

TEST REPORT

Report Number: 104103871MIN-017

Project Number: G104103871

Testing performed on the
Alarm Panel PRO

to

47 CFR, Part 15:2020, §15.107 and §15.109, Class B

ICES-003, Issue 6 Update 2019

EN 55032:2015

AS/NZS CISPR 32:2015

For

Konnected, Inc.

Test Performed by:
Intertek Testing Services NA, Inc.
40 51st Way NE, Suite 100
Fridley, MN 55421 USA

Test Authorized by:
Konnected, Inc.
5718 Old Cheney Hwy
Orlando, FL 32807 USA

Prepared by:



Kiran Mekala, EMC Project Engineer

Reviewed by:



Uri Spector, EMC Team Lead

Date of issue: July 14, 2020

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1.0 DESCRIPTION OF THE SAMPLE (EUT)

Model:	Alarm Panel PRO
Type of EUT:	Alarm Panel
Intertek Sample ID:	MIN2007131329
Company:	Konnected, Inc.
Customer:	Thomas Connaughton
Address:	5718 Old Cheney Hwy Orlando, FL 32807 USA
Phone:	+1 (732) 841-2119
e-mail:	Connaughton.group@outlook.com
Test Standards:	<input checked="" type="checkbox"/> 47 CFR, Part 15:2020, §15.107 and §15.109, Class B, test method: ANSI C63.4-2014 <input checked="" type="checkbox"/> ICES-003, Issue 6 Update 2019 <input checked="" type="checkbox"/> EN 55032:2015 <input checked="" type="checkbox"/> AS/NZS CISPR 32:2015
Date Sample Submitted:	May 14, 2020
Test Work Started:	May 14, 2020
Test Work Completed:	July 13, 2020
Test Sample Conditions:	<input type="checkbox"/> Damaged <input type="checkbox"/> Poor (Usable) <input checked="" type="checkbox"/> Good <input type="checkbox"/> Prototype <input checked="" type="checkbox"/> Production <input type="checkbox"/> Used

2.0 TEST SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards.

TEST STANDARD	TEST	RESULT
Subpart B – 15.107 / EN 55032 / AS/NZS CISPR 32	Conducted Emissions	Pass
Subpart B – 15.109 / EN 55032 / AS/NZS CISPR 32	Radiated Emissions	Pass
EN 55032 / AS/NZS CISPR 32	Conducted Emissions at Telecommunication Ports	Pass

2.1 Measurement Uncertainty

Radiated Emissions:

Measurement	Frequency Range	Expanded Uncertainty (k=2)	U _{cispr}
Radiated Emissions, 10m	30-1000 MHz	4.0 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.8 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	5.1 dB	5.2 dB
Radiated Emissions, 3m	6-18 GHz	5.2 dB	5.5 dB

As shown above our radiated emissions Measurement Uncertainty is less than the corresponding reference value U_{cispr} in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required.

AC Mains Conducted Emissions and Conducted Emissions at Telecommunication Port:

Measurement	Frequency Range	Expanded Uncertainty (k=2)	U _{cispr}
AC Line Conducted Emissions	150 kHz - 30 MHz	2.6 dB	3.4 dB
Telecom Port Emissions	150 kHz - 30 MHz	3.2 dB	5.0 dB

As shown above our conducted emissions Measurement Uncertainty is less than the corresponding reference value U_{cispr} in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required.

3.0 EQUIPMENT UNDER TEST

3.1 Power Configuration

Rated voltage:	<input checked="" type="checkbox"/> 12VDC via support AC adapter
Rated current:	2.5 Amp.
Rated frequency:	N/A
Number of phases:	N/A

3.2 EUT Configuration

The equipment under test was operated during the measurement under the following conditions:

- Standby
- Test program (H - Pattern)
- Continuous Operation
- Specific test program
- ██████████

Operating modes of the EUT:

No.	Description
1	Per client, EUT was measured in standby mode with WIFI transmitter disabled
2	For Telecommunication Emissions testing, the Ethernet port on the EUT was pinging via network connection

Cables:

No.	Type	Length	Designation	Note
1	4-wire, unshielded	1m	AUX/ALARM 12V output	
2	18-wire, unshielded	1m	Zone inputs/outputs	
3	Ethernet, unshielded	1m	Network connection	

Support equipment/Services:

No.	Item	Description
1	12VDC AC Adapter	Netgear Model: 2ABL030F and P/N 332-10758-01

General notes: None

3.3 Environmental conditions

During the measurement the environmental conditions were within the required ranges and shown in the test data sections

4.0 TEST CONDITIONS AND RESULTS

4.1 Line Conducted Emissions

Test result:	Pass
Frequency range:	0.15MHz-30MHz
Max. Emissions margin:	11.15 dB below the limits

Notes: None

Sample Calculations

The following is how net line-conducted readings were determined:

$$NF = RF + LF + CF + AF$$

Where NF = Net Reading in dB μ V

RF = Reading from receiver in dB μ V

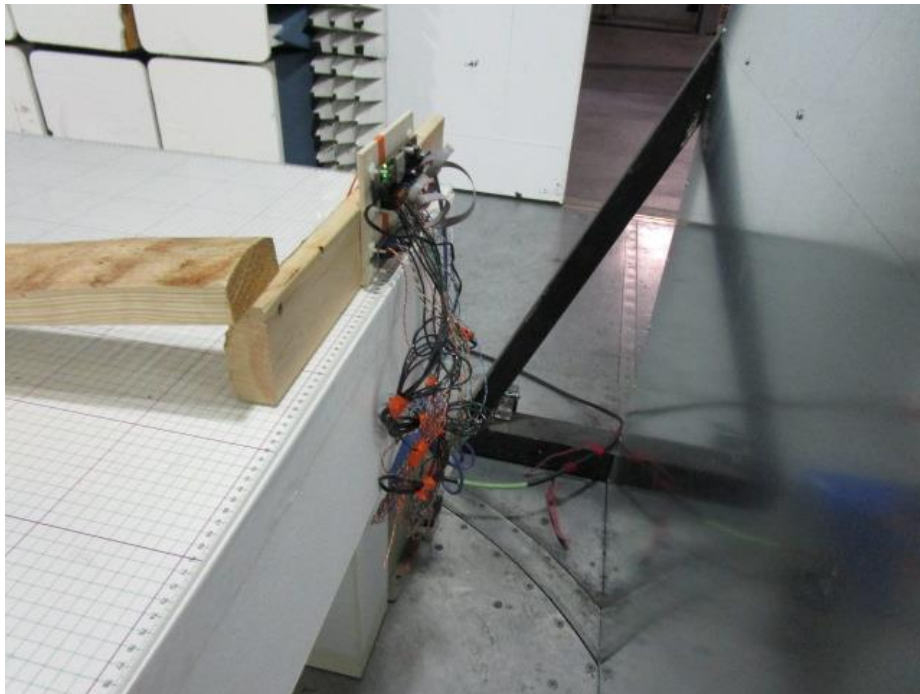
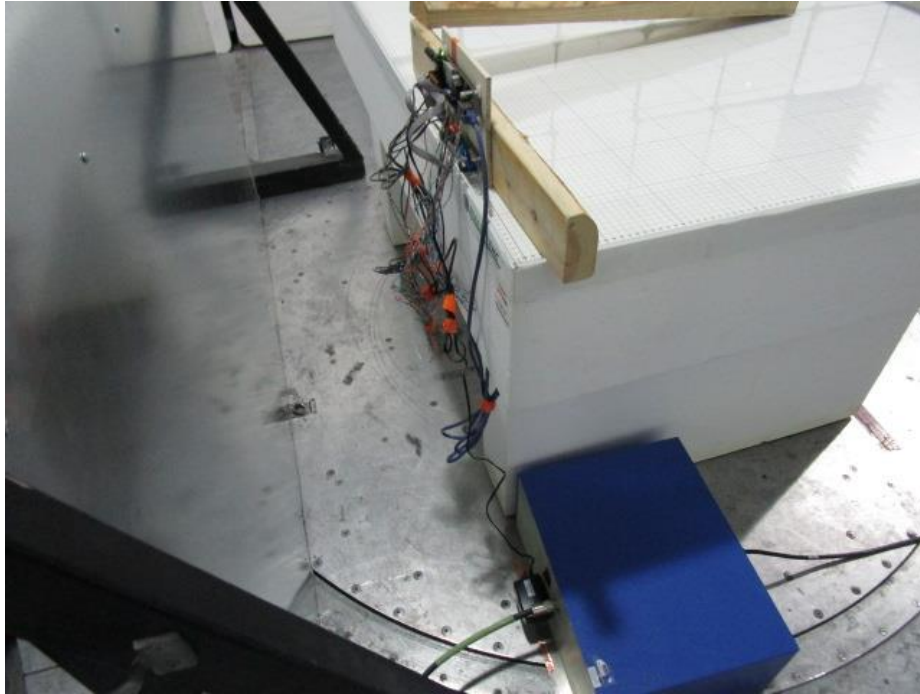
LF = LISN or ISN Correction Factor in dB

CF = Cable Correction Factor in dB

AF = Attenuator Loss Factor in dB

Example:

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu\text{V}$$

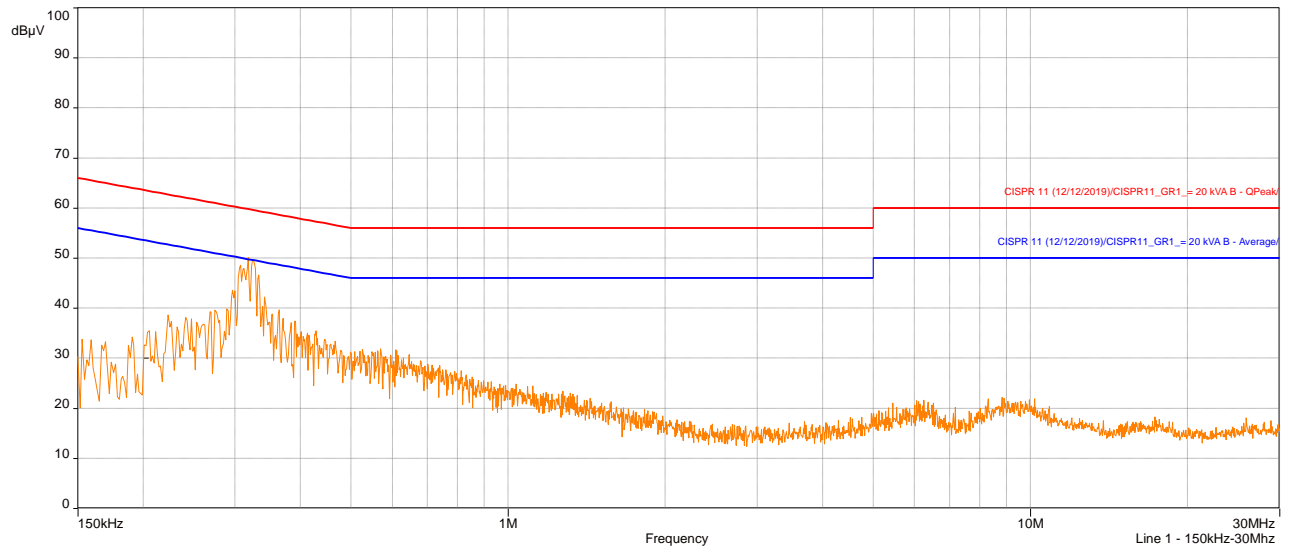


Test Setup Photos

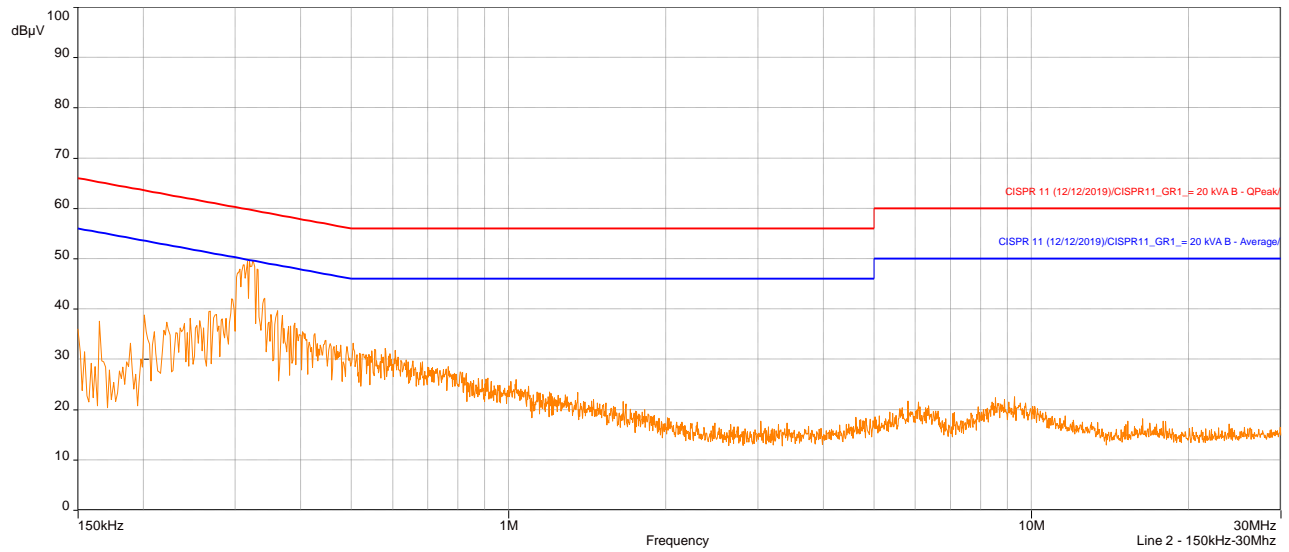
Date:	May 14, 2020	Result: Pass
Tested by:	Kiran Mekala	
Standard:	FCC Part 15.107, Class B	
Test Point:	Line 1 and Line 2	
Operation mode:	See page 5	
Environmental Conditions:	23°C; 30%(RH); 99kPa	
Equipment Verification:	<input checked="" type="checkbox"/>	
Note:	None	

Table 1

Frequency (MHz)	Line	Correction (dB)	AVG Level (dBμV)	QP Level (dBμV)	AVG Limit (dBμV)	QP Limit (dBμV)	AVG Margin (dB)	QP Margin (dB)
0.299	1	10.03	31.43	43.30	50.28	60.28	-18.86	-16.98
0.316	1	10.03	35.70	47.99	49.84	59.84	-14.14	-11.85
0.322	1	10.03	36.90	48.49	49.64	59.64	-12.74	-11.15
0.329	1	10.03	34.56	47.35	49.49	59.49	-14.93	-12.14
0.341	1	10.03	26.12	40.25	49.19	59.19	-23.07	-18.94
0.365	1	10.03	23.53	37.00	48.63	58.63	-25.09	-21.63
0.299	2	10.03	31.48	43.43	50.28	60.28	-18.81	-16.86
0.316	2	10.03	35.57	47.94	49.84	59.84	-14.27	-11.89
0.322	2	10.03	36.90	48.48	49.68	59.68	-12.78	-11.20
0.328	2	10.03	35.06	47.64	49.53	59.53	-14.47	-11.89
0.339	2	10.03	26.77	40.98	49.23	59.23	-22.46	-18.25
0.364	2	10.03	23.26	37.16	48.66	58.66	-25.40	-21.50



Graph 1: Peak Readings Line 1



Graph 2: Peak Readings Line 2

4.2 Radiated Emissions

Test location:	<input checked="" type="checkbox"/> Anechoic Chamber
Test distance:	<input checked="" type="checkbox"/> 3 meters
Test result:	Pass
Frequency range:	30MHz-13GHz for FCC Part 15.109 30MHz-6GHz for EN 55032
Max. Emissions margin:	0.1 dB below the limits

Notes: The radiated emissions test was performed at 3m measurement distance. See Tables 2 and 4 and Graphs 3, 4, 5, and 6 for FCC Part 15.109. See Tables 3 and 5 and Graphs 3, 4, 5, and 6 for EN 55032.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where: FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude in dB(μ V)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(m^{-1})

AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(μ V) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(μ V/m).

$$RA = 48.1 \text{ dB}(\mu\text{V})$$

$$AF = 7.4 \text{ dB}(m^{-1})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 16.0 \text{ dB}$$

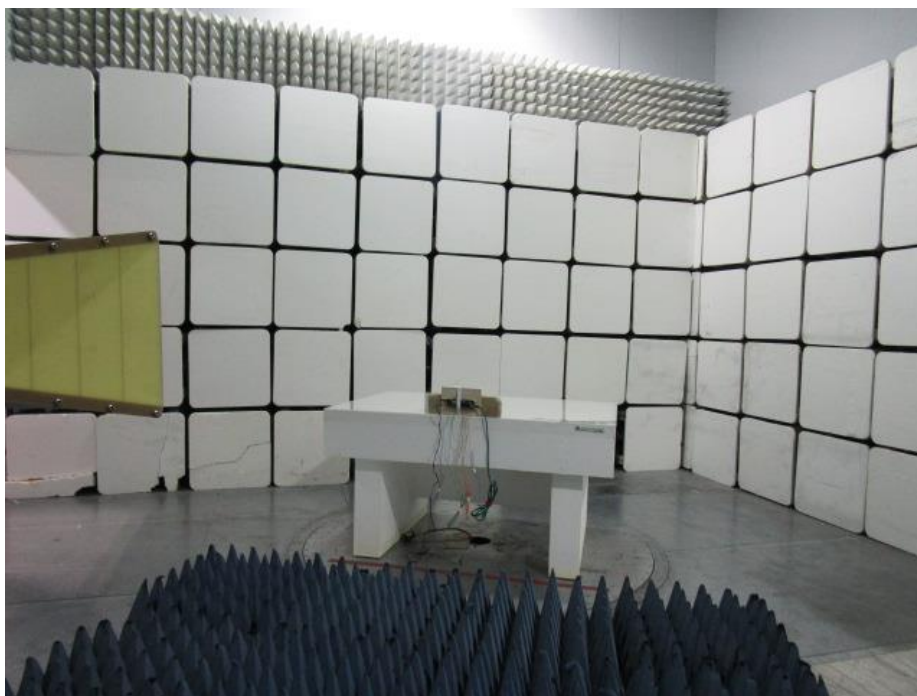
$$FS = RA + AF + CF - AG$$

$$FS = 48.1 + 7.4 + 1.6 - 16.0$$

$$FS = 41.1 \text{ dB}(\mu\text{V}/\text{m})$$



Test Setup Photos



Test Setup Photos

Date:	July 13, 2020	Result: Pass
Tested by:	Kiran Mekala	
Standard:	FCC Part 15.109, Class B	
Test Point:	Enclosure	
Operation mode:	See page 5	
Environmental Conditions:	22°C; 50%(RH); 99kPa	
Equipment Verification:	<input checked="" type="checkbox"/>	
Note:	Test Range: 30MHz to 1GHz	

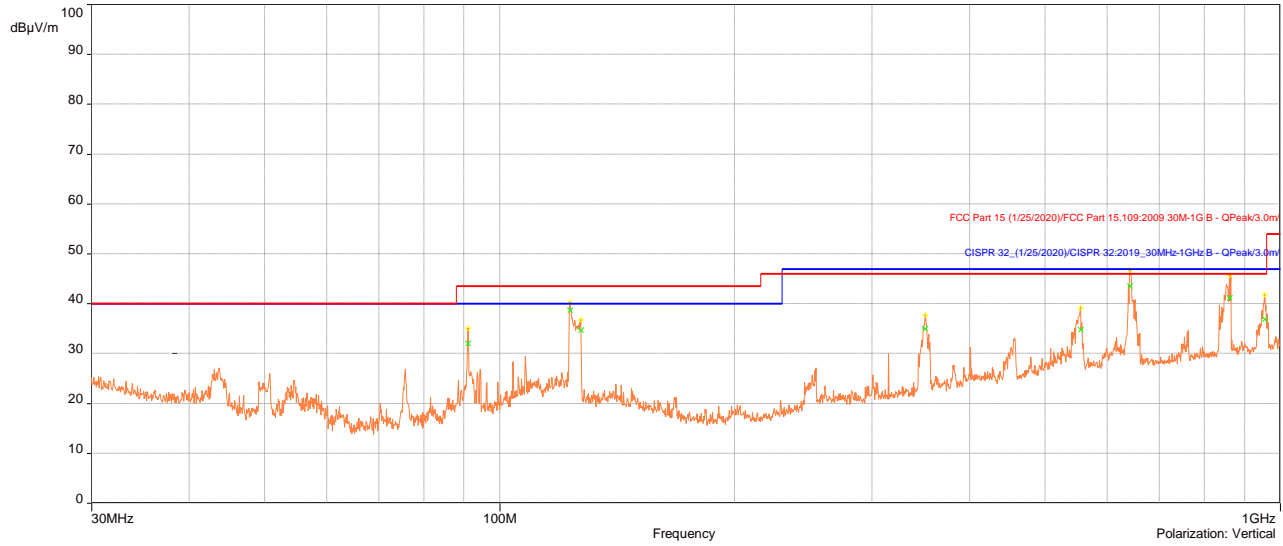
Table 2

Frequency (MHz)	Height (m)	Polarization	Correction (dB)	Total QP Reading (dBµV/m)	QPeak Limit (dBµV/m)	Margin (dB)
91.102	1.22	Vertical	14.42	32.04	43.52	-11.48
123.044	1.01	Vertical	17.72	38.72	43.52	-4.80
126.995	1.01	Vertical	17.64	34.70	43.52	-8.82
350.965	1.00	Vertical	20.90	34.96	46.00	-11.04
554.916	1.09	Vertical	24.84	34.80	46.00	-11.20
641.629	1.00	Vertical	25.83	43.58	46.00	-2.42
861.224	1.00	Vertical	27.92	41.13	46.00	-4.87
954.974	1.00	Vertical	28.79	36.87	46.00	-9.13
106.939	1.00	Horizontal	17.16	22.00	43.52	-21.52
254.231	1.00	Horizontal	18.67	28.71	46.00	-17.29
351.006	1.00	Horizontal	20.90	34.71	46.00	-11.29
643.847	1.09	Horizontal	25.83	35.01	46.00	-10.99
852.555	1.00	Horizontal	27.81	42.01	46.00	-3.99
861.043	1.00	Horizontal	27.92	44.53	46.00	-1.47
941.385	1.00	Horizontal	28.76	37.23	46.00	-8.77

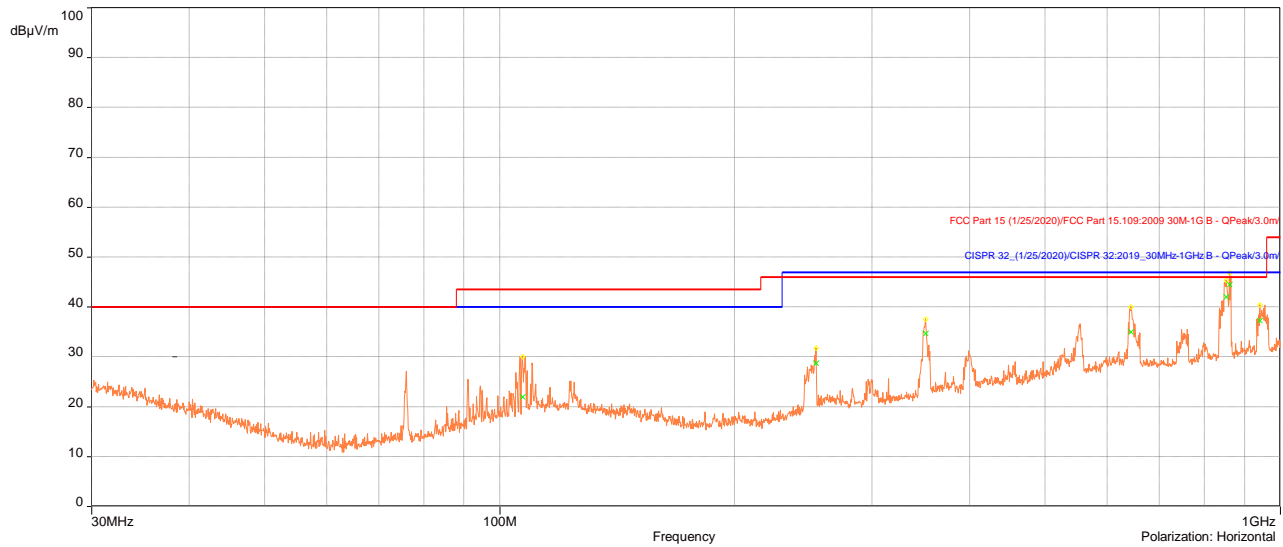
Date:	July 13, 2020	Result: Pass
Tested by:	Kiran Mekala	
Standard:	EN 55032	
Test Point:	Enclosure	
Operation mode:	See page 5	
Environmental Conditions:	22°C; 50%(RH); 99kPa	
Equipment Verification:	<input checked="" type="checkbox"/>	
Note:	Test Range: 30MHz to 1GHz	

Table 3

Frequency (MHz)	Height (m)	Polarization	Correction (dB)	Total QP Reading (dB μ V/m)	QPeak Limit (dB μ V/m)	Margin (dB)
91.102	1.22	Vertical	14.42	32.04	40.00	-7.96
123.044	1.01	Vertical	17.72	38.72	40.00	-1.28
126.995	1.01	Vertical	17.64	34.70	40.00	-5.30
350.965	1.00	Vertical	20.90	34.96	47.00	-12.04
554.916	1.09	Vertical	24.84	34.80	47.00	-12.20
641.629	1.00	Vertical	25.83	43.58	47.00	-3.42
861.224	1.00	Vertical	27.92	41.13	47.00	-5.87
954.974	1.00	Vertical	28.79	36.87	47.00	-10.13
106.939	1.00	Horizontal	17.16	22.00	40.00	-18.00
254.231	1.00	Horizontal	18.67	28.71	47.00	-18.29
351.006	1.00	Horizontal	20.90	34.71	47.00	-12.29
643.847	1.09	Horizontal	25.83	35.01	47.00	-11.99
852.555	1.00	Horizontal	27.81	42.01	47.00	-4.99
861.043	1.00	Horizontal	27.92	44.53	47.00	-2.47
941.385	1.00	Horizontal	28.76	37.23	47.00	-9.77



Graph 3: Peak Readings Vertical



Graph 4: Peak Readings Horizontal

Date:	July 13, 2020	Result: Pass
Tested by:	Kiran Mekala	
Standard:	FCC Part 15.109, Class B	
Test Point:	Enclosure	
Operation mode:	See page 5	
Environmental Conditions:	23°C; 50%(RH); 99kPa	
Equipment Verification:	<input checked="" type="checkbox"/>	
Note:	Test Range: 1GHz to 13GHz	

Table 4

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	AVG Reading dB μ V	Total Reading @ 3m dB μ V/m	Limit dB μ V/m	Margin dB
	Polarity	Hts(cm)							
1068.00	V	121	24.2	1.9	42.1	35.3	19.4	54.0	-34.6
1168.00	V	115	24.5	2.0	42.1	34.1	18.5	54.0	-35.5
1228.00	V	124	24.6	2.1	42.1	32.7	17.3	54.0	-36.7
1372.00	V	129	24.9	2.2	42.1	34.5	19.5	54.0	-34.5
1872.00	V	116	26.7	2.6	42.2	35.8	22.8	54.0	-31.2
1900.00	V	116	26.8	2.6	42.3	60.3	47.3	54.0	-6.7
2200.00	V	118	27.7	2.8	42.4	60.0	48.0	54.0	-6.0
2304.00	V	120	27.9	2.8	42.4	60.4	48.7	54.0	-5.2
2400.00	V	116	28.2	2.9	42.4	59.0	47.6	54.0	-6.4
1168.00	H	118	24.5	2.0	42.1	34.5	18.9	54.0	-35.1
1372.00	H	120	24.9	2.2	42.1	34.8	19.8	54.0	-34.2
1900.00	H	102	26.8	2.6	42.3	62.2	49.3	54.0	-4.7
2000.00	H	100	27.2	2.6	42.4	62.5	49.9	54.0	-4.0
2200.00	H	145	27.7	2.8	42.4	61.6	49.6	54.0	-4.4
2304.00	H	149	27.9	2.8	42.4	61.4	49.7	54.0	-4.2

Date:	July 13, 2020	Result: Pass
Tested by:	Kiran Mekala	
Standard:	EN 55032	
Test Point:	Enclosure	
Operation mode:	See page 5	
Environmental Conditions:	23°C; 50%(RH); 99kPa	
Equipment Verification:	<input checked="" type="checkbox"/>	
Note:	Test Range: 1GHz to 6GHz	

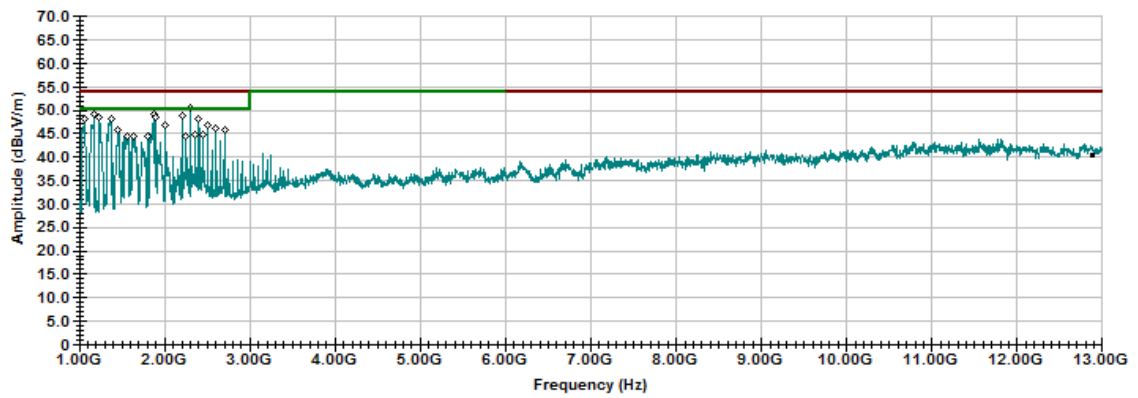
Table 5

Frequency MHz	Antenna		Ant. CF dB1/m	Cable loss dB	Pre-amp Gain (dB)	AVG Reading dBµV	Total Reading @ 3m dBµV/m	Limit dBµV/m	Margin dB
	Polarity	Hts(cm)							
1068.00	V	102	24.2	1.9	42.1	35.3	19.4	50.0	-30.6
1168.00	V	104	24.5	2.0	42.1	34.1	18.5	50.0	-31.5
1228.00	V	109	24.6	2.1	42.1	32.7	17.3	50.0	-32.7
1372.00	V	106	24.9	2.2	42.1	34.5	19.5	50.0	-30.5
1872.00	V	110	26.7	2.6	42.2	35.8	22.8	50.0	-27.2
1900.00	V	100	26.8	2.6	42.3	60.3	47.4	50.0	-2.6
2200.00	V	101	27.7	2.8	42.4	60.0	48.0	50.0	-2.0
2304.00	V	100	27.9	2.8	42.4	60.4	48.7	50.0	-1.3
2400.00	V	103	28.2	2.9	42.4	59.0	47.6	50.0	-2.4
1168.00	H	102	24.5	2.0	42.1	34.5	18.9	50.0	-31.1
1372.00	H	138	24.9	2.2	42.1	34.8	19.8	50.0	-30.2
1900.00	H	190	26.8	2.6	42.3	62.2	49.3	50.0	-0.7
2000.00	H	146	27.2	2.6	42.4	62.5	49.9	50.0	-0.1
2200.00	H	147	27.7	2.8	42.4	61.6	49.6	50.0	-0.4
2304.00	H	190	27.9	2.8	42.4	61.4	49.7	50.0	-0.3

Project # - G104103871
Company - Konnected
Model # - Alarm Panel PRO

Peak Radiated Emissions EN 55032 / FCC Part 15.109, Class B Vertical Antenna Polarization

— ver_scan_cf
◇ max_ver_20_cf
— FCC_B_3m
— CISPR-B_HF_3m



Operator: KM

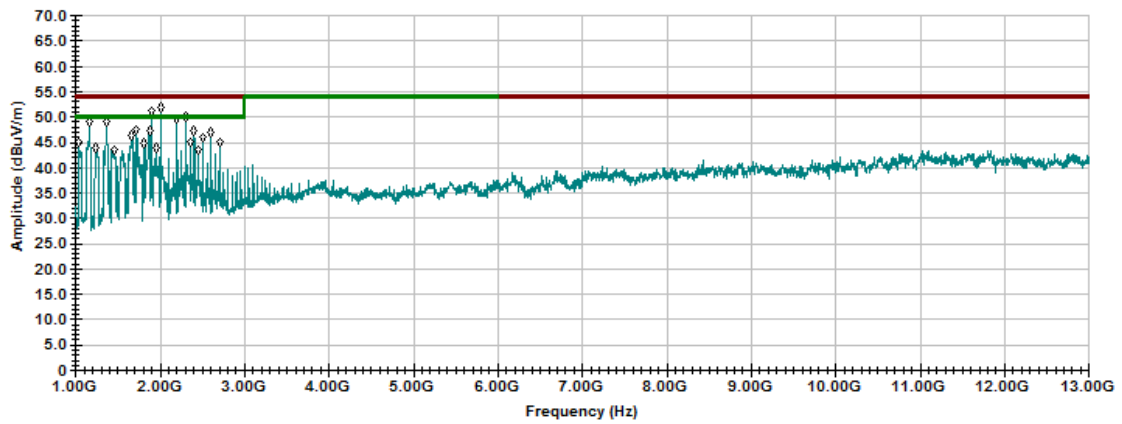
Project #: G104103871

Graph 5: Peak Readings Vertical

Project # - G104103871
Company - Konnected
Model # - Alarm Panel PRO

Peak Radiated Emissions EN 55032 / FCC Part 15.109, Class B Horizontal Antenna Polarization

— hor_scan_cf
◇ max_hor_20_cf
— FCC_B_3m
— CISPR-B_HF_3m



Operator: KM

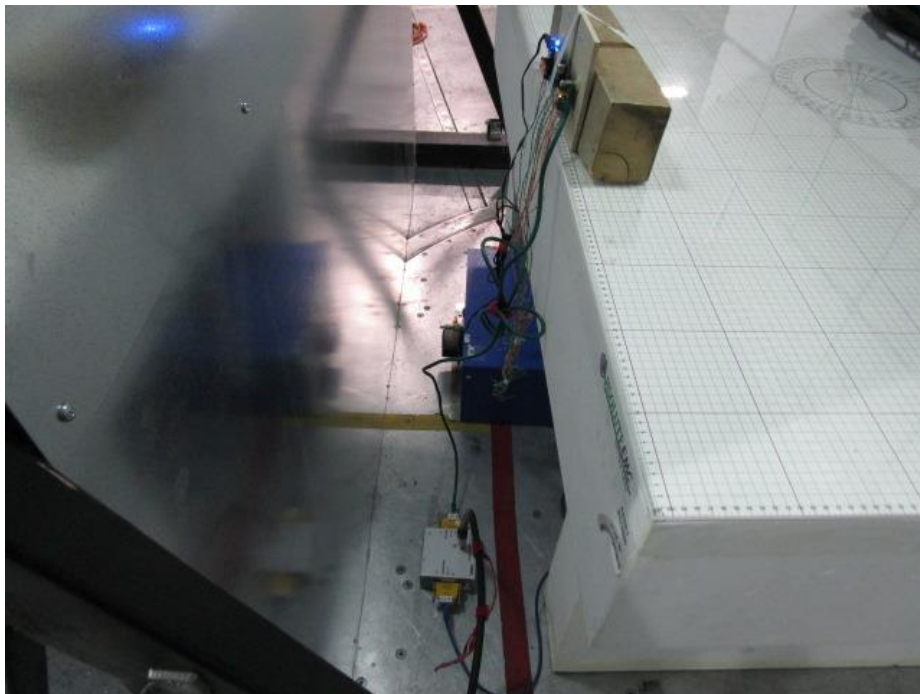
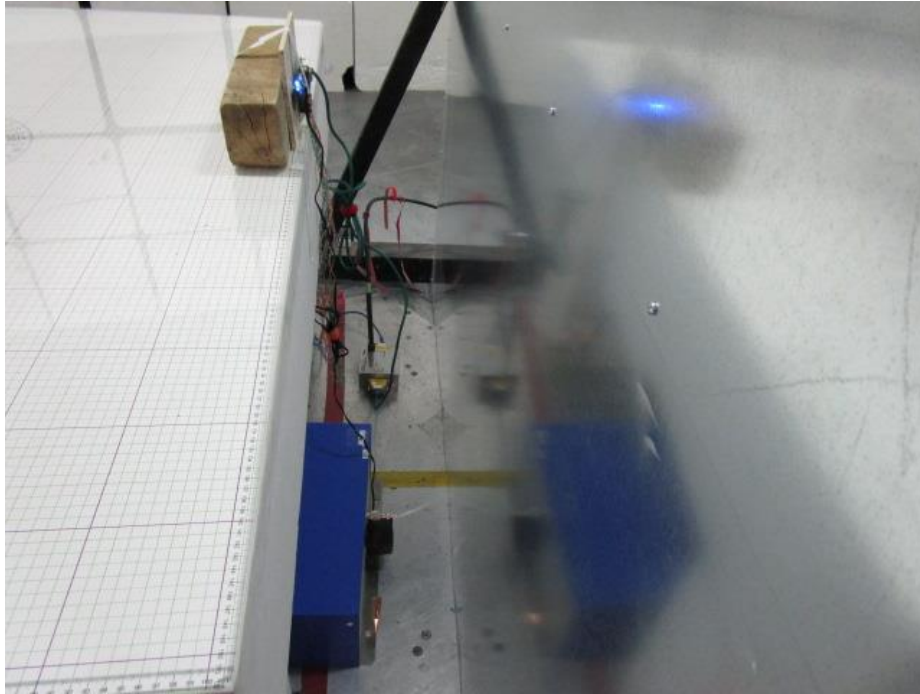
Project #: G104103871

Graph 6: Peak Readings Horizontal

4.3 Conducted Emissions at Telecommunication Ports

Test result:	Pass
Frequency range:	0.15MHz-30MHz
Max. Emissions margin:	12.95 dB below the limits

Notes: None

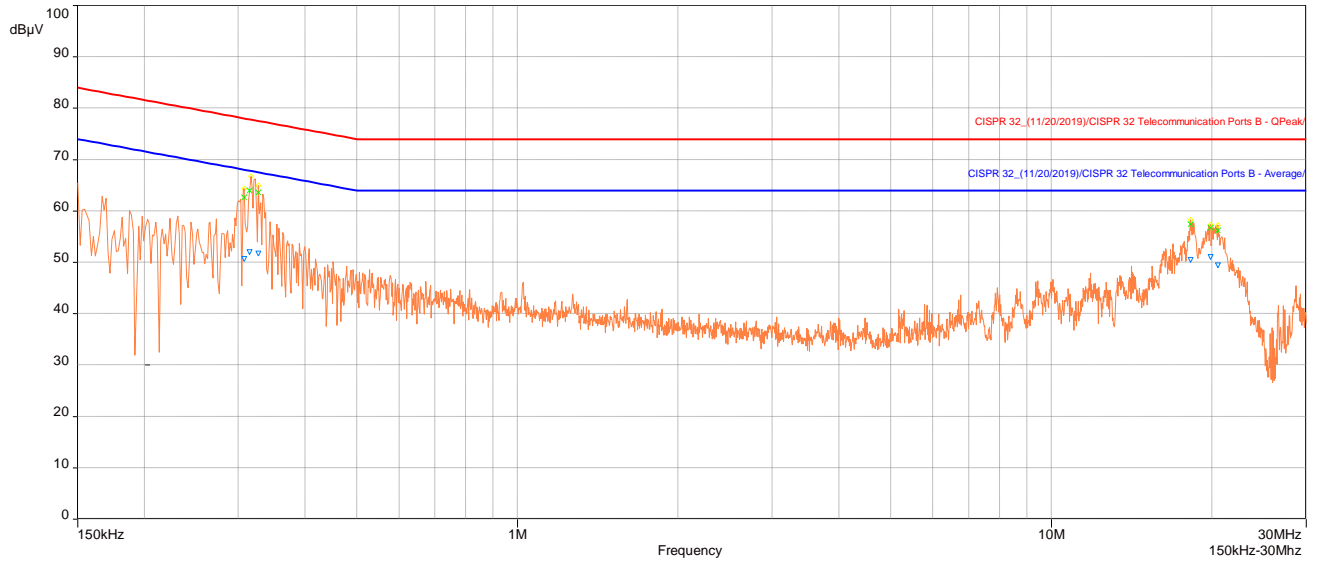


Test Setup Photos

Date:	July 13, 2020	Result: Pass
Tested by:	Kiran Mekala	
Standard:	EN 55032, Class B	
Test Point:	Ethernet Port	
Operation mode:	See page 5	
Environmental Conditions:	23°C; 50%(RH); 99kPa	
Equipment Verification:	<input checked="" type="checkbox"/>	
Note:	None	

Table 6

Frequency (MHz)	Line	Correction (dB)	AVG Level (dB μ V)	QP Level (dB μ V)	AVG Limit (dB μ V)	QP Limit (dB μ V)	AVG Margin (dB)	QP Margin (dB)
0.307	1	20.08	50.66	62.65	68.04	78.04	-17.38	-15.39
0.315	1	20.07	52.04	64.03	67.84	77.84	-15.80	-13.81
0.327	1	20.06	51.70	63.59	67.53	77.53	-15.82	-13.94
18.223	1	19.93	50.50	57.42	64.00	74.00	-13.50	-16.58
19.850	1	19.96	51.05	56.71	64.00	74.00	-12.95	-17.29
20.481	1	19.97	49.46	56.16	64.00	74.00	-14.54	-17.84



Graph 7: Peak Measurements

5.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	LAST CAL DATE	CAL DUE
Spectrum Analyzer	R & S	ESU	100398	25283	07/17/2019	07/17/2020
Spectrum Analyzer	R & S	ESCI	100358	12909	04/09/2020	04/09/2021
Bicono-Log Antenna	Teseq	CBL6112D	32859	25289	05/13/2020	05/13/2021
Horn Antenna	EMCO	3115	9504-4504	172463	07/25/2019	07/25/2020
LISN	COM-Power	Li-215A	191970	172315	07/25/2019	07/25/2020
Pre-Amplifier	MITEQ	LNA-40-00101800-35-15P	2108525	172474	05/14/2020	05/14/2021
ISN	TESEQ	ISN-T8	29421	24299	02/21/2020	02/21/2021
System	Quantum Change	TILE! Instrument Control	Ver. 3.4.K.29	15259	VBU	VBU
System	Nexio Inc.	BAT-EMC	Ver. 3.17.0.21	172Nexio	VBU	VBU

6.0 REVISION HISTORY

REVISION LEVEL	DATE	REPORT NUMBER	PREPARED	REVIEWED	NOTES
0	07-14-2020	104103871MIN-017	KM	US	Original Issue