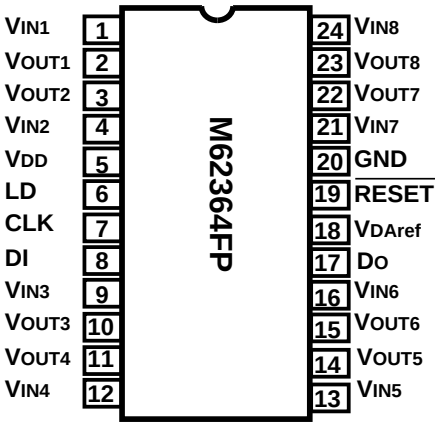
M62364FP

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

GENERAL DESCRIPTION

The M62364FP is a CMOS 8-bit, 8-ch D/A converter having a multiplying function and output buffer amplifiers. It has a serial data input and can easily communicate with a microcontroller by the simple three-wiring method (DI, CLK, LD).
The output buffer amplifiers operating in AB-class has both sinking and driving capabilities of 1.0mA or more and can operate in a whole supply range from V_{DD} to GND.
The IC is suitable for a use in automatic adjustment applications in conjunction with a MCU by utilizing the terminal D_O for a cascading connection.

PIN CONFIGURATION (TOP VIEW)



Outline 24P2Q (FP)

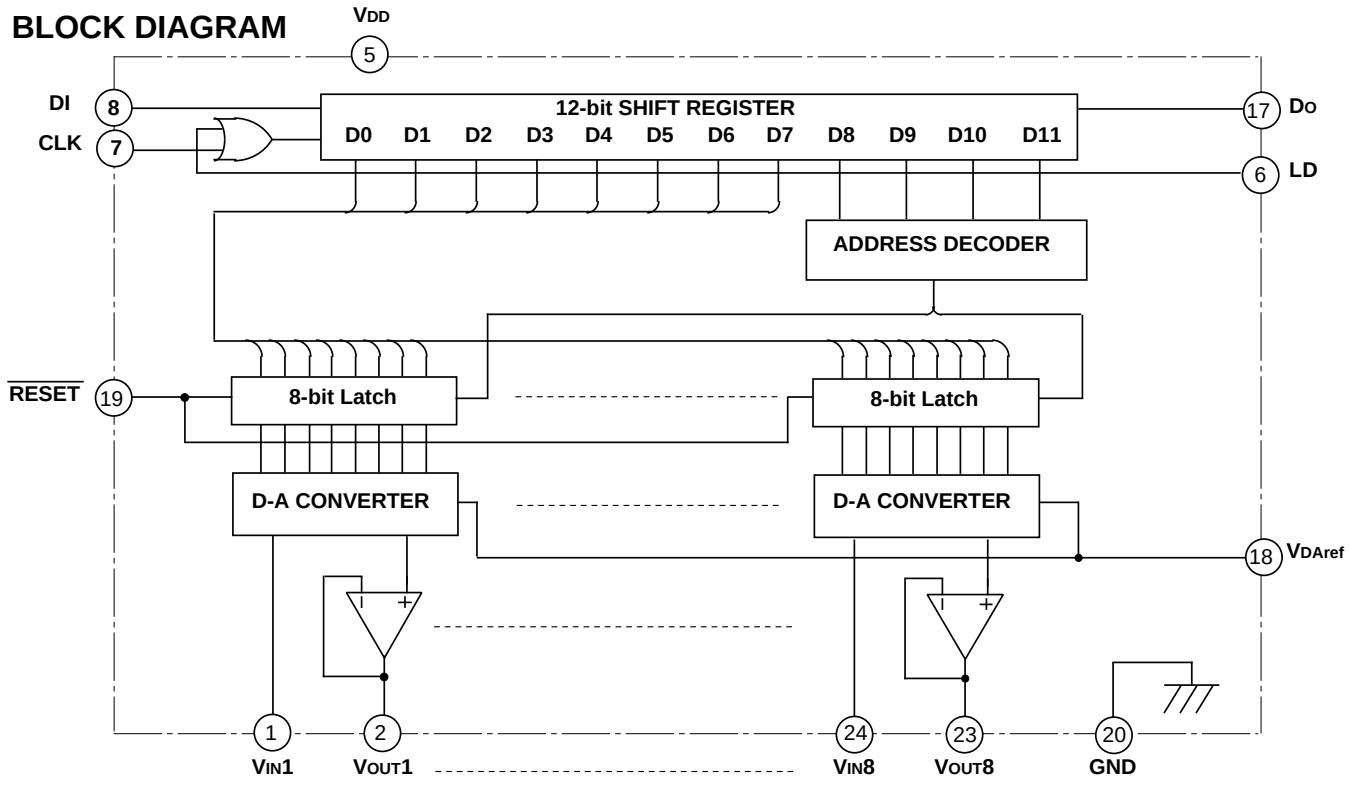
FEATURES

- Three-wiring serial data transmission
- Doubled precision 8-ch D/A converter employing an R-2R with higher-order segment method
- 8 buffer amplifiers operating in a whole supply voltage range from V_{DD} to GND
- 4-quadrant multiplication

APPLICATION

Digital to analog conversion for consumer and industrial equipment.
Gain setting and automatic adjustment of display-monitor and CTV.

BLOCK DIAGRAM

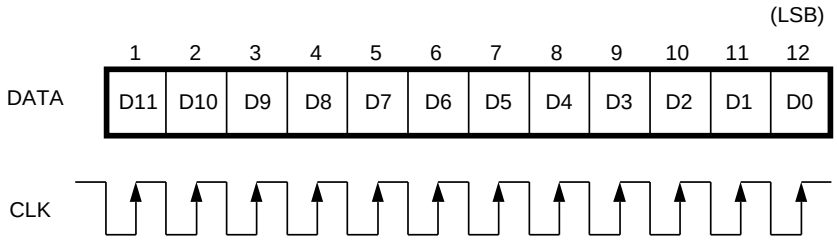


EXPLANATION OF TERMINALS

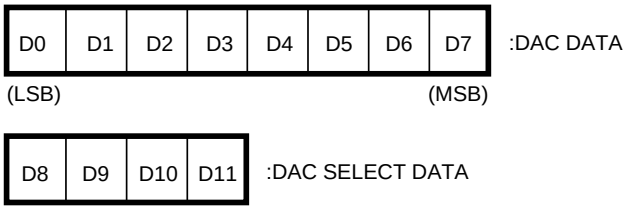
PIN No.	Symbol	Function
8	D I	Serial data input
17	Do	Serial data output
7	CLK	Shift clock input. Input data of DI are taken into the 12-bit shift register on a rising edge of the clock.
6	L D	A low state enables data loading to the 12-bit shift register. During a rising edge of LD, the data will be loaded to the output register.
19	$\overline{\text{RESET}}$	Reset 8-bit latches
2	$V_{OUT}1$	D/A Converter Output with 8-bit resolution
3	$V_{OUT}2$	
10	$V_{OUT}3$	
11	$V_{OUT}4$	
14	$V_{OUT}5$	
15	$V_{OUT}6$	
22	$V_{OUT}7$	
23	$V_{OUT}8$	
5	V_{DD}	Power Supply
20	GND	Ground
1	$V_{IN}1$	D/A Converter Input
4	$V_{IN}2$	
9	$V_{IN}3$	
12	$V_{IN}4$	
13	$V_{IN}5$	
16	$V_{IN}6$	
21	$V_{IN}7$	
24	$V_{IN}8$	
18	V_{DAref}	D-A Converter Reference Voltage Input

DIGITAL FORMAT

•12BIT SERIAL DATA



•DATA ASSIGNMENT



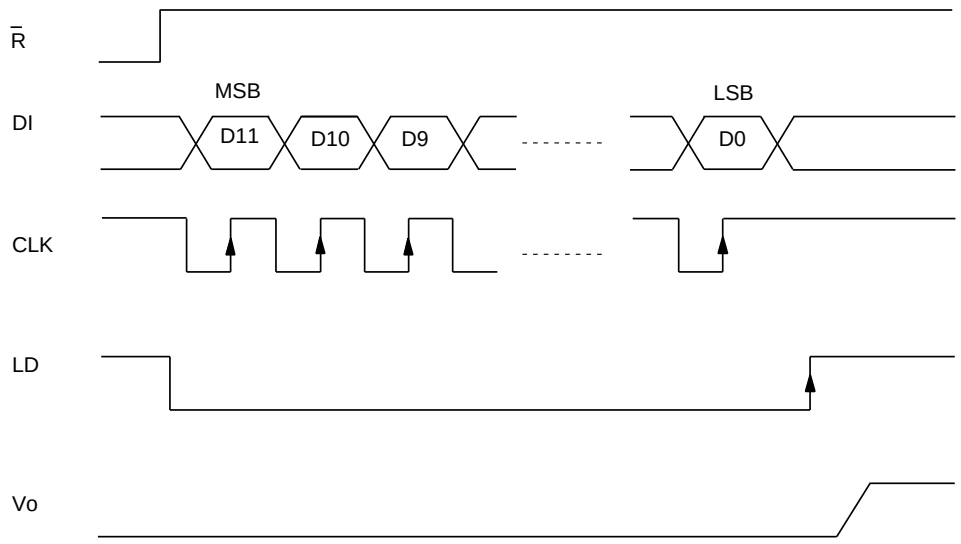
Dac Select Data

D8	D9	D10	D11	**Dac Selection**
0	0	0	0	Don't Care
0	0	0	1	VOUT1 Selection
0	0	1	0	VOUT2 Selection
0	0	1	1	VOUT3 Selection
0	1	0	0	VOUT4 Selection
0	1	0	1	VOUT5 Selection
0	1	1	0	VOUT6 Selection
0	1	1	1	VOUT7 Selection
1	0	0	0	VOUT8 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

•Digital Data Format

D0	D1	D2	D3	D4	D5	D6	D7	DAC OUTPUT
0	0	0	0	0	0	0	0	V_{DAref}
1	0	0	0	0	0	0	0	$(V_{IN}-V_{DAref})/256 \times 1+V_{DAref}$
0	1	0	0	0	0	0	0	$(V_{IN}-V_{DAref})/256 \times 2+V_{DAref}$
1	1	0	0	0	0	0	0	$(V_{IN}-V_{DAref})/256 \times 3+V_{DAref}$
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1	1	1	1	1	1	1	1	$(V_{IN}-V_{DAref})/256 \times 255+V_{DAref}$

TIMING CHART



* Input data carried out LD signal Low besides CLK signal positive edge.
CLK,LD is keep generally HIGH level.

ABSOLUTE MAXIMUM RATING

SYMBOL	PARAMETER	MEASUREMENT CONDITION	RATINGS	UNIT
V_{DD}	Supply Voltage		-0.3 ~ +7.0	V
V_{IND}	Digital Input Voltage		-0.3 ~ +7.0	V
V_{IN}	Analog Input Voltage		-0.3 ~ VDD+0.3	V
V_{OUT}	Analog Output Voltage		-0.3 ~ VDD+0.3	V
V_{DAref}	D-A Reference Voltage		-0.3 ~ VDD+0.3	V
T_{opr}	Operating Temperature		-20 ~ +75	°C
T_{stg}	Storage Temperature		-40 ~ +125	°C

ELECTRICAL CHARACTERISTICS

<Ana/Dig Common Part> (V_{DD}=5V±10%,V_{DD}≥V_{IN},GND,V_{DAref}=0V,Ta=-20~85°C unless otherwise noted)

SYMBOL	PARAMETER	MEASUREMENT CONDITION	LIMIT			UNIT
			MIN	TYP	MAX	
V_{DD}	Supply Voltage		2.7	3.0	3.6	V
I_{DD}	Supply Current	CLK=1MHz,V_{CC}=3V,IAO=0µA			3.5	mA

<Digital Part> (V_{DD}=5V±10%,V_{DD}≥V_{IN},GND,V_{DAref}=0V,Ta=-20~85°C unless otherwise noted)

SYMBOL	PARAMETER	MEASUREMENT CONDITION	LIMIT			UNIT
			MIN	TYP	MAX	
I_{ILK}	Input Leak Current	V_{IN}=0 ~ V_{DD}	-10		10	µ A
I_{IL}	Digital Input "Low" Voltage				0.2V_{DD}	V
I_{IH}	Digital Input "High" Voltage		0.8V_{DD}			V
V_{OL}	Do Terminal Output "Low" Voltage	I_{OL}=2.5mA			0.4	V
V_{OH}	Do Terminal Output "High" Voltage	I_{OH}=-400µA	V_{DD}-0.4			V

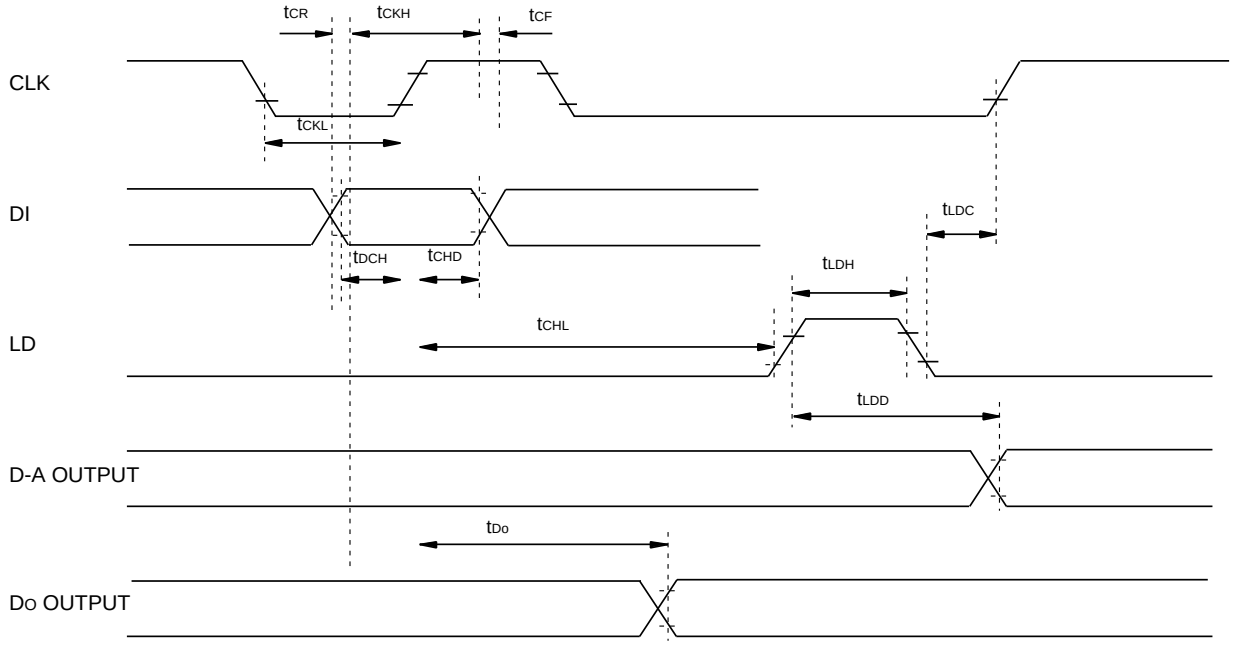
<Analog Part> (V_{DD}=5V±10%,V_{DD}≥V_{IN},GND,V_{DAref}=0V,Ta=-20~85°C unless otherwise noted)

SYMBOL	PARAMETER	MEASUREMENT CONDITION	LIMIT			UNIT
			MIN	TYP	MAX	
I_{IN}	Input Current	V_{IN}=3V,V_{DAref}=0V, *Proportional to max. input current condition(V_{IN}-V_{DAref}) and digital data of each channels.			0.18	mA
I_{DAref}	D-A Reference Input Current	V_{IN}=3V,V_{DAref}=0V, *Proportional to max. input current condition(V_{IN}-V_{DAref}) and digital data of each channels.	-1.44			mA
RES	Resolution	V_{DD}=2.61V,V_{DAref}=0.050V(10mV/1LSB) Without load(IAO=±0)		8		bit
DNL	Differential Nonlinearity		-1		1	LSB
NL	Nonlinearity		-1.5		1.5	LSB
V_{AO}	Buffer Amplifier Output Voltage Range	I_{AO}=±100µA	0.1		V_{CC}-0.1	V
		I_{AO}=±500µA	0.2		V_{CC}-0.2	
I_{AO}	Buffer Amplifier Output Current Range	Upper Saturation Voltage=0.4V Lower Saturation Voltage=0.4V	-1		1	mA
C_O	Output Capacitative Load				0.1	µ F
R_O	Buffer Amplifier Output Impedance			5		Ω

<AC Characteristics> (V_{DD}=5V±10%,V_{DD}≥V_{IN},GND,V_{DAref}=0V,Ta=-20~85°C, unless otherwise noted)

SYMBOL	PARAMETER	MEASUREMENT CONDITION	LIMIT			UNIT
			MIN	TYP	MAX	
t_{CKL}	Clock "L" Pulse Width		200			nS
t_{CKH}	Clock "H" Pulse Width		200			nS
t_{CR}	Clock Rise Time				200	nS
t_{CF}	Clock Fall Time					
t_{DCH}	Data Set Up Time		60			nS
t_{CHD}	Data Hold Time		100			nS
t_{CHL}	LD Set Up Time		200			nS
t_{LDC}	LD Hold Time		100			nS
t_{LDH}	LD "H" Pulse Duration Time		100			nS
t_{Do}	Data Output Delay Time	C_L=100pF	70		350	nS
t_{LDD}	D-A Output Setting Time	C_L≤100pF,V_{AO}:0.1<=>2.6V This Time Until The Output Becomes The final Value Of 1/2 LSB			300	µS

TIMING CHART



⚠ Mitsubishi Electric Corporation puts the maximum effort into making semiconductor products better and more reliable,but there is always the possibility that trouble may occur with them.Trouble with semiconductors may lead to personal injury, fire or property damage.Remember to give due consideration to safety when making your circuit design,in order to prevent fires from spreading,redundancy,malfunction or other mishap.