

Produkte
Products

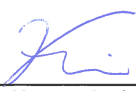
Prüfbericht - Nr.: 14049119 001 <i>Test Report No.:</i>		Seite 1 von 16 <i>Page 1 of 16</i>	
Auftraggeber: <i>Client:</i>		Bluision Inc. 600 Corporate Drive, Suite 410 Fort Lauderdale, FL 33334 United States of America	
Gegenstand der Prüfung: <i>Test Item:</i>		Bluetooth Low Energy Device - Beacon Transmitter	
Bezeichnung: <i>Identification:</i>	BEEKS LR	Serien-Nr.: <i>Serial No.:</i>	Engineering sample
Wareneingangs-Nr.: <i>Receipt No.:</i>	A000538389-001	Eingangsdatum: <i>Date of Receipt:</i>	29.04.2017
Prüfört: <i>Testing Location:</i>	TÜV Rheinland Hong Kong Ltd. 3/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., 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: <i>Condition of test item at delivery:</i>		Test samples are not damaged and suitable for testing.	
Prüfgrundlage: <i>Test Specification:</i>	FCC Part 15 Subpart C ANSI C63.10-2013		
Prüfergebnis: <i>Test Results:</i>	Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage. The above mentioned product was tested and passed .		
Prüflaboratorium: <i>Testing Laboratory:</i>	TÜV Rheinland Hong Kong Ltd. 3-4, 11/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong		
geprüft/ tested by:		kontrolliert/ reviewed by:	
10.05.2017	Kevin Wong Project Manager		10.05.2017
			Mika Chan Project Manager
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>
			Name/Stellung <i>Name/Position</i>
			Unterschrift <i>Signature</i>
Sonstiges: <i>Other Aspects</i>		FCC ID: SL6-BVLRANGE	
Abkürzungen:	P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet	Abbreviations:	P(ass) = passed F(ail) = failed N/A = not applicable 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 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 safety mark on this or similar products.</i>			

Table of Content

	Page
Cover Page	1
Table of Content	2
Product information	4
Manufacturers declarations	4
Product function and intended use	4
Submitted documents.....	4
Independent Operation Modes	4
Related Submittal(s) Grants	5
Remark	5
Test Set-up and Operation Mode	6
Principle of Configuration Selection	6
Test Operation and Test Software.....	6
Special Accessories and Auxiliary Equipment.....	6
Countermeasures to achieve EMC Compliance.....	6
Test Methodology	7
Radiated Emission	7
Field Strength Calculation.....	7
Test Setup Diagram	8
List of Test and Measurement Instruments	10
Measurement Uncertainty	11
Results FCC Part 15 – Subpart C	12
FCC 15.203 – Antenna Requirement 1	Pass..... 12
FCC 15.204 – Antenna Requirement 2.....	N/A..... 12
FCC 15.247 (a)(2) – 6dB Bandwidth Measurement	Pass..... 13
FCC 15.247(b)(3) – Maximum Peak Couducted Output Power	Pass..... 13
FCC 15.247(e) – Power Spectral Density.....	Pass..... 14
FCC 15.247(d) – Spurious Conducted Emissions.....	Pass..... 14
FCC 15.205 – Radiated Emissions in Restricted Frequency Bands.....	Pass..... 15
Appendix 1 – Test protocols	15 pages
Appendix 2 – Test setup	2 pages

Appendix 3 – EUT External Photos 3 pages
Appendix 4 – EUT Internal Photos 4 pages
Appendix 5 – RF exposure information..... 2 pages

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	PCB Antenna
Antenna gain (dBi)	5 dBi
Power level	fix
Type of equipment	stand alone radio device
Connection to public utility power line	No
Nominal voltage	V _{nor} : 3.6V
Independent Operation Modes	Transmitting

Product function and intended use

The equipment under test (EUT) is a Bluetooth low energy Beacon Transmitter which is powered by batteries only.

FCC ID: SL6-BVLRANGE

Models	Product description
BEEKS LR	Bluetooth Low Energy device - Beacon Transmitter

Submitted documents

Circuit Diagram
 Block Diagram
 Technical Description
 User manual
 Label

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.

For further information refer to User Manual

Related Submittal(s) Grants

None

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

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.

- During test, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power was selected according to the instruction given by the manufacturer (rfpower =1). The setting of the RF output power expected by the customer shall be fixed on the firmware of the final end product.

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and 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:

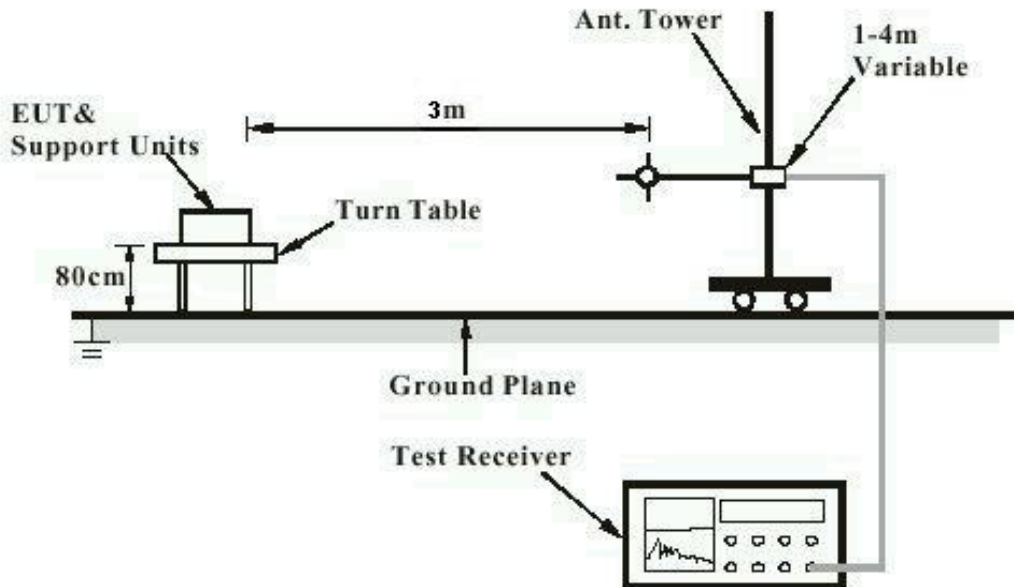
$$FS = R + AF + CF + FA - PA$$

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.

Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

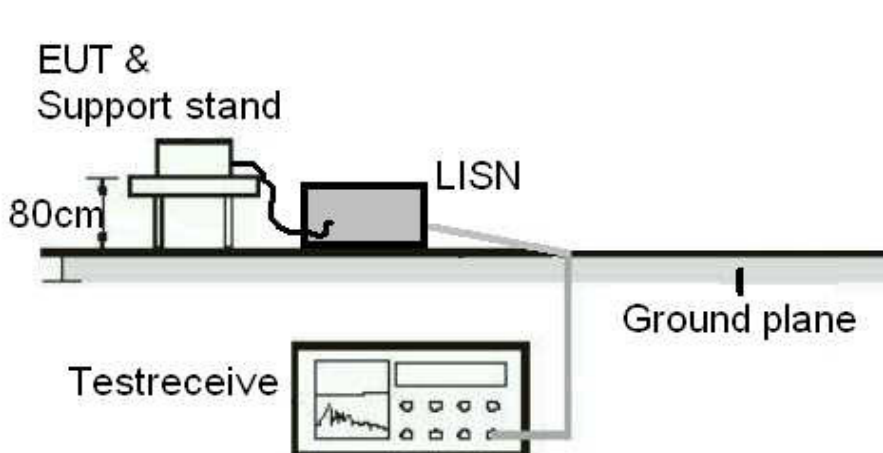
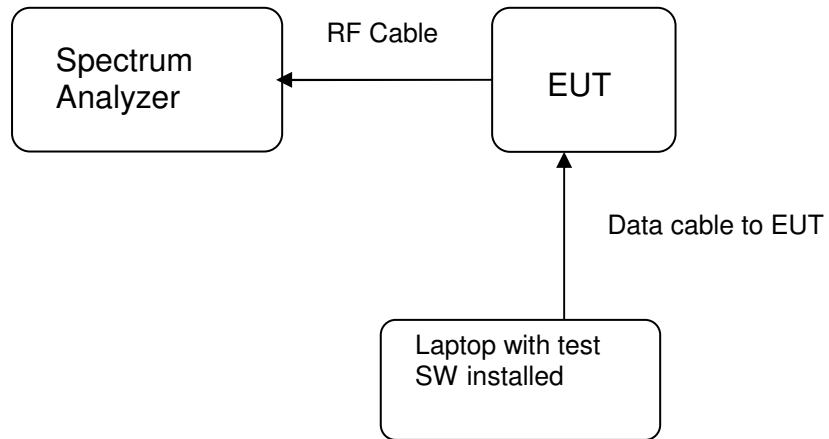


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)



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)	03 Jul 2015	02 Jul 2018
Control Room	ZhongYu Electron	6.2(L)*2.5(W)*2.4(H)	N/A	N/A
ESU EMI Test Receiver	R&S	ESU26	29 Jun 2016	28 Jun 2017
Bi-log Hybrid Antenna	SCHWARZBECK	VULB9163	29 Jun 2016	28 Jun 2017
Double-ridged horn antenna	SCHWARZBECK	9120D	29 Jun 2016	28 Jun 2017
RF Amplifier	HP	8347A	29 Jun 2016	28 Jun 2017
EMI Test Software	AUDIX	E3	N/A	N/A
Coaxial Cable	GTS	N/A	N/A	N/A
Thermo meter	N/A	N/A	29 Jun 2016	28 Jun 2017

TÜV Rheinland Hong Kong Ltd

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP30	16-Oct-16	15 Oct 2017

Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 3.70\text{dB}$ (9kHz to 30MHz) and $\pm 4.64\text{dB}$ (30MHz to 1000MHz) and is $\pm 4.83\text{dB}$ (1GHz to 18GHz) and $\pm 5.20\text{dB}$ (18GHz to 25GHz)

The estimated combined standard uncertainty for antenna conducted emission is $\pm 2.1\text{dB}$

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for the level of confidence is approximately 95%.

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:	Integral PCB antenna
	b) Manufacturer and model no:	N/A
	c) Peak Gain:	5 dBi
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2		N/A
FCC Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.	
Results:	Only one integral antenna can be used.	
Verdict:	N/A	

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 : ANSI C63.10 – 2013 Mode of operation : TX mode Port of testing : Temporary antenna port Detector : Peak Supply voltage : 3.6 Vdc Temperature : 23°C Humidity : 50%			
Results: For test protocols please refer to Appendix 1			
Channel frequency (MHz)	6 dB left (MHz)	6 dB right (MHz)	6dB bandwidth (kHz)
2402	2401.652	2402.330	678.000
2440	2439.646	2440.336	690.000
2480	2479.640	2480.336	696.000

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 : ANSI C63.10 – 2013 Mode of operation : TX mode Port of testing : Temporary antenna port Detector : Peak Supply voltage : 3.6 Vdc Temperature : 23°C Humidity : 50%			
Results: For test protocols please refer to Appendix 1			
Frequency (MHz)	Measured Output Power (dBm)	Limit (W/dBm)	Verdict
2402	3.26	1 / 30.0	Pass
2440	2.43	1 / 30.0	Pass
2480	1.03	1 / 30.0	Pass

FCC 15.247(e) – Power Spectral Density			Pass
<p>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.</p>			
<p>Test Specification : ANSI C63.10 – 2013 Mode of operation : TX mode Port of testing : Temporary antenna port Detector : Peak Supply voltage : 3.6 Vdc Temperature : 23°C Humidity : 50%</p>			
<p>Results: For test protocols please refer to Appendix 1.</p>			
Operating frequency (MHz)	Power density (dBm)	Limit (dBm)	Verdict
2402	3.21	8.0	Pass
2440	2.37	8.0	Pass
2480	0.79	8.0	Pass

FCC 15.247(d) – Spurious Conducted Emissions			Pass		
<p>Test Specification : ANSI C63.10 – 2013 Mode of operation : TX mode Port of testing : Temporary antenna port Detector : Peak Supply voltage : 3.6 Vdc Temperature : 23 °C Humidity : 50 %</p>					
<p>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.</p>					
<p>Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.</p> <p>Only the worst cases is shown below. For test protocols refer to Appendix 1</p>					
Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	2400.000	-33.17	3.21	36.38	Pass
2440	2344.000	-46.55	2.37	48.92	Pass
2480	2384.000	-46.38	0.79	47.17	Pass
	2483.500	-42.47	0.79	43.26	Pass

FCC 15.205 – Radiated Emissions in Restricted Frequency Bands		Pass
Test Specification : ANSI C63.10 – 2013 Mode of operation : TX mode Port of testing : Enclosure Detector : Peak Supply voltage : 3.6 Vdc Temperature : 23°C 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 section 15.205(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
2400.000	61.77	74.0 / PK
2400.000	34.71	54.0 / AV
47.994	25.57	40.0 / QP
96.099	24.27	43.5 / QP
218.309	23.69	46.0 / QP
327.887	28.98	46.0 / QP
492.469	30.32	46.0 / QP
903.309	34.07	46.0 / QP
Mode: 2402 MHz TX		Horizontal Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2400.000	70.24	74.0 / PK
2400.000	44.03	54.0 / AV
96.099	32.42	43.5 / QP
143.830	30.72	43.5 / QP
191.745	33.18	43.5 / QP
239.987	31.64	46.0 / QP
327.887	33.21	46.0 / QP
576.644	28.50	46.0 / QP

Mode: 2440 MHz TX			Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
47.994	26.35	40.0 / QP	96.099	32.64	43.5 / QP
95.762	21.97	43.5 / QP	143.830	30.50	43.5 / QP
191.745	20.14	43.5 / QP	192.419	32.64	43.5 / QP
299.316	21.66	46.0 / QP	239.987	31.80	46.0 / QP
576.644	26.78	46.0 / QP	336.035	29.50	46.0 / QP
798.980	31.49	46.0 / QP	798.980	31.07	46.0 / QP
Mode: 2440 MHz TX			Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
96.099	32.64	43.5 / QP	2483.500	52.19	74.0 / PK
143.830	30.50	43.5 / QP	2483.500	26.53	54.0 / AV
192.419	32.64	43.5 / QP	47.994	25.92	40.0 / QP
239.987	31.80	46.0 / QP	96.099	22.79	43.5 / QP
336.035	29.50	46.0 / QP	144.335	20.90	43.5 / QP
798.980	31.07	46.0 / QP	291.036	21.89	46.0 / QP
Mode: 2480MHz TX			Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	52.19	74.0 / PK	576.644	27.74	46.0 / QP
2483.500	26.53	54.0 / AV	798.980	31.00	46.0 / QP
47.994	25.92	40.0 / QP			
96.099	22.79	43.5 / QP			
144.335	20.90	43.5 / QP			
291.036	21.89	46.0 / QP			
576.644	27.74	46.0 / QP			
798.980	31.00	46.0 / QP			
Mode: 2480 MHz TX			Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	59.44	74.0 / PK	96.099	30.39	43.5 / QP
2483.500	32.83	54.0 / AV	143.830	28.72	43.5 / QP
96.099	30.39	43.5 / QP	191.745	32.27	43.5 / QP
143.830	28.72	43.5 / QP	239.987	31.74	46.0 / QP
191.745	32.27	43.5 / QP	336.035	29.27	46.0 / QP
239.987	31.74	46.0 / QP	432.546	27.93	46.0 / QP
336.035	29.27	46.0 / QP			
432.546	27.93	46.0 / QP			