Tiny Package, High Efficiency, Step-up DC/DC Converter

Features

- Input Voltage: 1.1V~5.5V
- Internal MOSFET with high switch current up to 3A
- 25μA Quiescent (Switch-off) Supply Current
- Shutdown Mode Supply Current: <5μA
- 90% Efficiency
- Up to 450KHz Switching Frequency
- Using Internal Power Switches
- SOT-23-6 Package

Applications

- PDA
- DSC
- LCD Panel
- RF-Tags
- MP3
- Portable Instrument
- Wireless Equipment

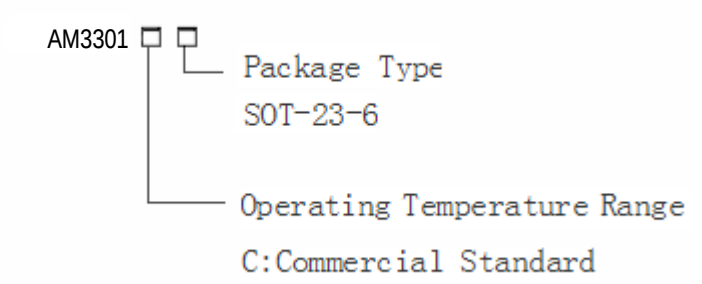
Description

The AM3301 is a compact, high efficiency, and low voltage step-up DC/DC converter including an error amplifier, ramp generator, comparator, switch pass element and driver in which providing a stable and high efficient operation over a wide range of load currents. It operates in stable waveforms without external compensation.

The low start-up input voltage below 1.1V. The high switching rate minimized the size of external components. Besides, the 25μA low quiescent current together with high efficiency maintains long battery lifetime.

The output voltage is set with two external resistors.

Ordering Information



Typical Application

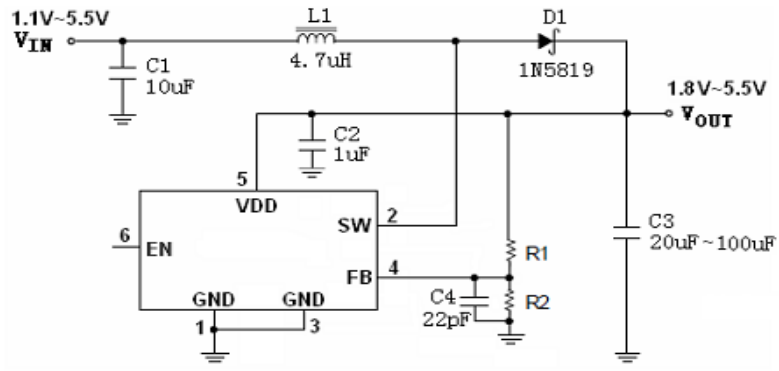
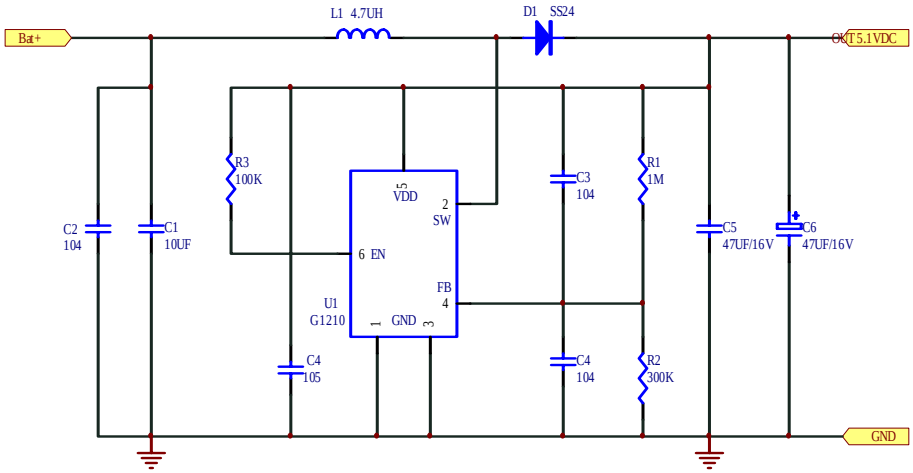


Figure 1 (1.1V Stat-up input Voltage)



Test Circuit

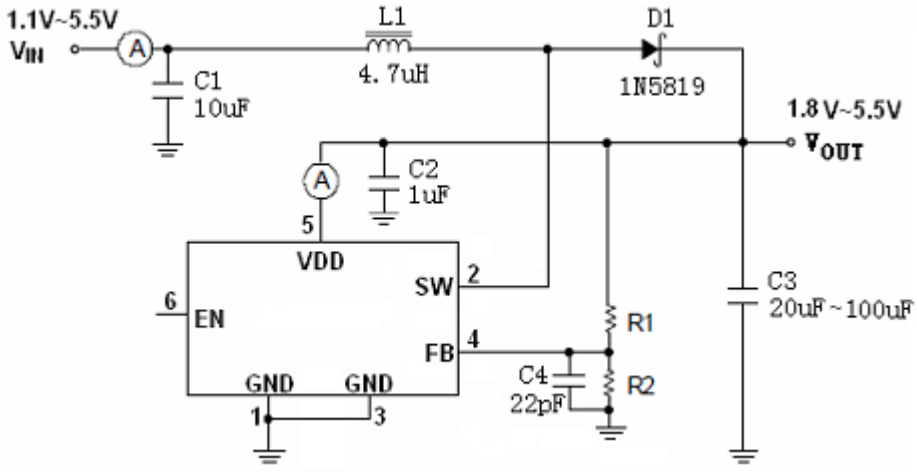
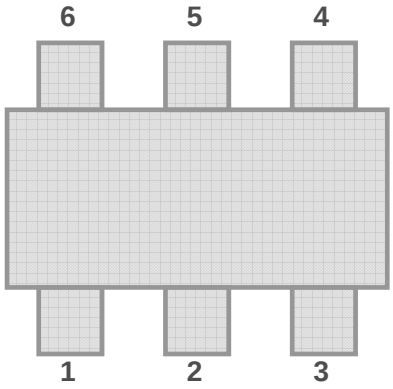


Figure.2 （1.1V Stat-up input Voltage）

Absolute Maximum Ratings

- Supply Voltage……..−0.3V to 6V
- SW Pin Switch Voltage……−0.3V to 6V
- Other I/O Pin Voltages……−0.3V to 6V
- SW Pin Switch Current ……3A
- Operating Junction Temperature……125℃
- Storage Temperature Range ……−65℃ ~ +150℃

Pin Assignment



PIN NUMBER SOT23-6	PIN NAME	FUNCTION
1/3	GND	Ground
2	SW	Switch Output
4	FB	Feedback
5	VDD	Output
6	EN	ON/OFF Control(High Enable)

Electrical Characteristics

(V_{IN} = 1.5V, VDD set to 3.3V, Load Current = 0A, TA = 25℃, unless otherwise specified)

Parameter	Test Conditions	Min	Typ	Max	Units
Start-UP Voltage	IL = 1mA	1.00			V
Operating VDD Range	VDD pin voltage	1.0		5.5	V
No Load Current I (V_{IN})	V_{IN} = 1.5V, V_{OUT} = 3.3V		75		μA
Feedback Reference Voltage	Close Loop, VDD = 3.3V	1.15	1.18	1.22	V
Switching Frequency	VDD = 3.3V		300		KHz
Maximum Duty	VDD = 3.3V		80		%
SW ON Resistance	VDD = 3.3V		0.07		Ω
Current Limit Setting	VDD = 3.3V		3		A
Line Regulation	V_{IN} = 1.5 ~ 2.5V, IL = 100mA		25		mV/V
Load Regulation	V_{IN} = 2.5V, IL = 1 ~ 300mA		0.05		mV/mA
En Input High		1			V
En Input Low				0.6	V
Temperature Stability for V_{OUT}			50		ppm/℃
Thermal Shutdown			165		℃
Thermal Shutdown Hysterics			10		℃
Maximum V_{RM}			145		mV

Pin Information

GND (Pin 1/3): Signal and Power Ground. Provide a short direct PCB path between GND and the (–) side of the output capacitor(s).

SW (Pin 2): Switch Pin. Connect inductor between SW and V_{IN}. Keep these PCB trace lengths as short and wide as possible to reduce EMI and voltage overshoot.

FB (Pin 4): Feedback Input to the g_m Error Amplifier. Connect resistor divider tap to this pin. The output voltage can be adjusted from 3.3V to 20V by: $V_{OUT} = 1.18V \bullet [1 + (R1/R2)]$

VDD (Pin 5): Input positive power pin.

EN (Pin 6): En Control Input. Forcing this pin above 1V enables the part. Forcing this pin below 0.6V shuts down the device. In shutdown, all functions are disabled, drawing <1μA supply current. Do not leave EN floating.

Application Information

Output Voltage Setting

Referring to Typical Application Circuits, the output voltage of the switching regulator (V_{OUT}) can be set with Equation (1).

$$V_{OUT} = \left(1 + \frac{R1}{R2}\right) \times 1.212\ V \quad (1)$$

Current-limiting Resistance Setting

$$RM = \frac{0.145}{I_{MAX\text{-}switch}}$$

Feedback Loop Design

Referring to the Typical Application Circuits. The selection of R1 and R2 based on the trade-off between quiescent current consumption and interference immunity is stated below:

- l Follow Equation (1)
- l Higher R reduces the quiescent current (Path current = 1.212V/R2), however resistors beyond 5MW are not Recommended.

For applications without standby or suspend modes, lower values of R1 and R2 are preferred. For applications concerning the current consumption in standby or suspend modes, the higher values of R1 and R2 are needed. Such high impedance feedback loop is sensitive to any interference ,which requires careful PCB layout
and avoid any interference, especially to FB pin. To improve the system stability, a proper value capacitor between FB pin and GND pin is suggested. An empirical suggestion is around 20pF.

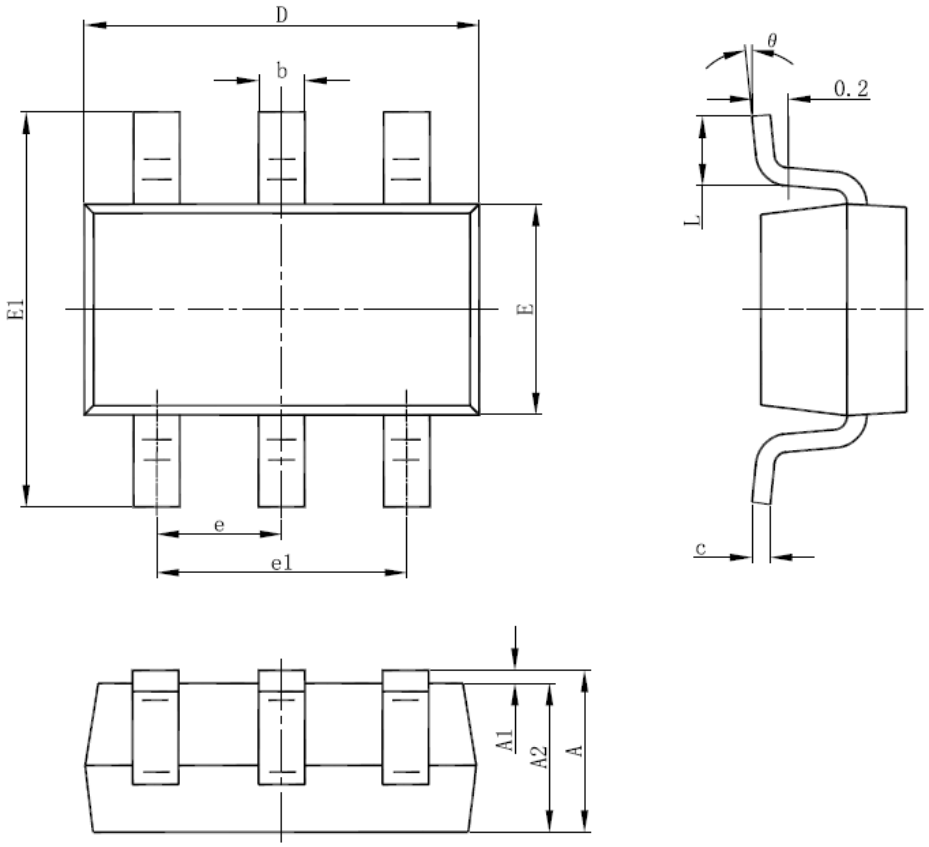
PCB Layout Guide

PCB Layout shall follow these guidelines for better system stability:

- A full GND plane without any gap break.
- VDD to GND bypass Cap – The 1μF MLCC noise bypass Cap pin 4 shall have short and wide connections.
- V_{IN} to GND bypass Cap – Add a Cap close to the inductor when V_{IN} is not an idea voltage source.
- Minimize the FB node copper area and keep it far away from noise sources.

Packaging Information

SOT-23-6 Package Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In 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	0.500	0.012	0.020
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	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°