PLESSEY
Semiconductors

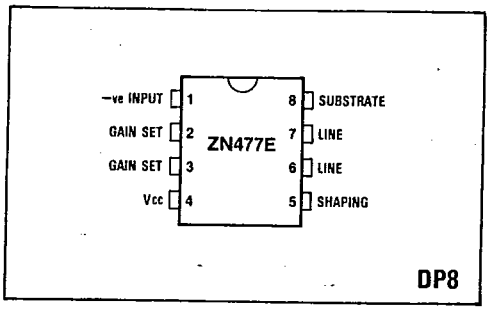
T-75-07-15

ZN477E

MICROPHONE AMPLIFIER FOR TELEPHONE CIRCUITS

FEATURES

- On Chip Bridge Allows Dual Supply Polarity Operation
- 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 ZN477E was developed specifically for use with low impedance transducers such as electret microphones (with FET buffers) to replace the carbon transmitter in telephone handsets. Dual polarity operation is accommodated by an on-chip bridge. Full lightning surge protection is given by on-chip components thus eliminating the need for an external surge suppression diode.

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

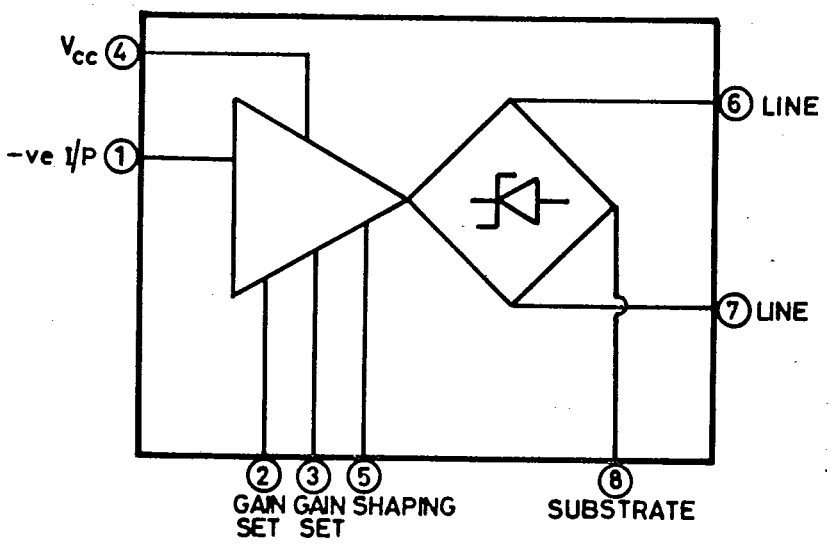


Fig. 1 System Diagram

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ABSOLUTE MAXIMUM RATINGS

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

A.C. CHARACTERISTICS

$T_{amb}=25°C$ $R_G=25k\Omega$ $R_L=100\Omega$ $C_G=100nF$ $R_O=15\Omega$ $I_S=50mA$ $C_S=1nF$ $f=1kHz$
$V_O=300mV$ 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	ΔA_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	ΔA_V (V_O)	−1	+0.2	+1	dB	$V_O=95mV$
		−1	−0.6	+1	dB	$V_O=950mV$
Change in voltage gain with line polarity	ΔA_V (P)	–	0.2	0.5	dB	
Output impedance	R_{out}	–	50	–	Ω	
Total harmonic distortion	DH(300)	–	1	3	%	$V_O=300mV$
	DH(900)	–	4.5	6	%	$V_O=900mV$
Temperature co-efficient of A_V	T_c (A_V)	–	0.2	–	%/°C	$T_{amb}=-20°C$ to +80°C

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

D.C. CHARACTERISTICS

$T_{amb}=25°C$, $V_{in}=0$ $R_G=25k\Omega$ for either supply polarity unless otherwise stated.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Supply Voltage	V_S	–	5.5	6.0	volts	$I_S=21mA$
		5.4	6.8	–	volts	$I_S=50mA$
		–	9.2	9.7	volts	$I_S=100mA$

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MICROPHONE AMPLIFIER APPLICATION

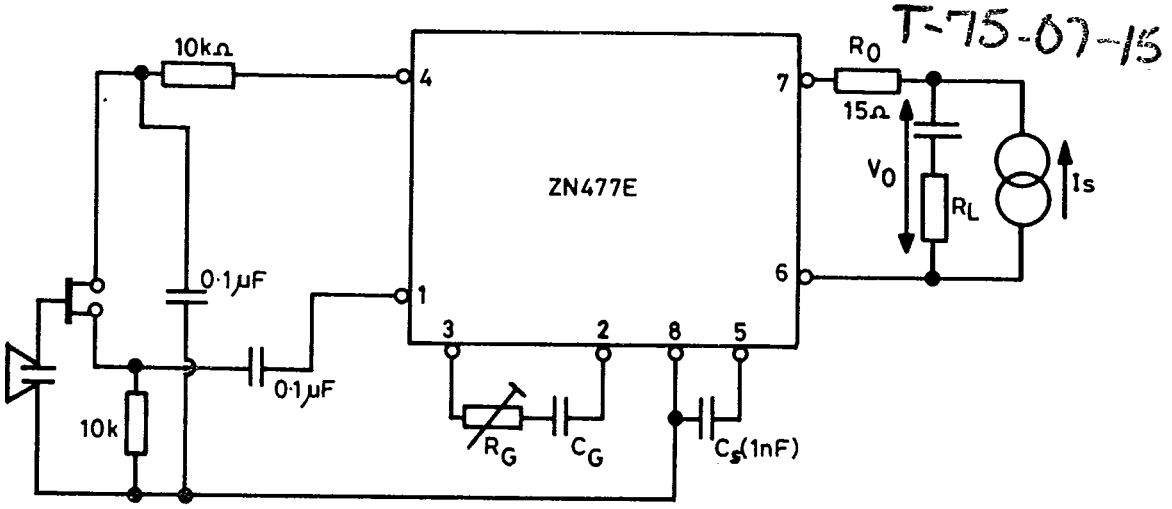


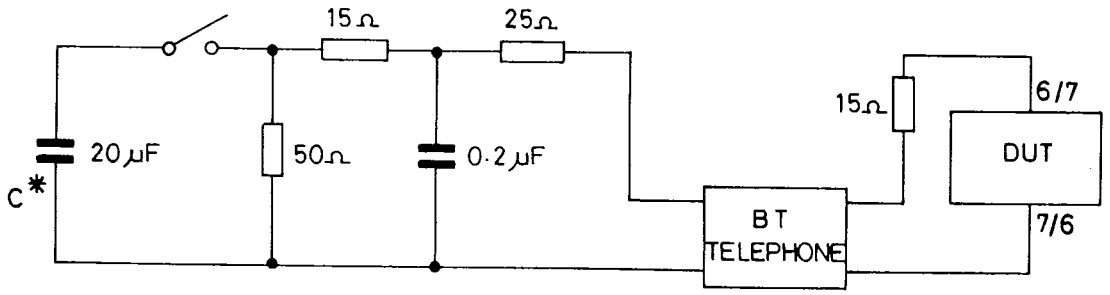
Fig. 2 Typical Application Circuit

The circuit shows ZN477E 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

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

BT LIGHTNING SURGE TEST CIRCUIT



*C CHARGED TO 1500 VOLTS

When the capacitor is fully charged the switch is closed thus discharging the capacitor into the test network. The device under test, DUT, is connected via a 15ohm resistor to the standard microphone wires. The DUT must survive the discharge on either line polarity.

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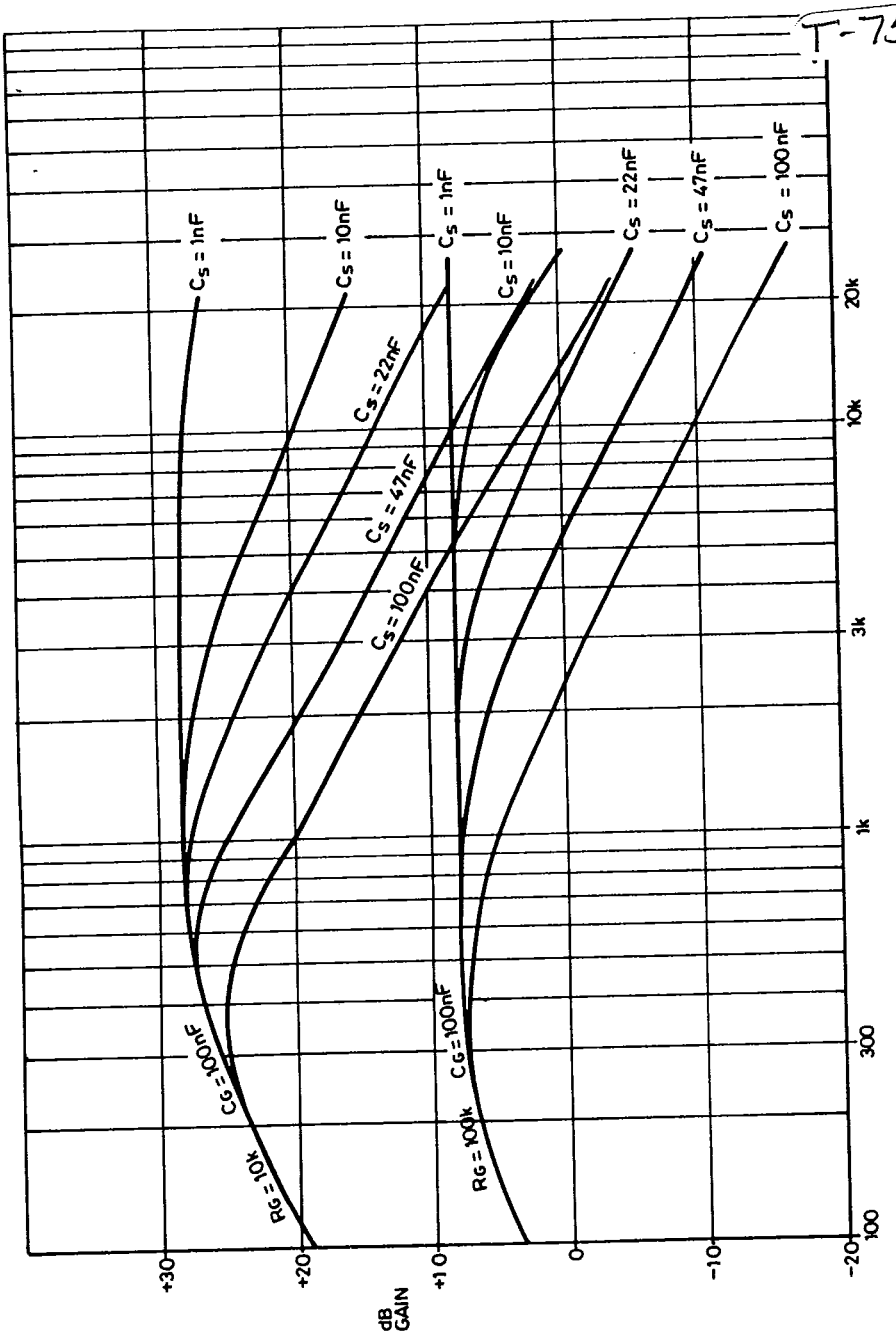

Conditions $I_L = 50mA$

Gain (dB) vs Frequency (Hz)

Conditions $C_S = 1nF$ $C_G = 100nF$ $f = 1kHz$ $I_L = 50mA$

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