300KHz, 4.0A / 23V Step-Down Converter

■ General Description

LN8105 consists of step-down switching regulator with PWM control. These devices include a reference voltage source, oscillation circuit, error amplifier, internal PMOS and etc.

LN8105 provides low-ripple power, high efficiency,and excellent transient characteristics. The PWM control circuit is able to very the duty ratio linearly from 0 up to 100%. This converter also contains an error amplifier circuit as well as a soft-start circuit that prevents overshoot at startup. An enable function,an over current protect function and a short circuit protect function are built inside, and when OCP or SCP happens, the operation frequency will be reduced from 300KHz to 60KHz. Also, an internal compensation block is built in to minimum external component count.

With the addition of an internal P-channel Power MOS, a coil, capacitors, and a diode connected externally, these ICs can function as step-down switching regulators. They serve as ideal power supply units for portable devices when coupled with the SOP-8 mini-package, providing such outstanding features as low current consumption. Since this converter can accommodate an input voltage up to 23V, it is also suitable for the operation via an AC adapter.

■ Features

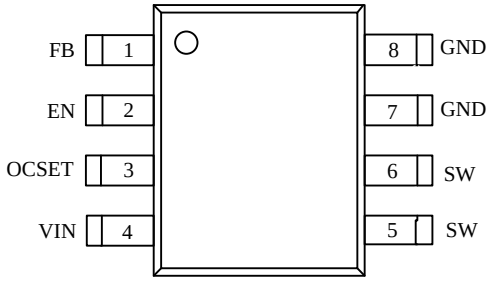
- Input voltage: 4.2V to 23V.
- Output voltage: 0.8V to VIN.
- Duty ratio: 0% to 100% PWM control
- Oscillation frequency: 300KHz typ.
- Soft-start, Current limit, Enable function
- Thermal Shutdown function
- Built-in internal P-channel MOS
- SOP-8 Package.

■ Applications

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-Video Player
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment
- Microprocessor core supply
- Networking power supply

■ Package

- SOP-8



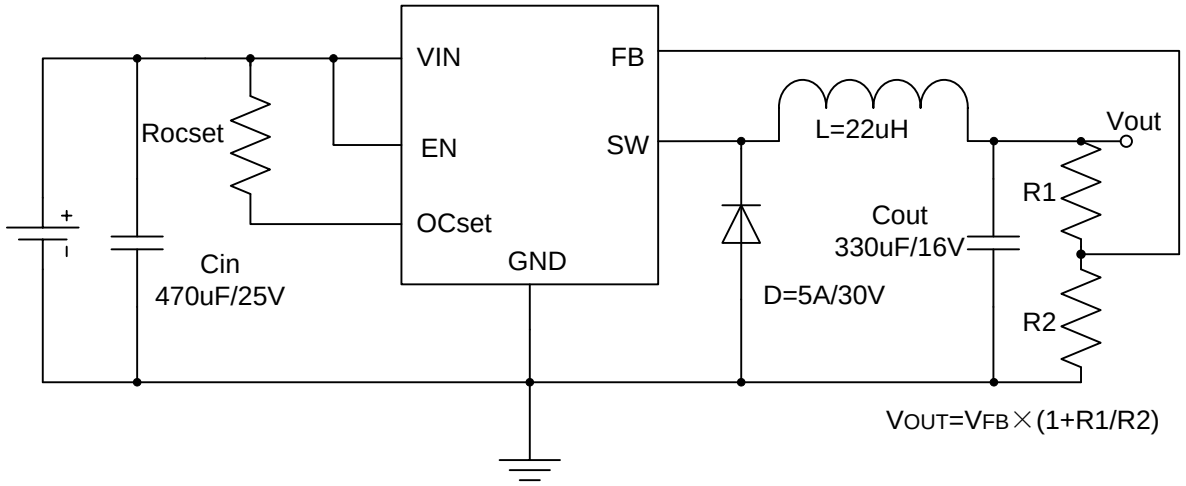
SOP-8 (Top View)

■ Ordering Information

LN8105 ①②③

Designator	Symbol	Description	Designator	Symbol	Description
①	M	Oscillation Frequency 300KHz	③	S	Embossed Tape :Standard Feed
②	P	Package Types: SOP-8		R	Embossed Tape :Reverse Feed

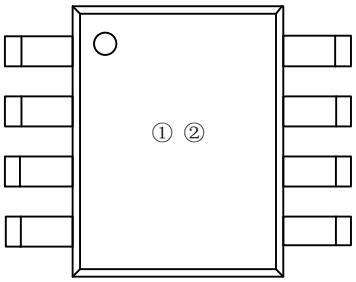
■ Typical Application Circuit



■ Pin Assignment

Pin Number	Pin Name	Function Description
1	FB	Feedback input
2	EN	Enable/Disable pin H:Normal operation mode.(Step-down opration) L:Shutdown mode.(All circuits deactivated)
3	OCSET	Add an external resistor to set max output current.
4	VIN	IC power supply pin
5、6	SW	Switch Pin. Connect external inductor/diode here.Minimize trace Area at this pin to reduce EMI.
7、8	GND	GND Pin.

■ Marking Rule



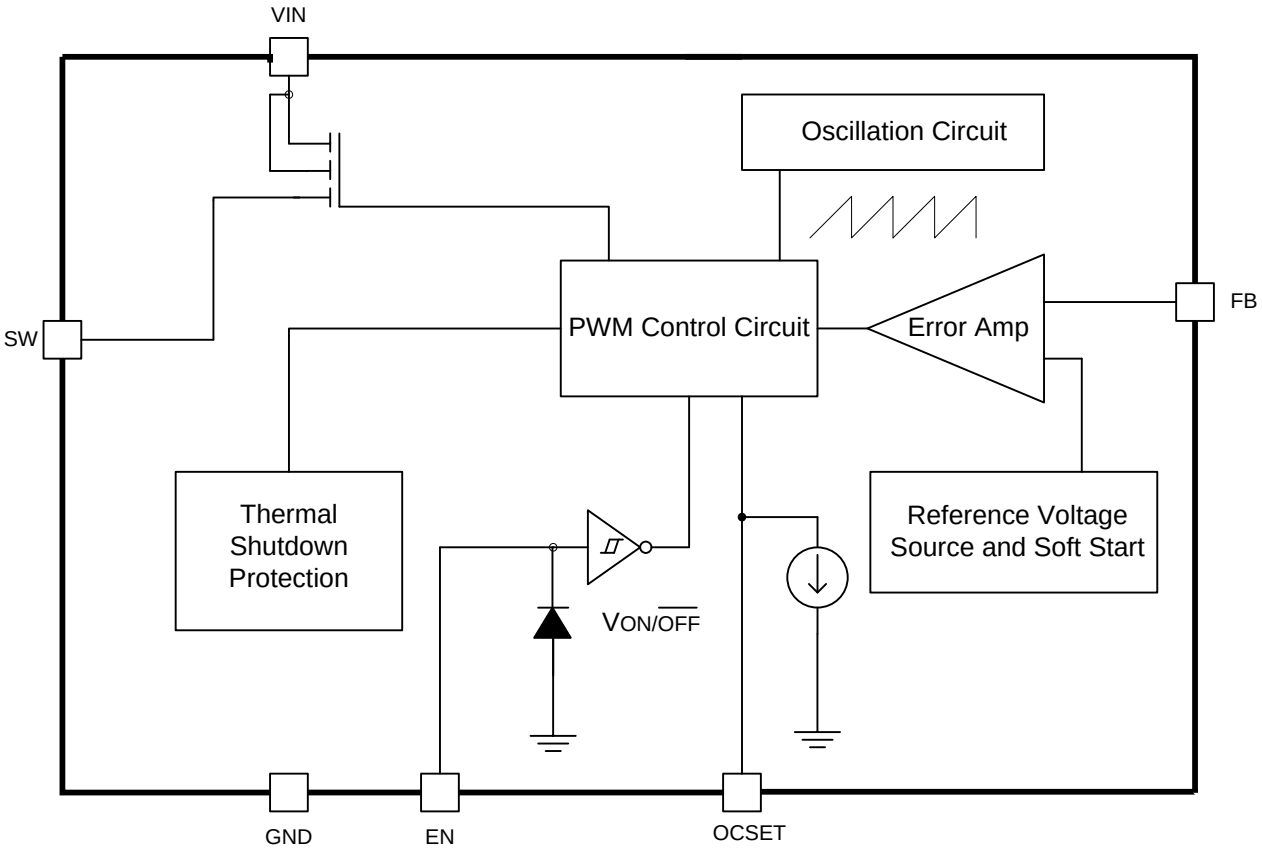
① Represents the product name

Symbol	Product Name
5	LN8105◆P◆

② Represents the assembly lot No.

0-9，A-Z; 0-9，A-Z mirror writing，repeated（G，I，J，O，Q，W exception）

■ Function Block Diagram



■ Absolute Maximum Ratings

The following ratings designate persistent limits beyond which damage to the device may occur.

Parameter	Symbol	Maximum Rating	Unit
V_{IN} Pin Voltage	V_{IN}	V_{SS}-0.3 to V_{SS}+ 25	V
Feedback Pin Voltage	V_{FB}	V_{SS}-0.3 to V_{CC}	
ON/OFF Pin Voltage	$V_{ON/OFF}$	V_{SS}-0.3 to V_{IN}+0.3	
Switch Pin Voltage	V_{OUTPUT}	V_{SS}-0.3 to V_{IN} +0.3	
Power Dissipation	P_D	Internally limited	mw
Operating Temperature Range	T_{OPR}	-20~+125	℃
Storage Temperature Range	T_{STG}	-40~+150	℃

Caution:

The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

■ Electrical Characteristics

(Vcc=+12V,T_A=25℃, unless otherwise specified.)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}		4.2		23	V
Feedback Voltage	V_{FB}	I_{OUT}=0.1A	0.784	0.8	0.816	V
Feedback Bias Current	I_{FB}	I_{OUT}=0.1A		0.1	0.5	μA
Switch Current	I_{SW}		5		-	A
Current Consumption During Power Off	I_{GND}	$V_{ON/OFF}$=0V		1	10	μA
OCSET Pin Bias Current	I_{OCSET}		75	90	105	μA
Line Regulation	$\triangle V_{OUT}/V_{OUT}$	V_{IN}=5V~23V		1	2	%
Load Regulation	$\triangle V_{OUT}/V_{OUT}$	I_{OUT}=0.1 to 4A		0.2	0.5	%
Oscillation Frequency	f_{OSC}	Measure waveform at SW pin	240	300	360	KHz
Frequency of Current Limit or Short Circuit Protect	f_{OSC1}	Measure waveform at SW pin	30	60	90	KHz
EN Pin Input Voltage	V_{SH}	Evaluate oscillation at SW pin	2.0			V
	V_{SL}	Evaluate oscillation stop at SW pin			0.8	
EN Pin Input Leakage Current	I_{SH}			20	-	μA
	I_{SL}			-10	-	μA
Soft-Start Time	T_{SS}		0.3	2	5	ms
Internal MOSFET R_{DSON}	$R_{DS(ON)}$	V_{IN}=5V,V_{FB}=0V		110	150	mΩ
		V_{IN}=12V,V_{FB}=0V		60	80	
Efficiency	η	V_{IN}=12V,V_{OUT}=5V,I_{OUT}=4A		87		%

*Guaranteed by design, not tested.

■ Application Information

- **PWM Control**

The LN8105 consists of DC/DC converters that employ a pulse-width modulation (PWM) system.

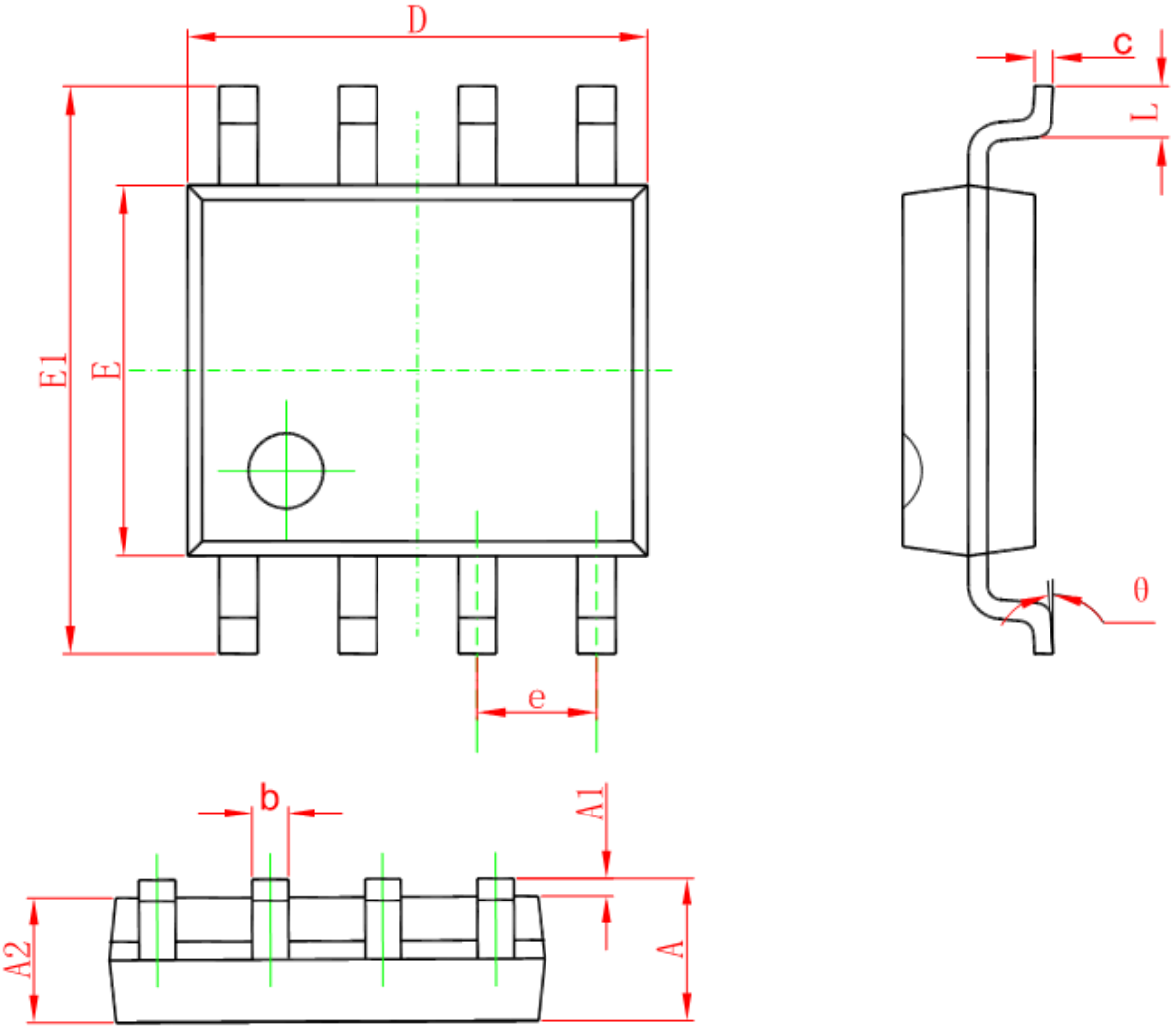
In converters of the LN8105, the pulse width varies in a range from 0 to 100%, according to the load current. The ripple voltage produced by the switching can easily be removed through a filter because the switching frequency remains constant. Therefore, these converters provide a low-ripple power over broad ranges of input voltage and load current.

- **RDS(ON) Current Limiting**

The current limit threshold is setting by the external resistor connecting from VIN supply to OCSET. The internal 100uA sink current crossing the resistor sets the voltage at the pin of OCSET. When the PWM voltage is less than the voltage at OCSET, an over-current condition is triggered.

■ Package Information

- **SOP-8**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°