

COMPLIANCE WORLDWIDE INC. TEST REPORT 314-19R1

In Accordance with the Requirements of
Federal Communications Commission CFR Title 47 Part 15.225, Subpart C
Innovation, Science and Economic Development Canada
RSS 210, Issue 9
Low Power License-Exempt Radio Communication Devices
Intentional Radiators

Issued to
Kronos Incorporated
900 Chelmsford Street
Lowell, MA 01851

for the
InTouch DX
With New 13.56 MHz
Smart Card RFID Reader, Rev. B Mk II

FCC ID: P5W-8610K007
IC: 1416A-8610K007

Report Issued on August 9, 2019
Revision R1 Issued on August 29, 2019

Tested by



Brian F. Breault
EMC Test Engineer

Reviewed By



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1. Scope

This test report certifies that the Kronos InTouch DX with the 13.56 MHz Smart Card RFID Reader, Revision B Mk 2, as tested, meets the FCC Part 15.225 Subpart C, and ISED Canada RSS 210 requirements. The scope of this test report is limited to the test samples provided by the client, only in as much as those samples represent other production units. If any significant changes are made to the units, the changes shall be evaluated and a retest may be required. Revision R1 adds RF Exposure for Mobile device calculation exemption in Section 7.8.

Note: The Kronos InTouch DX contains the iClass SE Reader Module Mk2 (FCC ID JQ6-SE3210, IC ID 2236B-SE3210).

2. Product Details

- 2.1. Manufacturer:** Kronos, Inc.
- 2.2. Model Number:** InTouch DX
- 2.3. Serial Numbers:** Beta Rev 1, # 103
iClass SE Reader Module SE3210B-1103
- 2.4. Description:** A time clock built for today's modern workforce.
- 2.5. Power Source:** 18 VDC, 2.22A (internal power adapter – 100-240 VAC, 50/60 Hz, 1.0A) Model: EA10442G-180
- 2.6. Hardware Revision:** N/A
- 2.7. Software Revision:** N/A
- 2.8. Modulation Type:** Pulse Modulation
- 2.9. Operating Frequencies:** 13.56 MHz
- 2.10. EMC Modifications:** None

3. Product Configuration

3.1. Operational Characteristics & Software

The Kronos InTouch DX with RFID module was configured to transmit continuously to the RFID tags once power is applied to the unit.

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Volts	Frq (Hz)	Description/Function
Kronos, Inc.	InTouch DX	Beta Rev 1, #103	18	VDC	Time clock with 13.56 MHz RFID

3.3. EUT Connected Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Frq (Hz)	Description/Function
EDACPower Elec.	EA10442G-180	N/A	100-240	50/60	Internal power adapter

3.4. EUT Cables/Transducers

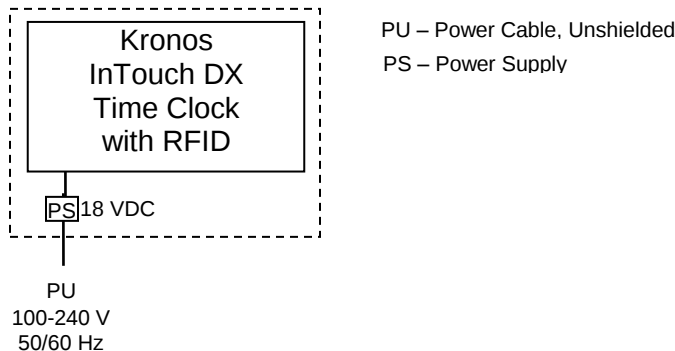
Cable Type	Length	Shield	From	To
None	N/A	N/A		

3. Product Configuration (continued)

3.5. Support Equipment

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
N/A					

3.6. Block Diagram



4. Measurements Parameters

4.1. Measurement Equipment and Software Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due	Interval
EMI Test Receiver, 9kHz - 7GHz ¹	Rohde & Schwarz	ESR7	101156	9/10/2020	2 Years
EMI Test Receiver, 10 Hz - 7GHz ¹	Rohde & Schwarz	ESR7	101770	10/3/2020	2 Years
Spectrum Analyzer, 2 Hz to 26.5 GHz ²	Rohde & Schwarz	FSW26	102057	9/13/2020	2 Years
Spectrum Analyzer, 9 kHz to 40 GHz ³	Rohde & Schwarz	FSV40	100899	9/10/2020	2 Years
EMI Receiver 9 kHz - 1 GHz	Hewlett Packard	8546A	3650A00360	9/11/2020	2 Years
Loop Antenna 9 kHz - 30 MHz	EMCO	6512	9309-1139	1/28/2022	3 Years
Biconilog Antenna, 30 MHz - 2 GHz	Sunol Sciences	JB1	A050913	6/5/2022	2 Years
Horn Antenna, 960 MHz to 18 GHz	Electro-Metrics	EM-6961	6337	10/3/2020	2 Years
Horn Antenna, 18 GHz to 26.5 GHz	Electro-Metrics	AH-826	081051	9/28/2019	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B	3008A01323	9/11/2020	2 Years
Digital Barometer	Control Company	4195	ID236	4/3/2020	2 Years
Temperature Chamber ⁴	Associated Environmental	SD-308	10782	CNR	

¹ ESR7 Firmware revision: V3.46 SP1, Date installed: 12/22/2018

² FSW26 Firmware revision: V4.30 SP1, Date installed: 02/22/2019

³ FSV40 Firmware revision: V2.30 SP4, Date installed: 05/04/2016

⁴ Used with calibrated measurement equipment.

Previous V3.36 SP2, installed 12/5/2018.

Previous V3.36 SP2, installed 10/26/2018.

Previous V2.30 SP1, installed 10/22/2014.

Manufacturer	Software Description	Title or Model #	Rev.	Report Sections
Compliance Worldwide	Test Report Generation Software	Test Report Generator	1.0	Used to process conducted emissions data

4. Measurements Parameters (continued)

4.2. Measurement & Equipment Setup

Test Dates:	Jul 25 th - August 2 nd , 2019
Test Engineer:	Brian Breault
Normal Site Temperature (15 - 35°C):	24.0
Relative Humidity (20 -75%RH):	33%
Frequency Range:	.01 MHz to 26.5 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	120 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Avg Bandwidth:	300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz
Detector Function:	Peak, QP - 30 MHz to 1 GHz Peak, Avg - Above 1 GHz Unless otherwise specified.

4.3 Measurement Procedure

The test measurements contained in this report are based on the requirements detailed in FCC Part 15, Subpart C - Intentional Radiators, notably Section 15.225, Operation within the band 13.110 – 14.010 MHz.

5. Choice of Equipment for Test Suits

5.1. Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

5.2. Presentation

The test sample was tested complete with all required ancillary equipment. Refer to Section 3 of this report for the product equipment configuration.

5.3. Choice of Operating Frequencies

The transmitter in the unit under test utilizes a single operating frequency at approximately 13.56 MHz

6. Measurement Summary

Test Requirement	FCC Part 15 Reference	RSS Reference	Test Report Section	Result	Comment
Antenna Requirement	15.203	RSS-GEN Section 7.1.2	7.1	Compliant	
Operation within the Band 13.110 MHz – 14.010 MHz (Radiated Field Strength)	15.225 (a), (b), (c)	RSS-210 Section A2.6	7.2	Compliant	
Spurious Radiated Emissions	15.209		7.3	Compliant	
Operation within the Band 13.110 MHz – 14.010 MHz (Frequency Stability)	15.225 (e)	RSS-210 Section A2.6	7.4	Compliant	
Occupied Bandwidth/ Lower and Upper Band Edges	15.215(c) C63.10	N/A	7.5	Compliant	
99% Power Bandwidth	N/A	RSS-GEN Section 4.6.1	7.6	Compliant	
Power Line Conducted Emissions	15.207	RSS-GEN Section 7.2.4	7.7	Compliant	
Public Exposure to Radio Frequency Energy Levels.	1.1307 (b)(1)	RSS 102, Issue 5	7.8	Compliant	

7. Measurement Data

7.1. Antenna Requirement (Section 15.203, RSS-GEN 7.1.2)

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

Status: Compliant - The antenna utilized by the device under test is contained inside a sealed plastic enclosure.

7. Measurement Data (continued)

7.2. Operation within the Band 13.110 MHz – 14.010 MHz (15.225 (a), (b) and (c))

Radiated Field Strength of Fundamental (15.225 (a), (b) and (c))

Requirement: (a) The field strength of any emissions within the band 13.553 - 13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Test Note: Reference ANSI C63.10-2013 sections 5.3.2 and 6.4.4.2. The following formula was used to extrapolate the measurement distance to the limit distance:

$$FS_{\text{limit}} = FS_{\text{max}} - 20 \log \left(\frac{d_{\text{limit}}}{d_{\text{measure}}} \right) \quad \text{Equation 1}$$

FS_{limit} is the calculation of field strength at the limit distance (dB μ V/m) **50.05**

FS_{max} is the measured field strength, expressed in (dB μ V/m) 59.59

d_{measure} is the distance of the measurement point from the EUT (Meters) 10.00

d_{limit} is the reference limit distance (Meters) 30.00

The screen captures on the following pages display the value measured at a distance of 10 meters. This distance value was adjusted to the limit distance using the formula detailed in Equation 1.

Result: Compliant - The fundamental frequency radiated field strength of the device under test complies with the requirements detailed in FCC Part 15.225, Section (a).

The peak field strength of the device under test met the average requirement. For this reason, the quasi-peak field strength was not factored using a duty cycle correction factor.

Freq. (MHz)	Amplitude ¹ (dB μ V/m)	Corr. Ampl. ² (dB μ V/m)	FCC 15.225 Limit (dB μ V/m) Quasi-Peak	Margin (dB)	Ant Pos.	Ant Height	Turntable Azimuth	Result
	Peak	Quasi Peak			Par/Per Gnd Par	cm	Deg	
13.56	50.05	N/A	84.00	-33.95	Per	100	161	Compliant

¹ Measurement has been extrapolated from 10 meters to 30 meters using Equation 1 on this page.

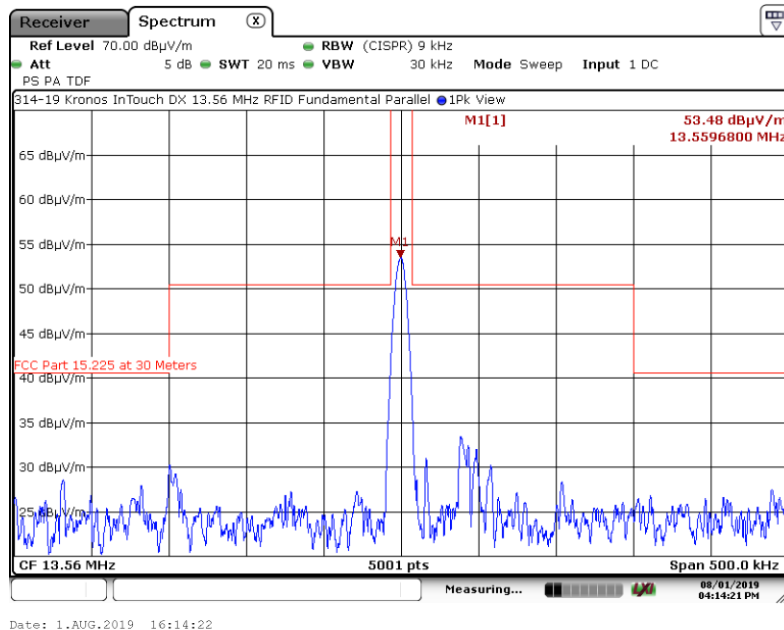
² The QP field strength was not factored because the peak field strength met the FCC Part 15.225 limit (FCC 15.35(a)).

7. Measurement Data (continued)

7.2. Operation within the Band 13.110 MHz – 14.010 MHz (15.225 (a), (b) and (c))

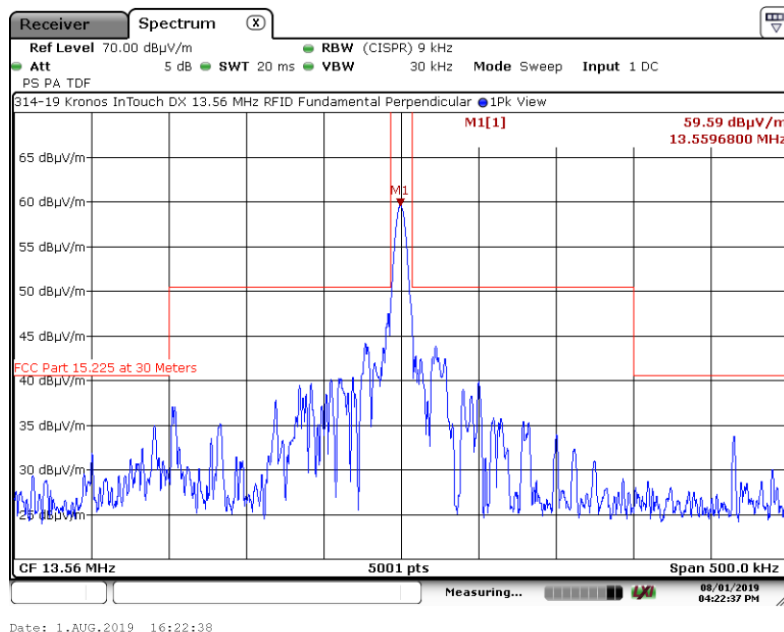
Radiated Field Strength of Fundamental (15.225 (a), (b) and (c))

7.2.1. Worst Case Field Strength of the Fundamental – Parallel Antenna



Date: 1.AUG.2019 16:14:22

7.2.2. Worst Case Field Strength of the Fundamental – Perpendicular Antenna



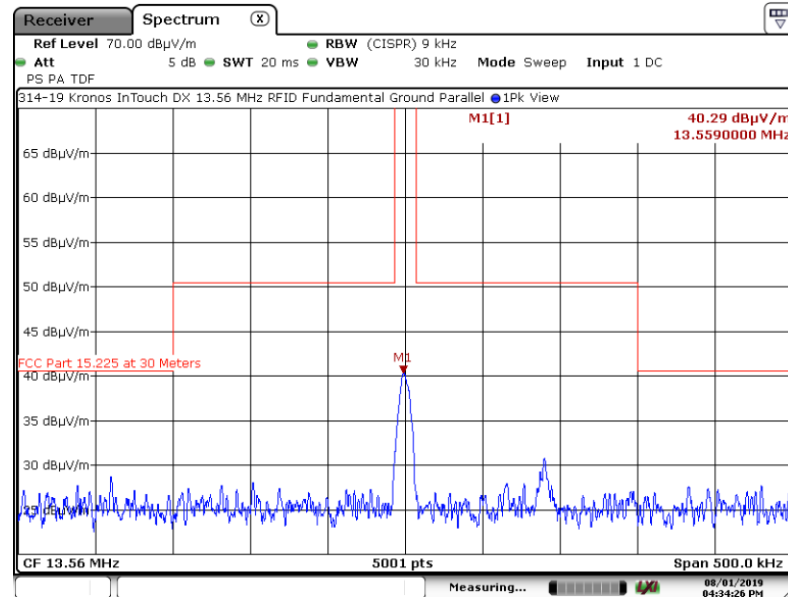
Date: 1.AUG.2019 16:22:38

7. Measurement Data (continued)

7.2. Operation within the Band 13.110 MHz – 14.010 MHz (15.225 (a), (b) and (c))

Radiated Field Strength of Fundamental (15.225 (a), (b) and (c))

7.2.3. Worst Case Field Strength of the Fundamental – Ground Parallel Antenna



Date: 1.AUG.2019 16:34:27

7. Measurement Data (continued)

7.3. Transmitter Spurious Radiated Emissions (15.225 (d), 15.209)

Requirement: The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table (Reference FCC 15.209):

Frequency (MHz)	Field Strength (μV/m)	Meas. Dist. (meters)	Field Strength (dBμV/m)	Distance (Meters)
0.009–0.490	2400/F(kHz)	300	128.5 to 93.8	3
0.490–1.705	24000/F(kHz)	30	73.8 to 63.0	3
1.705–30.0	30	30	69.5	3
30–88	100	3	40	3
88–216	150	3	43.5	3
216–960	200	3	46	3
Above 960	500	3	54	3

¹ Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise a quasi-peak detector is used.

² Extrapolation below 30 MHz is calculated at 40 dB/decade.

Procedure: Test measurements were made in accordance with ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices, Section 6.5.

Test Notes: 1. The vertical cursors in scans 7.3.2.1, 7.3.2.2 and 7.3.3.3 mark the fundamental frequency for the device under test.

2. The following worst-case measurements were verified on the open area test site. Reference scans 7.3.3.1 and 7.3.3.2 for scan data.

Frequency (MHz)	Amplitude (dBμV/m)		Limit (dBμV/m)	Margin	Polarity	Antenna Height	Azimuth
	Peak	Quasi Peak	Quasi Peak	(dB)	(H/V)	(cm)	(Deg)
565.17 ¹	---	---	---	---	---	---	---
960.00	44.42	41.49	43.5	-2.01	H	149	126
698.22	43.91	40.95	43.5	-2.55	H	163	241
831.42	43.89	41.54	43.5	-1.96	H	171	16
598.38 ¹	---	---	---	---	---	---	---
531.99	35.28	27.91	43.5	-15.59	H	150	16
960.00	46.13	42.21	43.5	-1.29	V	100	73
399.00	40.5	25.84	43.5	-17.66	V	121	266
698.22	38.31	29.96	43.5	-13.54	V	100	12

¹ Intermittent emission. Not measureable.

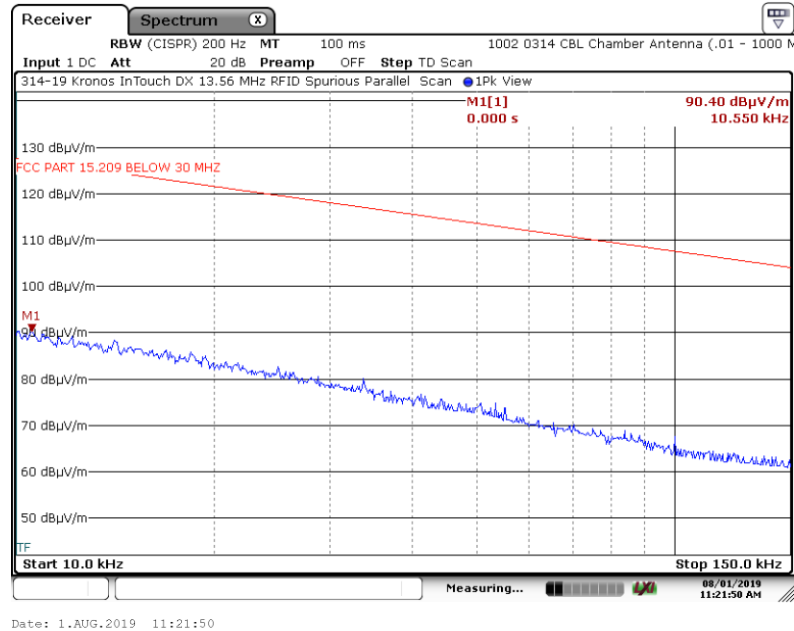
Results: Compliant - The transmitter installed in the unit under test meet the FCC Part 15.209 emissions requirements.

7. Measurement Data (continued)

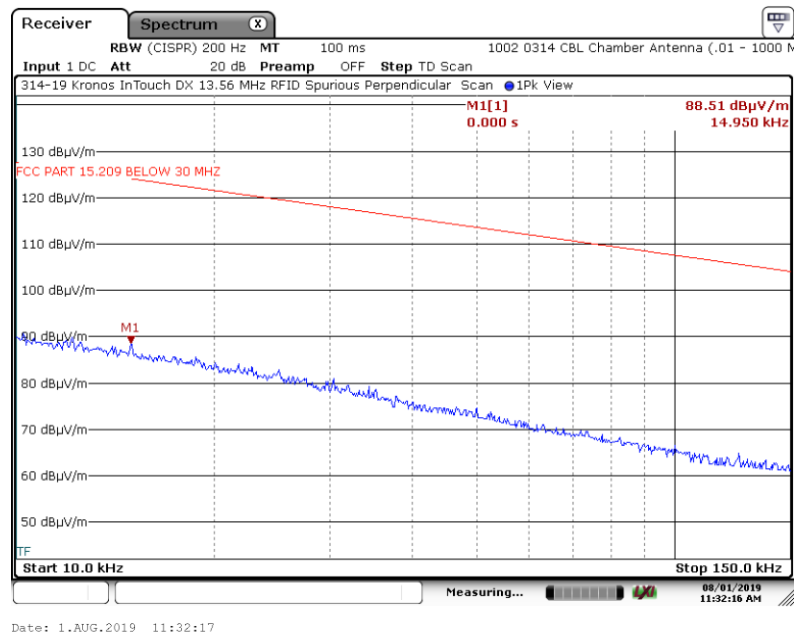
7.3. Spurious Radiated Emissions, 10 kHz to 25.0 GHz (15.225, § (d), 15.209) (cont'd)

7.3.1. Spurious Radiated Emissions, 10 kHz to 150 kHz Test Results

7.3.1.1. Parallel Antenna



7.3.1.2. Perpendicular Antenna

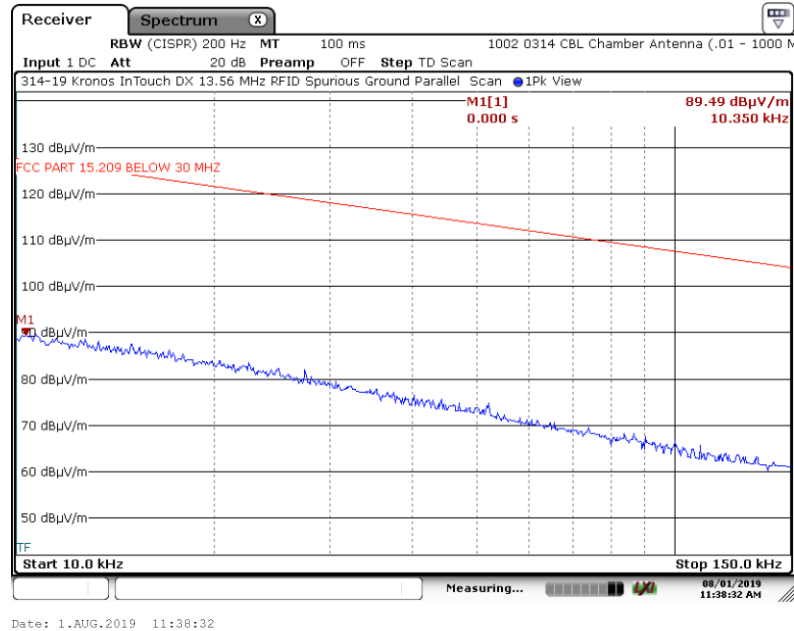


7. Measurement Data (continued)

7.3. Spurious Radiated Emissions, 10 kHz to 25.0 GHz (15.225, § (d), 15.209) (cont'd)

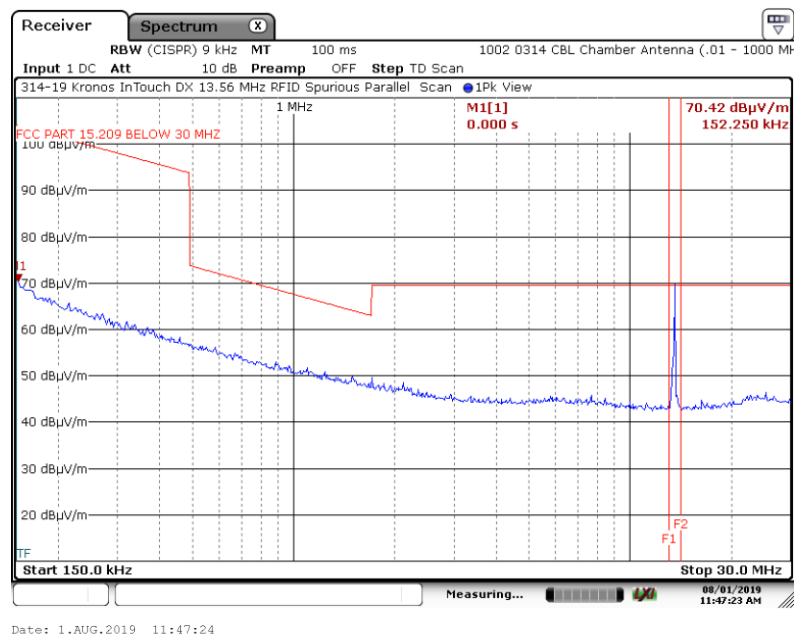
7.3.1. Spurious Radiated Emissions, 10 kHz to 150 kHz Test Results

7.3.1.3. Ground Parallel Antenna



7.3.2. Spurious Radiated Emissions, 150 kHz to 30 MHz Test Results

7.3.2.1. Parallel Antenna

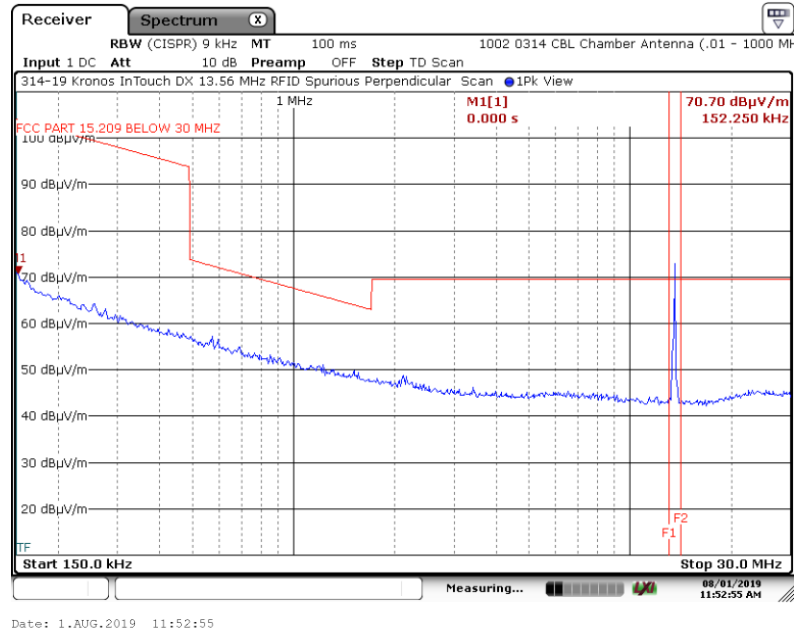


7. Measurement Data (continued)

7.3. Spurious Radiated Emissions, 10 kHz to 25.0 GHz (15.225, § (d), 15.209) (cont'd)

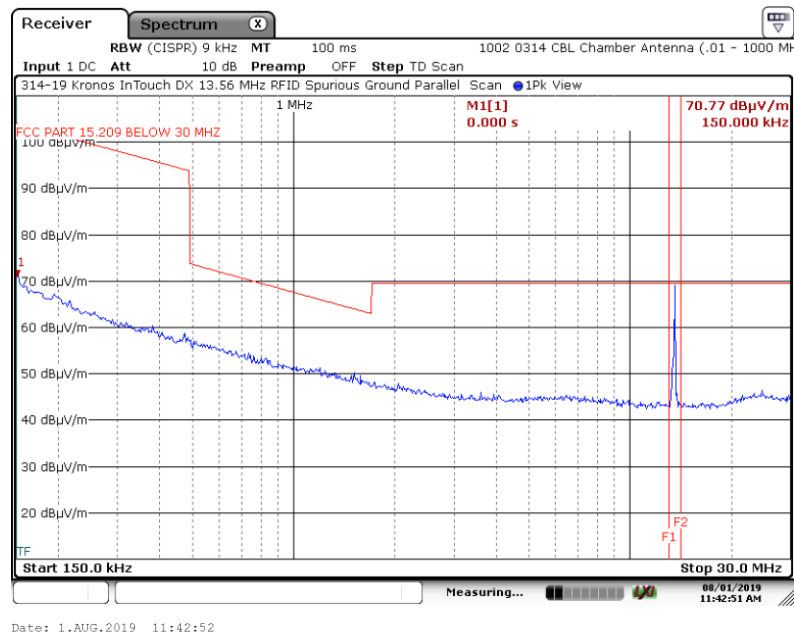
7.3.2. Spurious Radiated Emissions, 150 kHz to 30 MHz Test Results

7.3.2.2. Perpendicular Antenna



7.3.2. Spurious Radiated Emissions, 150 kHz to 30 MHz Test Results

7.3.2.3. Ground Parallel Antenna

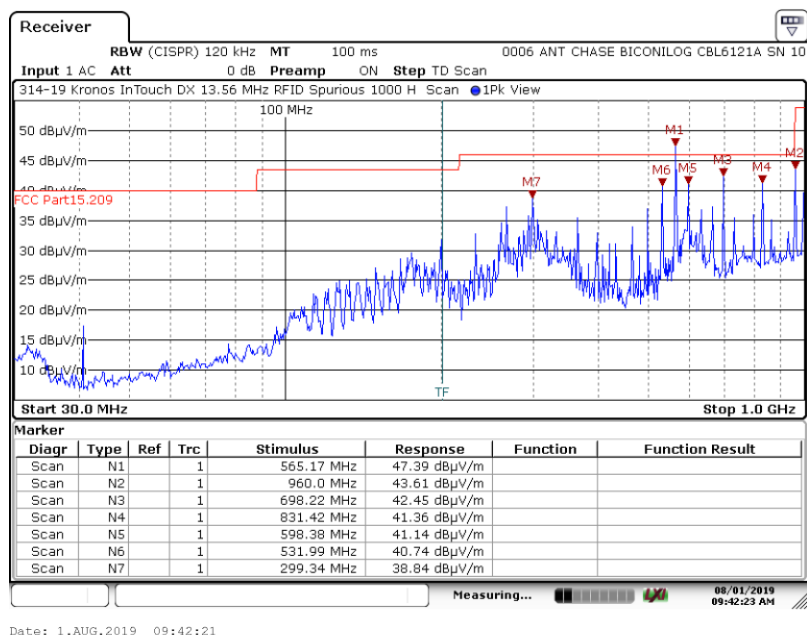


7. Measurement Data (continued)

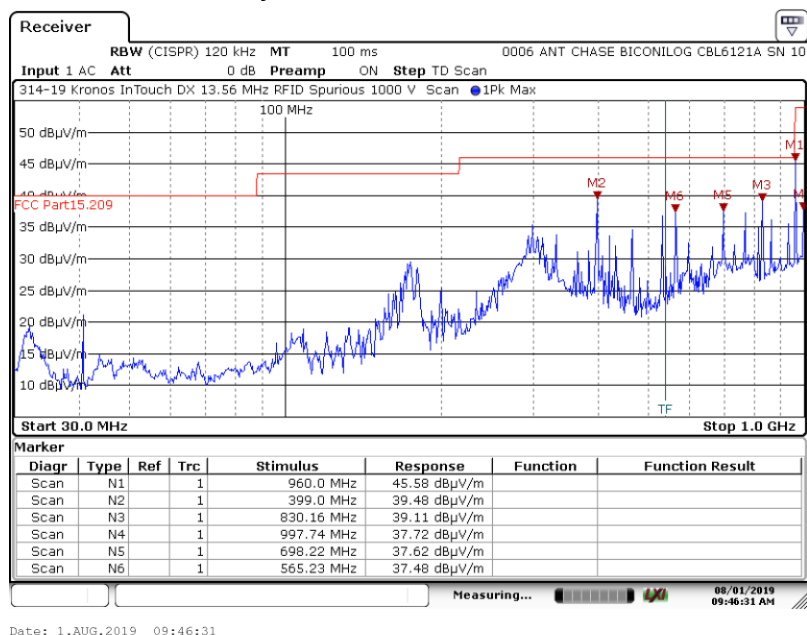
7.3. Spurious Radiated Emissions, 10 kHz to 25.0 GHz (15.225, § (d), 15.209) (cont'd)

7.3.3. Spurious Radiated Emissions, 30 MHz to 1 GHz Test Results

7.3.3.1. Horizontal Polarity



7.3.3.2. Vertical Polarity

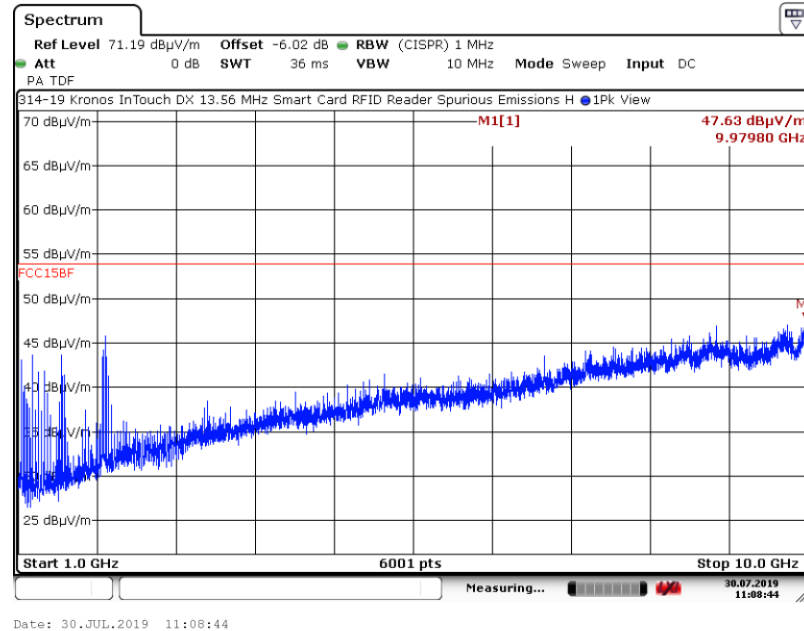


7. Measurement Data (continued)

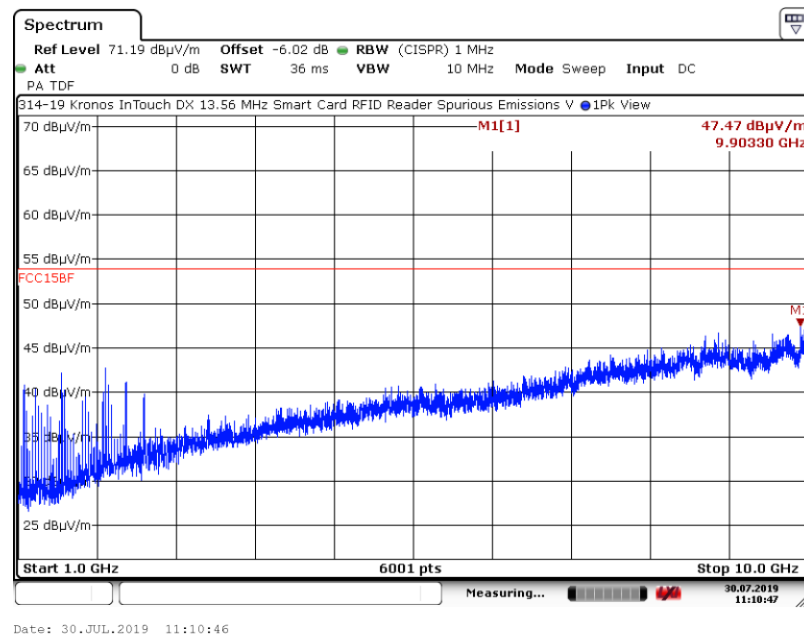
7.3. Spurious Radiated Emissions, 10 kHz to 25.0 GHz (15.225, § (d), 15.209) (cont'd)

7.3.4. Spurious Radiated Emissions, 1 GHz to 10 GHz Test Results

7.3.4.1. Horizontal Polarity



7.3.4.2. Vertical Polarity

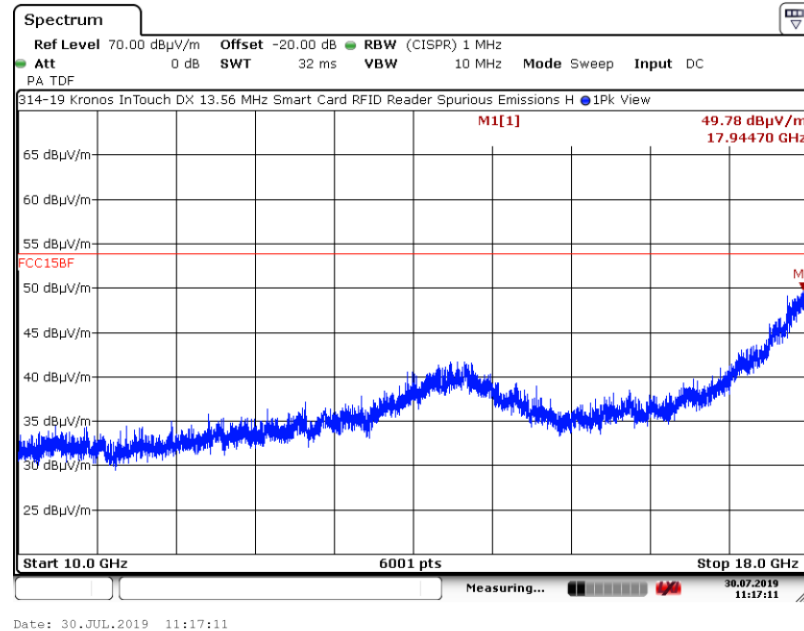


7. Measurement Data (continued)

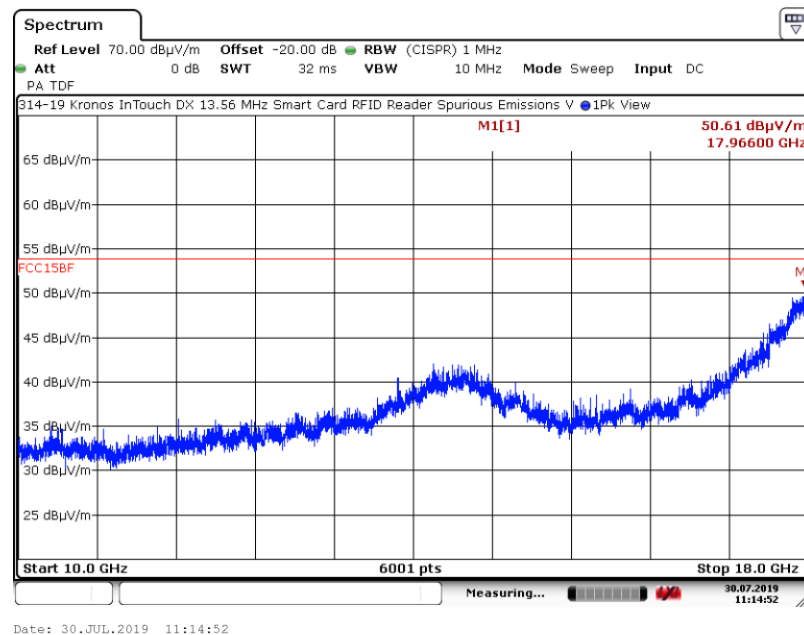
7.3. Spurious Radiated Emissions, 10 kHz to 25.0 GHz (15.225, § (d), 15.209) (cont'd)

7.3.5. Spurious Radiated Emissions, 10 GHz to 18 GHz Test Results

7.3.5.1. Horizontal Polarity



7.3.5.2. Vertical Polarity

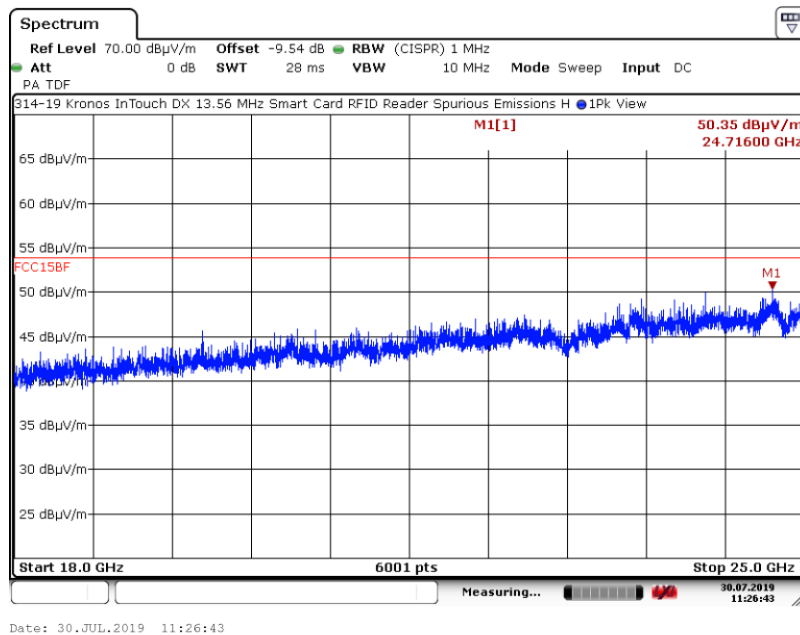


7. Measurement Data (continued)

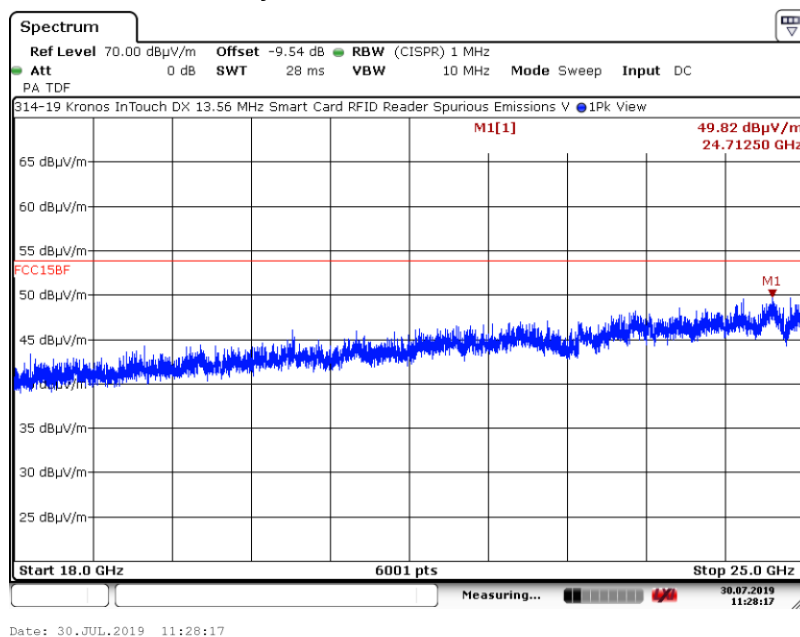
7.3. Spurious Radiated Emissions, 10 kHz to 25.0 GHz (15.225, § (d), 15.209) (cont'd)

7.3.6. Spurious Radiated Emissions, 18 GHz to 25 GHz Test Results

7.3.6.1. Horizontal Polarity



7.3.6.2. Vertical Polarity



7. Measurement Data (continued)

7.3. Spurious Radiated Emissions, 10 kHz to 1.0 GHz (15.225, § (d), 15.209) (cont'd)

7.3.4. Worst Case Harmonic Emissions

Frequency (MHz)	Amplitude (dBμV/m)		Limit (dBμV/m)	Margin (dB) Quasi-Peak	Polarity (H/V)	Antenna Height (cm)	Azimuth (Deg.)
	Peak	Quasi Peak	Quasi- Peak				
27.12	49.08	37.84	60.69	-22.85	Par	100	104
40.68	50.27	36.87	40.00	-3.13	V	100	24
54.24	32.44	29.66	40.00	-10.34	V	100	354
67.80	31.12	27.12	40.00	-12.88	V	171	174
81.36	45.25	36.55	40.00	-3.45	V	100	0
94.92	43.43	36.55	43.50	-6.95	H	147	0
108.48	40.86	35.03	43.50	-8.47	V	100	0
122.04	40.86	35.45	43.50	-8.05	V	100	158
135.60	39.87	35.45	43.50	-8.05	H	161	0

7. Measurement Data (continued)

7.4. Frequency Stability (§ 15.225 (e))

Requirement: The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Note: The device under test was powered by a wall adapter with an input voltage rating of 100 to 240 volts, AC. Minimum voltage was set for 102 volts, AC and Maximum voltage was set for 138 volts, AC.

Result: Compliant - The unit under test complies with the requirements detailed in FCC Part 15.225 (e).

7.4.1. Temperature and Voltage Variation

Temp °C	Supply Voltage	Meas Freq.	Limit			Offset	Result
		(MHz)	F _{MIN} (MHz)	F _{MAX} (MHz)	%	(%)	
Ambient	120 VAC	13.5594200	N/A			N/A	
-20		13.5594200	13.558064	13.560776	± 0.01	0.00000000	Compliant
-10		13.5595200	13.558064	13.560776	± 0.01	0.00073749	Compliant
0		13.5607200	13.558064	13.560776	± 0.01	0.00958743	Compliant
+10		13.5595200	13.558064	13.560776	± 0.01	0.00073749	Compliant
+20		13.5594200	13.558064	13.560776	± 0.01	0.00000000	Compliant
+30		13.5593200	13.558064	13.560776	± 0.01	0.00073749	Compliant
+40		13.5595200	13.558064	13.560776	± 0.01	0.00073749	Compliant
+50		13.5593200	13.558064	13.560776	± 0.01	0.00073749	Compliant
+20	102 VAC	13.5593200	13.558164	13.560876	± 0.01	0.00147498	Compliant
	138 VAC	13.5593150	13.558164	13.560876	± 0.01	0.00151185	Compliant

7. Measurement Data (continued)

7.5. Occupied Bandwidth (Section 15.215 (c) and ANSI C63.10, Section 6.9)

Requirement: Intentional radiators operating under the alternative provisions to the general emission limits, as contained in Sections 15.217 through 15.255 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule. The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW

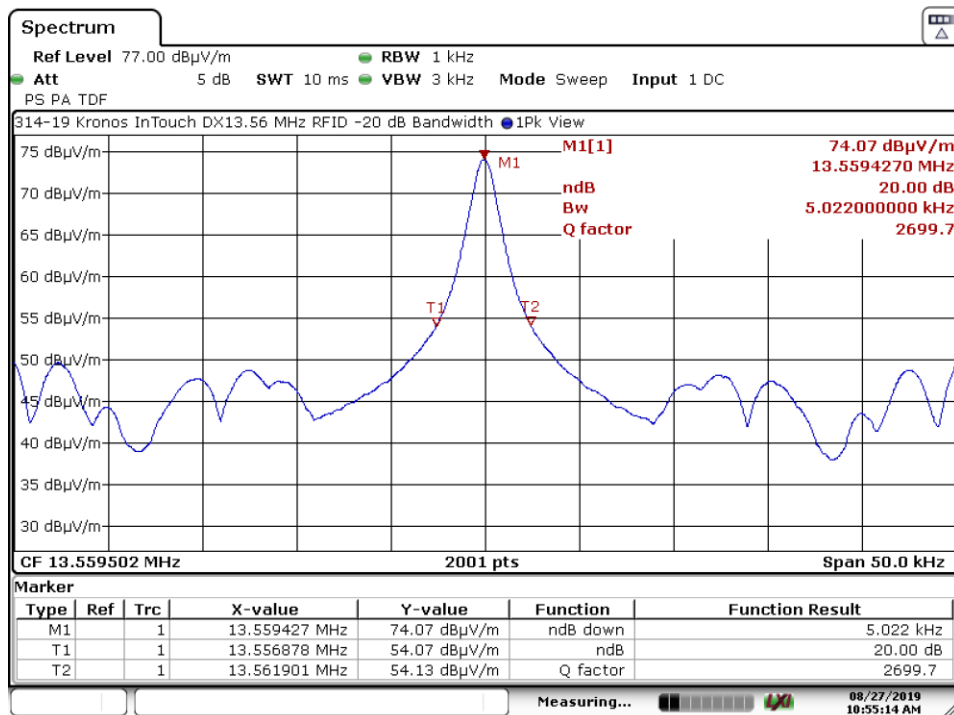
Frequency Band: $F_{MIN} = 13.110 \text{ MHz}$

$F_{MAX} = 14.010 \text{ MHz}$

Result: Compliant.

-20 dB Frequency Measured		Lower & Upper Band Edge		Result
(F _{LO} & F _{HI})		(F _{MIN} & F _{Max})		
MHz		MHz		
F _{LO}	13.5569	F _{MIN}	13.11	Compliant (F _{LO} > F _{MIN})
F _{HI}	13.5619	F _{MAX}	14.01	Compliant (F _{HI} < F _{Max})

7.5.1. Plot of 20 dB Bandwidth vs. Frequency Band



Date: 27.AUG.2019 10:55:14

7. Measurement Data (continued)

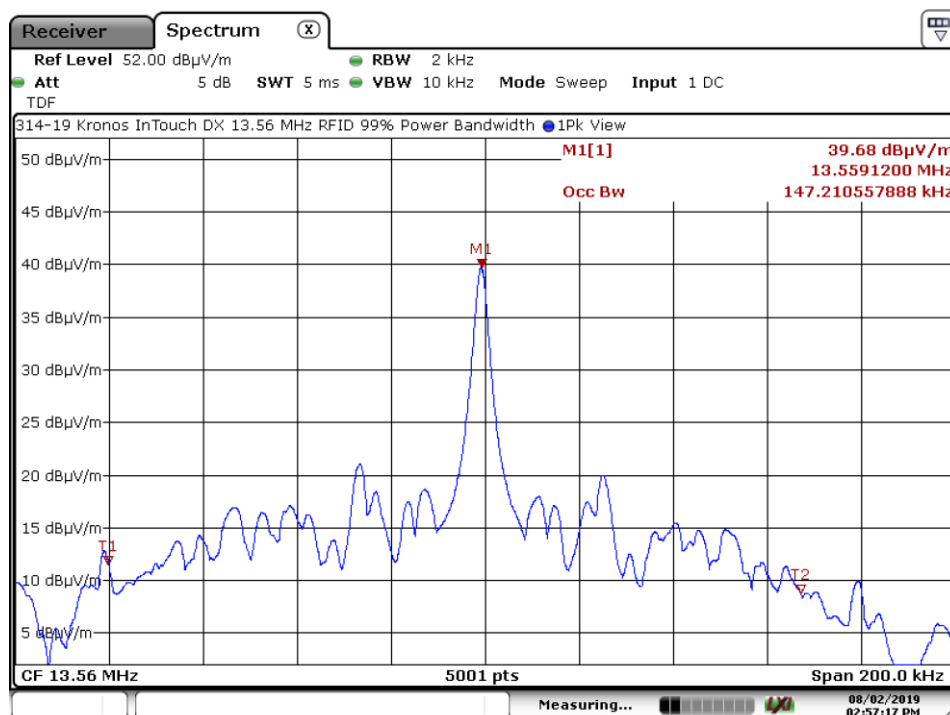
7.6. 99% Power Bandwidth (RSS-GEN Section 4.6.1)

Requirement: When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

Procedure: This test was performed utilizing the automated 99% bandwidth function of the spectrum analyzer.

Frequency	99% Power Bandwidth
(MHz)	(kHz)
13.559	147.21



Date: 2.AUG.2019 14:57:17

7. Measurement Data (continued)

7.7. Power Line Conducted Emissions (FCC Part 15.207)

Requirement: For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5.0	56	46
5.0 to 30.0	60	50

* Decreases with the logarithm of the frequency.

Procedure: Test measurements were made in accordance with ANSI C63.10-2013, Section 6.2: Standard test method for ac power-line conducted emissions from unlicensed wireless devices.

Results: The device under test meets the FCC Part 15.207 conducted emissions requirements.

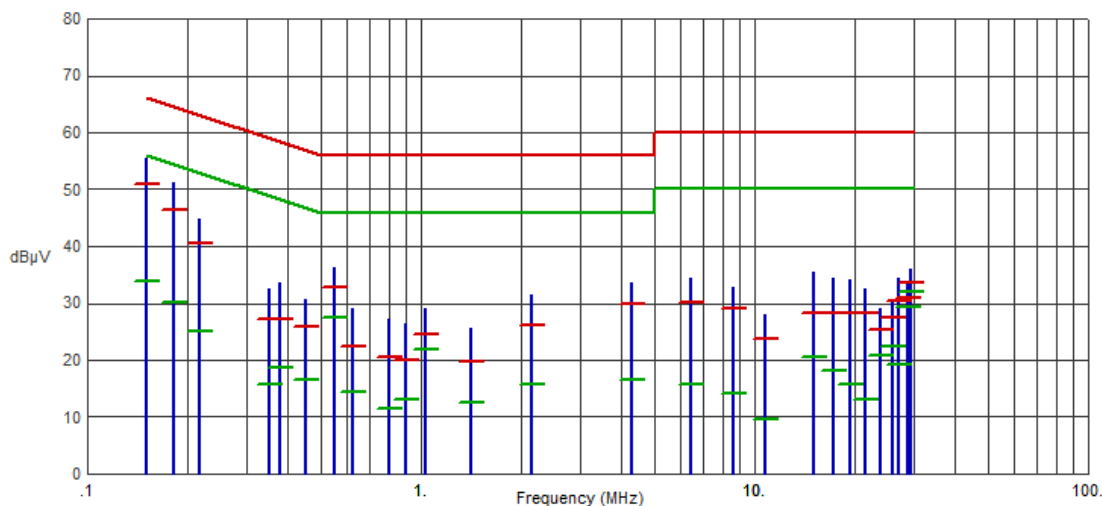
7. Measurement Data (continued)

7.7. Power Line Conducted Emissions (15.207)

7.7.1. 120 Volts, 60 Hz Phase

Test No.: 314-19, 120 Volts, 60 Hz Phase

FCC Part 15.207



Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1500	55.46	51.05	66.00	-14.95	33.80	56.00	-22.20	
.1815	51.32	46.37	64.42	-18.05	30.02	54.42	-24.40	
.2175	44.71	40.40	62.91	-22.51	25.07	52.91	-27.84	
.3525	32.59	27.17	58.90	-31.73	15.63	48.90	-33.27	
.3773	33.70	27.25	58.34	-31.09	18.59	48.34	-29.75	
.4493	30.69	25.86	56.89	-31.03	16.46	46.89	-30.43	
.5483	36.20	32.75	56.00	-23.25	27.54	46.00	-18.46	
.6248	29.18	22.33	56.00	-33.67	14.45	46.00	-31.55	
.8025	27.13	20.53	56.00	-35.47	11.52	46.00	-34.48	
.9038	26.38	20.11	56.00	-35.89	13.02	46.00	-32.98	
1.0320	29.14	24.66	56.00	-31.34	21.81	46.00	-24.19	
1.4190	25.61	19.64	56.00	-36.36	12.43	46.00	-33.57	
2.1503	31.46	26.02	56.00	-29.98	15.79	46.00	-30.21	
4.3013	33.49	29.94	56.00	-26.06	16.43	46.00	-29.57	
6.4500	34.34	30.22	60.00	-29.78	15.63	50.00	-34.37	
8.6010	32.88	28.98	60.00	-31.02	14.22	50.00	-35.78	
10.7520	27.89	23.80	60.00	-36.20	9.73	50.00	-40.27	
15.0540	35.35	28.20	60.00	-31.80	20.66	50.00	-29.34	
17.2028	34.38	28.23	60.00	-31.77	18.12	50.00	-31.88	
19.3605	34.25	28.15	60.00	-31.85	15.75	50.00	-34.25	
21.5048	32.43	28.15	60.00	-31.85	13.03	50.00	-36.97	
23.7683	29.06	25.45	60.00	-34.55	20.67	50.00	-29.33	
25.9305	30.50	27.41	60.00	-32.59	22.52	50.00	-27.48	
27.1185	34.30	30.28	60.00	-29.72	19.21	50.00	-30.79	
28.6845	33.79	31.04	60.00	-28.96	29.42	50.00	-20.58	
29.2358	36.12	33.73	60.00	-26.27	31.93	50.00	-18.07	

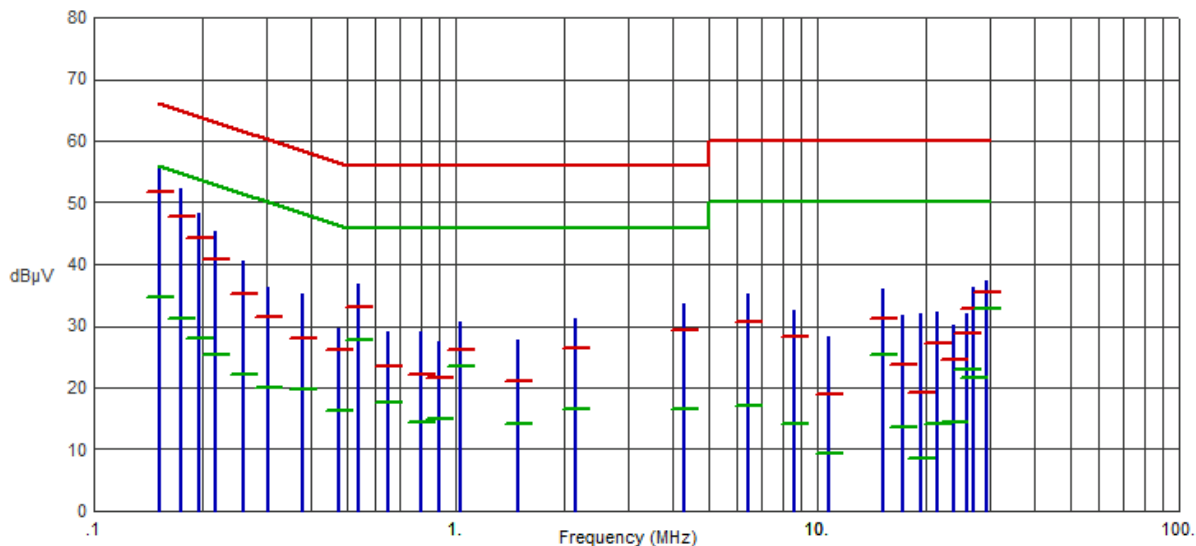
7. Measurement Data (continued)

7.7. Power Line Conducted Emissions (15.207)

7.7.2. 120 Volts, 60 Hz Neutral

Test No.: 314-19, 120 Volts, 60 Hz Neutral

FCC Part 15.207



Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1523	55.43	51.61	65.87	-14.26	34.70	55.87	-21.17	
.1748	52.39	47.85	64.73	-16.88	31.27	54.73	-23.46	
.1950	48.28	44.35	63.82	-19.47	28.11	53.82	-25.71	
.2175	45.42	40.79	62.91	-22.12	25.22	52.91	-27.69	
.2603	40.40	35.08	61.42	-26.34	22.15	51.42	-29.27	
.3030	36.30	31.47	60.16	-28.69	19.88	50.16	-30.28	
.3795	35.10	27.90	58.29	-30.39	19.81	48.29	-28.48	
.4740	29.53	26.08	56.44	-30.36	16.17	46.44	-30.27	
.5415	36.90	33.02	56.00	-22.98	27.61	46.00	-18.39	
.6495	29.09	23.34	56.00	-32.66	17.50	46.00	-28.50	
.8025	28.97	22.09	56.00	-33.91	14.35	46.00	-31.65	
.9038	27.34	21.71	56.00	-34.29	15.02	46.00	-30.98	
1.0320	30.64	26.22	56.00	-29.78	23.39	46.00	-22.61	
1.4888	27.65	21.16	56.00	-34.84	14.12	46.00	-31.88	
2.1503	31.31	26.51	56.00	-29.49	16.46	46.00	-29.54	
4.3035	33.71	29.26	56.00	-26.74	16.47	46.00	-29.53	
6.4545	35.27	30.69	60.00	-29.31	17.07	50.00	-32.93	
8.6078	32.55	28.29	60.00	-31.71	14.20	50.00	-35.80	
10.7610	28.39	18.93	60.00	-41.07	9.28	50.00	-40.72	
15.1350	36.06	31.21	60.00	-28.79	25.33	50.00	-24.67	
17.2185	31.85	23.68	60.00	-36.32	13.68	50.00	-36.32	
19.3673	31.92	19.22	60.00	-40.78	8.56	50.00	-41.44	
21.5183	32.24	27.29	60.00	-32.71	14.11	50.00	-35.89	
23.7863	30.15	24.41	60.00	-35.59	14.36	50.00	-35.64	
25.9395	32.00	28.71	60.00	-31.29	22.90	50.00	-27.10	
27.1185	36.21	32.87	60.00	-27.13	21.70	50.00	-28.30	
29.2358	37.37	35.39	60.00	-24.61	32.91	50.00	-17.09	

7. Measurement Data (continued)

7.8. Public Exposure to Radio Frequency Energy Levels ((FCC KDB 447498 D01 v06, 1.1307 (b)(1), 2.1091(b)) RSS-GEN, RSS 102, Issue 5

7.8.1 SAR Test Exclusion (FCC KDB 447498 D01 v06, Clause 4.3.1.c)2))

Frequency (MHz)	MPE Distance (mm)	DUT Output Power (mW)	SAR Test Exclusion (mW)	Result
	(1)	(2)	(3)	
13.56	≤50	0.00303389	442.9735	Compliant

- (1) FCC KDB 447498 D01 v06, Clause 4.3.1.(c)(2)
- (2) Converted from 10M field strength measurement ($FS_{(dB\mu V/m)} - 84.77$)
Reference Section 7.2, Measured Field Strength
- (3) $\frac{1}{2}(1 + \log(100/f_{(MHz)}))$
Formula detailed in KDB 447498 D01 v06, Clause 4.3.1.(c)(2)

7.8.2 Exemption Limits for Routine Evaluation – SAR Evaluation (RSS-102 Clause 2.5.1)

Frequency (MHz)	MPE Distance (mm)	DUT Output Power (mW)	SAR Test Exclusion (mW)	Result
	(1)	(2)	(3)	
13.56	≤5 mm	0.00303389	71	Compliant

- (1) RSS-102, Clause 2.5.1
- (2) Converted from 10M field strength measurement ($FS_{(dB\mu V/m)} - 84.77$)
Reference Section 7.2, Measured Field Strength
- (3) RSS-102, Clause 2.5.1, Table 1 $1 \leq 300$ MHz = 71 mW at ≤ 5 mm

8. Test Setup Photographs

8.1. Radiated Emissions Front View



8. Test Setup Photographs

8.2. Radiated Emissions Rear View - Fundamental



8. Test Setup Photographs

8.3. Radiated Emissions Rear View <30 MHz



8. Test Setup Photographs

8.4. Radiated Emissions Rear View 30 MHz – 1 GHz



8. Test Setup Photographs

8.5. Radiated Emissions – Front View >1 GHz



8. Test Setup Photographs

8.6. Radiated Emissions – Rear View >1 GHz



8. Test Setup Photographs

8.7. Frequency Stability Test - Setup



8.8. Frequency Stability Test – DUT



8. Test Setup Photographs

8.9. Power Line Conducted Emissions - Front



8. Test Setup Photographs

8.10. Power Line Conducted Emissions – Back



9. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with the Federal Communications Commission (FCC) and Industry Canada standards. Through our American Association for Laboratory Accreditation (A2LA) ISO Guide 17025 Accreditation our test sites are designated with the FCC (designation number **US1091**), Industry Canada (file number **IC 3023A-1**) and VCCI (Member number 3168) under registration number A-0274.

Compliance Worldwide is also designated as a Phase 1 CAB under APEC-MRA (US0132) for Australia/New Zealand AS/NZS CISPR 22, Chinese-Taipei (Taiwan) BSMI CNS 13438 and Korea (RRA) KN 11, KN 13, KN 14-1, KN 22, KN 32, KN 61000-6-3, KN 61000-6-4.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane. A second conducted emissions site is also located in the basement of the OATS site with a 2.3 x 2.5 meter ground plane and a 2.4 x 2.4 meter vertical wall.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.