HA17408P

8-Bit Multiplying Digital-to-Analog Converter

HITACHI

ADE-204-061 (Z)
Rev. 0
Dec. 2000

Description

The HA17408P is an 8-bit monolithic D/A converter that incorporates a reference current amplifier, an R-2R resistor ladder, and eight high-speed current switches.

Circuit designers can set the maximum output current to match the needs of their applications by setting the reference voltage and selecting a resistor value.

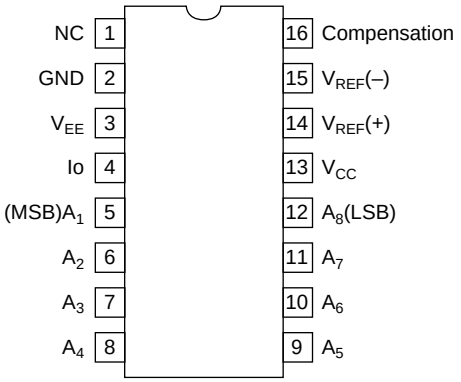
The reference current is distributed to the current value for each bit by the R-2R resistor ladder, and thus the maximum output current is 255/256 times the reference current. For example, the largest output current that can be acquired for a reference input current of 2.0 mA is 1.992 mA.

The HA17408P can be used in a wide range of applications including CRT displays, stepping motor control, programmable power supplies, audio equipment, and attenuators.

Features

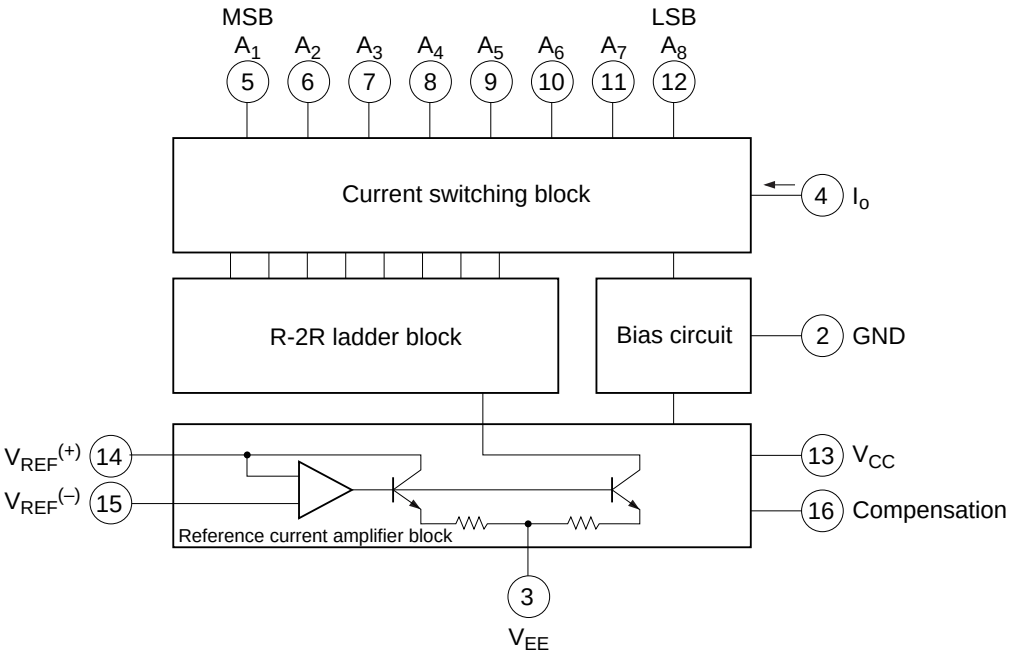
- A linearity of ±0.19% (± 1/2 LSB) is guaranteed.
- Short settling time (250 ns typical) for rapid conversions
- Low power dissipation: 157 mW typical
- Compatible with TTL and CMOS logic
- Standard supply voltages of V_{CC} = +5.0 V, V_{EE} = –5.0 V and = –15.0 V
- Wide output voltage range: +0.5 to –5.0 V

Pin Arrangement



(Top view)

Block Diagram



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Rating	Unit
Power-supply voltage	V_{CC}	5.5	V
	V_{EE}	–16.5	V
Digital input voltage	V_5 to V_{12}	0 to +5.5	V
Output voltage	V_O	0.5 to –5.2	V
Reference current	I_{14}	5.0	mA
Reference amplifier input voltage range	V_{REF}	V_{CC}, V_{EE}	V
Power dissipation	P_T	625	mW
Operating temperature	Topr	–20 to +75	°C
Storage temperature	Tstg	–55 to +125	°C

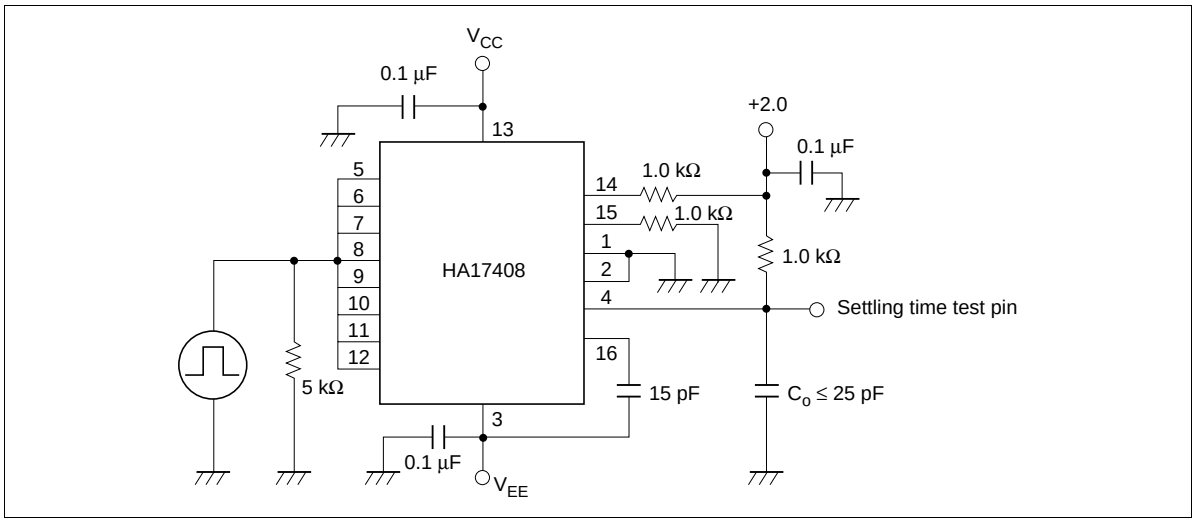
Electrical Characteristics (V_{CC} = 5.0 V, V_{EE} = –15 V, Iref = 2 mA, Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Relative error	E_R	—	—	±0.19	%FS	
Settling time (± 1/2 LSB)	t_s	—	250	—	ns	All bits OFF to ON
Transmission delay time	t_{PLH}, t_{PHL}	—	30	100	ns	
Maximum output current drift	T_{CIO}	—	±20	—	ppm/°C	
Digital input level	V_{IH}	2.0	—	—	V	
	V_{IL}	—	—	0.8	V	
Digital input current	I_{IH}	—	0	0.04	mA	V_{IH} = 5.0 V
	I_{IL}	–0.8	–0.002	—	mA	V_{IL} = 0.8 V
Reference input bias current	I_{15}	–3.0	–1.0	—	µA	
Output current range	I_{OR}	0	2.0	2.1	mA	V_{EE} = –5.0 V
		0	2.0	4.2	mA	V_{EE} = –7.0 to –15 V
Output current	I_O	1.9	1.99	2.1	mA	Vref = 2.000 V, R_{14} = 1.000 Ω
	$I_{O\ (min)}$	—	0	4.0	µA	All bits low
Output voltage range	V_O	–0.6	—	+0.5	V	V_{EE} = –5 V
		–5.0	—	+0.5	V	V_{EE} < –10 V
Reference current slew rate	STIref	—	4.0	—	mA/µs	

Electrical Characteristics (V_{CC} = 5.0 V, V_{EE} = –15 V, Iref = 2 mA, Ta = 25°C) (cont)

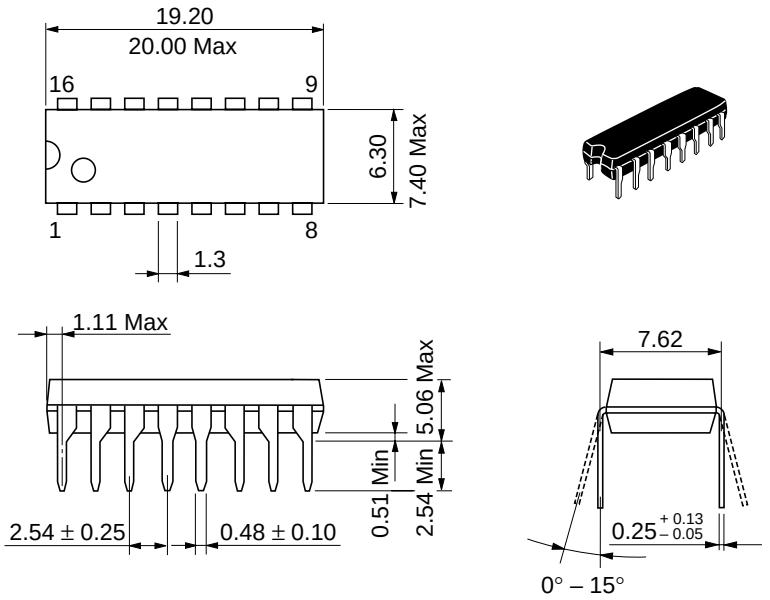
Item	Symbol	Min	Typ	Max	Unit	Test Conditions	
Power supply current	I_{CC}	—	1.9	14	mA		
	I_{EE}	–13	–5.8	—	mA		
Power-supply voltage	V_{CC}	4.5	5.0	5.5	V		
	V_{EE}	–16.5	–15	–4.5	V		
Power dissipation	P_T	—	34	136	mW	All bits low	V_{EE} = –5.0 V
		—	97	265	mW		V_{EE} = –15 V
		—	34	—	mW	All bits high	V_{EE} = –5.0 V
		—	97	—	mW		V_{EE} = –15 V

Settling Time Test Circuit



Package Dimensions

Unit: mm



Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	1.07 g

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