

# 1 RF Exposure Compliance

## 1.1 Test Standards

Test standard : FCC 47 CFR Part 2 Section 2.1091  
RSS-102 Issue 5 Section 3.2

FCC ID:2AF6B-RAK2560C  
For model RAK2560C:  
Contains FCC ID: 2AF6B-RAK5860, 2AF6B-RAK4630  
Contains IC: 10224A-201912BG77, 25908-RAK4630  
For model RAK2560:  
Contains FCC ID: 2AF6B-RAK4630  
Contains IC: 25908-RAK4630

## 1.2 MPE Limits of FCC and IC

### MPE Limit for FCC

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
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
300-1,500			f/1500	30
1,500-100,000			1.0	30

### MPE Limit for IC

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m <sup>2</sup> )	Reference Period (minutes)
0.003-10 <sup>21</sup>	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f <sup>0.5</sup>	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f <sup>0.25</sup>	0.1540/ f <sup>0.25</sup>	8.944/ f <sup>0.5</sup>	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f <sup>0.3417</sup>	0.008335 f <sup>0.3417</sup>	0.02619 f <sup>0.6834</sup>	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f <sup>1.2</sup>
150000-300000	0.158 f <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> f <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> f	616000/ f <sup>1.2</sup>
<b>Note:</b> f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

## 1.3 Test Result

Test Result: PASS

This device is mobile device, and the applicant declares that the minimum separation distance is greater than 20cm, detail minimum distance refer to below calculation table. Therefore MPE measurement or computational modeling should be used to determine compliance.

MPE Calculation is based on the conducted power, and considering maximum power and antenn gain. The following formula is used to MPE evaluation.

- (1) The power density according to far-field model is:

$$S = \frac{P \times G_{(\theta, \phi)}}{4 \times \pi \times R^2}$$

Where:

- $P$  = input power of the antenna.  
 $G$  = antenna gain relative to an isotropic antenna.  
 $\theta, \phi$  = elevation and azimuth angles.  
 $R$  = distance from the antenna to the point of investigation.

- (2) For single or multiple RF sources, the calculated power density should comply with following:

$$\sum_i \frac{S_i}{S_{Limit, i}} \leq 1$$

Where:

- $S_i$  = the power density when the  $f$  is  $i$ .  
 $S_{Limit, i}$  = the reference level requirement for power density when  $f$  is  $i$ .  
 $f$  = operating frequency.

### A. Stand-alone operation mode (worst mode)

FCC ID	Operating Mode	Band	PG (dBm)	PG (mW)	Calculation (mW/cm <sup>2</sup> )	FCC Limit (mW/cm <sup>2</sup> )	Verdict
2AF6B-RAK4630	Lora	902-928MHz	19	79.43	0.016	0.601	Pass
	BLE	2.4G	6.7	4.68	0.001	1.0	Pass
2AF6B-RAK5860	NB-IOT	--	23	199.53	0.040	1.0	Pass

IC ID	Operating Mode	Band	PG (dBm)	PG (W)	Calculation (W/m <sup>2</sup> )	IC Limit (W/m <sup>2</sup> )	Verdict
25908-RAK4630	Lora	902-928MHz	19	0.0794	1.580	2.74	Pass
	BLE	2.4G	6.7	0.0047	0.009	5.35	Pass
10224A-201912BG77	NB-IOT	--	23	0.1995	0.397	2.55	Pass

Note:

- The above RF output power for Lora & BLE refer to FCC ID: 2AF6B-RAK4630 and IC: 25908-RAK4630.
- The above RF output power for NB-IOT refer to FCC ID: 2AF6B-RAK5860 and IC: 10224A-201912BG77.
- The Lora, BLE, NB-IOT modes cannot transmit simultaneous.
- $R = 0.2m$