

7-10W High Performance LED Driver IC Application Reference

1. General Description

CS9210S is a source power factor correction high precision non isolated buck type LED constant current driver circuit for 85Vac~265Vac universal input voltage range. This driver IC integrated source power factor corrective circuit to realize high power correction factor and low distortion.

With 500V power MOSFET integrated, CS9210S is able to have excellent constant current control capability with the cooperation of limited peripheral devices. The advanced inside high precision current sampling circuit helps for the constant current output and both linear/load adjusting ratio.

CS9210S also provide excellent protection functions including LED open/short circuit protection, current limitation protection, and inductance short circuit protection. Chip will automatically reboot after all of the protections. The unique over temperature adjustment function also protect the power and load when system temperature up to the setting limit. The build-in soft start circuit also effectively lowered the stress of power on/off of LED.

Features

500V Power MOSFET Inside

±3% precision LED output current

High PF (>0.9)

Excellent Linear / Load Adjustment Ratio

Soft Start

High Efficiency

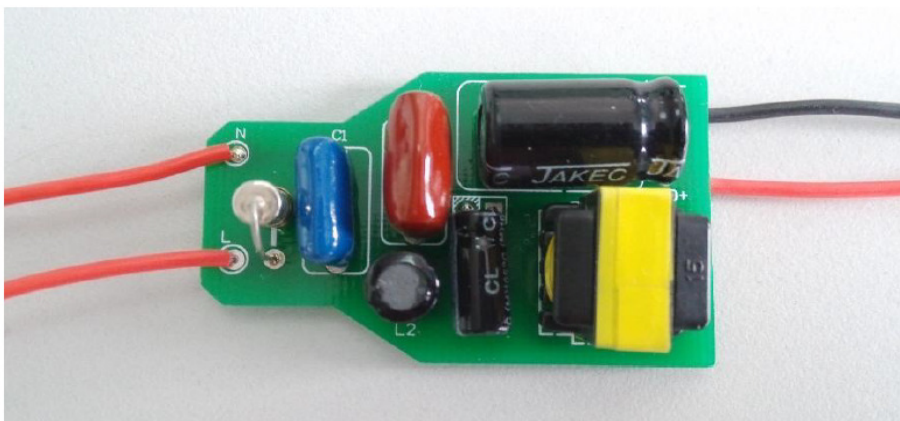
LED Open/Short Protection

Chip Over Temperature Protection

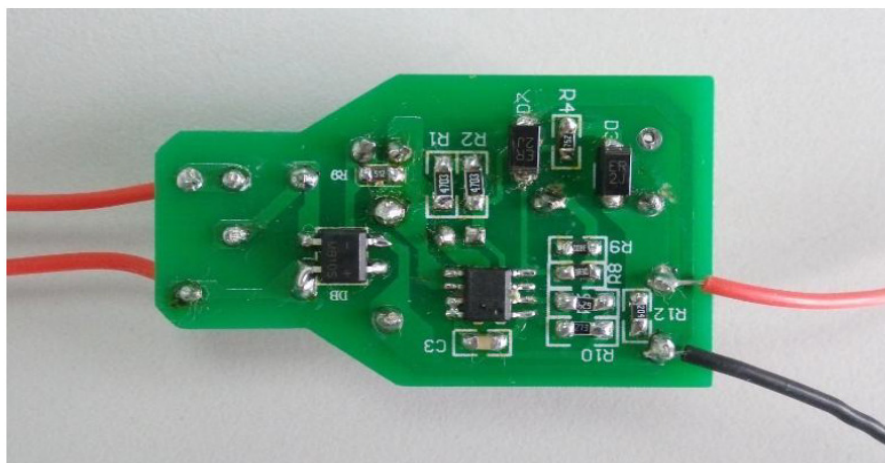
Assembly: SOP-8 / DIP-8

2. DEMO Board

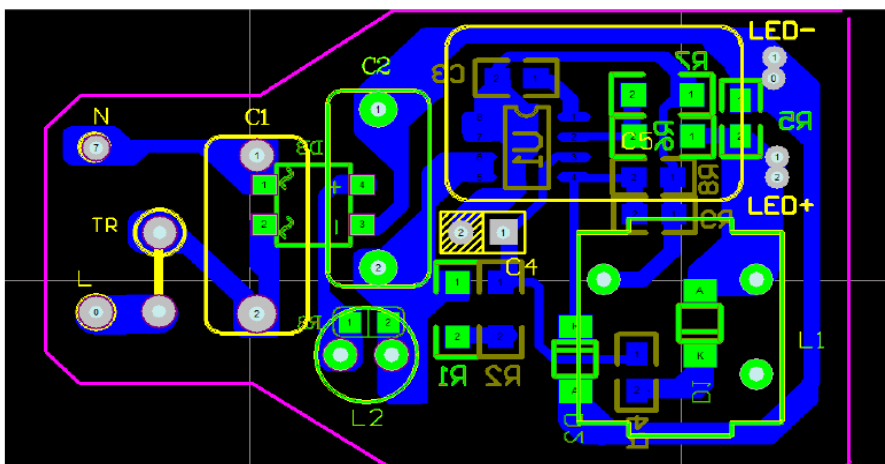
Top



Bottom



3. PCB Layout



4. BOM List

| Item | Reference | Description | QTY |
|------|-----------|-------------------------------------|-----|
| 1 | C1 | CAP MPC473 47nF/400V 薄膜电容 | 1 |
| 2 | C2 | CAP MPC104 100nF/400V 薄膜电容 | 1 |
| 3 | C3 | CAP SMD MLCC 105K/10V 0805 Y5V ±10% | 1 |
| 4 | C4 | CAP AL-E 3.3u M 50V 105C | 1 |
| 5 | C5 | CAP AL-E 150u M 100V 105C | 1 |
| 6 | BD1 | BRIDGE-DIODE 0.5A 600V MB6S MDI | 1 |
| 7 | D1, D2 | DIODE 1A 600V ES1J SMA | 2 |
| 8 | TR | FUSE 0.5A 250V Φ3x7mm | 1 |
| 9 | L1 | TRANSFORMER EE13 1mH | 1 |
| 10 | L2 | 1.5mH 工字电感 | 1 |
| 11 | R1, R2 | RES SMD CHIP 470KJ 1206 1/4W 5% | 2 |
| 12 | R3 | RES SMD CHIP 5.1KJ 0805 1/8W 5% | 1 |
| 13 | R4 | RES SMD CHIP 7.5KJ 0805 1/8W 5% | 1 |
| 14 | R5 | RES SMD CHIP 200KJ 0805 1/8W 5% | 1 |
| 15 | R6 | RES SMD CHIP 620KJ 1206 1/4W 5% | 1 |
| 16 | R7 | RES SMD CHIP 27KJ 1206 1/4W 5% | 1 |
| 17 | R8 | RES SMD CHIP 3.0RF 0805 1/8W 1% | 1 |
| 18 | R9 | RES SMD CHIP 3.3RF 0805 1/8W 1% | 1 |
| 19 | U1 | IC SOP8 CS9210S | 1 |

5. Transformer Parameter

5.1 Frame: EE13 5+5

5.2 Coil

| Lead | Windings | Wire Diameters |
|-----------------|----------|----------------|
| 2→9(Primary Np) | 150T | 0.25mm |

5.3 Inductance Lp : 1.0mH

6. Actual Testing

6.1 Efficiency Check

Condition: Universal voltage (85V-265V) input range, input/output and efficiency calculated

| | Vin(V) | Pin (W) | PF | Iout(mA) | Vout (V) | Pout(W) | Efficiency |
|-----|--------|---------|-------|----------|----------|---------|------------|
| 7W | 85 | 7.15 | 0.963 | 125 | 52.2 | 6.525 | 91.26% |
| | 110 | 7.12 | 0.978 | 125 | 52.3 | 6.538 | 91.82% |
| | 135 | 7.13 | 0.978 | 125 | 52.3 | 6.538 | 91.69% |
| | 180 | 7.17 | 0.963 | 125 | 52.3 | 6.538 | 91.18% |
| | 220 | 7.23 | 0.937 | 125 | 52.3 | 6.538 | 90.42% |
| 10W | 265 | 7.28 | 0.892 | 125 | 52.3 | 6.538 | 89.80% |
| | 85 | 9.67 | 0.912 | 124 | 71.3 | 8.841 | 91.43% |
| | 110 | 9.62 | 0.956 | 124 | 71.3 | 8.841 | 91.90% |
| | 135 | 9.63 | 0.968 | 125 | 71.3 | 8.913 | 92.55% |
| | 180 | 9.70 | 0.970 | 125 | 71.3 | 8.913 | 91.88% |
| | 220 | 9.77 | 0.954 | 125 | 71.3 | 8.913 | 91.22% |
| | 265 | 9.87 | 0.927 | 125 | 71.3 | 8.913 | 90.30% |

6.2 Protection Function Check

| Testing Parameter | Results |
|------------------------------|---------|
| LED open circuit protection | OK |
| LED short circuit protection | OK |

7. Reliability Check

| | |
|------------------------|-------------------|
| On/Off Test | 3000 on/off, Pass |
| High Temperature Aging | 85°C/72hrs, Pass |
| Low Temperature Start | -30°C Start, Pass |

8. Application Circuit

