

RF Exposure Evaluation

FCC ID:2A25Z-D310MWE

IC:27724-D310MWE

1. Client Information

Applicant	:	Shenzhen Radio Technology Co.,Ltd
Address	:	1601 Room, 16 the west, Tian-an-Yun-Gu, Ban Tian Longgang, Shenzhen, China
Manufacturer	:	Guangdong ZKRadio Electronic Tech Co., Ltd
Address	:	4 / F, Gate 2, Building A, Zhongjin Industrial Park, South Pusha Road, Shahu Village, Tangxia Town, Dongguan City, China

2. General Description of EUT

EUT Name	:	Desktop Card Issuer	
HVIN/Model(s) No.	:	D310MWE(D247)	
Product Description	:	Operation Frequency:	NFC: 13.56MHz
		Number of Channel:	1 Channels
		Antenna Gain:	5dBi Coil Antenna
		Modulation Type:	ASK
Power Supply	:	USB 5V	
Software Version	:	V2.00	
Hardware Version	:	V2.00	
Remark: the evaluation report used the EUT(20210723-14_01-1).			

SAR Test Exclusion Calculations

1. IC: According to RSS-102 — Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands) Issue 5: March 19, 2015

(1) Clause 2.5.1: Exemption limits for Routine Evaluation – SAR Evaluation

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤ 5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤ 300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥ 50 mm
≤ 300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

2. FCC RF Exposure Evaluation

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: Portable Device

Refer Standard: KDB 447498 D01 General RF Exposure Guidance v06

FCC Part 2 §2.1093

Evaluation method

According to KDB447498 D01 General RF Exposure Guidance v06 Section 4.3.1 Standalone SAR test exclusion considerations: "Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.²² The 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 (see 5) of section 4.1). To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, typically in the SAR measurement or SAR analysis report, according to the required published RF exposure KDB procedures. 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 the SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops & tablets etc.²³ "

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [V_f (\text{GHz})] \leq 3.0$$
 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

- f (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

3. Test Result:

Mode	Freq. (MHz)	Field strength(max) (dBuV/m)	ERP (max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]
NFC	13.56	59.4	-41.86	-41 ± 1	-40.0
<p>Note:</p> $E = \text{EIRP} - 20 \log D + 104.8$ <p>where:</p> <p>E = electric field strength in dBuV/m, EIRP = equivalent isotropic radiated power in dBm D = specified measurement distance in meters.</p> <p>(1) EIRP=E-104.8+20logD, D=3 (2) EIRP=ERP+2.15dB (3) Add the appropriate maximum ground reflection factor to the EIRP (6 dB for frequencies ≤30 MHz)</p>					

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Band/Mode	f (GHz)	Antenna Distance (mm)	RF output power		SAR Test Exclusion Threshold	SAR Test Exclusion
			dBm	mW		
NFC	13.56	5	-40	0.0001	0< 3.0	Yes

ISED

Maximum Antenna Gain: 5.00dBi

Refer to RSS-102 Issue 5 require, EIRP is maximum compare with the conducted power or ERP; the EIRP (including power tolerance is -35.0 dBm less than 71mW (18.51dBm); So meet SAR Exemption limits for routine evaluation.

4. Conclusion:

The measurement results comply with the ISED Limit per RSS-102 Issue 5 for the uncontrolled RF Exposure of portable device.

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v06.

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