STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT White LED Driver for LCD Backlights

TYPE BD9204F

FEATURE

- Input voltage range 7V-15V
- Built-in 3ch boost DCDC converter (current mode)
- OVP, SCP, OPEN protection
- Analog dimming, PWM dimming enable
- Under voltage lock out (UVLO)
- Fail pin annotate abnormal state
- SOP28 package

○ ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

PARAMETER	Symbol	Limit	Unit
Power Supply Voltage	Vccmax	20	V
Power Dissipation	Pd	750 *1	mW
Operating Temperature Range	Topr	-40～+85	℃
Storage Temperature Range	Tstg	-55～+150	℃

*1 Pd derated at 6.0 mW/℃ for temperature above Ta=25℃,
mounted on 70mm × 70mm × 1.6mm 1 layer(cupper area 70mm × 70mm)glass-epoxy PCB.
This product is not designed for protection against radioactive rays.

○ OPERATING CONDITIONS (Ta=25℃)

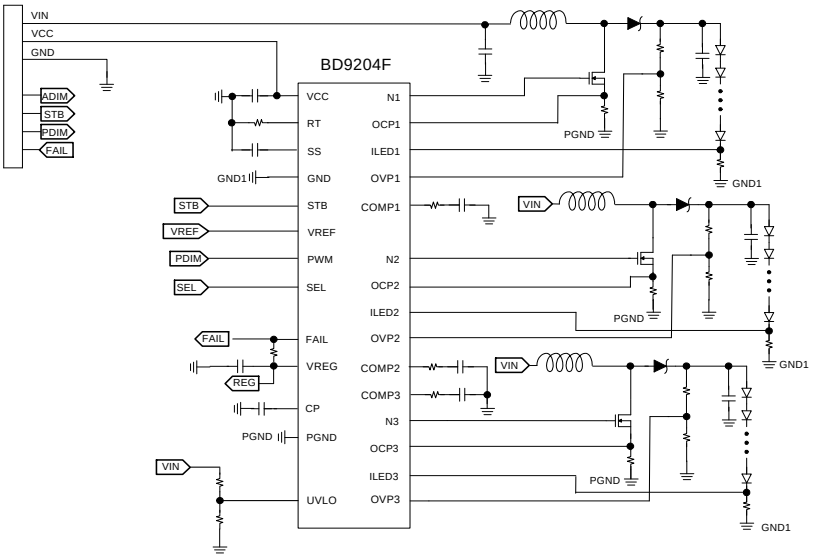
PARAMETER	Symbol	Limit	Unit
Power Supply Voltage	VCC	7～15	V

○ELECTRICAL CHARACTERISTICS(unless otherwise specified VCC=12V, Ta=25℃)

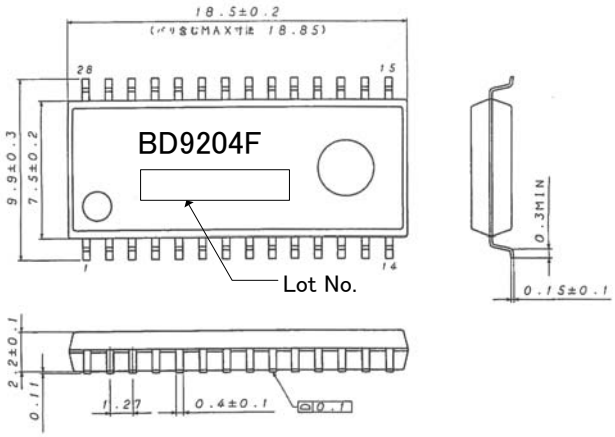
PARAMETER	Symbol	Limit			UNIT	Conditions
		MIN.	TYP.	MAX.		
【Total Current Consumption】						
Circuit Current	ICC	—	4.7	-	mA	STB=H, SEL=L, PWM=L
Standby Current	IST	—	0	10	uA	STB=L
【VREG】						
VREG Output Voltage	VREG	4.8	5.0	5.2	V	IO=0mA, CREG=1uF
VREG input current	IREG	2.16	3.6	5.04	mA	VREG=5.25V (input externally) STB=H, SEL=L, PWM=L
【Boost Driving Pin】						
N1, N2, N3 resistance1	RONH	-	4.0	-	Ω	ION=-10mA Between output N and internal power supply
N1, N2, N3 resistance2	RONL	-	2.0	-	Ω	ION=10mA
【Error-Amp block】						
ILED threshold voltage	VFB	(-2%)	1.5	(+2%)	V	VREF=1.5V
COMP1,2,3 sink current	ICOMPSI	-	100	-	uA	VLED=2.0V
COMP1,2,3 source current	ICOMPSO	-	100	-	uA	VLED=1.0V
【CT Oscillator block】						
Oscillation Frequency	FRT	270	300	330	kHz	RT=160kΩ
【SOFT START】						
SS source current	ISS	-	1.0	-	uA	
SS END pin voltage	VSS	-	5.0	-	V	
【OVP and SCP detection】						
Over Voltage Protection voltage	VOVP	1.65	2.0	2.35	V	Sweep up
OVP hysteresis	VOVPHYS	-	0.05	-	V	Sweep down
Short Circuit Protection voltage	VSCP	0.05	0.20	0.35	V	Sweep down
SCP hysteresis	VSCPHYS	-	0.05	-	V	Sweep up
【Fail pin】						
Low level voltage (normal state)	VFAIL	-	0.2	0.5	V	IOFAIL=1mA
Leak current (abnormal state)	ILFAIL	-	-	2	uA	VOFAIL=4V
CP pin charge current	ICP	-	1	-	uA	VCP=0V
CP detect voltage	VCP	-	2.0	-	V	
【SEL pin】						
Input Low voltage	VSELL	-0.3	-	0.8	V	CH1,CH2,CH3=enable
Input Middle voltage	VSELM	1.6	-	3.0	V	CH1,CH2,=enable
Input High voltage	VSELH	4.2	-	-	V	CH1=enable
【STB pin】						
Input Low voltage	VSTBYL	-0.3	-	0.8	V	
Input High voltage	VSTBYH	2.0	-	-	V	
【PWM pin】						
Input Low voltage	VPWML	-0.3	-	1.2	V	
Input High voltage	VPWMH	3.0	-	-	V	

(This product is not designed for protection against radioactive rays.)

○ BLOCK DIAGRAM



○PACKEGE, MARKING SPECIFICATION SOP-28



○ PIN No. & PIN NAME

(UNIT:mm)

No.	name	function
1	VREF	analog dimming signal input
2	FAIL	abnormal state output
3	SS	soft start setting
4	RT	oscillation frequency setting
5	OCP3	CH3 DCDC over current protection
6	PGND	power ground pin
7	N3	CH3 DCDC switching output
8	OCP2	CH2 DCDC over current protection
9	N2	CH2 DCDC switching output
10	OCP1	CH1 DCDC over current protection
11	N1	CH1 DCDC switching output
12	STB	ON/OFF logic input
13	VCC	Power pin
14	VREG	internal power supply output

No.	name	function
15	ILED1	CH1 current signal feedback input
16	COMP1	CH1 error amplifier output
17	COMP2	CH2 error amplifier ouput
18	COMP3	CH3 error amplifier output
19	SEL	power on channel select input
20	UVLO	the voltage monitor input for UVLO
21	GND	analog ground pin
22	PWM	PWM dimming signal input
23	OVP1	CH1 boost voltage monitor input
24	OVP2	CH2 boost voltage monitor input
25	OVP3	CH3 boost voltage monitor input
26	CP	latch OFF timer setting
27	ILED3	CH3 current signal feedback input
28	ILED2	CH2 current signal feedback input

○ Operation Notes

1) Absolute maximum ratings

An excess in the absolute maximum rating, such as supply voltage, temperature range of operating conditions, etc., can break down the devices, thus making impossible to identify breaking mode, such as a short circuit or an open circuit. If any over rated values will expect to exceed the absolute maximum ratings, consider adding circuit protection devices, such as fuses.

2) GND voltage

The potential of GND pin must be minimum potential in all condition. As an exception, the circuit design allows voltages up to -0.3 V to be applied to the ICT pin.

3) Thermal design

Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions.

4) Inter-pin shorts and mounting errors

Use caution when positioning the IC for mounting on printed circuit boards. The IC may be damaged if there is any connection error or if pins are shorted together.

5) Actions in strong electromagnetic field

Use caution when using the IC in the presence of a strong electromagnetic field as doing so may cause the IC to malfunction.

6) Mutual impedance

Power supply and ground wiring should reflect consideration of the need to lower mutual impedance and minimize ripple as much as possible (by making wiring as short and thick as possible or rejecting ripple by incorporating inductance and capacitance).

7) External components

The input DC voltage or DC current or temperature of external components such as inductor or capacitor affects its electrical character. . The ripple current through capacitor over regulation also affect to its reliability. External components should be chosen and made sure, considering the margins in all operational condition.

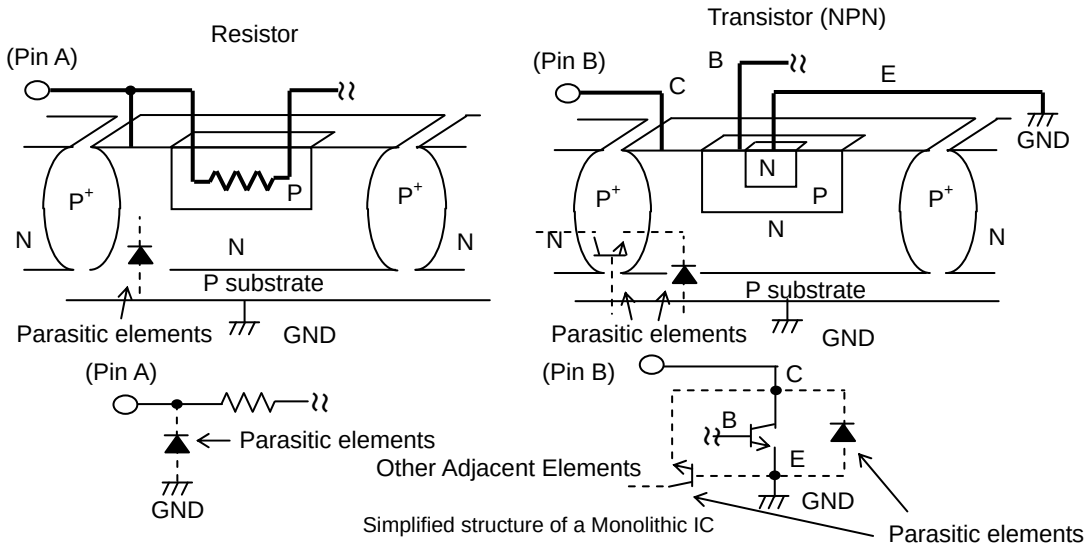
8) Regarding input pin of the IC

This monolithic IC contains P+ isolation and P substrate layers between adjacent elements in order to keep them isolated. P-N junctions are formed at the intersection of these P layers with the N layers of other elements, creating a parasitic diode or transistor. For example, as shown in the figures below, the relation between each potential is as follows:

When GND > Pin A and GND > Pin B, the P-N junction operates as a parasitic diode.

When GND > Pin B, the P-N junction operates as a parasitic transistor.

Parasitic diodes can occur inevitable in the structure of the IC. The operation of parasitic diodes can result in mutual interference among circuits, operational faults, or physical damage. Accordingly, methods by which parasitic diodes operate, such as applying a voltage that is lower than the GND (P substrate) voltage to an input pin, should not be used. Although the circuit design allows voltages up to -0.3 V to be applied to the ICT pin, voltages lower than this may cause the behavior described above. Use caution when designing the circuit.



Notes

No copying or reproduction of this document, in part or in whole, is permitted without the consent of ROHM Co.,Ltd.

The content specified herein is subject to change for improvement without notice.

The content specified herein is for the purpose of introducing ROHM's products (hereinafter "Products"). If you wish to use any such Product, please be sure to refer to the specifications, which can be obtained from ROHM upon request.

Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.

The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties. ROHM shall bear no responsibility whatsoever for any dispute arising from the use of such technical information.

The Products specified in this document are intended to be used with general-use electronic equipment or devices (such as audio visual equipment, office-automation equipment, communication devices, electronic appliances and amusement devices).

The Products specified in this document are not designed to be radiation tolerant.

While ROHM always makes efforts to enhance the quality and reliability of its Products, a Product may fail or malfunction for a variety of reasons.

Please be sure to implement in your equipment using the Products safety measures to guard against the possibility of physical injury, fire or any other damage caused in the event of the failure of any Product, such as derating, redundancy, fire control and fail-safe designs. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel-controller or other safety device). ROHM shall bear no responsibility in any way for use of any of the Products for the above special purposes. If a Product is intended to be used for any such special purpose, please contact a ROHM sales representative before purchasing.

If you intend to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, you will be required to obtain a license or permit under the Law.

ROHM SEMICONDUCTOR

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

ROHM Customer Support System

http://www.rohm.com/contact/