



SANYO Semiconductors

DATA SHEET

LB8684CL — Monolithic Digital IC Digital Camera Motor Driver for Cell Phones

Overview

The LB8684CL is a low-voltage, low-saturation 1.5-channel constant current forward/reverse driver IC provided in a miniature package suitable for use in cell phone cameras. The LB8684CL can be driven directly from a microcontroller and is optimal for control of the voice coil motors used for shutter and aperture control in cell phone cameras.

Features

- Supports low-voltage drive. (2.2V or more)
- Ultraminiature package (ECSP2828-12)

Functions

- Constant current control ($I_{OUT} = 100\text{mA}$ at $R_F = 2\Omega$)
- Built-in thermal protection circuit
- Built-in reference voltage (0.2V typical)
- Built-in spark killer diode
- ENA input logic (3-port interface)

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		-0.3 to +8.0	V
Output voltage	V_{OUT} max	OUT1, OUT2, OUT3	$V_{CC} + V_{SF}$	V
Input voltage	V_{IN} max	ENA, CHSEL, IN	-0.3 to +8.0	V
Ground pin source current	IGND	Per channel	400	mA
Allowable power dissipation	P_d max	When mounted on a circuit board *	450	mW
Operating temperature	T_{opr}		-30 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +150	$^\circ\text{C}$

* Specified circuit board : $20.0 \times 10.0 \times 0.8\text{mm}^3$, paper-phenol

■ 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.

SANYO Semiconductor Co., Ltd.

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

LB8684CL

Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V _{CC}		2.2 to 7.5	V
High-level input voltage	V _{IH}	ENA, CHSEL, IN	1.5 to 7.5	V
Low-level input voltage	V _{IL}		-0.3 to 0.5	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 3.3V

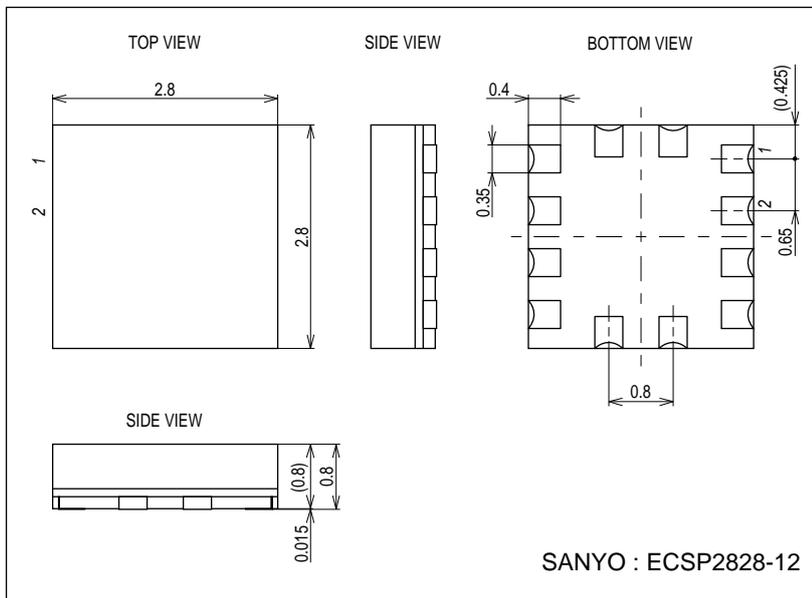
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current	I _{CC0}	ENA = 0V		0.1	1	μA
	I _{CC01}	ENA = 3V, FC = 0V		3.8	5.5	mA
	I _{CC02}	ENA = 3V, RF = 2Ω, excluding the output current, I _O		5.5	8.0	mA
Output saturation voltage	V _{OUT1}	ENA = 3V, I _{OUT} = 100mA		0.2	0.3	V
	V _{OUT2}	ENA = 3V, I _{OUT} = 200mA*		0.41	0.6	V
Output constant current	I _{OUT1}	Between REF and GND : 2Ω	95	100	105	mA
	I _{OUT2}	Between REF and GND : 1Ω*	190	200	210	mA
Input current	I _{IN}	V _{IN} = 3V		50	70	μA
Spark killer diode						
Reverse current	IS(leak)				1	μA
Forward voltage	V _{SF1}	I _{OUT} = 100mA			1.7	V
	V _{SF2}	I _{OUT} = 200mA*			1.7	V

* Design guarantee: These characteristics are design targets and are not measured.

Package Dimensions

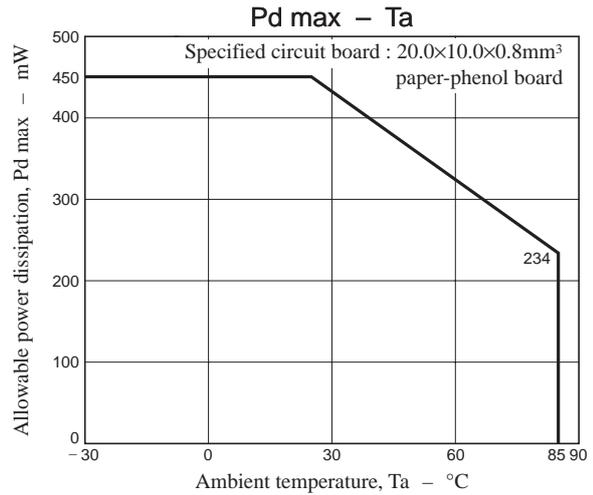
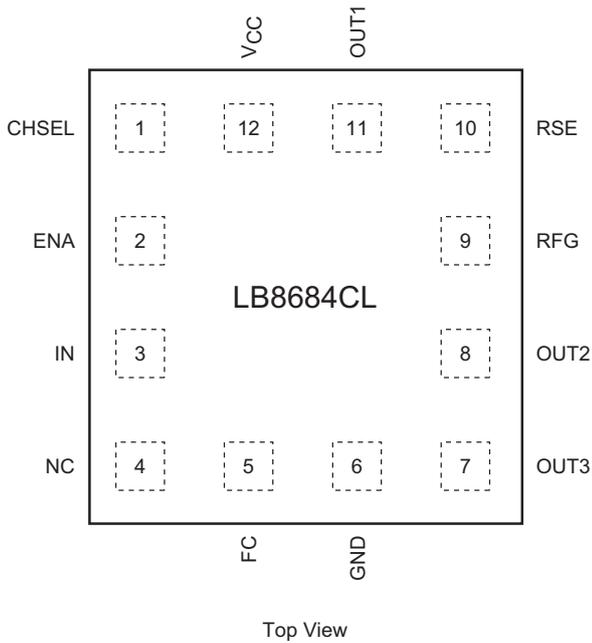
unit:mm (typ)

3324

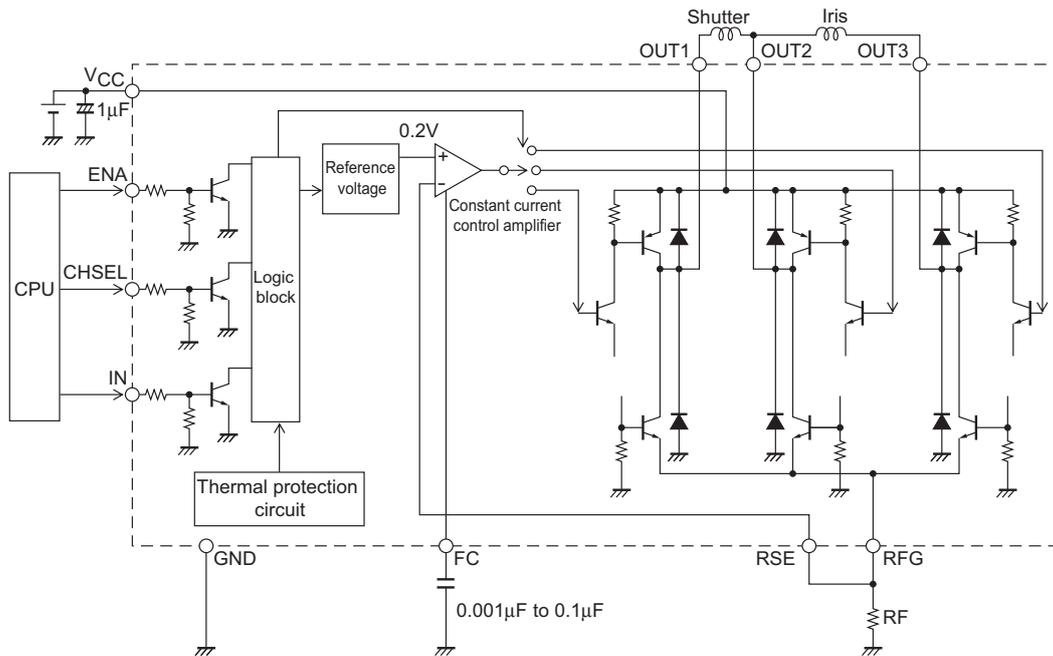


LB8684CL

Pin Assignment



Block Diagram



[Constant current formula] $I_{OUT} = 0.2 \div R_F$ Example : If I_O is 100mA, R_F will be 2Ω .

Usage Notes : The set current is determined, as described by the above equation, by the resistor R_F inserted between the RFG pin and ground.

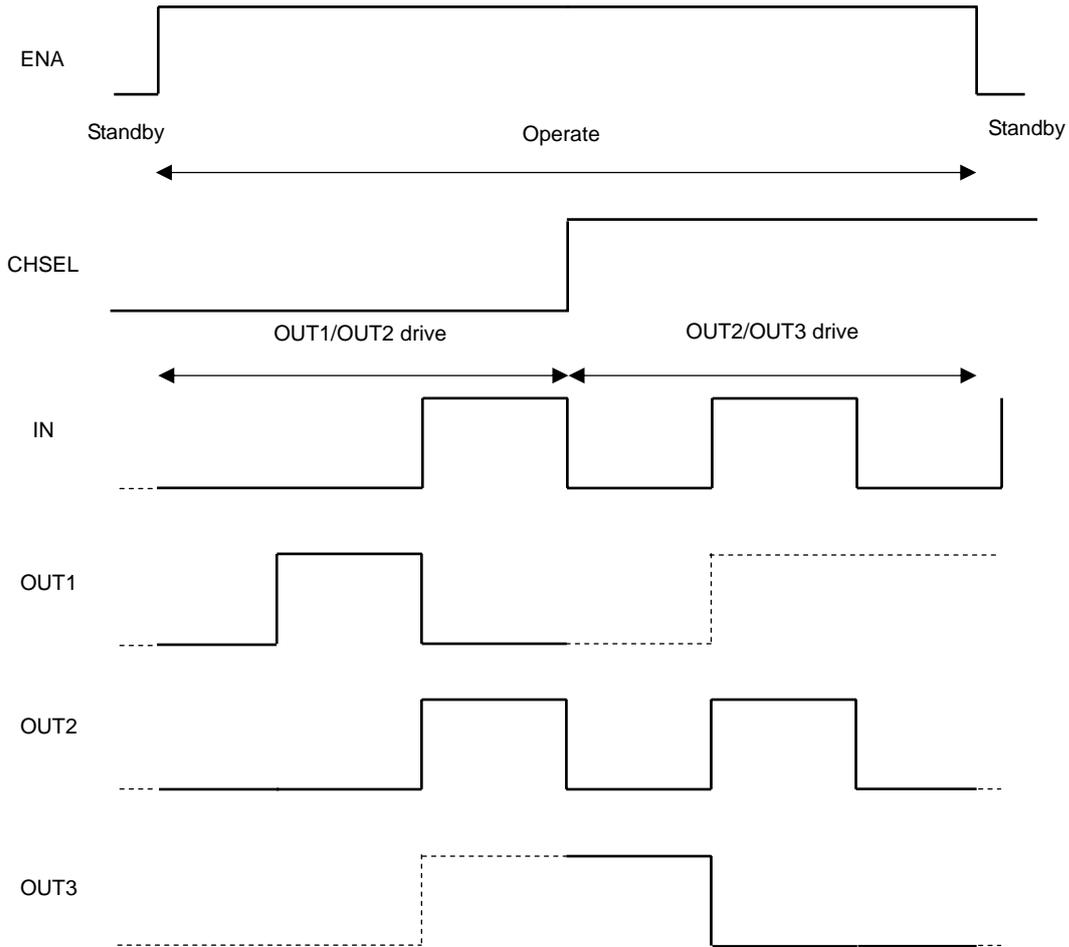
Truth Table

Input			Output			Notes	
ENA	CHSEL	IN	OUT1	OUT2	OUT3		
Low	x	x	-	-	-	Standby	
High	Low	Low	High	Low	-	Shutter	Forward
		High	Low	High	-		Reverse
	High	Low	-	Low	High	Aperture	Forward
		High	-	High	Low		Reverse

Note: "-" indicates the output off state. (high-impedance)

LB8684CL

Timing Chart



- The LB8684CL will be in standby mode when ENA is low and in normal operating mode when ENA is high.
- CHSEL selects OUT1/OUT2 drive when low, and OUT2/OUT3 drive when high.
- The IN pin is used for forward/reverse switching.
- The broken line (---) indicates the off state.
- During either OUT1/OUT2 or OUT2/OUT3 drive, the output high side transistor will be saturated and the low side transistor will not be saturated. Note that the output current is a constant current.

- 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 March, 2007. Specifications and information herein are subject to change without notice.