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

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   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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HA17902A Series

Quad Operational Amplifier

ADE-204-068 (Z)

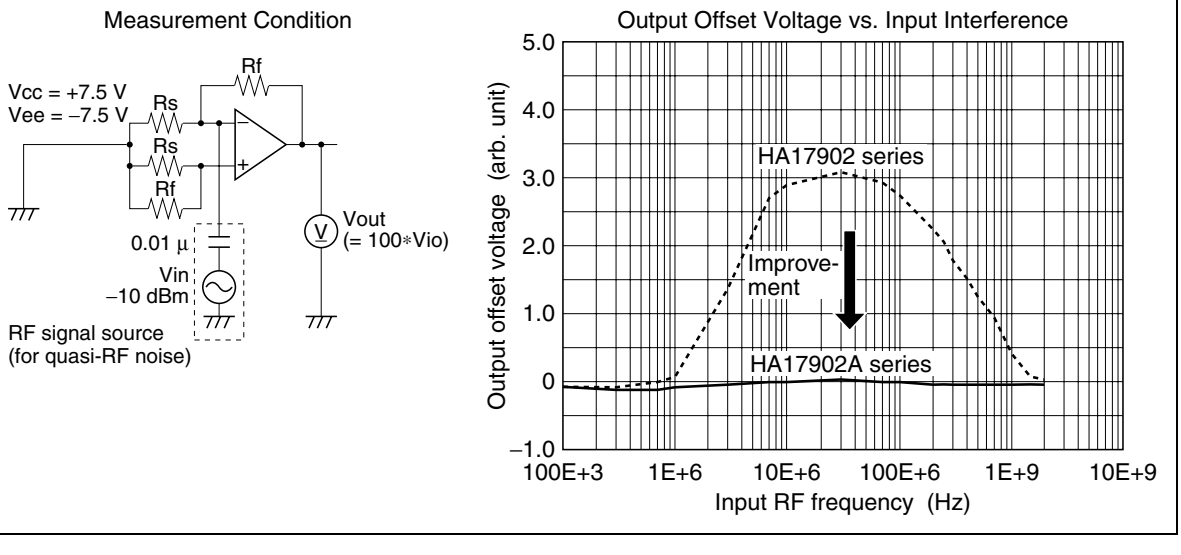
Rev.0
May 2001

Description

HA17902A series are quad operational amplifier that provide high gain and internal phase compensation, with single power supply. They can be widely used to control equipments.

Features

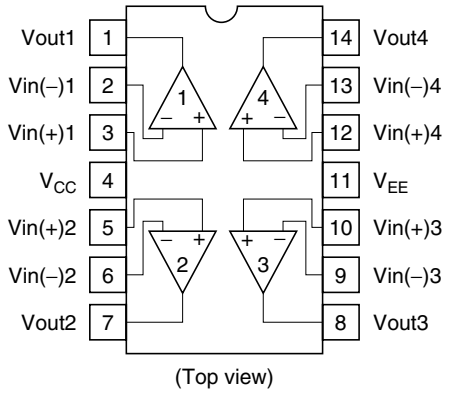
- Wide range of supply voltage, and single power supply used
- Internal phase compensation
- Wide range of common mode voltage, and possible to operate with an input about 0 V
- Low electro-magnetic susceptibility level



Ordering Information

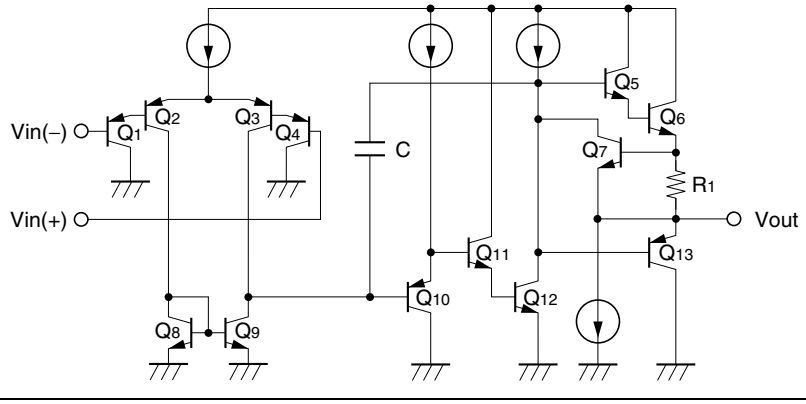
Type No.	Application	Package
HA17902AP	Industrial use	DP-14
HA17902AFP		FP-14DA

Pin Arrangement



(Top view)

Circuit Schematic (1/4)

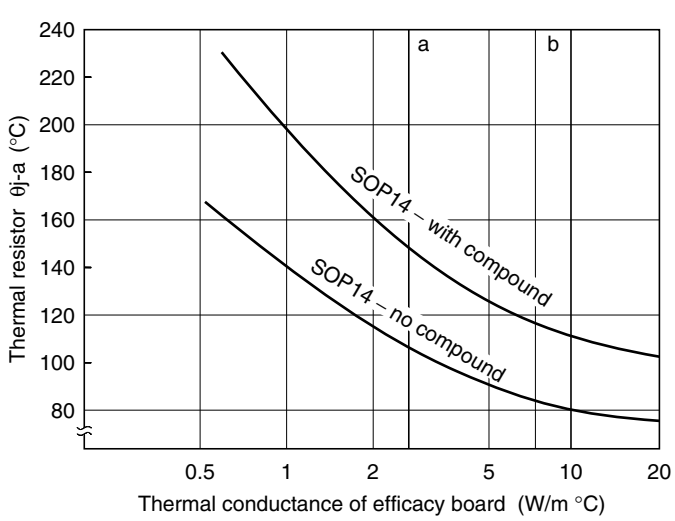


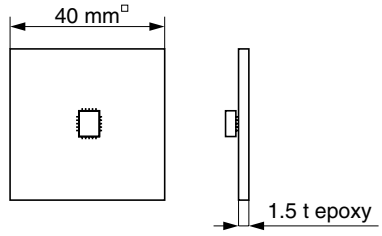
Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	32	V
Sink current	Isink	50	mA
Power dissipation	P_T	625 *1,2	mW
Common mode input voltage	V_{CM}	–0.3 to V_{CC}	V
Differential input voltage	Vin (diff)	$\pm V_{CC}$	V
Operating temperature	Topr	–40 to +85	°C
Storage temperature	Tstg	–55 to +125	°C

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





a. Class epoxy board of 10% wiring density
b. Class epoxy board of 30% wiring density

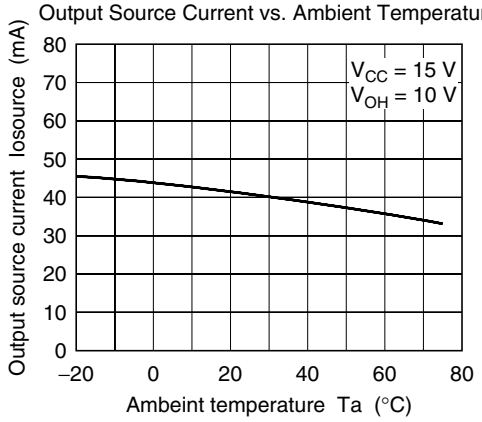
Electrical Characteristics

(V_{CC} = +15 V, Ta = 25°C)

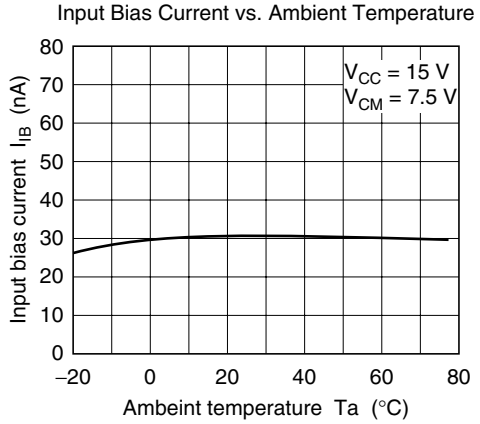
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V_{IO}	—	2	7	mV	V_{CM} = 7.5 V, R_S = 50 Ω, Rf = 50 kΩ
Input offset current	I_{IO}	—	5	50	nA	V_{CM} = 7.5 V, $I_{IO} = \lvert I_{I(-)} - I_{I(+)} \rvert$
Input bias current	I_{IB}	—	30	500	nA	V_{CM} = 7.5 V
Power source rejection ratio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

Characteristic Curves

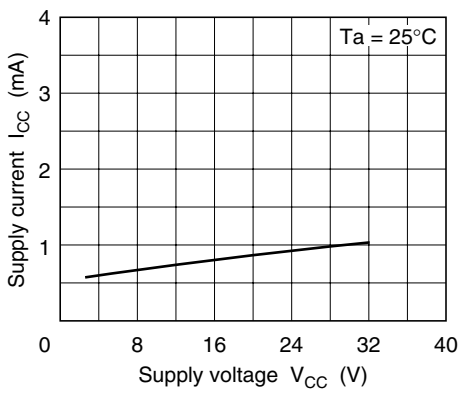
Output Source Current vs. Ambient Temperature



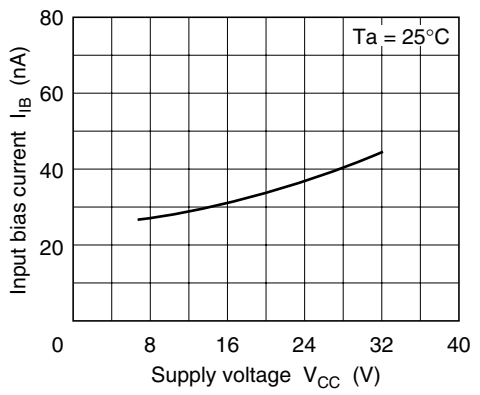
Input Bias Current vs. Ambient Temperature



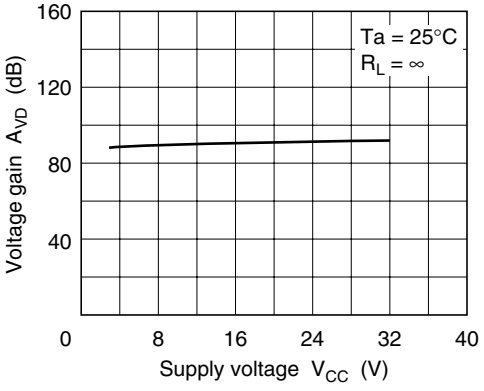
Supply Current vs. Supply Voltage



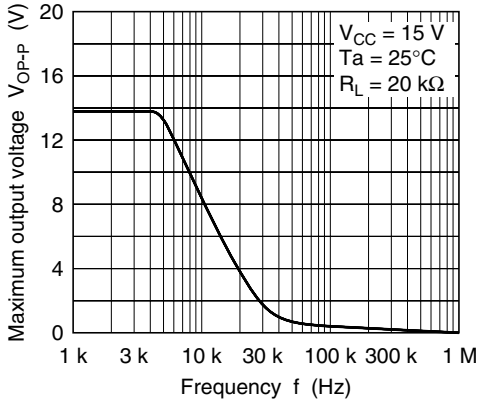
Input Bias Current vs. Supply Voltage



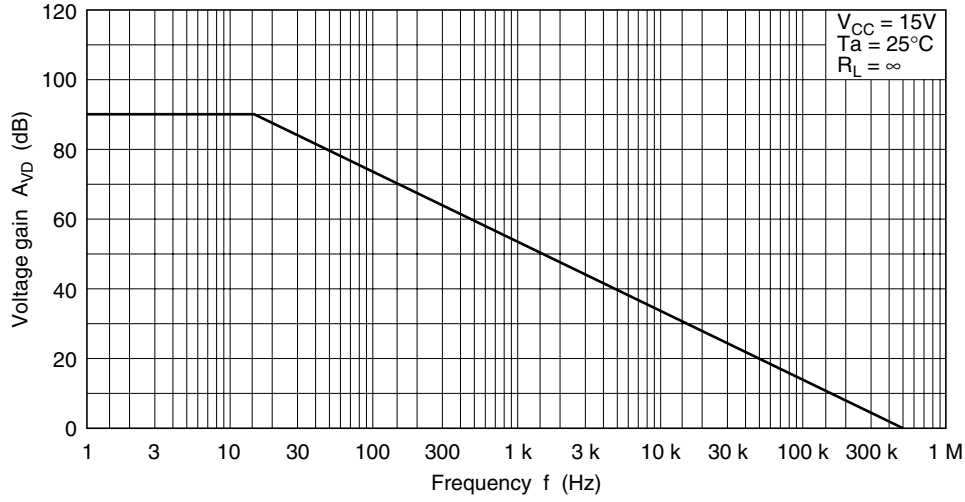
Voltage Gain vs. Supply Voltage



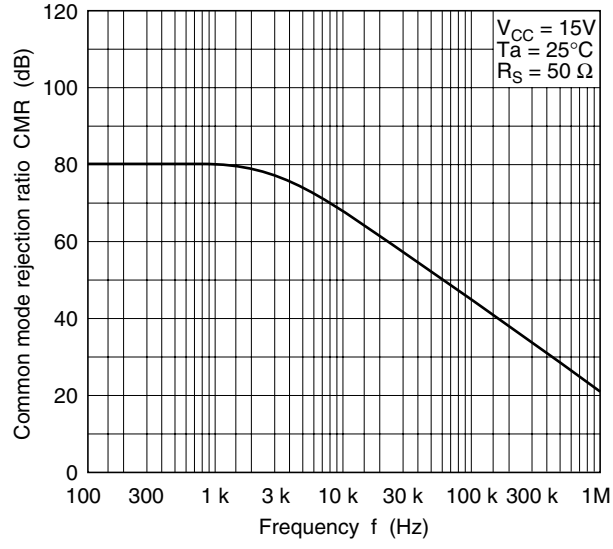
Maxlmum Output Voltage vs. Frequency



Voltage Gain vs. Frequency



Common Mode Rejection Ratio vs. Frequency



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.

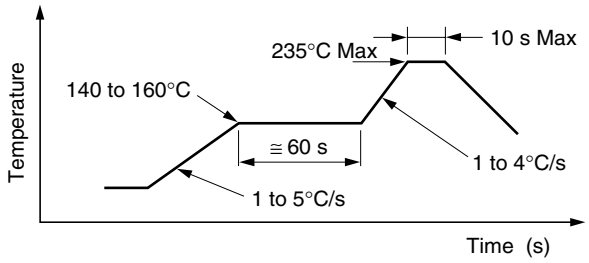
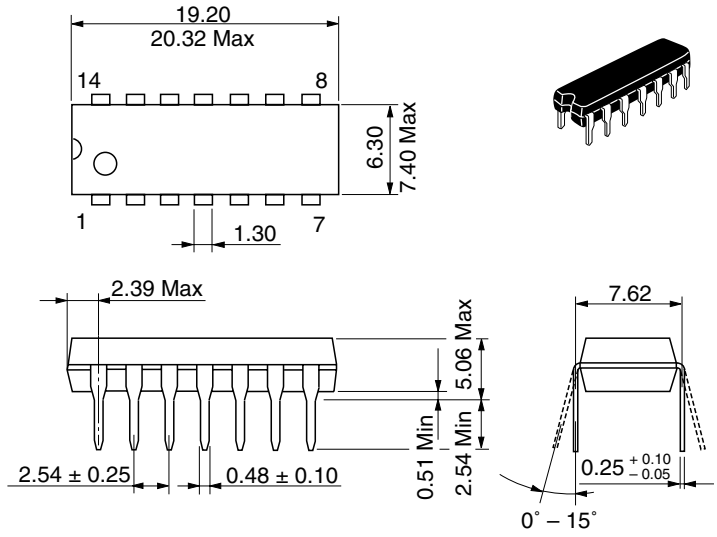


Figure 1 An Example of Infrared Rays Reflow Conditions

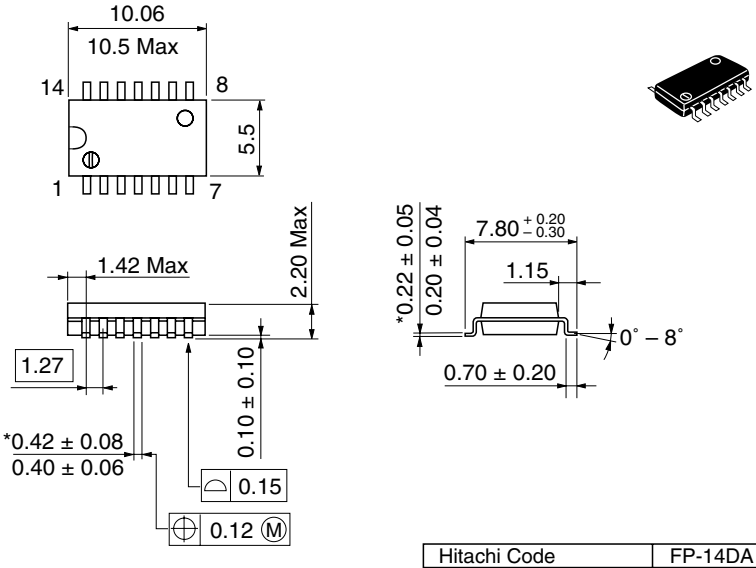
Package Dimensions

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

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