

Produkte
Products

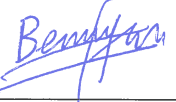
Prüfbericht - Nr.: 14047371 001			Seite 1 von 17 <i>Page 1 of 17</i>		
<i>Test Report No.:</i>					
Auftraggeber: <i>Client:</i>		Bluvision Inc. 600 Corporate Drive, Suite 410 Fort Lauderdale, FL 33334 United States of America			
Gegenstand der Prüfung: <i>Test Item:</i>		Bluetooth Low Energy device - Employee Card			
Bezeichnung: <i>Identification:</i>	Beacon Card	Serien-Nr.: <i>Serial No.:</i>	Engineering sample		
Wareneingangs-Nr.: <i>Receipt No.:</i>	A000481825-001	Eingangsdatum: <i>Date of Receipt:</i>	29.12.2016		
Prüfört: <i>Testing Location:</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 Hong Kong Productivity Council HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong				
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:			
10.04.2017	Kevin Wong Project Manager		10.04.2017	Benny Lau Senior 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: Other Aspects		FCC ID: SL6-BVCARD01			
Abkürzungen:		Abbreviations:			
P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet		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 15.207 – Conducted Emission on AC Mains	Pass..... 12
FCC 15.247 (a)(2) – 6dB Bandwidth Measurement	Pass..... 13
FCC 15.247(b)(3) – Maximum Peak Couducted Output Power	Pass..... 14
FCC 15.247(e) – Power Spectral Density.....	Pass..... 14
FCC 15.247(d) – Spurious Conducted Emissions.....	Pass..... 15
FCC 15.205 – Radiated Emissions in Restricted Frequency Bands.....	Pass..... 16

Appendix 1 – Test protocols	13 pages
Appendix 2 – Test setup	2 pages
Appendix 3 – EUT External Photos	3 pages
Appendix 4 – EUT Internal Photos	3 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)	0 dBi
Power level	fix
Type of equipment	stand alone radio device
Connection to public utility power line	No
Nominal voltage	V _{nom} : 3.0 VDC
Independent Operation Modes	Transmitting

Product function and intended use

The equipment under test (EUT) is a Bluetooth Low Energy Beacon Card which is powered by batteries only.

FCC ID: SL6-BVCARD01

Models	Product description
Beacon Card	Bluetooth Low Energy device - Employee Card

Submitted documents

Circuit Diagram
 Block Diagram
 Technical Description
 User manual
 Label
 Bill of material

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. 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:

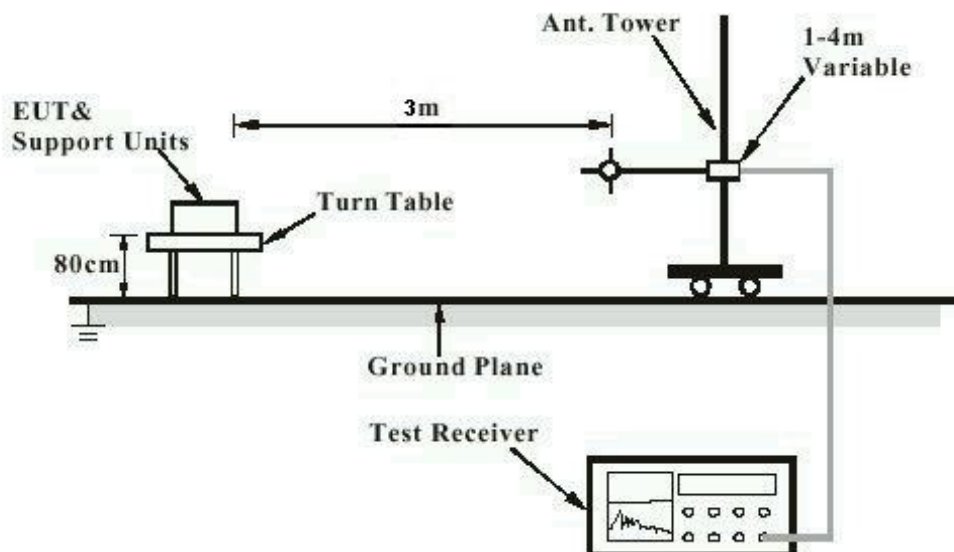
$$FS = R + AF + CF + FA - PA$$

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)

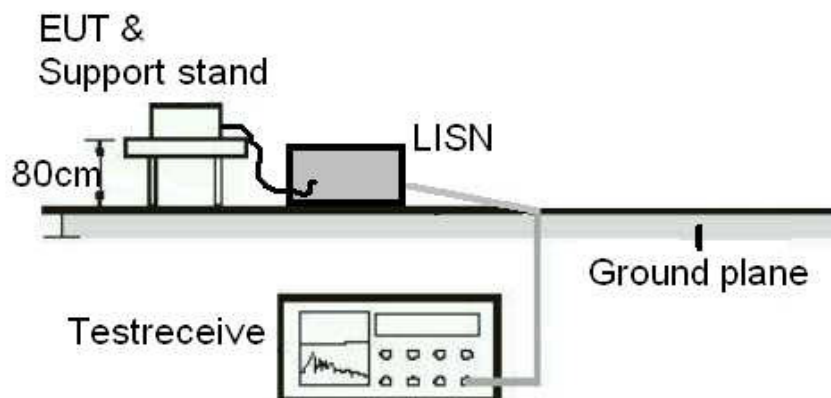
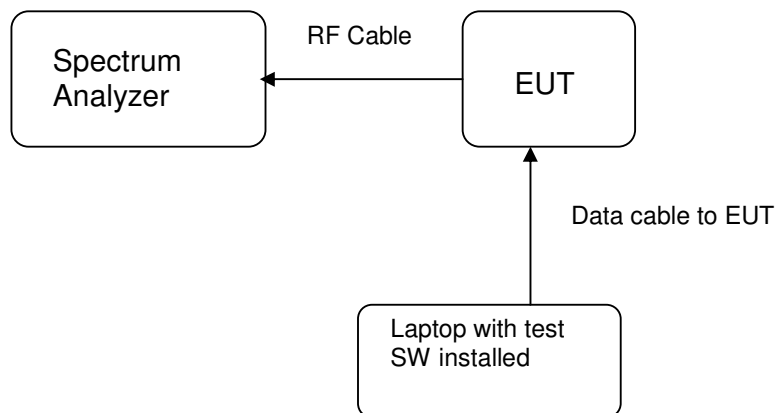


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)



List of Test and Measurement Instruments

Hong Kong Productivity Council (FCC: 90656)

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	25 Apr 2016	25 Apr 2017
Test Receiver	R & S	ESU40	26 Jul 2016	26 Jul 2017
Bi-conical Antenna	R & S	HK116	01 Sep 2015	01 Sep 2017
Log Periodic Antenna	R & S	HL223	01 Sep 2015	01 Sep 2017
Coaxial cable	Harbour	LL335	10 Jun 2016	10 Jun 2018
Microwave amplifier 0.5-26.5GHz, 25dB gain	HP	83017A	18 Jul 2016	18 Jul 2018
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	28 Oct 2015	28 Oct 2017
Standard Gain Horn	ETS-Lindgren	3160-07	03 Mar-16	03 Mar 18
Standard Gain Horn	ETS-Lindgren	3160-08	03 Mar 16	03 Mar 18
Standard Gain Horn	ETS-Lindgren	3160-10	03 Mar 16	03 Mar 18
Active Loop Antenna	EMCO	6502	27 Oct 2016	27 Oct 2017

TÜV Rheinland Hong Kong Ltd

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP30	15 Oct 2016	15-Oct-2017

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is $\pm 2.42\text{dB}$.

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 4.81\text{dB}$ (9kHz to 30MHz) and $\pm 4.62\text{dB}$ (30MHz to 200MHz) and $\pm 5.67\text{dB}$ (200MHz to 1000MHz) and is $\pm 5.07\text{dB}$ (1GHz to 8.2GHz) and $\pm 4.58\text{dB}$ (8.2GHz to 12.4GHz) and $\pm 4.78\text{dB}$ (12.4GHz to 18GHz)

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: b) Manufacturer and model no: c) Peak Gain:	Integral PCB antenna N/A 0 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 15.207 – Conducted Emission on AC Mains		Pass
There is no AC power input or output ports on the EUT.		

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 : 3.0 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	2401.660	2402.336	676.000
2440	2439.660	2440.340	680.000
2480	2479.652	2480.340	688.000

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 : 3.0 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	-1.69	1 / 30.0	Pass
2440	-2.39	1 / 30.0	Pass
2480	-2.74	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 : ANSI C63.10 – 2013 Mode of operation : TX mode Port of testing : Temporary antenna port Detector : Peak Supply voltage : 3.0 Vdc Temperature : 23°C Humidity : 50%			
Results: For test protocols please refer to Appendix 1.			
Operating frequency (MHz)	Power density (dBm)	Limit (dBm)	Verdict
2402	-2.04	8.0	Pass
2440	-2.78	8.0	Pass
2480	-3.08	8.0	Pass

FCC 15.247(d) – Spurious Conducted Emissions					Pass
Test Specification : ANSI C63.10 – 2013 Mode of operation : TX mode Port of testing : Temporary antenna port Detector : Peak Supply voltage : 3.0 Vdc Temperature : 23 °C 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					
Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	2399.980	-38.61	-2.04	36.57	Pass
2440	No peak found	---	-2.78	---	Pass
2480	2483.560	-45.06	-3.08	41.98	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 : 3.7 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	
2389.744	46.44	74.0 / PK	
2338.462	33.78	54.0 / AV	
4803.205	52.97	74.0 / PK	
4803.205	37.87	54.0 / AV	
Mode: 2402 MHz TX		Horizontal Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2389.872	65.78	74.0 / PK	
2388.718	33.95	54.0 / AV	
4803.429	54.75	74.0 / PK	
4804.006	41.92	54.0 / AV	
7205.673	60.44	74.0 / PK	
7205.192	46.07	54.0 / AV	

Mode: 2440 MHz TX			Vertical Polarization		
Freq MHz			Level dBuV/m		Limit/ Detector dBuV/m
No peak found			---		74.0 / PK
No peak found			---		54.0 / AV
Mode: 2440 MHz TX			Horizontal Polarization		
Freq MHz			Level dBuV/m		Limit/ Detector dBuV/m
No peak found			---		74.0 / PK
No peak found			---		54.0 / AV
Mode: 2480MHz TX			Vertical Polarization		
Freq MHz			Level dBuV/m		Limit/ Detector dBuV/m
2483.500			60.67		74.0 / PK
2483.500			34.17		54.0 / AV
No peak found			---		74.0 / PK
No peak found			---		54.0 / AV
Mode: 2480 MHz TX			Horizontal Polarization		
Freq MHz			Level dBuV/m		Limit/ Detector dBuV/m
2483.500			69.51		74.0 / PK
2483.500			41.51		54.0 / AV
No peak found			---		74.0 / PK
No peak found			---		54.0 / AV