HA17324F/FP

Quad Operational Amplifier

HITACHI

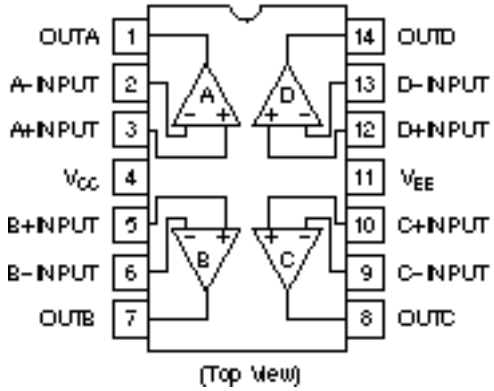
Description

HA17324 is quad operational amplifier that provide high gain and internal phase compensation, with single power supply. They can be widely used to control equipments.

Features

- Wide range of supply voltage, and single power supply used
- Internal phase compensation
- Wide range of common mode voltage, and possible to operate with an input about 0V

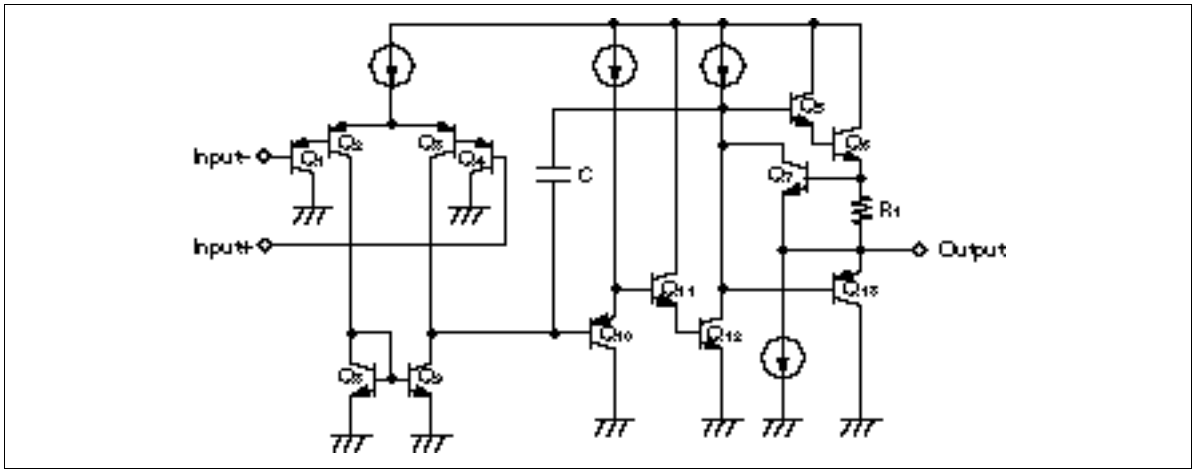
Pin Arrangement



Notice:	The example of an applied circuit or combination with other equipment shown herein indicates characteristics and performance of semiconductor -applied products. The company shall assume no responsibility for any problem involving a patent caused when applying the descriptions in the example.

Preliminary: This document contains information on a new product. Specifications and information contained herein are subject to change without notice.

Circuit Schematic (1/4)



Ordering Information

Type No.	Application	Package
HA17324FP	Industrial use	FP-14DA
HA17324F	Commercial use	FP-14DA

Absolute Maximum Ratings (Ta = 25°C)

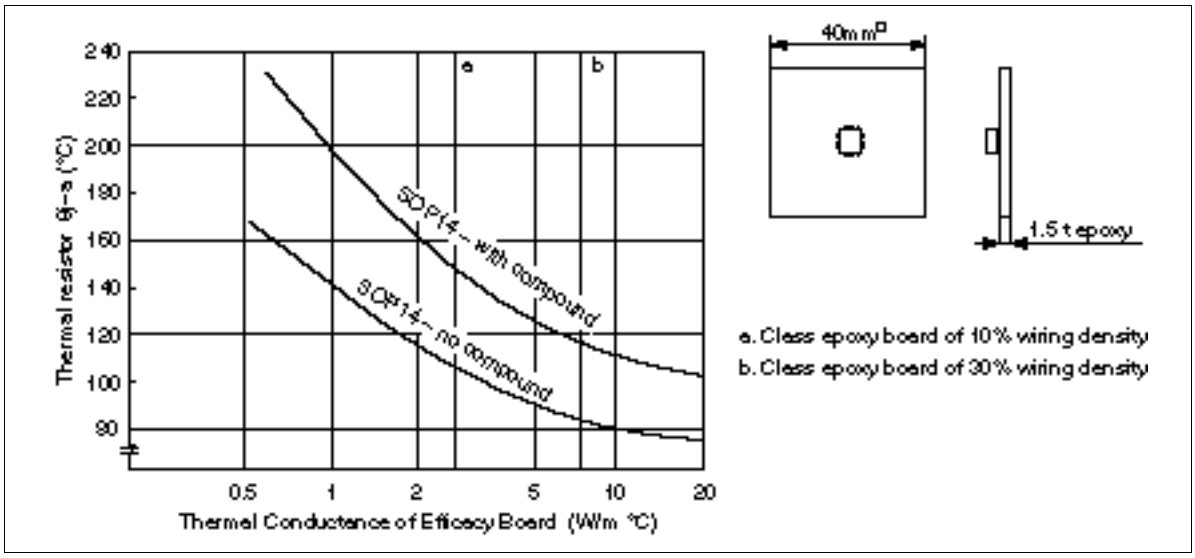
Item	Symbol	Rating	Unit
Supply voltage	V_{CC}	32	V
Sink current	Isink	50	mA
Power dissipation	P_T	625*	mW
Common mode input voltage	V_{CM}	–0.3 to V_{CC}	V
Differential input voltage	Vin (diff)	±V_{CC}	V
Operating temperature	Topr	–20 to +75	°C
Storage temperature	Tstg	–55 to +125	°C

Note: Tjmax is shown as follows.

Tjmax = θj-a · $P_C$max + Ta (θj-a; Thermal resistor between junction and ambient at set board use).

The wiring density and the material of the set board must be chosen for thermal conductance of efficacy board.

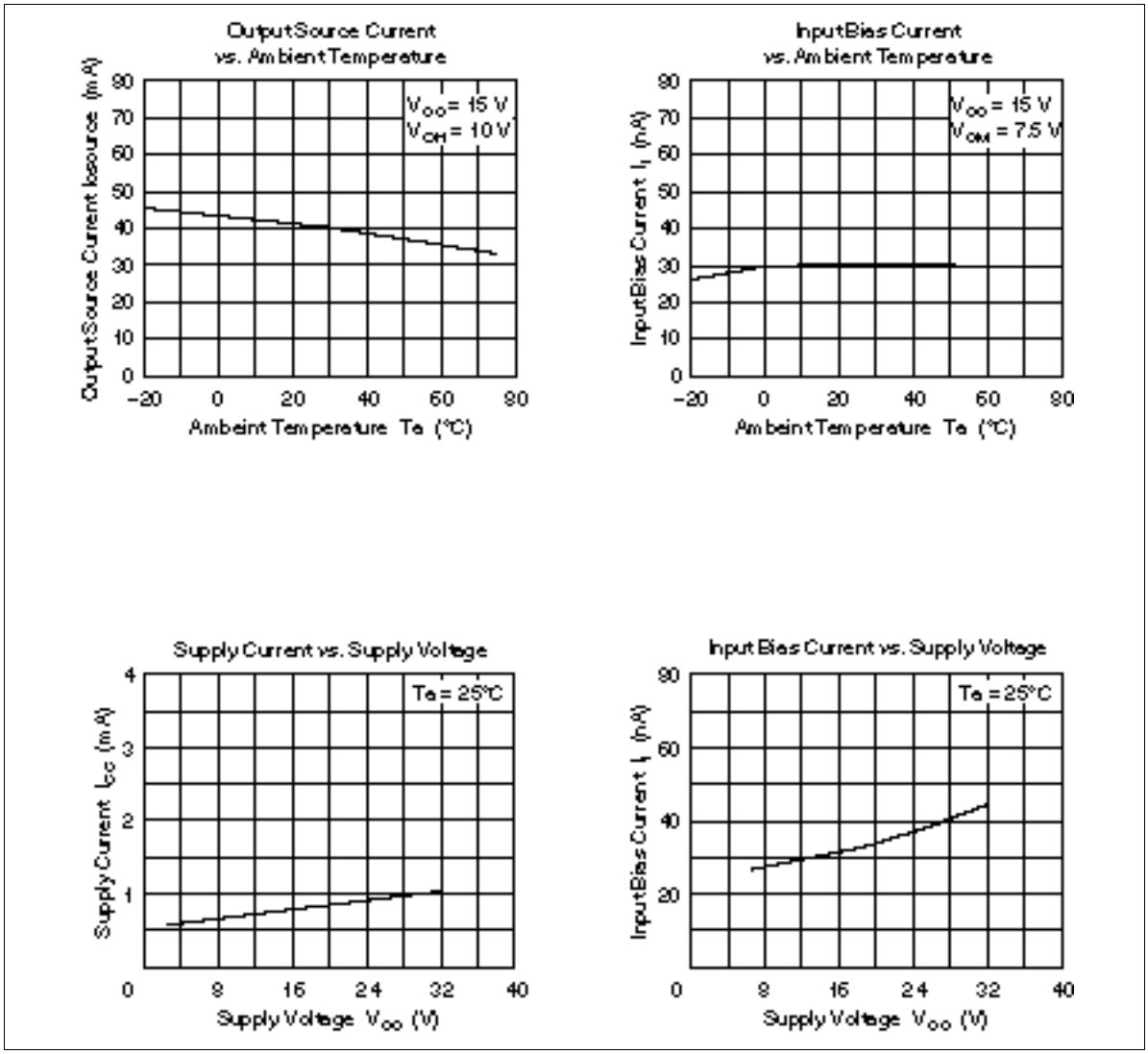
And $P_C$max cannot be over the value of P_T.

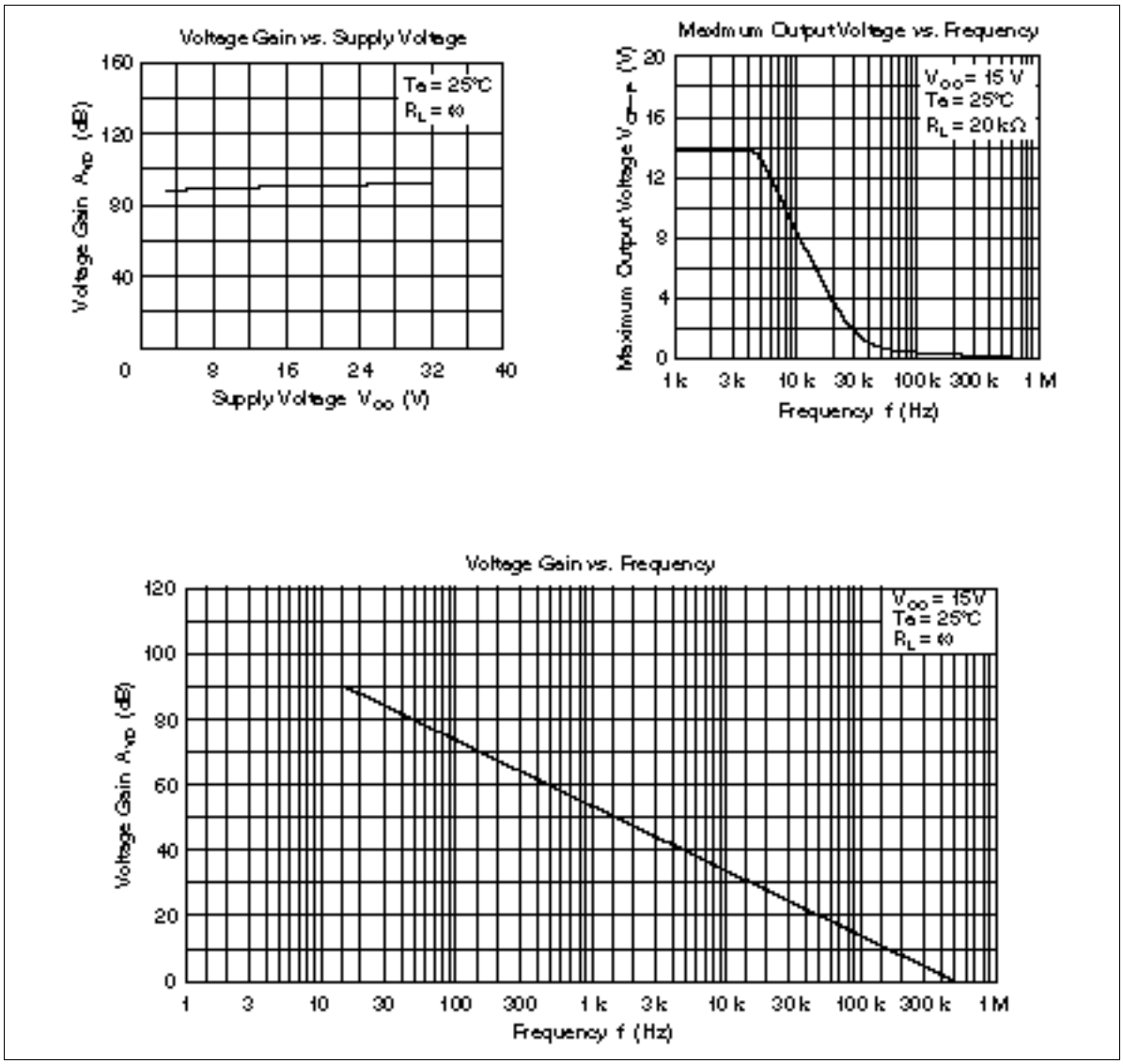


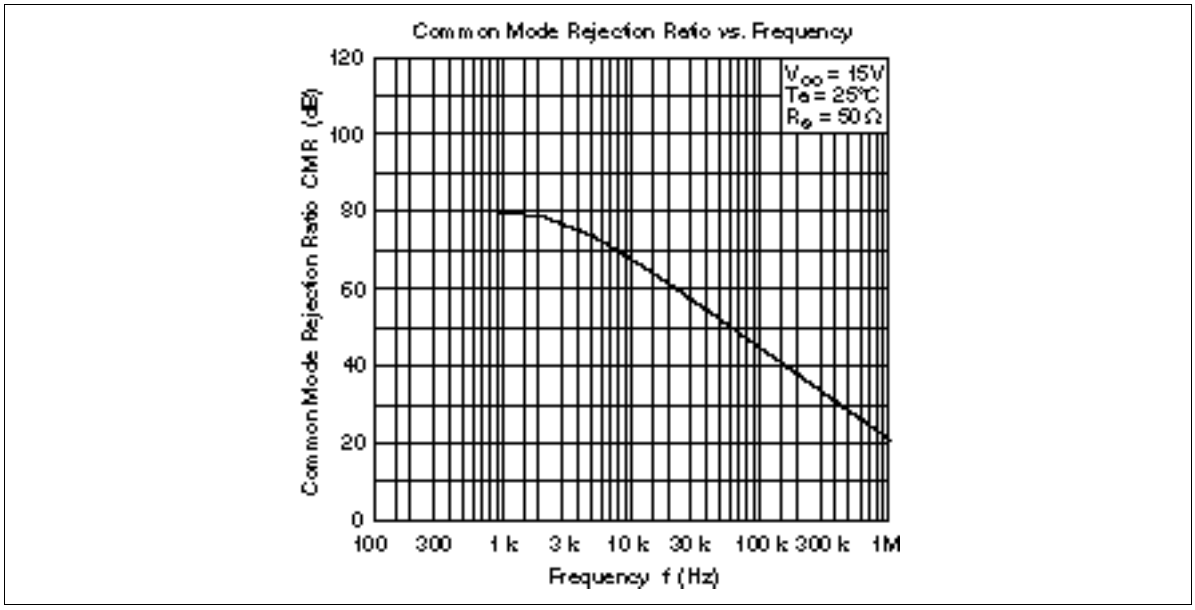
Electrical Characteristics (V_{CC} = +15V, Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V_{IO}	—	2	7	mV	V_{CM} = 7.5V, RS = 50Ω, Rf = 50kΩ
Input offset current	I_{IO}	—	5	50	nA	V_{CM} = 7.5V, I_{IO} = | $I_{I(-)} - I_{I(+)}$ |
Input bias current	I_I	—	30	500	nA	V_{CM} = 7.5V
Power source rejection ratio	PSRR	—	93	—	dB	f = 100Hz, R_S = 1kΩ, Rj = 100kΩ
Voltage gain	A_{VD}	75	90	—	dB	R_S = 1 kΩ, Rf = 100kΩ, R_L =
Common mode rejection ratio	CMR	—	80	—	dB	R_S = 50Ω, Rf = 5kΩ
Common mode input voltage range	V_{CM}	–0.3	—	13.5	V	R_S = 1kΩ, Rf = 100kΩ, f = 100Hz
Maximum output voltage	Vop-p	—	13.6	—	V	f = 100Hz, R_S = 1kΩ, Rf = 100kΩ, R_L = 20kΩ
Output source current	Isource	20	40	—	mA	V_{IN}^+ = 1V, V_{IN}^- = 0V, V_{OH} = 10V
Output sink current	Isink	10	20	—	mA	V_{IN} = 0V, V_{IN} = 1V, V_{OL} = 2.5V
Supply current	I_{CC}	—	0.8	2	mA	V_{IN} = GND, R_L = ∞
Power dissipation	P_T	—	12	30	mW	R_L = ∞, V_{IN} = GND
Slew rate	SR	—	0.19	—	V/µs	f = 1.5kHz, V_{CM} = 7.5V, R_L =
Channel separation	CS	—	120	—	dB	f = 1kHz
Output sink current	Isink	15	50	—	µA	V_{IN}^+ = 0V, V_{IN}^- = 1V, V_{OL} = 200mV
	Isink	3	9	—	mA	V_{IN}^+ = 0V, V_{IN}^- = 1V, V_{OL} = 1V
Output voltage	V_{OH}	13.2	13.6	—	V	I_{OH} = –1mA
	V_{OH}	12.0	13.3	—	V	I_{OH} = –10mA
Output voltage	V_{OL}	—	0.8	1.0	V	I_{OL} = 1mA
	V_{OL}	—	1.1	1.8	V	I_{OL} = 10mA

Characteristics Curve




Voltage Gain vs. Supply Voltage
Ta = 25°C
R_L = ∞
Voltage Gain A_{VD} (dB)
160
120
80
40
0
8
16
24
32
40
Supply Voltage V_{CC} (V)
Maximum Output Voltage vs. Frequency
V_{CC} = 15 V
Ta = 25°C
R_L = 20 kΩ
Maximum Output Voltage V_{OH-R} (V)
20
16
12
8
4
0
1 k
3 k
10 k
30 k
100 k
300 k
1 M
Frequency f (Hz)
Voltage Gain vs. Frequency
V_{CC} = 15V
Ta = 25°C
R_L = ∞
Voltage Gain A_{VD} (dB)
120
100
80
60
40
20
0
1
3
10
30
100
300
1 k
3 k
10 k
30 k
100 k
300 k
1 M
Frequency f (Hz)



Solder Mounting Method

1. Small and light surface-mount packages require spicial attentions on solder mounting.
   On solder mounting, pre-heating before soldering is needed.
   The following figure show an example of infrared rays refow.

2. The difference of thermal expansion coefficeient between mounted substrates and IC leads may cause a failure like solder peeling or soler wet, and electrical characteristics may change by thermal stress. Therefore, mounting should be done after sufficient confirmation for especially in case of ceramic substrates.

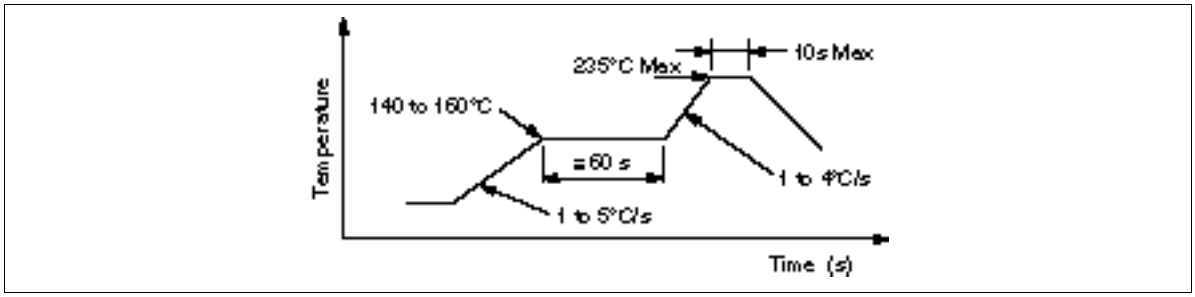


Figure 1 An Example of Infrared Rays Reflow Conditions