FCC / Industry Canada Certification Test Report

CRANE PAYMENT INNOVATIONS, INC

MICRO PAY6

WLL REPORT# **15775-01 Rev 0**
October 1, 2018
Re-issued November 7, 2018

FCC ID: QP8-MICROPAY6

IC ID: 1297A-MICROPAY6

Prepared for:

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Malvern, PA, 19355

Prepared By:

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For the

CRANE PAYMENT INNOVATIONS, INC

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October 1, 2018
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Prepared by:

Elmer Rodriguez
Product Safety, Manager

Reviewed by:

Steven D. Koster
President

Abstract

This report has been prepared on behalf of Crane Payment Innovations, Inc to support the attached Application for Equipment Authorization. The test report and application are submitted for an Intentional Radiator under Part 15.225 of the FCC Rules and Regulations and Industry Canada RSS210. This Certification Test Report documents the test configuration and test results for the MICROpay 6 unit.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Certificate AT-1448 as an independent FCC test laboratory.

The MICROpay 6 complies with the limits for an Intentional Radiator device under FCC Part 15.225 and Industry Canada RSS 210.

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Revision History	Reason	Date
Rev 0	Initial Release	October 1, 2018
Rev 1	ACB Comments	November 7, 2018

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1.1 Compliance Statement

The MICROpay 6 complies with the limits for an Intentional Radiator device under FCC Part 15.225 (10/2010) and Industry Canada RSS 210 (Issue 8).

1.2 Test Scope Summary

Tests for radiated and conducted emissions were performed. All measurements were performed in accordance with the 2013 version of ANSI C63.10. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

Test Specification	Specific Description	Date Completed	Result	Modifications (Y/N)
CFR47 Part 15.207, RSS Gen section 7.2.4	Class B Conducted Emissions – AC Power Ports	10/01/2018	Complied	No
CFR47 Part 15.209, RSS Gen section 7.2.5	Class B Radiated Emissions	9/10/2018	Complied	No
RSS Gen section 6	Receiver Spurious Emissions	9/10/2018	Complied	No
CFR47 Part 15.225, RSS 210 section A2.6	Field Strength	9/10/2018	Complied	No
CFR47 Part 15.225, RSS GEN section 4.7	Frequency Stability	9/19/2018	Complied	No
CFR47 Part 2.1049	Occupied Bandwidth	9/11/2018	Complied	No

1.3 Contract Information

Customer:	Crane Payment Innovations, Inc 3222 Phoenixville Pike, Suite 200 Malvern, PA 19355
Purchase Order Number:	4500552304
Quotation Number:	71032A

1.4 Test Dates

Testing was performed on the following date(s): 9/13/2018- 9/19/2018

1.5 Test and Support Personnel

Washington Laboratories, LTD	Steve D. Koster
Customer Representative	Daniel Mitchell

1.6 Abbreviations

A	**A**mpere
ac	**a**lternating **c**urrent
AM	Amplitude Modulation
Amps	**Amp**ere**s**
b/s	**b**its per **s**econd
BW	**B**and**W**idth
CE	**C**onducted **E**mission
cm	**c**enti**m**eter
CW	**C**ontinuous **W**ave
dB	**d**eci**B**el
dc	**d**irect **c**urrent
EMI	**E**lectro**m**agnetic **I**nterference
EUT	**E**quipment **U**nder **T**est
FM	**F**requency **M**odulation
G	**g**iga - prefix for 10^9 multiplier
Hz	**H**ertz
IF	**I**ntermediate **F**requency
k	**k**ilo - prefix for 10^3 multiplier
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
M	**M**ega - prefix for 10^6 multiplier
m	**m**eter
μ	**m**icro - prefix for 10^{-6} multiplier
NB	**N**arrow**b**and
QP	**Q**uasi-**P**eak
RE	**R**adiated **E**missions
RF	**R**adio **F**requency
rms	**r**oot-**m**ean-**s**quare
SN	**S**erial **N**umber
S/A	**S**pectrum **A**nalyzer
V	**V**olt

2 Equipment Under Test

2.1 EUT Identification & Description

The MICROpay6 is a vending machine interface that provides closed network payment solutions. The MICROpay6 utilizes RFID tags pre-loaded with "cash" as a payment solution for the host vending machine. The RFID emission is based on ISO 14443 standard with a carrier center frequency of 13.56 MHz..

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Table 1: Device Summary

ITEM	DESCRIPTION
Manufacturer:	Crane Payment Innovations, Inc
FCC ID:	QP8-MICROPAY6
IC ID:	1297A-MICROPAY6
Model:	MICROpay 6
FCC Rule Parts:	§15.225
IC Rule Part	§RSS 210 A2.6 & RSS Gen
Frequency Range:	13.56MHz
Maximum Output Power:	3851 uV/m at 10 meters
Modulation:	ASK
Occupied Bandwidth:	155.68 kHz
Type of Information:	Data
Number of Channels:	1
Power Output Level	Fixed
Antenna Type	Internal PCB
Frequency Tolerance:	>±0.01% (±100 ppm)
Interface Cables:	Power, I/O
Highest TX Spurious Emission	57.3 uV/m
Highest RX Spurious Emission	42.0 uV/m
Power Source & Voltage:	24Vdc from Host Device

2.2 Test Configuration

The MICROpay6 will be connected to an MDB vending simulator to provide power and communications. The RFID antenna connects to the MICROpay6 via a MCX Coax cable and connector for RFID operation and a ribbon cable for status and audible indicators. No other connections were necessary.

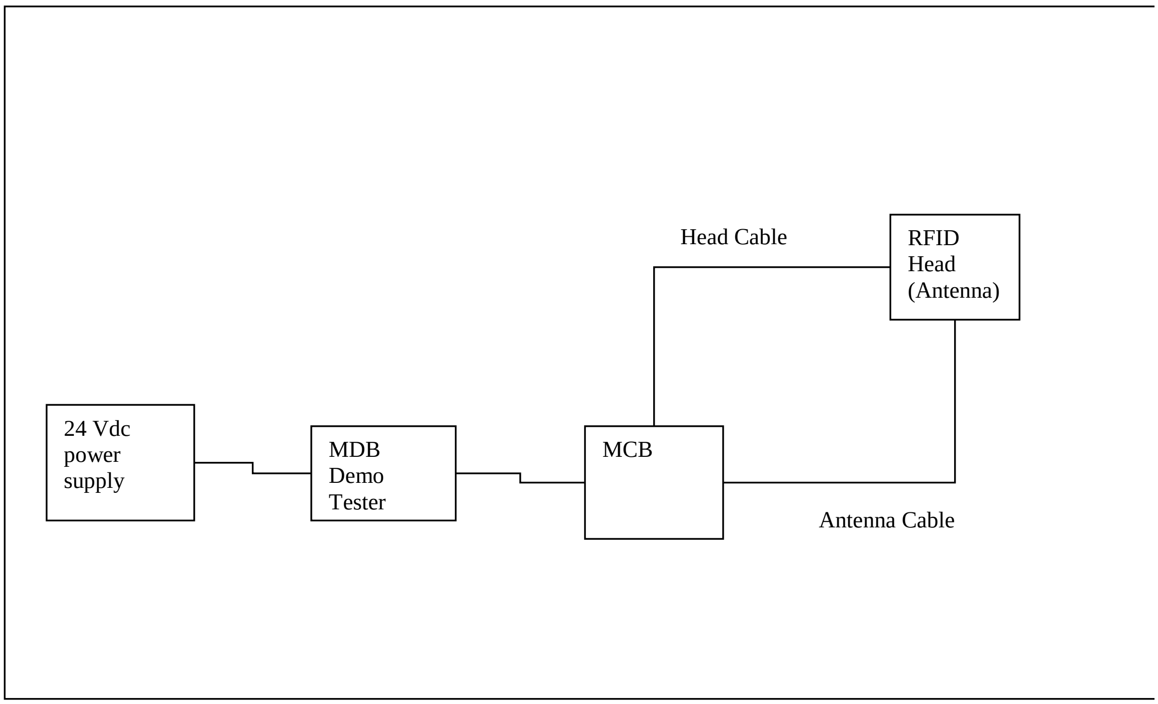

Figure 1: Test Configuration

2.3 Testing Algorithm

The EUT operates continuously when power is applied transmitting at 13.56MHz. An RFID card is place in close proximity to provide a constant TX signal.

Worst case emission levels are provided in the test results data.

2.4 Measurements

2.4.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.10:2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2.5 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ACLASS under Certificate AT-1448 as an independent FCC test laboratory.

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 (R2002) with a type B evaluation of the standard uncertainty. Elements contributing to the standard uncertainty are combined using the method described in Equation 1 to arrive at the total standard uncertainty. The standard uncertainty is multiplied by the coverage factor to determine the expanded uncertainty which is generally accepted for use in commercial, industrial, and regulatory applications and when health and safety are concerned (see Equation 2). A coverage factor was selected to yield a 95% confidence in the uncertainty estimation.

Equation 1: Standard Uncertainty

$$u_c = \pm\sqrt{\frac{a^2}{{div_a}^2} + \frac{b^2}{{div_b}^2} + \frac{c^2}{{div_c}^2} + \ldots\ldots}$$

Where u_c = standard uncertainty

a, b, c, = individual uncertainty elements

$div_{a,\,b,\,c}$ = the individual uncertainty element divisor based on the probability distribution

Divisor = 1.732 for rectangular distribution

Divisor = 2 for normal distribution

Divisor = 1.414 for trapezoid distribution

Equation 2: Expanded Uncertainty

$$U = ku_c$$

Where U	= expanded uncertainty
k	= coverage factor
	k ≤ 2 for 95% coverage (ANSI/NCSL Z540-2 Annex G)
u_c	= standard uncertainty

The measurement uncertainty complies with the maximum allowed uncertainty from CISPR 16-4-2. Measurement uncertainty is not used to adjust the measurements to determine compliance. The expanded uncertainty values for the various scopes in the WLL accreditation are provided in Table 2 below.

Table 2: Expanded Uncertainty List

Scope	Standard(s)	Expanded Uncertainty
Conducted Emissions	CISPR11, CISPR22, CISPR14, FCC Part 15	±2.63 dB
Radiated Emissions	CISPR11, CISPR22, CISPR14, FCC Part 15	±4.55 dB

3 Test Equipment

Table 3 shows a list of the test equipment used for measurements along with the calibration information.

Table 3: Test Equipment

Test Name:	**Conducted Emissions Voltage**	Test Date:	
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
125	SOLAR - 8028-50-TS-24-BNC	LISN	5/23/2019
126	SOLAR - 8028-50-TS-24-BNC	LISN	5/23/2019
728	AGILENT - 8564EC	SPECTRUM ANALYZER	10/26/2018
53	HP - 11947A	LIMITER TRANSIENT	2/1/2019

Test Name:	**Radiated Emissions**	Test Date:	
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
823	AGILENT - N9010A	EXA SPECTRUM ANALYZER	4/21/2019
644	SUNOL SCIENCES CORPORATION - JB1 925-833-9936	BICONALOG ANTENNA	1/16/2020
276	ELECTRO-METRICS - BPA-1000	RF PRE-AMPLIFIER	2/7/2019
856	EMCO - 6507	ACTIVE LOOP 1kHZ - 30MHZ	11/12/2018

Test Name:	**Temperature Stability**	Test Date:	**9/19/2018**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
776	TENNY - TJR-A-WS4	1.22 CUFT	6/1/2019
823	AGILENT – N9010A	EXA SPECTRUM ANALYZER	4/21/2019

4 Test Results

4.1 Occupied Bandwidth

Occupied bandwidth measurement was performed by coupling the output of the EUT to the input of a spectrum analyzer using a near field probe. Table 4 provides a summary of the Occupied Bandwidth Results.

Table 4: Occupied Bandwidth Results

Frequency	Bandwidth	Limit	Pass/Fail
13.560MHz	115.66 kHz	N/A	Pass

The occupied bandwidth was measured as shown:

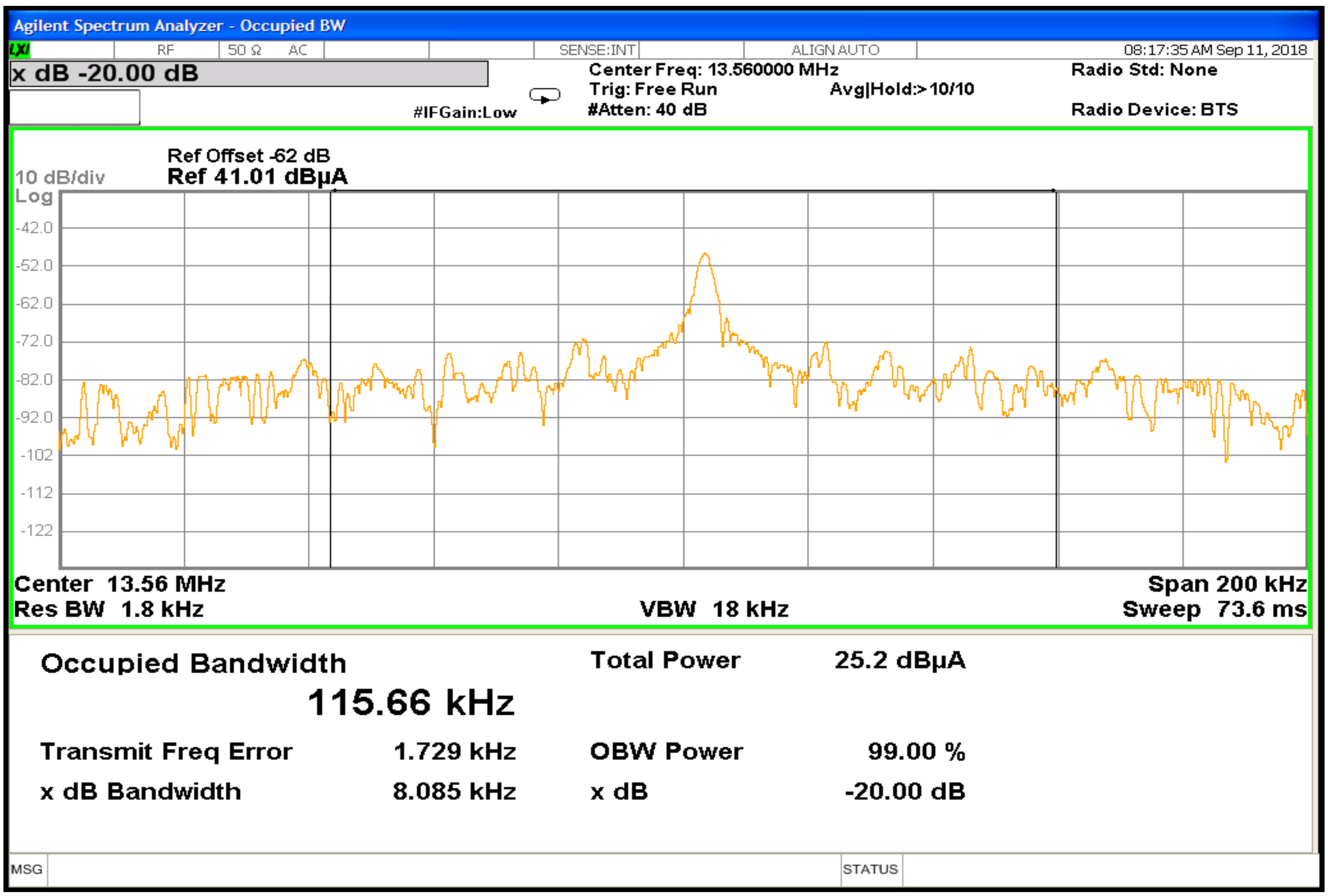

Figure 2: Occupied Bandwidth

4.2 Radiated Spurious Emissions: FCC §15.225, §15.209, RSS 210 §A2.6, RSS GEN §7.2.5

Radiated emissions from the EUT must comply with the field strength limits as specified in FCC Part 15.225 and 15.209 and IC RSS 210 and RSS GEN. The limits for the radiated emissions are as shown in the following table.

Table 5: Radiated Spurious Emissions Limits

Frequency (MHz)	Limit (µV/m)	Rule Part Reference
13.553 - 13.567	15,848 (@ 30m)	§15.225(a), §RSS 210 A2.6(a)
13.410 – 13.553	334 (@ 30m)	§15.225(b), §RSS 210 A2.6(b)
13.567 – 13.710	334 (@ 30m)	§15.225(b), §RSS 210 A2.6(b)
13.110 – 13.410	106 (@ 30m)	§15.225(c), §RSS 210 A2.6(c)
13.710 – 14.010	106 (@ 30m)	§15.225(c), §RSS 210 A2.6(c)
1.705 – 13.110 14.010 – 30.0	30 (@ 30m)	§15.225(d), §RSS 210 A2.6(c) §15.209, RSS GEN 7.2.5
30.00 – 88.00	100 (@ 3m)	§15.225(d), §RSS 210 A2.6(d) §15.209, RSS GEN 7.2.5
88.00 – 216.00	150 (@ 3m)	§15.225(d), §RSS 210 A2.6(d) §15.209, RSS GEN 7.2.5
216.00 – 960.00	200 (@ 3m)	§15.225(d), §RSS 210 A2.6(d) §15.209, RSS GEN 7.2.5
Above 960	500 (@ 3m)	§15.225(d), §RSS 210 A2.6(d) §15.209, RSS GEN 7.2.5

4.2.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on an Open Area Test Site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. For frequencies below 30MHz, the loop antenna was mounted on a tripod at a height of 1 meter and a distance of 10m from the EUT. Above 30MHz, Biconical and log periodic broadband receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters at a distance of 3 meters from the EUT. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured

Below 150 kHz, bandwidths used were 300Hz RBW and 10 kHz VBW. Between 150 kHz and 30MHz, bandwidths used were 10kHz RBW and 30kHz VBW. The reading was taken at 10m. A correction factor was used to adjust the 10-meter results to the equivalent at 30 meters using the 40dB/decade roll-off. Three orientations of the loop antenna were tested. Above 30MHz, bandwidths used were 100 kHz RBW and 30kHz VBW.

Emissions were scanned from 9 kHz to 1GHz. Emissions from were measured using a peak detector. Worst case emissions are reported in the data table.

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level):	VdBμV
Antenna Factor (Ant Corr):	AFdB/m
Cable Loss Correction (Cable Corr):	CCdB
Amplifier Gain:	GdB (if applicable)
Electric Field (Corr Level):	EdBμV/m = VdBμV + AFdB/m + CCdB - GdB
To convert to linear units:	EμV/m = antilog (EdBμV/m/20)

4.2.2 Test Results

The EUT complies with the radiated emission requirements of §15.225 and RSS-210. The following tables provide the test data.

Table 6: Radiated Emissions below 30MHz

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
13.56	F	0	1	45.61	17.5	1425.7	47544	-30.461	Vertical
13.56	S	0	1	53.6	17.5	3577.4	47544	-22.471	Vertical
13.56	T	180	1	54.24	17.5	3851	47544	-21.83	Vertical
13.56	F	0	1	27.28	17.5	172.8	47544	-48.791	Flat
13.56	S	90	1	31.21	17.5	271.7	47544	-44.86	Flat
13.56	T	180	1	31.73	17.5	288.3	47544	-44.345	Flat
13.56	V	0	1	48.2	17.5	1921.4	47544	-27.87	Side
13.56	V	0	1	48.97	17.5	2098.3	47544	-27.105	Side
13.56	V	180	1	50.62	17.5	2537.3	47544	-25.454	Side

*Note: Limit corrected to 10 m

Table 7: Radiated Emissions Band Edge

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr. Factors (dB)	Corr Level @ 30 m	Limit (uV/m)	Margin (dB)
13.348	X	0	1	18.48	-1.3	7.23	106	-23.3261
13.348	Y	0	1	27.98	-1.3	21.58	106	-13.8261
13.348	Z	0	1	22.55	-1.3	11.55	106	-19.2561
13.773	X	0	1	17.72	-1.3	6.62	106	-24.0861
13.773	Y	0	1	19.2	-1.3	7.85	106	-22.6061
13.773	Z	0	1	14.63	-1.3	4.64	106	-27.1761
13.553	X	0	1	21.2	-1.3	9.89	334	-30.5749
13.553	Y	0	1	23.98	-1.3	13.61	334	-27.7949
13.553	Z	0	1	18.86	-1.3	7.55	334	-32.9149
13.567	X	0	1	27.1	-1.3	19.50	334	-24.6749
13.567	Y	0	1	32.5	-1.3	36.31	334	-19.2749
13.567	Z	0	1	26.8	-1.3	18.84	334	-24.9749

Table 8: Radiated Emissions above 30MHz

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
40.69	V	0.00	1.00	44.40	-11.6	43.7	100.0	-7.2	W Card
55.98	V	0.00	1.00	44.73	-18.2	21.1	100.0	-13.5	W Card
67.83	V	0.00	1.00	46.01	-17.1	27.9	100.0	-11.1	W Card
81.37	V	0.00	1.00	48.25	-17.4	34.9	100.0	-9.1	W Card
110.64	V	0.00	1.00	36.47	-12.3	16.1	150.0	-19.4	W Card
122.07	V	90.00	1.00	41.68	-10.9	34.4	150.0	-12.8	W Card
149.24	V	45.00	1.00	42.60	-12.4	32.3	150.0	-13.3	W Card
230.58	V	90.00	1.00	47.87	-12.7	57.3	200.0	-10.9	W Card
40.70	H	0.00	4.00	42.55	-11.6	35.3	100.0	-9.0	W Card
67.83	H	0.00	4.00	45.29	-17.1	25.7	100.0	-11.8	W Card
110.60	H	180.00	4.00	41.86	-12.3	29.9	150.0	-14.0	W Card
122.07	H	0.00	4.00	45.80	-10.9	55.3	150.0	-8.7	W Card
149.21	H	0.00	4.00	44.14	-12.4	38.6	150.0	-11.8	W Card
230.58	H	0.00	4.00	37.81	-12.7	18.0	200.0	-20.9	W Card

Table 9: Radiated Emissions Receive Only

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr. Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
40.69	V	0.00	1.00	41.73	-11.6	32.1	100.0	-9.9	Wo Card
55.99	V	0.00	1.00	43.80	-18.2	19.0	100.0	-14.4	Wo Card
67.83	V	0.00	1.00	48.64	-17.1	37.8	100.0	-8.5	Wo Card
81.37	V	0.00	1.00	49.79	-17.4	41.7	100.0	-7.6	Wo Card
110.59	V	0.00	1.00	37.49	-12.3	18.1	150.0	-18.4	Wo Card
122.07	V	90.00	1.00	39.80	-10.9	27.7	150.0	-14.7	Wo Card
149.21	V	45.00	1.00	39.68	-12.4	23.1	150.0	-16.3	Wo Card
230.57	V	90.00	1.00	38.96	-12.7	20.5	200.0	-19.8	Wo Card
40.70	H	0.00	4.00	38.20	-11.6	21.4	100.0	-13.4	Wo Card
67.82	H	0.00	4.00	45.08	-17.1	25.1	100.0	-12.0	Wo Card
110.60	H	180.00	4.00	41.82	-12.3	29.8	150.0	-14.0	Wo Card
122.07	H	0.00	4.00	43.41	-10.9	42.0	150.0	-11.0	Wo Card
149.00	H	0.00	4.00	41.85	-12.4	29.6	150.0	-14.1	Wo Card
230.58	H	0.00	4.00	34.96	-12.7	13.0	200.0	-23.8	Wo Card

4.3 Conducted Emissions (AC Power Line) FCC §15.207, RSS GEN §7.2.4

The EUT was placed on an 80 cm high 1 x 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 Ω/50 µH Line Impedance Stabilization Network bonded to a 3 x 2-meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

All emissions were measured with the EUT intact with the exception of the fundamental transmit frequency of 13.56MHz. To measure 13.56MHz, the internal antenna was replaced with a resistive load.

Tested with a CUIinc model SDI65-24-U 100 – 240V~ 50-60Hz to 24VDC wall adaptor.

AC Power Line conducted emissions test data are included in Table 10.

Table 10: AC Power Conducted Emissions Test Data

NEUTRAL

Frequency (MHz)	Level QP (dBμV)	Level AVG (dBμV)	Cable Loss (dB)	LISN Corr (dB)	Level QP Corr (dBμV)	Level Corr Avg (dBμV)	Limit QP (dBμV)	Limit AVG (dBμV)	Margin QP (dB)	Margin AVG (dB)
0.162	36.5	32.6	10.1	0.2	46.9	43.0	65.4	55.4	-18.5	-12.4
1.190	29.8	21.1	10.2	0.3	40.3	31.6	56.0	46.0	-15.7	-14.4
8.230	34.1	32.8	11.2	0.1	45.4	44.1	60.0	50.0	-14.6	-5.9
13.600	41.1	37.3	11.4	0.5	53.0	49.2	60.0	50.0	-7.0	-0.8
14.115	30.5	29.3	11.4	0.6	42.5	41.3	60.0	50.0	-17.5	-8.7
15.020	38.1	29.5	11.5	0.6	50.2	41.6	60.0	50.0	-9.8	-8.4

PHASE

Frequency (MHz)	Level QP (dBμV)	Level AVG (dBμV)	Cable Loss (dB)	LISN Corr (dB)	Level QP Corr (dBμV)	Level Corr Avg (dBμV)	Limit QP (dBμV)	Limit AVG (dBμV)	Margin QP (dB)	Margin AVG (dB)
1.190	34.1	26.6	10.2	0.3	44.6	37.1	56.0	46.0	-11.4	-8.9
3.445	36.6	27.5	10.6	0.3	47.5	38.4	56.0	46.0	-8.5	-7.6
4.730	31.5	27.7	10.7	0.2	42.4	38.6	56.0	46.0	-13.6	-7.4
14.275	44.5	32.3	11.4	0.4	56.3	44.2	60.0	50.0	-3.7	-5.8
20.600	36.2	28.0	11.7	0.7	48.6	40.4	60.0	50.0	-11.4	-9.6
23.830	36.5	27.7	11.9	1.0	49.4	40.5	60.0	50.0	-10.6	-9.5

4.4 Frequency Stability: FCC Part §2.1055, §15.225, RSS GEN §4.7, RSS 210 §A2.6

Frequency as a function of temperature and voltage variation shall be maintained within the FCC-prescribed tolerances. Per §15.225(e) and RSS 210 A2.6, the frequency tolerance shall be maintained within ±0.01% of the reference frequency.

4.4.1 Test Procedure

The temperature stability was measured with the unit in an environmental chamber used to vary the temperature of the sample. The sample was held at each temperature step to allow the temperature of the sample to stabilize.

The frequency stability of the transmitter was examined at the voltage extremes and for the temperature range of -20°C to +50°C. The carrier frequency was measured while the EUT was in the temperature chamber. The reference frequency of the EUT was measured at the ambient room temperature with the frequency counter.

The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range.

The RF carrier frequency shall not depart from the reference frequency (reference frequency is the frequency at 20ºC and rated supply voltage) in excess of +/-1356 Hz.

The EUT was powered by 24Vdc voltage.

Per ANSI 63.10 the EUT was tested at each temperature at the turn on point, 2-minute point, 5-minute point, and 10-minute point.

4.4.2 Test Results

The EUT complies with the temperature stability requirements of the specified standards. Test results are given in Table 11.

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Table 11: Frequency Stability Test Data

Temperature (Centigrade)	**Frequency (MHz)**	**Deviation (Hz)**	**Limit (+/- Hz)**	**Pass/Fail**
25(ambient)	13.562630	0	1356	**NA**
-20	13.563210	580	1356	Pass
-10	13.562830	200	1356	Pass
0	13.563000	370	1356	Pass
10	13.563170	540	1356	Pass
20	13.562580	-50	1356	Pass
30	13.562330	-300	1356	Pass
40	13.562170	-460	1356	Pass
50	13.562500	-130	1356	Pass

2 minutes after turning on

Temperature (Centigrade)	**Frequency (MHz)**	**Deviation (Hz)**	**Limit (+/- Hz)**	**Pass/Fail**
-20	13.56343	800	1356	Pass
-10	13.563483	853	1356	Pass
0	13.563516	886	1356	Pass
20	13.563468	838	1356	Pass
30	13.563439	809	1356	Pass
40	13.563407	777	1356	Pass
50	13.563393	763	1356	Pass

5 minutes after turning on

Temperature (Centigrade)	Frequency (MHz)	Deviation (Hz)	Limit (+/- Hz)	Pass/Fail
-20	13.56343	800	1356	Pass
-10	13.563488	585	1356	Pass
0	13.563515	885	1356	Pass
20	13.563463	833	1356	Pass
30	13.563436	806	1356	Pass
40	13.563406	776	1356	Pass
50	13.563393	763	1356	Pass

10 minutes after turning on

Temperature (Centigrade)	Frequency (MHz)	Deviation (Hz)	Limit (+/- Hz)	Pass/Fail
-20	13.56343	800	1356	Pass
-10	13.563491	861	1356	Pass
0	13.563514	884	1356	Pass
20	13.563461	831	1356	Pass
30	13.563435	805	1356	Pass
40	13.563405	775	1356	Pass
50	13.563393	763	1356	Pass