



# RADIO EXPOSURE TEST REPORT

**FCC ID** : RCC-RAR720000

**Equipment** : 79G Millimeter Wave Radar

**Brand Name** : RoyalTek

**Model Name** : RAR-7200, RAR-7203

**Applicant** : RoyalTek Company Ltd.  
8th Floor, No. 40 Wenhwa 2nd Rd., Guishan Dist.,  
Tao Yuan City, 333010, Taiwan

**Manufacturer** : RoyalTek Company Ltd.  
8th Floor, No. 40 Wenhwa 2nd Rd., Guishan Dist.,  
Tao Yuan City, 333010, Taiwan

**Standard** : 47 CFR Part 2.1091

The product was received on Apr. 25, 2024, and testing was started from Apr. 25, 2024 and completed on Jul. 19, 2024. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: **Sam Chen**

**Sporton International Inc. Hsinchu Laboratory**

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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### Photographs of EUT v01





## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

**Conformity Assessment Condition:**

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

**Disclaimer:**

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: **Sam Chen**

Report Producer: **Sandy Chuang**



# 1 General Description

## 1.1 EUT General Information

For EUT 1:

RF General Information		
Frequency Range (GHz)	Operating Frequency (GHz)	Modulation
77-81	78.8~79.3	FMCW

For EUT 2~3:

RF General Information		
Frequency Range (GHz)	Operating Frequency (GHz)	Modulation
77-81	77~81	FMCW

## 1.2 Antenna Information

Ant.	TX/RX	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
1~2	TX	RoyalTek	RAR-7200	Patch Array	N/A	12.2877	2TX/4RX
3~6	RX						

Note: The above information was declared by manufacturer.



**1.3 Table for Multiple Listing**

Model Name	Operation Mode							
	EUT 1		EUT 2			EUT 3		
	BSD-RCTA (Bandwidth: 500MHz)		PAS (Bandwidth: 4GHz)			RPAS (Bandwidth: 4GHz)		
	78.8~79.3GHz		77~81GHz			77~81GHz		
RAR-7200	V		V			-		
RAR-7203	-		-			V		
Description								
The power setting is the same for RPAS/PAS mode.								
The power setting is the same for BSD/RCTA mode.								
Model Name	Accessories Description							
	ECU		ECU to radar cable			ECU to signal cable		
	Brand	Model	Brand	Model	Remark	Brand	Model	Remark
RAR-7200	RoyalTek	RAR-7200 ECU	RoyalTek	CABLE RAR-7200	Non-Shielded, 3.7m	RoyalTek	Y CABLE RAR-7200	Non-Shielded, 6.5m
RAR-7203	RoyalTek	RAR-8200 ECU	RoyalTek	CABLE RAR-7200	Non-Shielded, 12.4m	RoyalTek	CABLE RAR-8200	Non-Shielded, 5m
Model Name	LED		Indicator			Radar bracket		
	Brand	Model	Brand	Model	Remark	Brand	Model	
RAR-7200	RoyalTek	CABLE LED RAR-7200	-	-	-	RoyalTek	RAR-7200 car bracket	
RAR-7203	-	-	RoyalTek	RAR-8200 Indicator	Non-Shielded, 1m	RoyalTek	RAR-7200 car bracket	
Model Name	Buzzer			DC adaptor				
	Brand	Model	Remark	Brand	Model	Remark		
RAR-7200	RoyalTek	CABLE BUZZER RAR-7000	Non-Shielded, 0.08m	-	-	-		
RAR-7203	-	-	-	RoyalTek	DC ADAPTOR	Non-Shielded, 1.2m		

Note 1: From the above EUTs, EUT 1 and EUT 2 were selected to test all the test items.

Note 2: The above information was declared by manufacturer.



### 1.4 Accessories

Accessories	
ECU*1	
Radar bracket*1	
For EUT 1~2 use	For EUT 3 use
ECU to radar cable 1*1: Non-Shielding, 3.7m	ECU to radar cable 2*1: Non-Shielding, 12.4m
ECU to signal cable 1*1: Non-Shielding, 6.5m	ECU to signal cable 2*1: Non-Shielding, 5.0m
LED*2	Indicator*1
Buzzer*1: Non-Shielding, 0.08m	DC Adapter*1: Non-Shielding, 1.2m

### 1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2.1091
- ♦ KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ 47 CFR Part 1.1307
- ♦ 47 CFR Part 1.1310

### 1.6 Testing Location

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065      FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.



## 2 Maximum Permissible Exposure

### 2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

### 2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

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





### 2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

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

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);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance

R between the person and the antenna / radiating structure, where  $R > \lambda / 2 \pi$ .

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

Note: R is in meters, f is in MHz.



## 2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For EUT 1

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	Option	TL EIRP (dBm)
FMCW	12.2877	-	7.37	0.5	6.124	20	C	768

For EUT 2

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	Option	TL EIRP (dBm)
FMCW	12.2877	-	-13.9	0.5	0.046	20	C	768

————THE END————