



Certificate #5376.01



EUROFINS ELECTRICAL TESTING SERVICE (SHENZHEN) CO., LTD.

RADIO TEST - REPORT

FCC Compliance Test Report

Product name: Beacon Transmitter

Model name: BCON-11, BCON-11(C), BCON-11(CNTX), BCON-11(NRX)

FCC ID: WNG-BCON-11

Test Report Number: EFGX25010139-IE-01-E01

Test Report No.: EFGX25010139-IE-01-E01
Eurofins Electrical Testing Service (Shenzhen) Co., Ltd.

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1 General Information

1.1 Notes

The results of this test report relate exclusively to the item tested as specified in chapter "Description of test item" and are not transferable to any other test items.

Eurofins Product Testing Service (Shenzhen) Co., Ltd. is not responsible for any generalisations and conclusions drawn from this report. Any modification of the test item can lead to invalidity of test results and this test report may therefore be not applicable to the modified test item.

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Operator:

2025-01-22

Bruce Zheng / Project Engineer

A handwritten signature in black ink that appears to read "Bruce Zheng".

Date

Eurofins-Lab.

Name / Title

Signature

Technical responsibility for area of testing:

2025-01-22

Abert Xu / Lab Manager

A handwritten signature in black ink that appears to read "Abert Xu".

Date

Eurofins-Lab.

Name / Title

Signature



1.2 Testing laboratory

Eurofins Electrical Testing Service (Shenzhen) Co., Ltd.

1st Floor, Building 2, Chungu, Meisheng Huigu Science and Technology Park, No. 83 Dabao Road, Bao'an District, Shenzhen. P.R.China.

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The Laboratory has passed the Accreditation by the American Association for Laboratory Accreditation (A2LA). The Accreditation number is 5376.01

The Laboratory has been listed by industry Canada to perform electromagnetic emission measurements, The CAB identifier is CN0088

1.3 Details of approval holder

| | | |
|-----------|---|---------------------------------------------------------------------------------------------|
| Name | : | Rondish CO.,LTD |
| Address | : | Unit G & H, 4/F, Block 1, Kwai Tak Ind. Ctr, 15-33 Kwai Tak St., Kwai Chung, N.T. Hong Kong |
| Telephone | : | ./. |
| Fax | : | ./. |

1.4 Details of Manufacturer

| | | |
|-----------|---|---------------------------------------------------------------------------------------------|
| Name | : | Rondish CO.,LTD |
| Address | : | Unit G & H, 4/F, Block 1, Kwai Tak Ind. Ctr, 15-33 Kwai Tak St., Kwai Chung, N.T. Hong Kong |
| Telephone | : | ./. |
| Fax | : | ./. |



1.5 Application details

| | | |
|--------------------------------|---|--------------------------|
| Date of receipt of application | : | 2024-12-25 |
| Date of receipt of test item | : | 2024-12-25 |
| Date of test | : | 2024-12-25 to 2025-01-22 |
| Date of issue | : | 2025-01-22 |

1.6 Test item

| | | |
|------------------------|---|---------------------------------------------------|
| Product type | : | Beacon Transmitter |
| Model name | : | BCON-11, BCON-11(C), BCON-11(CNTX), BCON-11(NRX) |
| Sample ID | : | 250106-20-008 |
| Brand | : | ./ |
| Serial number | : | ./ |
| Ratings | : | DC 24V from Ethernet |
| Test voltage | : | DC 24V |
| Additional information | : | N/A |

RadioTechnical data

| | | |
|-------------------|---|------------------|
| Frequency range | : | 125KHz |
| Radio Tech. | : | SRD |
| Frequency channel | : | 1 Channel |
| Modulation | : | FSK |
| Antenna type | : | Internal antenna |



1.7 Test standards

| Test Standards | |
|-----------------------|------------------------------------------------------------------------|
| FCC Part 15 Subpart C | PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators |

Test Method

- 1: ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- 2: ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices.

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

or

The deviations as specified were ascertained in the course of the tests performed.

2.2 Test environment

Temperature : 20 ... 25°C
Relative humidity content : 30 ... 60%
Air pressure : 100 ... 101kPa

2.3 Measurement uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

| System Measurement Uncertainty | |
|--------------------------------------------------------------|---------------------------------------------------------------------------|
| Test Items | Extended Uncertainty |
| Uncertainty for Conducted RF test | RF Power Conducted: 1.16dB Frequency test involved: 1.05×10-7 or 1% |
| Uncertainty for Radiated Spurious Emission 25MHz-3000MHz | Horizontal: 4.46dB; Vertical: 4.54dB; |
| Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz | Horizontal: 4.42dB; Vertical: 4.41dB; |
| Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz | Horizontal: 4.63dB; Vertical: 4.62dB; |

2.4 Test mode

The EUT was set at continuously transmitting during the test.



2.5 Test equipment utilized

| EQUIPMENT ID | EQUIPMENT NAME | MODEL NO. | CAL. DUE DATE |
|--------------|--------------------------|-------------------|---------------|
| 23-2-13-01 | EMI Test Receiver | ESR7 | 2025-03-25 |
| 23-2-13-02 | Signal Analyzer | N9020B-544 | 2025-03-25 |
| 23-2-12-01 | Active Loop Antenna | FMZB 1519B | 2025-03-25 |
| | TRILOG Broadband Antenna | VULB9168 | 2025-06-02 |
| 23-2-12-03 | Horn Antenna | 3117 | 2025-06-02 |
| 23-2-12-04 | Horn Antenna | BBHA 9170 | 2025-06-02 |
| 23-2-10-01 | Preamplifier | BBV9745 | 2025-03-25 |
| 23-2-10-02 | Preamplifier | EMC001330 | 2025-03-25 |
| 23-2-10-03 | Preamplifier | EMC051845SE | 2025-03-25 |
| 23-2-10-14 | Switch and Control Unit | ERIT-E-JS0806-SF1 | N/A |

2.6 Auxiliary Equipment Used during Test:

| DESCRIPTION | MANUFACTURER | MODEL NO. | S/N |
|-------------------|-----------------------------------|-----------|-----|
| LAN to DC adapter | N/A | N/A | N/A |
| Battery | NEATA BATTERY MANUFACTURE CO.,LTD | NT12-7 | N/A |

2.7 Test software information

| | | | |
|-----------------------|------------------|------------|-------------|
| Test Software Version | N.A | | |
| Modulation | Setting TX Power | TX Pattern | Packet Type |
| FSK | Default | Default | Default |

2.8 Customized Configurations

| EUT Conf. | Signal Description | Operating Frequency | Duty Cycle |
|-----------|--------------------|---------------------|------------|
| TM1 | FSK | 125KHz | ./ |

2.9 Test Environments

| Environment Parameter | Temperature | Voltage | Relative Humidity |
|-----------------------|-------------|---------|-------------------|
| 101.7Kpa | 26.5 °C | 24V | 58.3% |

2.10 Test results

 1st test test after modification production test

| Technical Requirements | | | | |
|------------------------|----------------------------------|-------------|---------|-----------|
| FCC Part 15 Subpart C | | | | |
| Test Condition | | Test Result | Verdict | Test Site |
| §15.207 | Conducted emission AC power port | N.A | N.A | N.A |
| §15.209 & §15.205 | Spurious radiated emission | Page 16 | Pass | Site 1 |
| §15.215 | -20dB Bandwidth & 99%Bandwidth | Page 12 | Pass | Site 1 |
| §15.203 | Antenna requirement | See note 1 | Pass | -- |

Remark 1: N/A – Not Applicable.

Note 1: The EUT use internal antenna, According to §15.203, it is considered sufficiently to comply with the provisions of this section.

3 Technical Requirement

3.1 Conducted Emission

Test Method:

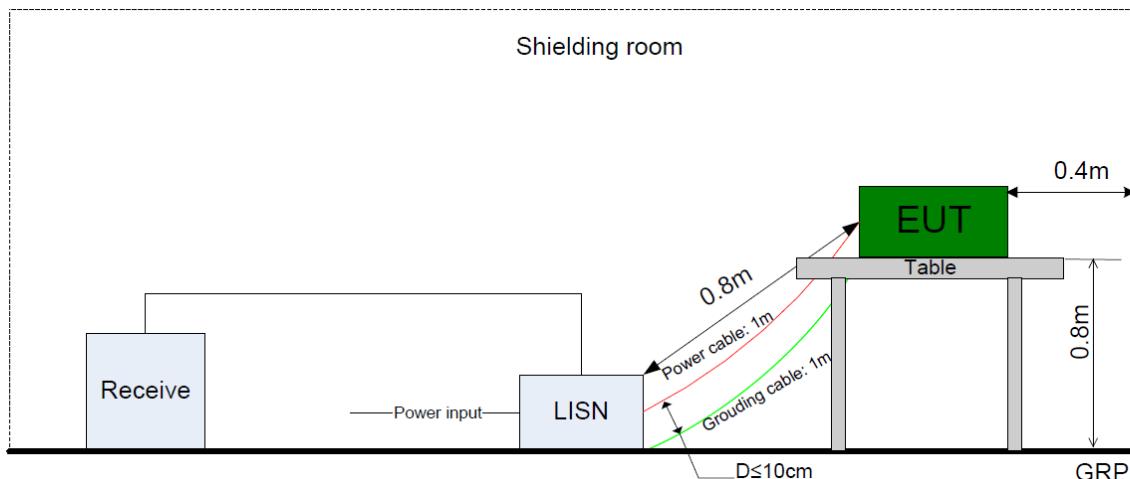
The test method was referred to the subclause 5.2 of ANSI C63.4-2014.

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Test Setup:

The mains cable of the EUT (per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.



Limit:

| Frequency MHz | QP Limit dB μ V | AV Limit dB μ V |
|------------------|------------------------|------------------------|
| 0.150-0.500 | 66-56* | 56-46* |
| 0.500-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Decreasing linear.

Test Result: N.A

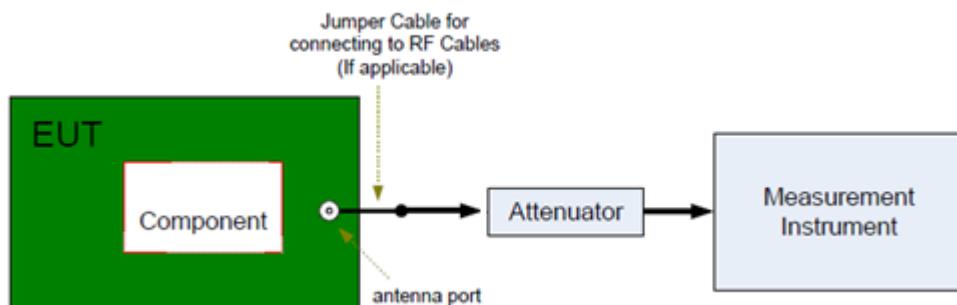
3.2 20dB bandwidth

Test Method:

1. Connect EUT test port to spectrum analyzer.
2. Set the EUT to transmit maximum output power at 2405MHz.
3. Then set the EUT to transmit at high, middle and low frequency separately.
4. Set Span = approximately 1.5 to 5 times the 99% bandwidth.
5. Set RBW \geq 1% to 5% of the 99% bandwidth, VBW \geq RBW.
6. Set Sweep = auto.
7. Set Detector function = Average.
8. Allow the trace to stabilize.
9. Repeat above procedures until all frequencies measured were complete.

Test Setup:

The component's antenna port(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The press a button of the EUT is to emit the specified signals for the purpose of measurements.

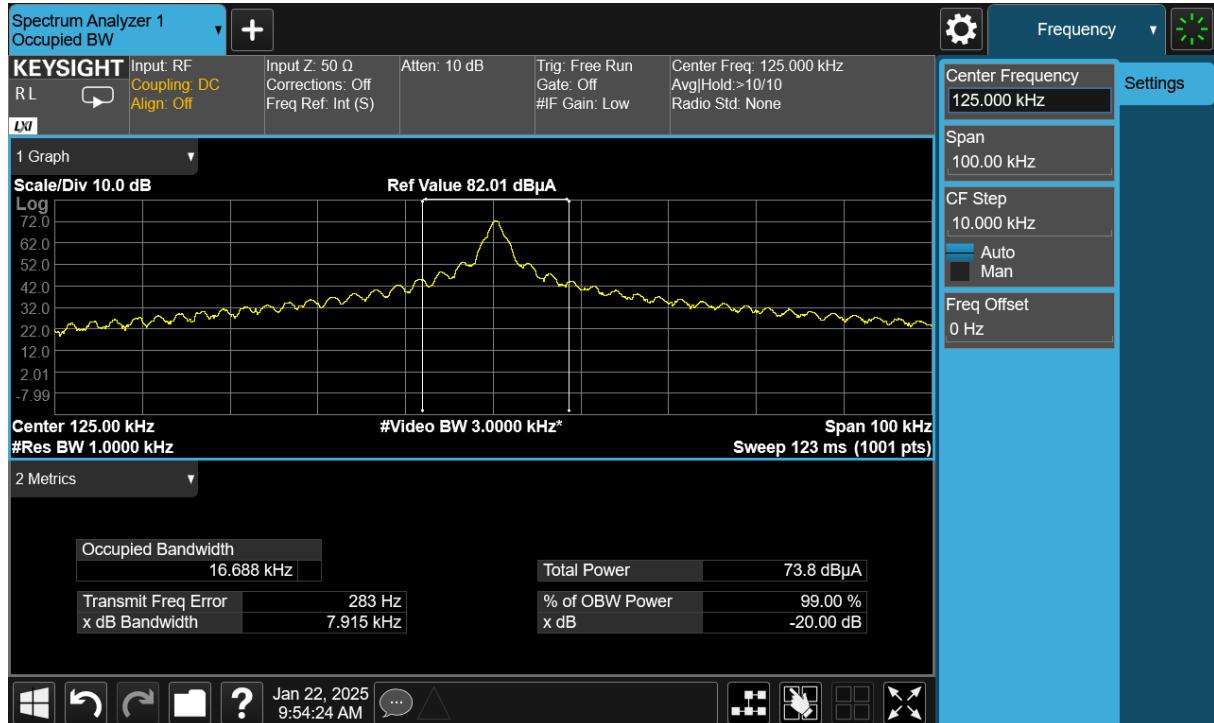


Limit:

According to 15.215(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Result

| 20dB Bandwidth (KHz) | Result |
|----------------------|--------|
| 16.688 | Pass |



3.3 Spurious radiated emission

Test Method:

- 1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: 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.
- 4: 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.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, $VBW \geq RBW$ for peak measurement and $VBW = 10Hz$ for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, $VBW \geq RBW$ for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 30MHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 200 Hz, $VBW \geq RBW$ from 9KHz to 0.15MHz, RBW 9KHz $VBW \geq RBW$ from 0.15MHz to 30MHz for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

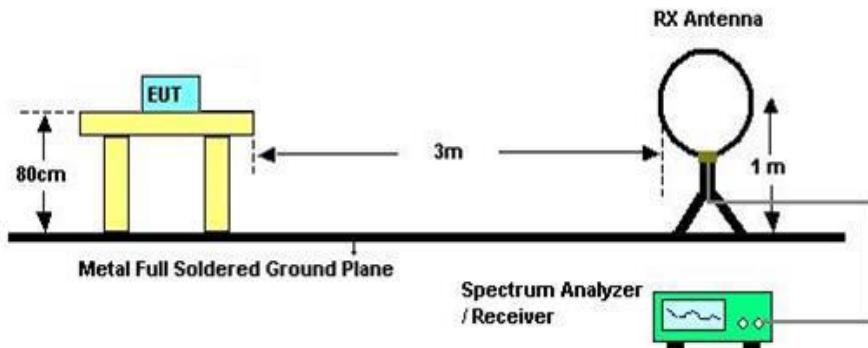
Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($20\log(1/\text{duty cycle})$)).
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

Test Setup:

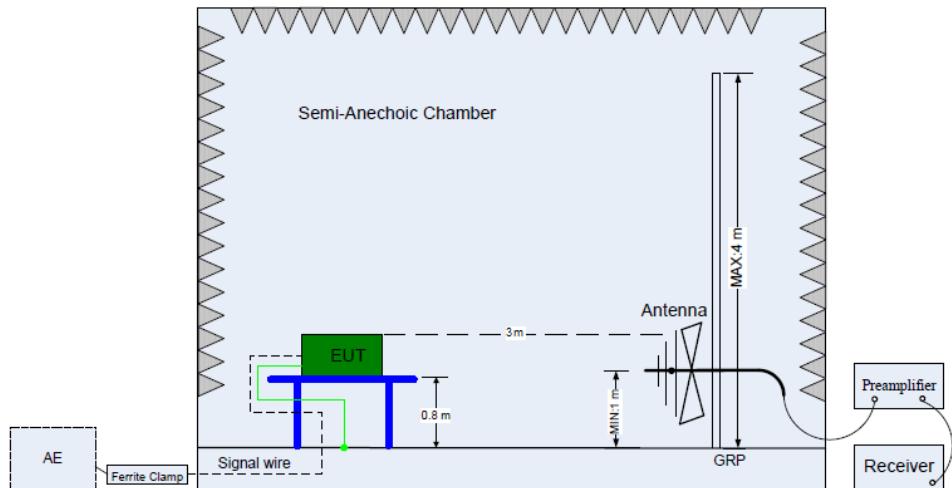
Test Setup 1: Radiated Emission test below 30MHz

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.4. The test distance is 3m. The setup is according to ANSI C63.4.



Test Setup 2: Radiated Emission test below 1GHz

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.4. The test distance is 3m. The setup is according to ANSI C63.4.



**Limit:**

Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

§ 15.209

| Frequency MHz | Field Strength uV/m | Field Strength dB μ V/m | Detector |
|------------------|------------------------|--------------------------------|----------|
| 30-88 | 100 | 40 | QP |
| 88-216 | 150 | 43.5 | QP |
| 216-960 | 200 | 46 | QP |
| 960-1000 | 500 | 54 | QP |
| Above 1000 | 500 | 54 | AV |
| Above 1000 | 5000 | 74 | PK |

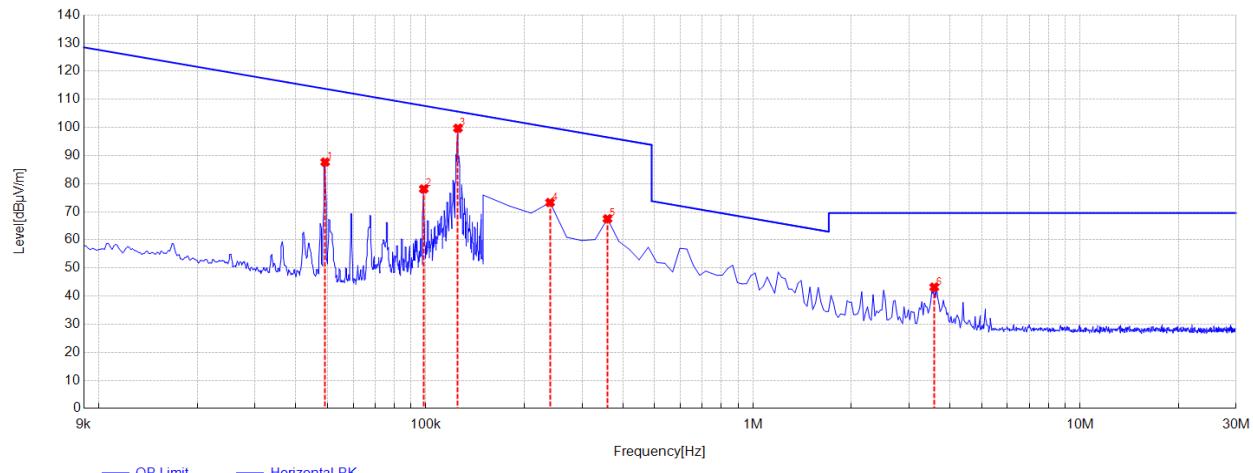
§ 15.205 Restricted bands of operation

| MHz | MHz | MHz | GHz |
|-------------------|---------------------|---------------|------------------|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | (²) |
| 13.36-13.41 | | | |

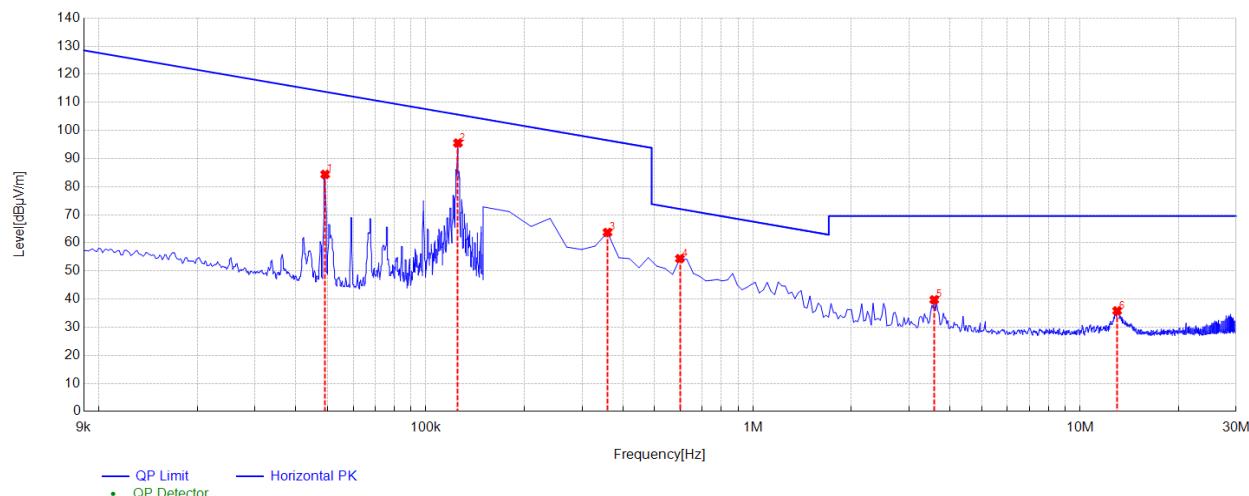
Remark:

- (1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- (2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss - Amplifier Gain.
- (4) Below 1GHz: Corrector factor = Antenna Factor + Cable Loss - Amplifier Gain.

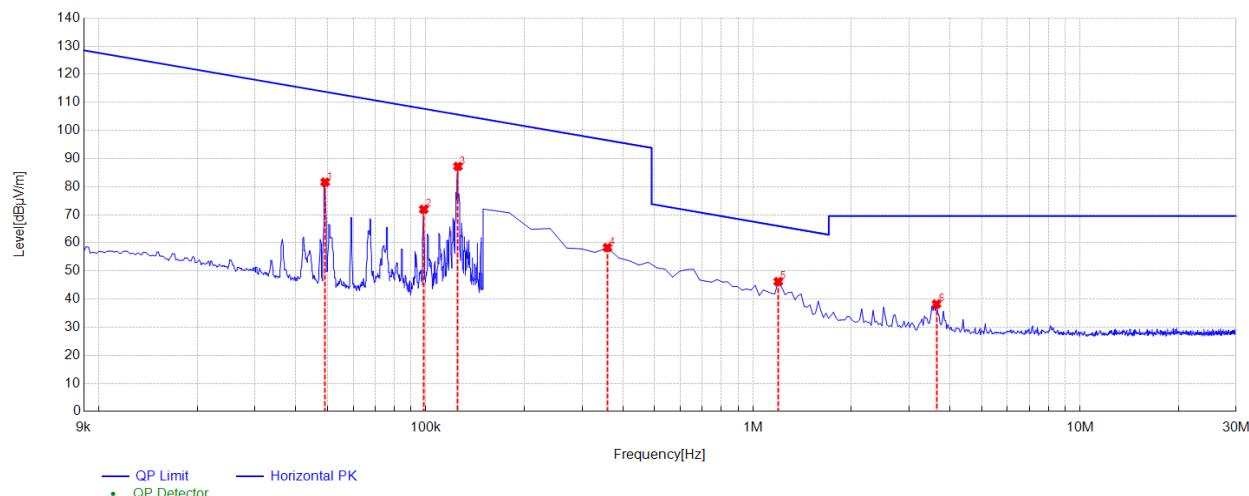
Spurious radiated emission 9KHz – 30MHz



| NO. | Freq. [MHz] | Level [dB μ V/m] | Factor [dB/m] | Limit [dB μ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | Verdict |
|-----|-------------|----------------------|---------------|----------------------|-------------|-------------|-----------|----------|---------|
| 1 | 0.0492 | 87.69 | -10.80 | 113.76 | 26.07 | 100 | 32 | X | PASS |
| 2 | 0.0985 | 78.12 | -10.36 | 107.72 | 29.60 | 100 | 34 | X | PASS |
| 3 | 0.1253 | 99.72 | -10.39 | 105.64 | 5.92 | 100 | 98 | X | PASS |
| 4 | 0.2396 | 73.30 | -10.36 | 100.01 | 26.71 | 100 | 281 | X | PASS |
| 5 | 0.3590 | 67.49 | -10.35 | 96.50 | 29.01 | 100 | 276 | X | PASS |
| 6 | 3.5828 | 43.17 | -9.93 | 69.50 | 26.33 | 100 | 13 | X | PASS |

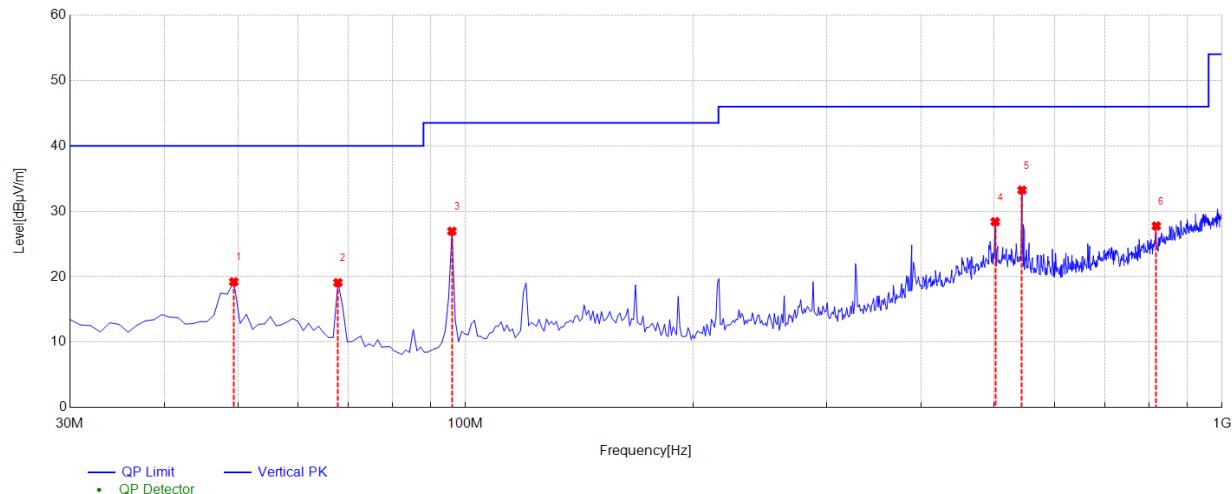


| NO. | Freq. [MHz] | Level [dB μ V/m] | Factor [dB/m] | Limit [dB μ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | Verdict |
|-----|-------------|----------------------|---------------|----------------------|-------------|-------------|-----------|----------|---------|
| 1 | 0.0492 | 84.37 | -10.80 | 113.76 | 29.39 | 100 | 328 | Y | PASS |
| 2 | 0.1253 | 95.53 | -10.39 | 105.64 | 10.11 | 100 | 10 | Y | PASS |
| 3 | 0.3590 | 63.71 | -10.35 | 96.50 | 32.79 | 100 | 9 | Y | PASS |
| 4 | 0.5978 | 54.40 | -10.32 | 72.06 | 17.66 | 100 | 6 | Y | PASS |
| 5 | 3.5828 | 39.75 | -9.93 | 69.50 | 29.75 | 100 | 313 | Y | PASS |
| 6 | 12.9855 | 35.82 | -9.30 | 69.50 | 33.68 | 100 | 6 | Y | PASS |

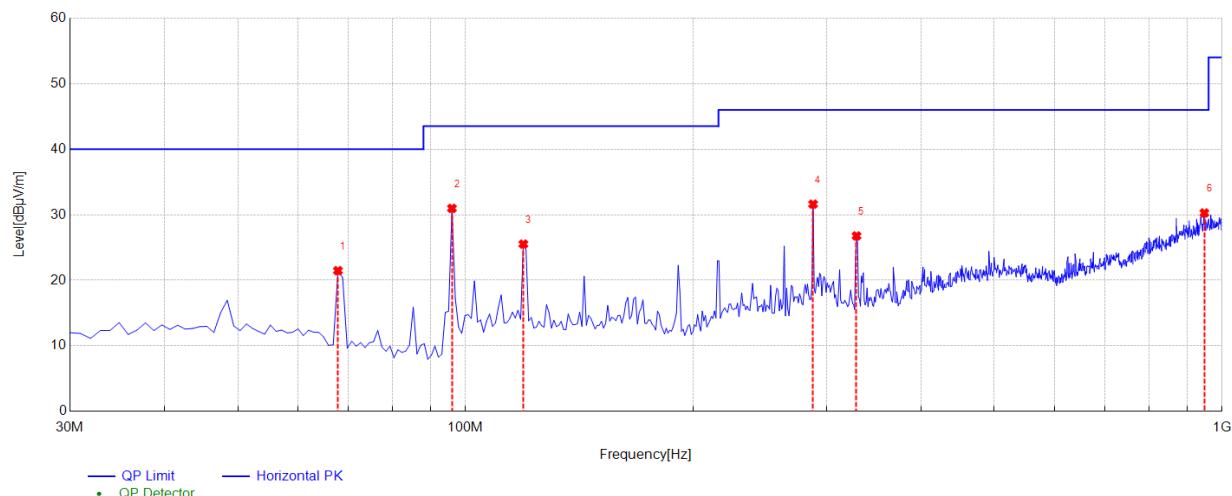


| NO. | Freq. [MHz] | Level [dB μ V/m] | Factor [dB/m] | Limit [dB μ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | Verdict |
|-----|-------------|----------------------|---------------|----------------------|-------------|-------------|-----------|----------|---------|
| 1 | 0.0492 | 81.62 | -10.80 | 113.76 | 32.14 | 100 | 27 | Z | PASS |
| 2 | 0.0985 | 71.93 | -10.36 | 107.72 | 35.79 | 100 | 27 | Z | PASS |
| 3 | 0.1253 | 87.23 | -10.39 | 105.64 | 18.41 | 100 | 87 | Z | PASS |
| 4 | 0.3590 | 58.32 | -10.35 | 96.50 | 38.18 | 100 | 96 | Z | PASS |
| 5 | 1.1948 | 46.22 | -10.14 | 66.01 | 19.79 | 100 | 354 | Z | PASS |
| 6 | 3.6424 | 38.23 | -9.93 | 69.50 | 31.27 | 100 | 6 | Z | PASS |

Spurious radiated emission 30MHz – 1GHz



| NO. | Freq. [MHz] | Level [dB μ V/m] | Factor [dB/m] | Limit [dB μ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | Verdict |
|-----|-------------|----------------------|---------------|----------------------|-------------|-------------|-----------|----------|---------|
| 1 | 49.4000 | 19.23 | -15.93 | 40.00 | 20.77 | 100 | 124 | Vertical | PASS |
| 2 | 67.8300 | 19.11 | -18.10 | 40.00 | 20.89 | 100 | 249 | Vertical | PASS |
| 3 | 95.9600 | 26.96 | -19.81 | 43.50 | 16.54 | 100 | 207 | Vertical | PASS |
| 4 | 501.420 | 28.41 | -10.87 | 46.00 | 17.59 | 100 | 185 | Vertical | PASS |
| 5 | 544.100 | 33.24 | -9.96 | 46.00 | 12.76 | 100 | 185 | Vertical | PASS |
| 6 | 818.610 | 27.76 | -4.38 | 46.00 | 18.24 | 100 | 213 | Vertical | PASS |



| NO. | Freq. [MHz] | Level [dB μ V/m] | Factor [dB/m] | Limit [dB μ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | Verdict |
|-----|-------------|----------------------|---------------|----------------------|-------------|-------------|-----------|------------|---------|
| 1 | 67.8300 | 21.48 | -18.10 | 40.00 | 18.52 | 100 | 170 | Horizontal | PASS |
| 2 | 95.9600 | 30.98 | -19.81 | 43.50 | 12.52 | 100 | 142 | Horizontal | PASS |
| 3 | 119.240 | 25.53 | -17.79 | 43.50 | 17.97 | 100 | 360 | Horizontal | PASS |
| 4 | 288.020 | 31.62 | -16.01 | 46.00 | 14.38 | 100 | 256 | Horizontal | PASS |
| 5 | 328.760 | 26.78 | -15.32 | 46.00 | 19.22 | 100 | 256 | Horizontal | PASS |
| 6 | 947.620 | 30.28 | -1.54 | 46.00 | 15.72 | 100 | 274 | Horizontal | PASS |

END