M62342P/FP, M62343P/FP

8-Bit D/A Converter (Buffered)

REJ03F0073-0200
Rev.2.00
Jun 15, 2007

Description

The M62342 and M62343 are CMOS-structure semiconductor integrated circuits incorporating two or 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.

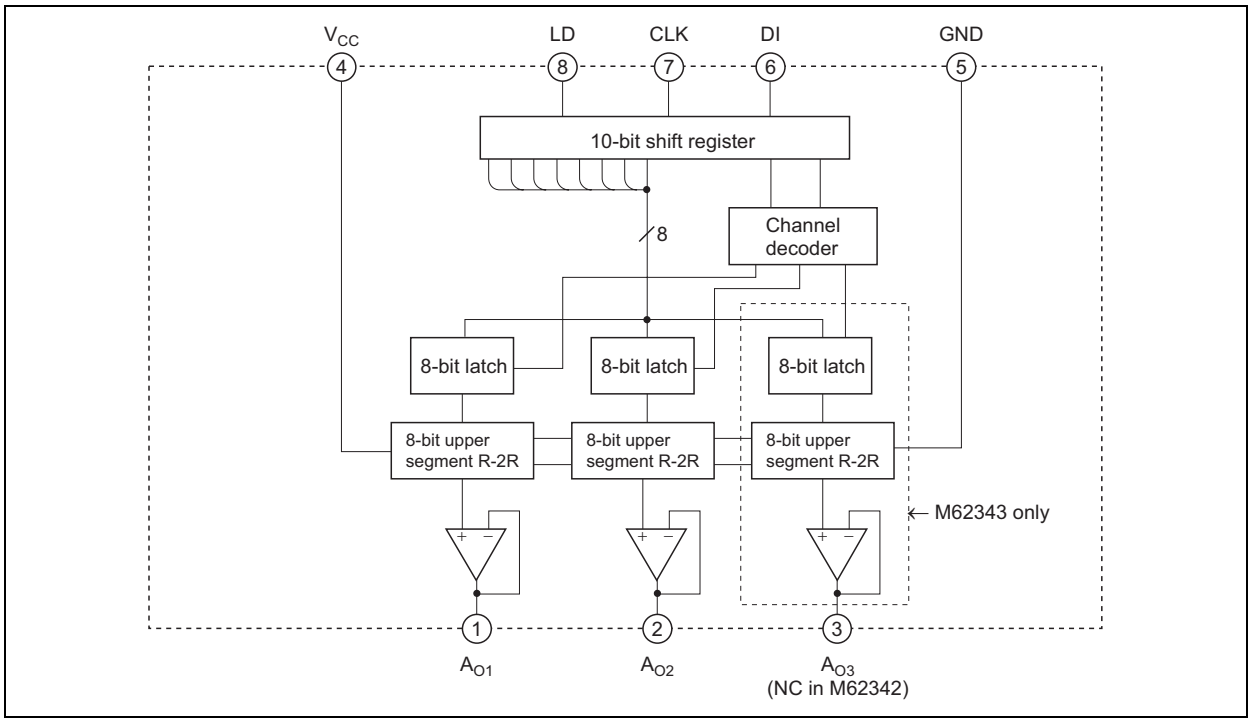
Features

- 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

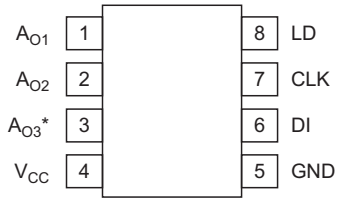
Signal gain setting and automatic adjustment in CTV, and display monitors, conversion from digital data to analog data in consumer and industrial products

Block Diagram



Pin Arrangement

M62342P/FP
M62343P/FP



(Top view)

Outline: PRDP0008AA-A (8P4) [P]
PRSP0008DE-C [FP] (recommend)
PRSP0008DA-A (8P2S-A) [FP] (not recommend for new design)

Note: Pin 3 of the M62342 is a NC pin.

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} (M62343 only)	
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	Vin	–0.3 to V_{CC}+0.3 ≤ 7.0	V
Output voltage	V_O	–0.3 to V_{CC}+0.3 ≤ 7.0	V
Internal power consumption	Pd	417 (P) / 272 (FP)	mW
Operating ambient temperature	Topr	–20 to +85	℃
Storage temperature	Tstg	–55 to +125	℃

Electrical Characteristics

(Unless specified otherwise, V_{CC} = +5 V ±10%, GND = 0 V, Ta = -20ºC to 85ºC)

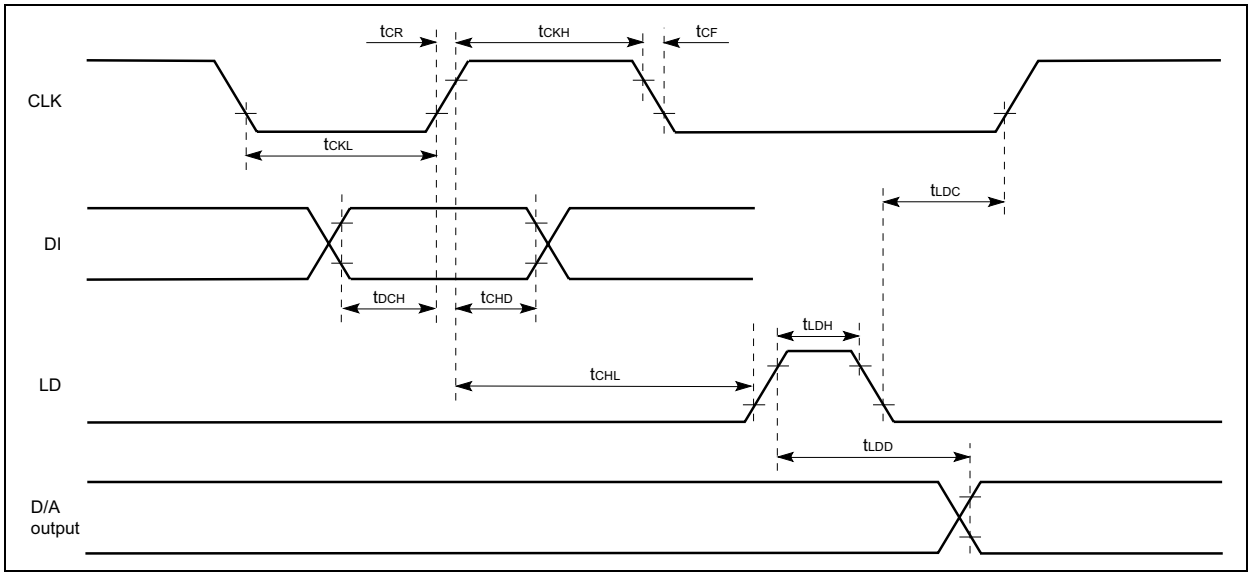
Item	Symbol	Specification Values			Unit	Test Conditions
		Min	Typ	Max		
Power supply voltage	V_{CC}	2.7	5.0	5.5	V	
Power supply current	I_{CC}	0	0.7 (M62342) 0.8 (M62343)	2.5 (M62342) 2.7 (M62343)	mA	At CLK = 1 MHz operation, I_{AO} = 0 µA D/A data: 6 Ah (at maximum current)
		0	0.5 (M62342) 0.6 (M62343)	1.6 (M62342) 1.8 (M62343)		DI = CLK = LD = GND, I_{AO} = 0 µA
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} = ±100 µA
		0.2	—	V_{CC}–0.2		I_{AO} = ±500 µA
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 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

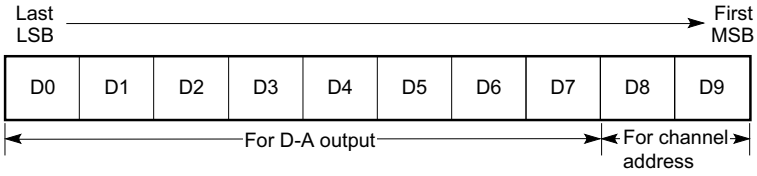
(Unless specified otherwise, V_{CC} = +5 V ±10%, GND = 0 V, Ta = -20ºC to 85ºC)

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



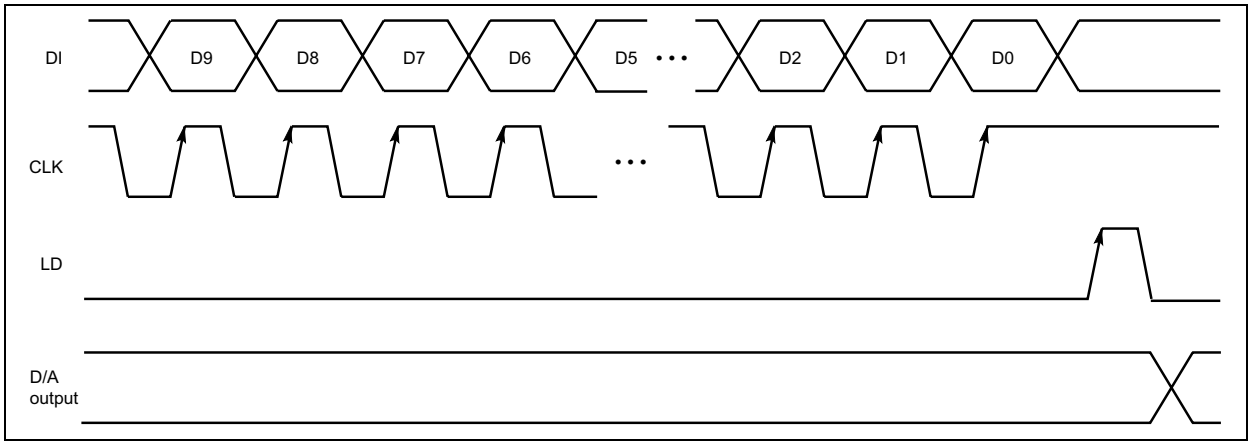
Channel Select Data

D8	D9	Channel Selection
0	0	AO1 selected
1	0	AO2 selected
0	1	M62343 : AO3 selected M62343 Don't care
1	1	Don't care

DAC Data

D0	D1	D2	D3	D4	D5	D6	D7	DAC output
0	0	0	0	0	0	0	0	$V_{CC}/256\times1$
1	0	0	0	0	0	0	0	$V_{CC}/256\times2$
0	1	0	0	0	0	0	0	$V_{CC}/256\times3$
1	1	0	0	0	0	0	0	$V_{CC}/256\times4$
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0	1	1	1	1	1	1	1	$V_{CC}/256\times255$
1	1	1	1	1	1	1	1	$V_{CC}/256\times256$

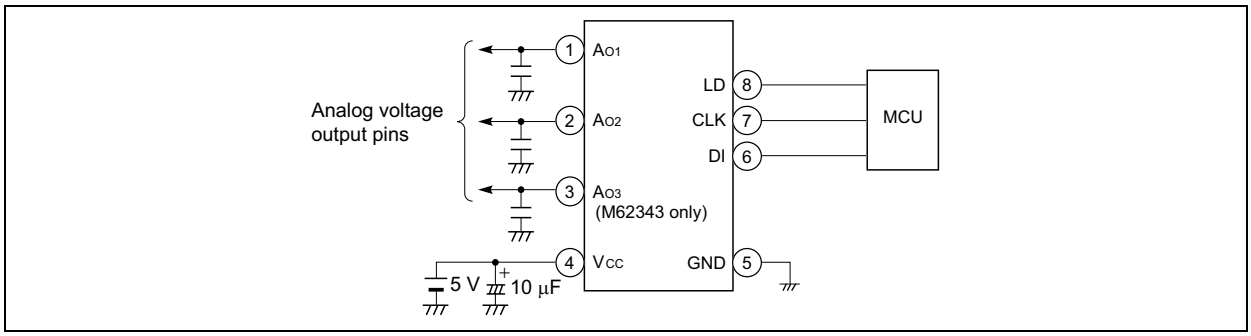
Data Timing Chart (Model)



Usage Notes

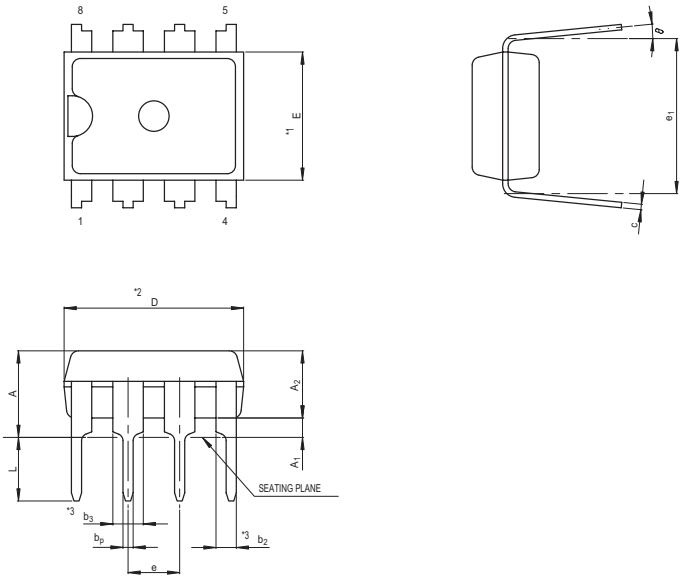
1. With this IC, D/A converter upper reference voltage setting is performed by means of the power supply voltage. If ripples or spikes are imposed on this pin, conversion accuracy may fall. When using this IC, a capacitor must be inserted between the power supply pin and GND in order to ensure stable 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

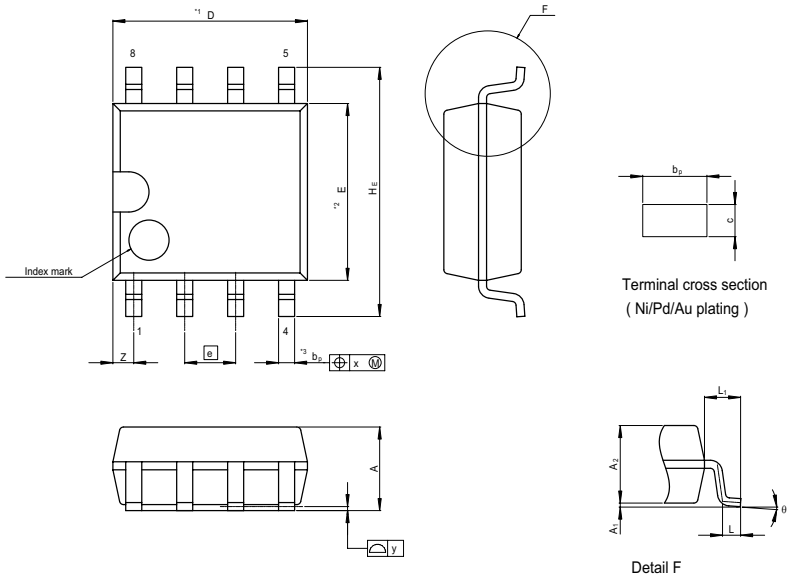
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP8-6.3x8.84-2.54	PRDP0008AA-A	8P4	0.5g



NOTE)
1. DIMENSIONS "*1" AND "*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION "*3" DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e_1	7.32	7.62	7.92
D	8.7	8.9	9.1
E	6.15	6.3	6.45
A	—	—	4.5
A_1	0.51	—	—
A_2	—	3.3	—
b_p	0.4	0.5	0.6
b_2	0.9	1.0	1.3
b_3	1.4	1.5	1.8
c	0.22	0.27	0.34
θ	0°	—	15°
e	2.29	2.54	2.79
L	3.0	—	—

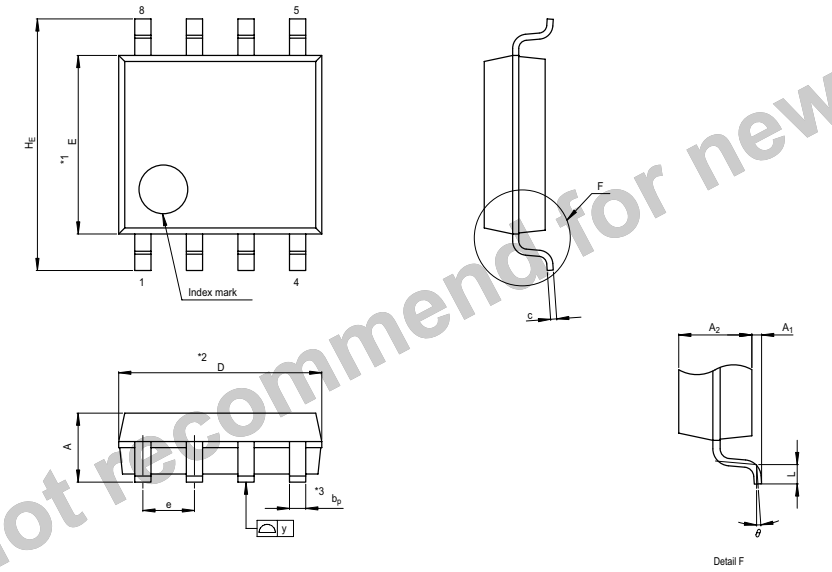
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x4.85-1.27	PRSP0008DE-C	—	0.1g



NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	4.65	4.85	5.05
E	4.2	4.4	4.6
A_2	—	1.85	—
A_1	0.00	0.1	0.20
A	—	—	2.03
b_p	0.34	0.4	0.46
b_1	—	—	—
c	0.15	0.20	0.25
c_1	—	—	—
θ	0°	—	8°
H_E	5.7	6.2	6.5
e	1.12	1.27	1.42
x	—	—	0.12
y	—	—	0.10
Z	—	—	0.75
L	0.25	0.45	0.65
L_1	—	0.90	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x5-1.27	PRSP0008DA-A	8P2S-A	0.07g



NOTE)
1. DIMENSIONS "*1" AND "*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION "*3" DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	4.8	5.0	5.2
E	4.2	4.4	4.6
A_2	—	1.5	—
A_1	0.05	—	—
A	—	—	1.9
b_p	0.35	0.4	0.5
c	0.13	0.15	0.2
θ	0°	—	10°
H_E	5.9	6.2	6.5
e	1.12	1.27	1.42
y	—	—	0.1
L	0.2	0.4	0.6

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

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, AZIACenter, 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

Colophon .7.0