

Small and high accuracy Temperature Sensor IC Series



Analog Output Temperature Sensor IC

BD1020HFV

- Description

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

- Features

- 1) Detection Temperature Range -30~+100°C
- 2) Operating Voltage Range +2.4V~+5.5V
- 3) High Accuracy (typically $\pm 1.0^{\circ}\text{C}@T_a=30^{\circ}\text{C}$, typically $\pm 2.0^{\circ}\text{C}@T_a=-30\sim+100^{\circ}\text{C}$)
- 4) Temperature Sensitivity (typically $-8.2\text{mV}/^{\circ}\text{C}$)
- 5) Low Quiescent Current (typically 4uA)
- 6) Ultra Small Package (typically $1.60\text{mm} \times 1.60\text{mm} \times 0.60\text{mm}$)
- 7) Low Thermal Resistance (typically $187^{\circ}\text{C}/\text{W}$)
- 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 ($T_a=25^{\circ}\text{C}$)

PARAMETERS	SYMBOL	LIMIT	UNIT
Power Supply Voltage	V_{DD}	$-0.3\sim 7.0$ ※1	V
Output Voltage	V_{OUT}	$-0.3\sim V_{DD}+0.3$	V
Output Current	I_{OUT}	± 1	mA
Power Dissipation	P_d	536 ※2	mW
Storage Temperature Range	T_{stg}	$-55\sim 150$	°C

※1. Not to exceed P_d

※2. Reduced by 5.36mW for each increase in T_a of 1°C over 25°C
 (mounted on $70\text{mm} \times 70\text{mm} \times 1.6\text{mm}$ Glass-epoxy PCB)

- Recommended Operating Condition

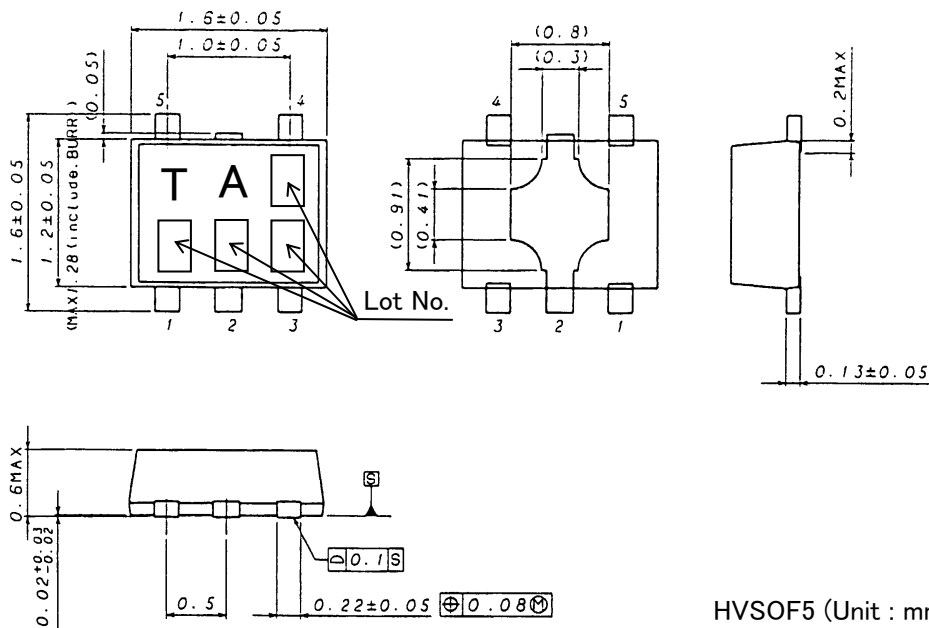
PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Power Supply Voltage	V_{DD}	2.40	3.00	5.50	V
Operation Temperature	T_{opr}	-30	-	100	°C

● Electrical Characteristics and Accuracy (Unless otherwise specified, $V_{DD}=3.0V$, $T_a=25^\circ C$)

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

Radiation hardness is not designed.

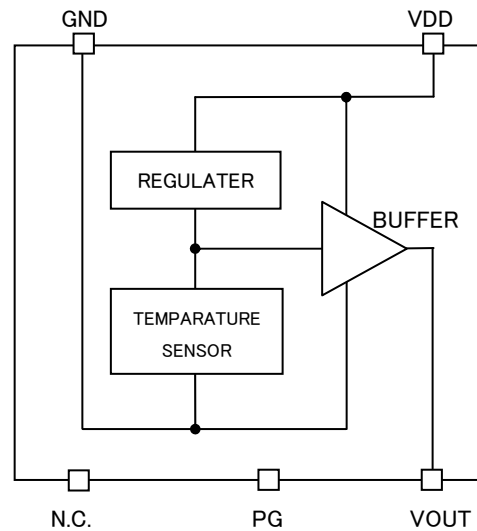
● Package Outlines



● 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 temperature reversely	
4	VDD	Power Supply	
5	GND	Ground	

● Block Diagram



● 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.

6) Please connect it with the temperature measurement part (GND line usually) to make thermal conductivity with 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.

● Reference Data

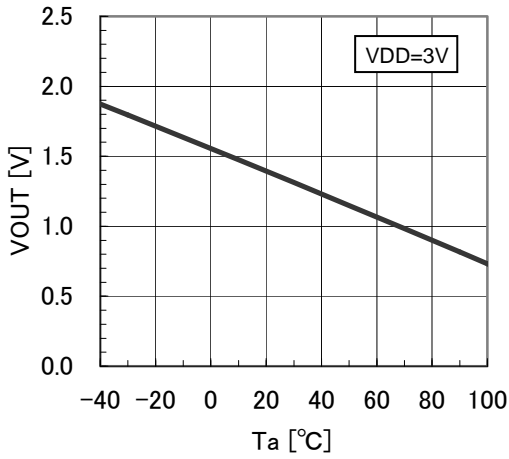


Fig.1 Output Voltage vs. Temperature

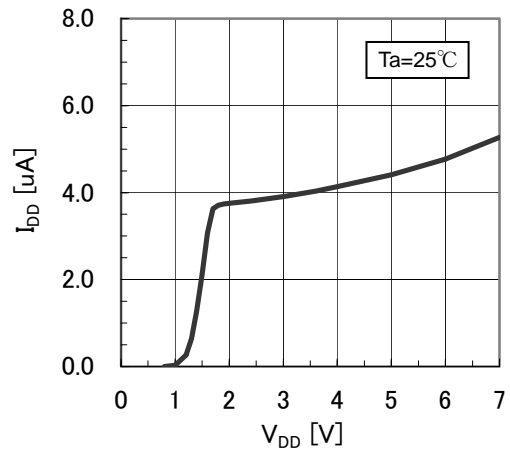


Fig.2 Supply Current vs. Supply Voltage

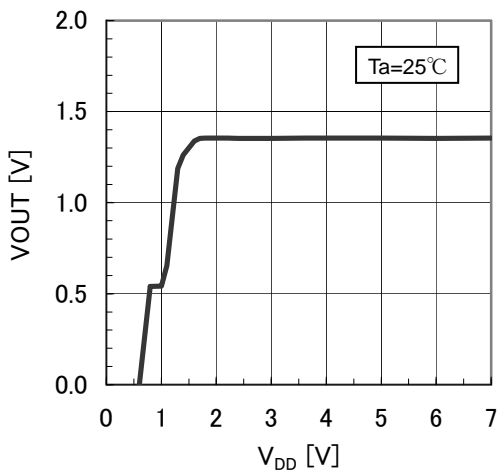


Fig.3 Output Voltage vs. Supply Voltage

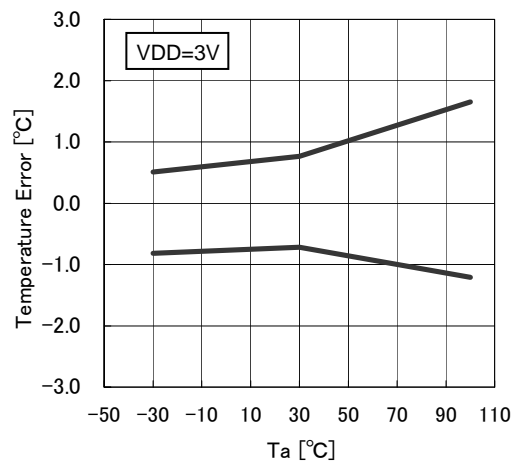


Fig.4 Error vs. Temperature

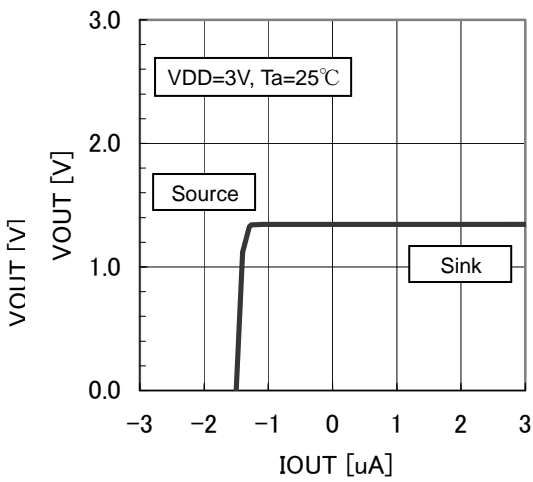


Fig.5 Output Voltage vs. Output Current

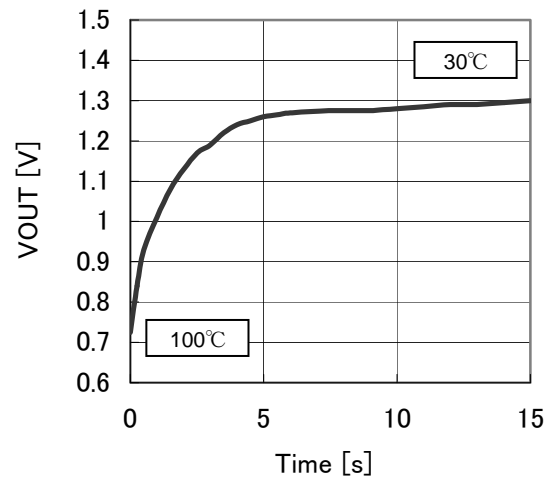
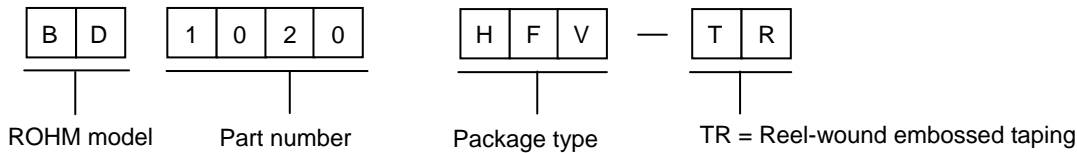
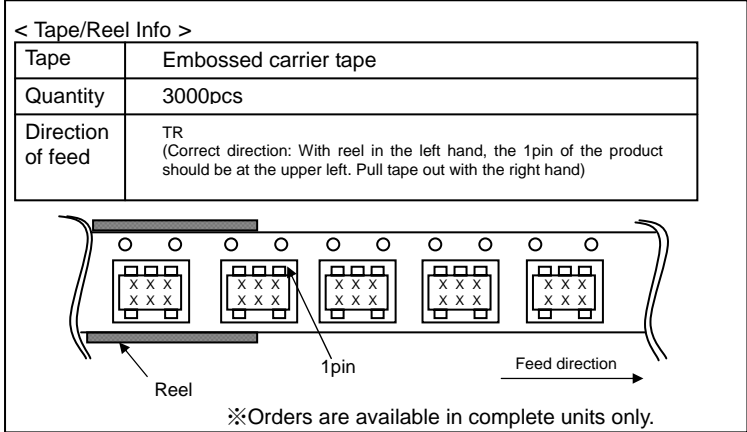
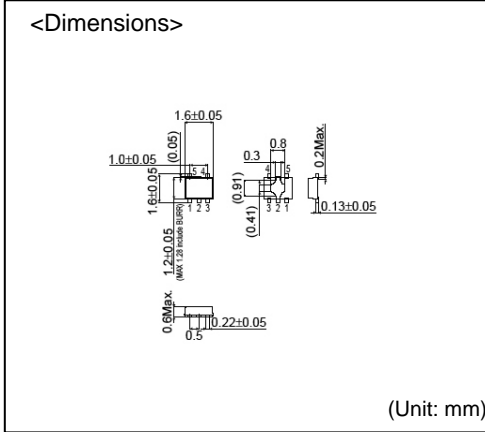


Fig.6 Start Up Response
(VOUT response 100°C→30°C in atmosphere)

● Product Designations (Selecting a model name when ordering)



HVSO5F5



- The contents described herein are correct as of June, 2008
- The contents described herein are subject to change without notice. For updates of the latest information, please contact and confirm with ROHM CO.,LTD.
- Any part of this application note must not be duplicated or copied without our permission.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams and information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than by buyer's right to use such devices itself, resale or otherwise dispose of the same, implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by ROHM CO., LTD. is granted to any such buyer.
- The products described herein utilize silicon as the main material.
- The products described herein are not designed to be X ray proof.

The products listed in this catalog are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys). Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

Excellence in Electronics

ROHM CO., LTD.

21, Saiin Mizosaki-cho, Ukyo-ku, Kyoto
 615-8585, Japan
 TEL: +81-75-311-2121 FAX: +81-75-315-0172
 URL: <http://www.rohm.com>

Published by
LSI Business Promotion Dept.

Contact us for further information about the products.

San Diego	TEL: +1-858-625-3630	FAX: +1-858-625-3670	Shanghai	TEL: +86-21-6279-2727	FAX: +86-21-6247-2066
Atlanta	TEL: +1-770-754-5972	FAX: +1-770-754-0691	Hangzhou	TEL: +86-571-87658072	FAX: +86-571-87658071
Boston	TEL: +1-978-371-0382	FAX: +1-928-438-7164	Nanjing	TEL: +86-25-8689-0015	FAX: +86-25-8689-0393
Chicago	TEL: +1-847-368-1086	FAX: +1-847-368-1008	Ningbo	TEL: +86-532-87654201	FAX: +86-574-87654208
Dallas	TEL: +1-469-287-5366	FAX: +1-469-368-7973	Qingdao	TEL: +86-532-5779-312	FAX: +86-532-5779-653
Denver	TEL: +1-303-708-0908	FAX: +1-303-708-0858	Suzhou	TEL: +86-512-6807-1300	FAX: +86-512-6807-2300
Detroit	TEL: +1-248-348-9920	FAX: +1-248-348-9942	Wuxi	TEL: +86-510-82702693	FAX: +86-510-82702992
Shenzhen	TEL: +1-615-620-6700	FAX: +1-615-620-6702	Shenzhen	TEL: +86-755-8307-3008	FAX: +86-755-8307-3003
Mexico	TEL: +52-33-3123-2001	FAX: +52-33-3123-2002	Dongguan	TEL: +86-769-8393-3320	FAX: +86-769-8398-4140
Düsseldorf	TEL: +49-2154-9210	FAX: +49-2154-921400	Fuzhou	TEL: +86-591-8801-8698	FAX: +86-591-8801-8690
Munich	TEL: +49-8161-48310	FAX: +49-8161-483120	Guangzhou	TEL: +86-20-8364-9796	FAX: +86-20-8364-9707
Stuttgart	TEL: +49-711-72723710	FAX: +49-711-72723720	Huizhou	TEL: +86-752-205-1054	FAX: +86-752-205-1059
France	TEL: +33-1-5697-3060	FAX: +33-1-5697-3080	Xiamen	TEL: +86-592-238-5705	FAX: +86-592-239-8380
United Kingdom	TEL: +44-1-908-306700	FAX: +44-1-908-235788	Zhuhai	TEL: +86-756-3232-480	FAX: +86-756-3232-460
Denmark	TEL: +45-3694-4739	FAX: +45-3694-4789	Hong Kong	TEL: +852-2-740-6262	FAX: +852-2-375-8971
Barcelona	TEL: +34-9375-24320	FAX: +34-9375-24410	Taipei	TEL: +886-2-2500-6956	FAX: +886-2-2503-2869
Hungary	TEL: +36-1-4719338	FAX: +36-1-4719339	Kaohsiung	TEL: +886-7-237-0881	FAX: +886-7-238-7332
Poland	TEL: +48-22-5757213	FAX: +48-22-5757001	Singapore	TEL: +65-6332-2322	FAX: +65-6332-5662
Russia	TEL: +7-95-980-6755	FAX: +7-95-937-8290	Philippines	TEL: +63-2-807-6872	FAX: +63-2-809-1422
Seoul	TEL: +82-2-8182-7000	FAX: +82-2-8182-7115	Thailand	TEL: +66-2-254-4890	FAX: +66-2-256-6334
Masan	TEL: +82-55-240-6234	FAX: +82-55-240-6236	Kuala Lumpur	TEL: +60-3-7958-8355	FAX: +60-3-7958-8377
Dalian	TEL: +86-411-8230-8549	FAX: +86-411-8230-8537	Penang	TEL: +60-4-2286453	FAX: +60-4-2286452
Beijing	TEL: +86-10-8525-2483	FAX: +86-10-8525-2489	Kyoto	TEL: +81-75-365-1218	FAX: +81-75-365-1228
Tianjin	TEL: +86-22-23029181	FAX: +86-22-23029183	Yokohama	TEL: +81-45-476-2290	FAX: +81-45-476-2295

Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

It is our top priority to supply products with the utmost quality and reliability. However, there is always a chance of failure due to unexpected factors. Therefore, please take into account the derating characteristics and allow for sufficient safety features, such as extra margin, anti-flammability, and fail-safe measures when designing in order to prevent possible accidents that may result in bodily harm or fire caused by component failure. ROHM cannot be held responsible for any damages arising from the use of the products under conditions out of the range of the specifications or due to non-compliance with the NOTES specified in this catalog.

Thank you for your accessing to ROHM product informations.

More detail product informations and catalogs are available, please contact your nearest sales office.

ROHM Customer Support System

THE AMERICAS / EUROPE / ASIA / JAPAN

www.rohm.com

Contact us : webmaster@rohm.co.jp