



SANYO Semiconductors

## DATA SHEET

# LA5724M

Monolithic Linear IC  
Separately-Excited Step-Down  
Switching Regulator  
(Variable Type)

## Overview

The LA5724M is a separately-excited step-down switching regulator (variable type).

## Functions

- Time-base generator (160kHz) incorporated.
- Current limiter incorporated.
- Thermal shutdown circuit incorporated.

## Specifications

### Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V <sub>IN</sub>		30	V
Maximum output current	I <sub>O</sub> max		0.6	A
SW pin application reverse voltage	V <sub>SW</sub>		-1	V
VOS pin application voltage	V <sub>VOS</sub>		-0.2 to 7	V
Allowable power dissipation	Pd max	Mounted on a circuit board.*	0.8	W
Operating temperature	T <sub>opr</sub>		-30 to +125	°C
Storage temperature	T <sub>stg</sub>		-40 to +150	°C

\* Specified circuit board : 114.3×76.1×1.6mm<sup>3</sup>, glass epoxy board.

### Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V <sub>IN</sub>		4.5 to 28	V

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# LA5724M

**Electrical Characteristics** at  $T_a = 25^\circ\text{C}$ ,  $V_{\text{IN}} = 15\text{V}$

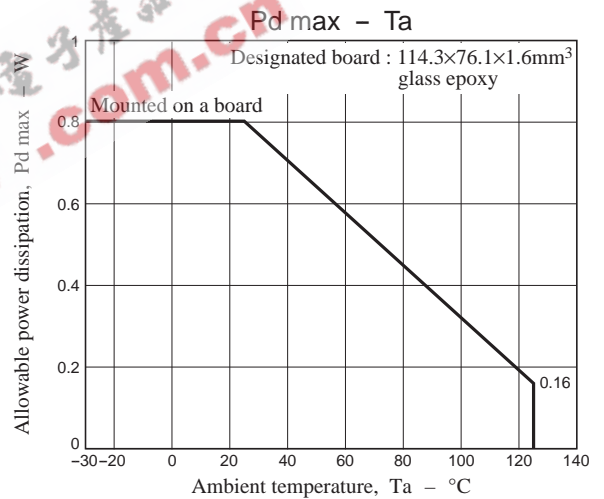
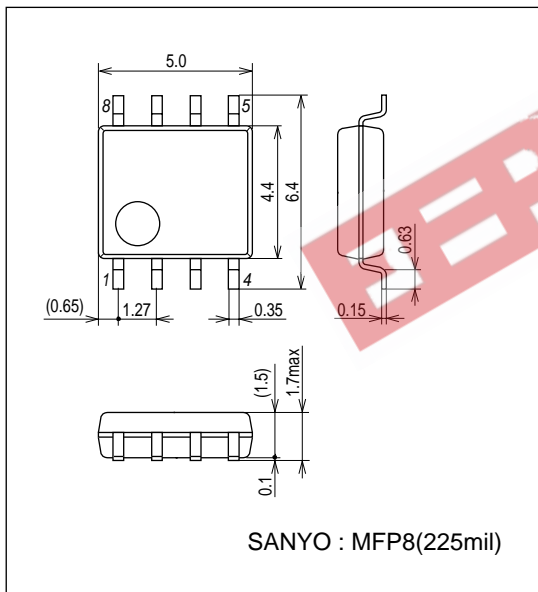
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference voltage	$V_{\text{OS}}$	$I_{\text{O}} = 0.3\text{A}$	1.20	1.23	1.26	V
Reference pin bias current	$I_{\text{FB}}$			1	2	$\mu\text{A}$
Switching frequency	fosc		128	160	192	kHz
Efficiency	$\eta$	$V_{\text{OUT}} = 5\text{V}$ , $I_{\text{O}} = 0.3\text{A}$		82		%
Short-circuit protection circuit operating switching frequency	fscp			30		kHz
Saturation voltage	Vsat	$I_{\text{OUT}} = 0.3\text{A}$ , $V_{\text{OS}} = 0\text{V}$		1.2		V
Maximum on duty	D max	$V_{\text{OS}} = 0\text{V}$		100		%
Minimum on duty	D min	$V_{\text{OS}} = 5\text{V}$		0		%
Output leakage current	I <sub>lk</sub>	$\text{SW}_{\text{OUT}} = -1\text{V}$			200	$\mu\text{A}$
Supply current	I <sub>in</sub>	$V_{\text{OS}} = 2\text{V}$		5	10	mA
Current limiter operating voltage	I <sub>S</sub>	$V_{\text{IN}} = 15\text{V}$	0.7			A
Thermal shutdown operating temperature	TSD	Designed target value. *		165		$^\circ\text{C}$
Thermal shutdown Hysteresis width	$\Delta\text{TSD}$	Designed target value. *		15		$^\circ\text{C}$

\* Design target value : No measurement made.

## Package Dimensions

unit : mm (typ)

3032D

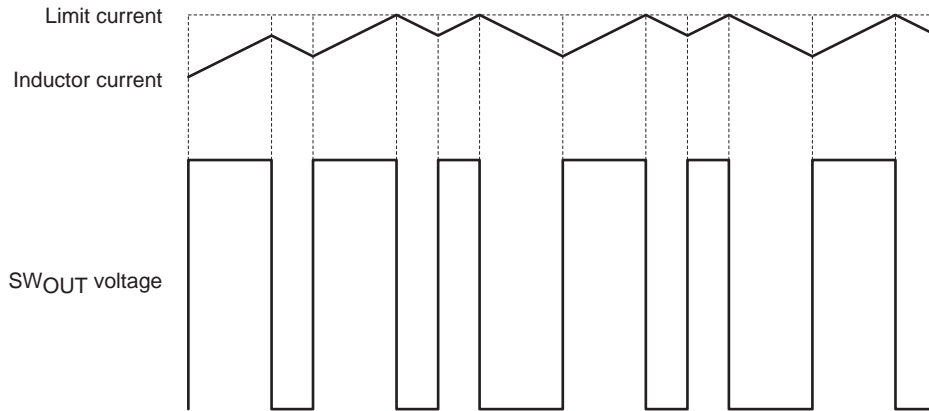




**Protection Circuit Functional Descriptions**

1. Overcurrent protection function

The overcurrent protection function detects, on a cycle-by-cycle basis, the output transistor current and turns off that output transistor current if it exceeds 0.7A in a cycle-by-cycle manner.



2. Short circuit protection function

This IC prevents the current from increasing when the outputs are shorted by setting the switching frequency to 30kHz if the V<sub>OS</sub> pin voltage falls below 0.8V.

Note : Since the switching frequency becomes 30kHz when the V<sub>OS</sub> pin voltage falls under 0.8V, the current capacity is reduced. If a load is applied with the V<sub>OS</sub> pin voltage over 0.8V, the inductance value operates at 47μH. If a load is to be applied when this voltage is under 0.8V, the inductance value must be increased.

**Description of Functional Settings**

1. Calculation equation to set the output voltage

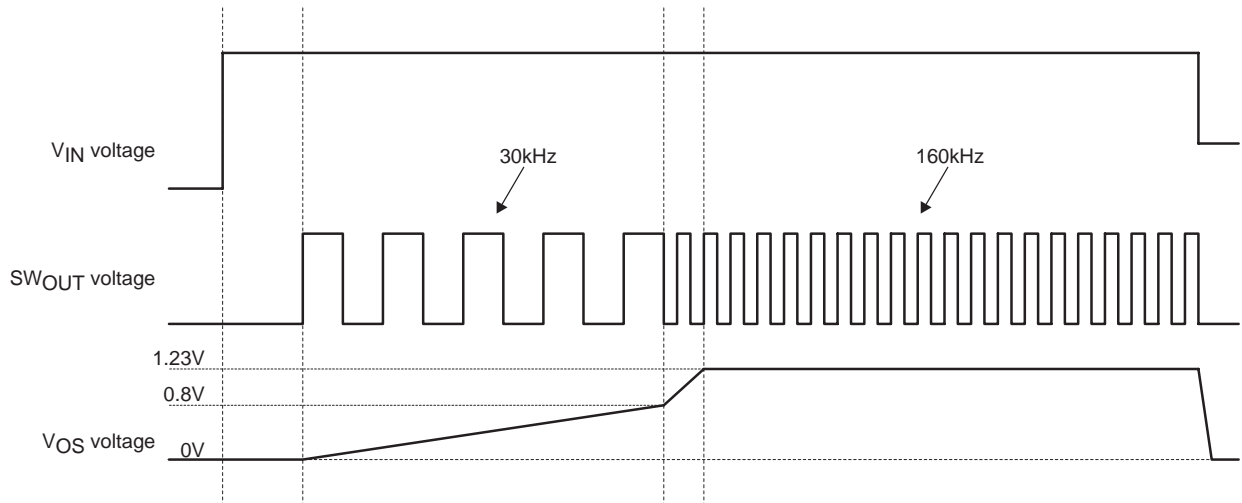
This IC controls the switching output so that the V<sub>OS</sub> pin voltage becomes 1.23V (typ).

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<sub>OS</sub> pin has the inrush current of 1μA (typ). Therefore, the error becomes larger when R<sub>1</sub> and R<sub>2</sub> resistance values are large.

## Timing Chart



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