OPA301AIDBVR-TP

150MHz Rail-to-Rail Output CMOS Operational Amplifier

Features

- Supply Range：2.5V to 5.5V
- Rail-to-Rail Input and Output: 2mV Typical V_{OS}
- High Speed
  150MHz, –3dB Bandwidth (G=+1)
  130V/μs, Slew Rate
  58ns Settling Time to 0.1% with 2V Step
- Operating Temperature: -40°C ~ +125°C
- Type Package:SOT23-5

Applications

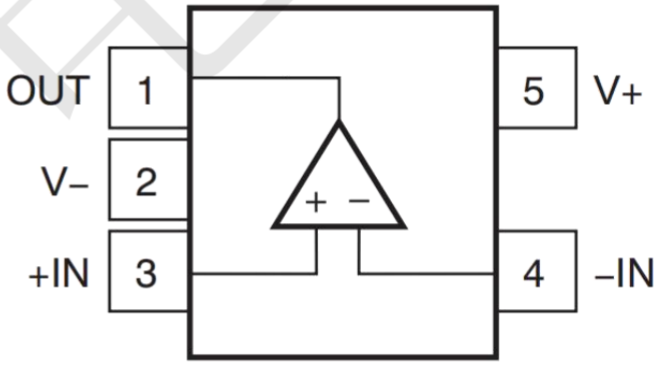
- Temperature Sensors
- Battery-Powered Instruments
- Smoke/Gas/Environment Sensors
- Medical Equipment
- Portable Instruments and Mobile Device
- Active Filters
- Piezo Electrical Transducer Amplifier
- Sensor Interface
- Handheld Test Equipment

General Description

They have bandwidth and slew rate typically found in current feedbackamplifiers. All have a wide input common-mode voltage range and outputvoltage swing, making them easy to use on single supplies as low as 2.5V.

These features make the ideal for portable and battery-powered applications where size and power arecritical. All are specified over the extended –40°C to +125°C temperature range.

Pinout (top view)



Pin Configurations

Pin Number	Pin Name	Pin Function
1	OUT	Output
2	V-	Chip Supply Voltage(Negative)/GND
3	+IN	In-phase input
4	-IN	Reverse input
5	V+	Chip Supply Voltage(Positive)/VDD

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)

Parameter		Value	Unit
Supply Voltage V+ to V-		7.5	V
Common-Mode input Voltage		(-Vs)-0.5～(+Vs)+0.5	V
Storage Temperature Range		-65～+150	℃
Junction Temperature		160	℃
Operating Temperature Range		-55～+150	℃
Package thermal resistance @T_A=25 C θ_{JA}	SOT23-5	190	°C/W
Lead temperature range (Soldering 10 sec)		260	℃
ESD susceptibility	HBM	1000	V
	MM	400	V

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CAUTION

This integrated circuit can be damaged by ESD. Silicore Technology recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Electrical Characteristics

(Vs=+5V, G=+2, R_F=887Ω, R_L=150Ω, Unless otherwise specified.)

Parameter		Condition	Type	Min/Max Over Temperature					
			+25℃	+25℃	0~70℃	-40~85℃	-40~125℃	Units	Min/Max
Dynamic Performance	-3Db Small Signal Bandwidth	G=+1,Vo=0.1Vpp,R_F=24Ω,R_L=150Ω	180	--	--	--	--	MHz	Type
		G=+1,Vo=0.1Vpp,R_F=24Ω,R_L=1kΩ	150	--	--	--	--		
		G=+2,Vo=0.1Vpp,R_L=50Ω	40	--	--	--	--		
		G=+2,Vo=0.1Vpp,R_L=150Ω	80	--	--	--	--		
		G=+2,Vo=0.1Vpp,R_L=1kΩ	130	--	--	--	--		
		G=+2,Vo=0.1Vpp,R_L=10kΩ	160	--	--	--	--		
	Gain-Bandwidth Product	G=+10,R_L=150Ω	90	--	--	--	--		
		G=+10,R_L=1kΩ	120	--	--	--	--		
	Bandwidth for 0.1dB Flatness	G=+2,Vo=0.1Vpp,R_F=887Ω,R_L=150Ω	37	--	--	--	--		
	Slew Rate	G=+1,2V Output Step	93/-118	--	--	--	--	V/μs	Type
		G=+2,2V Output Step	116/-103	--	--	--	--		
		G=+2,4V Output Step	130/-130	--	--	--	--		
	Rise/Fall Time	G=+2,Vo=0.2Vpp,10% to 90%	4	--	--	--	--	ns	Type
		G=+2,Vo=2Vpp,10% to 90%	14	--	--	--	--		
	Settling Time to 0.1%	G=+2,2V Output Step	58	--	--	--	--		
	Overload Recovery Time	Vin.G=+Vs	18	--	--	--	--		
Noise/Distortion Performance	Harmonic Distortion 2nd-Harmonic	G=+2,f=1MHz,Vo=2Vpp,R_L=150Ω		--	--	--	--	dBc	Type
	3rd-Harmonic	G=+2,f=1MHz,Vo=2Vpp,R_L=150Ω		--	--	--	--		
	Input Voltage Noise	f=1MHz	8.1	--	--	--	--		Type
	Input Current Noise	f=1MHz		--	--	--	--		Type
	Differential Gain Error(NTSC)	G=+2,R_L=150Ω	0.03	--	--	--	--	%	
	Differential Phase Error(NTSC)	G=+2,R_L=150Ω	0.08	--	--	--	--	degree	Type

Electrical Characteristics (Cont.)

(Vs=+5V, G=+2, R_F=887Ω, R_L=150Ω, Unless otherwise specified.)

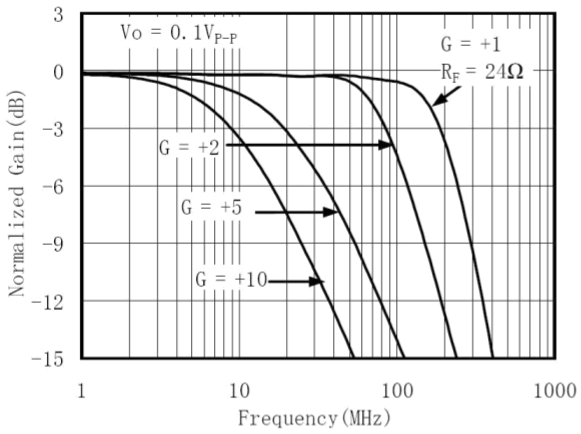
Parameter		Condition	Type	Min/Max Over Temperature					
			+25℃	+25℃	0~70℃	-40~85℃	-40~125℃	Units	Min/Max
DC Performance	Input Offset Voltage(V_{OS})		±2.0	±8.0	±8.9	±9.5	±9.8	mV	Max
	Input Offset Voltage Drift		4.4	--	--	--	--	μV/℃	Type
	Input Bias Current(I_B)		6	--	--	--	--	pA	Type
	Input Offset Current(I_{OS})		2	--	--	--	--		
	Open-Loop Gain (A_{OL})	Vo=0.3V to 4.7V,R_L=150Ω	80	75	74	74	73	dB	Type
		Vo=0.2V to 4.8V,R_L=1kΩ	104	92	91	91	80		
Input Characteristics	Input Common-Mode Voltage Range(VCM)		-0.2 to +3.8V	--	--	--	--	V	Type
	Common-Mode Rejection Ratio(CMRR)	VCM= -0.1V to +3.5V	80	66	65	65	62	dB	Min
Output Characteristics	Output Voltage Swing from Rail	R_L=150Ω	0.12	--	--	--	--	V	Type
		R_L=1kΩ	0.03	--	--	--	--		
	Output Current		130	100	95	90	84	mA	Min
	Closed-Loop Output Impedance	f<100kHz	0.08	--	--	--	--	Ω	Type
Power Supply	Operating Voltage Range		--	2.5	2.7	2.7	2.7	V	Min
			--	5.5	5.5	5.5	5.5	V	Max
	Quiescent Current (per amplifier)		2.3	2.9	3.4	3.8	4.0	mA	Max
	Supply Current when Disabled per amplifier		75	120	127	130	137	μA	Max
	Power Supply Rejection Ratio (PSRR)	ΔVs=+2.7V to +5.5V,V_{CM}=(-Vs)+0.5	80	67	67	65	62	dB	Min
Power-down Disable	Turn-On Time		236	--	--	--	--	ns	Type
	Turn-Off Time		52	--	--	--	--	ns	Type
	$\overline{Disable}$ Voltage-Off		--	0.8	--	--	--	V	Max
	$\overline{Disable}$ Voltage-On		--	2.0	--	--	--	V	Min

Specifications subject to change without notice.

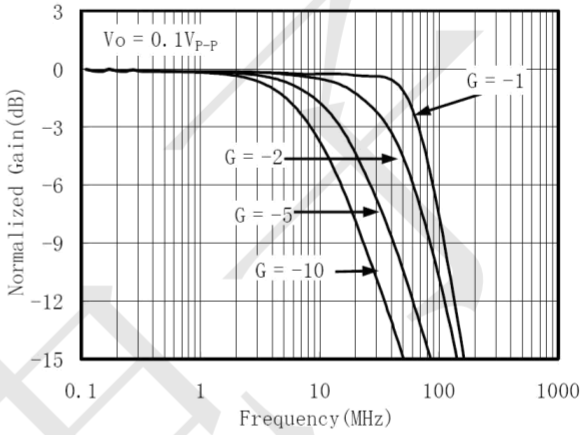
TYPICAL CHARACTERISTICS

(At T_A= +25℃, V_S = +5V, G = +2, R_F = 887Ω, R_G = 887Ω, and R_L = 150Ω connected to Vs/2,Unless otherwise noted.)

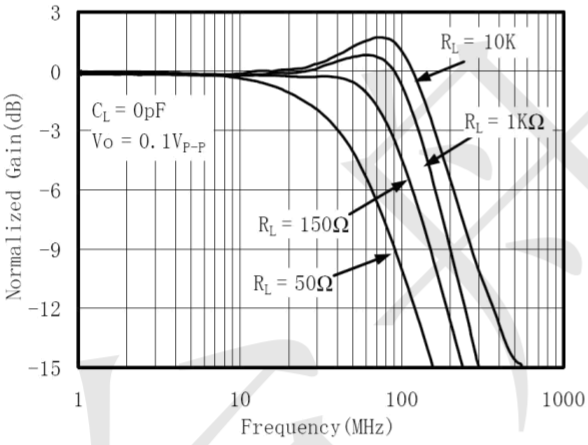
Non-Inverting Small Signal Frequency Response



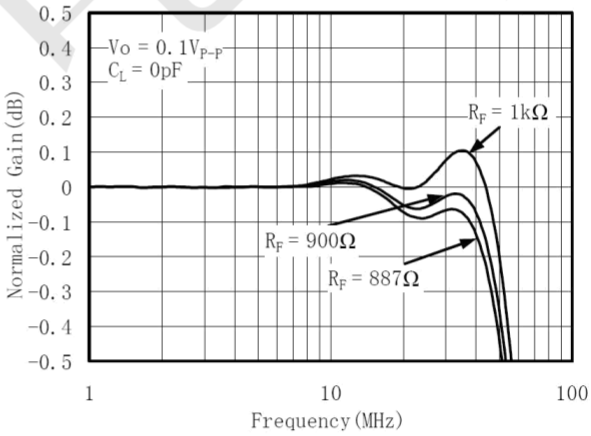
Inverting Small Signal Frequency Response



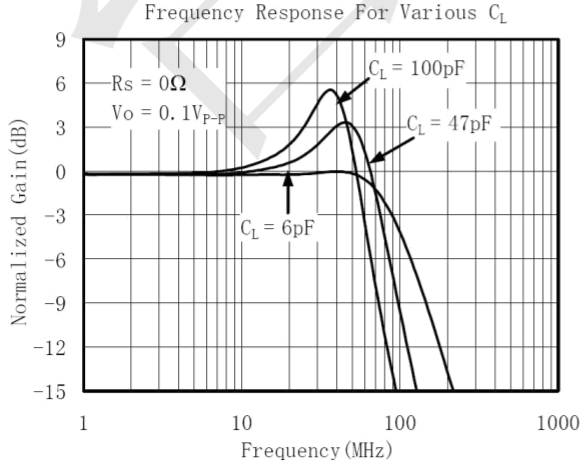
Frequency Response For Various R_L



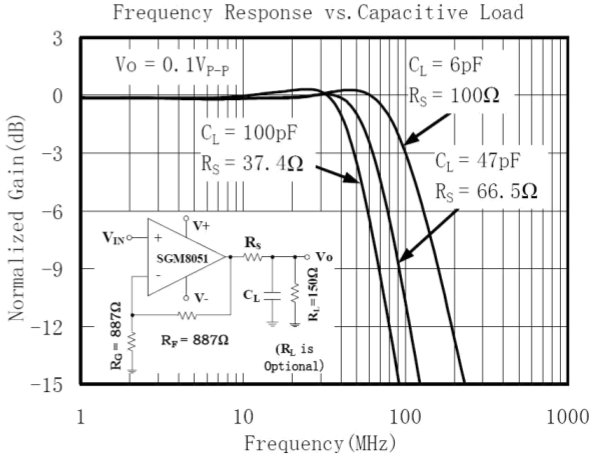
0.1dB Gain Flatness For Various R_F



Frequency Response For Various C_L

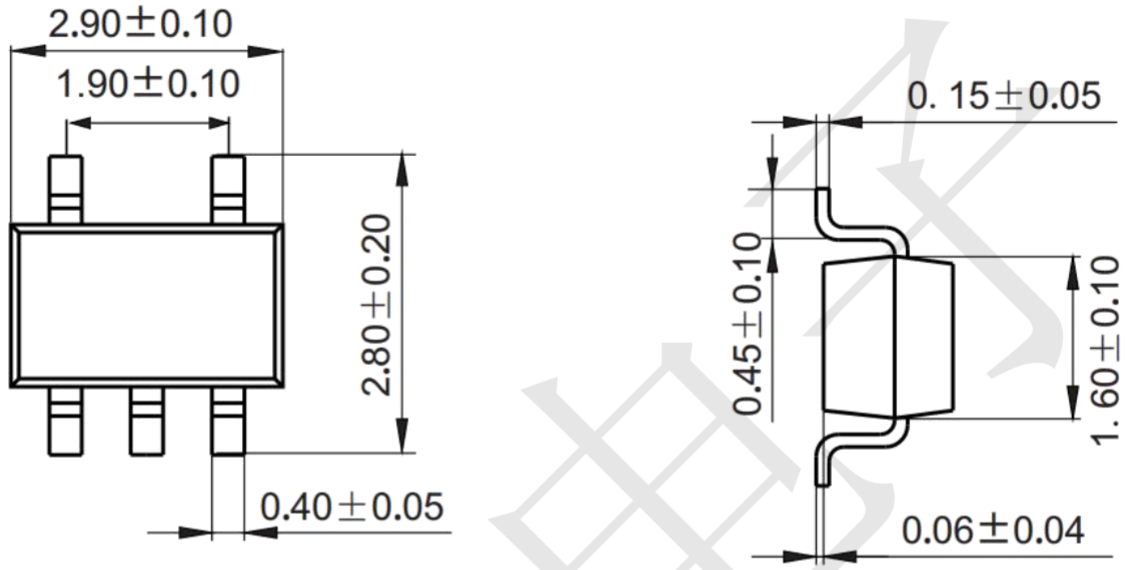


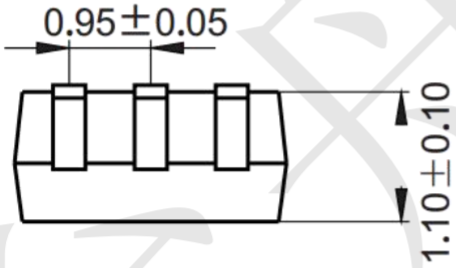
Frequency Response vs. Capacitive Load



Package information (Unit: mm)

SOT23-5 (Unit: mm)





Mounting Pad Layout (unit: mm)

