

## Features

- 65 V/ $\mu$ S Slew Rate
- 250 nS Settling Time to 0.1%
- 1 MHz Full Power Bandwidth
- 12 MHz Gain Bandwidth
- 100 M $\Omega$  Input Impedance
- Internally Compensated

## Applications

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

## Description

The SP-2510/12/15 operational amplifiers are optimally compensated for bandwidth, slew rate, and settling time. These characteristics make these devices the preferred candidates for high accuracy and high frequency analog signal processing applications.

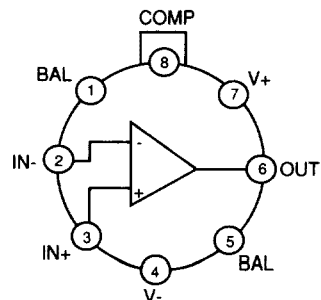
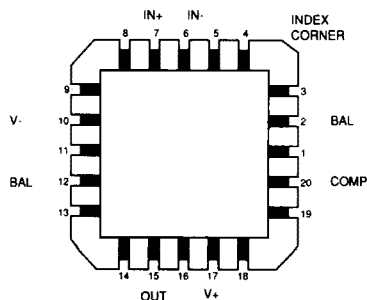
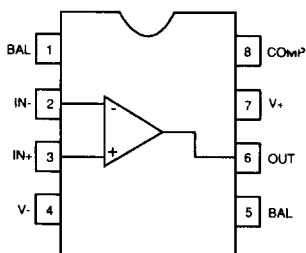
These devices are designed to allow additional compensation and offset trimming. A 100K $\Omega$  trim potentiometer is recommended for use between the balance pins (the wiper should be connected to V<sup>+</sup>).

The SP-2512 and SP-2515 are the relaxed specification military temperature range and the commercial temperature range of the SP-2510.

All versions are available in metal can, ceramic mini DIP packages, and in die form. The SP-2510 is also available in ceramic LCC packages.

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## Connection Diagrams



# SP-2510/12/15

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-2510	-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-2510

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	mV
Offset Voltage Drift	ΔV <sub>OS</sub> /ΔT	-55°C ≤ T <sub>A</sub> ≤ 125°C; average		20	11	μV/°C
Bias Current	I <sub>b</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		100	200	nA
Offset Current	I <sub>OS</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C		10	25	nA
Input Impedance	Z <sub>in</sub>	Guaranteed by Design	50	100		MΩ
Common Mode Range	V <sub>cm</sub>	-55°C ≤ T <sub>A</sub> ≤ 125°C	±10.0		50	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	15K		V/V
Common Mode Rejection Ratio	CMRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, V <sub>cm</sub> = ±10V	7.5K			V/V
Unity Gain Bandwidth Product	GBW	A <sub>v</sub> > 10		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	±10	±20		mA
Full Power Bandwidth	FPBW	V <sub>O</sub> = ±10V, FPBW = (SR) (2π V <sub>p</sub> ) <sup>-1</sup>	750	1000		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		25	50	nS
Overshoot	γ	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±200mV		25	40	%
Slew Rate	SR	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>O</sub> = ±5V	50	65		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		0.25		S
<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	80	90		dB

## 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-2512	-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-2512

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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		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
<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	7.5K	15K		V/V
Common Mode Rejection Ratio	CMRR	-55°C ≤ T <sub>A</sub> ≤ 125°C, V <sub>cm</sub> = ±10V	74	90		dB
Unity Gain Bandwidth Product	GBW	A <sub>v</sub> > 10		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	±20		mA
Full Power Bandwidth	FPBW	V <sub>o</sub> = ±10V, FPBW = (SR) (2π V <sub>p</sub> ) <sup>-1</sup>	600	1000		KHz
<u>Transient Response</u>						
Rise Time	t <sub>r</sub>	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>o</sub> = ±200mV		25	50	nS
Overshoot	γ	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>o</sub> = ±200mV		25	50	%
Slew Rate	SR	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>o</sub> = ±5V	40	60		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		0.25		S
<u>Power Supply</u>						
Supply Current	I <sub>s</sub>			4	6	mA
Power Supply Rejection Ratio	PSRR	-55°C ≤ T <sub>A</sub> ≤ 125°C	74	90		dB

# SP-2510/12/15

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-2515	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".

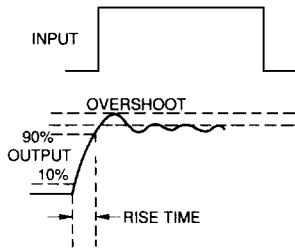
### SP-2515

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Input Characteristics</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	74	90		dB
Unity Gain Bandwidth Product	GBW	A <sub>v</sub> > 10		12		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>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>	600	1000		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		25	50	nS
Overshoot	γ	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>o</sub> = ±200mV		25	50	%
Slew Rate	SR	R <sub>L</sub> = 2KΩ, C <sub>L</sub> = 50pF, V <sub>o</sub> = ±5V	40	60		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		0.25		S
<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	74	90		dB

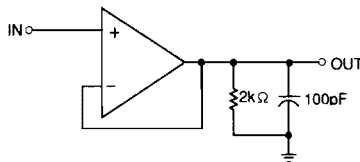
# SP-2510/12/15

High Slew Rate Operational Amplifiers

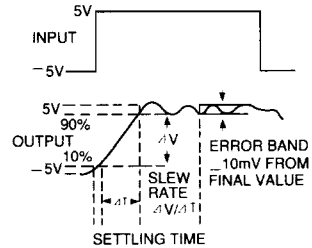
## A.C. Performance



Transient Response



A.C. Test Circuit



Slew Rate/Settling Time

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## Ordering Information

When ordering the SP-2510/12/15, specify the package and screening according to the following :

<b>SP 2 - 2510 - 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.

