CE RADIO TEST REPORT

Prepared For :	
Product Name:	6-in-1 music camping lights
Trade Name:	
Model :	BY1006
Prepared By :	Shenzhen BST Technology Co., Ltd. Building No.23-24, Zhiheng Industrial Park, Guankouer Road, Nantou,Nanshan District,Shenzhen,Guangdong,China
Test Date:	Dec. 23-27, 2016
Date of Report :	Dec. 27, 2016
Report No.:	BSTDG1612657910001ER-7

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TEST REPORT DECLARATION

Applicant	:	
Address	:	
Manufacturer	:	
Address	:	
EUT Description	:	6-in-1 music camping lights
Model Number	:	BY1006

Test Standards:

ETSI EN 300 328 V1.9.1(2015-02)

The EUT described above is tested by **BST Technology Co.,Ltd.** Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. **BST Technology Co.,Ltd.** Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the **2014/53/EU** directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Prepared by : Grace

Assistant

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Test Engineer

Reviewer : Dilys

Supervisor

Approved & Authorized Signer :

Andrew. Shu / Manager

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	Test Results
Equivalent Isotropic Radiated Power	Pass
Maximum spectral power density	N.A*
Frequency Range	Pass
Frequency hopping requirements	Pass
Medium access protocol	Pass *
Transmitter Spurious Emissions	Pass
Receiver spurious emissions	Pass

Note:

N.A*- This item has no requirement for FHSS equipment.

Pass *- The manufacturer has verified that medium access protocol has been implemented by the EUT.

2. GENERAL INFORMATION

2.1. Report information

2.1.1.This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that BST approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that BST in any way guarantees the later performance of the product/equipment.

2.1.2.The sample/s mentioned in this report is/are supplied by Applicant, BST therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

2.1.3.Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through BST, unless the applicant has authorized BST in writing to do so.

2.2. Measurement Uncertainty

Available upon request.

3. PRODUCT DESCRIPTION

3.1. EUT Description

Description	:	6-in-1 music camping lights :
Applicant	:	BY1006
Model Number		
Operation Frequency	:	2402MHZ-2480MHZ
Power	:	DC5V

3.2. Block Diagram of EUT Configuration

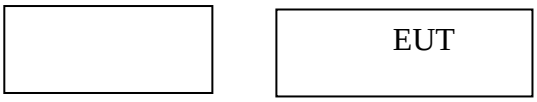

Figure 1 EUT SETUP

3.3. Support Equipment List

Table 2 Ancillary Equipment

Name	Model No	S/N	Manufacturer	Used "√"
/	/	/	/	/

3.4. Operating Condition of EUT

Test mode 1: TX
Test mode 2: RX

3.5. Test Conditions

Temperature: -20~55℃
Relative Humidity: 50~70 %

3.6. Modifications

No modification was made.

3.7. Abbreviations

AC	Alternating Current
AMN	Artificial Mains Network
DC	Direct Current
EM	ElectroMagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
IF	Intermediate Frequency
RF	Radio Frequency
rms	root mean square
EMI	Electromagnetic Interference
EMS	Electromagnetic Susceptibility

4. TEST EQUIPMENT USED

4.1. Test Equipment Used to Measure Radiated Disturbance

Table 3 For Spurious Emission Test

NO.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB3436	EMI Test Receiver	Rohde & Schwarz	ESI26	Jan 30,2016	1 Year
SB3440	Bilog Antenna	Chase	CBL6112B	Jan 30,2016	1 Year
SB3438	Signal Generator	Rohde & Schwarz	SMR20	Jan 30,2016	1 Year
SB3174	Antenna	Schwarzbeck	VUBA9117	Jan 30,2016	3 Year
SB3434	Horn Antenna	Rohde & Schwarz	HF906	Jan 30,2016	1 Year
SB3435	Horn Antenna	Rohde & Schwarz	HF906	Jan 30,2016	1 Year
SB3450/01	3m Semi-anechoic chamber	Albatross Projects	9X6X6	Mar 23,2016	2 Year

Table 4 RF Test

NO.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB3436	EMI Test Receiver	Rohde & Schwarz	ESI26	Jan 30,2016	1 Year
SB3440	Bilog Antenna	Chase	CBL6112B	Jan 30,2016	1 Year
SB3438	Signal Generator	Rohde & Schwarz	SMR20	Jan 30,2016	1 Year
SB3997	EMI Receiver	Rohde & Schwarz	ESPI3	Jan 30,2016	1Year

5. EQUIVALENT ISOTROPIC RADIATED POWER

5.1. Test Requirements

5.1.1.Test Standard

ETSI EN 300 328 V1.9.1(2015-02)

5.1.2.Test Limit

The equivalent isotropic radiated power shall be equal to or less than -10 dBW(100mW).

5.2. Test Procedure

For Transmitter

See clause 5.3 for the test conditions.
The equivalent isotropic radiated power shall be determined and recorded.
The following shall be applied to the combination(s) of the radio device and its intended antenna(e). In the case that the RF power level is user adjustable, all measurements shall be made with the highest power level available to the user for that combination.
The following methods of measurement shall apply.
Radiated measurements
This method shall only be used for integral antenna equipment that does not have a temporary antenna connector provided. In the case of radiated measurements, using a test site as described in annex B and applicable measurement procedures as described in annex C, the equivalent isotropic radiated power as defined in clause 4.3.1.1 shall be measured and recorded.
Conducted measurements
In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. The RF power as defined in clause 4.3.1.1 shall be measured and recorded. The measurement shall be performed using normal operation of the equipment with the test modulation applied.
The test procedure shall be as follows:
step 1:
- using a suitable means, the output of the transmitter shall be coupled to a matched diode detector;
- the output of the diode detector shall be connected to the vertical channel of an oscilloscope;
- the combination of the diode detector and the oscilloscope shall be capable of faithfully reproducing the
envelope peaks and the duty cycle of the transmitter output signal;
- the observed duty cycle of the transmitter (Tx on/(Tx on + Tx off)) shall be noted as x, ($0 < x < 1$) and
recorded. For the purpose of testing, the equipment shall be operated with a duty cycle that is equal to or
more than 0,1.

step 2:
- the average output power of the transmitter shall be determined using a wideband, calibrated RF power
meter with a matched thermocouple detector or an equivalent thereof and, where applicable, with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall be recorded as "A" (in dBm);
- the e.i.r.p. shall be calculated from the above measured power output A, the observed duty cycle x, and
the applicable antenna assembly gain "G" in dBi, according to the formula:
P = A + G + 10 log (1/x);
P shall not exceed the value specified in clause 4.3.1.2.
The measurement shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range.
These frequencies shall be recorded. FHSS equipment shall be made to hop continuously to each of these three
frequencies separately.
These measurements shall be performed at normal and extreme test conditions, see clause 5.3.
The method of measurement shall be documented.
The results obtained shall be compared to the limits in clause 4.3.1.2 in order to prove compliance with the requirement.

5.3. Test Data

Table 5 Effective Radiated Power

Low channel(2402.0MHz)

Ambient temperature: 25 ℃ Relative humidity: 68 %		
Test conditions		Effective radiated power (dBm)
T_{nom}(25℃)	V_{nom}(DC 5V)	-2.92
T_{min}(-20℃)	V_{nom}(DC 5V)	-2.93
	V_{min}(DC 4.5V)	-2.94
T_{max}(55℃)	V_{nom}(DC 5V)	-2.82
	V_{min}(DC 4.5V)	-2.94
Measurement uncertainty		±1.5dB

Note:
(1) Limit shall be equal to or less than -10 dBW(100mW)
(2) -10 dBW(100mW)=20 dBm

Middle channle (2441MHz)

Ambient temperature: 25 ℃ Relative humidity: 68 %		
Test conditions		Effective radiated power (dBm)
T_{nom}(25℃)	V_{nom}(DC 5V)	-2.84
T_{min}(-20℃)	V_{nom}(DC 5V)	-2.85
	V_{min}(DC 4.5V)	-2.82
T_{max}(55℃)	V_{nom}(DC 5V)	-2.84
	V_{min}(DC 4.5V)	-2.83
Measurement uncertainty		±1.5dB

Note:

(1) Limit shall be equal to or less than -10 dBW(100mW)

(2) -10 dBW(100mW)=20 dBm

High channle (2480MHz)

Ambient temperature: 25 ℃ Relative humidity: 68 %		
Test conditions		Effective radiated power (dBm)
T_{nom}(25℃)	V_{nom}(DC 5V)	-2.82
T_{min}(-20℃)	V_{nom}(DC 5V)	-2.84
	V_{min}(DC 4.5V)	-2.85
T_{max}(55℃)	V_{nom}(DC 5V)	-2.82
	V_{min}(DC 4.5V)	-2.84
Measurement uncertainty		±1.5dB

Note:

(1) Limit shall be equal to or less than -10 dBW(100mW)

(2) -10 dBW(100mW)=20 dBm

6. MAXIMUM SPECTRAL POWER DENSITY

6.1. Test Requirements

6.1.1.Test Standard

ETSI EN 300 328 V1.9.1(2015-02)

6.1.2.Test Limit

For equipment using FHSS modulation, the maximum spectral power density shall be limited to -10 dBW (100 mW) per 100 kHz e.i.r.p. For equipment using other types of modulation, the maximum spectral power density shall be limited to -20 dBW (10 mW) per MHz e.i.r.p

6.2. Test Procedure

Test procedure refers to clause 5.3 and clause 5.7.3 of standard ETSI EN 300 328.

6.3. Test Data

Table 6 Peak Power Density

Ambient temperature:	25	C
Relative humidity:	67	%

Frequency (GHz)	Peak power density (dBmW/100kHz)
--	--
Measurement uncertainty	±3dB

Note: NOT Applicble, The device is FHSS modulation.

7. FREQUENCY RANGE

7.1. Test Requirements

7.1.1.Test Standard

ETSI EN 300 328 V1.9.1(2015-02)

7.1.2.Test Limit

For all equipment the frequency range shall lie within the band 2.4GHz to 2.4835GHz (f_L>2.4GHz and f_H<2.4835GHz).

7.2. Test Procedure

Test procedure refers to clause 5.3 and clause 5.7.4 of standard ETSI EN 300 328.

7.3. Test Data

Table 7 Frequency Range

Test Conditions		Frequency (MHz)			
Temperature (^{O}C)	Voltage (Vdc)	f_L at Low Channel	f_H at High Channel	f_L Limit	f_H Limit
Tmin = -20	5V	2401.023	2480.651	2400	2483.5
	4.5V	2401.024	2480.653	2400	2483.5
Tnor = +25	5V	2401.022	2480.653	2400	2483.5
	4.5V	2401.027	2480.655	2400	2483.5
Tmax =+55	5V	2401.026	2480.657	2400	2483.5
	4.5V	2401.023	2480.656	2400	2483.5
Measurement uncertainty		+/- 1×10^{-7}			

8. FREQUENCY HOPPING REQUIREMENTS

8.1. Test Requirements

8.1.1.Test Standard

ETSI EN 300 328 V1.9.1(2015-02)

8.1.2.Test Limit

The maximum dwell time shall be 0.4 s.

Non-adaptive Frequency Hopping systems shall make use of non-overlapping hopping channels separated by the channel bandwidth as measured at 20 dB below peak power. The hopping channels defined within a hopping sequence shall be at least 1 MHz apart (channel separation).

Non-adaptive Frequency Hopping systems shall make use of a hopping sequence(s) that contains at least 15 hopping channels.
Adaptive Frequency Hopping systems shall make use of a hopping sequence(s) that is capable of operating over a minimum of 90 % of the band specified in table 1, from which at any given time a minimum of 20 hopping channels shall be used.
Each hopping channel of the hopping sequence shall be occupied at least once during a period not exceeding four times the product of the dwell time per hop and the number of channels.

8.2. Test Procedure

Test procedure refers to clause 5.3 and clause 5.7.4 of standard ETSI EN 300 328.

Dwell time:

The dwell time per channel shall not exceed 0,4 s.
While the equipment is operating (transmitting and/or receiving) each channel of the hopping sequence shall be occupied at least once during a period not exceeding four times the product of the dwell time per hop and the number of channels. Systems that meet the above constraints shall be tested according to the requirements for FHSS modulation.

20dB bandwidth Testing

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Channel separation:

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 100 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another truce
3. Measure the channel separation.

Hopping sequence:

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in transmitting mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

8.3. Test Data

Table 7 **Time of Occupancy**

DH1 mode

Channel	Pulse width (ms)	Dwell time (s)	Limit (s)	Result
Low	0.485	0.1552	0.4	Pass
Mid	0.490	0.1568	0.4	Pass
High	0.490	0.1568	0.4	Pass

NOTE: Dwell time = Pulse time(1600/2/79)*31.6S*

DH3 mode

Channel	Pulse width (ms)	Dwell time (s)	Limit (s)	Result
Low	1.760	0.2816	0.4	Pass
Mid	1.760	0.2816	0.4	Pass
High	1.770	0.2832	0.4	Pass

NOTE: Dwell time = Pulse time(1600/4/79)*31.6S*

DH5 mode

Channel	Pulse width (ms)	Dwell time (s)	Limit (s)	Result
Low	3.040	0.3243	0.4	Pass
Mid	3.060	0.3264	0.4	Pass
High	3.060	0.3264	0.4	Pass

NOTE: Dwell time = Pulse time(1600/6/79)*31.6S*

Channel Separation:

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.000	1	Pass
Adjacent Channel	2403			
Middle Channel	2441	1.004	1	Pass
Adjacent Channel	2442			
High Channel	2480	1.000	1	Pass
Adjacent Channel	2479			

20 dB Badwidth:

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.044
Middle	2441	1.048
High	2480	1.048

Hopping Sequence:

The frequency hopping systems operating in 2400-2483.5 MHz band employ 79 nonoverlapping channels.

Frequency Range (MHz)	***Number of Hopping Channel***	**Limit (CH)**
2400-2483.5	79	≥15

Test Result: *Compliance*

9. MEDIUM ACCESS PROTOCOL

9.1. Test Requirements

9.1.1.Test Standard

ETSI EN 300 328 V1.9.1(2015-02)

9.1.2.Test Requirements

A medium access protocol shall be implemented by the equipment.

Note: The manufacturer has verified that medium access protocol has been implemented by the EUT.

10. TRANSMITTER SPURIOUS EMISSION

10.1.Test Requirements

10.1.1.Test Standard

ETSI EN 300 328 V1.9.1(2015-02)

10.1.2.Test Limit

Table 8 Transmitter Limit for narrowband spurious emissions

Frequency Range	Limit when operating	Limit when in standby
30MHz to 1GHz	-36dBm	-57dBm
Above 1GHz to 12.75GHz	-30dBm	-47dBm
1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	-47dBm	-47dBm

Table 9 Transmitter Limit for wideband spurious emissions

Frequency Range	Limit when operating	Limit when in standby
30MHz to 1GHz	-86dBm	-107dBm
Above 1GHz to 12.75GHz	-80dBm	-97dBm
1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	-97dBm	-97dBm

10.2.Test Procedure

Test procedure refers to clause 5.3 and clause 5.7.5 of standard ETSI EN 300 328.

The equipment was placed on a wooden turntable, and it was transmitting.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode. The resolution bandwidth was set to 1MHz. The measuring frequencies are from 30 MHz to 12.75GHz.

10.3.Test Data

Table 10 Transmitter Spurious Emission Test Data

Ambient temperature: 25 ℃					
Relative humidity: 67 %					
Test mode Operating					
f(MHz)	Band-Width(kHz)	dBm	f(MHz)	Band-Width(kHz)	dBm
142.370	120	-90.2	**168.21**	120	-91.65
218.350	120	-90.4	**215.97**	120	-91.83
4804.0	1000	-	**4960.0**	1000	-
7206.0	1000	-	**7440.0**	1000	-
Measurement Uncertainly		±6dB			

Ambient temperature: 25 ℃					
Relative humidity: 67 %					
Test mode Standby					
f(MHz)	Band-Width(kHz)	dBm	f(MHz)	Band-Width(kHz)	dBm
413.580	120	-110.6	**671.66**	120	-108.74
1726.500	1000	-	**1761.41**	1000	-
Measurement Uncertainly		±6dB			

11. RECEIVER SPURIOUS EMISSIONS

11.1.Test Requirements

11.1.1.Test Standard

ETSI EN 300 328 V1.9.1(2015-02)

11.1.2.Test Limit

Table 11 Narrowband spurious emission limits for receivers

Frequency Range	Limit when in standby
30MHz to 1GHz	-57dBm
Above 1GHz to 12.75GHz	-47dBm

Table 12 wideband spurious emissions limits for receivers

Frequency Range	Limit when in standby
30MHz to 1GHz	-107dBm/Hz
Above 1GHz to 12.75GHz	-97dBm/Hz

11.2.Test Procedure

Test procedure refers to clause 5.3 and clause 5.7.6 of standard ETSI EN 300 328.
The equipment was placed on a wooden turntable, and it was receiving.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode. The resolution bandwidth was set to 1MHz. The measuring frequencies are from 30 MHz to 12.75GHz.

11.3.Test Data

Table 13 Receivers Spurious Emission Test Data

Ambient temperature: 25 ℃					
Relative humidity: 67 %					
Test mode Operating					
f(MHz)	Band-Width(kHz)	dBm	f(MHz)	Band-Width(kHz)	dBm
159.491	120	-122.5	**167.32**	120	-120.71
118.386	120	-122.3	**178.53**	120	-121.03
4804.0	1000	-	**4960.0**	1000	-
7206.0	1000	-	**7440.0**	1000	-
Measurement Uncertainly		±6dB			

12. TABLE LIST

APPENDIX I EUT PHOTO

Refer to report **BSTDG1612657910001ER-1**