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# HA17324 Series

## Quad Operational Amplifier

# HITACHI

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### 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.

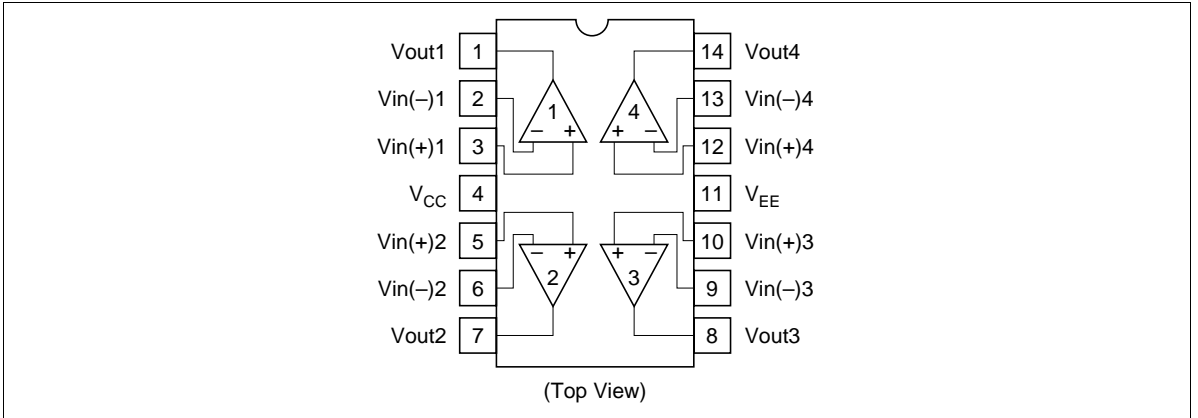
### Features

- 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

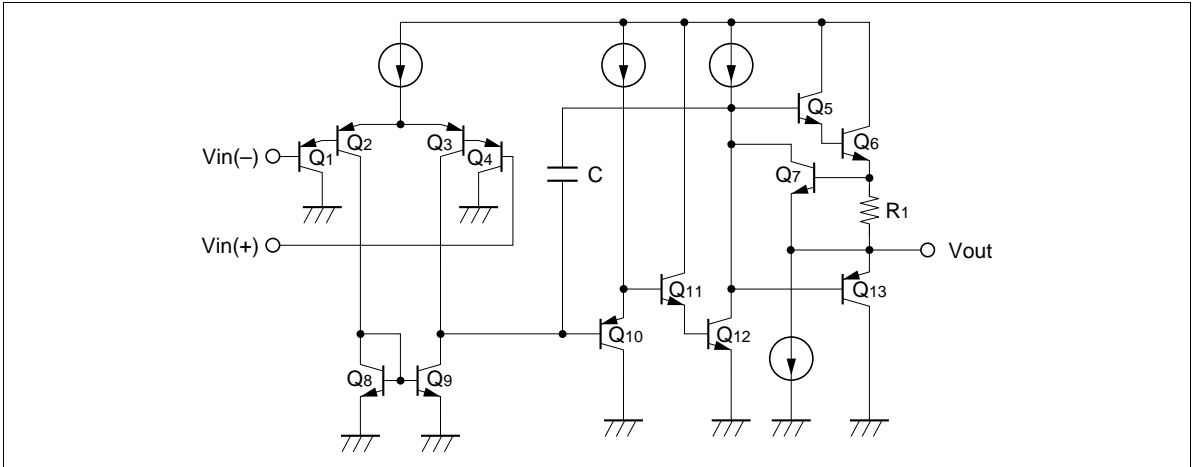
### Ordering Information

Type No.	Application	Package
HA17324FP	Industrial use	FP-14DA
HA17324F	Commercial use	FP-14DA
HA17324	Commercial use	DP-14
HA17324P	Industrial use	DP-14

## Pin Arrangement



## Circuit Schematic (1/4)



**Absolute Maximum Ratings (Ta = 25°C)**

<b>Item</b>	<b>Symbol</b>	<b>Rating</b>	<b>Unit</b>
Supply voltage	$V_{CC}$	32	V
Sink current	$I_{sink}$	50	mA
Power dissipation	$P_T$	625*	mW
Common mode input voltage	$V_{CM}$	-0.3 to $V_{CC}$	V
Differential input voltage	$V_{in (diff)}$	$\pm V_{CC}$	V
Operating temperature	$T_{opr}$	-20 to +75	°C
Storage temperature	$T_{stg}$	-55 to +125	°C

Note: These are allowable values up to Ta=50°C.

Derate by 8.3mW/°C above that temperature.

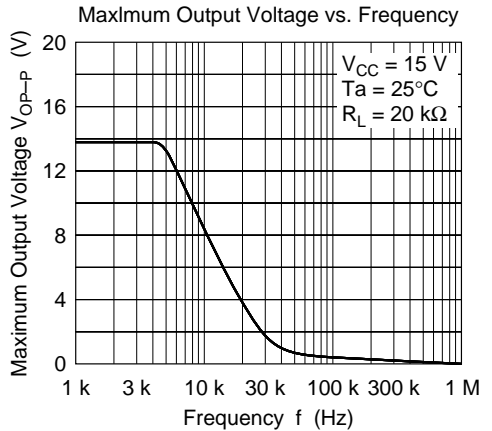
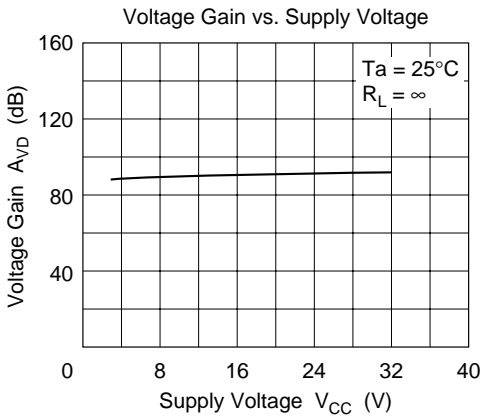
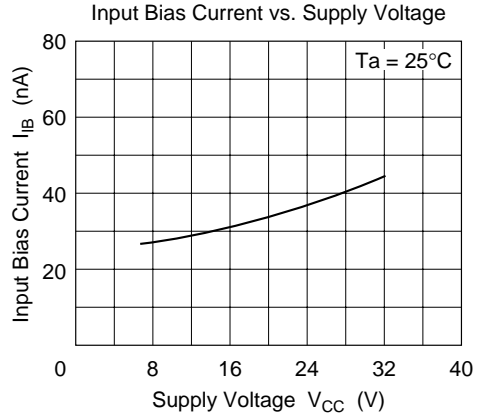
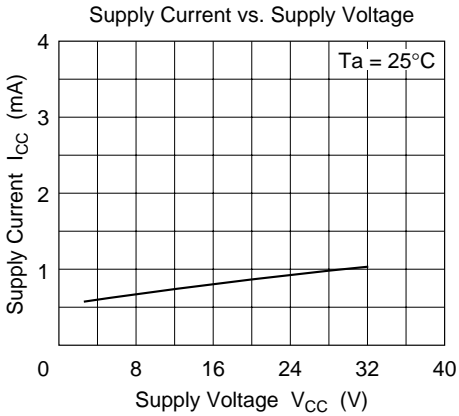
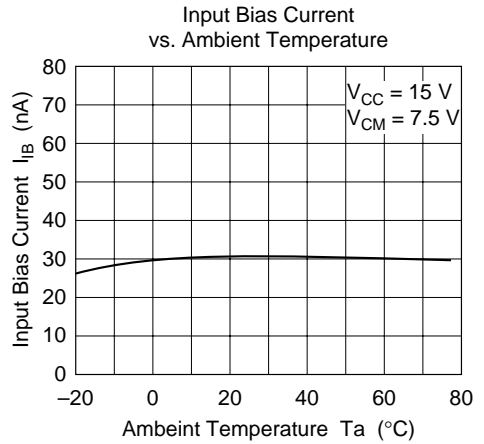
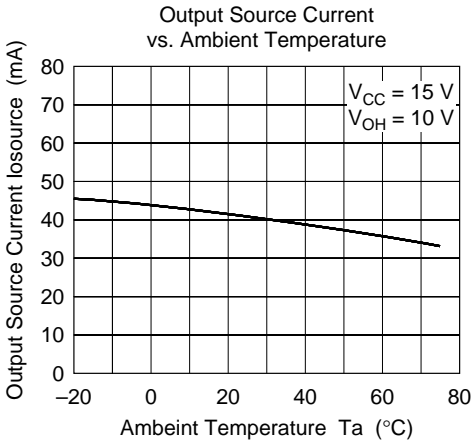
In case of SOP, see notes on SOP Package Usage in Reliability section.

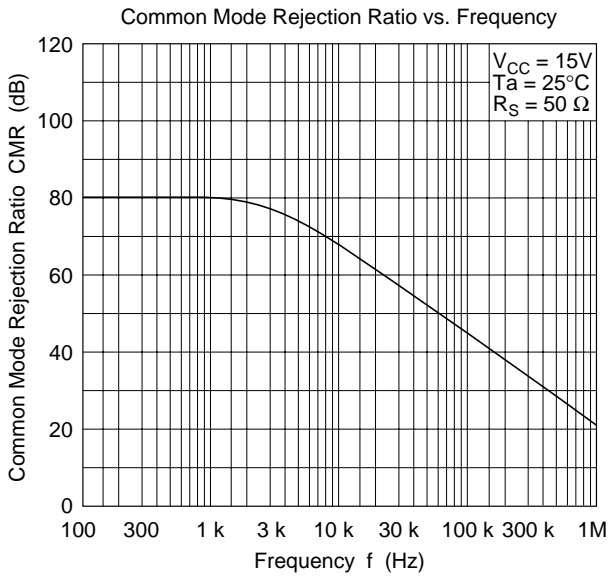
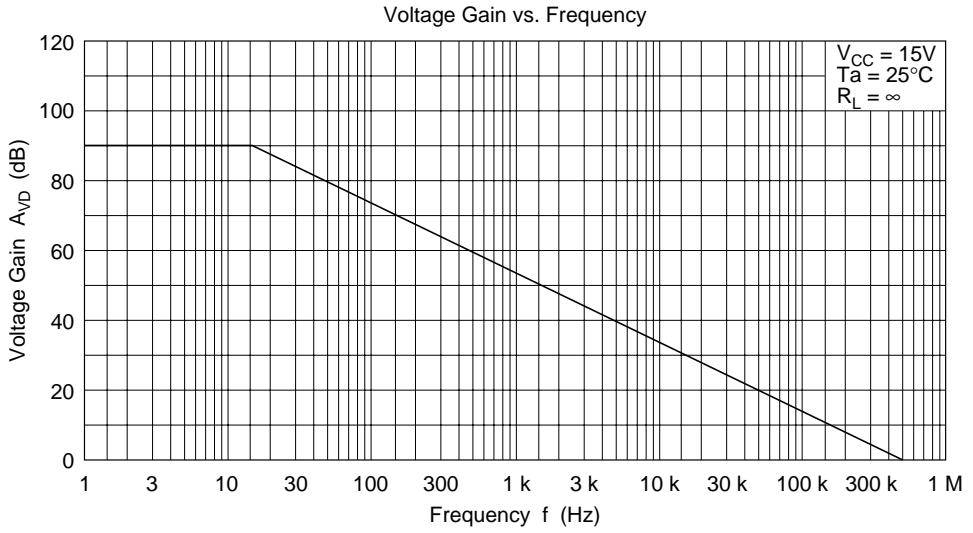
# HA17324 Series

## Electrical Characteristics ( $V_{CC} = +15V$ , $T_a = 25^\circ C$ )

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	$V_{IO}$	—	2	7	mV	$V_{CM} = 7.5V$ , $R_S = 50\Omega$ , $R_f = 50k\Omega$
Input offset current	$I_{IO}$	—	5	50	nA	$V_{CM} = 7.5V$ , $I_{IO} =  I_{I(-)} - I_{I(+)} $
Input bias current	$I_{IB}$	—	30	500	nA	$V_{CM} = 7.5V$
Power source rejection ratio	PSRR	—	93	—	dB	$f = 100Hz$ , $R_S = 1k\Omega$ , $R_j = 100k\Omega$
Voltage gain	$A_{VD}$	75	90	—	dB	$R_S = 1k\Omega$ , $R_f = 100k\Omega$ , $R_L = \infty$
Common mode rejection ratio	CMR	—	80	—	dB	$R_S = 50\Omega$ , $R_f = 5k\Omega$
Common mode input voltage range	$V_{CM}$	-0.3	—	13.5	V	$R_S = 1k\Omega$ , $R_f = 100k\Omega$ , $f = 100Hz$
Maximum output voltage	$V_{op-p}$	—	13.6	—	V	$f = 100Hz$ , $R_S = 1k\Omega$ , $R_f = 100k\Omega$ , $R_L = 20k\Omega$
Output source current	$I_{osource}$	20	40	—	mA	$V_{IN}^+ = 1V$ , $V_{IN}^- = 0V$ , $V_{OH} = 10V$
Output sink current	$I_{osink}$	10	20	—	mA	$V_{IN} = 0V$ , $V_{IN} = 1V$ , $V_{OL} = 2.5V$
Supply current	$I_{CC}$	—	0.8	2	mA	$V_{IN} = GND$ , $R_L = \infty$
Slew rate	SR	—	0.19	—	V/ $\mu s$	$f = 1.5kHz$ , $V_{CM} = 7.5V$ , $R_L = \infty$
Channel separation	CS	—	120	—	dB	$f = 1kHz$
Output sink current	$I_{osink}$	15	50	—	$\mu A$	$V_{IN}^+ = 0V$ , $V_{IN}^- = 1V$ , $V_{OL} = 200mV$
	$I_{osink}$	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	$I_{OL} = 10mA$

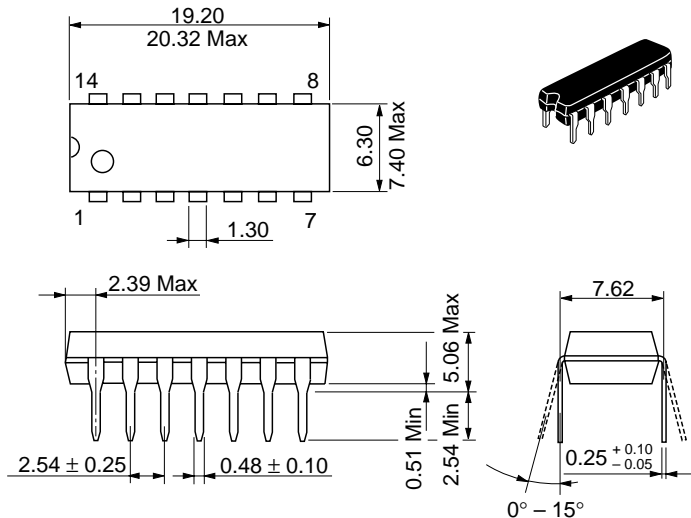
Characteristic Curves





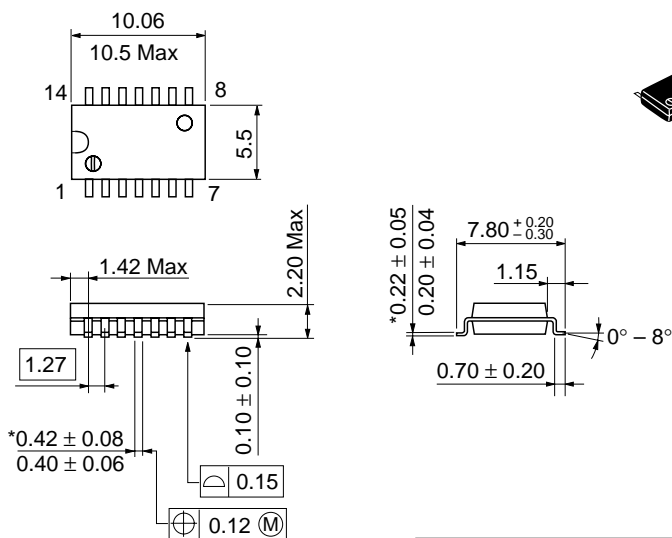
Package Dimensions

Unit: mm



Hitachi Code	DP-14
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.97 g

Unit: mm



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.23 g

## Cautions

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