



**FCC Part 1 Subpart I  
FCC Part 2 Subpart J  
INDUSTRY CANADA RSS 102 ISSUE 5**

**RF EXPOSURE REPORT**

**FOR**

**Overhead Door and Gate Operator**

**MODEL NUMBER: 1D8389**

**FCC ID: HBW8389  
IC: 2666A-8389**

**REPORT NUMBER: 11311836B**

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NVLAP Lab code: 100414-0

Revision History

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Chamberlain Group Inc.  
845 Larch Av.  
Elmhurst, IL 60126

**EUT DESCRIPTION:** Commercial 24VDC High Traffic Overhead Door and Gate Operator with low power FHSS transceiver and digital device/receiver.

**MODEL:** HVIN: 1D8389 PMN: HCTDCU

**SERIAL NUMBER:** non serialized

**DATE TESTED:** June 28, 2016 to July 05, 2016

| APPLICABLE STANDARDS                    |              |
|---|--------------|
| STANDARD                                | TEST RESULTS |
| FCC PART 1 SUBPART I & PART 2 SUBPART J | Pass         |
| INDUSTRY CANADA RSS 102 ISSUE 5         | Pass         |

UL Verification Services Inc. calculated the RF Exposure of the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations of these calculations. The results show that the equipment is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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## TEST METHODOLOGY

All calculations were made in accordance with FCC OET Bulletin 65 Edition 97-01 and IC Safety Code 6.

## 2. REFERENCES

All measurements were made as documented in test report UL Verification Services Inc. Document 11311836A for operation in the 902-928MHz Band.

Output power is excerpted from the applicable test report. Antenna gain data is excerpted from the manufacturer documentation.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, IL 60062 USA.

UL NBK is accredited by NVLAP, Laboratory Code 100414-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/>

## 4. MAXIMUM PERMISSIBLE RF EXPOSURE

### 4.1. FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (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.

**TABLE 1—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 Exposure</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                        |
| 300-1,500  |                               |                               | f/300                               | 6                        |
| 1,500-100,000  |                               |                               | 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                       |
| 300-1,500  |                               |                               | f/1500                              | 30                       |
| 1,500-100,000  |                               |                               | 1.0                                 | 30                       |

f = frequency in MHz

\* = Plane-wave equivalent power density

**Notes:**

- (1) Occupational/controlled exposure 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 a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
- (2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

## 4.2. IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

**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/ f                                  | -                                 | 6**                        |
| 1.1-10                 | 87/ f <sup>0.5</sup>      | -  | -                                 | 6**                        |
| 10-20                  | 27.46                     | 0.0728                                   | 2                                 | 6                          |
| 20-48                  | 58.07/ f <sup>0.25</sup>  | 0.1540/ f <sup>0.25</sup>                | 8.944/ f <sup>0.5</sup>           | 6                          |
| 48-300                 | 22.06                     | 0.05852                                  | 1.291                             | 6                          |
| 300-6000               | 3.142 f <sup>0.3417</sup> | 0.008335 f <sup>0.3417</sup>             | 0.02619f <sup>0.6834</sup>        | 6                          |
| 6000-15000             | 61.4                      | 0.163                                    | 10                                | 6                          |
| 15000-150000           | 61.4                      | 0.163                                    | 10                                | 616000/ f <sup>1.2</sup>   |
| 150000-300000          | 0.158 f <sup>0.5</sup>    | 4.21 x 10 <sup>-4</sup> f <sup>0.5</sup> | 6.67 x 10 <sup>-5</sup> f         | 616000/ f <sup>1.2</sup>   |

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

For 915MHz the limit is 2.77W/m<sup>2</sup>

## 4.3. EQUATIONS

### POWER DENSITY

Power density is given by:

$$S = \text{EIRP} / (4 * \text{Pi} * \text{D}^2)$$

Where

S = Power density in mW/cm<sup>2</sup>

EIRP = Equivalent Isotropic Radiated Power in mW

D = Separation distance in cm

Power density in units of mW/cm<sup>2</sup> is converted to units of W/m<sup>2</sup> by multiplying by 10.

### **DISTANCE**

Distance is given by:

$$D = \text{SQRT} (EIRP / (4 * \text{Pi} * S))$$

Where

D = Separation distance in cm  
EIRP = Equivalent Isotropic Radiated Power in mW  
S = Power density in mW/cm<sup>2</sup>

### **SOURCE-BASED DUTY CYCLE**

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

$$\text{Source-based time-averaged EIRP} = (\text{DC} / 100) * \text{EIRP}$$

Where

DC = Duty Cycle in %, as applicable  
EIRP = Equivalent Isotropic Radiated Power in W



#### **4.4. LIMITS AND IC EXEMPTION**

##### **FIXED LIMITS**

From FCC 1.1310 Table 1 (b), the maximum value of  $S = 1.6 \text{ mW/cm}^2$   
From IC safety code 6, section 2.2, Table 5, Column 4,  $S = 10 \text{ W/m}^2$

##### **INDUSTRY CANADA EXEMPTION**

RSS-102 Clause 2.5.2 RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than 20 cm, except when the device operates as follows:

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834} \text{ W}$  (adjusted for tune-up tolerance), where  $f$  is in MHz.

For 915MHz transmitter the limit is 1.38

Based on the measured power and antenna gain the device is exempted from routine evaluation.

## 5. RF EXPOSURE RESULTS

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

(Single chain transmitters, no colocation, 20 cm MPE distance)

| Single Chain and non-colocated transmitters |      |                               |                                  |                          |                      |              |                                   |                          |
|---|------|-------------------------------|----------------------------------|--------------------------|----------------------|--------------|-----------------------------------|--------------------------|
| Band  | Mode | Separatio<br>Distance<br>(cm) | Output<br>PEAK<br>Power<br>(dBm) | Antenna<br>Gain<br>(dBi) | Duty<br>Cycle<br>(%) | EIRP<br>(mW) | FCC Power<br>Density<br>(mW/cm^2) | IC<br>Density<br>(W/m^2) |
| 902-928MHz                                  | FHSS | 20                            | 8.49                             | 0.50                     | 100.0                | 7.9          | 0.002                             | 0.02                     |

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz; therefore, the device is exempted from routine RF exposure evaluation.

Based on the table above the device is exempted from SAR. Minimum separation distance between the antenna and bystanders is 20cm.

### Notes:

- 1) For MPE the new KDB 447498 requires the calculations to use the maximum rated power; that power should be declared by the manufacturer, and should not be lower than the measured power. If the power has a tolerance then we also need to check that the measured power is within the tolerance.
- 2) The manufacturer configures output power so that the maximum power, after accounting for manufacturing tolerances, will never exceed the maximum power level measured.
- 3) The antenna gain in the tables above is the maximum antenna gain among various channels within the specified band.

**END OF REPORT**