

## Features

- 120 V/ $\mu$ S Slew Rate
- 200 nS Settling Time to 0.1%
- 2.0 MHz Full Power Bandwidth
- 20 MHz Gain Bandwidth

## Applications

- Video Amplifiers
- Pulse Amplifiers
- Signal Generators
- High Speed Sample-and-Hold Amplifiers

## Description

The SP-2520/22/25 are high slew rate, wide bandwidth operational amplifiers which are stable at closed loop gains of 3 or greater without external compensation. These devices also exhibit fast settling times, high input impedance, and low input offset currents. These characteristics combine to make the SP-2520/22/25 prime candidates for high frequency analog processing applications.

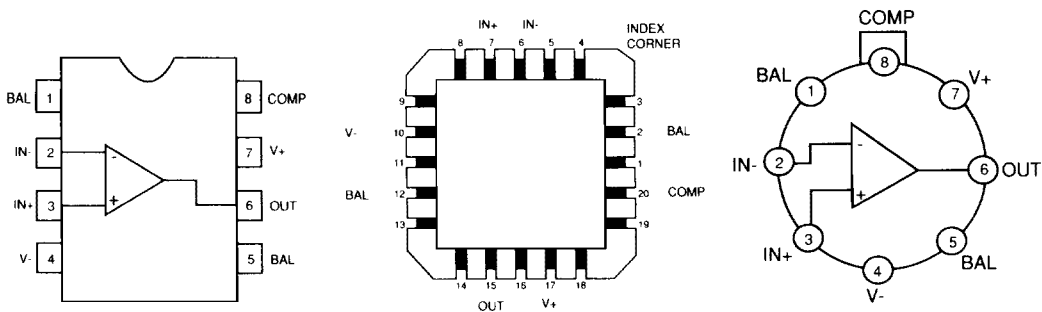
These amplifiers provide the designer with the ability to tailor its transfer characteristics through compensation. Offsets can be trimmed by connecting a nulling potentiometer between its balance pins, and connecting the wiper to the positive supply,  $V^+$ . A 200K $\Omega$  potentiometer is recommended.

The SP-2522 and SP-2525 are the relaxed specification military temperature range and the commercial temperature range of the SP-2520.

All versions are available in metal can, ceramic mini DIP packages, and in die form. The SP-2520 is also available in ceramic LCC packages.

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## Connection Diagrams



# SP-2520/22/25

Uncompensated, High Slew Rate Operational Amplifiers

## Absolute Maximum Ratings

Voltage Between V <sup>+</sup> and V <sup>-</sup> Terminals	40.0V	Operating Temperature Range	
Differential Input Voltage, V <sub>d</sub>	±15.0V	SP-2520	-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, I <sub>p</sub>	50mA		

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

### SP-2520

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		4	8 11	mV mV
Offset Voltage Drift	ΔV <sub>OS</sub> /ΔT	-55°C ≤ T <sub>A</sub> ≤ 125°C; average		20		μV/°C
Bias Current	I <sub>B</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		100	200 400	nA nA
Offset Current	I <sub>OS</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		10	25 50	nA nA
Input Impedance	Z <sub>i</sub>	Guaranteed by Design	50	100		MΩ
Common Mode Range	V <sub>cm</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C	±10.0			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	10K 7.5K	15K		V/V V/V
Common Mode Rejection Ratio	CMRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, V <sub>cm</sub> = ±10V	80	90		dB
Gain Bandwidth Product	GBW	A <sub>v</sub> > 10, Guaranteed by Design	10	20		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	±10	±20		mA
Full Power Bandwidth	FPBW	V <sub>O</sub> = ±10V, FPBW = (SR) (2π V <sub>p</sub> ) <sup>-1</sup>	1500	2000		KHz
<b>Transient Response</b>						
Rise Time	t <sub>r</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±200mV, A <sub>v</sub> = 3		25	50	nS
Overshoot	γ	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±200mV, A <sub>v</sub> = 3		25	40	%
Slew Rate	SR	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±5V, A <sub>v</sub> = 3	±100	120		V/S
Settling Time to 0.1%	t <sub>s</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±5V, A <sub>v</sub> = 3		0.20		μS
<b>Power Supply</b>						
Supply Current	I <sub>S</sub>			4	6	mA
Power Supply Rejection Ratio	PSRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, ΔV <sub>S</sub> = ±5V	80	90		dB

# SP-2520/22/25

Uncompensated, High Slew Rate Operational Amplifiers

## Absolute Maximum Ratings

Voltage Between V <sup>+</sup> and V <sup>-</sup> Terminals	40.0V	Operating Temperature Range	
Differential Input Voltage, V <sub>d</sub>	±15.0V	SP-2522	-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, I <sub>p</sub>	50mA		

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

### SP-2522

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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		5	10	mV
Offset Voltage Drift	ΔV <sub>OS</sub> /ΔT	-55°C ≤ T <sub>A</sub> ≤ 125°C; average		25	14	μV/°C
Bias Current	I <sub>b</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		125	250	nA
Offset Current	I <sub>OS</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		20	50	nA
Input Impedance	Z <sub>in</sub>	Guaranteed by Design	40	100	100	MΩ
Common Mode Range	V <sub>cm</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C	±10.0			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	7.5K	15K		V/V
Common Mode Rejection Ratio	CMRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, V <sub>cm</sub> = ±10V	5K	90		V/V
Gain Bandwidth Product	GBW	A <sub>v</sub> > 10, Guaranteed by Design	74	20		dB
<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	±10	±20		mA
Full Power Bandwidth	FPBW	V <sub>O</sub> = ±10V, FPBW = (SR) (2π V <sub>p</sub> ) <sup>-1</sup>	1200	1600		KHz
<b>Transient Response</b>						
Rise Time	t <sub>r</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±200mV, A <sub>v</sub> = 3		25	50	nS
Overshoot	γ	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±200mV, A <sub>v</sub> = 3		25	50	%
Slew Rate	SR	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±5V, A <sub>v</sub> = 3	±80	120		V/S
Settling Time to 0.1%	t <sub>s</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±5V, A <sub>v</sub> = 3		0.20		μS
<b>Power Supply</b>						
Supply Current	I <sub>s</sub>			4	6	mA
Power Supply Rejection Ratio	PSRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, ΔV <sub>s</sub> = ±5V	74	90		dB

# SP-2520/22/25

Uncompensated, High Slew Rate Operational Amplifiers

## Absolute Maximum Ratings

Voltage Between V <sup>+</sup> and V <sup>-</sup> Terminals	40.0V	Operating Temperature Range	
Differential Input Voltage, V <sub>d</sub>	±15.0V	SP-2525	0 °C ≤ T <sub>A</sub> ≤ 75°C
Internal Power Dissipation, P <sub>d</sub>	300mW	Storage Temperature Range	-65°C ≤ T <sub>A</sub> ≤ 150°C
Peak Output Current, I <sub>p</sub>	50mA		

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

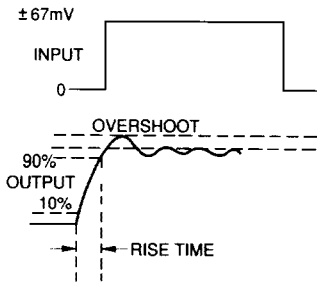
### SP-2525

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Input Chars.</b>						
Offset Voltage	V <sub>os</sub>	0 °C ≤ T <sub>A</sub> ≤ 75°C		5	10	mV
Offset Voltage Drift	ΔV <sub>os</sub> /ΔT	0 °C ≤ T <sub>A</sub> ≤ 75°C; average		30	14	μV/°C
Bias Current	I <sub>B</sub>	0 °C ≤ T <sub>A</sub> ≤ 75°C		125	250	nA
Offset Current	I <sub>os</sub>	0 °C ≤ T <sub>A</sub> ≤ 75°C		20	50	nA
Input Impedance	Z <sub>in</sub>	Guaranteed by Design	40	100	100	MΩ
Common Mode Range	V <sub>cm</sub>	0 °C ≤ T <sub>A</sub> ≤ 75°C	±10.0			V
<b>Transfer Characteristics</b>						
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	7.5K	15K		V/V
Common Mode Rejection Ratio	CMRR	0 °C ≤ T <sub>A</sub> ≤ 75°C, V <sub>cm</sub> = ±10V	5K	74	90	V/V
Gain Bandwidth Product	GBW	A <sub>v</sub> > 10, Guaranteed by Design	10	20		MHz
<b>Output Characteristics</b>						
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>oOUT</sub>	V <sub>o</sub> = ±10V	±10	±20		mA
Full Power Bandwidth	FPBW	V <sub>o</sub> = ±10V, FPBW = (SR) (2π V <sub>p</sub> ) <sup>-1</sup>	1200	1600		KHz
<b>Transient Response</b>						
Rise Time	t <sub>r</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>o</sub> = ±200mV, A <sub>v</sub> = 3		25	50	nS
Overshoot	γ	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>o</sub> = ±200mV, A <sub>v</sub> = 3		25	50	%
Slew Rate	SR	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>o</sub> = ±5V, A <sub>v</sub> = 3	±80	120		V/S
Settling Time to 0.1%	t <sub>s</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>o</sub> = ±5V, A <sub>v</sub> = 3		0.20		μS
<b>Power Supply</b>						
Supply Current	I <sub>s</sub>			4	6	mA
Power Supply Rejection Ratio	PSRR	0 °C ≤ T <sub>A</sub> ≤ 75°C, ΔV <sub>s</sub> = ±5V	74	90		dB

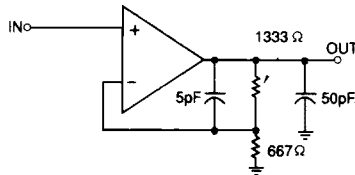
# SP-2520/22/25

Uncompensated High Slew Rate Operational Amplifiers

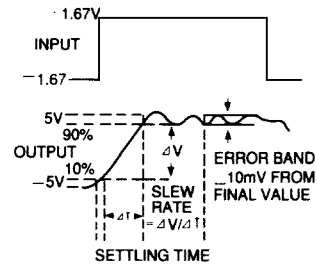
## A.C. Performance



Transient Response



A.C. Test Circuit



Slew Rate/Settling Time

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## Ordering Information

When ordering the SP-2520/22/25, specify the package and screening according to the following :

Prefix: _____	<b>SP 2 - 2520 - 2</b>	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	
7 - 8-Pin CERDIP	(Dice Only)	
0 - DICE	/883 : -55 °C to 125 °C	
	Full Mil Processing	

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.

