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# HA17558 Serise

Dual Operational Amplifier

# HITACHI

ADE-204-042 (Z)

Rev. 0

Dec. 2000

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## Description

HA17558 is dual operational amplifiers which provides internal frequency compensation and high performance. It can be applied widely to measuring control equipment and to general Use. The two amplifiers share a common bias network and power supply leads.

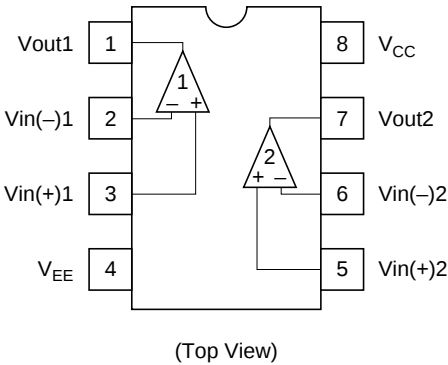
## Features

- High voltage Gain: 104dB (Typ)
- High speed: 1V/ $\mu$ s
- Continuous short-circuit protection
- Low-noise operational amplifiers
- Internal frequency compensation

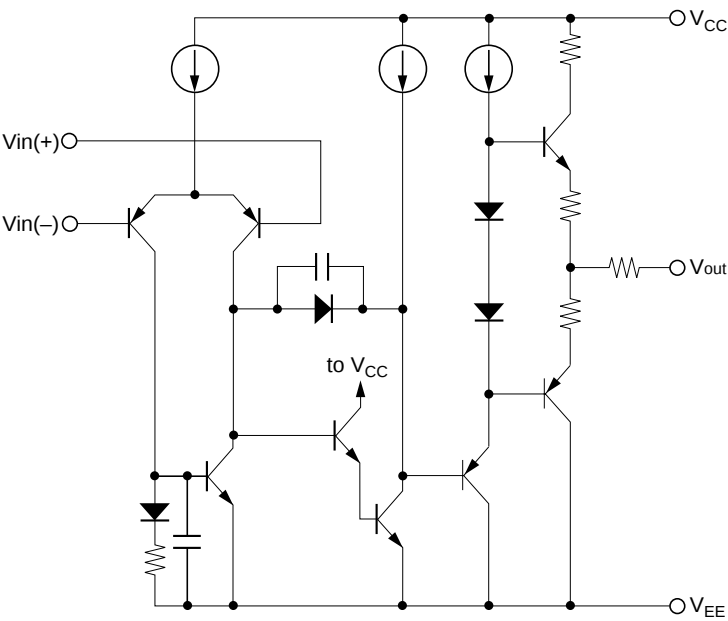
## Ordering Information

| Type No.  | Application    | Package |
|-----------|----------------|---------|
| HA17558FP | Industrial use | FP-8D   |
| HA17558F  | Commercial use | FP-8D   |
| HA17558   | Commercial use | DP-8    |
| HA17558PS | Industrial use | DP-8    |

Pin Arrangement



Circuit Schematic (1/2)



Absolute Maximum Ratings (Ta = 25°C)

| Item                       | Symbol                        | Ratings           |                   |                   |                   | Unit       |
|----------------------------|-------------------------------|-------------------|-------------------|-------------------|-------------------|------------|
|                            |                               | HA17558           | HA17558 PS        | HA17558 F         | HA17558 FP        |            |
| Supply voltage             | V <sub>CC</sub>               | +18               | +18               | +18               | +18               | V          |
|                            | V <sub>EE</sub>               | −18               | −18               | −18               | −18               | V          |
| Differential input voltage | V <sub>IN (diff)</sub>        | ±30               | ±30               | ±30               | ±30               | V          |
| Common-mode input voltage  | V <sub>CM</sub> <sup>*3</sup> | ±15               | ±15               | ±15               | ±15               | V          |
| Power dissipation          | P <sub>T</sub>                | 670 <sup>*1</sup> | 670 <sup>*1</sup> | 385 <sup>*2</sup> | 385 <sup>*2</sup> | mW         |
| Operating temperature      | Topr                          | −20 to +75        | −20 to +75        | −20 to +75        | −20 to +75        | −20 to +75 |
| Storage temperature        | Tstg                          | −55 to +125       | −55 to +125       | −55 to +125       | −55 to +125       | °C         |

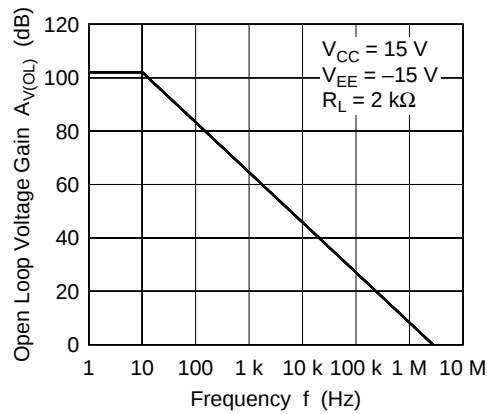
- Notes: 1. These are the allowable values up to Ta = 45 °C. Derate by 8.3mW/°C above that temperature.  
2. These are the allowable values up to Ta = 31 °C mounting on 30% wiring density glass epoxy board. Derate by 7.14mW/°C above that temperature.  
3. If the supply voltage is less than ±15V, input voltage should be less than supply voltage.

Electrical Characteristics (Ta = 25°C, V<sub>CC</sub> = +15V, V<sub>EE</sub> = −15V)

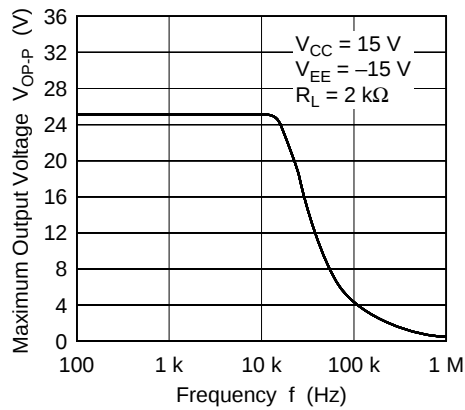
| Item                            | Symbol          | Min | Typ   | Max | Unit  | Test conditions                             |
|---------------------------------|-----------------|-----|-------|-----|-------|---------------------------------------------|
| Input offset voltage            | V <sub>IO</sub> | —   | 0.5   | 6   | mV    | R <sub>s</sub> ≤ 10kΩ                       |
| Input offset current            | I <sub>IO</sub> | —   | 5     | 200 | nA    |                                             |
| Input bias current              | I <sub>IB</sub> | —   | 50    | 500 | nA    |                                             |
| Voltage gain                    | A <sub>VD</sub> | 86  | 104   | —   | dB    | R <sub>L</sub> ≥ 2kΩ, V <sub>O</sub> = ±10V |
| Maximum output voltage          | Vop-p           | ±12 | ±14   | —   | V     | R <sub>L</sub> ≥ 10kΩ                       |
| Maximum output voltage          | Vop-p           | ±10 | ±12.4 | —   | V     | R <sub>L</sub> ≥ 2kΩ                        |
| Common mode input voltage range | V <sub>CM</sub> | ±12 | ±14   | —   | V     |                                             |
| Common mode rejection ratio     | CMR             | 70  | 100   | —   | dB    | R <sub>s</sub> ≤ 10kΩ                       |
| Supply voltage rejection ratio  | PSRR            | —   | 10    | 150 | μV/V  | R <sub>s</sub> ≤ 10kΩ                       |
| Power dissipation               | Pd              | —   | 90    | 170 | mW    | 2-channel, No load                          |
| Slew rate                       | SR              | —   | 1.0   | —   | V/μs  | A <sub>VD</sub> = 1                         |
| Equivalent input noise voltage  | V <sub>NI</sub> | —   | 6     | —   | μVp-p | R <sub>s</sub> = 1kΩ, f = 1Hz to 1kHz       |
| Channel separation              | CS              | —   | 105   | —   | dB    | f = 1kHz                                    |

Characteristic Curves

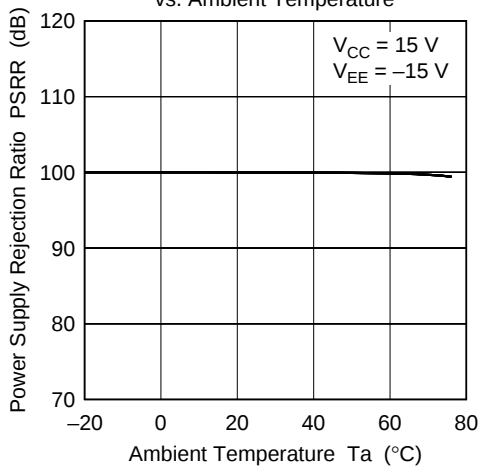
Open Loop Voltage Gain vs. Frequency



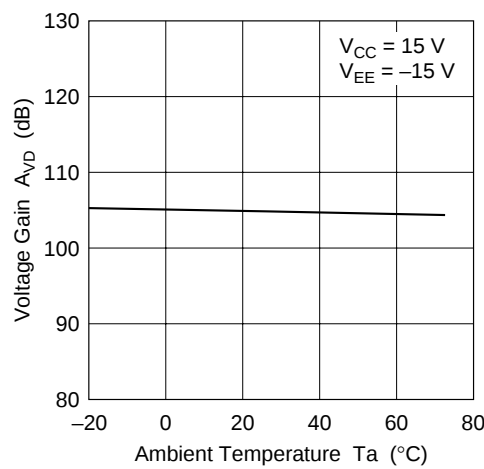
Maximum Output Voltage vs. Frequency



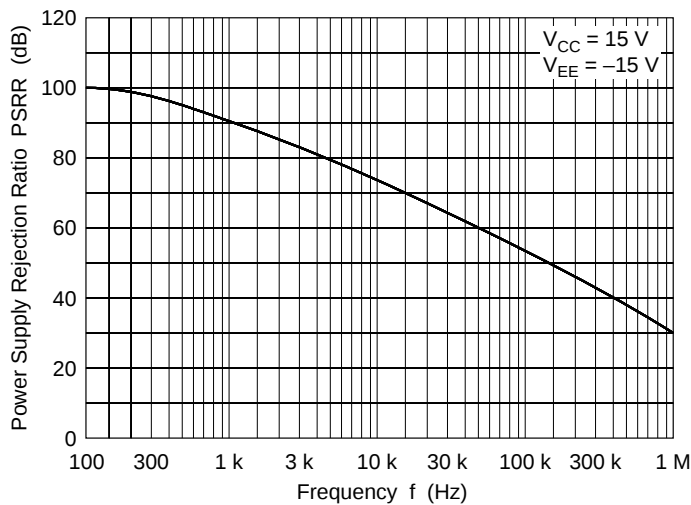
Power Supply Rejection Ratio vs. Ambient Temperature



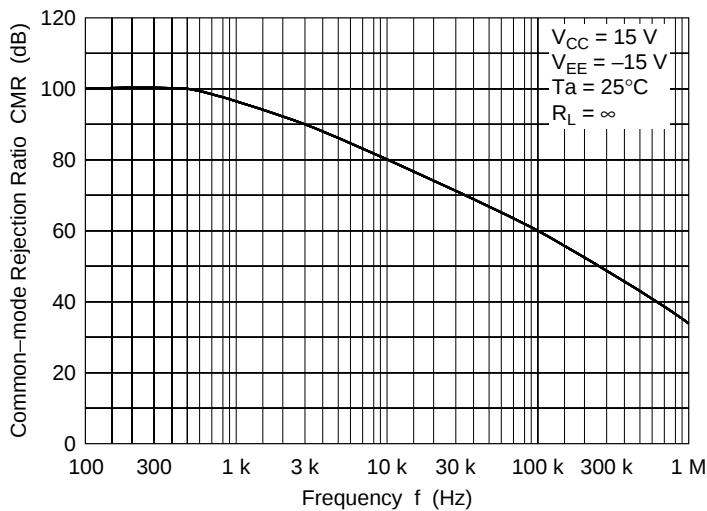
Voltage Gain vs. Ambient Temperature

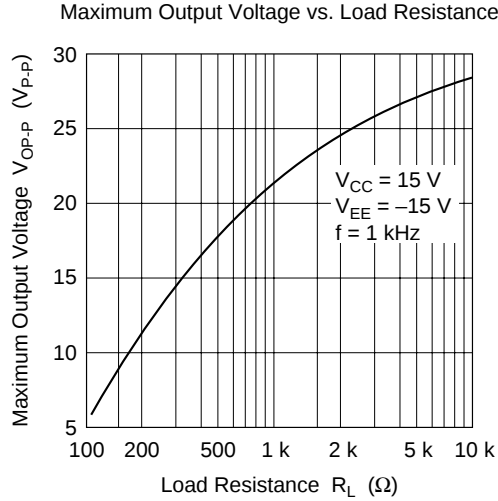
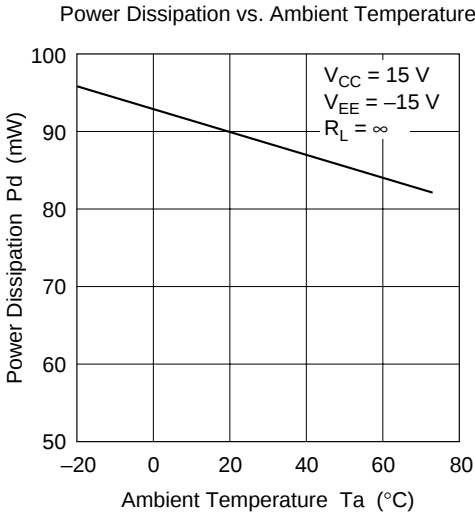
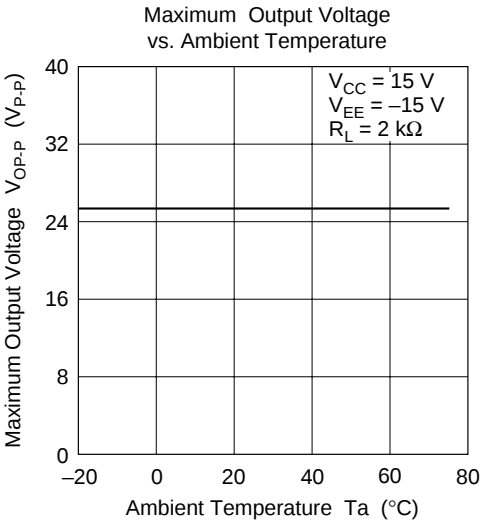
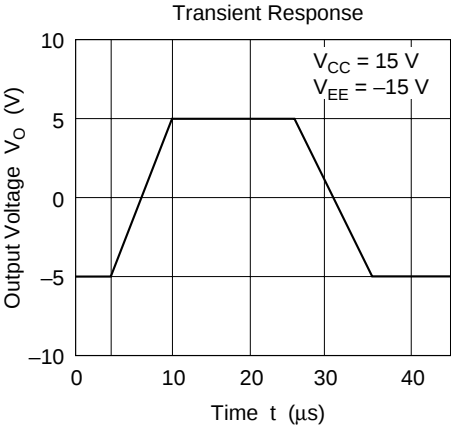


Power Supply Rejection Ratio vs. Frequency

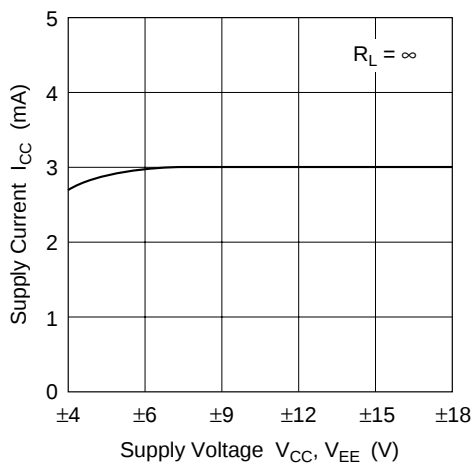


Common-mode Rejection Ratio vs. Frequency

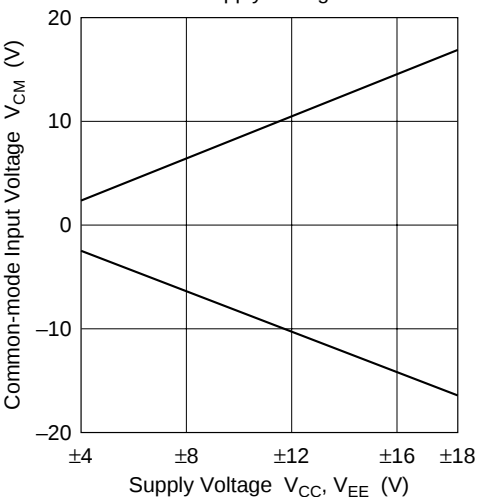




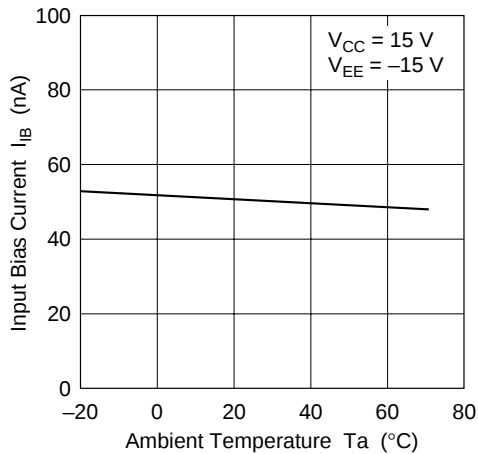
Supply Current vs. Supply Voltage



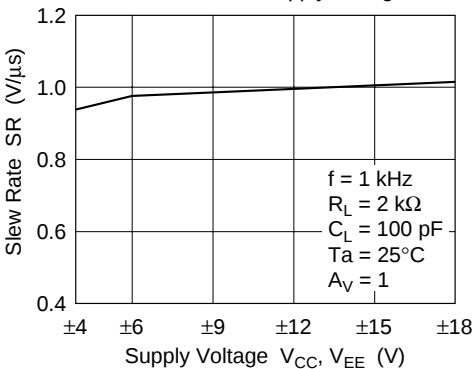
Common-mode Input Voltage vs. Supply Voltage



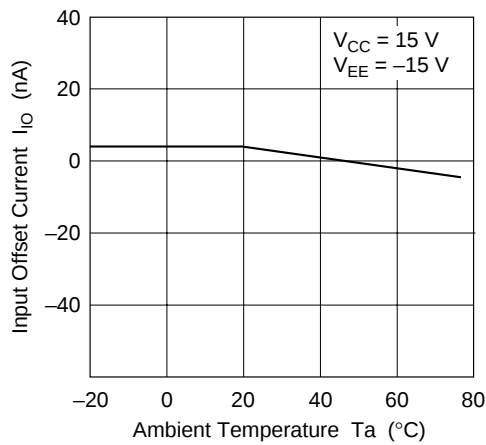
Input Bias Current vs. Ambient Temperature



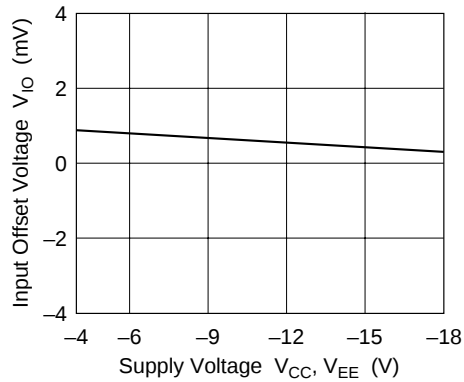
Slew Rate vs. Supply Voltage



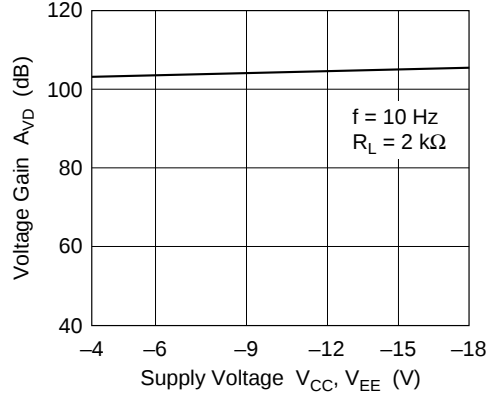
Input Offset Current vs. Ambient Temperature



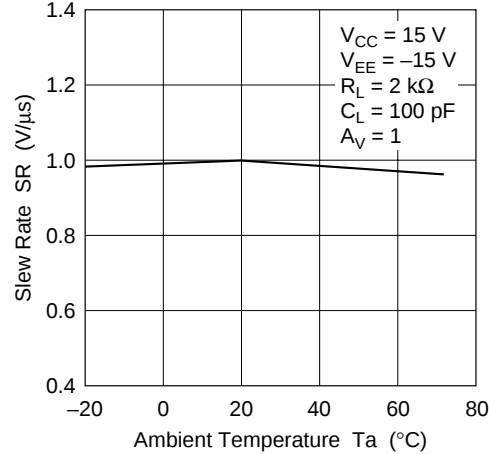
Input Offset Voltage vs. Supply Voltage

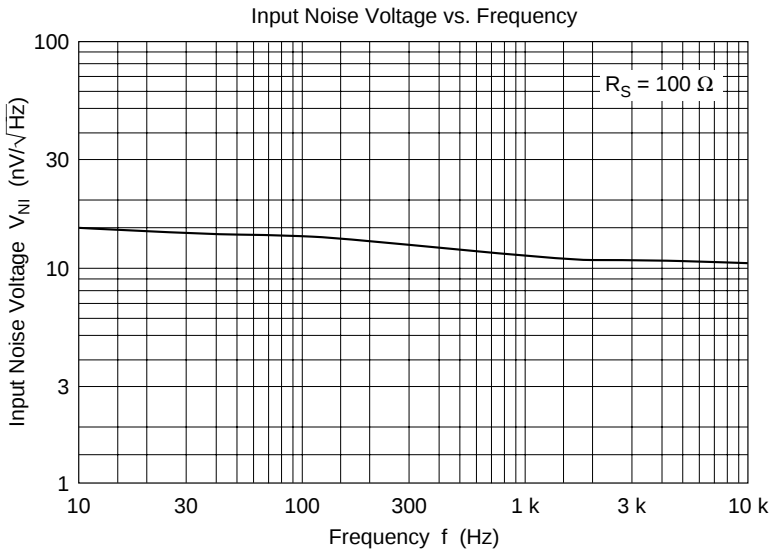
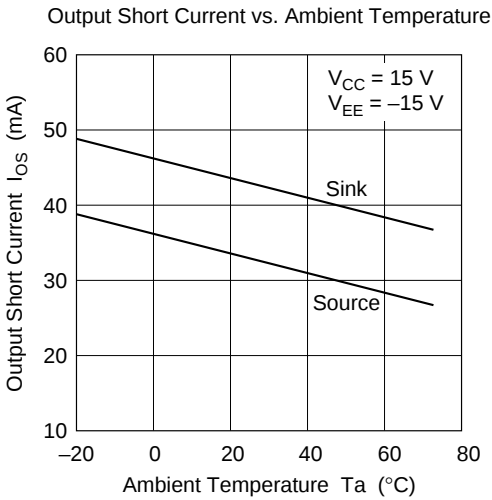


Voltage Gain vs. Supply Voltage

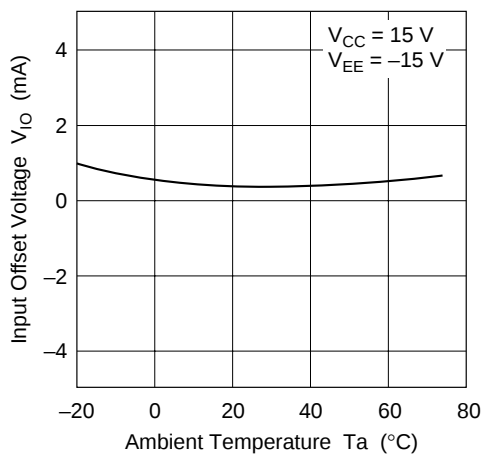


Slew Rate vs. Ambient Temperature

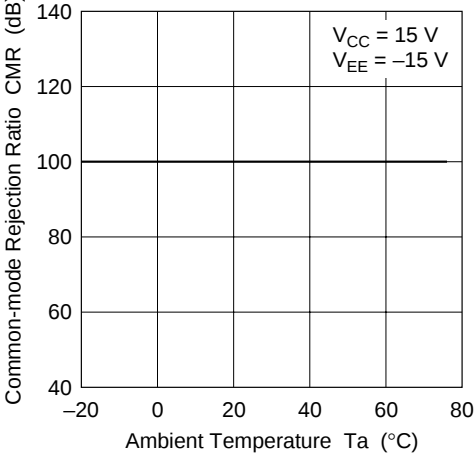




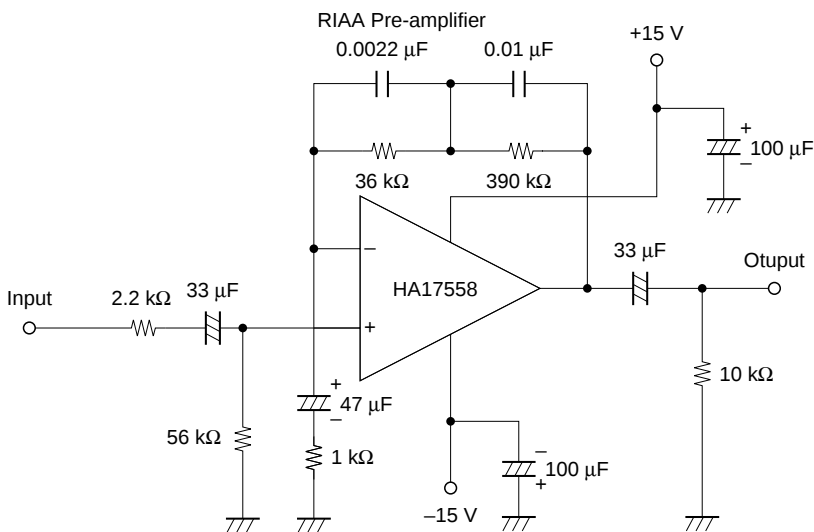
Input Offset Voltage vs. Ambient Temperature



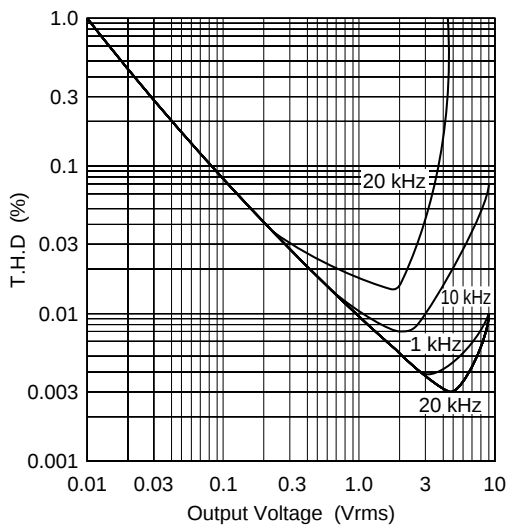
Common-mode Rejection Ratio vs. Ambient Temperature



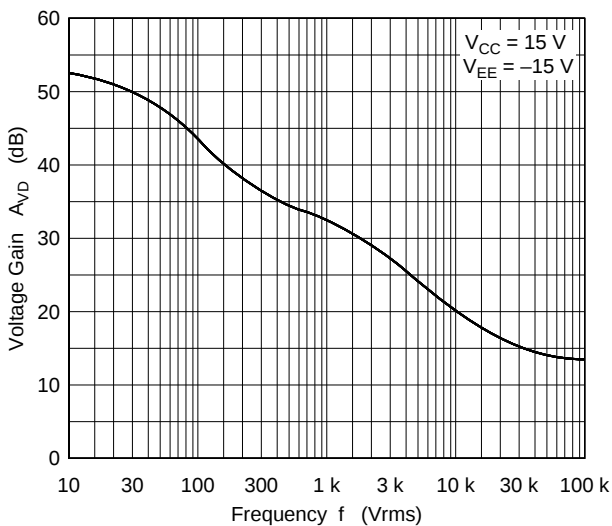
Circuit Example



T.H.D. vs. Output Voltage (RIAA Pre-Amp)

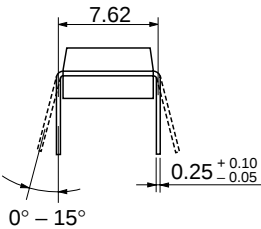
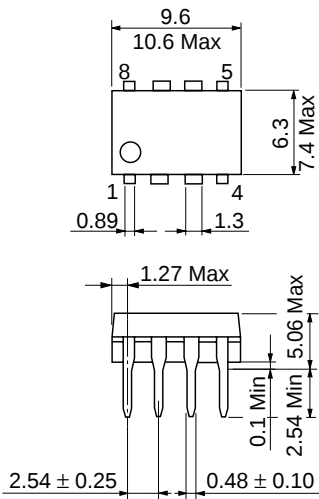


T.H.D. vs. Output Voltage (RIAA Pre-Amp)



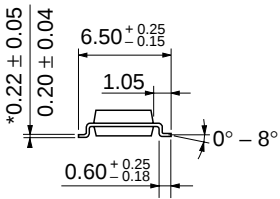
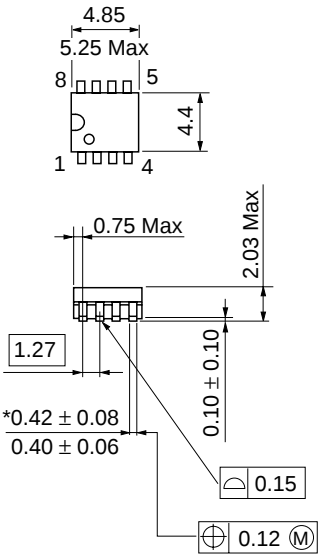
Package Dimensions

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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