

# KOENIG & BAUER

## RF exposure Info – SAR exclusion Document

| Device Under Test   |                            |
|---------------------|----------------------------|
| Designation:        | alphaJET                   |
| Type:               | HS 1040.6308               |
| Serial number:      | EUT #1: MI5050-000001      |
| Device              | CMM10404715                |
| FCC ID              | 2AWS3CCM10404715           |
| Manufacturer:       | Koenig & Bauer Coding GmbH |
| Test Plan:          | Calculation following KDBs |
| Relevant Standards: | KDB 447498 D01, KDB412172  |

Responsible for the Report:

07.12.2020

Date

Christian Schmitt  
(Qualitymanager)

Name (Job Title)



Signature

## Contents

|                                                                                                                              |   |
|------------------------------------------------------------------------------------------------------------------------------|---|
| .....                                                                                                                        | 0 |
| 0. REVISION HISTORY .....                                                                                                    | 2 |
| 1. FCC Standalone SAR Test Exclusion of 13.56 MHz Transmitter .....                                                          | 3 |
| 1.1. Considerations in Section 4.3.1. c) of KDB447498 D01 .....                                                              | 3 |
| 1.2. Step a) Threshold result from the Formula in Section 4.3.1 a) .....                                                     | 3 |
| 1.3. Step b) Threshold result from Formula in Section 4.3.1. b) 1); .....                                                    | 3 |
| 1.4. Step c) 1) Threshold result from Formula in Section 4.3.1 c) 1); >50mm and <200mm                                       | 3 |
| 1.5. SAR Exclusion Result (1g Head or Body) .....                                                                            | 4 |
| 2. FCC Determination of the Equivalent Isotropically Radiated Power (EIRP) of an RF<br>Transmitting System (KDB412172) ..... | 5 |
| 3. Technical Data of RFID Module .....                                                                                       | 6 |

## 0. REVISION HISTORY

| Project number | Issue date | Chapter | Description    |
|----------------|------------|---------|----------------|
|                | 2020-09-07 | n.a.    | Initial issue  |
|                | 2020-12-07 | all     | Format changes |

## 1. FCC Standalone SAR Test Exclusion of 13.56 MHz Transmitter

### 1.1. Considerations in Section 4.3.1. c) of KDB447498 D01

<100 MHz – Separation Distance  $\leq 50$  mm or Separation distance  $> 50$  mm and  $< 200$  mm

The 1g head or body SAR test exclusion thresholds for  $< 100$  MHz are determined by the following steps:

### 1.2. Step a) Threshold result from the Formula in Section 4.3.1 a)

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

- $f(\text{GHz})$  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
- When the maximum test separation distance is  $< 5$  mm, a distance of 5 mm is applied.

Step b) requires formula to be rearranged to give power allowed at numeric threshold at 50 mm test separation distance and Step c) requires  $f(\text{GHz})$  to be set to 100MHz (0.1 GHz) giving:

$$[\text{Power threshold}] / [50\text{mm}] * [\text{sqrt}(0.1)] \leq 3.0$$

$$\text{Step a) Power threshold} \leq (3.0 * 50) / \text{sqrt}(0.1) = 474.3\text{mW}$$

### 1.3. Step b) Threshold result from Formula in Section 4.3.1. b) 1);

Power threshold at test separation in mW =  $[\text{Power threshold at } 50\text{mm}] + [(\text{Test separation distance} - 50\text{mm}) * (f(\text{MHz})/150)]$

- $f(\text{MHz})$  = is the RF channel transmit frequency in MHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

$$\text{Power threshold} = 474.3 \text{ mW} + [(\text{test separation distance} - 50 \text{ mm}) * (f(\text{MHz})/150)]\text{mW}$$

Step c) requires  $f(\text{MHz})$  to be set to 100 MHz giving:

$$\text{Power threshold} = 474.3 \text{ mW} + [(\text{test separation distance} - 50 \text{ mm}) * 100 / 150] \text{ mW}$$

### 1.4. Step c) 1) Threshold result from Formula in Section 4.3.1 c) 1); $> 50\text{mm}$ and $< 200\text{mm}$

Threshold result from Formula in Section 4.3.1 b) 1) is multiplied by  $[1 + \log(100/f(\text{MHz}))]$

Power threshold =  $[474.3 \text{ mW} + (\text{test separation distance} - 50\text{mm}) * (100/150)] * [1 + \log(100/f(\text{MHz}))]$

- f(MHz) is the RF channel transmit frequency in MHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

### 1.5. SAR Exclusion Result (1g Head or Body)

| Frequency (MHz) | Maximum Power (Tune up value)** (mW) | Test separation distance (mm)* | SAR Exclusion Power Threshold from Section 4.3.1 c) (mW) | SAR Test Exclusion (Yes/No) |
|-----------------|--------------------------------------|--------------------------------|----------------------------------------------------------|-----------------------------|
| 13.56           | 0.0000044                            | 77                             | 624.2                                                    | Yes                         |

\*Test separation distance: Measured minimum distance from antenna to any part of the body of a user according to 4.1. f).

\*\*Tune up value is the maximum declared output power of the device derived from FCC Determination of the Equivalent Isotropically Radiated Power (EIRP) given in the measurement and calculation in Section 2 of this document.

The SAR exclusion threshold has been evaluated using the formula described above from information supplied by the Manufacturer. Based on the calculation above, the EUT is categorically excluded from SAR testing.

## 2. FCC Determination of the Equivalent Isotropically Radiated Power (EIRP) of an RF Transmitting System (KDB412172)

Section 2.2 Direct calculation from the DUT power measured in a radiated test configuration

Section 2.2 states: When the DUT power is measured using a radiated test configuration, the EIRP can be directly determined using the field strength (linear) approach by applying Equation:

$$\text{EIRP} = P_t \times G_t = (E \times d)^2 / 30$$

- EIRP is the Equivalent Isotropically Radiated Power in Watts
- $P_t$  is the transmit output power in Watts (not required)
- $G_t$  is the numeric gain of the transmitting antenna (unitless, not required)
- $E$  is the electrical field strength in V/m
- $d$  is the measurement distance in m

Measure the electric field strength  $E$  at test distance  $d$ . (data from Test Report)

Calculate the EIRP using the equation above. Increase the EIRP to include an declared tune up tolerance values to give the maximum power.

The result is the Maximum Power (Tune up Value) required in the SAR exclusion assessment.

| Frequency (MHz) | Electrical Field Strength (dB $\mu$ V/m) | Electrical Field Strength (V/m) | Test Distance (m) | EIRP (W) | EIRP (mW) | Tune up tolerance (%) |
|-----------------|------------------------------------------|---------------------------------|-------------------|----------|-----------|-----------------------|
| 13.56           | 41.7                                     | 0.00012                         | 3                 | 4.43E-09 | 0.0000044 | 0                     |

### 3. Technical Data of RFID Module

Product Description: Consumables Control Module

Model Number: CCM10404715

| Description                                                          | Value                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------|
| Mechanical Dimensions of RFID Module<br>(Unit mounted in molded box) | L 110mm, W 75mm, H 12mm                                      |
| Cable Length                                                         | 520mm                                                        |
| Connector                                                            | 16 pin WR-MPC3 connector                                     |
| Frequency Range                                                      | 13.56 MHz +/- 7kHz                                           |
| Maximum Power (from measured peak<br>radiated power from antenna)    | 41.7 dB $\mu$ V/m at 3m<br>-> -53,5dBm or 0,0027 $\mu$ W ERP |
| Antenna Gain                                                         | See above                                                    |
| Separation distance from antenna                                     | A User is at minimum 77mm away from<br>the RFID Antenna      |
| RIFD standard                                                        | RFID ISO 14443A                                              |