



RF TEST REPORT

Applicant Cooper Wiring Devices Inc
FCC ID UH2-RF9640N
Product Z-Wave Plus Universal Smart Dimmer
Model RF9643-N
Report No. R2101A0031-R1
Issue Date March 5, 2021

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15 (2019)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of Measurement Results

| Number | Test Case | Clause in FCC rules | Verdict |
|---|-----------------------------------|--|---------|
| 1 | Occupied Bandwidth (20dB) | 15.215 | PASS |
| 2 | Radiated Emissions | 15.249(a),15.249(c),15.249(d),15.209,15.205; | PASS |
| 3 | AC Power Line Conducted Emissions | 15.207; | PASS |
| Date of Testing: January 10, 2021 ~ March 3, 2021 | | | |
| Date of Sample Receiving: January 10, 2021 | | | |
| Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. | | | |



1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City: Shanghai
Post code: 201201
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E-mail: xukai@ta-shanghai.com

2 General Description of Equipment under Test

2.1 Applicant and Manufacturer Information

| | |
|-----------------------------|--|
| Applicant | Cooper Wiring Devices Inc |
| Applicant address | 203 Cooper Circle, Peachtree City, GA / US |
| Manufacturer | Dongguan Wiring Devices Electronics Co.,Ltd |
| Manufacturer address | Sijin 2nd road,Songzailing District, Yuanshanbei Village, Changpig Town, Dongguan, Guangdong, China |

2.2 General information

| EUT Description | |
|---|-----------------------|
| Model | RF9643-N |
| SN | 2# |
| HW Version | / |
| SW Version | / |
| Power Supply | External power supply |
| Antenna Type | Internal Antenna |
| Test Mode(s) | z-wave |
| Tested Frequency Range(s) | 908.40MHz |
| Modulation Type | FSK, GFSK |
| Data rate | 9.6 kbps |
| Note: The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant. | |



3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards:

FCC CFR47 Part 15C (2019) Radio Frequency Devices

ANSI C63.10 (2013)

4 Test Configuration

Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

5 Test Case Results

5.1 Occupied Bandwidth

Ambient condition

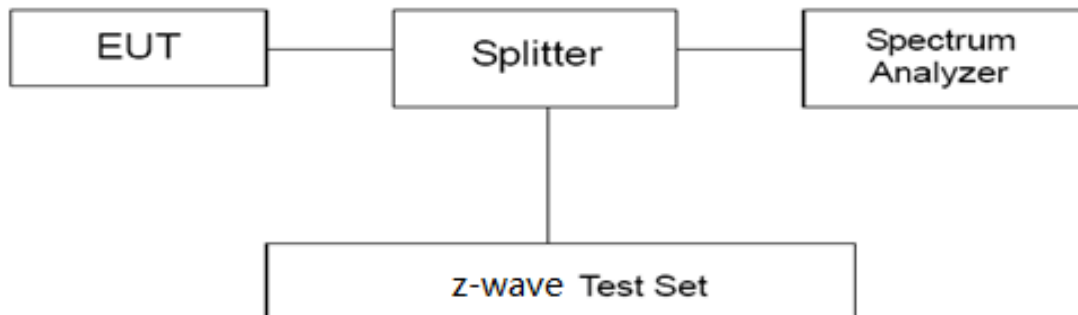
| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C | 45%~50% | 101.5kPa |

Method of Measurement

Tests are performed in accordance with ANSI C63.10-2013.

The 20 dB and 99% bandwidth of the fundamental frequency remain inside the band of operation of 902-928 MHz. The EUT was connected to the spectrum analyzer and z-wave test set via a power splitter with a known loss. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 10 kHz and VBW is set to 30 kHz on spectrum analyzer.

Test Setup



Limits

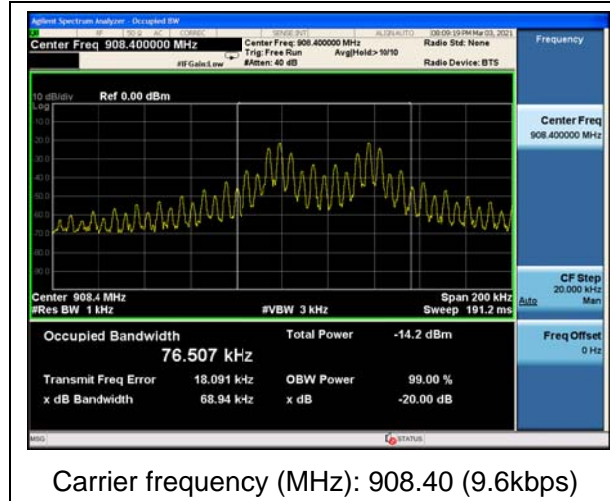
No specific occupied bandwidth requirements in part 15.215(c).

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$. $U = 1.19$ dB

Test Results

| Mode | Frequency (MHz) | Rate (kbps) | 20dB Bandwidth(kHz) | 99% Bandwidth(kHz) |
|--------|-----------------|-------------|---------------------|--------------------|
| z-wave | 908.40 | 9.6 | 68.94 | 76.507 |



5.2 Radiated Emissions

Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C | 45%~50% | 101.5kPa |

Method of Measurement

The test set-up was made in accordance to the general provisions of ANSI C63.10-2013. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

During the test, below 30MHz, the center of the loop shall be 1 meters; above 30MHz, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

Below 1GHz (detector: Peak and Quasi-Peak)

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz(detector: Peak):

(a) PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

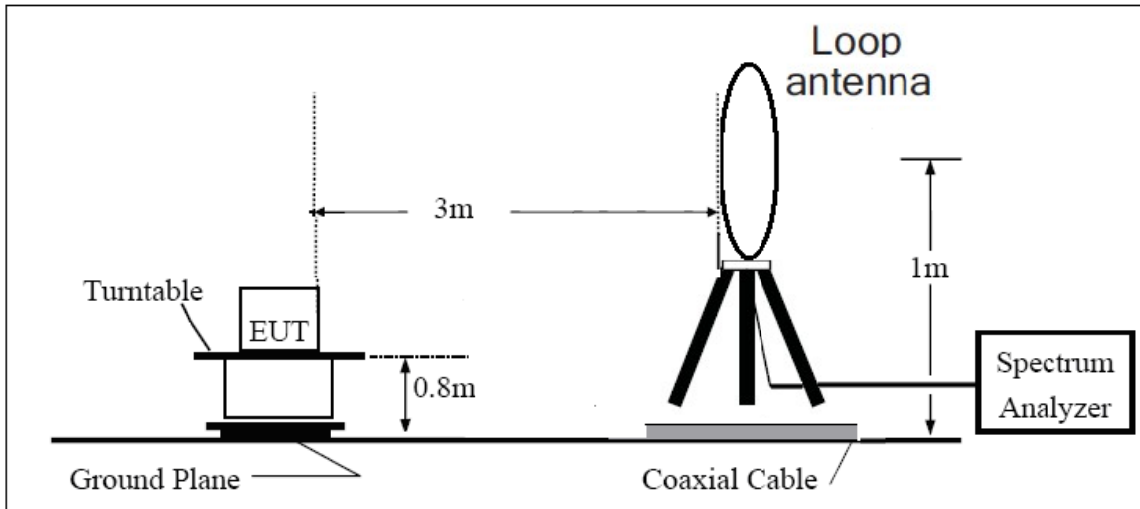
(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded. Then this mode was measured in the following mode: EUT with cradle and EUT without cradle. The worst emission was found in EUT with cradle mode and the worst case was recorded.

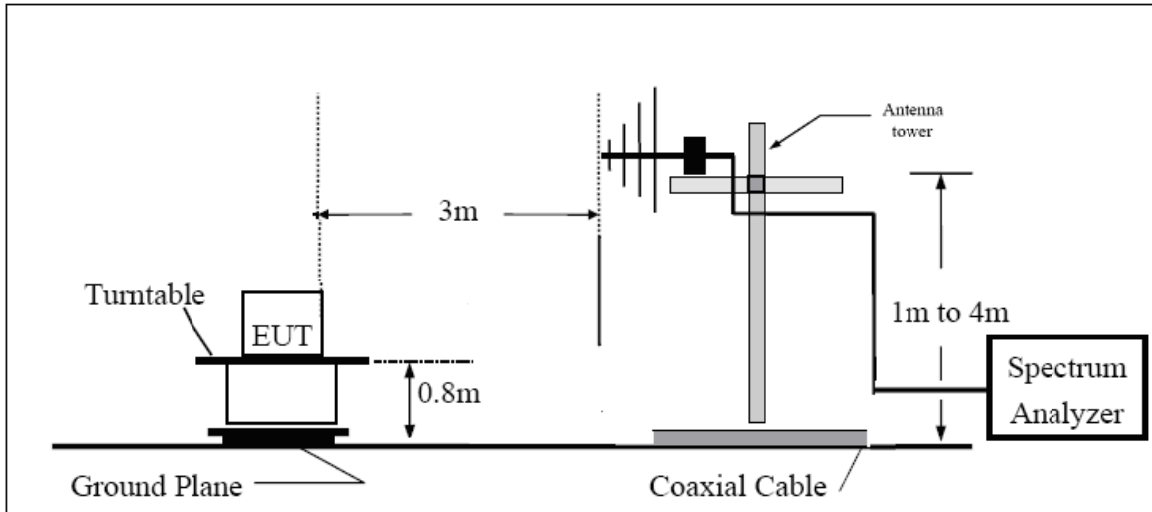
The test is in transmitting mode.

Test setup

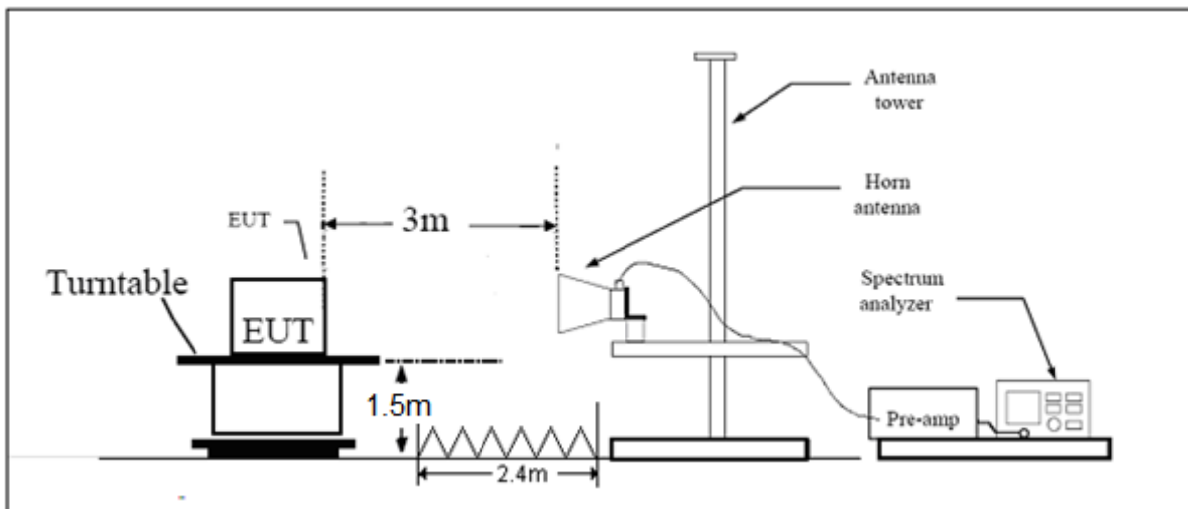
9KHz~~~ 30MHz



30MHz~~~ 1GHz



Above 1GHz



**Limits**

Limit in restricted band(Part 15.209)

| Frequency of emission (MHz) | Field strength(uV/m) | Field strength(dBuV/m) |
|-----------------------------|----------------------|------------------------|
| 0.009–0.490 | 2400/F(kHz) | / |
| 0.490–1.705 | 24000/F(kHz) | / |
| 1.705–30.0 | 30 | / |
| 30-88 | 100 | 40 |
| 88-216 | 150 | 43.5 |
| 216-960 | 200 | 46 |
| Above960-1000 | 500 | 54 |

Limit in radiated emission measurement (Part 15.209)

| Frequency of emission (MHz) | Field strength(dBuV/m) @3m | |
|-----------------------------|----------------------------|-------------|
| Above 1000 | 74 (peak) | 54(average) |

Limit in radiated emission measurement (Part 15.249)

| Frequency of emission (MHz) | Field strength of fundamental @3m | |
|-----------------------------|-----------------------------------|----------|
| | (millivolts/meter) | (dBuV/m) |
| 902-928 MHz fundamental | 50 | 94 |
| 902-928 MHzharmonics | 500 | |

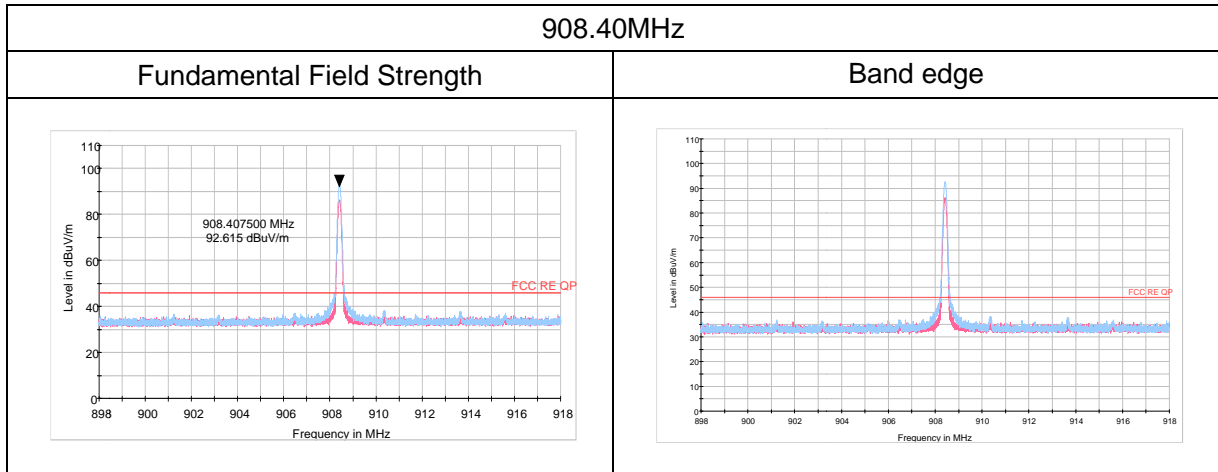
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

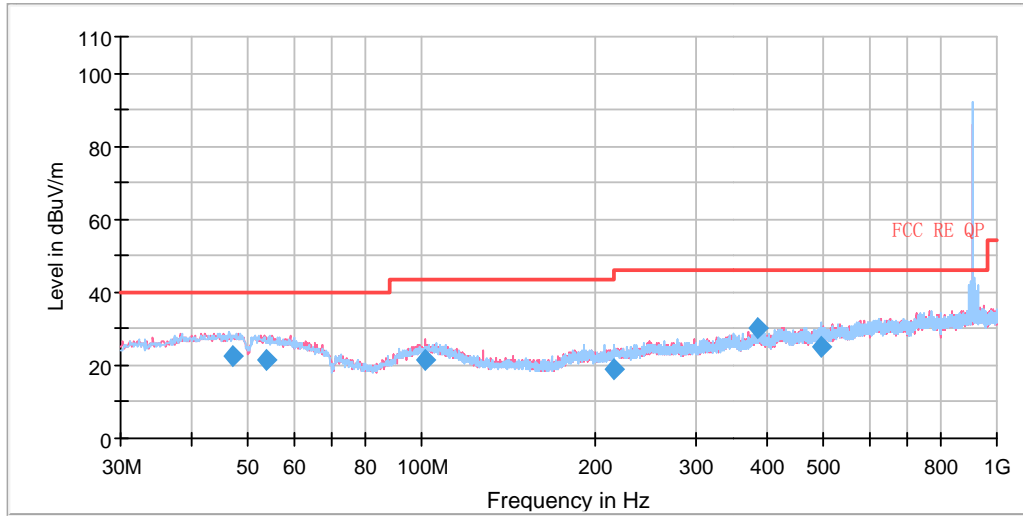
| Frequency | Uncertainty |
|--------------|-------------|
| 9KHz-30MHz | 3.55 dB |
| 30MHz-200MHz | 4.02 dB |
| 200MHz-1GHz | 3.28 dB |
| Above 1GHz | 3.70 dB |



Test Results:



908.40MHz

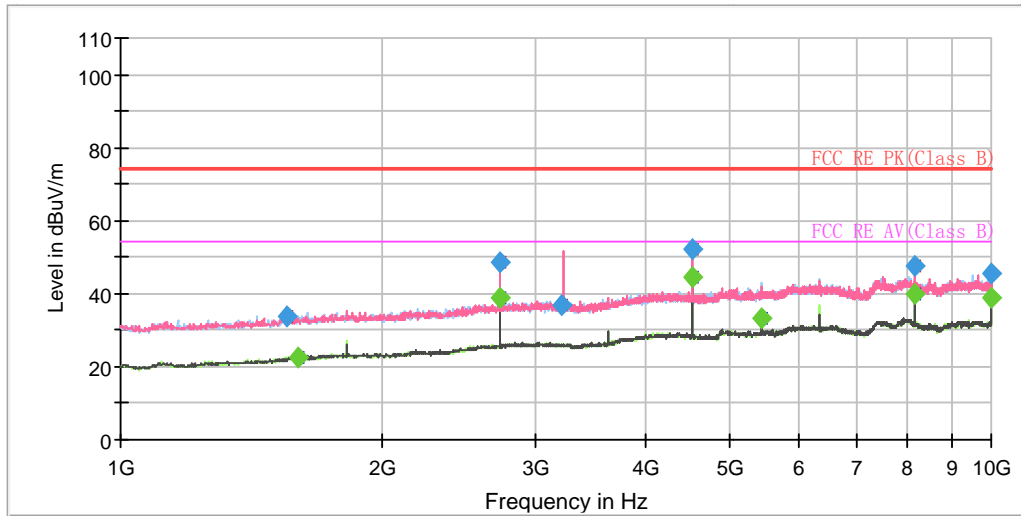


Note: The signal beyond the limit is carrier.

Radiated Emission 30M-1GHz

| Frequency (MHz) | Quasi-Peak (dBuV/m) | Height (cm) | Polarization | Azimuth (deg) | Correct Factor (dB) | Margin (dB) | Limit (dBuV/m) |
|-----------------|---------------------|-------------|--------------|---------------|---------------------|-------------|----------------|
| 46.968750 | 22.53 | 125.0 | H | 323.0 | -0.6 | 17.47 | 40.00 |
| 53.771250 | 21.66 | 109.0 | H | 274.0 | -1.7 | 18.34 | 40.00 |
| 101.698750 | 21.63 | 100.0 | V | 52.0 | -5.0 | 21.87 | 43.50 |
| 215.870000 | 18.95 | 184.0 | H | 88.0 | -6.8 | 24.55 | 43.50 |
| 384.010000 | 30.35 | 100.0 | H | 331.0 | -2.1 | 15.65 | 46.00 |
| 493.502500 | 24.94 | 209.0 | H | 26.0 | -0.3 | 21.06 | 46.00 |

- Remark: 1. Quasi-Peak = Reading value + Correction factor
 2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)
 3. Margin = Limit – Quasi-Peak



Radiated Emission 1G-10GHz

| Frequency (MHz) | Peak (dBuV/m) | Average (dBuV/m) | Height (cm) | Polarization | Azimuth (deg) | Correct Factor (dB) | Margin (dB) | Limit (dBuV/m) |
|-----------------|---------------|------------------|-------------|--------------|---------------|---------------------|-------------|----------------|
| 1554.625000 | 33.69 | --- | 100.0 | H | 218.0 | -15.9 | 40.31 | 74.00 |
| 1599.250000 | --- | 22.75 | 200.0 | H | 168.0 | -15.6 | 31.25 | 54.00 |
| 2723.375000 | --- | 39.09 | 100.0 | V | 160.0 | -10.4 | 14.91 | 54.00 |
| 2725.500000 | 48.72 | --- | 100.0 | V | 166.0 | -10.4 | 25.28 | 74.00 |
| 3214.250000 | 36.94 | --- | 100.0 | H | 26.0 | -8.3 | 37.06 | 74.00 |
| 4542.375000 | --- | 44.26 | 100.0 | V | 209.0 | -4.9 | 9.74 | 54.00 |
| 4542.375000 | 51.97 | --- | 100.0 | V | 209.0 | -4.9 | 22.03 | 74.00 |
| 5449.750000 | --- | 33.26 | 200.0 | V | 233.0 | -2.7 | 20.74 | 54.00 |
| 8176.125000 | 47.76 | --- | 100.0 | V | 191.0 | 0.5 | 26.24 | 74.00 |
| 8176.125000 | --- | 39.80 | 100.0 | V | 191.0 | 0.5 | 14.20 | 54.00 |
| 9993.000000 | 45.73 | --- | 100.0 | H | 134.0 | 7.1 | 28.27 | 54.00 |
| 9993.000000 | --- | 38.71 | 100.0 | H | 134.0 | 7.1 | 15.29 | 74.00 |

5.3 Conducted Emissions

Ambient condition

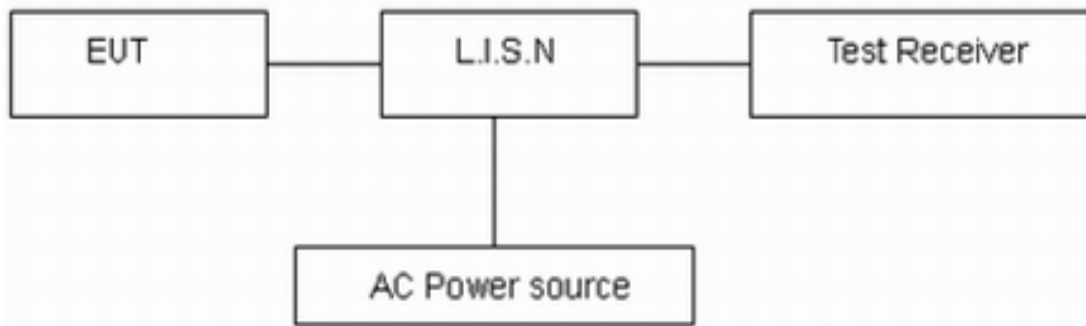
| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C | 45%~50% | 101.5kPa |

Method of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.10-2013. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

The test is in transmitting mode.

Test Setup



Note: AC Power source is used to change the voltage from 220V/50Hz to 110V/60Hz.

Limits

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

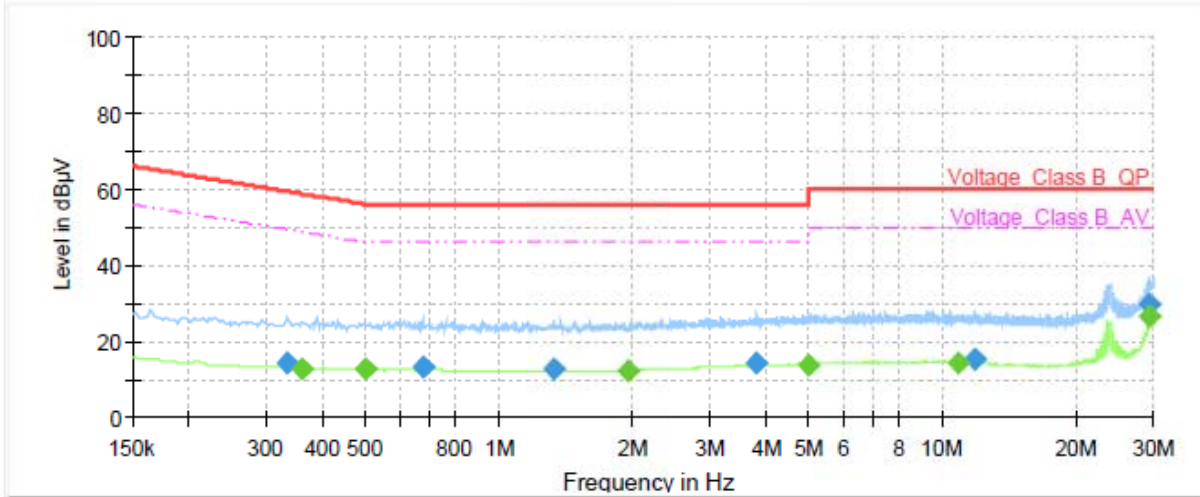
*: Decreases with the logarithm of the frequency.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$. $U = 1.19$ dB

Test Results:

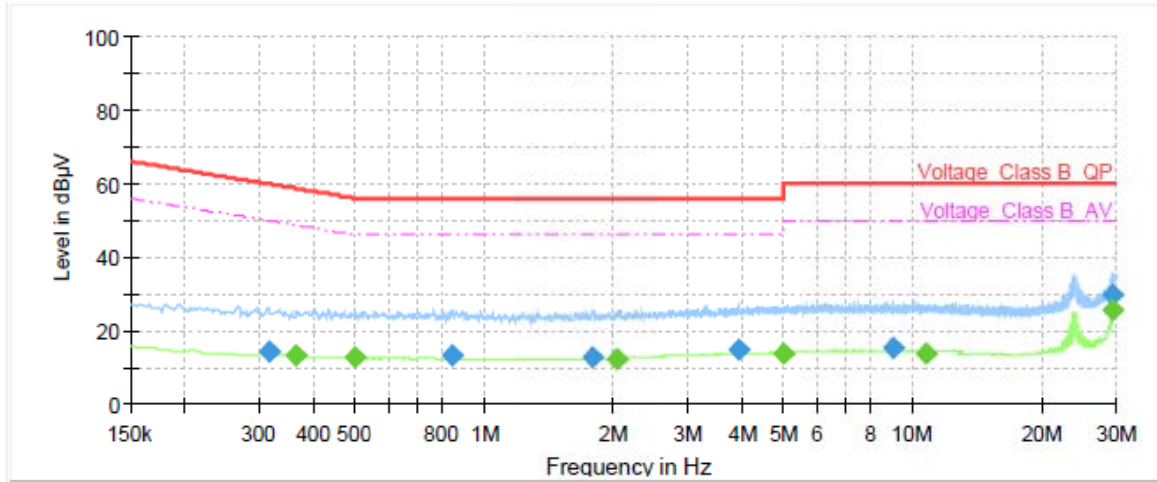
908.4MHz



| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.33 | 14.52 | --- | 59.34 | 44.82 | 70.0 | 9.000 | L1 | ON | 21 |
| 0.36 | --- | 12.86 | 48.75 | 35.89 | 70.0 | 9.000 | L1 | ON | 21 |
| 0.50 | --- | 13.05 | 46.00 | 32.95 | 70.0 | 9.000 | L1 | ON | 20 |
| 0.67 | 13.29 | --- | 56.00 | 42.71 | 70.0 | 9.000 | L1 | ON | 20 |
| 1.33 | 12.96 | --- | 56.00 | 43.04 | 70.0 | 9.000 | L1 | ON | 20 |
| 1.96 | --- | 12.12 | 46.00 | 33.88 | 70.0 | 9.000 | L1 | ON | 20 |
| 3.83 | 14.29 | --- | 56.00 | 41.71 | 70.0 | 9.000 | L1 | ON | 19 |
| 5.00 | --- | 14.09 | 46.00 | 31.91 | 70.0 | 9.000 | L1 | ON | 19 |
| 10.84 | --- | 14.48 | 50.00 | 35.52 | 70.0 | 9.000 | L1 | ON | 20 |
| 11.80 | 15.45 | --- | 60.00 | 44.55 | 70.0 | 9.000 | L1 | ON | 20 |
| 29.23 | 29.69 | --- | 60.00 | 30.31 | 70.0 | 9.000 | L1 | ON | 20 |
| 29.24 | --- | 26.64 | 50.00 | 23.36 | 70.0 | 9.000 | L1 | ON | 20 |

Remark: Correct factor = cable loss + LISN factor

L Line



| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.31 | 14.20 | --- | 59.86 | 45.66 | 70.0 | 9.000 | N | ON | 21 |
| 0.36 | --- | 13.34 | 48.69 | 35.35 | 70.0 | 9.000 | N | ON | 21 |
| 0.50 | --- | 12.89 | 46.00 | 33.11 | 70.0 | 9.000 | N | ON | 20 |
| 0.84 | 13.22 | --- | 56.00 | 42.78 | 70.0 | 9.000 | N | ON | 20 |
| 1.79 | 13.03 | --- | 56.00 | 42.97 | 70.0 | 9.000 | N | ON | 20 |
| 2.04 | --- | 12.41 | 46.00 | 33.59 | 70.0 | 9.000 | N | ON | 20 |
| 3.94 | 14.70 | --- | 56.00 | 41.30 | 70.0 | 9.000 | N | ON | 19 |
| 5.00 | --- | 13.99 | 46.00 | 32.01 | 70.0 | 9.000 | N | ON | 19 |
| 9.03 | 15.44 | --- | 60.00 | 44.56 | 70.0 | 9.000 | N | ON | 20 |
| 10.69 | --- | 14.08 | 50.00 | 35.92 | 70.0 | 9.000 | N | ON | 20 |
| 29.24 | --- | 25.62 | 50.00 | 24.38 | 70.0 | 9.000 | N | ON | 20 |
| 29.24 | 29.70 | --- | 60.00 | 30.30 | 70.0 | 9.000 | N | ON | 20 |

Remark: Correct factor = cable loss + LISN factor
N Line



6 Main Test Instruments

| Name | Manufacturer | Type | Serial Number | Calibration Date | Expiration Date |
|--------------------------|--------------|--------------|---------------|------------------|-----------------|
| Spectrum Analyzer | R&S | FSV30 | 100815 | 2020-12-13 | 2021-12-12 |
| EMI Test Receiver | R&S | ESCI | 100948 | 2020-05-18 | 2021-05-17 |
| Loop Antenna | SCHWARZBECK | FMZB1519 | 1519-047 | 2020-04-02 | 2023-04-01 |
| TRILOG Broadband Antenna | SCHWARZBECK | VULB 9163 | 391 | 2019-12-16 | 2021-12-15 |
| Horn Antenna | R&S | HF907 | 102723 | 2018-08-11 | 2021-08-10 |
| EMI Test Receiver | R&S | ESR | 101667 | 2020-05-18 | 2021-05-17 |
| LISN | R&S | ENV216 | 101171 | 2018-12-15 | 2021-12-14 |
| Spectrum Analyzer | Agilent | N9010A | MY47191109 | 2020-05-18 | 2021-05-17 |
| Power Splitter | Hua Xiang | SHX-GF2-2-13 | 10120101 | / | / |
| RF Cable | Agilent | SMA 15cm | 0001 | 2020-12-10 | 2021-06-09 |
| Software | R&S | EMC32 | 9.26.0 | / | / |

*****END OF REPORT *****



ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.



ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.