

STRUCTURE Silicon Monolithic Integrated Circuit

NAME OF PRODUCT DC-AC Inverter Control IC

TYPE **BD9897FS**

FUNCTION

- 36V High voltage process
- 1ch control with Full-Bridge
- Lamp current and voltage sense feed back control
- Sequencing easily achieved with Soft Start Control
- Short circuit protection with Timer Latch
- Under Voltage Lock Out
- Mode-selectable the operating or stand-by mode by stand-by pin
- Synchronous operating the other BD9897FS IC's
- BURST mode controlled by PWM and DC input
- Output liner Control by external DC voltage

○Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Supply Voltage	V <sub>cc</sub>	36	V
BST pin	BST	40	V
SW pin	SW	36	V
BST-SW voltage difference	BST-SW	7	V
Operating Temperature Range	T <sub>opr</sub>	-40~+85	°C
Storage Temperature Range	T <sub>stg</sub>	-55~+150	°C
Maximum Junction Temperature	T <sub>jmax</sub>	+150	°C
Power Dissipation	P <sub>d</sub>	950*	mW

\*P<sub>d</sub> derate at 7.6mW/°C for temperature above Ta = 25°C (When mounted on a PCB 70.0mm×70.0mm×1.6mm)

○Operating condition

Parameter	Symbol	Limits	Unit
Supply voltage	V <sub>cc</sub>	7.5~30.0	V
BST voltage	BST	4.0~36.0	V
BST-SW voltage difference	BST-SW	4.0~6.5	V
CT oscillation frequency	f <sub>CT</sub>	60~180	kHz
BCT oscillation frequency	f <sub>BCT</sub>	0.05~1.00	kHz

Status of this document

The Japanese version of this document is the official specification.

Please use the translation version of this document as a reference to expedite understanding of the official version.

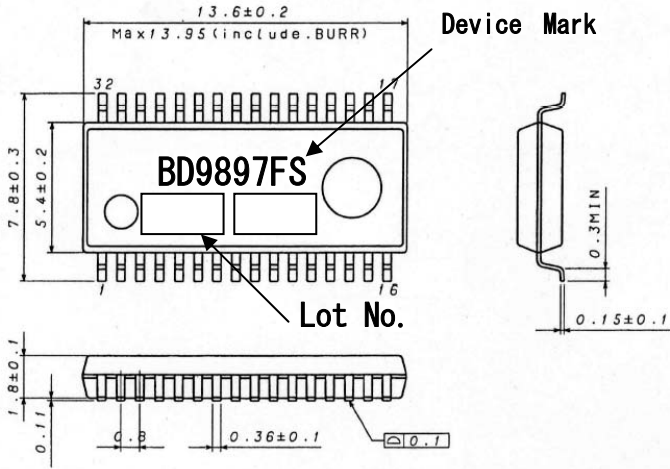
If there are any uncertainty in translation version of this document, official version takes priority.

○ Electric Characteristics (Ta=25°C, VCC=24V)

Parameter	Symbol	Limits			Unit	Conditions
		MIN.	TYP.	MAX.		
((WHOLE DEVICE))						
Operating current	Icc1	—	7.2	13	mA	CT_SYNC_IN = OPEN
Stand-by current	Icc2	—	13.0	30.0	μA	
((STAND BY CONTROL))						
Stand-by voltage H	VstH	2.0	—	VCC	V	System ○ N
Stand-by voltage L	VstL	-0.3	—	0.8	V	System ○ F F
((UVLO BLOCK))						
Operating voltage (VCC)	VuvloH	5.7	6.0	6.3	V	
Hysteresis width (VCC)	ΔVCC_Vuvlo	0.26	0.35	0.43	V	
Operating voltage (UVLO)	Vuvlo2	2.179	2.25	2.321	V	
Hysteresis width (UVLO)	ΔVuvlo	0.074	0.098	0.122	V	
((REG BLOCK))						
REG output voltage	VREG	5.68	5.80	5.92	V	VCC>7.0V
REG source current	IREG	20.0	—	—	mA	
((OSC BLOCK))						
Active edge setting current	Iact	1.35/(RT*7)	1.5/(RT*6)	1.65/(RT*5)	A	
Negative edge setting current	Ineg	Iact × 29	Iact × 35	Iact × 41	A	
OSC Max voltage	VOSCH	1.8	2.0	2.2	V	fCT=120kHz
OSC Min voltage	VOSCL	0.35	0.45	0.60	V	fCT=120kHz
Soft start current	ISS	0.6	1.1	1.6	μA	
SRT ON resistance	RSRT	—	100	200	Ω	
((BOSC BLOCK))						
BOSC Max voltage	VBCTH	1.94	2.00	2.06	V	fBCT=0.3kHz
BOSC Min voltage	VBCTL	0.40	0.50	0.60	V	fBCT=0.3kHz
BOSC constant current	IBCT	1.35/BRT	1.5/RT	1.65/RT	A	VBCT=0.2V
BOSC frequency	fBCT	291	300	309	Hz	(BRT=33kΩ BCT=0.048 μF)
((FEED BACK BLOCK))						
IS threshold voltage 1	VIS①	1.225	1.250	1.275	V	
IS threshold voltage 2	VIS②	—	VREFIN	VIS①	V	VREF applying voltage
VS threshold voltage	VVS	1.220	1.250	1.280	V	
IS source current 1	IIS1	—	—	0.9	μA	DUTY=2.2V
IS source current 2	IIS2	32	50	68	μA	DUTY=0V IS=0.5V
VS source current	IVS	—	—	0.9	μA	
IS COMP detect voltage ①	VISCOMP①	0.90	0.94	0.98	V	VREFIN ≥ 1.25V
IS COMP detect voltage ②	VISCOMP②	—	VREFIN × 0.73	—	V	VREFIN < 1.25V
VREF input voltage range	VREFIN	0.6	—	1.6	V	No effect at VREF > 1.25V
((DUTY BLOCK))						
High voltage	VDUTY-OUTH	2.8	3.1	3.4	V	
Low voltage	VDUTY-OUTL	—	—	0.5	V	
DUTY-OUT sink resistance	RDUTY-OUTSink	—	150	300	Ω	
DUTY-OUT source resistance	RDUTY-OUTSource	—	250	500	Ω	
((OUTPUT BLOCK))						
LN output sink resistance	RsinkLN	0.75	1.5	3.0	Ω	
LN output source resistance	RsourceLN	2.5	5	10	Ω	
HN output sink resistance	RsinkHN	1.25	2.5	5.0	Ω	VBST-VSW=5.0V
HN output source resistance	RsourceLN	2.5	5	10	Ω	VBST-VSW=5.0V
MAX DUTY	MAX DUTY	46.0	48.0	49.5	%	FOUT=60kHz
OFF period	TOFF	100	200	400	ns	
Drive output frequency	FOUT	58.5	60.0	61.5	kHz	(RT=4.7kΩ CT=235pF)
((TIMER LATCH BLOCK))						
Timer Latch setting voltage	VCP	1.94	2.0	2.06	V	
Timer Latch setting current	ICP	0.40	0.55	0.70	μA	
((COMP CLOCK))						
COMP1 over voltage detect voltage	VCOMP1	2.460	2.485	2.510	V	VSS > 2.2V
COMP2 over voltage detect voltage	VCOMP2_H	2.460	2.485	2.510	V	VSS > 2.2V
COMP2 under voltage detect voltage ①	VCOMP_L_1	1.225	1.25	1.275	V	VSS > 2.2V
COMP2 under voltage detect voltage ②	VCOMP_L_2	0.606	0.625	0.644	V	VSS < 2.2V
((Synchronous Block))						
High voltage	VCT_SYNC	2.8	3.1	3.4	V	
Low voltage	VCT_SYNC_L	—	—	0.5	V	
CT_SYNC sink resistance	RCT_SYNC_SYNC	—	150	300	Ω	
CT_SYNC source resistance	RCT_SYNC_SOURCE	—	370	740	Ω	
High voltage input range	VCT_SYNC_IN_H	2.0	—	3.3	V	
Low voltage input range	VCT_SYNC_IN_L	-0.3	—	0.6	V	

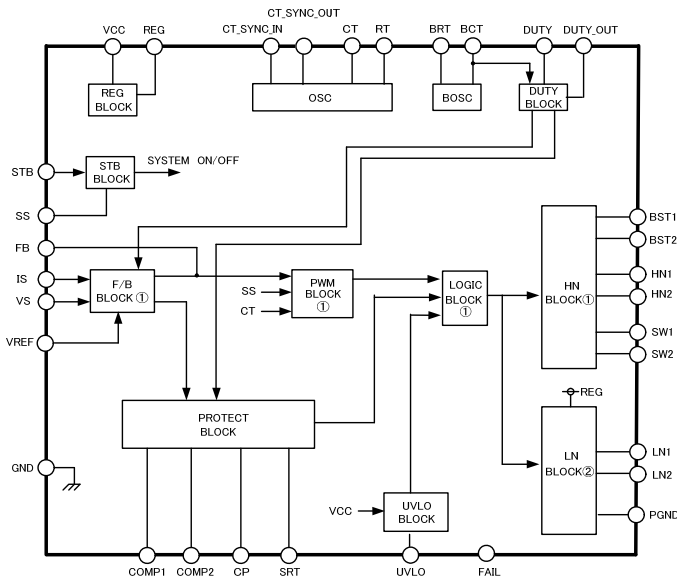
(This product is not designed to be radiation-resistant.)

○Package Dimensions



SSOP-A32 (Unit : mm)

○Block Diagram



○Pin Description

PIN No.	PIN NAME	FUNCTION
1	PGND	Ground for FET drivers
2	LN2	NMOS FET driver
3	HN2	NMOS FET driver
4	SW2	Lower rail voltage for HN2 output
5	BST2	Boot-Strap input for HN2 output
6	CT_SYNC_IN	CT synchronous signal input pin
7	CT_SYNC_OUT	CT synchronous signal output pin
8	SRT	External resistor from SRT to RT for adjusting the triangle oscillator
9	RT	External resistor from SRT to RT for adjusting the triangle oscillator
10	CT	External capacitor from CT to GND for adjusting the triangle oscillator
11	GND	GROUND
12	BCT	External capacitor from BCT to GND for adjusting the BURST triangle oscillator
13	BRT	External resistor from BRT to GND for adjusting the BURST triangle oscillator
14	DUTY	Control PWM mode and BURST mode
15	DUTY_OUT	BURST signal output pin
16	STB	Stand-by switch
17	CP	External capacitor from CP to GND for Timer Latch
18	FAIL	COMP2 under voltage protect clock output
19	VREF	Reference voltage input pin for Error amplifier
20	VS	Error amplifier input
21	IS	Error amplifier input
22	FB	Error amplifier output
23	SS	External capacitor from SS to GND for Soft Start Control
24	COMP2	Under, over voltage detect pin
25	COMP1	Over voltage detect pin
26	VCC	Supply voltage input
27	UVLO	External Under Voltage Lock Out
28	REG	Internal regulator output
29	BST1	Boot-Strap input for HN1 output
30	SW1	Lower rail voltage for HN1 output
31	HN1	NMOS FET driver
32	LN1	NMOS FET driver

○NOTE FOR USE

1. When designing the external circuit, including adequate margins for variation between external devices and IC. Use adequate margins for steady state and transient characteristics.
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  $\pm 0.3V$  compared with the PGND pin.
6. BD9897FS 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. Absolute maximum ratings are those values that, if exceeded, may cause the life of a device to become significantly shortened. Moreover, the exact failure mode caused by short or open is not defined. Physical countermeasures, such as a fuse, need to be considered when using a device beyond its maximum ratings.
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. On operating Slow Start Control (SS is less than 2.2V), It does not operate Timer Latch.
10. By STB voltage, BD9897FS are changed to 2 states. Therefore, do not input STB pin voltage between one state and the other state (0.8~2.0V).

11. The pin connected a connector need to connect to the resistor for electrical surge destruction. This IC is a monolithic IC which (as shown is Fig-1) has P<sup>+</sup> 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.

12. This IC is a monolithic IC which (as shown is Fig-1)has P<sup>+</sup> 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.

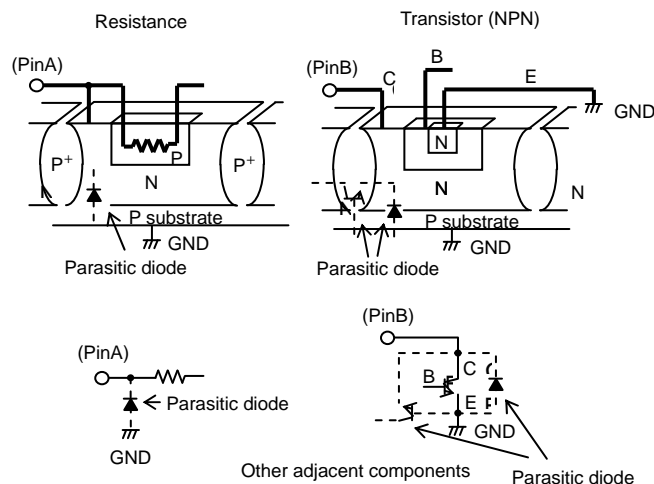


Fig-1 Simplified structure of a Bipolar IC

## 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.



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/>

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ROHM Semiconductor:](#)

[BD9897FS-E2](#)