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XL1410-TP

2A 380KHz 28V Buck DC to DC Converter

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Features

- Output Adjustable from 1.222V to 22V
- Maximum Duty Cycle 100%
- 2A Constant Output Current Capability
- EN pin with hysteresis function
- Built in thermal shutdown function
- Built in current limit function
- TTL shutdown capability
- package: SOP8

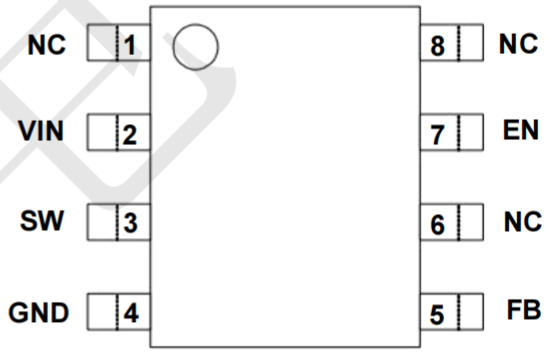
General Description

The is a 380KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 2A load with high efficiency, low ripple and excellent line and load regulation. Requiring a minimum number of external components, the regulator is simple to use and include internal frequency compensation and a fixed-frequency oscillator.

Applications

- Battery Chargers
- NICs / Switches / Hubs
- LCD TV
- DSL Modem
- Access Point Router
- Negative Voltage Power Supplies
- Set Top Box

Pinout (top view)



SOP8

Pin Configurations

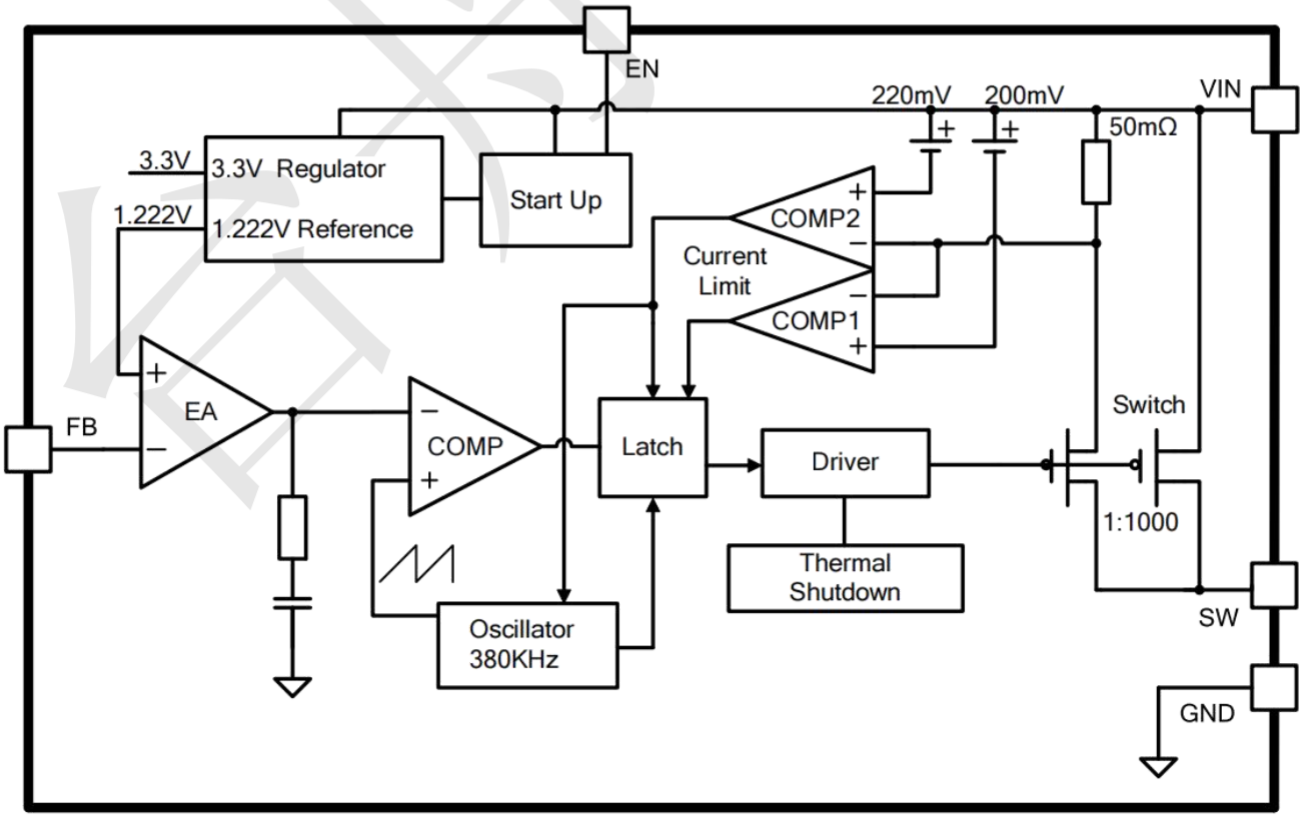
Pin Number	Pin Name	Pin Function
1	NC	No Connected.
2	VIN	Power Supply Input.
3	SW	Power Switch Output Pin (SW). Output is the switch node that
4	GND	ground pin.
5	FB	Feedback Pin (FB). Through an external resistor divider network.
6	NC	No Connected.
7	EN	Enable Pin. Drive EN pin low to turn off the device, drive it high to turn it on. Floating is default high.
8	NC	No Connected.

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input Voltage	Vin	-0.3 to 26	V
Feedback Pin Voltage	VFB	-0.3 to Vin	V
EN Pin Voltage	VEN	-0.3 to Vin	V
Output Switch Pin Voltage	VSW	-0.3 to Vin	V
Power Dissipation	PD	Internally limited	mW
(Junction to Ambient, No Heatsink, Free Air)	RJA	100	℃/W
Operating Junction Temperature	TJ	-10 to 85	℃
Storage Temperature	TSTG	-65 to 150	℃
Lead Temperature (Soldering, 10 sec)	TLEAD	260	℃
ESD (HBM)		2000	V

Note1: Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

BLOCK DIAGRAM



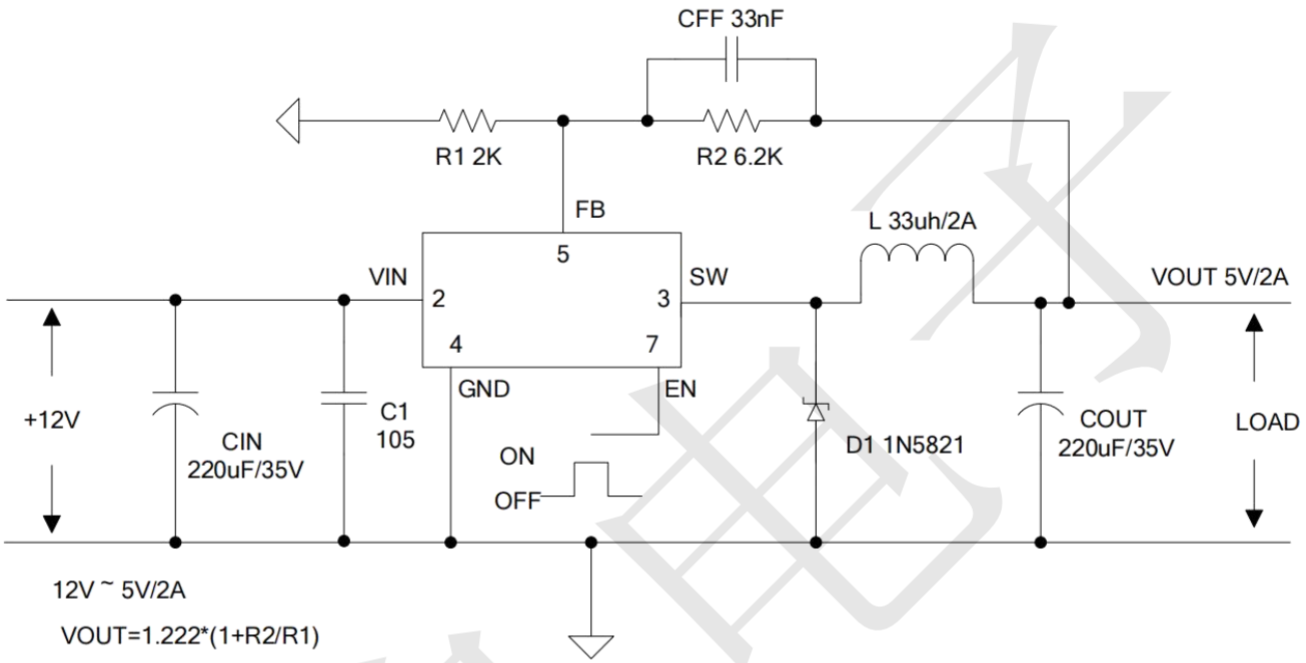
Electrical Characteristics

(Vin = 12V, GND=0V, Vin & GND parallel connect a 220uf/50V capacitor; Iout=500mA, Ta = 25℃; the others floating unless otherwise specified.)

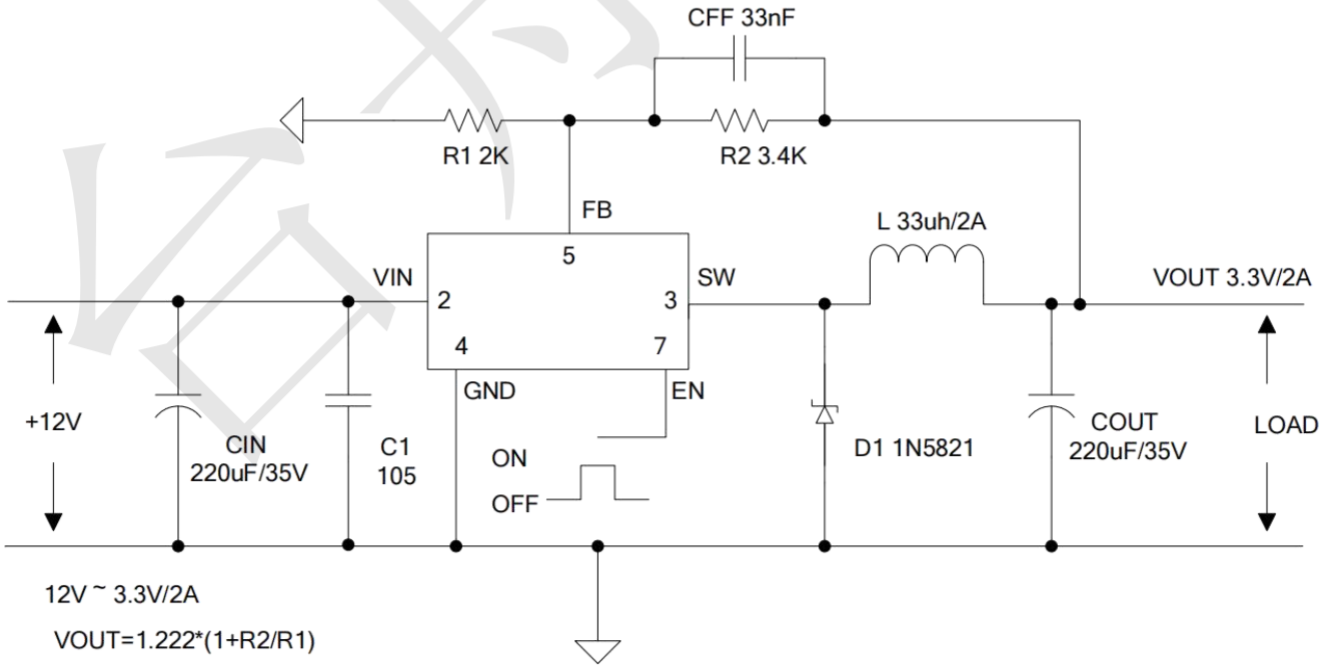
Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	Vin		3.6	--	25	V
Shutdown Supply Current	IS	VEN=0V	--	60	200	uA
Quiescent Supply Current	Iq	VEN =2V, VFB =Vin	--	3	5	mA
Oscillator Frequency	Fosc		323	380	437	Khz
Switch Current Limit	IL	VFB =0V	--	4	--	A
EN Pin Threshold	VEN	High (Regulator ON)	--	1.3	--	V
		Low (Regulator OFF)	--	0.6	--	V
EN Pin Input Leakage Current	IH	VEN =2V (ON)	--	1	15	uA
	IL	VEN =0V (OFF)	--	1	15	uA
Max. Duty Cycle	DMAX	VFB=0V	--	100	--	%
Feedback Voltage	VFB	Vin = 7V to 28V,Vout=5V, Iload=0.2A to 2A	1.186	1.222	1.258	V
Efficiency	η	Vin=12V,Vout=5V, Iout=2A	--	83	--	%

Note: Output switch tests are performed under pulsed conditions to minimize power dissipation.

Typical Application Circuit

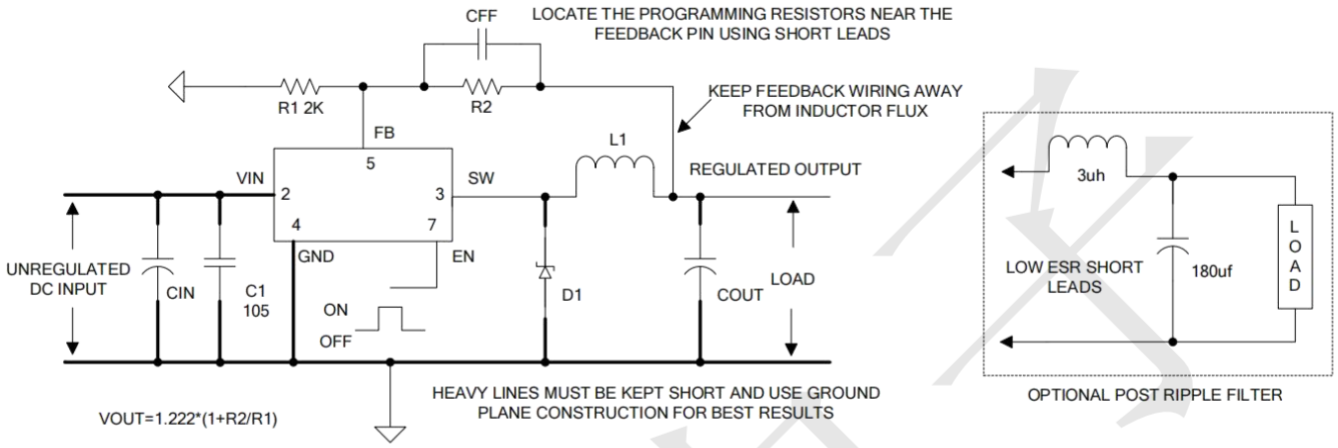


System Parameters Test Circuit (12V ~ 5V/2A)



System Parameters Test Circuit (12V ~ 3.3V/2A)

Test Circuit and Layout guidelines



Standard Test Circuits and Layout Guides

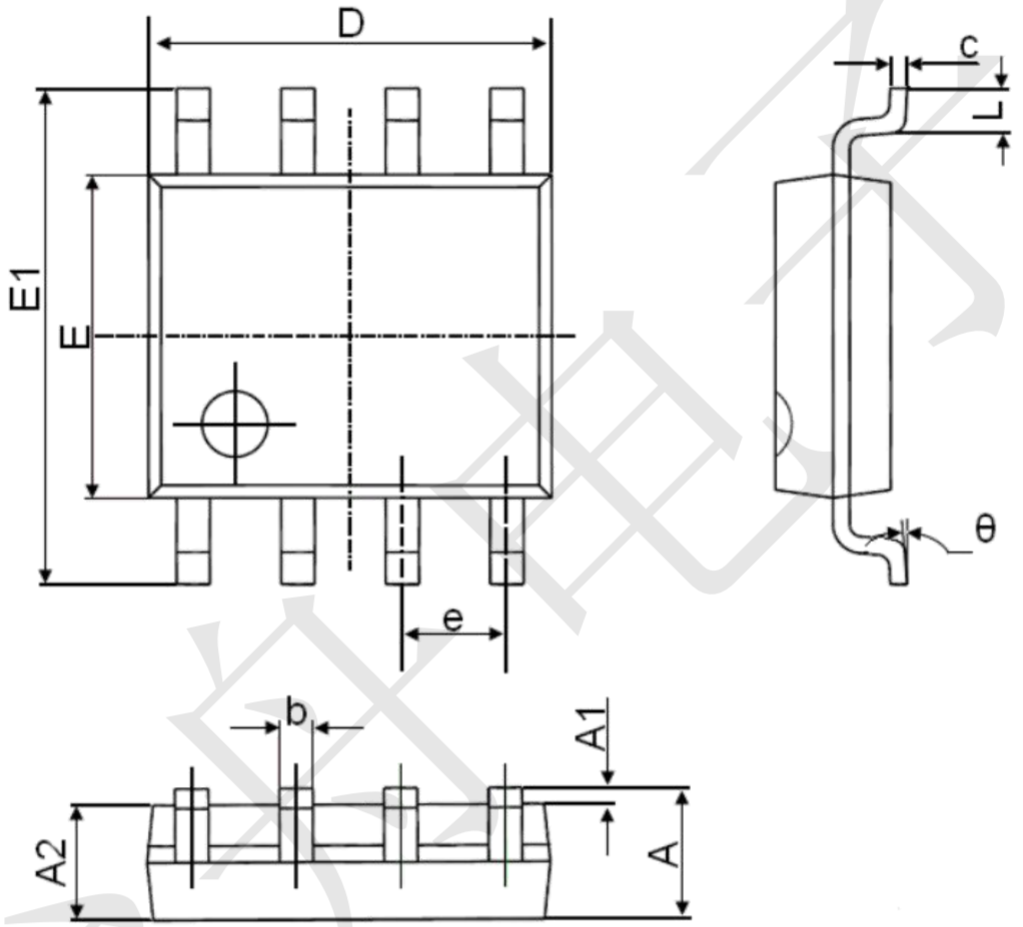
Select R1 to be approximately 2K, use a 1% resistor for best stability.
C1 and CFF are optional; in order to increase stability and reduce the input power line noise, C1 must be placed near to VIN and GND;
For output voltages greater than approximately 10V, an additional capacitor CFF is required. The compensation capacitor is typically between 100 pf and 33 nf, and is wired in parallel with the output voltage setting resistor, R2. It provides additional stability for high output voltage, low input-output voltages, and/or very low ESR output capacitors, such as solid tantalum capacitors.
CFF=1/(31*1000*R2); This capacitor type can be ceramic, plastic, silver mica, etc. (Because of the unstable characteristics of ceramic capacitors made with Z5U material, they are not recommended.)

Schottky Diode Selection Table

Current	Surface Mount	Through Hole	VR (The same as system maximum input voltage)				
			20V	**30V**	**40V**	**50V**	**60V**
1A		√	1N5817	1N5818	1N5819	--	--
3A		√	1N5820	1N5821	1N5822	--	--
		√	MBR320	MBR330	MBR340	MBR350	MBR360
	√		SK32	SK33	SK34	SK35	SK36
	√		--	30WQ03	30WQ04	30WQ05	--
		√	--	31DQ03	31DQ04	31DQ05	--
		√	SR302	SR303	SR304	SR305	SR306

Package Outline Dimensions (unit: mm)

SOP8



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°