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LA5779MP

Monolithic Linear IC

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

Overview

The LA5779MP 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 | $P_d\text{ max}$ | Mounted on a substrate.* | 3.9 | W |
| Operating temperature | T_{opr} | | -30 to +125 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -40 to +150 | $^\circ\text{C}$ |

* Specified substrate : $76.1 \times 114.3 \times 1.6\text{mm}^3$: Copper foil ratio 60% FR4

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 |

LA5779MP

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

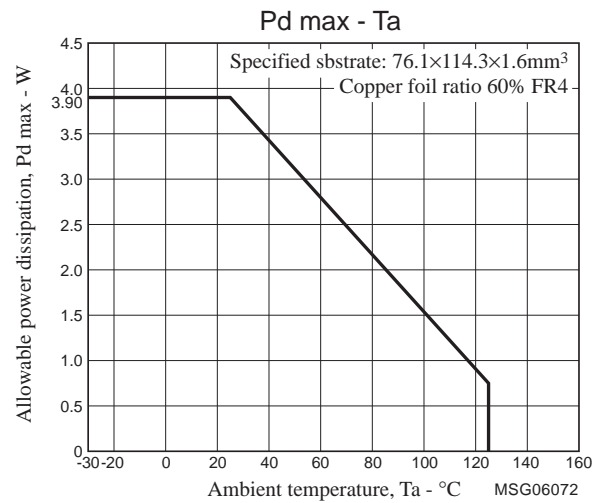
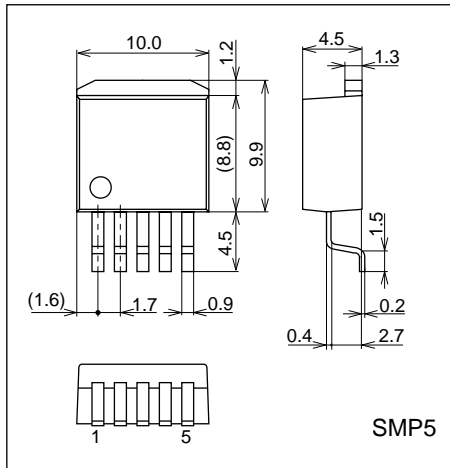
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|----------------------|---|---------|------|-----------------|-------|
| | | | min | typ | max | |
| Reference voltage | V _{OS} | V _{IN} = 15V, I _O = 1.0A | 1.20 | 1.23 | 1.26 | V |
| Efficiency | η | V _{IN} = 15V, I _O = 1.0A, Set V _O = 5V | | 84 | | % |
| Switching frequency | f | V _{IN} = 15V, I _O = 1.0A | 128 | 160 | 192 | kHz |
| Switching frequency when short-circuit protection is active | f _{short} | V _{IN} = 15V, V _{OS} = 0V | 15 | 30 | 45 | kHz |
| Line regulation | ΔV _O LINE | V _{IN} = 8 to 20V, I _O = 1.0A | | 40 | 100 | mV |
| Load regulation | ΔV _O LOAD | V _{IN} = 15V, I _O = 0.5 to 1.5A | | 10 | 30 | mV |
| Output voltage temperature coefficient | ΔV _O /ΔTa | Designed target value. * | | ±0.5 | | mV/°C |
| Ripple attenuation factor | RREJ | f = 100 to 120Hz | | 45 | | dB |
| Output leak current | I _O leak | V _{IN} = 15V, SW _{OUT} = -0.4V | | | 50 | μA |
| Current limiter operating voltage | I _S | V _{IN} = 15V | 3.1 | | | A |
| Operating current | I _{VIN} | V _{IN} = 15V | | 5.6 | | mA |
| Standby current | I _{STBY} | V _{IN} = 15V, ENA = 5V | | 50 | 100 | 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 | | °C |
| Thermal shutdown Hysteresis width | ΔTSD | Designed target value. * | | 15 | | °C |

* Design target value: No measurement made.

Package Dimensions

unit : mm (typ)

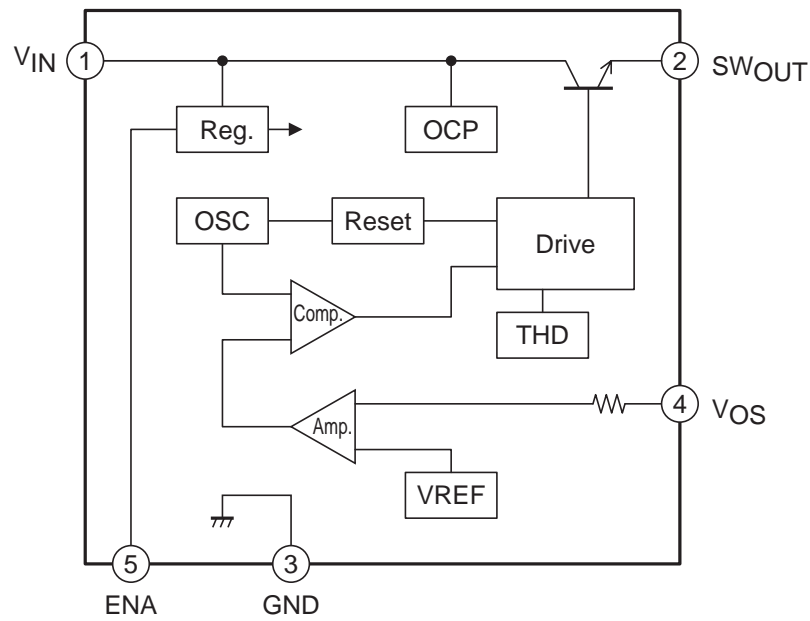
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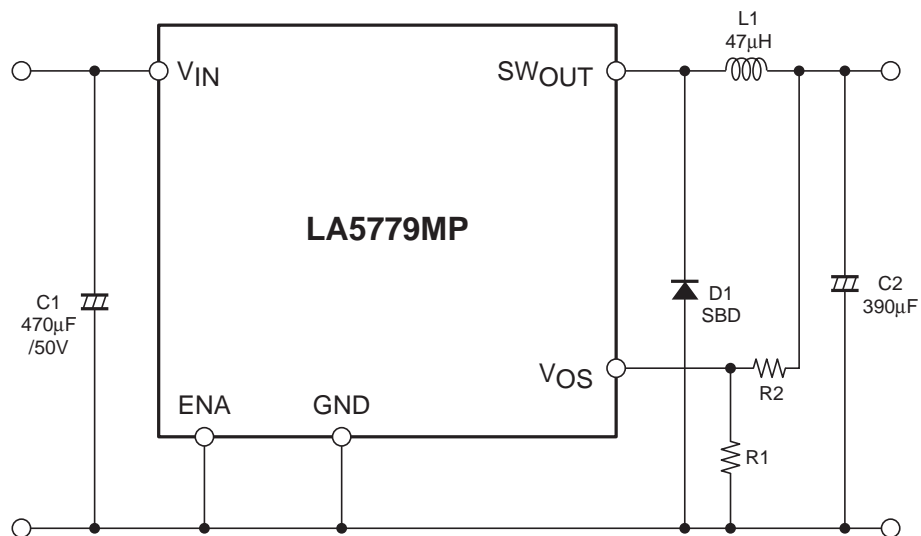
Pin Assignment

(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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