Radio Frequency Exposure Evaluation Report

FOR:
MP CONSULTING LLC

Model Name:
84000100019_04

Product Description:
Daughterboard: A communications module capable of WIFI and Bluetooth communications

FCC ID: 2AQ89-APT0001
IC ID: 24336-APT0001

Applied Rules and Standards:
CFR 47 Part 2.1093
FCC KDB 447498 D01 General RF Exposure Guidance v06

Test Report #: SAR_EX_ ACTIV_001_18001_FCC_ISED

DATE: 2019-09-25

A2LA Accredited

IC recognized #
3462B-2

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1. Assessment

The following device was evaluated against the limits for general population uncontrolled exposure specified in CFR 47 Part 2.1093 according to SAR evaluation exclusion requirements specified in FCC regulation as listed in KDB 447498.

The device meets the requirements for SAR exclusion as stipulated by the above given FCC/ISED rules and when used at a distance of 31.5 mm.

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2019-09-25	Compliance	Cindy Li (Lab Manager)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I am approving this document Location: Date: 2019-09-25 14:48:57

Responsible for the Report:

Date	Section	Name	Signature
2019-09-25	Compliance	Kevin Wang (Senior EMC Engineer)	Kevin Wang Digitally signed by: Kevin Wang DN: CN = Kevin Wang email = kevin.wang@cetecom.com C = US O = Cetecom Inc. Date: 2019.09.25 12:20:51 -07'00'

2. Administrative Data

2.1. Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
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Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Test Lab Manager	Cindy Li
Project Manager	Rami Saman

2.2. Identification of the Client

Client Name:	MP CONSULTING LLC
Street Address:	21805 W. FIELD PKWY, SUITE #160
City/Zip Code	DEER PARK, IL 60010
Country	USA

2.3. Identification of the Manufacturer

Applicant / Manufacturer's Name:	ACTIVE PROTECTIVE TECHNOLOGIES, INC.
Manufacturers Address:	580 Virginia Dr., Suite 230
City/Zip Code	Fort Washington, PA 19034
Country	USA

3. Equipment under Assessment

Model No:	84000100019_04
HW Version :	84000100019_A
SW Version :	Daughterboard REV.A
FCC-ID:	2AQ89-APT0001
IC-ID:	24336-APT0001
HVIN:	84000100019_04
PMN:	APT BELT CONNECTIVITY MODULE V1
Product Description:	Daughterboard (Module Integrated)
Frequency Range / number of channels:	WIFI 802.11a/b/g/n Nominal band: 2400 MHz – 2483.5 MHz; Murata LBEE5KL1DX: with FCCID:VPYLB1DX / ICID:772C-LB1DX
Minimum distance of antenna or radiating parts to user	31.5mm
Power Supply/ Rated Operating Voltage Range:	USB / Vmin: 3.25 VDC/ Vnom: 3.6 VDC / Vmax: 4.2 VDC
Modes of Operation:	Periodic operation
Other Radios included in the device:	Bluetooth 4.2 Low Energy (BT LE) WIFI 802.11a/b/g/n
EUT Dimensions (mm) : / Weight (grams) :	1x25x20 mm for (daughterboard) <1lb. (DB), ~5 lbs. (Prod.)
Co-located Transmitters/ Antennas:	☐ Yes ■ No
Exposure Category:	☐ Occupational/ Controlled ■ General Population/ Uncontrolled
Device Category	☐ Fixed Installation ☐Mobile ■ Portable ☐ Mixed Mobile and Portable
EUT Diameter	■ < 60 cm ☐ Other _____
Sample Revision	☐Prototype Unit; ■Production Unit; ☐Pre-Production

4. FCC Exemption Limits for Routine Evaluation

4.1. FCC SAR test exclusions.

FCC SAR test exclusions are set by KDB 447498 D01 General RF Exposure Guidance v06

KDB 447498 Section: 4.3.1. Standalone SAR test exclusion considerations

a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

[(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, 30 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 values 3.0 and 7.5 are referred to as *numeric thresholds* in step b) below

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 according to 4.1 f) is applied to determine SAR test exclusion.

4.2. RSS-102

Section 2.5.1 Exemption Limits for Routine Evaluation-SAR Evaluation

- 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 1.

- **Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance**

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

- Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

  For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

5. Stand-Alone SAR Evaluation Exclusion

- According to KDB 447498, SAR evaluation can be excluded if the following equation is satisfied:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0

FCC Standalone Transmission SAR Exclusion Calculations						
Radio	**Frequency [GHz]**	**Max. Output Power [mW]**	**Max. Output Power corrected by duty factor* [mW]**	**Distance [mm]**	**P/D*SQRT(F) at 31.5mm**	**≤ 3.0**
WiFi	2.412	131.83	56.95	31.5	2.81	Yes
Buetooth EDR	2402	41.69	-	31.5	2.05	Yes
Bluetooth LE	2402	16.6	-	31.5	0.82	Yes

- F: Frequency.
- P: Max. Output Power [mW].
- D: Distance.
- X: Min Distance to pass.
- SQRT(F): Square root(Frequency)

* The Max Average WiFi power from the operational description including tune up was corrected for the maximum 0.432 Load based duty cycle for the device,
This load based duty cycle is based on a max throughput of 54 KBs with worst case modulation.

ISED Standalone Transmission SAR Exclusion Calculations						
Radio	**Frequency [MHz]**	**Max. Output Power [mW]**	**Load based Duty Cycle Corrected Power [mW]**	**Distance [mm]**	**Limit [mW]**	**Exempt**
WiFi	2.412	131.83	56.95	31.5	83	Yes
Buetooth EDR	2402	41.69	-	31.5	83	Yes
Bluetooth LE	2402	16.6	-	31.5	83	Yes

6. Revision History

Date	Report Name	Changes to report	Report prepared by
2019-09-25	SAR_EX_ ACTIV_001_18001_FCC_ISED	Initial Version	Kevin Wang