


SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

LV5747QA — 1-channel Step-down Switching Regulator

Bi-CMOS LSI

Overview

The LV5747QA is a 1-channel step-down switching regulator.

Functions

- 1 channel step-down switching regulator controller.
- Frequency decrease function at pendent.
- Load-independent soft start circuit.
- ON/OFF function.
- Built-in pulse-by-pulse OCP circuit. It is detected by using ON resistance of an external MOS.

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{IN} max		45	V
Allowable pin voltage	V_{IN} , SW		45	V
	HDRV, CBOOT		52	V
	LDRV		6.0	V
	Between CBOOT to SW, Between CBOOT to HDRV		6.0	V
	EN, ILIM		$V_{IN}+0.3$	V
	Between V_{IN} to ILIM		1.0	V
	V_{DD}		6.0	V
	SS, FB, COMP		$V_{DD}+0.3$	V
Allowable Power dissipation	P_d max	Mounted on a specified board. *	0.65	W
Junction temperature	T_j max		150	$^\circ\text{C}$
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* Specified board: 24mm x 15mm x 1.6mm, glass epoxy 2-layer board.

- 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. 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 new introduction or other application different from current conditions on the usage of automotive device, communication device, office equipment, industrial equipment etc. , please consult with us about usage condition (temperature, operation time etc.) 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.

LV5747QA

Recommended Operating Ranges at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage range	V_{IN}		8.0 to 42	V
Error amplifier input voltage	V_{FB}		0 to 1.6	V

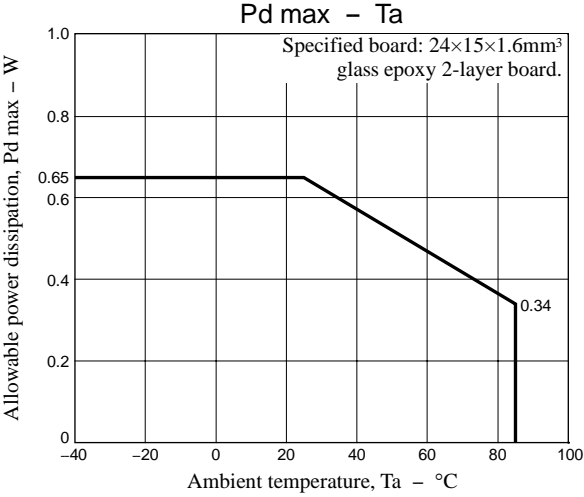
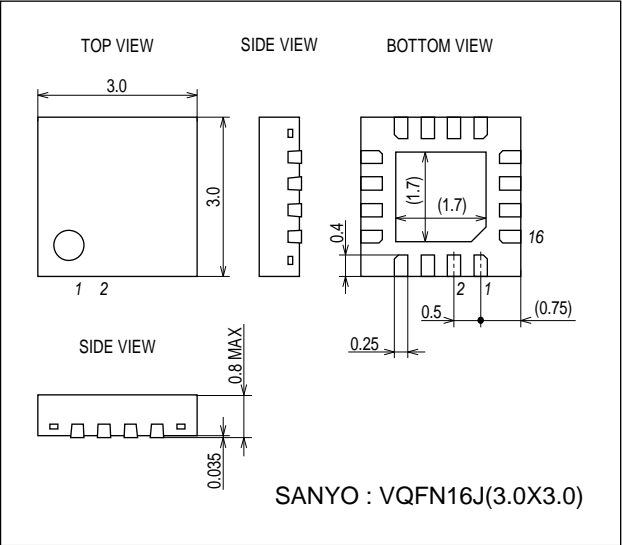
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{IN} = 24\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference voltage block						
Internal reference voltage	V_{ref}	Including offset of E/A	0.698	0.708	0.718	V
5V power supply	V_{DD}	$I_{OUT} = 0$ to 5mA	4.7	5.2	5.7	V
Triangular waveform oscillator block						
Oscillation frequency	F_{OSC}		335	385	435	kHz
Frequency variation	$F_{OSC DV}$	$V_{IN} = 8$ to 42V		1		%
Oscillation frequency fold back detection voltage	$V_{OSC FB}$	FB voltage detection after SS ends		0.5		V
Oscillatory frequency after fold back	$F_{OSC FB}$	$V_{FB} = 0\text{V}$	25	45	60	kHz
ON/OFF circuit block						
IC start-up voltage	$V_{EN on}$	$V_{IN} = 8$ to 42V		3.4	4.3	V
start-up voltage hysteresis	$V_{EN hys}$		1.0	1.2		V
Soft start circuit block						
Soft start source current	$I_{SS SC}$	$EN > 4.3\text{V}$	4	5	6	μA
Soft start sink current	$I_{SS SK}$	$EN < 1\text{V}$, $V_{DD} = 5\text{V}$		2		mA
Soft start end voltage	$V_{SS END}$		0.9	1.1	1.3	V
UVLO circuit block						
UVLO lock release voltage	V_{UVLO}		7.0	7.4	7.8	V
UVLO hysteresis	$V_{UVLO H}$			0.6		V
Error amplifier						
Input bias current	$I_{EA IN}$				100	nA
Error amplifier gain	G_{EA}		1000	1400	1800	$\mu\text{A/V}$
Common mode input range	$V_{EA R}$	$V_{IN} = 8$ to 42V	0.0		1.6	V
Sink output current	$I_{EA OSK}$	FB = 1.0V		-100		μA
Source output current	$I_{EA OSC}$	FB = 0V		100		μA
Current detection amplifier gain	G_{ISNS}			1.3		
over current limiter circuit block						
Reference current	I_{LIM}		-10%	20	+10%	μA
Over current detection comparator offset voltage	$V_{LIM OFS}$		-5		+5	mV
Over current detection comparator common mode input range			$V_{IN}-0.45$		V_{IN}	V
PWM comparator						
Input threshold voltage	$V_t \text{ max}$	Duty cycle = DMAX, SW = V_{IN}	1.0	1.1	1.2	V
	$V_t 0$	Duty cycle = 0%, SW = V_{IN}	0.4	0.5	0.6	V
Maximum ON duty	DMAX		85	90	95	%
Output block						
Output stage ON resistance (the upper side)	R_{ONH}			5		Ω
Output stage ON resistance (the under side)	R_{ONL}			5		Ω
Output stage ON current (the upper side)	I_{ONH}		240			mA
Output stage ON current (the under side)	I_{ONL}		240			mA
The whole device						
Standby current	I_{CCS}	$EN < 1\text{V}$			60	μA
Mean consumption current	I_{CCA}	$EN > 4.3\text{V}$		3.3		mA

LV5747QA

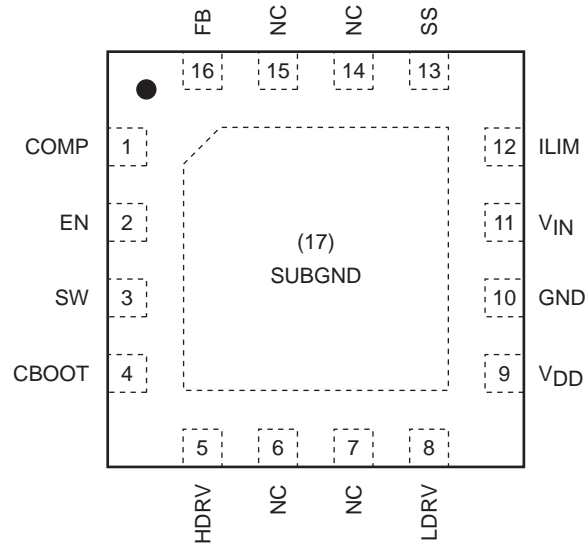
Package Dimensions

unit : mm (typ)
3444



LV5747QA

Pin Assignment



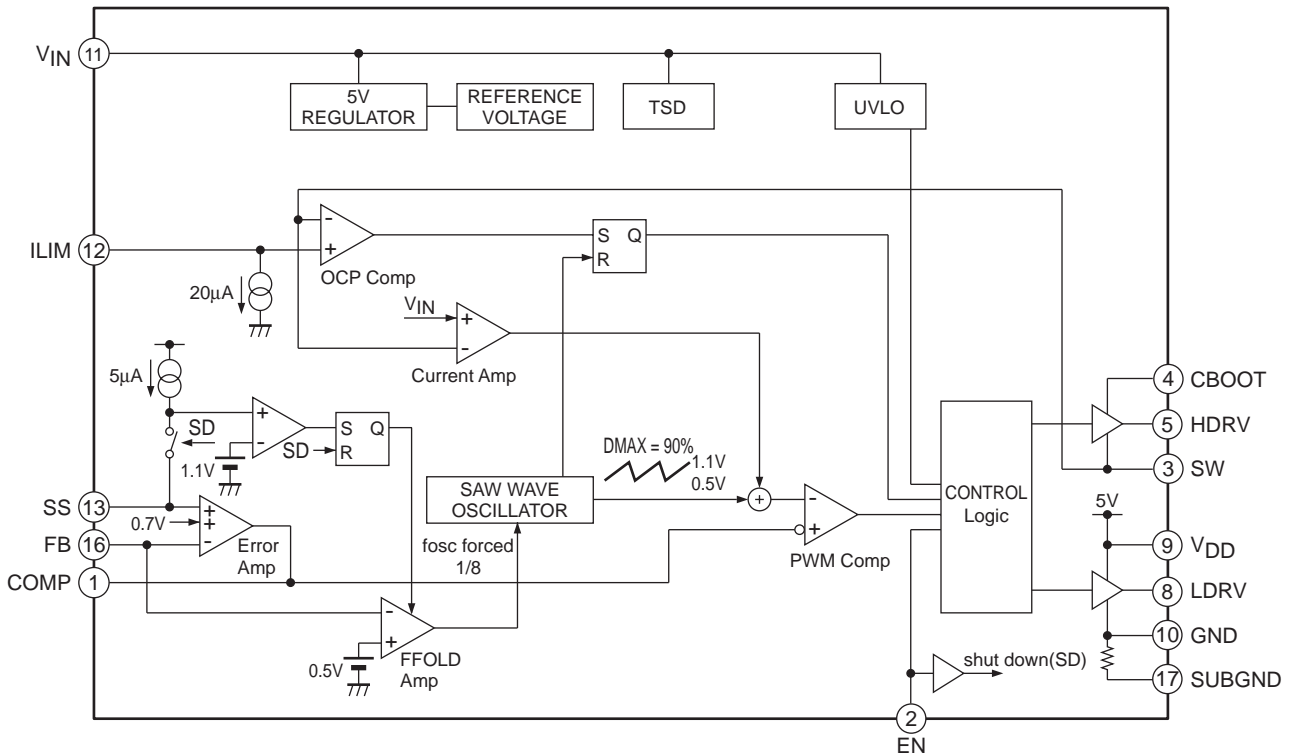
(Top view)

Pin Function

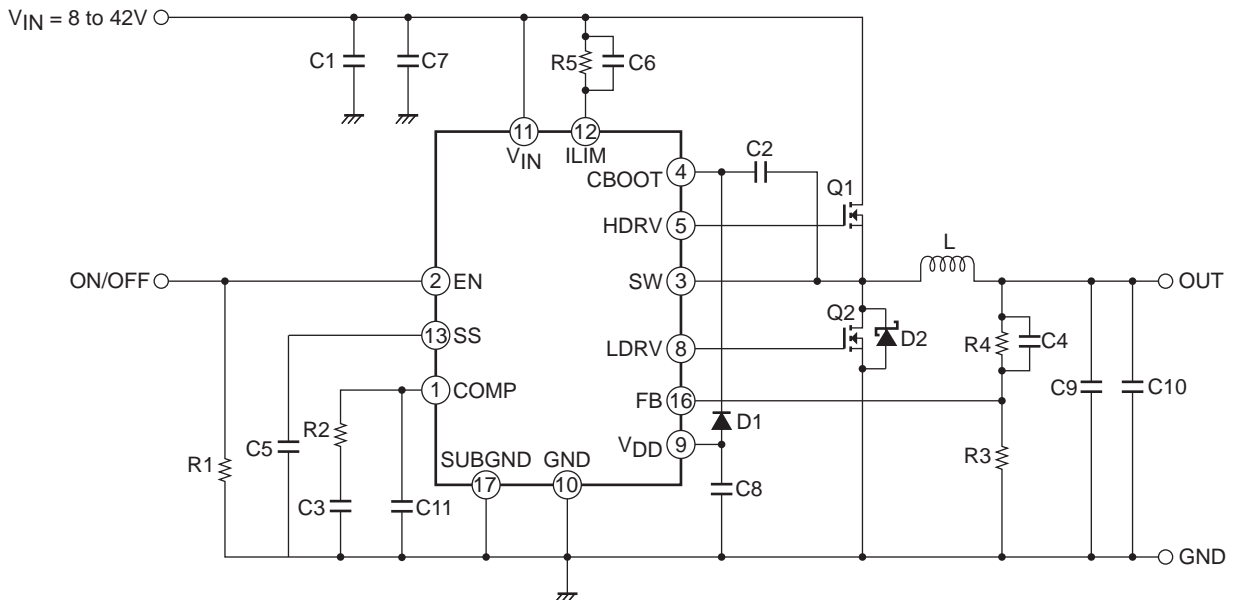
Pin No.	Pin name	Description
1	COMP	Error amplifier output pin. Connect a phase compensation circuit between this pin and FB.
2	EN	ON/OFF pin.
3	SW	Pin to connect with switching node. The source of NchMOSFET connects to this pin.
4	CBOOT	Bootstrap capacity connection pin. This pin becomes a GATE drive power supply of an external NchMOSFET. Connect a bypath capacitor between CBOOT and SW.
5	HDRVV	An external the upper MOSFET gate drive pin.
6, 7, 14, 15	NC	NC denotes no internal connection.
8	LDRV	An external the lower MOSFET gate drive pin.
9	V _{DD}	Power supply pin for an external the lower MOS-FET gate drive.
10	GND	Ground pin. Each reference voltage is based on the voltage of the ground pin.
11	V _{IN}	Power supply pin. This pin is monitored by UVLO function. When the voltage of this pin becomes 7.8V or more by UVLO function, The IC starts and the soft start function operates.
12	ILIM	Reference current pin for current detection. The sink current of about 20 μ A flows to this pin. When a resistance is connected between this pin and V _{IN} outside and the voltage applied to the SW pin is lower than the voltage of the terminal side of the resistance, the upper NchMOSFET is off by operating the current limiter comparator. This operation is reset with respect to each PWM pulse.
13	SS	Pin to connect a capacitor for soft start. A capacitor for soft start is charged by using the voltage of about 5 μ A. This pin ends the soft start period by using the voltage of about 1.1V and the frequency fold back function becomes active.
16	FB	Error amplifier reverse input pin. By operating the converter, the voltage of this pin becomes 0.708V. The voltage in which the output voltage is divided by an external resistance is applied to this pin. Moreover, when this pin voltage becomes 0.5V or less after a soft start ends, the frequency fold back function operations, and the oscillating frequency is falling with the FB voltage.
17	SUBGND	It is connected to SUB of the IC. Thus, use it with electric potential same as a GND pin.

LV5747QA

Block Diagram



Sample Application Circuit



- 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.
- Regarding monolithic semiconductors, if you should intend to use this IC continuously under high temperature, high current, high voltage, or drastic temperature change, even if it is used within the range of absolute maximum ratings or operating conditions, there is a possibility of decrease reliability. Please contact us for a confirmation.
- 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.
- 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 October, 2012. Specifications and information herein are subject to change without notice.