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# HA19510/MP

High-Speed, Low-Power 8-bit Flash D/A Converter

# HITACHI

November 1996

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## Description

The HA19510/MP consists of high-speed, low-power 8-bit D/A converters. The digital and clock inputs of these monolithic bipolar LSIs are fully TTL/CMOS compatible. The noise-minimizing internal reference voltage generator and high conversion rate ( $f_{CLK} = 40$  MHz Min) make these devices suitable for high-speed image processing applications.

## Features

- 8-bit resolution
- Conversion rate: 40 MHz (Min)
- Single power supply: +5 V
- TTL/CMOS compatible clock and digital inputs
- Internal reference voltage: +3.0 V (Typ)
- Low power consumption: 225 mW (Typ)

## Applications

- Video signal processing
- Image processing, etc.

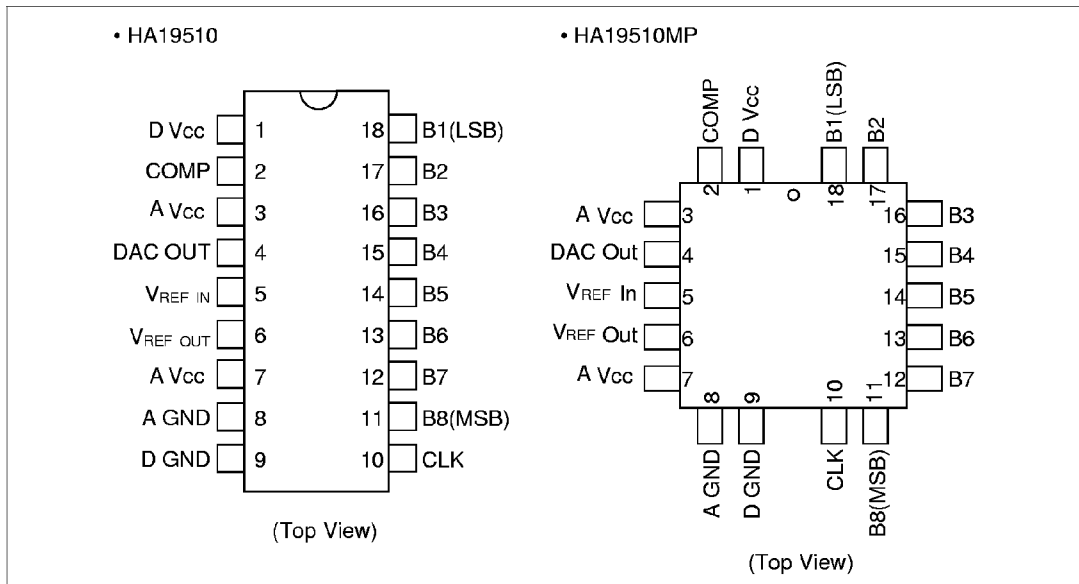
## Ordering Information

Type No.	Package
HA19510	300mil 18-pin plastic DIP (DP-18A)
HA19510MP	18-pin plastic QFI (MP-18)

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# HA19510/MP

## Pin Arrangement

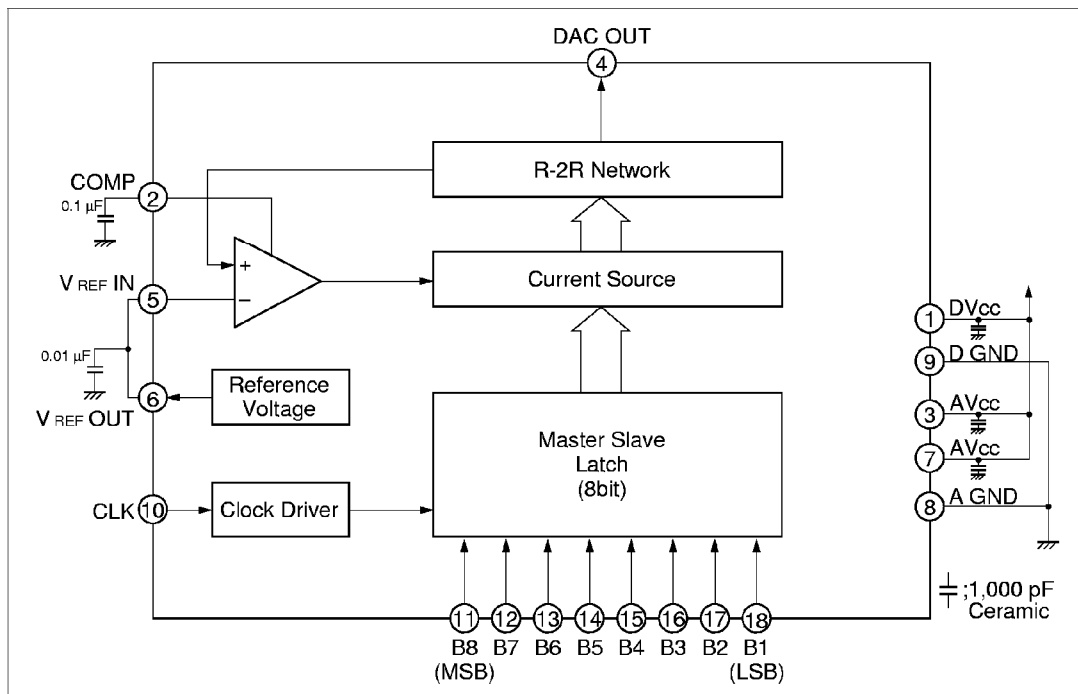


**Pin Descriptions**

<b>Pin No.</b>	<b>Symbol</b>	<b>Function</b>
1	D $V_{CC}$	Digital power supply (+5 V)
2	COMP	Phase compensation
3	A $V_{CC}$	Analog power supply (+5 V)
4	DAC OUT	Analog voltage output
5	$V_{REF IN}$	Reference voltage input
6	$V_{REF OUT}$	Reference voltage output
7	A $V_{CC}$	Analog power supply (+5 V)
8	AGND	Analog ground
9	DGND	Digital ground
10	CLK	Clock input
11	B8	Digital input (MSB)
12	B7	Digital input
13	B6	Digital input
14	B5	Digital input
15	B4	Digital input
16	B3	Digital input
17	B2	Digital input
18	B1	Digital input (LSB)

## HA19510/MP

### Block Diagram



### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ , unless otherwise specified)

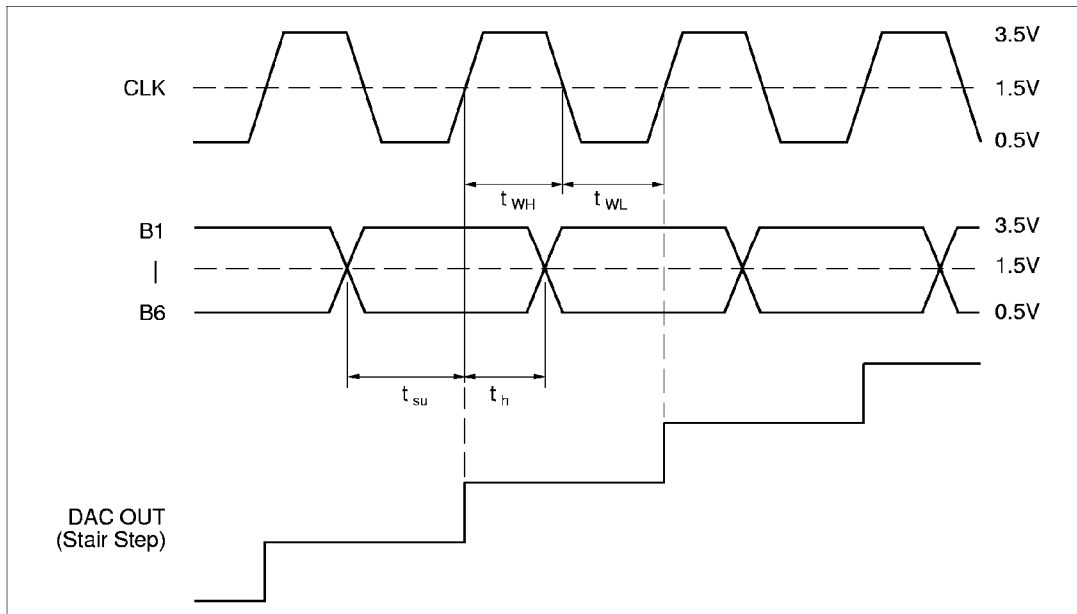
Item	Symbol	Rating	Unit
Power supply voltage	$V_{CC}$	+7.0	V
Digital input voltage	$V_{IN}$	0 to $V_{CC}$	V
Power dissipation	$P_T$	500	mW
Operating temperature	$T_{opr}$	0 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +125	$^\circ\text{C}$

**Electrical Characteristics** ( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5.0\text{ V}$ , and pins 5 and 6 are shorted, unless otherwise specified)

Item	Symbol	Min	Typ	Max	Unit	Test conditions	
Resolution		8	8	8	bit		
Conversion rate	$f_{CLK}$	40	—	—	MHz		
Linearity error	LE	-0.5	—	0.5	LSB		
Clock pulsewidth H-level	$t_{WH}$	12.5	—	—	ns	$f_{CLK} = 40\text{ MHz}$	
Clock pulsewidth L-level	$t_{WL}$	12.5	—	—	ns	$f_{CLK} = 40\text{ MHz}$	
Data setup time	$t_{su}$	10	—	—	ns	$f_{CLK} = 40\text{ MHz}$	
Data hold time	$t_h$	10	—	—	ns	$f_{CLK} = 40\text{ MHz}$	
Power supply voltage	$V_{CC}$	4.75	5.00	5.25	V		
Current consumption	$I_{CC}$	—	45	60	mA		
Digital input voltage	$V_{IH}$	2.0	—	$V_{CC}$	V		
	$V_{IL}$	0	—	0.8	V		
Digital input current	$I_{IH}$	—	—	20	$\mu\text{A}$	$V_{IH} = 2.7\text{ V}$	
	$I_{IL}$	-400	—	—	$\mu\text{A}$	$V_{IL} = 0.4\text{ V}$	
Reference input current	$I_{REF IN}$	-20	0	20	$\mu\text{A}$	$V_{REF IN} = 3.0\text{ V}$	
Reference input voltage	$V_{REF IN}$	2.0	3.0	4.0	V		
Reference output voltage	$V_{REF OUT}$	3.0	3.1	3.22	V		
Analog output voltage	Full Scale	$V_{CC} - 15\text{ m}$	$V_{CC}$	$V_{CC} + 15\text{ m}$	V	$V_{IH} \geq 2.0\text{ V}$	
	Zero Scale	$V_{ZS}$	3.94	4.00	4.06	V	$V_{IL} \leq 0.8\text{ V}$
Output Impedance	$Z_{out}$	55	75	95	$\Omega$		

## HA19510/MP

### Timing Chart



### Input Code Table

B8	B7	B6	B5	B4	B3	B2	B1	Aout (V)
0	0	0	0	0	0	0	0	$V_{ZS}$
0	0	0	0	0	0	0	1	$V_{ZS} + 1 \text{ LSB}$
1	1	1	1	1	1	1	0	$V_{FS} - 1 \text{ LSB}$
1	1	1	1	1	1	1	1	$V_{FS}$

Note:  $1 \text{ LSB} = (V_{FS} - V_{ZS})/255$

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