Measurement of RF Interference from a NEMA10DIM 7 Pin Outdoor Controller Transceiver

For	Ideal Industries Inc. 1375 Park Avenue Sycamore, IL 60178
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REVISION HISTORY

Revision	Date	Description
—	05 AUG 2020	Initial release

Measurement of RF Emissions from a 7 Pin Outdoor Controller, Model No. NEMA10DIM Transceiver

1. INTRODUCTION

1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on an Ideal Industries Inc. 7 Pin Outdoor Controller, Model No. NEMA10DIM, Serial No. 35000001 and 35000002, transceiver (hereinafter referred to as the EUT). The EUT is a digital modulation transceiver. The transceiver was designed to transmit and receive in the 902-928MHz band using an internal antenna. The EUT was manufactured and submitted for testing by Ideal Industries Inc. located in Sycamore, IL.

1.2 Purpose

The test series was performed to determine if the EUT meets the conducted RF emission requirements, radiated RF emissions requirements, and additional provisions of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109, for receivers and Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 902-928MHz band.

The test series was also performed to determine if the EUT meets the conducted RF emission requirements, radiated RF emissions requirements, and additional provisions of the Industry Canada Radio Standards Specification RSS-Gen Sections 5 and 7 for receivers and Industry Canada Radio Standards Specification RSS-Gen Section 8 and Industry Canada Radio Standards Specification RSS-247 for Transmitters.

Testing was performed in accordance with ANSI C63.4-2014.

1.3 Deviations, Additions and Exclusions

The following additions were implemented during this test series:

- A 0.1uF capacitor was added to the 24VDC trace on the board, to replace the original capacitor at location C32. All tests were conducted with this change made to the EUT.

1.4 EMC Laboratory Identification

This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by the American Association for Laboratory Accreditation (A2LA), A2LA Lab Code: 1786-01.

1.5 Laboratory Conditions

The temperature at the time of the test was 23°C and the relative humidity was 31%.

2. APPLICABLE DOCUMENTS

The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subparts B and C
- ANSI C63.4-2014, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”
- 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 Performing Compliance Measurements On Digital Transmissions Systems (DTS) Operating Under §15.247, January 7, 2016

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

- Industry Canada RSS-GEN, Issue 5, March 2019, “General Requirements for Compliance of Radio Apparatus”

3. EUT SET-UP AND OPERATION

3.1 General Description

The EUT is a 7 Pin Outdoor Controller, Model No. NEMA10DIM. A block diagram of the EUT setup is shown as Figure 1 and Figure 2. For testing, Serial No. 35000001 was used for Radiated tests and Conducted Emissions, while Serial No. 35000002 was used for Antenna Conducted tests.

3.1.1 Power Input

The EUT obtained 120VAC power via two, 2m unshielded wires.

3.1.2 Peripheral Equipment

No peripheral equipment was submitted with the EUT.

3.1.3 Interconnect Cables

No interconnect cables were submitted with the EUT.

3.1.4 Grounding

The EUT was not connected to ground.

3.2 Software

For all tests, the EUT had Software Version NEMA_CERT_NA.hex to provide the correct modes for testing.

3.3 Operational Mode

The EUT and all peripheral equipment were energized. The cables were manually maximized during the preliminary emissions sweeps. The cable arrangement which resulted in the worst case emissions was utilized.

Mode	Description
TX	The EUT was powered on and set to transmit at the following frequencies: - 902.7MHz - 915MHz - 927.3MHz
RX	The EUT was powered on and set to receive at the following frequencies: - 902.7MHz - 915MHz - 927.3MHz

3.4 EUT Modifications

No modifications were required for compliance.

4. TEST FACILITY AND TEST INSTRUMENTATION

4.1 Shielded Enclosure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2014 for site attenuation.

4.2 Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-1.

Conducted and radiated emission tests were performed with an EMI receiver utilizing the bandwidths and detectors specified in the specifications.

4.3 Calibration Traceability

Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the International System Units (SI) through the National Institute of Standards and Technology (NIST).

4.4 Measurement Uncertainty

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

Values of Expanded Measurement Uncertainty (95% Confidence) are presented below:

Measurement Type	Expanded Measurement Uncertainty
Conducted disturbance (mains port) (150 kHz – 30 MHz)	2.7
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

5. TEST PROCEDURES

5.1 Receiver

5.1.1 Powerline Conducted Emissions

5.1.1.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, 15.107(a), all radio frequency voltages on the power lines of a receiver shall be below the values shown below when using a quasi-peak or average detector:

CONDUCTED LIMITS FOR A RECEIVER

Frequency (MHz)	RFI Voltage dBµV (QP)	RFI Voltage dBµV (Average)
0.15 - 0.5	66 decreasing with logarithm of frequency to 56	56 decreasing with logarithm of frequency to 46
0.5 - 5	56	46
5 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.
Note 2: If the levels measured using the QP detector meet both the QP and the Average limits, the EUT is considered to have met both requirements and measurements do not need to be performed using the Average detector.

5.1.1.2 Procedures

The interference on each power lead of the EUT was measured by connecting the measuring equipment to the appropriate meter terminal of the Line Impedance Stabilization Network (LISN). The meter terminal of the LISN not under test was terminated with 50 ohms.

1) The EUT was operated in the RX mode.

2) Measurements were first made on the 120VAC high line.
3) The frequency range from 150kHz to 30MHz was broken up into smaller frequency sub-bands.
4) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector.
5) The data thus obtained was then searched by the computer for the highest levels. Any emissions levels that were within 10dB of the average limit were then measured again using both a quasi-peak detector and an average detector. (If no peak readings were within 10dB of the average limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.)
6) Steps (4) and (5) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 150kHz to 30MHz was investigated. The peak trace was automatically plotted. The plot also shows quasi-peak and average readings that were taken on discrete frequencies. A table showing the quasi-peak and average readings was also generated. This tabular data compares the quasi-peak and average conducted emissions to the applicable conducted emissions limits. 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)

7) Steps (3) through (6) were repeated on the 120VAC neutral line.

5.1.1.3 Results

The plots and tabular results of the peak, quasi-peak, and average conducted voltage levels acquired from each input power line with the EUT operated in the RX mode are shown on pages 23 through 26. All power line conducted emissions measured from the EUT were within the specification limits. The emissions level closest to the limit (worst case) occurred at 270kHz and the emissions level at this frequency was 3.8dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 2.

5.1.2 Radiated Measurements

5.1.2.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Section 15.109(a), all radio frequency emissions from a receiver shall be below the limits shown on the following table:

RADIATION LIMITS FOR A RECEIVER

Frequency (MHz)	Distance between EUT And Antenna in Meters	Field Strength (μV/m)	Field Strength (dBμV/m)
30 – 88	3	100	40
88 – 216	3	150	43.5
216 – 960	3	200	46
Above 960	3	500	54

Note: The tighter limit shall apply at the edge between the two frequency bands.

5.1.2.2 Procedures

Testing was performed separately on a low, middle, and high channel. Testing was performed with the antenna of the EUT in place.

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2014 for site attenuation.

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.

Since a quasi-peak detector and an average detector require long integration times, it is not practical to automatically sweep through the quasi-peak and average levels. Therefore, radiated emissions from the EUT were first scanned using a peak detector and automatically plotted. The frequencies where significant emission levels were noted were then remeasured using the quasi-peak detector or average detector.

The broadband measuring antenna was positioned at a 3 meter distance from the EUT. The EUT was placed on an 80cm high non-conductive stand. The frequency range from 30MHz to 1GHz was investigated using a peak detector function with the bilog antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The frequency range from 1GHz to 10GHz was investigated using a peak detector function with the double ridged waveguide antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The maximum levels for each antenna polarization were plotted.

Final radiated emissions were performed on all significant broadband and narrowband emissions found in the preliminary sweeps using the following methods:

1) Measurements from 30MHz to 1GHz were made using a quasi-peak detector and a broadband bilog antenna. Measurements above 1GHz were made using an average detector and a broadband double ridged waveguide antenna.

2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken:

    a) The EUT was rotated so that all sides were exposed to the receiving antenna.
    b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
    c) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.
    d) For hand-held or body-worn devices, the EUT was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.

5.1.2.1 Results

Radiated emissions plots are shown on pages 27 through 44. As can be seen from the data, all emissions measured from the EUT were within the specification limits. Photographs of the test configuration which yielded the highest or worst case, radiated emission levels are shown on Figures 4 and 5.

5.2 Transmitter

5.2.1 Powerline Conducted Emissions

5.2.1.1 Requirements

Per the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, per 15.207(a), all radio frequency voltages on the power lines of a transmitter shall be below the values shown below when using a quasi-peak or average detector:

Frequency (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 decreasing with logarithm of frequency to 56	56 decreasing with logarithm of frequency to 46
0.5 – 5	56	46
5 – 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.
Note 2: If the levels measured using the QP detector meet both the QP and the Average limits, the EUT is considered to have met both requirements and measurements do not need to be performed using the Average detector.

5.2.1.2 Procedures

The interference on each power lead of the EUT was measured by connecting the measuring equipment to the appropriate meter terminal of the Line Impedance Stabilization Network (LISN). The meter terminal of the LISN not under test was terminated with 50 ohms.

1) The EUT was operated in the TX mode.
2) Measurements were first made on the 120VAC high line.
3) The frequency range from 150kHz to 30MHz was broken up into smaller frequency sub-bands.
4) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector.
5) The data thus obtained was then searched by the computer for the highest levels. Any emissions levels that were within 10dB of the average limit were then measured again using both a quasi-peak detector and an average detector. (If no peak readings were within 10dB of the average limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.)
6) Steps (4) and (5) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 150kHz to 30MHz was investigated. The peak trace was automatically plotted. The plot also shows quasi-peak and average readings that were taken on discrete frequencies. A table showing the quasi-peak and average readings was also generated. This tabular data compares the quasi-peak and average conducted emissions to the applicable conducted emissions limits.
7) Steps (3) through (6) were repeated on the 120VAC neutral line.

5.2.1.3 Results

The plots and tabular data of the peak, quasi-peak, and average conducted voltage levels acquired from each input power line with the EUT operated in the TX mode are shown on pages 45 through 48. All power line conducted emissions measured from the EUT were within the specification limits. The emissions level closest to the limit (worst case) occurred at 263kHz and the emissions level at this frequency was 2.4dB within the limit. Photographs of the test configuration which yielded the highest or worst case, conducted emission levels are shown on Figure 2.

5.2.2 6dB Bandwidth

5.2.2.1 Requirements

Per FCC 15.247(a)(2) and RSS 247 5.2(a), the minimum 6dB bandwidth shall be at least 500kHz for all systems using digital modulation techniques.

5.2.2.2 Procedures

The antenna port of the EUT was connected to the spectrum analyzer through 40dB of attenuation. The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 100kHz, the video bandwidth (VBW) was set to the same as or 3 times greater than the RBW, and the span was set to 3 times the RBW.

The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.

5.2.2.3 Results

The plots on pages 49 through 54 show that the minimum 6 dB bandwidth was 657.3kHz, which is greater than

minimum allowable 6dB bandwidth requirement of 500kHz for systems using digital modulation techniques. The 99% bandwidth was measured to be 793.2kHz.

5.2.3 Peak Output Power

5.2.3.1 Requirements

Per section 15.247(b)(3) and RSS 247 5.4(d), for systems using digital modulation the maximum peak output conducted power shall not be greater than 1.0W (30dBm). Per section 15.247(b)(4), this limit is based on the use of antennas with directional gains that do not exceed 6dBi. Since the limit allows for a 6dBi antenna gain, the maximum EIRP can be increased by 6dB to 4 Watt (36dBm).

For the antenna conducted method, the antenna port of the EUT was connected to the spectrum analyzer through 40dB of attenuation. The maximum meter reading was recorded. The peak power output was calculated for the low, middle and high channels.

The antenna port of the EUT was connected to the spectrum analyzer through 40dB of attenuation. The EUT was set to transmit separately at the low, middle, and high channels. The resolution bandwidth (RBW) was set to greater than the 6dB bandwidth. The 'Max-Hold' function was engaged. The maximum meter reading was recorded. The peak power output was calculated for the low, middle and high channels.

For the radiated emissions method, the EUT was placed on the non-conductive stand and set to transmit. A bilog antenna was placed at a test distance of 3 meters from the EUT. The resolution bandwidth (RBW) of the spectrum analyzer was set to greater than the 6dB bandwidth. The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The peak power output was measured for the low, middle and high channels.

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, as required. The peak power output was calculated for low, middle, and high hopping frequencies.

5.2.3.2 Results

For the antenna conducted emissions method, the results are presented on pages 55 through 57. The maximum peak conducted output power from the transmitter was 0.0143W (11.58dBm), which is below the 1W limit.

For the radiated emissions method, the results are presented on page 58. The maximum EIRP measured from the transmitter was 0.0093W (9.7dBm), which is below the 4W limit.

5.2.4 Radiated Spurious Emissions Measurements

5.2.4.1 Requirements

Per section 15.247(d) and RSS 247 5.5, in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated emissions measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS GEN, must comply with the radiated emission limits specified in §15.209(a) and RSS GEN.

Paragraph 15.209(a) and RSS GEN 8.9 has the following radiated emission limits:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300

0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

5.2.4.2 Procedures

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.

Preliminary radiated emissions tests were performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the EUT. The entire frequency range from 30MHz to 10GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 10GHz.

1) For all harmonics not in the restricted bands, the following procedure was used:
   a) The field strength of the fundamental was measured using a bilog antenna. The bilog 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.
   b) The field strengths of all the harmonics not in the restricted band were then 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 100 kHz was used on the spectrum analyzer.
   c) To ensure that maximum or worst case emission levels at the fundamental and harmonics were measured, the following steps were taken when measuring the fundamental emissions and the spurious emissions:
      i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
      ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
      iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
      iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer. The measuring antenna was not raised or lowered to ensure maximized readings, instead the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.
   d) All harmonics not in the restricted bands must be at least 20dB below levels measured at the fundamental. However, attenuation below the general limits specified in §15.209(a) is not required.
2) For all emissions in the restricted bands, the following procedure was used:
   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 100kHz was used on the spectrum analyzer.
   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 1 MHz was used on the spectrum analyzer.

c) To ensure that maximum or worst case emission levels were measured, the following steps were taken when taking all measurements:

   i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.

   ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.

   iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.

   iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer. The measuring antenna was not raised or lowered to ensure maximized readings, instead the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.

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.

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 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1 GHz must be no greater than 20 dB above the limits specified in 15.209(a).

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. An average reading was taken.

5.2.4.3 Results

Preliminary radiated emissions plots with the EUT transmitting are shown on pages 59 through 70. Final radiated emissions data are presented on data pages 71 through 79. As can be seen from the data, all emissions measured from the EUT were within the specification limits. Photographs of the test configuration which yielded the highest or worst-case radiated emission levels are shown on Figures 4 and 6.

5.2.5 Band Edge Compliance

5.2.5.1 Requirements

Per section 15.247(d), the emissions at the band-edges must be at least 20dB below the highest level measured within the band but attenuation below the general limits listed in 15.209(a) is not required.

5.2.5.2 Procedures

1) Low Band Edge:

   a) The EUT was setup inside the test chamber on a non-conductive stand and a broadband measuring antenna was placed at a test distance of 3 meters from the EUT.

   b) The EUT was set to transmit continuously at the channel closest to the low band-edge.

   c) The EUT was maximized for worst case emissions at the measuring antenna and the maximum meter reading was recorded.

   d) To determine the band edge compliance, the following spectrum analyzer settings were used:

      - Center Frequency = 902MHz (low band-edge frequency).

- Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
- Resolution Bandwidth (RBW) = ≥ 1% of the span.
- 'Max-Hold' function was engaged.

e) The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.

f) The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)

g) The analyzer's display was then screenshot and saved.

2) High Band Edge

a) The EUT was setup inside the test chamber on a non-conductive stand and a broadband measuring antenna was placed at a test distance of 3 meters from the EUT.

b) The EUT was set to transmit continuously at the channel closest to the high band-edge.

c) The EUT was maximized for worst case emissions at the measuring antenna and the maximum meter reading was recorded.

d) To determine the band edge compliance, the following spectrum analyzer settings were used:

- Center Frequency = 928MHz (high band-edge frequency).
- Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
- Resolution Bandwidth (RBW) = ≥ 1% of the span.
- 'Max-Hold' function was engaged.

e) The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.

f) The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)

g) The analyzer's display was then screenshot and saved.

5.2.5.3 Results

Pages 80 and 81 show the radiated band-edge compliance results. As can be seen from these plots, the emissions at the low end band edge and the high end band edge are within the 20dB down limits.

5.2.6 Power Spectral Density

5.2.6.1 Requirement

Per section 15.247(e) and RSS 247 5.2(b), the peak power spectral density from the intentional radiator shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.2.6.2 Procedures

1) The antenna port of the EUT was connected to the spectrum analyzer through a 40dB pad.

2) The EUT was then placed in the normal operation mode (for DTS devices).

3) To determine the power spectral density, the following spectrum analyzer settings were used:
    a) Center Frequency = Transmit Frequency
    b) Span = 1.5× the DTS (6dB) bandwidth
    c) Resolution Bandwidth (RBW) = 3kHz ≤ RBW ≤ 100kHz
    d) Sweep time = Auto
    e) Detector = Peak
    f) Trace Function = Max-Hold
4) A display line was then placed on the corresponding +8dBm level.
5) The analyzers display was then screenshot and saved.

5.2.6.3 Results

The power spectral density data are presented on Pages 82 through 84. As can be seen from the plots, the peak power density is less than 8dBm in a 3kHz band during any time interval of continuous transmission.

6. CONCLUSIONS

It was determined that the Ideal Industries Inc. 7 Pin Outdoor Controller, Model No. NEMA10DIM digital modulation transceiver, Serial No. 35000001 did fully meet the technical requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109 for receivers and Subpart C, Sections 15.207 and 15.247 for Intentional Radiators Operating within the 902-928MHz band, when tested per ANSI C63.4-2014.

It was also determined that the Ideal Industries Inc. 7 Pin Outdoor Controller, Model No. NEMA10DIM digital modulation transceiver, Serial No. 35000001 did fully meet the technical requirements of the Industry Canada Radio Standards Specification, RSS-GEN, Sections 5 and 7 for receivers and the Industry Canada Radio Standards Specification RSS-GEN Section 8 and Radio Standards Specification RSS-247 for transmitters, when tested per ANSI C63.4-2014.

7. 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 test specifications.

The data presented in this test report pertains to the EUT at the test date. Any electrical or mechanical modification made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

8. ENDORSEMENT DISCLAIMER

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST or any agency of the Federal Government.

9. EQUIPMENT LIST

Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW11	PREAMPLIFIER	PMI	PE2-35-120-5R0-10-12-SFF	PL11685/1241	1GHZ-20GHZ	4/2/2020	4/2/2021
CDX8	COMPUTER	ELITE	WORKSTATION			N/A	
GRB0	1MHZ, LISN SIGNAL CHECKER	ELITE	LISNCHKR1M	1	1MHZ	1/9/2019	1/9/2021
GRE2	SIGNAL GENERATOR	AGILENT	E4438C	MY42081749	250KHZ-6GHZ	3/20/2020	3/20/2021
MEA3	MICRO-OHM METER	KEITHLEY	580	772667	10UOHM-200KOHM	6/4/2020	6/4/2021
NDQ0	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	311	400-1000MHZ	5/8/2020	5/8/2022
NTA4	BILOG ANTENNA	TESEQ	6112D	46660	20-2000GHZ	9/23/2019	9/23/2020
NWQ2	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS LINDGREN	3117	66659	1GHZ-18GHZ	4/7/2020	4/7/2022
RBG2	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101591	2HZ-44GHZ	3/23/2020	3/23/2021
SES0	24VDC POWER SUPPLY	P-TRANS	FS-32024-1M	001	18-27VDC	NOTE 1	
T1E0	10DB 25W ATTENUATOR	WEINSCHEL	46-10-43	AU1882	DC-18GHZ	3/19/2020	3/19/2022
T2S3	20DB 25W ATTENUATOR	WEINSCHEL	46-20-34	BV3544	DC-18GHZ	3/11/2020	3/11/2022
T2SK	20DB 25W ATTENUATOR	WEINSCHEL	46-20-34	CD5022	DC-18GHZ	3/19/2020	3/19/2022
VBR8	CISPR EN FCC CE VOLTAGE.exe					N/A	
VBV2	CISPR EN FCC ICES RE.EXE	ELITE	CISPR EN FCC ICES RE.EXE	---	---	N/A	
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	
XLT37	5W, 50 OHM TERMINATION	JFW INDUSTRIES	50T-199 N M	---	DC-18 GHZ	12/13/2019	12/13/2021

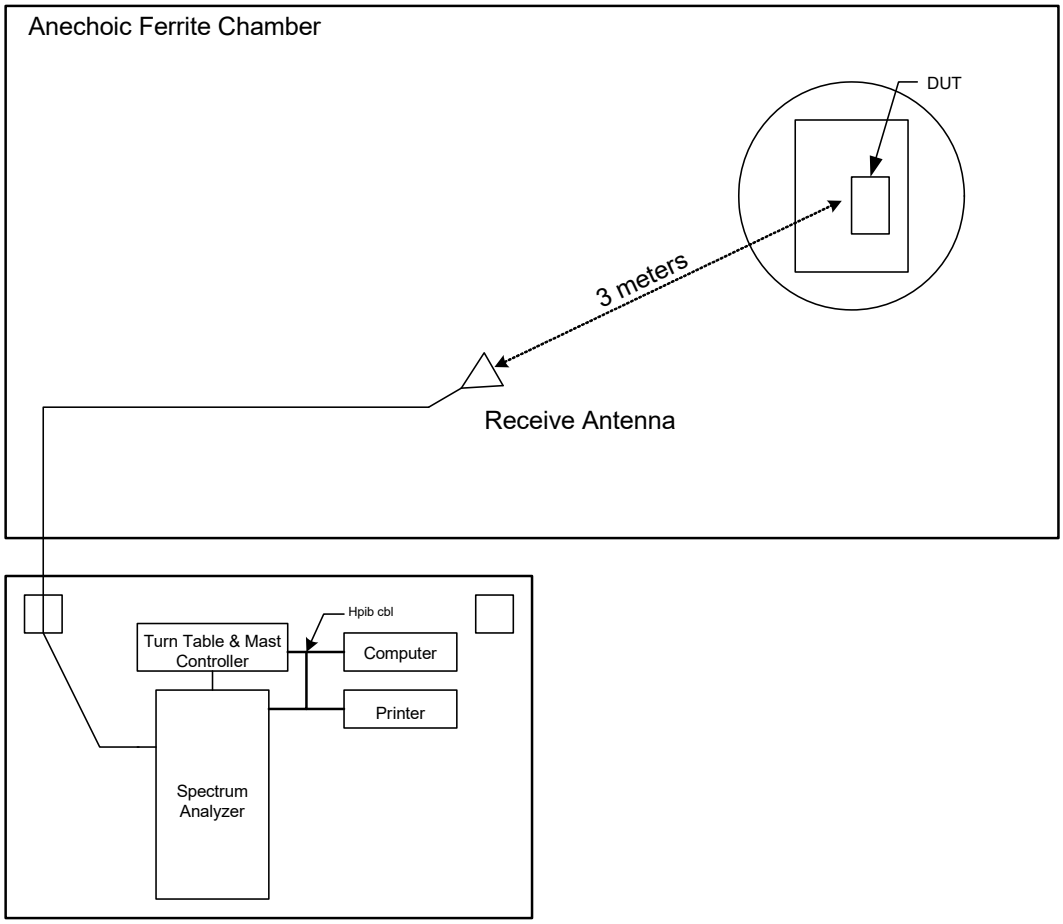
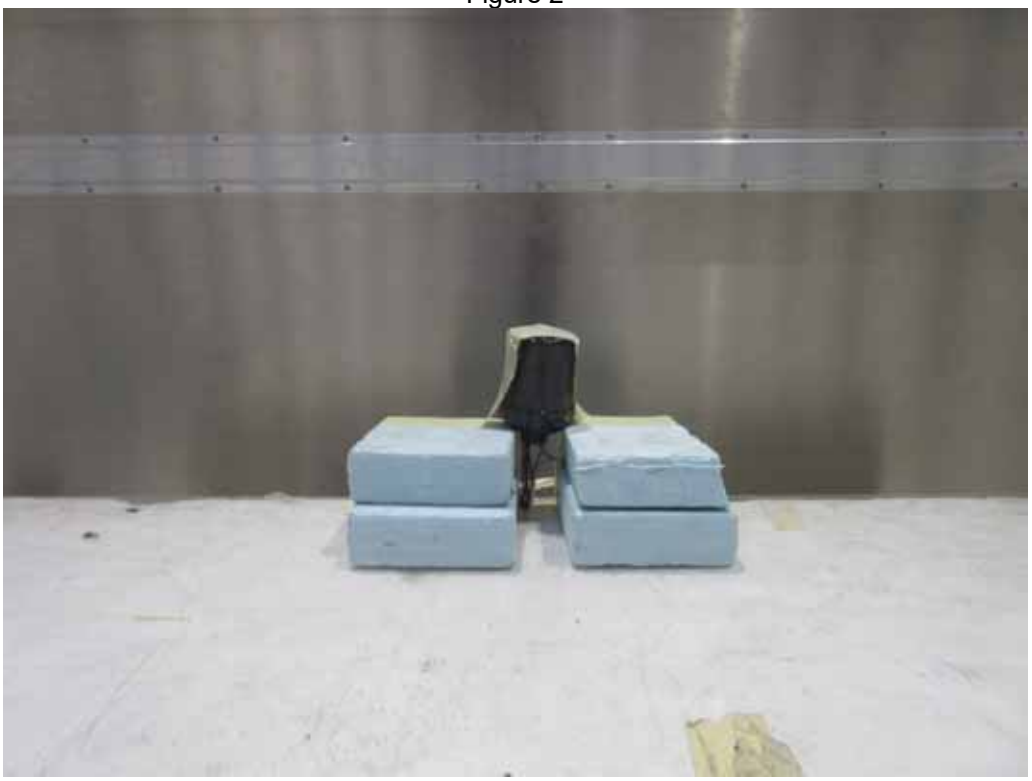


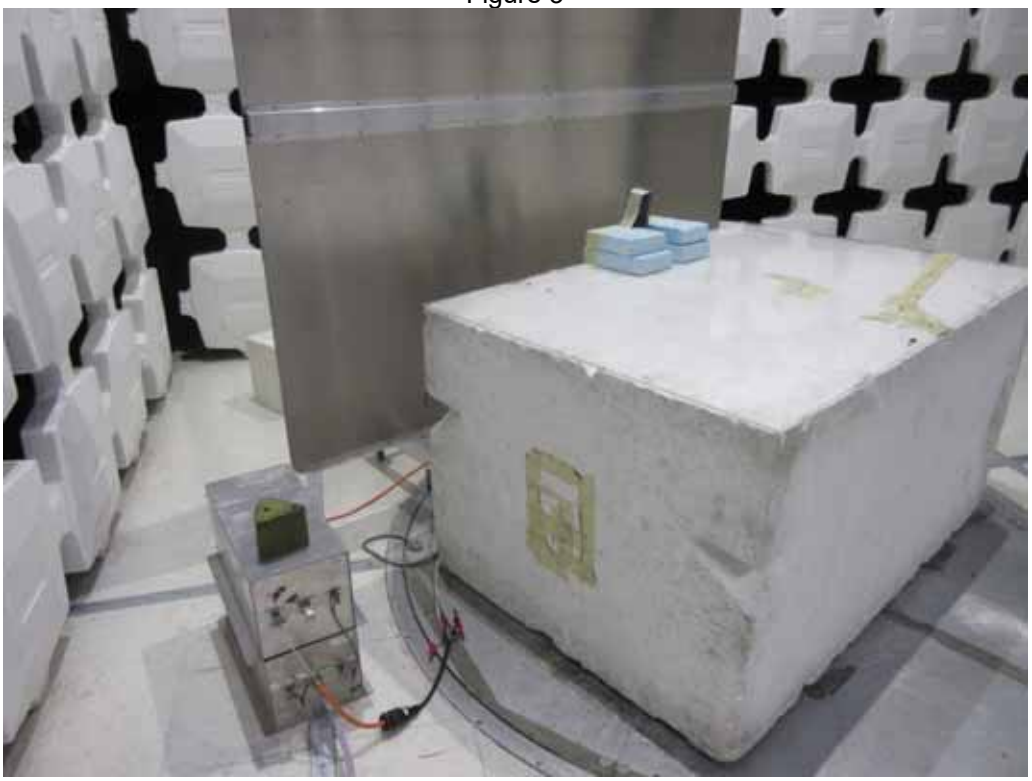
FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

Figure 2



Test Item Setup

Figure 3



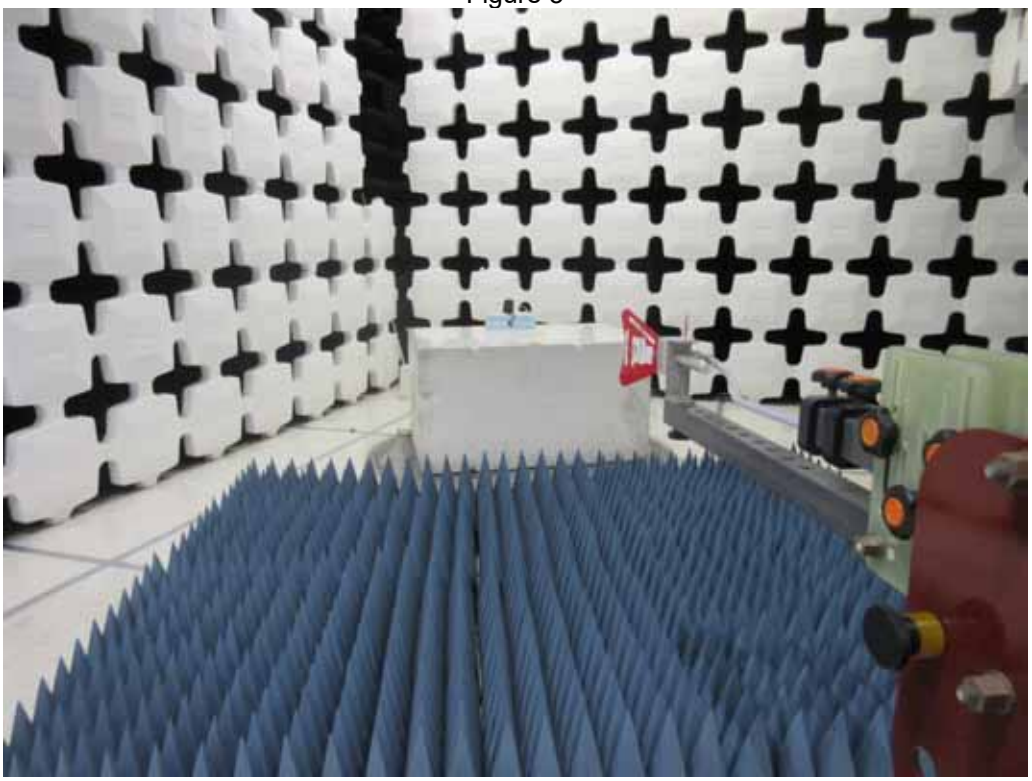
Test Setup for Conducted Emissions

Figure 4

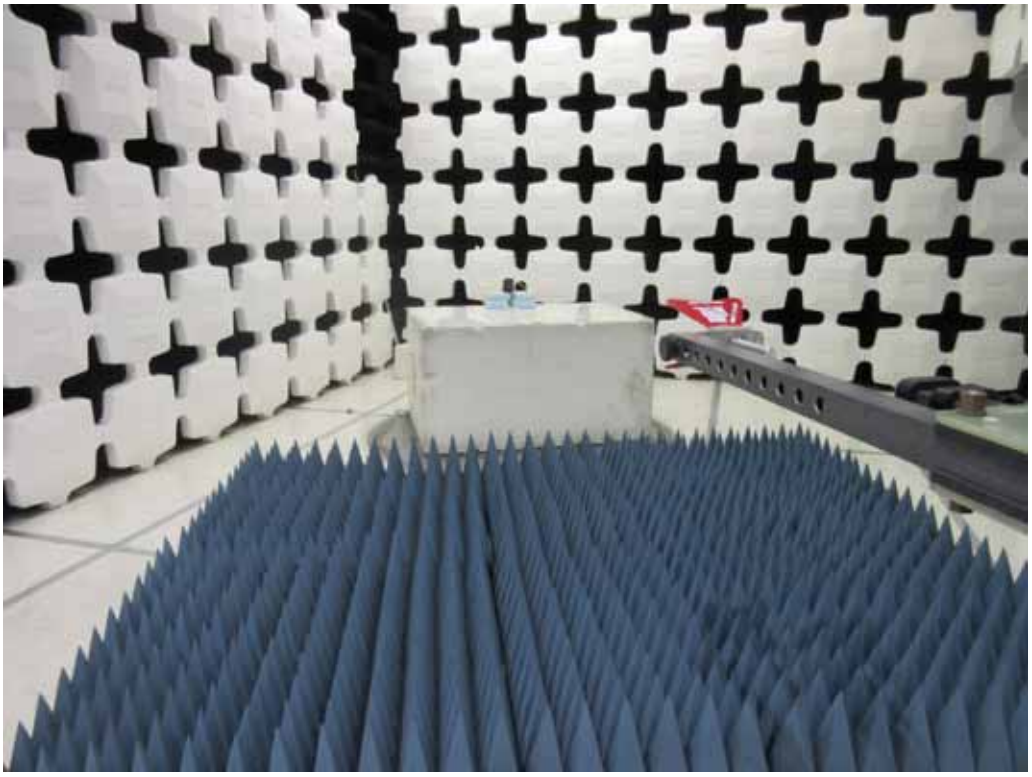
Test Setup for Radiated Emissions – 30MHz to 1GHz, Horizontal Polarization

Test Setup for Radiated Emissions – 30MHz to 1GHz, Vertical Polarization

Figure 5



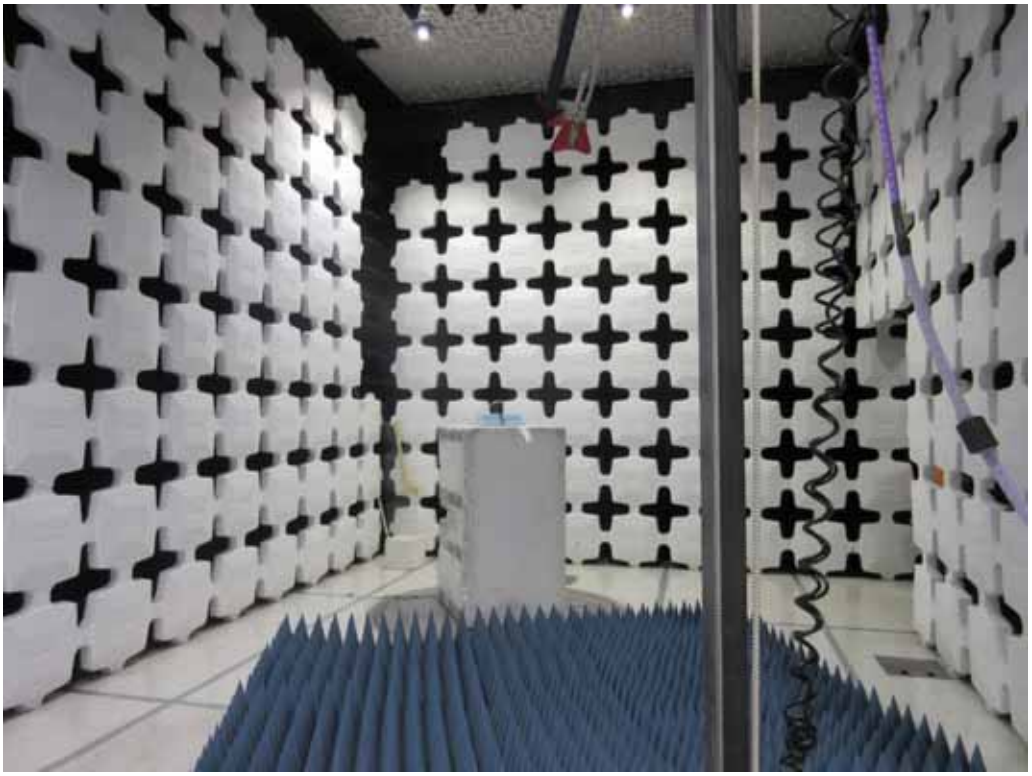
Test Setup for Radiated Emissions (Receiver) – 1 to 10GHz, Horizontal Polarization



Test Setup for Radiated Emissions (Receiver) – 1 to 10GHz, Vertical Polarization

Figure 6

Test Setup for Radiated Emissions (Transmitter) – 1 to 10GHz, Horizontal Polarization



Test Setup for Radiated Emissions (Transmitter) – 1 to 10GHz, Vertical Polarization

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 05/14/2020

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
DUT Revision	:	1.0
Serial Number	:	35000001
DUT Mode	:	RX @ 928MHZ
Line Tested	:	120VAC 60HZ HIGH LINE
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-10
Notes	:	
Test Engineer	:	T. Jozefczyk
Limit	:	Class A
Test Date	:	Jul 17, 2020 09:42:22 AM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit

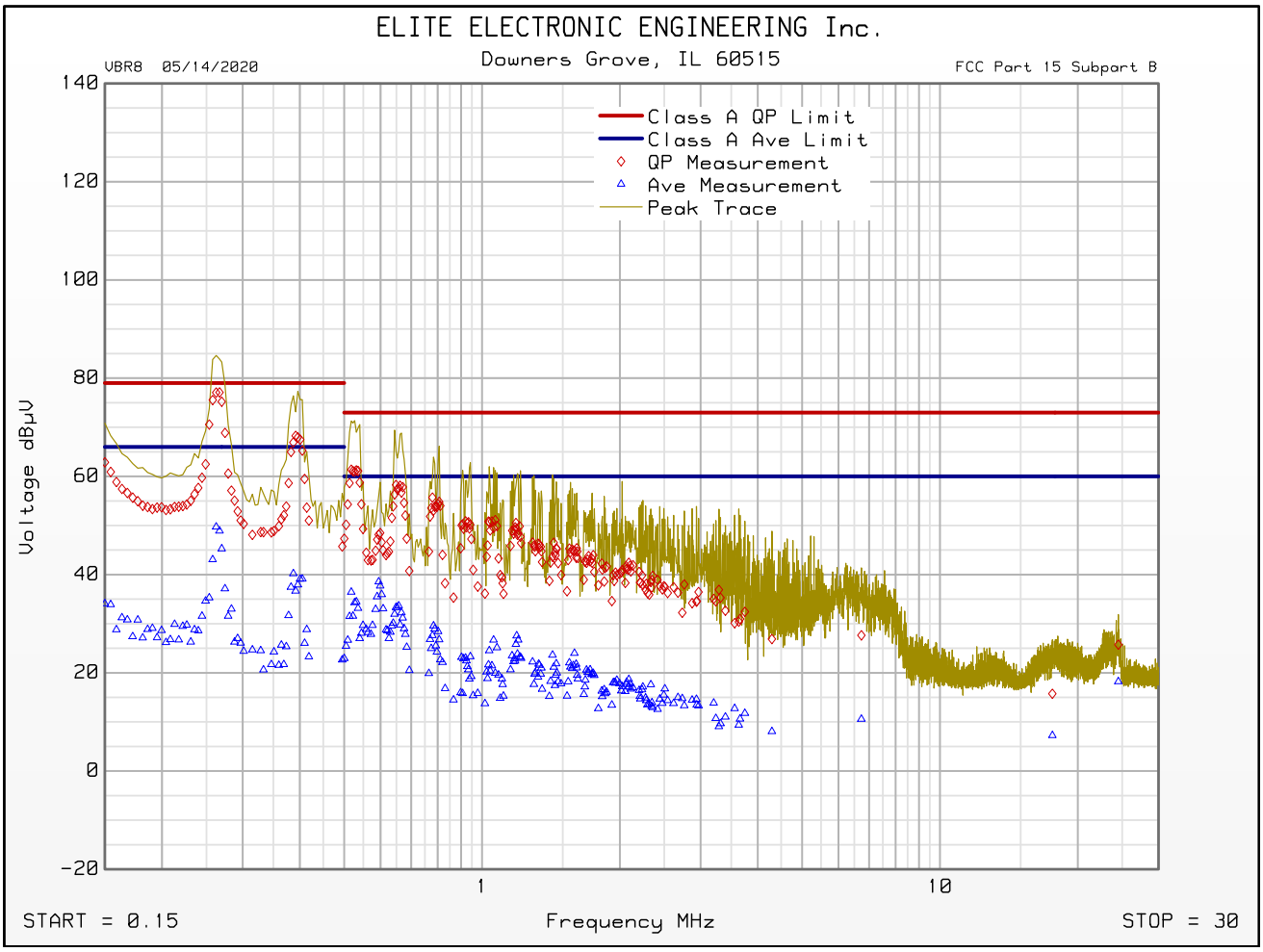
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.267	77.1	79.0		48.9	66.0	
0.270	75.2	79.0		45.3	66.0	
0.518	61.3	73.0		36.4	60.0	
1.069	51.1	73.0		19.9	60.0	
1.434	46.5	73.0		21.2	60.0	
2.359	39.7	73.0		13.0	60.0	
4.295	26.9	73.0		8.1	60.0	
6.734	27.6	73.0		10.6	60.0	
17.598	15.7	73.0		7.2	60.0	
24.522	25.7	73.0		18.2	60.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VBR8 05/14/2020

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
DUT Revision	:	1.0
Serial Number	:	35000001
DUT Mode	:	RX @ 928MHZ
Line Tested	:	120VAC 60HZ HIGH LINE
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-10
Notes	:	
Test Engineer	:	T. Jozefczyk
Limit	:	Class A
Test Date	:	Jul 17, 2020 09:42:22 AM



Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 05/14/2020

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
DUT Revision	:	1.0
Serial Number	:	35000001
DUT Mode	:	RX @ 928MHZ
Line Tested	:	120VAC 60HZ NEUTRAL LINE
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-10
Notes	:	
Test Engineer	:	T. Jozefczyk
Limit	:	Class A
Test Date	:	Jul 17, 2020 09:50:54 AM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit

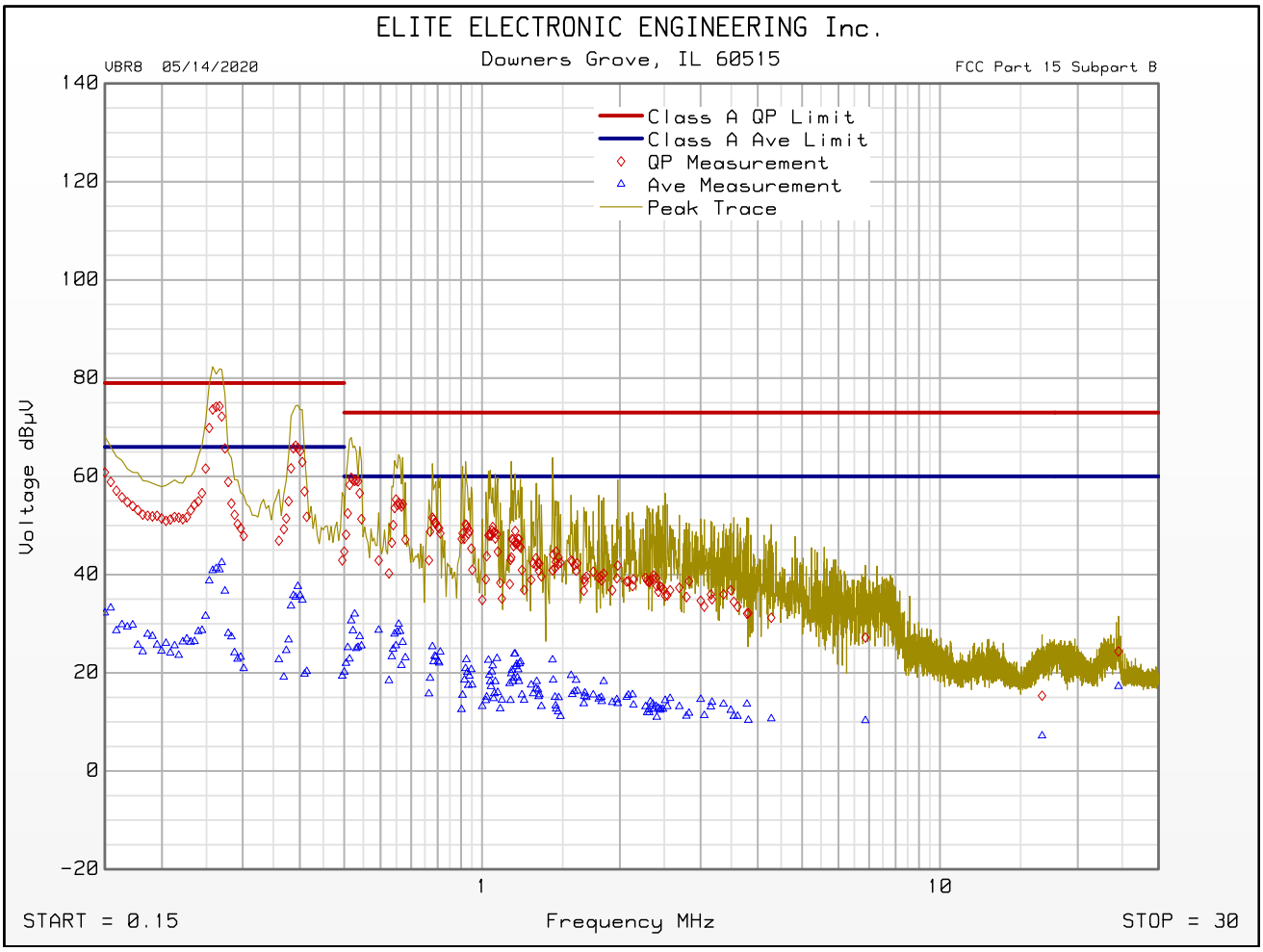
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.267	74.3	79.0		41.0	66.0	
0.270	72.2	79.0		42.5	66.0	
0.518	59.7	73.0		30.6	60.0	
0.920	50.2	73.0		20.9	60.0	
1.452	44.7	73.0		12.7	60.0	
2.368	39.8	73.0		12.6	60.0	
4.281	31.2	73.0		10.7	60.0	
6.874	27.2	73.0		10.3	60.0	
16.707	15.3	73.0		7.2	60.0	
24.535	24.4	73.0		17.3	60.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VBR8 05/14/2020

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
DUT Revision	:	1.0
Serial Number	:	35000001
DUT Mode	:	RX @ 928MHZ
Line Tested	:	120VAC 60HZ NEUTRAL LINE
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-10
Notes	:	
Test Engineer	:	T. Jozefczyk
Limit	:	Class A
Test Date	:	Jul 17, 2020 09:50:54 AM

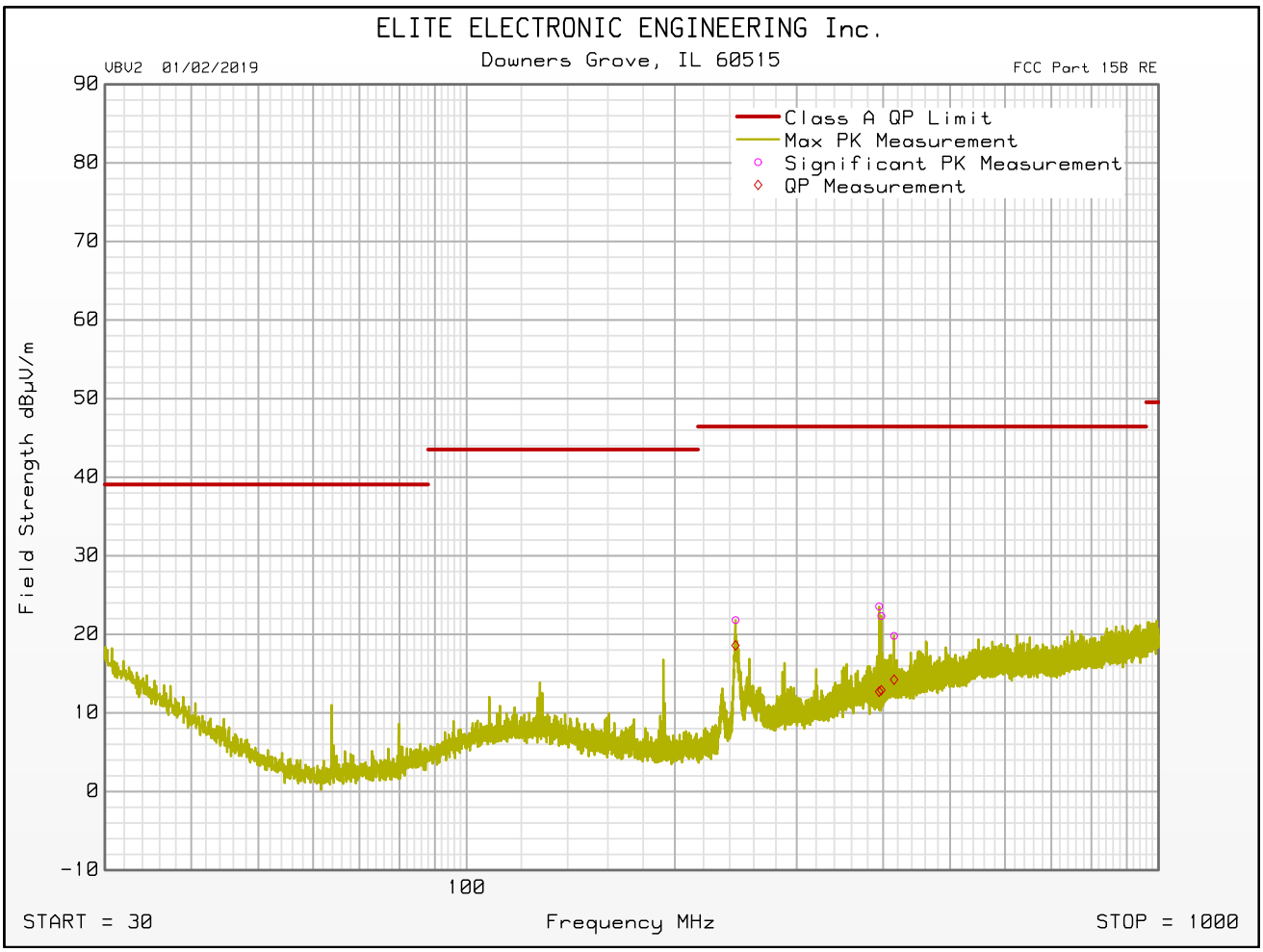


Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

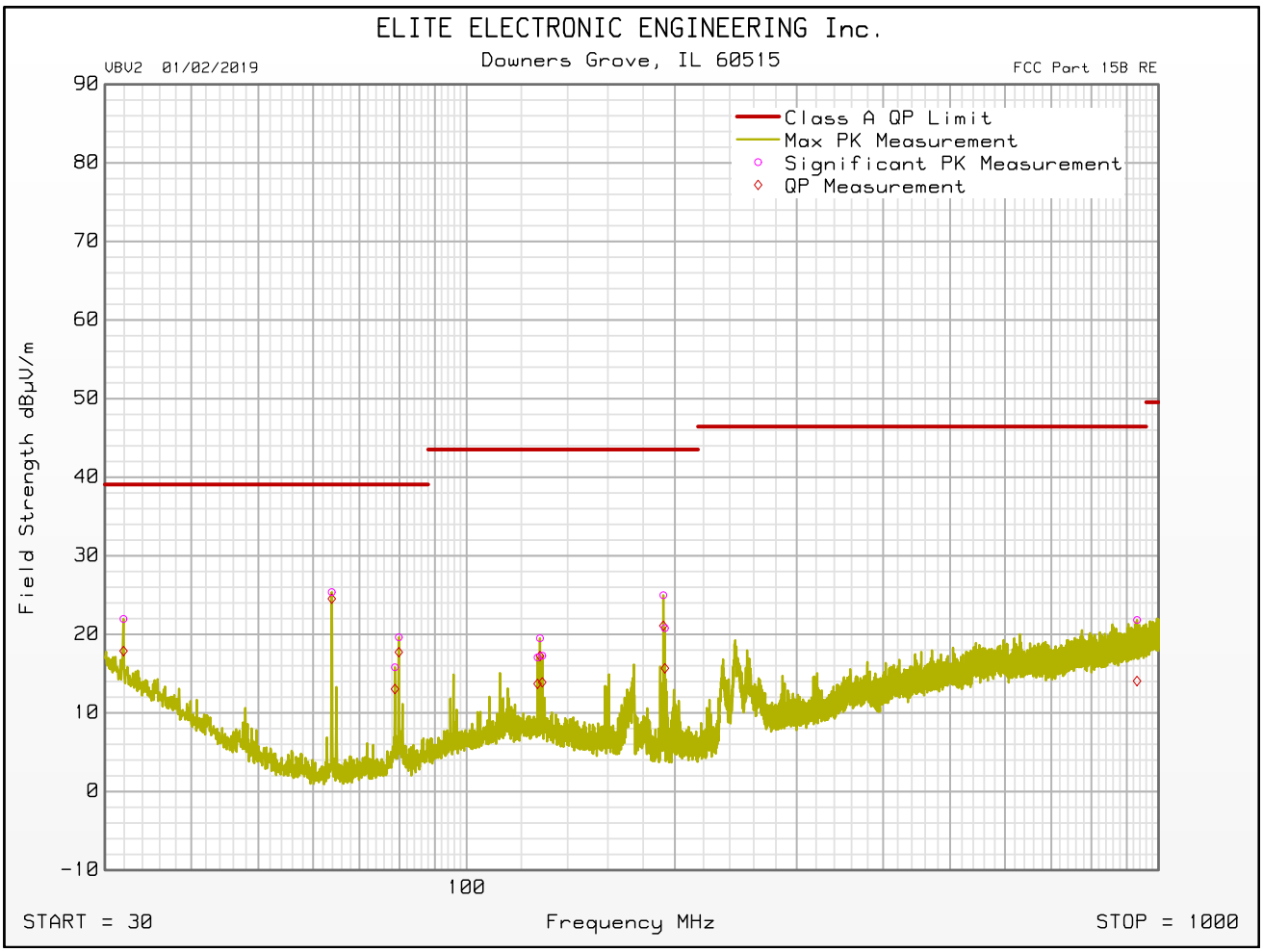
Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 902.7MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	H
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 20, 2020 10:39:19 AM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 902.7MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	V
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 20, 2020 10:39:19 AM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

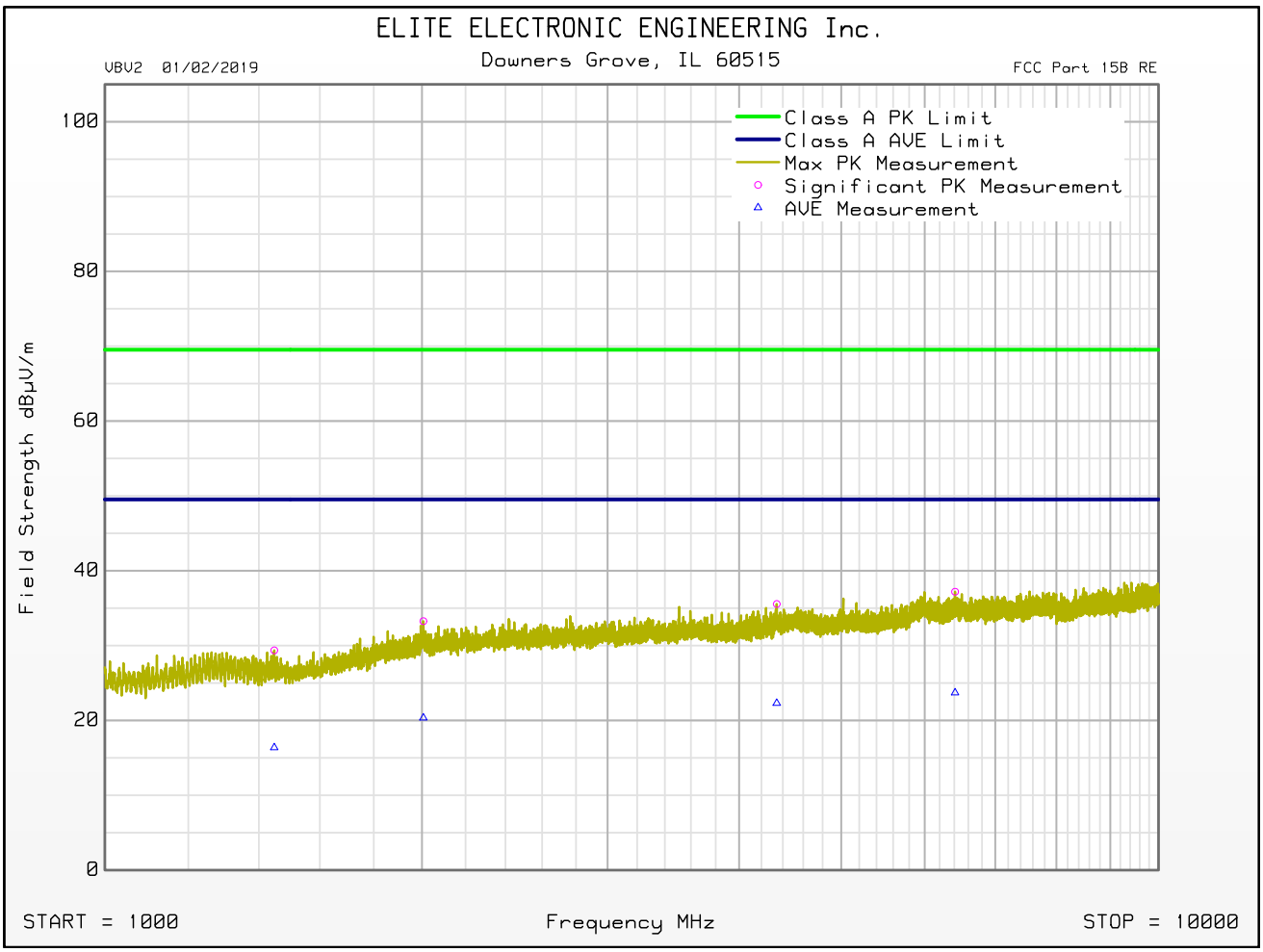
Manufacturer : IDEAL INDUSTRIES
Model : NEMA10DIM
Serial Number : 35000001
DUT Mode : RX @ 902.7MHZ
Turntable Step Angle (°): 45
Mast Positions (cm) : 120, 200, 340
Scan Type : Stepped Scan
Test RBW : 120 kHz
Prelim Dwell Time (s) : 0.0001
Notes : 120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer : T. Jozefczyk
Test Date : Jul 20, 2020 10:39:19 AM

Freq (MHz)	Peak Mtr Rdg (dBuV)	QP Mtr Rdg (dBuV)	Ant Fac (dB)	Amp Fac (dB)	Cbl Fac (dB)	Dist Corr (dB)	Peak Total (dBµV/m)	QP Total (dBµV/m)	QP Limit (dBµV/m)	QP Lim Mrg (dB)	Ant Pol	Mast Ht (cm)	Azim (°)
31.920	8.6	4.6	23.4	0.0	0.4	-10.5	22.0	17.9	39.1	-21.2	V	120	270
63.840	22.9	22.1	12.4	0.0	0.5	-10.5	25.4	24.5	39.1	-14.5	V	200	0
78.780	12.6	9.8	13.1	0.0	0.6	-10.5	15.8	13.0	39.1	-26.0	V	120	0
79.800	16.2	14.3	13.3	0.0	0.6	-10.5	19.6	17.7	39.1	-21.3	V	120	0
126.640	8.5	5.2	18.3	0.0	0.7	-10.5	17.1	13.7	43.5	-29.8	V	120	180
127.660	11.0	8.7	18.3	0.0	0.7	-10.5	19.5	17.3	43.5	-26.3	V	120	180
128.620	8.8	5.4	18.2	0.0	0.7	-10.5	17.3	13.9	43.5	-29.6	V	120	0
192.460	19.5	15.7	15.0	0.0	0.9	-10.5	25.0	21.1	43.5	-22.4	V	120	180
193.480	15.4	10.2	15.0	0.0	0.9	-10.5	20.8	15.7	43.5	-27.8	V	120	180
244.740	13.4	10.2	17.9	0.0	1.0	-10.5	21.8	18.6	46.4	-27.8	H	120	180
394.740	11.8	1.0	20.9	0.0	1.3	-10.5	23.6	12.7	46.4	-33.7	H	120	135
397.560	10.4	1.0	21.1	0.0	1.3	-10.5	22.3	12.9	46.4	-33.5	H	120	135
414.900	6.4	0.9	22.5	0.0	1.3	-10.5	19.8	14.2	46.4	-32.2	H	120	270
931.200	3.7	-4.1	26.7	0.0	1.9	-10.5	21.8	14.1	46.4	-32.4	V	120	270

FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

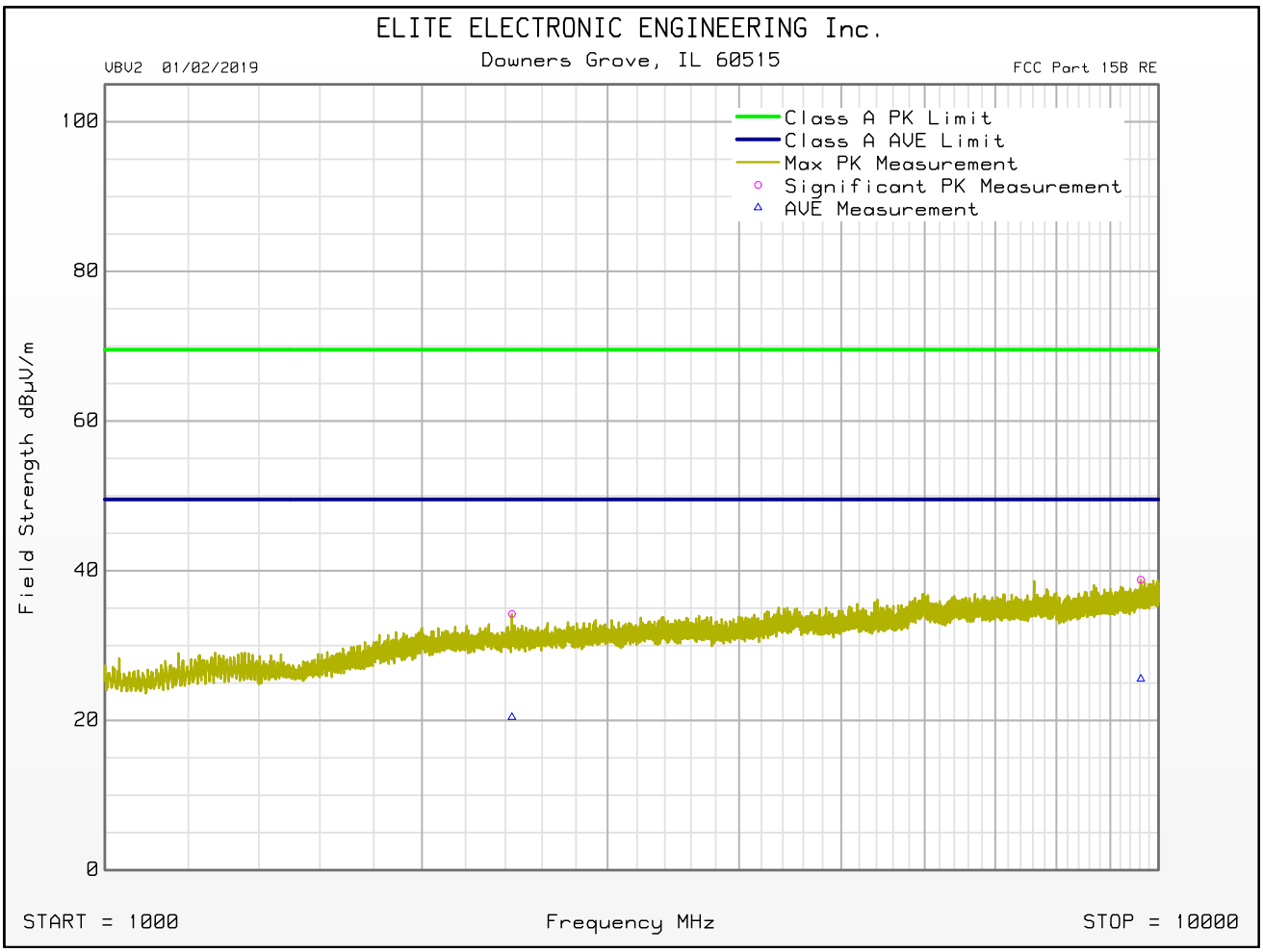
Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 902.7MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	H
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 21, 2020 11:44:27 AM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 902.7MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	V
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 21, 2020 11:44:27 AM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

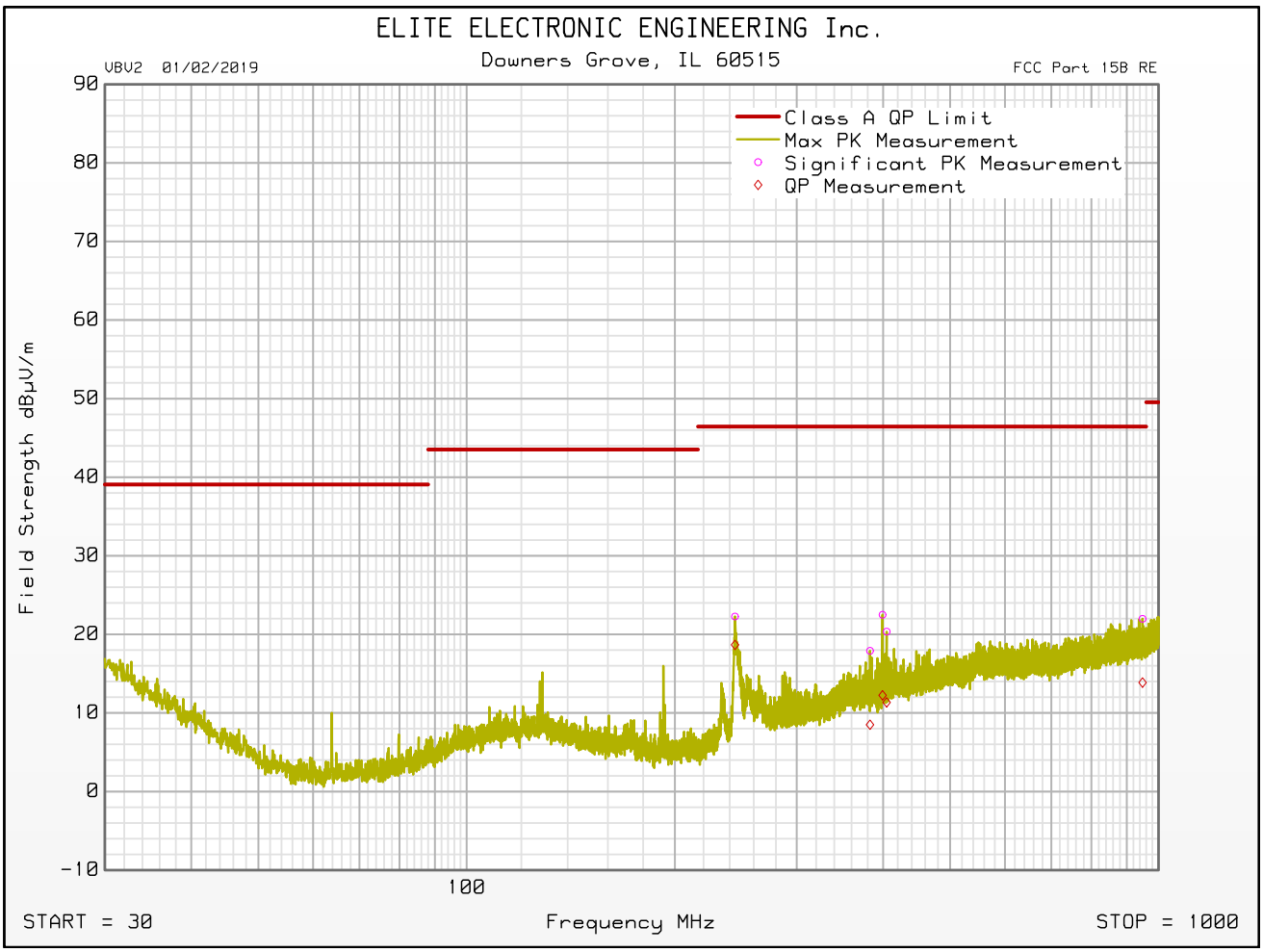
Manufacturer : IDEAL INDUSTRIES
Model : NEMA10DIM
Serial Number : 35000001
DUT Mode : RX @ 902.7MHZ
Turntable Step Angle (°): 45
Mast Positions (cm) : 120, 200, 340
Scan Type : Stepped Scan
Test RBW : 1 MHz
Prelim Dwell Time (s) : 0.0001
Notes : 120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer : T. Jozefczyk
Test Date : Jul 21, 2020 11:44:27 AM

Freq (GHz)	Peak Mtr Rdg (dBuV)	Ave. Mtr Rdg (dBuV)	Ant Fac (dB)	Amp Fac (dB)	Cbl Fac (dB)	Dist Corr (dB)	Peak Total (dBµV/m)	Peak Limit (dBµV/m)	Peak Lim Mrg (dB)	Ave. Total dBµV/m	Ave. Limit dBµV/m	Ave. Lim Mrg (dB)	Ant Pol	Mast Ht (cm)	Azim (°)
1.448	50.2	37.2	28.3	-41.1	2.4	-10.5	29.4	69.5	-40.2	16.4	49.5	-33.2	H	120	270
2.006	49.8	36.9	32.0	-40.8	2.8	-10.5	33.3	69.5	-36.3	20.3	49.5	-29.2	H	200	90
2.4345	49.9	36.1	32.2	-40.5	3.0	-10.5	34.2	69.5	-35.3	20.4	49.5	-29.1	V	120	315
4.3425	48.5	35.2	33.8	-40.2	4.0	-10.5	35.6	69.5	-34.0	22.3	49.5	-27.2	H	120	45
6.411	47.6	34.1	35.8	-40.4	4.7	-10.5	37.2	69.5	-32.3	23.7	49.5	-25.8	H	120	225
9.6225	46.8	33.6	36.8	-40.2	5.9	-10.5	38.8	69.5	-30.7	25.5	49.5	-24.0	V	200	45

FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

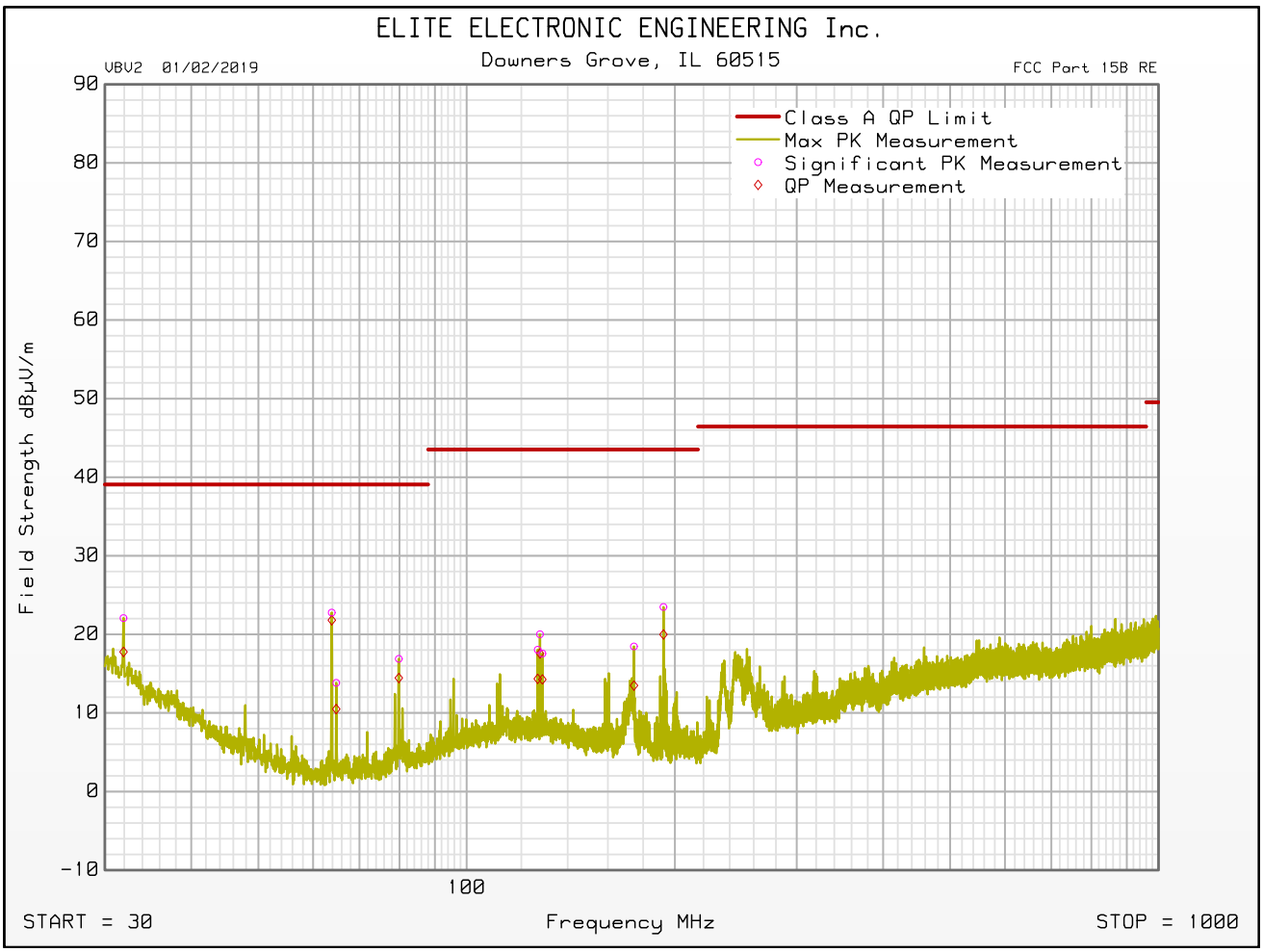
Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 915MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	H
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 20, 2020 10:04:19 AM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 915MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	V
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 20, 2020 10:04:19 AM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

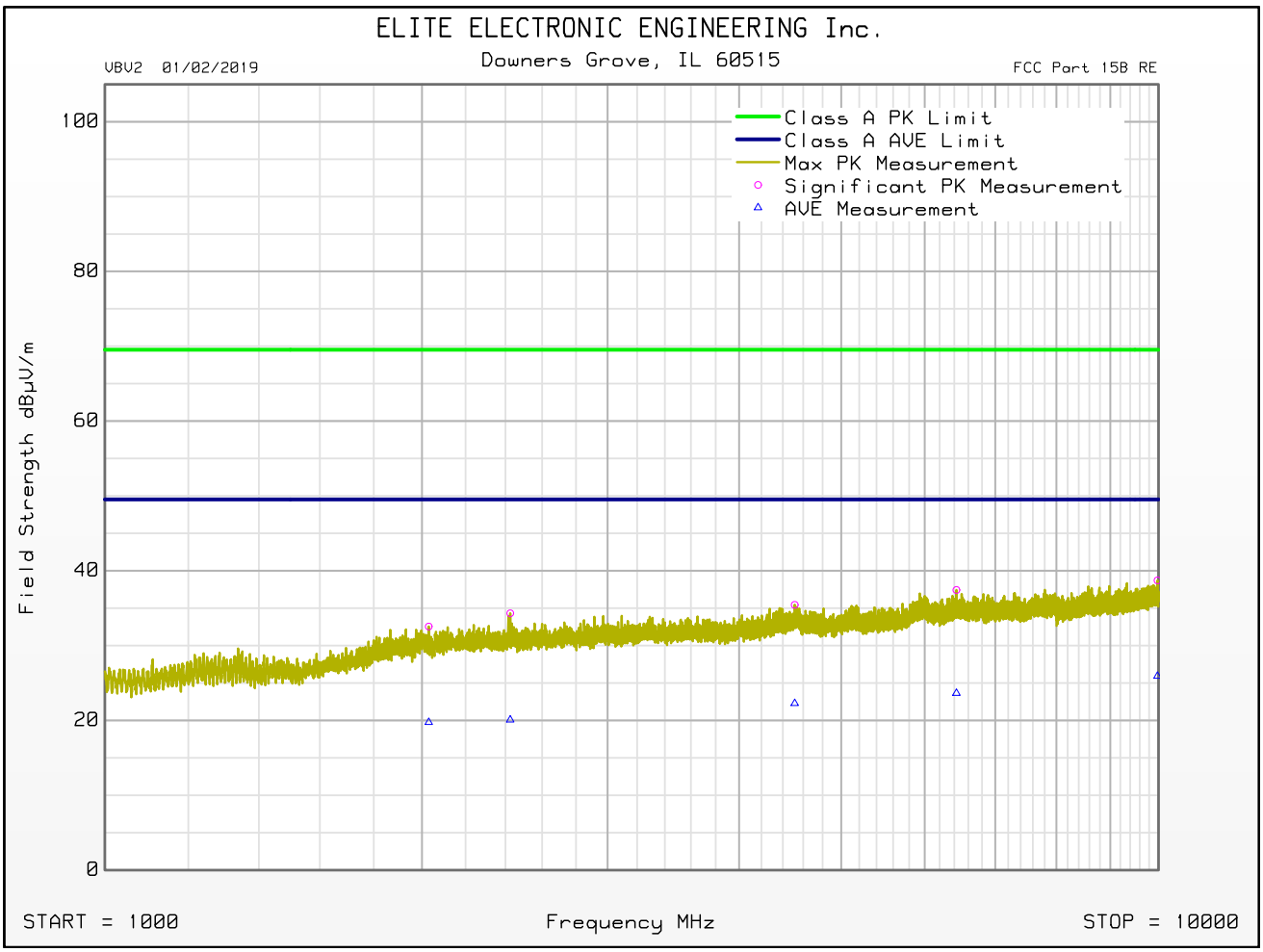
Manufacturer : IDEAL INDUSTRIES
Model : NEMA10DIM
Serial Number : 35000001
DUT Mode : RX @ 915MHZ
Turntable Step Angle (°): 45
Mast Positions (cm) : 120, 200, 340
Scan Type : Stepped Scan
Test RBW : 120 kHz
Prelim Dwell Time (s) : 0.0001
Notes : 120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer : T. Jozefczyk
Test Date : Jul 20, 2020 10:04:19 AM

Freq (MHz)	Peak Mtr Rdg (dBuV)	QP Mtr Rdg (dBuV)	Ant Fac (dB)	Amp Fac (dB)	Cbl Fac (dB)	Dist Corr (dB)	Peak Total (dBµV/m)	QP Total (dBµV/m)	QP Limit (dBµV/m)	QP Lim Mrg (dB)	Ant Pol	Mast Ht (cm)	Azim (°)
31.920	8.8	4.4	23.4	0.0	0.4	-10.5	22.1	17.8	39.1	-21.3	V	120	225
63.840	20.3	19.4	12.4	0.0	0.5	-10.5	22.8	21.8	39.1	-17.3	V	200	0
64.800	11.4	8.0	12.4	0.0	0.5	-10.5	13.8	10.5	39.1	-28.6	V	200	45
79.800	13.5	11.0	13.3	0.0	0.6	-10.5	16.9	14.4	39.1	-24.6	V	120	225
126.700	9.5	5.8	18.3	0.0	0.7	-10.5	18.0	14.3	43.5	-29.2	V	120	180
127.660	11.5	9.1	18.3	0.0	0.7	-10.5	20.0	17.6	43.5	-26.0	V	120	180
128.680	9.1	5.8	18.2	0.0	0.7	-10.5	17.6	14.3	43.5	-29.3	V	120	45
174.520	12.6	7.6	15.5	0.0	0.8	-10.5	18.5	13.5	43.5	-30.0	V	120	315
192.520	18.0	14.5	15.0	0.0	0.9	-10.5	23.5	20.0	43.5	-23.5	V	120	315
244.320	13.9	10.3	17.8	0.0	1.0	-10.5	22.3	18.7	46.4	-27.8	H	120	180
382.860	6.1	-3.3	21.1	0.0	1.2	-10.5	17.9	8.5	46.4	-37.9	H	120	225
399.240	10.4	0.2	21.3	0.0	1.3	-10.5	22.5	12.3	46.4	-34.2	H	120	135
404.700	7.8	-1.2	21.7	0.0	1.3	-10.5	20.3	11.3	46.4	-35.1	H	120	135
948.420	3.7	-4.4	26.8	0.0	1.9	-10.5	22.0	13.9	46.4	-32.6	H	200	315

FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

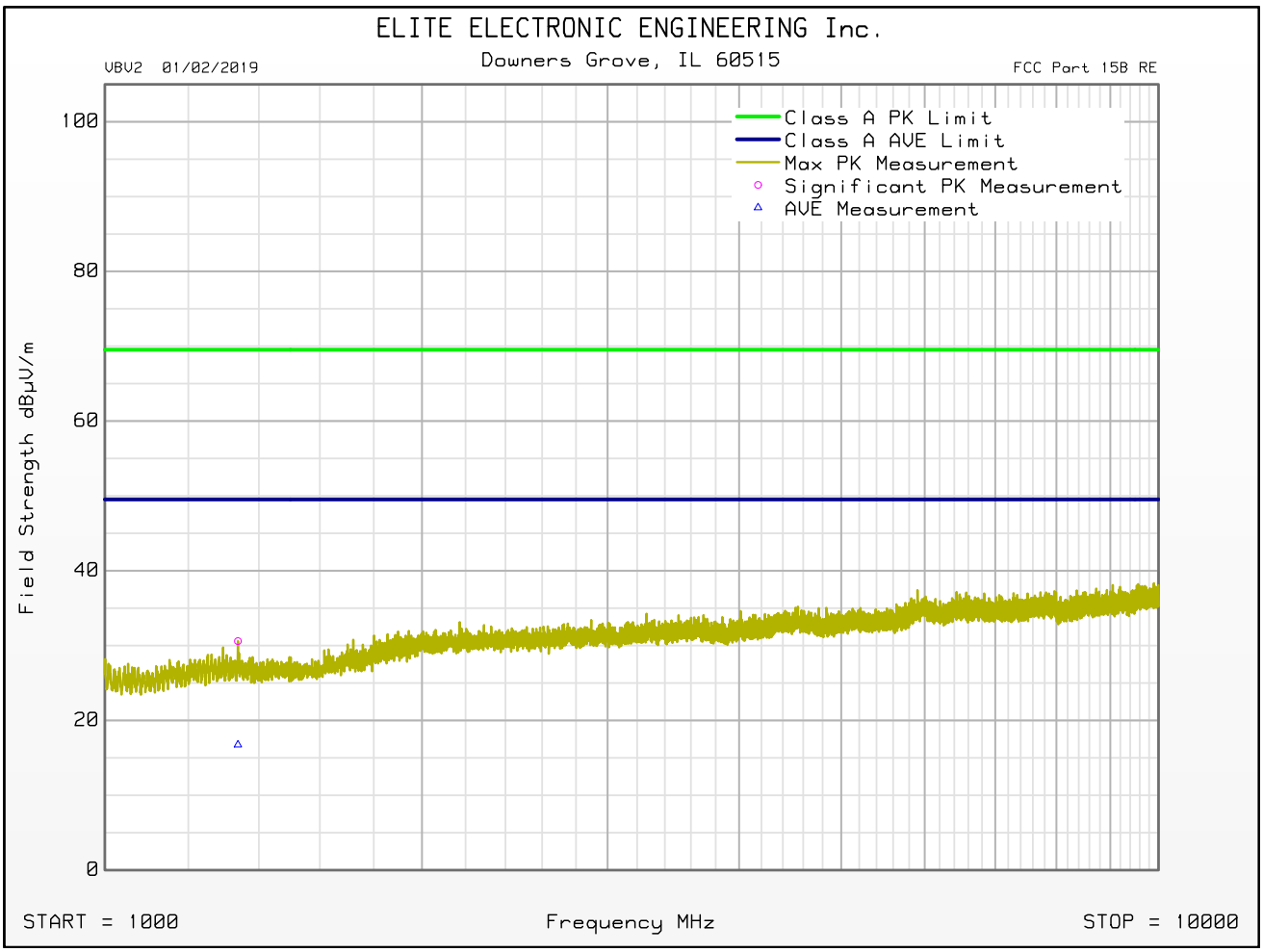
Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 915MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	H
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 21, 2020 12:04:18 PM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 915MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	V
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 21, 2020 12:04:18 PM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

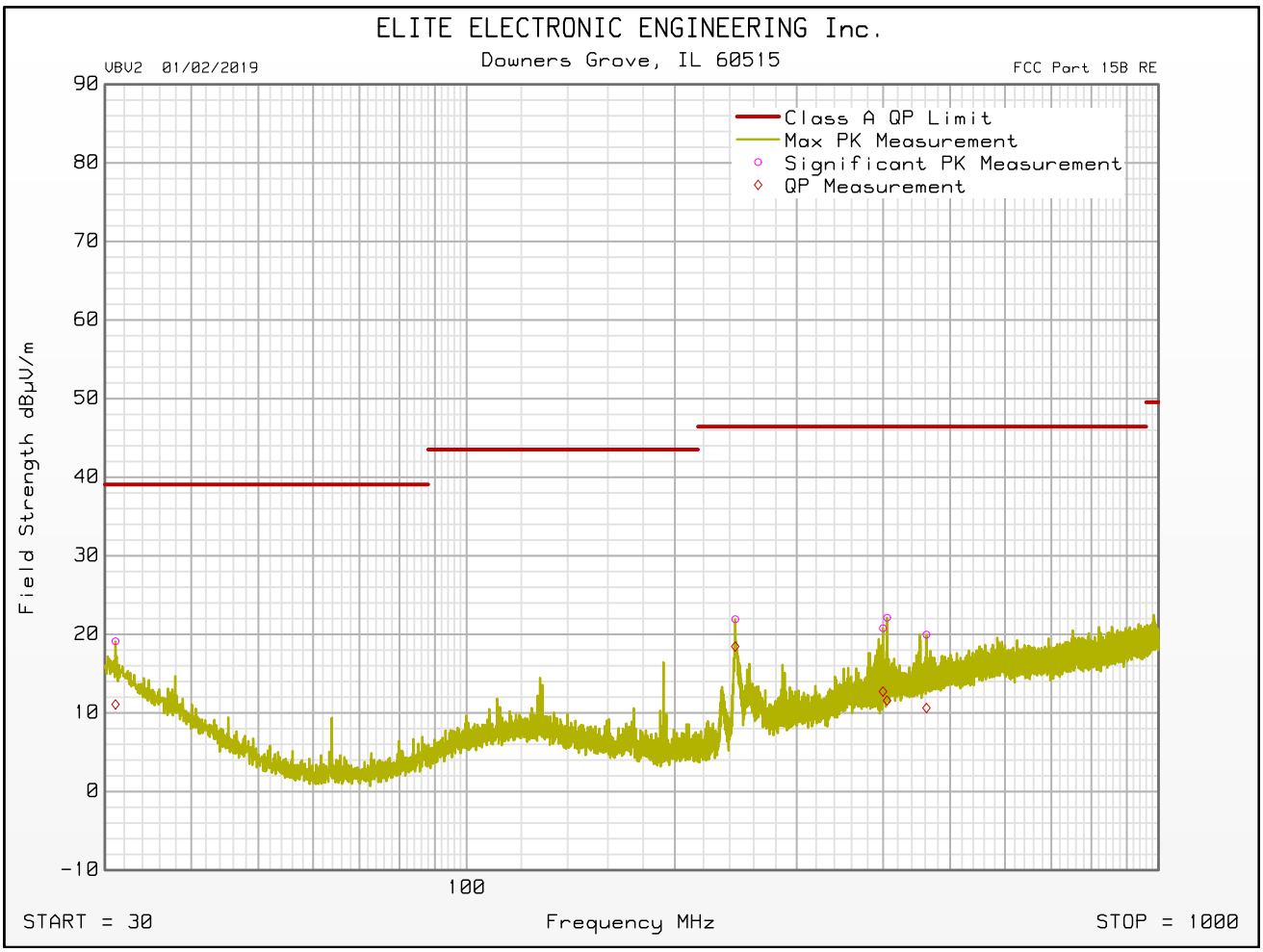
Manufacturer : IDEAL INDUSTRIES
Model : NEMA10DIM
Serial Number : 35000001
DUT Mode : RX @ 915MHZ
Turntable Step Angle (°): 45
Mast Positions (cm) : 120, 200, 340
Scan Type : Stepped Scan
Test RBW : 1 MHz
Prelim Dwell Time (s) : 0.0001
Notes : 120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer : T. Jozefczyk
Test Date : Jul 21, 2020 12:04:18 PM

Freq (GHz)	Peak Mtr Rdg (dBuV)	Ave. Mtr Rdg (dBuV)	Ant Fac (dB)	Amp Fac (dB)	Cbl Fac (dB)	Dist Corr (dB)	Peak Total (dBµV/m)	Peak Limit (dBµV/m)	Peak Lim Mrg (dB)	Ave. Total dBµV/m	Ave. Limit dBµV/m	Ave. Lim Mrg (dB)	Ant Pol	Mast Ht (cm)	Azim (°)
1.3375	50.7	36.8	29.0	-40.9	2.3	-10.5	30.6	69.5	-38.9	16.7	49.5	-32.8	V	120	315
2.0295	49.2	36.4	31.8	-40.8	2.8	-10.5	32.5	69.5	-37.0	19.7	49.5	-29.8	H	340	225
2.4255	50.0	35.8	32.2	-40.5	3.0	-10.5	34.3	69.5	-35.2	20.1	49.5	-29.5	H	340	315
4.516	48.0	34.9	34.2	-40.4	4.1	-10.5	35.4	69.5	-34.1	22.3	49.5	-27.3	H	200	45
6.43	47.8	34.0	35.8	-40.4	4.7	-10.5	37.4	69.5	-32.1	23.6	49.5	-25.9	H	340	270
9.9795	46.2	33.4	37.2	-40.1	6.0	-10.5	38.7	69.5	-30.8	25.9	49.5	-23.6	H	340	135

FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

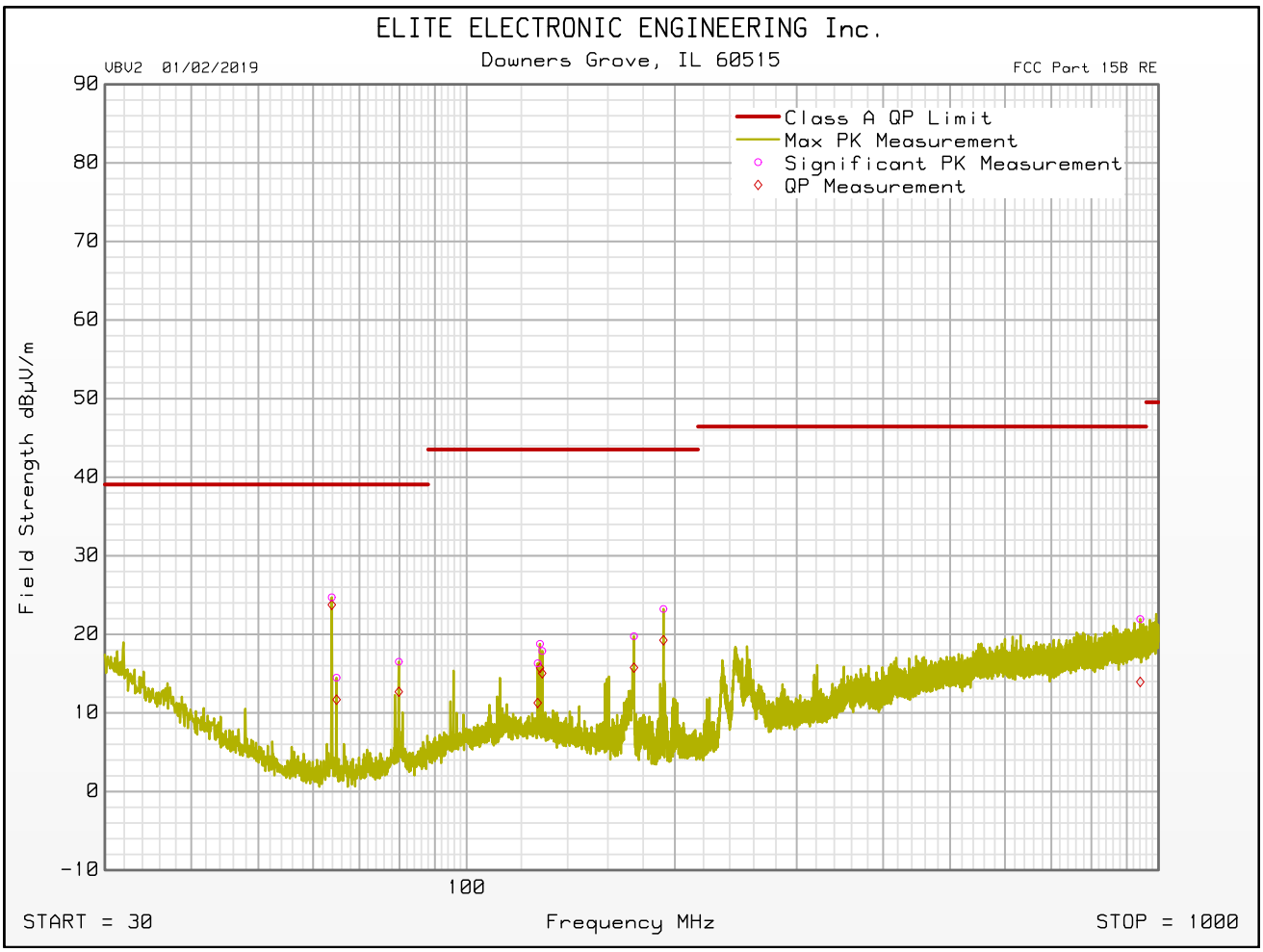
Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 927MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	H
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 20, 2020 10:22:47 AM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 927MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	V
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 20, 2020 10:22:47 AM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

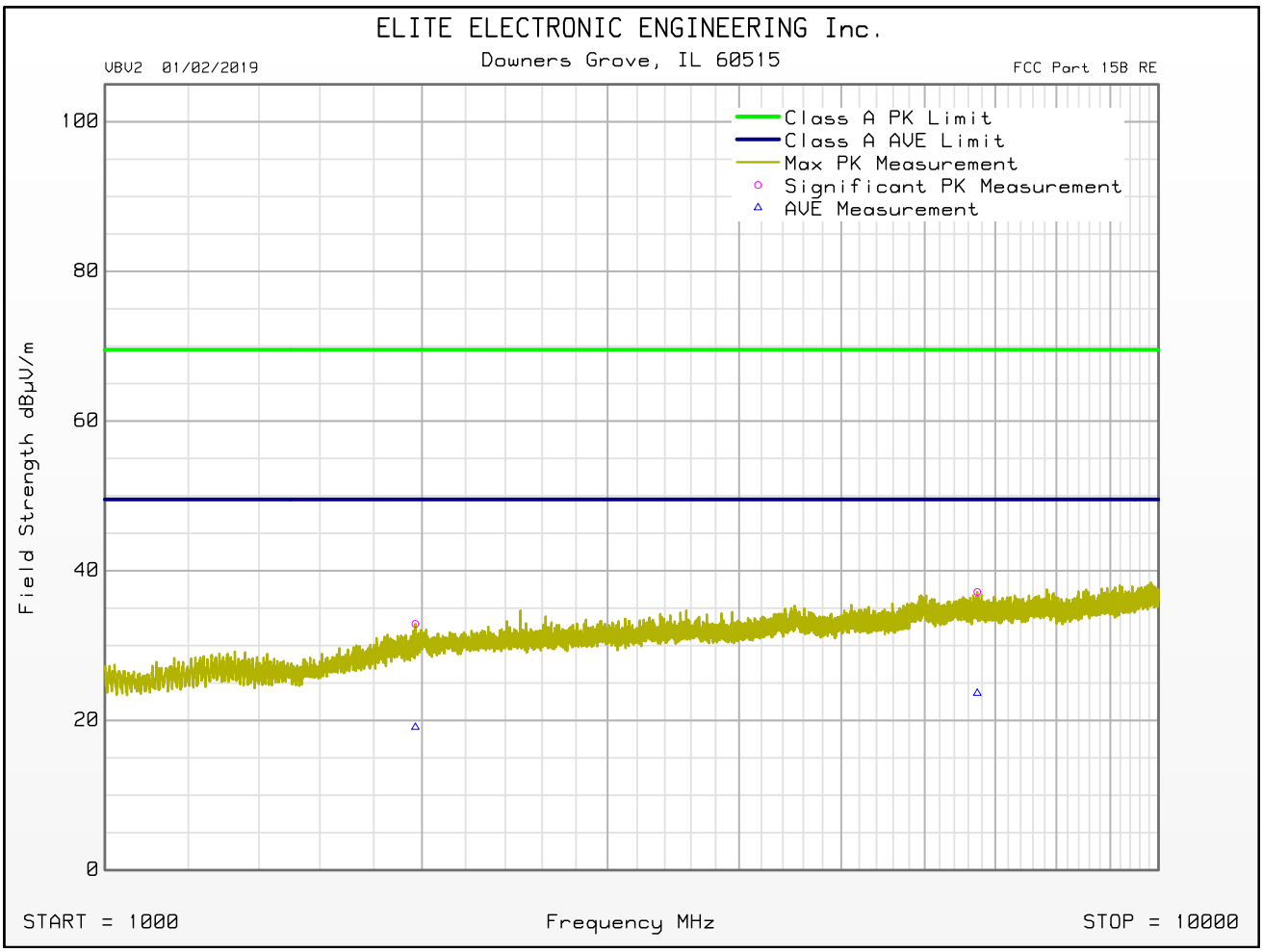
Manufacturer : IDEAL INDUSTRIES
Model : NEMA10DIM
Serial Number : 35000001
DUT Mode : RX @ 927MHZ
Turntable Step Angle (°): 45
Mast Positions (cm) : 120, 200, 340
Scan Type : Stepped Scan
Test RBW : 120 kHz
Prelim Dwell Time (s) : 0.0001
Notes : 120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer : T. Jozefczyk
Test Date : Jul 20, 2020 10:22:47 AM

Freq (MHz)	Peak Mtr Rdg (dBuV)	QP Mtr Rdg (dBuV)	Ant Fac (dB)	Amp Fac (dB)	Cbl Fac (dB)	Dist Corr (dB)	Peak Total (dBµV/m)	QP Total (dBµV/m)	QP Limit (dBµV/m)	QP Lim Mrg (dB)	Ant Pol	Mast Ht (cm)	Azim (°)
31.080	5.3	-2.8	23.9	0.0	0.3	-10.5	19.1	11.1	39.1	-28.0	H	120	315
63.840	22.3	21.3	12.4	0.0	0.5	-10.5	24.7	23.8	39.1	-15.3	V	200	0
64.860	12.0	9.2	12.4	0.0	0.5	-10.5	14.5	11.7	39.1	-27.4	V	200	0
79.800	13.1	9.3	13.3	0.0	0.6	-10.5	16.5	12.7	39.1	-26.4	V	340	0
126.700	7.8	2.8	18.3	0.0	0.7	-10.5	16.3	11.3	43.5	-32.2	V	120	180
127.660	10.3	7.2	18.3	0.0	0.7	-10.5	18.8	15.7	43.5	-27.8	V	120	135
128.620	9.4	6.6	18.2	0.0	0.7	-10.5	17.9	15.0	43.5	-28.5	V	120	45
174.520	13.9	9.9	15.5	0.0	0.8	-10.5	19.8	15.8	43.5	-27.8	V	120	0
192.520	17.8	13.8	15.0	0.0	0.9	-10.5	23.2	19.3	43.5	-24.3	V	120	180
244.500	13.6	10.1	17.8	0.0	1.0	-10.5	21.9	18.5	46.4	-28.0	H	120	180
399.780	8.7	0.6	21.3	0.0	1.3	-10.5	20.8	12.7	46.4	-33.7	H	120	135
405.240	9.5	-1.0	21.8	0.0	1.3	-10.5	22.1	11.6	46.4	-34.9	H	120	135
462.060	6.0	-3.3	23.0	0.0	1.4	-10.5	20.0	10.6	46.4	-35.8	H	120	135
941.100	3.8	-4.2	26.7	0.0	1.9	-10.5	21.9	13.9	46.4	-32.5	V	340	225

FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

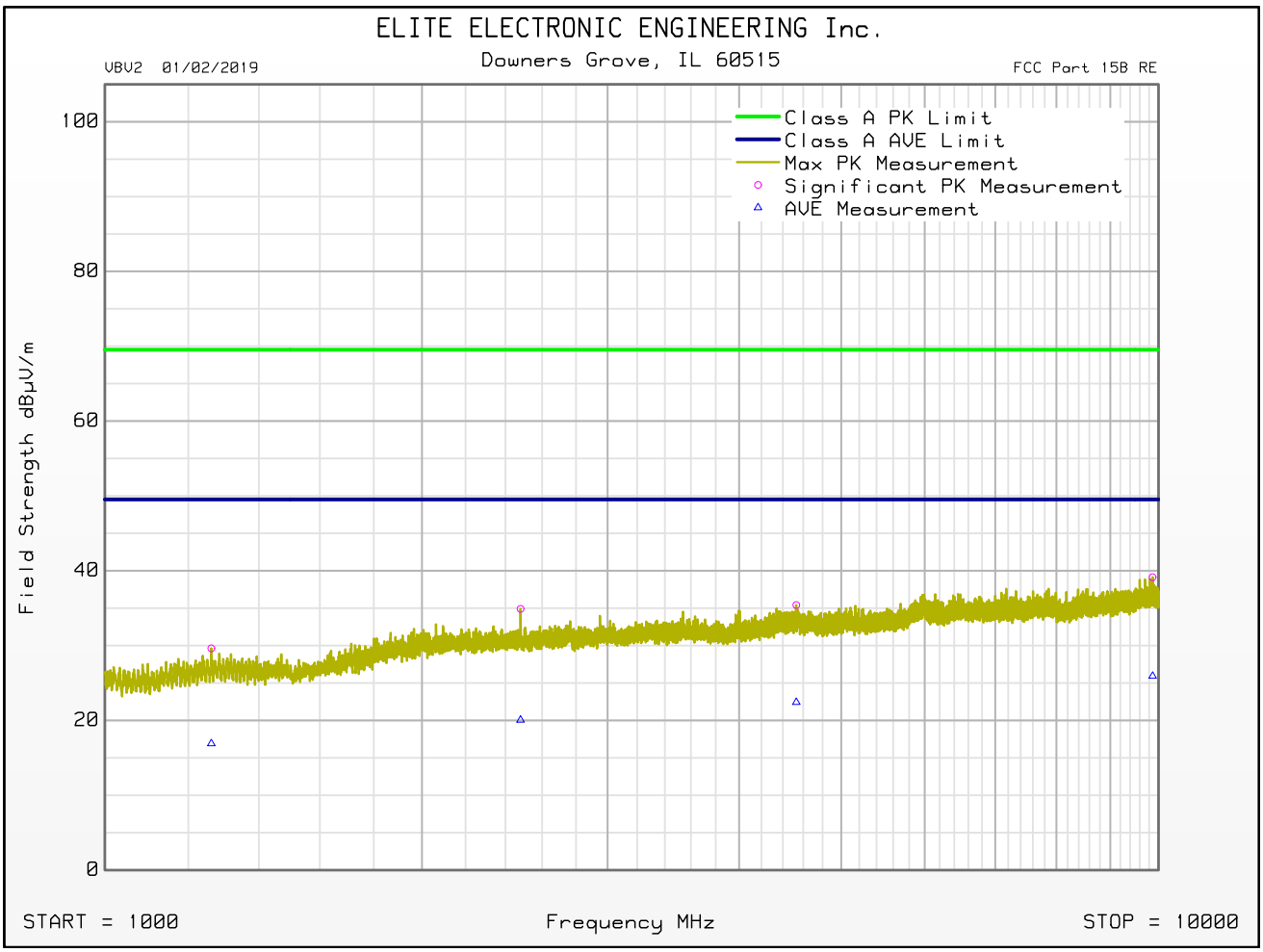
Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 927.3MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	H
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 21, 2020 01:08:23 PM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
Serial Number	:	35000001
DUT Mode	:	RX @ 927.3MHZ
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	V
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer	:	T. Jozefczyk
Test Date	:	Jul 21, 2020 01:08:23 PM



FCC Part 15B Class A Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer : IDEAL INDUSTRIES
Model : NEMA10DIM
Serial Number : 35000001
DUT Mode : RX @ 927.3MHZ
Turntable Step Angle (°): 45
Mast Positions (cm) : 120, 200, 340
Scan Type : Stepped Scan
Test RBW : 1 MHz
Prelim Dwell Time (s) : 0.0001
Notes : 120VAC 60HZ; 0.1UF CAP ADDED TO 24VDC POWER LINE
Test Engineer : T. Jozefczyk
Test Date : Jul 21, 2020 01:08:23 PM

Freq (GHz)	Peak Mtr Rdg (dBuV)	Ave. Mtr Rdg (dBuV)	Ant Fac (dB)	Amp Fac (dB)	Cbl Fac (dB)	Dist Corr (dB)	Peak Total (dBµV/m)	Peak Limit (dBµV/m)	Peak Lim Mrg (dB)	Ave. Total dBµV/m	Ave. Limit dBµV/m	Ave. Lim Mrg (dB)	Ant Pol	Mast Ht (cm)	Azim (°)
1.262	49.6	36.8	29.1	-40.8	2.2	-10.5	29.6	69.5	-39.9	16.9	49.5	-32.6	V	340	315
1.971	49.8	36.0	31.7	-40.9	2.8	-10.5	32.9	69.5	-36.6	19.1	49.5	-30.5	H	340	90
2.4805	50.5	35.6	32.3	-40.5	3.1	-10.5	34.9	69.5	-34.6	20.0	49.5	-29.5	V	120	135
4.532	47.9	34.9	34.3	-40.4	4.1	-10.5	35.4	69.5	-34.1	22.4	49.5	-27.1	V	200	270
6.731	47.4	33.9	35.9	-40.5	4.8	-10.5	37.2	69.5	-32.4	23.6	49.5	-25.9	H	340	315
9.873	46.7	33.5	37.1	-40.2	6.0	-10.5	39.1	69.5	-30.4	25.9	49.5	-23.6	V	200	315

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 05/14/2020

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
DUT Revision	:	1.0
Serial Number	:	35000001
DUT Mode	:	TX @ 902MHZ
Line Tested	:	120VAC 60HZ HIGH LINE
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-10
Notes	:	
Test Engineer	:	T. Jozefczyk
Limit	:	Class A
Test Date	:	Jul 17, 2020 10:23:07 AM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit

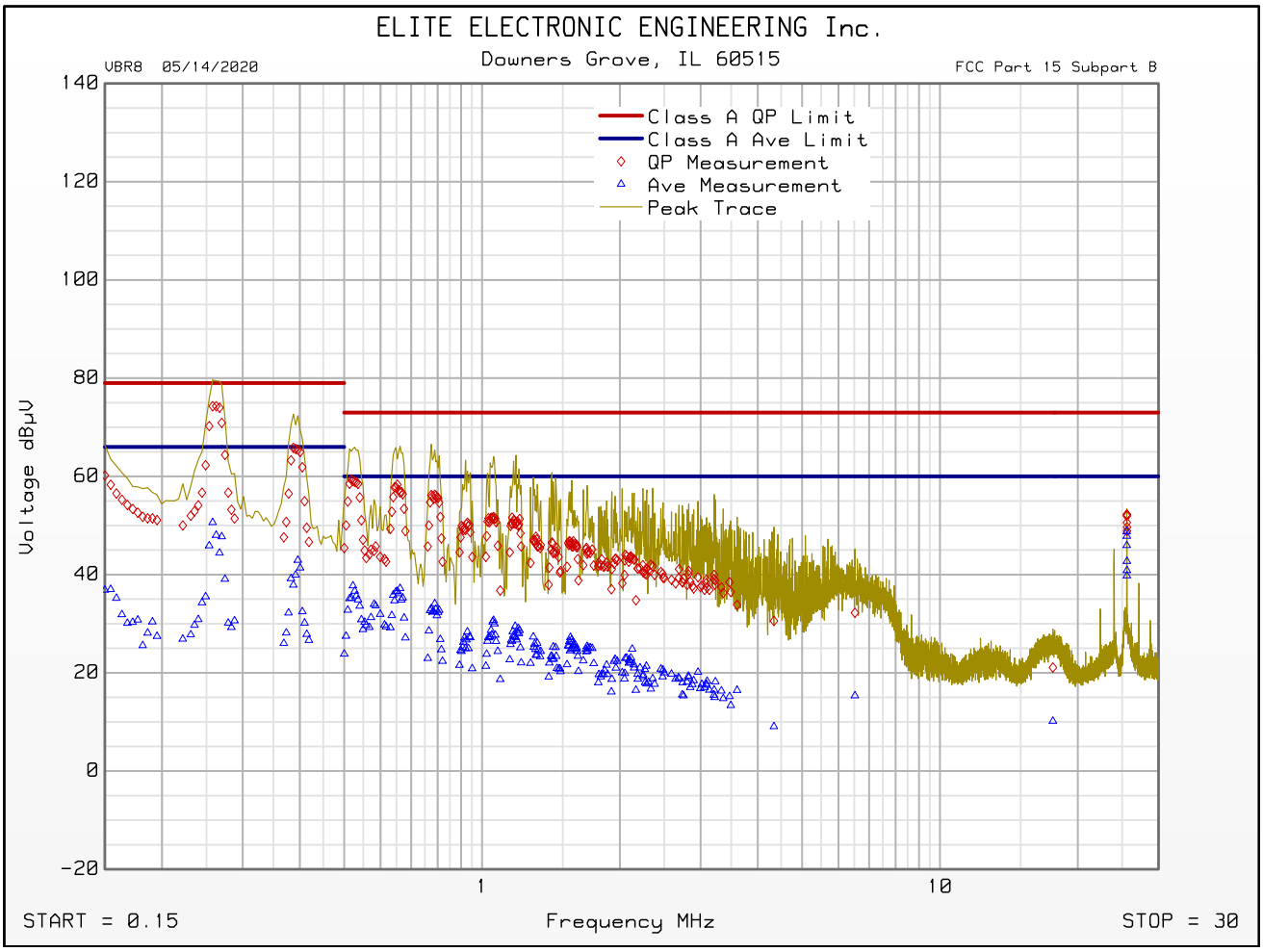
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.258	74.3	79.0		50.6	66.0	
0.270	70.9	79.0		47.7	66.0	
0.518	59.4	73.0		35.2	60.0	
1.060	51.7	73.0		30.7	60.0	
1.551	46.8	73.0		26.4	60.0	
2.336	42.0	73.0		16.7	60.0	
4.340	30.6	73.0		9.1	60.0	
6.518	32.2	73.0		15.3	60.0	
17.647	21.1	73.0		10.2	60.0	
25.593	52.2	73.0		48.8	60.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VBR8 05/14/2020

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
DUT Revision	:	1.0
Serial Number	:	35000001
DUT Mode	:	TX @ 902MHZ
Line Tested	:	120VAC 60HZ HIGH LINE
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-10
Notes	:	
Test Engineer	:	T. Jozefczyk
Limit	:	Class A
Test Date	:	Jul 17, 2020 10:23:07 AM



Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 05/14/2020

Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
DUT Revision	:	1.0
Serial Number	:	35000001
DUT Mode	:	TX @ 902MHZ
Line Tested	:	120VAC 60HZ NEUTRAL LINE
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-10
Notes	:	
Test Engineer	:	T. Jozefczyk
Limit	:	Class A
Test Date	:	Jul 17, 2020 10:12:51 AM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit

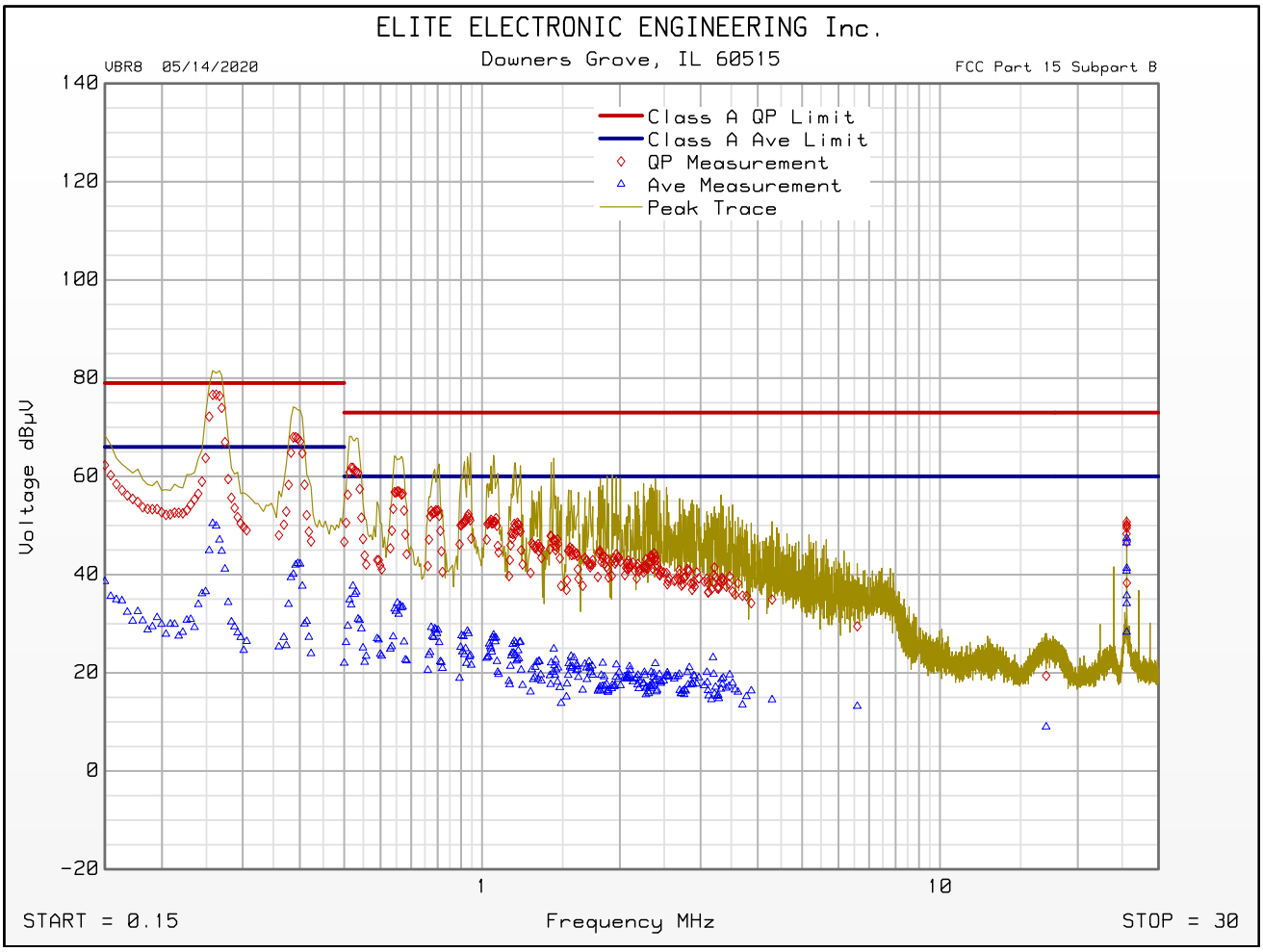
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.263	76.6	79.0		49.9	66.0	
0.270	73.9	79.0		44.8	66.0	
0.518	61.8	73.0		33.8	60.0	
0.934	52.3	73.0		28.0	60.0	
1.412	47.9	73.0		17.7	60.0	
2.377	44.4	73.0		18.2	60.0	
4.299	34.9	73.0		14.5	60.0	
6.599	29.5	73.0		13.2	60.0	
17.058	19.4	73.0		9.0	60.0	
25.575	50.7	73.0		47.4	60.0	

FCC Part 15 Subpart B Conducted Emissions Test

Cumulative Data

VBR8 05/14/2020

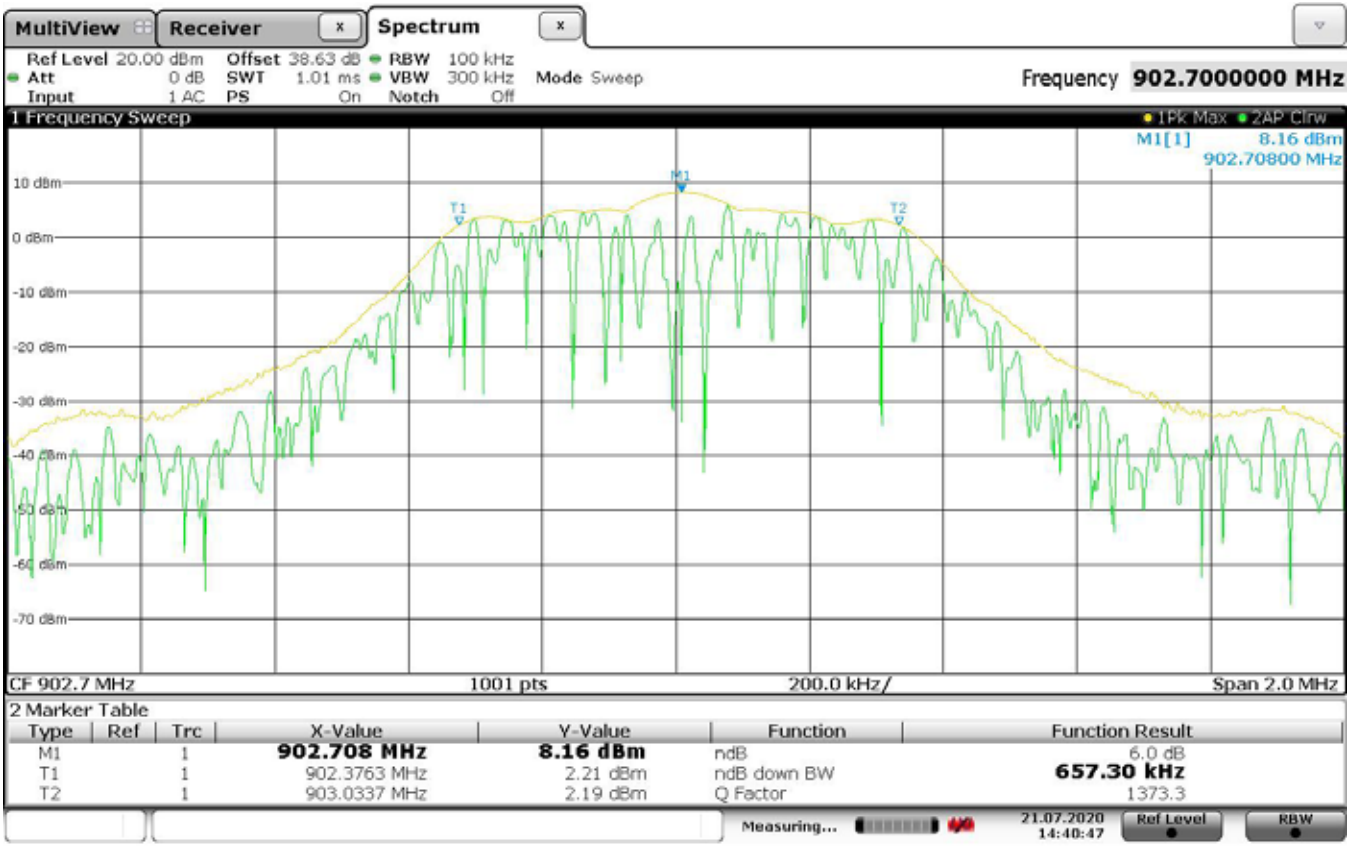
Manufacturer	:	IDEAL INDUSTRIES
Model	:	NEMA10DIM
DUT Revision	:	1.0
Serial Number	:	35000001
DUT Mode	:	TX @ 902MHZ
Line Tested	:	120VAC 60HZ NEUTRAL LINE
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-10
Notes	:	
Test Engineer	:	T. Jozefczyk
Limit	:	Class A
Test Date	:	Jul 17, 2020 10:12:51 AM



Emissions Meet QP Limit
Emissions Meet Ave Limit

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – Occupied Bandwidth - Conducted
MODE	TX – 902.7MHz
DATE TESTED	July 22, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	6dB BW = 657.3kHz

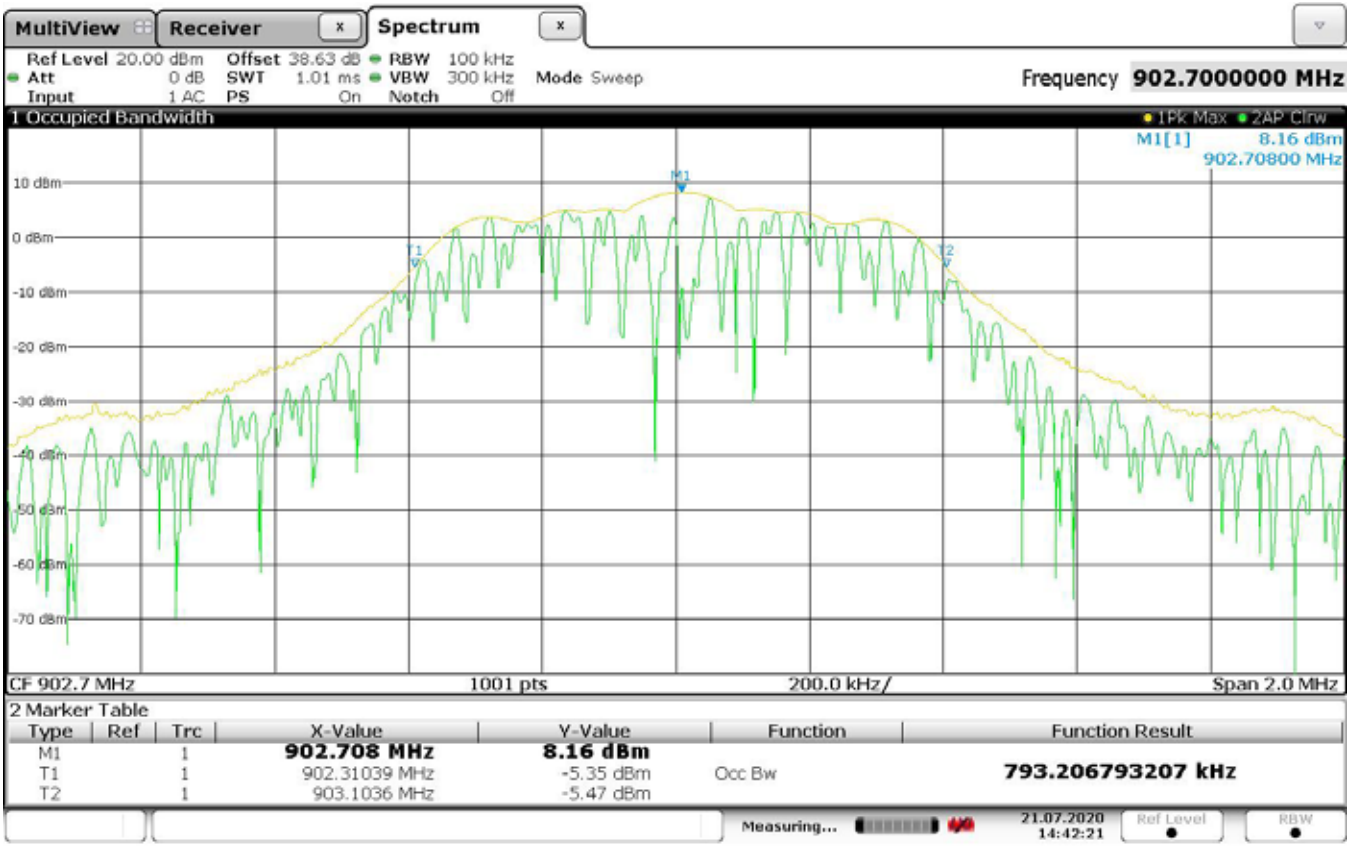
OCCUPIED BANDWIDTH – 6DB BW



Date: 21.JUL.2020 14:40:47

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – Occupied Bandwidth - Conducted
MODE	TX – 902.7MHz
DATE TESTED	July 22, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	99% BW = 793.2kHz

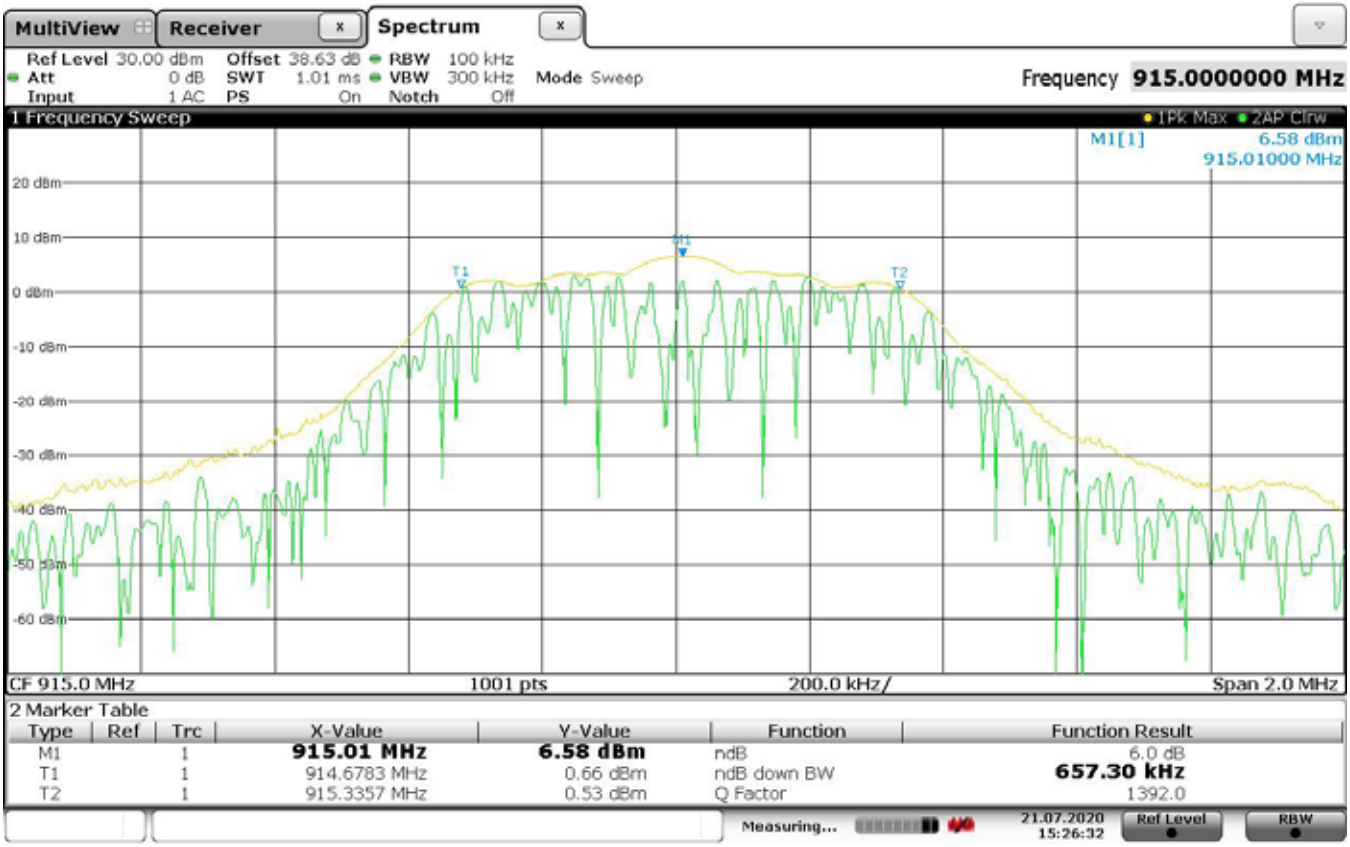
OCCUPIED BANDWIDTH – 99%



Date: 21.JUL.2020 14:42:21

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – Occupied Bandwidth - Conducted
MODE	TX – 915MHz
DATE TESTED	July 22, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	6dB BW = 657.3kHz

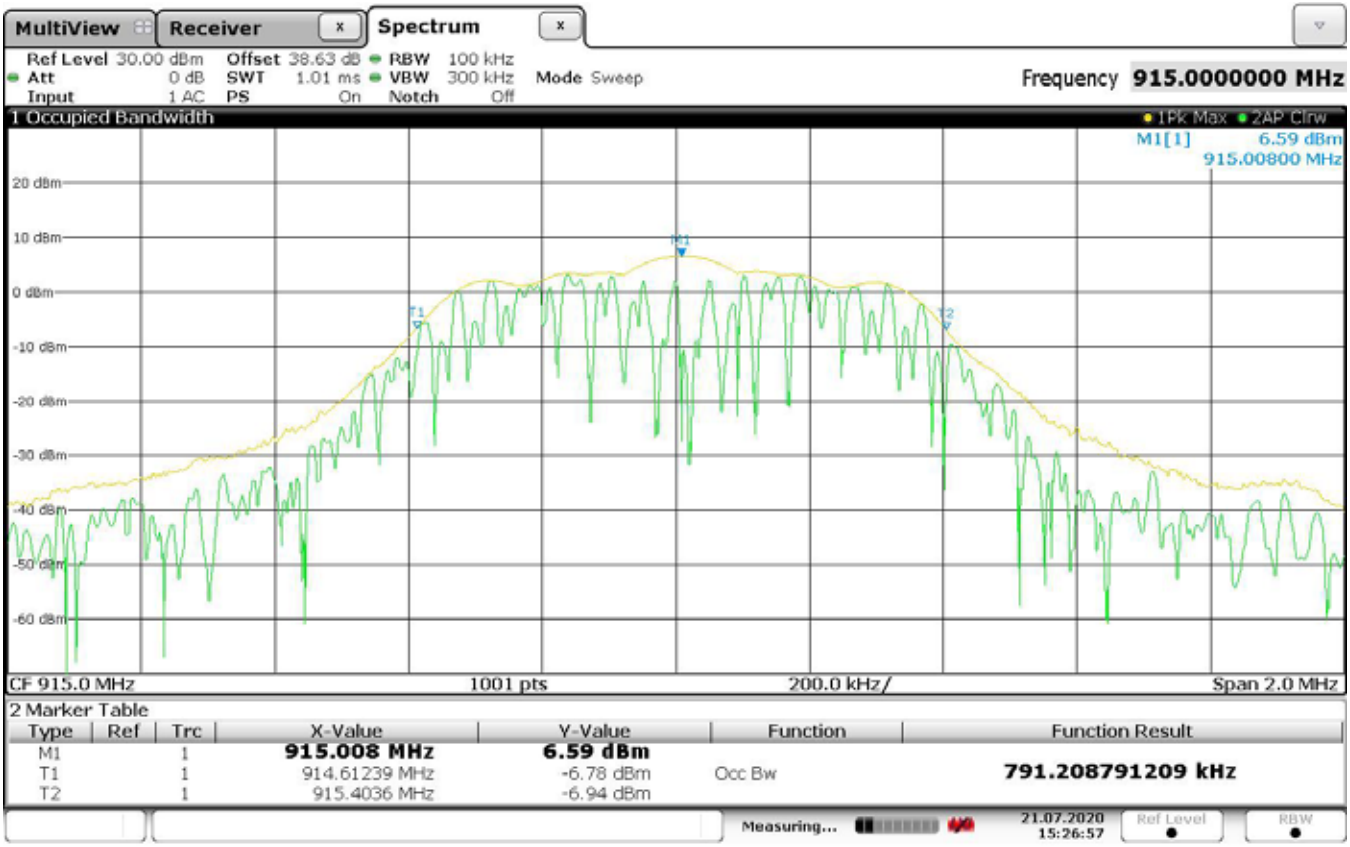
OCCUPIED BANDWIDTH – 6DB BW



Date: 21.JUL.2020 15:26:33

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – Occupied Bandwidth - Conducted
MODE	TX – 915MHz
DATE TESTED	July 22, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	99% BW = 791.2kHz

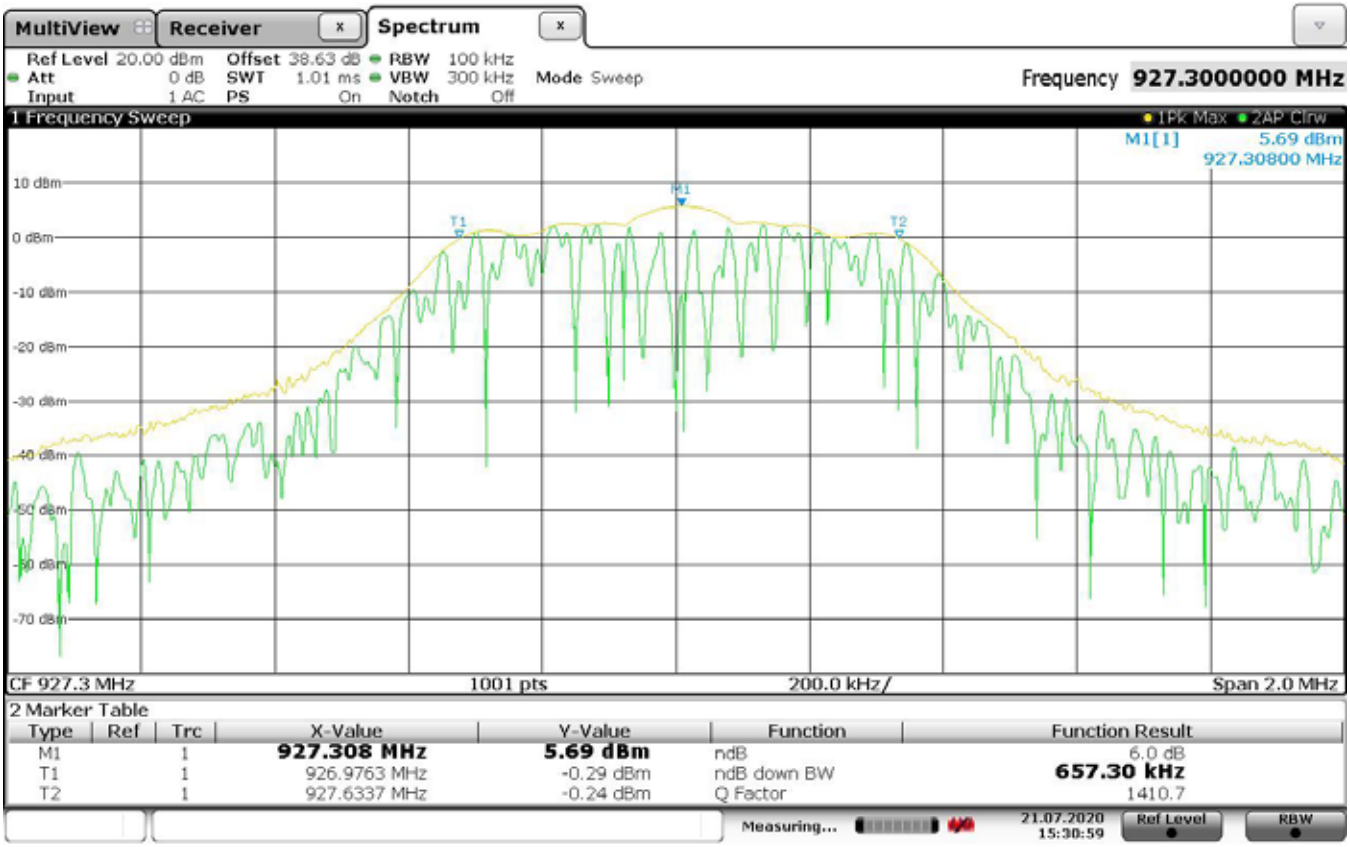
OCCUPIED BANDWIDTH – 99%



Date: 21.JUL.2020 15:26:57

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – Occupied Bandwidth - Conducted
MODE	TX – 927.3MHz
DATE TESTED	July 22, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	6dB BW = 657.3kHz

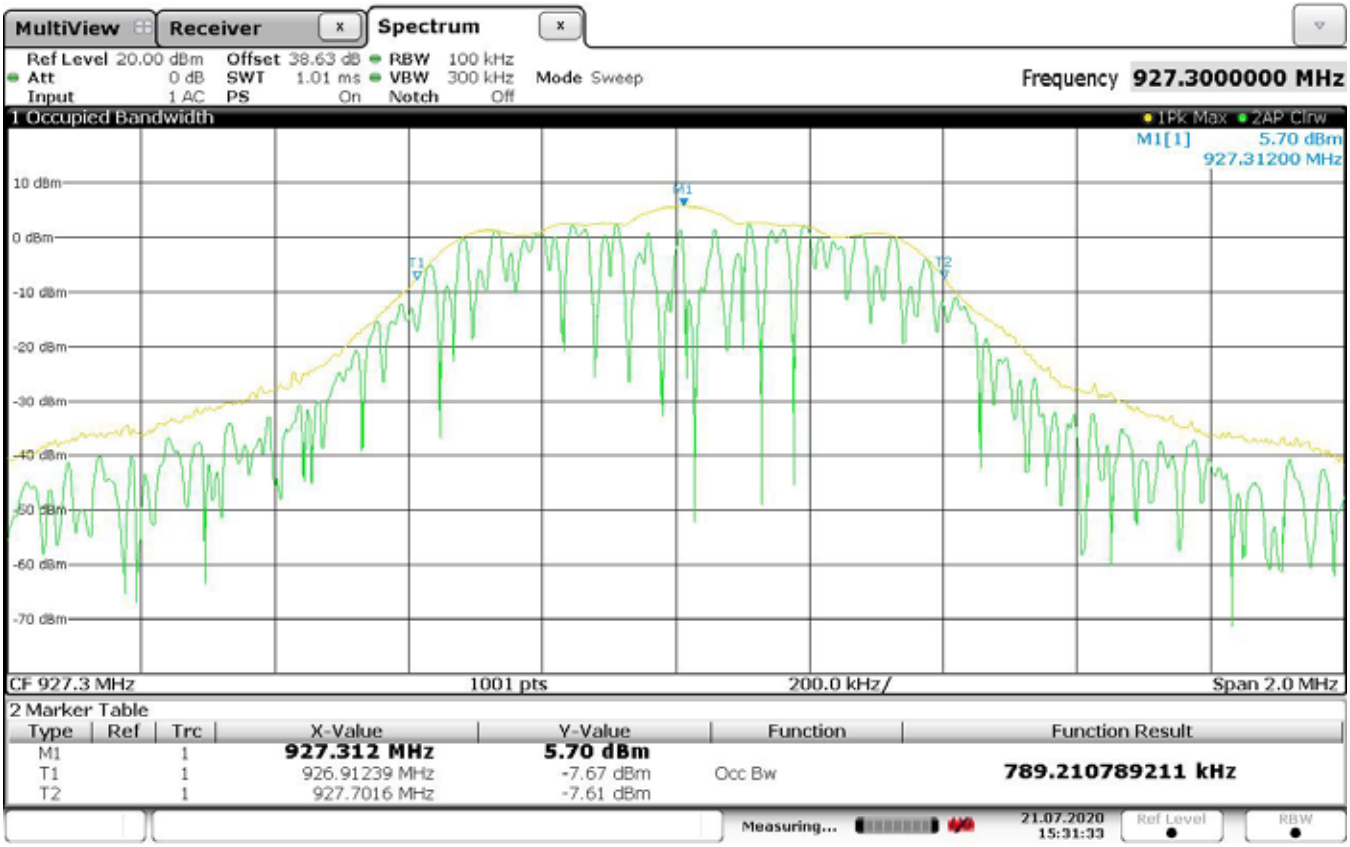
OCCUPIED BANDWIDTH – 6DB BW



Date: 21.JUL.2020 15:30:59

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – Occupied Bandwidth - Conducted
MODE	TX – 927.3MHz
DATE TESTED	July 22, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	99% BW = 789.21kHz

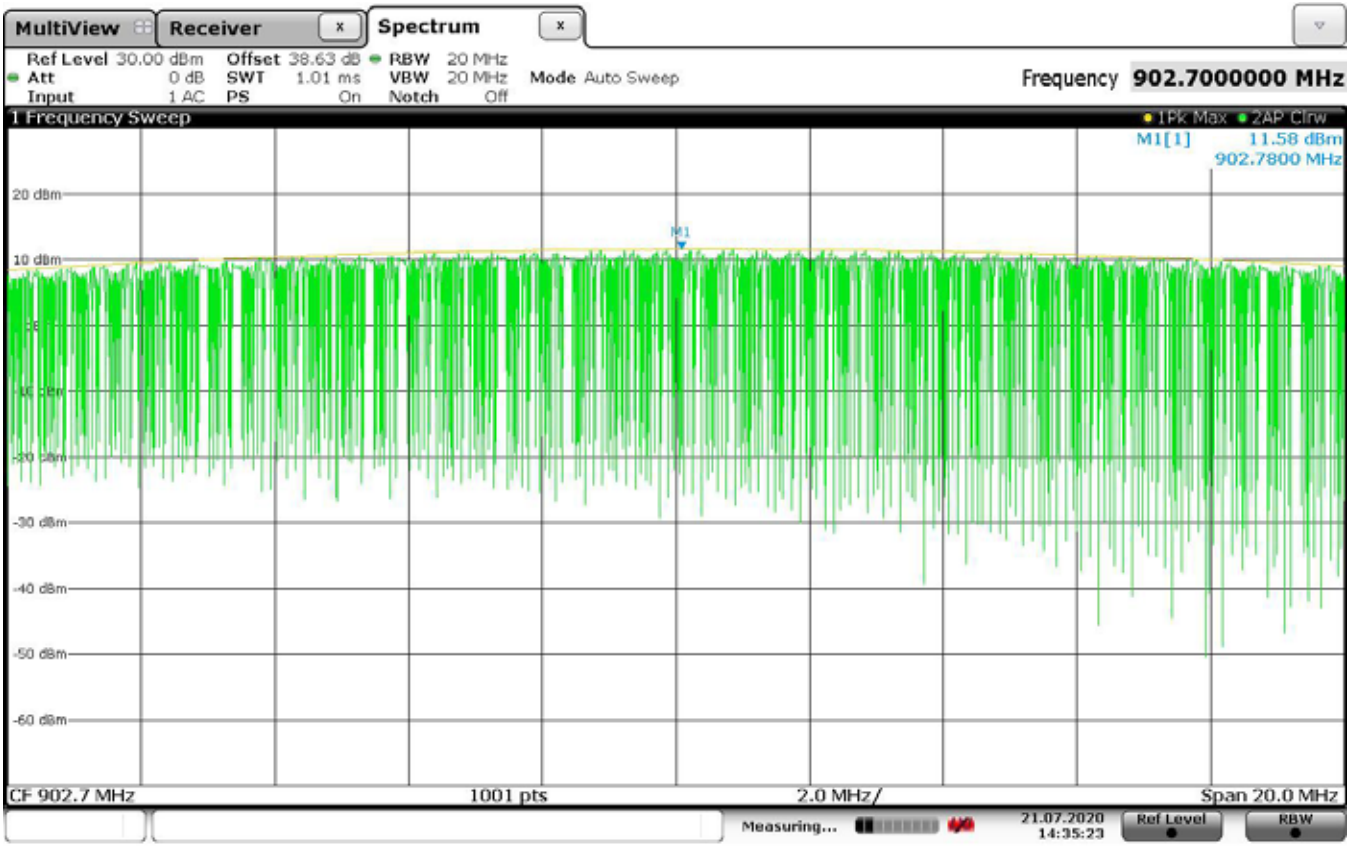
OCCUPIED BANDWIDTH – 99%



Date: 21.JUL.2020 15:31:33

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – RF Output Power - Conducted
MODE	TX – 902.7MHz
DATE TESTED	July 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	RF Output Power = 11.58dBm

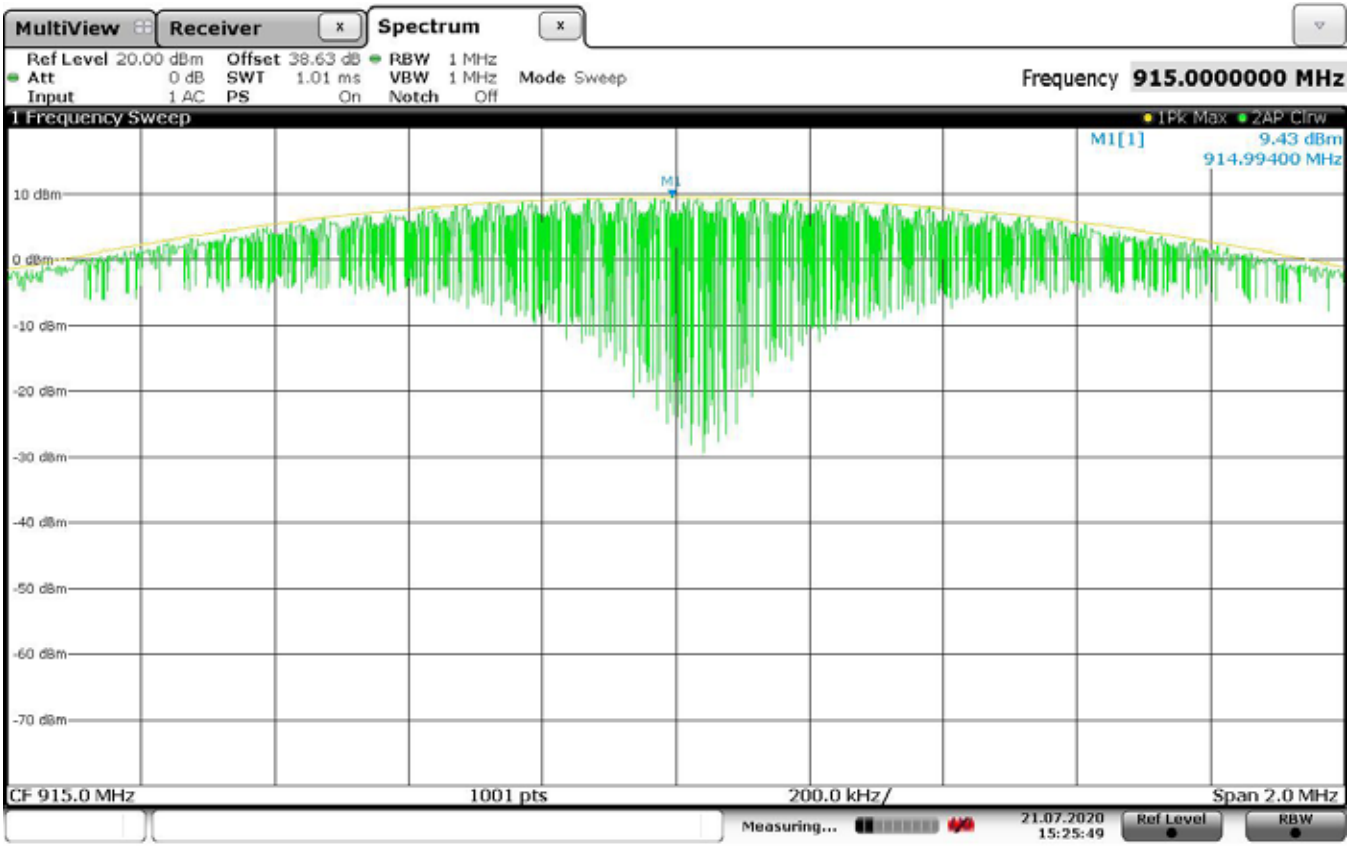
RF OUTPUT POWER - CONDUCTED



Date: 21.JUL.2020 14:35:23

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – RF Output Power - Conducted
MODE	TX – 902.7MHz
DATE TESTED	July 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	RF Output Power = 9.43dBm

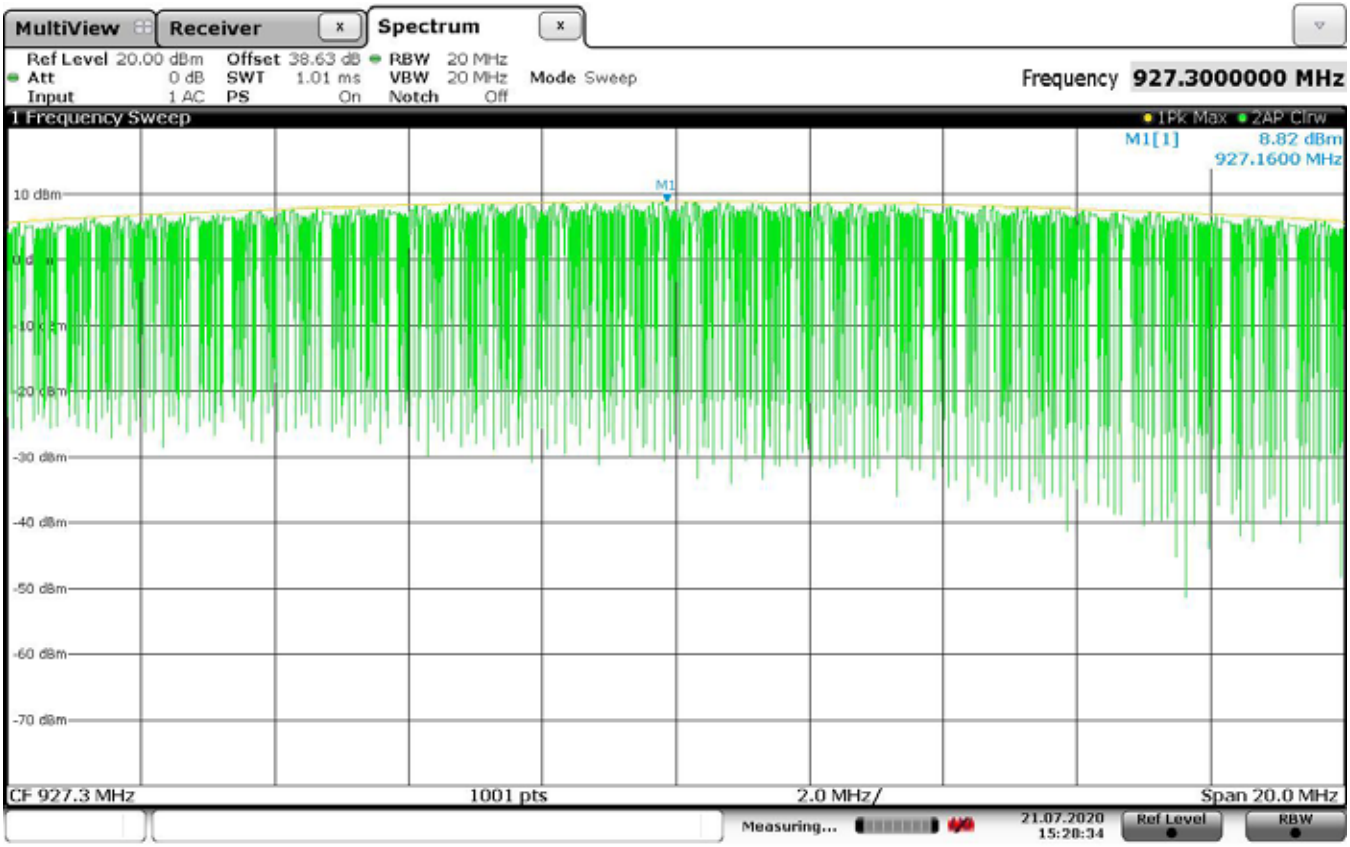
RF OUTPUT POWER - CONDUCTED



Date: 21.JUL.2020 15:25:49

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – RF Output Power - Conducted
MODE	TX – 927.3MHz
DATE TESTED	July 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	RF Output Power = 8.82dBm

RF OUTPUT POWER - CONDUCTED

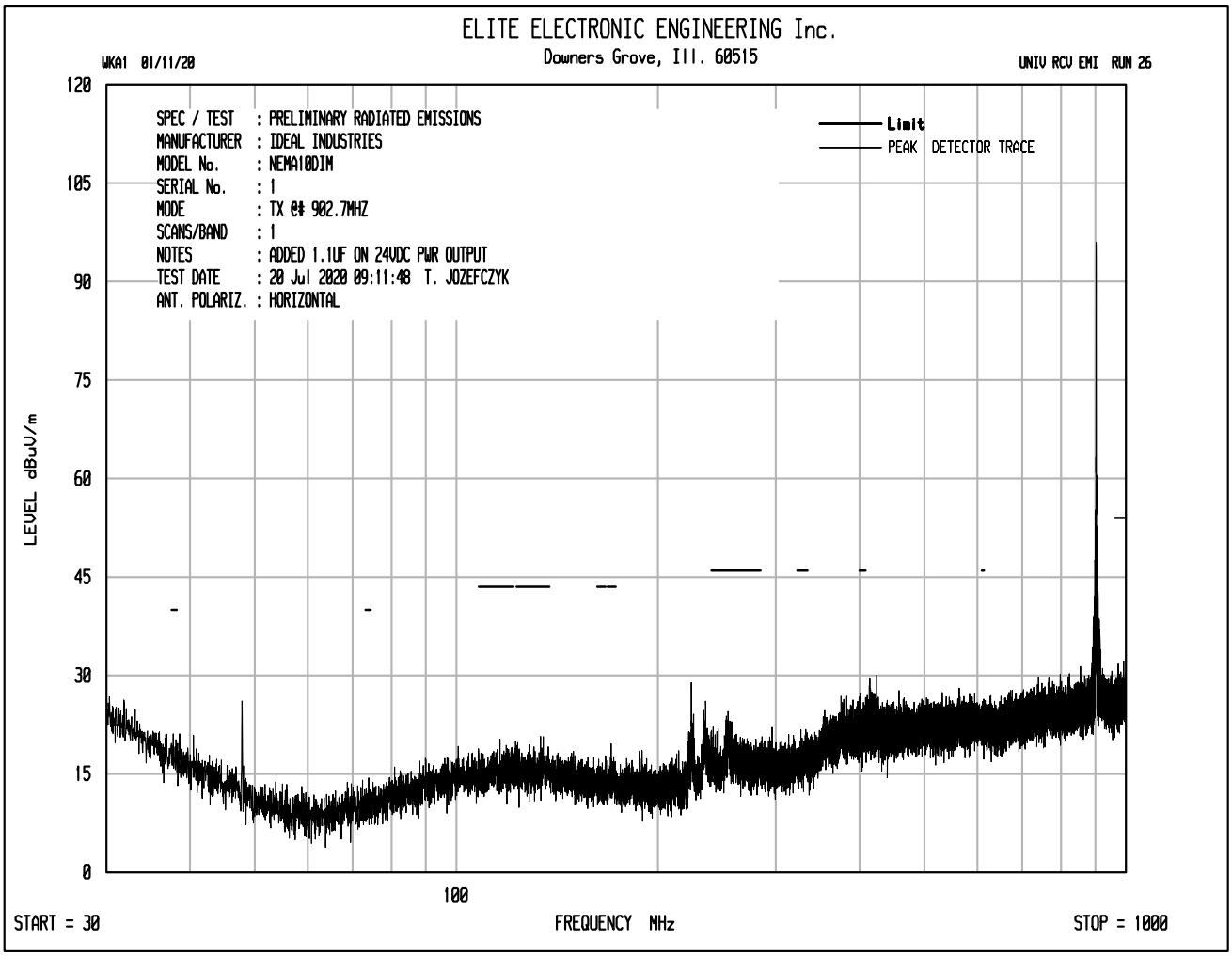


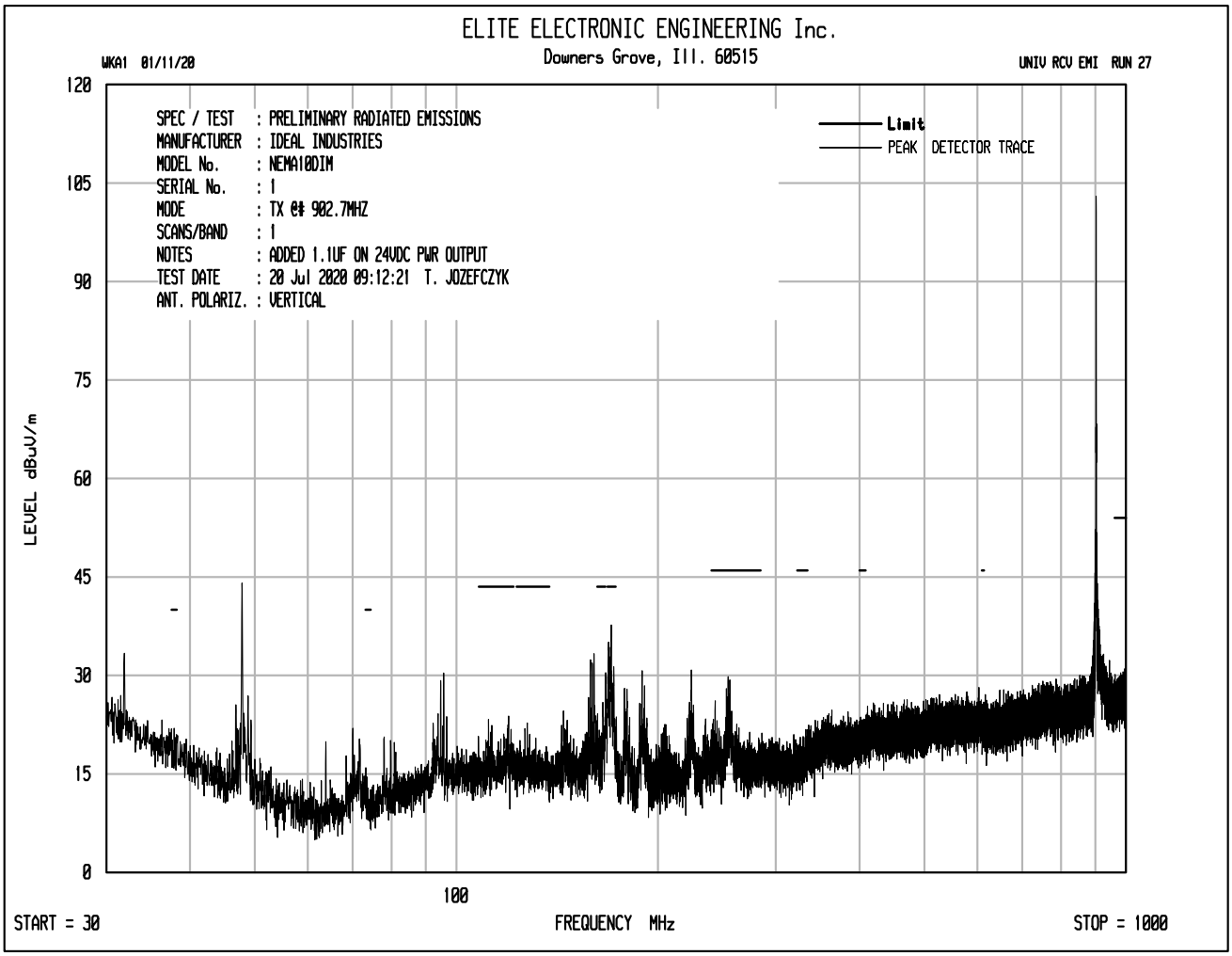
DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – RF Output Power - Radiated
MODE	TX
DATE TESTED	July 20, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

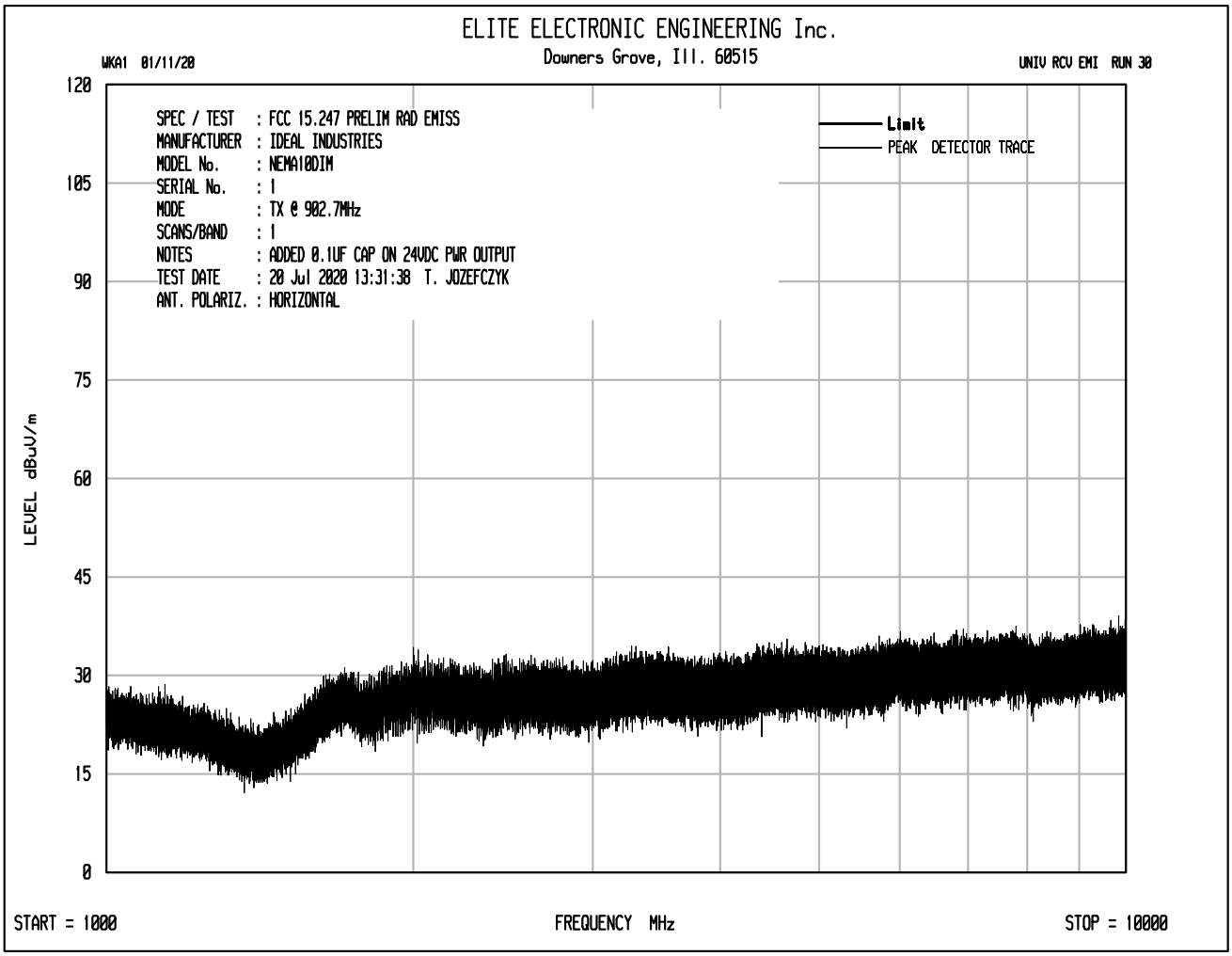
RF OUTPUT POWER

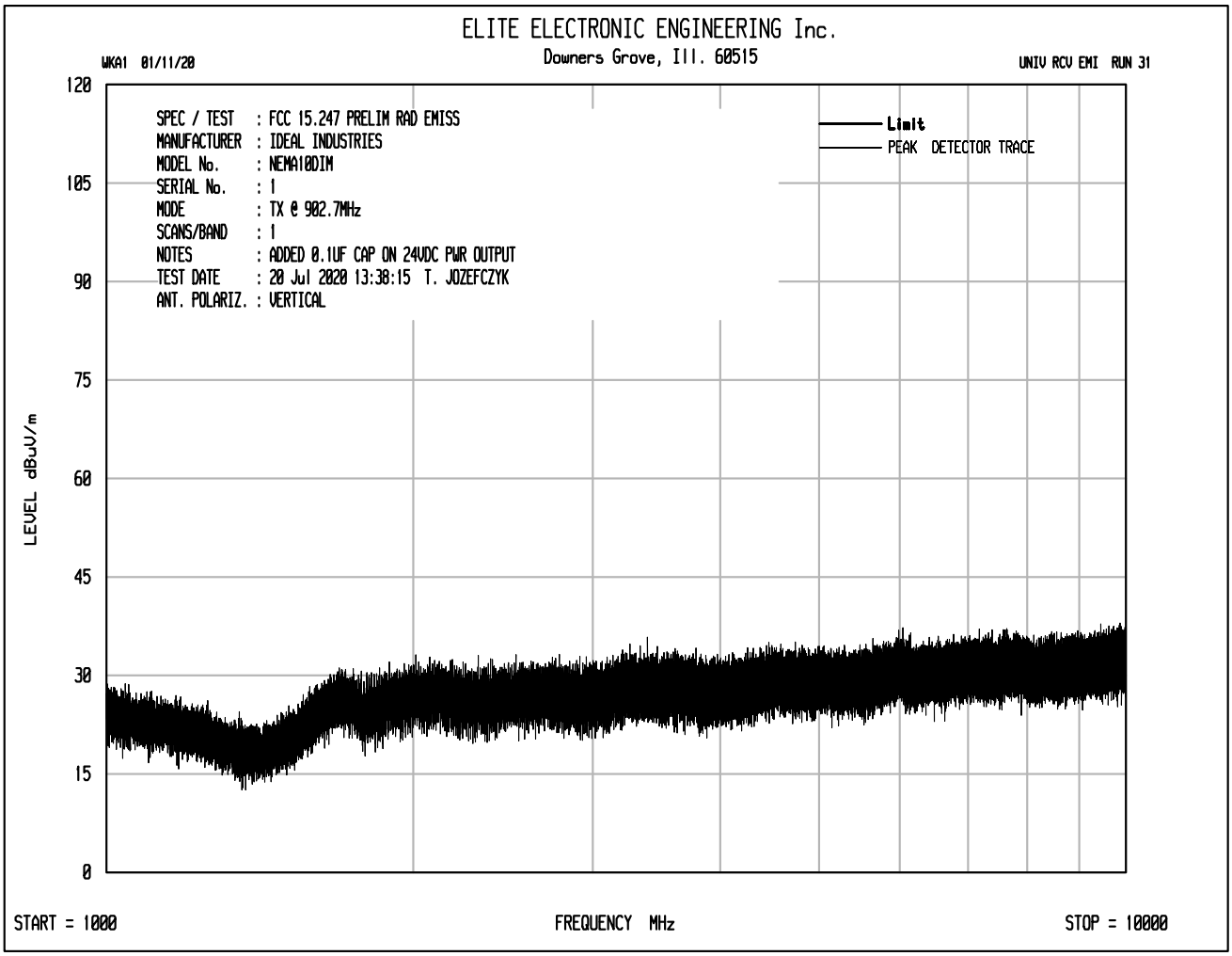
Freq. (MHz)	Ant Pol	Wide BW Meter Reading (dBµV)	Matched Sig. Gen. Reading (dBm)	Equivalent Antenna Gain (dB)	Cable Loss (dB)	EIRP Total (dBm)	Limit (dBm)	Margin (dB)
902.70	H	73.32	3.32	2.15	1.63	3.84	36.00	-32.16
902.70	V	76.92	8.52	2.15	1.63	9.04	36.00	-26.96
915.00	H	72.34	2.48	2.15	1.64	2.99	36.00	-33.01
915.00	V	75.25	6.80	2.15	1.64	7.31	36.00	-28.69
927.30	H	72.25	2.80	2.15	1.65	3.30	36.00	-32.70
927.30	V	77.14	9.20	2.15	1.65	9.70	36.00	-26.30

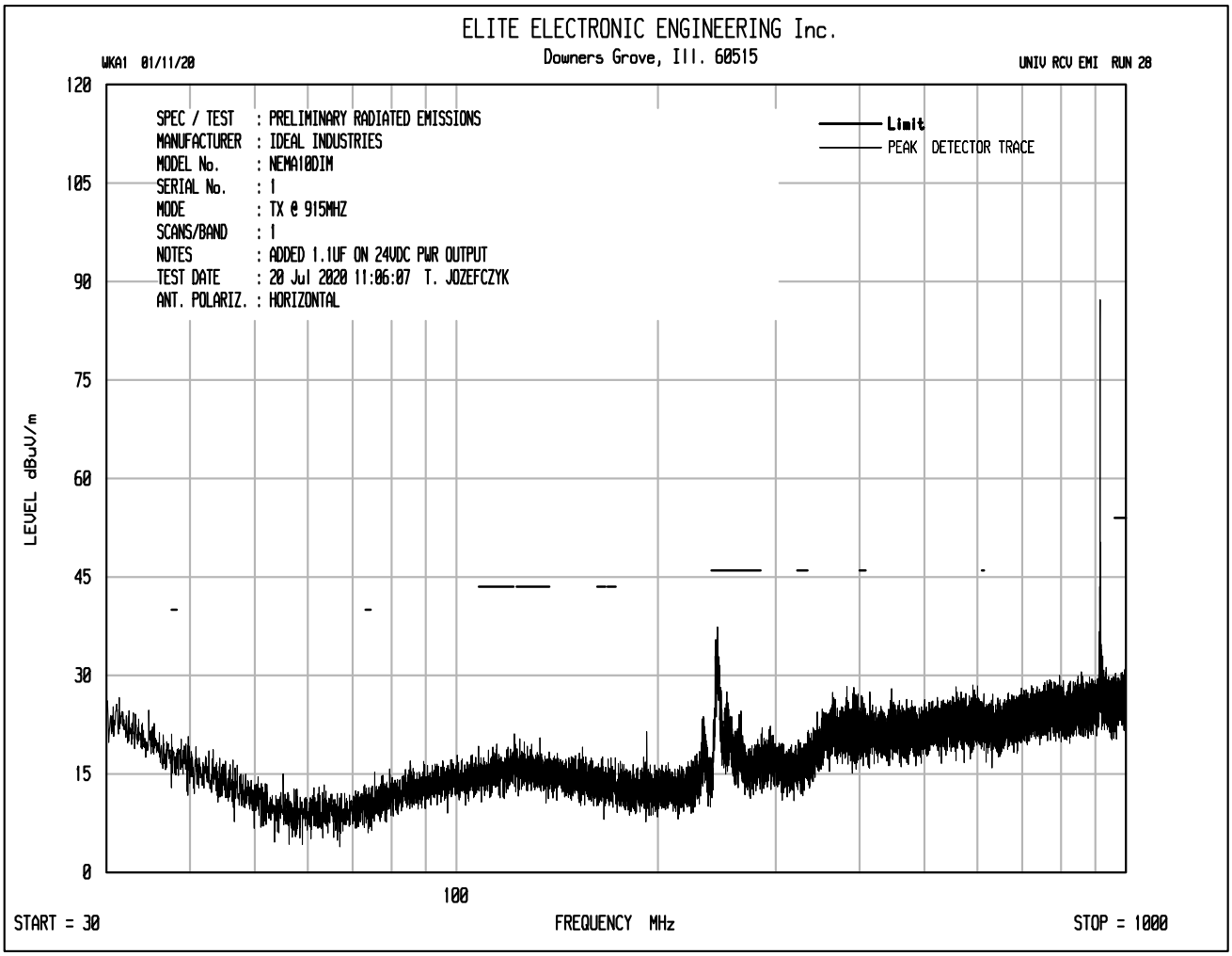
EIRP = Calculated Signal (dBm) + Antenna Gain (dB) – Cable Loss (dB)

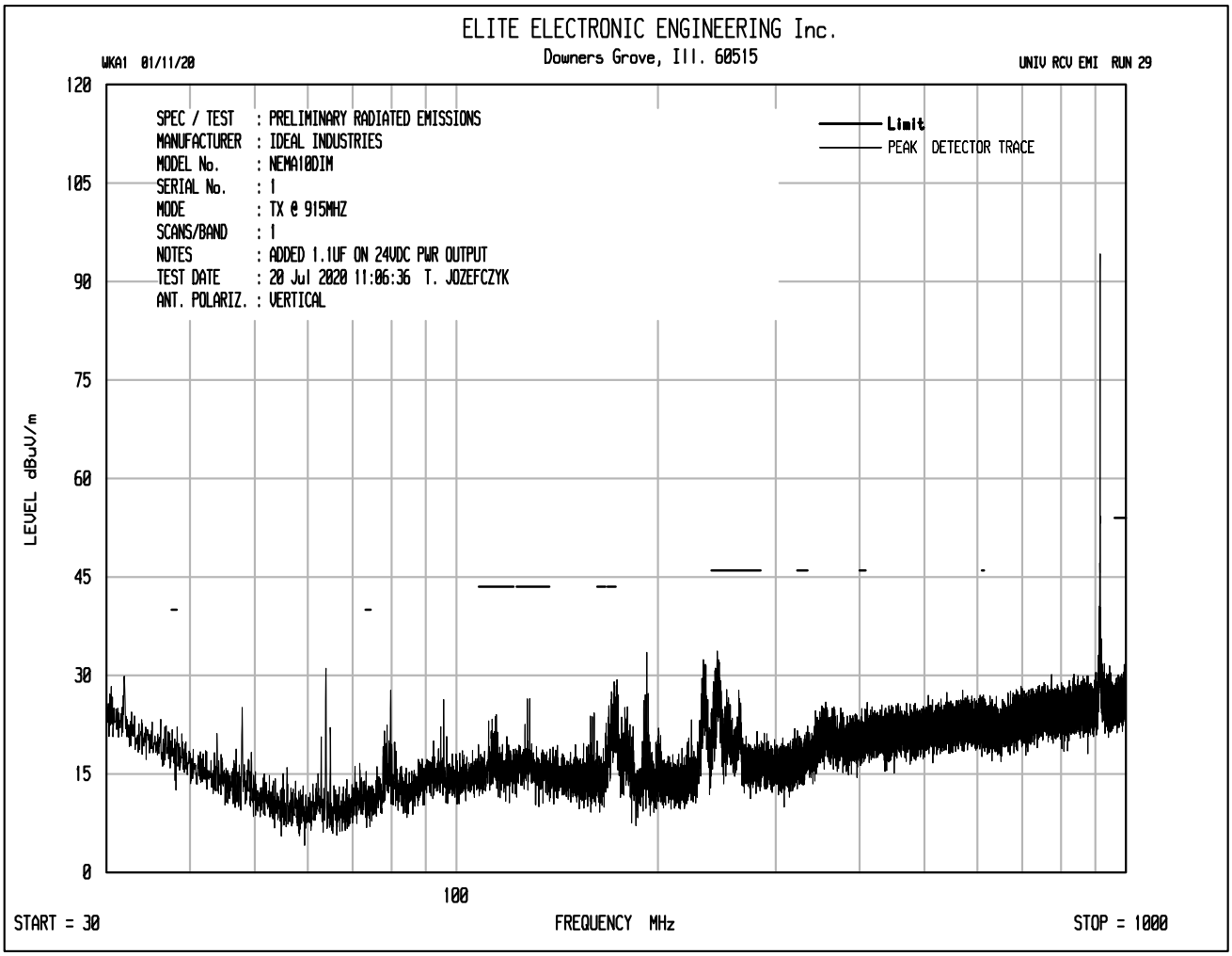

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 26
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @# 902.7MHZ
SCANS/BAND : 1
NOTES : ADDED 1.1UF ON 24VDC PWR OUTPUT
TEST DATE : 20 Jul 2020 09:11:48 T. JOZEFCZYK
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
100
START = 30
FREQUENCY MHz
STOP = 1000

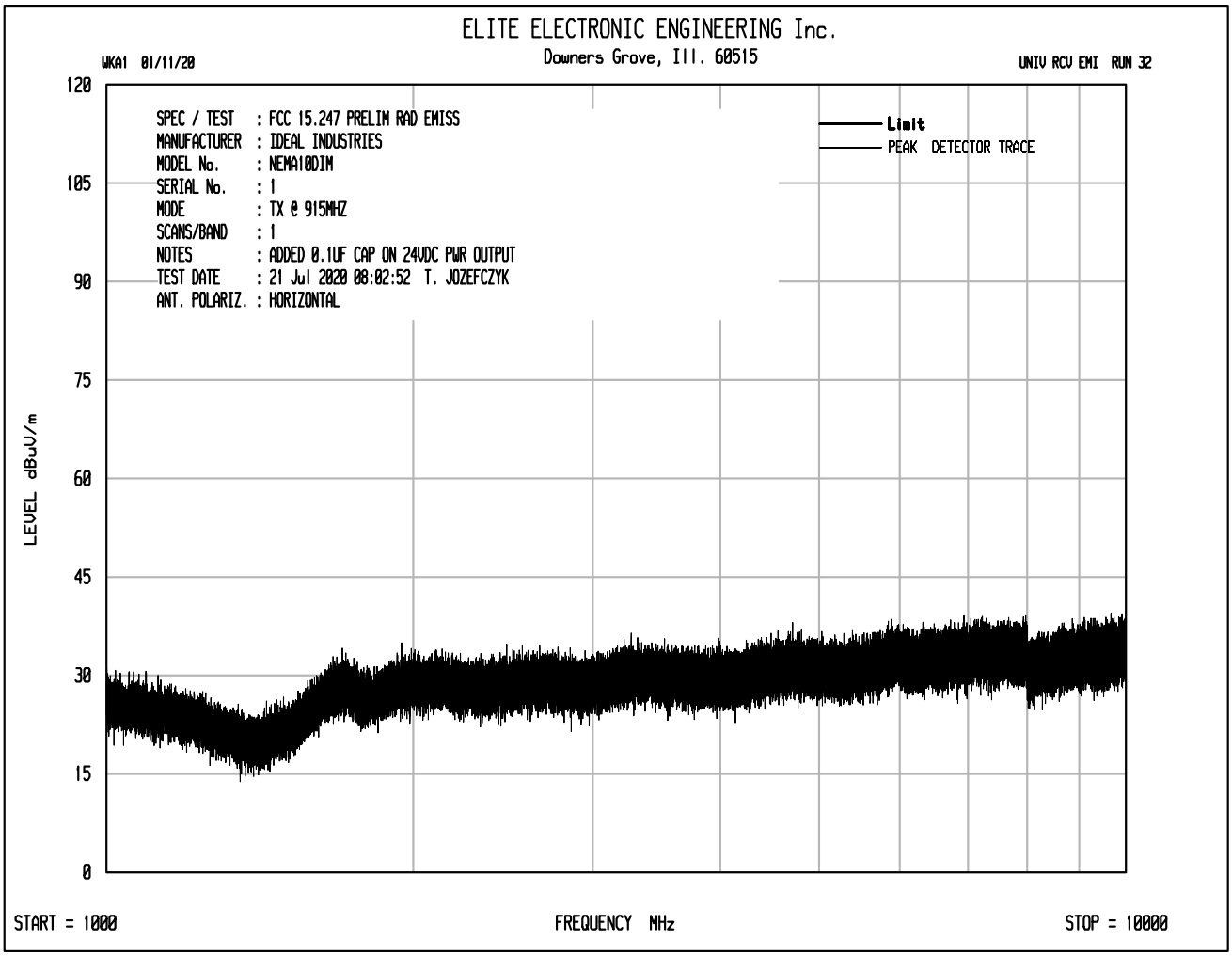

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 27
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @# 902.7MHZ
SCANS/BAND : 1
NOTES : ADDED 1.1UF ON 24VDC PWR OUTPUT
TEST DATE : 20 Jul 2020 09:12:21 T. JOZEFCZYK
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
100
START = 30
FREQUENCY MHz
STOP = 1000

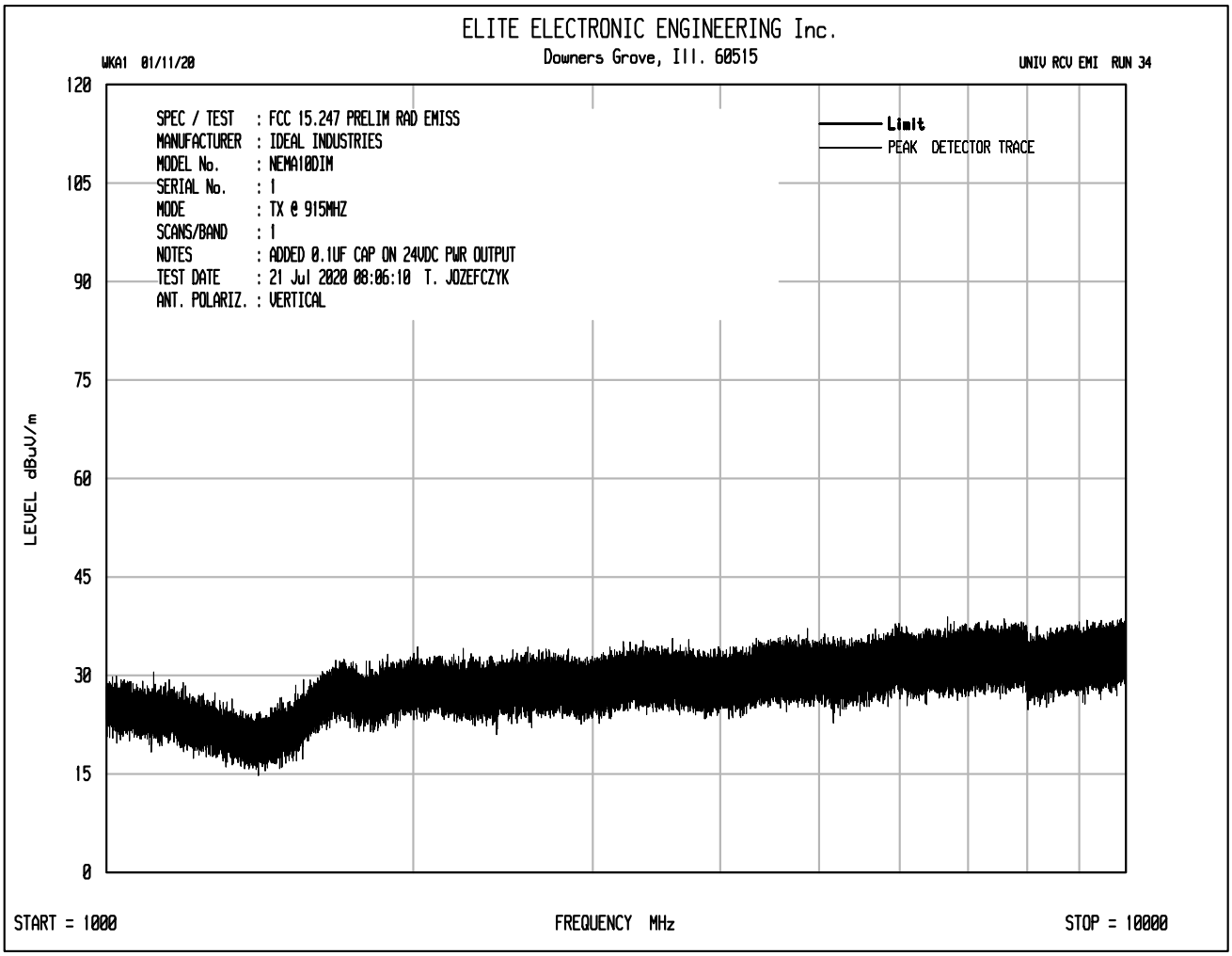

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 30
SPEC / TEST : FCC 15.247 PRELIM RAD EMISS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 902.7MHz
SCANS/BAND : 1
NOTES : ADDED 0.1UF CAP ON 24VDC PWR OUTPUT
TEST DATE : 20 Jul 2020 13:31:38 T. JOZEFCZYK
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

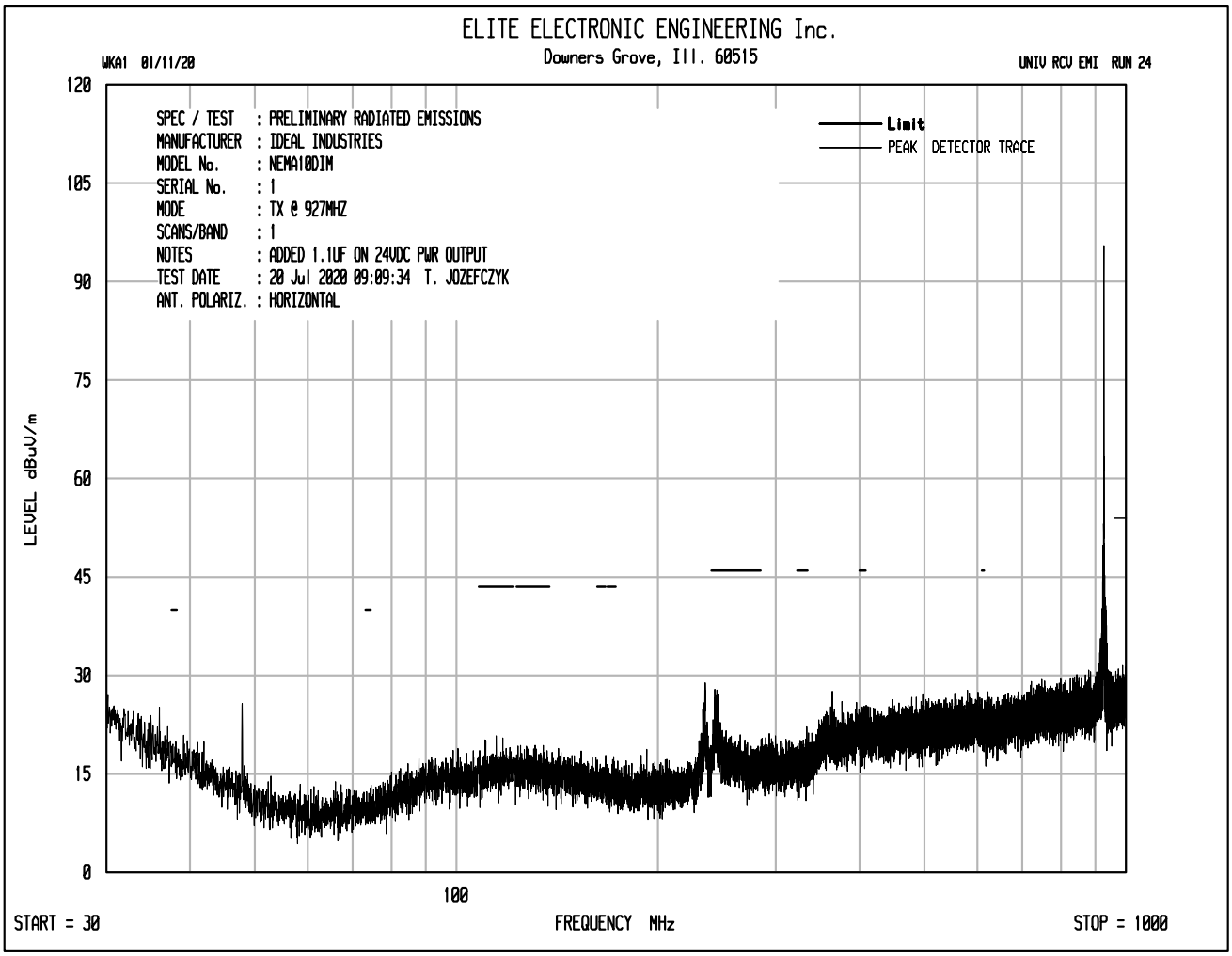

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 31
SPEC / TEST : FCC 15.247 PRELIM RAD EMISS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 902.7MHz
SCANS/BAND : 1
NOTES : ADDED 0.1UF CAP ON 24VDC PWR OUTPUT
TEST DATE : 20 Jul 2020 13:38:15 T. JOZEFCZYK
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

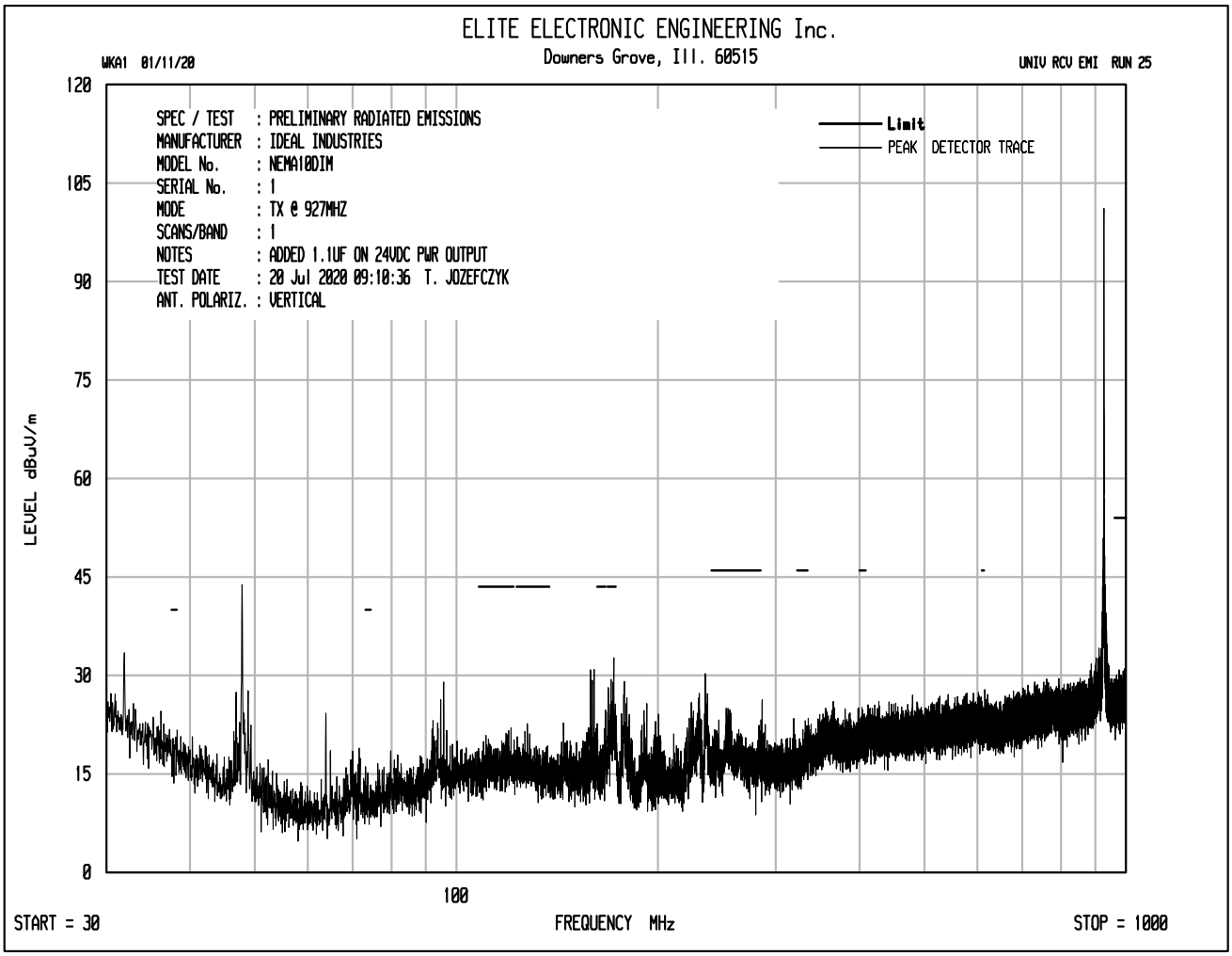

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 20
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 915MHZ
SCANS/BAND : 1
NOTES : ADDED 1.1UF ON 24VDC PWR OUTPUT
TEST DATE : 20 Jul 2020 11:06:07 T. JOZEFCZYK
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
100
START = 30
FREQUENCY MHz
STOP = 1000

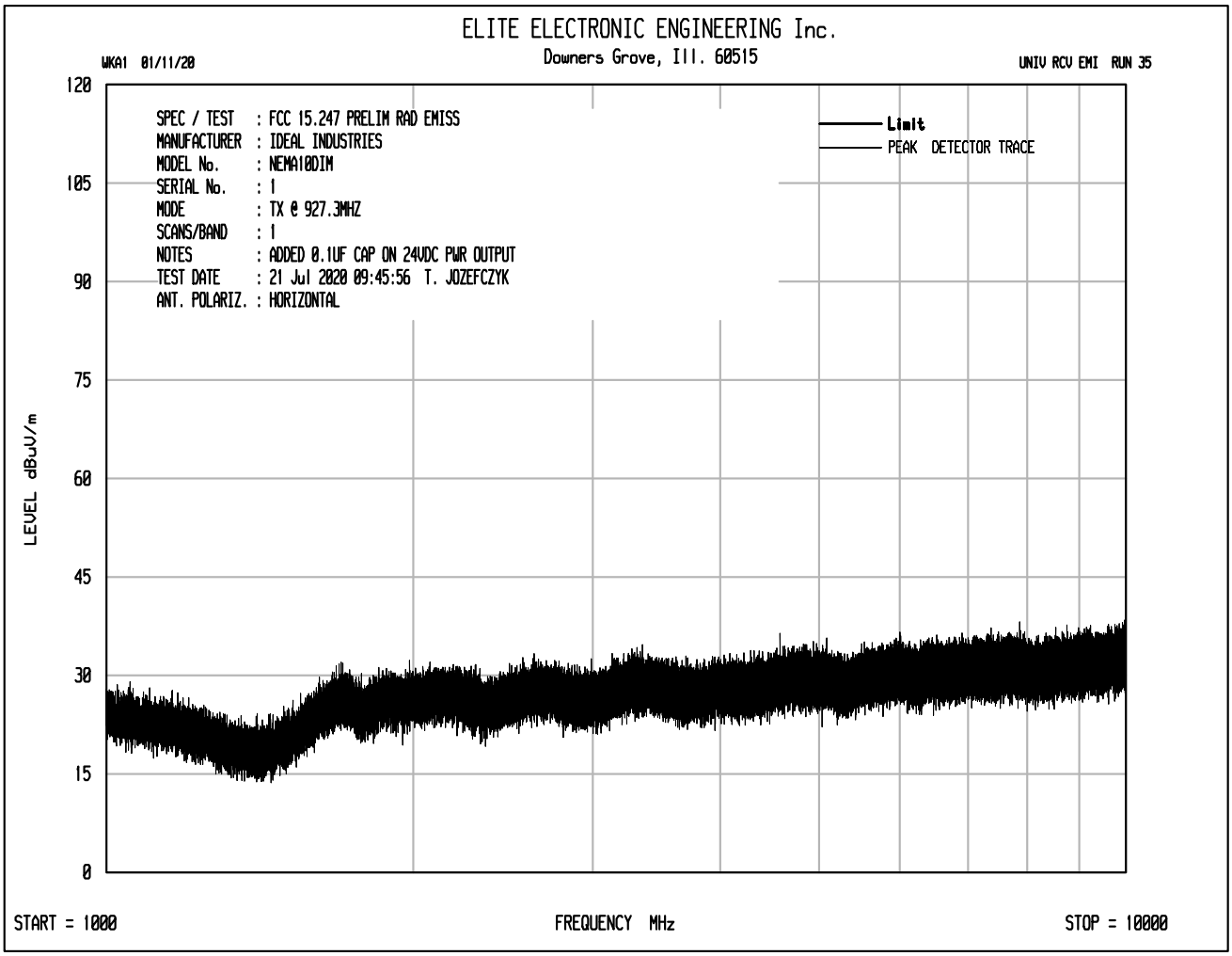

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 29
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 915MHZ
SCANS/BAND : 1
NOTES : ADDED 1.1UF ON 24VDC PWR OUTPUT
TEST DATE : 20 Jul 2020 11:06:36 T. JOZEFCZYK
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
100
START = 30
FREQUENCY MHz
STOP = 1000

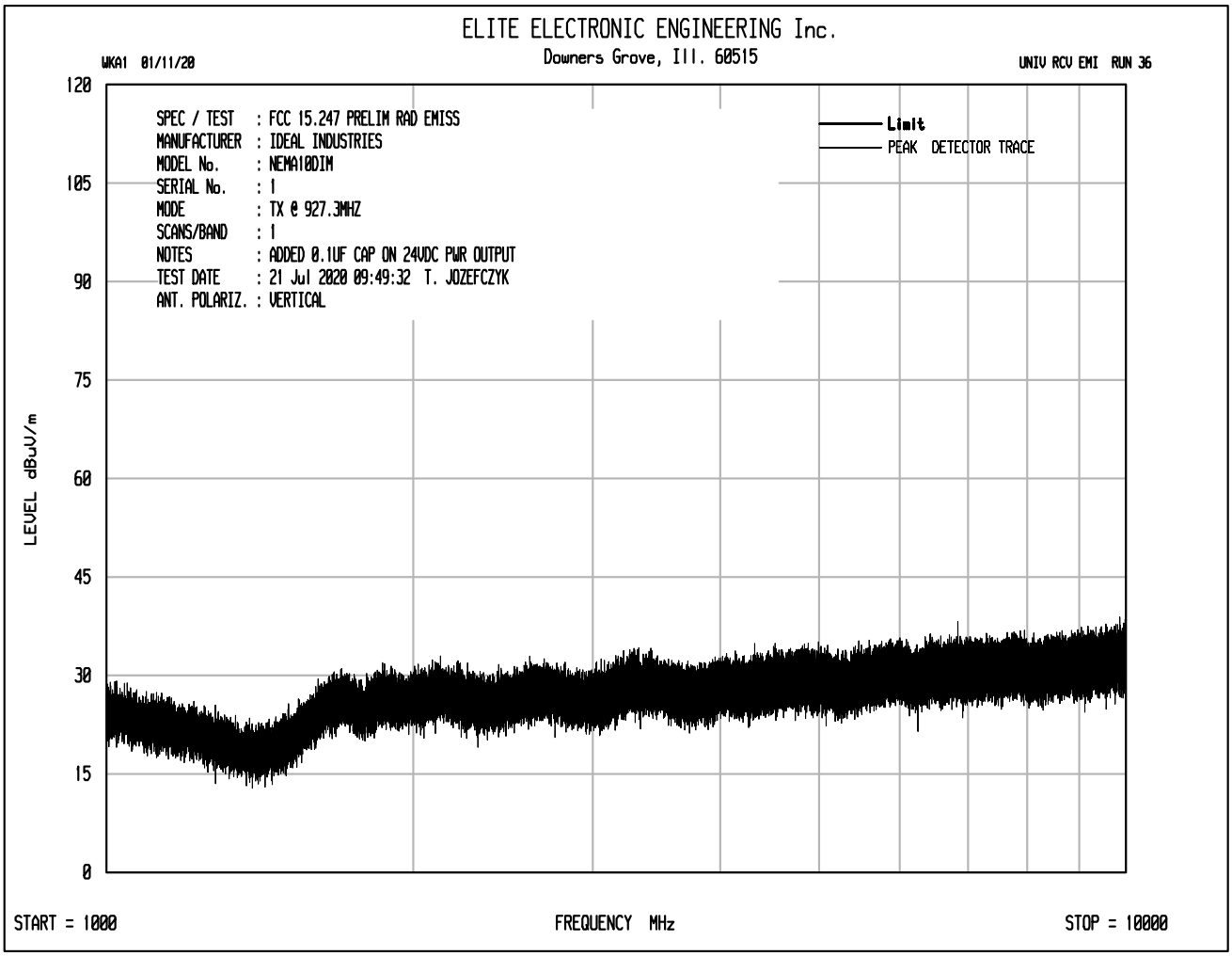

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 32
SPEC / TEST : FCC 15.247 PRELIM RAD EMISS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 915MHZ
SCANS/BAND : 1
NOTES : ADDED 0.1UF CAP ON 24VDC PWR OUTPUT
TEST DATE : 21 Jul 2020 08:02:52 T. JOZEFCZYK
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 34
SPEC / TEST : FCC 15.247 PRELIM RAD EMISS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 915MHZ
SCANS/BAND : 1
NOTES : ADDED 0.1UF CAP ON 24VDC PWR OUTPUT
TEST DATE : 21 Jul 2020 08:06:10 T. JOZEFCZYK
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 24
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 927MHZ
SCANS/BAND : 1
NOTES : ADDED 1.1UF ON 24VDC PWR OUTPUT
TEST DATE : 20 Jul 2020 09:09:34 T. JOZEFCZYK
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
100
START = 30
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 25
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 927MHZ
SCANS/BAND : 1
NOTES : ADDED 1.1UF ON 24VDC PWR OUTPUT
TEST DATE : 20 Jul 2020 09:10:36 T. JOZEFCZYK
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
100
START = 30
FREQUENCY MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 35
SPEC / TEST : FCC 15.247 PRELIM RAD EMISS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 927.3MHZ
SCANS/BAND : 1
NOTES : ADDED 0.1UF CAP ON 24VDC PWR OUTPUT
TEST DATE : 21 Jul 2020 09:45:56 T. JOZEFCZYK
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA1 01/11/20
UNIV RCV EMI RUN 36
SPEC / TEST : FCC 15.247 PRELIM RAD EMISS
MANUFACTURER : IDEAL INDUSTRIES
MODEL No. : NEMA10DIM
SERIAL No. : 1
MODE : TX @ 927.3MHZ
SCANS/BAND : 1
NOTES : ADDED 0.1UF CAP ON 24VDC PWR OUTPUT
TEST DATE : 21 Jul 2020 09:49:32 T. JOZEFCZYK
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 10000

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Radiated Spurious Emissions – Harmonics in Non-Restricted Bands
MODE	TX – 902.7MHz
DATE TESTED	July 20 & 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

RADIATED SPURIOUS EMISSIONS

Freq. (MHz)	Ant. Pol.	Meter Reading (dBµV)	Ambient	CBL Fac. (dB)	Ant. Fac. (dB)	Pre Amp (dB)	Peak Total dBµV/m at 3m	Peak Total µV/m at 3m	Peak Limit µV/m at 3m	Margin (dB)
902.70	H	69.40		2.88	26.70	0.00	98.98	88949.34		
902.70	V	73.17		2.88	26.70	0.00	102.75	137291.21		
1805.40	H	40.36	Ambient	3.25	31.50	-39.76	35.35	58.53	13729.12	-47.41
1805.40	V	41.19	Ambient	3.25	31.50	-39.76	36.18	64.39	13729.12	-46.58
6318.90	H	38.54	Ambient	5.53	38.12	-39.02	43.17	144.00	13729.12	-39.59
6318.90	V	38.56	Ambient	5.53	38.12	-39.02	43.19	144.33	13729.12	-39.57
7221.60	H	38.97	Ambient	5.88	38.38	-39.01	44.22	162.62	13729.12	-38.53
7221.60	V	38.88	Ambient	5.88	38.38	-39.01	44.13	160.94	13729.12	-38.62
902.00	H	31.42		2.88	26.70	0.00	61.00	1122.14	13729.12	-21.75
902.00	V	30.58		2.88	26.70	0.00	60.16	1018.71	13729.12	-22.59

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Radiated Spurious Emissions – Harmonics in Restricted Bands
MODE	TX – 902.7MHz
DATE TESTED	July 20 & 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

RADIATED SPURIOUS EMISSIONS

Freq. (MHz)	Ant. Pol.	Meter Reading (dBµV)	Ambient	CBL Fac. (dB)	Ant. Fac. (dB)	Pre Amp (dB)	Peak Total dBµV/m at 3m	Peak Total µV/m at 3m	Peak Limit µV/m at 3m	Margin (dB)
2708.10	H	52.36	Ambient	3.68	33.43	-39.51	49.96	314.88	5000.00	-24.02
2708.10	V	52.07	Ambient	3.68	33.43	-39.51	49.67	304.54	5000.00	-24.31
3610.80	H	50.87	Ambient	4.76	34.61	-38.85	51.39	370.97	5000.00	-22.59
3610.80	V	51.19	Ambient	4.76	34.61	-38.85	51.71	384.89	5000.00	-22.27
4513.50	H	50.26	Ambient	4.80	35.95	-38.89	52.11	403.41	5000.00	-21.86
4513.50	V	50.01	Ambient	4.80	35.95	-38.89	51.86	391.96	5000.00	-22.11
5416.20	H	50.31	Ambient	5.11	36.56	-39.03	52.95	444.09	5000.00	-21.03
5416.20	V	50.59	Ambient	5.11	36.56	-39.03	53.23	458.64	5000.00	-20.75
8124.30	H	48.73	Ambient	6.08	38.27	-38.98	54.10	506.74	5000.00	-19.88
8124.30	V	49.04	Ambient	6.08	38.27	-38.98	54.41	525.15	5000.00	-19.57
9027.00	H	48.48	Ambient	6.30	38.62	-38.88	54.52	531.97	5000.00	-19.46
9027.00	V	48.79	Ambient	6.30	38.62	-38.88	54.83	551.30	5000.00	-19.15

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Radiated Spurious Emissions – Restricted Band Averages
MODE	TX – 902.7MHz
DATE TESTED	July 20 & 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

RADIATED SPURIOUS EMISSIONS

Freq. (MHz)	Ant. Pol.	Meter Reading (dBµV)	Ambient	CBL Fac. (dB)	Ant. Fac. (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBµV/m at 3m	Average Total µV/m at 3m	Average Limit µV/m at 3m	Margin (dB)
2708.10	H	36.94	Ambient	3.68	33.43	-39.51	0.00	34.54	53.35	500.00	-19.44
2708.10	V	36.42	Ambient	3.68	33.43	-39.51	0.00	34.02	50.25	500.00	-19.96
3610.80	H	36.07	Ambient	4.76	34.61	-38.85	0.00	36.59	67.51	500.00	-17.39
3610.80	V	36.10	Ambient	4.76	34.61	-38.85	0.00	36.62	67.74	500.00	-17.36
4513.50	H	35.25	Ambient	4.80	35.95	-38.89	0.00	37.10	71.65	500.00	-16.87
4513.50	V	35.15	Ambient	4.80	35.95	-38.89	0.00	37.00	70.83	500.00	-16.97
5416.20	H	34.80	Ambient	5.11	36.56	-39.03	0.00	37.44	74.47	500.00	-16.54
5416.20	V	34.82	Ambient	5.11	36.56	-39.03	0.00	37.46	74.64	500.00	-16.52
8124.30	H	33.58	Ambient	6.08	38.27	-38.98	0.00	38.95	88.57	500.00	-15.03
8124.30	V	33.59	Ambient	6.08	38.27	-38.98	0.00	38.96	88.67	500.00	-15.02
9027.00	H	33.73	Ambient	6.30	38.62	-38.88	0.00	39.77	97.36	500.00	-14.21
9027.00	V	33.77	Ambient	6.30	38.62	-38.88	0.00	39.81	97.81	500.00	-14.17

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Radiated Spurious Emissions – Harmonics in Non-Restricted Bands
MODE	TX – 915MHz
DATE TESTED	July 20 & 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

RADIATED SPURIOUS EMISSIONS

Freq. (MHz)	Ant. Pol.	Meter Reading (dBµV)	Ambient	CBL Fac. (dB)	Ant. Fac. (dB)	Pre Amp (dB)	Peak Total dBµV/m at 3m	Peak Total µV/m at 3m	Peak Limit µV/m at 3m	Margin (dB)
915.00	H	68.75		2.89	26.68	0.00	98.32	82449.93		
915.00	V	71.72		2.89	26.68	0.00	101.29	116062.07		
1830.00	H	44.94		3.25	31.69	-39.74	40.14	101.62	11606.21	-41.15
1830.00	V	44.83		3.25	31.69	-39.74	40.03	100.34	11606.21	-41.26
5490.00	H	39.31	Ambient	5.07	36.74	-39.03	42.09	127.18	11606.21	-39.21
5490.00	V	39.96	Ambient	5.07	36.74	-39.03	42.74	137.06	11606.21	-38.56
6405.00	H	39.03	Ambient	5.56	37.97	-39.02	43.54	150.40	11606.21	-37.75
6405.00	V	39.43	Ambient	5.56	37.97	-39.02	43.94	157.49	11606.21	-37.35

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Radiated Spurious Emissions – Harmonics in Restricted Bands
MODE	TX – 915MHz
DATE TESTED	July 20 & 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

RADIATED SPURIOUS EMISSIONS

Freq. (MHz)	Ant. Pol.	Meter Reading (dBµV)	Ambient	CBL Fac. (dB)	Ant. Fac. (dB)	Pre Amp (dB)	Peak Total dBµV/m at 3m	Peak Total µV/m at 3m	Peak Limit µV/m at 3m	Margin (dB)
2745.00	H	51.55	Ambient	3.74	33.20	-39.49	49.00	281.82	5000.00	-24.98
2745.00	V	51.39	Ambient	3.74	33.20	-39.49	48.84	276.68	5000.00	-25.14
3660.00	H	50.82	Ambient	4.77	34.79	-38.86	51.52	376.74	5000.00	-22.46
3660.00	V	50.71	Ambient	4.77	34.79	-38.86	51.41	372.00	5000.00	-22.57
4575.00	H	50.46	Ambient	4.80	36.39	-38.91	52.74	433.45	5000.00	-21.24
4575.00	V	50.46	Ambient	4.80	36.39	-38.91	52.74	433.45	5000.00	-21.24
7320.00	H	49.76	Ambient	5.84	38.18	-39.01	54.78	548.27	5000.00	-19.20
7320.00	V	49.34	Ambient	5.84	38.18	-39.01	54.36	522.39	5000.00	-19.62
8235.00	H	48.69	Ambient	6.23	38.38	-38.97	54.32	520.15	5000.00	-19.66
8235.00	V	48.47	Ambient	6.23	38.38	-38.97	54.10	507.14	5000.00	-19.88
9150.00	H	48.47	Ambient	6.31	38.73	-38.87	54.64	539.47	5000.00	-19.34
9150.00	V	48.60	Ambient	6.31	38.73	-38.87	54.77	547.60	5000.00	-19.21

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Radiated Spurious Emissions – Restricted Band Averages
MODE	TX – 915MHz
DATE TESTED	July 20 & 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

RADIATED SPURIOUS EMISSIONS

Freq. (MHz)	Ant. Pol.	Meter Reading (dBµV)	Ambient	CBL Fac. (dB)	Ant. Fac. (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBµV/m at 3m	Average Total µV/m at 3m	Average Limit µV/m at 3m	Margin (dB)
2745.00	H	35.69	Ambient	3.74	33.20	-39.49	0.00	33.14	45.39	500.00	-20.84
2745.00	V	35.91	Ambient	3.74	33.20	-39.49	0.00	33.36	46.56	500.00	-20.62
3660.00	H	35.38	Ambient	4.77	34.79	-38.86	0.00	36.08	63.69	500.00	-17.90
3660.00	V	35.20	Ambient	4.77	34.79	-38.86	0.00	35.90	62.38	500.00	-18.08
4575.00	H	35.51	Ambient	4.80	36.39	-38.91	0.00	37.79	77.52	500.00	-16.19
4575.00	V	35.00	Ambient	4.80	36.39	-38.91	0.00	37.28	73.10	500.00	-16.70
7320.00	H	33.77	Ambient	5.84	38.18	-39.01	0.00	38.79	87.00	500.00	-15.19
7320.00	V	33.76	Ambient	5.84	38.18	-39.01	0.00	38.78	86.90	500.00	-15.20
8235.00	H	33.62	Ambient	6.23	38.38	-38.97	0.00	39.25	91.75	500.00	-14.73
8235.00	V	33.64	Ambient	6.23	38.38	-38.97	0.00	39.27	91.97	500.00	-14.71
9150.00	H	33.59	Ambient	6.31	38.73	-38.87	0.00	39.76	97.27	500.00	-14.22
9150.00	V	33.61	Ambient	6.31	38.73	-38.87	0.00	39.78	97.49	500.00	-14.20

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Radiated Spurious Emissions – Harmonics in Non-Restricted Bands
MODE	TX – 927.3MHz
DATE TESTED	July 20 & 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

RADIATED SPURIOUS EMISSIONS

Freq. (MHz)	Ant. Pol.	Meter Reading (dBµV)	Ambient	CBL Fac. (dB)	Ant. Fac. (dB)	Pre Amp (dB)	Peak Total dBµV/m at 3m	Peak Total µV/m at 3m	Peak Limit µV/m at 3m	Margin (dB)
927.30	H	68.34		2.90	26.72	0.00	97.95	79016.30		
927.30	V	73.60		2.90	26.72	0.00	103.21	144782.70		
1854.60	H	44.76		3.26	31.92	-39.72	40.22	102.53	14478.27	-43.00
1854.60	V	47.30		3.26	31.92	-39.72	42.76	137.36	14478.27	-40.46
5563.80	H	38.66	Ambient	5.11	37.16	-39.03	41.90	124.44	14478.27	-41.32
5563.80	V	38.89	Ambient	5.11	37.16	-39.03	42.13	127.77	14478.27	-41.09
6491.10	H	38.58	Ambient	5.60	38.15	-39.02	43.30	146.30	14478.27	-39.91
6491.10	V	38.76	Ambient	5.60	38.15	-39.02	43.48	149.36	14478.27	-39.73
9273.00	H	38.34	Ambient	6.42	38.84	-38.85	44.75	172.79	14478.27	-38.46
9273.00	V	38.37	Ambient	6.42	38.84	-38.85	44.78	173.39	14478.27	-38.43
928.00	H	33.85		2.90	26.71	0.00	63.46	1490.12	14478.27	-19.75
928.00	V	33.45		2.90	26.71	0.00	63.06	1423.05	14478.27	-20.15

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Radiated Spurious Emissions – Harmonics in Restricted Bands
MODE	TX – 927.3MHz
DATE TESTED	July 20 & 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

RADIATED SPURIOUS EMISSIONS

Freq. (MHz)	Ant. Pol.	Meter Reading (dBµV)	Ambient	CBL Fac. (dB)	Ant. Fac. (dB)	Pre Amp (dB)	Peak Total dBµV/m at 3m	Peak Total µV/m at 3m	Peak Limit µV/m at 3m	Margin (dB)
2781.90	H	50.86	Ambient	3.80	32.93	-39.46	48.12	254.76	5000.00	-25.86
2781.90	V	50.90	Ambient	3.80	32.93	-39.46	48.16	255.94	5000.00	-25.82
3709.20	H	50.36	Ambient	4.77	34.42	-38.86	50.69	342.22	5000.00	-23.29
3709.20	V	50.08	Ambient	4.77	34.42	-38.86	50.41	331.36	5000.00	-23.57
4636.50	H	49.67	Ambient	4.80	36.72	-38.93	52.26	410.32	5000.00	-21.72
4636.50	V	50.07	Ambient	4.80	36.72	-38.93	52.66	429.66	5000.00	-21.32
7418.40	H	49.14	Ambient	5.89	38.00	-39.01	54.02	502.33	5000.00	-19.96
7418.40	V	49.32	Ambient	5.89	38.00	-39.01	54.20	512.85	5000.00	-19.78
8345.70	H	48.76	Ambient	6.18	38.33	-38.96	54.31	519.36	5000.00	-19.67
8345.70	V	48.70	Ambient	6.18	38.33	-38.96	54.25	515.78	5000.00	-19.73

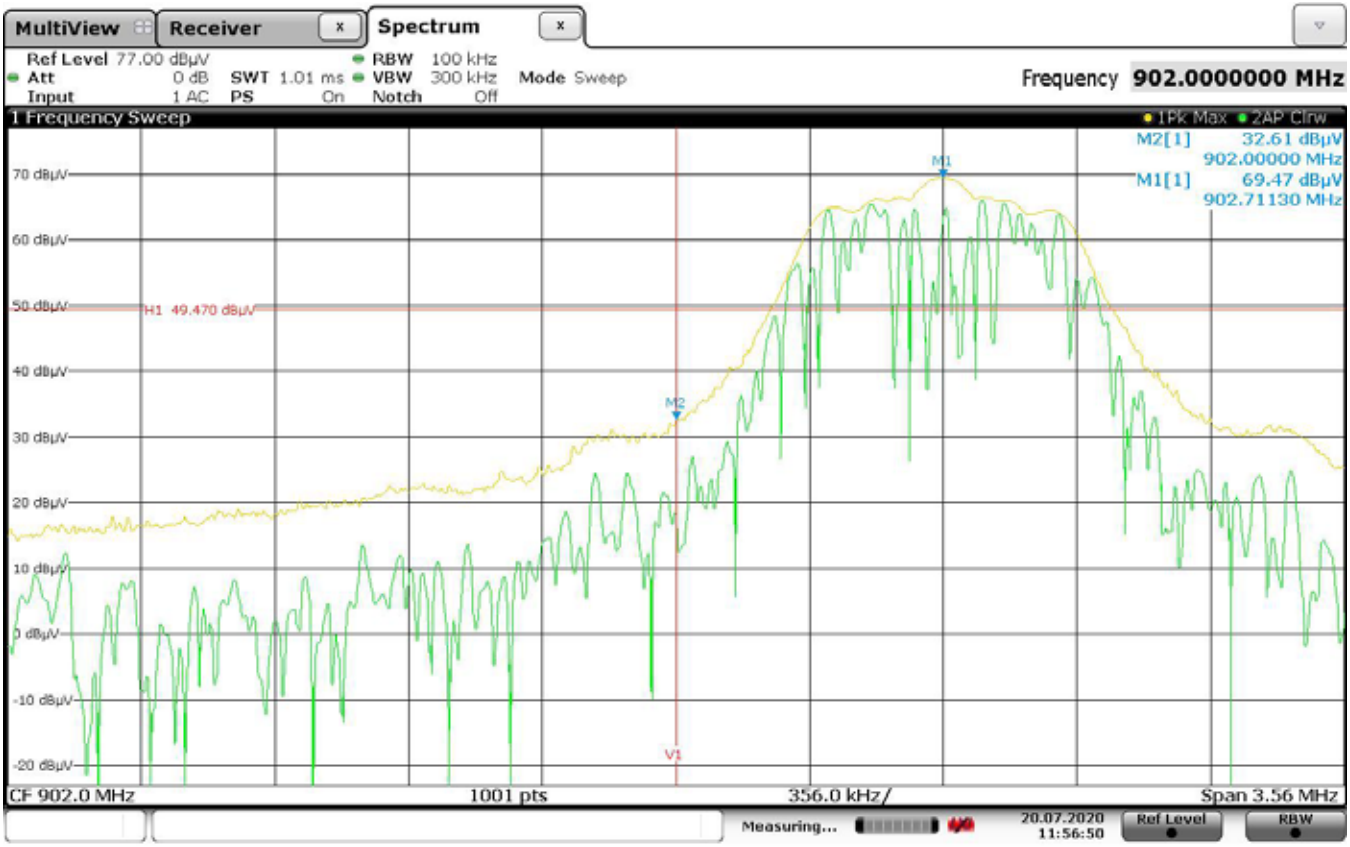
DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Radiated Spurious Emissions – Restricted Band Averages
MODE	TX – 927.3MHz
DATE TESTED	July 20 & 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

RADIATED SPURIOUS EMISSIONS

Freq. (MHz)	Ant. Pol.	Meter Reading (dBμV)	Ambient	CBL Fac. (dB)	Ant. Fac. (dB)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBμV/m at 3m	Average Total μV/m at 3m	Average Limit μV/m at 3m	Margin (dB)
2781.90	H	35.71	Ambient	3.80	32.93	-39.46	0.00	32.97	44.53	500.00	-21.01
2781.90	V	35.46	Ambient	3.80	32.93	-39.46	0.00	32.72	43.26	500.00	-21.26
3709.20	H	34.96	Ambient	4.77	34.42	-38.86	0.00	35.29	58.12	500.00	-18.69
3709.20	V	34.99	Ambient	4.77	34.42	-38.86	0.00	35.32	58.32	500.00	-18.66
4636.50	H	34.45	Ambient	4.80	36.72	-38.93	0.00	37.04	71.14	500.00	-16.94
4636.50	V	34.43	Ambient	4.80	36.72	-38.93	0.00	37.02	70.98	500.00	-16.96
7418.40	H	33.96	Ambient	5.89	38.00	-39.01	0.00	38.84	87.50	500.00	-15.14
7418.40	V	33.93	Ambient	5.89	38.00	-39.01	0.00	38.81	87.19	500.00	-15.17
8345.70	H	33.64	Ambient	6.18	38.33	-38.96	0.00	39.19	91.09	500.00	-14.79
8345.70	V	33.63	Ambient	6.18	38.33	-38.96	0.00	39.18	90.98	500.00	-14.80

DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Band Edge
MODE	TX – 902.7MHz
DATE TESTED	July 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

BAND EDGE – LOW



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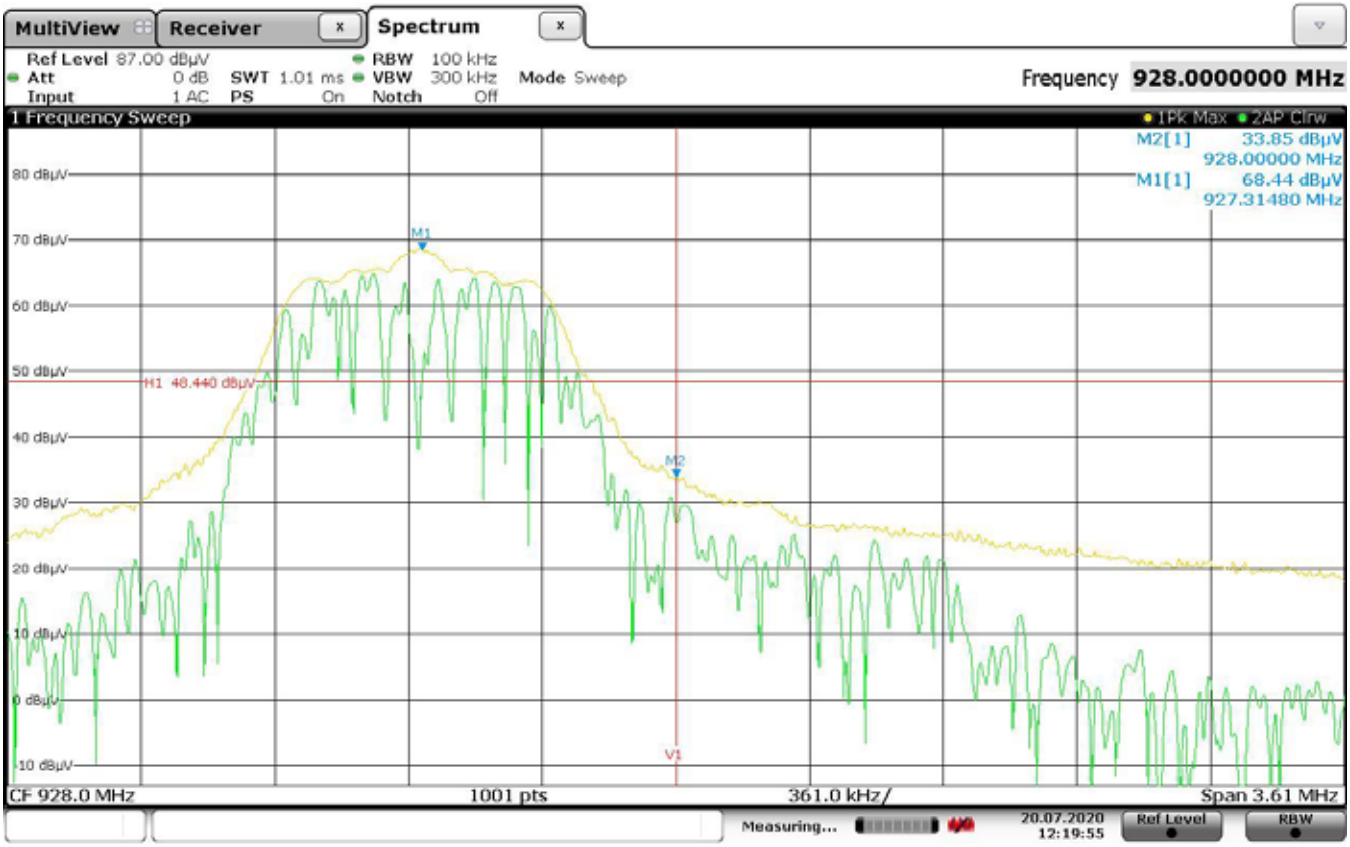
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000001
TEST	FCC §15.247, RSS-247 – Band Edge
MODE	TX – 927.3MHz
DATE TESTED	July 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

BAND EDGE – HIGH



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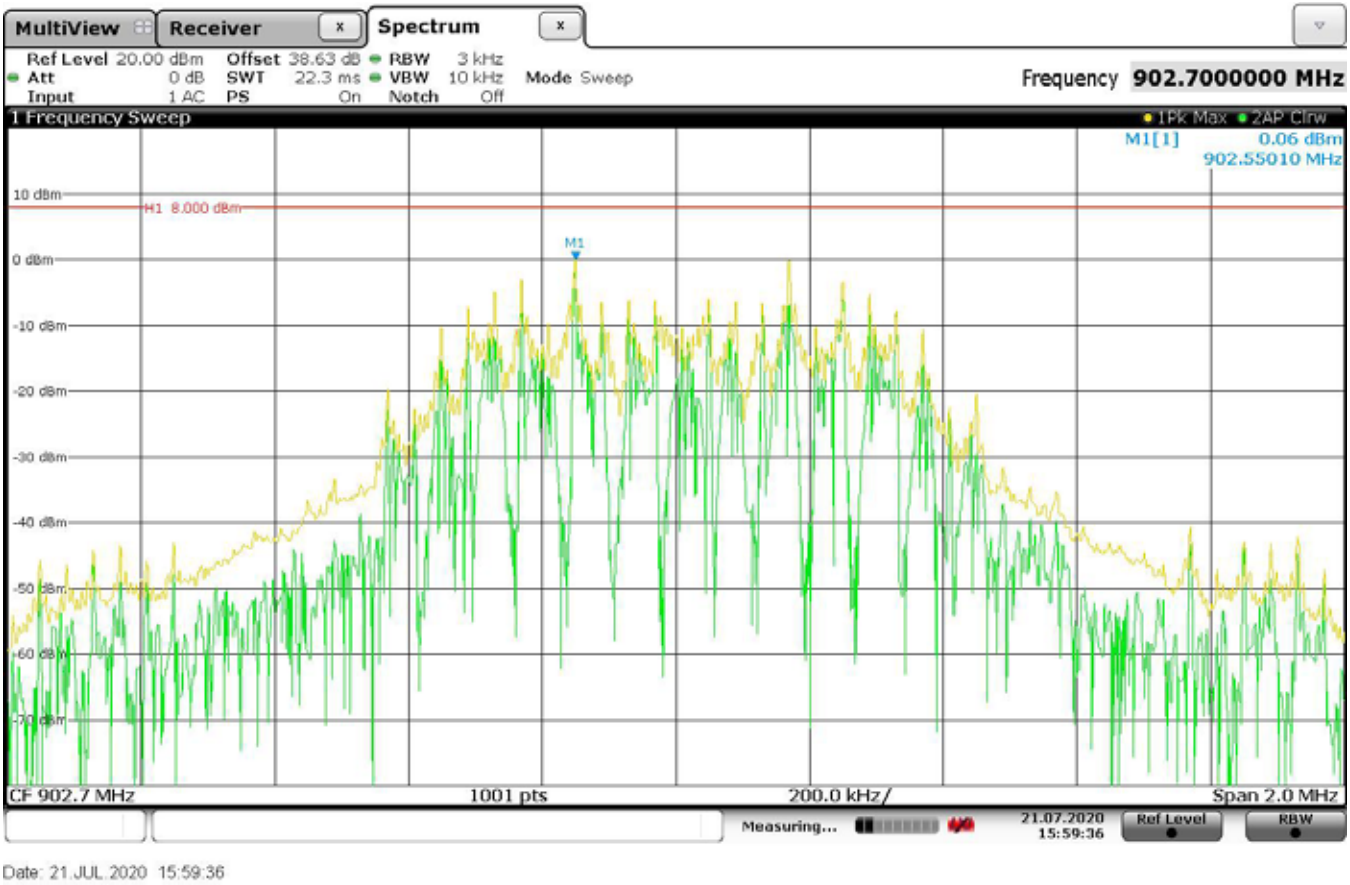
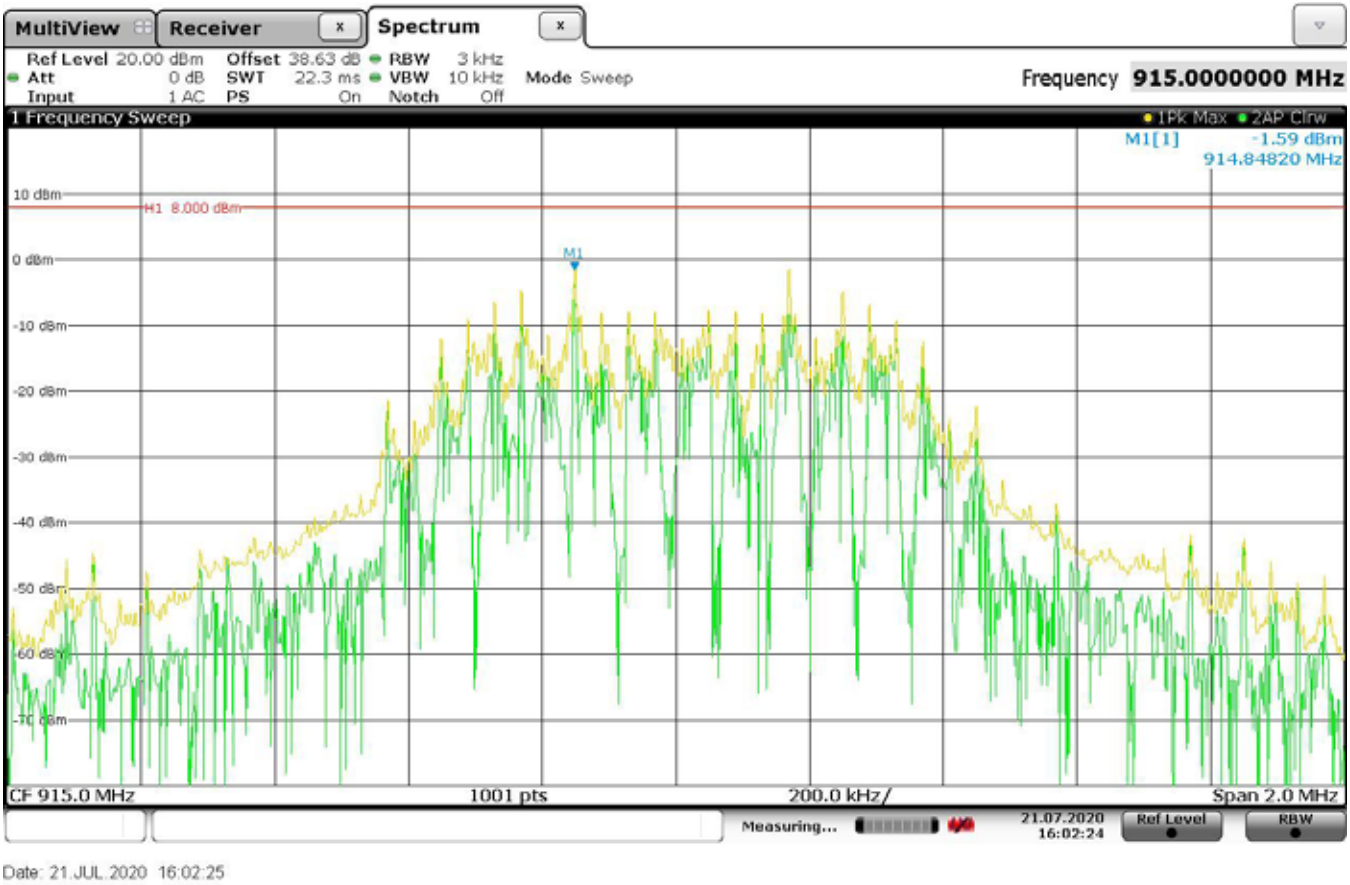
DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – Power Spectral Density
MODE	TX – 902.7MHz
DATE TESTED	July 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

POWER SPECTRAL DENSITY



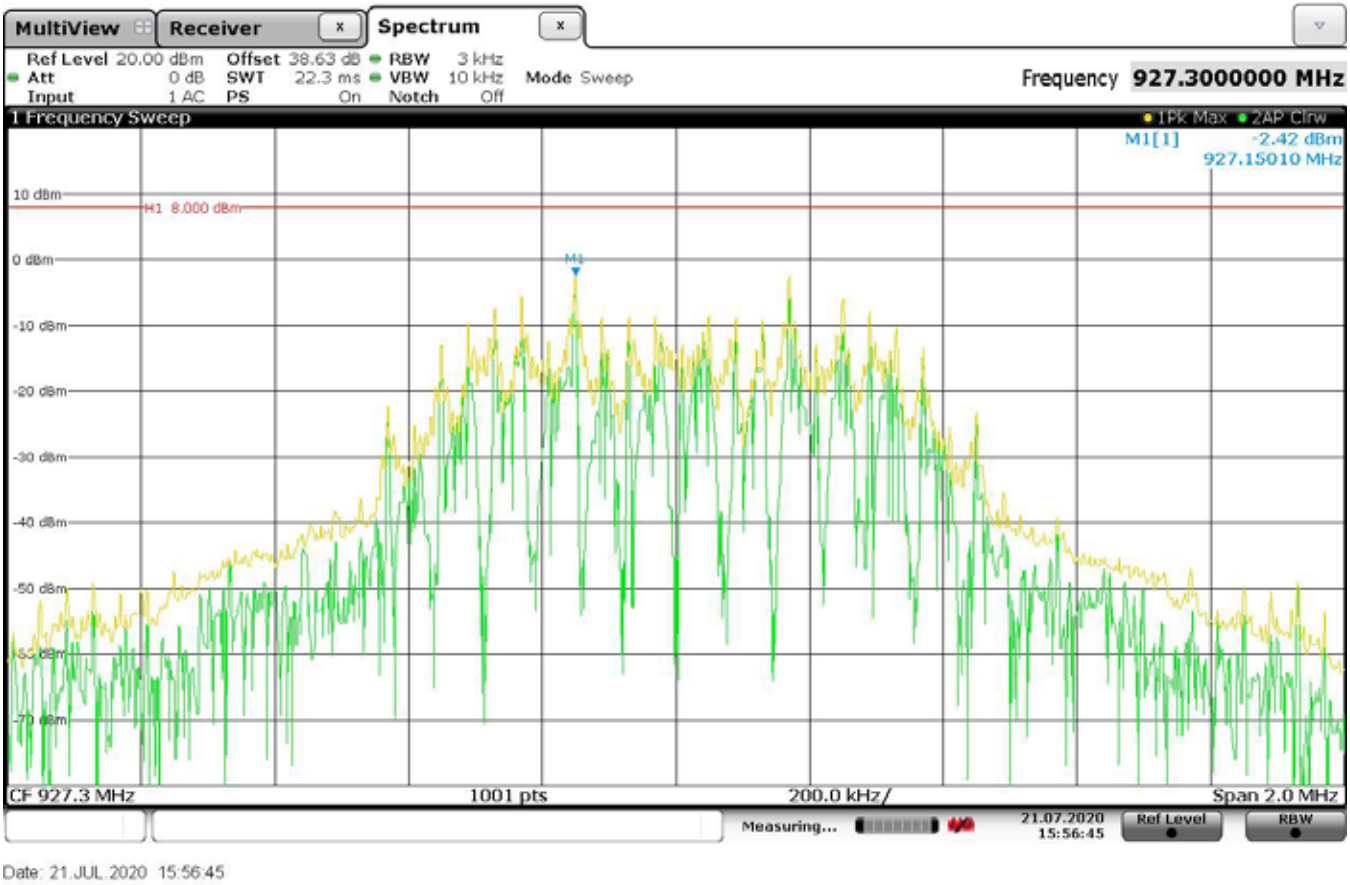
DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – Power Spectral Density
MODE	TX – 915MHz
DATE TESTED	July 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

POWER SPECTRAL DENSITY



DATA PAGE	
MANUFACTURER	Ideal Industries Inc.
EUT	7 Pin Outdoor Controller
MODEL NO.	NEMA10DIM
SERIAL NO.	35000002
TEST	FCC §15.247, RSS-247 – Power Spectral Density
MODE	TX – 927.3MHz
DATE TESTED	July 21, 2020
TEST PERFORMED BY	Tylar Jozefczyk
NOTES	

POWER SPECTRAL DENSITY



Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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

(A2LA Cert. No. 1786.01) Revised 01/10/2020 Page 1 of 8

5202 Presidents Court, Suite 220 | Frederick, MD 21703-8515 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

Test Technology:	Test Method(s) [1]:
Bulk Current Injection (BCI)	ISO 11452-4; CS-11979, Section 6.1; CS.00054, Section 5.8.1; GMW 3097, Section 3.4.1; SAE J1113-4; EMC-CS-2009.1 (RI112); FMC1278 (RI112)
Bulk Current Injections (BCI) *(Closed Loop Method)*	ISO 11452-4; SAE J1113-4
Radiated Immunity Anechoic *(Including Radar Pulse)*	ISO 11452-2; ISO 11452-5; CS-11979, Section 6.2; CS.00054, Section 5.8.2; GMW 3097, Section 3.4.2; 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; GMW 3097, Section 3.4.3; EMC-CS-2009.1 (RI114); FMC1278 (RI114); ISO 11452-11
Radiated Immunity *(Portable Transmitters)*	ISO 11452-9; 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; EIA-364-20D
Insulation Resistance	MIL-STD-202, Method 302; SAE/USCAR-2, Revision 6, Section 5.5.1; EIA-364-21D
Contact Resistance	MIL-STD-202, Method 307; SAE/USCAR-2, Revision 6, Section 5.3.1; EIA/ECA-364-23C; USCAR21-3 Section 4.5.3
DC Resistance	MIL-STD-202, Method 303
Contact Chatter	MIL-STD-202, Method 310; SAE/USCAR-2, Revision 6, Section 5.1.9
Voltage Drop	SAE/USCAR-2, Revision 6, Section 5.3.2; 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); IEC 61000-4-6, Ed 2.0 (2006-05); IEC 61000-4-6 Ed. 3.0 (2008); KN 61000-4-6 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); EN 61000-4-6 (1996) + A1(2001); IEC 61000-4-6; EN 61000-4-6; KN 61000-4-6
Power Frequency Magnetic Field Immunity	IEC 61000-4-8 (1993) + A1(2000); IEC 61000-4-8 (2009); EN 61000-4-8 (1994) + A1(2000); KN 61000-4-8 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); 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); KN 61000-4-11 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-11; EN 61000-4-11; KN 61000-4-11
Ring Wave	IEC 61000-4-12, Ed. 2 (2006-09); EN 61000-4-12:2006; 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; IEC/EN 61000-6-2; AS/NZS 61000-6-2; KN 61000-6-2; IEC/EN 61000-6-3; AS/NZS 61000-6-3; KN 61000-6-3; IEC/EN 61000-6-4; AS/NZS 61000-6-4; KN 61000-6-4; EN 50130-4; IEC 61326-1; IEC/CISPR 14-2; EN 55014-2; AS/NZS CISPR 14.2; KN 14-2; IEC/CISPR 24; AS/NZS CISPR 24; EN 55024; KN 24; 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; EN 301 489-19; EN 301 489-52;
European Radio Test Standards	ETSI EN 300 086-1; ETSI EN 300 086-2; ETSI EN 300 113-1; ETSI EN 300 113-2; ETSI EN 300 220-1; ETSI EN 300 220-2; ETSI EN 300 330-1; ETSI EN 300 330-2; ETSI EN 300 440-1; ETSI EN 300 440-2; ETSI EN 300 422-1; ETSI EN 300 422-2; ETSI EN 300 328; ETSI EN 301 893; ETSI EN 301 511; ETSI EN 301 908-1; ETSI EN 908-2; ETSI EN 908-13; ETSI EN 301 413; 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 GSM, GPRS, EGPRS UMTS (W-CDMA) LTE including CAT M1 A-GPS for UMTS/GSM LTS A-GPS, A-GLONASS, SIB8/SIB16 Large Device/Laptop/Tablet Testing Integrated Device Testing 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; 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 Part 15B	ANSI C63.4:2014	40000
Industrial, Scientific, and Medical Equipment Part 18	FCC MP-5 (February 1986)	40000
Intentional Radiators Part 15C	ANSI C63.10:2013	40000
Unlicensed Personal Communication Systems Devices 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 Part 15E	ANSI C63.10:2013	40000
U-NII with DFS Intentional Radiators Part 15E	FCC KDB 905462 D02 (v02)	40000
UWB Intentional Radiators Part 15F	ANSI C63.10:2013	40000
BPL Intentional Radiators Part 15G	ANSI C63.10:2013	40000
White Space Device Intentional Radiators Part 15H	ANSI C63.10:2013	40000
Commercial Mobile Services (FCC Licensed Radio Service Equipment) 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) 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) Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
Maritime and Aviation Radio Services Parts 80 and 87	ANSI/TIA-603-E; ANSI C63.26:2015	40000
Microwave and Millimeter Bands Radio Services 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 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 Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters) 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.