



SANYO Semiconductors

DATA SHEET

CMOS LSI
LC7480/7480M — Video A/D Converter with 3-Input Multiplexer

Overview

The LC7480 is a video 6-bit flash type A/D converter implemented in CMOS process technology. It has an internal clamp voltage generation circuit for video component signals (Y, R-Y, and B-Y) and a multiplexer.

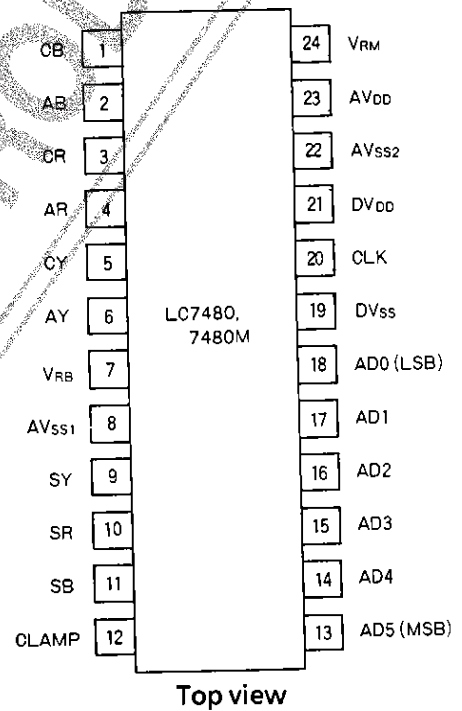
Functions

- Clamp voltage generation circuit (CY, CR, and CB)
- Three-input multiplexer
- Reference voltage source

Features

- Resolution 6 bits
- Nonlinearity error $\pm 1/2$ LSB
- Maximum conversion rate ... 20MSPS
- Analog input voltage range .. 1Vpp
- Digital input/output voltage . CMOS level
- Single power source $5 \pm 0.5V$
- Power dissipation 135mW (typ)
- Package DIP24S(LC7480)
 MFP24S(LC7480M)

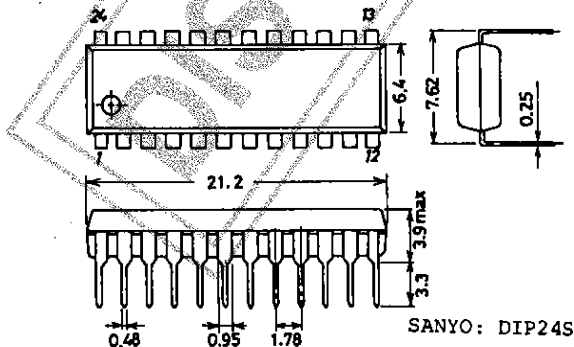
Pin Assignment



Package Dimensions

(unit : mm)
 3067

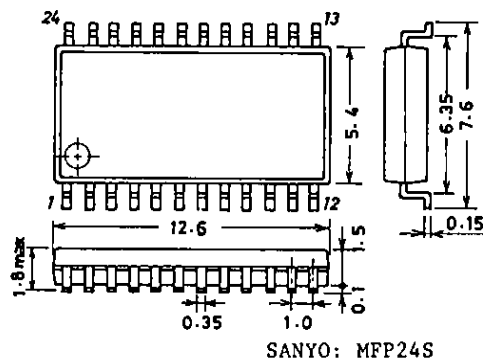
[LC7480]



Package Dimensions

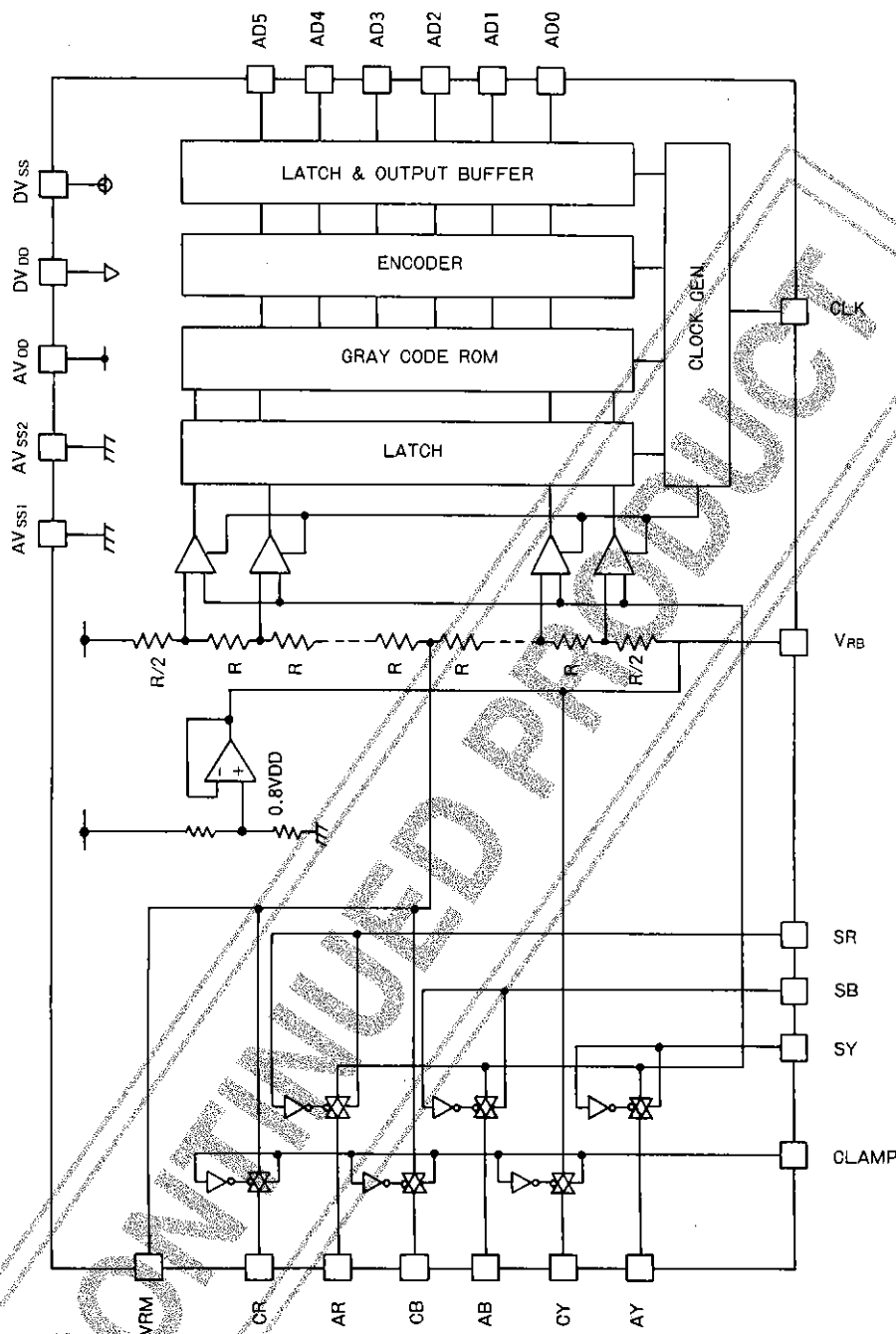
(unit : mm)
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[LC7480M]



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Block Diagram



Pin Functions

Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	CB	Clamp voltage output for B-Y signal	13	AD5	Digital output [MSB]
2	AB	B-Y signal input	14	AD4	Digital output
3	CR	Clamp voltage output for R-Y signal	15	AD3	Digital output
4	AR	R-Y signal input	16	AD2	Digital output
5	CY	Clamp voltage output for Y signal	17	AD1	Digital output
6	AY	Y signal input	18	AD0	Digital output [LSB]
7	VRB	Reference voltage (B)	19	DVSS	Digital GND
8	AVSS1	Analog GND	20	CLK	Clock input
9	SY	Multiplexer SW (for Y signal)	21	DVDD	Digital power supply
10	SR	Multiplexer SW (for R-Y signal)	22	AVSS2	Analog GND
11	SB	Multiplexer SW (for B-Y signal)	23	AVDD	Analog power supply
12	CLAMP	Clamp SW	24	VRM	Reference voltage (M)

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Absolute Maximum Ratings at $T_a = 25 \pm 2^\circ\text{C}$, $V_{SS} (= DV_{SS}, AV_{SS1}, AV_{SS2}) = 0\text{V}$

			unit	Applicable pins
Supply Voltage	V_{DD} ($= AV_{DD}, DV_{DD}$)	-0.3 to +7.0	V	AV_{DD}, DV_{DD}
I/O Pin Voltage	V_{IN}, V_{OUT}	-0.3 to $V_{DD} + 0.3$	V	I/O pins
Analog Reference Voltage	V_{RM}, V_{RB}	-0.3 to $V_{DD} + 0.3$	V	V_{RM}, V_{RB}
Allowable Power Dissipation	$P_d \text{ max}$	$T_a \leq 70^\circ\text{C}$	300	mW
Operating Temperature	T_{opr}	-30 to +70	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-55 to +125	$^\circ\text{C}$	

(Note) The LSI should be used on the condition that $AV_{DD} = DV_{DD}$ and $AV_{SS1} = AV_{SS2} = DV_{SS}$.

Allowable Operating Conditions at $T_a = -30$ to $+70^\circ\text{C}$, $V_{SS} = 0\text{V}$

		min	typ	max	unit	Applicable pins
Supply Voltage	V_{DD}	4.5	5.0	5.5	V	AV_{DD}, DV_{DD}
Analog Input Voltage	V_{INA}	$V_{DD} - V_{RB}$			Vpp	AY, AR, AB
Digital Input Voltage	V_{IHD}	0.7	V_{DD}		V	CLK, SY, SR,
	V_{ILD}			0.3	V_{DD}	SB, CLAMP
Sampling Clock	f_{CLK}	1.0		20.0	MHz	CLK
Sampling Clock Pulse Width	t_{CLKH} (H level)	25.0			ns	CLK
	t_{CLKL} (L level)	25.0			ns	CLK
Clamp Pulse Width	t_{CLPH} (H level)	2.0			μs	CLAMP
MPX Set up	t_{MSU}	25.0			ns	SY, SR, SB
MPX Hold	t_{MHD}	0.0			ns	SY, SR, SB
MPX Off	t_{MOFF}	0.0			ns	SY, SR, SB

Electrical Characteristics at $T_a = 25 \pm 2^\circ\text{C}$, $V_{DD} = 5\text{V} \pm 10\%$, $V_{SS} = 0\text{V}$

		min	typ	max	unit	Applicable pins
Power Dissipation (Analog)	I_{DDA}	$V_{DD} = 5\text{V}$,		20.0	mA	AV_{DD}
Power Dissipation (Digital)	$I_{DD D}$	$f_{CLK} = 14.3\text{MHz}$, input signal = 3.58MHz (sine wave)		7.0	mA	DV_{DD}
Resolution				6.0	bit	
Linearity Error	SINL			$\pm 1/2$	LSB	
Differential Linearity Error	SDNL			$\pm 1/2$	LSB	
Reference Voltage (M)	V_{RM}		$0.9V_{DD}$		V	V_{RM}
Reference Voltage (B)	V_{RB}		$0.8V_{DD}$		V	V_{RB}
Digital Output Voltage	V_{OH}	$I_o = -1.6\text{mA}$	$V_{DD} - 0.4$		V	[AD0 to AD5]
	V_{OL}	$I_o = +1.6\text{mA}$		0.4	V	

Switching Characteristics at $T_a = 25 \pm 2^\circ\text{C}$, $V_{DD} = 5\text{V} \pm 10\%$, $V_{SS} = 0\text{V}$

		min	typ	max	unit	Applicable pins
Digital Output Delay Time	t_{pd}	Load capacitance : 50pF		40.0	ns	

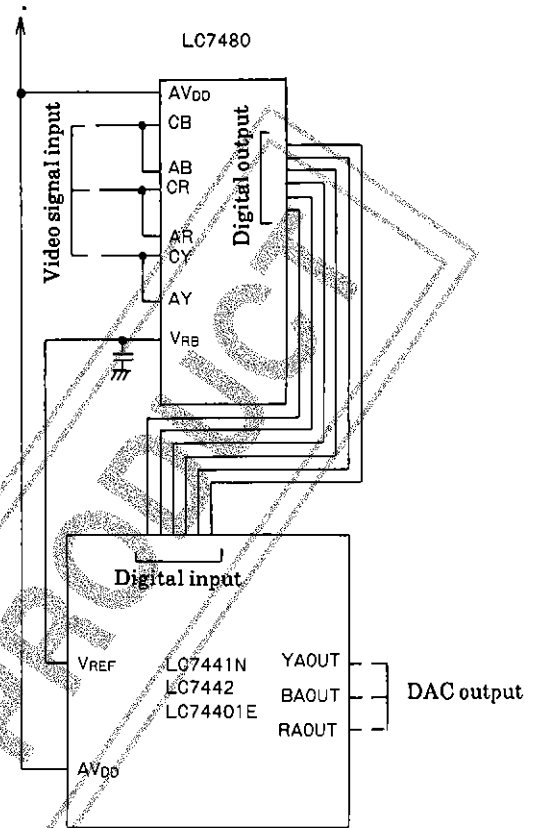
Output Code Example

STEP	Analog Input Voltage (V)		Digital I/O Code	AOUT (V)
0	3.992	4.000	000000	3.992
1	4.000	4.016	000001	4.008
2	4.016	4.032	000010	4.024
31	4.480	4.496	011111	4.488
32	4.496	4.512	100000	4.504
33	4.512	4.528	100001	4.520
61	4.960	4.976	111101	4.968
62	4.976	4.992	111110	4.984
63	4.992	5.000	111111	5.000

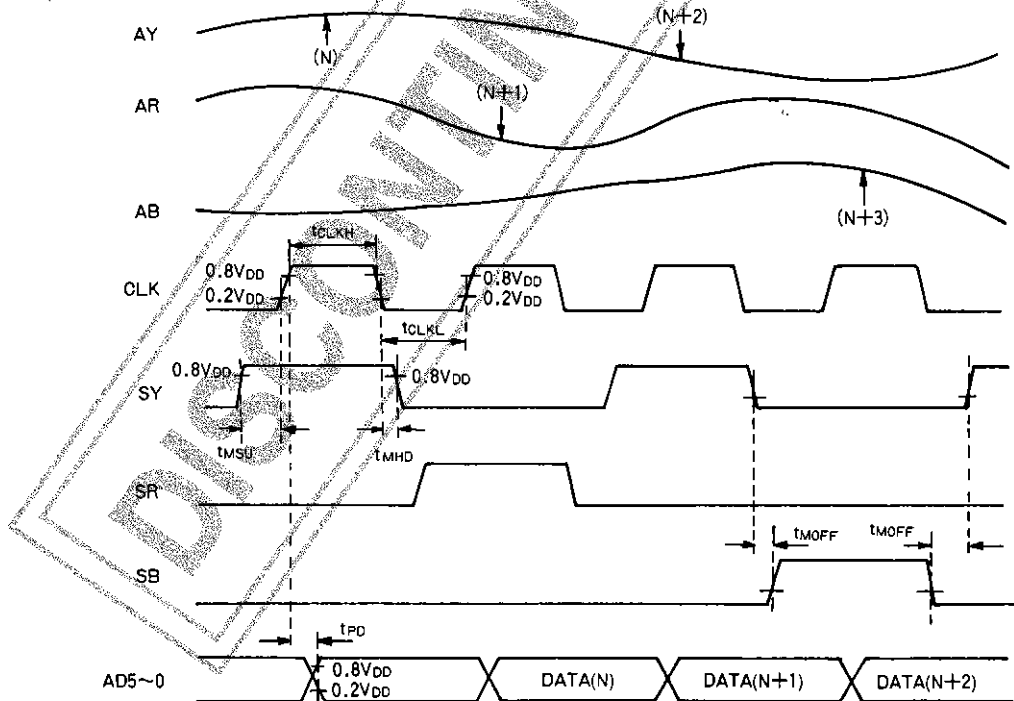
$V_{DD} = 5.000V, V_{RB} = V_{REF} = 3.992V$

1LSB = 16mV

Application Circuit



Timing Chart



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