

RF Exposure Exhibit

Report Number: FCC_IC_RF_SL21060701-CAAR-002A1_BLE_MPE

Project Number: SL21060701-CAAR-002A1_BLE

Report Issue Date: 03/16/2022

Model Tested: 002277

Lab Address: 775 Montague Expressway, Milpitas, CA 95035

FCC/IC Test US1109/US0160
Site Number:

FCC ID: TCZ-10105567G1

ISED: 1175F-10105567G1

to

47CFR 2.1091

RSS-102 Issue 5

KDB: 447498 D01 General RF Exposure Guidance v06

For

Supra DirectKey Module
Carrier Fire & Security Americas corporation

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :  , **Date:** 03-16-2022
James Ma / Test Engineer

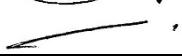

Approved by :  , **Date:** 03-16-2022
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1 General Information

1.1 General Description of EUT

Product	The Supra® DirectKey™ Module
Brand	Supra®
Test Model	002277
Identification No. of EUT	85000465 (Radiated), 85000477 (Conducted)
Status of EUT	Engineering sample
Power Supply Rating	1.8 – 3.6 Vdc
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	Up to 1Mbps
Operating Frequency	2.402 ~ 2.480GHz
Number of Channel	40
Output Power	3dBm
Antenna Gain	1.5 dBi
Antenna Type	Chip Antenna (Johanson 2450AT18D0100E)
Antenna Connector	Permanently attached

Note: Antenna gain as declared by Carrier Fire & Security Americas corporation

2 RF EXPOSURE SUMMARY

Test	Reference FCC	Reference Industry Canada	Result
Radio frequency Radiation Exposure Evaluation	47 CFR§2.1091	RSS-102 Issue 5	Complies

3 RF EXPOSURE LIMITS

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS-102 are followed.

3.1 FCC LIMITS

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
8(A) Limits For Occupational / Control 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 density

3.2 INDUSTRY CANADA LIMITS

According to RSS-102, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

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	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	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/ f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/ f^{1.2}$

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

4 TEST RESULTS

4.1 CLASSIFICATION

The antenna of the product, under normal use condition, is at least 20 cm away from the body of the user and accessible to the end user. Warning statement to the user for keeping at least 20 cm or more separation distance with the antenna should be included in user's manual.

4.2 EIRP CALCULATIONS

The Supra® DirectKey™ Module, Model **002277**

4.3 MAXIMUM RF POWER

CH 0	Highest Output Pwr	Ant. Gain
(MHz)	(dBm)	(dBi)
2402.00	1.90	1.50

Note: Antenna gain is 1.5 dBi as declared by Carrier Fire & Security Americas corporation
 Output Power measurement was taken from
 Report FCC_IC_RF_SL21060701-CAAR-002A1_BLE

4.3.1 RF EXPOSURE CALCULATION

Frequency Range (MHz)	EIRP dBm	S = EIRP/ $4\pi D^2$	RSS Limit W/m ²	FCC Limit mW/cm ²	Results
		at 20 cm			
2402.000	3.40	0.000435 mW/cm ² 0.00435 W/m ²	5.35	1.00	Complies

The summation of the MPE ratio is less than 1, therefore, the EUT complies for the MPE requirement of simultaneous transmission.

5 APPENDIX A: POWER DENSITY CALCULATION

The Power Density can be calculated using the formula

$$S = EIRP / 4\pi D^2$$

Where: S is Power Density in mW/cm²
 D is the distance from the antenna in cm.