

μ A747/747C/SA747C Dual Operational Amplifier

Product Specification

Linear Products

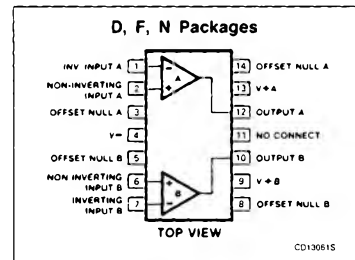
DESCRIPTION

The 747 is a pair of high-performance monolithic operational amplifiers constructed on a single silicon chip. High common-mode voltage range and absence of "latch-up" make the 747 ideal for use as a voltage-follower. The high gain and wide range of operating voltage provides superior performance in integrator, summing amplifier, and general feedback applications. The 747 is short-circuit protected and requires no external components for frequency compensation. The internal 6dB/octave roll-off insures stability in closed-loop applications. For single amplifier performance, see μ A741 data sheet.

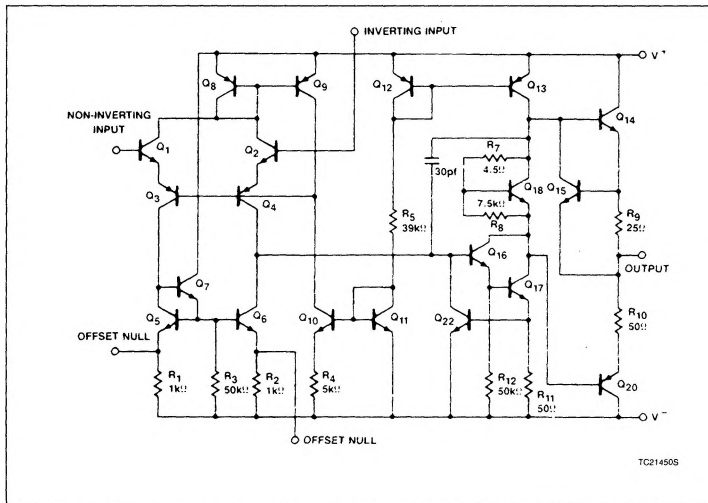
FEATURES

- No frequency compensation required
- Short-circuit protection
- Offset voltage null capability
- Large common-mode and differential voltage ranges
- Low power consumption
- No latch-up

PIN CONFIGURATION



EQUIVALENT SCHEMATIC



Dual Operational Amplifier

 μ A747/747C/SA747C

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
14-Pin Plastic DIP	-55°C to +125°C	μ A747N
14-Pin Plastic DIP	0 to +70°C	μ A747CN
14-Pin Plastic DIP	-45°C to +85°C	SA747CN
14-Pin Cerdip	-55°C to +125°C	μ A747F
14-Pin Cerdip	0 to +70°C	μ A747CF
14-Pin SO	0 to +70°C	μ A747CD

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V_S	Supply voltage		
	μ A747	± 22	V
	μ A747C	± 18	V
	SA747C	± 18	V
P_D MAX	Maximum power dissipation		
	$T_A = 25^\circ\text{C}$ (still air) ¹		
	D package	1000	mW
	F package	1200	mW
	N package	1500	mW
V_{IN}	Differential input voltage	± 30	V
V_{IN}	Input voltage ²	± 15	V
	Voltage between offset null and V-	± 0.5	V
T_{STG}	Storage temperature range	-65 to +150	°C
T_A	Operating temperature range		
	μ A747	-55 to +125	°C
	μ A747C	0 to +70	°C
	SA747C	-40 to +85	°C
T_{SOLD}	Lead temperature (soldering, 10sec)	300	°C
I_{SC}	Output short-circuit duration	Indefinite	

NOTES:

1. Derate above 25°C at the following rates:

D package at 8.3mW/°C

F package at 9.7mW/°C

N package at 12mW/°C

2. For supply voltages less than $\pm 15\text{V}$, the absolute maximum input voltage is equal to the supply voltage.

Dual Operational Amplifier

 $\mu A747/747C/SA747C$ **DC ELECTRICAL CHARACTERISTICS** ($\mu A747$, $\mu 747C$) $T_A = 25^\circ\text{C}$, $V_{CC} = \pm 15\text{V}$ unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	$\mu A747$			$\mu A747C$			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Offset voltage	$R_S \leq 10\text{k}\Omega$ $R_S \leq 10\text{k}\Omega$, over temp.		2.0 3.0	5.0 6.0		2.0 3.0	6.0 7.5	mV mV
$\Delta V_{OS}/\Delta T$				10			10		$\mu\text{V}/^\circ\text{C}$
I_{OS}	Offset current	$T_A = +125^\circ\text{C}$ $T_A = -55^\circ\text{C}$ Over temperature		20 7.0 85	200 200 500		20 7.0 300	200 300 300	nA nA nA nA
$\Delta I_{OS}/\Delta T$				200			200		$\text{pA}/^\circ\text{C}$
I_{BIAS}	Input current	$T_A = +125^\circ\text{C}$ $T_A = -55^\circ\text{C}$ Over temperature		80 30 300	500 500 1500		80 30 800	500 800 800	nA nA nA nA
$\Delta I_B/\Delta T$				1			1		$\text{nA}/^\circ\text{C}$
V_{OUT}	Output voltage swing	$R_L \geq 2\text{k}\Omega$, over temp. $R_L \geq 10\text{k}\Omega$, over temp.	± 10 ± 12	± 13 ± 14		± 10 ± 12	± 13 ± 14		V V
I_{CC}	Supply current each side	$T_A = +125^\circ\text{C}$ $T_A = -55^\circ\text{C}$ Over temperature		1.7 1.5 2.0	2.8 2.5 3.3		1.7 2.0 3.3	2.8 3.3 3.3	mA mA mA mA
P_d	Power consumption	$T_A = +125^\circ\text{C}$ $T_A = -55^\circ\text{C}$ Over temperature		50 45 60	85 75 100		50 60 100	85 100 100	mW mW mW mW
C_{IN}	Input capacitance			1.4			1.4		pF
	Offset voltage adjustment range			± 15			± 15		mV
R_{OUT}	Output resistance			75			75		Ω
	Channel separation			120			120		dB
PSRR	Supply voltage rejection ratio	$R_S \leq 10\text{k}\Omega$, over temp.		30	150		30	150	$\mu\text{V}/\text{V}$
A_{VOL}	Large-signal voltage gain (DC)	$R_L \geq 2\text{k}\Omega$, $V_{OUT} = \pm 10\text{V}$ Over temperature	50,000 25,000			25,000 15,000			V/V V/V
CMRR	Common-mode rejection ratio	$R_S \leq 10\text{k}\Omega$, $V_{CM} = \pm 12\text{V}$ Over temperature	70			70			dB

Dual Operational Amplifier

 $\mu A747/747C/SA747C$ **DC ELECTRICAL CHARACTERISTICS** (SA747C) $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$ unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	SA747C			UNIT
			Min	Typ	Max	
V_{OS}	Offset voltage	$R_S \leq 10\Omega$ $R \leq 10k\Omega$, over temperature		2.0 3.0	6.0 7.5	mV mV
$\Delta V_{OS}/\Delta T$				10		$\mu\text{V}/^\circ\text{C}$
I_{OS}	Offset current	Over temperature		20	200 500	mA mA
$\Delta I_{OS}/\Delta T$				300		$\mu\text{A}/^\circ\text{C}$
I_{BIAS}	Input bias current	Over temperature		80	500 1500	mA mA
$\Delta I_B/\Delta T$				1		$\text{mA}/^\circ\text{C}$
V_{OUT}	Output voltage swing	$R_L \geq 2k\Omega$, over temperature $R_L \geq 10k\Omega$, over temperature	± 10 ± 12	± 13 ± 14		V V
I_{CC}	Supply current, each side	Over temperature		1.7 2.0	2.8 3.3	mA mA
P_d	Power consumption	Over temperature		50 60	85 100	mW mW
C_{IN}	Input capacitance			1.4		pF
	Offset voltage adjustment range			± 15		mV
R_{OUT}	Output resistance			75		Ω
	Channel separation			120		dB
PSRR	Supply voltage rejection ratio	$R_S \leq 10k\Omega$, over temperature		30	150	$\mu\text{V}/\text{V}$
A_{VOL}	Large signal voltage gain (DC)	$R_L \geq 2k\Omega$, $V_{OUT} = \pm 10\text{V}$	25,000			V/V
CMRR	Common-mode rejection ratio	$R_S \leq 10k\Omega$, $V_{CM} = \pm 12\text{V}$ Over temperature	70			dB
I_{SC}	Output short-circuit current		10	25	60	mA

AC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$ unless otherwise specified.

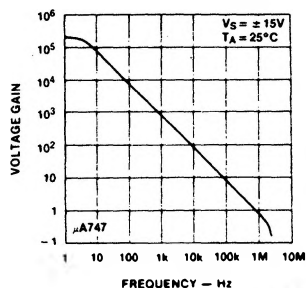
SYMBOL	PARAMETER	TEST CONDITIONS	$\mu A747/\mu A747C/$ SA747C			UNIT
			Min	Typ	Max	
t_R	Transient response	$V_{IN} = 20\text{mV}$, $R_L = 2k\Omega$, $C_L < 100\text{pF}$				
	Rise time	Unity gain $C_L \leq 100\text{pF}$		0.3		μs
	Overshoot	Unity gain $C_L \leq 100\text{pF}$		5.0		%
SR	Slew rate	$R_L > 2k\Omega$		0.5		V/ μs

Dual Operational Amplifier

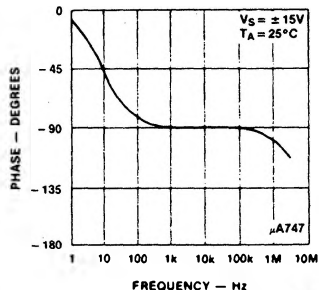
 $\mu A747/747C/SA747C$

TYPICAL PERFORMANCE CHARACTERISTICS

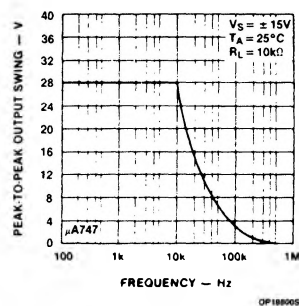
Open-Loop Voltage Gain as a Function of Frequency



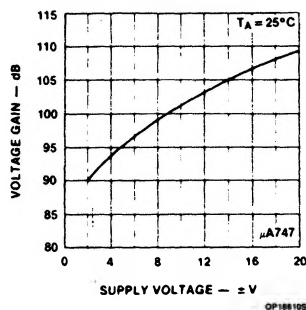
Open-Loop Phase Response as a Function of Frequency



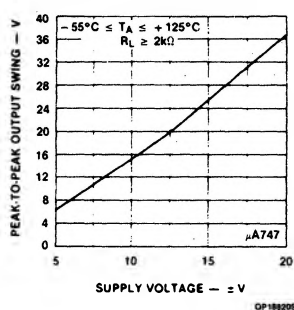
Output Voltage Swing as a Function of Frequency



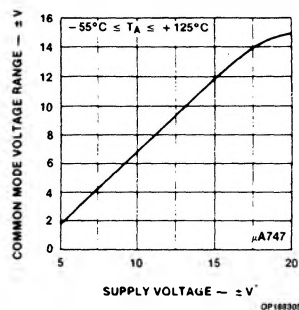
Open-Loop Voltage Gain as a Function of Supply Voltage



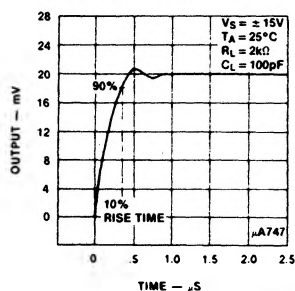
Output Voltage Swing as a Function of Supply Voltage



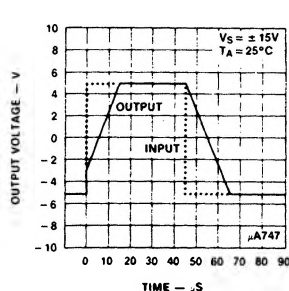
Input Common-Mode Voltage Range as a Function of Supply Voltage



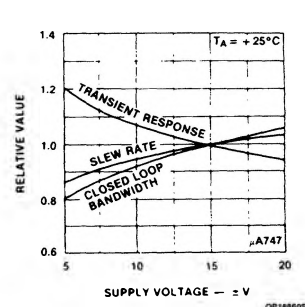
Transient Response



Voltage-Follower Large-Signal Pulse Response



Frequency Characteristics as a Function of Supply Voltage

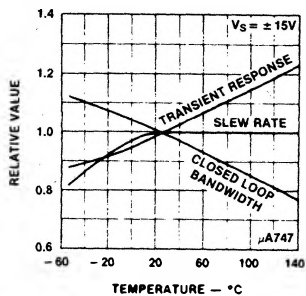


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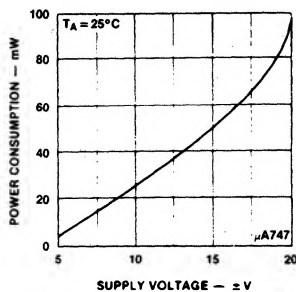
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

Frequency Characteristics as a Function of Ambient Temperature



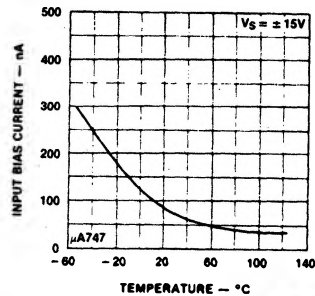
OP188705

Power Consumption as a Function of Supply Voltage



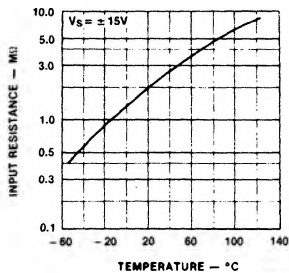
OP188805

Input Bias Current as a Function of Ambient Temperature



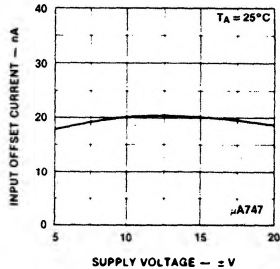
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Input Resistance as a Function of Ambient Temperature



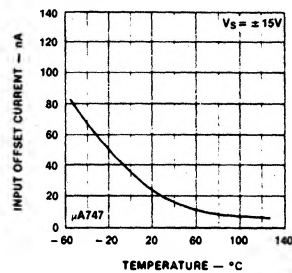
OP189005

Input Offset Current as a Function of Supply Voltage



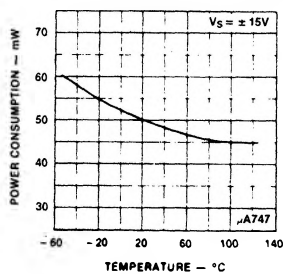
OP189105

Input Offset Current as a Function of Ambient Temperature



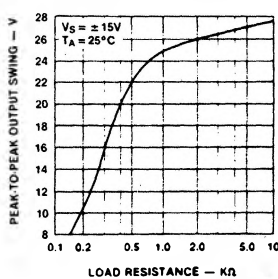
OP189205

Power Consumption as a Function of Ambient Temperature



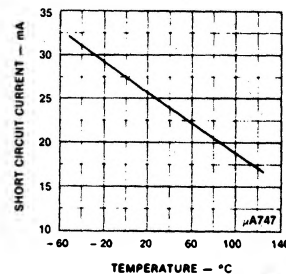
OP189305

Output Voltage Swing as a Function of Load Resistance



OP189405

Output Short-Circuit Current as a Function of Ambient Temperature

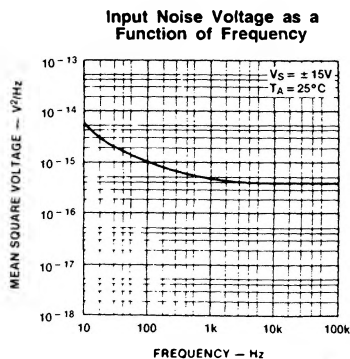


OP189505

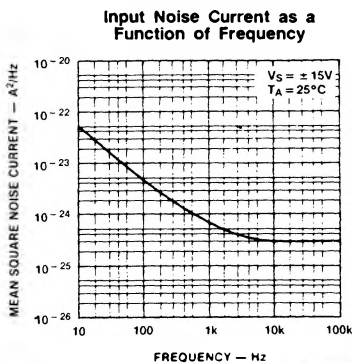
Dual Operational Amplifier

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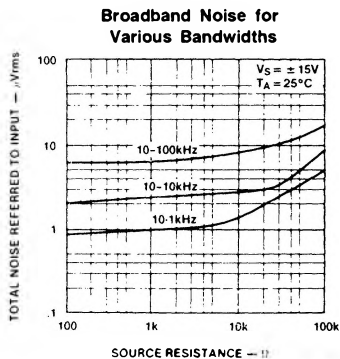
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



OP189705

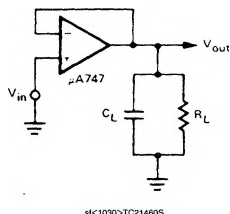


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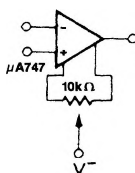


OP189905

TEST CIRCUITS



Transient Response Test Circuit



Voltage Offset Null Circuit