

Radiofrequency radiation exposure evaluation: mobile devices

RESULT :

Pass

Test Specification

Test item	: RBS03
Identification / Type No.	: RTK300
HVIN	: RTK300N
FCC ID	: 2BFWS-RTK300N
IC	: 32325-RTK300N
Test standard	: CFR47 FCC Part 2: Section 2.1091 CFR47 FCC Part 1: Section 1.1310 FCC KDB Publication 447498 D04 RSS-102 Issue 6

➤ FCC requirements

FCC requirement: Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20cm normally can be maintained between the user and the device.

MPE Calculation Method according to KDB 447498 D04

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES
SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	$1,920 R^2$
1.34	–	30	35.6 m	–	1.6 m	$3,450 R^2/f^2$
30	–	300	1.6 m	–	159 mm	$3.83 R^2$
300	–	1,500	159 mm	–	31.8 mm	$0.0128 R^2/f$
1,500	–	100,000	31.8 mm	–	0.5 mm	$19.2 R^2$
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B. 1})$$

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B. 2})$$

where

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

2) EUT RF Exposure Evaluation operations

Test Mode	Conducted Power (dBm)	Conducted Power (mW)	ERP (dBm)	ERP (mW)	Minimum Separation Distances (cm)	Limit (mW)
BLE	10.39	10.940	11.50	14.125	20	768
2.4GHz WLAN	25.56	359.749	26.67	464.515	20	768
920MHz SRD	19.81	95.719	20.92	123.595	20	470

The product also has multiple transmitters. The Simltaneous Transmission Possibilities are as below

Mode	Configuration
1	BLE + 2.4GHz WLAN + 920MHzSRD

Test Mode	ERP (mW)	Limit (mW)	Result ratio	Total	Limit	Result
BLE	14.125	768	0.018392	0.886197	1.0	PASS
2.4GHz WLAN	464.515	768	0.604837			
920MHz SRD	123.595	470	0.262968			

“RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”

IC requirements: The EUT shall comply with the requirement of RSS-102 section 4 Exposure Limits.

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 MHz⁶ and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (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).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

a) EUT RF Exposure Evaluation standalone operations, Worst Case mode

Test mode	Max EIRP (dBm)	Max EIRP (W)	Limit of MPE EIRP (W)	MPE Radtio	Result
BLE	13.65	0.02317	2.68	0.008646	Pass
2.4GHz WLAN	28.82	0.76208	2.68	0.284358	Pass
920MHz SRD	23.07	0.20277	1.38	0.146935	Pass

The product also has multiple transmitters. The Simltaneous Transmission Possibilities are as below

Mode	Configuration
1	BLE + 2.4GHz WLAN + 920MHzSRD

Test mode	Result ratio	Total	Limit	Result
BLE	0.008646	0.439938	1.0	Pass
2.4GHz WLAN	0.284358			
920MHz SRD	0.146935			

“RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”