

## Ultra Low Noise Wideband Pre-amplifier

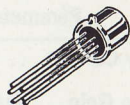
## FEATURES

- High Controlled Gain : 60 dB  $\pm$ 1 dB typical
- Low Noise : 40 $\Omega$  Equivalent Noise Resistance, or 800 pV/ $\sqrt{\text{Hz}}$
- Wide Bandwidth : 15 MHz typical
- Low Supply Current : <3 mA from 5V

## DESCRIPTION

A versatile high grade a.c. pre-amplifier designed for applications requiring ultra low noise such as infra-red imaging and low noise wide band amplifiers e.g. microphone, acoustic emission, transducer bridge amplifier. The matching of open loop gain coupled with small physical size make the ZN459 series ideal for multichannel amplification.

ZN459/ZN459C

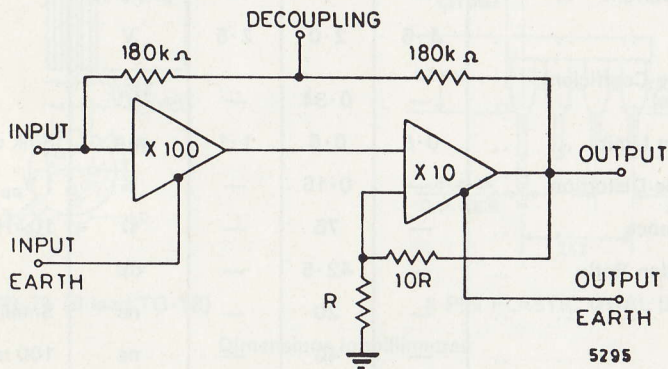


TO-71

ZN459CP



8-Lead D.I.L.



ZN459 OUTLINE CIRCUIT

# ZN459 Series

## ABSOLUTE MAXIMUM RATINGS

Supply Voltage .. .. .	6.0 Volts
Operating Temperature Range:	
for ZN459 .. .. .	-55 to +125°C
for ZN459C and ZN459CP .. .. .	0 to +70 °C
Storage Temperature Range .. .. .	-55 to +125°C

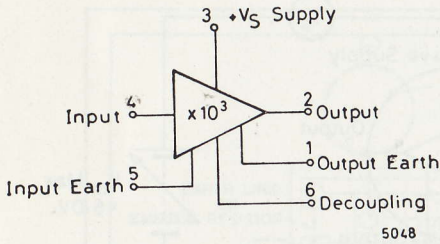
## CHARACTERISTICS (at $V_{CC} = 5V$ , $T_{amb} = 25^{\circ}C$ ).

Parameter	Min.	Typ.	Max.	Units	Conditions
Supply Current .. .. .	2.0	2.5	3.0	mA	
Voltage Gain .. .. .	59	60	61	dB	10 kHz
TC of Voltage Gain .. .. .	—	-0.2	—	%/°C	
$V_{CC}$ Coefficient of Voltage Gain	—	25	—	%/V	
Cut-off Frequency .. .. .	—	15	—	MHz	3 dB down
Input Resistance .. .. .	3.5	7	—	k $\Omega$	10 kHz
Input Capacitance .. .. .	—	80	—	pF	Note 1
Noise Resistance .. .. .	—	40	—	$\Omega$	$R_S = 0$
White Noise Voltage .. .. .	—	800	1100	pV/ $\sqrt{Hz}$	$R_S = 0$
L.F. Spot Noise .. .. .	—	3	—	nV/ $\sqrt{Hz}$	$R_S = 0$ , $f = 25$ Hz
White Noise Current .. .. .	—	1	—	pA/ $\sqrt{Hz}$	
Output Level .. .. .	1.5	2.0	2.5	V	
Supply Voltage Coefficient of Output Level .. .. .	—	0.34	—	V/V	
Output Current Limit .. .. .	0.6	0.8	1.1	mA	Sink current
Total Harmonic Distortion .. .. .	—	0.15	—	%	1 $V_{pp}$ at 10 kHz
Output Resistance .. .. .	—	75	—	$\Omega$	10 kHz
Supply Rejection Ratio .. .. .	—	42.5	—	dB	
Delay Time .. .. .	—	20	—	ns	Small signal
Delay Time .. .. .	—	40	—	ns	100 mV rms input
Positive Input Overdrive .. .. .	—	10	—	mA	
Negative Input Overdrive .. .. .	—	-5	—	V	

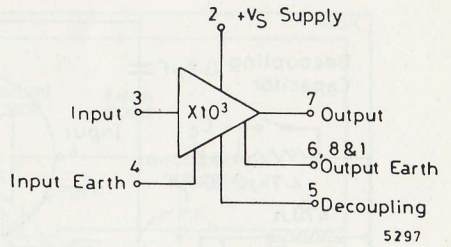
Note 1: In P.C.B. The Input Capacitance may be reduced to 25pF by screening between output and input.

# ZN459 Series

## PINNING CONFIGURATIONS

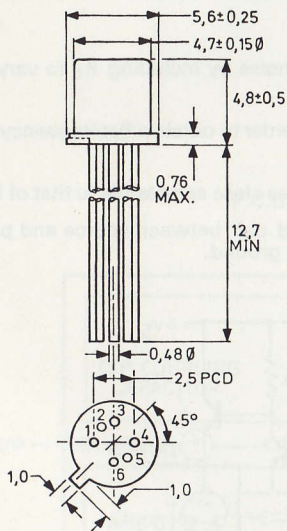


METAL CAN

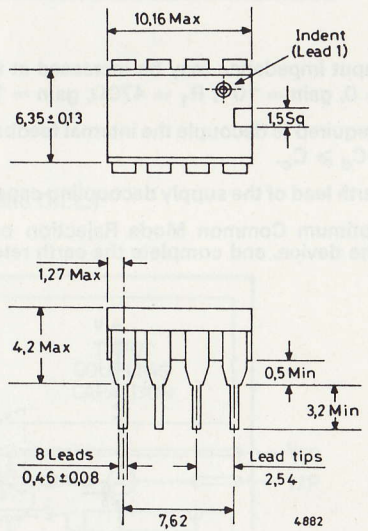


P PACKAGE

## PACKAGE DETAILS



TO-71 (6 lead TO-18)



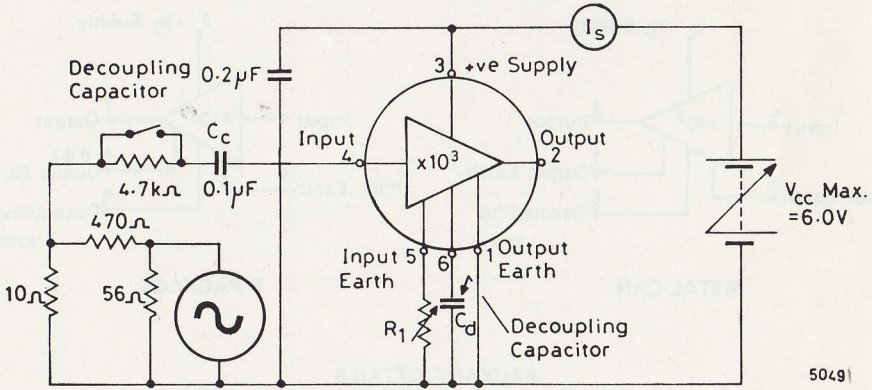
8 PIN PLASTIC DUAL IN-LINE

Dimensions in millimetres



# ZN459 Series

## GAIN TEST CIRCUIT (Metal Can)

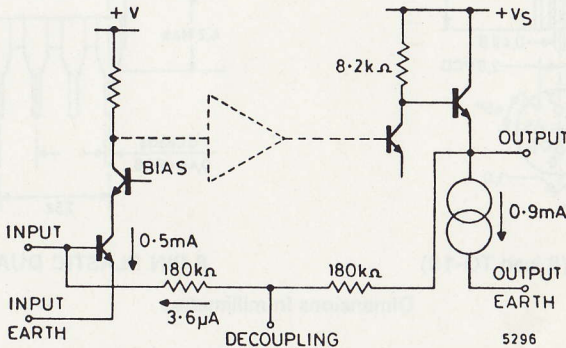


The input impedance may be increased at the expense of noise by including  $R_1$  to vary the gain ( $R_1 = 0$ , gain =  $10^3$ ;  $R_1 = 470\Omega$ , gain =  $10^2$ ).

$C_d$  is required to decouple the internal feedback loop and in order to obtain a flat frequency response make  $C_d \geq C_c$ .

The earth lead of the supply decoupling capacitor should be as close as possible to that of  $R_1$ .

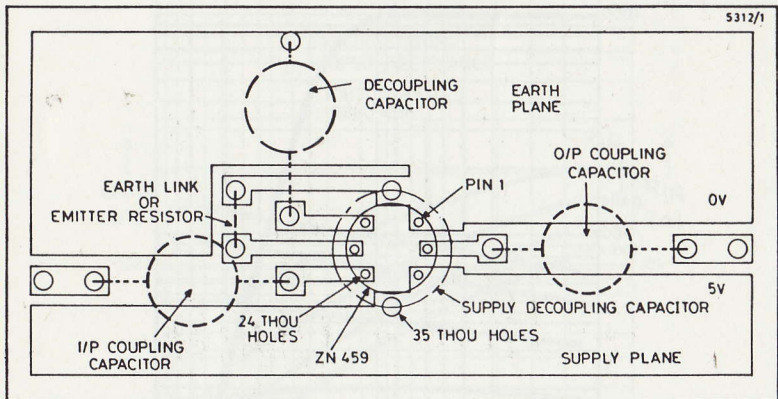
For optimum Common Mode Rejection connect a twisted pair between source and pins 4 and 5 of the device, and complete the earth return from source ground.



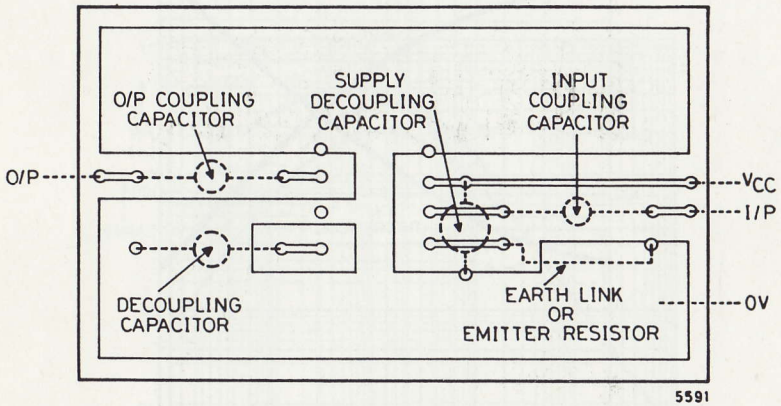
ZN459 INPUT AND OUTPUT CIRCUIT

# ZN459 Series

## P.C.B. LAYOUT (Metal Can)

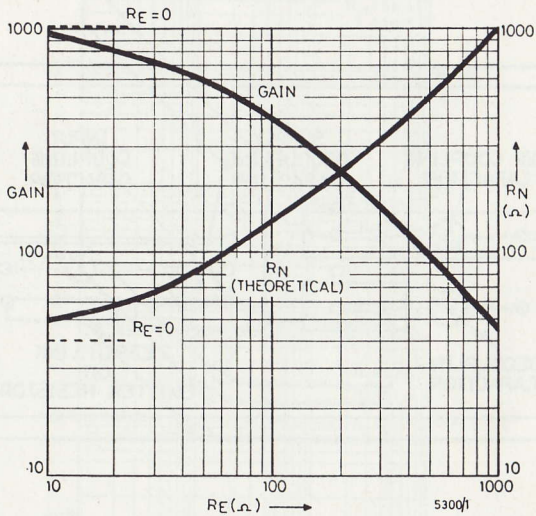
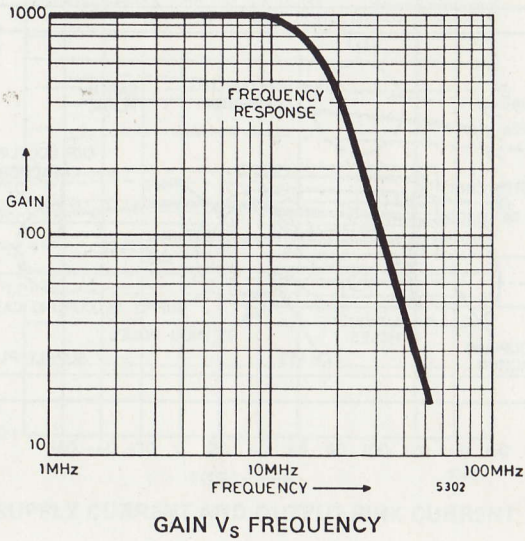


## P.C.B. LAYOUT (Plastic D.I.L.)



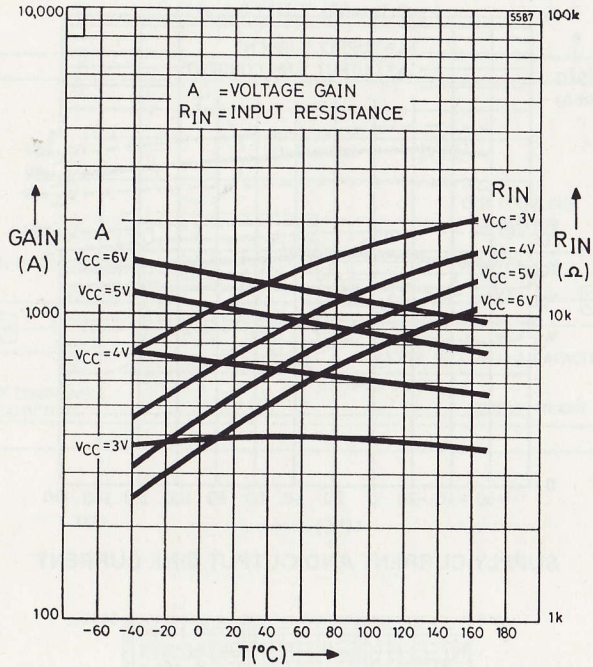
# ZN459 Series

## TYPICAL CHARACTERISTICS

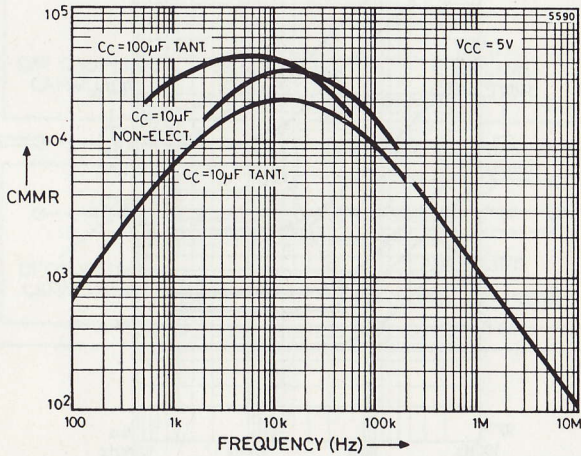




# ZN459 Series

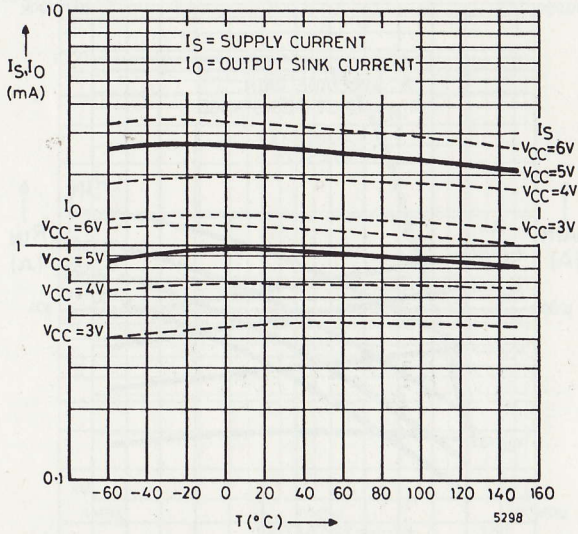


GAIN AND INPUT IMPEDANCE

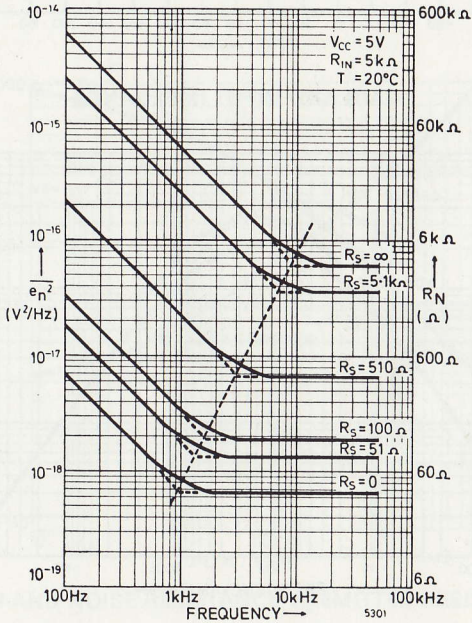


COMMON MODE REJECTION Vs FREQUENCY  
(Measured between input earth and output earth)

# ZN459 Series



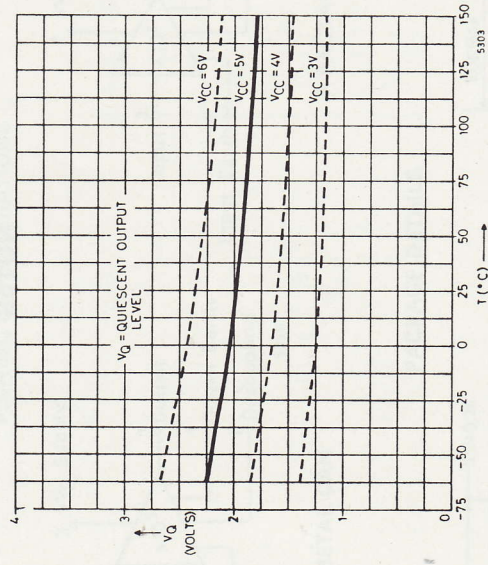
SUPPLY CURRENT AND OUTPUT SINK CURRENT



NOISE VOLTAGE



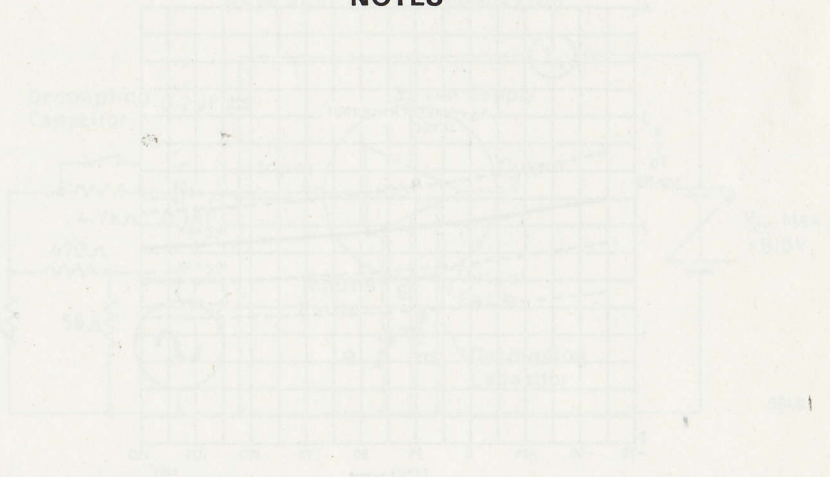
# ZN459 Series



QUIESCENT OUTPUT LEVEL

# ZN459 Series

## NOTES

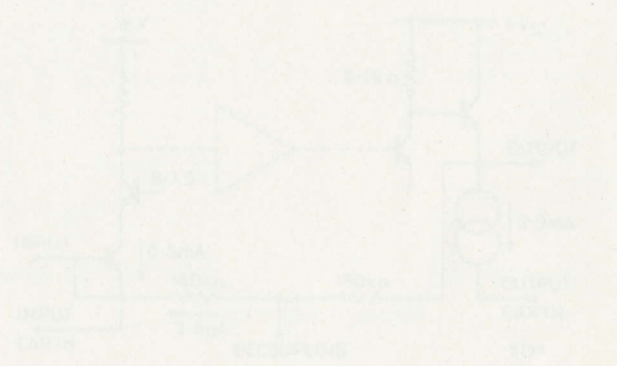


The input impedance may be increased by increasing  $R_1$ , as vary the gain ( $R_1 = 0$ , gain = 10;  $R_1 = 470\Omega$ , gain = 10<sup>2</sup>).

$C_2$  is required to decouple the input feedback loop and is order to increase the frequency response rate  $C_2 \geq C_1$ .

The earth lead of the supply decoupling capacitor should be as close as possible to that of  $R_1$ .

For optimum Common Mode Rejection, connect a twisted pair between anode and pins 4 and 5 of the device, and connect the earth return from source ground.



ZERO INPUT AND OUTPUT CURRENT

# ZN459 Series

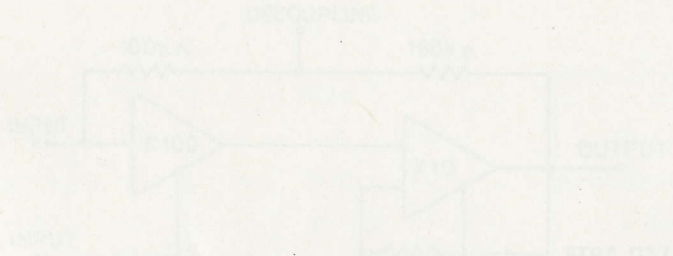
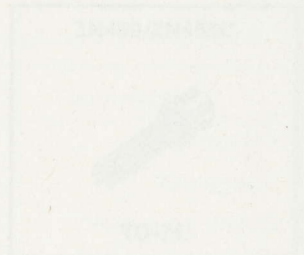
## NOTES

### FEATURES

- High Conversion Gain: 30 dB at 100 kHz
- Low Noise: 400 pV/√Hz
- Wide Bandwidth: 15 MHz typical
- Low Supply Current: <math>< 3 \text{ mA}</math> from 1V

### DESCRIPTION

The ZN459 is a low noise, wide bandwidth, high conversion gain, low supply current, monolithic, integrated circuit. It is designed for use as a pre-amplifier for low level signals. The ZN459 is available in two packages: the 8-pin DIP and the 14-pin DIP. The ZN459 is also available in a surface mount package.



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# ZN459 Series

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