Ordering number : ENA1683

LA5759

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Monolithic Linear IC

Separately-excited Step-down Switching Regulator (Variable Type)

Overview

The LA5759 is a separately-excited step-down switching regulator (variable type).

Features

- Output smoothing condenser can use a Low ESR condenser for the reliability improvement
- High efficiency
- Four external parts
- Time-base generator (80kHz) incorporated
- Current limiter incorporated
- Thermal shutdown circuit incorporated
- Soft start circuit incorporated

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	$V_{IN\ max}$		34	V
SW pin application reverse	V_{SW}		-1	V
Allowable power dissipation	Pd max1	Infinite heat sink.	7.5	W
	Pd max2	No heat sink.	1.75	W
Operating temperature	Topr		-30 to +125	°C
Storage temperature	Tstg		-40 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V_{IN}		4.5 to 32	V

Semiconductor Components Industries, LLC, 2013

Electrical Characteristics at Ta = 25°C, V_O = 3.3V

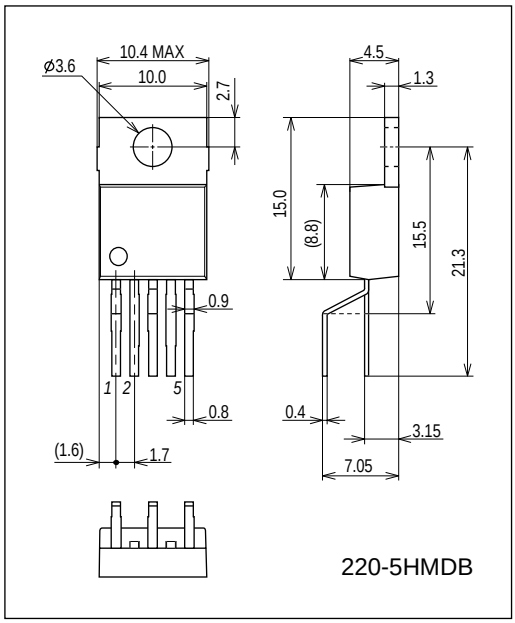
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference voltage	V_{OS}		1.235	1.26	1.285	V
Efficiency	η			78		%
Switching frequency	f	V_{IN} = 15V, I_O = 1.0A	60	80	100	kHz
Line regulation	ΔV_OLINE	V_{IN}= 8 to 20V, I_O=1.0A		40	100	mV
Load regulation	ΔV_OLOAD	V_{IN} = 15V, I_O = 0.5 to 1.5A		10	30	mV
Output voltage temperature coefficient	$\Delta V_O/\Delta Ta$	Designed target value*		±0.5		mV/°C
Ripple attenuation factor	RREJ	f = 100 to 120Hz		45		dB
Current limiter operating voltage	I_S	V_{IN} = 15V	5.4			A
Thermal shutdown operating temperature	TSD	Designed target value*		165		°C
Thermal shutdown hysteresis width	ΔTSD	Designed target value*		15		°C

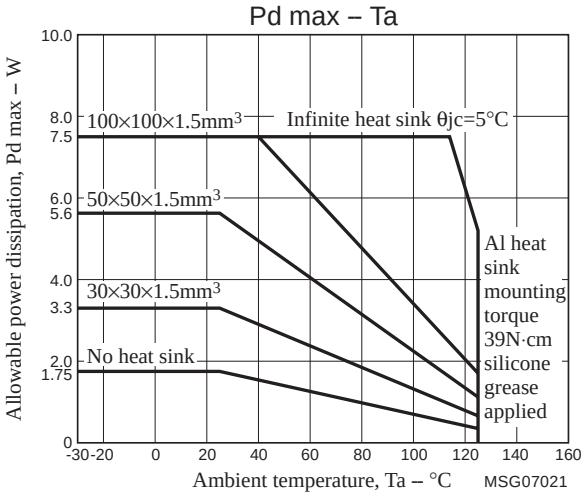
* Designed target value: No measurement made.

Package Dimensions

unit : mm (typ)

3376

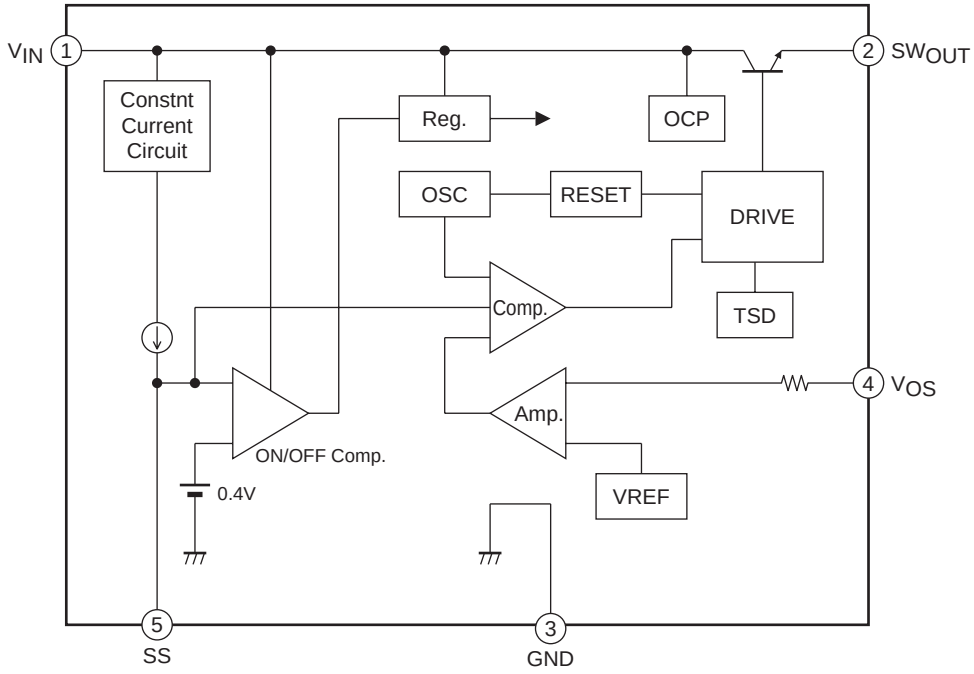




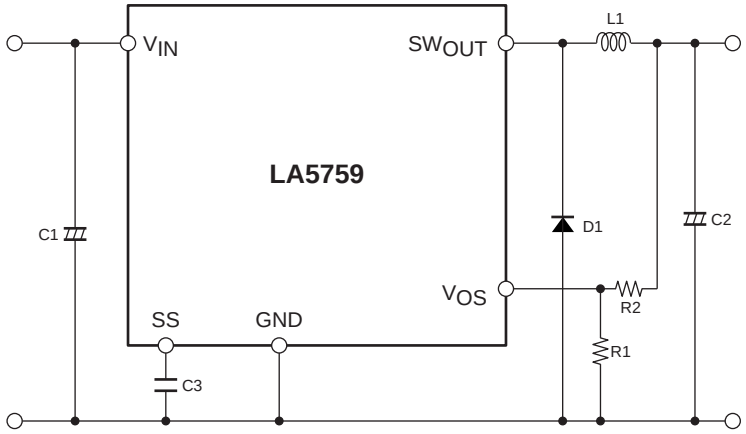
Pin Assignment

(1)V_{IN} (2)SW_{OUT} (3)GND (4)V_{OS} (5)SS

Block Diagram



Application Circuit Example



Notes: C3 is for the soft start function. Delete C3 and keep the SS pin open when the soft function is not necessary.

Description of Functional Settings

1. Calculation equation to set the output voltage

   This IC controls the switching output so that the V_{OS} pin voltage becomes 1.26V (typ).

   The equation to set the output voltage is as follows:

$$V_O = \left(1 + \frac{R2}{R1}\right) \times 1.26V(typ)$$

   The V_{OS} pin has the inrush current of 1μA (typ). Therefore, the error becomes larger when R1 and R2 resistance values are large.

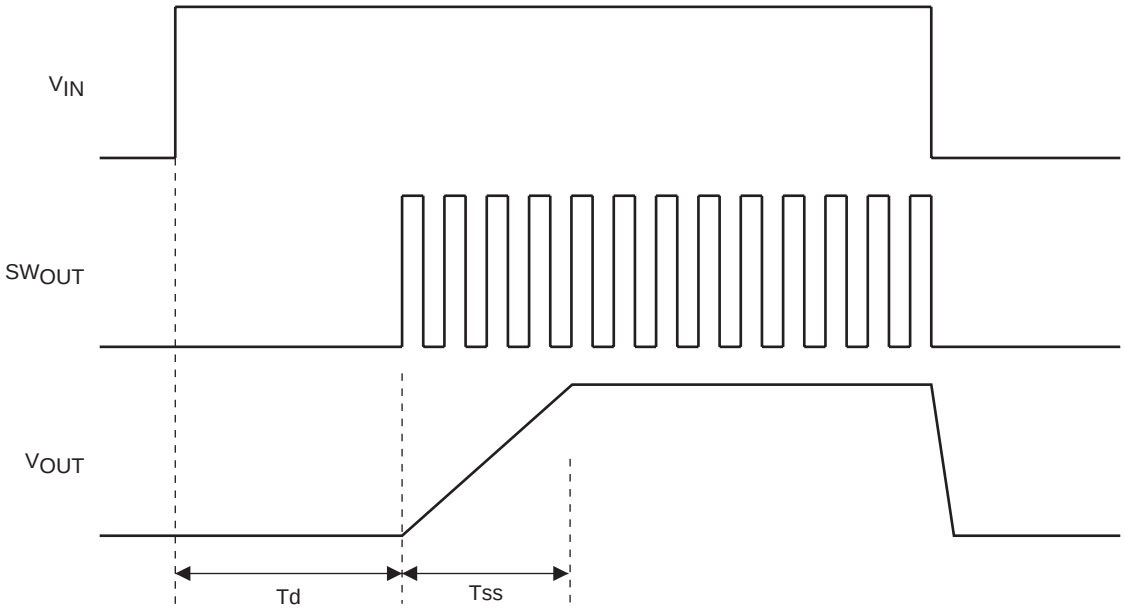
2. Start delay function

The SS pin has the internally-connected 10μA (typ) constant-current supply. When the voltage of SS pin exceeds the threshold voltage, the regulator starts operation. As the threshold is 0.62V(typ), the start delay time can be calculated as follows:

ex. For setting at 1μF

$$Td = \frac{C \times V}{i} = \frac{1\mu \times 0.4}{10\mu} = 40\ msec$$

Timing Chart



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