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47 CFR Part 2.1091
Radiofrequency radiation exposure evaluation:
Mobile devices

Test Sample: Wireless Smart Hub
Model Number: HUB200
Tested For: Automatic Technology (Australia) Pty Ltd

Report Number: M180310-3
Date of Issue: 12 June 2019

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47 CFR Part 2.1091

Radiofrequency radiation exposure evaluation: Mobile devices

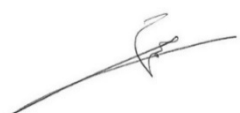
Test Sample: Wireless Smart Hub
Model Number: HUB200
Manufacturer: Automatic Technology (Australia) Pty Ltd

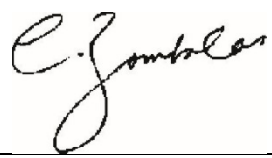
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KDB: **447498 D01 General RF Exposure Guidance v06**
RF exposure procedures and equipment authorization policies for mobile and portable devices.

Result: The Wireless Smart Hub model HUB200 complied with the RF exposure requirements of 47 CFR Part 2.1091, however an exclusion zone of 20 cm in front of the antenna applies, elsewhere the exposure level was below the mobile device limits.

Test Date: 3rd May 2019


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1 INTRODUCTION

This report is intended to demonstrate compliance of the Wireless Smart Hub model HUB200 with the RF exposure requirements of 47 CFR Part 2.1091. Evaluation was performed in accordance with FCC KDB 447498 D01.

The test sample was provided by the Client. The conclusion herein is based on the information provided by the client.

2 GENERAL INFORMATION

(Information supplied by the Client)

Wireless Smart Hub with the Automatic Technology Smart Hub, allow customer to control his garage door and gate on his smart phone while they are at home or away from home. According to HUB200 user manual, the device is not intended to be operated within 20cm of user or nearby person.

2.1 EUT (Frequency Hopping device Transceiver #1) Details

Radio:	Frequency Hopping device
Operating Band:	910 MHz – 928 MHz
Maximum Output power	20.00 dBm
Antenna:	External
Antenna Model:	monopole antenna
Antenna Gain:	0 dBi

2.2 EUT (WiFi 2.4 Ghz Transceiver #2) Details

Radio:	2.4 GHz WiFi
FCC ID	X4K-HUB100BSM02
Operating Band:	2412 MHz – 2462 MHz
Maximum Output power:	+23.35 dBm
Antenna:	External
Antenna Model:	monopole antenna
Antenna Gain	0 dBi

3 LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE), §1.1310

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

Where f = Frequency in MHz, * = Plane-wave power density

4 UNCERTAINTY

EMC Technologies has evaluated the tools and methods used to perform Radiated Electromagnetic Field predictions.

The estimated measurement uncertainties for the calculation shown within this report are as follows:

Electromagnetic Modelling

30 MHz to 100GHz ± 2.8 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

5 ASSUMPTIONS IN THIS ASSESSMENT

This assessment does not include accumulated RF fields from nearby sites/antennas or possible radio signal reflections or attenuation due to buildings or the general environment.

Antenna Parameters and power settings were supplied by the customer.

The aperture of the radiating element assumed to be a point source in free space and far field conditions.

6 EVALUATION RESULT

The MPE was evaluated at 20 cm to show compliance with the power density listed in table 1,

The following formula was used to calculate the power density at 20 cm

$$S = \frac{P * G}{4\pi R^2}$$

$$S = \frac{EIRP}{4\pi R^2}$$

Where

(S): Power density (mW/cm^2)

(P): Output power at antenna terminal (mW)

(G): Gain (ratio)

(R): Minimum test separation distance (20 cm)

Technology	Frequency Band	Power dBm	Gain dBi	Duty Cycle %	EIRP dBm	EIRP (mW)	Flux Density at 20 cm mW/cm ²	Flux Density limit mW/cm ²	Percentage of the limit (%)
ISM	910	20	0	100%	20.00	100.00	0.0199	0.61	3.28%
WiFi	2412	23.35	0	100%	23.35	216.27	0.0430	1.00	4.30%
Worst case total percentage of the limit at 20 cm (SRD+ WiFi)									7.59%

Co-location consideration:

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 .

$$\sum_1^N \frac{S_{eqN}}{S_{limN}} = \frac{S_{eq1}}{S_{lim1}} + \frac{S_{eq2}}{S_{lim2}} + \dots + \frac{S_{eqN}}{S_{limN}} \leq 1$$

Where: S_{eq} = Power Spectral density (mW/cm²) of a specific transmitter
 S_{lim} = MPE limit (mW/cm²)

The following simultaneous transmissions are possible:

Transmitter 1	Transmitter 2	MPE Ratio Sum	Result
WiFi	ISM	0.08	Pass

7 CONCLUSION

The Wireless Smart Hub model HUB200 was evaluated on behalf of Automatic Technology (Australia) Pty Ltd with the RF exposure requirements of 47 CFR Part 2.1091. An exclusion zone of 20 cm was required in front of the antennas, away from this area the electric field measured at 20 cm did not exceed the MPE limit.