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	Christian Schmitt (Qualitymanager)	
Date	Name (Job Title)	Signature

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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 <=50 mm or Separation distance >50 mm and <200 mm

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

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

[(max power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [sqrt(f(GHz)] <= 3.0 for 1g SAR

- 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 une 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(GHz) to be set to 100MHz (0.1 GHz) giving:

[Power threshold] / [50mm] * [sqrt(0.1)] <= 3.0

Step a) Power threshold <= (3.0 * 50) / sqrt(0.1) = 474.3mW

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

Power threshold at test separation in mW = [Power threshold at 50mm] + [(Test separation distance – 50mm) * (f(MHz)/150)]

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

Power threshold = 474.3 mW + [(test separation distance – 50 mm) * (f(MHz)/150)]mW

Steb c) requires f(MHz) to be set do 100 MHz giving:

Power threshold = 474.3 MHz + [(test separation distance – 50 mm) * 100 / 150] mW

1.4. Step c) 1) Threshold result from Formula in Section 4.3.1 c) 1); >50mm and <200mm

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

Power threshold = [474.3 mW + (test separation distance – 50mm) * (100/150)] * [1+log(100/f(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 ist 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 os 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 Equotation:

$EIRP = Pt \times Gt = (E \times d)^2/30$

- EIRP is the Equivalent Isotropically Radiated Power in Watts
- Pt is the transmittel output power in Watts (not required)
- Gt 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 electic 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 ist the Maximum Power (Tune up Value) required in the SAR exclusion assessment.

Frequency (MHz)	Electrical Field Strength (dBµV/m)	Electical 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 (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 radiated power from antenna)	41.7 dBµV/m at 3m -> -53,5dBm or 0,0027µW ERP
Antenna Gain	See above
Separation distance from antenna	A User is at minimum 77mm away from the RFID Antenna
RIFD standard	RFID ISO 14443A