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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

Cautions

Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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HA17358A Series

Dual Operational Amplifier

RENESAS

ADE-204-033B (Z)

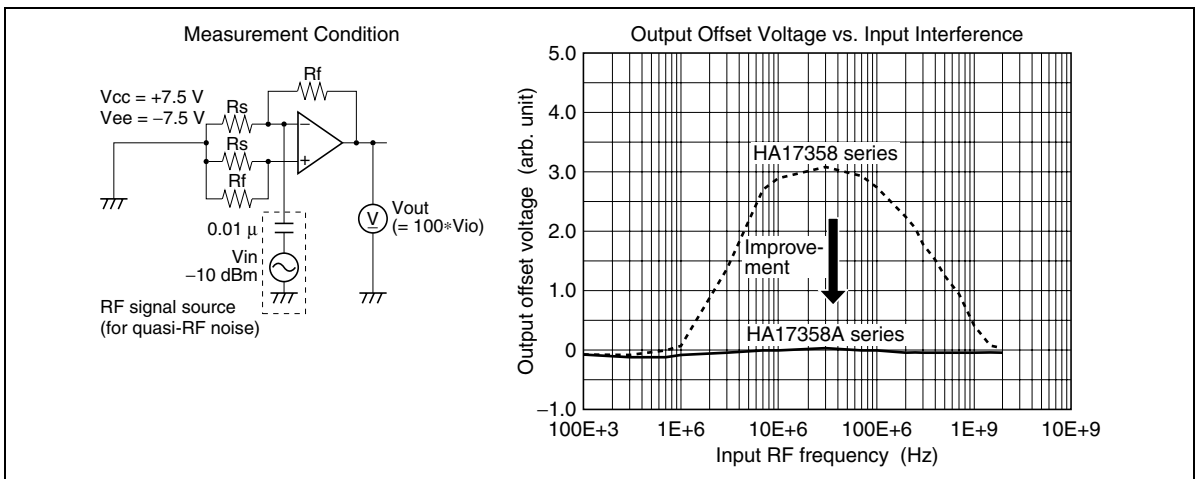
Rev.2
May 2001

Description

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

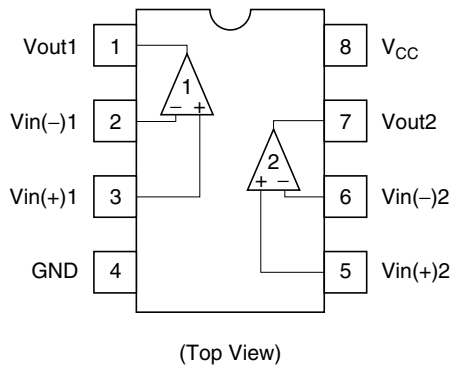
- Wide range of supply voltage, and single power supply used
- Wide range of common mode voltage, and possible to operate with an input about 0 V, and output around 0 V is available
- Frequency characteristics and input bias current are temperature compensated
- Low electro-magnetic susceptibility level



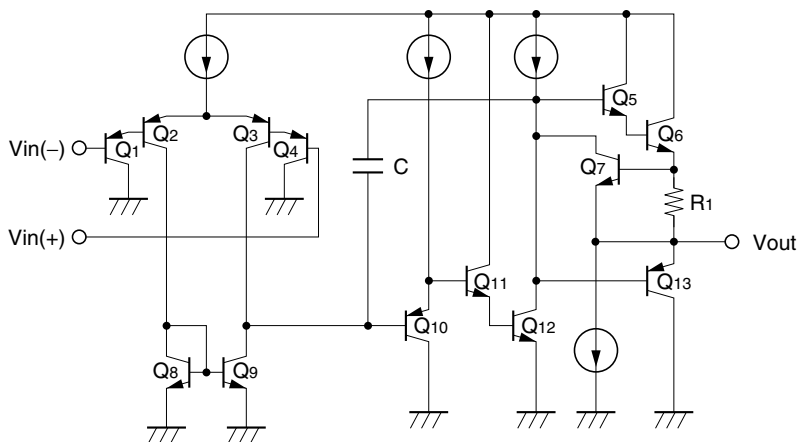
Ordering Information

Type No.	Application	Package
HA17358A	Commercial use	DP-8B
HA17358AF		FP-8D
HA17358ARP		FP-8DC

Pin Arrangement



Circuit Schematic (1/2)



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings		Unit
		HA17358A	HA17358AF/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)	$\pm V_{CC}$	$\pm V_{CC}$	V
Operating temperature	T_{opr}	-40 to +85	-40 to +85	°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. These are the allowable values up to Ta = 25°C mounting in air.

When it is mounted on glass epoxy board of 40 mm × 40 mm × 1.5 mmt with 30% wiring density, the allowable value is 570 mW up to Ta = 45°C. If Ta > 45°C, derate by 7.14 mW/°C.

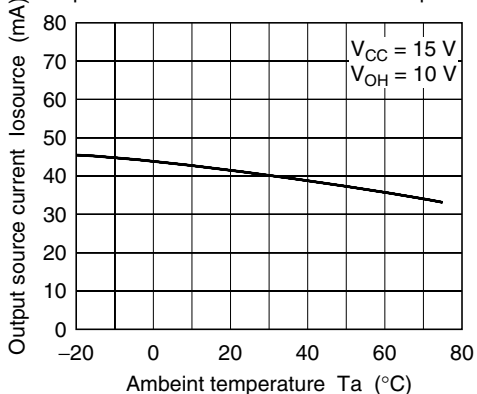
Electrical Characteristics

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

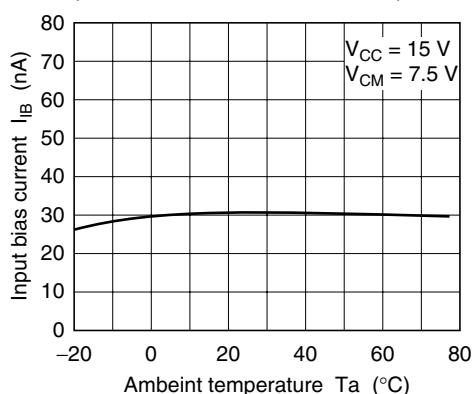
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V_{IO}	—	3	7	mV	$V_{CM} = 7.5\text{V}$, $R_S = 50\Omega$, $R_f = 50\text{k}\Omega$
Input offset current	I_{IO}	—	5	50	nA	$V_{CM} = 7.5\text{V}$, $I_{IO} = I_{I(+)} - I_{I(-)} $
Input bias current	I_{IB}	—	30	250	nA	$V_{CM} = 7.5\text{V}$
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	—	V/ μs	$R_L = \infty$, $V_{CM} = 7.5\text{V}$, $f = 1.5\text{kHz}$
Channel separation	CS	—	120	—	dB	$f = 1\text{kHz}$

Characteristic Curves

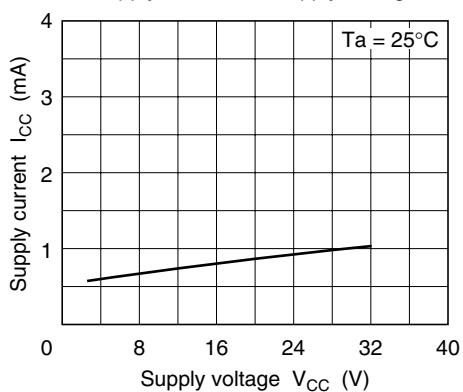
Output Source Current vs. Ambient Temperature



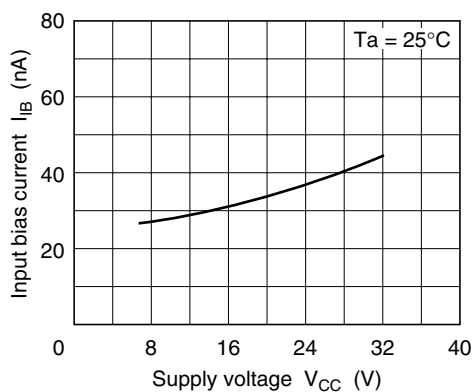
Input Bias Current vs. Ambient Temperature



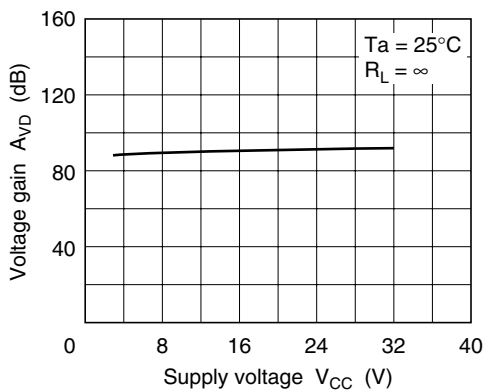
Supply Current vs. Supply Voltage



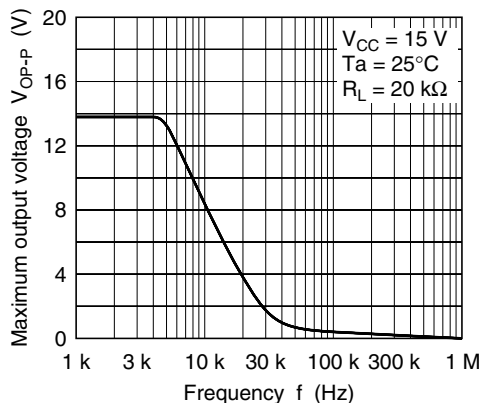
Input Bias Current vs. Supply Voltage

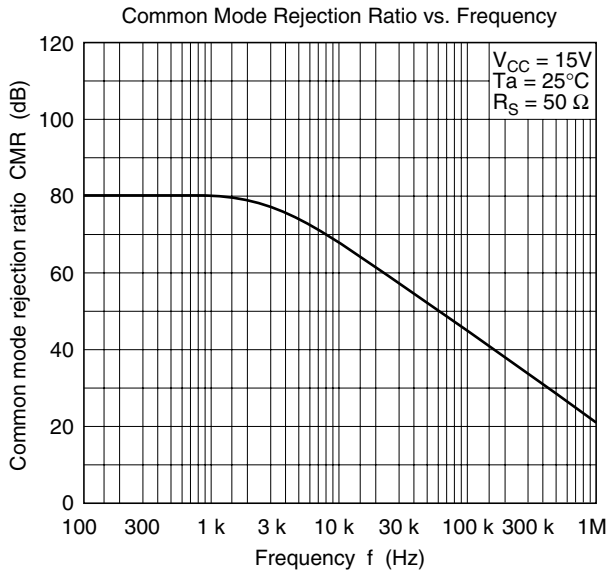
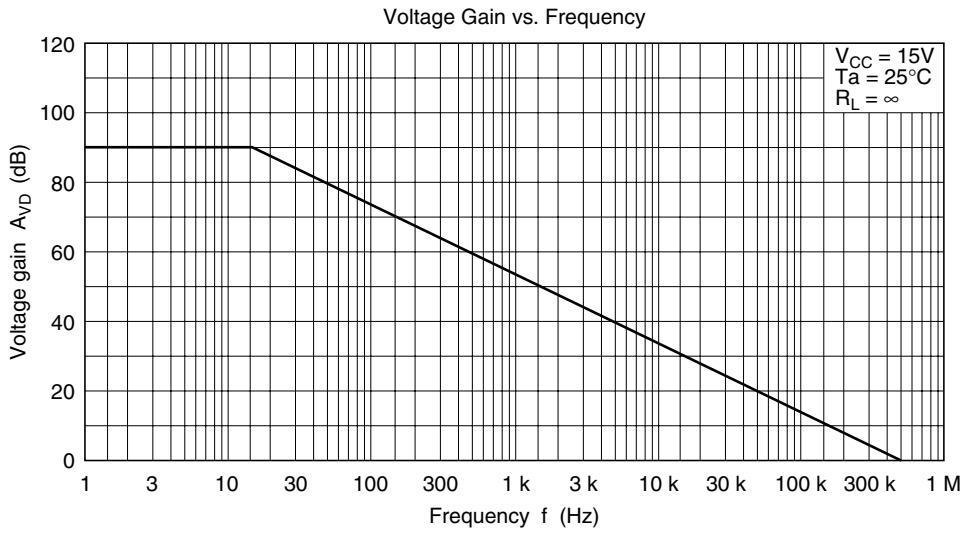


Voltage Gain vs. Supply Voltage



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.

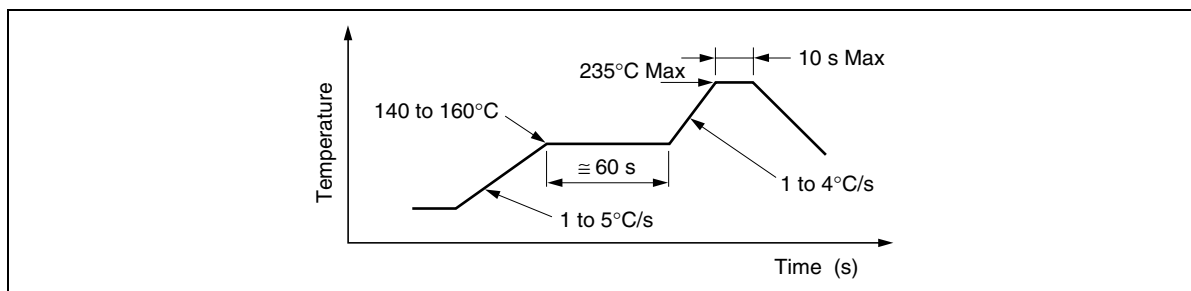
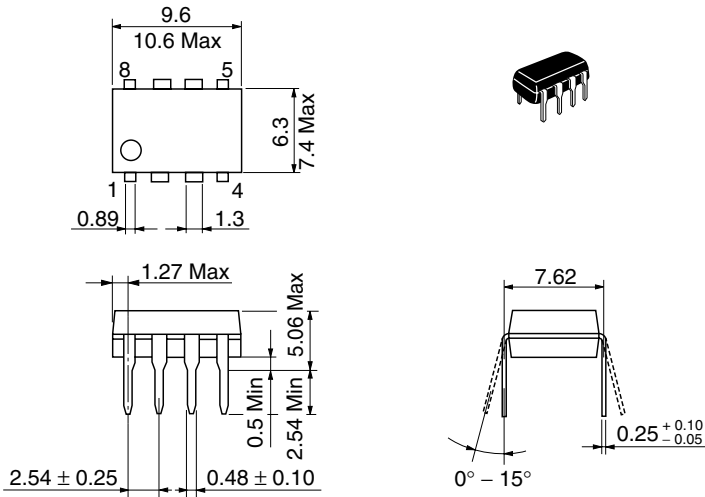


Figure 1 An Example of Infrared Rays Reflow Conditions

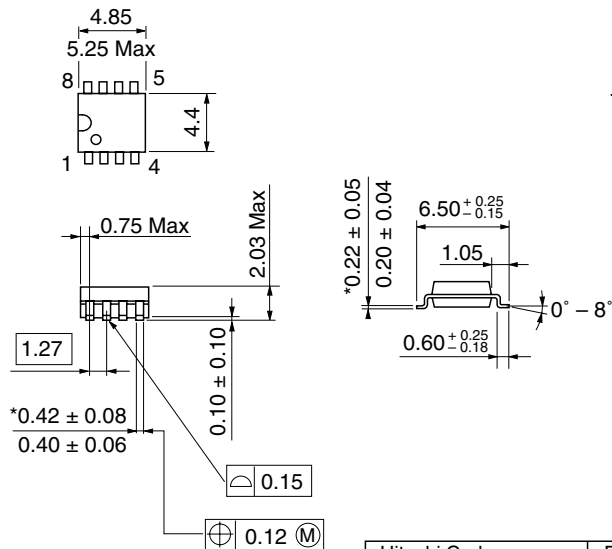
Package Dimensions

Unit: mm



Hitachi Code	DP-8B
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.51 g

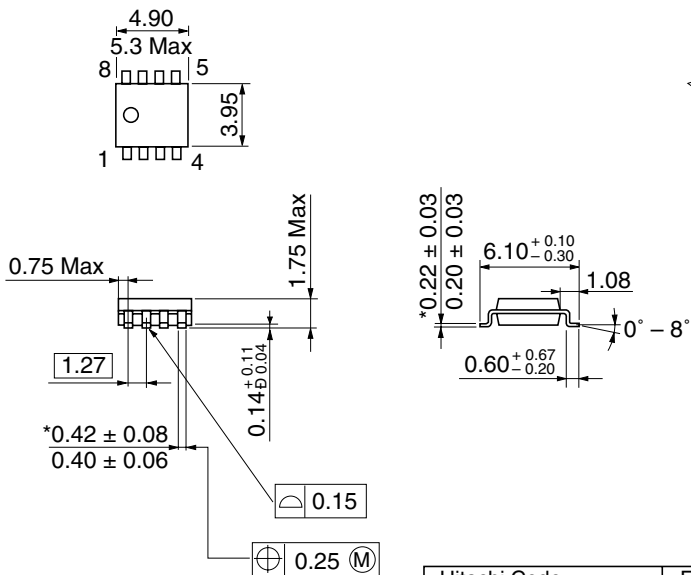
Unit: mm



*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

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