Structure Silicon Monolithic Integrated Circuit

Product Name Intelligent LED Driver for cellular phone

Type **BD6095GU**

Features
LCD Back Light LED Driver / Flash LED Driver
Auto Luminous Control
Charge Pump DC/DC
Variable Output LDO

○Absolute Maximum Ratings (Ta=25 °C)

Parameter	Symbol	Limits	Unit	Condition
Maximum Applied voltage	VMAX	7	V	
Power Dissipation	Pd	1500	mW	
Operating Temperature Range	Topr	-35 ~ +85	°C	
Storage Temperature Range	Tstg	-55 ~ +150	°C	

note) Power dissipation deleting is 12.0mW/ °C, when it's used in over 25 °C.
(It's deleting is on the board that is ROHM's standard)

○Operating conditions (VBAT≥VIO, Ta=-35~85 °C)

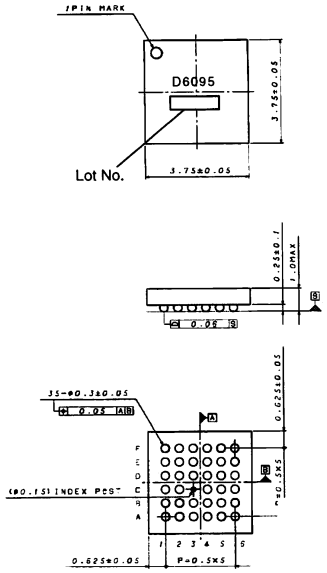
Parameter	Symbol	Limits	Unit	Condition
VBAT input voltage	VBAT	2.7~5.5	V	
VIO pin voltage	VIO	1.65~3.3	V	

*This chip is not designed to protect itself against radioactive rays.

○Electrical Characteristics (Unless otherwise specified, Ta=25°C, VBAT=3.6V, VIO=1.8V)

Parameter	Symbol	Limits			Unit	Condition
		Min.	Typ.	Max.		
【Circuit Current】						
VBAT Circuit current 1	IBAT1	-	0.1	1.0	μA	RESET=0V, VIO=0V
VBAT Circuit current 2	IBAT2	-	0.5	3.0	μA	RESET=0V, VIO=1.8V
VBAT Circuit current 3	IBAT3	-	90	150	μA	LDO1=LDO2=ON, I_{LDO}=0mA Other blocks=OFF
VBAT Circuit current 4	IBAT4	-	61	65	mA	DC/DC x1mode, I_{LED}=60mA VBAT=3.7V, LED Vf=3.0V
VBAT Circuit current 5	IBAT5	-	83	94	mA	DC/DC x1.33mode, I_{LED}=60mA VBAT=3.1V, LED Vf=3.0V
VBAT Circuit current 6	IBAT6	-	93	104	mA	DC/DC x1.5mode, I_{LED}=60mA VBAT=2.9V, LED Vf=3.5V
VBAT Circuit current 7	IBAT7	-	124	136	mA	DC/DC x2mode, I_{LED}=60mA VBAT=3.2V, LED Vf=4.0V
VBAT Circuit current 8	IBAT8	-	0.25	1.0	mA	Only ALC block ON ADCYC=0.5s setting Except sensor current
【LED Driver】						
LED current Step (Setup)	ILEDSTP1		128		Step	LED1~5
LED current Step (At slope)	ILEDSTP2		256		Step	LED1~5
LED current Step (Flash)	ILEDSTPFL		32		Step	LEDFL
White LED Max setup current	IMAXWLED	-	25.6	-	mA	LED1~5
Flash LED Max setup current	IMAXFLED	-	120	-	mA	LEDFL
LED1~5 current accuracy	IWLED	-7%	15	+7%	mA	I_{LED}=15mA setting at VLED=1.0V
Flash LED current accuracy	IFLED	-7%	60	+7%	mA	I_{LED}=60mA setting at VLED=1.0V
LED current Matching	ILEDMT	-	-	4	%	Between LED1~5 at VLED=1.0V
LED OFF Leak current	ILKLED	-	-	1.0	μA	VLED=4.5V
【DC/DC (Charge Pump)】						
Maximum Output voltage	VoCP	4.65	5.1	5.55	V	
Current Load	IOUT	-	-	250	mA	VBAT≥3.2V, VOUT=4V
Oscillator frequency	fosc	0.8	1.0	1.2	MHz	
Over Voltage Protection detect voltage	OVP	-	-	6.0	V	
Short Circuit current limit	Ilim	-	125	250	mA	VOUT=0V
【Regulator (LDO1,LDO2)】						
Output voltage	Vo	1.164	1.20	1.236	V	Io=50mA
		1.261	1.30	1.339	V	Io=50mA
		1.455	1.50	1.545	V	Io=50mA
		1.552	1.60	1.648	V	Io=50mA
		1.746	1.80	1.854	V	Io=50mA <Initial Voltage of LDO1>
		2.134	2.20	2.266	V	Io=50mA
		2.328	2.40	2.472	V	Io=50mA
		2.425	2.50	2.575	V	Io=50mA <Initial Voltage of LDO2>
		2.522	2.60	2.678	V	Io=50mA
		2.619	2.70	2.781	V	Io=50mA
		2.716	2.80	2.884	V	Io=50mA
		2.813	2.90	2.987	V	Io=50mA
		2.910	3.00	3.090	V	Io=50mA
		3.007	3.10	3.193	V	Io=50mA
		3.104	3.20	3.296	V	Io=50mA
		3.201	3.30	3.399	V	Io=50mA
【Sensor Interface】						
SBIAS Output voltage	VoS	2.850	3.0	3.150	V	Io=200μA <Initial Voltage>
		2.470	2.6	2.730	V	Io=200μA
ADC resolution	ADRES		8		bit	

○External dimensions

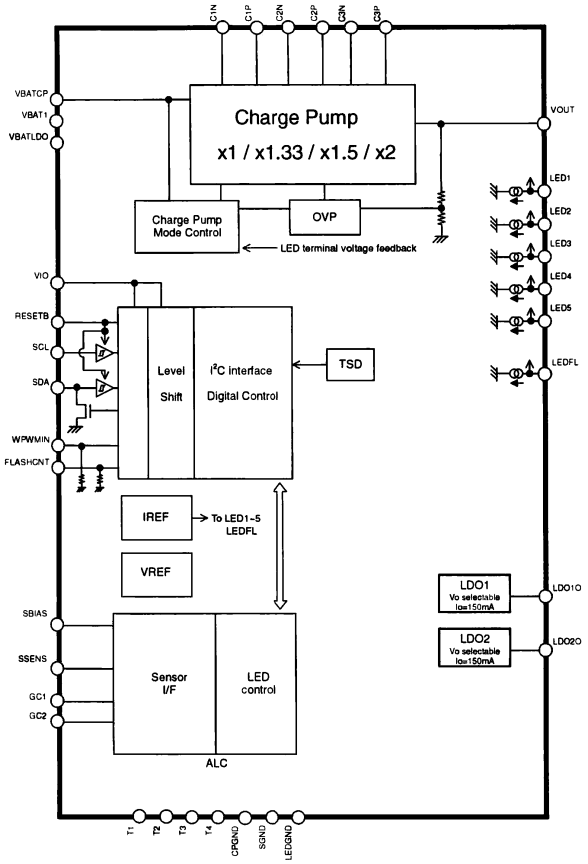


VCSP50L3 (35pin) (Unit : mm)

○Terminals

PIN	PIN Name	PIN	PIN Name
A1	T1	D1	WPWMIN
A2	LEDFL	D2	LED1
A3	CPGND	D3	FLASHCNT
A4	C3N	D4	SDA
A5	C3P	D5	SCL
A6	T2	D6	C1N
B1	LED4	E1	VBATLDO
B2	LED5	E2	LDO2O
B3	LEDGND	E3	GC2
B4	VOUT	E4	GC1
B5	VBATCP	E5	SGND
B6	C2P	E6	VIO
C1	LED3	F1	T4
C2	LED2	F2	LDO1O
C4	RESETB	F3	SSENS
C5	C1P	F4	VBAT1
C6	C2N	F5	SBIAS
-	-	F6	T3

○Block diagram



REV. A

○Cautions on use

(1) Absolute Maximum Ratings

An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down devices, thus making impossible to identify breaking mode such as a short circuit or an open circuit. If any special mode exceeding the absolute maximum ratings is assumed, consideration should be given to take physical safety measures including the use of fuses, etc.

(2) Power supply and ground line

Design PCB pattern to provide low impedance for the wiring between the power supply and the ground lines. Pay attention to the interference by common impedance of layout pattern when there are plural power supplies and ground lines. Especially, when there are ground pattern for small signal and ground pattern for large current included the external circuits, please separate each ground pattern. Furthermore, for all power supply pins to ICs, mount a capacitor between the power supply and the ground pin. At the same time, in order to use a capacitor, thoroughly check to be sure the characteristics of the capacitor to be used present no problem including the occurrence of capacity dropout at a low temperature, thus determining the constant.

(3) Ground voltage

Make setting of the potential of the ground pin so that it will be maintained at the minimum in any operating state. Furthermore, check to be sure no pins are at a potential lower than the ground voltage including an actual electric transient.

(4) Short circuit between pins and erroneous mounting

In order to mount ICs on a set PCB, pay thorough attention to the direction and offset of the ICs. Erroneous mounting can break down the ICs. Furthermore, if a short circuit occurs due to foreign matters entering between pins or between the pin and the power supply or the ground pin, the ICs can break down.

(5) Operation in strong electromagnetic field

Be noted that using ICs in the strong electromagnetic field can malfunction them.

(6) Input pins

In terms of the construction of IC, parasitic elements are inevitably formed in relation to potential. The operation of the parasitic element can cause interference with circuit operation, thus resulting in a malfunction and then breakdown of the input pin. Therefore, pay thorough attention not to handle the input pins, such as to apply to the input pins a voltage lower than the ground respectively, so that any parasitic element will operate. Furthermore, do not apply a voltage to the input pins when no power supply voltage is applied to the IC. In addition, even if the power supply voltage is applied, apply to the input pins a voltage lower than the power supply voltage or within the guaranteed value of electrical characteristics.

(7) External capacitor

In order to use a ceramic capacitor as the external capacitor, determine the constant with consideration given to a degradation in the nominal capacitance due to DC bias and changes in the capacitance due to temperature, etc.

(8) Thermal shutdown circuit (TSD)

This LSI builds in a thermal shutdown (TSD) circuit. When junction temperatures become detection temperature or higher, the thermal shutdown circuit operates and turns a switch OFF. The thermal shutdown circuit, which is aimed at isolating the LSI from thermal runaway as much as possible, is not aimed at the protection or guarantee of the LSI. Therefore, do not continuously use the LSI with this circuit operating or use the LSI assuming its operation.

(9) Thermal design

Perform thermal design in which there are adequate margins by taking into account the permissible dissipation (Pd) in actual states of use.

(10) LDO

Use each output of LDO by the independence. Don't use under the condition that each output is short-circuited because it has the possibility that an operation becomes unstable.

(11) About the pin for the test, the un-use pin

Prevent a problem from being in the pin for the test and the un-use pin under the state of actual use. Please refer to a function manual and an application notebook. And, as for the pin that doesn't specially have an explanation, ask our company person in charge.

(12) About the rush current

For ICs with more than one power supply, it is possible that rush current may flow instantaneously due to the internal powering sequence and delays. Therefore, give special consideration to power coupling capacitance, power wiring, width of ground wiring, and routing of wiring.

(13) About the function description or application note or more.

The function description and the application notebook are the design materials to design a set. So, the contents of the materials aren't always guaranteed. Please design application by having fully examination and evaluation include the external elements.

Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).
Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.
It is our top priority to supply products with the utmost quality and reliability. However, there is always a chance of failure due to unexpected factors. Therefore, please take into account the derating characteristics and allow for sufficient safety features, such as extra margin, anti-flammability, and fail-safe measures when designing in order to prevent possible accidents that may result in bodily harm or fire caused by component failure. ROHM cannot be held responsible for any damages arising from the use of the products under conditions out of the range of the specifications or due to non-compliance with the NOTES specified in this catalog.

Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available, please contact your nearest sales office.

ROHM Customer Support System **THE AMERICAS / EUPOPE / ASIA / JAPAN**

www.rohm.com **Contact us** : webmaster@rohm.co.jp

ROHM CO., LTD. 21, Saiin Mizosaki-cho, Ukyo-ku, Kyoto 615-8585, Japan
TEL : +81-75-311-2121
FAX : +81-75-315-0172