LM348/LM248

Quad Operational Amplifier

Features

- LM741 OP Amp operating characteristics
- Low supply current drain
- Class AB output stage no crossover distortion
- Pin compatible with the LM324/LM248
- Low input offset voltage : 1mV Typ.
- Low input offset current : 4nA Typ.
- Low input bias current : 30nA Typ.
- Gain bandwidth (unity gain): 1.0MHz Typ.
- High degree of isolation between amplifiers: 120dB
- Overload protection for inputs and outputs

Description

TheLM348/LM248 is a true quad LM741. It consists of four independent, high-gain, internally compensated, low power operational amplifiers which have been designed to provide functional characteristics identical to those of the familiar LM741 operational amplifier. In addition the total supply current for all four amplifiers is comparable to the supply current of a single LM741 type OP Amp. Other features include input offset currents and input bias current which are much less than those of a standard LM741. Also, excellent isolation between amplifiers has been achieved by independently biasing each amplifier and using layout techniques which minimize thermal coupling.

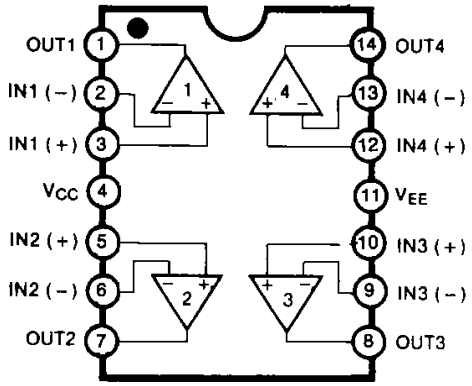
14-DIP



14-SOP



Internal Block Diagram

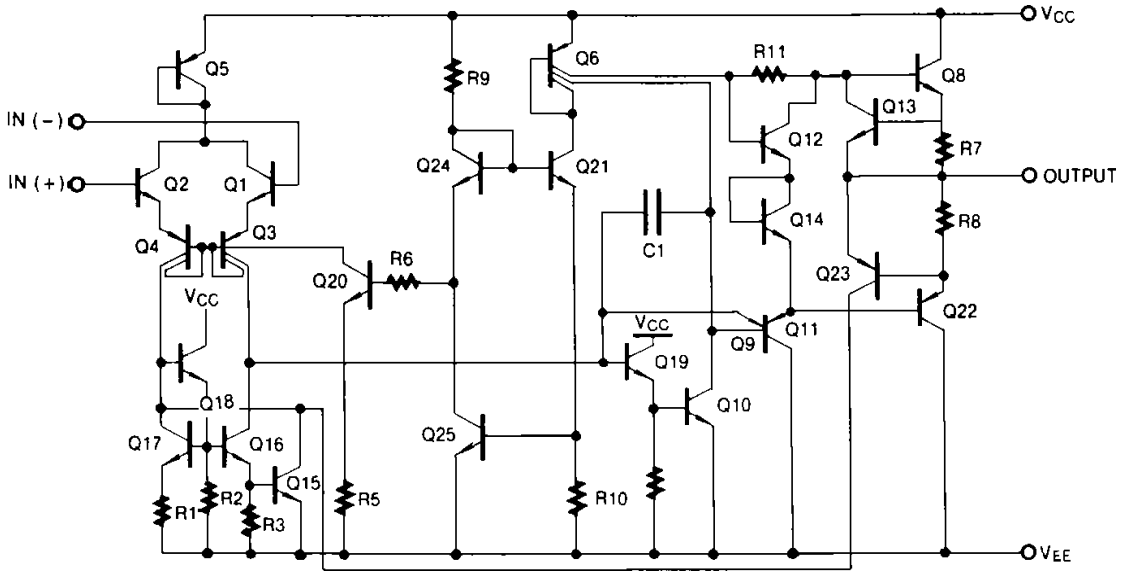


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Schematic Diagram

(One Section Only)



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	±18	V
Differential Input Voltage	$V_{I(DIFF)}$	36	V
Input Voltage	V_I	±18	V
Output Short Circuit Duration	-	Continuous	-
Operating Temperature LM348 LM248	T_{OPR}	 0 ~ +70 -25 ~ +85	°C
Storage Temperature	T_{STG}	- 65~ +150	°C

Electrical Characteristics

(V_{CC} =15V, V_{EE}= -15V, T_A=25 °C, unless otherwise specified)

Parameter	Symbol	Conditions		LM248			LM348			Unit
				Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	R_S≤10KΩ		-	1	6.0	-	1	6.0	mV
			Note 1	-	-	7.5	-	-	7.5	
Input Offset Current	I_{IO}			-	4	50	-	4	50	nA
			Note 1	-	-	125	-	-	100	
Input Bias Current	I_{BIAS}			-	30	200	-	30	200	nA
			Note 1	-	-	500	-	-	400	
Input Resistance	R_I	-		0.8	2.5	-	0.8	2.5	-	MΩ
Supply Current (all Amplifiers)	I_{CC}	-		-	2.4	4.5	-	2.4	4.5	mA
Large Signal Voltage Gain	G_V	R_L≥2KΩ		25	160	-	25	160	-	V/mV
			Note 1	15	-	-	15	-	-	
Channel Separation	CS	f = 1KHz to 20KHz		-	120	-	-	120	-	dB
Common Mode Input Voltage Range	$V_{I(R)}$	Note 1		±12	-	-	±12	-	-	V
Small Signal Bandwidth	BW	G_V = 1		-	1.0	-	-	1.0	-	MHz
Phase Margin (Note2)	MPH	G_V = 1		-	60	-	-	60	-	Degree
Slew Rate (Note2)	SR	G_V = 1		-	0.5	-	-	0.5	-	V/μs
Output Short Circuit Current	I_{SC}	-		-	25	-	-	25	-	mA
Output Voltage Swing	$V_{O(P-P)}$	R_L≥10KΩ	Note 1	±12	±13	-	±12	±13	-	V
		R_L≥2KΩ		±10	±12	-	±10	±12	-	
Common Mode Rejection Ratio	CMRR	R_S≥10KΩ	Note 1	70	90	-	70	90	-	dB
Power Supply Rejection Ratio	PSRR	R_S≥10KΩ	Note 1	77	96	-	77	96	-	dB

Note :

1. LM348: 0 ≤ T_A ≤ +70 °C , LM248: -25 ≤ T_A ≤ +85 °C
2. Guaranteed by design.

Typical Performance Characteristics

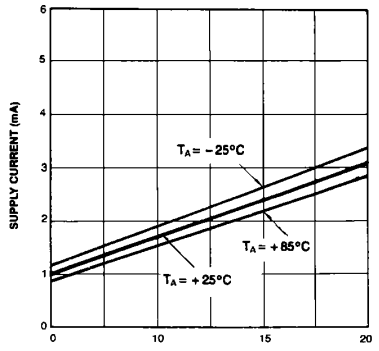


Figure 1. Supply Current vs Supply voltage

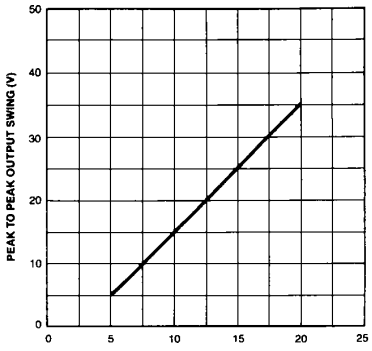


Figure 2. Output Voltage Swing vs Supply voltage

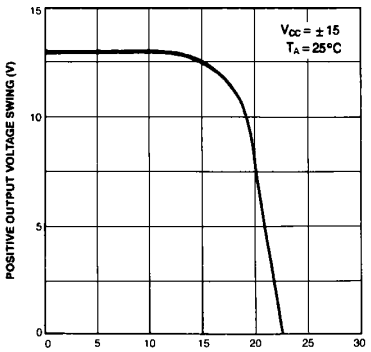


Figure 3. Output voltage swing vs Source Current (mA)

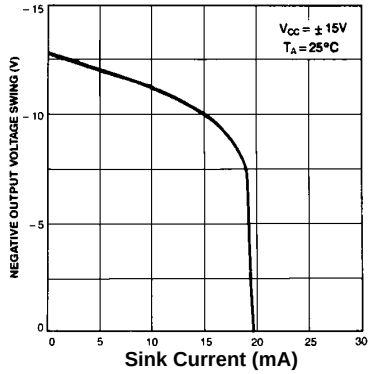


Figure 4. Output voltage swing vs Sink Current (mA)

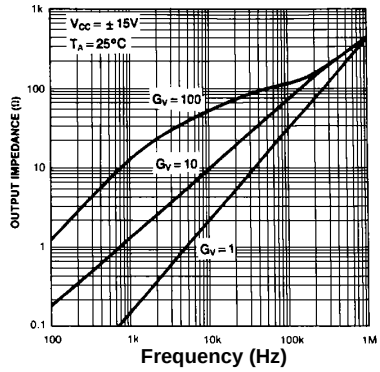


Figure 5. Output Impedance vs Frequency

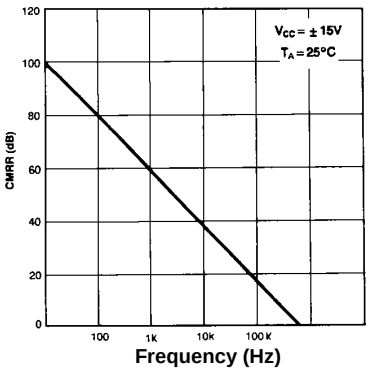


Figure 6. Common-mode Rejection Ratio vs Frequency

Typical Performance Characteristics (continued)

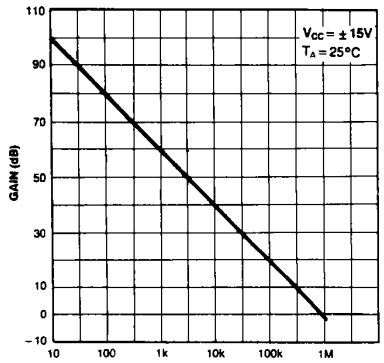


Figure 7. Open Loop Frequency Response

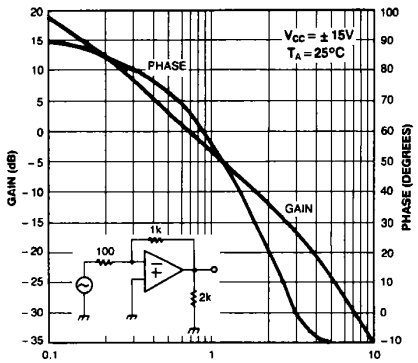


Figure 8. Bode Plot

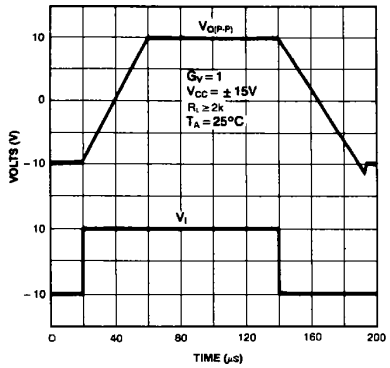


Figure 9. Large Signal Pulse Response

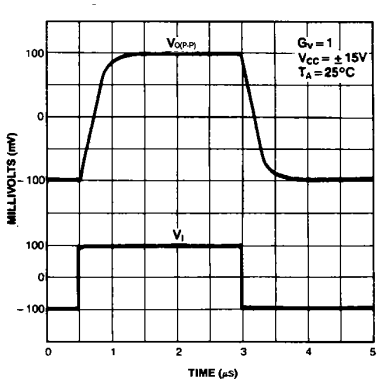


Figure 10. Small Signal Pulse Response

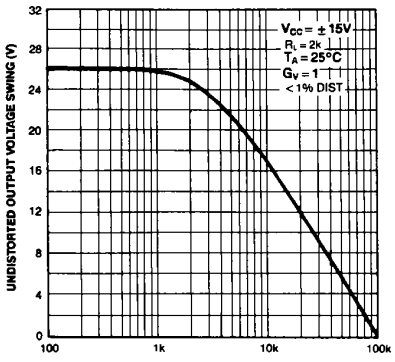


Figure 11. Undistorted Output Voltage Swing vs Frequency

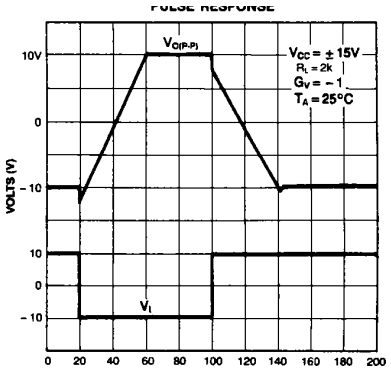


Figure 12. Inverting Large Signal Pulse Response

Typical Performance Characteristics (continued)

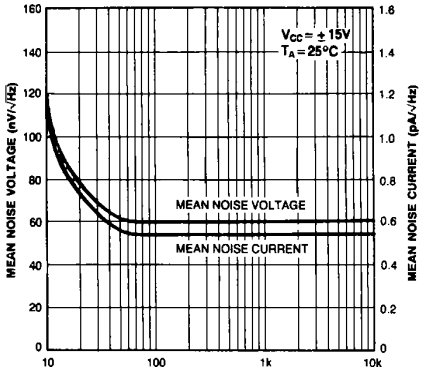


Figure 13. Input Noise Voltage And Noise Current vs Frequency

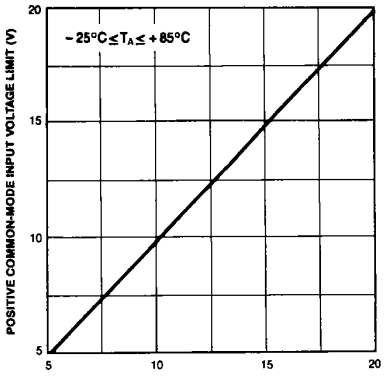


Figure 14. Positive Common Mode Input Voltage Limit vs Positiue Supply Voltage

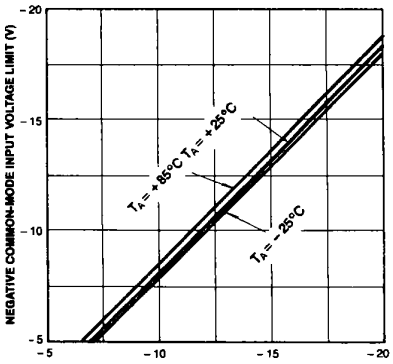
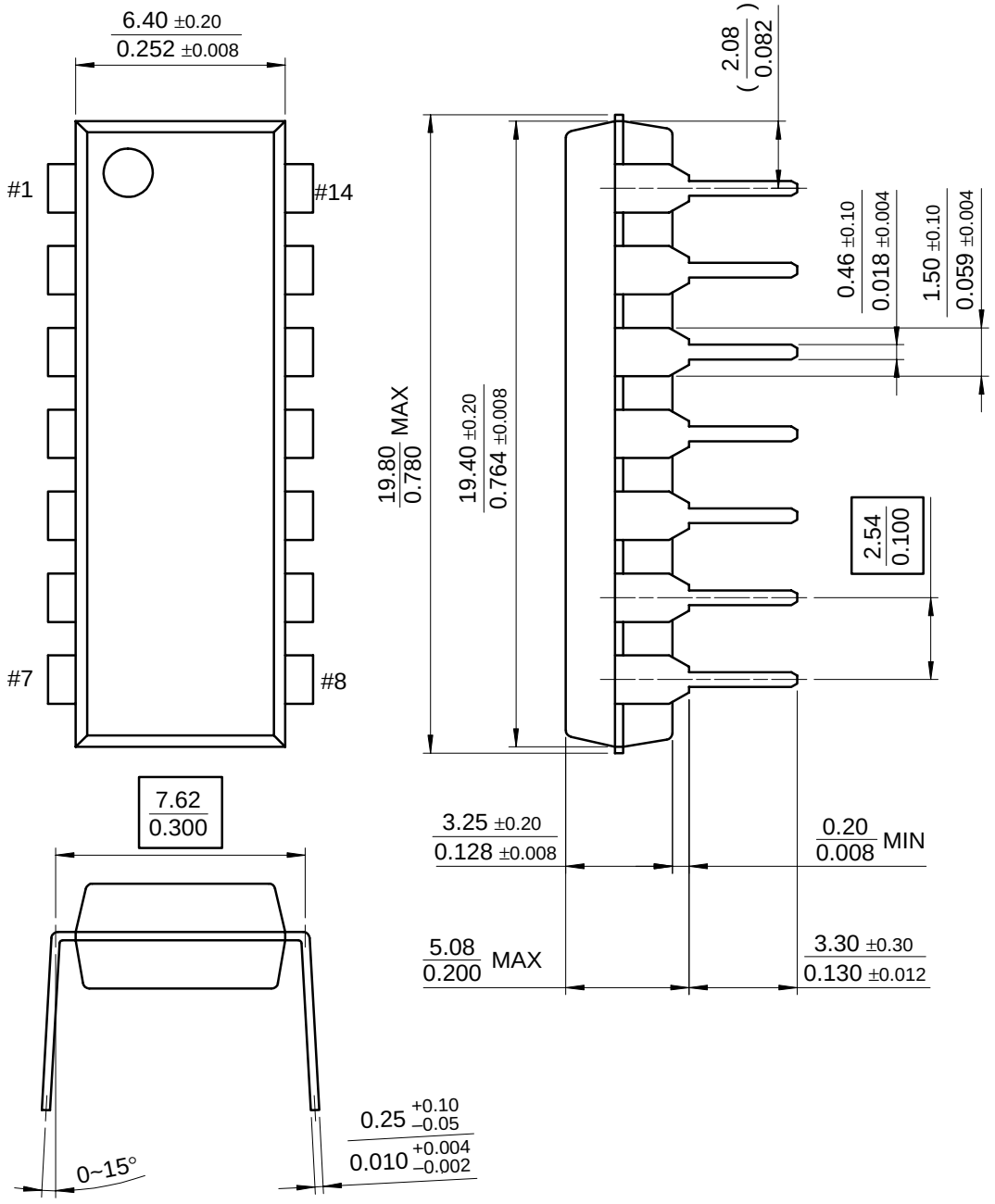


Figure 15. Negative Common.mode Input Voltage Limit vs Negative Supply Voltage

Mechanical Dimensions

Package

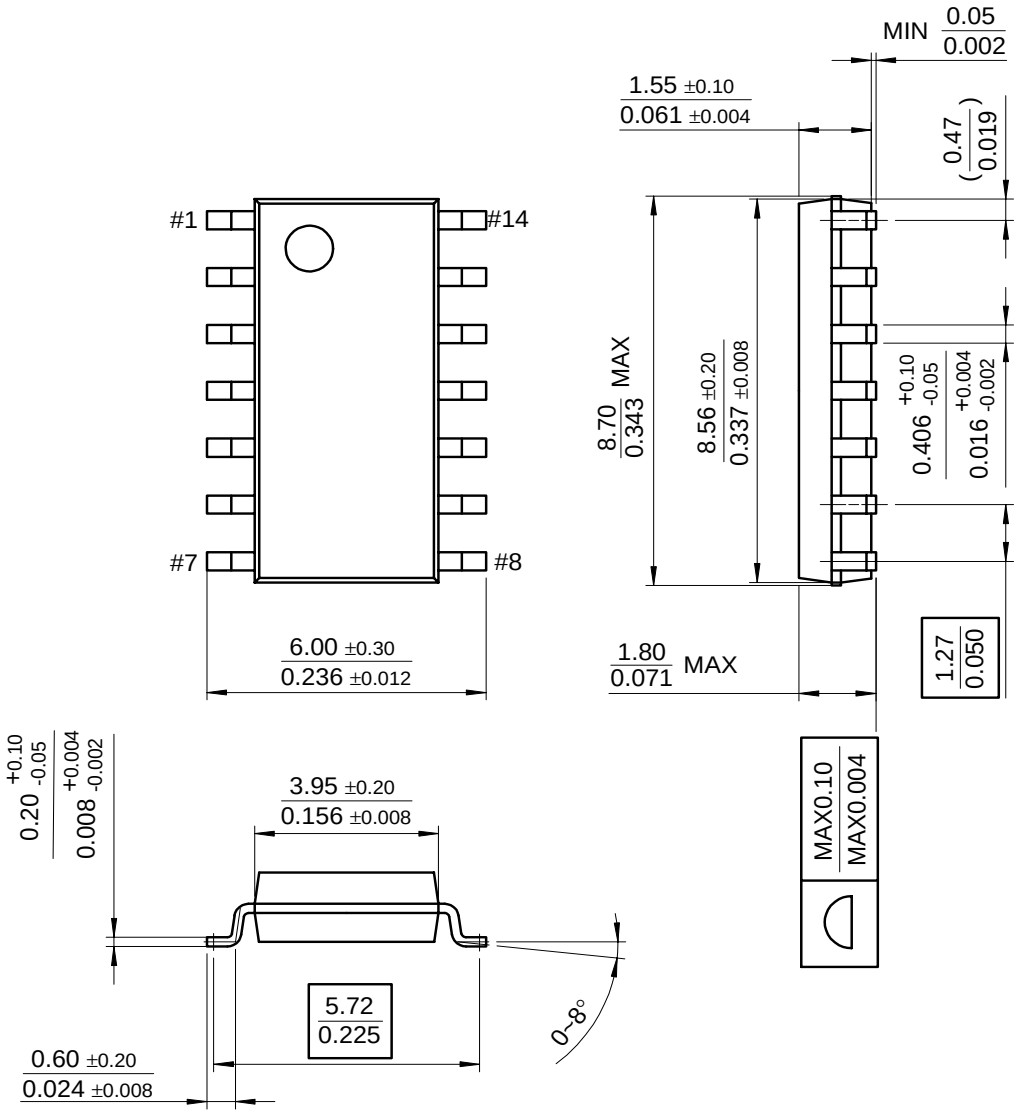
14-DIP



Mechanical Dimensions

Package

14-SOP



Ordering Information

Product Number	Package	Operating Temperature
LM348N	14-DIP	0 ~ + 70°C
LM348M	14-SOP	
LM248N	14-DIP	-25 ~ + 85°C
LM248M	14-SOP	

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