Sipex Corporation
SIGNAL PROCESSING EXCELLENCE

SP-2500/02/05

Precision, High Slew Rate Operational Amplifiers

T-79.07-10

Features

- 30 V/µS Slew Rate
- 10 nA Offset Current
- 330 nS Settling Time To 0.1%
- 500 KHz Full Power Bandwidth
- 12 MHz Typical Gain Bandwidth
- 20 MΩ Minimum Input Impedance
- Internally Compensated

Applications

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

Description

The SP-2500/02/05 operational amplifiers are fast settling, low offset voltage and current,and high slew rate operational amplifiers Their wide bandwidth and high input impedance combined with internal compensation make them excellant choices in high frequency signal conditioning applications.

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

The SP-2502 and SP-2505 are the relaxed specification military temperature range and the commercial temperature range of the SP-2500.

All versions are available in metal can and ceramic mini DIP packages as well as in die form. LCC packaged versions are also available.

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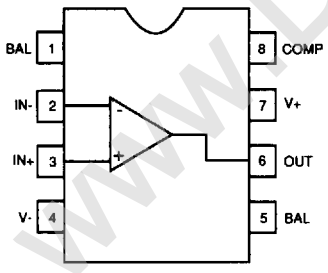
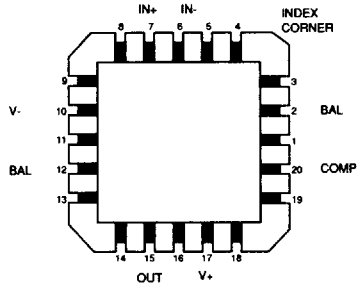
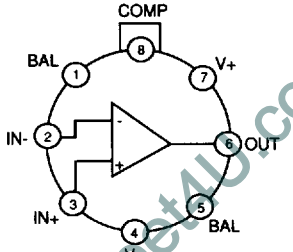
Connection Diagrams







SP-2500/02/05

Precision, High Slew Rate Operational Amplifiers

Absolute Maximum Ratings

Voltage Between V^+ and V^- Terminals	40.0V	Operating Temperature Range	
Differential Input Voltage, V_d	±15.0V	SP-2500	$-55^oC \le T_A \le 125^oC$
Internal Power Dissipation , P_d	300mV	Storage Temperature Range	$-65^oC \le T_A \le 150^oC$
Peak Output Current , I_p	50mA		

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

SP-2500

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Characteristics						
Offset Voltage	V_{OS}			2	5	mV
		$-55^oC \le T_A \le 125^oC$			8	mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$-55^oC \le T_A \le 125^oC$; average		20		µV/°C
Bias Current	I_B			100	200	nA
		$-55^oC \le T_A \le 125^oC$			400	nA
Offset Current	I_{OS}			10	25	nA
		$-55^oC \le T_A \le 125^oC$			50	nA
Input Impedance	Z_{in}	Guaranteed by Design	25	50		MΩ
Common Mode Range	V_{cm}	$-55^oC \le T_A \le 125^oC$	±10.0			V
Transfer Characteristics						
Large Signal Voltage Gain	Av_{OL}	$R_L = 2K\Omega$, $V_O = \pm10V$	20K	30K		V/V
		$-55^oC \le T_A \le 125^oC$, $R_L = 2K\Omega$, $V_O = \pm10V$	15K			V/V
Common Mode Rejection Ratio	CMRR	$-55^oC \le T_A \le 125^oC$, $V_{cm} = \pm10V$	80	90		dB
Unity Gain Bandwidth Product	GBW	$A_V > 10$		12		MHz
Output Characteristics						
Output Voltage Swing	V_O	$-55^oC \le T_A \le 125^oC$, $R_L = 2K\Omega$	±10.0	±12.0		V
Output Current	I_{OUT}	$V_O = \pm10V$	±10	±20		mA
Full Power Bandwidth	FPBW	$V_O = \pm10V$, FPBW= (SR) $(2\pi V_p)^{-1}$	350	500		KHz
Transient Response						
Rise Time	t_R	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm200mV$		25	50	nS
Overshoot	γ	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm200mV$		25	40	%
Slew Rate	SR	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm5V$	25	30		V/ S
Settling Time to 0.1%	t_S	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm5V$		0.33		S
Power Supply						
Supply Current	I_S			4	6	mA
Power Supply Rejection Ratio	PSRR	$-55^oC \le T_A \le 125^oC$, $\Delta V_s = \pm5V$	80	90		dB

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Precision, High Slew Rate Operational Amplifiers

Absolute Maximum Ratings

Voltage Between V^+ and V^- Terminals	40.0V	Operating Temperature Range	
Differential Input Voltage, V_d	±15.0V	SP-2502	$-55^oC \le T_A \le 125^oC$
Internal Power Dissipation , P_d	300mV	Storage Temperature Range	$-65^oC \le T_A \le 150^oC$
Peak Output Current , I_p	50mA		

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

SP-2502

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Characteristics						
Offset Voltage	V_{OS}			4	8	mV
		$-55°C \le T_A \le 125°C$			10	mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$-55°C \le T_A \le 125°C$; average		20		µV/°C
Bias Current	I_B			125	250	nA
		$-55°C \le T_A \le 125°C$			500	nA
Offset Current	I_{OS}			20	50	nA
		$-55°C \le T_A \le 125°C$			100	nA
Input Impedance	Z_{in}	Guaranteed by Design	25	50		MΩ
Common Mode Range	V_{cm}	$-55°C \le T_A \le 125°C$	±10.0			V
Transfer Characteristics						
Large Signal Voltage Gain	Av_{OL}	$R_L = 2K\Omega$, $V_O = ±10V$	15K	25K		V/V
		$-55°C \le T_A \le 125°C$, $R_L = 2K\Omega$, $V_O = ±10V$	10K			V/V
Common Mode Rejection Ratio	CMRR	$-55°C \le T_A \le 125°C$, $V_{cm} = ±10V$	74	90		dB
Unity Gain Bandwidth Product	GBW	$A_V > 10$		12		MHz
Output Characteristics						
Output Voltage Swing	V_O	$-55°C \le T_A \le 125°C$, $R_L = 2K\Omega$	±10.0	±12.0		V
Output Current	I_{OUT}	$V_O = ±10V$	±10	±20		mA
Full Power Bandwidth	FPBW	$V_O = ±10V$, FPBW= (SR) ($2\pi V_p)^{-1}$	300	500		KHz
Transient Response						
Rise Time	t_R	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = ±200mV$		25	50	nS
Overshoot	γ	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = ±200mV$		25	50	%
Slew Rate	SR	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = ±5V$	20	30		V/S
Settling Time to 0.1%	t_S	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = ±5V$		0.33		S
Power Supply						
Supply Current	I_S			4	6	mA
Power Supply Rejection Ratio	PSRR	$-55°C \le T_A \le 125°C$, $\Delta V_s = ±5V$	74	90		dB

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Absolute Maximum Ratings

Voltage Between V^+ and V^- Terminals	40.0V	Operating Temperature Range	
Differential Input Voltage, V_d	±15.0V	SP-2505	$0\,^{\circ}C \le T_A \le 75^{\circ}C$
Internal Power Dissipation , P_d	300mV	Storage Temperature Range	$-65^{\circ}C \le T_A \le 150^{\circ}C$
Peak Output Current , I_p	50mA		

Electrical Characteristics:

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

SP-2505

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Characteristics						
Offset Voltage	V_{OS}			4	8	mV
		$0\,^{\circ}C \le T_A \le 75^{\circ}C$			10	mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$0\,^{\circ}C \le T_A \le 75^{\circ}C$; average		20		µV/°C
Bias Current	I_B			125	250	nA
		$0\,^{\circ}C \le T_A \le 75^{\circ}C$			500	nA
Offset Current	I_{OS}			20	50	nA
		$0\,^{\circ}C \le T_A \le 75^{\circ}C$			100	nA
Input Impedance	Z_{in}	Guaranteed by Design	25	50		MΩ
Common Mode Range	V_{cm}	$0\,^{\circ}C \le T_A \le 75^{\circ}C$	±10.0			V
Transfer Characteristics						
Large Signal Voltage Gain	Av_{OL}	$R_L = 2K\Omega$, $V_O = \pm 10V$	15K	25K		V/V
		$0\,^{\circ}C \le T_A \le 75^{\circ}C$, $R_L = 2K\Omega$, $V_O = \pm 10V$	10K			V/V
Common Mode Rejection Ratio	CMRR	$0\,^{\circ}C \le T_A \le 75^{\circ}C$, $V_{cm} = \pm 10V$	74	90		dB
Unity Gain Bandwidth Product	GBW	$A_V > 10$		12		MHz
Output Characteristics						
Output Voltage Swing	V_O	$0\,^{\circ}C \le T_A \le 75^{\circ}C$, $R_L = 2K\Omega$	±10.0	±12.0		V
Output Current	I_{OUT}	$V_O = \pm 10V$	±10	±20		mA
Full Power Bandwidth	FPBW	$V_O = \pm 10V$, $FPBW = (SR)\,(2\pi V_p)^{-1}$	300	500		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	50	%
Slew Rate	SR	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm 5V$	20	30		V/ S
Settling Time to 0.1%	t_S	$R_L = 2K\Omega$, $C_L = 50pF$, $V_O = \pm 5V$		0.33		S
Power Supply						
Supply Current	I_S			4	6	mA
Power Supply Rejection Ratio	PSRR	$0\,^{\circ}C \le T_A \le 75^{\circ}C$, $\Delta V_s = \pm 5V$	74	90		dB

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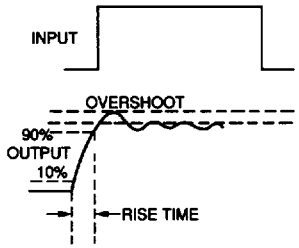
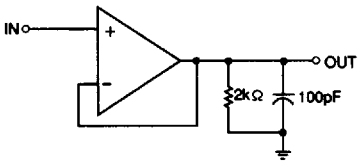
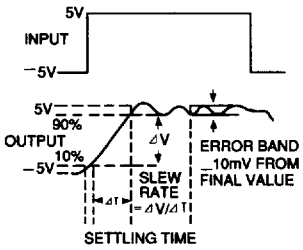
A.C. Performance



Transient Response



A.C. Test Circuit



Slew Rate/Settling Time

Ordering Information

When ordering the SP-2500/02/05, specify the package and screening according to the following :

SP 2 - 2500 - 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	
0 - DICE	/883 : -55 °C to 125 °C Full Mil Processing

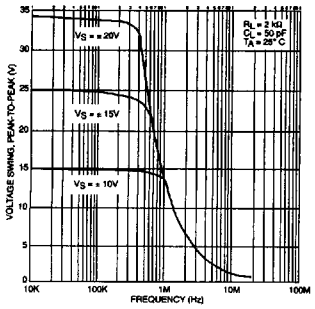
NOTES:1. Not all package types and screening option combinations are available. Consult local sales office or factory for availability information.

2. Consult factory for special package or screening requirements.

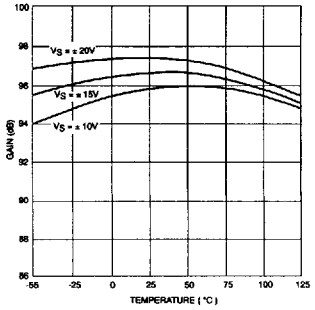
3. Consult factory for 883 revision C compliant data sheet.

4. Consult factory for package mechanical dimensions.

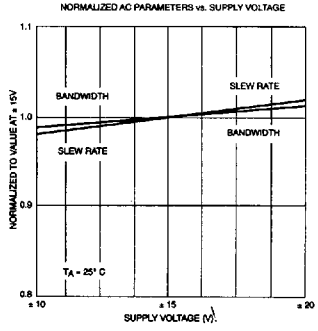
OUTPUT VOLTAGE SWING vs. FREQUENCY



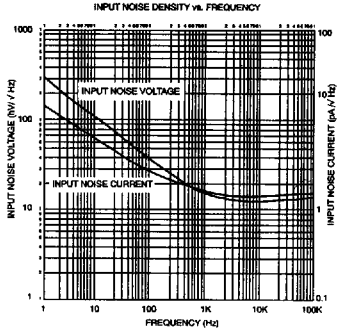
OPEN-LOOP VOLTAGE GAIN vs. TEMPERATURE



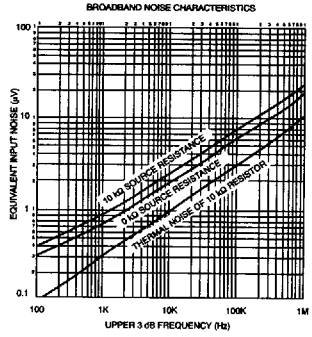
NORMALIZED AC PARAMETERS vs. SUPPLY VOLTAGE



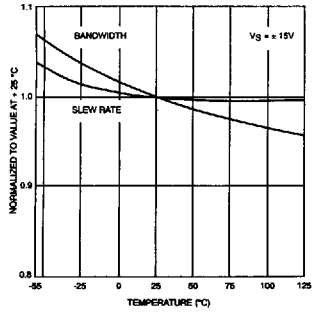
INPUT NOISE DENSITY vs. FREQUENCY



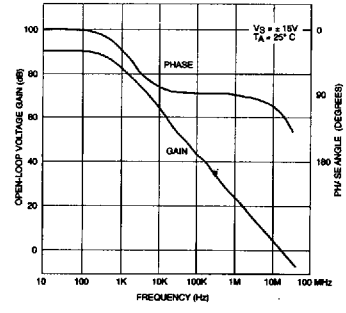
BROADBAND NOISE CHARACTERISTICS



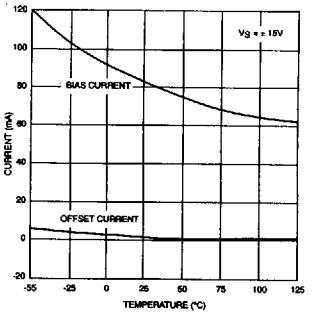
NORMALIZED AC PARAMETERS vs. TEMPERATURE



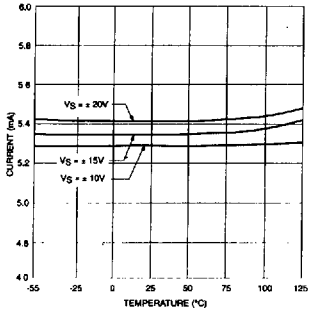
OPEN-LOOP FREQUENCY AND PHASE RESPONSE



INPUT BIAS AND OFFSET CURRENT vs. TEMPERATURE



POWER SUPPLY CURRENT vs. TEMPERATURE



OPEN-LOOP FREQUENCY RESPONSE vs. COMPENSATION CAPACITOR