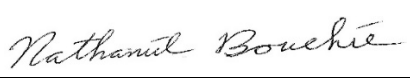
| Engineering Test Report No. 2202468-03 | |
|---|---|
| Report Date | December 7, 2022 |
| Manufacturer Name | Helios Technologies |
| Manufacturer Address | 15926 University Oak<br>San Antonio, TX 78249 |
| Product Name<br>Brand/Model No. | RCD Touch Screen Display/Controller<br>RCDGM05-01 |
| Date Received | August 29, 2022 |
| Test Dates | August 29, 2022 – September 13, 2022 |
| Specifications | EN 12895<br>EN 61326-1<br>EN 60945<br>EN 55035<br>EN 301 489-1/17 |
| Laboratory | Elite Electronic Engineering, Inc. 1516 Centre Circle, Downers Grove, IL 60515 |
| Signature |   |
| Tested by | Nathaniel Bouchie<br>Josh Barker |
| Signature |  |
| Approved by | Raymond J. Klouda,<br>Registered Professional Engineer of Illinois – 44894 |
| PO Number | PO05 |



Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the EN 12895, EN 61326-1, EN 60945, EN 55035, and EN 301 489-1/17 test specifications. The data presented in this test report pertains to the EUT on the test dates specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification. This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

## Table of Contents

# 1. Report Revision History

| Revision | Date | Description |
|---|---|---|
| – | 12 DEC 2022 | Initial Release of Engineering Test Report No. 2202468-03 |
| | | |

## 2. Introduction

This document presents the results of a series of electromagnetic compatibility (EMC) tests that were performed on a RCD Touch Screen Display/Controller (hereinafter referred to as the Equipment Under Test (EUT)).

The EUT was identified as follows:

| EUT Identification | |
|---|---|
| Product Description | RCD Touch Screen Display/Controller |
| Model/Part No. | RCDGM05-01 |
| S/N | 57540***2205110039 |
| Software/Firmware Version | 1.0.0 |
| Size of EUT | 5.75 in x 4 in x 1.5 in |
| Number of Interconnection Wires | 18 |
| Type of Interconnection Wires | 12AWG Power, I/O, Fiber Optic |
| Highest Internal Frequency of the EUT: | 2480MHz |

The EUT listed above was used throughout the test series.

## 3. Power Input

The EUT obtained 12VDC power via two 12AWG, 1-foot wires.

## 4. Grounding

The EUT was not connected to ground.

## 5. Support Equipment

The EUT was submitted for testing along with the following support equipment:

| Description | Model # | S/N |
|---|---|---|
| Load Box | N/a | N/a |
| Support Laptop | N/a | H2R9P32 |
| Load Box (Replacement) | N/a | N/a |
| Bluetooth Speaker | N/a | 41.42.41.96.4A.4F |

## 6. Interconnect Leads

The following interconnect cables were submitted with the test item:

| Item | Description |
|---|---|
| 14 Pin Harness | Connects EUT to Load Box |
| COM Fiber Optic | Connects EUT to Support Laptop |
| RS485 Fiber Optic | Connects EUT to Support Laptop |

## 7. Modifications Made to the EUT

The following modifications were made to the EUT to meet test specification criteria:

- Modified the front-end power supply and reverse-polarity protection circuit to be much more resilient to the low/negative voltage transients.

# 8. Modes of Operation

The EMC tests were performed with the EUT operating in one or more of the test modes described below. See the specific test section for the applicable test modes.

## 8.1. Tx Standby

This mode was achieved by applying 24VDC to the EUT with the support equipment attached. The support equipment software was used to turn on the following settings on the EUT:

- Output 1
- Output 2
- Buzzer at 100% volume and 2837MHz

## 8.2. WiFi and BLE Paired

The support equipment software was used to turn on the following settings on the EUT:

- Output 1
- Output 2
- Buzzer at 100% volume and 2837MHz
- WiFi and BLE Paired

## 8.3. Tx @ BR GPSK, Ch78 2480MHz

The support equipment software was used to turn on the following settings on the EUT:

- Output 1
- Output 2
- Buzzer at 100% volume and 2837MHz
- Tx @ BR GPSK, Ch78 2480MHz

## 8.4. Tx @ EDR 8DPSK, Ch78 2480MHz

The support equipment software was used to turn on the following settings on the EUT:

- Output 1
- Output 2
- Buzzer at 100% volume and 2837MHz
- Tx @ EDR 8DPSK, Ch78 2480MHz

## 8.5. Tx @ WiFi 802.11b, Ch1 2412MHz

The support equipment software was used to turn on the following settings on the EUT:

- Output 1
- Output 2
- Buzzer at 100% volume and 2837MHz
- Tx @ WiFi 802.11b, Ch1 2412MHz

## 8.6. Tx @ BLE, Ch39 2480MHz

The support equipment software was used to turn on the following settings on the EUT:

- Output 1
- Output 2
- Buzzer at 100% volume and 2837MHz
- Tx @ BLE, Ch39 2480MHz

## 9. Test Specifications

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

| Reference Number | Title of Standard | Year | Amendments/ Version | Listed in EMC Official Journal |
|---|---|---|---|---|
| EN 12895 | Industrial Trucks – Electromagnetic Compatibility | 2015 | A1:2019 | Yes |
| EN 61326-1 | Electrical equipment for measurement, control, and laboratory use – EMC requirements – Part 1: General requirements | 2013 | Ed 2.0 | Yes |
| EN 60945 | Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results | 2002 | A1:2008 | Yes |
| EN 55032 | Electromagnetic compatibility of multimedia equipment – Emission requirements | 2015 | A11:2020 | Yes |
| EN 55035 | Electromagnetic compatibility of multimedia equipment - Immunity requirements | 2017 | A11:2020 | Yes |
| EN 301 489-1 | Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements | 2011 | V1.9.2 | Yes |
| EN 301 489-17 | ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonized Standard for ElectroMagnetic Compatibility | 2020 | V3.2.4 | No |
| IEC 61000-4-2 | Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test | 2008 | Ed 2.0 | No |
| IEC 61000-4-3 | Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency electromagnetic field immunity test | 2020 | Ed 4.0 | No |
| IEC 61000-4-4 | Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test | 2014 | Ed 3.0 | No |
| IEC 61000-4-5 | Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test | 2017 | Ed 3.1 | No |
| IEC 61000-4-6 | Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields | 2013 | Ed 4.0 | No |
| IEC 61000-4-8 | Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test | 2009 | Ed 2.0 | No |

## 10. Test Plan

No test plan was provided. Instructions were provided by personnel from Helios Technologies and used in conjunction with the specifications listed in section 9 of this document.

## 11. Deviation, Additions to, or Exclusions from Test Specifications

There were no deviations, additions to, or exclusions from the test specifications during this test series.

## 12. Laboratory Conditions

| Ambient Parameters | Value |
|---|---|
| Temperature | 24.4°C |
| Relative Humidity | 30% |
| Atmospheric Pressure | 1014.6mb |

## 13. Summary

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

| Test Description | Test Method | Results |
|---|---|---|
| RF Radiated Emissions Test | EN 55032 | Conforms |
| RF Conducted Emissions Test (DC Power Ports) | EN 55032 | Conforms |
| Radiated Immunity Test | EN 61000-4-3 | Conforms |
| Electrostatic Discharge (ESD) Test | EN 61000-4-2 | Conforms |
| Electrical Fast Transients (EFT) Test | EN 61000-4-4 | Conforms |
| RF Common Mode Test | EN 61000-4-6 | Conforms |
| Surge Test | EN 61000-4-5 | Conforms |
| Magnetic Field Immunity Test | EN 61000 | Conforms |

## 14. Immunity Monitoring

The EUT was monitored visually, by camera if needed, for any change in state; more specifically, any flickering, dimming or unexpected change in state. Support software was also used to monitor the EUT for any undesirable change in state.

## 15. Immunity Criteria

The EUT shall adhere to the following performance criteria as stated in the EN 301 489 Standard:

Performance criteria for continuous phenomena applied to transmitters and receivers:

During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the test, the EUT shall not unintentionally transmit or change its actual operating state and stored data. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for transient phenomena applied to transmitters and receivers:

After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for voltage interruption applied to transmitters and receivers:

- In the case where the equipment is fitted with or connected to a battery back-up, the performance criteria for transient phenomena shall apply.
- In the case where the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up) volatile user data may have been lost and if applicable the communication link need not to be maintained and lost functions should be recoverable by user or operator.
- No unintentional responses shall occur at the end of the test.
- In the event of loss of function(s) or in the event of loss of user stored data, this fact shall be recorded in the test report.

## 16. Sample Calculations

For Powerline Conducted Emissions:

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

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

For Antenna Port Conducted Emissions:

The resultant power level (PL) is a summation in decibels (dB) of the receiver meter reading (MTR), the cable loss factor (CF) and any external attenuation (EA).

Formula 1: PL (dBm) = MTR (dBm) + CF (dB) + EA (dB).

For Radiated Emissions:

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

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

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

Formula 2: FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

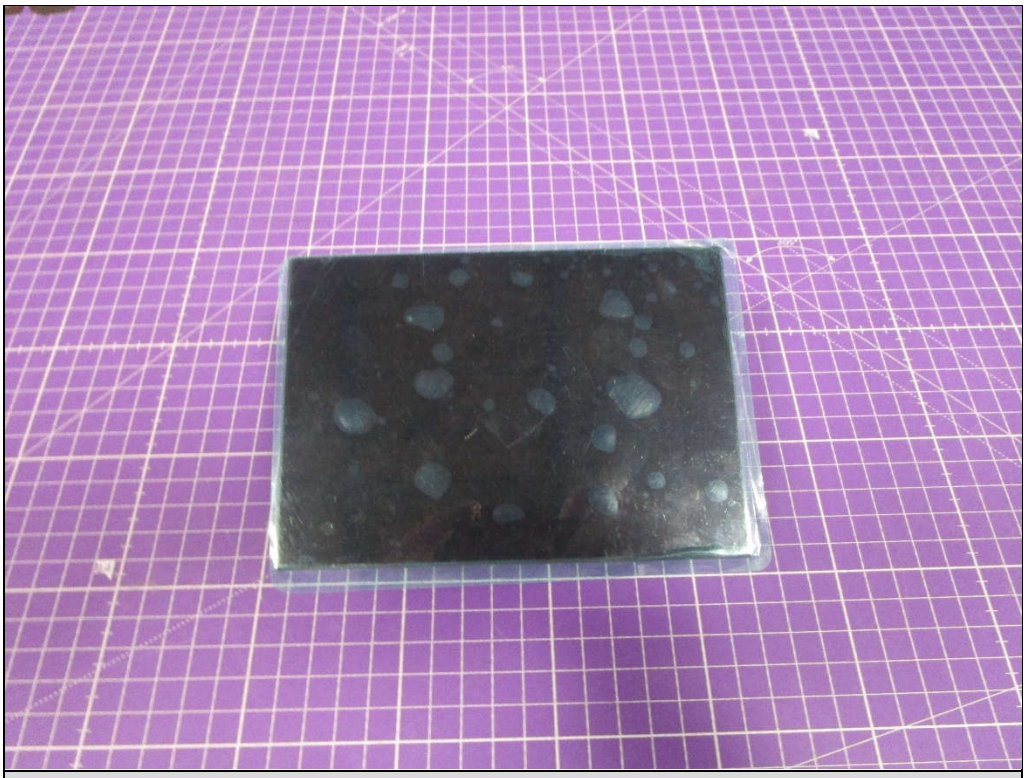
## 17. Statement of Conformity

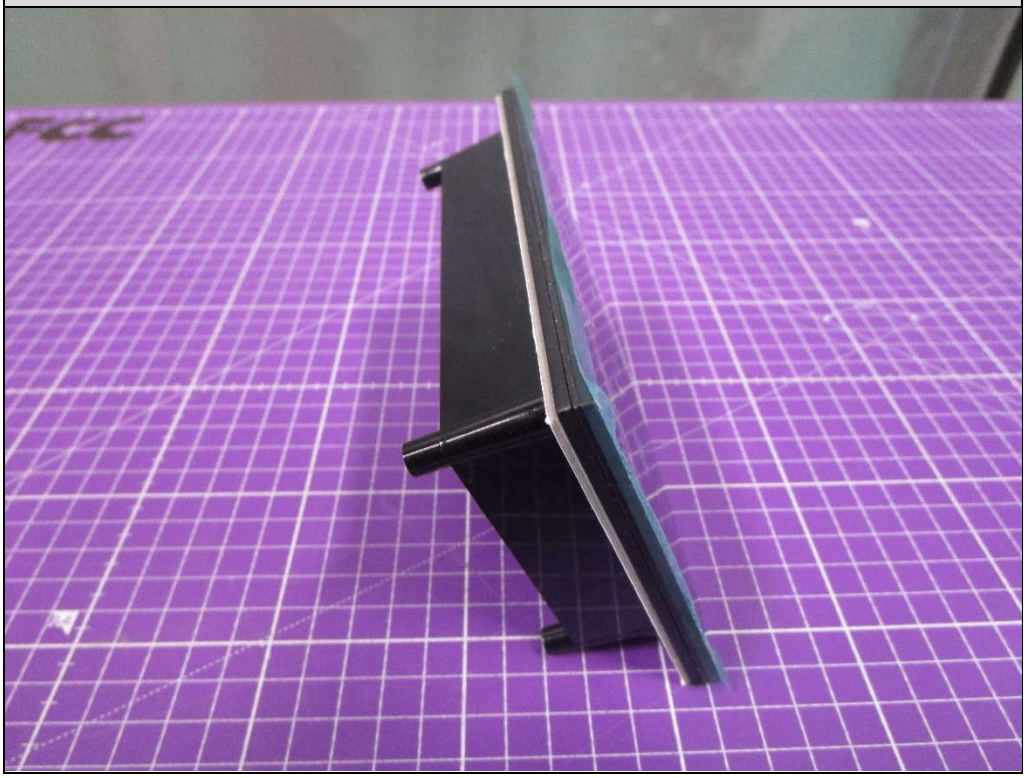
The Helios Technologies RCD Touch Screen Display/Controller, Model No.RCDGM05-01, Serial No. 57540***2205110039, did fully conform to the selected requirements of the EN 12895, EN 61326-1, EN 60945, EN 55035, and EN 301 489-1/17 specifications.

## 18. 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 listed in section 9 of this document. The data presented in this test report pertains to the EUT on the test date specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

## 19. Photographs of EUT





## 20. Equipment List

| Eq ID | Equipment Description | Manufacturer | Model No. | Serial No. | Frequency Range | Cal Date | Due Date |
|---|---|---|---|---|---|---|---|
| ACF1 | POWER AMPLIFIER | IFI, INC. | 406 | 1294-4567 | 0.01-250MHZ | NOTE 1 | |
| ACV0 | BROADBAND POWER AMPLIFIER | AMPLIFIER RESEARCH | 75A220 | 17806 | 0.01-220MHZ | NOTE 1 | |
| APW3 | PREAMPLIFIER | PLANAR ELECTRONICS | PE2-35-120-5R0-10-12 | PL2924 | 1GHZ-20GHZ | 3/9/2022 | 3/9/2023 |
| AWF4 | RF POWER AMPLIFIER | OPHIR | 5295FE | 1001 | .7-6GHZ | NOTE 1 | |
| CDX8 | COMPUTER | ELITE | WORKSTATION | | | N/A | |
| CDZ4 | LAB WORKSTATION | ELITE | LWS-10 | | WINDOWS 10 | CNR | |
| GBN9 | SIGNAL GENERATOR | ROHDE & SCHWARZ | SMY 02 | 61400238 | 9KHZ-2.080GHZ | 2/28/2022 | 2/28/2023 |
| GRE1 | SIGNAL GENERATOR | AGILENT | E4438C | MY42081749 | 250KHZ-6GHZ | 3/7/2022 | 3/7/2023 |
| GURB | ATTENUATOR FOR PEFT.1 | HAEFELY | 50R | 54.3DB | 1HZ-1MHZ | 9/30/2021 | 9/30/2022 |
| GUU0 | EMC IMMUNITY TEST SYSTEM | KEYTEK | CE MASTER | 9612414 | --- | 9/28/2021 | 9/28/2022 |
| MGD0 | GAUSSMETER | F.W. BELL | 5180 | 1342020 | --- | 4/8/2022 | 4/8/2024 |
| MGDC | GAUSSMETER PROBE | F.W. BELL | MOS51-3204 | 1722001 | --- | 4/8/2022 | 4/8/2024 |
| MML0 | ELECTROMETER/MULTIMETER | KEITHLEY | 619 | 220024 | V/A/R | 9/23/2021 | 9/23/2022 |
| MPE0 | DUAL POWER METER | AGILENT | E4419B | GB39511351 | 0.1MHZ-50GHZ | 8/25/2022 | 8/25/2023 |
| MPI3 | POWER SENSOR | KEYSIGHT | E9304A | MY56100035 | 9KHZ-6GHZ | 10/27/2021 | 10/27/2023 |
| MRK12 | HYGRO-THERMOMETER (ESD LAB) | EXTECH | 445703 | 1020 | --- | 3/12/2021 | 3/12/2023 |
| MSV3 | DIGITAL OSCILLOSCOPE | LECROY | WR64XI | LCRY0607M12920 | 600MHz | 10/4/2021 | 10/4/2022 |
| NEF1 | E-FIELD GENERATOR | TDK | EFG-03 | 131105 | .01 to 100 MHZ | Note 1 | |
| NLS0 | 24" ACTIVE LOOP ANTENNA | EMCO | 6502 | 89979 | 10KHZ-30MHZ | 9/11/2020 | 9/11/2022 |
| NSA4 | LOG-PERIODIC ANTENNA | AMPLIFIER RESEARCH | AT1080 | 13264 | 80-1000MHZ | NOTE 1 | |
| NSDS1 | UNIVERSAL SPHERICAL DIPOLE SOURCE | AET | USDS-H | AET-1116 | | NOTE 1 | |
| NTA4 | BILOG ANTENNA | TESEQ | 6112D | 46660 | 20-2000GHZ | 10/5/2020 | 10/5/2022 |
| NWQ0 | DOUBLE RIDGED WAVEGUIDE ANTENNA | ETS LINDGREN | 3117 | 66657 | 1GHZ-18GHZ | 6/13/2022 | 6/13/2023 |
| NWV1 | DOUBLE RIDGED WAVEGUIDE ANTENNA | ETS LINDGREN | 3119 | 164466 | 400MHZ-6GHZ | NOTE 1 | |
| PCC1 | CURRENT PROBE | ELECTRO-METRICS | PCL-25 | 203 | 0.001-100MHZ | 12/21/2021 | 12/21/2023 |
| PDP5 | DIFFERENTIAL PROBE (High Voltage) | YOKOGAWA | 701926 | 163970 | 0-7kV | 8/25/2022 | 8/25/2023 |
| PIE4 | CURRENT INJECTION PROBE | TEGAM INC. | 95236-1 | 12028 | 10KHZ-100MHZ | NOTE 1 | |
| PLZ2 | 50UH LISN (CISPER 25) | ELITE | 50UH-CISPR25 | 003 | .01-.15MHZ | 4/8/2021 | 4/8/2023 |
| PLZ3 | 50UH LISN (CISPER 25) | ELITE | 50UH-CISPR25 | 004 | .01-.15MHZ | 4/8/2021 | 4/8/2023 |
| PLZA | 250uH LISN ADAPTOR | ELITE | 250UH-CISPR | 001 | .01-.15MHZ | 4/8/2021 | 4/8/2023 |
| PLZB | 250UH LISN ADAPTOR | ELITE | 250UH-CISPR | 002 | .01-.15 | 4/5/2022 | 4/5/2023 |
| PMF1 | HIGH VOLTAGE PROBE | KEITHLEY | 6103C | 04 | 0-30KV | 8/30/2022 | 8/30/2024 |
| R21F | 3M ANECHOIC CHAMBER NSA | EMC TEST SYSTEMS | 3M ANECHOIC | | 30MHZ-18GHZ | 3/30/2022 | 3/30/2023 |
| RBC0 | ESCI EMI TEST RECEIVER | ROHDE & SCHWARZ | ESCI | 100340 | 9KHZ-3GHZ | 9/14/2022 | 9/14/2023 |
| RBC1 | ESCI EMI TEST RECEIVER | ROHDE & SCHWARZ | ESCI | 100341 | 9KHZ-3GHZ | 9/14/2022 | 9/14/2023 |
| RBG3 | EMI ANALYZER | ROHDE & SCHWARZ | ESW44 | 101592 | 2HZ-44GHZ | 4/7/2022 | 4/7/2023 |
| SHC2 | Power Supplies | HENGFU | HF60W-SL-24 | A11372702 | 24V | NOTE 1 | |
| SMAT | DC POWER SUPPLY | VOLTEQ | HY3020EX | 11885472 | 30VDC/20A | NOTE 1 | |

## Equipment list continued

| Eq ID | Equipment Description | Manufacturer | Model No. | Serial No. | Frequency Range | Cal Date | Due Date |
|---|---|---|---|---|---|---|---|
| T1N3 | 10DB 20W ATTENUATOR | NARDA | 766-10 | --- | DC-4GHZ | 1/21/2022 | 1/21/2024 |
| TTC0 | 30 DB ATTENUATOR 50W | WEINSCHEL | 47-30-43 | AZ0513 | 0-18GHZ | 1/13/2022 | 1/13/2024 |
| 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 | |
| WOJ0 | SOFTWARE, BSI61000-4-3 RS | ELITE | BSI_610004_3_RS | 1 | 80-2000MHZ | I/O | |
| WOJ1 | IEC_61000_4_6_CI | ELITE | | | | | |
| XDBB0 | DUAL DIRECTIONAL COUPLER (700W) | WERLATONE | C10996-20 | 115548 | 700-6000MHZ | 12/23/2021 | 12/23/2022 |
| XDN6 | DUAL DIRECTIONAL COUPLER (50DB) | AMPLIFIER RESEARCH | DC6580AM1 | 0342034 | 80-1000MHZ (1500W) | 12/28/2021 | 12/28/2022 |
| XDR4 | DUAL DIRECTIONAL COUPLER (50DB) | AMPLIFIER RESEARCH | DC2600 | 1007850-501 | 0.01-100MHZ(600W)100-250MHZ(300W) | 7/26/2022 | 7/26/2023 |
| XDR6 | DUAL DIRECTIONAL COUPLER (50DB) | AMPLIFIER RESEARCH | DC2035A | 0341867 | .01-250MHZ (3500W) | 12/28/2021 | 12/28/2022 |
| XFA3 | RF CURRENT CALIBRATION FIXTURE | TEGAM | 95241-1 | 12048 | .01-450MHZ | 3/3/2022 | 3/3/2023 |
| XLK8 | 100W 50 OHM TERMINATION | JFW INDUSTRIES | 50T-032-1.0 | 009 | DC-1GHZ | 1/26/2021 | 1/26/2023 |
| XLT26 | 5W, 50 OHM TERMINATION | JFW INDUSTRIES | 50T-199 N M | --- | DC-18 GHZ | 6/8/2021 | 6/8/2023 |
| XNG2 | COUPLING/DECOUPLING NETWK | FISCHER CUSTOM COMM. | FCC-801-M2-25 | 9714 | 0.15-230MHZ | 2/3/2022 | 2/3/2024 |
| XNM1 | PASSIVE IMPEDANCE ADAPTER | FISCHER CUSTOM COMM. | FCC-801-150-50-CDN | 97215 | 0.15-230MHZ | 2/3/2022 | 2/3/2024 |
| XPR0 | HIGH PASS FILTER | K&L MICROWAVE | 11SH10-4800/X20000 | 001 | 4.8-20GHZ | 9/7/2021 | 9/7/2023 |
| XRL1 | DISCHARGE NETWORK (470K x 2) | ELITE | 470k | 002 | --- | 1/18/2022 | 1/18/2024 |
| XRL3 | DISCHARGE NETWORK (470K x 2) | ELITE | 470k | 004 | --- | 7/27/2022 | 7/27/2024 |
| XTR6 | ESD SIMULATOR | NOISEKEN | ESS-S3011 | ESS15Y2245 | --- | 4/4/2022 | 4/4/2023 |
| XTRAG | ESD GUN | NOISEKEN | GT-30RA | ESS1920507 | --- | 4/4/2022 | 4/4/2023 |

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

## 21. RF Radiated Emissions Test

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | Tx Standby |

| Information | |
|---|---|
| Setup Format | Tabletop |
| Height of Support | N/a |
| Type of Test Site | Semi-anechoic chamber |
| Test site used | Room 21 |
| Type of Antennas Used | Below 1GHz: Bilog (or equivalent)<br>Above 1GHz: Double-ridged waveguide (or equivalent) |
| Highest Internal Frequency of the EUT: | 2480MHz |
| Highest Measurement Frequency: | 6GHz |
| Notes | The cables were manually maximized during the preliminary emissions sweeps. The cable arrangement which resulted in the worst-case emissions was utilized. |

| EN 60945<br>Requirements | |
|---|---|
| The field strength of radiated emissions at a distance of 3 meters shall not exceed the following values: | |
| Frequency of Emission<br>(MHz) | Quasi-peak Limit<br>(dBµV/m) |
| 0.15 to 0.3*<br>0.3 to 30**<br><br>30 to 156<br>156 to 165<br>165 to 1000<br><br>1000 to 2000 | 80 to 52<br>52 to 34<br><br>54<br>24<br>54<br><br>54 |

*The limits decrease linearly with the logarithm of the frequency in the range 0.15MHz to 0.3MHz
**The limits decrease linearly with the logarithm of the frequency in the range 0.3MHz to 30MHz

| CISPR 32 Class B<br>Requirements | | | |
|---|---|---|---|
| The field strength of radiated emissions at a distance of 3 meters shall not exceed the following values: | | | |
| Frequency of Emission<br>(MHz) | Peak Limit<br>(dBµV/m) | Quasi-peak Limit<br>(dBµV/m) | Average Limit<br>(dBµV/m) |
| 30 to 230<br>230 to 1000<br><br>1000 to 6000 | ---<br>---<br><br>74 | 40<br>47<br><br>--- | ---<br>---<br><br>54 |

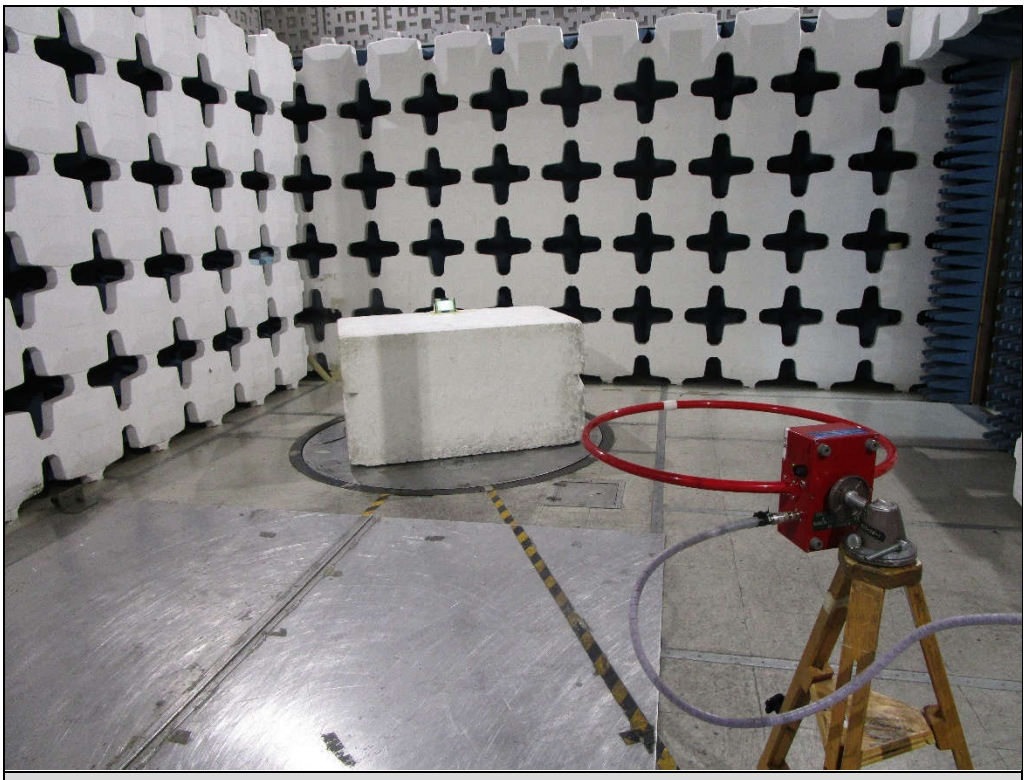
| Measurement Uncertainty | | |
|---|---|---|
| Measurement Type | $U_{lab}$ | $U_{CISPR}$ |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz) | 4.3 dB | 6.3 dB |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz) | 3.1 dB | 5.2 dB |

$U_{lab}$ = Determined for Elite Electronic Engineering, Inc.
$U_{CISPR}$ = From CISPR 16-4-2 Table 1

| Procedures |
|---|
| Since a quasi-peak detector and an average detector requires a 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.<br><br>The EUT and all peripheral equipment were placed on an 80cm high non-conductive stand. The broadband measuring antenna was positioned at a 3-meter distance from the EUT. 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 6GHz 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.<br><br>Final radiated emissions were performed on all significant broadband and narrowband emissions found in the exploratory sweeps using the following methods:<br><br>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.<br>2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken:<br>a) The EUT was rotated so that all sides were exposed to the receiving antenna.<br>b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.<br>c) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.<br>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. |

Test Setup for Radiated Emissions: 150kHz to 30MHz, X-axis Polarization

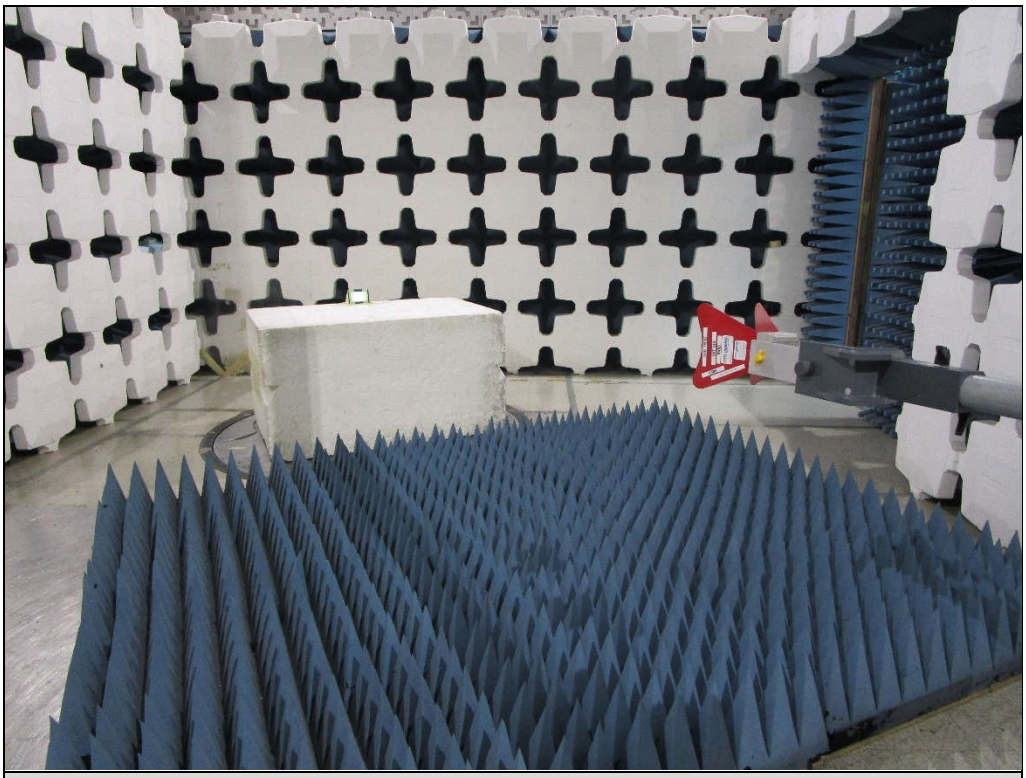
Test Setup for Radiated Emissions: 150kHz to 30MHz, Y-axis Polarization



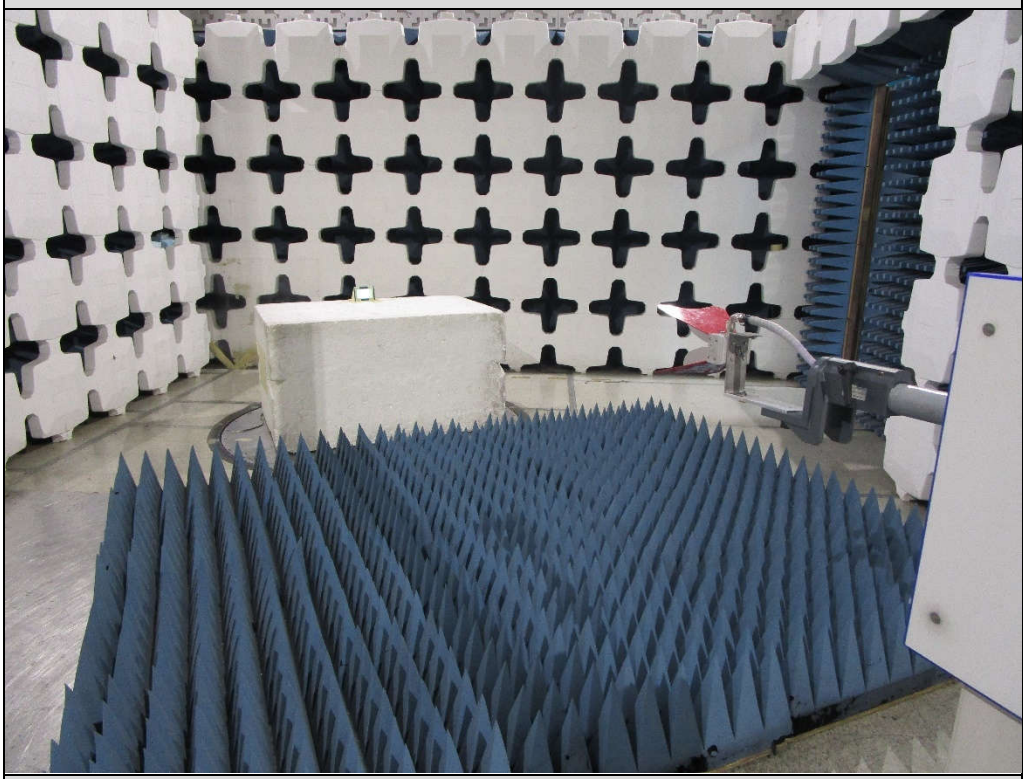
Test Setup for Radiated Emissions: 150kHz to 30MHz, Z-axis Polarization

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

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



Test Setup for Radiated Emissions: Above 1GHz, Horizontal Polarization



Test Setup for Radiated Emissions: Above 1GHz, Vertical Polarization

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

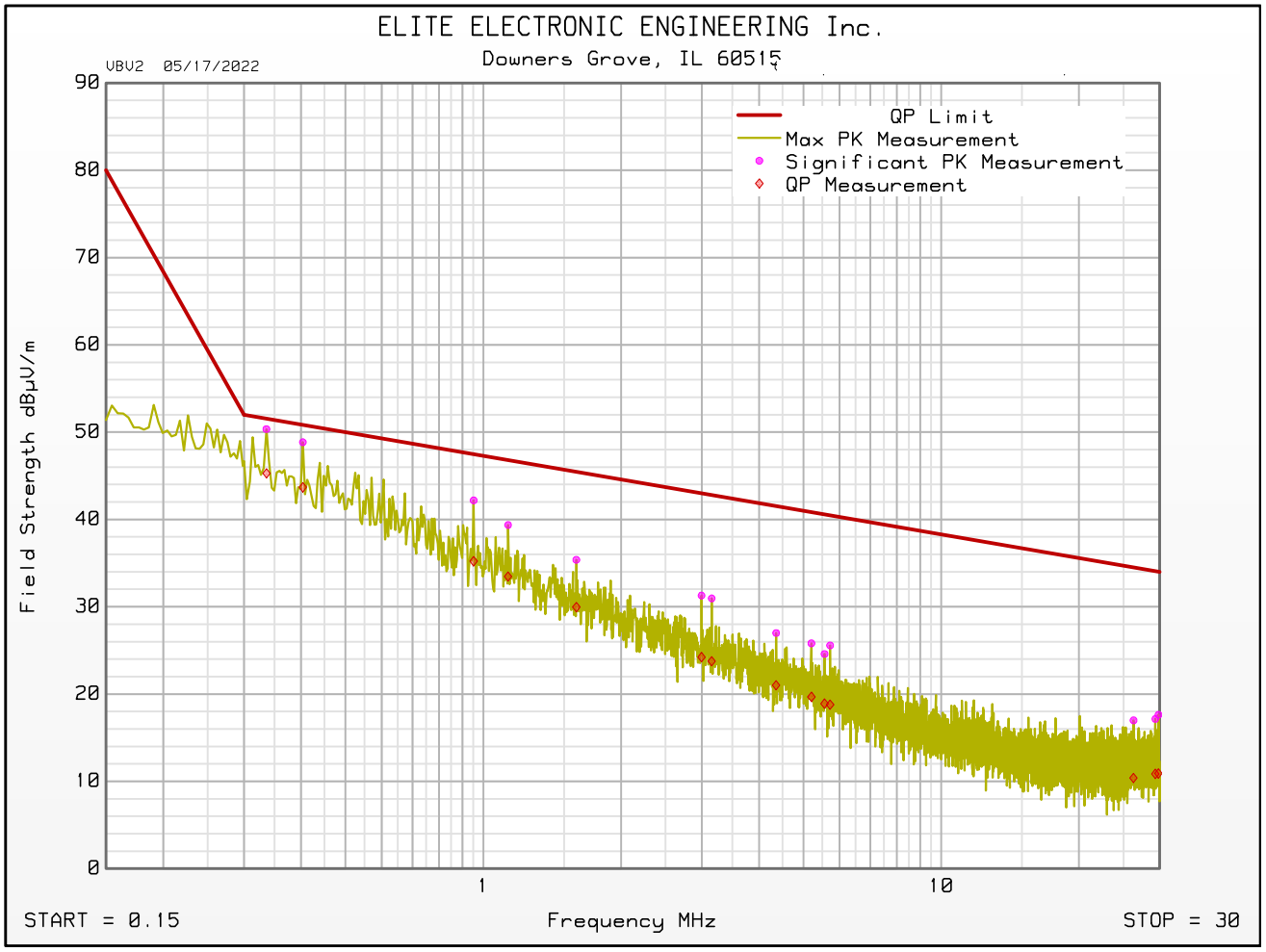
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 30, 2022 08:53:43 AM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 Orient | Azim ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.336 | 39.3 | 34.2 | 11.1 | 0.0 | 0.0 | 0.0 | 50.3 | 45.3 | 51.6 | -6.3 | X | 0 | |
| 0.404 | 37.8 | 32.6 | 11.1 | 0.0 | 0.0 | 0.0 | 48.8 | 43.7 | 50.8 | -7.2 | X | 45 | |
| 0.953 | 31.1 | 24.1 | 11.1 | 0.0 | 0.0 | 0.0 | 42.2 | 35.2 | 47.5 | -12.3 | X | 0 | |
| 1.133 | 28.3 | 22.4 | 11.1 | 0.0 | 0.0 | 0.0 | 39.4 | 33.5 | 46.8 | -13.3 | X | 180 | |
| 1.596 | 24.2 | 18.8 | 11.2 | 0.0 | 0.0 | 0.0 | 35.4 | 30.0 | 45.5 | -15.5 | X | 90 | |
| 2.996 | 20.0 | 12.9 | 11.3 | 0.0 | 0.0 | 0.0 | 31.3 | 24.2 | 43.0 | -18.8 | X | 315 | |
| 3.153 | 19.7 | 12.5 | 11.3 | 0.0 | 0.0 | 0.0 | 31.0 | 23.8 | 42.8 | -19.0 | X | 225 | |
| 4.359 | 15.8 | 9.8 | 11.2 | 0.0 | 0.0 | 0.0 | 27.0 | 21.0 | 41.5 | -20.5 | X | 315 | |
| 5.205 | 14.8 | 8.6 | 11.1 | 0.0 | 0.0 | 0.0 | 25.8 | 19.7 | 40.8 | -21.2 | X | 0 | |
| 5.561 | 13.6 | 7.9 | 11.0 | 0.0 | 0.0 | 0.0 | 24.6 | 18.9 | 40.6 | -21.7 | X | 315 | |
| 5.718 | 14.6 | 7.8 | 11.0 | 0.0 | 0.0 | 0.0 | 25.6 | 18.8 | 40.5 | -21.7 | X | 180 | |
| 26.297 | 8.1 | 1.5 | 8.4 | 0.0 | 0.5 | 0.0 | 17.0 | 10.4 | 34.5 | -24.1 | X | 270 | |
| 29.348 | 8.7 | 2.4 | 8.0 | 0.0 | 0.5 | 0.0 | 17.1 | 10.9 | 34.1 | -23.2 | X | 45 | |
| 29.816 | 9.2 | 2.5 | 7.9 | 0.0 | 0.5 | 0.0 | 17.6 | 10.9 | 34.0 | -23.1 | X | 90 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Antenna Orientation | : | X-Axis |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 30, 2022 08:53:43 AM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

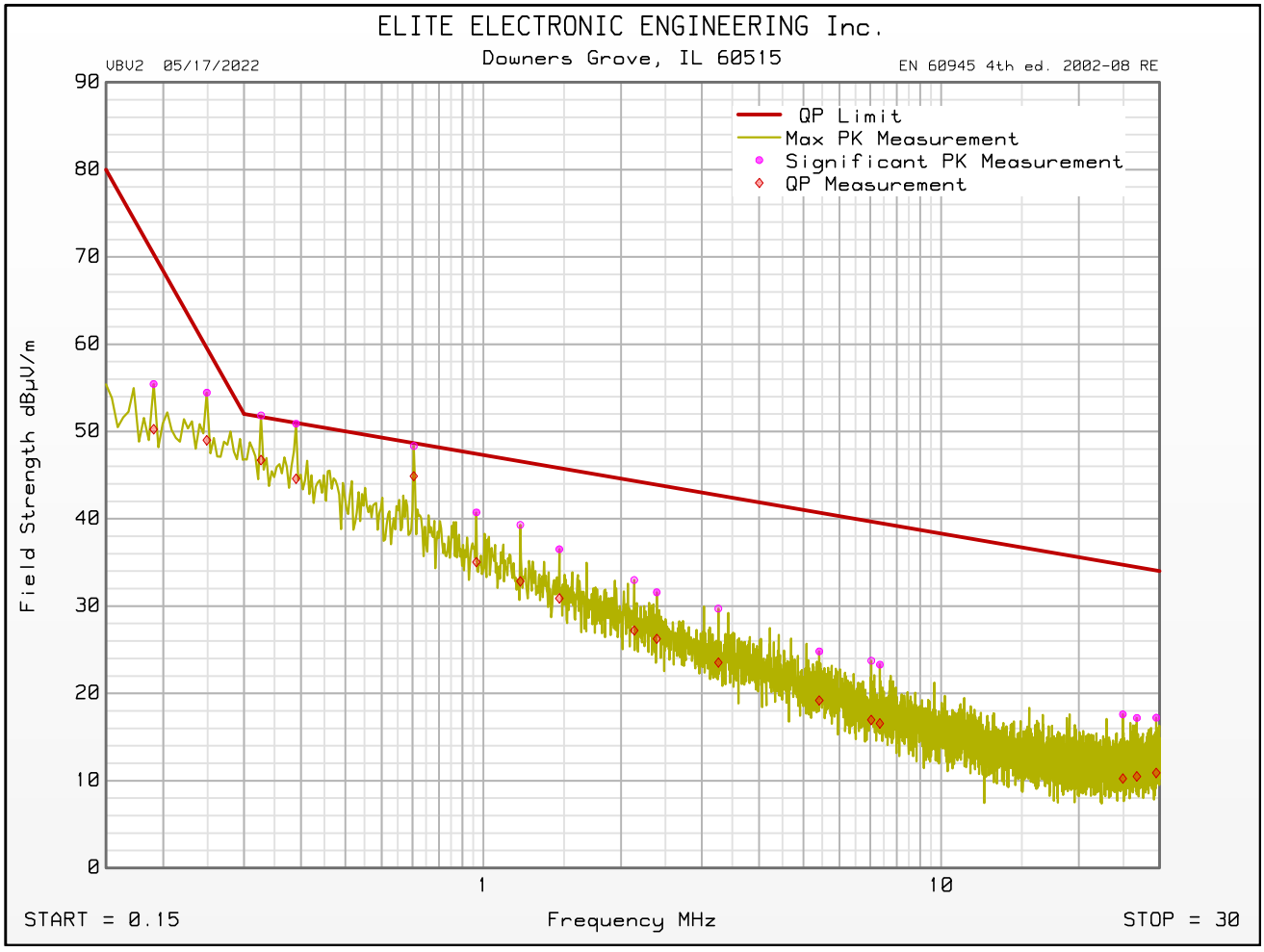
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 02, 2022 01:19:04 PM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 Orient | Azim ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.191 | 44.4 | 39.2 | 11.1 | 0.0 | 0.0 | 0.0 | 55.4 | 50.3 | 70.3 | -20.1 | X | 90 | |
| 0.249 | 43.4 | 37.9 | 11.1 | 0.0 | 0.0 | 0.0 | 54.5 | 49.0 | 59.5 | -10.5 | X | 180 | |
| 0.327 | 40.8 | 35.7 | 11.1 | 0.0 | 0.0 | 0.0 | 51.8 | 46.7 | 51.7 | -4.9 | X | 315 | |
| 0.390 | 39.8 | 33.5 | 11.1 | 0.0 | 0.0 | 0.0 | 50.9 | 44.6 | 51.0 | -6.4 | X | 0 | |
| 0.705 | 37.3 | 33.8 | 11.1 | 0.0 | 0.0 | 0.0 | 48.3 | 44.9 | 48.7 | -3.8 | X | 180 | |
| 0.966 | 29.6 | 24.0 | 11.1 | 0.0 | 0.0 | 0.0 | 40.7 | 35.0 | 47.4 | -12.4 | X | 45 | |
| 1.205 | 28.2 | 21.7 | 11.1 | 0.0 | 0.0 | 0.0 | 39.3 | 32.8 | 46.6 | -13.7 | X | 45 | |
| 1.466 | 25.3 | 19.7 | 11.2 | 0.0 | 0.0 | 0.0 | 36.5 | 30.9 | 45.8 | -14.9 | X | 180 | |
| 2.136 | 21.7 | 16.0 | 11.2 | 0.0 | 0.0 | 0.0 | 33.0 | 27.2 | 44.3 | -17.1 | X | 180 | |
| 2.393 | 20.3 | 15.0 | 11.3 | 0.0 | 0.0 | 0.0 | 31.6 | 26.2 | 43.9 | -17.6 | X | 180 | |
| 3.261 | 18.4 | 12.3 | 11.3 | 0.0 | 0.0 | 0.0 | 29.7 | 23.5 | 42.7 | -19.1 | X | 90 | |
| 5.417 | 13.8 | 8.2 | 11.0 | 0.0 | 0.0 | 0.0 | 24.8 | 19.2 | 40.7 | -21.5 | X | 270 | |
| 7.037 | 13.0 | 6.2 | 10.8 | 0.0 | 0.0 | 0.0 | 23.7 | 17.0 | 39.7 | -22.7 | X | 270 | |
| 7.347 | 12.6 | 5.8 | 10.7 | 0.0 | 0.0 | 0.0 | 23.3 | 16.6 | 39.5 | -22.9 | X | 90 | |
| 24.938 | 8.5 | 1.1 | 8.6 | 0.0 | 0.5 | 0.0 | 17.6 | 10.2 | 34.7 | -24.5 | X | 90 | |
| 26.760 | 8.3 | 1.6 | 8.3 | 0.0 | 0.5 | 0.0 | 17.2 | 10.5 | 34.4 | -24.0 | X | 0 | |
| 29.501 | 8.8 | 2.5 | 7.9 | 0.0 | 0.5 | 0.0 | 17.2 | 10.9 | 34.1 | -23.2 | X | 315 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Antenna Orientation | : | X-Axis |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 02, 2022 01:19:04 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

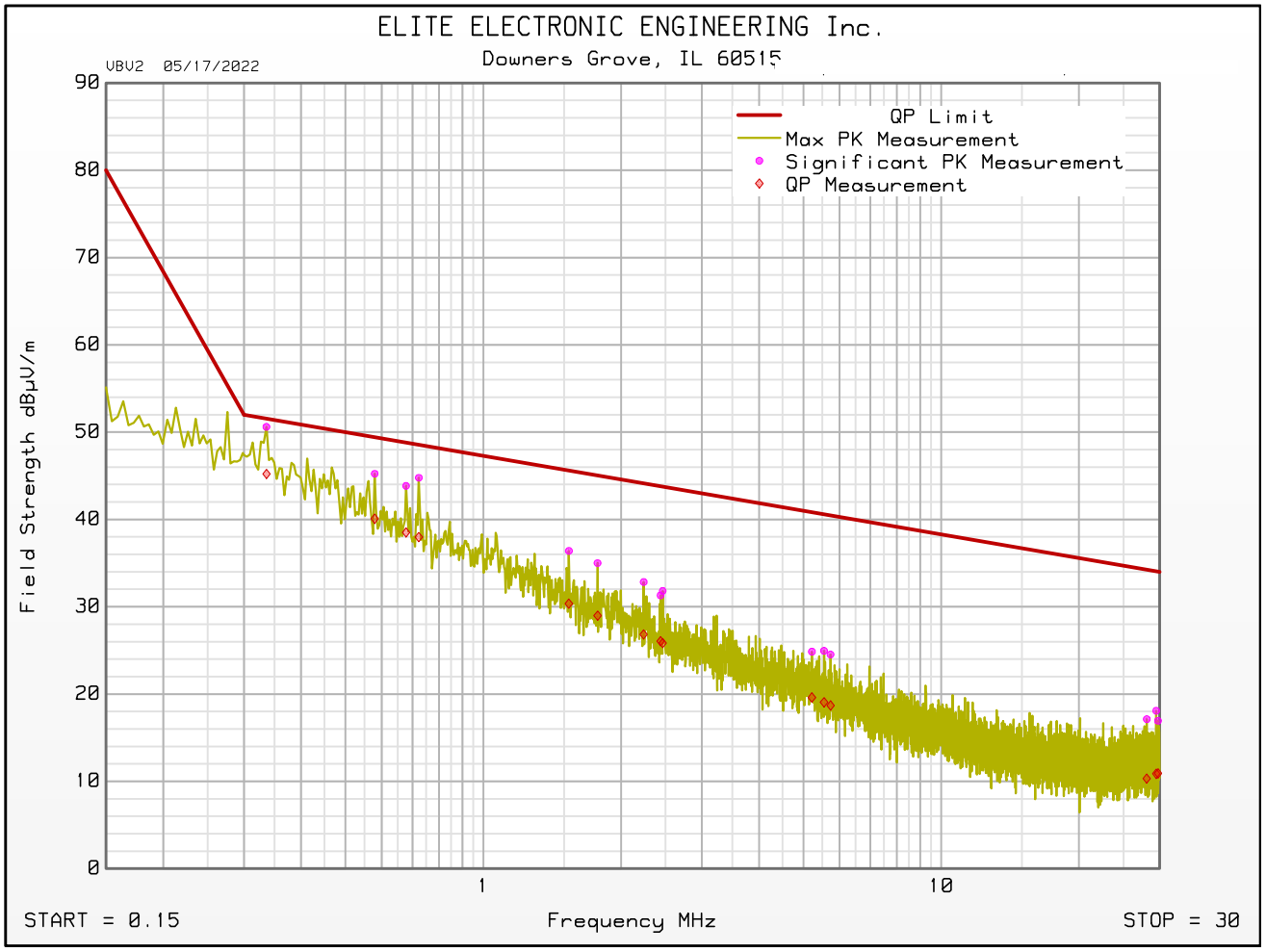
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 30, 2022 09:00:38 AM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 Orient | Azim ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.336 | 39.5 | 34.2 | 11.1 | 0.0 | 0.0 | 0.0 | 50.6 | 45.2 | 51.6 | -6.3 | Y | 225 | |
| 0.579 | 34.2 | 29.0 | 11.1 | 0.0 | 0.0 | 0.0 | 45.2 | 40.1 | 49.4 | -9.3 | Y | 225 | |
| 0.678 | 32.8 | 27.4 | 11.1 | 0.0 | 0.0 | 0.0 | 43.8 | 38.5 | 48.8 | -10.3 | Y | 315 | |
| 0.723 | 33.7 | 26.9 | 11.1 | 0.0 | 0.0 | 0.0 | 44.8 | 38.0 | 48.6 | -10.6 | Y | 0 | |
| 1.538 | 25.2 | 19.2 | 11.2 | 0.0 | 0.0 | 0.0 | 36.4 | 30.4 | 45.6 | -15.2 | Y | 315 | |
| 1.776 | 23.8 | 17.8 | 11.2 | 0.0 | 0.0 | 0.0 | 35.0 | 29.0 | 45.0 | -16.1 | Y | 45 | |
| 2.240 | 21.6 | 15.6 | 11.2 | 0.0 | 0.0 | 0.0 | 32.8 | 26.8 | 44.1 | -17.3 | Y | 225 | |
| 2.438 | 20.0 | 14.8 | 11.3 | 0.0 | 0.0 | 0.0 | 31.3 | 26.1 | 43.8 | -17.8 | Y | 90 | |
| 2.465 | 20.6 | 14.6 | 11.3 | 0.0 | 0.0 | 0.0 | 31.8 | 25.8 | 43.8 | -17.9 | Y | 0 | |
| 5.219 | 13.8 | 8.6 | 11.0 | 0.0 | 0.0 | 0.0 | 24.9 | 19.6 | 40.8 | -21.2 | Y | 315 | |
| 5.547 | 14.0 | 8.1 | 11.0 | 0.0 | 0.0 | 0.0 | 25.0 | 19.1 | 40.6 | -21.5 | Y | 0 | |
| 5.732 | 13.6 | 7.7 | 11.0 | 0.0 | 0.0 | 0.0 | 24.5 | 18.7 | 40.5 | -21.8 | Y | 225 | |
| 28.110 | 8.5 | 1.7 | 8.1 | 0.0 | 0.5 | 0.0 | 17.1 | 10.3 | 34.3 | -23.9 | Y | 225 | |
| 29.478 | 9.6 | 2.4 | 7.9 | 0.0 | 0.5 | 0.0 | 18.1 | 10.9 | 34.1 | -23.2 | Y | 45 | |
| 29.753 | 8.5 | 2.5 | 7.9 | 0.0 | 0.5 | 0.0 | 16.9 | 10.9 | 34.0 | -23.1 | Y | 180 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Antenna Orientation | : | Y-Axis |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 30, 2022 09:00:38 AM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

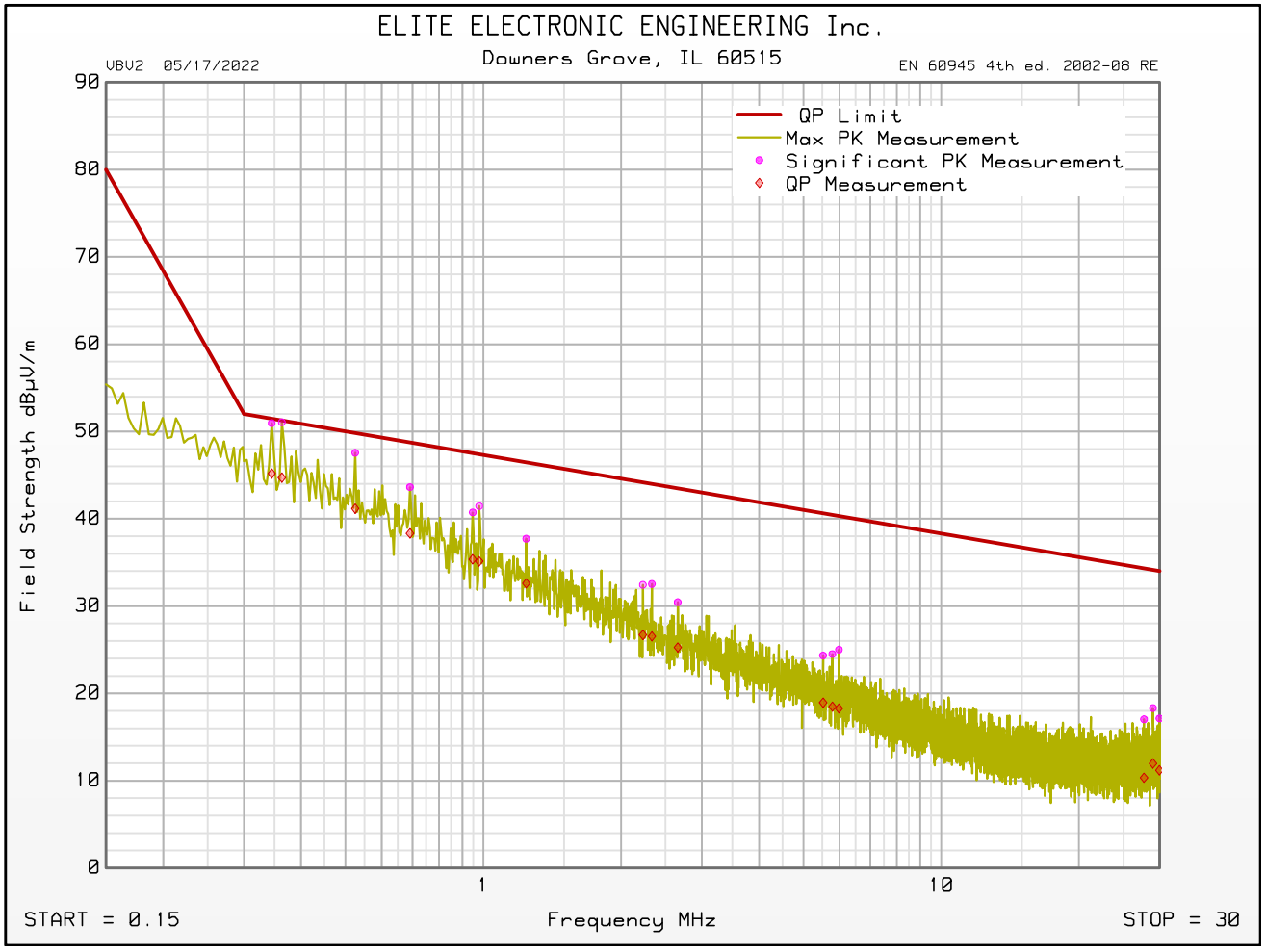
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 02, 2022 01:26:52 PM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 Orient | Azim ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.345 | 39.9 | 34.1 | 11.1 | 0.0 | 0.0 | 0.0 | 51.0 | 45.2 | 51.5 | -6.3 | Y | 0 | |
| 0.363 | 40.0 | 33.7 | 11.1 | 0.0 | 0.0 | 0.0 | 51.1 | 44.7 | 51.3 | -6.5 | Y | 0 | |
| 0.525 | 36.5 | 30.1 | 11.1 | 0.0 | 0.0 | 0.0 | 47.6 | 41.2 | 49.8 | -8.6 | Y | 315 | |
| 0.692 | 32.6 | 27.3 | 11.1 | 0.0 | 0.0 | 0.0 | 43.6 | 38.3 | 48.7 | -10.4 | Y | 180 | |
| 0.948 | 29.6 | 24.3 | 11.1 | 0.0 | 0.0 | 0.0 | 40.7 | 35.4 | 47.5 | -12.1 | Y | 45 | |
| 0.980 | 30.4 | 24.0 | 11.1 | 0.0 | 0.0 | 0.0 | 41.5 | 35.1 | 47.4 | -12.2 | Y | 225 | |
| 1.241 | 26.6 | 21.5 | 11.1 | 0.0 | 0.0 | 0.0 | 37.7 | 32.6 | 46.5 | -13.8 | Y | 135 | |
| 2.231 | 21.2 | 15.5 | 11.2 | 0.0 | 0.0 | 0.0 | 32.4 | 26.7 | 44.2 | -17.5 | Y | 270 | |
| 2.334 | 21.3 | 15.3 | 11.3 | 0.0 | 0.0 | 0.0 | 32.5 | 26.5 | 44.0 | -17.4 | Y | 270 | |
| 2.658 | 19.2 | 14.0 | 11.3 | 0.0 | 0.0 | 0.0 | 30.4 | 25.3 | 43.5 | -18.2 | Y | 180 | |
| 5.520 | 13.3 | 7.9 | 11.0 | 0.0 | 0.0 | 0.0 | 24.3 | 18.9 | 40.6 | -21.7 | Y | 225 | |
| 5.786 | 13.6 | 7.5 | 11.0 | 0.0 | 0.0 | 0.0 | 24.5 | 18.5 | 40.4 | -21.9 | Y | 90 | |
| 5.979 | 14.1 | 7.4 | 10.9 | 0.0 | 0.0 | 0.0 | 25.0 | 18.3 | 40.3 | -22.0 | Y | 270 | |
| 27.723 | 8.3 | 1.6 | 8.2 | 0.0 | 0.5 | 0.0 | 17.0 | 10.3 | 34.3 | -24.0 | Y | 0 | |
| 29.001 | 9.8 | 3.5 | 8.0 | 0.0 | 0.5 | 0.0 | 18.3 | 12.0 | 34.1 | -22.2 | Y | 180 | |
| 29.955 | 8.8 | 2.8 | 7.9 | 0.0 | 0.5 | 0.0 | 17.1 | 11.2 | 34.0 | -22.8 | Y | 90 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Antenna Orientation | : | Y-Axis |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 02, 2022 01:26:52 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

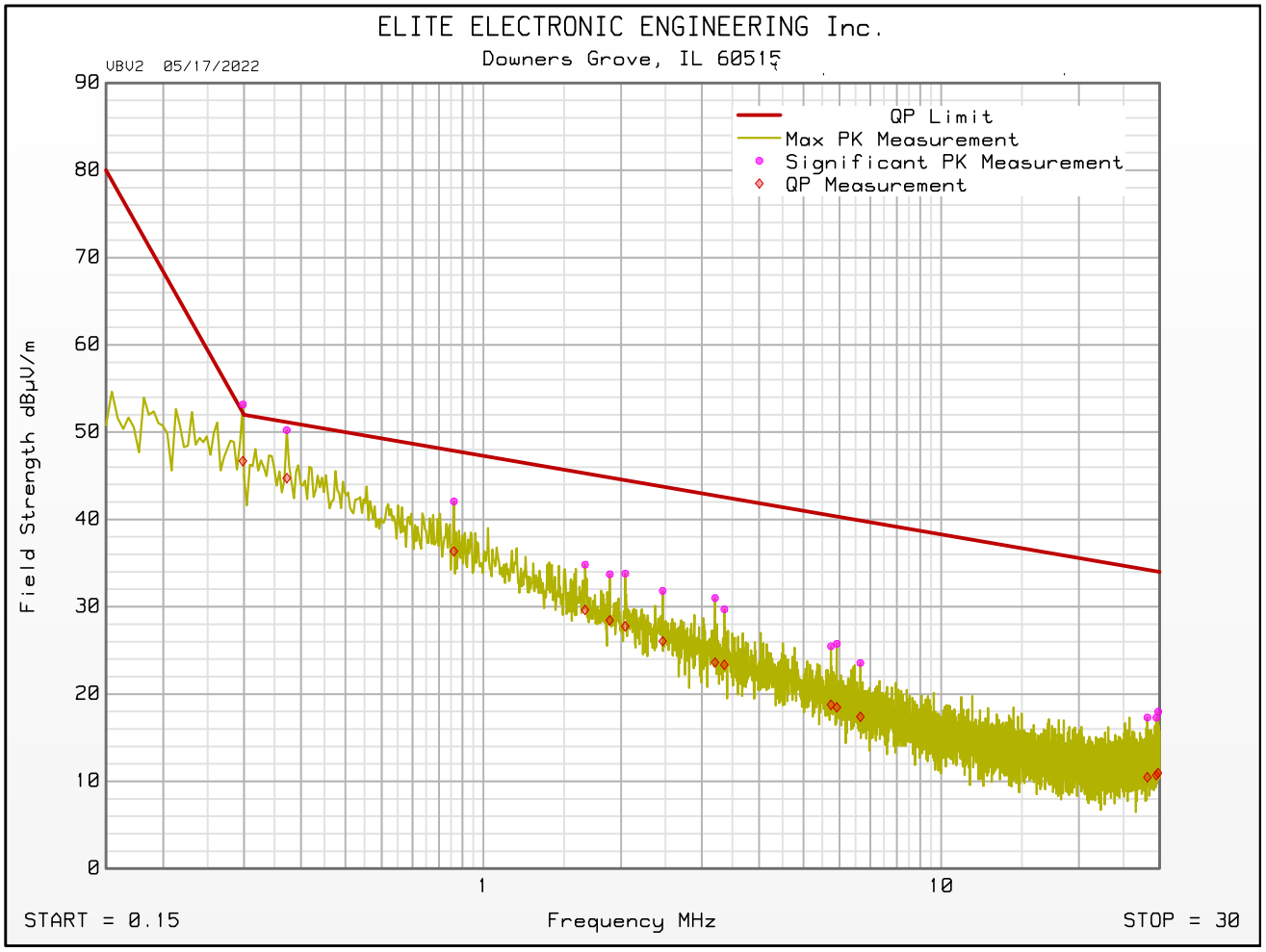
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 30, 2022 09:28:02 AM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 Orient | Azim ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.299 | 42.1 | 35.6 | 11.1 | 0.0 | 0.0 | 0.0 | 53.2 | 46.7 | 52.2 | -5.5 | Z | 225 | |
| 0.372 | 39.2 | 33.7 | 11.1 | 0.0 | 0.0 | 0.0 | 50.2 | 44.7 | 51.2 | -6.4 | Z | 180 | |
| 0.863 | 31.0 | 25.3 | 11.1 | 0.0 | 0.0 | 0.0 | 42.1 | 36.3 | 47.9 | -11.5 | Z | 315 | |
| 1.668 | 23.6 | 18.5 | 11.2 | 0.0 | 0.0 | 0.0 | 34.8 | 29.6 | 45.3 | -15.7 | Z | 135 | |
| 1.889 | 22.5 | 17.2 | 11.2 | 0.0 | 0.0 | 0.0 | 33.7 | 28.4 | 44.8 | -16.4 | Z | 180 | |
| 2.042 | 22.6 | 16.5 | 11.2 | 0.0 | 0.0 | 0.0 | 33.8 | 27.8 | 44.5 | -16.7 | Z | 225 | |
| 2.465 | 20.6 | 14.8 | 11.3 | 0.0 | 0.0 | 0.0 | 31.8 | 26.1 | 43.8 | -17.7 | Z | 270 | |
| 3.207 | 19.7 | 12.3 | 11.3 | 0.0 | 0.0 | 0.0 | 31.0 | 23.6 | 42.7 | -19.1 | Z | 45 | |
| 3.360 | 18.4 | 12.1 | 11.3 | 0.0 | 0.0 | 0.0 | 29.7 | 23.3 | 42.6 | -19.2 | Z | 90 | |
| 5.745 | 14.5 | 7.8 | 11.0 | 0.0 | 0.0 | 0.0 | 25.5 | 18.8 | 40.5 | -21.7 | Z | 180 | |
| 5.916 | 14.8 | 7.5 | 10.9 | 0.0 | 0.0 | 0.0 | 25.8 | 18.5 | 40.3 | -21.9 | Z | 315 | |
| 6.659 | 12.7 | 6.6 | 10.8 | 0.0 | 0.0 | 0.0 | 23.6 | 17.4 | 39.9 | -22.5 | Z | 135 | |
| 28.205 | 8.7 | 1.8 | 8.1 | 0.0 | 0.5 | 0.0 | 17.3 | 10.5 | 34.2 | -23.8 | Z | 270 | |
| 29.492 | 8.9 | 2.3 | 7.9 | 0.0 | 0.5 | 0.0 | 17.3 | 10.7 | 34.1 | -23.4 | Z | 180 | |
| 29.766 | 9.6 | 2.5 | 7.9 | 0.0 | 0.5 | 0.0 | 18.0 | 10.9 | 34.0 | -23.1 | Z | 90 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Antenna Orientation | : | Z-Axis |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 30, 2022 09:28:02 AM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

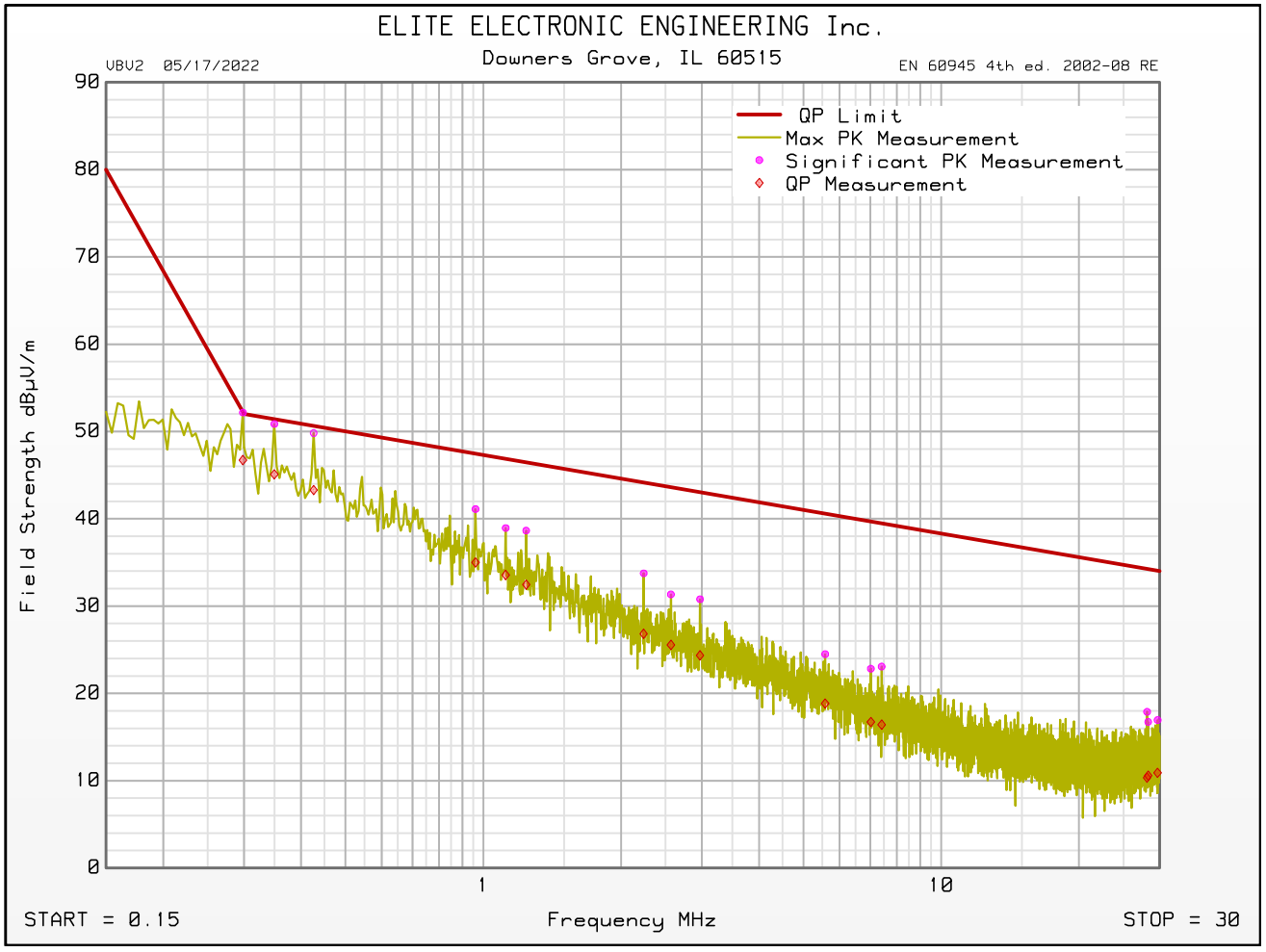
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 02, 2022 01:39:39 PM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 Orient | Azim ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.299 | 41.1 | 35.7 | 11.1 | 0.0 | 0.0 | 0.0 | 52.2 | 46.7 | 52.2 | -5.5 | Z | 45 | |
| 0.350 | 39.8 | 34.0 | 11.1 | 0.0 | 0.0 | 0.0 | 50.9 | 45.1 | 51.4 | -6.3 | Z | 225 | |
| 0.426 | 38.8 | 32.2 | 11.1 | 0.0 | 0.0 | 0.0 | 49.8 | 43.3 | 50.6 | -7.3 | Z | 270 | |
| 0.962 | 30.0 | 23.9 | 11.1 | 0.0 | 0.0 | 0.0 | 41.1 | 35.0 | 47.4 | -12.4 | Z | 135 | |
| 1.119 | 27.8 | 22.5 | 11.1 | 0.0 | 0.0 | 0.0 | 38.9 | 33.6 | 46.9 | -13.3 | Z | 270 | |
| 1.241 | 27.5 | 21.3 | 11.1 | 0.0 | 0.0 | 0.0 | 38.7 | 32.5 | 46.5 | -14.0 | Z | 45 | |
| 2.240 | 22.5 | 15.6 | 11.2 | 0.0 | 0.0 | 0.0 | 33.8 | 26.8 | 44.1 | -17.3 | Z | 225 | |
| 2.568 | 20.1 | 14.3 | 11.3 | 0.0 | 0.0 | 0.0 | 31.3 | 25.6 | 43.6 | -18.0 | Z | 135 | |
| 2.973 | 19.5 | 13.1 | 11.3 | 0.0 | 0.0 | 0.0 | 30.8 | 24.4 | 43.0 | -18.7 | Z | 45 | |
| 5.579 | 13.5 | 7.9 | 11.0 | 0.0 | 0.0 | 0.0 | 24.5 | 18.8 | 40.6 | -21.7 | Z | 0 | |
| 7.019 | 12.1 | 6.0 | 10.8 | 0.0 | 0.0 | 0.0 | 22.8 | 16.7 | 39.7 | -22.9 | Z | 180 | |
| 7.410 | 12.3 | 5.7 | 10.7 | 0.0 | 0.0 | 0.0 | 23.1 | 16.4 | 39.5 | -23.0 | Z | 90 | |
| 28.151 | 9.3 | 1.7 | 8.1 | 0.0 | 0.5 | 0.0 | 17.9 | 10.4 | 34.2 | -23.9 | Z | 270 | |
| 28.317 | 8.1 | 2.0 | 8.1 | 0.0 | 0.5 | 0.0 | 16.7 | 10.6 | 34.2 | -23.6 | Z | 225 | |
| 29.690 | 8.5 | 2.5 | 7.9 | 0.0 | 0.5 | 0.0 | 16.9 | 10.9 | 34.0 | -23.1 | Z | 0 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Antenna Orientation | : | Z-Axis |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz (Freq. Range <30MHz) |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 02, 2022 01:39:39 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

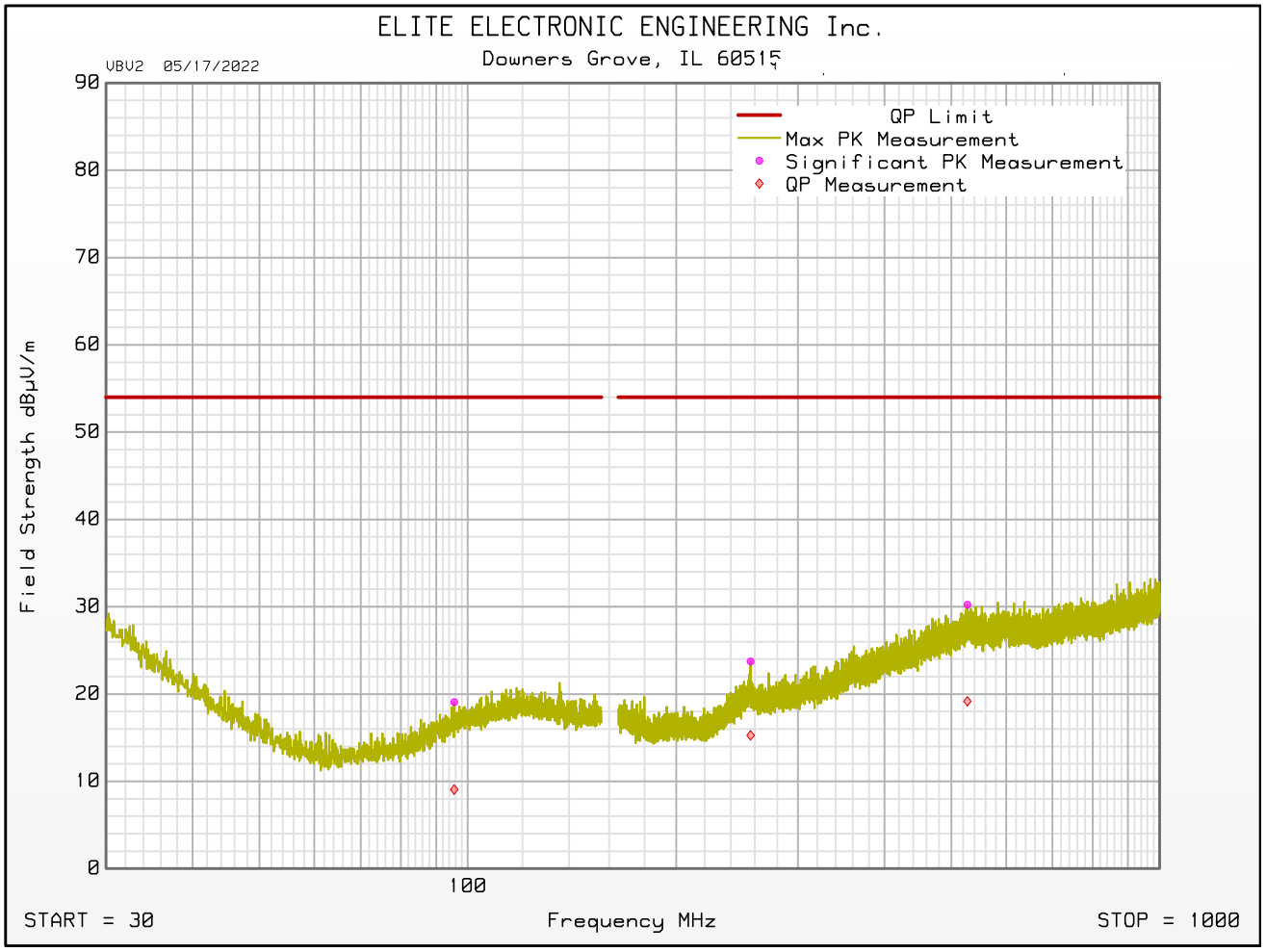
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 31, 2022 03:21:14 PM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.060 | 5.4 | -4.9 | 25.0 | 0.0 | 0.5 | 0.0 | 30.8 | 20.5 | 54.0 | -33.5 | Vertical | 340 | 45 | |
| 95.580 | 2.4 | -7.6 | 16.1 | 0.0 | 0.5 | 0.0 | 19.1 | 9.1 | 54.0 | -44.9 | Horizontal | 120 | 270 | |
| 147.180 | 3.6 | -7.6 | 16.9 | 0.0 | 0.8 | 0.0 | 21.3 | 10.1 | 54.0 | -43.9 | Vertical | 340 | 180 | |
| 256.280 | 3.8 | -4.6 | 18.9 | 0.0 | 1.0 | 0.0 | 23.7 | 15.3 | 54.0 | -38.7 | Horizontal | 200 | 90 | |
| 527.300 | 4.0 | -7.1 | 24.8 | 0.0 | 1.5 | 0.0 | 30.2 | 19.2 | 54.0 | -34.8 | Horizontal | 340 | 45 | |
| 990.900 | 3.9 | -6.8 | 27.3 | 0.0 | 2.0 | 0.0 | 33.2 | 22.6 | 54.0 | -31.4 | Vertical | 120 | 180 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

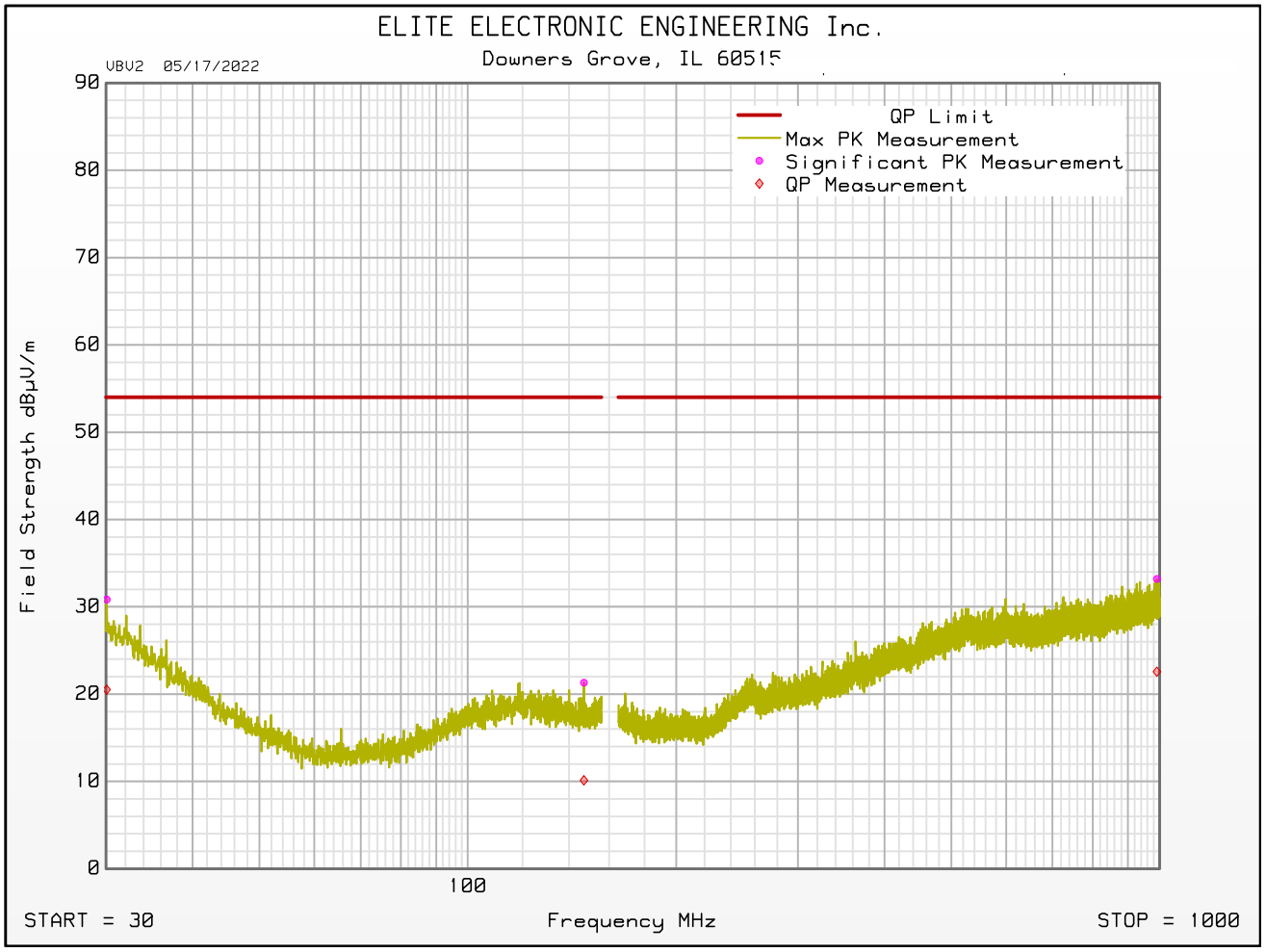
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Antenna Polarization | : | Horizontal |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 31, 2022 03:21:14 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Antenna Polarization | : | Vertical |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 31, 2022 03:21:14 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

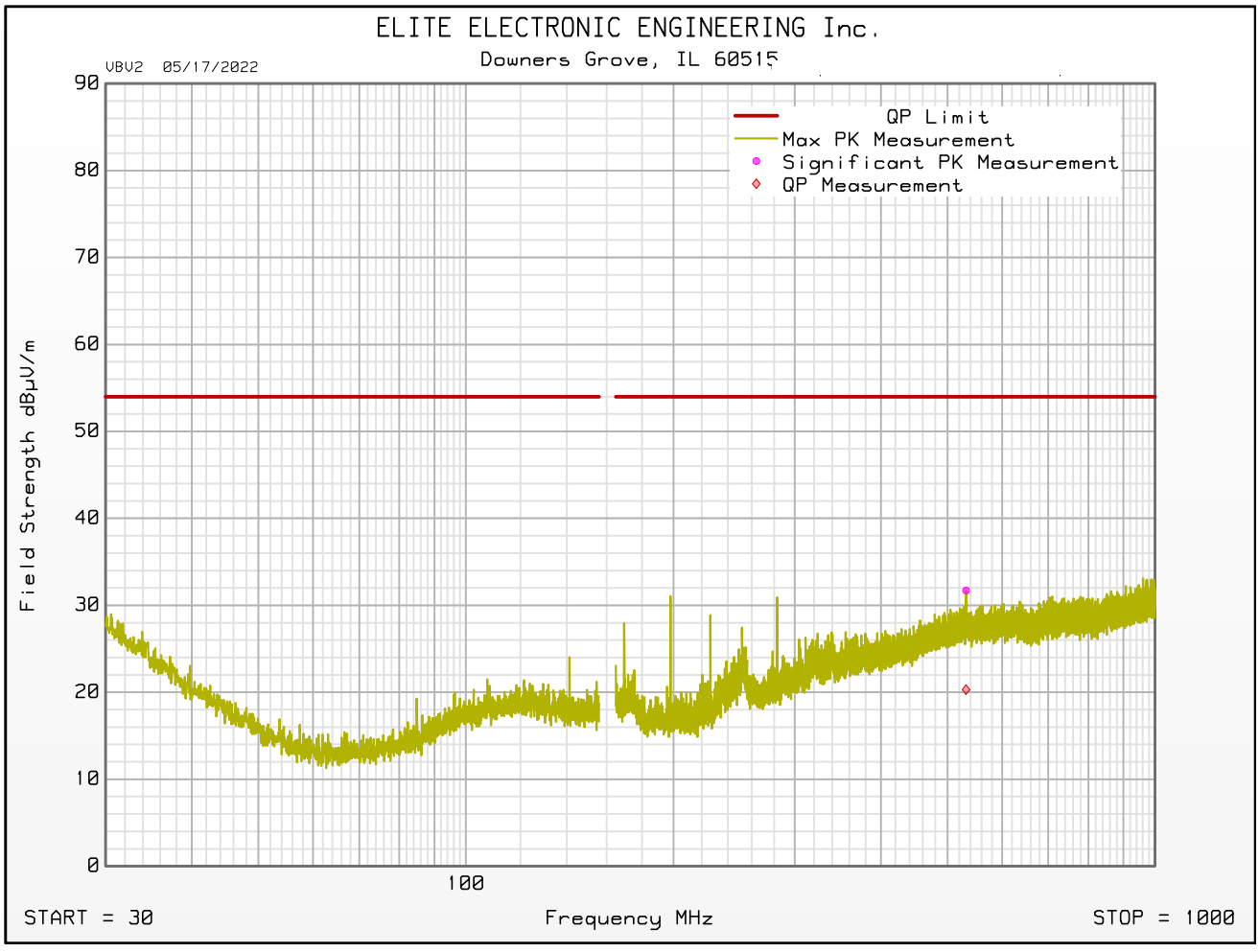
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 08:57:06 AM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.840 | 4.9 | -5.3 | 24.5 | 0.0 | 0.5 | 0.0 | 29.9 | 19.7 | 54.0 | -34.3 | Vertical | 120 | 270 | |
| 43.860 | 9.4 | 4.1 | 17.5 | 0.0 | 0.5 | 0.0 | 27.5 | 22.1 | 54.0 | -31.9 | Vertical | 120 | 45 | |
| 71.460 | 10.8 | 5.3 | 12.7 | 0.0 | 0.5 | 0.0 | 24.0 | 18.5 | 54.0 | -35.5 | Vertical | 200 | 0 | |
| 81.300 | 9.5 | 2.7 | 13.4 | 0.0 | 0.5 | 0.0 | 23.4 | 16.6 | 54.0 | -37.4 | Vertical | 120 | 0 | |
| 84.840 | 20.7 | 18.9 | 14.0 | 0.0 | 0.5 | 0.0 | 35.2 | 33.3 | 54.0 | -20.7 | Vertical | 120 | 180 | |
| 121.860 | 4.9 | -6.5 | 18.3 | 0.0 | 0.6 | 0.0 | 23.8 | 12.4 | 54.0 | -41.6 | Vertical | 120 | 180 | |
| 141.420 | 9.5 | 5.4 | 17.2 | 0.0 | 0.7 | 0.0 | 27.4 | 23.3 | 54.0 | -30.7 | Vertical | 120 | 90 | |
| 169.740 | 14.9 | 11.9 | 16.3 | 0.0 | 0.9 | 0.0 | 32.1 | 29.1 | 54.0 | -24.9 | Vertical | 120 | 0 | |
| 198.000 | 19.1 | 17.7 | 15.4 | 0.0 | 1.0 | 0.0 | 35.5 | 34.1 | 54.0 | -19.9 | Vertical | 120 | 315 | |
| 226.320 | 16.5 | 11.5 | 15.7 | 0.0 | 1.0 | 0.0 | 33.3 | 28.2 | 54.0 | -25.8 | Vertical | 120 | 45 | |
| 282.860 | 15.4 | 12.5 | 18.7 | 0.0 | 1.0 | 0.0 | 35.1 | 32.2 | 54.0 | -21.8 | Vertical | 120 | 225 | |
| 531.860 | 5.4 | -6.0 | 24.8 | 0.0 | 1.5 | 0.0 | 31.7 | 20.3 | 54.0 | -33.7 | Horizontal | 200 | 90 | |
| 625.860 | 5.9 | -5.6 | 24.9 | 0.0 | 1.6 | 0.0 | 32.4 | 20.8 | 54.0 | -33.2 | Vertical | 340 | 135 | |
| 992.580 | 4.2 | -6.6 | 27.4 | 0.0 | 2.0 | 0.0 | 33.6 | 22.7 | 54.0 | -31.3 | Vertical | 200 | 0 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

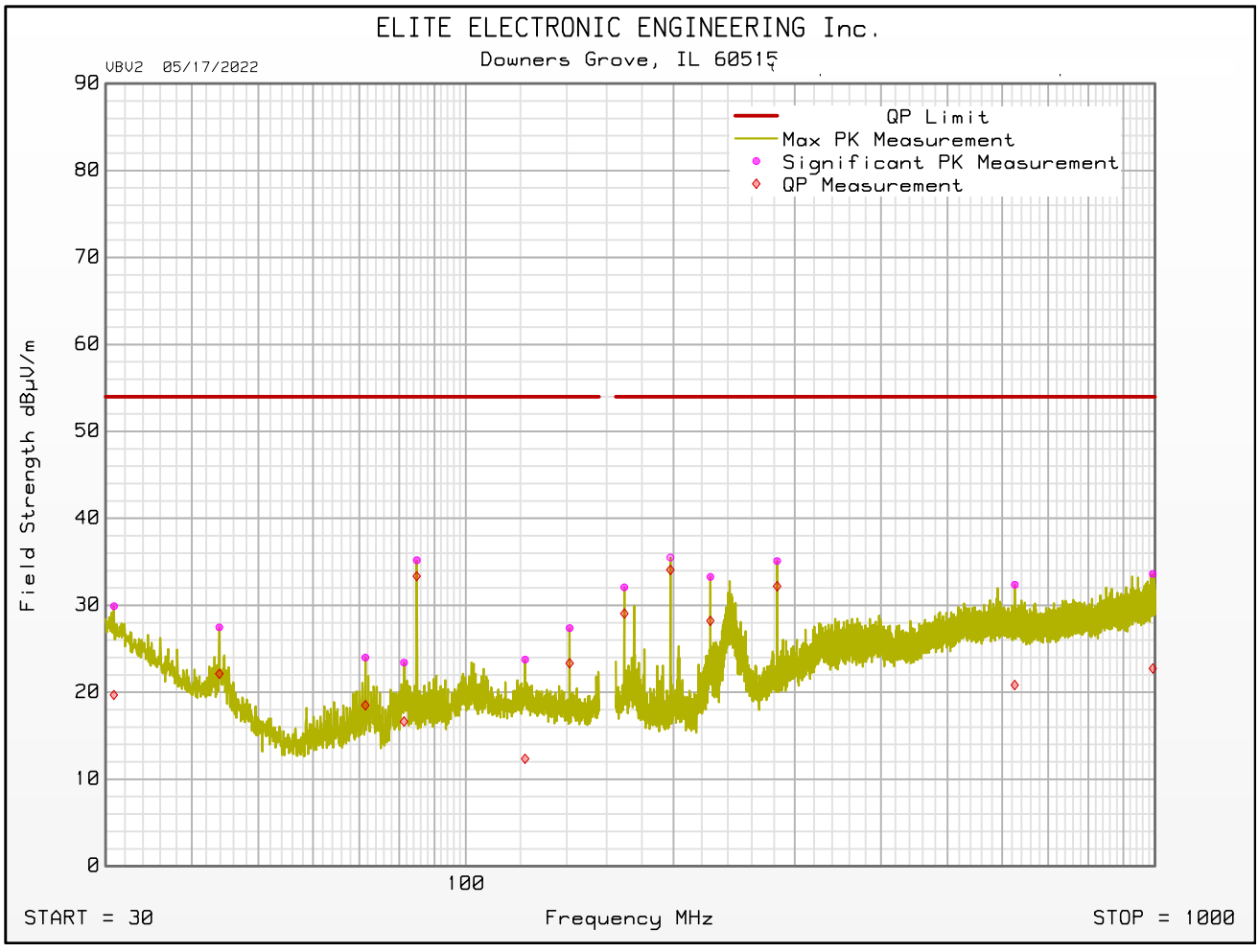
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Antenna Polarization | : | Horizontal |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 08:57:06 AM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Antenna Polarization | : | Vertical |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 08:57:06 AM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

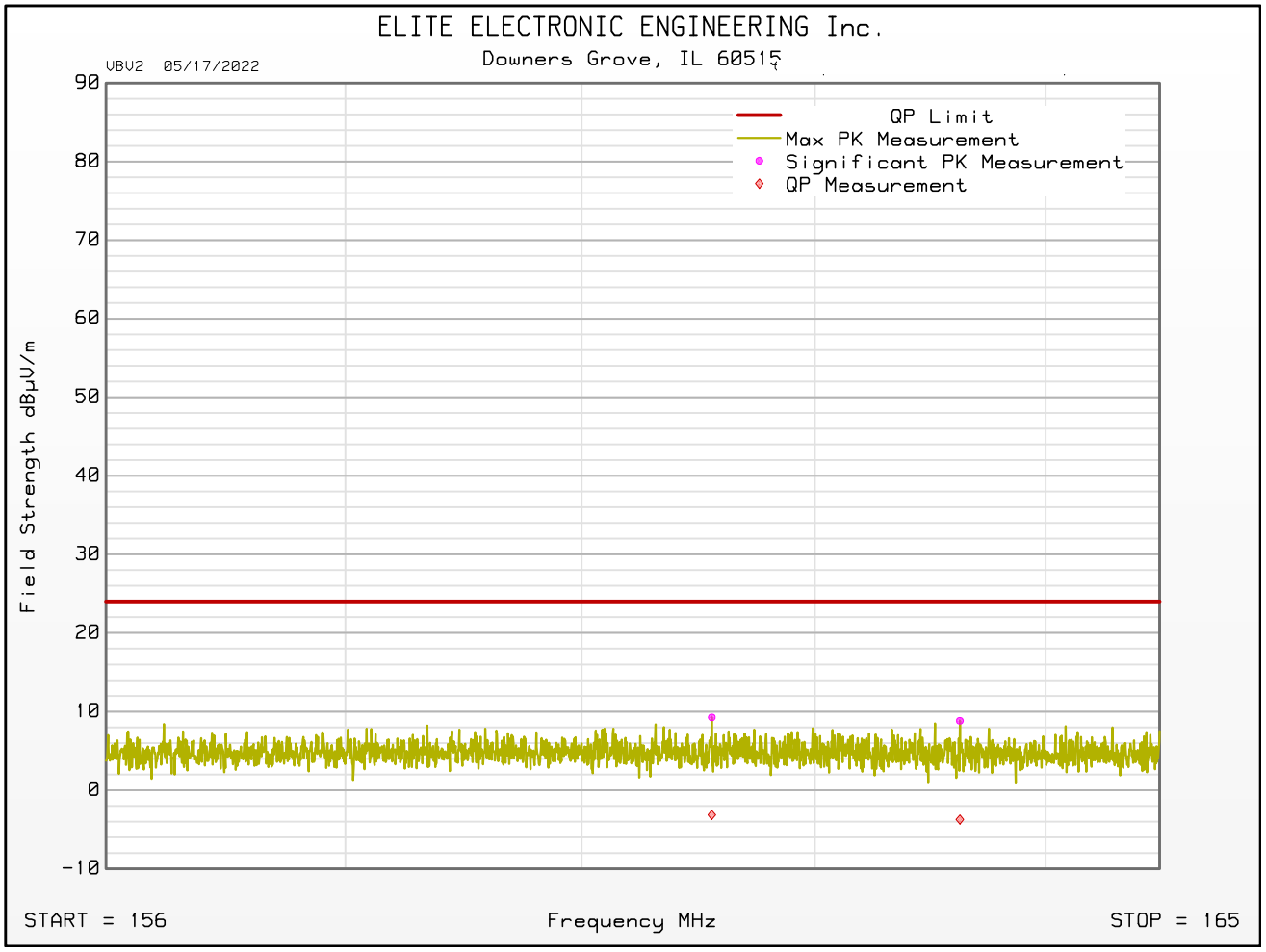
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 31, 2022 03:38:00 PM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 156.761 | -9.5 | -21.6 | 17.2 | 0.0 | 0.8 | 0.0 | 8.5 | -3.6 | 24.0 | -27.6 | Vertical | 120 | 135 | |
| 158.160 | -9.1 | -21.5 | 17.2 | 0.0 | 0.8 | 0.0 | 8.9 | -3.5 | 24.0 | -27.5 | Vertical | 120 | 315 | |
| 159.191 | -9.4 | -21.1 | 17.2 | 0.0 | 0.8 | 0.0 | 8.7 | -3.1 | 24.0 | -27.1 | Vertical | 200 | 90 | |
| 161.112 | -8.7 | -21.2 | 17.2 | 0.0 | 0.8 | 0.0 | 9.3 | -3.2 | 24.0 | -27.2 | Horizontal | 200 | 225 | |
| 163.254 | -9.0 | -21.5 | 16.9 | 0.0 | 0.9 | 0.0 | 8.8 | -3.7 | 24.0 | -27.7 | Horizontal | 120 | 180 | |
| 164.555 | -9.1 | -21.1 | 16.8 | 0.0 | 0.9 | 0.0 | 8.6 | -3.5 | 24.0 | -27.5 | Vertical | 200 | 0 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

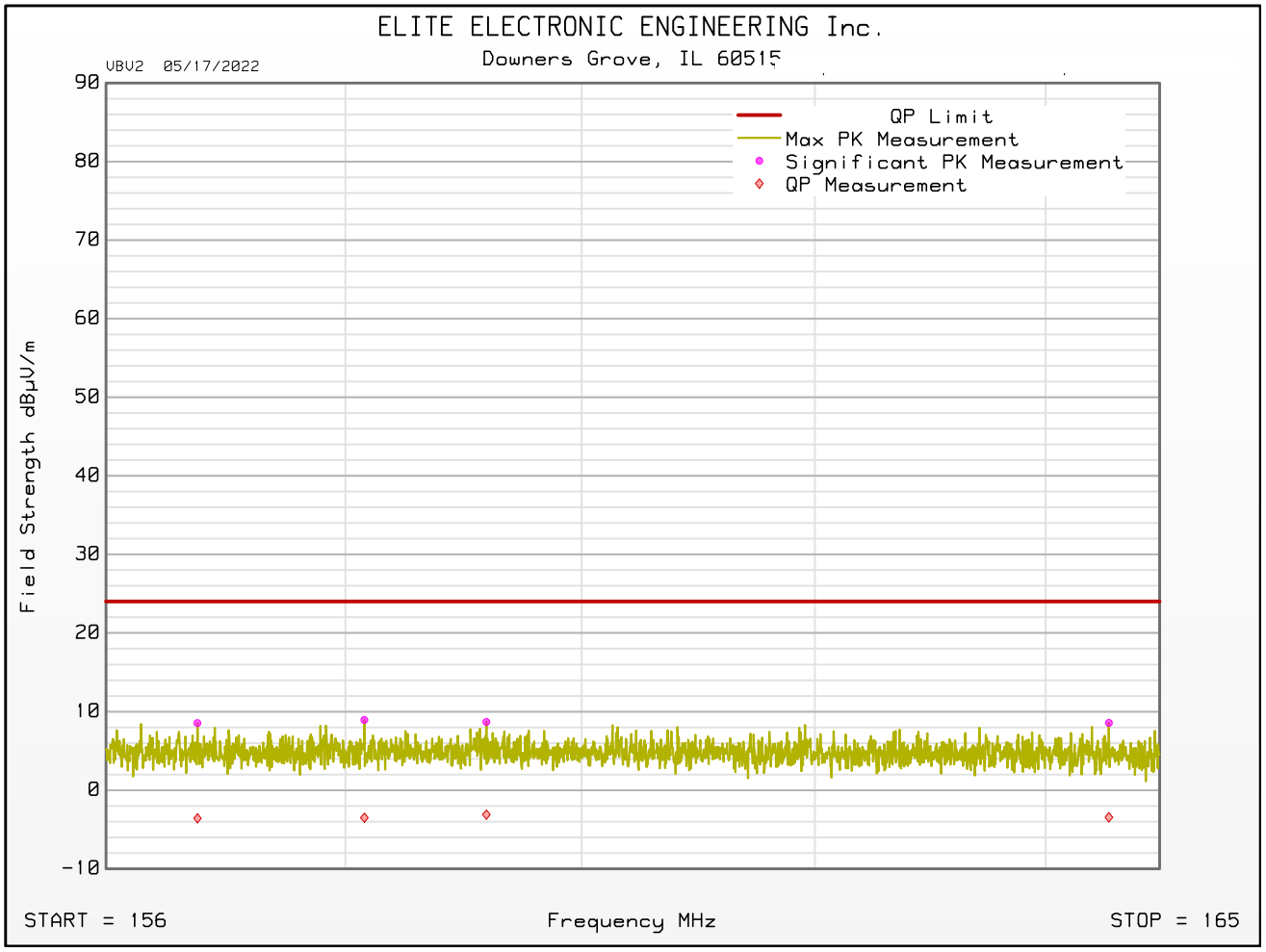
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Antenna Polarization | : | Horizontal |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 31, 2022 03:38:00 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Antenna Polarization | : | Vertical |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 31, 2022 03:38:00 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

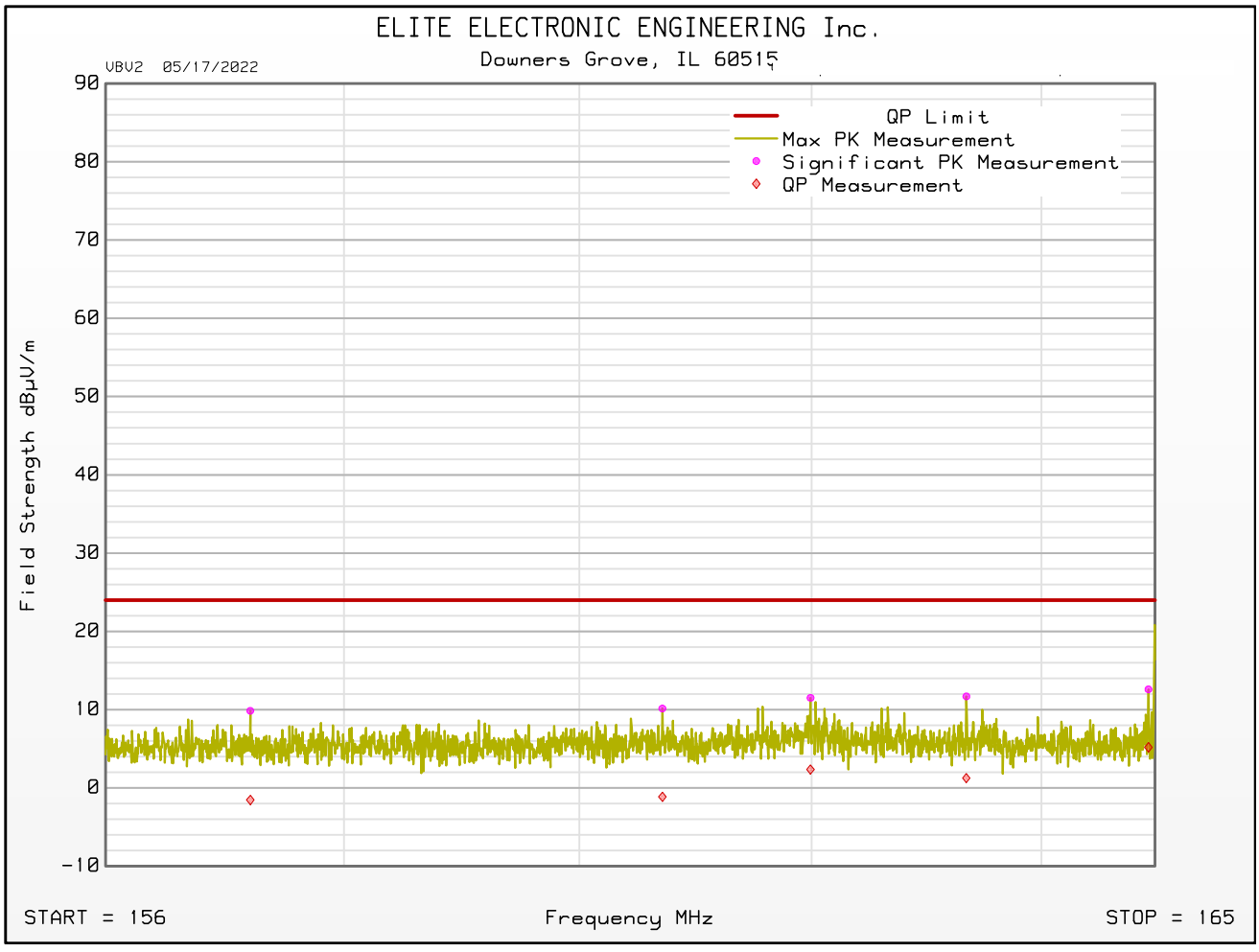
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, Updated Firmware |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Aug 31, 2022 04:28:50 PM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 157.211 | -8.2 | -19.6 | 17.2 | 0.0 | 0.8 | 0.0 | 9.8 | -1.6 | 24.0 | -25.6 | Horizontal | 200 | 45 | |
| 157.850 | -7.4 | -17.6 | 17.2 | 0.0 | 0.8 | 0.0 | 10.6 | 0.5 | 24.0 | -23.5 | Vertical | 120 | 225 | |
| 159.164 | -7.3 | -20.4 | 17.2 | 0.0 | 0.8 | 0.0 | 10.8 | -2.4 | 24.0 | -26.4 | Vertical | 340 | 45 | |
| 159.893 | -7.3 | -19.3 | 17.2 | 0.0 | 0.8 | 0.0 | 10.7 | -1.3 | 24.0 | -25.3 | Vertical | 340 | 0 | |
| 160.712 | -7.9 | -19.2 | 17.2 | 0.0 | 0.8 | 0.0 | 10.1 | -1.2 | 24.0 | -25.2 | Horizontal | 200 | 270 | |
| 161.990 | -6.4 | -15.6 | 17.1 | 0.0 | 0.8 | 0.0 | 11.5 | 2.3 | 24.0 | -21.7 | Horizontal | 340 | 225 | |
| 163.281 | -5.3 | -16.1 | 16.9 | 0.0 | 0.9 | 0.0 | 12.5 | 1.7 | 24.0 | -22.3 | Vertical | 120 | 0 | |
| 163.344 | -6.1 | -16.5 | 16.9 | 0.0 | 0.9 | 0.0 | 11.7 | 1.2 | 24.0 | -22.8 | Horizontal | 200 | 90 | |
| 164.942 | -5.0 | -12.4 | 16.8 | 0.0 | 0.9 | 0.0 | 12.6 | 5.2 | 24.0 | -18.8 | Horizontal | 340 | 225 | |
| 164.996 | 4.5 | 2.1 | 16.8 | 0.0 | 0.9 | 0.0 | 22.1 | 19.7 | 24.0 | -4.3 | Vertical | 120 | 315 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

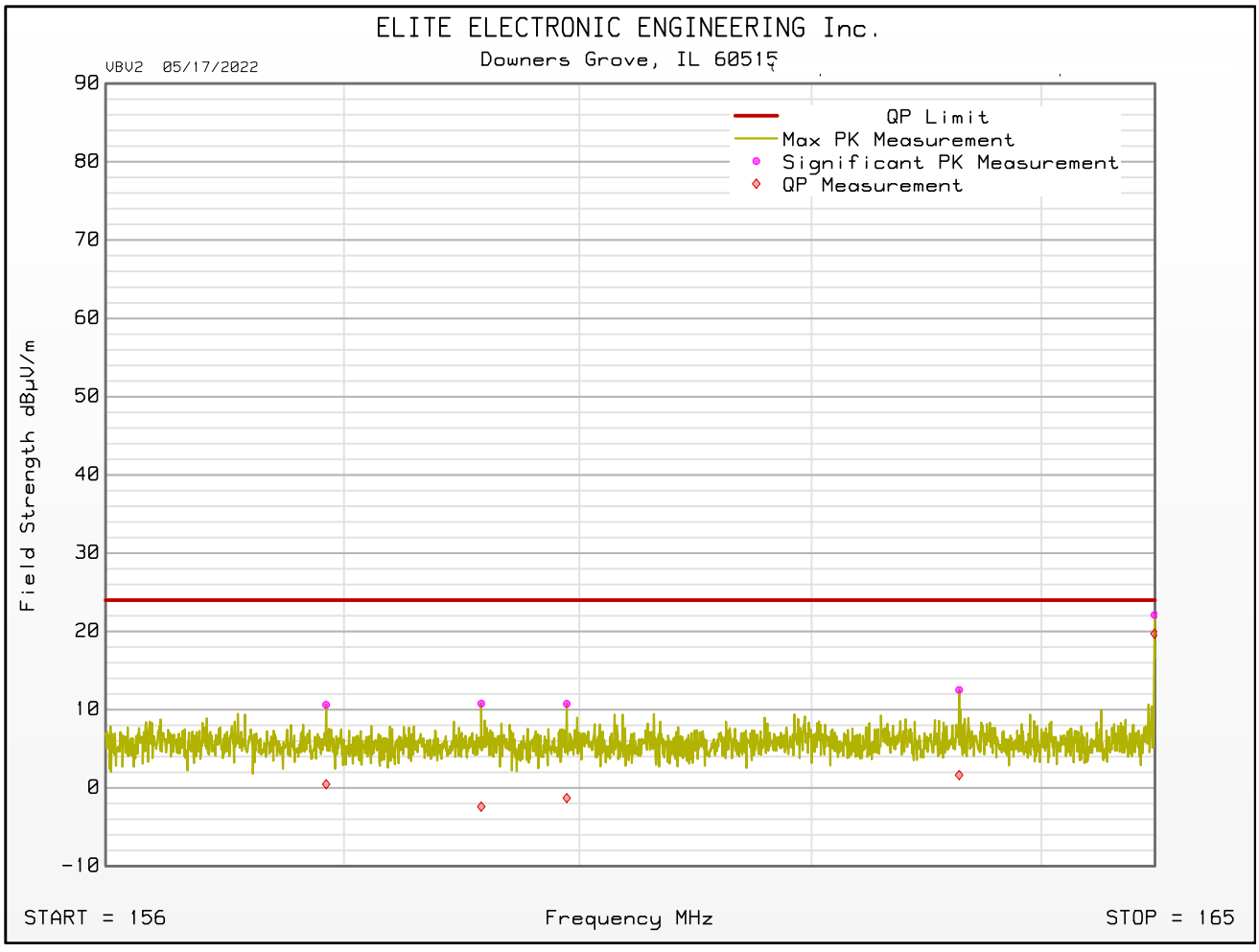
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, Updated Firmware |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Antenna Polarization | : | Horizontal |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Aug 31, 2022 04:28:50 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, Updated Firmware |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Antenna Polarization | : | Vertical |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 9 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Aug 31, 2022 04:28:50 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

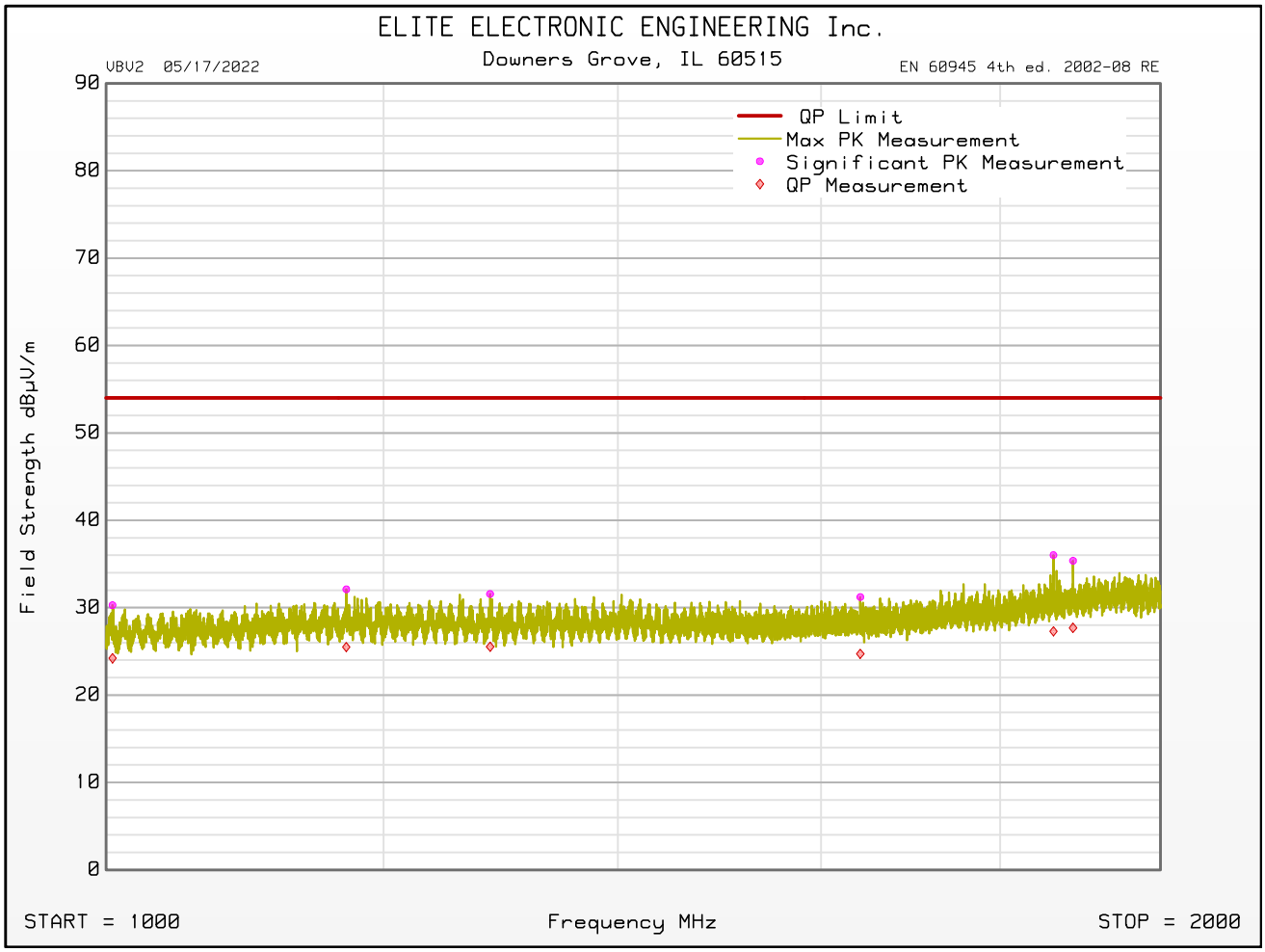
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 30, 2022 01:46:59 PM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1004.200 | 41.4 | 35.4 | 29.0 | -42.1 | 2.0 | 0.0 | 30.3 | 24.2 | 54.0 | -29.8 | Vertical | 200 | 0 | |
| 1171.000 | 42.3 | 35.7 | 29.8 | -42.2 | 2.2 | 0.0 | 32.1 | 25.5 | 54.0 | -28.5 | Vertical | 200 | 45 | |
| 1287.100 | 41.4 | 35.3 | 29.6 | -41.8 | 2.4 | 0.0 | 31.6 | 25.5 | 54.0 | -28.5 | Vertical | 120 | 180 | |
| 1641.720 | 40.1 | 33.6 | 29.5 | -41.1 | 2.7 | 0.0 | 31.2 | 24.7 | 54.0 | -29.3 | Vertical | 200 | 315 | |
| 1864.080 | 42.4 | 33.7 | 31.6 | -40.9 | 2.9 | 0.0 | 36.0 | 27.3 | 54.0 | -26.7 | Horizontal | 340 | 180 | |
| 1888.200 | 41.4 | 33.8 | 31.9 | -40.9 | 2.9 | 0.0 | 35.4 | 27.7 | 54.0 | -26.3 | Horizontal | 200 | 45 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Mode | : | Ambient |
| Test Date | : | Aug 30, 2022 01:46:59 PM |



# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

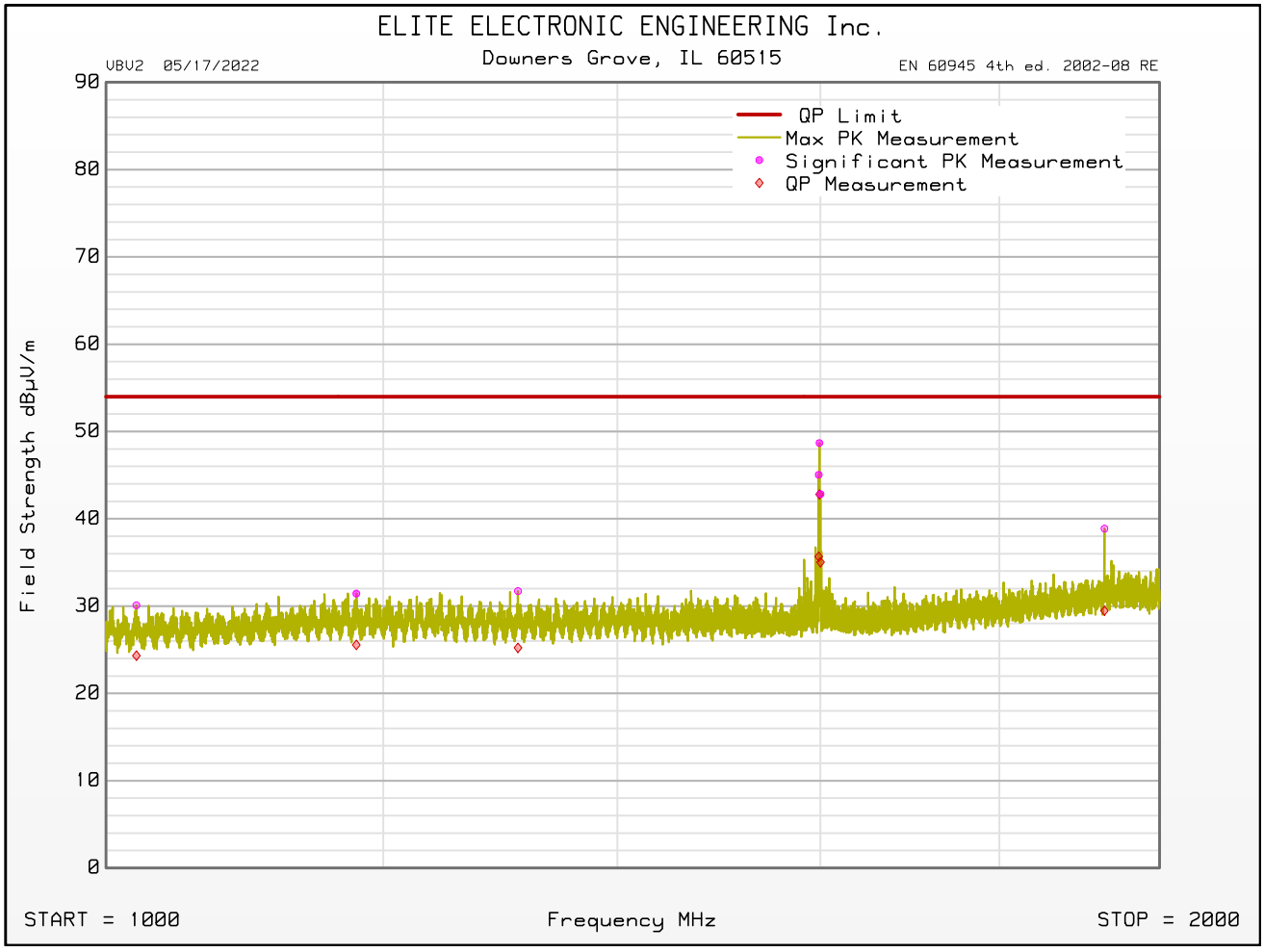
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 10:48:55 AM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1020.160 | 41.2 | 35.5 | 29.0 | -42.2 | 2.0 | 0.0 | 30.1 | 24.3 | 54.0 | -29.7 | Horizontal | 340 | 225 | |
| 1178.980 | 41.6 | 35.7 | 29.8 | -42.2 | 2.2 | 0.0 | 31.4 | 25.6 | 54.0 | -28.4 | Vertical | 120 | 180 | |
| 1311.280 | 41.5 | 35.0 | 29.6 | -41.7 | 2.4 | 0.0 | 31.7 | 25.2 | 54.0 | -28.8 | Horizontal | 200 | 90 | |
| 1598.220 | 54.2 | 44.8 | 29.3 | -41.1 | 2.7 | 0.0 | 45.0 | 35.7 | 54.0 | -18.3 | Vertical | 200 | 135 | |
| 1598.940 | 57.8 | 51.9 | 29.3 | -41.1 | 2.7 | 0.0 | 48.7 | 42.8 | 54.0 | -11.2 | Vertical | 120 | 180 | |
| 1600.020 | 52.0 | 44.2 | 29.3 | -41.1 | 2.7 | 0.0 | 42.8 | 35.0 | 54.0 | -19.0 | Vertical | 120 | 180 | |
| 1928.700 | 44.4 | 34.9 | 32.4 | -40.8 | 2.9 | 0.0 | 38.9 | 29.5 | 54.0 | -24.5 | Vertical | 120 | 135 | |

# EN 60945 4th ed. 2002-08
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| 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 | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 10:48:55 AM |



# CISPR 32 Ed. 2.1 2019-10 Class B
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

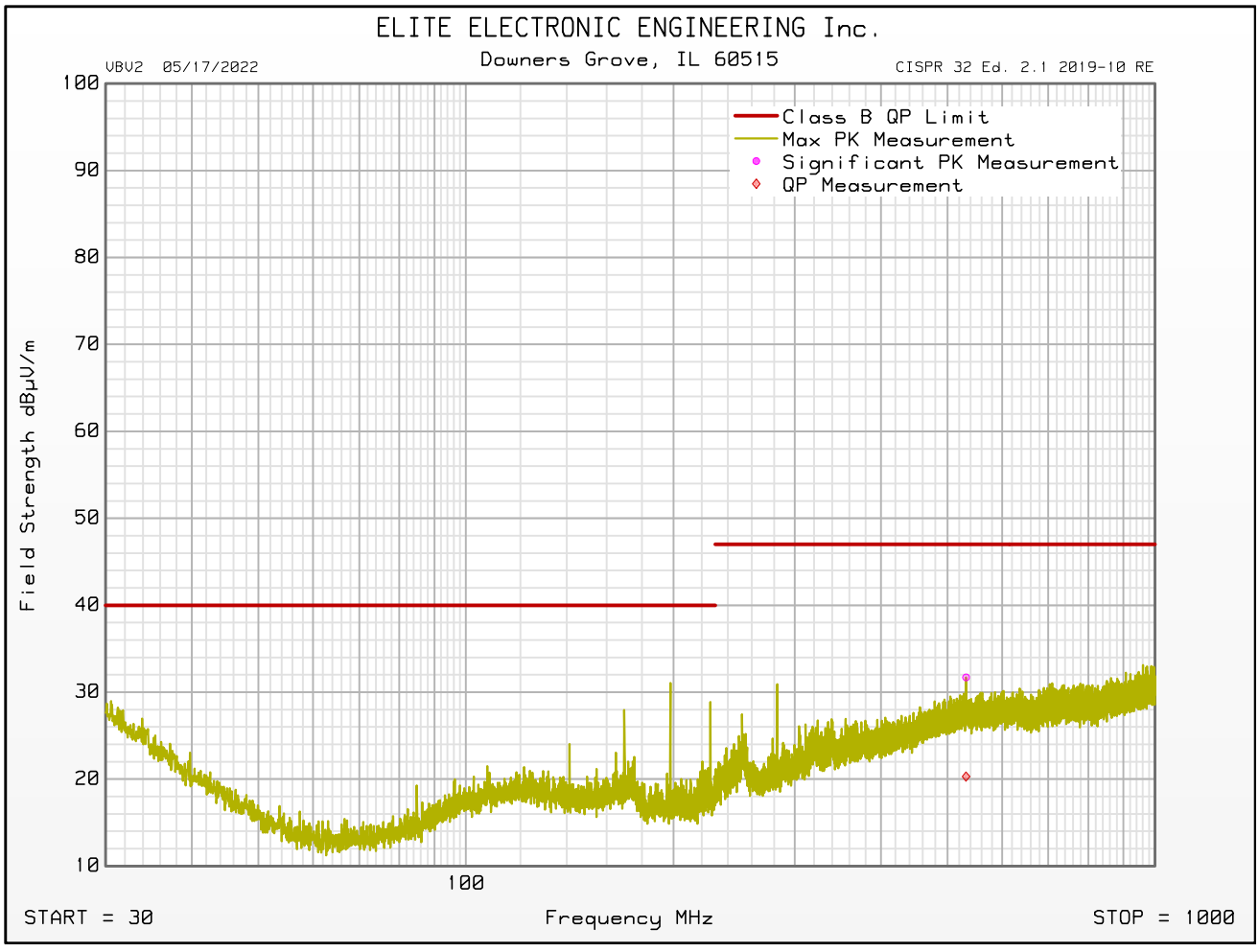
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 08:37:24 AM |

| Freq MHz | Peak Mtr Rdg dBuV | QP Mtr Rdg dBuV | Ant Fac dB/m | 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 ° | Excessive QP Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.840 | 4.9 | -5.3 | 24.5 | 0.0 | 0.5 | 0.0 | 29.9 | 19.7 | 40.0 | -20.3 | Vertical | 120 | 270 | |
| 43.860 | 9.4 | 4.1 | 17.5 | 0.0 | 0.5 | 0.0 | 27.5 | 22.1 | 40.0 | -17.9 | Vertical | 120 | 45 | |
| 71.460 | 10.8 | 5.3 | 12.7 | 0.0 | 0.5 | 0.0 | 24.0 | 18.5 | 40.0 | -21.5 | Vertical | 200 | 0 | |
| 81.300 | 9.5 | 2.7 | 13.4 | 0.0 | 0.5 | 0.0 | 23.4 | 16.6 | 40.0 | -23.4 | Vertical | 120 | 0 | |
| 84.840 | 20.7 | 18.9 | 14.0 | 0.0 | 0.5 | 0.0 | 35.2 | 33.3 | 40.0 | -6.7 | Vertical | 120 | 180 | |
| 121.860 | 4.9 | -6.5 | 18.3 | 0.0 | 0.6 | 0.0 | 23.8 | 12.4 | 40.0 | -27.6 | Vertical | 120 | 180 | |
| 141.420 | 9.5 | 5.4 | 17.2 | 0.0 | 0.7 | 0.0 | 27.4 | 23.3 | 40.0 | -16.7 | Vertical | 120 | 90 | |
| 169.740 | 14.9 | 11.9 | 16.3 | 0.0 | 0.9 | 0.0 | 32.1 | 29.1 | 40.0 | -10.9 | Vertical | 120 | 0 | |
| 175.560 | 13.3 | 4.1 | 15.7 | 0.0 | 0.9 | 0.0 | 29.9 | 20.7 | 40.0 | -19.3 | Vertical | 120 | 315 | |
| 198.000 | 19.1 | 17.7 | 15.4 | 0.0 | 1.0 | 0.0 | 35.5 | 34.1 | 40.0 | -5.9 | Vertical | 120 | 315 | |
| 226.320 | 16.5 | 11.5 | 15.7 | 0.0 | 1.0 | 0.0 | 33.3 | 28.2 | 40.0 | -11.8 | Vertical | 120 | 45 | |
| 531.860 | 5.4 | -6.0 | 24.8 | 0.0 | 1.5 | 0.0 | 31.7 | 20.3 | 47.0 | -26.7 | Horizontal | 200 | 90 | |
| 625.860 | 5.9 | -5.6 | 24.9 | 0.0 | 1.6 | 0.0 | 32.4 | 20.8 | 47.0 | -26.2 | Vertical | 340 | 135 | |
| 992.580 | 4.2 | -6.6 | 27.4 | 0.0 | 2.0 | 0.0 | 33.6 | 22.7 | 47.0 | -24.3 | Vertical | 200 | 0 | |

# CISPR 32 Ed. 2.1 2019-10 Class B
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

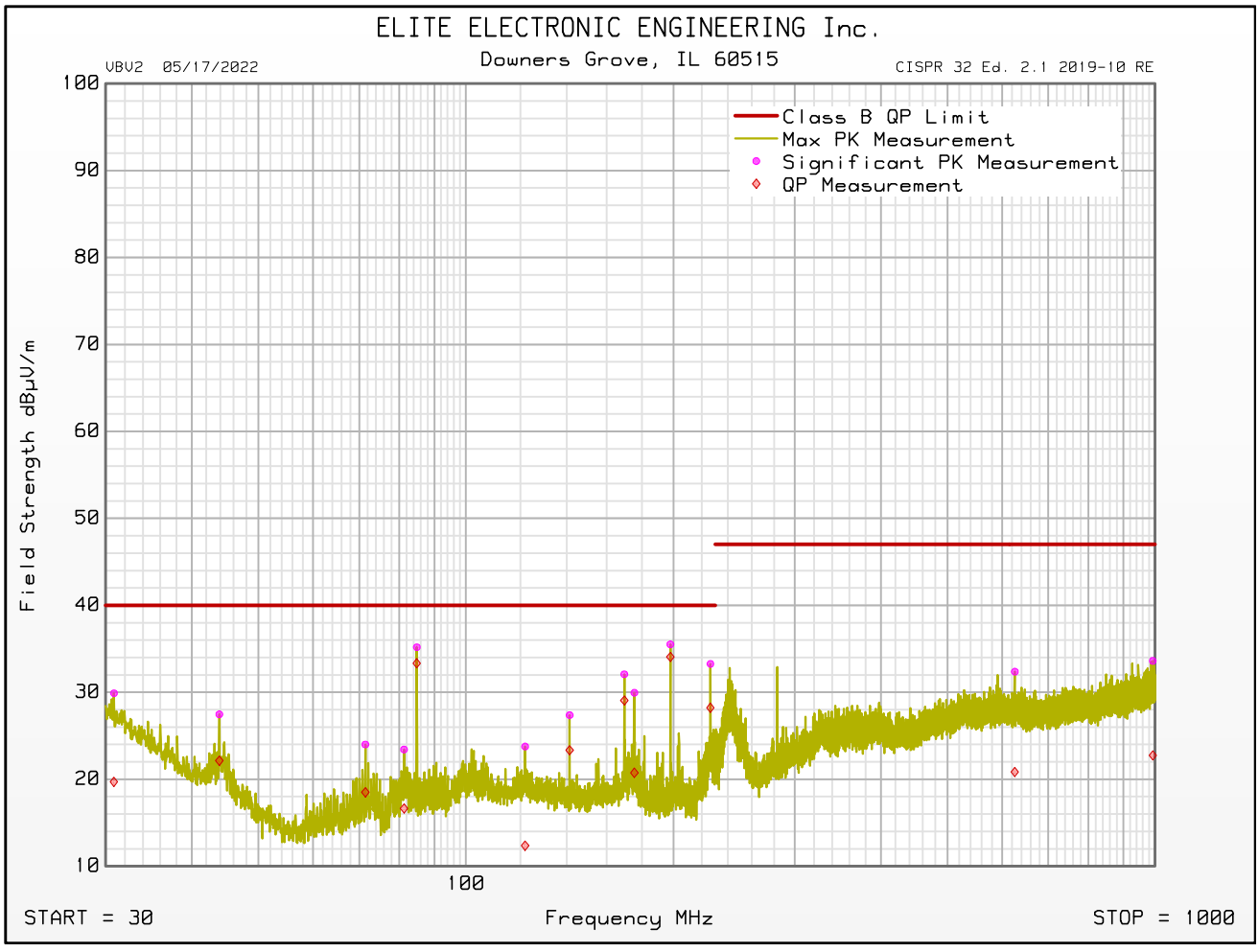
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Antenna Polarization | : | Horizontal |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 08:37:24 AM |



# CISPR 32 Ed. 2.1 2019-10 Class B
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Antenna Polarization | : | Vertical |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 120 kHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 08:37:24 AM |



# CISPR 32 Ed. 2.1 2019-10 Class B
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| 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 | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 10:25:25 AM |

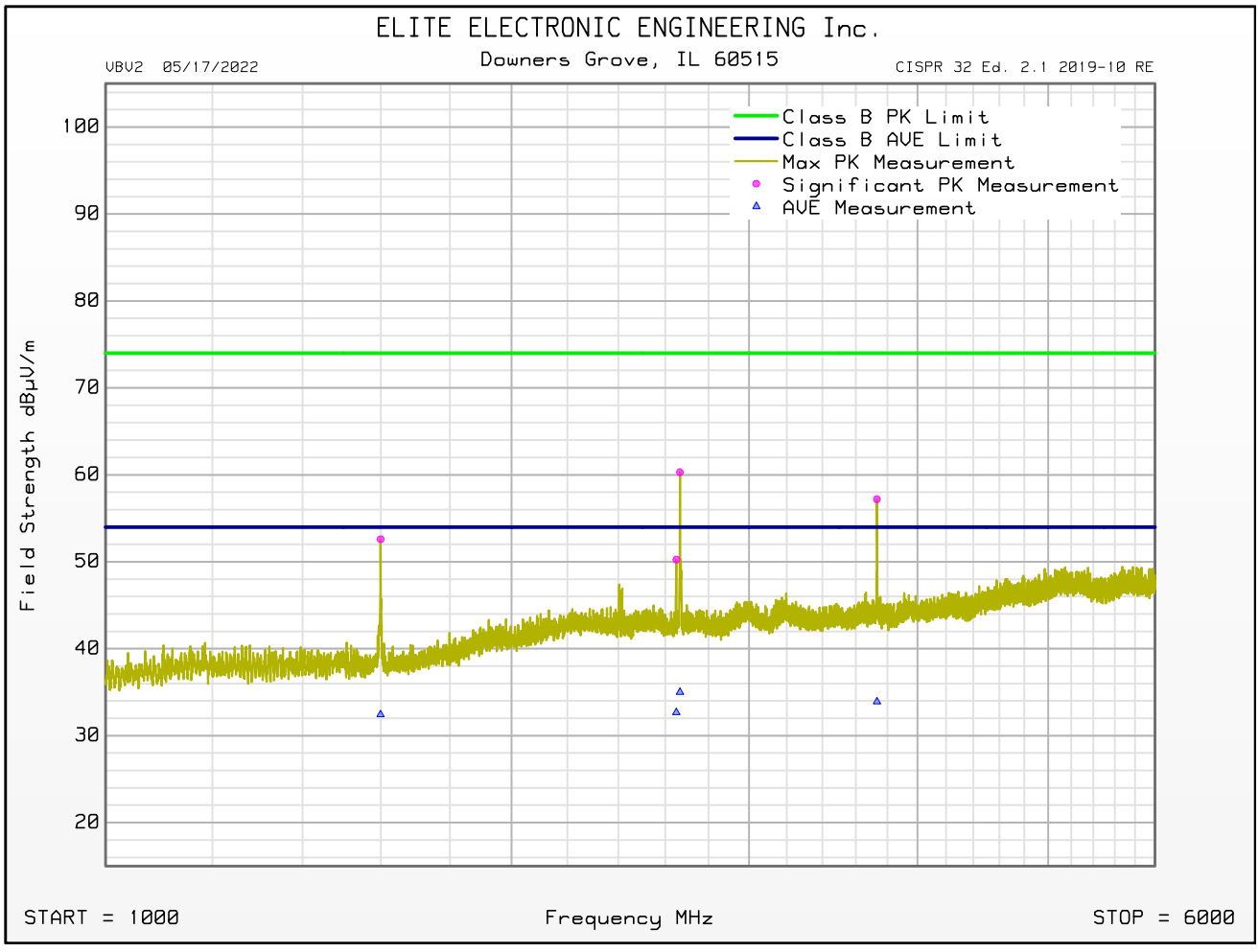
| Freq MHz | Peak Mtr Rdg dBuV | Ant Fac dB/m | Amp Fac dB | Cbl Fac dB | Dist Corr dB | Peak Total dBµV/m | Peak Limit dBµV/m | Peak Lim Mrg dB | Ant Pol | Mast Ht cm | Azim ° | Excessive Peak Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1313.500 | 50.7 | 29.6 | -41.7 | 2.4 | 0.0 | 40.9 | 74.0 | -33.1 | Vertical | 340 | 315 | |
| 1599.000 | 61.7 | 29.3 | -41.1 | 2.7 | 0.0 | 52.6 | 74.0 | -21.4 | Horizontal | 340 | 180 | |
| 2406.500 | 54.9 | 33.6 | -41.1 | 3.4 | 0.0 | 50.8 | 74.0 | -23.2 | Vertical | 340 | 45 | |
| 2650.000 | 54.8 | 33.2 | -41.4 | 3.6 | 0.0 | 50.3 | 74.0 | -23.7 | Horizontal | 120 | 225 | |
| 2666.000 | 64.8 | 33.3 | -41.4 | 3.6 | 0.0 | 60.3 | 74.0 | -13.7 | Horizontal | 200 | 225 | |
| 3732.000 | 58.7 | 34.5 | -40.4 | 4.4 | 0.0 | 57.2 | 74.0 | -16.8 | Horizontal | 340 | 225 | |
| 5089.500 | 47.9 | 37.6 | -40.5 | 5.0 | 0.0 | 50.0 | 74.0 | -24.0 | Vertical | 340 | 225 | |

| Freq MHz | Average Mtr Rdg dBuV | Ant Fac dB/m | Amp Fac dB | Cbl Fac dB | Dist Corr dB | Average Total dBµV/m | Average Limit dBµV/m | Average Lim Mrg dB | Ant Pol | Mast Ht cm | Azim ° | Excessive Average Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1313.500 | 37.1 | 29.6 | -41.7 | 2.4 | 0.0 | 27.4 | 54.0 | -26.6 | Vertical | 340 | 315 | |
| 1599.000 | 41.6 | 29.3 | -41.1 | 2.7 | 0.0 | 32.4 | 54.0 | -21.6 | Horizontal | 340 | 180 | |
| 2406.500 | 35.8 | 33.6 | -41.1 | 3.4 | 0.0 | 31.7 | 54.0 | -22.3 | Vertical | 340 | 45 | |
| 2650.000 | 37.2 | 33.2 | -41.4 | 3.6 | 0.0 | 32.7 | 54.0 | -21.3 | Horizontal | 120 | 225 | |
| 2666.000 | 39.5 | 33.3 | -41.4 | 3.6 | 0.0 | 35.0 | 54.0 | -19.0 | Horizontal | 200 | 225 | |
| 3732.000 | 35.4 | 34.5 | -40.4 | 4.4 | 0.0 | 33.9 | 54.0 | -20.1 | Horizontal | 340 | 225 | |
| 5089.500 | 34.1 | 37.6 | -40.5 | 5.0 | 0.0 | 36.2 | 54.0 | -17.8 | Vertical | 340 | 225 | |

# CISPR 32 Ed. 2.1 2019-10 Class B
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

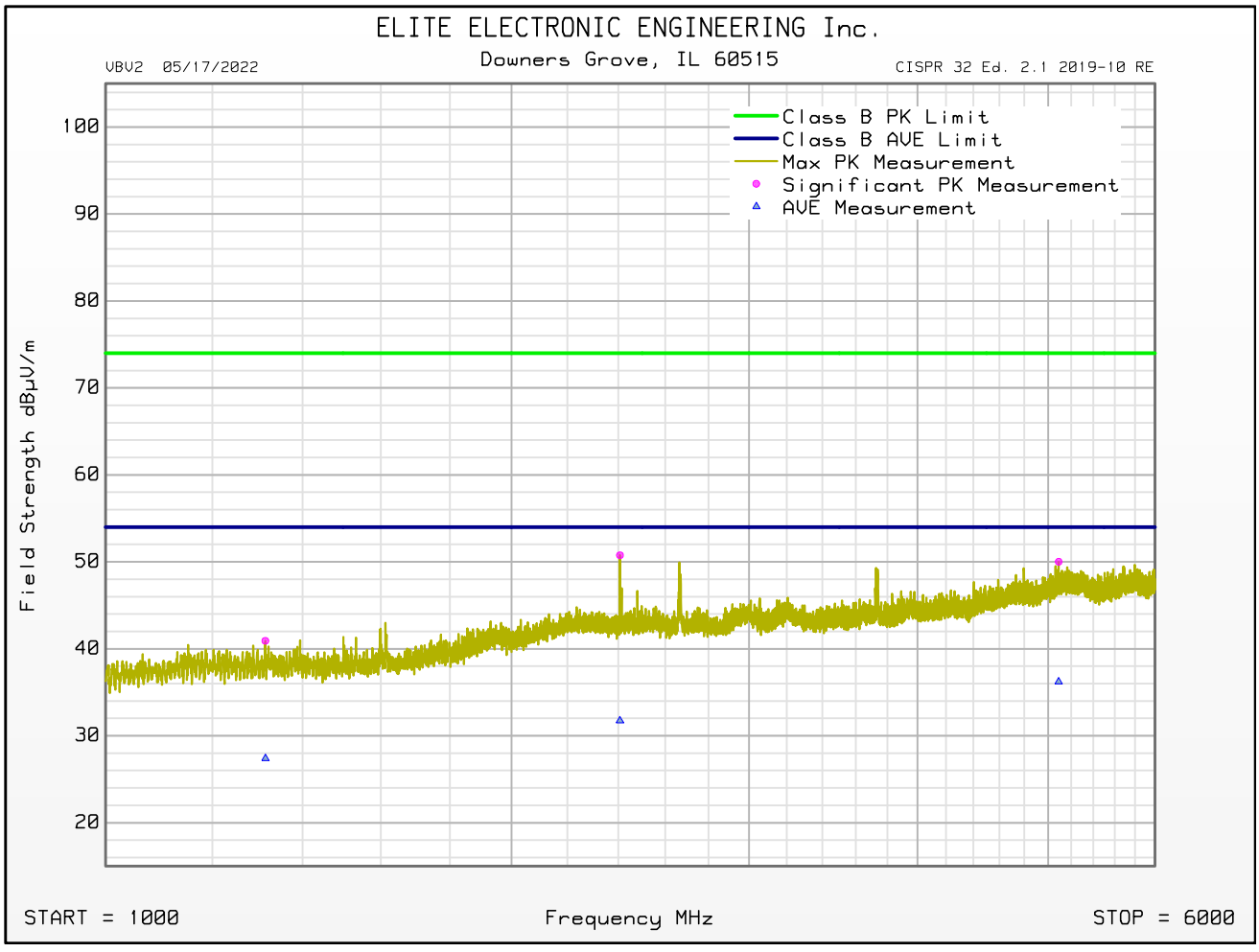
| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Antenna Polarization | : | Horizontal |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 1 MHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 10:25:25 AM |



# CISPR 32 Ed. 2.1 2019-10 Class B
# Radiated RF Emissions Test

SW ID/Rev: VBV2 05/17/2022

| | | |
|---|---|---|
| Manufacturer | : | Helios |
| Model | : | RCDGM05-01 |
| Serial Number | : | 57540***2205110039 |
| DUT Mode | : | Powered On, Tx Standby, UPDATED FIRMWARE |
| Turntable Step Angle (°) | : | 45 |
| Mast Positions (cm) | : | 120, 200, 340 |
| Antenna Polarization | : | Vertical |
| Scan Type | : | Stepped Scan |
| Test RBW | : | 1 MHz |
| Prelim Dwell Time (s) | : | 0.0001 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Test Date | : | Sep 01, 2022 10:25:25 AM |



## 22. RF Conducted Emissions Test (DC Power Ports)

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | Tx Standby |

| Information | |
|---|---|
| Setup Format | Tabletop |
| Height of Support | N/A |
| Type of Test Site | Semi-anechoic |
| Test site used | Room 21 |
| Note | None |

| Requirements | |
|---|---|
| Frequency of Emission (MHz) | Quasi-peak Limit (dBµV) |
| 0.01 to 0.15* | 96-50 |
| 0.15 to 0.35** | 60-50 |
| 0.35 to 30 | 50 |

*The limits decrease linearly with the logarithm of the frequency in the range 0.01MHz to 0.15 MHz
**The limits decrease linearly with the logarithm of the frequency in the range 0.15MHz to 0.35 MHz

| Measurement Uncertainty | | |
|---|---|---|
| Measurement Type | $U_{lab}$ | $U_{CISPR}$ |
| Conducted disturbance (150kHz – 30MHz) | 2.7dB | 3.4dB |

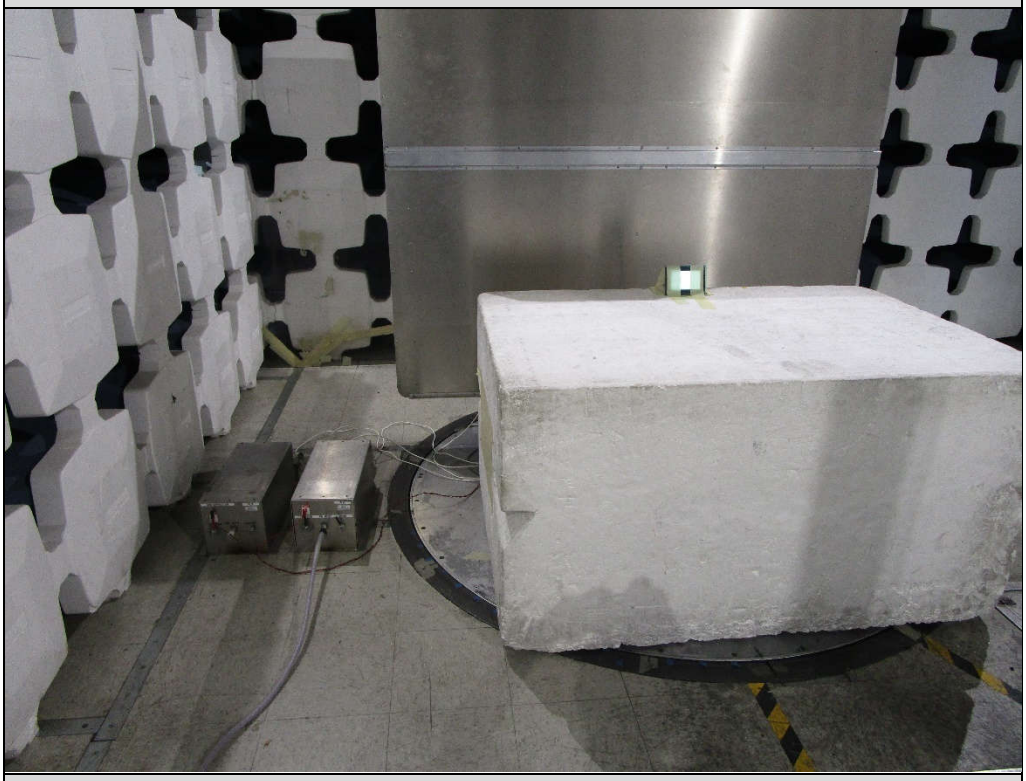
$U_{lab}$ = Determined for Elite Electronic Engineering, Inc.
$U_{CISPR}$ = From CISPR 16-4-2 Table 1

**Procedures**

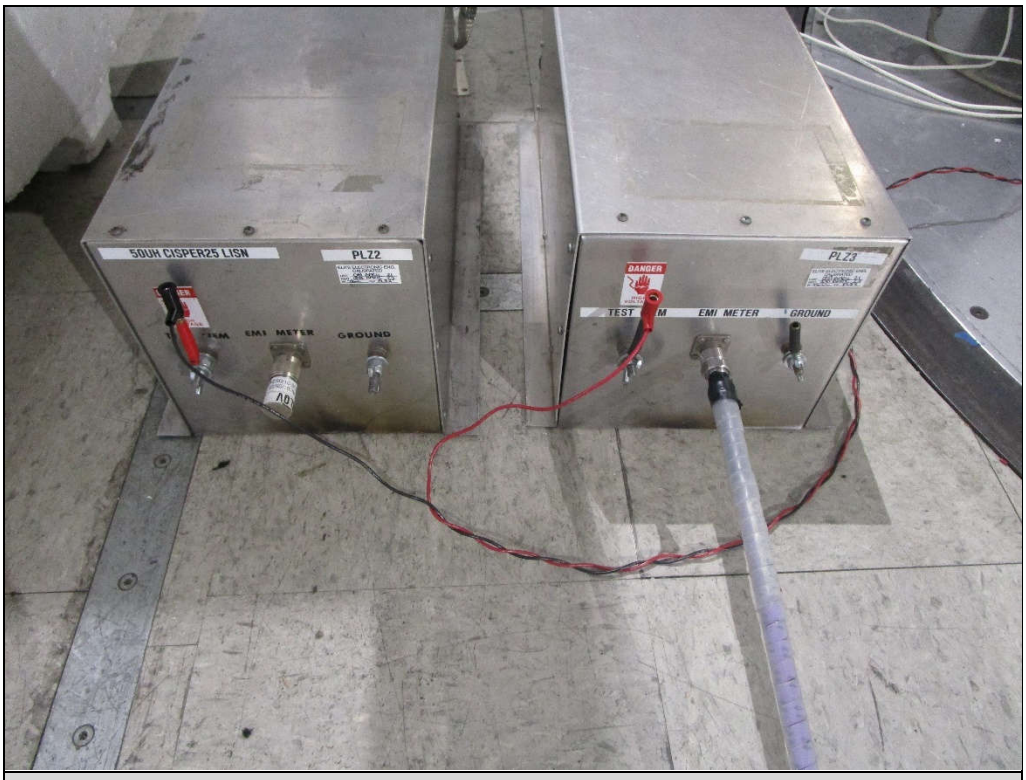
The interference on each power lead of the EUT was measured by connecting the measuring equipment to the appropriate meter terminal of the Line Impedance Stabilization Network (LISN). The meter terminal of the LISN not under test was terminated with 50 ohms.

1) The EUT was operated in the Tx Standby mode.
2) Measurements were first made on the Voltage high line.
3) The frequency range from 150 kHz to 30 MHz 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 Voltage return line.

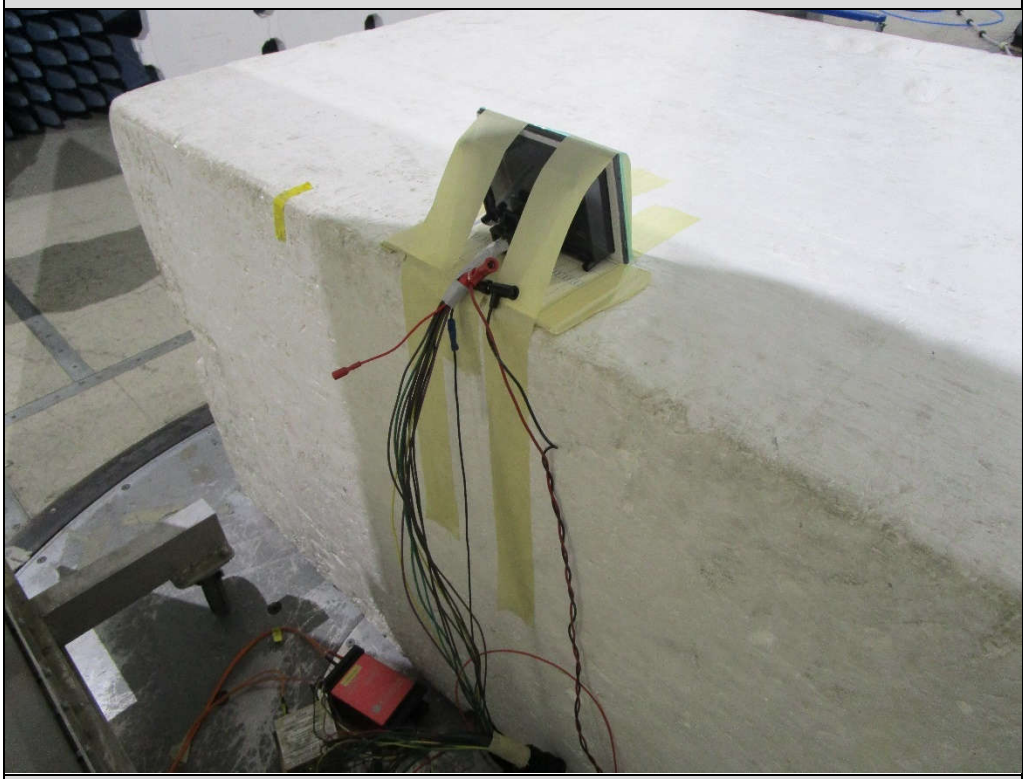
Test Setup for RF Conducted Emissions (DC Ports)



Test Setup for RF Conducted Emissions (DC Ports)




Test Setup for RF Conducted Emissions (DC Ports)



Test Setup for RF Conducted Emissions (DC Ports)

# EN 60945 4th ed. 2002-08 Conducted Emissions Test

## Significant Emissions Data

VBR8 05/14/2020

| | | |
|---|---|---|
| Manufacturer | : | Helios Technologies |
| Model | : | RCDGM05-01 |
| DUT Revision | : | Load Powered Externally |
| Serial Number | : | 57540***2205110035 |
| DUT Mode | : | Powered On, Tx Standby |
| Line Tested | : | High |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Limit | : | EMC Class B |
| Test Date | : | Sep 02, 2022 03:43:48 PM |
| Data Filter | : | Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit |

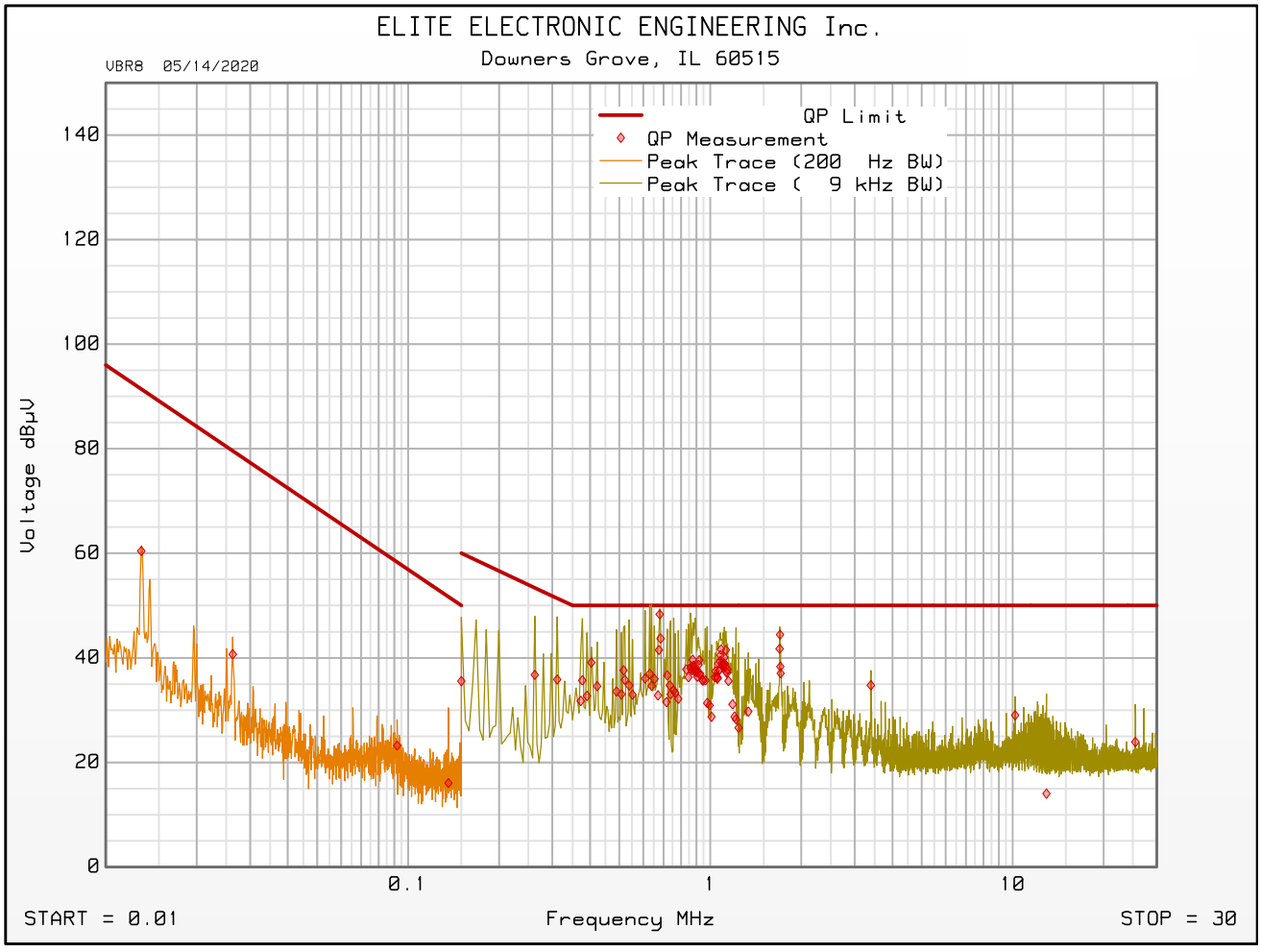
| Freq MHz | Quasi-peak Level dBµV | Quasi-peak Limit dBµV | Excessive Quasi-peak Emissions |
|---|---|---|---|
| 0.013 | 60.4 | 91.4 | |
| 0.026 | 40.7 | 79.6 | |
| 0.092 | 23.2 | 58.3 | |
| 0.150 | 35.5 | 50.0 | |
| 0.312 | 35.9 | 51.4 | |
| 0.404 | 39.1 | 50.0 | |
| 0.680 | 48.3 | 50.0 | |
| 1.085 | 41.6 | 50.0 | |
| 1.112 | 40.1 | 50.0 | |
| 1.126 | 41.5 | 50.0 | |
| 1.699 | 44.4 | 50.0 | |
| 3.397 | 34.8 | 50.0 | |
| 10.194 | 29.0 | 50.0 | |
| 12.936 | 14.0 | 50.0 | |
| 25.469 | 23.9 | 50.0 | |

# EN 60945 4th ed. 2002-08 Conducted Emissions Test

## Cumulative Data

VBR8 05/14/2020

| | | |
|---|---|---|
| Manufacturer | : | Helios Technologies |
| Model | : | RCDGM05-01 |
| DUT Revision | : | Load Powered Externally |
| Serial Number | : | 57540***2205110035 |
| DUT Mode | : | Powered On, Tx Standby |
| Line Tested | : | High |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Limit | : | EMC Class B |
| Test Date | : | Sep 02, 2022 03:43:48 PM |




Emissions Meet QP Limit

# EN 60945 4th ed. 2002-08 Conducted Emissions Test

## Significant Emissions Data

VBR8 05/14/2020

| | | |
|---|---|---|
| Manufacturer | : | Helios Technologies |
| Model | : | RCDGM05-01 |
| DUT Revision | : | Load Powered Externally |
| Serial Number | : | 57540***2205110035 |
| DUT Mode | : | Powered On, Tx Standby |
| Line Tested | : | Return |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Limit | : | EMC Class B |
| Test Date | : | Sep 02, 2022 03:34:50 PM |
| Data Filter | : | Up to 80 maximum levels detected with 6 dB level excursion threshold over 10 dB margin below limit |

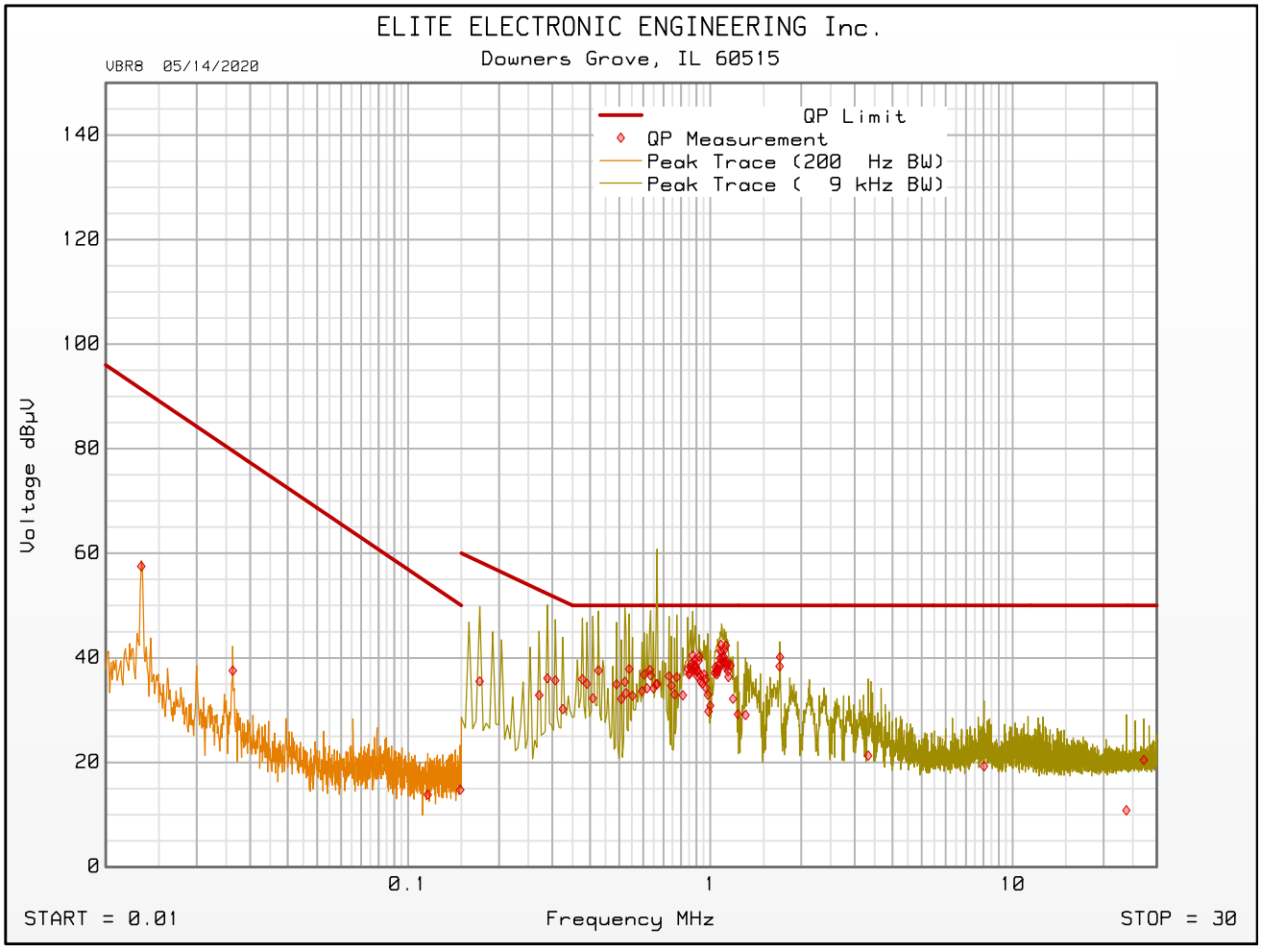
| Freq MHz | Quasi-peak Level dBµV | Quasi-peak Limit dBµV | Excessive Quasi-peak Emissions |
|---|---|---|---|
| 0.013 | 57.5 | 91.4 | |
| 0.026 | 37.5 | 79.6 | |
| 0.116 | 13.8 | 54.4 | |
| 0.149 | 14.8 | 50.1 | |
| 0.272 | 32.9 | 53.0 | |
| 0.307 | 35.7 | 51.5 | |
| 0.539 | 37.8 | 50.0 | |
| 0.874 | 40.4 | 50.0 | |
| 0.919 | 40.2 | 50.0 | |
| 1.085 | 42.5 | 50.0 | |
| 1.112 | 41.5 | 50.0 | |
| 1.126 | 42.4 | 50.0 | |
| 1.699 | 40.1 | 50.0 | |
| 3.329 | 21.3 | 50.0 | |
| 8.039 | 19.3 | 50.0 | |
| 23.795 | 10.8 | 50.0 | |
| 27.156 | 20.4 | 50.0 | |

# EN 60945 4th ed. 2002-08 Conducted Emissions Test

## Cumulative Data

VBR8 05/14/2020

| | | |
|---|---|---|
| Manufacturer | : | Helios Technologies |
| Model | : | RCDGM05-01 |
| DUT Revision | : | Load Powered Externally |
| Serial Number | : | 57540***2205110035 |
| DUT Mode | : | Powered On, Tx Standby |
| Line Tested | : | Return |
| Scan Step Time [ms] | : | 30 |
| Meas. Threshold [dB] | : | -10 |
| Notes | : | |
| Test Engineer | : | N. Bouchie |
| Limit | : | EMC Class B |
| Test Date | : | Sep 02, 2022 03:34:50 PM |




Emissions Meet QP Limit

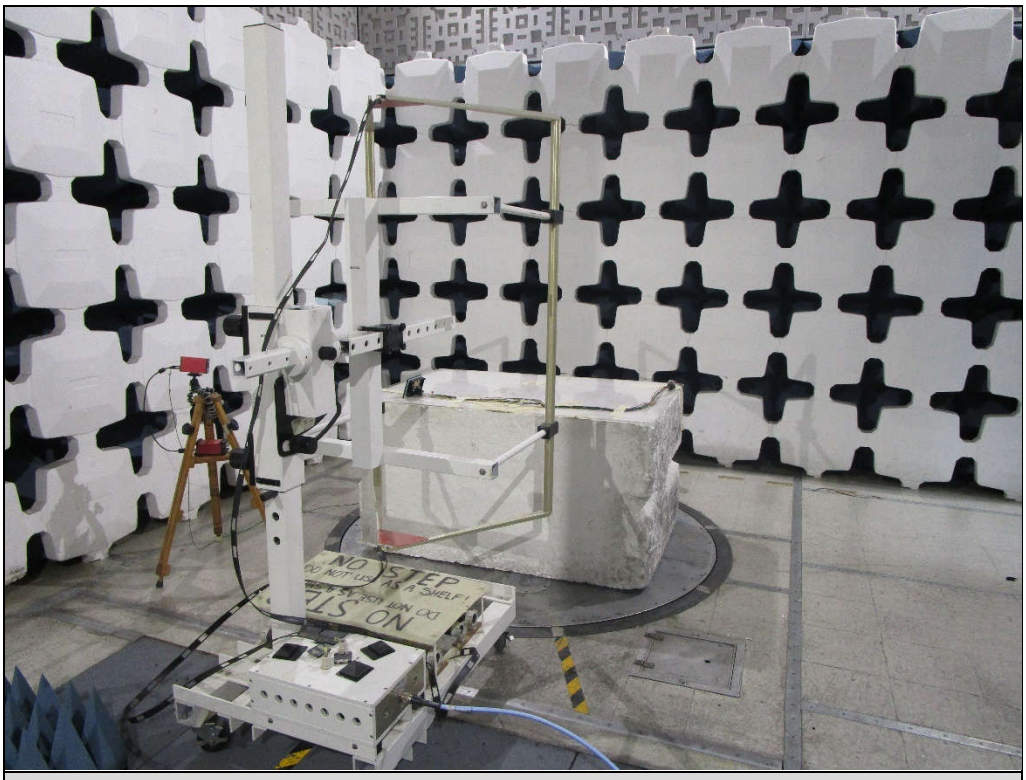
# 23. Radiated Immunity Test

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |

| Information | |
|---|---|
| Setup Format | Tabletop |
| Height of Support | N/A |
| Type of Test Site | Semi-anechoic |
| Position of Radiating Antennas | 3m – Log periodic Antenna<br>2.5m – Double-ridge Waveguide |
| Type of Antennas Used | Below 1GHz: Log periodic (or equivalent)<br>Above 1GHz: Double-ridged waveguide (or equivalent) |
| Uniform Field Area | 1.5 m 1.5 m square |
| Partial Illumination Used | No |
| Number of Interconnection Wires | 18 |
| Type of Interconnection Wires | 12AWG Power, I/O, Fiber Optic |
| Frequency Step Sizes | 1% |
| Notes | None |

| Requirements | |
|---|---|
| Frequency of Test Signal (MHz) | Quasi-peak Limit (dBµV) |
| 27 to 80 | 10 |
| 80 to 1000 | 10 |
| 1000 to 2700 | 3 |
| 2700 to 6000 | 3 |

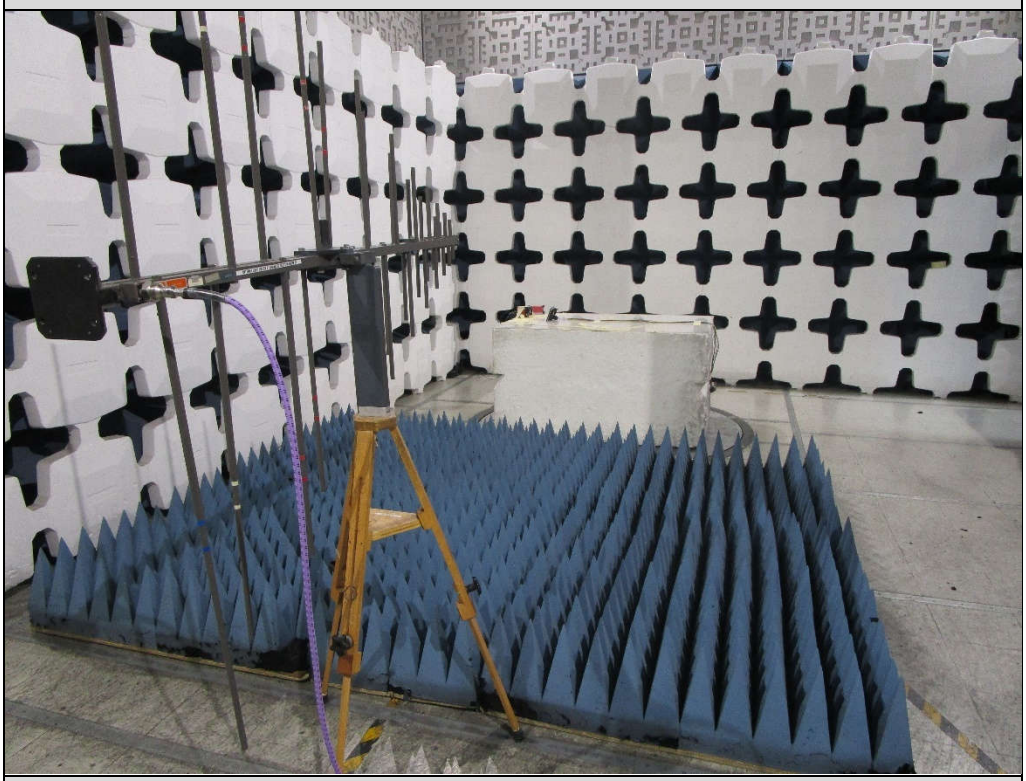
| Procedures |
| --- |
| The test item is placed on an 80cm high non-conductive table. The test item was arranged so that the front of the test item was coincident with the uniform field area established during the calibration process. The test item was operated in the WiFi and BLE Paired mode.<br><br>The transmit antennas and cables, used to establish the uniform field, were set up in the same configuration as they were during the calibration process for vertical polarization.<br>(a) The forward power determined during the calibration process was adjusted to achieve the required field intensity level and applied to the field generating antenna. The frequency steps are 1% of the preceding frequency. The dwell time at each frequency was longer than the time required to exercise the test item but never less than 0.5 seconds.<br>(b) The entire frequency range was incrementally swept with the signal 80% modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to switch test equipment when necessary.<br>(c) If a response occurs, at the specified level, the response is recorded. The low and high frequencies of the range over which the response occurs at the specified level are also noted. The applied level is then reduced, and the frequency simultaneously adjusted to determine points at which responses occur at applied levels less than the requirements. The levels and frequencies of these points are recorded.<br>(d) Steps (a) through (c) were repeated with the transmitting antenna positioned with horizontal polarization.<br>(e) Steps (a) through (d) were repeated with the right, back and left side of the test item coincident with the uniform area established during the calibration process. |



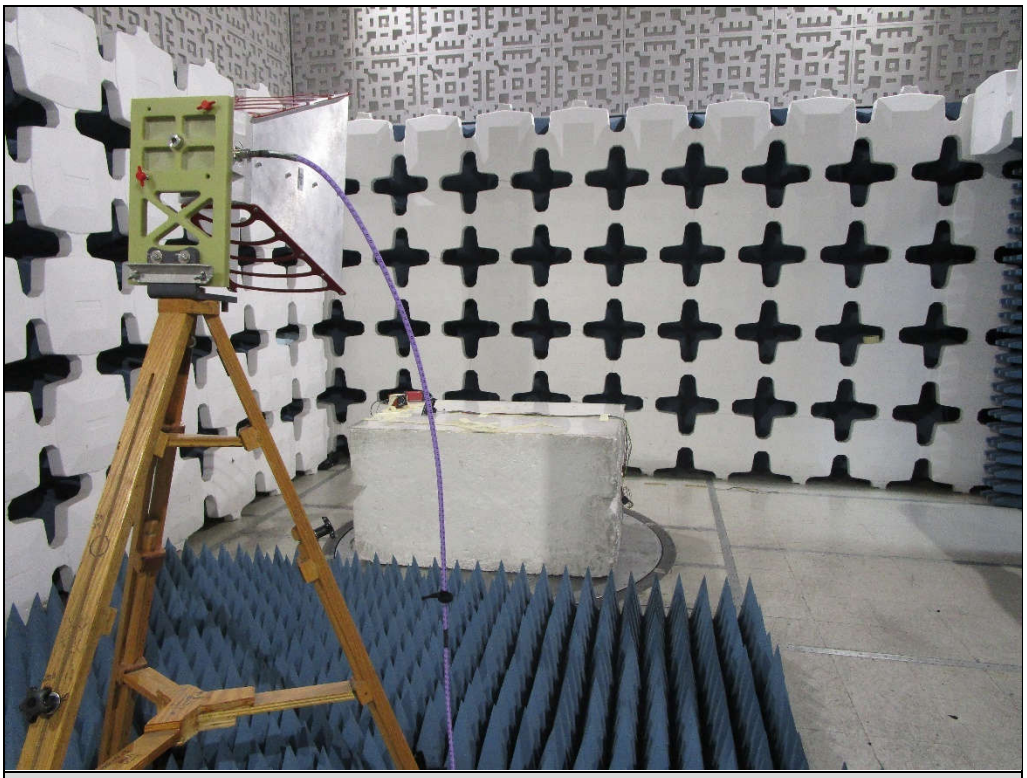

Test Setup for Radiated Immunity: 27MHz to 80MHz, Horizontal Polarization


Test Setup for Radiated Immunity: 27MHz to 80MHz, Vertical Polarization

Test Setup for Radiated Immunity: 80MHz to 1GHz, Horizontal Polarization



Test Setup for Radiated Immunity: 80MHz to 1GHz, Vertical Polarization



Test Setup for Radiated Immunity: Above 1GHz, Horizontal Polarization

Test Setup for Radiated Immunity: Above 1GHz, Vertical Polarization

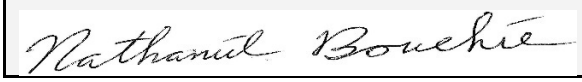
| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |
| Date Tested | September 8, 2022 |

| Frequency (MHz) | Antenna Polarization | Modulation | Applied Level (V/m) | Threshold Level (V/m) | Required Performance Criterion | Meets Performance Criterion? (Y/N) | Notes |
|---|---|---|---|---|---|---|---|
| Side Tested: Front (0 degrees) | | | | | | | |
| 27 – 1000 | Vertical | 1kHz AM @ 80% | 10 | --- | Note* | Y | --- |
| 27 – 1000 | Horizontal | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Side Tested: Right (90 degrees) | | | | | | | |
| 27 – 1000 | Vertical | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| 27 – 1000 | Horizontal | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Side Tested: Back (180 degrees) | | | | | | | |
| 27 – 1000 | Vertical | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| 27 – 1000 | Horizontal | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Side Tested: Left (270 degrees) | | | | | | | |
| 27 – 1000 | Vertical | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| 27 – 1000 | Horizontal | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Side Tested: Front (0 degrees) | | | | | | | |
| 1000 - 6000 | Vertical | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| 1000 - 6000 | Horizontal | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Side Tested: Right (90 degrees) | | | | | | | |
| 1000 - 6000 | Vertical | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| 1000 - 6000 | Horizontal | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Side Tested: Back (180 degrees) | | | | | | | |
| 1000 - 6000 | Vertical | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| 1000 - 6000 | Horizontal | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Side Tested: Left (270 degrees) | | | | | | | |
| 1000 - 6000 | Vertical | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| 1000 - 6000 | Horizontal | 1kHz AM @ 80% | 3 | --- | * | Y | --- |

*Performance criteria for continuous phenomena applied to transmitters and receivers

The EUT conforms

Tested by: Nathaniel Bouchie



| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |
| Date Tested | September 8, 2022 |

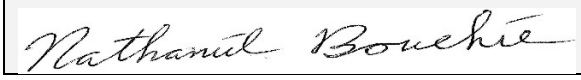
| Frequency (MHz) | Antenna Polarization | Modulation | Applied Level (V/m) | Threshold Level (V/m) | Required Performance Criterion | Meets Performance Criterion? (Y/N) | Notes |
|---|---|---|---|---|---|---|---|
| Side Tested: Front (0 degrees) | | | | | | | |
| Spot[1] | Vertical | 1kHz AM @ 80% | 10 | --- | Note* | Y | --- |
| Spot[1] | Horizontal | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Side Tested: Right (90 degrees) | | | | | | | |
| Spot[1] | Vertical | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Spot[1] | Horizontal | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Side Tested: Back (180 degrees) | | | | | | | |
| Spot[1] | Vertical | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Spot[1] | Horizontal | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Side Tested: Left (270 degrees) | | | | | | | |
| Spot[1] | Vertical | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Spot[1] | Horizontal | 1kHz AM @ 80% | 10 | --- | * | Y | --- |
| Side Tested: Front (0 degrees) | | | | | | | |
| Spot[2] | Vertical | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Spot[2] | Horizontal | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Side Tested: Right (90 degrees) | | | | | | | |
| Spot[2] | Vertical | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Spot[2] | Horizontal | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Side Tested: Back (180 degrees) | | | | | | | |
| Spot[2] | Vertical | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Spot[2] | Horizontal | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Side Tested: Left (270 degrees) | | | | | | | |
| Spot[2] | Vertical | 1kHz AM @ 80% | 3 | --- | * | Y | --- |
| Spot[2] | Horizontal | 1kHz AM @ 80% | 3 | --- | * | Y | --- |

[1]800MHz and 900MHz
[2]1800MHz, 2600MHz, 3500MHz and 5000MHz

*Performance criteria for continuous phenomena applied to transmitters and receivers

The EUT conforms

Tested by: Nathaniel Bouchie



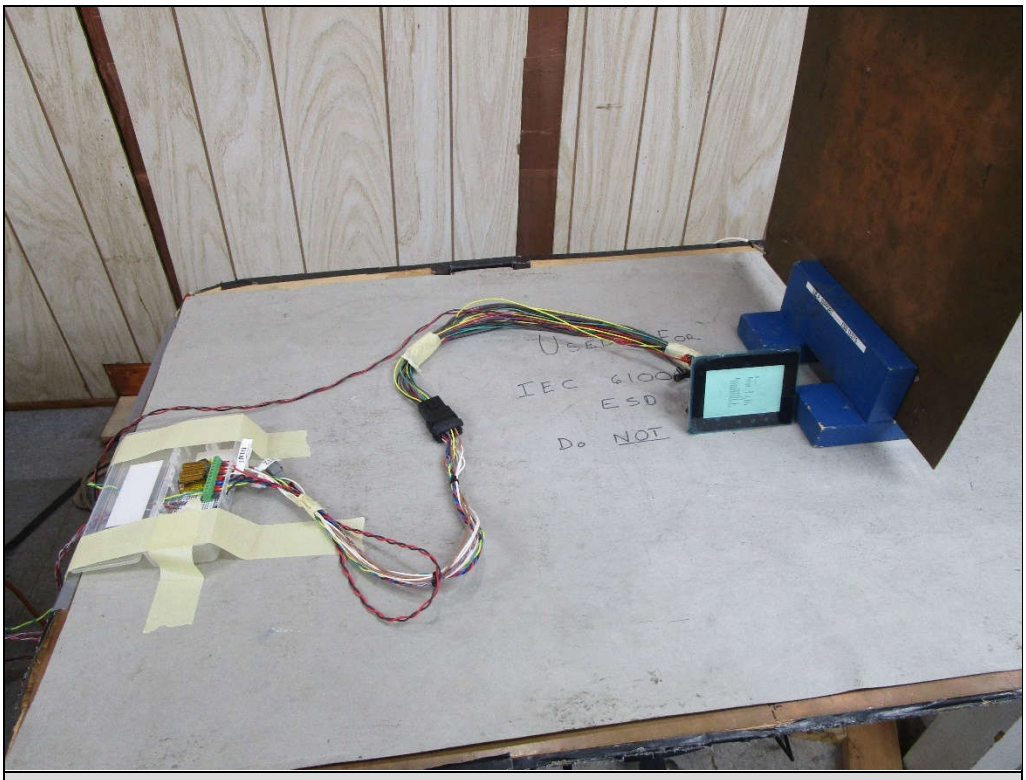
## 24. Electrostatic Discharge (ESD) Test

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |

| Test Conditions | | | |
|---|---|---|---|
| Test Parameters | Requirements | During Test | Comments |
| Discharge Network | 150pF / 330Ω | 150pF / 330Ω | --- |
| Ambient Temperature | 15C-35C | 23.8 | --- |
| Relative Humidity | 30%-60% | 33 | --- |
| Air Pressure | 860mbar-1060mbar | 1014.6 | --- |
| Setup Format | Tabletop | | --- |

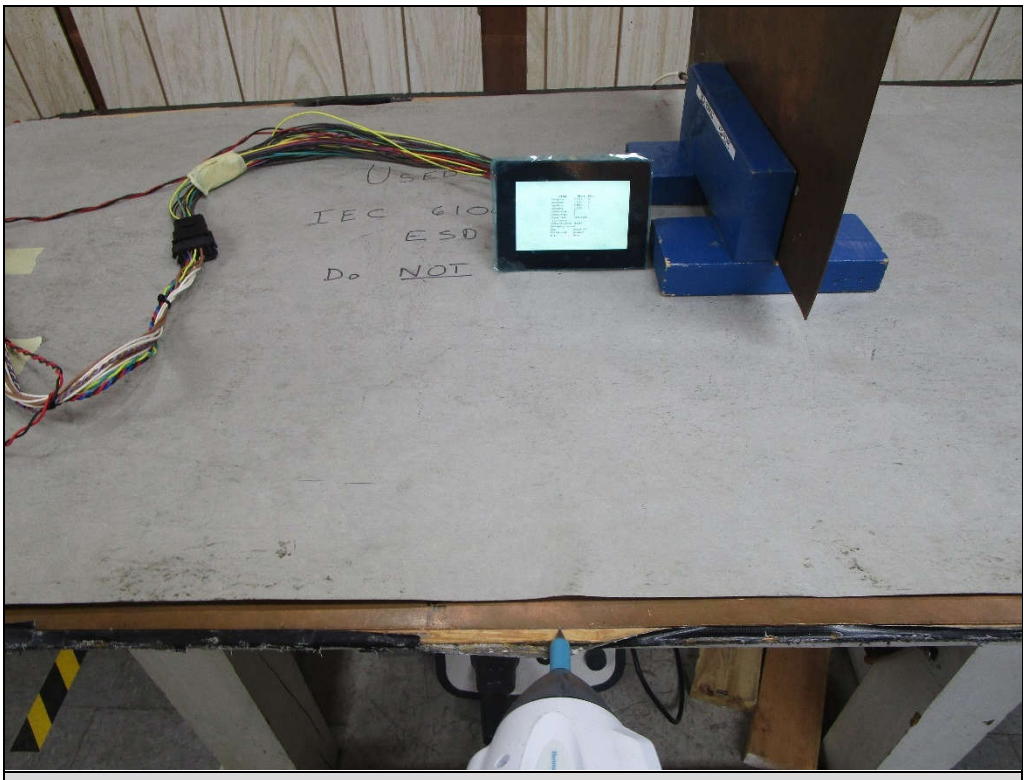
| Requirements | | |
|---|---|---|
| Level | Air Discharge | Contact Discharge |
| 3 | 8kV | 6kV |

| Procedures |
| --- |
| Contact Discharge Method – Indirect Application<br><br>The test item was operated in the WiFi and BLE Paired mode.<br>(b) The ESD simulator charge voltage was set to 6 kV.<br>(c) At locations 10 cm from each side of the test item, the tip of the contact discharge electrode was positioned vertically, touched to the horizontal coupling plane and the discharge was initiated.<br>(d) Ten (10) discharges were applied at each location at a 1 pulse per second repetition rate.<br>(e) The test item was continuously monitored for a response.<br>(f) Steps (a) through (e) were repeated with the polarity of the discharges reversed.<br>(g) Steps (c) through (f) were repeated except step (c) was performed as follows:<br><br>The vertical coupling plane was positioned at locations 10 cm from each side of the test item, the tip of the contact discharge electrode was positioned to the center of one vertical edge, touched to the vertical coupling plane and the discharge was initiated.<br>Contact Discharge Method – Direct Application<br><br>The test item was operated in the WiFi and BLE Paired mode.<br>(b) The ESD simulator charge voltage was set to 6 kV.<br>(c) At all conductive surfaces, the tip of the contact discharge electrode were touched to the test item and the discharge was initiated.<br>(d) Ten (10) discharges were applied at each location at a 1 pulse per second repetition rate.<br>(e) The test item was continuously monitored for a response.<br>(f) Steps (a) through (e) were repeated with the polarity of the discharges reversed.<br><br>Air Discharge Method – Direct Application<br><br>The test item was operated in the WiFi and BLE Paired mode.<br>(b) The ESD simulator charge voltage was set to 2 kV.<br>(c) At insulated surfaces, the tip of the discharge electrode was placed near the surface of the test item and the discharge was allowed to discharge at a rate of 20 pps.<br>(d) The test item was continuously monitored for a response.<br>(e) At locations where responses were noted, the discharge rate was reduced to 1 pulse per second. Ten (10) discharges were applied at each location at the 1 pulse per second repetition rate.<br>(f) Steps (a) through (e) were repeated with the polarity of the discharges reversed.<br>(g) Steps (c) through (f) were repeated with the ESD simulator charge voltage set to 4 kV.<br>(h) Steps (c) through (f) were repeated with the ESD simulator charge voltage set to 8 kV. |

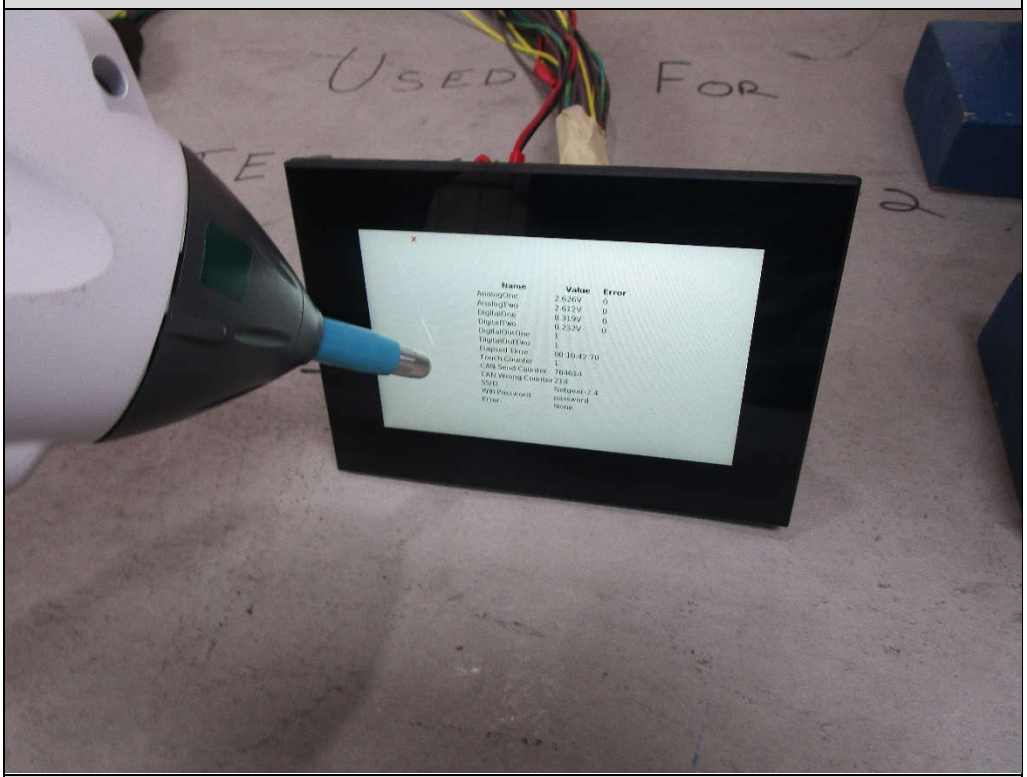



Test Setup for Electrostatic Discharge (ESD)


Test Setup for Electrostatic Discharge (ESD)




Test Setup for Electrostatic Discharge (ESD)




Test Setup for Electrostatic Discharge (ESD)

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |
| Date Tested | September 13, 2022 |

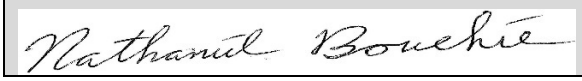
| Test Point | Voltage Level (kV) | Pulse Polarity | Number Applied | Repetition Rate (pps) | Required Performance Criterion | Meets Performance Criterion? (Y/N) | Notes |
|---|---|---|---|---|---|---|---|
| Method: Contact Discharge – Indirect Application | | | | | | | |
| HCP, Front | 6 kV | +/- | 10 | 1 | Note* | Y | --- |
| HCP, Back | 6 kV | +/- | 10 | 1 | * | Y | --- |
| HCP, Left | 6 kV | +/- | 10 | 1 | * | Y | --- |
| HCP, Right | 6 kV | +/- | 10 | 1 | * | Y | --- |
| VCP, Front | 6 kV | +/- | 10 | 1 | * | Y | --- |
| VCP, Back | 6 kV | +/- | 10 | 1 | * | Y | --- |
| VCP, Left | 6 kV | +/- | 10 | 1 | * | Y | --- |
| VCP, Right | 6 kV | +/- | 10 | 1 | * | Y | --- |
| Method: Air Discharge | | | | | | | |
| RCD Screen | 2/4/8 kV | +/- | 10 | 1 | * | Y | --- |
| Top Edge | 2/4/8 kV | +/- | 10 | 1 | * | Y | --- |
| Right Edge | 2/4/8 kV | +/- | 10 | 1 | * | Y | --- |
| Left Edge | 2/4/8 kV | +/- | 10 | 1 | * | Y | --- |
| Bottom Edge | 2/4/8 kV | +/- | 10 | 1 | * | Y | --- |

HCP - Horizontal Coupling Plane
VCP - Vertical Coupling Plane

*Performance criteria for transient phenomena applied to transmitters and receivers

The EUT conforms

Tested by: Nathaniel Bouchie



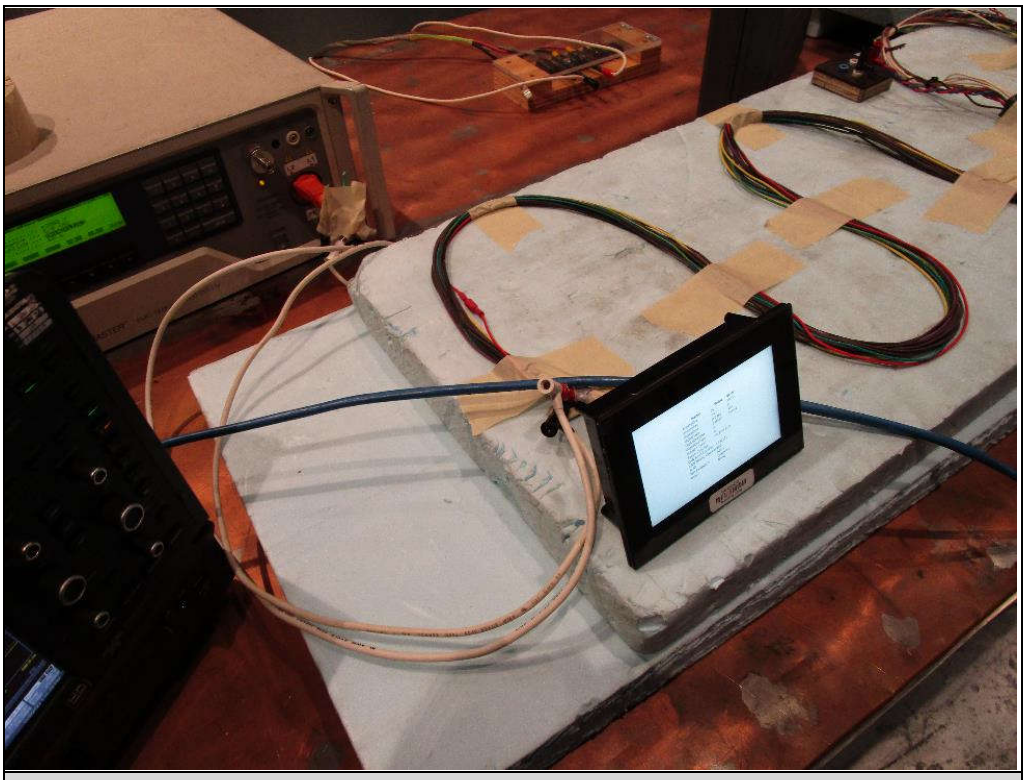
# 25. Electrical Fast Transients (EFT) Test

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |

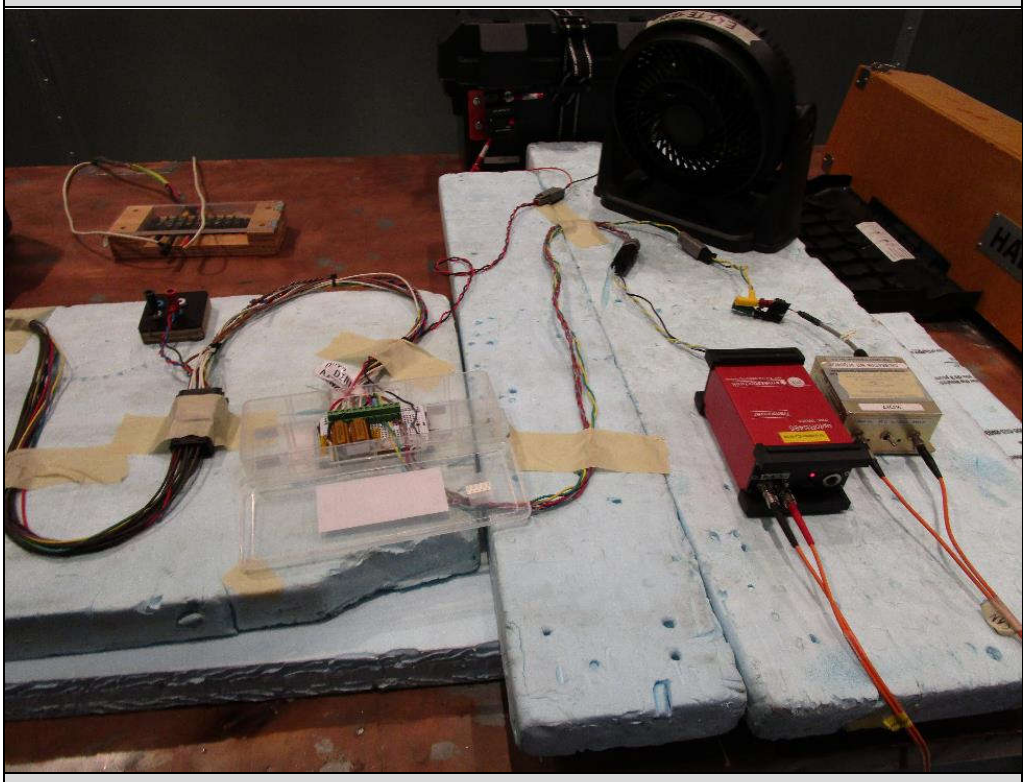
| Information | |
|---|---|
| Type of Test | Laboratory |
| Test level (power leads) | 3 |
| Test level (signal leads) | 4 |
| Coupling mode | Common mode |
| Test Voltage Polarity | Positive and Negative |
| Test Duration | 60 seconds |
| Repetition Frequency | 5kHz |
| Ports Tested and sequence of ports tested | 1) Line 1 to Ground<br>2) Line 2 to Ground<br>3) Line 1 and Line 2 to Ground<br>4) 12AWG I/O |
| Auxiliary Equipment | 1) Load Box<br>2) Support Laptop<br>3) Load Box (Replacement)<br>4) Bluetooth Speaker |

| Requirements | | | | |
|---|---|---|---|---|
| Level | Power Ports | | Signal and Control Ports | |
| | Peak Voltage (kV) | Repetition Frequency (kHz) | Peak Voltage (kV) | Repetition Frequency (kHz) |
| 1<br>2<br>3<br>4 | 0.5<br>1<br>2<br>4 | 5 | 0.25<br>0.5<br>1<br>2 | 5 |

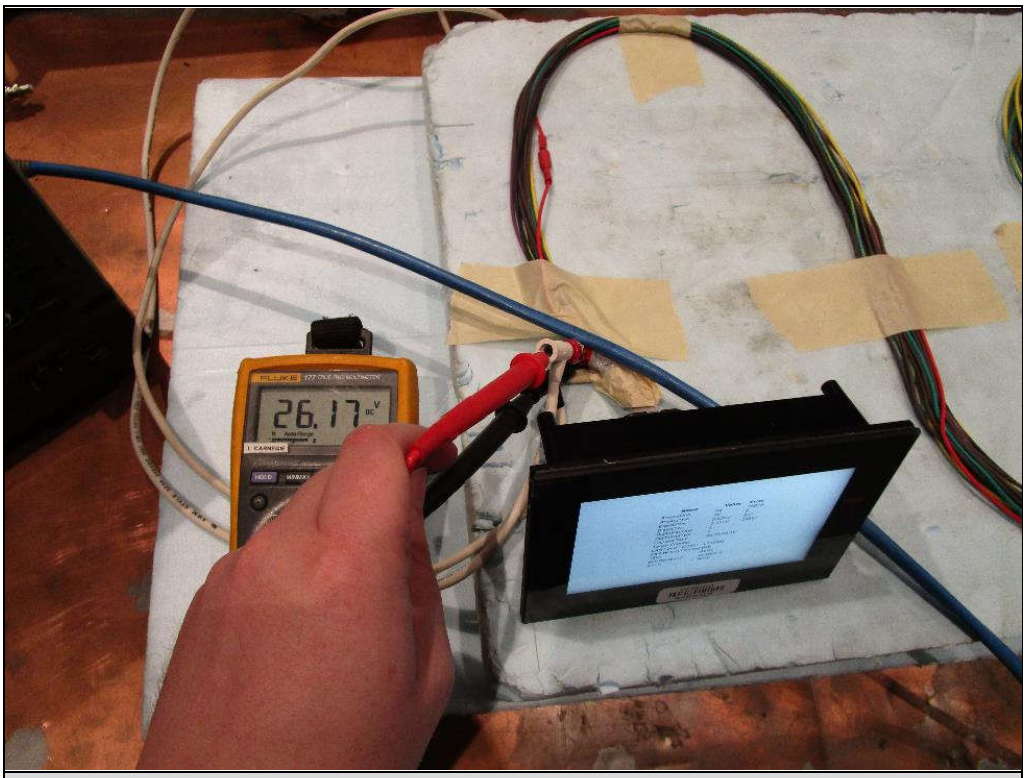
| Procedures |
| --- |
| Power Lines<br><br>The power cable of the test item was connected to the output of the electrical fast transient generator.<br>(b) The test item was operated in the WiFi and BLE Paired mode.<br>(c) The positive polarity electrical fast transients were applied between each of the power leads and ground.<br>(d) The negative polarity electrical fast transients were applied between each of the power leads and ground.<br>(e) The test item was continuously monitored for a response.<br><br>Interconnect Cables<br><br>(a) The test item was operated in the WiFi and BLE Paired mode.<br>(b) The output of the electrical fast transient generator was connected to the capacitive coupling clamp which conforms to the IEC 61000-4-4 specification.<br>(c) The coupling clamp was positioned on the ground plane.<br>(d) The interconnect cable was placed into the coupling clamp and the positive polarity electrical fast transients were applied.<br>(e) Step (d) was repeated for application of the negative polarity electrical fast transients.<br>(f) The test item was continuously monitored for a response.<br>(g) Steps (c) through (g) were repeated for all of the interconnect cables. |



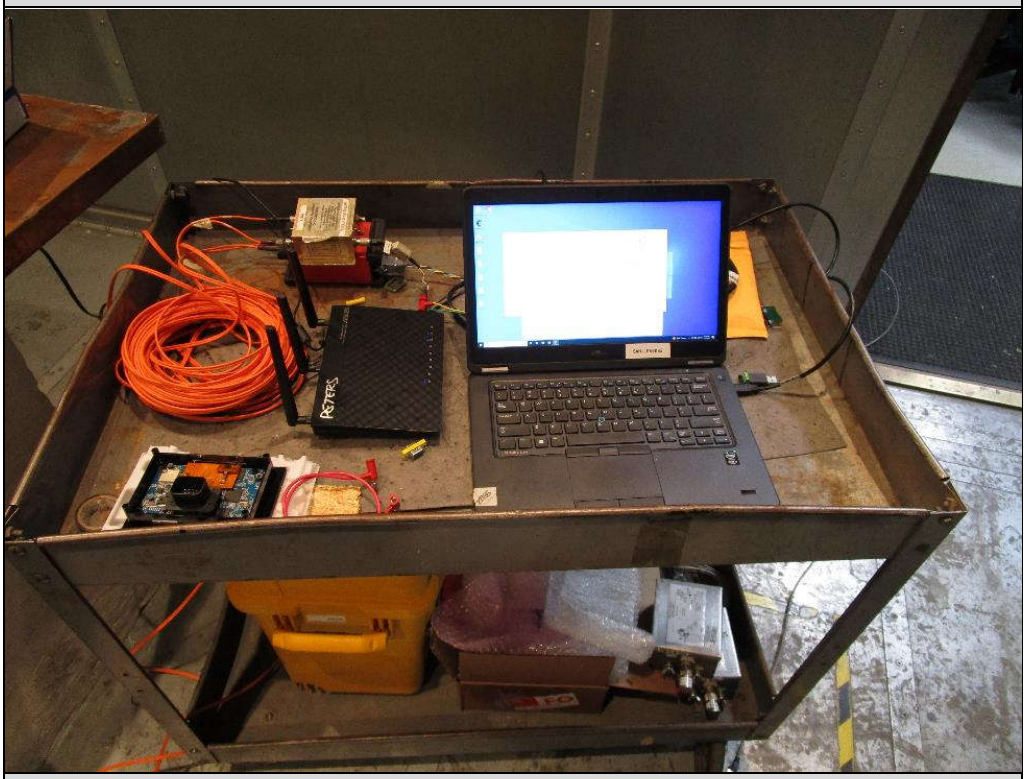
Test Setup for Electrical Fast Transients – Power Leads



Test Setup for Electrical Fast Transients – Power Leads




Test Setup for Electrical Fast Transients – Signal Leads



Test Setup for Electrical Fast Transients – Signal Leads

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |
| Date Tested | November 7, 2022 |

| Lead Tested | Applied Voltage (kV) | Pulse Polarity | Time Applied (seconds) | Required Performance Criterion | Meets Performance Criterion? (Y/N) | Notes |
|---|---|---|---|---|---|---|
| 24VDC Input Power Leads | | | | | | |
| Line 1 to Ground | 2 | +/- | 60 | Note* | Y | --- |
| Line 2 to Ground | 2 | +/- | 60 | * | Y | --- |
| Line 1 and Line 2 to Ground | 2 | +/- | 60 | * | Y | --- |
| Signal Leads (Capacitive Coupling Clamp) | | | | | | |
| 12AWG I/O | 2 | +/- | 60 | * | Y | --- |

*Performance criteria for transient phenomena applied to transmitters and receivers

The EUT conforms

Tested by: Josh Barker

# 26. RF Common Mode Test

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |

| Information | |
|---|---|
| Type of Test | Laboratory |
| Test level (power leads) | 2 |
| Test level (signal leads) | 2 |
| Coupling method | CDN<br>Current Probe |
| Ports Tested – CDN Method | DC Mains |
| Ports Tested – Current Probe Method | 14-pin Harness (Except DC Mains) |

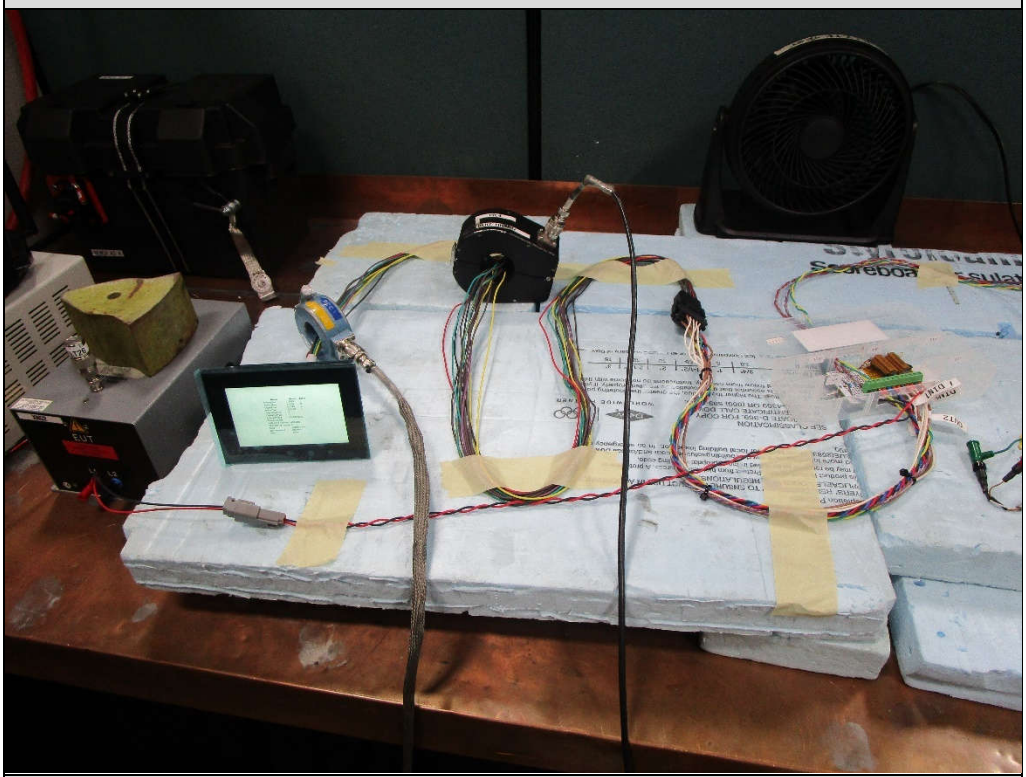
| Requirements | | |
|---|---|---|
| Level | Applied Level ($V_{rms}$) | Applied Level (dBµV) |
| 2 | 3 | 129.5 |

| Procedures |
|---|
| Power Lines<br><br>A signal generator output was amplified and connected to the RF Input of the Coupling/Decoupling Network (CDN). A computer system, used to control the signal generator, adjusted the output of the signal generator until the required levels were achieved. The power cable of the EUT was connected to the output of the CDN. The frequency range was swept from 150kHz to 80MHz using the signal levels established during the calibration process, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave, pausing to adjust the RF signal level as necessary. The frequency was swept incrementally with the step size of 1% of the preceding frequency value. The dwell time at each frequency was not less than the time necessary for the EUT to be exercised and to respond but was not less than 0.5 second. The EUT was continuously monitored for a response.<br><br>Interconnect Cables<br><br>A signal generator output was amplified and connected to the RF Input of the current injection probe. A computer system, used to control the signal generator, adjusted the output of the signal generator until the required levels were achieved. The current injection probe was clamped around the interconnect cable(s). The frequency range was swept from 150kHz to 80MHz using the signal levels established during the calibration process, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave, pausing to adjust the RF signal level as necessary. The frequency was swept incrementally with the step size of 1% of the preceding frequency value. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond but shall not be less than 0.5 seconds. The EUT was continuously monitored for a response. |


Test Setup for RF Common Mode – Power Leads

Test Setup for RF Common Mode – Power Leads

Test Setup for RF Common Mode – Signal Leads



Test Setup for RF Common Mode – Signal Leads

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |
| Date Tested | September 12, 2022 |

| Frequency (MHz) | Applied Level (Vrms) | Threshold Level ($V_{rms}$) | Modulation | Required Performance Criterion | Meets Performance Criterion? (Y/N) | Notes |
|---|---|---|---|---|---|---|
| Input Power – CDN Method | | | | | | |
| 0.15 – 80 | 3 | --- | 1kHz AM @ 80% | Note* | Y | --- |
| Interconnect Cables – Current Probe Method | | | | | | |
| 0.15 – 80 | 3 | --- | 1kHz AM @ 80% | * | Y | --- |

*Performance criteria for continuous phenomena applied to transmitters and receivers

The EUT conforms

Tested by: Nathaniel Bouchie

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |
| Date Tested | September 12, 2022 |

| Frequency (MHz) | Applied Level (Vrms) | Threshold Level (Vrms) | Modulation | Required Performance Criterion | Meets Performance Criterion? (Y/N) | Notes |
|---|---|---|---|---|---|---|
| Input Power – CDN Method | | | | | | |
| Spot Frequencies[1] | 10 | --- | 1kHz AM @ 80% | Note* | Y | --- |
| Spot Frequencies[1] | 10 | --- | 1kHz AM @ 80% | * | Y | --- |
| Interconnect Cables – Current Probe Method | | | | | | |
| Spot Frequencies[1] | 10 | --- | 1kHz AM @ 80% | * | Y | --- |
| Spot Frequencies[1] | 10 | --- | 1kHz AM @ 80% | * | Y | --- |

[1]Spot Frequencies – 2MHz, 3MHz, 4MHz, 6.2MHz, 8.2MHz, 12.6MHz, 16.5MHz, 18.8MHz, 22MHz, and 25MHz

*Performance criteria for continuous phenomena applied to transmitters and receivers

The EUT conforms

Tested by: Nathaniel Bouchie

## 27. Surge Test

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |

| Information | |
|---|---|
| Test Level | Level 3 |
| DC Power Port | L1 to L2: +/-0.5kV, +/-1.0kV, 5 each |
| Time between impulses | 1 minute |
| Operating conditions of EUT | Nominal |
| EUT ports to be tested | DC mains |

| Requirements | | |
|---|---|---|
| Level | Line to Line (kV) | Line to Ground[a] (kV) |
| 1 | --- | 0.5 |
| 2 | 0.5 | 1 |
| 3 | 1 | 2 |
| 4 | 2 | 4 |

[a] For symmetrical interconnection lines the test can be applied to multiple lines simultaneously with respect to ground, i.e. “lines to ground”

**Procedures**

The line voltage to the EUT was checked and adjusted to the nominal level. The EUT was checked for proper operation. The test was performed with the EUT operated in the WiFi and BLE Paired mode.

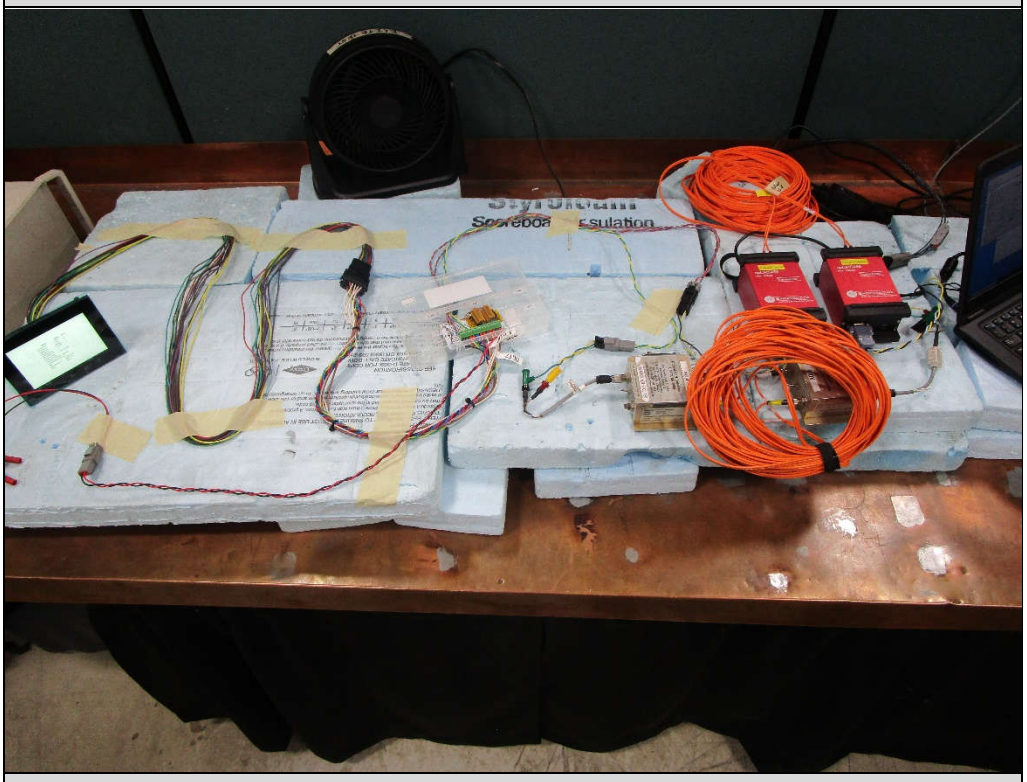
a) The power cable of the EUT was connected to the output of the surge generator.

b) The EUT was operated in the WiFi and BLE Paired mode.

c) The positive and negative polarity surges were applied between the leads tested at the 0°, 90°, 180°, and 270° power phase angles for AC lines, and at random for DC lines. Five surges of each polarity were applied to the EUT.

d) The EUT was continuously monitored for a response.

Test Setup for Surges



Test Setup for Surges

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |
| Date Tested | November 7, 2022 |

| Leads Tested | Applied Voltage (kV) | Pulse Polarity | Phase Angle (degrees) | Coupling Capacitor (uF) | Source Impedance (ohms) | Number Of Pulses Applied | Required Performance Criterion | Meets Performance Criterion? (Y/N) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 24VDC | | | | | | | | | |
| L1 to L2 | 0.5 | +/- | N/a | 18 | 2 | 5 ea/pol | Note* | Y | --- |
| L1 to L2 | 1.0 | +/- | N/a | 18 | 2 | 5 ea/pol | * | Y | --- |

*Performance criteria for transient phenomena applied to transmitters and receivers

The EUT conforms

Tested by: Josh Barker

## 28. Magnetic Field Immunity Test

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |

| Information | |
|---|---|
| Test Level | 30 A/m |
| Power Frequency | 50Hz/60Hz |
| Test Duration | 5 minutes per axis |
| Operating conditions of EUT | WiFi and BLE Paired |

**Procedures**

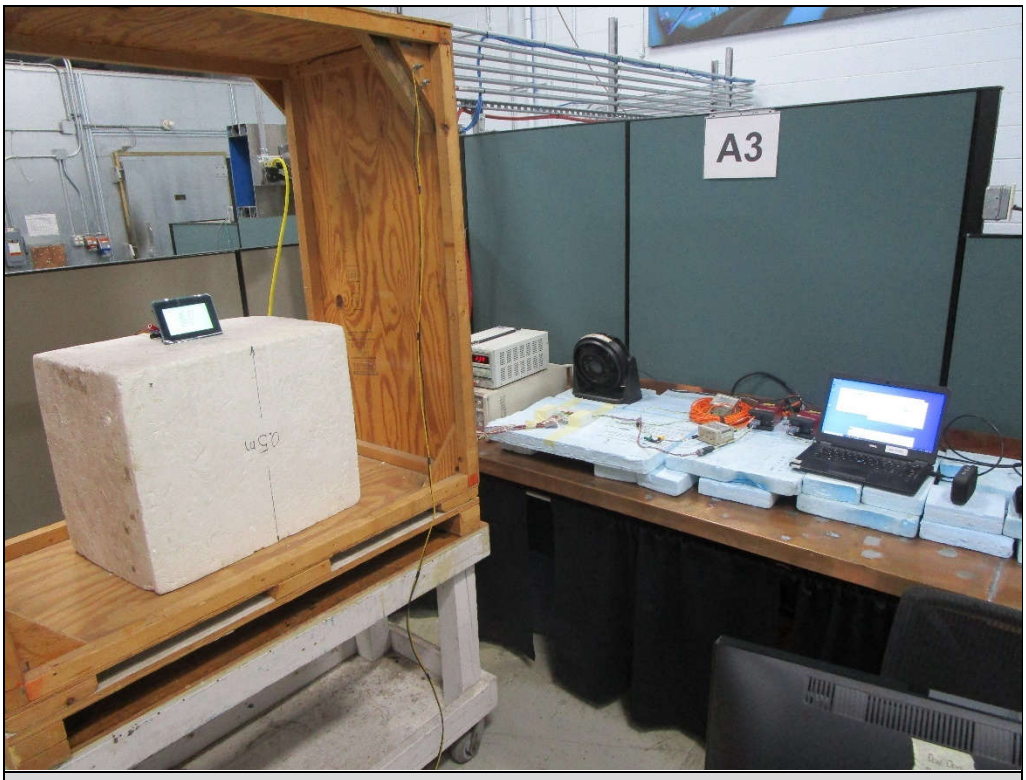
Calibration Procedure

A programmable power supply was connected to a square induction coil with dimensions of 48 inches x 48 inches x 24 inches. A gauss meter was placed in the center of the coil. The output of the power supply was set to the 50Hz, and the current level was increased until the desired magnetic field was seen on the gauss meter. The output current of the power supply was recorded. The magnetic field in the coil was verified and found to be uniform within a maximum variation of less than ±3dB.

The power supply was set to 60Hz, and the above steps were repeated.

Test Procedure

1) The ambient level in the test area was measured and found to be greater than 20dB below the test level.
2) EUT was placed in the center of the induction coil.
3) The test was performed with the EUT operated in the WiFi and BLE Paired mode.
4) The output of the power supply was increased until the output current was the same level as that established during the calibration process.
5) The EUT was then exposed to the magnetic field for a minimum of 5 minutes.
6) The EUT was rotated 90° so that the magnetic field was through the top of the EUT (Y axis). The EUT was then exposed to the magnetic field for a minimum of 5 minutes.
7) The EUT was rotated 90° so that the magnetic field was through the front of the EUT (Z axis). The EUT was exposed to the magnetic field for a minimum of 5 minutes.
8) The test was repeated with the power supply set to 60Hz and the respective current level.




Test Setup for Magnetic Field Immunity


Test Setup for Magnetic Field Immunity


Test Setup for Magnetic Field Immunity


Test Setup for Magnetic Field Immunity

| | |
|---|---|
| Manufacturer | Helios Technologies |
| Product | RCD Touch Screen Display/Controller |
| Model | RCDGM05-01 |
| Serial No | 57540***2205110039 |
| Mode | WiFi and BLE Paired |
| Date Tested | September 13, 2022 |

| Frequency (Hz) | Axis Tested | Applied Level (A/m) | Required Level (A/m) | Duration (minutes) | Required Performance Criterion | Meets Performance Criterion? (Y/N) |
|---|---|---|---|---|---|---|
| 50 | X | 30 | 30 | 5 | Note* | Y |
| 50 | Y | 30 | 30 | 5 | * | Y |
| 50 | Z | 30 | 30 | 5 | * | Y |
| 60 | X | 30 | 30 | 5 | * | Y |
| 60 | Y | 30 | 30 | 5 | * | Y |
| 60 | Z | 30 | 30 | 5 | * | Y |

*Performance criteria for continuous phenomena applied to transmitters and receivers

The EUT conforms

Tested by: Nathaniel Bouchie

## 29. Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELITE ELECTRONIC ENGINEERING, INC.
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ELECTRICAL

Valid To: June 30, 2023 Certificate Number: 1786.01

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

| Test Technology: | Test Method(s) [1]: |
|---|---|
| ***Transient Immunity*** | ISO 7637-2 (including emissions); ISO 7637-3;<br>ISO 16750-2:2012, Sections 4.6.3 and 4.6.4;<br>CS-11979, Section 6.4; CS.00054, Section 5.9;<br>EMC-CS-2009.1 (CI220); FMC1278 (CI220, CI221, CI222);<br>GMW 3097, Section 3.5; SAE J1113-11; SAE J1113-12;<br>ECE Regulation 10.06 Annex 10 |
| ***Electrostatic Discharge (ESD)*** | ISO 10605 (2001, 2008);<br>CS-11979 Section 7.0; CS.00054, Section 5.10;<br>EMC-CS-2009.1 (CI 280); FMC1278 (CI280); SAE J1113-13;<br>GMW 3097 Section 3.6 |
| ***Conducted Emissions*** | CISPR 25 (2002, 2008), Sections 6.2 and 6.3;<br>CISPR 25 (2016), Sections 6.3 and 6.4;<br>CS-11979, Section 5.1; CS.00054, Sections 5.6.1 and 5.6.2;<br>GMW 3097, Section 3.3.2;<br>EMC-CS-2009.1 (CE 420); FMC1278 (CE420, CE421) |
| ***Radiated Emissions Anechoic*** | CISPR 25 (2002, 2008), Section 6.4;<br>CISPR 25 (2016), Section 6.5;<br>CS-11979, Section 5.3; CS.00054, Section 5.6.3;<br>GMW 3097, Section 3.3.1;<br>EMC-CS-2009.1 (RE 310); FMC1278 (RE310); |



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]: |
|---|---|
| ***Vehicle Radiated Emissions*** | CISPR 12; CISPR 36; ICES-002;<br>ECE Regulation 10.06 Annex 5 |
| ***Bulk Current Injection (BCI)*** | ISO 11452-4; CS-11979, Section 6.1; CS.00054, Section 5.8.1;<br>GMW 3097, Section 3.4.1; SAE J1113-4;<br>EMC-CS-2009.1 (RI112); FMC1278 (RI112);<br>ECE Regulation 10.06 Annex 9 |
| ***Radiated Immunity Anechoic***<br>*(Including Radar Pulse)* | ISO 11452-2; ISO 11452-5;<br>CS-11979, Section 6.2; CS.00054, Section 5.8.2;<br>GMW 3097, Section 3.4.2;<br>EMC-CS-2009.1 (RI114); FMC1278 (RI114); SAE J1113-21;<br>ECE Regulation 10.06 Annex 9 |
| ***Radiated Immunity Magnetic Field*** | ISO 11452-8 |
| ***Radiated Immunity Reverb*** | ISO/IEC 61000-4-21; GMW 3097, Section 3.4.3;<br>EMC-CS-2009.1 (RI114); FMC1278 (RI114);<br>ISO 11452-11 |
| ***Radiated Immunity***<br>*(Portable Transmitters)* | ISO 11452-9;<br>EMC-CS-2009.1 (RI115); FMC1278 (RI115) |
| ***Vehicle Radiated Immunity (ALSE)*** | ISO 11451-2; ECE Regulation 10.06 Annex 6 |
| ***Vehicle Product Specific EMC Standards*** | EN 14982; EN ISO 13309; ISO 13766; EN 50498;<br>EC Regulation No. 2015/208; EN 55012 |
| ***Electrical Loads*** | ISO 16750-2 |
| **Emissions**<br>Radiated and Conducted<br>(3m Semi-anechoic chamber,<br>up to 40 GHz) | 47 CFR, FCC Part 15 B (using ANSI C63.4:2014);<br>47 CFR, FCC Part 18 (using FCC MP-5:1986);<br>ICES-001; ICES-003; ICES-005;<br>IEC/CISPR 11, Ed. 4.1 (2004-06); AS/NZS CISPR 11 (2004);<br>IEC/CISPR 11 Ed 5 (2009-05) + A1 (2010);<br>KN 11 (2008-5) with RRL Notice No. 2008-3 (May 20, 2008);<br>CISPR 11; EN 55011; KS C 9811; CNS 13803 (1997, 2003);<br>CISPR 14-1; EN 55014-1; AS/NZS CISPR 14.1;<br>CISPR 16-2-1 (2008); CISPR 16-2-1; KS C 9814-1; KN 14-1;<br>IEC/CISPR 22 (1997);<br>EN 55022 (1998) + A1(2000);<br>EN 55022 (1998) + A1(2000) + A2(2003); EN 55022 (2006);<br>IEC/CISPR 22 (2008-09); AS/NZS CISPR 22 (2004);<br>AS/NZS CISPR 22, 3rd Edition (2006); KN 22 (up to 6 GHz);<br>CNS 13438 (up to 6 GHz); VCCI V-3 (up to 6 GHz);<br>CISPR 32; EN 55032; KS C 9832; KN 32;<br>ECE Regulation 10.06 Annex 7 (Broadband)<br>ECE Regulation 10.06 Annex 8 (Narrowband)<br>ECE Regulation 10.06 Annex 14 (Conducted) |

| Test Technology: | Test Method(s) [1]: |
|---|---|
| **Emissions (cont'd)** | |
| Cellular Radiated Spurious Emissions | ETSI TS 151 010-1 GSM; 3GPP TS 51.010-1, Sec 12;<br>ETSI TS 134 124 UMTS; 3GPP TS 34.124;<br>ETSI TS 136 124 LTE; E-UTRA; 3GPP TS 36.124 |
| Current Harmonics | IEC 61000-3-2; EN 61000-3-2; KN 61000-3-2;<br>KS C 9610-3-2; ECE Regulation 10.06 Annex 11 |
| Flicker and Fluctuations | IEC 61000-3-3; EN 61000-3-3; KN 61000-3-3;<br>KS C 9610-3-3; ECE Regulation 10.06 Annex 12 |
| **Immunity** | |
| Electrostatic Discharge | IEC 61000-4-2, Ed. 1.2 (2001);<br>IEC 61000-4-2 (1995) + A1(1998) + A2(2000);<br>EN 61000-4-2 (1995); EN 61000-4-2 (2009-05);<br>KN 61000-4-2 (2008-5);<br>RRL Notice No. 2008-4 (May 20, 2008);<br>IEC 61000-4-2; EN 61000-4-2; KN 61000-4-2;<br>KS C 9610-4-2; IEEE C37.90.3 2001 |
| Radiated Immunity | IEC 61000-4-3 (1995) + A1(1998) + A2(2000);<br>IEC 61000-4-3, Ed. 3.0 (2006-02);<br>IEC 61000-4-3, Ed. 3.2 (2010);<br>KN 61000-4-3 (2008-5);<br>RRL Notice No. 2008-4 (May 20, 2008);<br>IEC 61000-4-3; EN 61000-4-3; KN 61000-4-3;<br>KS C 9610-4-3; IEEE C37.90.2 2004 |
| Electrical Fast Transient/Burst | IEC 61000-4-4, Ed. 2.0 (2004-07);<br>IEC 61000-4-4, Ed. 2.1 (2011);<br>IEC 61000-4-4 (1995) + A1(2000) + A2(2001);<br>KN 61000-4-4 (2008-5);<br>RRL Notice No. 2008-5 (May 20, 2008);<br>IEC 61000-4-4; EN 61000-4-4; KN 61000-4-4;<br>KS C 9610-4-4; ECE Regulation 10.06 Annex 15 |
| Surge | IEC 61000-4-5 (1995) + A1(2000);<br>IEC 61000-4-5, Ed 1.1 (2005-11);<br>EN 61000-4-5 (1995) + A1(2001);<br>KN 61000-4-5 (2008-5);<br>RRL Notice No. 2008-4 (May 20, 2008);<br>IEC 61000-4-5; EN 61000-4-5; KN 61000-4-5;<br>KS C 9610-4-5;<br>IEEE C37.90.1 2012; IEEE STD C62.41.2 2002;<br>ECE Regulation 10.06 Annex 16 |

| Test Technology: | Test Method(s) [1]: |
|---|---|
| **Immunity (cont'd)** | |
| Conducted Immunity | IEC 61000-4-6 (1996) + A1(2000);<br>IEC 61000-4-6, Ed 2.0 (2006-05);<br>IEC 61000-4-6 Ed. 3.0 (2008);<br>KN 61000-4-6 (2008-5);<br>RRL Notice No. 2008-4 (May 20, 2008);<br>EN 61000-4-6 (1996) + A1(2001); IEC 61000-4-6;<br>EN 61000-4-6; KN 61000-4-6; KS C 9610-4-6 |
| Power Frequency Magnetic Field Immunity (*Down to 3 A/m*) | IEC 61000-4-8 (1993) + A1(2000); IEC 61000-4-8 (2009);<br>EN 61000-4-8 (1994) + A1(2000);<br>KN 61000-4-8 (2008-5);<br>RRL Notice No. 2008-4 (May 20, 2008);<br>IEC 61000-4-8; EN 61000-4-8; KN 61000-4-8; KS C 9610-4-8 |
| Voltage Dips, Short Interrupts, and Line Voltage Variations | IEC 61000-4-11, Ed. 2 (2004-03);<br>KN 61000-4-11 (2008-5);<br>RRL Notice No. 2008-4 (May 20, 2008);<br>IEC 61000-4-11; EN 61000-4-11; KN 61000-4-11;<br>KS C 9610-4-11 |
| Ring Wave | IEC 61000-4-12, Ed. 2 (2006-09);<br>EN 61000-4-12:2006;<br>IEC 61000-4-12; EN 61000-4-12; KN 61000-4-12;<br>IEEE STD C62.41.2 2002 |
| Generic and Product Specific EMC Standards | IEC/EN 61000-6-1; AS/NZS 61000-6-1; KN 61000-6-1;<br>KS C 9610-6-1; IEC/EN 61000-6-2; AS/NZS 61000-6-2;<br>KN 61000-6-2; KS C 9610-6-2; IEC/EN 61000-6-3;<br>AS/NZS 61000-6-3; KN 61000-6-3; KS C 9610-6-3;<br>IEC/EN 61000-6-4; AS/NZS 61000-6-4; KN 61000-6-4;<br>KS C 9610-6-4; EN 50130-4; EN 61326-1; EN 50121-3-2;<br>EN 12895; EN 50270; EN 50491-1; EN 50491-2; EN 50491-3;<br>EN 55015; EN 60730-1; EN 60945; IEC 60533;<br>EN 61326-2-6; EN 61800-3; IEC/CISPR 14-2; EN 55014-2;<br>AS/NZS CISPR 14.2; KN 14-2; KS C 9814-2;<br>IEC/CISPR 24; AS/NZS CISPR 24; EN 55024; KN 24;<br>IEC/CISPR 35; AS/NZS CISPR 35; EN 55035; KN 35;<br>KS C 9835; IEC 60601-1-2; JIS T0601-1-2 |
| ***TxRx EMC Requirements*** | EN 301 489-1; EN 301 489-3; EN 301 489-9;<br>EN 301 489-17; EN 301 489-19; EN 301 489-20 |

| Test Technology: | Test Method(s) [1]: |
|---|---|
| ***European Radio Test Standards*** | ETSI EN 300 086-1; ETSI EN 300 086-2;<br>ETSI EN 300 113-1; ETSI EN 300 113-2;<br>ETSI EN 300 220-1; ETSI EN 300 220-2;<br>ETSI EN 300 220-3-1; ETSI EN 300 220-3-2;<br>ETSI EN 300 330-1; ETSI EN 300 330-2;<br>ETSI EN 300 440-1; ETSI EN 300 440-2;<br>ETSI EN 300 422-1; ETSI EN 300 422-2;<br>ETSI EN 300 328; ETSI EN 301 893;<br>ETSI EN 301 511; ETSI EN 301 908-1;<br>ETSI EN 908-2; ETSI EN 908-13;<br>ETSI EN 303 413; ETSI EN 302 502;<br>EN 303 340; EN 303 345-2; EN 303 345-3; EN 303 345-4 |
| ***Canadian Radio Tests*** | RSS-102 (RF Exposure Evaluation [MEAS]);<br>RSS-102 (Nerve Stimulation [MEAS]) (5Hz to 400kHz);<br>SPR-002; RSS-111; RSS-112; RSS-117; RSS-119; RSS-123;<br>RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133;<br>RSS-134; RSS-135; RSS-137; RSS-139; RSS-140; RSS-141;<br>RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192;<br>RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210;<br>RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222;<br>RSS-236; RSS-238; RSS-243; RSS-244; RSS-247; RSS-248;<br>RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-GEN |
| ***Mexico Radio Tests*** | IFT-008-2015; NOM-208-SCFI-2016 |
| ***Japan Radio Tests*** | Radio Law No. 131, Ordinance of MPT No. 37, 1981,<br>MIC Notification No. 88:2004, Table No. 22-11;<br>ARIB STD-T66, Regulation 18 |
| ***Taiwan Radio Tests*** | LP-0002 (July 15, 2020) |
| ***Australia/New Zealand Radio Tests*** | AS/NZS 4268; Radiocommunications (Short Range Devices)<br>Standard (2014) |
| ***Hong Kong Radio Tests*** | HKCA 1039 Issue 6; HKCA 1042; HKCA 1033 Issue 7;<br>HKCA 1061; HKCA 1008; HKCA 1043; HKCA 1057;<br>HKCA 1073 |
| ***Korean Radio Test Standards*** | KN 301 489-1; KN 301 489-3; KN 301 489-9;<br>KN 301 489-17; KN 301 489-52; KS X 3124; KS X 3125;<br>KS X 3130; KS X 3126; KS X 3129 |
| ***Vietnam Radio Test Standards*** | QCVN 47:2015/BTTTT; QCVN 54:2020/BTTTT;<br>QCVN 55:2011/BTTTT; QCVN 65:2013/BTTTT;<br>QCVN 73:2013/BTTTT; QCVN 74:2020/BTTTT;<br>QCVN 112:2017/BTTTT; QCVN 117:2020//BTTTT |
| ***Vietnam EMC Test Standards*** | QCVN 18:2014/BTTTT; QCVN 86:2019/BTTTT;<br>QCVN 96:2015/BTTTT; QCVN 118:2018/BTTTT |

| Test Technology: | Test Method(s) [1]: |
|---|---|
| ***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 (using ANSI/TIA-603-E, TIA-102.CAAA-E, ANSI C63.26:2015) |
| ***OTA (Over the Air) Performance***<br>GSM, GPRS, EGPRS<br>UMTS (W-CDMA)<br>LTE including CAT M1<br>A-GPS for UMTS/GSM<br>LTS A-GPS, A-GLONASS, SIB8/SIB16<br>Large Device/Laptop/Tablet Testing<br>Integrated Device Testing<br>WiFi 802.11 a/b/g/n/a | CTIA Test Plan for Wireless Device Over-the-Air Performance (Method for Measurement for Radiated Power and Receiver Performance) V3.8.2;<br>CTIA Test Plan for RF Performance Evaluation of WiFi Mobile Converged Devices V2.1.0 |
| ***Electrical Measurements and Simulation***<br>AC Voltage / Current<br>(1mV to 5kV) 60 Hz<br>(0.1V to 250V) up to 500 MHz<br>(1μA to 150A) 60 Hz<br>DC Voltage / Current<br>(1mV to 15 kV) / (1μA to 10A)<br>Power Factor / Efficiency / Crest Factor<br>(Power to 30kW)<br>Resistance<br>(1mΩ to 4000MΩ)<br>Surge<br>(Up to 10 kV / 5 kA) (Combination Wave and Ring Wave) | FAA AC 150/5345-10H<br>FAA AC 150/5345-43J<br>FAA AC 150/5345-44K<br>FAA AC 150/5345-46E<br>FAA AC 150/5345-47C<br>FAA EB 67D |

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, edition, version, etc. is not identified in the scope of accreditation, laboratories may use the version that immediately precedes the current version for a period of one year from the date of publication of the standard measurement method, per part C., Section 1 of A2LA *R101 - General Requirements- Accreditation of ISO-IEC 17025 Laboratories*.

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

| Rule Subpart/Technology | Test Method | Maximum Frequency (MHz) |
|---|---|---|
| Unintentional Radiators<br>Part 15B | ANSI C63.4:2014 | 40000 |
| Industrial, Scientific, and Medical Equipment<br>Part 18 | FCC MP-5 (February 1986) | 40000 |
| Intentional Radiators<br>Part 15C | ANSI C63.10:2013 | 40000 |
| Unlicensed Personal Communication Systems Devices<br>Part 15D | ANSI C63.17:2013 | 40000 |
| U-NII without DFS Intentional Radiators<br>Part 15E | ANSI C63.10:2013 | 40000 |
| U-NII with DFS Intentional Radiators<br>Part 15E | FCC KDB 905462 D02 (v02) | 40000 |
| UWB Intentional Radiators<br>Part 15F | ANSI C63.10:2013 | 40000 |
| BPL Intentional Radiators<br>Part 15G | ANSI C63.10:2013 | 40000 |
| White Space Device Intentional Radiators<br>Part 15H | ANSI C63.10:2013 | 40000 |
| Commercial Mobile Services (FCC Licensed Radio Service Equipment)<br>Parts 22 (cellular), 24, 25 (below 3 GHz), and 27 | ANSI/TIA-603-E;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000 |
| General Mobile Radio Services (FCC Licensed Radio Service Equipment)<br>Parts 22 (non-cellular), 90 (below 3 GHz), 95, 97, and 101 (below 3 GHz) | ANSI/TIA-603-E;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000 |
| Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment)<br>Part 96 | ANSI/TIA-603-E;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000 |

Testing Activities Performed in Support of FCC 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) |
|---|---|---|
| Maritime and Aviation Radio Services | | |
| Parts 80 and 87 | ANSI/TIA-603-E;<br>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;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000 |
| Broadcast Radio Services | | |
| Parts 73 and 74 (below 3 GHz) | ANSI/TIA-603-E;<br>TIA-102.CAAA-E;<br>ANSI C63.26:2015 | 40000 |
| Signal Boosters | | |
| Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters)<br>Section 90.219 | ANSI C63.26:2015 | 40000 |

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

# Accredited Laboratory

A2LA has accredited

## ELITE ELECTRONIC ENGINEERING INC.

*Downers Grove, IL*

for technical competence in the field of

## Electrical Testing

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

Presented this 19th day of May 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1786.01
Valid to June 30, 2023

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