

Compact High Accuracy Temperature Sensor ICs

Low current Thermostat Output Temperature Sensor ICs



BDJ□□□0HFV Series

No.11047EBT05

●Description

BDJ□□□0HFV series is thermostat output temperature sensor IC with built-in temperature detection element, constant current circuit, high-accuracy reference voltage source in one chip. Temperature detection can be realized at $\pm 2.5^{\circ}\text{C}$ accuracy without complicated design. It is the best temperature sensor IC for a portable equipment of micro and low current, the power down function, and the battery drive. It is possible to use it for a wide usage such as the heat detection and temperature monitors because it provides with the analog output in addition to the thermostat power output. BDJ□□□0HFV series has 5 products at 55°C , 60°C , 65°C , 70°C , 80°C detection temperature.

●Features

- 1) Detection Temperature lineup at 55°C , 60°C , 65°C , 70°C , 80°C (5 products)
- 2) Power supply Voltage range 2.4~5.5V.
- 3) High Accuracy thermostat (typ. $\pm 1.0^{\circ}\text{C}$, max. $\pm 2.5^{\circ}\text{C}$ @ $T_a=55\sim 80^{\circ}\text{C}$)
- 4) High Accuracy Analog Output (typ. $\pm 1.0^{\circ}\text{C}$, max. $\pm 2.5^{\circ}\text{C}$ @ $T_a=-30\sim 100^{\circ}\text{C}$)
- 5) Analog Output Temperature Sensitivity (typ. $-8.2\text{mV}/^{\circ}\text{C}$)
- 6) Low Supply Current (typ. 7.5 μA)
- 7) Power down control function built in. (PD interface Voltage min 1.5V)
- 8) Small Package (typ. 1.60mm \times 1.60mm \times 0.60mm)
- 9) Low thermal resistance package (typ. 187 $^{\circ}\text{C}/\text{W}$)
- 10) ESD Rating 8kV (HBM)

●Applications

Cell phone, Digital Camera, Thermal Protection for Electrical Equipment (NoteBook PC, FPD-TV, etc.)

●Line up matrix

| Product Name | Detect Temp. ($^{\circ}\text{C}$) | OS Output Format | | Marking |
|--------------|-------------------------------------|------------------|----------|---------|
| | | Open Drain | Active L | |
| BDJ0800HFV | 80 | Open Drain | Active L | ff |
| BDJ0700HFV | 70 | Open Drain | Active L | fh |
| BDJ0650HFV | 65 | Open Drain | Active L | fk |

| Product Name | Detect Temp. ($^{\circ}\text{C}$) | OS Output Format | | Marking |
|--------------|-------------------------------------|------------------|----------|---------|
| | | Open Drain | Active L | |
| BDJ0600HFV | 60 | Open Drain | Active L | fm |
| BDJ0550HFV | 55 | Open Drain | Active L | fn |

● **Absolute Maximum Ratings** (Ta = 25°C)

| Parameter | Symbol | Ratings | Unit |
|---------------------------|------------------|------------------------------|------|
| Power Supply Voltage | V _{DD} | -0.3 to 7.0 ^{*1} | V |
| Input Voltage (PD) | V _{IN} | -0.3 to V _{DD} +0.3 | V |
| OS terminal Voltage | V _{OS} | -0.3 to 7.0 ^{*1} | V |
| OS terminal Current | I _{OS} | 5.0 | mA |
| Power dissipation | P _d | 536 ^{*2} | mW |
| Storage Temperature Range | T _{stg} | -55 to 150 | °C |

*1. Not to exceed P_d

*2. Reduced by 5.36mW for each increase in Ta of 1°C over 25°C
(mounted on 70mm × 70mm × 1.6mm Glass-epoxy PCB)

● **Recommended Operating Conditions**

| Parameter | Symbol | Ratings | | | Unit |
|-----------------------------|------------------|---------|------|------|------|
| | | Min. | Typ. | Max. | |
| Power Supply Voltage | V _{DD} | 2.4 | 2.8 | 5.5 | V |
| Operating Temperature Range | T _{opr} | -30 | - | 100 | °C |

● **Electrical Characteristics** (Unless otherwise specified, V_{DD} = 2.8V, Ta = 25°C)

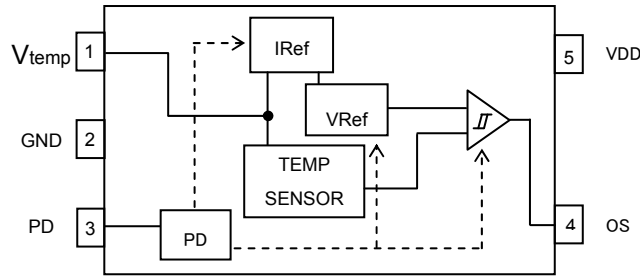
| Parameter | Symbol | Limits | | | Unit | Conditions |
|--|-----------------------|--------|-------|-----------------|-------|--|
| | | Min. | Typ. | Max. | | |
| Supply Current | | | | | | |
| Normal function mode | I _{DD} | - | 7.5 | 12.0 | μA | PD="H" |
| Power Down mode | I _{DDPD} | - | 0.3 | 1.0 | μA | PD="L" |
| PD | | | | | | |
| Input L Voltage | V _{IL} | GND | - | 0.2 | V | |
| Input H Voltage | V _{IH} | 1.5 | - | V _{DD} | V | |
| PD Leakage Current | I _{LPD} | - | - | 1.0 | μA | PD=2.8V |
| Analog Output | | | | | | |
| V _{Temp} Output Voltage | V _{temp} | 1.279 | 1.300 | 1.321 | V | Ta = 30°C |
| V _{Temp} Temperature Sensitivity | V _{SE} | -8.00 | -8.20 | -8.40 | mV/°C | Ta = -30 to 100°C |
| V _{Temp} Load Regulation | ΔV _{tempRL} | - | - | 1.0 | mV | difference of I _{OUT} : 0uA / 2μA |
| V _{Temp} V _{DD} Regulation | ΔV _{tempVDD} | - | - | 4.0 | mV | V _{DD} =2.4~5.5V |
| OS Output Open Drain | | | | | | |
| OS Leakage Current | I _L | - | - | 1.0 | μA | V _{OS} = 5.0V |
| OS Output Voltage | V _{OL} | - | - | 0.4 | V | I _{OS} = 1.0mA |

Radiation hardness is not designed.

● **Temperature Accuracy** (Unless otherwise specified, V_{DD} = 2.8V)

| Parameter | Symbol | Limits | | | Unit | Conditions |
|--|-------------------|--------|------|------|------|---|
| | | Min. | Typ. | Max. | | |
| Thermostat | | | | | | |
| Sensing Temperature Accuracy | T _{acc} | - | ±1.0 | ±2.5 | °C | |
| Sensing Temperature Hysteresis | T _{hys} | 7.5 | 10.0 | 12.5 | °C | |
| Analog Output | | | | | | |
| V _{Temp} Temperature Accuracy | T _{temp} | - | ±1.0 | ±2.5 | °C | V _{DD} = 2.8V Ta = -30 to 100°C |

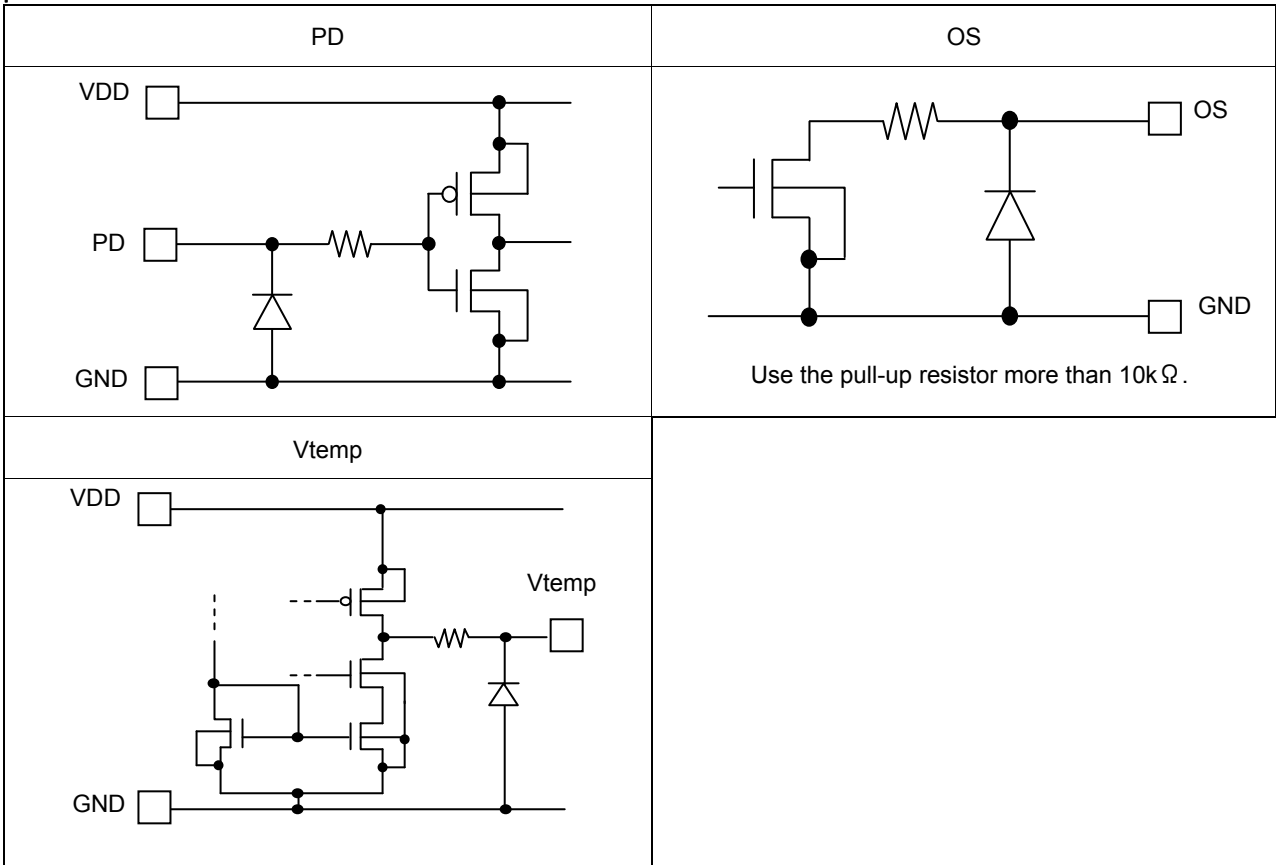
●Block Diagram



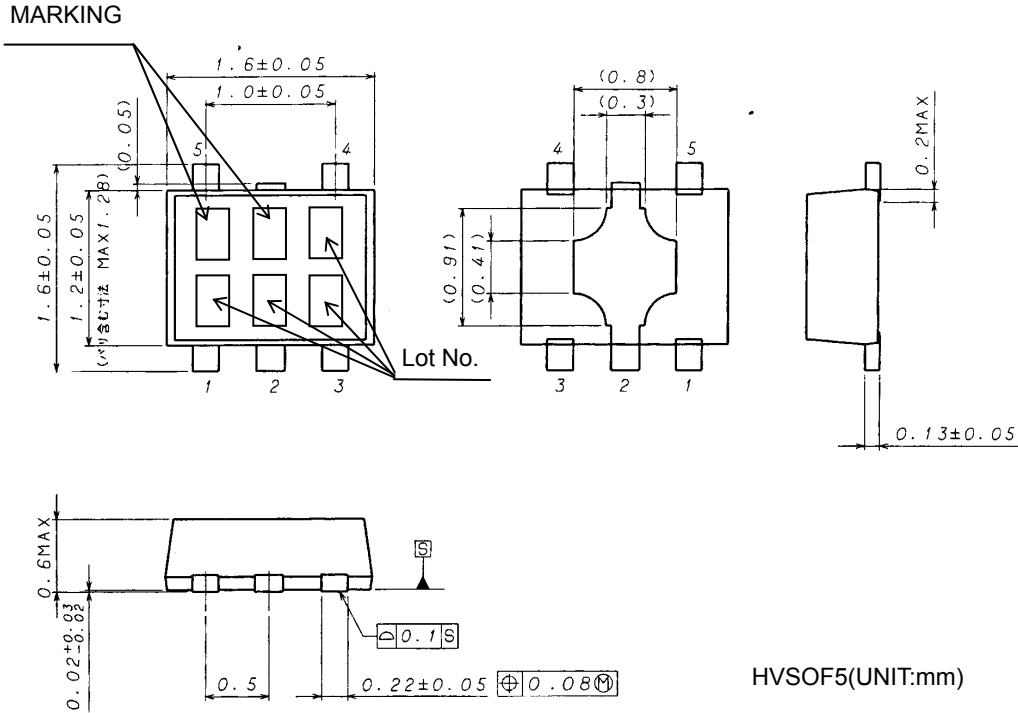
●Pin Description

| PIN NO. | PIN NAME | FUNCTION | COMMENT |
|---------|----------|---|--|
| 1 | Vtemp | Output voltage in inverse proportion to the temperature (TYP. -8.20mV/°C) | Set the OPEN state or connect high impedance input node.(over 10MΩ) |
| 2 | GND | GROUND | |
| 3 | PD | PD control H : Normal function mode L : Power Down mode | “H” Thermostat and Analog output operation. “L” Power Down state. |
| 4 | OS | Digital thermostat output | Open Drain Active L. Use the pull-up resistor more than 10kΩ . |
| 5 | VDD | POWER SUPPLY | |

●Equivalent Circuit

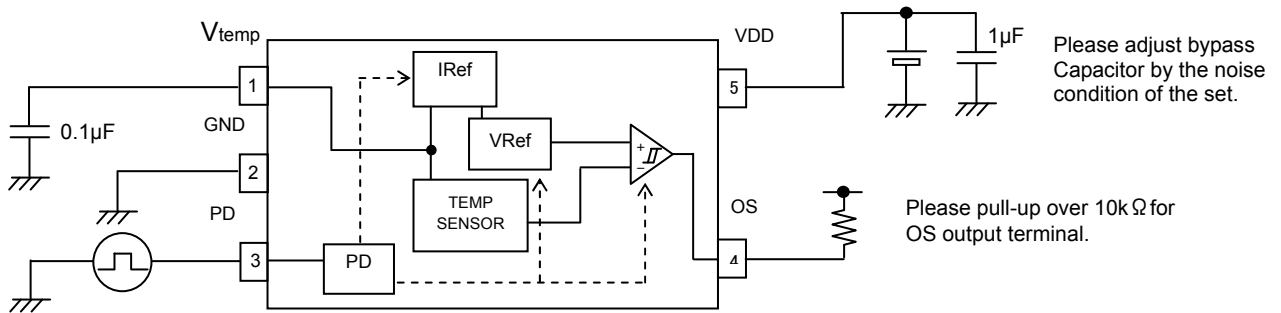


●Package Outlines (HVSO5)



●Block Diagram

Please adjust Capacitor by the noise condition of the set.



●Reference Data

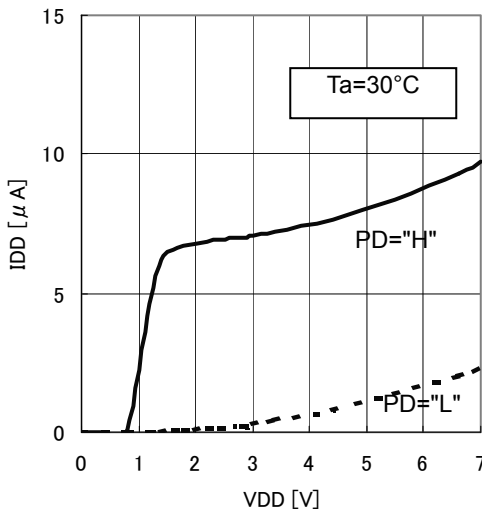


Fig1. Supply Current(IDD) vs. Supply Voltage

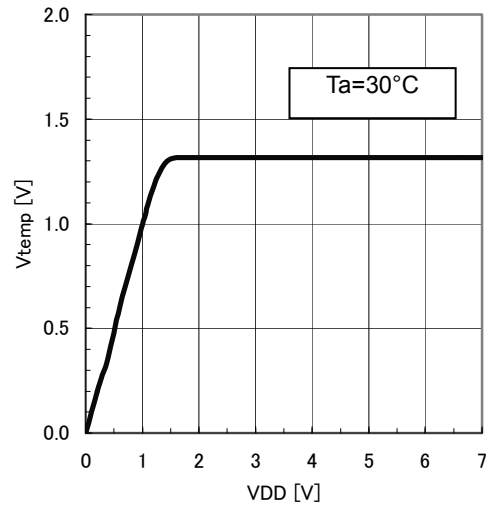


Fig2. Vtemp Voltage vs. Supply Voltage

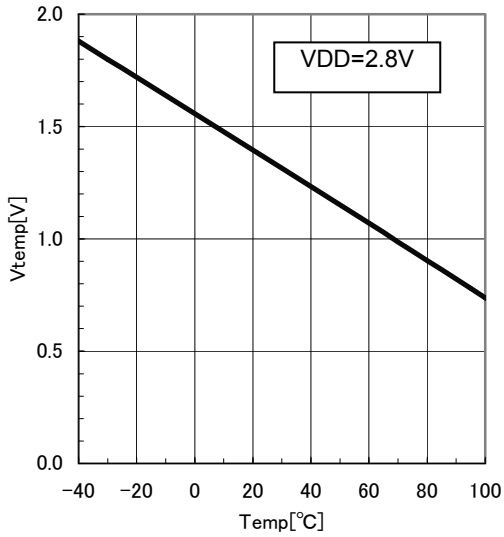


Fig3. Vtemp Voltage vs. Temperature

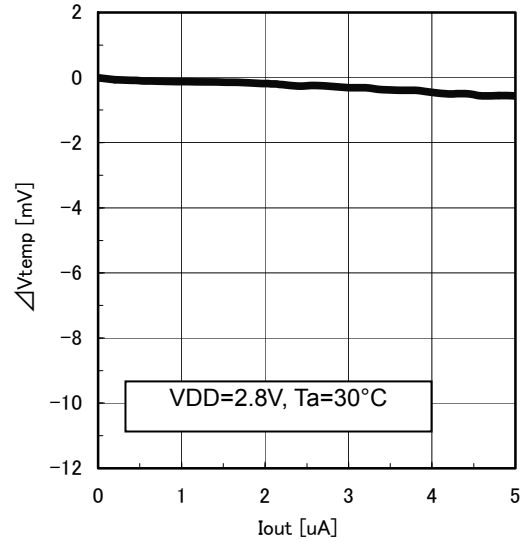


Fig4. Vtemp Voltage vs. Output Current

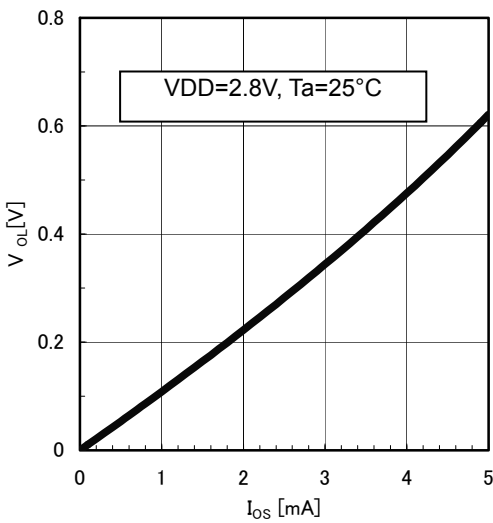
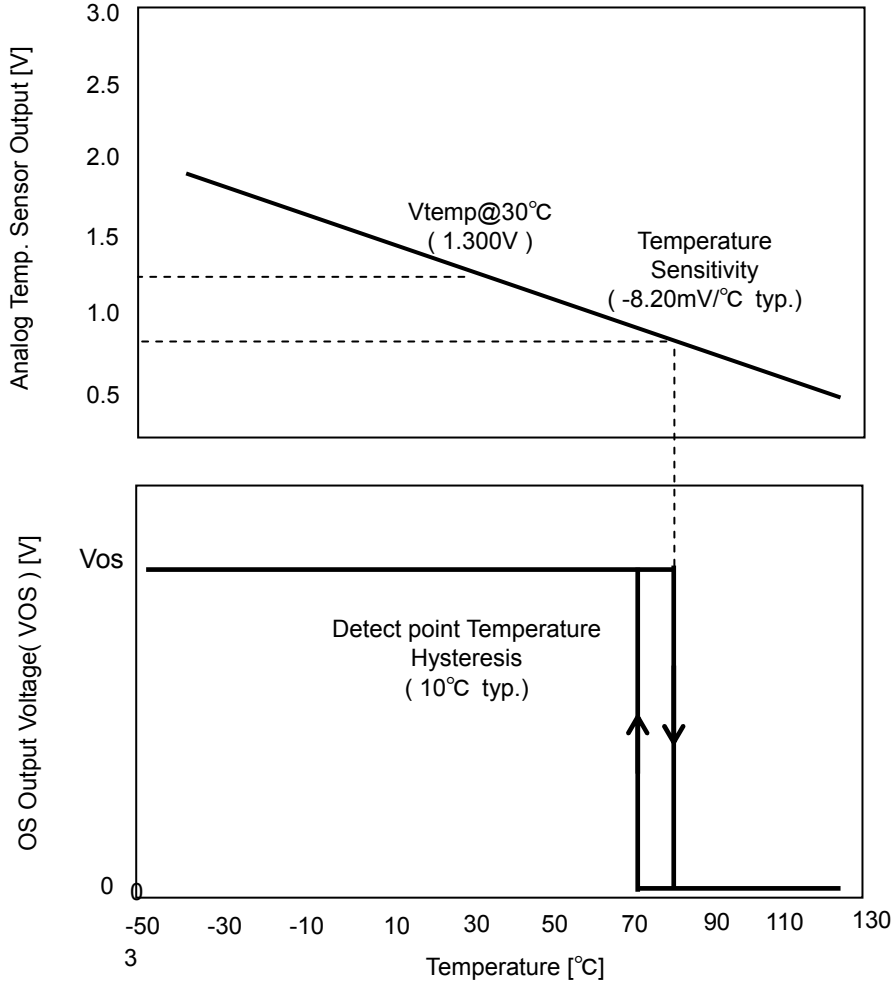


Fig5. OS Output Voltage vs. Load Current

●Function Diagram(ex. 80°C detect Active “L” type BDJ0800HFV)

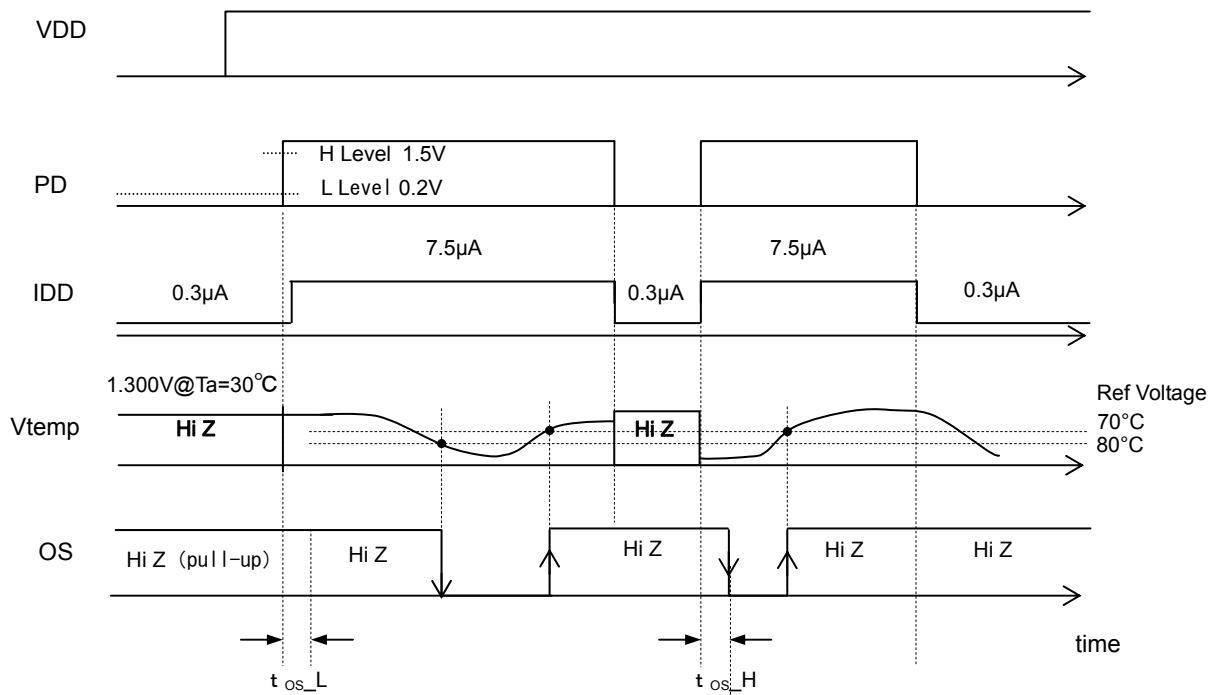
Temperature sensor internal IC sense temperature, Vtemp terminal output voltage convert temperature.
 Vtemp value is 1.300[V] at Ta = 30[°C].
 The value of Vtemp voltage reduce reversely proportional temperature at rate of -8.2mV/°C.



If the temperature over detect temperature, internal comparator operate OS output “H” to “L”.(ex.active “L” Type)
 In case of OS return to “H”,the temperature 10°C lower than detect temperature.

●Operation Sequence

(ex.80°C detect Active“L”type BDJ0800HFV)



BDJ0800HFV operate start after PD“H”Input.
Please read OS terminal signal below wait time after PD “H” Input.

| Ta | Symbol | Wait time |
|--------------------|-------------------|-----------|
| Under detect Temp. | t _{os_L} | 200µs |
| Over detect Temp. | t _{os_H} | 1000µs |

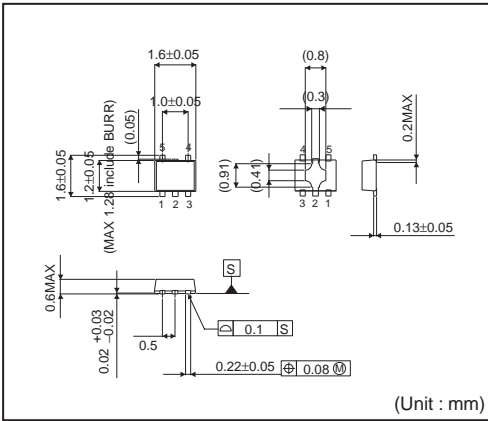
●Notes for use

- 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.

●Ordering part number

| | | | | | | | | | | | | |
|-------------|---|---|--------------|---|---------------|---|------------|---|---|-------------------------------------|---|---|
| B | D | J | 0 | 8 | 0 | 0 | H | F | V | - | T | R |
| Series Name | | | Detect Temp. | | Output Format | | Package | | | Packaging and forming specification | | |
| | | | 080: 80°C | | 0 : active L | | HFV:HVSOF5 | | | TR: Embossed tape and reel | | |
| | | | 070: 70°C | | 1 : active H | | | | | | | |
| | | | 065: 65°C | | | | | | | | | |
| | | | 060: 60°C | | | | | | | | | |
| | | | 055: 55°C | | | | | | | | | |

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.

Notice

Precaution on using ROHM Products

- Our Products are designed and manufactured for application in ordinary electronic equipments (such as AV equipment, OA equipment, telecommunication equipment, home electronic appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment ^(Note 1), transport equipment, traffic equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, 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 any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

| JAPAN | USA | EU | CHINA |
|-----------|-----------|------------|-----------|
| CLASS III | CLASS III | CLASS II b | CLASS III |
| CLASS IV | | CLASS III | |

- 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:
 - Installation of protection circuits or other protective devices to improve system safety
 - Installation of redundant circuits to reduce the impact of single or multiple circuit failure
- 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:
 - Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
 - Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
 - Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
 - Sealing or coating our Products with resin or other coating materials
 - 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
 - Use of the Products in places subject to dew condensation
- The Products are not subject to radiation-proof design.
- Please verify and confirm characteristics of the final or mounted products in using the Products.
- 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.
- De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.
- Confirm that operation temperature is within the specified range described in the product specification.
- 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

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

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.

Precaution for Foreign Exchange and Foreign Trade act

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.

Precaution Regarding Intellectual Property Rights

1. All information and data including but not limited to application example contained in this document is for reference only. ROHM does not warrant that foregoing information or data will not infringe any intellectual property rights or any other rights of any third party regarding such information or data. ROHM shall not be in any way responsible or liable for infringement of any intellectual property rights or other damages arising from use of such information or data.:
2. No license, expressly or implied, is granted hereby under any intellectual property rights or other rights of ROHM or any third parties with respect to the information contained in this document.

Other Precaution

1. This document may not be reprinted or reproduced, in whole or in part, without prior written consent of ROHM.
2. The Products may not be disassembled, converted, modified, reproduced or otherwise changed without prior written consent of ROHM.
3. In no event shall you use in any way whatsoever the Products and the related technical information contained in the Products or this document for any military purposes, including but not limited to, the development of mass-destruction weapons.
4. The proper names of companies or products described in this document are trademarks or registered trademarks of ROHM, its affiliated companies or third parties.

General Precaution

1. Before you use our Products, you are requested to carefully read this document and fully understand its contents. ROHM shall not be in any way responsible or liable for failure, malfunction or accident arising from the use of any ROHM's Products against warning, caution or note contained in this document.
2. All information contained in this document is current as of the issuing date and subject to change without any prior notice. Before purchasing or using ROHM's Products, please confirm the latest information with a ROHM sales representative.
3. The information contained in this document is provided on an "as is" basis and ROHM does not warrant that all information contained in this document is accurate and/or error-free. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties resulting from inaccuracy or errors of or concerning such information.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.