

# Low Cost, 300MHz Rail-to Rail Amplifiers

CONNECTION DIAGRAMS

**Preliminary Technical Data** 

# AD8061/62/63

#### FEATURES (TOP VIEW) Low Cost Single (AD8061) SOIC-8 (R) SOT-23-6(RT) Dual (AD8062) AD8061/3 DISABLE AD8061 Single with Disable (AD8063) NC 1 8 (AD8063 Only) 1 6 + Vs Rail-to-rail Output swing +Vs -IN 7 5 DISABLE (AD8063 Only) **High Speed** $V_{\rm S}$ 2 V OUT +IN 6 300MHz, -3 dB Bandwidth (G = +1) -IN 5 NC -V<sub>S</sub> 4 800V/µs Slew Rate Operates on 2.7V to 8V Supplies Excellent Video Specs ( $R_L = 150\Omega$ , G = +2) Gain Flatness 0.1 dB to 30MHz SOIC-8 (R) and<sup>µ</sup>SOIC (RM) 0.01% Differential Gain Error AD8062 0.03° Differential Phase Error V<sub>OUT1</sub> 1 8 +Vs Low Power 6.8mA/Amplifier Typ Supply Current 7 V<sub>OUT2</sub> AD8063 400µA when disabled – IN 2 6 Small Packaging +IN 2 AD8061 Available in SOIC-8 and SOT23-5 AD8062 Available in SOIC-8 and µSOIC AD8063 Available in SOIC-8 and SOT23-6

APPLICATIONS Imaging Photodiode Pre-amp Professional Cameras Hand Sets Base Stations DVD / CD Filters A-to-D Driver

### **PRODUCT DESCRIPTION**

The AD8061, AD8062, and AD8063 are rail-to-rail out voltage feedback amplifiers offering ease of use and low cost. They have bandwidth and slew rate typically found in current feedback amplifiers. All have a wide input voltage range and output voltage swing making them easy to use on single supplies as low as 2.7V.

Despite being low cost, the AD8061, AD8062, and AD8063 provide excellent overall performance. For video applications, their differential gain and phase errors are 0.01% and 0.03° into a 150 $\Omega$  load, along with 0.1dB flatness out to 30MHz. Additionally, they offer wide bandwidth to 300MHz along with 800V/µs slew rate.

The AD8061, AD8062, and AD8063 offer a typical low power of 7.0mA/amplifier, while being capable of delivering up to 50mA of load current. The AD8063 has a power down disable feature that reduces the supply current to  $400\mu$ A. These

Operating Model **Temperature Range** Package AD8061AR -40 to +85°C 8 Lead SOIC -40 to +85°C AD8061ART 5 Lead SOT23-5 AD8062AR -40 to +85°C 8 Lead SOIC -40 to +85°C 8 Lead µSOIC AD8062ARM AD8063AR  $-40 \text{ to } +85^{\circ}\text{C}$ 8 Lead SOIC -40 to +85°C 6 Lead SOT23-6 AD8063ART

features make the AD8063 ideal for portable and battery

powered applications where size and power is critical.

This information applies to a product under development. Its characteristics and specifications are subject to change without notice. Analog Devices assumes no obligation regarding future manufacturing unless otherwise agreed to in writing. REV PrD8/9/99

			AD8061/62/63		
Parameter	Conditions	Min	Тур	Max	Units
DYNAMIC PERFORMANCE					
-3 dB Bandwidth	$G = +1, V_0 = 0.2Vp-p$		300		MHz
	$G = -1, +2, V_0 = 0.2Vp-p$		115		MHz
	$G = +1, V_0 = 2Vp-p$		TBD		MHz
Bandwidth for 0.1 dB Flatness	$V_0 = 0.2 V p - p,$		30		MHz
Slew Rate	$G = +1, V_0 = 1V$ Step , $R_L = 2k\Omega$		500		V/µs
	$G = +2$ , $V_0 = 2V$ Step, $R_L = 2k\Omega$		800		V/μs
Settling Time to 0.1%	$G = +2$ , $V_0 = 2V$ Step $G = +2$ , $V_0 = 2V$ Step		20		ns
NOISE/HARMONIC PERFORMANCE	$3 - 12, v_0 - 2v step$				
SFDR	$f_{\rm C} = 5$ MHz, $V_{\rm o} = 2V$ p-p, $R_{\rm L} = 1k\Omega$		-77		dBc
SIDK			-50		dBc
	$f_C = 20 \text{ MHz}, V_o = 2V \text{ p-p}, R_L = 1k\Omega$				
Crosstalk, Output to Output	f = 5  MHz, G = +2		-90		dBc
Input Voltage Noise	f = 100  kHz		8.5		nV/√H
Input Current Noise	f = 100  kHz		1.2		pA/√H
Differential Gain Error	NTSC, G = +2, $R_L = 150 \Omega$		0.01		%
Differential Phase Error	NTSC, $G = +2$ , $R_L = 150 \Omega$		0.03		Degree
Third Order Intercept	f = 10  MHz		28		dBc
DC PERFORMANCE					
Input Offset Voltage			1	6	mV
	T <sub>min</sub> - T <sub>max</sub>		TBD		mV
Input Offset Voltage Drift	1 mm 1 max		3.5		μV/°C
Input Offset Voltage Matching	AD8062 only		1	7.5	mV
Input Bias Current			6	9	μA
	T <sub>min</sub> - T <sub>max</sub>		TBD	<i>.</i>	μΑ
Input Bias Current Matching	AD8062 only		1	4.5	μΑ
Input Offset Current			0.3		μη <b>κ</b> ±μΑ
Input Offset Current Matching	AD8062 only		1	4.5	μΑ
Open Loop Gain	$V_0 = \pm 2.0 \text{ V}, \text{ R}_L = 150\Omega$	68	74	1.5	dB
open Loop Guin		74	80		dB
	$V_o = \pm 2.0 \text{ V}, R_L = 2k\Omega$	74	80		uD
INPUT CHARACTERISTICS			2		
Input Resistance			3		MΩ
Input Capacitance			1		pF
Input Common-Mode Voltage Range	$R_L = 1k\Omega$	(2)	-5.3 to 3.2		V
Common-Mode Rejection Ratio	$V_{CM} = 2.2V$ to $-4.2V$	62	70		dB
OUTPUT CHARACTERISTICS					
Output Voltage Swing	$R_L = 150 \ \Omega$	0.3		4.75	V
	$R_{L} = 2k\Omega$	0.25		4.85	V
Output Current	$V_0 = +/-2.5 V$		50		mA
Capacitive Load Drive	30% over shoot		15		pF
POWER DOWN DISABLE					<u> </u>
Turn-on Time			TBD		ns
Turn-off Time			TBD		ns
Input Voltage - Disabled			TBD		V
Input Voltage - Enabled			TBD		v
POWER SUPPLY					+ ·
Operating Range		2.7	5	8	v
Quiescent Current per Amplifier		2.1	7.0	9.5	mA
Supply Current when Disabled			0.4	7.5	mA
		72			
Power Supply Rejection Ratio		12	80		dB

# **SPECIFICATIONS** (@T<sub>A</sub> = +25°C, V<sub>S</sub> = +5,0, R<sub>L</sub> = 1k, R<sub>F</sub> = $0\Omega$ , Gain =+1, unless otherwise noted)

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Conditions	Min		Max	Units
		• *		
$G = +1, V_0 = 0.2Vp-p$		300		MHz
		115		MHz
		TBD		MHz
				MHz
				V/µs
-				V/µs
-		40		ns
$f_{c} = 5 \text{ MHz} \text{ V} = 1.0 \text{ V} \text{ p-p} \text{ R}_{c} = 1 \text{ kO}$		TBD		dBc
				dBc
				dBc
,				nV/√H:
				nv/√H
				рА/\П. %
				Degree
				dBc
F = 5 MHZ		-62		dBc
			6	mV
T <sub>min</sub> - T <sub>max</sub>				mV
				μV/ºC
1001				μA
T <sub>min</sub> - T <sub>max</sub>			10	μA
		0.3		±μA
N OF N		00		dB dB
$V_0 = \pm 2.5 V$		90		dB
		2		Ma
. To much				MΩ
-				pF
	(2)			V
$V_{CM} = 0.3V$ to 1.7V	62	70		dB
$R_L = 150 \ \Omega$	0.3		2.85	V
$R_L = 2k\Omega$	0.25		2.9	V
$V_o = +2.5V$		30		mA
30% over shoot		15		pF
		TBD		ns
		TBD		ns
		TBD		V
		TBD		v
	1			
	2.7	3	8	v
		7.0	9.0	mA
			2.0	
		0.4	2.0	mA
	$ \begin{array}{c} G = \!$	$\begin{tabular}{ c c c c c } \hline Al \\ Min \\ \hline G =+1, V_o = 0.2Vp-p \\ G =-1, +2, V_o = 0.2Vp-p \\ G =+1, V_o = 1Vp-p \\ V_o = 0.2Vp-p, \\ G =+1, V_o = 0.7V Step , R_L = 2k\Omega \\ G =+2, V_o = 1.5V Step , R_L = 2k\Omega \\ G =+2, V_o = 1V Step \\ \hline f_C = 5 MHz, V_o = 1.0V p-p, R_L = 1k\Omega \\ f_C = 20 MHz, V_o = 1.0V p-p, R_L = 1k\Omega \\ f = 5 MHz, G = +2 \\ f = 100 kHz \\ f = 100 kHz \\ f = 100 kHz \\ F = 5 MHz \\ \hline \hline T_{min} - T_{max} \\ V_o = \pm 2.5 V \\ \hline \\ \hline + lnput \\ R_L = 1k\Omega \\ V_{CM} = 0.3V to 1.7V \\ \hline \\ R_L = 150 \Omega \\ R_L = 2k\Omega \\ V_o = \pm 2.5V \\ \hline \\ $	$\begin{tabular}{ c c c c c c c } \hline AD8061/62/62 & Min & Typ & & & & & & & & & & & & & & & & & & &$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

### **SPECIFICATIONS** (@T<sub>A</sub> = +25°C, V<sub>S</sub> = +3V, R<sub>L</sub> = 1k, R<sub>F</sub> = $0\Omega$ , Gain =+1, unless otherwise noted)

		Gain =+1, unless otherwise noted) AD8061/62/63			
Parameter	Conditions	Min	Тур	Max	Units
DYNAMIC PERFORMANCE			71		
-3 dB Bandwidth	$G = +1, V_0 = 0.2Vp-p$		300		MHz
	$G = -1, +2, V_0 = 0.2Vp-p$		115		MHz
	$G = +1, V_0 = 1Vp-p$		TBD		MHz
Bandwidth for 0.1 dB Flatness	$V_o = 0.2Vp-p,$		30		MHz
Slew Rate	$G = +1, V_0 = 0.7V$ Step , $R_L = 2k\Omega$		280		V/µs
	$G = +2$ , $V_0 = 1.5V$ Step , $R_L = 2k\Omega$		250		V/μs
Settling Time to 0.1%	$G = +2, V_0 = 1.5 V \text{ Step}, R_L = 2.832$ $G = +2, V_0 = 1V \text{ Step}$		40		ns
NOISE/HARMONIC PERFORMANCE					
SFDR	$f_{\rm C} = 5$ MHz, $V_{\rm o} = 1.0$ V p-p, $R_{\rm L} = 1$ k $\Omega$		TBD		dBc
	$f_{\rm C} = 20$ MHz, $V_0 = 1.0V$ p-p, $R_{\rm L} = 1k\Omega$		TBD		dBc
Crosstalk, Output to Output	f = 5 MHz, $G = +2$		-90		dBc
Input Voltage Noise	f = 100  kHz		8.5		nV/√Hz
Input Current Noise	f = 100  kHz		1.2		pA/√Hz
Differential Gain Error	NTSC, G = +2, $R_L = 150 \Omega$		0.3		%
Differential Phase Error	NTSC, $G = +2$ , $R_L = 150 \Omega$		0.4		Degree
Third Order Intercept	f = 10  MHz		6.5		dBc
SFDR	F = 5  MHz		-62		dBc
DC PERFORMANCE			-		
Input Offset Voltage			1	6	mV
input officer + office	T <sub>min</sub> - T <sub>max</sub>		2	0	mV
Input Offset Voltage Drift	1 min 1 max		3.5		μV/°C
Input Bias Current			4	8.5	μΑ
L	T <sub>min</sub> - T <sub>max</sub>		6	10	μΑ
Input Offset Current			0.3		±μA
Open Loop Gain					dB
	$V_{o} = \pm 2.5 V$		90		dB
INPUT CHARACTERISTICS					
Input Resistance			3		MΩ
Input Capacitance	+Input		1		pF
Input Common-Mode Voltage Range	$R_L = 1k\Omega$		-5.3 to 3.2		V
Common-Mode Rejection Ratio	$V_{CM} = 0.45$ to 1.55V	62	70		dB
OUTPUT CHARACTERISTICS					
Output Voltage Swing	$R_L = 150 \ \Omega$	0.3		2.55	v
	$R_{L} = 2k\Omega$	0.25		2.6	v
Output Current	$V_0 = +2.5V$		30		mA
Capacitive Load Drive	30% over shoot		15		pF
POWER DOWN DISABLE					-
Turn-on Time			TBD		ns
Turn-off Time			TBD		ns
Input Voltage - Disabled			TBD		V
Input Voltage - Enabled			TBD		V
POWER SUPPLY					
Operating Range		2.7	3	8	V
Quiescent Current per Amplifier			7.0	9.0	mA
Supply Current when Disabled			0.4		mA
Power Supply Rejection Ratio		72	-80		dB

## **SPECIFICATIONS** (@T<sub>A</sub> = +25°C, V<sub>S</sub> = +2.7V, R<sub>L</sub> = 1k, R<sub>F</sub> = $0\Omega$ , Gain =+1, unless otherwise noted)

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