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Angel Aerial Systems, Inc.

SAR EXEMPTION REPORT

SCOPE OF WORK

SAR EXEMPTION CALCULATION
ON THE GROUND CONTROLLER ANGEL AERIAL SYSTEMS

REPORT NUMBER

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SAR EXEMPTION TEST REPORT

Report Number: 106417534LEX-003.5

Project Number: G106417534

Report Issue Date: 4/3/2026

Product Name: Ground Controller Angel Aerial Systems
Model V1.0

Standards: FCC Part 2.1093
RSS-102 Issue 6

Tested by:
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Client:
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1 Introduction and Conclusion

SAR exemption calculations were performed on the product constructed as described in section 4. Information provided by the client including maximum output power, antenna gain(s), and minimum separation distance(s) was used to determine if the product under evaluation was exempt from SAR. Any change in these stated values may invalidate these results. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product under evaluation is **exempt** from SAR requirements for each of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) evaluated. Intertek does not make any claims of compliance for samples or variants which were not evaluated.

2 Test Summary

Section	Requirement	Result
6	FCC SAR Exemption Criteria (FCC Title 47 CFR Part 1.1307, 2.1093)	Exempt from SAR
7	ISED SAR Exemption Criteria (RSS-102 Issue 6)	Exempt from SAR



3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	Angel Aerial Systems, Inc.
Address:	10385 Spartan Dr. Cincinnati, OH 45215 USA
Contact:	Dennis Krause
Telephone:	513-604-8166
Email:	Dennis@angelaerialsystems.com
Manufacturer Information	
Manufacturer Name:	Angel Aerial Systems, Inc.
Manufacturer Address:	10385 Spartan Dr. Cincinnati, OH 45215 USA



4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	Ground Controller Angel Aerial Systems
Model Number	V1.0
Embedded Module(s)	Microhard pMDDL2450 OEM Microhard HP900 OEM WiFi
FCC ID	pMDDL2450: 2BUWQ18PMDDL2450 HP900: 2BUWQHP900 WiFi: 2BUWQ-MT7922A12L
Wireless Technology	pMDDL2450: 2.4 GHz 2x2 MIMO HP900: 900 MHz FHSS (ISM band) WiFi: WiFi 5 GHz Band (802.11a/n/ac/ax)
Supported Transmit Bands	pMDDL2450: 2.4GHz (2400-2483.5 MHz ISM band) HP900: 902-928MHz WiFi 5 GHz: 5180–5320 MHz
Rated RF Output Power	pMDDL2450: 21dBm* HP900: 30 dBm WiFi: 17.87 dBm
Antenna(s) and Gain	pMDDL2450APA-M25: 8 dBi HP900: AANE-WH-0039-1: 1.8 dBi WiFi: AYP6Y-100242: 2.48 dBi
Description of Equipment Under Test (provided by client)	
The Ground Control Station (GCS) is a portable handheld device used to control and monitor the UAV system. It incorporates certified RF modules operating in the 900 MHz and 2.4 GHz bands for command, control, telemetry, and video transmission. The RF modules are permanently installed with integrated antennas. The device is intended for handheld use by trained operators during normal operation. Simultaneous transmission of multiple radios may occur.	

*Angel Aerial has stated that the 30dBm module (pMDDL2450) has been reduced to 21dBm.

4.1 Variant Models:

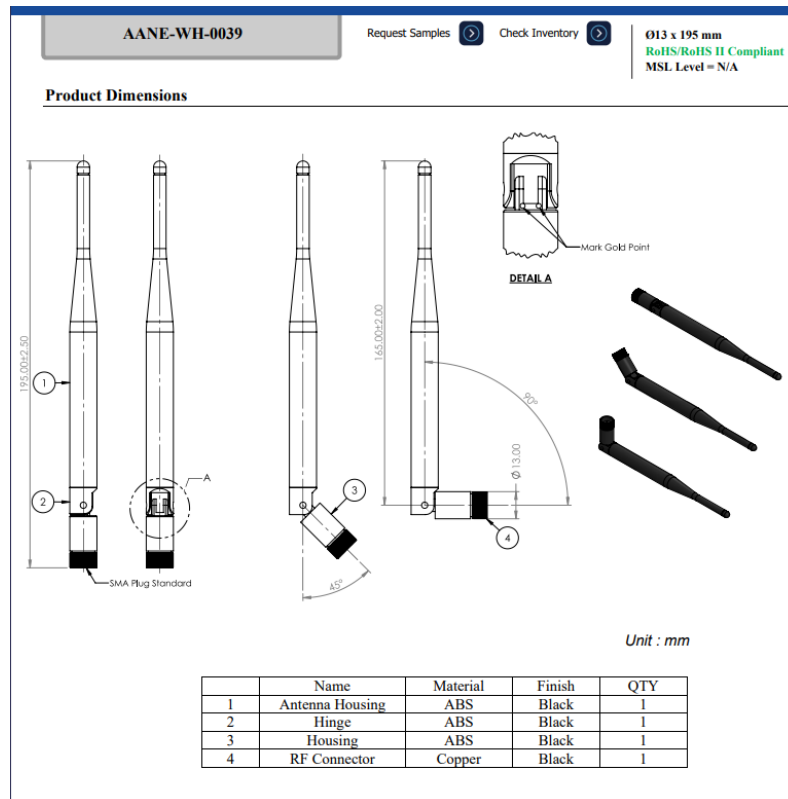
There were no variant models covered by this evaluation.



4.2 Antenna Separation

The following information was provided by Angel Aerial Systems, Inc. and may affect compliance. Intertek does not make any claims of compliance for values other than those shown below.

Embedded Modules	Frequency (GHz)	Declared Separation Distance (cm)
NS9HP900	0.928	14.1
NS918PMDDL2450	2.480	10.2
RAS-MT7922A12L	5.825	6.6



The 902–928 MHz antenna (Abracon AANE-WH-0039-2), the manufacturer datasheet specifies an overall antenna length of 195 mm. Over the 902–928 MHz band, $\lambda/4$ is approximately 80.8 to 83.1 mm.



DETAILS	MORE INFORMATION	REVIEWS (4)
Manufacturer	Alfa Network	
SKU	APA-M25	
EAN	4718050302390	
Wi-Fi Frequency	2.4 Ghz, 5 Ghz	
Antenna Type	Directional	
Antenna Gain	2.4GHz (8) dBi, 5GHz (10) dBi	
Antenna Connector	RP-SMA Male	
Polarization	Linear	
Environment	Indoor	
VSWR	< 2.0	
Dimensions	167.3x66x18 mm	
Mount Type	Screw-on	
Material	Plastic	

The 2.4 GHz antenna (ALFA APA-M25), the manufacturer dimensions are $167.3 \times 66 \times 18$ mm. Using the maximum physical dimension of 167.3 mm as the antenna length, over the 2.4 GHz band $\lambda/4$ is approximately 30.2 to 31.2 mm.



4.3 Duty Cycle

The following information was provided by Angel Aerial Systems, Inc. and may affect compliance. Intertek does not make any claims of compliance for values other than those shown below.

Embedded Module(s)	Frequency (GHz)	Declared Duty Cycle
NS9HP900	0.928	100%
NS918PMDDL2450	2.480	100%
RAS-MT7922A12L	5.825	100%



4.4 Maximum Output Power

4.4.1 NS9HP900 (900MHz)

The following information was provided by UltraTech's File No.: 19MCRS108_FCC15C247 and may affect compliance. Intertek does not make any claims of compliance for values other than those shown below.

Transmitter Test Signals	
Frequency Band(s):	902.4 – 927.65 MHz
Frequency(ies) Tested: (Near lowest, near middle & near highest frequencies in the frequency range of operation.)	902.4 MHz, 903.0 MHz, 914.9 MHz, 915.0 MHz 927.5 MHz, 927.6 MHz, 927.65 MHz
RF Power Output: (measured maximum output power at antenna terminals)	30 dBm, 1 W (conducted)
Normal Test Modulation:	GFSK
Modulating Signal Source:	Internal

4.4.2 NS918PMDDL2450 (2.4GHz)

The following information was provided by Operating Manual pMDDL2450 Document Revision: 2.2.8 MICROHARD and may affect compliance. Intertek does not make any claims of compliance for values other than those shown below.

TX Power	
This setting establishes the transmit power level which will be delivered to the antenna connector(s) of the pMDDL. Unless required, the Tx Power should be set not for maximum, but rather for the minimum value required to maintain an adequate system fade margin. TX Power reflects the Total RF power for the pMDDL. In MIMO mode this means that the total RF power is split between antenna interfaces. When MIMO is disabled a total of 30 dBm can be presented to the ANT 1 Antenna.	Values (selection) 7 - 30 dBm (1 dBm increments) 20 (Default)

*Customer has stated that the output power was reduced to 21dBm.



4.4.3 RAS-MT7922A12L (5GHz)

The following information was provided by Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch; Report No.: RFBARR-WTW-P21060023U-6 and may affect compliance. Intertek does not make any claims of compliance for values other than those shown below.

Table 4: The Measured Conducted Output Power

Frequency Band (MHz)	MAX. Power		MIN. Power	
	Output Power (mW)	Output Power (dBm)	Output Power (mW)	Output Power (dBm)
5250~5350	197.703	22.96	49.659	16.96
5470~5725	243.885	23.87	61.235	17.87



5 Antenna Gain

5.1 APA-M25 Antenna (with NS918PMDDL2450 Radio)

The antenna gain power for the APA-M25, was taken from Alfa Networks Inc. APA-M25 2.4GHz/5GHz Dual-Band High-Gain Indoor Panel Antenna Datasheet. Deviations from the values below may affect compliance. Intertek does not make any claims of compliance for values other than shown below.

Specification

Electrical	
Frequency:	2.4 ~ 2.5GHz 5.150 ~ 5.875GHz
V.S.W.R:	2.0:1 Max
Antenna Type:	Patch Directional
Gain:	8 dBi @ 2.4GHz 10dBi @ 5GHz
Polarization:	Linear, Vertical
Vertical Beam-with:	16 degree
Horizontal Beam-with:	66 degree

5.2 AANE-WH-0039-1 (with NS9HP900 Radio)

The antenna gain power for the AANE-WH-0039-1, was taken from ABRACON, AANE-WH-0039-1 Datasheet, Electrical Specification. Deviations from the values below may affect compliance. Intertek does not make any claims of compliance for values other than shown below.

Electrical Specification

Parameter	Specification		Unit
Operating Frequency	Europe (863-870 MHz)	US (902-928 MHz)	MHz
VSWR(Typ.)	2.0		
Peak Gain	1.3	1.8	dBi
Maximum Efficiency	85.6	83.8	%
Average Efficiency	81	77	%
Impedance	50		Ω
Polarization	Linear		
Radiation Pattern (Azimuth)	Omni-directional		
Max Power - Ambient 25°C	5		W

**5.3 AYP6Y-100242 (with RAS-MT7922A12L Radio)**

The antenna gain power for the AYP6Y-100242, was taken from Bureau Veritas Consumer Products Services (H.K.) Ltd., Report No.: RJBARR-WTW-P25080328A. Deviations from the values below may affect compliance. Intertek does not make any claims of compliance for values other than shown below.

Ant. Set	Brand	Main/Aux	Model	Peak gain with cable loss	Cable Loss	Antenna Type	Connector Type	Cable Length (mm)
35	AWAN	Main	DC33001WH10 (AYP5Y-100004)	1.93dBi @ 2.4GHz 2.85 dBi @ 5GHz 2.72 dBi @ 5.925~6.425GHz 2.9 dBi @6.425~6.525GHz 2.9 dBi @6.525~6.875GHz 2.73 dBi @6.875~7.125GHz	1.52dB @ 2.4GHz 2.46 dB @ 5GHz 2.62 dB @ 5.925~6.425GHz 2.65 dB @6.425~6.525GHz 2.74 dB @6.525~6.875GHz 2.81 dB @6.875~7.125GHz	PIFA	I-PEX	431
		Aux	DC33001WH20 (AYP5Y-100005)	1.60 dBi @ 2.4GHz 2.33 dBi @ 5GHz 2.92 dBi @ 5.925~6.425GHz 1.88 dBi @6.425~6.525GHz 1.85 dBi @6.525~6.875GHz 0.86 dBi @6.875~7.125GHz	1.40dB @ 2.4GHz 2.14 dB @ 5GHz 2.42 dB @ 5.925~6.425GHz 2.44 dB @6.425~6.525GHz 2.53 dB @6.525~6.875GHz 2.60 dB @6.875~7.125GHz			412
...		Main	DC33001WH50 (AYP6Y-100242)	1.86 dBi @ 2.4GHz 2.48 dBi @ 5GHz 2.65 dBi @ 5.925~6.425GHz 2.32 dBi @6.425~6.525GHz 2.32 dBi @6.525~6.875GHz 2.45 dBi @6.875~7.125GHz	1.30 dB @ 2.4GHz 1.94dB @ 5GHz 2.17 dB @ 5.925~6.425GHz 2.20 dB @6.425~6.525GHz 2.27 dB @6.525~6.875GHz 2.33 dB @6.875~7.125GHz			432.5



6 FCC SAR Exemption Criteria

FCC Title 47 CFR Part 1.1307(3)(i):

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

- (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);

- (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).

**GENERAL RF EXPOSURE TEST EXEMPTION GUIDANCE (447498 D04 Interim General RF Exposure Guidance v01):****2.1 RF Exposure Test Exemptions for Single Source****2.1.1 General RF Exposure Test Exemption Considerations**

RF exposure test exemptions provide means to obtain certification without the need of showing data (measurements, or analytical/numerical modeling) to demonstrate compliance. Hereafter, in this context, an RF source is referred to as “exempt RF device” [Glossary] in the sense that it is not required to show data demonstrating compliance to RF exposure limits.

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.⁸ However, it is always possible, especially when the potential for exposure cannot be easily determined, that an RF exposure evaluation may become required according §§ 1.1307(c) and (d).

As detailed in Section 2.1.2, the 1-mW and SAR-based test exemption conditions are in terms of source-based available maximum time-averaged (matched conducted) output power for all operating configurations, adjusted for tune-up tolerance, and at the minimum test separation distance [Glossary] required for the particular RF exposure scenario under consideration. This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.

To qualify for SAR test exemption, the test separation distances applied must be fully explained and justified (typically in the SAR measurement, or SAR analysis report, according to KDB Pub. 865664) by showing the actual operating configurations and exposure conditions of the transmitter, and applicable host platform requirements (e.g., KDB Pubs. 648474, 616217, 941225)

When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for SAR test exemption. If RF exposure testing requirements for a specific device are covered in a KDB publication, those requirements must be satisfied before applying any SAR test exemption provisions. For example, this is the case for handheld PTT two-way radios, handsets, laptops, and tablets, etc.⁹ Finally, 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.

⁸ Specific test exemption thresholds for operations under occupational/controlled limits are not established.

⁹ When SAR evaluation is required by the hotspot mode or UMPC mini-tablet procedures, that is, where an antenna is ≤ 2.5 cm from a surface or edge, the test separation distance from the phantom to the antenna or device enclosure, as appropriate, shall be applied to determine SAR test exemption for such configurations, according to the criteria in this document. For that case, the test separation distance cannot be determined from the distance of the antenna to the device surface or edge.



6.1 ERP VS Conducted Output Power Determination

Frequency (GHz)	Radio Output Power (dBm)	Antenna Gain (dbi)	Total EIRP (dBm)	Total ERP (dBm)
0.902*	30	1.8	31.8	29.65
2.460 (Tx Chain 1)*	21	8	29	26.85
2.460 (Tx Chain 2)*	21	8	29	26.85
5.825*	17.87	2.48	20.35	18.2

6.2 Exclusion Calculation

Frequency (GHz)	Separation Distance (cm)	Time Average Output Power (mW)	ERP (mW)	P _{th} (mW)	Limit Ratio (Percentage)	Exempt from SAR?
0.902*	14.1	1000	-	2757.29	36.3%	Yes
2.460 (Tx Chain 1)*	10.2	-	484.17	2124.01	22.8%	Yes
2.460 (Tx Chain 2)*	10.2	-	484.17	2124.01	22.8%	Yes
5.825*	6.6	-	66.07	753.79	8.8%	Yes
					Total = 90.7%	Yes

*Worst case frequency range was chosen for the calculation.



7 ISED SAR Exemption Criteria

RSS-102 Issue 6 § 6.3: SAR exemption limits

Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance

Frequency (MHz)	≤ 5 mm (mW)	10 mm (mW)	15 mm (mW)	20 mm (mW)	25 mm (mW)	30 mm (mW)	35 mm (mW)	40 mm (mW)	45 mm (mW)	> 50 mm (mW)
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

The exemption limits in Table 11 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 50 mm from a flat phantom, which provides a SAR value of approximately 0.4 W/kg for 1 g of tissue.

For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluation in table 11 are multiplied by a factor of 2.5.

For controlled-use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in table 11 are multiplied by a factor of 5.

When the operating frequency of the device is between two frequencies located in table 11, linear interpolation shall be applied for the applicable separation distance. If the separation distance of the device is between two distances located in table 11, linear interpolation may be applied for the applicable frequency. Alternatively, the limit corresponding to the smaller distance may be employed. For example, in case of a 7 mm separation distance, either use the exception value for a 5 mm separation distance or interpolate between the limits corresponding to 5 mm and 10 mm separation distances



7.1 ERP VS Conducted Output Power Determination

Frequency (GHz)	Radio Output Power (dBm)	Antenna Gain (dbi)	Total EIRP (dBm)	Total ERP (dBm)
0.902*	30	1.8	31.8	29.65
2.460 (Tx Chain 1)*	21	8	29	26.85
2.460 (Tx Chain 2)*	21	8	29	26.85
5.825*	17.87	2.48	20.35	18.2

7.2 Exclusion Calculation

Frequency (GHz)	Time Average Output Power (mW)	ERP (mW)	Separation Distance (mm)	P _{th} 10-g Extremity (mW)	SAR estimated (W/kg)	Limit Ratio (Percentage)	Exempt from SAR?
0.902*	1000	-	141	748.9	0.534	33.4%	Yes
2.460 (Tx Chain 1)*	-	484.17	102	610.4	0.317	19.8%	Yes
2.460 (Tx Chain 2)*	-	484.17	102	610.4	0.317	19.8%	Yes
5.825*	-	66.07	66	320.0	0.082	5.1%	Yes
						Total = 78.1%	Yes

*Worst case frequency range was chosen for the calculation.

$$SAR_{estimated} = \frac{P_{max}}{P_{max,exemption}} \times 0.25 \times SAR_{limit} \text{ W/kg}$$



8 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	2/11/2026	106417534LEX-003	LAR	MC	Original Issue
1	2/25/2026	106417534LEX-003.1	LAR	MC	FCC ID change
2	3/11/2026	106417534LEX-003.2	LAR	MC	HP900 antenna max output change
3	3/26/2026	106417534LEX-003.3	LAR	JP	Changed NS9HP900 duty cycle from 25% to 100%
4	3/26/2026	106417534LEX-003.4	LAR	JP	Changed NS918PMDDL2450 duty cycle from 25% to 100% and reduced the output power to 21dBm
5	4/3/2026	106417534LEX-003.5	LAR	JP	Calculation adjustment for worst case scenario. Added FCC Title 47 CFR Part 1.1307(3)(i): (c) Added GENERAL RF EXPOSURE TEST EXEMPTION GUIDANCE (447498 D04 Interim General RF Exposure Guidance v01)