RF EXPOSURE REPORT

Report Number. : R15385837-E2

Applicant	:	Car Key Express 12101 Sycamore Station Pl Ste 140 Louisville, KY, USA
Model	:	GMSSL-G200
FCC ID	:	X32-GMSSG200
IC	:	8797A-GMSSG200
EUT Description	:	Remote-Control Transmitter
Test Standard(s)	:	FCC 47 CFR PART 1 Subpart I FCC 47 CFR PART 2 Subpart J RSS-102 Issue 6

Date Of Issue:
2024-11-14

Prepared by:
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CERT #0751.06

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2024-09-03	Initial Issue	Noah Bennett
V2	2024-11-14	-Corrected calculation in section 7.1 TCB Feedback: -Updated antenna gain in section 8.1	Noah Bennett

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Car Key Express 12101 Sycamore Station Pl Ste 140 Louisville, KY, USA
EUT DESCRIPTION:	Remote-Control Transmitter
MODEL:	GMSSL-G200
SERIAL NUMBER:	Non-Serialized
SAMPLE RECEIPT DATE:	2024-07-10
DATE TESTED:	2024-07-25 Thru 2024-08-14

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 1 SUBPART I & PART 2 SUBPART J RSS-102 Issue 6	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released
For UL LLC By:

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Prepared By:

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2. TEST METHODOLOGY

All calculations were made in accordance with FCC Parts 1.1310, 2.1091, 2.1093, KDB 447498 D01 v06, KDB 447498 D03 V01, IEEE Std C95.1-2005, IEEE Std C95.3-2002, and RSS-102 Issue 6.

3. REFERENCES

Output power is excerpted from client declarations.

100% Duty Cycle and 0dB Antenna Gain was used as worst case.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2. DECISION RULES

For all tests where the applicable U_{LAB} <= U_{MAX} the Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2, where U_{MAX} = 30% (0.3) for RF Exposure evaluations. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

For all tests where the applicable U_{LAB} > U_{MAX} the Decision Rule is based on Guarded Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.3.2, with a guard band equal to (U_{LAB} – U_{MAX}), where U_{MAX} = 30% (0.3) for RF Exposure evaluations. (Test results are adjusted by the value of the guard band to determine conformity with a specified requirement.)

6. MAXIMUM PERMISSIBLE EXPOSURE (LIMITS AND EQUATIONS)

6.1. 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^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			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

6.2. EQUATIONS

POWER DENSITY

Power density is given by:

S = EIRP / (4 * Pi * D^2)

Where

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

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

DISTANCE

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

Where

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

SOURCE-BASED DUTY CYCLE

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

Source-based time-averaged EIRP = (DC / 100) * EIRP

Where

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

DISTANCE CORRECTION

Distance correction factor to scale E-field reading from x meters to y meters is as follows:

Correction Factor = 20log(x/y)

Where x is the initial measurement distance and y is the desired distance.

MAXIMUM E-FIELD STRENGTH (dBuV/m to V/m)

To convert from dBuV/m to V/m, the following equation was used:

V/m = 10^[(dBuv/m -120) / 20].

MIMO AND COLOCATED TRANSMITTERS (IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple chain devices, and colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the EIRP (in linear units) of each transmitter.

Total EIRP = (EIRP1) + (EIRP2) + ... + (EIRPn)

where

EIRPx = Source-based time-averaged EIRP of chain x or transmitter x

The total EIRP is then used to calculate the Power Density or the Distance as applicable.

MIMO AND COLOCATED TRANSMITTERS (NON-IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply:

The Power Density at the specified separation distance is calculated for each transmitter chain or transmitter.

The fraction of the exposure limit is calculated for each chain or transmitter as
(Power Density of chain or transmitter) / (Limit applicable to that chain or transmitter).

The fractions are summed.

Compliance is established if the sum of the fractions is less than or equal to one.

7. FCC PORTABLE DEVICE TEST EXCLUSION CONSIDERATIONS

7.1. Stand-alone test exclusion KDB 447498 D01 v6.

a) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)] ≤ 3.0, for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

SAR Exclusion Calculations Table for Portable Devices (separation distance ≤ 50 mm)

Antenna	Frequency (MHz)	Maximum E-Field Strength at 3m		Maximum Output Power		Separation Distances (mm)	Calculated Threshold Value
		dBuV/m	V/m	dBm	mW		
Key-Fob	314.9	72.61	0.0043	-22.65	0.00544	5	0.0

Conclusion:
The computed value is ≤ 3; therefore, EUT qualifies for Standalone 1-gm body SAR test exclusion.

Note: Conversion of **X** dBm = **Y** dBuV/m + 20Log(**D**) - 104.8 where **X** is the transmitter power in dBm, **Y** is the Max E-Field strength at 3m in dBuV/m, and D is the measurement distance in meters.

X dBm = **72.61** dBuV + 20Log(3) - 104.8
X dBm = -22.65

8. ISED PORTABLE DEVICE TEST EXCLUSION CONSIDERATIONS

8.1. RSS-102 Issue 6 Exemption Limits

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 11 for operating frequencies below 6GHz and Table 12 for operating frequencies between 6GHz and 30 GHz.

Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance

Frequency (MHz)	≤ 5 mm (mW)	10 mm (mW)	15 mm (mW)	20 mm (mW)	25 mm (mW)	30 mm (mW)	35 mm (mW)	40 mm (mW)	45 mm (mW)	> 50 mm (mW)
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

Exemption Justification

The minimum separation distance is based on documentation provided by the customer.

The maximum conducted power is the manufacturer's declared maximum output power across production units at the antenna port. The gain is the declared nominal antenna gain, including any cable losses between the antenna and the antenna port. 0dBi antenna gain was used as worst-case.

The EIRP is calculated from the maximum conducted power and the antenna gain.

Using linear extrapolation of Table 11, the Exemption Limit (mW) for the EUT operating at 314.9MHz is 43.71mW.

Tx	Frequency (MHz)	Maximum Declared Average Power	Antenna Gain (dBm)	N/A dBi (mW)
Key-FOB	314.9	Conducted	-22.65	0.00543

Exemption Limit (mW)	Max Avg ERP (mW)	Margin
43.71	0.00543	-43.70

END OF TEST REPORT