# RF EXPOSURE ANALYSIS

### **EQUIPMENT**

Type of equipment: Data Collection Unit

Brand name: SCA

Type / Model: DCU / 682860

Manufacturer: SCA Hygiene products AB

By request of: SCA Hygiene products AB

Operating frequency: 2405 MHz

## REQUIREMENT

CFR 47 §1.1310

RSS-102 issue 5 (2014)

Radiocommunications (Electromagnetic Radiation — Human Exposure) Standard 2014

#### **CALCULATIONS**

2,4 GHz radio's Highest output power to antenna is1.4 dBm With +2 dBi antenna gain EIRP is 3.4 dBm or 2.2 mW

850 MHz cellular radio's highest output power to antenna is 1.904 W or 32.79 dBm With +1 dBi antenna gain EIRP is 33.79 dBm or 2.39 W

1900 MHz cellular radio's radio's highest output power to antenna is 0.964 W or 29.84 dBm With +2.0 dBi antenna gain EIRP is 31.84 dBm or 1.53 W

A test separation distance of 20 cm is used.

A worst case calculation is as follows:

$$S = \frac{EIRP}{4 \times \pi \times r^2}$$

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# Maximum power densities are

S = 0.0022 / ( 4 x 
$$\pi$$
 x 0,2 $^2$  ) = 0.0044 W/m $^2$  = 0.00044 mW/cm $^2$  at 2405 MHz

S = 2.39 / ( 4 x 
$$\pi$$
 x 0,2 $^2$  ) = 4.761 W /m $^2$  = 0.476 mW/cm $^2$  at 824.2 MHz

$$S = 1.53 / (4 \times \pi \times 0.2^{2}) = 3.044 \text{ W/m}^{2} = 0.344 \text{ mW/cm}^{2} 1850.2 \text{ MHz}$$

# **LIMITS & EVALUATIONS:**

Standard	Limit	Unit	Values	Result
CFR 47 §1.1310	1	mW / cm²	0.0004 at 2405 MHz	PASS
CFR 47 §1.1310	824.2 / 1500	mW / cm²	0.549 at 824.2 MHz	PASS
CFR 47 §1.1310	1	mW / cm²	0.344 at 1850.2 MHz	PASS

## Simultaneous transmission

KDB 447498 D01 section 7.2: Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is  $\leq$  1.0.

GSM 850 and 2.4 GHz transmitter transmitting simultaneously 0.476/(824.2/1500) + 0.00044/1 = 0.866

GSM 1900 and 2.4 GHz transmitter transmitting simultaneously 0.344/1 + 0.0004/1 = 0.344

The EUT is exempted from rf-evaluation in simultaneous transmission

# **RSS 102**

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment) between 300 and 6000 MHz is 0.02619  $f^{0.6834}$  W /  $m^2$ .

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Standard	Reference for limit	Limit	Unit
RSS-102 issue 5 (2014) section 2.5.2	0.02619 f <sup>0.6834</sup>	5.35 at 2405 MHz	W/m²
RSS-102 issue 5 (2014) section 2.5.2	0.02619 f <sup>0.6834</sup>	2.576 at 824.2 MHz	W/m²
RSS-102 issue 5 (2014) section 2.5.2	0.02619 f <sup>0.6834</sup>	4.476 at 1850.2 MHz	W/m²

The EUT doesn't fulfil requirement in 20 cm distance.

Minimum safe use distance is (EIRP /  $4\pi$  S)^0.5

Frequency (MHz)	Limit	Use distance	Unit
2405	5.355	0.20	m
824.2	2.576	0.28	m
1850.2	4.476	0.20	m

Minimum safe use distance for EUT per RSS 102 issue 5 is 28 cm. For simultaneous transmission of GSM 850 and 2,4 GHz transmitter minimum safe use distance is 28 cm.

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Matt-Ville	
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