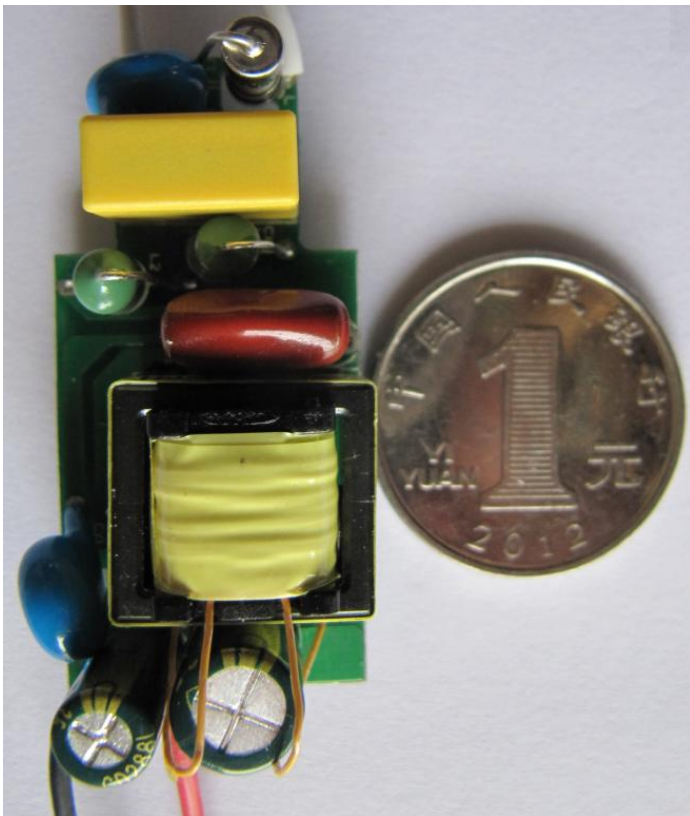


样机测试报告

样机名称: BP3315INA07UN-BULB(22V 320mA)

**特点:**

- 高功率因素  
(0.925@220Vac, 满载)
- 高效率  
(84.4%@220Vac, 满载)
- 高精度线性调整率  
(±0.6%@85Vac~265Vac, 满载)
- 高精度负载调整率  
(±0.5%@220Vac, Vo: 15.9~22.8V)
- 具有多种保护功能, 可靠性高
- 体积小
- 总元件数少, 成本低
- 通过 EMI, 且有足够余量



版本修改记录

| 修改日期       | 版本  | 描述    |
|------------|-----|-------|
| 2013.04.03 | 1.0 | 第一次发行 |
|            |     |       |
|            |     |       |



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## 1. 设计规格

### 1.1 输入规格

- 输入电压: 85Vac~265Vac
- 输入频率: 47Hz~63Hz

### 1.2 输出规格

- 输出电压: 15.9V~22.8V
- 输出电流: 320mA

## 2. 评估结果

### 2.1 电气性能测试结果

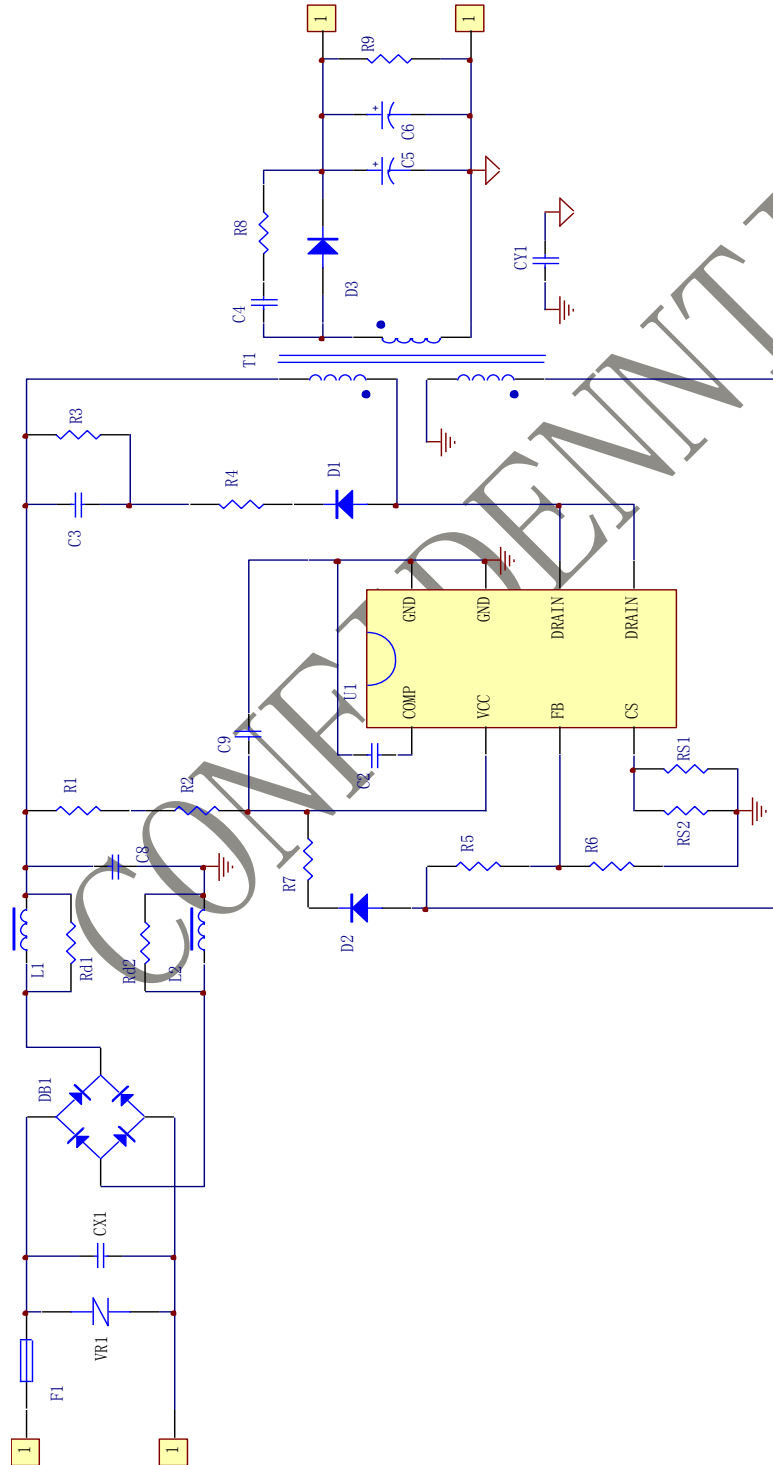
- 效率: 84.4% (220Vac, 满载)
- PF 值: 0.925 (220Vac, 满载)
- 线性调整率:  $\pm 0.6\%$  (85Vac~265Vac, 满载)
- 负载调整率:  $\pm 0.5\%$  (220Vac,  $V_o$ : 15.9V~22.8V)

### 2.2 保护功能测试结果

- 开路保护 OK(开路电压: 29.6V)
- 短路保护 OK

### 3. 样机资料

#### 3.1 原理图





晶丰明源半导体

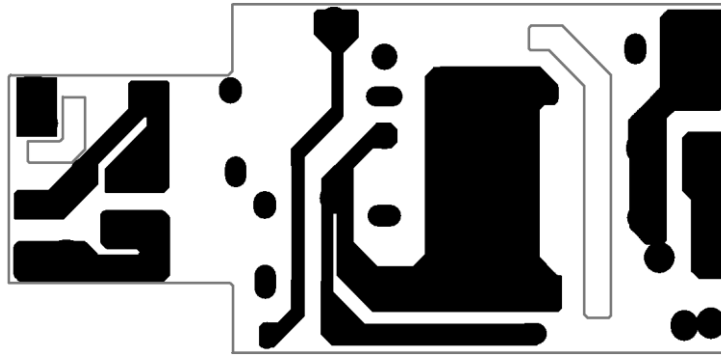
BP3315

7W LED 球泡灯电源

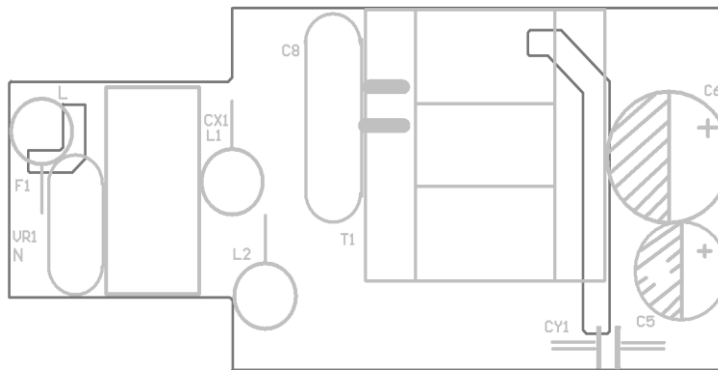
## 3.2 材料表

| 元件类型  | 型号描述                                | 用量 | 单位  | 位号       |
|-------|-------------------------------------|----|-----|----------|
| 贴片电阻  | RES-SMD-1206-300.00K-5%-0.250W      | 2  | Pcs | R1,R2    |
|       | RES-SMD-1206-220.00K-5%-0.250W      | 1  | Pcs | R3       |
|       | RES-SMD-1206-150.00R-5%-0.250W      | 1  | Pcs | R4       |
|       | RES-SMD-0805-270.00K-5%-0.125W      | 1  | Pcs | R5       |
|       | RES-SMD-0805-020.00K-5%-0.125W      | 1  | Pcs | R6       |
|       | RES-SMD-0805-033.00R-5%-0.125W      | 1  | Pcs | R7       |
|       | RES-SMD-0805-100.00R-5%-0.125W      | 1  | Pcs | R8       |
|       | RES-SMD-0805-020.00K-5%-0.125W      | 1  | Pcs | R9       |
|       | RES-SMD-1206-005.10K-5%-0.250W      | 2  | Pcs | Rd1, Rd2 |
|       | RES-SMD-0805-002.20R-1%-0.125W      | 1  | Pcs | RS1      |
|       | RES-SMD-0805-002.70R-1%-0.125W      | 1  | Pcs | RS2      |
| 贴片电容  | CAP-SMD-0805-X7R-001.00uF-10%-025V  | 1  | Pcs | C2       |
|       | CAP-SMD-1206-X7R-001.00nF-10%-1000V | 1  | Pcs | C3       |
|       | CAP-SMD-0805-X7R-330.00pF-10%-250V  | 1  | Pcs | C4       |
|       | CAP-SMD-1206-X7R-010.00uF-10%-25V   | 1  | Pcs | C9       |
| 压敏电阻  | VAR-Φ7-470V-Φ7D471K                 | 1  | Pcs | VR1      |
| 安规电容  | CAP-X2-000.10uF                     | 1  | Pcs | CX1      |
|       | CAP-Y1-002.20nF                     | 1  | Pcs | CY1      |
| 电解电容  | CAP-ELE-220.00uF-35V 8*12           | 1  | Pcs | C6       |
|       | CAP-ELE-100.00uF-35V 6*12           | 1  | Pcs | C5       |
| 薄膜电容  | CAP-MEF-100.00nF-400V-12*4.0 P10    | 1  | Pcs | C8       |
| 贴片二极管 | DIO-REC-SMA-01.00A-1000V-1N4007_SMA | 2  | Pcs | D1,D2    |
|       | SMD-02.00A-200V-ES2D                | 1  | Pcs | D3       |
| 贴片桥堆  | MB6S                                | 1  | Pcs | DB1      |
| 色环电感  | 2.2mH 4*8                           | 2  | Pcs | L1, L2   |
| 变压器   | EE16-1.60mH 5+5 卧式                  | 1  | Pcs | T1       |
| 保险丝   | FUS -1.0A-250V                      | 1  | Pcs | F1       |
| 芯片    | IC-BPS-BP3315-SOP8                  | 1  | Pcs | U1       |

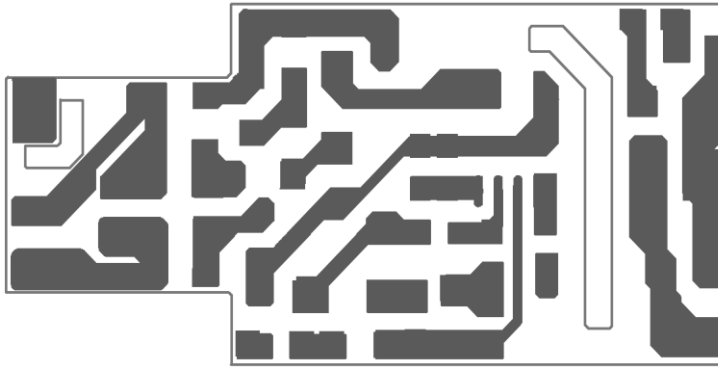
### 3.3 PCB Gerber 文件



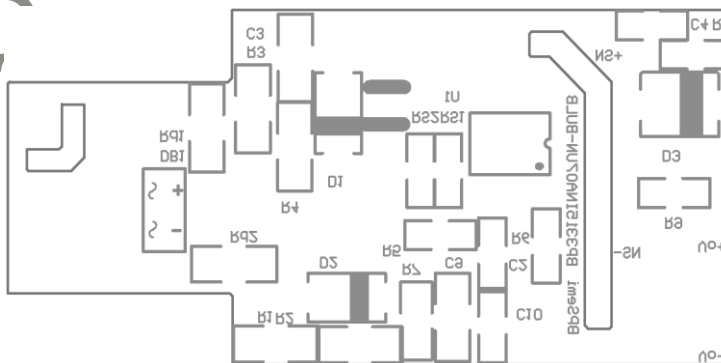
Top Layer



Top Overlay



Bottom Layer



Bottom Overlay

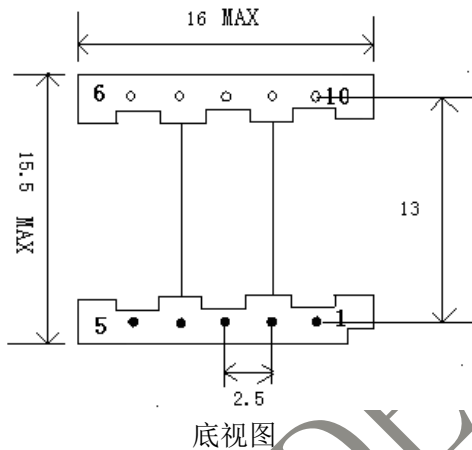
### 3.4 变压器

#### 3.4.1 铁芯

EE16, PC40 或等同材质

#### 3.4.2 骨架图

EE16, 5+5



#### 3.4.3 绕线结构

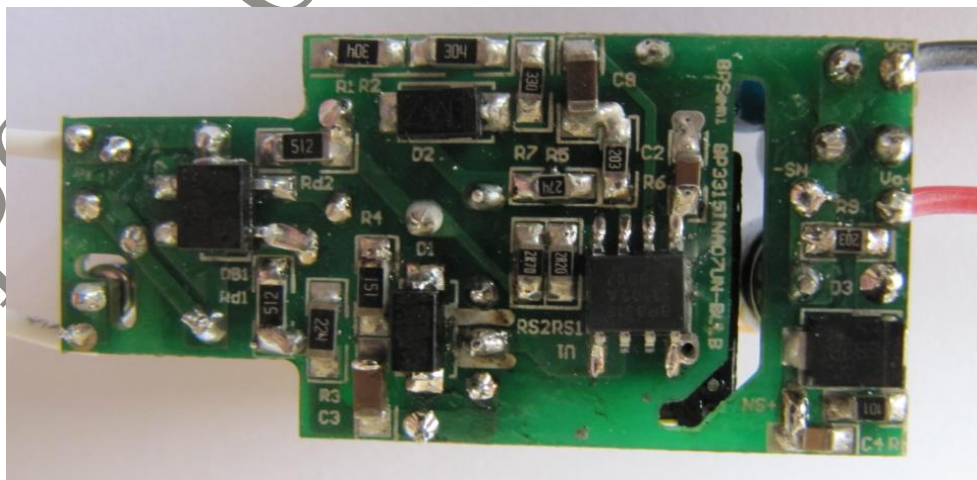
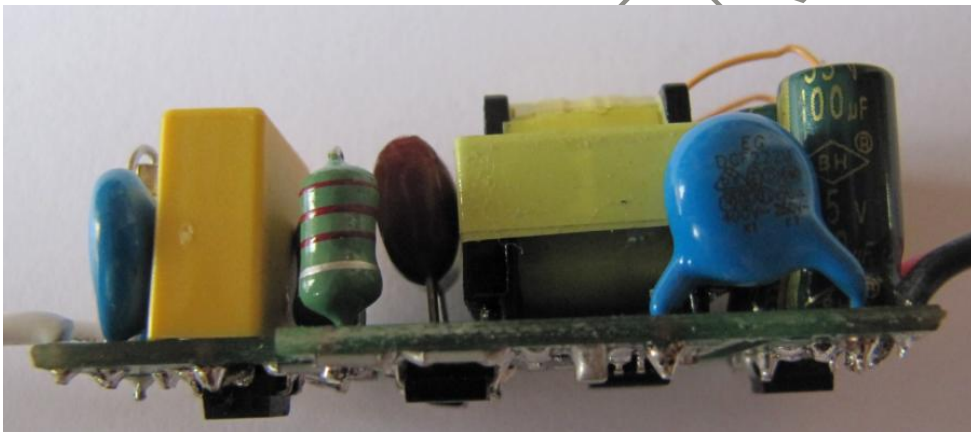
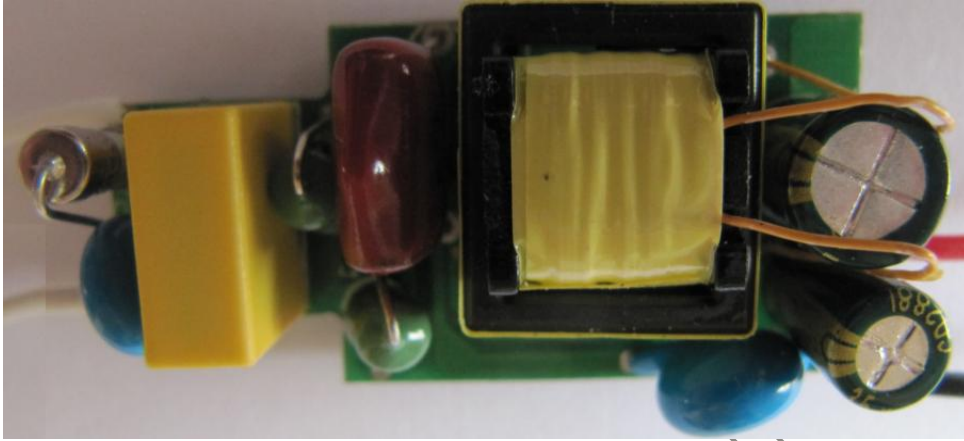
##### 1. 变压器绕法

| 层数   | 脚位        | 线径                       | 匝数   | 电感量   |
|------|-----------|--------------------------|------|---|
| N1   | 2脚-4脚     | φ 0.21mm, 顺时针密绕          | 100T | 变压器原边电感量 LP 为 1.6mH (40KHz 测试)。精度为 +/-5%。骨架采用卧式 EE-16 (5+5) 具体参数见骨架机构图。铁芯的材质是 PC40。 |
| 绝缘胶带 | --        | Tape                     | 2T   |   |
| N2   | 5脚-3脚     | φ 0.15mm*2, 顺时针密绕        | 23T  |   |
| 绝缘胶带 | --        | Tape                     | 2T   |   |
| N3   | Ns+脚-Ns-脚 | φ 0.25mm, 顺时针密绕<br>三层绝缘线 | 35T  |   |
| 绝缘胶带 | --        | Tape                     | 2T   |   |
| N4   | 4脚-1脚     | φ 0.30mm, 顺时针密绕          | 40T  |   |
| 绝缘胶带 | --        | Tape                     | 3T   |   |

注1：Ns-和 Ns+引线从 Pin6~10 这边引出，引出线长为 30mm，6, 7, 8, 9, 10 脚要拔脚，4 脚绕完线再剪，一定要按上面所绕保证每线都不相交。

### 4. LED 驱动器照片/尺寸

(长\*宽\*高) 46.6 mm \*22.0 mm \*17.0 mm





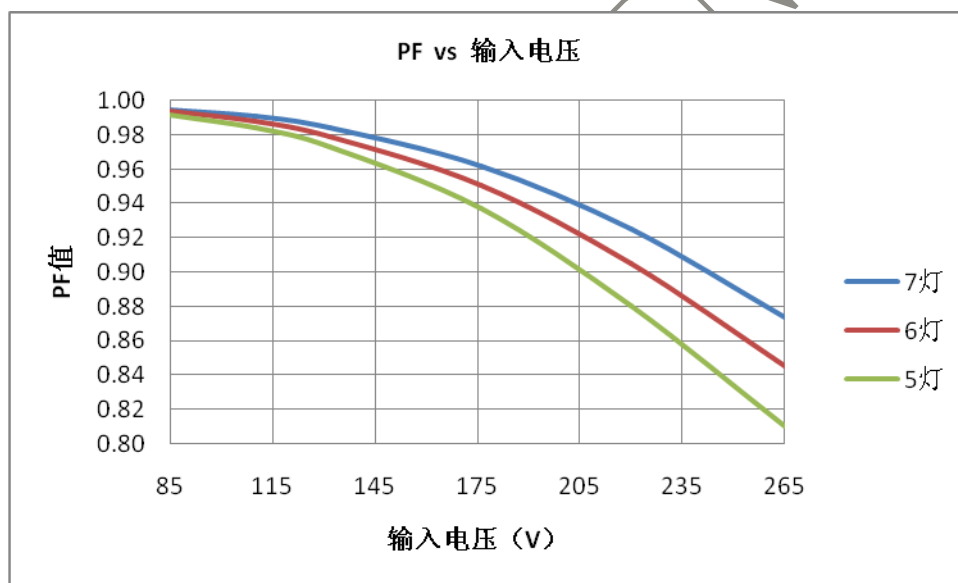
### 5. 详细测试数据

#### 5.1 输入性能

##### 5.1.1 功率因素

| 输入电压 (V) | PF 值   |        |        |
|----------|--------|--------|--------|
|          | 带载 7 灯 | 带载 6 灯 | 带载 5 灯 |
| 85       | 0.995  | 0.994  | 0.992  |
| 110      | 0.991  | 0.988  | 0.984  |
| 132      | 0.984  | 0.979  | 0.973  |
| 176      | 0.962  | 0.951  | 0.937  |
| 220      | 0.925  | 0.905  | 0.880  |
| 265      | 0.874  | 0.845  | 0.810  |

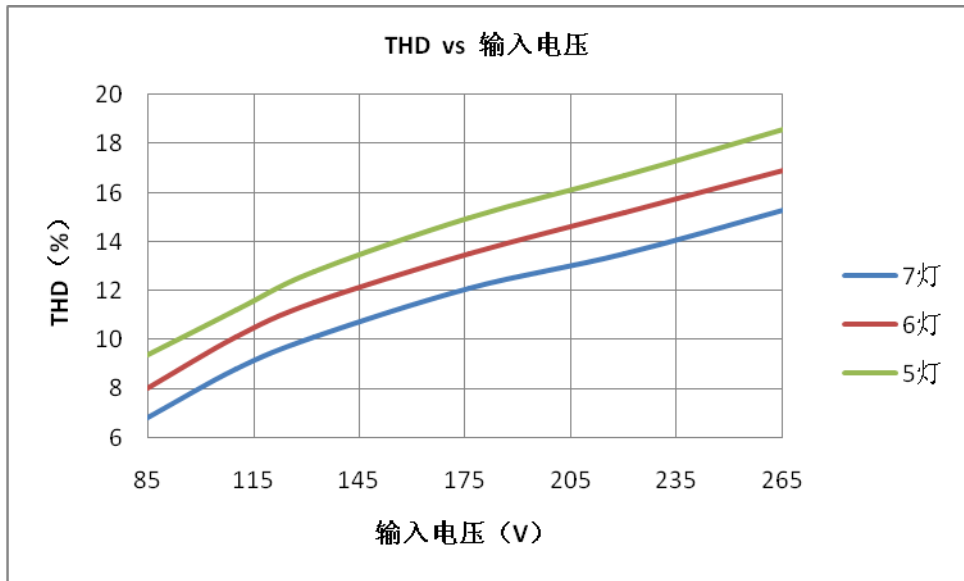
PF 值对输入电压曲线图



##### 5.1.2 THD

| 输入电压 (V) | THD (%) |        |        |
|----------|---------|--------|--------|
|          | 带载 7 灯  | 带载 6 灯 | 带载 5 灯 |
| 85       | 6.8     | 8.0    | 9.4    |
| 110      | 8.8     | 10.1   | 11.2   |
| 132      | 10.1    | 11.5   | 12.8   |
| 176      | 12.1    | 13.5   | 15.0   |
| 220      | 13.5    | 15.2   | 16.7   |
| 265      | 15.3    | 16.9   | 18.6   |

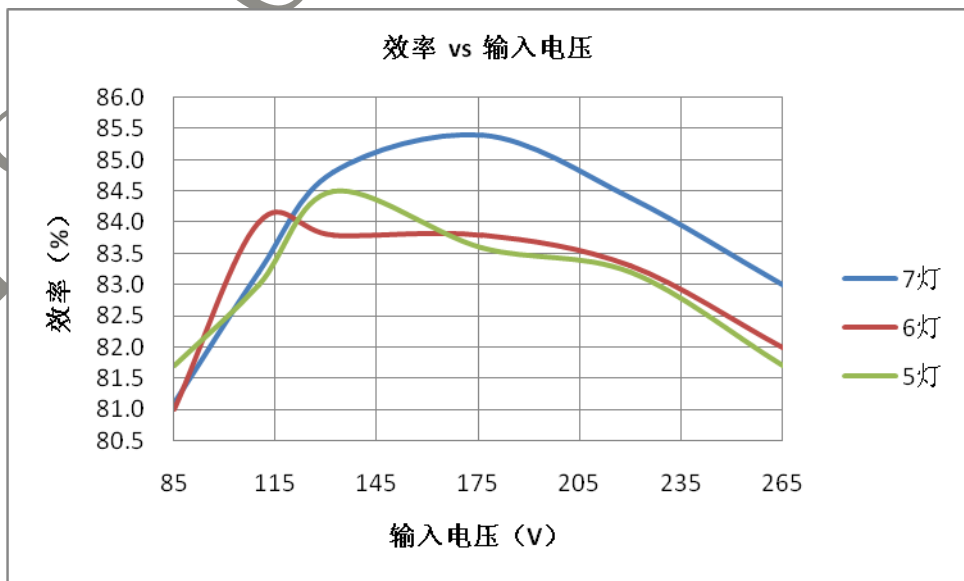
THD 对输入电压曲线图



### 5.1.3 效率

| 输入电压 (V) | 效率 (%) |        |        |
|----------|--------|--------|--------|
|          | 带载 7 灯 | 带载 6 灯 | 带载 5 灯 |
| 85       | 81.1   | 81.0   | 81.7   |
| 110      | 83.2   | 84.0   | 83.0   |
| 132      | 84.8   | 83.8   | 84.5   |
| 176      | 85.4   | 83.8   | 83.6   |
| 220      | 84.4   | 83.3   | 83.2   |
| 265      | 83.0   | 82.0   | 81.7   |

效率对输入电压曲线图

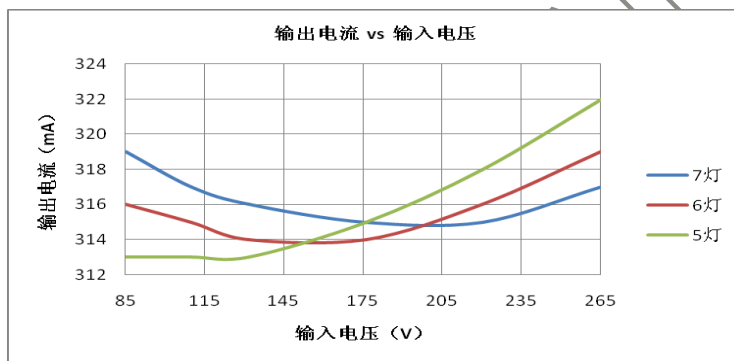


### 5.2 输出性能

#### 5.2.1 线性调整率

| 输入电压 (V) | 输出电流 (mA) |        |        |
|----------|-----------|--------|--------|
|          | 带载 7 灯    | 带载 6 灯 | 带载 5 灯 |
| 85       | 319       | 316    | 313    |
| 110      | 317       | 315    | 313    |
| 132      | 316       | 314    | 313    |
| 176      | 315       | 314    | 315    |
| 220      | 315       | 316    | 318    |
| 265      | 317       | 319    | 322    |
| △        | ±0.6%     | ±0.8%  | ±1.4%  |

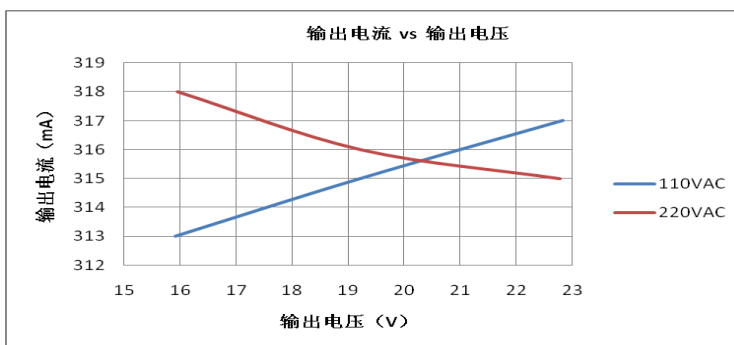
线性调整率曲线图



#### 5.2.2 负载调整率

| 110VAC   |           | 220VAC   |           |
|----------|-----------|----------|-----------|
| 输出电压 (V) | 输出电流 (mA) | 输出电压 (V) | 输出电流 (mA) |
| 15.92    | 313       | 15.96    | 318       |
| 19.21    | 315       | 19.24    | 316       |
| 22.83    | 317       | 22.77    | 315       |
| /        | ±0.6%     | /        | ±0.5%     |

负载调整率曲线图





晶丰明源半导体

# BP3315

## 7W LED 球泡灯电源

### 5.3 EMI 测试结果

#### 5.3.1 传导测试

##### CE Test Report

EUT: 3315  
 Manuf: JINGFENGMINGYUAN  
 Op Cond: TA CE CHAMBER  
 Operator: SJF  
 Test Spec: EN 55015  
 Comment:

| Scan Settings (3 Ranges) |        |           | IF BW |       | Detector |       | Receiver Settings |       |
|--------------------------|--------|-----------|-------|-------|----------|-------|-------------------|-------|
| Start                    | Stop   | Step      |       |       |          |       | M-Time            | Atten |
| 9kHz                     | 50kHz  | 61Hz      | 200Hz | PK+AV | 20msec   | 10 dB | OFF               | 60dB  |
| 50kHz                    | 150kHz | 61Hz      | 200Hz | PK+AV | 20msec   | 10 dB | OFF               | 60dB  |
| 150kHz                   | 30MHz  | 3.9063kHz | 9kHz  | PK+AV | 20msec   | 10 dB | OFF               | 60dB  |

Transducer No. 1 Start 9kHz Stop 30MHz Name ENV216

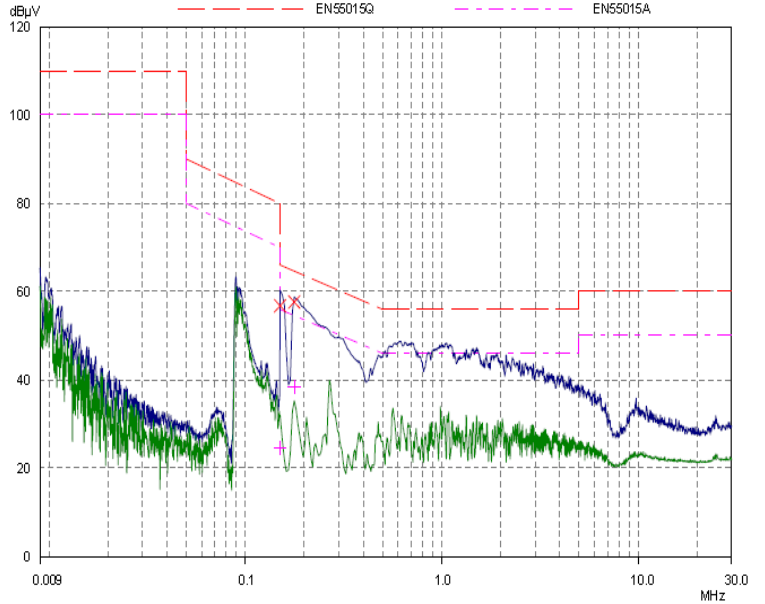
Final Measurement: Detectors: X QP / + AV  
 Meas Time: 1sec  
 Peaks: 8  
 Acc Margin: 25 dB

##### Final Measurement Results

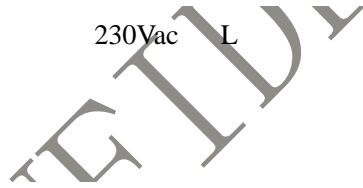
| Frequency MHz | QP Level dBµV | QP Limit dBµV | QP Delta dB | Phase | PE  |
|---------------|---------------|---------------|-------------|-------|-----|
| 0.15          | 56.76         | 66.00         | 9.24        | L1    | gnd |
| 0.17734       | 57.56         | 64.61         | 7.05        | L1    | gnd |

| Frequency MHz | AV Level dBµV | AV Limit dBµV | AV Delta dB | Phase | PE  |
|---------------|---------------|---------------|-------------|-------|-----|
| 0.15          | 24.65         | 56.00         | 31.35       | L1    | gnd |
| 0.17734       | 38.39         | 54.61         | 16.22       | L1    | gnd |



230Vac L



##### CE Test Report

EUT: 3315  
 Manuf: JINGFENGMINGYUAN  
 Op Cond: TA CE CHAMBER  
 Operator: SJF  
 Test Spec: EN 55015  
 Comment:

| Scan Settings (3 Ranges) |        |           | IF BW |       | Detector |       | Receiver Settings |       |
|--------------------------|--------|-----------|-------|-------|----------|-------|-------------------|-------|
| Start                    | Stop   | Step      |       |       |          |       | M-Time            | Atten |
| 9kHz                     | 50kHz  | 61Hz      | 200Hz | PK+AV | 20msec   | 10 dB | OFF               | 60dB  |
| 50kHz                    | 150kHz | 61Hz      | 200Hz | PK+AV | 20msec   | 10 dB | OFF               | 60dB  |
| 150kHz                   | 30MHz  | 3.9063kHz | 9kHz  | PK+AV | 20msec   | 10 dB | OFF               | 60dB  |

Transducer No. 1 Start 9kHz Stop 30MHz Name ENV216

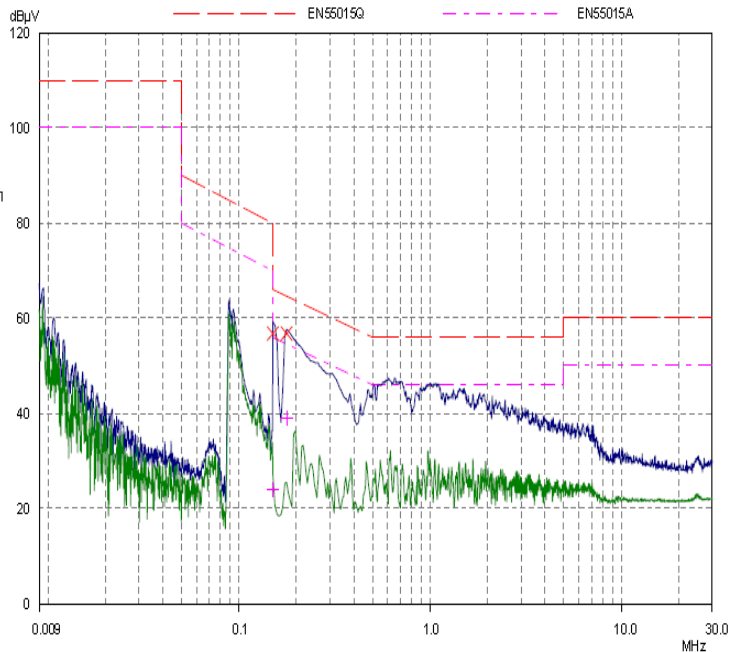
Final Measurement: Detectors: X QP / + AV  
 Meas Time: 1sec  
 Peaks: 8  
 Acc Margin: 25 dB

##### Final Measurement Results

| Frequency MHz | QP Level dBµV | QP Limit dBµV | QP Delta dB | Phase | PE  |
|---------------|---------------|---------------|-------------|-------|-----|
| 0.15          | 56.72         | 66.00         | 9.28        | N     | gnd |
| 0.17734       | 56.74         | 64.61         | 7.87        | N     | gnd |

| Frequency MHz | AV Level dBµV | AV Limit dBµV | AV Delta dB | Phase | PE  |
|---------------|---------------|---------------|-------------|-------|-----|
| 0.15          | 23.90         | 56.00         | 32.10       | N     | gnd |
| 0.17734       | 38.86         | 54.61         | 15.75       | N     | gnd |



230Vac N



晶丰明源半导体

# BP3315

## 7W LED 球泡灯电源

### CE TEST REPORT

EUT: 3315  
 Manuf: JINGFENGMINGYUAN  
 Op Cond: TA CE CHAMBER  
 Operator: SJF  
 Test Spec: FCC Part15B  
 Comment:

| Scan Settings |       | (1 Range) Frequencies |       |          | Receiver Settings |       |        |       |  |
|---------------|-------|-----------------------|-------|----------|-------------------|-------|--------|-------|--|
| Start         | Stop  | Step                  | IF BW | Detector | M-Time            | Atten | Preamp | OpRge |  |
| 150kHz        | 30MHz | 3.9063kHz             | 9kHz  | PK+AV    | 20msec            | 10 dB | OFF    | 60dB  |  |

| Transducer | No. | Start | Stop  | Name   |
|------------|-----|-------|-------|--------|
| 1          | 1   | 9kHz  | 30MHz | ENV216 |

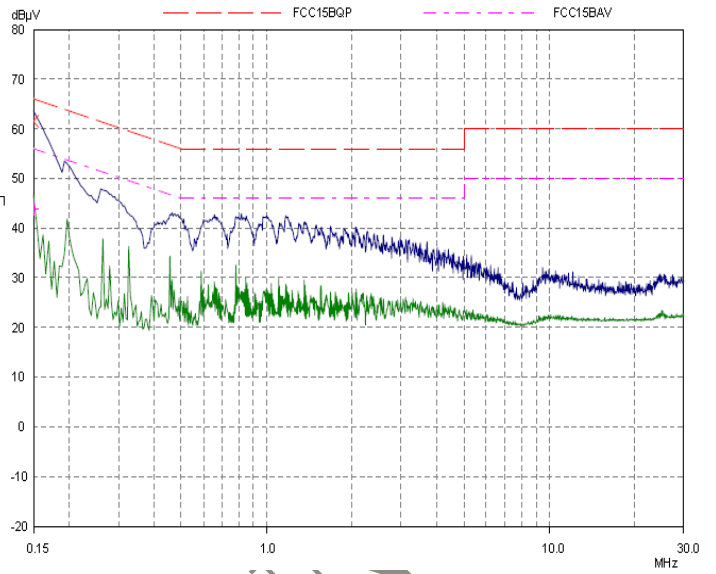
| Final Measurement: | Detectors:  | X QP / + AV |
|--------------------|-------------|-------------|
|                    | Meas Time:  | 1sec        |
|                    | Peaks:      | 8           |
|                    | Acc Margin: | 25 dB       |

### Final Measurement Results

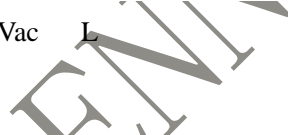
| Frequency MHz | QP Level dBuV | QP Limit dBuV | QP Delta dB | Phase | PE  |
|---------------|---------------|---------------|-------------|-------|-----|
| 0.15          | 61.52         | 66.00         | 4.48        | L1    | gnd |

| Frequency MHz | AV Level dBuV | AV Limit dBuV | AV Delta dB | Phase | PE  |
|---------------|---------------|---------------|-------------|-------|-----|
| 0.15          | 43.97         | 56.00         | 12.03       | L1    | gnd |



120Vac



### CE TEST REPORT

EUT: 3315  
 Manuf: JINGFENGMINGYUAN  
 Op Cond: TA CE CHAMBER  
 Operator: SJF  
 Test Spec: FCC Part15B  
 Comment:

| Scan Settings |       | (1 Range) Frequencies |       |          | Receiver Settings |       |        |       |  |
|---------------|-------|-----------------------|-------|----------|-------------------|-------|--------|-------|--|
| Start         | Stop  | Step                  | IF BW | Detector | M-Time            | Atten | Preamp | OpRge |  |
| 150kHz        | 30MHz | 3.9063kHz             | 9kHz  | PK+AV    | 20msec            | 10 dB | OFF    | 60dB  |  |

| Transducer | No. | Start | Stop  | Name   |
|------------|-----|-------|-------|--------|
| 1          | 1   | 9kHz  | 30MHz | ENV216 |

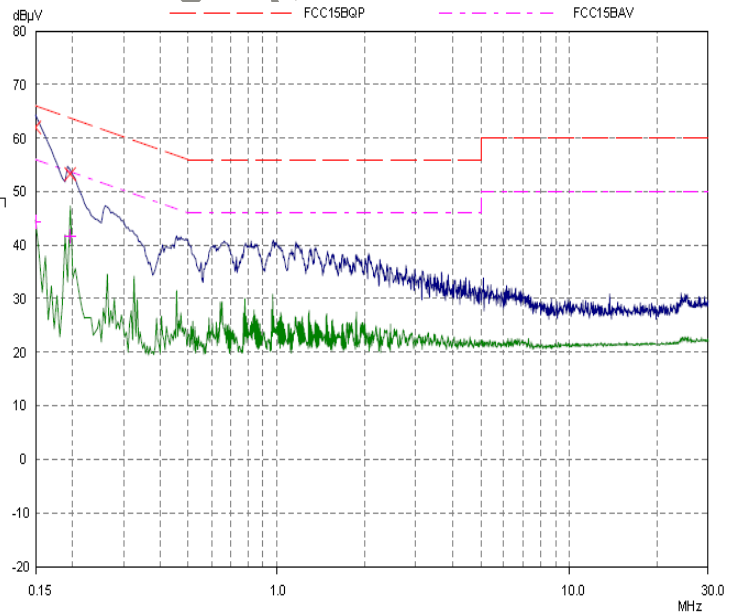
| Final Measurement: | Detectors:  | X QP / + AV |
|--------------------|-------------|-------------|
|                    | Meas Time:  | 1sec        |
|                    | Peaks:      | 8           |
|                    | Acc Margin: | 25 dB       |

### Final Measurement Results

| Frequency MHz | QP Level dBuV | QP Limit dBuV | QP Delta dB | Phase | PE  |
|---------------|---------------|---------------|-------------|-------|-----|
| 0.15          | 61.96         | 66.00         | 4.04        | N     | gnd |
| 0.19687       | 53.29         | 63.74         | 10.45       | N     | gnd |

| Frequency MHz | AV Level dBuV | AV Limit dBuV | AV Delta dB | Phase | PE  |
|---------------|---------------|---------------|-------------|-------|-----|
| 0.15          | 44.32         | 56.00         | 11.68       | N     | gnd |
| 0.19687       | 41.65         | 53.74         | 12.09       | N     | gnd |



120Vac N



### 5.3.2 辐射测试

#### EUT Information

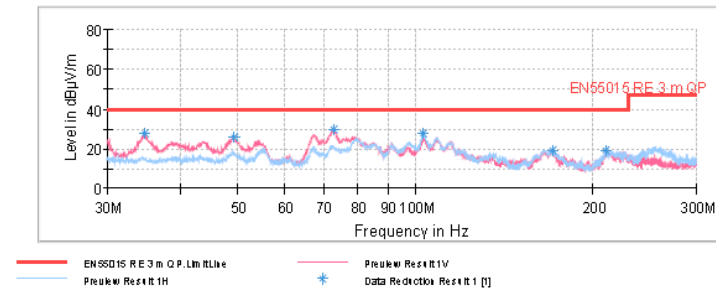
Description:  
 EUT Name: 3315  
 Manufacturer: JINGFENGZHENG YUAN

#### Common Information

Test Description: YXA1303-0251  
 Test Site: TA Technology (Shanghai) Co., Ltd  
 Test Standard: EN 55015  
 Environment Conditions: 966 Semi-anechoic Chamber  
 Operator Name: Songjunfeng

#### RE 0.03-1GHz QP Class B

RE 0.03-1GHz QP Class B



#### Data Reduction Result 1 [1]

| Frequency (MHz) | MaxPeak-MaxHold (dBµV/m) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Comment |
|-----------------|--------------------------|-------------|--------------|---------------|------------|---------|
| 34.792500       | 27.6                     | 100.0       | V            | 28.0          | -22.7      |         |
| 49.338750       | 25.5                     | 100.0       | V            | 13.0          | -23.6      |         |
| 72.626250       | 29.8                     | 200.0       | V            | 240.0         | -29.7      |         |
| 103.068750      | 27.9                     | 200.0       | H            | 153.0         | -26.3      |         |
| 171.007500      | 19.5                     | 200.0       | H            | 4.0           | -29.9      |         |
| 210.697500      | 19.1                     | 100.0       | H            | 0.0           | -28.2      |         |

230Vac

#### EUT Information

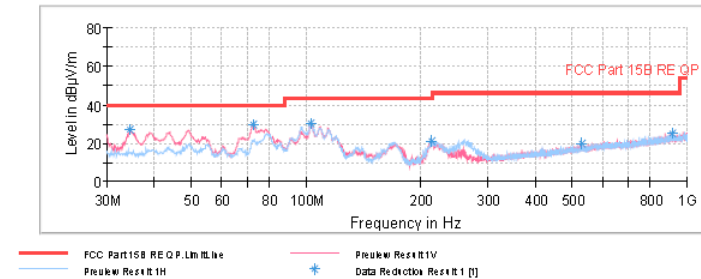
Description:  
 EUT Name: 3315  
 Manufacturer: JINGFENGZHENG YUAN

#### Common Information

Test Description: YXA1303-0251  
 Test Site: TA Technology (Shanghai) Co., Ltd  
 Test Standard:  
 Environment Conditions: 966 Semi-anechoic Chamber  
 Operator Name: Songjunfeng

#### RE 30M-1GHz QP

RE 30M-1GHz QP



#### Data Reduction Result 1 [1]

| Frequency (MHz) | MaxPeak-MaxHold (dBµV/m) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Comment |
|-----------------|--------------------------|-------------|--------------|---------------|------------|---------|
| 34.607500       | 26.9                     | 100.0       | V            | 24.0          | -22.7      |         |
| 72.558750       | 30.0                     | 200.0       | V            | 251.0         | -29.7      |         |
| 103.113750      | 30.7                     | 200.0       | H            | 149.0         | -26.3      |         |
| 214.178750      | 20.9                     | 100.0       | V            | 191.0         | -28.0      |         |
| 531.611250      | 19.5                     | 200.0       | H            | 117.0         | -20.2      |         |
| 913.670000      | 25.1                     | 300.0       | H            | 202.0         | -14.8      |         |

120Vac

### 6. 可靠性测试

#### 6.1 短路保护

短路保护 OK

#### 6.2 开路保护

开路保护 OK, 开路电压 29.6V

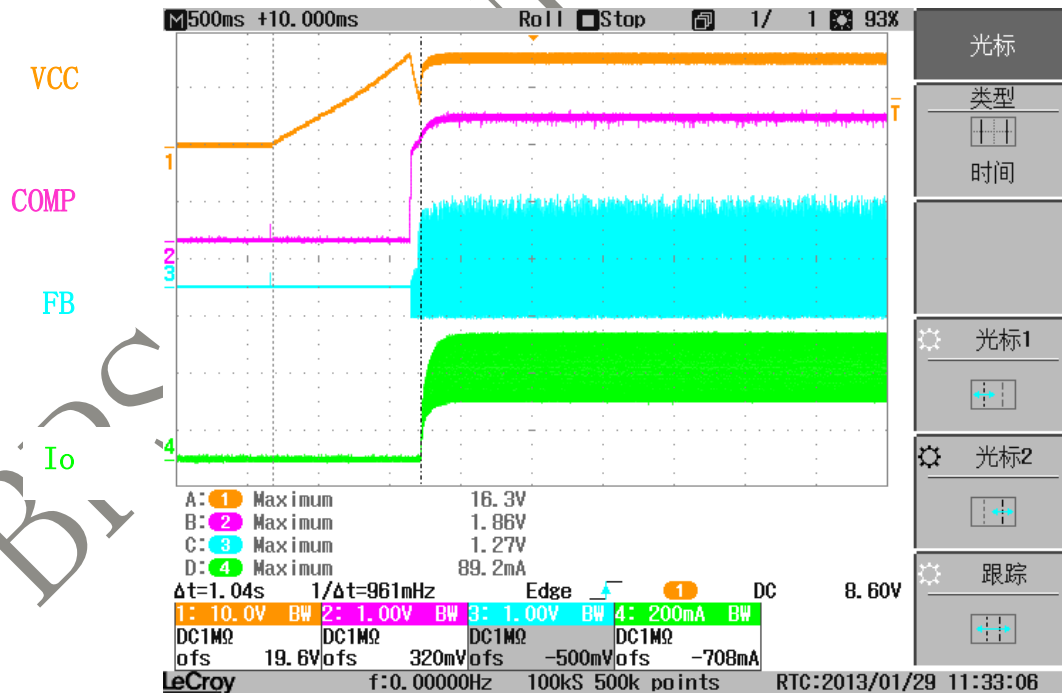
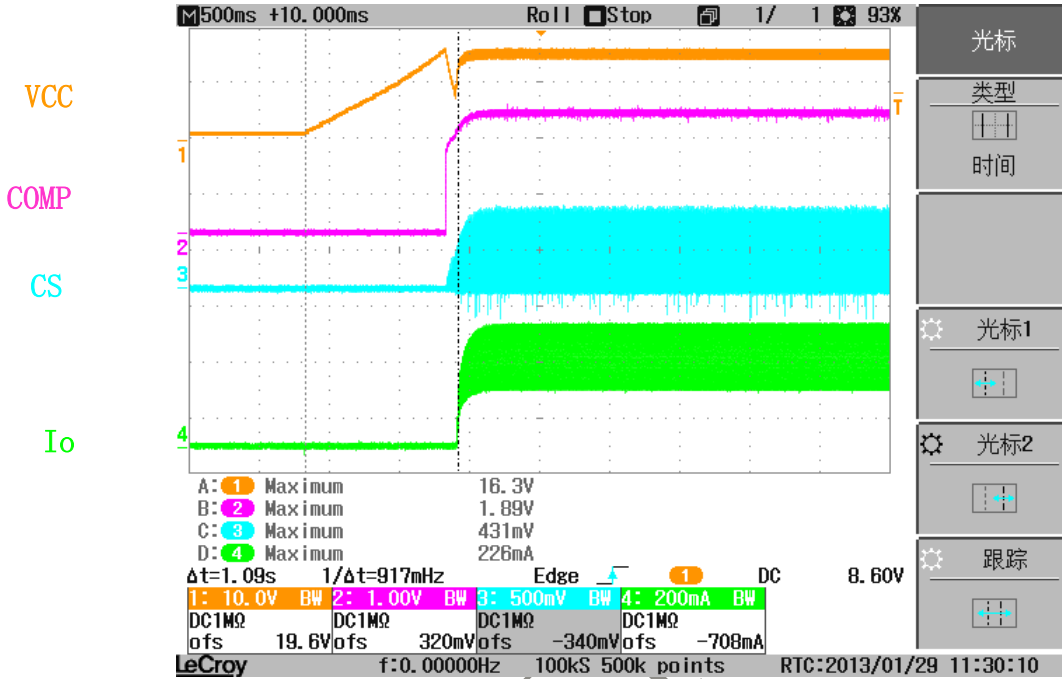
#### 6.3 温升测试

测试条件: 带载 7LEDs

| 测试条件      | 测试时间                            | 环境温度<br>(°C) | 器件温度(°C) |       |       |       | 输出电流 |
|-----------|---------------------------------|--------------|----------|-------|-------|-------|------|
|           |                                 |              | 芯片       | 整流管   | 变压器磁芯 | 变压器线圈 |      |
| 85VAC 常温  | 10 分钟                           | 20.9         | 58.9     | 54.9  | 49.3  | 51.1  | 316  |
|           | 20 分钟                           | 21.6         | 62.1     | 57.1  | 53.6  | 55.2  | 316  |
|           | 30 分钟                           | 22.1         | 62.9     | 57.7  | 54.4  | 56.0  | 316  |
|           | 器件上升温度 $\Delta T_{MAX}$<br>(°C) |              | 40.8     | 35.6  | 32.3  | 33.9  | /    |
| 220VAC 常温 | 10 分钟                           | 22.0         | 59.1     | 62.7  | 52.2  | 52.6  | 317  |
|           | 20 分钟                           | 22.5         | 59.2     | 62.9  | 52.1  | 52.6  | 317  |
|           | 30 分钟                           | 22.6         | 59.3     | 63.0  | 52.0  | 52.6  | 317  |
|           | 器件上升温度 $\Delta T_{MAX}$<br>(°C) |              | 37.1     | 40.7  | 30.2  | 30.6  | /    |
| 85VAC 高温  | 10 分钟                           | 87.0         | 120.9    | 115.7 | 115.0 | 118.3 | 297  |
|           | 20 分钟                           | 86.4         | 119.8    | 115.0 | 114.4 | 117.7 | 297  |
|           | 30 分钟                           | 86.2         | 120.0    | 114.8 | 113.9 | 117.3 | 297  |
|           | 器件上升温度 $\Delta T_{MAX}$<br>(°C) |              | 33.9     | 28.7  | 28.0  | 31.3  | /    |
| 220VAC 高温 | 10 分钟                           | 86.2         | 119.6    | 120.9 | 112.2 | 114.9 | 309  |
|           | 20 分钟                           | 85.9         | 117.2    | 119.0 | 109.8 | 112.7 | 309  |
|           | 30 分钟                           | 86.0         | 117.0    | 119.1 | 109.8 | 112.8 | 309  |
|           | 器件上升温度 $\Delta T_{MAX}$<br>(°C) |              | 33.4     | 34.7  | 26.0  | 28.7  | /    |

### 7. 重要波形记录

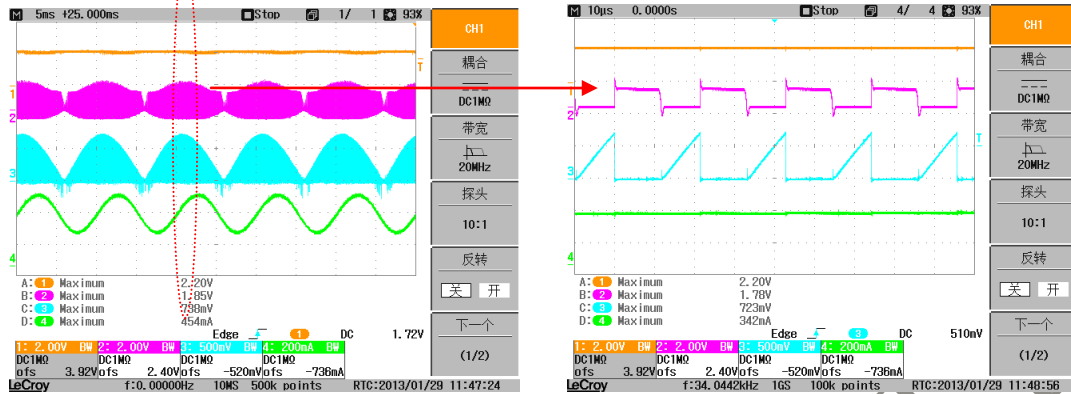
#### 7.1 85Vac 满载启动波形





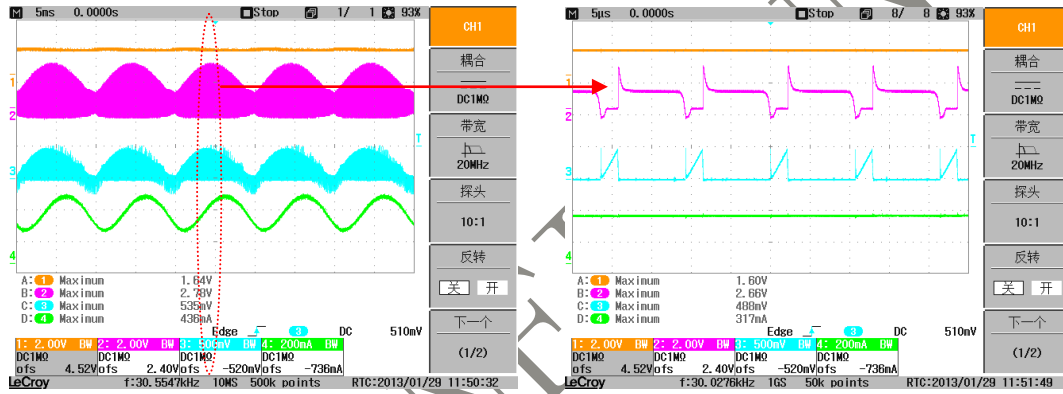
### 7.2 85Vac 满载工作时，基本信号波形

COMP  
FB  
CS  
Io

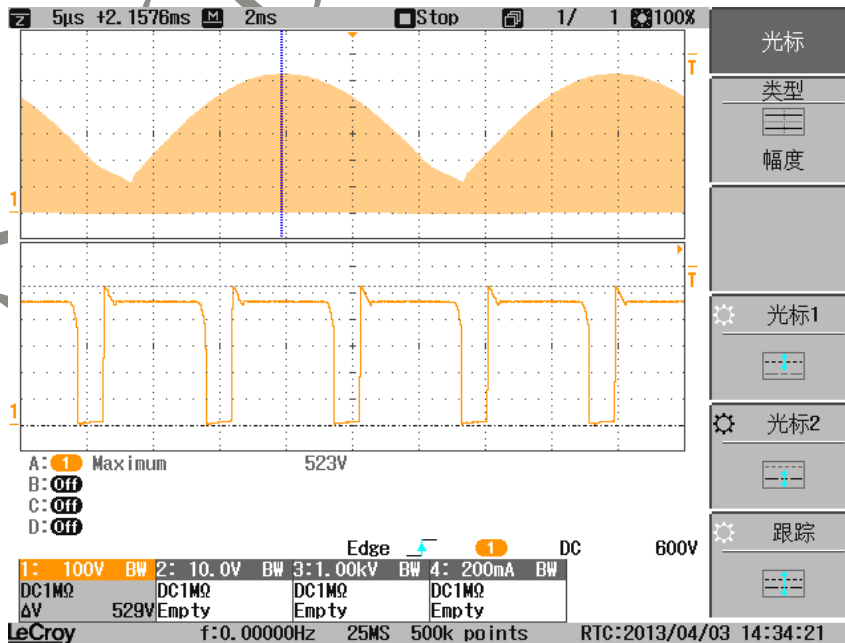


### 7.3 265Vac 满载工作时，基本信号波形

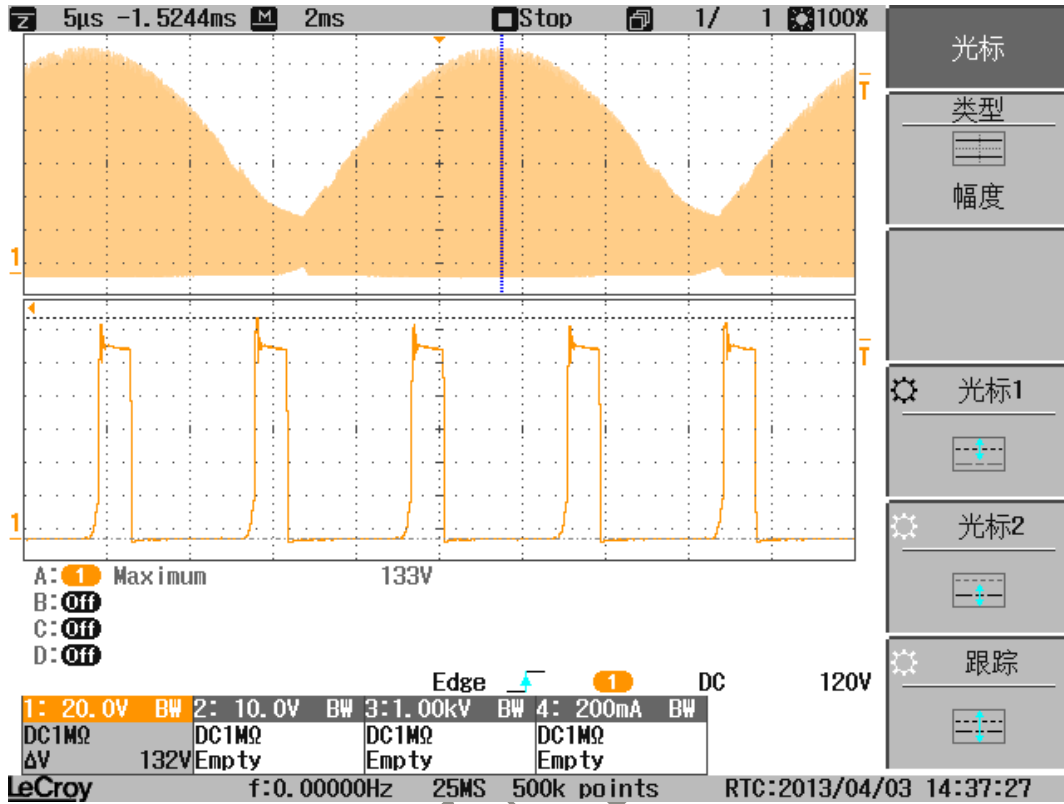
COMP  
FB  
CS  
Io



### 7.4 265Vac 满载工作时，MOSFET 电压波形 ( $V_{MAX}:529V$ )



7.5 265Vac 满载工作时，输出整流管反向电压波形 ( $V_{MAX}:132V$ )



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