

M62362P/FP

R03DS0044EJ0300

Rev.3.00

Jun 03, 2011

1280 Resolution 3ch Multiplying D/A Converter

Description

The M62362P is an integrated circuit semiconductor of CMOS structured with 3 channels of built-in 1280 step resolution (equivalent 10.3-bit) multiplication type D/A converters.

The 3-wire serial interface method and it is able to cascading serial use with D_O terminal.

The device is suited for use in high accuracy automatic adjustment combination with microcomputer.

Features

- Digital data transfer method: 3-wire serial data transfer method
- High resolution
Resolution is more over 10-bit and error is less than ±1 LSB
- Capable of 4 quadrant multiplication
- Short setting time
- With reset terminal

Recommended Operating Condition

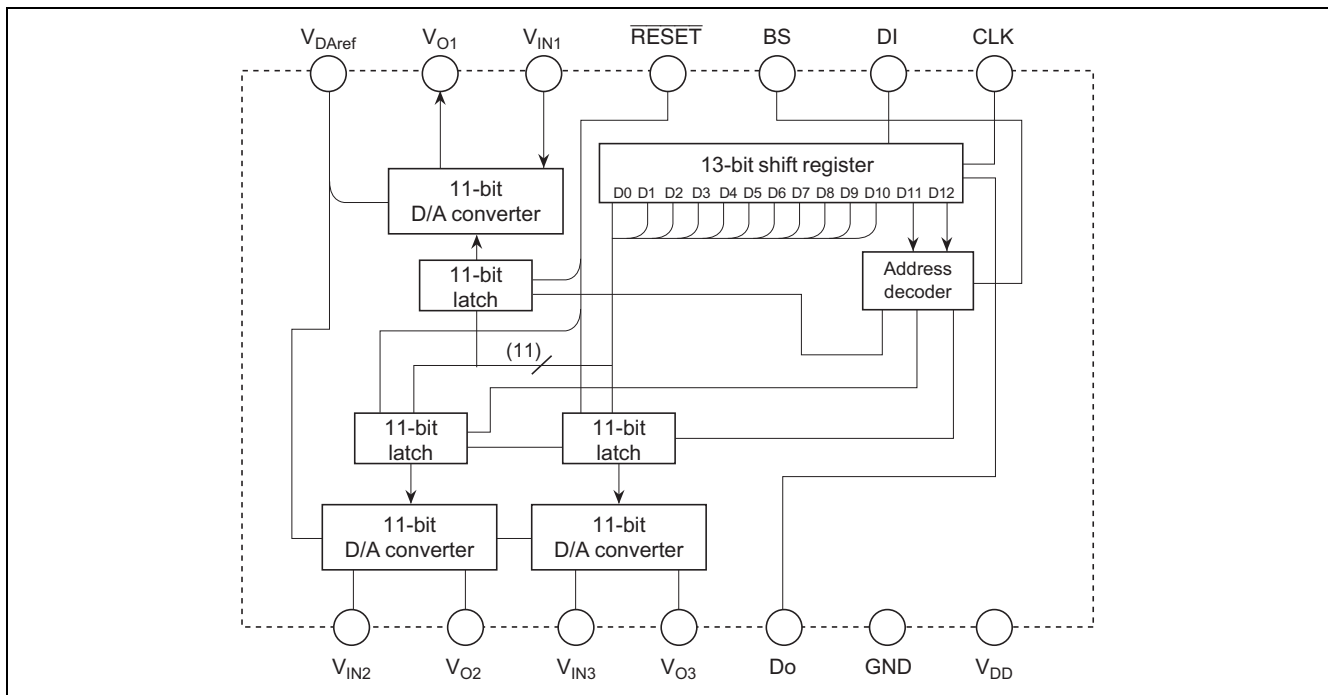
Digital section supply voltage: V_{DD} = 5 V ± 10%

Application

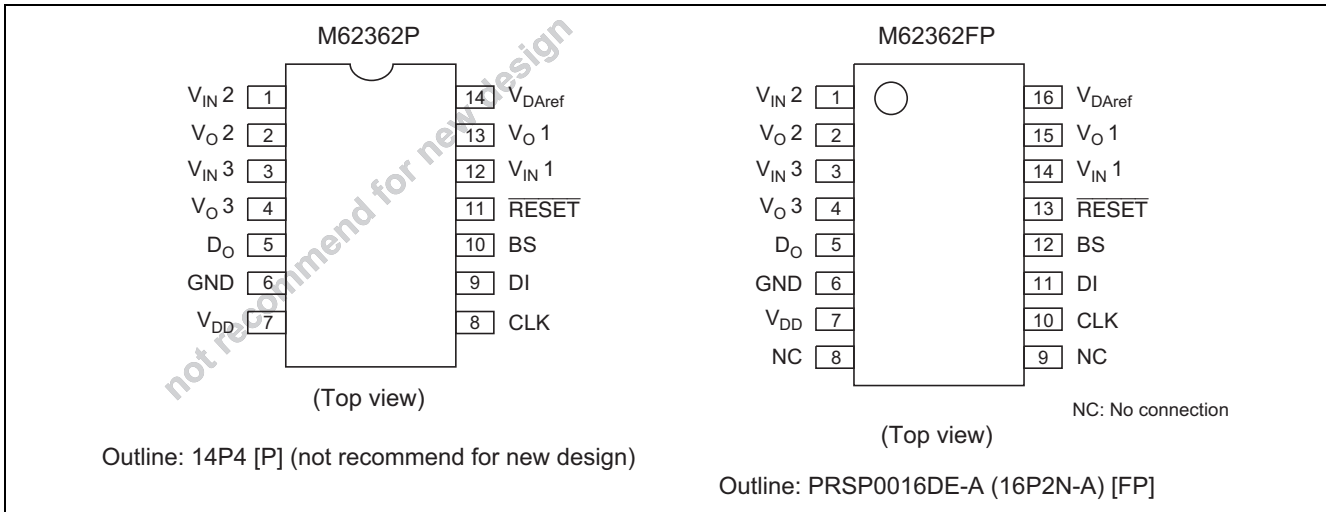
Signal gain control of display-monitor or CTV. Conversion from digital control data to analog control data for home-use and industrial equipment.

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

Block Diagram



Pin Arrangement

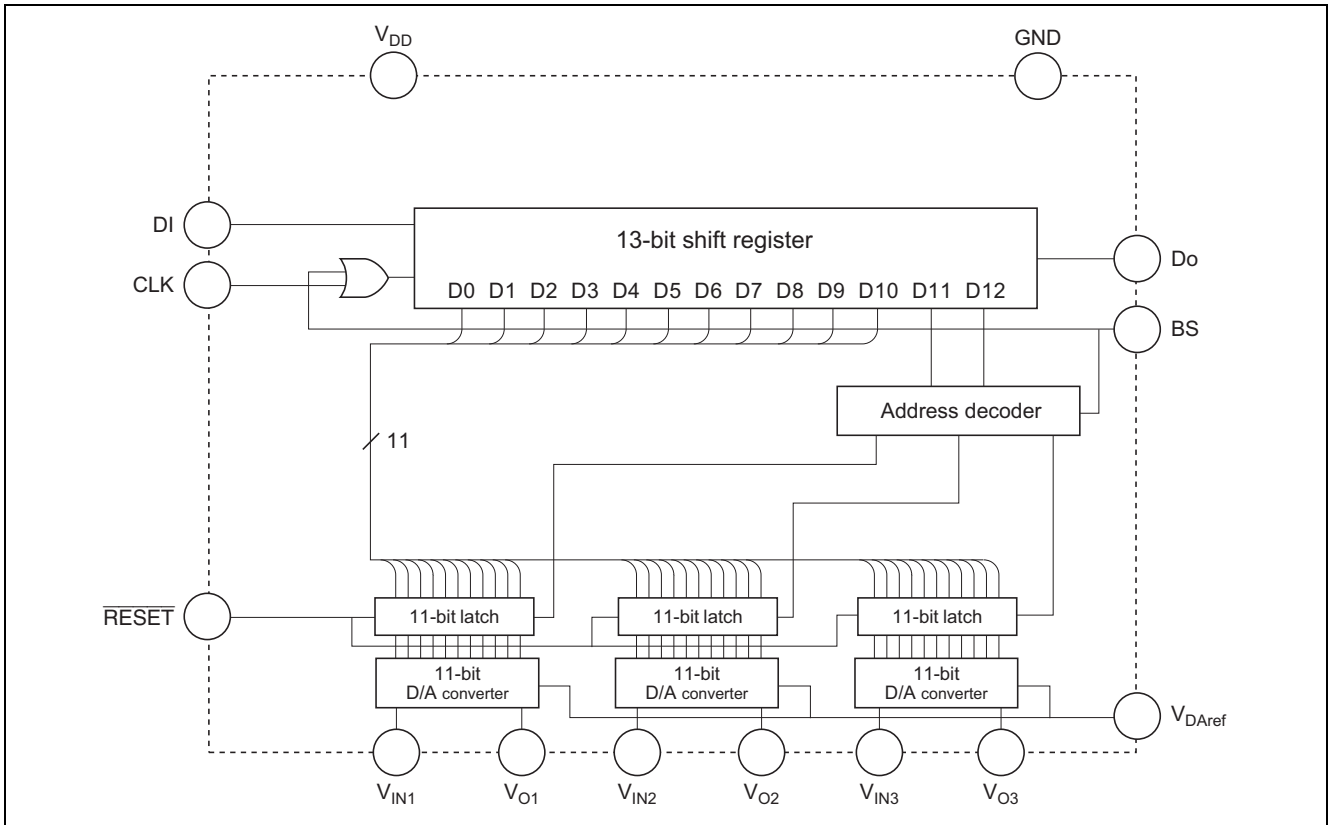


Pin Description

Pin No.	Pin Name	Function
9 (11)	DI	Serial data input terminal
5	D _O	Serial data output terminal
8 (10)	CLK	Serial clock input terminal
10 (12)	BS	When BS terminal level is "H" latch circuit data is load
11 (13)	RESET	When RESET terminal level is "L", all D/A output terminal became "L"
13 (15)	V _{O1}	1280 resolution D/A output
2	V _{O2}	
4	V _{O3}	
7	V _{DD}	Power supply terminal
6	GND	GND terminal
1	V _{IN2}	D/A converter input terminal
3	V _{IN3}	
12 (14)	V _{IN1}	
14 (16)	V _{DAref}	D/A converter reference voltage input terminal

Note: () : M62362FP

Block Diagram for Explanation of Terminals



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	V _{DD}	-0.3 to +7.0	V
Digital input voltage (DI, CLK, BS)	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 +85	°C
Storage temperature	T _{stg}	-40 to +125	°C

Electrical Characteristics

<Digital Part>

(V_{DD} , $V_{IN} = +5\text{ V} \pm 10\%$, $V_{DD} \geq V_{IN}$, $GND = V_{D\text{Aref}} = 0\text{ V}$, $T_a = -20$ to $+85^\circ\text{C}$, 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	μA	$V_{IN} = 0$ 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} , $V_{IN} = +5\text{ V} \pm 10\%$, $V_{DD} \geq V_{IN}$, $GND = V_{D\text{Aref}} = 0\text{ V}$, $T_a = -20$ to $+85^\circ\text{C}$, unless otherwise noted.)

Item	Symbol	Limits			Unit	Conditions	
		Min	Typ	Max			
Input voltage	V_{IN}	0	—	V_{DD}	V		
Output voltage	V_O	0	—	V_{DD}	V	$V_{IN} = 0$ to V_{DD}	
Input current	I_{IN}	—	0.75	1.5	mA	$V_{IN} = 5\text{ V}$, $V_{D\text{Aref}} = 0\text{ V}$ Proportional to $(V_{IN} - V_{D\text{Aref}})$	
D/A reference source current	$I_{D\text{Aref}}$	-4.5	-2.25	—	mA	$V_{IN1} = V_{IN2} = V_{IN3} = 5\text{ V}$, $V_{D\text{Aref}} = 0\text{ V}$ Proportional to $(V_{IN} - V_{D\text{Aref}})$	
D/A output sink or source current	I_O	-1.0	—	1.0	$\mu\text{A}/\text{LSB}$		
Output impedance	R_O	—	1.8	3.6	$\text{k}\Omega$	Constant for all D/A output mode	
Resolution	RES	—	1280	—	STEP		
Accuracy	Differential nonlinearity	DNL	-1	—	1	LSB	
	Nonlinearity	NL	-0.6	—	0.6	%FS	
	Nonlinearity for channels	ΔNL	-0.4	—	0.4	%FS	

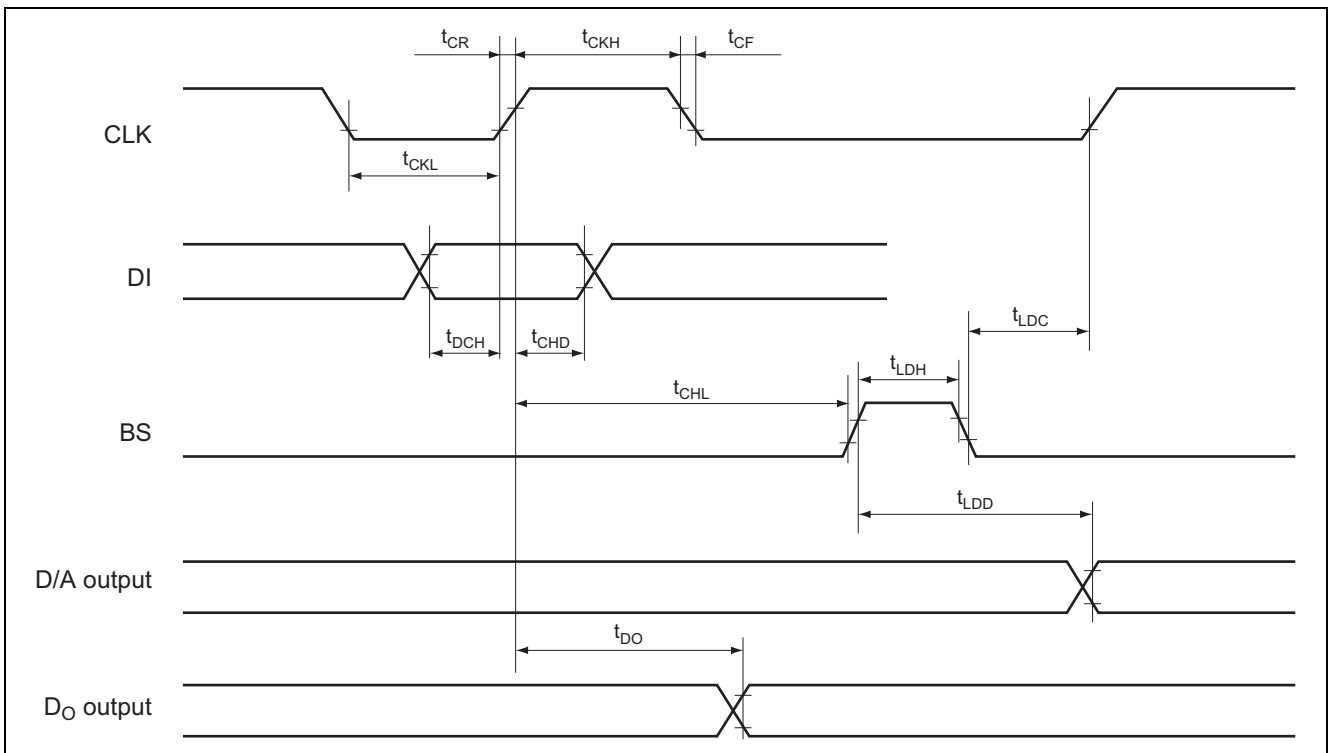
Note: Polarity of current, (+) is sink into IC and (-) is source from IC.

AC Characteristics

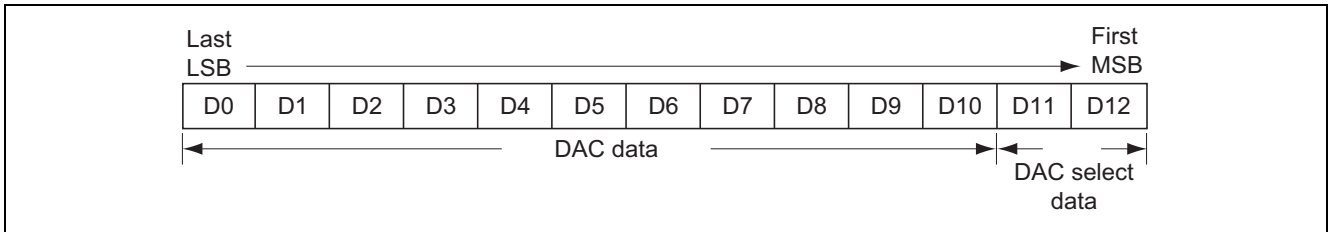
(V_{DD} , $V_{IN} = +5\text{ V} \pm 10\%$, $V_{DD} \geq V_{IN}$, $GND = V_{DAREF} = 0\text{ V}$, $T_a = -20\text{ to }+85^\circ\text{C}$)

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	$C_L \leq 100\text{ pF}$
Data output setting time	t_{LDD}	—	—	20	μs	No load
Input/output response time		—	—	5		$f = 10\text{ kHz}$

Timing Chart



Digital Data Format



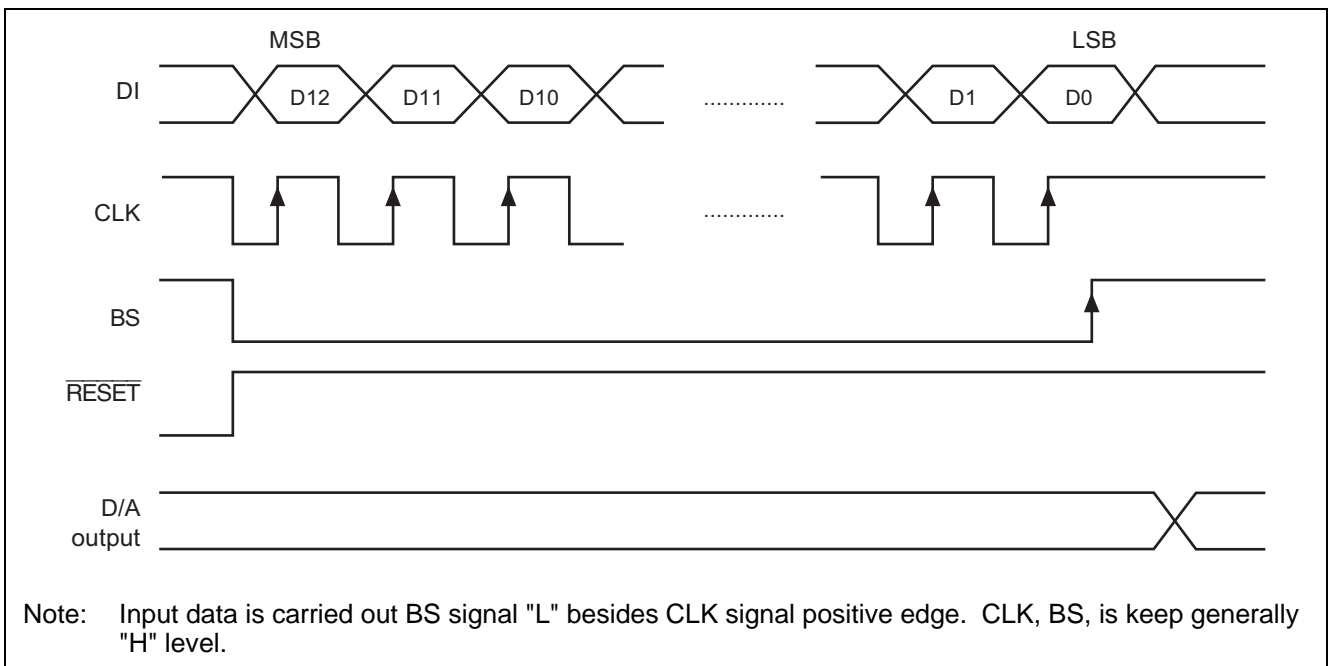
DAC Data

D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D/A Output
0	0	0	0	0	0	0	0	0	0	0	$V_{D\text{Aref}}$
1	0	0	0	0	0	0	0	0	0	0	$(V_{IN} - V_{D\text{Aref}}) / 1280 \times 1 + V_{D\text{Aref}}$
0	1	0	0	0	0	0	0	0	0	0	$(V_{IN} - V_{D\text{Aref}}) / 1280 \times 2 + V_{D\text{Aref}}$
1	1	0	0	0	0	0	0	0	0	0	$(V_{IN} - V_{D\text{Aref}}) / 1280 \times 3 + V_{D\text{Aref}}$
:	:	:	:	:	:	:	:	:	:	:	:
1	1	1	1	1	1	1	1	0	0	1	$(V_{IN} - V_{D\text{Aref}}) / 1280 \times 1279 + V_{D\text{Aref}}$
0	0	0	0	0	0	0	0	1	0	1	V_{IN}
:	:	:	:	:	:	:	:	:	:	:	:
1	1	1	1	1	1	1	1	1	1	1	V_{IN}

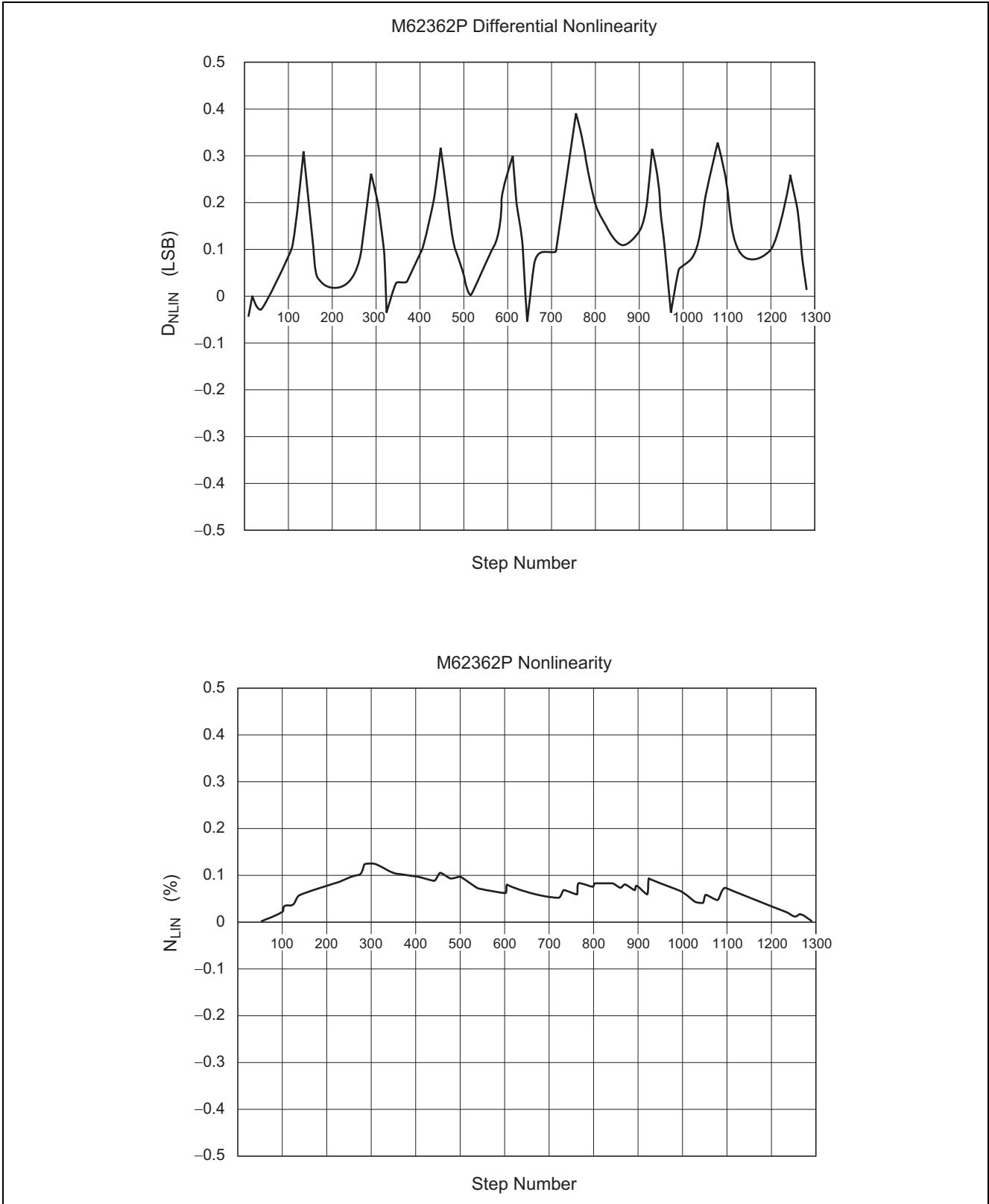
DAC Select Data

D11	D12	DAC Selection
0	0	Don't care
0	1	ch1
1	0	ch2
1	1	ch3

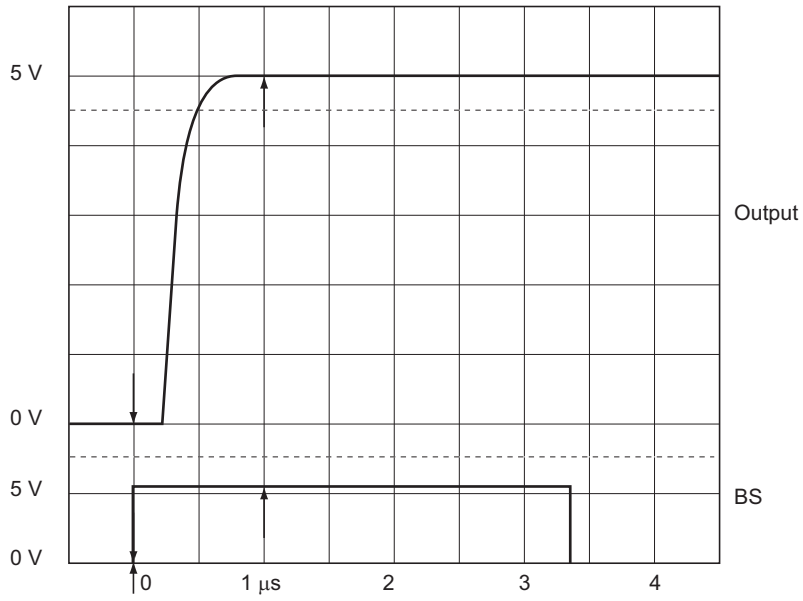
Timing Chart (Model)



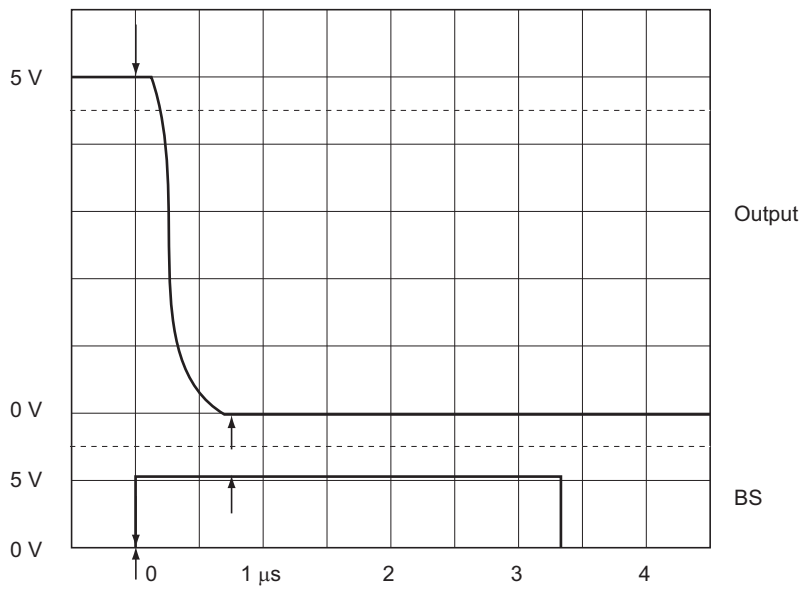
Typical Characteristics



M62362P Output Rise Characteristics (Setting Time)



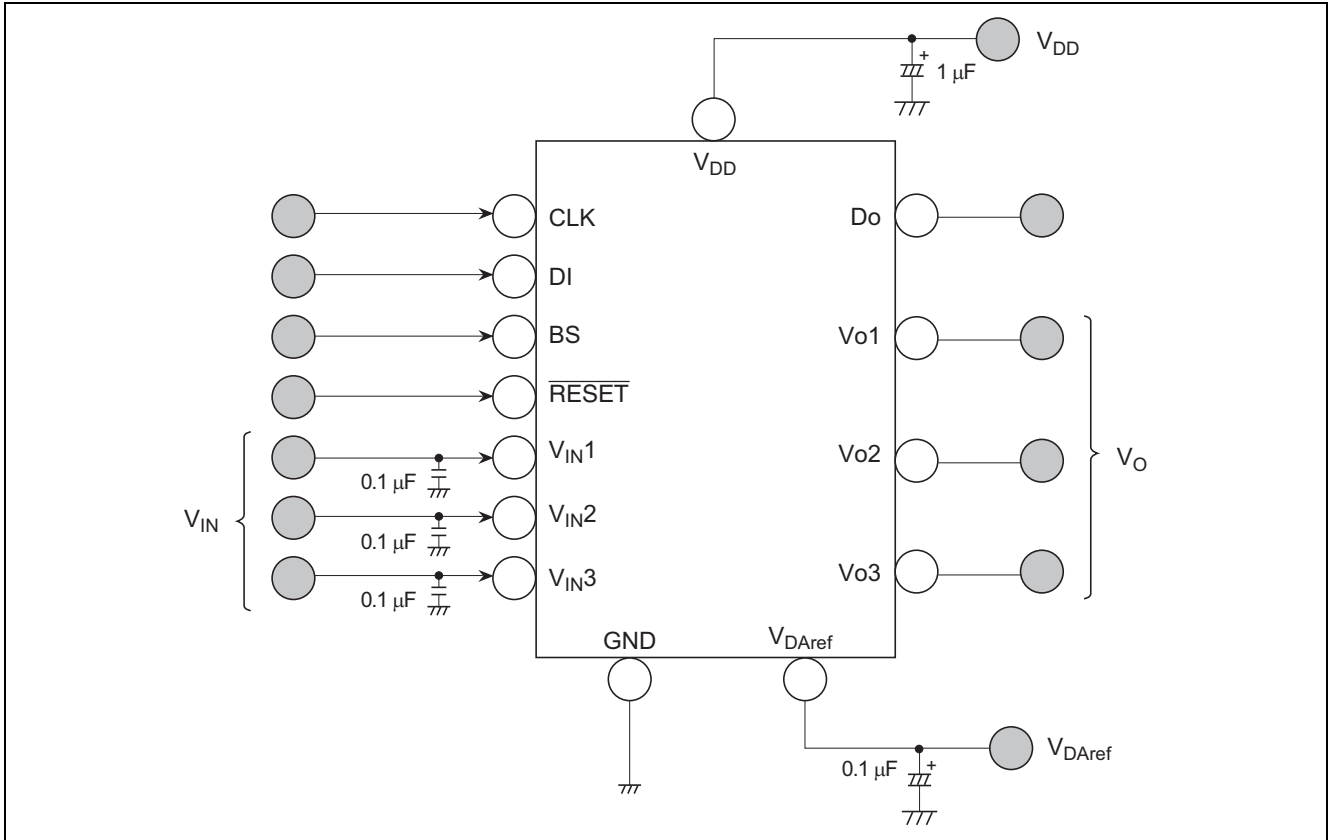
M62362P Output Fall Characteristics (Setting Time)



Precaution for Use

M62362 have 5 terminals these are input free voltage at use. (V_{DD} , V_{IN1} , V_{IN2} , V_{IN3} , V_{DAref}) If ripple and spike is input to these terminals, accuracy of conversion is down. So, when use this device, please connect capacitor among to each terminals and GND for stable operation.

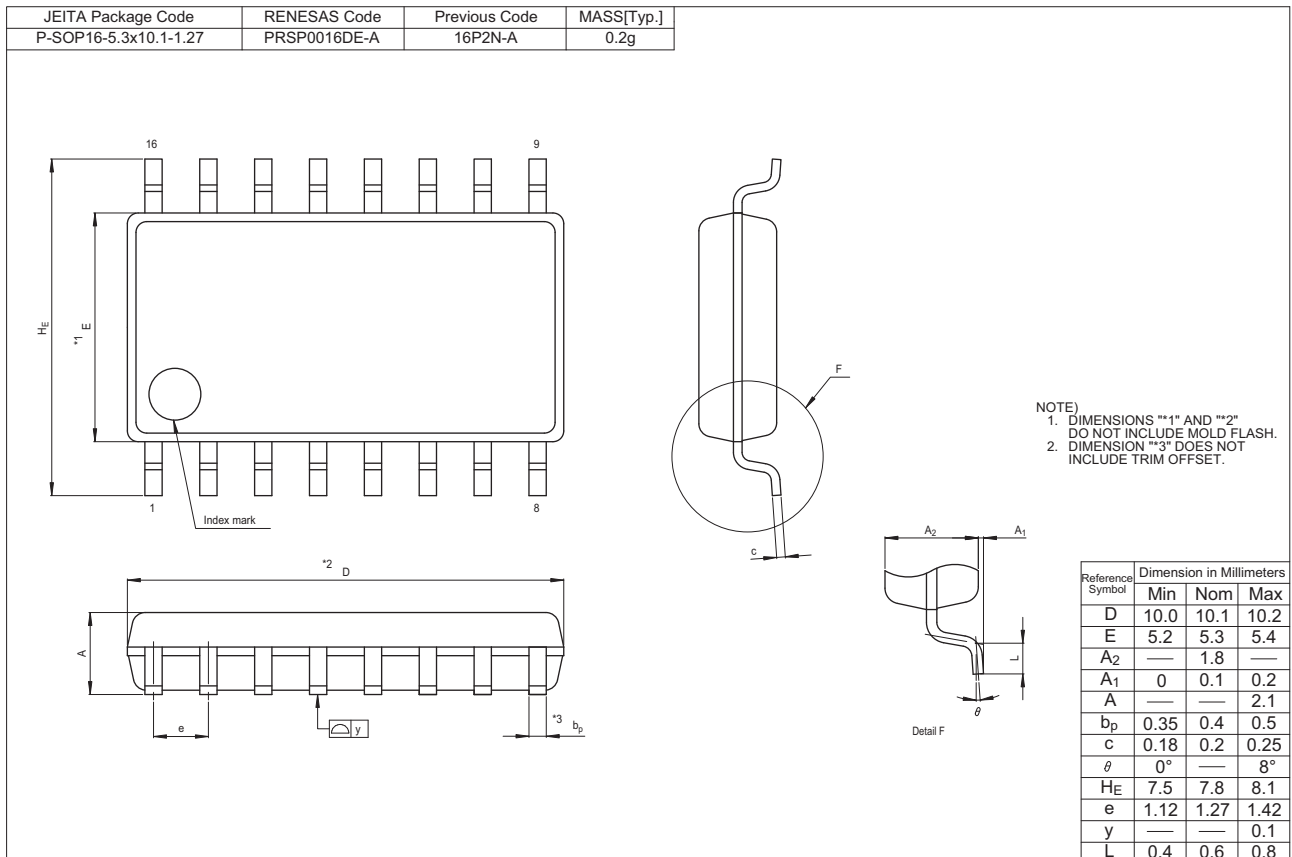
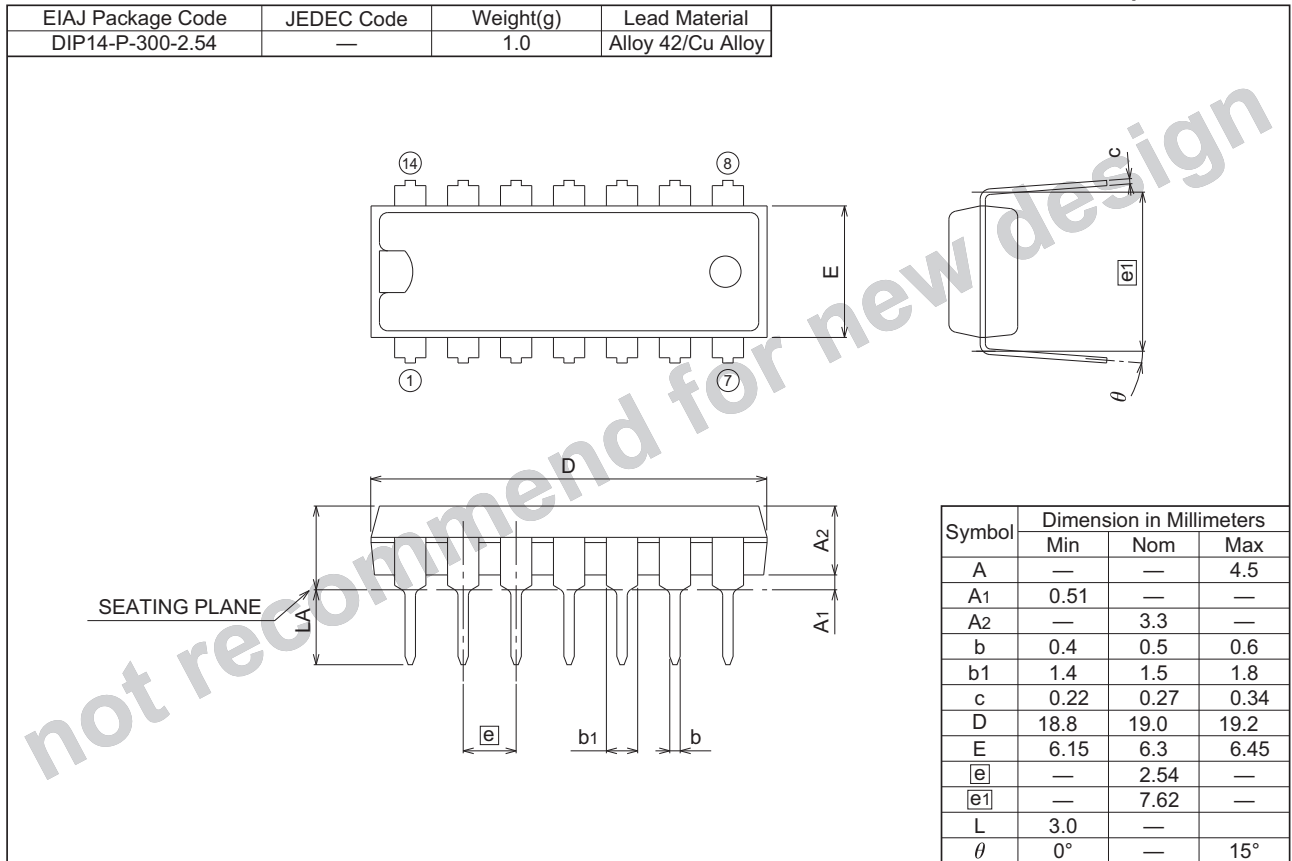
Application Example



Package Dimensions

14P4

Plastic 14pin 300mil DIP



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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-586-6000, Fax: +1-408-586-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 HarbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6276-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jin Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141