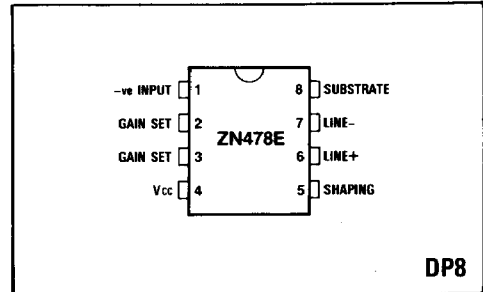


ZN478E

MICROPHONE AMPLIFIER FOR TELEPHONE CIRCUITS

FEATURES

- Low Working Voltage
- Designed to match electrets with FET buffers
- Gain Adjustable by External Resistor
- Operates from 1mA to 100mA Line Current
- Low Noise
- Low Distortion
- Operates on Telephone Supply Lines
- Minimum External Components in Telephone Circuits



Pin connections - top view

DESCRIPTION

The ZN478E was developed specifically for use with low impedance transducers such as electret microphones (with FET buffers) to replace the carbon transmitter in telephone handsets. The ZN478E is especially useful where a low operating voltage is required.

The amplifier gain can be adjusted over a wide range by an external resistor to suit a variety of different low impedance transducer sensitivities.

This is a single polarity device and care should be taken over line connection.

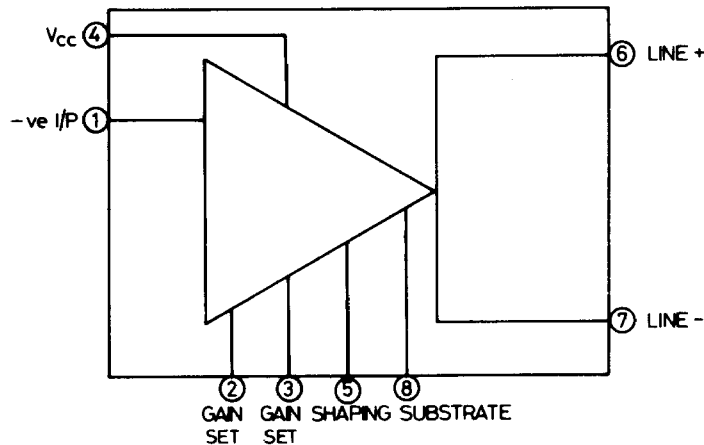


Fig. 1 System Diagram

ABSOLUTE MAXIMUM RATINGS

Supply Current 100mA continuous
 Operating Temp. Range -20 to +80°C
 Storage Temp. Range -55 to +125°C

A.C. CHARACTERISTICS

$T_{amb} = 25^{\circ}C$ $R_G = 25k\Omega$ $R_L = 100\Omega$ $C_G = 100nF$ $R_O = 15\Omega$ $I_S = 50mA$ $C_S = 1nF$ $f = 1kHz$
 $V_O = 300mV$ unless otherwise stated.
 Circuit as Fig. 2.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Voltage gain	A_V	17	20	23	dB	
		-	28	-	dB	$R_G = 10k\Omega$ min. rec. value
Change in voltage gain from typical at $I_S = 50mA$ when I_S is changed	$\Delta A_V (I_S)$	-1	-0.1	+1	dB	$I_S = 100mA$
		-1	-0.5	+1	dB	$I_S = 20mA$
		-	-0.9	0	dB	$I_S = 10mA$
Change in voltage gain with V_O relative to V_O of 300mV	$\Delta A_V (V_O)$	-1	+0.2	+1	dB	$V_O = 95mV$
		-1	-0.6	+1	dB	$V_O = 950mV$
Output impedance	R_{out}	-	50	-	Ω	
Total harmonic distortion	DH(300)	-	1	3	%	$V_O = 300mV$
	DH(900)	-	4.5	6	%	$V_O = 900mV$

I_{FET} to be $\leq 1mA$

D.C. CHARACTERISTICS

$T_{amb} = 25^{\circ}C$, $V_{in} = 0$ $R_G = 25k\Omega$ unless otherwise stated.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Supply Voltage	V_S	-	3.9	4.4	volts	$I_S = 21mA$
		4.3	4.6	-	volts	$I_S = 50mA$
		-	7.0	8.5	volts	$I_S = 100mA$

MICROPHONE AMPLIFIER APPLICATION

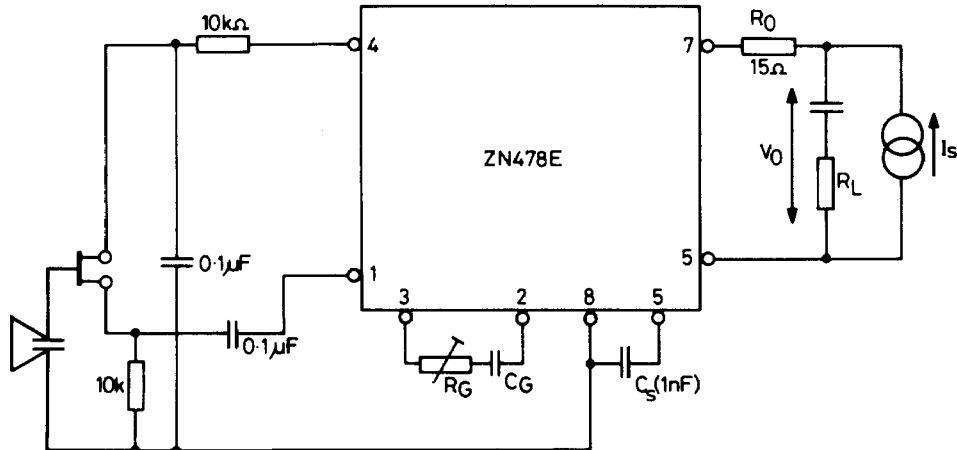


Fig. 2 Typical Application Circuit

The circuit shows ZN478E with a electret plus FET transducer in a typical telephone handset application but with load test included. The value of R_G is set to give the appropriate voltage gain for the particular transducer in use.

The value of the lower cut-off frequency f_L is determined by C_G and R_G from the expression

$$f_L \approx \frac{1}{2\pi C_G (R_G + 500)}$$

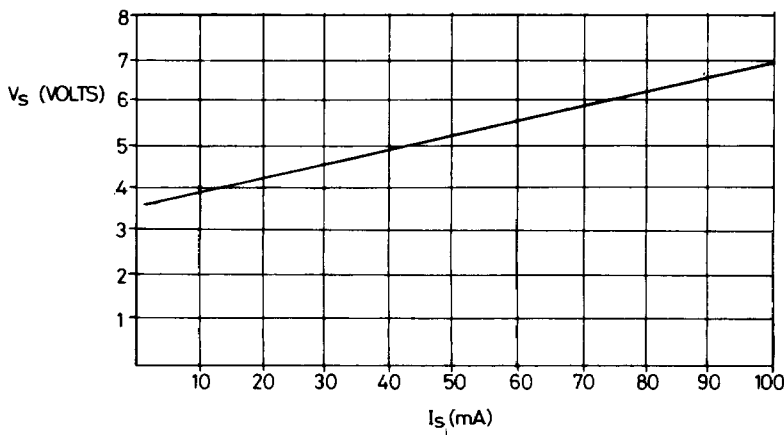
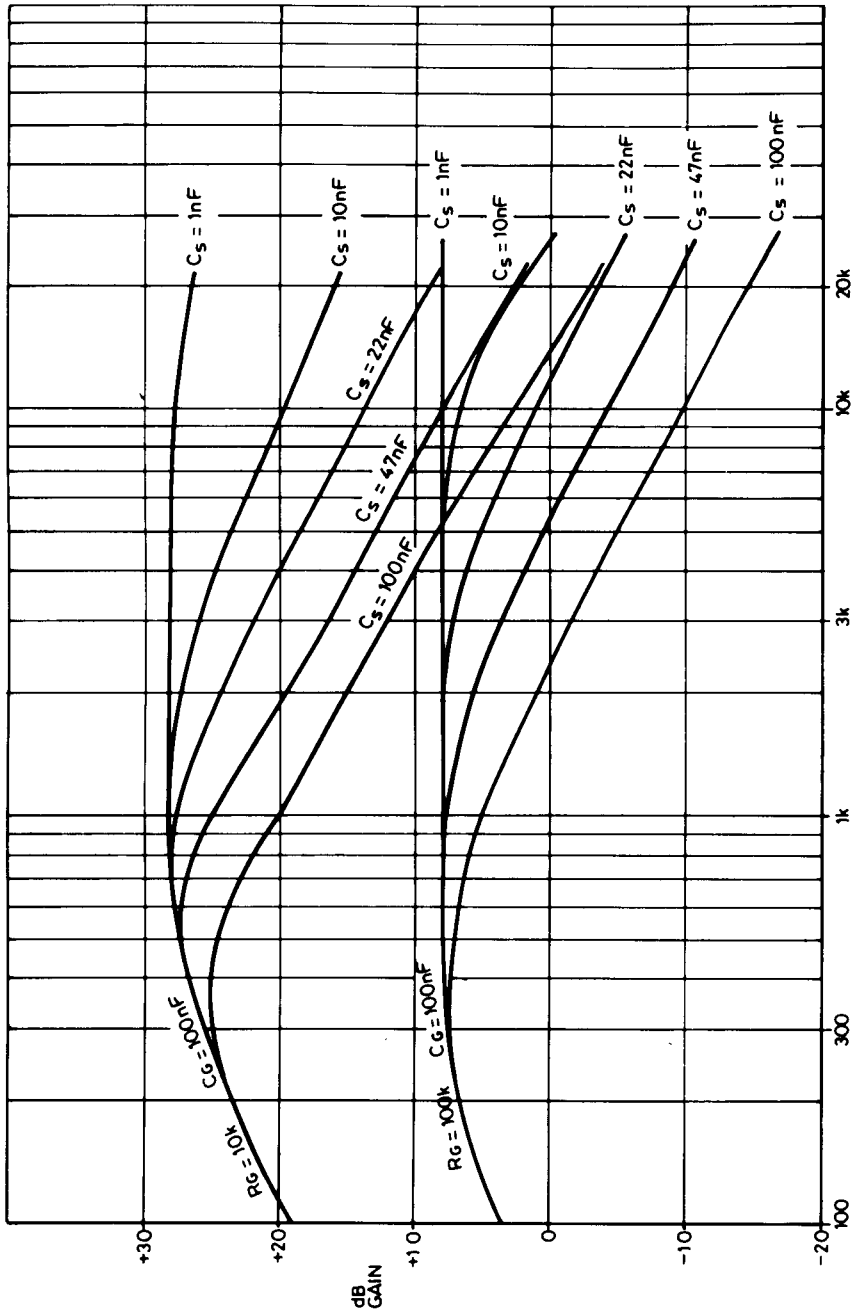


Fig. 3 Average Supply Voltage vs Supply Current for ZN478E

Conditions $I_L = 50\text{mA}$



Gain (dB) vs Frequency (Hz)

Conditions $C_S = 1\text{nF}$ $C_G = 100\text{nF}$ $f = 1\text{kHz}$ $I_L = 50\text{mA}$

