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Dormakaba USA, Inc.
MPE REPORT

SCOPE OF WORK
MPE CALCULATION
ON THE KEYPAD MODEL 705, LOCK MODEL 732

REPORT NUMBER
104364418LEX-002.1

ISSUE DATE	**REVISED DATE**
7/31/2020	2/16/2021

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DOCUMENT CONTROL NUMBER
Non-Specific EMC Report Shell Rev. December 2017

MPE TEST REPORT

Report Number:	104364418LEX-002.1
Project Number:	G104364418
Report Issue Date:	7/31/2020
Report Revised Date:	2/16/2021
Product Name:	Keypad Model 705 Lock Model 732
Variant Model(s) not Tested but Declared Electrically Identical by Manufacturer:	Keypad Models 703, 704 Lock Models 731, 733
FCC Standards:	FCC Part 1.1310 Limits for Maximum Permissible Exposure (MPE)
Industry Canada Standards:	RSS-102 Issue 5

Tested by:
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Report prepared by

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MPE Calculation

§ 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^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	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.

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^2)	Reference Period (minutes)
0.003-10^{21}	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

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

1.1 Test Procedure

An MPE evaluation for was performed in order to show that the device was compliant with §2.1091 and RSS-102. The maximum power density was calculated at a separation distance of 20cm. The calculation was performed using the maximum gain from the internal antenna declared by the manufacturer.

The maximum RF exposure at a 20 cm distance using the formula:

$$ConductedPower_{mW} = 10^{ConductedPower(dBm)/10}$$

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

1.2 Antenna Gain

The antenna used was a Johanson Technology P/N 2450AT18B100. The antenna gain provided by the customer is from the datasheet. Actual values may affect compliance.

2.4GHz Mini Antenna, SMT **P/N 2450AT18B100**

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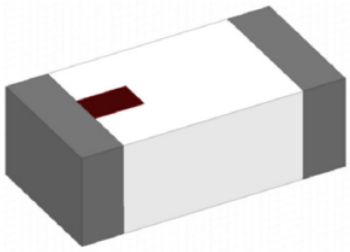
Let us help you with the antenna design, optimization, and tuning!

General Specifications	
Part Number	2450AT18B100
Frequency (MHz)	2400 - 2500
Avg. Rad Efficiency*	76%
Peak Gain (dBi typ.)	0.5
Average Gain (dBi typ.)	-0.5
Return Loss (dB)	9.5 min.
Impedance	50 Ω
Input Power	2 Watts max. (CW)



Storage Temperature	-45 to +125°C
Operating Temperature	-45 to +125°C
Recommended Storage Conditions of unused product on T&R and period.	+5 to +35°C Humidity 45~75%RH 18 months max.
Reel Quantity	3000pcs

1.3 Results (FCC):

Duty Cycle	100 (%)							
Separation Dist.	20 (cm)							
Operating Mode	Frequecy (MHz)	Declared Max Cond. Power (Inc. Tolerance) (dBm)	Duty Cycle Adjusted Cond. Output Power (dBm)	Antenna Gain (dB)	MPE Value (mW/cm^2)	MPE Limit (mW/cm^2)	Margin to Limit (mW/cm^2)	MPE / Limit Ratio (for Co-Location)
BLE	2402	-0.09	-0.09	0.5	0.0002	1.00	0.9998	0.0002

The calculated maximum power density at 20cm distance is less that the limit for general population / uncontrolled exposure.

1.4 Results (ISED):

Duty Cycle	100 (%)							
Separation Dist.	20 (cm)							
Operating Mode	Frequecy (MHz)	Declared Max Cond. Power (Inc. Tolerance) (dBm)	Duty Cycle Adjusted Cond. Output Power (dBm)	Antenna Gain (dB)	MPE Value (W/m^2)	MPE Limit (W/m^2)	Margin to Limit (W/m^2)	MPE / Limit Ratio (for Co-Location)
BLE	2402	-0.09	-0.09	0.5	0.0022	5.35	5.3486	0.000409

The calculated maximum power density at 20cm distance is less that the limit for general population / uncontrolled exposure.

2 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	7/31/2020	104364418LEX-002	BL	BCT	Original Issue
1	2/16/2021	104364418LEX-002.1	BL	BCT	Updated antenna gain