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GEC PLESSEY
SEMICONDUCTORS

ADVANCE INFORMATION

DS3624 - 2.0

ZN460, ZN460AM, ZN460CP

ULTRA LOW NOISE WIDEBAND PREAMPLIFIER

The ZN460 is a versatile high performance AC preamplifier, designed for applications requiring ultra low noise such as infra-red imaging and low noise wideband amplifiers e g microphone, acoustic emission, transducer bridge amplifier. The matching of open loop gain, coupled with small physical size. makes the ZN460 ideal for multichannel amplification.

The programmable gain feature allows variable detector gain factors to be trimmed out The programmable bandwidth feature allows the noise bandwidth to be reduced to the required signal bandwidth, thus minimising the wideband output noise

ZN460

CM8

FEATURES

- High Controlled Gain : 60dB ±1dB typical
- Programmable Gain : 50-60dB typical
- Programmable Bandwidth : 6MHz downwards
- Low Noise : 40Ω Equivalent Noise Resistance, or 800pV/√Hz
- Low Supply Current : <3mA from 5V

ZN460CP

DP8

ABSOLUTE MAXIMUM RATINGS

Supply voltage	6 Volts
Operating Temperature Range:	
for ZN460 and ZN460AM	-55 to +125°C
for ZN460CP	0 to +70°C
Storage Temperature Range	-55 to +125°C

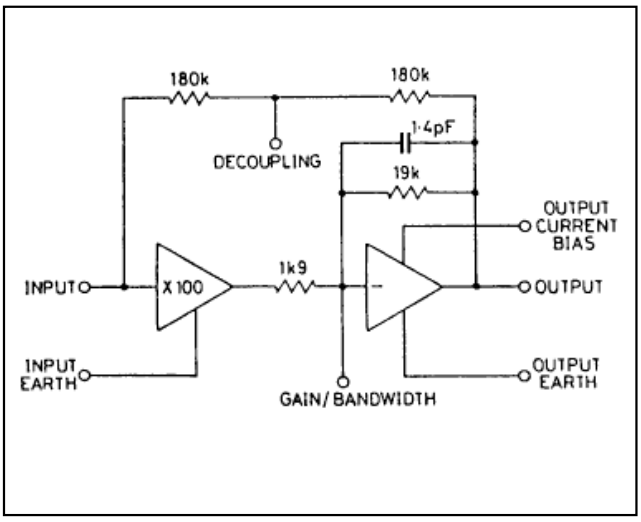
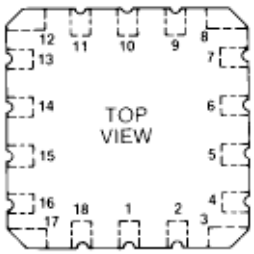


Fig.1 Circuit diagram

ZN460AM



LC18

ELECTRICAL CHARACTERISTICS

Test condltions (unless otherwise stated):

(V_{CC} = 5V, T_{amb} = 25°C)

Parameter	Min.	Typ.	Max.	Units	Conditions
Supply Current	2.0	2.5	3.0	mA	
Voltage Gain	59	60	61	dB	10KHz (Note 1)
TC of Voltage Gain		-0.2		%/°C	
V_{CC} Coefficient of Voltage Gain		25		%/V	
Cut-off Frequency		6		MHz	3dB down (Note 1)
Input Resistance	3.5	7		kΩ	10KHz
Input Capacitance		80		pF	Note 2
Noise Resistance		40		Ω	R_S = 0
White Noise Voltage		800	1100	pV/√HZ	R_S = 0
L.F. Spot Noise		3		nV/√HZ	R_S = 0, f = 25Hz
White Noise Current		1		pA/√HZ	
Output Level	1.5	2.0	2.5	V	
Output Swing		4		Vpp	R_F = ∞
	2			Vpp	R_F = 6KΩ
Supply Voltage Coefficient of Output Level		0.34		V/V	
Output Current Limit	0.6	0.8	1.1	mA	Note 3
Total Harmonic Distortion		0.15		%	1 Vpp at 10KHz
Output Resistance		75		Ω	10KHz
Supply Rejection Ratio		42.5		dB	
Delay Time		20		ns	Small signal
Delay Time		40		ns	100mV rms input
Positive Input Overdrive			10	mA	
Negative Input Overdrive			-5	V	

Note 1: Without external components

Note 2: In P.C.B. The input capacitance may be reduced to 25pF by screening between output and input.

Note 3: Sink current without external bias resistor

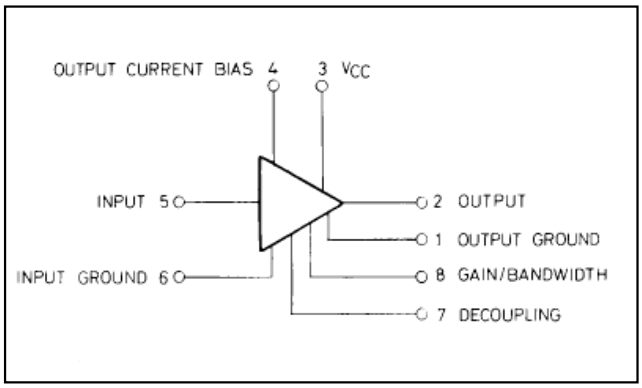


Fig.2 Pinning configuration - ZN460 and ZN460CP

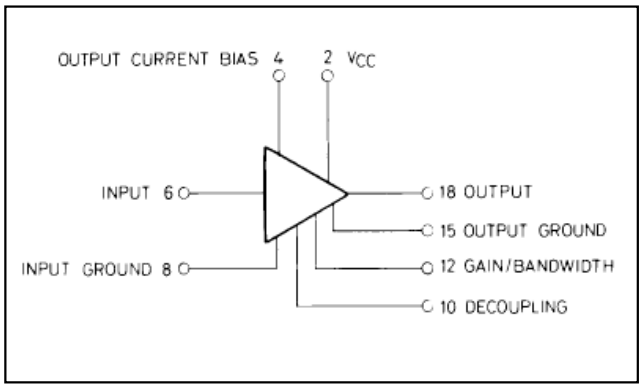


Fig.3 Pinning configuration - ZN460AM

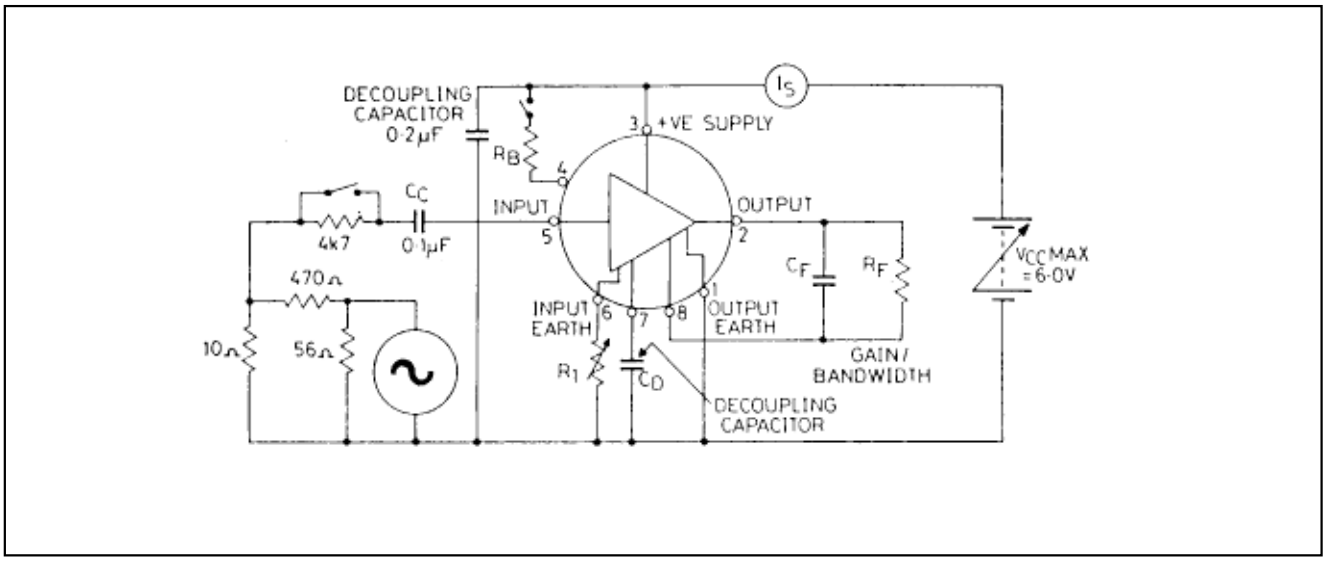


Fig.4 Gain Test Circuit (ZN460)

The input impedance may be increased at the expense of noise by including R_1 to vary the galn (R_1 = 0, gain = 10^3; R_1 = 470Ω, 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 .

R_B may be used to increase the output quiescent current up to a maximum of 5 mA. The value is given by:

$$I_O = \frac{10\ (Vcc - 1.34)}{R_B'}$$

Where R_B' is the parallel combination of R_B and 40KΩ.

The gain and bandwidth may be modified by means of R_F and C_F. The gain is given by:

$$A = \frac{10^3.\ R_F}{R_F + 19} \quad \text{with } R_F \text{ in k}\Omega$$

and the bandwidth by :

$$f_C = \frac{10^{12}}{2\ \pi\ R_F'\ (C_F + 1.4)} \quad \text{Hz with } C_F \text{ in pF}$$

Where R_F' is the parallel combination of R_F and 19KΩ.

The recommended minimum value of R_F is 6KΩ since a lesser value reduces the output swing below $2V_{pp}$.

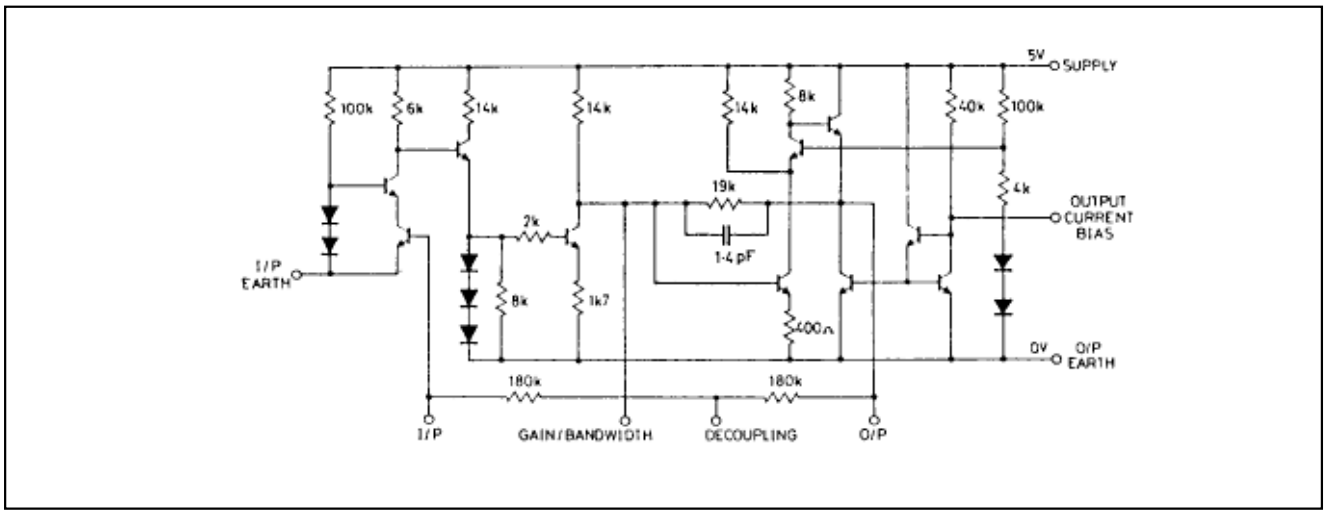


Fig.5 ZN460 Circuit digram (typical values)

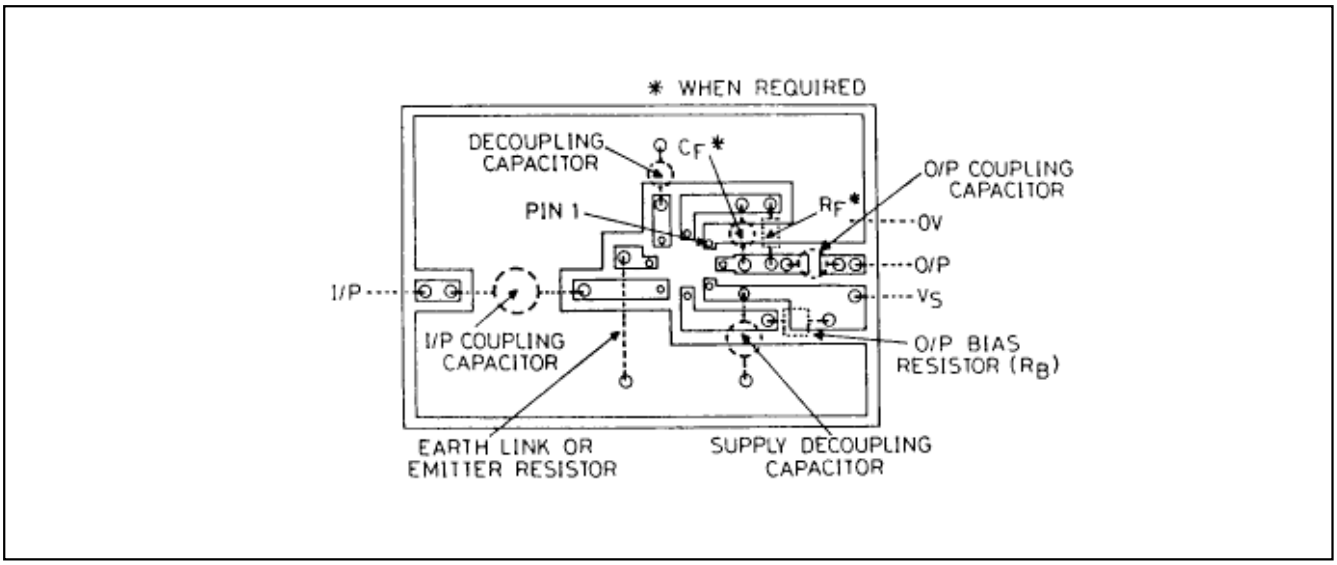


Fig.6 PCB Layout - ZN460

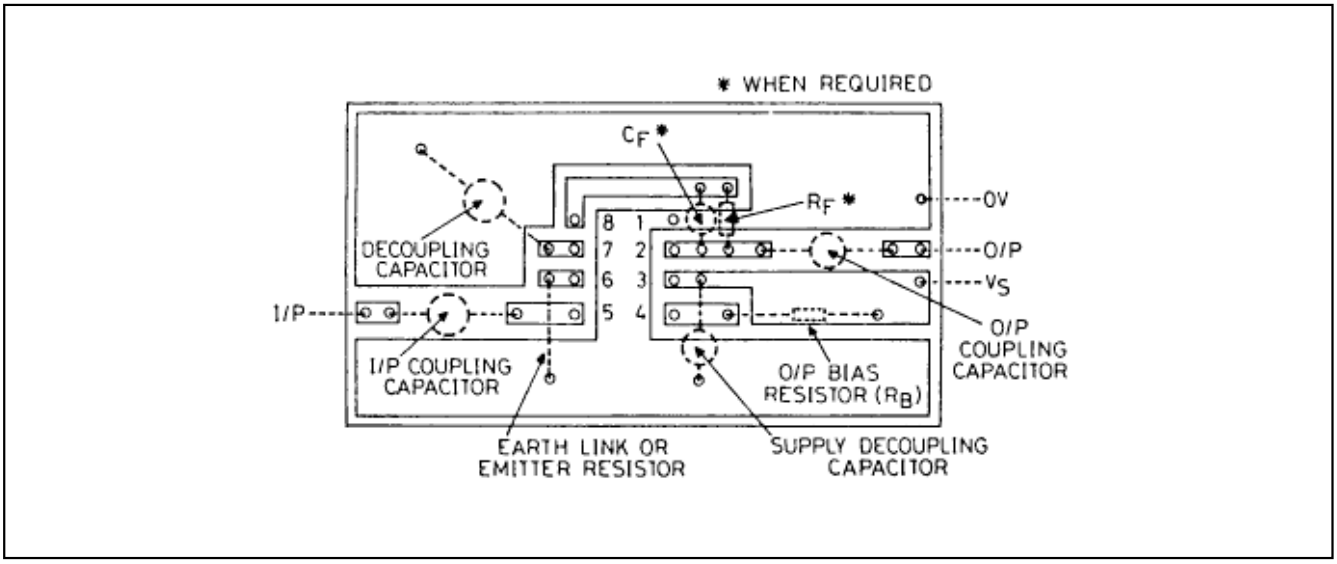


Fig.7 PCB Layout - ZN460CP

TYPICAL CHARACTERISTICS

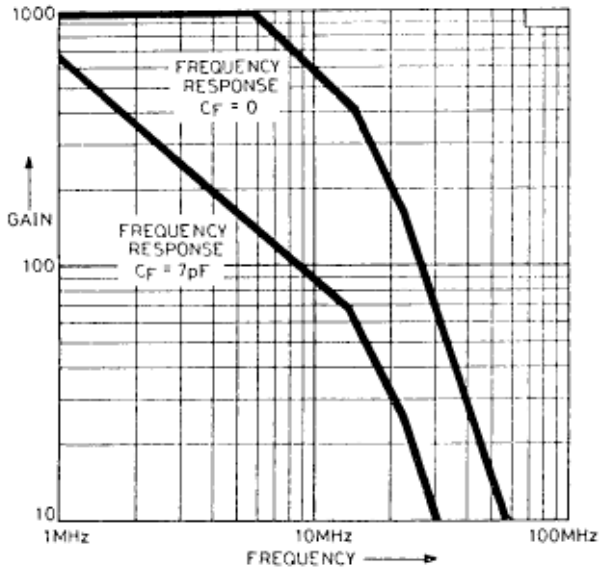


Fig.8 Gain V_S Frequency ($R_F = \infty$)

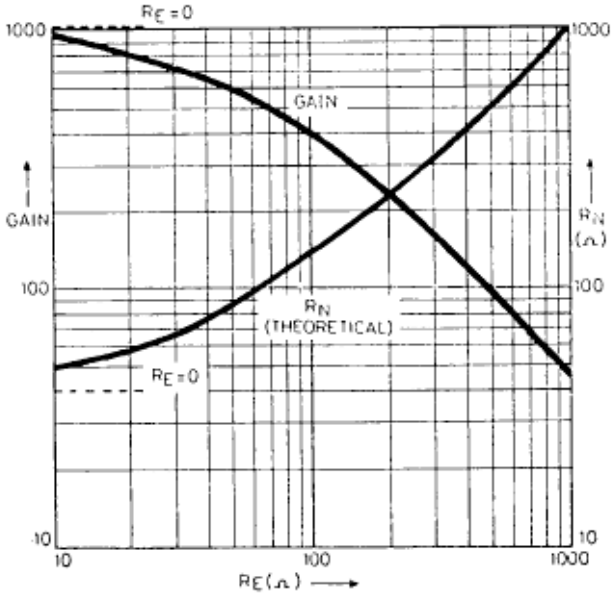


Fig.9 Gain and noise resistance V_S emitter resistance ($R_F = \infty$)

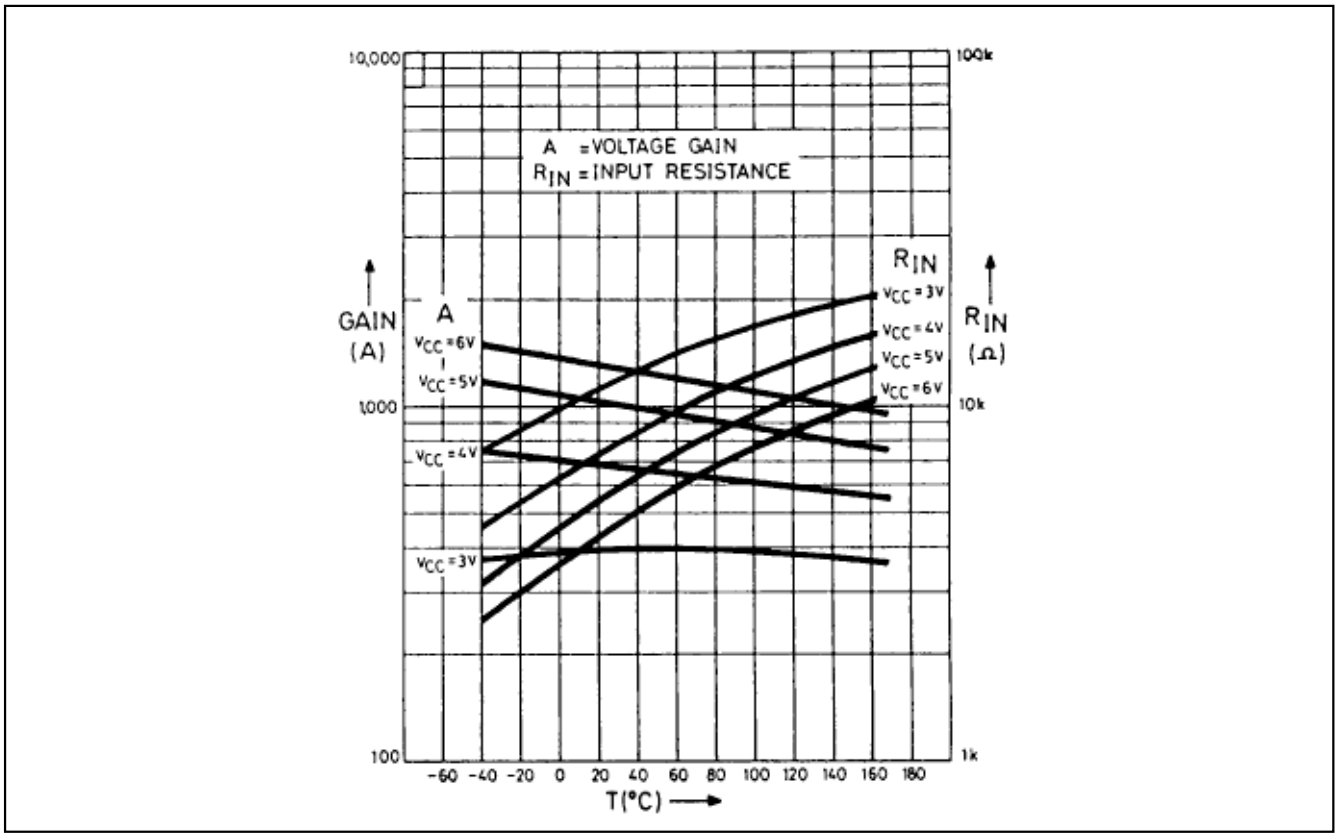


Fig.10 Gain and Input Impedance

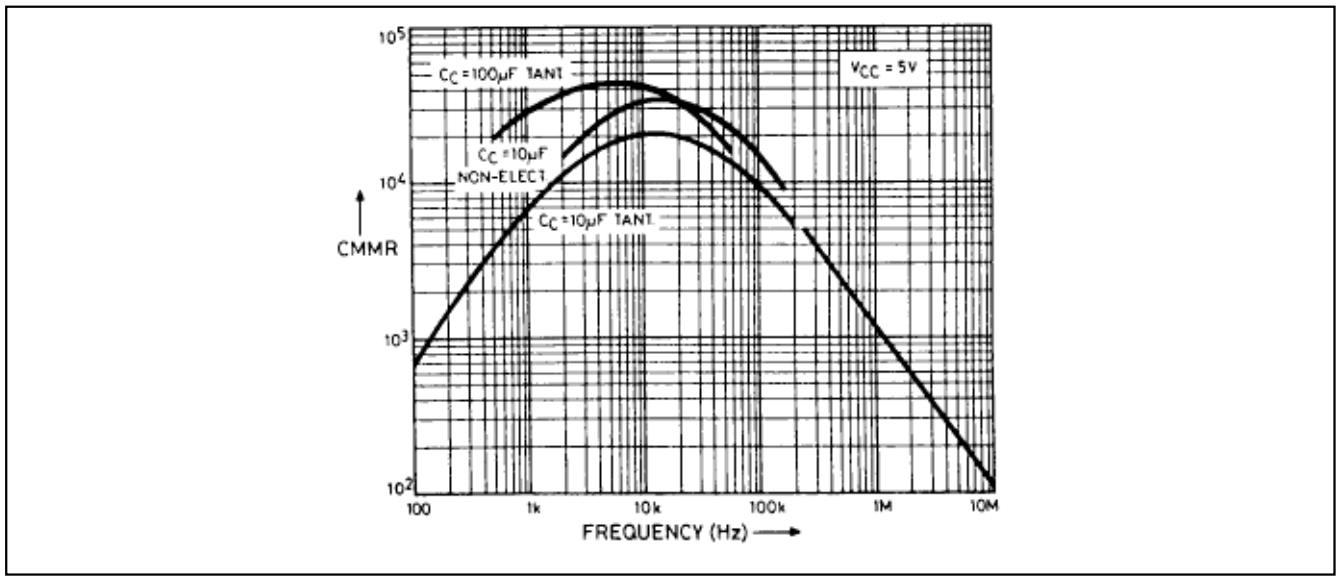


Fig.11 Common Mode Rejection Vs Frequency
(Measured between input earth and output earth)

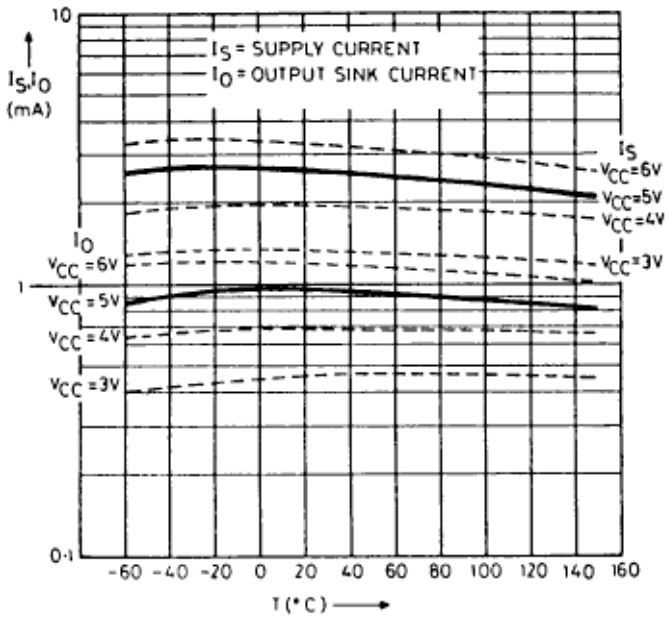


Fig.12 Supply current and output sink current

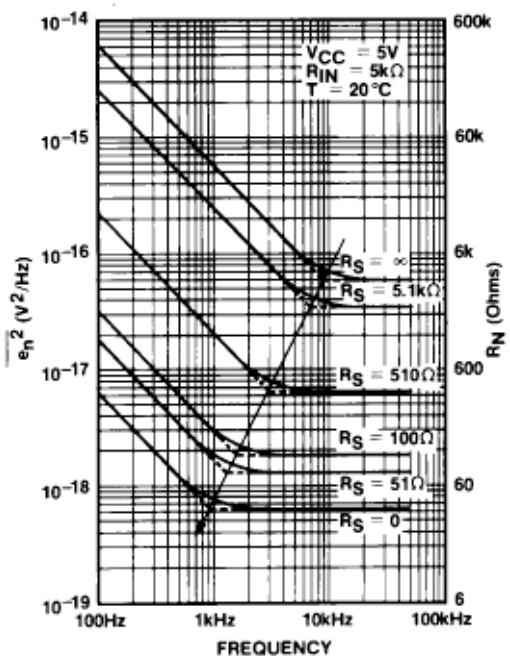


Fig.13 Noise voltage

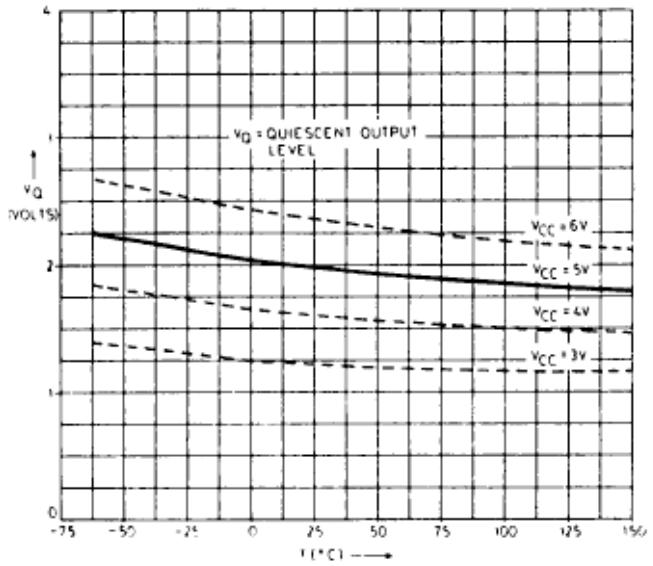


Fig.13 Quiescent Output Level

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