



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_{IN}		30	V
Maximum output current	I_O max		0.6	A
SW pin application reverse voltage	V_{SW}		-1	V
VOS pin application voltage	V_{VOS}		-0.2 to 7	V
Allowable power dissipation	P_d max	Mounted on a circuit board.*	0.8	W
Operating temperature	T_{opr}		-30 to +125	°C
Storage temperature	T_{stg}		-40 to +150	°C

* Specified circuit board : 114.3×76.1×1.6mm³, glass epoxy board.

Recommended Operating Conditions at Ta = 25°C

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

- Any and all SANYO Semiconductor products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO Semiconductor representative nearest you before using any SANYO Semiconductor products described or contained herein in such applications.
- SANYO Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor products described or contained herein.

SANYO Semiconductor Co., Ltd.

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

LA5724M

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

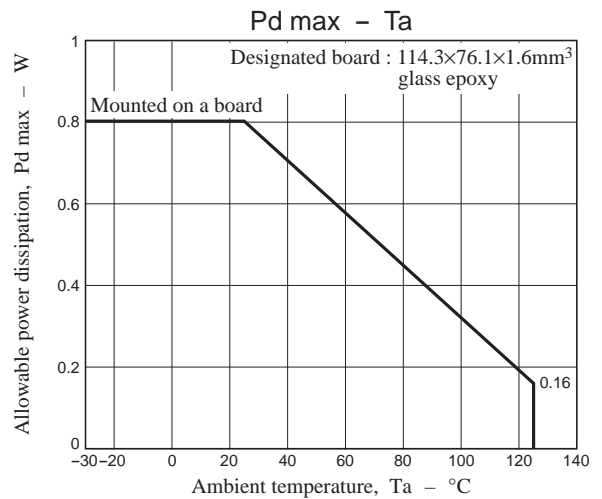
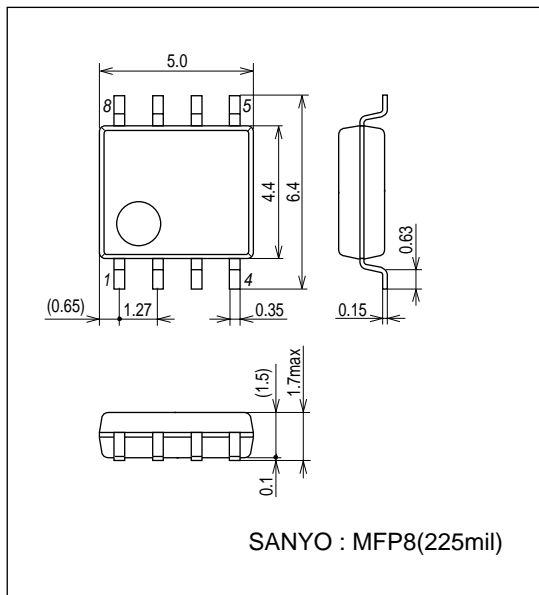
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference voltage	V_{OS}	$I_O = 0.3\text{A}$	1.20	1.23	1.26	V
Reference pin bias current	I_{FB}			1	2	μA
Switching frequency	fosc		128	160	192	kHz
Efficiency	η	$V_{OUT} = 5\text{V}$, $I_O = 0.3\text{A}$		82		%
Short-circuit protection circuit operating switching frequency	fscp			30		kHz
Saturation voltage	Vsat	$I_{OUT} = 0.3\text{A}$, $V_{OS} = 0\text{V}$		1.2		V
Maximum on duty	D max	$V_{OS} = 0\text{V}$		100		%
Minimum on duty	D min	$V_{OS} = 5\text{V}$		0		%
Output leakage current	I _{lk}	$SW_{OUT} = -1\text{V}$			200	μA
Supply current	I _{in}	$V_{OS} = 2\text{V}$		5	10	mA
Current limiter operating voltage	I _S	$V_{IN} = 15\text{V}$	0.7			A
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

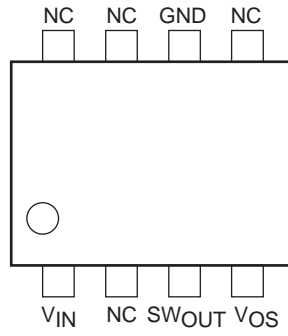
unit : mm (typ)

3032D

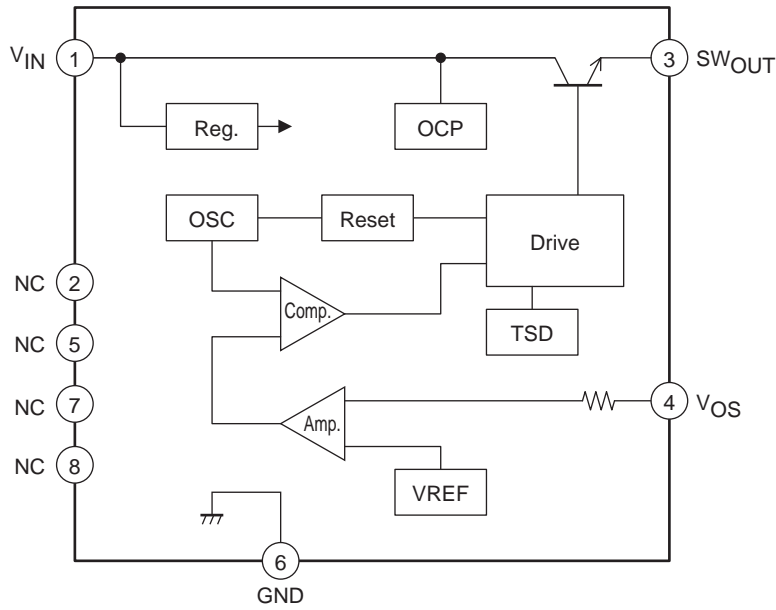


LA5724M

Pin Assignment

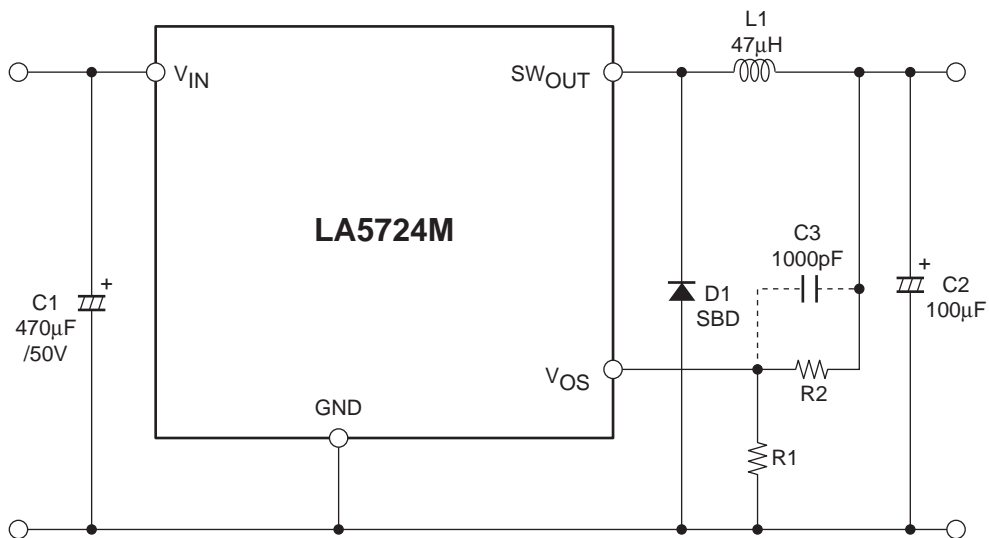


Block Diagram



Note : Since the NC pins are not connected within the IC package, they can be used as connection points.

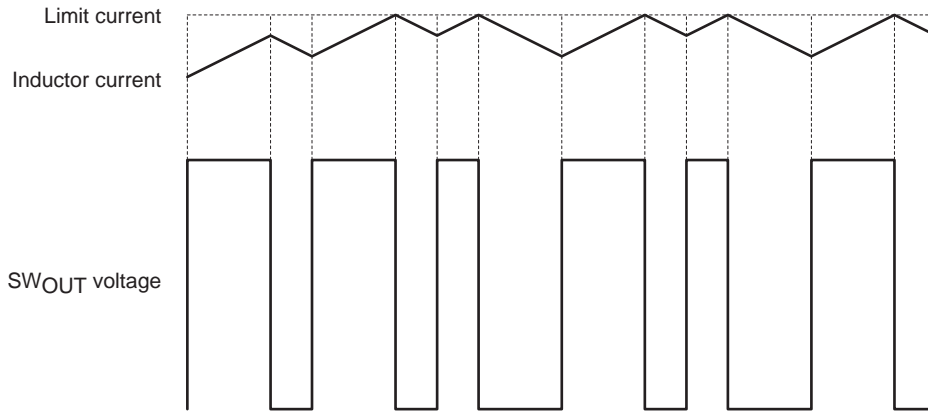
Application Circuit Example



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.



www.DataSheet4U.com

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_{OS} pin voltage falls below 0.8V.

Note : Since the switching frequency becomes 30kHz when the V_{OS} pin voltage falls under 0.8V, the current capacity is reduced. If a load is applied with the V_{OS} 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

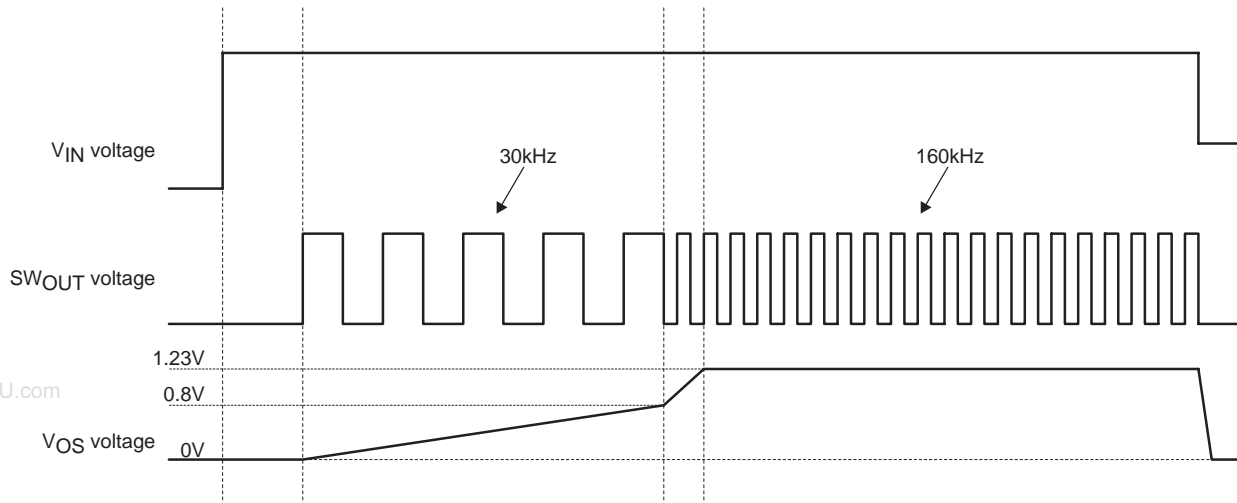
This IC controls the switching output so that the V_{OS} pin voltage becomes 1.23V (typ).

The equation to set the output voltage is as follows :

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

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

Timing Chart



- Specifications of any and all SANYO Semiconductor products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Semiconductor Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO Semiconductor products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Semiconductor Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO Semiconductor product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO Semiconductor believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of January, 2007. Specifications and information herein are subject to change without notice.