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# *EMC Test Report*

## *Application for FCC Grant of Equipment Authorization*
## *Canada Certification*

## *FCC Part 15 Subpart C*

## *Model: SmartStand w/ passive pipette accessories*

| | |
|---|---|
| IC CERTIFICATION #: | 22074-SSSCSB1 |
| FCC ID: | 2AJ5V-SS-SCSB1 |
| APPLICANT: | Mettler-Toledo International, GmbH<br>IM Langacher 44<br>Greifensee 8606 Switzerland |
| TEST SITE(S): | National Technical Systems - Silicon Valley<br>41039 Boyce Road.<br>Fremont, CA. 94538-2435 |
| IC SITE REGISTRATION #: | 2845B-3 |
| REPORT DATE: | November 16, 2016 |
| RE-ISSUED DATE: | December 14, 2016 |
| FINAL TEST DATES: | September 16 and 21, 2016 |
| TOTAL NUMBER OF PAGES: | 33 |

PROGRAM MGR /
TECHNICAL REVIEWER:

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A2LA ACCREDITED
Testing Cert #0214.26

## REVISION HISTORY

| Rev# | Date | Comments | Modified By |
|---|---|---|---|
| - | November 16, 2016 | First release | |
| 1 | December 14, 2016 | Corrected FCC and IC IDs. Added more detail about the operation of the EUT during testing. | dwb |

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## SCOPE

An electromagnetic emissions test has been performed on the Mettler-Toledo International, GmbH model SmartStand w/ passive pipette accessories, pursuant to the following rules:

RSS 210 Issue 9 "License-Exempt Radio Apparatus: Category I Equipment"
FCC Part 15 Subpart C

Using the methods from:

RSS-Gen Issue 4 "General Requirements for Compliance of Radio Apparatus"
ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in National Technical Systems - Silicon Valley test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

## OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

## STATEMENT OF COMPLIANCE

The tested sample of Mettler-Toledo International, GmbH model SmartStand w/ passive pipette accessories complied with the requirements of the following regulations:

RSS-Gen Issue 4 "General Requirements for Compliance of Radio Apparatus"
RSS 210 Issue 9 "License-Exempt Radio Apparatus: Category I Equipment"
FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of Mettler-Toledo International, GmbH model SmartStand w/ passive pipette accessories and therefore apply only to the tested sample. The sample was selected and prepared by Richard Hill of Mettler-Toledo International, GmbH.

## DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

## TEST RESULTS SUMMARY

### GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

| FCC Rule Part | RSS Rule part | Description | Measured Value / Comments | Limit / Requirement | Result (margin) |
|---|---|---|---|---|---|
| 15.203 | - | RF Connector | Integral Antenna | Unique or integral antenna required | Complies |
| 15.209 | RSS-GEN Tables 4 & 5 | Radiated Emissions | 8.80 dBµV/m @ 0.125 MHz (-16.9 dB) | Refer to page 17 | Complies |
| 15.207 | RSS-Gen Table 3 | AC Conducted Emissions | 37.7dBµV @ 17.56MHz (-12.3dB) | Refer to page 16 | Complies |
| - | RSS-Gen 8.4 | User Manual | In Manual | Statement for all products | Complies |
| - | RSP-100 RSS-Gen 6.6 | Occupied Bandwidth | 26.5 kHz | Information only | N/A |

### MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

| Measurement Type | Measurement Unit | Frequency Range | Expanded Uncertainty |
|---|---|---|---|
| Radiated emission (field strength) | dBµV/m | 0.009 to 1000 MHz | ± 3.6 dB |
| | | 1000 to 40000 MHz | ± 6.0 dB |
| Conducted Emissions (AC Power) | dBµV | 0.15 to 30 MHz | ± 2.4 dB |

## EQUIPMENT UNDER TEST (EUT) DETAILS

### GENERAL

The Mettler-Toledo International, GmbH model SmartStand w/ passive pipette accessories is a pipette charging stand that is designed to charge electronic pipettes and read the passive_rfid tags enclosed within electronic and manual pipettes. Since the EUT would be placed on a tabletop during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT power adapter input is 100-240 Volts, 50/60 Hz, 0.8 Amps. The EUT input is rated 5VDC, 4A.

The sample was received on September 16, 2016 and tested on September 16 and 21, 2016. The EUT consisted of the following component(s):

| Company | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Mettler-Toledo International, GmbH | SmartStand | Passive Pipette Stand | T1-003 | 2AJ5VV-SS-SCSB1 |

### OTHER EUT DETAILS

The following EUT details should be noted: The SmartStand uses RFID operating at 125 kHz to communicate with the pipettes. Data obtained from the pipettes can be sent to via Bluetooth or USB to a connected computer.

### ANTENNA SYSTEM

The antenna system consists of low frequency coil.

### ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 33 cm wide by 13 cm deep by 33 cm high.

### MODIFICATIONS

No modifications were made to the EUT in order to comply with the emission specifications.

***SUPPORT EQUIPMENT***

The following equipment was used as support equipment for testing:

| Company | Model | Description | Serial Number |
|---|---|---|---|
| PhiHong | PSAA20R-050L6 | AC/DC Adapter | - |
| Hewlett Packard | Probook 6570b | Laptop | 5CB2480TRQ |
| Hewlett Packard | PPP009C | AC Adapter | F120881329021487 |
| Rainin | E4 XLS | Mettler Toledo | A1553909U |

No remote support equipment was used during testing.

***EUT INTERFACE PORTS***

The I/O cabling configuration during testing was as follows:

| Port | | Cable(s) | | |
|---|---|---|---|---|
| From | To | Description | Shielded/Unshielded | Length(m) |
| DC Power In | AC/DC Adapter | 2wire | Unshielded | 0.6 |
| USB | Computer | multiconductor | Shielded | 1 |

The AC input of the power adapter was connected to the mains using an extension cable.

***EUT OPERATION***

During emissions testing the EUT was constantly sending RFID transmissions looking for pipettes. There are 4 RFID radios and antennas. Only one RFID radio operates at a time as they cycle through each position in the stand looking for a pipette in each location. It was sending any pipette data via Bluetooth to a PC except during bandwidth measurements.

## TEST SITE

### GENERAL INFORMATION

Final test measurements were taken at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with industry Canada.

| Site | Designation / Registration Numbers | | Location |
|---|---|---|---|
| | FCC | Canada | |
| Chamber 3 | US0027 | 2845B-3 | 41039 Boyce Road<br>Fremont,<br>CA 94538-2435 |

ANSI C63.4 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4.

### CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.10. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

### RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4.

## MEASUREMENT INSTRUMENTATION

### RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

### INSTRUMENT CONTROL COMPUTER

Software is used to view and convert receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers. The software used for radiated and conducted emissions measurements is NTS EMI Test Software (rev 2.10)

### LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

### FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

### ANTENNAS

A loop antenna is used below 30 MHz. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

### ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.10 specifies that the test height above ground for table mounted devices shall be 80 centimeters for testing below 1 GHz. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor as specified in ANSI C63.4. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

### INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

## TEST PROCEDURES

### EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.10, and the worst-case orientation is used for final measurements.

### CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

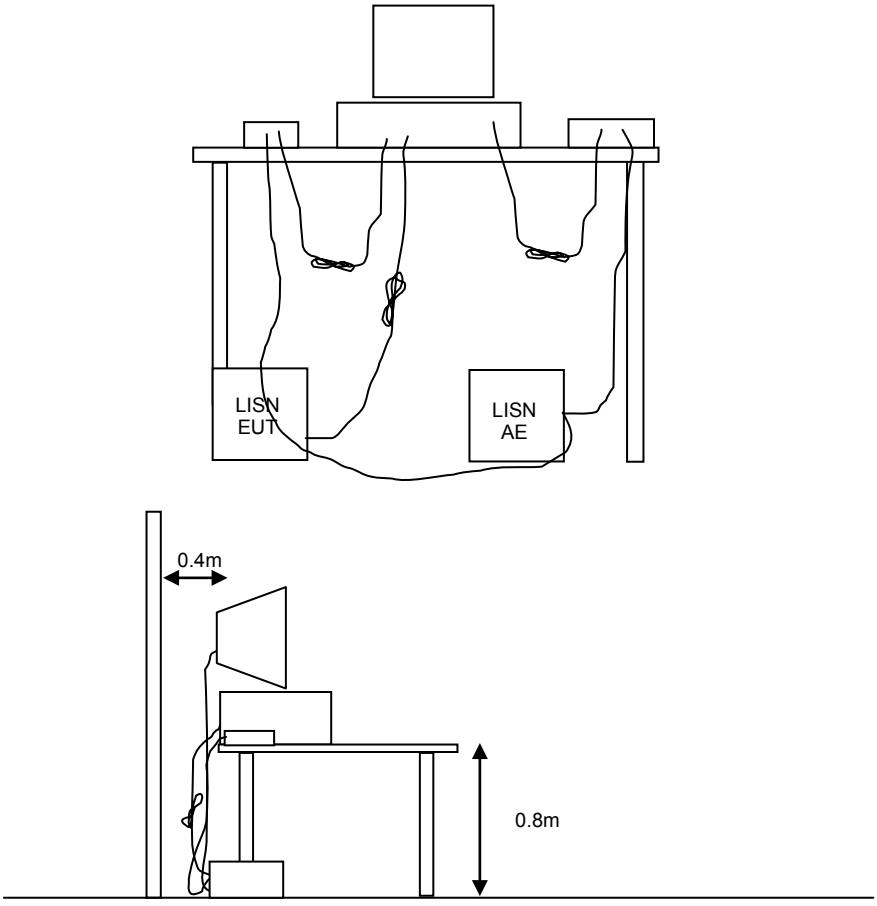
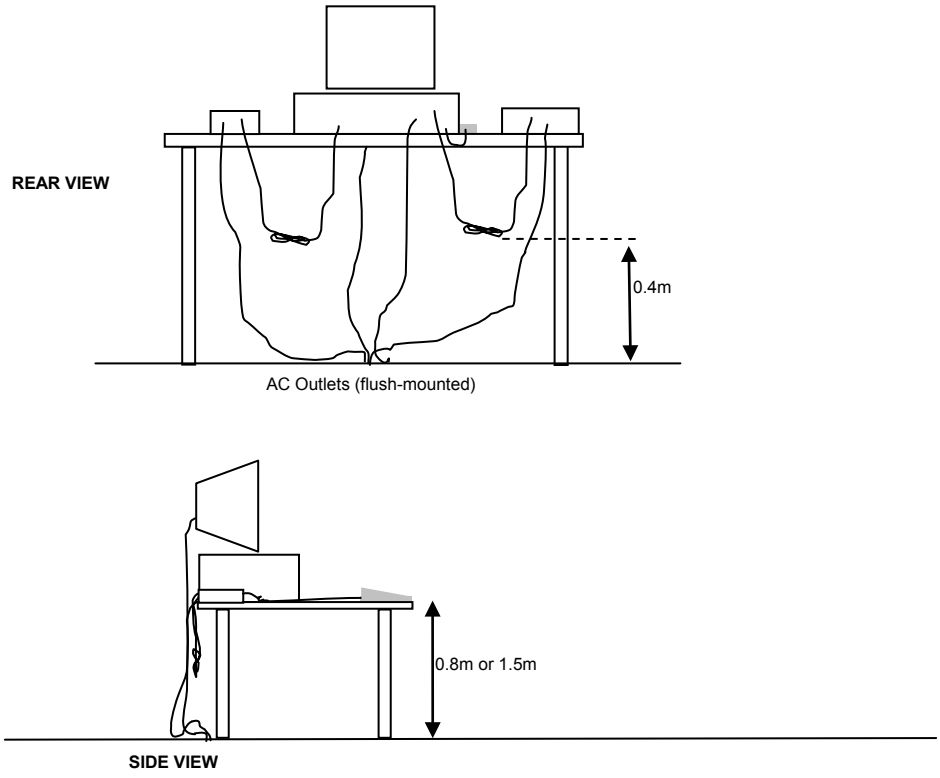



**Figure 1 Typical Conducted Emissions Test Configuration**

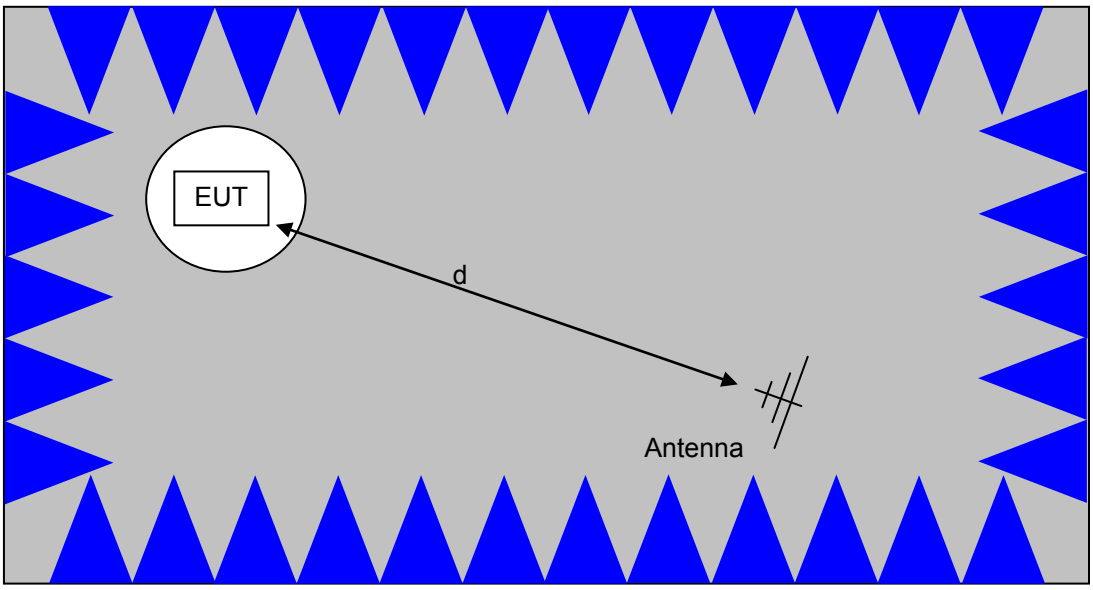
***RADIATED EMISSIONS***

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

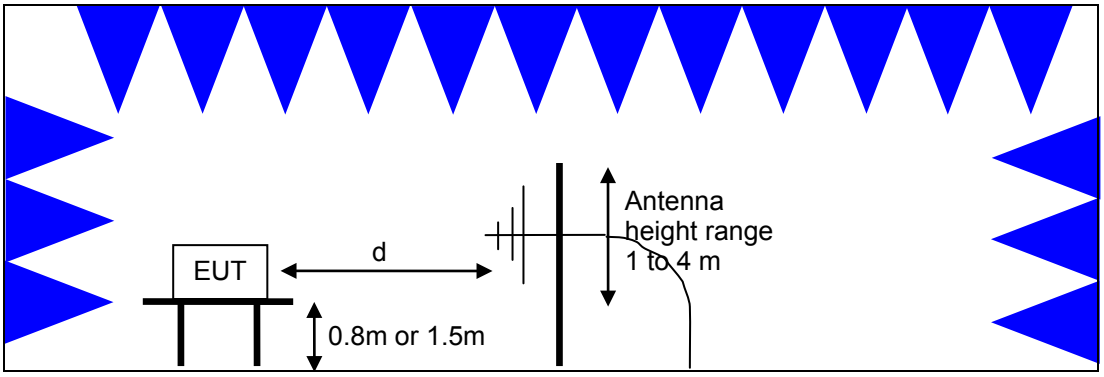



Typical Test Configuration for Radiated Field Strength Measurements




The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation and VSWR requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.




Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

***BANDWIDTH MEASUREMENTS***

The 6dB, 20dB, 26dB and/or 99% signal bandwidth are measured using the bandwidths recommended by ANSI C63.10 and RSS GEN.

***SPECIFICATION LIMITS AND SAMPLE CALCULATIONS***

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

***CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN***

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

| Frequency (MHz) | Average Limit (dBuV) | Quasi Peak Limit (dBuV) |
|---|---|---|
| 0.150 to 0.500 | Linear decrease on logarithmic frequency axis between 56.0 and 46.0 | Linear decrease on logarithmic frequency axis between 66.0 and 56.0 |
| 0.500 to 5.000 | 46.0 | 56.0 |
| 5.000 to 30.000 | 50.0 | 60.0 |

***GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS***

The table below shows the general limits for transmitters[1].

| Frequency Range (MHz) | Limit (uV/m) | Limit (dBuV/m @ 3m) |
|---|---|---|
| 0.009-0.490 | $2400/F_{KHz}$ @ 300m | $67.6-20*\log_{10}(F_{KHz})$ @ 300m |
| 0.490-1.705 | $24000/F_{KHz}$ @ 30m | $87.6-20*\log_{10}(F_{KHz})$ @ 30m |
| 1.705 to 30 | 30 @ 30m | 29.5 @ 30m |
| 30 to 88 | 100 @ 3m | 40 @ 3m |
| 88 to 216 | 150 @ 3m | 43.5 @ 3m |
| 216 to 960 | 200 @ 3m | 46.0 @ 3m |
| Above 960 | 500 @ 3m | 54.0 @ 3m |

[1] All bands including the restricted bands as detailed in FCC 15.205 and RSS-Gen Table 6

***SAMPLE CALCULATIONS - CONDUCTED EMISSIONS***

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:
$R_r$ = Receiver Reading in dBuV
S = Specification Limit in dBuV
M = Margin to Specification in +/- dB

***SAMPLE CALCULATIONS - RADIATED EMISSIONS***

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:
$F_d$ = Distance Factor in dB
$D_m$ = Measurement Distance in meters
$D_s$ = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:
$R_r$ = Receiver Reading in dBuV/m
$F_d$ = Distance Factor in dB
$R_c$ = Corrected Reading in dBuV/m
$L_s$ = Specification Limit in dBuV/m
M = Margin in dB Relative to Spec

# Appendix A Test Equipment Calibration Data

| Manufacturer | Description | Model | Asset # | Calibrated | Cal Due |
|---|---|---|---|---|---|
| **Radiated Emissions, 0.1 - 30 MHz, 16-Sep-16** | | | | | |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-7 GHz | ESIB7 | 1756 | 6/29/2016 | 6/29/2017 |
| EMCO | Magnetic Loop Antenna, 9 kHz-30 MHz | AL-130 | 3003 | 8/9/2016 | 8/9/2018 |
| **Conducted Emissions - AC Power Ports, 16-Sep-16** | | | | | |
| Rohde & Schwarz | Pulse Limiter | ESH3 Z2 | 1401 | 4/26/2016 | 4/26/2017 |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-7 GHz | ESIB7 | 1756 | 6/29/2016 | 6/29/2017 |
| Com-Power | 9KHz-30MHz, 50uH, 15Aac, 10Adc, max CISPR 15 | LI-215A | 2671 | 7/1/2016 | 7/1/2017 |
| Com-Power | 9KHz-30MHz, 50uH, 15Aac, 10Adc, max CISPR 15 | LI-215A | 2672 | 7/13/2016 | 6/26/2017 |
| **Antenna Port, 21-Sep-16** | | | | | |
| Agilent Technologies | PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX, | E4446A | 2139 | 6/24/2016 | 6/24/2017 |

# *Appendix B Test Data*

T102805 Pages 21 – 32

| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Product | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| System Configuration: | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Emissions Standard(s): | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | A |
| Immunity Standard(s): | KN61000-6-2, KN61326-1, KN301 489-1, -3, -17 | Environment: | Radio Commercial |

# EMC Test Data

For The

# Rainin Instruments

Product

SmartStand with Passive Pipette Accessories

Date of Last Test: 11/14/2016

| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | N/A |

# Radiated Emissions and Bandwidth

## Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

## General Test Configuration

The EUT was located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

## Ambient Conditions:

| | |
|---|---|
| Temperature: | 21 °C |
| Rel. Humidity: | 45 % |

## Summary of Results

| Run # | Test Performed | Limit | Result | Value / Margin |
|---|---|---|---|---|
| 2 | Transmitter Fundamental and Radiated Spurious Emissions, 0.01 - 30 MHz | FCC 15.209<br>RSS 210 4.4 | Pass | 8.80 dBµV/m @ 0.125 MHz (-16.9 dB) |
| 3 | 99% Bandwidth | RSS-GEN | Pass | 26.5 kHz |

## Modifications Made During Testing

No modifications were made to the EUT during testing

## Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | N/A |

Run #1: Preliminary Radiated Emissions, 0.01-30 MHz, Fundamental and Transmitter Spurious Emissions

Date of Test: 9/16/2016
Test Engineer: David Bare
Test Location: Fremont Chamber #3

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

| Frequency Range | Test Distance | Limit Distance | Extrapolation Factor |
|---|---|---|---|
| 0.01 - 30 MHz | 10 | 300 | -59.1 |
| 0.01 - 30 MHz | 3 | 300 | -80.0 |

Note: The field strength of any spurious emissions may not exceed the field strength of the fundamental signal.

| Frequency | Level | Pol | RSS-210 / FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 0.125 | 0.4 | Open | 25.7 | -25.3 | Peak | 110 | 1.0 | Measured at 10 m |
| 0.250 | -25.1 | Open | 19.6 | -44.7 | Peak | 110 | 1.0 | Measured at 3 m (Noise floor) |
| 0.375 | -4.0 | Open | 16.1 | -20.1 | Peak | 110 | 1.0 | Measured at 3 m |
| 0.375 | -20.9 | Closed | 16.1 | -37.0 | Peak | 110 | 1.0 | Measured at 3 m |
| 0.125 | -11.1 | Closed | 25.7 | -36.8 | Peak | 110 | 1.0 | Measured at 10 m |
| 0.500 | 12.3 | Open | 33.6 | -21.3 | Peak | 110 | 1.0 | Measured at 3 m (Noise floor) |
| 0.500 | 12.4 | Closed | 33.6 | -21.2 | Peak | 110 | 1.0 | Measured at 3 m (Noise floor) |
| 0.626 | 22.7 | Open | 31.7 | -9.0 | Peak | 135 | 1.0 | Measured at 3 m |

| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | N/A |

Run #2: Maximized Readings - Fundamental and Transmitter Spurious Emissions, 0.01 - 30 MHz

Date of Test: 9/16/2016 Config. Used: 1
Test Engineer: David Bare Config Change: None
Test Location: Fremont Chamber #3 EUT Voltage: 120V/60Hz

| Frequency Range | Test Distance | Limit Distance | Extrapolation Factor |
|---|---|---|---|
| 0.01 - 30 MHz | 10 | 300 | -59.1 |
| 0.01 - 30 MHz | 3 | 300 | -80.0 |

Fundamental Field Strength

| Frequency | Level | Pol | RSS-210 / FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | Open | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 0.125 | 0.4 | Open | 25.7 | -25.3 | Avg | 110 | 1.0 | Measured at 10 m |
| 0.125 | 8.8 | Open | 25.7 | -16.9 | Avg | 110 | 1.0 | Measured at 3 m |

Spurious Emissions

| Frequency | Level | Pol | RSS-210 / FCC 15.209 | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 0.250 | -25.1 | Open | 19.6 | -44.7 | Avg | 110 | 1.0 | Measured at 3 m (Noise floor) |
| 0.375 | -10.0 | Open | 16.1 | -26.1 | Avg | 110 | 1.0 | Measured at 3 m |
| 0.375 | -20.9 | Closed | 16.1 | -37.0 | Avg | 110 | 1.0 | Measured at 3 m |
| 0.626 | 8.1 | Open | 31.7 | -23.6 | QP | 135 | 1.0 | Measured at 3 m |

| | |
|---|---|
| Note 1: | QP detector used except peak and average detectors used from 10-90 kHz and 110-490 kHz . |

| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | N/A |

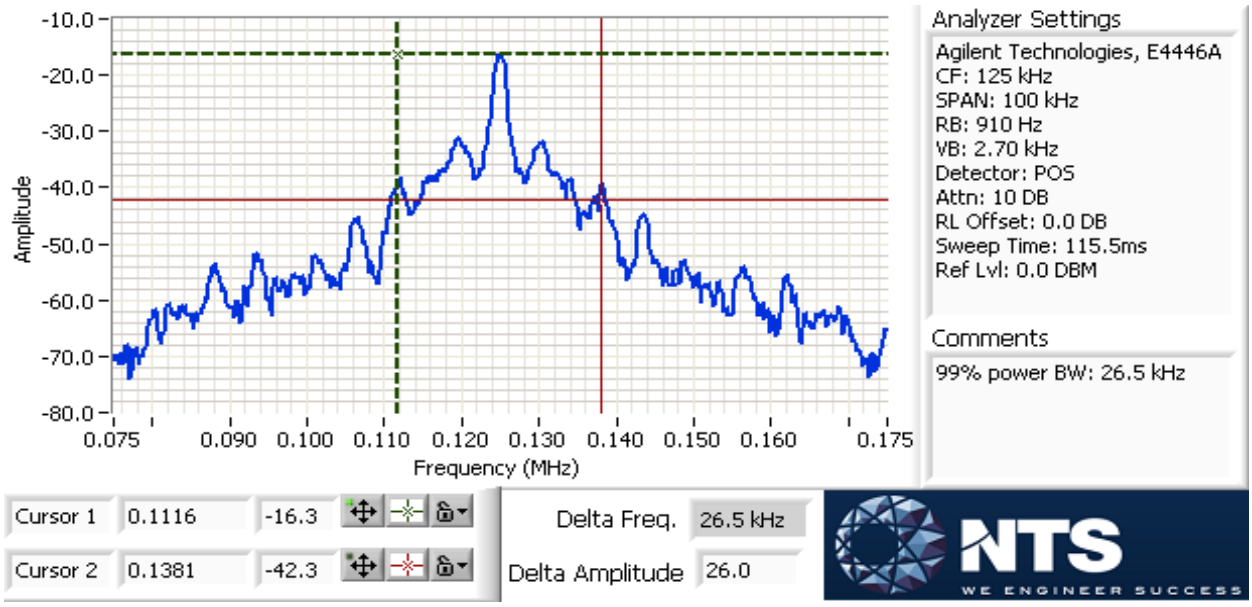
Run #3: Bandwidth Measurement(s)

Date of Test: 9/21/2016
Test Engineer: David Bare
Test Location: Fremont EMC Lab #4A

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

| Power Setting | Frequency (MHz) | Resolution Bandwidth | Video Bandwidth | Bandwidth (kHz) 99% |
|---|---|---|---|---|
| Max | 0.125 | 910 Hz | 2.7 kHz | 26.5 |

| | |
|---|---|
| Note 1: | 99% bandwidth measured in accordance with ANSI C63.10, with RB between 1% and 5% of the measured bandwidth and VB ≥ 3*RB and Span ≥ 1.5% and ≤ 5% of measured bandwidth. |



| | | | |
|---|---|---|---|
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| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | A |

# Conducted Emissions

*(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)*

## Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 9/16/2016
Test Engineer: Mehran Birgani
Test Location: Chamber #3
Config. Used: 1
Config Change: -
EUT Voltage: Refer to Run

## General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Any cables running to remote support equipment where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

## Ambient Conditions:

Temperature: 24-26 °C
Rel. Humidity: 35-40 %

## Summary of Results

| Run # | Test Performed | Limit | Result | Margin |
|---|---|---|---|---|
| Bluetooth and USB both Active | | | | |
| 1 | CE, AC Power, 220V/60Hz | Class B | Pass | 33.3dBµV @ 15.69MHz (-16.7dB) |
| 2 | CE, AC Power,120V/60Hz | Class B | Pass | 37.7dBµV @ 17.56MHz (-12.3dB) |
| 3 | CE, AC Power,230V/50Hz | Class B | Pass | 36.5dBµV @ 17.55MHz (-13.5dB) |

## Modifications Made During Testing

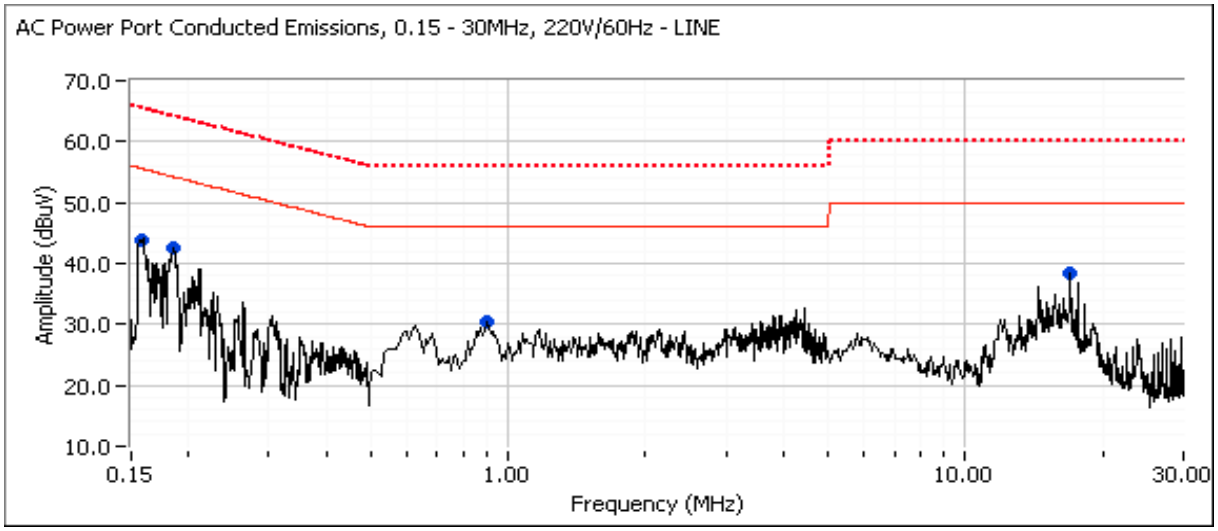
No modifications were made to the EUT during testing

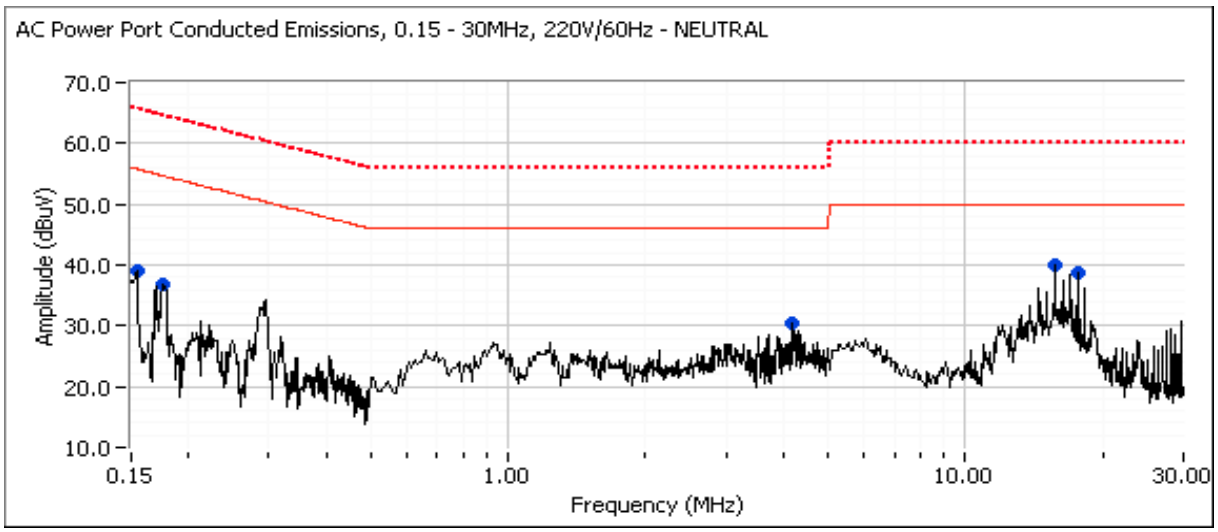
## Deviations From The Standard

No deviations were made from the requirements of the standard.

| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | A |

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 220V/60Hz



| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | A |

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 220V/60Hz

Class B required by EN 301 489-1

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

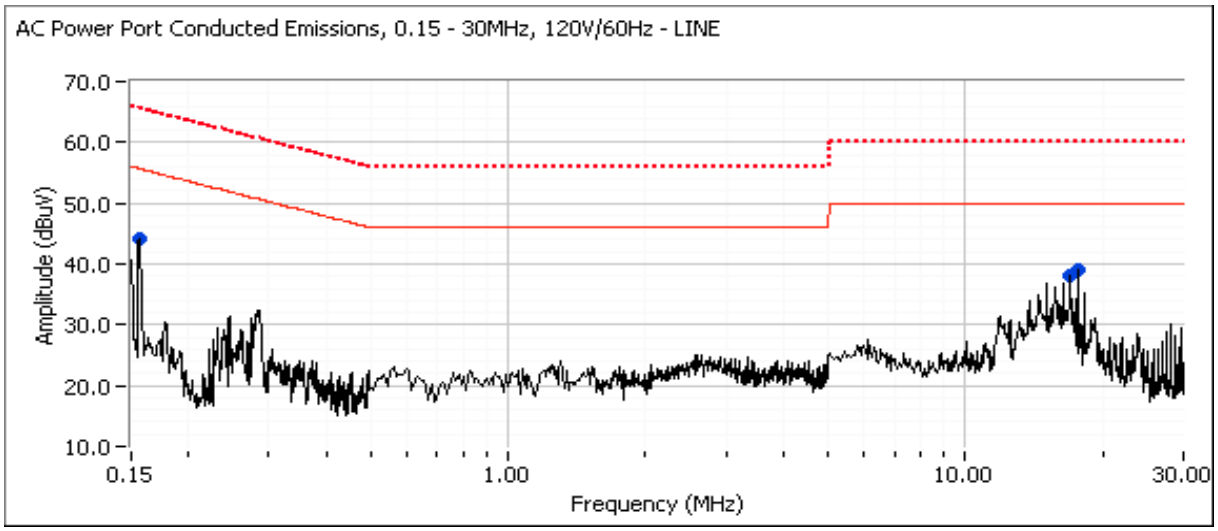
| Frequency | Level | AC | Class B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 15.694 | 40.0 | Neutral | 50.0 | -10.0 | Peak | |
| 17.569 | 38.8 | Neutral | 50.0 | -11.2 | Peak | |
| 0.156 | 43.9 | Line | 55.5 | -11.6 | Peak | |
| 0.184 | 42.5 | Line | 54.2 | -11.7 | Peak | |
| 16.945 | 38.3 | Line | 50.0 | -11.7 | Peak | |
| 0.899 | 30.5 | Line | 46.0 | -15.5 | Peak | |
| 4.224 | 30.4 | Neutral | 46.0 | -15.6 | Peak | |
| 0.154 | 38.9 | Neutral | 55.8 | -16.9 | Peak | |
| 0.174 | 36.8 | Neutral | 54.7 | -17.9 | Peak | |

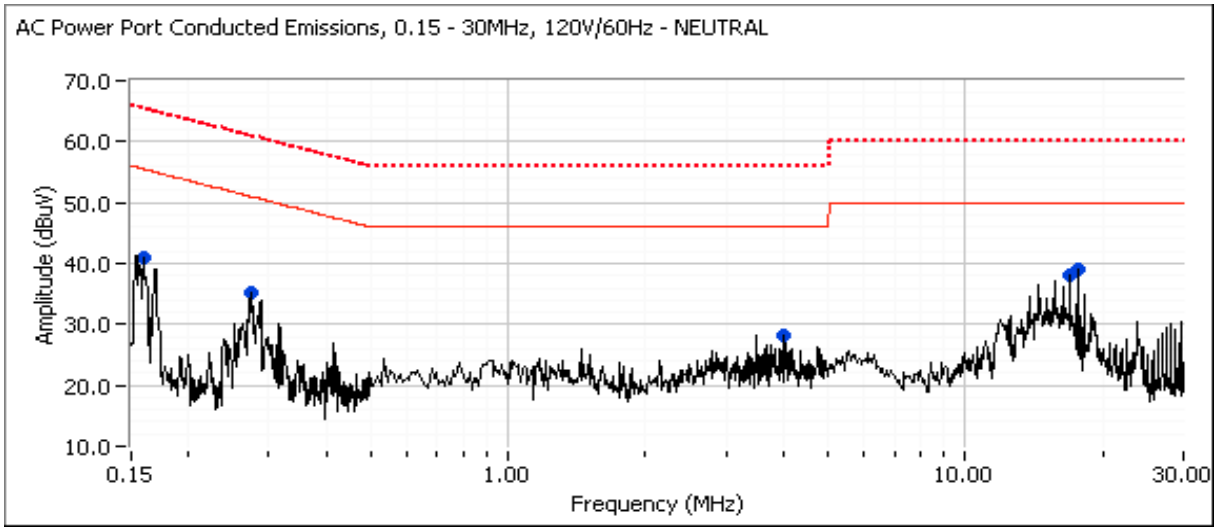
Final quasi-peak and average readings

| Frequency | Level | AC | Class B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 15.694 | 33.3 | Neutral | 50.0 | -16.7 | AVG | AVG (0.10s) |
| 16.945 | 32.9 | Line | 50.0 | -17.1 | AVG | AVG (0.10s) |
| 0.156 | 42.7 | Line | 65.7 | -23.0 | QP | QP (1.00s) |
| 16.945 | 36.8 | Line | 60.0 | -23.2 | QP | QP (1.00s) |
| 0.174 | 41.3 | Neutral | 64.8 | -23.5 | QP | QP (1.00s) |
| 15.694 | 36.5 | Neutral | 60.0 | -23.5 | QP | QP (1.00s) |
| 4.224 | 21.1 | Neutral | 46.0 | -24.9 | AVG | AVG (0.10s) |
| 0.184 | 38.0 | Line | 64.3 | -26.3 | QP | QP (1.00s) |
| 0.899 | 19.5 | Line | 46.0 | -26.5 | AVG | AVG (0.10s) |
| 0.899 | 28.4 | Line | 56.0 | -27.6 | QP | QP (1.00s) |
| 0.156 | 27.7 | Line | 55.7 | -28.0 | AVG | AVG (0.10s) |
| 4.224 | 27.4 | Neutral | 56.0 | -28.6 | QP | QP (1.00s) |
| 17.569 | 21.3 | Neutral | 50.0 | -28.7 | AVG | AVG (0.10s) |
| 0.184 | 24.9 | Line | 54.3 | -29.4 | AVG | AVG (0.10s) |
| 0.174 | 24.3 | Neutral | 54.8 | -30.5 | AVG | AVG (0.10s) |
| 0.154 | 33.3 | Neutral | 65.8 | -32.5 | QP | QP (1.00s) |
| 17.569 | 27.0 | Neutral | 60.0 | -33.0 | QP | QP (1.00s) |
| 0.154 | 16.8 | Neutral | 55.8 | -39.0 | AVG | AVG (0.10s) |

| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | A |

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz



| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
| | | Project Manager: | Christine Krebill |
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | A |

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

| Frequency | Level | AC | Class B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 17.557 | 39.1 | Neutral | 50.0 | -10.9 | Peak | |
| 17.556 | 39.0 | Line | 50.0 | -11.0 | Peak | |
| 0.158 | 44.0 | Line | 55.7 | -11.7 | Peak | |
| 16.926 | 38.1 | Neutral | 50.0 | -11.9 | Peak | |
| 16.926 | 38.0 | Line | 50.0 | -12.0 | Peak | |
| 0.159 | 41.0 | Neutral | 55.5 | -14.5 | Peak | |
| 0.273 | 35.1 | Neutral | 51.0 | -15.9 | Peak | |
| 4.025 | 28.3 | Neutral | 46.0 | -17.7 | Peak | |

Final quasi-peak and average readings

| Frequency | Level | AC | Class B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 17.556 | 37.7 | Line | 50.0 | -12.3 | AVG | AVG (0.10s) |
| 17.557 | 36.0 | Neutral | 50.0 | -14.0 | AVG | AVG (0.10s) |
| 16.926 | 35.9 | Neutral | 50.0 | -14.1 | AVG | AVG (0.10s) |
| 16.926 | 34.2 | Line | 50.0 | -15.8 | AVG | AVG (0.10s) |
| 0.158 | 47.5 | Line | 65.6 | -18.1 | QP | QP (1.00s) |
| 17.556 | 38.8 | Line | 60.0 | -21.2 | QP | QP (1.00s) |
| 17.557 | 38.2 | Neutral | 60.0 | -21.8 | QP | QP (1.00s) |
| 0.159 | 43.4 | Neutral | 65.5 | -22.1 | QP | QP (1.00s) |
| 16.926 | 37.7 | Neutral | 60.0 | -22.3 | QP | QP (1.00s) |
| 16.926 | 36.6 | Line | 60.0 | -23.4 | QP | QP (1.00s) |
| 0.158 | 29.7 | Line | 55.6 | -25.9 | AVG | AVG (0.10s) |
| 0.159 | 26.8 | Neutral | 55.5 | -28.7 | AVG | AVG (0.10s) |
| 0.273 | 16.4 | Neutral | 51.0 | -34.6 | AVG | AVG (0.10s) |
| 0.273 | 26.3 | Neutral | 61.0 | -34.7 | QP | QP (1.00s) |
| 4.025 | 10.5 | Neutral | 46.0 | -35.5 | AVG | AVG (0.10s) |
| 4.025 | 16.9 | Neutral | 56.0 | -39.1 | QP | QP (1.00s) |

| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
| Model: | SmartStand with Passive Pipette Accessories | T-Log Number: | T102805 |
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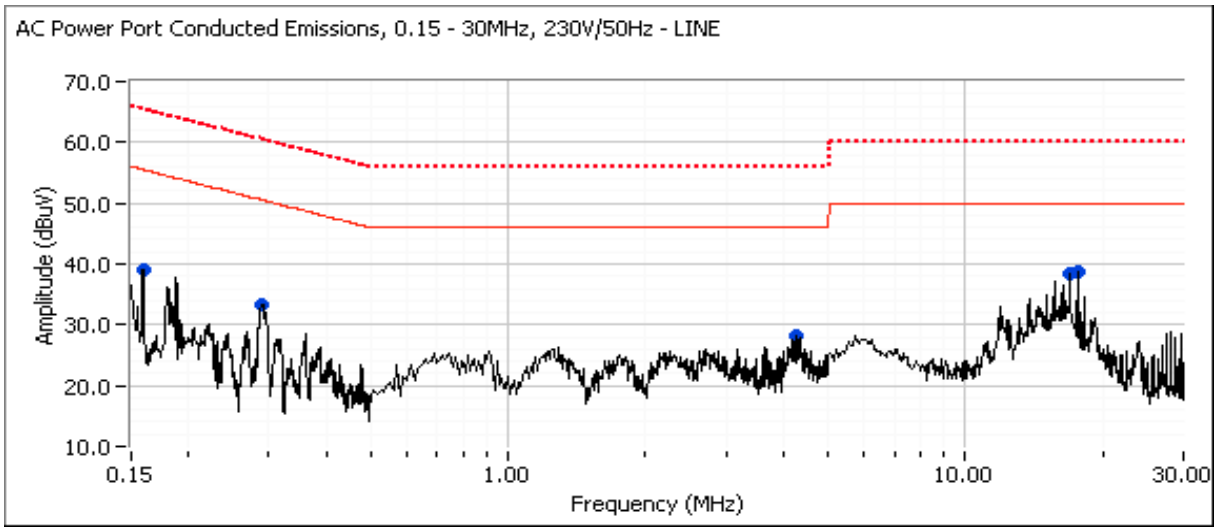
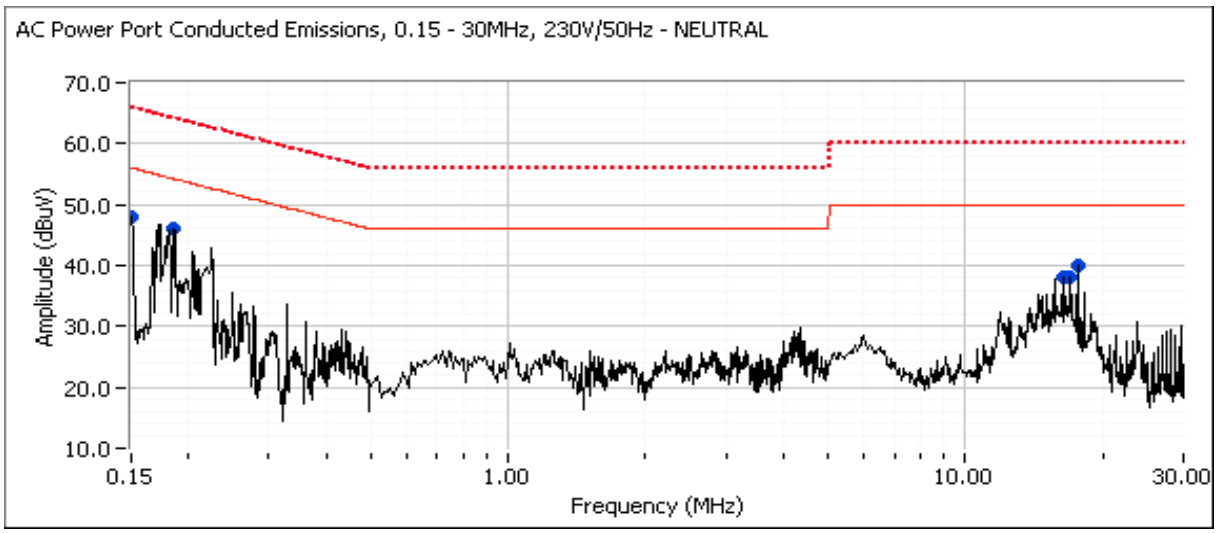
| Contact: | Richard Hill | Project Coordinator: | Kimberly Bailey |
| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | A |

Run #3: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz



| | | | |
|---|---|---|---|
| Client: | Rainin Instruments | Job Number: | JD102672 |
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| Standard: | FCC Part 15B/ICES-003, EN 61326-1, EN 300 330-1, EN 301 489-1/-3(RFID)/-17(BT), KN 11 & KN 301 489-1/-3(RFID)/-17(BT) | Class: | A |

Run #3: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

| Frequency | Level | AC | Class B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 0.150 | 47.9 | Neutral | 56.0 | -8.1 | Peak | |
| 0.186 | 46.1 | Neutral | 54.2 | -8.1 | Peak | |
| 17.552 | 39.9 | Neutral | 50.0 | -10.1 | Peak | |
| 17.553 | 38.7 | Line | 50.0 | -11.3 | Peak | |
| 16.940 | 38.5 | Line | 50.0 | -11.5 | Peak | |
| 16.925 | 38.1 | Neutral | 50.0 | -11.9 | Peak | |
| 16.297 | 38.0 | Neutral | 50.0 | -12.0 | Peak | |
| 0.158 | 39.1 | Line | 55.5 | -16.4 | Peak | |
| 0.291 | 33.4 | Line | 50.5 | -17.1 | Peak | |
| 4.276 | 28.1 | Line | 46.0 | -17.9 | Peak | |

Final quasi-peak and average readings

| Frequency | Level | AC | Class B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 17.552 | 36.5 | Neutral | 50.0 | -13.5 | AVG | AVG (0.10s) |
| 17.553 | 35.2 | Line | 50.0 | -14.8 | AVG | AVG (0.10s) |
| 16.925 | 35.0 | Neutral | 50.0 | -15.0 | AVG | AVG (0.10s) |
| 16.297 | 34.6 | Neutral | 50.0 | -15.4 | AVG | AVG (0.10s) |
| 17.552 | 39.2 | Neutral | 60.0 | -20.8 | QP | QP (1.00s) |
| 17.553 | 38.4 | Line | 60.0 | -21.6 | QP | QP (1.00s) |
| 0.186 | 42.3 | Neutral | 64.2 | -21.9 | QP | QP (1.00s) |
| 16.925 | 37.8 | Neutral | 60.0 | -22.2 | QP | QP (1.00s) |
| 0.291 | 27.8 | Line | 50.5 | -22.7 | AVG | AVG (0.10s) |
| 4.276 | 19.1 | Line | 46.0 | -26.9 | AVG | AVG (0.10s) |
| 16.940 | 21.7 | Line | 50.0 | -28.3 | AVG | AVG (0.10s) |
| 4.276 | 27.4 | Line | 56.0 | -28.6 | QP | QP (1.00s) |
| 0.186 | 25.0 | Neutral | 54.2 | -29.2 | AVG | AVG (0.10s) |
| 0.291 | 31.1 | Line | 60.5 | -29.4 | QP | QP (1.00s) |
| 0.158 | 34.1 | Line | 65.6 | -31.5 | QP | QP (1.00s) |
| 16.940 | 28.3 | Line | 60.0 | -31.7 | QP | QP (1.00s) |
| 16.297 | 27.2 | Neutral | 60.0 | -32.8 | QP | QP (1.00s) |
| 0.158 | 21.7 | Line | 55.6 | -33.9 | AVG | AVG (0.10s) |
| 0.150 | 27.0 | Neutral | 66.0 | -39.0 | QP | QP (1.00s) |
| 0.150 | 9.1 | Neutral | 56.0 | -46.9 | AVG | AVG (0.10s) |

***End of Report***

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