

## FCC - TEST REPORT

Report Number : **68.940.15.019.01** Date of Issue: November 25, 2015

Model : **BTC100**

Product Type : MIPOW PLAYBULB SPHERE

Applicant : Shenzhen Baojia Battery Technology Co., Ltd

Address : Block A, Yonghe Road, Tongfuyu Industrial Zone, Heping, Fuyong,  
Baoan, Shenzhen, China

Production Facility : Shenzhen Baojia Battery Technology Co., Ltd

Address : Block A, Yonghe Road, Tongfuyu Industrial Zone, Heping, Fuyong,  
Baoan, Shenzhen, China

Test Result : ☒ **Positive** ☐ **Negative**

Total pages : 21

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## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch  
Building 12&13, Zhiheng Wisdomland Business Park,  
Nantou Checkpoint Road 2, Nanshan District,  
Shenzhen City, 518052,  
P. R. China

FCC Registration No.: 502708

IC Registration No: 10320A-1

Telephone: 86 755 8828 6998  
Fax: 86 755 8828 5299

#### Test Site 2:

Company name: Dongguan Precise Testing Service Co., Ltd.  
Building D, Baoding Technology Park, Guangming Road2,  
Dongcheng District, Dongguan,  
Guangdong, China.

FCC Registration Number: 371540

Remark: All test items were performed at Site 2.

### 3 Description of the Equipment Under Test

Product:	MIPOW PLAYBULB SPHERE
Model no.:	BTC100
FCC ID:	SL7BTC100
Rating:	Input: 5VDC/250mA Output: 4.2VDC/150mA
RF Transmission Frequency:	117KHz
Modulation:	FSK
Antenna Type:	Integral Antenna
Antenna Gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a MIPOW PLAYBULB COMET operated at 117KHz.

## 4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

## 5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	11	Site 2	Pass
§15.209	Field strength of fundamental	13	Site 2	Pass
§15.215	20dB&99% bandwidth	15	Site 2	Pass
§15.209(a)	Filed strength of harmonics and spurious	17	Site 2	Pass
§15.203	Antenna requirement	See note 1		Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses an integral antenna, which gain is 0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for FCC ID: SL7BTC100 complies with Section 15.207, 15.209, 15.231 of the FCC Part 15, Subpart C Rules.

### SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: November 11, 2015

Testing Start Date: November 11, 2015

Testing End Date: November 20, 2015

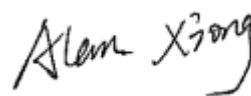
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:

Prepared by:



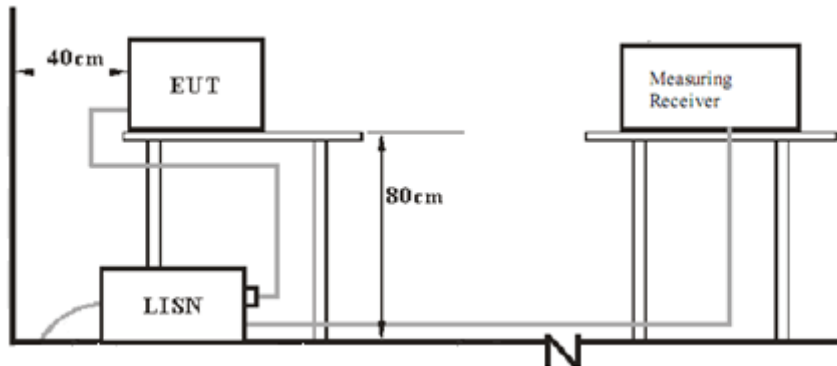
John Zhi  
EMC Project Manager



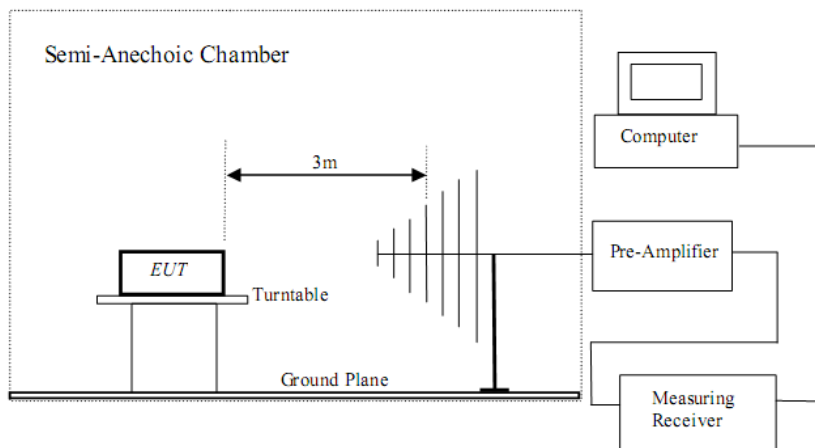
Alan Xiong  
EMC Project Engineer

## 7 Test Setups

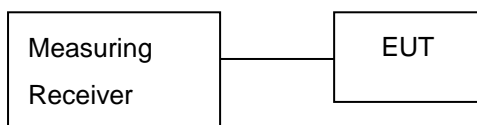
### 7.1 AC Power Line Conducted Emission test setups



### 7.2 Radiated test setups



### 7.3 Conducted RF test setups





## 8 Test Methodology

### 8.1 Conducted Emission

#### Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line
- 5.

### 8.2 Radiated Emission

The sample was placed 0.8m above the ground plane on a standard emission test site \*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\*On a standard emission test site with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules.

### 8.3 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:

$$FS = R + \text{System Factor}$$
$$\text{System Factor} = AF + CF + FA - PA$$

Where FS = Net Field Strength in dBuV/m at 3 meters.

R = Reading of Spectrum Analyzer / Test Receiver 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.

## 9 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Adapter	5V/250mA	---	---

## 10 Technical Requirement

### 10.1 Conducted Emission Test 150KHz – 30MHz

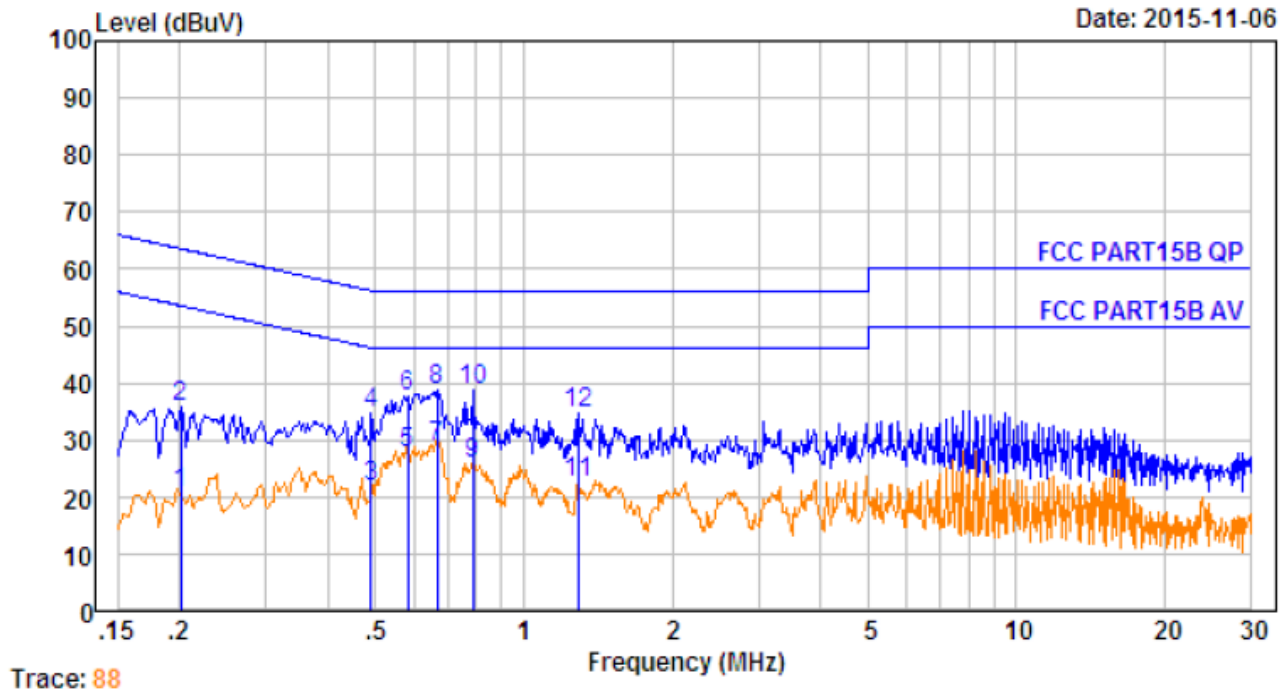
Product Type: MIPOW PLAYBULB SPHERE

M/N: BTC100

Operating Condition: TM1; Normal Working Mode

Test Specification: Power Line, Live

Comment: AC 120V/60Hz



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBUV	Emission Level dBUV	Limit dBUV	Over Limit dB	Remark
1.	0.202	10.61	0.60	9.59	20.80	53.54	-32.74	Average
2.	0.202	10.61	0.60	24.59	35.80	63.54	-27.74	Peak
3.	0.489	10.64	0.60	10.46	21.70	46.19	-24.49	Average
4.	0.489	10.64	0.60	23.46	34.70	56.19	-21.49	Peak
5.	0.582	10.66	0.60	16.47	27.73	46.00	-18.27	Average
6.	0.582	10.66	0.60	26.47	37.73	56.00	-18.27	Peak
7.	0.668	10.66	0.60	17.43	28.69	46.00	-17.31	Average
8.	0.668	10.66	0.60	27.43	38.69	56.00	-17.31	Peak
9.	0.788	10.66	0.60	14.44	25.70	46.00	-20.30	Average
10.	0.788	10.66	0.60	27.44	38.70	56.00	-17.30	Peak
11.	1.289	10.68	0.60	11.34	22.62	46.00	-23.38	Average
12.	1.289	10.68	0.60	23.34	34.62	56.00	-21.38	Peak

## Conducted Emission Test 150kHz – 30MHz

Product Type: MIPOW PLAYBULB SPHERE

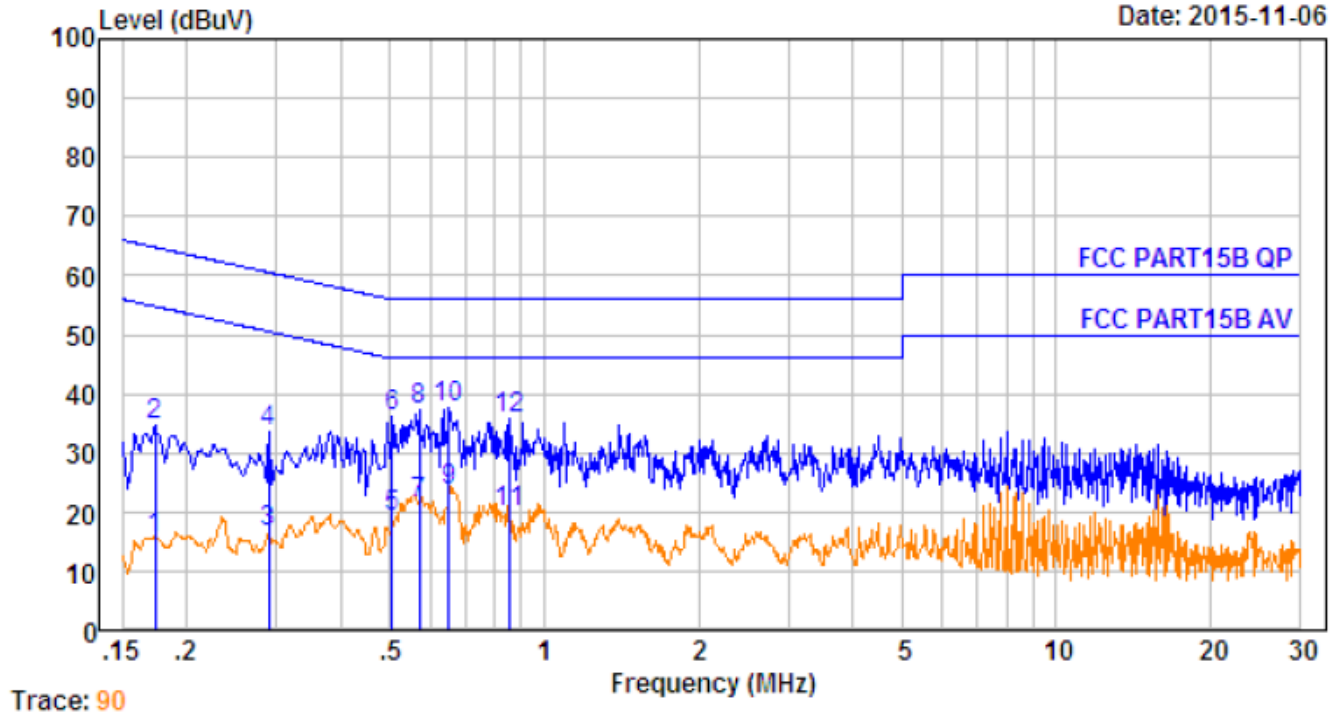
M/N: BTC100

Operating Condition: TM1; Normal Working Mode

Test Specification: Power Line, Neutral

Comment: AC 120V/60Hz

Date: 2015-11-06

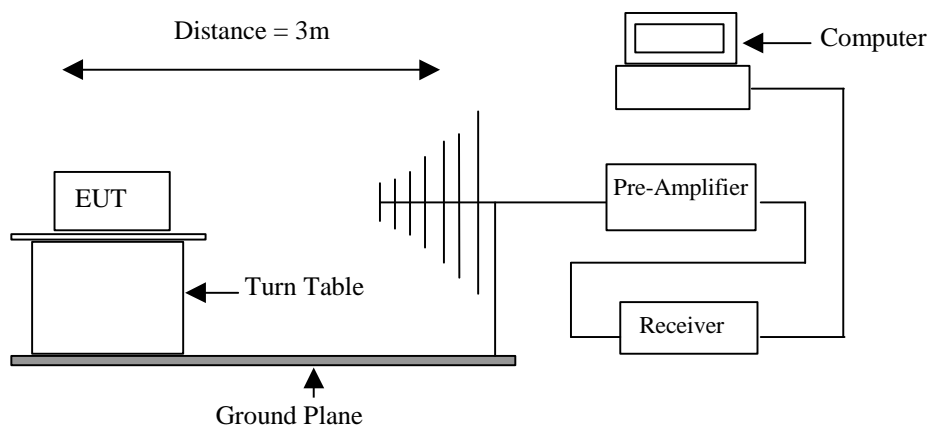


No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.174	10.60	0.60	4.33	15.53	54.77	-39.24	Average
2.	0.174	10.60	0.60	23.33	34.53	64.77	-30.24	Peak
3.	0.289	10.63	0.60	5.46	16.69	50.54	-33.85	Average
4.	0.289	10.63	0.60	22.46	33.69	60.54	-26.85	Peak
5.	0.505	10.65	0.60	7.78	19.03	46.00	-26.97	Average
6.	0.505	10.65	0.60	24.78	36.03	56.00	-19.97	Peak
7.	0.570	10.66	0.60	10.11	21.37	46.00	-24.63	Average
8.	0.570	10.66	0.60	26.11	37.37	56.00	-18.63	Peak
9.	0.651	10.66	0.60	12.31	23.57	46.00	-22.43	Average
10.	0.651	10.66	0.60	26.31	37.57	56.00	-18.43	Peak
11.	0.857	10.67	0.60	8.71	19.98	46.00	-26.02	Average
12.	0.857	10.67	0.60	24.71	35.98	56.00	-20.02	Peak

## 10.2 Radiated Emission of Fundamental Frequency

Test Requirement:	FCC part 15 section 15.209(a)
Test Method:	ANSI C63.4:2003
Test Date:	2015-11-14
Mode of Operation:	Transmitting mode.
Detector Function	Quasi Peak(CISPR)
Measurement BW	RBW 10KHz ; VBW 30KHz
Trace mode:	Max hold

### Test Setup:



**Results: PASS**

Test conditions		Maximum power (dB $\mu$ V/m)	
Frequency		117KHz	117KHz
Mode		At 10 m distance	At 30 m distance
T <sub>nom</sub>	V <sub>nom</sub>	18.93	-9.77

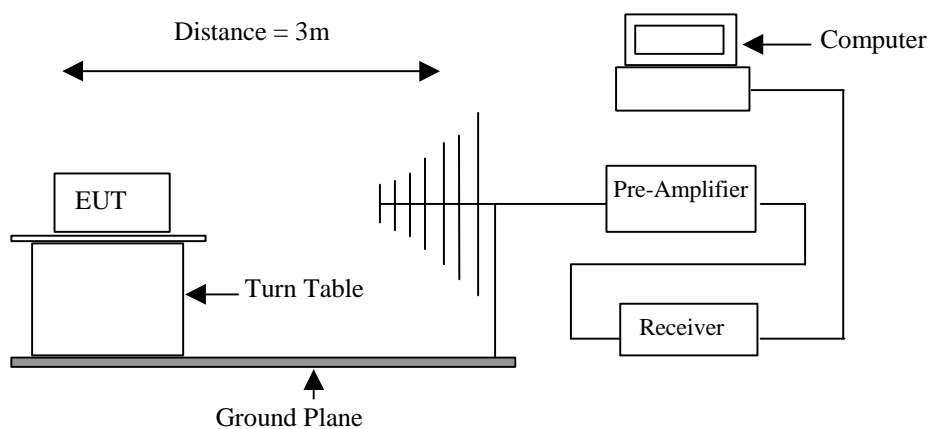
Limits for Fundamental Frequency: [ Section 15.209( a ) ]:

Frequency (MHz)	Field strength ( $\mu$ V/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30(29.5dB $\mu$ V/m)	30
30-88	100(40dB $\mu$ V/m)	3
88-216	150(43.5dB $\mu$ V/m)	3
216-960	200(46dB $\mu$ V/m)	3
Above 960	500(54dB $\mu$ V/m)	3

### 10.3 Field strength of the harmonics and spurious

Test Requirement:	FCC part 15 section 15.209
Test Method:	ANSI C63.4:2003
Test Date:	2015-11-14
Mode of Operation:	Transmitting mode.
Detector Function	Quasi Peak(CISPR)
Measurement BW	RBW 120KHz ; VBW 300KHz
Trace mode:	Max hold

#### Test Setup:



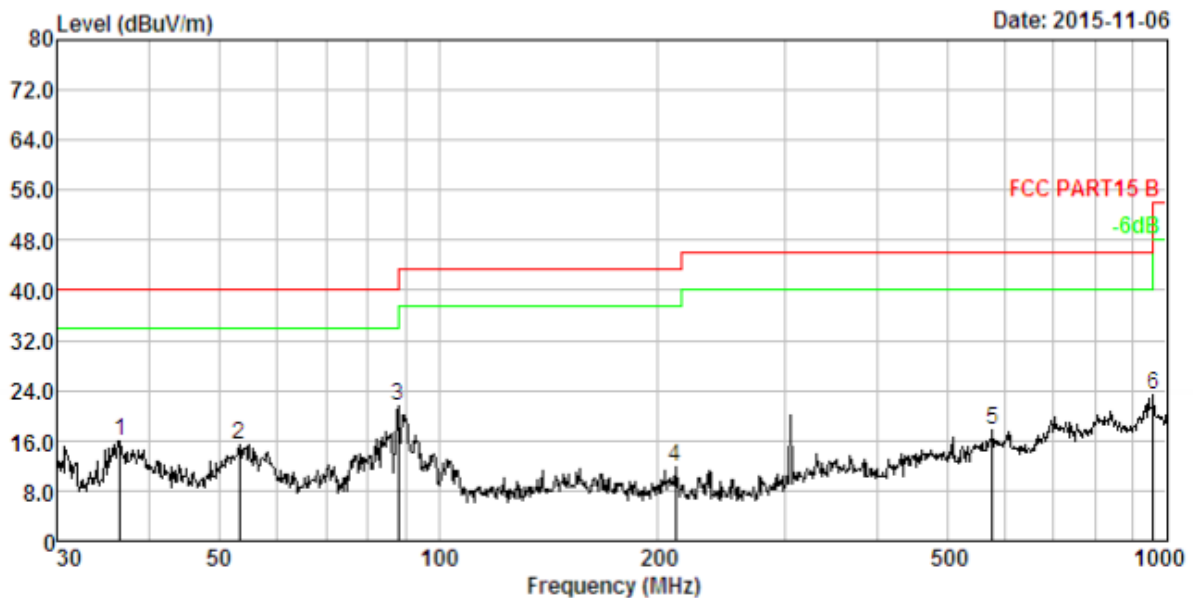
**Results: PASS**

EUT: MIPOW PLAYBULB SPHERE

M/N: BTC100

Operating Condition: Transmitting Mode

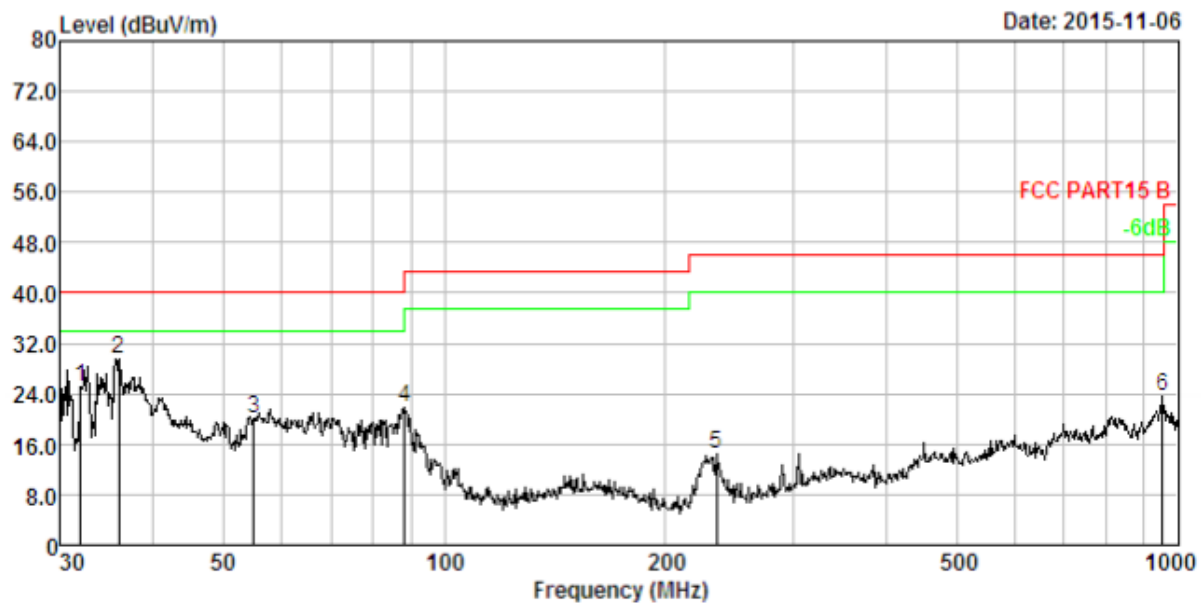
Test Specification: Horizontal



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	36.509	1.23	13.47	31.43	30.04	16.09	40.00	-23.91	Peak
2.	53.318	1.58	12.02	31.97	30.17	15.40	40.00	-24.60	Peak
3.	88.033	2.03	9.06	40.90	30.34	21.65	43.50	-21.85	Peak
4.	211.527	2.82	10.60	29.04	30.65	11.81	43.50	-31.69	Peak
5.	576.644	3.73	18.55	26.31	31.00	17.59	46.00	-28.41	Peak
6.	958.794	4.19	23.43	26.83	31.18	23.27	46.00	-22.73	Peak



EUT: MIPOW PLAYBULB SPHERE  
M/N: BTC100  
Operating Condition: Transmitting Mode  
Test Specification: Vertical



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	31.955	1.11	13.22	40.85	29.99	25.19	40.00	-14.81	Peak
2.	36.001	1.22	13.44	45.04	30.03	29.67	40.00	-10.33	Peak
3.	55.027	1.60	11.90	36.75	30.18	20.07	40.00	-19.93	Peak
4.	88.342	2.03	9.10	41.15	30.35	21.93	43.50	-21.57	Peak
5.	234.991	2.92	11.48	30.70	30.69	14.41	46.00	-31.59	Peak
6.	952.094	4.19	23.43	27.21	31.17	23.66	46.00	-22.34	Peak

Note: No further spurious emissions found between 30 MHz and lowest internal used/generated frequency.

**Limits for Radiated Emission [ Section 15.209 ]:**

Frequency (MHz)	Field strength ( $\mu\text{V/m}$ )	Measurement distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30(29.5dB $\mu\text{V/m}$ )	30
30-88	100(40dB $\mu\text{V/m}$ )	3
88-216	150(43.5dB $\mu\text{V/m}$ )	3
216-960	200(46dB $\mu\text{V/m}$ )	3
Above 960	500(54dB $\mu\text{V/m}$ )	3

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak ) limits shown in this table or to the general limits shown in section 15.209, whichever permits a higher field strength.

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 15.209.

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

## 10.4 Bandwidth Measurement

Test Requirement:	FCC part 15 section 15.215
Test Method:	ANSI C63.4:2003
Test Date:	2015-11-17
Mode of Operation:	Transmitting continuously mode
Detector Function:	Peak
Trace mode:	Max hold

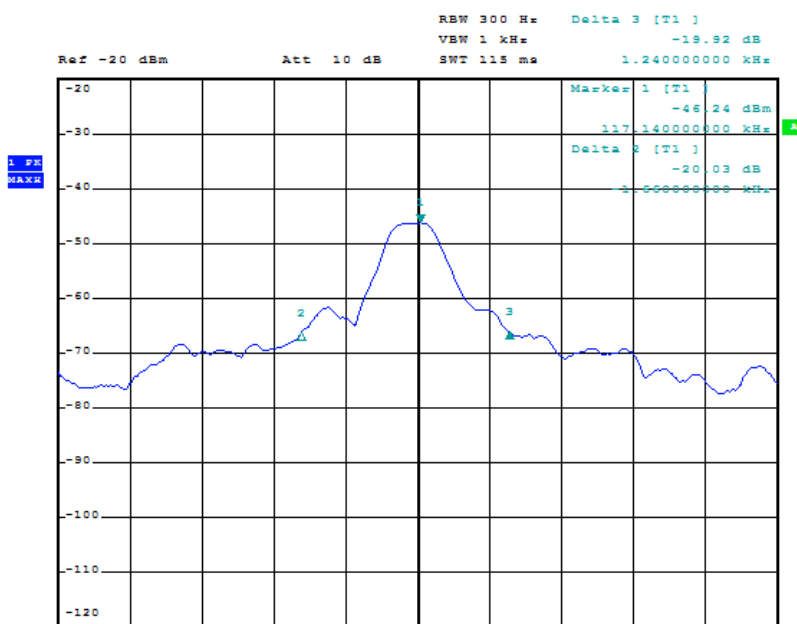
### Test setup:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

### Test Result: Pass

Result data graph is shown in the following for reference.

	Occupied Bandwidth(KHz)
20dB	2.90



## 11 Test Equipment List

### List of Test Instruments

	DESCRIPTION	MANUFACTURE R	MODEL NO.	SERIAL NO.	CAL. DUE DATE
CE	EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016
	Artificial Mains Network	Narda	L2-16B	000WX31025	July 7, 2016
	Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 7, 2016
	RF Cable	SCHWARZBECK	AK9515E	96222	July 3, 2016
	Shielded Room	CHENGYU	843	PTS-002	June 5, 2016
C	EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016
RE	EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016
	Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 3, 2016
	Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 3, 2016
	RF Cable	SCHWARZBECK	AK9515E	96221	July 3, 2016
	3m Anechoic Chamber	CHENGYU	966	PTS-001	June 5, 2016
	MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A
	Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 5, 2016
	Spectrum analyzer	Agilent	E4407B	MY46185649	June 5, 2016
	Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	June 5, 2016
	Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 5, 2016

## 12 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Items	Extended Uncertainty
Radiated Emissions Electric field 3 m distance	$\pm 3.80$ dB
Conducted emissions mains	$\pm 2.45$ dB
Conducted RF test	Power level test involved: 2.04dB Frequency test involved: $1.1 \times 10^{-7}$