



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

LV5851M — Bi-CMOS IC Step-down Switching Regulator

Overview

LV5851M is a chopper type 1ch step-down regulator incorporating the drive transistor.

For the LO side switch, the 0.03Ω, and HI side switch, the 0.06Ω resistance is incorporated, enabling driving of the output up to 3 A with high efficiency.

Being of a current mode control type, this product ensures satisfactory load current response and simple phase compensation. The fold-back function is provided as the protection in case of output over-current. This function reduces the frequency in case of over-current and thus reduce the inductor current. The overheat protection function is also provided. For the package, MFP8 without exposed-PAD has been employed.

Functions

- 3A 1ch step-down switching regulator
- Input Voltage Range (5-18V)
- High efficiency: Max efficiency over 95%
- Compact package: MFP8 (225mil)
(No backside heat sink)
- Synchronous rectification, Current Mode Operation
- High/Low impedance Switch:
 - High-Side Switch: 60mΩ
 - Low-Side Switch: 30mΩ
- Soft start time 7.5ms
- Over-current protection

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V _{IN-abs}		-0.3 to 20	V
SW pin voltage	V _{SW-abs}		-0.3 to V _{IN} +0.3	V
EN pin voltage	V _{EN-abs}		V _{IN-abs}	V
FB,COMP pin			-0.3 to 7	V
Allowable power dissipation	Pd max	With specified board *	1.0	W
Junction temperature	Tj max		150	°C
Operating temperature	Topr		-30 to 85	°C
Storage temperature	Tstg		-40 to 150	°C

* Specified board: 31.0mm × 34.0mm × 1.7mm, glass epoxy.

■ Any and all SANYO Semiconductor Co.,Ltd. products described or contained herein are, with regard to "standard application", intended for the use as general electronics equipment (home appliances, AV equipment, communication device, office equipment, industrial equipment etc.). The products mentioned herein shall not be intended for use for any "special application" (medical equipment whose purpose is to sustain life, aerospace instrument, nuclear control device, burning appliances, transportation machine, traffic signal system, safety equipment etc.) that shall require extremely high level of reliability and can directly threaten human lives in case of failure or malfunction of the product or may cause harm to human bodies, nor shall they grant any guarantee thereof. If you should intend to use our products for applications outside the standard applications of our customer who is considering such use and/or outside the scope of our intended standard applications, please consult with us prior to the intended use. If there is no consultation or inquiry before the intended use, our customer shall be solely responsible for the use.

■ Specifications of any and all SANYO Semiconductor Co.,Ltd. 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.

LV5851M

Recommended Operating Conditions at Ta = 25°C

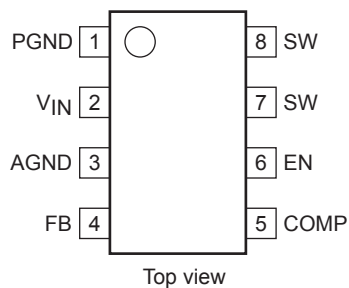
Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V _{IN}		5 to 18	V
SW pin voltage	V _{SW}		-0.3 to V _{IN} +0.3	V
Output Voltage Range			0.85 to 0.8V _{IN}	V
Maximum Output Current	I _O max		3	A

Electrical Characteristics at Ta = 25°C, V_{IN} = 12V, V_{OUT}=5V, unless otherwise specified.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply Voltage	V _{IN}		5		18	V
Reference Voltage	V _{FB}		0.825	0.835	0.845	V
Starting input voltage	V _{UVLO1}			4.65	4.9	V
Operation stop input voltage	V _{UVLO2}		3.8	4.3		V
Feedback Voltage Input Current	I _{FB}			80		nA
IC operate current	I _{IN}	FB=0.9V		3		mA
EN starting voltage	V _{EN_ON}		2			V
EN stopping voltage	V _{EN_OFF}				0.6	V
Load Regulation				0.5		%
Line Regulation				1		%
Switching frequency	f _{OSC}	V _{IN} =12V, I _O =1.0A	350	500	600	kHz
Max Duty cycle	D _{max}		80			%
Min Duty cycle	D _{min}				13.5	%
Shut Down current	I _{sd}			180		μA
Soft Start Time	St		5	7.5	10	ms
Internal MOS FET High Side ON-Resistance	R _{ONH}	V _{IN} =12V		60	90	mΩ
		V _{IN} =5V		90	160	mΩ
Internal MOS FET Low Side ON-Resistance	R _{ONL}	V _{IN} =12V		30	50	mΩ
		V _{IN} =5V		50	90	mΩ
Current limiter operating voltage	I _S	V _{IN} =12V		4.5		A
		V _{IN} =5V		4.0		A
Thermal shutdown operating temperature	TSD	*Design guarantee		160		°C
Thermal shutdown Hysteresis width	ΔTSD	*Design guarantee		50		°C

*: Design guarantee (value guaranteed by design and not tested before shipment)

Pin Assignment

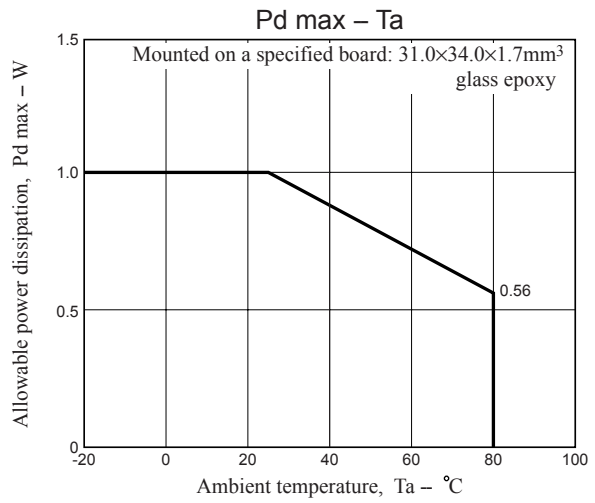
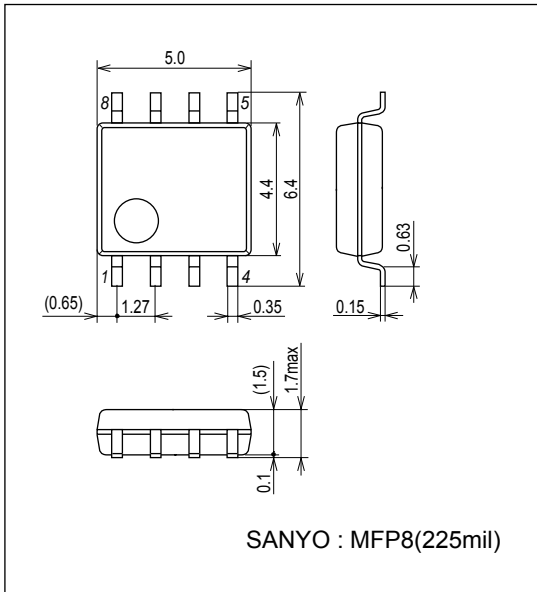


LV5851M

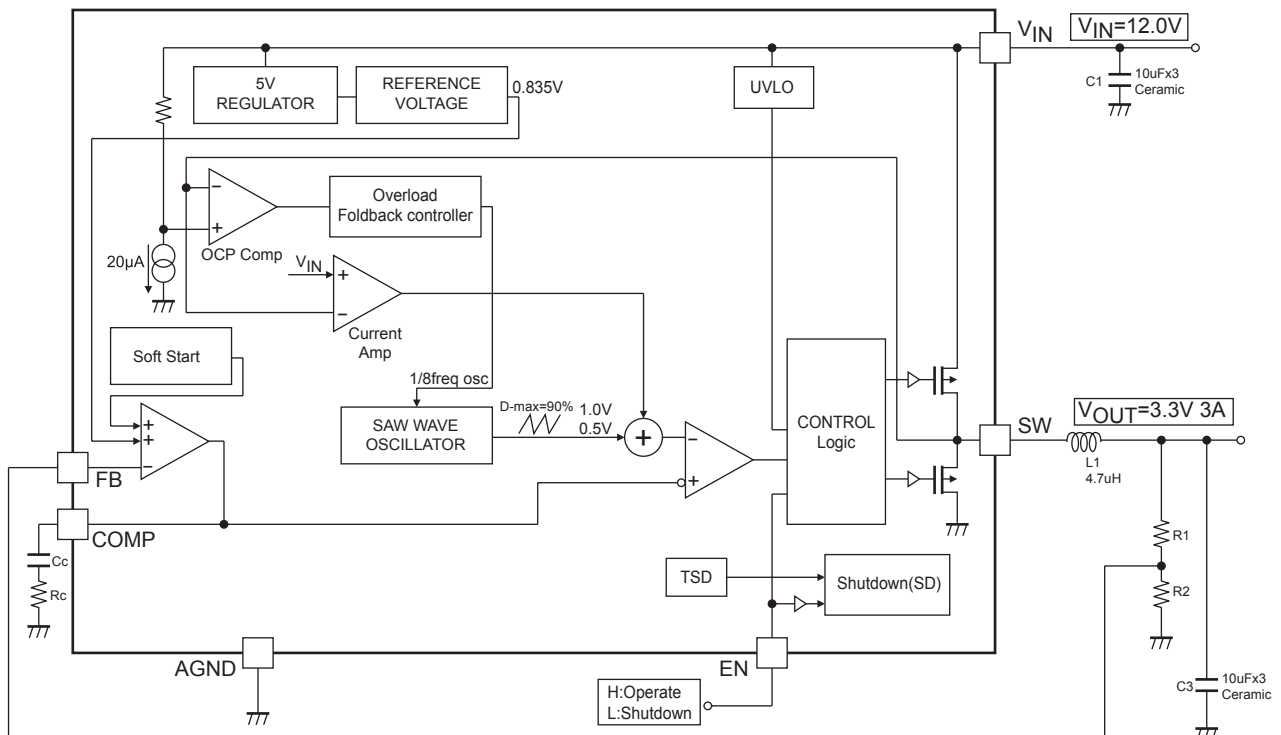
Package Dimensions

unit : mm (typ)

3032D



Block Diagram and Sample Application Circuit



LV5851M

Pin Function

Pin No.	Pin name	Function	Equivalent circuit
1	PGND	Power Ground pin. Connect to AGND electrically.	
2	V _{IN}	Power supply pin. Connect the sufficiently large capacitance (10μF x 3 parallel or more recommended for the output current of 3 A or more between this pin and GND). With the pin voltage of 4.65V or more, the soft start function is activated and IC starts up slowly. When the pin voltage drops to 4.3 V or less, IC stops operation.	
7, 8	SW	Power Switching Output. Connect Inductor to this pin.	
3	AGND	Each reference voltage is based on the voltage of the AGND pin.	
4	FB	Error amplifier reverse input pin. By operating the converter, the voltage of this pin becomes 0.835V. The voltage in which the output voltage is divided by an external resistance is applied to this pin. The output voltage is determined as the follow formula. $V_{OUT} = V_{ref} \times \left\{ 1 + \frac{R1}{R2} \right\}, \quad V_{ref} = 0.835V$ Example: 3.3V Output voltage (Refer to the Block Diagram and Sample Application Circuit) $V_{OUT} = 0.835V \times \left\{ 1 + \frac{3.0k}{1.0k} \right\} = 3.340V$	
5	COMP	External loop compensation pin. Connect with the phase compensation external capacitance and resistance of DC / DC converter close loop.	
6	EN	ON / OFF pin [High : Operating / Low : Shutdown Open: forbidden] Operate voltage: ≥ 2V Shutdown voltage : ≥ 0.6V	

- SANYO Semiconductor Co.,Ltd. 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 Co.,Ltd. products described or contained herein.
- SANYO Semiconductor Co.,Ltd. strives to supply high-quality high-reliability products, however, any and all semiconductor products fail or malfunction with some probability. It is possible that these probabilistic failures or malfunction could give rise to accidents or events that could endanger human lives, trouble that could give rise to smoke or fire, or accidents 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 Co.,Ltd. products described or contained herein are controlled under any of applicable local export control laws and regulations, such products may require 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 consent 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 Co.,Ltd. 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.
- Upon using the technical information or products described herein, neither warranty nor license shall be granted with regard to intellectual property rights or any other rights of SANYO Semiconductor Co.,Ltd. or any third party. SANYO Semiconductor Co.,Ltd. shall not be liable for any claim or suits with regard to a third party's intellectual property rights which has resulted from the use of the technical information and products mentioned above.

This catalog provides information as of January, 2010. Specifications and information herein are subject to change without notice.