Operational Amplifiers

The αRD101ASH5U is a general purpose operational amplifier which features improved performance over industry standards such as the LM709. Advanced processing techniques make possible an order of magnitude reduction in input currents, and a redesign of the biasing circuitry reduces the temperature drift of input current.This amplifier offers many features which make its application nearly foolproof: overload protection on the input and output, no latch-up when the common mode range is exceeded,and freedom from oscillations and compensation with a single 30 pF capacitor. It has advantages over internally compensated amplifiers in that the frequency compensation can be tailored to the particular application. For example, in low frequency circuits it can be overcompensated for increased stability margin. Or the compensation can be optimized to give more than a factor of ten improvement in high frequency performance for most applications.In addition, the device provides better accuracy and lower noise in high impedance circuitry. The low input currents also make it particularly well suited for long interval integrators or timers, sample and hold circuits and low frequency waveform generators.Further, replacing circuits where matched transistor pairs buffer the inputs of conventional IC op amps, it can give lower offset voltage and a drift at a lower cost.

Features

-
- Offset voltage 3 mV maximum over temperature
- Input current 100 nA maximum over temperature
- Offset current 20 nA maximum over temperature
- Guaranteed drift characteristics
- Offsets guaranteed over entire common mode and supply voltage ranges
- Slew rate of 10V/us as a summing amplifier
- High RadHard. . . . . 10^5 rad

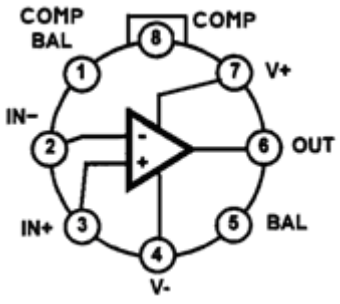
Ordering information

Part	Mark.	Temp., °C	Package	Package drawing
αRD101A/C5B	101A5U	-60 to +125	8-lead metal can	SH-8
αRD201A/C5D	101A5U	-60 to +125		
αRD301A/C5J	301A5a	0 to +70		

Notes: 1. This Pb-free hermetic packaged products employ 100% Au plate, which is RoHS.

Pinout

8-lead metal can
Top View



Package pinout

Absolute Maximum Ratings

Supply Voltage	±22V
Differential Input Voltage	±30V
Input Voltage(Note 2)	±15V
Ouput Short Circuit Duration(Note 3)	Continuous
Total Power	750mW
Storage Temperature Range	-65°C <Ta<+150°C
ESD Tolerance(Note 4)	3500V

Notes:

2. The maximum power dissipation must be derated at elevated temperatures and is dictated by Tjmax (maximum junction temperature), ThetaJA (package junction to ambient thermal resistance), and TA (ambient temperature). The maximum allowable power dissipation at any temperature is Pdmax = (Tjmax - TA)/ThetaJA or the number given in the Absolute Maximum Ratings, whichever is lower.
3. For supply voltages less than +15V, the absolute maximum input voltage is equal to the supply voltage.
4. Human body model, 100 pF discharged through 1.5k Ohms.

Thermal Information

Thermal Resistance (typical)	θ_{JA} = 170 °C/W (note 1)
	θ_{JC} = 85 °C/W (note 2)
Maximum Junction Temperature	150°C
Lead Temperature (Soldering, 10 seconds)	300°C

Notes:

5. θ_{JA} is measured with component on an evaluation PC board in free air
6. For θ_{JC} "case temp" location is the center of metal can

Electrical Specifications

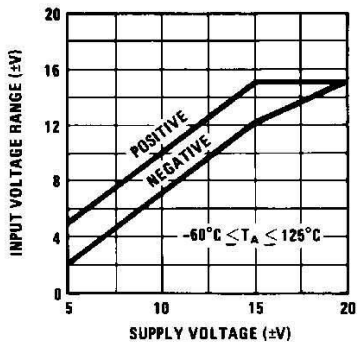
V_{SUPPLY} = ± 15 V

Parameter	Temp., °C	αRD101A/C5B αRD201A/C5D			αRD301A/C5J			Units
		Min	Typ	Max	Min	Typ	Max	
Input Characteristics								
Input Offset Voltage , Rs ≤ 50kΩ	25	-2	0.5	2	-2	0.5	2	mV
	Tmax	-3	-	3	-3	-	3	
	Tmin	-3	-	3	-3	-	3	
Offset Voltage Drift , Rs ≤ 50kΩ		-15	10	15	-15	10	15	µV/°C
Input Bias Current	25	-	30	75	-	30	75	nA
	Tmax	-	15	75	-	20	75	
	Tmin	-	45	100	-	35	100	
Input Offset Current	25	-10	-	10	-10	-	10	nA
	Tmax	-10	-	10	-10	-	10	
	Tmin	-20	-	20	-20	-	20	
Offset Current Drift	25 to Tmax	-0.1	0.05	0.1	-0.1	0.05	0.1	nA/°C
	Tmin to 25	-0.2	0.07	0.2	-0.2	0.07	0.2	

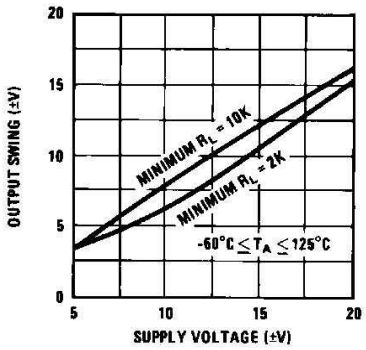
Parameter	Temp., °C	αRD101A/C5B αRD201A/C5D			αRD301A/C5J			Units
		Min	Typ	Max	Min	Typ	Max	
Maximum Common Mode Voltage,R_L=2kΩ	25	+11	+13	-	+11	+13	-	V
	Tmax	+11	+13	-	+11	+13	-	
	Tmin	+11	+13	-	+11	+13	-	
Minimum Common Mode Voltage	25	-	-13	-11	-	-13	-11	V
	Tmax	-	-13	-11	-	-13	-11	
	Tmin	-	-13	-11	-	-13	-11	
Input Resistance	25	1.5	4	-	1.5	4	-	kΩ
Transfer characteristics								
Large Signal Voltage Gain V_{OUT}=±10V,R_L=2kΩ	25	80	160	-	80	160	-	kV/V
	Tmax	80	160	-	80	160	-	
	Tmin	40	80	-	40	80	-	
Common Mode Rejection Ratio , Rs ≤ 50kΩ	25	80	96	-	80	96	-	dB
	Tmax	80	85	-	80	85	-	
	Tmin	80	85	-	80	85	-	
Power Supply Characteristics								
Supply Current	25	-	1.5	2.0	-	1.5	2.0	mA
	Tmax	-	1.2	2.0	-	1.2	2.0	
	Tmin	-	2.0	3.0	-	2.0	3.0	
Supply Voltage Rejection Ratio, Rs ≤ 50kΩ	25	80	96	-	70	96	-	dB

Typical Performance Characteristics

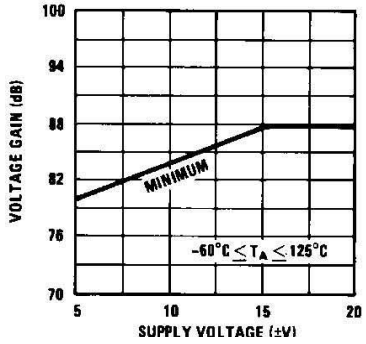
Input Voltage Range



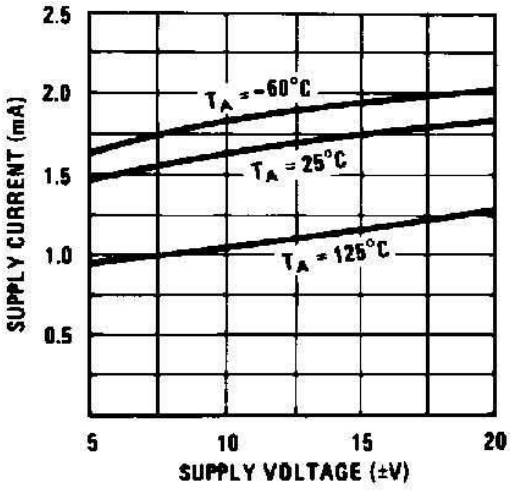
Output Swing



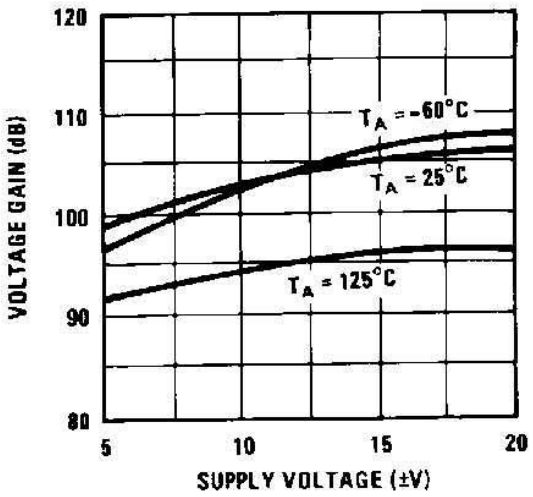
Voltage Gain



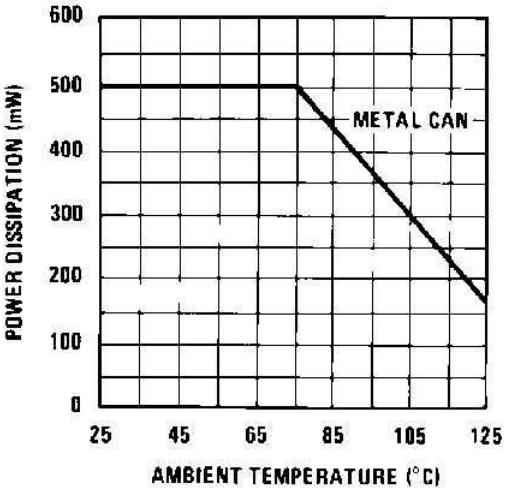
Supply Current



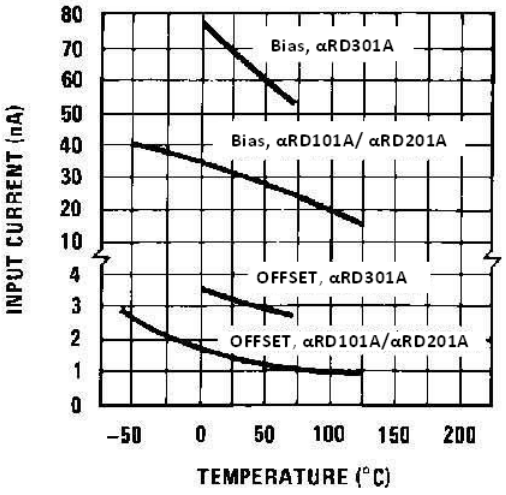
Voltage Gain



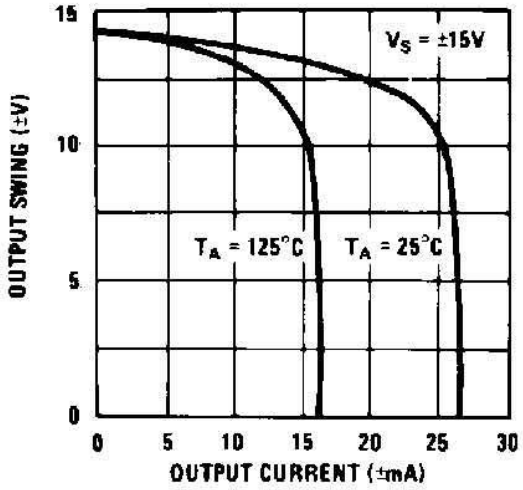
Maximum Power Dissipation



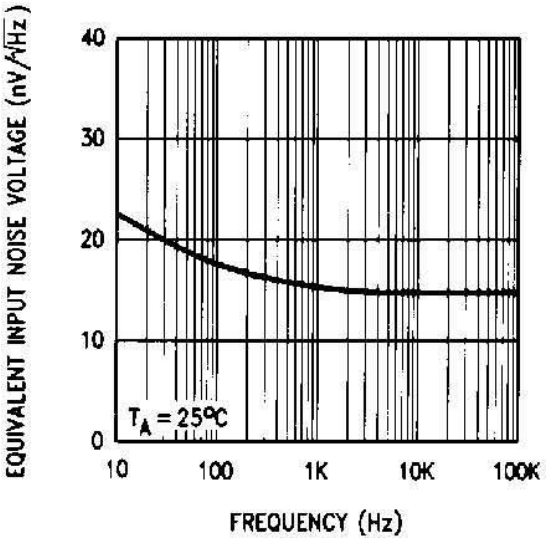
Input Current,



Current Limiting



Input Noise Voltage

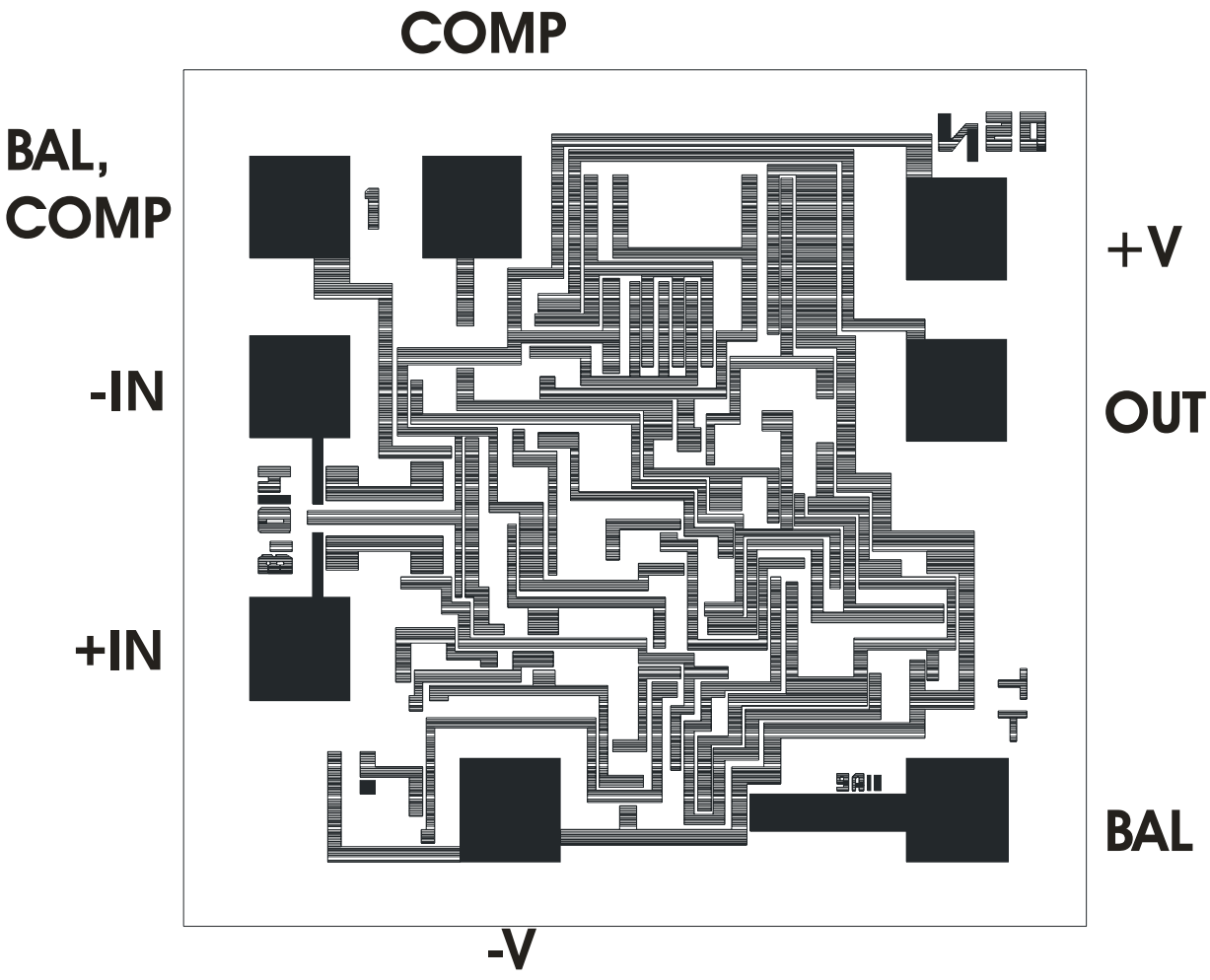


Die Characteristics

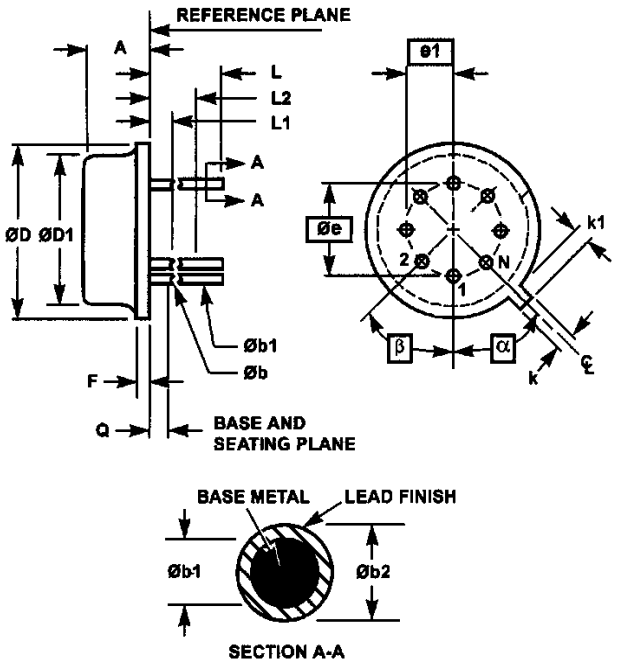
Die dimensions:
1.3x1.2± 0.1 mm,
51x47 ± 4 mils.
Wafer thickness 0.46± 0.02 mm,
18 ± 1 mils.
Metallization:
type: Al, 1% Si,thickness: 1.4 ± 0.1 µm
Glassivation:
type: Phosphosilicate glass (PSG)
PSG thickness 1.2 ±0.2µm.

Worst case current density:
$8 \cdot 10^4$ A/cm^2.
Substrate potential(Powered Up):
Unbiased.
Transistor count:
24.
Process:
Bipolar epitaxial.

Metallization Mask layout



Metal Can Package



SH-8

8-lead metal can package

Symbol	Millimeters		Inches		Note
	MIN	MAX	MIN	MAX	
A	6.00	6.22	0.236	0.244	-
Øb	0.41	0.48	0.016	0.019	13
Øb1	0.41	0.53	0.016	0.021	13
Øb2	0.41	0.61	0.016	0.024	-
ØD	9.09	9.19	0.335	0.375	-
ØD1	8.23	8.43	0.305	0.335	-
Øe	0.200		5.08		-
e1	0.100		2.54		-
F	0.33	0.43	0.013	0.017	-
k	0.69	0.86	0.027	0.034	-
k1	0.69	1.14	0.027	0.045	14
L	13.0	14.0	0.512	0.552	13
L1	-	1.27	-	0.05	13
L2	6.35	6.85	0.250	0.270	13
Q	0.5	-	0.02	-	-
α	45°		45°		15
β	45°		45°		15
N	8		8		16

Notes:

- (All leads) Øb applies between L1 and L2. Øb1 applies between L2 and 0.500 from the reference plane. Diameter is uncontrolled in L1 and beyond 0.500 from the reference plane.
- Measured from maximum diameter of the product.
- α is the basic spacing from the centerline of the tab to terminal 1 and β is the basic spacing of each lead or lead position (N -1 places) from a, looking at the bottom of the package.
- N is the maximum number of terminal positions.
- Controlling dimension: millimeter.

All RD ALFA Microelectronics semiconductor products are manufactured, assembled and tested under ISO9001 quality systems certification.

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