



Test Report for Hanchett Entry Systems, Inc.
Report No. EW0235-4 Issue 5



TEST REPORT

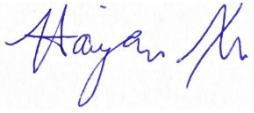
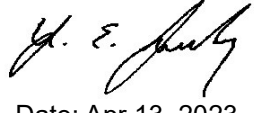
Applicant	Hanchett Entry Systems, Inc.
Address	10027 S. 51 st Street, Suite 102, Phoenix AZ 85044

FCC ID	VC3-DR100V3
ISED IC	7160A-DR100V3
Product Description	RFID Reader Module
PMN Model/HVIN FVIN HMN	DR100-V3 DR100-V3 N/A DR100
Additional Models & Model Difference	N/A
Date of tests	Jul 19, 2022 to Jan 5, 2023
FCC Test Firm DN Canada CABID	US1028 US0106

The tests have been carried out according to the requirements of the following standard:

- ☒ FCC Part 15, Subpart C, 15.247
- ☒ RSS-247 Issue 2

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Haiyan Xu Wireless Engineer	Approved by Yunus Faziloglu Wireless Manager
	 Date: Apr 13, 2023

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED	ISSUED BY	APPROVED BY
1	Original release	Jan 3, 2023	HX	YF
2	Update output power rating (Section 3) Update peak power table and results (Section 4.4) Update PSD Test Procedure RBW to 10kHz (Section 4.5) Update conducted band edge data (Section 4.7)	Jan 6, 2023	HX	YF
3	Include AC line conducted emissions data (Section 4.1) Include radiated spurious emissions data (Section 4.2)	Feb 21, 2023	RMB	YF
4	To address TCB review comments: Power setting clarification added to Pg 6 Noise floor readings added to Pg 39, Pg 44 and Pg 49	Mar 16, 2023	RMB	YF
5	Updated EUT antenna gain in Section 3	Apr 13, 2023	RMB	YF



1 SUMMARY OF TEST RESULTS

The EUT has been tested against the following requirements:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247), RSS-247				
STANDARD SECTION		TEST TYPE AND LIMIT	APPLICABLE	RESULT
47CFR15	RSS			
15.207	Gen 8.8	AC Power Line Conducted Emissions	Y	Pass
15.205 15.209	247 3.3 247 5.5 Gen 8.9 Gen 8.10	Radiated Spurious Emissions	Y	Pass
15.247(d)	247 5.5	Conducted Spurious Emissions	Y	Pass
15.247(a)(2)	247 5.2(a)	6dB Bandwidth	Y	Pass
--	Gen 6.7	99% Occupied Bandwidth	Y	Pass
15.247(b)(3)	247 5.4(d)	Conducted Output Power	Y	Pass
15.247(e)	247 5.2(b)	Power Spectral Density	Y	Pass
15.203	Gen 6.8	Antenna Requirement	Y	Pass



2 MEASUREMENT UNCERTAINTY

The listed uncertainties are the worst-case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results. Values for measurement uncertainty are calculated per ETSI TR 100 028 (2001).

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation: Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4% 0.3dB	5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.



3 GENERAL INFORMATION

General Description of EUT

PRODUCT	RFID Reader Module
MODEL NO.	DR100-V3
ADDITIONAL MODEL	N/A
FCC ID	VC3-DR100V3
ISED IC	7160A-DR100V3
NOMINAL VOLTAGE	3VDC
MODULATION TECHNOLOGY	Zigbee: DTS
DATA RATES	250Kbps
OPERATING FREQUENCY	2405-2480MHz
EUT Power Setting	Default (maximum). Same setting for all channels.
OUTPUT POWER	2.19mW (Peak Conducted)
ANTENNA TYPE	Internal PCB surface mount antenna
ANTENNA GAIN	2.9dBi gain

This test report supports a "Limited Modular Approval" certification application for the RFID Reader Module (Model: DR100-V3) operating pursuant to:

CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2

This report contains test data for the Zigbee radio portion of this EUT.

The EUT is the RFID Reader Module (Model: DR100-V3). It communicates reading activity to a remote unit over the 2.4GHz band. It was tested inside the Aperio V3 Wireless Door Relay (Host Model: DR100). The RFID Reader Module (Model: DR100-V3) also contains a 125kHz RFID radio and a 13.56MHz RFID radio. The Zigbee radio of the module uses an internal PCB surface mount antenna. The Host Model DR100 operating voltage is 24VDC, and the RFID Reader Module (Model: DR100-V3) operating voltage is 3VDC.

In addition, DR100 host includes a previously certified Bluetooth Low Energy module with FCC ID: Y88-MBM1CC2640 and IC: 9504A-MBM1CC2640.

Lowest clock frequency in the device (used/generated): 32.768kHz

A support laptop was used to control the Zigbee transmitter. PuTTY (software) was used on this laptop to enable/disable transmitters and set transmission channels. The transmitter was set to operate in continuous transmit mode with modulation (duty-cycle > 98%). EUT was supplied with an "RFID



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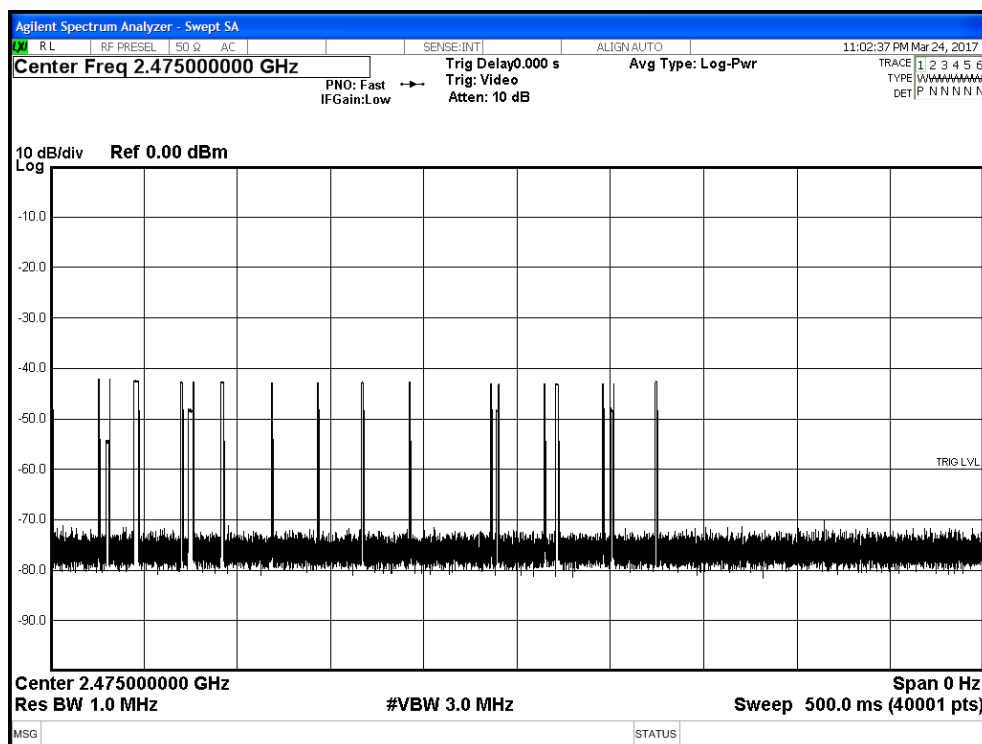
windmill" test fixture to present RFID tags to the EUT during unintentional emissions testing in order to simulate normal operation of periodic tag reading. This fixture was not exercised during radio testing.

Following bandwidths were used during emissions testing:

Freq. (MHz)	RBW	VBW	Pre-scan	Final
0.009-0.15	200Hz	1kHz	Peak	Quasi Peak
0.15-30	9kHz	30kHz	Peak	Quasi Peak
30-1000	120kHz	300kHz	Peak	Quasi Peak
>1000	1MHz	3MHz	Peak	Peak Max Hold and RMS Power Avg Max Hold

If peak measurements were below the applicable limit, QPk and RMS measurements were not performed.

For some harmonic emissions of Zigbee, average readings were calculated by applying operational duty-cycle correction factor to peak readings as permitted in 558074 D01 15.247 Meas Guidance v05r02 Section 11 Q3.A3.a). Client confirmed that operational duty-cycle of the Zigbee radio is same as the radio in FCC ID: VC3-R100V3 on file with the FCC. Following plot and calculation is an excerpt from test report ER0115-2 in that filing.



Software used to calculate duty-cycle over worst case 100ms window from trace data points of the plot above.

Duty-Cycle = 13.6%

DCCF = $20 \cdot \log(13.6/100) = -17.3\text{dB}$

We found that the product complied with the requirements above without modification. Test sample was received in good condition.



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Description of Test Modes

16 channels are provided for the Zigbee radio:

Channel	FREQ. (MHz)	Channel	FREQ. (MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

Configuration of System Under Test

Two samples were provided for testing, one for radiated measurements and another with an SMA connector for conducted antenna port measurements. Both samples were powered with a 24VDC power supply and had a temporary port for a serial to USB cable for connection to a support laptop for putting the radio in necessary test modes. EUT configuration modes are as follows:

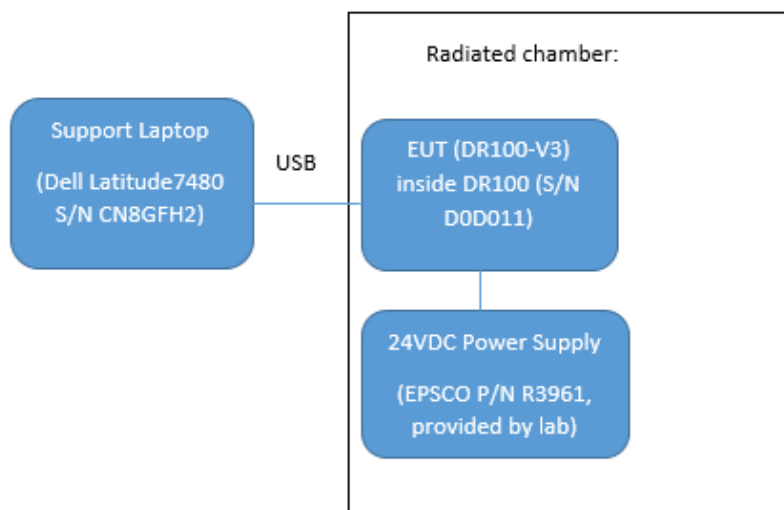
TEST MODE	DESCRIPTION
A	Continuous transmission with modulation (Duty-cycle > 98%)



Test Setup Block Diagrams

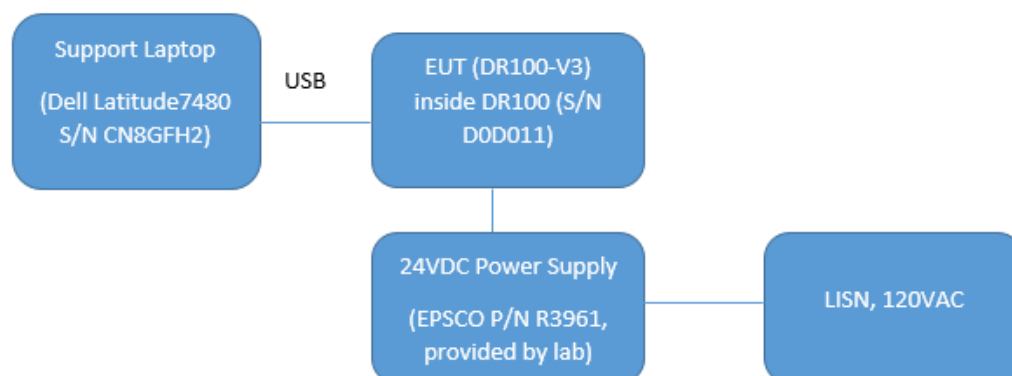
Radiated Emissions

Radiated setup



Power Line Conducted Emissions

Conducted Emissions



For antenna port test setup block diagrams, please see the corresponding sections of this report.



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Following channels/modes were selected for the applicable tests below.

TEST	TEST MODE	AVAILABLE CHANNELS	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Kbps)	Notes
PLCE	A	11 to 26	19	O-QPSK	250	--
RSE<1G	A	11 to 26	11,19,26	O-QPSK	250	1, 2
RSE>1G	A	11 to 26	11,19,26	O-QPSK	250	2
RBE	A	11 to 26	11,26	O-QPSK	250	2
COP	A	11 to 26	11,18,26	O-QPSK	250	--
PSD	A	11 to 26	11,18,26	O-QPSK	250	--
CBE	A	11 to 26	11,26	O-QPSK	250	--
6DB	A	11 to 26	11,18,26	O-QPSK	250	--
OBW	A	11 to 26	11,18,26	O-QPSK	250	--
CSE	A	11 to 26	11,18,26	O-QPSK	250	--

Note 1: Testing below 30MHz was limited to 2 channels only since no emissions were detected in this range.

Note 2: Host was in normal installation (upright) position during testing.

PLCE: Power Line Conducted Emissions

RSE: Radiated Spurious Emissions

RBE: Radiated Bandedges

COP: Conducted Output Power

PSD: Power Spectral Density

CBE: Conducted Band-edge

6DB: 6dB Bandwidth

OBW: 99% Occupied Bandwidth

CSE: Conducted Spurious Emissions

Test Conditions:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
Antenna Port Measurements	23.2deg. C, 50.9%RH, 1018mbar 20.9deg. C, 54.7%RH, 1010mbar	24VDC	RB: 11-30-2022 RB: 01-05-2023

Environmental conditions during radiated spurious emissions and power line conducted emissions tests can be found on the associated data tables.



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General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C, Section 15.247
RSS-247 Issue 2
558074 D01 15.247 Meas Guidance v05r02
ANSI C63.10-2013

Note: All tests performed and recorded per the standards above.

Support Equipment

Support Equipment	Model #	Serial #
Laptop	Dell Latitude 7480	CN8GFH
DC Power Supply	EPSCO R3961	N/A
DC Power Supply	Eventek KPS3010D	N/A



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4 TEST RESULTS

4.1 CONDUCTED EMISSIONS MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.1.2 TEST INSTRUMENTS

Rev. 8/26/2022

Spectrum Analyzers / Receivers /Preselectors									
Rental EXA Signal Analyzer(1118472)	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
Rental EXA Signal Analyzer(1118473)	9KHz-26.5GHz	N9010A-526;K	AT	MY51170010	1118472	I	10/27/2022	10/27/2021	
	9KHz-26.5GHz	N9010A-526;N	AT	MY51170076	1118473	I	8/5/2022	8/5/2021	
LISNs/Measurement Probes									
LISN Asset 2092	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
	9KHz-30MHz	NNLK 8121	Schwarzbeck	NNLK 8121-662	2092	I	10/25/2022	10/25/2021	
Conducted Test Sites (Mains / Telco)									
CEMI 1	FCC Code		VCCI Code			Cat	Calibration Due	Calibrated on	
CEMI 5	719150		A-0015			III	NA	N/A	
	719150		A-0015			III	NA	N/A	
Meteorological Meters/Chambers									
Weather Clock (Pressure Only)		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
Asset #2657		BA928	Oregon Scientific	C3166-1	831	I	11/23/2022	11/23/2020	
Asset #2657		1235C97	Control Company	200435369	2657	I	8/18/2025	8/18/2022	
		1235C97	Control Company	200435369	2657	I	8/23/2022	7/23/2020	
Cables									
CEMI-02	Range		Mfr			Cat	Calibration Due	Calibrated on	
CEMI-15	9kHz - 2GHz		C-S			II	2/17/2023	2/17/2022	
	9kHz - 2GHz		C-S			II	2/17/2023	2/17/2022	
Attenuators									
20dB ATT(A#2506)	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
20dB ATT(A#2506)	9kHz-2GHz	PE7014-20	Pasternack	2016	2506	II	8/3/2023	8/3/2022	
	9kHz-2GHz	PE7014-20	Pasternack	2016	2506	II	8/4/2022	8/4/2021	

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



4.1.3 TEST PROCEDURES

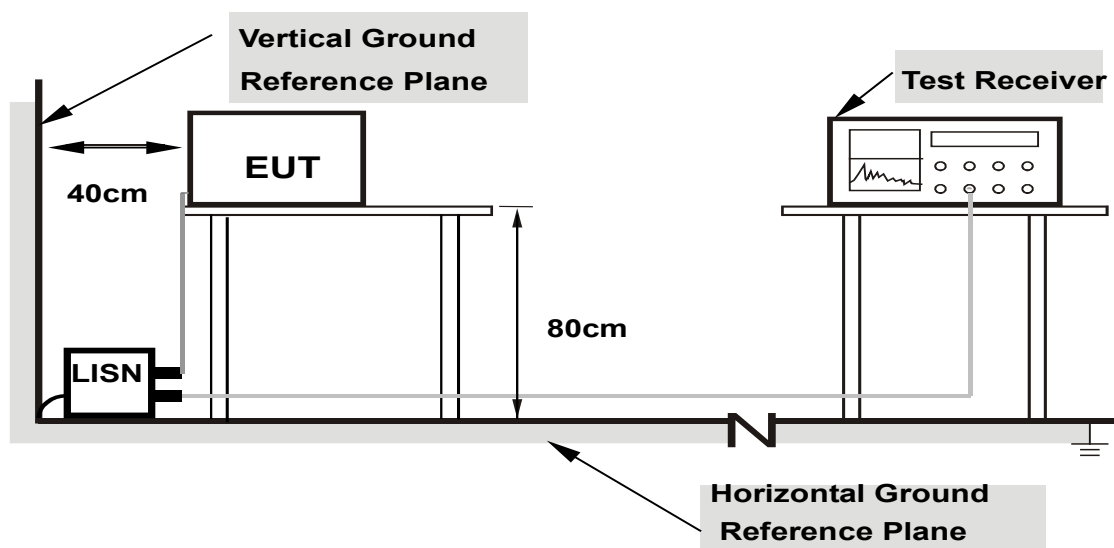
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded. RBW of 9kHz and VBW of 30kHz were used during measurement.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



**Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

For the actual test configuration, please refer to Test Setup Photos exhibit.

4.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power and connected all equipment.
- b. EUT was operated according to manufacturer's specifications.



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4.1.7 TEST RESULTS

Bureau Veritas Consumer Product Services Inc.
Conducted Emissions per CISPR 16-2-1

Peak Detector Data

Notes:

EUT Line tested: 120VAC/60Hz; Line Phase

EUT Mode of Operation: AC Side of DC Supply

zb mid

Work Order # - W0235

EUT Power Input - 120VAC/ 60Hz

Test Site - CEMI-1

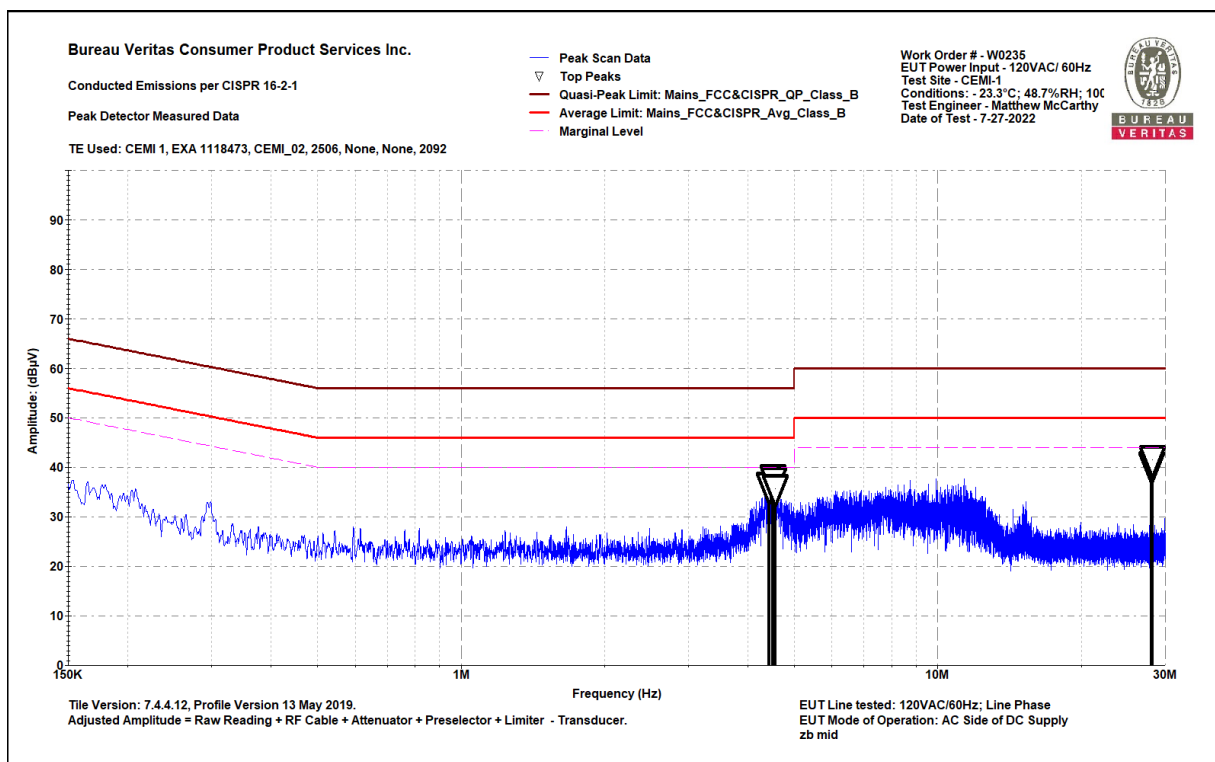
Conditions: - 23.3°C; 48.7%RH; 1006mBar

Test Engineer - Matthew McCarthy

Date of Test - 7-27-2022

Frequency (MHz)	Raw Pk Reading (dBμV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBμV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBμV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBμV)	Margin to Avg Limit (dB)	Pk to Avg Limit Results (Pass/Fail)	Worst Margin (Avg Limit) (dB)
4.434	15.6	20.4	36.1	56	-19.9	PASS		46	-9.9	PASS	
4.505	17.2	20.4	37.7	56	-18.3	PASS	-18.3	46	-8.3	PASS	-8.3
4.533	16.8	20.4	37.2	56	-18.8	PASS		46	-8.8	PASS	
4.56	15.2	20.4	35.7	56	-20.3	PASS		46	-10.3	PASS	
28.041	19.5	20.7	40.2	60	-19.8	PASS		50	-9.8	PASS	
28.134	20.7	20.7	41.5	60	-18.5	PASS		50	-8.5	PASS	

Line PK



Line PK

Bureau Veritas Consumer Product
Services Inc.

One Distribution Center Circle, #1
Littleton, MA

Tel.: (978) 486-8880
Fax: (978) 486-8828



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Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

Bureau Veritas Consumer Product Services Inc.

Conducted Emissions per CISPR 16-2-1

Peak Detector Data

Notes:

EUT Line tested: 120VAC/60Hz; Neutral Phase

EUT Mode of Operation: AC Side of DC Supply

zb mid

Work Order # - W0235

EUT Power Input - 120VAC/ 60Hz

Test Site - CEMI-1

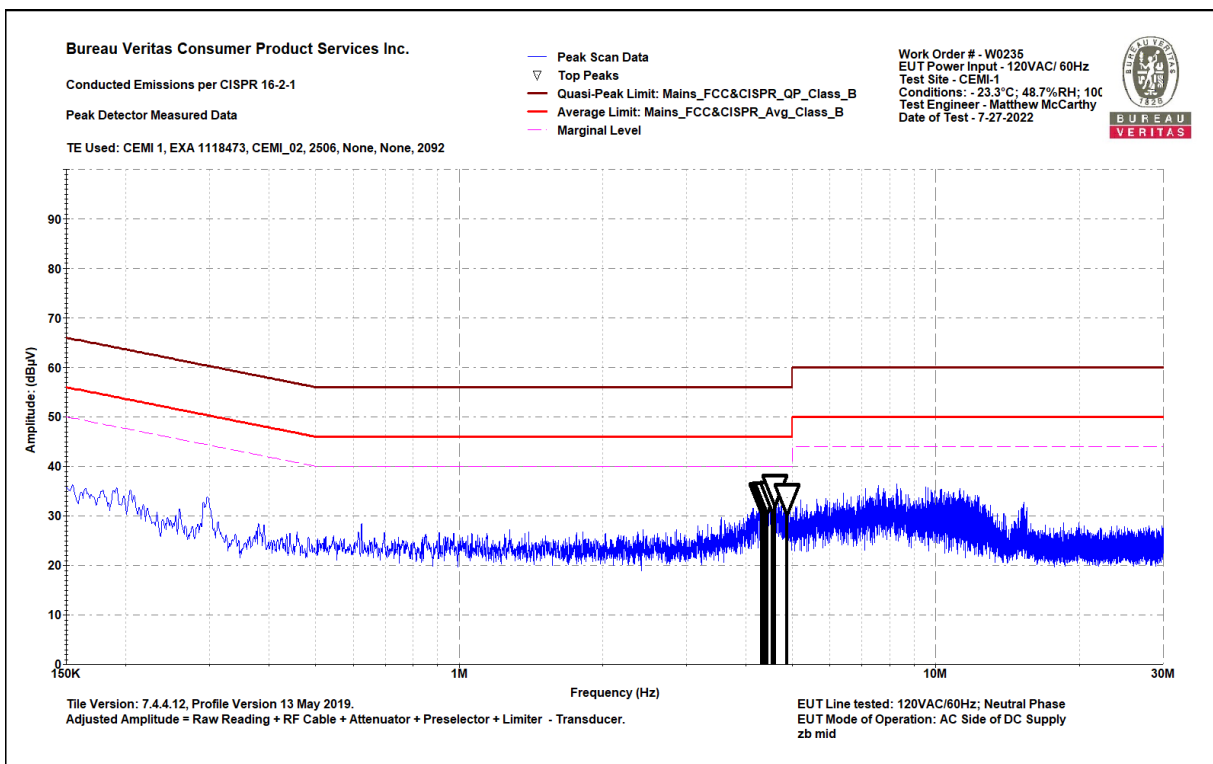
Conditions: - 23.3°C; 48.7%RH; 1006mBar

Test Engineer - Matthew McCarthy

Date of Test - 7-27-2022

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Margin to Avg Limit (dB)	Pk to Avg Limit Results (Pass/Fail)	Worst Margin (Avg Limit) (dB)
4.311	13.4	20.4	33.8	56	-22.2	PASS		46	-12.2	PASS	
4.379	13.6	20.4	34	56	-22	PASS		46	-12	PASS	
4.425	13.5	20.4	33.9	56	-22.1	PASS		46	-12.1	PASS	
4.547	13.7	20.4	34.1	56	-21.9	PASS		46	-11.9	PASS	
4.599	15	20.4	35.5	56	-20.5	PASS	-20.5	46	-10.5	PASS	-10.5
4.877	13.3	20.4	33.7	56	-22.3	PASS		46	-12.3	PASS	

Neutral PK



Neutral PK

Bureau Veritas Consumer Product
Services Inc.

One Distribution Center Circle, #1
Littleton, MA

Tel.: (978) 486-8880
Fax: (978) 486-8828



4.2 RADIATED EMISSIONS MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSIONS MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emissions limits specified in Section 15.209(a).

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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4.2.2 TEST INSTRUMENTS

Rev. 8/17/2022

Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	1/27/2023	1/27/2022
2093 MXE EMI Receiver	20Hz-26.5GHz	N9038A	Agilent	MY51210181	2093	I	3/7/2023	3/7/2022
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz	1686	I	12/5/2022	12/5/2020
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	I	12/8/2022	12/8/2020
Preamps / Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
8449B HF Preamp	1-18GHz	8449B	Agilent	1149055		II	11/10/2022	11/10/2021
8447F Rental PA	9KHz-1.3GHz	84477F	HP	3113A.05395		II	10/18/2022	10/18/2021
2116 BRF	0.009-18000MHz	BRM50702	Micro-Tronics	G226	2116	II	11/10/2022	11/10/2021
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Red-Brown Bilog	30-2000MHz	JB1	Sunol	A0032406	1218	I	4/28/2023	4/28/2021
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	4/26/2023	4/26/2021
Small Loop	10kHz-30MHz	PLA-130/A	ARA	1024	755	I	8/25/2022	8/25/2020
Large Loop	20Hz-5MHz	6511	EMCO	9704-1154	67	I	8/21/2022	8/21/2020
HF (White) Horn	18-26.5GHz	801-WLM	Waveline	758	758	III	Verify before Use	date of test
Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	11/23/2022	11/23/2020
Asset #2656		1235C97	Control Company	200435359	2656	I	8/23/2022	7/23/2020
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2474	9KHz-18GHz		MegaPhase			II	11/9/2022	11/9/2021
Asset #2610	9KHz-18GHz		Pasternack			II	3/16/2023	3/16/2022
Asset #2583	9KHz-18GHz		Pasternack			II	2/17/2023	2/17/2022
Asset #2323	1-26.5GHz	TM26-S1S1-120	MEGAPHASE	17139101 002		II	9/10/2022	9/10/2021

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



4.2.3 TEST PROCEDURES

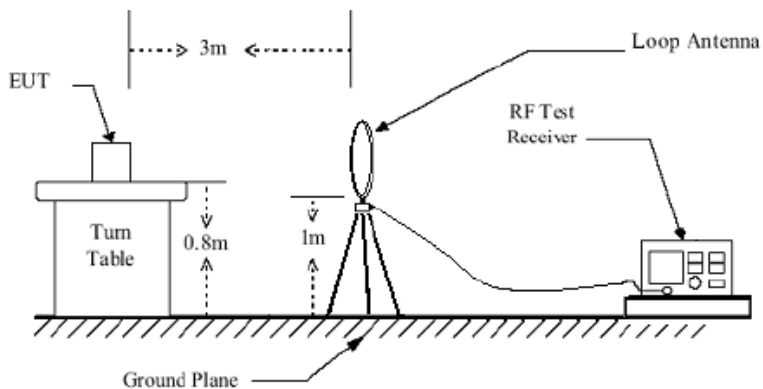
- a. The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. In 9kHz-6GHz range, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the lowest point of the loop shall be 1m above the ground.
- g. In 6-18GHz range, the measurement distance was 1m. In 18-25GHz, the measurement distance was 0.1m.
- h. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, and was placed in its intended operating position. The turntable was rotated to maximize the emission level.

4.2.4 DEVIATION FROM TEST STANDARD

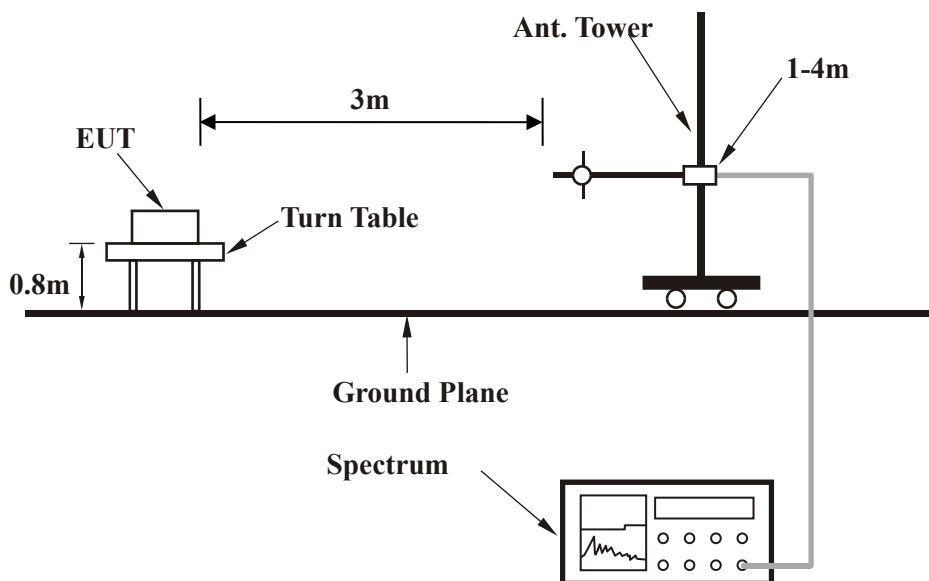
No deviation.

4.2.5 TEST SETUP

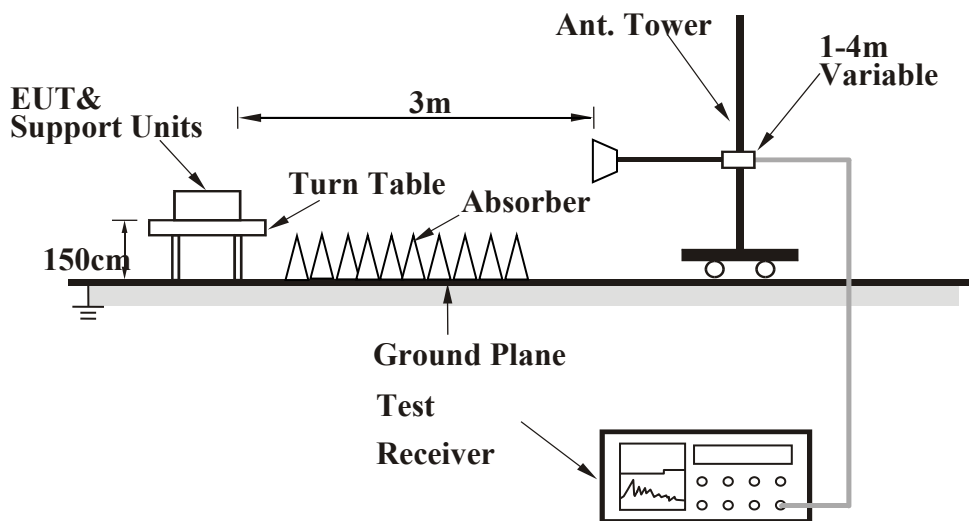
Below 30MHz test setup



Below 1GHz test setup



Above 1GHz test setup



Note: For the actual test configuration, please refer to the Test Setup Photos exhibit.

4.2.6 EUT OPERATING CONDITIONS

EUT was operated according to the manufacturer's specifications.



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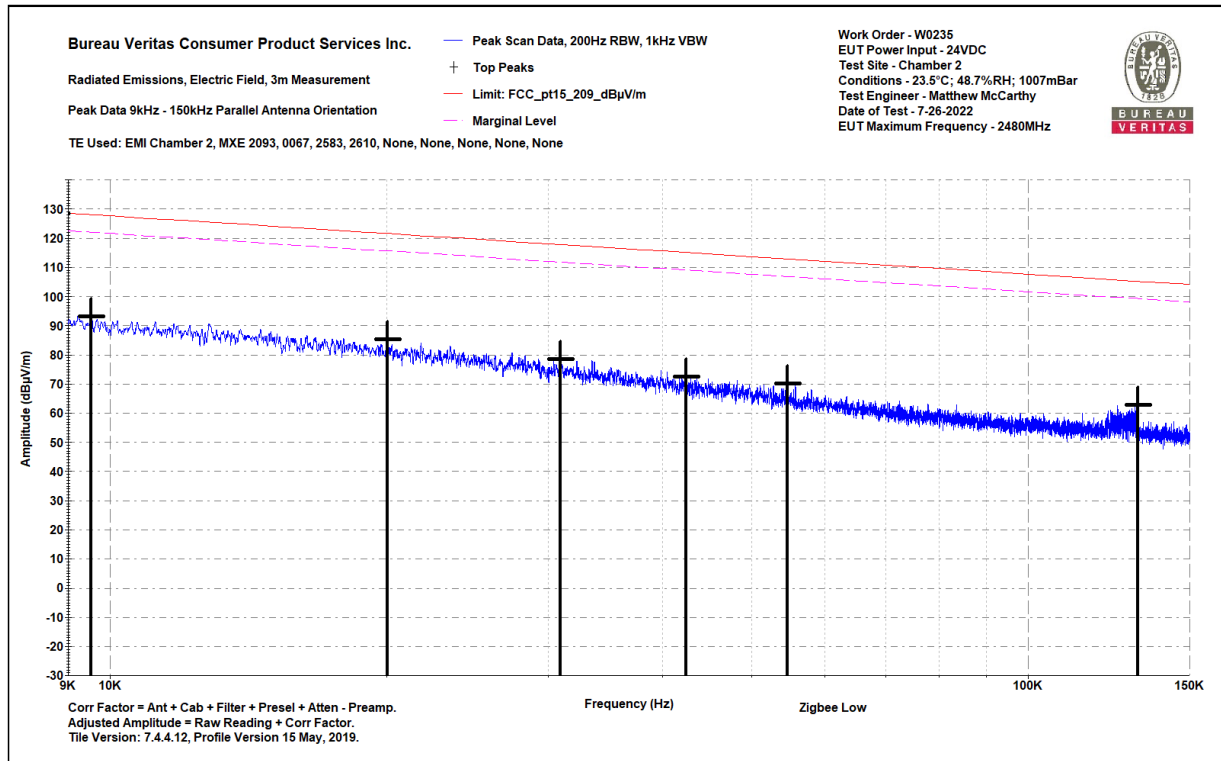
Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

4.2.7 TEST RESULTS

Emissions below 1GHz

Results for Zigbee 250Kbps O-QPSK Channel 11

No emissions within 10dB of the limit were identified in 9kHz-30MHz range. Only plots shown below.

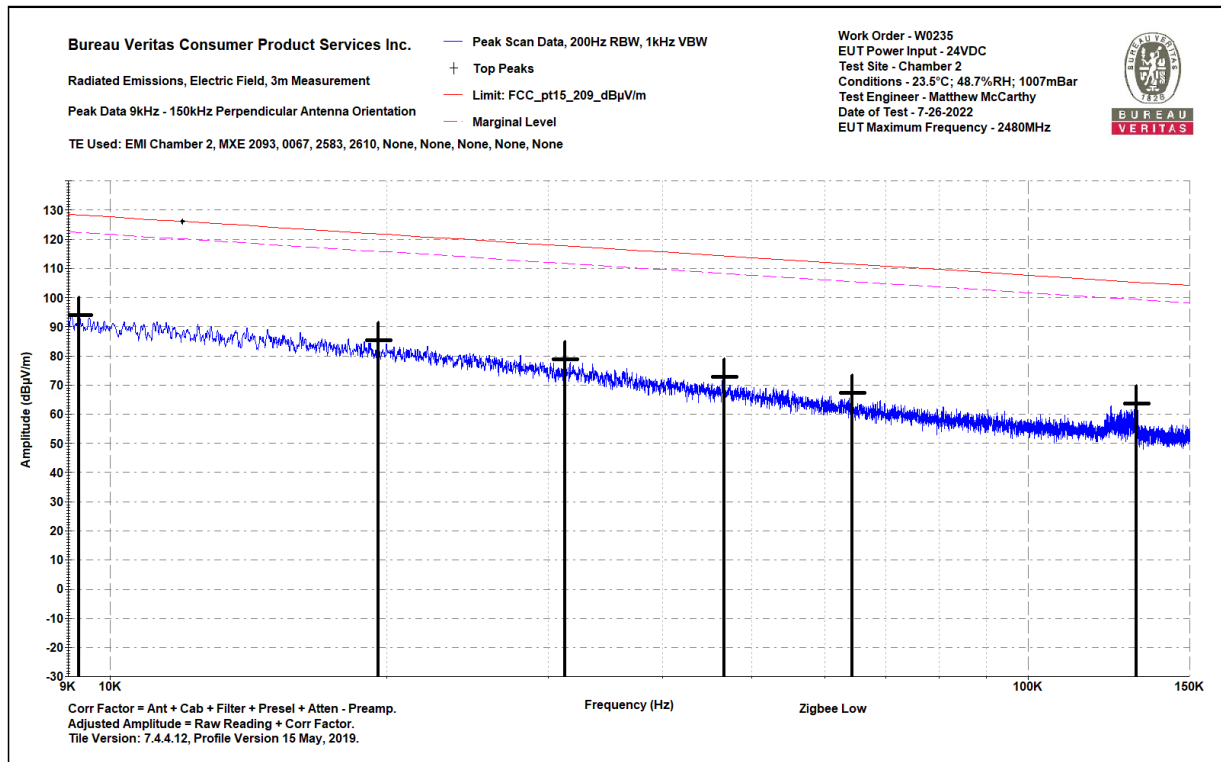


0.009-0.15MHz Parallel

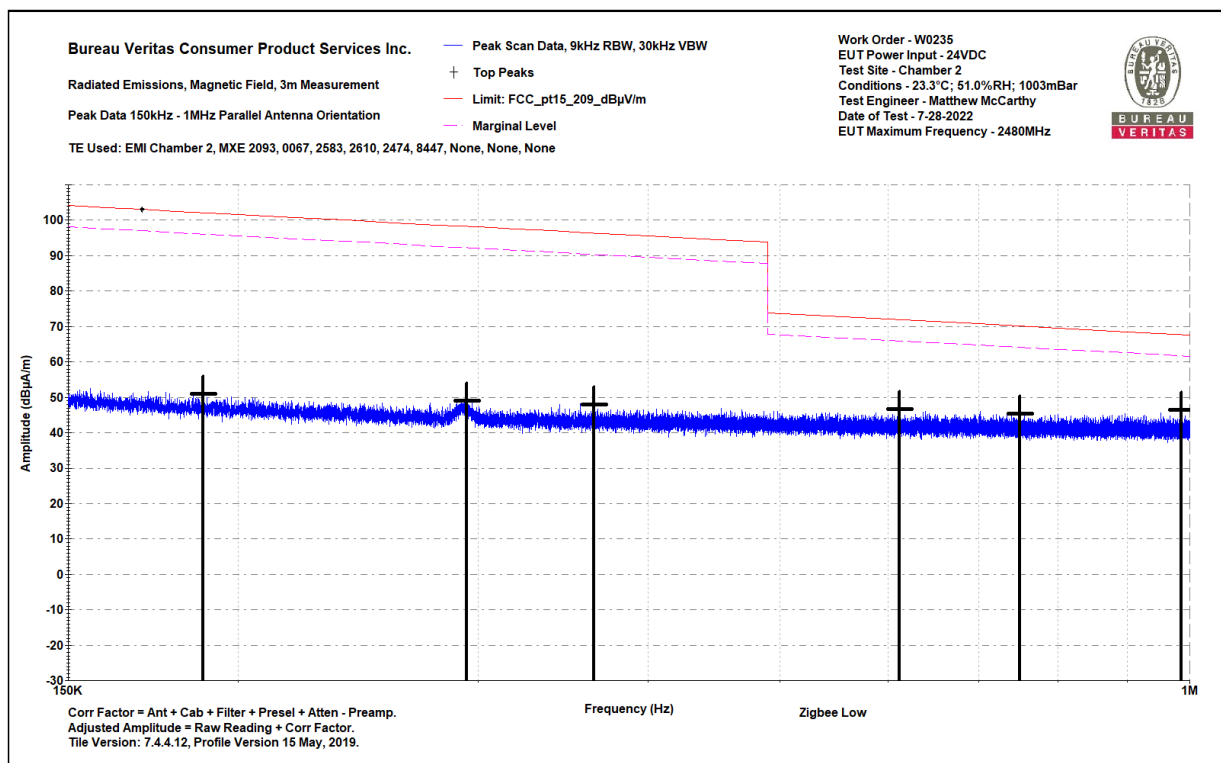


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Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5



0.009-0.15MHz Perpendicular



0.15-1MHz Parallel

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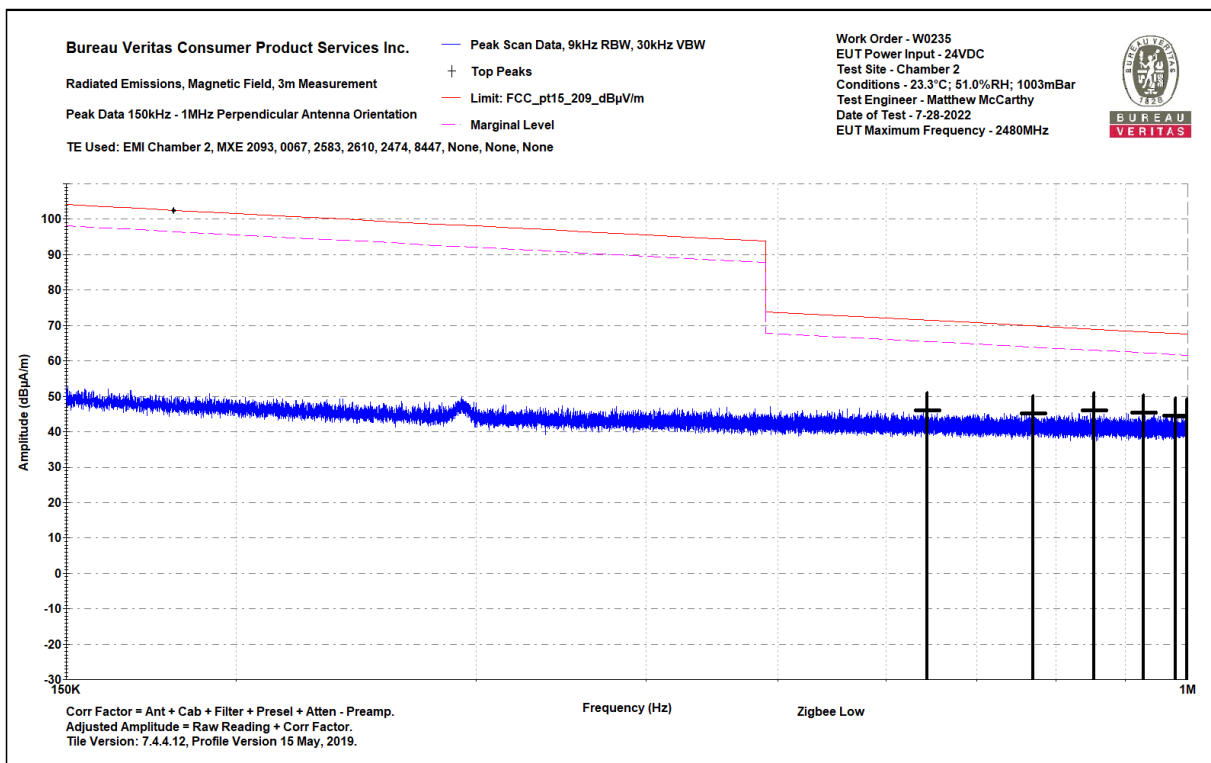
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Littleton, MA

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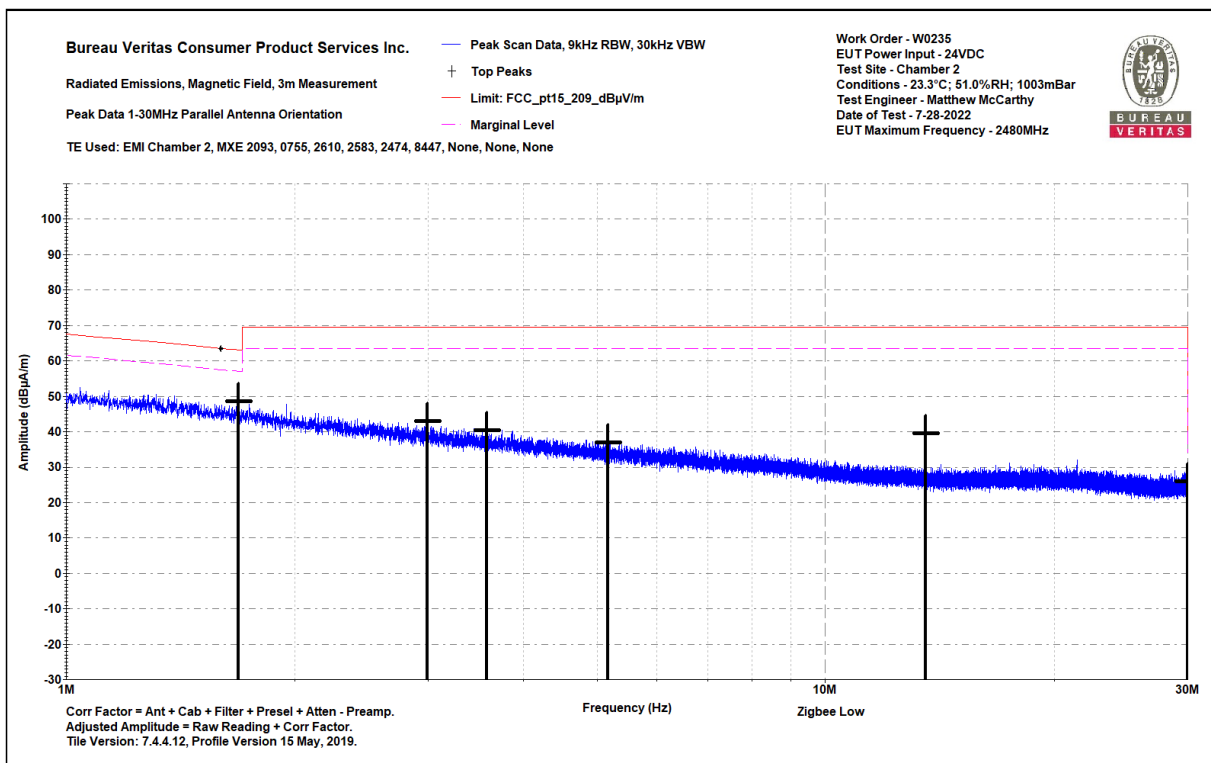


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0.15-1MHz Perpendicular



1-30MHz Parallel

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Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

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Radiated Emissions, Magnetic Field, 3m Measurement

Peak Data 1-30MHz Perpendicular Antenna Orientation

TE Used: EMI Chamber 2, MXE 2093, 0755, 2610, 2583, 2474, 8447, None, None, None

Peak Scan Data, 9kHz RBW, 30kHz VBW

+ Top Peaks

Limit: FCC_pt15_209_dBμV/m

Marginal Level

Work Order - W0235

EUT Power Input - 24VDC

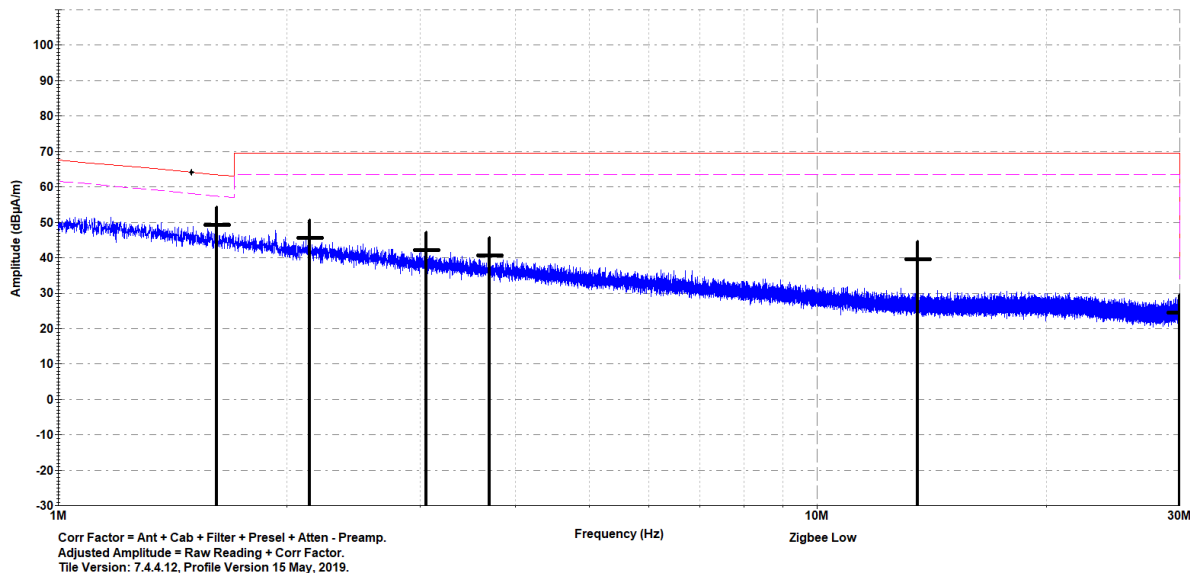
Test Site - Chamber 2

Conditions - 23.3°C; 51.0%RH; 1003mBar

Test Engineer - Matthew McCarthy

Date of Test - 7-28-2022

EUT Maximum Frequency - 2480MHz



1-30MHz Perpendicular

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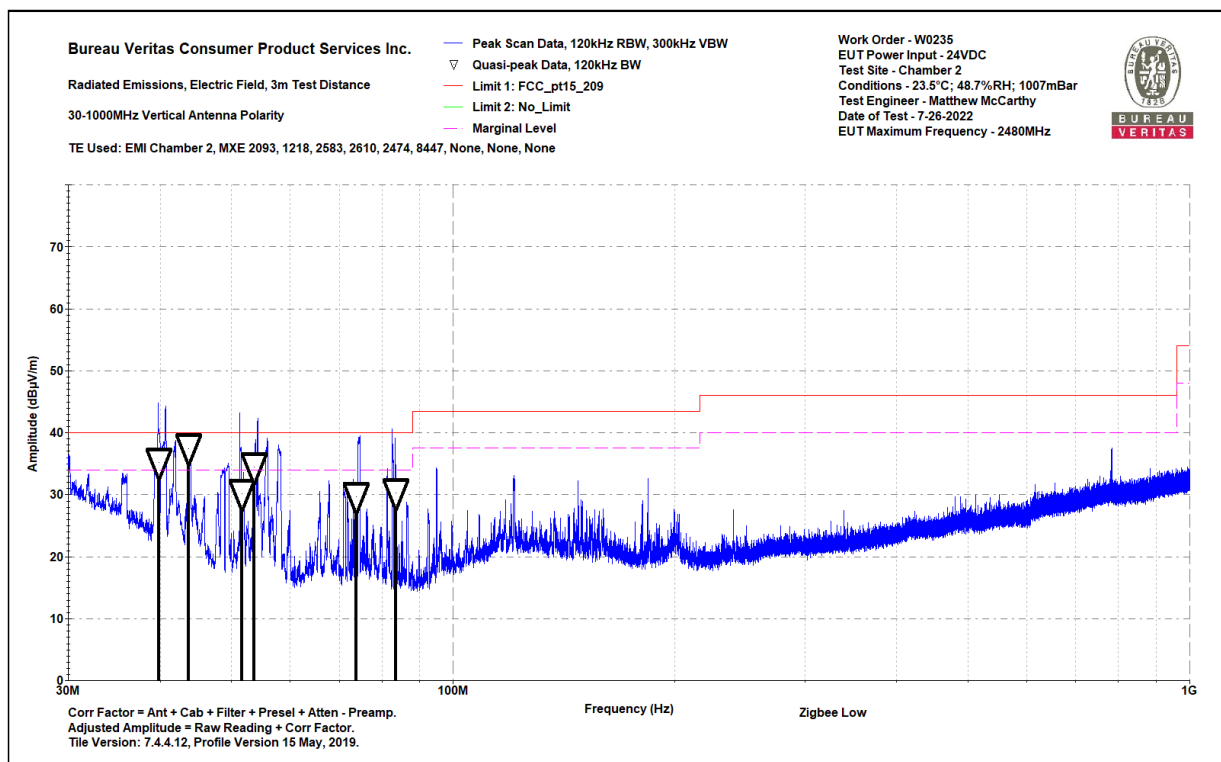
Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
30-1000MHz Vertical Data
Notes:
Zigbee Low
0

Work Order - W0235
EUT Power Input - 24VDC
Test Site - Chamber 2
Conditions - 23.5°C; 48.7%RH; 1007mBar
Test Engineer - Matthew McCarthy
Date of Test - 7-26-2022

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_209 (dBµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: No_Limit (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
39.795	40.8	-5.6	35.2	40	-4.8	PASS		200	-164.8	PASS		118	10
43.764	45.7	-8.2	37.5	40	-2.5	PASS	-2.5	200	-162.5	PASS	-162.5	108	25
51.673	41.9	-11.7	30.2	40	-9.8	PASS		200	-169.8	PASS		175	65
53.633	46.5	-12.1	34.4	40	-5.6	PASS		200	-165.6	PASS		125	294
73.881	41.2	-11.6	29.6	40	-10.4	PASS		200	-170.4	PASS		216	25
83.506	42.3	-12.1	30.3	40	-9.7	PASS		200	-169.7	PASS		157	18

30-1000MHz Vertical



30-1000MHz Vertical



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Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

Bureau Veritas Consumer Product Services Inc.

Radiated Emissions Electric Field 3m Distance

30-1000MHz Horizontal Data

Notes:

Zigbee Low

0

Work Order - W0235

EUT Power Input - 24VDC

Test Site - Chamber 2

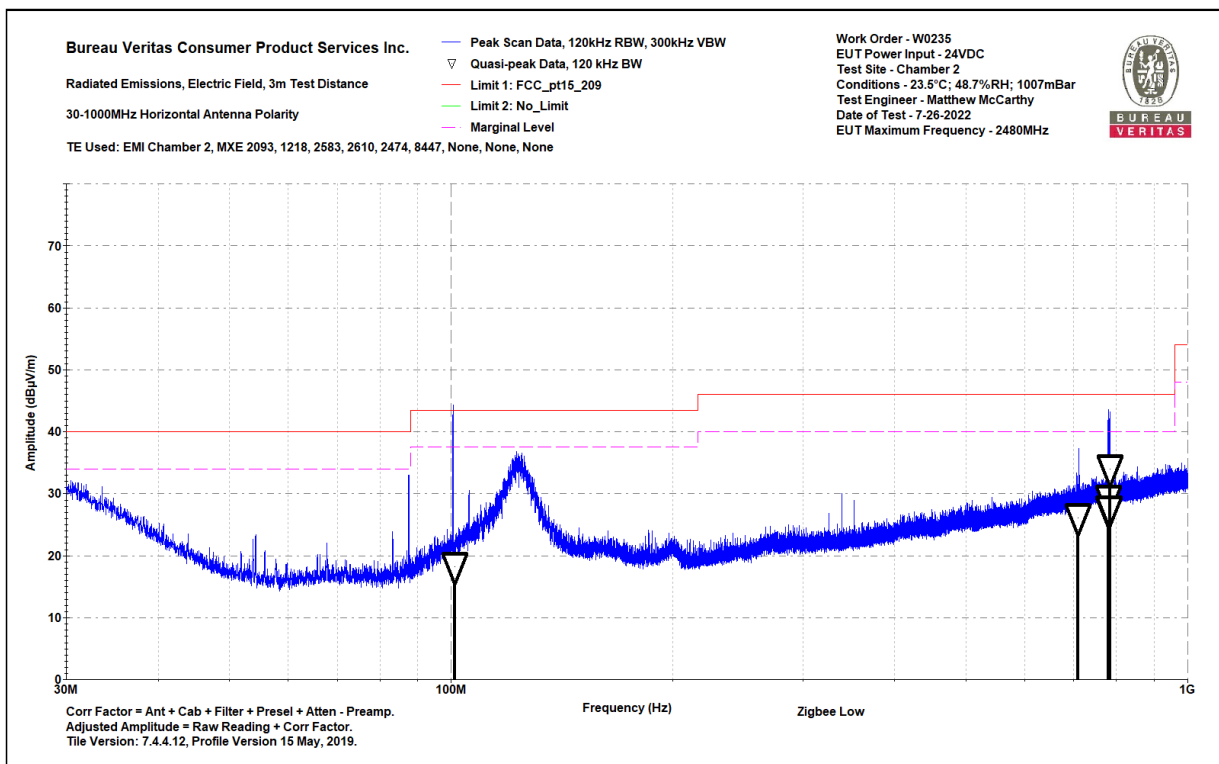
Conditions - 23.5°C; 48.7%RH; 1007mBar

Test Engineer - Matthew McCarthy

Date of Test - 7-26-2022

Frequency (MHz)	Raw QP Reading (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_20 9 (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: No_Limit (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
101.212	27.3	-9.1	18.2	43.5	-25.3	PASS		200	-181.8	PASS		223	296
709.925	24.2	2	26.1	46	-19.9	PASS		200	-173.9	PASS		225	69
779.726	25.6	3.4	29	46	-17	PASS		200	-171	PASS		110	45
779.958	23.8	3.4	27.3	46	-18.7	PASS		200	-172.7	PASS		104	20
782.301	24	3.4	27.4	46	-18.6	PASS		200	-172.6	PASS		193	32
785.381	30.6	3.3	33.9	46	-12.1	PASS	-12.1	200	-166.1	PASS	-166.1	147	296

30-1000MHz Horizontal



30-1000MHz Horizontal

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Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

Results for Zigbee 250Kbps O-QPSK Channel 19

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
30-1000MHz Vertical Data

Notes:

Zigbee Mid

0

Work Order - W0235

EUT Power Input - 24VDC

Test Site - Chamber 2

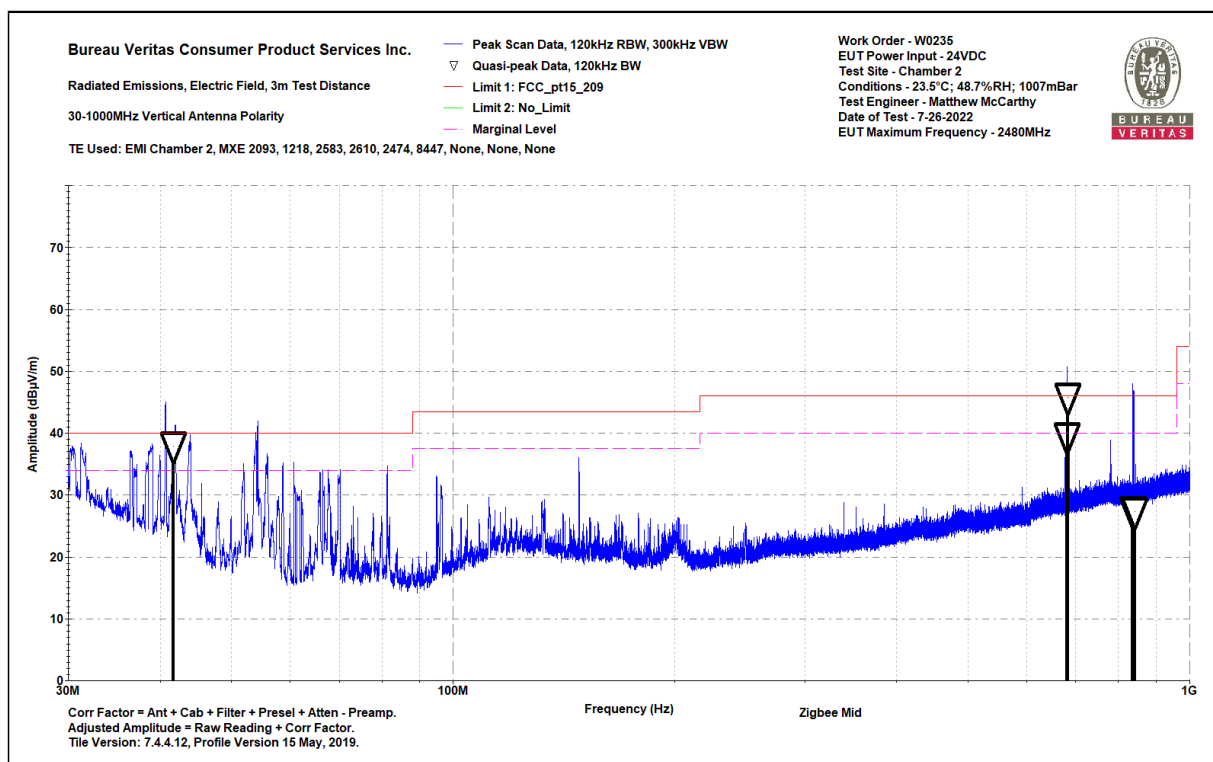
Conditions - 23.5°C; 48.7%RH; 1007mBar

Test Engineer - Matthew McCarthy

Date of Test - 7-26-2022

Frequency (MHz)	Raw QP Reading (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_20 9 (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: No_Limit (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
41.673	44.8	-6.9	37.9	40	-2.1	PASS		200	-162.1	PASS		113	245
681.612	38	1.4	39.4	46	-6.6	PASS		200	-160.6	PASS		136	25
682.978	44.5	1.4	45.8	46	-0.2	PASS	-0.2	200	-154.2	PASS	-154.2	214	13
836.264	23.5	3.8	27.4	46	-18.6	PASS		200	-172.6	PASS		131	86
839.474	23.5	3.8	27.3	46	-18.7	PASS		200	-172.7	PASS		149	155
841.729	23.5	3.8	27.3	46	-18.7	PASS		200	-172.7	PASS		141	178

30-1000MHz Vertical



30-1000MHz Vertical

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Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

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Radiated Emissions Electric Field 3m Distance

30-1000MHz Horizontal Data

Notes:

Zigbee Mid

0

Work Order - W0235

EUT Power Input - 24VDC

Test Site - Chamber 2

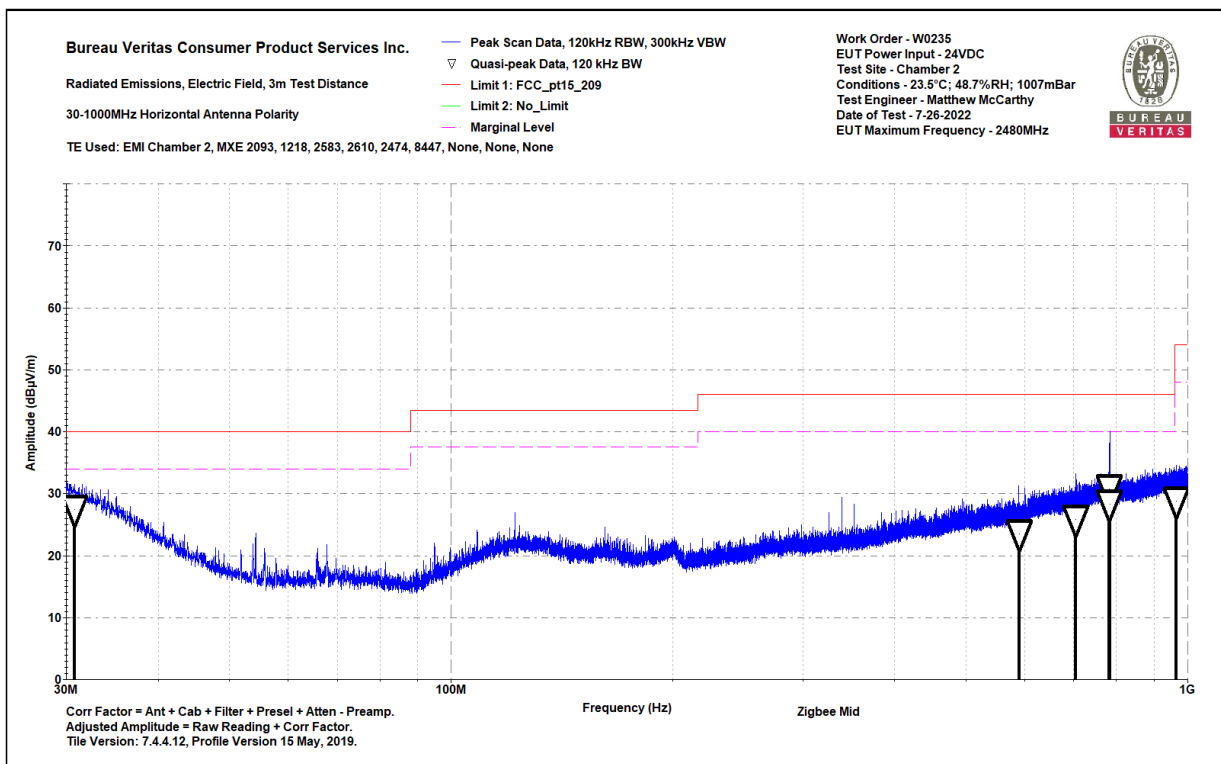
Conditions - 23.5°C; 48.7%RH; 1007mBar

Test Engineer - Matthew McCarthy

Date of Test - 7-26-2022

Frequency (MHz)	Raw QP Reading (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_209 (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: No_Limit (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.796	26.1	1.3	27.5	40	-12.5	PASS	-12.5	200	-172.5	PASS		105	110
590.367	23.7	-0.2	23.5	46	-22.5	PASS		200	-176.5	PASS		169	78
705.406	24.1	1.8	25.9	46	-20.1	PASS		200	-174.1	PASS		157	20
781.897	27.4	3.4	30.8	46	-15.2	PASS		200	-169.2	PASS	-169.2	112	155
783.501	25	3.3	28.3	46	-17.7	PASS		200	-171.7	PASS		108	202
964.122	23	5.8	28.8	54	-25.2	PASS		200	-171.2	PASS		168	25

30-1000MHz Horizontal



30-1000MHz Horizontal

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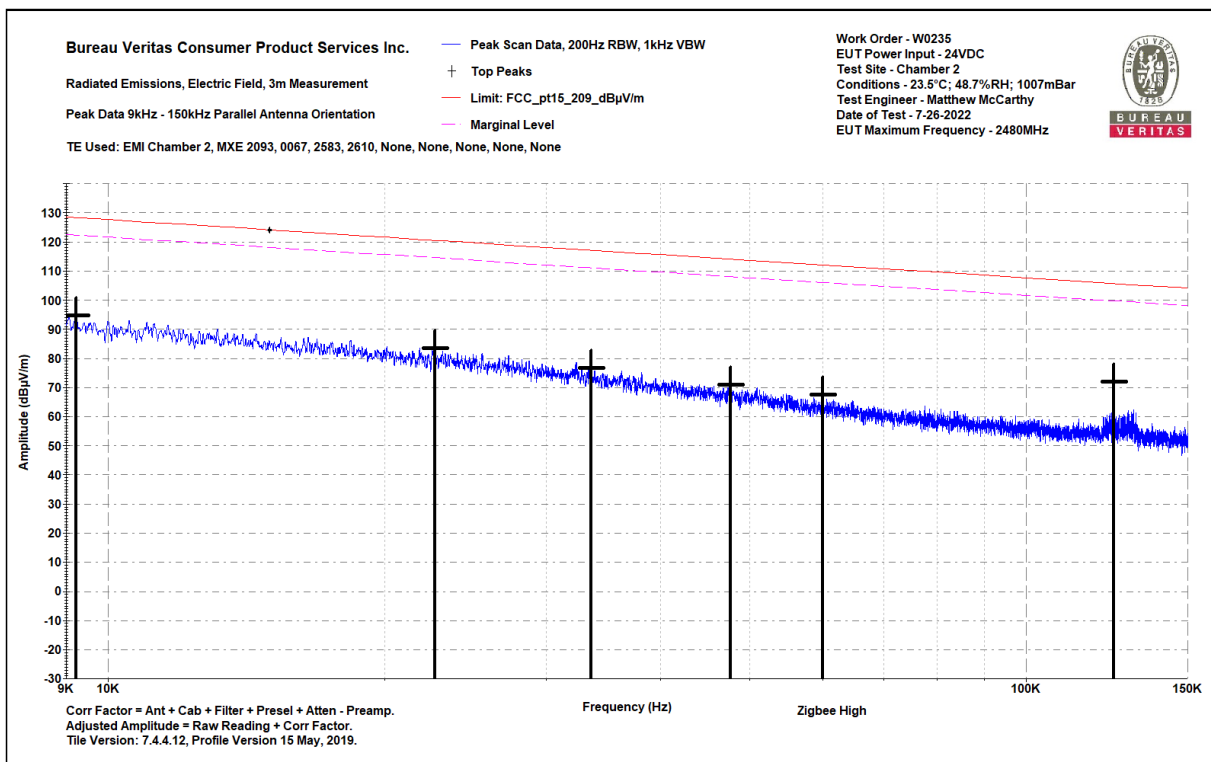


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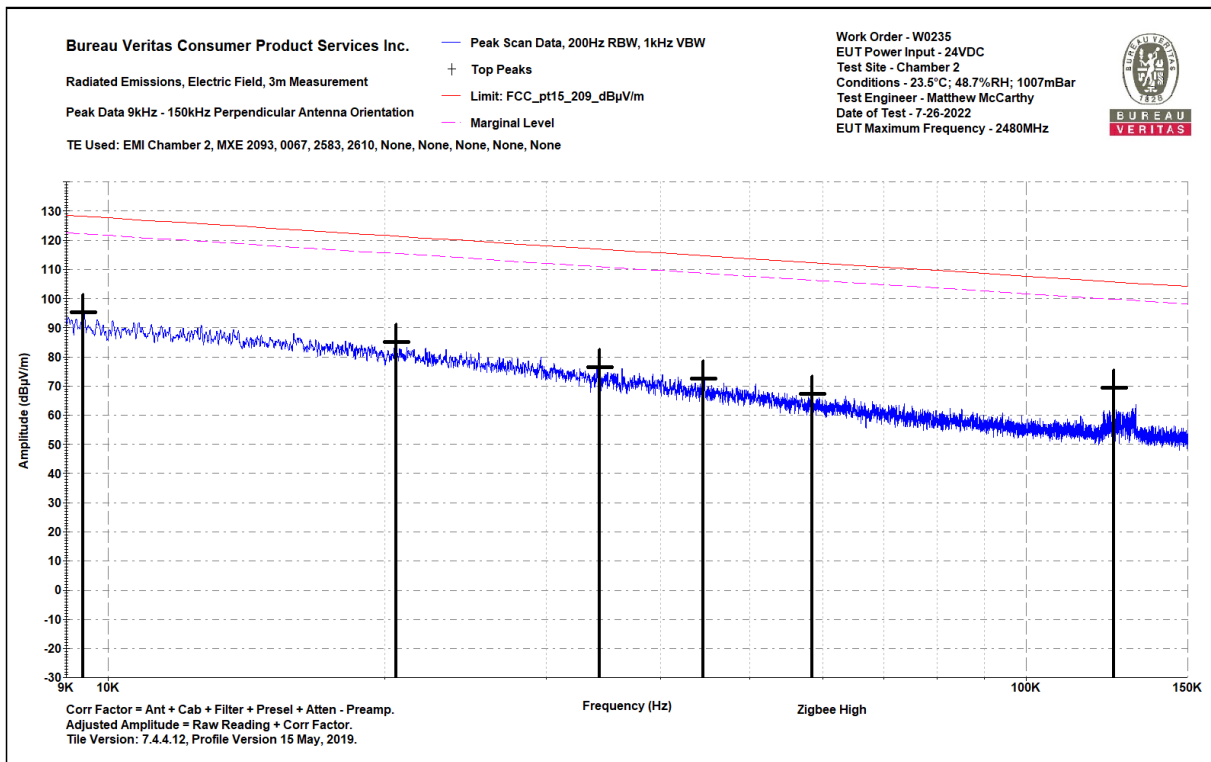
Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

Results for Zigbee 250Kbps O-QPSK Channel 26

No emissions within 10dB of the limit were identified in 9kHz-30MHz range. Only plots shown below.



0.009-0.15MHz Parallel



0.009-0.15MHz Perpendicular

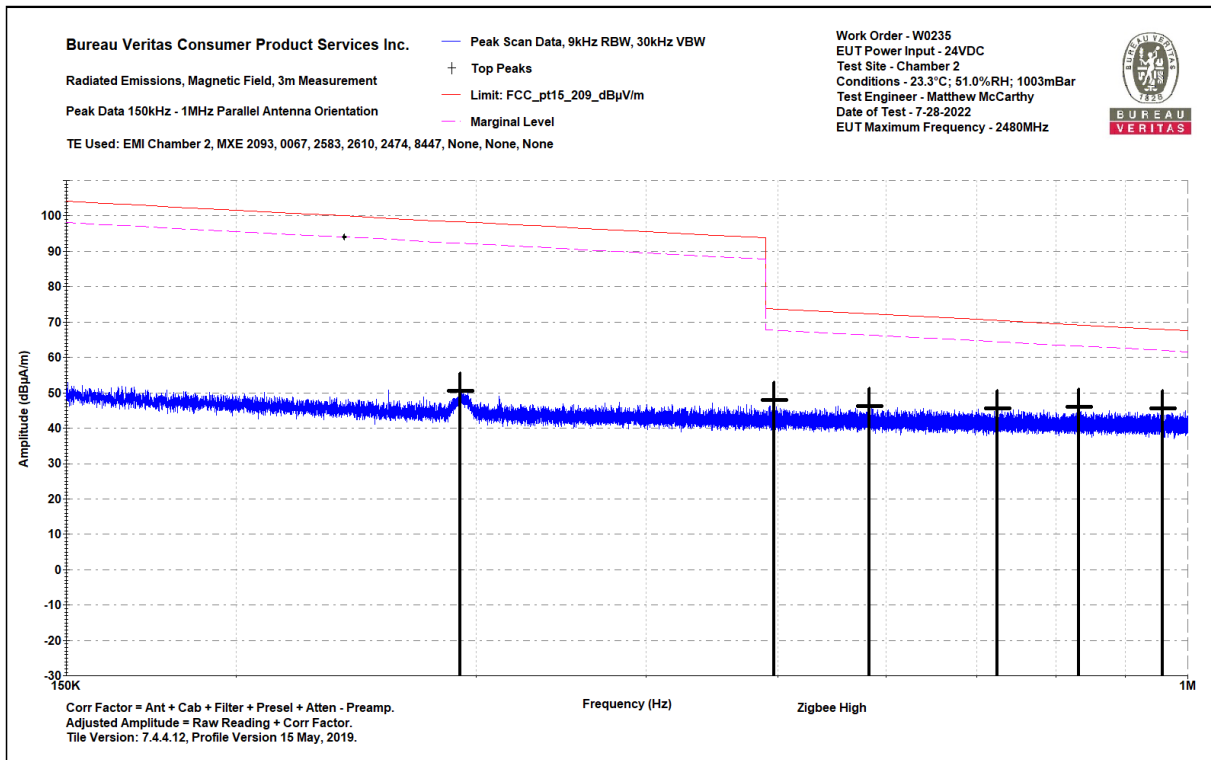
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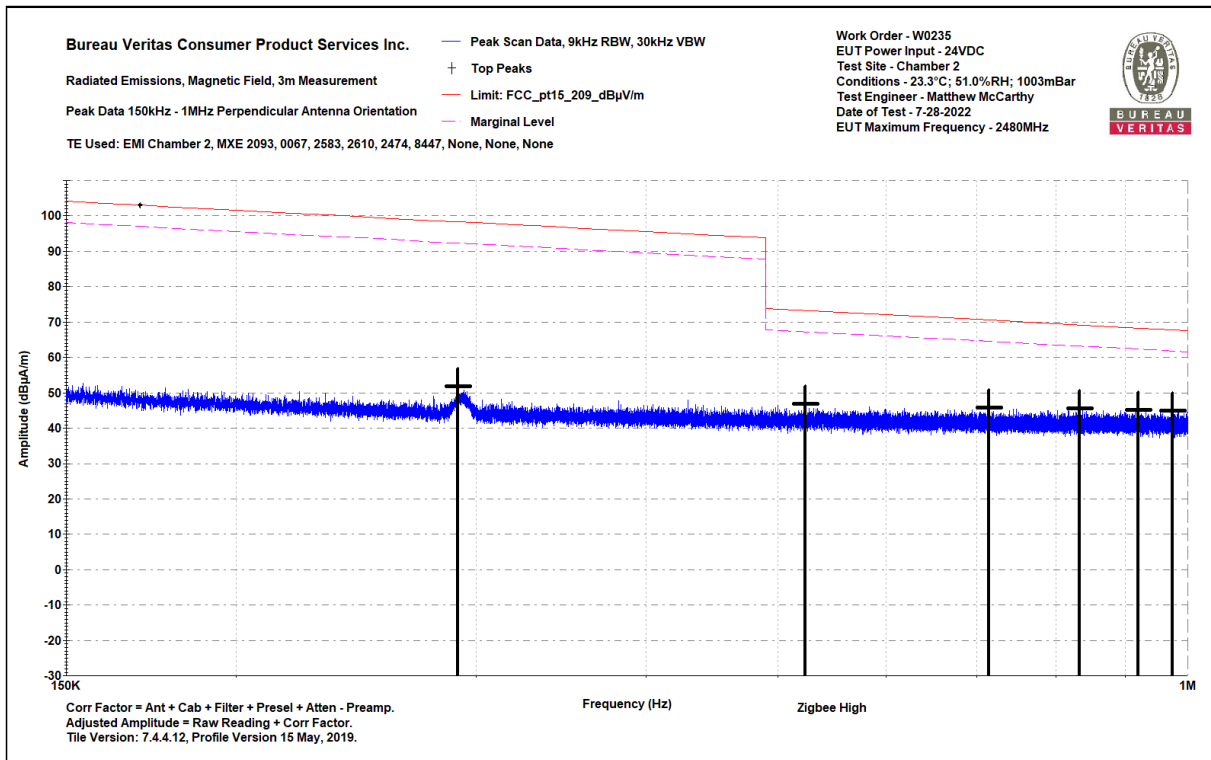
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Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5



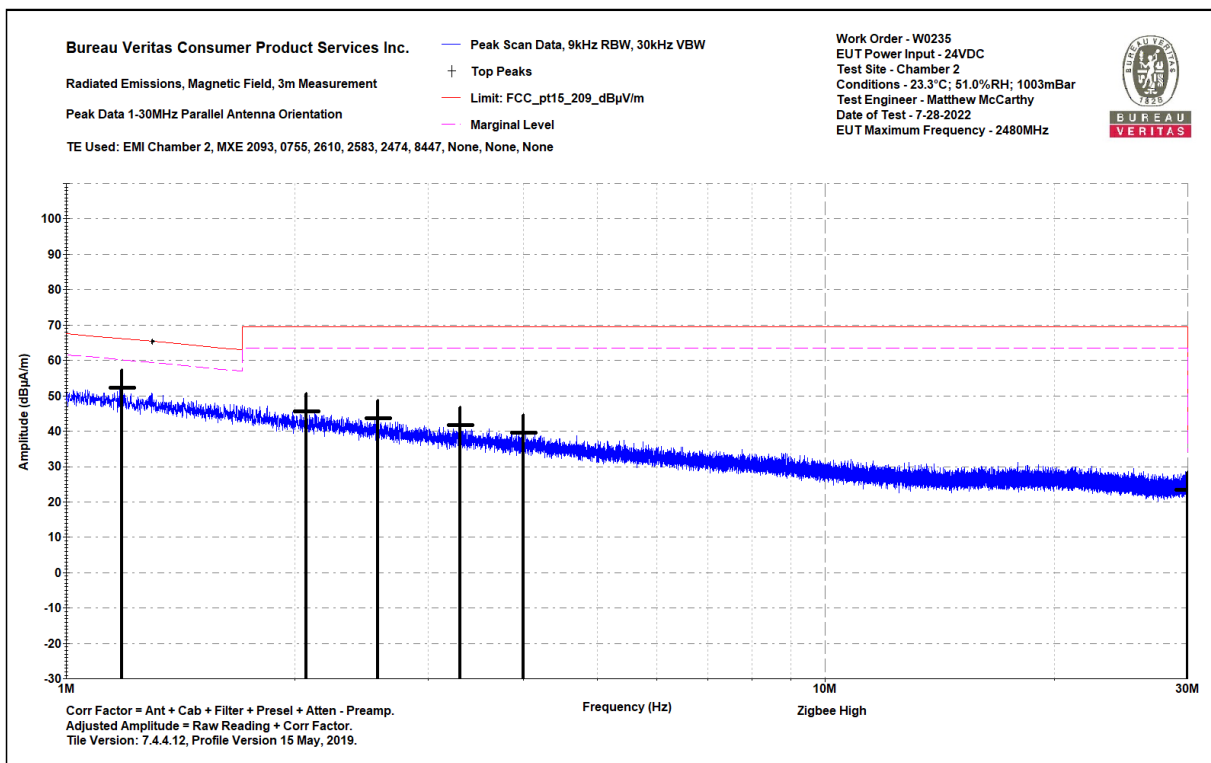
0.15-1MHz Parallel



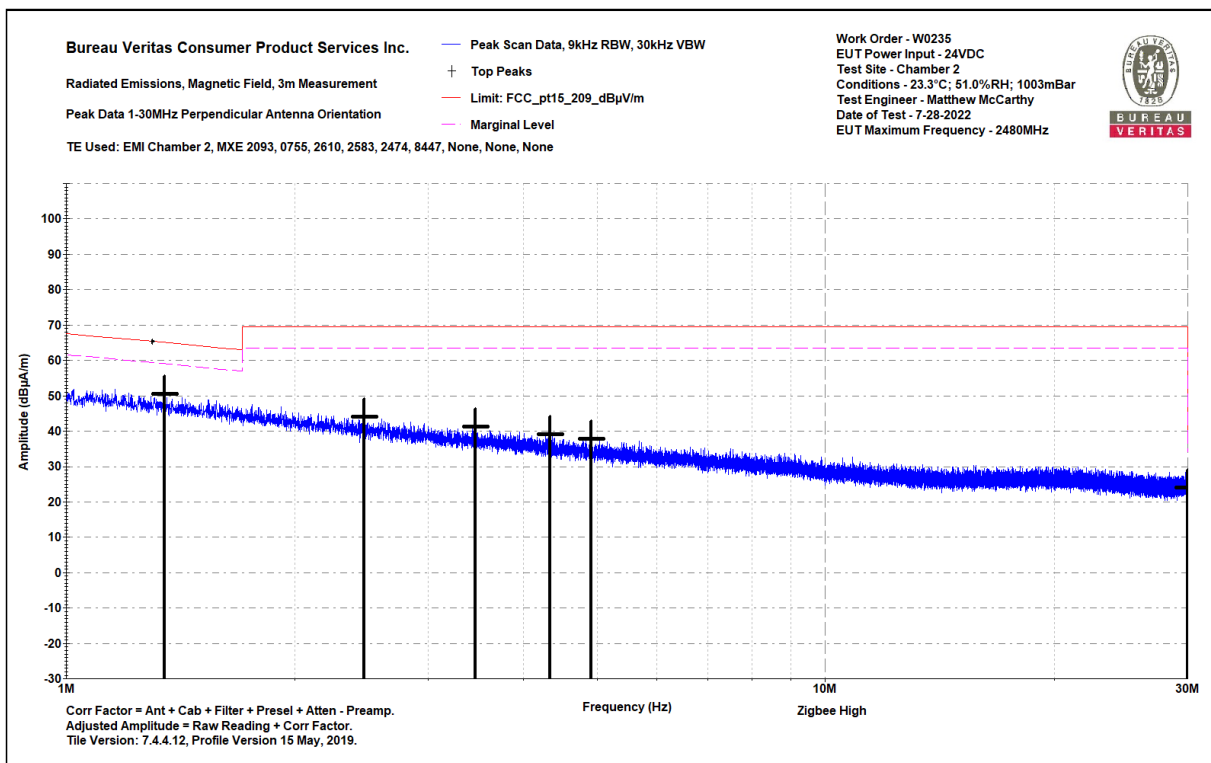
0.15-1MHz Perpendicular



Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5



1-30MHz Parallel



1-30MHz Perpendicular

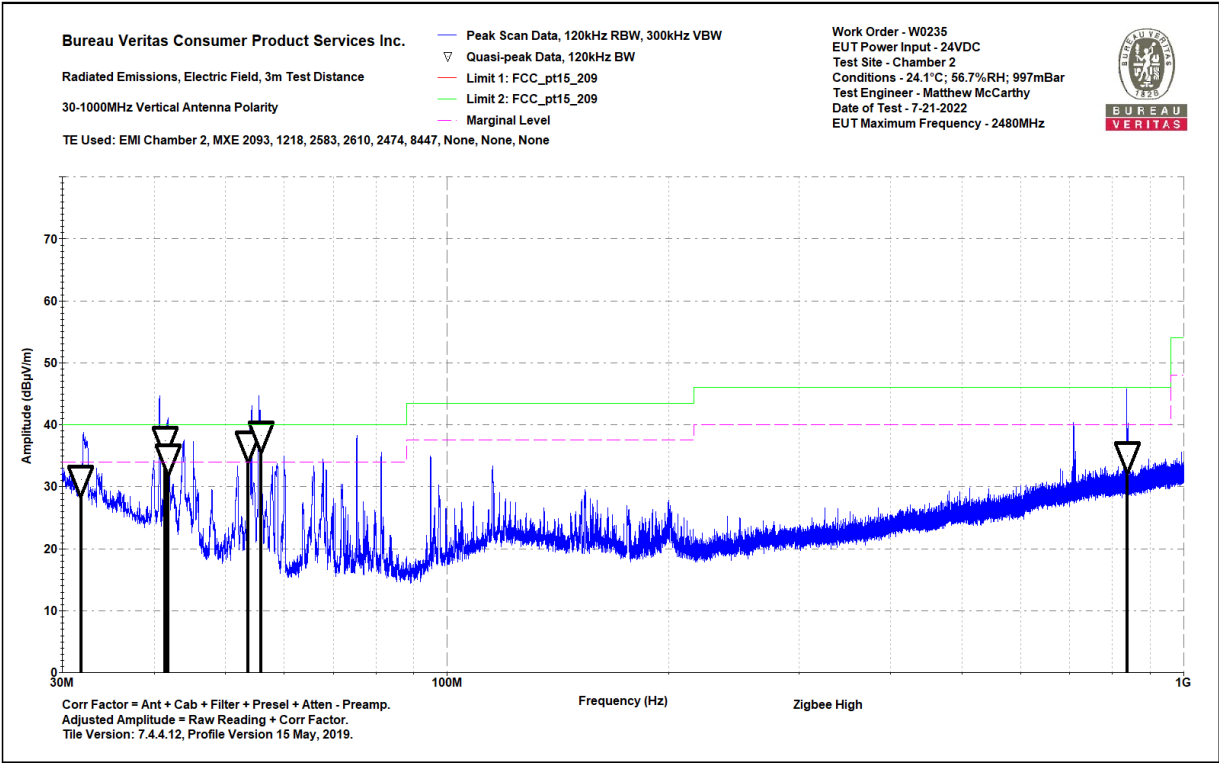


Test Report for Hanchett Entry Systems, Inc.
Report No. EW0235-4 Issue 5

Bureau Veritas Consumer Product Services Inc.	Work Order - W0235
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 24VDC
30-1000MHz Vertical Data	Test Site - Chamber 2
Notes:	Conditions - 24.1°C; 56.7%RH; 997mBar
Zigbee High	Test Engineer - Matthew McCarthy
0	Date of Test - 7-21-2022

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_20 9 (dBµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_20 9 (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
31.806	30.6	0.6	31.2	40	-8.8	PASS		40	-8.8	PASS		116	20
41.406	44.1	-6.7	37.4	40	-2.6	PASS		40	-2.6	PASS		125	200
41.775	41.5	-6.9	34.6	40	-5.4	PASS		40	-5.4	PASS		203	12
53.717	48.8	-12.1	36.7	40	-3.3	PASS		40	-3.3	PASS		125	201
55.93	50.5	-12.2	38.3	40	-1.7	PASS	-1.7	40	-1.7	PASS	-1.7	175	107
837.771	31.1	3.8	34.9	46	-11.1	PASS		46	-11.1	PASS		125	72

30-1000MHz Vertical



30-1000MHz Vertical



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Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

Bureau Veritas Consumer Product Services Inc.

Radiated Emissions Electric Field 3m Distance

30-1000MHz Horizontal Data

Notes:

Zigbee High

0

Work Order - W0235

EUT Power Input - 24VDC

Test Site - Chamber 2

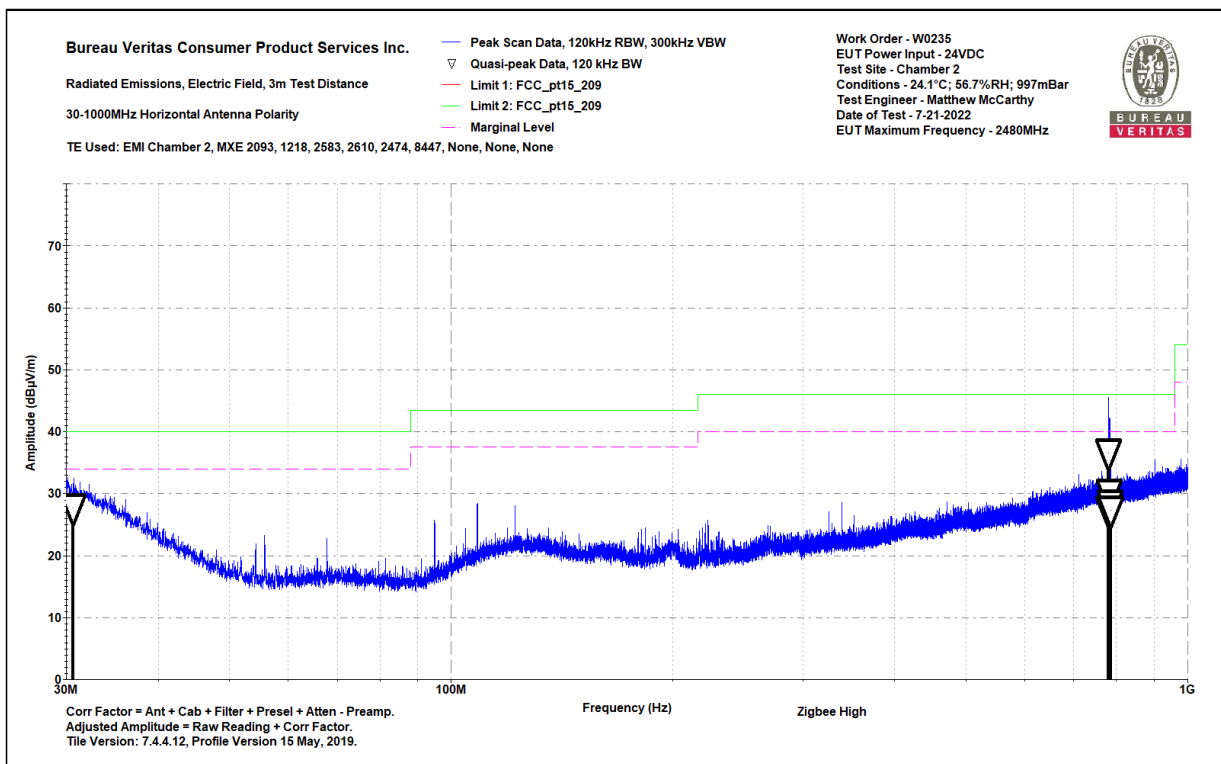
Conditions - 24.1°C; 56.7%RH; 997mBar

Test Engineer - Matthew McCarthy

Date of Test - 7-21-2022

Frequency (MHz)	Raw QP Reading (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_20 9 (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_20 9 (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.679	26.2	1.4	27.7	40	-12.3	PASS		40	-12.3	PASS		137	210
779.995	23.8	3.4	27.3	46	-18.7	PASS		46	-18.7	PASS		167	110
780.05	33.1	3.4	36.6	46	-9.4	PASS	-9.4	46	-9.4	PASS	-9.4	104	299
783.442	26.7	3.3	30	46	-16	PASS		46	-16	PASS		118	304
784.527	25.1	3.3	28.4	46	-17.6	PASS		46	-17.6	PASS		175	315
786.101	24	3.3	27.3	46	-18.7	PASS		46	-18.7	PASS		245	338

30-1000MHz Horizontal



30-1000MHz Horizontal

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Test Report for Hanchett Entry Systems, Inc. Report No. EW0235-4 Issue 5

Emissions above 1GHz

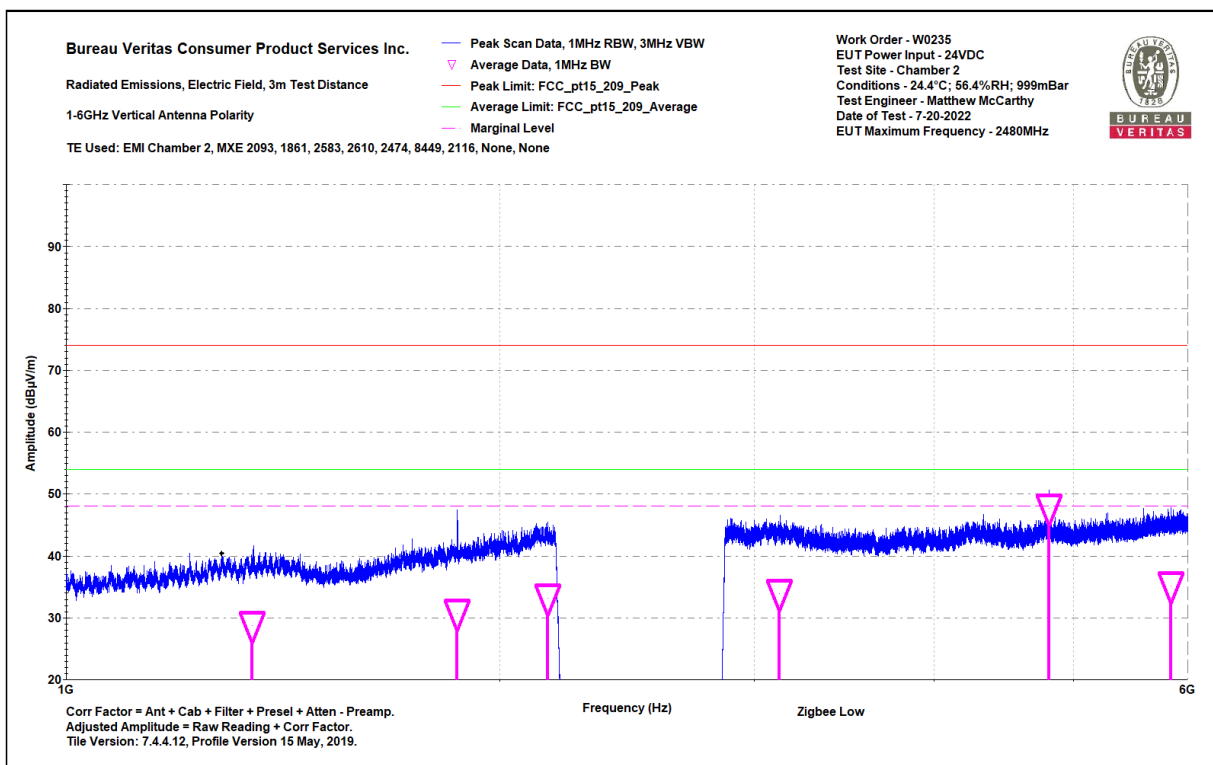
Results for Zigbee 250Kbps O-QPSK Channel 11

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Notes:
Zigbee Low
0

Work Order - W0235
EUT Power Input - 24VDC
Test Site - Chamber 2
Conditions - 24.4°C; 56.4%RH; 999mBar
Test Engineer - Matthew McCarthy
Date of Test - 7-20-2022

Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_20_9_Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	Av Lim: FCC_pt15_20_9_Average (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1346.6	47	36.2	-7.4	39.6	74	-34.4	PASS		28.7	54	-25.3	PASS		298	307
1868.1	44.7	34.8	-4	40.6	74	-33.4	PASS		30.7	54	-23.3	PASS		294	61
2159.3	43.6	35	-1.8	41.8	74	-32.2	PASS		33.2	54	-20.8	PASS		285	232
3125.2	42.7	34.4	-0.4	42.3	74	-31.7	PASS		34	54	-20	PASS		125	288
4810	50.2	46.8	0.8	51	74	-23	PASS	-23	47.6	54	-6.4	PASS	-6.4	103	4
5843.5	43.1	32.9	2.2	45.3	74	-28.7	PASS		35.2	54	-18.8	PASS		209	118

1-6GHz Vertical



1-6GHz Vertical

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