

Assessment report

471457-3R1ARFWL

Date of issue: September 1, 2022

Applicant:

Avnet, Inc.

Product:

Azure Sphere MT3620 Module

Model:

AES-MS-MT3620-M-G-3

FCC ID:

2AF62-AVT3620C3

IC ID:

21571-AVT3620C3

Type of assessment:

MPE Calculation Report

Specifications:

- ◆ FCC 47 CFR Part 1 Subpart I, §§1.1307, 1.1310
- ◆ FCC 47 CFR Part 2 Subpart J, §2.1091
- ◆ KDB 447498 D01 General RF Exposure Guidance v06
- ◆ RSS-102 Issue 5 Amendment 1, (February 2021)

Lab and test locations

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Reviewed by	James Cunningham, EMC/MIL/WL Supervisor
Review date	September 1, 2022
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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Section 1 Declaration

RSS-102 Annex B - Declaration of RF exposure compliance:

Attestation:

I attest that the information provided in Annex A is correct; that the Technical Brief was prepared, and the information contained therein is correct; that the device evaluation was performed and/or supervised by me; that the applicable measurement methods and evaluation methodologies have been followed; and that the device meets the SAR and/or RF field strength limits of RSS-102.

Date of issue: August 25, 2022

Martha Espinoza, Wireless Test Engineer

Prepared by



Signature

Section 2 Evaluation summary

2.1 MPE exemption for stand-alone transmission

2.1.1 References, definition, and limits

FCC §2.1091(d)

- (2) For operations within the frequency range of 300 kHz and 6 GHz (inclusive), the limits for maximum permissible exposure (MPE), derived from the whole-body SAR limits and listed in Table 1 in paragraph (e)(1) of this section, may be used instead of whole-body SAR limits as set forth in paragraphs (a) through (c) of this section to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b) of this part, except for portable devices as defined in §2.1093 of this chapter as these evaluations shall be performed according to the SAR provisions in §2.1093.

Table 2.1-1: Table 1 to §1.1310(e)(1)—Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) 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
300–1500			f / 300	<6
1500–100000			5	<6
(ii) 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
1500–100000			1.0	<30

Notes: f = frequency in MHz. * = Plane-wave equivalent power density.

RSS-102, Section 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance)
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $0.031f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

Equation from Page 18 of OET Bulletin 64, Edition 97-01:

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

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)

2.1.2 EUT technical information

Operational frequency	CH36: 5180 MHz; CH44: 5220 MHz; CH48: 5240 MHz; CH52: 5260 MHz; CH60: 5300 MHz; CH64: 5320 MHz; CH100: 5500 MHz; CH124: 5620 MHz; CH144: 5720 MHz; CH149: 5745 MHz; CH157: 5785 MHz; CH165: 5825 MHz
Antenna type	Chip Antenna Integrated
Antenna gain	5.2 dBi
Number of antennas	1
Maximum transmitter conducted power	13.99 dBm (25.06109 mW)
Maximum EIRP	19.19 dBm (82.98501 mW)

2.1.3 MPE exemption calculations

Fundamental transmit (prediction) frequency:	<u>5260</u> MHz	
Maximum measured conducted peak output power:	<u>13.99</u> dBm	
Cable and/or jumper loss:	<u>0</u> dB	
Maximum peak power at antenna input terminal:	<u>13.99</u> dBm	
Tx On time:	<u>100.000</u> ms	
Tx period time:	<u>100.000</u> ms	
Average factor:	<u>100</u> %	
Maximum calculated average power at antenna input terminal:	<u>25.06109</u> mW	
Single Antenna gain (typical):	<u>5.2</u> dBi	
Number of antennas:	<u>1</u>	
Total system gain:	<u>5.20</u> dBi	
	FCC limit:	ISED limit:
MPE limit for uncontrolled exposure at prediction frequency:	<u>1.000000</u> mW/cm ²	<u>0.914234</u> mW/cm ²
	<u>10.000000</u> W/m ²	<u>9.142336</u> W/m ²
Minimum calculated prediction distance for compliance:	<u>20</u> cm	<u>20</u> cm
Typical (declared) distance:	<u>20</u> cm	<u>20</u> cm
Average power density at prediction frequency:	<u>0.016509</u> mW/cm ²	<u>0.016509</u> mW/cm ²
	<u>0.165094</u> W/m ²	<u>0.165094</u> W/m ²
Margin of Compliance:	<u>17.82</u> dB	<u>17.43</u> dB
Maximum allowable antenna gain:	<u>23.02</u> dBi	<u>22.63</u> dBi

2.1.4 Verdict

The calculation is below the limit; therefore, the product is compliant with the RF exposure requirements for the declared distance.