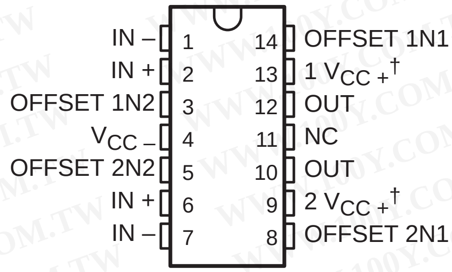
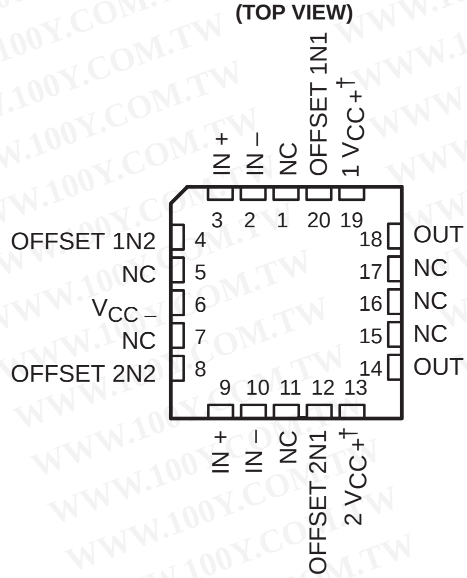
- **No Frequency Compensation Required**
- **Low Power Consumption**
- **Short-Circuit Protection**
- **Offset-Voltage Null Capability**
- **Wide Common-Mode and Differential Voltage Ranges**
- **No Latch-Up**
- **Designed to Be Interchangeable With Fairchild µA747C and µA747M**

D, J, N, OR W PACKAGE
(TOP VIEW)



uA747m . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

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

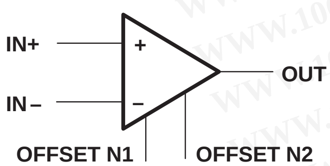
description

The uA747 is a dual general-purpose operational amplifier featuring offset-voltage null capability. Each half is electrically similar to uA741.

The high common-mode input voltage range and the absence of latch-up make this amplifier ideal for voltage-follower applications. The device is short-circuit protected and the internal frequency compensation ensures stability without external components. A low-value potentiometer may be connected between the offset null inputs to null out the offset voltage as shown in Figure 2.

The uA747C is characterized for operation from 0°C to 70°C; the uA747M is characterized for operation over the full military temperature range of –55°C to 125°C.

symbol (each amplifier)

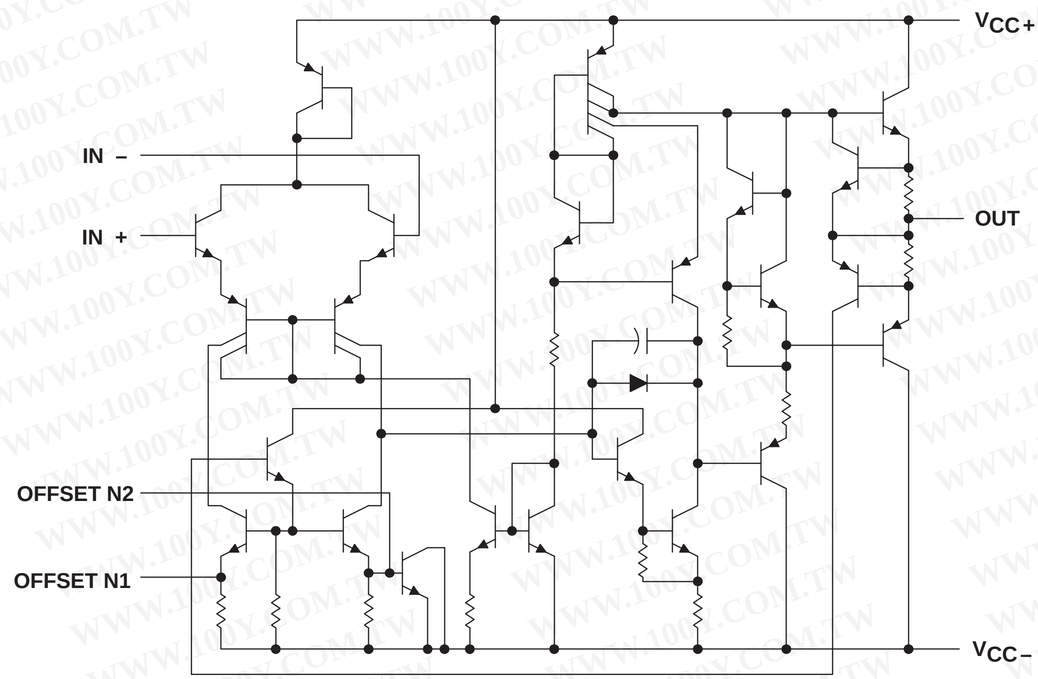


AVAILABLE OPTIONS

T_A	V_{IO} Max AT 25°C	PACKAGE				
		14-PIN				20-PIN
		SMALL OUTLINE (D)	CERAMIC DIP (J)	PLASTIC DIP (N)	FLAT PACK (W)	CHIP CARRIER (FK)
0°C to 70°C	6 mV	uA747CD	—	uA747CN	—	—
–55°C to 125°C	5 mV	—	uA747MJ	—	uA747MW	uA747MFK

The D package is available taped and reeled. Add the suffix R to the device type, (i.e., uA747CDR).

schematic (each amplifier)



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

		uA747C	uA747M	UNIT
Supply voltage, V_{CC+} (see Note 1)		18	22	V
Supply voltage, V_{CC-} (see Note 1)		−18	−22	V
Differential input voltage (see Note 2)		±30	±30	V
Input voltage any input (see Notes 1 and 3)		±15	±15	V
Voltage between any offset null terminal (N1/N2) and V_{CC-}		±0.5	±0.5	V
Duration of output short circuit (see Note 4)		unlimited	unlimited	
Continuous total dissipation		See Dissipation Rating Table		
Operating free-air temperature range		0 to 70	−55 to 125	°C
Storage temperature range		−65 to 150	−65 to 150	°C
Case temperature for 60 seconds	FK package		260	°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	J or W package		300	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	D or N package	260		°C

NOTES: 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 noninverting 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 15 V, whichever is less.
4. The output may be shorted to ground or either power supply. For the uA747M only, the unlimited duration of the short circuit applies at (or below) 125°C case temperature or 75°C free-air temperature.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25°C$ POWER RATING	DERATING FACTOR	DERATE ABOVE T_A	$T_A = 70°C$ POWER RATING	$T_A = 125°C$ POWER RATING
D	800 mW	7.6 mW/°C	45°C	608 mW	—
FK	800 mW	11.0 mW/°C	77°C	800 mW	275 mW
J	800 mW	11.0 mW/°C	77°C	800 mW	275 mW
N	800 mW	9.2 mW/°C	63°C	736 mW	—
W	800 mW	8.0 mW/°C	50°C	640 mW	200 mW

electrical characteristics at specified free-air temperature, $V_{CC\pm} = \pm15$ V

PARAMETER		TEST CONDITIONS†	T_A‡	uA747C MIN	uA747C TYP	uA747C MAX	uA747M MIN	uA747M TYP	uA747M MAX	UNIT
V_{IO}	Input offset voltage	$V_O = 0$	25°C		1	6		1	5	mV
			Full range			7.5			6	
$\Delta V_{IO(adj)}$	Offset voltage adjust range		25°C		±15			±15		mV
I_{IO}	Input offset current		25°C		20	200		20	200	nA
			Full range			300			500	
I_{IB}	Input bias current		25°C		80	500		80	500	nA
			Full range			800			1500	
V_{ICR}	Common-mode input voltage range		25°C	±12	±13		±12	±13		V
			Full range	±12			±12			
$V_{O(PP)}$	Maximum peak-to-peak output voltage swing	$R_L = 10$ kΩ	25°C	24	28		24	28		V
		$R_L \geq 10$ kΩ	Full range	24			24			
		$R_L = 2$ kΩ	25°C	20	26		20	26		
		$R_L \geq 2$ kΩ	Full range	20			20			
A_{VD}	Large-signal differential voltage amplification	$R_L \geq 2$ kΩ, $V_O = \pm 10$ V	25°C	25	200		50	200		V/mV
			Full range	15			25			
r_i	Input resistance		25°C	0.3	2		0.3*	2		MΩ
r_o	Output resistance	See Note 5	25°C		75			75		Ω
C_i	Input capacitance		25°C		1.4			1.4		pF
CMRR	Common-mode rejection ratio	$V_{IC} = V_{ICR}$	25°C	70	90		70	90		dB
			Full range	70			70			
k_{SVS}	Supply-voltage sensitivity ($\Delta V_{IO} / \Delta V_{CC}$)	$V_{CC} = \pm 9$ V to ± 15 V	25°C		30	150		30	150	µV/V
			Full range			150			150	
I_{OS}	Short-circuit output current		25°C		±25	±40		±25	±40	mA
I_{CC}	Supply current (each amplifier)	No load	25°C		1.7	2.8		1.7	2.8	mA
			Full range			3.3			3.3	
P_D	Power dissipation (each amplifier)	No load, $V_O = 0$	25°C		50	85		50	85	mW
			Full range			100			100	
V_{o1}/V_{o2}	Channel separation		25°C		120			120	0	dB

† All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified.
‡ Full range for uA747C is 0°C to 70°C and for uA747M is –55°C to 125°C.
*On products compliant to MIL-STD-883, Class B, this parameter is not production tested.
NOTE 5: This typical value applies only at frequencies above a few hundred hertz because of the effects of drift and thermal feedback.

operating characteristics, $V_{CC\pm} = \pm 15$ V, $T_A = 25°C$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_r	Rise time	$V_I = 20$ mV, $R_L = 2$ kΩ, $C_L = 100$ pF, See Figure 1		0.3		µs
	Overshoot factor			5%		
SR	Slew rate at unity gain	$V_I = 10$ mV, $R_L = 2$ kΩ, $C_L = 100$ pF, See Figure 1		0.5		V/µs

PARAMETER MEASUREMENT INFORMATION

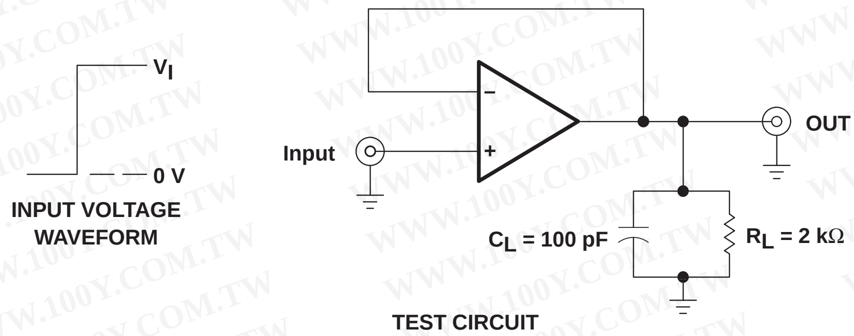


Figure 1. Rise Time, Overshoot, and Slew Rate

APPLICATION INFORMATION

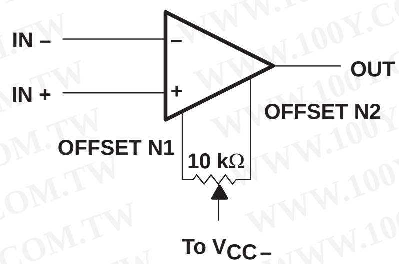


Figure 2. Input Offset Voltage Null Circuit

TYPICAL CHARACTERISTICS†

INPUT OFFSET CURRENT
vs
FREE-AIR TEMPERATURE

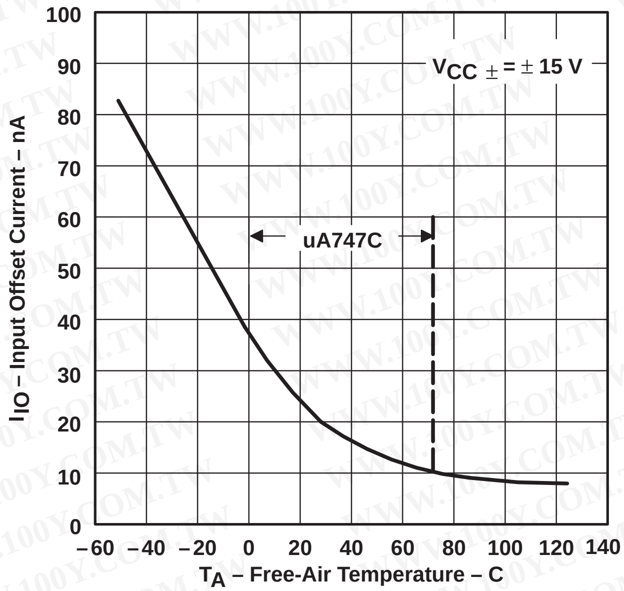


Figure 3

INPUT BIAS CURRENT
vs
FREE-AIR TEMPERATURE

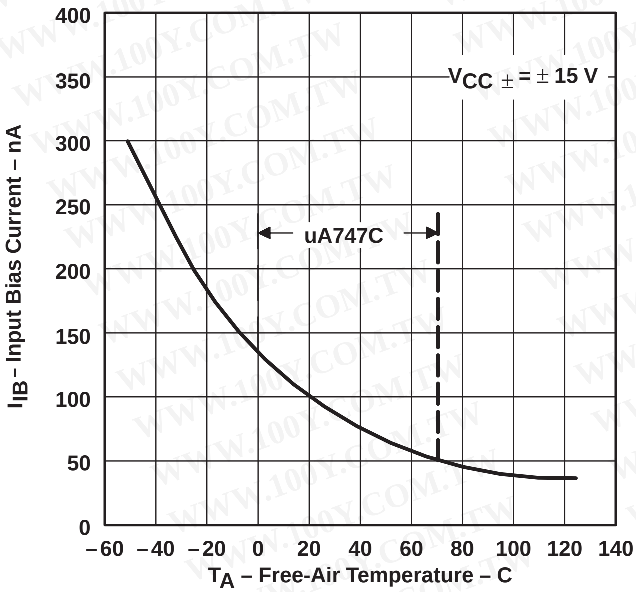


Figure 4

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

TYPICAL CHARACTERISTICS

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE vs LOAD RESISTANCE

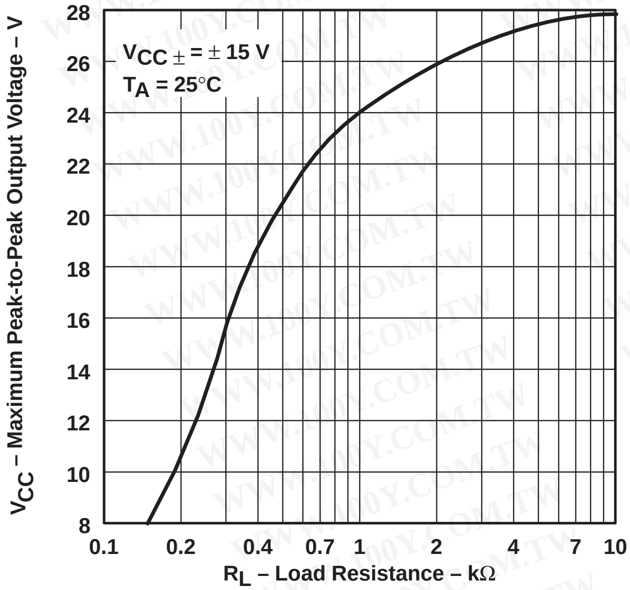


Figure 5

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE vs FREQUENCY

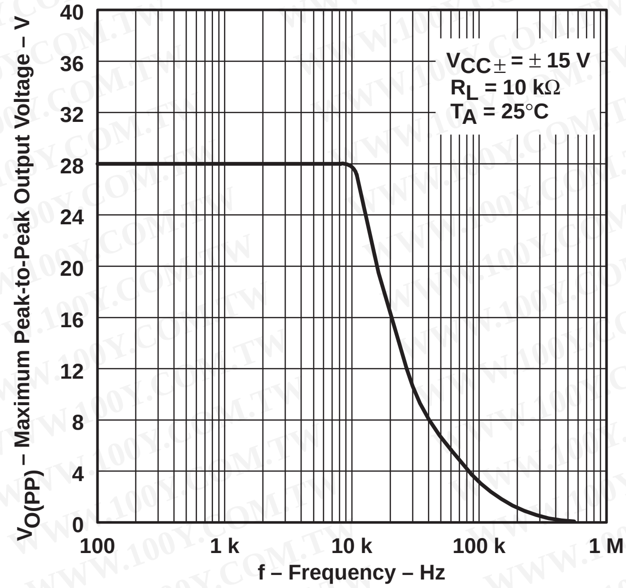


Figure 6

OPEN-LOOP LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION vs SUPPLY VOLTAGE

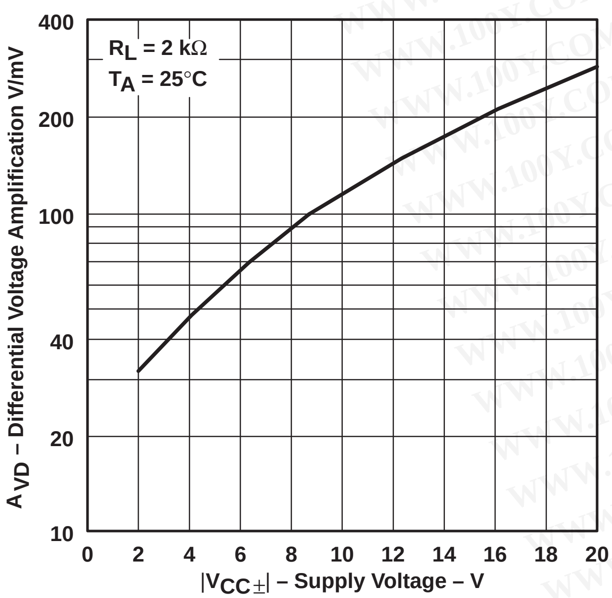


Figure 7

OPEN-LOOP LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION vs FREQUENCY

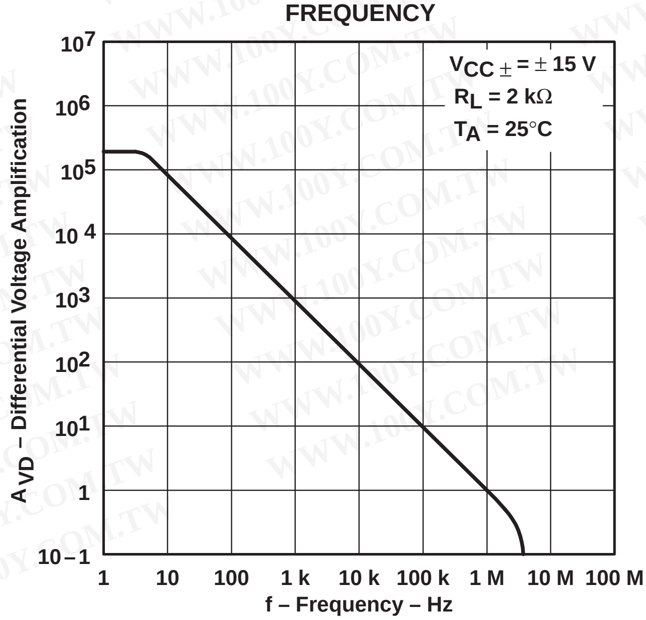


Figure 8

TYPICAL CHARACTERISTICS

COMMON-MODE REJECTION RATIO
vs
FREQUENCY

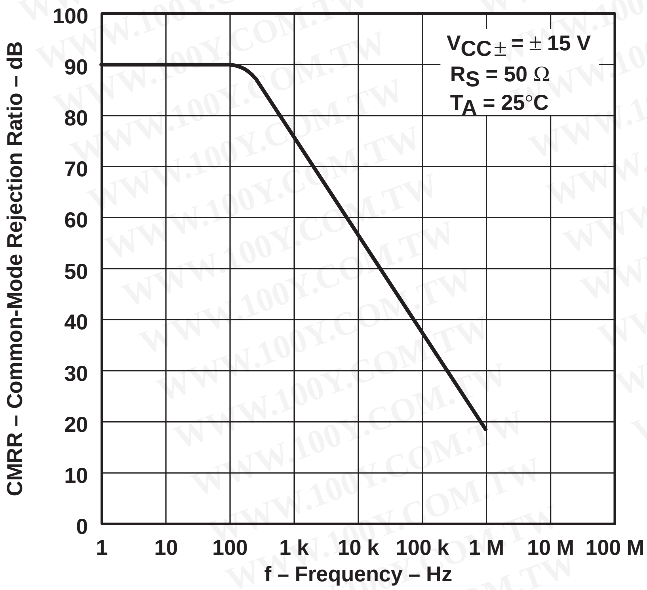


Figure 9

OUTPUT VOLTAGE
vs
ELAPSED TIME

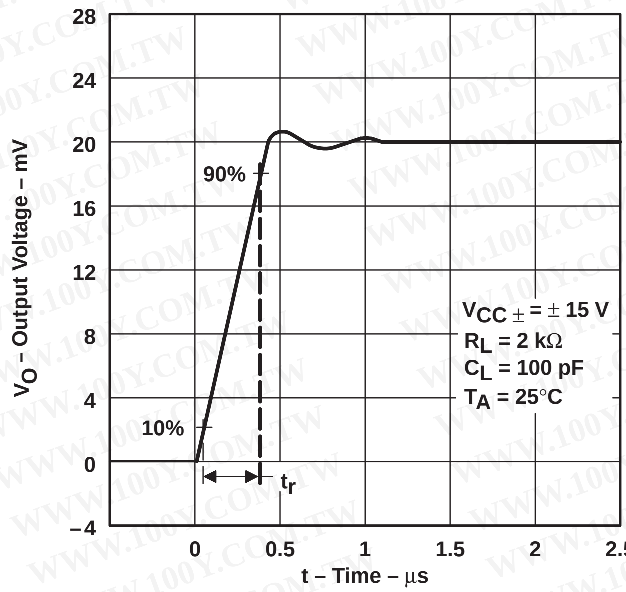


Figure 10

VOLTAGE-FOLLOWER
LARGE-SIGNAL PULSE RESPONSE

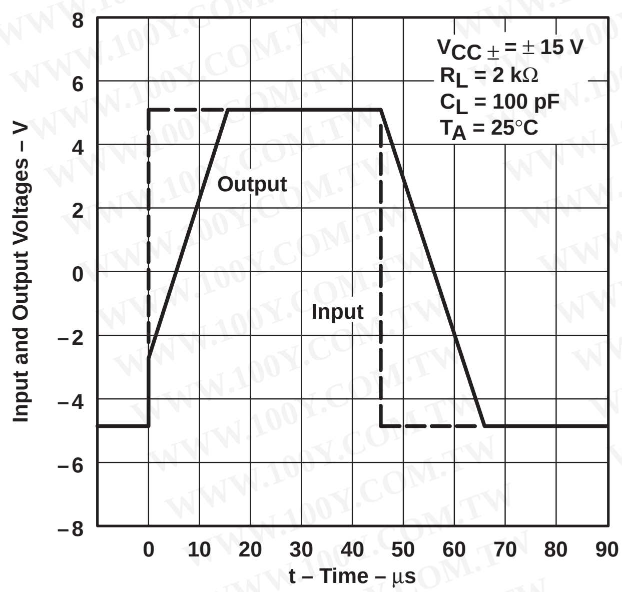


Figure 11

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