



GENERAL DESCRIPTION

The SM8205 is a current mode control LED driver IC designed to control single switch PWM converters (Buck, Boost, Buck-Boost, or SEPIC), in a constant frequency or constant off-time mode. The controller uses a peak current control scheme (with programmable slope compensation), and includes an internal trans-conductance amplifier to control the output current in closed loop, enabling high output current accuracy. Programmable MOSFET current limit enables current limiting during input under voltage and output overload conditions. An internal 7 ~ 50V linear regulator powers the IC, eliminating the need for a separate power supply for the IC. SM8205 provides a TTL compatible PWM dimming input that can accept an external control signal with a duty ratio of 0 – 100% and a frequency of up to a few kilohertz. The SM8205 also provides a Fault output which can be used to disconnect the LEDs in case of a fault condition, using an external disconnect N-channel MOSFET. The SM8205 based LED driver is ideal for RGB backlight applications with DC inputs. The SM8205 based LED lamp driver can achieve efficiency in excess of 90% for Buck and Boost applications.

FEATURES

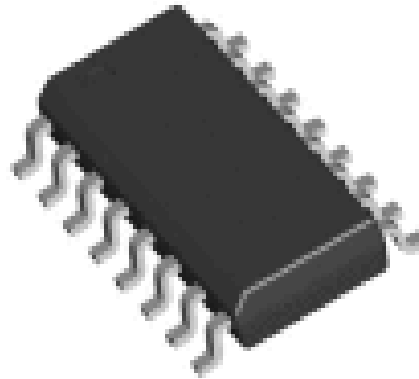
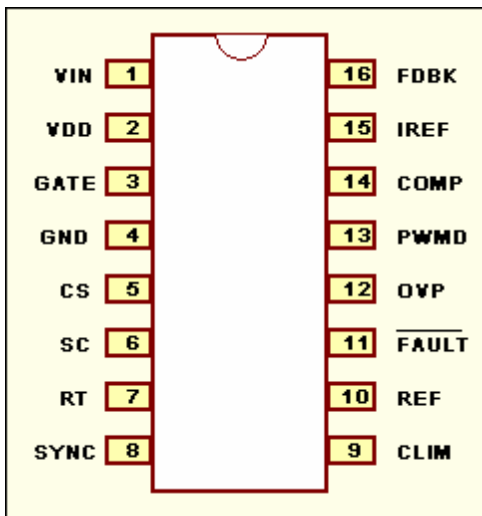
- VIN range from 7V to 50V
- Internal 2% reference voltage
- High PWM dimming ratio
- Constant frequency or constant off-time operation
- Programmable slope compensation
- Input under-voltage protection
- Output short-circuit protection
- Output over-voltage protection
- Programmable switching frequency
- Cycle-by-cycle current limit
- Soft start
- Providing SOP-16 Package

APPLICATIONS

- RGB backlight applications
- LED drivers
- Other DC/DC LED drivers



PIN ASSIGNMENTS

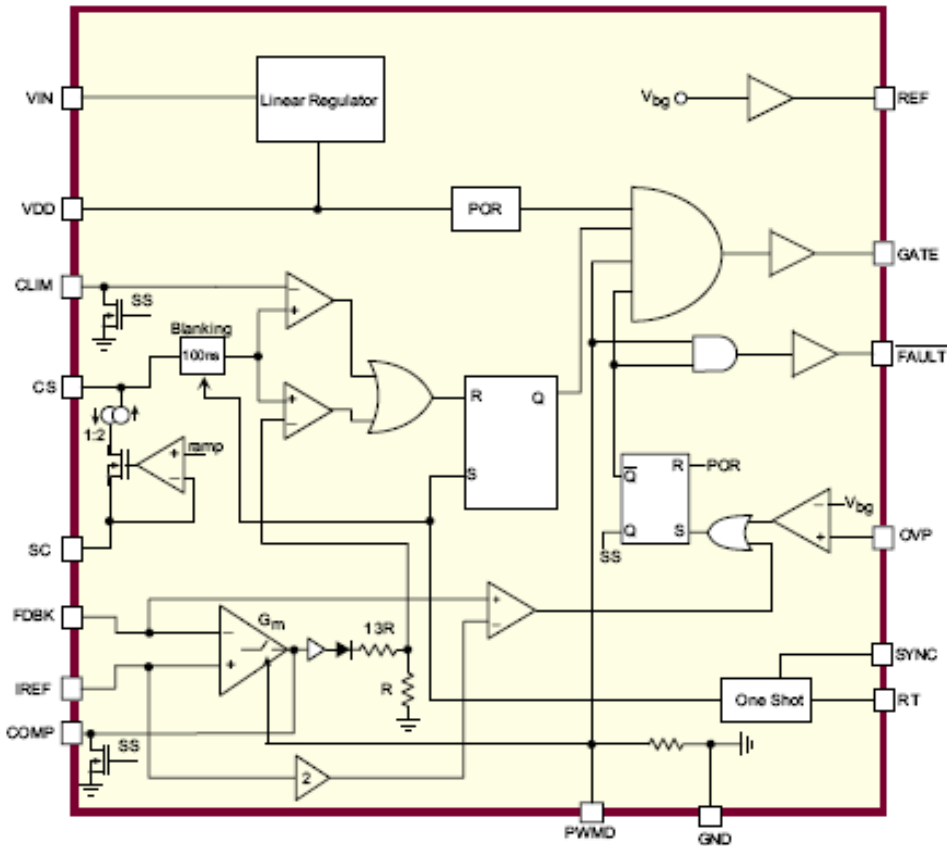


PIN DESCRIPTIONS

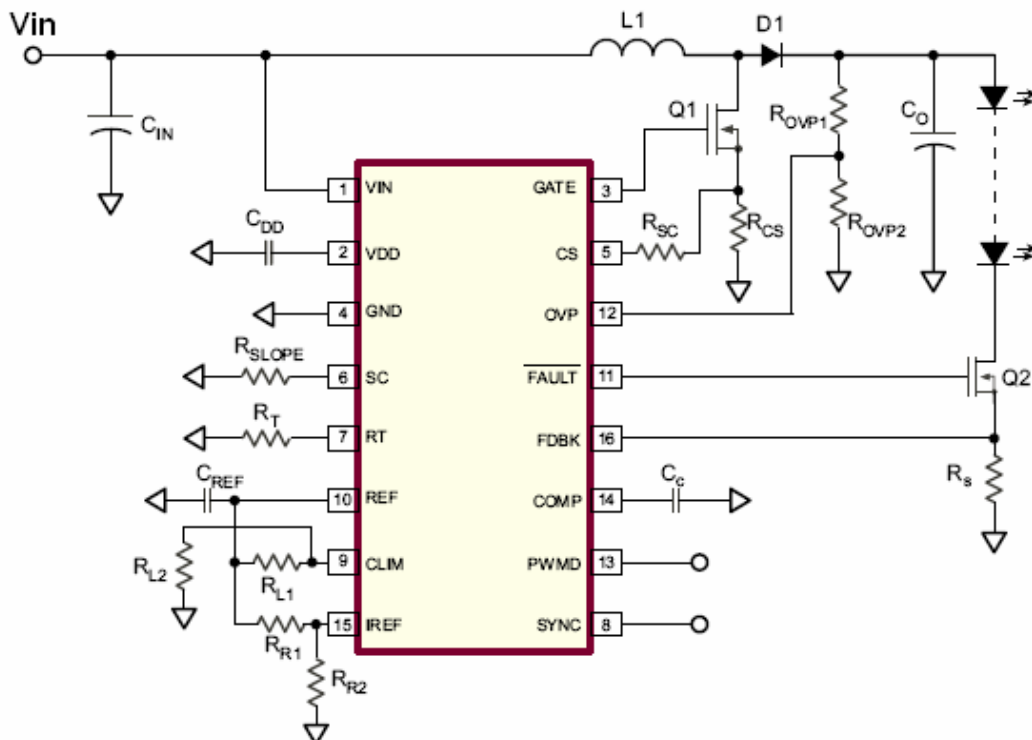
Pin No.	Name	Description
1	VIN	Power supply input (7V-50V). Bypass with 1uF~10uF capacitor to GND as close to the device as possible in the circuit board layout.
2	VDD	Internal low dropout linear regulator output. Bypass with a low ESR capacitor to GND (at least 0.1uF).
3	GATE	This pin is the output GATE driver for an external N-channel power MOSFET.
4	GND	Ground return for all circuits. This pin must be connected to the return path from the input.
5	CS	This pin is used to sense the drain current of the external power N-MOSFET. It includes a built-in 100ns (min) blanking time.
6	SC	Slope compensation for current sense. A resistor between SC and GND will program the slope compensation. In case of constant off-time mode operation, slope compensation is unnecessary and the pin can be left open.
7	RT	This pin is sets the frequency or the off-time of the power circuit. A resistor between RT and GND will program the circuit in constant frequency mode. A resistor between RT and GATE will program the circuit in a constant off-time mode.
8	SYNC	This I/O pin may be connected to the SYNC pin of other SM8205 circuits and will cause the oscillators to lock to the highest frequency oscillator.
9	CLIM	This pin provides a programmable input current limit for the converter. The current limit can be set by using a resistor divider from the REF pin. Soft start can also be provided using this pin.
10	REF	This pin provides 2% accurate reference voltage. It must be bypass with at least 10nF~1uF capacitor to GND.
11	FAULT	This pin is pulled to ground when there is an output short circuit or output over voltage condition. It can be used to drive an external MOSFET in the case of boost converter to disconnect the load from the voltage source.
12	OVP	Over-voltage protection sense input. When this pin exceeds 1.25V, the GATE output of the SM8205 is turned off and FAULT goes low. The IC will turn on when power is recycled.
13	PWMD	When this pin is pulled to GND or left open, switching of the SM8205 is disabled. An external TTL high level is applied to the switching will resume.
14	COMP	Stable closed loop control can be accomplished by connecting a compensation network between COMP and GND.
15	IREF	The voltage at this pin sets the output current level. The current reference can be set using a resistor divider from REF pin.
16	FDBK	This pin provides output current feedback to the SM8205 by a current sense resistor.



FUNCTIONAL BLOCK DIAGRAM



TYPICAL APPLICATION CIRCUIT





MAXIMUM RATINGS

Parameter	Value
V _{IN} to GND	-0.5V to +55V
V _{DD} to GND	-0.3V to +13.5V
PWMD to GND	-0.3 to V _{DD} +0.3V
GATE to GND	-0.3 to V _{DD} +0.3V
All other pins to GND	-0.3 to V _{DD} +0.3V
Junction to ambient thermal impedance	82 °C/W
Operating Junction Temperature	+125 °C
Operating Temperature	-40 °C to +85 °C
Storage Temperature	-55 °C to +150 °C

Stresses beyond those listed under “Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicates in the operational sections of the specifications is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

(The specifications are at T_A = 25°C and V_{IN} = 24V, unless otherwise notes.)

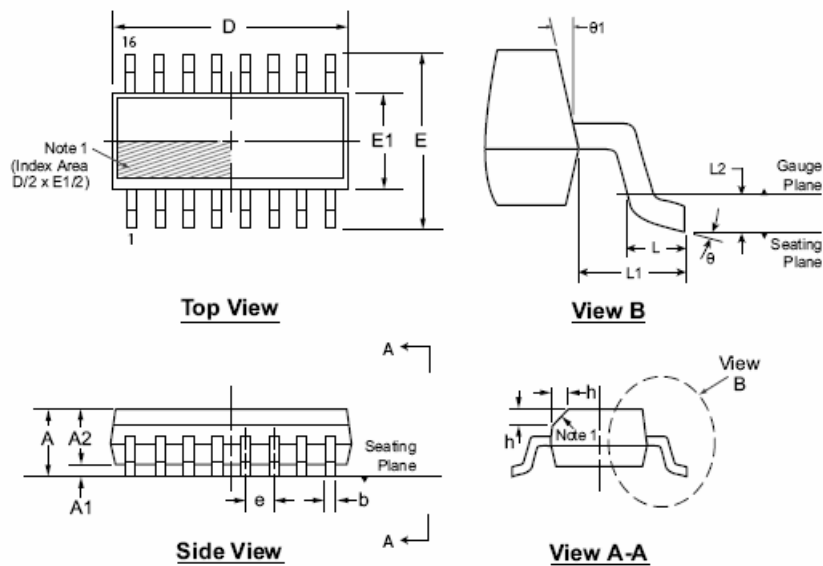
Symbol	Parameter	Min	Typ	Max	Unit	Conditions
Input						
V _{INDC}	Input DC supply voltage range	7		50	V	DC input voltage
I _{NSD}	Shutdown mode supply current		1.0	1.5	mA	PWMD = 0
Internal Regulator						
V _{DD}	Internally regulated voltage	4.75	5	5.25	V	I _{DD} =PWMD=0
UVLO	V _{DD} under voltage lockage threshold	3.7	4.2	4.7	V	V _{DD} rising
ΔUVLO	V _{DD} under voltage lockage hysteresis		500		mV	
V _{DD(ext)}	Steady state external voltage that can be applied at the V _{DD} pin			12	V	
Reference						
V _{REF}	REF pin voltage (0°C < T _A < 85°C)	1.225	1.25	1.275	V	REF bypassed with a 0.1uF capacitor to GND, I _{REF} =0, V _{DD} =5V, PWMD=0
V _{REFLINE}	Line regulation of reference voltage			20	mV	REF bypassed with a 0.1uF capacitor to GND, I _{REF} =0, V _{DD} =4.75 ~ 12V, PWMD=0
V _{REFLOAD}	Load regulation of reference voltage			10	mV	REF bypassed with a 0.1uF capacitor to GND, I _{REF} =0~500u, PWMD=0
PWM Dimming						
V _{PWMD-Low}	PWMD input low voltage			0.8	V	V _{DD} = 4.75V ~ 12V
V _{PWMD-Hi}	PWMD input high voltage	2.0			V	V _{DD} = 4.75V ~ 12V
R _{PWMD}	PWMD pull-down resistance	50	100	150	KΩ	V _{PWMD} = 5V
Soft start						
I _{CLIM}	Current into CLIM pin when pulled low			200	uA	FAULT is low, 6.25KΩ resistor between REF and CLIM.



Slope Compensation						
ISLOPE	Current sourced out of SC pin	0		100	u A	
GSLOPE	Internal current mirror ratio	1.8	2	2.2		ISLOPE = 50uA, RCSENSE = 1.0KΩ

PACKAGE OUTLINE

16-Lead SOIC (Narrow Body) Package Outline (NG) 9.90x3.90mm body, 1.75mm height (max), 1.27mm pitch



Note:

1. This chamfer feature is optional. If it is not present, then a Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier can be: a molded mark/identifier; an embedded metal marker; or a printed indicator.

Symbol	A	A1	A2	b	D	E	E1	e	h	L	L1	L2	θ	θ1		
Dimension (mm)	MIN	1.35*	0.10	1.25	0.31	9.80*	5.80*	3.80*	1.27 BSC	0.25	0.40	1.04 REF	0.25 BSC	0°	5°	
	NOM	-	-	-	-	9.90	6.00	3.90		-	-		-	-	-	-
	MAX	1.75	0.25	1.65*	0.51	10.00*	6.20*	4.00*		0.50	1.27		-	-	8°	15°

JEDEC Registration MS-012, Variation AC, Issue E, Sept. 2005.

* This dimension is not specified in the original JEDEC drawing. The value listed is for reference only.

Drawings are not to scale.