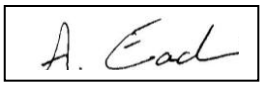
MEASUREMENT AND TEST REPORT

VERSION 1.00

Computer Peripheral Composite Device

for demonstration of compliance with
Industry Canada ICES-003 & FCC CFR47 Part 15B

Report Prepared for:	Syscor Controls & Automation Inc. 201 - 60 Bastion Square Victoria, BC V8W 1J2
Equipment Under Test (EUT):	000472
Trade Name:	FR-Tracker™ Base Station
FCC ID:	2AAZE-000472
IC Certification number:	11413A-000472
FCC RULE PART(S):	Part 15B, 15C
INDUSTRY CANADA RULE PART(S)	RSS-210
Tested by:	Island Compliance Services Inc. 6454 Fitzgerald Road Courtenay, BC V9J 1N7

Prepared By	Authorized By
A. Horel (Technical Writer) 	A. Eadie (Sr. EMC Eng.) 

Note: This test report has been prepared for the Applicant and device described herein. It may not be duplicated or used in part without prior written consent from Island Compliance Services Inc.

FCC OATS registration number: 386117
Industry Canada OATS registration number: 9578B-1

Revision History

Version	Date	Author	Comment
1.00 Composite	04/11/2013	A. Horel	Original Release

CONTENTS

1 SUMMARY OF TEST RESULTS

The equipment under test was found to comply with the test standards and criteria outlined herein.

Test Description	Reference Specification FCC	Reference Specification Industry Canada	Result	Comment
Radiated Emissions	FCC Subpart B 15.109	ICES-003 Issue 4	Complies	
Power line Conducted Emissions	FCC Subpart B 15.107	ICES-003 Issue 4	Complies	

1.1 ENVIRONMENTAL CONDITIONS

Description	Reading
Testing Dates	28th-30th Oct 2013
Indoor Temperature	17C-25C
Indoor Humidity	30-45%
Outdoor Temperature	9C-15C
Outdoor Humidity	60-80%

1.2 STANDARD TEST CONDITIONS AND ENGINEERING PRACTICES

The measurements shown in this test report were made in accordance with the procedures given in ANSI C63.4 2003 or later.

2 GENERAL EQUIPMENT SPECIFICATIONS

Item	Description
Manufacturer	Syscor Controls & Automation Inc.
Applicant	Syscor Controls & Automation Inc.
Model Number	000472
Model Description	RF Tracker Base Station
Size	6”x7”x8”, 6lb
Transmitter(s)	2 x Freescale MC13224
Function	Collects and processes sensor data
Power Supply Input	External 6VDC – 40VDC
Power Output	17mW (conducted)
Antenna Gain/Type	2 x Antenna Factor ANT-2.4-OM-CM-01-N, 1/2-wave, 7dBi gain
Channel Spacing	5MHz
Frequency Range	2405-2475MHz
Modulation	O-QPSK

2.1 AUXILIARY EQUIPMENT

Equipment	Description
N/A	

2.2 ENGINEERING CHANGES TO PRODUCTION UNIT

N/A

3 RADIATED EMISSIONS

3.1 TEST PROCEDURE

Maximizing procedure was performed on the six (6) highest emissions readings between the lowest RF frequency generated on the device (without going below 9 kHz) and the 10th harmonic of the highest fundamental frequency. Where applicable, a hybrid antenna, horn antenna and loop antenna were used to cover the relevant frequency bands.

3.2 CORRECTED AMPLITUDE & MARGIN CALCULATION

The Corrected Amplitude is calculated by adding the Antenna Factor, and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "Margin" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit for Class A. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

3.3 SUMMARY OF 15.109 LIMITS

Limits below detailed for 3m measurement distance.

Frequency Range (MHz)	Field Strength (µV/m)	Limit dBuV/m	Detector
30-88	100	40.0	QP
88-216	150	43.5	QP
216-960	200	46.0	QP
960 – 1000	500	54.0	QP
Above 1000	500	54.0	Avg
Above 1000	5000	74.0	Peak

3.4 DATA

No.	Freq (MHz)	Rdng (dBuV)	Corrected (dBuV/m)	Spec (dBuV/m)	Margin (dB)	Polarity	Antenna Height (cm)
1	144.200	30.6	40.6	43.5	-2.9	Hz	107
2	329.311	25.0	42.1	46.0	-3.9	Hz	100
3	151.090	28.3	38.2	43.5	-5.3	Hz	171
4	64.110(QP)	24.4	32.4	40.0	-7.6	Vt	103
5	575.023	17.3	38.6	46.0	-7.4	Hz	100
6	243.414	24.3	37.8	46.0	-8.2	Vt	103

3.5 EMISSIONS PLOT (30MHZ – 2GHZ)

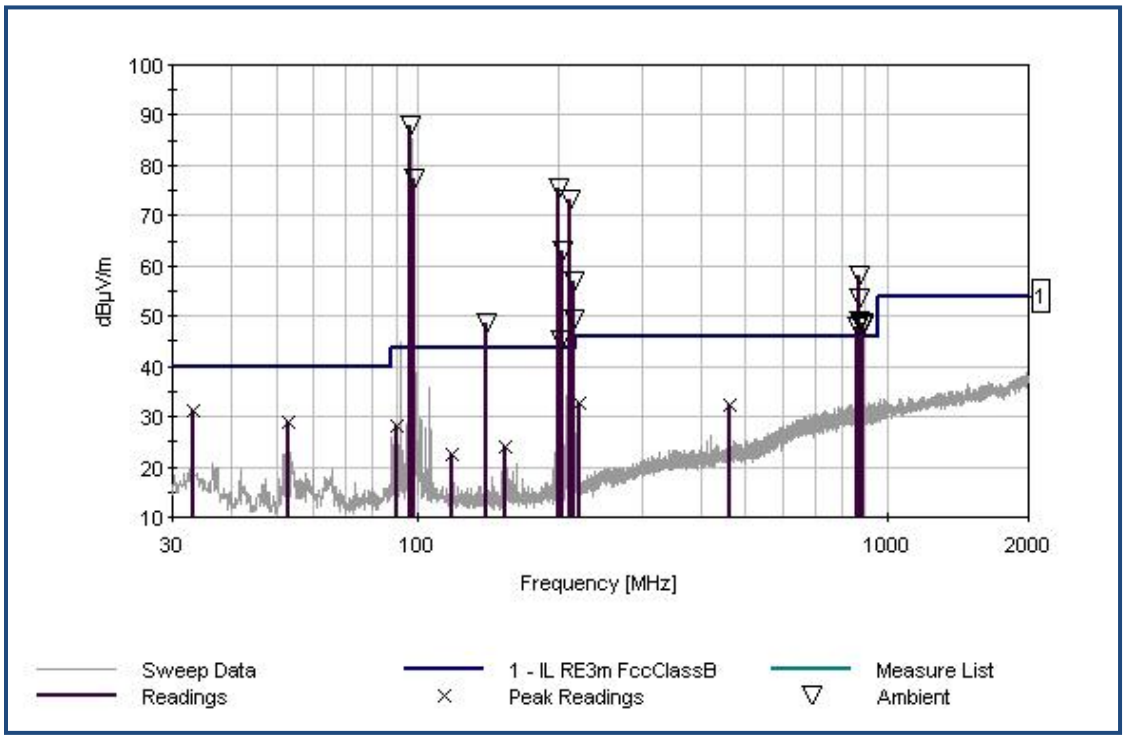


FIGURE 1 - SPURIOUS EMISSIONS PLOT (30MHZ – 2GHZ)

4 POWER LINE CONDUCTED EMISSIONS

4.1 TEST METHOD

For the duration of the conducted emissions test, the power cord of the EUT was connected to the main power outlet of the LISN. The LISN in turn is connected to an AC power source. Exploratory tests of the EUT are performed by varying modes and cable positioning. Maximizing procedures are performed on the highest emission readings from the EUT

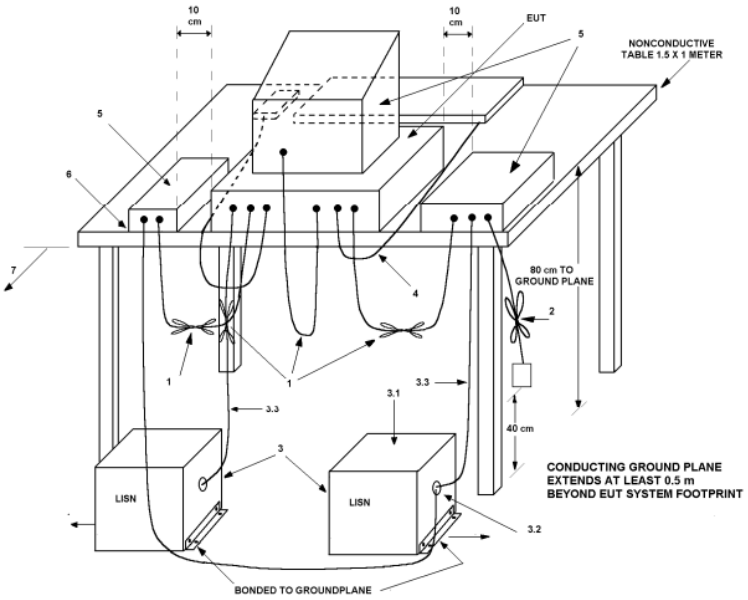


TABLE 1 - TEST ARRANGEMENT FOR CONDUCTED EMISSIONS OF TABLETOP EQUIPMENT

4.2 LIMITS AS PER 15.207

Frequency of emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

TABLE 2 – CONDUCTED EMISSION LIMITS

4.3 NOTES

N/A

4.4 LINE RESULTS PLOT 120V

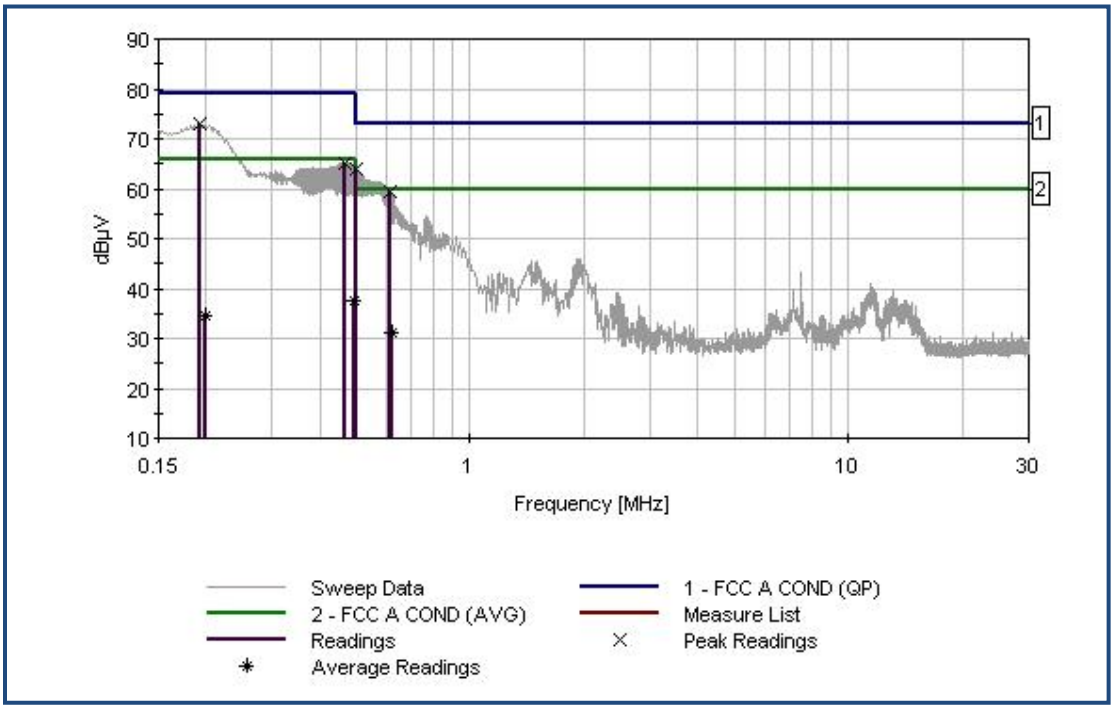


FIGURE 2 - CONDUCTED EMISSIONS PLOT – LINE 120V

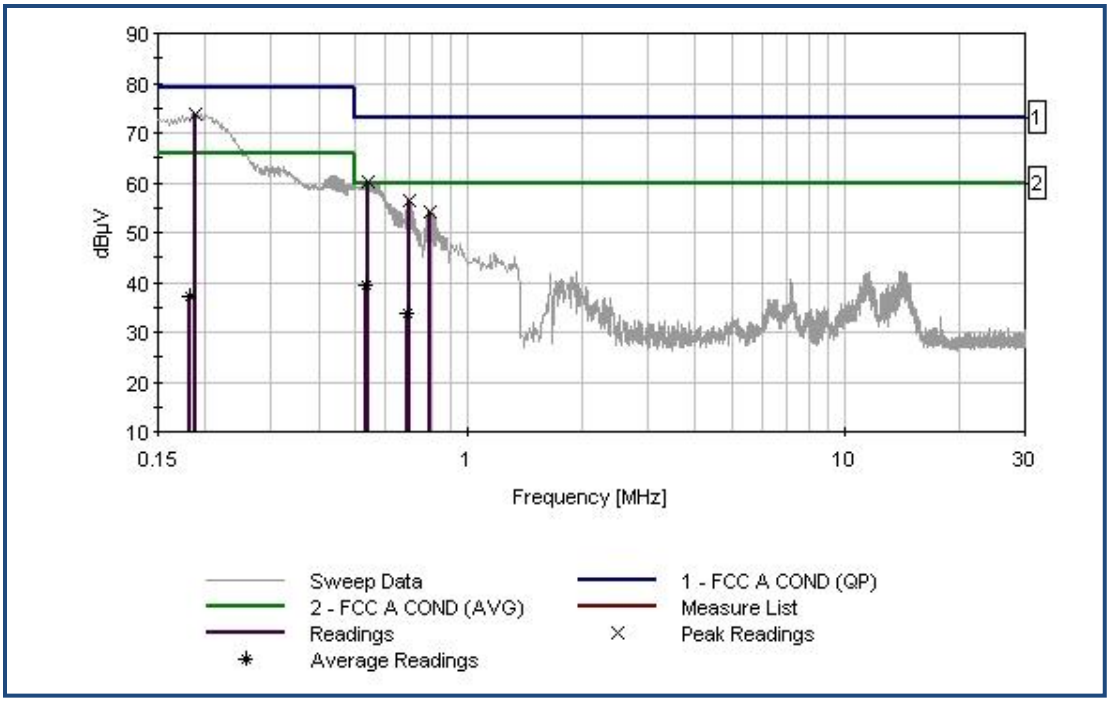


FIGURE 3 - CONDUCTED EMISSIONS PLOT – NEUTRAL 120V

4.5 MEASUREMENT DATA, LINE 120V

No.	Freq (Hz)	Rdng (dBuV)	Corrected (dBuV)	Spec (dBuV)	Margin (dB)	Detector	Polarity
1	193.632k	62.9	73.0	79.0	-6.0	Pk	Line
2	502.695k	53.7	63.8	73.0	-9.2	Pk	Line
3	611.775k	49.5	59.6	73.0	-13.4	Pk	Line
4	464.516k	55.1	65.2	79.0	-13.8	Pk	Line
5	492.250k	27.3	37.4	79.0	-41.6	Av	Line
6	622.250k	21.2	31.3	73.0	-41.7	Av	Line

4.6 MEASUREMENT DATA, NEUTRAL 120V

No.	Freq (Hz)	Rdng (dBuV)	Corrected (dBuV)	Spec (dBuV)	Margin (dB)	Detector	Polarity
1	188.178k	63.6	73.7	79.0	-5.3	Pk	Neutral
2	540.000k	50.0	60.1	73.0	-12.9	Pk	Neutral
3	693.586k	46.3	56.4	73.0	-16.6	Pk	Neutral
4	788.123k	44.1	54.2	73.0	-18.8	Pk	Neutral
5	534.200k	29.5	39.6	73.0	-33.4	Av	Neutral
6	687.000k	23.5	33.6	73.0	-39.4	Av	Neutral

5 TEST EQUIPMENT

All applicable test equipment will be calibrated in accordance with ANSI Standard NCSL Z540-1 or other NIST traceable calibration standard. Equipment is calibrated on a 2 year cycle or according to the manufacturer's recommendations.

Manufacturer	Description	Model	Serial Number	Cal/Char Due Date D/M/Y
Agilent	Spectrum Analyzer	E4407B	US4142960	10/10/2014
Com-Power	Loop Antenna	AL-130	301049	15/1/2014
Electro Metrics	Hybrid Antenna	EM-3141	9902-1141	07/12/2014
HP	RF Amplifier	11975A	2738A01196	01/03/2014
HP	RF Amplifier	8449B	N/A	19/9/2015
AH Systems	Horn Antenna	SAS-571	1242	18/11/2013
Amawima	Horn Antenna	ANT-K	002009	7/2/2014

6 TEST DIAGRAMS

6.1 POWER LINE CONDUCTED EMISSIONS TEST SETUP

6.2 RADIATED EMISSIONS TEST SETUP