

STRUCTURE Silicon Monolithic Integrated Circuit

NAME OF PRODUCT DC-AC Inverter Control IC

TYPE **B D 9 8 9 3 F**

- FUNCTION
1. 1ch control with Push-Pull
 2. Lamp current and voltage sense feed back control
 3. Sequencing easily achieved with Soft Start Control
 4. Short circuit protection with Timer Latch
 5. Under Voltage Lock Out
 6. Short circuit protection with over voltage
 7. Mode-selectable the operating or stand-by mode by stand-by pin
 8. BURST mode controlled by PWM and DC input

○Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Supply Voltage	Vcc	15	V
Operating Temperature Range	Topr	-35~+95	°C
Storage Temperature Range	Tstg	-55~+125	°C
Power Dissipation	Pd	562*	mW
Maximum Junction Temperature	Tjmax	+150	°C

*Pd derated at 4.5mW/°C for temperature above Ta = 25°C (When mounted on a PCB 70.0mm×70.0mm×1.6mm)

○Recommended operating condition

Parameter	Symbol	Limits	Unit
Supply voltage	Vcc	4.5~14.0	V
Drive output frequency	f _{OUT}	20~150	KHz
BCT oscillation frequency	f _{BCT}	0.10~0.50	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.

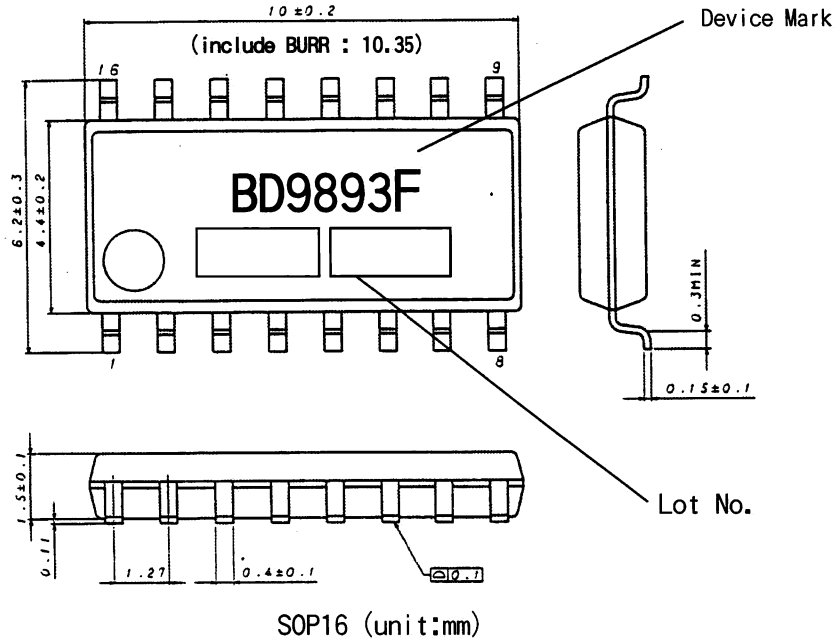
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○Electric Characteristics (Ta=25°C, VCC=7V)

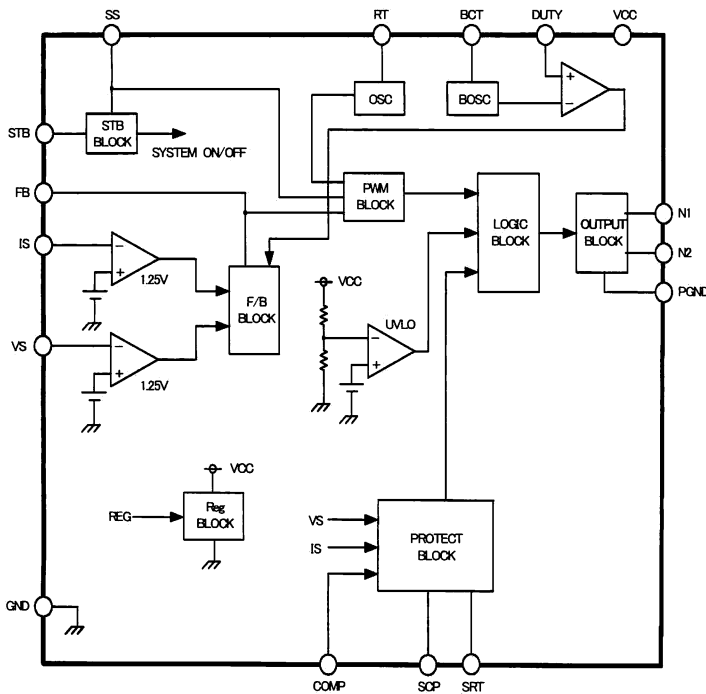
Parameter	Symbol	Limits			Unit	Conditions
		MIN.	TYP.	MAX.		
((WHOLE DEVICE))						
Operating current	I _{CC1}	—	8	16	mA	
Stand-by current	I _{CC2}	—	2	10	μA	
((OVER VOLTAGE DETECT))						
FB over voltage detect voltage	V _{ovf}	2.20	2.40	2.60	V	
((STAND-BY CONTROL))						
Stand-by voltage H1 (High Active)	V _{stH1}	2.3	—	V _{CC}	V	System ON DUTY pin : 0.5V→2.0V BURST Dimming : 100%→0%
Stand-by voltage H2 (Low Active)	V _{stH2}	1.4	—	2.1	V	System ON DUTY pin : 0.5V→2.0V BURST Dimming : 0%→100%
Stand-by voltage L	V _{stL}	-0.3	—	0.8	V	System OFF
((TIMER LATCH))						
Timer Latch voltage	V _{SCP}	1.9	2.0	2.1	V	
Timer Latch current	I _{SCP}	0.5	1.0	1.5	μA	
((OSC BLOCK))						
Active edge Current	I _{act}	1.25/RT	1.5/RT	1.75/RT	A	
MAX DUTY	MAXDUTY	44	46.4	49	%	f _{OUT} =60kHz
Soft start current	I _{ss}	1.0	2.0	3.0	μA	
IS COMP detect Voltage	V _{isc}	0.45	0.50	0.55	V	
SS COMP detect voltage	V _{ss}	2.0	2.2	2.4	V	
SRT ON resistance	R _{SRT}	—	200	400	Ω	
((UVLO BLOCK))						
Operating voltage	V _{uvloH}	4.13	4.30	4.47	V	
Shut down voltage	V _{uvloL}	3.94	4.10	4.26	V	
((FEED BACK BLOCK))						
IS threshold voltage	V _{is}	1.225	1.250	1.275	V	
VS threshold voltage	V _{vs}	1.220	1.250	1.280	V	
IS source current 1	I _{is1}	—	—	1.5	μA	DUTY=2.0V
IS source current 2	I _{is2}	13.0	20.0	27.0	μA	DUTY=0V、IS=0.5V
VS source current	I _{vs}	—	—	1.0	μA	
((Output BLOCK))						
N1ch output voltage H	V _{outN1H}	V _{CC} -0.3	V _{CC} -0.1	—	V	
N2ch output voltage H	V _{outN2H}	V _{CC} -0.3	V _{CC} -0.1	—	V	
N1ch output voltage L	V _{outN1L}	—	0.1	0.3	V	
N2ch output voltage L	V _{outN2L}	—	0.1	0.3	V	
N1ch sink resistance	R _{sinkN1}	—	4	8	Ω	I _{sink} = 10mA
N1ch source resistance	R _{sourceN1}	—	7	14	Ω	I _{source} = 10mA
N2ch sink resistance	R _{sinkN2}	—	4	8	Ω	I _{sink} = 10mA
N2ch source resistance	R _{sourceN2}	—	7	14	Ω	I _{source} = 10mA
Drive output frequency	F _{OUT}	58.5	60.0	61.5	kHz	RT=29.2kΩ
((BURST MODE))						
BOSC Max voltage	V _{burH}	1.94	2.0	2.06	V	f _{BCT} =0.2kHz
BOSC Min Voltage	V _{burL}	0.4	0.5	0.6	V	f _{BCT} =0.2kHz
BOSC frequency	F _{BOSC}	252.2	260	267.8	Hz	BCT=46420pF
((COMP BLOCK))						
Over voltage detect	V _{COMP}	1.92	2.00	2.08	V	
Under voltage detect	V _{COMPL}	0.96	1.00	1.04	V	
Hysteresis width	ΔV _{COMP}	—	0.1	0.15	V	

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

○Package Dimensions



○Block Diagram



○Pin Description

Pin No.	Pin Name	Function
1	RT	External resistor from RT to GND for adjusting the internal triangle oscillator
2	SRT	External resistor from SRT to RT for adjusting the internal triangle oscillator
3	FB	Error amplifier output
4	IS	Error amplifier input①
5	VS	Error amplifier input②
6	GND	GROUND
7	DUTY	Control PWM mode and BURST mode
8	BCT	External capacitor from BCT to GND for adjusting the BURST triangle oscillator
9	COMP	Under, over voltage detect
10	SCP	External capacitor from SCP to GND for Timer Latch
11	SS	External capacitor from SS to GND for Soft Start Control
12	STB	Stand-by switch Select the BURST dimming direction
13	N2	FET driver
14	PGND	Ground for FET drivers
15	N1	FET driver
16	VCC	Supply voltage input

○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, 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. The BD9893F 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. Do not continue to use the IC after operating this circuit or use the IC in an environment where the 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, BD9893F are changed to 3 states. Therefore, do not input STB pin voltage between one state and the other state (0.8~1.4V, 2.1~2.3V).

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.

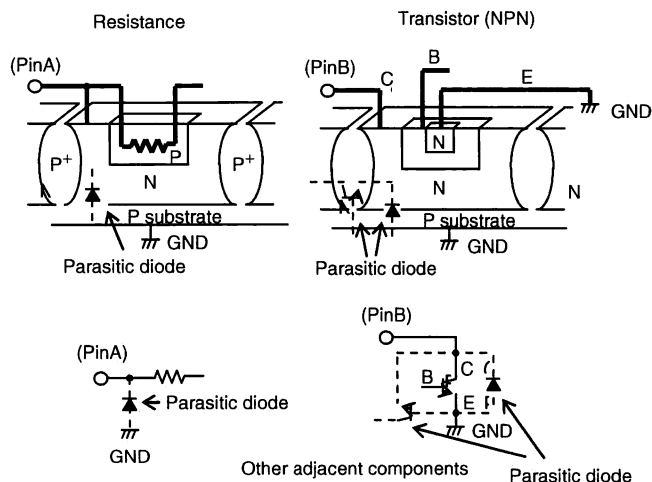


Fig-1 Simplified structure of a Bipolar IC

Notes

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