

## Features

- 12 MHz Unity Gain Bandwidth Product
- 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, Precision Comparators
- DAC Buffers
- High Speed Sample-and-Hold Amplifiers

## Description

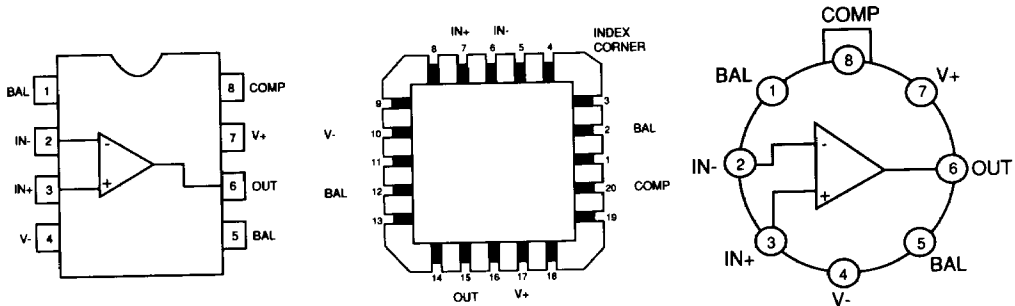
The SP-2600/02/05 are internally compensated, bipolar operational amplifiers. Their wide bandwidth and high input impedance combine with low offset current to make them excellent candidates for high-gain amplification of analog signals; specifically signals comprised of high frequencies.

This operational amplifier provides the designer with the opportunity to supplement the compensation (pin 8) where the application requires it. Offsets can also be trimmed by attaching an external nulling potentiometer between the balance pins (pins 1 and 5) and by connecting the wiper to the positive supply, V<sup>+</sup>. A 100K $\Omega$  potentiometer is recommended.

The SP-2600 and SP-2602 are offered as 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-2605 is offered in plastic, ceramic mini DIP, and metal can packages as well as in die forms.

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## Connection Diagrams



# SP-2600/02/05

Wideband, Precision Operational Amplifiers

## Absolute Maximum Ratings

Voltage Between V <sup>+</sup> and V <sup>-</sup> Terminals	45.0V	Operating Temperature Range	
Differential Input Voltage, V <sub>d</sub>	±12.0V	SP-2600	-55°C ≤ T <sub>A</sub> ≤ 125°C
Internal Power Dissipation, P <sub>d</sub>	300mW	Storage Temperature Range	-65°C ≤ T <sub>A</sub> ≤ 150°C
Peak Output Current	Full Short Circuit Protection		

**Electrical Characteristics:** V<sup>+</sup> = +15V, V<sup>-</sup> = -15V, T<sub>A</sub> = 25°C unless otherwise specified in "Conditions".

### SP-2600

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Input Characteristics</b>						
Offset Voltage	V <sub>os</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		0.5 2	4 6	mV
Offset Voltage Drift	ΔV <sub>os</sub> /ΔT	-55°C ≤ T <sub>A</sub> ≤ 125°C; average		5		μV/°C
Bias Current	I <sub>b</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		1 10	10 30	nA
Offset Current	I <sub>os</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		1 5	10 30	nA
Input Impedance	Z <sub>in</sub>	Guaranteed by Design	100	500		MΩ
Common Mode Range	V <sub>cm</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C	±11.0			V
<b>Transfer Characteristics</b>						
Large Signal Voltage Gain	A <sub>vOL</sub>	R <sub>L</sub> = 2KΩ, V <sub>o</sub> = ±10V -55°C ≤ T <sub>A</sub> ≤ 125°C, R <sub>L</sub> = 2KΩ, V <sub>o</sub> = ±10V	100K 70K	150K		V/V
Common Mode Rejection Ratio	CMRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, V <sub>cm</sub> = ±10V	80	100		dB
Unity Gain Bandwidth Product	GBW	V <sub>OL</sub> < 90mV		12		MHz
<b>Output Characteristics</b>						
Output Voltage Swing	V <sub>o</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C, R <sub>L</sub> = 2KΩ	±10.0	±12.0		V
Output Current	I <sub>OUT</sub>	V <sub>o</sub> = ±10V	±15	±22		mA
Full Power Bandwidth	FPBW	V <sub>o</sub> = ±10V, FPBW = (SR) (2π V <sub>p</sub> ) <sup>-1</sup>	50	75		KHz
<b>Transient Response</b>						
Rise Time	t <sub>r</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±200mV		30	60	nS
Overshoot	γ	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±200mV		25	40	%
Slew Rate	SR	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±5V	±4	±7		V/μS
Settling Time	t <sub>s</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±5V		1.5		S
<b>Power Supply</b>						
Supply Current	I <sub>s</sub>			3.0	3.7	mA
Power Supply Rejection Ratio	PSRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, ΔV <sub>s</sub> = ±5V	80	90		dB

## Absolute Maximum Ratings

Voltage Between V <sup>+</sup> and V <sup>-</sup> Terminals	45.0V	Operating Temperature Range	-55°C ≤ T <sub>A</sub> ≤ 125°C
Differential Input Voltage, V <sub>d</sub>	±12.0V	SP-2602	-55°C ≤ T <sub>A</sub> ≤ 125°C
Internal Power Dissipation, P <sub>d</sub>	300mW	Storage Temperature Range	-65°C ≤ T <sub>A</sub> ≤ 150°C
Peak Output Current	Full Short Circuit Protection		

**Electrical Characteristics:** V<sup>+</sup> = +15V, V<sup>-</sup> = -15V, T<sub>A</sub> = 25°C unless otherwise specified in "Conditions".

### SP-2602

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<u>Input Characteristics</u>						
Offset Voltage	V <sub>os</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		3	5	mV
Offset Voltage Drift	ΔV <sub>os</sub> /ΔT	-55°C ≤ T <sub>A</sub> ≤ 125°C; average		5	7	μV/°C
Bias Current	I <sub>b</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		15	25	nA
Offset Current	I <sub>os</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		5	25	nA
Input Impedance	Z <sub>in</sub>	Guaranteed by Design	40	300		MΩ
Common Mode Range	V <sub>cm</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C	±11.0			V
<u>Transfer Characteristics</u>						
Large Signal Voltage Gain	A <sub>vOL</sub>	R <sub>L</sub> = 2KΩ, V <sub>o</sub> = ±10V -55°C ≤ T <sub>A</sub> ≤ 125°C, R <sub>L</sub> = 2KΩ, V <sub>o</sub> = ±10V	80K 60K	150K		V/V V/V
Common Mode Rejection Ratio	CMRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, V <sub>cm</sub> = ±10V	74	100		dB
Unity Gain Bandwidth Product	GBW	V <sub>o</sub> < 90mV		12		MHz
<u>Output Characteristics</u>						
Output Voltage Swing	V <sub>o</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C, R <sub>L</sub> = 2KΩ	±10.0	±12.0		V
Output Current	I <sub>out</sub>	V <sub>o</sub> = ±10V	±10	±18		mA
Full Power Bandwidth	FPBW	V <sub>o</sub> = ±10V, FPBW = (SR) (2π V <sub>p</sub> ) <sup>-1</sup>	50	75		KHz
<u>Transient Response</u>						
Rise Time	t <sub>r</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±200mV		30	60	nS
Overshoot	γ	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±200mV		25	40	%
Slew Rate	SR	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±5V	±4	±7		V/μS
Settling Time	t <sub>s</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±5V		1.5		S
<u>Power Supply</u>						
Supply Current	I <sub>s</sub>			3.0	4.0	mA
Power Supply Rejection Ratio	PSRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, ΔV <sub>s</sub> = ±5V	74	90		dB

# SP-2600/02/05

Wideband, Precision Operational Amplifiers

## Absolute Maximum Ratings

Voltage Between V<sup>+</sup> and V<sup>-</sup> Terminals 45.0V  
 Differential Input Voltage, V<sub>d</sub> ±12.0V  
 Internal Power Dissipation, P<sub>d</sub> 300mW  
 Peak Output Current Full Short Circuit Protection

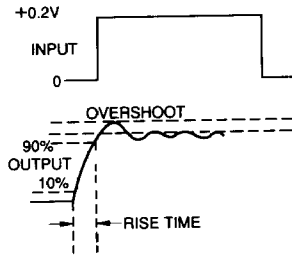
Operating Temperature Range  
 SP-2605 0 °C ≤ T<sub>A</sub> ≤ 75°C  
 Storage Temperature Range -65°C ≤ T<sub>A</sub> ≤ 150°C

**Electrical Characteristics:** V<sup>+</sup> = +15V, V<sup>-</sup> = -15V, T<sub>A</sub> = 25°C unless otherwise specified in "Conditions".

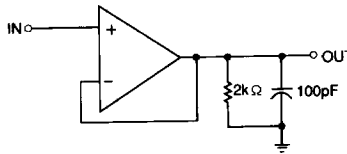
### SP-2605

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<u>Input Characteristics</u>						
Offset Voltage	V <sub>os</sub>	0°C ≤ T <sub>A</sub> ≤ 75°C		3	5	mV
Offset Voltage Drift	ΔV <sub>os</sub> /ΔT	0°C ≤ T <sub>A</sub> ≤ 75°C; average		5	7	μV/°C
Bias Current	I <sub>b</sub>	0°C ≤ T <sub>A</sub> ≤ 75°C		5	25	nA
Offset Current	I <sub>os</sub>	0°C ≤ T <sub>A</sub> ≤ 75°C		5	25	nA
Input Impedance	Z <sub>in</sub>	Guaranteed by Design	40	300		MΩ
Common Mode Range	V <sub>cm</sub>	0°C ≤ T <sub>A</sub> ≤ 75°C	±11.0			V
<u>Transfer Characteristics</u>						
Large Signal Voltage Gain	A <sub>vOL</sub>	R <sub>L</sub> = 2KΩ, V <sub>o</sub> = ±10V 0°C ≤ T <sub>A</sub> ≤ 75°C, R <sub>L</sub> = 2KΩ, V <sub>o</sub> = ±10V	80K	150K		V/V
Common Mode Rejection Ratio	CMRR	0°C ≤ T <sub>A</sub> ≤ 75°C, V <sub>cm</sub> = ±10V	74	100		dB
Unity Gain Bandwidth Product	GBW	V <sub>o</sub> < 90mV		12		MHz
<u>Output Characteristics</u>						
Output Voltage Swing	V <sub>o</sub>	0°C ≤ T <sub>A</sub> ≤ 75°C, R <sub>L</sub> = 2KΩ	±10.0	±12.0		V
Output Current	I <sub>OUT</sub>	V <sub>o</sub> = ±10V	±10	±18		mA
Full Power Bandwidth	FPBW	V <sub>o</sub> = ±10V, FPBW = (SR) (2π V <sub>p</sub> ) <sup>-1</sup>	50	75		KHz
<u>Transient Response</u>						
Rise Time	t <sub>r</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±200mV		30	60	nS
Overshoot	γ	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±200mV		25	40	%
Slew Rate	SR	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±5V	±4	±7		V/μS
Settling Time	t <sub>s</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 100pF, V <sub>o</sub> = ±5V		1.5		S
<u>Power Supply</u>						
Supply Current	I <sub>s</sub>			3.0	4.0	mA
Power Supply Rejection Ratio	PSRR	0°C ≤ T <sub>A</sub> ≤ 75°C, ΔV <sub>s</sub> = ±5V	74	90		dB

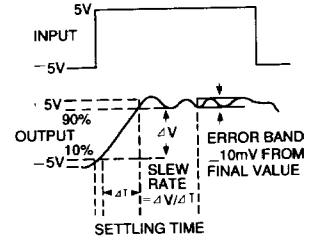
## A.C. Performance



Transient Response



A.C. Test Circuit



Slew Rate/Settling Time

## Ordering Information

When ordering the SP-2600/02/05, specify the package and screening according to the following :

<b>SP 2 - 2600 - 2</b>	
Prefix: _____	Generic Part # _____
SP (SIPEX)	
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.

