



EMI - TEST REPORT

- FCC 15.247 -

Type / Model Name : ARU 2400 Antenna Reader Unit

Product Description : RFID UHF Reader 902-928 MHz

Applicant : Kathrein Sachsen GmbH

Address : Lindenstrasse 3
09241 Mühlau, Germany

Manufacturer : Kathrein Sachsen GmbH

Address : Lindenstrasse 3
09241 Mühlau, Germany

| | |
|--|-----------------|
| Test Result according to the standards listed in clause 1 test standards: | POSITIVE |
|--|-----------------|

| | | |
|--------------------------|-----------------------|-------------------------------|
| Test Report No. : | T44114-01-00HU | 20. May 2019 Date of issue |
|--------------------------|-----------------------|-------------------------------|



Deutsche
Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test results
without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (October, 2017)

| | |
|-----------------------------------|---|
| Part 15, Subpart A, Section 15.31 | Measurement standards |
| Part 15, Subpart A, Section 15.33 | Frequency range of radiated measurements |
| Part 15, Subpart A, Section 15.35 | Measurement detector functions and bandwidths |

FCC Rules and Regulations Part 15, Subpart B - Unintentional Radiators (October, 2017)

| | |
|------------------------------------|--|
| Part 15, Subpart B, Section 15.107 | AC Line conducted emissions, |
| Part 15, Subpart B, Section 15.109 | Radiated emissions, general requirements |

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (October, 2017)

| | |
|------------------------------------|---|
| Part 15, Subpart C, Section 15.203 | Antenna requirement |
| Part 15, Subpart C, Section 15.204 | External radio frequency power amplifiers and antenna modifications |
| Part 15, Subpart C, Section 15.205 | Restricted bands of operation |
| Part 15, Subpart C, Section 15.207 | Conducted limits |
| Part 15, Subpart C, Section 15.209 | Radiated emission limits, general requirements |
| Part 15, Subpart C, Section 15.247 | Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz |

FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969

| | |
|-----------------------------------|---|
| Part 1, Subpart I, Section 1.1310 | Radiofrequency radiation exposure limits |
| Part 1, Subpart 2, Section 2.1093 | Radiofrequency radiation exposure evaluation: portable device |

ANSI C63.10: 2013 Testing Unlicensed Wireless Devices

ANSI C95.1:2005 IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

CISPR 16-4-2: 2003 Uncertainty in EMC measurement

2 SUMMARY

GENERAL REMARKS:

The frequency range was scanned from 9 kHz to 10 GHz.

All emissions not reported in this test report were more than 10 dB below the specified limit.

The EuT is a frequency hopping system using 52 channels in the frequency band from 902 to 928 MHz.

The device transmits to each antenna in turn (not all at the same time). This function is controlled via software from the manufacturer and can not be changed from the user.

The Reader was tested as a system with different antennas and with original antenna cable which was supplied by manufacturer.

For detailed information about the model and the antenna please refer to the user manual or technical documentation from the manufacturer.

The EuT is declared as Class B digital device.

It is not possible to set the EuT only in receiving mode.

FINAL ASSESSMENT:

The equipment under test **fulfills** the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 12. December 2018

Testing concluded on : 30. January 2019

Checked by:

Tested by:

Pessinger Jürgen

Huber Markus

FCC ID: WJ9-ARU2400

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT – Detailed photos see Attachment A

3.2 Power supply system utilised

Power supply voltage: : Primary: 100-240 V / 50-60 Hz / 1 ϕ , 24.0 V DC
Secondary: 24.0 V / DC

3.3 Short description of the EUT

The device is a UHF RFID reader. The UHF RFID Reader can read active and passive Tags in the frequency range from 902 to 928 MHz.

Number of tested samples: 1
Serial number: G0L3745426

EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- TAG reading mode supplying max. 27.0 dBm

- Tx mode unmodulated at CH1, CH2, CH25, CH51, CH52

- Tx mode modulated at CH1, CH2, CH25, CH51, CH52

- Standby mode

EUT configuration:

The following peripheral devices and interface cables were connected during the measurements:

- Test software Model: Supplied by manufacturer

- Lap Top Model: Supplied by CSA Group Bayern GmbH

- Antenna Model: See point 4.5.1.3

- Power supply Model : GE18I24, S/N OFB8411071

- Model:

- Model:

- customer specific cables

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY**

4.2 Statement regarding the usage of logos in test reports

The accreditation and notification body logos displayed in this test report are only valid for standards listed in the accreditation or notification scope of CSA Group Bayern GmbH.

4.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

FCC ID: WJ9-ARU2400

| Measurement Type | Range | Confidence Level (%) | Calculated Uncertainty |
|--|-------------------------|----------------------|--------------------------|
| AC Conducted Spurious Emissions | 0.15 MHz to 30 MHz | 95% | ± 3.29 dB |
| 20 dB Bandwidth | Center frequency of EuT | 95% | ± 2.5 × 10 ⁻⁷ |
| 99% Occupied Bandwidth | Center frequency of EuT | 95% | ± 2.5 × 10 ⁻⁷ |
| Radiated Spurious Emissions | 9 kHz to 30 MHz | 95% | ± 3.53 dB |
| Radiated Spurious Emissions | 30 MHz to 1000 MHz | 95% | ± 3.71 dB |
| Radiated Spurious Emissions | 1000 MHz to 10000 MHz | 95% | ± 2.34 dB |
| Radiated power of the fundamental wave | Center frequency of EuT | 95% | ± 3.71 dB |
| Peak conducted output power | 902 MHz to 928 MHz | 95% | ± 0.35 dB |
| Conducted Spurious Emissions | 9 kHz to 10000 MHz | 95% | ± 2.15 dB |

4.5 Measurement Protocol for FCC, VCCI and AUSTEL

4.5.1 GENERAL INFORMATION

4.5.1.1 Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.5.1.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

FCC: DE 0011

FCC ID: WJ9-ARU2400**4.6 Determination of worst case measurement conditions**

Tests were performed with following antenna type and power supply:

- Antenna:
 - U-LORA-ETSI-FCC, 52010092
 - WIRA-40-linear-FCC, 52010252
 - Internal antenna
 - WRA 7070 Antenna Unit, 52010334
- Power Setting: Standby
- Power setting: 27.0 dBm
- Power setting: 23.0 dBm
- Power supply: Mean Well GE18I24
- PoE switch: D-Link, DGS-1008P
 - P/N: EGS1008PM....D1E
 - S/N: SY3RI4004871
 - H/W Ver.: D1
 - PSU: I.T.E Power Supply, NU90-J540167-I1, S/N.:418013104883

The spurious radiated emission measurement (9 kHz up to 1 GHz) was only performed with antenna WIRA-40-linear-FCC (52010252) and power setting 23.0 dBm. The spurious radiated emission measurement (1GHz up to 10 GHz) was only performed with internal antenna and power setting 27.0 dBm.

Pre measurement in the chamber shows that this configurations are the worst case configuration for the relevant spurious emission test.

To find out the worst case setting for the UHF reader for each test, pre tests were performed with different reader settings which are shown in the table "EuT operation mode".

To keep the test report clear and simple, the tests were carried out and documented in this test report only with these worst case settings.

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4.6.1 Functionality of device

Declared by manufacturer:

Example for a Hopping sequence for Kathrein UHF RFID Devices. The channel spacing is 500 kHz, the center frequency of the first channel is 902.25MHz. The occupancy time is 400ms for each slot, the slot frequency is determined randomly each time before the slot is used.

| Slot Number | Channel Number | Frequency (MHz) | Slot Number | Channel Number | frequency (MHz) |
|-------------|----------------|-----------------|-------------|----------------|-----------------|
| 1 | 21 | 912.25 | 27 | 3 | 903.25 |
| 2 | 44 | 923.75 | 28 | 39 | 921.25 |
| 3 | 25 | 914.25 | 29 | 24 | 913.75 |
| 4 | 36 | 919.75 | 30 | 16 | 909.75 |
| 5 | 27 | 915.25 | 31 | 51 | 927.25 |
| 6 | 29 | 916.25 | 32 | 26 | 914.75 |
| 7 | 35 | 919.25 | 33 | 4 | 903.75 |
| 8 | 49 | 926.25 | 34 | 47 | 925.25 |
| 9 | 6 | 904.75 | 35 | 18 | 910.75 |
| 10 | 46 | 924.75 | 36 | 40 | 921.75 |
| 11 | 19 | 911.25 | 37 | 11 | 907.25 |
| 12 | 20 | 911.75 | 38 | 48 | 925.75 |
| 13 | 45 | 924.25 | 39 | 7 | 905.25 |
| 14 | 22 | 912.75 | 40 | 12 | 907.75 |
| 15 | 30 | 916.75 | 41 | 23 | 913.25 |
| 16 | 8 | 905.75 | 42 | 13 | 908.25 |
| 17 | 42 | 922.75 | 43 | 31 | 917.25 |
| 18 | 52 | 927.75 | 44 | 2 | 902.75 |
| 19 | 14 | 908.75 | 45 | 1 | 902.25 |
| 20 | 37 | 920.25 | 46 | 43 | 923.25 |
| 21 | 41 | 922.25 | 47 | 50 | 926.75 |
| 22 | 17 | 910.25 | 48 | 33 | 918.25 |
| 23 | 5 | 904.25 | 49 | 34 | 918.75 |
| 24 | 10 | 906.75 | 50 | 32 | 917.75 |
| 25 | 15 | 909.25 | 51 | 28 | 915.75 |
| 26 | 38 | 920.75 | 52 | 9 | 906.25 |

FCC ID: WJ9-ARU2400

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emissions

For test instruments and accessories used see section 6 Part A 4.

5.1.1 Description of the test location

Test location: Shielded Room S2

5.1.2 Photo documentation of the test set-up

- U-LORA-ETSI-FCC, 52010092

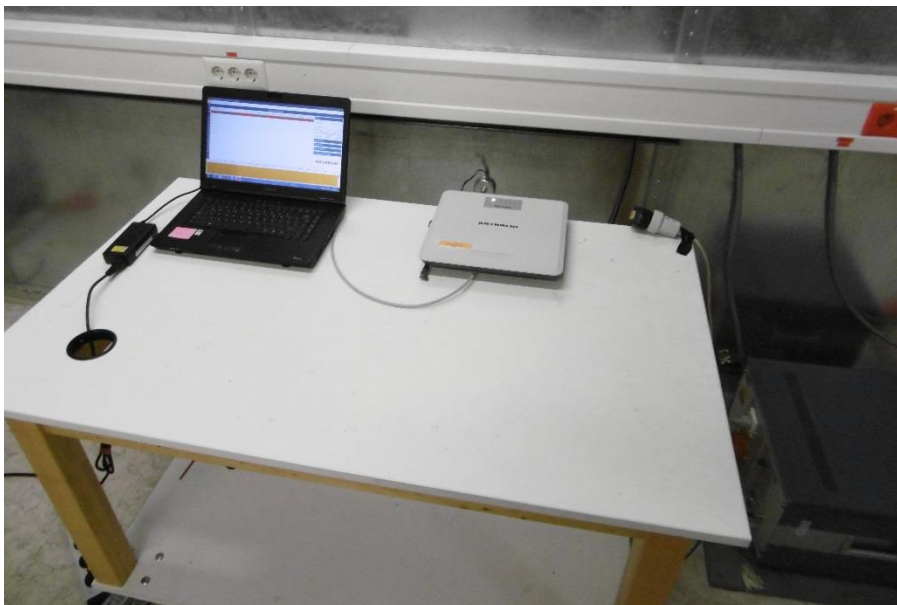


- WIRA-40-linear-FCC, 52010252



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- Internal antenna:



- WRA 7070 Antenna Unit, 52010334



FCC ID: WJ9-ARU2400

- Internal antenna – powered via PoE:



FCC ID: WJ9-ARU2400

5.1.3 Applicable standard

According to FCC Part 15C, Section 15.207(a):

Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of Emission (MHz) | Conducted Limit (dBμV) | |
|--------------------------------|------------------------|------------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 * | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

* Decreases with the logarithm of the frequency

5.1.4 Description of Measurement

The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a line impedance stabilization network (LISN) with 50 Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded.

To convert between dBμV and μV, the following conversions apply:

$$\text{dB}\mu\text{V} = 20 \log \mu\text{V}$$

$$\mu\text{V} = 10^{(\text{dB}\mu\text{V}/20)}$$

5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz
Min. limit margin 13.20 dB at 0.507 MHz (Standby, WRA 7070 Antenna Unit, 52010334)

The requirements are **FULFILLED**.

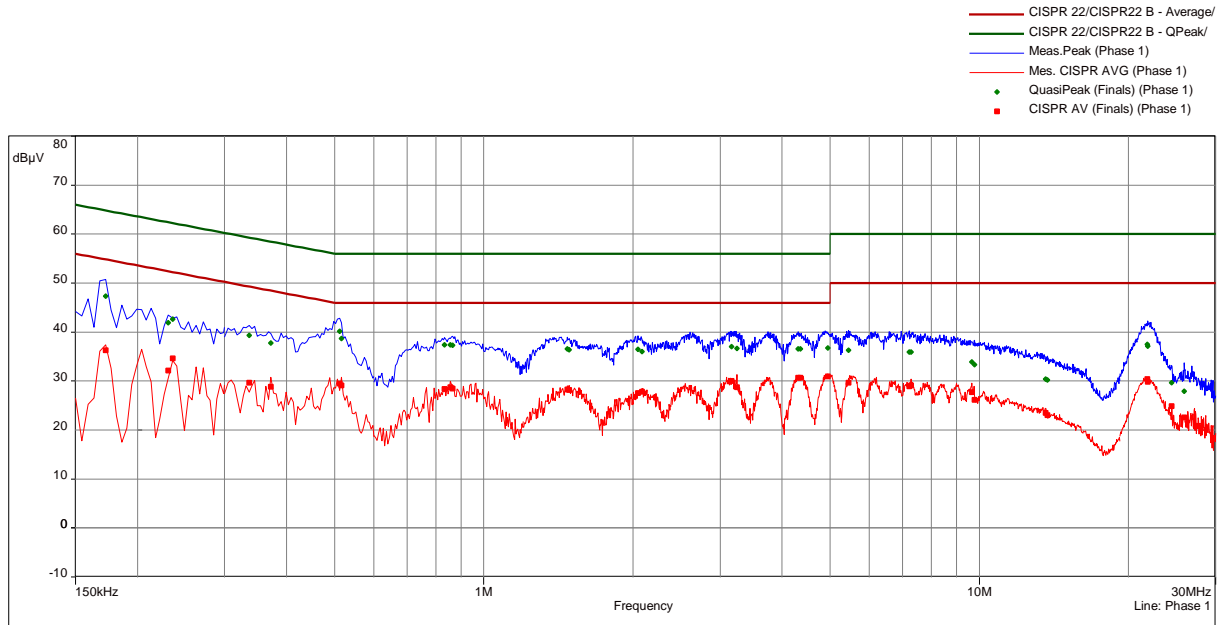
Remarks: For detailed test result please refer to following test protocols.

FCC ID: WJ9-ARU2400

5.1.6 Test protocol

Test point L1
Operation mode: Tag reading mode
Remarks: U-LORA-ETSI-FCC, 52010092

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|--------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.1725 | 1 | 47.35 | 17.49 | 64.84 | 36.32 | 18.52 | 54.84 | Phase 1 | 10.08 |
| 0.231 | 1 | 41.89 | 20.53 | 62.41 | 32.15 | 20.27 | 52.41 | Phase 1 | 10.10 |
| 0.2355 | 1 | 42.63 | 19.62 | 62.25 | 34.63 | 17.63 | 52.25 | Phase 1 | 10.10 |
| 0.336 | 2 | 39.33 | 19.97 | 59.30 | 29.65 | 19.65 | 49.30 | Phase 1 | 10.13 |
| 0.372 | 2 | 37.74 | 20.72 | 58.46 | 28.87 | 19.58 | 48.46 | Phase 1 | 10.14 |
| 0.5115 | 2 | 40.18 | 15.82 | 56.00 | 29.46 | 16.54 | 46.00 | Phase 1 | 10.14 |
| 0.516 | 2 | 38.71 | 17.29 | 56.00 | 29.14 | 16.86 | 46.00 | Phase 1 | 10.14 |
| 0.834 | 3 | 37.44 | 18.56 | 56.00 | 28.35 | 17.65 | 46.00 | Phase 1 | 10.19 |
| 0.8565 | 3 | 37.39 | 18.61 | 56.00 | 28.72 | 17.28 | 46.00 | Phase 1 | 10.19 |
| 0.8655 | 3 | 37.28 | 18.72 | 56.00 | 28.48 | 17.52 | 46.00 | Phase 1 | 10.19 |
| 1.4745 | 4 | 36.55 | 19.45 | 56.00 | 28.33 | 17.67 | 46.00 | Phase 1 | 10.25 |
| 1.488 | 4 | 36.35 | 19.65 | 56.00 | 28.16 | 17.84 | 46.00 | Phase 1 | 10.25 |
| 2.046 | 4 | 36.51 | 19.49 | 56.00 | 27.52 | 18.48 | 46.00 | Phase 1 | 10.27 |
| 2.0865 | 4 | 36.04 | 19.96 | 56.00 | 27.80 | 18.20 | 46.00 | Phase 1 | 10.27 |
| 3.165 | 5 | 37.07 | 18.93 | 56.00 | 30.06 | 15.94 | 46.00 | Phase 1 | 10.35 |
| 3.2415 | 5 | 36.65 | 19.35 | 56.00 | 28.70 | 17.30 | 46.00 | Phase 1 | 10.35 |
| 4.3125 | 5 | 36.59 | 19.41 | 56.00 | 30.71 | 15.29 | 46.00 | Phase 1 | 10.41 |
| 4.353 | 5 | 36.61 | 19.39 | 56.00 | 30.70 | 15.30 | 46.00 | Phase 1 | 10.42 |
| 4.944 | 6 | 36.78 | 19.22 | 56.00 | 30.93 | 15.07 | 46.00 | Phase 1 | 10.44 |
| 5.448 | 6 | 36.30 | 23.70 | 60.00 | 29.66 | 20.34 | 50.00 | Phase 1 | 10.48 |
| 7.2255 | 6 | 35.91 | 24.09 | 60.00 | 28.91 | 21.09 | 50.00 | Phase 1 | 10.61 |
| 7.284 | 6 | 35.95 | 24.05 | 60.00 | 29.15 | 20.85 | 50.00 | Phase 1 | 10.61 |

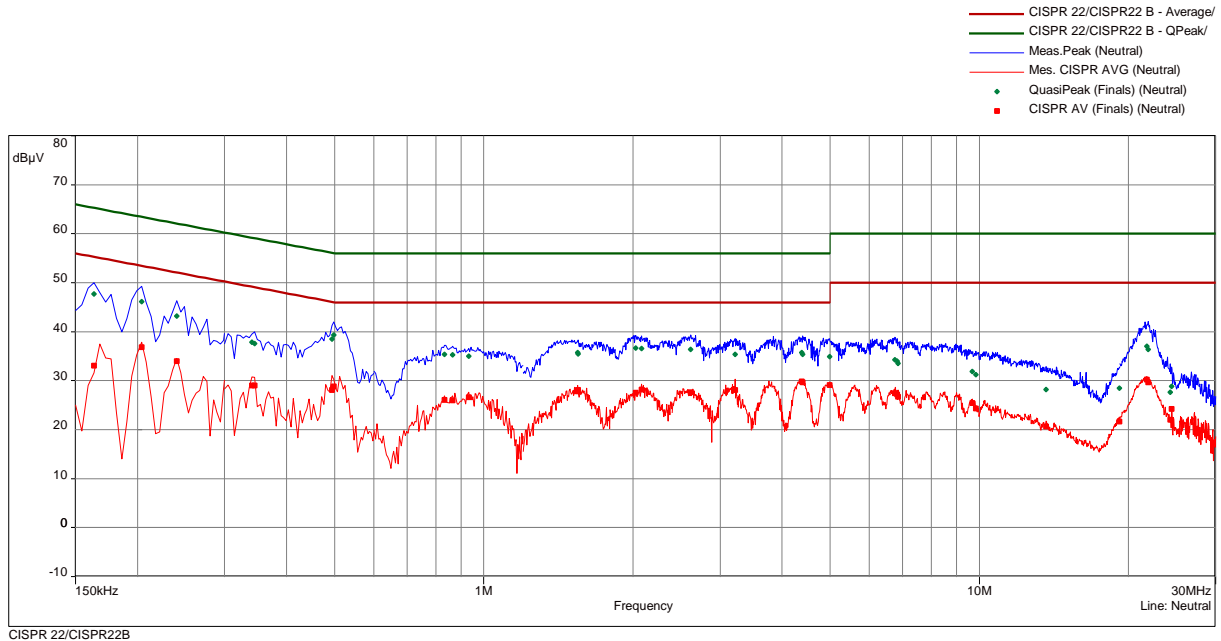
FCC ID: WJ9-ARU2400

| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|---------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 9.663 | 7 | 33.93 | 26.07 | 60.00 | 27.70 | 22.30 | 50.00 | Phase 1 | 10.70 |
| 9.7845 | 7 | 33.33 | 26.67 | 60.00 | 26.13 | 23.87 | 50.00 | Phase 1 | 10.70 |
| 13.605 | 7 | 30.42 | 29.58 | 60.00 | 23.49 | 26.51 | 50.00 | Phase 1 | 10.99 |
| 13.7265 | 7 | 30.18 | 29.82 | 60.00 | 23.08 | 26.92 | 50.00 | Phase 1 | 11.00 |
| 21.8145 | 8 | 37.47 | 22.53 | 60.00 | 30.36 | 19.64 | 50.00 | Phase 1 | 11.40 |
| 21.9 | 8 | 37.13 | 22.87 | 60.00 | 29.89 | 20.11 | 50.00 | Phase 1 | 11.40 |
| 24.4515 | 8 | 29.68 | 30.32 | 60.00 | 24.92 | 25.08 | 50.00 | Phase 1 | 11.47 |
| 25.896 | 8 | 27.92 | 32.08 | 60.00 | 22.62 | 27.38 | 50.00 | Phase 1 | 11.46 |

FCC ID: WJ9-ARU2400

Test point: N
 Operation mode: Tag reading mode
 Remarks: U-LORA-ETSI-FCC, 52010092

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|--------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.1635 | 9 | 47.70 | 17.58 | 65.28 | 33.12 | 22.17 | 55.28 | Neutral | 10.09 |
| 0.204 | 9 | 46.13 | 17.32 | 63.45 | 36.81 | 16.63 | 53.45 | Neutral | 10.10 |
| 0.24 | 9 | 43.16 | 18.93 | 62.10 | 33.95 | 18.14 | 52.10 | Neutral | 10.11 |
| 0.3405 | 10 | 37.83 | 21.36 | 59.19 | 29.01 | 20.18 | 49.19 | Neutral | 10.14 |
| 0.345 | 10 | 37.56 | 21.52 | 59.08 | 29.02 | 20.06 | 49.08 | Neutral | 10.14 |
| 0.4935 | 10 | 38.47 | 17.64 | 56.11 | 28.08 | 18.03 | 46.11 | Neutral | 10.15 |
| 0.498 | 10 | 39.32 | 16.71 | 56.03 | 28.86 | 17.17 | 46.03 | Neutral | 10.15 |
| 0.834 | 11 | 35.34 | 20.66 | 56.00 | 26.07 | 19.93 | 46.00 | Neutral | 10.19 |
| 0.8655 | 11 | 35.26 | 20.74 | 56.00 | 26.00 | 20.00 | 46.00 | Neutral | 10.19 |
| 0.933 | 11 | 34.96 | 21.04 | 56.00 | 26.64 | 19.36 | 46.00 | Neutral | 10.19 |
| 1.5465 | 12 | 35.73 | 20.27 | 56.00 | 28.14 | 17.86 | 46.00 | Neutral | 10.27 |
| 1.551 | 12 | 35.48 | 20.52 | 56.00 | 27.86 | 18.14 | 46.00 | Neutral | 10.27 |
| 2.028 | 12 | 36.67 | 19.33 | 56.00 | 27.60 | 18.40 | 46.00 | Neutral | 10.28 |
| 2.082 | 12 | 36.58 | 19.42 | 56.00 | 28.24 | 17.76 | 46.00 | Neutral | 10.28 |
| 2.616 | 13 | 36.38 | 19.62 | 56.00 | 27.63 | 18.37 | 46.00 | Neutral | 10.33 |
| 3.2145 | 13 | 35.33 | 20.67 | 56.00 | 28.11 | 17.89 | 46.00 | Neutral | 10.36 |
| 4.38 | 13 | 35.74 | 20.26 | 56.00 | 29.84 | 16.16 | 46.00 | Neutral | 10.43 |
| 4.398 | 13 | 35.40 | 20.60 | 56.00 | 29.63 | 16.37 | 46.00 | Neutral | 10.43 |
| 4.989 | 14 | 34.93 | 21.07 | 56.00 | 29.16 | 16.84 | 46.00 | Neutral | 10.46 |
| 6.753 | 14 | 34.28 | 25.72 | 60.00 | 27.44 | 22.56 | 50.00 | Neutral | 10.59 |
| 6.825 | 14 | 34.03 | 25.97 | 60.00 | 27.20 | 22.80 | 50.00 | Neutral | 10.59 |
| 6.852 | 14 | 33.50 | 26.50 | 60.00 | 26.68 | 23.32 | 50.00 | Neutral | 10.59 |

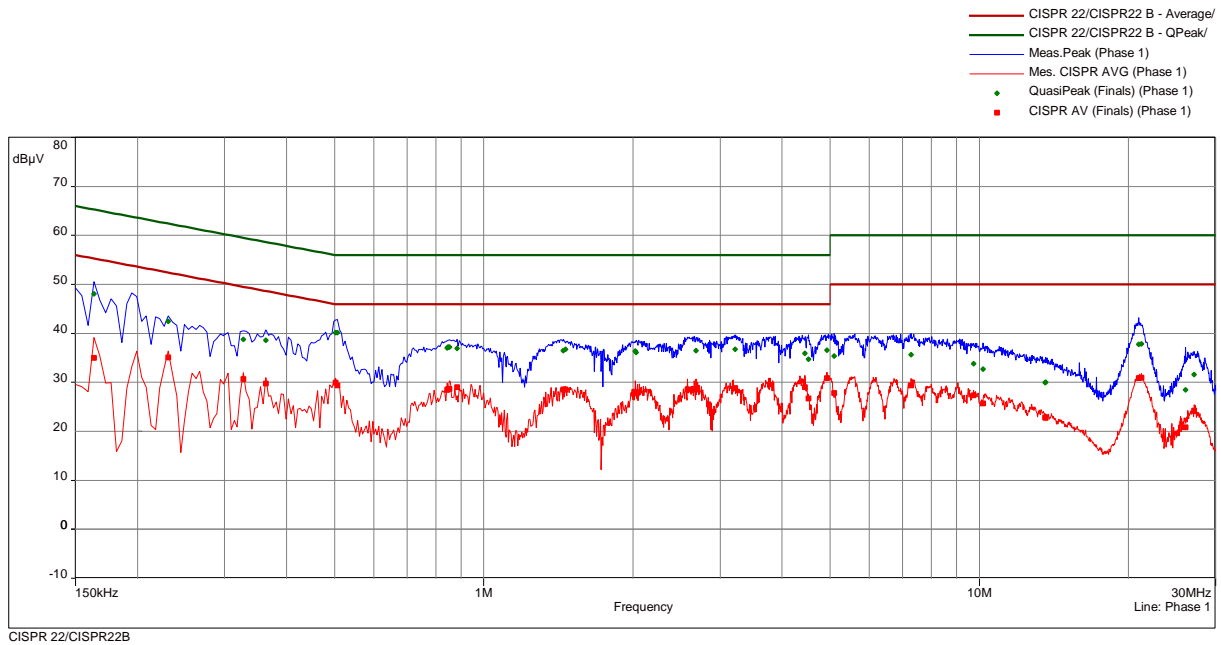
FCC ID: WJ9-ARU2400

| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|---------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 9.681 | 15 | 31.87 | 28.13 | 60.00 | 25.47 | 24.53 | 50.00 | Neutral | 10.69 |
| 9.8385 | 15 | 31.26 | 28.74 | 60.00 | 24.31 | 25.69 | 50.00 | Neutral | 10.69 |
| 13.6275 | 15 | 28.15 | 31.85 | 60.00 | 20.69 | 29.31 | 50.00 | Neutral | 10.96 |
| 19.176 | 15 | 28.45 | 31.55 | 60.00 | 21.62 | 28.38 | 50.00 | Neutral | 11.32 |
| 21.783 | 16 | 37.08 | 22.92 | 60.00 | 30.25 | 19.75 | 50.00 | Neutral | 11.38 |
| 21.9225 | 16 | 36.37 | 23.63 | 60.00 | 29.67 | 20.33 | 50.00 | Neutral | 11.37 |
| 24.294 | 16 | 27.62 | 32.38 | 60.00 | 22.07 | 27.93 | 50.00 | Neutral | 11.38 |
| 24.4515 | 16 | 28.83 | 31.17 | 60.00 | 24.25 | 25.75 | 50.00 | Neutral | 11.37 |

FCC ID: WJ9-ARU2400

Test point L1
Operation mode: Tag reading mode
Remarks: WIRA-40-linear-FCC, 52010252

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|--------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.1635 | 1 | 48.04 | 17.24 | 65.28 | 35.01 | 20.28 | 55.28 | Phase 1 | 10.08 |
| 0.231 | 1 | 42.43 | 19.98 | 62.41 | 35.11 | 17.30 | 52.41 | Phase 1 | 10.10 |
| 0.327 | 2 | 38.76 | 20.77 | 59.53 | 30.67 | 18.86 | 49.53 | Phase 1 | 10.13 |
| 0.363 | 2 | 38.61 | 20.05 | 58.66 | 29.78 | 18.88 | 48.66 | Phase 1 | 10.14 |
| 0.5025 | 2 | 40.19 | 15.81 | 56.00 | 29.94 | 16.06 | 46.00 | Phase 1 | 10.14 |
| 0.507 | 2 | 40.12 | 15.88 | 56.00 | 29.41 | 16.59 | 46.00 | Phase 1 | 10.14 |
| 0.843 | 3 | 37.07 | 18.93 | 56.00 | 28.50 | 17.50 | 46.00 | Phase 1 | 10.19 |
| 0.8475 | 3 | 37.25 | 18.75 | 56.00 | 28.70 | 17.30 | 46.00 | Phase 1 | 10.19 |
| 0.852 | 3 | 37.25 | 18.75 | 56.00 | 28.66 | 17.34 | 46.00 | Phase 1 | 10.19 |
| 0.8835 | 3 | 36.95 | 19.05 | 56.00 | 29.04 | 16.96 | 46.00 | Phase 1 | 10.19 |
| 1.4475 | 4 | 36.45 | 19.55 | 56.00 | 28.53 | 17.47 | 46.00 | Phase 1 | 10.25 |
| 1.461 | 4 | 36.71 | 19.29 | 56.00 | 28.60 | 17.40 | 46.00 | Phase 1 | 10.25 |

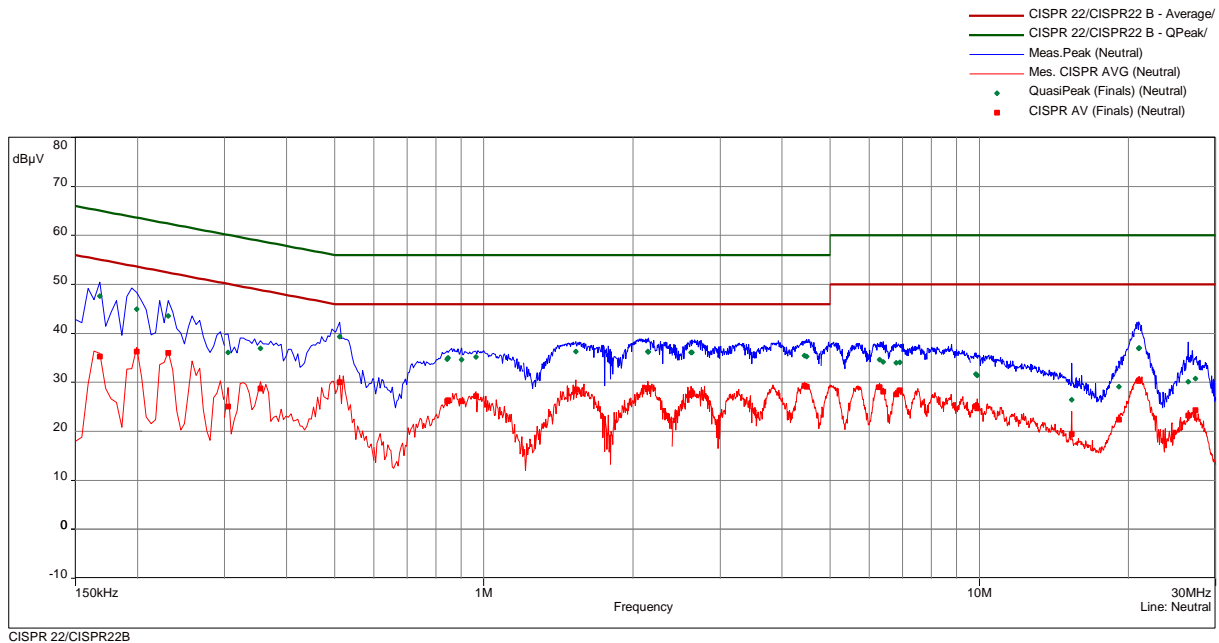
FCC ID: WJ9-ARU2400

| freq MHz | SR | QP dB(μV) | margin dB | limit dB | AV dB(μV) | margin dB | limit dB | line | corr dB |
|-------------|----|--------------|--------------|-------------|--------------|--------------|-------------|---------|------------|
| 2.0235 | 4 | 36.36 | 19.64 | 56.00 | 27.81 | 18.19 | 46.00 | Phase 1 | 10.27 |
| 2.0325 | 4 | 36.12 | 19.88 | 56.00 | 27.99 | 18.01 | 46.00 | Phase 1 | 10.27 |
| 2.679 | 5 | 36.46 | 19.54 | 56.00 | 28.56 | 17.44 | 46.00 | Phase 1 | 10.33 |
| 3.2145 | 5 | 36.75 | 19.25 | 56.00 | 28.84 | 17.16 | 46.00 | Phase 1 | 10.35 |
| 4.443 | 5 | 35.97 | 20.03 | 56.00 | 29.06 | 16.94 | 46.00 | Phase 1 | 10.42 |
| 4.524 | 5 | 34.71 | 21.29 | 56.00 | 26.75 | 19.25 | 46.00 | Phase 1 | 10.42 |
| 4.9305 | 6 | 36.53 | 19.47 | 56.00 | 30.84 | 15.16 | 46.00 | Phase 1 | 10.44 |
| 5.0925 | 6 | 35.35 | 24.65 | 60.00 | 27.82 | 22.18 | 50.00 | Phase 1 | 10.45 |
| 7.2795 | 6 | 35.65 | 24.35 | 60.00 | 29.36 | 20.64 | 50.00 | Phase 1 | 10.61 |
| 9.7395 | 7 | 33.78 | 26.22 | 60.00 | 27.40 | 22.60 | 50.00 | Phase 1 | 10.70 |
| 10.1805 | 7 | 32.73 | 27.27 | 60.00 | 25.74 | 24.26 | 50.00 | Phase 1 | 10.72 |
| 13.5825 | 7 | 29.97 | 30.03 | 60.00 | 22.83 | 27.17 | 50.00 | Phase 1 | 10.99 |
| 13.614 | 7 | 30.01 | 29.99 | 60.00 | 22.77 | 27.23 | 50.00 | Phase 1 | 10.99 |
| 20.9955 | 8 | 37.78 | 22.22 | 60.00 | 30.90 | 19.10 | 50.00 | Phase 1 | 11.37 |
| 21.261 | 8 | 37.84 | 22.16 | 60.00 | 30.94 | 19.06 | 50.00 | Phase 1 | 11.38 |
| 26.103 | 8 | 28.51 | 31.49 | 60.00 | 20.85 | 29.15 | 50.00 | Phase 1 | 11.46 |
| 27.1515 | 8 | 31.58 | 28.42 | 60.00 | 24.26 | 25.74 | 50.00 | Phase 1 | 11.43 |

FCC ID: WJ9-ARU2400

Test point: N
Operation mode: Tag reading mode
Remarks: WIRA-40-linear-FCC, 52010252

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|--------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.168 | 9 | 47.58 | 17.48 | 65.06 | 35.30 | 19.76 | 55.06 | Neutral | 10.09 |
| 0.1995 | 9 | 44.98 | 18.65 | 63.63 | 36.27 | 17.37 | 53.63 | Neutral | 10.10 |
| 0.231 | 9 | 43.53 | 18.88 | 62.41 | 36.05 | 16.36 | 52.41 | Neutral | 10.11 |
| 0.3045 | 10 | 36.07 | 24.05 | 60.12 | 25.04 | 25.08 | 50.12 | Neutral | 10.13 |
| 0.354 | 10 | 36.97 | 21.90 | 58.87 | 28.78 | 20.09 | 48.87 | Neutral | 10.14 |
| 0.5115 | 10 | 39.30 | 16.70 | 56.00 | 30.02 | 15.98 | 46.00 | Neutral | 10.15 |
| 0.843 | 11 | 34.78 | 21.22 | 56.00 | 26.20 | 19.80 | 46.00 | Neutral | 10.19 |
| 0.8475 | 11 | 34.99 | 21.01 | 56.00 | 26.35 | 19.65 | 46.00 | Neutral | 10.19 |
| 0.9015 | 11 | 34.62 | 21.38 | 56.00 | 26.19 | 19.81 | 46.00 | Neutral | 10.19 |
| 0.9645 | 11 | 35.15 | 20.85 | 56.00 | 27.20 | 18.80 | 46.00 | Neutral | 10.19 |
| 1.533 | 12 | 36.26 | 19.74 | 56.00 | 28.60 | 17.40 | 46.00 | Neutral | 10.27 |
| 2.145 | 12 | 36.28 | 19.72 | 56.00 | 28.85 | 17.15 | 46.00 | Neutral | 10.29 |
| 2.1495 | 12 | 36.20 | 19.80 | 56.00 | 28.70 | 17.30 | 46.00 | Neutral | 10.29 |
| 2.6205 | 13 | 36.08 | 19.92 | 56.00 | 27.55 | 18.45 | 46.00 | Neutral | 10.33 |
| 2.634 | 13 | 36.14 | 19.86 | 56.00 | 27.87 | 18.13 | 46.00 | Neutral | 10.33 |

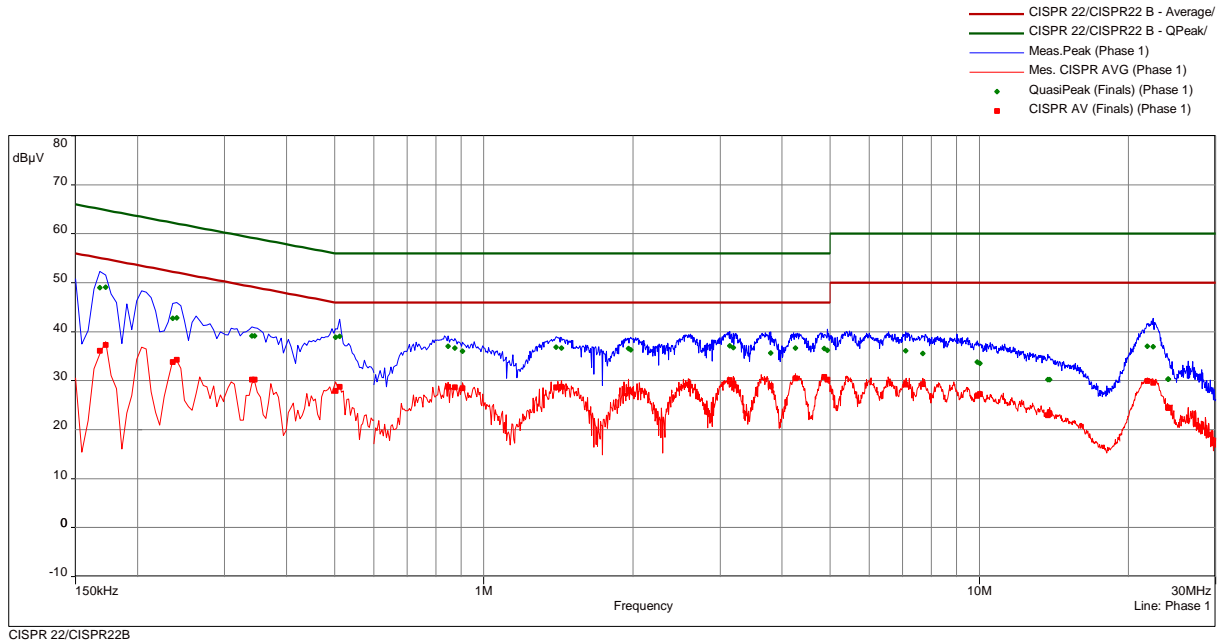
FCC ID: WJ9-ARU2400

| freq MHz | SR | QP dB(μV) | margin dB | limit dB | AV dB(μV) | margin dB | limit dB | line | corr dB |
|-------------|----|--------------|--------------|-------------|--------------|--------------|-------------|---------|------------|
| 4.434 | 13 | 35.44 | 20.56 | 56.00 | 29.32 | 16.68 | 46.00 | Neutral | 10.43 |
| 4.488 | 13 | 35.29 | 20.71 | 56.00 | 29.10 | 16.90 | 46.00 | Neutral | 10.43 |
| 6.2895 | 14 | 34.60 | 25.40 | 60.00 | 29.00 | 21.00 | 50.00 | Neutral | 10.55 |
| 6.393 | 14 | 34.16 | 25.84 | 60.00 | 28.06 | 21.94 | 50.00 | Neutral | 10.56 |
| 6.798 | 14 | 33.99 | 26.01 | 60.00 | 27.54 | 22.46 | 50.00 | Neutral | 10.59 |
| 6.9195 | 14 | 34.12 | 25.88 | 60.00 | 28.39 | 21.61 | 50.00 | Neutral | 10.59 |
| 9.8385 | 15 | 31.67 | 28.33 | 60.00 | 25.16 | 24.84 | 50.00 | Neutral | 10.69 |
| 9.906 | 15 | 31.44 | 28.56 | 60.00 | 24.67 | 25.33 | 50.00 | Neutral | 10.70 |
| 15.351 | 15 | 26.43 | 33.57 | 60.00 | 19.47 | 30.53 | 50.00 | Neutral | 11.07 |
| 19.14 | 15 | 29.10 | 30.90 | 60.00 | 22.40 | 27.60 | 50.00 | Neutral | 11.32 |
| 21 | 16 | 36.99 | 23.01 | 60.00 | 30.32 | 19.68 | 50.00 | Neutral | 11.37 |
| 21.027 | 16 | 37.03 | 22.97 | 60.00 | 30.42 | 19.58 | 50.00 | Neutral | 11.37 |
| 26.4225 | 16 | 30.15 | 29.85 | 60.00 | 23.23 | 26.77 | 50.00 | Neutral | 11.32 |
| 27.309 | 16 | 30.80 | 29.20 | 60.00 | 24.31 | 25.69 | 50.00 | Neutral | 11.29 |

FCC ID: WJ9-ARU2400

Test point L1
Operation mode: Tag reading mode
Remarks: Internal antenna

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|--------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.168 | 1 | 48.96 | 16.10 | 65.06 | 36.07 | 18.99 | 55.06 | Phase 1 | 10.08 |
| 0.1725 | 1 | 49.12 | 15.72 | 64.84 | 37.28 | 17.56 | 54.84 | Phase 1 | 10.08 |
| 0.2355 | 1 | 42.70 | 19.56 | 62.25 | 33.84 | 18.41 | 52.25 | Phase 1 | 10.10 |
| 0.24 | 1 | 42.85 | 19.25 | 62.10 | 34.25 | 17.84 | 52.10 | Phase 1 | 10.10 |
| 0.3405 | 2 | 39.11 | 20.08 | 59.19 | 30.23 | 18.96 | 49.19 | Phase 1 | 10.13 |
| 0.345 | 2 | 39.19 | 19.89 | 59.08 | 30.20 | 18.88 | 49.08 | Phase 1 | 10.13 |
| 0.5025 | 2 | 38.90 | 17.10 | 56.00 | 27.90 | 18.10 | 46.00 | Phase 1 | 10.14 |
| 0.5115 | 2 | 39.02 | 16.98 | 56.00 | 28.74 | 17.26 | 46.00 | Phase 1 | 10.14 |
| 0.8475 | 3 | 37.03 | 18.97 | 56.00 | 28.78 | 17.22 | 46.00 | Phase 1 | 10.19 |
| 0.8745 | 3 | 36.66 | 19.34 | 56.00 | 28.62 | 17.38 | 46.00 | Phase 1 | 10.19 |
| 0.906 | 3 | 36.05 | 19.95 | 56.00 | 28.51 | 17.49 | 46.00 | Phase 1 | 10.19 |
| 1.398 | 4 | 36.87 | 19.13 | 56.00 | 28.64 | 17.36 | 46.00 | Phase 1 | 10.24 |
| 1.434 | 4 | 36.66 | 19.34 | 56.00 | 28.79 | 17.21 | 46.00 | Phase 1 | 10.25 |
| 1.9605 | 4 | 36.54 | 19.46 | 56.00 | 28.06 | 17.94 | 46.00 | Phase 1 | 10.26 |
| 1.9785 | 4 | 36.31 | 19.69 | 56.00 | 27.83 | 18.17 | 46.00 | Phase 1 | 10.26 |

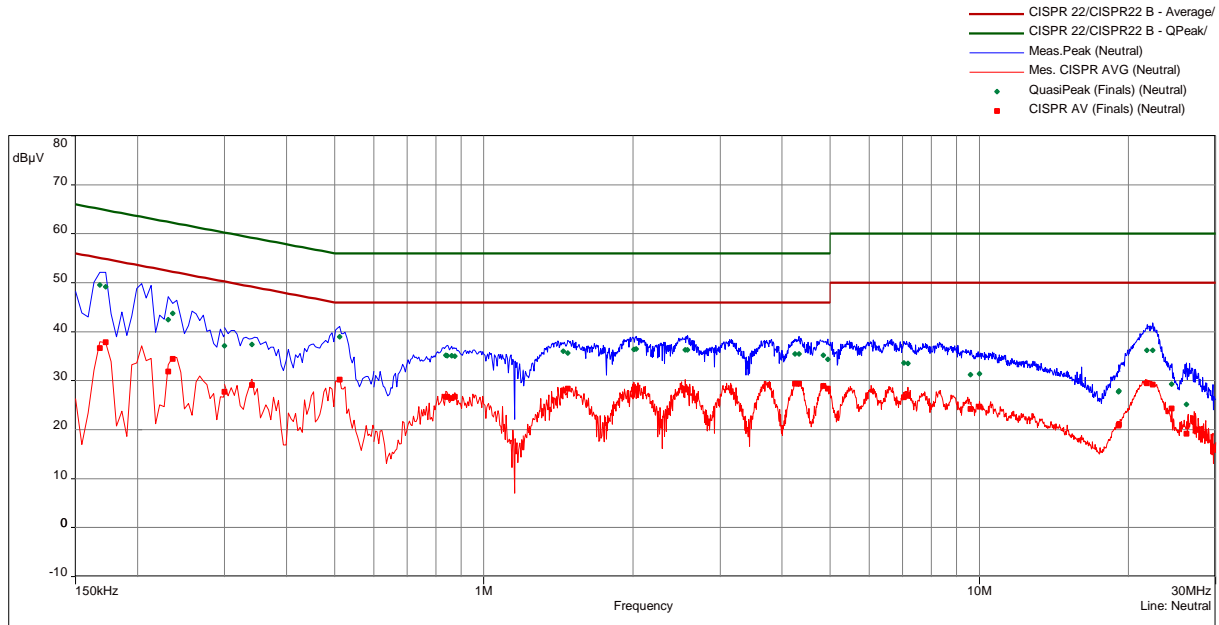
FCC ID: WJ9-ARU2400

| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|---------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 3.1335 | 5 | 37.12 | 18.88 | 56.00 | 30.14 | 15.86 | 46.00 | Phase 1 | 10.35 |
| 3.1875 | 5 | 36.73 | 19.27 | 56.00 | 29.42 | 16.58 | 46.00 | Phase 1 | 10.35 |
| 3.795 | 5 | 35.69 | 20.31 | 56.00 | 28.96 | 17.04 | 46.00 | Phase 1 | 10.37 |
| 4.254 | 5 | 36.63 | 19.37 | 56.00 | 30.50 | 15.50 | 46.00 | Phase 1 | 10.41 |
| 4.8675 | 6 | 36.60 | 19.40 | 56.00 | 30.76 | 15.24 | 46.00 | Phase 1 | 10.44 |
| 4.9395 | 6 | 36.19 | 19.81 | 56.00 | 30.24 | 15.76 | 46.00 | Phase 1 | 10.44 |
| 7.1085 | 6 | 36.08 | 23.92 | 60.00 | 29.17 | 20.83 | 50.00 | Phase 1 | 10.60 |
| 7.689 | 6 | 35.56 | 24.44 | 60.00 | 29.26 | 20.74 | 50.00 | Phase 1 | 10.63 |
| 9.906 | 7 | 33.77 | 26.23 | 60.00 | 26.88 | 23.12 | 50.00 | Phase 1 | 10.71 |
| 10.023 | 7 | 33.50 | 26.50 | 60.00 | 27.28 | 22.72 | 50.00 | Phase 1 | 10.71 |
| 13.749 | 7 | 30.26 | 29.74 | 60.00 | 22.93 | 27.07 | 50.00 | Phase 1 | 11.00 |
| 13.8705 | 7 | 30.25 | 29.75 | 60.00 | 23.25 | 26.75 | 50.00 | Phase 1 | 11.01 |
| 21.8145 | 8 | 37.06 | 22.94 | 60.00 | 29.96 | 20.04 | 50.00 | Phase 1 | 11.40 |
| 22.422 | 8 | 36.93 | 23.07 | 60.00 | 29.60 | 20.40 | 50.00 | Phase 1 | 11.41 |
| 24.024 | 8 | 30.32 | 29.68 | 60.00 | 24.56 | 25.44 | 50.00 | Phase 1 | 11.46 |
| 24.087 | 8 | 30.30 | 29.70 | 60.00 | 24.47 | 25.53 | 50.00 | Phase 1 | 11.46 |

FCC ID: WJ9-ARU2400

Test point: N
Operation mode: Tag reading mode
Remarks: Internal antenna

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|--------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.168 | 9 | 49.51 | 15.55 | 65.06 | 36.67 | 18.39 | 55.06 | Neutral | 10.09 |
| 0.1725 | 9 | 49.20 | 15.64 | 64.84 | 37.84 | 17.00 | 54.84 | Neutral | 10.09 |
| 0.231 | 9 | 42.44 | 19.97 | 62.41 | 31.84 | 20.57 | 52.41 | Neutral | 10.11 |
| 0.2355 | 9 | 43.74 | 18.51 | 62.25 | 34.43 | 17.82 | 52.25 | Neutral | 10.11 |
| 0.3 | 10 | 37.10 | 23.15 | 60.24 | 27.73 | 22.52 | 50.24 | Neutral | 10.13 |
| 0.3405 | 10 | 37.38 | 21.82 | 59.19 | 29.15 | 20.04 | 49.19 | Neutral | 10.14 |
| 0.5115 | 10 | 38.93 | 17.07 | 56.00 | 30.25 | 15.75 | 46.00 | Neutral | 10.15 |
| 0.8385 | 11 | 35.20 | 20.80 | 56.00 | 26.73 | 19.27 | 46.00 | Neutral | 10.19 |
| 0.843 | 11 | 35.11 | 20.89 | 56.00 | 26.69 | 19.31 | 46.00 | Neutral | 10.19 |
| 0.861 | 11 | 35.09 | 20.91 | 56.00 | 26.45 | 19.55 | 46.00 | Neutral | 10.19 |
| 0.8745 | 11 | 34.96 | 21.04 | 56.00 | 26.69 | 19.31 | 46.00 | Neutral | 10.19 |
| 1.4475 | 12 | 36.01 | 19.99 | 56.00 | 28.03 | 17.97 | 46.00 | Neutral | 10.26 |
| 1.479 | 12 | 35.61 | 20.39 | 56.00 | 28.36 | 17.64 | 46.00 | Neutral | 10.26 |
| 2.01 | 12 | 36.38 | 19.62 | 56.00 | 28.18 | 17.82 | 46.00 | Neutral | 10.28 |
| 2.0325 | 12 | 36.50 | 19.50 | 56.00 | 28.42 | 17.58 | 46.00 | Neutral | 10.28 |
| 2.5485 | 13 | 36.30 | 19.70 | 56.00 | 28.25 | 17.75 | 46.00 | Neutral | 10.33 |
| 2.5755 | 13 | 36.29 | 19.71 | 56.00 | 28.22 | 17.78 | 46.00 | Neutral | 10.33 |

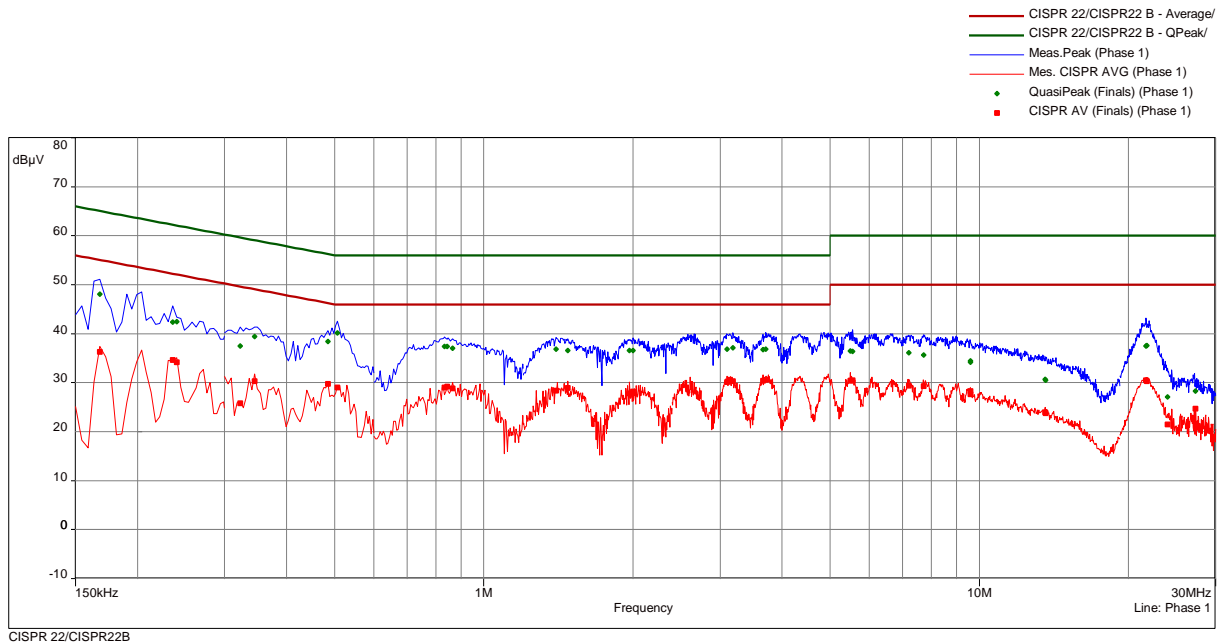
FCC ID: WJ9-ARU2400

| freq MHz | SR | QP dB(μV) | margin dB | limit dB | AV dB(μV) | margin dB | limit dB | line | corr dB |
|-------------|----|--------------|--------------|-------------|--------------|--------------|-------------|---------|------------|
| 4.245 | 13 | 35.46 | 20.54 | 56.00 | 29.36 | 16.64 | 46.00 | Neutral | 10.42 |
| 4.3305 | 13 | 35.48 | 20.52 | 56.00 | 29.42 | 16.58 | 46.00 | Neutral | 10.42 |
| 4.8495 | 14 | 35.16 | 20.84 | 56.00 | 28.98 | 17.02 | 46.00 | Neutral | 10.45 |
| 4.9485 | 14 | 34.36 | 21.64 | 56.00 | 28.38 | 17.62 | 46.00 | Neutral | 10.45 |
| 7.0455 | 14 | 33.59 | 26.41 | 60.00 | 26.60 | 23.40 | 50.00 | Neutral | 10.60 |
| 7.1805 | 14 | 33.57 | 26.43 | 60.00 | 26.89 | 23.11 | 50.00 | Neutral | 10.60 |
| 9.609 | 15 | 31.28 | 28.72 | 60.00 | 24.24 | 25.76 | 50.00 | Neutral | 10.69 |
| 10.0005 | 15 | 31.45 | 28.55 | 60.00 | 24.66 | 25.34 | 50.00 | Neutral | 10.70 |
| 19.086 | 15 | 27.77 | 32.23 | 60.00 | 20.81 | 29.19 | 50.00 | Neutral | 11.32 |
| 19.1445 | 15 | 27.94 | 32.06 | 60.00 | 21.14 | 28.86 | 50.00 | Neutral | 11.32 |
| 21.8055 | 16 | 36.19 | 23.81 | 60.00 | 29.48 | 20.52 | 50.00 | Neutral | 11.37 |
| 22.3905 | 16 | 36.17 | 23.83 | 60.00 | 29.17 | 20.83 | 50.00 | Neutral | 11.37 |
| 24.4515 | 16 | 29.33 | 30.67 | 60.00 | 24.30 | 25.70 | 50.00 | Neutral | 11.37 |
| 26.193 | 16 | 25.19 | 34.81 | 60.00 | 19.21 | 30.79 | 50.00 | Neutral | 11.33 |

FCC ID: WJ9-ARU2400

Test point L1
Operation mode: Tag reading mode
Remarks: WRA 7070 Antenna Unit, 52010334

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|--------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.168 | 1 | 48.07 | 16.99 | 65.06 | 36.28 | 18.78 | 55.06 | Phase 1 | 10.08 |
| 0.2355 | 1 | 42.35 | 19.91 | 62.25 | 34.61 | 17.64 | 52.25 | Phase 1 | 10.10 |
| 0.24 | 1 | 42.50 | 19.60 | 62.10 | 34.19 | 17.91 | 52.10 | Phase 1 | 10.10 |
| 0.3225 | 2 | 37.47 | 22.18 | 59.64 | 25.85 | 23.80 | 49.64 | Phase 1 | 10.13 |
| 0.345 | 2 | 39.44 | 19.64 | 59.08 | 30.35 | 18.73 | 49.08 | Phase 1 | 10.13 |
| 0.4845 | 2 | 38.38 | 17.88 | 56.26 | 29.80 | 16.46 | 46.26 | Phase 1 | 10.14 |
| 0.507 | 2 | 40.12 | 15.88 | 56.00 | 29.03 | 16.97 | 46.00 | Phase 1 | 10.14 |
| 0.834 | 3 | 37.43 | 18.57 | 56.00 | 29.05 | 16.95 | 46.00 | Phase 1 | 10.19 |
| 0.843 | 3 | 37.42 | 18.58 | 56.00 | 29.19 | 16.81 | 46.00 | Phase 1 | 10.19 |
| 0.8655 | 3 | 36.99 | 19.01 | 56.00 | 28.87 | 17.13 | 46.00 | Phase 1 | 10.19 |
| 1.398 | 4 | 36.88 | 19.12 | 56.00 | 28.37 | 17.63 | 46.00 | Phase 1 | 10.24 |
| 1.479 | 4 | 36.57 | 19.43 | 56.00 | 28.95 | 17.05 | 46.00 | Phase 1 | 10.25 |
| 1.9695 | 4 | 36.59 | 19.41 | 56.00 | 27.81 | 18.19 | 46.00 | Phase 1 | 10.26 |
| 2.001 | 4 | 36.59 | 19.41 | 56.00 | 28.17 | 17.83 | 46.00 | Phase 1 | 10.26 |

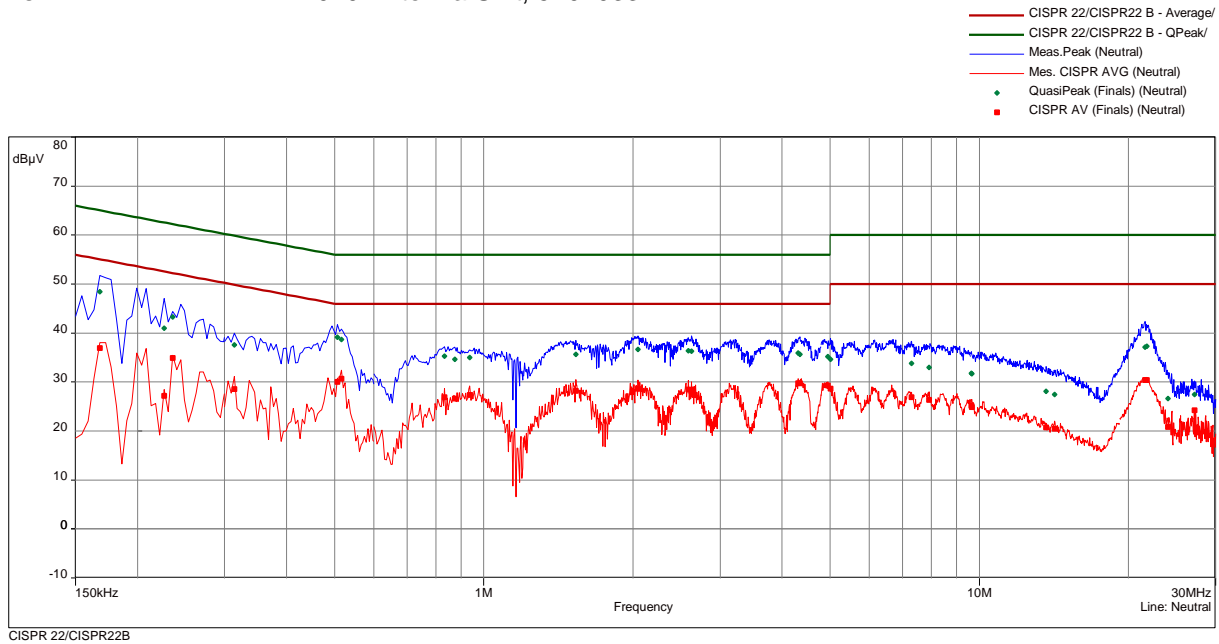
FCC ID: WJ9-ARU2400

| freq MHz | SR | QP dB(μV) | margin dB | limit dB | AV dB(μV) | margin dB | limit dB | line | corr dB |
|-------------|----|--------------|--------------|-------------|--------------|--------------|-------------|---------|------------|
| 3.0975 | 5 | 36.88 | 19.12 | 56.00 | 30.16 | 15.84 | 46.00 | Phase 1 | 10.34 |
| 3.183 | 5 | 37.12 | 18.88 | 56.00 | 30.28 | 15.72 | 46.00 | Phase 1 | 10.35 |
| 3.6645 | 5 | 36.73 | 19.27 | 56.00 | 30.36 | 15.64 | 46.00 | Phase 1 | 10.36 |
| 3.7095 | 5 | 36.86 | 19.14 | 56.00 | 30.59 | 15.41 | 46.00 | Phase 1 | 10.37 |
| 5.4975 | 6 | 36.45 | 23.55 | 60.00 | 30.37 | 19.63 | 50.00 | Phase 1 | 10.49 |
| 5.5515 | 6 | 36.39 | 23.61 | 60.00 | 30.47 | 19.53 | 50.00 | Phase 1 | 10.49 |
| 7.212 | 6 | 36.12 | 23.88 | 60.00 | 29.42 | 20.58 | 50.00 | Phase 1 | 10.61 |
| 7.725 | 6 | 35.65 | 24.35 | 60.00 | 29.34 | 20.66 | 50.00 | Phase 1 | 10.63 |
| 9.6045 | 7 | 34.47 | 25.53 | 60.00 | 28.33 | 21.67 | 50.00 | Phase 1 | 10.70 |
| 9.609 | 7 | 34.17 | 25.83 | 60.00 | 27.61 | 22.39 | 50.00 | Phase 1 | 10.70 |
| 13.587 | 7 | 30.65 | 29.35 | 60.00 | 24.00 | 26.00 | 50.00 | Phase 1 | 10.99 |
| 13.623 | 7 | 30.46 | 29.54 | 60.00 | 23.80 | 26.20 | 50.00 | Phase 1 | 10.99 |
| 21.6975 | 8 | 37.49 | 22.51 | 60.00 | 30.48 | 19.52 | 50.00 | Phase 1 | 11.39 |
| 21.801 | 8 | 37.60 | 22.40 | 60.00 | 30.35 | 19.65 | 50.00 | Phase 1 | 11.40 |
| 24.0105 | 8 | 27.06 | 32.94 | 60.00 | 21.49 | 28.51 | 50.00 | Phase 1 | 11.46 |
| 27.309 | 8 | 28.33 | 31.67 | 60.00 | 24.68 | 25.32 | 50.00 | Phase 1 | 11.43 |

FCC ID: WJ9-ARU2400

Test point: N
 Operation mode: Tag reading mode
 Remarks: WRA 7070 Antenna Unit, 52010334

Result: Passed

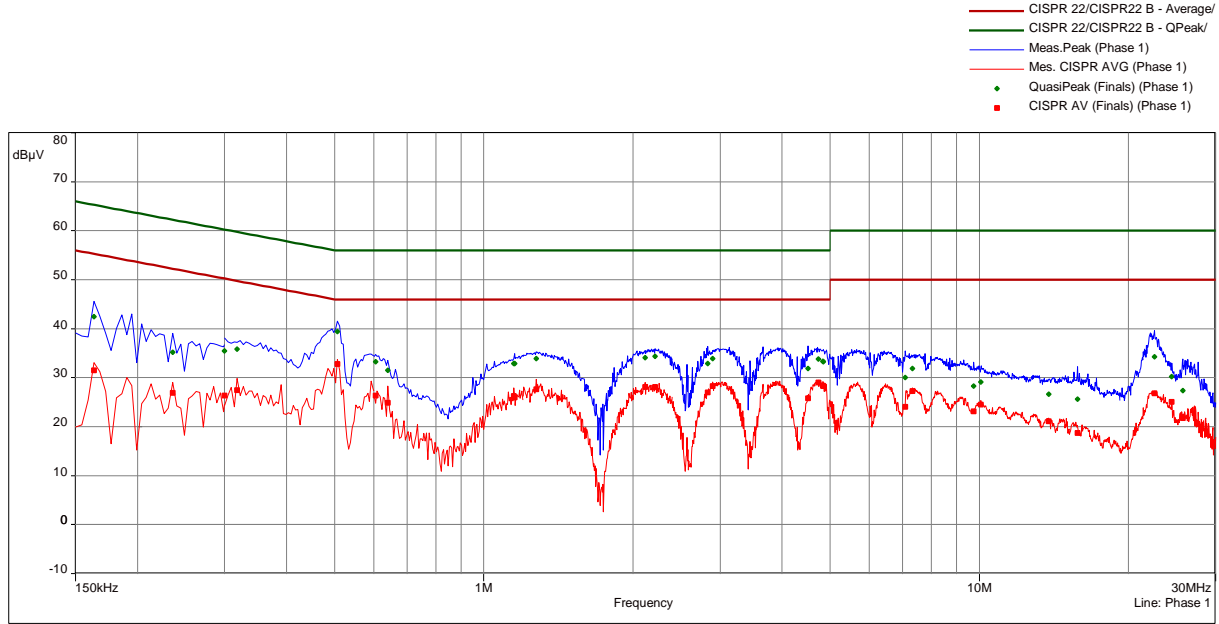


| freq MHz | SR | QP dB(μV) | margin dB | limit dB | AV dB(μV) | margin dB | limit dB | line | corr dB |
|-------------|----|--------------|--------------|-------------|--------------|--------------|-------------|---------|------------|
| 0.168 | 9 | 48.44 | 16.62 | 65.06 | 36.97 | 18.09 | 55.06 | Neutral | 10.09 |
| 0.2265 | 9 | 41.01 | 21.57 | 62.58 | 27.15 | 25.43 | 52.58 | Neutral | 10.11 |
| 0.2355 | 9 | 43.32 | 18.93 | 62.25 | 34.93 | 17.32 | 52.25 | Neutral | 10.11 |
| 0.3135 | 10 | 37.57 | 22.31 | 59.88 | 28.61 | 21.27 | 49.88 | Neutral | 10.13 |
| 0.507 | 10 | 39.18 | 16.82 | 56.00 | 30.00 | 16.00 | 46.00 | Neutral | 10.15 |
| 0.516 | 10 | 38.72 | 17.28 | 56.00 | 30.67 | 15.33 | 46.00 | Neutral | 10.15 |
| 0.834 | 11 | 35.31 | 20.69 | 56.00 | 26.86 | 19.14 | 46.00 | Neutral | 10.19 |
| 0.8745 | 11 | 34.63 | 21.37 | 56.00 | 26.65 | 19.35 | 46.00 | Neutral | 10.19 |
| 0.9375 | 11 | 35.02 | 20.98 | 56.00 | 27.32 | 18.68 | 46.00 | Neutral | 10.19 |
| 1.533 | 12 | 35.61 | 20.39 | 56.00 | 28.19 | 17.81 | 46.00 | Neutral | 10.27 |
| 2.046 | 12 | 36.71 | 19.29 | 56.00 | 28.63 | 17.37 | 46.00 | Neutral | 10.28 |
| 2.589 | 13 | 36.43 | 19.57 | 56.00 | 28.48 | 17.52 | 46.00 | Neutral | 10.33 |
| 2.625 | 13 | 36.25 | 19.75 | 56.00 | 28.13 | 17.87 | 46.00 | Neutral | 10.33 |
| 4.3125 | 13 | 35.92 | 20.08 | 56.00 | 29.80 | 16.20 | 46.00 | Neutral | 10.42 |
| 4.344 | 13 | 35.62 | 20.38 | 56.00 | 29.81 | 16.19 | 46.00 | Neutral | 10.43 |
| 4.944 | 14 | 35.16 | 20.84 | 56.00 | 29.30 | 16.70 | 46.00 | Neutral | 10.45 |
| 5.0115 | 14 | 34.64 | 25.36 | 60.00 | 28.62 | 21.38 | 50.00 | Neutral | 10.46 |
| 7.302 | 14 | 33.77 | 26.23 | 60.00 | 26.91 | 23.09 | 50.00 | Neutral | 10.61 |
| 7.9185 | 14 | 33.01 | 26.99 | 60.00 | 26.34 | 23.66 | 50.00 | Neutral | 10.63 |
| 9.6405 | 15 | 31.81 | 28.19 | 60.00 | 25.16 | 24.84 | 50.00 | Neutral | 10.69 |
| 9.663 | 15 | 31.69 | 28.31 | 60.00 | 24.92 | 25.08 | 50.00 | Neutral | 10.69 |
| 13.6455 | 15 | 28.06 | 31.94 | 60.00 | 20.78 | 29.22 | 50.00 | Neutral | 10.96 |
| 14.19 | 15 | 27.42 | 32.58 | 60.00 | 20.45 | 29.55 | 50.00 | Neutral | 11.00 |
| 21.594 | 16 | 37.10 | 22.90 | 60.00 | 30.38 | 19.62 | 50.00 | Neutral | 11.37 |
| 21.783 | 16 | 37.33 | 22.67 | 60.00 | 30.41 | 19.59 | 50.00 | Neutral | 11.38 |
| 24.0195 | 16 | 26.62 | 33.38 | 60.00 | 20.81 | 29.19 | 50.00 | Neutral | 11.38 |
| 27.183 | 16 | 27.42 | 32.58 | 60.00 | 24.23 | 25.77 | 50.00 | Neutral | 11.29 |

FCC ID: WJ9-ARU2400

Test point L1
Operation mode: Standby mode
Remarks: WRA 7070 Antenna Unit, 52010334

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|--------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.1635 | 1 | 42.42 | 22.86 | 65.28 | 31.53 | 23.75 | 55.28 | Phase 1 | 10.08 |
| 0.2355 | 1 | 35.20 | 27.05 | 62.25 | 26.88 | 25.38 | 52.25 | Phase 1 | 10.10 |
| 0.3 | 2 | 35.44 | 24.80 | 60.24 | 26.35 | 23.89 | 50.24 | Phase 1 | 10.12 |
| 0.318 | 2 | 35.83 | 23.93 | 59.76 | 27.42 | 22.34 | 49.76 | Phase 1 | 10.13 |
| 0.507 | 2 | 39.46 | 16.54 | 56.00 | 32.80 | 13.20 | 46.00 | Phase 1 | 10.14 |
| 0.6045 | 3 | 33.22 | 22.78 | 56.00 | 26.37 | 19.63 | 46.00 | Phase 1 | 10.16 |
| 0.6405 | 3 | 31.47 | 24.53 | 56.00 | 24.90 | 21.10 | 46.00 | Phase 1 | 10.16 |
| 1.149 | 3 | 32.89 | 23.11 | 56.00 | 26.26 | 19.74 | 46.00 | Phase 1 | 10.21 |
| 1.1535 | 3 | 32.88 | 23.12 | 56.00 | 26.03 | 19.97 | 46.00 | Phase 1 | 10.21 |
| 1.2765 | 4 | 33.94 | 22.06 | 56.00 | 27.64 | 18.36 | 46.00 | Phase 1 | 10.23 |
| 2.118 | 4 | 34.11 | 21.89 | 56.00 | 28.10 | 17.90 | 46.00 | Phase 1 | 10.28 |
| 2.217 | 4 | 34.35 | 21.65 | 56.00 | 28.11 | 17.89 | 46.00 | Phase 1 | 10.29 |
| 2.832 | 5 | 32.90 | 23.10 | 56.00 | 27.00 | 19.00 | 46.00 | Phase 1 | 10.34 |
| 2.8995 | 5 | 33.93 | 22.07 | 56.00 | 28.31 | 17.69 | 46.00 | Phase 1 | 10.34 |
| 4.5105 | 5 | 31.84 | 24.16 | 56.00 | 25.76 | 20.24 | 46.00 | Phase 1 | 10.42 |
| 4.731 | 5 | 33.80 | 22.20 | 56.00 | 29.00 | 17.00 | 46.00 | Phase 1 | 10.43 |
| 4.8315 | 6 | 33.31 | 22.69 | 56.00 | 28.39 | 17.61 | 46.00 | Phase 1 | 10.44 |
| 4.8495 | 6 | 33.30 | 22.70 | 56.00 | 28.28 | 17.72 | 46.00 | Phase 1 | 10.44 |

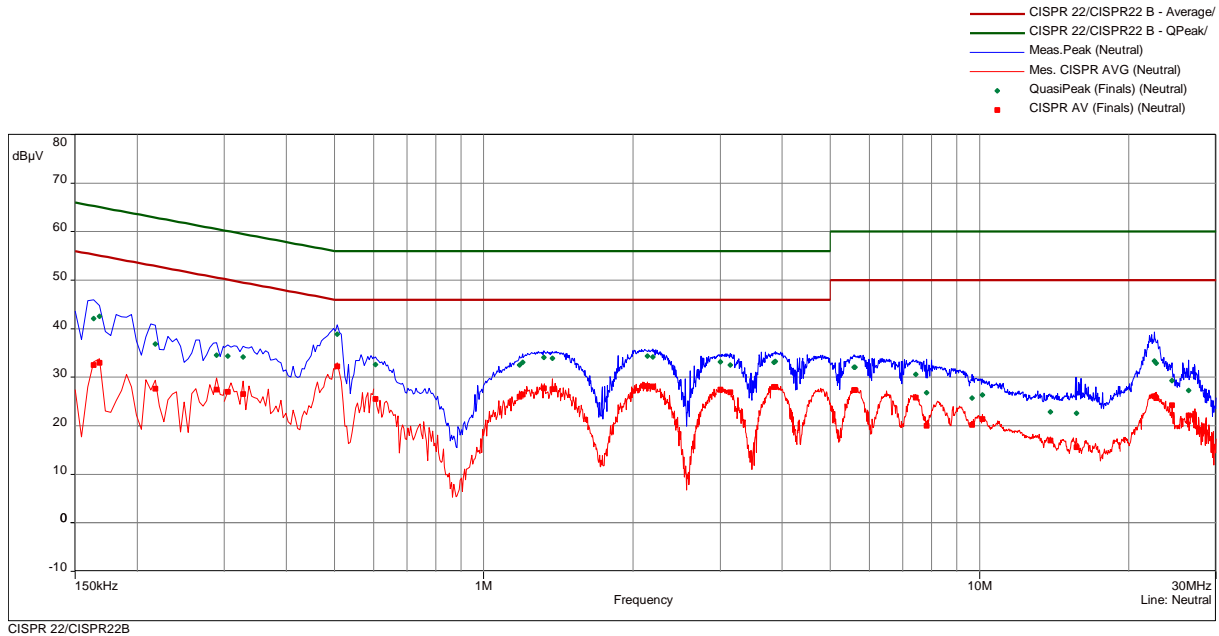
FCC ID: WJ9-ARU2400

| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|---------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 7.095 | 6 | 30.00 | 30.00 | 60.00 | 24.06 | 25.94 | 50.00 | Phase 1 | 10.60 |
| 7.329 | 6 | 31.87 | 28.13 | 60.00 | 27.26 | 22.74 | 50.00 | Phase 1 | 10.61 |
| 9.7395 | 7 | 28.32 | 31.68 | 60.00 | 23.15 | 26.85 | 50.00 | Phase 1 | 10.70 |
| 10.068 | 7 | 29.16 | 30.84 | 60.00 | 24.54 | 25.46 | 50.00 | Phase 1 | 10.71 |
| 13.8255 | 7 | 26.65 | 33.35 | 60.00 | 21.12 | 28.88 | 50.00 | Phase 1 | 11.01 |
| 15.774 | 7 | 25.61 | 34.39 | 60.00 | 18.69 | 31.31 | 50.00 | Phase 1 | 11.13 |
| 22.5795 | 8 | 34.32 | 25.68 | 60.00 | 26.78 | 23.22 | 50.00 | Phase 1 | 11.42 |
| 24.4515 | 8 | 30.22 | 29.78 | 60.00 | 25.08 | 24.92 | 50.00 | Phase 1 | 11.47 |
| 25.77 | 8 | 27.41 | 32.59 | 60.00 | 21.74 | 28.26 | 50.00 | Phase 1 | 11.46 |

FCC ID: WJ9-ARU2400

Test point: N
Operation mode: Standby mode
Remarks: WRA 7070 Antenna Unit, 52010334

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|--------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.1635 | 9 | 42.12 | 23.16 | 65.28 | 32.49 | 22.79 | 55.28 | Neutral | 10.09 |
| 0.168 | 9 | 42.58 | 22.48 | 65.06 | 32.95 | 22.11 | 55.06 | Neutral | 10.09 |
| 0.2175 | 9 | 36.81 | 26.10 | 62.91 | 27.60 | 25.31 | 52.91 | Neutral | 10.10 |
| 0.2895 | 9 | 34.51 | 26.03 | 60.54 | 27.47 | 23.06 | 50.54 | Neutral | 10.13 |
| 0.3045 | 10 | 34.38 | 25.74 | 60.12 | 27.04 | 23.08 | 50.12 | Neutral | 10.13 |
| 0.327 | 10 | 34.21 | 25.32 | 59.53 | 26.51 | 23.02 | 49.53 | Neutral | 10.14 |
| 0.507 | 10 | 38.87 | 17.13 | 56.00 | 32.23 | 13.77 | 46.00 | Neutral | 10.15 |
| 0.6045 | 11 | 32.60 | 23.40 | 56.00 | 25.54 | 20.46 | 46.00 | Neutral | 10.17 |
| 1.1805 | 11 | 32.56 | 23.44 | 56.00 | 25.97 | 20.03 | 46.00 | Neutral | 10.22 |
| 1.1985 | 11 | 33.08 | 22.92 | 56.00 | 26.48 | 19.52 | 46.00 | Neutral | 10.23 |
| 1.3215 | 12 | 34.07 | 21.93 | 56.00 | 27.73 | 18.27 | 46.00 | Neutral | 10.25 |
| 1.3755 | 12 | 33.93 | 22.07 | 56.00 | 27.59 | 18.41 | 46.00 | Neutral | 10.25 |
| 2.1405 | 12 | 34.35 | 21.65 | 56.00 | 28.16 | 17.84 | 46.00 | Neutral | 10.29 |
| 2.1945 | 12 | 34.19 | 21.81 | 56.00 | 28.13 | 17.87 | 46.00 | Neutral | 10.29 |
| 3.003 | 13 | 33.16 | 22.84 | 56.00 | 27.49 | 18.51 | 46.00 | Neutral | 10.35 |
| 3.1425 | 13 | 32.57 | 23.43 | 56.00 | 26.90 | 19.10 | 46.00 | Neutral | 10.36 |
| 3.849 | 13 | 33.10 | 22.90 | 56.00 | 27.98 | 18.02 | 46.00 | Neutral | 10.39 |
| 3.8715 | 13 | 33.24 | 22.76 | 56.00 | 28.04 | 17.96 | 46.00 | Neutral | 10.39 |

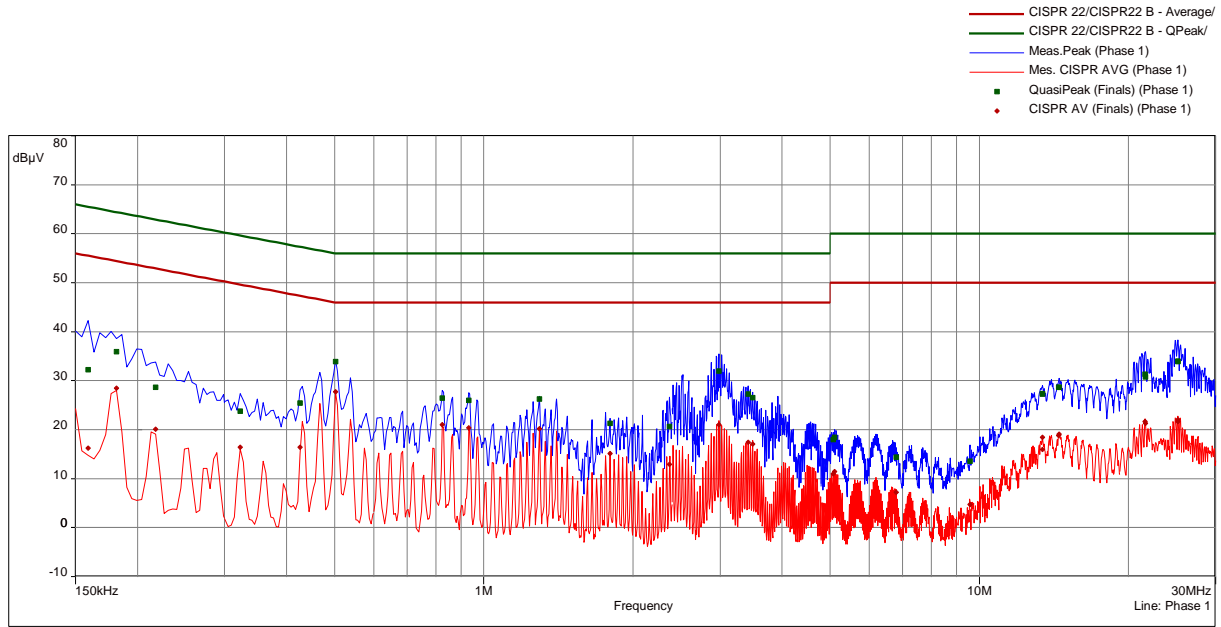
FCC ID: WJ9-ARU2400

| freq MHz | SR | QP dB(μV) | margin dB | limit dB | AV dB(μV) | margin dB | limit dB | line | corr dB |
|-------------|----|--------------|--------------|-------------|--------------|--------------|-------------|---------|------------|
| 5.583 | 14 | 32.03 | 27.97 | 60.00 | 27.32 | 22.68 | 50.00 | Neutral | 10.50 |
| 5.6055 | 14 | 32.02 | 27.98 | 60.00 | 27.33 | 22.67 | 50.00 | Neutral | 10.50 |
| 7.4325 | 14 | 30.60 | 29.40 | 60.00 | 25.85 | 24.15 | 50.00 | Neutral | 10.62 |
| 7.8195 | 14 | 26.84 | 33.16 | 60.00 | 20.03 | 29.97 | 50.00 | Neutral | 10.63 |
| 9.663 | 15 | 25.75 | 34.25 | 60.00 | 20.20 | 29.80 | 50.00 | Neutral | 10.69 |
| 10.1265 | 15 | 26.35 | 33.65 | 60.00 | 21.41 | 28.59 | 50.00 | Neutral | 10.71 |
| 13.893 | 15 | 22.83 | 37.17 | 60.00 | 16.99 | 33.01 | 50.00 | Neutral | 10.98 |
| 15.693 | 15 | 22.54 | 37.46 | 60.00 | 15.60 | 34.40 | 50.00 | Neutral | 11.10 |
| 22.5435 | 16 | 33.33 | 26.67 | 60.00 | 26.09 | 23.91 | 50.00 | Neutral | 11.38 |
| 22.7055 | 16 | 32.88 | 27.12 | 60.00 | 25.74 | 24.26 | 50.00 | Neutral | 11.38 |
| 24.4515 | 16 | 29.26 | 30.74 | 60.00 | 24.24 | 25.76 | 50.00 | Neutral | 11.37 |
| 26.4225 | 16 | 27.23 | 32.77 | 60.00 | 22.12 | 27.88 | 50.00 | Neutral | 11.32 |

FCC ID: WJ9-ARU2400

Test point L1
Operation mode: Tag reading mode
Remarks: Internal antenna – powered via PoE

Result: Passed

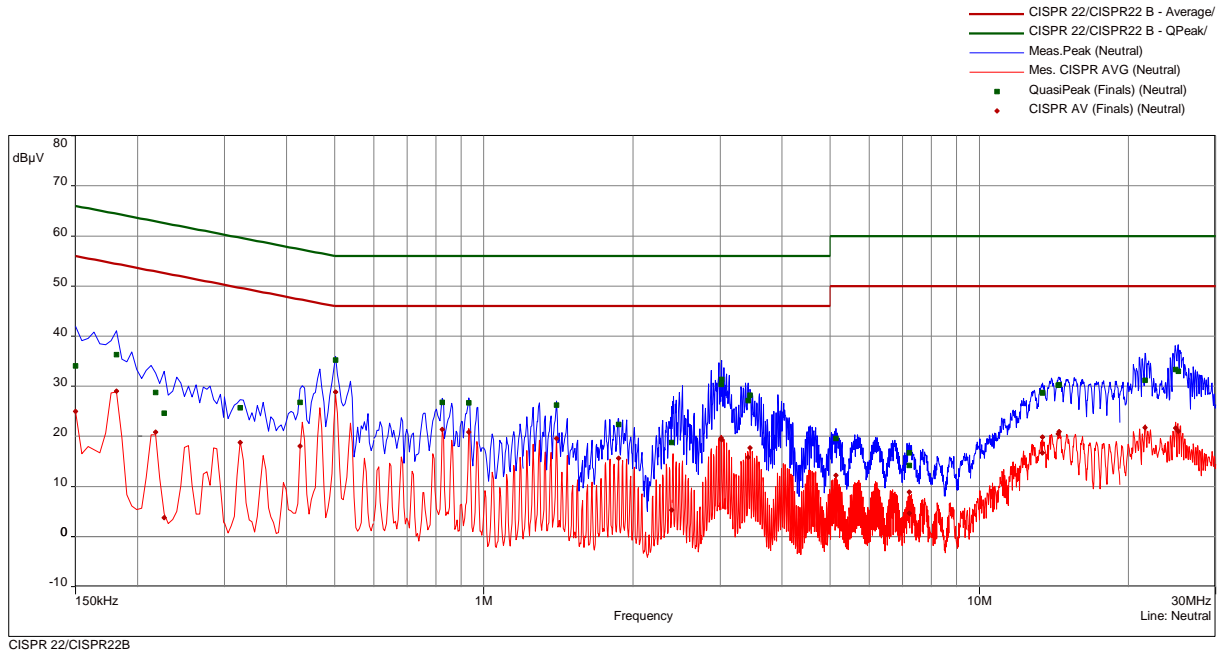


| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|---------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.159 | 1 | 32.27 | 33.24 | 65.52 | 16.27 | 39.25 | 55.52 | Phase 1 | 10.08 |
| 0.1815 | 1 | 35.96 | 28.45 | 64.42 | 28.43 | 25.99 | 54.42 | Phase 1 | 10.08 |
| 0.2175 | 1 | 28.66 | 34.25 | 62.91 | 20.07 | 32.85 | 52.91 | Phase 1 | 10.09 |
| 0.3225 | 2 | 23.80 | 35.84 | 59.64 | 16.40 | 33.24 | 49.64 | Phase 1 | 10.13 |
| 0.426 | 2 | 25.47 | 31.86 | 57.33 | 16.38 | 30.95 | 47.33 | Phase 1 | 10.14 |
| 0.5025 | 2 | 33.88 | 22.12 | 56.00 | 27.77 | 18.23 | 46.00 | Phase 1 | 10.14 |
| 0.825 | 3 | 26.47 | 29.53 | 56.00 | 20.99 | 25.01 | 46.00 | Phase 1 | 10.18 |
| 0.933 | 3 | 26.00 | 30.00 | 56.00 | 20.41 | 25.59 | 46.00 | Phase 1 | 10.18 |
| 1.2945 | 4 | 26.28 | 29.72 | 56.00 | 20.15 | 25.85 | 46.00 | Phase 1 | 10.23 |
| 1.7985 | 4 | 21.33 | 34.67 | 56.00 | 15.12 | 30.88 | 46.00 | Phase 1 | 10.26 |
| 2.37 | 4 | 20.63 | 35.37 | 56.00 | 12.92 | 33.08 | 46.00 | Phase 1 | 10.30 |
| 2.985 | 5 | 31.94 | 24.06 | 56.00 | 21.04 | 24.96 | 46.00 | Phase 1 | 10.34 |
| 3.417 | 5 | 27.31 | 28.69 | 56.00 | 17.46 | 28.54 | 46.00 | Phase 1 | 10.35 |
| 3.489 | 5 | 26.51 | 29.49 | 56.00 | 17.06 | 28.94 | 46.00 | Phase 1 | 10.35 |
| 5.07 | 6 | 18.03 | 41.97 | 60.00 | 10.97 | 39.03 | 50.00 | Phase 1 | 10.46 |
| 5.106 | 6 | 18.41 | 41.59 | 60.00 | 11.46 | 38.54 | 50.00 | Phase 1 | 10.46 |
| 6.798 | 6 | 14.39 | 45.61 | 60.00 | 7.26 | 42.74 | 50.00 | Phase 1 | 10.60 |
| 9.57 | 6 | 13.59 | 46.41 | 60.00 | 4.75 | 45.25 | 50.00 | Phase 1 | 10.72 |
| 13.4115 | 7 | 27.36 | 32.64 | 60.00 | 18.48 | 31.52 | 50.00 | Phase 1 | 11.05 |
| 13.4205 | 7 | 27.29 | 32.71 | 60.00 | 15.94 | 34.06 | 50.00 | Phase 1 | 11.05 |
| 14.4555 | 7 | 28.67 | 31.33 | 60.00 | 18.84 | 31.16 | 50.00 | Phase 1 | 11.13 |
| 14.4915 | 7 | 28.64 | 31.36 | 60.00 | 19.12 | 30.88 | 50.00 | Phase 1 | 11.13 |
| 21.6075 | 8 | 31.34 | 28.66 | 60.00 | 21.64 | 28.36 | 50.00 | Phase 1 | 11.53 |
| 21.6435 | 8 | 30.77 | 29.23 | 60.00 | 21.30 | 28.70 | 50.00 | Phase 1 | 11.54 |
| 25.158 | 8 | 33.87 | 26.13 | 60.00 | 21.64 | 28.36 | 50.00 | Phase 1 | 11.68 |
| 25.1625 | 8 | 34.02 | 25.98 | 60.00 | 22.02 | 27.98 | 50.00 | Phase 1 | 11.68 |

FCC ID: WJ9-ARU2400

Test point: N
 Operation mode: Tag reading mode
 Remarks: Internal antenna – powered via PoE

Result: Passed

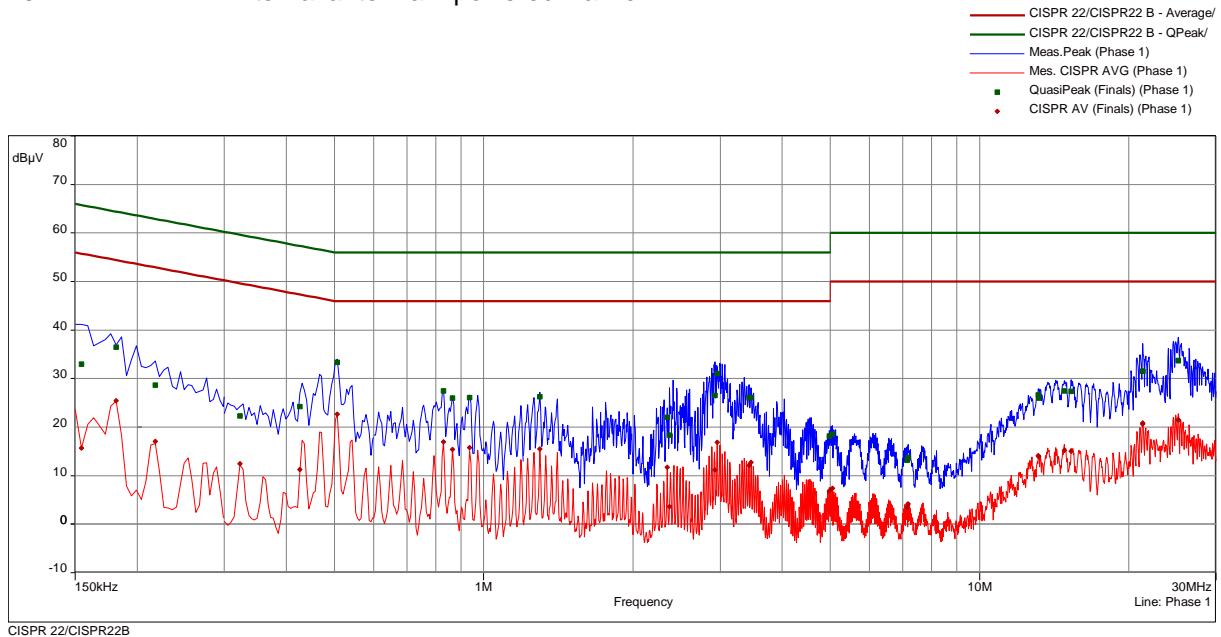


| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|---------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.15 | 9 | 34.02 | 31.98 | 66.00 | 25.00 | 31.00 | 56.00 | Neutral | 10.07 |
| 0.1815 | 9 | 36.27 | 28.15 | 64.42 | 29.00 | 25.42 | 54.42 | Neutral | 10.09 |
| 0.2175 | 9 | 28.72 | 34.20 | 62.91 | 20.81 | 32.11 | 52.91 | Neutral | 10.11 |
| 0.2265 | 9 | 24.65 | 37.93 | 62.58 | 3.81 | 48.77 | 52.58 | Neutral | 10.11 |
| 0.3225 | 10 | 25.68 | 33.97 | 59.64 | 18.78 | 30.86 | 49.64 | Neutral | 10.13 |
| 0.426 | 10 | 26.81 | 30.52 | 57.33 | 18.09 | 29.24 | 47.33 | Neutral | 10.14 |
| 0.5025 | 10 | 35.19 | 20.81 | 56.00 | 28.86 | 17.14 | 46.00 | Neutral | 10.14 |
| 0.825 | 11 | 26.80 | 29.20 | 56.00 | 21.36 | 24.64 | 46.00 | Neutral | 10.18 |
| 0.933 | 11 | 26.71 | 29.29 | 56.00 | 20.85 | 25.15 | 46.00 | Neutral | 10.18 |
| 1.4025 | 12 | 26.25 | 29.75 | 56.00 | 19.61 | 26.39 | 46.00 | Neutral | 10.24 |
| 1.8705 | 12 | 22.36 | 33.64 | 56.00 | 15.65 | 30.35 | 46.00 | Neutral | 10.26 |
| 2.397 | 12 | 18.74 | 37.26 | 56.00 | 5.31 | 40.69 | 46.00 | Neutral | 10.31 |
| 3.0165 | 13 | 30.39 | 25.61 | 56.00 | 19.64 | 26.36 | 46.00 | Neutral | 10.34 |
| 3.021 | 13 | 31.35 | 24.65 | 56.00 | 19.31 | 26.69 | 46.00 | Neutral | 10.34 |
| 3.417 | 13 | 27.17 | 28.83 | 56.00 | 15.82 | 30.18 | 46.00 | Neutral | 10.35 |
| 3.4485 | 13 | 28.20 | 27.80 | 56.00 | 17.74 | 28.26 | 46.00 | Neutral | 10.35 |
| 5.1375 | 14 | 19.61 | 40.39 | 60.00 | 12.18 | 37.82 | 50.00 | Neutral | 10.45 |
| 7.2165 | 14 | 14.22 | 45.78 | 60.00 | 4.62 | 45.38 | 50.00 | Neutral | 10.58 |
| 7.221 | 14 | 16.69 | 43.31 | 60.00 | 8.87 | 41.13 | 50.00 | Neutral | 10.58 |
| 13.4025 | 15 | 28.72 | 31.28 | 60.00 | 19.86 | 30.14 | 50.00 | Neutral | 10.90 |
| 13.4115 | 15 | 28.64 | 31.36 | 60.00 | 16.72 | 33.28 | 50.00 | Neutral | 10.90 |
| 14.4465 | 15 | 30.16 | 29.84 | 60.00 | 20.44 | 29.56 | 50.00 | Neutral | 10.96 |
| 14.4825 | 15 | 30.33 | 29.67 | 60.00 | 20.97 | 29.03 | 50.00 | Neutral | 10.96 |
| 21.594 | 16 | 31.23 | 28.77 | 60.00 | 21.74 | 28.26 | 50.00 | Neutral | 11.26 |
| 24.906 | 16 | 33.32 | 26.68 | 60.00 | 21.62 | 28.38 | 50.00 | Neutral | 11.26 |
| 25.1985 | 16 | 32.94 | 27.06 | 60.00 | 21.01 | 28.99 | 50.00 | Neutral | 11.25 |

FCC ID: WJ9-ARU2400

Test point L1
Operation mode: Standby mode
Remarks: Internal antenna – powered via PoE

Result: Passed

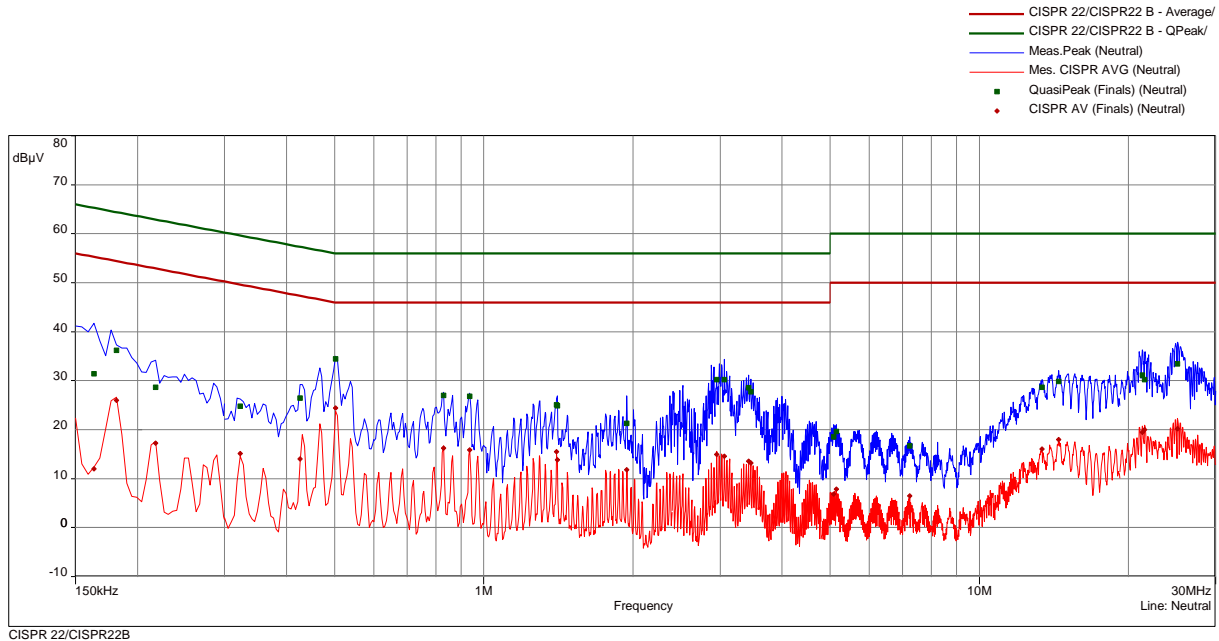


| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|---------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.1545 | 1 | 33.00 | 32.75 | 65.75 | 15.70 | 40.05 | 55.75 | Phase 1 | 10.08 |
| 0.1815 | 1 | 36.50 | 27.92 | 64.42 | 25.39 | 29.03 | 54.42 | Phase 1 | 10.08 |
| 0.2175 | 1 | 28.62 | 34.29 | 62.91 | 17.04 | 35.87 | 52.91 | Phase 1 | 10.09 |
| 0.3225 | 2 | 22.30 | 37.35 | 59.64 | 12.51 | 37.14 | 49.64 | Phase 1 | 10.13 |
| 0.426 | 2 | 24.24 | 33.09 | 57.33 | 11.31 | 36.02 | 47.33 | Phase 1 | 10.14 |
| 0.507 | 2 | 33.34 | 22.66 | 56.00 | 22.68 | 23.32 | 46.00 | Phase 1 | 10.14 |
| 0.8295 | 3 | 27.44 | 28.56 | 56.00 | 16.99 | 29.01 | 46.00 | Phase 1 | 10.18 |
| 0.8655 | 3 | 25.99 | 30.01 | 56.00 | 15.43 | 30.57 | 46.00 | Phase 1 | 10.18 |
| 0.9375 | 3 | 26.11 | 29.89 | 56.00 | 15.76 | 30.24 | 46.00 | Phase 1 | 10.18 |
| 1.299 | 4 | 26.22 | 29.78 | 56.00 | 15.47 | 30.53 | 46.00 | Phase 1 | 10.23 |
| 2.343 | 4 | 22.05 | 33.95 | 56.00 | 11.68 | 34.32 | 46.00 | Phase 1 | 10.30 |
| 2.37 | 4 | 18.37 | 37.63 | 56.00 | 3.61 | 42.39 | 46.00 | Phase 1 | 10.30 |
| 2.9265 | 5 | 26.52 | 29.48 | 56.00 | 11.20 | 34.80 | 46.00 | Phase 1 | 10.34 |
| 2.958 | 5 | 31.03 | 24.97 | 56.00 | 16.92 | 29.08 | 46.00 | Phase 1 | 10.34 |
| 3.4305 | 5 | 26.05 | 29.95 | 56.00 | 12.13 | 33.87 | 46.00 | Phase 1 | 10.35 |
| 3.462 | 5 | 26.08 | 29.92 | 56.00 | 12.76 | 33.24 | 46.00 | Phase 1 | 10.35 |
| 4.98 | 6 | 18.12 | 37.88 | 56.00 | 6.88 | 39.12 | 46.00 | Phase 1 | 10.45 |
| 5.052 | 6 | 18.53 | 41.47 | 60.00 | 7.40 | 42.60 | 50.00 | Phase 1 | 10.46 |
| 7.1445 | 6 | 13.20 | 46.80 | 60.00 | 3.43 | 46.57 | 50.00 | Phase 1 | 10.61 |
| 7.176 | 6 | 13.79 | 46.21 | 60.00 | 4.18 | 45.82 | 50.00 | Phase 1 | 10.62 |
| 13.128 | 7 | 26.63 | 33.37 | 60.00 | 14.16 | 35.84 | 50.00 | Phase 1 | 11.02 |
| 13.164 | 7 | 26.00 | 34.00 | 60.00 | 13.97 | 36.03 | 50.00 | Phase 1 | 11.03 |
| 14.8245 | 7 | 27.49 | 32.51 | 60.00 | 15.18 | 34.82 | 50.00 | Phase 1 | 11.16 |
| 15.288 | 7 | 27.33 | 32.67 | 60.00 | 14.99 | 35.01 | 50.00 | Phase 1 | 11.20 |
| 21.342 | 8 | 31.47 | 28.53 | 60.00 | 20.84 | 29.16 | 50.00 | Phase 1 | 11.52 |
| 21.351 | 8 | 31.48 | 28.52 | 60.00 | 20.69 | 29.31 | 50.00 | Phase 1 | 11.52 |
| 25.176 | 8 | 33.72 | 26.28 | 60.00 | 21.49 | 28.51 | 50.00 | Phase 1 | 11.68 |
| 25.185 | 8 | 33.70 | 26.30 | 60.00 | 21.48 | 28.52 | 50.00 | Phase 1 | 11.68 |

FCC ID: WJ9-ARU2400

Test point N
Operation mode: Standby mode
Remarks: Internal antenna – powered via PoE

Result: Passed



| freq | SR | QP | margin | limit | AV | margin | limit | line | corr |
|---------|----|--------|--------|-------|--------|--------|-------|---------|-------|
| MHz | | dB(μV) | dB | dB | dB(μV) | dB | dB | | dB |
| 0.1635 | 9 | 31.38 | 33.90 | 65.28 | 11.99 | 43.30 | 55.28 | Neutral | 10.08 |
| 0.1815 | 9 | 36.24 | 28.18 | 64.42 | 26.02 | 28.40 | 54.42 | Neutral | 10.09 |
| 0.2175 | 9 | 28.67 | 34.24 | 62.91 | 17.27 | 35.65 | 52.91 | Neutral | 10.11 |
| 0.3225 | 10 | 24.82 | 34.83 | 59.64 | 15.12 | 34.52 | 49.64 | Neutral | 10.13 |
| 0.426 | 10 | 26.46 | 30.87 | 57.33 | 13.98 | 33.35 | 47.33 | Neutral | 10.14 |
| 0.5025 | 10 | 34.50 | 21.50 | 56.00 | 24.42 | 21.58 | 46.00 | Neutral | 10.14 |
| 0.8295 | 11 | 27.00 | 29.00 | 56.00 | 16.20 | 29.80 | 46.00 | Neutral | 10.18 |
| 0.9375 | 11 | 26.77 | 29.23 | 56.00 | 15.87 | 30.13 | 46.00 | Neutral | 10.18 |
| 1.4025 | 12 | 25.08 | 30.92 | 56.00 | 15.47 | 30.53 | 46.00 | Neutral | 10.24 |
| 1.407 | 12 | 24.85 | 31.15 | 56.00 | 13.82 | 32.18 | 46.00 | Neutral | 10.24 |
| 1.9425 | 12 | 21.31 | 34.69 | 56.00 | 11.85 | 34.15 | 46.00 | Neutral | 10.26 |
| 2.9535 | 13 | 30.25 | 25.75 | 56.00 | 14.93 | 31.07 | 46.00 | Neutral | 10.34 |
| 3.0615 | 13 | 30.22 | 25.78 | 56.00 | 14.62 | 31.38 | 46.00 | Neutral | 10.34 |
| 3.4215 | 13 | 28.58 | 27.42 | 56.00 | 13.54 | 32.46 | 46.00 | Neutral | 10.35 |
| 3.4575 | 13 | 27.72 | 28.28 | 56.00 | 13.21 | 32.79 | 46.00 | Neutral | 10.35 |
| 5.079 | 14 | 18.55 | 41.45 | 60.00 | 6.85 | 43.15 | 50.00 | Neutral | 10.45 |
| 5.151 | 14 | 19.68 | 40.32 | 60.00 | 7.88 | 42.12 | 50.00 | Neutral | 10.45 |
| 7.239 | 14 | 16.67 | 43.33 | 60.00 | 6.49 | 43.51 | 50.00 | Neutral | 10.59 |
| 13.398 | 15 | 28.65 | 31.35 | 60.00 | 16.06 | 33.94 | 50.00 | Neutral | 10.90 |
| 14.478 | 15 | 29.86 | 30.14 | 60.00 | 17.96 | 32.04 | 50.00 | Neutral | 10.96 |
| 21.3465 | 16 | 31.18 | 28.82 | 60.00 | 19.46 | 30.54 | 50.00 | Neutral | 11.26 |
| 21.576 | 16 | 30.25 | 29.75 | 60.00 | 20.05 | 29.95 | 50.00 | Neutral | 11.26 |
| 25.1265 | 16 | 33.41 | 26.59 | 60.00 | 20.16 | 29.84 | 50.00 | Neutral | 11.26 |

FCC ID: WJ9-ARU2400**5.2 20 dB bandwidth**

For test instruments and accessories used see section 6 Part MB.

5.2.1 Description of the test location

Test location: Shielded room S4

5.2.2 Photo documentation of the test set-up**5.2.3 Applicable standard**

According to FCC Part 15C, Section 15.247(a):

Frequency hopping systems shall have hopping carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

5.2.4 Description of Measurement

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio of -20 dB. The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or the first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

FCC ID: WJ9-ARU2400**5.2.5 Test result**

Power setting 27.0 dBm:

| Channel No. | -20 dB Bandwidth below peak (kHz) |
|--------------------|--------------------------------------|
| CH 1 (902.25 MHz) | 51.60 |
| CH 25 (914.75 MHz) | 52.20 |
| CH 52 (927.75 MHz) | 54.30 |

Bandwidth limit according to FCC Part15C, Section 15.247(a):

| Frequency (MHz) | Hopping channels | Limit -20 dB bandwidth (kHz) |
|--------------------|------------------|---------------------------------|
| 902-928 | ≥ 50 | < 250 |

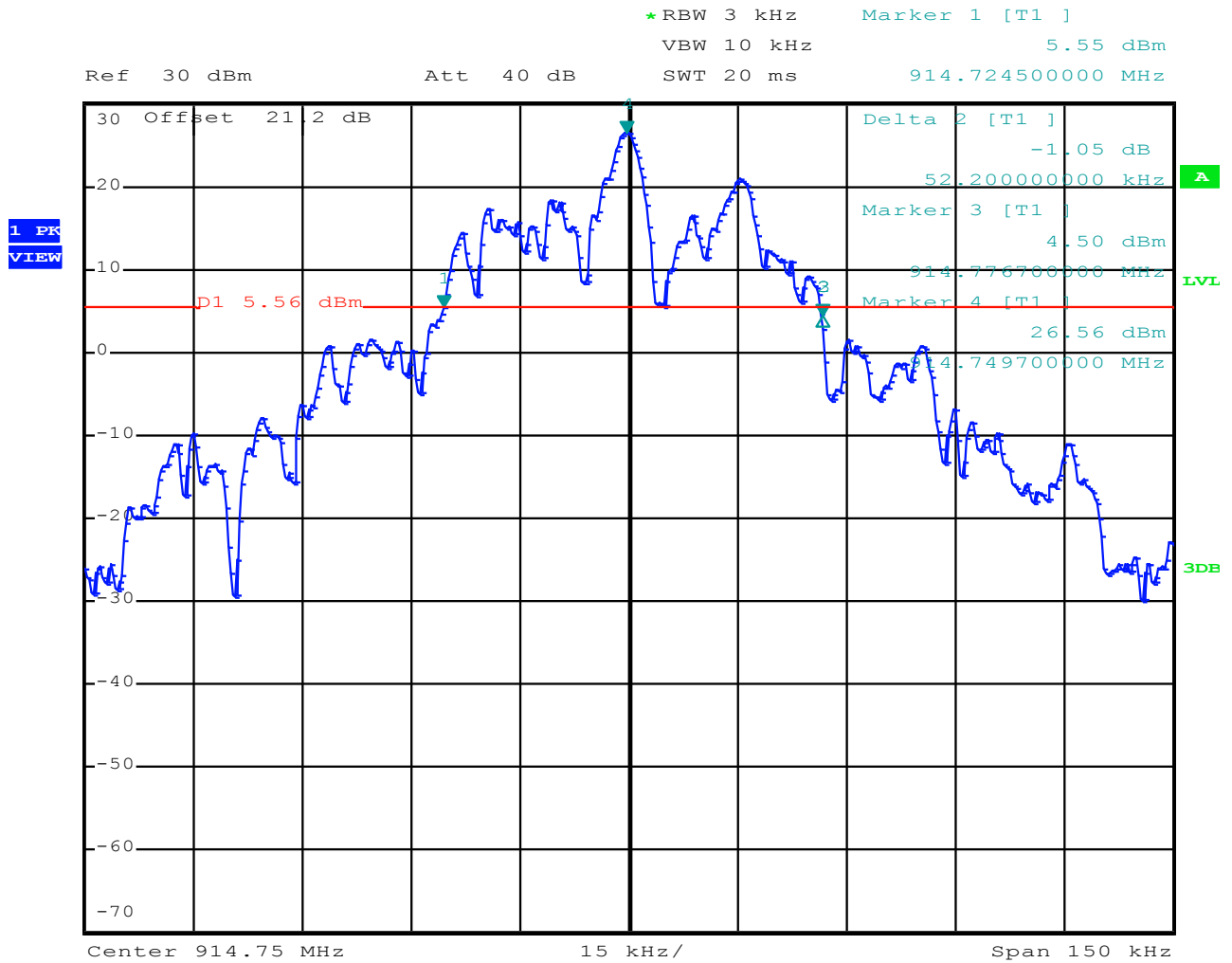
The requirements are **FULFILLED**.

Remarks: For detailed test result please refer to following test protocol.

To represent the worst case, the measurement was performed with max. power setting.

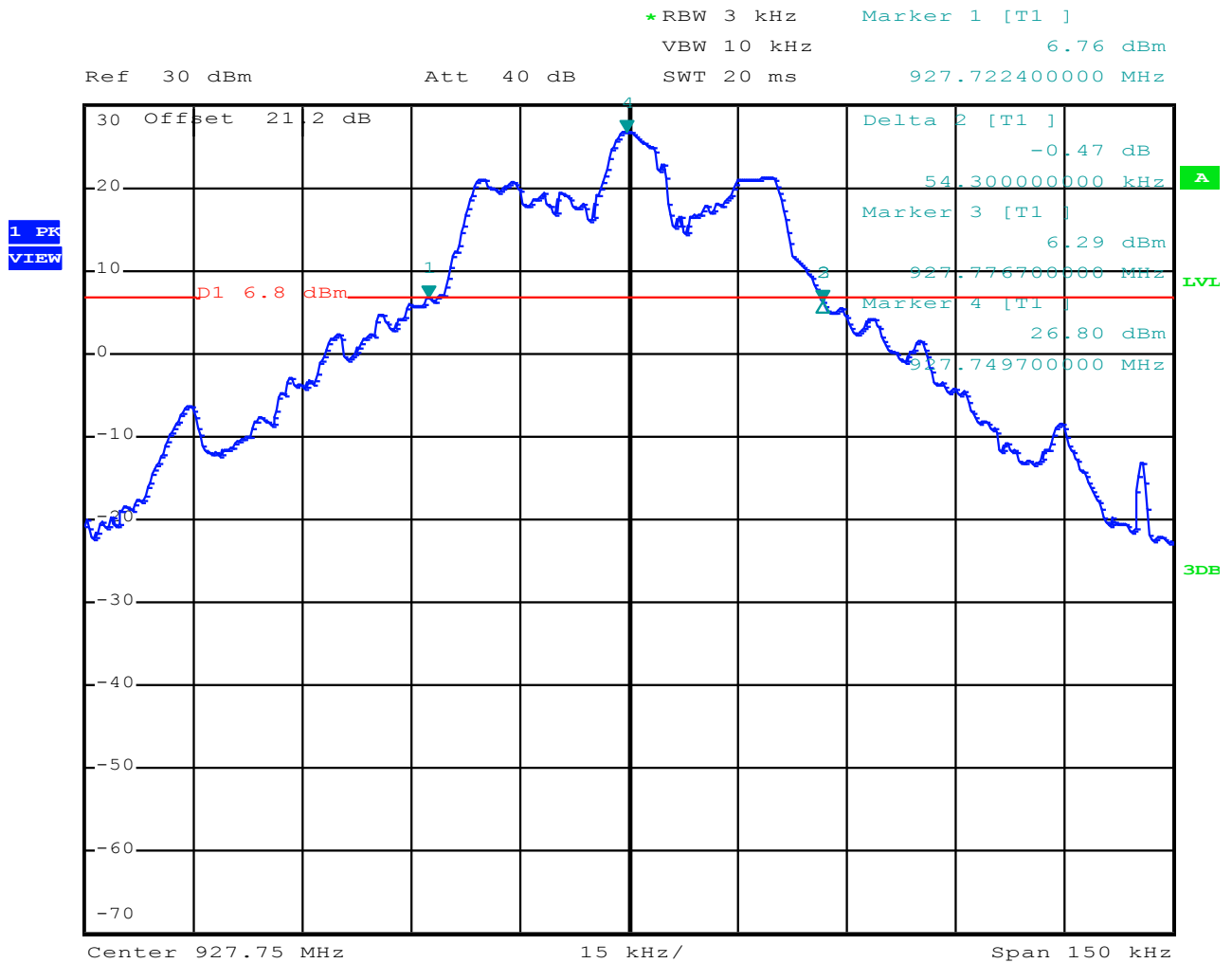
FCC ID: WJ9-ARU2400

Channel 25
914.75 MHz



FCC ID: WJ9-ARU2400

Channel 52
927.75 MHz



FCC ID: WJ9-ARU2400**5.3 Maximum peak conducted output power**

For test instruments and accessories used see section 6 Part CPC 2.

5.3.1 Description of the test location

Test location: Shielded room S4

5.3.2 Photo documentation of the test set-up**5.3.3 Applicable standard**

According to FCC Part 15C, Section 15.247(b)(2):

For frequency hopping systems operating in the 902-928 MHz band the maximum peak conducted output power shall not exceed the limit of 1 watt for systems employing at least 50 hopping channels.

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.3.4 Description of Measurement

A spectrum analyzer is connected to the output of the transmitter via a suitable attenuator while EUT was operating in transmit mode using the assigned frequency.

Spectrum analyser settings:

| | | | |
|----------|---------|------------|-------------|
| RBW | 300 kHz | Sweep time | 5 ms (Auto) |
| VBW | 1 MHz | Power Mode | Max. hold |
| Detector | Peak | Span | 25 0 kHz |

FCC ID: WJ9-ARU2400

5.3.5 Test result

- Power setting 27.0 dBm

| Channel | Frequency (MHz) | Peak Power (dBm) | Limit (dBm) | Delta (dB) |
|---------|-----------------|------------------|-------------|------------|
| 1 | 902.25 | 26.60 | 30.0 | -3.4 |
| 25 | 914.75 | 26.00 | 30.0 | -4.0 |
| 52 | 927.75 | 26.27 | 30.0 | -3.7 |

- Power setting 23.0 dBm

| Channel | Frequency (MHz) | Peak Power (dBm) | Limit (dBm) | Delta (dB) |
|---------|-----------------|------------------|-------------|------------|
| 1 | 902.25 | 22.65 | 30.0 | -7.3 |
| 25 | 914.75 | 22.60 | 30.0 | -7.4 |
| 52 | 927.75 | 22.58 | 30.0 | -7.4 |

Note: Test cable loss and fixed attenuation of 20 dB are included in the analyzer reading (Transducer factor).

Peak Power Limit according to FCC Part 15C, Section 15.247(b)(2):

| Frequency (MHz) | Hopping channels | Hop. CH carrier frequ. separation | Peak Power Limit | |
|-----------------|------------------|-----------------------------------|------------------|------------|
| | | | (dBm) | (W) |
| 902-928 | ≥ 50 | | 30 | 1.0 |

The requirements are **FULFILLED**.

Remarks: The conducted output power has been reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Refer to 5.3.5 b.) above.

FCC ID: WJ9-ARU2400**5.4 Spurious RF conducted emissions**

For test instruments and accessories used see section 6 Part **SEC1, SEC2 and SEC3**.

5.4.1 Description of the test location

Test location: Shielded room S4

5.4.2 Photo documentation of the test set-up**5.4.3 Applicable standard**

According to FCC Part 15C, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency band 902 to 928 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a).

5.4.4 Description of Measurement

A spectrum analyzer is connected to the output of the transmitter via a suitable attenuator while EUT was operating in transmit mode at the assigned frequency.

Spectrum analyzer settings:

| | |
|------------|-----------|
| RBW | 100 kHz |
| VBW | 300 kHz |
| Detector | Max. peak |
| Trace: | Max. hold |
| Sweep time | auto |

FCC ID: WJ9-ARU2400**5.4.5 Test result**

Power setting 27.0 dBm

| Hopping frequency from 902.75 to 927.25 MHz, max. level 26.87 dBm | | | |
|---|-----------------------|-------------------------|---------------|
| Frequency (GHz) | Peak power * (dBm) | Limit (-20 dB) (dBm) | Delta (dB) |
| 2.69218 | -57.59 | 6.87 | -64.46 |
| 5.056 | -56.09 | 6.87 | -62.96 |
| 7.324 | -54.41 | 6.87 | -61.28 |
| | | | |
| | | | |

* Fixed attenuation of 20 dB is included in the Peak power.

The requirements are **FULFILLED**.

Remarks:

All spurious emissions falling in restricted bands have been measured radiated.

For detailed results please refer to following test protocols.

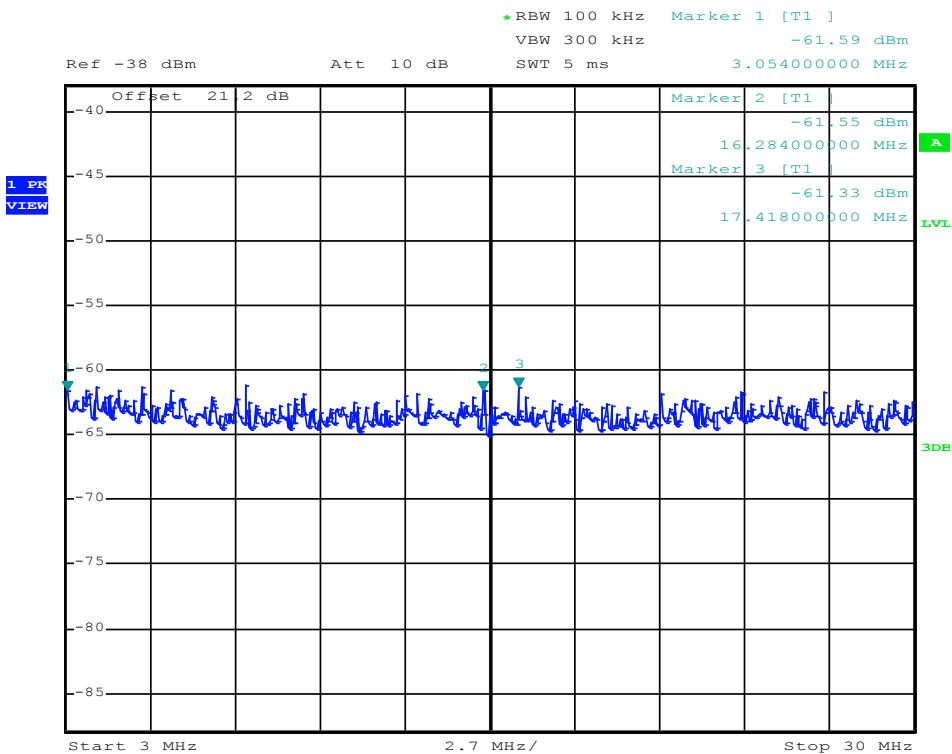
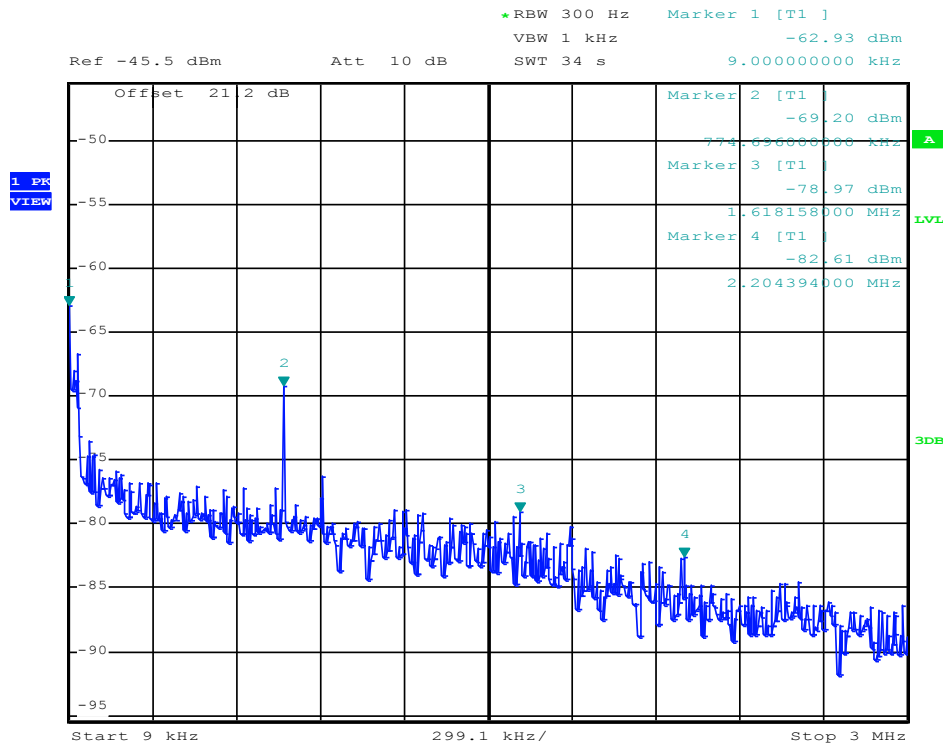
In the frequency range from 9 kHz to 30 MHz no emissions could be measured.

Test was performed in frequency hopping mode from 902.25 to 927.75 MHz.

This mode represents the worst case mode of the EuT.

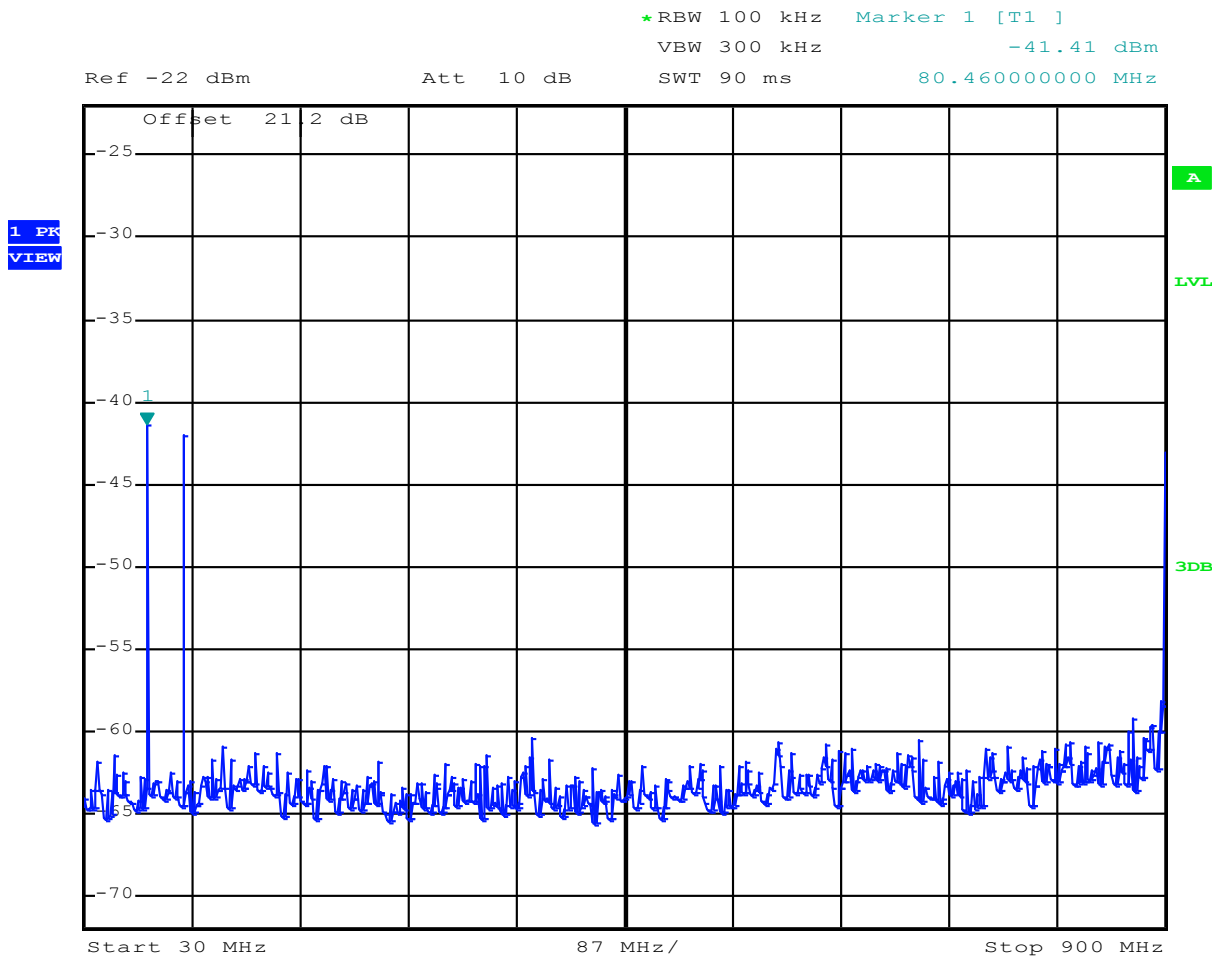
FCC ID: WJ9-ARU2400

Conducted RF emission from 9 kHz to 30 MHz



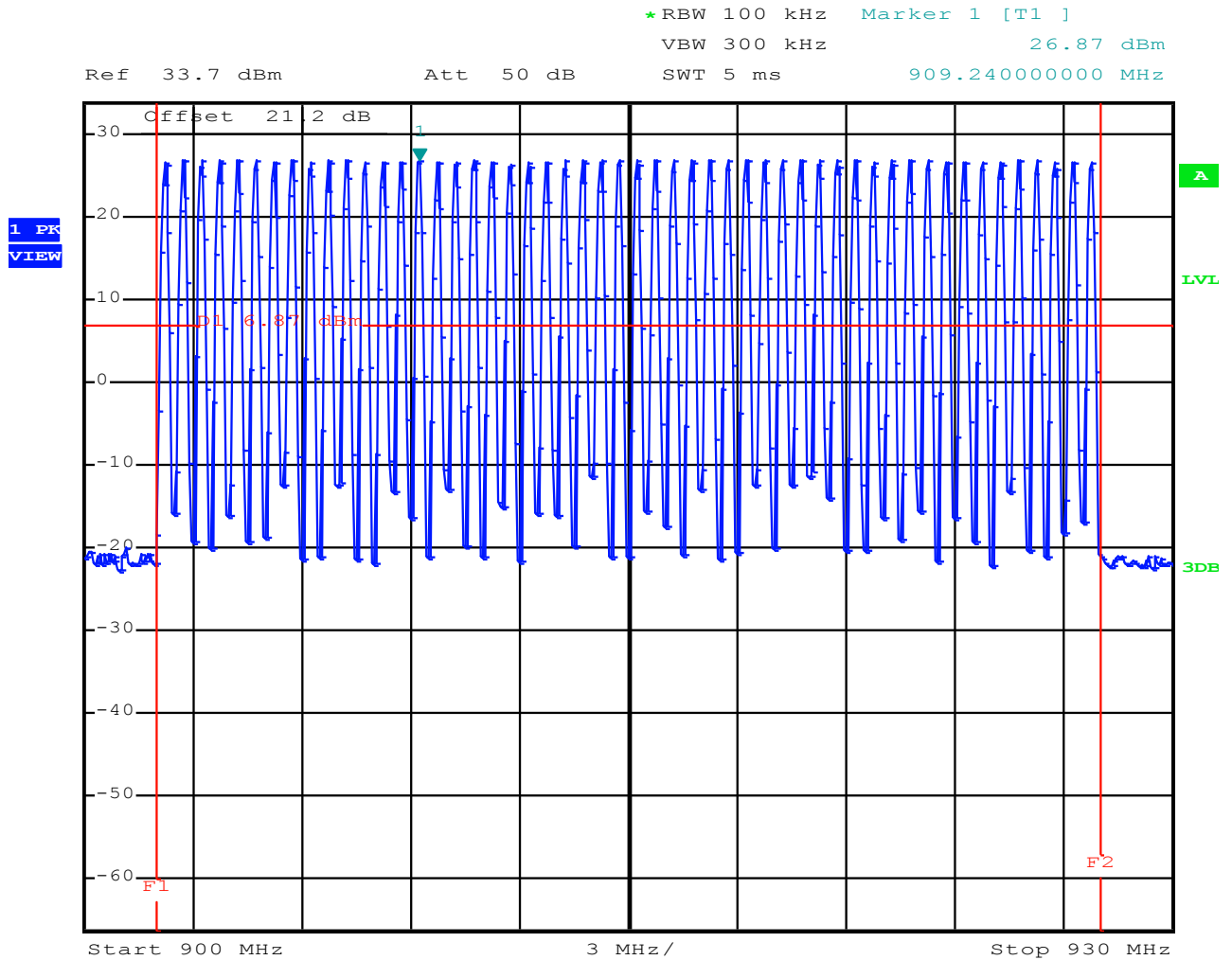
FCC ID: WJ9-ARU2400

Conducted RF emission from 30 to 1000 MHz



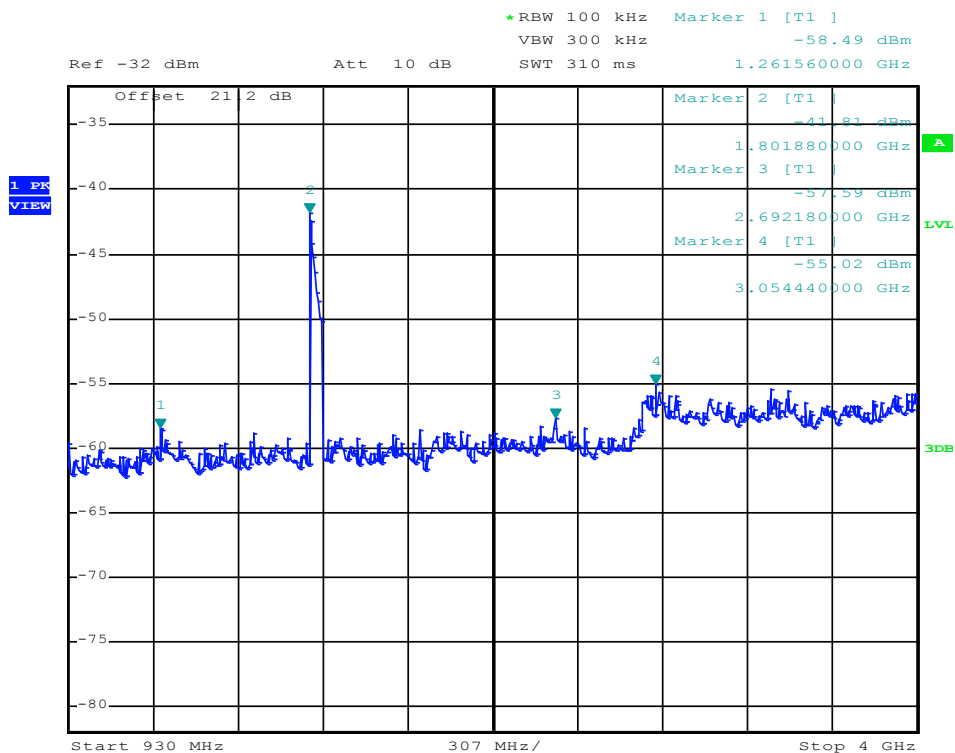
FCC ID: WJ9-ARU2400

Conducted RF emission from 30 to 1000 MHz
(Band edge)

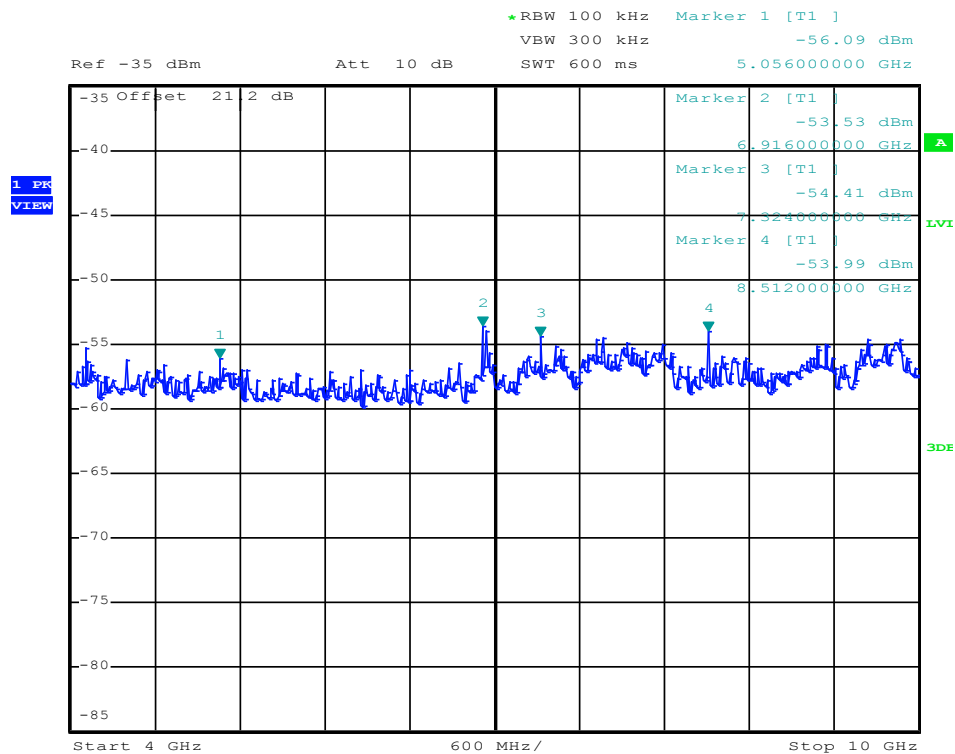


FCC ID: WJ9-ARU2400

Conducted RF emission from 1 to 10 GHz



Note: Signal level No.3 is located in restricted band.



Note: Signal level No.1 and No.3 are located in restricted band.

FCC ID: WJ9-ARU2400

5.5 Spurious radiated emissions

For test instruments and accessories used see section 6 Part **SER 1**, **SER 2**, **SER 3**.

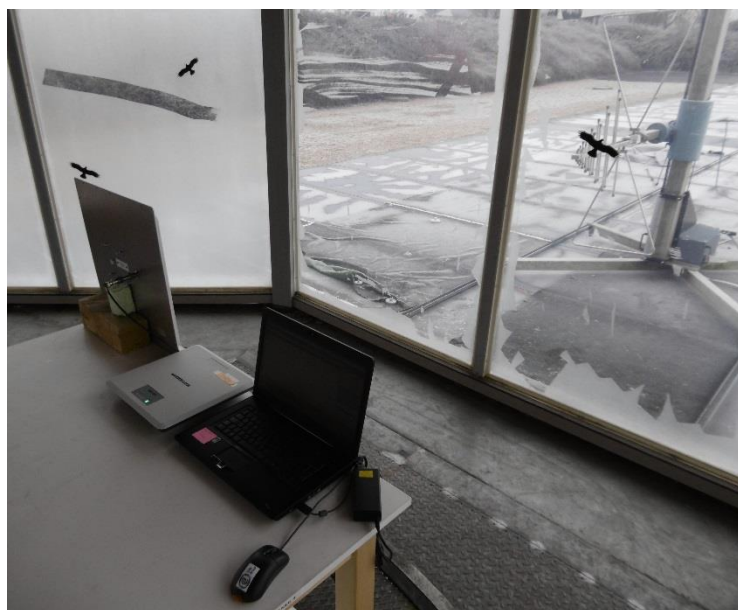
5.5.1 Description of the test location

Test location: OATS1
Test distance: 3 metres

Test location: Anechoic Chamber A1
Test distance: 3 metres

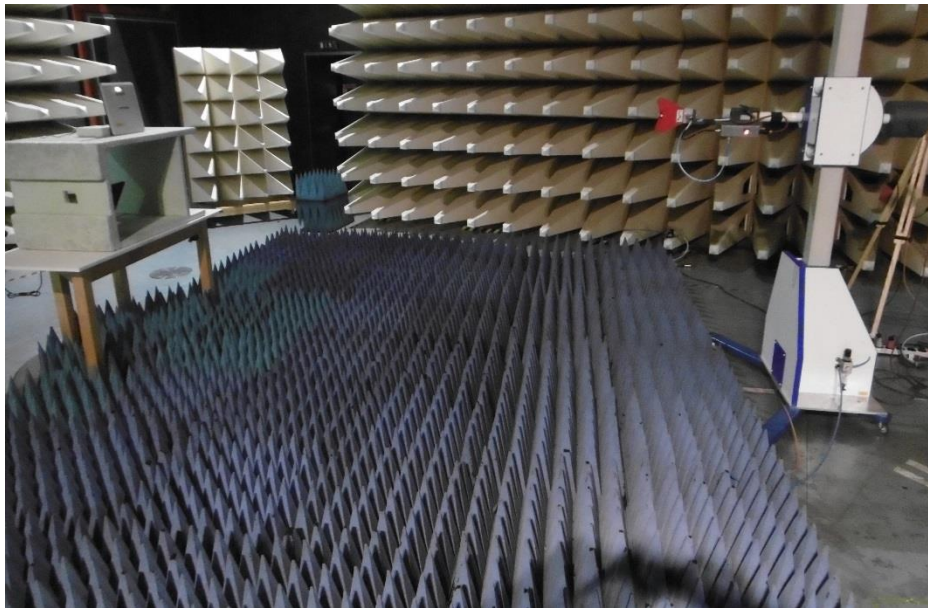
5.5.2 Photo documentation of the test set-up

- WIRA-40-linear-FCC, 52010252:



FCC ID: WJ9-ARU2400

- Internal antenna:



5.5.3 Applicable standard

According to FCC Part 15, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency bands 902 to 928 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a) (see Section 15.205(c)).

5.5.4 Description of Measurement

Radiated spurious emissions from the EUT are measured in the frequency range of 9 kHz to 1000 MHz using a tuned receiver and appropriate broadband linear polarized antennas. The measurements are made with 120 kHz bandwidth and quasi-peak detection (200 Hz, 9 kHz up to 30 MHz). The EUT was placed on a 1.0 X 1.5 metres non-conducting table 80 centimetres above the ground plane. The set up of the equipment under test will be in accordance to ANSI C63.4. The antenna was positioned 3 metres horizontally from the EUT. To locate maximum emissions from the EUT the antenna is shifted in height from 1 to 4 metres, after the EUT is rotated 360 degrees. The measurement scan is made in horizontal and vertical polarization of the antenna.

For the radiated measurement up from 1 GHz to maximum frequency as specified in Section 15.33, a spectrum analyzer and appropriate linear polarized antennas are used. The EUT is placed on a 1.0 X 1.5 metres non-conducting table 80 centimetres above the ground plane. The set up of the EUT will be in accordance to ANSI C63.4. The antenna was positioned 3 m horizontally from the EUT. To locate maximum emissions the EUT was rotated 360 degrees in the fully anechoic chamber. The measurement scan is made in horizontal and vertical polarization of the antenna. For testing above 1 GHz, if the emission level of the EUT in peak mode complies with the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.

FCC ID: WJ9-ARU2400

5.5.5 Test result

5.5.5.1 Radiated emission test $f < 1$ GHz

- Power setting 23.0 dBm

| Frequency [kHz] | L: QP [dB μ V] | L: AV [dB μ V] | Bandwidth [kHz] | Correct. [dB] | L: QP [dB μ V/m] | L: AV [dB μ V/m] | Limit [dB μ V/m] | Delta [dB] |
|-----------------|--------------------|--------------------|-----------------|---------------|----------------------|----------------------|----------------------|------------|
| 536.8 | 24.1 | 19.7 | 9.0 | 20 | 44.1 | 39.7 | 73.0 | -33.3 |
| 1073.6 | 23.4 | 18.0 | 9.0 | 20 | 43.4 | 38.0 | 67.0 | -29.0 |
| 1342.0 | 21.6 | 15.9 | 9.0 | 20 | 41.6 | 35.9 | 65.0 | -29.1 |

Note: No unwanted emissions from the EuT could be measured in the relevant frequency ranges.
Only ambient noises could be detected!

The table shows an extract of the critical values:

| Frequency (MHz) | Reading Vert. (dB μ V) | Reading Hor. (dB μ V) | Correct. Vert. (dB) | Correct. Hor. (dB) | Level Vert. (dB μ V/m) | Level Hor. (dB μ V/m) | Limit (dB μ V/m) | Dlimit (dB) |
|-----------------|----------------------------|---------------------------|---------------------|--------------------|----------------------------|---------------------------|----------------------|-------------|
| 36.014 | 11.2 | 14.7 | 10.7 | 10.7 | 21.9 | 25.4 | 40.0 | -14.6 |
| 59.973 | 15.6 | 14.1 | 12.1 | 12.1 | 27.7 | 26.2 | 40.0 | -12.3 |
| 216.434 | 19.7 | | 13.6 | | 33.3 | | 46.0 | -12.7 |
| 240.005 | | 15.8 | | 14.9 | | 30.7 | 46.0 | -15.3 |
| 324.492 | 13.6 | | 17.2 | | 30.8 | | 46.0 | -15.2 |
| 359.994 | | 13.4 | | 18.1 | | 31.5 | 46.0 | -14.5 |

5.5.5.2 Radiated emission test $f > 1$ GHz

- Power setting 27.0 dBm

| Frequency (GHz) | L: PK (dB μ V) | L: AV (dB μ V) | Bandwidth (kHz) | Correct. (dB) | L: PK (dB μ V/m) | L: AV (dB μ V/m) | Limit AV (dB μ V/m) | Delta (dB) |
|-----------------|--------------------|--------------------|-----------------|---------------|----------------------|----------------------|-------------------------|------------|
| 2.692 | 44.5 | 41.3 | 1000 | 3.7 | 48.2 | 45.0 | 54.0 | -9.0 |
| 5.056 | 45.3 | 38.1 | 1000 | 3.4 | 48.7 | 41.5 | 54.0 | -13.5 |
| 7.324 | 40.0 | 36.9 | 1000 | 2.5 | 42.5 | 39.4 | 54.0 | -14.6 |
| | | | | | | | | |

*) Average values were measured with spectrum analyzer by the following settings

RBW: 1 MHz
VBW: 10 Hz
Sweep: Auto

FCC ID: WJ9-ARU2400

Radiated limits according to FCC Part 15C, Section 15.209(a) for spurious emissions:

| Frequency (MHz) | Field strength of spurious emissions | | Measurement distance |
|--------------------|--------------------------------------|----------------|----------------------|
| | (μ V/m) | dB(μ V/m) | (metres) |
| 0.009 - 0.490 | 2400/F(kHz) | | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | | 30 |
| 1.705 - 30 | 30 | 29.5 | 30 |
| 30 - 88 | 100 | 40 | 3 |
| 88 - 216 | 150 | 43.5 | 3 |
| 216 - 960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209: (Refer to section 5.5.5.1)

| 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 | Above 38.6 |

The requirements are **FULFILLED**.

Remarks: During the test the EUT was set into TX continuous mode with normal modulation.

The measurement was performed up to the 10th harmonic (10000 MHz).

Test was performed in frequency hopping mode from 902.75 to 927.25 MHz.

This mode represents the worst case mode of the EuT.

FCC ID: WJ9-ARU2400

5.6 Hopping sequence

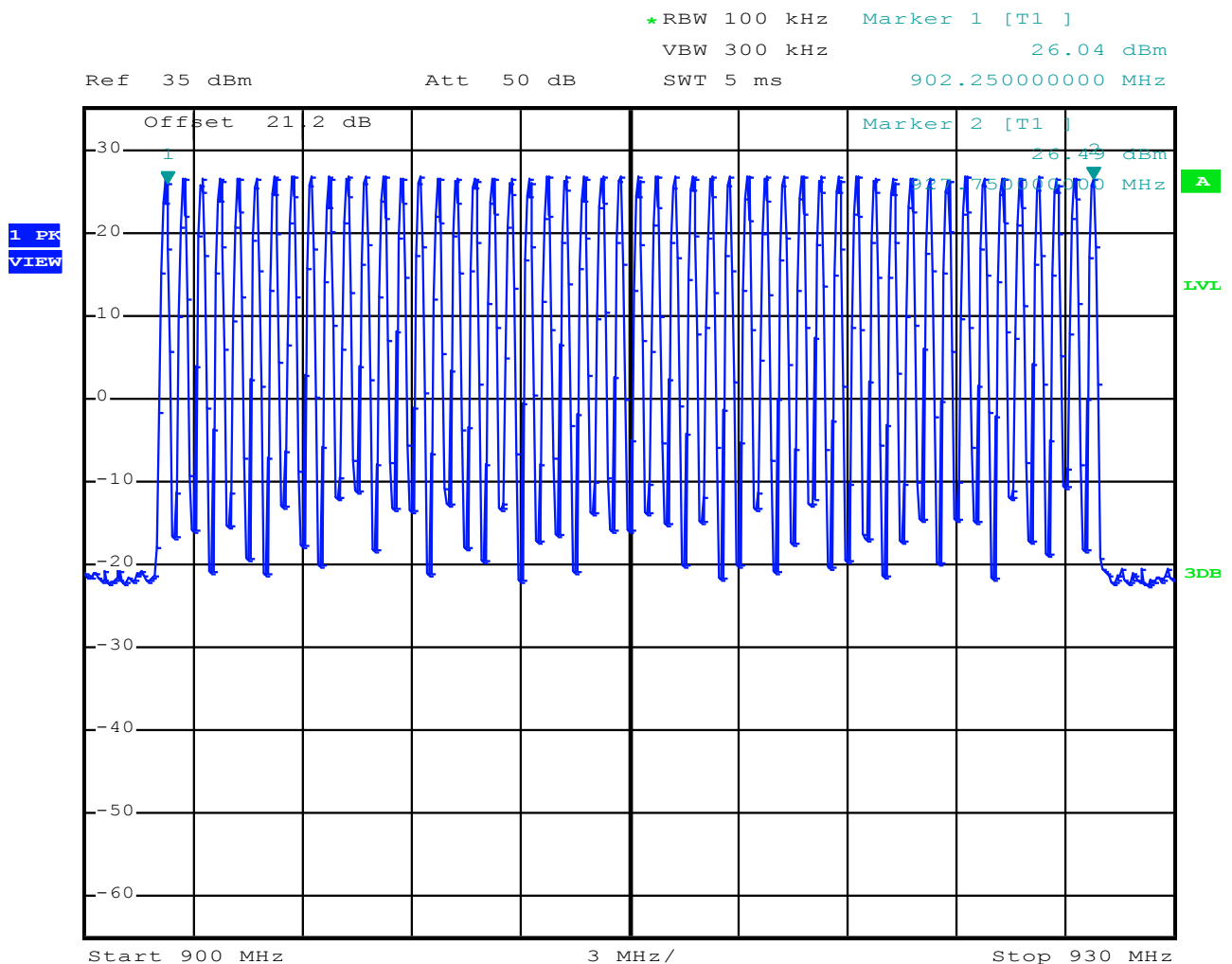
Requirement according to FCC Part 15C, Section 15.247(a):

The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies.

Remarks: The channel is represented by a pseudo-random hopping sequence hopping through the 54 RF-channels.

For detailed information about the hopping sequence, please refer to user manual.

5.6.1 Test protocol



FCC ID: WJ9-ARU2400**5.7 Equal hopping frequency use**

Requirement according to FCC Part 15C, Section 15.247(a):
Each frequency must be used equally on the average by each transmitter.

Remarks: The device fulfills the requirement according to FCC Part 15C, Section 15.247(a).
The manufacturer declares in the system manual that this function is controlled via software.
For detailed information about the hopping sequence, please refer to user manual.

5.8 Receiver input bandwidth

Requirement according to FCC Part 15C, Section 15.247(a):
The system receivers shall have input bandwidth that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signal.

Remarks: The receiver bandwidth is equal to the transmitter bandwidth in the 52 hopping channel mode.
(Declared by the manufacturer.)
For detailed information about the hopping sequence, please refer to user manual.

FCC ID: WJ9-ARU2400

5.9 Dwell time

For test instruments and accessories used see section 6 Part DC.

5.9.1 Description of the test location

Test location: Shielded room S4

5.9.2 Photo documentation of the test set-up



5.9.3 Applicable standard

According to FCC Part 15, Section 15.247(a)(i):

Frequency hopping systems operating in the 902-928 MHz band: The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

5.9.4 Description of Measurement

The measurement was done using a spectrum analyser in time domain function and able to store the maximum time of a period. This time period has been stored and added up the appropriate time intervals the hopping system has applied this channel.

5.9.5 Test result

| Channel frequency (MHz) | Number of Bursts (in 1 time period) | Dwell time (ms) |
|----------------------------|--|--------------------|
| 914.75 | 1 | 396.0 |

FCC ID: WJ9-ARU2400

Requirement according to FCC Part15C, Section 15.247(a):

| Frequency (MHz) | Hopping channels | time of one period (s) | Limit dwell time, AV (ms) |
|--------------------|------------------|---------------------------|------------------------------|
| 902-928 | ≥ 50 | 20 | < 400 |

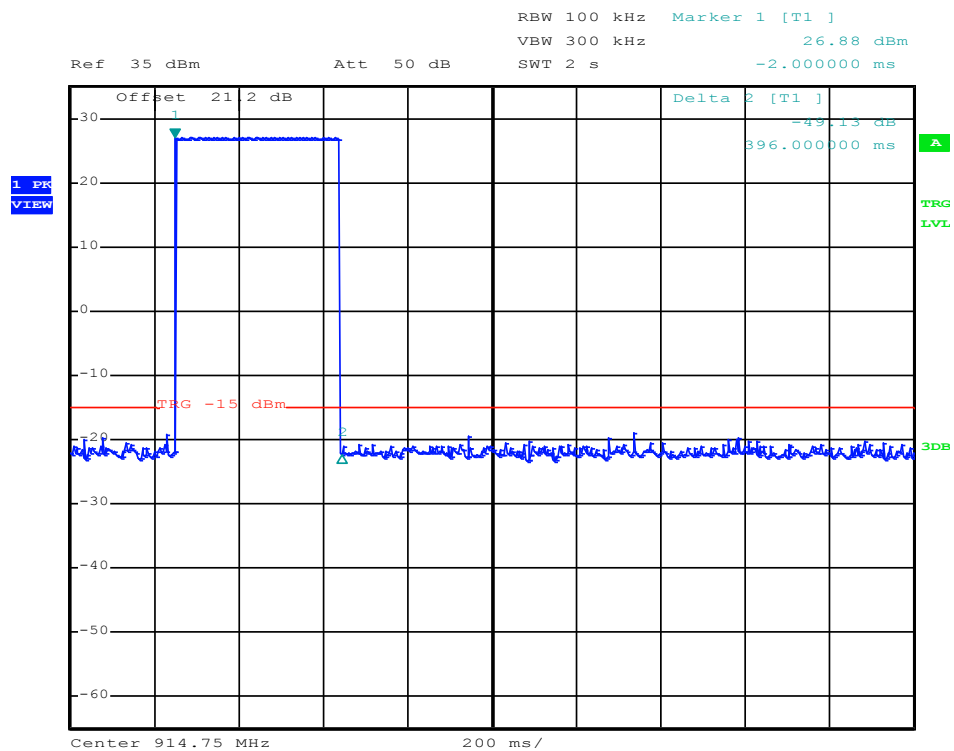
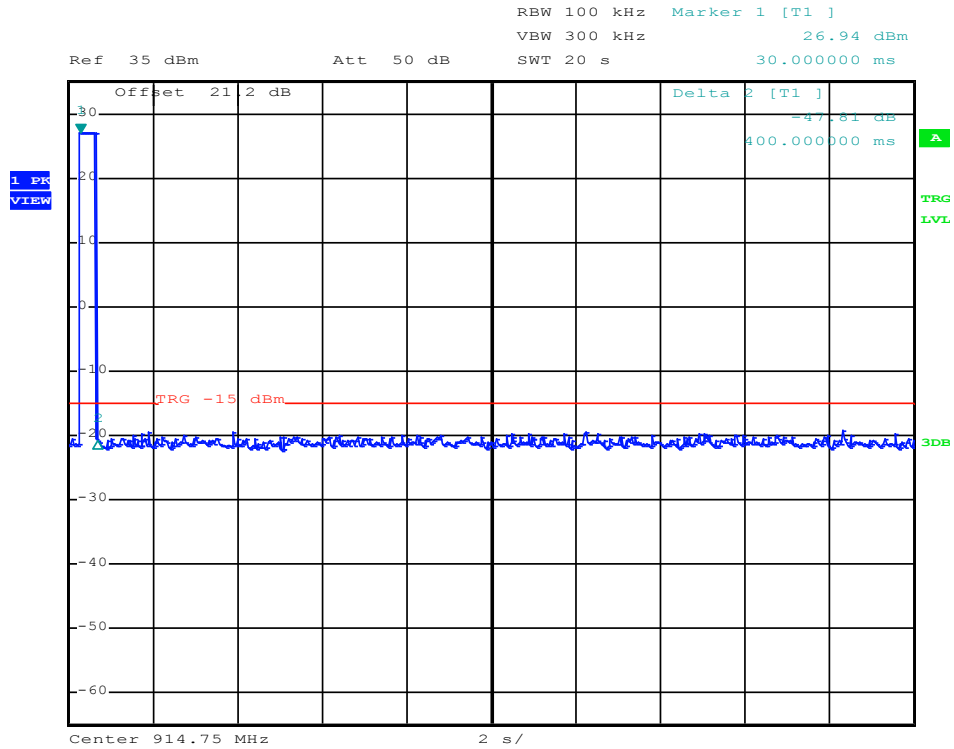
The requirements are **FULFILLED**.

Remarks: For detailed test result please refer to following test protocol.

FCC ID: WJ9-ARU2400

5.9.6 Test protocol

Time of occupancy (Dwell time)



FCC ID: WJ9-ARU2400

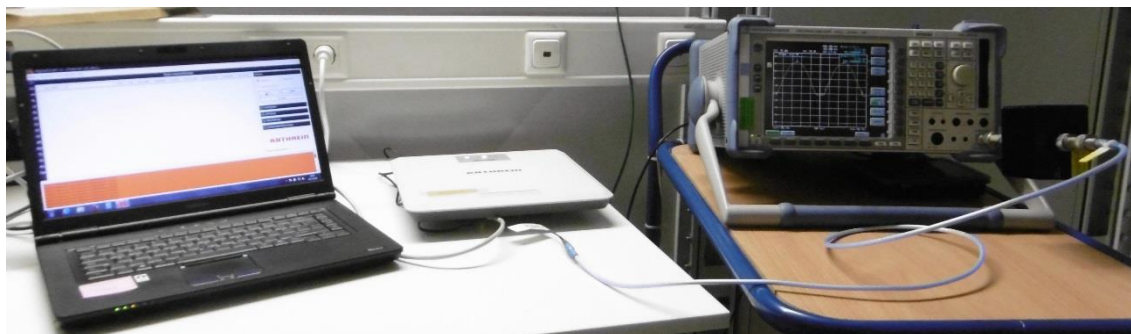
5.10 Channel separation

For test instruments and accessories used see section 6 Part MB.

5.10.1 Description of the test location

Test location: Shielded room S4

5.10.2 Photo documentation of the test set-up



5.10.3 Applicable standard

According to FCC Part 15, Section 15.247(a)(1):

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

5.10.4 Description of Measurement

This measurement was done by using a spectrum analyser. The Span of the analyzer was set wide enough to capture 2 frequencies. The result of the channel separation was compared with the 20 dB bandwidth and recorded.

5.10.5 Test result

| Channel 1 (MHz) | Channel 2 (MHz) | Channel separation (kHz) |
|--------------------|--------------------|-----------------------------|
| 902.25 | 902.75 | 500 |

FCC ID: WJ9-ARU2400

Limit according to FCC Part 15C, Section 15.247(a):

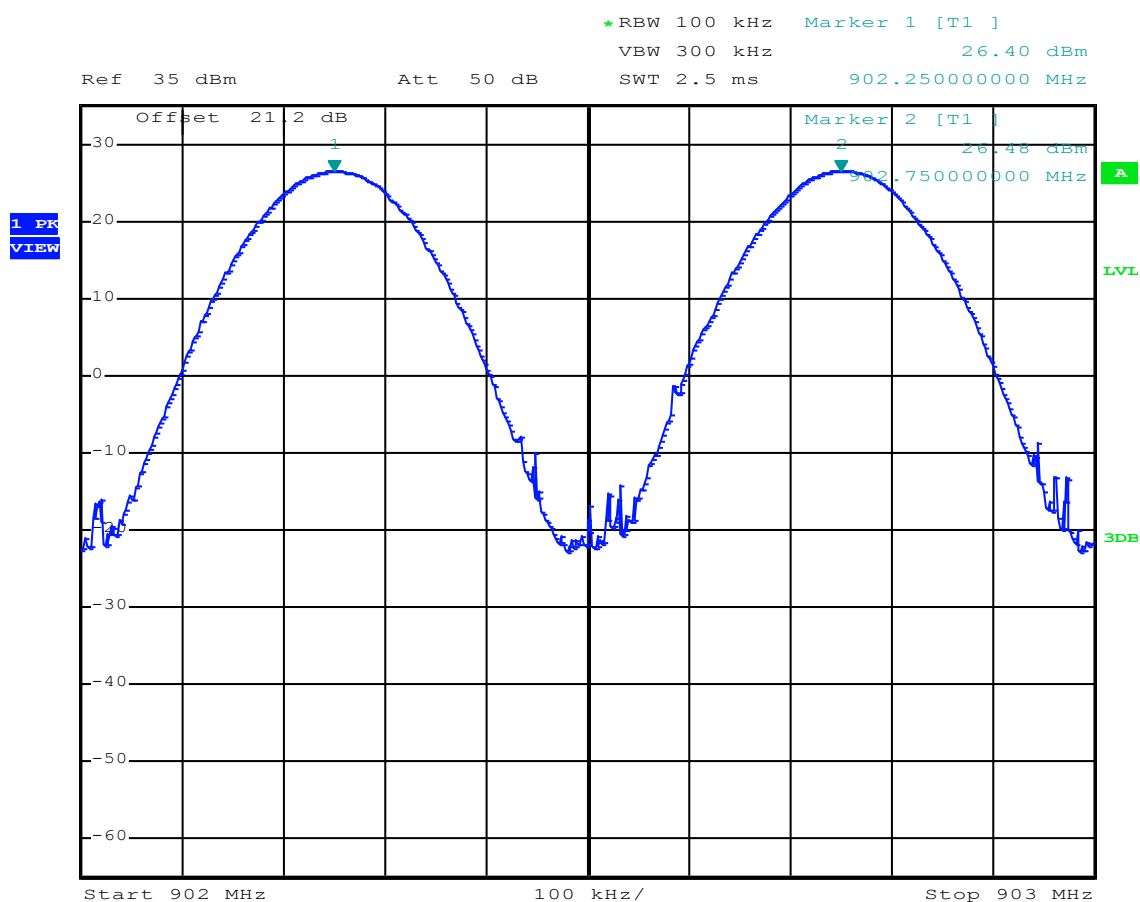
| Frequency (MHz) | Hopping channels | Limit channel separation (kHz) |
|--------------------|------------------|--|
| All systems | | > 25 kHz or 20 dB bandwidth, which ever is greater |
| 2400-2483.5 | ≥ 15 | |

The requirements are **FULFILLED**.

Remarks: For detailed test result please refer to following test protocol.

5.10.6 Test protocol

Channel separation



FCC ID: WJ9-ARU2400

5.11 Quantity of hopping channels

For test instruments and accessories used see section 6 Part MB.

5.11.1 Description of the test location

Test location: Shielded room S4

5.11.2 Photo documentation of the test set-up



5.11.3 Applicable standard

According to FCC Part 15, Section 15.247(a)(1)(i):

For frequency hopping systems operating in the 902-928 MHz band: If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies.

5.11.4 Description of Measurement

This measurement was done by using a spectrum analyser. The EuT was transmitting at its maximum data rate. The Span of the analyzer was set wide enough to capture the frequency band from 902-928 MHz.

5.11.5 Test result

| Hopping channel frequency range | Quantity of hopping channels value | Quantity of hopping channels minimum limit |
|---------------------------------|------------------------------------|--|
| 902-928 MHz | 52 | 50 |

Limit according to FCC Part 15C, Section 15.247(1):

| Frequency range (MHz) | LIMIT (Quantity of Hopping Channels) | | | |
|-----------------------|--------------------------------------|-------------------------|------------------------|-----------------------|
| | 20dB Bandwidth < 250kHz | 20dB Bandwidth > 250kHz | 20dB Bandwidth < 1 MHz | 20dB Bandwidth > 1MHz |
| 902 - 928 | 50 | 25 | --- | --- |

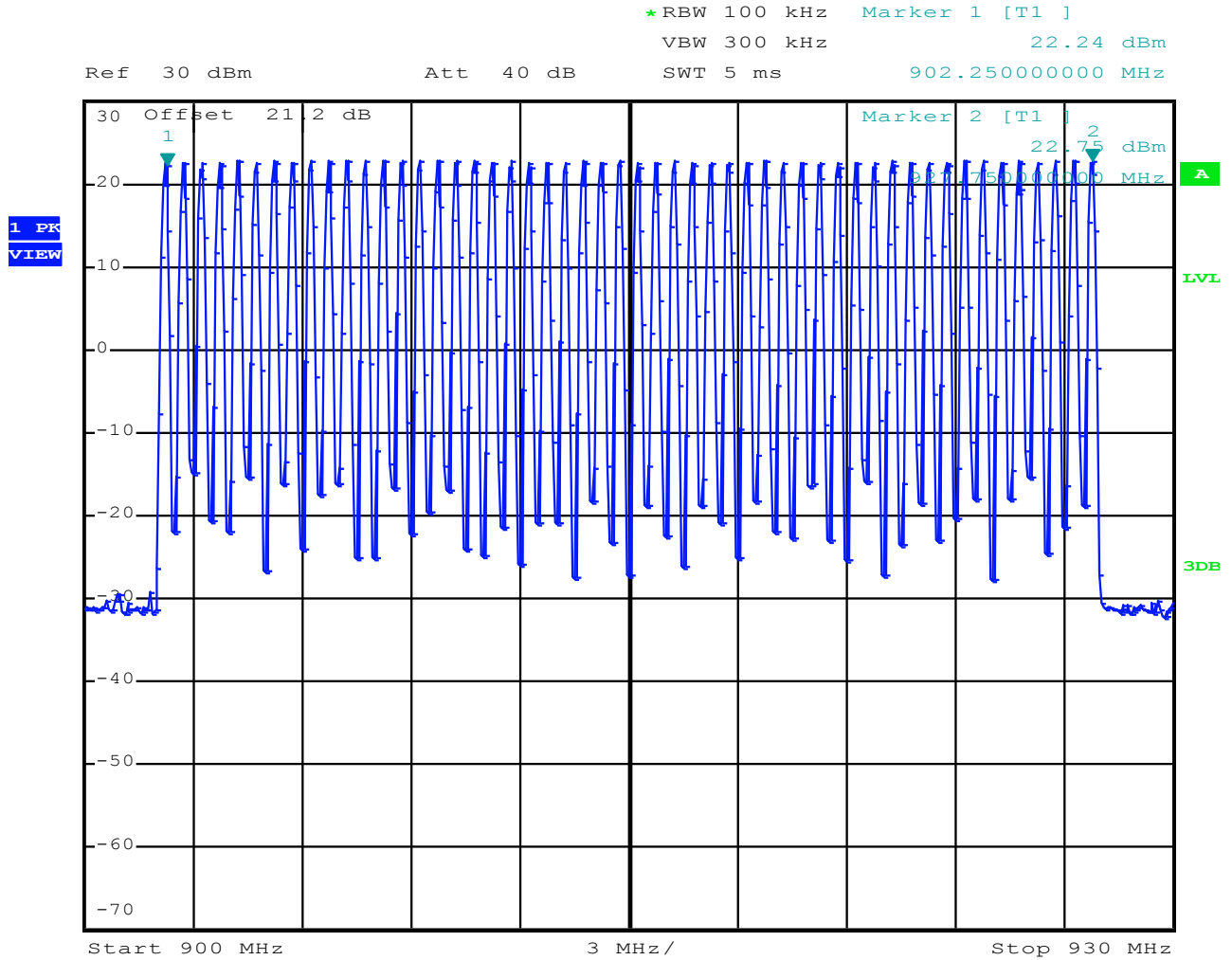
The requirements are **FULFILLED**.

Remarks: For detailed test result please refer to following test protocol.

FCC ID: WJ9-ARU2400

5.11.6 Test protocol

Quantity of hopping channel



FCC ID: WJ9-ARU2400**5.12 Antenna application****5.12.1 Applicable standard**

According to FCC Part 15C, Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited.

The EUT has FAKRA connectors to connect the defined antennas supplied by the manufacturer.

All supplied antennas meet the requirements of part 15.203 and 15.204.

The device will be professionally installed. So it is secured that the proper antenna is employed so that the limits accd. FCC Part 15.247 are not exceeded.

5.12.2 Antenna requirements

According to FCC Part 15C, Section 15.247 (b)(4):

The conducted output power limit specified in paragraph (b) of 15.247 is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from intentional radiator shall be reduced below the stated values in paragraph (b)(1), (b)(2) and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The necessary output power reduction depends on the used antenna type. The value of output power have to be reduced is controlled by firmware of the EUT and will be automatically set by selecting the antenna.

Remarks: For detailed information about the used the antennas please refer to
the user manual or technical documentation from the manufacturer.

FCC ID: WJ9-ARU2400**5.13 Maximum permissible exposure (MPE) – See Attachment B**

For test instruments and accessories used see section 6 Part **CPC 2**.

5.13.1 Description of the test location

Test location: None

5.13.2 Applicable standard

According to FCC Part 15, Section 15.247(i):

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

The test methods used comply with ANSI/IEEE C95.1, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

This test report shows the compliance with the limits for Maximum Permissible Exposure (MPE) specified in FCC Part 1, Section 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in FCC Part 1, Section 1.1307(b).

5.13.3 Description of Measurement

The maximum total power input to the antenna has been measured conducted as described in clause 5.3 of this document. Through the Friis transmission formula, the known maximum gain of the antenna and the maximum power, the MPE can be calculated in a defined distance away from the product.

Friis transmission formula:
$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

where

P_d = power density (mW/cm²)

P_{out} = output power to antenna (mW)

G = gain of antenna (linear scale)

r = distance between antenna and observation point (cm)

Remarks: For detailed test result please refer Attachment B.

FCC ID: WJ9-ARU2400

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

| Test ID | Model Type | Equipment No. | Next Calib. | Last Calib. | Next Verif. | Last Verif. |
|----------------|------------------------|----------------------|--------------------|--------------------|--------------------|--------------------|
| A 4 | BAT-EMC 3.18.0.26 | 01-02/68-13-001 | | | | |
| | ESCI | 02-02/03-15-001 | 11/06/2019 | 11/06/2018 | | |
| | ESH 2 - Z 5 | 02-02/20-05-004 | 25/10/2019 | 25/10/2017 | 30/04/2019 | 31/10/2018 |
| | N-4000-BNC | 02-02/50-05-138 | | | | |
| | N-1500-N | 02-02/50-05-140 | | | | |
| | ESH 3 - Z 2 | 02-02/50-05-155 | 18/11/2019 | 18/11/2016 | 06/05/2019 | 06/11/2018 |
| | SP 103 /3.5-60 | 02-02/50-05-182 | | | | |
| CPC 2 | FSP 30 | 02-02/11-05-001 | 09/10/2019 | 09/10/2018 | | |
| | 18N50W-20dB | 02-02/50-16-031 | | | | |
| DC | FSP 30 | 02-02/11-05-001 | 09/10/2019 | 09/10/2018 | | |
| | 18N50W-20dB | 02-02/50-16-031 | | | | |
| MB | FSP 30 | 02-02/11-05-001 | 09/10/2019 | 09/10/2018 | | |
| | 18N50W-20dB | 02-02/50-16-031 | | | | |
| SEC 1-3 | FSP 30 | 02-02/11-05-001 | 09/10/2019 | 09/10/2018 | | |
| | WHJS 1000-10EE | 02-02/50-05-070 | | | | |
| | 18N50W-20dB | 02-02/50-16-031 | | | | |
| SER 1 | ESCI | 02-02/03-05-005 | 11/12/2019 | 11/12/2018 | | |
| | HFH 2 - Z 2 | 02-02/24-15-001 | 22/03/2019 | 22/03/2018 | | |
| | NW-2000-NB | 02-02/50-05-113 | | | | |
| | KK-EF393/U-16N-21N20 m | 02-02/50-12-018 | | | | |
| | KK-SD_7/8-2X21N-33,0M | 02-02/50-15-028 | | | | |
| SER 2 | ESVS 30 | 02-02/03-05-006 | 06/06/2019 | 06/06/2018 | | |
| | VULB 9168 | 02-02/24-05-005 | 18/04/2019 | 18/04/2018 | | |
| | NW-2000-NB | 02-02/50-05-113 | | | | |
| | KK-EF393/U-16N-21N20 m | 02-02/50-12-018 | | | | |
| | KK-SD_7/8-2X21N-33,0M | 02-02/50-15-028 | | | | |
| SER 3 | FSP 40 | 02-02/11-11-001 | 17/10/2019 | 17/10/2018 | | |
| | AMF-6D-01002000-22-10P | 02-02/17-15-004 | | | | |
| | 3117 | 02-02/24-05-009 | 08/05/2019 | 08/05/2018 | | |
| | 18N-20 | 02-02/50-17-003 | | | | |
| | NMS111-GL200SC01-NMS11 | 02-02/50-17-012 | | | | |
| | BAM 4.5-P | 02-02/50-17-024 | | | | |
| | NCD | 02-02/50-17-025 | | | | |
| | KK-SF106-2X11N-6,5M | 02-02/50-18-016 | | | | |