

# Global EMC Inc. Labs

## EMC & RF Test Report

As per

RSS 210 Issue 7:2007

&

FCC Part 15 Subpart C:2010

Unlicensed Intentional Radiators

on the

Pico Read RFID USB Key



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Testing produced for



See Appendix A for full customer & EUT details.



LAB REGISTRATION #6844A-1



Client	<b>Securekey Technologies</b>	
Product	Pico Read RFID USB Key	
Standard(s)	RSS 210 Issue 7:2007 / FCC Part 15 Subpart C 15:2010	

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Client	<b>Securekey Technologies</b>
Product	Pico Read RFID USB Key
Standard(s)	RSS 210 Issue 7:2007 / FCC Part 15 Subpart C 15:2010



## Report Scope

This report addresses the EMC verification testing and test results of the Pico Read RFID USB Key, 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 7:2007 / FCC Part 15 Subpart C 15:2010

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.

Client	<b>Securekey Technologies</b>
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## Summary

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

EUT FCC Certification #, FCC ID:	YDC-TCL01
EUT Industry Canada Certification #, IC:	8969A-TCL01
EUT Passed all tests performed.	Yes (see test results summary)
Tests conducted by	Scott Drysdale

Client	Securekey Technologies	
Product	Pico Read RFID USB Key	
Standard(s)	RSS 210 Issue 7:2007 / FCC Part 15 Subpart C 15:2010	

## 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
FCC 15.209 RSS-210 (Table 2)	Spurious Radiated emissions	QuasiPeak Average	Pass
<b>Overall Result</b>			<b>PASS</b>

Client	<b>Securekey Technologies</b>
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All tests were performed by Scott Drysdale.

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 '\*'.

### ***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 incorporates an internal PCB trace antenna, and there are no provisions for end user replacement.

For the Restricted Bands of operation, the EUT is designed to only operate at 13.56 MHz.

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## ***Applicable Standards, Specifications and Methods***

ANSI C63.4:2003 - 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 - Code of Federal Regulations – Radio Frequency Devices

CISPR 22:1997 - Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

ICES-003:2004 - 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 210:2007 - Issue 7: Spectrum Management and Telecommunications Policy. Radio Standards Specification Low Power Licence-Exempt Radiocommunication 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 - July 29, 2010

Client	<b>Securekey Technologies</b>
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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 Toronto, Ontario, 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) and Industry Canada (IC). 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)
June 21, 2010	All	SD	20-25°C	30-45%	100 -103kPa

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## **Detailed Test Results Section**

Client	<b>Securekey Technologies</b>
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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 C64:2003

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.

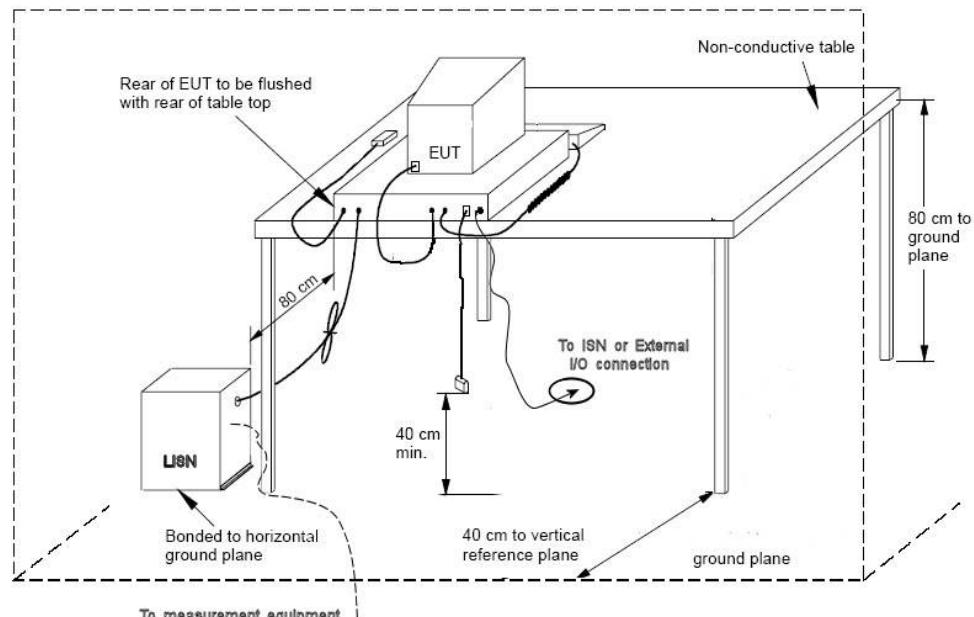
Note: If the Peak or Quasi Peak detector measurements do not exceed the Average limits, then the EUT is deemed to have passed the requirements.

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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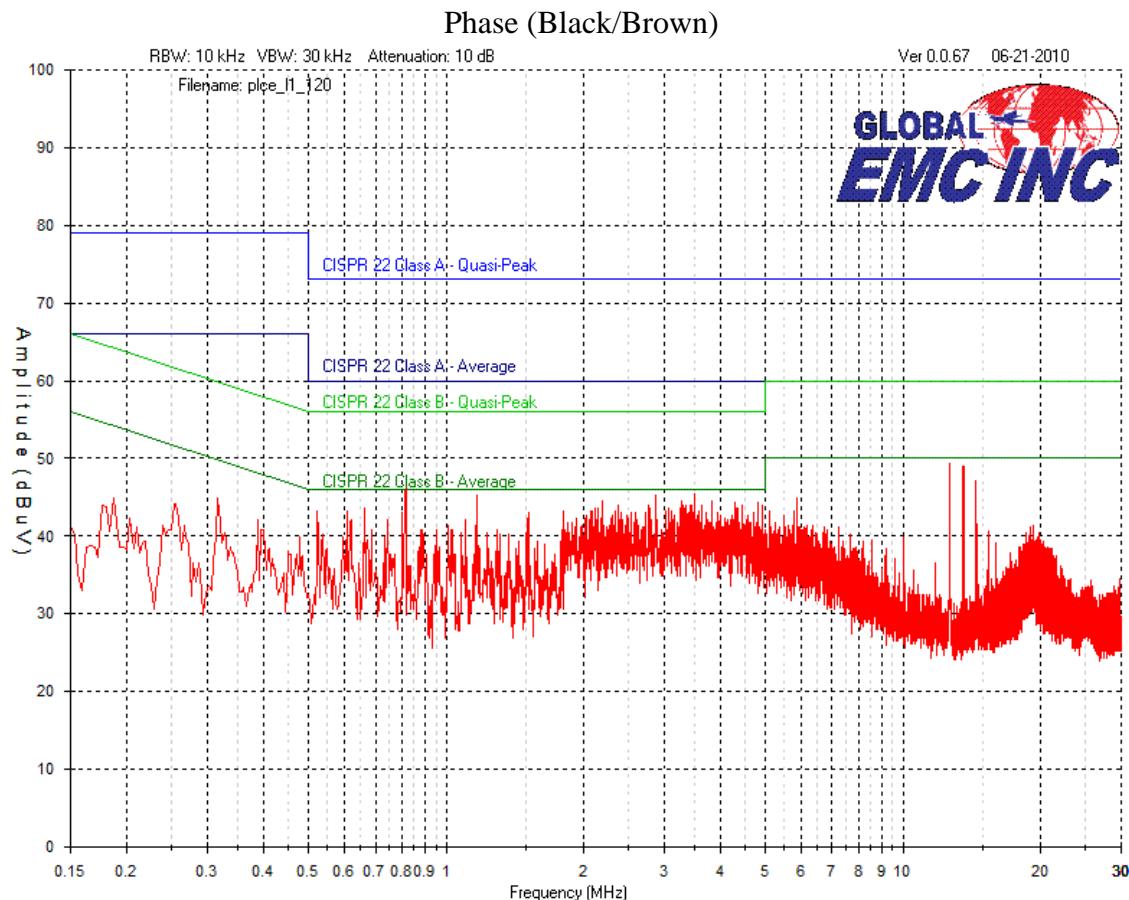
## Measurement Uncertainty

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.

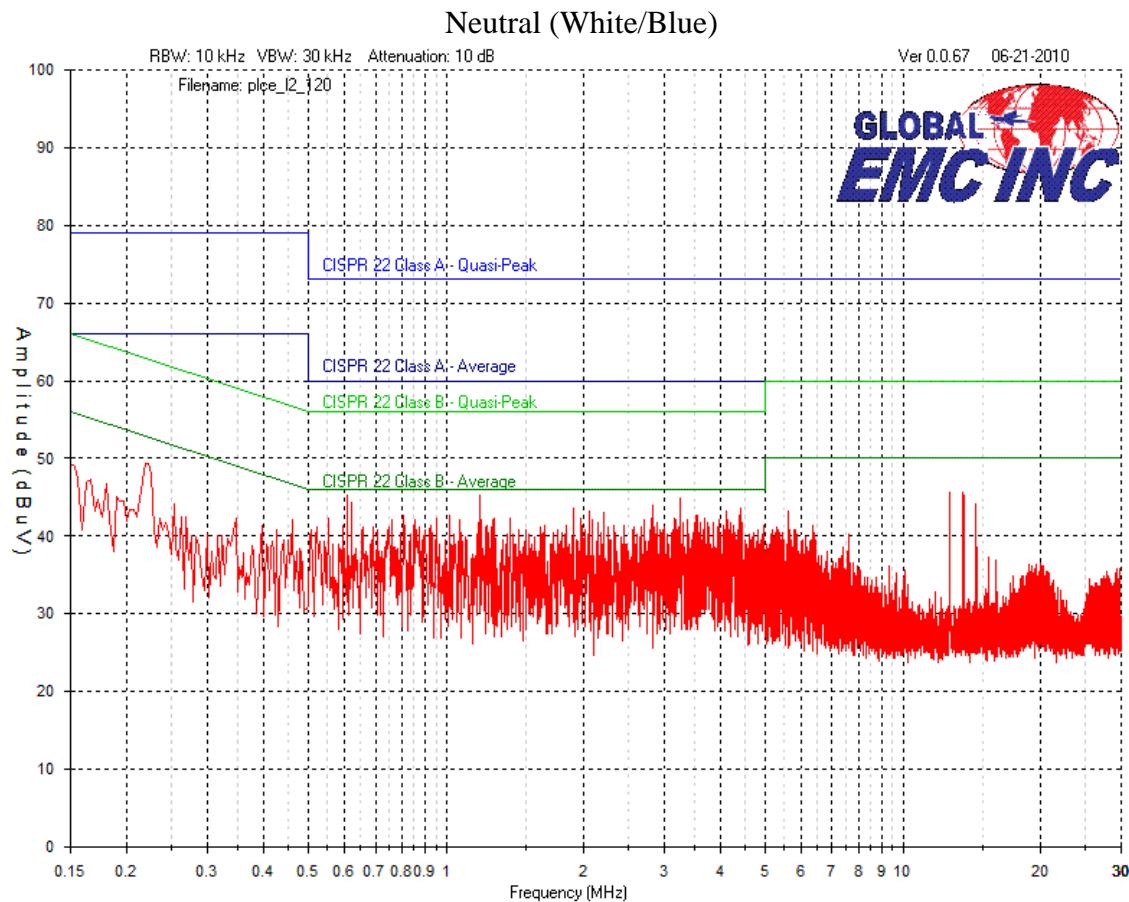
## Preliminary Graphs

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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## Final Measurements

Line 1 – Phase (Black/Brown)

Frequency (MHz)	Raw (dBuV)	Atten Factor (dB)	LISN Factor (dB)	Level (dBuV)	Limit (dB)	Margin (dB)	Pass/Fail
0.82086	16.2	10	0.2	26.4	46	19.6	Pass
3.50608	15.8	10	0.2	26	46	20	Pass
12.659	37.9	10	0.3	48.2	50	1.8	Pass
1.15254	15.6	10	0.2	25.8	46	20.2	Pass
2.89156	17.3	10	0.2	27.5	46	18.5	Pass
13.56174	38.9	10	0.3	49.2	50	0.8	Pass

Line 2 – Neutral (White/Blue)

Frequency (MHz)	Raw (dBuV)	Atten Factor (dB)	LISN Factor (dB)	Level (dBuV)	Limit (dB)	Margin (dB)	Pass/Fail
0.58411	19.2	10	0.2	29.4	46	16.6	Pass
1.15864	18.8	10	0.2	29	46	17	Pass
3.24397	19.4	10	0.2	29.6	46	16.4	Pass
0.6191	19.6	10	0.2	29.8	46	16.2	Pass
2.80803	22.2	10	0.2	32.4	46	13.6	Pass
1.89586	21.3	10	0.2	31.5	46	14.5	Pass

No peak emissions exceeded the quasi-peak limits, therefore the unit was deemed to meet the requirements based on the peak emissions. The tables above represent the peak emissions readings with respect to the average limit.

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 #
IFR Spectrum Analyzer	AN940	IFR	12/29/2009	12/29/2011	GEMC 6350
LISN	FCC-LISN-50/250-16-2-01	FCC	2009-02-11	2011-02-11	GEMC 65
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 28
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
Attenuator 10 dB	FP-50-10	Trilithic	NCR	NCR	GEMC 42

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B\_Rev1"

Client	<b>Securekey Technologies</b>
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Standard(s)	RSS 210 Issue 7:2007 / FCC Part 15 Subpart C 15:2010



## *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 C63.4:2003.

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

1.705 MHz – 30 MHz, 30 uV ( $29.5 \text{ dBuV/m}^1$ ) at 30 m,  $69.5 \text{ dBuV/m}$  at 3 m<sup>4</sup>

30 MHZ – 88 MHz, 100 uV/m ( $40.0 \text{ dBuV/m}^2$ ) at 3 m

88 MHz – 216 MHz, 150 uV/m ( $43.5 \text{ dBuV/m}^2$ ) at 3 m

216 MHz – 960 MHz, 200 uV/m ( $46.4 \text{ dBuV/m}^2$ ) at 3 m

Above 960 MHz, 500 uV/m ( $54.0 \text{ dBuV/m}^2$ ) at 3 m

Above 1000 MHz<sup>3</sup>, 500 uV/m ( $54 \text{ dBuV/m}$ ) at 3m

<sup>1</sup> Limit is 9 kHz bandwidth and using an Average detector, using a loop antenna.

<sup>2</sup> Limit is with 120 kHz measurement bandwidth and a using a Quasi Peak detector.

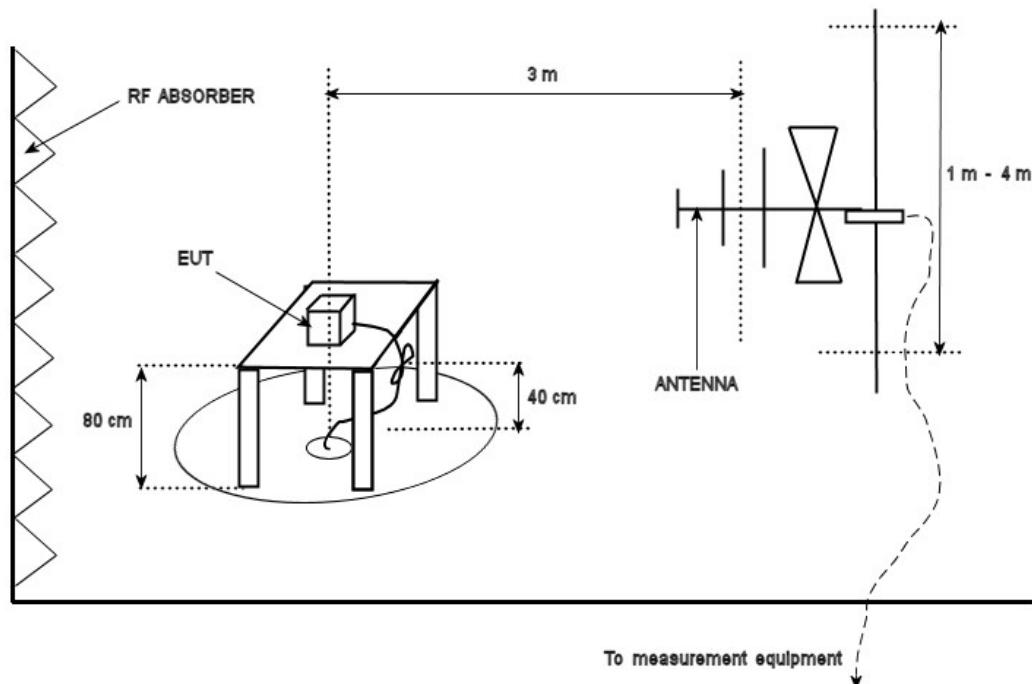
<sup>3</sup> Limit is with 1 MHz measurement bandwidth and using an Average detector

<sup>4</sup> Extrapolated in accordance with 15.31 (f)(2)

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### Typical Radiated Emissions Setup



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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

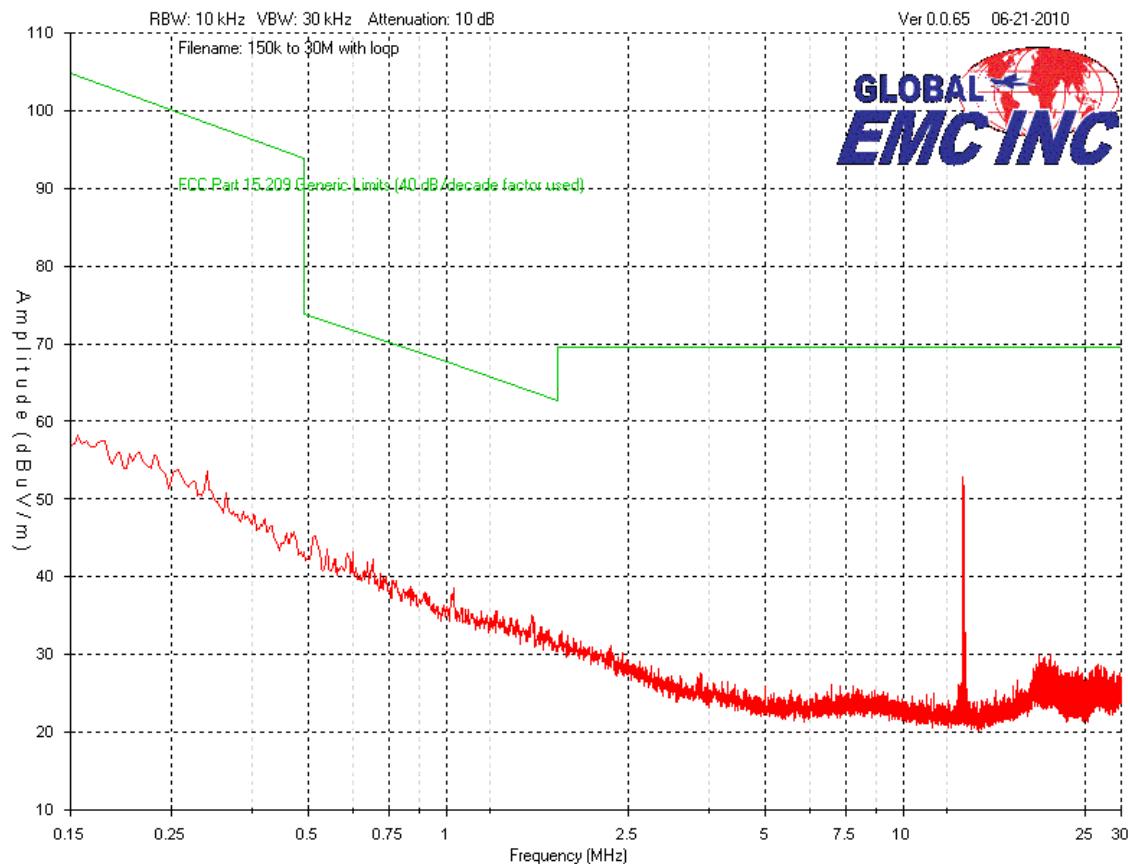
Note the graphs shown below are for graphical illustration only. For final measurements with the appropriate detector, please refer to the final measurement table where applicable. The graph shown below is a maximized peak measurement graph, measured with a resolution bandwidth greater than the final 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.

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

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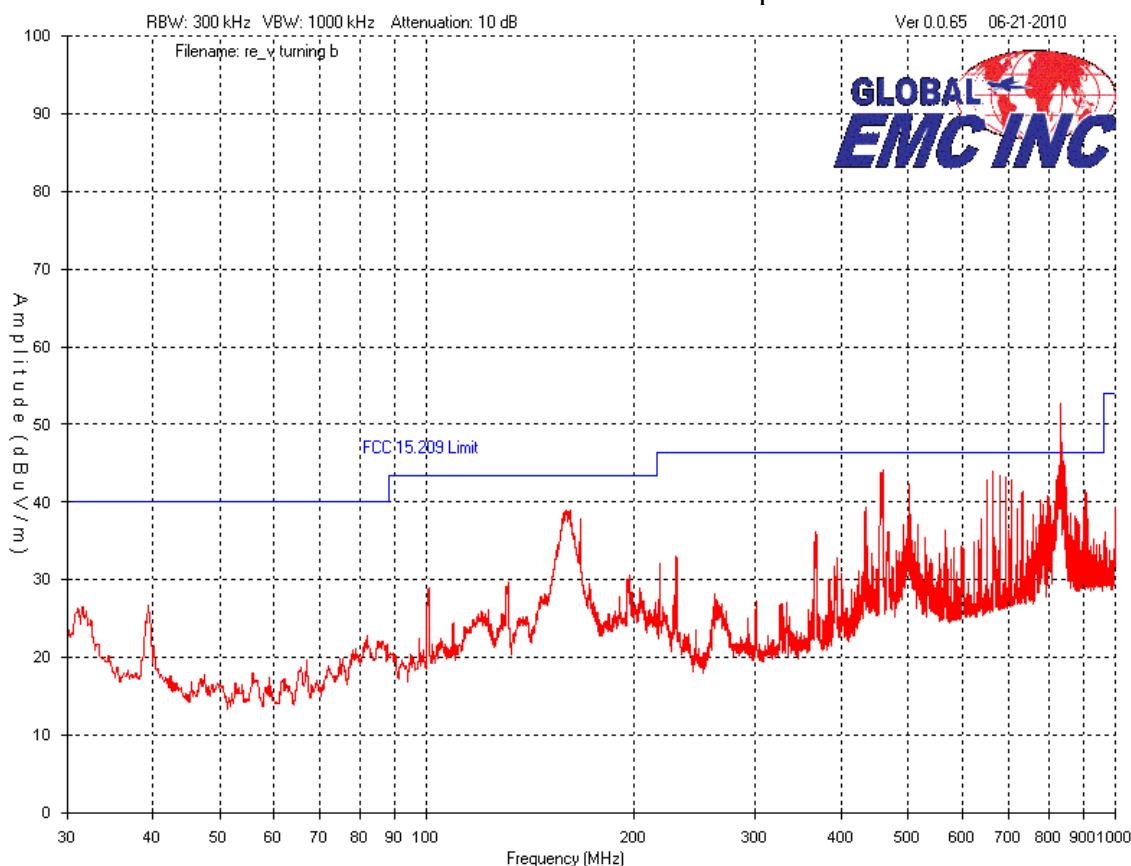
### 1MHz to 30 MHz – Radiated Emissions - Peak



Client	<b>Securekey Technologies</b>
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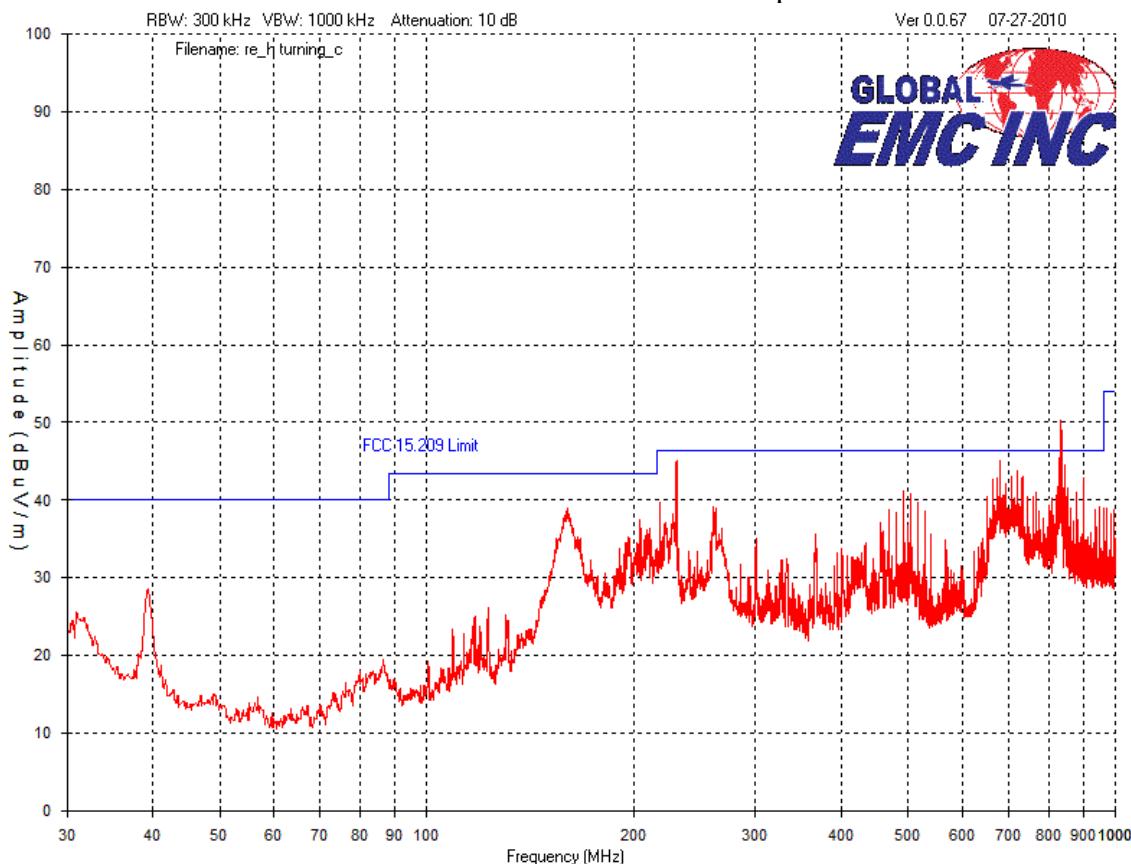
Vertical – Peak Emissions Graph



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Horizontal – Peak Emissions Graph



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## Final Measurements

For information purposes, the fundamental was measured to be 52.9 dBuV/m at 3 meters.

### Fundamental

Peak Emissions Table -

Frequency (MHz)	Raw (dBuV)	Ant. (dB/m)	Current Voltage (dB)	Preamp (dB)	Level (dBuV/m)	Limit (dB)	Margin (dB)	Pass/Fail
13.5594	49.4	-16	51.5	-32	52.9	69.5	16.6	Pass

### Spurious

Quasi Peak Emissions Table - Vertical

Frequency (MHz)	Raw (dBuV)	Ant. (dB/m)	Amp (dB )	Level (dBuV/m)	Limit (dB)	Margin (dB)	Pass/Fail
833.063	50.5	22.6	-30.3	42.8	46.4	3.6	Pass
832.093	49.5	22.5	-30.3	41.7	46.4	4.7	Pass
839.465	42.9	22.7	-30.3	35.3	46.4	11.1	Pass
844.703	42.2	22.8	-30.3	34.7	46.4	11.7	Pass
459.031	57.6	17.6	-31.1	44.1	46.4	2.3	Pass
664.477	53.2	21.4	-30.7	43.9	46.4	2.5	Pass

Quasi Peak Emissions Table - Horizontal

Frequency (MHz)	Raw (dBuV)	Ant. (dB/m)	Amp (dB )	Level (dBuV/m)	Limit (dB)	Margin (dB)	Pass/Fail
230.402	61.1	11.6	-31.7	41	46.4	5.4	Pass
222.739	56.7	11.3	-31.7	36.3	46.4	10.1	Pass
829.765	49.4	22.5	-30.3	41.6	46.4	4.8	Pass
195.676	55.5	10.6	-31.8	34.3	46.4	12.1	Pass
209.353	55.1	10.8	-31.7	34.2	46.4	12.2	Pass
492.787	54.1	17.9	-31	41	46.4	5.4	Pass

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## Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
IFR Spectrum Analyzer	AN940	IFR	12/29/2009	12/29/2011	GEMC 6350
BiLog Antenna	3142-C	ETS	2009-02-12	2011-02-12	GEMC 8
Loop Antenna	EM 6872	Electro Metrics	Aug 16, 2009	Aug 16, 2011	GEMC 71
Attenuator 3 dB	FP-50-3	Trilithic	NCR	NCR	GEMC 40
Schaffner Preamp 9kHz - 2 GHz	CPA9231A	Schaffner	8/26/2008	8/26/2010	GEMC 116
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 28
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
RF Cable 0.5M	LMR-400-0.5M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 31

This report module is based on GEMC template "FCC - 15.209 - Radiated Emissions\_Rev1.doc"

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## Appendix A – EUT Summary

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

### General EUT Description

<b>Manufacturer</b>	SecureKey Technologies
<b>EUT Name</b>	Pico Read RFID USB Key
<b>FCCID</b>	YDC-TCL01
<b>IC #</b>	8969A-TCL01
<b>Approximate Size (LxWxH)</b>	6cm x 3 cm x 2 cm
<b>Equipment Category (Commercial / Residential / Medical)</b>	Commercial
<b>Input Voltage and Frequency</b>	USB powered
<b>Rated Input Current</b>	N/A
<b>Intentional RF ( If yes describe )</b>	RFID
<b>Table Top / Wall mount / Floor standing (choose table top if unsure)</b>	Tabletop (Computer peripheral)
<b>I/O Connectors available on EUT</b>	USB Male
<b>Peripherals required for test</b>	None
<b>Minimum Separation distance from operator</b>	N/A
<b>Types and lengths of all I/O cables</b>	N/A

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’.

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## Appendix B – EUT and Test Setup Photographs

Client	<b>Securekey Technologies</b>
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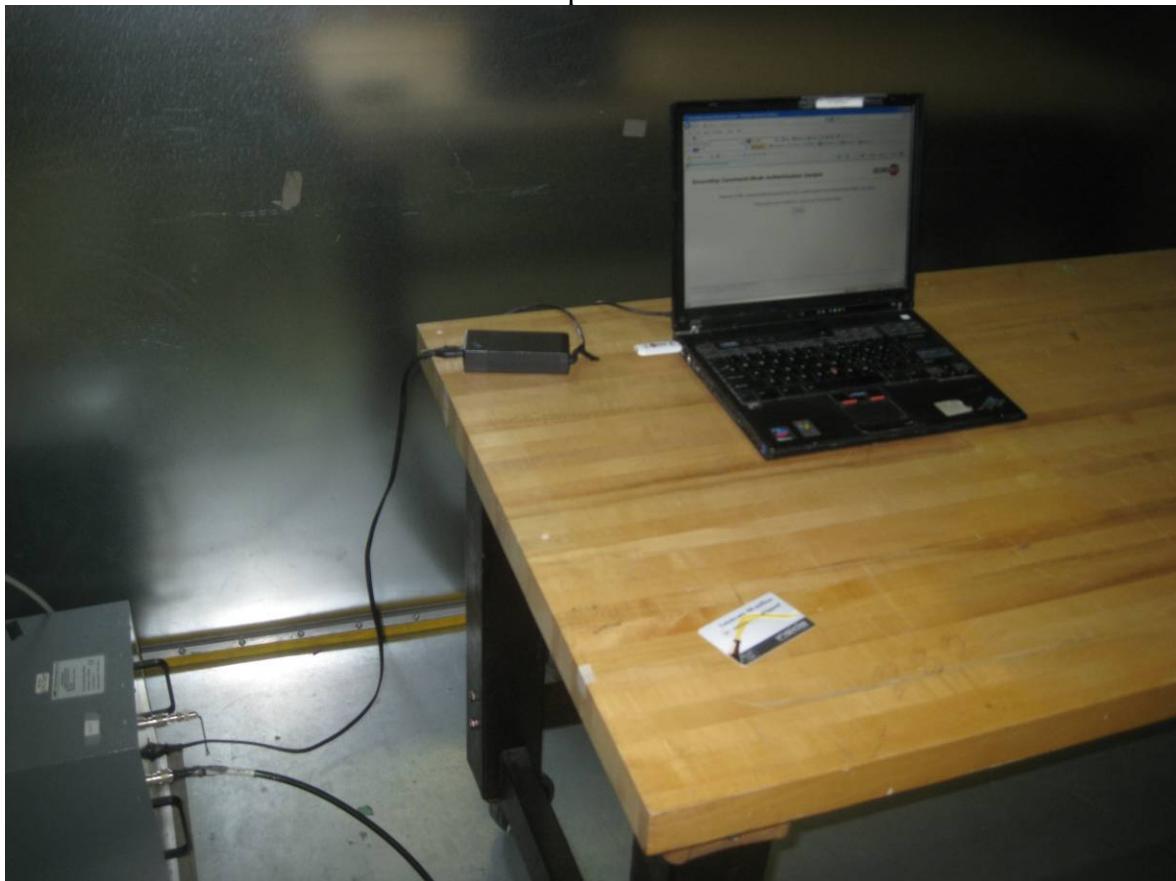
Note: These photos are for information purposes only. Also refer to PDF files that are separate from this test report.

EUT

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Power Line Conducted Emissions Test Setup



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Radiated Emissions – 150 kHz to 30 MHz



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### Radiated Emissions



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Radiated Emissions – Close Up

