signetics

HIGH PERFORMANCE OPERATIONAL AMPLIFIER | μA741

LINEAR INTEGRATED CIRCUITS

DESCRIPTION
The μA741 is a high performance operational amplifier with high open loop gain, internal compensation, high common mode range and exceptional temperature stability. The μA741 is short-circuit protected and allows for nulling of offset voltage.

FEATURES
- INTERNAL FREQUENCY COMPENSATION
- SHORT CIRCUIT PROTECTION
- OFFSET VOLTAGE NULL CAPABILITY
- EXCELLENT TEMPERATURE STABILITY
- HIGH INPUT VOLTAGE RANGE
- NO LATCH-UP

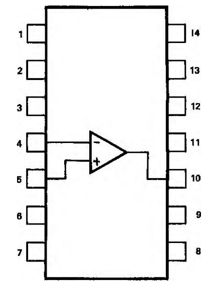
ABSOLUTE MAXIMUM RATINGS

	μA741C	μA741
Supply Voltage	±18V	±22V
Internal Power Dissipation (Note 1)	500mW	500mW
Differential Input Voltage	±30V	±30V
Input Voltage (Note 2)	±15V	±15V
Voltage between Offset Null and V^-	±0.5V	±0.5V
Operating Temperature Range	0°C to +70°C	-55°C to +125°C
Storage Temperature Range	-65°C to +150°C	-65°C to +150°C
Lead Temperature (Solder, 60 sec)	300°C	300°C
Output Short Circuit Duration (Note 3)	Indefinite	Indefinite

Notes
1. Rating applies for case temperatures to 125°C; derate linearly at 6.5mW/°C for ambient temperatures above +75°C.
2. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.
3. Short circuit may be to ground or either supply. Rating applies to +125°C case temperature or +75°C ambient temperature.

PIN CONFIGURATIONS

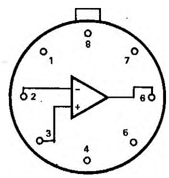
A PACKAGE
(Top View)



1. NC
2. NC
3. Offset Null
4. Inv. Input
5. Non-Inv. Input
6. V^-
7. NC
8. NC
9. Offset Null
10. Output
11. V^+
12. NC
13. NC
14. NC

ORDER PART NO. μA741CA

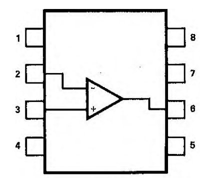
T PACKAGE



1. Offset Null
2. Inverting Input
3. Non-Inverting Input
4. V^-
5. Offset Null
6. Output
7. V^+
8. NC

ORDER PART NOS. μA741T/μA741CT

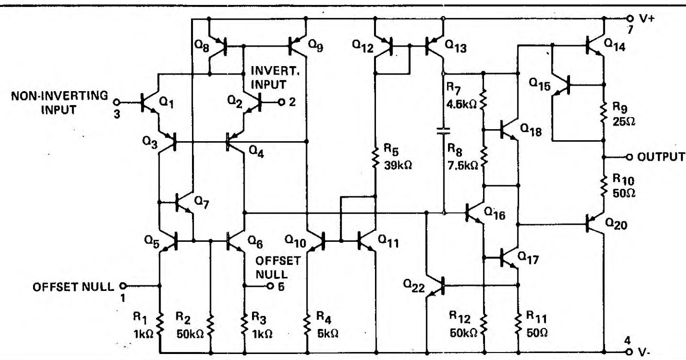
V PACKAGE



1. Offset Null
2. Inv. Input
3. Non-Inv. Input
4. V^-
5. Offset Null
6. Output
7. V^+
8. NC

ORDER PART NO. μA741CV

EQUIVALENT CIRCUIT

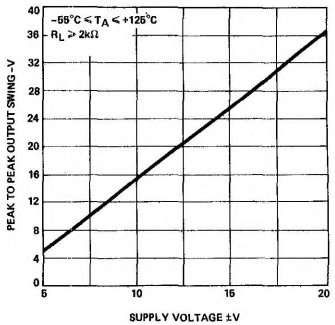


ELECTRICAL CHARACTERISTICS ($V_S = \pm15V$, $T_A = 25°C$ unless otherwise specified)

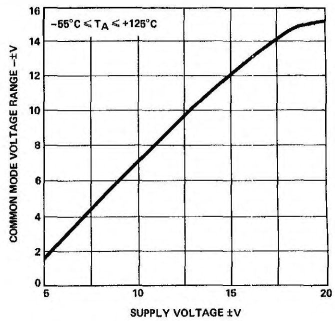
PARAMETER	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
μA741C					
Input Offset Voltage		2.0	6.0	mV	$R_S \leqslant 10k\Omega$
Input Offset Current		20	200	nA	
Input Bias Current		80	500	nA	
Input Resistance	0.3	2.0		MΩ	
Input Capacitance		1.4		pF	
Offset Voltage Adjustment Range		±15		mV	
Input Voltage Range	±12	±13		V	
Common Mode Rejection Ratio	70	90		dB	$R_S \leqslant 10k\Omega$
Supply Voltage Rejection Ratio		10	150	μV/V	$R_S \leqslant 10k\Omega$
Large-Signal Voltage Gain	20,000	200,000			$R_L \geqslant 2k\Omega$, $V_{out} = \pm10V$
Output Voltage Swing	±12	±14		V	$R_L \geqslant 10k\Omega$
	±10	±13		V	$R_L \geqslant 2k\Omega$
Output Resistance		75		Ω	
Output Short-Circuit Current		25		mA	
Supply Current		1.4	2.8	mA	
Power Consumption		50	85	mW	
Transient Response (unity gain)					$V_{in} = 20mV$, $R_L = 2k\Omega$, $C_L \leqslant 100pF$
Risetime		0.3		μs	
Overshoot		5.0		%	
Slew Rate		0.5		V/μs	$R_L \geqslant 2k\Omega$
The following specifications apply for $0°C \leqslant T_A \leqslant +70°C$					
Input Offset Voltage			7.5	mV	
Input Offset Current			300	nA	
Input Bias Current			800	nA	
Large-Signal Voltage Gain	15,000				$R_L \geqslant 2k\Omega$, $V_{out} = \pm10V$
Output Voltage Swing	±10	±13		V	$R_L \geqslant 2k\Omega$
μA741					
Input Offset Voltage		1.0	5.0	mV	$R_S \leqslant 10k\Omega$
Input Offset Current		10	200	nA	
Input Bias Current		80	500	nA	
Input Resistance	0.3	2.0		MΩ	
Input Capacitance		1.4		pF	
Offset Voltage Adjustment Range		±15		mV	
Large-Signal Voltage Gain	50,000	200,000			$R_L \geqslant 2k\Omega$, $V_{out} = \pm10V$
Output Resistance		75		Ω	
Output Short Circuit Current		25		mA	
Supply Current		1.4	2.8	mA	
Power Consumption		50	85	mW	
Transient Response (unity gain)					$V_{in} = 20mV$, $R_L = 2k\Omega$, $C_L \leqslant 100pF$
Risetime		0.3		μs	
Overshoot		5.0		%	
Slew Rate		0.5		V/μs	$R_L \geqslant 2k\Omega$
The following specifications apply for $-55°C \leqslant T_A \leqslant +125°C$					
Input Offset Voltage		1.0	6.0	mV	$R_S \leqslant 10k\Omega$
Input Offset Current		7.0	200	nA	$T_A = +125°C$
		20	500	nA	$T_A = -55°C$
Input Bias Current		0.03	0.5	μA	$T_A = +125°C$
		0.3	1.5	μA	$T_A = -55°C$
Input Voltage Range	±12	±13		V	
Common Mode Rejection Ratio	70	90		dB	$R_S \leqslant 10k\Omega$
Supply Voltage Refection Ratio		10	150	μV/V	$R_S \leqslant 10k\Omega$
Large-Signal Voltage Gain	25,000				$R_L \geqslant 2k\Omega$, $V_{out} = \pm10V$
Output Voltage Swing	±12	±14		V	$R_L \geqslant 10k\Omega$
	±10	±13		V	$R_L \geqslant 2k\Omega$
Supply Current		1.5	2.5	mA	$T_A = +125°C$
		2.0	3.3	mA	$T_A = -55°C$
Power Consumption		45	75	mW	$T_A = +125°C$
		45	100	mW	$T_A = -55°C$

TYPICAL CHARACTERISTIC CURVES

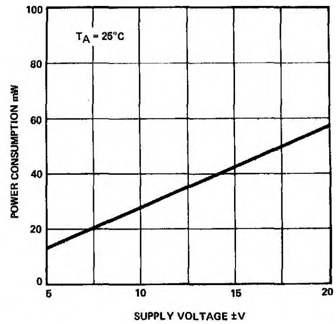
OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE



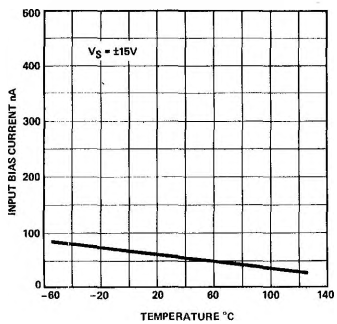
INPUT COMMON MODE VOLTAGE RANGE AS A FUNCTION OF SUPPLY VOLTAGE



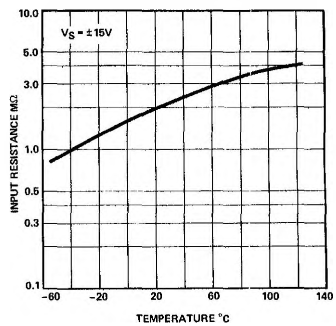
POWER CONSUMPTION AS A FUNCTION OF SUPPLY VOLTAGE



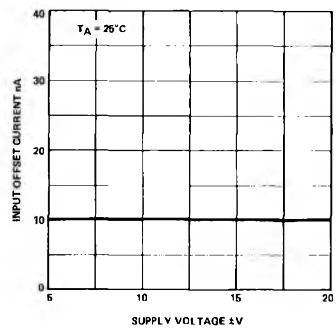
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



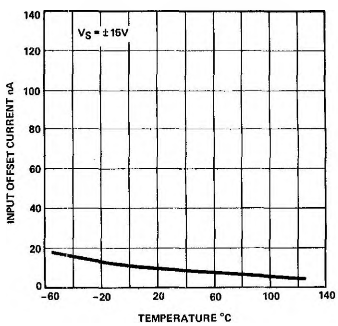
INPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE



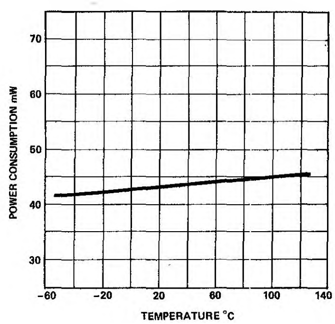
INPUT OFFSET CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



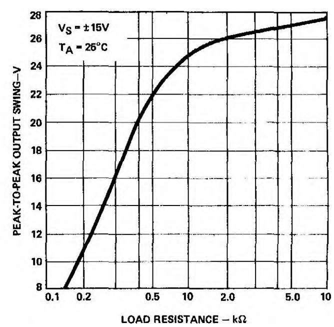
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE

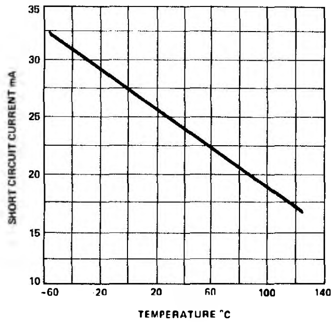


OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE

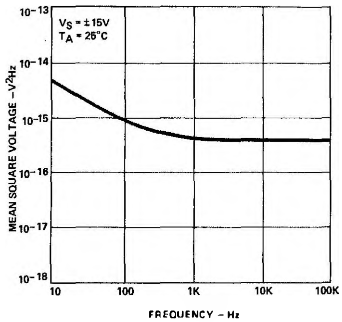


TYPICAL CHARACTERISTIC CURVES (Cont'd.)

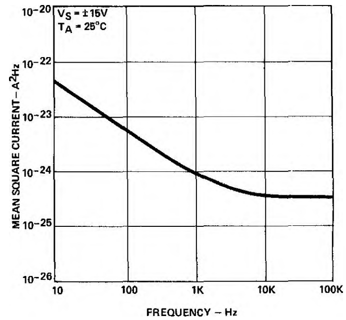
OUTPUT SHORT-CIRCUIT CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



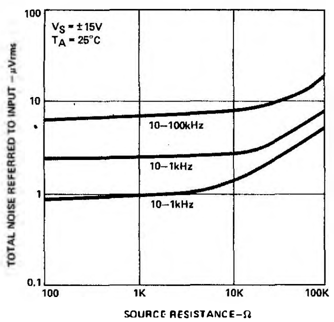
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



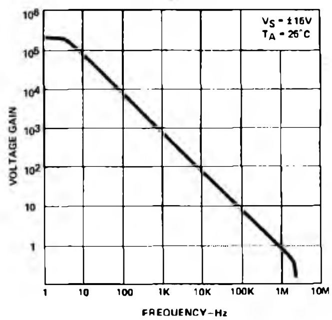
INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY



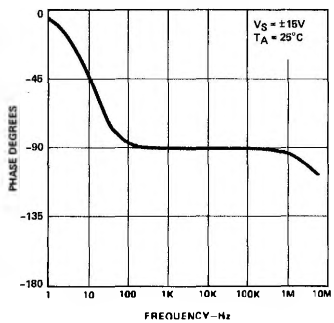
BROADBAND NOISE FOR VARIOUS BANDWIDTHS



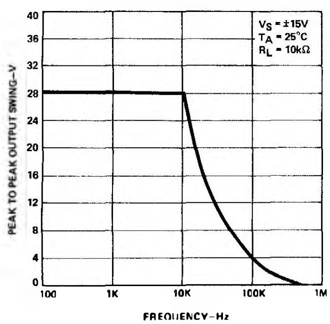
OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF FREQUENCY



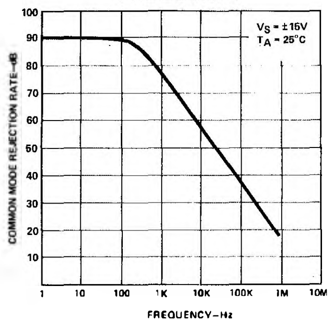
OPEN LOOP PHASE RESPONSE AS A FUNCTION OF FREQUENCY



OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY



COMMON MODE REJECTION RATIO AS A FUNCTION OF FREQUENCY



TRANSIENT RESPONSE