To all our customers

Regarding the change of names mentioned in the document, such as Mitsubishi Electric and Mitsubishi XX, to Renesas Technology Corp.

The semiconductor operations of Hitachi and Mitsubishi Electric were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Mitsubishi Electric, Mitsubishi Electric Corporation, Mitsubishi Semiconductors, and other Mitsubishi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Note : Mitsubishi Electric will continue the business operations of high frequency & optical devices and power devices.

Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

M62381FP

8-BIT 8CH MULTIPLYING D-A CONVERTER WITH BUFFER AMPLIFIERS

DESCRIPTION

The M62381FP is an integrated circuit semiconductor of CMOS structure with 8 channels of built-in 8-bit resolution multiplication type D-A converters.

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

This device is capable of 4 quadrant multiplication because of built-in inverting type amplifier.

FEATURES

- Digital data transfer method
  3-wire 12-bit serial data transfer method(DI,CLK,LD)
- High pressure proof(V_{DD}±5V)
- Short setting time
- Built-in reset terminal,all the buffer amplifier outputs forces zero volts.

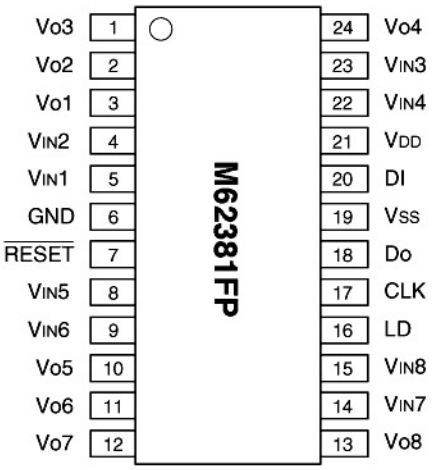
APPLICATION

Signal gain control of DISPLAY-MONITOR or CTV.

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

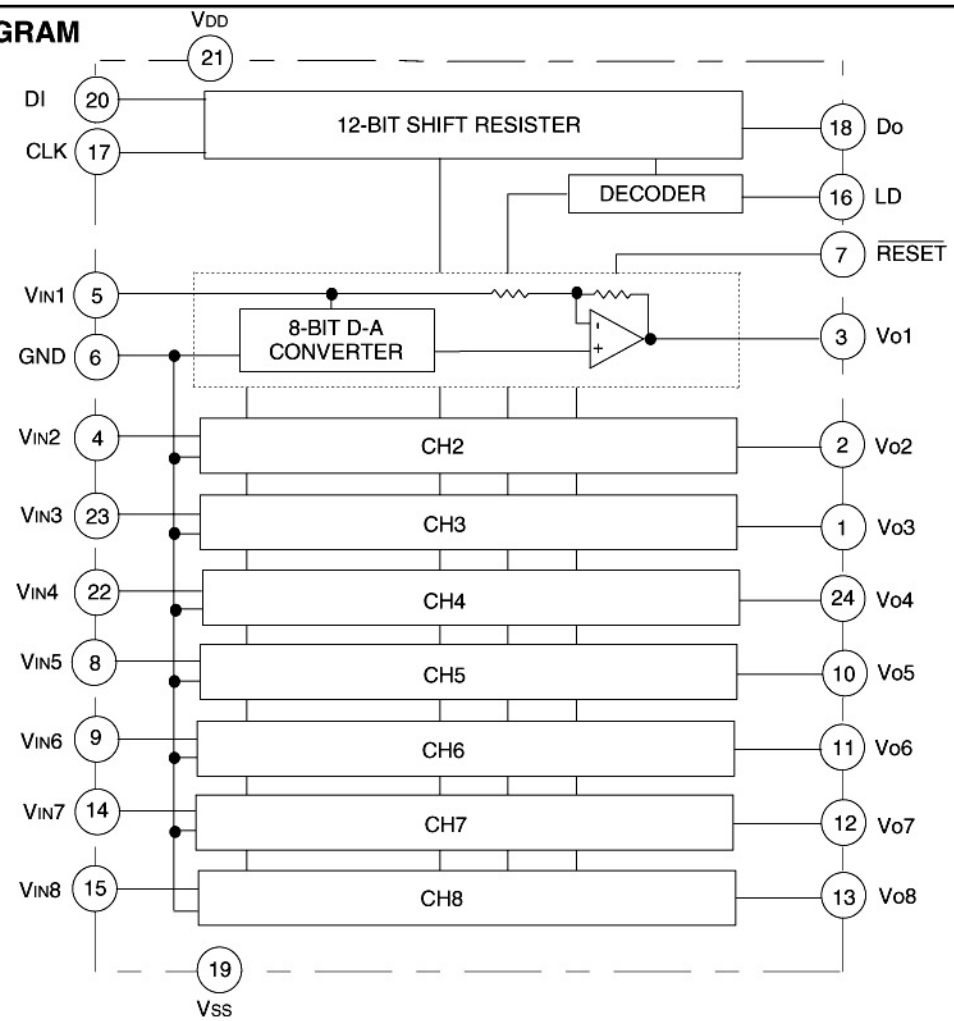
Automatic adjustment by combination with EEPROM and micro-computer.
(replacement of conventional half-fixed resistor.)

PIN CONFIGURATION (TOP VIEW)



Outline 24P2V-A

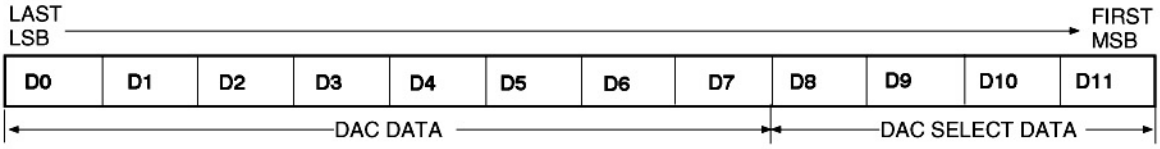
BLOCK DIAGRAM



EXPLANATION OF TERMINALS

Pin No.	Symbol	Function
⑳	DI	Serial data input terminal
⑱	Do	Serial data output terminal
⑰	CLK	Serial clock input terminal
⑯	LD	When LD terminal level is "H",latch circuit data is load
③	Vo1	8-bit resolution D-A converter output terminal
②	Vo2	
①	Vo3	
㉔	Vo4	
⑩	Vo5	
⑪	Vo6	
⑫	Vo7	
⑬	Vo8	
㉑	V_{DD}	Analog and digital common power supply terminal
⑲	V_{SS}	Analog negative power supply terminal
⑥	GND	GND terminal
⑤	$V_{IN}1$	D-A converter reference input terminal
④	$V_{IN}2$	
㉓	$V_{IN}3$	
㉒	$V_{IN}4$	
⑧	$V_{IN}5$	
⑨	$V_{IN}6$	
⑭	$V_{IN}7$	
⑮	$V_{IN}8$	
⑦	$\overline{RESET}$	When $\overline{RESET}$ terminal level is "H",all D-A output terminal became "0V"

DIGITAL DATA FORMAT



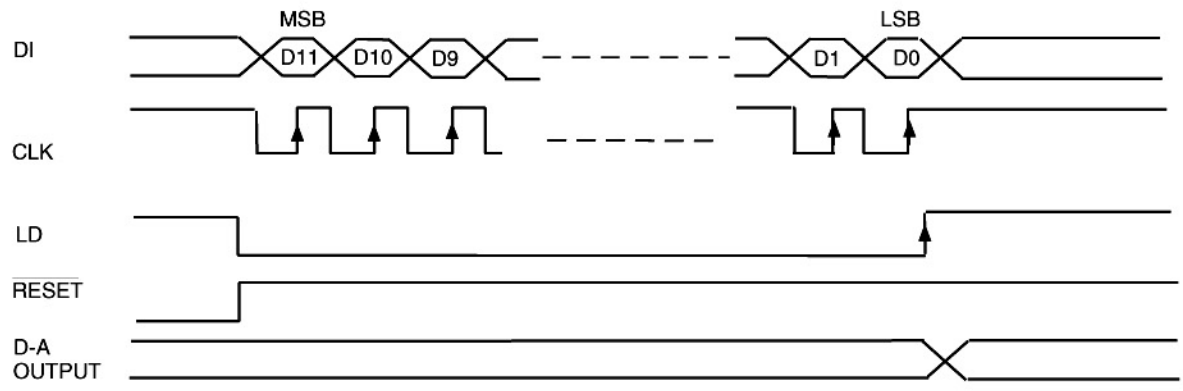
(1)DAC set up data

MSB							LSB	
D7	D6	D5	D4	D3	D2	D1	D0	D-A output
0	0	0	0	0	0	0	0	-VIN
0	0	0	0	0	0	0	1	(1/128-1) X VIN
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0	1	1	1	1	1	1	1	(127/128-1) X VIN
1	0	0	0	0	0	0	0	(128/128-1) X VIN
1	0	0	0	0	0	0	1	(129/128-1) X VIN
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1	1	1	1	1	1	1	0	(254/128-1) X VIN
1	1	1	1	1	1	1	1	(255/128-1) X VIN

(2)DAC select data

MSB			LSB	
D11	D10	D9	D8	DAC selection
0	0	0	0	Don t care
0	0	0	1	ch1 selection
0	0	1	0	ch2 selection
⋮	⋮	⋮	⋮	⋮
0	1	1	1	ch7 selection
1	0	0	0	ch8 selection
1	0	0	1	Don t care
⋮	⋮	⋮	⋮	⋮
1	1	1	1	Don t care

TIMING CHART (MODEL)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Conditions	Ratings	Unit
V_{DD}	Supply voltage		-0.3 to +6.0	V
V_{IN}	Digital input voltage		-0.3 to +6.0	V
Vss	Analog negative supply voltage		-6.0 to +3.0	V
V_{IN}	Input voltage		Vss+0.3 to V_{DD}-0.3	V
Vo	Output voltage		Vss+0.3 to V_{DD}-0.3	V
Topr	Operating temperature		-20 to +85	°C
Tstg	Storage temperature		-40 to +125	°C

ELECTRICAL CHARACTERISTICS

Digital part(V_{DD}=+5V, V_{SS}=-5V,$V_{DD}\geq V_{IN}\geq$Vss,GND=0V,Ta=-20 to +85°C,unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V_{DD}	Supply voltage		4.5	5.0	5.5	V
I_{ILK}	Input leak current	V_{IN}=0 to Vcc	-10		10	μA
V_{IL}	Input low voltage				0.2V_{DD}	V
V_{IH}	Input high voltage		0.8V_{DD}			V
V_{OL}	Output low voltage	I_{OL}=2.5mA			0.4	V
V_{OH}	Output high voltage	I_{OH}=-400μA	V_{DD}-0.4			V

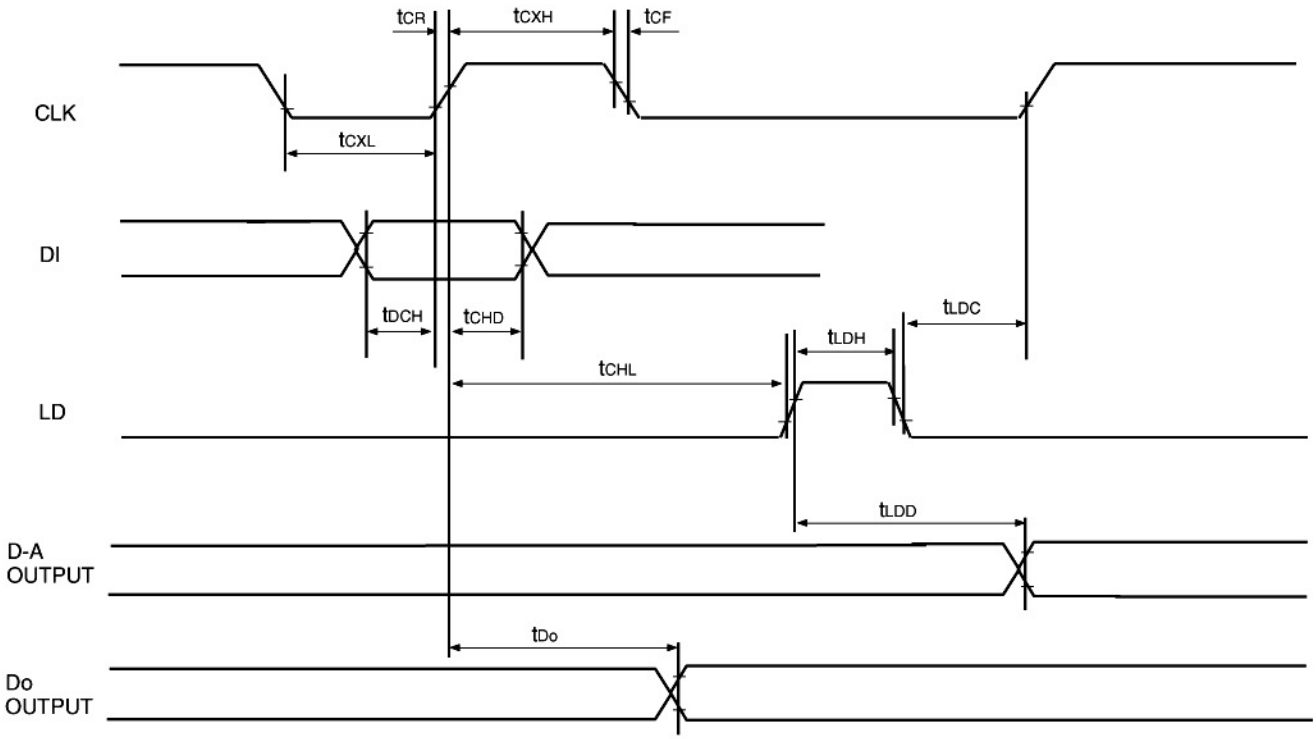
Analog part(V_{DD}=+5V, V_{SS}=-5V,$V_{DD}\geq V_{IN}\geq$Vss,GND=0V,Ta=-20 to +85°C,unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I_{IN}	D-A converter reference input current			0.2	0.4	mA
V_{AO}	Buffer amplifier output voltage range	I_{AO}=±500μA	V_{AOZERO} +0.15		V_{AOFULL} -0.15	V
		I_{AO}=±1mA	V_{AOZERO} +0.3		V_{AOFULL} -0.3	
I_{AO}	Buffer amplifier output current range	V_{AO}=V_{AOZERO}+0.3 to V_{AOFULL}-0.3	-1.0		1.0	mA
RES	Resolution		8			bit
DNL	Differential nonlinearity	V_{DD}-0.5≥V_{IN}≥V_{SS}+0.5	-1.0		1.0	LSB
NL	Nonlinearity		-1.5		1.5	LSB
EG	Gain error		-3		3	%FS

AC CHARACTERISTICS

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{CXL}	Clock "L"pulse width		200			ns
t_{CXH}	Clock "H"pulse width		200			ns
t_{CR}	Clock rise time				200	ns
t_{CF}	Clock fall time				200	ns
t_{DCH}	Data set up time		30			ns
t_{CHD}	Data hold time		60			ns
t_{CHL}	LD set up time		200			ns
t_{LDH}	LD hold time		100			ns
t_{LDC}	LD "H" pulse width		100			ns
t_{Do}	Data output delay time	C_L=100pF	70		350	ns
t_{LDD}	D-A output setting time	Without load				ns

TIMING CHART



APPLICATION EXAMPLE