Description

D80214 is a high precision off-line on-isolation LED constant current switch chip, which suitable for high precision of constant current non-isolation buck LED constant Current drive power.

D80214 uses a patented zero current detection method, critical quasi-resonant Technology mode to realize the high efficiency. Can use smaller size of inductance, no freewheeling diode reverse recovery problem, without any compensation circuit, built-in line voltage compensation, without increasing the current compensation circuit can meet the current accuracy of full input voltage range (± 3%).

D80214 built-in 650 withstand voltage tube, can reduce the cost of system. The D80213 can easily meet the demand of EPA2.0 energy efficiency with very low start-up current.

The D80214 also integrates several protection features for increasing the stability of system: under voltage lockout, LEB, LED open circuit protection, over current protection, loop open-circuit protection, LED short circuit protection.

D80214 adopt DIP-8 package.

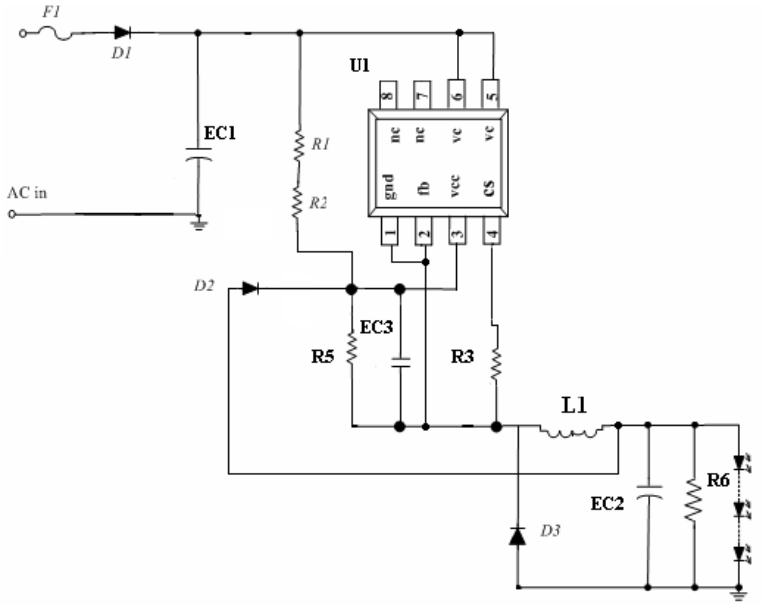
Feature

- High efficiency critical operating
- Patented zero current detection method
- Shaped inductance, without transformer
- Without freewheeling diode reverse recovery problem
- ±3%constant current accuracy, single chip ±1% accuracy
- Built-in 1N65 power tube
- Very low start-up current(15uA)
- Built-in cable compensation, wide input voltage
- Built-in cycle-by-cycle current limiting and LEB
- LED open/short circuit protection
- LED over voltage protection
- Over temperature protection
- Without compensation circuit

Application

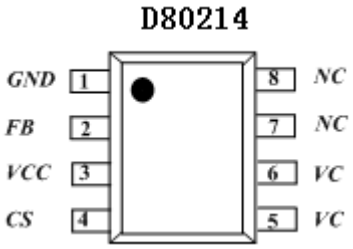
- Non-isolation and lower cost LED light
- Replace RC and without IC solution

Typical Application



Picture 1 D80214 typical application schematic

Pin Package



Pin Description

Pin No.	Pin Name	Description
1	Gnd	Signal and power ground
2	Fb	Output voltage feedback Pin
3	Vcc	IC power
4	Cs	Primary –side current sense Pin
5，6	Vc	The higher voltage input pin of internal Mos
7，8	Nc	Without connect

Order Information

Part number	Print	Package type
D80214	D80214 XXYY	Tape 2500pcs /Tape

Application Limiting Parameter (Note 1)

Parameter	Range
VCC – GND	-0.3V ~ 30V
FB - GND	-0.3V ~ 9V
VC- GND	0.3V ~ 650V
CS - GND	0.3V ~ 9V
Operating temperature range	.-40℃ to +125℃
Junction temperature range	-40℃ to +150℃
Storage temperature range	-60℃ to +150℃
Electronic protect human mode	2000V (Note2)
Electronic protect machine mode	500V

Note1: Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Note2: Human mode, 100PF capacitor discharge through the 1.5Kohm resistance.

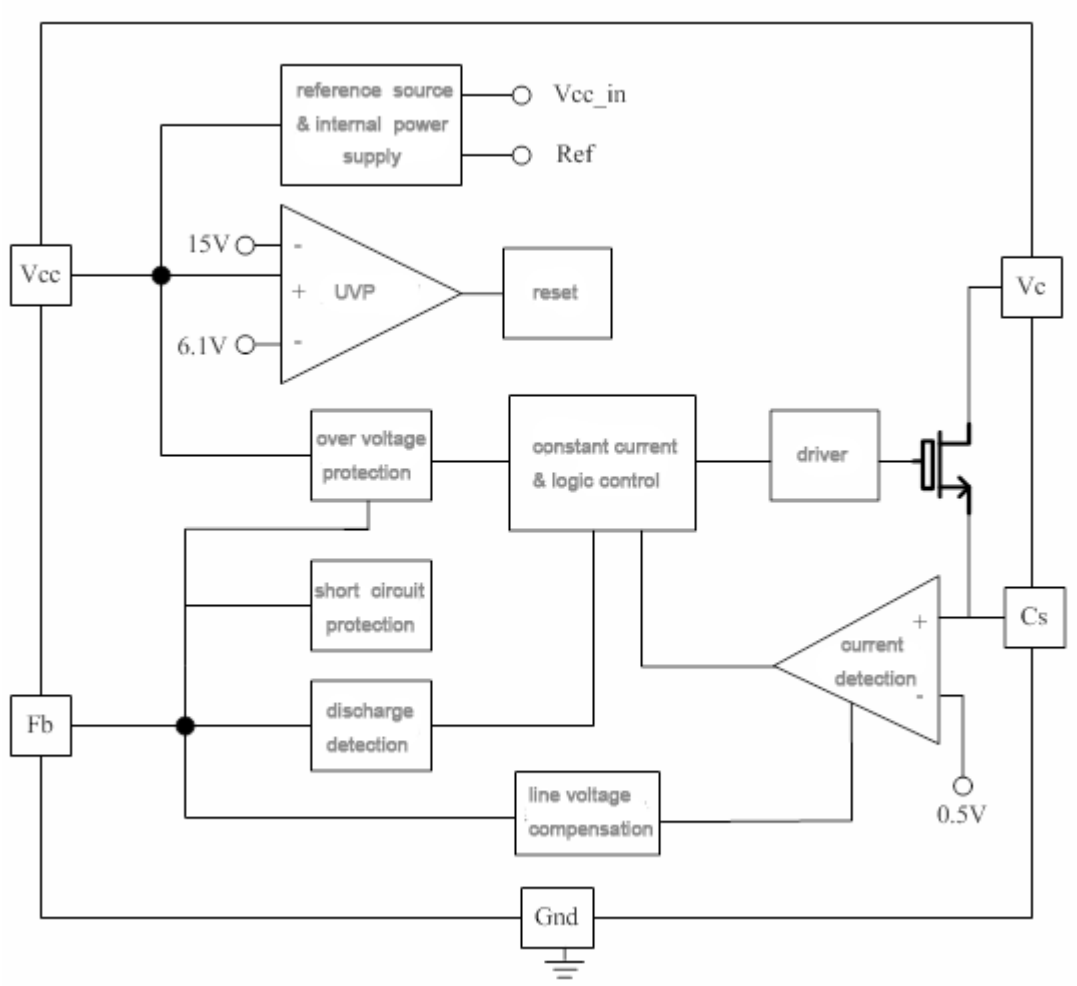
Electrical Characteristics

(VCC=12V,Ta=25℃, unless otherwise specified.)

Description	Symbol	Min.	Typ.	Max.	Unit.
FB Pin					
FB over voltage protection	FB_ovp	3	3.15	3.3	V
FB maximum output current	IFB_max		5		mA
FB minimum output current	IFB_min		25		uA
CS pin					
Over current limit voltage	Vcs	0.445	0.450	0.445	V
Leading edge blanking time	LEB		570		nS
OUT Pin					
Pull-up output current	Isource		50		mA
Pull-down output current	Isink	100			mA

VCC Pin					
Start-up current	Istart		15	35	uA
VCC start-up voltage	Vcc(on)	14	15	16	V
VCC turn-off voltage	Vcc(off)	5.5	6.1	6.6	V
VCC static operating current	Iccq		0.45		mA
VCC over voltage protection	Vcc(ovp)	22	24.5	26.5	V
Recommended VCC operating range	Vcc_op	6.8		21	V
Power tube					
Power on resistor	Rds_on			15	ohm
Breakdown voltage	Bvd_SS	650			V

Functional Block Diagram



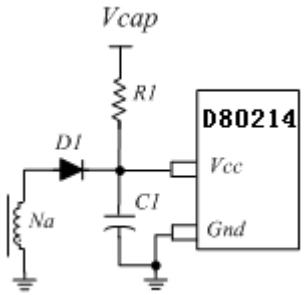
Picture 2 Internal Structure Diagram

D80214 is a constant current switch chip for LED lighting, can achieve higher precision constant current

with a patented zero current sense method and critical conduction mode.it adopt non-isolation buck topology structure controller. Built-in cable compensation, lower system cost, only need little periphery component can achieve excellent constant current index.

1、Start-up circuit

When the system start-up, as the picture 4, the input voltage V_{cap} to charge C_1 through the start-up resistance R_1. When the capacitor voltage V_{CC} achieve to start-up voltage $V_{cc\ (on)}$, the internal control circuit of chip begin to work. V_{CC} is supplied by the auxiliary winding after system start-up.
The delay time of power start–up (T_{sd}) is given by:
$T_{sd} = R_1 X C_1 X L_n (1- V_{cc(on)} / (V_{cap} - I_{start} X R_1))$
$V_{cc(on)}$ is starting voltage
I_{start} is starting current
V_{cap} is commutating voltage of AC

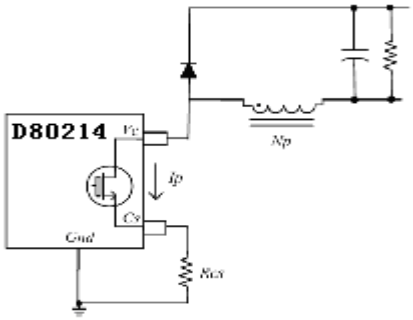


Picture 3 start-up schematic

Because the starting- current is very small (less than 30uA), the start-up resistance R1 can be made large. Calculate with R1 values is 1 M, VCC capacitor C1 value is 4.7uF; it can start within 1 seconds at AC 90V input.

2、Output constant current set

The chip adopts the cycle-by -cycle sense the peak current of inductance; CS is connected to the input point of peak current comparator, compared to internal reference voltage, thus control the power switch.



Picture 4 set constant current schematic

Chip operating in critical conduction mode
LED output current is given by: $I_{out} = 1/2 * V_{cs} / R_{cs}$
V_{cs} is internal current comparison threshold value
R_{cs} is current sense resistance value
The output current can be set according to the current sampling resistor. No relation with the inductance.

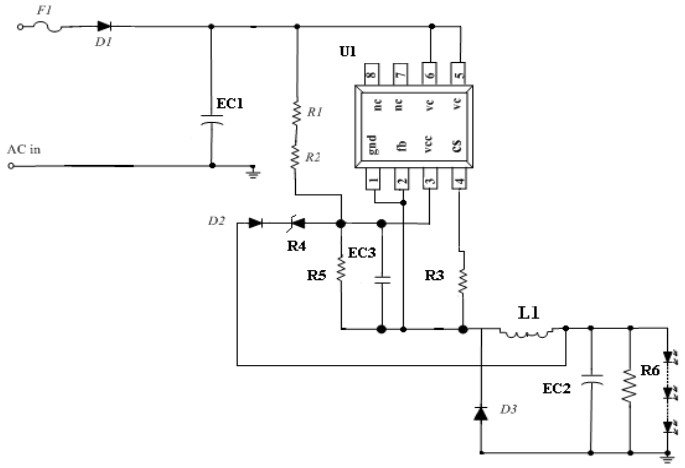
3、Working Frequently

System operating in current and inductance critical conduction mode, without any loop compensation. Design the center working frequency of system is about 45Khz. suggested that the maximum operating frequency for 100 KHz, the minimum frequency for 25Khz. Calculation formulas of frequency as bellow:
$F_{req} = I_p^2 * L_{m*\eta} / (2*V_{out} * I_{out})$
L_p is the peak current of inductance,
V_{out}, Iout is the output voltage and current,
L_m: is the inductance,
η: the efficiency of the system

4、D80214 Design Tactic

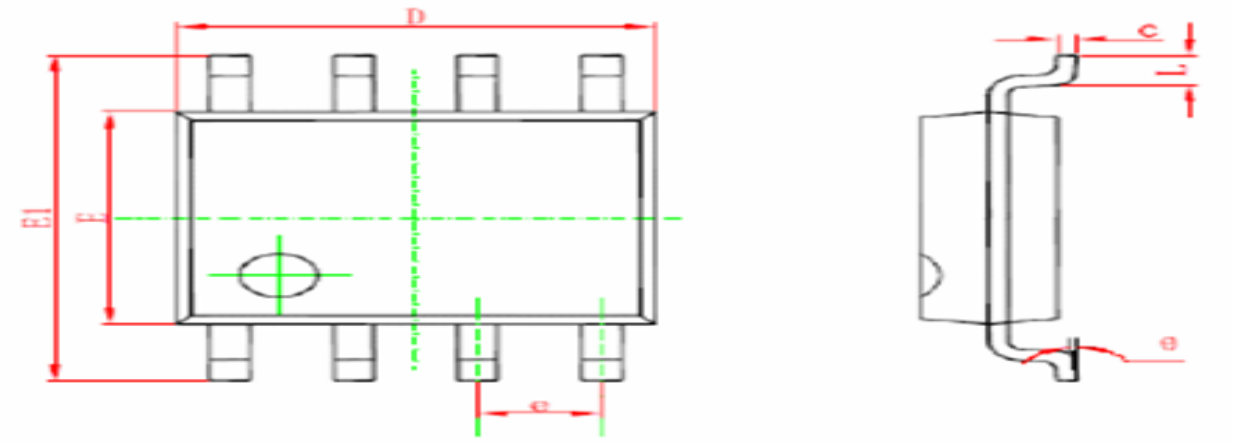
When design the PCB board, please take care as bellow:
VCC bypass capacitors should be as close to the chip VCC and GND pins.
Reduce power loop area, such as the transformer primary, power tube and the loop area between feedback resistances can effectively reduce the EMI radiation.
The ground of CS sampling resistance as close as possible to GND can effectively reduce the coupling noise, improve sampling accuracy.

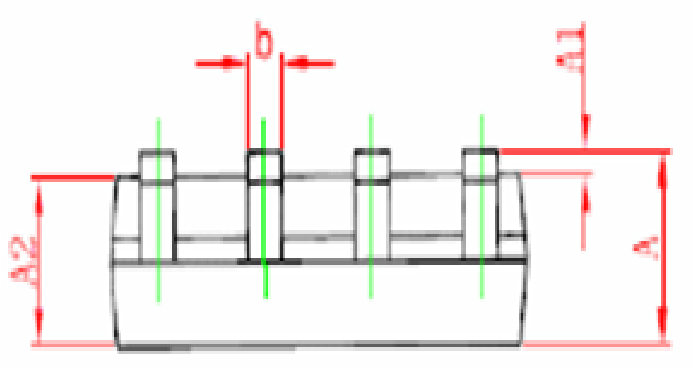
Typically Application



Picture 5 D80214 isolation solution

DIP-8 Package information





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°