

PWM Step-down DC/DC Converter Controller

General Description

The RT9226 is a low cost, high-efficiency voltage-mode PWM controller for motherboard power supply application. High-side 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 RT9226 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 high-side N-channel MOSFET driver provide optimized compromise between efficiency, cost, and response speed.

Ordering Information

RT9226-□□

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

Features

- Low cost and small size
- High efficiency
- Fast response with 200kHz operating frequency
- Adjustable current limit by sensing MOSFET $r_{DS(ON)}$, without extra current sensing resistor
- Shutdown function

Applications

- Low cost CPU power supply
- Motherboard I/O power supply
- Add-on card power supply

Pin Configurations

Part Number	Pin Configuration
RT9226CS (Plastic SOP-14)	TOP VIEW RT 1, OCSET 2, SS 3, NC 4, FB 5, EN 6, GND 7, 14 VCC, 13 NC, 12 NC, 11 NC, 10 BOOT, 9 UGATE, 8 PHASE

Absolute Maximum Ratings

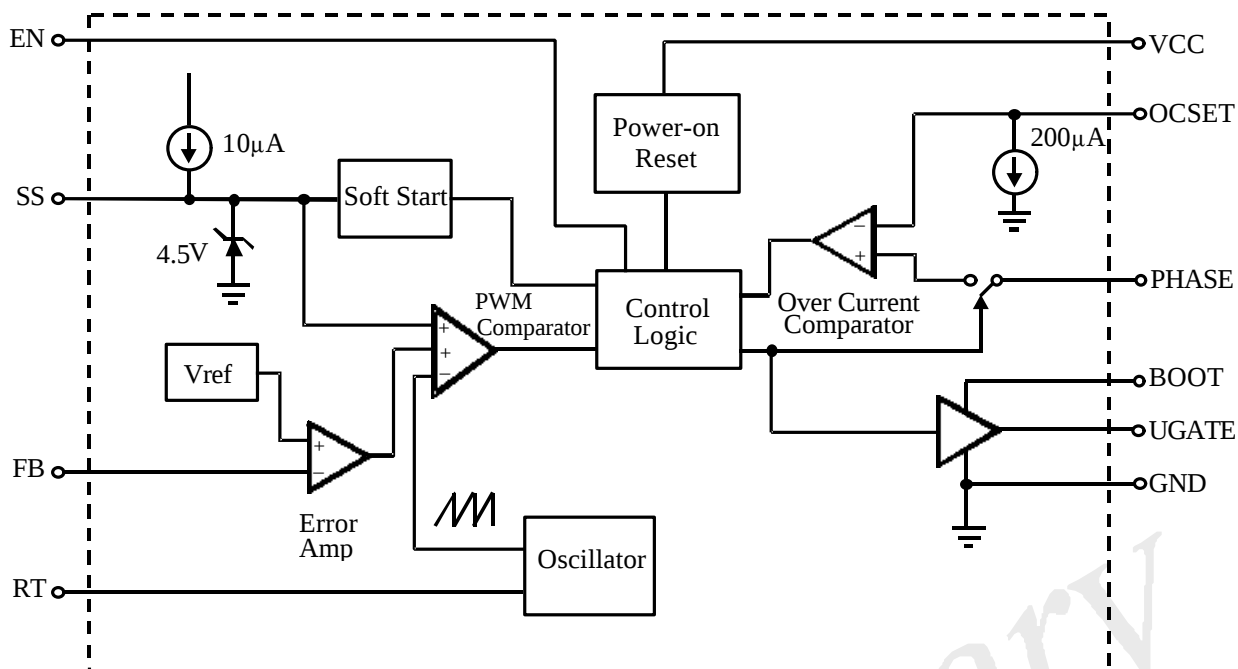
Supply Voltage (V_{CC})	15V
Input, Output or I/O Voltage	GND-0.3V to $V_{CC}+0.3V$
Ambient Temperature Range(T_A)	0 to 70
Operating Junction Temperature Range (T_J)	0 to 125
Storage Temperature Range (T_{STG})	-65 to 150
Power Dissipation and Thermal Characteristics:	
SOP Plastic Package, P_D @ $T_A=25$	0.625W
Thermal Resistance, $R_{\theta JA}$	160 /W
Lead Temperature (Soldering) 10 seconds (T_{LEAD})	260

Electrical Characteristics

$V_{CC}=12V$, $GND=0V$, $T_A=25$, unless other wise specified.

Parameter	Symbol	Test condition	Min	Typ	Max	Units
V_{CC} Supply Current						
Nominal Supply Current	I_{CC}	UGATE Open	--	3	--	mA
Power-on Reset						
V_{CC} Rising Threshold		$V_{OCSET} = 4.5V$	--	9.5	--	V
V_{CC} Falling Threshold		$V_{OCSET} = 4.5V$	--	7.5	--	V
Enable Input Threshold			0.2	--	2.2	V
Oscillator						
Frequency			170	200	230	kHz
Ramp Amplitude			--	1.9	--	--
Internal Voltage Reference						
Reference Voltage	V_{REF}		1.225	1.250	1.275	V
PWM Controller Error Amplifier						
DC Gain			--	65	--	dB
PWM Controller Gate Driver						
UGATE Source	R_{UGATE}	$I_{UGATE} = 0.3A$	--	8	--	Ω
UGATE Sink	R_{UGATE}	$I_{UGATE} = 0.3A$	--	6	--	Ω
Protection						
OCSET Sink Current	I_{OCSET}	$V_{OCSET} = 4.5V$	170	200	230	μA
SS Current	I_{SS}	$V_{SS} = 1.5V$	--	10	--	μA

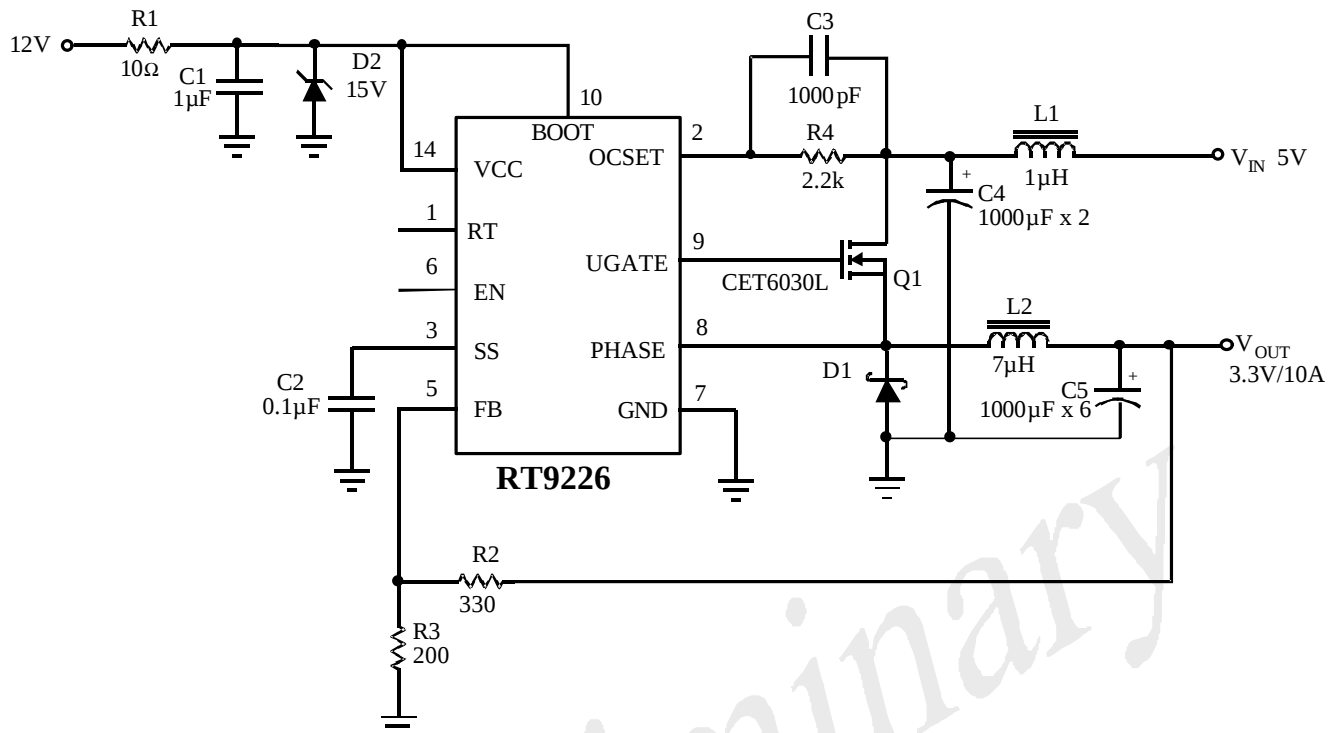
Function Block Diagram



Pin Description

Pin No.	Pin Name	Pin Function
1	RT	Oscillator frequency adjusting pin The switching frequency (f) is increased by placing a resistor (R) from this pin to GND and reduced by placing a resistor (R) to VCC according to following formulae: Speed up: $f = 200(1 + \frac{2 \times 10^4}{R})$ kHz Speed down: $f = 200(1 - \frac{1}{6 \times 10^{-6} R})$ kHz
2	OCSET	Current limit set pin with 200μA current sink
3	SS	Soft start pin, connect a capacitor from this pin to GND
4	NC	No connected
5	FB	Voltage-control feedback loop input
6	EN	Regulator enable pin
7	GND	Ground pin
8	PHASE	Current limit sense pin
9	UGATE	MOSFET driver output
10	BOOT	Driver power
11	NC	No connected
12	NC	No connected
13	NC	No connected
14	VCC	IC power

Typical Applications



C4, C5: Each 1000μF 6.3WV DC, Sanyo MV-GX or Equivalent.

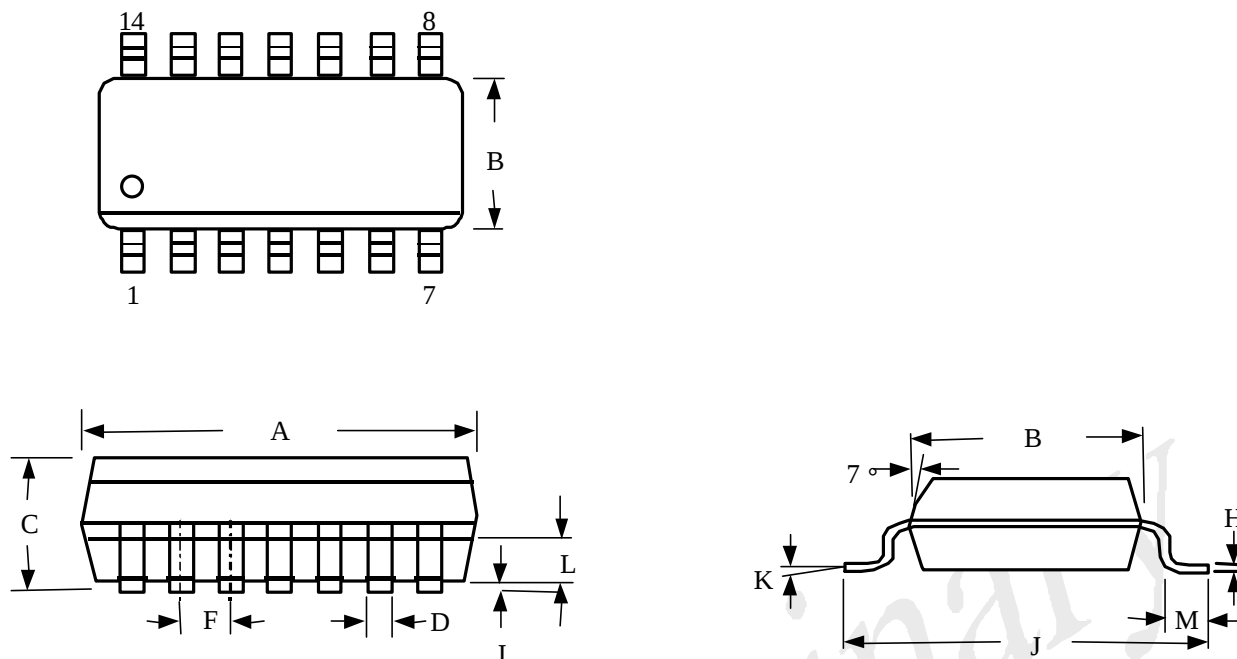
L1: Core: Micrometals T50-52; Winding: 5 turns of 18 AWG.

L2: Core: Micrometals T60-52; Winding: 14 turns of 17 AWG.

D1: BYV118

Q1: CET6030L

Package Information



Symbol	Dimensions in Inch			Dimensions in Millimeter		
	Min	Norm	Max	Min	Norm	Max
A	0.335	0.341	0.346	8.5	8.65	8.8
B	0.150	0.154	0.157	3.8	3.9	4
C	0.053	0.061	0.069	1.35	1.55	1.75
D	0.011	0.016	0.020	0.29	0.4	0.51
F	--	0.05	--	--	1.27	--
H	0.007	0.009	0.010	0.19	0.22	0.25
I	0.004	0.006	0.010	0.1	0.157	0.25
J	0.228	0.236	0.244	5.8	6	6.2
K	--	0.197	0.315	--	5	8
L	0.022	0.025	0.028	0.55	0.625	0.7
M	0.016	--	--	0.4	--	--