

General Description

The TP8204HS6-B is a fully integrated, high efficiency 3.0A synchronous rectified step-down converter. The TP8204HS6-B operates at high efficiency over a wide output current load range.

This device offers two operation modes PWM control and PFM Mode switching control, which allows a high efficiency over the wider range of the load.

The TP8204HS6-B requires a minimum number of readily available standard external components and is available in a 6-pin

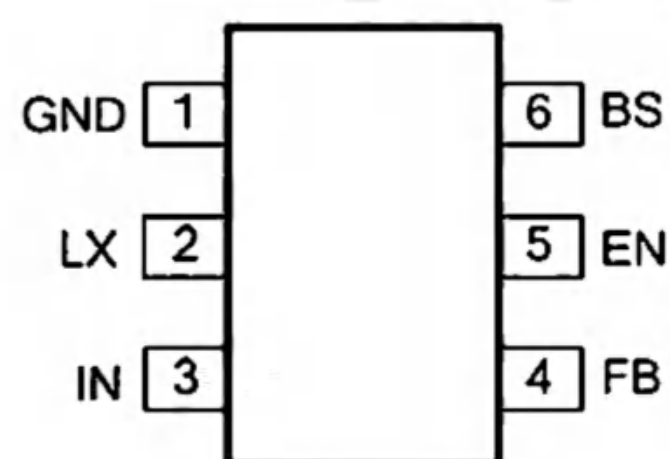
Applications

- Distributed Power Systems
- Digital Set Top Boxes
- Flat Panel Television and Monitors
- Wireless and DSL Modems
- Notebook Computer

Features

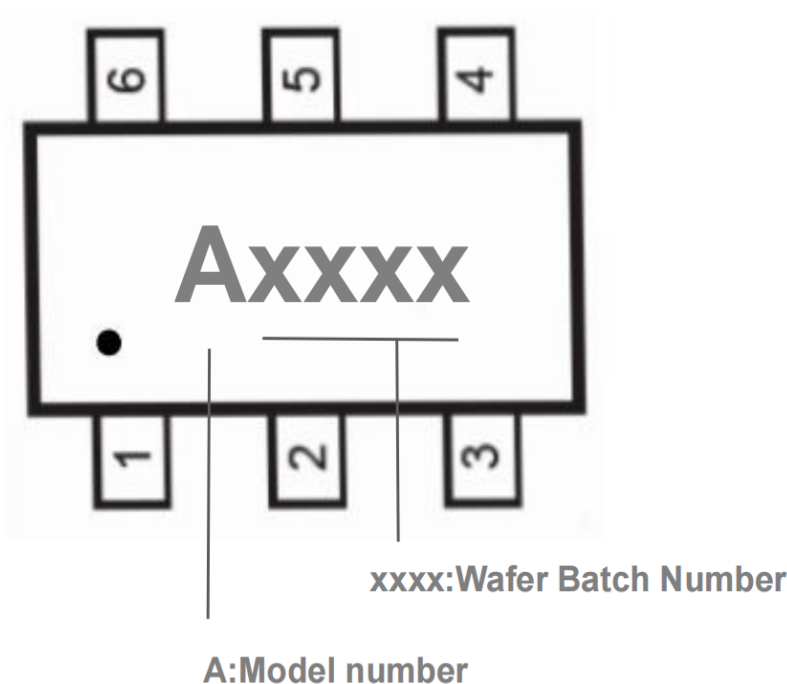
- High Efficiency: Up to 96%
- 500KHz Frequency Operation
- 3A Output Current
- No Schottky Diode Required
- 4.5V to 17V Input Voltage Range
- 0.8V Reference
- Slope Compensated Current Mode Control for Excellent Line and Load Transient Response
- Integrated internal compensation
- Stable with Low ESR Ceramic Output Capacitors
- Over Current Protection with Hiccup-Mode
- Thermal Shutdown
- Inrush Current Limit and Soft Start
- Available in SOT23-6 Package
- -40°C to +85°C Temperature Range

PIN CONFIGURATION



SOT23-6

Marking:



PIN	NAME	FUNCTION
1	GND	Ground
2	LX	Switching Pin
3	IN	Power supply Pin
4	FB	Adjustable version feedback input. Connect FB to the center point of the external resistor divider.
5	EN	Drive this pin to a logic-high to enable the IC. Drive to a logic-low to disable the IC and enter micro-power shutdown mode.
6	BS	Bootstrap. A capacitor connected between LX and BST pins is required to form a floating supply across the high-side switch driver.

TYPICAL APPLICATION

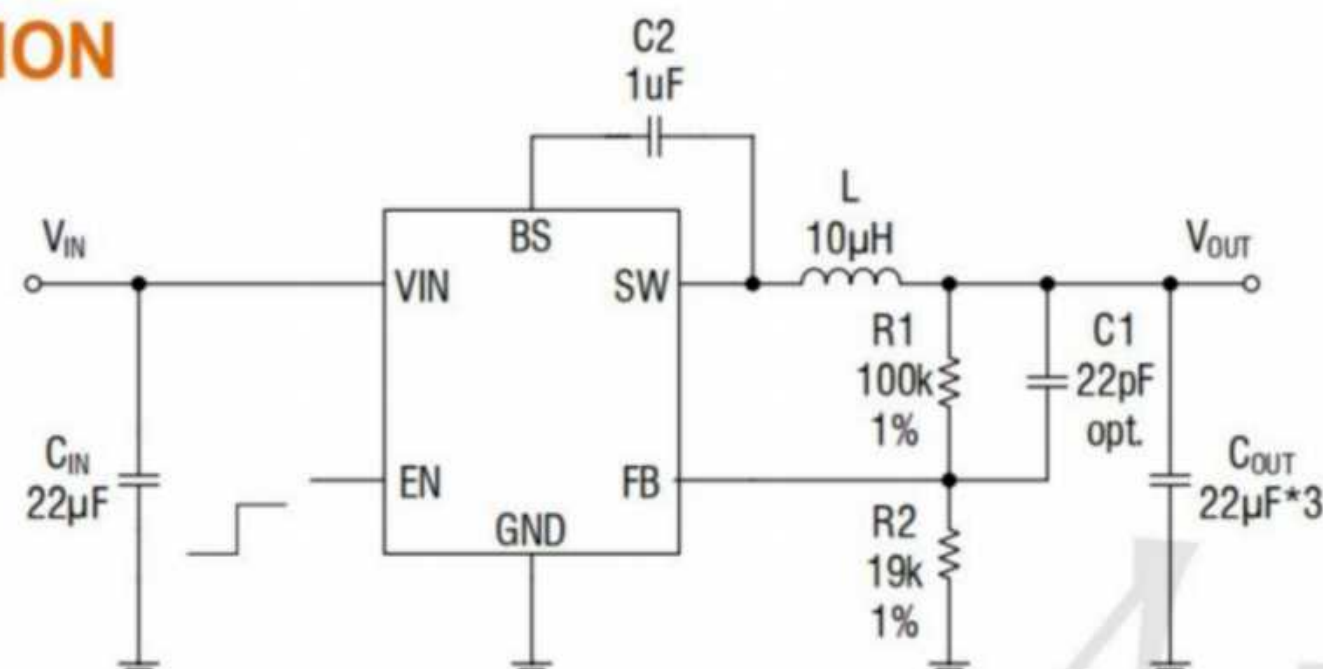


Figure 1. Basic Application Circuit

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Setting the Output Voltage

The external resistor divider is used to set the output voltage (see Typical Application on page 1). The feedback resistor R1 also sets the feedback loop bandwidth with the internal compensation capacitor. Choose R1 to be around 100kΩ for optimal transient response. R2 is then given by:

$$R2 = \frac{R1}{\frac{V_{OUT}}{V_{FB}} - 1}$$

Use a T-type network for when VOUT is low.

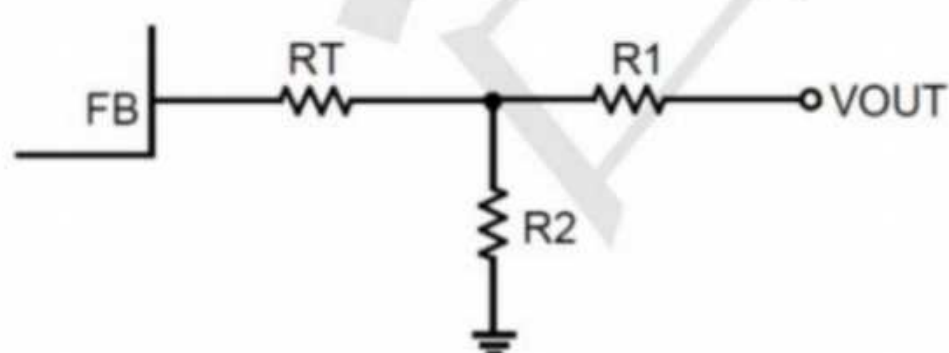


Figure 3: T-Type Network

Table 1 lists the recommended T-type resistors value for common output voltages.

V _{OUT}	R ₁	R ₂
1.2V	100kΩ	200kΩ
1.8V	100kΩ	78.7kΩ
2.5V	100kΩ	46.4kΩ
3.3V	100kΩ	31.6kΩ
5V	100kΩ	18.7kΩ

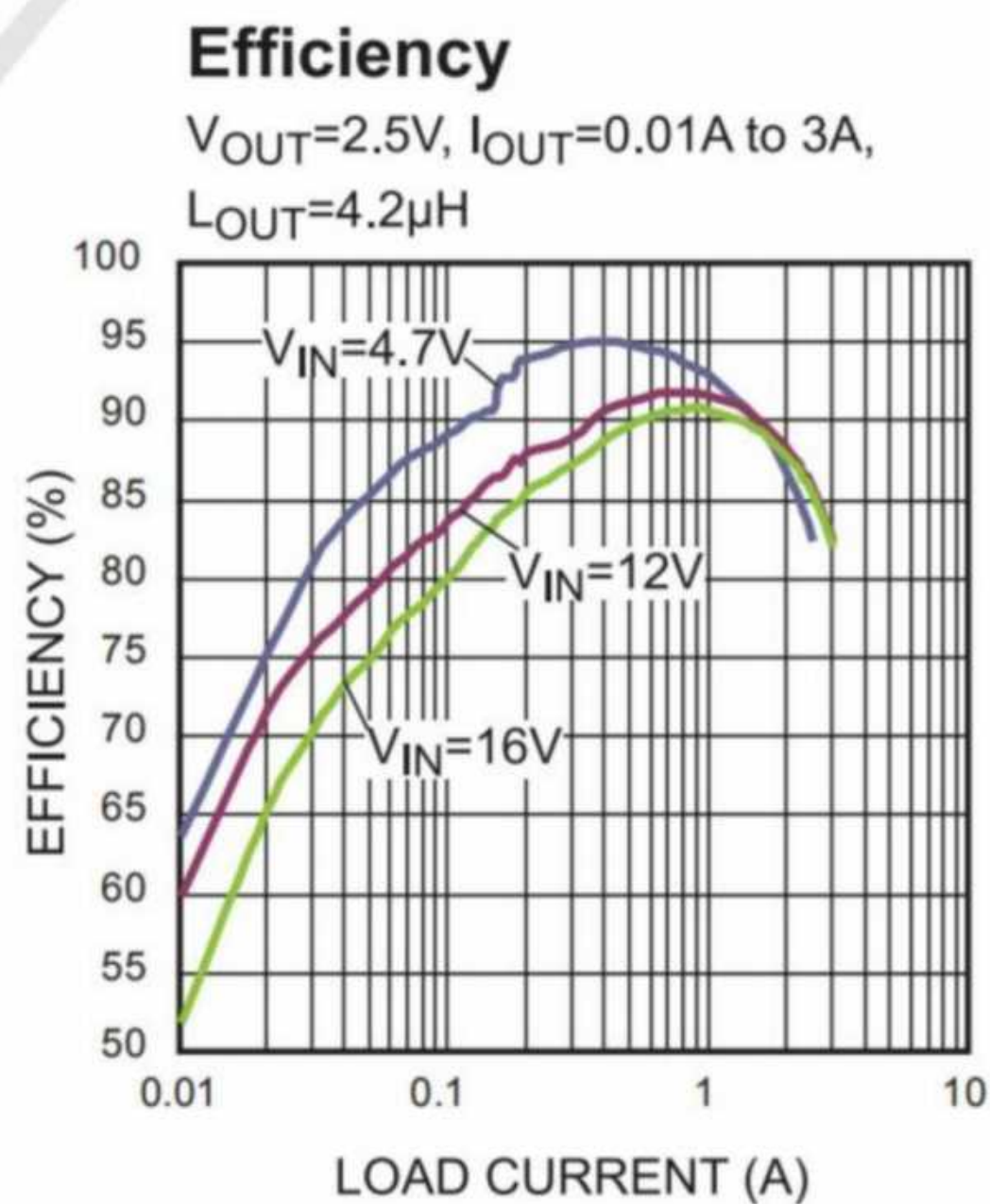
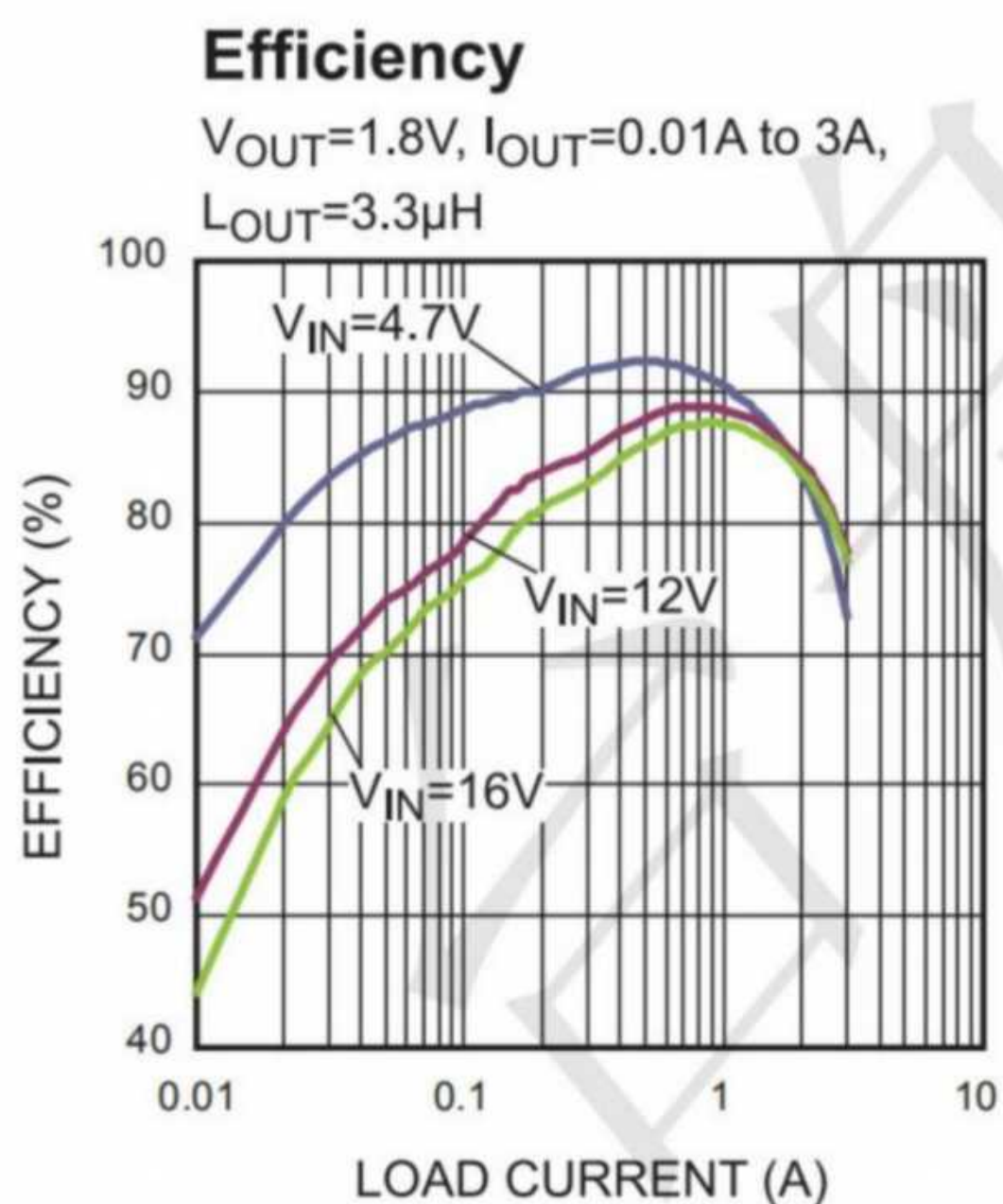
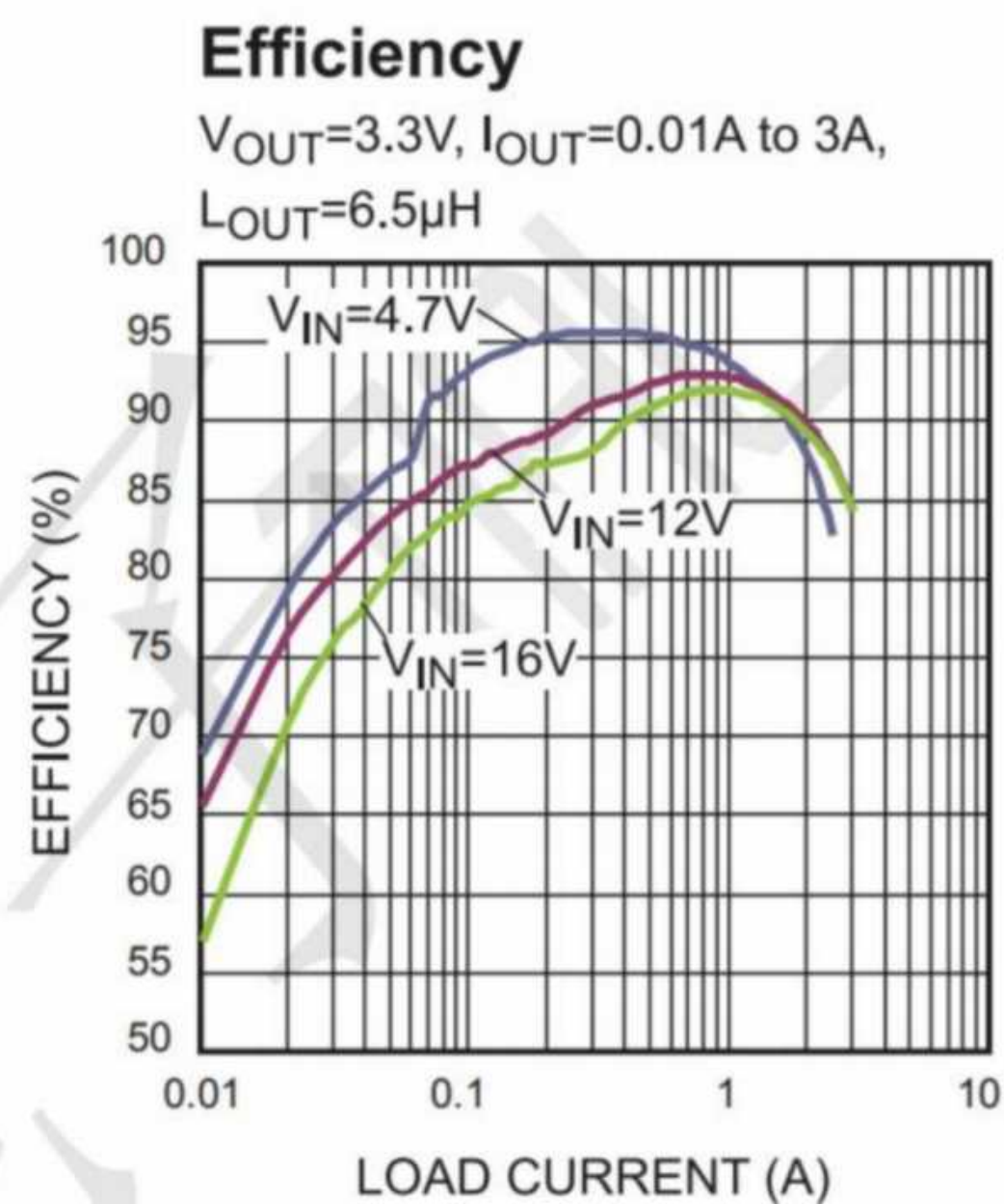
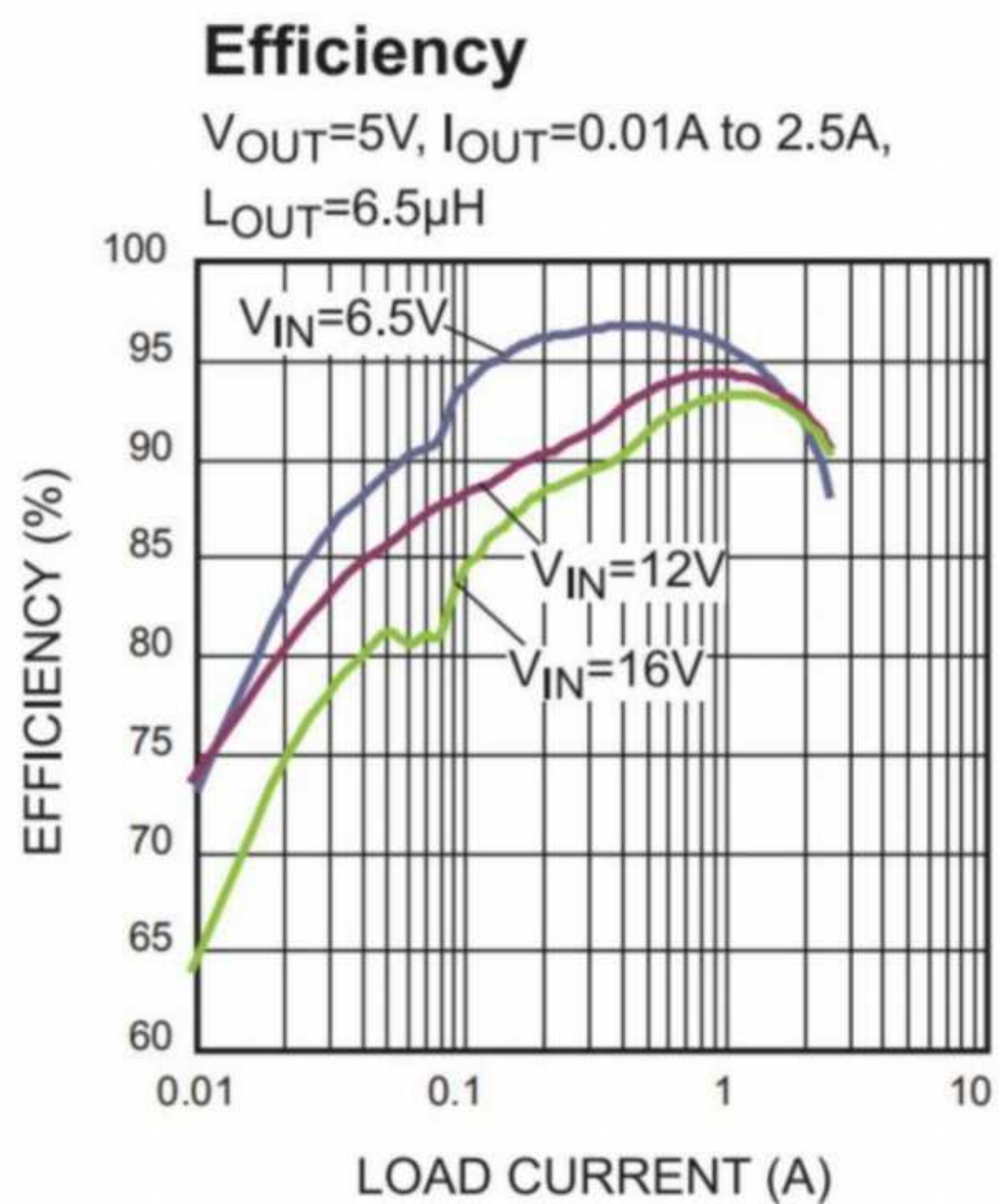
Absolute Maximum Rating ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Input Supply Voltage.....	-0.3V to 17V	Thermal Resistance θ_{JA}	170°C/W
EN Voltages.....	-0.3V to 6V	Junction Temperature(Note2).....	150°C
FB Voltages.....	-0.3V to 6V	Operating Temperature Range.....	-
SW Voltage.....	-0.3V to ($V_{IN}+0.5V$)	Lead Temperature(Soldering,10s).....	300°C
BS Voltage.....	($V_{SW}-0.3V$) to ($V_{SW}+5V$)	Storage Temperature Range.....	-65°C to 150°C
Power Dissipation.....	0.6W	ESD HBM(Human Body Mode).....	2kV
Thermal Resistance θ_{JC}	130°C/W	ESD MM(Machine Mode).....	200V

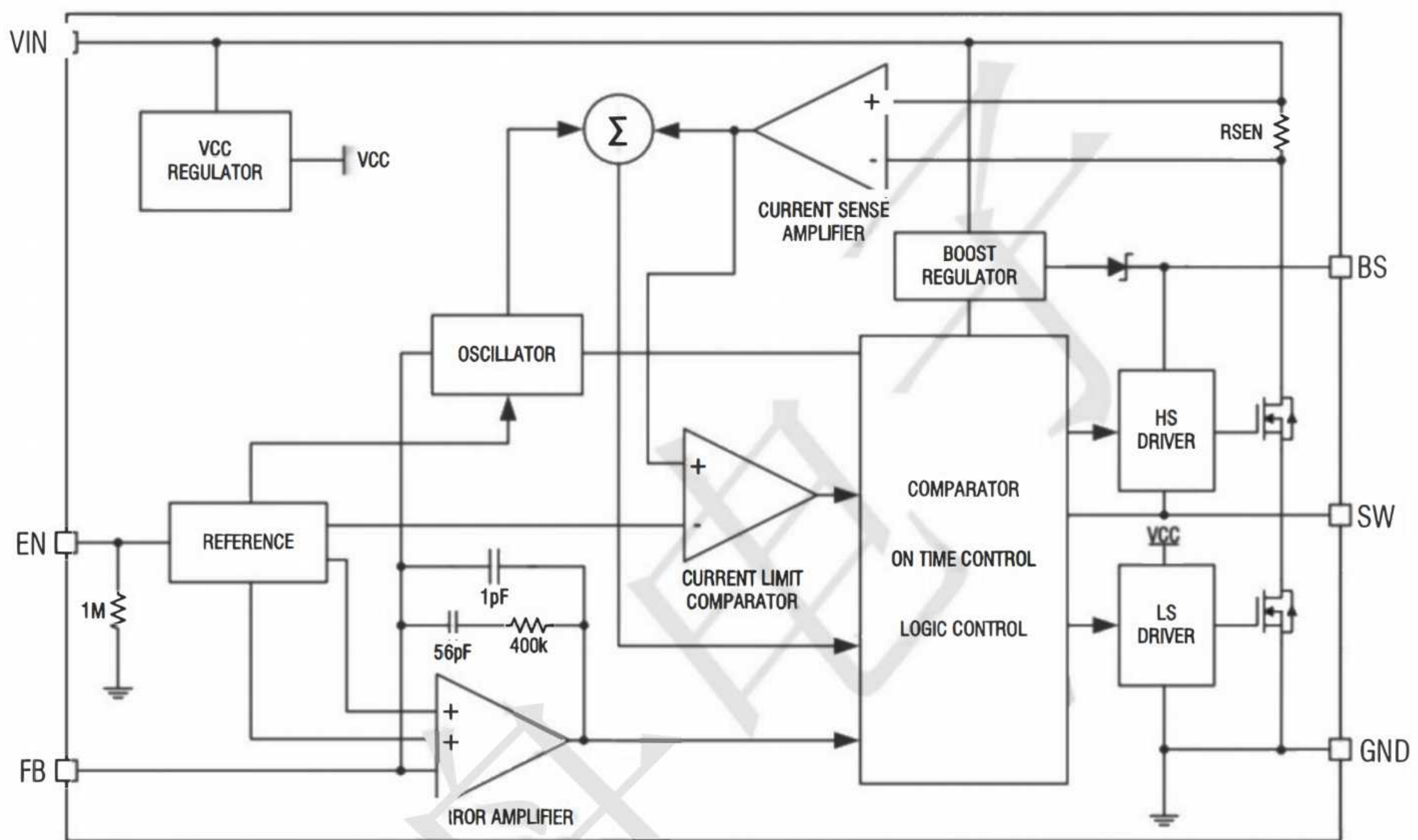
Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

($V_{IN}=12V$, $V_{OUT}=5V$, $T_A = 25^{\circ}\text{C}$, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage Range		4.5		17	V
Supply Current in Operation	$V_{EN}=3.0V$, $V_{FB}=2V$		0.6	0.8	mA
Supply Current in Shutdown	$V_{EN}=0$ or $EN = GND$		1		μA
Regulated Feedback Voltage	$T_A = 25^{\circ}\text{C}$, $4.5V \leq V_{IN} \leq 16V$	0.780	0.800	0.820	V
High-Side Switch On-Resistance			90		m Ω
Low-Side Switch On-Resistance			55		m Ω
High-Side Switch Leakage Current	$V_{EN}=0V$, $V_{SW}=0V$			1	μA
Low-Side Switch Leakage Current	$V_{EN}=0V$, $V_{SW}=12V$			1	μA
Upper Switch Current Limit	Minimum Duty Cycle		5		A
Oscillation Frequency		400	500	580	KHz
Maximum Duty Cycle	$V_{FB}=0.8V$		92		%
Minimum On-Time			60		nS
Soft-start Time	Tss		1		mS
Thermal Shutdown			180		$^{\circ}\text{C}$
EN High Level input Threshold		1.5	-	-	V
EN Low Level input Threshold		-	-	0.5	V



BLOCK DIAGRAM



Inductor Selection

A 1μH to 4.7μH inductor with a DC current rating of at least 25% percent higher than the maximum load current is recommended for most applications. For highest efficiency, the inductor DC resistance should be less than 15mΩ. For most designs, the inductance value can be derived from the following equation.

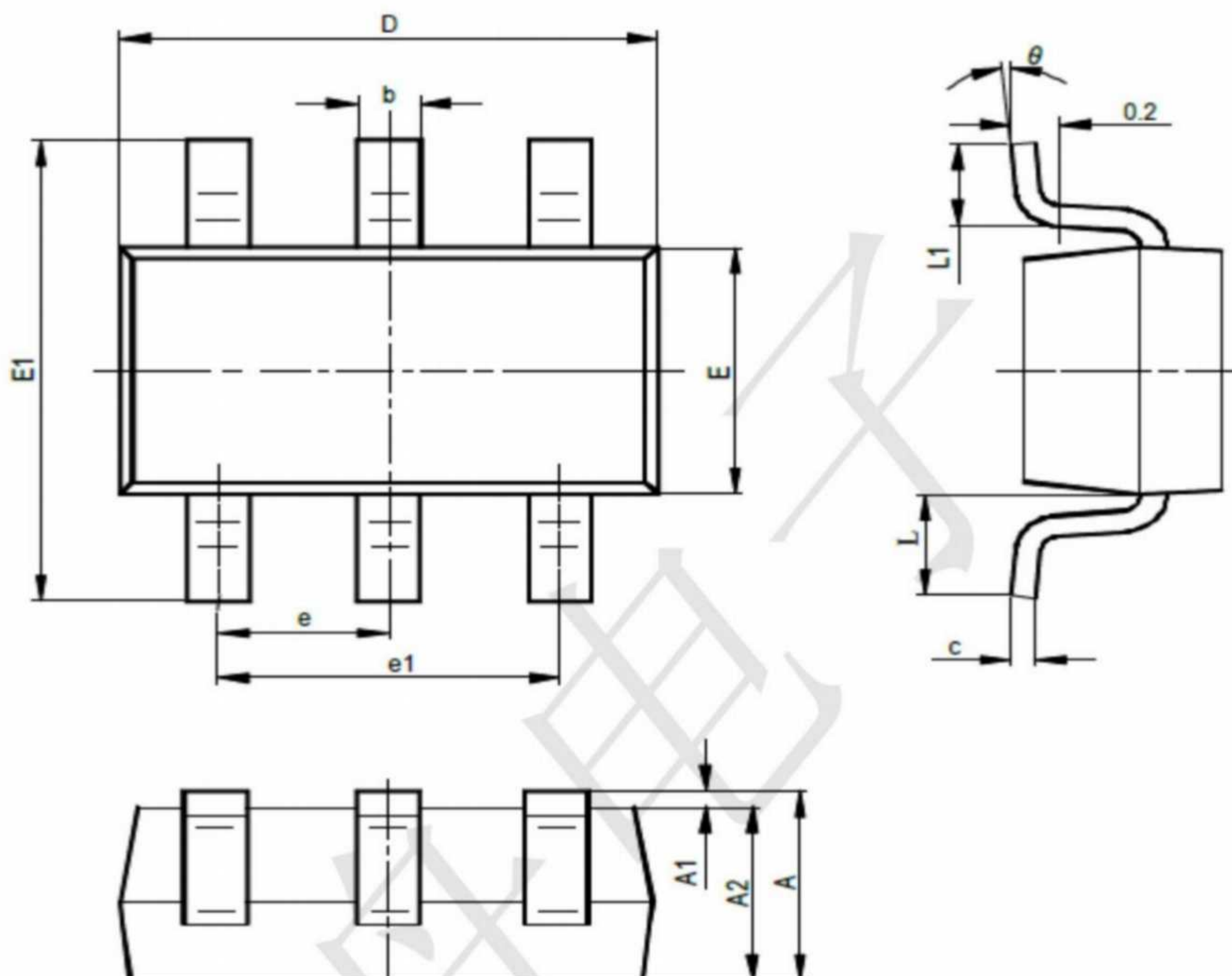
$$L = \frac{V_{out} \times (V_{in} - V_{out})}{V_{in} \times \Delta I_L \times f_{OSC}}$$

Where ΔI_L is the inductor ripple current. Choose inductor ripple current to be approximately 30% if the maximum load current, 2A. The maximum inductor peak current is:

$$I_{L(MAX)} = I_{LOAD} + \frac{\Delta I_L}{2}$$

Under light load conditions below 100mA, larger inductance is recommended for improved efficiency.

Package informantion
SOT23-6



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°