STRUCTURE Silicon Monolithic Integrated Circuit

NAME OF PRODUCT DC-AC Inverter Control IC

TYPE **ＢＤ９８９６ＦＶ**

FUNCTION
- 2ch control with Push-Pull
- Lamp current and voltage sense feed back control
- Sequencing easily achieved with Soft Start Control
- Circuit protection with Timer Latch
- Under Voltage Lock Out
- Over Voltage Protection
- Mode-selectable the operating or stand-by mode by stand-by pin
- BURST mode controlled by PWM and DC input
- Output linear Controllable Analog dimming by external DC voltage
- Synchronous operating the other several BD9896FV IC's

○Absolute Maximum Ratings (Ta = 25℃)

Parameter	Symbol	Limits	Unit
Supply Voltage	V_{CC}	15	V
Operating Temperature Range	Topr	-40～+90	℃
Storage Temperature Range	Tstg	-55～+150	℃
Power Dissipation	Pd	1062*	mW
Maximum Junction Temperature	Tjmax	+150	℃

*Pd derated at 8.5mW/℃ for temperature above Ta = 25℃ (When mounted on a PCB 70.0mm×70.0mm×1.6mm)

○Recommended operating condition

Parameter	Symbol	Limits	Unit
Supply voltage	V_{CC}	6.0～14.0	V
Output oscillation frequency	f_{out}	25～90	kHz
BCT oscillation frequency	f_{BCT}	0.05～1.00	kHz

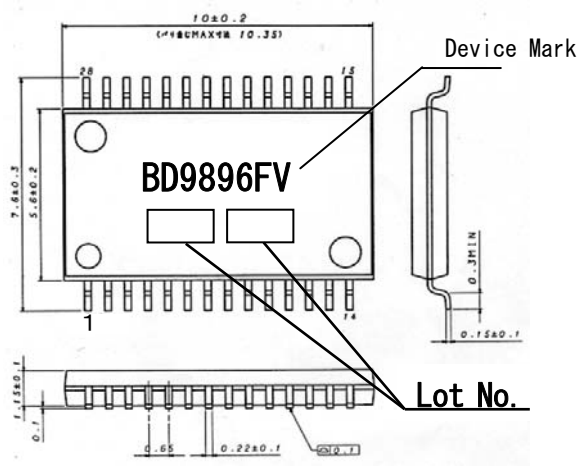
Status of this document
The Japanese version of this document is the official specification.
Please use the translation version of this document as a reference to expedite understanding of the official version.
If these are any uncertainty in translation version of this document, official version takes priority.

○Electric Characteristics (Ta=25℃, VCC=7V)

Parameter	Symbol	Limits			Unit	Conditions
		MIN.	TYP.	MAX.		
((WHOLE DEVICE))						
Operating current	Icc1	—	—	17.0	mA	CT_SYNC_IN=Low
Stand-by current	Icc2	—	—	10	μA	CT_SYNC_IN=OPEN
((OVER VOLTAGE DETECT))						
FB over voltage detect voltage	Vovf	2.20	2.40	2.60	V	
((STAND BY CONTROL))						
Stand-by voltage L	VstL	-0.3	—	0.8	V	
Input voltage range of Slave setting	VstH1	1.8	-	2.25	V	
Input voltage range of Master setting	VstH2	2.55	-	VCC	V	
((TIMER LATCH))						
Timer Latch voltage	Vcp	1.9	2.0	2.1	V	
Timer Latch current	Icp	0.5	1.0	1.5	μA	
((BURST MODE))						
BOSC Max voltage	VburH	1.94	2.0	2.06	V	f_{BCT}=0.3kHz
BOSC Min Voltage	VburL	0.4	0.5	0.6	V	f_{BCT}=0.3kHz
BOSC constant current	IBCT	1.35/BRT	1.5/BRT	1.65/BRT	A	
BOSC frequency	fBCT	292.5	300	307.5	Hz	BRT=36kΩ BCT=0.048μF
((OSC BLOCK))						
MAX DUTY	MAXDUTY	44	46.5	49	%	fout=60kHz
Soft start current	Iss	1.0	2.0	3.0	μA	
IS COMP detect Voltage	Visc	0.45	0.50	0.55	V	
SS COMP detect voltage	Vssc	2.0	2.2	2.4	V	
SRT ON resistance	RSRT	—	200	400	Ω	
((UVLO BLOCK))						
Detect voltage (VCC_UVLO)	Vcc_vuvlo	5.100	5.300	5.500	V	
Hysteresis width (VCC_UVLO)	⊿Vcc_vuvlo	0.150	0.200	0.250	V	
Operating voltage (UVLO)	Vuvlo	2.260	2.340	2.420	V	
Hysteresis width (UVLO)	⊿Vuvlo	0.075	0.100	0.125	V	
((REG BLOCK))						
REG output voltage	VREG	3.038	3.100	3.162	V	
REG source current	IREG	5.0	—	—	mA	
((FEED BACK BLOCK))						
IS threshold voltage ①	Vis①	1.225	1.250	1.275	V	VREF pin:OPEN,REG is shorted
IS threshold voltage ②	Vis②	—	VREFIN	VIS①	V	VREF pin is supplied
VS threshold voltage	Vvs	1.220	1.250	1.280	V	
IS source current 1	Iis1	—	—	1.5	μA	DUTY=2.2V
IS source current 2	Iis2	13.0	20.0	27.0	μA	DUTY=0V、IS=0.5V
VS source current	Ivs	—	—	1.0	μA	
VREF input voltage range	VREF IN	0.6	—	1.6	V	Over 1.25V is not effective
((OUTPUT BLOCK))						
NBｃｈ output voltage H	VoutNBH	VCC-0.3	VCC-0.1	—	V	
NAｃｈ output voltageH	VoutNAH	VCC-0.3	VCC-0.1	—	V	
NBｃｈ output voltage L	VoutNBL	—	0.1	0.3	V	
NAｃｈ output voltage L	VoutNAL	—	0.1	0.3	V	
NBｃｈ output sink resistance	RsinkNB	—	5	10	Ω	Isink = 10mA
NBｃｈ output source resistance	RsourceNB	—	8	16	Ω	Isource = 10mA
NAｃｈ output sink resistance	RsinkNA	—	5	10	Ω	Isink = 10mA
NAｃｈ output source resistance	RsourceNA	—	8	16	Ω	Isource = 10mA
Drive output frequency	f_{OUT}	57.9	60.0	62.1	KHz	RT=15.94kΩ
((COMP BLOCK))						
Overr voltage detect	VCOMPH	2.4	2.5	2.6	V	
Hysteresis width (COMP)	⊿VCOMPH	0.040	0.060	0.080	V	
((PROTECT CLOCK))						
FAIL-pin On resistor value	R_FAIL	—	200	400	Ω	
((SYNCRO BLOCK))						
CT_SYNC_IN_High input Voltage Range	VCT_SYNC_IN_H	2.0	—	VCC*0.8	V	
CT_SYNC_IN_Low input Voltage Range	VCT_SYNC_IN_L	-0.3	—	1.5	V	
CT_SYNC_IN Pull-up resistor	RCT_SYNC_IN_pull_up	500	—	—	kΩ	
CT_SYNC_IN Self-oscillation voltage	VCT_SYNC_IN	VCC＊0.9	—	VCC	V	
CT_SYNC_OUT sink resistor value	RCT_SYNC_OUT__sink	—	150	300	Ω	
CT_SYNC_OUT source resistor value	RCT_SYNC_OUT__source	—	370	740	Ω	
CT_SYNC_OUT_High output Voltage Range	VCT_SYNC_OUT _H	2.8	3.1	3.4	V	
CT_SYNC_OUT_Low output Voltage Range	VCT_SYNC_OUT_L	—	—	0.5	V	
SRT SYNC Exchange detect Voltage	Vsrtc	0.5	0.8	1.1	V	

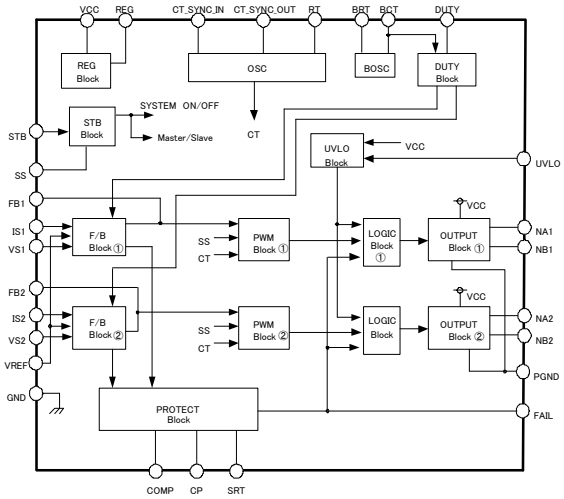
(This product is not designed for normal operation with in a radio active environment.)

○Package Dimensions



SSOP-B28 (Unit:mm)

○Block Diagram



○Pin Description

端子番号	端子名	機　能
1	NA1	FET driver for 1ch
2	NB1	FET driver for 1ch
3	CP	External capacitor from CP to GND for Timer Latch
4	REG	Internal regulator output
5	FAIL	Protect clock output
6	VREF	Reference voltage
7	CT_SYNC_OUT	Output pin of CT synchronous signal
8	CT_SYNC_IN	Input pin of CT synchronous signal
9	RT	External resistor from SRT to RT for adjusting the triangle oscillator
10	SRT	External resistor from SRT to RT 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	STB	Stand-by switch, Master/Slave selection
16	VS2	Error amplifier input④
17	IS2	Error amplifier input③
18	FB2	Error amplifier output②
19	VS1	Error amplifier input②
20	IS1	Error amplifier input①
21	FB1	Error amplifier output①
22	SS	External capacitor from SS to GND for Soft Start Control
23	COMP	Over voltage detector
24	VCC	Supply voltage input
25	UVLO	External Under Voltage Lock OUT
26	NB2	FET driver for 2ch
27	NA2	FET driver for 2ch
28	PGND	Ground for FET drivers

○NOTE FOR USE

1. When designing the external circuit, including adequate margins for variation between external devices and the IC.Use adequate margins for steady state and transient characteristics.
2. Recommended Operating Range
   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
   Mounting failures, such as misdirection or miscounts, may harm the device.
4. Electromagnetic Fields
   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
6. BD9896FV has the short circuit protection with Thermal Shut Down System. When STB or Vcc pin re-supplied, They enables to cancel the latch. If It rise the temperature of the chip more than 170℃(TYP), It make the external FET OFF
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, BD9896FV is changed to 3 states. Therefore, do not input STB pin voltage between one state and the other state (0.8～1.8, 2.25～2.55).
11. The pin connected a connector need to connect to the resistor for electrical surge destruction.
12. 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.

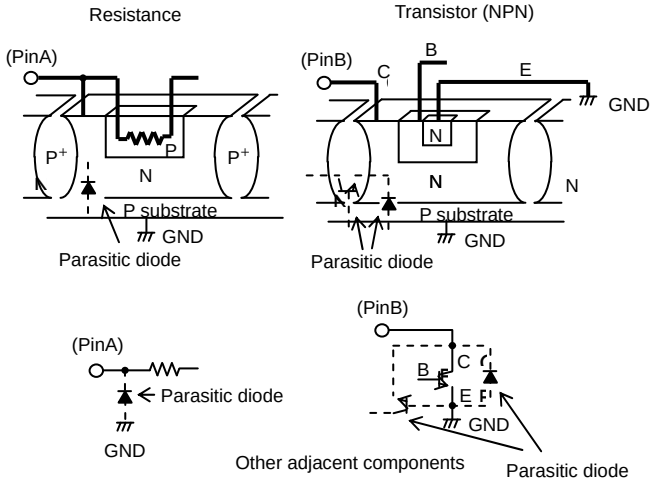


Fig-1 Simplified structure of a Bipolar IC

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/