STRUCTURE   Silicon Monolithic Integrated Circuit

TYPE   **BDE1204G**

PRODUCT   Thermostat and Analog Temperature Sensor

FEATURES   1) Highly accurate thermostat (± 4.0)
2) Thermostat sensing temperature 115, 120, 125 with CTRL state
3) Open drain output
4) Hysteresis temperature (TYP. 10)
5) Highly accurate analog output (± 3.5 @Ta = 30)
6) Analog output temperature sensitivity (-10.68 [mV/])
7) Low supply current (TYP. 16.0uA)
8) Small package (TYP. 2.90mm× 2.80mm× 1.25mm)

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	

 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 difference in translation
version of this document, formal version takes priority.

BLOCK DIAGRAM
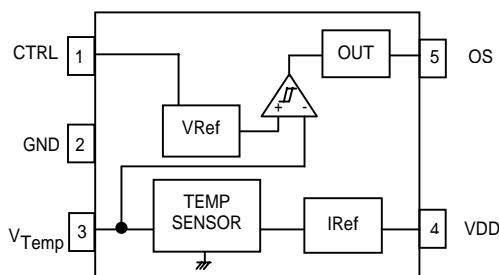
PIN DESCRIPTION

PIN NO.	PIN NAME	FUNCTION	COMMENT
1	CTRL	Sensing temperature setting	Refer to page 3/4 (TEMPERATURE / OUTPUT FORMAT TABLE) for the sensing temperature setting.
2	GND	GROUND	
3	V$_{temp}$	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 (Active L) Use the pull-up resistor more than 10k .

TEMPERATURE ACCURACY (unless otherwise specified, V$_{DD}$ = 3.0V)

PARAMETER	SYMBOL	LIMIT			UNIT	CONDITIONS
		MIN.	TYP.	MAX.		
Thermostat						
Sensing Temperature Accuracy	T$_{acc}$	-	0	± 4.0		Ta = 115, 120, 125
Sensing Temperature Hysteresis	Thys	7.5	10.0	12.5		
Analog Output						
V$_{Temp}$ Temperature Accuracy	T$_{Temp}$	-	-	± 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	I$_{DD}$	-	16.0	20.0	uA	CTRL = 3.0V
Analog Output						
V$_{Temp}$ Output Voltage	V$_{Temp}$	1.716	1.753	1.790	V	Ta = 30
V$_{Temp}$ Temperature Sensitivity	V$_{SE}$	-10.28	-10.68	-11.08	mV/	Ta = -30 to 100
V$_{Temp}$ Load Regulation	V$_{Temp}$RL	-	-	1	mV	difference of I$_{OUT}$: 0uA / 2uA
OS Output Open Drain						
OS Leakage Current	I$_L$	-	-	1.0	uA	OS : 5.0V
OS Output Voltage	V$_{OL}$	-	-	0.4	V	Iin$_{OS}$ = 1.2mA
CTRL						
Input L Voltage	V$_{IL}$	GND	-	0.6	V	
Input H Voltage	V$_{IH}$	2.4	-	V$_{DD}$	V	

Radiation hardiness is not designed.

BDE12040G TEMPERATURE / OUTPUT FORMAT TABLE

CTRL INPUT   L : Low, O : Open, H : High

TYPE	SENSING TEMPERATURE CTRL			OS Output FORMAT		MARKING
	L	H	O			
BDE1204G	120	125	115	Open Drain	Active L	fA

PACKAGE OUTLINES (SSOP5)

(UNIT : mm)
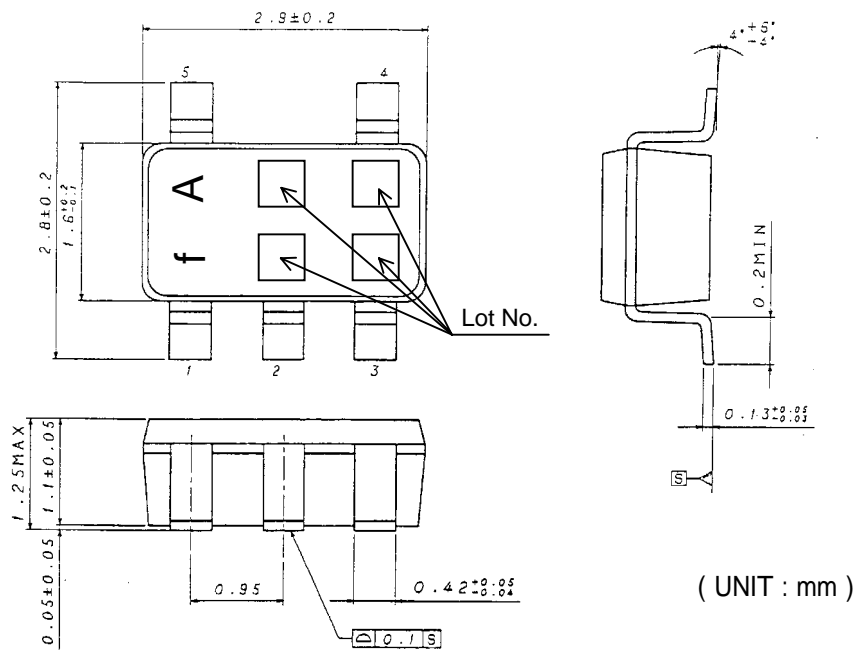
CAUTIONS ON USE

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.