



REPORT

For

Guard RFID Solutions Inc.

#140-766 Cliveden Place
Delta, British Columbia
V3M 6C7, Canada

Date: 31 August 2018
Report No.: 16702-12E
Revision No.: 1
Project No.: 16702
Equipment: Tag Reader 2
Model No.: TR-2

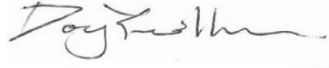


ONE STOP GLOBAL CERTIFICATION SOLUTIONS



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TEST REPORT_FCC 15 and ICES-003, Class B	
Report Reference No.....:	16702-12E
Report Revision History	<input checked="" type="checkbox"/> Rev. 0: 18 May 2018 <input checked="" type="checkbox"/> Rev. 1: 31 August 2018
Compiled by (+ signature)	Daniel Lee 
Approved by (+ signature).....:	Jeremy Lee 
Date of issue.....:	31 August 2018
Total number of pages	13
Testing Laboratory Name.....:	LabTest Certification Inc.
Address	3128-20800 Westminster HWY, Richmond, B.C. V6V 2W3 Canada
FCC Site Registration No.....:	CA5970
IC Site Registration No.....:	5970A-2
Test Site Location Name	LabTest Certification Inc.
Address	3128-20800 Westminster Hwy, Richmond, B.C. V6V 2W3 Canada
Applicant's name	Guard RFID Solutions Inc.
Address	#140-766 Cliveden Place, Delta, BC, V3M 6C7, Canada
Manufacturer's Name	Same as Applicant
Address	Same as Applicant
Test specification:	
Standard	<ul style="list-style-type: none"> ➤ FCC Part 15:2018 ➤ ICES-003, Issue 6, August 2016
Test procedure	➤ ANSI C63.4:2014
Non-standard test method.....:	N/A
Test item description:	
Trade Mark	
Model/Type reference	TR-2
Serial Number	300098
Ratings	12VDC
Possible test case verdicts:	
- test case does not apply to the test object	N/A

- test object does meet the requirement	P (Pass)
- test object does not meet the requirement	F (Fail)
Testing:	
Date of receipt of test item	26 April 2018
Date (s) of performance of tests.....	30 April 2018 & 31 August 2018

Revision History

Revision	Date	Reason For Change	Author(s)
0	18 May 2018	Initial Data	Daniel Lee
1	31 August 2018	Add results of Conducted Emission test with AC/DC Power Adaptor, EPSA120200U	Jeremy Lee

Program details

Testing Facility by procedure:	
<input checked="" type="checkbox"/> All Testing:	LabTest Certification Inc.
Testing location/ address	Unit 3128-20800 Westminster HWY, Richmond, B.C. V6V 2W3 Canada

Summary of testing:

Tests performed (name of test and test clause): FCC 15.109 & ICES-003, Radiated Emission FCC 15.107 & ICES-003, Conducted Emission	Testing location: In SAC, Richmond In SAC, Richmond
<p>The tests indicated in Test Summary were performed on the product constructed as described below. The test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.</p> <p>Based on the results of our investigation, we have concluded the product tested complies with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. LabTest does not make any claims of compliance for samples or variants which were not tested.</p>	

Description of Equipment Under Test and Variant Models

<p>Description: The EUT, TR2 is Tag Reader. The EUT is keep receiving TAC RFID Information and send the data to Host Computer via ethernet.</p>
<p>Variant Models: The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Labtest does not make any claims of compliance for samples or variants which were not tested.</p>
<p>None</p>

EUT Internal Operating Frequencies

Frequency (MHz)	Description	Frequency (MHz)	Description
25	Clock for Ethernet Phy and Magnetics Module	12	Clock for Microcontroller, LPC1778
26	Clock for Receiver #1	26	Clock for Receiver #2

Client Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	Tag Reader 2	Guard RFID	TR2	
SIM	Laptop	ASUS	S46C	
SIM	AC/DC Adaptor	CUI Inc	EP5A120200U	12V, 2.0A

Abbreviations:
 EUT - Equipment Under Test,
 AE - Auxiliary/Associated Equipment, or
 SIM - Simulator (Not Subjected to Test)

Software and Firmware

Use*	Description	Version
EUT	Hardware	Rev1.5.0
SIM	Software	n/p

Abbreviations:
 EUT - Equipment Under Test,
 AE - Auxiliary/Associated Equipment, or
 SIM - Simulator (Not Subjected to Test)

Input/Output Ports

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
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0	DC Input	DC	n/p	No	12VDC
1	Ethernet	I/O	n/p	No	Connects to PC for monitoring
*Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port (Not Involved in Process Control) TP = Telecommunication Ports					

Power Interface

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	12	-	-	DC	-	
2	110	-	-	60Hz	-	Via EPSA120200U

EUT Operation Modes

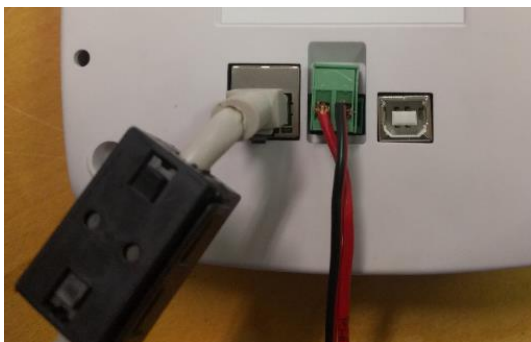
Mode #	Description
1	12VDC powered. The EUT sends data (Acknowledgement and Status messages) every 8 seconds.
2	AC/DC Adaptor Powered. The EUT sends data (Acknowledgement and Status messages) every 8 seconds.

EUT Configuration Modes

Mode #	Description
1	The EUT is placed on the table top in the chamber and connected to a DC power supply that is placed under the table. The EUT is connected to the Laptop that is located outside chamber via Ethernet cable. A ferrite is added to an ethernet cable near EUT.
1	The EUT is placed on the table top in the chamber and connected to AC/DC power Adaptor. The EUT is connected to the Laptop that is located outside chamber via Ethernet cable. A ferrite is added to an ethernet cable near EUT.

Modifications Required for Compliance

Laird 28A2025-0A2 ferrite core was used for compliance of Radiated Emission.



Test Equipment Verified for function

Model #	Description	Checked Function	Results
N9038A	EMI Receiver	Frequency and Amplitude	Connected 50MHz and -20 dBm Ref_signal and checked OK.
SAS-542	Anatenna, 30 to 300MHz	Checked structure	Normal – no damage.
SAS-510-2	Antenna, 300 to 1000MHz	Checked structure	Normal – no damage.
1670A	DC Power Source	Measured the Output power, 12VDC	Working normally
LIN-120C	LISN	Checked Insertion Losses from 150kHz to 30MHz	Losses were normal.
5001i	AC Power Source	Measured the Output power, 120VAC, 60Hz	Working normally

Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests:

Parameter	Uncertainty
Radiated Emission, 30 to 6,000MHz	± 4.93 dB
Conducted Measurements, 0.15 to 30MHz	± 3.52 dB

Uncertainty figures are valid to a confidence level of 95%.

Result Summary

The Compliance Status is a judgment based on the calculated highest emissions to appropriate standard limits. Measurement uncertainty values, provided on calibration certificates, were not be used in the judgment of the final status of compliance.

FCC 15, Subpart B and ICES-003			
Test Type	Regulation	Measurement Method	Compliance Status
Radiated Emissions- Unintentional radiators,	FCC15.109(a), Class B ICES-003, Clause 5.5	ANSI C63.4:2014	P
AC Power Line Conducted Emission	FCC15.107(a), Class B ICES-003, Clause 5.3	ANSI C63.4:2014	P

Test Conditions and Results – Emission - Radiated Disturbance

Governing Doc	FCC 15.109/ICES-003	Room Temperature	19.5 °C		
Basic Standard	ANSI C63.4	Relative Humidity	46.7 %		
Test Location	Richmond	Barometric	102.1 kPa		
Test Engineer	Jeremy Lee	Date	30 April 2018		
EUT Voltage	<input type="checkbox"/> 110VAC @ 60Hz <input checked="" type="checkbox"/> 12VDC				
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due
EMC Analyzer	KeySight	N9038A	702	18-Apr-2017	18-Apr-2018
Bicon Antenna	A.H. Systems	SAS-542	227A	12-Mar-2018	12-Mar-2020
Log Periodic Antenna	A.H. Systems	SAS-510-2	227B	07-Feb-2018	07-Feb-2020
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹
EMC Shielded Enclosure	USC	USC-26	374	IHC ²	IHC ²
DC Power Source	BK Precision	1670A	381	IHC ¹	IHC ¹
Note1) In House Calibration Ref. # 6 Note2) In House Calibration Ref. # 4					
Frequency Range:	<input checked="" type="checkbox"/> 30-1000MHz <input type="checkbox"/> 150kHz-30MHz				
Detector:	<input checked="" type="checkbox"/> Peak(for Prescan) <input checked="" type="checkbox"/> Quasi-Peak(for Formal)				
RBW/VBW:	<input checked="" type="checkbox"/> 120/300kHz <input type="checkbox"/> 9/30kHz				
Type of Facility:	<input checked="" type="checkbox"/> SAC <input type="checkbox"/> OATS <input type="checkbox"/> <i>in-situ</i>				
Distance:	<input checked="" type="checkbox"/> 3meter <input type="checkbox"/> 10meter <input type="checkbox"/> 1meter				
Arrangement of EUT:	<input checked="" type="checkbox"/> Table-top only <input type="checkbox"/> Floor-standing only <input type="checkbox"/> Rack Mounted				
Classification:	<input type="checkbox"/> Class A <input checked="" type="checkbox"/> Class B				
See data in the following pages.					
Compliant <input type="checkbox"/> Non-Compliant <input type="checkbox"/>					

Test Method

Test procedure is based on the FCC15.31(a)(3) - Other intentional and unintentional radiators are to be measured for compliance using the following procedure excluding sections 4.1.5.2, 5.7, 9 and 14: 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” (incorporated by reference, see § 15.38). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51.

NOTE to Paragraph (a)(3): Digital devices tested to show compliance with the provisions of §§ 15.107(e) and 15.109(g) must be tested following the ANSI C63.4 procedure described in paragraph (a)(3) of this section.[As stated in the adopting R&O, ANSI C63.4 is not used for measurements below 30 MHz.]

This test measures the radiating levels from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report.

The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard. Initially, the primary emission frequencies are identified by positioning a broadband receive antenna three meter from the EUT. A scan was made with an EMC Analyzer, controlled by EMC Test Software, Tile7, from 30 to 1,000 MHz with the receiver in the peak mode. The receiver IF bandwidth was 120 kHz and scan step was about 25 kHz. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to produce horizontal and vertical polarities while the turntable is rotated to determine the worst emitting configuration. Measurements were then made using CISPR quasi peak when the peak readings were within 10dB of the limit line. The numerical results are included herein to demonstrate compliance.

Test Result

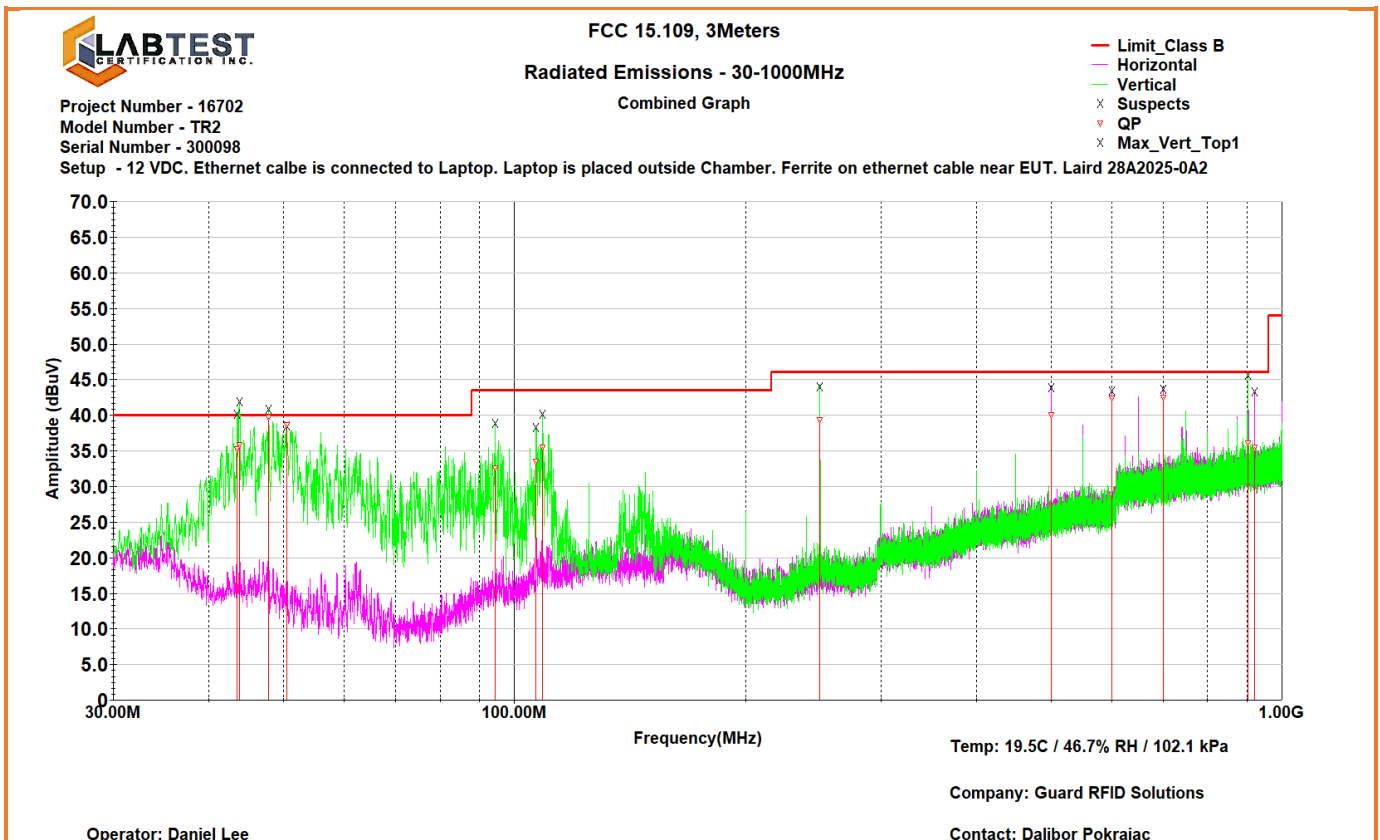
$$\text{Emission level (dBuV/m)} = \text{Quasi-Peak detected level (dBuV)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$$

Test setup

Description of test set-up:

The EUT was placed on a 0.8m non-conducting table above a ground reference plane (GRP).
 The EUT was set to **Operation Mode #1 with configuration Mode #1.**

Measurement Table/Graphical representation for Emission



- Measurement table									
Frequency (MHz)	Ant Fac (dB)	CableLoss (dB)	Preamp (dB)	AZ (Deg)	HGT (cm)	Peak (dBuV/m)	QP (dBuV/m)	Limit (dBuV/m)	Margin
Vertical									
43.4715	10.21	0.60	0.00	328	100	36.99	35.21	40.00	4.79
43.7625	10.15	0.60	0.00	320	102	37.45	35.81	40.00	4.19
47.7995	9.56	0.49	0.00	359	101	40.37	39.59	40.00	0.41
50.4427	9.24	0.64	0.00	100	100	42.42	38.59	40.00	1.41
94.3595	9.26	1.03	0.00	0	100	34.56	32.57	43.52	10.95
106.7028	9.67	1.08	0.00	360	105	35.61	33.46	43.52	10.06
108.8125	9.86	1.09	0.00	360	104	37.44	35.44	43.52	8.08
249.9845	16.99	1.99	0.00	171	186	41.51	39.36	46.02	6.66
902.4295	22.61	4.71	0.00	36	376	39.74	36.05	46.02	9.97
Horizontal									
500.0135	17.10	3.25	0.00	359	135	41.72	39.96	46.02	6.06
599.9662	19.10	3.62	0.00	153	124	44.44	42.36	46.02	3.66
699.9875	19.90	3.96	0.00	245	102	44.56	42.51	46.02	3.51
921.1390	22.11	4.75	0.00	277	107	39.93	35.49	46.02	10.53

Test Conditions and Results - Emission - Conducted Emissions-voltage AC mains port

Governing Doc	FCC 15.107 & ICES-003	Room Temperature	26.1 °C		
Basic Standard	ANSI C63.4	Relative Humidity	43.4 %		
Test Location	Richmond	Barometric	101.9 kPa		
Test Engineer	Daniel Lee	Date	31 August 2018		
EUT Voltage	<input checked="" type="checkbox"/> 110VAC @ 60Hz <input type="checkbox"/> 208VAC @ 60Hz				
Test Equipment Used	Manufacturer	Model	Identifier	Calibration	Calibration due
EMC Analyzer	Agilent	N9038A	702	26-Apr-2018	26-Apr-2019
LISN	COM-POWER	LIN-120C	920	01-Mar-2018	01-Mar-2019
RF Cable	MRO	n/a	n/a	IHC ¹	IHC ¹
EMC Shielded Enclosure	USC	USC-26	374	IHC ²	IHC ²
AC Power Source	California Instrument	5001i	059	IHC ³	IHC ³
Used Template of Tile 7!	_FCC_ConEmi_ACMainS_ClassB_20180501.TIL				
Note1) In House Calibration Ref. # 6 Note2) In House Calibration Ref. # 4 Note3) In House Calibration Ref. # 7					
Frequency Range:	<input checked="" type="checkbox"/> 150kHz-30MHz <input type="checkbox"/> 9-150kHz				
Detector:	<input checked="" type="checkbox"/> Peak <input checked="" type="checkbox"/> Quasi-Peak <input checked="" type="checkbox"/> Averaging				
RBW/VBW:	<input checked="" type="checkbox"/> 9/30kHz <input type="checkbox"/> 200/300Hz				
Coupling device:	<input checked="" type="checkbox"/> AMN <input type="checkbox"/> AAN <input type="checkbox"/> Current Probe <input type="checkbox"/> CVP				
Arrangement of EUT:	<input checked="" type="checkbox"/> Table-top only <input type="checkbox"/> Floor-standing only <input type="checkbox"/> Rack Mounted				
Classification:	<input checked="" type="checkbox"/> Class B <input type="checkbox"/> Class A				
Compliant	<input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/>				

Test Method

This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard. Initially a scan was made with an EMC Analyzer, controlled by EMC Test Software, Tile7, from 150 kHz to 30 MHz on each phase with the receiver in the peak mode. The measuring bandwidth was set up 9 kHz. Measurements were then made using CISPR16-1 quasi peak and averaging detectors when the peak readings were within 10dB of the Quasi-peak limit line.

Test Result

Conducted Emission (dBuV) = Measured Emission (dBuV) + Cable Loss(dB)+LISN(dB)

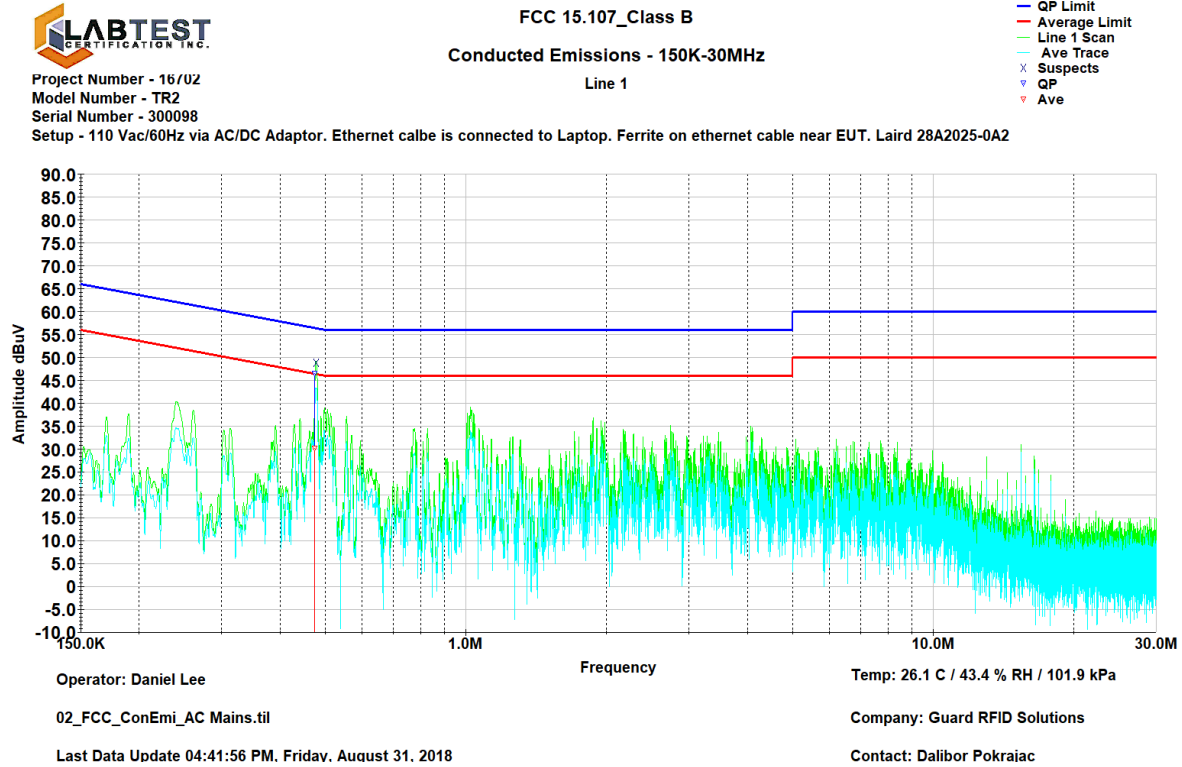
Test setup

Description of test set-up:

The EUT was placed on a 0.8m non-conducting table above a ground reference plane (GRP).
 The EUT was set to **Operation Mode #2 with configuration Mode #2.**

Measurement Graphical representation for Emission

- Graph of Line 1



- Table of Line 1

Frequency(MHz)	Peak (dBuV)	QP (dBuV)	QP Limit (dBuV)	Margin_QP (dB)	AVG (dBuV)	AVG Limit (dB)	Margin_AVG (dB)	LISN Losses (dB)	Path Losses (dB)
473.95500 KHz	49.91	46.48	56.44	9.96	30.15	46.44	16.29	0.09	0.01

- Graph of Line 2

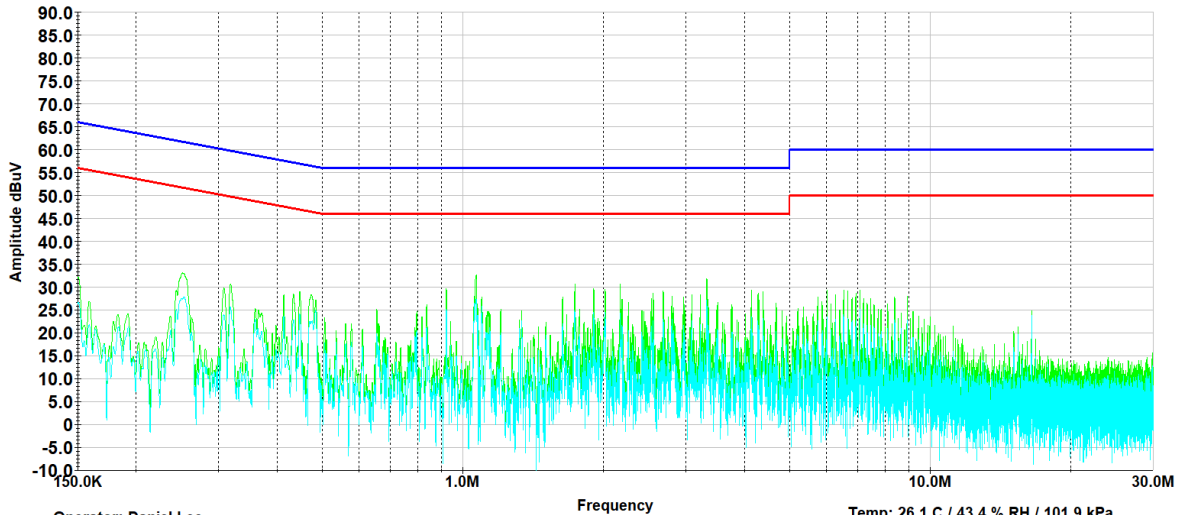


Project Number - 16/02
Model Number - TR2
Serial Number - 300098

Setup - 110 Vac/60Hz via AC/DC Adaptor. Ethernet cable is connected to Laptop. Ferrite on ethernet cable near EUT. Laird 28A2025-0A2

FCC 15.107_Class B
Conducted Emissions - 150K-30MHz
Line 2

QP Limit
Average Limit
Line 2 Scan
Ave Trace



Operator: Daniel Lee

02_FCC_ConEmi_AC Mains.til

Last Data Update 04:42:53 PM, Friday, August 31, 2018

Temp: 26.1 C / 43.4 % RH / 101.9 kPa

Company: Guard RFID Solutions

Contact: Dalibor Pokraiac

END OF REPORT