 | 30.02 | 13.90 | 40.16 | 24.04 | 63.57 | 53.57 | -23.41 | -29.53 |
| 4 | 1.89800 | 10.22 | 18.98 | 11.00 | 29.20 | 21.22 | 56.00 | 46.00 | -26.80 | -24.78 |
| 5 | 21.00600 | 10.37 | 12.44 | 4.60 | 22.81 | 14.97 | 60.00 | 50.00 | -37.19 | -35.03 |
| 6 | 24.33400 | 10.25 | 13.51 | 3.75 | 23.76 | 14.00 | 60.00 | 50.00 | -36.24 | -36.00 |

Remarks:

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

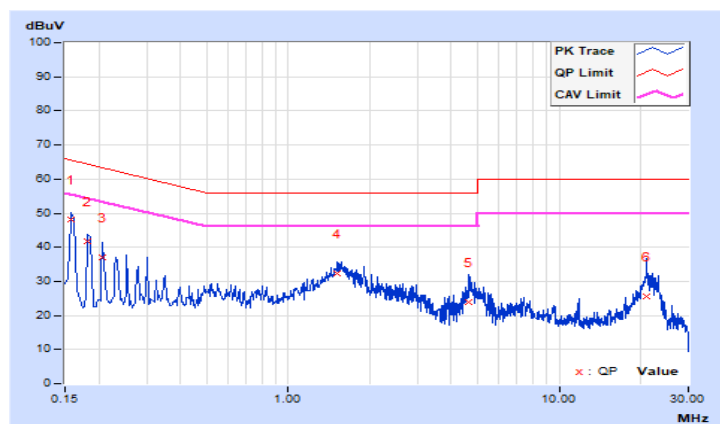


| | | | |
|------------------------|------------------|---|--------------------------------------|
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 25°C, 69% RH |
| Tested by | Wade Huang | Test Date | 2022/4/11 |

| 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 | 0.15800 | 10.14 | 38.03 | 23.15 | 48.17 | 33.29 | 65.57 | 55.57 | -17.40 | -22.28 |
| 2 | 0.18200 | 10.15 | 31.47 | 17.09 | 41.62 | 27.24 | 64.39 | 54.39 | -22.77 | -27.15 |
| 3 | 0.20600 | 10.15 | 26.90 | 12.82 | 37.05 | 22.97 | 63.37 | 53.37 | -26.32 | -30.40 |
| 4 | 1.52200 | 10.22 | 22.07 | 17.37 | 32.29 | 27.59 | 56.00 | 46.00 | -23.71 | -18.41 |
| 5 | 4.65400 | 10.28 | 13.77 | 5.18 | 24.05 | 15.46 | 56.00 | 46.00 | -31.95 | -30.54 |
| 6 | 21.03400 | 10.51 | 15.01 | 5.66 | 25.52 | 16.17 | 60.00 | 50.00 | -34.48 | -33.83 |

Remarks:

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



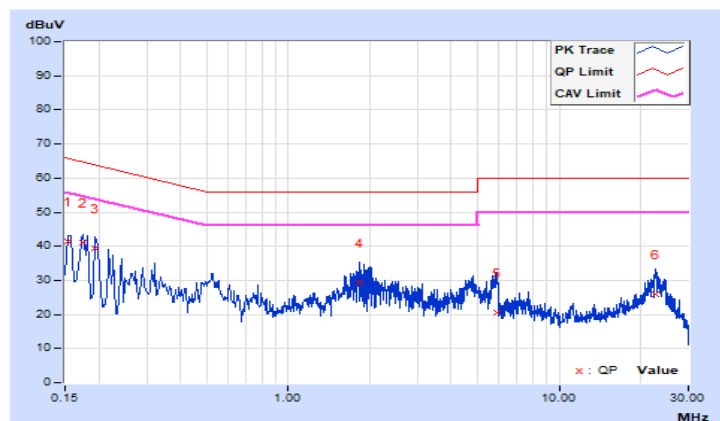
Mode B

| | | | |
|------------------------|------------------|---|--------------------------------------|
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 25°C, 69% RH |
| Tested by | Wade Huang | Test Date | 2022/4/11 |

| 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 | 0.15400 | 10.13 | 31.15 | 18.88 | 41.28 | 29.01 | 65.78 | 55.78 | -24.50 | -26.77 |
| 2 | 0.17400 | 10.13 | 30.78 | 16.35 | 40.91 | 26.48 | 64.77 | 54.77 | -23.86 | -28.29 |
| 3 | 0.19400 | 10.14 | 29.36 | 15.50 | 39.50 | 25.64 | 63.86 | 53.86 | -24.36 | -28.22 |
| 4 | 1.84200 | 10.22 | 18.93 | 8.02 | 29.15 | 18.24 | 56.00 | 46.00 | -26.85 | -27.76 |
| 5 | 5.89400 | 10.26 | 10.27 | 1.54 | 20.53 | 11.80 | 60.00 | 50.00 | -39.47 | -38.20 |
| 6 | 22.75000 | 10.31 | 15.63 | 5.75 | 25.94 | 16.06 | 60.00 | 50.00 | -34.06 | -33.94 |

Remarks:

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

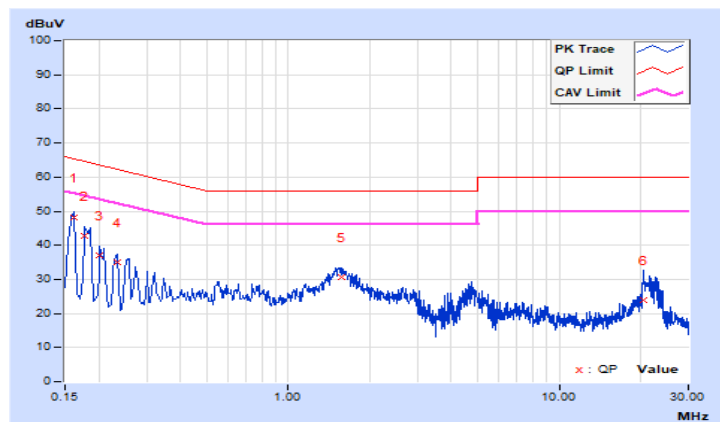


| | | | |
|------------------------|------------------|---|--------------------------------------|
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 25°C, 69% RH |
| Tested by | Wade Huang | Test Date | 2022/4/11 |

| 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 | 0.16148 | 10.14 | 38.14 | 21.24 | 48.28 | 31.38 | 65.39 | 55.39 | -17.11 | -24.01 |
| 2 | 0.17800 | 10.15 | 32.72 | 15.55 | 42.87 | 25.70 | 64.58 | 54.58 | -21.71 | -28.88 |
| 3 | 0.20200 | 10.15 | 26.89 | 13.24 | 37.04 | 23.39 | 63.53 | 53.53 | -26.49 | -30.14 |
| 4 | 0.23351 | 10.15 | 24.84 | 10.00 | 34.99 | 20.15 | 62.32 | 52.32 | -27.33 | -32.17 |
| 5 | 1.57702 | 10.22 | 20.45 | 16.01 | 30.67 | 26.23 | 56.00 | 46.00 | -25.33 | -19.77 |
| 6 | 20.56200 | 10.53 | 13.35 | 4.04 | 23.88 | 14.57 | 60.00 | 50.00 | -36.12 | -35.43 |

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



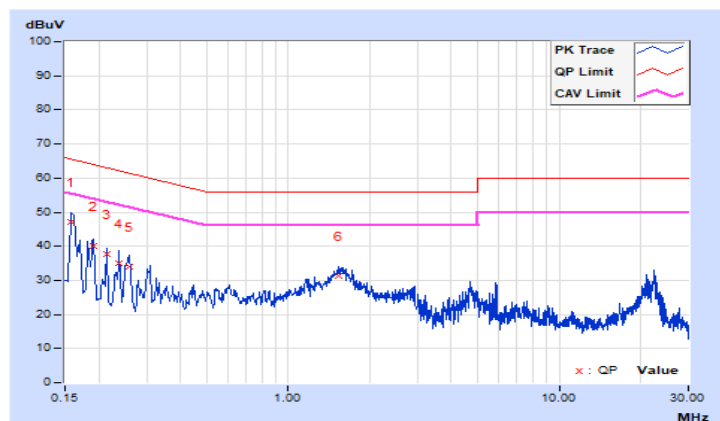
Mode C

| | | | |
|------------------------|------------------|---|--------------------------------------|
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 25°C, 69% RH |
| Tested by | Wade Huang | Test Date | 2022/4/11 |

| 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 | 0.15800 | 10.13 | 36.92 | 20.49 | 47.05 | 30.62 | 65.57 | 55.57 | -18.52 | -24.95 |
| 2 | 0.19000 | 10.14 | 30.09 | 17.19 | 40.23 | 27.33 | 64.04 | 54.04 | -23.81 | -26.71 |
| 3 | 0.21400 | 10.14 | 27.55 | 12.49 | 37.69 | 22.63 | 63.05 | 53.05 | -25.36 | -30.42 |
| 4 | 0.23800 | 10.14 | 24.71 | 9.68 | 34.85 | 19.82 | 62.17 | 52.17 | -27.32 | -32.35 |
| 5 | 0.25800 | 10.15 | 23.81 | 10.74 | 33.96 | 20.89 | 61.50 | 51.50 | -27.54 | -30.61 |
| 6 | 1.53400 | 10.21 | 21.08 | 16.23 | 31.29 | 26.44 | 56.00 | 46.00 | -24.71 | -19.56 |

Remarks:

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

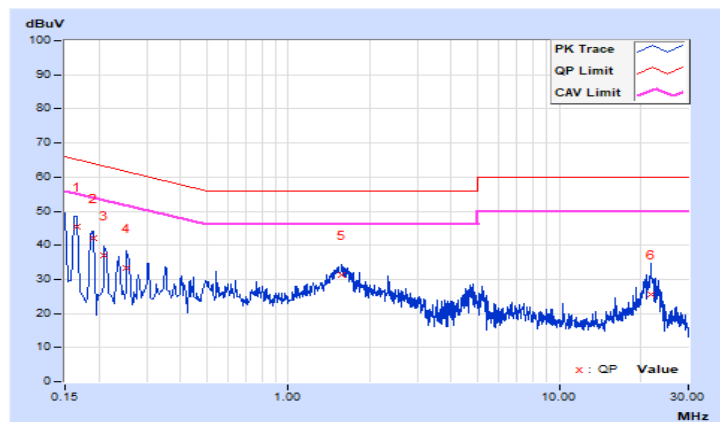


| | | | |
|------------------------|------------------|---|--------------------------------------|
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120 Vac, 60 Hz | Environmental Conditions | 25°C, 69% RH |
| Tested by | Wade Huang | Test Date | 2022/4/11 |

| 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 | 0.16535 | 10.14 | 35.35 | 18.29 | 45.49 | 28.43 | 65.19 | 55.19 | -19.70 | -26.76 |
| 2 | 0.19000 | 10.15 | 31.97 | 16.13 | 42.12 | 26.28 | 64.04 | 54.04 | -21.92 | -27.76 |
| 3 | 0.21000 | 10.15 | 26.98 | 11.68 | 37.13 | 21.83 | 63.21 | 53.21 | -26.08 | -31.38 |
| 4 | 0.25400 | 10.16 | 23.14 | 11.05 | 33.30 | 21.21 | 61.63 | 51.63 | -28.33 | -30.42 |
| 5 | 1.57000 | 10.22 | 21.10 | 16.43 | 31.32 | 26.65 | 56.00 | 46.00 | -24.68 | -19.35 |
| 6 | 21.80600 | 10.48 | 15.02 | 4.70 | 25.50 | 15.18 | 60.00 | 50.00 | -34.50 | -34.82 |

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

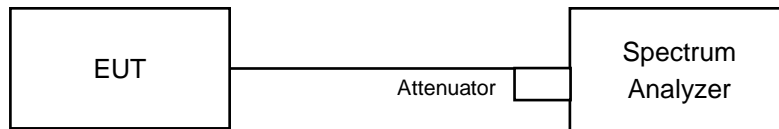


4.3 6 dB Bandwidth Measurement

4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test 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

4.3.5 Deviation from Test Standard

No deviation.

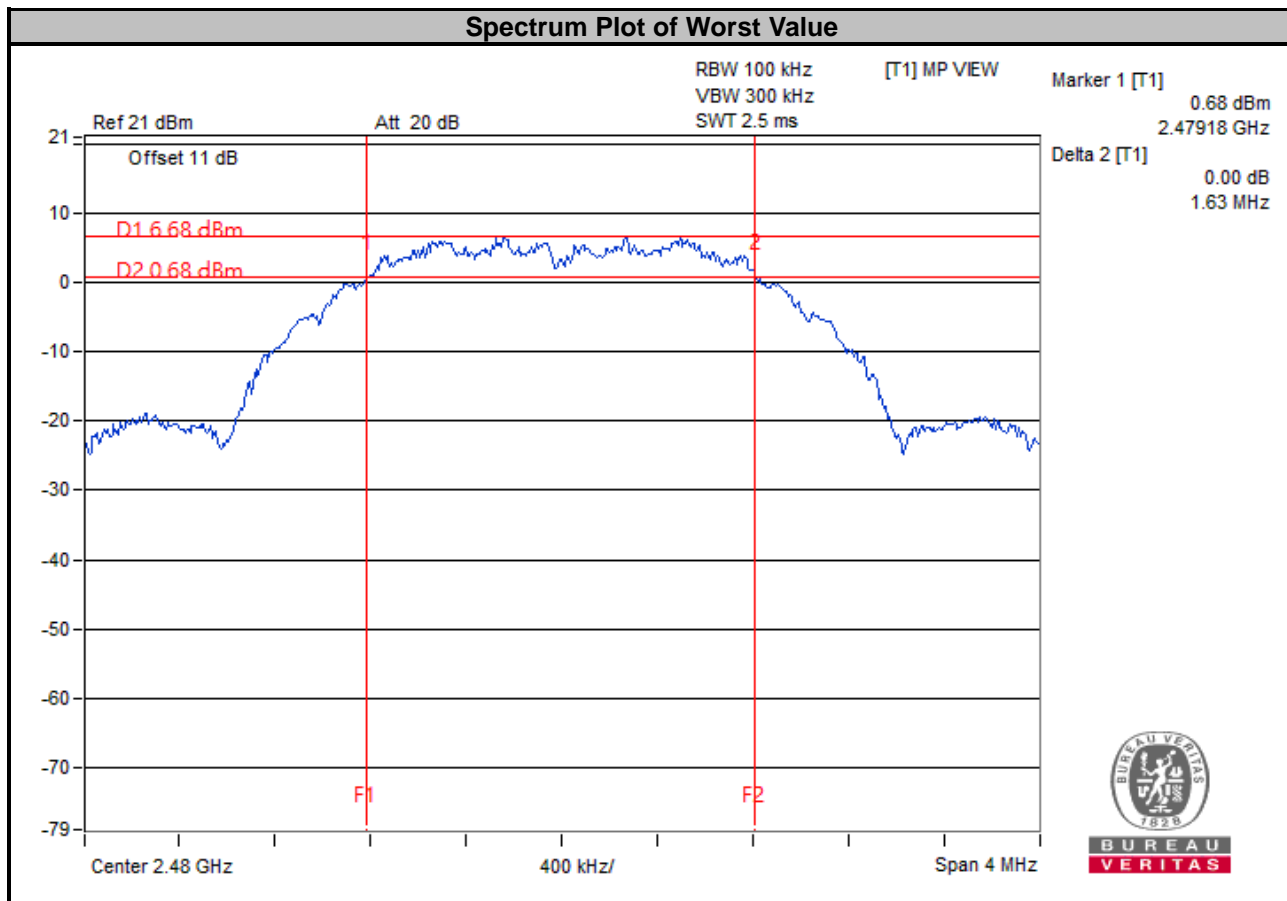
4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Result

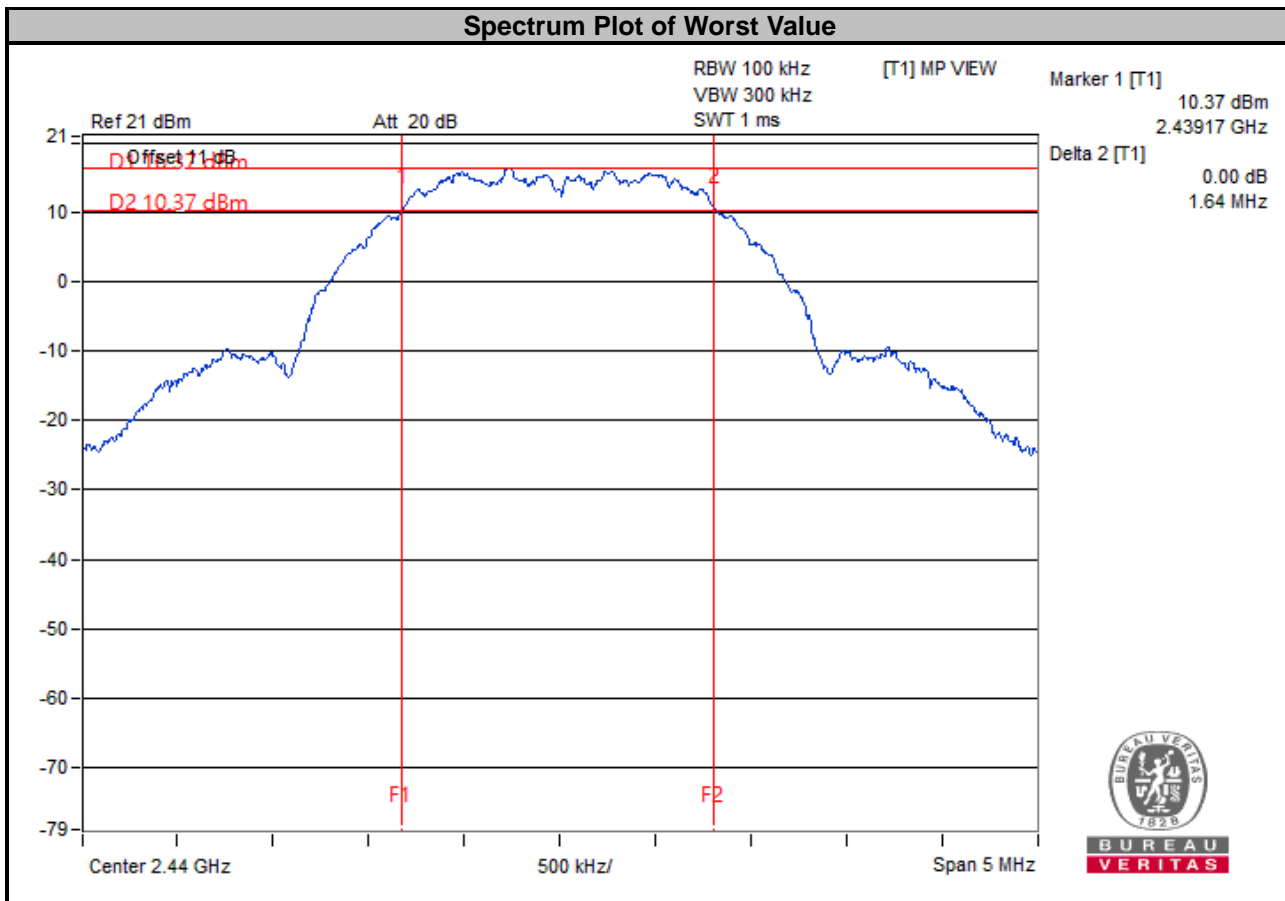
Mode A

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|----------------------|---------------------|-------------|
| 11 | 2405 | 1.64 | 0.5 | Pass |
| 18 | 2440 | 1.65 | 0.5 | Pass |
| 26 | 2480 | 1.63 | 0.5 | Pass |



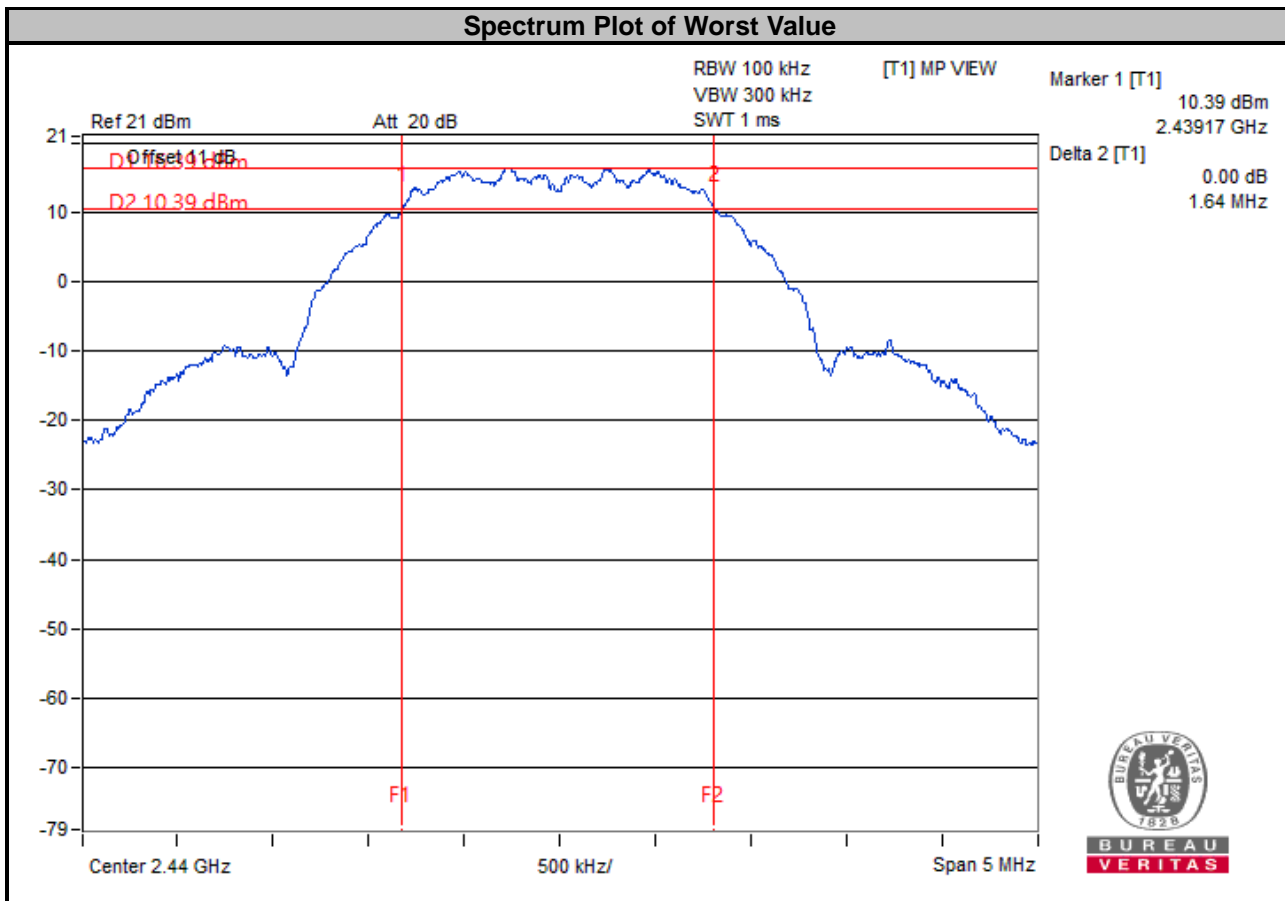
Mode B

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|----------------------|---------------------|-------------|
| 11 | 2405 | 1.65 | 0.5 | Pass |
| 18 | 2440 | 1.64 | 0.5 | Pass |
| 25 | 2475 | 1.64 | 0.5 | Pass |
| 26 | 2480 | 1.64 | 0.5 | Pass |



Mode C

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|----------------------|---------------------|-------------|
| 11 | 2405 | 1.65 | 0.5 | Pass |
| 18 | 2440 | 1.64 | 0.5 | Pass |
| 25 | 2475 | 1.64 | 0.5 | Pass |
| 26 | 2480 | 1.65 | 0.5 | Pass |

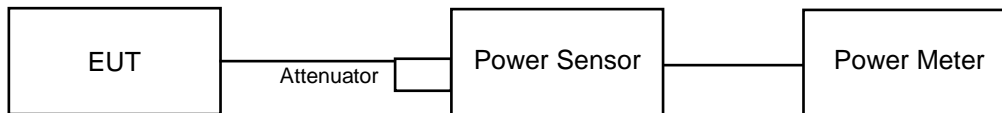


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

A 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 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.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.4.7 Test Results

Mode A

| Channel | Frequency (MHz) | Peak Power (mW) | Peak Power (dBm) | Limit (dBm) | Pass / Fail |
|---------|-----------------|-----------------|------------------|-------------|-------------|
| 11 | 2405 | 11.143 | 10.47 | 30 | Pass |
| 18 | 2440 | 10.864 | 10.36 | 30 | Pass |
| 26 | 2480 | 10.765 | 10.32 | 30 | Pass |

| Channel | Frequency (MHz) | Average Power (mW) | Average Power (dBm) |
|---------|-----------------|--------------------|---------------------|
| 11 | 2405 | 10.116 | 10.05 |
| 18 | 2440 | 9.931 | 9.97 |
| 26 | 2480 | 9.683 | 9.86 |

Mode B

| Channel | Frequency (MHz) | Peak Power (mW) | Peak Power (dBm) | Limit (dBm) | Pass / Fail |
|---------|-----------------|-----------------|------------------|-------------|-------------|
| 11 | 2405 | 94.406 | 19.75 | 30 | Pass |
| 18 | 2440 | 93.325 | 19.70 | 30 | Pass |
| 25 | 2475 | 94.406 | 19.75 | 30 | Pass |
| 26 | 2480 | 15.74 | 11.97 | 30 | Pass |

| Channel | Frequency (MHz) | Average Power (mW) | Average Power (dBm) |
|---------|-----------------|--------------------|---------------------|
| 11 | 2405 | 90.365 | 19.56 |
| 18 | 2440 | 89.743 | 19.53 |
| 25 | 2475 | 90.782 | 19.58 |
| 26 | 2480 | 14.588 | 11.64 |

Mode C

| Channel | Frequency (MHz) | Peak Power (mW) | Peak Power (dBm) | Limit (dBm) | Pass / Fail |
|---------|-----------------|-----------------|------------------|-------------|-------------|
| 11 | 2405 | 95.719 | 19.81 | 30 | Pass |
| 18 | 2440 | 95.499 | 19.80 | 30 | Pass |
| 25 | 2475 | 94.406 | 19.75 | 30 | Pass |
| 26 | 2480 | 23.823 | 13.77 | 30 | Pass |

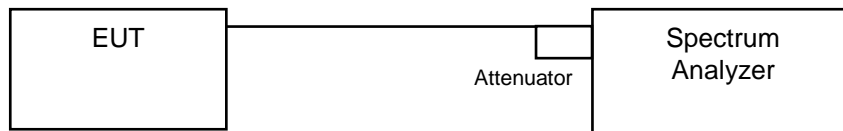
| Channel | Frequency (MHz) | Average Power (mW) | Average Power (dBm) |
|---------|-----------------|--------------------|---------------------|
| 11 | 2405 | 92.47 | 19.66 |
| 18 | 2440 | 92.045 | 19.64 |
| 25 | 2475 | 91.411 | 19.61 |
| 26 | 2480 | 22.856 | 13.59 |

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Set the RBW = 3 kHz, VBW = 10 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.

4.5.5 Deviation from Test Standard

No deviation.

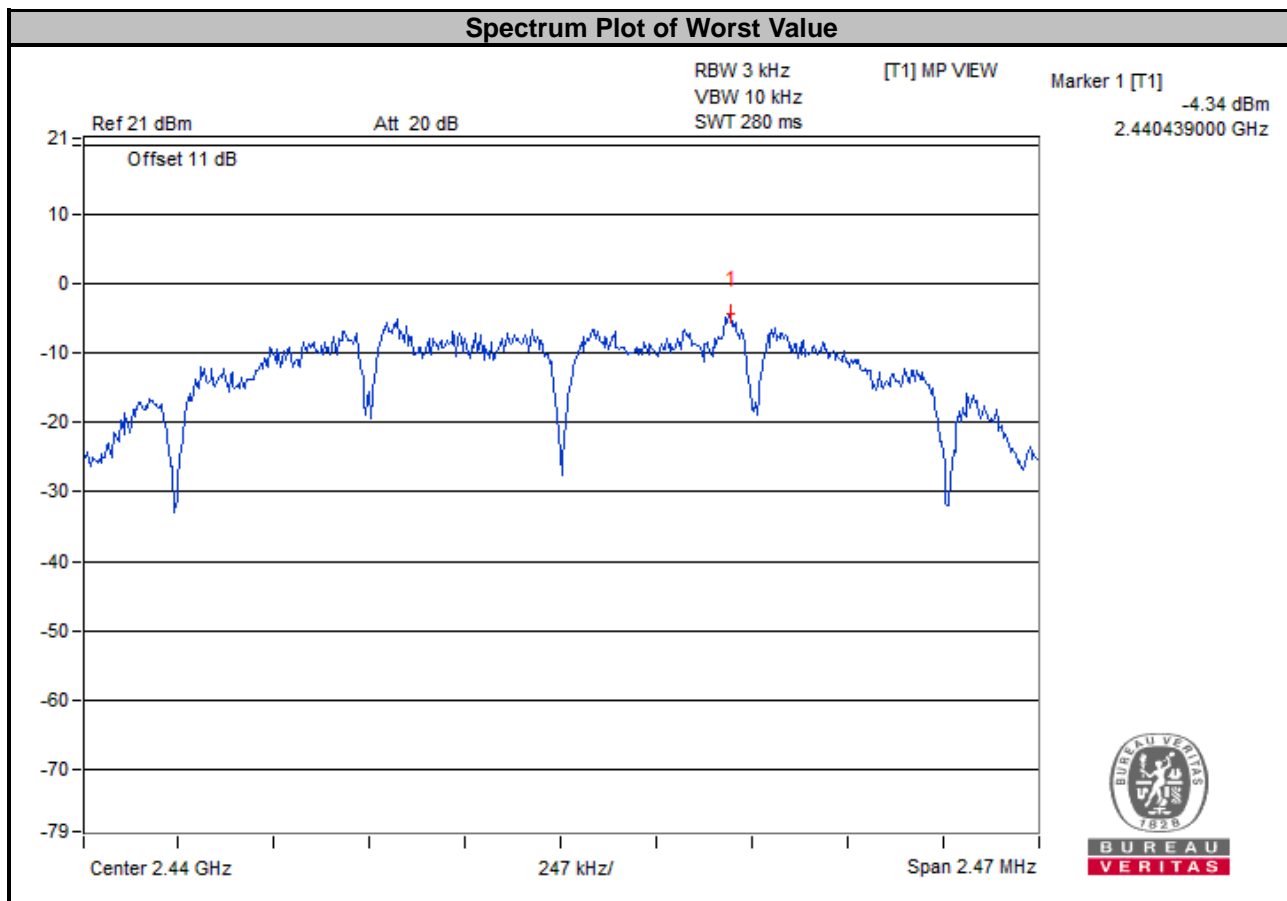
4.5.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

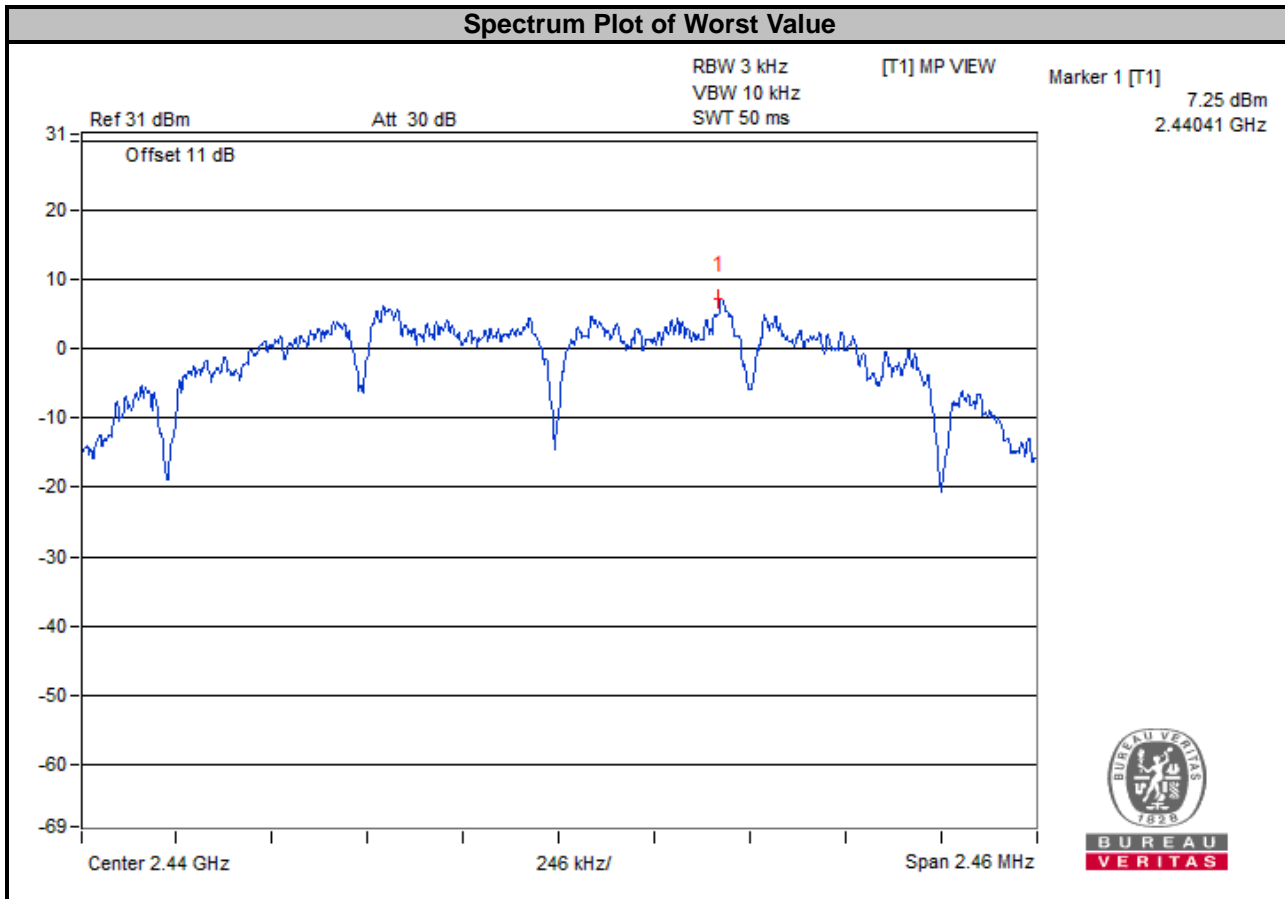
Mode A

| Channel | Frequency (MHz) | PSD (dBm/3 kHz) | Limit (dBm/3 kHz) | Pass / Fail |
|---------|-----------------|-----------------|-------------------|-------------|
| 11 | 2405 | -4.42 | 8 | Pass |
| 18 | 2440 | -4.34 | 8 | Pass |
| 26 | 2480 | -4.88 | 8 | Pass |



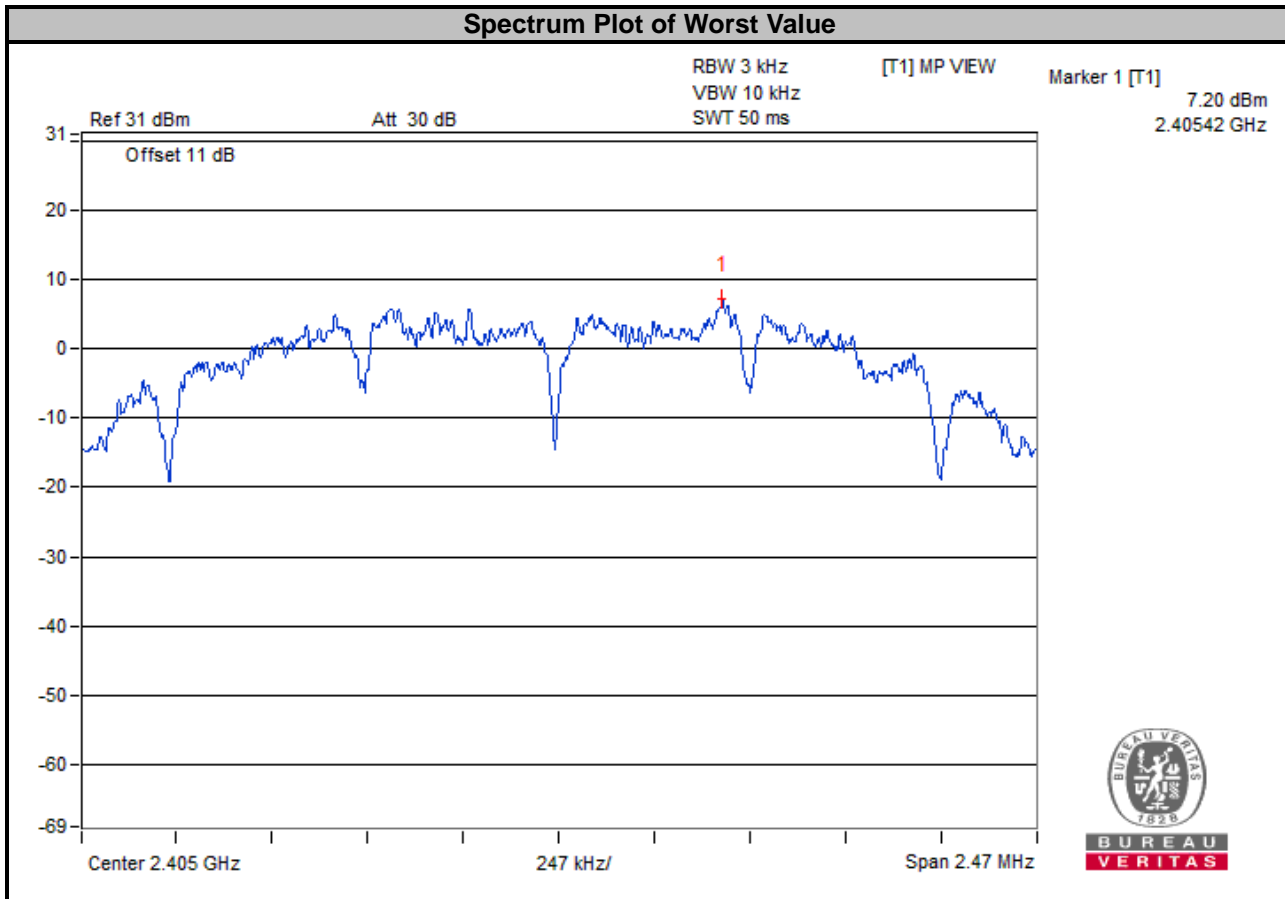
Mode B

| Channel | Frequency (MHz) | PSD (dBm/3 kHz) | Limit (dBm/3 kHz) | Pass / Fail |
|---------|-----------------|-----------------|-------------------|-------------|
| 11 | 2405 | 7.00 | 8 | Pass |
| 18 | 2440 | 7.25 | 8 | Pass |
| 25 | 2475 | 7.08 | 8 | Pass |
| 26 | 2480 | -1.47 | 8 | Pass |



Mode C

| Channel | Frequency (MHz) | PSD (dBm/3 kHz) | Limit (dBm/3 kHz) | Pass / Fail |
|---------|-----------------|-----------------|-------------------|-------------|
| 11 | 2405 | 7.20 | 8 | Pass |
| 18 | 2440 | 6.80 | 8 | Pass |
| 25 | 2475 | 6.50 | 8 | Pass |
| 26 | 2480 | 0.42 | 8 | Pass |



4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

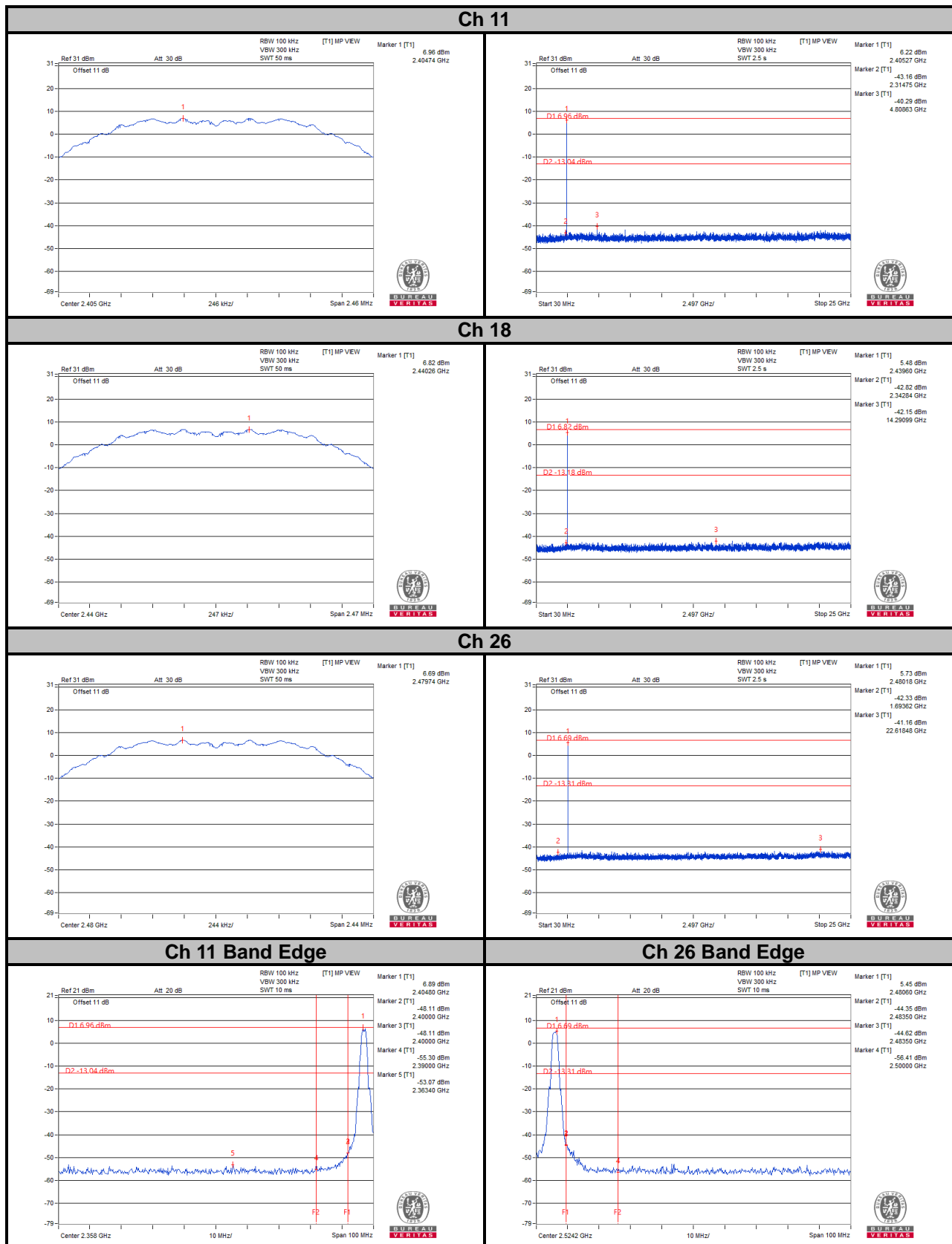
4.6.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.6.7 Test Results

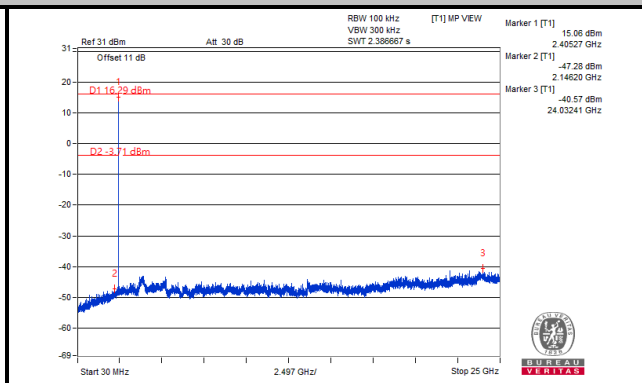
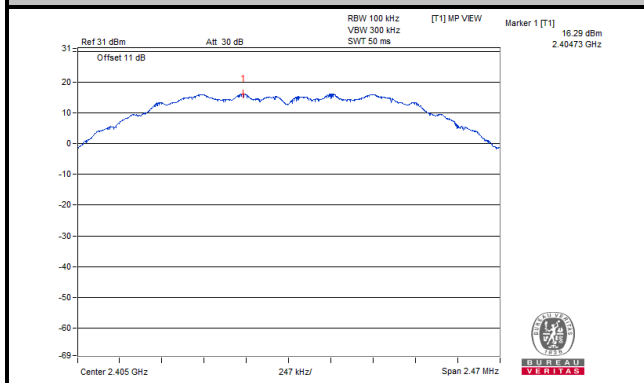
The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 20 dB offset below D1. It shows compliance with the requirement.

Mode A

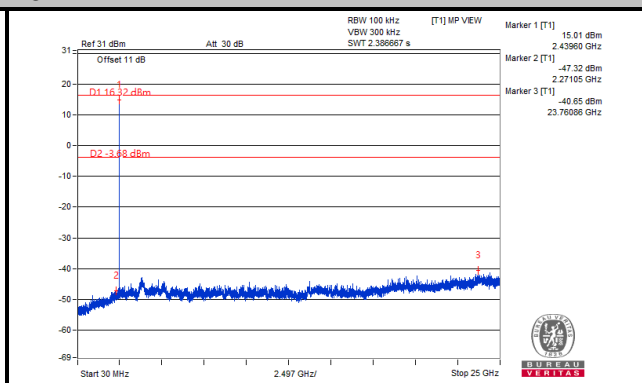
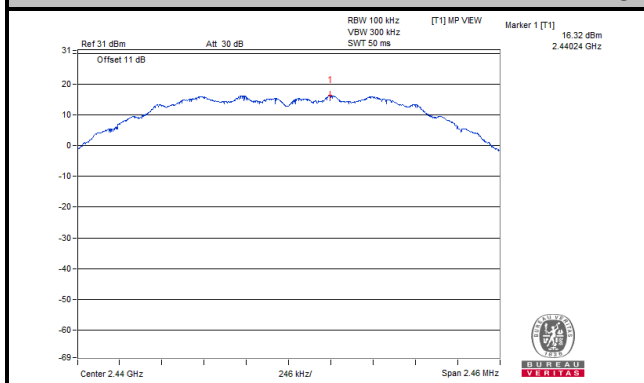


Mode B

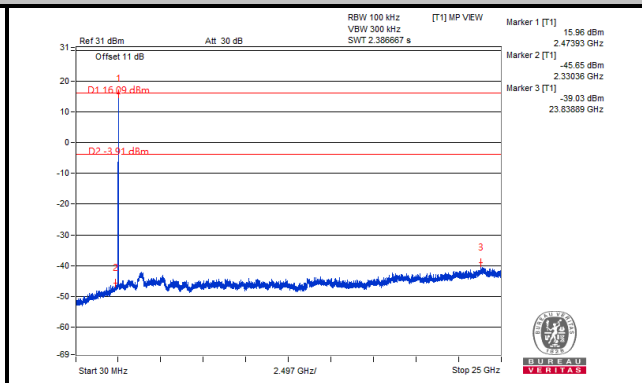
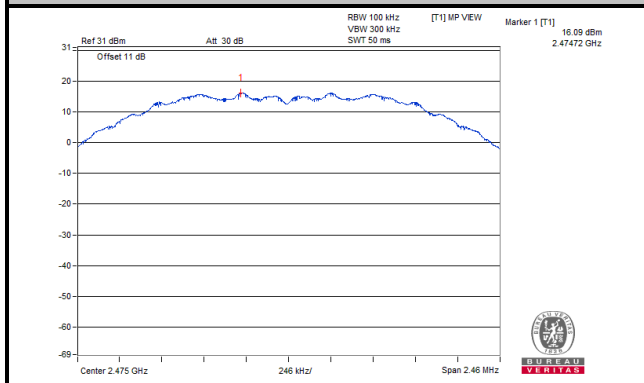
Ch 11



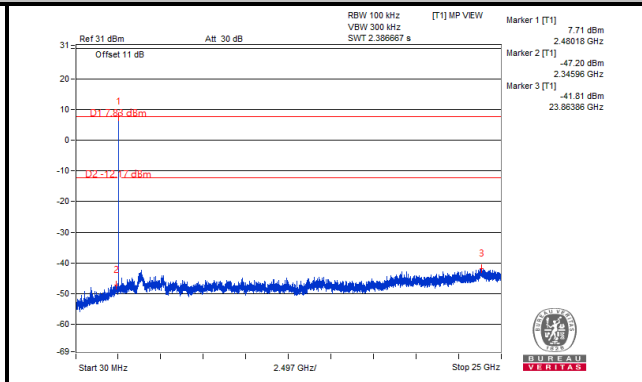
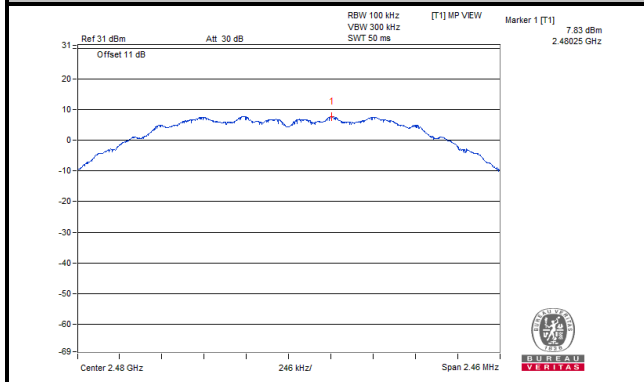
Ch 18



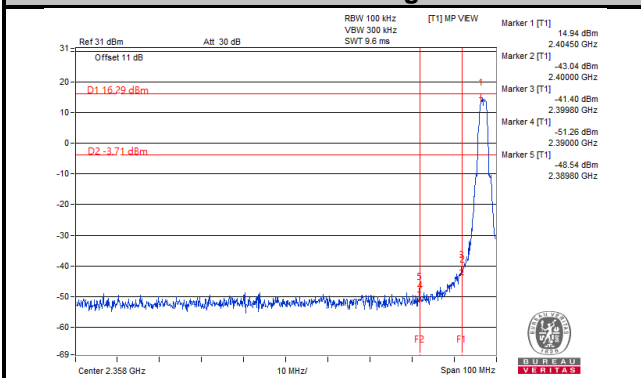
Ch 25



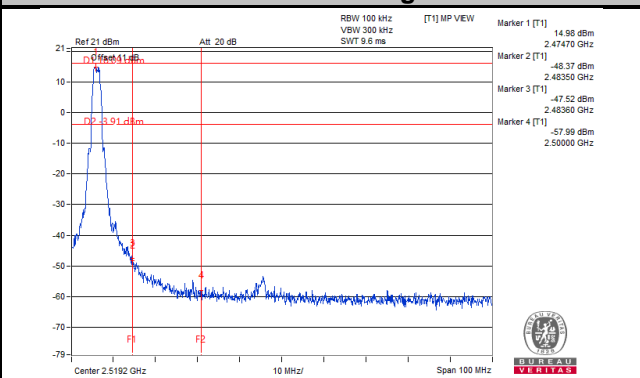
Ch 26



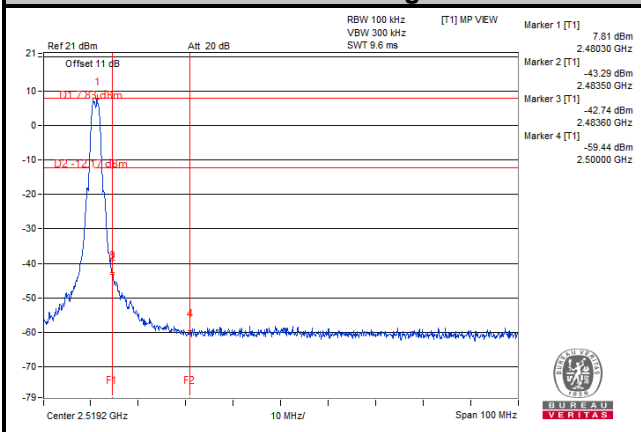
Ch 11 Band Edge



Ch 25 Band Edge

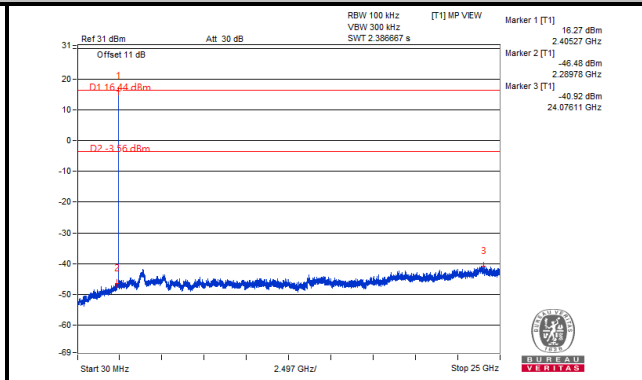
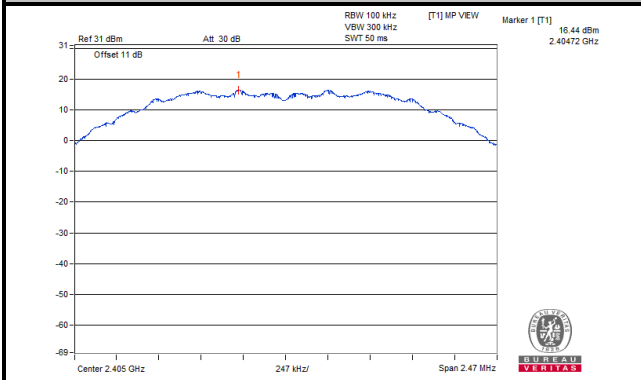


Ch 26 Band Edge

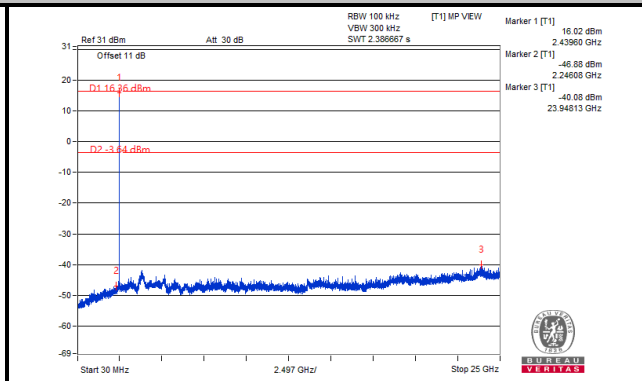
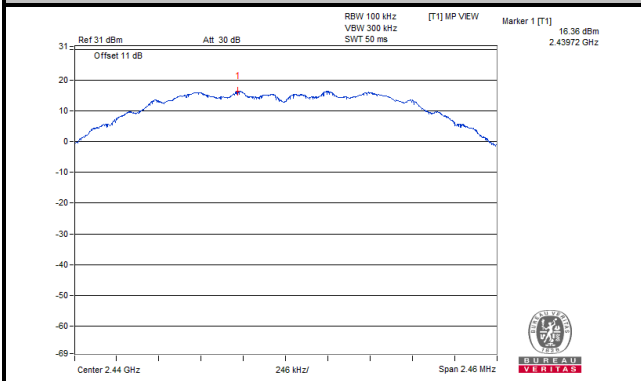


Mode C

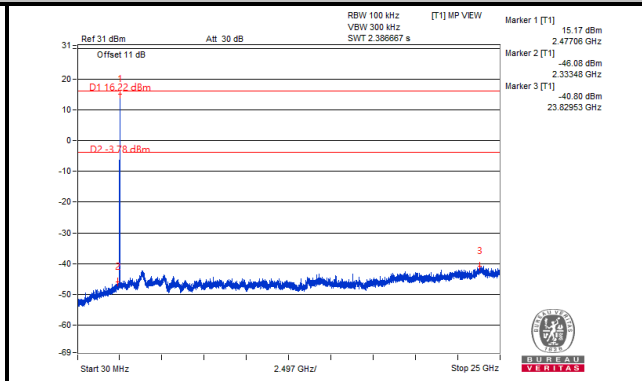
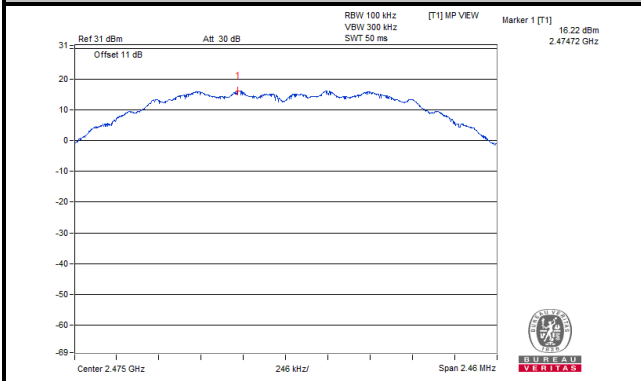
Ch 11



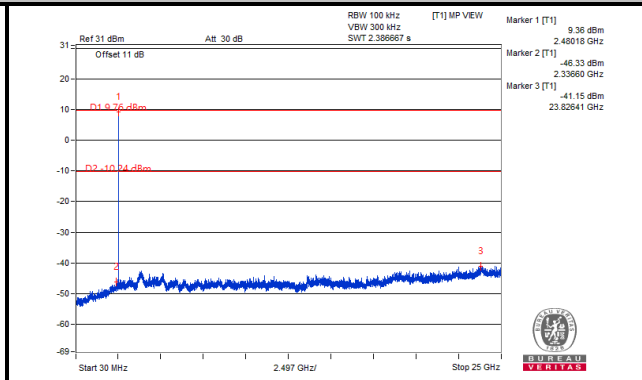
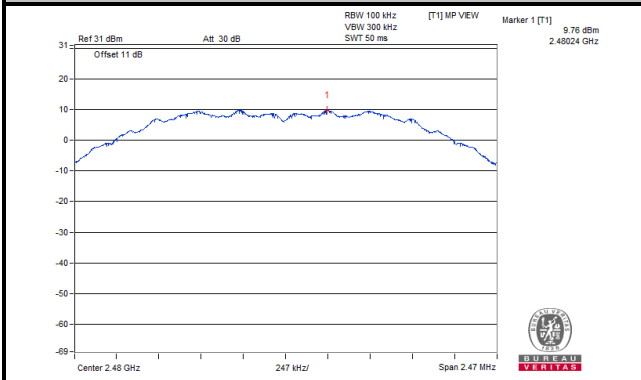
Ch 18



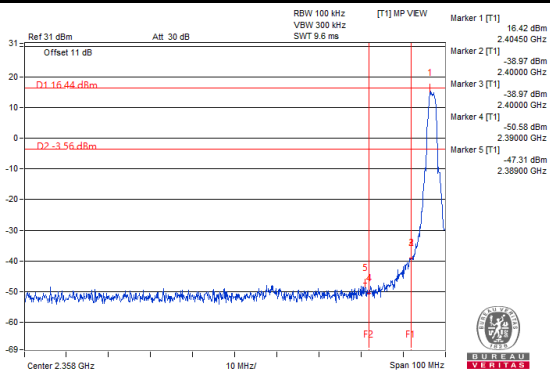
Ch 25



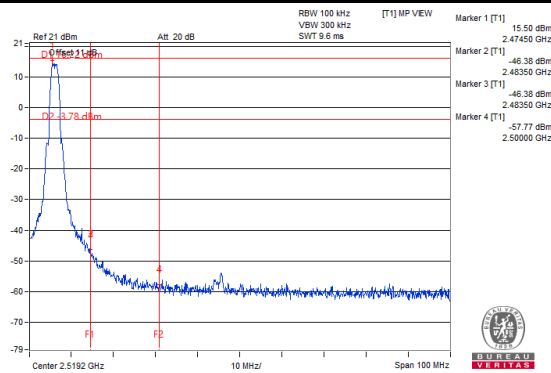
Ch 26



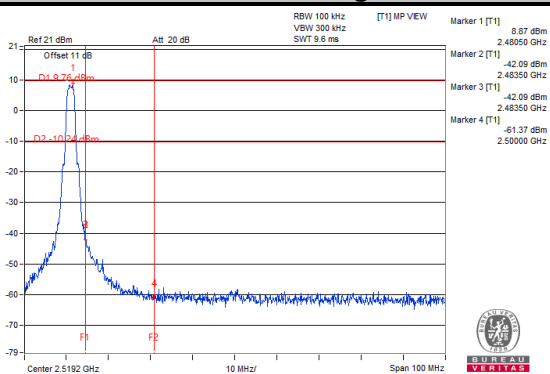
Ch 11 Band Edge



Ch 25 Band Edge

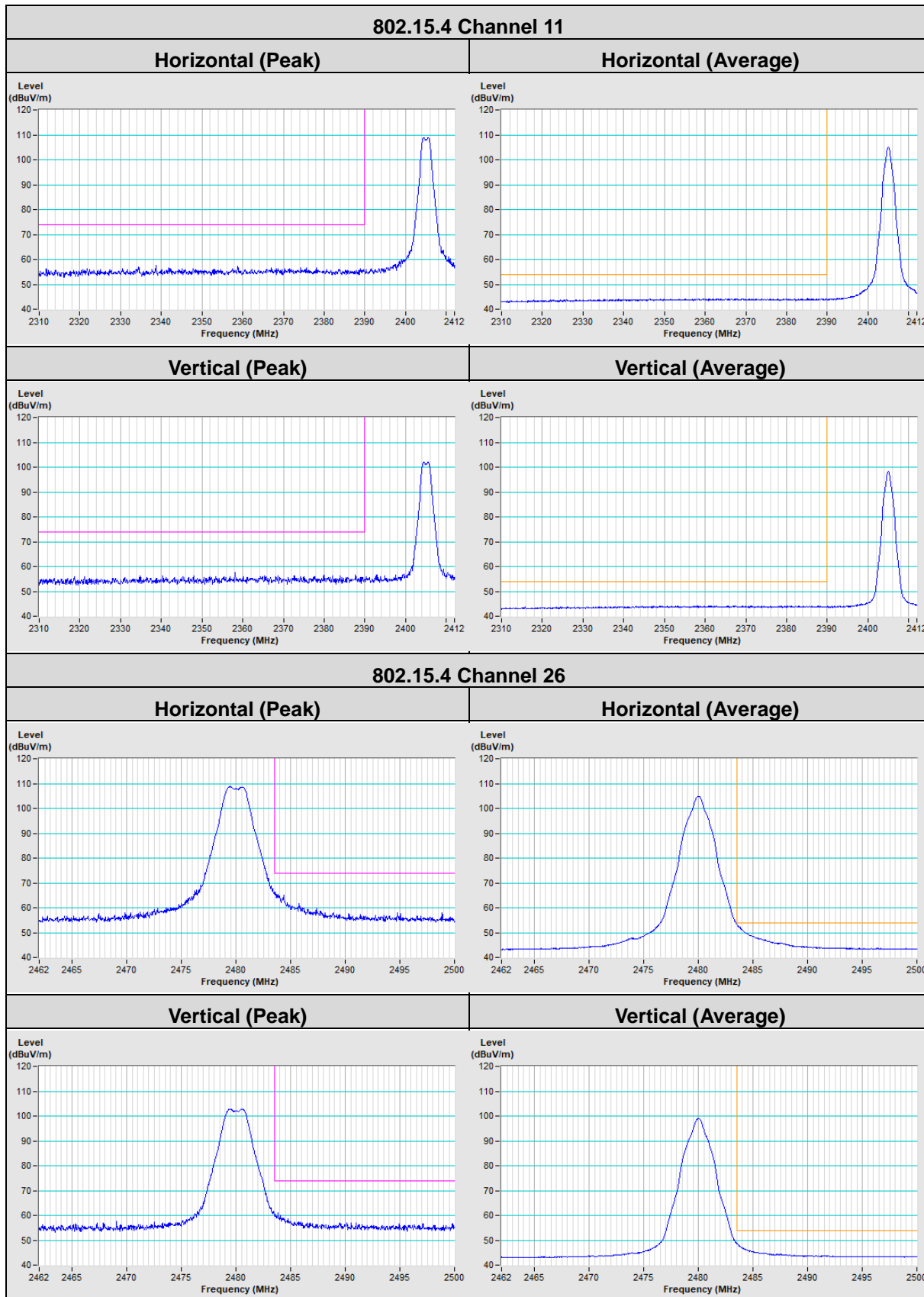


Ch 26 Band Edge

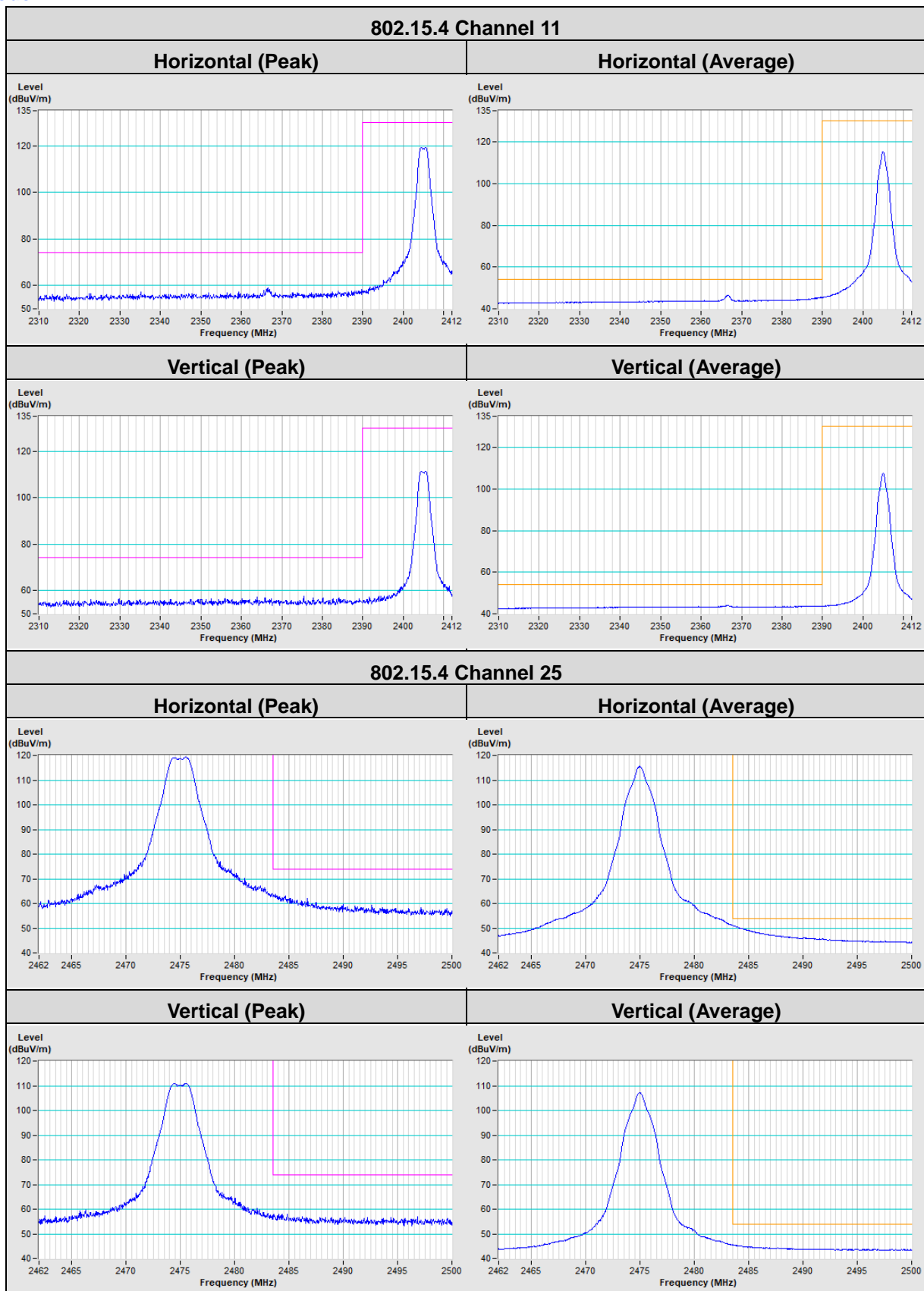


Annex A- Band Edge Measurement

Mode A

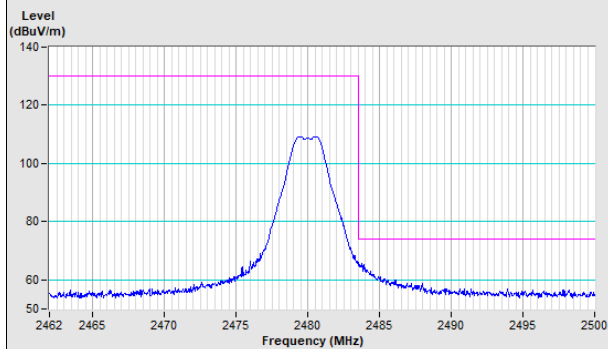


Mode B

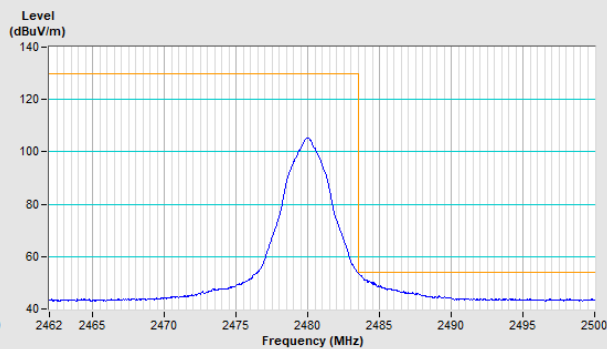


802.15.4 Channel 26

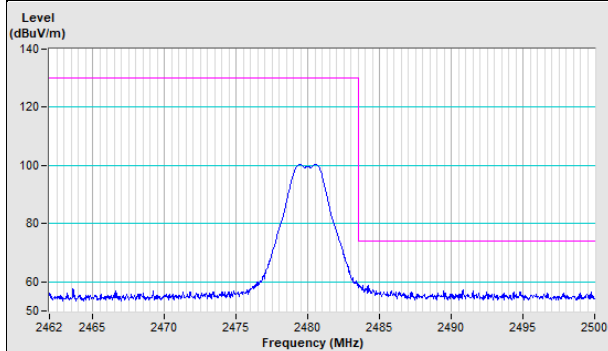
Horizontal (Peak)



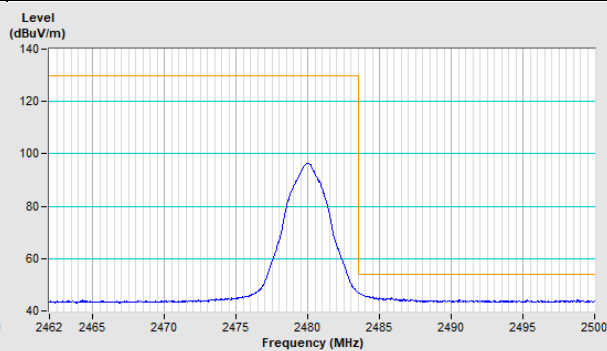
Horizontal (Average)



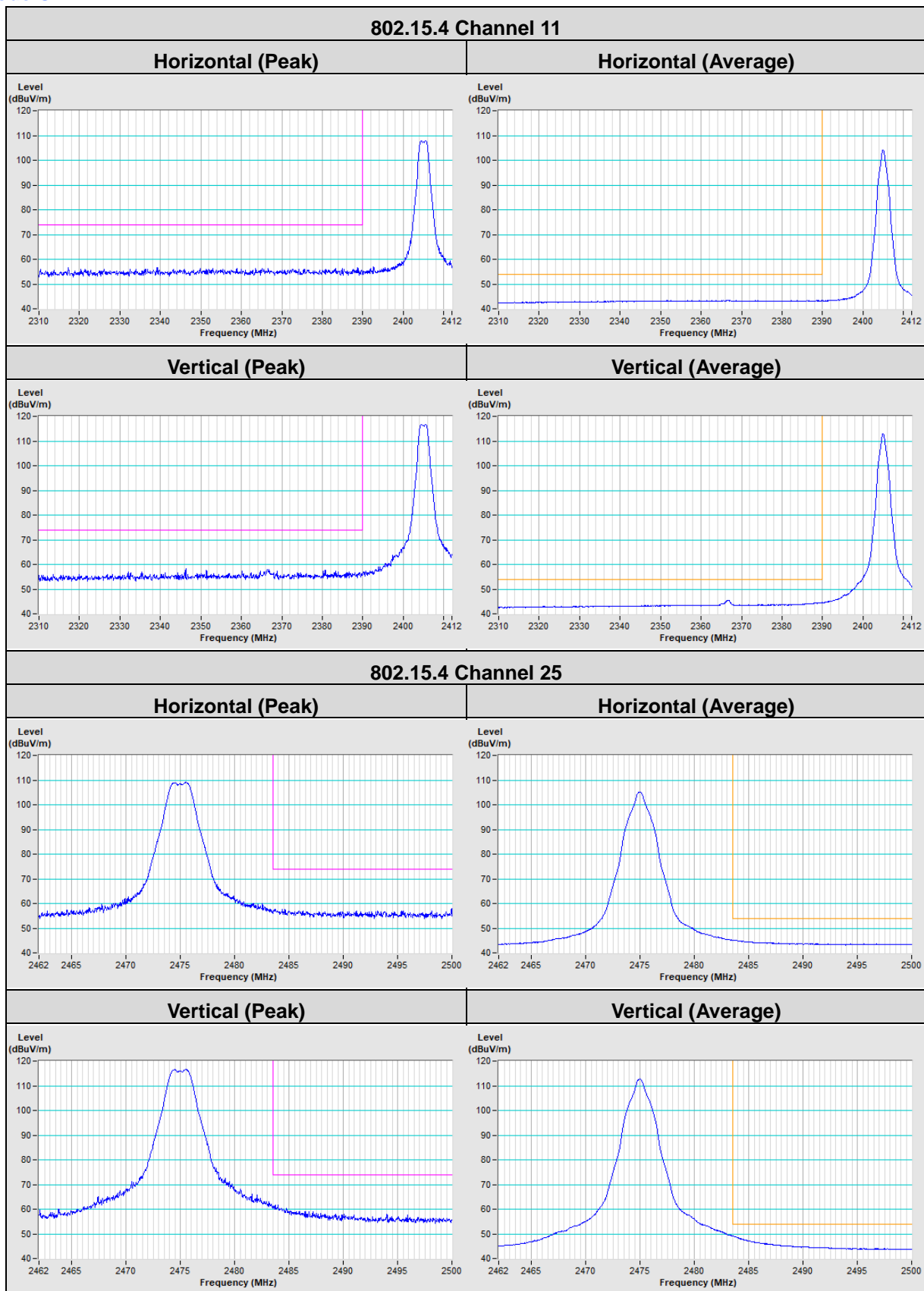
Vertical (Peak)



Vertical (Average)

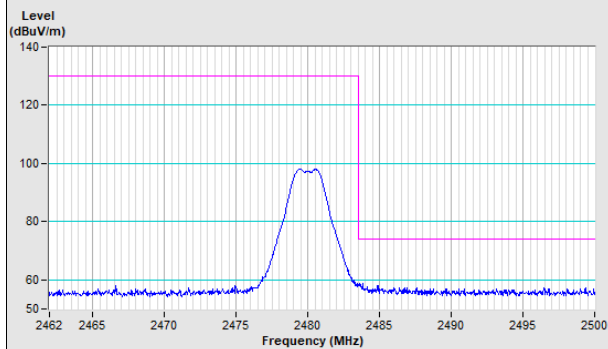


Mode C

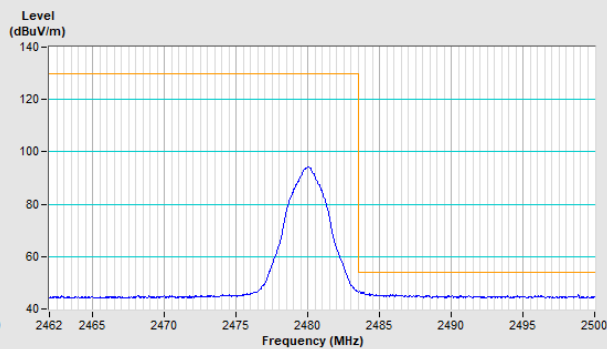


802.15.4 Channel 26

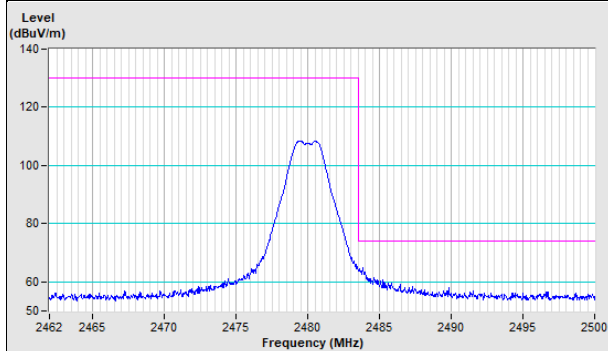
Horizontal (Peak)



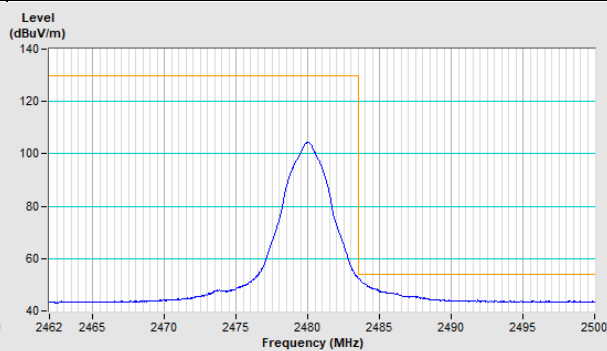
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



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

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