

DUAL OPERATIONAL AMPLIFIER

μ A747/747C/SA747C

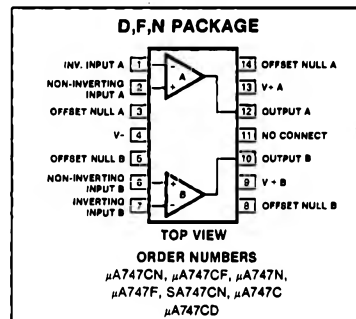
DESCRIPTION

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

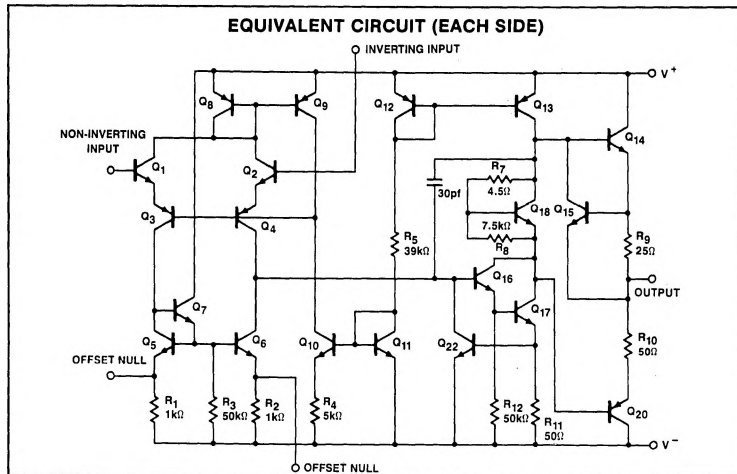
PIN CONFIGURATIONS



ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage		
μ A747	± 22	V
μ A747C	± 18	V
SA747C	± 18	V
Internal power dissipation		
H Package	500	mW
N,F Packages	670	mW
Differential input voltage	± 30	V
Input voltage	± 15	V
Voltage between offset null and V-	± 0.5	V
Storage temperature range	-65 to +155	$^{\circ}$ C
Operating temperature range		
μ A747	-55 to +125	$^{\circ}$ C
μ A747C	0 to +70	$^{\circ}$ C
SA747C	-40 to +85	$^{\circ}$ C
Lead temperature		
(soldering, 60 sec)	300	$^{\circ}$ C
Output short-circuit duration	indefinite	

EQUIVALENT SCHEMATIC



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

PARAMETER	TEST CONDITIONS	SA747C			UNIT
		Min	Typ	Max	
V_{OS} Offset voltage	$R_S = 10\text{k}\Omega$		2.0	8.0	mV
$\Delta V_{OS}/\Delta T$	$R_S \leq 10\text{k}\Omega$, over temperature		3.0 10	7.5	mV $\mu\text{V}/^\circ\text{C}$
I_{OS} Offset current	Over temperature		20 300	200 500	nA nA $\text{pA}/^\circ\text{C}$
I_{BIAS} Input bias current	Over temperature			500 1500	nA nA $\text{nA}/^\circ\text{C}$
$\Delta I_B/\Delta T$			1		
V_{OUT} Output voltage swing	$R_L \geq 2\text{k}\Omega$, over temperature $R_L \geq 10\text{k}\Omega$, over temperature	± 10 ± 12	± 13 ± 14		V V
I_{CC} Supply current	Over temperature		1.7 2.0	2.8 3.3	mA mA
Power consumption	Over temperature		50 60	85 100	mW mW
Input capacitance			1.4		pF
Offset voltage adjustment range			± 15		V
Output resistance			75		Ω
Channel separation			120		dB
PSRR Supply voltage rejection ratio	$R_S \leq 10\text{k}\Omega$, over temperature		30	150	$\mu\text{V}/\text{V}$
A_{VOL} Large signal voltage gain (DC)	$R_L \geq 2\text{k}\Omega$, $V_{OUT} = \pm 10\text{V}$	25,000			V/V
CMRR	$R_S \leq 10\text{k}\Omega$, $V_{CM} = \pm 12\text{V}$ Over temperature	70			dB
I_{sc}		10	25	60	mA

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

PARAMETER	TEST CONDITIONS	$\mu\text{A747}/\mu\text{A747C}/\text{SA747C}$			UNIT
		Min	Typ	Max	
Transient response	$V_{IN} = 20\text{mV}$, $R_1 = 2\text{k}\Omega$, $C_1 < 100\text{pf}$				
Risetime	Unity gain $CL \leq 100\text{pf}$		0.3		μs
Overshoot	Unity gain $CL \leq 100\text{pf}$		5.0		%
Slew rate	$R_L > 2\text{k}\Omega$		0.5		$\text{V}/\mu\text{s}$

DUAL OPERATIONAL AMPLIFIER

 μ A747/747C/SA747CDC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, $V_{CC} = \pm 15\text{V}$ unless otherwise specified.¹

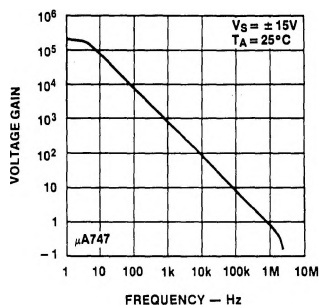
PARAMETER	TEST CONDITIONS	μ A747			μ A747C			UNIT
		Min	Typ	Max	Min	Typ	Max	
V_{OS} Offset voltage	$R_S \leq 10\text{k}\Omega$		2.0	5.0		2.0	6.0	mV
$\Delta V_{OS}/\Delta T$	$R_S \leq 10\text{k}\Omega$, over temp.		3.0 10	6.0		3.0 10	7.5	mV $\mu\text{V}/^\circ\text{C}$
I_{OS} Offset current	$T_A = +125^\circ\text{C}$ $T_A = -55^\circ\text{C}$ Over temperature		20 7.0 85	200 200 500		20 7.0 200	200 300	nA nA nA pA/ $^\circ\text{C}$
$\Delta I_{OS}/\Delta T$			200			200		
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 1	500 800	nA nA nA nA/ $^\circ\text{C}$
$\Delta I_B/\Delta T$			1			1		
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	2.8 3.3	mA mA mA mA
Power consumption	$T_A = +125^\circ\text{C}$ $T_A = -55^\circ\text{C}$ Over temperature		50 45 60	85 75 100		50 60	85 100	mW mW mW mW
Input capacitance			1.4			1.4		pF
Offset voltage adjustment range			± 15			± 15		V
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	$R_S \leq 10\text{k}\Omega$, $V_{CM} = \pm 12\text{V}$ Over temperature	70			70			dB

DUAL OPERATIONAL AMPLIFIER

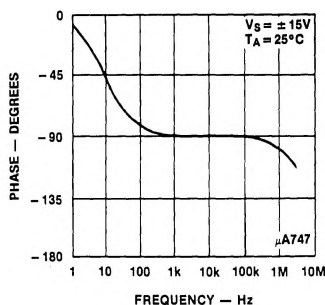
μ A747/747C/SA747C

TYPICAL PERFORMANCE CHARACTERISTICS

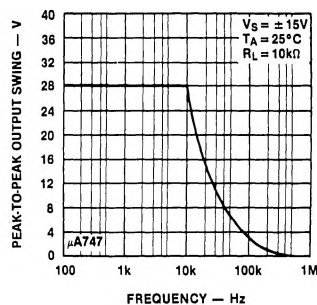
**OPEN LOOP VOLTAGE GAIN
AS A FUNCTION OF
FREQUENCY**



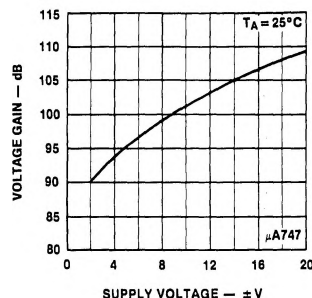
**OPEN LOOP PHASE RESPONSE
AS A FUNCTION OF
FREQUENCY**



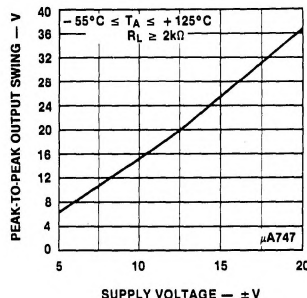
**OUTPUT VOLTAGE SWING
AS A FUNCTION OF
FREQUENCY**



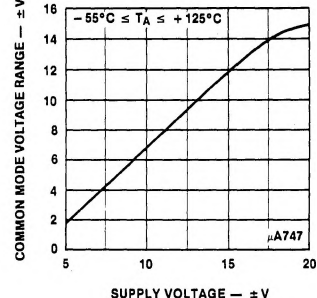
**OPEN LOOP VOLTAGE GAIN
AS A FUNCTION OF
SUPPLY VOLTAGE**



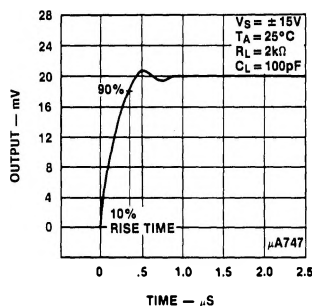
**OUTPUT VOLTAGE SWING
AS A FUNCTION OF
SUPPLY VOLTAGE**



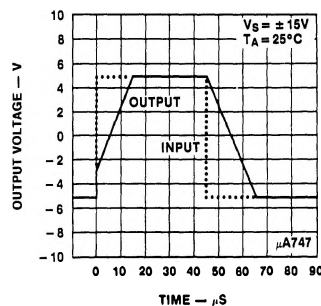
**INPUT COMMON MODE VOLTAGE
RANGE AS A FUNCTION OF
SUPPLY VOLTAGE**



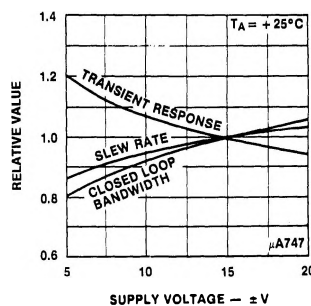
TRANSIENT RESPONSE



**VOLTAGE FOLLOWER
LARGE SIGNAL PULSE
RESPONSE**



**FREQUENCY CHARACTERISTICS
AS A FUNCTION OF
SUPPLY VOLTAGE**

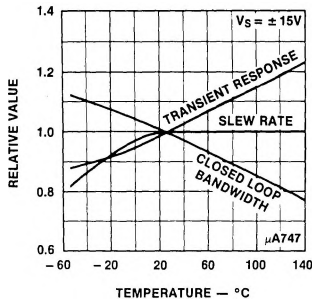


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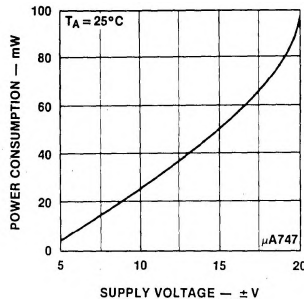
μ A747/747C/SA747C

TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

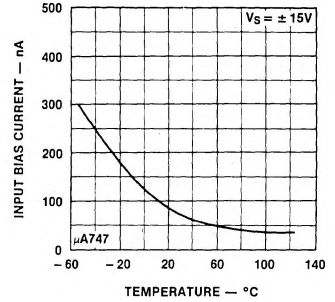
**FREQUENCY CHARACTERISTICS
AS A FUNCTION OF
AMBIENT TEMPERATURE**



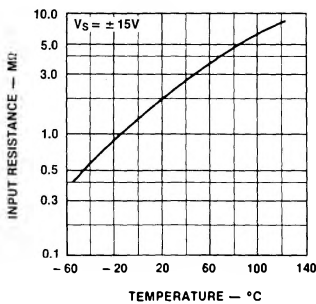
**POWER CONSUMPTION
AS A FUNCTION OF
SUPPLY VOLTAGE**



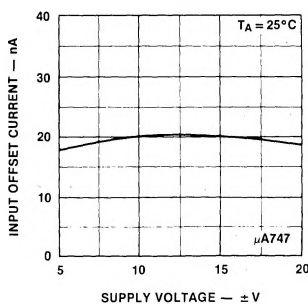
**INPUT BIAS CURRENT
AS A FUNCTION OF
AMBIENT TEMPERATURE**



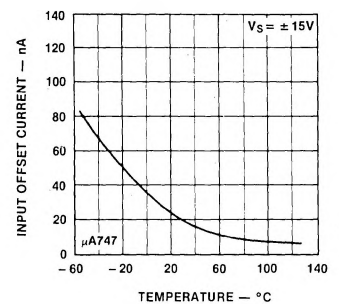
**INPUT RESISTANCE
AS A FUNCTION OF
AMBIENT TEMPERATURE**



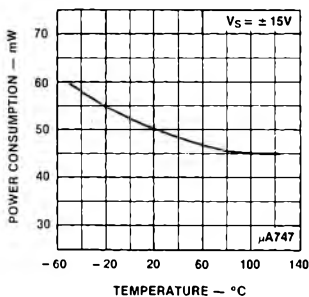
**INPUT OFFSET CURRENT
AS A FUNCTION OF
SUPPLY VOLTAGE**



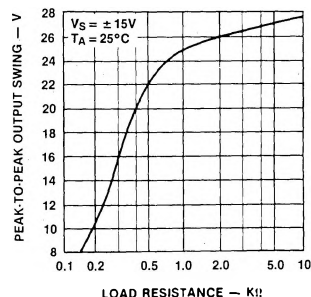
**INPUT OFFSET CURRENT
AS A FUNCTION OF
AMBIENT TEMPERATURE**



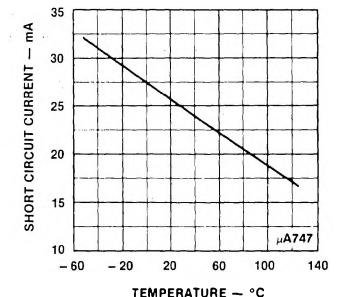
**POWER CONSUMPTION
AS A FUNCTION OF
AMBIENT TEMPERATURE**



**OUTPUT VOLTAGE SWING
AS A FUNCTION OF
LOAD RESISTANCE**



**OUTPUT SHORT-CIRCUIT
CURRENT AS A FUNCTION
OF AMBIENT TEMPERATURE**

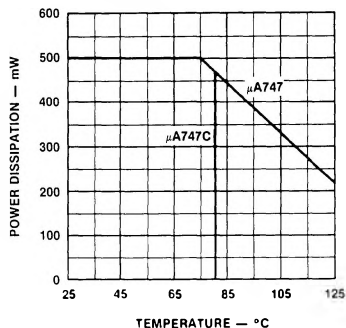


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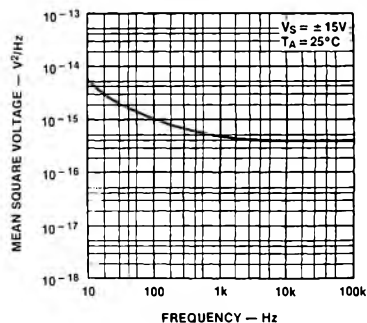
μ A747/747C/SA747C

TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

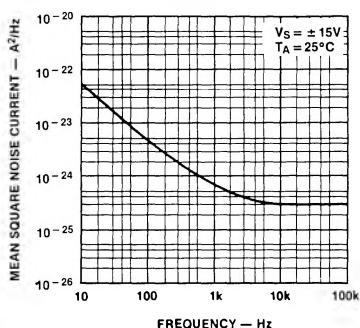
ABSOLUTE MAXIMUM POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE



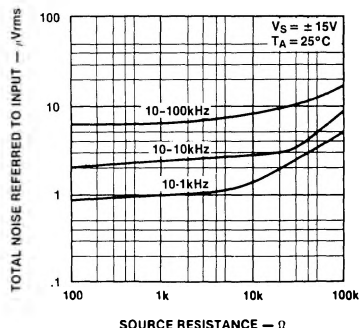
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY

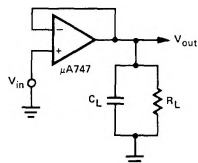


BROADBAND NOISE FOR VARIOUS BANDWIDTHS



TEST CIRCUITS

TRANSIENT RESPONSE TEST CIRCUIT



VOLTAGE OFFSET NULL CIRCUIT

