

MN6474A

D/A Converter for Digital Audio Equipment

■ Overview

The MN6474A is a CMOS digital-to-analog converter with a built-in 16-bit digital filter for pulse code modulation (PCM) digital audio equipment.

It uses noise shaping technology to convert a digital signal into a PWM signal.

It contains a 4-fold oversampling digital filter that permits simplification of the low pass filter after the D/A converter, thus greatly reducing the power consumption of the entire D/A conversion system.

The chip provides both regular and inverted phase outputs for both channels.

The chip contributes to cost and size reductions for CD players and other digital audio equipment.

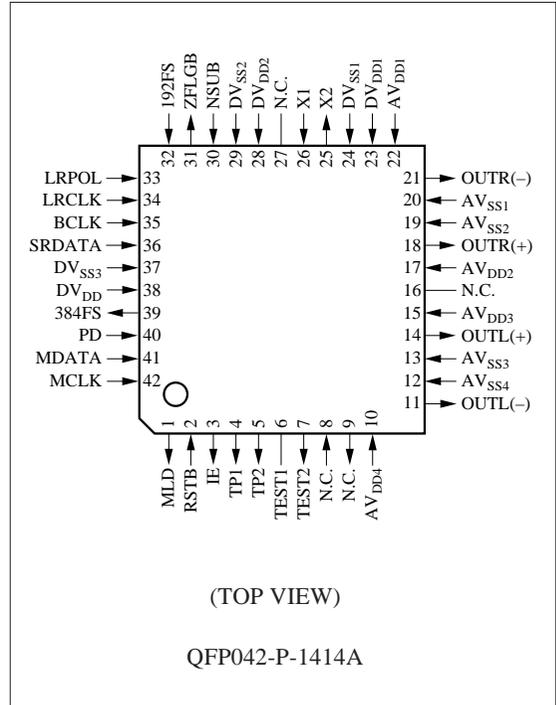
■ Features

- Built-in 4-fold oversampling digital filter
(ripple of only ± 0.0072 dB within the supported band and attenuation of 62.7 dB within the cutoff band)
- Internal resolution of 18 bits
- Two's complement input (I^2S input code also supported)
- Built-in overflow limiter
- No zero cross distortion
- Sample-and-hold circuit is unnecessary
- Output pin for detecting zero input
- Single 5V power supply

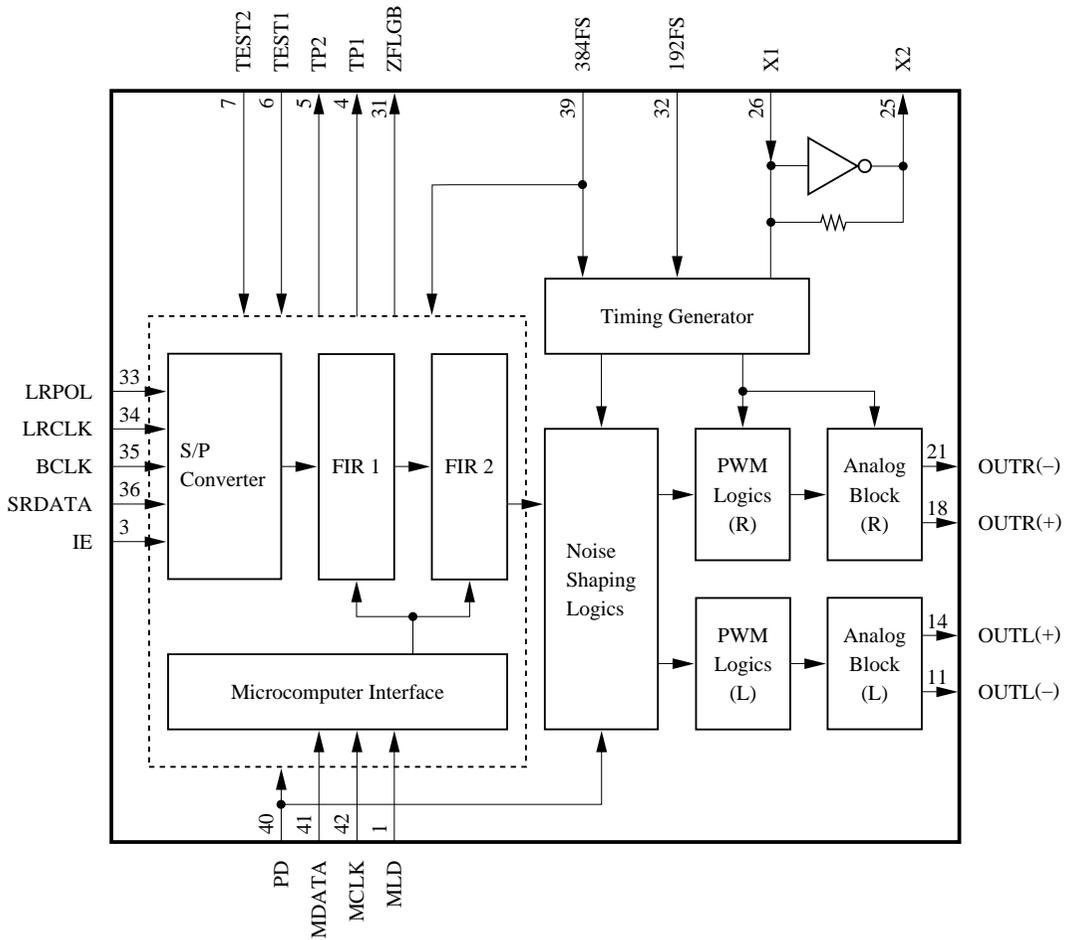
■ Applications

- CD players and other digital audio equipment

■ Pin Assignment



■ Block Diagram



■ Pin Descriptions

Pin No.	Symbol	Function Description
1	MLD	Microcomputer command load input ("L" level to load)
2	RSTB	Reset pin (active "L"). Always pull this pin low after applying the power.
3	IE	Input format selection pin. "H" level; I ² S format "L" level; signal processing LSI format.
4	TP1	Digital filter test output pin 1. Leave this pin open.
5	TP2	Digital filter test output pin 2. Leave this pin open.
6	TEST1	Digital filter test input pin 1. Keep this pin at "L" level.
7	TEST2	Digital filter test input pin 2. Keep this pin at "L" level.
8	N.C.	No connection Leave these pins open.
9	N.C.	No connection Leave these pins open.
10	AV _{DD4}	Power supply pin 4 for analog circuits. (+5V)
11	OUTL(-)	Left channel inverted phase PWM output pin.
12	AV _{SS4}	Ground pin 4 for analog circuits.
13	AV _{SS3}	Ground pin 3 for analog circuits.
14	OUTL(+)	Left channel normal phase PWM output pin.
15	AV _{DD3}	Power supply pin 3 for analog circuits. (+5V)
16	N.C.	No connection Leave this pin open.
17	AV _{DD2}	Power supply pin 2 for analog circuits. (+5V)
18	OUTR(+)	Right channel through phase PWM output pin.
19	AV _{SS2}	Ground pin 2 for analog circuits.
20	AV _{SS1}	Ground pin 1 for analog circuits.
21	OUTR(-)	Right channel inverted phase PWM output pin.
22	AV _{DD1}	Power supply pin 1 for analog circuits. (+5V)
23	DV _{DD1}	Power supply pin 1 for digital circuits. (+5V) (Power supply for oscillator circuit)
24	DV _{SS1}	Ground pin 1 for digital circuits. (Ground for oscillator circuit)
25	X2	Crystal oscillator pin.
26	X1	Crystal oscillator pin. (External clock input pin)
27	N.C.	No connection Leave this pin open.
28	DV _{DD2}	Power supply pin 2 for analog circuits. (+5V)
29	DV _{SS2}	Ground pin 2 for digital circuits.
30	NSUB	Connect to D-V _{DD} . (Silicon substrate potential fixing pin)
31	ZFLGB	Output pin for detecting zero input.
32	192FS	192f _s (=9.216 MHz)output pin. Max. load capacity: 30 pF.
33	LRPOL	LRCLK polarity selection pin. "H" level; selects the left channel "L" level; the right channel.
34	LRCLK	LRCLK pin. When the LRPOL pin is at "H" level, "H" level in this pin indicates left channel data input; "L" level indicates right channel data input. When the LRPOL pin is at "L" level, "L" level in this pin indicates left channel data input; "H" level input indicates right channel data input.
35	BCLK	Serial input bit clock
36	SRDATA	Serial input data (digital) input pin.
37	DV _{SS3}	Ground pin 3 for digital circuits.

■ Pin Descriptions (continued)

Pin No.	Symbol	Function Description
38	DV _{DD}	Power supply pin for digital circuits. (Silicon substrate potential fixing pin.) (+5V)
39	384FS	384f _s (=18.432 MHz) output pin. Max. load capacitance: 30 pF.
40	PD	Power down pin. (active "H")
41	MDATA	Microcomputer command data input pin.
42	MCLK	Clock input pin for microcomputer command.

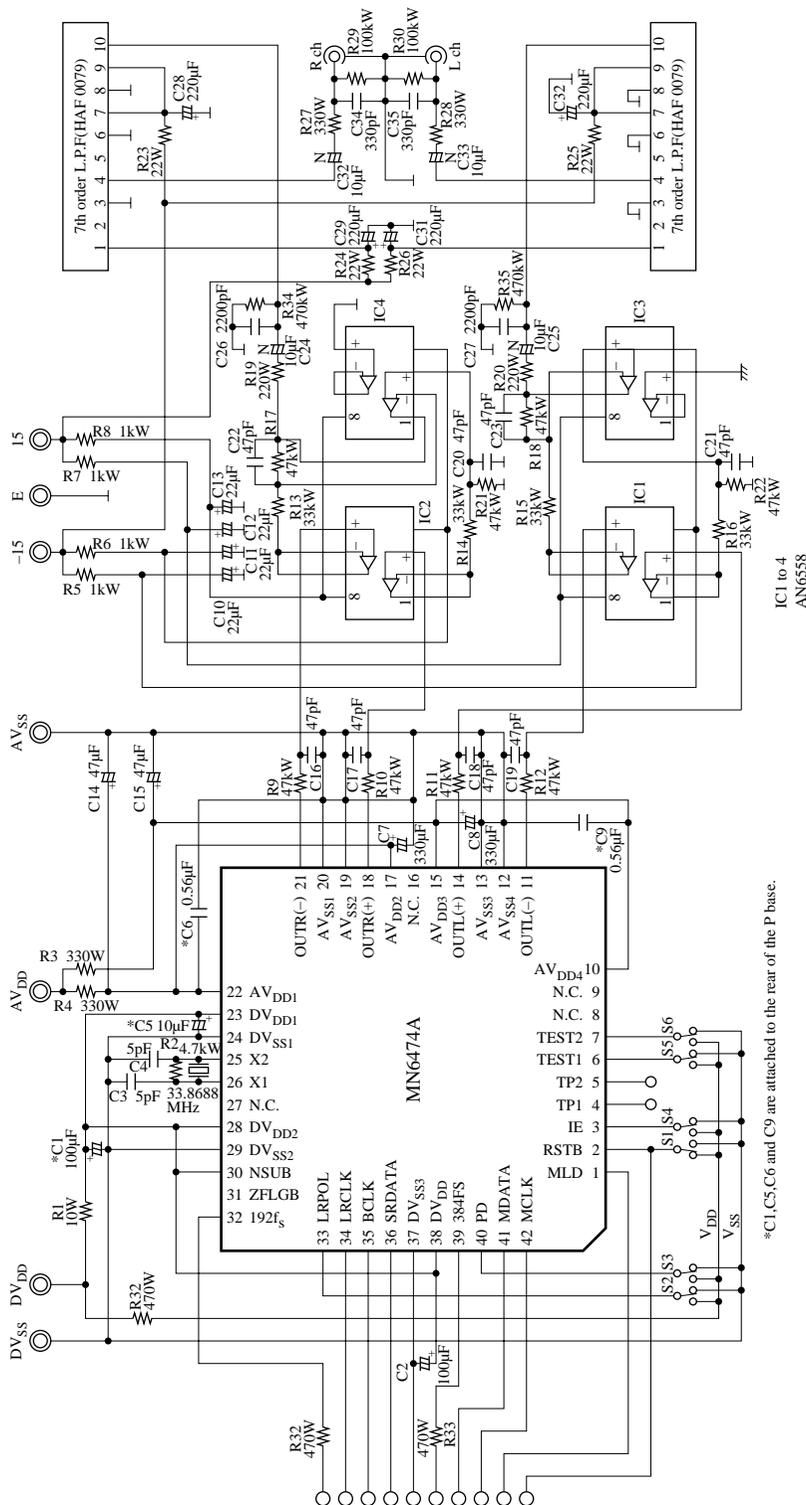
■ Conversion Characteristics

DV_{DD}=5.0V, DV_{SS}=0V, AV_{DD}=5.0V, AV_{SS}=0V, f=33.8688MHz, Ta=25°C

Parameter	Symbol	Test Conditions	min	typ	max	Unit
Analog characteristics						
Signal-to-noise ratio	S/N	EIAJ (1kHz)	95	106		dB
Dynamic range	D.R.	EIAJ (1kHz)	90	98		dB
Total harmonic distortion	THD+N	EIAJ (1kHz)		0.003	0.005	%
Crosstalk		EIAJ (1kHz)	90	98		dB
Output level *1		1kHz F.S.	1.4	1.7		V _{rms}

Note*1: These analog characteristics are for circuits equivalent to the suggested application circuit.

■ Application Circuit Example

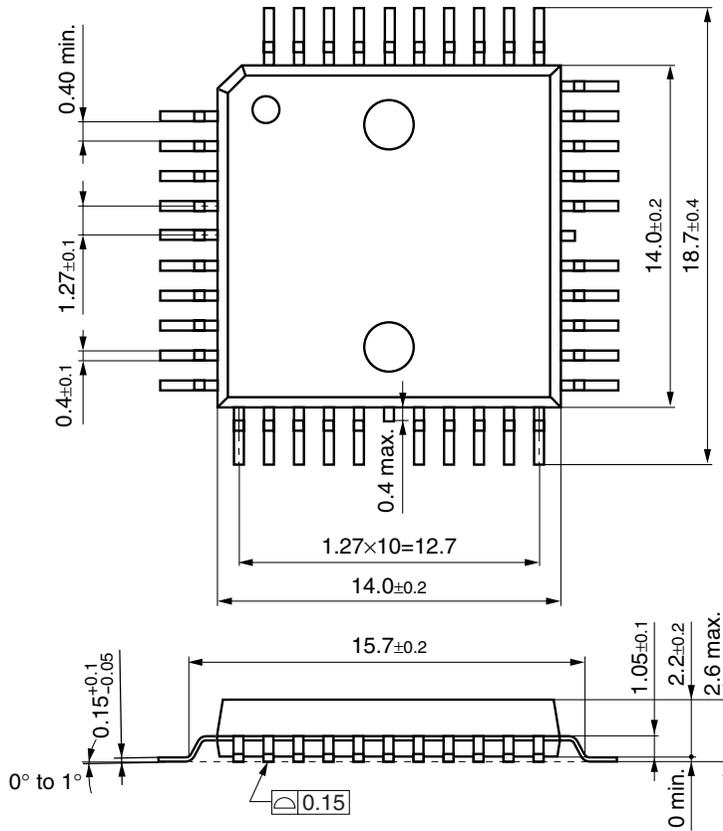


*C1, C5, C6 and C9 are attached to the rear of the P base.

PD(S3)	RSTB(S1)	IE(S4)
"L"	Reset	Signal processing LSI format
"H"	-	I ² S format

■ Package Dimensions (Unit: mm)

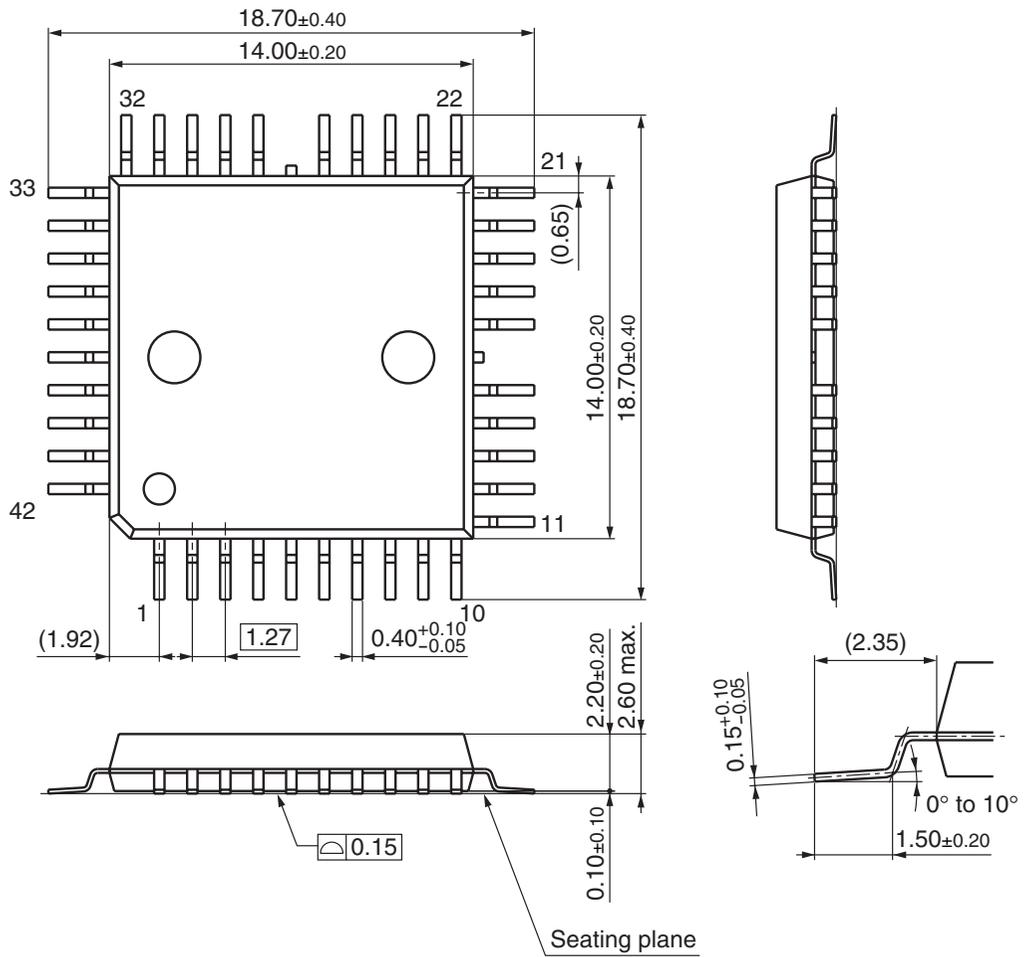
QFP042-P-1414A



Note) The package of this product will be changed to the following lead-free type (QFP042-P-1414D).

■ New Package Dimensions (Unit: mm)

- QFP042-P-1414D (Lead-free package)



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.