

Report on the FCC and IC Testing of the Bormann EDV+Zubehör GmbH

Model: Bormann BMKD Flex Mouse
In accordance with FCC 47 CFR Part 1 I
and ISED RSS-102

Prepared for: Bormann EDV+Zubehör GmbH
Lohwaldstrasse 53
86356 Neusaess
Germany

FCC ID: 2BBHS-BMKD
IC: 30681-BMKD



Product Service

Add value.
Inspire trust.

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Date: 2023-11-23

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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Martin Steindl	2023-11-23	 SIGN-ID 855857
Authorised Signatory	Michael Ingerl	2023-11-23	 SIGN-ID 855947

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

Engineering Statement:

This measurement shown in this report were made in accordance with the procedures described on test pages.

All reported testing was carried out on a sample equipment to demonstrate limited compliance with with FCC 47 CFR Part 1 I and ISED RSS-102.

The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Martin Steindl	2023-11-23	 SIGN-ID 855856

Laboratory Accreditation

DAkS Reg. No. D-PL-11321-11-02

DAkS Reg. No. D-PL-11321-11-03

Laboratory recognition

Registration No. BNetzA-CAB-16/21-15

Industry Canada test site registration

3050A-2

Executive Statement:

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 1 I:2021 and ISED RSS-102:2021

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1 Report Summary

1.1 Modification Report

Alternations and additions of this report will be issued to the holders of each copy in the form of a complete document.

Revision	Description of changes	Date of Issue
0	First Issue	2023-10-24
1	Altered FCC evaluation to 1.1307(b)(3)(i)(A) Correction of ISED exemption value	2023-11-23

Table 1: Report of Modifications

1.2 Introduction

Applicant	Bormann EDV + Zubehör GmbH Lohwaldstrasse 53 86356 Neusaess Germany
Manufacturer	Bormann EDV + Zubehör GmbH
Model Number(s)	Bormann BMKD Flex Mouse
Serial Number(s)	N/A
Hardware Version(s)	---
Software Version(s)	---
Number of Samples Tested	2
Test Specification(s) / Issue / Date	FCC 47 CFR Part 1 I : 2021 RSS-102, Issue 5, 2015 + Amd. 1 2021
Test Plan/Issue/Date	---
Order Number	42004281
Date	2023-05-05
Date of Receipt of EUT	2023-06-12 , 2023-08-23
Start of Test	2023-06-13
Finish of Test	2023-08-24
Name of Engineer(s)	M. Steindl
Related Document(s)	ANSI C63.4: 2014 ANSI C63.10: 2013 ISED RSS-210, Issue 10 : 2019 ISED RSS-GEN, Issue 5, Amendment 1 : 2019 FCC 47 CFR Part 2 J : 2019



1.3 Brief Summary of Results

A brief summary of the tests carried out i is shown below.

<i>Section</i>	<i>Specification Clause</i>	<i>Test Description</i>	<i>Result</i>
2.1	1.1307	RF Exposure	Pass

Table 2: Results according to FCC 47 CFR Part 1

A brief summary of the tests carried out in accordance with ISED RSS-247 and ISED RSS-GEN is shown below.

<i>Section</i>	<i>Specification Clause</i>	<i>Test Description</i>	<i>Result</i>
2.1	2.5.1	RF Exposure	Pass

Table 3: Results according to ISED RSS-2



1.4 Product Information

1.4.1 Technical Description

Frequency Band: 2400.0 MHz – 2483.5 MHz

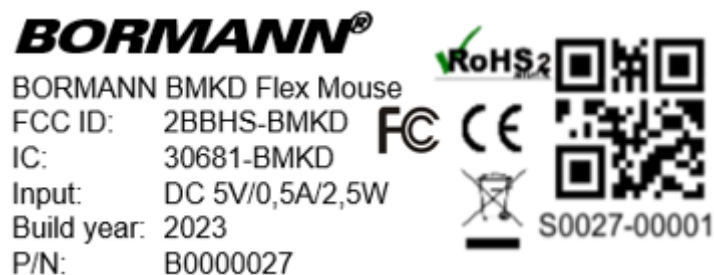
Antenna Gain: 5.3 dBi (declared)

FCC ID: 2BBHS-BMKD

IC: 30681-BMKD

Supply Voltage: N/A

Supply Frequency: DC (0 Hz)



1.4.2 EUT Ports / Cables identification

Port	Max Cable Length specified	Usage	Type	Screened
N/A				

Table 4

1.5 Test Configuration

The applicant provided a conducted test sample for frequency parameter tests and a normal test sample.

1.6 Modes of Operation

Conducted tests were performed on lowest, a middle and the highest frequency channel.



1.7 EUT Modifications Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	Not Applicable	Not Applicable

Table 5

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing test laboratory:

Test Name	Name of Engineer(s)
RF Exposure	M. Steindl

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany



Product Service

2 Test Details

2.1 RF Exposure

2.1.1 Specification Reference

FCC 47 CFR Part 15 C, Clause 15.249
FCC 47 CFR Part 1 I, Clause 1.1307
ISED RSS-210, Clause Annex B.10
ISED RSS-Gen, Clause 3.4
ISED RSS-102, Clause 2.5.1

2.1.2 Equipment under Test and Modification State

Bormann BMKD Flex Mouse; Conducted sample; Modification State 0

2.1.3 Date of Test

2024-08-24

2.1.4 Environmental Conditions

Ambient Temperature	25 °C
Relative Humidity	43 %

2.1.5 Test Method

The test was performed according to ANSI C63.10, sections 11.11 and 11.12
For details please refer to section 2.2 of test report TR-713300455-04.



2.1.6 Specification Limits

FCC 47 CFR Part 1, Clause 1.1307(b)(3)(i)(A)

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device): A single RF source is exempt if: ...

- (A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of radiating structure operating and the nearest portion of any other radiating structure is the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

...

ISED RSS-102, Clause 2.5.1

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in the table.

For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in the table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.:



Frequency (MHz)	Exemption limits (mW) ¹ at separation distance of									
	≤5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	≥50 mm
≤300 ²	71	101	132	162	193	223	254	284	315	345
450	52	70	88	106	123	141	159	177	195	213
835	17	30	42	55	67	80	92	105	117	130
1900	7	10	18	34	60	99	153	225	316	431
2450	4	7	15	30	52	83	123	173	235	309
3500	2	6	16	32	55	86	124	170	225	290
5800	1	6	15	27	41	56	71	85	97	106

2.1.7 Test Results

Maximum radiated carrier emission was 86.62 dBμV/m = 21.429 mV/m at 3 m distance.

$$EIRP = \frac{(E \times d)^2}{30}$$

So the EIRP is 137.76 μW = -8.61 dBm

FCC 47 CFR Part 1, Clause 1.1307(b)(3)(i)(A)

Frequency:	2405 MHz
Test distance:	5 mm
Carrier Power (e.i.r.p.):	-8.61 dBm = 137.76 μW
Exemption limit:	0 dBm = 1 mW
Test Result:	Pass

ISED RSS-Gen, Clause 3.4

Frequency:	2405 MHz
Test distance:	5 mm
Carrier Power (e.i.r.p.):	-8.61 dBm = 137.76 μW
Exemption limit:	4.25 mW
Test Result:	Pass

¹ The exemption limit in the table are based on measurements and simulations on half-wave dipole antennas at separation distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

² Transmitters operating between 3 kHz and 10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in IC RSS-102, issue 5, section 4.



3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

<i>Radio Interference Emission Testing</i>		
<i>Test Name</i>	<i>kp</i>	<i>Expanded Uncertainty</i>
Conducted Voltage Emission		
9 kHz to 150 kHz (50Ω/50μH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50μH AMN)	2	± 3.4 dB
100 kHz to 200 MHz (50Ω/5μH AMN)	2	± 3.6 dB
Discontinuous Conducted Emission		
9 kHz to 150 kHz (50Ω/50μH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50μH AMN)	2	± 3.4 dB
Conducted Current Emission		
9 kHz to 200 MHz	2	± 3.5 dB
Magnetic Fieldstrength		
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB
Radiated Emission		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 5.0 dB
1 GHz to 6 GHz	2	± 4.6 dB
Test distance 10 m		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 4.9 dB
The expanded uncertainty reported according to CISPR16-4-2: 2011 + A1 + A2 + Cor1 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$		

Table 6 Measurement uncertainty based on CISPR 16-4-2



<i>Radio Interference Emission Testing</i>		
<i>Test Name</i>	<i>kp</i>	<i>Expanded Uncertainty</i>
Occupied Bandwidth	2	± 5 %
Conducted Power		
9 kHz ≤ f < 30 MHz	2	± 1.0 dB
30 MHz ≤ f < 1 GHz	2	± 1.5 dB
1 GHz ≤ f ≤ 40 GHz	2	± 2.5 dB
1 MS/s power sensor (TS8997)	2	± 1.5 dB
Occupied Bandwidth	2	± 5 %
Power Spectral Density	2	± 3.0 dB
Radiated Power		
25 MHz – 6 GHz	1.96	±4.4 dB
1 GHz – 18 GHz	1.96	±4.7 dB
18 GHz – 40 GHz	1.96	±4.9 dB
40 GHz – 325 GHz	1.96	±6.1 dB
Conducted Spurious Emissions	2	± 3.0 dB
Radiated Spurious Emissions	2	± 6.0 dB
Voltage		
DC	2	± 1.0 %
AC	2	± 2.0 %
Time (automatic)	2	± 5 %
Frequency	2	± 10 ⁻⁷
The expanded uncertainty reported according to ETSI TR 100 028:2001 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%		

Table 7 Measurement uncertainty based on ETSI TR 100 028

The measurement uncertainty in the laboratory is less than or equal to the maximum measurement uncertainty according to CISPR16-4-2: 2011 + A1 + A2 + Cor1 (U_{CISPR}) and as specified in the test report below. This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.



Test Name	Expanded Uncertainty
Occupied Bandwidth	±5 %
Conducted Power	
9 kHz ≤ f < 30 MHz	±1.0 dB
30 MHz ≤ f < 1 GHz	±1.5 dB
1 GHz ≤ f ≤ 40 GHz	±2.5 dB
1 MS/s power sensor (2.4 / 5 GHz band)	±1.5 dB
Power Spectral Density	±3.0 dB
Radiated Power	
25 MHz – 26.5 GHz	±6.0 dB
26.5 GHz – 66 GHz	±8.0 dB
40 GHz – 325 GHz	±10.0 dB
Conducted Spurious Emissions	±3.0 dB
Radiated Field Strength 9 kHz – 40 GHz	±6.0 dB
Voltage	
DC	± 1.0 %
AC	± 2.0 %
Time (automatic)	± 5 %
Frequency	± 10 ⁻⁷

Table 8 Decision Rule: Maximum allowed measurement uncertainty