Low Power, High Speed, CCD Buffer Amplifier

Known Good Die

ADA4800-KGD

FEATURES

Integrated active load and gain of 1 buffer
Very low buffer power consumption
As low as 20 mW on chip
Power save feature to reduce active load current by GPO control
High buffer speed
400 MHz, −3 dB bandwidth
415 V/µs slew rate
Fast settling time to 1%, 2 V step: 5 ns
Adjustable buffer bandwidth
Push-pull output stage
Adjustable active load current
Known Good Die (KGD): these die are fully guaranteed to data sheet specifications.

APPLICATIONS

CCD image sensor output buffer
Digital still cameras
Camcorders

FUNCTIONAL BLOCK DIAGRAM

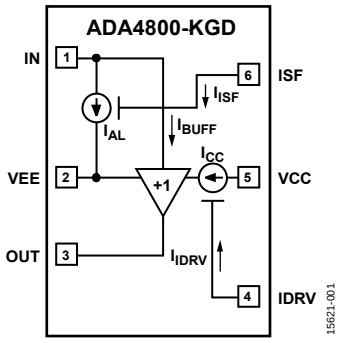

Figure 1.

GENERAL DESCRIPTION

The ADA4800-KGD is voltage buffer integrated with an active load. The buffer is a low power, high speed, low noise, high slew rate, fast settling, fixed gain of 1 monolithic amplifier for charge-coupled device (CCD) applications. For CCD applications, the active load current source (I_{AL}) can load the open source CCD sensor outputs, and the buffer can drive the AFE load. The active current load can also be switched off to use the ADA4800-KGD as a unity-gain buffer. The buffer consumes only 20 mW of static power. In applications where power savings is critical, the ADA4800-KGD features a power save mode that further reduces the total current consumption. The bandwidth of the ADA4800-KGD buffer is also fully adjustable through the IDRV pin.

The buffer of the ADA4800-KGD employs a push-pull output stage architecture, providing drive current and maximum slew capability for both rising and falling signal transitions. At a 4.7 mA quiescent current setting, it provides 400 MHz, −3 dB bandwidth, which makes this buffer well suited for CCD sensors from machine vision to digital still camera applications.

The ADA4800-KGD is ideal for driving the input of the Analog Devices, Inc., 12-bit and 14-bit high resolution analog front ends (AFE), such as the AD9928, the AD9990, the AD9920A, the AD9923A, and the AD9970 to AD9979 family.

The versatility of the ADA4800-KGD allows for seamless interfacing with many CCD sensors from various manufacturers.

The ADA4800-KGD operates at supply voltages as low as 4 V and up to 17 V.

Additional application and technical information can be found in the ADA4800 data sheet.

Rev. 0 **Document Feedback**

One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
Tel: 781.329.4700

Technical Support **www.analog.com**

TABLE OF CONTENTS

Features 1
Applications 1
Functional Block Diagram 1
General Description 1
Revision History 2
Specifications 3
Buffer Electrical Characteristics 3
Active Current Load Electrical Characteristics 3
Absolute Maximum Ratings 4
ESD Caution 4
Pin Configuration and Function Descriptions 5
Test Circuit 6
Outline Dimensions 7
Die Specifications and Assembly Recommendations 7
Ordering Guide 7

REVISION HISTORY

4/2017—Revision 0: Initial Version

SPECIFICATIONS

BUFFER ELECTRICAL CHARACTERISTICS

T_A = 25°C, VCC = 15 V, VEE = 0 V, R_{IDRV} = 249 kΩ connected to V_{IDRV}, R_{LOAD} = 1 kΩ in parallel with 22 pF in series with 10 Ω, V_{IN} = 7.5 V, unless otherwise noted (see Figure 3 for the test circuit).

Table 1.

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
GAIN					
Voltage Gain	V_{IN} = 6.5 V to 8.5 V, R_{ISF} = 0 Ω	0.995	0.998	1.005	V/V
INPUT/OUTPUT CHARACTERISTICS					
Offset Voltage			30	41	mV
IDRV Current	R_{IDRV} = 249 kΩ, V_{IDRV} = 15 V		52	59	µA
Voltage Range		V_{EE} + 1.4		V_{CC} − 1.4	V
Input Bias Current (I_{BUFF})			1		µA
DYNAMIC PERFORMANCE					
−3 dB Bandwidth	R_{IDRV} = 300 kΩ, I_{CC} = 1.1 mA, V_{OUT} = 0.1 V p-p		182		MHz
	R_{IDRV} = 150 kΩ, I_{CC} = 2.1 mA, V_{OUT} = 0.1 V p-p		288		MHz
	R_{IDRV} = 50 kΩ, I_{CC} = 4.7 mA, V_{OUT} = 0.1 V p-p		400		MHz
Slew Rate	V_{OUT} = 2 V step		415		V/µs
Rise Time	V_{IN} = 7.5 V to 8.5 V, 10% to 90%		2.2		ns
Fall Time	V_{IN} = 8.5 V to 7.5 V, 10% to 90%		1.8		ns
1% Settling Time	V_{IN} = 9.5 V to 7.5 V (falling edge)		5		ns
	V_{IN} = 7.5 V to 9.5 V (rising edge)		4.5		ns
	V_{IN} = 8.5 V to 7.5 V (falling edge)		4.5		ns
	V_{IN} = 7.5 V to 8.5 V (rising edge)		4		ns
Input/Output Delay Time	V_{IN} = 8.5 V to 7.5 V (falling edge)		0.4		ns
	V_{IN} = 7.5 V to 8.5 V (rising edge)		0.35		ns
Output Voltage Noise	At 20 MHz		1.5		nV/√Hz
POWER SUPPLY					
Supply Voltage Range		4	15	17	V
Supply Current (I_{CC})			1.4	1.8	mA
OPERATING TEMPERATURE RANGE		−40		+85	°C

ACTIVE CURRENT LOAD ELECTRICAL CHARACTERISTICS

T_A = 25°C, V_{EE} = 0 V, V_{ISF} = 3 V, R_{ISF} = 10 kΩ connected to V_{ISF}, V_{IN} = 7.5 V, unless otherwise noted (see Figure 3 for a test circuit).

Table 2.

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
INPUT/OUTPUT CHARACTERISTICS					
Active Load Current (I_{AL})	V_{ISF} = 0 V		1		µA
	V_{ISF} = 3 V		3		mA
	V_{ISF} = 7.5 V		12.7		mA
ISF Current (I_{ISF})	R_{ISF} = 10 kΩ		111	120	µA
Input Voltage Range		V_{EE} + 1.7		V_{CC}	V
OPERATING TEMPERATURE RANGE		−40		+85	°C

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted.

Table 3.

Parameter	Rating
Supply Voltage	18 V
Input Voltage Range	V_{EE} to V_{CC}
ISF Pin Range	V_{EE} to V_{CC}
IDRV Pin Range	V_{EE} to V_{CC}
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	−40°C to +85°C
Junction Temperature Range	−65°C to +150°C

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

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

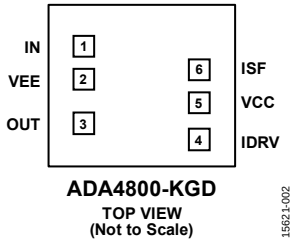

Figure 2. Pin Configuration

Table 4. Pin Function Descriptions

Pin No.	Mnemonic	X-Axis (µm)	Y-Axis (µm)	Type	Description
1	IN	−136	+94	Input	Input. Connect this pad to the CCD sensor output.
2	VEE	−136	+14	Input	Negative Power Supply Voltage.
3	OUT	−136	−88	Output	Output. Connect this pad to the AFE input.
4	IDRV	+136	−125	Input	Bandwidth Adjustment Pad. Connect this pad to VCC or an external voltage with an external resistor. This pad allows bandwidth to be controlled by adjusting I_{CC}. This pad can also be used to power down the buffer.
5	VCC	+136	−45	Input	Positive Power Supply Voltage.
6	ISF	+136	+35	Input	Active Load Current Adjustment Pad. Connect to VCC or an external voltage with an external resistor. This pad can also be connected to the microcontroller logic output through an external resistor for power save mode. This pad can also be used to power down the active current load.

TEST CIRCUIT

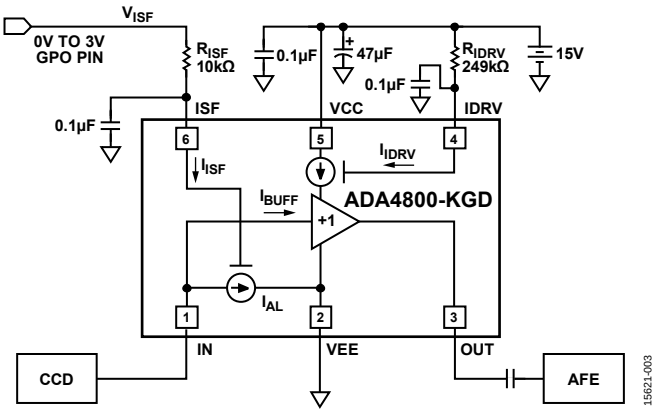

Figure 3. Typical Current Flow

OUTLINE DIMENSIONS

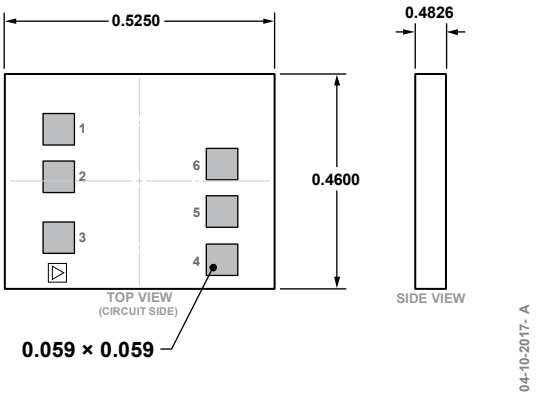

Figure 4. 6-Pad Bare Die [CHIP]
(C-6-11)
Dimensions shown in millimeters

DIE SPECIFICATIONS AND ASSEMBLY RECOMMENDATIONS

Table 5. Die Specifications

Parameter	Value	Unit
Scribe Line Width	75	µm
Die Size (Maximum Size)	525 × 460	µm
Thickness	482.6	µm
Bond Pads (Minimum Size)	59 × 59	µm
Bond Pad Composition	AlCu (0.5%)	%
Backside	None	Not applicable
Passivation	Doped oxide/SiN	Not applicable
ESD, Human Body Model (HBM)	2000	V

Table 6. Assembly Recommendations

Assembly Component	Recommendation
Die Attach	Hitachi EN4900GC
Bonding Method	0.8 mil gold
Bonding Sequence	1, 2, 3, 4, 5, 6

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
ADA4800-KGD-WP	−40°C to +85°C	6-Pad Bare Die [CHIP]	C-6-11

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Analog Devices Inc.:

ADA4800ACPZ-RL ADA4800ACPZ-R7