

# Synchronous PWM Step-down DC/DC Converter Controller

## General Description

The RT9226B is a low cost, high-efficiency voltage-mode PWM controller for motherboard power supply application. Synchronous N-channel MOSFET driver, short-circuit protection, and soft start function are integrated in a single chip. A simple high power buck regulator with shutdown function can be implemented with minimum external components.

The RT9226B provides current-limit protection by monitoring the voltage drop across N-channel MOSFET in over current condition, therefore, eliminates the current sensing resistor and minimizes the efficiency loss. The soft start function reduces the stress on power supply and components in power on duration. The 200 kHz operating frequency and high speed PWM control loop with Synchronous N-channel MOSFET driver provide optimized compromise between efficiency, cost, and response speed. Other features include output voltage monitoring for power good indication and over voltage protection.

## Ordering Information

RT9226B□□

- Package type  
S : SOP-14
- Operating temperature range  
C: Commercial standard

## Features

- Synchronous N-channel MOSFET Driver
- High Efficiency
- Fast Response with 200kHz Operating Frequency
- Adjustable Current Limit by Sensing MOSFET  $R_{DS(ON)}$ , without Extra Current Sensing Resistor
- Shutdown Function
- Power Good Indication Output and Over-voltage Protection

## Applications

- Low Cost CPU Power Supply
- Motherboard I/O Power Supply
- Add-On Card Power Supply
- DDR SDRAM Bus Terminator Power Supply

## Pin Configurations

Part Number	Pin Configurations
RT9226BCS (Plastic SOP-14)	TOP VIEW
	VSEN 1 14 VCC
	OCSET 2 13 LGATE
	SS 3 12 PGNDL
	FB 4 11 BOOT
	EN 5 10 UGATE
	GND 6 9 PHASE
	PGNDH 7 8 PGOOD

## Absolute Maximum Ratings

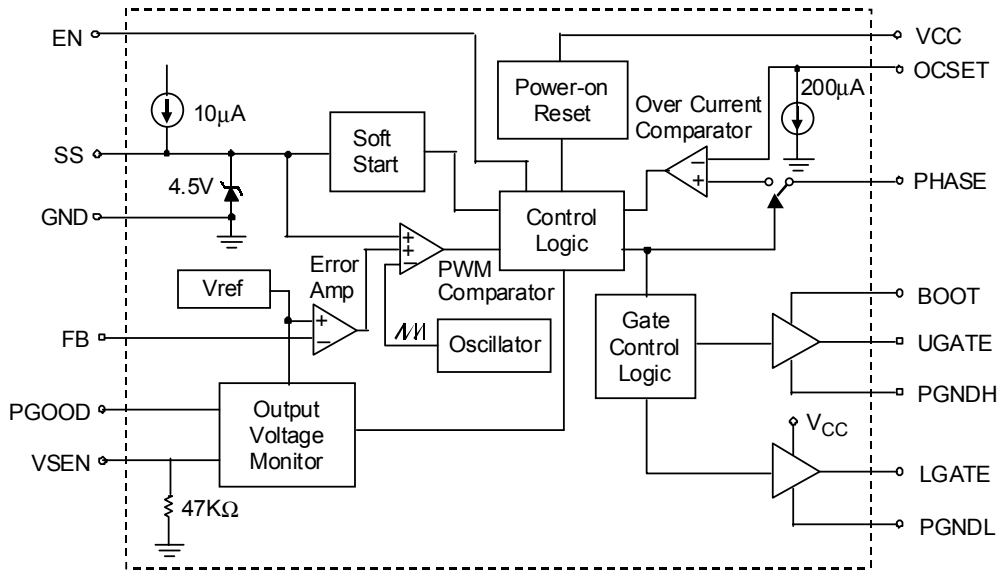
- Supply Voltage..... 15V
- Input, Output or I/O Voltage ..... GND–0.3V to V<sub>CC</sub>+0.3V
- Ambient Temperature Range ..... 0°C to 70°C
- Operating Junction Temperature Range..... 0°C to 125°C
- Storage Temperature Range..... –65°C to 150°C
- Package Thermal Resistance  
SOP-14,  $\theta_{JA}$  ..... 160°C/W
- Lead Temperature (Soldering, 10 sec.) ..... 300°C

## Electrical Characteristics

(V<sub>CC</sub> = 12V, GND = 0V, T<sub>A</sub> = 25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
<b>VCC Supply Current</b>						
Nominal Supply Current	I <sub>CC</sub>	UGATE Open	--	3	--	mA
<b>Power-On Reset</b>						
VCC Rising Threshold		V <sub>OCSET</sub> = 4.5V	--	9.5	--	V
VCC Falling Threshold		V <sub>OCSET</sub> = 4.5V	--	7.5	--	V
Enable Input Threshold	V <sub>EN</sub>		0.2	--	2.2	V
<b>Oscillator</b>						
Frequency			170	200	230	KHz
Ramp Amplitude	$\Delta V_{OSC}$		--	1.9	--	V
<b>Internal Voltage Reference</b>						
Reference Voltage	V <sub>REF</sub>		0.785	0.800	0.815	V
<b>PWM Controller Error Amplifier</b>						
DC Gain			--	65	--	dB
<b>PWM Controller Gate Driver</b>						
UGATE Source	R <sub>UGATE</sub>	I <sub>UGATE</sub> = 0.3A	--	8	--	$\Omega$
UGATE Sink	R <sub>UGATE</sub>	I <sub>UGATE</sub> = 0.3A	--	6	--	$\Omega$
LGATE Source	I <sub>LGATE</sub>	V <sub>CC</sub> = 12V, V <sub>LGATE</sub> = 6V	--	500	--	mA
LGATE Sink	R <sub>LGATE</sub>	I <sub>LGATE</sub> = 1V	--	5	--	$\Omega$
<b>Protection</b>						
OCSET Current Source	I <sub>OCSET</sub>	V <sub>OCSET</sub> = 4.5V	170	200	230	$\mu$ A
Soft-start Current	I <sub>SS</sub>	V <sub>SS</sub> = 1.5V	--	10	--	$\mu$ A
Over-voltage Trip (V <sub>SEN</sub> /V <sub>REF</sub> )			--	115	120	%
<b>Power Good</b>						
Upper Threshold (V <sub>SEN</sub> /V <sub>REF</sub> )			--	108	--	%
Lower Threshold (V <sub>SEN</sub> /V <sub>REF</sub> )			--	92	--	%
PGOOD Voltage Low	V <sub>PGOOD</sub>	I <sub>PGOOD</sub> = -5mA	--	0.5	--	V

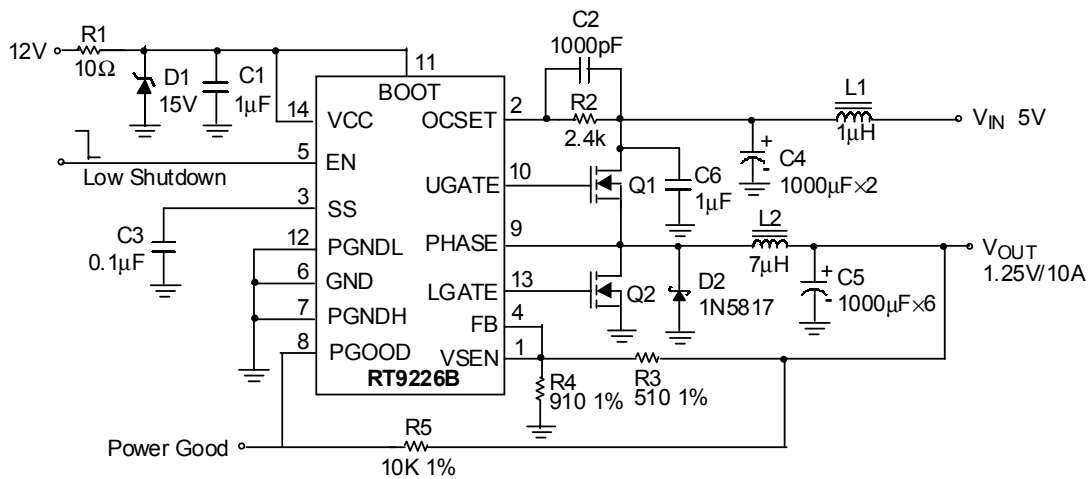
**Function Block Diagram**



**Pin Description**

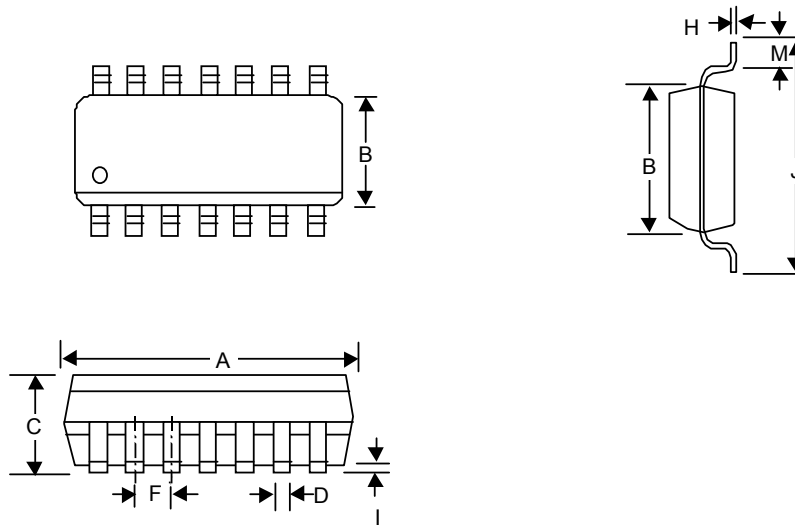
Pin No.	Pin Name	Pin Function
1	VSEN	Output Voltage Monitoring Input
2	OCSET	Current Limit Set Pin with 200µA Current Sink
3	SS	Soft Start, connect a capacitor from this pin to GND
4	FB	Feedback Input Pin
5	EN	Regulator Enable with Low Shutdown
6	GND	Ground
7	PGNDH	High Side Drive GND
8	PGOOD	Power Good Indication Output
9	PHASE	Current Limit Sense Input
10	UGATE	High Side Driver Output
11	BOOT	Driver Power
12	PGNDL	Low Side Driver GND
13	LGATE	Low Side Driver Output
14	VCC	Power Supply Input

## Typical Application Circuit



- C4, C5: Each 1000μF 6.3WV DC, Sanyo MV-GX or Equivalent.
- L1: Core: Micrometals T50-52; Winding: 5 turns of 18 AWG.
- L2: Core: Micrometals T60-52; Winding: 14 turns of 17 AWG.
- Q1, Q2: PHB83N03LT, PHB95N03LT

**Package Information**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	8.534	8.738	0.336	0.344
B	3.810	3.988	0.150	0.157
C	1.346	1.753	0.053	0.069
D	0.330	0.508	0.013	0.020
F	1.194	1.346	0.047	0.053
H	0.178	0.254	0.007	0.010
I	0.102	0.254	0.004	0.010
J	5.791	6.198	0.228	0.244
M	0.406	1.270	0.016	0.050

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