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25.April 2018

Prüfbericht / *Test Report* Nr. / *No.* TR-65350-25670-04 (Edition 2)

Auftraggeber *Applicant*	STORZ & BICKEL GMBH & CO.KG
Geräteart *Type of equipment*	Bluetooth Low Energy (BLE) Module
Typenbezeichnung *Type designation*	S&B Module
Seriennummer / *Serial number*	NA, Test Sample 1
FCC ID:	2APJE-SB
IC:	23679-SB
Auftragsnummer / *Order No.*	N/A
Prüfgrundlage *Test standards*	CFR 47 Pt1.1310 Health Canada Safety Code 6

TÜV SÜD Product Service GmbH
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Summary

Prüfergebnisse / *Test Results*	Auftragsnummer / *Order No.* **N/A**

Die Prüfungen wurden nach folgenden Vorschriften durchgeführt:
Tests were performed according to:

CFR 47 Pt1.1310

Health Canada Safety Code 6

Durchgeführte Prüfung ***Test performed***	**Prüfergebnis** ***Test result***			
	Erfüllt *Passed*	Nicht erfüllt *Not Passed*	Nicht zutreffend *Not applicable*	Nicht durchgeführt *Not performed*
Elektromagnetische Felder / *RF Exposure Assessment*	☒	☐	☐	☐

Bemerkungen / *Remarks:*

Die Prüfergebnisse beziehen sich ausschließlich auf das zur Prüfung vorgestellte Prüfmuster. Ohne schriftliche Genehmigung des Prüflabors darf der Prüfbericht auszugsweise nicht vervielfältigt werden. *The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.*

Datum / *Date*	Geprüft von / *Tested by*	Freigabe durch / *Checked by*
2018-05-18	Matthias Stumpe Responsible for testing	Martin Steindl Reviewer

Prüfergebnis / *Test Result*

☒ **Erfüllt / *Passed***

☐ **Nicht erfüllt / *Not passed***

Table of Contents

1 Administrative Data

Application details	
Applicant:	STORZ & BICKEL GMBH & CO.KG In Grubenäcker 7-9 78532 Tuttlingen Germany
Contact person:	Berthold MAIER
Order number:	N/A
Receipt of EUT:	2018-02-06
Return of EUT:	---
Date(s) of test:	2018-04-25
Note(s):	---
Responsible for testing:	Mr. Matthias Stumpe
Responsible for test report:	Mr. Matthias Stumpe
Test report checked by:	Mr. Martin Steindl

Report details	
Report number:	TR-65350-25670-04
Edition:	2
Issue date:	2018-05-18

2 Details about the Test Laboratory

Details about the Test Laboratory	
Company name:	TÜV SÜD Product Service GmbH
Address:	Äußere Frühlingstraße 45 D-94315 Straubing Germany
Contact:	Mr. Markus Biberger
	Phone: +49 9421 5522-0 Fax: +49 9421 5522-99

3 Description of the Equipment Under Test

Equipment characteristics	
Type designation:	S&B Module
Parts of the system:	---
Options and accessories:	---
Type of equipment:	Bluetooth Low Energy (BLE) Module
Serial number:	NA, Test Sample 1
Manufacturer:	STORZ & BICKEL GMBH & CO.KG
Application [1]:	Wideband Data Transmission Systems
Equipment class:	Equipment for portable use - - Radio Module
Kind of equipment:	Transceiver
Frequency band [1]:	3 b (2400 – 2483.5 MHz)
Frequency range:	2402 – 2480 MHz
Operating Frequency:	2402 – 2480 MHz
Channel spacing	Wideband
Number of RF-channels:	40
Antenna type:	Integrated
Antenna size:	N/A
Power supply:	External DC supply Nominal: 3.3 V
Version of EUT:	Hardware version: BLE 0.04 Firmware version: FW 0.20.03

[1] Classification according to CEPT/ERC Recommendation 70-03

4 Operation Mode and Configuration of EUT

Operation Mode(s)
Transmitting continuously on 2402 MHz and 2480 MHz

List of ports and cables				
No.	*Description*	*Classification*[2]	*Cable type*	*Cable length*
D1	DC Power Supply	dc power	Unshielded	≤ 3 m
S1	Configuration interface	signal/control port	Unshielded	≤ 3 m

List of devices connected to EUT				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*
1	DC Power Supply	NGSM 32/10	192.0810.31	Rohde&Schwarz
2	TSR-USB-Adapter	20700	4515X0001	FSM AG

List of support devices				
No.	*Description*	*Type designation*	*Serial no. or ID*	*Manufacturer*
1	Notebook (for Configuration of EUT)	NA	NA	NA
2	TSR-USB-Adapter	20700	4515X0001	FSM AG

[2] Ports shall be classified as ac power, dc power or signal/control port.

5 Referenced Regulations

European publication	*International publication*	*Title*
---	CFR 47 Pt.1.1310	Code of Federal Regulations - Radiofrequency radiation exposure limits.
---	Health Canada Safety Code 6	Safety Code 6: Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz - Safety Code 6 (2015)

6 Measurement Uncertainty Values

Radio Interference Emission Testing			
Test	k_p	*Expanded Uncertainty*	*Note*
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH V-NetznachbildungAMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH V-NetznachbildungAMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH NetznachbildungAMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH V-NetznachbildungAMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH V-NetznachbildungAMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Immunity Testing			
Test	k_p	*Expanded Uncertainty*	*Note*
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2.05	+21.9 / -18.0 %	3
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields	2	+30.3 / -23.2 %	2
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Note 1:
The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 2:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 3:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05, providing a level of confidence of p = 95.45%

Note 4:
It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.

6.1 Electromagnetic Fields Test

6.1.1 Test Equipment List

	Type	*Designation*	*Inv.-no.*	*Manufacturer*
☒	Radiation Meter	EMR 200	19590	Narda
☒	Electric Field Probe	Type 9.2	19743	Narda

6.1.2 Test Results

Results for electromagnetic fields test are documented as listed below.

RF Exposure Assessment

Prüfdatum / *Date of test:*	2018-04-25
Prüfer / *Operator:*	Matthias Stumpe
Messplatz / *Test site:*	Non shielded room

Prüfergebnis / *Test Result*
☒ **Erfüllt / *Passed***
☐ **Nicht erfüllt / *Not passed***

Equipenment under Test (BLE Module) has been set into continuous transmission mode.
Transmit Power was configured to maximum available level.
Resulting fieldstrength was measured with Electromagentig Radiation Meter. Radiation Meters field probe was placed as close to BLE module PCB antenna as possible. Field probe housing was contacting PCB antenna during test.

Frequency of Emission	*Test Distance*	*Maximum measured Exposure Level*	*Exposure Limit*	*Limit acc. to*	*Result*
2402 MHz (minimum freq.)	0 mm (Field probe housing directly contacting BLE Module PCB antenna)	4.88 V/m	61.4 V/m	Health Canada Safety Code 6, Table 5 (General Public)	PASS
		0.054 W/m²	1 mW/cm² = 10 W/m²	Health Canada Safety Code 6, Table 5, (General Public)	PASS
		0.054 W/m²	1 mW/cm²	CFR 47 Pt.1.1310(e), Table 1, (General Population)	PASS
2480 MHz (maximum freq.)		5.02 V/m	61.4 V/m	Health Canada Safety Code 6, Table 5 (General Public)	PASS
		0.058 W/m²	1 mW/cm² = 10 W/m²	Health Canada Safety Code 6, Table 5, (General Public)	PASS
		0.058 W/m²	1 mW/cm² = 10 W/m²	CFR 47 Pt.1.1310(e), Table 1, (General Population)	PASS

SAR Exemption acc. to RSS-102 clause 2.5.1.

Maximum Radiated Power Pmax (EIRP) has been tested as follows:

P_{max} = 2.13 dBm = 1.63 mW (at 2480 MHz, at 20°C, see test report TR-65350-25670-01 (FCC))

According to RSS-102 (chapter 2.5.1, Table 1) the SAR evaluation exemption limit for frequencies less than 3500 MHz and sepeartion distance of less or equal to 5 mm is 2 mW.

Hence nor SAR evaluation is required for the above specified Equipenment under Test (BLE Module).

7 Revision History

Revision History			
Edition	*Date*	*Issued by*	*Modifications*
1	2018-04-25	M.Stumpe	First Edition
2	2018-05-18	M.Stumpe	SAR Exemption confirmation in accordance to RSS-102 clause 2.5.1 has been added to report.