

## AD8013

### FEATURES

**Three Video Amplifiers in One Package**

**Drives Large Capacitive Load**

**Excellent Video Specifications ( $R_L = 150 \Omega$ )**

**Gain Flatness 0.1 dB to 60 MHz**

**0.02% Differential Gain Error**

**0.06° Differential Phase Error**

**Low Power**

**Operates on Single +5 V to +13 V Power Supplies**

**4 mA/Amplifier Max Power Supply Current**

**High Speed**

**140 MHz Unity Gain Bandwidth (3 dB)**

**Fast Settling Time of 18 ns (0.1%)**

**1000 V/ $\mu$ s Slew Rate**

**High Speed Disable Function per Channel**

**Turn-Off Time 30 ns**

**Easy to Use**

**95 mA Short Circuit Current**

**Output Swing to Within 1 V of Rails**

### APPLICATIONS

**LCD Displays**

**Video Line Driver**

**Broadcast and Professional Video**

**Computer Video Plug-In Boards**

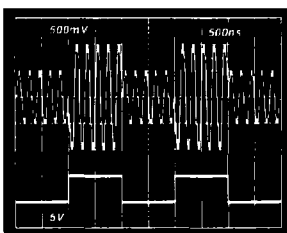
**Consumer Video**

**RGB Amplifier in Component Systems**

### PRODUCT DESCRIPTION

The AD8013 is a low power, single supply, triple video amplifier. Each of the three amplifiers has 30 mA of output current, and is optimized for driving one back terminated video load (150  $\Omega$ ) each. Each amplifier is a current feedback amplifier and features gain flatness of 0.1 dB to 60 MHz while offering differential gain and phase error of 0.02% and 0.06°. This makes the AD8013 ideal for broadcast and professional video electronics.

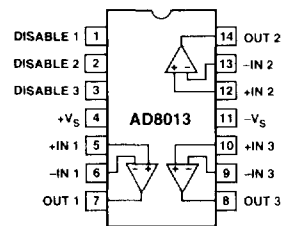
The AD8013 offers low power of 4 mA per amplifier max and runs on a single +5 V to +13 V power supply. The outputs of each amplifier swing to within one volt of either supply rail to easily accommodate video signals. The AD8013 is unique among current feedback op amps by virtue of its large capacitive load drive. Each op amp is capable of driving large capacitive



Channel Switching Characteristics for a 3:1 Mux

### PIN CONFIGURATION

14-Pin DIP & SOIC Package



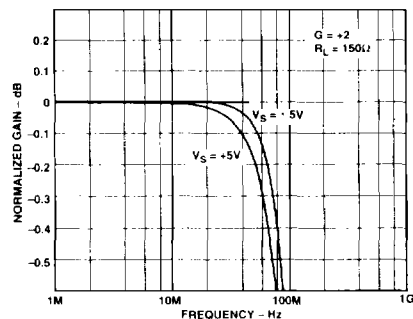
### ORDERING GUIDE

Model	Temperature Range	Package Description	Package Options*
AD8013AN	-40°C to +85°C	14-Pin Plastic DIP	N-14
AD8013AR-14	-40°C to +85°C	14-Pin Plastic SOIC	R-14
AD8013AR-14-REEL	-40°C to +85°C	14-Pin Plastic SOIC	R-14
AD8013AR-14-REEL7	-40°C to +85°C	14-Pin Plastic SOIC	R-14
AD8013ACHIPS	-40°C to +85°C	Die Form	

\*For outline information see Package Information section.

loads while still achieving rapid settling time. For instance it can settle in 18 ns driving a resistive load, and achieves 40 ns (0.1%) settling while driving 200 pF.

The outstanding bandwidth of 140 MHz along with 1000 V/ $\mu$ s of slew rate make the AD8013 useful in many general purpose high speed applications where a single +5 V or dual power supplies up to  $\pm 6.5$  V are required. Furthermore the AD8013's high speed disable function can be used to power down the amplifier or to put the output in a high impedance state. This can then be used in video multiplexing applications. The AD8013 is available in the industrial temperature range of -40°C to +85°C.



Fine-Scale Gain Flatness vs. Frequency,  $G = +2$ ,  $R_L = 150 \Omega$

To obtain the most recent version or complete data sheet, call our fax retrieval system at 1-800-446-6212 or visit our World Wide Web site at <http://www.analog.com>.

# AD8013—SPECIFICATIONS (@ $T_A = +25^\circ\text{C}$ , $R_{LOAD} = 150\ \Omega$ , unless otherwise noted)

Model	Conditions	$V_S$	AD8013A			Units
			Min	Typ	Max	
<b>DYNAMIC PERFORMANCE</b>						
Bandwidth (3 dB)	No Peaking, $G = +2$	+5 V	100	125		MHz
Bandwidth (0.1 dB)	No Peaking, $G = +2$	+5 V	110	140		MHz
	No Peaking, $G = +2$	+5 V		50		MHz
Slew Rate	No Peaking, $G = +2$	$\pm 5\ \text{V}$		60		MHz
	2 V Step	+5 V		400		V/ $\mu\text{s}$
Settling Time to 0.1%	6 V Step	+5 V	600	1000		V/ $\mu\text{s}$
	0 V to +2 V	$\pm 5\ \text{V}$		18		ns
	4.5 V Step, $C_{LOAD} = 200\ \text{pF}$ $R_{LOAD} > 1\ \text{k}\Omega$ , $R_{FB} = 1\ \text{k}\Omega$	$\pm 5\ \text{V}$		40		ns
<b>NOISE/HARMONIC PERFORMANCE</b>						
Total Harmonic Distortion	$f_c = 5\ \text{MHz}$ , $R_L = 1\ \text{k}\Omega$	+5 V		76		dBc
Input Voltage Noise	$f_c = 5\ \text{MHz}$ , $R_L = 150\ \Omega$	$\pm 5\ \text{V}$		66		dBc
	$f = 10\ \text{kHz}$	+5 V, $\pm 5\ \text{V}$		3.5		nV/ $\sqrt{\text{Hz}}$
Input Current Noise	$f = 10\ \text{kHz}$ ( $I_{NS}$ )	+5 V, $\pm 5\ \text{V}$		12		pA/ $\sqrt{\text{Hz}}$
Differential Gain ( $R_L = 150\ \Omega$ )	$f = 3.58\ \text{MHz}$ , $G = +2$	+5 V		0.05		%
		$\pm 5\ \text{V}$		0.02	0.05	%
Differential Phase ( $R_L = 150\ \Omega$ )	$f = 3.58\ \text{MHz}$ , $G = +2$	+5 V, $\pm 5\ \text{V}$		0.06		Degrees
<b>DC PERFORMANCE</b>						
Input Offset Voltage	$T_{MIN}$ to $T_{MAX}$	+5 V, +5 V		2	5	mV
Offset Drift				7		$\mu\text{V}/^\circ\text{C}$
Input Bias Current (-)		+5 V, +5 V		2	10	$\mu\text{A}$
Input Bias Current (+)	$T_{MIN}$ to $T_{MAX}$	+5 V, $\pm 5\ \text{V}$		3	15	$\mu\text{A}$
Open-Loop Transresistance		+5 V	650	800		k $\Omega$
		+5 V	800 k	1.1 M		$\Omega$
<b>INPUT CHARACTERISTICS</b>						
Input Resistance	+Input	+5 V		200		k $\Omega$
	Input	$\pm 5\ \text{V}$		150		$\Omega$
Input Capacitance		+5 V		2		pF
Input Common-Mode Voltage Range		+5 V		3.8		$\pm\ \text{V}$
Common-Mode Rejection Ratio		+5 V	1.2		3.8	+V
Input Offset Voltage		+5 V, $\pm 5\ \text{V}$	52	56		dB
Input Current		+5 V, $\pm 5\ \text{V}$		0.2	0.4	$\mu\text{A}/\text{V}$
+Input Current		+5 V, +5 V		5	7	$\mu\text{A}/\text{V}$
<b>OUTPUT CHARACTERISTICS</b>						
Output Voltage Swing	$V_{OH} - V_{EH}$ , $V_{CC} - V_{OH}$ $V_{OL} - V_{EL}$ , $V_{CC} - V_{OL}$			0.8	1.0	V
$R_L = 1\ \text{k}\Omega$				1.1	1.3	V
Output Current		+5 V, $\pm 5\ \text{V}$		30		mA
Short-Circuit Current		$\pm 5\ \text{V}$		95		mA
Capacitive Load Drive		+5 V		1000		pF
<b>MATCHING CHARACTERISTICS</b>						
Dynamic						
Crosstalk	$G = +2$ , $f = 5\ \text{MHz}$	+5 V, +5 V		70		dB
Gain Flatness Match	$f = 20\ \text{MHz}$	$\pm 5\ \text{V}$		0.1		dB
<b>POWER SUPPLY</b>						
Operating Range	Single Supply		+4.2		+13	V
	Dual Supply		+2.1		+6.5	V
Quiescent Current/Amplifier		+5 V		3.0	3.5	mA
		+5 V		3.4	4.0	mA
		+6.5 V		3.5		mA
Quiescent Current/Amplifier	Power Down	+5 V		0.25	0.35	mA
		$\pm 5\ \text{V}$		0.3	0.4	mA
Power Supply Rejection Ratio						
Input Offset Voltage	$V_S = +2.5\ \text{V}$ to $+5\ \text{V}$		70	76		dB
Input Current		+5 V, +5 V		0.03	0.2	$\mu\text{A}/\text{V}$
+Input Current		+5 V, $\pm 5\ \text{V}$		0.07	1.0	$\mu\text{A}/\text{V}$
<b>DISABLE CHARACTERISTICS</b>						
Off Isolation	$f = 6\ \text{MHz}$	+5 V, +5 V		-70		dB
Off Output Impedance	$G = +1$	+5 V, +5 V		12		pF
Turn-On Time				50		ns
Turn-Off Time				30		ns
Switching Threshold		$V_S + xV$	1.3	1.6	1.9	V

Specifications subject to change without notice.