

RF EXPOSURE REPORT



FCC Applicant: Motive Technologies, Inc.
55 Hawthorne St., Suite 400, San Francisco, CA 94105

FCC Manufacturer: Quanta Computer Inc.
No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City
33377, Taiwan

ISED Applicant: Motive Technologies, Inc.
55 Hawthorne St., Suite 400, San Francisco, CA 94105

ISED Manufacturer: Quanta Computer Inc.
No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City
33377, Taiwan

Product Name: Asset Gateway

Brand Name: Motive

FCC Model No.: AG-55

ISED Model No.: AG-55B

Model Difference: N/A

Report Number: TESA2207000224ES

FCC ID 2AQM7-AG55B

IC: 24516-AG55B

Issue Date: Aug. 26, 2022

Date of EUT Received: Jul. 21, 2022

Approved By

John Yeh

John Yeh

We hereby certify that:

The above equipment was evaluate by SGS Taiwan Ltd. The evaluation in this report is in compliance with FCC Rule Part §1.1307 and RSS-102.

The results of this report relate to the specific sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2207000224ES	00	Original.	Aug. 26, 2022	Yami Kuo	

Note:

- 1、The remark "" indicates modification of the report upon requests from certification body.

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	Asset Gateway
Brand Name:	Motive
FCC Model No.:	AG-55
ISED Model No.:	AG-55B
Model Difference:	N/A
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	BLE: ATY-TWC-K4P WWAN: ATY-TKR-KKQ
Power Supply:	3.6Vdc from Rechargeable Li-polymer Battery

1.2 Evaluation site

Laboratory		Site Address	FCC Designation number	ISED Company Number	CAB Identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	<input checked="" type="checkbox"/>	No. 134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, 24803, Taiwan.	TW0027	4620A	TW3702
	<input type="checkbox"/>	No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 333 Taiwan.	TW0028	4620E	
	<input type="checkbox"/>	1F, No. 8, Alley 15, Lane 120, Sec. 1, Nei Hu Road, Nei Hu District, Taipei City, 222 Taiwan.	TW0029	23862	

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2 DETERMINATION OF MPE EXEMPTION

2.1 FCC

2.1.1 Single RF Source

As per §1.1307(b)(3)(i),

- (A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);
- (B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Note: when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption thresholds.

- (C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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**Table 1 to § 1.1307(b)(3)(i)(C) –
Single RF Sources Subject to Routine Environmental Evaluation**

RF Source frequency (MHz)			Minimum Distance			Threshold ERP (W)
fL		fH	$\lambda L / 2\pi$		$\lambda H / 2\pi$	
0.3	-	1.34	159m	-	35.6m	1920 R ²
1.34	-	30	35.6m	-	1.6m	3450 R ² /f ²
30	-	300	1.6m	-	159mm	3.83 R ²
300	-	1500	159mm	-	31.8mm	0.0128 R ² f
1500	-	100000	31.8mm	-	0.5mm	19.2R ²

R= minimum separation distance in meter

f = frequency in MHz

2.1.2 Multiple RF Sources

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.

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

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2.1.3 Single RF Source Evaluation Results

Chain 0	Frequency (MHz)	Max. tune-up power (dBm)	Peak gain (dBi)	ERP (dBm)	ERP (W)	Permissible Minimum separation distance ($\lambda/2\pi$) (m)	R = actual Minimum separation distance(m)	ERP _{th} (W)	ERP/ERP _{th}	Simultaneous transmission modes						
										1	2	3	4	5	6	7
WWAN NB-IOT Band 2	1850.1	22.57	5.36	25.78	0.378	0.0258	0.200	0.768	0.492	V						
WWAN NB-IOT Band 4	1710.1	22.75	4.3	24.9	0.309	0.0279	0.200	0.768	0.402							
WWAN NB-IOT Band 5	848.9	22.51	-1.63	18.73	0.075	0.0563	0.200	0.435	0.172							
WWAN NB-IOT Band 12	699.1	23.41	-0.36	20.9	0.123	0.0683	0.200	0.358	0.344							
WWAN NB-IOT Band 13	777.1	22.83	0.18	20.86	0.122	0.0615	0.200	0.398	0.307							
WWAN NB-IOT Band 26	848.9	22.87	-1.63	19.09	0.081	0.0563	0.200	0.435	0.186							
WWAN NB-IOT Band 26 / Part 90	814.1	22.73	-1.68	18.9	0.078	0.0587	0.200	0.417	0.187							
WWAN CAT-M1 Band 2	1880	22.3	5.36	25.51	0.356	0.0254	0.200	0.768	0.464	V						
WWAN CAT-M1 Band 4	1732.5	22.47	4.3	24.62	0.290	0.0276	0.200	0.768	0.378							
WWAN CAT-M1 Band 5	846.5	22.36	-1.63	18.58	0.072	0.0564	0.200	0.433	0.166							
WWAN CAT-M1 Band 12	711	22.81	-0.36	20.3	0.107	0.0672	0.200	0.364	0.294							
WWAN CAT-M1 Band 13	782	23.12	0.18	21.15	0.130	0.0611	0.200	0.400	0.325							
WWAN CAT-M1 Band 26	829	22.3	-1.63	18.52	0.071	0.0576	0.200	0.424	0.167							
WWAN CAT-M1 Band 26 / Part 90	821.5	22.35	-1.68	18.52	0.071	0.0582	0.200	0.421	0.169							
BLE	2402	7.46	3.01	8.32	0.007	0.0199	0.200	0.768	0.009	V	V					

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the minimum separation distance of that band. All the single RF source results (P or ERP) are less than their corresponding threshold (P_{th} or ERP_{th}), so they are exempt from RF exposure evaluation.

2.1.4 Multiple RF Sources Evaluation Results

Simultaneous transmission modes	Σ ERP/ERP _{th}	Criteria
1	0.501	1
2	0.473	1

Note:

1. Σ (ERP/ERP_{th}): This is a summation of [(ERP of RF source / exemption threshold ERP for RF source)].

Considering the collocated transmitters, the aggregated (ERP/ERP_{th}) is smaller than 1, and MPE of collocated transmitters is compliant

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2.2 ISED

Exemption Limits for Routine Evaluation – RF Exposure Evaluation

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 1W (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 $1.31 \times 10^{-2} f^{0.6834}W$ (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).

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2.2.1 Exemption evaluation for RF exposure

Operation Mode	Evaluation Frequency (MHz)	Max. output Power include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (W)	Limit (W)	Max.EIRP/Limit	Pass / Fail	Simultaneous transmission modes						
								1	2	3	4	5	6	7
WWAN NB-IOT Band 2	1850.10	22.57	5.36	0.62	2.239	0.277	Pass	V						
WWAN NB-IOT Band 4	1710.10	22.75	4.30	0.51	2.122	0.240	Pass							
WWAN NB-IOT Band 5	848.90	22.51	-1.63	0.12	1.315	0.091	Pass							
WWAN NB-IOT Band 12	699.10	23.41	-0.36	0.20	1.151	0.174	Pass							
WWAN NB-IOT Band 13	777.10	22.83	0.18	0.20	1.238	0.162	Pass							
WWAN NB-IOT Band 26	848.90	22.87	-1.63	0.13	1.315	0.099	Pass							
WWAN NB-IOT Band 26 / Part 90	814.10	22.73	-1.68	0.13	1.278	0.102	Pass							
WWAN CAT-M1 Band 2	1880.00	22.3	5.36	0.58	2.264	0.256	Pass		V					
WWAN CAT-M1 Band 4	1732.50	22.47	4.30	0.48	2.141	0.224	Pass							
WWAN CAT-M1 Band 5	846.50	22.36	-1.63	0.12	1.312	0.091	Pass							
WWAN CAT-M1 Band 12	711.00	22.81	-0.36	0.18	1.165	0.155	Pass							
WWAN CAT-M1 Band 13	782.00	23.12	0.18	0.21	1.243	0.169	Pass							
WWAN CAT-M1 Band 26	829.00	22.3	-1.63	0.12	1.294	0.093	Pass							
WWAN CAT-M1 Band 26 / Part 90	821.50	22.35	-1.68	0.12	1.286	0.093	Pass							
BLE	2402.00	7.46	3.01	0.01	2.676	0.004	Pass	V	V					

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

2.2.2 Exemption evaluation for simultaneous transmission

Simultaneous transmission modes	Σ Max.EIRP/Limit	Criteria
1	0.281	1
2	0.260	1

Note:

1. Σ (EIRP / Limit): This is a summation of [(EIRP for each transmitter/antenna included in the simultaneous transmission) / (corresponding exemption limit)].
2. Considering the collocated transmitters, the summation of (EIRP /limit) is smaller than 1, so the MPE of simultaneous transmission is compliant.

~ End of Report ~

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