

### WIDEBAND SINGLE OPERATIONAL AMPLIFIER

The TDB2022-CM is a wideband monolithic operational amplifier. Its outstanding characteristics such as 150 MHz gain-bandwidth product and 50 V/ $\mu$ s slew rate make it particularly suitable for use as video frequency amplifier in TV signal processing applications.

The performances of the integrated video frequency amplifiers have been enhanced.

Operation from  $\pm 15$  V supplies.

3 dB noise figure.

Closed loop gain and phase irregularities with large input signals are minimized.

This circuit has been developed in co-operation with "Télé Diffusion de France".

- Input offset voltage : 5 mV max.
- Input bias current : 3  $\mu$ A max.
- Input offset current : 1  $\mu$ A max.
- Gain-bandwidth product : 95 MHz minimum.
- Slew rate : 40 V/ $\mu$ s min.
- Output short circuit current limited for indefinite duration.

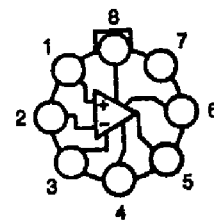
### WIDEBAND SINGLE OPERATIONAL AMPLIFIER

#### CASE CB-11



CM SUFFIX  
METAL CAN

#### PIN ASSIGNMENT (Top view)



- 1 - Non-inverting input
- 2 - Inverting input
- 3 - Frequency compensation
- 4 -  $V_{CC}$
- 5 - Output
- 6 - Output
- 7 - NC
- 8 -  $V_{CC}$

#### ORDERING INFORMATION

PART NUMBER	TEMPERATURE RANGE	PACKAGE
		CM
TDB2022	0°C to +70°C	•
Example : TDB2022CM		

**ELECTRICAL CHARACTERISTICS** $T_{amb} = +25^{\circ}\text{C}$  $V_{CC}^{+} = +12\text{ V}$  $V_{CC}^{-} = -12\text{ V}$ 

(Unless otherwise specified)

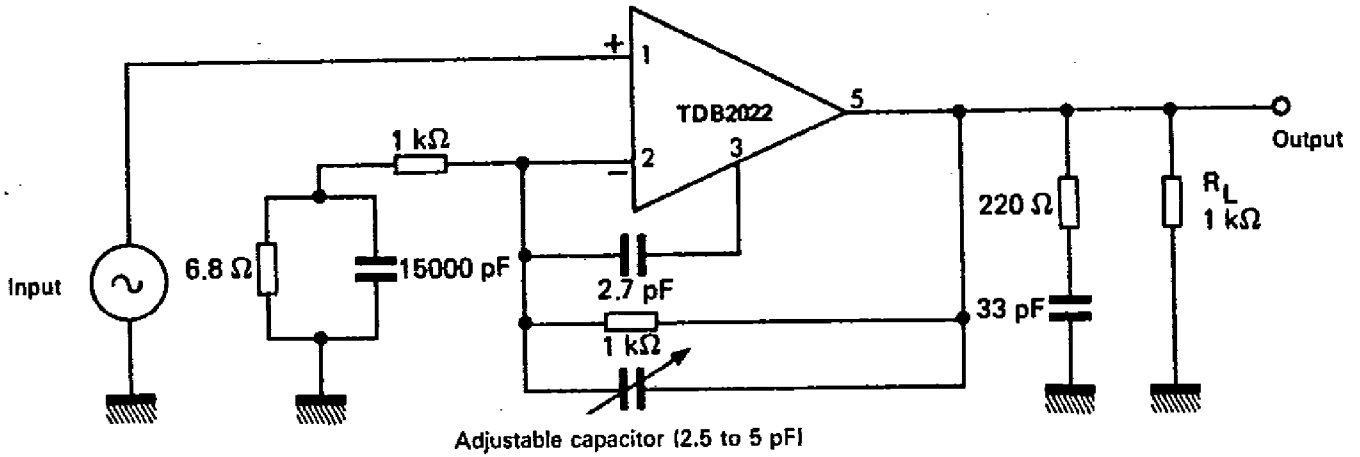
Characteristic	Symbol	Value			Unit
		Min	Typ	Max	
Input offset voltage ( $R_S = 2\text{ k}\Omega$ , $R_L = 100\text{ k}\Omega$ )	$V_{IO}$	—	2.8	5	mV
Input offset current ( $R_S = 2\text{ k}\Omega$ , $R_L = 100\text{ k}\Omega$ )	$I_{IO}$	—	0.18	1	$\mu\text{A}$
Input bias current ( $R_S = 1\text{ k}\Omega$ , $R_L = 100\text{ k}\Omega$ )	$I_{IB}$	—	1.6	3	$\mu\text{A}$
Differential mode voltage gain ( $R_S = 100\ \Omega$ , $R_L = 1\text{ k}\Omega$ , $f = 10\text{ kHz}$ ) - Fig. 7	$A_{VD}$	900	1500	—	V/mV
Supply voltage $V_{CC}^{+}$ rejection ratio ( $R_S = 2\text{ k}\Omega$ , $R_L = 100\text{ k}\Omega$ )	$SVR^{+}$	50	65	—	dB
Supply voltage $V_{CC}^{-}$ rejection ratio ( $R_S = 2\text{ k}\Omega$ , $R_L = 100\text{ k}\Omega$ )	$SVR^{-}$	80	92	—	dB
Supply currents ( $R_S = 1\text{ k}\Omega$ , $R_L = 100\text{ k}\Omega$ )	$I_{CC}^{+}$ , $I_{CC}^{-}$	—	8	10	mA
Temperature coefficient of input offset voltage ( $R_S = 2\text{ k}\Omega$ , $R_L = 100\text{ k}\Omega$ )	$\alpha V_{IO}$	—	3	20	$\mu\text{V}/^{\circ}\text{C}$
Common-mode rejection ratio ( $R_S = 2\text{ k}\Omega$ , $R_L = 100\text{ k}\Omega$ )	CMR	80	87	—	dB
Slew rate ( $R_L = 1\text{ k}\Omega$ ) $A_V = +2$ (Figs. 1, 2, 3) $A_V = +6$ (Figs. 5, 6)	SVO	—	50 60	—	V/ $\mu\text{s}$
Output(5) current Sourcing current Sinking current	$I_{O5}$ (source) $I_{O5}$ (sink)	—	10 3.5	—	mA
Output voltage swing ( $A_V = +6$ , $f = 4.43\text{ MHz}$ , $R_L = 1\text{ k}\Omega$ ) - Note 2 - Fig. 5	$V_{OPP}$	—	4	—	V
Output voltage swing Output 5 : $R_S = 1\text{ k}\Omega$ $R_L = 100\text{ k}\Omega$ Output 6 : $R_S = 1\text{ k}\Omega$ $R_L = 100\text{ k}\Omega$	$V_{OPP(5)}$ $V_{OPP(6)}$		+3.2 -8.6 +1.0 -1.7		V
Output impedance ( $R_S = 100\ \Omega$ , $f = 50\text{ kHz}$ ) - Output 5	$Z_{O(5)}$	—	40	—	$\Omega$
Differential input impedance ( $R_S = 1\text{ k}\Omega$ , $R_L = 100\text{ k}\Omega$ )	$Z_{id(1)}$ $Z_{id(2)}$	—	50 10	—	k $\Omega$
Input capacitance	$C_I$	—	5	—	pF
Transition frequency $R_S = 100\ \Omega$ , $R_L = 1\text{ k}\Omega$ , $f = 10\text{ MHz}$ , inverting amplifier $A_V = -10$ - Figs. 7, 8.	$f_T$	95	150	—	MHz
Noise figure (Center frequency : 10 kHz)	F	—	1.5	3	dB
Equivalent input noise voltage (Bandwidth : 200 Hz)	$v_n$	—	3.3	—	nV/ $\sqrt{\text{Hz}}$
Equivalent input noise current (Figs. 9, 10)	$i_n$	—	1.1	—	pA/ $\sqrt{\text{Hz}}$

**Note 1 :** Output voltage swing  $V_{OPP}$  is maximum allowable output amplitude peak to peak. 2nd or 3rd harmonic ratio less than -40 dB.

FIGURE 1 : NON-INVERTING AMPLIFIER ( $A_V = +2$ )

With bandwidth irregularity compensation

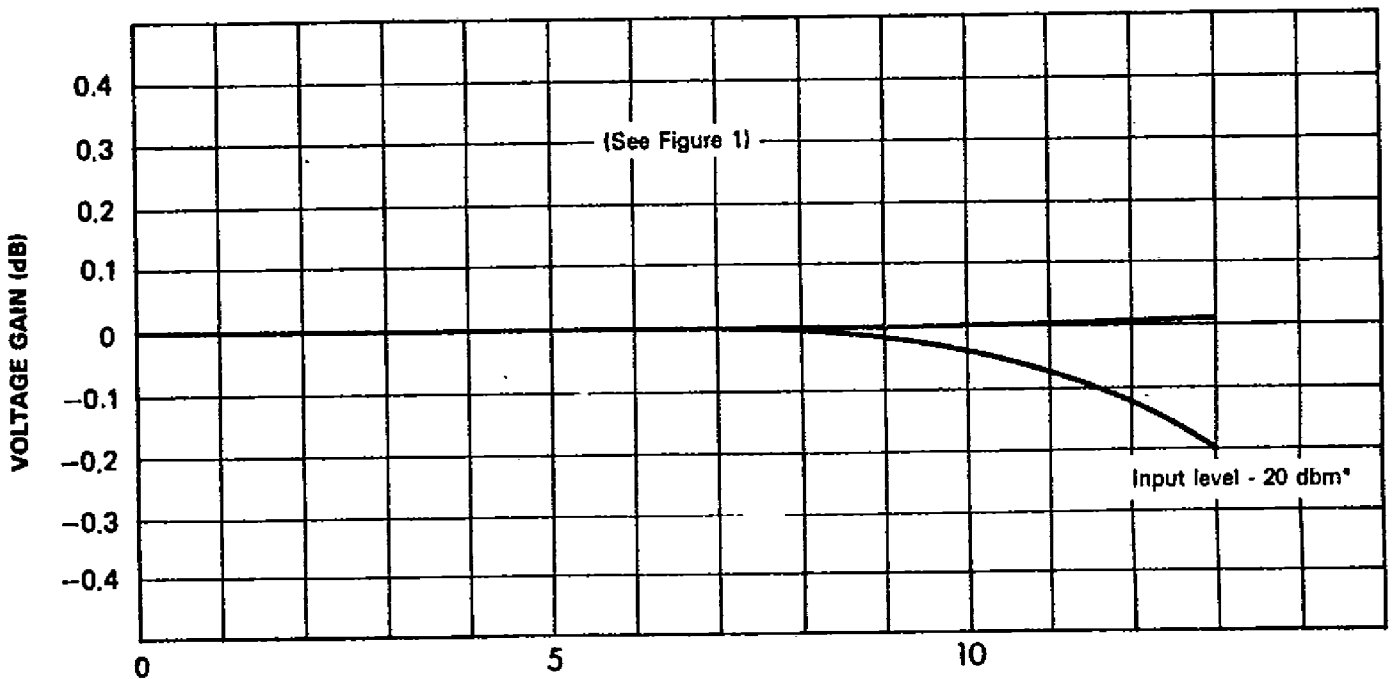
Application diagram  
supplied by Télé Diffusion de France



Input signal :  $-0.7\text{ V to }+0.7\text{ V}$   
Differential gain : 0.25% (0.02 dB)

Differential phase shift : 0.1 degree  
Slew rate :  $50\text{ V}/\mu\text{s}$

FIGURE 2 : VOLTAGE GAIN VERSUS FREQUENCY OF NON-INVERTING AMPLIFIER ( $A_V = +2$ )



\* 0 dbm : 1 mW  
with resistance of 50 Ω

TYPICAL APPLICATIONS (continued)

FIGURE 3 : SLEW RATE

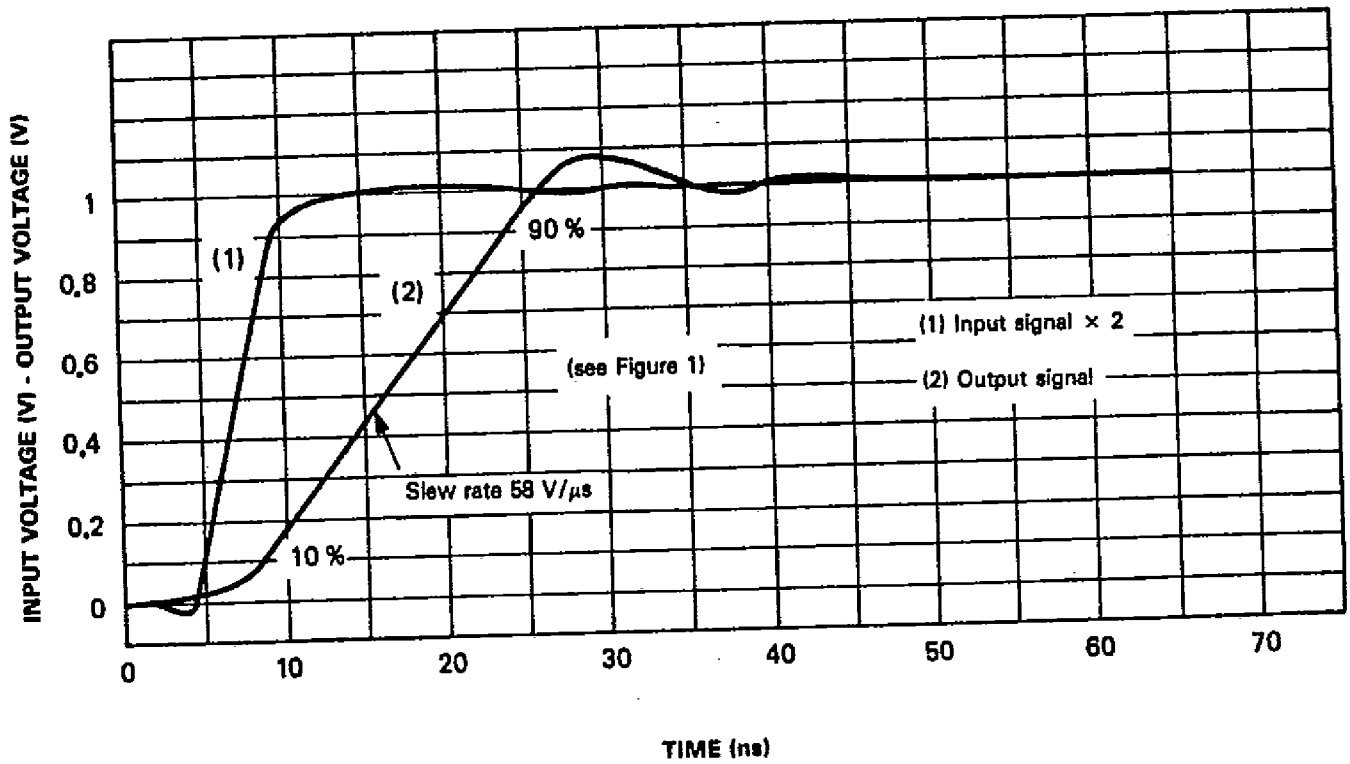
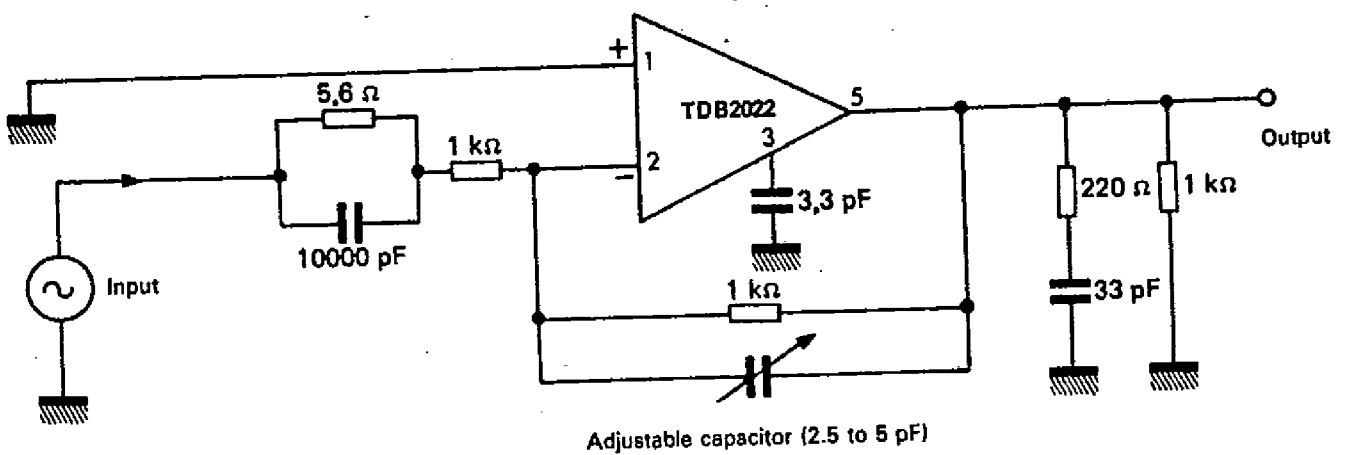


FIGURE 4 : INVERTING AMPLIFIER ( $A_V = -1$ )

With bandwidth irregularity compensation

Application diagram supplied by Télé Diffusion de France



Input signal :  $-0.7\text{ V to }+0.7\text{ V}$   
 Differential gain : 0.25% (0.02 dB)

Differential phase shift : 0.1 degree  
 Slew rate :  $40\text{ V}/\mu\text{s}$

FIGURE 5 : NON-INVERTING AMPLIFIER ( $A_V = +6$ )

Without bandwidth compensation

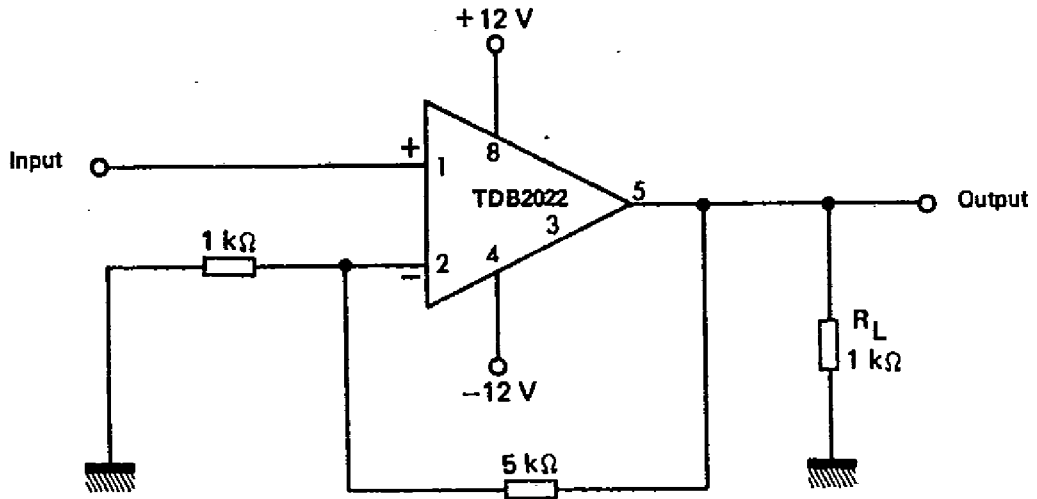


FIGURE 6 : MEASUREMENT OF SLEW RATE

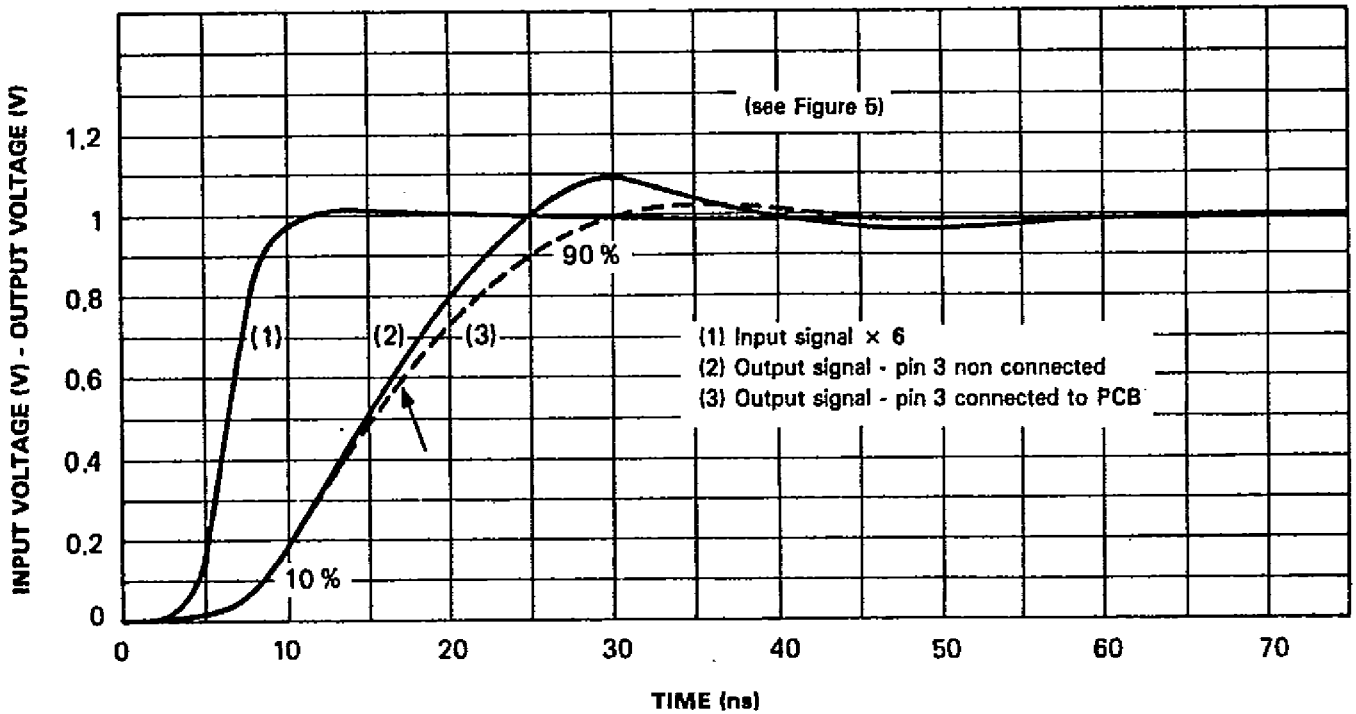


FIGURE 7 : INVERTING AMPLIFIER ( $A_V = -10$ )

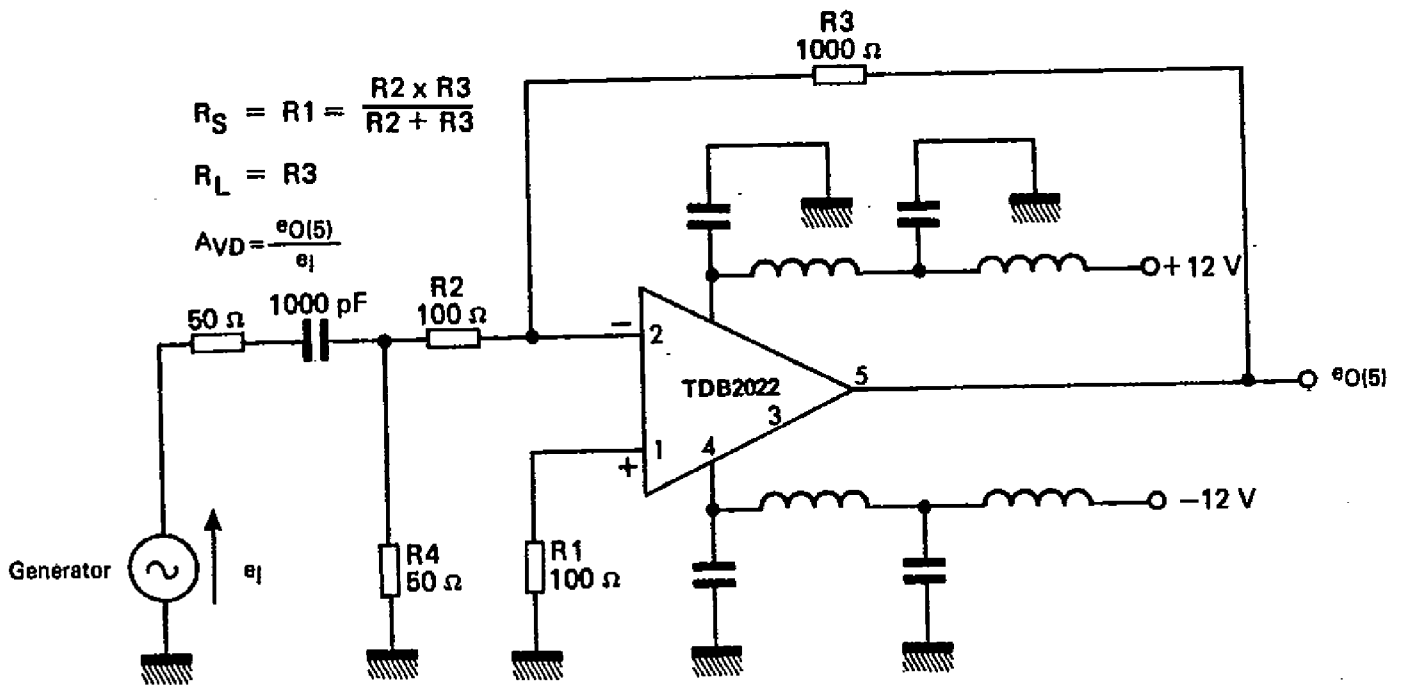


FIGURE 8 : GAIN VERSUS FREQUENCY - OPEN LOOP

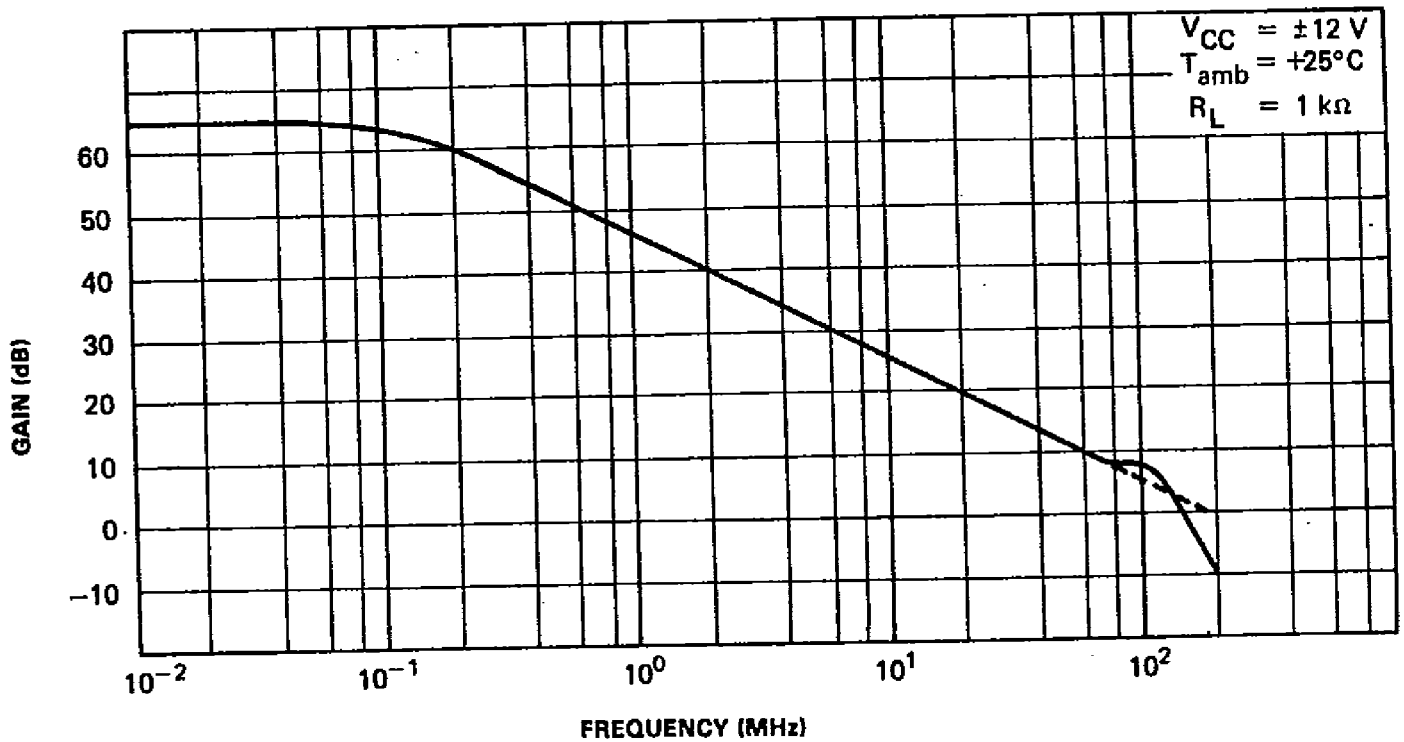


FIGURE 9 : NOISE FIGURE TEST CIRCUIT

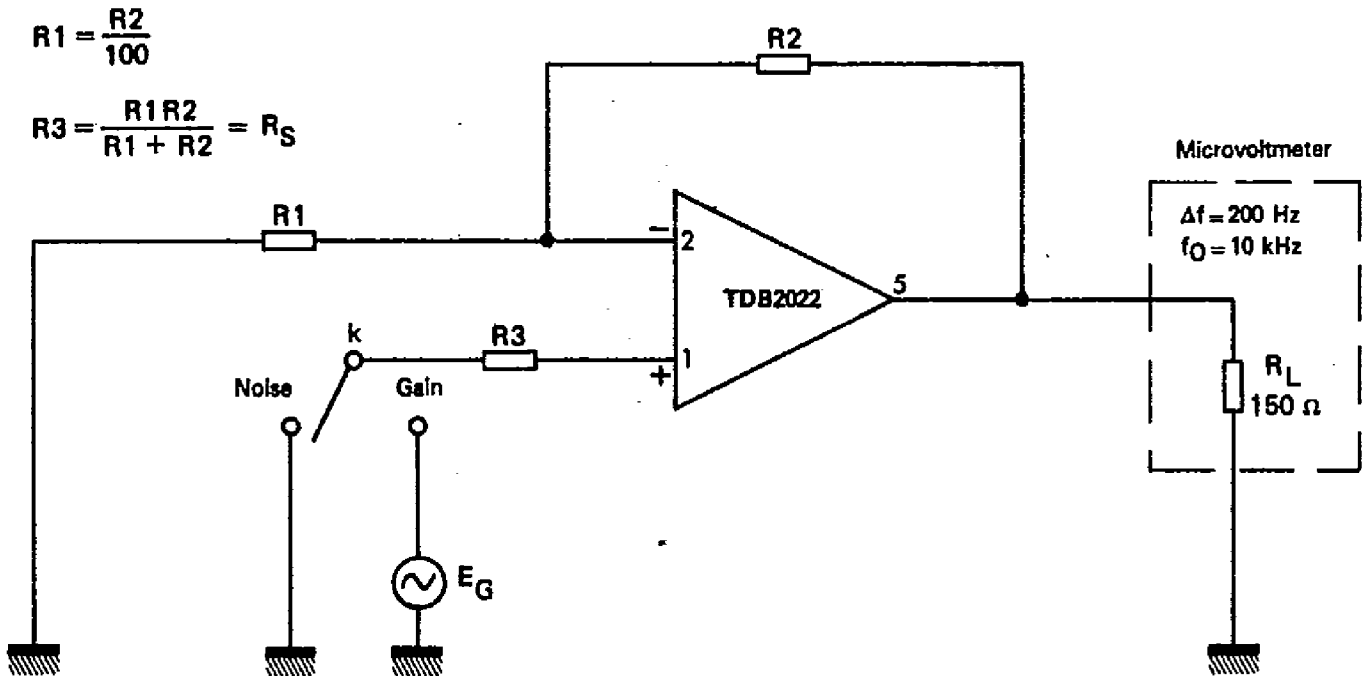
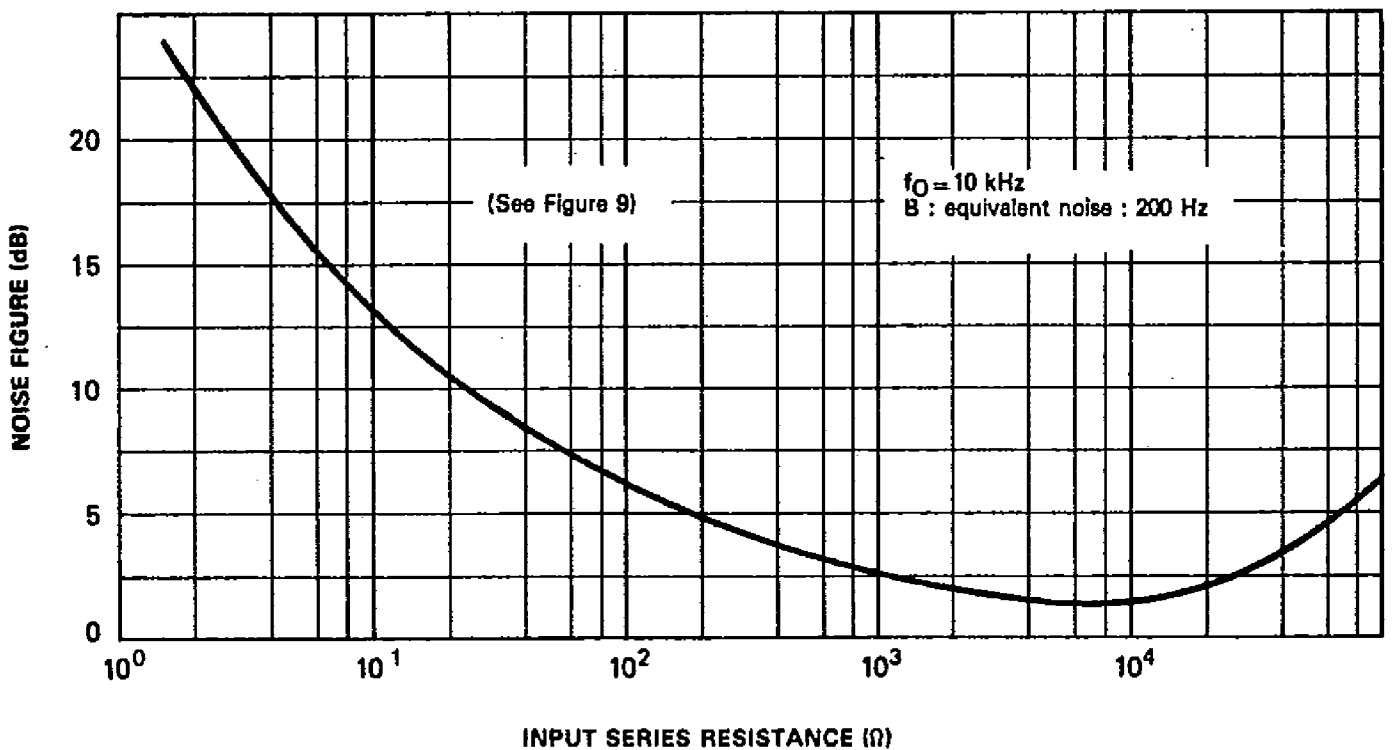
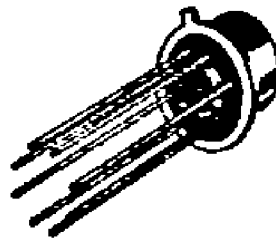


FIGURE 10 : NOISE FIGURE



**CB-11  
(TO-99)**



**CM SUFFIX  
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