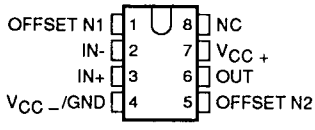
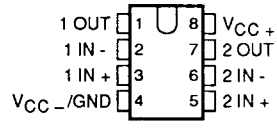
available features

- **Wide Gain-Bandwidth Product . . . 4.5 MHz**
- **High Slew Rate . . . 13 V/μs**
- **Fast Settling Time . . . 1.1 μs to 0.1 %**
- **Wide-Range Single-Supply Operation 4 V to 44 V**
- **Wide Input Common-Mode Range Includes Ground (V_{CC-})**
- **Low Total Harmonic Distortion . . . 0.02 %**
- **Low Input Offset Voltage . . . 3 mV Max (A Suffix)**
- **Large Output Voltage Swing – 14.7 V to 14 V (With ± 15-V Supplies)**
- **Large Capacitance Drive Capability 0 to 10,000 pF**
- **Excellent Phase Margin . . . 60°**
- **Excellent Gain Margin . . . 12 dB**
- **Output Short-Circuit Protection**

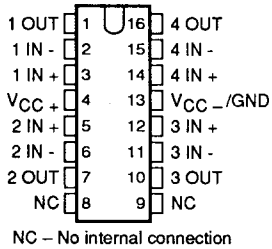
D-8 OR P PACKAGE
(SINGLE, TOP VIEW)



D-8 OR P PACKAGE
(DUAL, TOP VIEW)

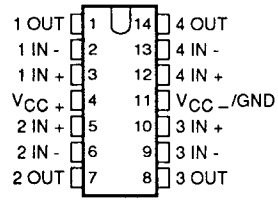


DW PACKAGE
(QUAD, TOP VIEW)



NC – No internal connection

N PACKAGE
(QUAD, TOP VIEW)



AVAILABLE OPTIONS

T_A	COMPLEXITY	PACKAGE			
		PLASTIC DIP		SMALL OUTLINE	
		STANDARD GRADE	PRIME GRADE	STANDARD GRADE	PRIME GRADE
0°C to 70°C	Single	TL34071P	TL34071AP	TL34071D	TL34071AD
	Dual	TL34072P	TL34072AP	TL34072D	TL34072AD
	Quad	TL34074N	TL34074AN	TL34074DW	TL34074ADW
– 40°C to 105°C	Single	TL33071P	TL33071AP	TL33071D	TL33071AD
	Dual	TL33072P	TL33072AP	TL33072D	TL33072AD
	Quad	TL33074N	TL33074AN	TL33074DW	TL33074ADW
– 55°C to 125°C	Single	TL35071P	TL35071AP	TL35071D	TL35071AD
	Dual	TL35072P	TL35072AP	TL35072D	TL35072AD
	Quad	TL35074N	TL35074AN	TL35074DW	TL35074ADW

D packages are available taped and reeled. Add "R" suffix to device type (e.g., TL34071ADR).

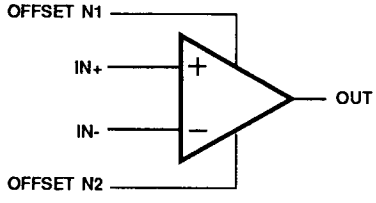
description

Quality, low cost, bipolar fabrication with innovative design concepts are employed for the TL33071/2/4, TL34071/2/4, and TL35071/2/4 series of monolithic operational amplifiers. This series of operational amplifiers offer 4.5 MHz of gain bandwidth product, 13 V/μs slew rate and fast settling time without the use of JFET device technology. Although this series can be operated from split supplies, it is particularly suited for single-supply operation, since the common-mode input voltage range includes ground potential (V_{CC-}). With a Darlington input stage, this series exhibits high input resistance, low input offset voltage, and high gain. The all-NPN output stage, characterized by no dead-band crossover distortion and large output voltage swing, provides high-capacitance drive capability, excellent phase and gain margins, low open-loop high-frequency output impedance, and symmetrical source/sink ac frequency response.

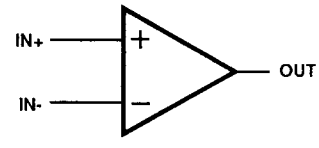
The TL33071/2/4, TL34071/1/4, and TL35071/2/4 series of devices are available in standard or prime performance (A-Suffix) grades and are specified over the commercial (0°C to 70°C), industrial/vehicular (– 40°C to 105°C) or military (– 55°C to 125°C) temperature ranges. These low-cost amplifiers are available in single, dual and quad configurations and are pin-compatible with the (low-cost) MC33071/2/4, MC34071/2/4, and MC35071/2/4 series of amplifiers. Packaging options include standard plastic DIP and SO packages.

symbol

SINGLE



DUAL AND QUAD
(PER AMPLIFIER)



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

Supply voltage, V_{CC+} (see Note 1) . . . . . 22 V
Supply voltage, V_{CC-} . . . . . −22 V
Differential input voltage (see Note 2) . . . . . ±44 V
Input voltage range, V_I (any input) . . . . . $V_{CC\pm}$
Input current, I_I (each input) . . . . . ±1 mA
Output current, I_O . . . . . ±80 mA
Total current into V_{CC+} terminal . . . . . 80 mA
Total current out of V_{CC-} terminal . . . . . 80 mA
Duration of short-circuit current at (or below) 25°C (see Note 3) . . . . . unlimited
Continuous total dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range, TA: TL3307_ . . . . . − 40°C to 105°C
TL3407_ . . . . . 0°C to 70°C
TL3507_ . . . . . − 55°C to125°C
Storage temperature range . . . . . − 65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D, DW, N, or P package . . . . . 260°C

NOTES: 1. All voltage values, except differential voltages, are with respect to the midpoint between V_{CC+} and V_{CC-}.
2. Differential voltages are at the noninverting input with respect to the inverting input. Excessive current will flow if input is brought below $V_{CC-} - 0.3$ V.
3. The output may be shorted to either supply. Temperature and/or supply voltages must be limited to ensure that the maximum dissipation rating is not exceeded.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 105°C$ POWER RATING	$T_A = 125°C$ POWER RATING
D-8	725 mW	5.8 mW/°C	464 mW	261 mW	145 mW
DW	1025 mW	8.2 mW/°C	656 mW	369 mW	205 mW
N	1150 mW	9.2 mW/°C	736 mW	414 mW	230 mW
P	1000 mW	8.0 mW/°C	640 mW	360 mW	200 mW

recommended operating conditions

		TL3307_		TL3407_		TL3507_		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
Supply voltage, $V_{CC\pm}$		± 2	± 22	± 2	± 22	± 2	± 22	V
Common-mode input voltage, V_{IC}	V_{CC} = 5 V	0	2.7	0	2.9	0	2.7	V
	$V_{CC\pm}$ = ±15 V	− 15	12.7	− 15	12.9	− 15	12.7	
Operating free-air temperature, T_A		− 40	105	0	70	− 55	125	°C

electrical characteristics at specified free-air temperature, $V_{CC\pm}$ = ±15 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A†	A SUFFIX			NON-A SUFFIX			UNIT
					MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IO}	Input offset voltage	V_{IC} = 0, V_O = 0, R_S = 50 Ω	V_{CC} = 5 V	25°C		0.5	3		1.5	5	mV
			V_{CC} = ±15 V	25°C		0.5	3		1.0	5	
				Full range			5			7	
α_{VIO}	Temperature coefficient of input offset voltage		V_{CC} = ±15 V	Full range		10			10		μV/°C
I_{IO}	Input offset current		V_{CC} = ±15 V	25°C		6	50		6	50	nA
				Full range			300			300	
I_{IB}	Input bias current		V_{CC} = 5 V	25°C		−0.8	−2		−0.8	−2	μA
				Full range			−2.3			−2.3	
			V_{CC} = ±15 V	25°C		−0.7	−1.5		−0.7	−1.5	
				Full range			−1.6			−1.6	
V_{ICR}	Common-mode input voltage range	R_S = 50 Ω		25°C	−15 V to 13.2 V			−15 V to 13.2 V			V
				Full range	−15 V to 12.8 V			−15 V to 12.8 V			
V_{OH}	High-level output voltage	V_{CC+} = 5 V, V_{CC-} = 0, R_L = 2 kΩ		25°C	3.7	4		3.7	4		V
		R_L = 10 kΩ		25°C	13.6	14		13.6	14		
		R_L = 2 kΩ		Full range	13.4			13.4			
V_{OL}	Low-level output voltage	V_{CC+} = 5 V, V_{CC-} = 0, R_L = 2 kΩ		25°C		0.1	0.3		0.1	0.3	V
		R_L = 10 kΩ		25°C		−14.7	−14.3		−14.7	−14.3	
		R_L = 2 kΩ		Full range			−13.5			−13.5	
A_{VD}	Large-signal differential voltage amplification	V_O = ±10 V, R_L = 2 kΩ		25°C	50	100		25	100		V/mV
				Full range	25			20			
I_{OS}	Short-circuit output current	Source: V_{ID} = 1 V, V_O = 0		25°C	−10	−30		−10	−30		mA
		Sink: V_{ID} = −1 V, V_O = 0			20	30		20	30		
CMRR	Common-mode rejection ratio	V_{IC} = V_{ICR} min, R_S = 50 Ω		25°C	80	97		70	97		dB
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{CC\pm}$ / ΔV_{IO})	$V_{CC\pm}$ = ±13.5 V to ±16.5 V, R_S = 100 Ω		25°C	80	97		70	97		dB
I_{CC}	Supply current (per channel)	V_O = 0, No Load		25°C		3.5	4.5		3.5	4.5	mA
				Full range			4.7			4.7	
		V_{CC+} = 5 V, V_{CC-} = 0, V_O = 0, No Load		25°C		3.4	4.4		3.4	4.4	
				Full range			4.6			4.6	

†Full range is 0°C to 70°C for the TL3407_ devices, −40°C to 105°C for the TL3307_ devices, and −55°C to 125°C for the TL3507_ devices.
‡All typical values are at T_A = 25°C.

operating characteristics at $V_{CC\pm}$ = ±15 V, T_A = 25°C

PARAMETER		TEST CONDITIONS		A SUFFIX			NON-A SUFFIX			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
SR+	Positive slew rate	V_I = −10 V to 10 V, R_L = 2 kΩ	A_V = 1	8	10		8	10		V/μs
SR−	Negative slew rate		A_V = −1		13			13		
	Settling time	A_{VD} = −1, 10-V Step	To 0.1%		1.1			1.1		μs
			To 0.01%		2.2			2.2		
V_n	Equivalent input noise voltage	f = 1 kHz, R_S = 100 Ω			32			32		nV/√Hz
I_n	Equivalent input noise current	f = 1 kHz			0.22			0.22		pA/√Hz
THD	Total harmonic distortion	V_O = 2 V to 20 V, R_L = 2 kΩ, A_{VD} = 10, f = 10 kHz			0.02			0.02		%
GBW	Gain-bandwidth product	f = 100 kHz		3.5	4.5		3.5	4.5		MHz
BW	Power bandwidth	R_L = 2 kΩ, $V_{O(PP)}$ = 20 V, A_{VD} = 1, THD = 5.0%			200			200		kHz
ϕ_m	Phase margin	R_L = 2 kΩ, C_L = 0			60°			60°		
		R_L = 2 kΩ, C_L = 300 pF			40°			40°		
	Gain margin	R_L = 2 kΩ, C_L = 0			12			12		dB
		R_L = 2 kΩ, C_L = 300 pF			4			4		
r_i	Differential input resistance	V_{IC} = 0			150			150		MΩ
C_i	Input capacitance	V_{IC} = 0			2.5			2.5		pF
	Channel separation	f = 10 kHz			120			120		dB
z_o	Open-loop output impedance	f = 1 MHz			30			30		Ω