



RF Exposure Evaluation Report

FCC 47 CFR § 2.1091

for 77G Side Radar

Model Name.: ARS-DA03

Prepared for:

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Prepared by

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 Project No.:
 TM-2406000153P
 Page 2 / 14

 Report No.:
 TMWK2406001952KS
 Rev.: 04

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	October 04, 2024	Initial Issue	ALL	Allison Chen
01	December 09, 2024	See the following Note Rev.(01)	ALL	Allison Chen
02	December 25, 2024	See the following Note Rev.(02)	P.7, 12, 13	Allison Chen
03	December 30, 2024	See the following Note Rev.(03)	P.7, 12, 13	Allison Chen
04	December 31, 2024	See the following Note Rev.(03)	P.7, 12	Allison Chen

Note:

Rev.(01)

1. Modify antenna specification, frequency range in section 3.2 and test data in section 5 and 6.1.

Rev.(02)

- 1. Modify antenna specification, max. tune-up power (dBm) in section 3.2 and test data in section 5 and 6.1. **Rev.(03)**
- 1. Modify antenna specification, max. tune-up power (dBm) in section 3.2 and test data in section 5 and 6.1. **Rev.(04)**
- 1. Modify antenna specification, max. tune-up power (dBm) in section 3.2 and test data in section 5.



 Project No.:
 TM-2406000153P
 Page 3 / 14

 Report No.:
 TMWK2406001952KS
 Rev.: 04

Table of Contents

1	AT	TESTATION OF TEST RESULTS	4
2	TES	ST SPECIFICATION, METHODS AND PROCEDURES	5
3	DE	VICE UNDER TEST (DUT) INFORMATION	6
	3.1	DUT DESCRIPTION	6
	3.2	WIRELESS TECHNOLOGIES	7
4	MA	XIMUM PERMISSIBLE EXPOSURE	8
	4.1	LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)	8
	4.2	MPE CALCULATION METHOD	g
	4.3	MPE EXEMPTION	10
	4.4	MULTIPLE RF SOURCES	11
5	MP	E EXEMPTION OPTION C	12
6	SIN	IULTANEOUS TRANSMISSION ANALYSIS	13
	6.1	SUM OF THE 77G SIDE RADAR	13
7	FΔ(CILITIES	14



Project No.: TM-2406000153P Page 4 / 14
Report No.: TMWK2406001952KS Rev.: 04

1 Attestation of Test Results

Applicant Name	Alpha Networks Inc.
Model Name	ARS-DA03
Applicable Standards	FCC 47 CFR § 2.1091 FCC 47 CFR § 1.1307 FCC 47 CFR § 1.1310 Published RF exposure KDB procedures
Receive EUT Date:	June 13, 2024

Compliance Certification Services Inc., tested the above equipment in accordance with the requirements set forth in the above standards. Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainy. All indications of Pass/Fail in this report are opinions expressed by Compliance Certification Services Inc, based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved & Released By:

Sky Zhou

Asst. Section Manager

Compliance Certification Services Inc.



Project No.: TM-2406000153P Page 5 / 14
Report No.: TMWK2406001952KS Rev.: 04

2 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1091, the following FCC Published RF exposure KDB procedures:

- o 447498 D04 Interim General RF Exposure Guidance v01
- o 865664 D02 RF Exposure Reporting v01r02



 Project No.:
 TM-2406000153P
 Page 6 / 14

 Report No.:
 TMWK2406001952KS
 Rev.: 04

3 Device Under Test (DUT) Information

3.1 DUT Description

Product	77G Side Radar
Trade Name	ALPHA
Model No.	ARS-DA03
Model Discrepancy	N/A
Hardware Version	ARS-SA01B: 2A4G, ARS-SA07: 1A1G
Software Version	0000001620.56202
Sample Stage	Identical prototype



 Project No.:
 TM-2406000153P
 Page 7 / 14

 Report No.:
 TMWK2406001952KS
 Rev.: 04

3.2 Wireless Technologies

3.2 Wireless	s Technologies						
	Bluetooth: 2402MHz-2480MHz						
	☐ 802.11b/g/n HT20: 2412MHz ~ 2462 MHz						
	☐ 802.11n HT40: 2422MHz ~ 2452 MHz						
	☐ 802.11a/n HT20: 5180MHz ~ 5240MHz / 5260 ~ 5320MHz /						
	5500 ~ 5700MHz / 5745MHz ~ 5825MHz						
	☐ 802.11n HT40: 5190 MHz ~ 5230 MHz / 5270 MHz ~ 5310 MHz /						
	5510 MHz ~ 5670 MHz / 5755 MHz ~ 5795MHz						
_	☐ 802.11ac VHT20: 5180MHz ~ 5240MHz / 5260 ~ 5320MHz /						
Frequency	5500 ~ 5700MHz / 5745MHz ~ 5825MHz						
Range	☐ 802.11ac VHT40: 5190 MHz ~ 5230 MHz / 5270 MHz ~ 5310 MHz /						
	5510 MHz ~ 5670 MHz / 5755 MHz ~ 5795MHz						
	☐ 802.11ac VHT80: 5210 MHz / 5290 MHz / 5530 MHz / 5775 MHz						
	□ 802.11ax HE20: 5180MHz ~ 5240MHz / 5260 ~ 5320MHz /						
	5500 ~ 5700MHz / 5745MHz ~ 5825MHz						
	□ 802.11ax HE40: 5190 MHz ~ 5230 MHz / 5270 MHz ~ 5310 MHz /						
	5510 MHz ~ 5670 MHz / 5755 MHz ~ 5795MHz						
	☐ 802.11ax HE80: 5210 MHz / 5290 MHz / 5530 MHz / 5775 MHz ☑ Others: 76.5-76.74 GHz						
	Z Othors. 10.0-10.14 Oriz						
Exposure	☐ Occupational/Controlled exposure						
classification	General Population/Uncontrolled exposure						
	·						
	Type: Patch Antenna						
	(4) A (1) (1) (1)						
	(1) Antenna model: ARS-SA01B/TX1, Gain: 18.69 dBi						
Antenna	·						
Specification	ARS-SA01B/TX2, Gain: 17.75 dBi						
	(2) Antenna model:						
	(2) Antenna model: ARS-SA07/TX5, Gain: 11.09 dBi						
	ARS-SA07/TX5, Gain: 11.09 dBi ARS-SA07/TX6, Gain: 11.94 dBi						
	AKS-SAUI/TAO, Galli. TT.94 UDI						
May Tune							
Max. Tune-up Power	Antenna model ARS-SA01B -10.00 dBm (0.100 mW)						
(dBm)	Antenna model ARS-SA07 -5.50 dBm (0.282 mW)						
(abiii)							

Notes:

- 1. For more details, please refer to the User's manual of the EUT.
- Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
- 3. The EIRP power referred the power of the test report TMWK2406001942KR for RF Exposure assessment purpose.



 Project No.:
 TM-2406000153P
 Page 8 / 14

 Report No.:
 TMWK2406001952KS
 Rev.: 04

4 Maximum Permissible Exposure

4.1 Limits for Maximum Permissible Exposure (MPE)

Table 1 - Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)					
(A) Limits for Occupational/Controlled Exposure									
0.3-3.0	614	1.63	* 100	6					
3.0-30	1842/f	4.89/f	* 900/f²	6					
30-300	61.4	0.163	1.0	6					
300-1,500			f/300	6					
1,500-100,000			5	6					
	(B) 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					
300-1,500			f/1500	30					
1,500-100,000			1.0	30					



Project No.: TM-2406000153P Page 9 / 14
Report No.: TMWK2406001952KS Rev.: 04

4.2 MPE Calculation Method

<u>Calculation</u>

Given

$$E = \frac{\sqrt{30 \times P \times G}}{d} \& S = \frac{E^2}{377}$$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

$$P(mW) = P(W) / 1000 \text{ and}$$

$$d(cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$
 Equation 1

Where

d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

If, Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$



Project No.: TM-2406000153P Page 10 / 14
Report No.: TMWK2406001952KS Rev.: 04

4.3 MPE EXEMPTION

- (A) The available maximum time-averaged power is no more than 1 mW
- (B) The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold *Pth* (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). *Pth* is given by:

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

Where

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

and

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

d = the separation distance (cm);

(C) 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).

Single RF Sources Subject to Routine Environmental Evaluation						
RF Source frequency (MHz) Threshold ERP (watts)						
0.3-1.34	1,920 R².					
1.34-30	3,450 R ² /f ² .					
30-300	3.83 R ² .					
300-1,500	0.0128 R ² f.					
1,500-100,000 19.2R ² .						
Note: R is in meters, f is in MHz.						



Project No.: TM-2406000153P Page 11 / 14
Report No.: TMWK2406001952KS Rev.: 04

4.4 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),

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



Project No.: TM-2406000153P Page 12/14

Report No.: TMWK2406001952KS Rev.: 04

MPE Exemption Option C

(1) Antenna model: ÀŔS SA01B

Frequency (MHz)	R(m)	Max Tune-up power (dBm)	G(dBi)	Max Tune-up EIRP (dBm)	Max Tune-up ERP (dBm)	Max Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
76500	0.2	-10	18.69	8.69	6.54	0.005	0.768	Complies

(2) Antenna model:

ARS-SA07

Frequency (MHz)	R(m)	Max Tune-up power (dBm)	G(dBi)	Max Tune-up EIRP (dBm)	Max Tune-up ERP (dBm)	Max Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
76500	0.2	-5.5	11.94	6.44	4.29	0.003	0.768	Complies



Project No.: TM-2406000153P Page 13 / 14
Report No.: TMWK2406001952KS Rev.: 04

6 Simultaneous Transmission Analysis

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),

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

	Item	Capable Transmit Configurations				
RF Exposure Condition	1	Antenna (ARS SA01B)	+	Antenna (ARS SA07)		

6.1 Sum of the 77G Side Radar

(1) Antenna model: ARS SA01B + ARS SA07

Antenna	Frequency (MHz)	Max Tune-up ERP(mW)	ERP Threshold(mW)	simultaneous Transmission	simultaneous Transmission Limit
ARS SA01B	76500	0.005	0.768	0.01	~1
ARS SA07	76500	0.003	0.768	0.01	≦1



 Project No.:
 TM-2406000153P
 Page
 14 / 14

 Report No.:
 TMWK2406001952KS
 Rev.:
 04

7 Facilities

All measurement facilities used to collect the measurement data are located at

⊠ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

END OF REPORT