

Test Report # 3517 A

Equipment Under Test:	InTouch DX G2 w/ HID SmartCard
Requirement(s):	FCC 15.207 FCC 15.209 FCC 15.225 RSS-210 RSS-GEN
Test Date(s):	September 21, 2021 – October 13, 2021
Prepared for:	Kronos Incorporated (UKG) Attn: Jigney Shah 300 Chelmsford St Lowell, MA 01851

Report Issued by: Alec Krabbe, EMC Engineer

Signature: 

Date: 10/28/2021

Report Reviewed by: Adam Alger, Laboratory Manager

Signature: 

Date: 10/27/2021

Report Constructed by: Alec Krabbe, EMC Engineer

Signature: 

Date: 10/25/2021

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Company: Kronos Incorporated (UKG)	Page 1 of 22	Name: InTouch DX G2 w/ HID SmartCard
Report: TR 3517 A		Model: 8610000-017
Job: C-3517		Serial: 00J2054861

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Laird Connectivity Test Services in Review

The Laird Connectivity, Inc. laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:



A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025:2017 with Electrical (EMC) Scope

A2LA Certificate Number: 1255.01

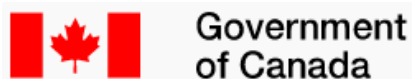
Scope of accreditation includes all test methods listed herein unless otherwise noted



Federal Communications Commission (FCC) – USA

Accredited Test Firm Registration Number: 953492

Recognition of two 3 meter Semi-Anechoic Chambers



Innovation, Science and Economic Development Canada

Accredited U.S. Identification Number: US0218

Recognition of two 3 meter Semi-Anechoic Chambers

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1 TEST REPORT SUMMARY

During **September 21, 2021 – October 25, 2021** the Equipment Under Test (EUT), **InTouch DX G2 w/ HID SmartCard**, as provided by **Kronos Incorporated (UKG)** was tested to the following requirements:

FCC

Requirements	Description	Specification	Method	Compliant
FCC: 15.207 IC: RSS-210	AC Power Line Conducted Emissions	0.15 - 30 MHz	ANSI C63.10	Yes
FCC: 15.209 IC: RSS-210	Intentional Radiated Emissions	30 – 1000 MHz	ANSI C63.10	Yes
FCC: 15.225 IC: RSS-210	Operation within the band 13.110 – 14.010 MHz	9 kHz – 30 MHz	ANSI C63.10	Yes
FCC: 2.1049 IC: RSS-GEN (6.7)	Occupied Bandwidth	Reported	ANSI C63.10	Reported

Notice:

The results relate only to the item tested as configured and described in this report. Any additional configurations, modes of operation, or modifications made to the equipment under test after the specified test date(s) are at the decision of the client and may not apply to the data seen in this test report.

The decision rule for Pass / Fail assessment to the specification or standard listed in this test report has been agreed upon by the client and laboratory to be as follows:

Measurement Type	Rule
Emissions – Amplitude	1 dB below specified limit
Emissions – Frequency	1% less than the specification
Immunity	Tested at specified level

2 CLIENT INFORMATION

Company Name	Kronos Incorporated (UKG)
Contact Person	Jigney Shah
Address	300 Chelmsford St Lowell, MA 01851

2.1 Equipment Under Test (EUT) Information

Product Name	InTouch DX G2 w/ HID SmartCard
Model Number	8610000-017
Serial Number	00J2054861
IEEE Address	00405816BFB0
IC ID	1416A-8610U007
FCC ID	P5W-8610U007

2.2 Product Description

The InTouch DX G2 timeclock is a data collection device that communicates with the UKG host applications. The timeclock collects information that employees enter using a badge reader, biometric device, or keypad. The host application software collects data from the timeclocks to track and process labor-related data, generate management reports, and transfer information to the payroll service.

2.3 Modifications Incorporated for Compliance

Dummy load was needed for conducted emissions testing to determine that emissions coupled into AC powerline were related to the transmitter. This was done in accordance with FCC KDB 174176.

2.4 Deviations and Exclusions from Test Specifications

No test modes provided; device tested in its operational setup.

2.5 Additional Information

Device is powered by 120 VAC and has an ethernet cable protruding the back of the enclosure for LAN operation. All programing is done through end user, android interface. No additional programming control/test modes available at time of testing. Software version: 4.0.0

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3 REFERENCES

Publication	Edition	Date	AMD 1	AMD 2
FCC 2.1055	-	2021-10	-	-
FCC 15.207	-	2021-10	-	-
FCC 15.209	-	2021-10	-	-
FCC 15.225	-	2021-10	-	-
ANSI C63.10	-	2013-06	-	-
RSS-GEN	5	2018-04	2019-03	2021-02
RSS-210	10	2019-12	2020-04	-
KDB 174176	v01r01	2015-06	-	-

4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of $k = 2$.

References	Version / Date
CISPR 16-4-1	Ed. 2 (2009-02)
CISPR 16-4-2	Ed. 2 (2011-06)
CISPR 32	Ed. 1 (2012-01)
ANSI C63.23	2012
A2LA P103	February 4, 2016
A2LA P103c	August 10, 2015
ETSI TR 100-028	V1.3.1 (2001-03)

Measurement Type	Configuration	Uncertainty $\pm$
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

Parameter	ETSI U.C. $\pm$	U.C. $\pm$
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

5 TEST DATA

5.1 Radiated Emissions

Description of Measurement	The frequency spectrum is investigated for intentional and / or unintentional signals emanating from the EUT by use of a standardized test site and measurement antenna. The antenna, cable, pre-amp, and other necessary measurement system correction factors are loaded onto the EMI receiver / spectrum analyzer when the measurements are performed allowing the data to be gathered and reported as corrected values. The maximum emissions from the EUT are determined by turn-table azimuth rotation (360°) and scanning of the measurement antenna. Maximized levels are noted at degree values of azimuth, measurement antenna height, and measurement antenna polarity.
Example Calculations	Measurement (dBμV) + Cable factor (dB) + Other (dB) + Antenna Factor (dB/m) = Corrected Reading (dBμV/m) Margin (dB) = Limit (dBμV/m) - Corrected Reading (dBμV/m) Example at 4000 MHz: Reading = 40 dBμV + 3.4 dB + 0.9 dB + 6.5 dB/m = 50.8 dBμV/m Average Limit = 20 log (500) = 54 dBμV/m Margin = 54 dBμV/m - 50.8 dBμV/m = 3.2 dB

Block Diagram



5.1.1 Radiated Emissions: 13.56 MHz RFID

Operator	Jon Dilley	QA	Alec Krabbe
Temperature	22.3 °C	R.H. %	48.1 %
Test Date	9/29/2021	Location	Chamber 3
Requirement	FCC 15.225 RSS-210	Method	ANSI C63.10

FCC 15.209 Limits:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m) (d_{limit})	Field Strength (dBμV/m) @ measurement distance
0.009-0.490	$2400/F(\text{kHz})^1$	300^3	Use F (kHz) 2
0.490-1.705	$24000/F(\text{kHz})^1$	30^3	Use F (kHz) 2
1.705-30	30	30^3	29.5

Note 1: F = measured frequency.

Note 2: Eq. 1 used to convert Field Strength (FS) to limit in dBμV/m.

Note 3: Conversion of measurement distance made using a combination of Eq. 2, Eq. 3, and Eq. 4.

FCC 15.225 Limits:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m) (d_{limit})	Field Strength (dBμV/m) @ measurement distance
13.553-13.567	15848	30	84.0
13.410-13.553	334	30	50.5
13.567-13.710	334	30	50.5
13.110-13.410	106	30	40.5
13.710-14.010	106	30	40.5
13.110-14.010 outside	15.209 limits	see 15.209	see 15.209

Test Parameters

Frequency	9 kHz – 30 MHz	Distance	3 m ($d_{measure}$)
Detector(s)	Quasi-Peak, Average	Table height	80 cm
RBW	200 Hz, 9 kHz	VBW	2 kHz, 90 kHz
Example Calculations	Eq. 1 $\text{dB}\mu\text{V/m}$ field strength conversion: $20 * \log \left(FS \left(\frac{\mu\text{V}}{\text{m}} \right) \right)$ Eq. 2 $d_{near\ field} = \frac{\lambda}{2\pi} distance = 47.77 / f_{MHz}$ If $d_{measure} < \frac{\lambda}{2\pi}$ and $d_{limit} > \frac{\lambda}{2\pi}$, the measurement shall be extrapolated using Eq. 3 Eq. 3 $FS_{limit} = FS - 40 * \log \left(\frac{d_{near\ field}}{d_{measure}} \right) - 20 * \log \left(\frac{d_{limit}}{d_{near\ field}} \right)$ If $d_{measure} \leq \frac{\lambda}{2\pi}$ and $d_{limit} \leq \frac{\lambda}{2\pi}$, the measurement shall be extrapolated using Eq. 4 Eq. 4 $FS_{limit} = FS - 40 * \log \left(\frac{d_{limit}}{d_{measure}} \right)$		

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960206	Antenna - Loop	A.H. Systems, Inc.	SAS-565-H	2758	9/3/2021	9/3/2023	Active Calibration
EE 960085	Analyzer - EMI Receiver	Agilent	N9038A	MY51210148	4/20/2021	4/20/2022	Active Calibration
LSC-300	Cable	Chamber 3 Emissions	-	-	4/15/2021	4/15/2022	Active Verification

EUT Parameters

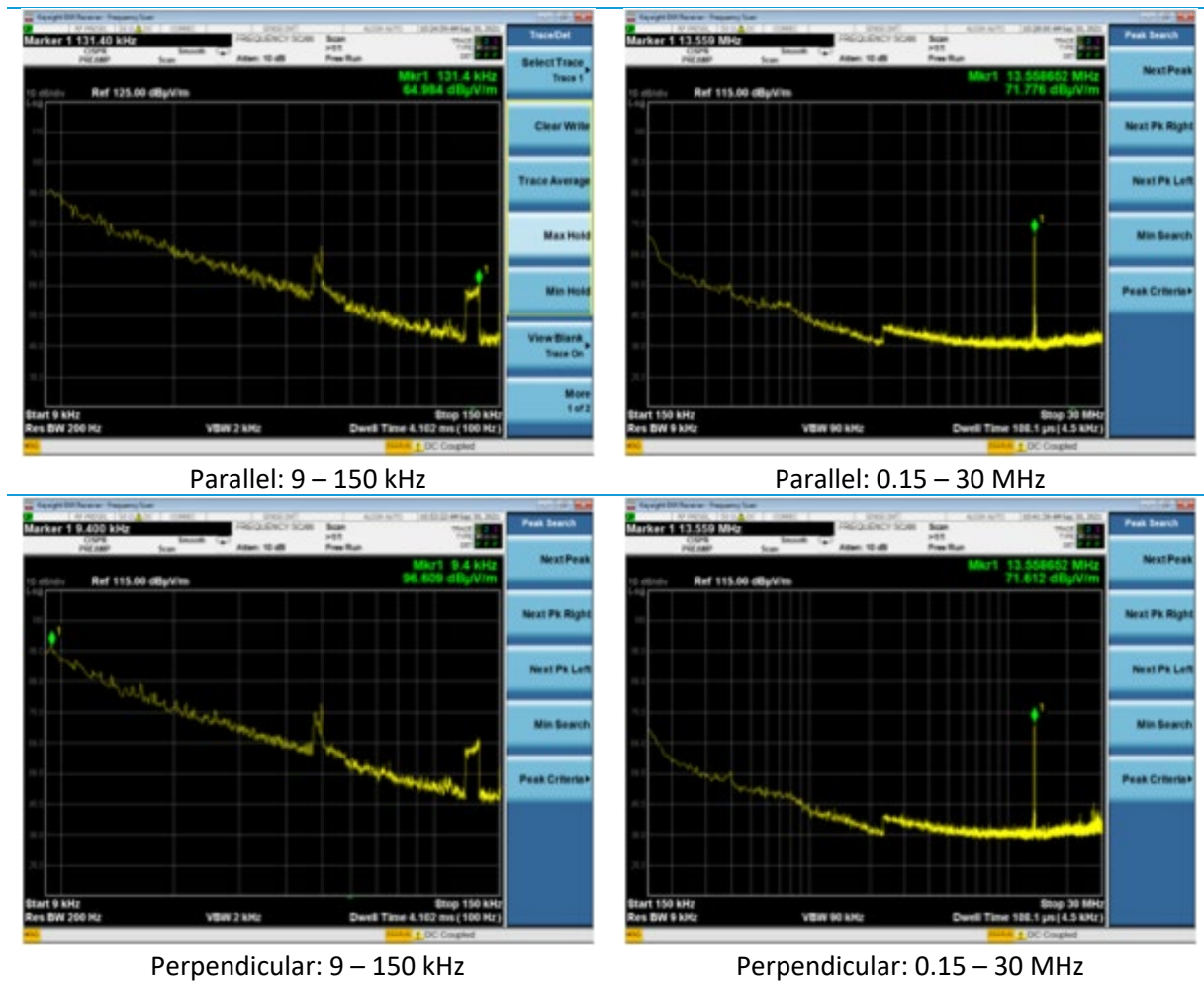
Input Power	120 VAC / 60 Hz	Mode	Operational Mode
EUT	InTouch DX G2 w/ HID SmartCard	EUT	RFID Tx

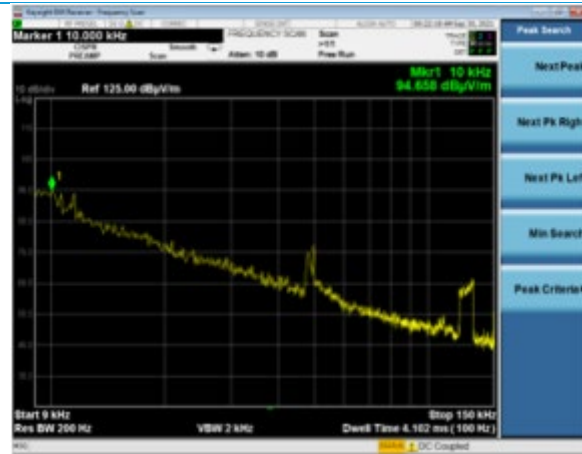
Table

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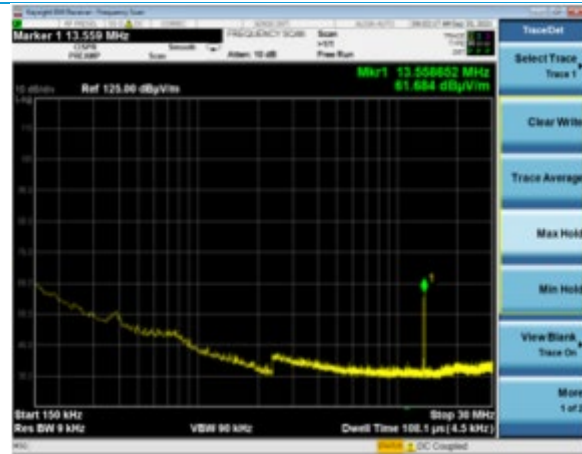
Frequency (MHz)	Antenna Polarity	Height (cm)	Azimuth (degree)	Quasi-Peak Reading @ 3m	Correction to Quasi-Peak Reading	Corrected Quasi-Peak @ Limit Distance	Quasi-Peak Limit @ Limit Distance	Quasi-Peak Margin (dB)
(dBµV/m)								
13.560	Parallel	100	175	69.3	-21.4	47.9	84	44.3
13.559	Perpendicular	100	260	69.9	-21.4	48.5	84	35.5
13.558	Skew	100	167	61.1	-21.4	39.7	84	36.1

Plots





Skew: 9 – 150 kHz



Skew: 0.15 – 30 MHz

5.1.2 Radiated Emissions: 30 – 1000 MHz

Operator	Jon Dille	QA	Adam Alger
Temperature	24.2 °C	R.H. %	38.9 %
Test Date	9/23/2021	Location	Chamber 3
Requirement	FCC 15.209 RSS-210	Method	ANSI C63.10

Limits:

Frequency (MHz)	FCC 15.209	FCC 15.109 Class A
	Field Strength (dBμV/m)	
30 - 88	40	49.5
88 – 216	43.5	54
216 – 960	46	57
> 960	54	60

Test Parameters

Frequency	30 – 1000 MHz	Distance	3 m
Detector(s)	Quasi-Peak	Table height	80 cm
RBW	120 kHz	VBW	1.2 MHz
Notes	Emissions determined to not be a product of the transmitter. FCC 15.109 Class A limits applied to device.		

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960150	Antenna - Biconical	ETS Lindgren	3110B	0003-3346	10/30/2020	10/30/2021	Active Calibration
AA 960163	Antenna - Log Periodic	A.H. Systems, Inc.	SAS-512-2	500	7/29/2021	7/29/2022	Active Calibration
EE 960085	Analyzer - EMI Receiver	Agilent	N9038A	MY51210148	4/20/2021	4/20/2022	Active Calibration
LSC-300	Cable	Chamber 3 Emissions	-	-	4/15/2021	4/15/2022	Active Verification

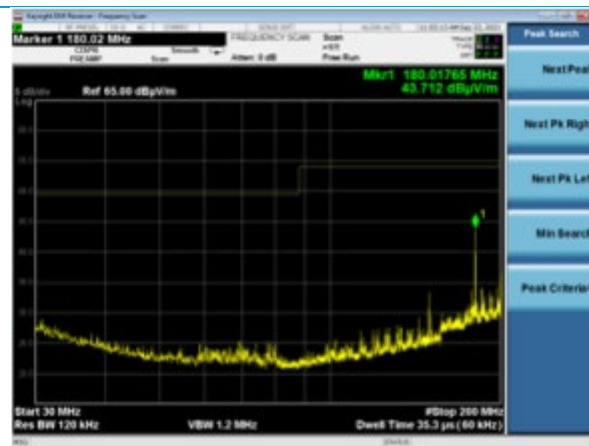
EUT Parameters

Input Power	120 VAC / 60 Hz	Mode	Operational Mode
EUT	InTouch DX G2 w/ HID SmartCard	EUT	Router connected
Notes	Continuous ping run to show device maintained connection to router via ethernet cable.		

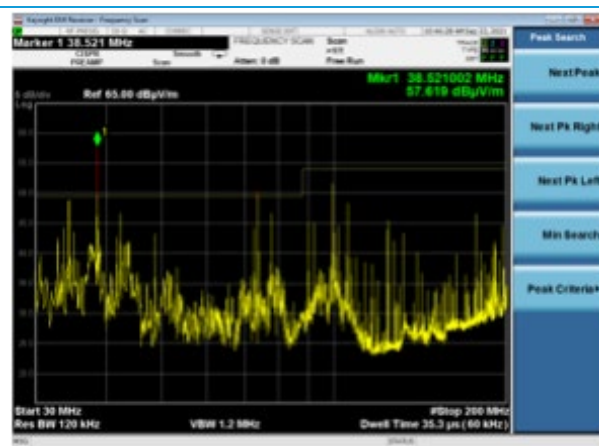
Table

Frequency (MHz)	Antenna Polarity	Height (cm)	Azimuth (degree)	Quasi-Peak Reading (dB μ V/m)	FCC 15.109 Class A		FCC 15.209	
					Quasi-Peak Limit	Quasi-Peak Margin	Quasi-Peak Limit	Quasi-Peak Margin
37.5	Vertical	100	242	41.7	49.5	7.8	40.0	-1.7
75.2	Vertical	100	0	30.9	49.5	18.6	40.0	9.1
180.0	Horizontal	100	254	43.0	54.0	11.0	43.5	0.5
480.0	Horizontal	100	0	44.7	57.0	12.3	46.0	1.3
480.0	Vertical	100	155	50.9	57.0	6.1	46.0	-4.9
800.0	Horizontal	100	215	40.2	57.0	16.8	46.0	5.8
960.0	Horizontal	100	27	47.0	57.0	10.0	46.0	-1.0
960.0	Vertical	155	330	52.4	57.0	4.6	46.0	-6.4

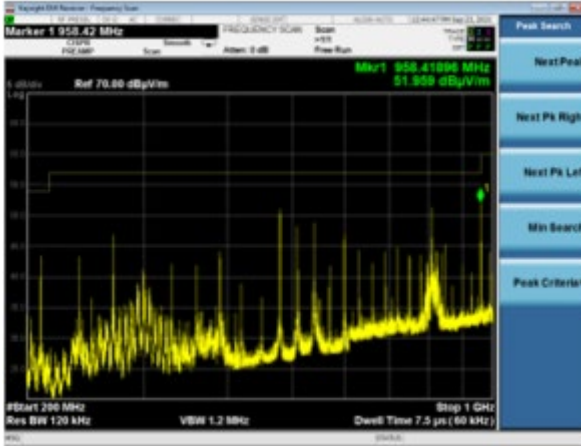
Plots



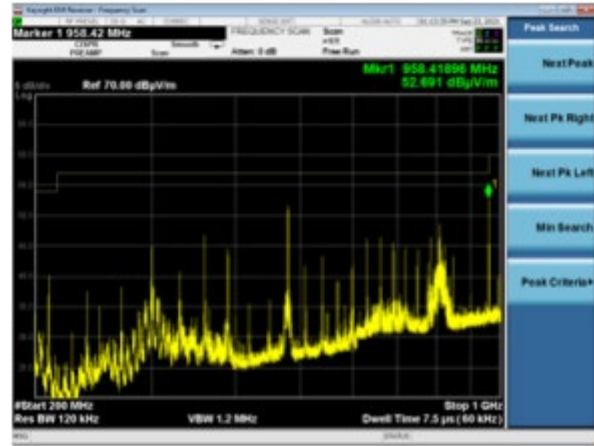
30 – 200 MHz: Horizontal Polarity



30 - 200 MHz: Vertical Polarity



200 – 1000 MHz: Horizontal Polarity



200 – 1000 MHz: Vertical Polarity

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5.1.3 99% Occupied Bandwidth

Operator	Jon Dille	QA	Zach Wilson
Temperature	21.1 °C	R.H. %	59.1 %
Test Date	10/13/2021	Location	Conducted Bench
Requirement	FCC 2.1049 IC: RSS-GEN 6.7	Method	ANSI C63.10

Test Parameters

Frequency	13.56 MHz	Detector(s)	Peak
RBW	20 kHz	VBW	62 kHz

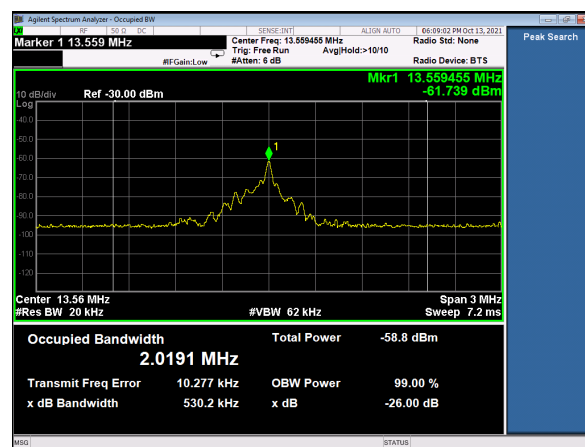
Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960030	Probe - Near Field Kit	EMCO	7405	9509/1152	XXX	XXX	Indication Only
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	7/28/2021	7/28/2022	Active Calibration

EUT Parameters

Input Power	120 VAC / 60 Hz	Mode	Operational Mode
EUT	InTouch DX G2 w/ HID SmartCard	EUT	RFID Tx

Plot



Note: Measured Occupied Bandwidth is 2.0191 MHz

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5.1.4 Frequency Stability

Operator	Jon Dille Ivan Alvarez	QA	Adam Alger
Temperature	21.1 °C	R.H. %	59.1 %
Test Date	10/13/2021 10/25/2021	Location	Temp Chamber
Requirement	FCC 15.225 (e) IC: RSS-GEN 6.11	Method	ANSI C63.10

Test Parameters

Fundamental Frequency	13559474.8 Hz		
Temperature Variation	(-)20 – 50 °C	Voltage Variation	120 V ± 15%
RBW	1.1 kHz	VBW	11 kHz
Example Calculation	Temp Variation: $\frac{ f_{max} - f_{min} }{f_{max}} * 100 = \% \text{ Variation}$ Voltage Variation: $\frac{ f_{fundamental} - f_{measured} }{f_{fundamental}} * 100 = \% \text{ Variation}$		

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960030	Probe - Near Field Kit	EMCO	7405	9509/1152	XXX	XXX	Indication Only
AA 960134	EFT - Cal Adapter Kit	EM Test	KW50	0606-05	4/22/2021	4/22/2024	Active Calibration
CC 000210C	Chamber - Environmental	Thermotron	S-8C	28133	1/27/2021	1/28/2022	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	7/28/2021	7/28/2022	Active Calibration

EUT Parameters

Input Power	120 VAC / 60 Hz	Mode	Operational Mode
EUT	InTouch DX G2 w/ HID SmartCard	EUT	RFID Tx

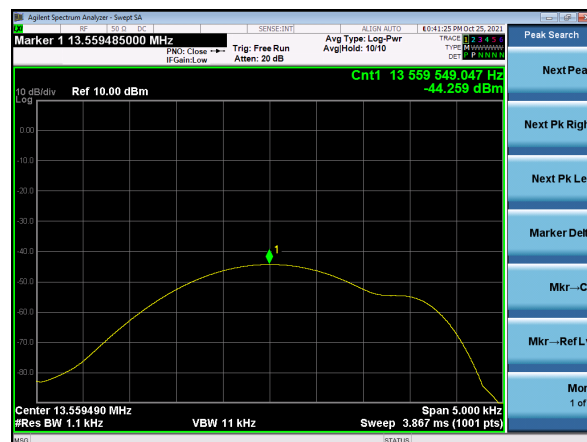
Voltage Variation

Voltage (V)	Measured Frequency (Hz)	Variation (%)
120 (nominal)	13559474.8	0.000220
102 (-15%)	13559450.8	0.000043
138 (+15%)	13559464.2	0.000142

Temperature Variation

Temperature (°C)	Measured Frequency (Hz)				Variation (%)
	Initial	2 min	5 min	10 min	
20	13559549.0	13559466.8	13559466.5	13559449.5	0.000734
50	13559473.0	13559490.2	13559478.1	13559482.1	0.000127
40	13559427.9	13559490.0	13559422.7	13559407.4	0.000609
30	13559507.2	13559425.0	13559439.0	13559442.0	0.000606
10	13559491.8	13559405.8	13559439.1	13559380.9	0.000818
0	13559451.0	13559444.0	13559458.4	13559434.2	0.000178
-10	13559482.5	13559536.3	13559500.0	13559387.9	0.001094
-20	13559554.3	13559440.2	13559480.3	13559491.4	0.000841

Plot



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5.2 AC Mains Conducted Emissions

A line impedance stabilization network (LISN) or artificial mains network (AMN) allows the emissions of the power supply conductors to be measured while isolating the EUT from the supply mains.

Description of Measurement

The AMN, cable, and other necessary measurement system correction factors are loaded onto the EMI receiver when the measurements are performed. The data is gathered and reported as the corrected values.

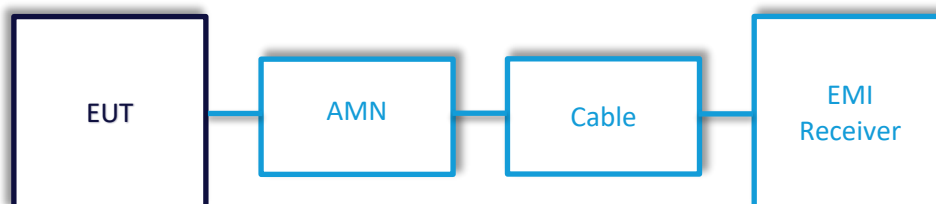
Maximum emissions are determined with a peak max hold trace then measurements at a selection of the highest points are made with quasi-peak and average detectors. Results are recorded and compared to limit for each line. (e.g. line and neutral)

Example Calculations

Measurement (dBμV) + Cable factor (dB) + Other (dB) = Corrected Reading (dBμV)

Margin (dB) = Limit (dBμV) - Corrected Reading (dBμV)

Block Diagram



5.2.1 AC Mains Conducted Emissions

Operator	Jon Dille	QA	Anthony Smith
Temperature	21.8 °C	R.H. %	50.8 %
Test Date	9/27/2021	Location	Conducted Bench
Requirement	FCC 15.207	Method	ANSI C63.10
Note	Suitable dummy load used during measurement in accordance with KDB 174176.		

FCC 15.207 Limits:

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

*Decreases with the logarithm of the frequency.

Test Parameters

Frequency	0.15 – 30 MHz	Distance	80 cm from LISN, 40 cm from wall
Detector(s)	Quasi-Peak, Average	Table height	80 cm
RBW	9 kHz	VBW	62 Hz

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	7/28/2021	7/28/2022	Active Calibration
EE 960162	LISN	COM-POWER	LI-215A	191969	4/19/2021	4/19/2022	Active Calibration
LSC-211	Cable	Micro-Coax	UFB311A-0-1440-70U70U	64639224071-002	12/9/2019	12/9/2021	Active Verification

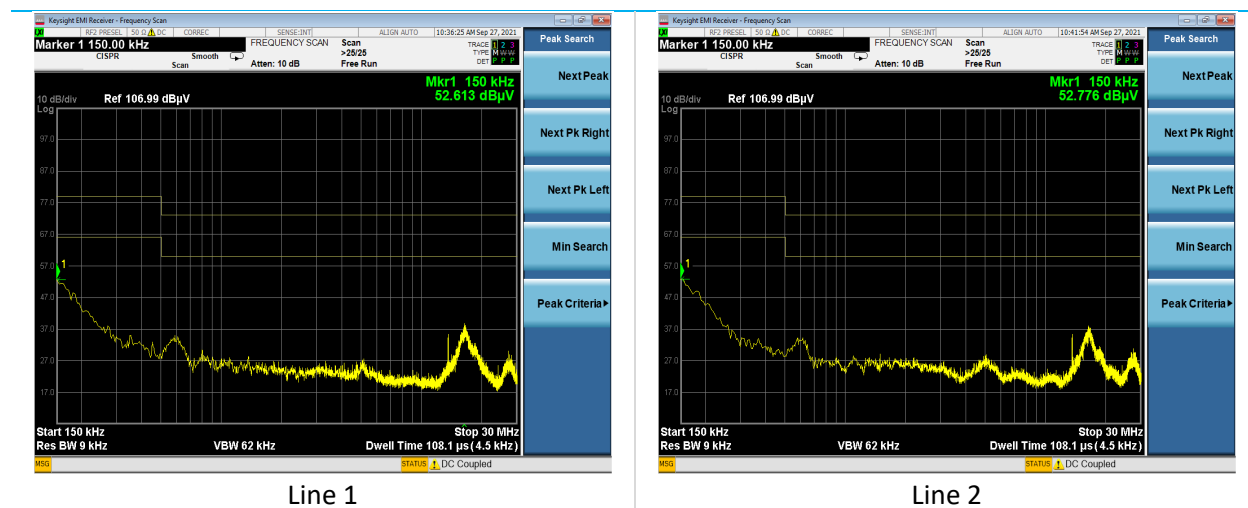
EUT Parameters

Input Power	120 VAC / 60 Hz	Mode	Operational Mode
EUT	InTouch DX G2 w/ HID SmartCard	EUT	RFID Tx

FCC 15.207 Table:

Line	Frequency (MHz)	Quasi-Peak Reading (dBμV)	Quasi-Peak Limit (dBμV)	Quasi-Peak Margin (dB)	Average Reading (dBμV)	Average Limit (dBμV)	Average Margin (dB)
1	0.154	49.5	65.8	16.3	33.7	55.8	22.1
1	0.599	30.7	56.0	25.3	23.7	46.0	22.3
1	16.089	33.5	60.0	26.5	23.6	50.0	26.4
2	0.150	50.7	66.0	15.3	35.7	56.0	20.3
2	0.568	31.1	56.0	24.9	24.4	46.0	21.6
2	16.212	33.7	60.0	26.3	22.4	50.0	27.6

Plots



Note: Plots display FCC 15.107 Class A limits.

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6 REVISION HISTORY

Version	Date	Notes	Person
V0	10/22/2021	Initial Draft	Alec Krabbe
V0	10/27/2021	Review	Adam Alger
V1	10/28/2021	Final	Alec Krabbe
V2	1/10/2022	Removed Test Setup Photos (Filing STC)	Alec Krabbe
V3	1/11/2022	Updated FCC/IC IDs	Alec Krabbe
V4	1/13/2022	Added SW version to sec 2.5	Alec Krabbe

END OF REPORT