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

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Keep safety first in your circuit designs!

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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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HA17904 Series

Dual Operational Amplifier



ADE-204-046 (Z)
Rev. 0
Dec. 2000

Description

HA17904 is dual operational amplifier which, provide internal phase compensation and high gain, and mono power source operation is possible. It can be widely applied to control equipment and to general use.

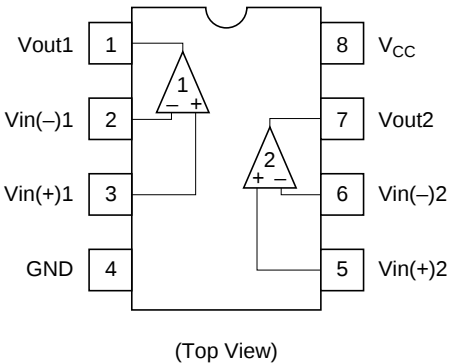
Features

- Wide range of operating supply voltage and mono power source operation is possible.
- Wide range of common mode input voltage possible to operate with an input around 0V, and output around 0V is available.
- Frequency characteristics and input bias current are temperature compensated.

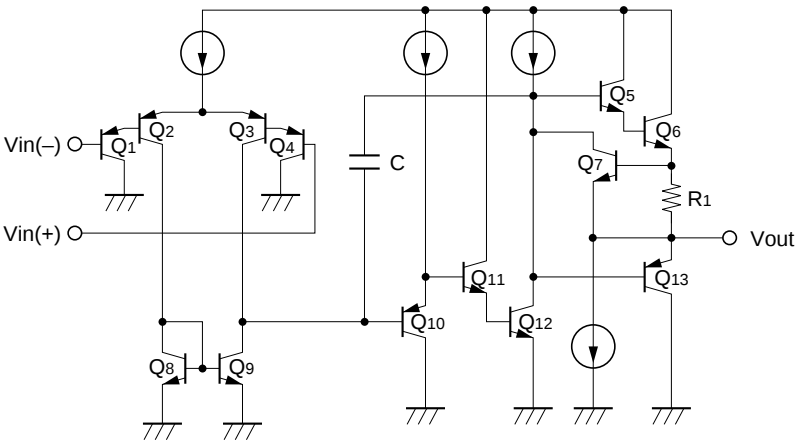
Ordering Information

Type No.	Application	Package
HA17904PSJ	Car use	DP-8
HA17904FPJ	Car use	FP-8D
HA17904FPK	Car use	
HA17904PS	Industrial use	DP-8
HA17904FP	Industrial use	FP-8D

Pin Arrangement



Circuit Schematic (1/2)



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings					Unit
		HA17904PS	HA17904FP	HA17904PSJ	HA17904FPJ	HA17904FPK	
Supply voltage	V _{CC}	32	32	32	32	32	V
Output sink current	I _{O sink}	50	50	50	50	50	mA
Common-mode input voltage	V _{CM}	−0.3 to V _{CC}	−0.3 to V _{CC}	−0.3 to V _{CC}	−0.3 to V _{CC}	−0.3 to V _{CC}	V
Common-mode differential voltage	V _{IN(diff)}	±V _{CC}	±V _{CC}	±V _{CC}	±V _{CC}	±V _{CC}	V
Power dissipation	P _T	570* ¹	385* ²	570* ¹	385* ²	385* ²	mW
Operating temperature range	Topr	−20 to +75	−20 to +75	−40 to +85	−40 to +85	−40 to +125	°C
Storage temperature range	Tstg	−55 to +125	−55 to +125	−55 to +125	−55 to +125	−55 to +150	°C

Notes: 1. These are the allowable values up to Ta = 55 °C. Derate by 8.3mW/°C above that temperature.
 2. These are the allowable values up to Ta = 45 °C mounting on 30% wiring density glass epoxy board. Derate by 7.14mW/°C above that temperature.

Electrical Characteristics 1 ($V_{CC} = +15V$, $T_a = 25^{\circ}C$)

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

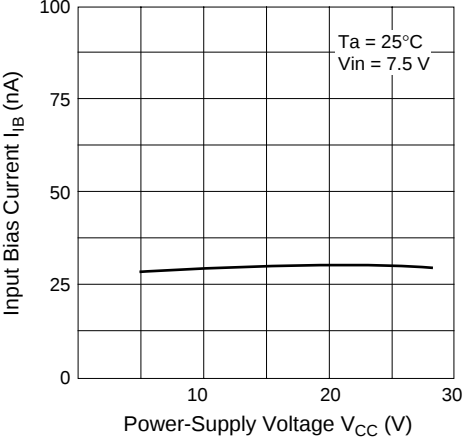
Electrical Characteristics 2 ($V_{CC} = +15V$, $T_a = -40$ to $+125^{\circ}C$)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V_{IO}	—	—	7	mV	$V_{CM} = 7.5V$, $R_S = 50\Omega$, $R_L = 50k\Omega$
Input offset current	I_{IO}	—	—	200	nA	$V_{CM} = 7.5V$, $I_{IO} = I_{I(+)} - I_{I(-)} $
Input bias current	I_{IB}	—	—	500	nA	$V_{CM} = 7.5V$
Common mode input voltage range	V_{CM}	0	—	13.0	V	$R_S = 1k\Omega$, $R_f = 100k\Omega$
Supply current	I_{CC}	—	—	4	mA	$V_{IN} = GND$, $R_L = \infty$

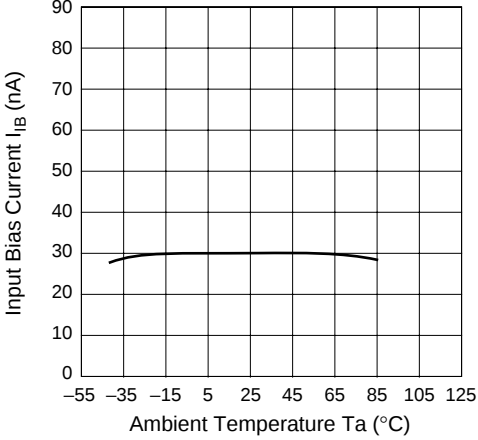
Note: As for the characteristic curve, refer to HA17904FPK.

Characteristic Curves

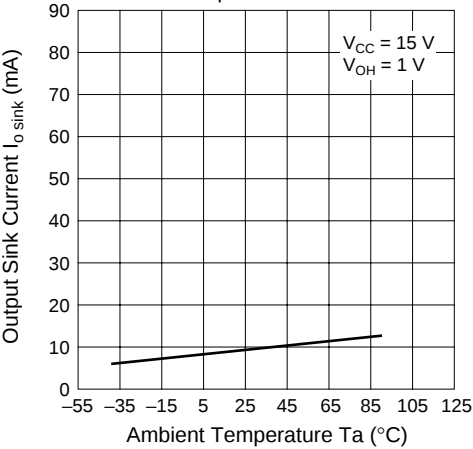
Input Bias Current vs.
Power-Supply
Voltage Characteristics



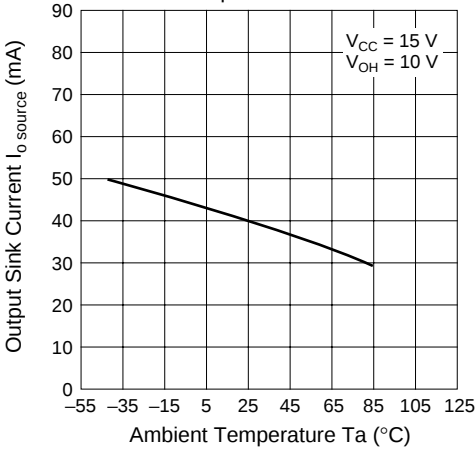
Input Bias Current vs.
Ambient
Temperature Characteristics

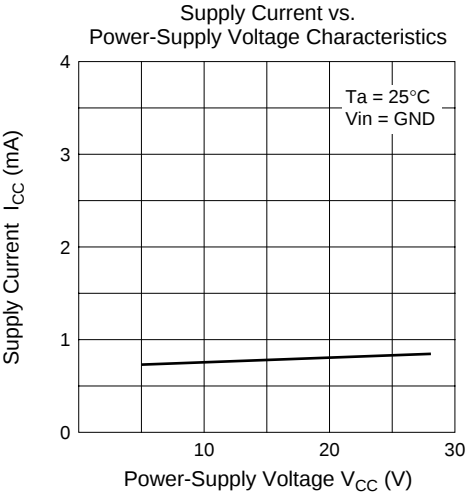
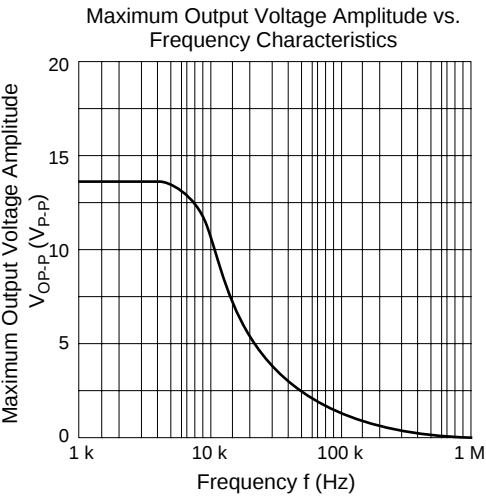
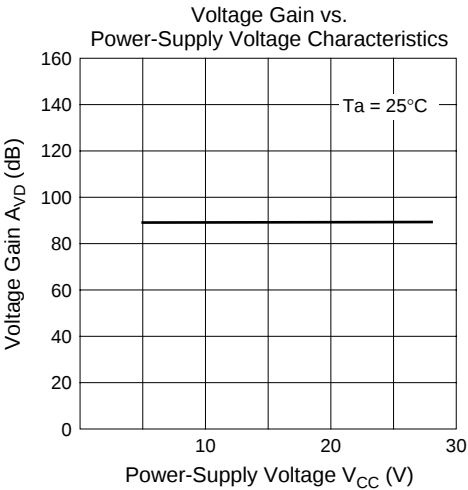
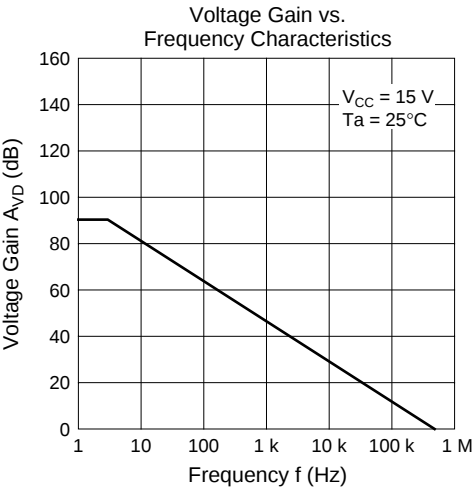


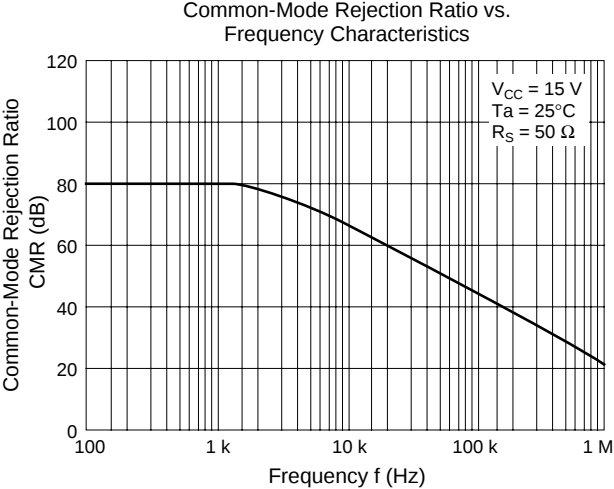
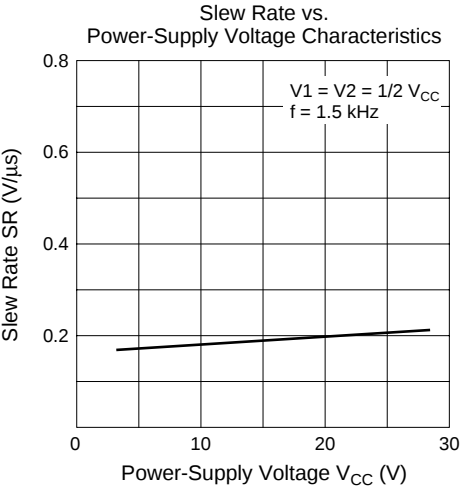
Output Sink Current vs.
Ambient Temperature Characteristics



Output Source Current vs.
Ambient Temperature Characteristics

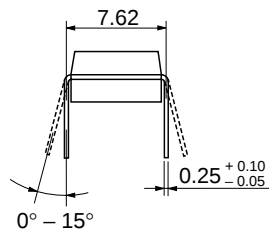
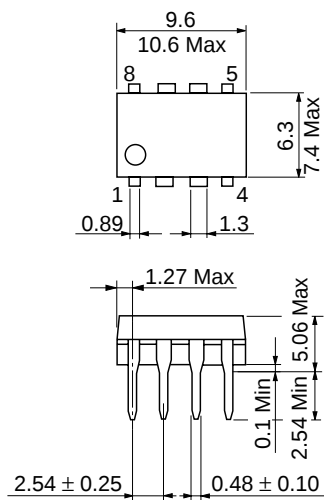






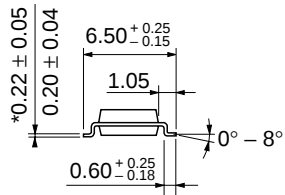
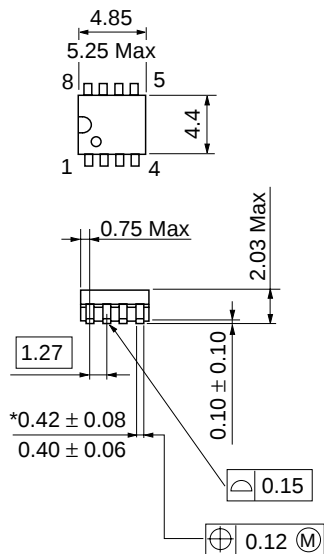
Package Dimensions

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

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