FAIRCHILD

A Schlumberger Company

MIL-STD-883
July 1986—Rev 2[5]

# μA747AQB Dual Operational Amplifier

Aerospace and Defense Data Sheet
Linear Products

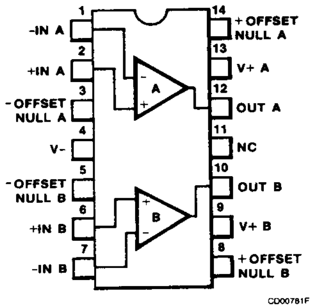
## Description

The μA747AQB is a pair of high performance monolithic operational amplifiers constructed using the Fairchild Planar Epitaxial process. They are intended for a wide range of analog applications where board space or weight are important. High common mode voltage range and absence of latch-up make the μA747AQB ideal for use as a voltage follower. The high gain and wide range of operating voltage provide superior performance in integrator, summing amplifier, and general feedback applications.

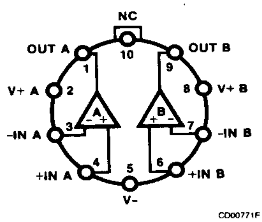
The μA747AQB is short circuit protected and requires no external components for frequency compensation. The internal 6 dB/octave roll-off insures stability in closed loop applications.[6]

- **No Frequency Compensation Required**
- **Short Circuit Protection**
- **Offset Voltage Null Capability**
- **Large Common Mode and Differential Voltage Ranges**
- **Low Power Consumption**
- **No Latch-Up**

## Connection Diagram 14-Lead DIP (Top View)

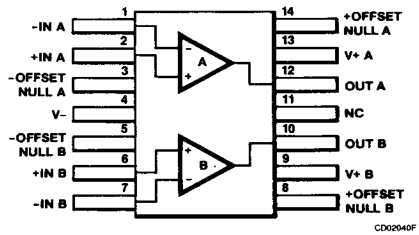



## Connection Diagram 10-Lead Can (Top View)




Lead 5 connected to case.

## Connection Diagram 14-Lead Flatpak (Top View)




## Order Information

| Part No. | Case/ Finish | Package Code Mil-M-38510, Appendix C |
|---|---|---|
| μA747AFMQB | AA | F-1 14-Lead Flatpak |
| μA747ADMQB | CA | D-1 14-Lead DIP |
| μA747AHMQB | IC | A-2 10-Lead Can |

**JAN Product Available**

| | | |
|---|---|---|
| 10102 | BAA | F-1 14-Lead Flatpak |
| 10102 | BAB | F-1 14-Lead Flatpak |
| 10102 | BCA | D-1 14-Lead DIP |
| 10102 | BCB | D-1 14-Lead DIP |
| 10102 | BIA | A-2 10-Lead Can |
| 10102 | BIC | A-2 10-Lead Can |

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**Absolute Maximum Ratings**

| | |
|---|---|
| Storage Temperature Range | −65°C to +175°C |
| Operating Temperature Range | −55°C to +125°C |
| Lead Temperature (soldering, 60 s) | 300°C |
| Internal Power Dissipation[12] | |
| Can and Flatpak | 350 mW |
| DIP | 400 mW |
| Supply Voltage | ±22 V |
| Differential Input Voltage | ±30 V |
| Input Voltage[13] | ±20 V |
| Short Circuit Duration[14] | Indefinite |

**Processing:** MIL-STD-883, Method 5004

**Burn-In:** Method 1015, Condition A, PDA calculated using Method 5005, Subgroup 1

**Quality Conformance Inspection:** MIL-STD-883, Method 5005

**Group A Electrical Tests Subgroups:**

1. Static tests at 25°C
2. Static tests at 125°C
3. Static tests at −55°C
4. Dynamic tests at 25°C
5. Dynamic tests at 125°C
6. Dynamic tests at −55°C
9. AC tests at 25°C
10. AC tests at 125°C
11. AC tests at −55°C

**Group C and D Endpoints: Group A, Subgroup 1**

**Notes**

1. 100% Test and Group A
2. Group A
3. Periodic tests, Group C
4. Guaranteed but not tested
5. When changes occur, FSC will make data sheet revisions available. Contact local sales representative for the latest revision.
6. For more information on device function, refer to the Fairchild Linear Data Book Commercial Section.
7. Not available on μA747AHMQB.
8. $Z_I$ is guaranteed by $I_{IB}$: $Z_I = 4.0\ V_T/I_{IB}$, $V_T = 26$ mV at 25°C, 34 mV at 125°C, and 19 mV at −55°C.
9. $P_c$ is guaranteed by $I_{CC}$: $P_c = 40\ I_{CC}$.
10. $V_{IR}$ is guaranteed the CMR test.
11. BW is guaranteed by $t_r$: $BW = 0.35/t_r$.
12. Rating applies to ambient temperatures up to 125°C. Above 125°C ambient, derate linearly at 140°C/W for the Can and Flatpak and 120°C/W for the DIP.
13. For supply voltages less than ±20 V, the absolute maximum input voltage is equal to the supply voltage.
14. Short circuit may be to ground or either supply. Rating applies to 125°C case temperature or 75°C ambient temperature.

**μA747AQB**
**Electrical Characteristics** $\pm 5.0\ V \leq V_{CC} \leq \pm 20\ V$, unless otherwise specified.

| Symbol | Characteristic | | Condition | | Min | Max | Unit | Note | Subgrp |
|---|---|---|---|---|---|---|---|---|---|
| $V_{IO}$ | Input Offset Voltage | | $R_S = 50\ k\Omega$, $V_{CM} = 0\ V$ | | | 3.0 | mV | 1 | 1 |
| | | | | | | 4.0 | mV | 1 | 2,3 |
| $\Delta V_{IO}/\Delta T$ | Input Offset Voltage Temperature Sensitivity | | $25°C \leq T_A \leq 125°C$ | | | 15 | μV/°C | 4 | 2 |
| | | | $-55°C \leq T_A \leq +25°C$ | | | 15 | μV/°C | 4 | 3 |
| $V_{IO\ adj}$ | Input Offset Voltage Adjustment Range[7] | | $V_{CC} = \pm 20\ V$ | | 5.0 | | mV | 1 | 1,2,3 |
| $I_{IO}$ | Input Offset Current | | $V_{CM} = 0\ V$ | | | 30 | nA | 1 | 1 |
| | | | | | | 70 | nA | 1 | 2,3 |
| $\Delta I_{IO}/\Delta T$ | Input Offset Current Temperature Sensitivity | | $25°C \leq T_A \leq 125°C$ | | | 0.2 | nA/°C | 4 | 2 |
| | | | $-55°C \leq T_A \leq +25°C$ | | | 0.5 | nA/°C | 4 | 3 |
| $I_{IB}$ | Input Bias Current | | $V_{CM} = 0\ V$ | | | 80 | nA | 1 | 1 |
| | | | | | | 210 | nA | 1 | 2,3 |
| $Z_I$ | Input Impedance[8] | | $V_{CC} = \pm 20\ V$ | | 1.0 | | MΩ | 1 | 1 |
| | | | | | 0.5 | | MΩ | 1 | 2 |
| $I_{CC}$ | Supply Current (Total) | | $V_{CC} = \pm 20\ V$ | | | 7.50 | mA | 1 | 1 |
| | | | | | | 6.75 | mA | 1 | 2 |
| | | | | | | 8.25 | mA | 1 | 3 |
| $P_c$ | Power Consumption (Total)[9] | | $V_{CC} = \pm 20\ V$ | | | 300 | mW | 1 | 1 |
| | | | | | | 270 | mW | 1 | 2 |
| | | | | | | 330 | mW | 1 | 3 |
| CMR | Common Mode Rejection | | $V_{CC} = \pm 20\ V$, $V_{CM} = \pm 15\ V$, $R_S = 50\ \Omega$ | | 80 | | dB | 1 | 1,2,3 |
| $V_{IR}$ | Input Voltage Range[10] | | | | ±15 | | V | 1 | 1,2,3 |
| PSRR | Power Supply Rejection Ratio | | $V+ = 10\ V$, $V- = -20\ V$ to $V+ = 20\ V$, $V- = -10\ V$, $R_S = 50\ \Omega$ | | | 50 | μV/V | 1 | 1 |
| | | | | | | 100 | μV/V | 1 | 2,3 |
| $I_{OS}$ | Output Short Circuit Current | | | | | 60 | mA | 1 | 1,2,3 |
| $A_{VS}$ | Large Signal Voltage Gain | | $V_{CC} = \pm 20\ V$, $V_O = \pm 15\ V$, $R_L = 2.0\ k\Omega$ | | 50 | | V/mV | 1 | 4 |
| | | | | | 32 | | V/mV | 1 | 5,6 |
| | | | $V_{CC} = \pm 5\ V$, $V_O = \pm 2\ V$, $R_L = 2.0\ k\Omega$ | | 10 | | V/mV | 1 | 4,5,6 |
| $V_{OP}$ | Output Voltage Swing | | $V_{CC} = \pm 20\ V$ | $R_L = 10\ k\Omega$ | ±16 | | V | 1 | 4,5,6 |
| | | | | $R_L = 2.0\ k\Omega$ | ±15 | | V | 1 | 4,5,6 |
| $TR(t_r)$ | Transient Response | Rise Time | $V_{CC} = \pm 20\ V$, $V_I = 50\ mV$, $R_L = 2.0\ k\Omega$, $C_L = 100\ pF$, $A_V = 1.0$ | | | 800 | ns | 3 | 9, 10, 11 |
| $TR(o_s)$ | | Overshoot | | | | 25 | % | 3 | 9, 10, 11 |
| BW | Bandwidth[11] | | | | 0.437 | | MHz | 3 | 9, 10, 11 |

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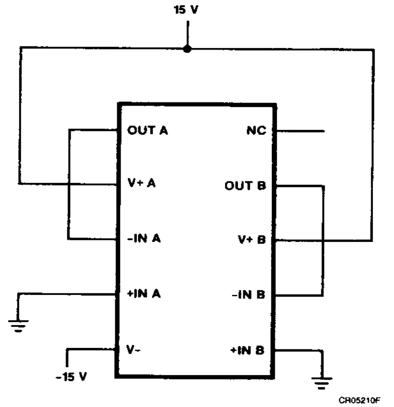
**Electrical Characteristics** $\pm 5.0\ V \leqslant V_{CC} \leqslant \pm 20\ V$, unless otherwise specified.

| Symbol | Characteristic | Condition | Min | Max | Unit | Note | Subgrp |
|---|---|---|---|---|---|---|---|
| SR | Slew Rate | $V_{CC} = \pm 20$ V, $R_L = 2.0$ kΩ, $A_V = 1.0$ | 0.3 | | V/μs | 3 | 9, 10, 11 |
| CS | Channel Separation | $V_{CC} = \pm 20$ V | 100 | | dB | 1 | 9, 10, 11 |
| $N_I$ (BB) | Noise Broadband | $V_{CC} = \pm 20$ V, BW = 5.0 kHz | | 15 | $\mu V_{rms}$ | 4 | 9 |
| $N_I$ (PC) | Noise Popcorn | $V_{CC} = \pm 20$ V, BW = 5.0 kHz | | 40 | $\mu V_{pk}$ | 4 | 9 |

**Primary Burn-In Circuit**
(38510/10102 may be used by FSC as an alternate)




**Equivalent Circuit**