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LA5779

Monolithic Linear IC

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

Overview

The LA5779 is a Separately-excited step-down switching regulator (variable type).

Functions

- High efficiency.
- Six external parts.
- Time-base generator (160kHz) incorporated.
- Current limiter incorporated.
- Thermal shutdown circuit incorporated.
- ON/OFF function.

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Input voltage	$V_{IN\text{ max}}$		30	V
Maximum Output current	$I_O\text{ max}$		3	A
SW pin application reverse voltage	V_{SW}		-1	V
Allowable power dissipation	$P_d\text{ max1}$	Infinitely large heat sink.	7.5	W
	$P_d\text{ max2}$	Independent IC.	1.75	W
Operating temperature	T_{opr}		-30 to +125	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +150	$^\circ\text{C}$
Junction temperature	$T_j\text{ max}$		150	$^\circ\text{C}$

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 $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V_{IN}		4.5 to 28	V

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_O = 3.3\text{V}$

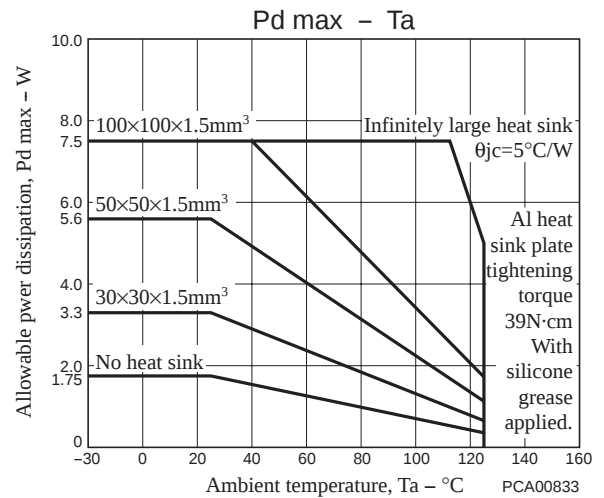
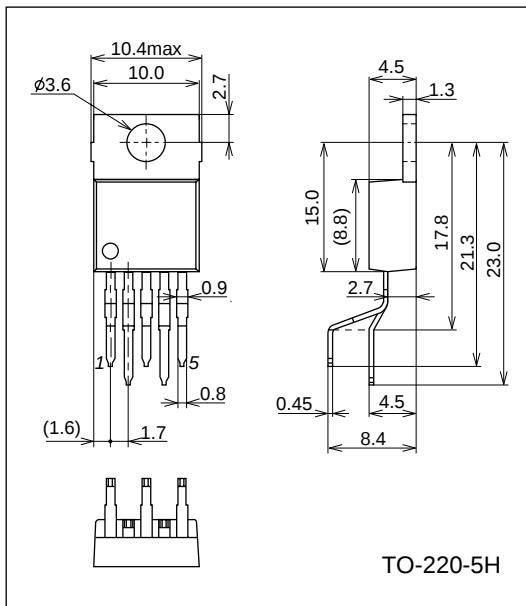
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference voltage	V_{OS}	$V_{IN} = 15\text{V}$, $I_O = 1.0\text{A}$	1.20	1.23	1.26	V
Efficiency	η	$V_{IN} = 15\text{V}$, $I_O = 1.0\text{A}$, Set $V_O = 5\text{V}$		84		%
Switching frequency	f	$V_{IN} = 15\text{V}$, $I_O = 1.0\text{A}$	128	160	192	kHz
Switching frequency when short-circuit protection is active	f_{short}	$V_{IN} = 15\text{V}$, $V_{OS} = 0\text{V}$	15	30	45	kHz
Line regulation	$\Delta V_{O\text{LINE}}$	$V_{IN} = 8$ to 20V , $I_O = 1.0\text{A}$		40	100	mV
Load regulation	$\Delta V_{O\text{LOAD}}$	$V_{IN} = 15\text{V}$, $I_O = 0.5$ to 1.5A		10	30	mV
Output voltage temperature coefficient	$\Delta V_O/\Delta T_a$	Designed target value. *		± 0.5		mV/ $^\circ\text{C}$
Ripple attenuation factor	RREJ	$f = 100$ to 120Hz		45		dB
Output leak current	$I_{O\text{leak}}$	$V_{IN} = 15\text{V}$, $SW_{OUT} = -0.4\text{V}$			50	μA
Current limiter operating voltage	I_S	$V_{IN} = 15\text{V}$	3.1			A
Operating current	I_{VIN}	$V_{IN} = 15\text{V}$		5.6		mA
Standby current	I_{STBY}	$V_{IN} = 15\text{V}$, $\text{ENA} = 5\text{V}$			200	μA
ENA pin LOW voltage range	V_{ENAL}				0.6	V
ENA pin HIGH voltage range	V_{ENAH}		2.4		V_{IN}	V
Thermal shutdown operating temperature	TSD	Designed target value. *		165		$^\circ\text{C}$
Thermal shutdown Hysteresis width	ΔTSD	Designed target value. *		15		$^\circ\text{C}$

* Design target value: No measurement made.

Package Dimensions

unit : mm (typ)

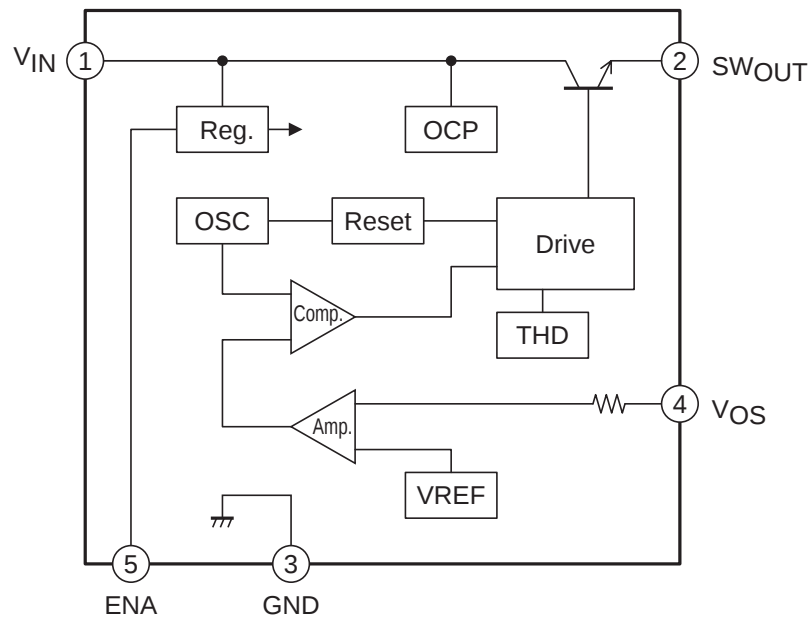
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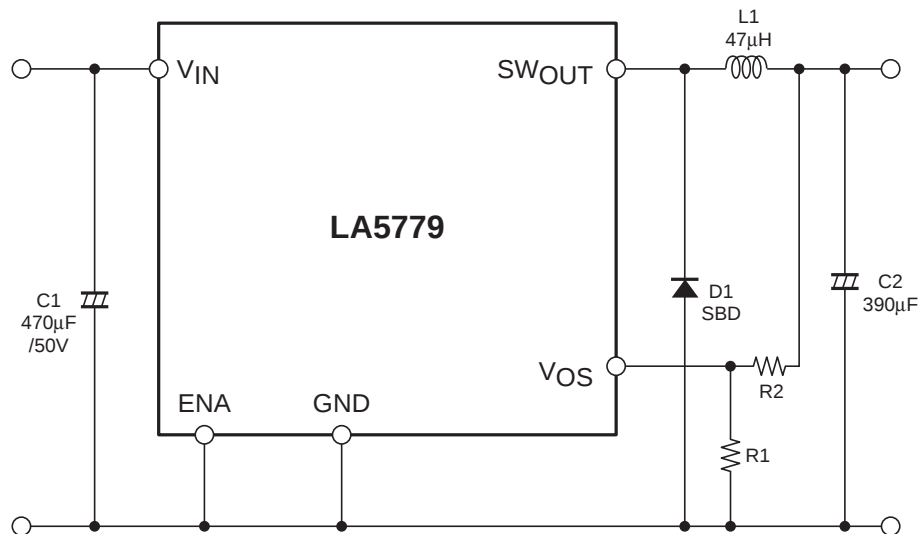
Pin Assignment

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

Block Diagram



Application Circuit Example



Description of Functional Settings

Calculation equation to set the output voltage

This IC controls the switching output so that the V_{OS} pin voltage becomes 1.23V (typ).

The equation to set the output voltage is as follows:

$$V_O = \left(1 + \frac{R_2}{R_1}\right) \times 1.23V(\text{typ})$$

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

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