21V, 5A, 500KHz Synchronous PWM-Buck DC/DC Converter

Description

FS2462 is a high-efficiency synchronous step-down DC/DC converter that employs a special process technique to obtain very low R_{DS}(ON) for the internal metal–oxide–semiconductor field-effect transistor (MOSFET). The input operation voltage is in a wide 4.75V to 21V, and continuous load current capability is 5A. Control circuit is designed by a particular current mode which provides fast transient response and eases loop stabilization.

This product has a very low standby current less than 1μA in shutdown mode. When the $\overline{\text{SHDN}}$/S pin voltage is less than 0.4V, FS2462 will turn off. Fault protection includes over current protection (OCP), under voltage lockout protection (UVLO) and over temperature protection (OTP) function.

This high-efficiency current mode step-down “Green Power Converter” offers the standard SOP-8 package with an exposed pad.

Features

- High Efficiency up to 90%
- Internal MOSFET R_{DS}(ON): 110mΩ/20mΩ
- Internal Compensation
- Input Operation Voltage Range: 4.75V to 21V
- 5A Continuous Output Current
- Output Voltage down to 0.805V
- 500KHz Oscillation Frequency
- Sync to External Clock from 300 KHz to 800 KHz
- Cycle-by-Cycle Current Limit
- Under Voltage Lockout
- Over-Temperature Protection with Auto Recovery
- <1μA Shutdown Current
- Thermal Enhanced SOP-8 (Exposed Pad) Package
- RoHS Compliant

Applications

- Networking equipment
- OLPC, Netbook
- Distributed power system
- LCD monitor, TV, STB
- External HDD
- Security System

Pin Assignments

SP Package (SOP-8 Exposed Pad)

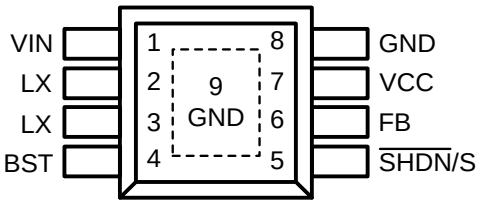
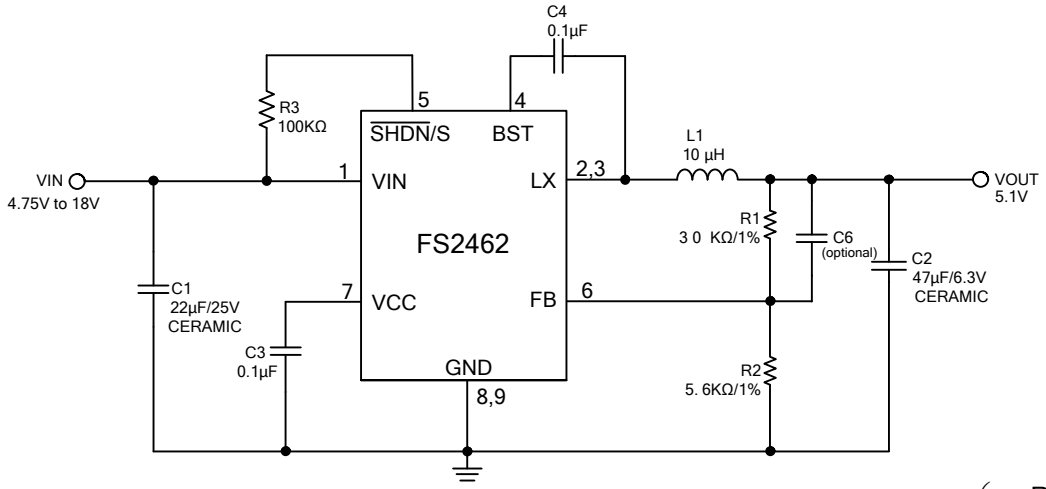


Figure 1. Pin Assignment of FS2462

Ordering Information

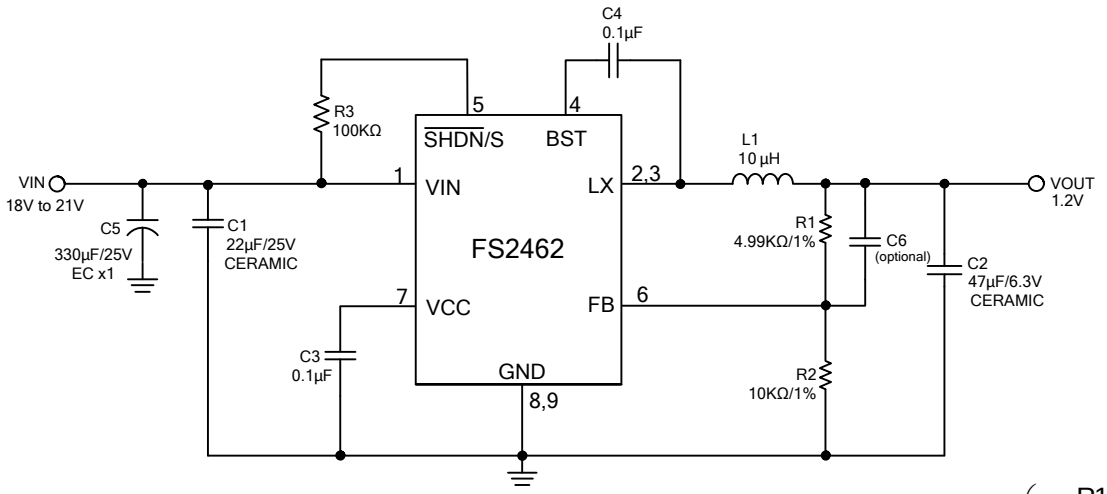
FS2462

Typical Application Circuit



$$V_{OUT} = 0.805 \times \left(1 + \frac{R1}{R2}\right) V$$

Figure 2. Output 5.1V Application Circuit



$$V_{OUT} = 0.805 \times \left(1 + \frac{R1}{R2}\right) V$$

Figure 3. High Input Voltage Application Circuit

V_{OUT}	R1 (1%)	R2 (1%)
5.11V	30 kΩ	5.6 kΩ
3.38 V	32 kΩ	10 kΩ
2.5V	4.99 kΩ	2.32 kΩ
1.8 V	4.99 kΩ	3.92 kΩ
1.2 V	4.99 kΩ	10 kΩ

Functional Pin Description

I/O	Pin Name	Pin No.	Pin Function
I	FB	6	Voltage Feedback Input Pin. FB and VOUT are connected by a resistive voltage divider. This IC senses feedback voltage via FB and regulates it at 805mV.
I	VIN	1	Power Supply Input Pin. Drive 4.75V to 21V voltage to this pin to power on this chip. A 22μF ceramic bypass capacitor is connected between VIN and GND to eliminate noise.
O	VCC	7	Bias Supply Output Pin. A 0.1μF capacitor must be connected from this pin to GND.
I	$\overline{\text{SHDN}}$/S	5	This pin provides a digital control to turn the converter on or off. For automatic start-up, connect the $\overline{\text{SHDN}}$/S pin to VIN pin with a 100KΩ resistor. An external clock from 300KHz to 800 KHz can be applied to the $\overline{\text{SHDN}}$/S pin to change oscillation frequency.
O	LX	2,3	Power Switching Output Pin. This is the output pin that internal high-side NMOS switches to supply power.
O	BST	4	High-Side Gate-Drive BST Input. A 0.1μF capacitor is connected from this pin to LX. It can boost the gate drive to fully turn on the internal high-side NMOS.
I	GND	8	Ground Pin. This pin is connected to the exposed pad with copper.
I	Exposed Pad	9	Ground Pin. The exposed pad must be soldered to a large PCB area and connected to GND for maximum power dissipation.

Block Diagram

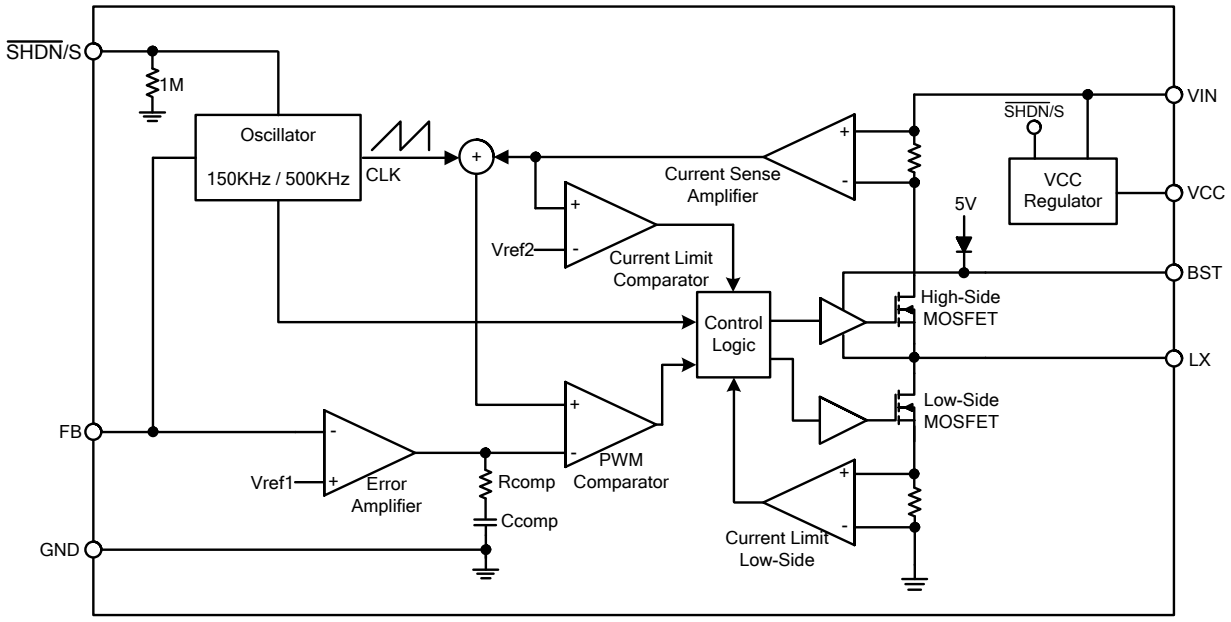


Figure 4. Block Diagram of FS2462

Electrical Characteristics

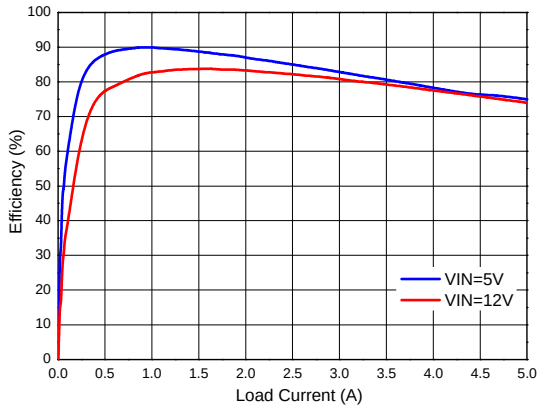
(V_{IN}=12V, T_A=25°C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input Supply Voltage	V_{IN}		4.75		21	V
VIN Shutdown Supply Current	I_{SD}	$V_{\overline{SHDN}}$ = 0V			1	μA
VIN Quiescent Supply Current	I_{DDQ}	$V_{\overline{SHDN}}$ = 2V, V_{FB} = 1V		1.5		mA
Feedback Voltage	V_{FB}	4.75V≦V_{IN}≦21V	780	805	830	mV
High-Side MOSFET R_{DS}(ON) (Note2)	HSR_{DS}(ON)			110		mΩ
Low-Side MOSFET R_{DS}(ON) (Note2)	LSR_{DS}(ON)			20		mΩ
MOSFET Leakage Current	I_{LX}(Leak)	$V_{\overline{SHDN}}$ = 0V, V_{LX} = 0V		0	10	μA
High-Side MOSFET Current Limit (Note2)	I_{LIMIT}			8		A
Maximum Duty Cycle	D_{MAX}	V_{FB} = 0.7V		90		%
Oscillation frequency	F_{LX}		350	500	650	KHz
Short-Circuit Oscillation Frequency	F_{LX}(Short)	V_{FB} = 0.3V		150		KHz
Sync Frequency Range	F_{SYNC}		300		800	KHz
Input UVLO Threshold	VUVLO(Vth)	V_{IN} Rising		4		V
Under Voltage Lockout Threshold Hysteresis	VUVLO(Hys)			200		mV
$\overline{SHDN}$/S Input Low Voltage	$V_{\overline{SHDN}}$ (L)				0.4	V
$\overline{SHDN}$/S Input High Voltage	$V_{\overline{SHDN}}$ (H)		2.0			V
$\overline{SHDN}$/S Input Current	$I_{\overline{SHDN}}$	$V_{\overline{SHDN}}$ = 2V		2		μA
VCC Regulator	V_{CC}			4.5		V
Soft-Start Time	T_{SS}			600		μs
Thermal Shutdown Threshold (Note 2)	T_{SD}			170		°C

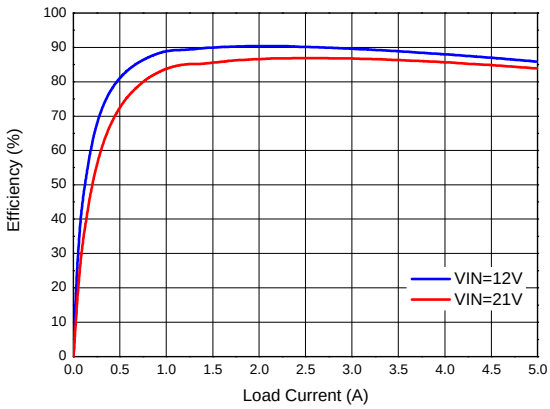
Note 2：Guarantee by design.

Typical Performance Curves

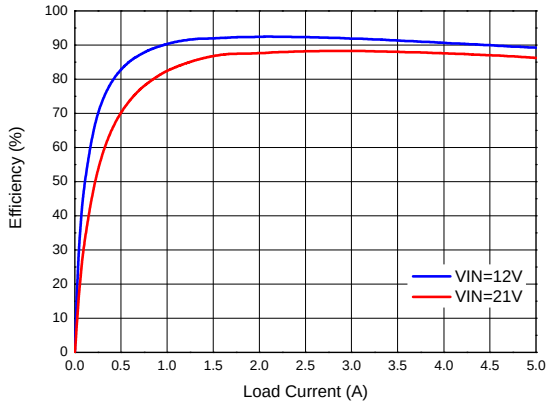
V_{IN} = 12V, V_{OUT} = 3.3V, C1 =10μF x 2, C2 = 22μF x 2, L1 =1.8μH, TA = +25°C, unless otherwise noted.



V_{OUT}=1.2V
Figure 5. Efficiency vs. Loading



V_{OUT}=3.3V
Figure 6. Efficiency vs. Loading



V_{OUT}=5V
Figure 7. Efficiency vs. Loading

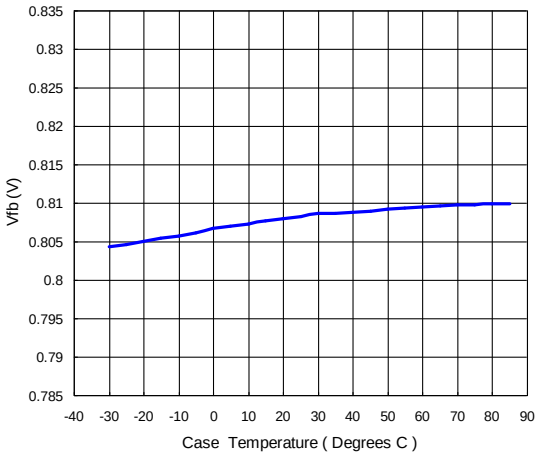


Figure 8. Feedback Voltage vs. Temperature

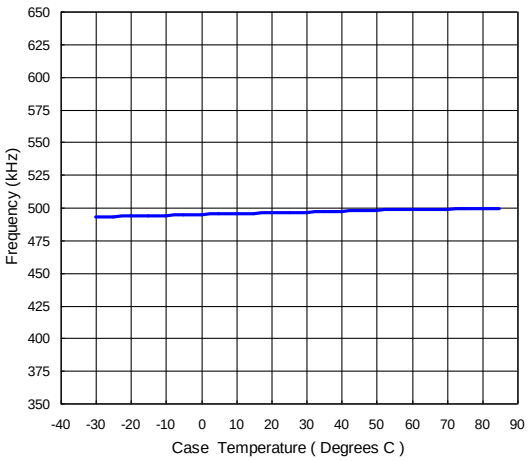


Figure 9. Frequency vs. Temperature

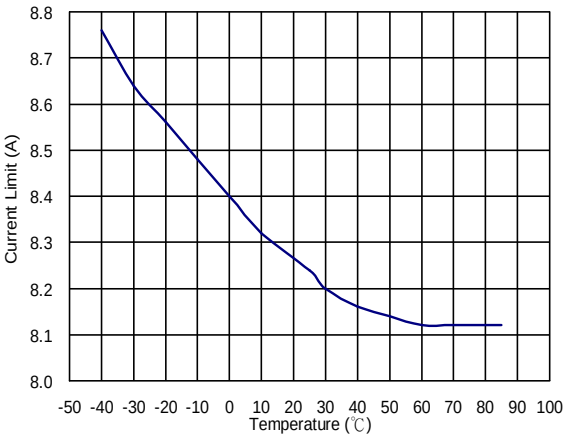
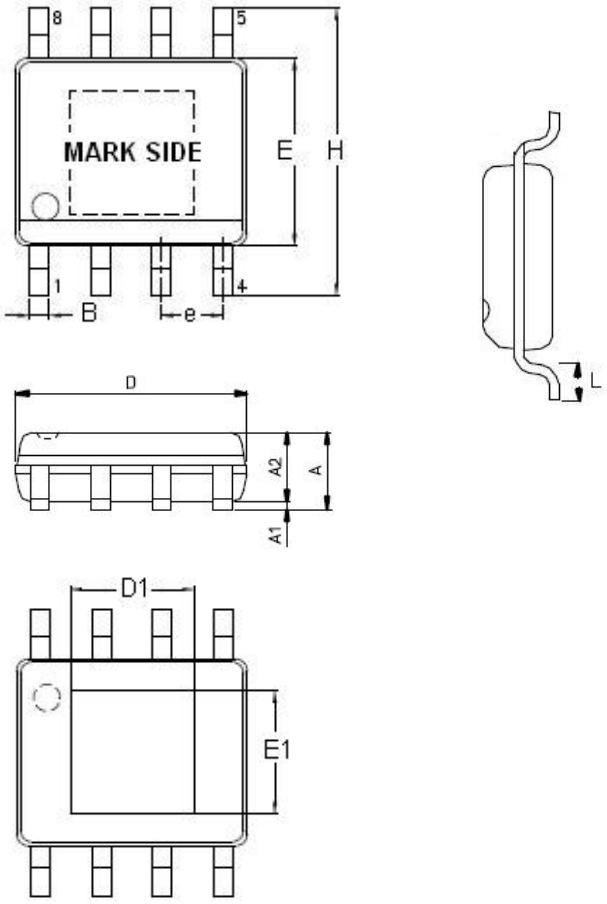


Figure 10. Current Limit vs. Temperature

Outline Information

SOP-8 (Exposed Pad) Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	1.25	1.70
A1	0.00	0.15
A2	1.25	1.55
B	0.31	0.51
D	4.80	5.00
D1	3.04	3.50
E	3.80	4.00
E1	2.15	2.41
e	1.20	1.34
H	5.80	6.20
L	0.40	1.27

Note：Followed From JEDEC MO-012-E.