DUAL OPERATIONAL AMPLIFIER

μA747/747C/SA747C

DESCRIPTION

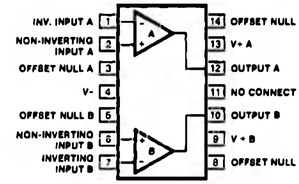
The 747 is a pair of high performance monolithic operational amplifiers constructed on a single silicon chip. High common mode voltage range and absence of "latch-up" make the 747 ideal for use as a voltage follower. The high gain and wide range of operating voltage provides superior performance in integrator, 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 μA741 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

D,F,N PACKAGE



TOP VIEW

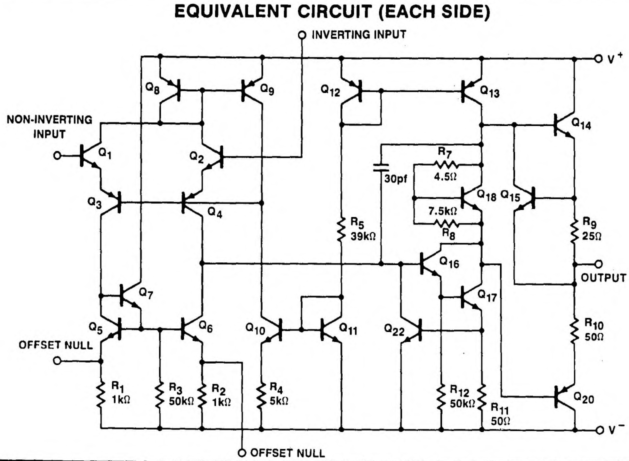
ORDER NUMBERS
μA747CN, μA747CF, μA747N, μA747F, SA747CN, μA747C μA747CD

ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage		
μA747	±22	V
μA747C	±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	°C
Operating temperature range		
μA747	-55 to +125	°C
μA747C	0 to +70	°C
SA747C	-40 to +85	°C
Lead temperature (soldering, 60 sec)	300	°C
Output short-circuit duration	indefinite	

EQUIVALENT SCHEMATIC

EQUIVALENT CIRCUIT (EACH SIDE)



DUAL OPERATIONAL AMPLIFIER

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DC ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_S = \pm 15V$ unless otherwise specified.

PARAMETER		TEST CONDITIONS	SA747C			UNIT
			Min	Typ	Max	
V_{OS}	Offset voltage	$R_S = 10k\Omega$		2.0	6.0	mV
		$R_S \leq 10k\Omega$, over temperature		3.0	7.5	mV
$\Delta V_{OS}/\Delta T$				10		μV/°C
I_{OS}	Offset current			20	200	nA
		Over temperature			500	nA
$\Delta I_{OS}/\Delta T$				300		pA/°C
I_{BIAS}	Input bias current				500	nA
		Over temperature			1500	nA
$\Delta I_B/\Delta T$				1		nA/°C
V_{OUT}	Output voltage swing	$R_L \geq 2k\Omega$, over temperature	±10	±13		V
		$R_L \geq 10k\Omega$, over temperature	±12	±14		V
I_{CC}	Supply current			1.7	2.8	mA
		Over temperature		2.0	3.3	mA
	Power consumption			50	85	mW
		Over temperature		60	100	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	$R_S \leq 10k\Omega$, over temperature		30	150	μV/V
A_{VOL}	Large signal voltage gain (DC)	$R_L \geq 2k\Omega$, $V_{OUT} = \pm 10V$	25,000			V/V
CMRR		$R_S \leq 10k\Omega$, $V_{CM} = \pm 12V$				
		Over temperature	70			dB
I_{SC}			10	25	60	mA

AC ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_S = \pm 15V$ unless otherwise specified.

PARAMETER	TEST CONDITIONS	μA747/μA747C/SA747C			UNIT
		Min	Typ	Max	
Transient response	$V_{IN} = 20mV$, $R_1 = 2k\Omega$, $C_1 < 100pf$				
Risetime	Unity gain CL ≤ 100pf		0.3		μs
Overshoot	Unity gain CL ≤ 100pf		5.0		%
Slew rate	RL > 2kΩ		0.5		V/μs

DUAL OPERATIONAL AMPLIFIER

μA747/747C/SA747C

DC ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_{CC} = \pm 15V$ unless otherwise specified.[1]

PARAMETER		TEST CONDITIONS	μA747			μA747C			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Offset voltage	$R_S \le 10k\Omega$		2.0	5.0		2.0	6.0	mV
		$R_S \le 10k\Omega$, over temp.		3.0	6.0		3.0	7.5	mV
$\Delta V_{OS}/\Delta T$				10			10		μV/°C
I_{OS}	Offset current			20	200		20	200	nA
		$T_A = +125°C$		7.0	200				nA
		$T_A = -55°C$		85	500				nA
		Over temperature					7.0	300	nA
$\Delta I_{OS}/\Delta T$				200			200		pA/°C
I_{BIAS}	Input current			80	500		80	500	nA
		$T_A = +125°C$		30	500				nA
		$T_A = -55°C$		300	1500				nA
		Over temperature					30	800	nA
$\Delta I_B/\Delta T$				1			1		nA/°C
V_{OUT}	Output voltage swing	$R_L \ge 2k\Omega$, over temp.	±10	±13		±10	±13		V
		$R_L \ge 10k\Omega$, over temp.	±12	±14		±12	±14		V
I_{CC}	Supply current each side			1.7	2.8		1.7	2.8	mA
		$T_A = +125°C$		1.5	2.5				mA
		$T_A = -55°C$		2.0	3.3				mA
		Over temperature					2.0	3.3	mA
	Power consumption			50	85		50	85	mW
		$T_A = +125°C$		45	75				mW
		$T_A = -55°C$		60	100				mW
		Over temperature					60	100	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	$R_S \le 10k\Omega$, over temp.		30	150		30	150	μV/V
A_{VOL}	Large signal voltage gain (DC)	$R_L \ge 2k\Omega$, $V_{OUT} = \pm 10V$	50,000			25,000			V/V
		Over temperature	25,000			15,000			V/V
CMRR		$R_S \le 10k\Omega$, $V_{CM} = \pm 12V$ Over temperature	70			70			dB

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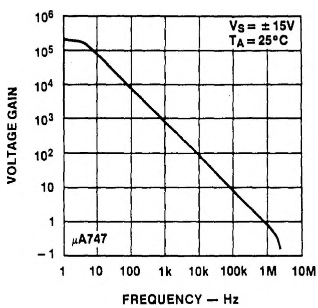
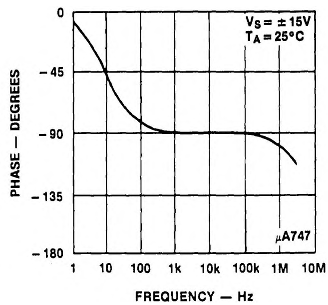
TYPICAL PERFORMANCE CHARACTERISTICS

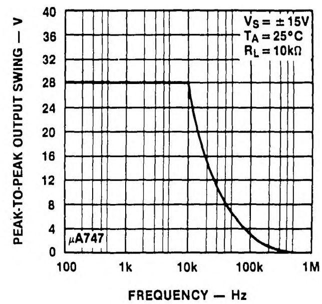
OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF FREQUENCY



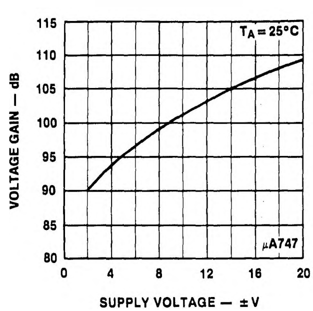
OPEN LOOP PHASE RESPONSE AS A FUNCTION OF FREQUENCY



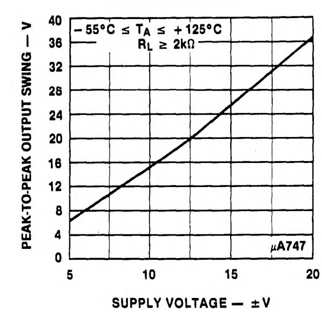
OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY



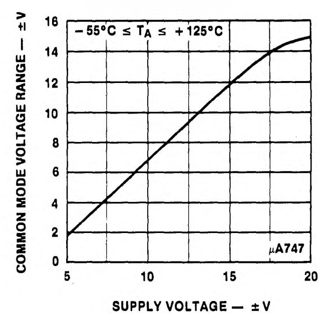
OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGE



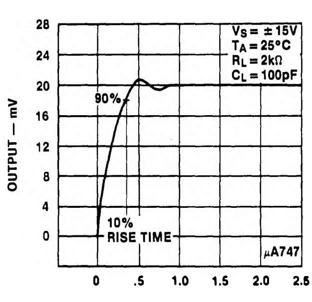
OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE



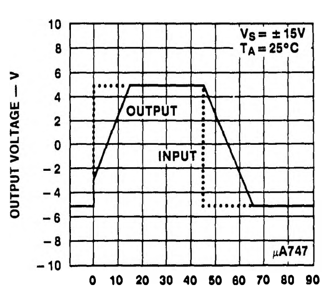
INPUT COMMON MODE VOLTAGE RANGE AS A FUNCTION OF SUPPLY VOLTAGE



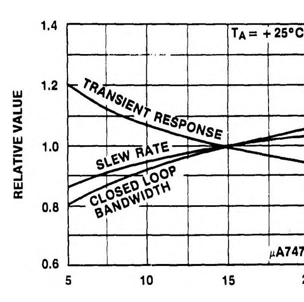
TRANSIENT RESPONSE



VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



FREQUENCY CHARACTERISTICS AS A FUNCTION OF SUPPLY VOLTAGE



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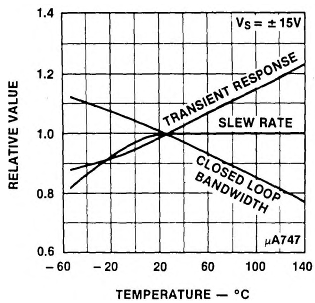
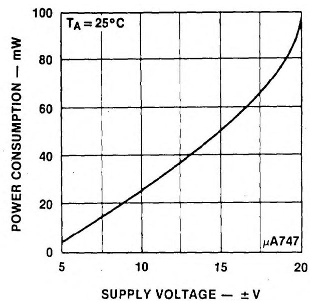
TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

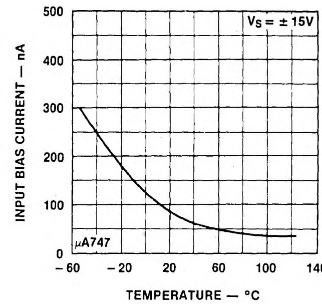
FREQUENCY CHARACTERISTICS AS A FUNCTION OF AMBIENT TEMPERATURE



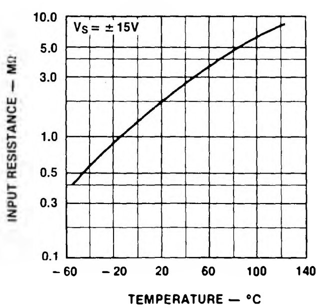
POWER CONSUMPTION AS A FUNCTION OF SUPPLY VOLTAGE



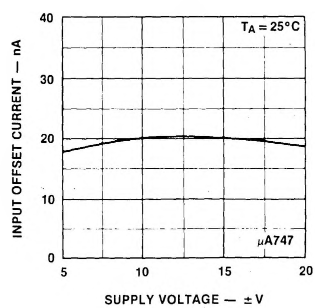
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



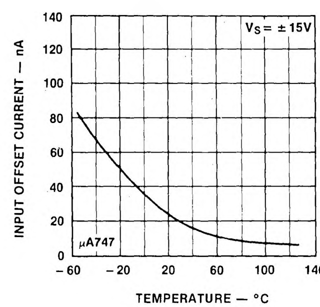
INPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE



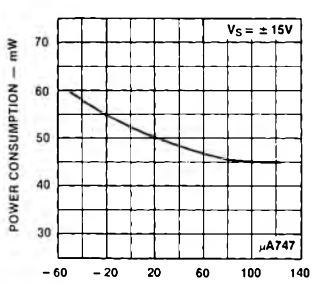
INPUT OFFSET CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



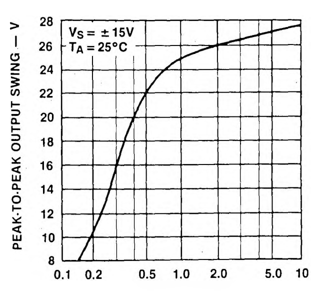
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



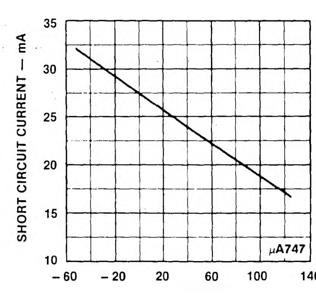
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE



OUTPUT SHORT-CIRCUIT CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



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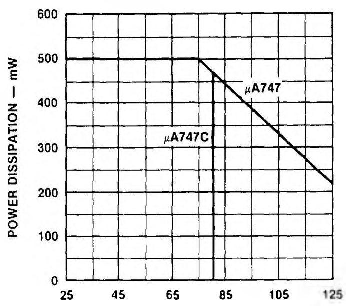
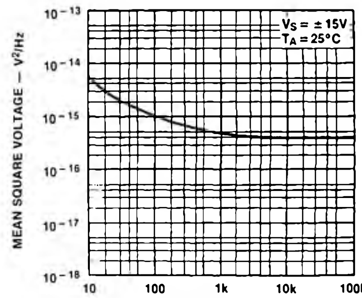
TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

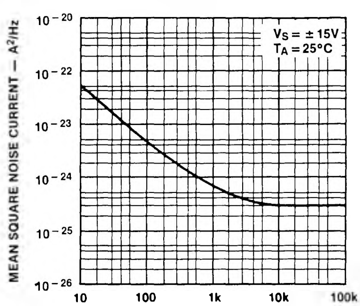
ABSOLUTE MAXIMUM POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE



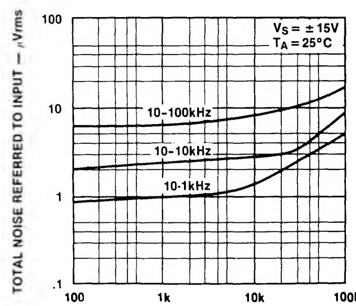
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY

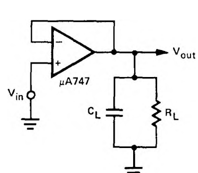


BROADBAND NOISE FOR VARIOUS BANDWIDTHS



TEST CIRCUITS

TRANSIENT RESPONSE TEST CIRCUIT



VOLTAGE OFFSET NULL CIRCUIT