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# Dormakaba USA Inc. MPE REPORT

**SCOPE OF WORK**  
MPE CALCULATION  
ON THE WXC

**REPORT NUMBER**  
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## MPE TEST REPORT

**Report Number:** 104352999LEX-003b

**Project Number:** G104352999

**Report Issue Date:** 6/22/2020

**Product Name:** WXC

**Standards:** FCC Part 1.1310 Limits for Maximum  
Permissible Exposure (MPE)

RSS-102 Issue 5 RF Field Strength Limits for  
Devices Used by the General Public

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Client:  
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## 1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

## 2 Test Summary

Section	Test full name	Result
9	FCC Part 1.1310 Limits for Maximum Permissible Exposure (MPE) (Limits for General Population / Uncontrolled Exposure)	Pass
	RSS-102 Issue 5 RF Field Strength Limits (For Devices Used by the General Public)	Pass



### 3 Client Information

This product was tested at the request of the following:

Client Information	
<b>Client Name:</b>	Dormakaba USA Inc.
<b>Address:</b>	6161 E. 75th Street Indianapolis, IN 46250 USA
<b>Contact:</b>	Robert Strong
<b>Telephone:</b>	317-806-3288
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Manufacturer Information	
<b>Manufacturer Name:</b>	Dormakaba USA Inc.
<b>Manufacturer Address:</b>	6161 E. 75th Street Indianapolis, IN 46250 USA



#### 4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	WXC
Model Number	WXC
Receive Date	6/8/2020
Test Start Date	6/8/2020
Test End Date	6/11/2020
Device Received Condition	Good
Test Sample Type	Production
Rated Voltage	6VDC
Description of Equipment Under Test (provided by client)	
The WDC is a door lock that can be unlocked using RFID and Bluetooth technology.	

Radios in the EUT			
Manufacturer	FCCID	TX Band	Transmission Type
HID	JQ6-SE3210	125kHz	RFID Module
HID	JQ6-SE3210	13.56MHz	RFID Module
HID	JQ6-XTENDER	2402-2480MHz	Bluetooth Module
Dormakaba	WEF-WXC	2405-2475MHz	Wireless door controller (Non-modular 'zigbee like')

##### 4.1 Variant Models:

There were no variant models covered by this evaluation.



## 5 Output Power:

Taken from the MPE reports from each of the transmitters.

Transmitter	Frequency	Power (dBm)
RFID	13.56MHz	-15.228
Bluetooth	2402MHz	-0.08
'Zigbee like' WXC	2405MHz	13.71



5.1 EUT Photo (Front):







**5.2 EUT Photo (Back):**





## 6 FCC Limits

§ 1.1310: The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

### Part 1.1310 Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30–300 .....	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

**7 RSS-102 Issue 5 Exposure Limits:**

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m <sup>2</sup> )	Reference Period (minutes)
0.003-10 <sup>21</sup>	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> <sup>0.5</sup>	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	58.07/ <i>f</i> <sup>0.25</sup>	0.1540/ <i>f</i> <sup>0.25</sup>	8.944/ <i>f</i> <sup>0.5</sup>	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> <sup>0.3417</sup>	0.008335 <i>f</i> <sup>0.3417</sup>	0.02619 <i>f</i> <sup>0.6834</sup>	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> <sup>1.2</sup>
150000-300000	0.158 <i>f</i> <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> <i>f</i>	616000/ <i>f</i> <sup>1.2</sup>

**Note:** *f* is frequency in MHz.  
\* Based on nerve stimulation (NS).  
\*\* Based on specific absorption rate (SAR).



## 8 Test Procedure

An MPE evaluation for was performed in order to show that the device was compliant with the general population exposure limits from FCC §2.1091 and RSS-102 Issue 5. The maximum power density was calculated for each transmitter band at a separation distance of 20cm using the maximum declared output power including tune up tolerance.

For each transmitter the maximum RF exposure at a 20 cm distance using the formula:

$$\text{ConductedPower}_{mW} = 10^{\text{ConductedPower}(dBm)/10}$$

$$\text{PowerDensity} = \frac{\text{ConductedPower}_{mW} \times \text{Ant.Gain}}{4\pi \times (20_{cm})^2}$$

For transmitters that could operate simultaneously, the MPE to limit ratio for each was calculated and then summed. If the sum of the MPE to limit ratios was less than 1, that specific combination of transmitters was deemed to comply.



## 9 Results:

The calculated maximum power density at 20cm distance was equal to or less than the required limits for general population exposure for FCC Part 1.1310, and RSS-102 Issue 5.

**FCC MPE Data**

Duty Cycle		100 (%)						
Separation Dist.		20 (cm)						
Operating Mode	Frequency (MHz)	Declared Max Cond. Power (Inc. Tolerance) (dBm)	Duty Cycle Adjusted Cond. Output Power (dBm)	Antenna Gain (dB)	MPE Value (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )	Margin to Limit (mW/cm <sup>2</sup> )	MPE / Limit Ratio (for Co-Location)
Bluetooth	2402	-0.08	-0.08	0.1	0.0002	1.00	0.9998	0.0002
Zigbee-like	2405	13.71	13.71	5	0.0148	1.00	0.9852	0.0148
RFID	13.56	-15.228	-15.228	0	0.0000	0.98	0.9789	0.0000

Since  $0.0002 + 0.0148 + 0.0000 = 0.0150 < 1.0$  the device complies with the multiple transmitter rule.

**RSS-102 Issue 5 MPE Data**

Duty Cycle		100 (%)						
Separation Dist.		20 (cm)						
Operating Mode	Frequency (MHz)	Declared Max Cond. Power (Inc. Tolerance) (dBm)	Duty Cycle Adjusted Cond. Output Power (dBm)	Antenna Gain (dB)	MPE Value (W/m <sup>2</sup> )	MPE Limit (W/m <sup>2</sup> )	Margin to Limit (W/m <sup>2</sup> )	MPE / Limit Ratio (for Co-Location)
Bluetooth	2402	-0.08	-0.08	0.1	0.0020	5.35	5.3488	0.000374
Zigbee-like	2405	13.71	13.71	5	0.1478	5.36	5.2076	0.027602
RFID	13.56	-15.228	-15.228	0	0.0001	2.00	1.9999	0.000030

Since  $0.000374 + 0.027602 + 0.000030 = 0.028005 < 1.0$  the device complies with the multiple transmitter rule.



### 10 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	6/22/2020	104352999LEX-003b	BN	BCT	Original Issue