钍地半导体
Tudi Semiconductor

Product Specification

TUDI-AD8652

50 MHz, Precision, Low Distortion, Low Noise CMOS Amplifiers

网址 www.sztdbdt.com

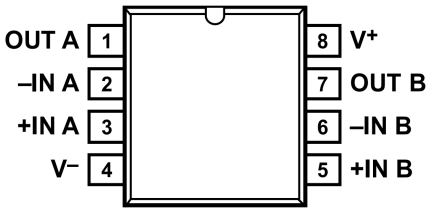
用芯智造·卓越品质

semiconductor device manufacturer

- Design
- research and development
- production
- and sales

FEATURES

Bandwidth: 50 MHz at 5 V
Low noise: 4.5 nV/√Hz
Offset voltage: 100 μV typical, specified over entire common-mode range
Slew rate: 41 V/μs
Rail-to-rail input and output swing
Input bias current: 1 pA
Single-supply operation: 2.7 V to 5.5 V
Space-saving MSOP and SOIC_N packaging



8-Lead SOIC_N (R-8)

APPLICATIONS

Optical communications
Laser source drivers/controllers
Broadband communications
High speed ADCs and DACs
Microwave link interface
Cell phone PA control
Video line drivers
Audio

GENERAL DESCRIPTION

The AD865x family consists of high precision, low noise, low distortion, rail-to-rail CMOS operational amplifiers that run from a single-supply voltage of 2.7 V to 5.5 V.
The AD865x family is made up of rail-to-rail input and output amplifiers with a gain bandwidth of 50 MHz and a typical voltage offset of 100 μV across common mode from a 5 V supply. It also features low noise—4.5 nV/√Hz.
The AD865x family can be used in communications applications, such as cell phone transmission power control, fiber optic networking, wireless networking, and video line drivers.
The AD865x family features the newest generation of DigiTrim® in-package trimming. This new generation measures and corrects the offset over the entire input common-mode range, providing less distortion from V_{OS} variation than is typical of other rail-to-rail amplifiers. Offset voltage and CMRR are both specified and guaranteed over the entire common-mode range as well as over the extended industrial temperature range.
The AD865x family is offered in the narrow 8-lead SOIC package and the 8-lead MSOP package. The amplifiers are specified over the extended industrial temperature range (-40°C to +125°C).

SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

V^+ = 2.7 V, V^- = 0 V, V_{CM} = V^+/2, T_A = 25°C, unless otherwise specified.

Table 1.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}					
AD8651		0 V ≤ V_{CM} ≤ 2.7 V		100	350	µV
		−40°C ≤ T_A ≤ +85°C, 0 V ≤ V_{CM} ≤ 2.7 V			1.4	mV
		−40°C ≤ T_A ≤ +125°C, 0 V ≤ V_{CM} ≤ 2.7 V			1.6	mV
AD8652		0 V ≤ V_{CM} ≤ 2.7 V		90	300	µV
		−40°C ≤ T_A ≤ +125°C, 0 V ≤ V_{CM} ≤ 2.7 V		0.4	1.3	mV
Offset Voltage Drift	TCV_{OS}			4		µV/°C
Input Bias Current	I_B			1	10	pA
		−40°C ≤ T_A ≤ +125°C			600	pA
Input Offset Current	I_{OS}			1	10	pA
		−40°C ≤ T_A ≤ +85°C			30	pA
		−40°C ≤ T_A ≤ +125°C			600	pA
Input Voltage Range	V_{CM}		−0.1		+2.8	V
Common-Mode Rejection Ratio	CMRR					
AD8651		V^+ = 2.7 V, −0.1 V < V_{CM} < +2.8 V	75	95		dB
		−40°C ≤ T_A ≤ +85°C, −0.1 V < V_{CM} < +2.8 V	70	88		dB
		−40°C ≤ T_A ≤ +125°C, −0.1 V < V_{CM} < +2.8 V	65	85		dB
AD8652		V^+ = 2.7 V, −0.1 V < V_{CM} < +2.8 V	77	95		dB
		−40°C ≤ T_A ≤ +125°C, −0.1 V < V_{CM} < +2.8 V	73	90		dB
Large Signal Voltage Gain	A_{VO}	R_L = 1 kΩ, 200 mV < V_O < 2.5 V	100	115		dB
		R_L = 1 kΩ, 200 mV < V_O < 2.5 V, T_A = 85°C	100	114		dB
		R_L = 1 kΩ, 200 mV < V_O < 2.5 V, T_A = 125°C	95	108		dB
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	I_L = 250 µA, −40°C ≤ T_A ≤ +125°C	2.67			V
Output Voltage Low	V_{OL}	I_L = 250 µA, −40°C ≤ T_A ≤ +125°C			30	mV
Short-Circuit Limit	I_{SC}	Sourcing		80		mA
		Sinking		80		mA
Output Current	I_O			40		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S = 2.7 V to 5.5 V, V_{CM} = 0 V	76	94		dB
		−40°C ≤ T_A ≤ +125°C	74	93		dB
Supply Current	I_{SY}					
AD8651		I_O = 0		9	12	mA
		−40°C ≤ T_A ≤ +125°C			14.5	mA
AD8652		I_O = 0		17.5	19.5	mA
		−40°C ≤ T_A ≤ +125°C			22.5	mA
INPUT CAPACITANCE	C_{IN}					
Differential				6		pF
Common Mode				9		pF
DYNAMIC PERFORMANCE						
Slew Rate	SR	G = 1, R_L = 10 kΩ		41		V/µs
Gain Bandwidth Product	GBP	G = 1		50		MHz
Settling Time, 0.01%		G = ±1, 2 V step		0.2		µs
Overload Recovery Time		V_{IN} × G = 1.48 V^+		0.1		µs
Total Harmonic Distortion + Noise	THD + N	G = 1, R_L = 600 Ω, f = 1 kHz, V_{IN} = 2 V p-p		0.0006		%
NOISE PERFORMANCE						
Voltage Noise Density	e_n	f = 10 kHz		5		nV/√Hz
		f = 100 kHz		4.5		nV/√Hz
Current Noise Density	i_n	f = 10 kHz		4		fA/√Hz

V^+ = 5 V, V^- = 0 V, V_{CM} = V^+/2, T_A = 25°C, unless otherwise specified.

Table 2.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}					
AD8651		0 V ≤ V_{CM} ≤ 5 V		100	350	µV
		−40°C ≤ T_A ≤ +85°C, 0 V ≤ V_{CM} ≤ 5 V			1.4	mV
		−40°C ≤ T_A ≤ +125°C, 0 V ≤ V_{CM} ≤ 5 V			1.7	mV
AD8652		0 V ≤ V_{CM} ≤ 5 V		90	300	µV
		−40°C ≤ T_A ≤ +125°C, 0 V ≤ V_{CM} ≤ 5 V		0.4	1.4	mV
Offset Voltage Drift	TCV_{OS}			4		µV/°C
Input Bias Current	I_B			1	10	pA
		−40°C ≤ T_A ≤ +85°C			30	pA
		−40°C ≤ T_A ≤ +125°C			600	pA
Input Offset Current	I_{OS}			1	10	pA
		−40°C ≤ T_A ≤ +85°C			30	pA
		−40°C ≤ T_A ≤ +125°C			600	pA
Input Voltage Range	V_{CM}		−0.1		+5.1	V
Common-Mode Rejection Ratio	CMRR					
AD8651		0.1 V < V_{CM} < 5.1 V	80	95		dB
		−40°C ≤ T_A ≤ +85°C, 0.1 V < V_{CM} < 5.1 V	75	94		dB
		−40°C ≤ T_A ≤ +125°C, 0.1 V < V_{CM} < 5.1 V	70	90		dB
AD8652		0.1 V < V_{CM} < 5.1 V	84	100		dB
		−40°C ≤ T_A ≤ +125°C, 0.1 V < V_{CM} < 5.1 V	76	95		dB
Large Signal Voltage Gain	A_{VO}	R_L = 1 kΩ, 200 mV < V_O < 4.8 V	100	115		dB
		R_L = 1 kΩ, 200 mV < V_O < 4.8 V, T_A = 85°C	98	114		dB
		R_L = 1 kΩ, 200 mV < V_O < 4.8 V, T_A = 125°C	95	111		dB
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	I_L = 250 µA, −40°C ≤ T_A ≤ +125°C	4.97			V
Output Voltage Low	V_{OL}	I_L = 250 µA, −40°C ≤ T_A ≤ +125°C			30	mV
Short-Circuit Limit	I_{SC}	Sourcing		80		mA
		Sinking		80		mA
Output Current	I_O			40		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S = 2.7 V to 5.5 V, V_{CM} = 0 V	76	94		dB
		−40°C ≤ T_A ≤ +125°C	74	93		dB
Supply Current	I_{SY}					
AD8651		I_O = 0		9.5	14.0	mA
		−40°C ≤ T_A ≤ +125°C			15	mA
AD8652		I_O = 0		17.5	20.0	mA
		−40°C ≤ T_A ≤ +125°C			23.5	mA
INPUT CAPACITANCE	C_{IN}					
Differential				6		pF
Common Mode				9		pF
DYNAMIC PERFORMANCE						
Slew Rate	SR	G = 1, R_L = 10 kΩ		41		V/µs
Gain Bandwidth Product	GBP	G = 1		50		MHz
Settling Time, 0.01%		G = ±1, 2 V step		0.2		µs
Overload Recovery Time		V_{IN} × G = 1.2 V^+		0.1		µs
Total Harmonic Distortion + Noise	THD + N	G = 1, R_L = 600 Ω, f = 1 kHz, V_{IN} = 2 V p-p		0.0006		%
NOISE PERFORMANCE						
Voltage Noise Density	e_n	f = 10 kHz		5		nV/√Hz
		f = 100 kHz		4.5		nV/√Hz
Current Noise Density	i_n	f = 10 kHz		4		fA/√Hz

ABSOLUTE MAXIMUM RATINGS

Absolute maximum ratings apply at 25°C, unless otherwise noted.

Table 3.

Parameter	Rating
Supply Voltage	6.0 V
Input Voltage	GND to V_S + 0.3 V
Differential Input Voltage	±6.0 V
Output Short-Circuit Duration to GND	Indefinite
Electrostatic Discharge (HBM)	4000 V
Storage Temperature Range	
RM, R Package	−65°C to +150°C
Operating Temperature Range	−40°C to +125°C
Junction Temperature Range	
RM, R Package	−65°C to +150°C
Lead Temperature (Soldering, 10 sec)	300°C

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, a device soldered in a circuit board for surface-mount packages.

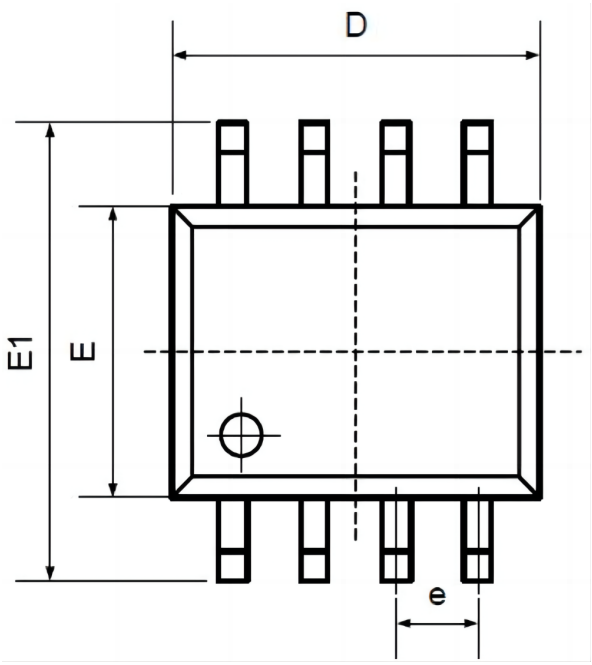
Table 4. Thermal Resistance

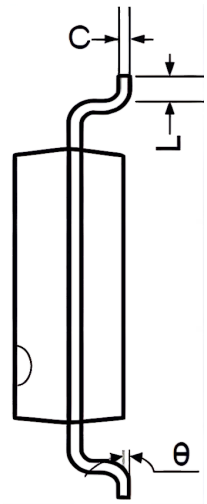
Package Type	θ_{JA}	θ_{JC}	Unit
8-Lead MSOP (RM)	210	45	°C/W
8-Lead SOIC_N (R)	158	43	°C/W

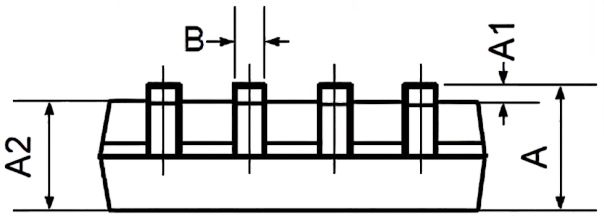
Order information

Order Number	Package	Package Quantity	Marking On The park
AD8652ARZ-REEL-TUDI	SOP8	Tape,Reel,2500	AD8652ARZ-REEL

Package SOP8







Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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