Inv № 675

8482K 2A, 18V Synchronous Rectified Step-Down Converter

February 2015

DESCRIPTION

The 8482K is a monolithic synchronous buck regulator. The device integrates two 130mΩ MOSFETs, and provides 2A of continuous load current over a wide input voltage of 4.75V to 18V. Current mode control provides fast transient response and cycle-by-cycle current limit.

An adjustable soft-start prevents inrush current at turn-on, and in shutdown mode the supply current drops to 1μA.

FEATURES

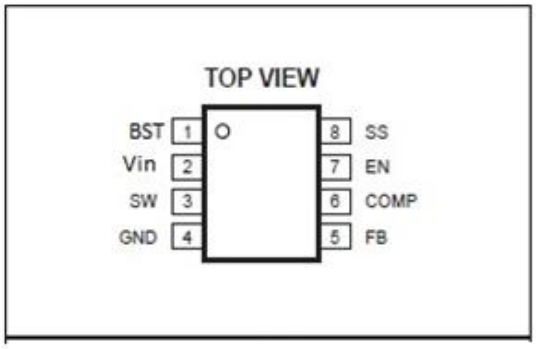
- 2A Output Current
- Wide 4.75V to 18V Operating Input Range
- Integrated 130 mOhm Power MOSFET Switches
- Output Adjustable from 0.923V to 15V
- Up to 93% Efficiency
- Programmable Soft-Start
- Stable with Low ESR Ceramic Output Capacitors
- Fixed 340kHz Frequency
- Cycle-by-Cycle Over Current Protection
- Input Under Voltage Lockout
- 8-Pin SOIC

APPLICATIONS

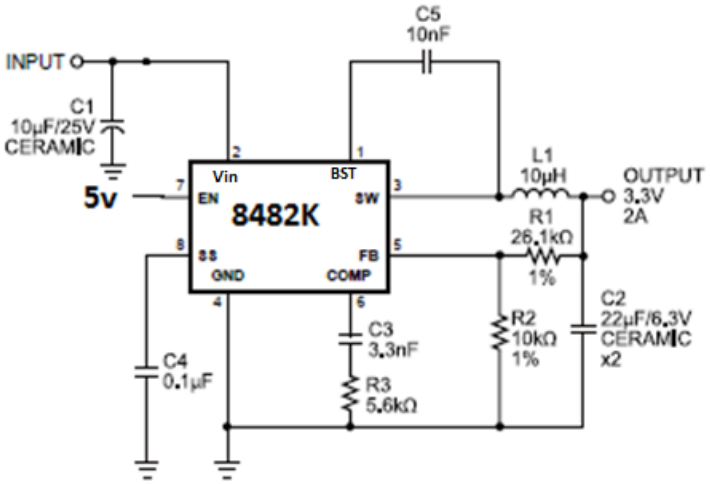
- Networking Systems
- Distributed Power Systems
- FPGA,DSP,ASIC Power Supplies
- Green Electronics/Appliances
- Notebook Computers

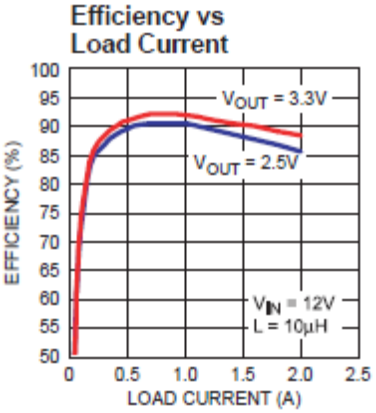
PIN CONFIGURATION

SOIC-8



TYPICAL APPLICATION





PACKAGE

SOIC-8

1pin=BST, 2pin=Vin, 3pin=SW, 4pin=GND, 5pin=FB, 6pin=COMP, 7pin=EN, 8pin=SS.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage Vin .....-0.3V to +20V
Switch Node Voltage SW 21V
Boost Voltage BST .....V_{SW} – 0.3V to V_{SW} + 6V
All Other Pins.....-0.3V to +6V
Junction Temperature.....150°C
Continuous Power Dissipation (T_A = +25°C) SOIC-8……1.38W

Recommended Operating Conditions

Input Voltage V_{IN} .....4.75V to 18V
Output Voltage V_{OUT}.....0,923V to 15V
Operating Junction Temperature (TJ).....-40°C to +125°C
Thermal Resistance SOIC-8.....θ_{JA} =90°C/W, θ_{JC} =45°C/W

ELECTRICAL CHARACTERISTICS Vin=12V, T_A=+25°C, unless otherwise noted.

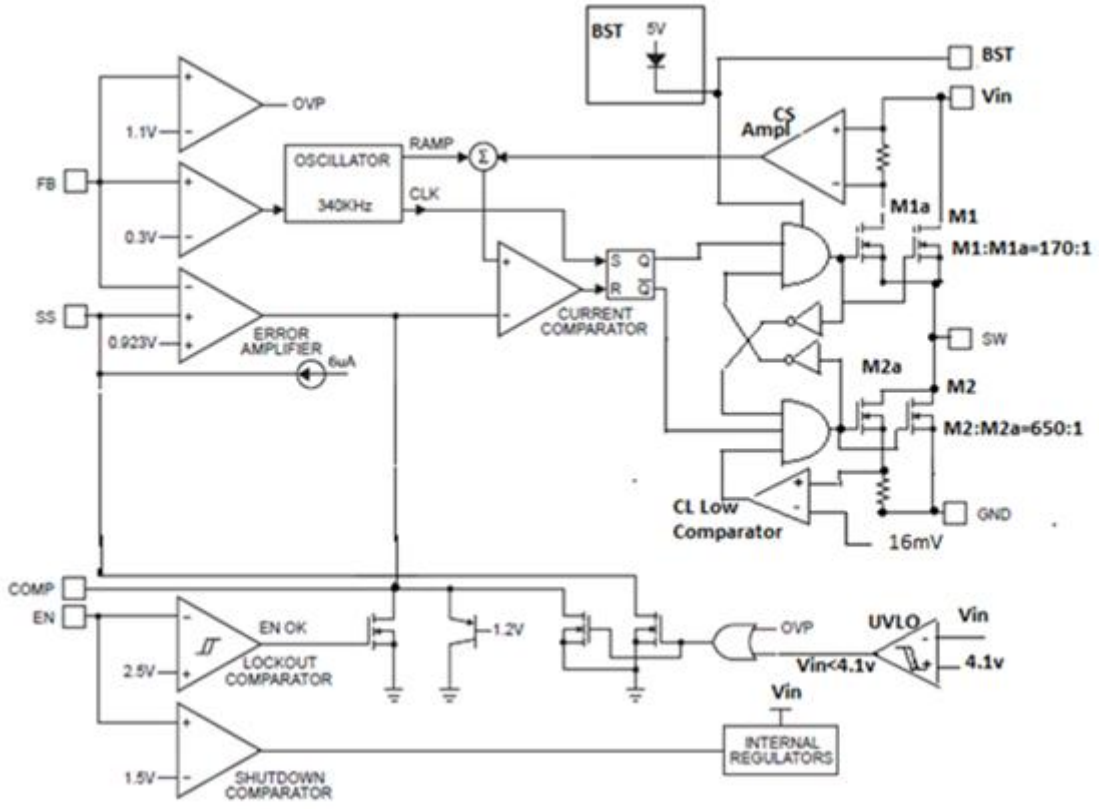
Parameter	Symbol	Condition	Min	Typ	Max	Units
Shutdown Supply Current	Isd	V_{EN} = 0V		1	3	µA
Supply Current	I_Q	V_{EN} = 2.0V V_{FB}=1.0V		1.7	2.2	mA
Feedback Voltage	Vfb	4.75V ≤ V_{IN} ≤ 18V	0.900	0.923	0.946	V
Feedback Overvoltage Threshold	OVP			1.10		V
Error Amplifier Voltage Gain(1)	Aea			400		V/V
Error Amplifier Transconductance	Gea	∆Icomp=±10µA		800		µA/V
High-Side Switch On Resistance(1)	Rdson1			130		mOhm
Low-Side Switch On Resistance(1)	Rdson2			130		mOhm
High-Side Switch Leakage Current	I_{LO}	V_{EN} = 0V Vsw=0V	-10			µA
Upper Switch Current Limit	CL	Minimum Duty Cycle	2.4	3.4		A
Lower Switch Current Limit	CL_low	From Drain to Source		1.1		A
COMP to Current Sense Transconductance	Gcs			3.5		A/V
Oscillation Frequency	Fosc		305	340	375	kHz
Short Circuit Oscillation Frequency	Fscp	Vfb=0V		100		kHz
Maximum Duty Cycle	DCmax	Vfb=0.7V		90		%
Minimum On Time(1)	Tonmin			220		ns
EN Shutdown Threshold Voltage	Vth_EN	V_{EN} Rising	1.1	1.5	2.0	V
EN Shutdown Threshold Voltage Hysteresis	Hys_EN			210		mV
EN Lockout Threshold Voltage	Vlock	V_{EN} Rising	2.2	2.5	2.7	V
EN Lockout Hysteresis	Hys_lck			210		mV
Input Under Voltage Lockout Threshold	UVLO	V_{IN} Rising	3.80	4.10	4.40	V
Input Under Voltage Lockout Threshold Hysteresis	Hys_uvlo			210		mV
Soft-Start Current	Iss	Vss=0V		6		µA
Soft-Start Period	Tss	Css=0.1µF		15		ms
Thermal Shutdown(1)	TP			160		°C

Note: (1) – Guaranteed by design, not tested.

PIN FUNCTIONS

Pin #	Name	Description
1	BST	High-Side Gate Drive Boost Input. BS supplies the drive for the high-side N-Channel MOSFET switch. Connect a 0.01µF or greater capacitor from SW to BS to power the high side switch.
2	Vin	Power Input. Vin supplies the power to the IC, as well as the step-down converter switches. Drive Vin with a 4.75V to 18V power source. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input to the IC.
3	SW	Power Switching Output. SW is the switching node that supplies power to the output. Connect the output LC filter from SW to the output load. Note that a capacitor is required from SW to BS to power the high-side switch.
4	GND	Ground.
5	FB	Feedback Input. FB senses the output voltage to regulate that voltage. Drive FB with a resistive voltage divider from the output voltage. The feedback threshold is 0.923V.
6	COMP	Compensation Node. COMP is used to compensate the regulation control loop. Connect a series RC network from COMP to GND to compensate the regulation control loop. In some cases, an additional capacitor from COMP to GND is required. See Compensation Components.
7	EN	Enable Input. EN is a digital input that turns the regulator on or off. Drive EN high to turn on the regulator, drive it low to turn it off. Pull up with 100kΩ resistor for automatic startup.
8	SS	Soft-Start Control Input. SS controls the soft start period. Connect a capacitor from SS to GND to set the soft-start period. A 0.1µF capacitor sets the soft-start period to 15ms. To disable the Soft-Start feature, leave SS unconnected.

FUNCTIONAL BLOCK DIAGRAMM



Compensation Components

8482K employs current mode control for easy compensation and fast transient response. The system stability and transient response are controlled through the COMP pin. COMP pin is the output of the internal transconductance error amplifier. A series capacitor-resistor combination sets a pole-zero combination to control the characteristics of the control system.
The following table lists recommended components for some standard output voltages. Listed compensation components (R3, C3) values are based on the output capacitors installed on boards.

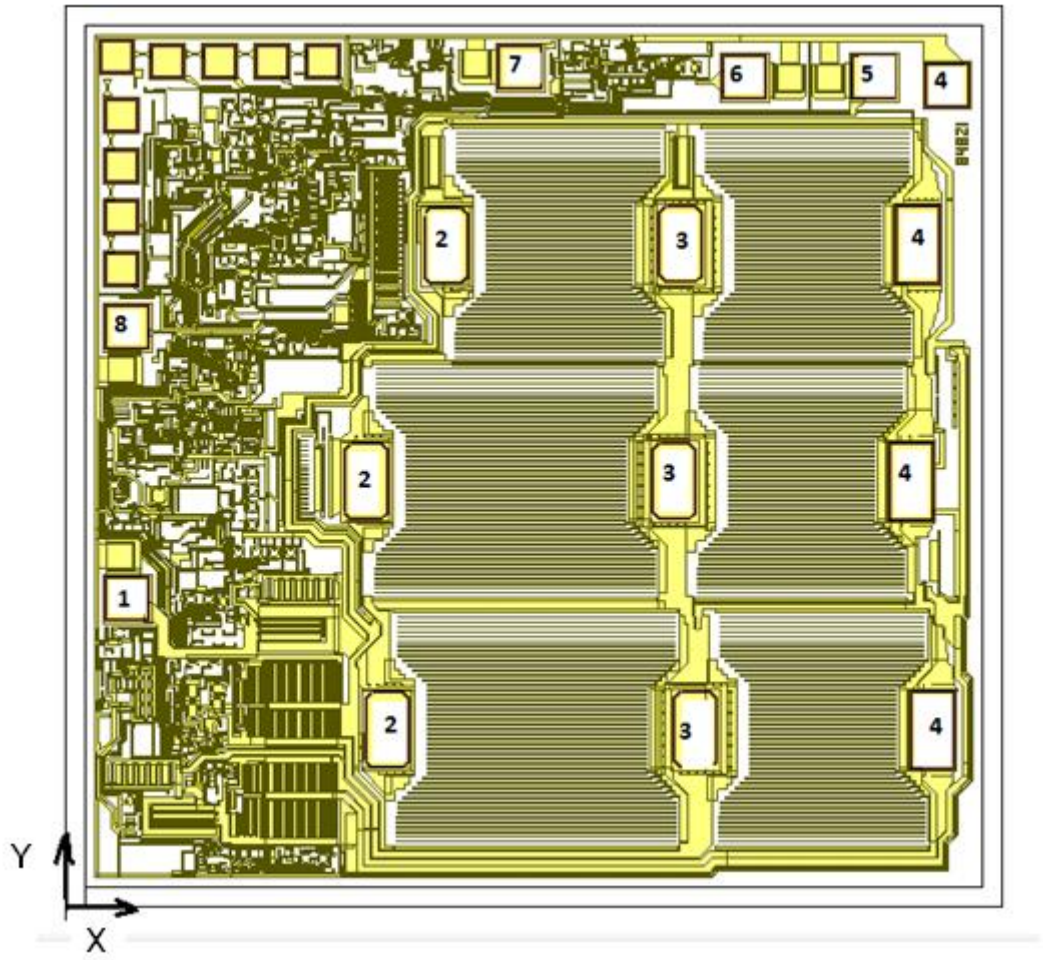
Vout	R1	R3	C3	L1
1.8V	9.53k	4.99k	4.7nF	4.7µH
2.5V	16.9k	5.6k	4.7nF	4.7µH…6.8µH
3.3V	26.1k	5.6k	3.3nF	6.8µH…10µH
5.0V	44.2k	10k	3.3nF	10µH…15µH
12.0V	121k	25.5k	2.2nF	33µH…47µH

PCB Layout Guide

PCB layout is very important to achieve stable operation. Please follow these guidelines:

- Keep the path of switching current short and minimize the loop area formed by input cap, high-side MOSFET and low-side MOSFET.
- Bypass ceramic capacitors are suggested to be put close to the Vin Pin
- Ensure all feedback connections are short and direct. Place the feedback resistors and compensation components as close to the chip as possible.
- Route SW away from sensitive analog areas such as FB.
- Connect Vin, SW, and especially GND respectively to a large copper area to cool the chip to improve thermal performance and long-term reliability.

8482K PAD LOCATIONS

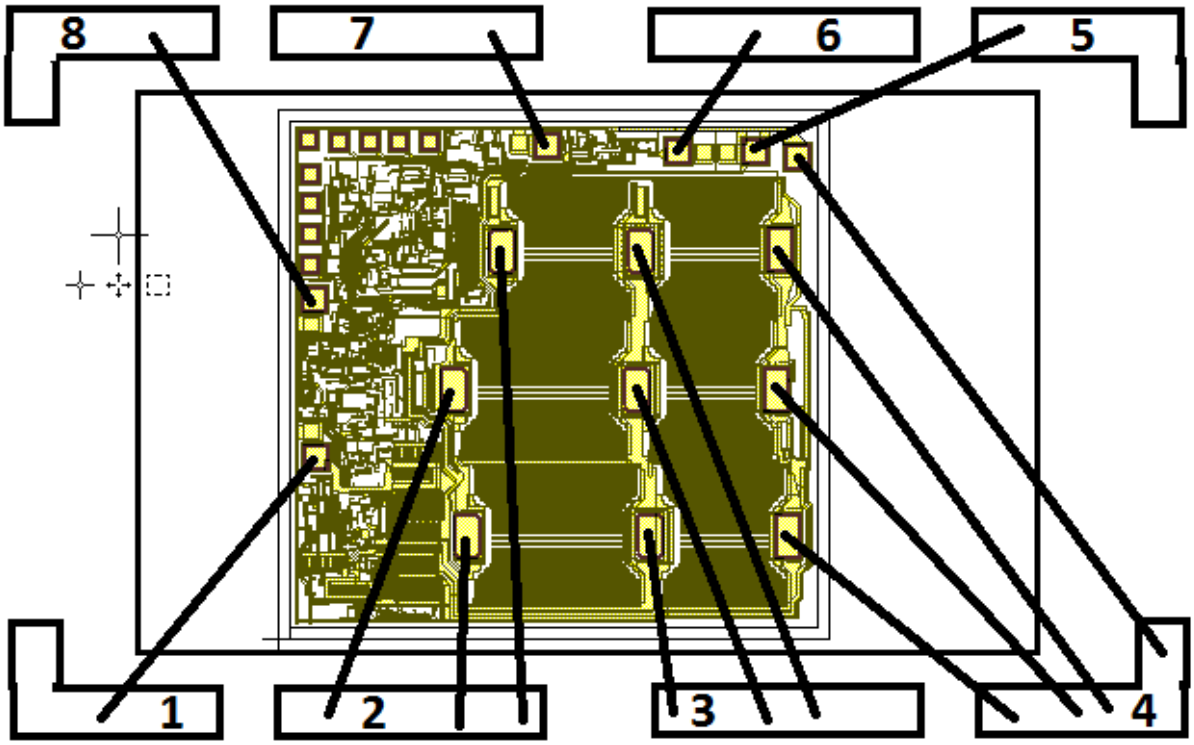


Chip Size =1.92*1.85 mm

PAD NAMES AND COORDINATES

PAD		PAD coordinates (center)		PAD size (µm)
Name	#	X(µm)	Y(µm)	
BST	1	128	632	90*90
Vin	2	780	1357	90*159
Vin	2	616	874	90*159
Vin	2	660	362	90*159
SW	3	1262	1357	90*159
SW	3	1248	874	90*159
SW	3	1293	362	90*159
GndP	4	1748	1357	90*159
GndP	4	1734	874	90*159
GndP	4	1779	362	90*159
Gnd	4	1810	1685	90*90
FB	5	1660	1702	90*90
COMP	6	1393	1702	90*90
EN	7	934	1721	90*90
SS	8	128	1187	90*90

BONDING DIAGRAMM



Assembly Characteristics

No.	Assembly Characteristics	Value
1	Wafer Size	6 Inch
2	Wafer Thickness before Grinding	675 +/-25 µm
3	Scribe Street Width	80 µm
4	Chip Size (including Scribe Line)	1.92 × 1.85 mm^2
5	Die Attach Material	Substrate is connected to GND
6	Quantity of Bond Pad Metal Layers	1
7	Pad Thickness	2.6 µm
8	Composition of Metal Layers	Al+Si(1.0%)+Ti(0.5%)
9	Min. Bond Pad Opening Size	90×90 µm
10	Min. Bond Pad Pitch	150 µm
11	Min. Wire Diameters	1.2 mil (30.5 µm)
12	Circuit Under Pad Design (CUP)	No

For your information

Pb-free products:
♦ RoHS compliant and compatible with the current requirements of IPC/JEDEC J-STD-020.
Green products:
♦ Lead-free (RoHS compliant)
♦ Halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

The appearance complies with the requirements of the company standards.