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%

S 114 10-06 Strömberg 164234

CALCULATIONS

EIRP:

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

Conversion dBm to W:

Conducted:

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

EIRP:

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

Time averaged maximum power:

Conducted:

$$18.2\ mW\ *\ 0.224\ =\ 4.13\ mW\ \approx\ 5\ mW$$

EIRP:

$$7.9\ mW\ *\ 0.224\ =\ 1.79\ mW\ \approx\ 2\ mW$$

Power density S:

5 mm separation distance:

$$S\left[\frac{W}{m^2}\right] = \frac{DC \times EIRP}{4 \times \pi \times R^2} = \frac{0.224 \times 0.0079}{4 \times \pi \times 0.005^2} = 5.71$$

20 cm separation distance:

$$S\left[\frac{W}{m^2}\right] = \frac{DC \times EIRP}{4 \times \pi \times R^2} = \frac{0.224 \times 0.0079}{4 \times \pi \times 0.20^2} = 0.004$$

S 114 10-06 Strömberg 164234

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

1. Table A.1: For general public and limbs exposure.

2. 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:

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

3. (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 mW/cm^2 = 10 W/m^2

4. 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 x 10^{-2} $f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz

S 114 10-06 Strömberg 164234

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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