

STATEMENT ON EXPOSURE TO ELECTROMAGNETIC FIELDS

EQUIPMENT

Type of equipment:	Zigbee radio module
Type / Model:	ICC-A-1
Manufacturer:	IKEA of Sweden AB
By request of:	IKEA of Sweden AB

STANDARD

EN 62479
47 CFR §1.1310
RSS-102 Issue 5
Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency fields – 3 kHz to 300 GHz
AS/NZS 2772.1

CONDITIONS

Operating frequency range is 2405-2480 MHz.

Highest output power to antenna is +12.60 dBm.

Antenna gain is -3.6 dBi.

A test separation distance of 5 mm is used for handheld/portable applications.

A test separation distance of 20 cm is used for mobile applications.

Maximum (worst case) duty cycle is 22.4%

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CALCULATIONS**EIRP:**

$$+12.60 \text{ dBm} + (-3.6) \text{ dB} = +9.0 \text{ dBm}$$

Conversion dBm to W:

$$\text{Conducted:} \quad 1 \text{ mW} * 10^{(12.60 \text{ dBm}/10)} = 18.2 \text{ mW}$$

$$\text{EIRP:} \quad 1 \text{ mW} * 10^{(9.0 \text{ dBm}/10)} = 7.9 \text{ mW}$$

Time averaged maximum power:

$$\text{Conducted:} \quad 18.2 \text{ mW} * 0.224 = 4.13 \text{ mW} \approx 5 \text{ mW}$$

$$\text{EIRP:} \quad 7.9 \text{ mW} * 0.224 = 1.79 \text{ mW} \approx 2 \text{ mW}$$

Power density S:

$$5 \text{ mm separation distance:} \quad S \left[\frac{\text{W}}{\text{m}^2} \right] = \frac{\text{DC} \times \text{EIRP}}{4 \times \pi \times R^2} = \frac{0.224 \times 0.0079}{4 \times \pi \times 0.005^2} = 5.71$$

$$20 \text{ cm separation distance:} \quad S \left[\frac{\text{W}}{\text{m}^2} \right] = \frac{\text{DC} \times \text{EIRP}}{4 \times \pi \times R^2} = \frac{0.224 \times 0.0079}{4 \times \pi \times 0.20^2} = 0.004$$

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LIMITS & EVALUATIONS:

Standard	Reference for limit	Limit	Unit	Values	Result
EN 62479	EN 62479 ¹	40	mW	2.0	PASS
CFR 47 §1.1310	KDB 447498 D01 ²	7.5	NA	0.64	PASS
	CFR 47 §1.1310 ³	10	W/m ²	0.004	PASS
RSS-102 issue 5 (2015)	RSS-102 issue 5 (2015) ⁴	10	mW	5.0	PASS
	RSS-102 issue 5 (2015) ⁵	2700	mW	2.0	PASS
Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency fields – 3 kHz to 300 GHz	Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency fields – 3 kHz to 300 GHz ⁶	10	W/m ²	5.71	PASS
AS/NZS 2772.1	AS/NZS 2772.2 ⁷	20	mW	2.0	PASS

- Table A.1: For general public and limbs exposure.
- Section 4.3.1, 1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

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

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
- (e) Table 1 – Limits for maximum permissible exposure. For frequency range 1500 – 100 000 MHz and general population/uncontrolled exposure the maximum allowed power density is $1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$
- Section 2.5.2: 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 $1.31 \times 10^{-2} f^{0.6834} \text{ W}$ (adjusted for tune-up tolerance), where f is in MHz

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5. Section 2.5.1, Table 1: 4 mW at 2450 MHz. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5
6. Table 7: For general public and 2 GHz- 300 GHz the equivalent plane wave power flux density is: 10
7. Section 3.7.3: In some circumstances an RF exposure evaluation may not be required. This is the case with low-power devices whose nominal average RF radiated power does not exceed 20 mW and which do not produce exceptionally high instantaneous fields.

Intertek Semko AB, Radio & EMC

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