STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT NAME 1ch Switching Regulator Controller

TYPE **BD9300F**

FEATURES PMW Switching Regulator Controller
Input Voltage Range:3.6V～35V

●ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

Parameter	Symbol	Rating	Unit
Supply Voltage	Vcc	36	V
Power Dissipation	Pd	450*	mW
Operating Temperature Range	Topr	-40～+85	℃
Storage Temperature Range	Tstg	-55～+125	℃
Output Pin Current	Io	100**	mA
Output Pin Voltage	Vo	36	V
Junction Temperature	Tjmax	125	℃

* Derating in done 4.5mW/℃ for operating above Ta≧25℃
(On 70.0mm×70.0mm×1.6mm board)
** Pd should not be exceeded

●OPERATING CONDITIONS (Ta=-40℃～+85℃)

Parameter	Symbol	Limit			Unit
		Min	Typ	Max	
Supply Voltage	Vcc	3.6	12	35	V
Output Sink Current	IO	—	—	30	mA
Output Pin Voltage	VO	—	—	35	V
Timing Capacitance	CT	33	—	1000	pF
Timing Resistance	RT	5	—	100	kΩ
Oscillator Frequency	Fosc	20	—	800	kHz

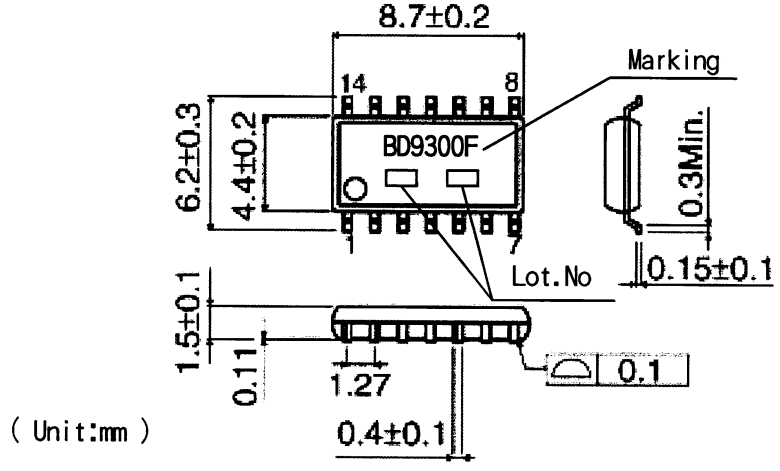
★This product is not designed for protection against radioactive rays.
★The product described in this specification is a strategic product(and/or Service) subject to COCOM regulations. It should not be exported without Authorization from the appropriate government.

Status of this document
The Japanese version of this document is the formal specification.
A customer may use this translation version only for a reference to help reading the formal version.
If there are any differences in translation version of this document, formal version takes priority.

●ELECTORICAL CHARACTERISTICS (Unless otherwise specified, Ta=25℃ Vcc=12V, CT=200pF, RT=20kΩ)

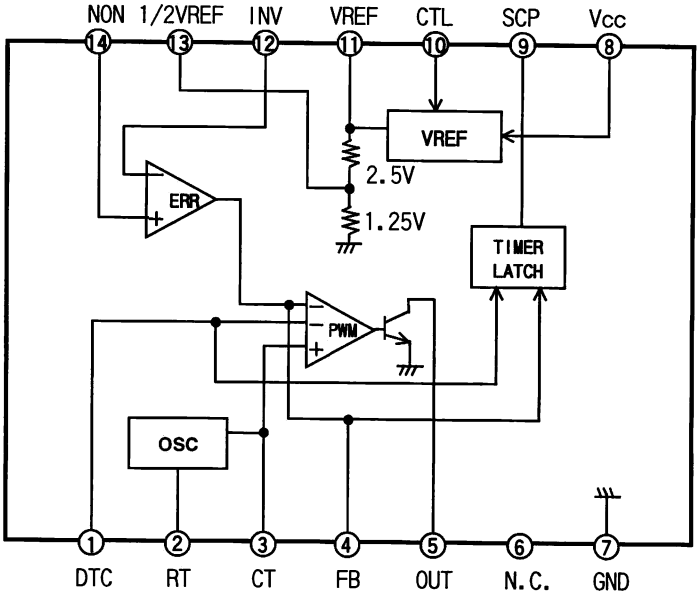
Parameter	Symbol	Limit			Unit	Condition
		Min	Typ	Max		
【ERROR AMPLIFIER BLOCK】						
Output Voltage	VREF	2.475	2.500	2.525	V	IREF=1mA
Line Regulation	VDLI	—	1.5	20	mV	Vcc=3.6～35V, IREF=1mA
Load Regulation	VDLD	—	0.5	20	mV	IREF=0～1mA
1/2 VREF Voltage	1/2VREF	1.212	1.25	1.288	V	
【OSCILLATION BLOCK】						
Oscillation Frequency	FOSC	165	220	275	kHz	
Threshold Voltage Of Charging	$VOSC^+$	—	1.95	—	V	
Threshold Voltage Of Discharging	$VOSC^-$	—	1.45	—	V	
Frequency Drift	FDVO	—	1	—	%	Vcc=3.6～35V
【PROTECTION CIRCUIT BLOCK】						
Threshold Voltage	VIT	1.5	1.8	2.1	V	
SCP Source Current	Iscp	—	7	11	uA	
【DEAD TIME CONTROL INPUT】						
Input Threshold Voltage High	VtH	2.05	—	—	V	Duty Cycle=0%
Input Threshold Voltage Low	VtL	—	—	1.35	V	Duty Cycle=100%
Input Bias Current	Ibd	—	0.1	1	uA	DTC=1.5V
Latch Mode Source Current	Idtc	200	500	—	uA	DTC=0V
【UNDER VOLTAGE LOCK OUT BLOCK】						
Threshold Voltage	VUT	—	2.8	—	V	
【ERROR AMPLIFIER BLOCK】						
Input Bias Current	IIB	—	0.1	1	uA	
Open Loop Gain	AV	—	85	—	dB	Null AMP
Max. Output Voltage	VOH	2.3	2.5	—	V	
Min. Output Voltage	VOL	—	0.7	0.9	V	
Output Sink Current	IOI	0.1	1	—	mA	VFB=1.25V
Output Source Current	IOO	40	70	—	uA	VFB=1.25V
【OUTPUT BLOCK】						
Saturation Voltage	VSAT	—	1.0	1.4	V	Io=30mA
Leak Current	ILEAK	—	—	10	uA	OUT=35V
【CONTROL BLOCK】						
CTL ON Voltage	VON	2	—	—	V	
CTL OFF Voltage	VOFF	—	—	0.7	V	
CTL SINK current	ICTL	—	57	90	uA	VCTL=5V
【DEVICE】						
Stand-by Current	ISTB	—	0	10	uA	VCTL=0V .
Average Supply Current	ICC	—	1.2	2.4	mA	RT=VREF

●PHYSICAL DIMENSION・MARKING (SOP-14)



(Unit:mm)

● BLOCK DIAGRAM



*Please refer to Technical note concerning application circuit, and etc.

● PIN NO. & FUNCTION TABLE

Pin No.	Pin Name	Function
1	DTC	Dead time control voltage input
2	RT	Connect to external resister setting operating frequency
3	CT	Connect to external capacitor setting operating frequency
4	FB	Error amp output
5	OUT	PWM output (OPEN Collector)
6	N.C.	-
7	GND	Ground
8	Vcc	Power input
9	SCP	Connect to external capacitor setting short circuit protection timing. (Connect to GND when no use)
10	CTL	Control voltage input
11	VREF	Reference voltage output
12	INV	Error amp inverting input
13	1/2VREF	1/2Reference voltage output
14	NON	Error amp non inverting input

NOTES FOR USE

1. Operation supply voltage range

   The circuit functionality is guaranteed within operation of ambient temperature range, as long as it is within operation supply voltage range. The standard electrical characteristic values are guaranteed at the test circuit voltage of VCC=12V. They cannot be guaranteed at other voltages. However, the variation will be small.

2. Grounding

   It is recommended that every capacitor (bypass and another capacitors) is grounded to PIN7 using single-point connections.

3. FB Terminal

   The FB terminal is for phase margin of the DC/DC system. A capacitor and a resistor or an only capacitor placed between the FB terminal and the INV terminal. The values of the capacitor and the resistor shall be adjusted according to the output current and the output capacitor value. The output may be oscillating if the value of capacitor is not sufficient, also the transient response may become insufficient if the value is too large. Therefore, the value of the capacitor and the resistor shall be adequately set up based on the condition of the temperature, and so on. Since the FB terminal also detects output short condition compulsorily applying an external voltage onto the FB terminal must not be performed because it may activate the timer latch protection circuit.

4. OUT Terminal

   Since the IC may possibly be destroyed if a current exceeding its absolute maximum rating is input, be sure to locate a current limiting resistor. The resistance value shall be determined with a sufficient margin based on the input voltage (VCC), the VBE of the external transistor and output SAT voltage (VSAT).

5. VCC Terminal

   For reduce the influence of switching noise, bypass capacitor is connected between VCC and GND.

6. Electromagnetic Fields

   The IC is susceptible to strong electromagnetic fields and may cause malfunction. Therefore, caution should be used when placing it on the PCB.

7. Miscellaneous

   This product is produced with strict quality control, but can be destroyed if used beyond absolute maximum ratings. Furthermore, the failure mode cannot be defined (e.g. short mode or open mode), if the device is used above the absolute maximum ratings, a fuse is recommended.

8. Application Design

   When designing the external circuit, included adequate margins, including not only steady state but also transient characteristics.

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