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Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14039790 001**	**Seite 1 von 12** *Page 1 of 12*

Auftraggeber: *Client:*	**Montblanc Simplo GmbH** **Hellgrundweg 100** **22525 Hamburg, Germany**
Gegenstand der Prüfung: *Test Item:*	**Bluetooth Low Energy Wristband**
Bezeichnung: *Identification:*	**e-Strap**
Serien-Nr.: *Serial No.:*	**Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**A000199906-002**
Eingangsdatum: *Date of Receipt:*	**15.05.2015**
Prüfort: *Testing Location:*	**TÜV Rheinland Hong Kong Ltd.** 8/F, First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong **Global United Technology Services Co., Ltd.** 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, China
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of test item at delivery:*	Test samples are not damaged and suitable for testing.
Prüfgrundlage: *Test Specification:*	**FCC Part 15 Subpart C** **ANSI C63.4-2009**
Prüfergebnis: *Test Results:*	**Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.** The above mentioned product was tested and **passed**.
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Hong Kong Ltd.** 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong

geprüft/ *tested by:*			**kontrolliert/** *reviewed by:*		
26.06.2015	Benny Lau Senior Project Manager		26.06.2015	Sharon Li Department Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges: Other Aspects **FCC ID: 2AENP-GC183209**

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

Table of Content

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Product information

Manufacturers declarations

	Transceiver
Operating frequency range	2402 - 2480 MHz
Type of modulation	GFSK
Number of channels	40
Channel separation	2 MHz
Type of antenna	Chip Antenna
Antenna gain (dBi)	2 dBi
Power level	fix
Type of equipment	stand alone radio device
Connection to public utility power line	No
Nominal voltage	V_{nor}: 3.7 VDC
Independent Operation Modes	Transmitting

Product function and intended use

The equipment under test (EUT) is a Bluetooth low energy device.

FCC ID: 2AENP-GC183209

Models	**Product description**
e-Strap	Bluetooth Low Energy Wristband

Submitted documents

Circuit Diagram
Block Diagram
Bill of material
User manual
Label

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

Nil

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- There was no special software to exercise the device.

Special Accessories and Auxiliary Equipment

- none

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2009.

The equipment under test (EUT) was placed at the middle of the 80 cm height turntable, and the turntable is 3 meters far from the measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

FS = R + AF + CF + FA – PA

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

List of Test and Measurement Instruments

Global United Technology Services Co., Ltd. (Registration number: 600491)

Radiated Emission

Equipment	Manufacturer	Type	Cal.Date	Cal.Due Date
3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	April 5, 2015	April 4, 2017
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	N/A	N/A
ESU EMI Test Receiver	R&S	ESU26	June 8, 2015	June 7, 2016
Loop Antenna	Zhinan	ZN30900A	June 8, 2015	June 7, 2016
Bi-log Hybrid Antenna	SCHWARZBECK	VULB9163	Mar. 8, 2015	Mar. 8, 2016
Double-ridged horn antenna	SCHWARZBECK	9120D	Mar. 8, 2015	Mar. 8, 2016
Horn Antenna	ETS-LINDGREN	3160-09	Mar. 8, 2015	Mar. 8, 2016
RF Amplifier	HP	8347A	June 8, 2015	June 7, 2016
RF Amplifier	HP	8349B	June 8, 2015	June 7, 2016
EMI Test Software	AUDIX	E3	N/A	N/A
Coaxial cable	GTS	N/A	June 8, 2015	June 7, 2016

AC Mains Conducted Emission

Equipment	Manufacturer	Type	Cal.Date	Cal.Due date
Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	Sep. 08 2013	Sep. 7, 2015
EMI Test Receiver	R&S	ESCS30	June 8 2015	June 7, 2016
Pulse Limiter	R&S	ESH3-Z2	June 8 2015	June 7, 2016
Coaxial Switch	ANRITSU CORP	MP59B	June 8 2015	June 7, 2016
Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	June 8 2015	June 7, 2016
Coaxial Cable	GTS	N/A	June 8 2015	June 7, 2016
EMI Test Software	AUDIX	E3	N/A	N/A
Thermo meter	KTJ	TA328	June 8 2015	June 7, 2016

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Radio Test

Equipment	Manufacturer	Type	S/N	Due Date
Spectrum Analyzer	R & S	FSP30	Jan 12 2015	Jan 12, 2017

Results FCC Part 15 – Subpart C

FCC 15.203 – Antenna Requirement 1		**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	a) Antenna type: b) Manufacturer and model no: c) Peak Gain:	Fixed Integral chip antenna RFANT3216120A5T 2 dBi
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2	**N/A**
FCC Requirement:	Provide information for every antenna proposed for the use with the EUT
Results:	Only one integral antenna can be used.
Verdict:	N/A

FCC 15.207 – Conducted Emission on AC Mains **Pass**

Test Specification : ANSI C63.4 – 2009
Mode of operation : Charging mode
Port of testing : AC Mains input port of power supply
Detector : Quasi-peak and Average
RBW : 9 kHz
Supply voltage : 120Vac 60Hz
Temperature : 23ºC
Humidity : 50%

Requirement: 15.207(a)

Results: Pass

Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.17	42.31	36.58	66 - 56	56 - 46	Pass
> 0,5 - 5	4.454	46.91	38.08	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass

Neutral measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.168	43.26	36.46	66 - 56	56 - 46	Pass
> 0,5 - 5	4.202	45.89	37.19	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass

Results:	Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test Results plots refer to Appendix 1, page 2.

FCC 15.247 (a)(2) – 6dB Bandwidth Measurement **Pass**

FCC Requirement: Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.

Test Specification : KDB 558074 D01 DTS Measurement Guidance v03r02 section 8.1 Option 1
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100KHz/ 300KHz
Supply voltage : 3.7 Vdc
Temperature : 23ºC
Humidity : 50%

Results: For test protocols please refer to Appendix 1, page 3-4.

Channel frequency (MHz)	6 dB left (MHz)	6 dB right (MHz)	6dB bandwidth (kHz)
2402	2401.710	2402.380	670
2440	2439.730	2440.370	640
2480	2479.710	2480.370	660

FCC 15.247(b)(3) – Maximum Peak Couducted Output Power **Pass**

FCC Requirement: For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt (30dBm)

Test Specification : KDB 558074 D01 DTS Measurement Guidance v03r02 section 9.1.1
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
Supply voltage : 3.7 Vdc
Temperature : 23ºC
Humidity : 50%

Results: For test protocols please refer to Appendix 1, page 5-6.

Frequency (MHz)	Measured Output Power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	-6.72	1.2	-5.52	1 / 30.0	Pass
2440	-6.33	1.2	-5.13	1 / 30.0	Pass
2480	-5.85	1.2	-4.65	1 / 30.0	Pass

FCC 15.247(e) – Power Spectral Density **Pass**

FCC Requirement: For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Specification : KDB 558074 D01 DTS Measurement Guidance v03r02 section 10.2
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : ≥100 KHz / ≥3xRBW
span : ≥1.5 x DTS BW
Supply voltage : 3.7 Vdc
Temperature : 23ºC
Humidity : 50%

Results: For test protocols please refer to Appendix 1, page 7-8.

Operating frequency (MHz)	Power density (dBm)	Limit (dBm)	Verdict
2402	-6.81	8.0	Pass
2440	-6.46	8.0	Pass
2480	-5.98	8.0	Pass

FCC 15.247(d) – Spurious Conducted Emissions **Pass**

Test Specification : KDB 558074 D01 DTS Measurement Guidance v03r02 section 11.1
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz
Supply voltage : 3.7 Vdc
Temperature : 23 ºC
Humidity : 50 %

FCC Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.

Only the worst cases is shown below. For test protocols refer to Appendix 1, page 9-14.

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	98.902	-46.12	-6.81	-39.31	Pass
2440	98.902	-44.84	-6.46	-38.38	Pass
2480	98.902	-46.17	-5.98	-40.19	Pass

FCC 15.247(d) or 15.205 – Radiated Emissions in Restricted Frequency Bands **Pass**

Test Specification : ANSI C63.4 – 2009
Mode of operation : TX mode
Port of testing : Enclosure
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 3.7 Vdc
Temperature : 23ºC
Humidity : 50%

FCC Requirement: In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in section15.205(a), must also comply with the radiated emission limits specified in section 15.205(c).

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.

All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.

Mode: 2402MHz TX Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2310.000	35.87	74.0 / PK
2310.000	24.79	54.0 / AV
4804.000	43.25	74.0 / PK
4804.000	34.76	54.0 / AV

Mode: 2402 MHz TX Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2310.000	36.43	74.0 / PK
2310.000	25.52	54.0 / AV
4804.000	42.15	74.0 / PK
4804.000	34.07	54.0 / AV

Mode: 2440 MHz TX Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4880.000	41.52	74.0 / PK
4880.000	34.48	54.0 / AV

Mode: 2440 MHz TX Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4880.000	41.73	74.0 / PK
4880.000	34.22	54.0 / AV

Mode: 2480MHz TX Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	36.31	74.0 / PK
2483.500	25.79	54.0 / AV
4960.000	41.61	74.0 / PK
4960.000	32.85	54.0 / AV
Mode: 2480 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	36.78	74.0 / PK
2483.500	25.27	54.0 / AV
4960.000	41.50	74.0 / PK
4960.000	33.64	54.0 / AV