
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.

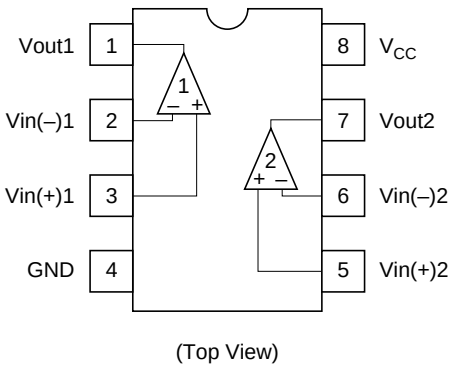
Features

- 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.

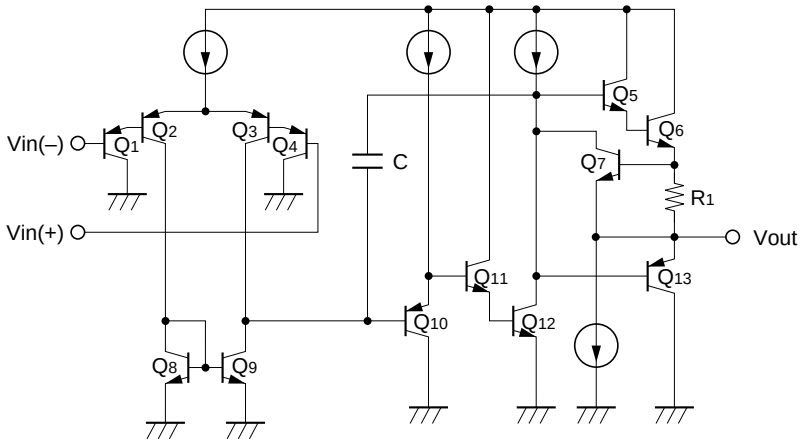
Ordering Information

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



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.

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, R _f = 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, R _f = 100kΩ
Voltage gain	A _{VD}	75	90	—	dB	R _L = ∞, R _S = 1kΩ, R _f = 100kΩ
Common mode rejection ratio	CMR	—	80	—	dB	R _S = 50Ω, R _f = 5kΩ
Common mode input voltage range	V _{CM(+)}	13.5	—	—	V	R _S = 1kΩ, R _f = 100kΩ
	V _{CM(-)}	—	—	-0.3	V	R _S = 1kΩ, R _f = 100kΩ
Peak-to-peak output voltage	V _{op-p}	—	13.6	—	V	f = 100Hz, R _L = 20kΩ, R _S = 1kΩ, R _f = 100kΩ
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 = ∞
Slew rate	SR	—	0.2	—	V/μs	R _L = ∞, V _{CM} = 7.5V, f = 1.5kHz
Channel separation	CS	—	120	—	dB	f = 1kHz

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

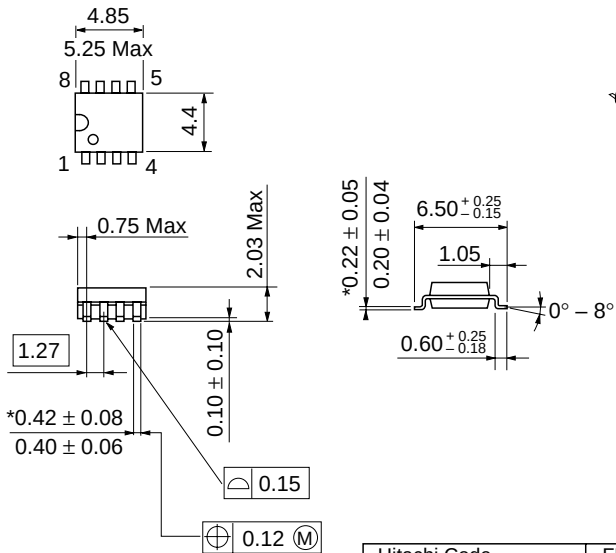
Electrical Characteristics 2 (V_{CC} = +15V, Ta = -40 to +125°C)

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, R _f = 100kΩ
Supply current	I _{CC}	—	—	4	mA	V _{IN} = GND, R _L = ∞

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

Package Dimensions

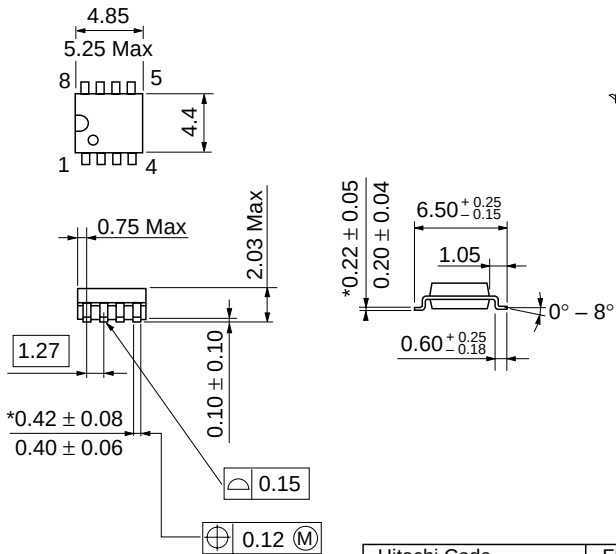
Unit: mm



Hitachi Code	FP-8D
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.10 g

*Dimension including the plating thickness
Base material dimension

Unit: mm



Hitachi Code	FP-8D
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.10 g

*Dimension including the plating thickness
Base material dimension

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