



Prüfbericht-Nr.: <i>Test report no.:</i>	DE24AEWW 001	Auftrags-Nr.: <i>Order no.:</i>	1140885_090	Seite 1 von 12 <i>Page 1 of 12</i>
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	41373134	Auftragsdatum: <i>Order date:</i>	2023-05-25	
Auftraggeber: <i>Client:</i>	INFICON GmbH, Bonner Str. 498, 50968 Köln, Deutschland			
Prüfgegenstand: <i>Test item:</i>	SMART-Spray			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	551-051			
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			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2023-07-13	There are no photos of the EUT in this report acc. to the confidentiality letter. For EUT photos please see the Photo Documentation to this report Number.		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003668536-005 to 008			
Prüfzeitraum: <i>Testing period:</i>	2024-03-04 - 2024-03-06			
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>	X	genehmigt von: <i>authorized by:</i>	X	
Datum: <i>Date:</i>	13.05.2024	Datum: <i>Issue date:</i>	13.05.2024	
Stellung / Position	Sachverständige(r)/Expert	Stellung / Position	Sachverständige(r)/Expert	
Sonstiges / Other:	-			
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 4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft 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 4 = sufficient N/A = not applicable	5 = poor 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.</i> <i>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	SMART-Spray
2	Typ-No.	551-051
3	Test sample obtaining	☒ Sampling by customer ☐ Sampling by TÜV Rheinland Group ☐ others:
4	Supported radio technologies	BLE
5	Description of EUT	The device is a helium spray gun. This allows you to pressurise the test specimen with helium and, in the event of a leak, this is displayed.
6	Max RF output power (measured)	3.4dBm
7	Operating Frequency (declared)	BLE: 2402-2480MHz
8	Channel Bandwidth (declared)	BLE: 2MHz
9	Number of Channels	BLE: 40
10	Modulation	BLE: GFSK
11	Rated Voltage / Frequency	3,65V DC Battery Powered
12	FCC-ID (Radio module)	2BFIX-1101102
13	IC (Radio module)	32279-1101102
14	Antenna Type	☒ Integral antenna (designed as a fixed part of the EUT) ☐ Dedicated antenna (removable, obligation to be used) ☐ Permanent antenna connector
15	Antenna number of chains	1
16	Antenna Gain (declared)	2402MHz:-2.6dBi 2440MHz:-1.6dBi 2480MHz:-2.8dBi
17	Software / Firmware	Bootloader SMART-Spray V0.5.0 Bluetooth Firmware Würth SMART-Spray 1.4 Bluetooth Config Version Inficon SMART-Spray 1.4.2 Software SMART-Spray 0.12.13
18	Hardware	FBG Pushbutton SmartG: v.01 FBG Mainboard SMART-Spray: v.05
19	Provided Samples	A003668536-005 to 008
20	Conducted measurements sample	A003668536-006 (cond. sample)
21	Radiated measurements sample	A003668536-008 (rad. sample)
22	Companion Device used for radio connection with the EUT	EUT in Test Mode. Therefore, no Companion Device was used.
23	Auxiliary equipment used to set up the EUT	-
24	Accessory Devices used together with the EUT	-

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Absatz <i>Clause</i>	Anforderungen – Prüfungen / <i>Requirements - Tests</i>	Bemerkungen / <i>Remarks</i>	Ergebnis <i>Result</i>
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
BLE	2400 – 2483.5 MHz	SISO	DE244R13 001

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 §2.1091 (mobile)
- 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
- 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

Evaluation of Compliance:

As it can be seen in the test report DE244R13 001 measured maximum conducted output power is 3.4dBm, and the antenna Gain -1.6dBi, so the same maximum conducted power is considered for the evaluation.

Considering the separation distance of 5 mm (When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f of 447498 D01 V06) is applied to determine SAR test exclusion)

Frequency [MHz]	ERP [dBm]	Antenna Gain [dBi]	EIRP [dBm]	EIRP [mW]	SAR test exclusion Thresholds [mW]	Limit (1- g SAR) [mW]	Limit (10-g SAR) [mW]	Result
2440	3.4	-1.6	1.8	1.513	0.4578	3	7.5	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 6, chapter 6.3:

Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

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 11 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 11 are multiplied by a factor of 2.5.
☒	If the operating frequency of the device is between two frequencies located in Table 11, 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 5.2.1.

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Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance

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

Considering the separation distance of 5 mm as declared by the customer and a frequency of 2450 MHz the maximum output power at 5 mm distance is 3 mW= 4.771 dBm.

Over linear interpolation the limit for 2402 MHz is given with 3.26 mW $\pm$ 5.132 dBm and for 2480 MHz with 2.97 mW $\pm$ 4.727 dBm.

Evaluation of Compliance:

As it can be seen in the test report DE244R13 001 measured maximum conducted output power is 3.4dBm at 2440MHz, so the same maximum conducted power is considered for the evaluation.

Frequency [MHz]	ERP [dBm]	Antenna Gain [dBi]	EIRP [dBm]	EIRP [mW]	Limit at 2402 MHz [mW]	Limit at 2480 MHz [mW]	Result
2440	3.4	-1.6	1.8	1.5135	3.26	2.97	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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4 Application form

The following information was provided by the customer and form the basis for the execution of the tests and the assessment of conformity. The given information can affect the results of both.

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Änderungsverzeichnis
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5 Change history

Revision Number	List of revisions	Date of issue
DE24AEWW 001	Initial Release	13.05.2024

Note: Latest revision report will replace all previous reports.

Ende des Prüfberichts
End of Test Report