钍地半导体
Tudi Semiconductor

Product Specification

TUDI-AD8619

Low Cost Micropower, Low Noise CMOS
Rail-to-Rail, Input/Output Operational Amplifiers

网址 www.sztdbdt.com

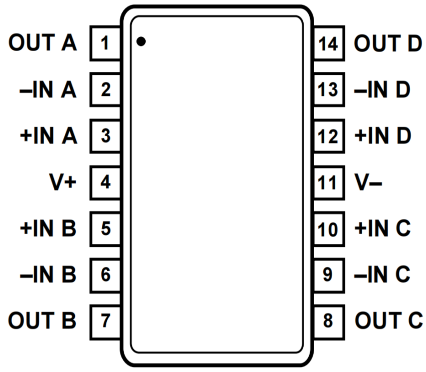
用芯智造 · 卓越品质

semiconductor device manufacturer

- Design
- research and development
- production
- and sales

FEATURES

Offset voltage: 2.2 mV maximum
Low input bias current: 1 pA maximum
Single-supply operation: 1.8 V to 5.5 V
Low noise: 22 nV/$\sqrt{\text{Hz}}$
Micropower: 50 μA/amplifier maximum over
temperature No phase reversal
Unity gain stable
Qualified for automotive applications



14-Lead TSSOP and 14-Lead SOIC

APPLICATIONS

Battery-powered instrumentation
Multipole filters
Current shunt sense
Sensors
ADC predrivers
DAC drivers/level shifters
Low power ASIC input or output amplifiers

GENERAL DESCRIPTION

The AD8613/AD8617/AD8619 are single, dual, and quad micro-power, rail-to-rail input and output amplifiers that feature low supply current, as well as low input voltage and current noise.
The parts are fully specified to operate from 1.8 V to 5 V single supply, or ±0.9 V and ±2.5 V dual supply. The combination of low noise, very low input bias currents, and low power consumption make the AD8613/AD8617/AD8619 especially useful in portable and loop-powered instrumentation.
The ability to swing rail-to-rail at both the input and output enables designers to buffer CMOS ADCs, DACs, ASICs, and other wide output swing devices in low power, single-supply systems.
The AD8613 is available in a 5-lead SC70 package and a 5-lead TSOT-23 package. The AD8617 is available in 8-lead MSOP, 8-lead SOIC, and 8-lead LFCSP packages. The AD8619 is available in 14-lead TSSOP and 14-lead SOIC packages. The AD8617W is qualified for automotive applications and is available in 8-lead MSOP and 8-lead SOIC packages. The AD8619W is qualified for automotive applications and is available in 14-lead SOIC and 14-lead TSSOP packages.

SPECIFICATIONS

Electrical characteristics at V_{SY} = 5 V, V_{CM} = V_{SY}/2, T_A = 25°C, unless otherwise noted.

Table 1.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}	−0.3 V < V_{CM} < +5.3 V		0.4	2.2	mV
		−40°C < T_A < +125°C, −0.3 V < V_{CM} < +5.2 V			2.2	mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	−40°C < T_A < +125°C		1	4.5	µV/°C
AD8613				2.5	7.0	µV/°C
Input Bias Current	I_B			0.2	1	pA
		−40°C < T_A < +85°C			110	pA
		−40°C < T_A < +125°C			780	pA
Input Offset Current	I_{OS}			0.1	0.5	pA
		−40°C < T_A < +85°C			50	pA
		−40°C < T_A < +125°C			250	pA
Input Voltage Range	IVR		0		5	V
Common-Mode Rejection Ratio	CMRR	0 V < V_{CM} < 5 V		95		dB
		−40°C < T_A < +125°C	68			dB
Large Signal Voltage Gain	A_{VO}	R_L = 10 kΩ, 0.5 V < V_O < 4.5 V	235	500		V/mV
Input Capacitance	C_{DIFF}			1.9		pF
	C_{CM}			2.5		pF
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	I_L = 1 mA	4.95	4.98		V
		−40°C to +125°C	4.9			V
		I_L = 10 mA		4.7		V
		−40°C to +125°C	4.50			V
Output Voltage Low	V_{OL}	I_L = 1 mA		20	30	mV
		−40°C to +125°C			50	mV
		I_L = 10 mA		190	275	mV
		−40°C to +125°C			335	mV
Short-Circuit Current	I_{SC}			±80		mA
Closed-Loop Output Impedance	Z_{OUT}	f = 10 kHz, A_V = 1		15		Ω
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	1.8 V < V_{SY} < 5 V	67	94		dB
		−40°C < T_A < +125°C	64			dB
Supply Current/Amplifier	I_{SY}	V_O = V_{SY}/2		38		µA
		−40°C < T_A < +125°C			50	µA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L = 10 kΩ		0.1		V/µs
Settling Time to 0.1%	t_S	G = ±1, V_{IN} = 2 V step, C_L = 20 pF, R_L = 1 kΩ		23		µs
Gain Bandwidth Product	GBP	R_L = 100 kΩ		400		kHz
		R_L = 10 kΩ		350		kHz
Phase Margin	$Ø_M$	R_L = 10 kΩ, R_L = 100 kΩ, C_L = 20 pF		70		Degrees
NOISE PERFORMANCE						
Peak-to-Peak Noise	e_n p-p	0.1 Hz to 10 Hz		2.3	3.5	µV
Voltage Noise Density	e_n	f = 1 kHz		25		nV/√Hz
		f = 10 kHz		22		nV/√Hz
Current Noise Density	i_n	f = 1 kHz		0.05		pA/√Hz

Electrical characteristics at V_{SY} = 1.8 V, V_{CM} = V_{SY}/2, T_A = 25°C, unless otherwise noted.

Table 2.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}	−0.3 V < V_{CM} < +1.9 V		0.4	2.2	mV
		−0.3 V < V_{CM} < +1.8 V; −40°C < T_A < +125°C			2.2	mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	−40°C < T_A < +125°C		1	8.5	µV/°C
AD8613				3.7	9.0	µV/°C
Input Bias Current	I_B			0.2	1	pA
		−40°C < T_A < +85°C			110	pA
		−40°C < T_A < +125°C			780	pA
Input Offset Current	I_{OS}			0.1	0.5	pA
		−40°C < T_A < +85°C			50	pA
		−40°C < T_A < +125°C			250	pA
Input Voltage Range	IVR		0		1.8	V
Common-Mode Rejection Ratio	CMRR	0 V < V_{CM} < 1.8 V	58	86		dB
		−40°C < T_A < +125°C	55			dB
Large Signal Voltage Gain	A_{VO}	R_L = 10 kΩ, 0.5 V < V_O < 1.3 V	85	1000		V/mV
Input Capacitance	C_{DIFF}			2.1		pF
	C_{CM}			3.8		pF
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	I_L = 1 mA	1.65	1.73		V
		−40°C to +125°C	1.6			V
Output Voltage Low	V_{OL}	I_L = 1 mA		44	60	mV
		−40°C to +125°C			80	mV
Short-Circuit Current	I_{SC}			±7		mA
Closed-Loop Output Impedance	Z_{OUT}	f = 10 kHz, A_V = 1		15		Ω
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	1.8 V < V_S < 5 V	67	94		dB
Supply Current/Amplifier	I_{SY}	V_O = V_{SY}/2		38		µA
		−40°C < T_A < +125°C			50	µA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L = 10 kΩ		0.1		V/µs
Settling Time to 0.1%	t_S	G = ±1, V_{IN} = 1 V step, C_L = 20 pF, R_L = 1 kΩ		6.5		µs
Gain Bandwidth Product	GBP	R_L = 100 kΩ		400		kHz
		R_L = 10 kΩ		350		kHz
Phase Margin	$Ø_M$	R_L = 10 kΩ, R_L = 100 kΩ, C_L = 20 pF		70		Degrees
NOISE PERFORMANCE						
Peak-to-Peak Noise	e_n p-p	0.1 Hz to 10 Hz		2.3	3.5	µV
Voltage Noise Density	e_n	f = 1 kHz		25		nV/√Hz
		f = 10 kHz		22		nV/√Hz
Current Noise Density	i_n	f = 1 kHz		0.05		pA/√Hz

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted.

Table 3.

Parameter	Rating
Supply Voltage	6 V
Input Voltage	V_{SS} − 0.3 V to V_{DD} + 0.3 V
Input Current	±10 mA
Differential Input Voltage	±6 V
Output Short-Circuit Duration to GND	Indefinite
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	−40°C to +125°C
Junction Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 60 sec)	300°C
ESD AD8613	
HBM	±4000 V
FICDM	±1000 V
ESD AD8617	
HBM	±3000 V
FICDM	±1000 V
MM	±100 V
ESD AD8619	
HBM	±4000 V
FICDM	±1250 V
MM	±200 V

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.

THERMAL RESISTANCE

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

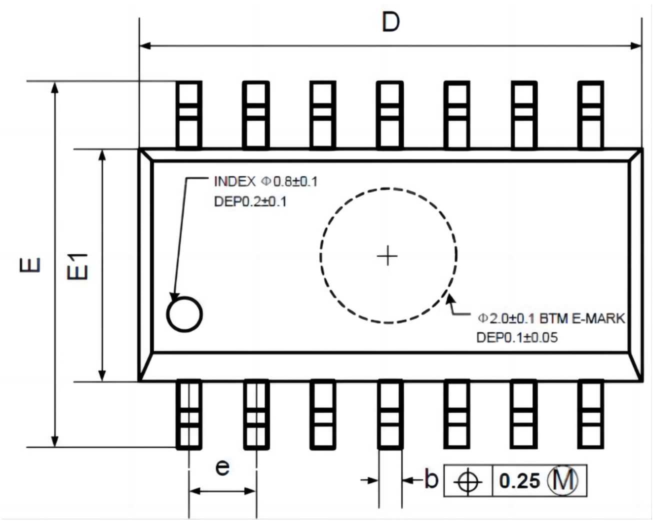
Table 4. Thermal Characteristics

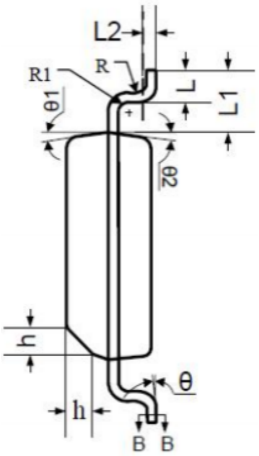
Package Type	θ_{JA}	θ_{JC}	Unit
5-Lead TSOT-23 (UJ-5)	207	61	°C/W
5-Lead SC70 (KS-5)	376	126	°C/W
8-Lead MSOP (RM-8)	210	45	°C/W
8-Lead SOIC_N (R-8)	158	43	°C/W
8-Lead LFCSP (CP-8-21)	81	20	°C/W
14-Lead SOIC_N (R-14)	120	36	°C/W
14-Lead TSSOP (RU-14)	180	35	°C/W

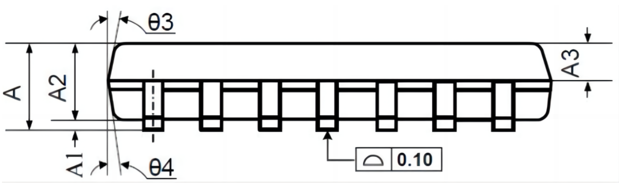
Order information

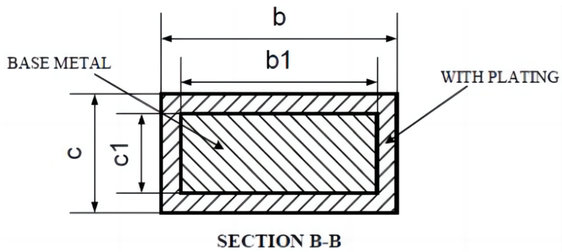
Order Number	Package	Package Quantity	Marking On The park
AD8619ARUZ-REEL-TUDI	TSSOP14	Tape,Reel,2500	AD8619ARUZ-REEL
AD8619ARZ-REEL-TUDI	SOP14	Tape,Reel,2500	AD8619ARZ-REEL

Package SOP14



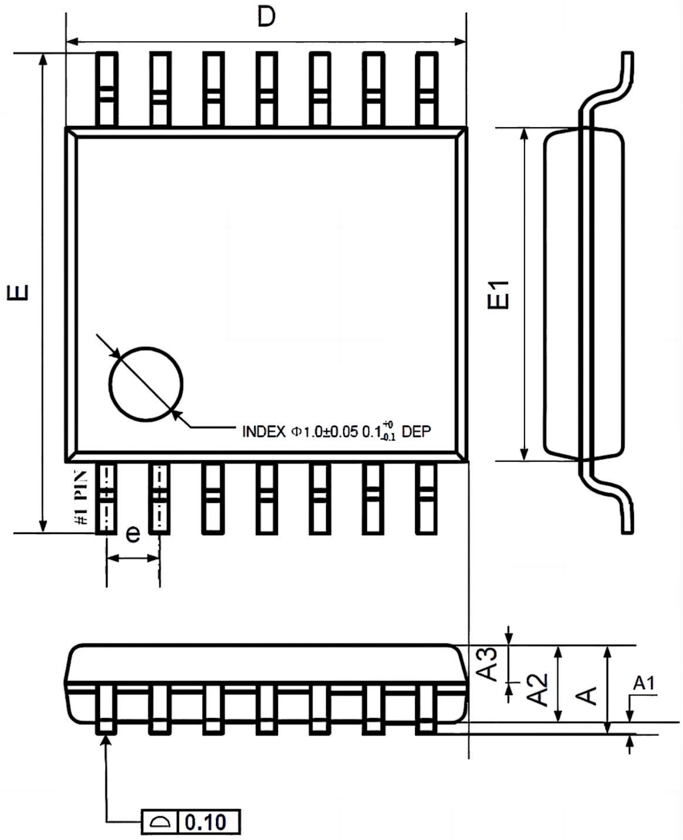


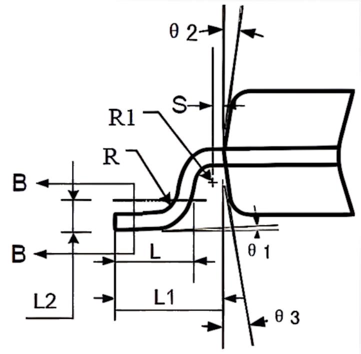


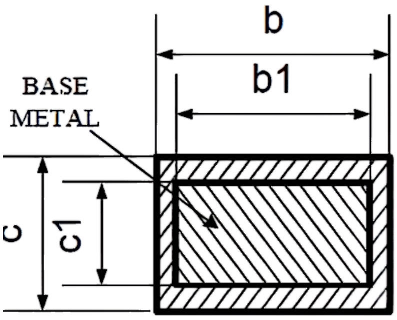


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.36		0.49
b1	0.35	0.40	0.45
C	0.16		0.25
c1	0.15	0.20	0.25
D	8.53	8.63	8.73
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
R	0.07		
R1	0.07		
h	0.30	0.40	0.50
θ	0°		8°
θ1	6°	8°	10°
θ2	6°	8°	10°
θ3	5°	7°	9°
θ4	5°	7°	9°

Package TSSOP14







Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	—	—	1.20
A1	0.05	—	0.15
A2	0.90	1.00	1.05
A3	0.34	0.44	0.54
b	0.20	—	0.28
b1	0.20	0.22	0.24
C	0.10	—	0.19
c1	0.10	0.13	0.15
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65 BSC		
L	0.45	0.60	0.75
L1	1.00 REF		
L2	0.25 BSC		
R	0.09	—	—
R1	0.09	—	—
S	0.20	—	—
θ1	0°	—	8°
θ2	10°	12°	14°
θ3	10°	12°	14°

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