Small and high accuracy Temperature Sensor IC Series High Accuracy detection

Thermostat Output Temperature Sensor ICs with Power Down Function

BDJ□□□0HFV Series

No.09047EAT05

● **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 ±2.5℃ 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 8 types of model at 5℃ intervals from +55℃ to +90℃ temperature range.

● **Features**

1) Detection Temperature Range 55～90℃ by 5℃ Step 8 products.
2) Power supply Voltage range 2.4～5.5V.
3) High Accuracy thermostat (typ.±1.0℃, max.±2.5℃ @Ta=55～90℃)
4) High Accuracy Analog Output (typ.±1.0℃, max.±2.5℃ @Ta=-30～100℃)
5) Analog Output Temperature Sensitivity (typ. -8.2mV/℃)
6) Low Supply Current (typ. 7.5μA)
7) Power down control function built in.(PD interface Voltage min 1.5V)
8) Small Package (typ. 1.60mm × 1.60mm × 0.60mm)
9) Low thermal resistance package (typ. 187℃/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. (℃)	OS Output Format		Marking	Product Name	Detect Temp. (℃)	OS Output Format		Marking
BDJ0900HFV	90	Open Drain	Active L	fd	BDJ0700HFV	70	Open Drain	Active L	fh
BDJ0850HFV	85	Open Drain	Active L	fe	BDJ0650HFV	65	Open Drain	Active L	fk
BDJ0800HFV	80	Open Drain	Active L	ff	BDJ0600HFV	60	Open Drain	Active L	fm
BDJ0750HFV	75	Open Drain	Active L	fg	BDJ0550HFV	55	Open Drain	Active L	fn

● ABSOLUTE MAXIMUM RATINGS (Ta = 25℃)

PARAMETERS	SYMBOL	LIMIT	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	Pd	536[*2]	mW
Storage Temperature Range	T_{stg}	-55 to 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	VDD	2.4	2.8	5.5	V
Operating Temperature Range	Topr	-30	-	100	℃

● ELECTRICAL CHARACTERISTICS (unless otherwise specified, V_{DD} = 2.8V, Ta = 25℃)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
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℃
V$_{Temp}$ Temperature Sensitivity	V_{SE}	-8.00	-8.20	-8.40	mV/℃	Ta = -30 to 100℃
V$_{Temp}$ Load Regulation	$\triangle V_{temp}R_L$	-	-	1.0	mV	difference of I_{OUT} : 0μA / 2μA
V$_{temp}$ VDD Regulation	$\triangle V_{temp}VDD$	-	-	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 hardiness is not designed.

● TEMPERATURE ACCURACY (unless otherwise specified, V_{DD} = 2.8V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Thermostat						
Sensing Temperature Accuracy	T_{acc}	-	±1.0	±2.5	℃	
Sensing Temperature Hysteresis	Thys	7.5	10.0	12.5	℃	
Analog Output						
V$_{temp}$ Temperature Accuracy	T_{temp}	-	±1.0	±2.5	℃	V_{DD} = 2.8V Ta = -30 to 100℃

● Block Diagram
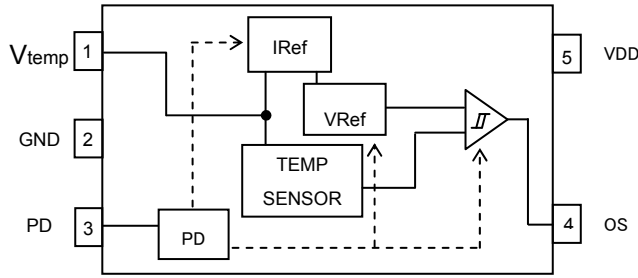
● PIN DESCRIPTION

| PIN NO.	PIN NAME	FUNCTION	COMMENT
1	Vtemp	Output voltage in inverse proportion to the temperature (TYP. -8.20mV/℃)	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

PD	OS
	Use the pull-up resistor more than 10kΩ.
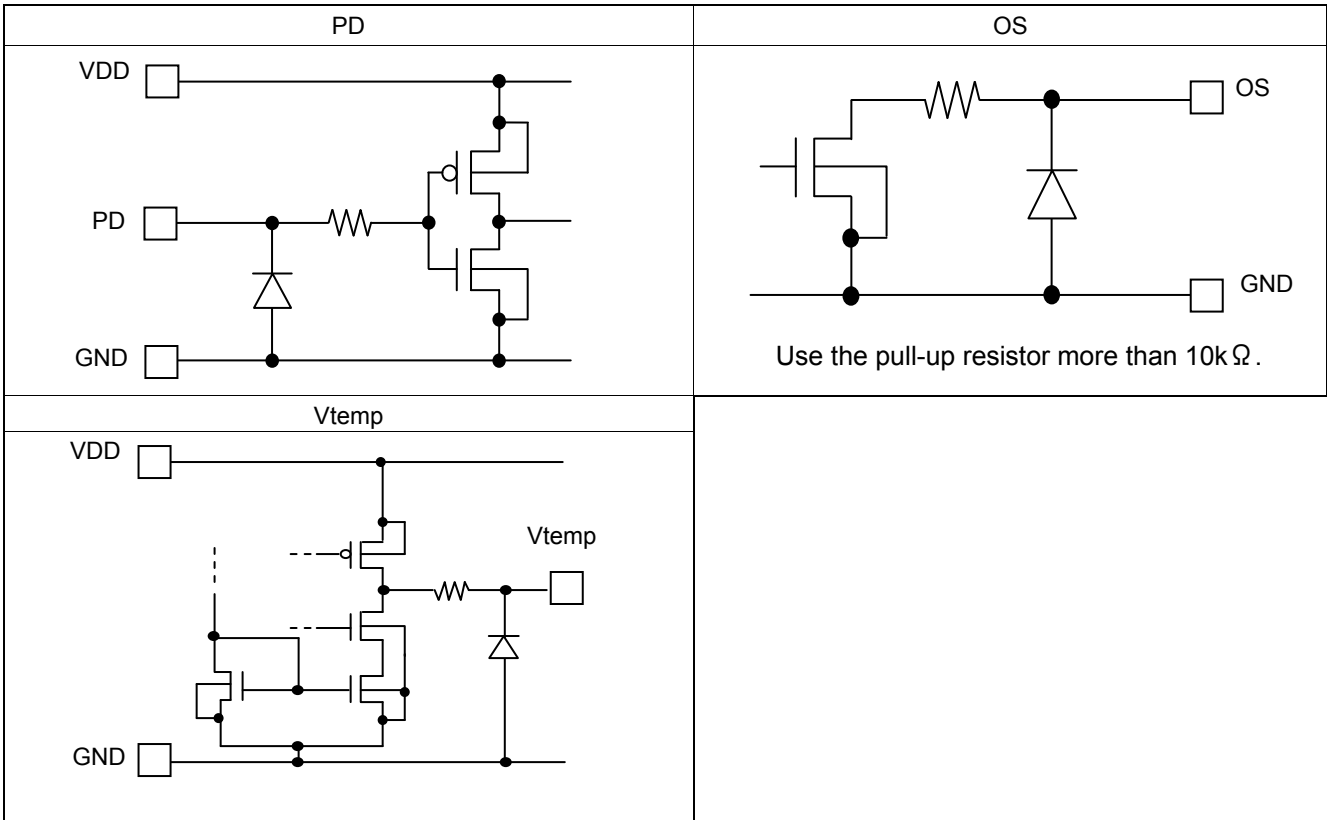
Vtemp

● PACKAGE OUTLINES (HVSOF5)

MARKING

HVSOF5(UNIT:mm)
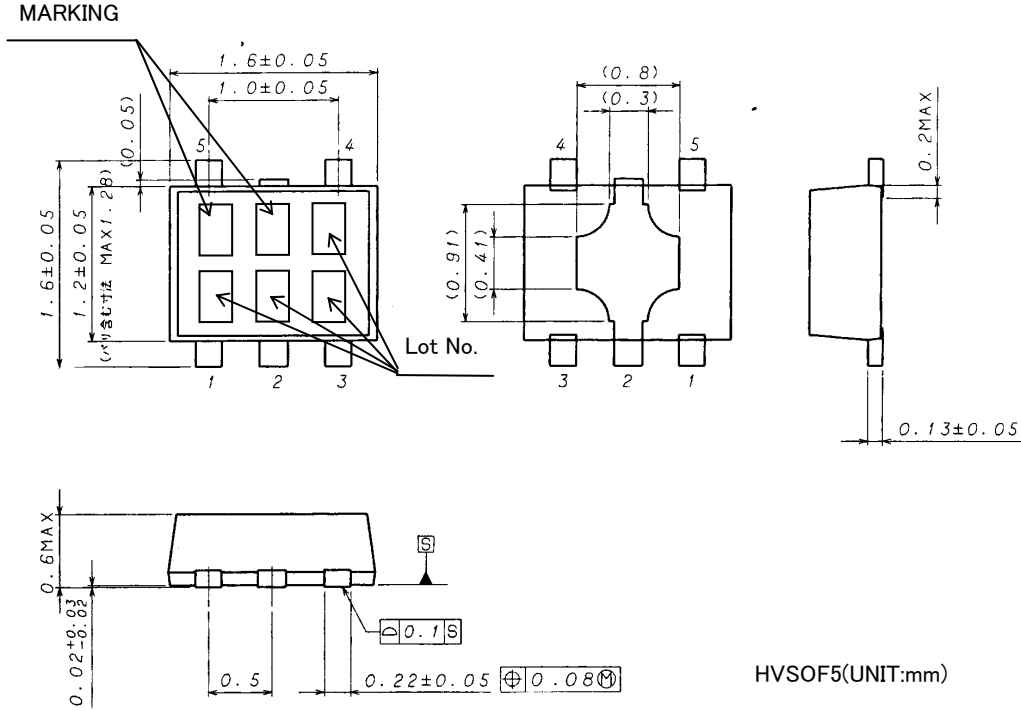
● Block Diagram

Please adjust Capacitor by the noise condition of the set.

Please adjust bypass Capacitor by the noise condition of the set.

Please pull-up over 10kΩ for OS output terminal.
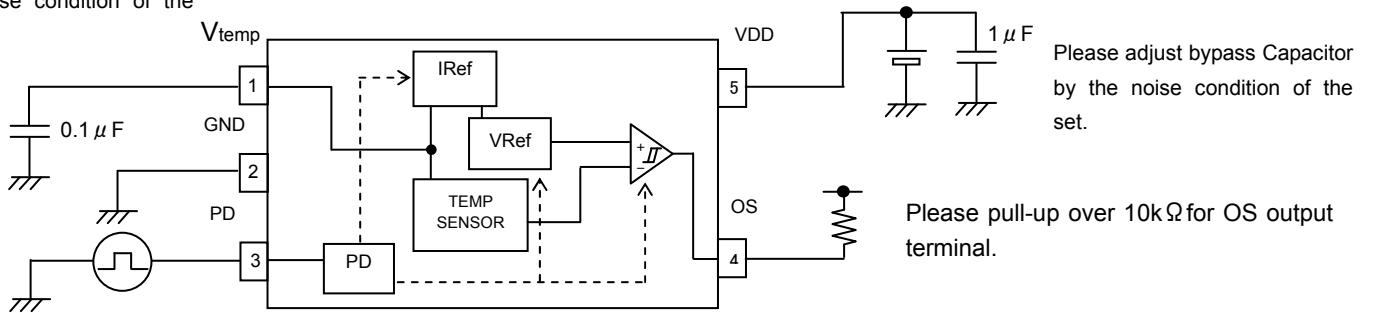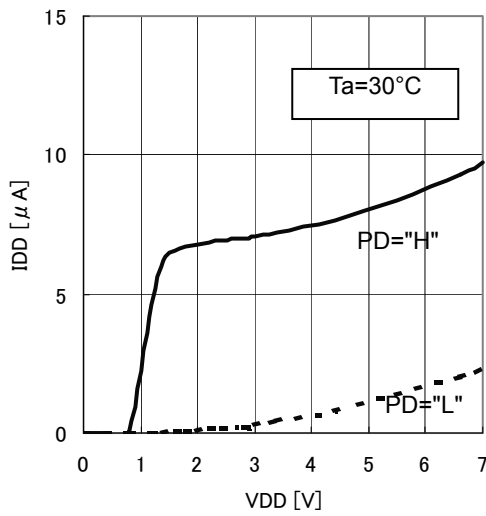
●Reference Data

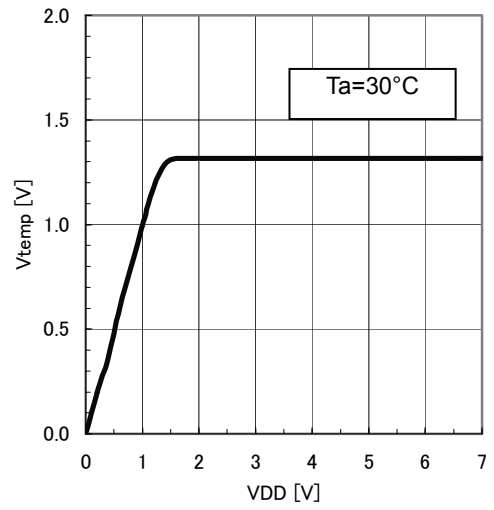Fig1. Supply Current(IDD) vs. Supply Voltage

Fig2. Vtemp Voltage vs. Supply Voltage
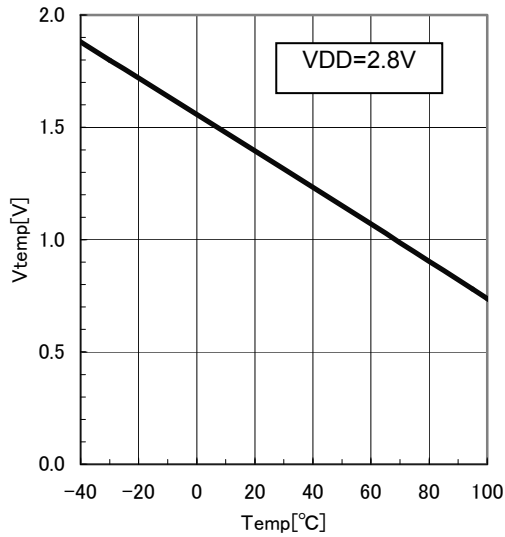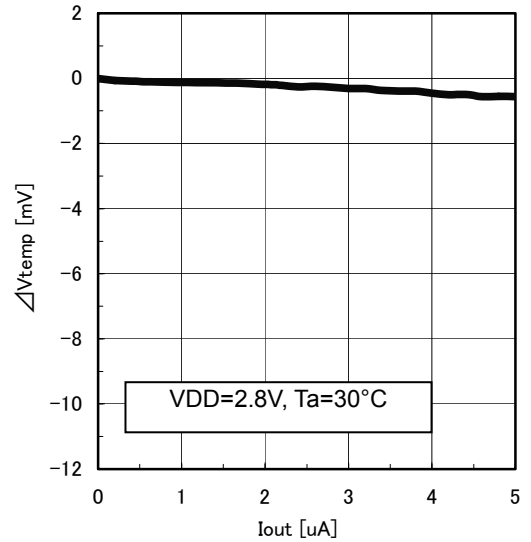

Fig3. Vtemp Voltage vs. Temperature
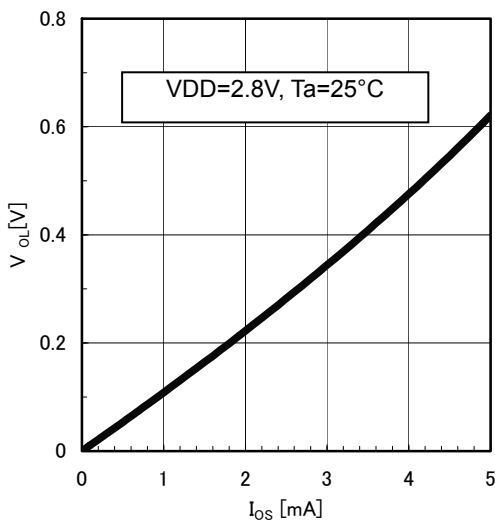

Fig4. Vtemp Voltage vs. Output Current

Fig5. OS Output Voltage vs. Load Current

●Function Diagram（ex. 80℃ 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[℃].
The value of Vtemp voltage reduce reversely proportional temperature at rate of –8.2mV/℃.
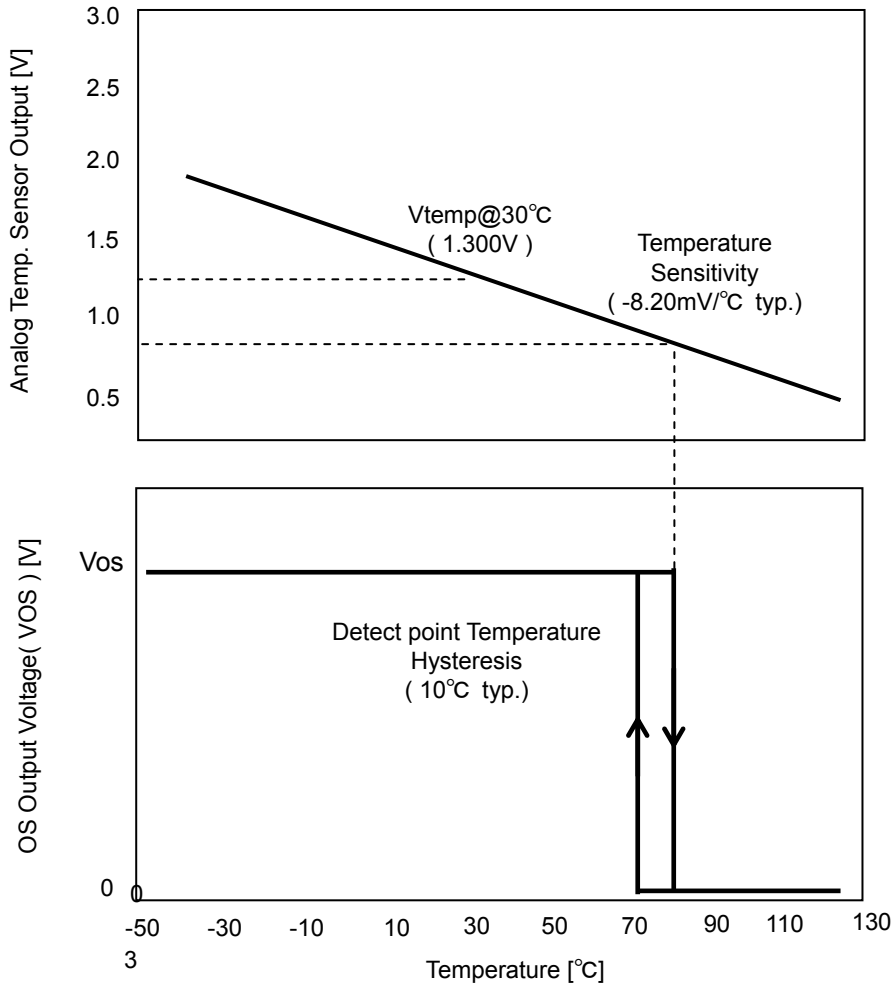
If the temperature over detect temperature,
internal comparator operate OS output "H" to "L".(ex.active "L" Type)
In case of OS return to "H",the temperature 10℃ lower than detect temperature.

●Operation Sequence
　（ex.80℃ detect　Active "L" type BDJ0800HFV）
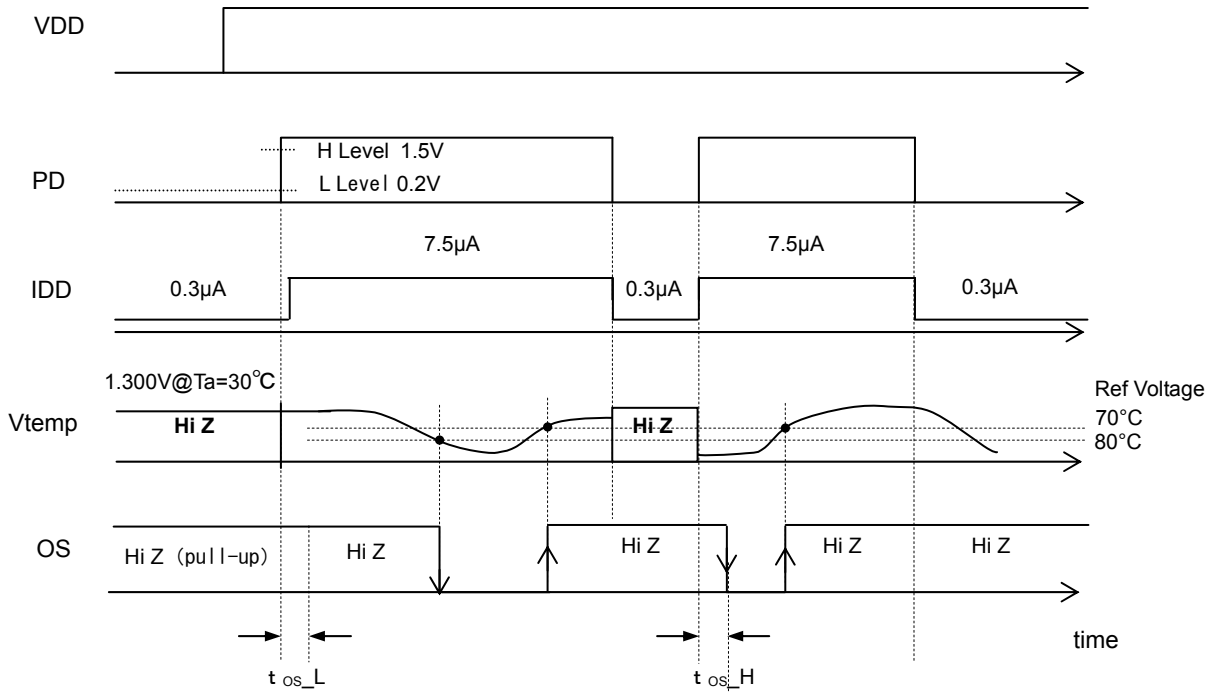
BDJ0800HFV operate start after PD "H" Input.

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	9	0	0		H	F	V	—	T	R

Series Name

Detect Temp.
090: 90℃ 070: 70℃
085: 85℃ 065: 65℃
080: 80℃ 060: 60℃
075: 75℃ 055: 55℃

Output Format
0 : active   L
1 : active   H

Package : HVSOF5

TR=Reel-wound embossed taping

HVSOF5

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

1pin

Direction of feed

Reel

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

Notes

No copying or reproduction of this document, in part or in whole, is permitted without the consent of ROHM Co.,Ltd.

The content specified herein is subject to change for improvement without notice.

The content specified herein is for the purpose of introducing ROHM's products (hereinafter "Products"). If you wish to use any such Product, please be sure to refer to the specifications, which can be obtained from ROHM upon request.

Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.

The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties. ROHM shall bear no responsibility whatsoever for any dispute arising from the use of such technical information.

The Products specified in this document are intended to be used with general-use electronic equipment or devices (such as audio visual equipment, office-automation equipment, communication devices, electronic appliances and amusement devices).

The Products specified in this document are not designed to be radiation tolerant.

While ROHM always makes efforts to enhance the quality and reliability of its Products, a Product may fail or malfunction for a variety of reasons.

Please be sure to implement in your equipment using the Products safety measures to guard against the possibility of physical injury, fire or any other damage caused in the event of the failure of any Product, such as derating, redundancy, fire control and fail-safe designs. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel-controller or other safety device). ROHM shall bear no responsibility in any way for use of any of the Products for the above special purposes. If a Product is intended to be used for any such special purpose, please contact a ROHM sales representative before purchasing.

If you intend to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, you will be required to obtain a license or permit under the Law.

Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available, please contact us.

ROHM Customer Support System

http://www.rohm.com/contact/