- Low Input Currents
- Low Input Offset Parameters
- Frequency and Transient Response Characteristics Adjustable
- Short-Circuit Protection
- Offset-Voltage Null Capability
- No Latch-Up
- Wide Common-Mode and Differential Voltage Ranges
- Same Pin Assignments as uA709
- Designed to be Interchangeable with National Semiconductor LM101A and LM301A

description

The LM101A, LM201A, and LM301A are highperformance operational amplifiers featuring very low input bias current and input offset voltage and current to improve the accuracy of highimpedance circuits using these devices. The high common-mode input voltage range and the absence of latch-up make these amplifiers ideal for voltage-follower applications. The devices are protected to withstand short circuits at the output. The external compensation of these amplifiers allows the changing of the frequency response (when the closed-loop gain is greater then unity) for applications requiring wider bandwidth or higher slew rate. A potentiometer may be connected between the offset-null inputs (N1 and N2), as shown in Figure 7, to null out the offset voltage.

The LM101A is characterized for operation over the full military temperature range of -55° C to 125° C, the LM201A is characterized for operation from -25° C to 85° C, and the LM301A is characterized for operation from 0°C to 70°C.

symbol



PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.







AVAILABLE OPTIONS									
		PACKAGE							
ТА	VIO MAX at 25°C	SMALL OUTLINE	CHIP CARRIER	CERAMIC DIP	PLASTIC DIP	FLAT PACK	FLAT PACK		
		(D)	(FK)	(JG)	(P)	(U)	(W)		
0°C to 70°C	7.5 mV	LM301AD	-	-	LM301AP	-	-		
-25°C to 85°C	2 mV	LM201AD	-	-	LM201AP	-	-		
-55°C to 125°C	2 mV	LM101AD	LM101AFK	LM101AJG	LM101AP	LM101AU	LM101AW		

The D package is available taped and reeled. Add the suffix R to the device type, (i.e., LM301ADR).

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

		LM101A	LM201A	LM301A	UNIT
Supply voltage V _{CC+} (see Note 1)	22	22	18	V	
Supply voltage V _{CC} – (see Note 1)		-22	-22	-18	V
Differential input voltage (see Note 2)		±30	±30	±30	V
Input voltage (either input, see Notes 1 and 3)		±15	±15	±15	V
Voltage between either offset null terminal (N1/N2) and V_{CC-}			-0.5 to 2	-0.5 to 2	V
Duration of output short-circuit (see Note 4)	unlimited	unlimited	unlimited		
Continuous total power dissipation	See Dissipation Rating Table				
Operating free-air temperature range	-55 to 125	-25 to 85	0 to 70	°C	
Storage temperature range	-65 to 150	-65 to 150	-65 to 150	°C	
Case temperature for 60 seconds: FK package					°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	JG, U, or W package	300			°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	D or P package	260	260	260	°C

NOTES: 1. All voltage values, unless otherwise noted, are with respect to the midpoint between V_{CC+} and V_{CC-}.

2. Differential voltages are at the noninverting input terminal with respect to the inverting input terminal.

3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 V, whichever is less.

4. The output may be shorted to ground or either power supply. For the LM101A only, the unlimited duration of the short-circuit applies at (or above) 125°C case temperature or 75°C free-air temperature. For the LM201A only, the unlimited duration of the short-circuit applies at (or below) 85°C case temperature or 75°C free-air temperature.

DISSIPATION RATING TABLE

PACKAGE	T _A ≤ 25°C	DERATING	DERATE	T _A = 70°C	T _A = 85°C	T _A = 125°C
	POWER RATING	FACTOR	ABOVE TA	POWER RATING	POWER RATING	POWER RATING
D	500 mW	5.8 mW/°C	64°C	464 mW	377 mW	145 mW
FK	500 mW	11.0 mW/°C	105°C	500 mW	500 mW	275 mW
JG	500 mW	8.4 mW/°C	90°C	500 mW	500 mW	210 mW
Р	500 mW	8.0 mW/°C	87°C	500 mW	500 mW	200 mW
U	500 mW	5.4 mW/°C	57°C	432 mW	351 mW	135 mW
W	500 mW	8.0 mW/°C	87°C	500 mW	500 mW	200 mW

recommended operating conditions

	MIN	MAX	UNIT
Supply voltage, V _{CC+}	5	18	v
Supply voltage, V _{CC} _	-5	-18	



DADAMETED		TFOT CONDITIONOT		LM101A, LM201A			LM301A				
	PARAMETER	TEST COND	ITIONS	MIN	TYP	MAX	MIN	TYP	MAX	UNIT	
	hannel a ffa a beachta an		25°C		0.6	2		2	7.5		
VIO	Input offset voltage	AO = 0	Full range			3			10	mv	
αΛΙΟ	Average temperature coefficient of input offset voltage	V _O = 0	Full range		3	15		6	30	μV/°C	
luo.	Input offset current		25°C		1.5	10		3	50		
UO	input onset current		Full range			20			70	nA	
		$T_A = -55^{\circ}C$ to $25^{\circ}C$			0.02	0.2					
ano	Average temperature coefficient of	$T_A = 25^{\circ}C$ to MAX	(0.01	0.1				~ ^ /0 C	
~IIO	input offset current	$T_A = 0^{\circ}C$ to $25^{\circ}C$						0.02	0.6	na/°C	
		$T_A = 25^{\circ}C$ to $70^{\circ}C$;					0.01	0.3		
lun	Input bias current		25°C		30	75		70	250		
чв			Full range			100			300	0 ^{nA}	
VICR	Common-mode input voltage range	See Note 6	Full range	±15			±12			V	
	Maximum peak-to-peak output voltage swing	$V_{CC\pm} = \pm 15 V$,	25°C	24	28		24	28			
.,		$R_L = 10 \ k\Omega$	Full range	24			24			V	
VOPP		$V_{CC\pm} = \pm 15 V$,	25°C	20	26		20	26			
V _{OPP}		$R_L = 2 k\Omega$	Full range	20			20				
AVD	Large-signal differential voltage	$V_{CC\pm} = \pm 15 V,$ $V_{O} = \pm 10 V.$	25°C	50	200		25	200		\//m\/	
, vD	amplification	$R_L \ge 2 k\Omega$	Full range	25			15			V/IIIV	
ri	Input resistance		25°C	1.5	4		0.5	2		MΩ	
			25°C	80	98		70	90		dB	
CMRR	Common-mode rejection ratio	VIC = VICR min	Full range	80			70				
ka u	Supply voltage rejection ratio		25°C	80	98		70	96		dB	
*SVR	$(\Delta V_{CC}/\Delta V_{IO})$		Full range	80			70				
	Supply current	No load, $V_O = 0$,	25°C		1.8	3		1.8	3	3	
		See Note 6	MAX		1.2	2.5				ma	

electrical characteristics at specified free-air temperature, C_C = 30 pF (see Note 5)

[†] All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified. Full range for LM101A is –55°C to 125°C, for LM201A is –25°C to 85°C, and for LM301A is 0°C to 70°C.

NOTES: 5. Unless otherwise noted, V_{CC±} = ±5 V to ±20 V for LM101A and LM201A, and V_{CC±} = ±5 V to ±15 V for LM301A. All typical values are at V_{CC±} = ±15 V.

6. For LM101A and LM201A, $V_{CC\pm} = \pm 20$ V. For LM301A, $V_{CC\pm} = \pm 15$ V.





TYPICAL CHARACTERISTICS

Figure 3

Figure 4





TYPICAL CHARACTERISTICS

TYPICAL APPLICATION DATA



Figure 7. Inverting Circuit with Adjustable Gain, Single-Pole Compensation, and Offset Adjustment





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