To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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HA17904 Series

Dual Operational Amplifier

REJ03D0688-0100
(Previous: ADE-204-046)
Rev.1.00
Jun 15, 2005

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.

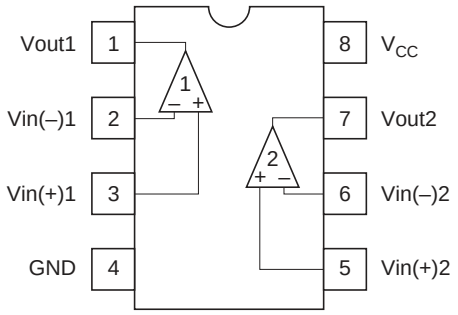
Features

- 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 currrent are temperature compensated.

Ordering Information

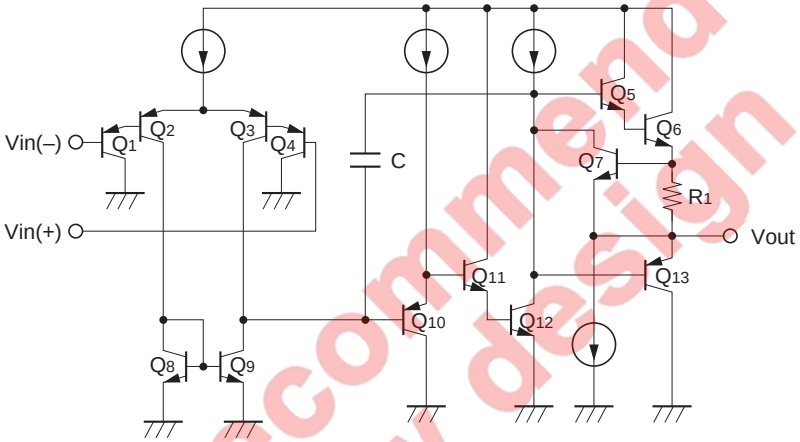
Type No.	Application	Package Code (Previous Code)
HA17904PSJ	Car use	PRDP0008AF-A (DP-8B)
HA17904FPJ		PRSP0008DE-B (FP-8DGV)
HA17904FPK		PRSP0008DE-B (FP-8DGV)

Pin Arrangement



(Top View)

Circuit Schematic (1/2)



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings			Unit
		HA17904PSJ	HA17904FPJ	HA17904FPK	
Supply voltage	V_{CC}	32	32	32	V
Output sink current	$I_{O\ sink}$	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}	V
Common-mode differential voltage	$V_{IN(diff)}$	±V_{CC}	±V_{CC}	±V_{CC}	V
Power dissipation	P_T	570*[1]	385*[2]	385*[2]	mW
Operating temperature range	Topr	–40 to +85	–40 to +85	–40 to +125	°C
Storage temperature range	Tstg	–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 temeperature.

Electrical Characteristics 1

(V_{CC} = +15V, Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V_{IO}	—	3	7	mV	V_{CM} = 7.5V, R_S = 50Ω, Rf = 50kΩ
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 = 1kΩ, Rf = 100kΩ
Voltage gain	A_{VD}	75	90	—	dB	R_L = ∞, R_S = 1kΩ, Rf = 100kΩ
Common mode rejection ratio	CMR	—	80	—	dB	R_S = 50Ω, Rf = 5kΩ
Common mode input voltage range	$V_{CM(+)}$	13.5	—	—	V	R_S = 1kΩ, Rf = 100kΩ
	$V_{CM(–)}$	—	—	–0.3	V	R_S = 1kΩ, Rf = 100kΩ
Peak-to-peak output voltage	Vop-p	—	13.6	—	V	f = 100Hz, R_L = 20kΩ, R_S = 1kΩ, Rf = 100kΩ
Output source current	Iosource	20	40	—	mA	V_{IN}^+ = 1V, V_{IN}^- = 0V, V_{OH} = 10V
Output sink current	Iosink	10	20	—	mA	V_{IN}^- = 1V, V_{IN}^+ = 0V, V_{OL} = 2.5V
Output sink current	Iosink	15	50	—	µA	V_{IN}^- = 1V, V_{IN}^+ = 0V, Vout = 200mV
Supply current	I_{CC}	—	0.8	2	mA	V_{IN} = GND, R_L = ∞
Slew rate	SR	—	0.2	—	V/µs	R_L = ∞, V_{CM} = 7.5V, f = 1.5kHz
Channel separation	CS	—	120	—	dB	f = 1kHz

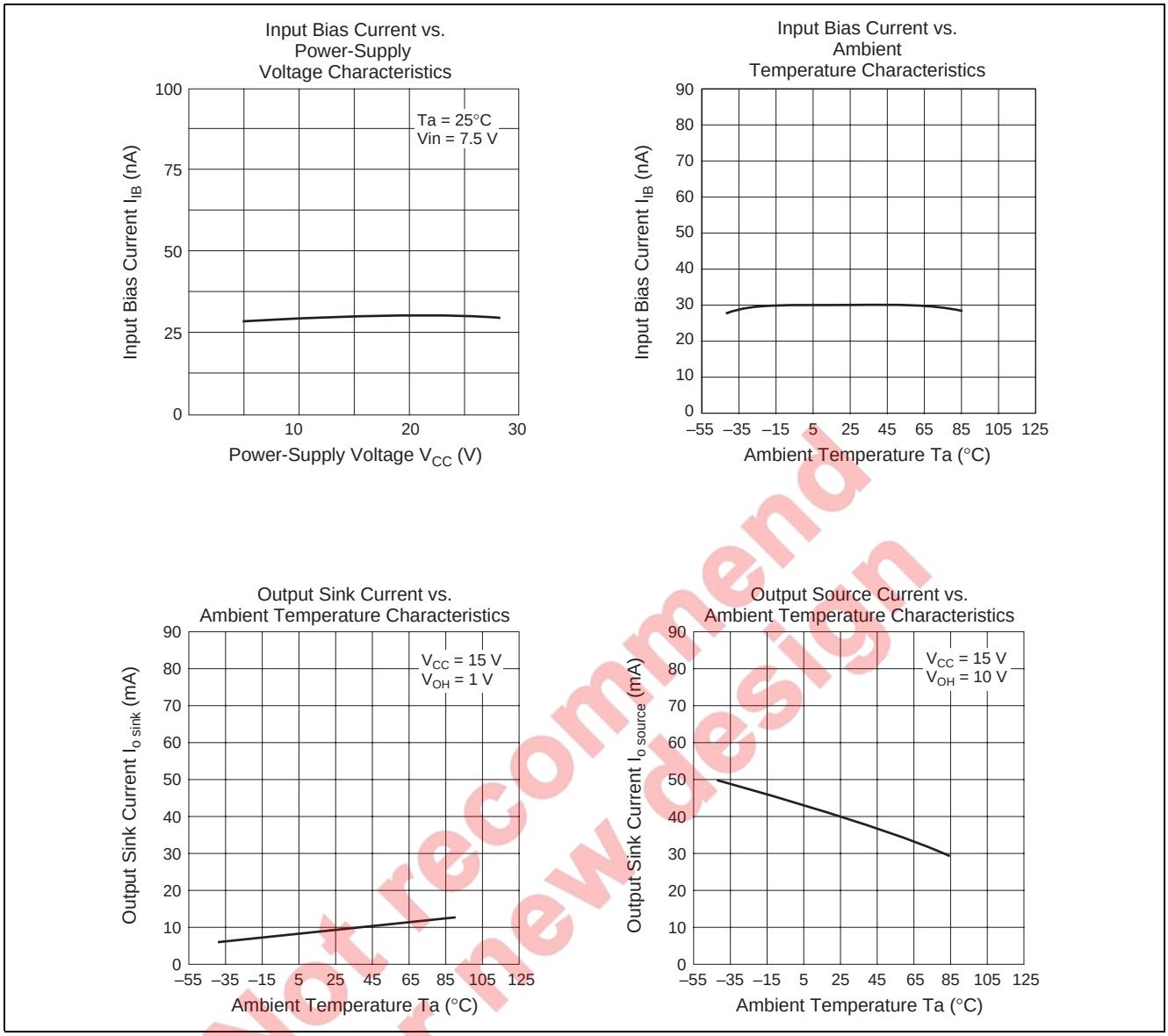
Electrical Characteristics 2

(V_{CC} = +15V, Ta =–40 to +125°C)

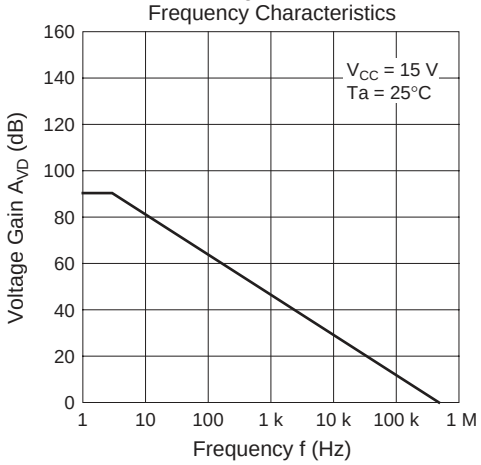
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V_{IO}	—	—	7	mV	V_{CM} = 7.5V, R_S = 50Ω, R_L = 50kΩ
Input offset current	I_{IO}	—	—	200	nA	V_{CM} = 7.5V, I_{IO} = | $I_{I(+)}$ – $I_{I(–)}$ |
Input bias current	I_{IB}	—	—	500	nA	V_{CM} = 7.5V
Common mode input voltage range	V_{CM}	0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

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

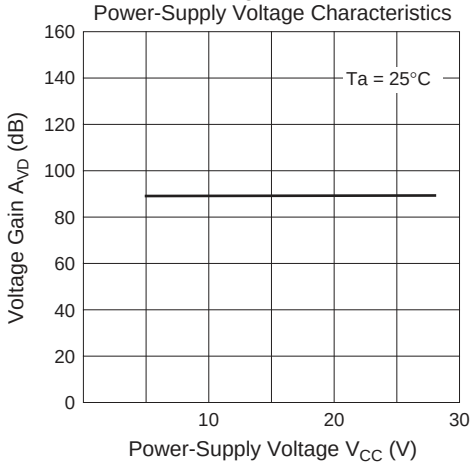
Characteristic Curves



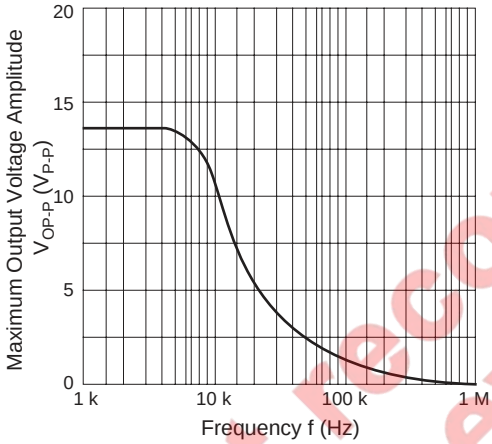
Voltage Gain vs.
Frequency Characteristics



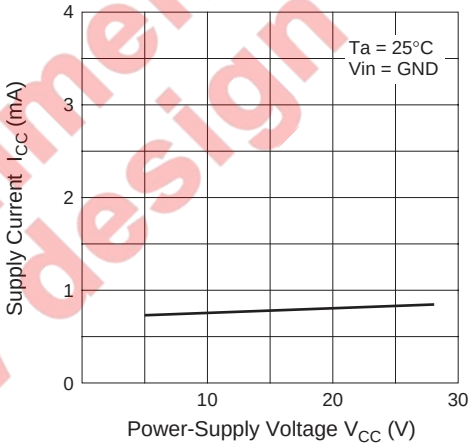
Voltage Gain vs.
Power-Supply Voltage Characteristics



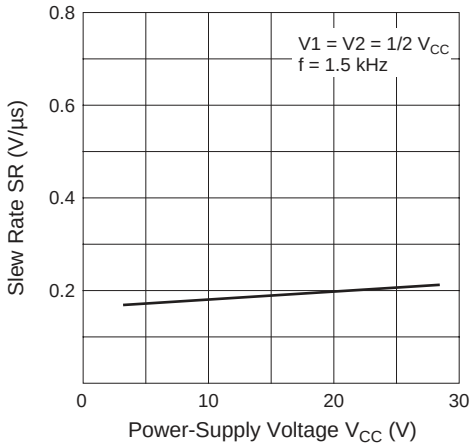
Maximum Output Voltage Amplitude vs.
Frequency Characteristics



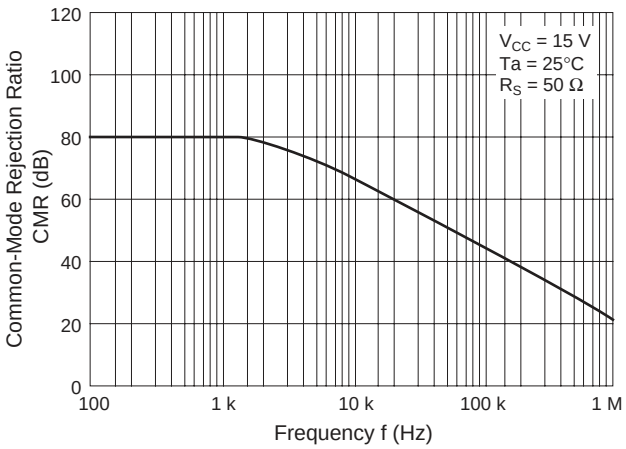
Supply Current vs.
Power-Supply Voltage Characteristics



Slew Rate vs.
Power-Supply Voltage Characteristics

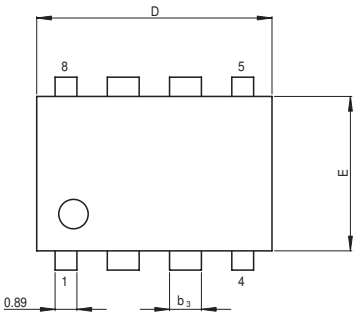


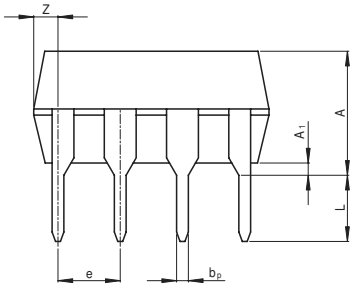
Common-Mode Rejection Ratio vs.
Frequency Characteristics

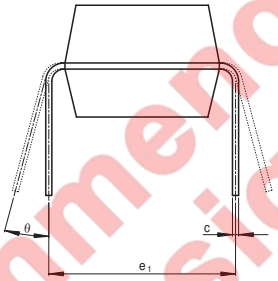


Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP8-6.3x9.6-2.54	PRDP0008AF-A	DP-8B	0.51g

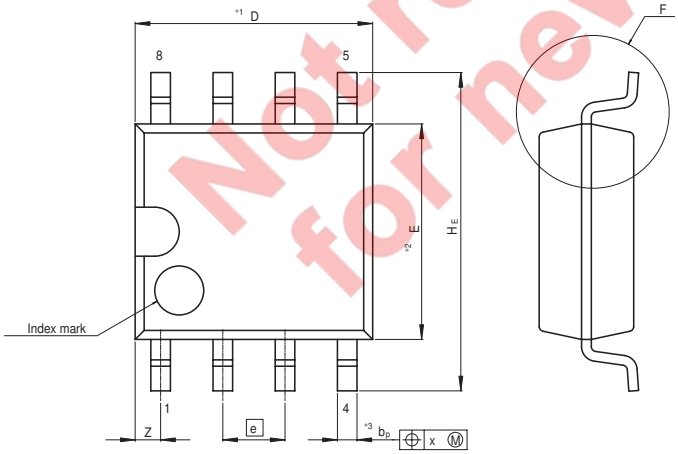


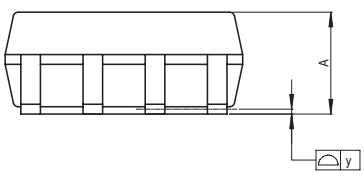




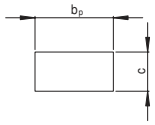
Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e_1	——	7.62	——
D	——	9.6	10.6
E	——	6.3	7.4
A	——	——	5.06
A_1	0.5	——	——
b_p	0.38	0.48	0.58
b_3	——	1.3	——
c	0.20	0.25	0.35
θ	0°	——	15°
e	2.29	2.54	2.79
Z	——	——	1.27
L	2.54	——	——

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x4.85-1.27	PRSP0008DE-B	FP-8DGV	0.1g

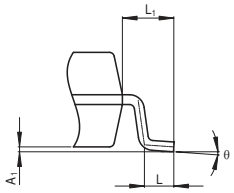




NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT INCLUDE TRIM OFFSET.



Terminal cross section
(Ni/Pd/Au plating)



Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	——	4.85	5.25
E	——	4.4	——
A_2	——	——	——
A_1	0.00	0.1	0.20
A	——	——	2.03
b_p	0.35	0.4	0.45
b_1	——	——	——
c	0.15	0.20	0.25
c_1	——	——	——
θ	0°	——	8°
H_E	6.35	6.5	6.75
e	——	1.27	——
x	——	——	0.12
y	——	——	0.15
Z	——	——	0.75
L	0.42	0.60	0.85
L_1	——	1.05	——

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