

T-79-07-10

## Features

- 100 MHz Gain Bandwidth Product ( $A_v = 5$ )
- 500 M $\Omega$  Input Impedance
- 500  $\mu$ V Input Offset Voltage
- 150K V/V Open Loop Voltage Gain

## Applications

- Video Amplifiers
- Pulse Amplifiers
- High Speed Comparators
- Low Distortion Oscillators
- High-Q Active Filters

## Description

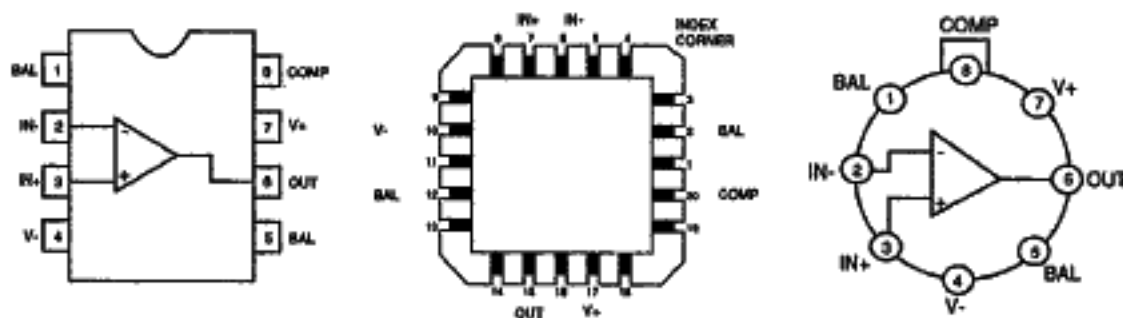
The SP-2620/22/25 are uncompensated, wide bandwidth operational amplifiers. They are stable for gains of five (5) or greater. In addition to their wide bandwidth, the SP-2620/22/25 offer the advantages of high input impedance, low input bias, input offset currents, low input offset voltage, and short circuit protection. These characteristics combined with the option for complete control of the amplifier's compensation to make it a superior amplifier for high frequency analog signal applications.

These amplifiers provide the designer with the ability to tailor its transfer characteristics through compensation. Offsets can also be trimmed by connecting a nulling potentiometer between its balance pins, and connecting the wiper to the positive supply,  $V_+$ . A 100K $\Omega$  potentiometer is recommended.

The SP-2620 and the SP-2622 are offered in military (-55°C to 125°C) versions; both are available in metal can, ceramic mini DIP, and LCC packages as well as in die form. The SP-2625 is offered in plastic, ceramic mini DIP, and metal can packages as well as in die form.

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## Connection Diagrams



# SP-2620/22/25

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Very Wideband, Uncompensated Operational Amplifiers

## Absolute Maximum Ratings

|                                           |                               |                             |                                         |
|-------------------------------------------|-------------------------------|-----------------------------|-----------------------------------------|
| Voltage Between $V^+$ and $V^-$ Terminals | 45.0V                         | Operating Temperature Range |                                         |
| Differential Input Voltage, $V_d$         | $\pm 12.0V$                   | SP-2620                     | $-55^\circ C \leq T_A \leq 125^\circ C$ |
| Internal Power Dissipation, $P_d$         | 300mW                         | Storage Temperature Range   | $-65^\circ C \leq T_A \leq 150^\circ C$ |
| Peak Output Current                       | Full Short Circuit Protection |                             |                                         |

**Electrical Characteristics:**  $V^+ = +15V$ ,  $V^- = -15V$ ,  $T_A = 25^\circ C$  unless otherwise specified in "Conditions".

## SP-2620

| Parameter                       | Symbol       | Conditions                                                                                                                                       | Min         | Typ        | Max | Units      |
|---------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------|-----|------------|
| <b>Input Characteristics</b>    |              |                                                                                                                                                  |             |            |     |            |
| Offset Voltage                  | $V_{os}$     | $-55^\circ C \leq T_A \leq 125^\circ C$                                                                                                          |             | 0.5        | 4   | mV         |
| Bias Current                    | $I_b$        | $-55^\circ C \leq T_A \leq 125^\circ C$                                                                                                          |             | 1          | 15  | nA         |
| Offset Current                  | $I_{os}$     | $-55^\circ C \leq T_A \leq 125^\circ C$                                                                                                          |             | 10         | 35  | nA         |
| Input Impedance                 | $Z_{in}$     | Guaranteed by Design                                                                                                                             | 65          | 500        |     | M $\Omega$ |
| Common Mode Range               | $V_{cm}$     | $-55^\circ C \leq T_A \leq 125^\circ C$                                                                                                          | $\pm 11.0$  |            |     | V          |
| <b>Transfer Characteristics</b> |              |                                                                                                                                                  |             |            |     |            |
| Large Signal Voltage Gain       | $A_{v_{OL}}$ | $R_L = 2K\Omega$ , $V_o = \pm 10V$ , $C_L = 50pF$<br>$-55^\circ C \leq T_A \leq 125^\circ C$ , $R_L = 2K\Omega$ , $C_L = 50pF$ , $V_o = \pm 10V$ | 100K<br>70K | 150K       |     | V/V<br>V/V |
| Common Mode Rejection Ratio     | CMRR         | $-55^\circ C \leq T_A \leq 125^\circ C$ , $V_{cm} = \pm 10V$                                                                                     | 80          | 100        |     | dB         |
| Gain Bandwidth Product          | GBW          | $V_{OL} < 90mV$ , $R_L = 2K\Omega$ , $C_L = 50pF$ , $A_v = 40dB$                                                                                 |             | 100        |     | MHz        |
| <b>Output Characteristics</b>   |              |                                                                                                                                                  |             |            |     |            |
| Output Voltage Swing            | $V_o$        | $-55^\circ C \leq T_A \leq 125^\circ C$ , $R_L = 2K\Omega$ , $C_L = 50pF$                                                                        | $\pm 10.0$  | $\pm 12.0$ |     | V          |
| Output Current                  | $I_{out}$    | $V_o = \pm 10V$                                                                                                                                  | $\pm 15$    | $\pm 22$   |     | mA         |
| Full Power Bandwidth            | FPBW         | $V_o = \pm 10V$ , $FPBW = (SR)/(2\pi V_o)$ , $R_L = 2K\Omega$ , $C_L = 50pF$                                                                     | 400         | 600        |     | KHz        |
| <b>Transient Response</b>       |              |                                                                                                                                                  |             |            |     |            |
| Rise Time                       | $t_r$        | $R_L = 2K\Omega$ , $C_L = 50pF$ , $V_o = \pm 200mV$ , $A_v = 40dB$                                                                               |             | 17         | 45  | nS         |
| Slew Rate                       | SR           | $R_L = 2K\Omega$ , $C_L = 50pF$ , $V_o = \pm 5V$ , $A_v = 40dB$                                                                                  | $\pm 25$    | $\pm 35$   |     | V/ $\mu S$ |
| <b>Power Supply</b>             |              |                                                                                                                                                  |             |            |     |            |
| Supply Current                  | $I_s$        |                                                                                                                                                  |             | 3.0        | 4.0 | mA         |
| Power Supply Rejection Ratio    | PSRR         | $-55^\circ C \leq T_A \leq 125^\circ C$ , $\Delta V_s = \pm 5V$                                                                                  | 80          | 90         |     | dB         |

# SP-2620/22/25

Very Wideband, Uncompensated Operational Amplifiers

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## Absolute Maximum Ratings

Voltage Between  $V^+$  and  $V^-$  Terminals 45.0V  
 Differential Input Voltage,  $V_d$   $\pm 12.0V$   
 Internal Power Dissipation,  $P_d$  300mW  
 Peak Output Current Full Short Circuit Protection

Operating Temperature Range  
 SP-2622  $-55^\circ C \leq T_A \leq 125^\circ C$   
 Storage Temperature Range  $-65^\circ C \leq T_A \leq 150^\circ C$

**Electrical Characteristics:**  $V^+ = +15V$ ,  $V^- = -15V$ ,  $T_A = 25^\circ C$  unless otherwise specified in "Conditions".

### SP-2622

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| Parameter                       | Symbol       | Conditions                                                                                                                                       | Min        | Typ        | Max | Units      |
|---------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|-----|------------|
| <b>Input Characteristics</b>    |              |                                                                                                                                                  |            |            |     |            |
| Offset Voltage                  | $V_{os}$     | $-55^\circ C \leq T_A \leq 125^\circ C$                                                                                                          |            | 3          | 5   | mV         |
| Bias Current                    | $I_b$        | $-55^\circ C \leq T_A \leq 125^\circ C$                                                                                                          |            | 5          | 25  | nA         |
| Offset Current                  | $I_{os}$     | $-55^\circ C \leq T_A \leq 125^\circ C$                                                                                                          |            | 5          | 25  | nA         |
| Input Impedance                 | $Z_{in}$     | Guaranteed by Design                                                                                                                             | 40         | 300        |     | M $\Omega$ |
| Common Mode Range               | $V_{cm}$     | $-55^\circ C \leq T_A \leq 125^\circ C$                                                                                                          | $\pm 11.0$ |            |     | V          |
| <b>Transfer Characteristics</b> |              |                                                                                                                                                  |            |            |     |            |
| Large Signal Voltage Gain       | $A_{v_{OL}}$ | $R_L = 2K\Omega$ , $V_o = \pm 10V$ , $C_L = 50pF$<br>$-55^\circ C \leq T_A \leq 125^\circ C$ , $R_L = 2K\Omega$ , $C_L = 50pF$ , $V_o = \pm 10V$ | 80K<br>60K | 150K       |     | V/V<br>V/V |
| Common Mode Rejection Ratio     | CMRR         | $-55^\circ C \leq T_A \leq 125^\circ C$ , $V_{cm} = \pm 10V$                                                                                     | 74         | 100        |     | dB         |
| Gain Bandwidth Product          | GBW          | $V_o < 90mV$ , $R_L = 2K\Omega$ , $C_L = 50pF$ , $A_v = 40dB$                                                                                    |            | 100        |     | MHz        |
| <b>Output Characteristics</b>   |              |                                                                                                                                                  |            |            |     |            |
| Output Voltage Swing            | $V_o$        | $-55^\circ C \leq T_A \leq 125^\circ C$ , $R_L = 2K\Omega$ , $C_L = 50pF$                                                                        | $\pm 10.0$ | $\pm 12.0$ |     | V          |
| Output Current                  | $I_{out}$    | $V_o = \pm 10V$                                                                                                                                  | $\pm 10$   | $\pm 18$   |     | mA         |
| Full Power Bandwidth            | FPBW         | $V_o = \pm 10V$ , $FPBW = (SR)(2\pi V_o)^{-1}$ , $R_L = 2K\Omega$ , $C_L = 50pF$                                                                 | 320        | 600        |     | KHz        |
| <b>Transient Response</b>       |              |                                                                                                                                                  |            |            |     |            |
| Rise Time                       | $t_r$        | $R_L = 2K\Omega$ , $C_L = 50pF$ , $V_o = \pm 200mV$ , $A_v = 40dB$                                                                               |            | 17         | 45  | nS         |
| Slew Rate                       | SR           | $R_L = 2K\Omega$ , $C_L = 50pF$ , $V_o = \pm 5V$ , $A_v = 40dB$                                                                                  | $\pm 20$   | $\pm 35$   |     | V/ $\mu$ S |
| <b>Power Supply</b>             |              |                                                                                                                                                  |            |            |     |            |
| Supply Current                  | $I_s$        |                                                                                                                                                  |            | 3.0        | 4.0 | mA         |
| Power Supply Rejection Ratio    | PSRR         | $-55^\circ C \leq T_A \leq 125^\circ C$ , $\Delta V_s = \pm 5V$                                                                                  | 74         | 90         |     | dB         |

Very Wideband, Uncompensated Operational Amplifiers

**Absolute Maximum Ratings**

|                                           |                               |                             |                                         |
|-------------------------------------------|-------------------------------|-----------------------------|-----------------------------------------|
| Voltage Between $V^+$ and $V^-$ Terminals | 45.0V                         | Operating Temperature Range |                                         |
| Differential Input Voltage, $V_d$         | $\pm 12.0V$                   | SP-2625                     | $0^\circ C \leq T_A \leq 75^\circ C$    |
| Internal Power Dissipation, $P_d$         | 300mW                         | Storage Temperature Range   | $-65^\circ C \leq T_A \leq 150^\circ C$ |
| Peak Output Current                       | Full Short Circuit Protection |                             |                                         |

**Electrical Characteristics:**  $V^+ = +15V$ ,  $V^- = -15V$ ,  $T_A = 25^\circ C$  unless otherwise specified in "Conditions".

**SP-2625**

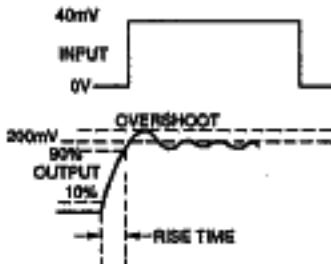
| Parameter                       | Symbol       | Conditions                                                                                                                                    | Min        | Typ        | Max | Units      |
|---------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|-----|------------|
| <b>Input Characteristics</b>    |              |                                                                                                                                               |            |            |     |            |
| Offset Voltage                  | $V_{os}$     | $0^\circ C \leq T_A \leq 75^\circ C$                                                                                                          |            | 3          | 5   | mV         |
| Bias Current                    | $I_b$        | $0^\circ C \leq T_A \leq 75^\circ C$                                                                                                          |            | 5          | 25  | nA         |
| Offset Current                  | $I_{os}$     | $0^\circ C \leq T_A \leq 75^\circ C$                                                                                                          |            | 5          | 25  | nA         |
| Input Impedance                 | $Z_{in}$     | Guaranteed by Design                                                                                                                          | 40         | 300        |     | M $\Omega$ |
| Common Mode Range               | $V_{cm}$     | $0^\circ C \leq T_A \leq 75^\circ C$                                                                                                          | $\pm 11.0$ |            |     | V          |
| <b>Transfer Characteristics</b> |              |                                                                                                                                               |            |            |     |            |
| Large Signal Voltage Gain       | $A_{v_{OL}}$ | $R_L = 2K\Omega$ , $V_o = \pm 10V$ , $C_L = 50pF$<br>$0^\circ C \leq T_A \leq 75^\circ C$ , $R_L = 2K\Omega$ , $V_o = \pm 10V$ , $C_L = 50pF$ | 80K<br>70K | 150K       |     | V/V<br>V/V |
| Common Mode Rejection Ratio     | CMRR         | $0^\circ C \leq T_A \leq 75^\circ C$ , $V_{cm} = \pm 10V$                                                                                     | 74         | 100        |     | dB         |
| Gain Bandwidth Product          | GBW          | $V_o < 90mV$ , $C_L = 50pF$ , $R_L = 2K\Omega$ , $A_v = 40dB$                                                                                 |            | 100        |     | MHz        |
| <b>Output Characteristics</b>   |              |                                                                                                                                               |            |            |     |            |
| Output Voltage Swing            | $V_o$        | $0^\circ C \leq T_A \leq 75^\circ C$ , $R_L = 2K\Omega$ , $C_L = 50pF$                                                                        | $\pm 10.0$ | $\pm 12.0$ |     | V          |
| Output Current                  | $I_{out}$    | $V_o = \pm 10V$                                                                                                                               | $\pm 10$   | $\pm 18$   |     | mA         |
| Full Power Bandwidth            | FPBW         | $V_o = \pm 10V$ , $FPBW = (SR)(2\pi V_o)^{-1}$ , $C_L = 50pF$ , $R_L = 2K\Omega$                                                              | 320        | 600        |     | KHz        |
| <b>Transient Response</b>       |              |                                                                                                                                               |            |            |     |            |
| Rise Time                       | $t_r$        | $R_L = 2K\Omega$ , $C_L = 50pF$ , $A_v = 5$                                                                                                   |            | 17         | 45  | nS         |
| Slew Rate                       | SR           | $R_L = 2K\Omega$ , $C_L = 50pF$ , $V_o = \pm 5V$ , $A_v = 5$                                                                                  | $\pm 20$   | $\pm 35$   |     | V/ $\mu$ S |
| <b>Power Supply</b>             |              |                                                                                                                                               |            |            |     |            |
| Supply Current                  | $I_s$        |                                                                                                                                               |            | 3.0        | 4.0 | mA         |
| Power Supply Rejection Ratio    | PSRR         | $0^\circ C \leq T_A \leq 75^\circ C$ , $\Delta V_s = \pm 5V$                                                                                  | 74         | 90         |     | dB         |

# SP-2620/22/25

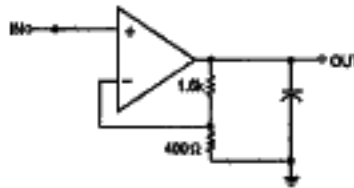
Very Wideband Uncompensated Operational Amplifiers

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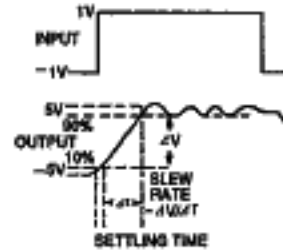
## A.C. Performance



Transient Response



A.C. Test Circuit



Slow Rate/Settling Time

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## Ordering Information

When ordering the SP-2620/22/25, specify the package and screening according to the following :

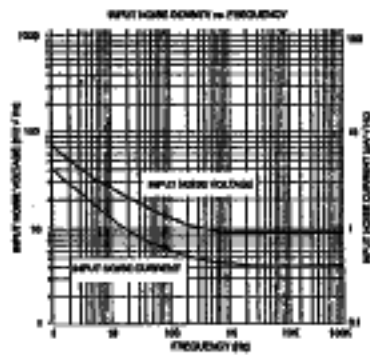
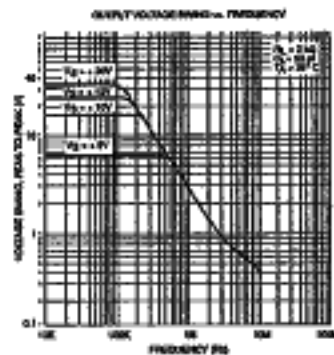
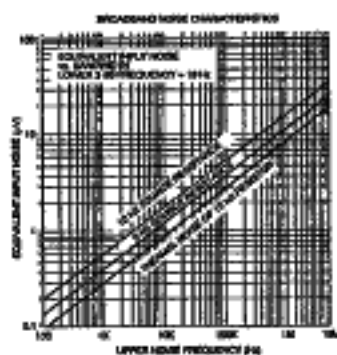
|                        |                                             |
|------------------------|---------------------------------------------|
| SP 2 - 2620 - 2        |                                             |
| Prefix: SP (SIPEX)     | Generic Part #                              |
| PACKAGE :              | SCREENING                                   |
| 1 - 14 pin ceramic DIP | -2 : -55 °C to 125 °C                       |
| 2 - Metal Can          | -4 : -25 °C to 85 °C                        |
| 3 - 8 Pin Plastic DIP  | -5 : 0 °C to 75 °C                          |
| 4 - 20 Pin LCC         | -6 : 25 °C 100% D.C. Probe (Dice Only)      |
| 7 - 8-Pin CERDIP       | /883 : -55 °C to 125 °C Full Mil Processing |
| 0 - DICE               |                                             |

NOTES: 1. Not all package types and screening option combinations are available. Consult local sales office or factory for availability information.

2. Consult factory for special package or screening requirements.

3. Consult factory for 883 revision C compliant data sheet.

4. Consult factory for package mechanical dimensions.



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