



Radio Frequency Exposure Evaluation Report

Brand:
Agnex Inc.

Model:
AGN3

Product Description:
The AGN3 is a solar-powered tank sensor monitoring device.

FCC ID: 2BBS4AGN3

Per:
CFR Part Part1 (1.1307), Part 2 (2.1091),
FCC KDB 447498 D04

Report number: EMC_TELI2_011_23001_FCC_ISED_RF_Exposure_Rev3

DATE: 2024-02-06



CETECOM Inc.

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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 Part 1 (1.1307), Part 2 (2.1091) 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 is 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 20 cm distance to the body.

Company	Description	Model
Agnex Inc.	The AGN3 is a solar-powered tank sensor monitoring device.	AGN3

Report reviewed by: TCB Evaluator

2024-02-06 Compliance Issa Ghanma
(EMC Lab Manager)

Date	Section	Name	Signature
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Responsible for the Report:

2024-02-06 Compliance Guangcheng Huang
(Senior EMC Engineer)

Date	Section	Name	Signature
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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
EMC Lab Manager:	Issa Ghanma
Responsible Project Leader:	Rami Saman

2.2 Identification of the Client / Manufacturer

Client's Name:	Agnex Inc.
Street Address:	16460 E Annadale Ave,
City/Zip Code	Sanger CA 93657
Country	USA

Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Assessment

Brand:	Agnex Inc.
Model:	AGN3
HW Version :	0.3
SW Version :	1.0.9
FCC-ID :	2BBS4AGN3
Product Description:	The AGN3 is a solar-powered tank sensor monitoring device.
Radio information as declared:	<p>Cellular radio:</p> <ul style="list-style-type: none"> • LTE CAT-M1 (3GPP Rel.14) • 2G: GSM/GPRS/EGPRS • Refer to the FCC ID: RI7ME910G1WW grant for detailed information on the output power specifications. <p>mmWave radio:</p> <ul style="list-style-type: none"> • Radar Sensor 57~64 GHz
Frequency Range	GSM 850: 824.2 – 848.2 MHz GSM 1900: 1850.2 – 1909.8 MHz LTE Band 2: 1850 – 1910 MHz LTE Band 4: 1710 – 1755 MHz LTE Band 5: 824 – 849 MHz LTE Band 12: 699 – 716 MHz LTE Band 13: 777 – 787 MHz LTE Band 25: 1850– 1915 MHz LTE Band 26: 814 – 849 MHz LTE Band 66: 1710 – 1780 MHz LTE Band 85: 698 – 716 MHz
Antenna Info as declared:	<p>KYOCERA AVX LTE cellular embedded antenna:</p> <ul style="list-style-type: none"> • Part No.: 1002289 • Peak Gain: 2.9dBi (698 – 960MHz); 4.3dBi (1710 – 2690MHz) <p>Radar Sensor antenna:</p> <ul style="list-style-type: none"> • Not available
Power Supply/ Rated Operating Voltage Range	Nominal Voltage: 3.6V Charge Voltage: 4.2 ± 0.02V
Operating Temperature Range	-20°C ~ +75°C
Sample Revision	<input checked="" type="checkbox"/> Production Unit; <input type="checkbox"/> Pre-Production
Dimensions [mm]	106 x 106 x 54.4
Weight [g]	570
Note: Details about the Equipment Under Test (EUT) are provided by the client or applicant.	

4 RF Exposure Limits and FCC and IC Basic Rules

4.1 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 1.1307(b)(3)(ii)(B)

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

5 Evaluations

5.1 Analysis of RF Exposure

Duty Cycle

The table below illustrates the highest possible duty cycle for each type of radio during operation.

Mode	Duty Cycle	Duty Cycle Correction [dBm]
LTE	1:1	0
GSM (1 Slot)	1:8	-9.03

FCC:

Tech-Band	Freq-Low _[GHz]	Pwr _[dBm]	Pwr[dBm] corrected by Duty Cycle	Power _[W]	Ant-G _[dBi]	EIRP _[W]	ERP _[mW]	FCC 1.1307(b)(3)(i)(B) Pth _[mW] = ERP _{20cm}
GSM 850	0.8240	33.50	24.47	0.280	2.90	0.546	332.660	1680.96
GSM 1900	1.8502	30.50	21.47	0.140	4.30	0.378	230.144	3060.00
LTE 2	1.8550	25.00	25.00	0.316	4.30	0.851	518.800	3060.00
LTE 4	1.7150	25.00	25.00	0.316	4.30	0.851	518.800	3060.00
LTE 5	0.8290	25.00	25.00	0.316	2.90	0.617	375.837	1691.16
LTE 12	0.7040	25.00	25.00	0.316	2.90	0.617	375.837	1436.16
LTE 13	0.7795	25.00	25.00	0.316	2.90	0.617	375.837	1590.18
LTE 25	1.8500	25.00	25.00	0.316	4.30	0.851	518.800	3060.00
LTE 26	0.8140	25.00	25.00	0.316	2.90	0.617	375.837	1660.56
LTE 66	1.7100	25.00	25.00	0.316	4.30	0.851	518.800	3060.00
LTE 85	0.6980	25.00	25.00	0.316	2.90	0.617	375.837	1423.92

Tech-Band	Freq-Low _[GHz]	EIRP _[W]	ERP _[W]	ERP _[mW]	Threshold ERP _[W]	FCC 1.1307(b)(3)(i)(c) ERP-Threshold- Ratio
mmWave radio	57.0000	0.015	0.010	9.661	0.77	0.0126

The worst case of RF exposure involves simultaneous transmission between LTE B85 and mmWave radio.
 TER (Total Exposure Ratio) = 0.2639 + 0.0126 = 0.2765
 Based on this TER value, the EUT qualifies for an RF exposure exemption.

6 Revision History

Date	Report Name	Changes to report	Prepared by
2023-11-27	EMC_TELI2_011_23001_FCC_ISSED_RF_Exposure	Initial Release	Cheng Song
2024-01-22	EMC_TELI2_011_23001_FCC_ISSED_RF_Exposure_R ev1	Updated Section 5.1, 'Analysis of RF Exposure', to include the duty cycle correction factor.	Cheng Song
2024-01-26	EMC_TELI2_011_23001_FCC_ISSED_RF_Exposure_R ev2	Deleted the test results for LTE Bands 8 and 71.	Cheng Song
2024-02-06	EMC_TELI2_011_23001_FCC_ISSED_RF_Exposure_R ev3	Update radar antenna info and radar EIRP result	Guangcheng Huang

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