

Structure Silicon Monolithic Integrated Circuit  
 Product Name Compound LED Driver for cellular phone

Type **BD6081GVW**

Features Charge Pump DC/DC  
 LCD Back Light LED Driver /RGB LED Driver  
 Functional compatible with BD6081GU

○Absolute Maximum Ratings (Ta=25 °C)

Parameter	Symbol	Limits	Unit	Condition
Maximum Applied voltage	VMAX	7	V	
Power Dissipation	Pd	1060	mW	
Operating Temperature Range	Topr	-25 ~ +85	°C	
Storage Temperature Range	Tstg	-55 ~ +150	°C	

note) Power dissipation deleting is 8.48mW/°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=-25~85 °C)

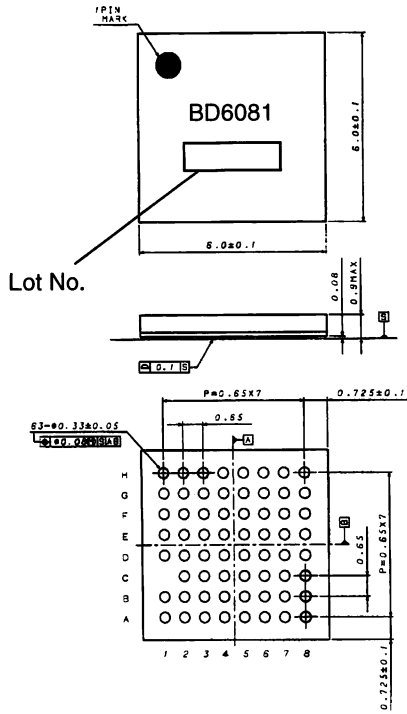
Parameter	Symbol	Limits	Unit	Condition
VBAT input voltage	VBAT	2.7~5.5	V	
VIO pin voltage	VIO	1.65~3.3	V	

\*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.		
<b>Circuit Current</b>						
VBAT Circuit current 1	IBAT1	-	0.1	3.0	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	-	6.2	9.5	μA	REG2 energy save mode, lo=0mA
VBAT Circuit current 4	IBAT4	-	100	150	μA	REG2 normal mode, lo=0mA
VBAT Circuit current 5	IBAT5	-	140	210	μA	REG1, REG2 normal mode lo=0mA
VBAT Circuit current 6	IBAT6	-	63	95	mA	DC/DC x1 mode, lo=60mA VBAT=4.0V
VBAT Circuit current 7	IBAT7	-	95	143	mA	DC/DC x1.5 mode, lo=60mA VBAT=3.6V
VBAT Circuit current 8	IBAT8	-	125	188	mA	DC/DC x2 mode, lo=60mA VBAT=2.7V
<b>LED Driver</b>						
LED current Step 1	ILEDSTP1	32			Step	MLED1~4, SLED1~2
LED current Step 2	ILEDSTP2	64			Step	R1LED, G1LED, B1LED R2LED, G2LED, B2LED (with 0mA setting)
LED Maximum setup current 1	IMAX1	-	-	32	mA	MLED1~4, SLED1~2, ISET=120kΩ
LED Maximum setup current 2	IMAX2	-	-	31.5	mA	R1LED, G1LED, B1LED R2LED, G2LED, B2LED, ISET=120kΩ
LED current accurate	ILED	18	20	22	mA	ILED=20mA, ISET=120kΩ
LED current Matching	ILEDMT	-	5	10	%	Between MLED1~4 Between SLED1~2 Between R1LED, G1LED and B1LED Between R2LED, G2LED and B2LED
LED OFF Leak current	ILKLED	-	-	1.0	μA	
<b>DC/DC(Charge Pump)</b>						
Output voltage	VoCP	Vf+0.15	Vf+0.2	-	V	Vf is LED forward voltage
Current Load	IOUT	-	-	255	mA	VBAT≥3.2V, VOUT=4V
Oscillator frequency	fosc	0.8	1.0	1.2	MHz	
Over voltage protection detect	OVP	-	6.0	6.5	V	
Over current protection detect	OCP	-	250	375	mA	VOUT=0V
<b>REG1</b>						
Output voltage	Vo1	2.716	2.80	2.884	V	lo=150mA, VBAT≥3.1V
I/O voltage difference	Vsat1	-	0.2	0.3	V	VBAT=2.5V, lo=150mA
Load stability	ΔVo11	-	10	60	mV	lo=1~150mA
Input stability	ΔVo12	-	10	60	mV	VBAT=3.2~5.5V, lo=150mA
Ripple rejection ratio	RR1	30	40	-	dB	f=100Hz, Vin=200mVp-p
Short circuit current limit	Ilim01	-	225	450	mA	Vo=0V
Discharge resistor at OFF	ROFF1	-	1.0	1.5	kΩ	
<b>REG2</b>						
Output voltage1	Vo21	1.74	1.8	1.86	V	lo=150mA (Normal mode)
Output voltage2	Vo22	1.71	1.8	1.89	V	lo=100μA (Energy save mode)
Load stability	ΔVo21	-	10	60	mV	lo=1~150mA
Input stability	ΔVo22	-	10	60	mV	VBAT=3.2~5.5V, lo=150mA
Ripple rejection ratio	RR2	30	40	-	dB	f=100Hz, Vin=200mVp-p
Short circuit current limit	Ilim02	-	225	450	mA	Vo=0V
Discharge resistor at OFF	ROFF2	-	1.0	1.5	kΩ	

External dimensions

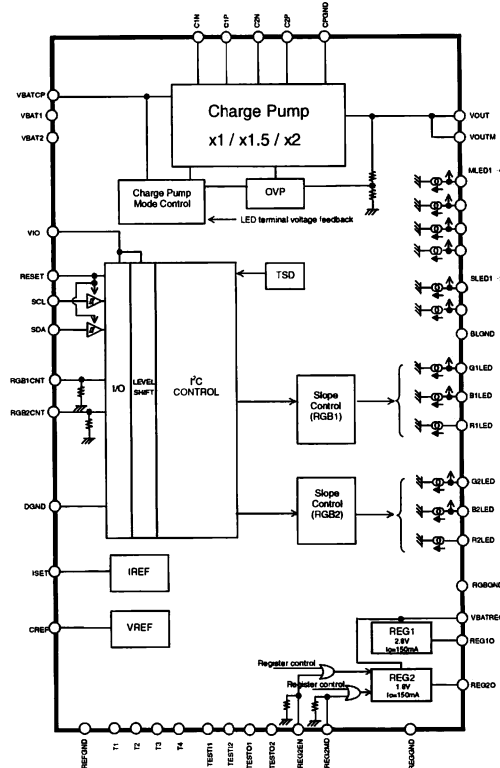


Terminals

PIN	Pin name	PIN	Pin name	PIN	Pin name
E4	VBATCP	F2	C2N	E6	REG2EN
B8	VBAT1	H3	C2P	F8	REG2MD
E3	VBAT2	F4	VOUT	F3	TEST11
D7	VBATREG	G4	VOUTM	C6	TEST12
A1	T1	A7	ISET	G5	TESTO1
H1	T2	D6	REG10	F7	TESTO2
H8	T3	C8	REG20	B4	NC
A8	T4	D3	MLED1	B5	NC
C7	CREF	D1	MLED2	B7	NC
G8	VIO	E1	MLED3	C4	NC
H7	RESET	E2	MLED4	C5	NC
H6	SDA	B2	SLED1	D2	NC
G6	SCL	B1	SLED2	D4	NC
F1	CPGND	A6	R1LED	D5	NC
B6	REFGND	A5	G1LED	D8	NC
E7	REGGND	A4	B1LED	E5	NC
C2	BLGND	B3	R2LED	E8	NC
A3	RGBGND	A2	G2LED	G2	NC
F5	DGND	C3	B2LED	G3	NC
G1	C1N	F6	RGB1CNT	H4	NC
H2	C1P	G7	RGB2CNT	H5	NC

SBGA063W060 (63 balls) (Unit : mm)

Block diagram



## ○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 GND line

Design PCB pattern to provide low impedance for the wiring between the power supply and the GND lines. Pay attention to the interference by common impedance of layout pattern when there are plural power supplies and GND lines. Especially, when there are GND pattern for small signal and GND pattern for large current included the external circuits, please separate each GND pattern. Furthermore, for all power supply terminals to ICs, mount a capacitor between the power supply and the GND terminal. 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) GND voltage

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

## (4) Short circuit between terminals 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 terminals or between the terminal and the power supply or the GND terminal, 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 terminals

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 terminal. Therefore, pay thorough attention not to handle the input terminals, such as to apply to the input terminals a voltage lower than the GND respectively, so that any parasitic element will operate. Furthermore, do not apply a voltage to the input terminals when no power supply voltage is applied to the IC. In addition, even if the power supply voltage is applied, apply to the input terminals 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 a operation becomes unstable.

## (11) Other cautions on use

Please consult supplementary documents such as function description of this LSI.

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