PLESSEY
Semiconductors

# TAB1042

## QUAD PROGRAMMABLE OPERATIONAL AMPLIFIER

The TAB1042 is an advanced bipolar integrated circuit containing four separate programmable operational amplifiers. The four amplifiers are programmed by current into a common bias pin which determines the main characteristics of each amplifier, supply current, frequency response and slew rate.

For example, with a suitable choice of bias current, the TAB1042 will perform in a manner similar to four amplifiers of the 741 type, but with improved frequency response and input characteristics.

The TAB1042 is especially suitable for use in active filter applications.

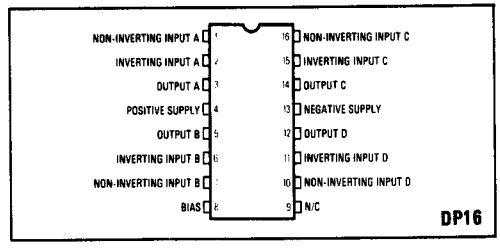


*Fig. 1 Pin connections*

### FEATURES

- Four Independent Op. Amps. in One Package
- Internally Compensated
- Wide Range of Supply Voltages from ±1.5V to ±12V
- No Latch-Up
- Programmable Over 100:1 Current Range
- Gain Bandwidth Product Up to 4MHz
- Built-In Short Circuit Protection
- Low Noise

### APPLICATIONS

- Active Filters
- Oscillators
- Low Voltage Amplifiers

### QUICK REFERENCE DATA

- Supply Voltages ±1.5V to ±12V
- Supply Current ±40uA to ±2mA
- Operating Frequency Range 1MHz
- Gain 95dB
- Operating Temperature Range -40°C to +85°C

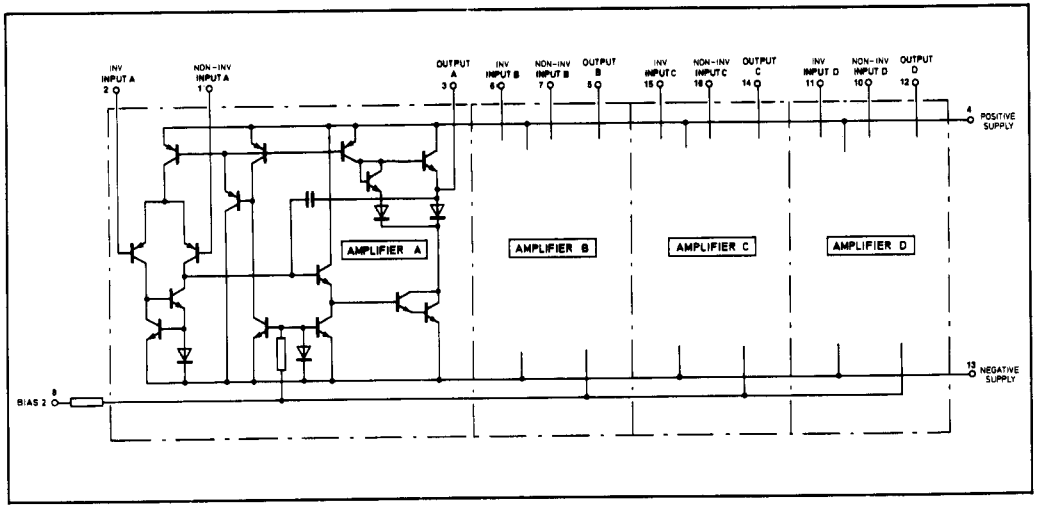


*Fig. 2 Circuit diagram*

## ELECTRICAL CHARACTERISTICS

**Test conditions (unless otherwise stated):**
$T_{amb}$ 25°C
Operating mode A:Supply volts ±12V Bias set current 75μA
Operating mode B:Supply volts ±12V Bias set current 1μA
Operating mode C:Supply volts ±1.5V Bias set current 1μA

| Characteristics | Operating Mode | | | | | | | | | Units | Conditions |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | | | B | | | C | | | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | | |
| Input offset voltage | | 1 | 5 | | 1 | 5 | | 1 | 5 | mV | Rs 10kΩ |
| Input offset current | | 20 | 200 | | 5 | 50 | | 5 | 50 | nA | |
| Input bias current | | 250 | 500 | | 30 | 100 | | 30 | 100 | nA | |
| Input resistance | 0.1 | 0.6 | | 0.5 | 2 | | 0.5 | 2 | | MΩ | |
| Supply current (each amplifier) | 1000 | 1600 | 2200 | | 42 | | 20 | 40 | 60 | μA | |
| Large signal volt gain | 74 | 95 | | 66 | 90 | | 66 | 90 | | dB | RL = 4kΩ(A) |
| | | | | | | | | | | | RL = 100kΩ(B) |
| | | | | | | | | | | | RL = 100kΩ(C) |
| Input voltage range | 10 | 10.5 | | 10 | 10.5 | | 0.2 | 0.4 | | ±V | Rs 10kΩ |
| Common mode rejection ratio | 70 | 110 | | | 82 | | | 82 | | dB | |
| Output voltage swing | 9 | 10.8 | | 9 | 10.8 | | 0.2 | 0.3 | | ±V | RL = 4kΩ(A) |
| | | | | | | | | | | | RL = 100kΩ(B) |
| | | | | | | | | | | | RL = 4kΩ(C) |
| Supply voltage rejection ratio | 75 | 96 | | 75 | 86 | | 75 | 86 | | dB | Rs 10kΩ |
| Gain bandwidth product | | | | | 50 | | | 50 | | kHz | Gain = 20dB |
| | | 3.5 | | | | | | | | MHz | |
| Slew rate | | 1.5 | | | 0.02 | | | 0.02 | | V/μs | Gain = 20dB |
| Input noise voltage | | 15 | | | 45 | | | 45 | | nV/√Hz | $f_o$ = 1kHz |
| Input noise current | | 1.6 | | | 1.6 | | | 1.0 | | pA/√Hz | $f_o$ = 1kHz |

## OPERATING NOTES

### Bias set current

The amplifiers are programmed by the $I_{SET}$ current into the BIAS pin to determine the frequency response, slew rate and the value of supply current. The relationship is summarised as follows:

| | |
|---|---|
| Gain bandwidth product | $I_{SET}$ x 50kHz |
| Power supply current (each amplifier) | $I_{SET}$ x 25μA |
| Slew rate | $I_{SET}$ x 0.02 V/μs ($I_{SET}$ in μA) |

The open loop voltage gain is largely unaffected by change in bias set current but tends to peak slightly at 10μA.

Since the voltage on the BIAS pin is approximately 0.65V more positive than the negative supply, a resistor may be connected between the bias pin and either 0V or the positive supply to set the current. Thus, if the resistor is connected to 0V, the $I_{SET}$ current is determined by:

$$I_{SET} = \frac{Vs - 0.65}{R}$$

where R is value of the 'set' resistor.

The output goes high if the non-inverting input is taken lower than 1V above the negative power supply.

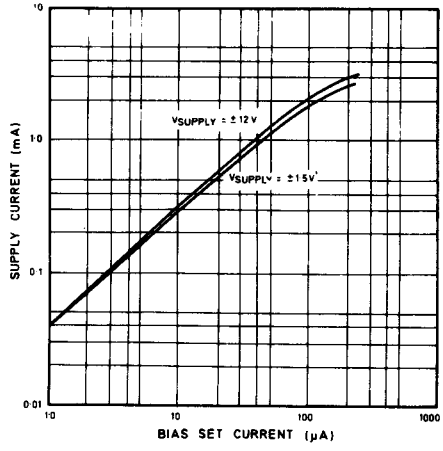


*Fig.3 Supply current (each amplifier) v. bias set current*

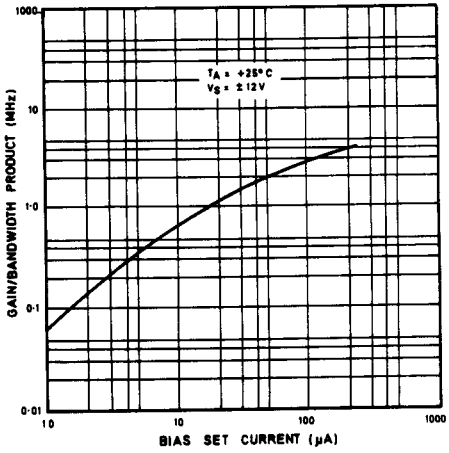


*Fig. 4 Gain bandwidth product v. $I_{SET}$*

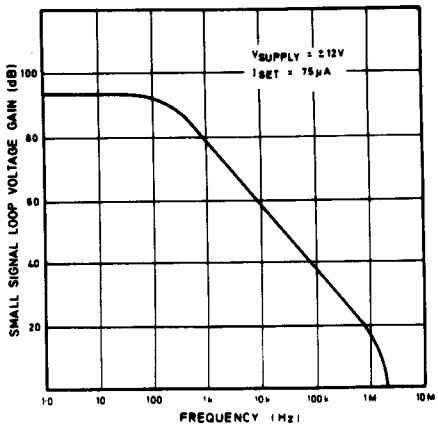


*Fig. 5 Typical frequency response*

## ABSOLUTE MAXIMUM RATINGS

| | |
|---|---|
| Supply voltages | ±15V |
| Common mode input voltage | Not greater than supplies |
| Differential input voltage | ±25V |
| Bias set current | 10mA each pin |
| Storage | -55° C to +125° C |
| Power dissipation | 800mW at 25° C |
| | Derate at 7mW/° C above 25° C |
| Operating temperature range | -40° C to +85° C |