GENERAL PURPOSE OPERATIONAL AMPLIFIER μA741/ μA741C/SA741C

DESCRIPTION

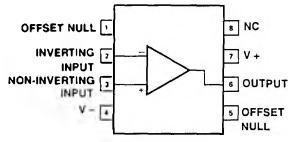
The μA741 is a high performance operational amplifier with high open loop gain, internal compensation, high common mode range and exceptional temperature stability. The μA741 is short-circuit protected and allows for nulling of offset voltage.

FEATURES

- **Internal frequency compensation**
- **Short circuit protection**
- **Excellent temperature stability**
- **High input voltage range**

PIN CONFIGURATION

D,FE,N PACKAGE



TOP VIEW

ORDER NUMBERS

μA741N μA741FE
μA741CN μA741CFE
SA741CN
μA741CD

ABSOLUTE MAXIMUM RATINGS

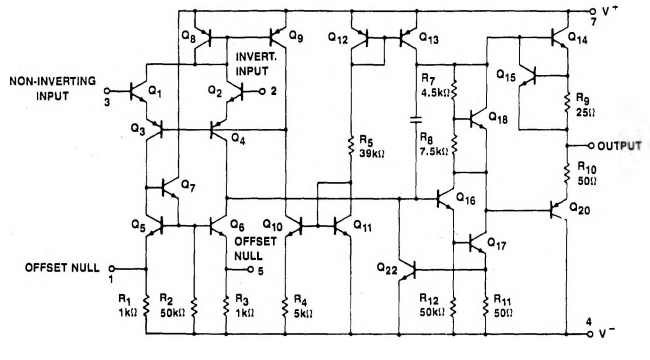
PARAMETER	RATING	UNIT
Supply voltage		
μA741C	±18	V
μA741	±22	V
Internal power dissipation		
N package	500	mW
FE package	1000	mW
Differential input voltage	±30	V
Input voltage[1]	±15	V
Output short-circuit duration	Continuous	
Operating temperature range		
μA741C	0 to +70	°C
SA741C	-40 to +85	°C
μA741	-55 to +125	°C
Storage temperature range	-65 to +150	°C
Lead temperature (soldering 60sec)	300	°C

NOTE

1. For supply voltages less than ± 15V, the absolute maximum input voltage is equal to the supply voltage.

EQUIVALENT SCHEMATIC

μA741, μA741C, SA741C



GENERAL PURPOSE OPERATIONAL AMPLIFIER μA741/μA741C/SA741C

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

PARAMETER		TEST CONDITIONS	μA741			μA741C			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Offset voltage	$R_S = 10k\Omega$		1.0	5.0		2.0	6.0	mV
		$R_S = 10k\Omega$, over temp.		1.0	6.0			7.5	mV
$\Delta V_{OS}/\Delta T$				10			10		μV/°C
I_{OS}	Offset current			20	200		20	200	nA
		Over temp.						300	nA
		$T_A = +125°C$		7.0	200				nA
		$T_A = -55°C$		20	500				nA
$\Delta I_{OS}/\Delta T$				200			200		pA/°C
I_{BIAS}	Input bias current			80	500		80	500	nA
		Over temp.						800	nA
		$T_A = +125°C$		30	500				nA
		$T_A = -55°C$		300	1500				nA
$\Delta I_B/\Delta T$				1			1		nA/°C
V_{OUT}	Output voltage swing	$R_L = 10k\Omega$	±12	±14		±12	±14		V
		$R_L = 2k\Omega$, over temp.	±10	±13		±10	±13		V
A_{VOL}	Large signal voltage gain	$R_L = 2k\Omega$, $V_O = \pm 10V$	50	200		20	200		V/mV
		$R_L = 2k\Omega$, $V_O = \pm 10V$, over temp.	25			15			V/mV
	Offset voltage adjustment range			±30			±30		mV
PSRR	Supply voltage rejection ratio	$R_S \leq 10k\Omega$					10	150	μV/V
		$R_S \leq 10k$, over temp.		10	150				μV/V
CMRR	Common mode rejection ratio								dB
		Over temp.	70	90					dB
I_{CC}	Supply current			1.4	2.8		1.4	2.8	mA
		$T_A = +125°C$		1.5	2.5				mA
		$T_A = -55°C$		2.0	3.3				mA
V_{IN}	Input voltage range	(μA741, over temp.)	±12	±13		±12	±13		V
R_{IN}	Input resistance		0.3	2.0		0.3	2.0		MΩ
P_d	Power consumption			50	85		50	85	mW
		$T_A = +125°C$		45	75				mW
		$T_A = -55°C$		45	100				mW
R_{OUT}	Output resistance			75			75		Ω
I_{SC}	Output short-circuit current		10	25	60	10	25	60	mA

PARAMETER		TEST CONDITIONS	SA741C			UNIT
			Min	Typ	Max	
V_{OS}	Offset voltage	$R_S = 10k\Omega$		2.0	6.0	mV
		$R_S = 10k\Omega$, over temp.			7.5	mV
$\Delta V_{OS}/\Delta T$				10		μV/°C
I_{OS}	Offset current			20	200	nA
		Over temp.			500	nA
$\Delta I_{OS}/\Delta T$				200		pA/°C
I_{BIAS}	Input bias current			80	500	nA
		Over temp.			1500	nA
$\Delta i_B/\Delta T$				1		nA/°C
V_{OUT}	Output voltage swing	$R_L = 10k\Omega$	±12	±14		V
		$R_L = 2k\Omega$, over temp.	±10	±13		V
A_{VOL}	Large signal voltage gain	$R_L = 2k\Omega$, $V_O = \pm 10V$	20	200		V/mV
		$R_L = 2k\Omega$, $V_O = \pm 10V$, over temp.	15			V/mV
	Offset voltage adjustment range			±30		mV

DC ELECTRICAL CHARACTERISTICS (Cont'd) $T_A = 25°C$, $V_S = \pm 15V$, unless otherwise specified.

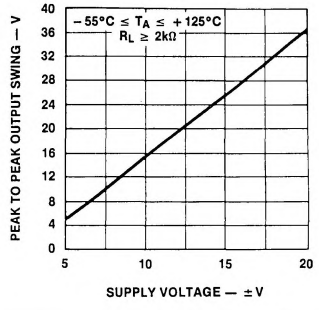
PARAMETER		TEST CONDITIONS	SA741C			UNIT
			Min	Typ	Max	
PSRR	Supply voltage rejection ratio	$R_S \leq 10k\Omega$		10	150	μV/V
CMRR	Common mode rejection ratio					dB
V_{IN}	Input voltage range Input resistance	(μA741, over temp.)	±12 0.3	±13 2.0		V MΩ
P_d	Power consumption			50	85	mW
R_{OUT} I_{SC}	Output resistance Output short-circuit current			75 25		Ω mA

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

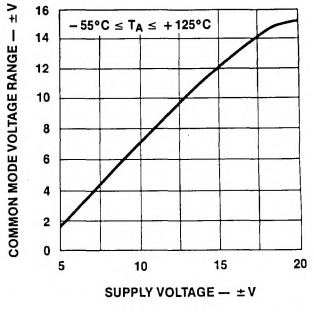
PARAMETER	TEST CONDITIONS	μA741, μA741C			UNIT
		Min	Typ	Max	
Parallel input resistance	Open loop, f = 20Hz				MΩ
Parallel input capacitance	Open loop, f = 20Hz		1.4		pF
Unity gain crossover frequency	Open loop		1.0		MHz
Transient response unity gain	V_{IN} = 20mV, R_L = 2kΩ, $C_L \leq$ 100pf				
Rise time			0.3		μs
Overshoot			5.0		%
Slew rate	C ≤ 100pf, $R_L \geq$ 2k, $V_{IN} = \pm 10V$		0.5		V/μs

TYPICAL PERFORMANCE CHARACTERISTICS

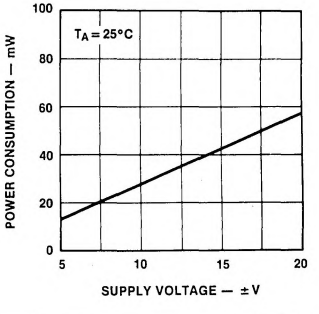
OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE



INPUT COMMON MODE VOLTAGE RANGE AS A FUNCTION OF SUPPLY VOLTAGE

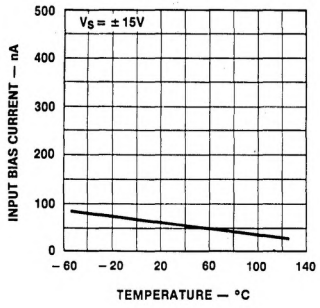


POWER CONSUMPTION AS A FUNCTION OF SUPPLY VOLTAGE

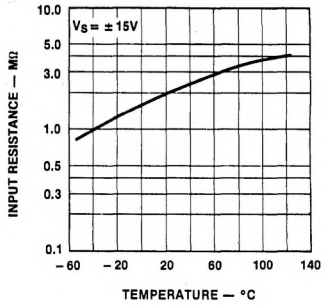


TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

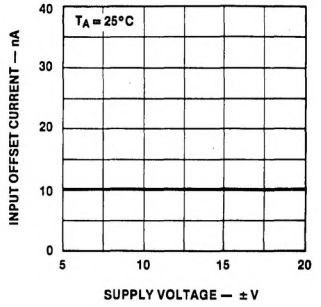
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



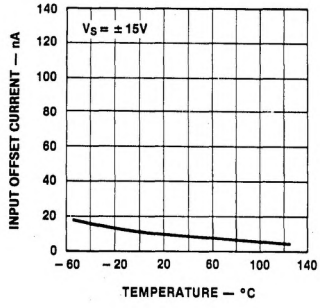
INPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE



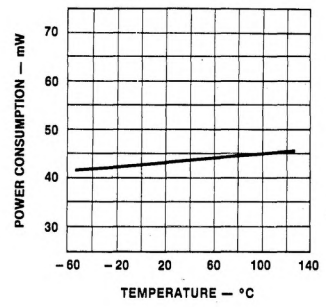
INPUT OFFSET CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



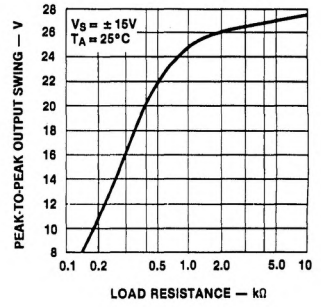
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



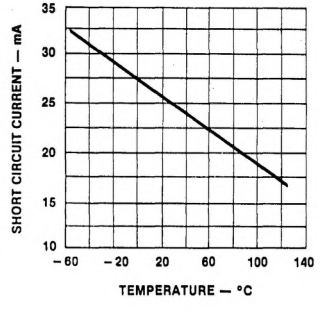
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



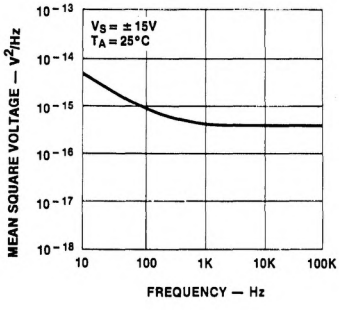
OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE



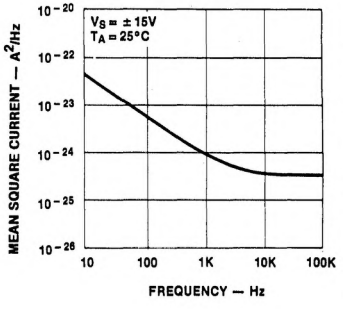
OUTPUT SHORT-CIRCUIT CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



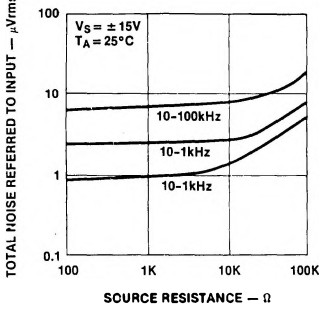
INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY



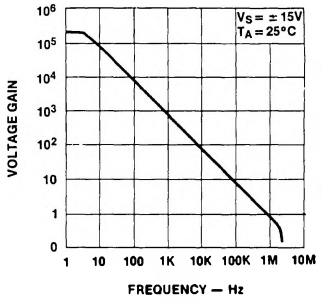
GENERAL PURPOSE OPERATIONAL AMPLIFIER — μA741/μA741C/SA741C

TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)

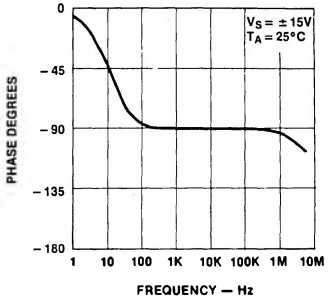
BROADBAND NOISE FOR VARIOUS BANDWIDTHS



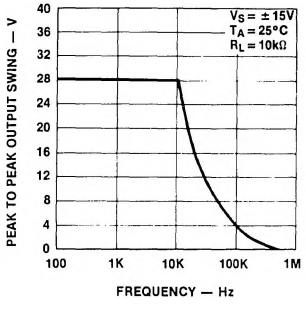
OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF FREQUENCY



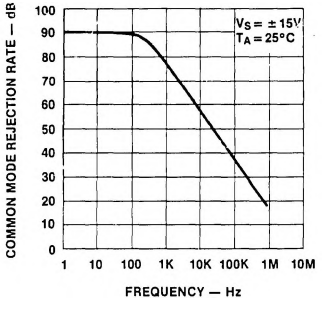
OPEN LOOP PHASE RESPONSE AS A FUNCTION OF FREQUENCY



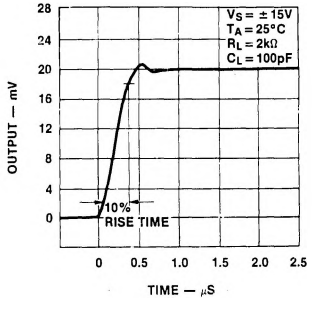
OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY



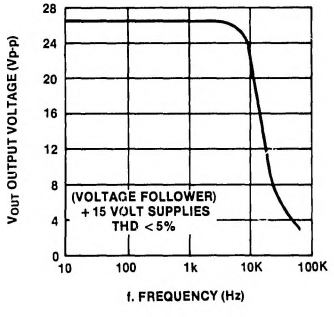
COMMON MODE REJECTION RATIO AS A FUNCTION OF FREQUENCY



TRANSIENT RESPONSE



POWER BANDWIDTH (Large Signal Swing vs Frequency)



VOLTAGE OFFSET NULL