



AiP221/AiP321

Single Operational Amplifiers

Product Specification

Specification Revision History:

Version	Date	Description
2020-07-A1	2020-07	New
2022-01-A2	2022-01	Modify ordering information
2022-03-A3	2022-03	Modify supply voltage range
2023-02-B1	2023-02	Update the template
2023-06-B2	2023-06	Modify parameters



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1、General Description

AiP221/AiP321 is a single high-gain frequency-compensated operational amplifier designed to operate from a single supply over a wide range of voltages. Operation from dual supplies is also possible. Under recommended operating conditions, the power supply current remains independent of the supply voltage. Application includes sensing amplifiers, audio amplifiers, industrial control circuits, DC gain components and all scenarios employing conventional operational-amplifier circuits.

Features:

- Wide supply ranges
Single supply: 3V~36V
Dual suppliers: $\pm 1.5V \sim \pm 18V$
- Low supply-current drain independent of supply voltage: 0.7mA Typical
- Wide unity gain bandwidth: 0.7MHz
- Built-in frequency compensation
- Low input bias and offset parameters
Input offset voltage: 3mV typical
Input offset current: 2nA typical
Input bias current: 20nA
- Differential input voltage range equal to maximum-rated supply voltage: $\pm 36V$
- Open-loop differential voltage gain: 100dB typical
Packaging form: SOT23-5

Ordering Information:

Reel packing specifications:

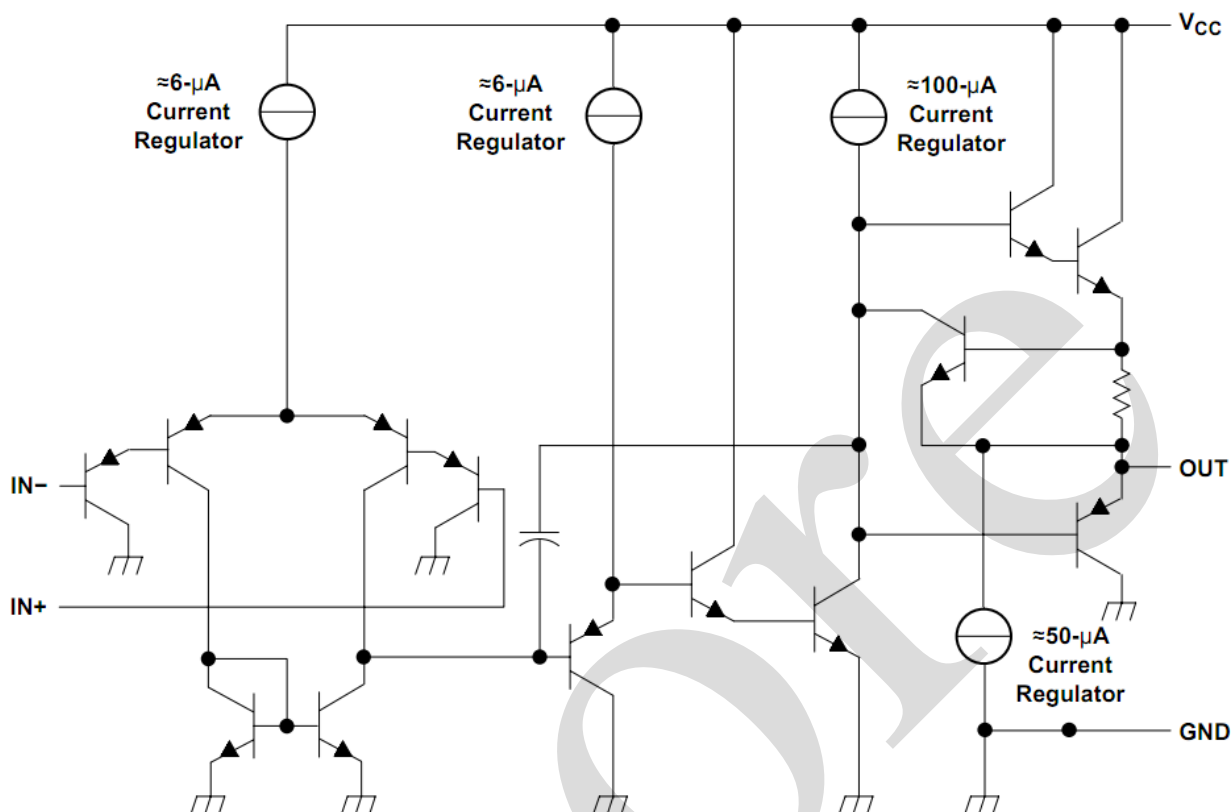
Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP221GB235.TR	SOT23-5	221	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP321GB235.TR		321			

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.

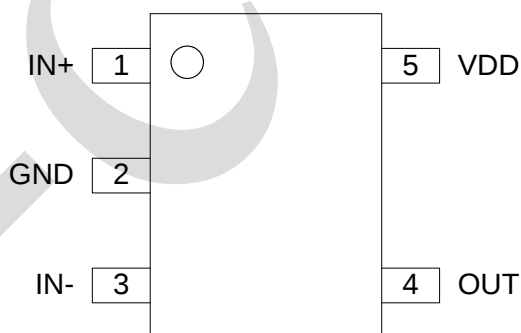


2、Block Diagram And Pin Description

2.1、Block Diagram



2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	IN+	Positive input
2	GND	Ground
3	IN-	Negative input
4	OUT	Output
5	V _{CC}	Power supply



3、Electrical Parameter

3.1、Absolute Maximum Ratings

(T_{amb}=25℃, unless otherwise specified)

Characteristic	Symbol	Conditions	Value	Unit
Power supply voltage	V _{CC}	-	40 or ±20	V
Differential input voltage	V _{ID}	-	±40	V
Input voltage	V _I	-	-0.3 to 40	V
Thermal resistance	θ _{JA}	-	260	℃/W
Operating virtual junction temperature	T _J	-	150	℃
Storage temperature	T _{stg}	-	-65 to 150	℃
Soldering temperature	T _L	10s	260	℃

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Power supply voltage	V _{CC}	-		3	-	36	V
Common-mode voltage	V _{CM}	-		0	-	V _{CC} -2	V
Ambient temperature	T _{amb}	-	AiP221	-40	-	125	°C
			AiP321	-40	-	85	

3.3、Electrical Characteristics

3.3.1、DC Characteristics

(V_{CC}=5V, T_{amb}=25℃, unless otherwise specified)

Parameter	Symbol	Conditions	T _{amb}	Value						Unit	
				AiP221			AiP321				
				Min.	Typ.	Max.	Min.	Typ.	Max.		
Input offset voltage	V _{IO}	V _{CC} =5V to 36V, V _{IC} =V _{ICR(min)} , V _O =1.4V	25°C	-	3	5	-	3	7	mV	
			Full range	-	-	7	-	-	9		
Input offset current	I _{IO}	V _O =1.4V	25°C	—	2	30	-	2	50	nA	
			Full range	-	-	100	-	-	150		
Input bias current	I _{IB}	V _O =1.4V	25°C	-	-20	-150	-	-20	-250	nA	
			Full range	-	-	-300	-	-	-500		
Common-mode input voltage range	V _{ICR}	V _{CC} =5V to 36V	25°C	0~V _{CC} -1.5	-	-	0~V _{CC} -1.5	-	-	V	
			Full range	0~V _{CC} -2	-	-	0~V _{CC} -2	-	-		
High-level output voltage	V _{OH}	RL≥2kΩ		25°C	3.5	-	-	3.5	-	-	V
		V _{CC} =36V	RL≥2kΩ	Full range	26	-	-	26	-	-	
			RL≥10kΩ	Full range	27	28	-	27	28	-	
Low-level output voltage	V _{OL}	RL≤10kΩ		Full range	-	5	20	-	5	20	mV
Large-signal	A _{VD}	V _{CC} =15V, V _O =1V		25°C	50	100	-	25	100	-	V/mV



differential voltage amplification		to 11V, $R_L \geq 2k\Omega$		Full range	25	-	-	15	-	-	
Common-mode rejection ratio	CMRR	$V_{CC}=5V$ to 36V, $V_{IC}=V_{ICR(min)}$		25℃	70	80	-	65	100	-	dB
Power supply rejection ratio	PSRR	$V_{CC}=5V$ to 36V		25℃	65	100	-	65	100	-	dB
Output current	I_O	$V_{CC}=15V$, $V_{ID}=1V$, $V_O=0$	Source	25℃	-20	-30	-	-20	-30	-	mA
				Full range	-10	-	-	-10	-	-	
		$V_{CC}=15V$, $V_{ID}=-1V$, $V_O=15V$	Sink	25℃	10	20	-	10	20	-	
				Full range	5	-	-	5	-	-	
		$V_{ID}=-1V$, $V_O=200mV$		25℃	12	30	-	12	30	-	uA
Short-circuit output current	I_{OS}	$V_{CC}=5V$, $V_O=0V$ $GND=-5V$		25℃	-	± 40	± 60	-	± 40	± 60	mA
Supply current	I_{CC}	$V_O=2.5V$, No load		Full range	-	0.7	1.2	-	0.7	1.2	mA
		$V_{CC}=36V$, $V_O=0.5V_{CC}$, No load		Full range	-	1	2	-	1	2	
Slew rate	SR	$V_{CC}=\pm 18V$, $R_L=1M\Omega$, $C_L=30pF$, $V_I=\pm 10V$		Full range	-	0.3	-	-	0.3	-	V/us
Gain-bandwidth product	GBP	$V_{CC}=\pm 18V$, $R_L=1M\Omega$, $C_L=20pF$		Full range	-	0.7	-	-	0.7	-	MHz
Equivalent noise	e_N	$V_{CC}=\pm 18V$, $R_S=100\Omega$, $f=1kHz$, $V_I=0V$		Full range	-	40	-	-	40	-	$nV/\sqrt{Hz}$



4、Testing Circuit

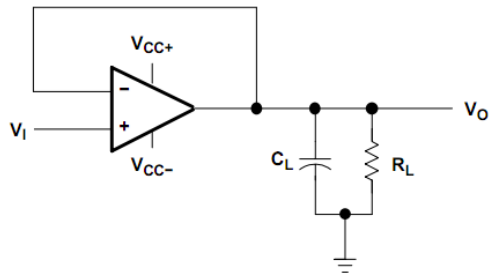


Figure 1. Unity-gain amplifier

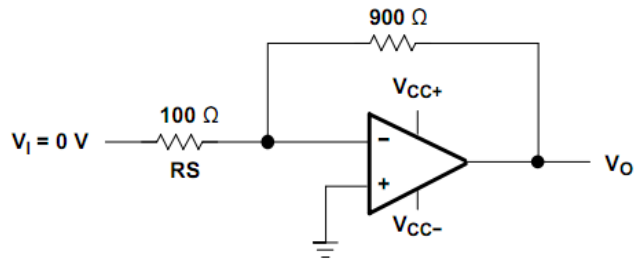
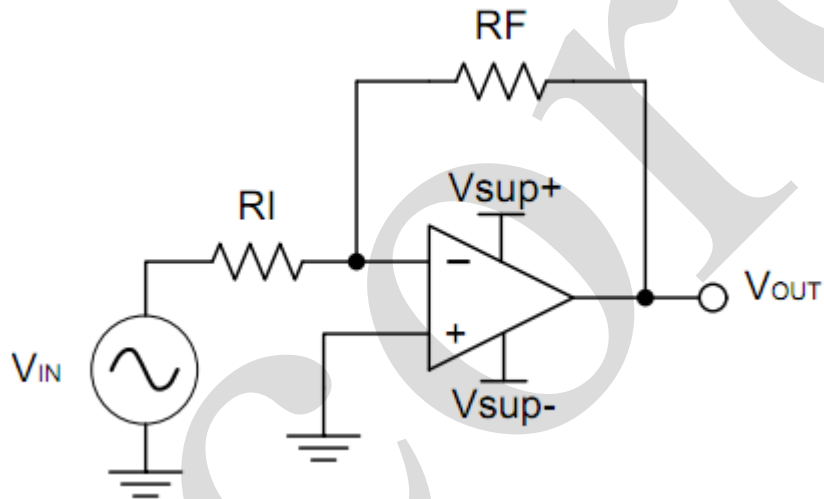


Figure 2. Noise-test circuit

5、Typical Application Circuit

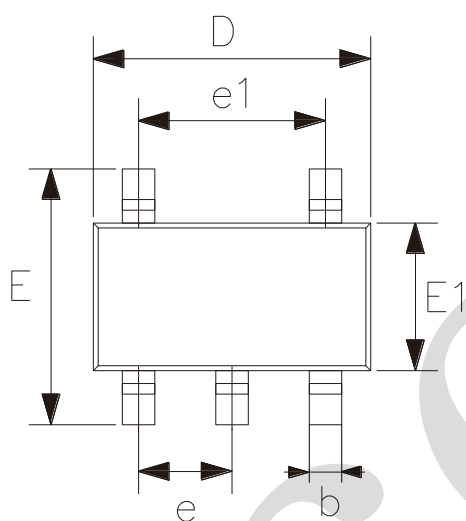
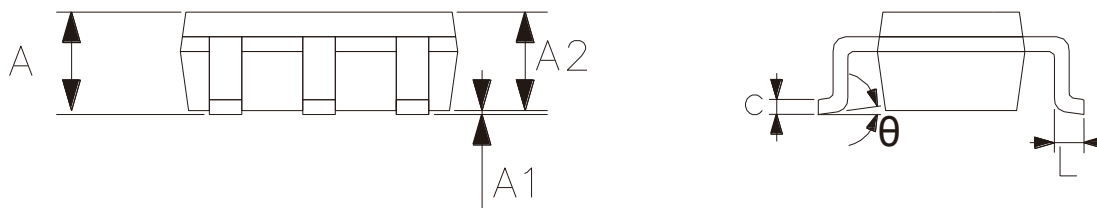
5.1、Application Circuit





6、Package Information

6.1、SOT23-5



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	—	1.26
A1	0.00	0.12
A2	1.00	1.20
b	0.30	0.50
c	0.10	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95	
e1	1.80	2.00
L	0.30	0.60
θ	0°	8°



7、Statements And Notes

7.1、The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

7.2、Notes

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