Washington Laboratories, Ltd.

FCC PART 15.249 CERTIFICATION TEST REPORT

for the

SYNQ™

FCC ID: QP8-SYNQ18

IC ID: 1297A-SYNQ18

REPORT# 15791-01 REV 2

Prepared for:

Crane Payment Innovation

3222 Phoenixville Pike, Suite 200

Malvern, PA 19355

Prepared By:

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Gaithersburg, Maryland 20879

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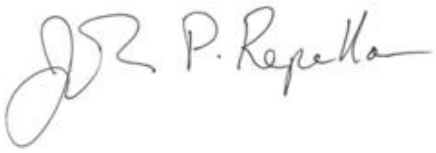

John P. Repella

Manager, EMC & Wireless Services

Reviewed by:

Steven D. Koster

President

ABSTRACT

This report has been prepared on behalf of Crane Payment Innovation to support the attached Application for Equipment Authorization. The test report and application are submitted for an Intentional Radiator under Part 15.249 (10/2015) of the FCC Rules and Regulations and Spectrum Management and Telecommunications Policy and under RSS-210 Issue 9, 08/2016 of Innovation, Science and Economic Development Canada (ISED). This Certification Test Report documents the test configuration and test results for the Crane Payment Innovation SYNQ™

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. The ISED Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Certificate AT-1448 as an independent FCC test laboratory.

The Crane Payment Innovation SYNQ ™ complies with the limits for a transmitter device under FCC Part 15.249 and Innovation, Science and Economic Development Canada (ISED) RSS-210.

Revision History	Description of Change	Date
Rev 0	Initial Release	October 31, 2018
REV 1	Report update to correct errors and address reviewer's comments	February 1, 2019
REV 2	Address reviewer's comments	February 5, 2019

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1 INTRODUCTION

1.1 COMPLIANCE STATEMENT

The Crane Payment Innovation SYNQ ™ complies with the limits for a transmitter device under FCC Part 15.249 (10/2013) and ISED Canada RSS-210 Issue 8 December 2010.

1.2 TEST SCOPE

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.

1.3 CONTRACT INFORMATION

Customer:	Crane Payment Innovations.
Address	3222 Phoenixville Pike, Suite 200
	Malvern, PA 19355
Purchase Order Number:	4500555905
Quotation Number:	71022A

1.4 TEST DATES

Testing was performed on the following date(s): 10/22/2018 – 10/26/2018, 02/01/2019

1.5 TEST AND SUPPORT PERSONNEL

Washington Laboratories, LTD	Nikolas Allen, John P. Repella
Customer Representative	Dan Mitchell

Abbreviations

A	**A**mpere
ac	**a**lternating **c**urrent
AM	Amplitude Modulation
Amps	Amperes
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

Table 1: Device Summary

Item	CPI SYNQ
Manufacturer:	Crane Payment Innovation
FCC ID:	QP8-SYNQ18
ISED ID:	1297A-SYNQ18
Model:	SYNQ ™
Serial Number of Unit Tested	Not Provided
FCC Rule Parts:	§15.249
ISED Rule Parts:	RSS-210
Frequency Range:	2400-2483.5 MHz
Maximum Output Field:	37.5 mV/m (@ 3m)
Modulation:	Gaussian Frequency Shift Keying
Occupied Bandwidth (99%)[MHz]:	1.0271
FCC Emission Designator:	1M03F7D
ISED Emissions Designators:	1M03F7D
Keying:	Automatic, Manual
Type of Information:	Data
Number of Channels:	40
Power Output Level	Fixed
Highest TX Spurious Emission:	40.5 uV/m (@ 3m)
Highest RX Spurious Emission:	27.4 uV/m (@ 3m)
Antenna Connector	PCB Trace
Antenna Type	PCB
Interface Cables:	None
Maximum Data Rate	8192 kSymbols
Power Source & Voltage:	DC, 20-42V Battery

The Crane Payment Innovation SYNQ™ is used as a wireless interface to a vending machine. It provides the ability for wireless payment from a Bluetooth device as well as service status information of the vending machine and included CPI Buss connected devices.

2.2 TEST CONFIGURATION

The SYNQ™ was connected to vending machine and bill/coin devices.

2.3 TESTING ALGORITHM

The SYNQ™ was tested with the EUT transmitting in a normal configuration and being set to a CW signal when appropriate.

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

2.4 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. The ISED Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Testing Certificate AT-1448 as an independent FCC test laboratory.

2.5 MEASUREMENTS

2.5.1 References

ANSI C63.2 (Jan-2016) Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 (Jan 2014) American National Standard for 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 (Jun 2013) American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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

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

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.

Table 2: Expanded Uncertainty List

Scope	Standard(s)	Expanded Uncertainty
Conducted Emissions	CISPR11, CISPR22, CISPR32, CISPR14, FCC Part 15	±2.63 dB
Radiated Emissions	CISPR11, CISPR22, CISPR32, 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 List

Test Name:	**Conducted Emissions Voltage**	Test Date:	**02/01/2019**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00125	Solar/8028-50-TS-24-BNC	LISN	5/23/2019
00126	Solar/8028-50-TS-24-BNC	LISN	5/23/2019
00823	Agilent/EXA N9010A	EXA SPECTRUM ANALYZER	4/21/2019
00895	HP/11947A	TRANSIENT LIMITER	12/10/2019

Test Name:	**Radiated Emissions**	Test Date:	**10/22/2018**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00644	Sunol Sciences Corporation – JB1	Broadband Hybrid Antenna	01/16/2020
00528	Agilent/E4446A	Spectrum Analyzer 3Hz - 44GHz	12/19/2018
00559	HP/8447D	Pre-amplifier	02/12/2019
00435	WLL/RG-223(0.5m)	BNC Coaxial Cable	04/12/2019
00004	ARA/DRG-118/A	Horn Antenna1-18GHz	0 6/14/2019
00522	HP/8449B	Pre-Amplifier 1-26.5GHz	02/12/2019
00849	AH Systems/SAC-18G-16	HF Coaxial Cable	01/18/2020
00776	Tenny/ TJR-A-WS4	Temperature Chamber	06/01/2019

4 TEST RESULTS

The Table Below shows the results of testing for compliance with a Frequency Hopping Spread Spectrum device in accordance with FCC Part 15.249 10/2015 and RSS-210 Issue 9. Full test results are shown in subsequent sub-sections.

Table 4: Test Summary Table

TX Test Summary			
FCC Rule Part	**IC Rule Part**	**Description**	**Result**
2.1049	RSS-GEN 6.7	Occupied Bandwidth	Pass
15.249 (b)	RSS-Gen 6.11 & 8.11	Frequency Stability	Pass
15.249 (d) 15.209	RSS-GEN	Bandedge Requirements	Pass
15.249 (a) 15.209	RSS-210 6.13 RSS-GEN 8.9	General Field Strength Limits	Pass
15.207	RSS-210	Conducted Emissions	Pass
RX/Digital Test Summary			
FCC Rule Part	**IC Rule Part**	**Description**	**Result**
15.107	RSS-GEN Section 8.8	AC Powerline Conducted Emissions	Pass
15.109	RSS-210 Section 4.3 RSS-GEN Section 7.3	General Field Strength Limits	Pass

Transmitter was active during the testing.

4.1 FREQUENCY STABILITY: (FCC PART §15.249 (B), RSS-GEN 8.11)

Frequency Stability was performed by coupling the output of the EUT to the input of a spectrum analyzer. The device was placed in a temperature table and frequency of a single channel was measured at -20 to 50 degrees C. The frequency tolerance of the carrier shall be maintained within ±0.001% of the operating frequency. See Table 5 for collected data.

Table 5: Frequency Stability Test Data

Temperature (Centigrade)	Frequency (MHz)	Deviation (Hz)	Limit (+/- Hz)	Pass/Fail
20(ambient)	2439.980820	0	24400	**NA**
-30	2439.960039	-20781	24400	Pass
-20	2439.974548	-6272	24400	Pass
-10	2439.981266	446	24400	Pass
0	2439.984150	3330	24400	Pass
10	2439.982913	2093	24400	Pass
20	2439.980688	-132	24400	Pass
30	2439.975933	-4887	24400	Pass
40	2439.971616	-9204	24400	Pass
50	2439.968205	-12615	24400	Pass

Voltage Variations				
Voltage	**Frequency (MHz)**	**Deviation (Hz)**	**Limit (+/- Hz)**	**Pass/Fail**
Nominal Voltage	2439.980820	0	24400	**NA**
115% of Nominal Voltage (39.1)	2439.980775	-45	24400	Pass
85% of Nominal Voltage (28.9)	2439.980914	94	24400	Pass

4.2 BANDEDGE: (FCC PART §15.249 (D), RSS-GEN)

Bandedge was performed by coupling the output of the EUT to the input of a spectrum analyzer. The device was set to operate on the lowest and highest channel and plots were taken.

Figure 1: Lower Bandedge

Figure 2: Upper Bandedge

4.3 OCCUPIED BANDWIDTH: (FCC PART §2.1049, RSS-GEN 6.8)

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer. At full modulation, the occupied bandwidth was measured as shown.

Table 6 provides a summary of the Occupied Bandwidth Results.

Table 6: Occupied Bandwidth Results

Frequency	Bandwidth (kHz)	Limit (kHz)	Pass/Fail
Low Channel: 2402MHz	1024.6	N/A	Pass
Mid Channel: 2440MHz	1027.1	N/A	Pass
High Channel: 2480MHz	1018.6	N/A	Pass

Figure 3: Occupied Bandwidth, Low Channel

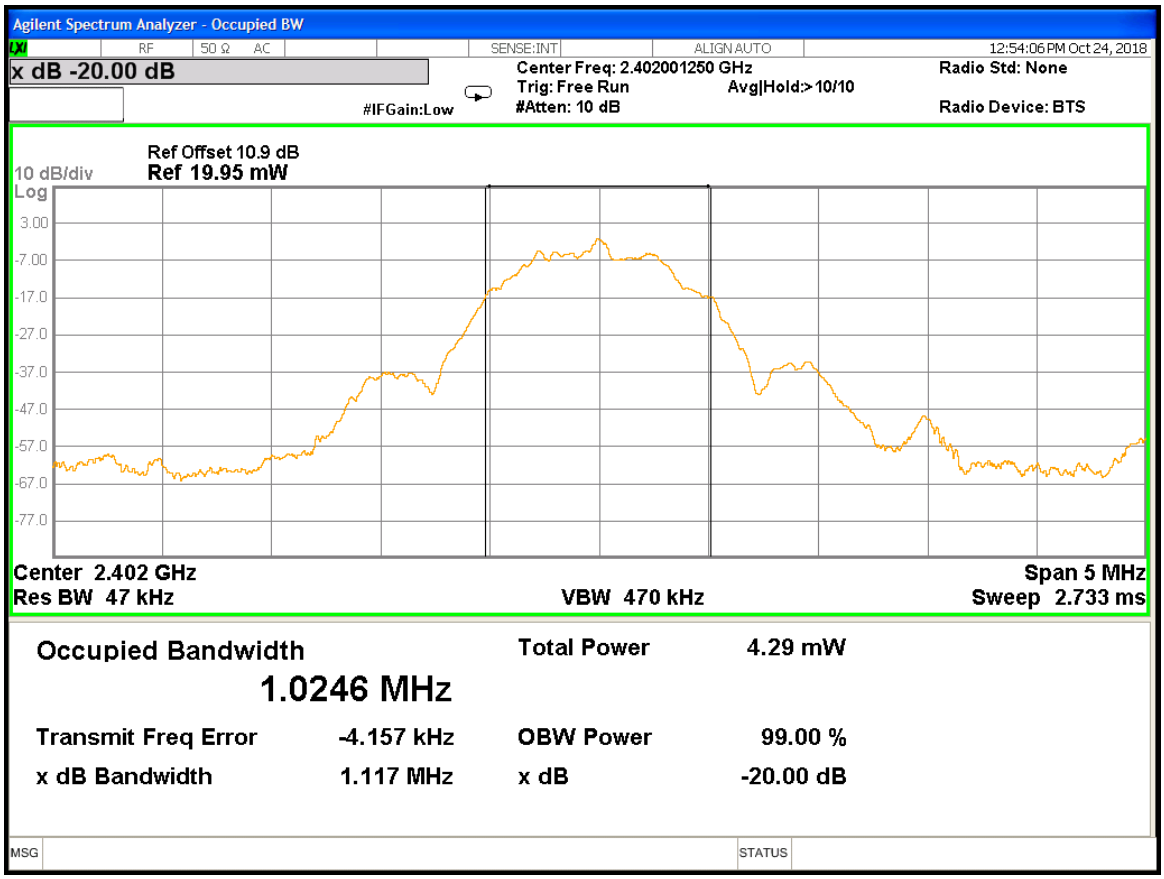


Figure 4: Occupied Bandwidth, Mid Channel

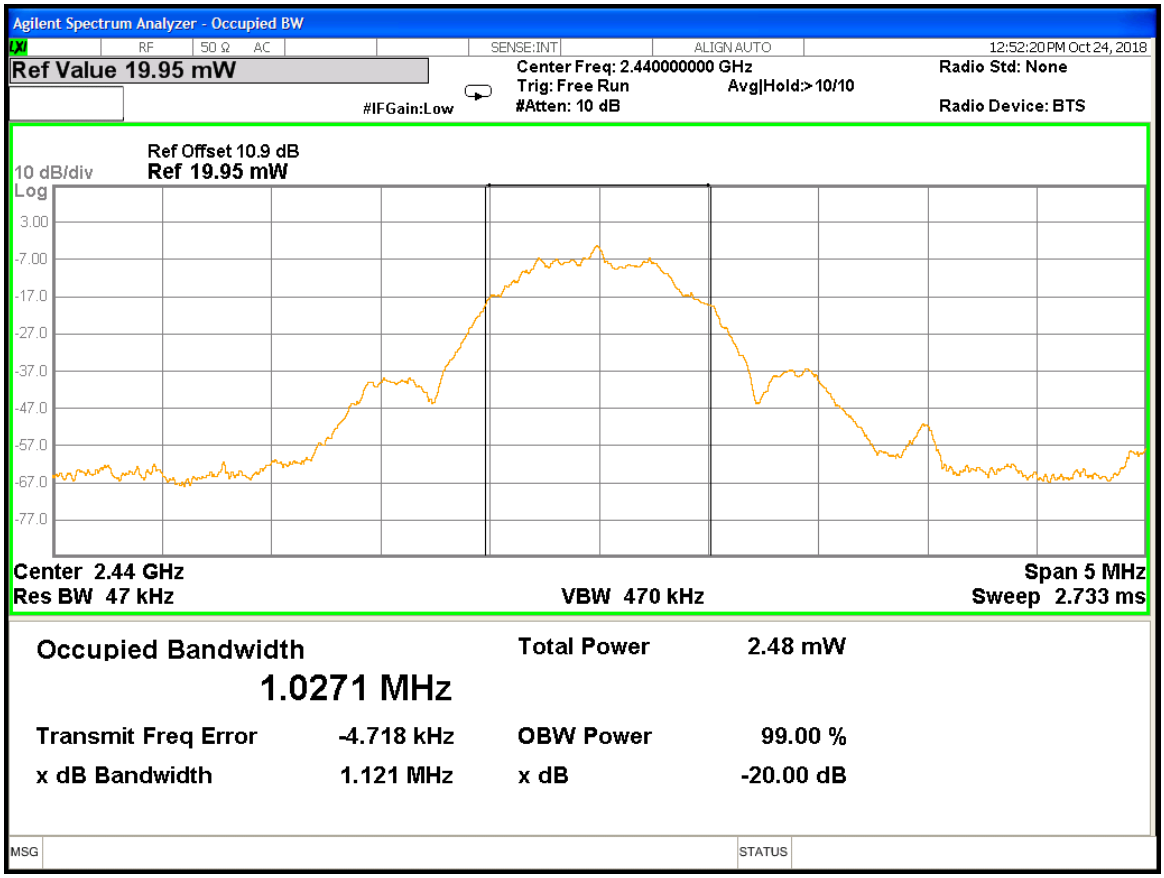
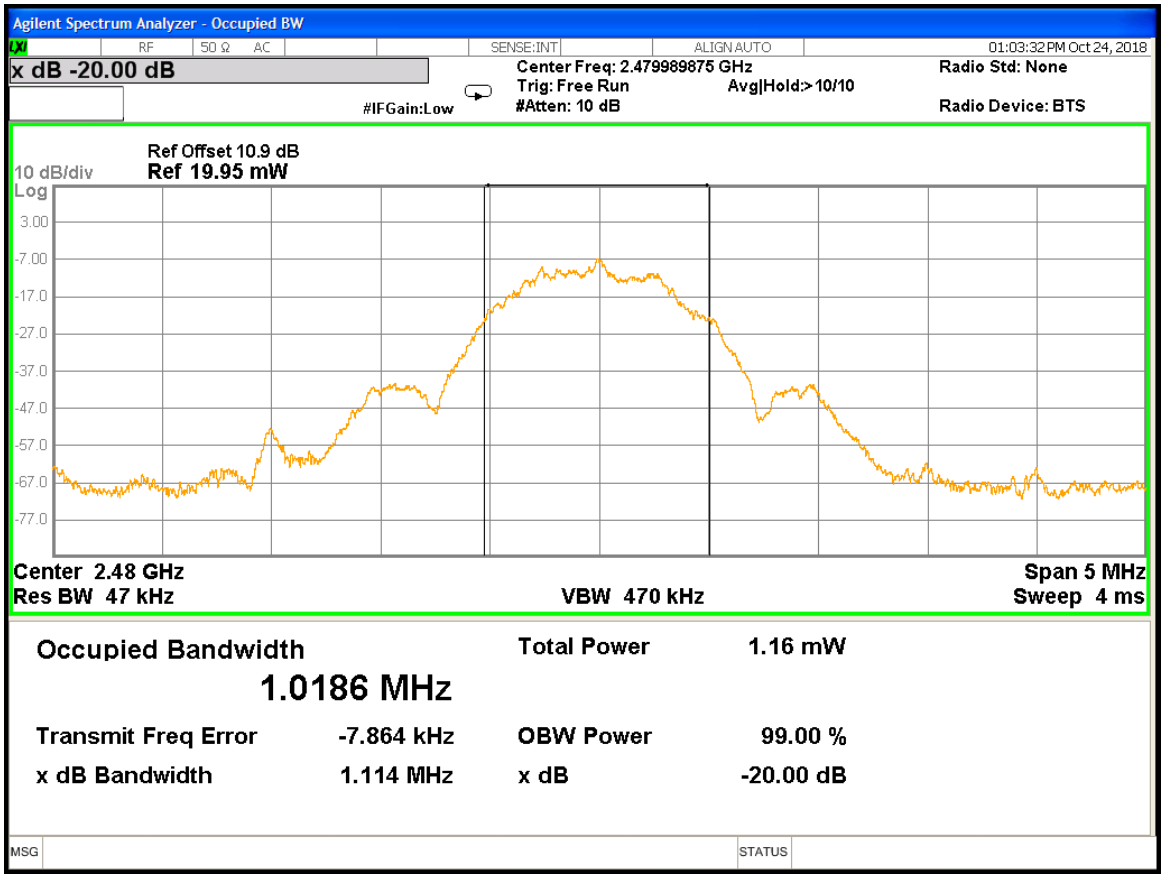
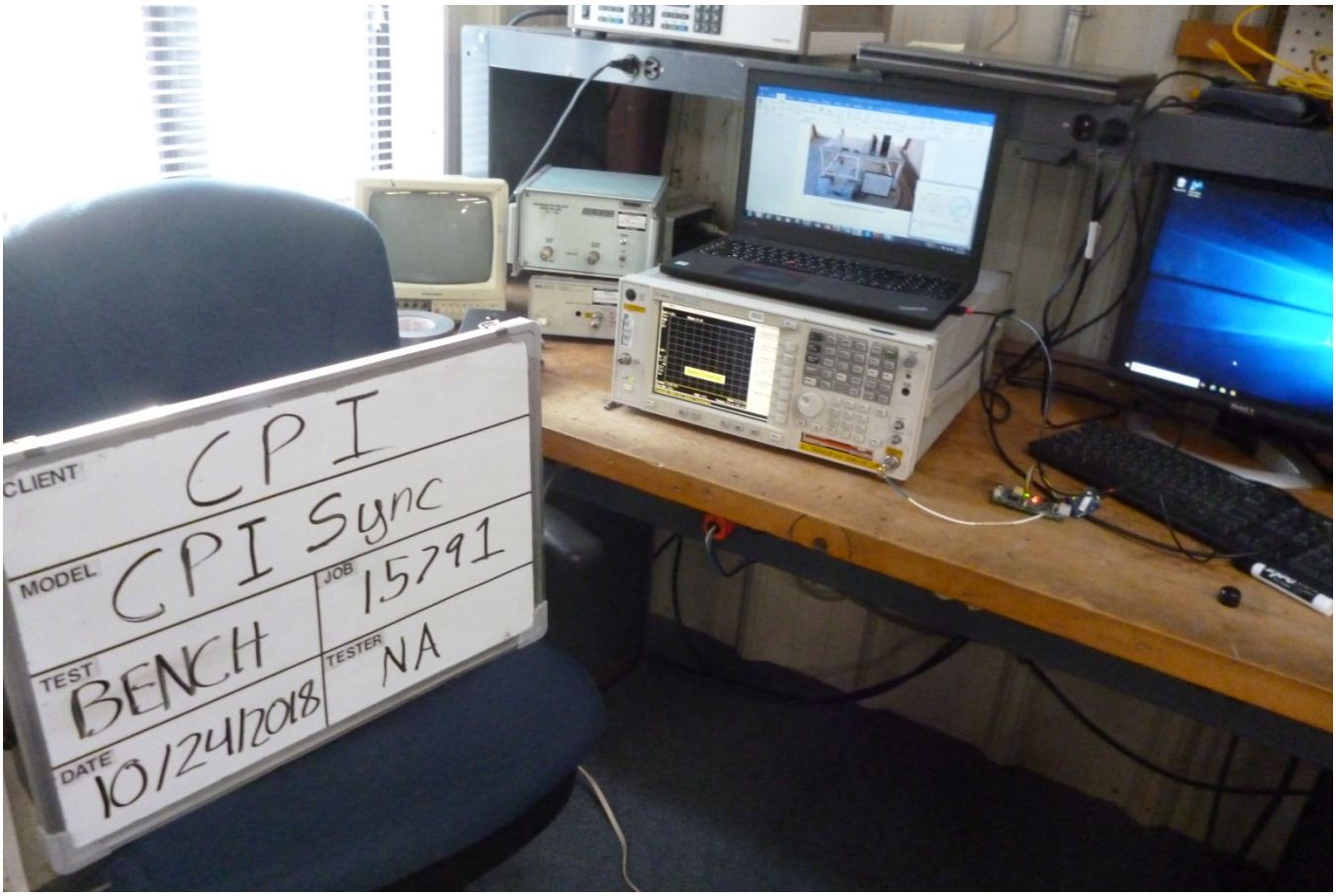


Figure 5: Occupied Bandwidth, High Channel



Photograph 1: Bench Test Setup Configuration



Photograph 2: Temp Stability Test Setup

4.5 AC MAINS CONDUCTED EMISSIONS(FCC PART §15.207(A), RSS-GEN)

4.5.1 Requirements

Compliance Standard: FCC Part 15.207, Class B

Frequency Range	Class B Digital Device	
	Quasi-peak	Average
0.15-0.5MHz	66 to 56dBµV	56 to 46dBµV
0.5 to 5MHz	56dBµV	46dBµV
0.5-30MHz	60dBµV	50dBµV

4.5.2 Test Procedure

The requirements of FCC Part 15 and ICES-003 call for the EUT to be placed on an 80cm-high 1 X 1.5-meter 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 was supplied to the peripherals through a second LISN. The peripherals were placed on the table in accordance with ANSI C63.4: 2014. Power 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, peak, or average 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. For average measurements, the post-detector filter was set to 10 Hz.

These emissions must meet the limits specified in §15.207 & §15.35 for quasi-peak and average measurements. At frequencies where, quasi-peak or peak measurements comply with the average limit, no average measurements need be performed.

4.5.3 Conducted Data Reduction and Reporting

At frequencies where, quasi-peak or peak measurements comply with the average limit, no average measurements need be performed. The Conducted emissions level to be compared to the FCC limit is calculated as shown in the following example.

Example:

Spectrum Analyzer Voltage: VdBµV
LISN Correction Factor: LISN dB
Cable Correction Factor: CF dB
Electric Field: EdBµV = V dBµV + LISN dB + CF dB

4.5.4 Test Data

The EUT complied with the Class B Conducted Emissions requirements.

Table 7 provides a summary of the Conducted Emissions results. Photograph 3 & 4 show a sample of the conducted emissions test configuration.

Table 7: 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)
0.150	31.2	16.0	10.2	0.2	41.6	26.3	66.0	56.0	-24.4	-29.7
0.476	19.3	12.8	10.2	0.3	29.7	23.2	56.4	46.4	-26.7	-23.2
7.175	23.6	17.1	11.0	0.0	34.6	28.1	60.0	50.0	-25.4	-21.9
7.476	24.1	17.4	11.0	0.1	35.2	28.5	60.0	50.0	-24.8	-21.5
22.159	17.0	9.6	11.6	1.1	29.7	22.3	60.0	50.0	-30.3	-27.7
23.606	17.8	8.7	11.6	1.1	30.6	21.4	60.0	50.0	-29.4	-28.6

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)
0.150	32.1	18.0	10.2	0.2	42.5	28.4	66.0	56.0	-23.5	-27.6
0.476	18.5	10.4	10.2	0.2	28.9	20.8	56.4	46.4	-27.5	-25.6
7.221	23.0	14.9	11.0	0.0	34.0	25.9	60.0	50.0	-26.0	-24.1
7.635	23.9	14.0	11.0	0.1	35.0	25.1	60.0	50.0	-25.0	-24.9
22.134	24.0	10.1	11.6	0.8	36.4	22.5	60.0	50.0	-23.6	-27.5
22.189	25.5	8.1	11.6	0.8	37.9	20.5	60.0	50.0	-22.1	-29.5

Photograph 3: Conducted Emissions Test Configuration - Front

Photograph 4: Conducted Emissions Test Configuration – Side

4.6 RADIATED SPURIOUS EMISSIONS: (FCC PART §15.249(A), RSS-GEN 8.9)

The EUT must comply with the requirements for radiated spurious emissions that fall within the restricted bands. These emissions must meet the limits specified in §15.209 and §15.35(b) for peak measurements.

4.6.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. 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. The peripherals were placed on the table in accordance with ANSI C63.4-2014. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The device was rotated in three axes. The maximum emissions are reported in Table 9.

The emissions were measured using the following resolution bandwidths:

Table 8: Spectrum Analyzer Settings

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	120kHz	>100 kHz
>1000 MHz	1 MHz	<10 Hz (Avg.), 1MHz (Peak)

Table 9: Radiated Emission Test Data

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)	Peak/Ave
31.15	V	180.00	1.00	33.11	-2.7	33.0	100.0	-9.6	Peak
57.23	V	0.00	1.00	45.00	-15.9	28.4	100.0	-10.9	Peak
79.99	V	180.00	2.00	41.37	-14.9	21.2	100.0	-13.5	Peak
242.90	V	180.00	1.30	36.22	-9.7	21.1	200.0	-19.5	Peak
257.48	V	0.00	2.20	36.85	-9.8	22.6	200.0	-19.0	Peak
324.97	V	270.00	3.60	30.94	-6.9	15.8	200.0	-22.0	Peak
359.99	V	0.00	3.20	32.24	-5.7	21.1	200.0	-19.5	Peak
1506.16	V	180.00	2.50	53.82	-7.1	216.0	5000.0	-27.3	Peak
1506.16	V	180.00	2.50	35.65	-7.1	26.7	500.0	-25.5	Ave
4803.94	V	0.00	1.40	56.32	5.7	1267.5	5000.0	-11.9	Peak
4803.94	V	0.00	1.40	36.80	5.7	133.9	500.0	-11.4	Ave
7206.07	V	180.00	1.40	45.69	11.0	680.2	5000.0	-17.3	Peak
7206.07	V	180.00	1.40	25.90	11.0	69.7	500.0	-17.1	Ave
31.19	H	270.00	3.80	34.92	-2.8	40.5	100.0	-7.8	Peak
53.32	H	0.00	3.50	43.57	-15.8	24.3	100.0	-12.3	Peak
113.20	H	45.00	2.00	40.08	-9.4	34.4	150.0	-12.8	Peak
138.39	H	0.00	4.00	34.34	-9.1	18.3	150.0	-18.3	Peak
238.37	H	0.00	1.80	35.93	-9.9	20.1	200.0	-20.0	Peak
299.97	H	270.00	2.00	32.14	-7.8	16.5	200.0	-21.7	Peak
333.72	H	45.00	1.20	31.50	-6.8	17.2	200.0	-21.3	Peak
1500.83	H	180.00	1.30	50.81	-7.1	152.5	5000.0	-30.3	Peak
1500.83	H	180.00	1.30	35.38	-7.1	25.8	500.0	-25.7	Ave
4803.94	H	0.00	1.40	56.32	5.7	1267.5	5000.0	-11.9	Peak
4803.94	H	0.00	1.40	42.24	5.7	250.6	500.0	-6.0	Ave
7206.07	H	180.00	1.40	48.62	11.0	953.1	5000.0	-14.4	Peak
7206.07	H	180.00	1.40	25.78	11.0	68.7	500.0	-17.2	Ave

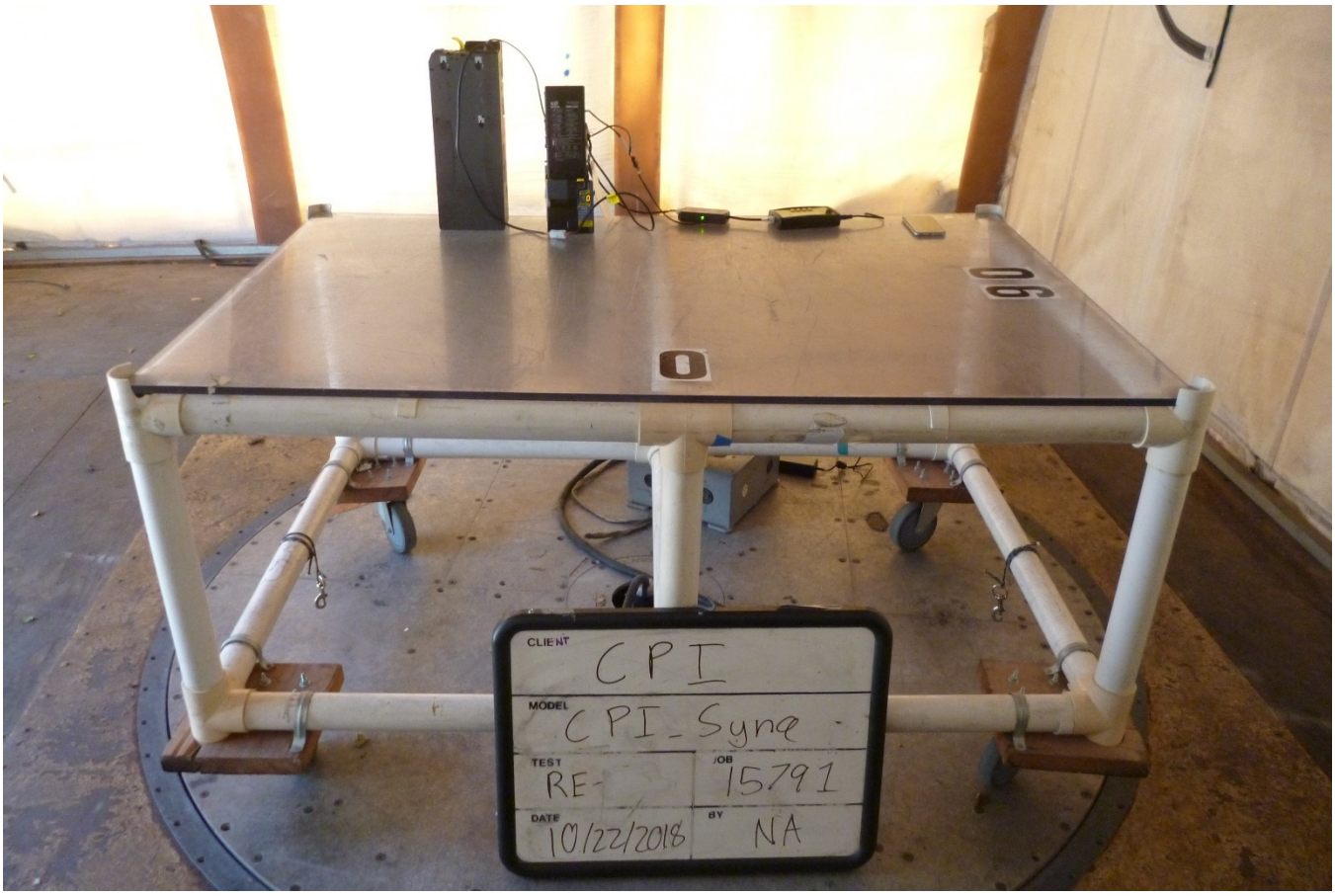
Emissions were scanned up to the 10th harmonic of the fundamental.

Table 10: 15.249 Radiated Field at Fundamental

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (mV/m)	Limit (mV/m)	Margin (dB)	Peak/Ave
2401.87	V	180.00	1.00	106.68	-15.2	37.4	50	-2.5	Peak
2439.97	V	180.00	1.00	105.98	-15.6	33.1	50	-3.6	Peak
2479.94	V	180.00	1.00	107.45	-16.0	37.5	50	-2.5	Peak
2401.87	H	180.00	1.00	105.31	-15.2	31.9	50	-3.9	Peak
2439.97	H	180.00	1.00	106.42	-15.6	34.8	50	-3.1	Peak
2479.94	H	180.00	1.00	105.50	-16.0	30.0	50	-4.4	Peak

Photograph 5: Radiated Emissions Test Setup

Photograph 6: Radiated Emissions Test Setup



4.7 RECEIVER RADIATED SPURIOUS EMISSIONS: (RSS-GEN 7.3)

The EUT must comply with the requirements for radiated spurious emissions that fall within the restricted bands. These emissions must meet the limits specified in §15.109 and §15.35(b) for peak measurements.

4.7.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. 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. The peripherals were placed on the table in accordance with ANSI C63.4-2014. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

Table 11: Spectrum Analyzer Settings

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	120kHz	>100 kHz
>1000 MHz	1 MHz	10 Hz (Avg.), 1MHz (Peak)

Average measurements above 1GHz were made with the Spectrum analyzer set to the linear mode with a Video bandwidth of 10Hz, and the resultant reading mathematically converted to dBuV. Correction factors were then applied, and the resulting value was compared to the limit.

Table 12: Radiated Emission Test Data, Receiver

Frequency MHz	Polarity H/V	Azimuth Degree	Ant. Ht (m)	SA Level dBuV	Corr. Factors dB	Corr. Level V/m	Limit uV/m	Margin (dB)	Peak/Ave
31.89	V	180.00	1.00	26.90	-2.9	15.9	100.0	-16.0	Peak
66.38	V	0.00	1.20	35.14	-14.6	10.7	100.0	-19.4	Peak
113.32	V	270.00	1.10	37.80	-9.1	27.4	150.0	-14.8	Peak
360.00	V	180.00	3.50	33.60	-5.7	24.8	200.0	-18.1	Peak
371.88	V	270.00	3.30	33.46	-5.5	24.9	200.0	-18.1	Peak
48.01	H	180.00	4.00	36.30	-13.8	13.3	100.0	-17.5	Peak
110.58	H	270.00	2.10	32.99	-9.5	14.9	150.0	-20.1	Peak
143.04	H	90.00	2.00	36.20	-9.2	22.3	150.0	-16.6	Peak
143.04	H	90.00	2.00	32.46	-9.2	14.5	150.0	-20.3	Peak
229.41	H	270.00	2.00	31.09	-10.3	11.0	200.0	-25.2	Peak
312.52	H	180.00	1.80	32.23	-7.3	17.7	200.0	-21.1	Peak
359.98	H	90.00	1.00	29.74	-5.7	15.9	200.0	-22.0	Peak