Class-AB Speaker Amplifiers

1.1W to1.5W Monaural Speaker Amplifier

BD7830NUV

No.10077EAT03

●Description

The BD7830NUV is a monaural speaker amplifier that operates at low voltage and was developed for portable navigation and mobile audio products. When in standby mode, its current consumption is 0 µA, and since it switches quickly and quietly from standby to ON, it is especially well suited for applications where there is frequent switching between standby and ON.

●Features

1) BTL monaural audio power amplifier
2) High power 2.25W 4Ωat Vcc=5V ,THD+N=10%
   High power 1.55W 8Ω at Vcc=5V ,THD+N=10%
   High power 0.77W 8Ω at Vcc=3.6V ,THD+N=10%
3) Wide operating supply voltage range: 2.4～5.5V
4) Low standby current: 0µA
5) Fast turn on/off time: 46msec
6) Built-in Fade-in/out function
7) Built-in anti-pop function
8) Built-in thermal shutdown function
9) Very small package (VSON008V2030)

●Applications

Mobile phones, Mobile electronics applications

●Absolute Maximum Ratings(Ta=+25℃)

Parameter	Symbol	Ratings	Unit
Supply voltage	V_{CC}	6.0	V
Power dissipation	Pd	530 *1	mW
Storage temperature range	Tstg	-55～+150	℃
STBY input range	V_{STBY}	-0.1～Vcc+0.1	V

*1 ROHM standard one layer board (70mm×70mm×1.6mmt) mounted, deratings is done at 4.24mW/℃ above Ta=+25℃.

●Operating Range

Parameter	Symbol	Ratings	Unit
Temperature range	Topr	-40～+85	℃
Supply voltage	V_{CC}	+2.4～+5.5	V

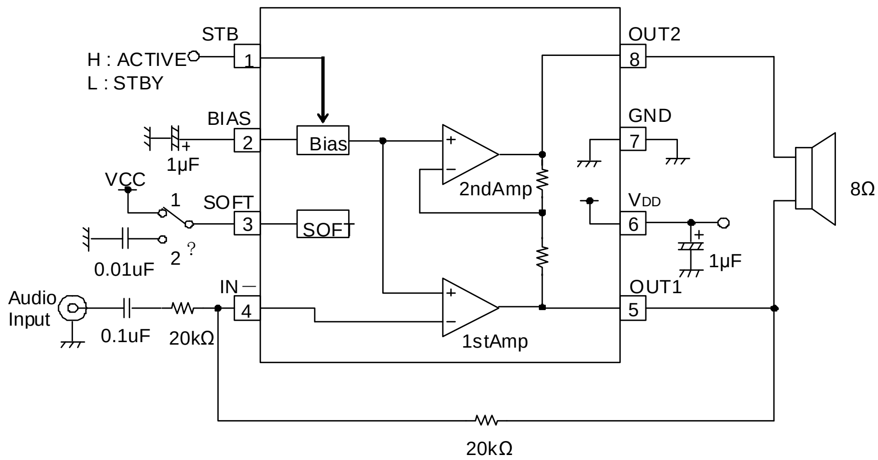
※ This product is not designed for protection against radioactive rays.

●Electrical characteristics (Unless otherwise noted, Ta=+25℃, V_{CC}=+3.0V, f=1kHz, RL=8Ω)

Parameter	Symbol	Limit			Unit	Monitor pin	Condition
		MIN.	TYP.	MAX.			
Supply current	I_{CC}	—	3.2	6.8	mA	6	Active mode
Standby supply current	I_{STBY}	—	0	2	µA	6	Standby mode
Output power	P_O	280	420	—	mW	5&8	BTL, THD+N=1% *1
Total harmonic distortion	THD+N	—	0.1	0.5	%	5&8	BTL, Po=150mW *1
Voltage gain1	A_{V1}	-1	0	+1	dB	5	Vin=-20dBV, 1stAmp
Voltage gain2	A_{V2}	-1	0	+1	dB	8	Vin=-20dBV, 2ndAmp
Power supply rejection ratio	PSRR	40	57	—	dB	5&8	BTL, Vripple=0.2Vpp *2
Mute attenuation	MUTE	60	80	—	dB	5&8	BTL, Vin=-20dBV
Output voltage	Vo	1.35	1.5	1.65	V	5&8	Vin=0V
Output offset voltage	ΔVo	-40	0	+40	mV	5&8	ΔVo=|Vo1-Vo2|
STBY release voltage	V_{STBYH}	1.4	—	Vcc+0.1	V	1	Active mode
STBY hold voltage	V_{STBYL}	-0.1	—	0.4	V	1	Standby mode
STBY input current H	I_{STBYH}	20	30	40	µA	1	V_{STBY}=3V
STBY input current L	I_{STBYL}	-2	0	—	µA	1	V_{STBY}=0V

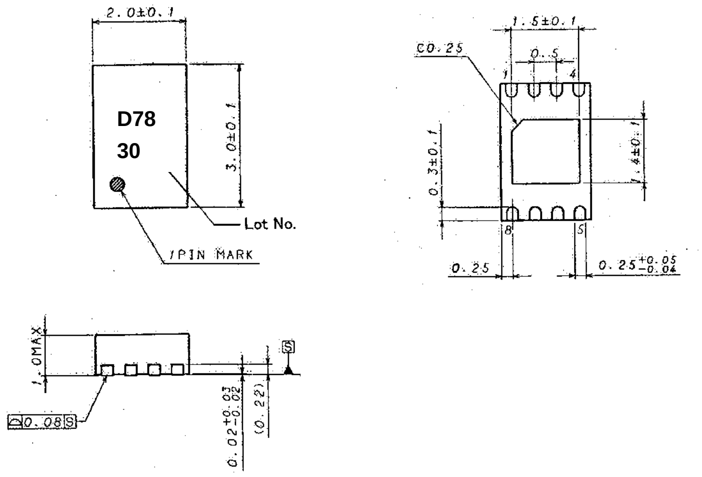
*1:B.W.=400～30kHz, *2:DIN AUDIO, SE:Single End, BTL:The voltage between 5pin and 8pin

●Application Circuit Example

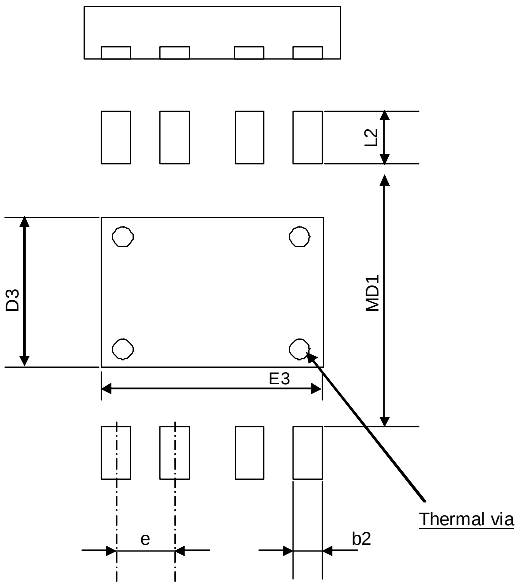


※3pin SOFT terminal
1 : Usually
2 : Enable to adjust fade in/out time by external capacitor

●Outer dimension



●Reference land pattern (adapt as necessary to suit conditions during actual design.)



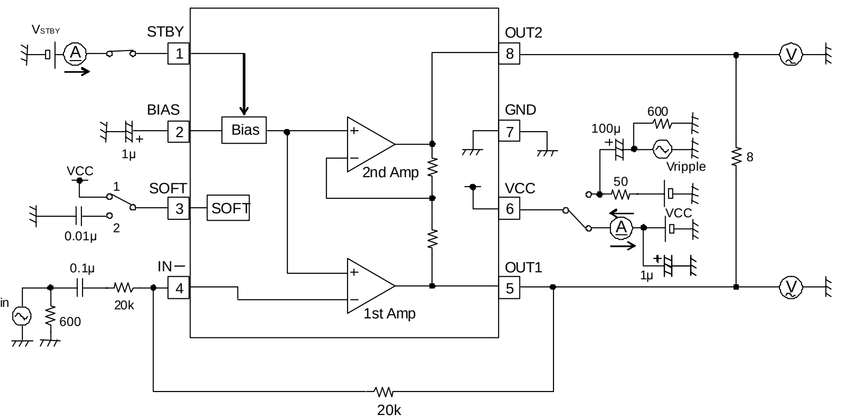
Unit: mm

PKG type	Lead pitch	Land		
		Gap	Length	Width
	e	MD1	L2	b2
VSON008V2030	0.50	2.20	0.70	0.27

PKG type	Central pad		Thermal via	
	Length	Width	Pitch	Diameter
	D3	E3		
VSON008V2030	1.20	1.60	—	ϕ0.300

※ This package is a non-lead type, so solderability of the lead ends and sides are not guaranteed.

●Measurement Circuit Diagram

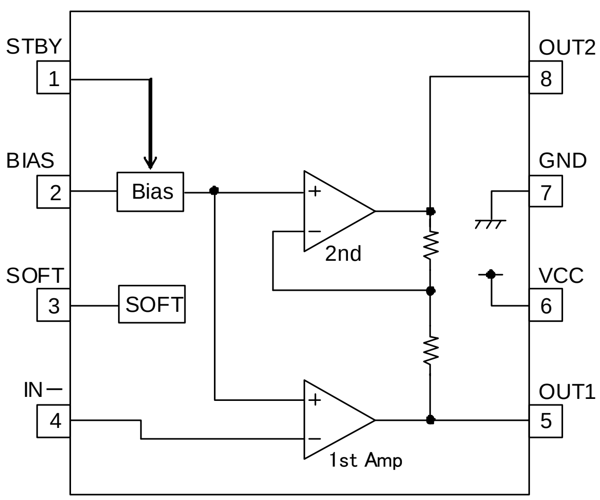


※3pin SOFT terminal

1 : Usually

2 : Enable to adjust fade in/out time by external capacitor

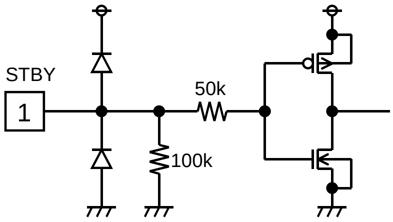
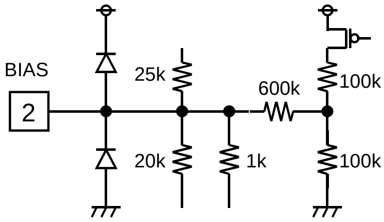
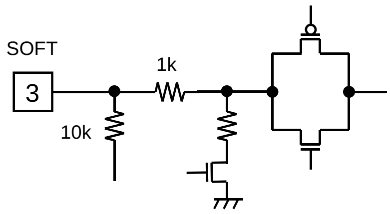
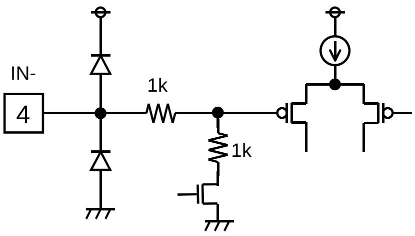
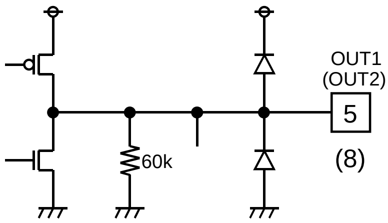
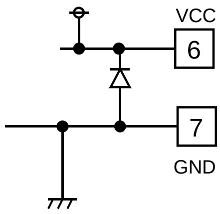
●Block diagram



●Pin assignment

PIN No.	PIN Name
1	STBY
2	BIAS
3	SOFT
4	IN-
5	OUT1
6	VCC
7	GND
8	OUT2

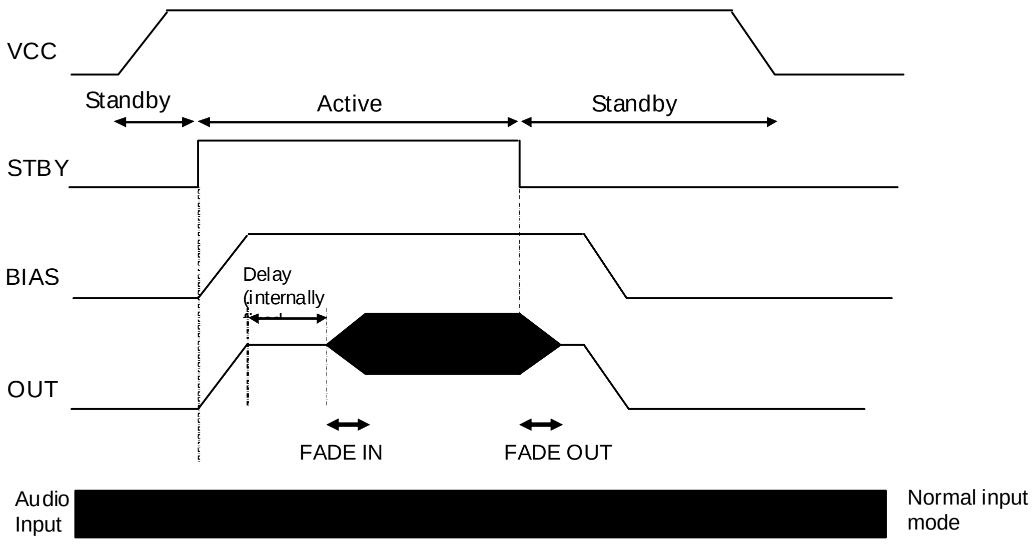
●Input/output equivalent circuit

<table>
<tr><th>PIN No.</th><th>PIN Name</th><th>PIN description</th><th>Equivalent circuit</th></tr>
<tr><td>1</td><td>STBY</td><td>Active/Standby
Control pin
STBY=H → Active
STBY=L → Standby</td><td>
</td></tr>
<tr><td>2</td><td>BIAS</td><td>Bias capacitor
Connection pin</td><td>
</td></tr>
<tr><td>3</td><td>SOFT</td><td>Fade-in/out
Adjustment pin</td><td>
</td></tr>
<tr><td>4</td><td>IN-</td><td>Input pin</td><td>
</td></tr>
<tr><td>5
8</td><td>OUT1
OUT2</td><td>Output pin</td><td>
</td></tr>
<tr><td>6</td><td>VCC</td><td>Power supply pin</td><td rowspan="2">
</td></tr>
<tr><td>7</td><td>GND</td><td>GND pin</td></tr>
</table>

Notes) The above numerical values are typical values for the design, which are not guaranteed.

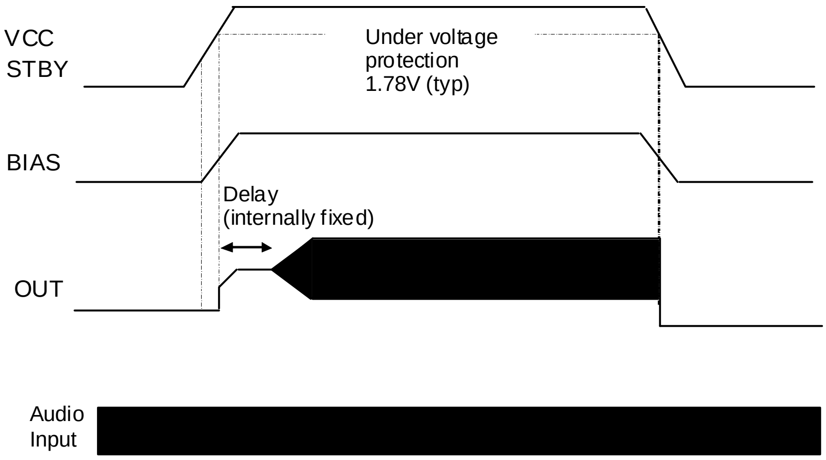
●Description of operations

①ON/OFF operation by STBY pin



Once VCC = H, when STBY = L → H then BIAS and output (OUT) are activated.
Once BIAS has become stable (= 1/2 VCC), output (OUT) fades in (FADE IN).
Once STBY = H → L, output (OUT) starts to fade out (FADE OUT), and when fade-out ends, the BIAS falls.

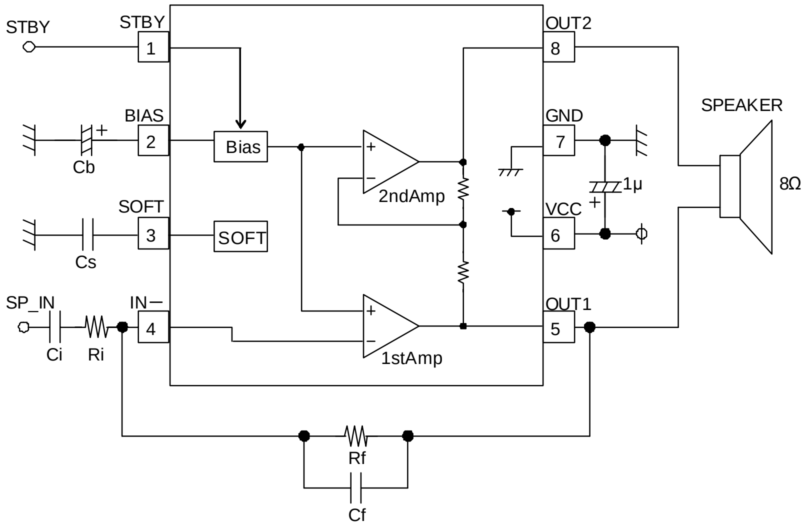
②ON/OFF control by shorting of VCC and STBY pins



When VCC = STBY = L → H, BIAS is activated. During low power mode (VCC < 1.78 V) protection is used to keep output (OUT) at low level, and FADE IN occurs when this protection is canceled. When VCC = STBY = H → L, output (OUT) falls without FADE OUT.

●External components and cautions points

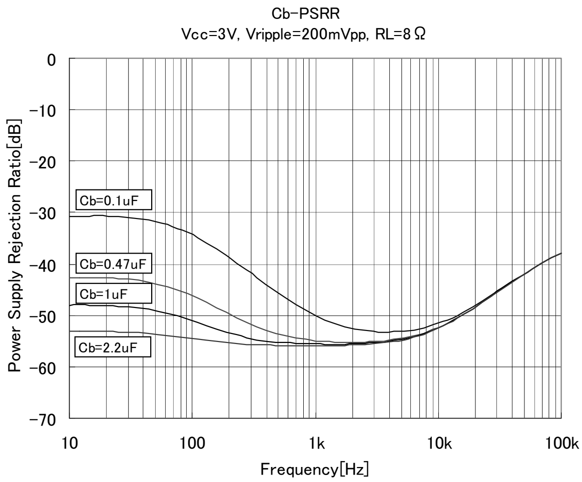
Setting of external components



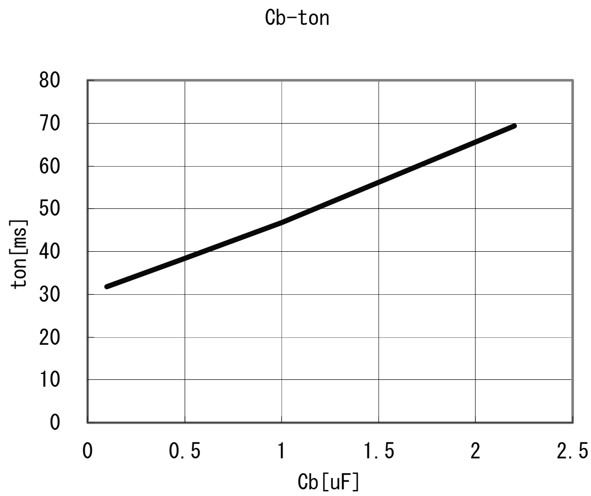
●Cb

This is a bypass capacitor, which is used for bias voltage stabilization.
When a larger capacitor is used, the efficiency of voltage ripple rejection can be improved.
When tuning, note with caution that Cb can affect the activation time.

Cb – Power Supply Ripple Rejection Ratio



Cb – Turn-on Time



●**Cs**

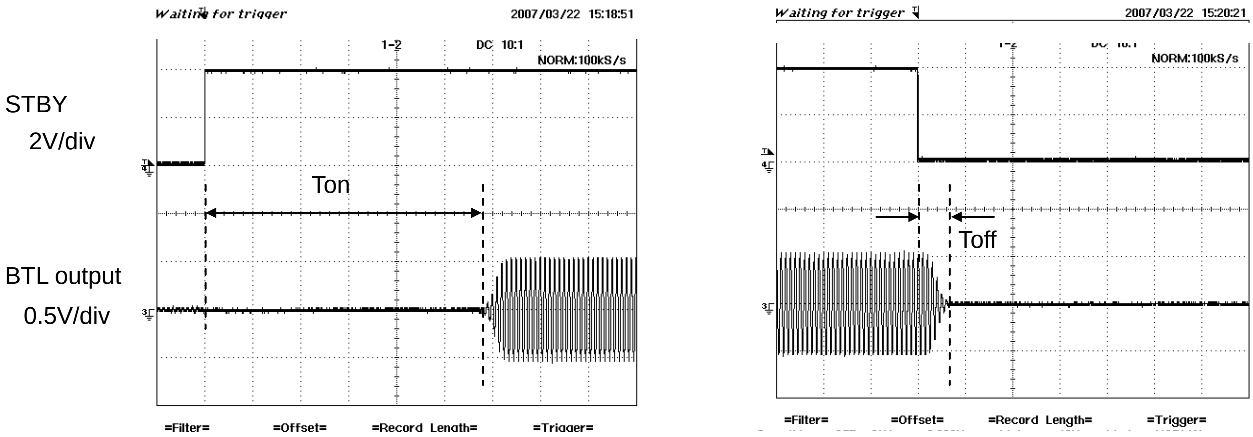
This capacitor is for adjustment of the FADE IN/OUT times. The FADE IN/OUT functions soften the operation (IN and OUT) of BTL output when switching between standby and active modes.

When a capacitor is connected to the SOFT pin (pin 3), the FADE IN/OUT functions are valid. When the capacitor rating is increased, the FADE IN/OUT effect is also increased, but note with caution when setting this that it also affects the activation time. If the FADE IN/OUT functions are not being used, connect the SOFT pin (pin 3) to VCC.

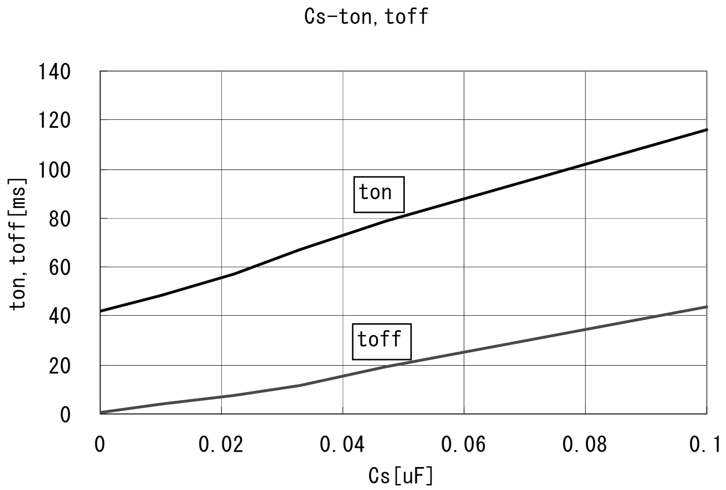
・ Fade-in/out waveforms

Standby → Active

Active → Standby



Cs - Fade-in/out Time

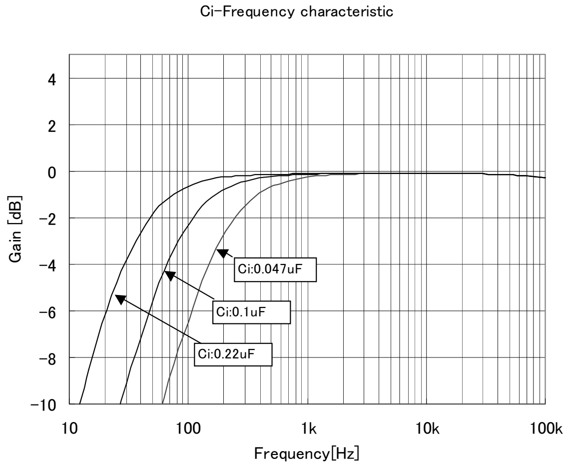


●**Ci**

This is a DC cut-off input coupling capacitor for the amp input pin.
This includes an Ri and a high-pass filter. The cut-off frequency is calculated as follows.

$$f_{CL} = \frac{1}{2\pi \times Ri \times Ci} \quad [Hz]$$

Ci – Low Frequency Characteristics



Capacitors of a certain size are required for coupling without attenuation of low frequencies, but in most cases of speakers used in portable equipment, it is nearly impossible to reproduce signals in the 100 to 200 Hz range or below. Even when a larger capacitor is used instead, it may not improve system performance. Also, pop sounds can affect the capacitance (Ci) of the capacitor. A larger coupling capacitor requires a greater charge to reach the bias DC voltage (normally 1/2 VCC). Because this charge current is supplied from the output due to routing of feedback, pop sounds occur easily at startup. Consequently, pop sounds can be minimized by selecting the smallest capacitor that still has the required low-frequency response.

●**Ri**

This is inverting input resistance, which sets the closed loop gain in conjunction with Rf.

●**Rf**

This is feedback resistance, which sets closed loop gain in conjunction with Rf. The amp gain is set using the following formula.

$$Gain = 20\log\left(\frac{Rf}{Ri}\right) \quad [dB]$$

●**Cf**

This is a feedback capacitor, which is used to cut high frequencies.
This includes Rf and a low-pass filter. The cut-off frequency is calculated as follows.

$$f_{CL} = \frac{1}{2\pi \times Ri \times Ci} \quad [Hz]$$

●Selection of external components

①Setting gain from desired output

Output Po is determined via the following formula, from which the required gain Av can also be obtained.

$Po\ [W] = Vo^2\ [Vrms] / RL\ [\Omega]$

$Vo = Av \cdot Vin$

$Av \geqq \sqrt{Po \cdot RL} / Vin$

②Setting input resistance and feedback resistance from gain

Gain Av is determined via the following formula, from which input resistance Rin and feedback resistance Rf can be set.

$Av = (Rf / Rin) \cdot 2$

Rin is set with the input side's drive capacity taken into account.

③Setting input coupling capacitor from low-range cut-off frequency

Low-range cut-off frequency fc is determined via the following formula, from which input coupling capacitor Cin can be set.

$fc\ [Hz] = 1 / (2\pi \cdot Rin \cdot Cin)$

$Cin \geqq 1 / (2\pi \cdot Rin \cdot fc)$

④Setting bias capacitor and SOFT capacitor to minimize pops

It is recommended that the capacitance of the bias capacitor CB be set to at least 10 times that of the input coupling capacitor Cin, in order to soften the rise of the bias voltage while improving the Cin following ability.

Also, when a higher gain is used, the capacitance of the SOFT capacitor Cs can be raised to control pop sounds.

Av = 2 (6 dB at BTL) → $Cs \cdot (80 / fc) \geqq 0.01\ \mu F$

Av = 4 (12 dB at BTL) → $Cs \cdot (80 / fc) \geqq 0.022\ \mu F$

Av = 8 (18 dB at BTL) → $Cs \cdot (80 / fc) \geqq 0.033\ \mu F$

Av = 20 (26 dB at BTL) → $Cs \cdot (80 / fc) \geqq 0.068\ \mu F$

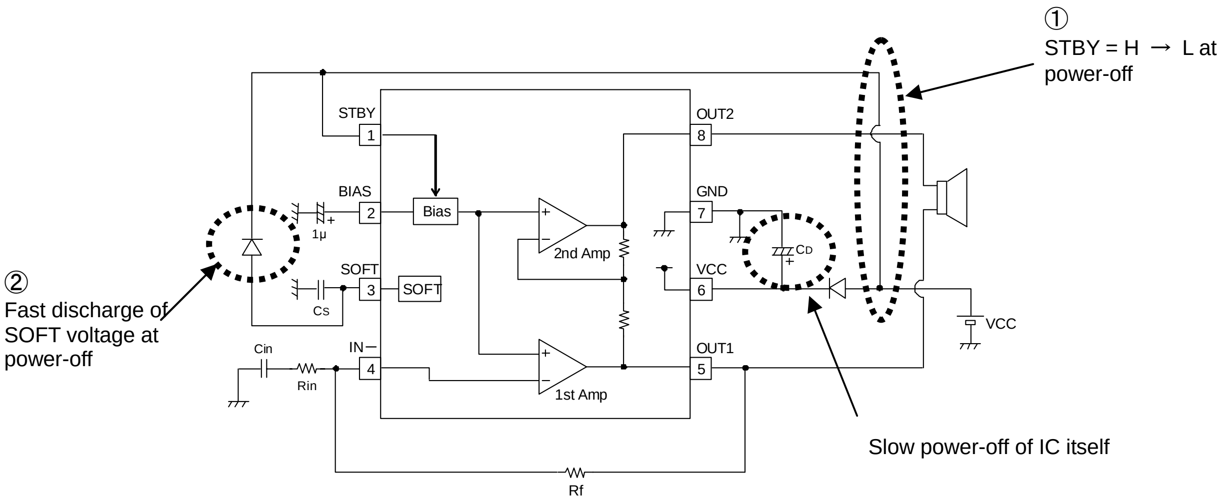
●Use when VCC = STBY short

Since this IC is designed on the assumption that it will be used to switch standby mode ON and OFF while the power supply remains ON, normally STBY should be switched from H to L and the SOFT voltage should be discharged before powering down. When used while VCC = STBY short, pop sounds may occur if the IC's power supply is reduced prior to discharging the SOFT voltage.

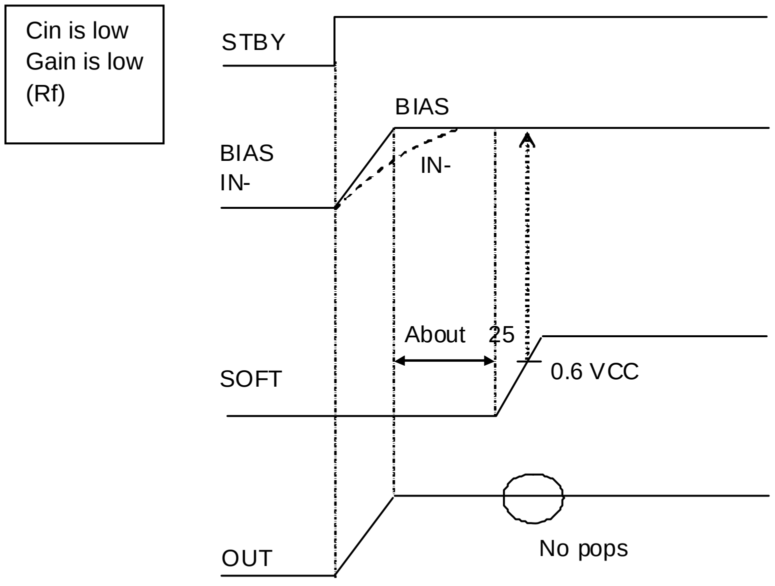
To prevent pop sounds, you must ① set STBY = H→L before setting VCC = H→L, and ② forcibly discharge the SOFT voltage.

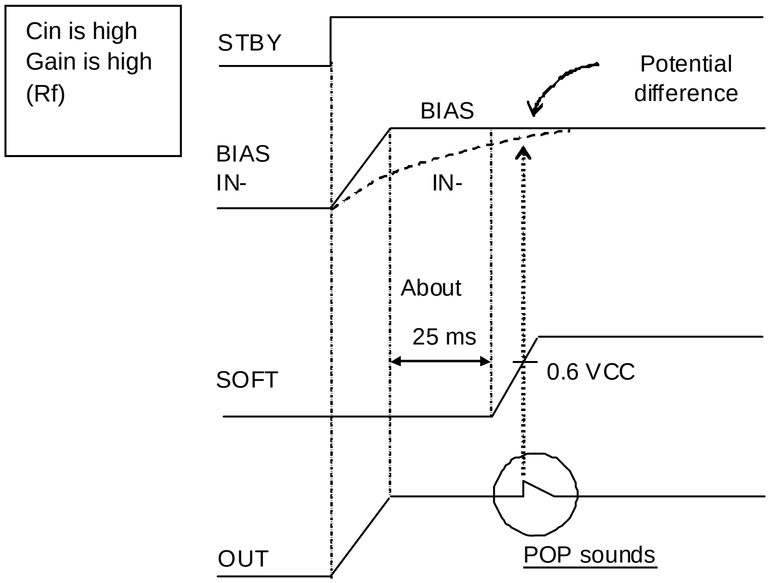
A sample circuit in which VCC = STBY short is used is shown below.

・Sample circuit configuration when VCC = STBY short



●**Mechanism of pop sounds**

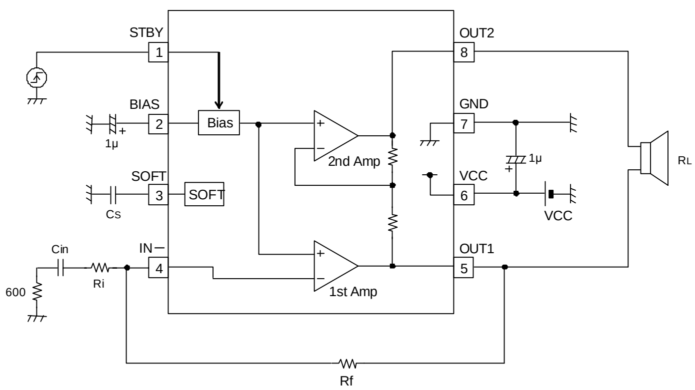




When SOFT voltage reaches 0.6 VCC, if there is a potential difference between BIAS and IN-, pop sounds will occur.

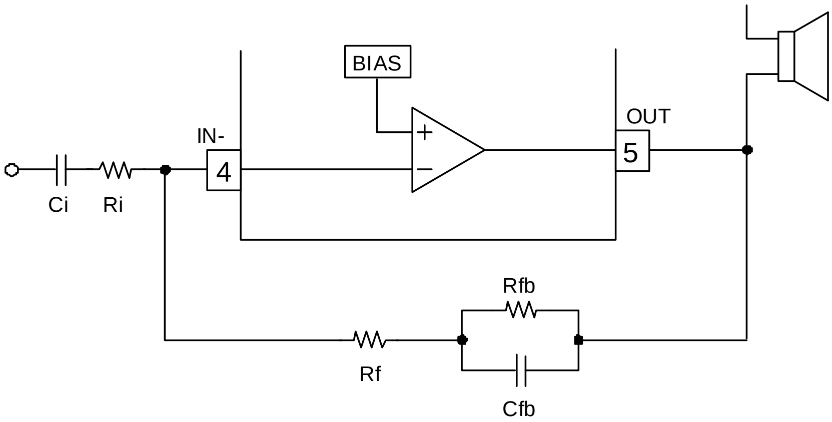
At startup, the input coupling Cin is charged from output OUT via the feedback resistance Rf, so when
Cin and Rf are high, charging takes longer and pop sounds can easily occur.

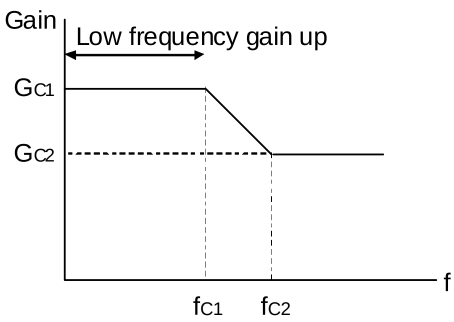
The rise of the SOFT voltage is changed by Cs, so pop sounds an be reduced by setting Cs high.



●Bass boost function

External components can be added to this chip to provide a bass boost function.





$$f_{C2} = \frac{1}{2\pi * Cfb * Rf} \quad \text{[Hz]}$$

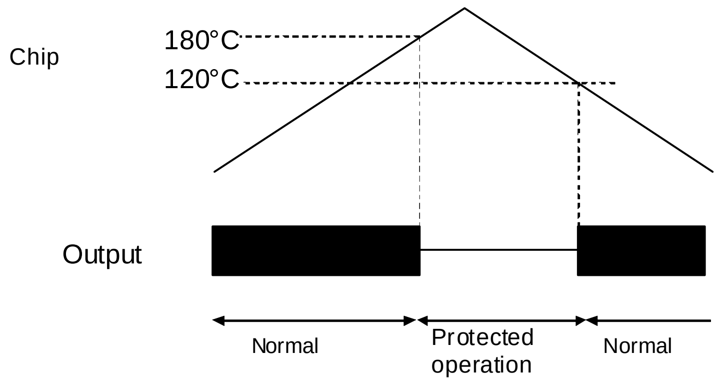
$$f_{C1} = \frac{1}{2\pi * Cfb * (Rf \,//\, Rfb)} \quad \text{[Hz]}$$

$$G_{C1} = 20 \log \frac{Rf + Rfb}{Ri} \quad \text{[dB]}$$

$$G_{C2} = 20 \log \frac{Rf}{Ri} \text{ (normal use)} \quad \text{[dB]}$$

●Thermal shutdown function

When the chip exceeds the Tjmax (150°C) temperature by reaching a temperature of 180℃ or above, the protection function is activated. High impedance is for OUT1 and OUT2 during protected mode. Protection is canceled and normal operation is resumed when the chip's temperature falls to 120℃ or below.



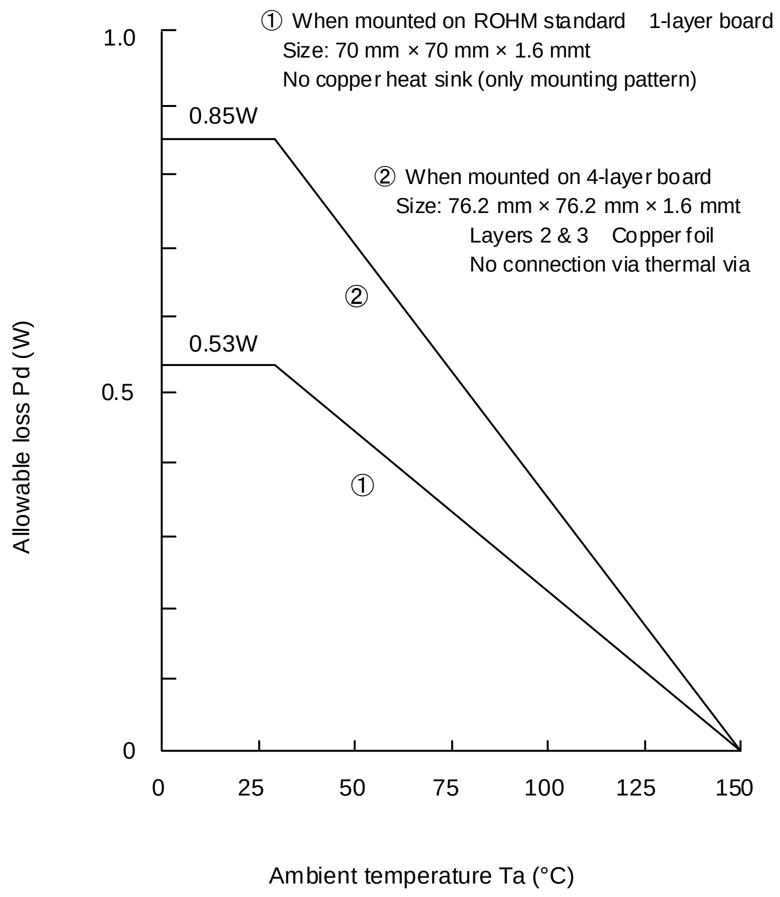
Protection start temperature: 180°C (typ) or more
Protection cancels temperature: 120°C (typ) or less

●Thermal design of chip

The characteristics of the IC vary greatly depending on the use temperature, and when the maximum allowable junction temperature is exceeded, components may deteriorate or become damaged. Thermal considerations are needed for this chip from two standpoints: preventing instantaneous damage and improving long-term reliability. Note the following points with caution.
The absolute maximum ratings for each chip include the maximum junction temperature (Tj_{MAX}) and operating temperature rate (Topr), and these values should be referred to when using the Pd-Ta characteristics (thermal dissipation curve).
Since the IC itself is designed with full consideration of thermal balance, there are no problems in terms of circuit operations, but even when a more-than-adequate thermal design is implemented in order to get full use of the IC's performance features, some moderation is often required for the sake of practical usage.
If there is an excessive input signal due to insufficient thermal dissipation, a TSD (thermal shutdown) operation may occur.

Thermal Dissipation Curve

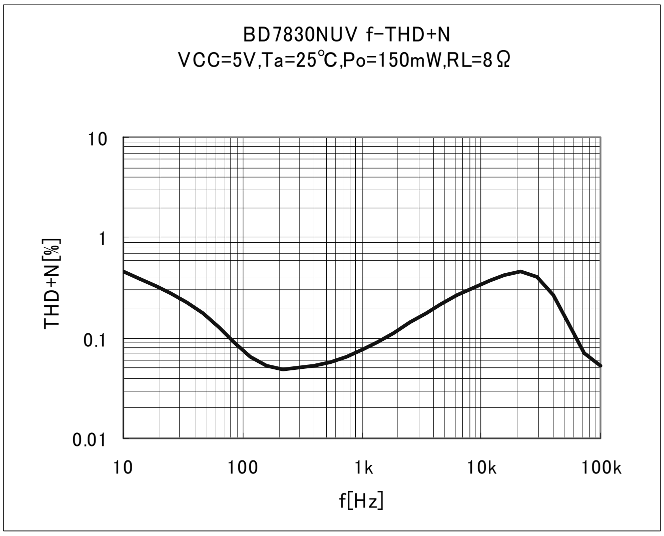
Reference data **VSON008V2030**

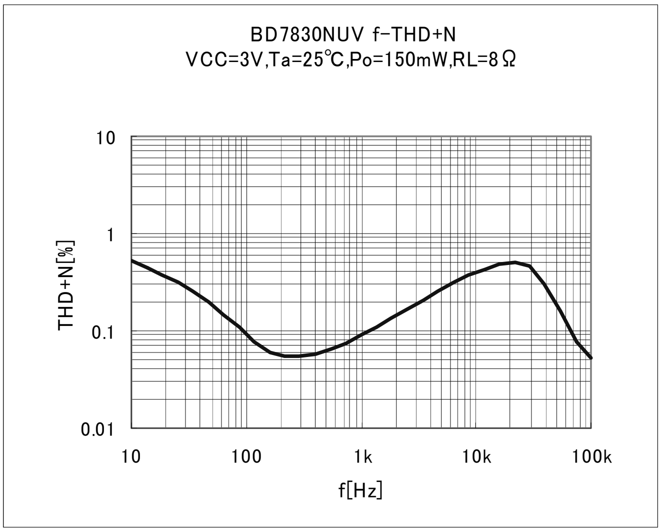


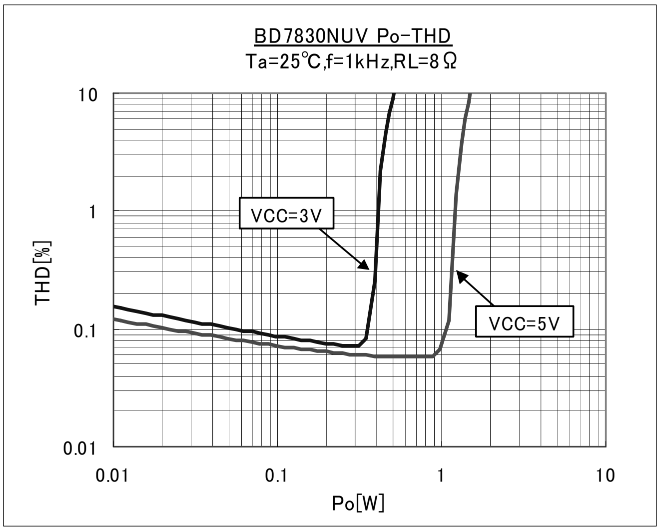
(Note) These are measured values. They are not guaranteed.

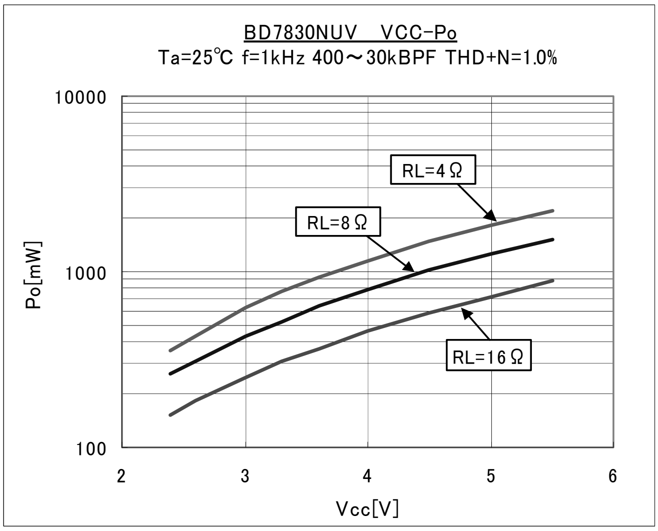
The allowable loss value varies depending on the type of board used for mounting. When this chip is mounted on a multi-layer board that is designed for thermal dissipation, the allowable loss becomes greater than shown in the above figure.

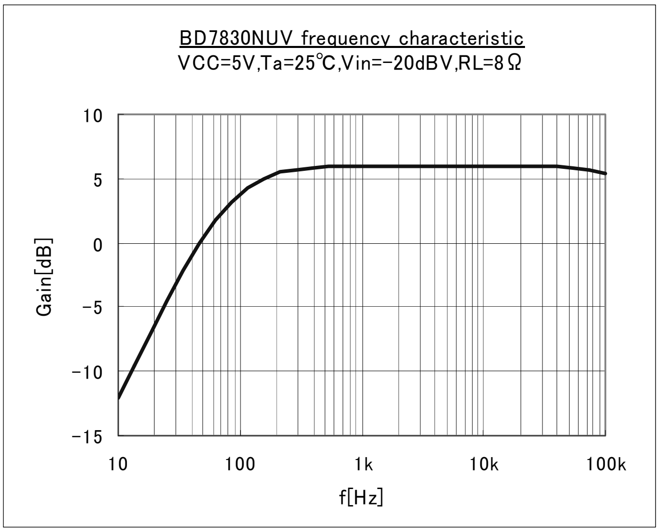
●Typical Characteristics (1)

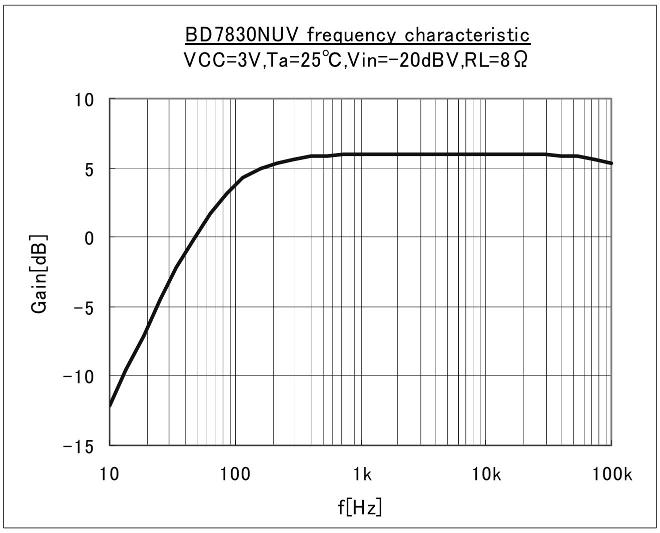




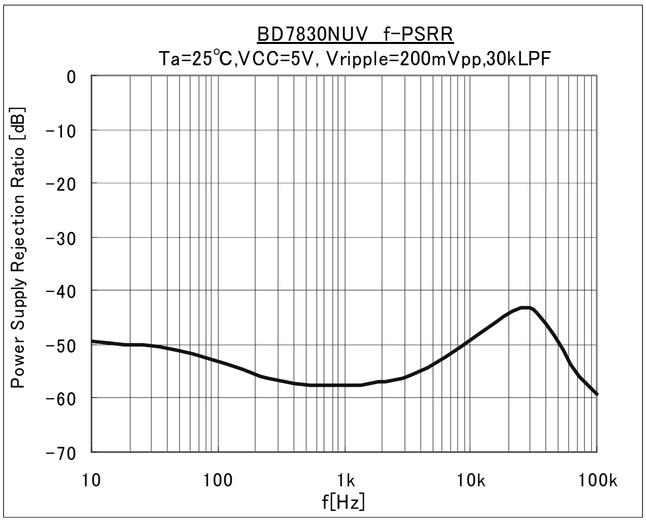


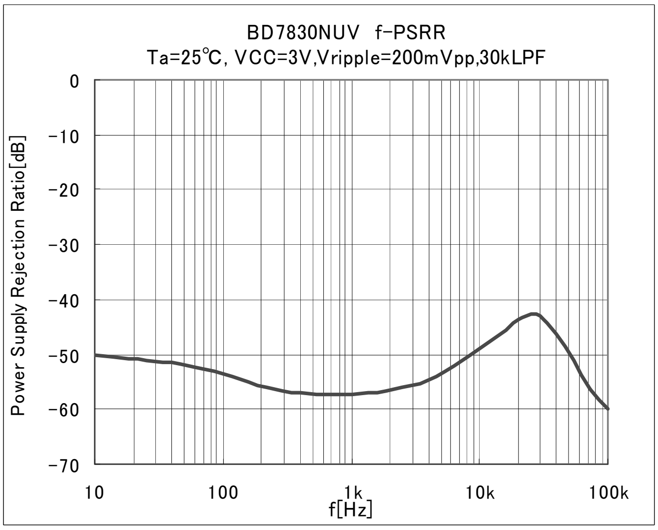


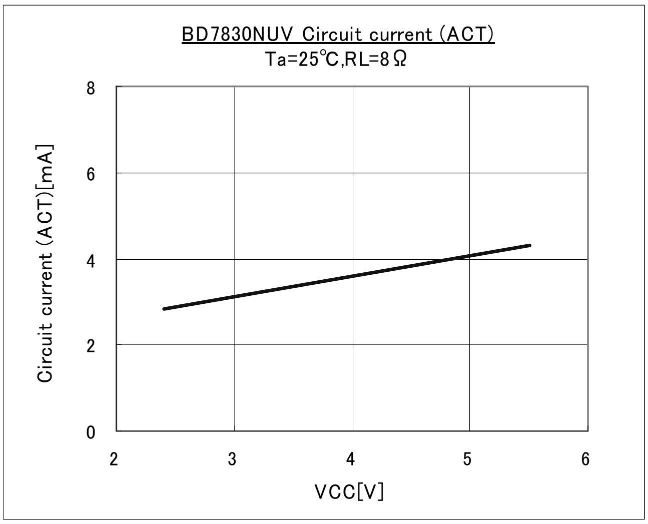


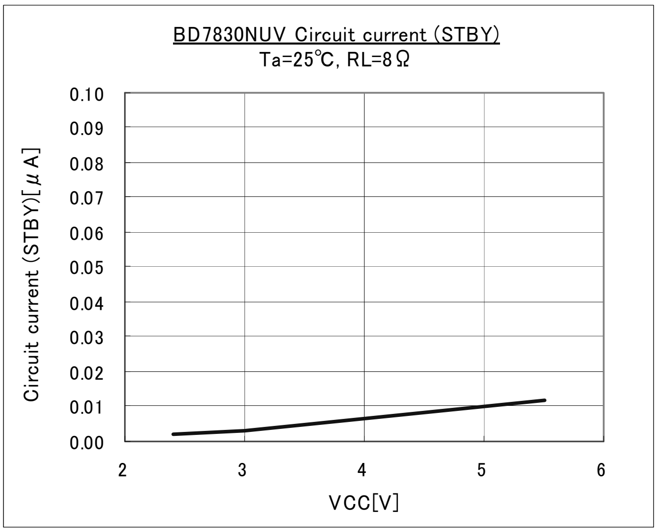


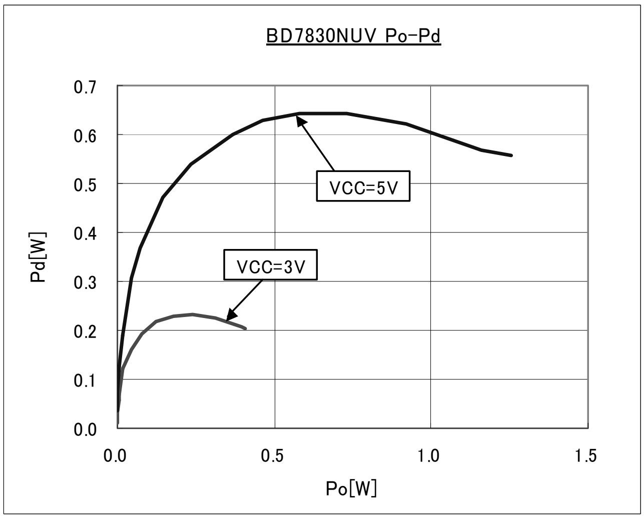
●Typical Characteristics (2)

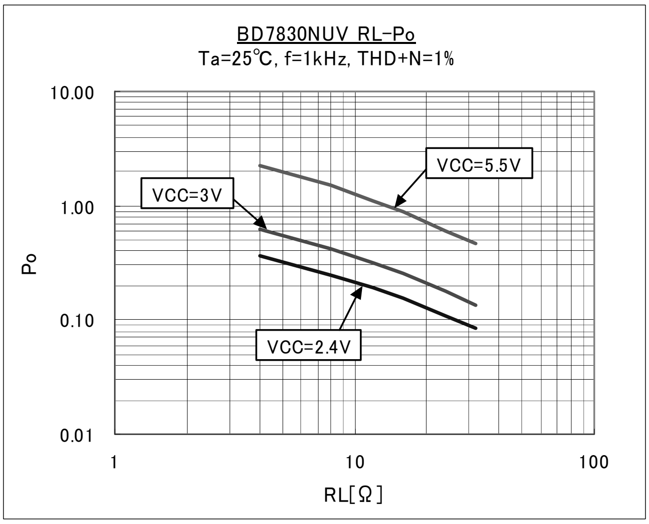












●Notes for use

1) The above numerical values and data are typical values for the design, which are not guaranteed.

2) The application circuit examples can be reliably recommended, but their characteristics should be checked carefully before use. When using external component constants that have been modified, determine an ample margin that takes into consideration variation among the external components and Rohm's LSI IC chips, including variation in static characteristics and transient characteristics.

3) Absolute maximum ratings
This IC may be damaged if the absolute maximum ratings for the applied voltage, temperature range, or other parameters are exceeded. Therefore, avoid using a voltage or temperature that exceeds the absolute maximum ratings. If it is possible that absolute maximum ratings will be exceeded, use fuses or other physical safety measures and determine ways to avoid exceeding the IC's absolute maximum ratings. The above numerical values and data are typical values for the design, which are not guaranteed.

4) GND pin's potential
Try to set the minimum voltage for GND pin's potential, regardless of the operation mode.
Check that the voltage of each pin does not go below GND pin's voltage, including transient phenomena.

5) Shorting between pins and mounting errors
When mounting the IC chip on a board, be very careful to set the chip's orientation and position precisely. When the power is turned on, the IC may be damaged if it is not mounted correctly. The IC may also be damaged if a short occurs (due to a foreign object, etc.) between two pins, between a pin and the power supply, or between a pin and the GND.

6) Shorting output pin
When output pin (5,8pin) is shorted to VCC or GND, the IC may be damaged by over current, so be careful in operation.

7) Thermal design
Ensure sufficient margins to the thermal design by taking in to account the allowable power dissipation during actual use modes, because this IC is power amp.
When excessive signal inputs which the heat dissipation is insufficient condition, it is possible that TSD (thermal shutdown circuit) is active.
TSD is protection of the heat by excessive signal inputs, it is not protection of the shorting output to VCC or GND.

8) Shorted pins and mounting errors
When the output pins (pins 5 and 8) are connected to VCC and GND, the thermal shutdown function repeatedly switches between shutdown (OFF) and cancel (ON). Note with caution that chip damage may occur if these connections remain for a long time.

9) Operating range
The rated operating power supply voltage range(VCC=+2.4～+5.5V) and the rated operation temperature range (Ta=-40～+85℃) are the range by which basic circuit functions is operated.
It is not guaranteed a specification and a rated output power about all operating power supply voltage range or operation temperature range.

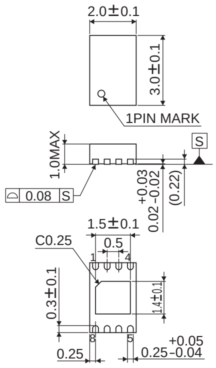
10) Operation in strong magnetic fields
Note with caution that operation faults may occur when this IC operates in a strong magnetic field.

●Ordering part number

B	D	7	8	3	0	N	U	V	-	T	R

B D	7 8 3 0	N U V	T R
Part No.	Part No.	Package NUV:VSON008V2030	Packaging and forming specification TR: Embossed tape and reel

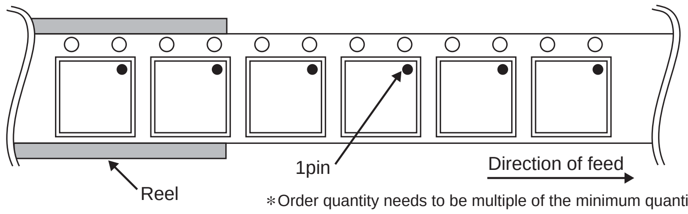
VSON008V2030



(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)



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

Notice

Precaution on using ROHM Products

1. 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
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

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.