

Bureau Veritas Consumer Product Services, Inc.	Test Report Number:
One Distribution Center Circle #1, Littleton, MA 01460	EW0235-5 Issue 4



CFR Title 47 FCC Part 2.1091

Report Exhibit

Prepared for Hanchett Entry Systems, Inc.

This report presents the environmental impact of human exposure to radiofrequency radiation for

DR100-V3

RFID Reader Module

Prepared by

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Approved by

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Issue date: Apr 13, 2023

Report No: EW0235-5 Issue 4



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1 Device Under Test Information

1.1 Product Information

Project Number:	W0235
Applicant Information:	Hanchett Entry Systems, Inc. 10027 S. 51st Street, Suite 102 Phoenix AZ 85044
Test Item Description:	RFID Reader Module
Model Number:	DR100-V3
Hardware Version of DUT:	N/A
Software Version of DUT:	N/A
Separation Distance:	20cm
Exposure Category of DUT:	Mobile
Multiple Simultaneous RF Sources:	Yes
Type of Test:	FCC RF Exposure Exemption Evaluation
Test Method:	CFR Title 47 FCC Part 1.1307(b)(3)
Deviations from Standard:	None
Sample Receipt Date:	Jul 1, 2022
Evaluation Date:	Jan 10, 2023

1.2 Technical Information

Radio A, Zigbee	
FCC ID:	VC3-DR100V3
Exposure Category of Transmitter:	Mobile
Maximum Conducted Output Power (dBm):	3.4
Maximum Tune-up Tolerance (dB):	N/A
Maximum Antenna Gain (dBi):	2.9

Radio B, BLE – from Intertek Report No. 1516281STO-002, Ed. 1	
FCC ID:	Y88-MBM1CC2640
Exposure Category of Transmitter:	Mobile
Maximum Conducted Output Power (dBm):	-2.0
Maximum Tune-up Tolerance (dB):	N/A
Maximum Antenna Gain (dBi):	1.1

Radio C, 13.56MHz	
FCC ID:	VC3-DR100V3
Exposure Category of Transmitter:	Mobile

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Maximum radiated power (dBuV/m @ 3m):	67.9
Maximum EIRP (mW):	0.00185
Maximum Tune-up Tolerance (dB):	N/A
Maximum Antenna Gain (dBi):	N/A

Radio D, 125kHz	
FCC ID:	VC3-DR100V3
Exposure Category of Transmitter:	Mobile
Maximum radiated power (dBuV/m @ 3m):	72.4
Maximum EIRP (mW):	0.00521
Maximum Tune-up Tolerance (dB):	N/A
Maximum Antenna Gain (dBi):	N/A

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2 Test Laboratory Information

Location of Test Lab:	One Distribution Center Circle #1 Littleton, MA 01460 (978) 486-8880
Key Contact:	Yunus Faziloglu Yunus.faziloglu@bureauveritas.com
Laboratory Accreditations:	BUREAU VERITAS CONSUMER PRODUCTS SERVICES, INC is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.
ISO/IEC 17025:2017:	1627-01
FCC Test Site Number:	US1028

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3 RF Exposure – Determination of Exemption – FCC Section 1.1307(b)(3)(i)

3.1 MPE-based Exemption – 1.1307(b)(3)(i)(C)

3.1.1 Zigbee:

Prediction of MPE limit at a given distance			
Equation from page 18 of OET Bulletin 65, Edition 97-01			
$S = \frac{PG}{4\pi R^2}$			
where:	S = power density		
	P = power input to the antenna		
	G = power gain of the antenna in the direction of interest relative to an isotropic radiator		
	R = distance to the center of radiation of the antenna		
	Maximum peak output power at the antenna terminal:	3.40	(dBm)
	Maximum peak output power at the antenna terminal:	2.187761624	(mW)
	Antenna gain(typical):	2.9	(dBi)
	Maximum antenna gain:	1.9498446	(numeric)
	Prediction distance:	20	(cm)
	Prediction frequency:	2440	(MHz)
	MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
	Power density at prediction frequency:	0.000849	(mW/cm^2)
	Maximum allowable antenna gain:	33.61269855	(dBi)

3.1.2 BLE:

Prediction of MPE limit at a given distance			
Equation from page 18 of OET Bulletin 65, Edition 97-01			
$S = \frac{PG}{4\pi R^2}$			
where:	S = power density		
	P = power input to the antenna		
	G = power gain of the antenna in the direction of interest relative to an isotropic radiator		
	R = distance to the center of radiation of the antenna		
	Maximum peak output power at the antenna terminal:	-2.00	(dBm)
	Maximum peak output power at the antenna terminal:	0.630957344	(mW)
	Antenna gain(typical):	1.1	(dBi)
	Maximum antenna gain:	1.288249552	(numeric)
	Prediction distance:	20	(cm)
	Prediction frequency:	2402	(MHz)
	MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
	Power density at prediction frequency:	0.000162	(mW/cm^2)
	Maximum allowable antenna gain:	39.01269855	(dBi)

3.1.3 13.56MHz RFID

Per 447498 D01 General RF Exposure Guidance v06 Section 4.3.1. Steps (a), (b), and (c):

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For frequencies below 100 MHz and test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by $[1 + \log(100/f(\text{MHz}))]$. The power threshold at the corresponding test separation distance at 100 MHz in step b) is obtained from Appendix B at 190mm as 567mW.

Power threshold at 13.56MHz can be calculated as:

$$567(1+\log(100/13.56)) = 1059\text{mW}$$

EIRP for 13.56MHz RFID is 0.00185mW and therefore exempt from routine evaluation.

3.1.4 125kHz RFID

Per 447498 D01 General RF Exposure Guidance v06 Section 4.3.1. Steps (a), (b), and (c):

For frequencies below 100 MHz and test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by $[1 + \log(100/f(\text{MHz}))]$.

The power threshold at the corresponding test separation distance at 100 MHz in step b) is obtained from Appendix B at 190mm as 567mW.

Power threshold at 0.125MHz can be calculated as:

$$567(1+\log(100/0.125)) = 2213\text{mW}$$

EIRP for 125kHz RFID is 0.00521mW and therefore exempt from routine evaluation.

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4 Multiple Simultaneous RF Exposure – FCC Section 1.1307(b)(3)(ii)

4.1 Multiple RF Source Total Exposure Ratio Exemption – 1.1307(b)(3)(ii)(B)

There are 2 simultaneous transmission configurations in the product.

Configuration 1: Zigbee + BLE + 13.56MHz RFID

Configuration 2: Zigbee + BLE + 125kHz RFID

Per, 447498 D01 General RF Exposure Guidance v06, Section 7.2:

“Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 , according to calculated/estimated, numerically modeled, or measured field strengths or power density.”

Calculation / Limit Ratio for each radio:

Radio	Calculation	Limit	Calculation / Limit Ratio
Zigbee	0.000849 mW/cm ²	1 mW/cm ²	0.000849
BLE	0.000162 mW/cm ²	1 mW/cm ²	0.000162
13.56MHz RFID	0.00185 mW	1059 mW	0.00000175
125kHz RFID	0.00521 mW	2213 mW	0.00000235

Sum of Calculation / Limit Ratios for each simultaneous transmission configuration:

	Configuration 1	Configuration 2
	Calculation / Limit Ratio	Calculation / Limit Ratio
Zigbee	0.000849	0.000849
BLE	0.000162	0.000162
13.56MHz RFID	0.00000175	Not active
125kHz RFID	Not active	0.00000235
Sum	0.00101275	0.00101335
Limit	1	1
Verdict	PASS	PASS

4.1.1 Conclusion

The DR100-V3 manufactured by Hanchett Entry Systems, Inc. meets the exemption criteria for the environmental impact of human exposure to radiofrequency radiation using the calculations performed herein.

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Document Revisions

Issue No.	Summary of Changes	Date Issued	Prepared by	Approved by
1	Original Release	Jan 12, 2023	HX	YF
2	To address TCB comments: Addition of RFID radios to exemption calculations	Mar 16, 2023	RMB	YF
3	To address TCB comments: RFID radio exemption calculations modified to follow KDB 447498 D01 v06 Sections 4.3.1. Steps (a), (b), and (c).	Apr 3, 2023	RMB	YF
4	To address TCB comments: Zigbee antenna gain and calculations updated	Apr 13, 2023	RMB	YF

End of Report