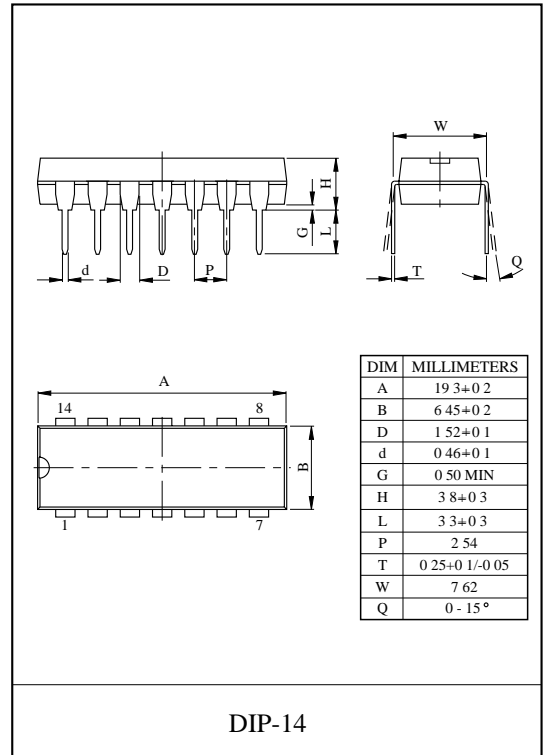
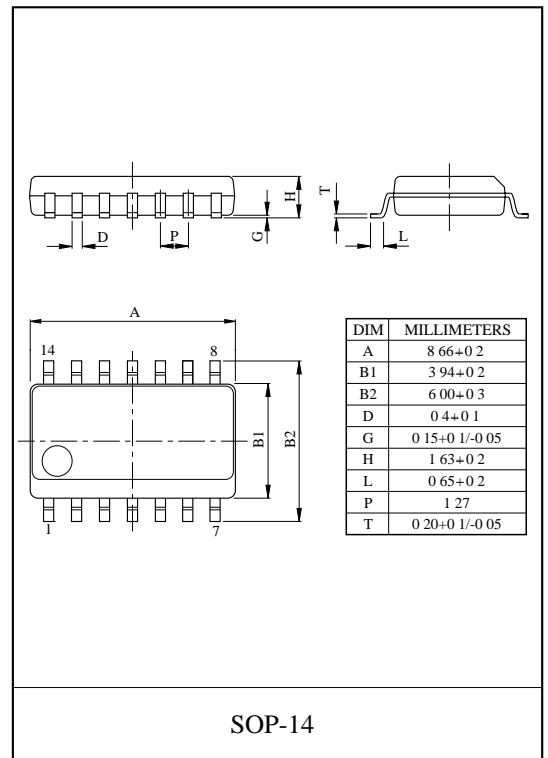
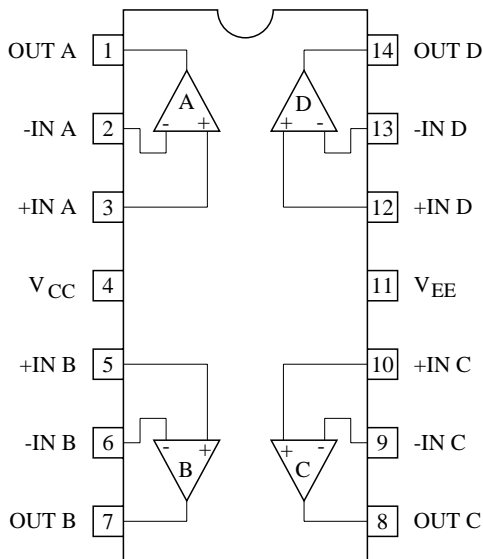


### QUAD OPERATIONAL AMPLIFIER

- In the Linear Mode the Input Common Mode Voltage Range Includes Ground.
- Four Internally Compensated OP Amps are in Single Package.
- Low Power Dissipation and Power Drain Suitable for Battery Operation.
- Differential Input Voltage Range Equal to the Power Supply Voltage.
- Wide Power Supply Voltage Range and Signal Power Supply : Single Supply  $3V_{DC}$  to  $36V_{DC}$   
Dual Supplies  $\pm 1.5V_{DC}$  to  $\pm 18V_{DC}$
- Large Output Voltage Swing :  $OV_{DC}$  to  $V_{CC}-1.5V_{DC}$
- Low Input Biasing Current :  $I_I=45nA(Typ.)$ .



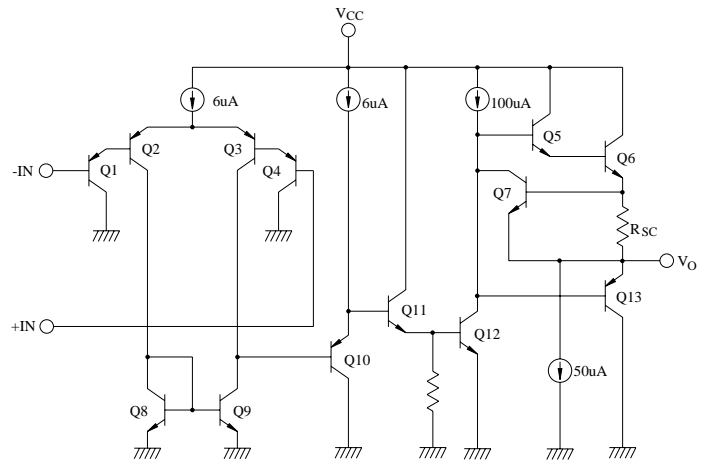
### PIN CONNECTION (TOP VIEW)



## MAXIMUM RATINGS (Ta=25°C)

| CHARACTERISTIC             |        | SYMBOL           | RATING    | UNIT |
|----------------------------|--------|------------------|-----------|------|
| Supply Voltage             |        | V <sub>CC</sub>  | 36, +18   | V    |
|                            |        | V <sub>EE</sub>  | 0, -18    |      |
| Differential Input Voltage |        | DV <sub>IN</sub> | ±36       | V    |
| Input Voltage              |        | V <sub>IN</sub>  | -0.3 ~ 36 | V    |
| Power Dissipation          | FA324P | P <sub>D</sub>   | 625       | mW   |
|                            | FA324F |                  | 280       |      |
| Operating Temperature      |        | T <sub>opr</sub> | -40 ~ 85  | °C   |
| Storage Temperature        |        | T <sub>stg</sub> | -55 ~ 125 | °C   |

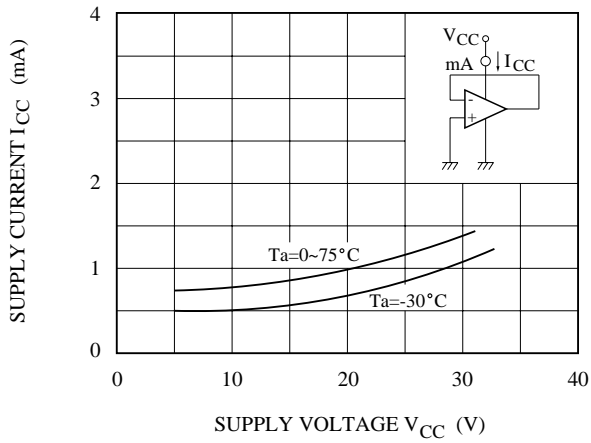
## EQUIVALENT CIRCUIT



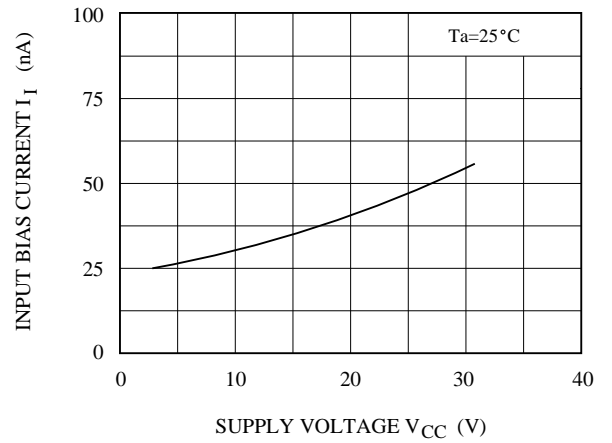
## ELECTRICAL CHARACTERISTICS (V<sub>CC</sub>=5V, V<sub>EE</sub>=GND, Ta=25°C)

| CHARACTERISTIC                           | SYMBOL                            | TEST CONDITION                              | MIN. | TYP.                 | MAX.                 | UNIT |
|------------------------------------------|-----------------------------------|---------------------------------------------|------|----------------------|----------------------|------|
| Input Offset Voltage                     | V <sub>IO</sub>                   | R <sub>g</sub> ≤ 10kΩ                       | -    | 2                    | 7                    | mV   |
| Input Offset Current                     | I <sub>IO</sub>                   | -                                           | -    | 5                    | 50                   | nA   |
| Input Bias Current                       | I <sub>I</sub>                    | -                                           | -    | 45                   | -250                 | nA   |
| Common Mode Input Voltage                | CMV <sub>IN</sub>                 | V <sub>CC</sub> =30V, V <sub>EE</sub> =GND  | 0    | -                    | V <sub>CC</sub> -1.5 | V    |
| Supply Current                           | I <sub>CC</sub> , I <sub>EE</sub> | R <sub>L</sub> =∞, All OP Amps              | -    | 0.7                  | 1.2                  | mA   |
| Voltage Gain                             | G <sub>V</sub>                    | R <sub>L</sub> ≤ 2kΩ                        | 86   | 100                  | -                    | dB   |
| Maximum Output Voltage Swing             | V <sub>OP-P</sub>                 | R <sub>L</sub> =2kΩ                         | 0    | V <sub>CC</sub> -1.5 | -                    | V    |
| Common Mode Input Signal Rejection Ratio | CMRR                              | -                                           | 60   | 85                   | -                    | dB   |
| Supply Voltage Rejection Ratio           | SVRR                              | R <sub>g</sub> =10kΩ                        | 60   | 100                  | -                    | dB   |
| Source Current                           | I <sub>source</sub>               | -IN=0V <sub>DC</sub> , +IN=1V <sub>DC</sub> | 20   | 40                   | -                    | mA   |
| Sink Current                             | I <sub>sink</sub>                 | -IN=1V <sub>DC</sub> , +IN=0V <sub>DC</sub> | 10   | 20                   | -                    | mA   |

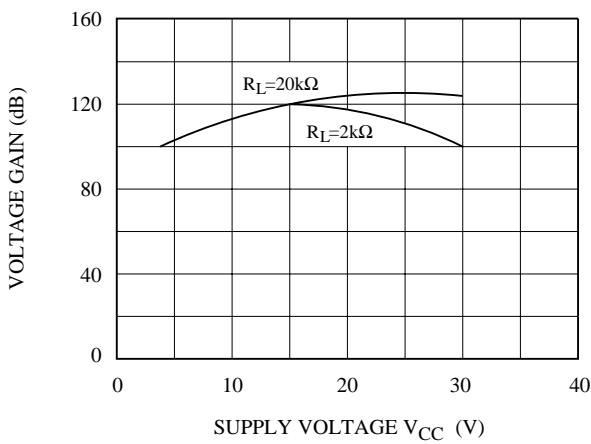
$V_{CC} - I_{CC}$



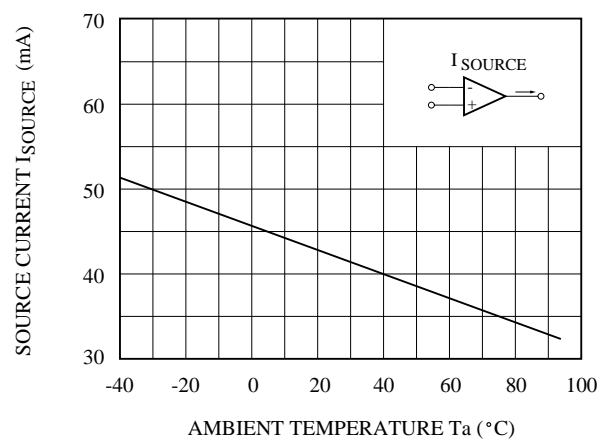
$V_{CC} - I_I$



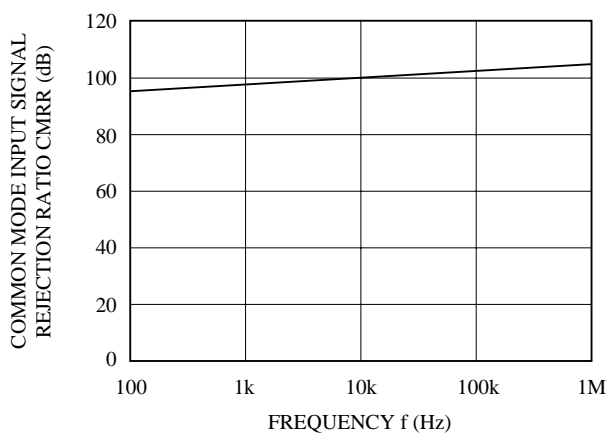
$V_{CC} - G_V$



$I_{SOURCE} - T_a$



CMRR - f



$G_V - f$

