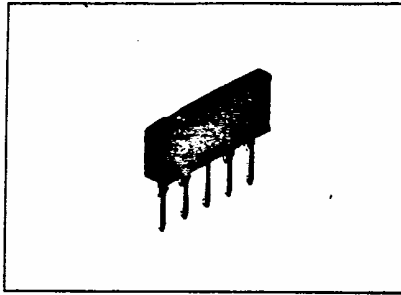


**FM IF Amplifier  
BA401**

T-74-11-01



**Dimensions (Unit: mm)**

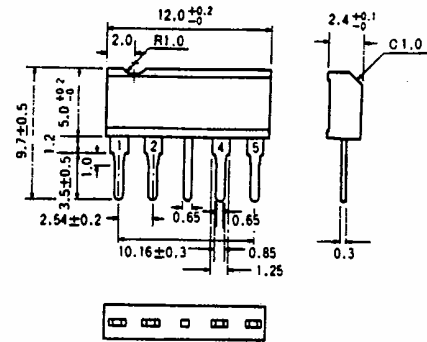


Fig. 1

The BA401 is a monolithic integrated circuit consisting of a single-stage differential amplifier usable as an FM IF amplifier or TV sound amplifier. It can be used as an FM IF limiter circuit as well and provides excellent characteristics. It is housed in a 5-pin SIP package to save space and improve ease-of-use.

**Features**

1. Suitable for use in narrowband or wideband amplification.
2. Ideal for use as an FM IF limiter circuit.
3. Extremely easy to use SIP package.

**Applications**

- FM tuners
- Radios
- Stereo equipment
- Car stereo systems
- TV sound IF stages

**Circuit Diagram**

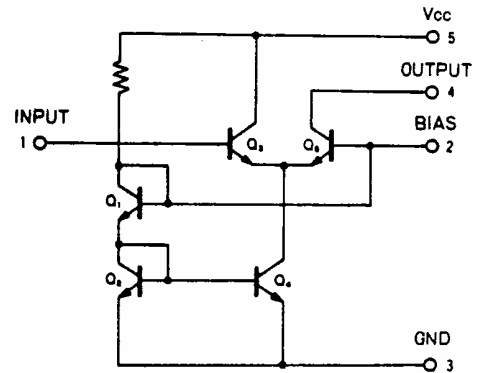


Fig. 2

**Absolute Maximum Ratings (Ta=25°C)**

Parameter	Symbol	Limits	Unit
Supply voltage	V <sub>cc</sub>	15	V
Output voltage	V <sub>out</sub>	24 (4pin)	V
Input voltage	V <sub>in</sub>	±3	V
Power dissipation	P <sub>d</sub>	300*	mW
Operating temperature range	T <sub>opr</sub>	-25~75	°C
Storage temperature range	T <sub>stg</sub>	-55~125	°C

\* Derating is done at 3mW/°C for operation above Ta=25°C.

**Electrical Characteristics (Ta=25°C, V<sub>cc</sub>=12V)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Test circuit
Quiescent current	I <sub>q</sub>	6.5	10.5	14.5	mA	—	Fig 9
Power dissipation	P <sub>D</sub>	78	126	174	mW	—	Fig 9
Closed loop voltage gain	G <sub>vc</sub>	26	32	38	dB	R <sub>g</sub> =50Ω, R <sub>L</sub> =1kΩ	Fig 10
Input impedance	R <sub>in</sub>	—	38	—	kΩ	f=10.7MHz	Fig 11

## Electrical Characteristic Curves

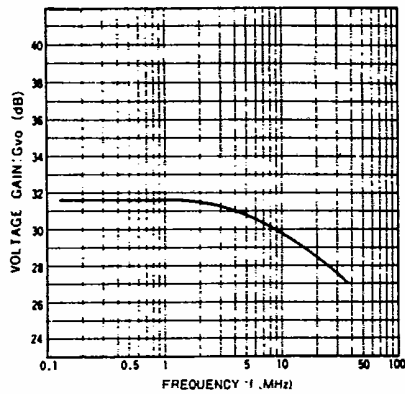


Fig. 3 Voltage gain vs. frequency

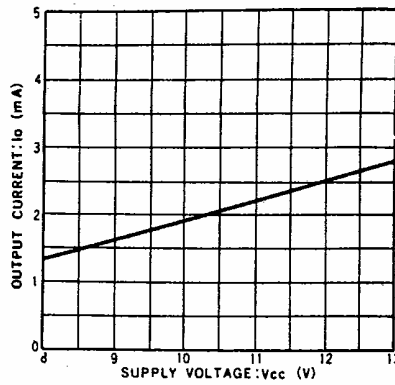


Fig. 4 Output current vs. supply voltage

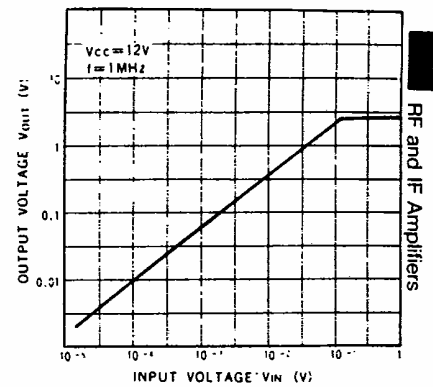


Fig. 5 Output voltage vs. input voltage

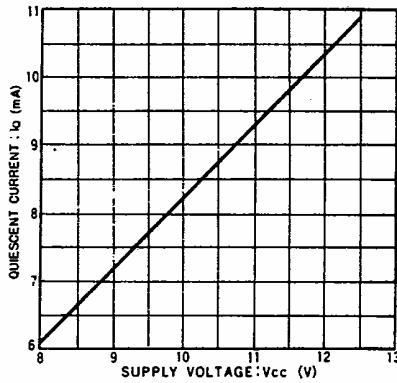


Fig. 6 Quiescent current vs. supply voltage

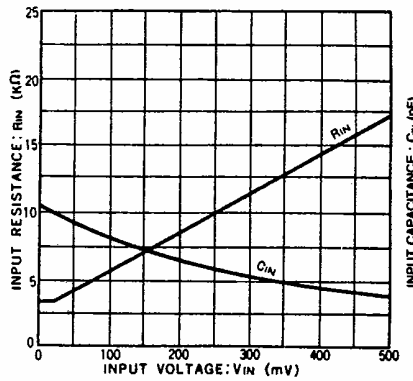


Fig. 7 Input impedance vs. input voltage

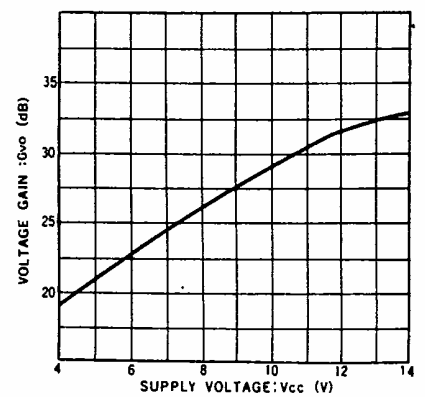


Fig. 8 Voltage gain vs. supply voltage

## Test Circuit

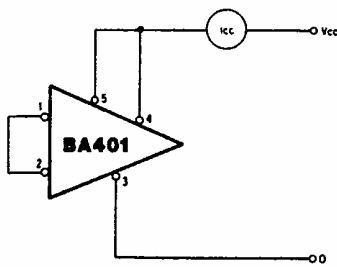


Fig. 9 Test circuit for supply current and power dissipation

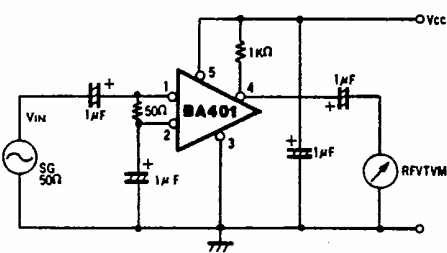


Fig. 10 Test circuit for voltage gain

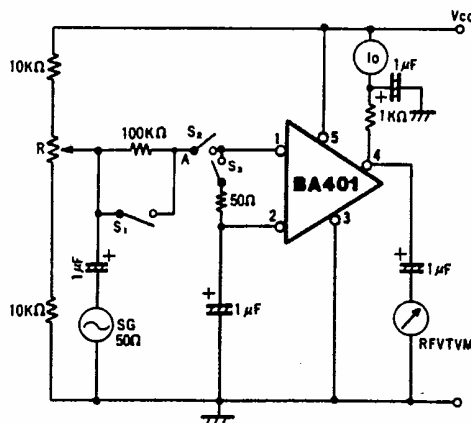


Fig. 11 Test circuit for input impedance

- ①  $I_o$  is the supply current when  $S_2$  is off and switch  $S_3$  is on.
- ②  $R$  is adjusted to fix  $I_{0-1} = I_{0-1}$  with switch  $S_3$  off and  $S_2$  on.
- ③  $V_{01}$  is the output voltage when switch  $S_1$  is on (i.e., when the output voltage is 0.1V).  $V_{02}$  is the output voltage when  $S_1$  is off.

$$R_{in} = \frac{V_{02} R_1}{V_{01} - V_{02}} (\Omega)$$

### Circuit Description

As shown in Fig. 12 the BA401 consists of a single-stage differential amplifier and bias circuit. One side of the differential amplifier is biased at  $2V_{BE}$ . The bias circuit provides a constant emitter current for the differential amplifier in addition to an open-collector type output circuit.

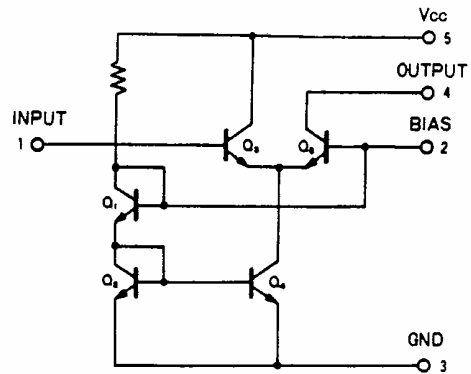


Fig. 12 Circuit diagram

### Application Examples

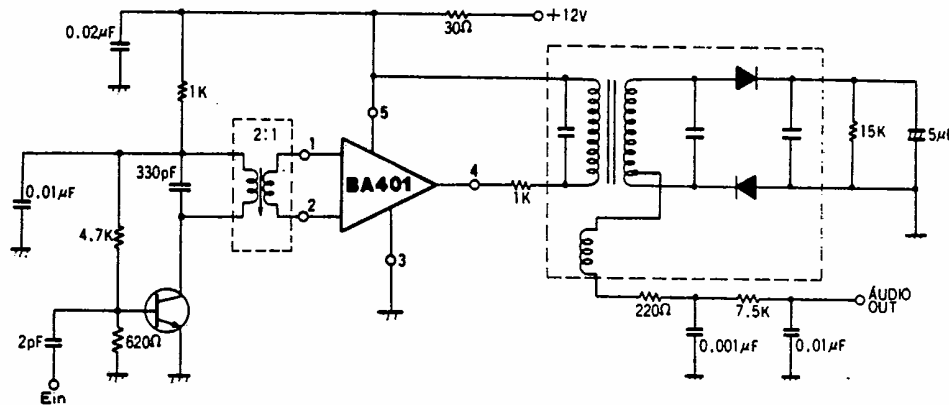


Fig. 13 TV sound IF amplifier

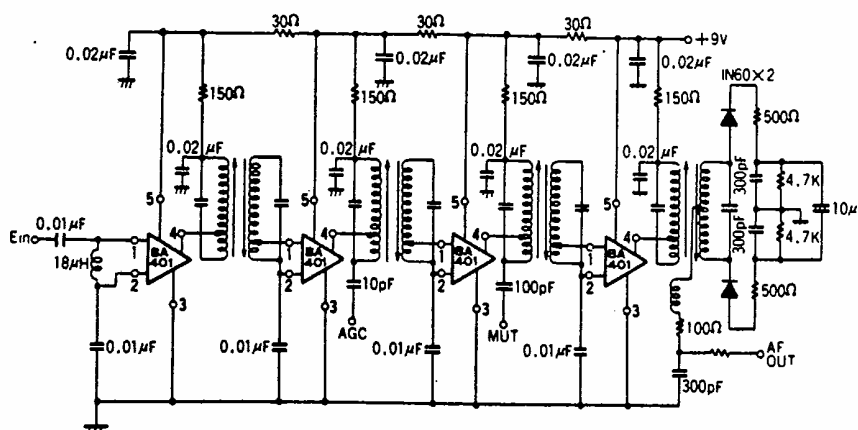


Fig. 14 FM IF amplifier

### External Components

1. Input Coupling Capacitor (Pin 1)  
This is an interstage coupling capacitor between IF amplifier stages.
2. Input Bias Resistor (Pins 1 and 2)  
This resistor provides bias current to pin 1 and performs impedance matching.

3. Bias Capacitor (Pin 2)  
This capacitor stabilizes the bias voltage.
4. Output Resistor (Pin 4)  
This is the load resistor for the differential amplifier.
5. Output Coupling Capacitor (Pin 4)  
This is the coupling capacitor for the output to the next stage.

### Precautions for Use

Care should be taken to place external components as close as possible to the IC. Wide ground conductors should be used to ensure positive grounding.