DESCRIPTION

The A7466 is a monolithic, step-down, switch mode converter with a built-in power MOSFET. It achieves a 0.5A peak-output current over a wide input supply range with excellent load and line regulation. Current-mode operation provides a fast transient response and eases loop stabilization. Fault condition protections include cycle-by-cycle current limiting and thermal shutdown.

The A7466 requires a minimal number of readily-available external components.

The A7466 is available in SOT-26 package.

ORDERING INFORMATION

Package Type	Part Number	
SOT-26 SPQ: 3,000pcs/Reel	E6	A7466E6R
		A7466E6VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

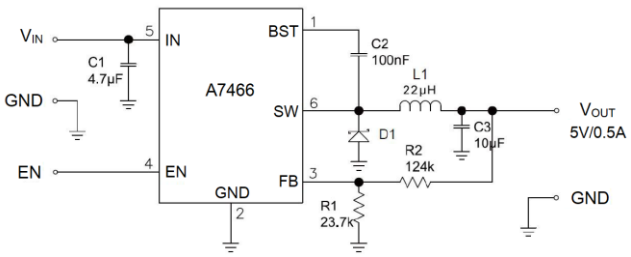
FEATURES

- 0.5A Peak Output Current
- Wide 4.5 ~ 60V Operating Input Range
- 1Ω Internal Power MOSFET
- Stable with Low-ESR Ceramic Output Capacitors
- Up to 90% Efficiency
- 0.1μA Shutdown Mode type
- Fixed 480kHz Frequency
- Thermal Shutdown
- Cycle-by-Cycle Over-Current Protection
- Available in SOT-26 package

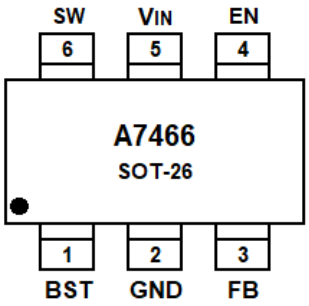
APPLICATION

- Smart Meters
- Distributed Power Systems
- Battery Chargers
- Pre-Regulator for Linear Regulators
- WLED Drivers

TYPICAL APPLICATION



PIN DESCRIPTION



Top View

Pin #	Symbol	Function
1	BST	Bootstrap. Connect a capacitor between the SW and BS pins to form a floating supply across the power switch driver. This capacitor drives the power switch's gate above the supply voltage.
2	GND	Ground. Voltage reference for the regulated output voltage. Requires special layout considerations. Isolate this node from the D1 to C1 ground path to prevent switching current spikes from inducing.
3	FB	Feedback. Sets the output voltage. Connect to the tap of an external resistor divider from the output to GND. The frequency foldback comparator lowers the oscillator frequency when the FB voltage is below 250mV to prevent current-limit runaway during a short-circuit fault.
4	EN	On/Off. Pull EN above 1.4V to turn the device ON. For automatic enable, connect to V_{IN} using a 100kΩ resistor.
5	IN	Supply Voltage. The A7466 operates from a 4.5 ~ 60V unregulated input. Requires C1 to prevent large voltage spikes from appearing at the input.
6	SW	Switch Output.

ABSOLUTE MAXIMUM RATINGS

V_{IN}, Supply voltage		-0.3V ~ 62V
V_{SW}		-0.3V ~ V_{IN}+0.3V
V_{BS}		V_{SW} +6.0V
All other pins		-0.3V ~ 6.0V
Continuous Power Dissipation (T_A=+25°C)	SOT-26	0.568W
Junction Temperature		150°C
Lead Temperature		260°C
Storage Temperature		-65°C ~150°C

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Conditions	Range	Unit
Supply Voltage	V_{IN}		4.5 ~ 60	V
Operating Junction Temp			-40°C ~125°C	°C

THERMAL RESISTANCE

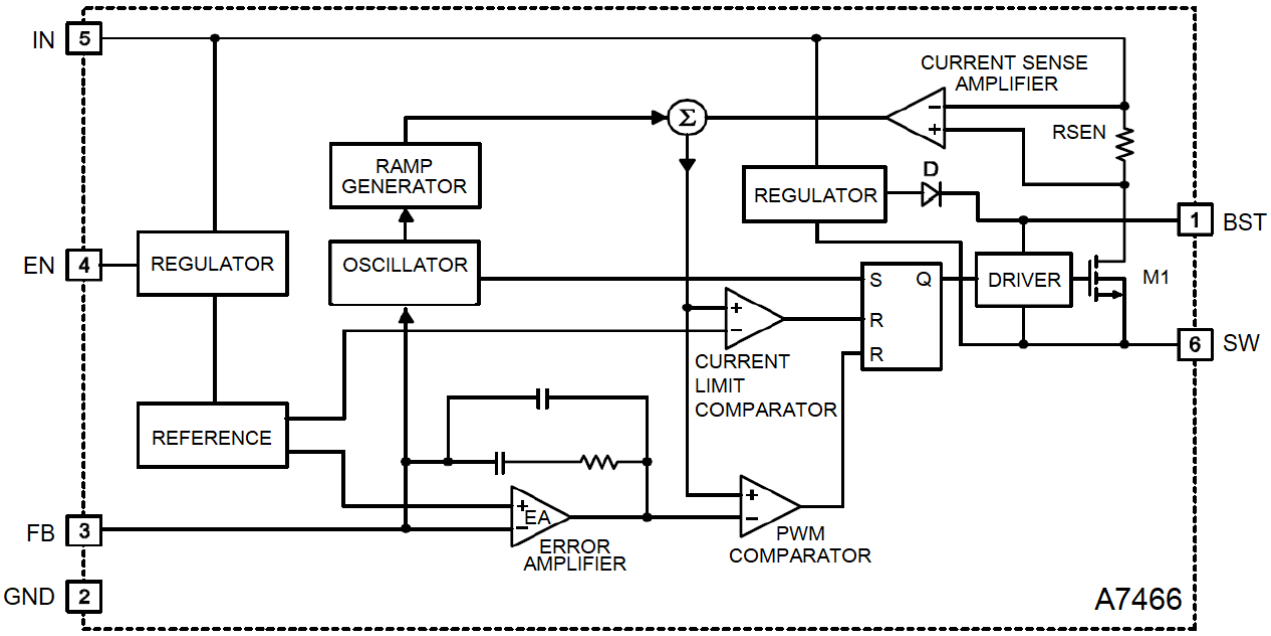
Package	θ_{JA}	θ_{JC}	Unit
SOT-26	220	110	°C/W

ELECTRICAL CHARACTERISTICS

V_{IN} = 12V, T_A = +25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Feedback Voltage	V_{FB}	4.5≤V_{IN}≤60V	0.792	0.812	0.832	V
Feedback Current	I_{FB}	V_{FB}=0.85V	-	-	0.1	μA
Switch-On Resistance	$R_{DS(ON)}$		-	1	-	Ω
Switch Leakage	I_{SW_LKG}	V_{EN}=0V, V_{SW}=0V	-	-	1	μA
Current Limit	I_{LIM}		-	1.5	-	A
Oscillator Frequency	f_{SW}	V_{FB}=0.6V	380	480	580	kHz
Foldback Frequency	f_{SW_F}	V_{FB}=0V	-	150	-	kHz
Under-Voltage Lockout Threshold, Rising	V_{UVLO_R}		2.9	3.3	3.73	V
Under-Voltage Lockout Threshold, Falling	V_{UVLO_F}		2.65	3.05	3.45	V
EN Threshold, Rising	V_{EN_R}		-	1.35	-	V
EN Threshold, Falling	V_{EN_F}		-	1	-	V
EN Input Current	I_{EN}	V_{EN}=2V	-	3.1	-	μA
		V_{EN}=0V	-	0.1	-	
Supply Current (Shutdown)	I_S	V_{EN}=0V	-	0.1	1.0	μA
Supply Current (Quiescent)	I_Q	V_{EN}=2V, V_{FB}=1V	-	0.73	0.85	mA
Thermal Shutdown	T_{SD}		-	165	-	°C

BLOCK DIAGRAM



DETAILED INFORMATION

Working Principle and Application

A7466 is a current mode step-down switching voltage stabilizing circuit with 480 kHz oscillation frequency and internal integration of high-voltage power MOSFET. The output of the internal error amplifier is proportional to the peak inductive current. The feedback signal is compared with the internal reference voltage of 0.812V to stabilize the output voltage. It has a wide input voltage range, accurate current limits, very low static working current suitable for battery powered applications.

APPLICATION INFORMATION

Setting Output Voltage.

The external resistor divider sets the output voltage (see the Typical Application).Table 1 lists resistors for common output voltages. The feedback resistor (R1) also sets the feedback loop bandwidth with the internal compensation capacitor.

R2 is: $V_{FB}=V_{OUT}*R1/(R1+R2)$

Table 1 Resistor Selection for Common Output Voltages

V_{OUT} (V)	R2(kΩ)	R1(kΩ)
1.8	80.6 (1%)	64.9 (1%)
2.5	49.9 (1%)	23.7 (1%)
3.3	49.9 (1%)	16.2 (1%)
5.0	49.9 (1%)	9.53 (1%)

Selecting the Inductor

The inductance is used to provide a continuous current to the output load when the switching voltage is input. In general, the inductance is chosen for the inductance rating to be 30% greater than the maximum load current. At the same time, make the peak current less than the maximum switching current, under the maximum peak inductance will not be saturated.

Selecting the Input Capacitor

The input capacitor reduces the surge current drawn from the input supply and the switching noise from the device. The input capacitor impedance at the switching frequency should be less than the input source impedance to prevent high-frequency-switching current from passing through the input. Use ceramic capacitors with X5R or X7R dielectrics for their low ESRs and small temperature coefficients. For most applications, a 4.7μF capacitor will sufficient.

Selecting the Output Capacitor

The output capacitor keeps the output voltage ripple small and ensures feedback loop stability. The output capacitor impedance should be low at the switching frequency. Use ceramic capacitors with X5R or X7R dielectrics for their low ESR characteristics. For most applications, a 22μF ceramic capacitor will sufficient.

TYPICAL APPLICATION

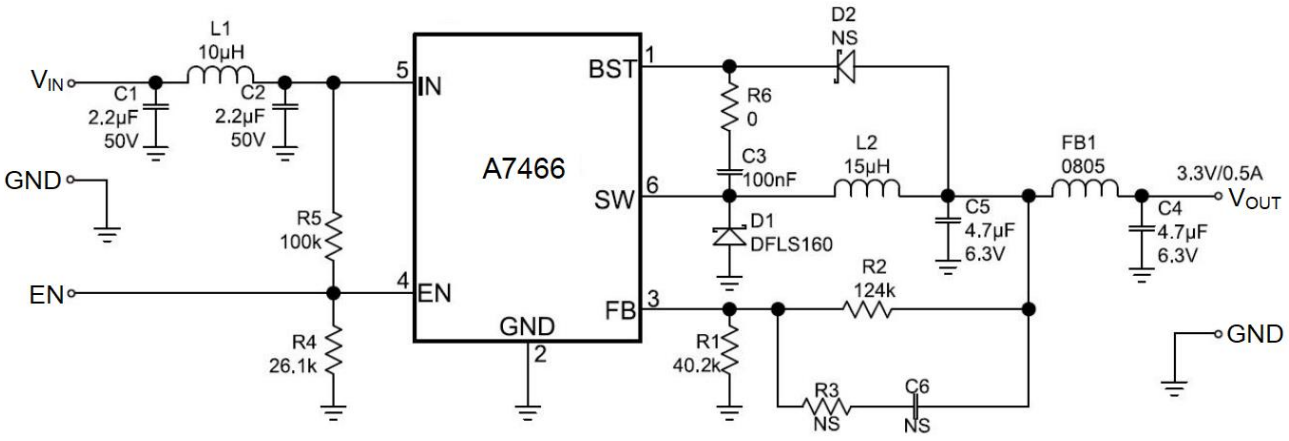


Fig. 1 3.3V Output Application Diagram

In the application case of Fig.1, it is divided into two modes of common use and ripple suppression. The element marked NS can theoretically be disconnected from the circuit, and it will not affect the output accuracy of V_{OUT}. This application is similar to the application in page 1 Typical Application.

The ripple suppression type refers to the application that has ripple requirements for V_{OUT}. It is recommended to add NS components. The specific component indicators can be adjusted according to actual needs.

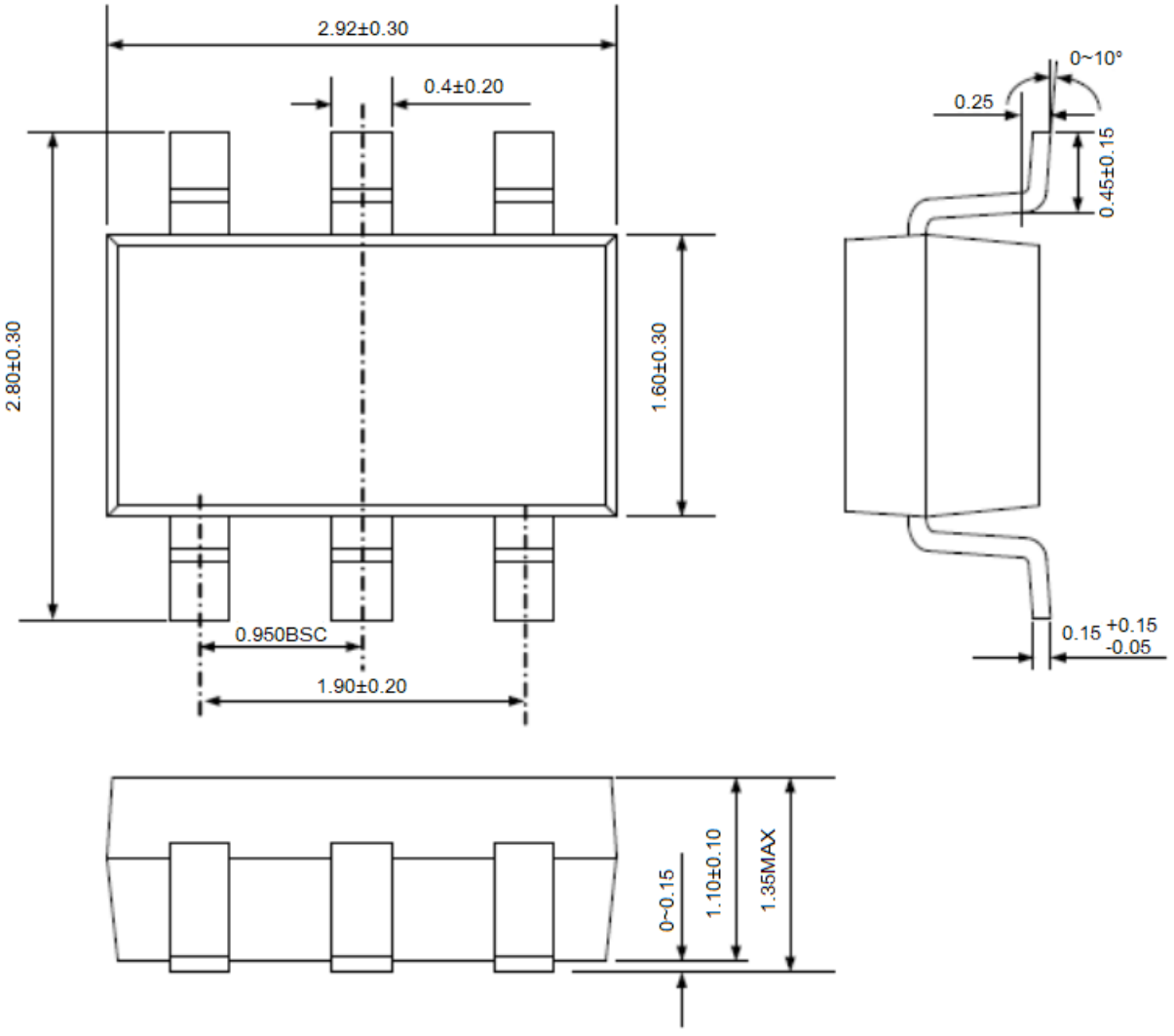
PCB Layout Guide

PCB layout is very important to stability. Please follow these guidelines.

1) Keep the path of switching current short and minimize the loop area formed by the input capacitor, high-side MOSFET, and schottky diode.
2) Keep the connection from the power ground→schottky diode→SW pin as short and wide as possible.
3) Ensure all feedback connections are short and direct. Place the feedback resistors and compensation components as close to the chip as possible.
4) Route SW away from sensitive analog areas such as FB.
5) Connect IN, SW, and especially GND to large copper areas to cool the chip for improved thermal performance and long-term reliability. For single layer PCBs, avoid soldering the exposed pad.

PACKAGE INFORMATION

Dimension in SOT-26 Package (Unit: mm)



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