STRUCTURE Silicon Monolithic Integrated Circuit

NAME OF PRODUCT DC-AC Inverter Control IC

TYPE **ＢＤ９２７０Ｆ**

FUNCTION
- 1ch control with Full-Bridge (For USE FET Body-Di)
- Lamp current and voltage sense feed back control
- Sequencing easily achieved with Soft Start Control
- Striking time can Control independently (STRK pin)
- Circuit protection with Timer Latch (COMP)
- Circuit protection with quick Shutdown (COMPSD)
- Mode-selectable the operating or stand-by mode by stand-by pin
- Synchronous operating the other BD9270F ICs
- BURST mode controlled by PWM input
- Output liner Control by external DC voltage
- Built-in Error mode output pin (FAIL pin)

○ Absolute Maximum Ratings（Ta = 25℃）

Parameter	Symbol	Limits	Unit
Supply Voltage	Vcc	20	V
OUTPUT DRIVER	LNx, HFNx,	20	V
Operating Temperature Range	Topr	-40～+85	℃
Storage Temperature Range	Tstg	-55～+150	℃
Maximum Junction Temperature	Tjmax	+150	℃
Power Dissipation	Pd	688*	mW

*Pd derate at 5.5mW/℃ for temperature above Ta = 25℃ (When mounted on a PCB 70.0mm×70.0mm×1.6mm)

○Operating condition

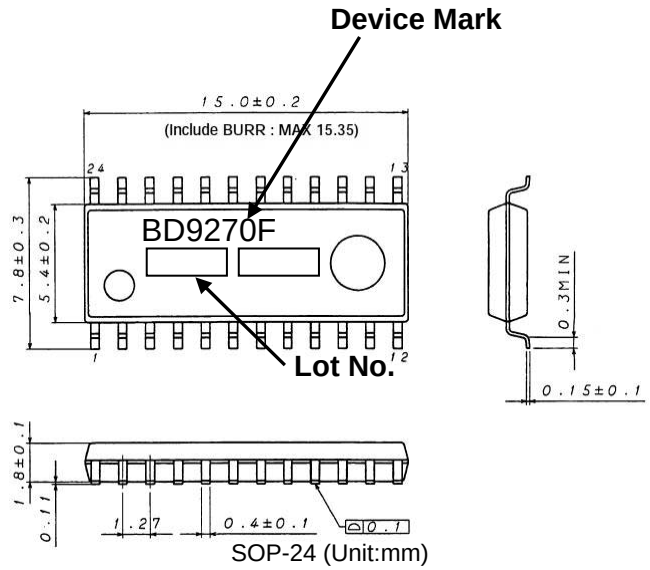
Parameter	Symbol	Limits	Unit
Supply voltage	Vcc	8.5～19.0	V
DRIVER frequency	FOUT	30～110	kHz

○Electric Characteristics（Ta=25℃、VCC=12V、STB=3.0V）

Parameter	Symbol	Limits MIN.	TYP.	MAX.	Unit	Conditions
((WHOEL DEVICE))						
Operating current	Icc1	－	4.5	8.1	mA	FOUT=60kHz, FB=GND, DUTY=0V
Stand-by current	Icc2	－	30	70	uA	
((STAND BY CONTROL))						
Stand-by voltage H	VstH	2	－	VCC	V	System ON
Stand-by voltage L	VstL	-0.3	－	0.8	V	System OFF
((REF4V BLOCK))						
REF4V output voltage	VREG	3.92	4.00	4.08	V	
REF4V source current	IREG	5	－	－	mA	
((VCC UVLO BLOCK))						
Operating voltage (VCC)	Vvccuvlo	7.0	7.5	8.0	V	
Hysteresis width (VCC)	⊿Vvccuvlo	0.50	0.60	0.70	V	
((OSC BLOCK))						
Drive output frequency	FOUT	63.0	65.0	67.0	kHz	RT=18.9kΩ
RT pin voltage	VRT	1.05	1.50	1.95	V	
SRT ON resistance	RSRT	－	100	200	Ω	
((SS STRK BLOCK))						
Soft start current	ISS	0.9	1.1	1.3	uA	
SS operation start voltage	VSS_ST	0.18	0.20	0.22	V	
SS term END voltage	VSS_ED	1.35	1.50	1.65	V	
STRK current	ISTRK	0.8	1.0	1.2	uA	
STRK term END voltage	VSTRK_ED	1.94	2.00	2.06	V	
((FEED BACK BLOCK))						
IS threshold voltage 1	VIS1	1.225	1.25	1.275	V	
IS threshold voltage 2	VIS2	－	VREFIN	VIS1	V	VREF applying voltage
VS threshold voltage	VVS	1.22	1.25	1.28	V	
IS source current 1	IIS1	－	－	0.9	uA	DUTY=1.5V
IS source current 2	IIS2	40	50	60	uA	DUTY=0V, IS=1.0V
VS source current	IVS	－	－	0.9	uA	
IS COMP detect voltage 1	VISCOMP1	0.593	0.625	0.657	V	VREFIN≧1.25V
IS COMP detect voltage 2	VISCOMP2	－	0.50	－	V	VREFIN= 1V
VREF input voltage range	VREFIN	0.6	－	1.6	V	No effect at VREF＞1.25V
((DUTY BLOCK))						
DUTY threshold voltage	DUTY-th	0.90	1.00	1.10	V	Low = IS high (burst off)
((OUTPUT BLOCK))						
LN output sink resistance	RsinkLN	1.8	3.5	7.0	Ω	VCC=12V
LN output source resistance	RsourceLN	4.5	9.0	18.0	Ω	VCC=12V
HFN output sink resistance	RsinkHFN	1.8	3.5	7.0	Ω	VCC=12V
HFN output source resistance	RsourceHFN	4.5	9.0	18.0	Ω	VCC=12V
MAX DUTY	MAX DUTY	44.0	45.5	47.0	%	FOUT=65kHz
((TIMER LATCH BLOCK))						
Timer Latch setting voltage	VCP	1.94	2.00	2.06	V	
Timer Latch setting current	ICP	0.9	1.0	1.1	uA	
((COMP BLOCK))						
COMP over voltage detect	VCOMPH	1.94	2.00	2.06	V	VSS＞1.65V, SRT operate, CP timer latch
Hysteresis width (COMP)	⊿VCOMPH	0.05	0.10	0.15	V	
COMPSD over voltage detect	VCOMPSDH	1.94	2.00	2.06	V	VSS＞1.65V, OSC 2 count
Hysteresis width (COMPSD)	⊿VCOMPSDH	0.05	0.10	0.15	V	
FAIL ON resistance	RFAIL	－	100	200	Ω	
((SYNCHRONOUS BLOCK))						
CT_SYNC_OUT High voltage	VCT_SYNCH	3.8	4.0	4.2	V	
CT_SYNC_OUT Low voltage	VCT_SYNCL	－	－	0.5	V	
CT_SYNC_OUT sink resistance	RSYNC_OUT_sink	－	150	300	Ω	
CT_SYNC_OUT source resistance	RSYNC_OUT_source	－	300	400	Ω	
CT_SYNC_IN High voltage input range	VCT_SYNC_IN_H	2.5	－	VCT_SYNCH	V	
CT_SYNC_IN Low voltage input range	VCT_SYNC_IN_L	-0.3	－	1	V	

（This product is not designed to be radiation-resistant.）

○Package Dimensions

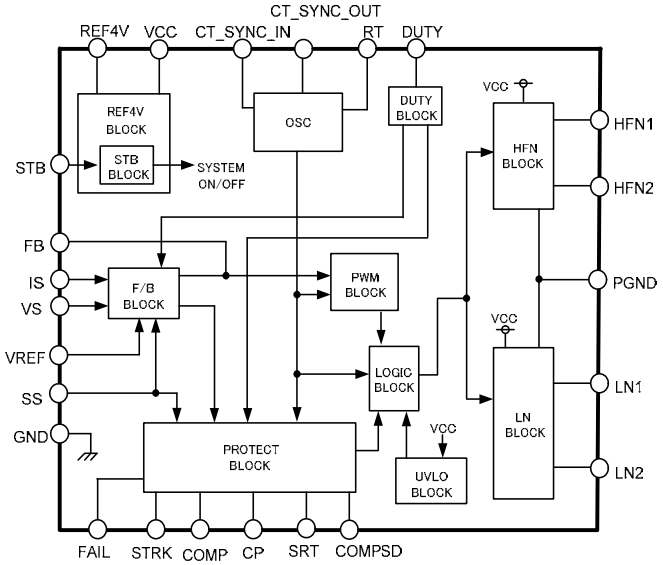


SOP-24 (Unit:mm)

○Pin Description

PIN No.	PIN NAME	FUNCTION
1	PGND	Ground for FET drivers
2	LN2	NMOS FET driver
3	HFN2	NMOS FET driver (New Function)
4	CT_SYNC_IN	CT synchronous signal input pin
5	CT_SYNC_OUT	CT synchronous signal output pin
6	REF4V	Internal regulator output
7	SRT	External resistor from SRT to RT for adjusting the start-up triangle oscillator
8	RT	External resistor from RT to GND for adjusting the triangle oscillator
9	GND	GROUND
10	DUTY	Control PWM mode and BURST mode
11	FAIL	Error mode OUTPUT Pin (open drain)
12	STB	Stand-by switch
13	CP	External capacitor from CP to GND for Timer Latch
14	VREF	Reference voltage input pin for Error amplifier
15	VS	Error amplifier input
16	IS	Error amplifier input
17	FB	Error amplifier output
18	SS	External capacitor from SS to GND for Soft Start Control
19	STRK	Striking time setting pin
20	COMPSD	Over voltage detect pin with Shutdown
21	COMP	Over voltage detect pin with timer latch
22	VCC	Supply voltage input
23	HFN1	NMOS FET driver (New Function)
24	LN1	NMOS FET driver

○Block Diagram



○NOTE FOR USE

1. This product is produced with strict quality control, but might be destroyed if used beyond its absolute maximum ratings. Once IC is destroyed, failure mode will be difficult to determine, like short mode or open mode. Therefore, physical protection countermeasure, like fuse is recommended in case operating conditions go beyond the expected absolute maximum ratings.
2. The circuit functionality is guaranteed within of ambient temperature operation range as long as it is within recommended operating range. The standard electrical characteristic values cannot be guaranteed at other voltages in the operating ranges, however the variation will be small.
3. Mounting failures, such as misdirection or miscounts, may harm the device.
4. A strong electromagnetic field may cause the IC to malfunction.
5. The GND pin should be the location within ±0.3V compared with the PGND pin. ALL Pin Voltage should be under VCC voltage +0.3V even if the voltage is under each terminal ratings.
6. BD9270F incorporate a built-in thermal shutdown circuit (TSD circuit). The thermal shutdown circuit (TSD circuit) is designed only to shut the IC off to prevent runaway thermal operation. It is not designed to protect the IC or guarantee its operation of the thermal shutdown circuit is assumed.
7. When modifying the external circuit components, make sure to leave an adequate margin for external components actual value and tolerance as well as dispersion of the IC.
8. About the external FET, the parasitic Capacitor may cause the gate voltage to change, when the drain voltage is switching. Make sure to leave adequate margin for this IC variation.
9. Under operating CP charge (under error mode) analog dimming and burst dimming are not operate.
10. Under operating Slow Start Control (SS is less than 1.5V), It does not operate Timer Latch.
11. By STB voltage, BD9270F are changed to 2 states. Therefore, do not input STB pin voltage between one state and the other state (0.8～2.0V).
12. The pin connected a connector need to connect to the resistor for electrical surge destruction.
13. This IC is a monolithic IC which (as shown is Fig-1) has P^+ substrate and between the various pins. A P-N junction is formed from this P layer of each pin. For example, the relation between each potential is as follows,

    ○(When GND > PinB and GND > PinA, the P-N junction operates as a parasitic diode.)
    ○(When PinB > GND > PinA, the P-N junction operates as a parasitic transistor.)

    Parasitic diodes can occur inevitably in the structure of the IC. The operation of parasitic diodes can result in mutual interference among circuits as well as operation faults and physical damage. Accordingly you must not use methods by which parasitic diodes operate, such as applying a voltage that is lower than the GND (P substrate) voltage to an input pin.

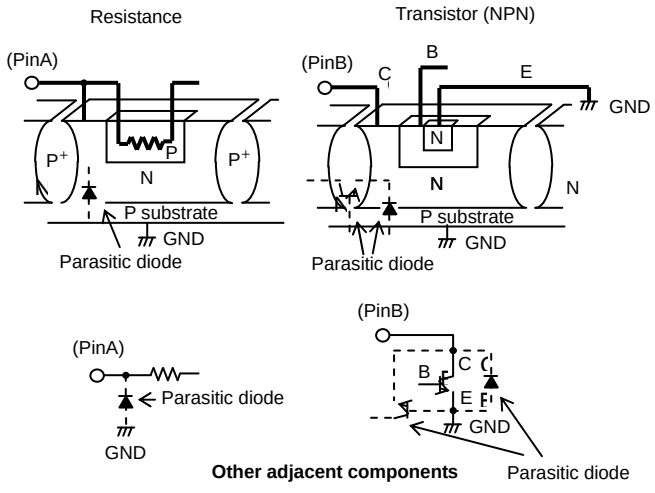


Fig-1 Simplified structure of a Bipolar IC

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/