

# UA747 Dual General-purpose Operational Amplifiers

## 1 Features

- No frequency compensation required
- Low power consumption
- Short-circuit protection
- Wide common-mode and differential voltage ranges
- No latch-up

## 2 Applications

- Signal conditioning
- Audio pre-amplifiers
- Active filters
- Voltage comparators
- Motor control circuits

## 3 Description

The uA747 is a dual general-purpose operational amplifier.

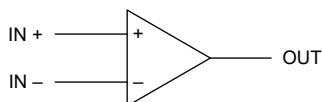
The high common-mode input voltage range and the absence of latch-up make this amplifier an excellent choice for voltage-follower applications. The device is short-circuit protected and the internal frequency compensation makes sure of stability without external components.

The uA747C is characterized for operation from 0°C to 70°C.

### Package Information

| PART NUMBER | PACKAGE <sup>(1)</sup> | PACKAGE SIZE <sup>(2)</sup> |
|-------------|------------------------|-----------------------------|
| UA747       | N (PDIP, 14)           | 19.3mm × 9.4mm              |

- (1) For more information, see [Section 9](#).  
 (2) The package size (length × width) is a nominal value and includes pins, where applicable.



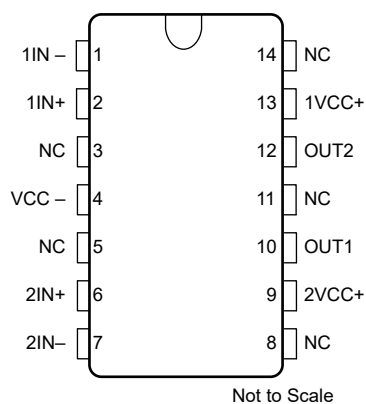
**Symbol (Each Amplifier)**



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## 4 Pin Configuration and Functions



NC – No internal connection

The two positive supply terminals ( $1V_{CC+}$  and  $2V_{CC+}$ ) are connected together internally.

**Figure 4-1. N Package, 14-Pin PDIP (Top View)**

## 5 Specifications

### 5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)

|                                                                  | $\mu\text{A747C}$                   | UNIT |
|------------------------------------------------------------------|-------------------------------------|------|
| Supply voltage, $V_{CC+}$ (see <sup>(1)</sup> )                  | 18                                  | V    |
| Supply voltage, $V_{CC-}$ (see <sup>(1)</sup> )                  | -18                                 | V    |
| Differential input voltage (see <sup>(2)</sup> )                 | $\pm 30$                            | V    |
| Input voltage any input (see <sup>(1)</sup> and <sup>(3)</sup> ) | $\pm 15$                            | V    |
| Duration of output short circuit (see <sup>(4)</sup> )           | unlimited                           |      |
| Continuous total dissipation                                     | See <i>Dissipation Rating</i> table |      |
| Operating free-air temperature range                             | 0 to 70                             | °C   |
| Storage temperature range                                        | -65 to 150                          | °C   |
| Lead temperature 1,6mm (1/16 inch) from case for 10 seconds      | N package                           | 260  |
|                                                                  |                                     | °C   |

(1) All voltage values, unless otherwise noted, are with respect to the midpoint between  $V_{CC+}$  and  $V_{CC-}$ .

(2) Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.

(3) The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15V, whichever is less.

(4) The output can be shorted to ground or either power supply. For the  $\mu\text{A747M}$  only, the unlimited duration of the short circuit applies at (or below) 125°C case temperature or 75°C free-air temperature.

### 5.2 Dissipation Rating

| PACKAGE | $T_A \leq 25^\circ\text{C}$ POWER RATING | DERATING FACTOR | DERATE ABOVE $T_A$ | $T_A = 70^\circ\text{C}$ POWER RATING | $T_A = 125^\circ\text{C}$ POWER RATING |
|---------|------------------------------------------|-----------------|--------------------|---------------------------------------|----------------------------------------|
| N       | 800mW                                    | 9.2mW/°C        | 63°C               | 736mW                                 | —                                      |

## 5.3 Electrical Characteristics

at specified free-air temperature,  $V_{CC} \pm = \pm 15V$

| PARAMETER       |                                           | TEST CONDITIONS <sup>(1)</sup> |              | $T_A$ <sup>(2)</sup> | uA747C |           |     | UNIT            |
|-----------------|-------------------------------------------|--------------------------------|--------------|----------------------|--------|-----------|-----|-----------------|
|                 |                                           |                                |              |                      | MIN    | TYP       | MAX |                 |
| $V_{IO}$        | Input offset voltage                      | $V_O = 0$                      |              | 25°C                 |        | ±0.3      | 6   | mV              |
|                 |                                           |                                |              | Full range           |        |           | 7.5 |                 |
| $I_{IO}$        | Input offset current                      |                                |              | 25°C                 |        | ±0.5      | 200 | nA              |
|                 |                                           |                                |              | Full range           |        |           | 300 |                 |
| $I_{IB}$        | Input bias current                        |                                |              | 25°C                 |        | –10       | 500 | nA              |
|                 |                                           |                                |              | Full range           |        |           | 800 |                 |
| $V_{ICR}$       | Common-mode input voltage range           |                                |              | 25°C                 | ±12    | ±13       |     | V               |
|                 |                                           |                                |              | Full range           | ±12    |           |     |                 |
| $V_{O(PP)}$     | Maximum peak-to-peak output voltage swing | $R_L = 10k\Omega$              |              | 25°C                 | 24     | 28        |     | V               |
|                 |                                           | $R_L > 10k\Omega$              |              | Full range           | 24     |           |     |                 |
|                 |                                           | $R_L = 2k\Omega$               |              | 25°C                 | 20     | 26        |     |                 |
|                 |                                           | $R_L > 2k\Omega$               |              | Full range           | 20     |           |     |                 |
| $r_o$           | Output resistance                         | $f = 1MHz, I_O = 0A$           |              | 25°C                 |        | 300       |     | $\Omega$        |
| $C_i$           | Input capacitance                         | ZID                            | Differential | 25°C                 |        | 10    0.1 |     | $M\Omega    pF$ |
|                 |                                           | ZICM                           | Common-mode  |                      |        | 4    1.5  |     | $G\Omega    pF$ |
| CMRR            | Common-mode rejection ratio               | $V_{IC} = V_{ICR}$             |              | 25°C                 | 70     | 80        |     | dB              |
|                 |                                           |                                |              | Full range           | 70     |           |     |                 |
| $I_{OS}$        | Short-circuit output current              |                                |              | 25°C                 |        | ±40       |     | mA              |
| $I_{CC}$        | Supply current (each amplifier)           | No load                        |              | 25°C                 |        | 0.35      | 2.8 | mA              |
|                 |                                           |                                |              | Full range           |        |           | 3.3 |                 |
| $V_{o1}/V_{o2}$ | Channel separation                        |                                |              | 25°C                 |        | 120       |     | dB              |

(1) All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified.

(2) Full range for uA747C is 0°C to 70°C.

## 5.4 Operating Characteristics

$V_{CC} \pm = \pm 15V, T_A = 25^\circ C$

| PARAMETER |                         | TEST CONDITIONS                                            | MIN | TYP | MAX | UNIT       |
|-----------|-------------------------|------------------------------------------------------------|-----|-----|-----|------------|
| SR        | Slew rate at unity gain | Change this to $R_L = 1M\Omega, C_L = 30pF, V_I = \pm 10V$ |     | 0.5 |     | V/ $\mu s$ |

## 5.5 Typical Characteristics

Data at high and low temperatures are applicable only within the rated operating free-air temperature range of the particular devices.

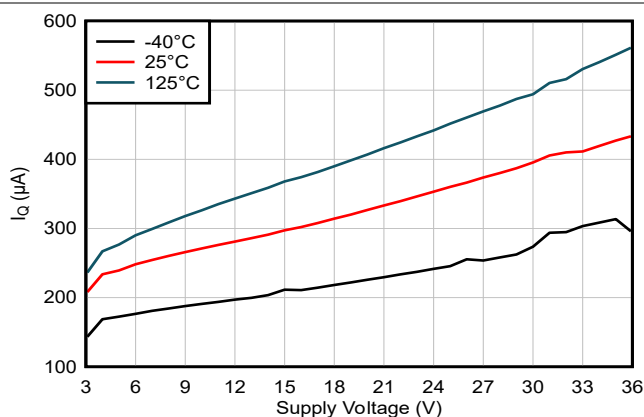


Figure 5-1. Quiescent Current vs Supply Voltage (New Die)

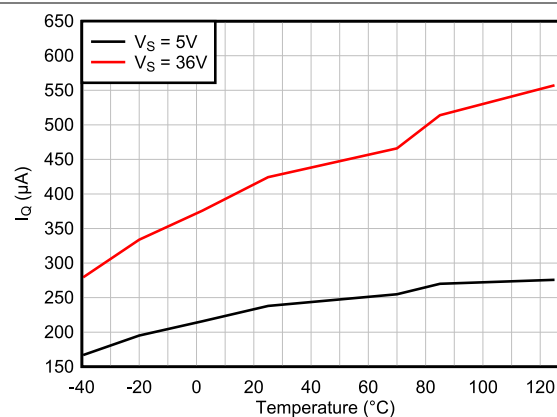


Figure 5-2. Quiescent Current vs Temperature (New Die)

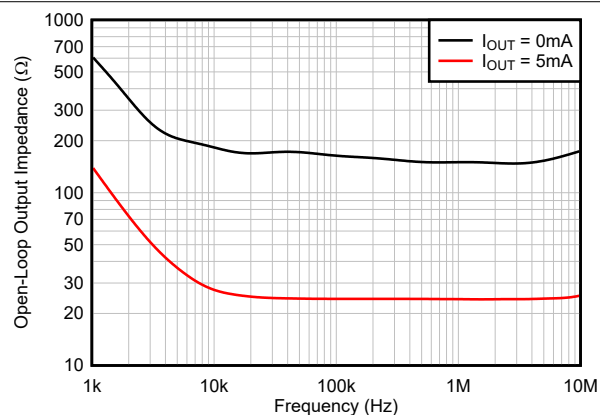
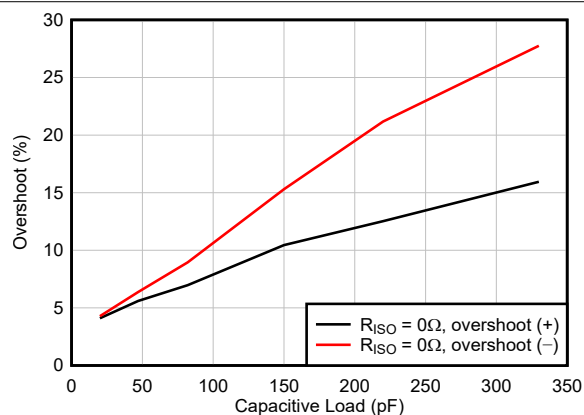
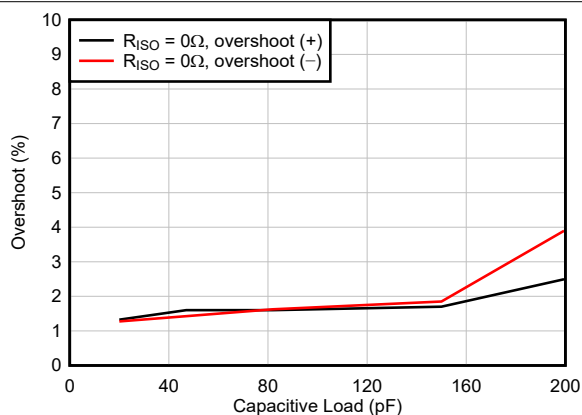


Figure 5-3. Open-Loop Output Impedance vs Frequency (New Die)



G = 1, 100mV output step,  $R_L$  = open

Figure 5-4. Small-Signal Overshoot vs Capacitive Load (New Die)



G = -1, 100mV output step,  $R_L$  = open

Figure 5-5. Small-Signal Overshoot vs Capacitive Load (New Die)

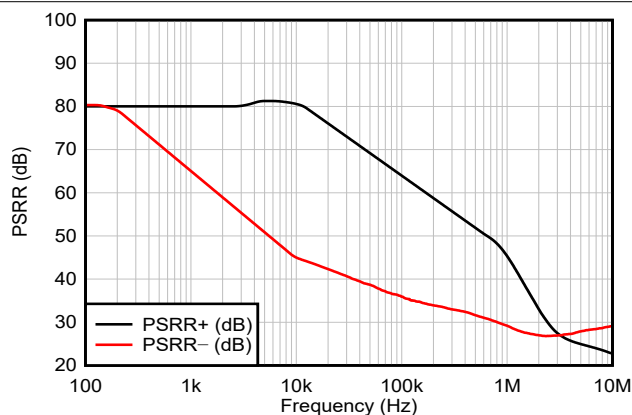


Figure 5-6. PSRR vs Frequency (New Die)

## 5.5 Typical Characteristics (continued)

Data at high and low temperatures are applicable only within the rated operating free-air temperature range of the particular devices.

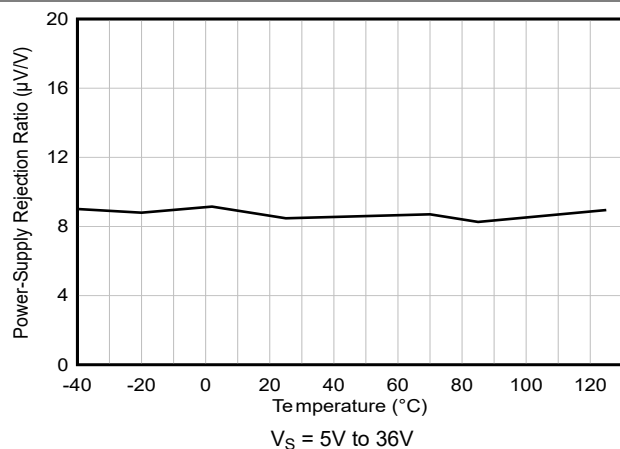


Figure 5-7. Power Supply Rejection Ratio vs Temperature (New Die)

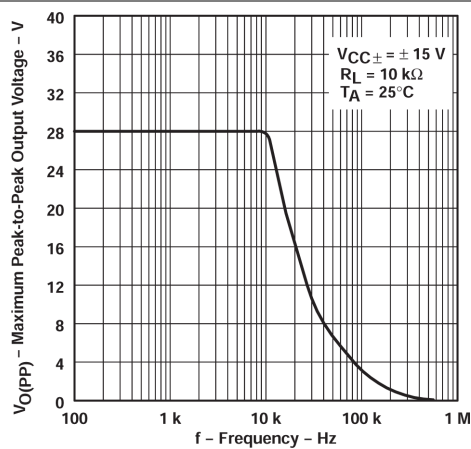


Figure 5-8. Maximum Peak-to-peak Output Voltage vs Frequency (Old Die)

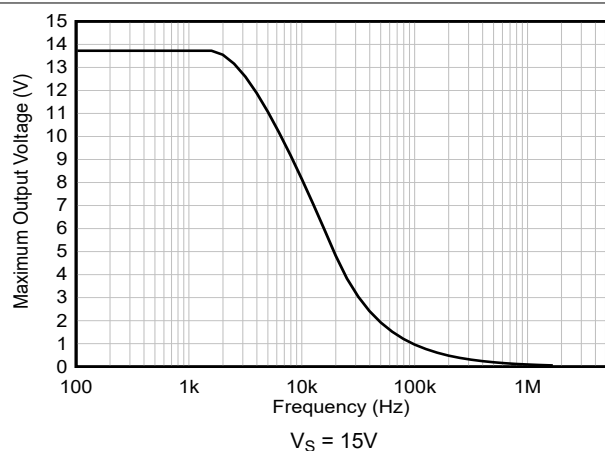


Figure 5-9. Maximum Output Voltage vs Frequency (New Die)

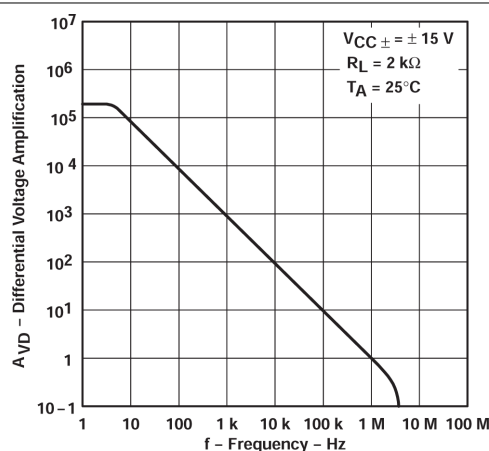


Figure 5-10. Open-loop Large-signal Differential Voltage Amplification vs Frequency (Old Die)

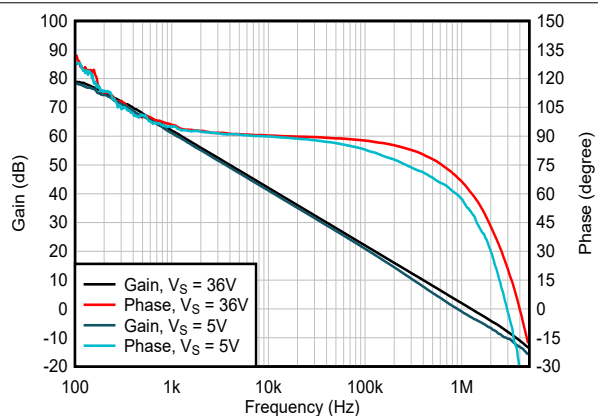


Figure 5-11. Open-Loop Gain and Phase vs Frequency (New Die)

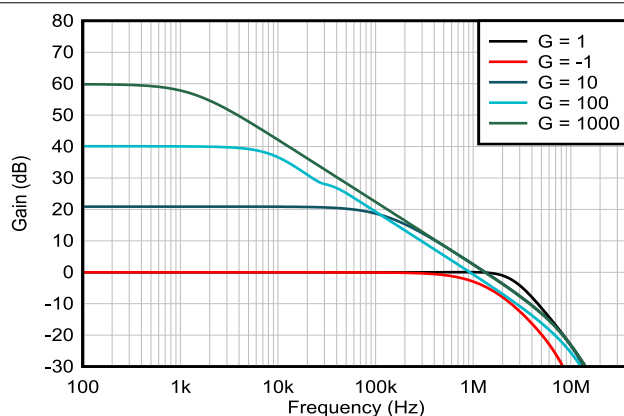


Figure 5-12. Closed-Loop Gain vs Frequency (New Die)

## 5.5 Typical Characteristics (continued)

Data at high and low temperatures are applicable only within the rated operating free-air temperature range of the particular devices.

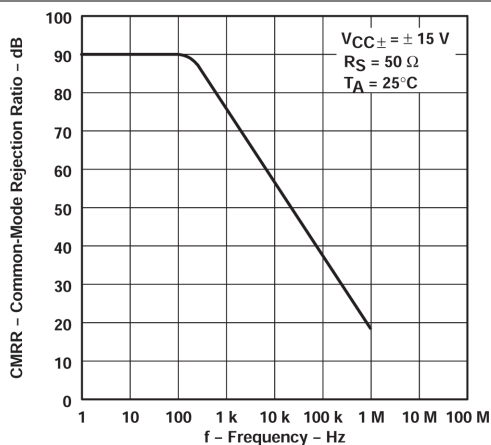


Figure 5-13. Common-mode Rejection Ratio vs Frequency (Old Die)

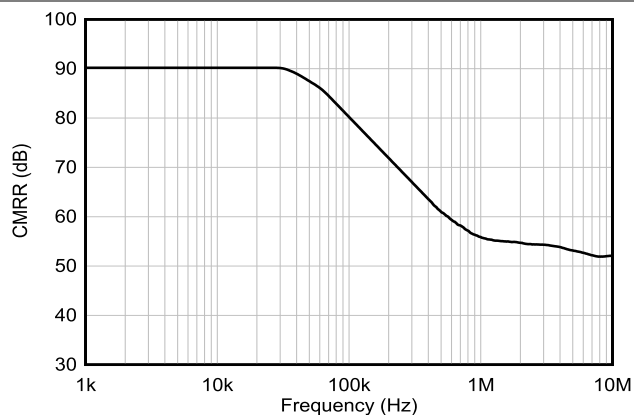


Figure 5-14. CMRR vs Frequency (New Die)

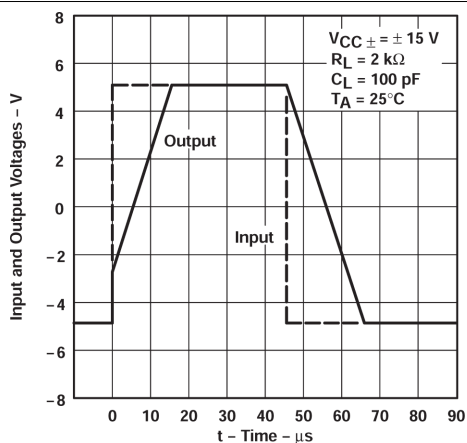


Figure 5-15. Voltage-follower Large-signal Pulse Response (Old die)

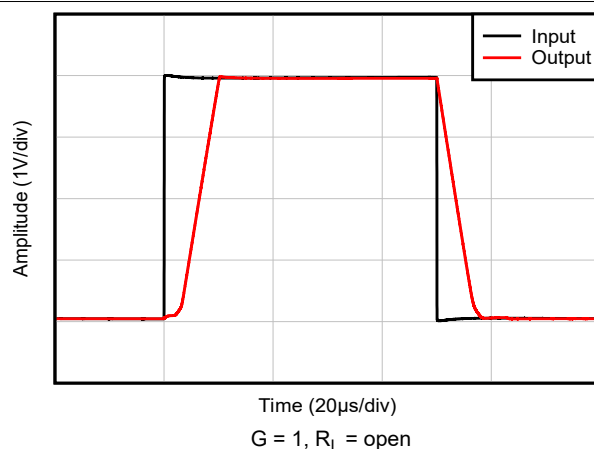


Figure 5-16. Large-Signal Step Response, G = 1 (New Die)

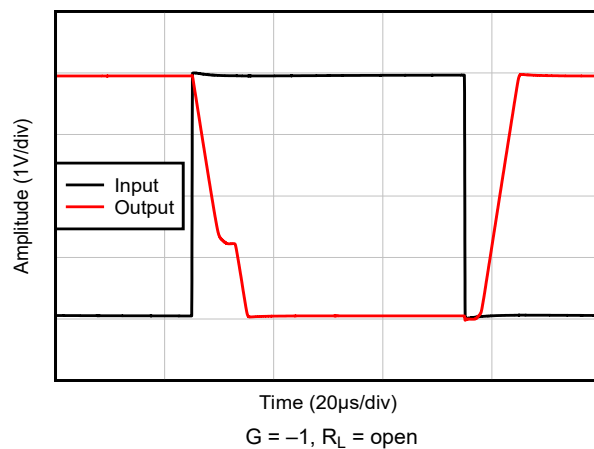


Figure 5-17. Large-Signal Step Response, G = -1 (New Die)



## 6 Parameter Measurement Information

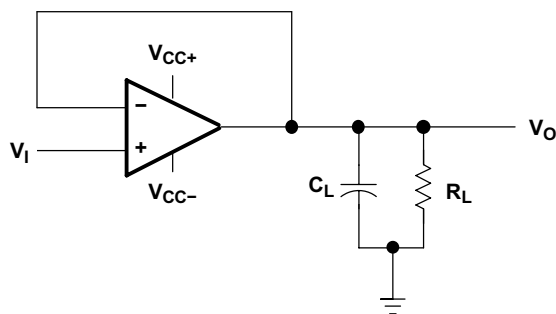


Figure 6-1. Unity-Gain Amplifier

## 7 Device and Documentation Support

### 7.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](https://www.ti.com). Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

### 7.2 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

### 7.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

### 7.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### 7.5 Glossary

[TI Glossary](#)

This glossary lists and explains terms, acronyms, and definitions.

## 8 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

| Changes from Revision A (October 1990) to Revision B (April 2026)                                                           | Page |
|-----------------------------------------------------------------------------------------------------------------------------|------|
| • Updated the numbering format for tables, figures, and cross-references throughout the document.....                       | 1    |
| • Deleted <i>Offset voltage null capability</i> bullet in the <i>Features</i> .....                                         | 1    |
| • Deleted <i>Designed to be interchangeable with fairchild μA747C and μA747M</i> bullet in the <i>Features</i> .....        | 1    |
| • Added the <i>Applications</i> section.....                                                                                | 1    |
| • Deleted offset parameters information in the <i>Description</i> .....                                                     | 1    |
| • Deleted UA747M information from the document.....                                                                         | 1    |
| • Deleted offset pins from the <i>Symbol (Each Amplifier)</i> figure in the <i>Description</i> .....                        | 1    |
| • Deleted the <i>Available Options</i> table in the <i>Description</i> .....                                                | 1    |
| • Deleted the <i>Schematic (Each Amplifier)</i> figure in the <i>Description</i> .....                                      | 1    |
| • Deleted D, J, or W and FK package .....                                                                                   | 3    |
| • Deleted offset pins in N package.....                                                                                     | 3    |
| • Added the <i>Pin Configuration and Functions</i> section.....                                                             | 3    |
| • Deleted voltage between any offset null terminal row in the <i>Absolute Maximum Ratings</i> table.....                    | 4    |
| • Deleted case temperature for 60 seconds row in the <i>Absolute Maximum Ratings</i> table.....                             | 4    |
| • Deleted lead temperature 1,6mm (1/16 inch) from case for 60 seconds row in the <i>Absolute Maximum Ratings</i> table..... | 4    |
| • Deleted uA747M column in the <i>Absolute Maximum Ratings</i> table.....                                                   | 4    |
| • Deleted W, J, FK and D package details in the <i>Dissipation Rating</i> table.....                                        | 4    |
| • Changed input offset voltage TYP from 1mV to ±0.3mV in the <i>Electrical Characteristics</i> table.....                   | 5    |
| • Deleted offset voltage adjust range row in the <i>Electrical Characteristics</i> table.....                               | 5    |
| • Changed input offset current TYP from 20nA to ±0.5nA in the <i>Electrical Characteristics</i> table.....                  | 5    |
| • Changed input bias current TYP from 80nA to –10nA in the <i>Electrical Characteristics</i> table.....                     | 5    |

|                                                                                                                                                                               |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| • Deleted large-signal differential voltage amplification row in the <i>Electrical Characteristics</i> table .....                                                            | 5 |
| • Deleted input resistance row in the <i>Electrical Characteristics</i> table .....                                                                                           | 5 |
| • Changed output resistance TYP from 75Ω to 300Ω in the <i>Electrical Characteristics</i> table.....                                                                          | 5 |
| • Changed input capacitance TYP from 1.4pF to 10    0.1qMΩ    pf in differential mode and 4    1.5GΩ    pf in common-mode in the <i>Electrical Characteristics</i> table..... | 5 |
| • Changed common mode rejection ratio TYP from 90dB to 80dB in the <i>Electrical Characteristics</i> table.....                                                               | 5 |
| • Changed short-circuit output current TYP from ±25mA to ±40mA in the <i>Electrical Characteristics</i> table.....                                                            | 5 |
| • Changed supply current (each amplifier) TYP from 1.7mA to 0.35mA in the <i>Electrical Characteristics</i> table....                                                         | 5 |
| • Deleted short-circuit output current MAX value in the <i>Electrical Characteristics</i> table.....                                                                          | 5 |
| • Deleted supply voltage sensitivity row in the <i>Electrical Characteristics</i> table.....                                                                                  | 5 |
| • Deleted rise time and over shoot factor rows in the <i>Operating Characteristics</i> table.....                                                                             | 5 |
| • Updated the slew rate at unity gain test conditions in the <i>Operating Characteristics</i> table.....                                                                      | 5 |
| • Updated to new die plot details in the <i>Typical Characteristics</i> .....                                                                                                 | 6 |
| • Updated <a href="#">Figure 6-1</a> in <i>Parameter Measurement Information</i> .....                                                                                        | 9 |
| • Deleted the <i>Input Offset Voltage Null Circuit</i> figure.....                                                                                                            | 9 |

## 9 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

## PACKAGING INFORMATION

| Orderable part number   | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|-------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">UA747CN</a> | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | UA747CN             |
| UA747CN.A               | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | UA747CN             |
| UA747CNE4               | Active        | Production           | PDIP (N)   14  | 25   TUBE             | -           | Call TI                              | Call TI                           | 0 to 70      |                     |

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

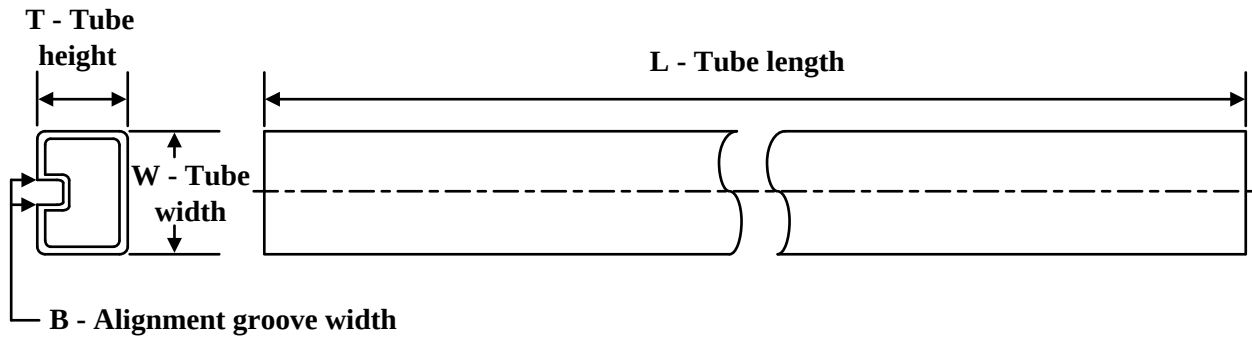
<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

## TUBE



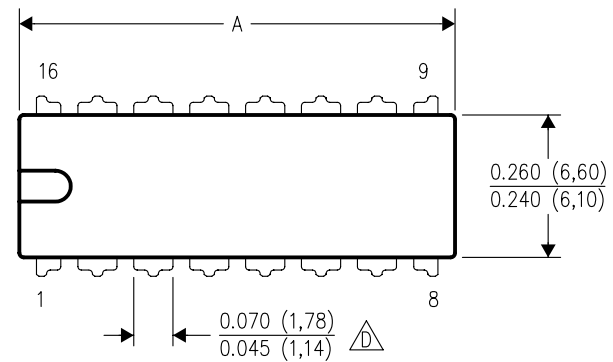
\*All dimensions are nominal

| Device    | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|-----------|--------------|--------------|------|-----|--------|--------|--------|--------|
| UA747CN   | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| UA747CN   | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| UA747CN.A | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| UA747CN.A | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |

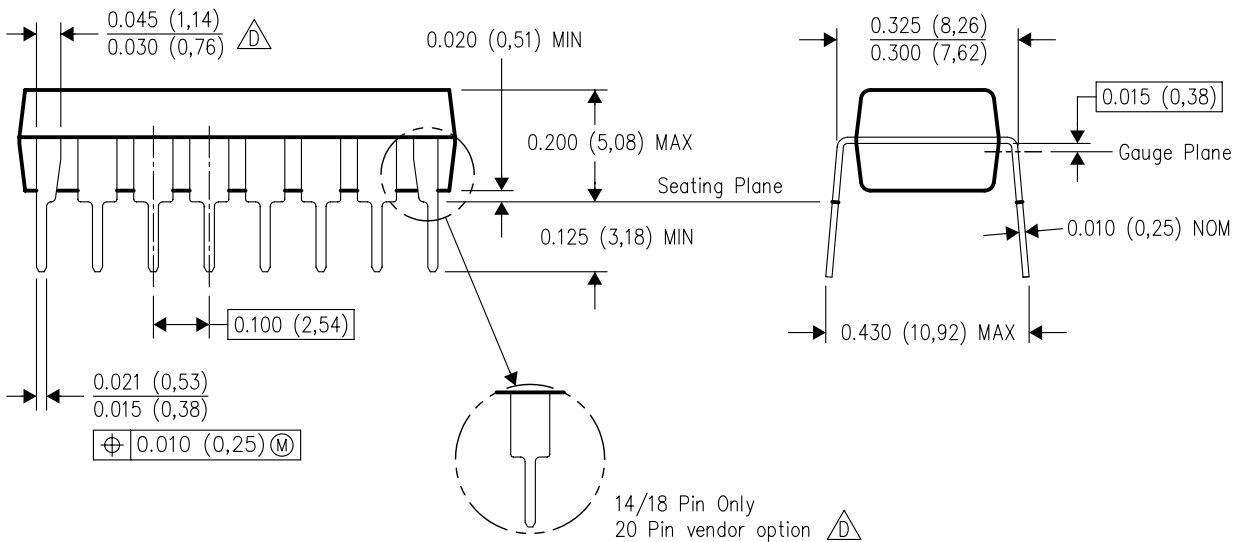
## N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



| PINS **             | 14               | 16               | 18               | 20               |
|---------------------|------------------|------------------|------------------|------------------|
| DIM                 |                  |                  |                  |                  |
| A MAX               | 0.775<br>(19,69) | 0.775<br>(19,69) | 0.920<br>(23,37) | 1.060<br>(26,92) |
| A MIN               | 0.745<br>(18,92) | 0.745<br>(18,92) | 0.850<br>(21,59) | 0.940<br>(23,88) |
| MS-001<br>VARIATION | AA               | BB               | AC               | AD               |



14/18 Pin Only  
20 Pin vendor option

4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

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