PMICRO
Powerlink Microelectronics

PL338x

Non-isolated AC/DC Buck Power Switch

Product Description

PL338x is a series of high efficiency non-isolated buck and highly integrated PWM power switch for AC/DC power supply applications with universal input.

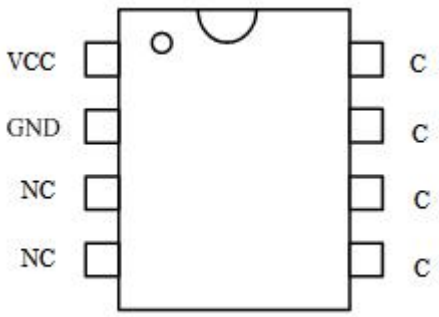
It integrates 700V power switch and proprietary voltage and current control to realize accurate CV/CC regulation without external voltage feedback and current sense circuitry.

Multi-mode operations are utilized to achieve low standby power, high efficiency and audio & noise free. PL338x operates in PFM mode at light load and with load becomes higher, the chip operates in PWM mode to achieve high efficiency.

PL338x also offers rich protection features including VCC UVP, VCC OVP, Cycle-by-Cycle peak current limiting, load UVP, load OVP and OTP.

PL338x is offered in SOP8 package.

Pin Configuration



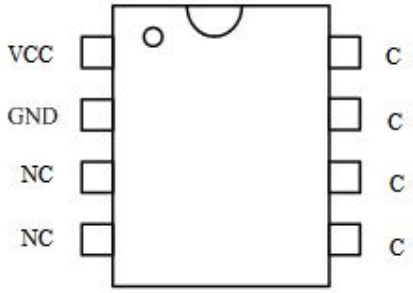
Key Features

- 5V Output
- Integrated 700V Power Switch
- Built-in HV Start-up Circuit
- ±5% Constant Voltage Regulation
- Built-in Frequency Jitter to Reduce EMI
- Adaptive Control Strategy to Increase Efficiency
- Built-in Leading Edge Blanking (LEB)
- Cycle-by-Cycle Peak Current Limiting (CBC)
- VCC UVP and OVP
- Output Open Circuit Protection
- Output Short Circuit Protection
- Over Temperature Protection (OTP)

Applications

- Power Supply for MCU
- Auxiliary Power Supply in Small Household Appliance
- Smart-home Devices
- Other Power applications

1 Pin Map



2 Pin Description

Pin	Description
VCC	IC Power Supply
GND	IC Ground
NC	Not Connect
C	HV BJT Collector Pin

3 Absolute Maximum Ratings

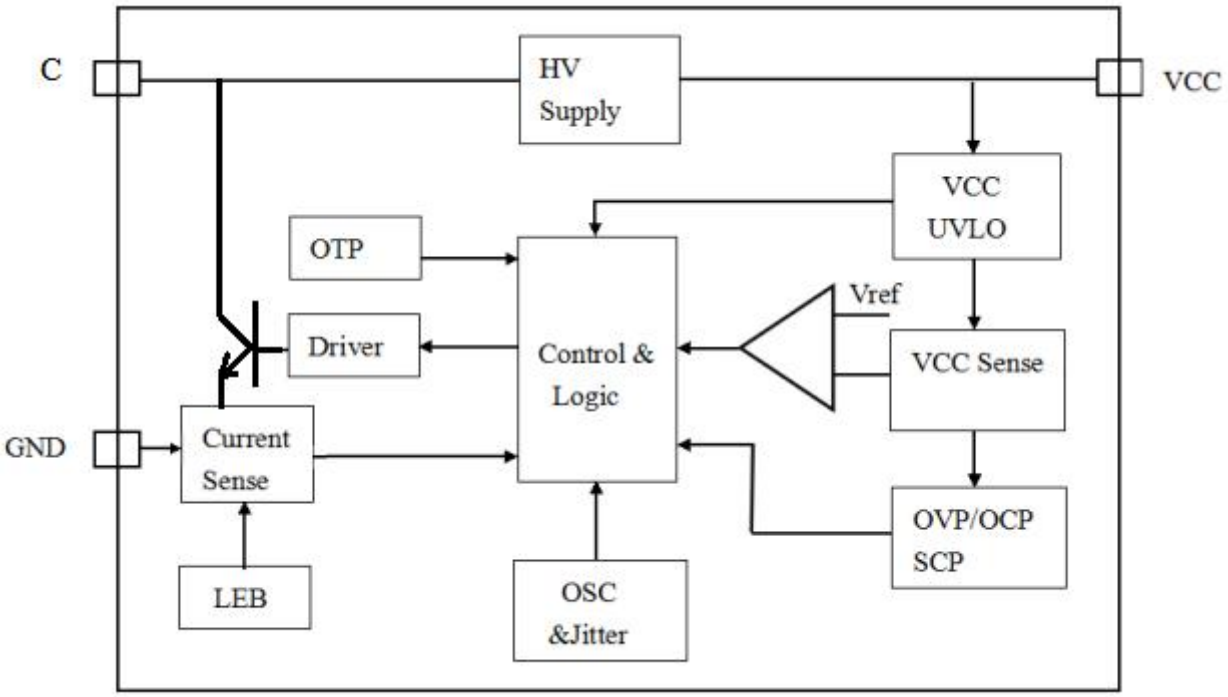
Parameter	Symbol	Value	Unit
VCC Voltage	VCC	-0.3 to 6	V
HV BJT Collector Pin	Vcbo	-0.3 to 700	V
Maximum Junction Temperature	Tjmax	150	℃
Storage Temperature	Tsto	-55 to 150	℃
Lead Temperature(Soldering,10secs)	Tlea	260	℃

Note: These are stress ratings only. Stress beyond these limits may cause permanent damage to the device. Functional operation of the device at these or any conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute maximum rated conditions for extended periods of time may affect device reliability.

4 Recommended Operating Conditions

Parameter	Value	Unit
Operating Temperature	-20 ~ 85	℃
Maximum Load @△T≤40℃（PL3381）	200	mA
Maximum Load @△T≤40℃（PL3382）	275	mA
Maximum Load @△T≤40℃（PL3383）	350	mA

5 Block Diagram

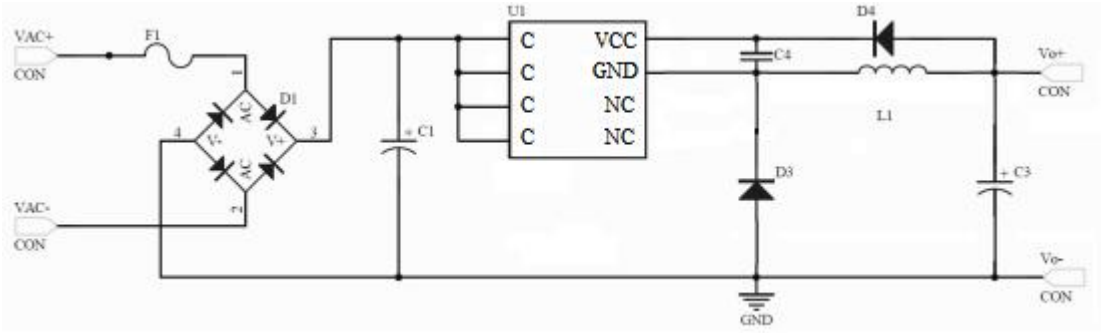


6 Electrical Characteristics

(Vout=5V, T_A = 25℃, unless otherwise specified）

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Power Supply Section						
Operation Current	Idd_static			0.5		mA
VCC Under Voltage Lockout OFF	UVLO_OFF	VCC_rise		5.1		V
VCC Under Voltage Lockout On	UVLO_ON	VCC_fall		4.1		V
VCC Over Voltage	VCC_OVP			5.8		V
VCC Over Current	VCC_OLP			4.85		V
OSC Section						
Maximum Frequency	Focs_max			38		KHz
Maximum Duty	D_max			43		%
Current Sense Section						
Maximum Peak Current（PL3381）	Ipk			375		mA
Maximum Peak Current（PL3382）	Ipk			600		mA
Maximum Peak Current（PL3383）	Ipk			750		mA
Turn on LEB Time	T_leb			300		ns
Over Temperature Protection						
Protection Trigger Point	T_otp			150		℃
Power BJT（PL3381）						
Collector-Base Breakdown Voltage	Vcbo		700			V
Collector-Emitter Saturation Current	Icesat			500		mA
Power BJT（PL3382）						
Collector-Base Breakdown Voltage	Vcbo		700			V
Collector-Emitter Saturation Current	Icesat			750		mA
Power BJT（PL3383）						
Collector-Base Breakdown Voltage	Vcbo		700			V
Collector-Emitter Saturation Current	Icesat			1000		mA

7 Application



Typical Application

Application Notes

PL338x is a high precision non-isolated buck with constant voltage output. It integrates high voltage start-up circuit and power switch and can realize innovative CV control with less peripheral devices.

7.1 Startup & Operating Current

After powering on, PL338x charges VCC capacitor through C pin and starts up when VCC voltage reaches its operating voltage.

During normal operation, PL338x is powered by output voltage. Due to its low operating current and multi-mode operations, high efficiency can be realized, especially at light load.

7.2 Inductor Choice

Buck inductor is generally chosen at its worst operating condition, that is maximum input voltage and maximum output current. If it works at CCM mode and the ripple coefficient of inductor current is r (≥0.25), the inductance can be calculated by the equation:

$$L = \frac{V_{OUT}(\mathrm{V_{IN}} - \mathrm{V_{OUT}})}{V_{IN} * F * \Delta I_L}$$

Where,

$$\Delta I_L = I_{OUT} * r$$

7.3 Peak Current

If PL338x works at CCM mode, the peak current can be calculated by the equation:

$$I_{L\_peak} = I_{OUT} + \frac{\Delta I_L}{2}$$

7.4 Freewheeling Diode

Low forward voltage and fast recovery diode is recommended to increase efficiency. At the same time, its breakdown voltage should be payed more attention.

7.5 Dummy Load

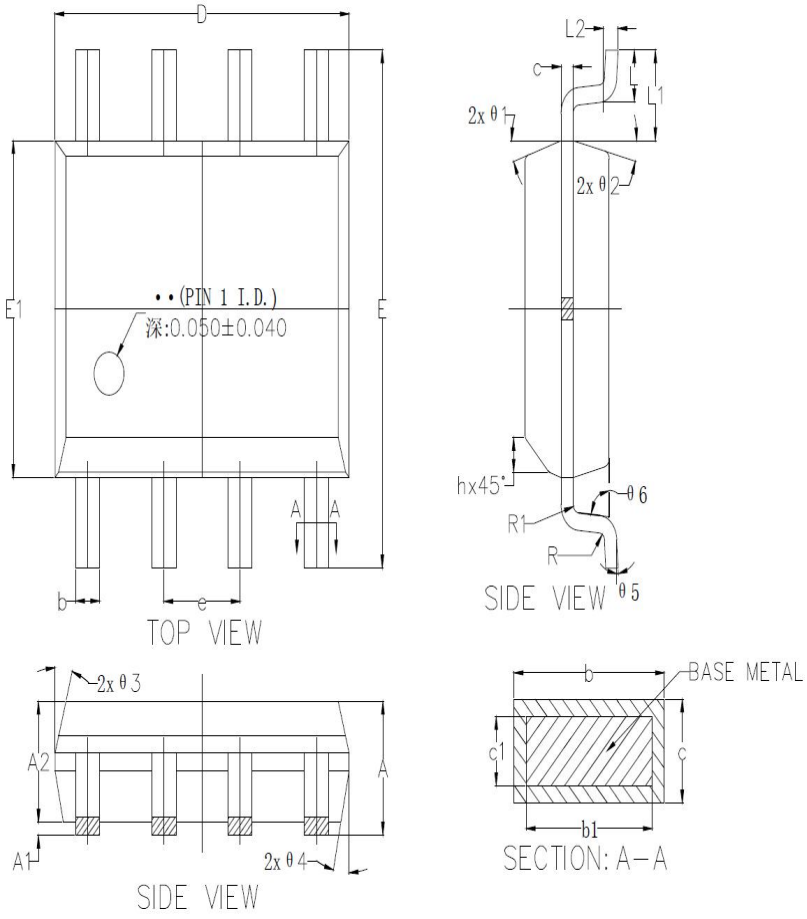
Dummy load is needed to avoid unstable output voltage. Proper dummy load can keep output voltage stable and standby power not too big.

7.6 Protections

Many protection functions are integrated in PL338x, including Cycle-by-Cycle peak current limiting, VCC UVP/OVP, load UVP/OVP and OTP.

8 Package Information

SOP8



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.40	1.55	1.70
A1	0.05	–	0.25
A2	1.30	1.40	1.50
b	0.37	–	0.47
b1	0.35	–	0.45
c	0.17	–	0.27
c1	0.15	–	0.25
D	4.80	4.90	5.00
E	5.85	–	6.15
E1	3.80	3.90	4.00
e		1.27 BSC	
L	0.57	–	0.87
L1	0.96	1.06	1.16
L2		0.25 BSC	
R	0.07	–	–
R1	0.07	–	–
h	0.25	0.35	0.45
θ1	15°	17°	19°
θ2	11°	13°	15°
θ3	15°	17°	19°
θ4	11°	13°	15°
θ5	0°	3°	6°
θ6	55°	–	85°
ϕ	0.40	0.50	0.60

9 Important Notice

POWERLINK reserves the right to make changes or corrections to its products at any time without notice. Customers should verify the datasheets are current and complete before placing orders.