

Global EMC Inc. Labs EMC & RF Test Report

As per

RSS 210 Issue 8

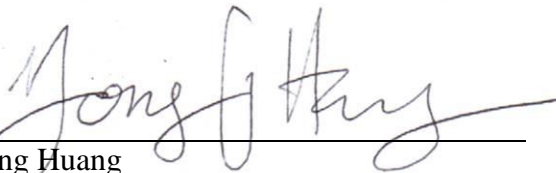
&

FCC Part 15 Subpart C

Unlicensed Intentional Radiators

on the

Kaba RFID Encoder



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Testing produced for

KABA®

See Appendix A for full customer & EUT details.




| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

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| Product | Kaba RFID Encoder | |
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Report Scope

This report addresses the EMC verification testing and test results of the Kaba RFID Encoder, herein referred to as EUT (Equipment Under Test) performed at Global EMC Labs.

The EUT was tested for compliance against the following standards:


RSS 210 Issue 8/ FCC Part 15 Subpart C 15

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report.

The results contained in this report relate only to the item(s) tested.

This report does not imply product endorsement by A2LA or any other accreditation agency, any government, or Global EMC Inc.


Opinions/interpretations expressed in this report, if any, are outside the scope of Global EMC Inc accreditation. Any opinions expressed do not necessarily reflect the opinions of Global EMC Inc, unless otherwise stated.

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|-------------|---|---|
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| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Summary

The results contained in this report relate only to the item(s) tested.


| | |
|--|--------------------------------|
| EUT FCC Certification #, FCC ID: | Q8SRFIDENC1 |
| EUT Industry Canada Certification #, IC: | 4652A- RFIDENC1 |
| EUT Passed all tests performed. | Yes (see test results summary) |
| Tests conducted by | Yong Huang |

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Test Results Summary

| Standard/Method | Description | Class/Limit | Result |
|---------------------------------|--|----------------------|---------------------------|
| FCC 15.203 | Antenna Requirement | Unique | Pass See Justification |
| FCC 15.205 RSS 210 (Table 1) | Restricted Bands for intentional operation | QuasiPeak Average | Pass |
| FCC 15.207 | Power line conducted emissions | QuasiPeak Average | Pass See Justification |
| FCC 15.209 RSS-210 (Table 2) | Intentional / Spurious Radiated emissions | QuasiPeak Average | Pass |
| Overall Result | | | PASS |

If the product as tested or otherwise complies with the specification, the EUT is deemed to comply with the requirement and is deemed a 'PASS' grade. If not 'FAIL' grade will be issued. Note that 'PASS' / 'FAIL' grade is independent of any measurement uncertainties. A 'PASS' / 'FAIL' grade within measurement uncertainty is marked with a '*'.

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Justifications, Descriptions, or Deviations

The following justifications for tests not performed or deviations from the above listed specifications apply:

For the Antenna requirement specified in FCC 15.203 (RSS 210 section 5.5), this device is designed with an integral antenna or proprietary antenna connector which meets the requirements of FCC 15.203.

For the Restricted Bands of operation as specified in FCC 15.205, the EUT is designed to only operate at 13.56 MHz

For the scope of this test report, radiated testing of the EUT was pre-scanned in three orthogonal axis to maximize emissions. Maximum emissions were found in the vertical EUT position. This setup was used for all testing in this report.


For the power line conducted emissions requirements, the EUT is DC powered, and this test is performed with a power supply provided by customer.

As per customer's instruction, the EUT has two possible mutually exclusive DC inputs. Configurations with both DC voltage inputs were pre-scanned individually, and no difference in emissions was observed, and the worse case was presented in this report.

Peripherals were as supplied and designated by the client.


A later revision of the standard may have been substituted in place of the previous dated referenced revision. The year of the specification used are listed under applicable standards. Using the later revision accomplishes the goal of ensuring compliance to the intent of the previous specification, while allowing the laboratory to incorporate the extensions and clarifications made available by a later revision.

No deviations are recorded.

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Applicable Standards, Specifications and Methods

- ANSI C63.4:2009 - Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
- CFR 47 FCC 15:2013 - Code of Federal Regulations – Radio Frequency Devices
- CISPR 22:2008 - Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
- ICES-003:2012 - Digital Apparatus - Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard
- ISO 17025:2005 - General Requirements for the competence of testing and calibration laboratories
- RSS 210:2010 - Issue 8: Spectrum Management and Telecommunications Policy. Radio Standards Specification Low Power Licence-Exempt Radio communication Devices

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Sample calculation(s)

Margin = limit – (received signal + antenna factor + cable loss – pre-amp gain)


Margin = 50.5dBuV/m – (50dBuV + 10dB + 2.5dB – 20dB)

Margin = 8.5 dB

Document Revision Status

Revision 1 - First released on the 23th, Mar. 2015

Revision 2 - 2nd revision released on 13th, Apr. 2015. Modification made as per TCB's request.

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Definitions and Acronyms

The following definitions and acronyms are applicable in this report.
See also ANSI C63.14.

AE – Auxillary Equipment.

BW – Bandwidth. Unless otherwise stated, this is refers to the 6 dB bandwidth.

EMC – Electro-Magnetic Compatibility

EMI – Electro-Magnetic Immunity


EUT – Equipment Under Test

ITE – Information Technology Equipment with a primary function(s) of entry, storage, display, retrieval, transmission, processing, switching, or control, of data.

LISN – Line impedance stabilization network

NCR – No Calibration Required

RF – Radio Frequency


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Testing Facility

Testing for EMC on the EUT was carried out at Global EMC labs in Montréal, Québec, Canada. The testing lab consists of a 3m semi-anechoic chamber calibrated to be able to allow measurements on an EUT with a maximum width or length of up to 2m and height up to 3m. The chamber is equipped with a turn table that is capable of testing devices up to 3300lb in weight. This facility is capable of testing products that are rated for 120 Vac and 240Vac single phase, or 208 Vac 3 phase input. DC capability is also available. The chamber is equipped with an antenna mast that controls polarization and height from the control room adjoining the shielded chamber. Radiated emissions measurements are performed using a Bilog, and Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN.

Calibrations and Accreditations


The measurement site used is registered with Federal Communications Commission (FCC, 382292) and Industry Canada (IC, 6844B-1). This site is calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”. The semi-anechoic chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. All measuring equipment is calibrated on an annual or bi-annual basis as listed for each respective test.

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Testing Environmental Conditions and Dates

Following were the environmental conditions in the facility during time of testing –

| Date | Test | Init. | Temperature (°C) | Humidity (%) | Pressure (kPa) |
|--------------|-------------|--------------|-----------------------------|---------------------|---------------------------|
| Feb. 12 2015 | All | YH | 20-25°C | 30-45% | 100 -103kPa |

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Detailed Test Results Section

| | | |
|-------------|---|---|
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Power Line Conducted Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT's power line does not exceed the limits listed below as defined in the applicable test standard, as measured from a LISN. This helps protect lower frequency radio services such as AM radio, shortwave radio, amateur radio operators, maritime radio, CB radio, and so on, from unwanted interference.

Limits & Method

The limits are as defined in 47 CFR FCC Part 15 Section 15.207


Method is as defined in ANSI C63.4:2009

| Average Limits | | QuasiPeak Limits | |
|-------------------|---------------|-------------------|---------------|
| 150 kHz – 500 kHz | 56 to 46 dBuV | 150 kHz – 500 kHz | 66 to 56 dBuV |
| 500 kHz – 5 MHz | 46 dBuV | 500 kHz – 5 MHz | 56 dBuV |
| 5 MHz – 30 MHz | 50 dBuV | 500 kHz – 30 MHz | 60 dBuV |

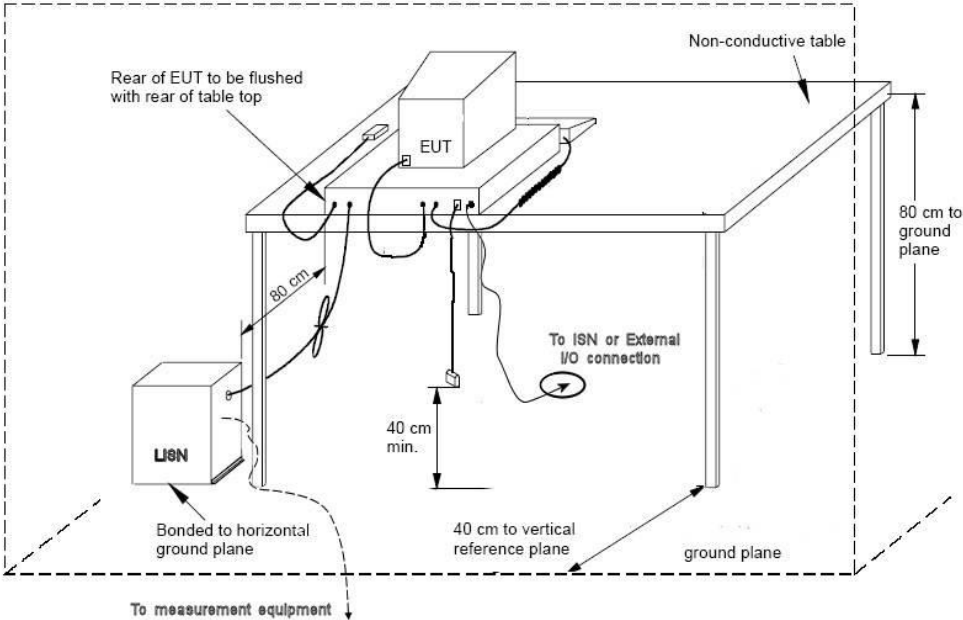
The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

Note: If the Peak or Quasi Peak detector measurements do not exceed the Average limits, then the EUT is deemed to have passed the requirements.


Both limits are applicable, and each is specified as being measured with a 9 kHz measurement bandwidth .

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Typical Setup Diagram



Note: The vertical reference plane is optional as per ANSI C63.4 section 5.2.2


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Measurement Uncertainty

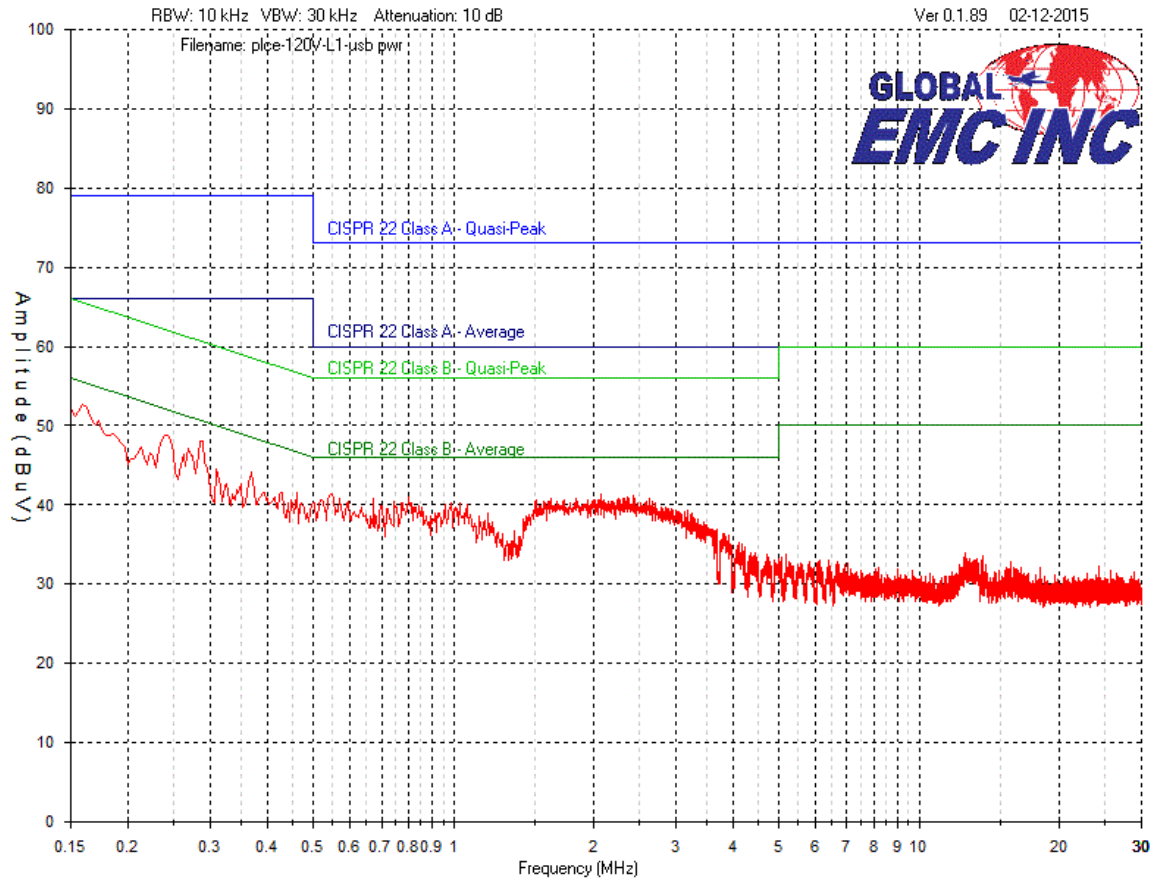
The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is +/-3.6 dB with a 'k=2' coverage factor and a 95% confidence level.


Preliminary Graphs

Note the graphs shown below are for graphical illustration only. For final measurements with the appropriate detector where applicable, please refer to the table. The graph shown below is a peak measurement graph, measured with a resolution bandwidth greater than or equal to the final required detector. These graphs are performed as a worst case measurement to enable the detection of frequencies of concern and for considerable time savings.

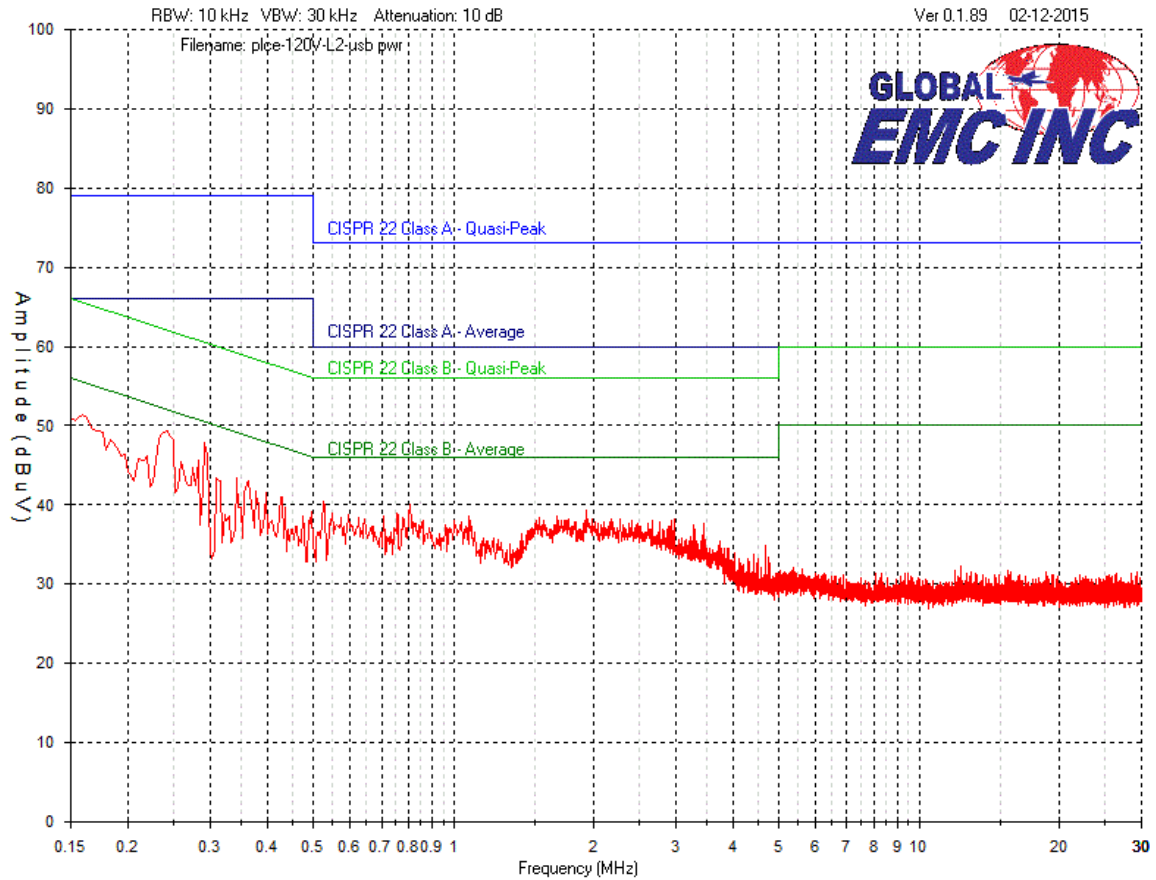
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Phase (Black/Brown)



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Neutral (White/Blue)



| | | |
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Final Measurements


Peak Emissions vs. Average Limit Table - Line 1 – 120Vac/60Hz

| Test Frequency (MHz) | Det. mode | Received signal (dBµV) | Attenuator (dB) | Cable loss (dB) | LISN factor (dB) | Emission Level (dBµV) | Emission limit (dBµV) | Margin (dB) | Result |
|----------------------|-----------|------------------------|-----------------|-----------------|------------------|-----------------------|-----------------------|-------------|--------|
| 0.16 | PEAK | 41.2 | 10 | 0 | 1.4 | 52.6 | 55.5 | 2.9 | PASS |
| 2.0737 | PEAK | 31.2 | 10 | 0.1 | 0.2 | 41.5 | 46 | 4.5 | PASS |
| 3.8315 | PEAK | 26.1 | 10 | 0.1 | 0.2 | 36.4 | 46 | 9.6 | PASS |
| 4.1101 | PEAK | 25.0 | 10 | 0.1 | 0.2 | 35.3 | 46 | 10.7 | PASS |
| 12.5676 | PEAK | 23.5 | 10 | 0.2 | 0.3 | 34.0 | 50 | 16.0 | PASS |
| 5.6424 | PEAK | 20.8 | 10 | 0.1 | 0.2 | 31.1 | 50 | 18.9 | PASS |

Peak Emissions vs. Average Limit Table - Line 2 – 120Vac/60Hz

| Test Frequency (MHz) | Det. mode | Received signal (dBµV) | Attenuator (dB) | Cable loss (dB) | LISN factor (dB) | Emission Level (dBµV) | Emission limit (dBµV) | Margin (dB) | Result |
|----------------------|-----------|------------------------|-----------------|-----------------|------------------|-----------------------|-----------------------|-------------|--------|
| 0.2429 | PEAK | 38.6 | 10 | 0 | 0.8 | 49.4 | 52 | 2.6 | PASS |
| 0.2926 | PEAK | 37.3 | 10 | 0 | 0.5 | 47.8 | 50.5 | 2.7 | PASS |
| 0.16 | PEAK | 40.0 | 10 | 0 | 1.4 | 51.4 | 55.5 | 4.1 | PASS |
| 0.5248 | PEAK | 30.3 | 10 | 0 | 0.2 | 40.5 | 46 | 5.5 | PASS |
| 0.3623 | PEAK | 32.8 | 10 | 0 | 0.3 | 43.1 | 48.7 | 5.6 | PASS |
| 0.3424 | PEAK | 33.1 | 10 | 0 | 0.4 | 43.5 | 49.1 | 5.6 | PASS |


Note: See ‘Appendix B – EUT & Test Setup Photographs’ for photos showing the test set-up for the highest line conducted emission

| | | |
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Test Equipment List

| Equipment | Model No. | Manufacturer | Last calibration date | Next calibration due date | Asset# |
|---------------------------|-------------------------|--------------|-----------------------|---------------------------|--------|
| HP Spectrum Analyzer | 8566B | HP | 1-28-15 | 1-28-17 | 4169 |
| Spectrum Analyzer Display | 8566B | HP | 1-28-15 | 1-28-17 | 4168 |
| Quasi Peak Adapter | 85650A | HP | 1-28-15 | 1-28-17 | 4170 |
| LISN | FCC-LISN-50/250-16-2-01 | FCC | 2013-05-06 | 2015-05-06 | 4005 |
| RF Cable 7m | LMR-400-7M-50OHM-MN-MN | LexTec | Verified 2013-04-02 | 2015-04-02 | 4025 |
| RF Cable 1m | LMR-400-1M-50OHM-MN-MN | LexTec | Verified 2013-04-02 | 2015-04-02 | 4026 |
| Attenuator 10 dB | FP-50-10 | Trilithic | Verified 2013-04-02 | 2015-04-02 | 4027 |
| Emission software | 0.1.87 | Global EMC | NCR | NCR | 58 |

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class A_Rev1"

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Radiated Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the limits listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect broadcast radio services such as television, FM radio, pagers, cellular telephones, emergency services, and so on, from unwanted interference.

Limit(s) and Method

The method is as defined in ANSI C63.4

The limits are as defined in FCC Part 15, Section 15.209:

0.009 MHz – 0.490 MHz, 2400/F(kHz) uV/m at 300 m⁴

0.490 MHz – 1.705 MHz, 24000/F(kHz) uV/m at 30 m⁴

1.705 MHz – 30 MHz, 30 uV/m at 30 m⁴

30 MHz – 88 MHz, 100 uV/m (40.0 dBuV/m¹) at 3 m

88 MHz – 216 MHz, 150 uV/m (43.5 dBuV/m¹) at 3 m

216 MHz – 960 MHz, 200 uV/m (46.0 dBuV/m¹) at 3 m

Above 960 MHz, 500 uV/m (54.0 dBuV/m¹) at 3 m

Above 1000 MHz, 500 uV/m (54 dBuV/m²) at 3m


Above 1000 MHz, 5000 uV/m (74 dBuV/m³) at 3m

¹Limit is with 120 kHz measurement bandwidth and a using a Quasi Peak detector.

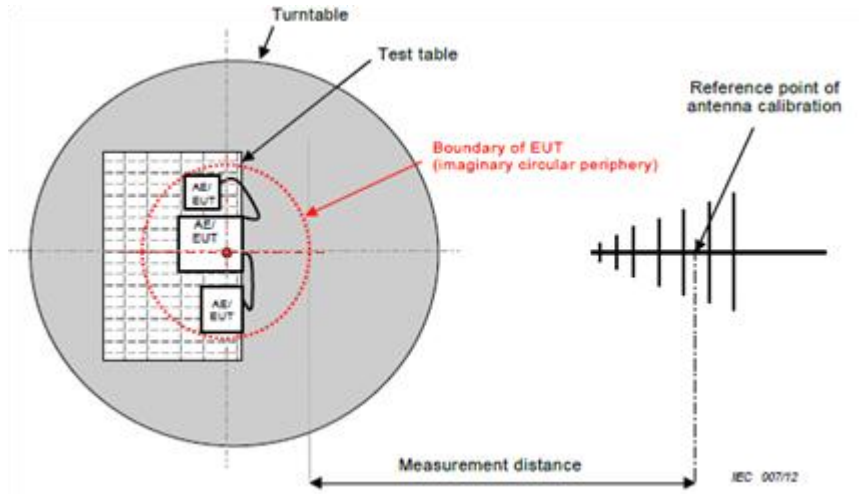
²Limit is with 1 MHz measurement bandwidth and using an Average detector

³Limit is with 1 MHz measurement bandwidth and using an Peak detector


⁴Limit is with using a Quasi-peak detector with a bandwidth as defined in CISPR 16-1-1

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Typical Radiated Emissions Setup



As per ANSI C63.4, Magnetic field measurements are made in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna, positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop is 1 m above the ground.

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Measurement Uncertainty


The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is +/-4.4 dB with a 'k=2' coverage factor and a 95% confidence level.

Preliminary Graphs

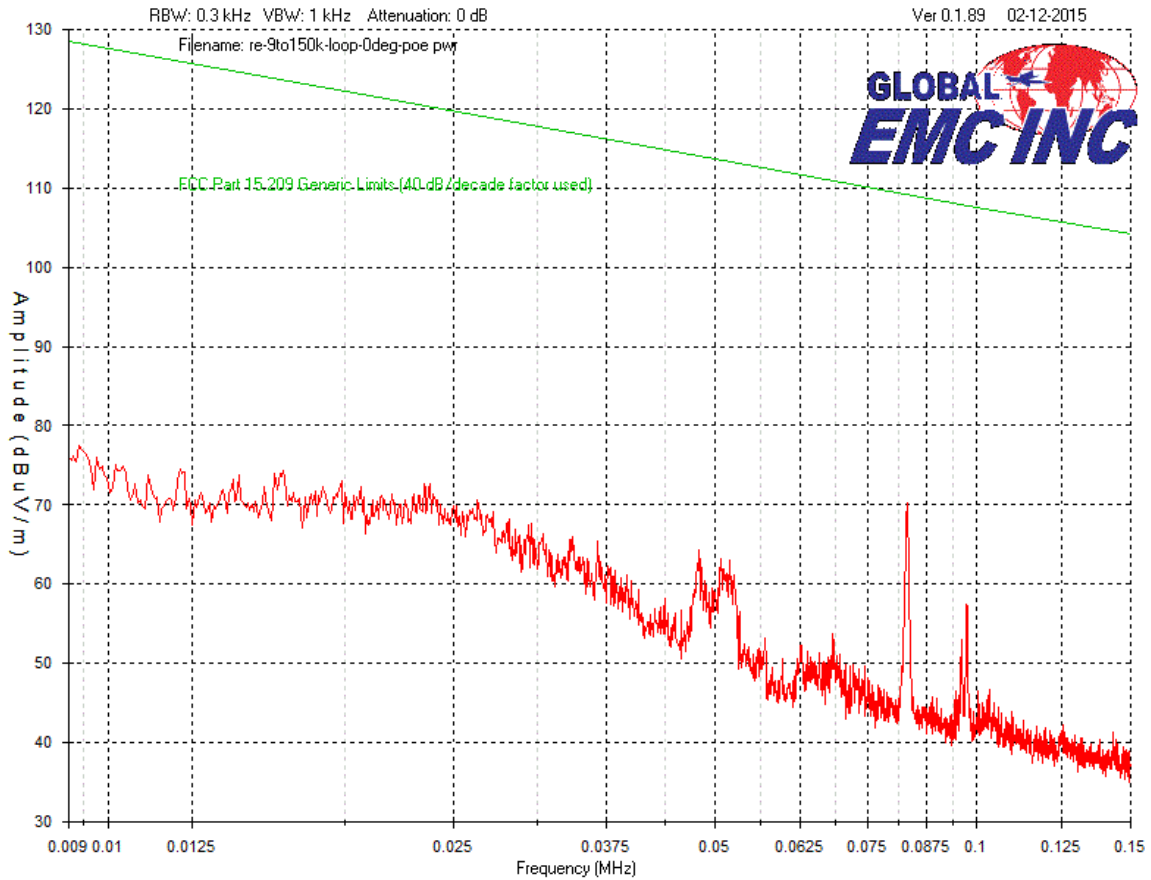
Note the graphs shown below are for graphical illustration only. For final measurements with the appropriate detector, please refer to the final measurement table where applicable. The graph shown below is a maximized peak measurement graph, measured with a resolution bandwidth greater than the final required detector and over a full 0-360 rotation. This peaking process is done as a worst case measurement. This process enables the detection of frequencies of concern for final measurement, and provides considerable time savings. Final measurements are performed over a full 0-360 degrees rotation and 1 – 4 meter height of measurement antenna.


In accordance with FCC Part 15, Subpart A, Section 15.33, the device was scanned to the 10th harmonic (a minimum of a 1 GHz).

Devices scanned above 1GHz may be scanned at a closer test distance, and in accordance with FCC Part 15, Subpart A, Section 15.31, an extrapolation factor of 20 dB/decade was used above 30 MHz, and 40 dB/decade below 30 MHz.

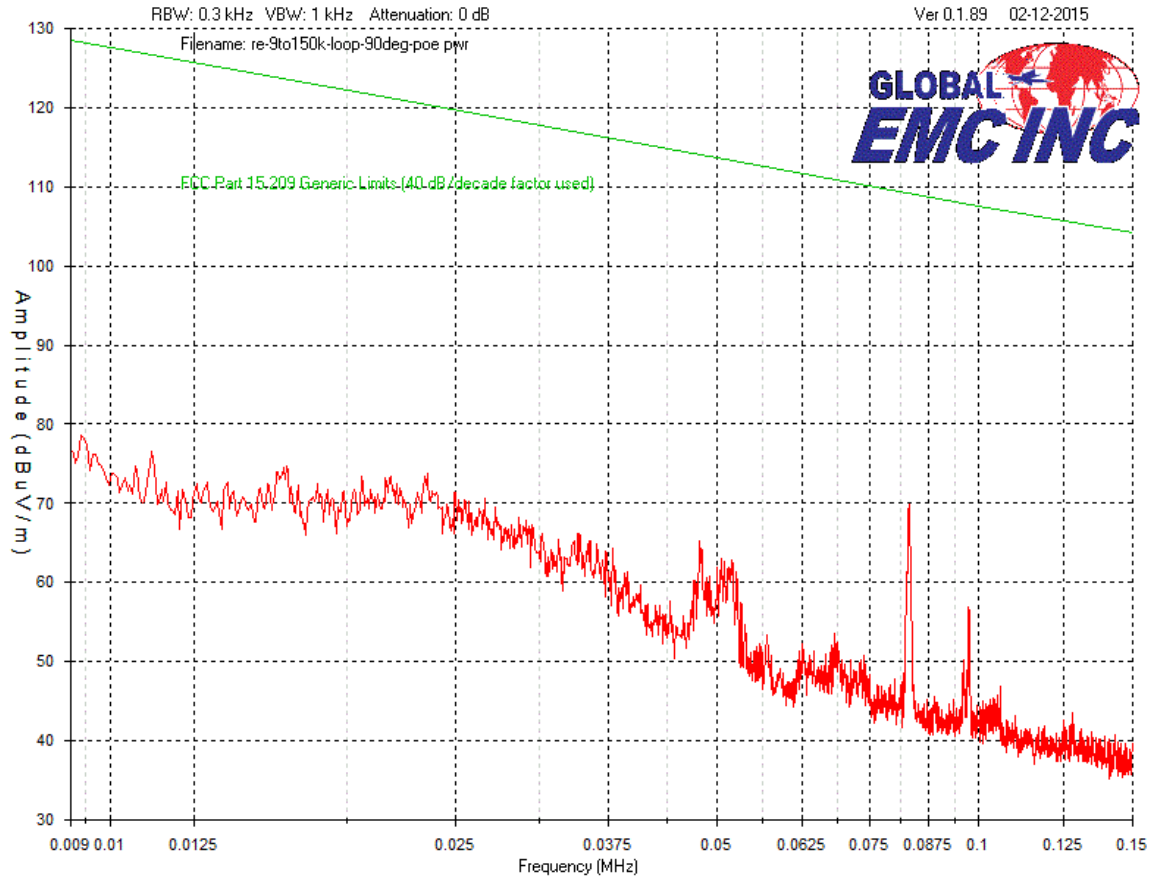
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9 kHz to 150 kHz – Loop @ 0 degree



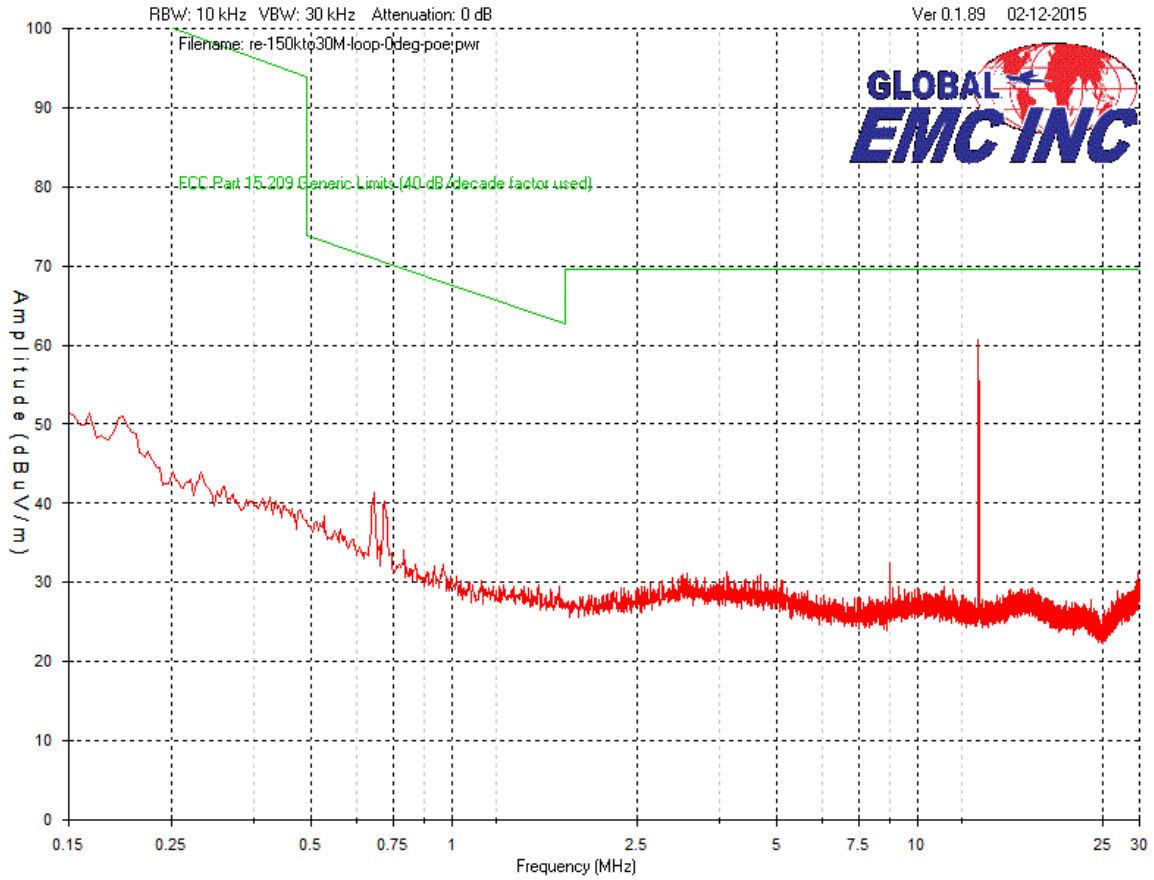
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9 kHz to 150 kHz – Loop @ 90 degree



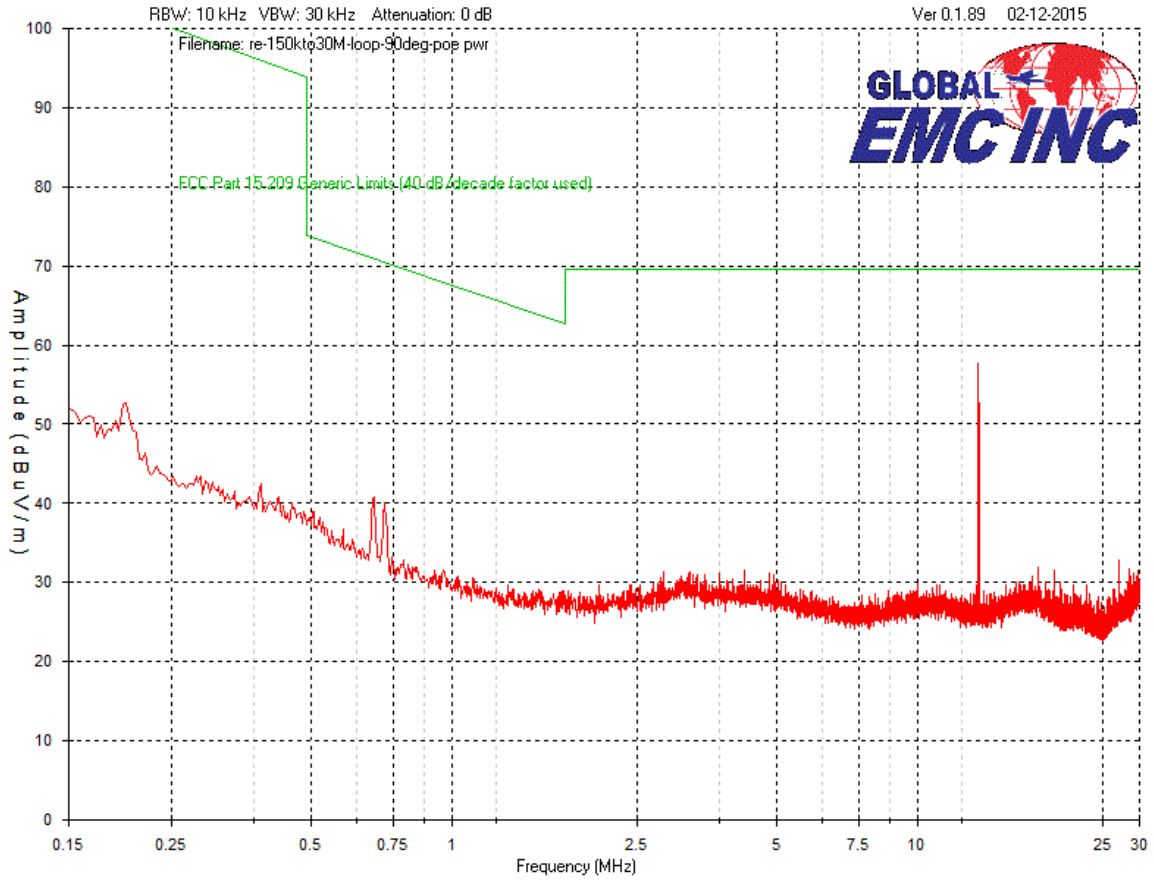
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|-------------|---|---|
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150 kHz to 30 MHz-Loop @ 0 degree



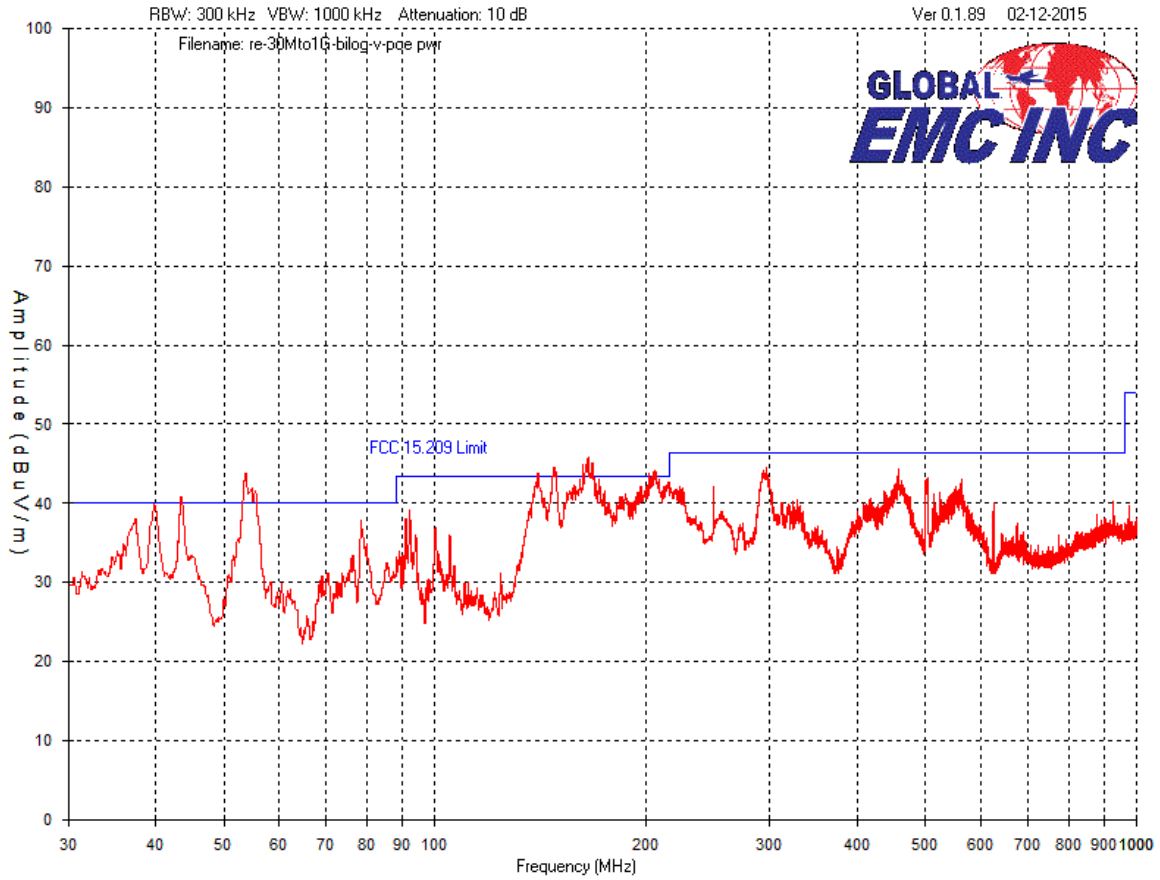
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|-------------|---|---|
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150 kHz to 30 MHz-Loop @ 90 degree



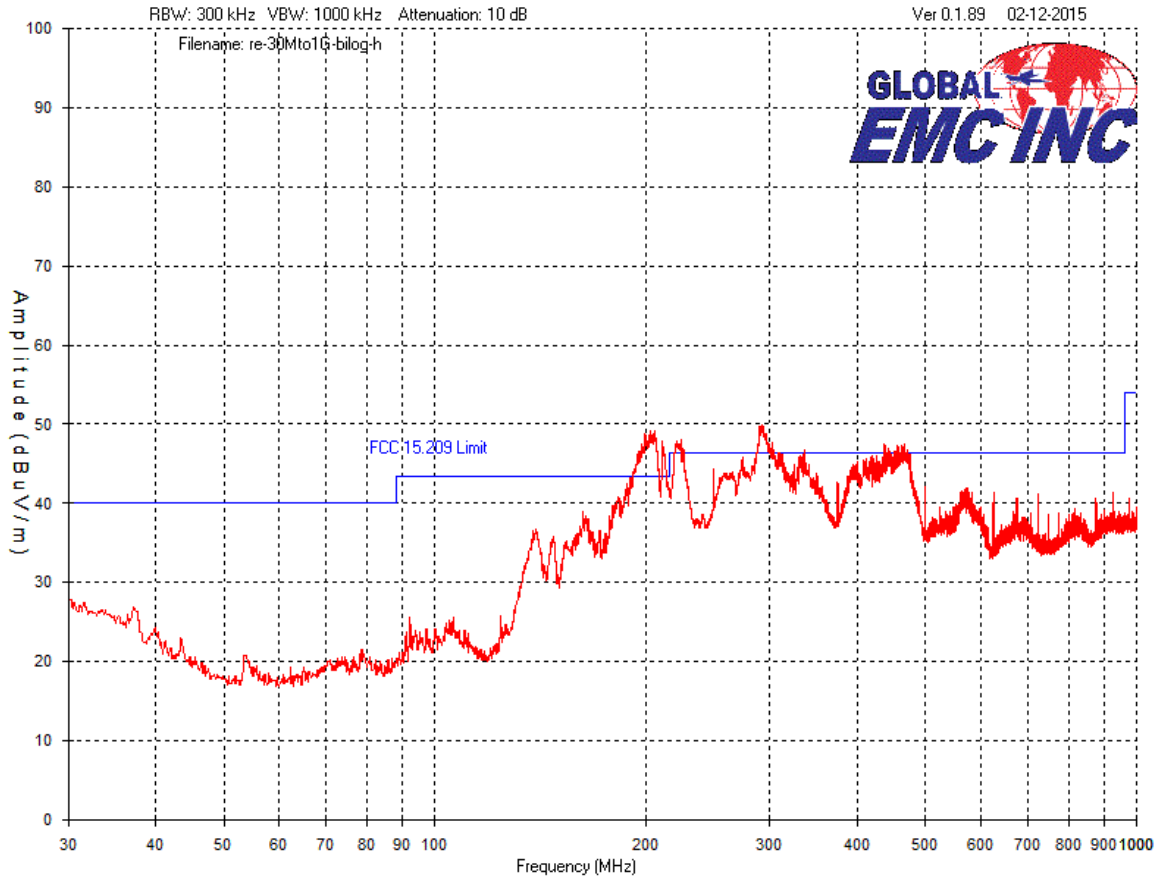
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30MHz to 1GHz – Vertical – Peak Emissions Graph



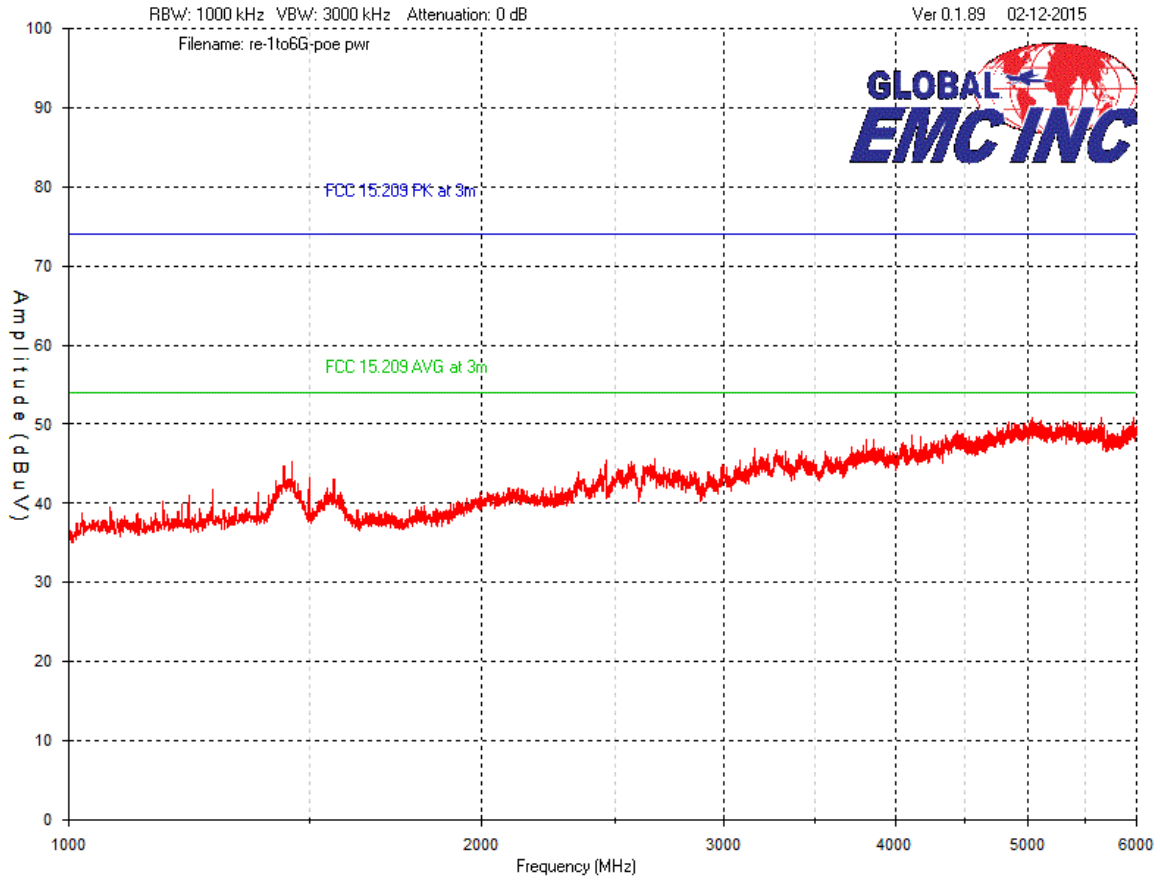
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30MHz to 1GHz – Horizontal – Peak Emissions Graph



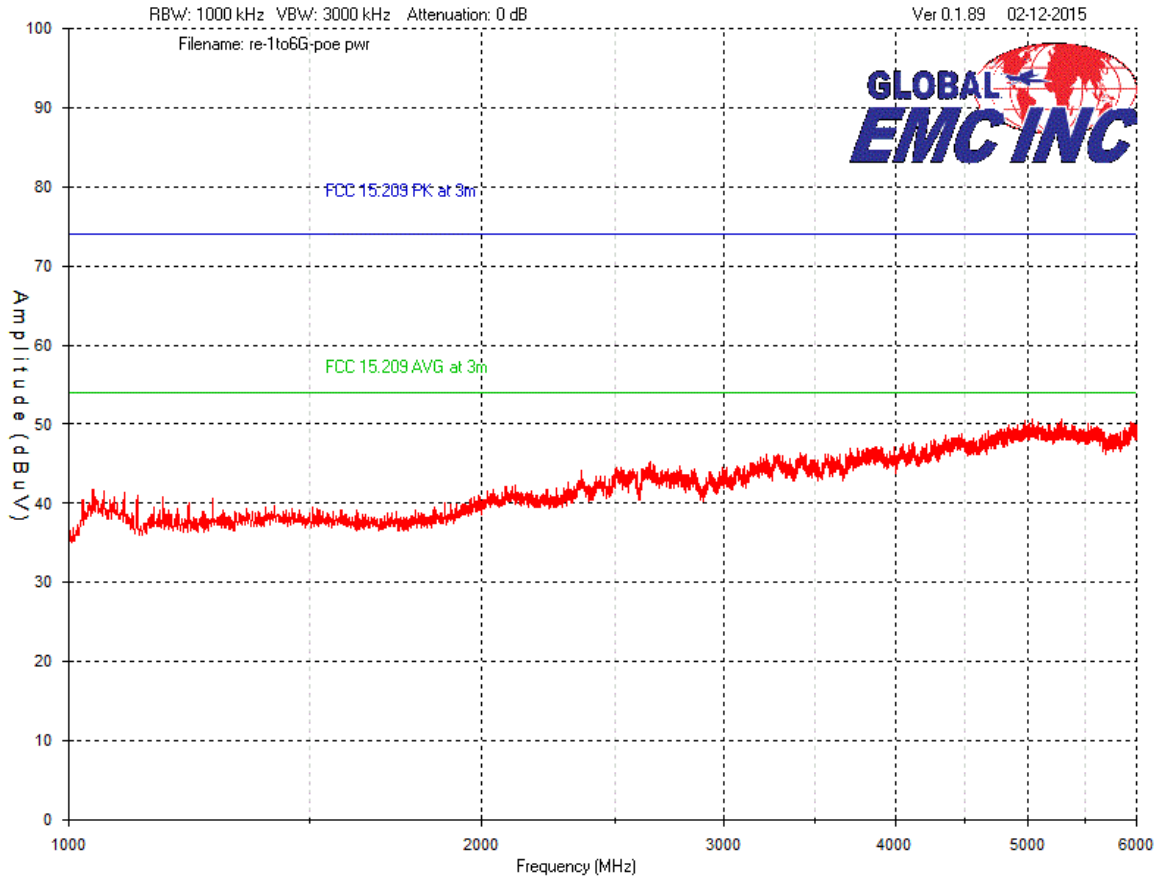
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1GHz to 6GHz– Vertical – Peak Emissions Graph




| | | |
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1GHz to 6GHz– Horizontal – Peak Emissions Graph



Note: Pre-scan were performed to compare both DC input options, worse case is presented.

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Final Measurements

Peak Emissions vs. Quasi Peak Limit Table – Loop@0 degree@3m distance

| Frequency (MHz) | Raw (dBuV) | Att. (dB) | Cable (dB) | Cur. Factor | Ant. (dB/m) | Amp (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pass/Fail |
|-----------------|------------|-----------|------------|-------------|-------------|----------|----------------|----------------|-------------|-----------|
| 13.556 | 51.6 | 3 | 0.4 | 51.5 | -13.9 | -28.5 | 64.1 | 69.5 | 5.4 | Pass |
| 0.6807 | 23.2 | 3 | 0.1 | 51.5 | -7.7 | -28.6 | 41.5 | 70.9 | 29.4 | Pass |
| 0.7172 | 22.5 | 3 | 0.1 | 51.5 | -8.1 | -28.6 | 40.4 | 70.5 | 30.1 | Pass |
| 8.7203 | 20.2 | 3 | 0.3 | 51.5 | -14.1 | -28.4 | 32.5 | 69.5 | 37.0 | Pass |
| 21.0085 | 13.5 | 3 | 0.5 | 51.5 | -14.8 | -28.5 | 25.2 | 69.5 | 44.3 | Pass |
| 0.1666 | 20.5 | 3 | 0 | 51.5 | 5.1 | -28.7 | 51.4 | 103.8 | 52.4 | Pass |

Peak Emissions vs. Quasi Peak Limit Table – Loop@90 degree@3m distance

| Frequency (MHz) | Raw (dBuV) | Att. (dB) | Cable (dB) | Cur. Factor | Ant. (dB/m) | Amp (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pass/Fail |
|-----------------|------------|-----------|------------|-------------|-------------|----------|----------------|----------------|-------------|-----------|
| 13.556 | 38.8 | 3 | 0.4 | 51.5 | -13.9 | -28.5 | 51.3 | 69.5 | 18.2 | Pass |
| 6.4782 | 31.4 | 3 | 0.3 | 51.5 | -13.7 | -28.5 | 44.0 | 69.5 | 25.5 | Pass |
| 0.7238 | 22.4 | 3 | 0.1 | 51.5 | -8.2 | -28.6 | 40.2 | 70.4 | 30.2 | Pass |
| 0.6807 | 22.3 | 3 | 0.1 | 51.5 | -7.7 | -28.6 | 40.6 | 70.9 | 30.3 | Pass |
| 29.1841 | 17.6 | 3 | 0.5 | 51.5 | -12.9 | -28.5 | 31.2 | 69.5 | 38.3 | Pass |
| 27.1112 | 18.8 | 3 | 0.5 | 51.5 | -14.8 | -28.5 | 30.5 | 69.5 | 39.0 | Pass |


| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Emission Reading Table – Vertical

| Frequency (MHz) | Det. mode | Raw (dBuV) | Ant. (dB/m) | Att. (dB) | Cab. (dB) | Amp (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pass/Fail |
|-----------------|-----------|------------|-------------|-----------|-----------|----------|----------------|----------------|-------------|-----------|
| 53.765 | QP | 51.3 | 7.1 | 3 | 0.7 | -28.5 | 33.6 | 40 | 6.4 | Pass |
| 165.412 | QP | 50.1 | 9.4 | 3 | 1.2 | -28.5 | 35.2 | 43.5 | 8.3 | Pass |
| 148.437 | QP | 51.4 | 8.6 | 3 | 1.2 | -28.5 | 35.7 | 43.5 | 7.8 | Pass |
| 43.386 | QP | 48.3 | 9.1 | 3 | 0.7 | -28.5 | 32.6 | 40 | 7.4 | Pass |
| 205.279 | QP | 45.5 | 10.8 | 3 | 1.4 | -28.6 | 32.1 | 43.5 | 11.4 | Pass |
| 39.7 | QP | 45.2 | 10.4 | 3 | 0.6 | -28.5 | 30.7 | 40 | 9.3 | Pass |

Emission Reading Table – Horizontal


| Frequency (MHz) | Det. mode | Raw (dBuV) | Ant. (dB/m) | Att. (dB) | Cab. (dB) | Amp (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pass/Fail |
|-----------------|-----------|------------|-------------|-----------|-----------|----------|----------------|----------------|-------------|-----------|
| 202.951 | QP | 51.9 | 10.4 | 3 | 1.4 | -28.6 | 38.1 | 43.5 | 5.4 | Pass |
| 211.099 | QP | 50.8 | 10.8 | 3 | 1.4 | -28.6 | 37.4 | 43.5 | 6.1 | Pass |
| 292.773 | QP | 53.3 | 13.5 | 3 | 1.7 | -28.6 | 42.9 | 46.4 | 3.5 | Pass |
| 224 | QP | 49.6 | 11.3 | 3 | 1.5 | -28.5 | 36.9 | 46.4 | 9.5 | Pass |
| 436.527 | QP | 37.3 | 17.2 | 3 | 2 | -28.7 | 30.8 | 46.4 | 15.6 | Pass |
| 202.951 | QP | 51.9 | 10.4 | 3 | 1.4 | -28.6 | 38.1 | 43.5 | 5.4 | Pass |

| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Test Equipment List

| Equipment | Model No. | Manufacturer | Last calibration date | Next calibration due date | Asset # |
|---------------------------|---------------------------------|-----------------|------------------------|---------------------------|---------|
| Spectrum Analyzer | 8566B | HP | 1-28-15 | 1-28-17 | 4169 |
| Quasi Peak Adapter | 85650A | HP | 1-28-15 | 1-28-17 | 4170 |
| Loop Antenna | EM 6879 | Electro-Metrics | 1-28-15 | 1-28-17 | 4040 |
| BiLog Antenna | 3142-C | ETS | 4/25/13 | 4/25/15 | 4002 |
| Attenuator 3 dB | FP-50-3 | Trilithic | Verified 2013-04-02 | 2015-04-02 | 4028 |
| 9kHz-1GHz, 28dB preamp | LNA 6901 | Teseq | 8-6-13 | 8-6-15 | 4036 |
| Horn Antenna | ATH1G18G | AR | 4/3/13 | 4/3/15 | 4003 |
| 1GHz-26.5GHz preamp | HP 8449B | HP | 4/25/13 | 4/25/15 | 4006 |
| RF Cable 7m | LMR-400-7M- 50OHM-MN- MN | LexTec | Verified 2013-04-02 | 2015-04-02 | 4026 |
| RF Cable 1M | LMR-400-1M- 50OHM-MN- MN | LexTec | Verified 2013-04-02 | 2015-04-02 | 4039 |
| RF Cable 10m | LMR-400- 10M-50OHM- MN-MN | LexTec | Verified 2013-04-02 | 2015-04-02 | 4025 |
| Emission software | 0.1.87 | Global EMC | NCR | NCR | 58 |

This report module is based on GEMC template "FCC - 15.209 - Radiated Emissions_Rev5.doc"

| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

20dB Bandwidth

Purpose


The purpose of this test is to measure the bandwidth of EUT. This also helps prevent corruption of data by ensuring adequate data separation to distinguish the reception of the intended information.

Limits

The Limit is as specified in FCC Part 15 and RSS 210.

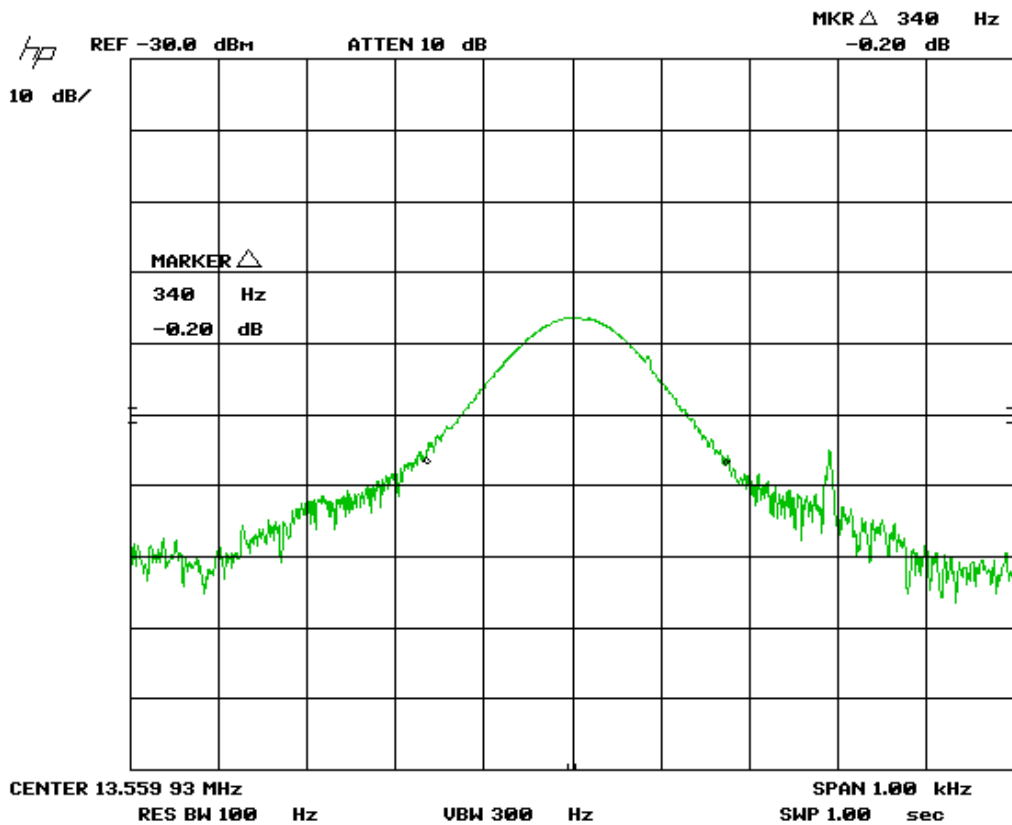
Results

The EUT passed. The 20 dB BW measured was 340Hz


| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Graph(s)

The graphs shown below shows the channel spacing during the operation of the device. This is measured by a max hold on the spectrum analyzer and the highest resolution bandwidth that is sufficiently low to exhibit the 20 dB bandwidth of a channel during operation of the EUT. This measurement is a peak measurement. Max hold is performed for a duration of not less than 1 minute.




Note: See ‘Appendix B – EUT & Test Setup Photographs’ for photos showing the test set-up.

| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Test Equipment List


| Equipment | Model No. | Manufacturer | Last calibration date | Next calibration due date | Asset # |
|----------------------------|---------------------------------|-------------------|------------------------|---------------------------|---------|
| Spectrum Analyzer | 8566B | HP | 1-28-15 | 1-28-17 | 4169 |
| Quasi Peak Adapter | 85650A | HP | 1-28-15 | 1-28-17 | 4170 |
| Loop Antenna | EM 6879 | Electro-Metrics | 10-11-13 | 10-11-15 | 4040 |
| BiLog Antenna | 3142-C | ETS | 4/25/13 | 4/25/15 | 4002 |
| Attenuator 3 dB | FP-50-3 | Trilithic | Verified 2013-04-02 | 2015-04-02 | 4028 |
| 9kHz-1GHz, 28dB preamp | LNA 6901 | Teseq | 8-6-13 | 8-6-15 | 4036 |
| Horn Antenna | ATH1G18G | AR | 4/3/13 | 4/3/15 | 4003 |
| 1GHz-26.5GHz preamp | HP 8449B | HP | 4/25/13 | 4/25/15 | 4006 |
| RF Cable 7m | LMR-400-7M- 50OHM-MN- MN | LexTec | Verified 2013-04-02 | 2015-04-02 | 4026 |
| RF Cable 1M | LMR-400-1M- 50OHM-MN- MN | LexTec | Verified 2013-04-02 | 2015-04-02 | 4039 |
| RF Cable 10m | LMR-400- 10M-50OHM- MN-MN | LexTec | Verified 2013-04-02 | 2015-04-02 | 4025 |
| Screen Capture software | Version 1.3.1 | John Miles, KE5FX | NCR | NCR | 59 |

This report module is based on GEMC template "FCC - 15.209 - Radiated Emissions_Rev5.doc"

| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Appendix A – EUT Summary

For further details for filing purposes, refer to filing package.

| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


General EUT Description

| Client Details | |
|--|--|
| Organization / Address | Kaba 7301 Decarie Blvd. Montreal QC Canada |
| Contact | Michael Mosca |
| Phone | 514-735-5410 ext. 749 |
| Email | michael.mosca@kaba.com |
| EUT (Equipment Under Test) Details | |
| EUT Name (for report title) | Kaba RFID Encoder |
| EUT Model / SN (if known) | SN1748 |
| EUT revision | 023-514630-R3 and SD-514630-002-04 |
| Software version | IP Encoder 0.010/Bootloader 0.001 Build date Feb 04, 2015 |
| Equipment category | ITE |
| EUT is powered using | USB and PoE |
| Input voltage range(s) (V) | 5VDC +/-0.25V for USB and 37VDC to 57VDC for PoE |
| Frequency range(s) (Hz) | NA |
| Rated input current (A) | 500mA |
| Nominal power consumption (W) | 2.5W |
| Number of power supplies in EUT | 0 |
| Transmits RF energy? (describe) | Yes RFID |
| Basic EUT functionality description | RFID card encoder |
| Modes of operation | Encode and read |
| Customer to setup EUT on site? | Yes |
| Frequency of all clocks present in EUT | 25MHz and 27.12MHz |
| I/O cable description Specify length and type | USB to micro USB (less than 1 meter) or Network cable |
| Available connectors on EUT | Micro USB and POE |
| Peripherals required to exercise EUT Ex. Signal generator | Front Desk Unit |
| Dimensions of product | L 135 mm W 80 mm |

| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

| | |
|---|---|
| | H 25 mm |
| Method of monitoring EUT and description of failure for immunity. | Encode and read in a continuous loop for immunity tests and RF Carrier ON for emission tests. Engineering firmware/software used to test EUT. |

Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see ‘Appendix B – EUT & Test Setup Photographs’.

| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

EUT Functional Description

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EUT Configuration

The EUT was configured in the following way during the tests:

- Cables and earthing were connected as per manufacturer's specification.
- The EUT was powered on and transmitting continuously during all tests.
- EUT was configured and operated by client on site during tests.

Operational Setup

These devices are required to be attached to the EUT for its normal operation.

(Ex Monitor to track progress)

Laptop provided by client.


Test Signals Required For Test

The following patterns or signals were generated during test by the peripherals as described above to exercise the EUT during testing.

None.


Modifications Required for Compliance

None.

| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Appendix B – EUT and Test Setup Photographs

Note: These photos are for information purposes only. Also refer to PDF files that are separate from this test report.

| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Conducted Emission Test Setup Photo#1:



| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Conducted Emission Test Setup Photo#2:



| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Radiated Emission Test Setup Photo#1:



| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Radiated Emission Test Setup Photo#2:



| | | |
|-------------|---|---|
| Client | Kaba Ilco Inc. |  |
| Product | Kaba RFID Encoder | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Radiated Emission Test Setup Photo#3:

