Small and High Accuracy Temperature Sensor IC Series

Analog Output Temperature Sensor IC

BD1020HFV

No.10047EBT02

●Description

Low quiescent current (4μA) and high accuracy temperature sensor
Detecting temperature by itself, output voltage appears linearly along the temperature.

●Features

1) Detection Temperature Range -30～+100℃
2) Operating Voltage Range +2.4V～+5.5V
3) High Accuracy (typically ±1.0℃@Ta=30℃, typically ±2.0℃@Ta=-30～+100℃)
4) Temperature Sensitivity (typically -8.2mV/℃)
5) Low Quiescent Current (typically 4μA)
6) Ultra Small Package (typically 1.60mm×1.60mm×0.60mm)
7) Low Thermal Resistance (typically 187℃/W)
8) ESD Rating 8kV (HBM)
9) Excellent Ripple Rejection Characteristic

●Applications

Cell Phone (RF Module, Battery Thermal Management),Audio Systems,Digital Still Camera
LCD, PDP,Optical pick up module for DVD,BlueRay

●Absolute Maximum Ratings (Ta=25℃)

PARAMETERS	SYMBOL	LIMIT	UNIT
Power Supply Voltage	V_{DD}	-0.3～7.0 ※1	V
Output Voltage	V_{OUT}	-0.3～V_{DD}+0.3	V
Output Current	I_{OUT}	±1	mA
Power Dissipation	Pd	536 ※2	mW
Storage Temperature Range	T_{stg}	-55～150	℃

※1. Not to exceed Pd
※2. Reduced by 5.36mW 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	V_{DD}	2.40	3.00	5.50	V
Operation Temperature	T_{opr}	-30	-	100	℃

●Electrical Characteristics and Accuracy (Unless otherwise specified, V_{DD}=3.0V, Ta=25℃)

PARAMETERS	SYMBOL	LIMIT			UNIT	CONDITIONS
		MIN.	TYP.	MAX.		
Accuracy	T_{acc}	-	±1.0	±1.5	℃	Ta = 30℃
		-	±2.0	±2.5		Ta = 100℃
		-	±2.0	±2.5		Ta = -30℃
Temperature Sensitivity	V_{SE}	-8.4	-8.2	-8.0	mV/℃	
Supply Current	I_S	-	4.0	7.0	μA	
Output Voltage	V_{OUT}	1.288	1.300	1.312	V	Ta = 30℃
Output VoltageLine Regulation	$\Delta V_{OUT}V_{DD}$	-	-	4	mV	V_{DD} = 2.4～5.5V
Output VoltageLoad Regulation	$\Delta V_{OUT}R_L$	-	-	1	mV	I_{OUT} : 0μA / 0.7μA,Difference

Radiation hardiness is not designed.

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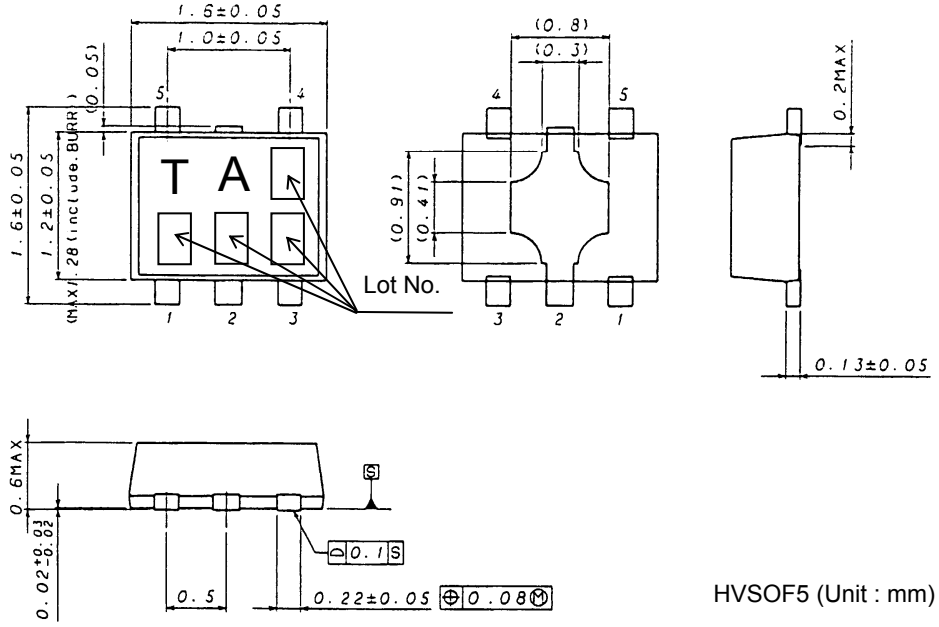
●Package Outlines

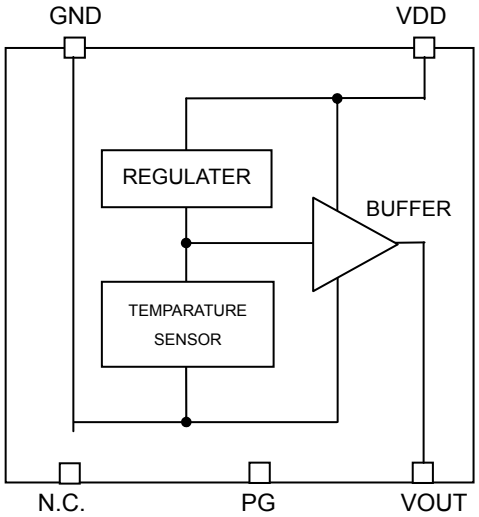


HVSOF5 (Unit : mm)

●Pin Descriptions

Pin No.	Pin Name	Function	Comment
1	N.C.	-	Please set to OPEN .
2	PG	Heat Condition	Please connect to temperature measurement part.
3	VOUT	Output Voltage for proportional t emperature reversely	-
4	VDD	Power Supply	-
5	GND	Ground	-

●Block Diagram



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●**Reference Data**

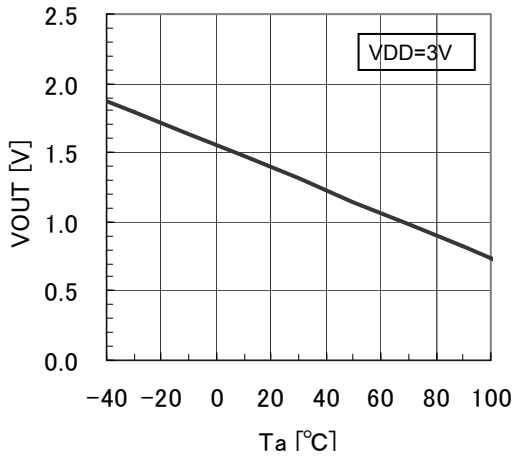

Fig.1 Output Voltage vs. Temperature

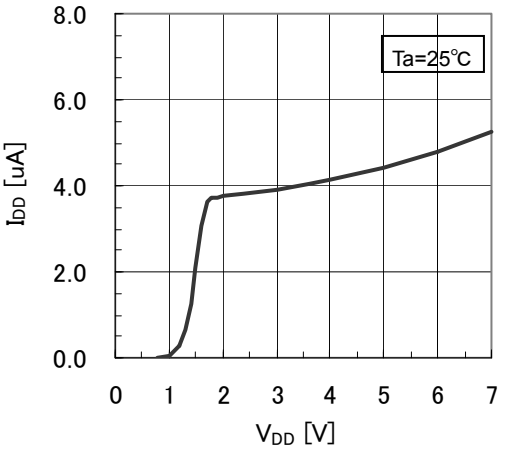

Fig.2 Supply Current vs. Supply Voltage

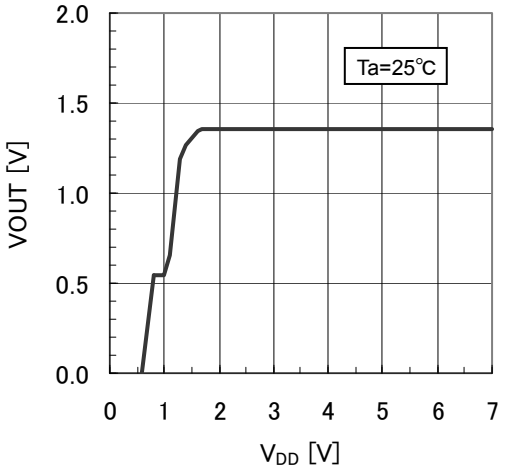

Fig.3 Output Voltage vs. Supply Voltage

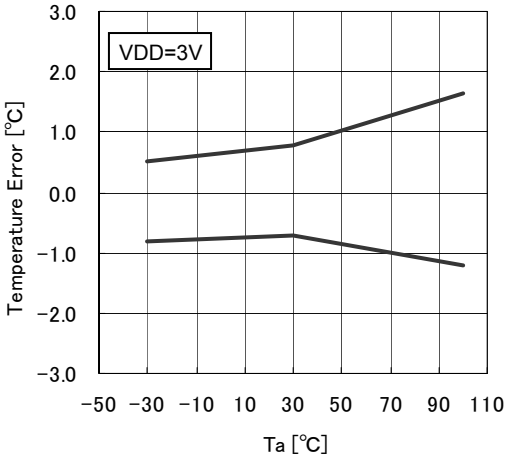

Fig.4 Error vs. Temperature

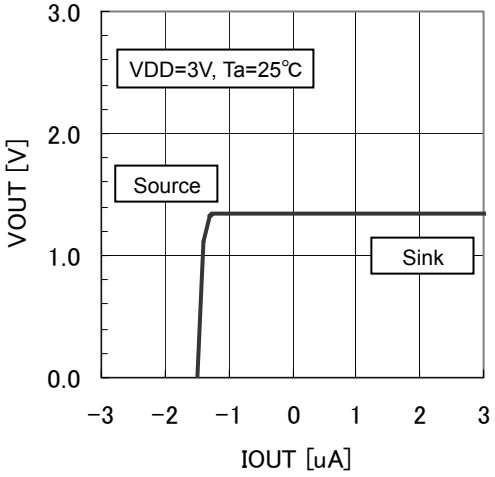

Fig.5 Output Voltage vs. Output Current

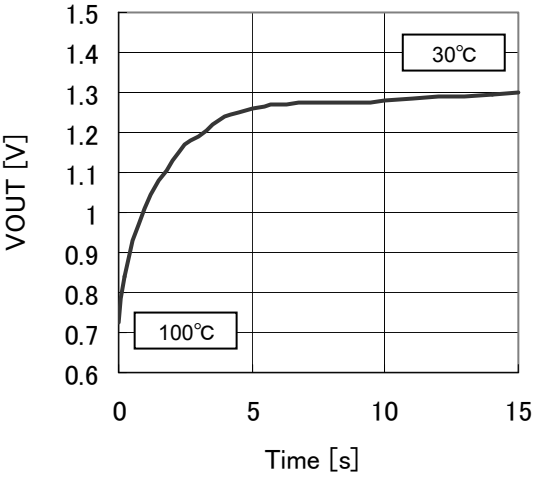

Fig.6 Start Up Response
(VOUT response 100℃→30℃ in atmosphere)

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●Notes for 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.

6) Please connect it with the temperature measurement part (GND line usually) to make thermal conductivitywith the mount board side the best though the PG pin (Pin NO.2) is hindered and doesn't exist about OPEN even if it connects it with GND.

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●**Ordering part number**

B	D	1	0	2	0	H	F	V	-	T	R

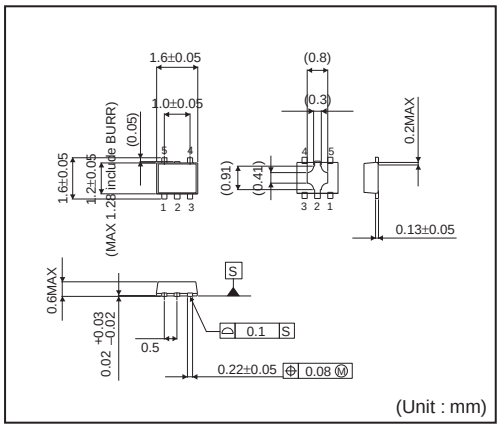
Part No.

Part No.
1020

Package
HFV: HVSOF5

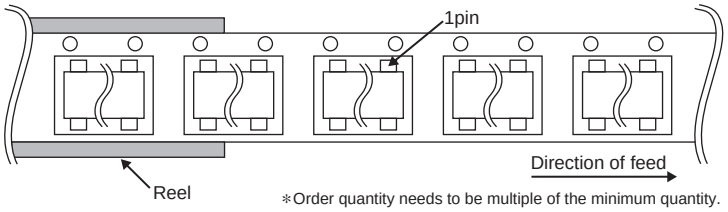
Packaging and forming specification
TR: Embossed tape and reel
(HVSOF5)

HVSOF5



<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 right when you hold reel on the left hand and you pull out the tape on the right hand)



∗Order quantity needs to be multiple of the minimum quantity.

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(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASSⅢ	CLASSⅢ	CLASSⅡb	CLASSⅢ
CLASSⅣ		CLASSⅢ	

2. ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
   [a] Installation of protection circuits or other protective devices to improve system safety
   [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure

3. Our Products are designed and manufactured for use under standard conditions and not under any special or extraordinary environments or conditions, as exemplified below. Accordingly, ROHM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any ROHM's Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc, prior to use, must be necessary:
   [a] Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
   [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
   [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl_2, H_2S, NH_3, SO_2, and NO_2
   [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
   [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
   [f] Sealing or coating our Products with resin or other coating materials
   [g] Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
   [h] Use of the Products in places subject to dew condensation

4. The Products are not subject to radiation-proof design.

5. Please verify and confirm characteristics of the final or mounted products in using the Products.

6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

7. De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.

8. Confirm that operation temperature is within the specified range described in the product specification.

9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.

2. In principle, the reflow soldering method must be used; if flow soldering method is preferred, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

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Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.

2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
   [a] the Products are exposed to sea winds or corrosive gases, including Cl2, H2S, NH3, SO2, and NO2
   [b] the temperature or humidity exceeds those recommended by ROHM
   [c] the Products are exposed to direct sunshine or condensation
   [d] the Products are exposed to high Electrostatic

2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.

3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

Precaution for Product Label

QR code printed on ROHM Products label is for ROHM's internal use only.

Precaution for Disposition

When disposing Products please dispose them properly using an authorized industry waste company.

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Since our Products might fall under controlled goods prescribed by the applicable foreign exchange and foreign trade act, please consult with ROHM representative in case of export.

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