

Features

- Adjustable Output up to 12V
- Over Voltage Protection
- Shutdown Current: 0.1 μ A
- Over Temperature Protection
- Internal Fixed PWM frequency: 1.0MHz
- Internal 0.2 Ω , 2.5A, 16V Power MOSFET
- Precision Feedback Reference Voltage: 0.6V
- Adjustable Over Current Protection: 0.5A ~ 2.5A
- Compact package: SOT23-6

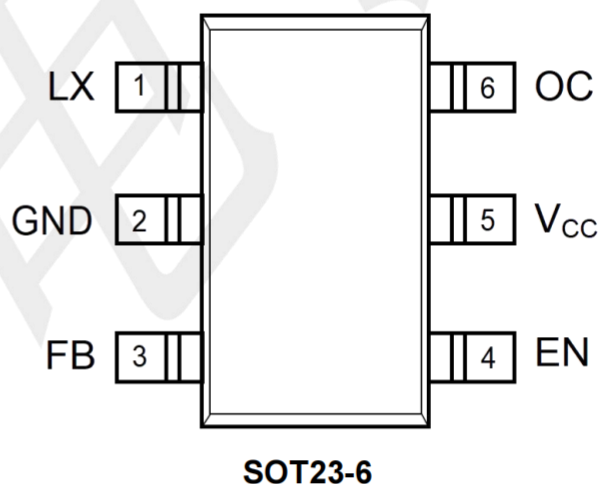
General Description

The is a current mode boost DC-DC converter. Its PWM circuitry with built-in 0.2 Ω power MOSFET make this regulator highly power efficient. The internal compensation network also minimizes as much as 6 external component counts. The non-inverting input of error amplifier connects to a 0.6V precision reference voltage and internal soft-start function can reduce the inrush current.

Applications

- Chargers
- LCD Displays
- Digital Cameras
- Handheld Devices
- Portable Products
- Medical equipment
- PDAs, Handheld PCs
- Internet Audio Players

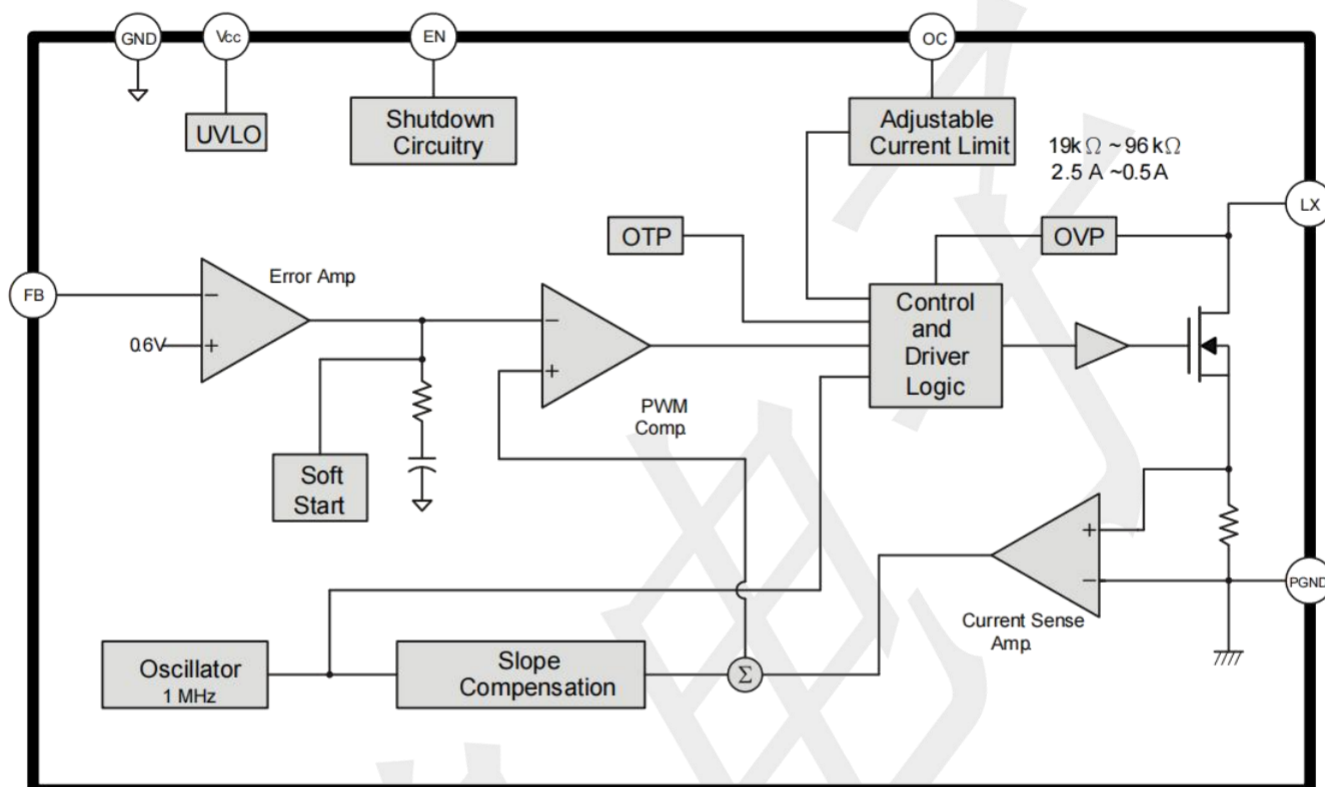
Pin Configurations (Top View)



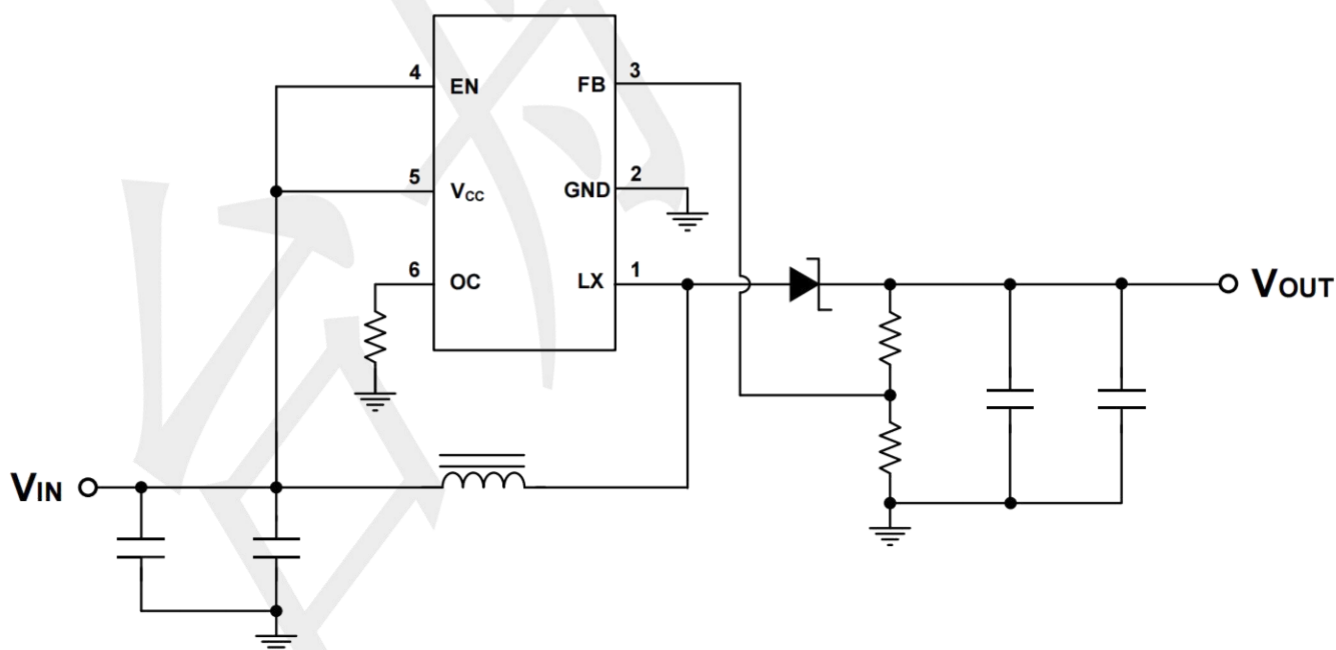
Pin Assignment

Pin Number	Pin Name	Pin Function
1	LX	Switch pin connected to the internal MOSFET switches and inductor terminal. Connect the inductor of the input to this pin.
2	GND	Analog ground pin.
3	FB	Feedback Voltage
4	EN	Enable Control (Active High)
5	VCC	IC Power Supply
6	OC	Adjustable Current Limit

BLOCK DIAGRAM



Typical Application Circuit



Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}		0	--	6	V
LX Voltage	V_{LX}		0	--	16	V
EN,FB Voltage			0	--	6	V
Power Dissipation	P_D	$T_A=25^{\circ}\text{C}$	--	--	455	mW
Thermal Resistance (Note1)	θ_{JA}		--	--	+220	$^{\circ}\text{C} / \text{W}$
Junction Temperature	T_J		--	--	+150	$^{\circ}\text{C}$
Operating Temperature	T_{OP}		-40	--	+85	$^{\circ}\text{C}$
Storage Temperature	T_{ST}		-65	--	+150	$^{\circ}\text{C}$
Lead Temperature		(soldering, 10 sec)	--	--	+260	$^{\circ}\text{C}$

Note1:

θ_{JA} is measured in the natural convection at $T_A=25^{\circ}\text{C}$ on a low effective thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

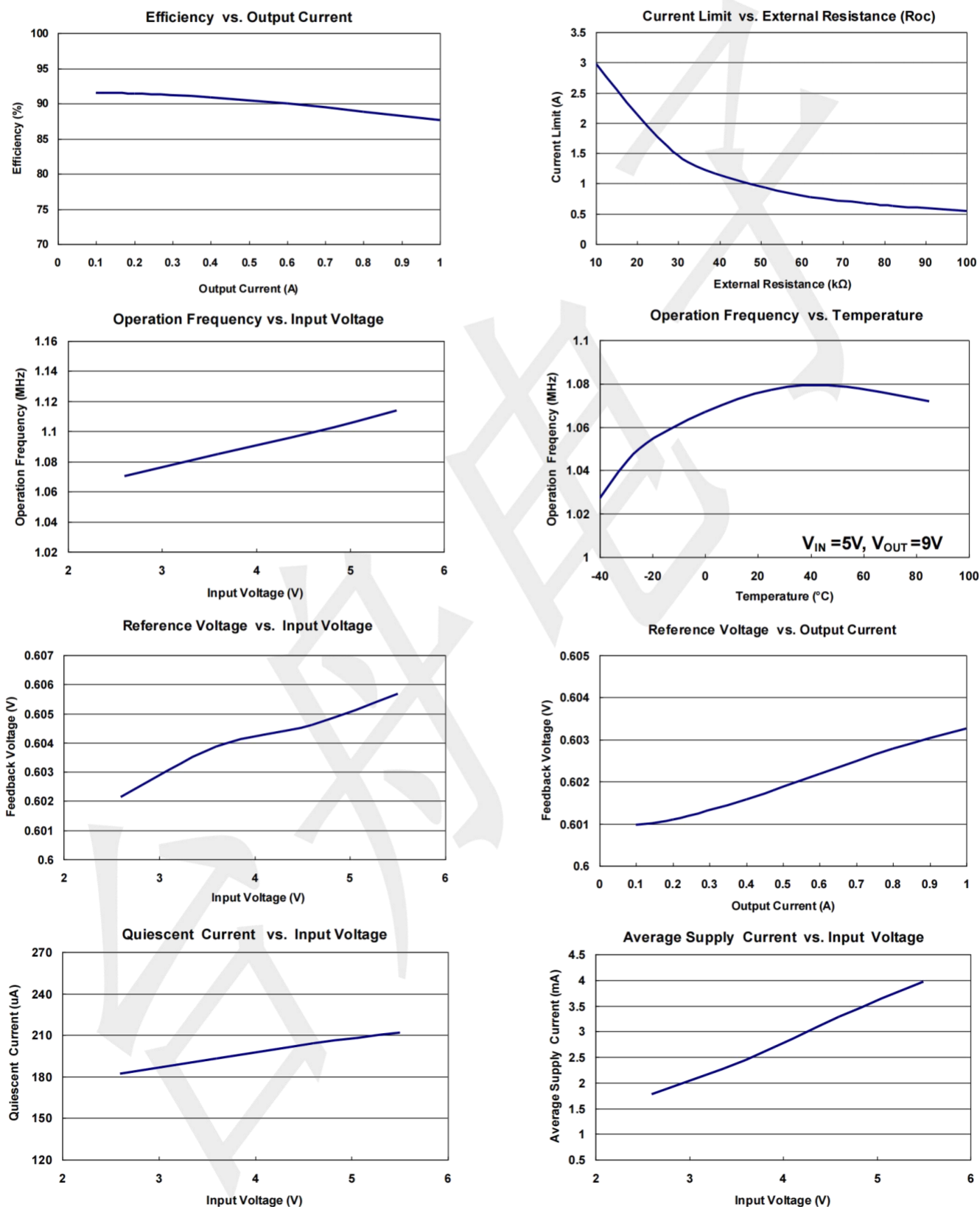
Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V_{IN}		2.6	--	6.0	V
Operating Temperature Range	T_A	Ambient Temperature	-40	--	+85	$^{\circ}\text{C}$

Electrical Characteristics (V_{CC}=3.3V, T_A=25°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
System Supply Input						
Input Supply Range	V _{CC}		2.6	--	6.0	V
Under Voltage Lockout	V _{UVLO}		--	2.2	--	V
UVLO Hysteresis			--	0.1	--	V
Quiescent Current	I _{CC}	V _{FB} =0.66V, No switching	--	0.19	--	mA
Average Supply Current	I _{CC}	V _{FB} =0.55V, Switching	--	2.20	--	mA
Shutdown Supply Current	I _{CC}	V _{EN} =GND	--	0.1	--	μA
Oscillator						
Operation Frequency	F _{OSC}	V _{FB} =1.0V	0.8	1.0	1.2	MHz
Frequency Change with Voltage	Δf / ΔV	V _{CC} =2.6V to 5.5V	--	5	--	%
Maximum Duty Cycle	T _{DUTY}		--	90	--	%
Reference Voltage						
Reference Voltage	V _{REF}		0.588	0.6	0.612	V
Line Regulation		V _{CC} =2.6V~5.5V	--	0.2	--	% / V
Enable Control						
Enable Voltage	V _{EN}		0.96	--	--	V
Shutdown Voltage	V _{EN}		--	--	0.6	V
MOSFET						
On Resistance of Driver	R _{DS (ON)}	I _{LX} =2A	--	0.2	--	Ω
Protection						
OCP Current	I _{OCP}		--	2.5	--	A
Adjustable OCP Current	I _{OCP}	External Resistor: 19k~96k	0.68	--	0.81	A
OTP Temperature	T _{OTP}		--	+150	--	°C

Typical Operating Characteristics ($V_{CC}=3.3V$, $V_{OUT}=5V$, $T_A=25^\circ C$, unless otherwise noted)



Function Description

Operation

The is a current mode boost converter. The constant switching frequency is 1MHz and operates with pulse width modulation (PWM). Build-in 16V / 2.5A MOSFET provides a high output voltage. The control loop architecture is peak current mode control; therefore slope compensation circuit is added to the current signal to allow stable operation for duty cycles larger than 50%.

Soft Start Function

Soft start circuitry is integrated into to avoid inrush current during power on. After the IC is enabled, the output of error amplifier is clamped by the internal soft-start function, which causes PWM pulse width increasing slowly and thus reducing input surge current.

Current Limit Program

A resistor between OC and GND pin programs peak switch current. The resistor value should be between 19k and 96k. The current limit will be set from 2.5A to 0.5A. Keep traces at this pin as short as possible. Do not put capacitance at this pin. To set the over current trip point according to the following equation:

$$I_{OCP} = \frac{48000}{R3}$$

Over Temperature Protection (OTP)

Will turn off the power MOSFET automatically when the internal junction temperature is over 150°C. The power MOSFET wake up when the junction temperature drops 30°C under the OTP threshold temperature.

Over Voltage Protection (OVP)

In some condition, the resistive divider may be unconnected, which will cause PWM signal to operate with maximum duty cycle and output voltage is boosted higher and higher. The power MOSFET will be turned off immediately, when the output voltage exceeds the OVP threshold level. The OVP threshold is 16V.

Application Information

Inductor Selection

Inductance value is decided based on different condition. 3.3μH to 4.7μH inductor value is recommended for general application circuit. There are three important inductor specifications, DC resistance, saturation current and core loss. Low DC resistance has better power efficiency. Also, it avoid inductor saturation which will cause circuit system unstable and lower core loss at 1 MHz.

Capacitor Selection

The output capacitor is required to maintain the DC voltage. Low ESR capacitors are preferred to reduce the output voltage ripple. Ceramic capacitor of X5R and X7R are recommended, which have low equivalent series resistance (ESR) and wider operation temperature range.

Diode Selection

Schottky diodes with fast recovery times and low forward voltages are recommended. Ensure the diode average and peak current rating exceed the average output current and peak inductor current. In addition, the diode's reverse breakdown voltage must exceed the output voltage.

Output Voltage Programming

The output voltage is set by a resistive voltage divider from the output voltage to FB. The output voltage is:

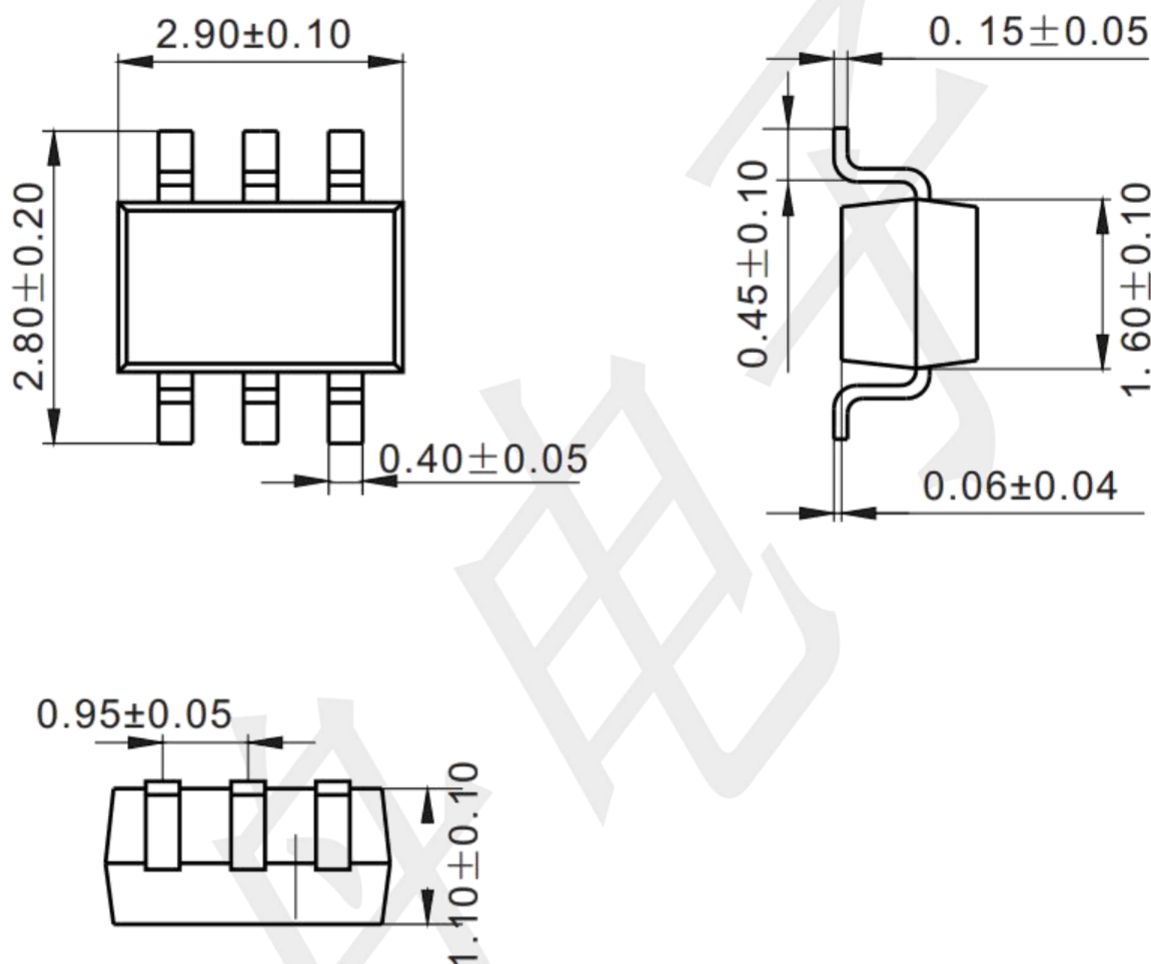
$$V_{OUT} = 0.6V \left(1 + \frac{R1}{R2} \right)$$

Layout Considerations

- 1.The power traces, consisting of the GND trace, the LX trace and the V_{CC} trace should be kept short, direct and wide.
- 2.LX、L and D switching node, wide and short trace to reduce EMI.
- 3.Place C_{IN} near V_{CC} pin as closely as possible to maintain input voltage steady and filter out the pulsing input current.
- 4.The resistive divider R1 and R2 must be connected to FB pin directly as closely as possible.
- 5.FB is a sensitive node. Please keep it away from switching node, LX.
- 6.The GND of the IC, C_{IN} and C_{OUT} should be connected close together directly to a ground plane.

Package information (Unit: mm)

SOT23-6



Mounting Pad Layout (unit: mm)

