

TEST REPORT

FROM



FOR

QI Systems, Inc.

SmartKit II System & Cash-to-Card System

Model: RMVD-U4 (SmartKit II) & CCRV-U4 (Cash-to-Card)

TO

47 CFR 15.225:2006

Test Report Serial No.:
SL07021502-QIS-001/HOST

This report supersedes None

Remarks: Equipment complied with the specification Equipment did not comply with the specification

This Test Report is Issued Under the Authority of:

A handwritten signature in black ink that appears to read "Benjamin Jing".

.....
Tested by: Benjamin Jing, Test Engineer

A handwritten signature in blue ink that appears to read "Kerwinn Corpuz".

.....
Reviewed by: Kerwinn Corpuz, EMC Lab Manager

Issue date: 13 April 2007

Manufacturer: QI Systems, Inc.



Registration No. 783147



Industry Canada
Industrie Canada

Registration No. 4842



Lab Code: KR0032



RTA No. D23/16V



Registration No. 2195



Lab Code: US0160



CSMI Code: SL244-E-100R

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FCCID: U4BM210-3G
To: 47 CFR 15.225:2006

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Executive Summary

The purpose of this test programme was to demonstrate compliance of the QI Systems, Inc., SmartKit II System & Cash-to-Card System, model RMVD-U4 (SmartKit II) & CCRV-U4 (Cash-to-Card) against the current 47 CFR 15.225:2006. The SmartKit II System & Cash-to-Card System demonstrated compliance with the 47 CFR 15.225:2006.

QI Systems, Inc. is the applicant and claimed manufacturer of this tested product. For the detailed description of this product, please refer to the SmartKit II System & Cash-to-Card System User Manual.

The equipment under test operating frequency is 13.56 MHz.

Note 1: The power supply brick that was tested with the EUT (SmartKit II System) will not be marketed. It was used for testing purposes only. The DC cable is 1.45 meter long from the brick.

To comply with Radiated Emissions test at frequency of 36.11 MHz and 43.87 MHz, a ferrite (Fair-Rite, model: 0443164151) was installed onto DC cable with single turn.

Note 2: The SmartKit II System DC cable will be provided with a length of 0.8 meter and will be installed into another metal enclosure.

Note 3: To comply with Conducted Emissions Voltage test, the EUT (Cash-to-Card System) must have an LC Filter across each phase and neutral line. Its power supply must be vertical position and the power cord should hang down near the chassis base.

The test has demonstrated that this unit complies with stipulated standards.



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1 Technical Details

| | |
|---------------------------------|--|
| Purpose | Compliance testing of SmartKit II System & Cash-to-Card System with 47 CFR 15.225:2006 |
| Applicant / Client | QI Systems, Inc. 101-3820 Jacombs Road Richmond, BC V6V1Y6 Canada |
| Manufacturer | QI Systems, Inc. |
| Laboratory performing the tests | SIEMIC Labs 2206 Ringwood Avenue San Jose, CA 95131 |
| Test location(s) | SIEMIC Labs 2206 Ringwood Avenue San Jose, CA 95131 |
| Test report reference number | SL07021502-QIS-001/HOST |
| Date EUT received | 29 March 2007 |
| Standard applied | 47 CFR 15.225:2006 |
| Dates of test (from – to) | 30 March 2007 to 12 April 2007 |
| No of Units: | 1 of each devices |
| Equipment Category: | DXX |
| Trade/Product Name: | SmartKit II & Cash-to-Card |
| Type/Model Name/No: | RMVD-U4 (SmartKit II) & CCRV-U4 (Cash-to-Card) |
| Technical Variants: | none |
| FCC ID No. | U4BM210-3G |

2 Tests Required

The product was tested in accordance with the following specifications.
The test results recorded in this Test Report are exclusively referred to the tested sample(s).

| Test Standard | | Description | Pass / Fail |
|--------------------------|--|--------------------|--------------------|
| 47 CFR Part 15.225: 2006 | | | |
| 15.207(a) | Conducted Emissions Voltage | | Pass |
| 15.225(a) | Limit in the band of 13.553 – 13.567 MHz | | Pass |
| 15.225(b) | Limit in the band of 13.410 – 13.553 MHz and 13.567 – 13.710 MHz | | Pass |
| 15.225(c) | Limit in the band of 13.110 – 13.410 MHz and 13.710 – 14.010 MHz | | Pass |
| 15.225(d) | Limit outside the band of 13.110 – 14.010 MHz | | Pass |
| 15.209 | Radiated Emission Limits | | Pass |
| ANSI C63.4: 2003 | | | |

*Notes: Deviations to above standards are outlined in specific test sections if applicable.
Cable loss and external attenuation are compensated for in the measurement system when applicable.*



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3 Measurements, Examinations and Derived Results

3.1 General observations

| Equipment serial number(s) | | |
|--|--|----------------|
| Module: | Model number: | Serial number: |
| SmartKit II System & Cash-to-Card System | RMVD-U4 (SmartKit II) & CCRV-U4 (Cash-to-Card) | none |
| | | |



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3.2 Test Results

3.2.1 Conducted Emissions Voltage

Requirement(s): 47 CFR §15.207

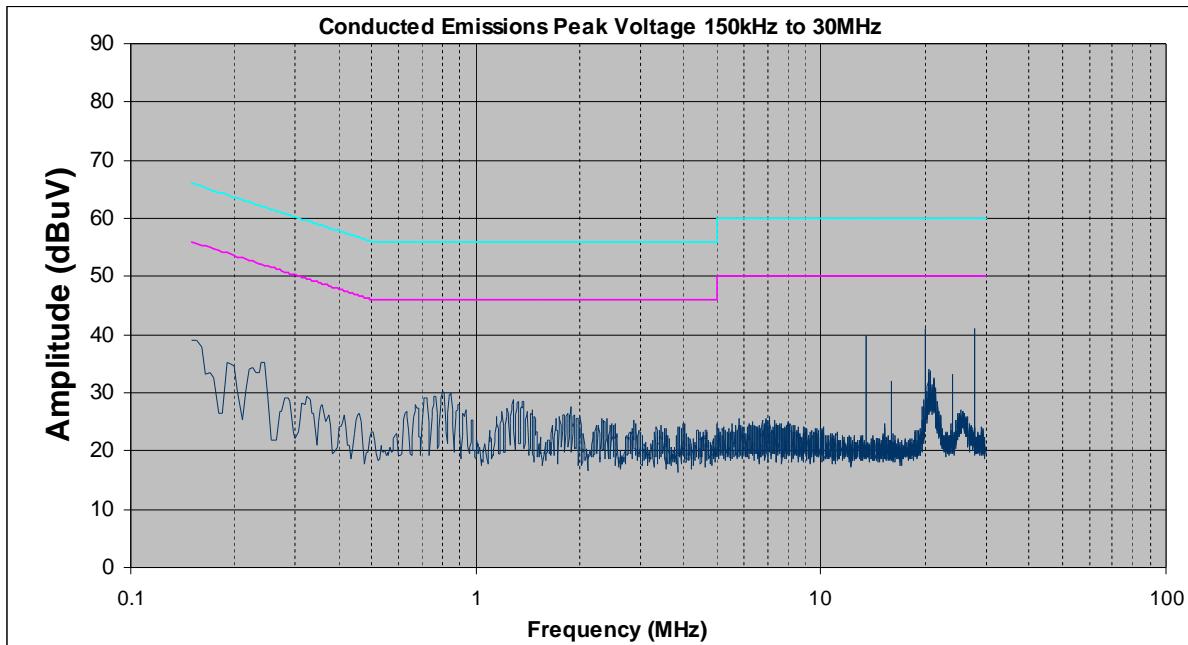
Procedures:

The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a $50\Omega/50\mu\text{H}$ EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. All other supporting equipment were powered separately from another mains.

The EUT was switched on and allowed to warm up to its normal operating condition. A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver. High peaks, relative to the limit line, were then selected. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz. Quasi-peak and Average measurements were made. The procedure was then repeated for the PHASE line.

Results: with SmartKit II System

Note – Quasi-Peak Limit Average Limit

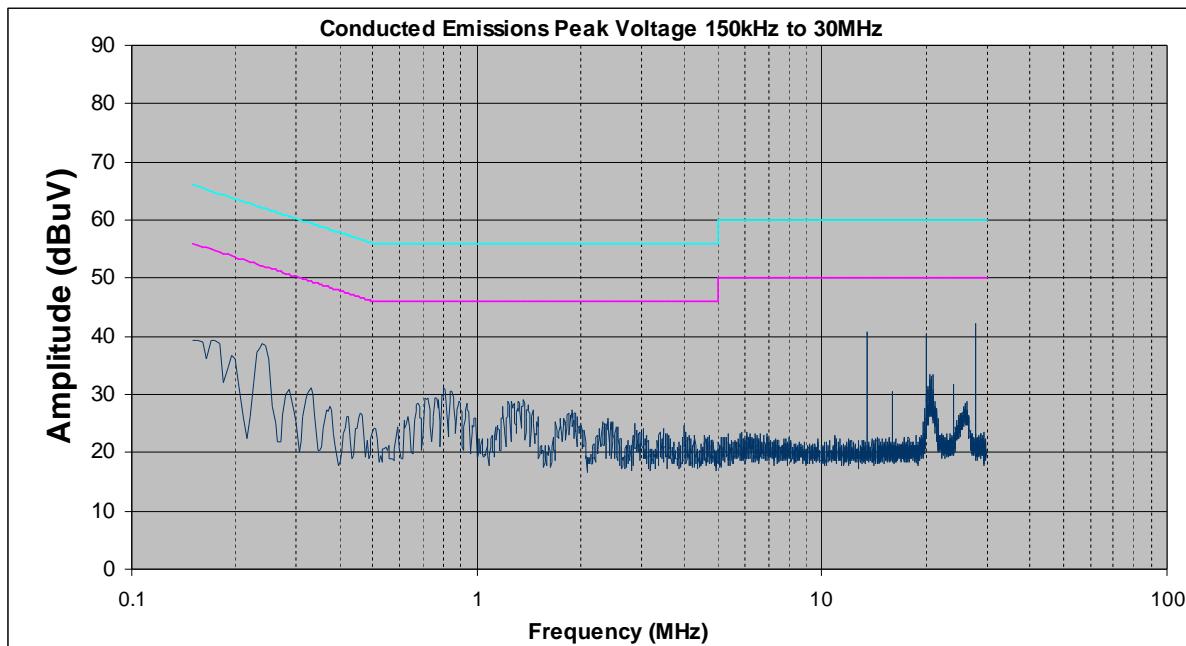


Neutral Line Plot at 120Vac, 60Hz

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**Phase Line Plot at 120Vac, 60Hz**

| LINE | FREQ (MHz) | Corrected Amplitude (dB μ V) PK | Limit (dB μ V) QP | Margin (dB) QP | Corrected Amplitude (dB μ V) PK | Limit (dB μ V) AVG | Margin (dB) AVG |
|---------|------------|-------------------------------------|-----------------------|----------------|-------------------------------------|------------------------|-----------------|
| Neutral | 13.56 | 39.8 | 60 | -20.2 | 39.8 | 50 | -10.2 |
| Neutral | 20 | 41.1 | 60 | -18.9 | 41.1 | 50 | -8.9 |
| Neutral | 28 | 41 | 60 | -19 | 41 | 50 | -9 |
| Phase | 13.56 | 40.9 | 60 | -19.1 | 40.9 | 50 | -9.1 |
| Phase | 20 | 40.4 | 60 | -19.6 | 40.4 | 50 | -9.6 |
| Phase | 28 | 41.6 | 60 | -18.4 | 41.6 | 50 | -8.4 |

Conducted Emission Table

Note: PK = peak; QP = quasi-peak; AVG = average detector.

Tested By: Benjamin Jing

Date Tested: 03 April 2007



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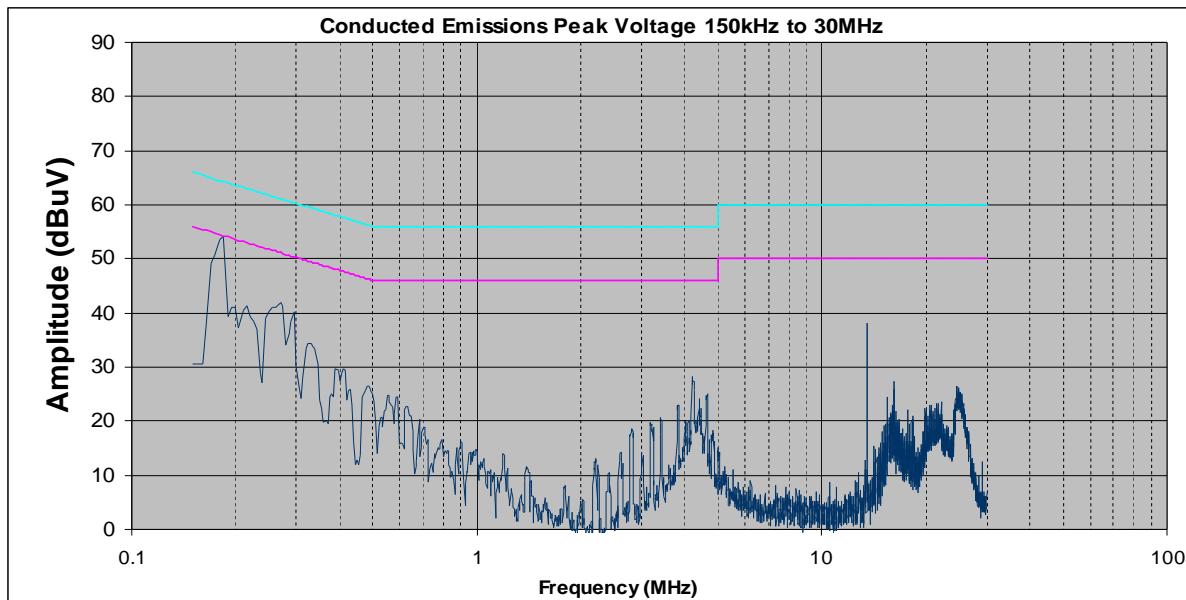
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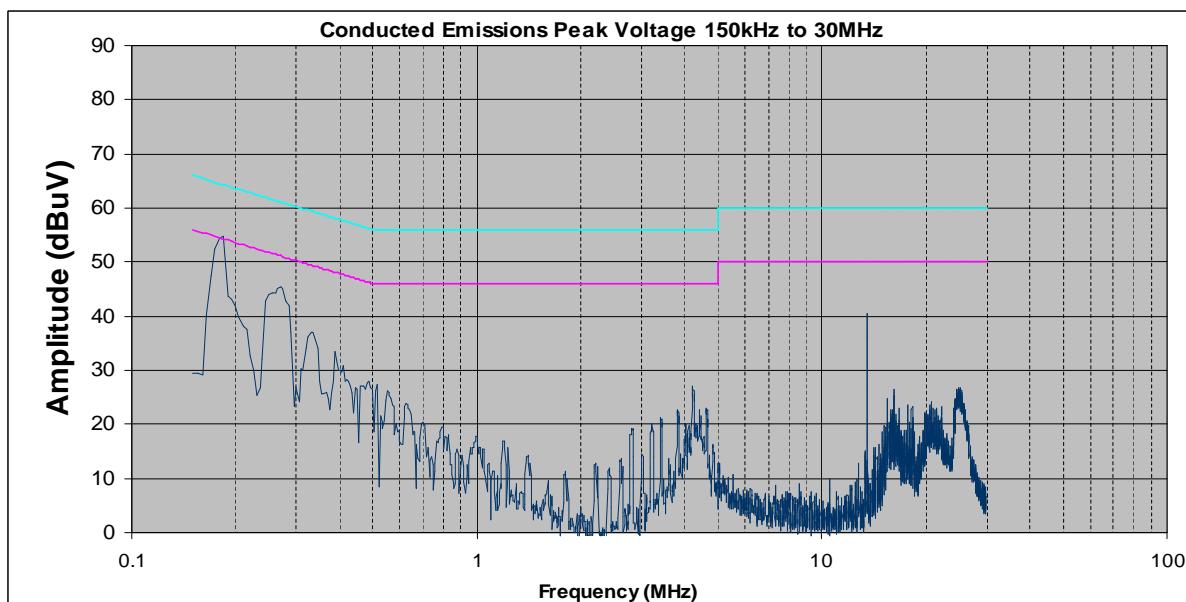
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Results: with Cash-to-Card System

Note - Quasi-Peak Limit Average Limit



Neutral Line Plot at 120Vac, 60Hz



Phase Line Plot at 120Vac, 60Hz



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| LINE | FREQ (MHz) | Corrected Amplitude (dB μ V) QP | Limit (dB μ V) QP | Margin (dB) QP | Corrected Amplitude (dB μ V) AVG | Limit (dB μ V) AVG | Margin (dB) AVG |
|---------|------------|-------------------------------------|-----------------------|----------------|--------------------------------------|------------------------|-----------------|
| Neutral | 0.2 | 48.3 | 63.61 | -15.31 | 41 | 53.61 | -12.61 |
| Neutral | 0.285 | 38 | 60.67 | -22.67 | 29 | 50.67 | -21.67 |
| Neutral | 13.56 | 36.8 | 60 | -23.2 | 36.8 | 50 | -13.2 |
| Phase | 0.201 | 49.2 | 63.57 | -14.37 | 38.6 | 53.57 | -14.97 |
| Phase | 0.285 | 41.9 | 60.67 | -18.77 | 32.8 | 50.67 | -17.87 |
| Phase | 13.56 | 39.7 | 60 | -20.3 | 39.7 | 50 | -10.3 |

Conducted Emission Table

Note: PK = peak; QP = quasi-peak; AVG = average detector.

Tested By: Benjamin Jing

Date Tested: 12 April 2007

3.2.2 Radiated Emissions within the Band of 13.110 – 14.010 MHz

Requirement(s): 47 CFR §15.225(a) – (c)

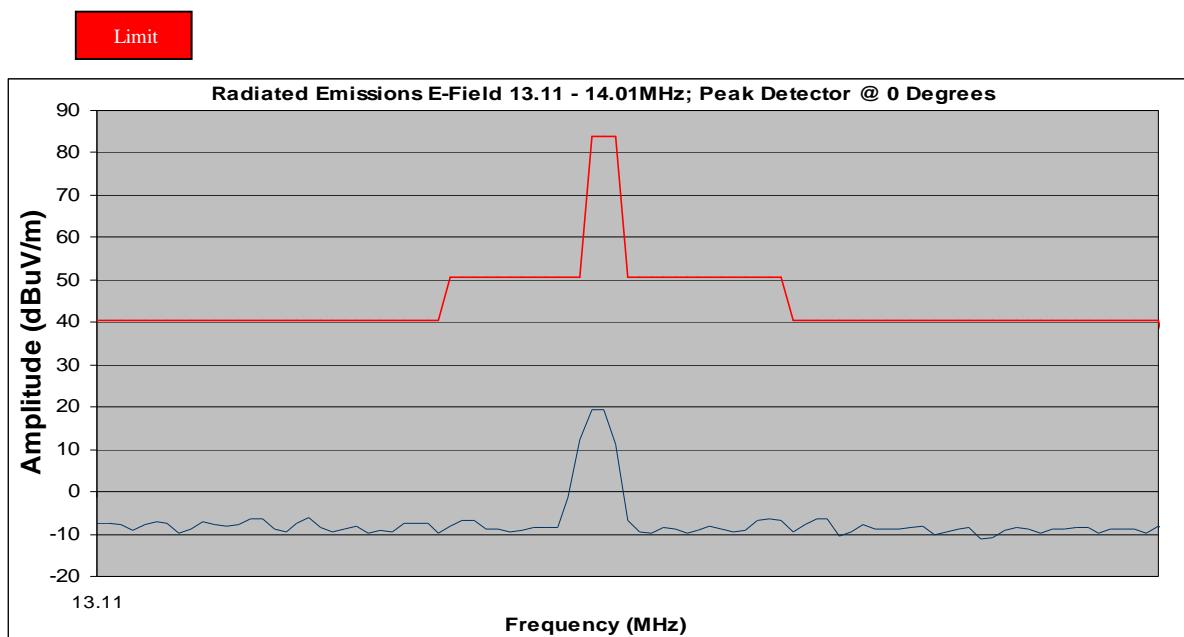
Procedures: Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10 kHz.

The limit is converted from microvolts/meter to decibel microvolts/meter.

Distance Correction Factor was calculated with 40 dB/decade.

Sample Calculation: Corrected Amplitude = Raw Amplitude(dB μ V/m) + ACF(dB) + Cable Loss(dB) – Distance Correction Factor

Results: Loop Antenna Positioned at 0 degrees with SmartKit II System



Radiated Emissions Plot

| Frequency (MHz) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Distance Correction Factor (dB) | Corrected Amplitude @ 3m (dB μ V/m) | Limit @ 30m (dB μ V/m) | Margin (dB μ V/m) | Detector |
|--------------------|---|------------------------|--------------------|------------------------------------|--|-------------------------------|--------------------------|----------|
| 13.56 | 23.6 | 35.62 | 0.28 | 40 | 19.5 | 84 | -64.5 | PK |

Radiated Emissions Table

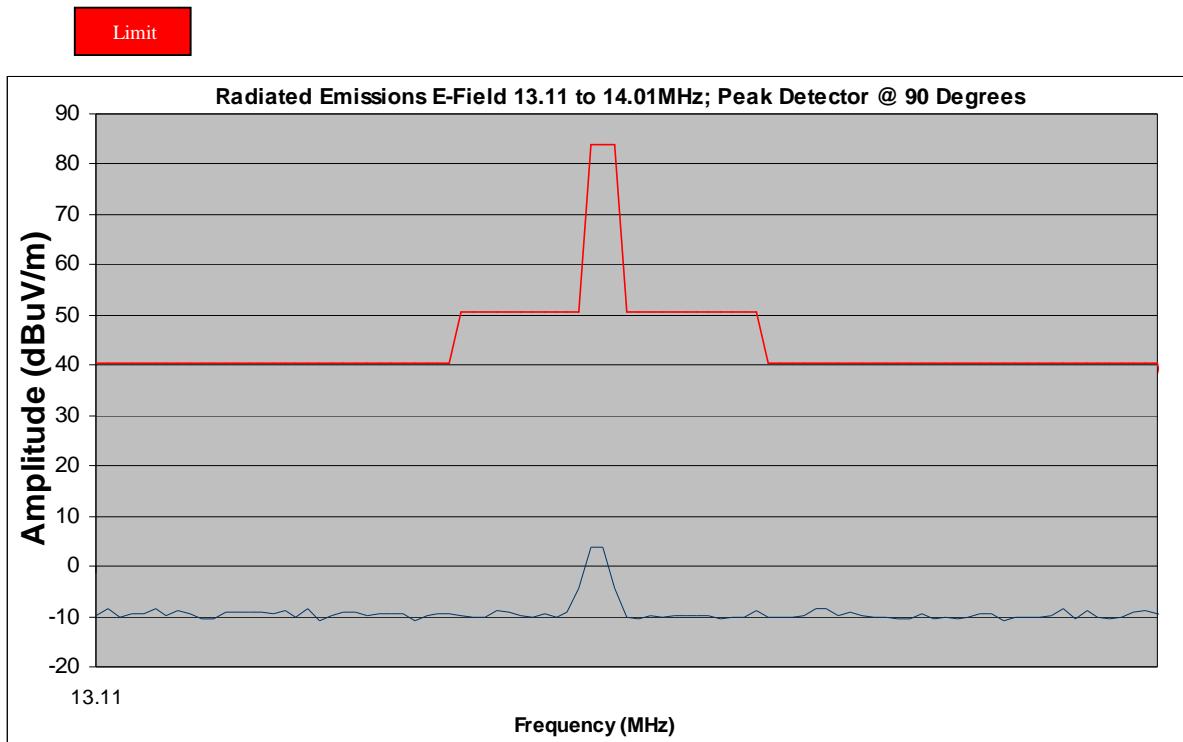


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Results: Loop Antenna Positioned at 90 degrees with SmartKit II System



Radiated Emissions Plot

| Frequency (MHz) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Distance Correction Factor (dB) | Corrected Amplitude @ 3m (dBuV/m) | Limit @ 30m (dB μ V/m) | Margin (dB μ V/m) | Detector |
|--------------------|--|---------------------------|-----------------------|--|--|----------------------------------|--------------------------|----------|
| 13.56 | 7.9 | 35.62 | 0.28 | 40 | 3.8 | 84 | -80.2 | PK |

Radiated Emissions Table

Tested By: Benjamin Jing

Date Tested: 2 April 2007



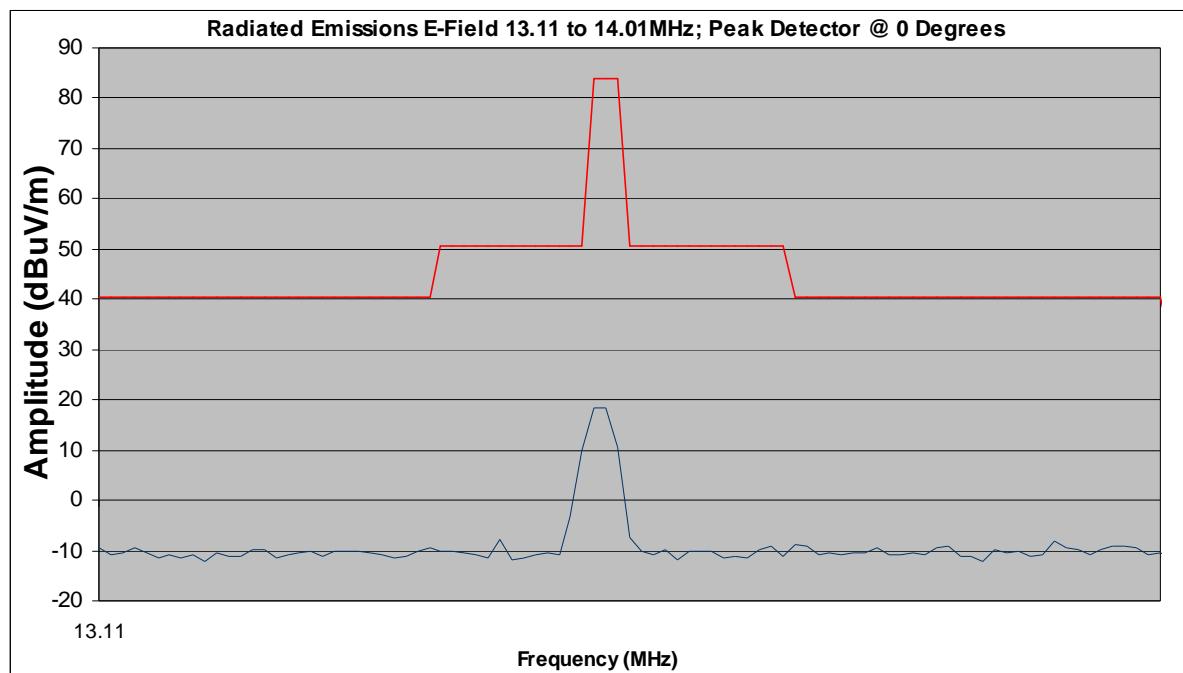
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Results: Loop Antenna Positioned at 0 degrees with Cash-to-Card System

Limit



Radiated Emissions Plot

| Frequency (MHz) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Distance Correction Factor (dB) | Corrected Amplitude @ 3m (dB μ V/m) | Limit @ 30m (dB μ V/m) | Margin (dB μ V/m) | Detector |
|--------------------|--|---------------------------|-----------------------|--|--|----------------------------------|--------------------------|----------|
| 13.56 | 22.6 | 35.62 | 0.28 | 40 | 18.5 | 84 | -65.5 | PK |

Radiated Emissions Table

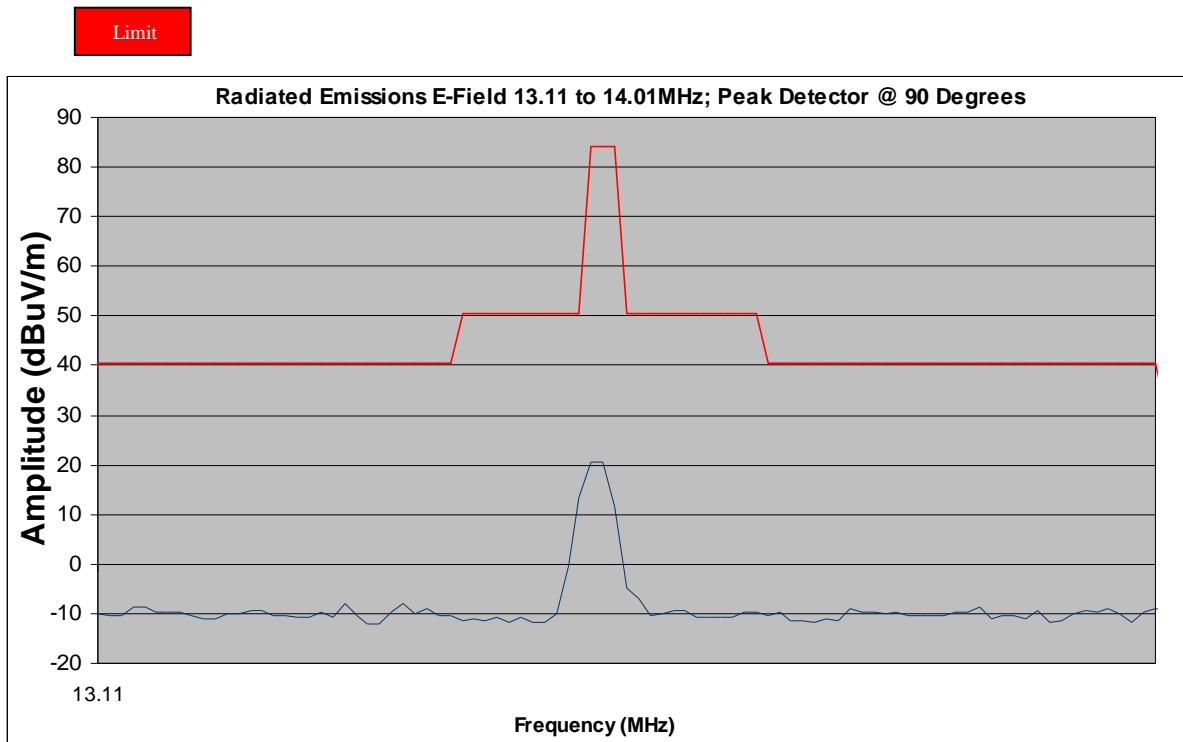


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Loop Antenna Positioned at 90 degrees with Cash-to-Card System



Radiated Emissions Plot

| Frequency (MHz) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Distance Correction Factor (dB) | Corrected Amplitude @ 3m (dB μ V/m) | Limit @ 30m (dB μ V/m) | Margin (dB μ V/m) | Detector |
|--------------------|--|---------------------------|-----------------------|--|--|----------------------------------|--------------------------|----------|
| 13.56 | 24.7 | 35.62 | 0.28 | 40 | 20.6 | 84 | -63.4 | PK |

Radiated Emissions Table

Tested By: Benjamin Jing

Date Tested: 2 April 2007



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3.2.3 Radiated Emissions < 30 MHz (outside 13.110 – 14.010 MHz)

Requirement(s): 47 CFR §15.209; 47 CFR §15.225(d)

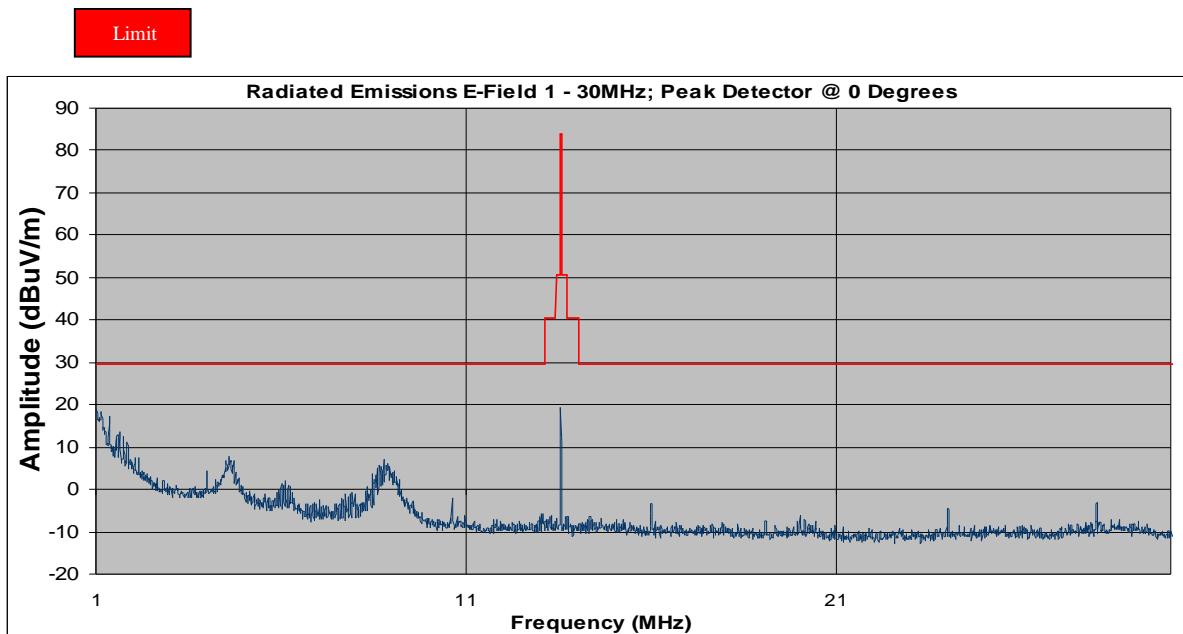
Procedures: Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10 kHz.

Distance Correction Factor was calculated with 40 dB/decade.

The limit is converted from microvolts/meter to decibel microvolts/meter.

Sample Calculation: Corrected Amplitude = Raw Amplitude(dB μ V/m) + ACF(dB) + Cable Loss(dB) – Distance Correction Factor

Results: Loop Antenna Positioned at 0 degrees with SmartKit II System



Radiated Emissions Plot

| Frequency (MHz) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Distance Correction Factor (dB) | Corrected Amplitude @ 3m (dB μ V/m) | Limit @ 30m (dB μ V/m) | Margin (dB μ V/m) | Detector |
|--------------------|--|---------------------------|-----------------------|--|--|----------------------------------|--------------------------|----------|
| 1.16 | -2.2 | 59.76 | 0.25 | 40 | 17.81 | 20.67 | -2.86 | PK |
| 4.71 | 3.8 | 42.81 | 0.25 | 40 | 6.86 | 29.54 | -22.68 | PK |

Radiated Emissions Table

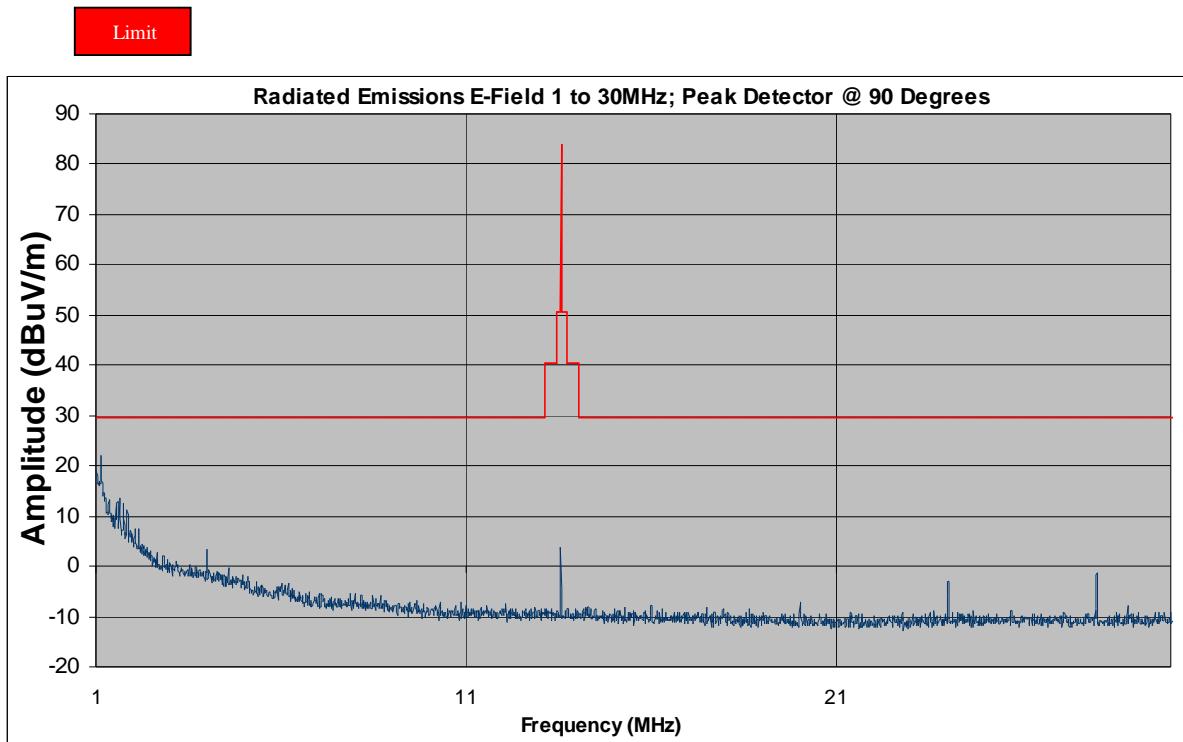


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Results: Loop Antenna Positioned at 90 degrees with SmartKit II System



Radiated Emissions Plot

| Frequency (MHz) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Distance Correction Factor (dB) | Corrected Amplitude @ 3m (dB μ V/m) | Limit @ 30m (dB μ V/m) | Margin (dB μ V/m) | Detector |
|--------------------|--|---------------------------|-----------------------|--|--|----------------------------------|--------------------------|----------|
| 1.16 | -3 | 59.76 | 0.25 | 40 | 17.01 | 20.67 | -3.66 | PK |
| 1.74 | 0.2 | 51.94 | 0.28 | 40 | 12.42 | 29.54 | -17.12 | PK |

Radiated Emissions Table



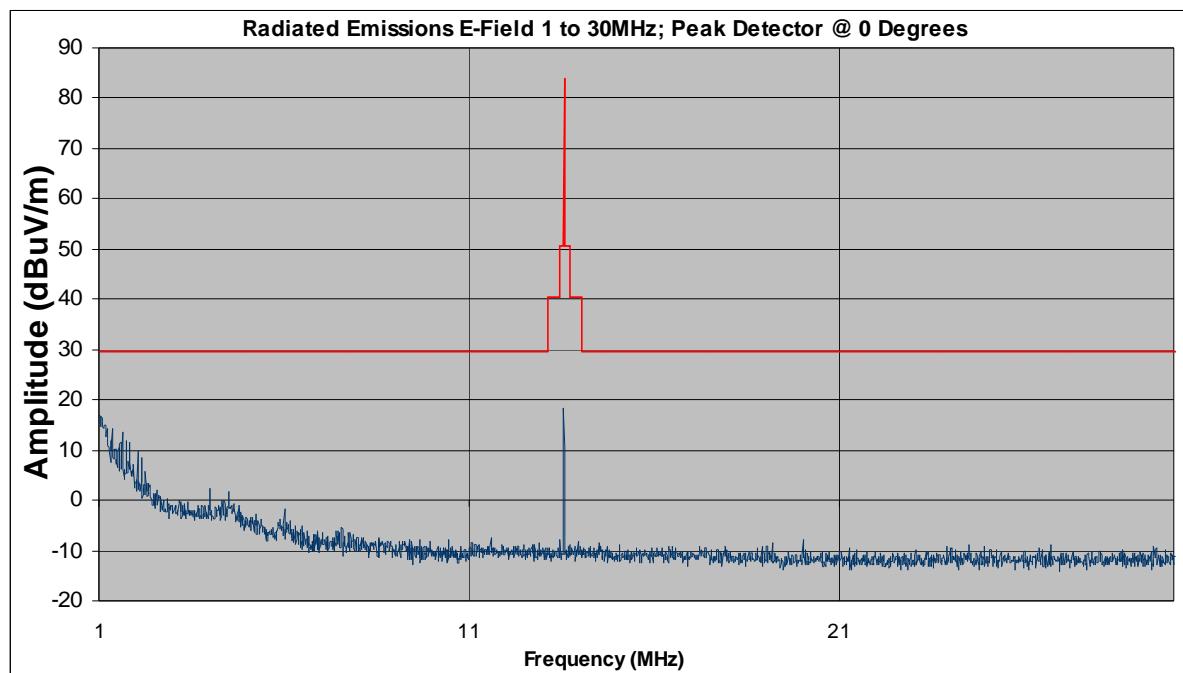
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Results: Loop Antenna Positioned at 0 degrees with Cash-to-Card System

Limit



Radiated Emissions Plot

| Frequency (MHz) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Distance Correction Factor (dB) | Corrected Amplitude @ 3m (dBuV/m) | Limit @ 30m (dB μ V/m) | Margin (dB μ V/m) | Detector |
|--------------------|--|---------------------------|-----------------------|--|--|----------------------------------|--------------------------|----------|
| 1.02 | -6.2 | 63.01 | 0.24 | 40 | 17.05 | 23.53 | -6.48 | PK |

Radiated Emissions Table



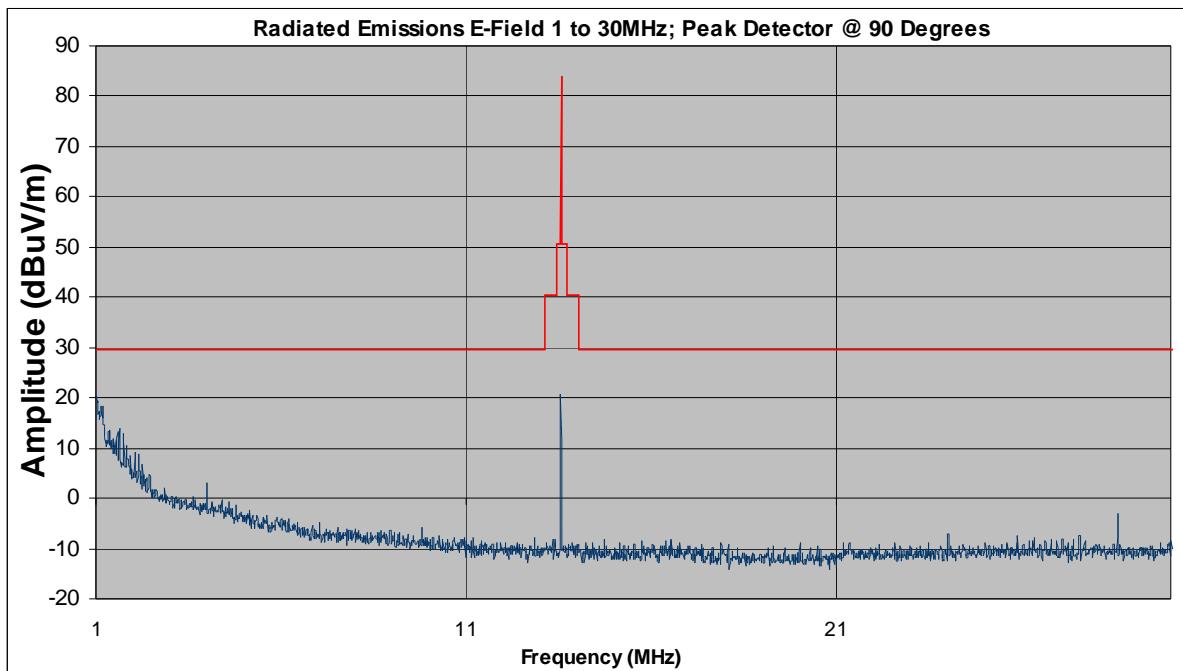
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Results: Loop Antenna Positioned at 90 degrees with Cash-to-Card System

Limit



Radiated Emissions Plot

| Frequency (MHz) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Distance Correction Factor (dB) | Corrected Amplitude @ 3m (dB μ V/m) | Limit @ 30m (dB μ V/m) | Margin (dB μ V/m) | Detector |
|--------------------|--|---------------------------|-----------------------|--|--|----------------------------------|--------------------------|----------|
| 1.02 | -2.8 | 63.01 | 0.24 | 40 | 20.45 | 23.53 | -3.08 | PK |

Radiated Emissions Table

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3.2.4 Radiated Emissions > 30 MHz

Requirement(s): 47 CFR §15.209; 47 CFR §15.225(d)

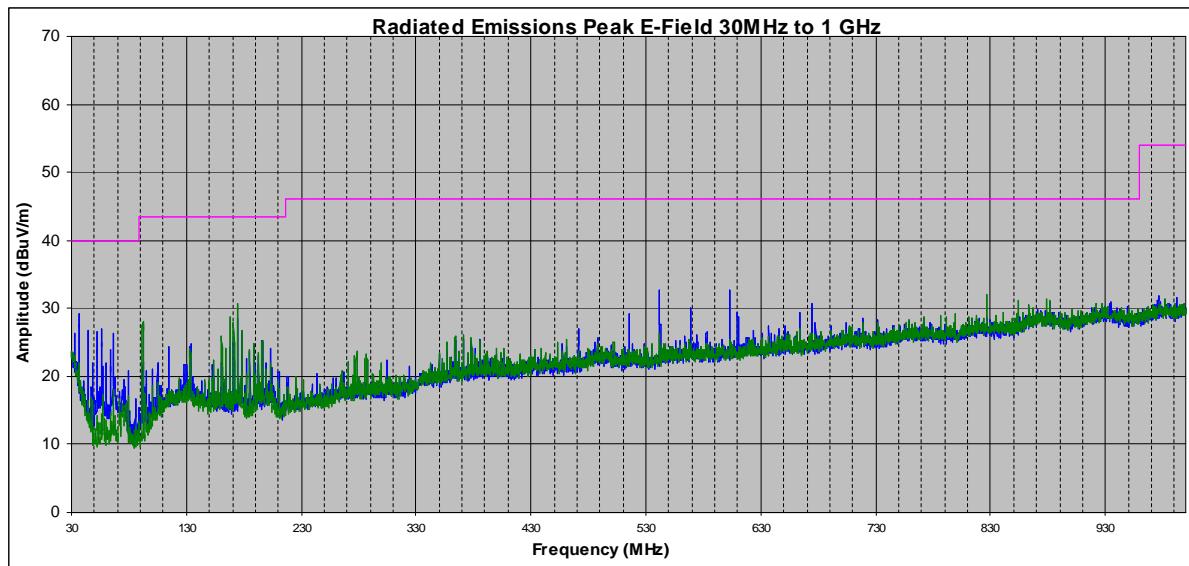
Procedures: Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power.

The limit is converted from microvolts/meter to decibel microvolts/meter.

Sample Calculation: Corrected Amplitude = Raw Amplitude(dB μ V/m) + ACF(dB) + Cable Loss(dB)

Results: with SmartKit II System

Vertical Polarization Horizontal Polarization Limit





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| Frequency (MHz) | Azimuth (degrees) | Detector (qp/pk) | Antenna Polarization (H/V) | Antenna Height (m) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Corrected Amplitude @ 3m (dB μ V/m) | Limit @ 3m (dB μ V/m) | Margin (dB μ V/m) |
|--------------------|----------------------|---------------------|----------------------------------|--------------------------|--|---------------------------|-----------------------|--|---------------------------------|--------------------------|
| 32.134 | 0 | PK | V | 1 | 6.2 | 19.48 | 0.71 | 26.39 | 40 | -13.61 |
| 36.111 | 355 | PK | V | 1 | 12.4 | 16.11 | 0.72 | 29.23 | 40 | -10.77 |
| 43.871 | 343 | PK | V | 1 | 16.6 | 9.43 | 0.74 | 26.77 | 40 | -13.23 |
| 52.116 | 350 | PK | V | 1 | 18.7 | 7.1 | 0.76 | 26.56 | 40 | -13.44 |
| 56.093 | 345 | PK | V | 1 | 18.7 | 7.62 | 0.77 | 27.09 | 40 | -12.91 |
| 66.76 | 347 | PK | V | 1 | 16.2 | 9.22 | 0.81 | 26.23 | 40 | -13.77 |

Radiated Emissions Table

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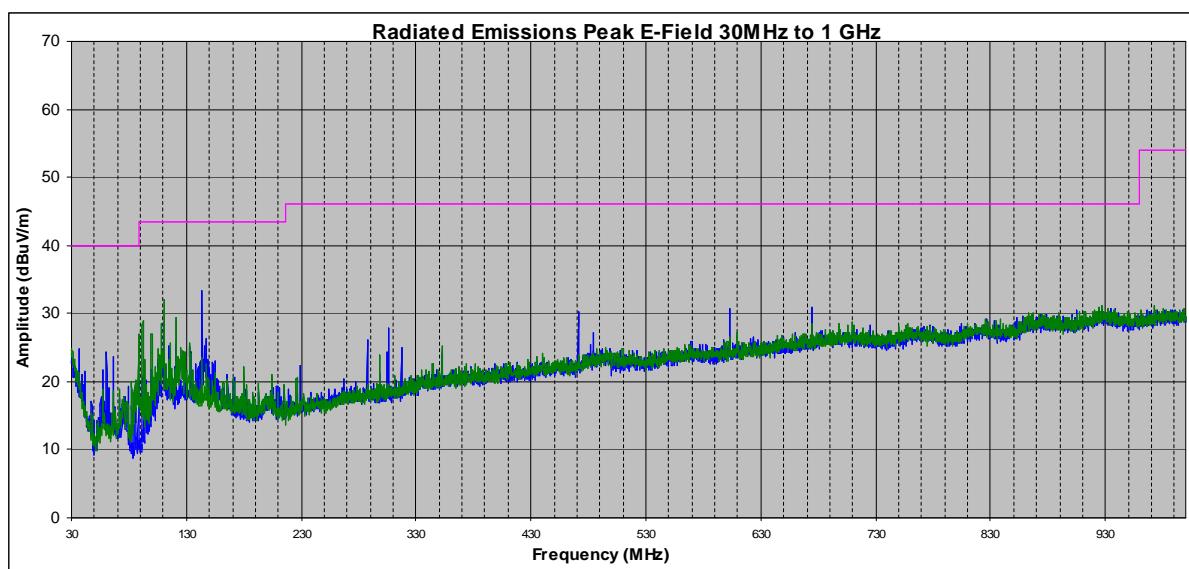
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Results: with Card-to-Cash System

Vertical Polarization

Horizontal Polarization

Limit

**Radiated Emissions Plot**

| Frequency (MHz) | Azimuth (degrees) | Detector (qp/pk) | Antenna Polarization (H/V) | Antenna Height (m) | Raw Amplitude @ 3m (dB μ V/m) | Antenna Factor (dB) | Cable Loss (dB) | Corrected Amplitude @ 3m (dB μ V/m) | Limit @ 3m (dB μ V/m) | Margin |
|--------------------|----------------------|---------------------|----------------------------------|--------------------------|--|---------------------------|-----------------------|--|---------------------------------|--------|
| 60.55 | 350 | PK | V | 1 | 14.9 | 8.67 | 0.79 | 24.35 | 40 | -15.65 |
| 143.58 | 30 | PK | V | 1 | 18.4 | 13.91 | 0.94 | 33.26 | 43.5 | -10.24 |
| 88.1 | 45 | PK | H | 2.1 | 18.1 | 7.96 | 0.87 | 26.93 | 43.5 | -16.57 |
| 91.88 | 60 | PK | H | 1.98 | 19.7 | 8.38 | 0.88 | 28.95 | 43.5 | -14.55 |
| 110.61 | 72 | PK | H | 1.88 | 18.2 | 12.9 | 0.91 | 32 | 43.5 | -11.5 |
| 121.37 | 135 | PK | H | 1.8 | 14.2 | 14.18 | 0.92 | 29.3 | 43.5 | -14.2 |

Radiated Emissions Table**Tested By:** Benjamin Jing**Date Tested:** 12 April 2007



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4 TEST INSTRUMENTATION

4.1 TEST INSTRUMENTATION

| Instrument | Manufacturer | Model | CAL Due Date |
|---------------------|----------------------|--------------|---------------------|
| Spectrum Analyzer | HP | 8568B | 04/26/2007 |
| Quasi-Peak Adapter | HP | 85650A | 04/26/2007 |
| RF Pre-Selector | HP | 85685A | 04/26/2007 |
| Spectrum Analyzer | HP | 8564E | 05/01/2007 |
| Biconlog Antenna | Sunol Sciences, Inc. | JB1 | 09/11/2007 |
| Loop Antenna | ETS-Lingren | 6512 | 05/13/2008 |
| Near Field Probe | Chase | MFP9150 | See Note |
| Chamber | Lingren | 3m | 08/21/2007 |
| DMM | Fluke | 73III | 07/04/2007 |
| Variac | KRM | AEEC-2090 | See Note |
| Environment Chamber | TestEquity | 1007H | 01/24/2009 |
| DMM | Fluke | 73III | 05/01/2007 |

Note: Functional Verification



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APPENDIX A: EUT TEST CONDITIONS

The following is the description of supporting equipment and details of cables used with the EUT.

| Equipment Description (Including Brand Name) | Cable Description |
|---|-------------------|
| SmartKit II System & Cash-to-Card System | 1. DC power |

| | |
|-------------------|--|
| EUT Description : | SmartKit II System & Cash-to-Card System |
| Model No : | RMVD-U4 (SmartKit II) & CCRV-U4 (Cash-to-Card) |
| Serial No : | none |

The following is the description of how the EUT is exercised during testing.

| Test | Description Of Operation |
|------|--|
| | The EUT was set to enter test mode automatically when powered. |



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APPENDIX B: EXTERNAL PHOTOS

See Attachment



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APPENDIX C: CIRCUIT/BLOCK DIAGRAMS

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APPENDIX D: INTERNAL PHOTOS

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APPENDIX E: PRODUCT DESCRIPTION

Detail description of this product is shown in the User's Guide.



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APPENDIX F: FCC LABEL LOCATION

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APPENDIX G: USER MANUAL

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