

M62343GP

8-Bit, 3-Channel D/A Converter (Buffered)

REJ03F0075-0200

Rev.2.00

Jun 15, 2007

Description

The M62343GP is a CMOS-structure semiconductor integrated circuit incorporating three 8-bit D/A converter channels with output buffer op-amps.

Serial data transfer type input can easily be used through a combination of three lines: DI, CLK, and LD.

Outputs incorporate buffer op-amps that have a drive capacity of 1 mA or above for both sink and source, and can operate over the entire voltage range from almost ground to V_{CC} (0 to 5 V), making peripheral elements unnecessary and enabling configuration of a system with few component parts.

This product is currently under development, and specifications and other details may be modified at a future date.

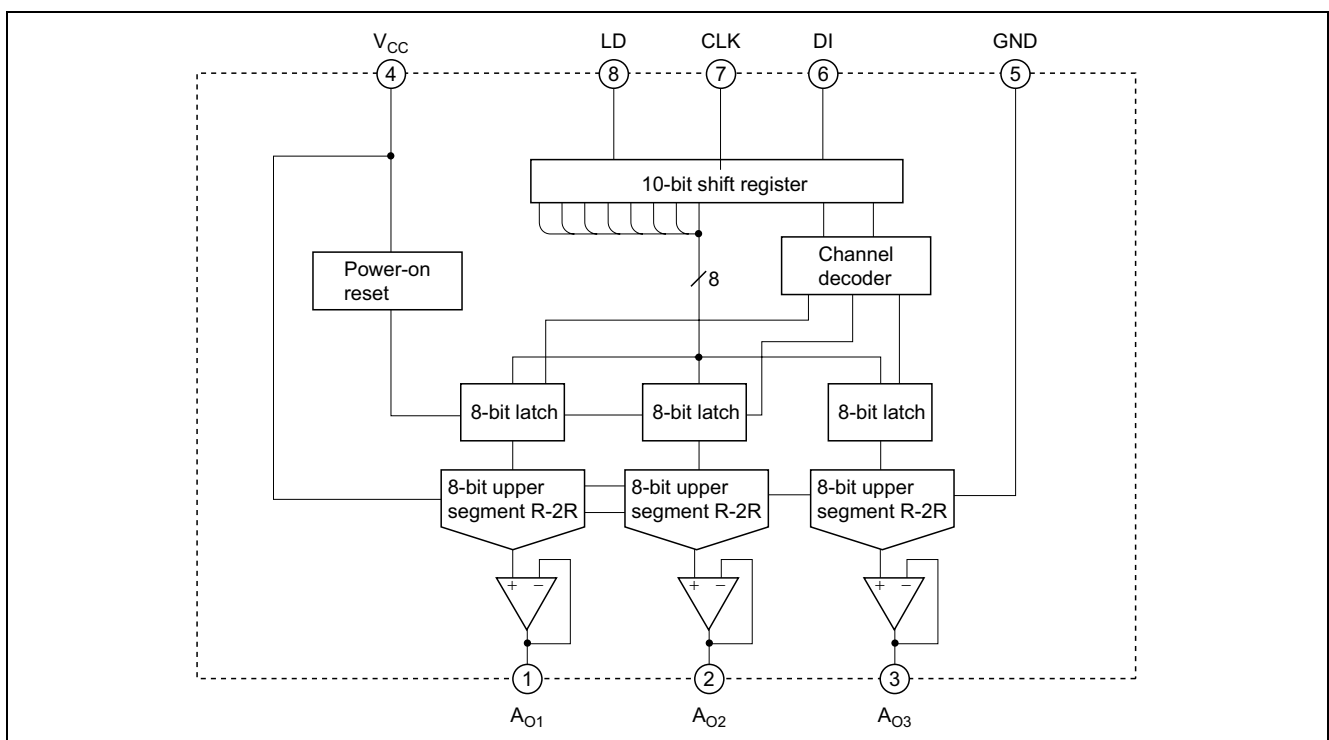
Features

- Data transfer format
10-bit serial data input type
- Output buffer op-amps
Operable over entire voltage range from almost ground to V_{CC} (0 to 5 V)
- High output current capacity
 ± 1 mA or higher

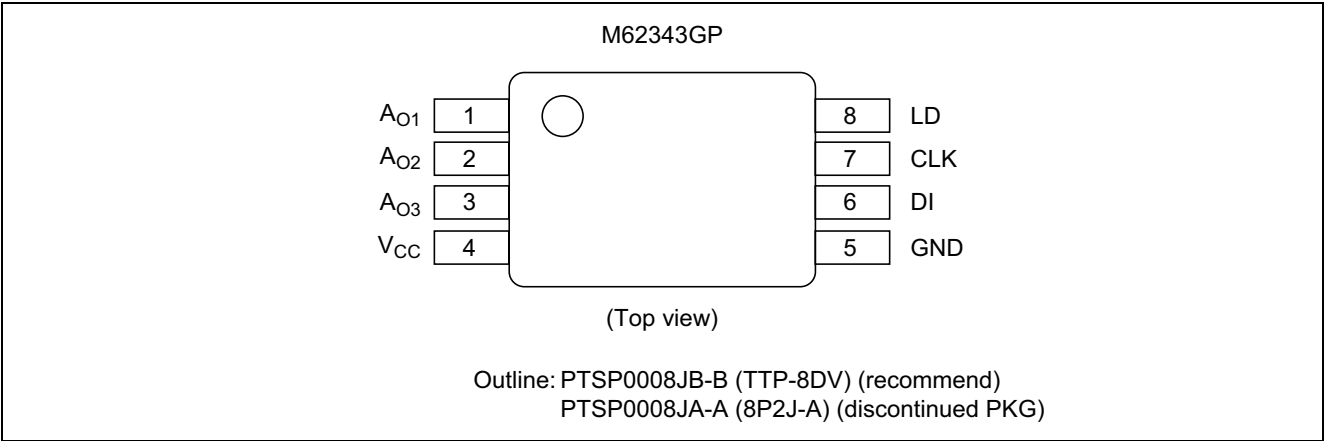
Application

Signal gain setting and automatic adjustment in DSC, CTV, and display monitors, conversion from digital data to analog data in consumer and industrial products

Block Diagram



Pin Arrangement



Pin Description

Pin No.	Symbol	Function
6	DI	Serial data input pin. Inputs serial data with a 10-bit data length.
7	CLK	Serial clock input pin. Input signal from DI pin is input to 10-bit shift register at rise of shift clock.
8	LD	Load pin. When “H” level is input to LD pin, value in 10-bit shift register is loaded into decoder and D/A output register.
1	A _{O1}	8-bit resolution D/A converter output pins (After power-on, all channels are reset and DAC data 00h is output.)
2	A _{O2}	
3	A _{O3}	
4	V _{CC}	Power supply voltage pin
5	GND	GND pin

Absolute Maximum Ratings

Item	Symbol	Rated Value	Unit
Power supply voltage	V_{CC}	-0.3 to 7.0	V
Input voltage	V_{IN}	-0.3 to $V_{CC}+0.3 \leq 7.0$	V
Output voltage	V_O	-0.3 to $V_{CC}+0.3 \leq 7.0$	V
Internal power consumption	P_d	200	mW
Operating ambient temperature	T_{opr}	-20 to +85	°C
Storage temperature	T_{stg}	-55 to +125	°C

Electrical Characteristics

(Unless specified otherwise, $V_{CC} = +5\text{ V} \pm 10\%$, $GND = 0\text{ V}$, $T_a = -20^\circ\text{C}$ to 85°C)

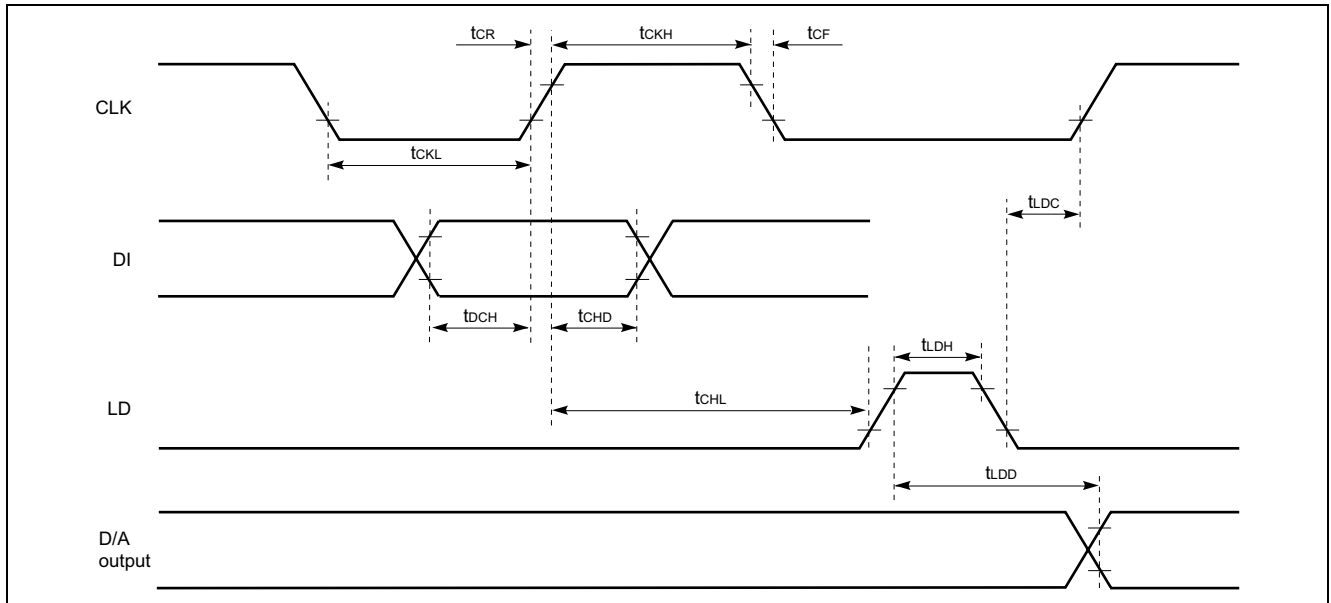
Item	Symbol	Specification Values			Unit	Test Conditions
		Min	Typ	Max		
Power supply voltage	V_{CC}	2.7	5.0	5.5	V	
Power supply current	I_{CC}	0	0.8	2.7	mA	At CLK = 1 MHz operation, $I_{AO} = 0\text{ }\mu\text{A}$ D/A data: 6 Ah (at maximum current)
		0	0.6	1.8		DI = CLK = LD = GND, $I_{AO} = 0\text{ }\mu\text{A}$
Input leakage current	I_{ILK}	-10	—	10	μA	$V_{IN} = 0$ to V_{CC}
Input voltage "L"	V_{IL}	0	—	$0.2V_{CC}$	V	
Input voltage "H"	V_{IH}	$0.5V_{CC}$	—	V_{CC}	V	
Buffer amp output voltage range	V_{AO}	0.1	—	$V_{CC}-0.1$	V	$I_{AO} = \pm 100\text{ }\mu\text{A}$
		0.1	—	$V_{CC}-0.2$		$I_{AO} = \pm 500\text{ }\mu\text{A}$
Buffer amp output drive range	I_{AO}	-1.0	—	1.0	mA	Upper saturation voltage = 0.3 V Lower saturation voltage = 0.2 V
Differential nonlinearity error	S_{DL}	-1.0	—	1.0	LSB	$V_{CC} = 5.12\text{ V}$ (20 mV/LSB) No load ($I_{AO} = 0$)
Nonlinearity error	S_L	-1.5	—	1.5	LSB	
Zero point error	S_{ZERO}	-2.0	—	2.0	LSB	
Full-scale error	S_{FULL}	-2.0	—	2.0	LSB	
Oscillation limit output capacitance	C_O	—	—	0.1	μF	
Buffer amp output impedance	R_O	—	5.0	—	Ω	

AC Characteristics

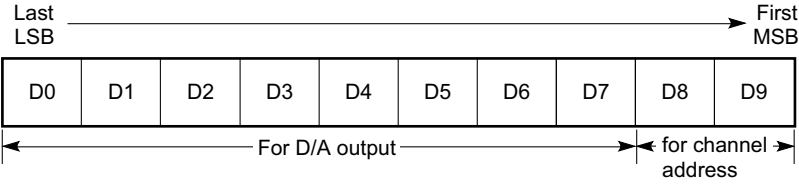
(Unless specified otherwise, $V_{CC} = +5\text{ V} \pm 10\%$, $GND = 0\text{ V}$, $T_a = -20^\circ\text{C}$ to 85°C)

Item	Symbol	Specification Values			Unit	Test Conditions
		Min	Typ	Max		
Clock "L" pulse width	t_{CKL}	200	—	—	ns	
Clock "H" pulse width	t_{CKH}	200	—	—	ns	
Clock rise time	t_{CR}	—	—	200	ns	
Clock fall time	t_{CF}	—	—	200	ns	
Data setup time	t_{DCH}	30	—	—	ns	
Data hold time	t_{CHD}	60	—	—	ns	
Load setup time	t_{CHL}	200	—	—	ns	
Load hold time	t_{LDC}	100	—	—	ns	
Load "H" pulse width	t_{LDH}	100	—	—	ns	
D-A output settling time	t_{LDD}	—	—	300	μs	Until output reaches last 1/2 LSB

Timing Chart



Digital Data Format



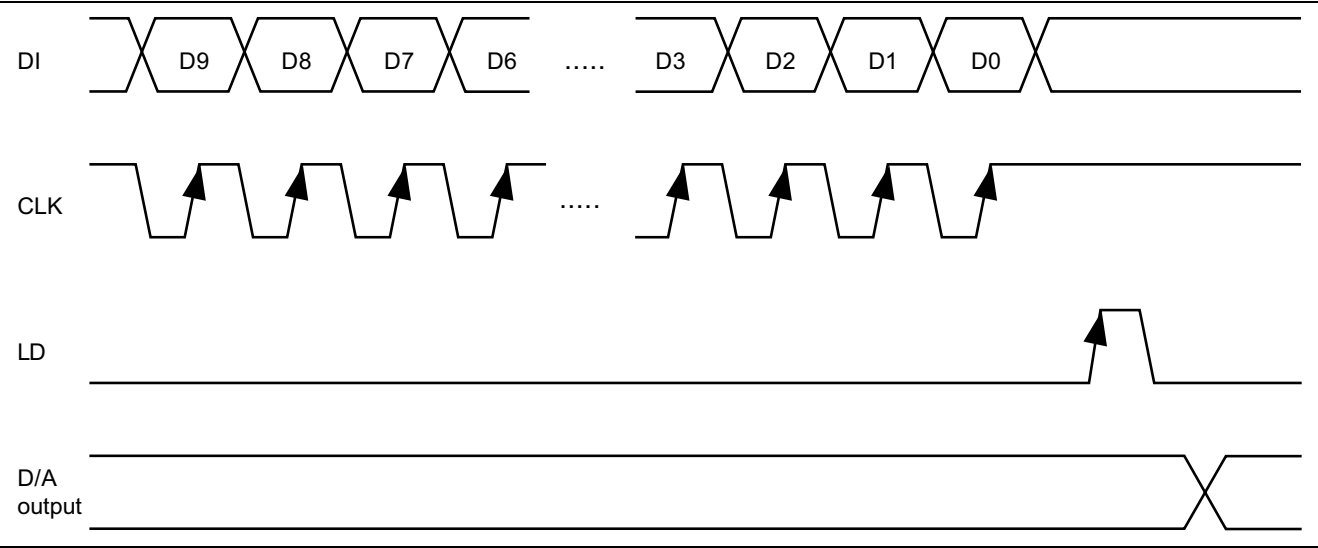
D/A Data

D0	D1	D2	D3	D4	D5	D6	D7	D-A output
0	0	0	0	0	0	0	0	$V_{CC}/256 \times 1$
1	0	0	0	0	0	0	0	$V_{CC}/256 \times 2$
0	1	0	0	0	0	0	0	$V_{CC}/256 \times 3$
1	1	0	0	0	0	0	0	$V_{CC}/256 \times 4$
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0	1	1	1	1	1	1	1	$V_{CC}/256 \times 255$
1	1	1	1	1	1	1	1	$V_{CC}/256 \times 256$

Channel Select Data

D8	D9	Channel Selection
0	0	AO1 selected
1	0	AO2 selected
0	1	AO3 selected
1	1	Don't care

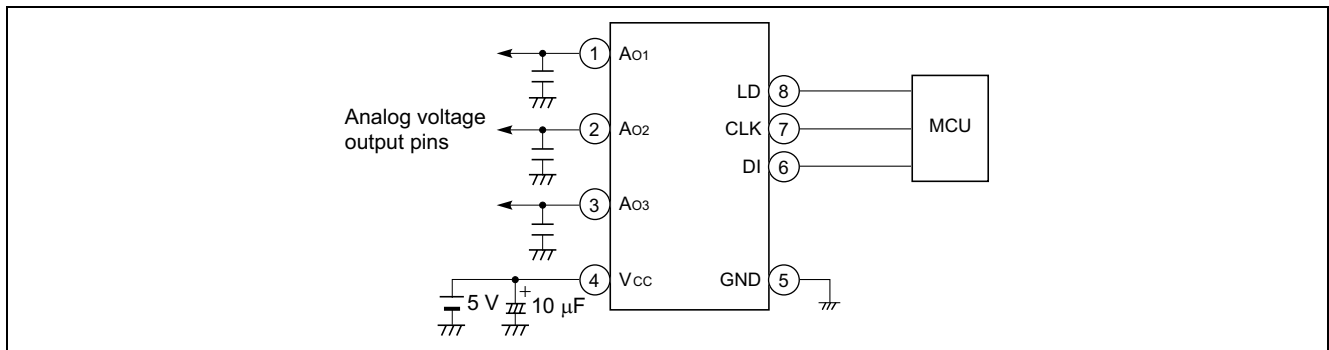
Data Timing Chart (Model)



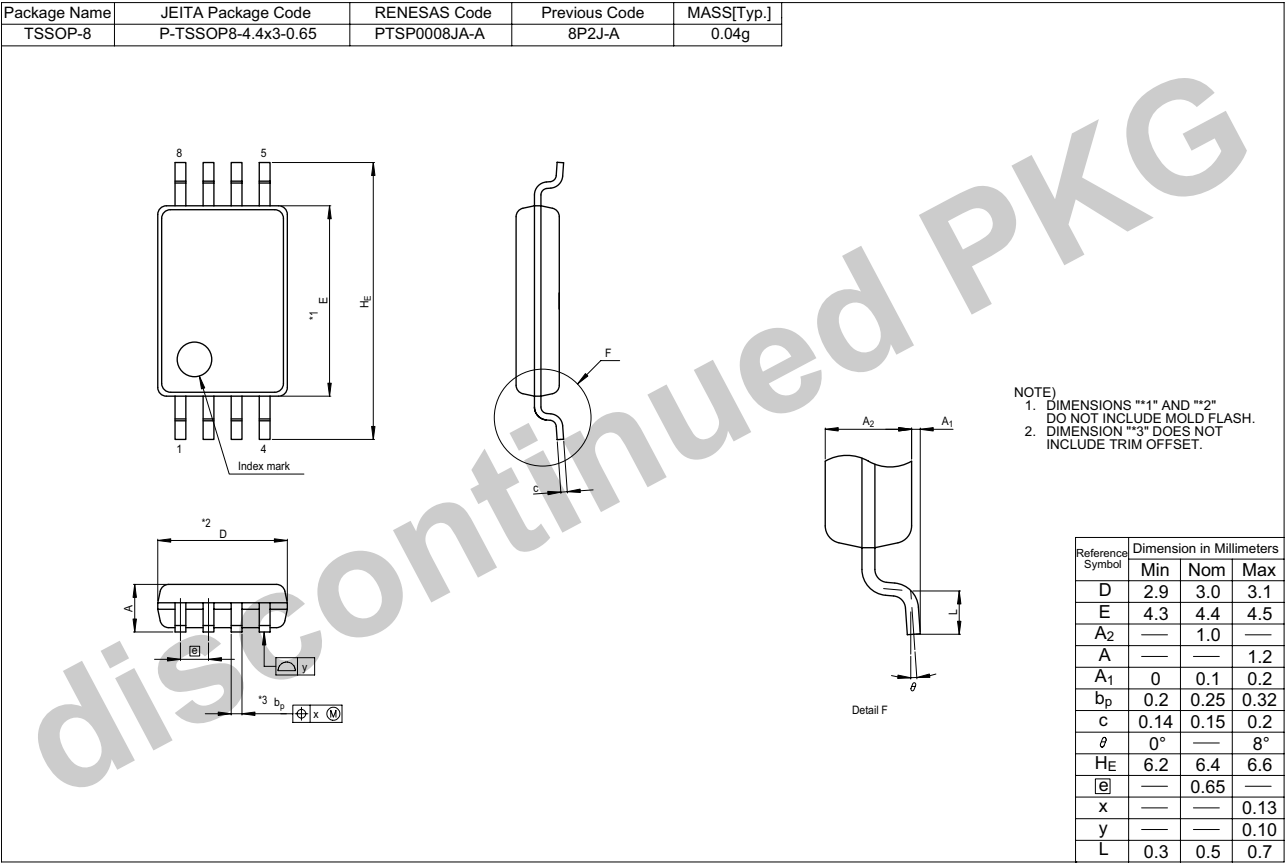
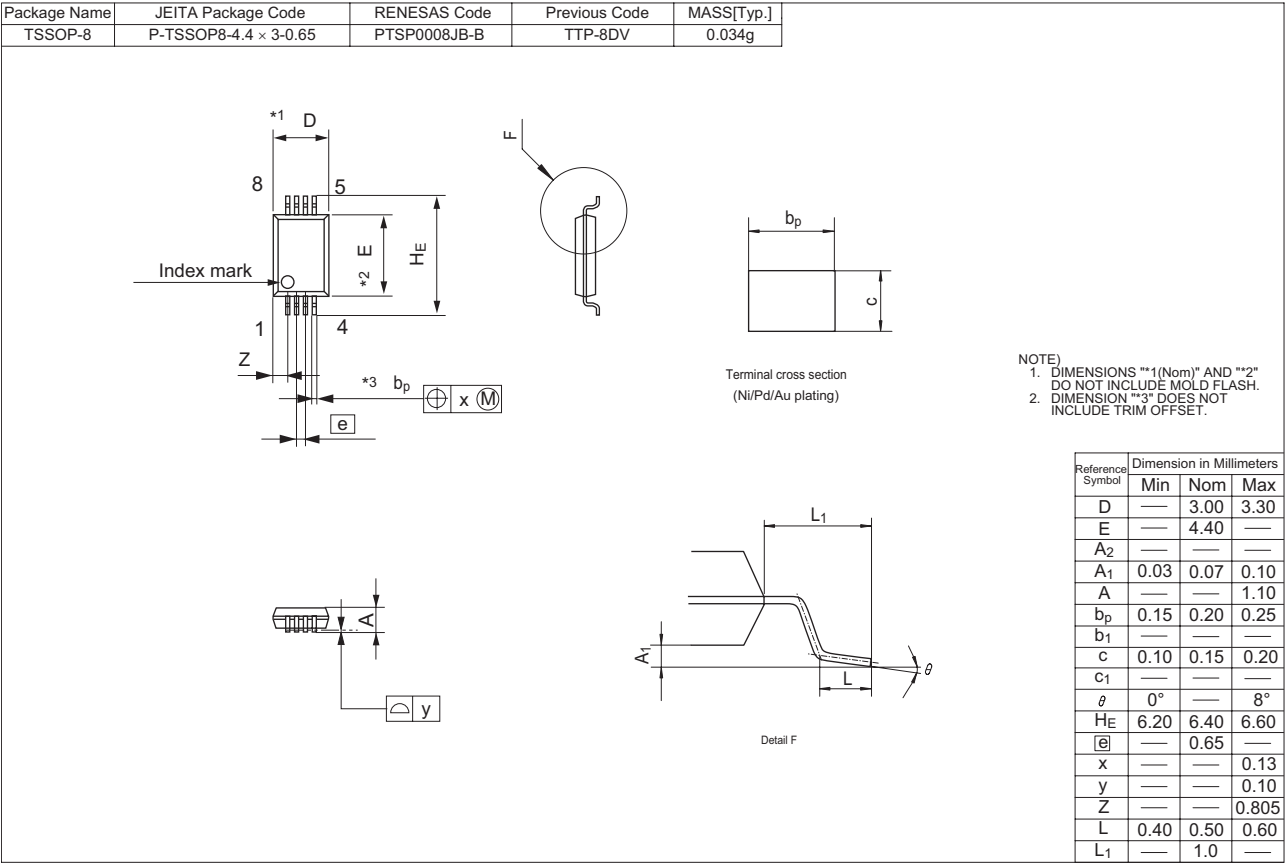
Usage Notes

1. With this IC, D/A converter upper reference voltage setting is performed by means of the power supply voltage. If ripples or spikes are imposed on this pin, conversion accuracy may fall. When using this IC, a capacitor must be inserted between the power supply pin and GND in order to ensure stable D/A conversion.
2. The output buffer amps of this IC are highly tolerant of capacitive loads. Therefore, connecting capacitors (0.1 μF max.) between the output pins and ground in order to eliminate jitter or noise due to output line wiring presents no problems whatever in terms of operation.

Sample Standard Application Circuit



Package Dimensions



Notes:

1. This document is provided for reference purposes only so that Renesas customers may select the appropriate Renesas products for their use. Renesas neither makes warranties or representations with respect to the accuracy or completeness of the information contained in this document nor grants any license to any intellectual property rights or any other rights of Renesas or any third party with respect to the information in this document.
2. Renesas shall have no liability for damages or infringement of any intellectual property or other rights arising out of the use of any information in this document, including, but not limited to, product data, diagrams, charts, programs, algorithms, and application circuit examples.
3. You should not use the products or the technology described in this document for the purpose of military applications such as the development of weapons of mass destruction or for the purpose of any other military use. When exporting the products or technology described herein, you should follow the applicable export control laws and regulations, and procedures required by such laws and regulations.
4. All information included in this document such as product data, diagrams, charts, programs, algorithms, and application circuit examples, is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas products listed in this document, please confirm the latest product information with a Renesas sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas such as that disclosed through our website. (<http://www.renesas.com>)
5. Renesas has used reasonable care in compiling the information included in this document, but Renesas assumes no liability whatsoever for any damages incurred as a result of errors or omissions in the information included in this document.
6. When using or otherwise relying on the information in this document, you should evaluate the information in light of the total system before deciding about the applicability of such information to the intended application. Renesas makes no representations, warranties or guaranties regarding the suitability of its products for any particular application and specifically disclaims any liability arising out of the application and use of the information in this document or Renesas products.
7. With the exception of products specified by Renesas as suitable for automobile applications, Renesas products are not designed, manufactured or tested for applications or otherwise in systems the failure or malfunction of which may cause a direct threat to human life or create a risk of human injury or which require especially high quality and reliability such as safety systems, or equipment or systems for transportation and traffic, healthcare, combustion control, aerospace and aeronautics, nuclear power, or undersea communication transmission. If you are considering the use of our products for such purposes, please contact a Renesas sales office beforehand. Renesas shall have no liability for damages arising out of the uses set forth above.
8. Notwithstanding the preceding paragraph, you should not use Renesas products for the purposes listed below:
 - (1) artificial life support devices or systems
 - (2) surgical implantations
 - (3) healthcare intervention (e.g., excision, administration of medication, etc.)
 - (4) any other purposes that pose a direct threat to human lifeRenesas shall have no liability for damages arising out of the uses set forth in the above and purchasers who elect to use Renesas products in any of the foregoing applications shall indemnify and hold harmless Renesas Technology Corp., its affiliated companies and their officers, directors, and employees against any and all damages arising out of such applications.
9. You should use the products described herein within the range specified by Renesas, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas shall have no liability for malfunctions or damages arising out of the use of Renesas products beyond such specified ranges.
10. Although Renesas endeavors to improve the quality and reliability of its products, IC products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Please be sure to implement safety measures to guard against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other applicable measures. Among others, since the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
11. In case Renesas products listed in this document are detached from the products to which the Renesas products are attached or affixed, the risk of accident such as swallowing by infants and small children is very high. You should implement safety measures so that Renesas products may not be easily detached from your products. Renesas shall have no liability for damages arising out of such detachment.
12. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written approval from Renesas.
13. Please contact a Renesas sales office if you have any questions regarding the information contained in this document, Renesas semiconductor products, or if you have any other inquiries.



RENESAS SALES OFFICES

<http://www.renesas.com>

Refer to "<http://www.renesas.com/en/network>" for the latest and detailed information.

Renesas Technology America, Inc.

450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.

Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7898

Renesas Technology Hong Kong Ltd.

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.

10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology Singapore Pte. Ltd.

1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.

Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

Renesas Technology Malaysia Sdn. Bhd

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510