

*FCC PART 15.225(a)(d)(e)
And 15.207*

TEST REPORT

For

SINGLE MODULE RFID CARD
Model: ET-SR-X-O-TFS
FCC ID: NNHMETS

Prepared for

SECURA KEY INC
20301 NORDHOFF ST.
CHATSWORTH, CA 91311

Prepared by: _____

REYNALD O. RAMIREZ

Approved by: _____

RUBY A. HALL

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DATE: JULY 10, 2018

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
PAGES	18	2	2	2	11	21	56

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TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
SUMMARY OF TEST RESULTS	5
1. PURPOSE	6
2. ADMINISTRATIVE DATA	7
2.1 Location of Testing	7
2.2 Traceability Statement	7
2.3 Cognizant Personnel	7
2.4 Date Test Sample Was Received	7
2.5 Disposition of the Test Sample	7
2.6 Abbreviations and Acronyms	7
3. APPLICABLE DOCUMENTS	8
4. DESCRIPTION OF TEST CONFIGURATION	9
4.1 Description of Test Configuration – (Emissions)	9
4.1.1 Cable Construction and Termination	10
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	11
5.1 EUT and Accessory List	11
5.2 Emissions Test Equipment	12
6. TEST SITE DESCRIPTION	13
6.1 Test Facility Description	13
6.2 EUT Mounting, Bonding and Grounding	13
7. TEST PROCEDURES	14
7.1 RF Emissions	14
7.1.1 Conducted Emissions Test	14
7.1.2 Radiated Emissions Test	15
7.1.3 Radiated Emissions – Frequency Tolerance	15
7.1.4 Sample Calculations	16
7.1.4 RF Emissions Test Results	17
8. DEVIATIONS FROM THE TEST PROCEDURES	18
9. CONCLUSIONS	18

LIST OF APPENDICES

APPENDIX	TITLE
A	Laboratory Accreditations
B	Modifications to the EUT
C	Additional Models Covered Under This Report
D	Diagrams, Charts and Photos • Test Setup Diagrams • Antenna and Amplifier Gain Factors • Radiated Emissions Photos
E	Data Sheets

LIST OF FIGURES

FIGURE	TITLE
1	Conducted Emissions Test Setup
2	Layout of Semi-Anechoic Chamber

LIST OF TABLES

TABLE	TITLE
1	Conducted Emissions Results
2	Radiated Emissions Results

GENERAL REPORT SUMMARY

This electromagnetic emission report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form except in full, without the written permission of Compatible Electronics.

This report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the Federal Government.

Device Tested: Single Module RFID card
 Model: ET-SR-X-O-TFS
 S/N: None

Product Description: This is a Single Module RFID card.
 (Dimensions: 4.25" x 1 1.5")

Modifications: The EUT was not modified during the testing to comply with the specifications.

Manufacturer: Secura Key Inc
 20301 Nordhoff St.
 Chatsworth, CA 91311

Test Dates: June 29 & August 2, 2018

Test Specifications covered by accreditation:



Emissions requirements
FCC CFR Title 47, Part 15 Subpart C, sections
15.225(a)(d)(e) and 15.207.

Test Procedure: ANSI C63.4: 2014 & ANSI
C63.10: 2013

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz.	Complies with the limits of CFR Title 47, Part 15, Subpart C, 15.207
2	Radiated RF Emissions, 10 kHz – 1000 MHz.	Complies with the limits of CFR Title 47, Part 15, Subpart C, Sections 15.225(a)(d)(e).

1. PURPOSE

This document is a test report based on the Emissions tests performed on the Single Module RFID card Model: ET-SR-X-O-TFS. The Emissions measurements were performed per the measurement procedure described in ANSI C63.4: 2014 & ANSI C63.10: 2013.

The tests were performed to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by CFR Title 47, Part 15, Subpart C, sections 15.225(a)(d)(e) and 15.207.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The emissions tests described herein were performed at the test facilities of Compatible Electronics, 1050 Lawrence Drive, Newbury Park, CA 91320 and 20621 Pascal Way, Lake Forest, CA 92630.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Secura Key Inc

Frank Tajbakhsh	Senior Electronic Engineer
-----------------	----------------------------

Compatible Electronics Inc.

Torey Oliver	Test Engineer
Reynald O. Ramirez	Senior Test Engineer
Ruby A. Hall	Lab Manager

2.4 Date Test Sample Was Received

The test sample was received on July 29, 2018.

2.5 Disposition of the Test Sample

The test sample remains with Compatible Electronics.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
MICR	Magnetic Ink Character Recognition
OCR	Optical Character Recognition
IOT	Image Output Transport
USB	Universal Serial Bus

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this test report.

SPEC	TITLE
FCC Title 47, Part 15 Subpart C	FCC Rules – Radio frequency device (including digital devices) Intentional Radiators
ANSI C63.4 2014	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.
ANSI C63.10 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – (Emissions)

The EUT was tested in a tabletop configuration. The EUT was powered on and when a valid card is presented to the EUT, the unit will activate a relay and illuminate a green LED. The EUT was checked with a card presented continuously and periodically. It was found that both variations were identical and tested with the card presented periodically. All 3 orthogonal axis positions were tested. The purpose of this radiated emissions scan is to verify that the above configuration does not exceed the required limits.

Due to external cabling for a camera and antenna mast controller, a known radio station (88.3 MHz KCLU) appears on the radiated emissions pre-scans. It was found that the radio station does not mask any emissions from the EUT when the camera and antenna mast controller cables were removed from the test chamber.

The final radiated and conducted data was taken in this mode of operation. All initial investigations were performed with the EMI Receiver in manual mode scanning the frequency range continuously.



4.1.1 Cable Construction and Termination

The EUT has no cables.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

#	EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NUMBER
1	SINGLE MODULE RFID CARD (EUT)	SECURA KEY INC	ET-SR-X-O-TFS	NONE FCC ID: NNHMETSr
	RFID CARD	SECURA KEY INC	NONE	NONE
	DC POWER SUPPLY (REMOTELY LOCATED)	BK PRECISION	1670	S/N: 281-6075

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU- FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
TDK Emissions Lab Software	TDK RF Solutions, Inc.	TDK Emissions Lab	Version: 10.78	N/A	N/A
EMI Receiver	Keysight Technologies	N9038A	MY51100115	Jan. 08, 2018	Jan. 08, 2019
LISN (EUT)	Com-Power	LI-215A	191989	Feb. 02, 2018	Feb. 02, 2019
Loop Antenna	Com-Power	AL-130	17067	Jun. 09, 2017	Jun. 09, 2019
Combi-Log Antenna	Com-Power	AC-220	061097	Mar. 12, 2018	Mar. 12, 2019
Turntable	EMCO	2088-2.03	None	NCR	NCR
Antenna Cable	Belden	RG-214/U	A/N: 6014	May 23, 2018	May 23, 2019
Antenna Mast	Com-Power	AM-400	None	NCR	NCR
Multi-Device Controller	ETS EMCO	2090	9511-1095	NCR	NCR
Temperature and Humidity Indicator	Abbeon	HTAB169B	3428	Jun. 18, 2018	Jun. 18, 2019
Barometer	Maximum	Predictor	3429	NCR	NCR
Computer	Dell	Vostro 3900	Asset# 3423	NCR	NCR
EMI Receiver	Rohde & Schwarz	ESIB40	100219	Sep. 06, 2017	Sep. 06, 2018
Chamber	Despatch Industries Inc.	16212A	149857	Mar. 06, 2018	Mar. 06, 2019
Digital Multimeter	Fluke	77	48610715	Mar. 05, 2018	Mar. 05, 2019

6. TEST SITE DESCRIPTION**6.1 Test Facility Description**

Please refer to section 2.1 and 7.1.2 of this report for test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5-meter non-conductive table 0.8 meters above the ground plane.

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The EMI Receiver was used as a measuring meter. The data was collected with the EMI Receiver in the peak detect mode with the "Max Hold" feature activated. The quasi-peak or average was used only where indicated in the data sheets. A 10-dB attenuation pad was used for the protection of the EMI Receiver input stage, and the EMI Receiver offset was adjusted accordingly to read the actual data measured. The EMI Receiver read the LISN output. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 0.15 MHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the EMI Receiver span adjusted to 1 MHz.

The final data was collected under program control by the computer in several overlapping sweeps by running the EMI Receiver at a minimum scan rate of 10 seconds per octave. The six highest emissions are listed in Table 1.0.

7.1.2 Radiated Emissions Test

The EMI Receiver was used as the measuring meter. A built-in, internal preamplifier was used to increase the sensitivity of the instrument. The EMI Receiver was initially used in the Analyzer mode feature activated. In this mode, the EMI receiver can then record the actual frequency to be measured. This final reading is then taken accurately in the EMI Receiver mode, which considers the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. A quasi-peak reading was taken only for those readings, which are marked accordingly on the data sheets. The effective measurement bandwidth used for the radiated emissions test is listed in the table below.

A loop antenna and broadband Combilog antenna were used as transducers during the measurement. A loop antenna was used from 10 kHz to 30 MHz, the Combilog antenna was used from 30 MHz to 1000 MHz. Furthermore, the frequency span was reduced during the preliminary investigations as deemed necessary.

The EMI test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.4, EN 50147-2 and CISPR 22. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength).

The measurement bandwidth and transducer used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Loop Antenna
150 kHz to 30 MHz	9 kHz	Loop Antenna
30 MHz to 1 GHz	120 kHz	CombiLog Antenna

The EUT was tested at a 3-meter test distance. The six highest emissions are listed in Table 2.0.

7.1.3 Radiated Emissions – Frequency Tolerance

The EUT was placed in a temperature cycling chamber. The chamber was set for –20 degrees and the EUT was exposed to this temperature for a period of 30 minutes. The temperature was subsequently increased in 10 degree steps up to + 50 degrees with a 30 minute acclimation periods between each temperature. At each temperature step the EUT was checked with a EMI Receiver to determine whether the carrier signal remained within 0.01% of the fundamental frequency at startup, 2 minutes, 5 minutes and 10 minutes after removal from the temperature chamber. The frequency tolerance of the carrier signal was maintained within 0.01% of the operating temperature variation testing –20 degrees to + 50 degrees C at normal voltage and variations at 85% to 100% at 20 degrees C.

7.1.4 Sample Calculations

A correction factor for the antenna, cable and a distance factor (if any) must be applied to the meter reading before a true field strength reading can be obtained. This Corrected Meter Reading is then compared to the specification limit to determine compliance with the limits.

The equation can be derived in the following manner: Specification limit ($\mu\text{V/m}$) $\log \times 20 =$
Specification Limit in dBuV

(Specification distance / test distance) $\log \times 40 =$ distance factor

Note: When using an Active Antenna, the Antenna factor shall be subtracted due to the combination of the internal amplification and antenna loss. At lower frequencies, the cable loss is negligible.

OR

Corrected Meter Reading = meter reading + F – A + C

where: F = antenna factor
 A = amplifier gain
 C = cable loss

The correction factors for the antenna and the amplifier gain are attached in Appendix D of this report. The data sheets are attached in Appendix E.

The distance factor D is 0 when the test is performed at the required specification distance.

7.1.4 RF Emissions Test Results

Table 1.0 CONDUCTED EMISSION RESULTS 14VDC
SINGLE MODULE RFID CARD MODEL: ET-SR-X-O-TFS

Frequency MHz	Emission Level* dBuV	Average Specification Limit dBuV	Delta (Emissions-Spec. Limit) dB
0.36	16.88A	48.69	-31.81
0.50	14.05A	46.00	-31.95
0.53	14.12A	46.01	-31.89
0.54	19.99A	46.00	-31.34
0.63	13.38A	46.00	-32.62
2.15	17.51A	46.00	-28.49

Table 2.0 RADIATED EMISSION RESULTS
SINGLE MODULE RFID CARD MODEL: ET-SR-X-O-TFS

Frequency MHz	Corrected Reading* dBuV	Specification Limit dBuV	Delta (Cor. Reading – Spec. Limit) dB
30.40 (V) (Y Axis)	33.31 QP	40.00	-6.69
39.60 (H) (Z Axis)	28.51 QP	40.00	-11.49
49.40 (V) (X Axis)	27.55 QP	40.00	-7.90
50.20 (V) (Z Axis)	28.39 QP	40.00	-11.61
104.7 (H) (X Axis)	35.57 QP	43.52	-7.95
189.90 (H) (X Axis)	31.50 QP	43.52	-12.02

Notes:

- (H) Horizontal
- (V) Vertical
- (QP) Quasi Peak
- (A) Average

8. DEVIATIONS FROM THE TEST PROCEDURES

There were no deviations from the test procedures.

9. CONCLUSIONS

The Single Module RFID card Model: ET-SR-X-O-TFS as tested meets all the specification limits defined in CFR Title 47, Subpart C, sections 15.225(a)(d)(e) and 15.207.

APPENDIX A

LABORATORY ACCREDITATIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025.



For the most up-to-date version of our scopes and certificates please visit

<http://celectronics.com/quality/scope/>

Quote from ISO-ILAC-IAF Communiqué on 17025:

"A laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems — Requirements."

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

No modifications were made to the EUT during the testing.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

SINGLE MODULE RFID CARD

Model: ET-SR-X-O-TFS

S/N: NONE

There were no additional models covered under this report.

APPENDIX D

DIAGRAMS, CHARTS AND PHOTOS

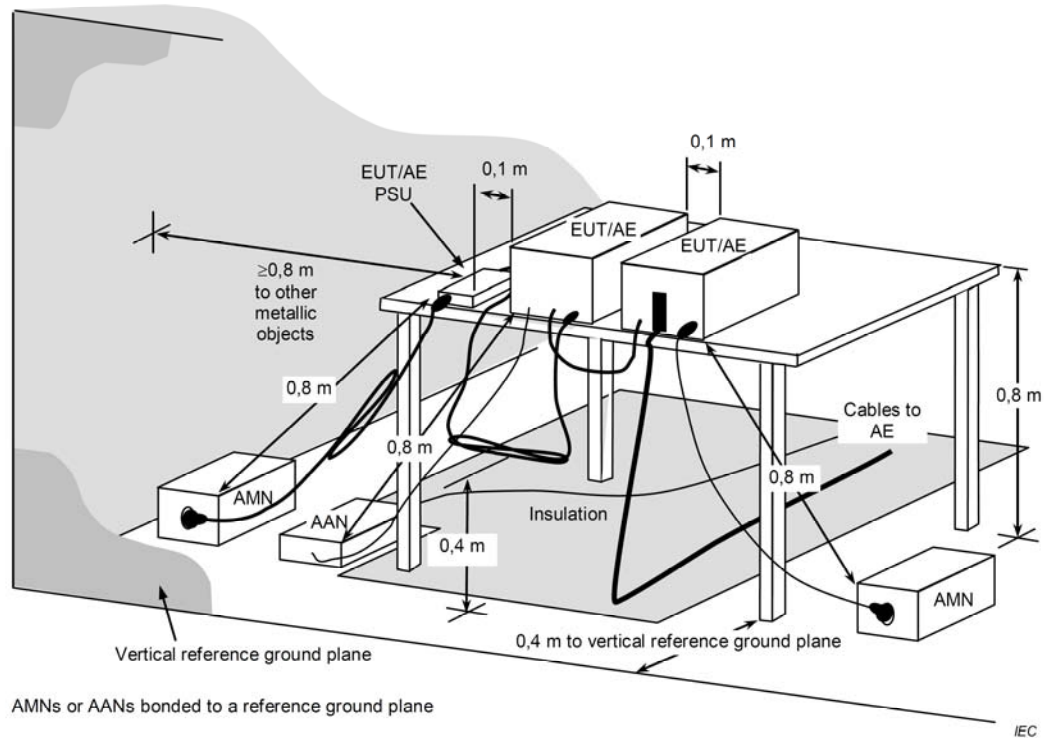
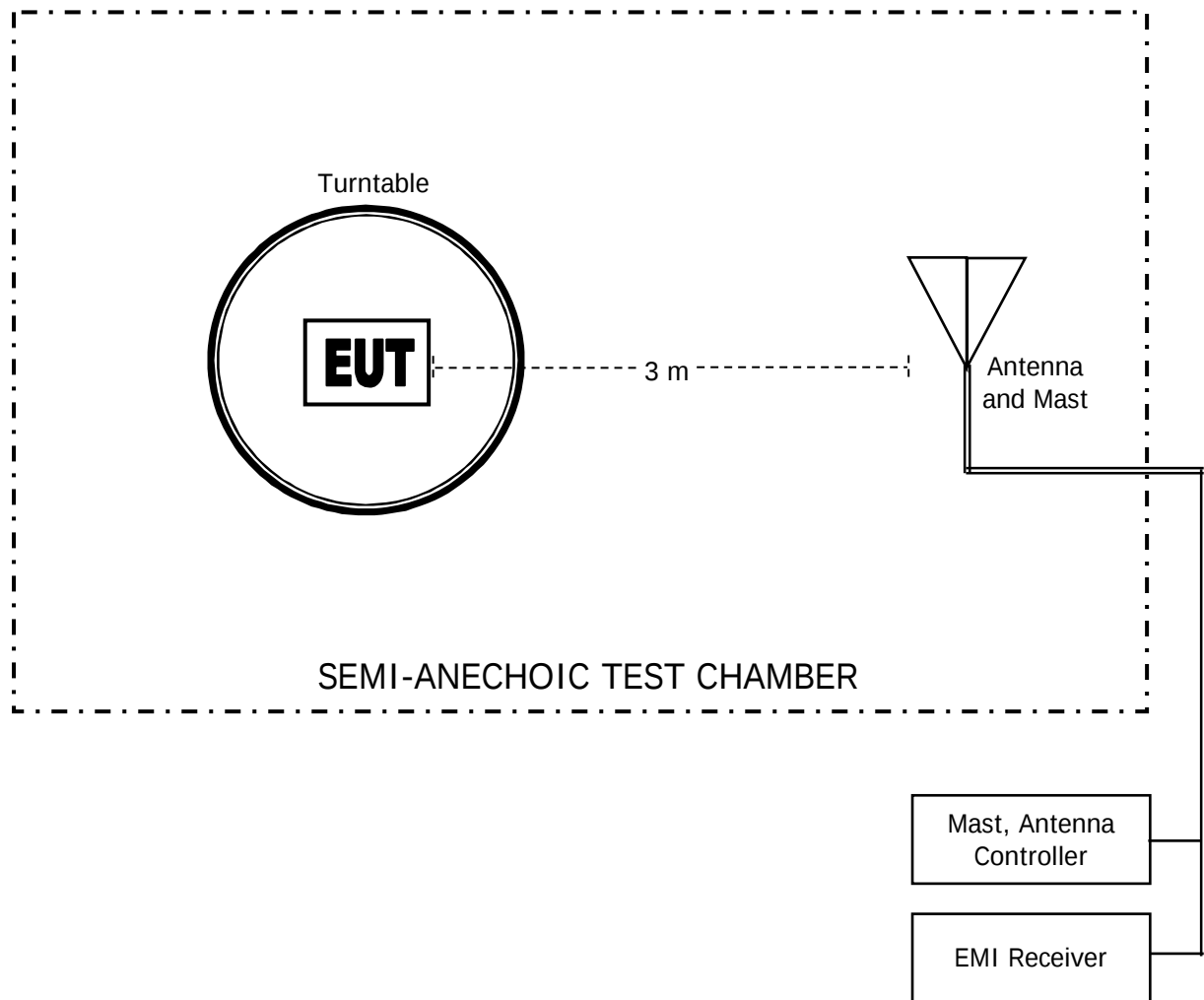
FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

FIGURE 2: LAYOUT OF SEMI-ANECHOIC CHAMBER



COM-POWER AL-130

ACTIVE LOOP ANTENNA

S/N: 17067

CALIBRATION DATE: JUNE 9, 2017

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
0.009	10.48	1	10.56
0.01	10.21	2	10.94
0.02	10.76	3	10.97
0.03	11.18	4	10.85
0.04	10.97	5	11.05
0.05	10.35	6	10.91
0.06	10.31	7	11.15
0.07	10.29	8	11.40
0.08	10.41	9	11.31
0.09	10.29	10	11.44
0.1	10.27	15	9.86
0.2	10.10	20	12.35
0.3	10.11	25	11.88
0.4	10.22	30	11.55
0.5	10.14		
0.6	10.15		
0.7	10.24		
0.8	10.45		
0.9	10.57		

COM-POWER AC-220

COMBI-LOG ANTENNA

S/N: 061097

CALIBRATION DATE: MARCH 12, 2018

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	
25	16.18	450	21.51
30	18.56	500	21.88
35	21.84	550	23.01
40	19.69	600	24.63
45	17.14	650	24.90
50	15.91	700	24.40
60	13.83	750	26.51
70	11.67	800	26.20
80	12.30	850	26.90
90	15.10	900	26.71
100	15.11	950	27.43
120	16.74	1000	27.57
140	15.69		
160	14.91		
180	15.58		
200	15.70		
225	15.70		
250	17.46		
275	17.46		
300	19.37		
350	19.90		
400	21.19		

BELDEN ANTENNA CABLE**RG-214/U****A/N: 6014****CALIBRATION DATE: MAY 23, 2018**

FREQUENCY (MHz)	CABLE LOSS	FREQUENCY (MHz)	CABLE LOSS
0.01	0.0	200	1.5
0.02	0.0	225	1.6
0.05	0.0	250	1.7
0.1	0.1	275	1.8
0.2	0.0	300	1.9
0.5	0.0	350	2.1
1	0.0	400	2.3
2	0.1	450	2.4
5	0.2	500	2.5
10	0.2	550	2.9
20	0.3	600	2.7
30	0.5	650	2.9
40	0.5	700	3.4
50	0.7	750	3.4
60	0.7	800	3.2
70	0.8	850	3.6
80	0.7	900	3.8
90	0.9	950	3.8
100	1.0	1000	4.1
125	1.1		
150	1.2		
175	1.4		



FRONT VIEW

SECURA KEY INC
SINGLE MODULE RFID CARD
MODEL: ET-SR-X-O-TFS
FCC SUBPART C – RADIATED EMISSIONS – 06-29-18

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

SECURA KEY INC
SINGLE MODULE RFID CARD
MODEL: ET-SR-X-O-TFS
FCC SUBPART C – RADIATED EMISSIONS – 06-29-18

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

SECURA KEY INC
SINGLE MODULE RFID CARD
MODEL: ET-SR-X-O-TFS
FCC SUBPART C – CONDUCTED EMISSIONS – 08-02-18

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



FRONT VIEW

SECURA KEY INC
SINGLE MODULE RFID CARD
MODEL: ET-SR-X-O-TFS
FCC SUBPART C – CONDUCTED EMISSIONS – 08-02-18

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



SECURA KEY INC
SINGLE MODULE RFID CARD
MODEL: ET-SR-X-O-TFS
FCC SUBPART C
FREQUENCY VARIATION OVER VOLTAGE AND TEMPERATURE – 07-06-18

PHOTOGRAPH SHOWING THE EUT CONFIGURATION

APPENDIX E

DATA SHEETS

FUNDAMENTAL EMISSIONS

FCC 15.225 (a)

Company: Secura Key
EUT: Single Module RFID Card
Model: ET-SR-X-O-TFS

Date: 6/29/2018
Lab: T
Test Engineer: R. Ramirez

Compatible Electronics, Inc.(Lab T)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Comments
13.56	54.49	H	124.00	-69.51	QP	X Axis
13.56	74.42	V	124.00	-49.58	QP	X Axis
13.56	61.58	H	124.00	-62.42	QP	Y Axis
13.56	47.85	V	124.00	-76.15	QP	Y Axis
13.56	40.39	H	124.00	-83.61	QP	Z Axis
13.56	75.51	V	124.00	-48.49	QP	Z Axis

RADIATED EMISSIONS

FCC 15.225 (d)

Company: Secura Key Inc

Date: 6/29/2018

EUT: Single Module RFID Card

Lab: T

Model: ET-SR-X-O-TFS

Test Engineer: R. Ramirez

Compatible Electronics, Inc.(Lab T)

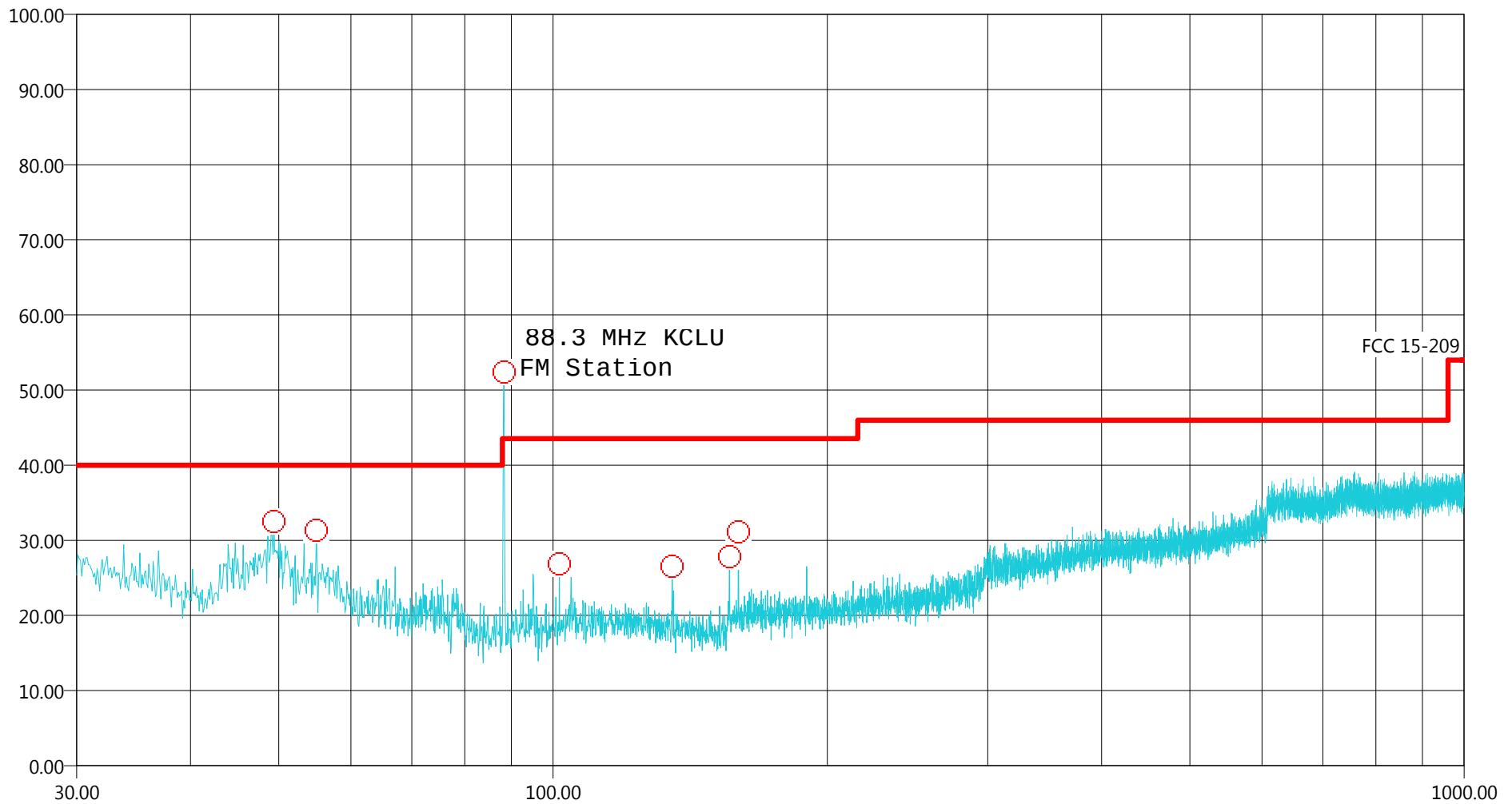
Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Comments
						No frequencies found
						from 9kHz-30 MHz

Title: Radiated Pre-Scan 30-1000 MHz
File: Radiated Pre-Scan 30-1000 MHz X axis
Operator: R. Ramirez
EUT Type: Single Module RFID Card
EUT Condition: X Axis
Comments: Lab T
Clock Oscillators: 13.56 MHz
Company: Secura Key Inc
Model: ET-SR-X-O-TFS
Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 10:32:25 AM
Sequence: Preliminary Scan

Radiated Pre-Scan 30-1000 MHz

Electric Field Strength (dBuV/m)



(PEAK) EMI (H)

(PEAK) EMI (V)

Limit

Title: Radiated Final 30-1000 MHz
 File: Radiated Final 30-1000 MHz x axis
 Operator: R. Ramirez
 EUT Type: Single Module RFID Card
 EUT Condition: X Axis
 Comments: Lab T
 Clock Oscillators: 13.56 MHz
 Company: Secura Key Inc
 Model: ET-SR-X-O-TFS
 Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 10:39:08 AM
 Sequence: Final Measurements

Data

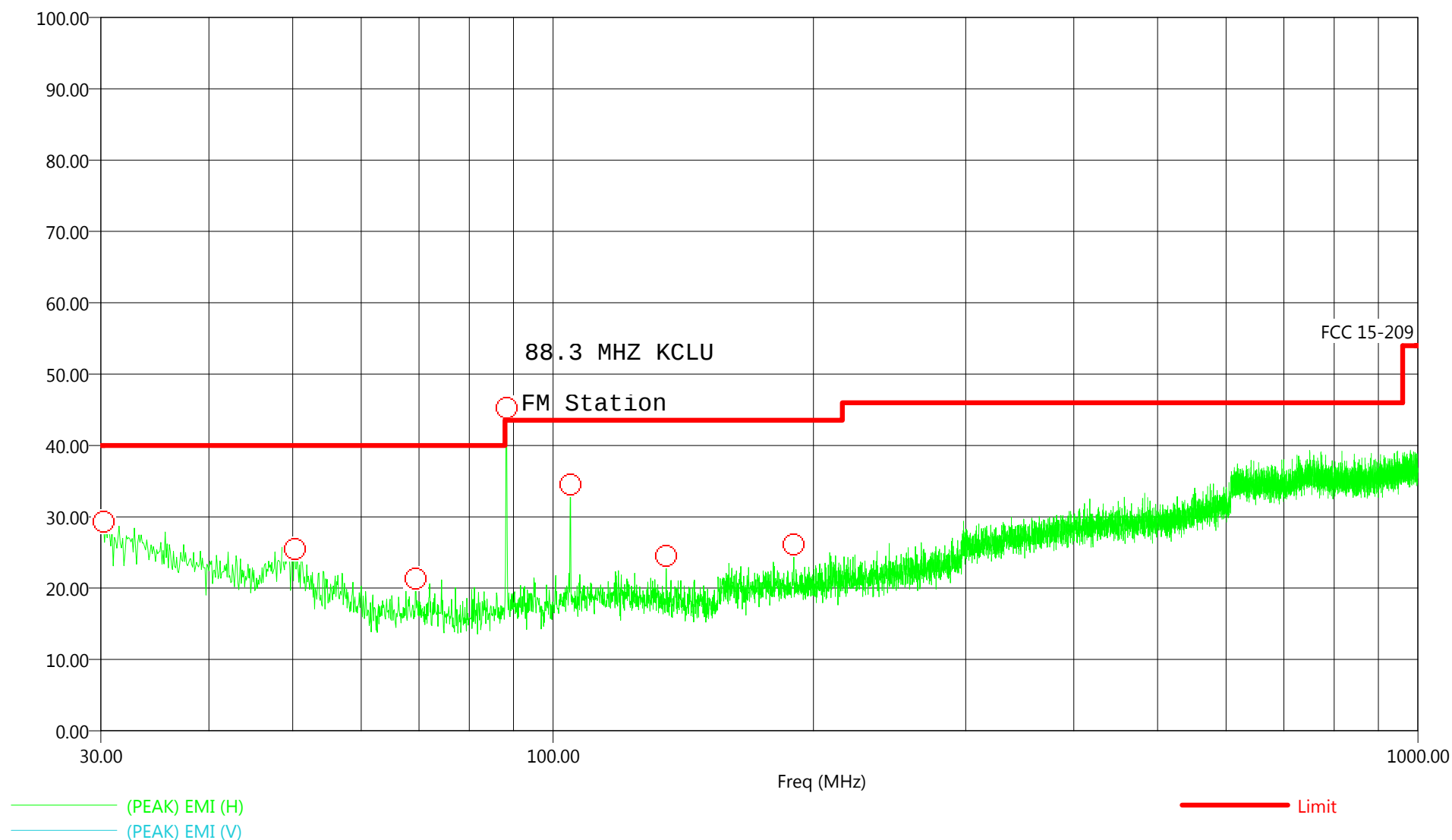
Freq (MHz)	Pol	(PEAK) EMI (dBuV/m)	(QP) EMI (dBuV/m)	Limit (dBuV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Twr Ht (cm)	Ttbl Agl (deg)
49.40	V	35.15	32.10	40.00	-4.85	-7.90		206.80
55.00	V	32.77	27.55	40.00	-7.23	-12.45		350.70
101.60	V	27.65	23.23	43.52	-15.87	-20.29		118.50
135.20	V	29.49	27.36	43.52	-14.03	-16.16		302.60
156.10	V	27.93	25.00	43.52	-15.59	-18.52		350.40
159.70	V	30.07	27.67	43.52	-13.45	-15.85		58.60

Title: Radiated Pre-Scan 30-1000 MHz
File: Radiated Pre-Scan 30-1000 MHz horizontal x axis
Operator: R. Ramirez
EUT Type: Single Module RFID Card
EUT Condition: X Axis
Comments: Lab T
Clock Oscillators: 13.56 MHz
Company: Secura Key Inc
Model: ET-SR-X-O-TFS
Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 10:54:48 AM
Sequence: Preliminary Scan

Radiated Pre-Scan 30-1000 MHz

Electric Field Strength (dBuV/m)



Title: Radiated Final 30-1000 MHz
 File: Radiated Final 30-1000 MHz horizontal x axis
 Operator: R. Ramirez
 EUT Type: Single Module RFID Card
 EUT Condition: X Axis
 Comments: Lab T
 Clock Oscillators: 13.56 MHz
 Company: Secura Key Inc
 Model: ET-SR-X-O-TFS
 Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 10:59:13 AM
 Sequence: Final Measurements

Data

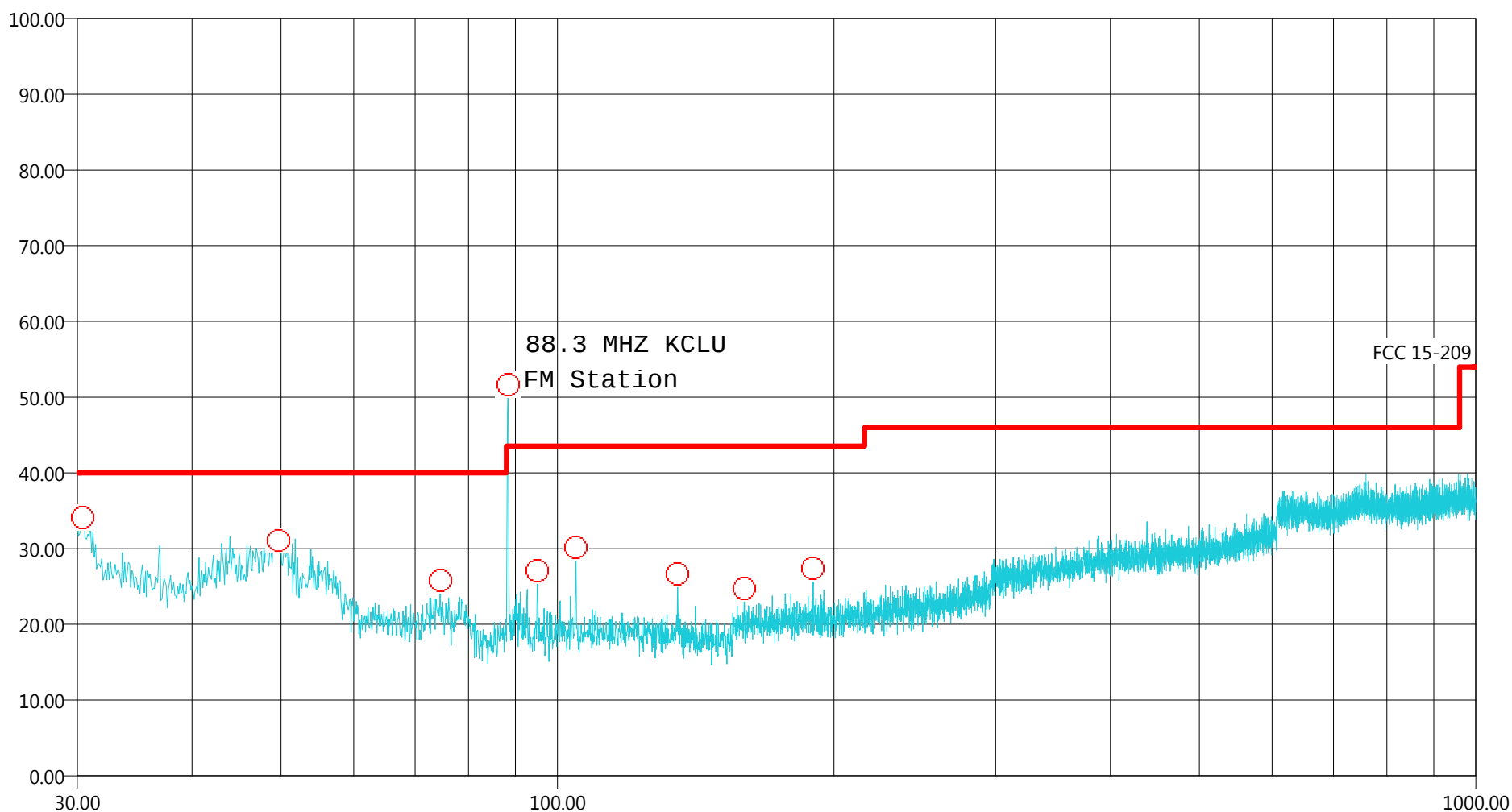
Freq (MHz)	Pol	(PEAK) EMI (dBuV/m)	(QP) EMI (dBuV/m)	Limit (dBuV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Twr Ht (cm)	Ttbl Agl (deg)
30.20	H	35.60	32.37	40.00	-4.40	-7.63		318.90
50.30	H	28.52	25.83	40.00	-11.48	-14.17		274.80
69.40	H	23.79	20.72	40.00	-16.21	-19.28		129.40
104.70	H	36.57	35.57	43.52	-6.95	-7.95		95.50
135.20	H	28.13	25.87	43.52	-15.39	-17.65		271.40
189.80	H	33.98	31.50	43.52	-9.54	-12.02		51.70

Title: Radiated Pre-Scan 30-1000 MHz
File: Radiated Pre-Scan 30-1000 MHz vertical y axis
Operator: R. Ramirez
EUT Type: Single Module RFID Card
EUT Condition: Y Axis
Comments: Lab T
Clock Oscillators: 13.56 MHz
Company: Secura Key Inc
Model: ET-SR-X-O-TFS
Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 1:00:06 PM
Sequence: Preliminary Scan

Radiated Pre-Scan 30-1000 MHz

Electric Field Strength (dBuV/m)



— (PEAK) EMI (H)
— (PEAK) EMI (V)

— Limit

Title: Radiated Final 30-1000 MHz
 File: Radiated Final 30-1000 MHz vertical y axis
 Operator: R. Ramirez
 EUT Type: Single Module RFID Card
 EUT Condition: Y Axis
 Comments: Lab T
 Clock Oscillators: 13.56 MHz
 Company: Secura Key Inc
 Model: ET-SR-X-O-TFS
 Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 1:06:45 PM
 Sequence: Final Measurements

Data

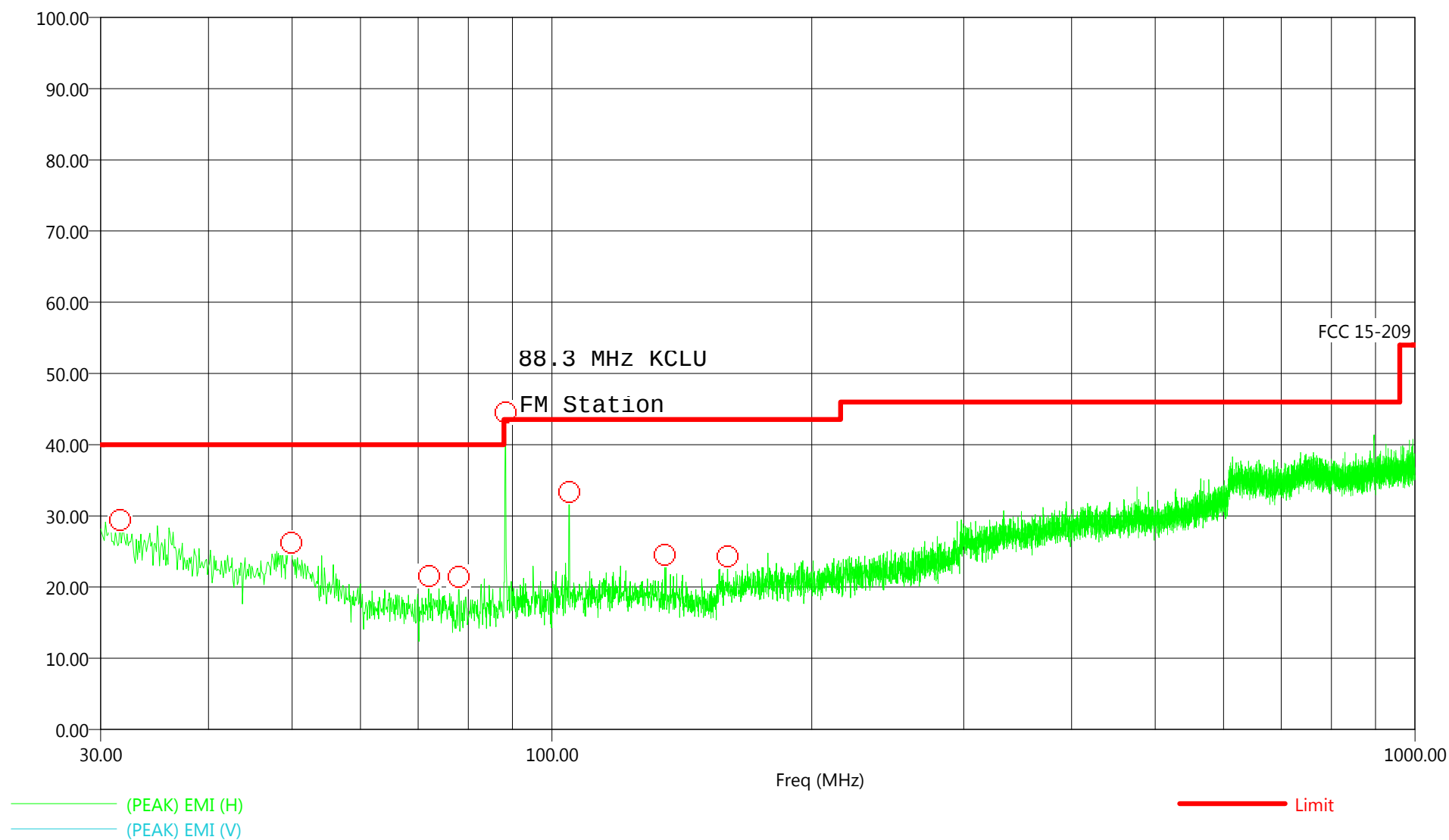
Freq (MHz)	Pol	(PEAK) EMI (dBuV/m)	(QP) EMI (dBuV/m)	Limit (dBuV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Twr Ht (cm)	Ttbl Agl (deg)
30.40	V	37.40	33.31	40.00	-2.60	-6.69		172.40
49.70	V	33.23	30.07	40.00	-6.77	-9.93		177.80
74.50	V	25.42	22.80	40.00	-14.58	-17.20		70.60
135.20	V	29.66	27.63	43.52	-13.86	-15.89		46.00
159.70	V	27.48	24.90	43.52	-16.04	-18.62		337.40
189.80	V	30.80	26.56	43.52	-12.72	-16.96		178.40

Title: Radiated Pre-Scan 30-1000 MHz
File: Radiated Pre-Scan 30-1000 MHz horizontal y axis
Operator: R. Ramirez
EUT Type: Single Module RFID Card
EUT Condition: Y Axis
Comments: Lab T
Clock Oscillators: 13.56 MHz
Company: Secura Key Inc
Model: ET-SR-X-O-TFS
Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 11:13:38 AM
Sequence: Preliminary Scan

Radiated Pre-Scan 30-1000 MHz

Electric Field Strength (dBuV/m)



Title: Radiated Final 30-1000 MHz
 File: Radiated Final 30-1000 MHz horizontal y axis
 Operator: R. Ramirez
 EUT Type: Single Module RFID Card
 EUT Condition: Y Axis
 Comments: Lab T
 Clock Oscillators: 13.56 MHz
 Company: Secura Key Inc
 Model: ET-SR-X-O-TFS
 Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 11:22:11 AM
 Sequence: Final Measurements

Data

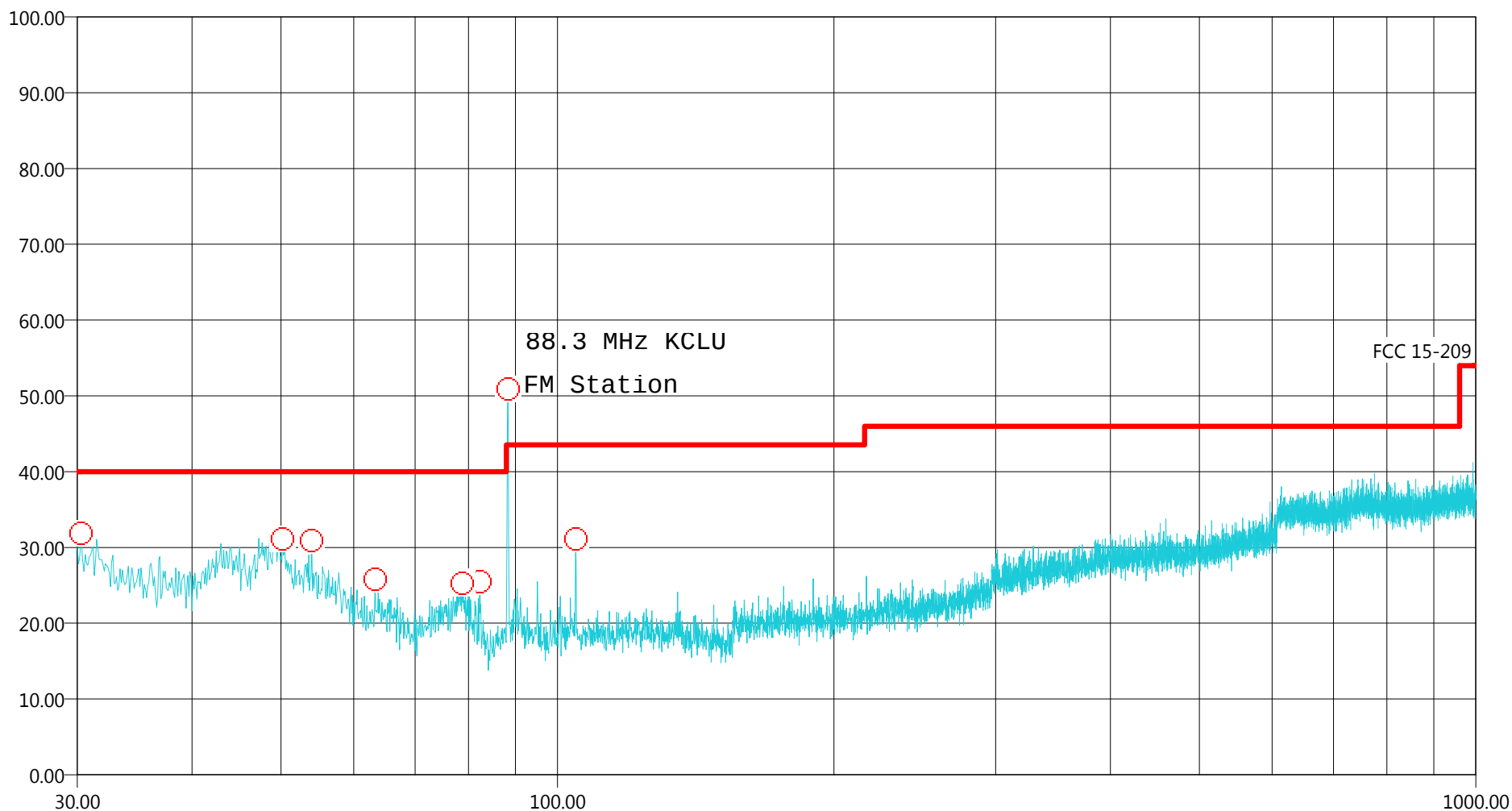
Freq (MHz)	Pol	(PEAK) EMI (dBuV/m)	(QP) EMI (dBuV/m)	Limit (dBuV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Twr Ht (cm)	Ttbl Agl (deg)
31.60	H	35.70	31.85	40.00	-4.30	-8.15		11.30
49.90	H	29.79	25.59	40.00	-10.21	-14.41		353.50
72.00	H	23.62	20.53	40.00	-16.38	-19.47		336.20
78.00	H	22.88	19.75	40.00	-17.12	-20.25		180.50
135.20	H	26.26	23.38	43.52	-17.26	-20.14		118.50
159.80	H	28.52	24.84	43.52	-15.00	-18.68		93.00

Title: Radiated Pre-Scan 30-1000 MHz
File: Radiated Pre-Scan 30-1000 MHz vertical z axis
Operator: R. Ramirez
EUT Type: Single Module RFID Card
EUT Condition: Z Axis
Comments: Lab T
Clock Oscillators: 13.56 MHz
Company: Secura Key Inc
Model: ET-SR-X-O-TFS
Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 1:26:19 PM
Sequence: Preliminary Scan

Radiated Pre-Scan 30-1000 MHz

Electric Field Strength (dBuV/m)



(PEAK) EMI (H)
(PEAK) EMI (V)

Limit

Title: Radiated Final 30-1000 MHz
File: Radiated Final 30-1000 MHz vertical z axis

6/29/2018 1:32:26 PM
Sequence: Final Measurements

Operator: R. Ramirez

EUT Type: Single Module RFID Card

EUT Condition: Z Axis

Comments: Lab T

Clock Oscillators: 13.56 MHz

Company: Secura Key Inc

Model: ET-SR-X-O-TFS

Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

Data

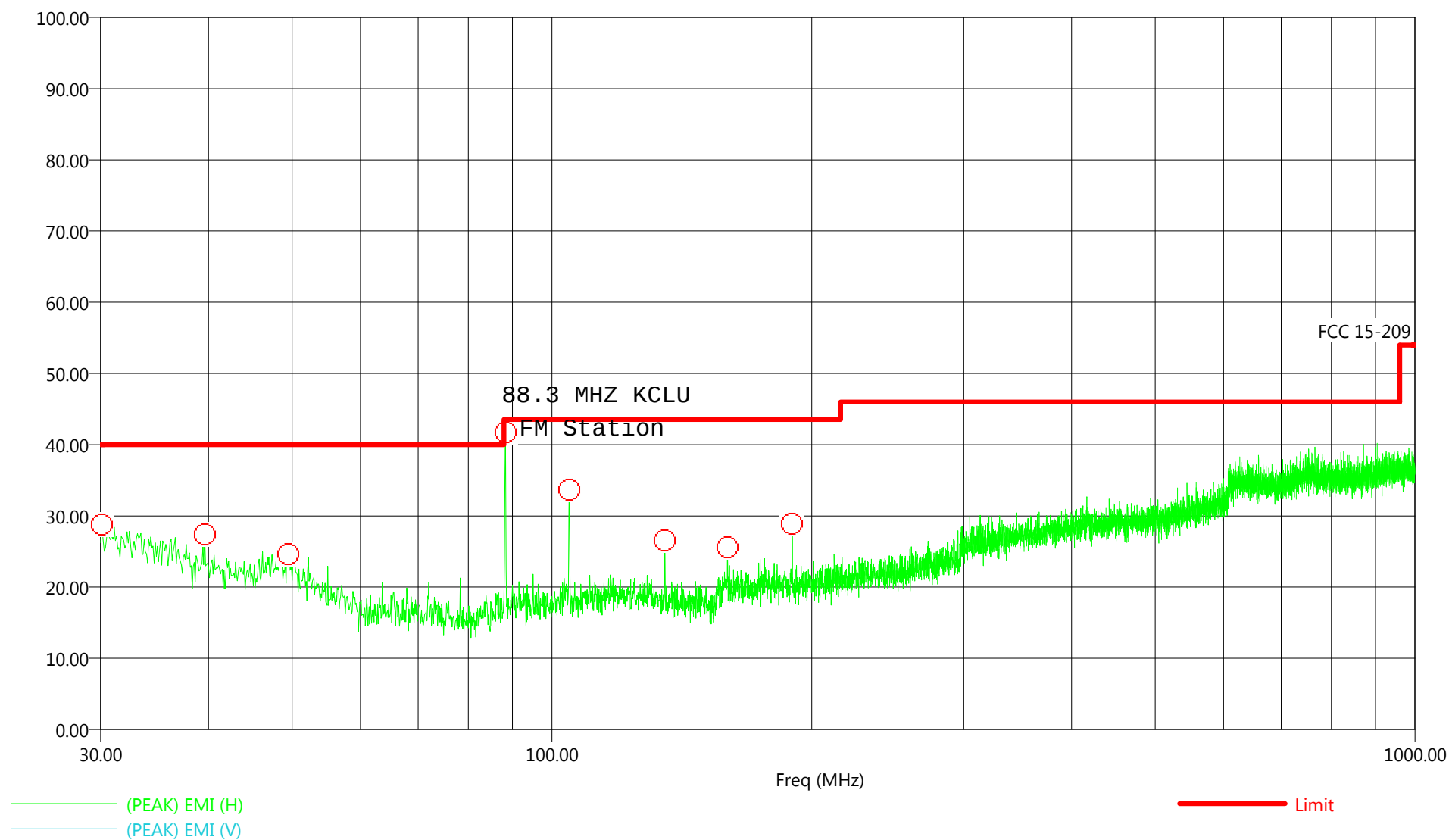
Freq (MHz)	Pol	(PEAK) EMI (dBuV/m)	(QP) EMI (dBuV/m)	Limit (dBuV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Twr Ht (cm)	Ttbl Agl (deg)
30.30	V	36.36	33.22	40.00	-3.64	-6.78		239.80
50.20	V	32.28	28.39	40.00	-7.72	-11.61		98.80
54.00	V	30.64	27.69	40.00	-9.36	-12.31		38.60
63.30	V	28.27	24.01	40.00	-11.73	-15.99		348.70
78.70	V	26.89	23.14	40.00	-13.11	-16.86		46.60
82.30	V	25.93	22.27	40.00	-14.07	-17.73		12.10

Title: Radiated Pre-Scan 30-1000 MHz
File: Radiated Pre-Scan 30-1000 MHz horizontal z axis
Operator: R. Ramirez
EUT Type: Single Module RFID Card
EUT Condition: Z Axis
Comments: Lab T
Clock Oscillators: 13.56 MHz
Company: Secura Key Inc
Model: ET-SR-X-O-TFS
Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 1:55:57 PM
Sequence: Preliminary Scan

Radiated Pre-Scan 30-1000 MHz

Electric Field Strength (dBuV/m)



Title: Radiated Final 30-1000 MHz
 File: Radiated Final 30-1000 MHz horizontal z axis
 Operator: R. Ramirez
 EUT Type: Single Module RFID Card
 EUT Condition: Z Axis
 Comments: Lab T
 Clock Oscillators: 13.56 MHz
 Company: Secura Key Inc
 Model: ET-SR-X-O-TFS
 Temperature: 70 F Humidity: 66 % Air Pressure: 30 inHg

6/29/2018 1:59:18 PM
 Sequence: Final Measurements

Data

Freq (MHz)	Pol	(PEAK) EMI (dBuV/m)	(QP) EMI (dBuV/m)	Limit (dBuV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Twr Ht (cm)	Ttbl Agl (deg)
30.10	H	35.78	32.45	40.00	-4.22	-7.55		354.60
39.60	H	31.22	28.51	40.00	-8.78	-11.49		268.40
49.50	H	29.38	25.94	40.00	-10.62	-14.06		333.00
135.20	H	30.44	28.34	43.52	-13.08	-15.18		291.50
159.70	H	31.56	26.80	43.52	-11.96	-16.72		66.00
189.80	H	33.77	31.01	43.52	-9.75	-12.51		318.80

FREQUENCY VARIATIONS OVER TEMPERATURE

FCC 15.225

Company: Secura Key Inc
EUT: Single Module RFID Card
Model: ET-SR-X-O-TFS

Date: 7/6/2018
Lab: R
Test ENG: Torey Oliver

Compatible Electronics, Inc. FAC-3

Specified (MHz)	Measurement (MHz)	Frequency Deviation (MHz)	Limit (MHz)	Margin (MHz)	Comments
13.56	13.56016	0.00016	0.001356	-0.001196	Temperature +50C
13.56	13.56041	0.00041	0.001356	-0.000946	Temperature -20C

FREQUENCY VARIATIONS OVER VOLTAGE

FCC 15.225

Company: Secura Key Inc
EUT: Single Module RFID Card
Model: ET-SR-X-O-TFS

Date: 7/6/2018
Lab: R
Test ENG: Torey Oliver

Compatible Electronics, Inc. FAC-3

Specified (MHz)	Measurement (MHz)	Frequency Deviation (MHz)	Limit (MHz)	Margin (MHz)	Comments
13.56	13.56028	0.00028	0.001356	-0.001076	115% Operating Voltage (16.1VDC)
13.56	13.56028	0.00028	0.001356	-0.001076	85% Operating Voltage (11.9VDC)

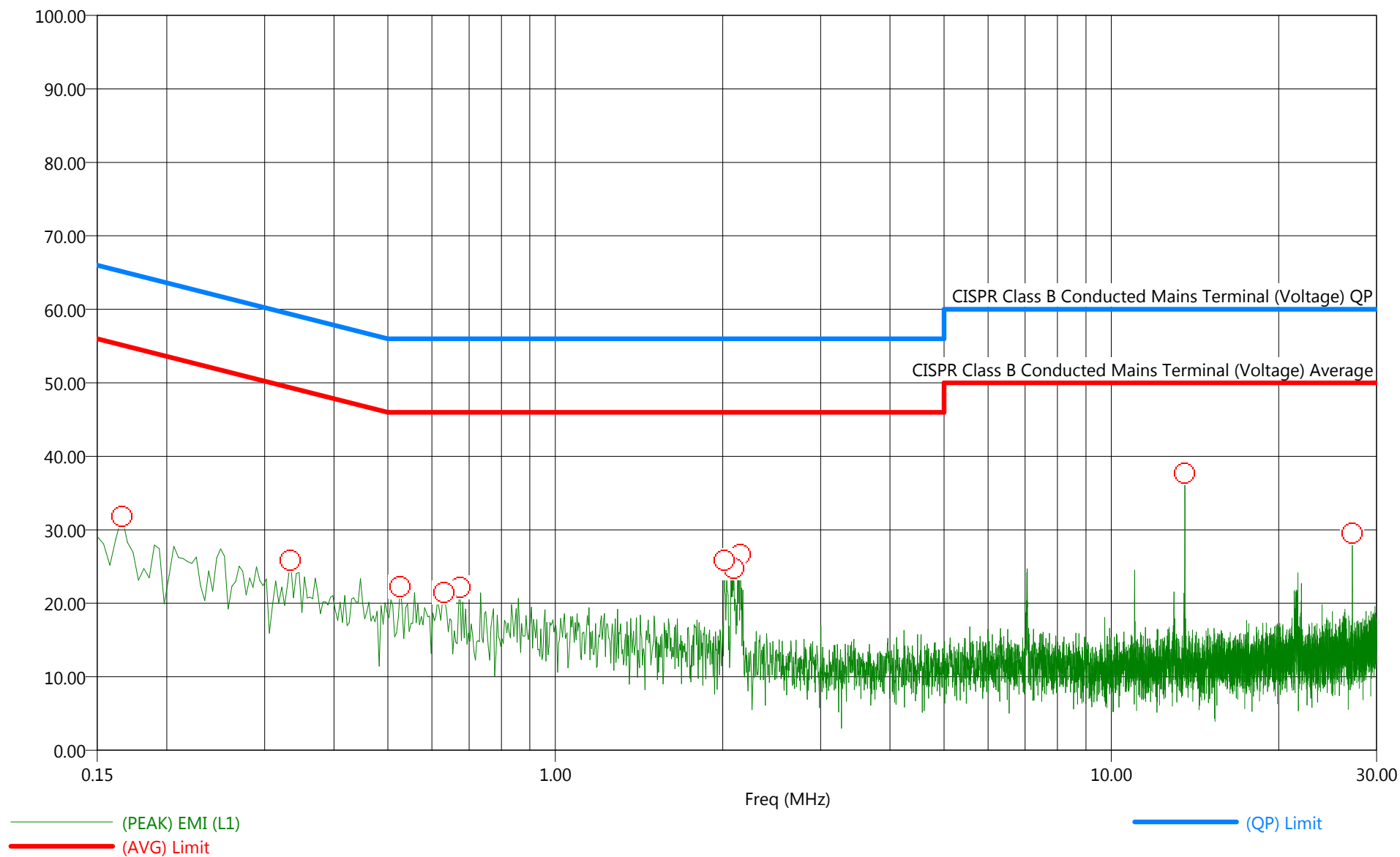
The measurements were taken at the temperature of 20C

Title: Conducted Emissions - Line
File: Conducted - Pre-Test - positive
Operator: R. Ramirez
EUT Type: Single Module RFID Card
EUT Condition:
Comments: Lab T
Company: Secura Key
Model: ET-SR-X-OTFS
Voltage: 14VDC

8/2/2018 8:42:30 AM
Sequence: Preliminary Scan

Conducted Line

Voltage (dBuV)



Title: Conducted Emissions - Line
 File: Conducted - Final Test - positive
 Operator: R. Ramirez
 EUT Type: Single Module RFID Card
 EUT Condition:
 Comments: Lab T
 Company: Secura Key
 Model: ET-SR-X-OTFS
 Voltage: 14VDC

8/2/2018 8:45:55 AM
 Sequence: Final Measurements

Data

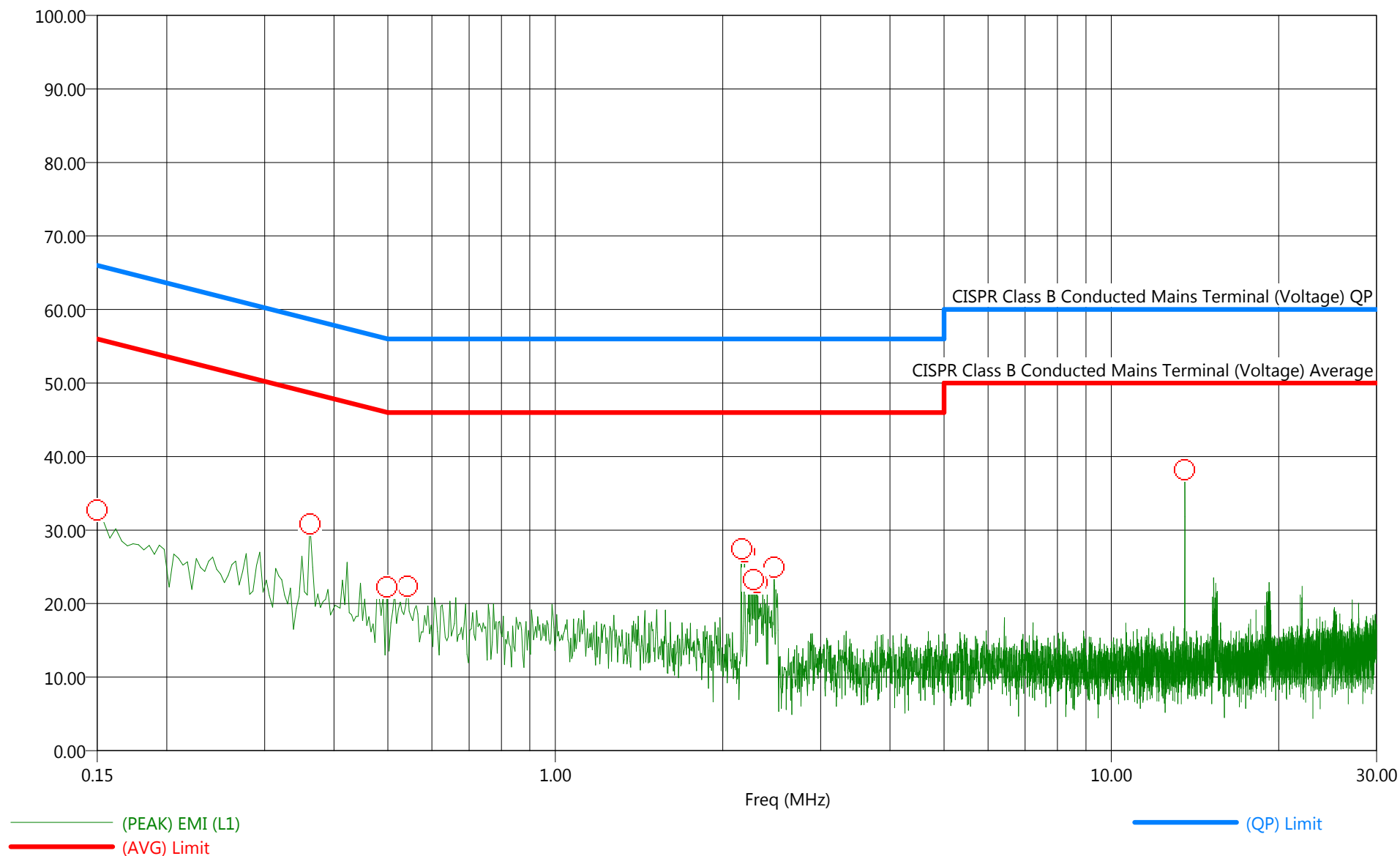
Freq (MHz)	(PEAK) EMI (dBuV)	(AVG) EMI (dBuV)	(QP) EMI (dBuV)	(AVG) Limit (dBuV)	(QP) Limit (dBuV)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)
0.17	27.49	19.88	25.33	55.48	65.48	-35.60	-40.15
0.33	24.76	17.08	23.86	49.52	59.52	-32.44	-35.66
0.53	24.89	14.12	20.40	46.01	56.01	-31.89	-35.61
0.63	21.11	13.38	19.73	46.00	56.00	-32.62	-36.27
0.67	22.11	13.58	18.93	46.00	56.00	-32.42	-37.07
2.01	17.41	11.38	18.22	46.00	56.00	-34.62	-37.78
2.09	16.58	10.30	18.84	46.00	56.00	-35.70	-37.16
2.15	17.66	17.51	17.50	46.00	56.00	-28.49	-38.50

Title: Conducted Emissions - Neutral
File: Conducted - Pre-Test - Negative
Operator: R. Ramirez
EUT Type: Single Module RFID Card
EUT Condition:
Comments: Lab T
Company: Secura Key
Model: ET-SR-X-OTFS
Voltage: 14VDC

8/2/2018 8:37:29 AM
Sequence: Preliminary Scan

Conducted Neutral

Voltage (dBuV)



Title: Conducted Emissions - Neutral
 File: Conducted - Final Test - Negative
 Operator: R. Ramirez
 EUT Type: Single Module RFID Card
 EUT Condition:
 Comments: Lab T
 Company: Secura Key
 Model: ET-SR-X-OTFS
 Voltage: 14VDC

8/2/2018 8:39:36 AM
 Sequence: Final Measurements

Data

Freq (MHz)	(PEAK) EMI (dBuV)	(AVG) EMI (dBuV)	(QP) EMI (dBuV)	(AVG) Limit (dBuV)	(QP) Limit (dBuV)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)
0.15	25.20	18.39	25.00	55.65	65.65	-37.26	-40.65
0.36	24.46	16.88	22.97	48.69	58.69	-31.81	-35.72
0.50	21.31	14.05	20.38	46.00	56.00	-31.95	-35.62
0.54	21.68	14.66	19.99	46.00	56.00	-31.34	-36.01
2.16	17.76	10.19	17.62	46.00	56.00	-35.81	-38.38
2.19	17.74	10.22	17.09	46.00	56.00	-35.78	-38.91
2.27	23.74	9.98	16.51	46.00	56.00	-36.02	-39.49
2.31	14.33	6.53	14.69	46.00	56.00	-39.47	-41.31
2.47	14.79	7.04	13.57	46.00	56.00	-38.96	-42.43