Small and high accuracy Temperature Sensor IC Series

Detect Temperature Changeable Thermostat Output Temperature Sensor IC

BDF□□□0G Series

● Description

Low quiescent current (16uA), high accuracy thermostat (temperature switch) ICs
Built in temperature sensor, reference voltage regulator, D/A converter, and comparator
Detecting temperature by itself, OS terminal state is changed at logically.
Open Drain Output (Active L) is available in BDF□□□0G series.

● Features

1) Detection Temperature Range -10～+130℃ by 8 products.
2) ±2.5℃ Step Selectable Detection Temperature with C1 and C2.
3) Hysteresis Temperature (typically 10℃)
4) High Accuracy Analog Output (typically ±3.5℃@Ta=30℃)
5) Analog Output Temperature Sensitivity (typically -10.8mV/℃)
6) Low Supply Current (typically 16uA)
7) Small Package (typically 2.90mm × 2.80mm × 1.25mm)
8) ESD Rating 8kV (HBM)
9) Excellent Ripple Rejection Characteristic

● Applications

Thermal Protection for Electrical Equipment (NoteBook PC, Cell phone, FPD-TV, etc.)
FAN Control for Thermal Management

Jun. 2008

● Products Variation

BDF □□□ | 0 | G

Detection Temperature (Center Temperature)		Output Format	Package
120:120℃	040: 40℃	(Open Drain, Active Low)	(SSOP6)
110:110℃	030: 30℃		
100:100℃	020: 20℃		
090: 90℃	010: 10℃		
080: 80℃	000: 0℃		
070: 70℃	910:-10℃		
060: 60℃	920:-20℃		
050: 50℃			

Temperature / Output Format Table

C1, C2 status description (L : Low, O : Open, H : High)

Product Name	Detection Temperature (℃)									OS Output Format		Marking
	C1	L	L	L	H	H	H	O	O	O			
	C2	L	H	O	L	H	O	L	H	O			
BDF1200G		110.0	112.5	115.0	117.5	120.0	122.5	125.0	127.5	130.0	Open Drain	Active Low	F0
BDF1000G		90.0	92.5	95.0	97.5	100.0	102.5	105.0	107.5	110.0			F4
BDF0800G		70.0	72.5	75.0	77.5	80.0	82.5	85.0	87.5	90.0			FA
BDF0600G		50.0	52.5	55.0	57.5	60.0	62.5	65.0	67.5	70.0			FE
BDF0400G		30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0			FJ
BDF0200G		10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0			FN
BDF0000G		−10.0	−7.5	−5.0	−2.5	0.0	2.5	5.0	7.5	10.0			FS
BDF9200G		−30.0	−27.5	−25.0	−22.5	−20.0	−17.5	−15.0	−12.5	−10.0			FW

● Absolute Maximum Ratings (Ta = 25℃)

PARAMETERS	SYMBOL	LIMIT	UNIT
Power Supply Voltage	V_{DD}	-0.3 to 7.0[*1]	V
Input Voltage (C1, C2)	V_{IN}	-0.3 to V_{DD}+0.3	V
Input Current (C1, C2)	I_{IN}	-1.0, +0.1	mA
OS terminal Voltage	V_{OS}	-0.3 to 7.0	V
OS terminal Current	I_{OS}	5.0	mA
Power dissipation	Pd	540[※2]	mW
Storage Temperature Range	T_{stg}	-55 to 150	℃

*1. Not to exceed Pd

*2. Reduced by 5.40mW for each increase in Ta of 1℃ over 25℃
(mounted on 70mm × 70mm × 1.6mm Glass-epoxy PCB)

● Recommended Operating Condition

PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Power Supply Voltage	VDD	2.9	3.0	5.5	V
Operating Temperature Range	Topr	-30	-	130	℃

● TEMPERATURE ACCURACY (unless otherwise specified, V_{DD} = 3.0V)

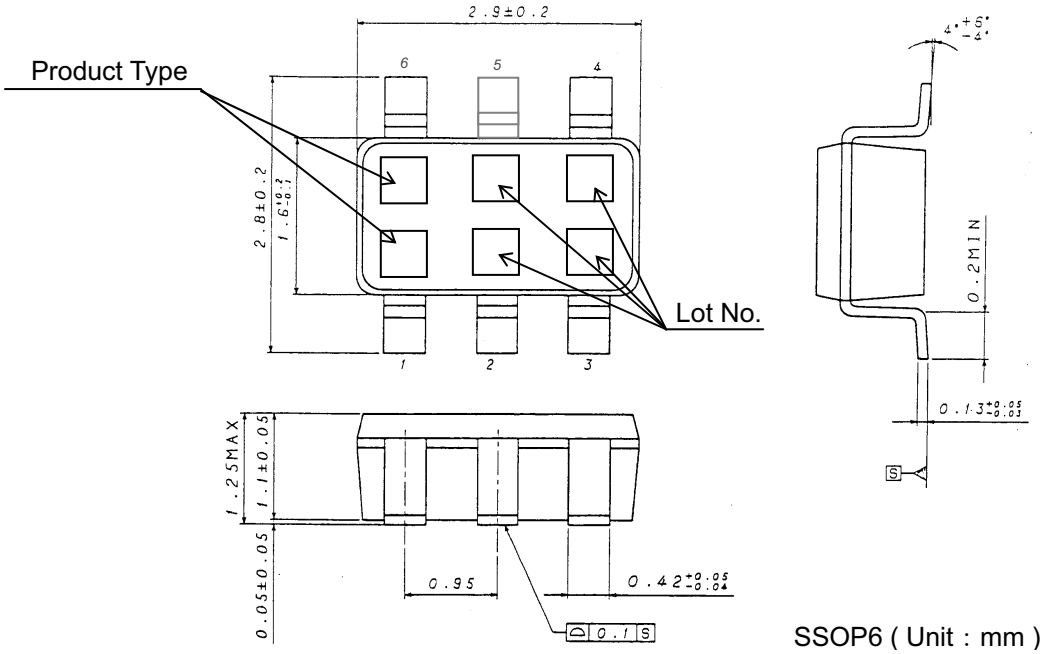
PARAMETER		SYMBOL	LIMIT			UNIT	CONDITIONS
			MIN.	TYP.	MAX.		
Thermostat (Temperature Switch)							
	Detection Temperature Accuracy	Tacc	-	0	±4.0 ±5.0	℃	Ta = -30℃～115℃ Ta = ～130℃
	Detection Temperature Hysteresis	Thys	7.5	10.0	12.5	℃	
Analog Output							
	VTemp Temperature Accuracy	TTemp	-	-	±3.5	℃	Ta = 30℃

● ELECTRICAL CHARACTERISTICS (unless otherwise specified, V_{DD} = 3.0V, Ta = 25℃)

PARAMETER		SYMBOL	LIMIT			UNIT	CONDITIONS
			MIN.	TYP.	MAX.		
Supply Current		IDD	-	16.0	20.0	uA	C1, C2 = 3.0V
Analog Output							
	VTemp Output Voltage	VTemp	1.716	1.753	1.790	V	Ta = 30℃
	VTemp Temperature Sensitivity	VSE	-10.28	-10.68	-11.08	mV/℃	Ta = -30 to 100℃
	VTemp Load Regulation	⊿VTempRL	-	-	1	mV	difference of IOUT : 0uA / 2uA
OS Output Open Drain							
	OS Leakage Current	IL	-	-	1.0	uA	OS : 5.0V
	OS Output Voltage	VOL	-	-	0.4	V	IinOS = 1.2mA
C1, C2							
	Input L Voltage	VIL	GND	-	0.6	V	
	Input H Voltage	VIH	2.4	-	VDD	V	

Radiation hardiness is not designed.

● Package Outline



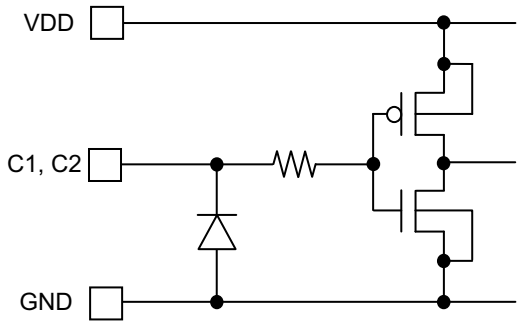
SSOP6 (Unit : mm)

● PIN Description

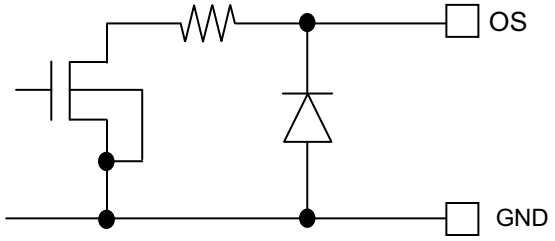
PIN NO.	PIN NAME	FUNCTION	COMMENT
1	C2	Detection temperature setting	Refer to 2/7 page for the temperature set. (Temperature / Output Format Table)
2	GND	GROUND	
3	VTemp	Output voltage in inverse proportion to the temperature (TYP. -10.68mV/℃)	Set the OPEN state or Connect high impedance input node.
4	VDD	POWER SUPPLY	
5	C1	Detection temperature setting	Refer to 2/7 page for the temperature set. (Temperature / Output Format Table)
6	OS	Digital thermostat output	Open Drain type Use the pull-up resistor over 10kΩ.

● Equivalence Circuit

C1, C2

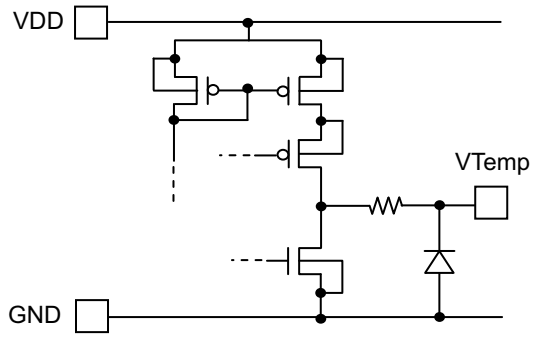


OS



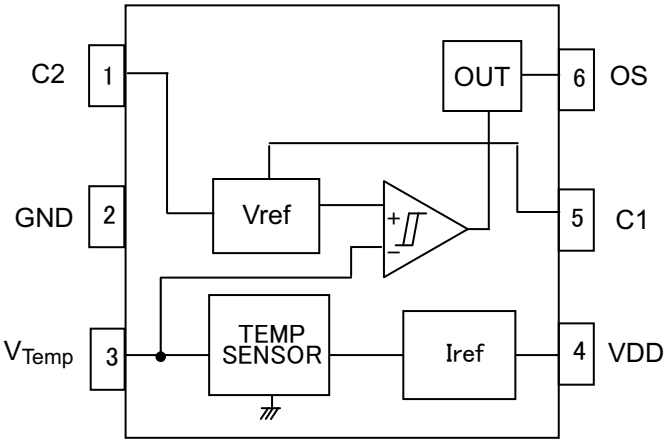
Please connect the pull-up resistor over 10kΩ.

VTemp

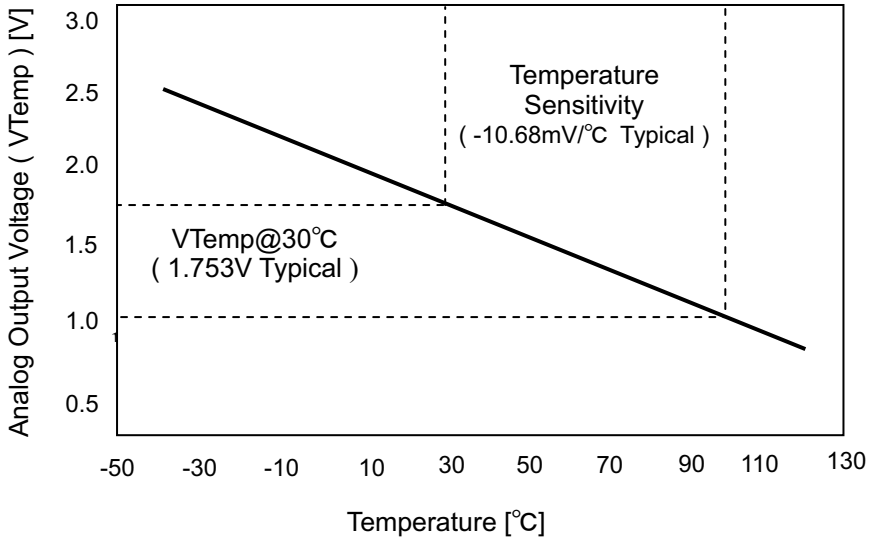


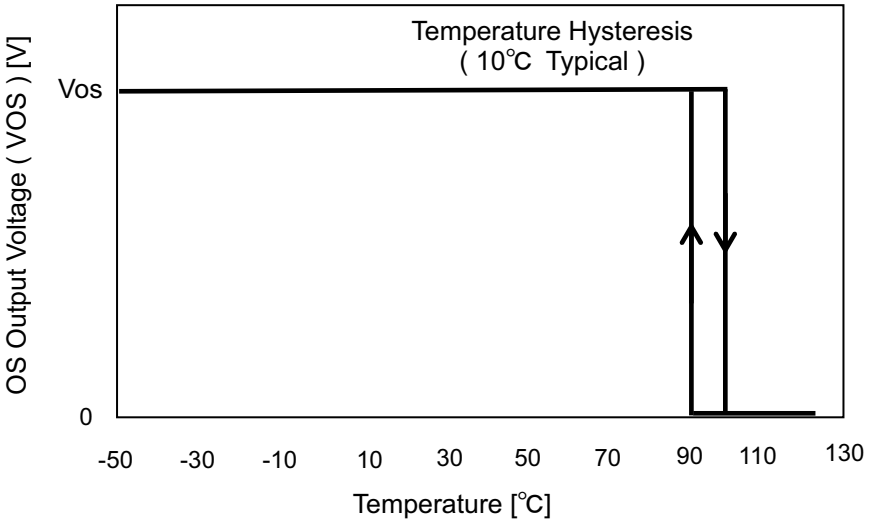
Please don't connect the pull-down resistor

● Block Diagram



● Functional Diagram (ex. Detection Temperature 100℃)





● Reference Data

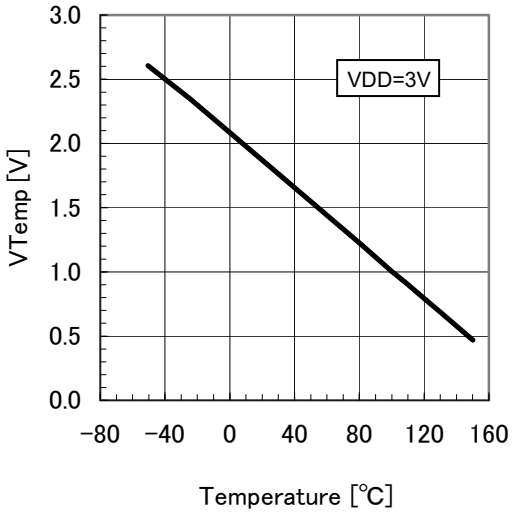


Fig1. VTemp Voltage vs. Temperature
(Temperature Sensitivity)

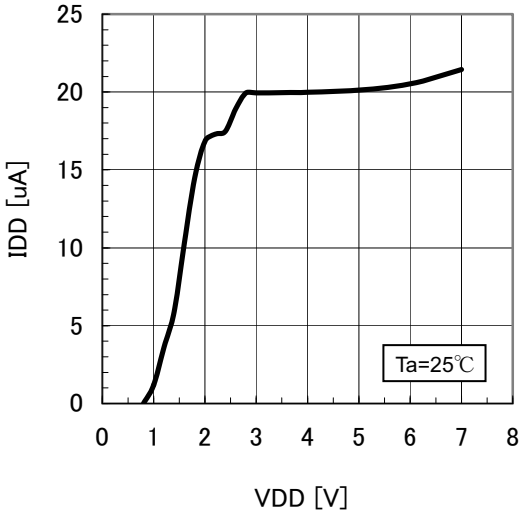


Fig2. Supply Current vs. Supply Voltage

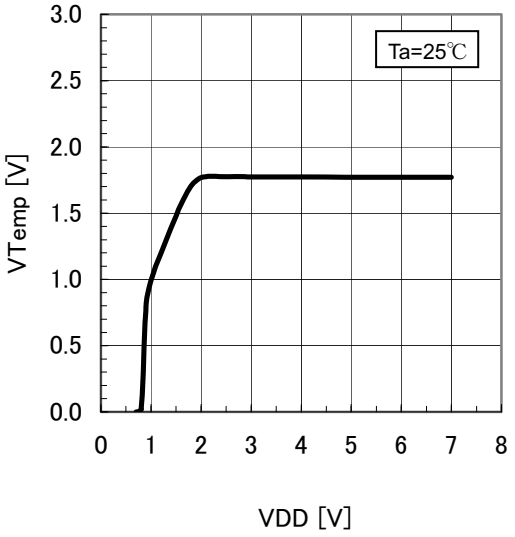


Fig3. VTemp Voltage vs. Supply Voltage

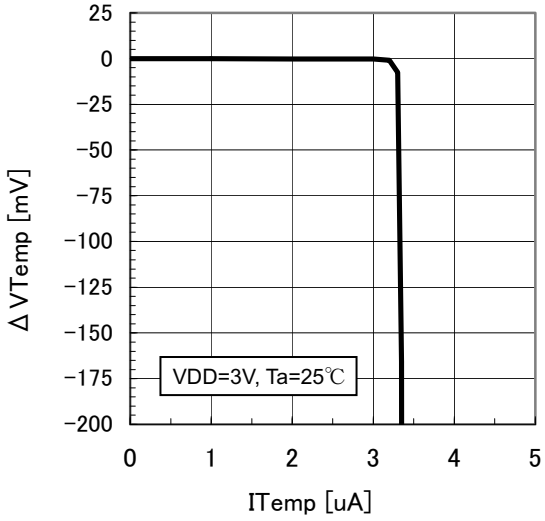


Fig4. VTemp Voltage vs. Output Current

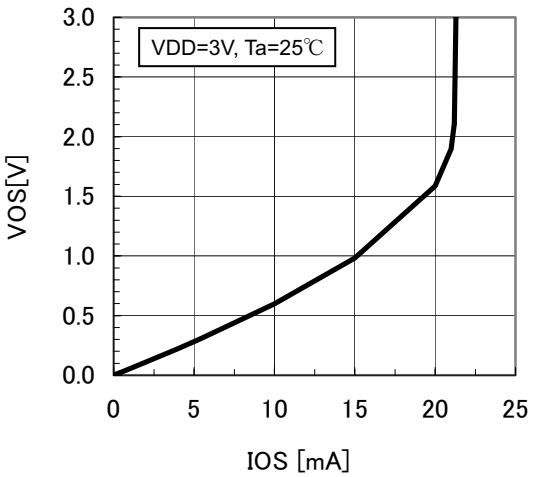


Fig5. OS Output Voltage vs. Load Current

● Caution On Use

1) Absolute Maximum Ratings

An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down devices, thus making impossible to identify breaking mode such as a short circuit or an open circuit. If any special mode exceeding the absolute maximum ratings is assumed, consideration should be given to take physical safety measures including the use of fuses, etc.

2) GND voltage

Make setting of the potential of the GND terminal so that it will be maintained at the minimum in any operating state.

3) Pin short and mistake fitting

When mounting the IC on the PCB, pay attention to the orientation of the IC. If there is a placement mistake, the IC may be burned up.

4) Operation in strong electric field

Be noted that using ICs in the strong electric field can malfunction them.

5) Mutual impedance

Use short and wide wiring tracks for the power supply and ground to keep the mutual impedance as small as possible. Use a capacitor to keep ripple to a minimum.

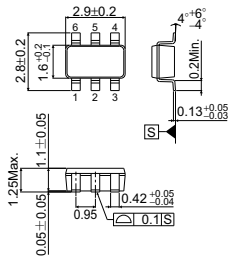
●Product Designations (Selecting a model name when ordering)

B	D	F	1	2	0	0	G	—	T	R

ROHM model — Part number — Package type — TR = Reel-wound embossed taping

SSOP6

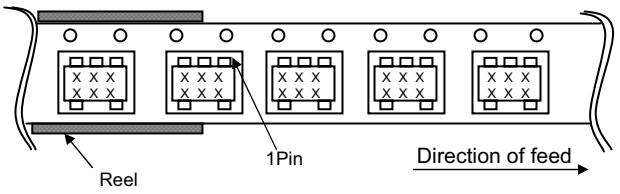
<Dimension>



(Unit:mm)

<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	3000pcs
Direction of feed	TR (The direction is the 1pin of product is at the upper light when you hold reel on the left hand and you pull out the tape on the right hand)



※When you order , please order in times the amount of package quantity.

Excellence in Electronics

ROHM

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