Small and high accuracy Temperature Sensor IC Series

Detect Temperature Changeable Thermostat Output Temperature Sensor IC

BDE□□□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 BDE□□□0G series.

● Features

1) Detection Temperature Range -25～+125℃ by 15 products.
2) ±5℃ Step Selectable Detection Temperature with CTRL.
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

● Products Variation

BDE □□□ **0** **G**

Detection Temperature (Center Temperature)		Output Format (Open Drain, Active Low)	Package (SSOP5)
120:120℃	040: 40℃		
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

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

Product Name	Detection Temperature (℃) CTRL			OS Output Format		Marking
	L	H	O			
BDE1200G	115	120	125	Open Drain	Active L	eA
BDE1100G	105	110	115	Open Drain	Active L	eB
BDE1000G	95	100	105	Open Drain	Active L	eC
BDE0900G	85	90	95	Open Drain	Active L	eD
BDE0800G	75	80	85	Open Drain	Active L	eE
BDE0700G	65	70	75	Open Drain	Active L	eF
BDE0600G	55	60	65	Open Drain	Active L	eG
BDE0500G	45	50	55	Open Drain	Active L	eH

Product Name	Detection Temperature (℃) CTRL			OS Output Format		Marking
	L	H	O			
BDE0400G	35	40	45	Open Drain	Active L	eJ
BDE0300G	25	30	35	Open Drain	Active L	eK
BDE0200G	15	20	25	Open Drain	Active L	eL
BDE0100G	5	10	15	Open Drain	Active L	eM
BDE0000G	-5	0	5	Open Drain	Active L	eN
BDE9100G	-15	-10	-5	Open Drain	Active L	eP
BDE9200G	-25	-20	-15	Open Drain	Active L	eQ

● Absolute Maximum Ratings (Ta = 25℃)

PARAMETERS	SYMBOL	LIMIT	UNIT
Power Supply Voltage	V_{DD}	-0.3 to 7.0 *1	V
Input Voltage (CTRL)	V_{IN}	-0.3 to V_{DD}+0.3	V
Input Current (CTRL)	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)

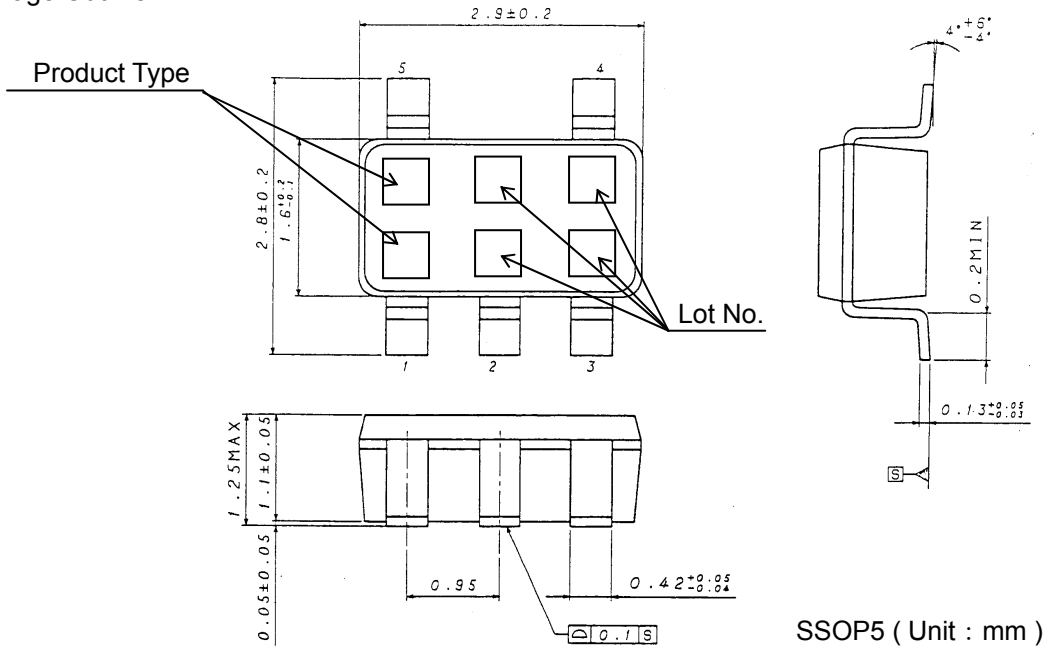
PARAMETER	SYMBOL	LIMIT			UNIT	CONDITIONS
		MIN.	TYP.	MAX.		
Thermostat (Temperature Switch)						
Detection Temperature Accuracy	Tacc	-	0	±4.0 ±5.0	℃	Ta = -20℃～115℃ Ta = ～125℃
Detection Temperature Hysteresis	Thys	7.5	10.0	12.5	℃	
Analog Output						
VTemp Temperature Accuracy	TTemp	-	-	±3.5	℃	Ta = 30℃

● 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	CTRL = 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
CTRL						
Input L Voltage	VIL	GND	-	0.6	V	
Input H Voltage	VIH	2.4	-	VDD	V	

Radiation hardiness is not designed.

● Package Outline



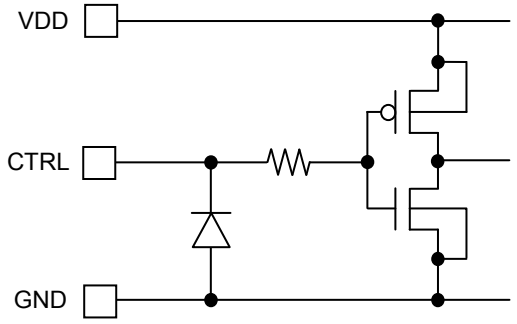
SSOP5 (Unit : mm)

● PIN Description

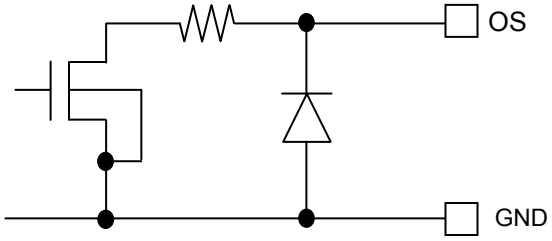
PIN NO.	PIN NAME	FUNCTION	COMMENT
1	CTRL	Detection temperature setting	Refer to 2/7 page for the emperature set. (Temperature / Output Format Table)
2	GND	GROUND	
3	Vtemp	Output voltage in inverse proportion to the temperature (TYP. -10.68mV/℃)	Set the OPEN state or Connect high impedance input node.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

● Equivalence Circuit

CTRL

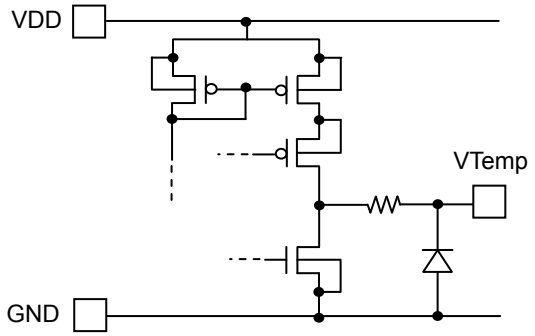


OS



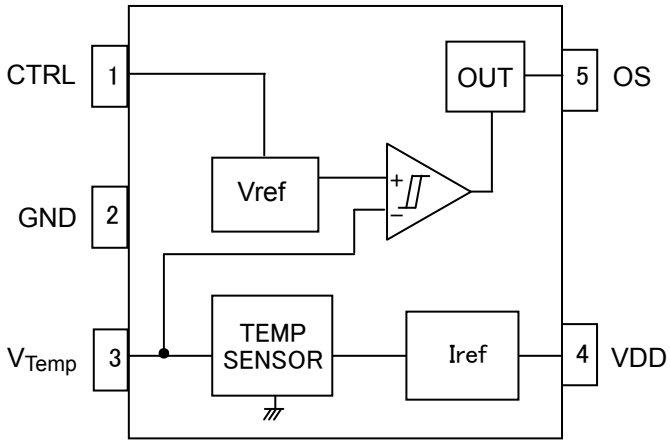
Please connect the pull-up resistor over 10kΩ.

VTemp

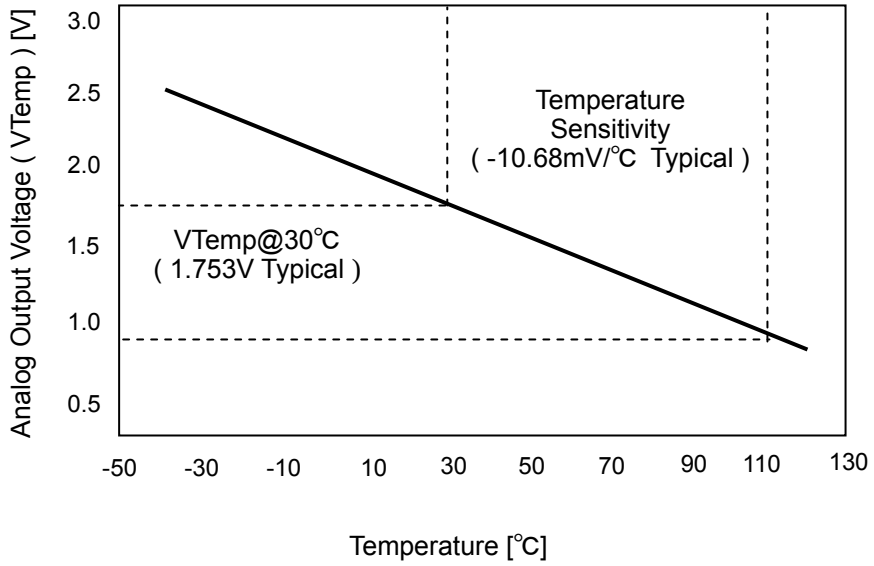


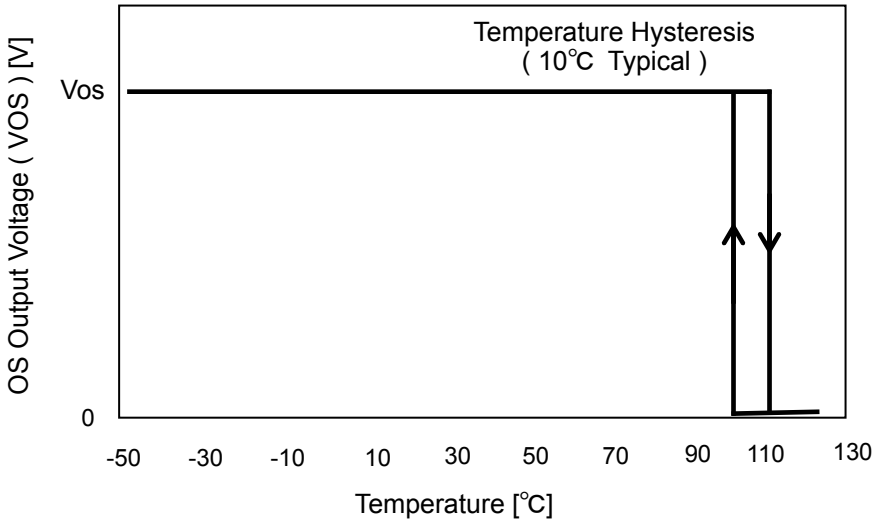
Please don't connect the pull-down resistor

● Block Diagram



● Functional Diagram (ex. Detection Temperature 110℃)





● Reference Data

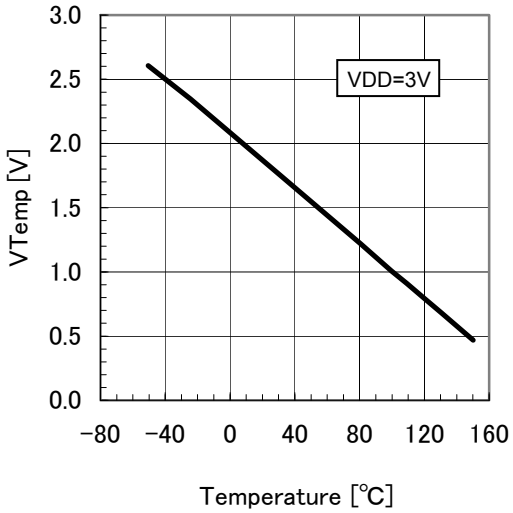


Fig1. VTemp Voltage vs. Temperature
(Temperature Sensitivity)

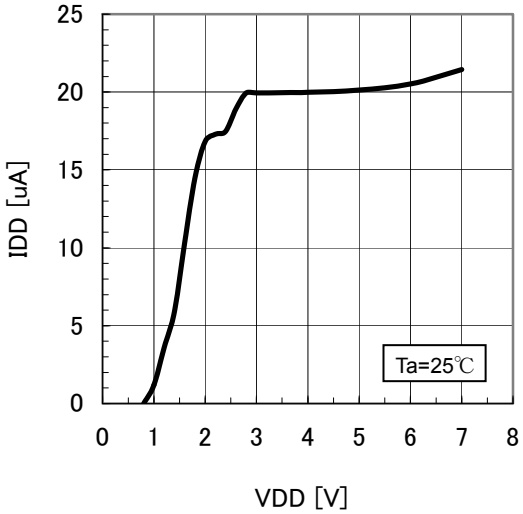


Fig2. Supply Current vs. Supply Voltage

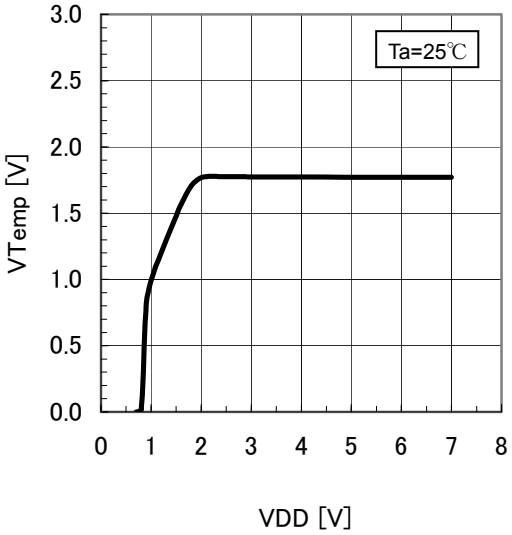


Fig3. VTemp Voltage vs. Supply Voltage

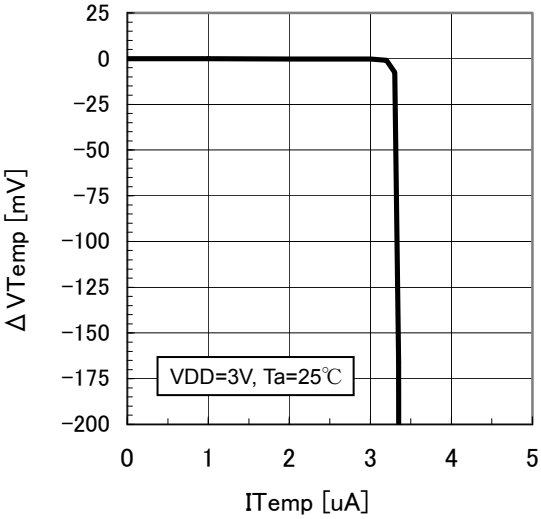


Fig4. VTemp Voltage vs. Output Current

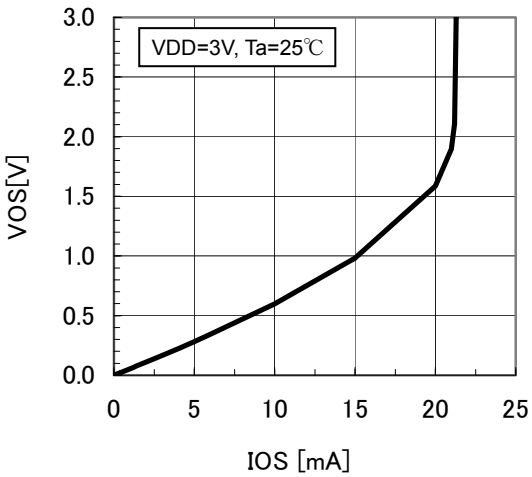


Fig5. OS Output Voltage vs. Load Current

● 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

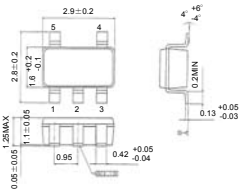
Use short and wide wiring tracks for the power supply and ground to keep the mutual impedance as small as possible. Use a capacitor to keep ripple to a minimum.

●Product Designations (Selecting a model name when ordering)

B	D	E	1	1	0	0	G	—	T	R
ROHM model			Part number				Package type		TR = Reel-wound embossed taping	

SSOP5

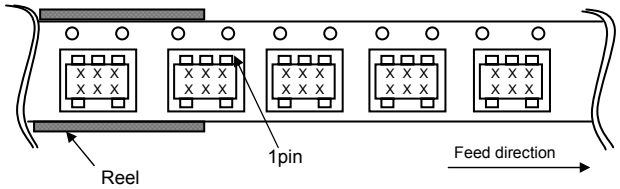
<Dimensions>



(Unit:mm)

< Tape/Reel Info >

Tape	Embossed carrier tape
Quantity	3000pcs
Direction of feed	TR (Correct direction: With reel in the left hand, the 1pin of the product should be at the upper left. Pull tape out with the right hand)



※Orders are available in complete units only.

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