



SIGNAL PROCESSING EXCELLENCE

SP-2510/12/15

High Slew Rate Operational Amplifiers

T-79-07-10

Features

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

Applications

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

Description

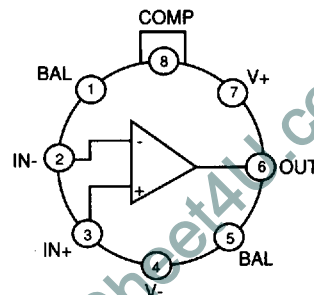
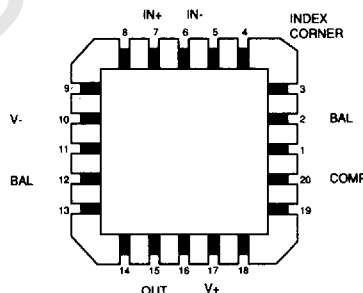
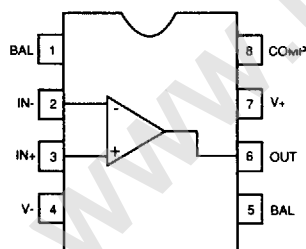
The SP-2510/12/15 operational amplifiers are optimally compensated for bandwidth, slew rate, and settling time. These characteristics make these devices the preferred candidates for high accuracy and high frequency analog signal processing applications.

These devices are designed to allow additional compensation and offset trimming. A 100K Ω trim potentiometer is recommended for use between the balance pins (the wiper should be connected to V $_{+}$).

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.

Connection Diagrams



SP-2510/12/15

High Slew Rate Operational Amplifiers

Absolute Maximum Ratings

Voltage Between V^+ and V^- Terminals

40.0V

Operating Temperature Range

Differential Input Voltage, V_d $\pm 15.0V$

SP-2510

 $-55^\circ C \leq T_A \leq 125^\circ C$ Internal Power Dissipation, P_d

300mW

Storage Temperature Range

 $-65^\circ C \leq T_A \leq 150^\circ C$ Peak Output Current, I_p

50mA

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

SP-2510

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Characteristics						
Offset Voltage	V_{OS}	$-55^\circ C \leq T_A \leq 125^\circ C$		4	8	mV
					11	mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$-55^\circ C \leq T_A \leq 125^\circ C$; average		20		$\mu V/^\circ C$
Bias Current	I_B	$-55^\circ C \leq T_A \leq 125^\circ C$		100	200	nA
					400	nA
Offset Current	I_{OS}	$-55^\circ C \leq T_A \leq 125^\circ C$		10	25	nA
					50	nA
Input Impedance	Z_{in}	Guaranteed by Design	50	100		M Ω
Common Mode Range	V_{cm}	$-55^\circ C \leq T_A \leq 125^\circ C$	± 10.0			V
Transfer Characteristics						
Large Signal Voltage Gain	A_{VOL}	$R_L = 2K\Omega$, $V_O = \pm 10V$ $-55^\circ C \leq T_A \leq 125^\circ C$, $R_L = 2K\Omega$, $V_O = \pm 10V$	10K 7.5K	15K		V/V V/V
Common Mode Rejection Ratio	CMRR	$-55^\circ C \leq T_A \leq 125^\circ C$, $V_{cm} = \pm 10V$	80	90		dB
Unity Gain Bandwidth Product	GBW	$A_v > 10$		12		MHz
Output Characteristics						
Output Voltage Swing	V_O	$-55^\circ C \leq T_A \leq 125^\circ C$, $R_L = 2K\Omega$	± 10.0	± 12.0		V
Output Current	I_{OUT}	$V_O = \pm 10V$	± 10	± 20		mA
Full Power Bandwidth	FPBW	$V_O = \pm 10V$, $FPBW = (SR) (2\pi V_p)^{-1}$	750	1000		KHz
Transient Response						
Rise Time	t_R	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm 200mV$		25	50	nS
Overshoot	γ	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm 200mV$		25	40	%
Slew Rate	SR	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm 5V$	50	65		V/S
Settling Time to 0.1%	t_s	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm 5V$		0.25		S
Power Supply						
Supply Current	I_S			4	6	mA
Power Supply Rejection Ratio	PSRR	$-55^\circ C \leq T_A \leq 125^\circ C$	80	90		dB

SP-2510/12/15

High Slew Rate Operational Amplifiers

Absolute Maximum Ratings

Voltage Between V^+ and V^- Terminals	40.0V	Operating Temperature Range	
Differential Input Voltage, V_d	$\pm 15.0V$	SP-2512	$-55^\circ C \leq T_A \leq 125^\circ C$
Internal Power Dissipation, P_d	300mW	Storage Temperature Range	$-65^\circ C \leq T_A \leq 150^\circ C$
Peak Output Current, I_p	50mA		

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

SP-2512

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<u>Input Characteristics</u>						
Offset Voltage	V_{os}	$-55^\circ C \leq T_A \leq 125^\circ C$		5	10	mV
Offset Voltage Drift	$\Delta V_{os}/\Delta T$	$-55^\circ C \leq T_A \leq 125^\circ C$; average		25	14	$\mu V/^\circ C$
Bias Current	I_b	$-55^\circ C \leq T_A \leq 125^\circ C$		125	250	nA
Offset Current	I_{os}	$-55^\circ C \leq T_A \leq 125^\circ C$		20	50	nA
Input Impedance	Z_{in}	Guaranteed by Design	40	100	100	M Ω
Common Mode Range	V_{cm}	$-55^\circ C \leq T_A \leq 125^\circ C$	± 10.0			V
<u>Transfer Characteristics</u>						
Large Signal Voltage Gain	$A_{v_{ol}}$	$R_L = 2K\Omega$, $V_o = \pm 10V$ $-55^\circ C \leq T_A \leq 125^\circ C$, $R_L = 2K\Omega$, $V_o = \pm 10V$	7.5K 5K	15K		V/V V/V
Common Mode Rejection Ratio	CMRR	$-55^\circ C \leq T_A \leq 125^\circ C$, $V_{cm} = \pm 10V$	74	90		dB
Unity Gain Bandwidth Product	GBW	$A_v > 10$		12		MHz
<u>Output Characteristics</u>						
Output Voltage Swing	V_o	$-55^\circ C \leq T_A \leq 125^\circ C$, $R_L = 2K\Omega$	± 10.0	± 12.0		V
Output Current	I_{out}	$V_o = \pm 10V$	± 10	± 20		mA
Full Power Bandwidth	FPBW	$V_o = \pm 10V$, $FPBW = (SR) (2\pi V_o)^{-1}$	600	1000		KHz
<u>Transient Response</u>						
Rise Time	t_r	$R_L = 2K\Omega$, $C_L = 50pF$, $V_o = \pm 200mV$		25	50	nS
Overshoot	γ	$R_L = 2K\Omega$, $C_L = 50pF$, $V_o = \pm 200mV$		25	50	%
Slew Rate	SR	$R_L = 2K\Omega$, $C_L = 50pF$, $V_o = \pm 5V$	40	60		V/S
Settling Time to 0.1%	t_s	$R_L = 2K\Omega$, $C_L = 50pF$, $V_o = \pm 5V$		0.25		S
<u>Power Supply</u>						
Supply Current	I_s			4	6	mA
Power Supply Rejection Ratio	PSRR	$-55^\circ C \leq T_A \leq 125^\circ C$	74	90		dB

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SP-2510/12/15

High Slew Rate Operational Amplifiers

Absolute Maximum Ratings

Voltage Between V^+ and V^- Terminals

40.0V

Operating Temperature Range

Differential Input Voltage, V_d $\pm 15.0V$

SP-2515

 $0^\circ C \leq T_A \leq 75^\circ C$ Internal Power Dissipation, P_d

300mW

Storage Temperature Range

 $-65^\circ C \leq T_A \leq 150^\circ C$ Peak Output Current, I_p

50mA

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

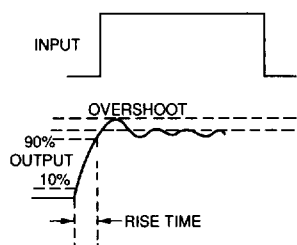
SP-2515

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<u>Input Characteristics</u>						
Offset Voltage	V_{os}	$0^\circ C \leq T_A \leq 75^\circ C$		5	10	mV
Offset Voltage Drift	$\Delta V_{os}/\Delta T$	$0^\circ C \leq T_A \leq 75^\circ C$; average		30	14	$\mu V/^\circ C$
Bias Current	I_b	$0^\circ C \leq T_A \leq 75^\circ C$		125	250	nA
Offset Current	I_{os}	$0^\circ C \leq T_A \leq 75^\circ C$		20	50	nA
Input Impedance	Z_{in}	Guaranteed by Design	40	100	100	M Ω
Common Mode Range	V_{cm}	$0^\circ C \leq T_A \leq 75^\circ C$	± 10.0			V
<u>Transfer Characteristics</u>						
Large Signal Voltage Gain	$A_{v_{OL}}$	$R_L = 2K\Omega$, $V_o = \pm 10V$ $0^\circ C \leq T_A \leq 75^\circ C$, $R_L = 2K\Omega$, $V_o = \pm 10V$	7.5K 5K	15K		V/V V/V
Common Mode Rejection Ratio	CMRR	$0^\circ C \leq T_A \leq 75^\circ C$, $V_{cm} = \pm 10V$	74	90		dB
Unity Gain Bandwidth Product	GBW	$A_v > 10$		12		MHz
<u>Output Characteristics</u>						
Output Voltage Swing	V_o	$0^\circ C \leq T_A \leq 75^\circ C$, $R_L = 2K\Omega$	± 10.0	± 12.0		V
Output Current	I_{out}	$V_o = \pm 10V$	± 10	± 20		mA
Full Power Bandwidth	FPBW	$V_o = \pm 10V$, $FPBW = (SR) (2\pi V_o)^{-1}$	600	1000		KHz
<u>Transient Response</u>						
Rise Time	t_r	$R_L = 2K\Omega$, $C_L = 50pF$, $V_o = \pm 200mV$		25	50	nS
Overshoot	γ	$R_L = 2K\Omega$, $C_L = 50pF$, $V_o = \pm 200mV$		25	50	%
Slew Rate	SR	$R_L = 2K\Omega$, $C_L = 50pF$, $V_o = \pm 5V$	40	60		V/S
Settling Time to 0.1%	t_s	$R_L = 2K\Omega$, $C_L = 50pF$, $V_o = \pm 5V$		0.25		S
<u>Power Supply</u>						
Supply Current	I_s			4	6	mA
Power Supply Rejection Ratio	PSRR	$0^\circ C \leq T_A \leq 75^\circ C$	74	90		dB

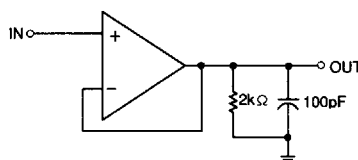
SP-2510/12/15

High Slew Rate Operational Amplifiers

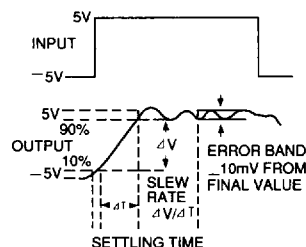
A.C. Performance



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 :

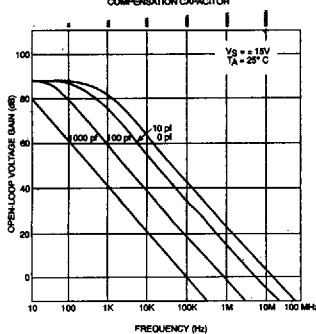
SP 2 - 2510 - 2	
Prefix: _____	Generic Part # _____
SP (SIPEX)	
PACKAGE : _____	SCREENING _____
1 - 14 pin ceramic DIP	-2 : -55 °C to 125 °C
2 - Metal Can	-4 : -25 °C to 85 °C
3 - 8 Pin Plastic DIP	-5 : 0 °C to 75 °C
4 - 20 Pin LCC	-6 : 25 °C 100% D.C. Probe (Dice Only)
7 - 8-Pin Cerdip	/883 : -55 °C 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.

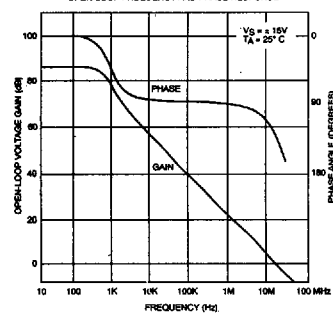
2. Consult factory for special package or screening requirements.

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

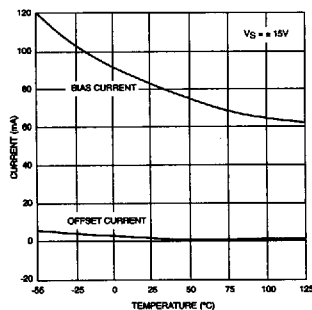
4. Consult factory for package mechanical dimensions.

OPEN-LOOP FREQUENCY RESPONSE vs.
COMPENSATION CAPACITOR

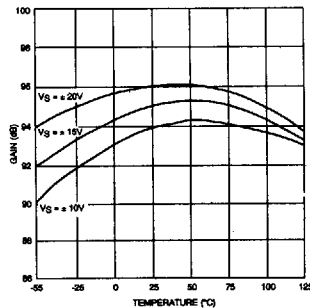
OPEN-LOOP FREQUENCY AND PHASE RESPONSE



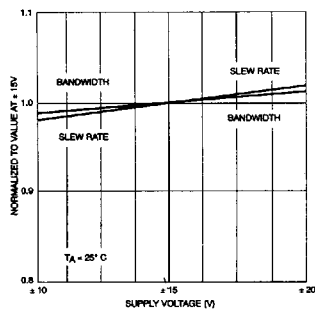
INPUT BIAS AND OFFSET CURRENT vs. TEMPERATURE



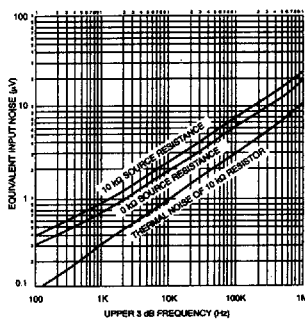
OPEN-LOOP VOLTAGE GAIN vs. TEMPERATURE



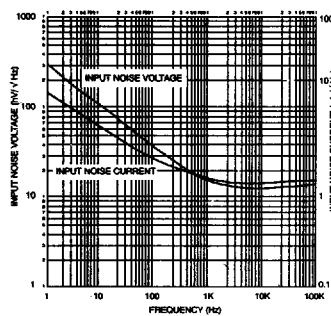
NORMALIZED AC PARAMETERS vs. SUPPLY VOLTAGE



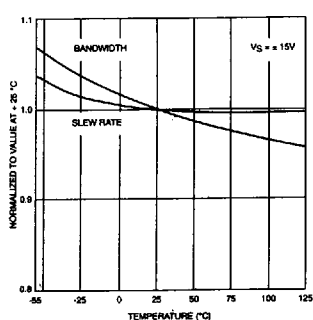
BROADBAND NOISE CHARACTERISTICS



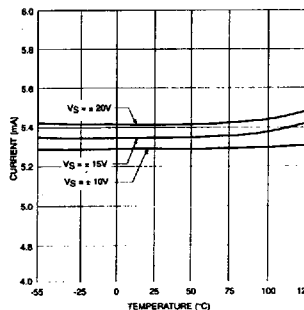
INPUT NOISE DENSITY vs. FREQUENCY



NORMALIZED AC PARAMETERS vs. TEMPERATURE



POWER SUPPLY CURRENT vs. TEMPERATURE



OUTPUT VOLTAGE SWING vs. FREQUENCY

