High Speed, Single Supply, Rail-to-Rail Output, Triple Op Amp

Preliminary Technical Data

ADA4855-3

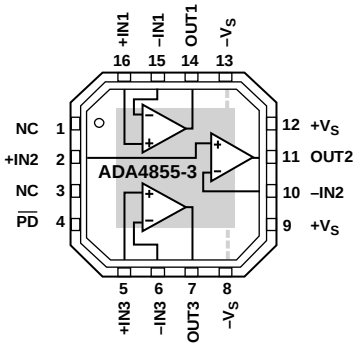
FEATURES

- Voltage feedback architecture
- High speed
  - 400 MHz, −3 dB bandwidth, G = 1
  - 190 MHz, −3 dB bandwidth, G = 2
  - 800 V/µs slew rate
  - 0.1 dB bandwidth flatness out to 63 MHz, G = 1
  - 6 ns settling time to 1% with 2 V step
- High input common-mode voltage range
  - V_{EE} − 0.2 V to V_{CC} − 1 V
- Rail-to-rail output swing: 0.2 V to 4.85 V
- Operates on 3.3 V to 5 V supplies
- Low offset voltage: 1 mV
- Excellent video specifications (R_L = 150 Ω, G = 2)
  - Differential gain error: 0.01%
  - Differential phase error: 0.01°
- Low power, 7.7mA/amplifier typical supply current
- Available in 16-lead LFCSP

APPLICATIONS

- Professional video
- Consumer video
- Imaging
- Industrial
- Instrumentation
- Professional videos and cameras
- Base stations
- Filters

CONNECTION DIAGRAM



NOTES
1. NC = NO CONNECT.
2. EXPOSED PAD CONNECTED TO $-V_S$.

07685-001

Figure 1. ADA4855-3

GENERAL DESCRIPTION

The ADA4855-3 is a single-supply, rail-to-rail output amplifier. It provides excellent overall performance with a wide −3 dB bandwidth out to 400 MHz and a fast slew rate of 800 V/µs. It has a wide input common-mode voltage range that extends 0.2 V below ground and 1 V below the positive rail. In addition, the output voltage swings within 200 mV of either supply rail, making these op amps easy to use on a single-supply voltage as low as 3.3 V. For video applications, the differential gain and phase errors are 0.01% and 0.01° into a 150 Ω load, along with 0.1 dB flatness out to 63 MHz.

The ADA4855-3 offers a typical low power of 7.7 mA per amplifier, while being capable of delivering up to 40 mA of load current. It has a power-down feature that reduces the supply current down to 1 mA.

TBD

Figure 2.Frequency Response, G = 1

The ADA4855-3 is available in a 16-lead LFCSP and is designed to work over the extended industrial temperature range of −40°C to +105°C.

Rev. PrB

One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
Tel: 781.329.4700 www.analog.com
Fax: 781.461.3113

TABLE OF CONTENTS

REVISION HISTORY

9/08—Revision PrB: Specs Version
8/08—Revision PrA: Initial Version

SPECIFICATIONS

T_A = 25°C, V_S = 5 V, R_L = 150 Ω, unless otherwise noted.

Table 1.

Parameter	Conditions	Min	Typ	Max	Unit
DYNAMIC PERFORMANCE					
−3 dB Bandwidth	G = 1, V_O = 0.2 V p-p		400		MHz
	G = 1, V_O = 2 V p-p		210		MHz
	G = 2, V_O = 0.2 V p-p		190		MHz
	G = 2, V_O = 2 V p-p		115		MHz
Bandwidth for 0.1 dB Flatness	G = 1, V_O = 2 V p-p		63		MHz
	G = 2, V_O = 2 V p-p		30		MHz
Slew Rate	G = 1, V_O = 2 V step		800		V/µs
Settling Time to 1%	G = 1, V_O = 2 V step		TBD		ns
	G = 2, V_O = 2 V step		6		ns
NOISE/DISTORTION PERFORMANCE					
Total Harmonic Distortion	f_C = 5 MHz, V_O = 2 V p-p		TBD		dBc
	f_C = 20 MHz, V_O = 2 V p-p		TBD		dBc
Crosstalk, Output to Output	f = 5 MHz, G = 2		−65		dBc
Input Voltage Noise	f = 100 kHz		6.5		nV/√Hz
Input Current Noise	f = 100 kHz		TBD		pA/√Hz
Differential Gain Error	G = 2		0.01		%
Differential Phase Error	G = 2		0.01		Degrees
DC PERFORMANCE					
Input Offset Voltage			1	3	mV
Input Offset Voltage Drift			TBD		µV/°C
Input Bias Current			4.5		µA
Input Offset Current			±0.05		µA
Open-Loop Gain	V_O = 0.5 V to 4.5 V		90		dB
INPUT CHARACTERISTICS					
Input Resistance			TBD		MΩ
Input Capacitance			TBD		pF
Input Common-Mode Voltage Range		V_{EE} − 0.2		V_{CC} − 1	V
Common-Mode Rejection Ratio	V_{CM} = −0.2 V to +4 V		TBD		dB
OUTPUT CHARACTERISTICS					
Output Voltage Swing		0.2		4.85	V
Maximum Output Current			40		mA
POWER-DOWN					
Turn-On Time			100		ns
ENABLE Voltage, On			3.75		V
POWER SUPPLY					
Operating Range		3		5.5	V
Quiescent Current per Amplifier			7.7		mA
Supply Current when Disabled			1		mA
Power Supply Rejection Ratio	ΔV_S = 1.3 V to 4.5 V		TBD		dB

T_A = 25°C, V_S = 3.0 V, R_L = 150 Ω, V_O = 2 V, unless otherwise noted.

Table 2.

Parameter	Conditions	Min	Typ	Max	Unit
DYNAMIC PERFORMANCE					
−3 dB Bandwidth	G = 1, V_O = 0.2 V p-p				MHz
	G = 1, V_O = 2 V p-p				MHz
	G = 2, V_O = 0.2 V p-p				MHz
	G = 2, V_O = 2 V p-p				MHz
	G = 2, V_O = 2 V p-p				MHz
Bandwidth for 0.1 dB Flatness	G = 2, V_O = 2 V p-p				MHz
Slew Rate	G = 2, V_O = 2 V step				V/µs
Settling Time to 1%	G = 2, V_O = 2 V step				ns
NOISE/DISTORTION PERFORMANCE					
Total Harmonic Distortion	f_C = 5 MHz, V_O = 2 V p-p				dBc
	f_C = 20 MHz, V_O = 2 V p-p				dBc
Crosstalk, Output to Output	f = 5 MHz, G = 2				dBc
Input Voltage Noise	f = 100 kHz				nV/√Hz
Input Current Noise	f = 100 kHz				pA/√Hz
Differential Gain Error	G = 2				%
Differential Phase Error	G = 2				Degrees
DC PERFORMANCE					
Input Offset Voltage					mV
Input Offset Voltage Drift					µV/°C
Input Bias Current					µA
Input Offset Current					µA
Open-Loop Gain	V_O = 0.5 V to 4.5 V				dB
INPUT CHARACTERISTICS					
Input Resistance					MΩ
Input Capacitance					pF
Input Common-Mode Voltage Range					V
Common-Mode Rejection Ratio	V_{CM} = −0.2 V to +3.2 V				dB
OUTPUT CHARACTERISTICS					
Output Voltage Swing, Load Resistance					V
Output Current	V_O = 0.5 V to 4.5 V				mA
POWER-DOWN DISABLE					
Turn-On Time					ns
ENABLE Voltage, On					V
POWER SUPPLY					
Operating Range					V
Quiescent Current per Amplifier					mA
Supply Current when Disabled					µA
Power Supply Rejection Ratio	ΔV_S = 1.3 V to 1.5 V				dB

ABSOLUTE MAXIMUM RATINGS

Table 3.

Parameter	Rating
Supply Voltage	6 V
Internal Power Dissipation[1]	See Figure 3
Common-Mode Input Voltage	($-V_S - 0.2$ V) to ($+V_S - 1$ V)
Differential Input Voltage	$\pm V_S$
Output Short-Circuit Duration	Observe Power Curves
Storage Temperature Range	−65°C to +125°C
Operating Temperature Range	−40°C to +105°C
Lead Temperature (Soldering, 10 sec)	300°C

[1] Specification is for device in free air.

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

THERMAL RESISTANCE

θ_{JA} is specified for the worst-case conditions, that is, θ_{JA} is specified for device soldered in circuit board for surface-mount packages.

Table 4.

Package Type	θ_{JA}	θ_{JC}	Unit
16-Lead LFCSP	67	17.5	°C/W

MAXIMUM POWER DISSIPATION

The maximum power that can be safely dissipated by the ADA4855-3 is limited by the associated rise in junction temperature. The maximum safe junction temperature for plastic encapsulated devices is determined by the glass transition temperature of the plastic, approximately 150°C. Temporarily exceeding this limit may cause a shift in parametric performance due to a change in the stresses exerted on the die by the package. Exceeding a junction temperature of 175°C for an extended period can result in device failure. While the ADA4855-3 is internally short-circuit protected, this may not be sufficient to guarantee that the maximum junction temperature (150°C) is not exceeded under all conditions.

To ensure proper operation, it is necessary to observe the maximum power derating curves.

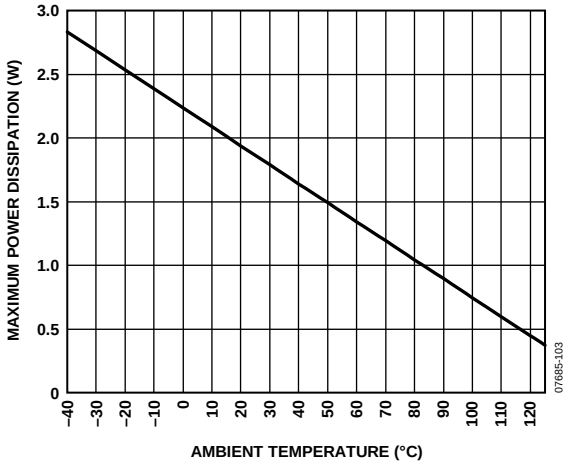


Figure 3. Maximum Power Dissipation vs. Ambient Temperature

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

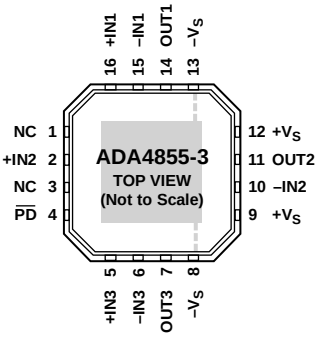


Figure 4. Pin Configuration

Table 5. Pin Function Descriptions

Pin No.	Mnemonic	Description
1	NC	No Connect
2	+IN2	Noninverting Input 2
3	NC	No Connect
4	$\overline{PD}$	Power Down
5	+IN3	Noninverting Input 3
6	–IN3	Inverting Input 3
7	OUT3	Output 3
8	$-V_S$	Negative Supply
9	$+V_S$	Positive Supply
10	–IN2	Inverting Input 2
11	OUT2	Output 2
12	$+V_S$	Positive Supply
13	$-V_S$	Negative Supply
14	OUT1	Output 1
15	–IN1	Inverting Input 1
16	+IN1	Noninverting Input 1
EP	EPAD	Exposed Pad. Must be connected to $-V_S$.

OUTLINE DIMENSIONS

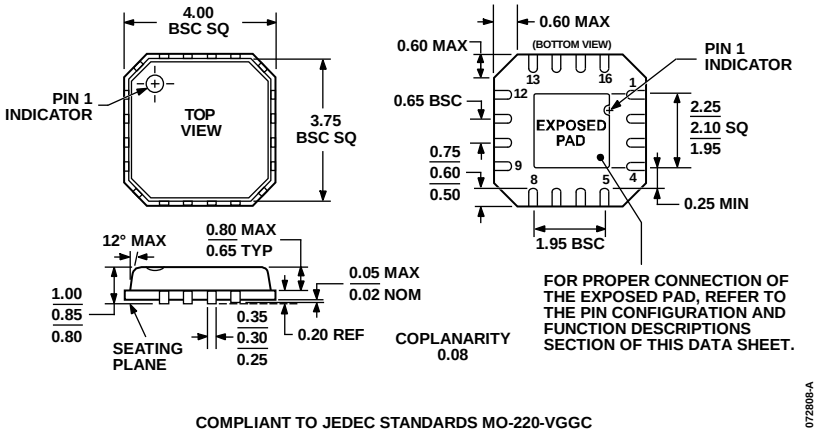


Figure 5.16-Lead Lead Frame Chip Scale Package [LFCSP_VQ]
4 mm × 4 mm Body, Very Thin Quad (CP-16-4)
Dimensions shown in millimeters

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option	Ordering Quantity
ADA4855-3ACPZ-R2[1]	–40°C to +105°C	16-Lead LFCSP_VQ	CP-16-4	250
ADA4855-3ACPZ-R7[1]	–40°C to +105°C	16-Lead LFCSP_VQ	CP-16-4	1,500
ADA4855-3ACPZ-RL[1]	–40°C to +105°C	16-Lead LFCSP_VQ	CP-16-4	5,000

[1] Z = RoHS Compliant Part.

PR07685-0-9/08(PrB)