AN6291, AN6291S

Dual dbx II Noise Reduction System ICs

■ Overview

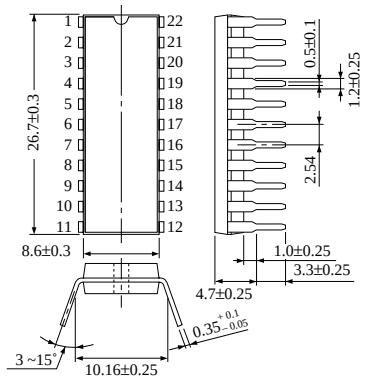
The AN6291 and the AN6291S are the single chip ICs suitably developed for noise reduction of dbxII type and used for stereo operation. They can be used for U.S. sound multiplex TV. 1.8V low voltage operation enables to apply for battery-operated equipment to the Hi-Fi deck. Package is available for 22-pin DIL plastic and 22-pin SOP package. Equipment can be minitualized and high integration.

■ Features

- Wide dynamic range : 110dB
- Low operating voltage : $V_{CC\ (min.)}$ =1.8V
- Fewer external components
- Adjustment : only one
- Low power consumption
- Wide operating supply voltage range :

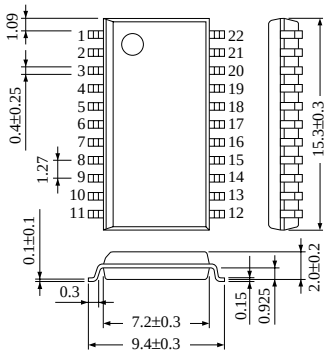
  $V_{CC\ (opr)}$ =1.8V to 14V

AN6291 Unit : mm



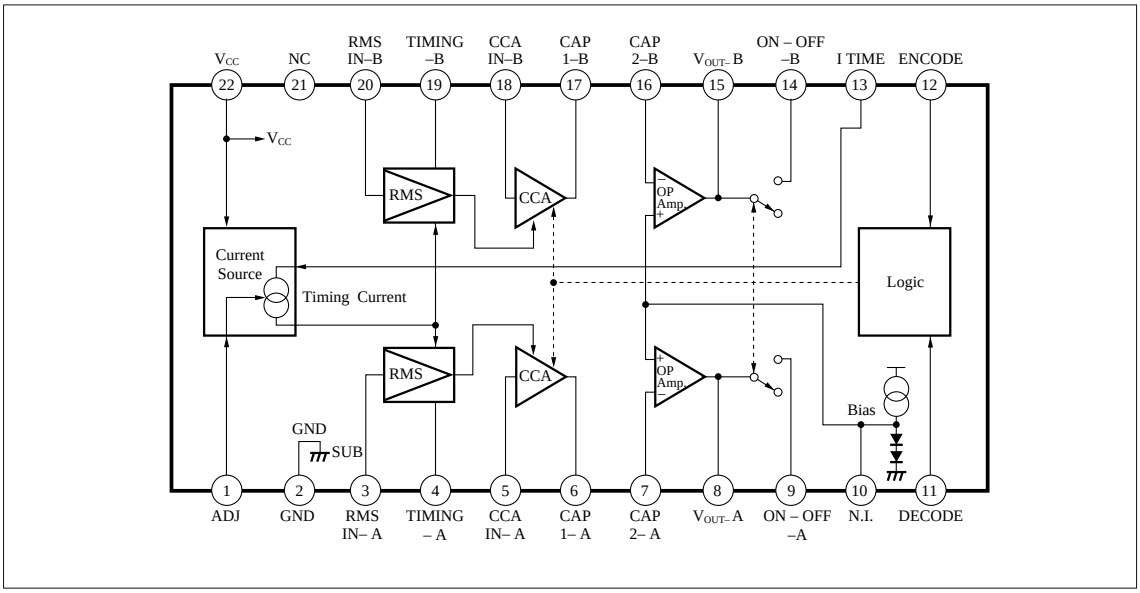
22-Lead DIP Package (DIP022-P-0400A)

AN6291S Unit : mm



22-Lead SOP Package (SOP022-P-0375)

■ Block Diagram



■ Pin Descriptions

Pin No.	Pin Name	Pin No.	Pin Name
1	Adjustment of timing current	12	ENCODE
2	GND	13	I TIME
3	RMS IN-A	14	ON-OFF-B
4	TIMING-A	15	VOUT-B
5	CCA IN-A	16	CAP-2-B
6	CAP-1-A	17	CAP-1-B
7	CAP-2-A	18	CCA IN-B
8	VOUT-A	19	TIMING-B
9	ON-OFF-A	20	RMS IN-B
10	N.I.	21	NC
11	DECODE	22	V_{CC}

■ Absolute Maximum Ratings (Ta=25˚C)

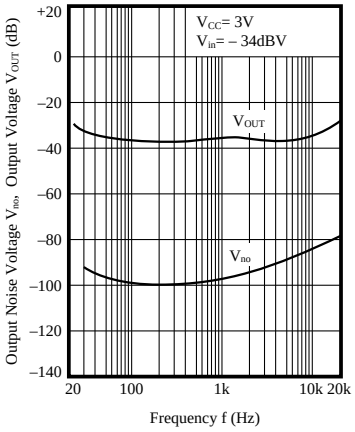
Parameter		Symbol	Rating	Unit
Supply Voltage		V_{CC}	14.4	V
Supply Current		I_{CC}	5	mA
Power Dissipation (Ta=75˚C)		P_D	100	mW
Operating Ambient Temperature		T_{opr}	–20 ~ + 75	˚C
Storage Temperature	AN6291	T_{stg}	–55 ~ + 125	˚C
	AN6291S	T_{stg}	–40 ~ + 125	˚C

■ Electrical Characteristics (V_{CC}=3V, Ta=25˚C)

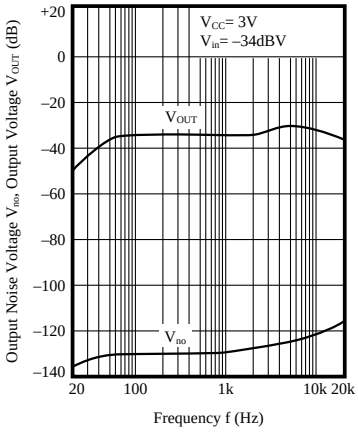
Parameter		Symbol	Condition	min.	typ.	max.	Unit
Input/Output Characteristics/ENCODE Mode		V_{OE-1}	V_{IN} = + 20dB, f=1kHz	7.5	10	12.5	dB
		V_{OE-2}	V_{IN} = 0dB, f=1kHz	–2	0	+ 2	
		V_{OE-3}	V_{IN}= –40dB, f=1kHz	–23	–20	–17	
Input/Output Characteristics/DECODE Mode		V_{OD-1}	V_{IN} = + 10dB, f=1kHz	17	20	23	dB
		V_{OD-2}	V_{IN}=0dB, f=1kHz	–2	0	+ 2	
		V_{OD-3}	V_{IN}= –20dB, f=1kHz	–44	–40	–36	
Maximum Output Voltage	ENCODE Mode	V_{OME}	THD=1%, f=1kHz	80	150	—	mV
	DECODE Mode	V_{OMD}		200	450	—	
Total Harmonic Distortion/DECODE Mode		THD_D	V_O = + 14dB, f=1kHz	—	0.15	0.3	%
Noise Output Voltage	ENCODE Mode	V_{NOE}	Input Short A-weight	—	100	200	μV
	DECODE Mode	V_{NOD}		—	3	6	
Difference Between Channels	ENCODE Mode	CD_E	V_{IN}= 0dB, f=1kHz	–1.2	0	1.2	dB
	DECODE Mode	CD_D		–1.2	0	1.2	
Crosstalk/ENCODE Mode		CT	Measuring channel : Short Another channel : Output 200mV, f=1kHz	50	60	—	dB
Ripple Rejection Ratio/DECODE Mode		SVRR	f=60Hz, V=100mV, Input Short	40	55	—	dB
Quiescent Current		I_{CC}	V_{CC} =3V, Input Short	—	1.8	3.2	mA
Input/Output Characteristics/dbx OFF Mode		V_{OFF}	V_{IN} = + 20dB, f=1kHz	17	20	23	dB
Total Harmonic Distortion/dbx OFF Mode		THD_{OFF}	V_{IN} = + 20dB, f=1kHz	—	0.3	1	%
Output Noise Voltage/dbx OFF Mode		Vn_{OFF}	Input Short, A-weight	—	10	20	μV

Note) 0dB= 20mV= –34dBV

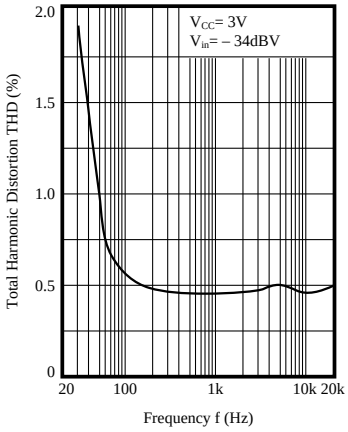
V_{OUT}, V_{no}– f (Encoder mode)



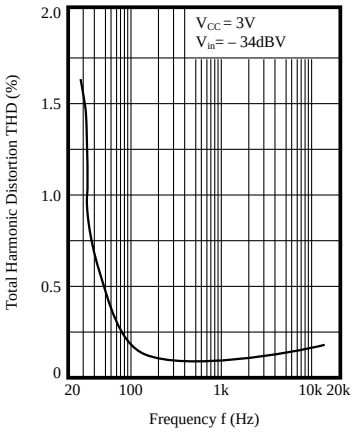
V_{OUT}, V_{no}– f (Decoder mode)



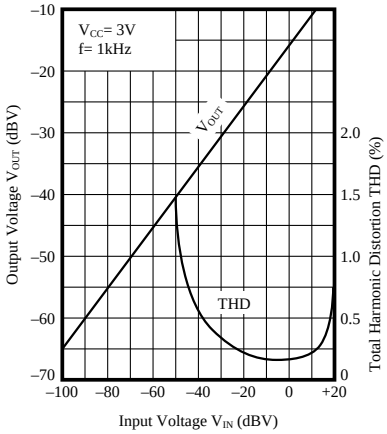
THD – f (Encoder mode)



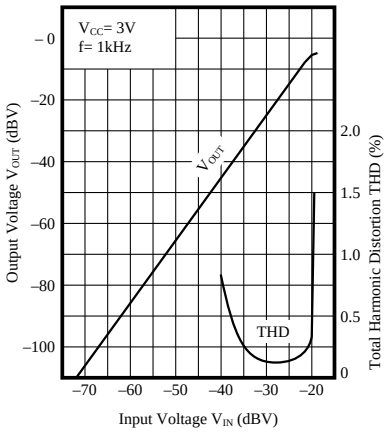
THD – f (Decoder mode)



V_{OUT}, THD –V_{IN} (Encoder mode)

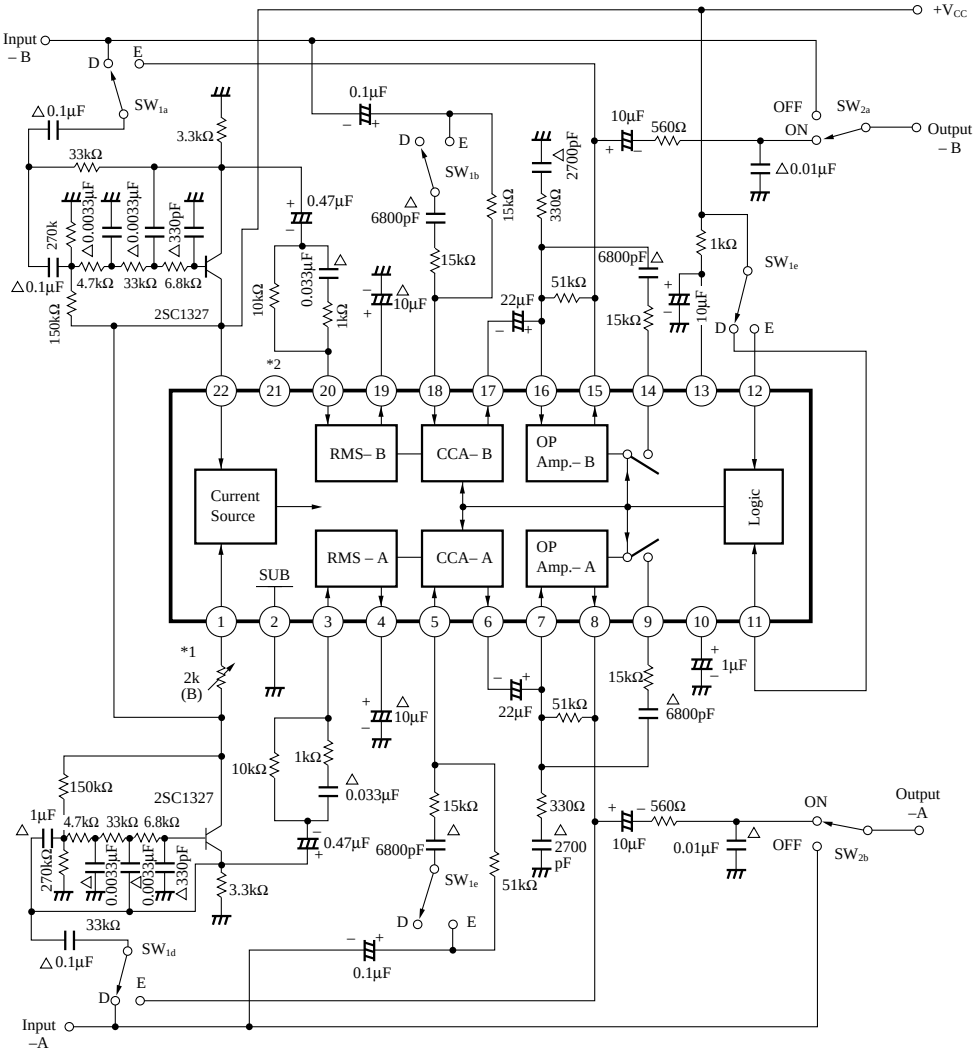


V_{OUT}, THD–V_{IN} (Decoder mode)



■ Application Circuits

1 Switching circuit of recording/playback



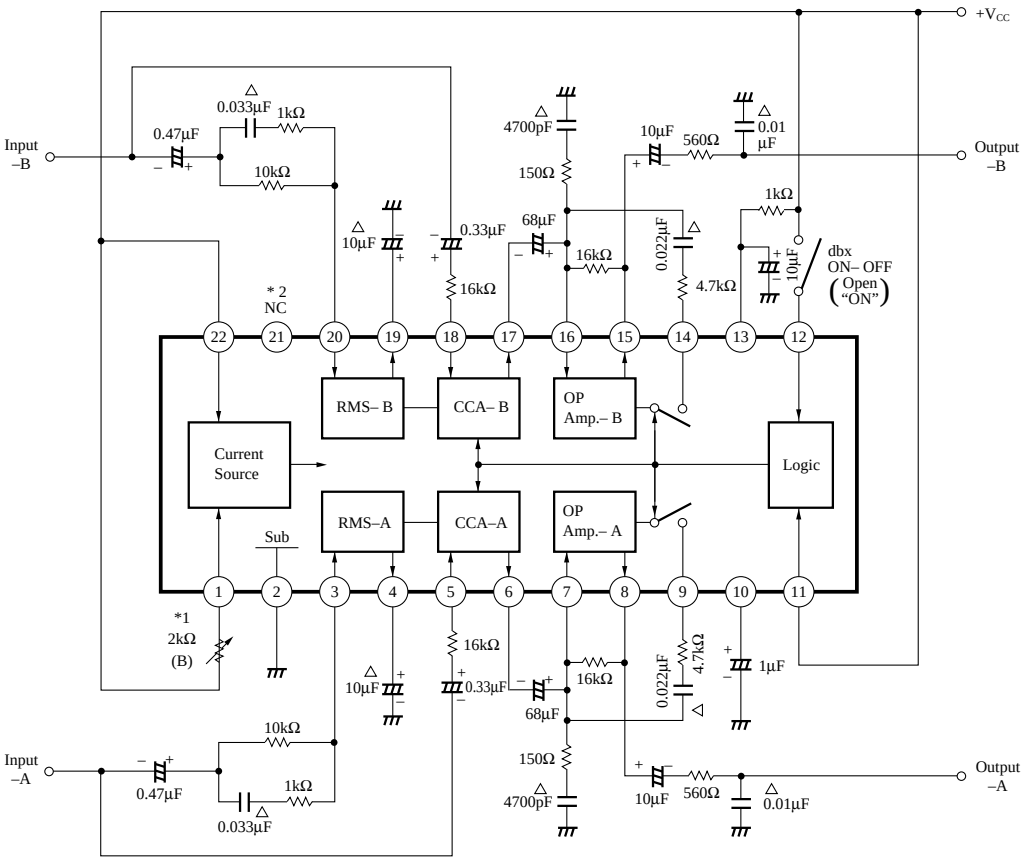
Logical condition of recording/playback

Pin11	Pin12	Mode
V_{CC}	Open	DECODE
Open	V_{CC}	ENCODE
V_{CC}	V_{CC}	OFF

* 1 Signals of 1kHz, 20mV are applied to the input of both channels at the same time, sinking current into the Pin13 should be adjusted to 15μA±5%. Standard value at V_{CC}=3V is about 1kΩ.
* 2 External circuit should not be connected with Pin21. Connected in the IC.
* 3 Users should follow the latest technical information from dbx company. Constant number might be changed.

Note 1) All the resistors and the capacitor with the mark △should be used in the error less than ±5%.
Note 2) S_{1a}~ S_{1e} : Switch record, playback (Above figure shows “PLAYBACK” mode).
Note 3) S_{2a}~ S_{2b} : dbx ON-OFF switch (Above figure shows “ON” mode).

2 Playback exclusive circuit (Designed noise at dbx OFF mode to be small)

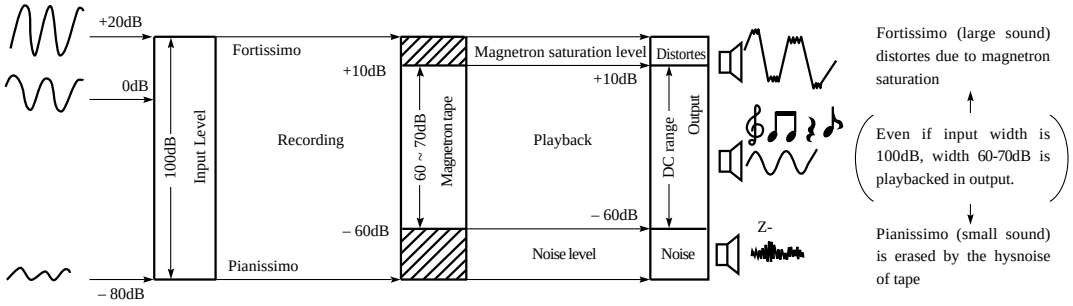


* 1 Signals of 1kHz, 20mV are applied to the input of the both channels, adjust sinking current into the Pin13 to 15µA±5% Standard value at V_{CC}=3V is about 1kΩ.
* 2 External circuit should not be connected with the Pin21. Connected in the IC.
* 3 Users should follow the latest technical information from dbx company. Constant number might be changed.

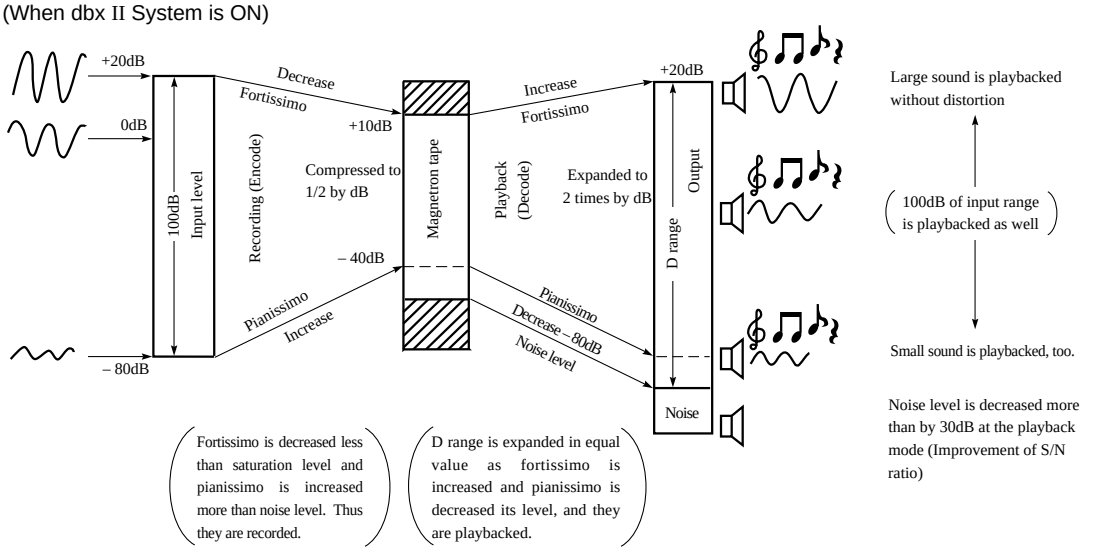
Note 1) All the resistors and the capacitor with the mark △ should be used in the error less than ±5%.
Note 2) Impedance of the input signal source should be less than 100Ω.

■ Effect of dbxII Noise Reduction System

(Without noise reduction system)



(When dbx II System is ON)



■ Cautions

(1) When users use the AN6291 and the AN6291S, contract should be made between the dbx Technology Licensing. dbx licence and trademark should be contacted with the following.

the U.S.A. : dbx Technology Licensing
433 California Street, Third Floor
San Francisco, California 94104
Tel : 415-765-2801
Fax : 415-765-2141

JAPAN Office : dbx Technology Licensing
Tel : 03-3378-0915
Fax : 03-3374-5191

(2) Capacitor between the Pin6 – 7 and Pin16 –17 is used to cut DC current.
When leakage of DC current is large, encode and decode characteristics is not right value, capacitor's leakage should be as minimum as possible.

(3) The AN6291 is a low power consumption current type. So effection of wiring resistance is small and oscillation character-ist of pattern location is good, however, when impedance of the input pin is high, wiring should be shorter because it is easily effected by external noises.

Request for your special attention and precautions in using the technical information and semiconductors described in this material

(1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.

(2) The technical information described in this material is limited to showing representative characteristics and applied circuit examples of the products. It does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.

(3) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
- Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
- Any applications other than the standard applications intended.

(4) The products and product specifications described in this material are subject to change without notice for reasons of modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.

(5) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.

(6) When using products for which dry packing is required, observe the conditions (including shelf life and after-unpacking standby time) agreed upon when specification sheets are individually exchanged.

(7) No part of this material may be reprinted or reproduced by any means without written permission from our company.

Please read the following notes before using the datasheets

A. These materials are intended as a reference to assist customers with the selection of Panasonic semiconductor products best suited to their applications.
Due to modification or other reasons, any information contained in this material, such as available product types, technical data, and so on, is subject to change without notice.
Customers are advised to contact our semiconductor sales office and obtain the latest information before starting precise technical research and/or purchasing activities.

B. Panasonic is endeavoring to continually improve the quality and reliability of these materials but there is always the possibility that further rectifications will be required in the future. Therefore, Panasonic will not assume any liability for any damages arising from any errors etc. that may appear in this material.

C. These materials are solely intended for a customer's individual use.
Therefore, without the prior written approval of Panasonic, any other use such as reproducing, selling, or distributing this material to a third party, via the Internet or in any other way, is prohibited.

2001 MAR