

Prüfbericht-Nr.: <i>Test report no.:</i>	DE25TOWU 002	Auftrags-Nr.: <i>Order no.:</i>	1175791 170	Seite 1 von 12 <i>Page 1 of 12</i>
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	11955 Prüfungen nach: A. RED 2014/5	Auftragsdatum: <i>Order date:</i>	2024-03-22	
Auftraggeber: <i>Client:</i>	Julius Blum GmbH, Industriestr. 1, 6973 Höchst, Österreich			
Prüfgegenstand: <i>Test item:</i>	SERVO-DRIVE for AVENTOS HF			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	SERVO-DRIVE for AVENTOS HF, Model:21FA000.22			
Auftrags-Inhalt: <i>Order content:</i>	Prüfung der Funkparameter nach FCC & ISCED <i>Test of radio parameters acc. to FCC & ISCED</i>			
Prüfgrundlage: <i>Test specification:</i>	Vollprüfung / Complete test RF exposure evaluation acc. to FCC CFR 47 Part 15 Subpart C §15.247 (i) RF exposure evaluation acc. to RSS-102 issue 6 December 15, 2023			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-12-12	For reasons of confidentiality, no photos of the EUT are included in this report. For EUT and test setup photos please see the Photo Documentation to this report Number.		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003887856-001 to 054			
Prüfzeitraum: <i>Testing period:</i>	05.08.2025 - 05.08.2025			
Ort der Prüfung: <i>Place of testing:</i>	Nürnberg <i>Nuremberg</i>			
Prüflaboratorium: <i>Testing laboratory:</i>	Wireless Labor <i>Wireless Test Lab</i>			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	06.08.2025	genehmigt von: <i>authorized by:</i>	8/6/2025	
Datum: <i>Date:</i>	Signiert von: Matthias Kraeutlein	Datum: <i>Issue date:</i>	Signed by: Shrinivas Naikar	
Stellung / Position	Sachverständige(r)/Expert	Stellung / Position	Sachverständige(r)/Expert	
Sonstiges / Other:	Dieser Prüfbericht DE25TOWU-002 ersetzt den Prüfbericht DE25TOWU -001 (siehe Änderungsverzeichnis) / The test report DE25TOWU-002 replaces the test report DE25TOWU-001 (see change history).			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legende:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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Anmerkungen Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. <i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i>
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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	Die Entscheidungsregel für Konformitätserklärungen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. <i>The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report.</i>

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Produktbeschreibung Product description

1	Test item	SERVO-DRIVE for AVENTOS HF
2	Typ-No.	SERVO-DRIVE for AVENTOS HF, Model:21FA000.22
3	Identical Type	21FA001.22 and 21FA005.22 (Please refer to Electrical Identical Declaration Letter by Blum, dated; 20-Mar-2025)
4	Test sample obtaining	☒ Sampling by customer ☐ Sampling by TÜV Rheinland Group ☐ others:
5	Serial-No.	-
6	Supported radio technologies evaluated in this report	2.4 GHz NordicSemi Enhanced ShockBurst
7	Supported radio technologies not evaluated in this report	-
8	Description of EUT	Servo Motor (household appliance) SERVO-DRIVE for AVENTOS HF
9	Max RF output power (measured)	1 dBm (conducted)
10	Operating Frequency (declared)	2404 MHz - 2452 MHz
11	Channel Bandwidth (declared)	1000 kHz
12	Number of Channels	3
13	Modulation	GFSK
14	Rated Voltage / Frequency	24V DC
15	Radio Module Name	21A00L83
16	FCC ID	FCC ID:W95-21FA00Y
17	IC ID	IC:8352A-21FA00Y
18	Radio Module / Antenna Type	☒ Radio module with antenna on module PCB ☐ Radio module with dedicated antenna ☐ Radio module with user accessible antenna connector
19	Antenna Name	PCB trace, omni directional
20	Antenna Type	☒ Integral antenna (designed as a fixed part of the EUT) ☐ Dedicated antenna (removable, obligation to be used) ☐ Permanent antenna connector
21	Antenna number of chains	1
22	Antenna Gain (declared)	2404MHz -4 dBi 2410MHz -4 dBi 2452MHz -4 dBi
23	Software / Firmware	BAU2465295621-00
24	Hardware	BAU2468404424-00
25	Provided Samples	A003887856-001 to 054
26	Conducted measurements sample	A003887856-26 (cond. sample)
27	Radiated measurements sample	A003887856-11 (rad. sample)
28	Companion Device used for radio connection with the EUT	EUT in Test Mode. Therefore, no Companion Device was used.
29	Auxiliary equipment used to set up the EUT	Lab Notebook
30	Data Cable	USB – TTL UART Cable
31	Temperature Range	0°C to 40°C
32	Environment	Indoor

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Absatz Clause	Anforderungen – Prüfungen / Requirements - Tests	Bemerkungen / Remarks	Ergebnis Result
FCC 15.247 (i)	RF exposure evaluation	-	P ☒ F ☐ N/A ☐ N/T ☐
RSS-102 Issue 6	RF exposure compliance of radiocommunication apparatus	-	P ☒ F ☐ N/A ☐ N/T ☐

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1 Registration

The measurement facilities for conducted and radiated disturbance measurements of the TÜV Rheinland LGA Products have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules. Measurement data will be accepted in conjunction with applications for Certification under Parts 15 and 18 of the Commission's Rules.

FCC Registration Number: 939976

Bundesnetzagentur Registration Number: BNetzA-CAB-17/21-16

The measurement facilities are also recognized by Innovation, Science and Economic Development (ISED) Canada to test to Canadian radio equipment requirements.

Company Number: 11235A

CAB Identifier: DE0018

2 EUT Classification

2.1 Wireless technologies and frequencies supported by the EUT

The named technologies are only those falling in the specification of the applied standard.

Technology	Frequency Range (TX)	TX Function	Test report
Non-specific SRD	2404 – 2452 MHz	SISO	DE258D0D 002

2.2 Standard specific classification of the EUT

2.2.1 Applied standards.

- FCC CFR 47 Part 15 Subpart C §15.247 (i)
- FCC CFR 47 Part 1 Subpart I §1.1307 (b)
- FCC CFR 47 Part 1 Subpart I §1.1310 (limits)
- FCC CFR 47 Part 2 Subpart J §2.1093 (portable)
- FCC KDB 447498 D01 v06 – RF Exposure procedures and equipment authorization policies for mobile and portable devices
- 447498 D04 Interim General RF Exposure Guidance v01
- RSS-102 issue 6

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2.2.2 Exposure conditions

	Type of exposure
☒	General public exposure
☐	Occupational exposure

	Separation distance – Intended usage location
☒	≤ 20 cm – portable Declared minimum test separation, ensured by enclosure: 5 mm
☐	Body-worn device
☐	Limb-worn device
☐	Head exposure device
☐	Implanted device
☐	> 20 cm
☐	Fixed device
☐	Mobile device

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3 Test results in detail

3.1 FCC SAR test exclusion requirements

Limit:

FCC KDB 447498 D01 v06, chapter 4.3.1:

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f}(\text{GHz})]$$

 ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR

FCC KDB 447498 D01 v06, Appendix A:

Appendix A gives example values for the converted formula of chapter 4.3.1 towards the max. power of channel, including tune-up tolerance for 1-g SAR test exclusion and varying frequencies and min. test separation distances.

For the frequency 2452MHz and a test separation distance of 5 mm the 1-g SAR test exclusion threshold of channel is 10 mW $\triangleq$ 10 dBm.

For 10-g extremity SAR test exclusion the power thresholds are 2.5 times higher than the 1-g SAR test exclusion threshold. Leading to a SAR test exclusion of $2.5 \cdot 10 \text{ mW} = 25 \text{ mW} \triangleq 13.9 \text{ dBm}$.

Evaluation of Compliance:

As it can be seen in test report DE258D0D 002 the Declared maximum conducted output power is worst power than the measured power. Therefore, declared maximum conducted power is considered for the evaluation.

Considering the separation distance of 5 mm and 1dB tune up tolerance as declared by the customer.

Signal	Frequency [MHz]	Output Power [dBm]	Antenna Gain [dBi]	EIRP (Including Tune-up tolerance) [dBm]	EIRP (Including Tune-up tolerance) [mW]	Limit at 2404 MHz [mW]	Limit at 2452 MHz [mW]	Result
Declared	2404 - 2452	1	-4	-2	0.631	10.08	10.00	Pass

Result:

The equipment is compliant according to FCC KDB 447498 D01 v06 because the constraint for the output power level at the test separation distance for standalone SAR test exclusion is met.

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3.2 ISED SAR evaluation exemption requirements

Limit:

RSS 102 issue 5, chapter 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 Table 1.

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power.

☐	For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5.
☐	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.
☒	If the operating frequency of the device is between two frequencies located in Table 1, 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
☐	Transmitters operating between 0.003-10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in Section 4.

Frequency (MHz)	≤ 5 mm (mW)	10 mm (mW)	15 mm (mW)	20 mm (mW)	25 mm (mW)	30 mm (mW)	35 mm (mW)	40 mm (mW)	45 mm (mW)	> 50 mm (mW)
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

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Considering the separation distance of 5 mm as declared by the customer and a frequency of 2404 MHz the maximum output power at 5 mm distance is 0.63 mW.

Over linear interpolation the limit for 2404 MHz is given with 3.25 mW and for 2452 MHz with 3.00 mW.

Considering 1dB tune up tolerance as declared by the customer.

Evaluation of Compliance:

As it can be seen in test report DE258D0D 002 the Declared maximum conducted output power is worst power than the measured power. Therefore, declared maximum conducted power is considered for the evaluation.

Signal	Frequency [MHz]	Output Power [dBm]	Antenna Gain [dBi]	EIRP (Including Tune-up tolerance) [dBm]	EIRP (Including Tune-up tolerance) [mW]	Limit at 2404 MHz [mW]	Limit at 2452 MHz [mW]	Result
Declared	2404 - 2452	1	-4	-2	0.631	3.25	3.00	Pass

Result:

The equipment is compliant according to RSS 102 issue 6 because the constraint for the output power level at the separation distance for SAR evaluation exemption is met.

Final test result	Pass
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Zusatzdokumentation
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4 Details provided by the customer.

- minimum test separation, ensured by enclosure: 5 mm
- Tune-up tolerance 1dB

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Änderungsverzeichnis
Change history

5 Change history.

Revision Number	List of revisions
DE25TOWU 001	Initial Release
DE25TOWU 002	Test distance changed from 200mm to 5 mm and SAR exclusion applied
Note: Latest revision report will replace all previous reports.	

Ende des Prüfberichts
End of Test Report