
HA17358, HA17904 Series

Dual Operational Amplifier

HITACHI

Description

HA17904 and HA17358 are dual operational amplifiers 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.

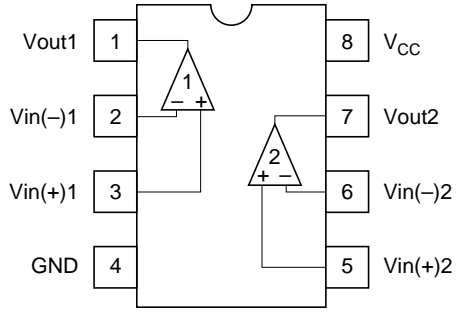
Features

- 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

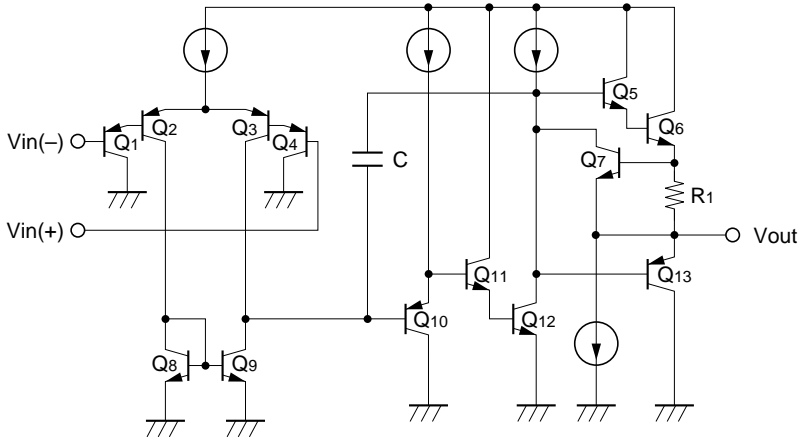
Type No.	Application	Package
HA17904PSJ	Car use	DP-8
HA17904FPJ	Car use	FP-8D
HA17904FPK	Car use	
HA17904PS	Industrial use	DP-8
HA17904FP	Industrial use	FP-8D
HA17358	Commercial use	DP-8
HA17358F	Commercial use	FP-8D

Pin Arrangement



(Top View)

Circuit Schematic (1/2)



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings							Unit
		HA17358	HA17358 F	HA17904 PS	HA17904 FP	HA17904 PSJ	HA17904 FPJ	HA17904 FPK	
Supply voltage	V _{CC}	32	32	32	32	32	32	32	V
Output sink current	I _{O sink}	50	50	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}	-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 _{CC}	±V _{CC}	V
Power dissipation	P _T	570* ¹	385* ²	570* ¹	385* ²	570* ¹	385* ²	385* ²	mW
Operating temperature range	Topr	-20 to +75	-20 to +75	-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 +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.

HA17358, HA17904 Series

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	$f = 1kHz$

Note: As for the characteristic curve, refer to HA17902.

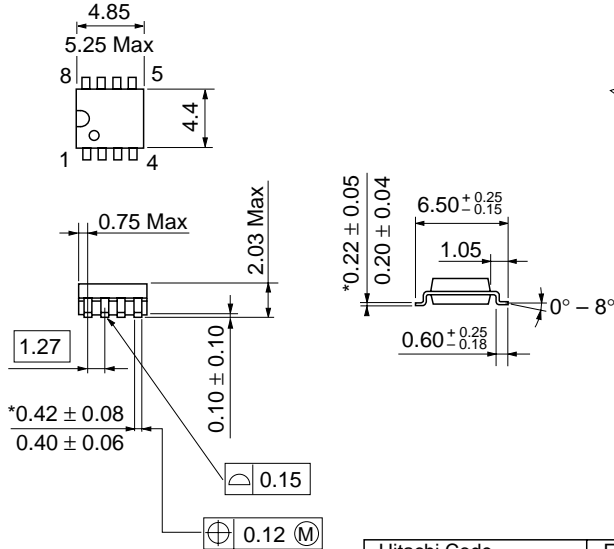
Electrical Characteristics 2 ($V_{CC} = +15V$, $T_a = -40$ to $+125^\circ C$)

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.

Package Dimensions

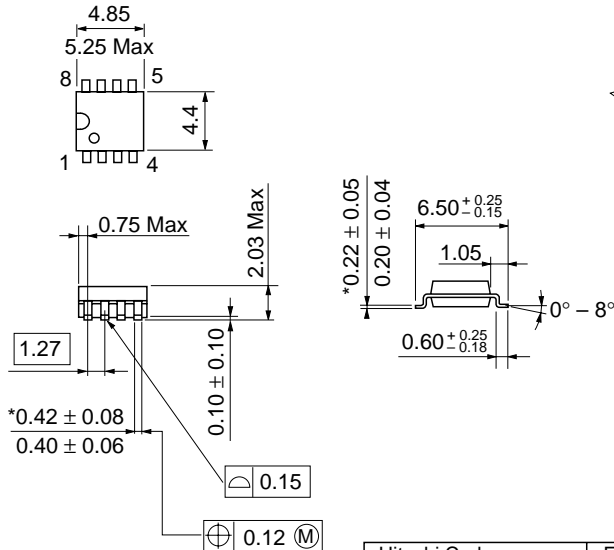
Unit: mm



*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-8D
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.10 g

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