

# HA17747/P

## Dual Operational Amplifier

# HITACHI

### Description

The HA17747/P is a dual internal phase compensation high-performance operational amplifier, that is appropriate for use in a wide range of applications in the test and control fields.

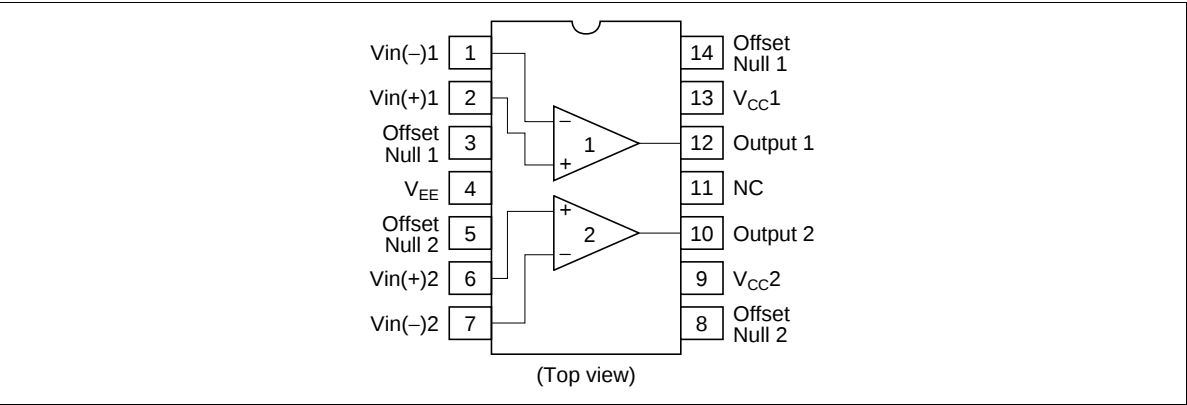
### Features

- High voltage gain : 106 dB (Typ)
- Wide output amplitude :  $\pm 13$  V (Typ) (at  $R_L \geq 2$  k $\Omega$ )
- Shorted output protection
- Adjustable offset voltage
- Internal phase compensation

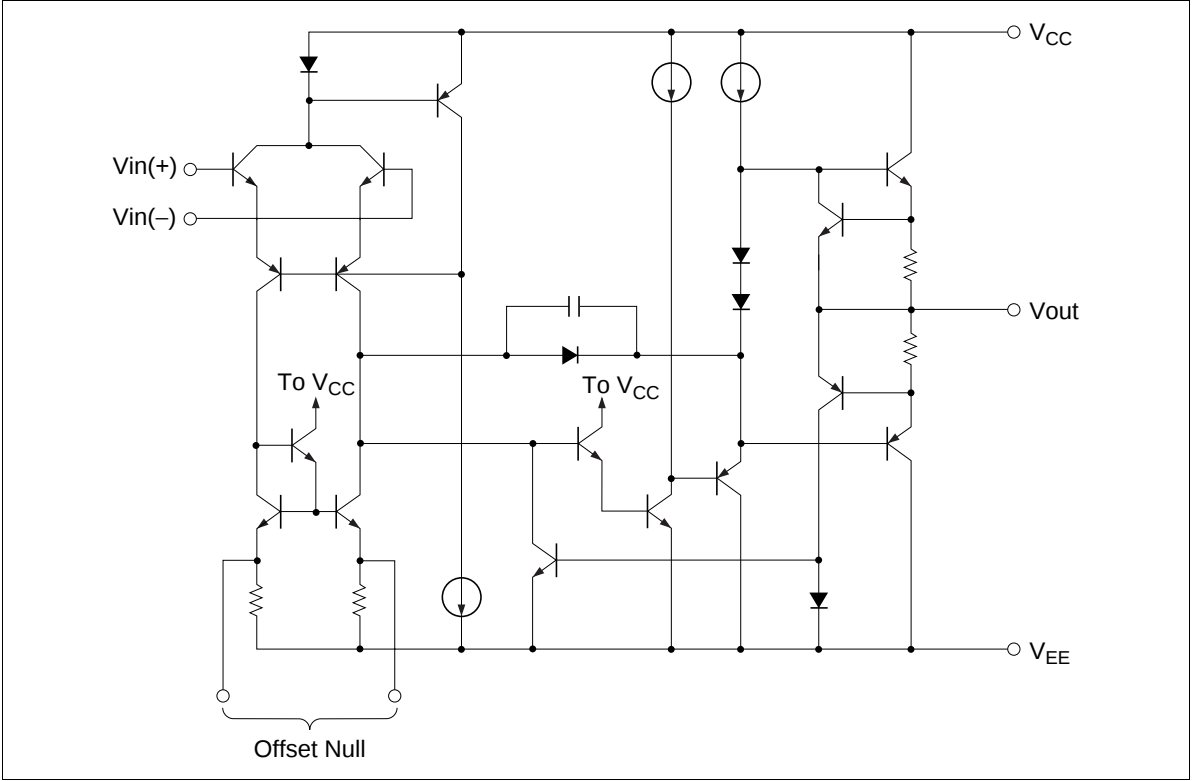
### Ordering Information

| Type No. | Application    | Package |
|----------|----------------|---------|
| HA17747P | Industrial use | DP-14   |
| HA17747  | Commercial use |         |

### Pin Arrangement



Circuit Structure



Absolute Maximum Ratings (Ta = 25°C)

| Item                                            | Symbol                             | Ratings           |                   | Unit |
|-------------------------------------------------|------------------------------------|-------------------|-------------------|------|
|                                                 |                                    | HA17747P          | HA17747           |      |
| Power-supply voltage                            | V <sub>CC</sub>                    | +18               | +18               | V    |
|                                                 | V <sub>EE</sub>                    | -18               | -18               | V    |
| Input voltage                                   | V <sub>in</sub>                    | ±15 <sup>*1</sup> | ±15 <sup>*1</sup> | V    |
| Differential input voltage                      | V <sub>in(diff)</sub>              | ±30               | ±30               | V    |
| Offset adjustment pin – V <sub>EE</sub> voltage | V <sub>OFF</sub> – V <sub>EE</sub> | ±0.5              | ±0.5              | V    |
| Allowable power dissipation                     | P <sub>T</sub>                     | 670 <sup>*2</sup> | 670 <sup>*2</sup> | mW   |
| Operating temperature                           | T <sub>opr</sub>                   | -20 to +75        | -20 to +75        | °C   |
| Storage temperature                             | T <sub>stg</sub>                   | -55 to +125       | -55 to +125       | °C   |

Notes: 1. When the power-supply voltage is less than ±15 V, the input voltage must fall within the power-supply voltage range.  
2. These are the allowable values up to Ta = 45°C. Above that temperature, derate by 8.3 mW/°C.

## Electrical Characteristics

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

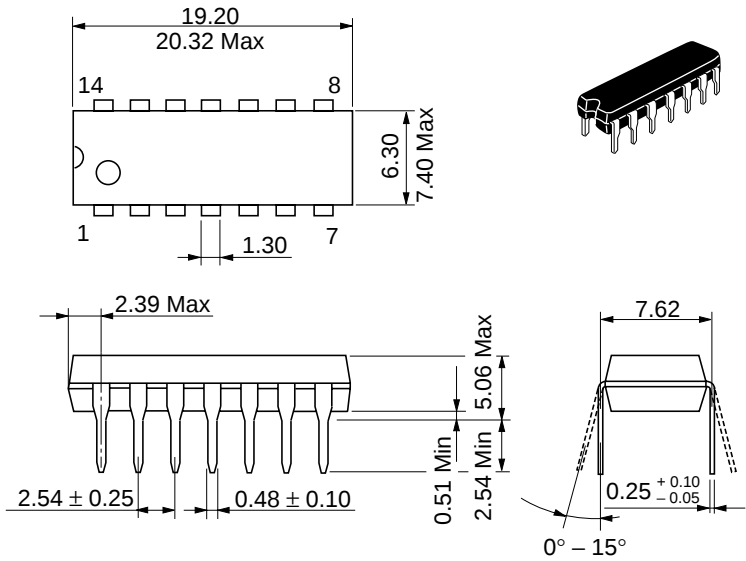
| Item                                  | Symbol               | Min | Typ      | Max | Unit             | Test Condition                                            |
|---------------------------------------|----------------------|-----|----------|-----|------------------|-----------------------------------------------------------|
| Input offset voltage                  | $V_{IO}$             | —   | 1.0      | 6.0 | mV               | $R_S \leq 10\text{ k}\Omega$                              |
| Input offset current                  | $I_{IO}$             | —   | 20       | 200 | nA               |                                                           |
| Input bias current                    | $I_{IB}$             | —   | 80       | 500 | nA               |                                                           |
| Voltage gain                          | $A_{VD}$             | 88  | 106      | —   | dB               | $R_L \geq 2\text{ k}\Omega$ , $V_{out} = \pm 10\text{ V}$ |
| Supply current                        | $I_{CC}$             | —   | 1.7      | 2.8 | mA               | No load                                                   |
| Power dissipation                     | $P_d$                | —   | 50       | 85  | mW               | (per channel rating)                                      |
| Input resistance                      | $R_{in}$             | 0.3 | 2.0      | —   | $M\Omega$        |                                                           |
| Input capacitance                     | $C_{in}$             | —   | 1.4      | —   | pF               |                                                           |
| Output resistance                     | $R_{out}$            | —   | 75       | —   | $\Omega$         |                                                           |
| Slew rate                             | SR                   | —   | 1.0      | —   | V/ $\mu\text{s}$ | $R_L \geq 2\text{ k}\Omega$                               |
| Rise time                             | $t_r$                | —   | 0.3      | —   | $\mu\text{s}$    | $V_{in} = -20\text{ mV}$ ,                                |
| Overshoot                             | $V_{over}$           | —   | 5.0      | —   | %                | $R_L = 2\text{ k}\Omega$ , $C_L = 100\text{ pF}$          |
| Input offset voltage adjustment range | $\Delta V_{IO(adj)}$ | —   | $\pm 15$ | —   | mV               |                                                           |
| Output shorted current                | $I_{OS}$             | —   | 25       | —   | mA               |                                                           |
| Channel separation                    | CS                   | —   | 120      | —   | dB               |                                                           |

### Electrical Characteristics-2 ( $V_{CC} = -V_{EE} = 15\text{ V}$ , $T_a = -20\text{ to }+75^\circ\text{C}$ )

| Item                             | Symbol                        | Min      | Typ      | Max   | Unit            | Test Condition                                            |
|----------------------------------|-------------------------------|----------|----------|-------|-----------------|-----------------------------------------------------------|
| Input offset voltage             | $V_{IO}$                      | —        | 1.0      | 9.0   | mV              | $R_S \leq 10\text{ k}\Omega$                              |
| Input offset current             | $I_{IO}$                      | —        | 20       | 400   | nA              |                                                           |
| Input bias current               | $I_{IB}$                      | —        | 80       | 1,100 | nA              |                                                           |
| Power-supply rejection ratio     | $\Delta V_{IO}/\Delta V_{CC}$ | —        | 30       | 150   | $\mu\text{V/V}$ | $R_S \leq 10\text{ k}\Omega$                              |
|                                  | $\Delta V_{IO}/\Delta V_{EE}$ | —        | 30       | 150   | $\mu\text{V/V}$ | $R_S \leq 10\text{ k}\Omega$                              |
| Voltage gain                     | $A_{VD}$                      | 80       | —        | —     | dB              | $R_L \geq 2\text{ k}\Omega$ , $V_{out} = \pm 10\text{ V}$ |
| Common-mode rejection ratio      | CMR                           | 70       | 90       | —     | dB              | $R_S \leq 10\text{ k}\Omega$                              |
| Common-mode input voltage range  | $V_{CM}$                      | $\pm 12$ | $\pm 13$ | —     | V               |                                                           |
| Maximum output voltage amplitude | $V_{OP-P}$                    | $\pm 12$ | $\pm 14$ | —     | V               | $R_L \geq 10\text{ k}\Omega$                              |
|                                  |                               | $\pm 10$ | $\pm 13$ | —     | V               | $R_L \geq 2\text{ k}\Omega$                               |
| Supply current                   | $I_{CC}$                      | —        | 2.1      | 3.7   | mA              | No load                                                   |
| Power dissipation                | $P_d$                         | —        | 65       | 110   | mW              | (per channel rating)                                      |

Package Dimensions

Unit: mm



|                        |          |
|------------------------|----------|
| Hitachi Code           | DP-14    |
| JEDEC                  | Conforms |
| EIAJ                   | Conforms |
| Mass (reference value) | 0.97 g   |

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