



Radio Frequency Exposure Evaluation Report

FOR:
Aversan Inc.

Model Name:
1205

Product Description:
Cell and Wi-Fi carrier with integrated RF switching.

FCC ID: 2AWBR002250
IC ID: 26073002250

Per:
CFR Part1 (1.1307 & 1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISED RSS-102 Issue 5

Report number: EMC_AVERS_006_20001_FCC_ISD_MPE_Rev1

DATE: 7/16/2020



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1 Assessment

This RF Exposure evaluation report, provides evidence for compliance of the below identified device, with the RF Exposure limits for mobile devices, as defined in FCC CFR Part1 (1.1307 & 1.1310), Part 2 (2.1091), and IC standard ISSED RSS-102 Issue 5, under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body. Multiple transmitter information as presented by the applicant). In addition, maximum antenna gain, or minimum distance towards the human body calculated respectively where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 24 cm distance to the body from the device, and 27cm distance to the body from the external antennas.

Company	Description	Model Name
Aversan Inc.	Cell and Wi-Fi carrier with integrated RF switching.	1205

Report reviewed by: TCB Evaluator

7/16/2020	Compliance	Cindy Li (Lab Manager)	
Date	Section	Name	Signature

Responsible for the Report:

7/16/2020	Compliance	Issa Ghanma (EMC Engineer)	
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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Lab Manager:	Li, Cindy
Responsible Project Leader:	Saman, Rami

2.2 Identification of the Client / Manufacturer

Applicant's Name:	Aversan Inc.
Street Address:	30 Eglinton Avenue West, Suite 500
City/Zip Code	Mississauga, ON L5R 3E7
Country	Canada

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as client.
Manufacturers Address:	-----
City/Zip Code	-----
Country	-----

3 Equipment under Assessment

Model name:	1205
FCC ID:	2AWBR002250
IC ID:	26073002250
HVIN:	1205
PMN:	RF Board
Power Supply/ Rated Operating Voltage Range:	Vehicle: 28 V DC
Integrated Module Info:	❖ Cellular: ▪ Module name : AirPrime ▪ Model number : EM7565 ▪ FCC ID : N7NEM75 ▪ IC ID : 2417C-EM75 ❖ WLAN (Wi-Fi), BT, BLE: ▪ Module FCC / IC ID : SQG-60SIPT / 3147A-602230C ▪ Module name / number : 60-2230C / 60-2230C-PU • Represents worst case, by transmitting using the higher antennae gains. ▪ Module name / number : 60-2230C / 60-2230C-PU
H.W Version:	05
S.W Version:	• Cell: SWI9X50C_01.07.02.00 • Internal Wi-Fi: 5.4.24.1 • External Wi-Fi: 5.6.23.4

Regulatory Band:

❖ **Cellular :**

- UMTS Band II : 1850 ~ 1910 MHz
- UMTS Band IV : 1710 ~ 1755 MHz
- UMTS Band V : 824 ~ 849 MHz
- LTE Band 2 : 1850 ~ 1910 MHz
- LTE Band 4 : 1710 ~ 1755 MHz
- LTE Band 5 : 824 ~ 849 MHz
- LTE Band 7 : 2500 ~ 2570 MHz
- LTE Band 12 : 699 ~ 716 MHz
- LTE Band 13 : 777 ~ 787 MHz
- LTE Band 26 : 814 ~ 849 MHz
- LTE Band 41 : 2496 ~ 2690 MHz
- LTE Band 66 : 1710 ~ 1780 MHz

❖ **WLAN (Wi-Fi), BT, BLE:**

- Wi-Fi 2.4 and 5 GHz: 802.11 a/b/g/n/h/ac
 - Center to center: 2412 MHz (ch 1) – 2462 MHz (ch 11), 11 channels.
 - 5.15 GHz to 5.35 GHz: Channel 36, 40, 44, 48, 52, 56, 60, 64
 - 5.47 GHz to 5.725 GHz: Channel 100, 104, 108, 112, 116, 120, 124
- Bluetooth LE:
 - Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 39), 40 channels
 - Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 78), 79 Channels

Antenna Type and Peak gain[dBi]:

❖ **Cellular Gain (dBi):**

- 1850 ~ 1910 MHz : 3.7
- 1710 ~ 1755 MHz : 3.7
- 824 ~ 849 MHz : 5.8
- 1850 ~ 1910 MHz : 5.8
- 2500 ~ 2570 MHz : 1.4
- 699 ~ 716 MHz : 5.8
- 777 ~ 787 MHz : 5.8
- 814 ~ 849 MHz : 5.8
- 2496 ~ 2690 MHz : 1.4
- 1710 ~ 1780 MHz : 3.7

	❖ <u>WLAN (Wi-Fi):</u> - Front panel: 2.4 GHz Peak Gain : 2.5 5 GHz Peak Gain : 3.0 - Rear panel: 2.4 – 2.48 GHz : 4.78 5.15 – 5.725 : 5.14
Maximum Conducted Output Power:	❖ <u>Cellular [Watts]:</u> - UMTS Band II : 0.181 - UMTS Band IV : 0.192 - UMTS Band V : 0.193 - LTE Band 2 : 0.180 - LTE Band 4/66 : 0.199 - LTE Band 5/26 : 0.192 - LTE Band 7 : 0.157 - LTE Band 12 : 0.189 - LTE Band 13 : 0.193 - LTE Band 26 : 0.190 - LTE Band 41 : 0.158 ❖ <u>WLAN (Wi-Fi), BT, BLE</u> - Wi-Fi 2.4GHz : 0.872 - BT, BLE : 0.012 - Wi-Fi 5GHz UNII-1 : 0.145 - Wi-Fi 5GHz UNII-2 : 0.087 - Wi-Fi 5GHz UNII2-EX : 0.126
Sample Revision:	☐ Prototype Unit; ☐ Production Unit; ☒ Pre-Production

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e)/ RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

IC

300 – 6000	$0.02619 \times f \text{ (MHz)}^{0.6834}$	6
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4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

Operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8 dBm (EIRP: 33.9);
 Operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8 dBm (EIRP: 36.9);

IC

300MHz <= operating frequency < 6 GHz: excluded if EIRP < $0.0131 \times f \text{ (MHz)}^{0.6834} \text{ W}$

4.3 RF Exposure Estimation (MPE Estimation)

Having available the source, based average output power, and peak antenna gain, or the ERP/EIRP of the specified device, and for a known minimum distance of its radiating structures from the body of persons. According to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

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

where: S = power density (mW/cm² or W/m²)

P = power input to the antenna (mW or W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm or m)

5 Evaluation

5.1 Analysis to Exclude Routine RF Exposure evaluation for Stand Alone Operation

Band	Lowest frequency [MHz]	Max.Power [W]	EIRP [W]	ISSED EIRP limit [W]	Max.Power [dBm]	EIRP [dBm]	FCC EIRP limit [dBm]	Verdict
UMTS II	1850	0.251	0.589	2.239	24.00	27.70	36.90	Complies
UMTS IV	1710	0.251	0.589	2.122	24.00	27.70	36.90	Complies
UMTS V	824	0.251	0.955	1.288	24.00	29.80	33.90	Complies
LTE 2	1850	0.251	0.589	2.239	24.00	27.70	36.90	Complies
LTE 4 / 66	1710	0.251	0.589	2.122	24.00	27.70	36.90	Complies
LTE 5 / 26	824	0.251	0.955	1.288	24.00	29.80	33.90	Complies
LTE 7	2500	0.251	0.347	2.751	24.00	25.40	36.90	Complies
LTE 12	699	0.251	0.955	1.151	24.00	29.80	33.90	Complies
LTE 13	777	0.251	0.955	1.238	24.00	29.80	33.90	Complies
LTE 26	814	0.251	0.955	1.278	24.00	29.80	33.90	Complies
LTE 41	2496	0.251	0.347	2.748	24.00	25.40	36.90	Complies
WLAN	2412	0.872	1.552 See note 1	2.684	29.41	31.91	36.90	Complies
WLAN	2412	0.872	2.624 See note 2	2.684	29.41	34.19	36.90	Complies
BT	2402	0.10	0.301	2.676	20.00	15.57	36.90	Complies
BLE	2402	0.10	0.301	2.676	20.00	15.57	36.90	Complies
UNII-1	5180	0.145	0.473	4.525	21.61	26.75	36.90	Complies
UNII-2	5260	0.10	0.327	4.573	20.00	24.06	36.90	Complies
UNII-2 EX	5500	0.126	0.411	4.714	21.00	26.14	36.90	Complies

Note 1: Front panel antenna gains used for EIRP.

Note 2: Rear panel antenna gains used for EIRP.

The single radios are exempt from routine environmental evaluation.

6 Analysis of RF Exposure for simultaneous transmission

- Evaluation based on worst-case power density limits for Canada.
- Calculation made for 27 cm.
- Evaluations are based on EIRP measured or calculated from known gain and conducted output power.
- Cellular can transmit simultaneously with Wi-Fi 2.4 GHz 802.11g radio using rear panel.

Band	Lowest frequency [MHz]	Max.Power Conducted [W]	EIRP [W]	Actual @ 27 cm [W/m2]	ISED [W/m2]	FCC [W/m2]	How much of limit is used up [%]
UMTS II	1850	0.251	0.589	0.64	4.48	10.00	14.36
UMTS IV	1710	0.251	0.589	0.64	4.24	10.00	15.15
UMTS V	824	0.251	0.955	1.04	2.58	5.49	40.47
LTE 2	1850	0.251	0.589	0.64	4.48	10.00	14.36
LTE 4 / 66	1710	0.251	0.589	0.64	4.24	10.00	15.15
LTE 5 / 26	824	0.251	0.955	1.04	2.58	5.49	40.47
LTE 7	2500	0.251	0.347	0.38	5.50	10.00	6.88
LTE 12	699	0.251	0.955	1.04	2.30	4.66	45.29
LTE 13	777	0.251	0.955	1.04	2.47	5.18	42.13
LTE 26	814	0.251	0.955	1.04	2.55	5.43	40.81
LTE 41	2496	0.251	0.347	0.38	5.49	10.00	6.89
WLAN	2412	0.872	2.624 See note 1	2.86	5.37	10.00	53.38
BT	2402	0.10	0.301	0.33	5.35	10.00	6.13
BLE	2402	0.10	0.301	0.33	5.35	10.00	6.13
UNII-1	5180	0.145	0.473	0.52	9.05	10.00	5.71
UNII-2	5260	0.10	0.327	0.36	9.14	10.00	3.90
UNII-2 EX	5500	0.126	0.411	0.45	9.43	10.00	4.76
Band	Lowest frequency [MHz]	Max.Power Conducted [W]	EIRP [W]	Actual@ 24 cm [W/m2]	ISED [W/m2]	FCC [W/m2]	How much of limit is used up [%]
LTE 12	699	0.251	0.955	1.32	2.30	4.66	57.32
WLAN	2412	0.872	1.552 See note 2	2.14	5.37	10.00	39.97

Note 1: Rear panel antenna gains used for EIRP.

Note 2: Front panel antenna gains used for EIRP

Conclusion:

- **The worst-case simultaneous transmission is LTE Band 12 simultaneous with Wi-Fi 2.4 GHz 802.11g, which is using;**
 - **Front panel (Internal antenna): 97.29% of a limit of 100% @ 24 cm.**
 - **Rear panel (External antenna): 98.67% of a limit of 100 % @ 27 cm.**

The equipment is passing RF exposure requirements @ the minimum separation distances above.

7 Revision History

Date	Report Name	Changes to report	Report prepared by
6/26/2020	EMC_AVERS_006_20001_FCC_ISSED_MPE	Initial Version	Issa Ghanma
7/16/2020	EMC_AVERS_006_20001_FCC_ISSED_MPE_Rev1	Include front panel antennae for minimum separation distance.	Issa Ghanma

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