

HA17358/A Series

Dual Operational Amplifier

HITACHI

ADE-204-033 (Z)

1st Edition

July 2000

Description

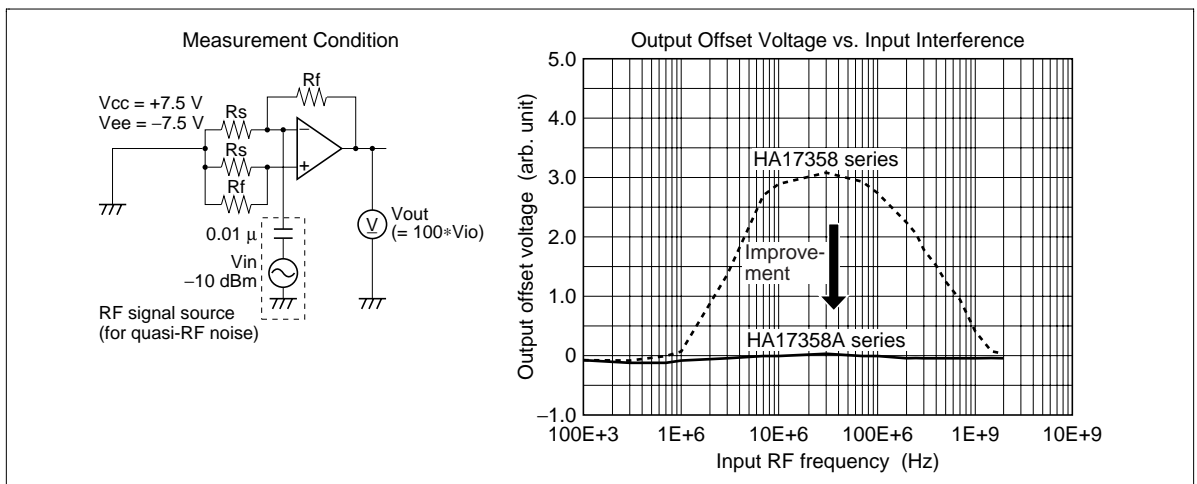
HA17358 series and HA17358A series are dual operational amplifier that provide high gain and internal phase compensation, with single power supply. They can be widely applied to control equipments and to general use.

Features

- Wide range of supply voltage, and single power supply used
- Wide range of common mode voltage, and possible to operate with an input about 0 V, and output around 0 V is available
- Frequency characteristics and input bias current are temperature compensated

Features only for “A” series

- Low electro-magnetic susceptibility level



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.

HA17358/A Series

Ordering Information

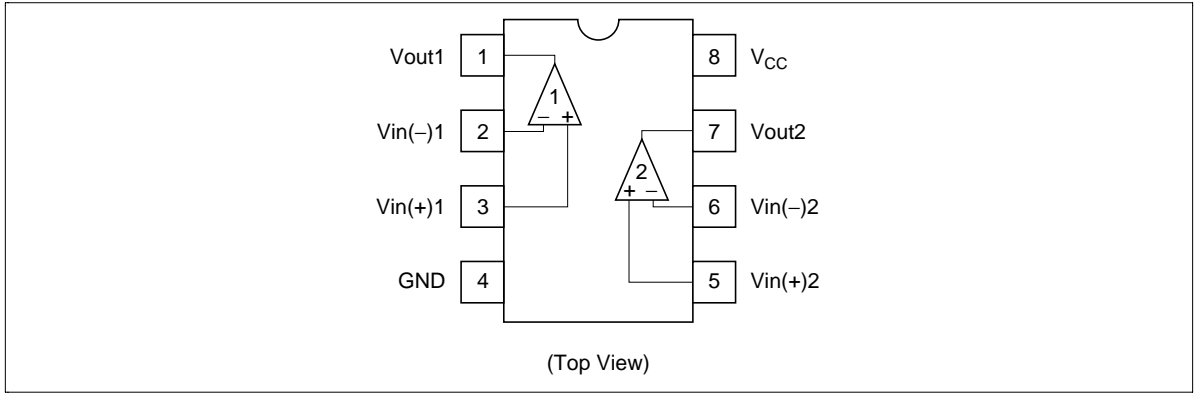
HA17358 Series

Type No.	Application	Package
HA17358	Commercial use	DP-8
HA17358F		FP-8D

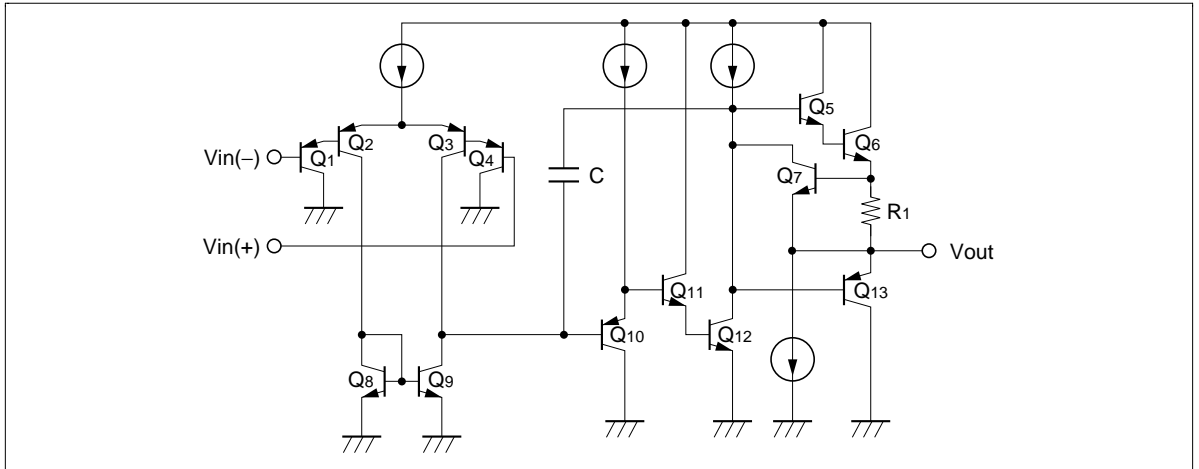
HA17358A Series

Type No.	Application	Package
HA17358APS	Industrial use	DP-8
HA17358ARP		FP-8DC
HA17358AFP		FP-8D

Pin Arrangement



Circuit Schematic (1/2)



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings		Unit
		HA17358/APS	HA17358F/AFP/ARP	
Supply voltage	V _{CC}	32	32	V
Sink current	I _{sink}	50	50	mA
Power dissipation	P _T	570 * ¹	385 * ²	mW
Common mode input voltage	V _{CM}	-0.3 to V _{CC}	-0.3 to V _{CC}	V
Differential input voltage	V _{in} (diff)	±V _{CC}	±V _{CC}	V
Operating temperature	T _{opr}	-20 to +75	-20 to +75	°C
Storage temperature	T _{stg}	-55 to +125	-55 to +125	°C

Notes: 1. This is the allowable values up to Ta = 50°C. Derate by 8.3 mW/°C.

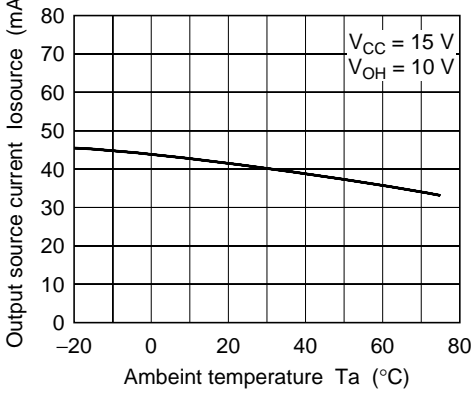
2. This is the allowable value up to Ta = 45°C mounting on 30% wiring density glass epoxy board. Derate by 7.14 mW/°C above that temperature.

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

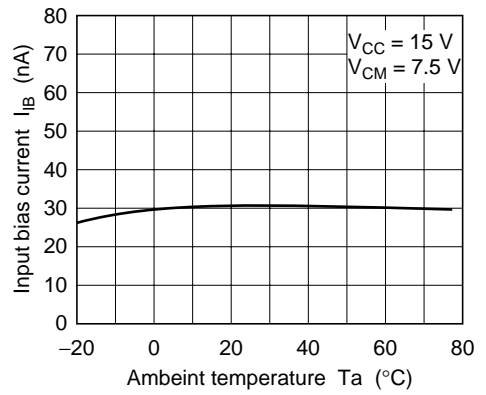
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V_{IO}	—	3	7	mV	$V_{CM} = 7.5\text{V}$, $R_S = 50\Omega$, $R_f = 50\text{k}\Omega$
Input offset current	I_{IO}	—	5	50	nA	$V_{CM} = 7.5\text{V}$, $I_{IO} = I_{I(+)} - I_{I(-)} $
Input bias current	I_{IB}	—	30	250	nA	$V_{CM} = 7.5\text{V}$
Power source rejection ratio	PSRR	—	93	—	dB	$R_S = 1\text{k}\Omega$, $R_f = 100\text{k}\Omega$
Voltage gain	A_{VD}	75	90	—	dB	$R_L = \infty$, $R_S = 1\text{k}\Omega$, $R_f = 100\text{k}\Omega$
Common mode rejection ratio	CMR	—	80	—	dB	$R_S = 50\Omega$, $R_f = 5\text{k}\Omega$
Common mode input voltage range	$V_{CM(+)}$	13.5	—	—	V	$R_S = 1\text{k}\Omega$, $R_f = 100\text{k}\Omega$
	$V_{CM(-)}$	—	—	-0.3	V	$R_S = 1\text{k}\Omega$, $R_f = 100\text{k}\Omega$
Peak-to-peak output voltage	V_{op-p}	—	13.6	—	V	$f = 100\text{Hz}$, $R_L = 20\text{k}\Omega$, $R_S = 1\text{k}\Omega$, $R_f = 100\text{k}\Omega$
Output source current	$I_{osource}$	20	40	—	mA	$V_{IN}^+ = 1\text{V}$, $V_{IN}^- = 0\text{V}$, $V_{OH} = 10\text{V}$
Output sink current	I_{osink}	10	20	—	mA	$V_{IN}^- = 1\text{V}$, $V_{IN}^+ = 0\text{V}$, $V_{OL} = 2.5\text{V}$
Output sink current	I_{osink}	15	50	—	μA	$V_{IN}^- = 1\text{V}$, $V_{IN}^+ = 0\text{V}$, $V_{out} = 200\text{mV}$
Supply current	I_{CC}	—	0.8	2	mA	$V_{IN} = \text{GND}$, $R_L = \infty$
Slew rate	SR	—	0.2	—	$\text{V}/\mu\text{s}$	$R_L = \infty$, $V_{CM} = 7.5\text{V}$, $f = 1.5\text{kHz}$
Channel separation	CS	—	120	—	dB	$f = 1\text{kHz}$

Characteristic Curves

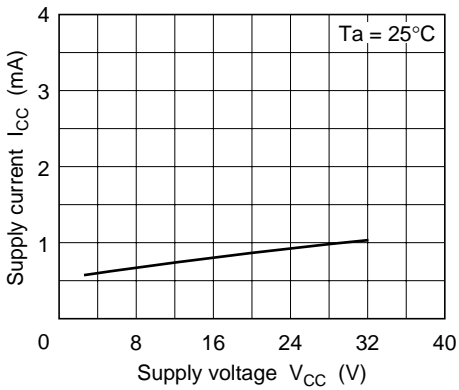
Output Source Current vs. Ambient Temperature



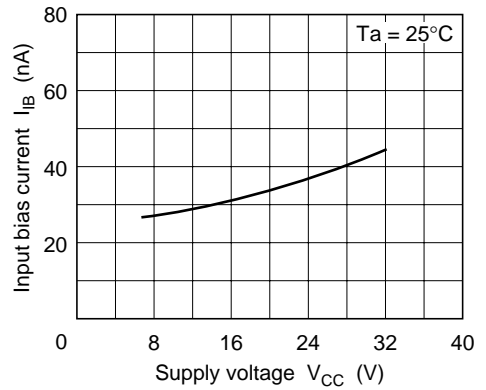
Input Bias Current vs. Ambient Temperature



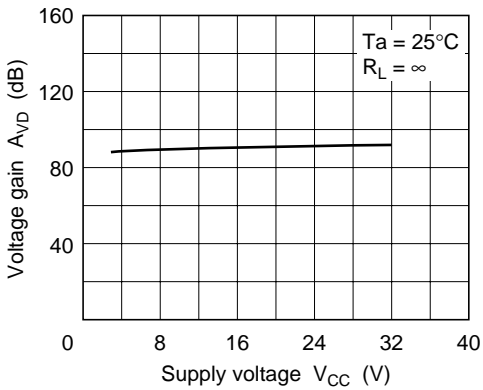
Supply Current vs. Supply Voltage



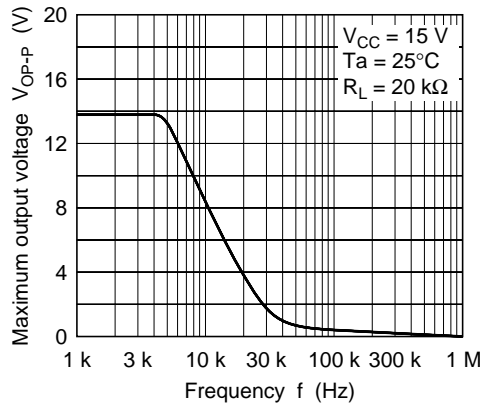
Input Bias Current vs. Supply Voltage

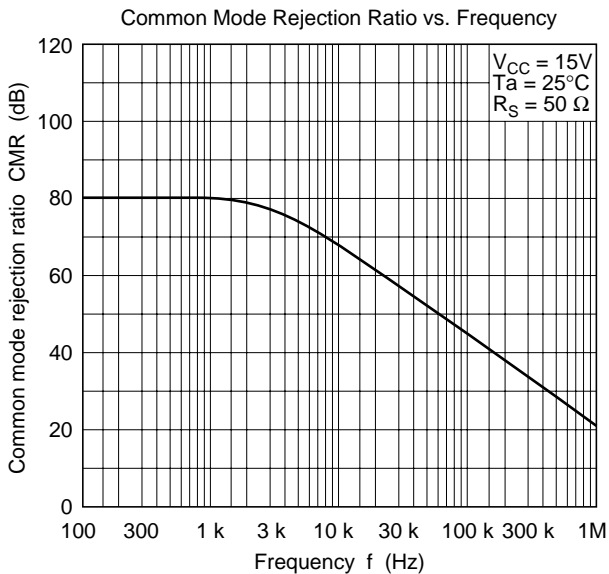
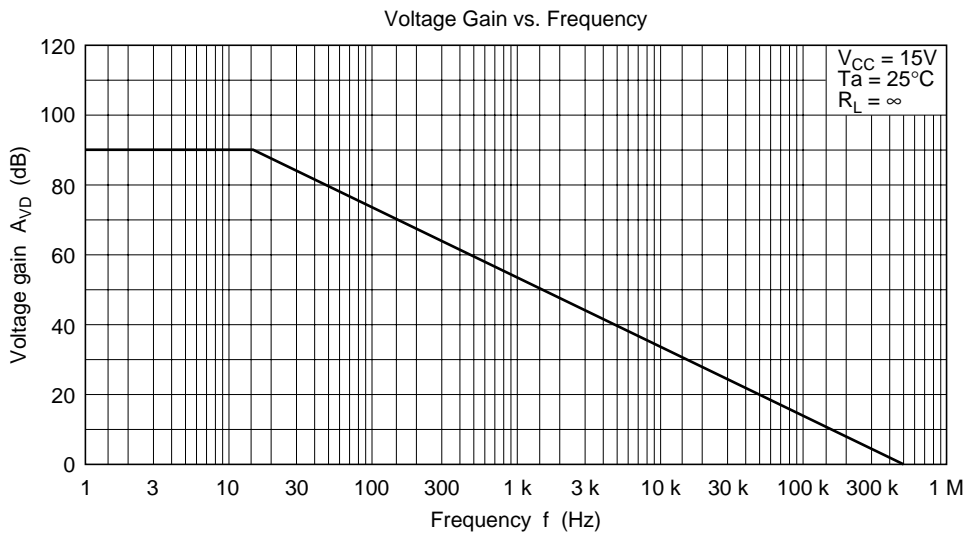


Voltage Gain vs. Supply Voltage



Maximum Output Voltage vs. Frequency





Solder Mounting Method

1. Small and light surface-mount packages require special attentions on solder mounting.
On solder mounting, pre-heating before soldering is needed.
The following figure show an example of infrared rays reflow.
2. The difference of thermal expansion coefficient between mounted substrates and IC leads may cause a failure like solder peeling or solder wet, and electrical characteristics may change by thermal stress.
Therefore, mounting should be done after sufficient confirmation for especially in case of ceramic substrates.

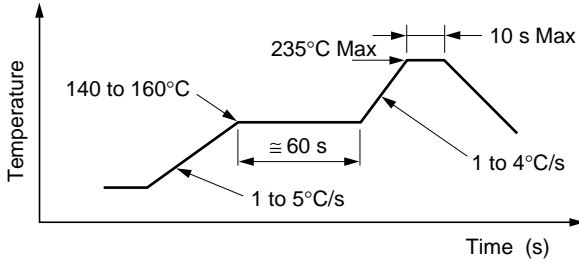
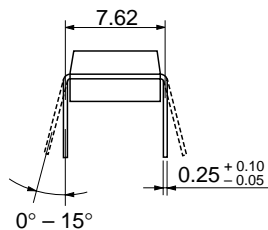
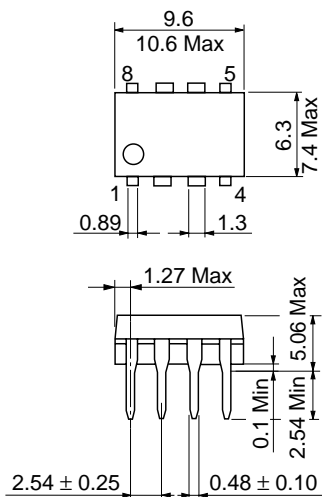


Figure 1 An Example of Infrared Rays Reflow Conditions

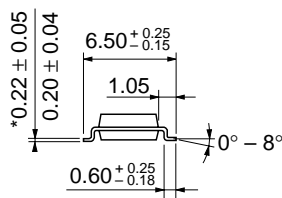
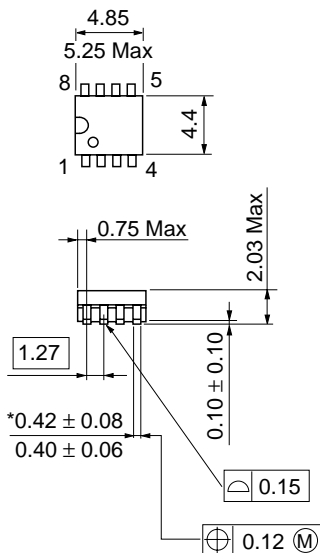
Package Dimensions

Unit: mm



Hitachi Code	DP-8
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.54 g

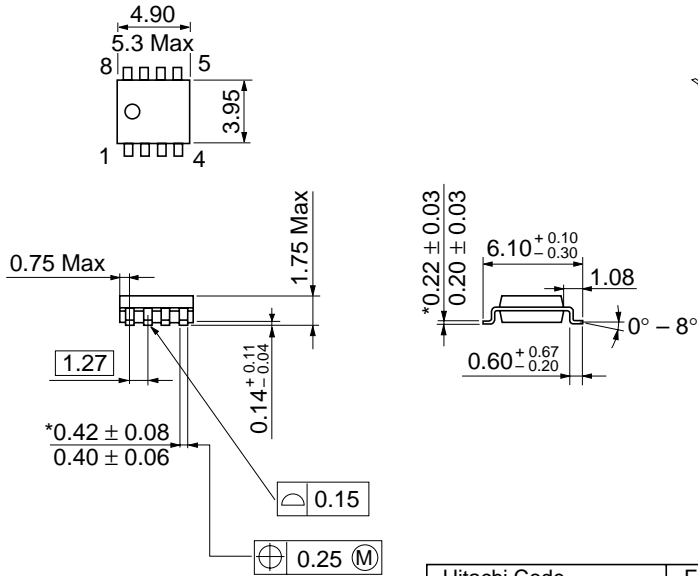
Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-8D
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.10 g

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-8DC
JEDEC	Conforms
EIAJ	—
Mass (reference value)	0.085 g

Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits.
 Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
 Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL NorthAmerica : <http://semiconductor.hitachi.com/>
 Europe : <http://www.hitachi-eu.com/hel/ecg>
 Asia : <http://www.hitachi.com.sg/grp3/sicd>
 Japan : <http://www.hitachi.co.jp/Sicd/indx.htm>

For further information write to:

Hitachi Semiconductor
 (America) Inc.
 179 East Tasman Drive,
 San Jose, CA 95134
 Tel: <1> (408) 433-1990
 Fax: <1>(408) 433-0223

Hitachi Europe GmbH
 Electronic Components Group
 Dornacher StraÙe 3
 D-85622 Feldkirchen, Munich
 Germany
 Tel: <49> (89) 9 9180-0
 Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
 Electronic Components Group.
 Whitebrook Park
 Lower Cookham Road
 Maidenhead
 Berkshire SL6 8YA, United Kingdom
 Tel: <44> (1628) 585000
 Fax: <44> (1628) 585160

Hitachi Asia Ltd.
 16 Collyer Quay #20-00
 Hitachi Tower
 Singapore 049318
 Tel: 535-2100
 Fax: 535-1533

Hitachi Asia Ltd.
 Taipei Branch Office
 3rd Flr, Hung Kuo Building, No.167,
 Tun Hwa North Road, Taipei (105)
 Taiwan
 Tel: <886> (2) 2718-3666
 Fax: <886> (2) 2718-8180
 Telex: 23222 HAS-TP

Hitachi Asia (Hong Kong) Ltd.
 Group III (Electronic Components)
 7th Flr, North Tower, World Finance Centre,
 Harbour City, Canton Road, Tsim Sha Tsui,
 Kowloon, Hong Kong
 Tel: <852> (2) 735 9218
 Fax: <852> (2) 730 0281
 Telex: 40815 HITEC HX

Copyright ' Hitachi, Ltd., 2000. All rights reserved. Printed in Japan.
 Colophon 1.0