| Engineering Test Report No. 2002451-01 | |
|---|---|
| Report Date | June 5, 2020 |
| Manufacturer Name | Ideal Industries |
| Manufacturer FCC FRN Number & IC Company Number | 0002862225<br>11250A |
| Manufacturer Address | 1375 Park Avenue<br>Sycamore, IL 60178 |
| Product Name Brand/Model No. | Luminaire Controller Model No. LCE20A1000 |
| Product FCC ID & IC UPN Number | FCC ID: 2AAMXLCE20A1000<br>IC UPN:11250A-LCE20A1000 |
| Date Received | May 26, 2020 |
| Test Dates | May 27, 2020 |
| Specifications | FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 for Digital Modulation Intentional Radiators Operating within the band 902-928MHz<br><br>Innovation, Science, and Economic Development Canada, RSS-247<br><br>Innovation, Science, and Economic Development Canada, RSS-GEN |
| Test Facility | Elite Electronic Engineering, Inc.<br>1516 Centre Circle,<br>Downers Grove, IL 60515<br><br>FCC Reg. Number: 269750<br>IC Reg. Number: 2987A |
| Signature | Mark E. Longinotti |
| Tested by | Mark E. Longinotti |
| Signature | Raymond J Klouda |
| Approved by | Raymond J. Klouda,<br>Registered Professional Engineer of Illinois – 44894 |
| PO Number | AWS1076 |

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# 1. Report Revision History

| Revision | Date | Description |
|---|---|---|
| – | 08 JUN 2020 | Initial Release of Engineering Test Report No. 2002451-01 |
| | | |

## 2. Introduction

This document presents the results of a series of electromagnetic compatibility (EMC) tests that were performed on one (1) Luminaire Controller, Model No. LCE20A1000 (hereinafter referred to as the Equipment Under Test (EUT)). The EUT was identified as follows:

| EUT Identification | |
|---|---|
| Description | Luminaire Controller |
| Device Type | Digitally Modulated |
| Band of Operation | 902-928MHz |
| Model/Part No. | LCE20A1000 |
| S/N | None Assigned |
| Size of EUT | 9.5cm x 6.5cm x 4.5cm |

The EUT listed above was used throughout the test series. The EUT was submitted for testing with no support equipment.

## 3. Purpose

The original EUT was issued a grant of equipment authorization under the following IDs:

FCC ID: 2AAMXLCE20A1000
IC: 11250A-LCE20A1000

The test series was performed to determine if the EUT, with the AC power supply removed from the PCB, meets the Class II Permissive Change requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Intentional Radiators. Testing was performed in accordance with ANSI C63.10-2013.

The test series was also performed to determine if the EUT, with the AC power supply removed from the PCB, meets the Class II Permissive Change requirements of the Innovation, Science, and Economic Development Canada Radio Standards Specification, RSS-247, for transmitters. Testing was performed in accordance with ANSI C63.10-2013.

## 4. Test Specifications

The tests were performed to selected portions of, and in accordance with the following test specifications:

- Federal Communications Commission “Code of Federal Regulations”, Title 47, Part 15, Subpart C, Section 247

- ANSI C63.4-2014, “American National Standard for Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz”

- ANSI C63.10-2013, “American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices”

- Federal Communications Commission Office of Engineering and Technology Laboratory Division, Guidance For Compliance Measurements On Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 Of the FCC Rules, April 2, 2019, KDB 558074

- RSS-247 Issue 2, February 2017, “Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices”

- RSS-Gen Issue 5, March 2019, Amendment 1, Innovation, Science, and Economic Development Canada, “Spectrum Management and Telecommunications, Radio Standards Specification, General Requirements for Compliance of Radio Apparatus”

## 5. Laboratory Conditions

The temperature at the time of the test was 25°C and the relative humidity was 33%.

## 6. Summary

The following EMC tests were performed and the results are shown below:

| Test Description | Test Methods | Results |
|---|---|---|
| Average Effective Isotropic Radiated Power (EIRP) | FCC 15.247<br>ISED RSS-247 | Conforms |
| Case Spurious Radiated Emissions | FCC 15.247<br>ISED RSS-247 | Conforms |

## 7. Test Plan

No test plan was provided. Instructions were provided by personnel from Ideal Industries and used in conjunction with the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247, and ANSI C63.4-2014 specifications.

## 8. Grounding

The EUT was not grounded.

## 9. Power Input

The EUT was powered with 12VDC via a 2 wire power harness.

## 10. Firmware/Software

For all tests, the EUT had Firmware Version audacy-certification-line-na loaded onto the device to provide the correct load characteristics.

## 11. Modifications Made to EUT

No modifications were made to the EUT during the testing.

## 12. Deviations from Specifications

No deviations from the specifications were made during the testing.

## 13. Modes of Operation

The EMC tests were performed with the EUT operating separately in each of the following test modes:

- Transmit at 902.73MHz
- Transmit at 915MHz
- Transmit at 927.26MHz

## 14. Sample Calculations

For Powerline Conducted Emissions:

The resultant voltage level (VL) is a summation in decibels (dB) of the receiver meter reading (MTR) and the cable loss factor (CF).

Formula 1: VL (dBµV) = MTR (dBµV) + CF (dB).

For Radiated Emissions:

The resultant field strength (FS) is a summation in decibels (dB) of the receiver meter reading (MTR), the antenna correction factor (AF), and the cable loss factor (CF). If an external preamplifier is used, the total is reduced by its gain (-PA). If a distance correction (DC) is required, it is added to the total.

Formula 1: FS (dBµV/m) = MTR (dBµV) + AF (dB/m) + CF (dB) + (- PA (dB)) + DC (dB)

To convert the Field Strength dBµV/m term to µV/m, the dBµV/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in µV/m terms.

Formula 2: FS (µV/m) = AntiLog [(FS (dBµV/m))/20]

## 15. Statement of Conformity

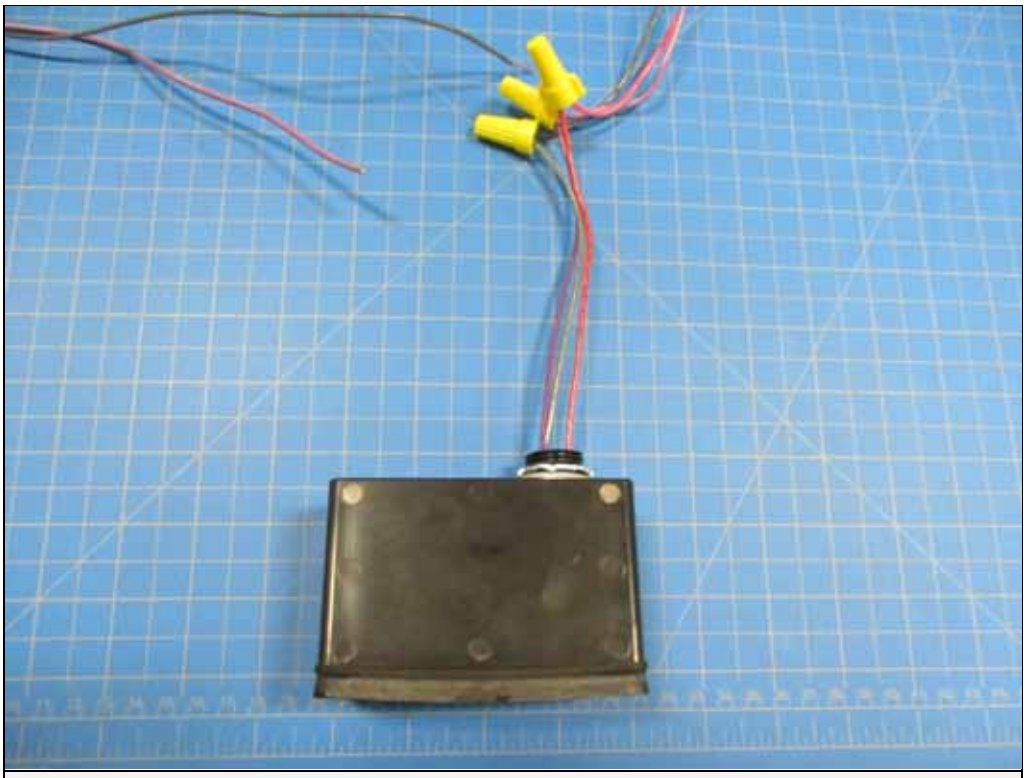
The Ideal Industries Luminaire Controller, Model No. LCE20A1000, Serial No. None Assigned, with the AC power supply removed from the PCB, did fully meet the Class II Permissive Change requirements of the FCC “Code of Federal Regulations”, Title 47, Part 15, Subpart C, Section 15.247 for Intentional Radiators. Testing was performed in accordance with ANSI C63.10-201.

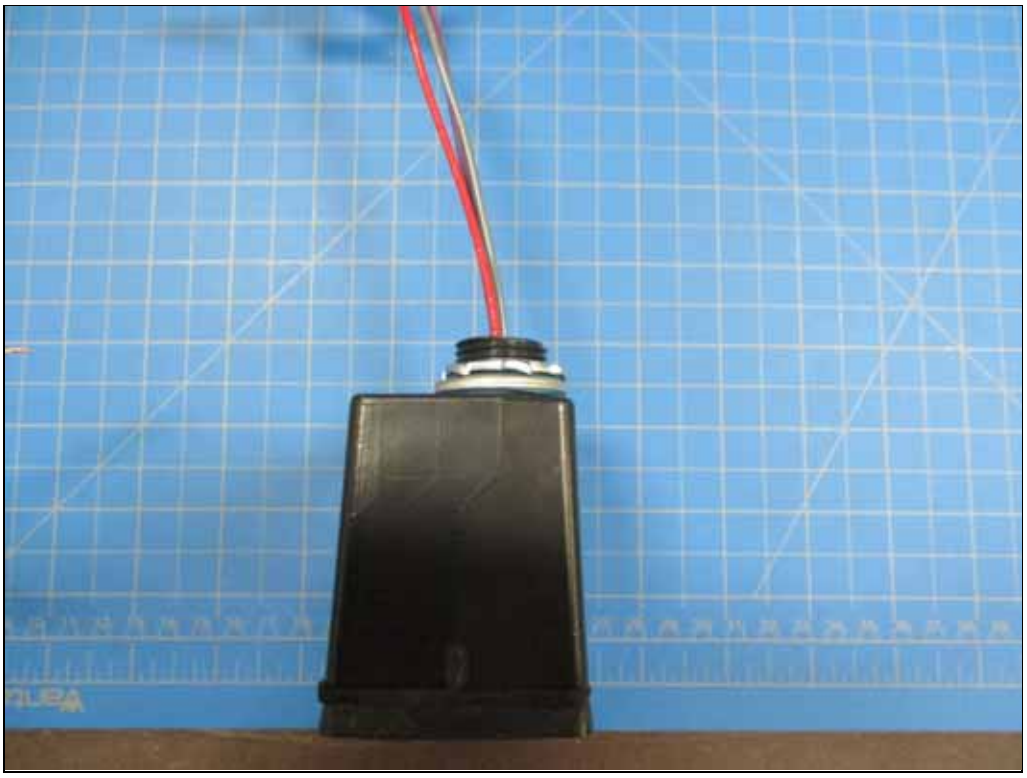
It was also determined that Ideal Industries Luminaire Controller, Model No. LCE20A1000, Serial No. None Assigned, with the AC power supply removed from the PCB, did fully meet the Class II Permissive Change requirements of the Innovation, Science, and Economic Development Canada Radio Standards Specification, RSS-247 for transmitters. Testing was performed in accordance with ANSI C63.10-2013.

## 16. Certification

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247 test specifications. The data presented in this test report pertains to the EUT on the test date specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

## 17. Photographs of EUT





## 18. Equipment List

| Eq ID | Equipment Description | Manufacturer | Model No. | Serial No. | Frequency Range | Cal Date | Due Date |
|---|---|---|---|---|---|---|---|
| APW3 | PREAMPLIFIER | PLANAR ELECTRONICS | PE2-35-120-5R0-10-12 | PL2924 | 1GHZ-20GHZ | 3/23/2020 | 3/23/2021 |
| GRE1 | SIGNAL GENERATOR | AGILENT | E4438C | MY42081749 | 250KHZ-6GHZ | 2/25/2020 | 2/25/2021 |
| NDQ1 | TUNED DIPOLE ANTENNA | EMCO | 3121C-DB4 | 313 | 400-1000MHZ | 6/28/2018 | 6/28/2020 |
| NTA3 | BILOG ANTENNA | TESEQ | 6112D | 32853 | 25-1000MHz | 10/10/2019 | 10/10/2020 |
| NWQ1 | DOUBLE RIDGED WAVEGUIDE ANTENNA | ETS-LINDGREN | 3117 | 66655 | 1GHZ-18GHZ | 4/28/2020 | 4/28/2022 |
| RBG3 | EMI ANALYZER | ROHDE & SCHWARZ | ESW44 | 101592 | 2HZ-44GHZ | 4/24/2020 | 4/24/2021 |
| XPQ3 | HIGH PASS FILTER | K&L MICROWAVE | 4IH30-1804/T10000-0 | 4 | 1.8GHZ-10GHZ | 9/6/2019 | 9/6/2021 |

N/A: Not Applicable I/O: Initial Only CNR: Calibration Not Required
NOTE 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

# 19. Average Effective Isotropic Radiated Power (EIRP)

| EUT Information | |
|---|---|
| Manufacturer | Ideal Industries |
| Product | Luminaire Controller |
| Model | LCE20A1000 |
| Serial No | None Assigned |
| Mode | Transmit at 902.73MHz, Transmit at 915MHz, and Transmit at 927.26MHz |

| Measurement Uncertainty | |
|---|---|
| Measurement Type | Expanded Measurement Uncertainty |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz) | 4.3 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz) | 3.1 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (6 GHz – 18 GHz) | 3.2 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (18 GHz – 26.5 GHz) | 3.3 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (26.5 GHz – 40 GHz) | 3.4 |

| Procedure |
|---|
| The EUT was placed on an 80cm high non-conductive stand and set to transmit. A bilog antenna was placed at a test distance of 3 meters from the EUT. The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. Method “AVGSA-1” of ANSI C63.10-2013 was used to measure the average EIRP. The average power output was measured for the low, middle and high channels.<br><br>The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a dipole antenna was then set in place of the EUT and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss. The average EIRP was calculated for low, middle, and high frequencies. |

Test Setup for Effective Isotropic Radiated Power – Horizontal Polarization

Test Setup for Effective Isotropic Radiated Power – Vertical Polarization

| Test Details | |
|---|---|
| Manufacturer | Ideal Industries |
| Model | LCE20A1000 |
| S/N | None Assigned |
| Test Performed | Average EIRP |
| Mode | Transmit at 902.73MHz |
| Date Tested | May 27, 2020 |
| Requirements | 4W (36dBm) |
| Parameters | Average EIRP = 0.112W (20.5dBm) |
| Notes | |

| Freq. (MHz) | Ant Pol | Meter Reading (dBm) | Matched Sig. Gen. Reading (dBm) | Equivalent Antenna Gain (dB) | Cable Loss (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 902.73 | H | -19.2 | 18.2 | 2.2 | 1.6 | 18.7 | 36.0 | -17.3 |
| 902.73 | V | -20.5 | 20.0 | 2.2 | 1.6 | 20.5 | 36.0 | -15.5 |

EIRP (dBm) = Matched Sig. Gen. Reading (dBm) + Antenna Gain (dB) – Cable Loss (dB)

| Test Details | |
|---|---|
| Manufacturer | Ideal Industries |
| Model | LCE20A1000 |
| S/N | None Assigned |
| Test Performed | Average EIRP |
| Mode | Transmit at 915MHz |
| Date Tested | May 27, 2020 |
| Requirements | 4W (36dBm) |
| Parameters | Average EIRP = 0.071W (18.5dBm) |
| Notes | |

| Freq. (MHz) | Ant Pol | Meter Reading (dBm) | Matched Sig. Gen. Reading (dBm) | Equivalent Antenna Gain (dB) | Cable Loss (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 915.00 | H | -22.7 | 14.6 | 2.2 | 1.6 | 15.1 | 36.0 | -20.9 |
| 915.00 | V | -22.5 | 18.0 | 2.2 | 1.6 | 18.5 | 36.0 | -17.5 |

EIRP (dBm) = Matched Sig. Gen. Reading (dBm) + Antenna Gain (dB) – Cable Loss (dB)

| Test Details | |
|---|---|
| Manufacturer | Ideal Industries |
| Model | LCE20A1000 |
| S/N | None Assigned |
| Test Performed | Average EIRP |
| Mode | Transmit at 927.26MHz |
| Date Tested | May 27, 2020 |
| Requirements | 4W (36dBm) |
| Parameters | Average EIRP = 0.052W (17.2dBm) |
| Notes | |

| Freq. (MHz) | Ant Pol | Meter Reading (dBm) | Matched Sig. Gen. Reading (dBm) | Equivalent Antenna Gain (dB) | Cable Loss (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 927.26 | H | -24.6 | 12.8 | 2.2 | 1.7 | 13.3 | 36.0 | -22.7 |
| 927.26 | V | -24.2 | 16.7 | 2.2 | 1.7 | 17.2 | 36.0 | -18.8 |

EIRP (dBm) = Matched Sig. Gen. Reading (dBm) + Antenna Gain (dB) – Cable Loss (dB)

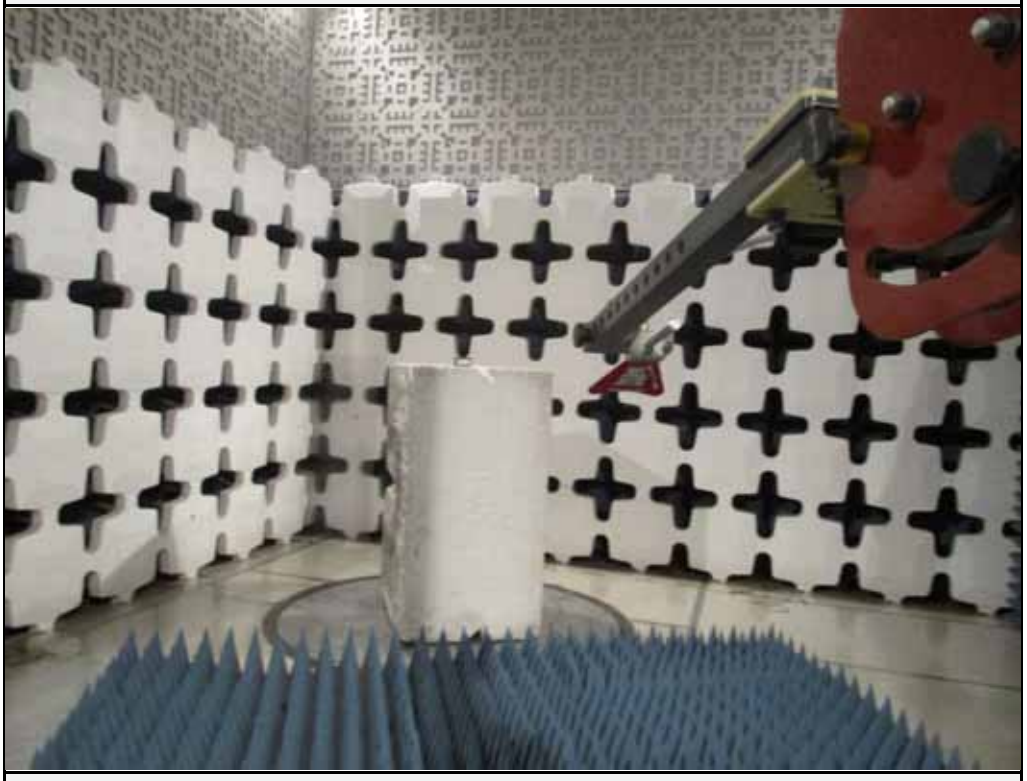
## 20. Case Spurious Radiated Emissions

| EUT Information | |
|---|---|
| Manufacturer | Ideal Industries |
| Product | Luminaire Controller |
| Model | LCE20A1000 |
| Serial No | None Assigned |
| Mode | Transmit at 902.73MHz, Transmit at 915MHz, Transmit at 927.26MHz |

| Measurement Uncertainty | |
|---|---|
| Measurement Type | Expanded Measurement Uncertainty |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz) | 4.3 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz) | 3.1 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (6 GHz – 18 GHz) | 3.2 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (18 GHz – 26.5 GHz) | 3.3 |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (26.5 GHz – 40 GHz) | 3.4 |

| Procedure |
| --- |
| Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.<br><br>Final emission tests were then manually performed over the frequency range of 30MHz to 10.0GHz.<br><br>1) For emissions in the restricted bands, the following procedure was used:<br><br>a) The field strengths of all emissions below 1GHz were measured using a bi-log antenna. The bi-log antenna was positioned at a 3 meter distance from the EUT. The EUT was placed on an 80cm high non-conductive stand. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.<br><br>b) The field strengths of all emissions above 1GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. The EUT was placed on a 1.5 meter high non-conductive stand. A peak detector with a resolution bandwidth of 1MHz was used on the spectrum analyzer.<br><br>c) To ensure that maximum (or worst case) emission levels were measured, the following steps were taken when taking all measurements:<br><br>i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.<br><br>ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.<br><br>iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.<br><br>d) For all radiated emissions measurements below 1GHz, if the peak reading is below the limits listed in §15.209(a), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a), then the emissions are remeasured using a quasi-peak detector.<br><br>e) For all radiated emissions measurements above 1GHz, the peak readings must comply with the §15.35(b) limits. §15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1GHz must be no greater than 20dB above the limits specified in §15.209(a).<br><br>f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector and an average reading was taken. |

Test Setup for Spurious Radiated Emissions above 1GHz – Horizontal Polarization



Test Setup for Spurious Radiated Emissions above 1GHz – Vertical Polarization

| Test Details | |
|---|---|
| Manufacturer | Ideal Industries |
| Model | LCE20A1000 |
| S/N | None Assigned |
| Mode | Transmit at 902.73MHz |
| Test Date | May 27, 2020 |
| Parameters | Peak Measurements in the Restricted Bands |
| Notes | 3 meter test distance |

| Freq. (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Peak Total dBµV/m at 3m | Peak Total µV/m at 3 m | Peak Limit µV/m at 3 m | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2708.19 | H | 48.4 | Ambient | 3.7 | 32.5 | -40.4 | 44.2 | 161.4 | 5000.0 | -29.8 |
| 2708.19 | V | 47.5 | Ambient | 3.7 | 32.5 | -40.4 | 43.3 | 145.5 | 5000.0 | -30.7 |
| 3610.92 | H | 52.7 | Ambient | 4.3 | 33.0 | -40.3 | 49.6 | 302.8 | 5000.0 | -24.4 |
| 3610.92 | V | 52.3 | Ambient | 4.3 | 33.0 | -40.3 | 49.2 | 289.2 | 5000.0 | -24.8 |
| 4513.65 | H | 52.2 | Ambient | 4.7 | 34.0 | -40.1 | 50.9 | 348.9 | 5000.0 | -23.1 |
| 4513.65 | V | 51.8 | Ambient | 4.7 | 34.0 | -40.1 | 50.5 | 333.2 | 5000.0 | -23.5 |
| 5416.38 | H | 50.7 | Ambient | 5.1 | 34.7 | -40.2 | 50.3 | 326.8 | 5000.0 | -23.7 |
| 5416.38 | V | 50.8 | Ambient | 5.1 | 34.7 | -40.2 | 50.4 | 330.6 | 5000.0 | -23.6 |

| Test Details | |
|---|---|
| Manufacturer | Ideal Industries |
| Model | LCE20A1000 |
| S/N | None Assigned |
| Mode | Transmit at 902.73MHz |
| Test Date | May 27, 2020 |
| Parameters | Average Measurements in the Restricted Bands |
| Notes | 3 meter test distance |

| Freq. (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | CBL Fac. (dB) | Ant Fac. (dB/m) | Pre Amp (dB) | Duty Cycle (dB) | Average Total dBµV/m at 3m | Average Total µV/m at 3 m | Average Limit µV/m at 3 m | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2708.19 | H | 32.50 | Ambient | 3.7 | 32.5 | -40.4 | 0.0 | 28.3 | 25.9 | 500.0 | -25.7 |
| 2708.19 | V | 32.6 | Ambient | 3.7 | 32.5 | -40.4 | 0.0 | 28.4 | 26.2 | 500.0 | -25.6 |
| 3610.92 | H | 37.1 | Ambient | 4.3 | 33.0 | -40.3 | 0.0 | 34.0 | 50.2 | 500.0 | -20.0 |
| 3610.92 | V | 37.1 | Ambient | 4.3 | 33.0 | -40.3 | 0.0 | 34.0 | 50.2 | 500.0 | -20.0 |
| 4513.65 | H | 36.3 | Ambient | 4.7 | 34.0 | -40.1 | 0.0 | 35.0 | 55.9 | 500.0 | -19.0 |
| 4513.65 | V | 36.4 | Ambient | 4.7 | 34.0 | -40.1 | 0.0 | 35.1 | 56.6 | 500.0 | -18.9 |
| 5416.38 | H | 35.0 | Ambient | 5.1 | 34.7 | -40.2 | 0.0 | 34.6 | 53.6 | 500.0 | -19.4 |
| 5416.38 | V | 35.1 | Ambient | 5.1 | 34.7 | -40.2 | 0.0 | 34.7 | 54.2 | 500.0 | -19.3 |

| Test Details | |
|---|---|
| Manufacturer | Ideal Industries |
| Model | LCE20A1000 |
| S/N | None Assigned |
| Mode | Transmit at 915MHz |
| Test Date | May 27, 2020 |
| Parameters | Peak Measurements in the Restricted Bands |
| Notes | 3 meter test distance |

| Freq. (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Peak Total dBµV/m at 3m | Peak Total µV/m at 3 m | Peak Limit µV/m at 3 m | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2745.00 | H | 49.4 | Ambient | 3.7 | 32.6 | -40.4 | 45.3 | 183.3 | 5000.0 | -28.7 |
| 2745.00 | V | 51.8 | Ambient | 3.7 | 32.6 | -40.4 | 47.7 | 241.7 | 5000.0 | -26.3 |
| 3660.00 | H | 52.2 | Ambient | 4.3 | 33.0 | -40.3 | 49.2 | 288.2 | 5000.0 | -24.8 |
| 3660.00 | V | 52.1 | Ambient | 4.3 | 33.0 | -40.3 | 49.1 | 284.9 | 5000.0 | -24.9 |
| 4575.00 | H | 51.6 | Ambient | 4.7 | 34.2 | -40.1 | 50.4 | 331.4 | 5000.0 | -23.6 |
| 4575.00 | V | 51.2 | Ambient | 4.7 | 34.2 | -40.1 | 50.0 | 316.5 | 5000.0 | -24.0 |
| 2745.00 | H | 49.4 | Ambient | 3.7 | 32.6 | -40.4 | 45.3 | 183.3 | 5000.0 | -28.7 |
| 2745.00 | V | 51.8 | Ambient | 3.7 | 32.6 | -40.4 | 47.7 | 241.7 | 5000.0 | -26.3 |

| Test Details | |
|---|---|
| Manufacturer | Ideal Industries |
| Model | LCE20A1000 |
| S/N | None Assigned |
| Mode | Transmit at 915MHz |
| Test Date | May 27, 2020 |
| Parameters | Average Measurements in the Restricted Bands |
| Notes | 3 meter test distance |

| Freq. (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | CBL Fac. (dB) | Ant Fac. (dB/m) | Pre Amp (dB) | Duty Cycle (dB) | Average Total dBµV/m at 3m | Average Total µV/m at 3 m | Average Limit µV/m at 3 m | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2745.00 | H | 36.20 | Ambient | 3.7 | 32.6 | -40.4 | 0.0 | 32.1 | 40.1 | 500.0 | -21.9 |
| 2745.00 | V | 36.2 | Ambient | 3.7 | 32.6 | -40.4 | 0.0 | 32.1 | 40.1 | 500.0 | -21.9 |
| 3660.00 | H | 36.7 | Ambient | 4.3 | 33.0 | -40.3 | 0.0 | 33.7 | 48.4 | 500.0 | -20.3 |
| 3660.00 | V | 36.7 | Ambient | 4.3 | 33.0 | -40.3 | 0.0 | 33.7 | 48.4 | 500.0 | -20.3 |
| 4575.00 | H | 35.9 | Ambient | 4.7 | 34.2 | -40.1 | 0.0 | 34.7 | 54.4 | 500.0 | -19.3 |
| 4575.00 | V | 35.8 | Ambient | 4.7 | 34.2 | -40.1 | 0.0 | 34.6 | 53.7 | 500.0 | -19.4 |
| 2745.00 | H | 36.20 | Ambient | 3.7 | 32.6 | -40.4 | 0.0 | 32.1 | 40.1 | 500.0 | -21.9 |
| 2745.00 | V | 36.2 | Ambient | 3.7 | 32.6 | -40.4 | 0.0 | 32.1 | 40.1 | 500.0 | -21.9 |

| Test Details | |
|---|---|
| Manufacturer | Ideal Industries |
| Model | LCE20A1000 |
| S/N | None Assigned |
| Mode | Transmit at 927.26MHz |
| Test Date | May 27, 2020 |
| Parameters | Peak Measurements in the Restricted Bands |
| Notes | 3 meter test distance |

| Freq. (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | CBL Fac (dB) | Ant Fac (dB/m) | Pre Amp (dB) | Peak Total dBµV/m at 3m | Peak Total µV/m at 3 m | Peak Limit µV/m at 3 m | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2781.78 | H | 50.1 | Ambient | 3.7 | 32.4 | -40.4 | 45.9 | 197.1 | 5000.0 | -28.1 |
| 2781.78 | V | 49.9 | Ambient | 3.7 | 32.4 | -40.4 | 45.7 | 192.6 | 5000.0 | -28.3 |
| 3709.04 | H | 52.8 | Ambient | 4.3 | 33.0 | -40.2 | 49.9 | 310.8 | 5000.0 | -24.1 |
| 3709.04 | V | 52.1 | Ambient | 4.3 | 33.0 | -40.2 | 49.2 | 286.8 | 5000.0 | -24.8 |
| 4636.30 | H | 50.6 | Ambient | 4.8 | 34.3 | -40.2 | 49.6 | 300.4 | 5000.0 | -24.4 |
| 4636.30 | V | 50.3 | Ambient | 4.8 | 34.3 | -40.2 | 49.3 | 290.2 | 5000.0 | -24.7 |
| 2781.78 | H | 50.1 | Ambient | 3.7 | 32.4 | -40.4 | 45.9 | 197.1 | 5000.0 | -28.1 |
| 2781.78 | V | 49.9 | Ambient | 3.7 | 32.4 | -40.4 | 45.7 | 192.6 | 5000.0 | -28.3 |

| Test Details | |
|---|---|
| Manufacturer | Ideal Industries |
| Model | LCE20A1000 |
| S/N | None Assigned |
| Mode | Transmit at 927.26MHz |
| Test Date | May 27, 2020 |
| Parameters | Average Measurements in the Restricted Bands |
| Notes | 3 meter test distance |

| Freq. (MHz) | Ant Pol | Meter Reading (dBµV) | Ambient | CBL Fac. (dB) | Ant Fac. (dB/m) | Pre Amp (dB) | Duty Cycle (dB) | Average Total dBµV/m at 3m | Average Total µV/m at 3 m | Average Limit µV/m at 3 m | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2781.78 | H | 34.70 | Ambient | 3.7 | 32.4 | -40.4 | 0.0 | 30.5 | 33.5 | 500.0 | -23.5 |
| 2781.78 | V | 34.9 | Ambient | 3.7 | 32.4 | -40.4 | 0.0 | 30.7 | 34.3 | 500.0 | -23.3 |
| 3709.04 | H | 36.6 | Ambient | 4.3 | 33.0 | -40.2 | 0.0 | 33.7 | 48.1 | 500.0 | -20.3 |
| 3709.04 | V | 36.6 | Ambient | 4.3 | 33.0 | -40.2 | 0.0 | 33.7 | 48.1 | 500.0 | -20.3 |
| 4636.30 | H | 34.9 | Ambient | 4.8 | 34.3 | -40.2 | 0.0 | 33.9 | 49.3 | 500.0 | -20.1 |
| 4636.30 | V | 34.9 | Ambient | 4.8 | 34.3 | -40.2 | 0.0 | 33.9 | 49.3 | 500.0 | -20.1 |
| 2781.78 | H | 34.70 | Ambient | 3.7 | 32.4 | -40.4 | 0.0 | 30.5 | 33.5 | 500.0 | -23.5 |
| 2781.78 | V | 34.9 | Ambient | 3.7 | 32.4 | -40.4 | 0.0 | 30.7 | 34.3 | 500.0 | -23.3 |

## 21. Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELITE ELECTRONIC ENGINEERING, INC.
1516 Centre Circle
Downers Grove, IL 60515
Robert Bugielski (QA Manager) Phone: 630 495 9770 ext. 168
Email: rbugielski@elitetest.com
Craig Fanning (EMC Lab Manager) Phone: 630 495 9770 ext. 112
Email: cfanning@elitetest.com
Stanley Dolecki (Automotive Team Leader) Phone: 630 495 9770 ext. 103
Email: sdolecki@elitetest.com
Website: www.elitetest.com

ELECTRICAL

Valid to: June 30, 2021 Certificate Number: 1786.01

In recognition of the successful completion of the A2LA Accreditation Program evaluation process, accreditation is granted to this laboratory to perform the following automotive electromagnetic compatibility and other electrical tests:

| Test Technology: | Test Method(s)[1]: |
|---|---|
| *Transient Immunity* | ISO 7637-2 (including emissions); ISO 7637-3;<br>ISO 16750-2:2012, Sections 4.6.3 and 4.6.4;<br>CS-11979, Section 6.4; CS.00054, Section 5.9;<br>EMC-CS-2009.1 (CI220); FMC1278 (CI220, CI221, CI222);<br>GMW 3097, Section 3.5;<br>SAE J1113-11; SAE J1113-12 |
| *Electrostatic Discharge (ESD)* | ISO 10605 (2001, 2008);<br>CS-11979 Section 7.0; CS.00054, Section 5.10;<br>EMC-CS-2009.1 (CI 280); FMC1278 (CI280); SAE J1113-13;<br>GMW 3097 Section 3.6 |
| *Conducted Emissions* | CISPR 25 (2002, 2008), Sections 6.2 and 6.3;<br>CISPR 25 (2016), Sections 6.3 and 6.4;<br>CS-11979, Section 5.1; CS.00054, Sections 5.6.1 and 5.6.2;<br>GMW 3097, Section 3.3.2;<br>EMC-CS-2009.1 (CE 420); FMC1278 (CE420, CE421) |
| *Radiated Emissions Anechoic* | CISPR 25 (2002, 2008), Section 6.4;<br>CISPR 25 (2016), Section 6.5;<br>CS-11979, Section 5.3; CS.00054, Section 5.6.3;<br>GMW 3097, Section 3.3.1;<br>EMC-CS-2009.1 (RE 310); FMC1278 (RE310) |
| *Vehicle Radiated Emissions* | CISPR 12; ICES-002 |

| Test Technology: | Test Method(s)[1]: |
|---|---|
| ***Bulk Current Injection (BCI)*** | ISO 11452-4;<br>CS-11979, Section 6.1; CS.00054, Section 5.8.1;<br>GMW 3097, Section 3.4.1;<br>SAE J1113-4;<br>EMC-CS-2009.1 (RI112); FMC1278 (RI112) |
| ***Bulk Current Injections (BCI)***<br>*(Closed Loop Method)* | ISO 11452-4; SAE J1113-4 |
| ***Radiated Immunity Anechoic***<br>*(Including Radar Pulse)* | ISO 11452-2; ISO 11452-5;<br>CS-11979, Section 6.2; CS.00054, Section 5.8.2;<br>GMW 3097, Section 3.4.2;<br>EMC-CS-2009.1 (RI114); FMC1278 (RI114); SAE J1113-21 |
| ***Radiated Immunity Magnetic Field*** | ISO 11452-8 |
| ***Radiated Immunity Reverb*** | ISO/IEC 61000-4-21;<br>GMW 3097, Section 3.4.3;<br>EMC-CS-2009.1 (RI114); FMC1278 (RI114);<br>ISO 11452-11 |
| ***Radiated Immunity***<br>*(Portable Transmitters)* | ISO 11452-9;<br>EMC-CS-2009.1 (RI115); FMC1278 (RI115) |
| ***Vehicle Radiated Immunity (ALSE)*** | ISO 11451-2 |
| ***Electrical Loads*** | ISO 16750-2, Sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.11, and 4.12 |
| ***Dielectric Withstand Voltage*** | MIL-STD-202, Method 301;<br>EIA-364-20D |
| ***Insulation Resistance*** | MIL-STD-202, Method 302;<br>SAE/USCAR-2, Revision 6, Section 5.5.1;<br>EIA-364-21D |
| ***Contact Resistance*** | MIL-STD-202, Method 307;<br>SAE/USCAR-2, Revision 6, Section 5.3.1;<br>EIA/ECA-364-23C;<br>USCAR21-3 Section 4.5.3 |
| ***DC Resistance*** | MIL-STD-202, Method 303 |
| ***Contact Chatter*** | MIL-STD-202, Method 310;<br>SAE/USCAR-2, Revision 6, Section 5.1.9 |
| ***Voltage Drop*** | SAE/USCAR-2, Revision 6, Section 5.3.2;<br>USCAR21-3 Section 4.5.6 |

| Test Technology: | Test Method(s)[1]: |
|---|---|
| **Emissions** | |
| Radiated and Conducted (3m Semi-anechoic chamber, up to 40 GHz) | 47 CFR, FCC Part 15 B (using ANSI C63.4:2014); 47 CFR, FCC Part 18 (using FCC MP-5:1986); ICES-001; ICES-003; ICES-005; IEC/CISPR 11, Ed. 4.1 (2004-06); AS/NZS CISPR 11 (2004); IEC/CISPR 11 Ed 5 (2009-05) + A1 (2010); KN 11 (2008-5) with RRL Notice No. 2008-3 (May 20, 2008); CISPR 11; EN 55011; KN 11; CNS 13803 (1997, 2003); CISPR 14-1; EN 55014-1; AS/NZS CISPR 14.1; KN 14-1; IEC/CISPR 22 (1997); EN 55022 (1998) + A1(2000); EN 55022 (1998) + A1(2000) + A2(2003); EN 55022 (2006); IEC/CISPR 22 (2008-09); AS/NZS CISPR 22 (2004); AS/NZS CISPR 22, 3rd Edition (2006); KN 22 (up to 6 GHz); CNS 13438 (up to 6 GHz); VCCI V-3 (up to 6 GHz); CISPR 32; EN 55032; KN 32 |
| Current Harmonics | IEC 61000-3-2; EN 61000-3-2; KN 61000-3-2 |
| Flicker and Fluctuations | IEC 61000-3-3; EN 61000-3-3; KN 61000-3-3 |
| **Immunity** | |
| Electrostatic Discharge | IEC 61000-4-2, Ed. 1.2 (2001); IEC 61000-4-2 (1995) + A1(1998) + A2(2000); EN 61000-4-2 (1995); EN 61000-4-2 (2009-05); KN 61000-4-2 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-2; EN 61000-4-2; KN 61000-4-2; IEEE C37.90.3 2001 |
| Radiated Immunity | IEC 61000-4-3 (1995) + A1(1998) + A2(2000); IEC 61000-4-3, Ed. 3.0 (2006-02); IEC 61000-4-3, Ed. 3.2 (2010); KN 61000-4-3 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-3; EN 61000-4-3; KN 61000-4-3; IEEE C37.90.2 2004 |
| Electrical Fast Transient/Burst | IEC 61000-4-4, Ed. 2.0 (2004-07); IEC 61000-4-4, Ed. 2.1 (2011); IEC 61000-4-4 (1995) + A1(2000) + A2(2001); KN 61000-4-4 (2008-5); RRL Notice No. 2008-5 (May 20, 2008); IEC 61000-4-4; EN 61000-4-4; KN 61000-4-4 |
| Surge | IEC 61000-4-5 (1995) + A1(2000); IEC 61000-4-5, Ed 1.1 (2005-11); EN 61000-4-5 (1995) + A1(2001); KN 61000-4-5 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-5; EN 61000-4-5; KN 61000-4-5; IEEE C37.90.1 2012 |

| Test Technology: | Test Method(s)[1]: |
|---|---|
| **Immunity (cont'd)** | |
| Conducted Immunity | IEC 61000-4-6 (1996) + A1(2000);<br>IEC 61000-4-6, Ed 2.0 (2006-05);<br>IEC 61000-4-6 Ed. 3.0 (2008);<br>KN 61000-4-6 (2008-5); RRL Notice No. 2008-4 (May 20, 2008);<br>EN 61000-4-6 (1996) + A1(2001); IEC 61000-4-6; EN 61000-4-6;<br>KN 61000-4-6 |
| Power Frequency Magnetic Field Immunity | IEC 61000-4-8 (1993) + A1(2000); IEC 61000-4-8 (2009);<br>EN 61000-4-8 (1994) + A1(2000);<br>KN 61000-4-8 (2008-5); RRL Notice No. 2008-4 (May 20, 2008);<br>IEC 61000-4-8; EN 61000-4-8; KN 61000-4-8 |
| Voltage Dips, Short Interrupts, and Line Voltage Variations | IEC 61000-4-11, Ed. 2 (2004-03);<br>KN 61000-4-11 (2008-5);<br>RRL Notice No. 2008-4 (May 20, 2008);<br>IEC 61000-4-11; EN 61000-4-11; KN 61000-4-11 |
| Ring Wave | IEC 61000-4-12, Ed. 2 (2006-09);<br>EN 61000-4-12:2006;<br>IEC 61000-4-12; EN 61000-4-12; KN 61000-4-12 |
| Generic and Product Specific EMC Standards | IEC/EN 61000-6-1; AS/NZS 61000-6-1; KN 61000-6-1;<br>IEC/EN 61000-6-2; AS/NZS 61000-6-2; KN 61000-6-2;<br>IEC/EN 61000-6-3; AS/NZS 61000-6-3; KN 61000-6-3;<br>IEC/EN 61000-6-4; AS/NZS 61000-6-4; KN 61000-6-4;<br>EN 50130-4; IEC 61326-1;<br>IEC/CISPR 14-2; EN 55014-2; AS/NZS CISPR 14.2; KN 14-2;<br>IEC/CISPR 24; AS/NZS CISPR 24; EN 55024; KN 24;<br>IEC 60601-1-2; JIS T0601-1-2 |
| ***TxRx EMC Requirements*** | EN 301 489-1; EN 301 489-3; EN 301 489-9; EN 301 489-17;<br>EN 301 489-19; EN 301 489-52; |
| ***European Radio Test Standards*** | ETSI EN 300 086-1; ETSI EN 300 086-2;<br>ETSI EN 300 113-1; ETSI EN 300 113-2;<br>ETSI EN 300 220-1; ETSI EN 300 220-2;<br>ETSI EN 300 330-1; ETSI EN 300 330-2;<br>ETSI EN 300 440-1; ETSI EN 300 440-2;<br>ETSI EN 300 422-1; ETSI EN 300 422-2;<br>ETSI EN 300 328; ETSI EN 301 893;<br>ETSI EN 301 511; ETSI EN 301 908-1;<br>ETSI EN 908-2; ETSI EN 908-13;<br>ETSI EN 301 413;<br>ETSI EN 302 502 |

| Test Technology: | Test Method(s)[1]: |
|---|---|
| *Canadian Radio Tests* | RSS-102 (RF Exposure Evaluation only); RSS-111; RSS-112; RSS-117; RSS-119; RSS-123; RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133; RSS-134; RSS-135; RSS-137; RSS-139; RSS-140; RSS-141; RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192; RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210; RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222; RSS-236; RSS-238; RSS-243; RSS-244; RSS-246; RSS-247; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-GEN |
| *Mexico Radio Tests* | IFT-008; NOM-208-SCFI |
| *Japan Radio Tests* | Radio Law No. 131, Ordinance of MPT No. 37, 1981, MIC Notification No. 88:2004, Table No. 22-11; ARIB STD-T66, Regulation 18 |
| *Taiwan Radio Tests* | LP-0002 |
| *Australia/New Zealand Radio Tests* | AS/NZS 4268; Radiocommunications (Short Range Devices) Standard (2014) |
| *Hong Kong Radio Tests* | HKCA 1039 Issue 6; HKCA 1042; HKCA 1033 Issue 7; HKCA 1061; HKCA 1008; HKCA 1043; HKCA 1057; HKCA 1073 |
| *Korean Radio Test Standards* | KN 301 489-1; KN 301 489-3; KN 301 489-9; KN 301 489-17; KN 301 489-52 |
| *Unlicensed Radio Frequency Devices* *(3 Meter Semi-Anechoic Room)* | 47 CFR FCC Part 15C, 15D, 15E, 15F, 15G, 15H (using ANSI C63.10:2013, ANSI C63.17:2013 and FCC KDB 905462 D02 (v02)) |
| *Licensed Radio Service Equipment* | 47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95, 96, 97, 101; ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015; |
| *OTA (Over the Air) Performance*<br>GSM, GPRS, EGPRS<br>UMTS (W-CDMA)<br>LTE including CAT M1<br>A-GPS for UMTS/GSM<br>LTS A-GPS, A-GLONASS, SIB8/SIB16<br>Large Device/Laptop/Tablet Testing<br>Integrated Device Testing<br>WiFi 802.11 a/b/g/n/ac | CTIA Test Plan for Wireless Device Over-the-Air Performance (Method for Measurement for Radiated Power and Receiver Performance) V3.8.2;<br>CTIA Test Plan for RF Performance Evaluation of WiFi Mobile Converged Devices V2.1.0 |

| Test Technology: | Test Method(s)[1]: |
|---|---|
| ***Electrical Measurements and Simulation*** | |
| AC Voltage / Current | FAA AC 150/5345-10H |
| (1mV to 5kV) 60 Hz | FAA AC 150/5345-43J |
| (0.1V to 250V) up to 500 MHz | FAA AC 150/5345-44K |
| (1µA to 150A) 60 Hz | FAA AC 150/5345-46E |
| DC Voltage / Current | FAA AC 150/5345-47C |
| (1mV to 15-kV) / (1µA to 10A) | FAA EB 67D |
| Power Factor / Efficiency / Crest Factor | |
| (Power to 30kW) | |
| Resistance | |
| (1mΩ to 4000MΩ) | |
| Surge | |
| (Up to 10 kV / 5 kA) (Combination Wave and Ring Wave) | |

On the following products and materials:
Telecommunications Terminal Equipment (TTE), Radio Equipment, Network Equipment, Information Technology Equipment (ITE), Automotive Electronic Equipment, Automotive Hybrid Electronic Devices, Maritime Navigation and Radio Communication Equipment and Systems, Vehicles, Boats and Internal Combustion Engine Driven Devices, Automotive, Aviation, and General Lighting Products, Medical Electrical Equipment, Motors, Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment, Household Appliances, Electric Tools, Low-voltage Switchgear and Control gear, Programmable Controllers, Electrical Equipment for Measurement, Control and Laboratory Use, Base Materials, Power and Data Transmission Cables and Connectors

[1] When the date, revision or edition of a test method standard is not identified on the scope of accreditation, the laboratory is expected to be using the current version within one year of the date of publication, per part C., Section 1 of A2LA *R101 - General Requirements - Accreditation of ISO-IEC 17025 Laboratories*.

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[2]

| Rule Subpart/Technology | Test Method | Maximum Frequency (MHz) |
|---|---|---|
| Unintentional Radiators<br>Part 15B | ANSI C63.4:2014 | 40000 |
| Industrial, Scientific, and Medical Equipment<br>Part 18 | FCC MP-5 (February 1986) | 40000 |
| Intentional Radiators<br>Part 15C | ANSI C63.10:2013 | 40000 |
| Unlicensed Personal Communication Systems Devices<br>Part 15D | ANSI C63.17:2013 | 40000 |

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[2]

| Rule Subpart/Technology | Test Method | Maximum Frequency (MHz) |
|---|---|---|
| U-NII without DFS Intentional Radiators<br>Part 15E | ANSI C63.10:2013 | 40000 |
| U-NII with DFS Intentional Radiators<br>Part 15E | FCC KDB 905462 D02 (v02) | 40000 |
| UWB Intentional Radiators<br>Part 15F | ANSI C63.10:2013 | 40000 |
| BPL Intentional Radiators<br>Part 15G | ANSI C63.10:2013 | 40000 |
| White Space Device Intentional Radiators<br>Part 15H | ANSI C63.10:2013 | 40000 |
| Commercial Mobile Services (FCC Licensed Radio Service Equipment)<br>Parts 22 (cellular), 24, 25 (below 3 GHz), and 27 | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |
| General Mobile Radio Services (FCC Licensed Radio Service Equipment)<br>Parts 22 (non-cellular), 90 (below 3 GHz), 95, 97, and 101 (below 3 GHz) | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |
| Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment)<br>Part 96 | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |
| Maritime and Aviation Radio Services<br>Parts 80 and 87 | ANSI/TIA-603-E; ANSI C63.26:2015 | 40000 |
| Microwave and Millimeter Bands Radio Services<br>Parts 25, 30, 74, 90 (above 3 GHz), 97 (above 3 GHz), and 101 | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |
| Broadcast Radio Services<br>Parts 73 and 74 (below 3 GHz) | ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015 | 40000 |

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[2]

| Rule Subpart/Technology | Test Method | Maximum Frequency (MHz) |
|---|---|---|
| Signal Boosters<br>Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters)<br>Section 90.219 | ANSI C63.26:2015 | 40000 |

[2]Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (https://apps.fcc.gov/oetcf/eas/) for a listing of FCC approved laboratories.

# Accredited Laboratory

A2LA has accredited

## ELITE ELECTRONIC ENGINEERING INC.

*Downers Grove, IL*

for technical competence in the field of

## Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 8th day of August 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1786.01
Valid to June 30, 2021

*For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*