



Description

D80421 is the control power switch chip apply to off-line small power AC/DC switch power supply of high performance of the primary side feedback, to achieve high precision of constant current output in the full input voltage range, precision is less than $\pm 5\%$, no loop compensation, without the opt coupler, without TL431 and transformer auxiliary winding and other components, reduce the system costs.

The chip integrates cycle-by-cycle peak current limit, the FB over-voltage protection, open/short circuit protection and boot soft start protection and so on, in order to improve the reliability of the system.

Feature

- The precision of constant current $<\pm 5\%$ in the width input voltage 85Vac~265Vac range
- Compatible with 1-3W in full input voltage
- Without primary of auxiliary winding
- Without opt coupler and 431 components with feedback control technology
- Without loop circuit compensate
- Built-in LEB
- Compare cycle-by-cycle peak current
- Output open/short circuit protection
- Built-in boot soft start
- Built-in FB over voltage protection and short circuit protection and so on
- Package: SOP8

Application

- LED lighting driver

Pin Figure



SOP8

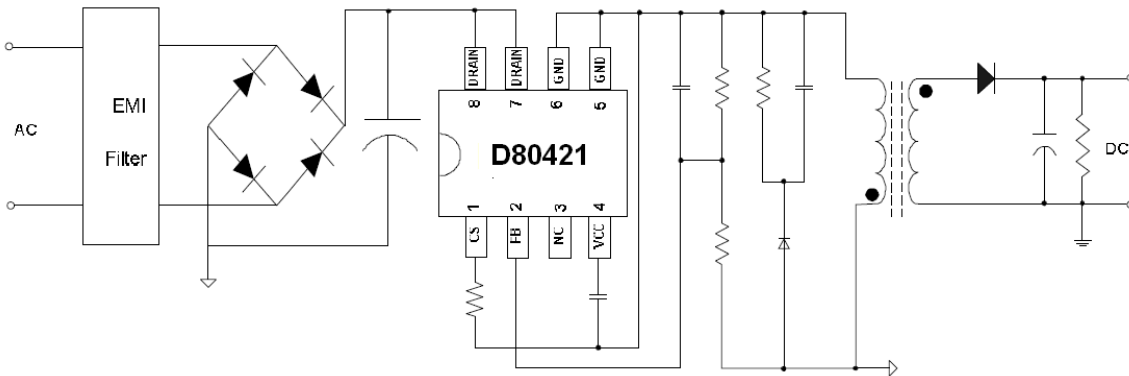
Output Power

| | | |
|---------------|--------------|---------------|
| Input voltage | 85Vac~265Vac | 180Vac~265Vac |
| Output power | 1~3W | 3~5W |

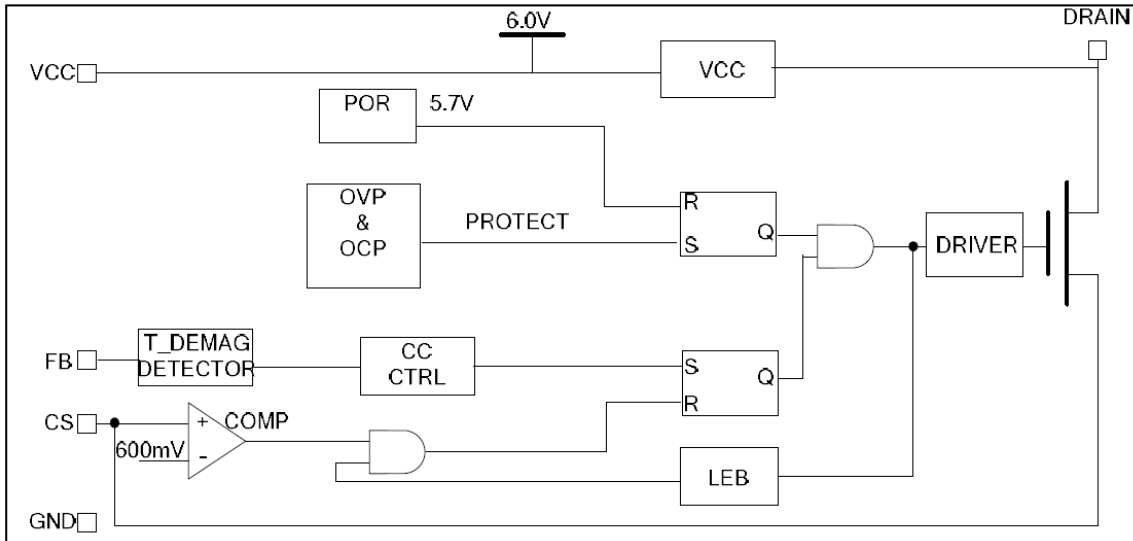


Notes: Please lay copper in 5,6feet (more than 5*5mm copper) when PCB layout, to increase the heat radiating area.

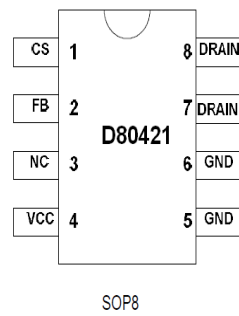
Typical Application



Internal Diagram



Pin Diagram



Pin Description

| Pin Name | Pin No. | Pin Description |
|----------|---------|--|
| CS | 1 | Primary side peak current detection port |
| FB | 2 | Output voltage feeding port |
| NC | 3 | Empty pin |
| VDD | 4 | Internal power supply voltage port |
| GND | 5,6 | Ground of chip |
| DRAIN | 7, 8 | Power switch tube leakage port input |

Limited Parameter

Limited parameter (TA=25°C)

| Symbol | Description | Range | Unit | |
|------------------|------------------------|---------|------|------|
| VDD | Chip operating voltage | -0.3~6 | V | |
| V _{FB} | FB input voltage | ~ | V | |
| V _{CS} | CS input voltage | -0.3~7 | V | |
| T _A | Operating temperature | -20~125 | °C | |
| T _{STG} | Storage temperature | -40~150 | °C | |
| V _{ESD} | Human body model | 4 | KV | |
| R _{ēja} | Thermal resistance | SOP8 | 65 | °C/W |



Electric parameter

(TA=25°C, VDD=18V, unless special notes)

| Symbol | Description | Condition | Range | | | Unit |
|----------------------|-----------------------------------|--|-------|------|-----|------|
| | | | Min | Typ | Max | |
| I _{CC} | Quietness current | V _{FB} =2V; I _D =1mA | | 250- | | uA |
| V _{CC} | Internal voltage supply | V _{FB} =2V; V _{DS} =500V | | 6 | | V |
| V _{CS} | Current detection threshold value | I _D =0.2A | | 600 | | mA |
| T _{LEB} | Lead edge blanking time | | | 450 | | ns |
| V _{FBMIN} | FB min threshold value | | | 300 | | mV |
| V _{FBMAX} | FB over voltage threshold value | | | 4 | | V |
| T _{DEM_MIN} | Min degaussing time | | | 5 | | us |
| D _{MAX} | Max duty cycle | I _{FB} =2.0mA | | 42 | | % |
| R _{DSON} | On-resistance | I _{FB} =0.5mA; I _D =50mA | | 30 | | Ohm |
| B _{VD_SS} | Against breakdown voltage | V _{DS} =100V; V _{DD} =5V | | 650 | | V |
| I _{D_SS} | Leakage current of power tube | | | | | uA |

Function description

D80421 is the control power switch chip apply to off-line small power AC/DC switch power supply of high performance of the primary side feedback, to achieve high precision of constant current output in the full input voltage range, precision is less than $\pm 5\%$, D80421 control the system output through primary sampling mode, the internal of IC integration of high voltage process, without the opt coupler and TL431 components. The chip integrates cycle-by-cycle peak current limit, the FB over-voltage protection, open/short circuit protection and boot soft start protection and so on, in order to improve the reliability of the system.

Start-up and Control

The internal of D80421 integration of high voltage power switch, save the external start-up resistance and power supply circuit of auxiliary winding through high voltage start-up, greatly reduce the system cost.



Working principle

The IC realize to control the primary side high-precision constant current and feedback power application system must to working in DCM mode, the IC control the output voltage/current through detection the fly back voltage of primary auxiliary winding. The output current depends on turns ratio and peak current:

$$I_O = 2/7 * N * I_P \quad (1)$$

Remark: I_O is output current: N is turns ratio of transformer: η is transfer efficiency

Working frequently

D80421 control switch frequency by load size, no need the external frequently set components (the max switch frequency should less than 65K). In the discontinue fly back power mode, the max output power is :

$$P_O = 1/2 * L_P * F_{SW} * I_P^2 \quad (3)$$

L_P is primary winding inductance , I_P is primary winding peak current .By the formula 3 , change the primary winding inductance will lead to the constant current change in the max output power and constant current mode. In order to compensate for the primary inductance variation, the internal loop circuit will lock the switch frequency; switch frequency locking can be expressed as below:

$$F_{SW} = 4 / (7 * T_{DEMAG}) \quad (4)$$

Because the T_{DEMAG} and inductance is inversely, the product of L_P and F_{SW} remained unchanged. The constant current will not change with the primary inductance in the max output power and constant current mode. The max compensate for the range $\pm 10\%$ of inductance value .

Current detection and LEB

Chip through the CS terminal detection the voltage of sense resistor to control the power switch action, thus realizing to control the current of the transformer primary side, provide cycle-by-cycle peak current limit. Input the switch current to the CS pin through an external sense resistor.

In order to eliminate the peak interface caused by the high tube in the opening moments, built-in leading edge blanking, avoid the disoperation in the power tube in the opening moments, so that can save the external RC filter circuit and system cost.

Protection circuit

Improve the system reliability, the IC integrated various protection, include: cycle-by-cycle

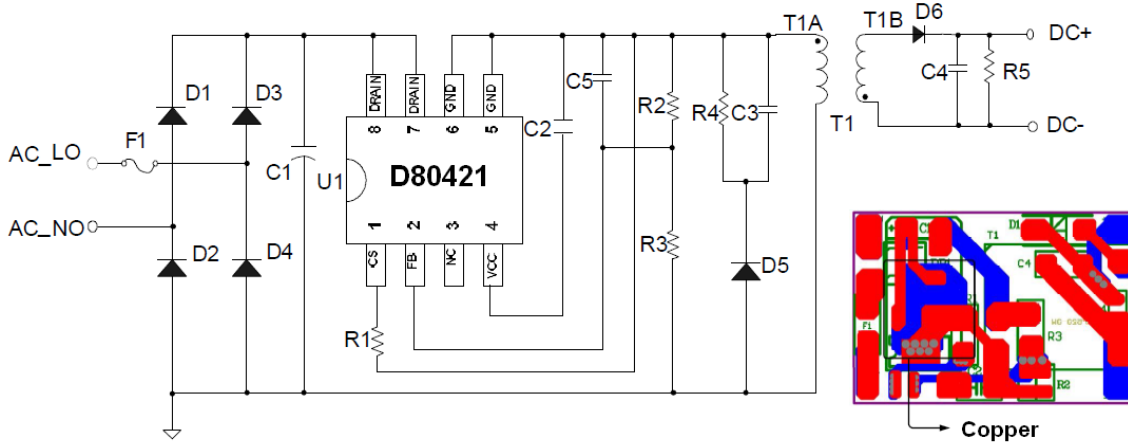


peak current limited, output short circuit protection, FB over voltage protection, soft start and so on.

Typical Application Solution

D80421 12V/300mA high lighting solution

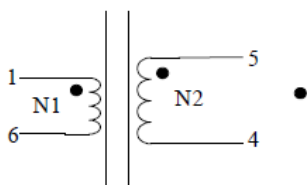
Schematic diagram:



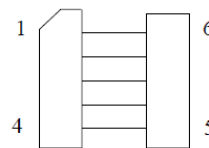
BOM File:

| Item | Parameter | Item | Parameter | Item | Parameter |
|------|-----------|------|------------|------|-----------|
| D1 | 1N4007 | R2 | 100K | C4 | 10uF/16V |
| D2 | 1N4007 | R3 | 2M | C5 | 15PF/16V |
| D3 | 1N4007 | R4 | 120K | U1 | D80421 |
| D4 | 1N4007 | R5 | 10K | F1 | 1A/250V |
| D5 | FR107 | C1 | 4.7uf/400V | T1 | EE10 |
| D6 | SS110 | C2 | 1uF/16V | | |
| R1 | 2.2Ω | C3 | 102/1KV | | |

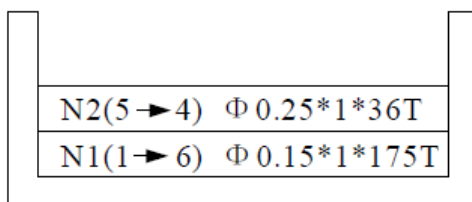
Transformer Parameter:



Transformer winding method



vertical view



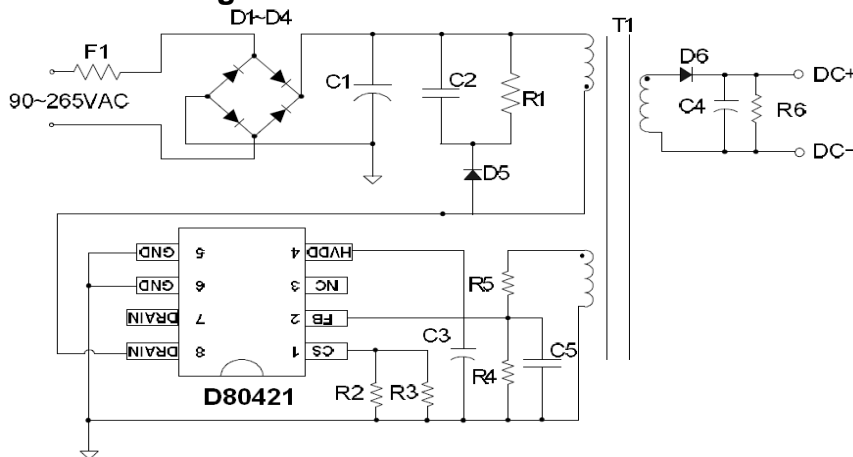


Instruction:

1. EE10 (4+2) vertical frame, PC40 magnetic core.
2. Inductance LP (1→6) =2.6mH, leakage inductance should lower than $\pm 5\%$.
3. Primary to secondary withstand voltage for 3000VAC, leakage current $< 2\text{mA}/60\text{s}$.
4. Primary to magnetic core withstand voltage for 1500VAC, leakage current $< 2\text{mA}/60\text{s}$
5. Secondary to magnetic core withstand voltage for 1500VAC, leakage current $< 2\text{mA}/60\text{s}$.
6. Test 1min in DC500V condition, the resistance of winding to mechanic core $> 100\ \text{m}\Omega$.
7. Test 1min in DC500V condition, the resistance of winding to the resistance of winding $> 100\ \text{m}\Omega$.

D80421 12V/300mA high lighting solution

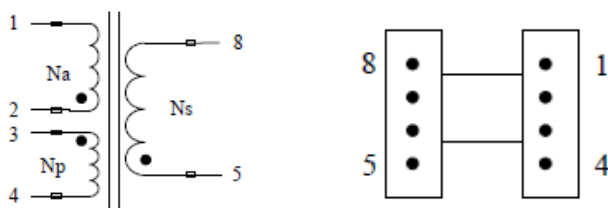
Schematic diagram:



BOM File:

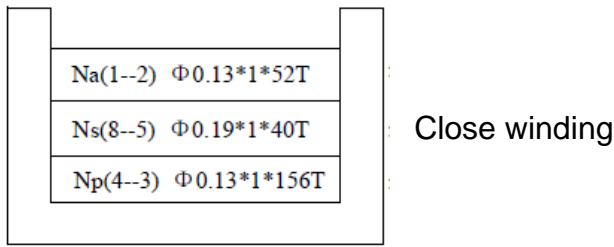
| Item | Parameter | Item | Parameter | Item | Parameter |
|------|-----------|------|-----------|------|------------|
| D1 | 1N4007 | R1 | 120K | C1 | 4.7uF/400V |
| D2 | 1N4007 | R2 | 2.4R | C2 | 102 |
| D3 | 1N4007 | R3 | 47R | C3 | 1uF/50V |
| D4 | 1N4007 | R4 | 7.5K/0805 | C4 | 10uF/50V |
| D5 | FR107 | R5 | 39K/0805 | C5 | 30Pf/16V |
| D6 | SS110 | R6 | 10K/0805 | F1 | 0R/1206 |
| | | | | T1 | EE10 |

Transformer Parameter





Transformer winding method



Instruction:

1. EE10 (4+4) vertical frame, PC40 magnetic core.
2. Inductance $LP(4 \rightarrow 3) = 2\text{mH}$, leakage inductance should lower than $\pm 5\%$.
3. Primary to secondary withstand voltage for 1500VAC, leakage current $< 2\text{mA}/60\text{s}$.
4. Primary to magnetic core withstand voltage for 1000VAC, leakage current $< 2\text{mA}/60\text{s}$.
5. Secondary to magnetic core withstand voltage for 1000VAC, leakage current $< 2\text{mA}/60\text{s}$.
6. Test 1min in DC500V condition, the resistance of winding to mechanic core $> 100\ \text{m}\Omega$.
7. Test 1min in DC500V condition, the resistance of winding to the resistance of winding $> 100\ \text{m}\Omega$.

Package Type

SOP8

