



# Product Specification

XBLW UA741

General-purpose Operational Amplifiers

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## Description

The UA741 is a general-purpose operational amplifiers.

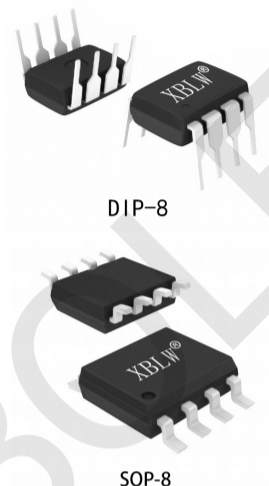
The amplifiers offer many features which make their application nearly foolproof: overload protection on the input and output, no latch-up when the common-mode range is exceeded, as well as freedom from oscillations.

## Features

- Overload Protection on the Input and Output
- No Latch-Up When the Common-Mode Range is Exceeded

## Apply

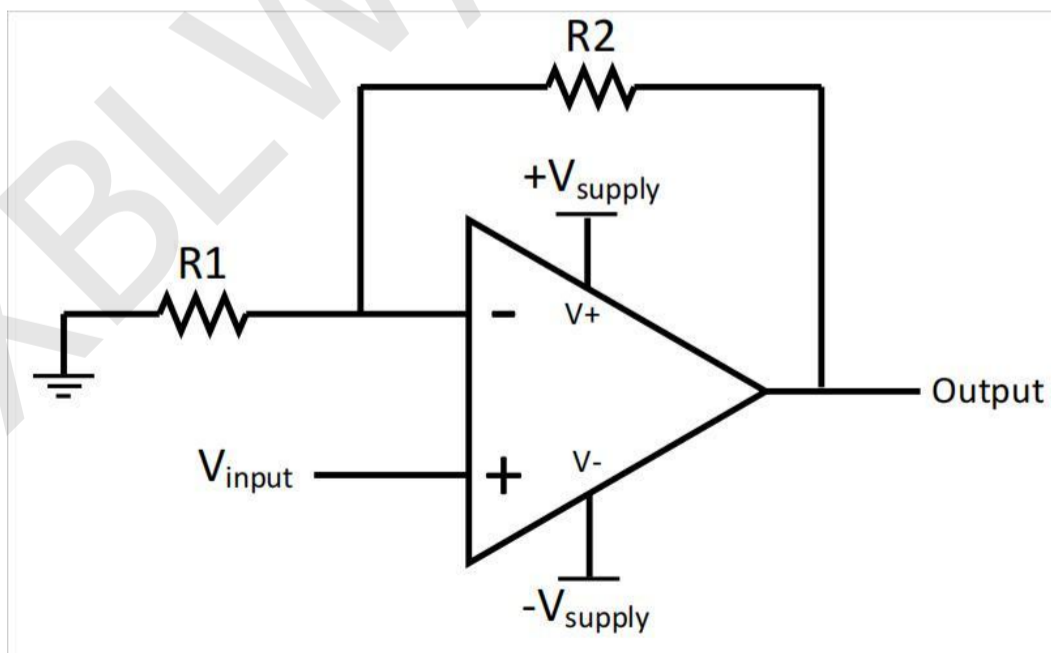
- Comparators
- Multivibrators
- DC Amplifiers
- Summing Amplifiers
- Integrator or Differentiators
- Active Filters



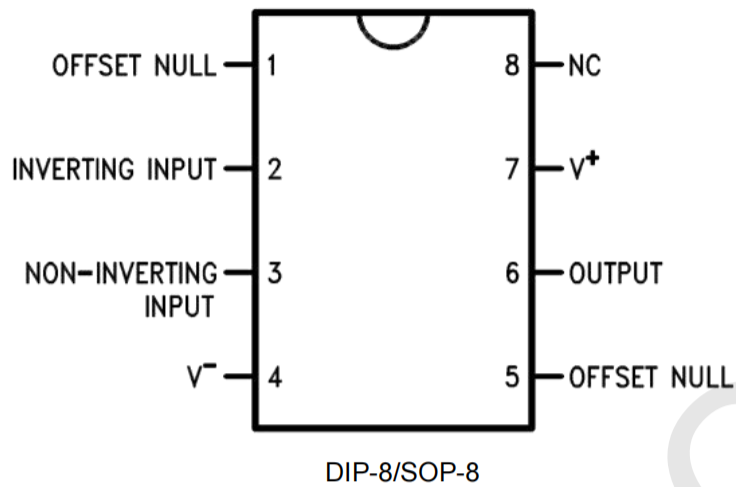
## Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW UA741CP	DIP-8	UA741CP	Tube	2000pcs/Box
XBLW UA741CDTR	SOP-8	UA741C	Tape	2500pcs/Reel

## Typical Applications



## Pin Configuration and Functions



Pin		I/O	Description
Name	No.		
INVERTING INPUT	2	I	Inverting signal input
NC	8	N/A	No Connect, should be left floating
NONINVERTING INPUT	3	I	Noninverting signal input
OFFSET NULL	1,5	I	Offset null pin used to eliminate the offset voltage and balance the input voltages.
OFFSET NULL			
OUTPUT	6	O	Amplified signal output
V+	7	I	Positive supply voltage
V-	4	I	Negative supply voltage

## Absolute Maximum rating

over operating free-air temperature range (unless otherwise noted)<sup>(1)(2)(3)</sup>

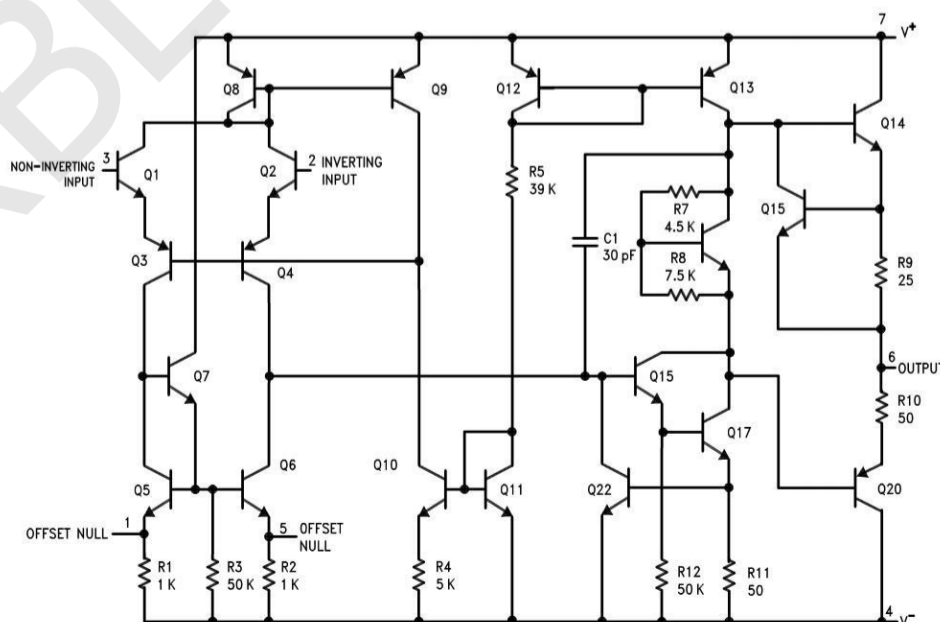
	Min	Max	Unit
Supply voltage		±22	V
Power dissipation		500	mW
Differential input voltage		±30	V
Input voltage		±15	V
Output short circuit duration	Continuous		
Operating temperature	0	70	°C
Junction temperature		150	°C
Soldering information	DIP package ( 10 seconds)		260 °C
Storage temperature, Tstg	-65	150	°C

## Electrical characteristics

Unless otherwise specified, these specifications apply for  $V_S = \pm 15\text{ V}$

Parameter	Test Conditions	Min	Typ	Max	Unit
Input offset voltage	$R_S \leq 10\text{ K}\Omega$	$T_A = 25^\circ\text{C}$	2	6	mV
		$T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$		7.5	mV
Input offset voltage adjustment range	$T_A = 25^\circ\text{C}, V_S = \pm 20\text{ V}$		$\pm 15$		mV
Input offset current	$T_A = 25^\circ\text{C}$		20	200	nA
	$T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$			300	nA
Input bias current	$T_A = 25^\circ\text{C}$		80	500	nA
	$T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$			0.8	$\mu\text{A}$
Input resistance	$T_A = 25^\circ\text{C}, V_S = \pm 20\text{ V}$	0.3	2		$\text{M}\Omega$
Input voltage range	$T_A = 25^\circ\text{C}$	$\pm 12$	$\pm 13$		V
Large signal voltage gain	$V_S = \pm 15\text{ V}, V_O = \pm 10\text{ V}, R_L \geq 2\text{ K}\Omega$	$T_A = 25^\circ\text{C}$	20	200	V/mV
		$T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$	15		
Output voltage swing	$V_S = \pm 15\text{ V}$	$R_L \geq 10\text{ K}\Omega$	$\pm 12$	$\pm 14$	V
		$R_L \geq 2\text{ K}\Omega$	$\pm 10$	$\pm 13$	
Output short circuit current	$T_A = 25^\circ\text{C}$		25		mA
Common-mode rejection ratio	$R_S \leq 10\text{ K}\Omega, V_{\text{CM}} = \pm 12\text{ V}, T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$	70	90		dB
Supply voltage rejection ratio	$V_S = \pm 20\text{ V}$ to $V_S = \pm 5\text{ V}, R_S \leq 10\Omega, T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$	77	96		dB
Transient response	Rise time	$T_A = 25^\circ\text{C}, \text{unity gain}$	0.3		$\mu\text{s}$
	Overshoot		5%		
Slew rate	$T_A = 25^\circ\text{C}, \text{unity gain}$		0.5		V/ $\mu\text{s}$
Supply current	$T_A = 25^\circ\text{C}$		1.7	2.8	mA
Power consumption	$V_S = \pm 15\text{ V}, T_A = 25^\circ\text{C}$		50	85	mW

## Functional Block Diagram



## Feature Description

### Overload Protection

The UA741 features overload protection circuitry on the input and output. This prevents possible circuit damage to the device.

### Latch-up Prevention

The UA741 is designed so that there is no latch-up occurrence when the common-mode range is exceeded. This allows the device to function properly without having to power cycle the device.

## Typical Application

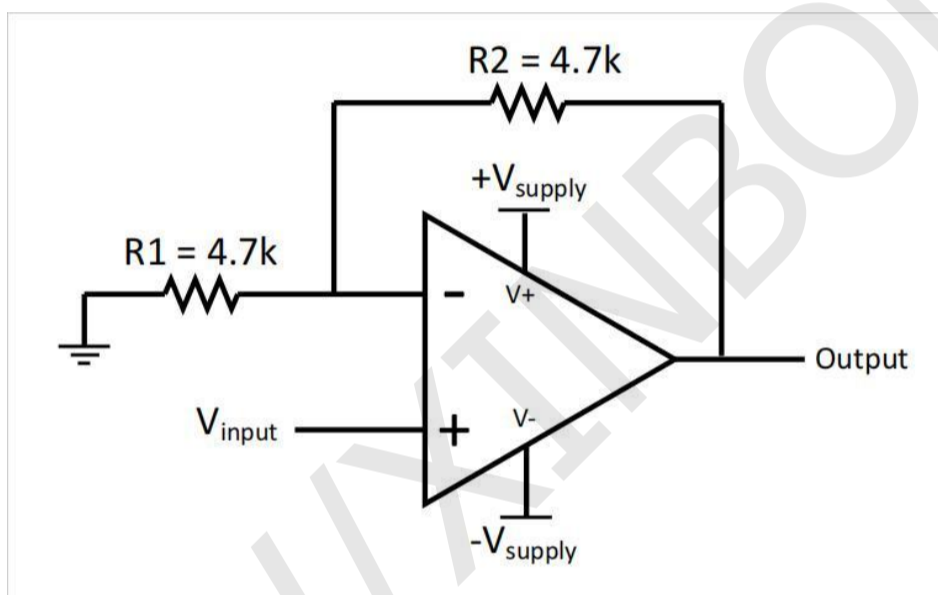


Figure 1. UA741 Noninverting Amplifier Circuit

### Design Requirements

As shown in Figure 1, the signal is applied to the noninverting input of the UA741. The gain of the system is determined by the feedback resistor and input resistor connected to the inverting input. The gain can be calculated by Equation 1:

$$\text{Gain} = 1 + (R2/R1)$$

(1) The gain is set to 2 for this application. R1 and R2 are 4.7-k resistors with 5% tolerance.

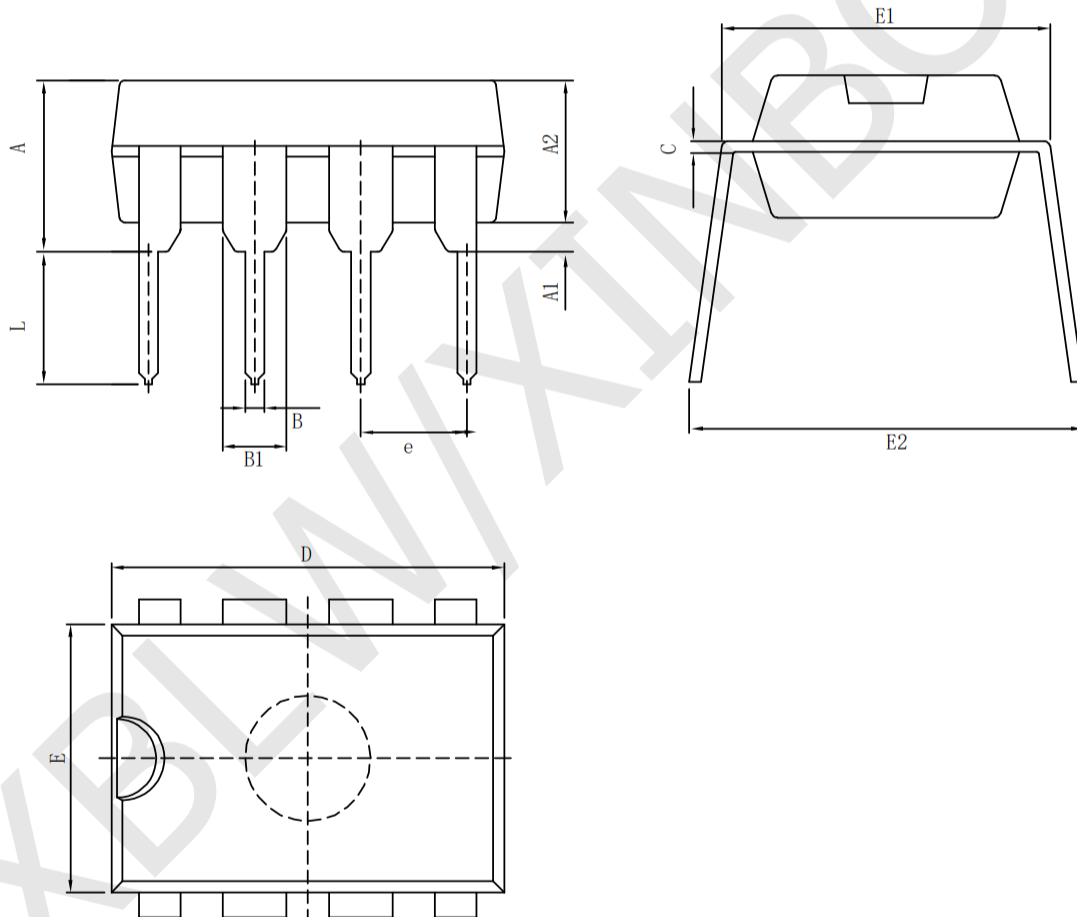
### Detailed Design Procedure

The UA741 can be operated in either single supply or dual supply. This application is configured for dual supply with the supply rails at  $\pm 15$  V. The input signal is connected to a function generator. A 1-V<sub>pp</sub>, 10-kHz sine wave was used as the signal input. 5% tolerance resistors were used, but if the application requires an accurate gain response, use 1% tolerance resistors.

## Package Outline Dimensions

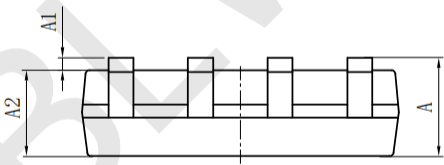
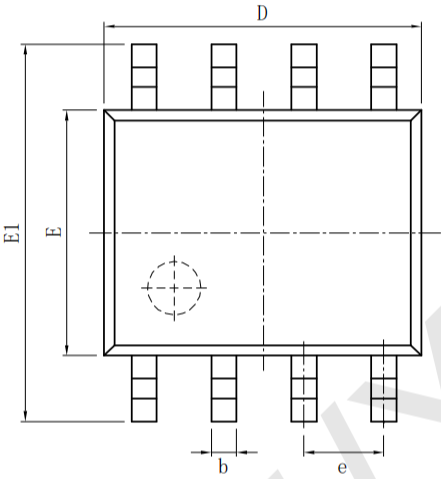
### • DIP-8

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min (mm)	Max (mm)			Min (in)	Max (in)
A		3.710	4.310	A		0.146	0.170
A1		0.510		A1		0.020	
A2		3.200	3.600	A2		0.126	0.142
B		0.380	0.570	B		0.015	0.022
B1		1.524 (BSC)		B1		0.060 (BSC)	
C		0.204	0.360	C		0.008	0.014
D		9.000	9.400	D		0.354	0.370
E		6.200	6.600	E		0.244	0.260
E1		7.320	7.920	E1		0.288	0.312
e		2.540 (BSC)		e		0.100 (BSC)	
L		3.000	3.600	L		0.118	0.142
E2		8.400	9.000	E2		0.331	0.354



• SOP-8

Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min (mm)	Max (mm)		Min (in)	Max (in)
A	1.350	1.750	A	0.053	0.069
A1	0.100	0.250	A1	0.004	0.010
A2	1.350	1.550	A2	0.053	0.061
b	0.330	0.510	b	0.013	0.020
c	0.170	0.250	c	0.006	0.010
D	4.700	5.100	D	0.185	0.200
E	3.800	4.000	E	0.150	0.157
E1	5.800	6.200	E1	0.228	0.224
e	1.270 (BSC)		e	0.050 (BSC)	
L	0.400	1.270	L	0.016	0.050
θ	0°	8°	θ	0°	8°



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