

# M62363FP

## 8-bit 8ch D/A Converter

REJ03D0874-0301  
Rev.3.01  
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### Description

The M62363FP is an integrated circuit semiconductor of CMOS structured with 8 channels of built-in 8-bit multiplication type D/A converters.

The input data is a easy-to-use 3-wire serial method and it is able to cascading serial use with  $D_O$  terminal.

The device is suited for use in automatic adjustment combination of microcomputer.

### Features

- Digital data transfer method: 3-wire serial data transfer method
- D/A converter system  
Employment of the additional higher-order segment R-2R method doubled precision compared to the conventional R-2R method.
- Short setting time
- 4 quadrant multiplication

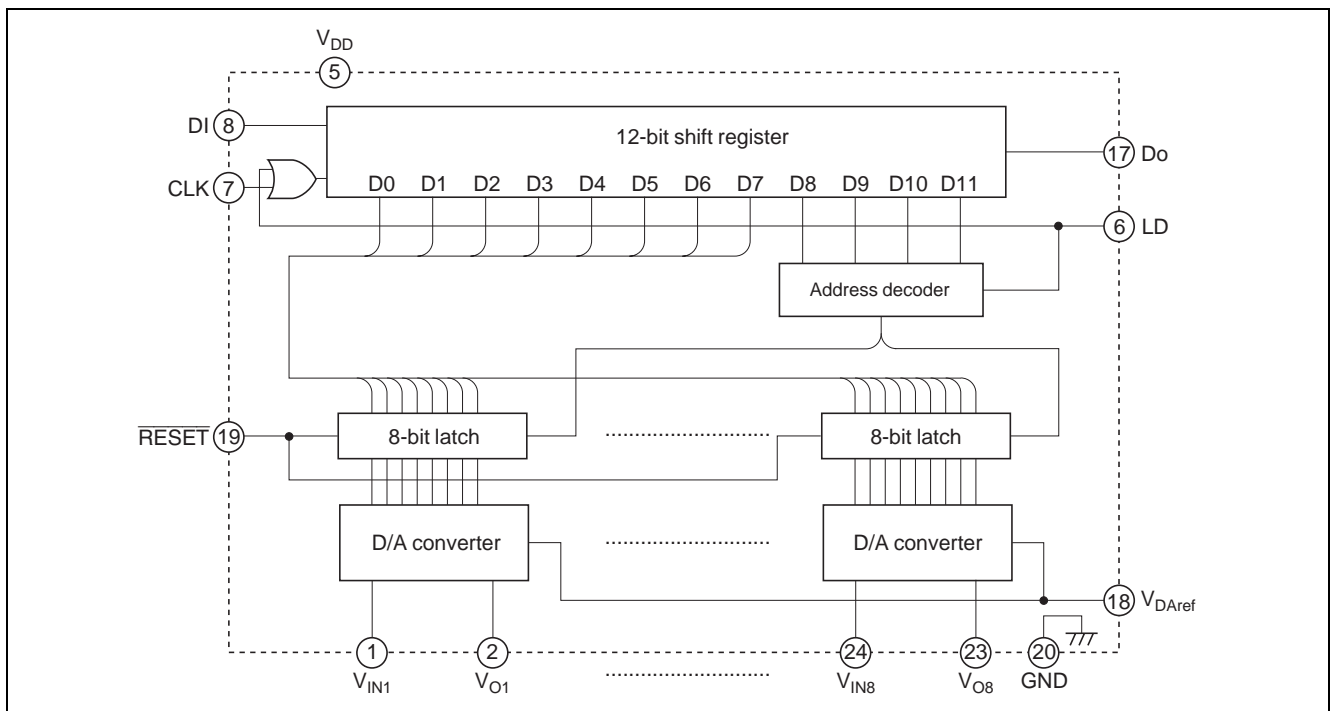
### Application

Conversion from digital control data to analog control data for home-use and industrial equipment.

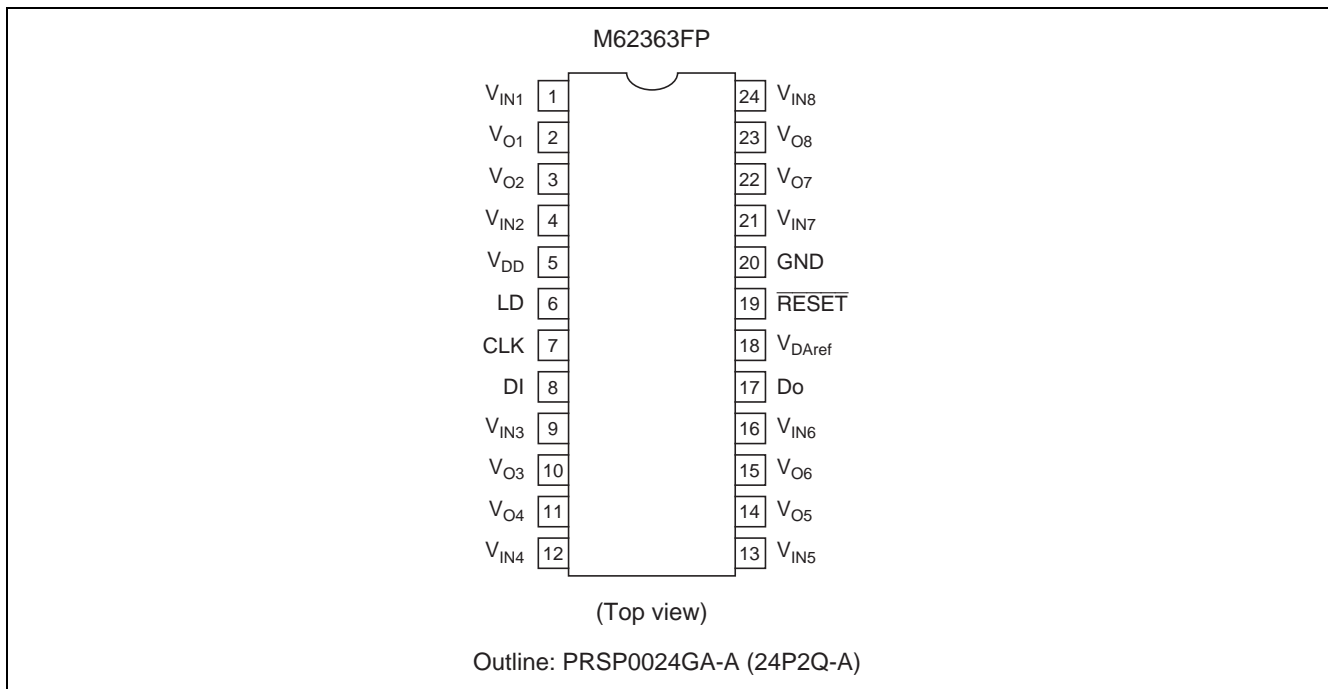
Automatic adjustment by combination with EEPROM and microcomputer. (Replacement of conventional half-fixed resistor.)

Signal gain control of display-monitor or CTV

### Block Diagram



## Pin Arrangement



## Pin Description

Pin No.	Pin Name	Function
8	DI	Serial data input terminal
17	DO	Serial data output terminal
7	CLK	Serial clock input terminal
6	LD	LD terminal input high level then latch circuit data load
19	$\overline{\text{RESET}}$	Reset terminal
2	VO1	8-bit resolution D/A output
3	VO2	
10	VO3	
11	VO4	
14	VO5	
15	VO6	
22	VO7	
23	VO8	
5	VDD	Power supply terminal
20	GND	GND terminal
1	VIN1	D/A converter input terminal
4	VIN2	
9	VIN3	
12	VIN4	
13	VIN5	
16	VIN6	
21	VIN7	
24	VIN8	
18	VDAREF	D/A converter reference voltage input terminal $V_O = (V_{IN} - V_{DAREF}) \times n / 256 + V_{DAREF}$

## Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	$V_{DD}$	-0.3 to +7.0	V
Input voltage	$V_{IND}$	-0.3 to +7.0	V
Input voltage	$V_{IN}$	-0.3 to $V_{DD} + 0.3$	V
Output voltage	$V_O$	-0.3 to $V_{DD} + 0.3$	V
D/A reference voltage	$V_{DAref}$	-0.3 to $V_{DD} + 0.3$	V
Operating temperature	$T_{opr}$	-20 to +75	°C
Storage temperature	$T_{stg}$	-40 to +125	°C

## Electrical Characteristics

### <Digital Part>

( $V_{DD}$ ,  $V_{IN} = +5\text{ V} \pm 10\%$ ,  $V_{DD} \geq V_{IN}$ ,  $GND = V_{DAref} = 0\text{ V}$ ,  $T_a = -20\text{ to }+75^\circ\text{C}$ , unless otherwise noted.)

Item	Symbol	Limits			Unit	Conditions
		Min	Typ	Max		
Supply voltage	$V_{DD}$	4.5	5.0	5.5	V	
Input leak current	$I_{ILK}$	-10	—	10	$\mu\text{A}$	$V_{IN} = 0\text{ to }V_{DD}$
Input low voltage	$V_{IL}$	—	—	$0.2 V_{DD}$	V	
Input high voltage	$V_{IH}$	$0.8 V_{DD}$	—	—	V	
Output low voltage	$V_{OL}$	—	—	0.4	V	$I_{OL} = 2.5\text{ mA}$
Output high voltage	$V_{OH}$	$V_{DD} - 0.4$	—	—	V	$I_{OH} = -400\ \mu\text{A}$

### <Analog Part>

( $V_{DD}$ ,  $V_{IN} = +5\text{ V} \pm 10\%$ ,  $V_{DD} \geq V_{IN}$ ,  $GND = V_{DAref} = 0\text{ V}$ ,  $T_a = -20\text{ to }+75^\circ\text{C}$ , unless otherwise noted.)

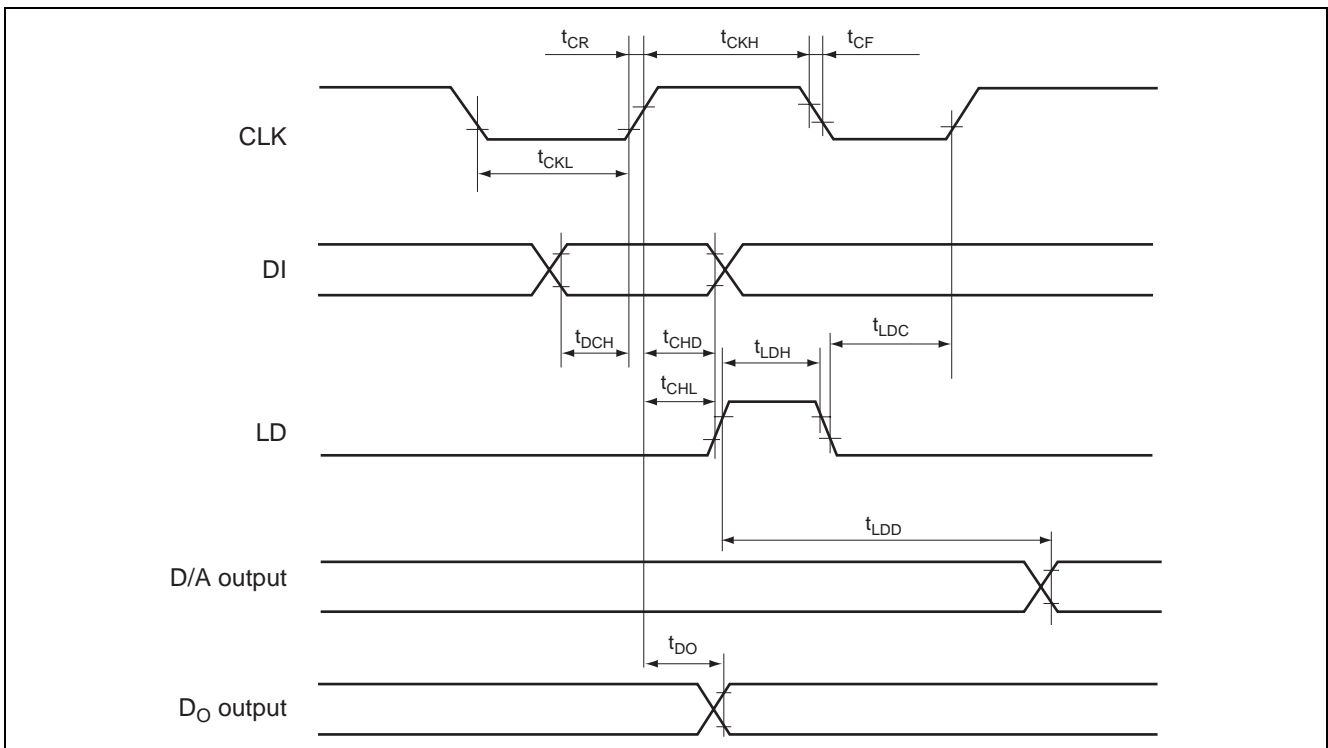
Item	Symbol	Limits			Unit	Conditions
		Min	Typ	Max		
Input current	$I_{IN}$	—	—	0.30	mA	$V_{IN} = 5\text{ V}$ , $V_{DAref} = 0\text{ V}$ Proportional to Max. input current condition ( $V_{IN} - V_{DAref}$ ) and digital data of each channels
D/A reference input current	$I_{DAref}$	-2.40	—	—	mA	$V_{IN1}\text{ to }V_{IN8} = 5\text{ V}$ , $V_{DAref} = 0\text{ V}$ Proportional to Max. input current condition ( $V_{IN} - V_{DAref}$ ) and digital data of each channels
Output impedance	$R_O$	—	—	50	$\text{k}\Omega$	Constant for all D/A output mode
Resolution	RES	—	8	—	bit	
Differential nonlinearity	DNL	-1	—	1	LSB	
Nonlinearity	NL	-1	—	1	LSB	

## AC Characteristics

( $V_{DD}$ ,  $V_{IN} = +5\text{ V} \pm 10\%$ ,  $V_{DD} \geq V_{IN}$ ,  $GND = V_{D\text{Aref}} = 0\text{ V}$ ,  $T_a = -20\text{ to }+75^\circ\text{C}$ , unless otherwise noted.)

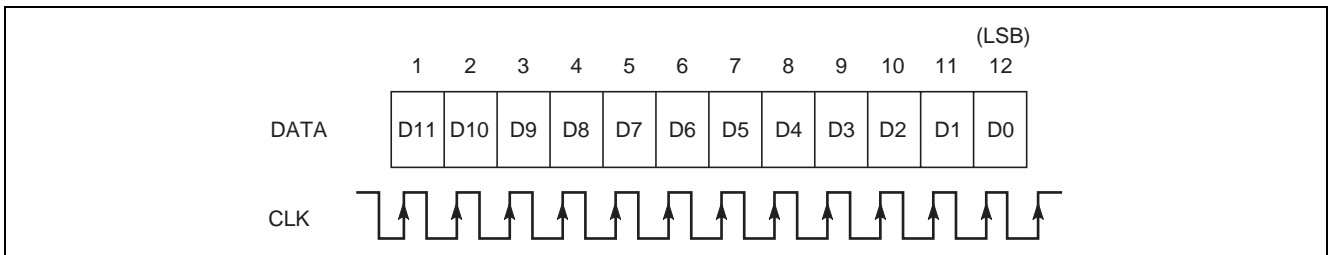
Item	Symbol	Limits			Unit	Conditions
		Min	Typ	Max		
Clock "L" pulse width	$t_{CKL}$	200	—	—	ns	
Clock "H" pulse width	$t_{CKH}$	200	—	—	ns	
Clock rise time	$t_{CR}$	—	—	200	ns	
Clock fall time	$t_{CF}$	—	—	200	ns	
Data setup time	$t_{DCH}$	60	—	—	ns	
Data hold time	$t_{CHD}$	100	—	—	ns	
LD setup time	$t_{CHL}$	200	—	—	ns	
LD hold time	$t_{LDC}$	100	—	—	ns	
LD "H" pulse width	$t_{LDH}$	100	—	—	ns	
Data output delay time	$t_{DO}$	70	—	350	ns	Less than $C_L = 100\text{ pF}$
D/A output setting time	$t_{LDD}$	—	—	5	$\mu\text{s}$	Without load
Input/output replay time	—	—	—	5	$\mu\text{s}$	$f = 10\text{ kHz}$

## Timing Chart

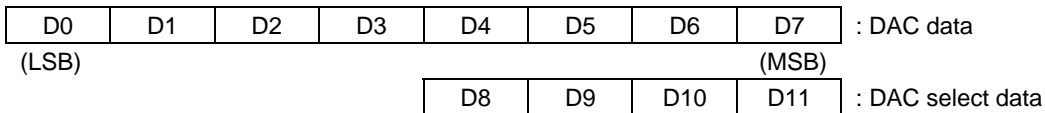


## Digital Data Format

### 12-bit serial data



### Data assignment



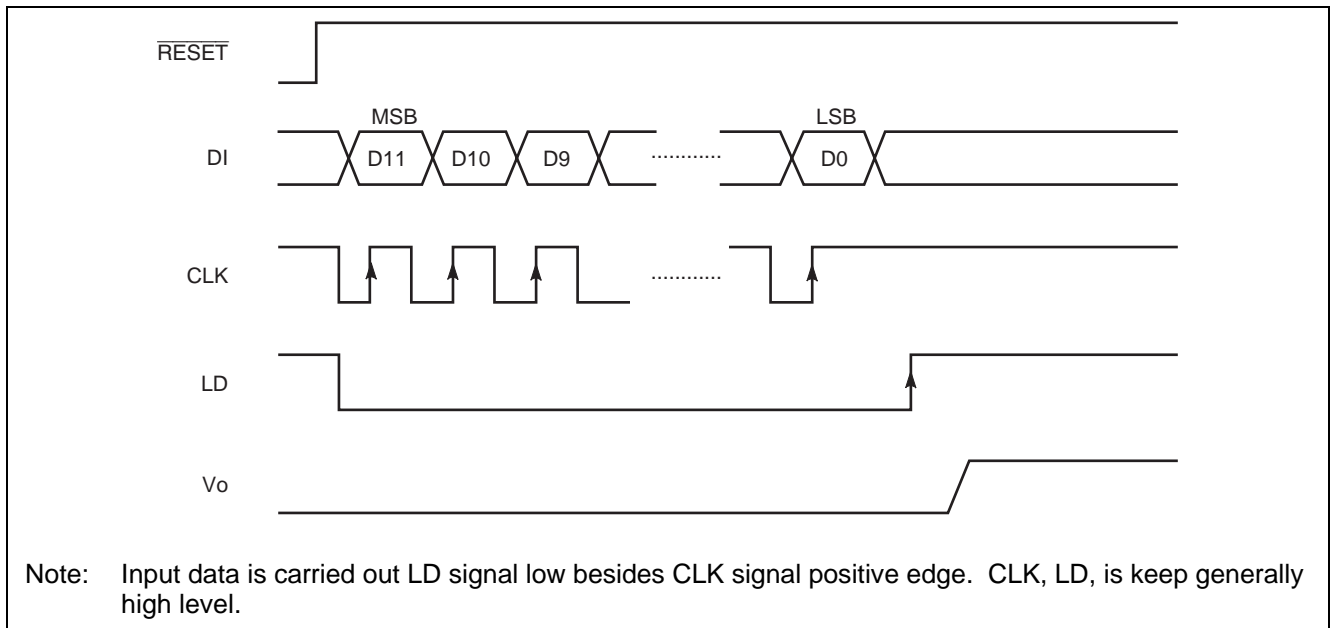
### DAC Data

(LSB)								(MSB)								D/A Output
D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$V_{DAref}$
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$(V_{IN} - V_{DAref}) / 256 \times 1 + V_{DAref}$
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$(V_{IN} - V_{DAref}) / 256 \times 2 + V_{DAref}$
1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$(V_{IN} - V_{DAref}) / 256 \times 3 + V_{DAref}$
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	$(V_{IN} - V_{DAref}) / 256 \times 255 + V_{DAref}$

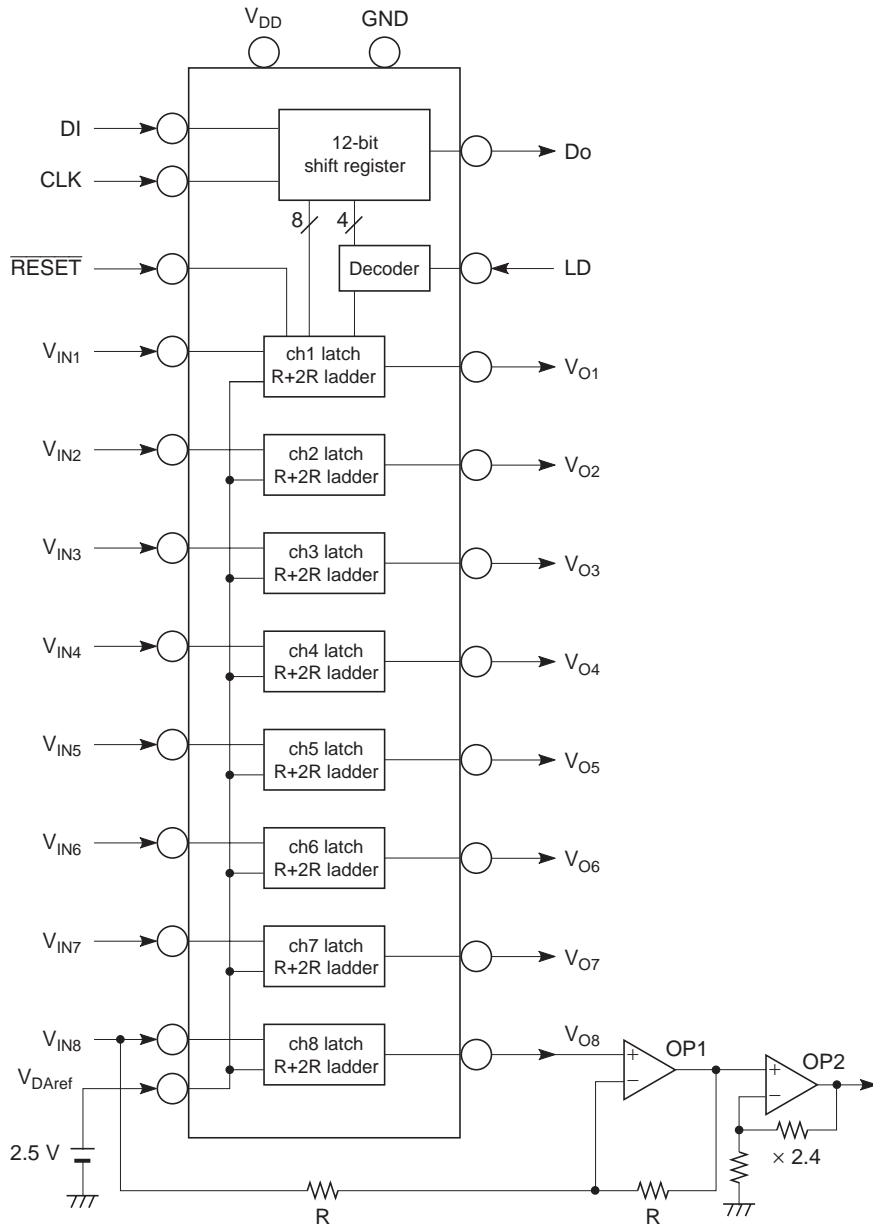
### DAC Select Data

D8	D9	D10	D11	DAC Selection
0	0	0	0	Don't care
0	0	0	1	$V_{O1}$ selection
0	0	1	0	$V_{O2}$ selection
0	0	1	1	$V_{O3}$ selection
0	1	0	0	$V_{O4}$ selection
0	1	0	1	$V_{O5}$ selection
0	1	1	0	$V_{O6}$ selection
0	1	1	1	$V_{O7}$ selection
1	0	0	0	$V_{O8}$ selection
1	0	0	1	Don't care
1	0	1	0	Don't care
1	0	1	1	Don't care
1	1	0	0	Don't care
1	1	0	1	Don't care
1	1	1	0	Don't care
1	1	1	1	Don't care

## Timing Chart (Model)



## Operating Description



Note: ch1 to ch7 becomes multiplication type D/A converter action of 0 to 5 V range by each output adds OP1.  
 ch8 become 4 quadrant multiplication of 0 to 12 V range at 6 V center by add OP1 and OP2 to this channel.

1. The value of  $V_O$  depend on output direct buffer.

$$V_O = (V_{IN} - V_{DAref}) \cdot \frac{n}{256} + V_{DAref} \dots (n = 0 \text{ to } 255) \dots (1)$$

<V <sub>IN</sub> = 5 V>	
n	V <sub>o</sub>
0	0
128	3.75
255	4.99

<V <sub>IN</sub> = 0 V>	
n	V <sub>o</sub>
0	2.5
128	1.25
255	0.01

2. The value of  $V_O$  depend on application of ch8.

$$V_{OP1} = (V_{IN} - V_{DAref}) \cdot \left(\frac{n}{128} - 1\right) + V_{DAref} \dots (n = 0 \text{ to } 255) \dots (2)$$

$$V_{OP2} = V_{OP1} \times 2.4 \dots \dots \dots (3)$$

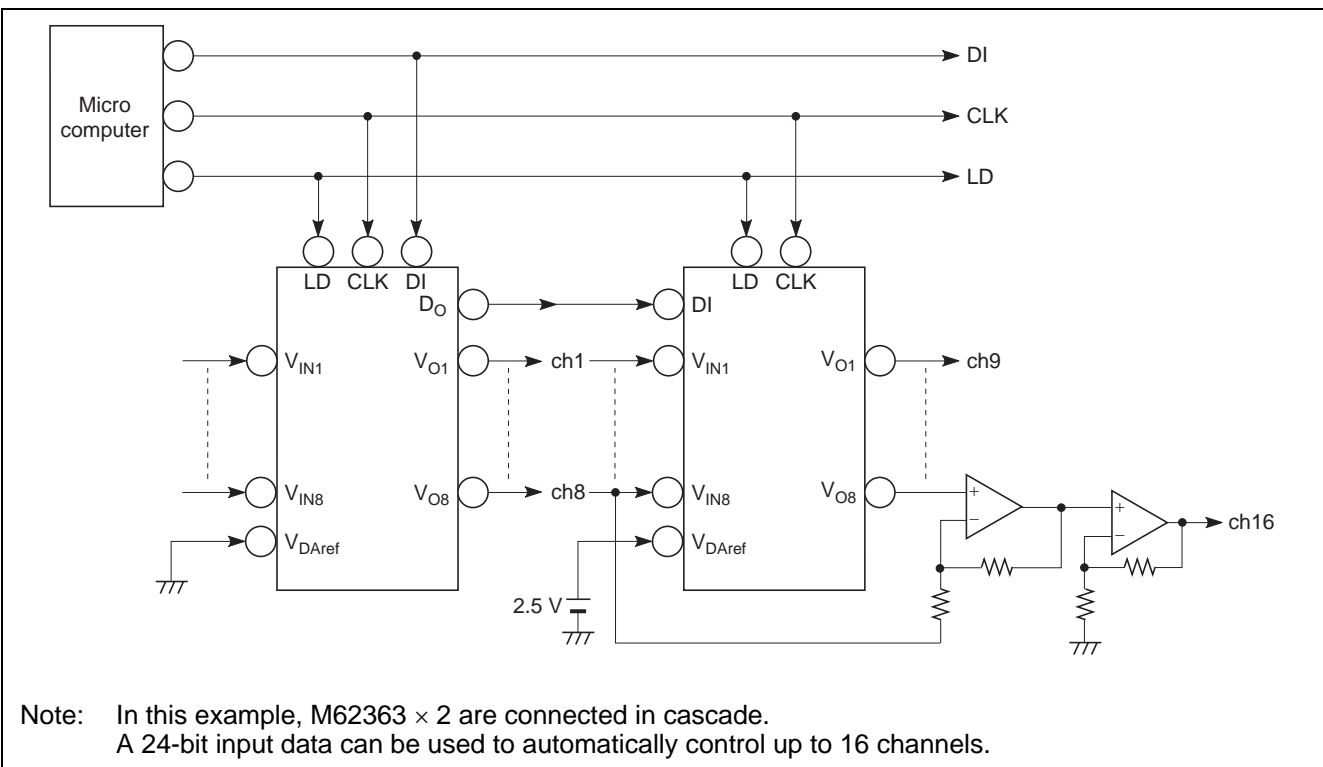
<V <sub>IN</sub> = 5 V>	
n	V <sub>OP1</sub>
0	0
128	2.50
255	4.98

<V <sub>IN</sub> = 0 V>	
n	V <sub>OP1</sub>
0	5.00
128	2.50
255	0.02

n	V <sub>OP1</sub>
0	0
128	6.00
255	11.95

n	V <sub>OP1</sub>
0	12.00
128	6.00
255	0.05

### Application Example of Cascade Connection

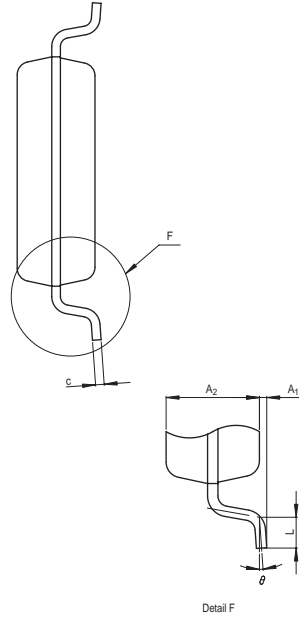
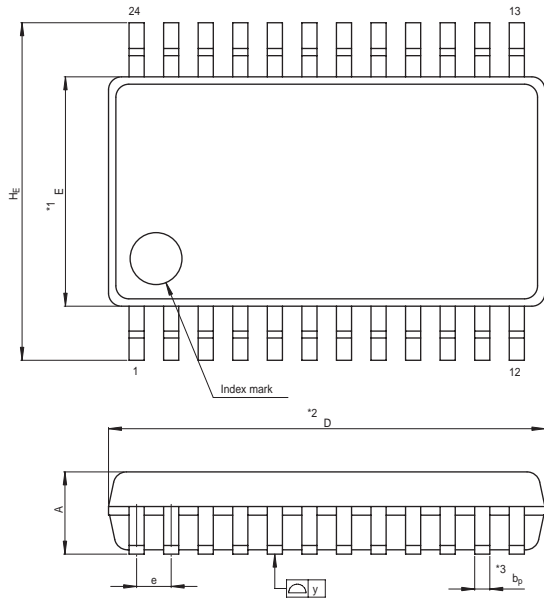


Note: In this example, M62363 × 2 are connected in cascade.  
A 24-bit input data can be used to automatically control up to 16 channels.



# Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SSOP24-5.3x10.1-0.80	PRSP0024GA-A	24P2Q-A	0.2g



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	10.0	10.1	10.2
E	5.2	5.3	5.4
A <sub>2</sub>	—	1.8	—
A	—	—	2.1
A <sub>1</sub>	0	0.1	0.2
b <sub>p</sub>	0.3	0.35	0.45
c	0.18	0.2	0.25
θ	0°	—	8°
H <sub>E</sub>	7.5	7.8	8.1
e	0.65	0.8	0.95
y	—	—	0.10
L	0.4	0.6	0.8

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