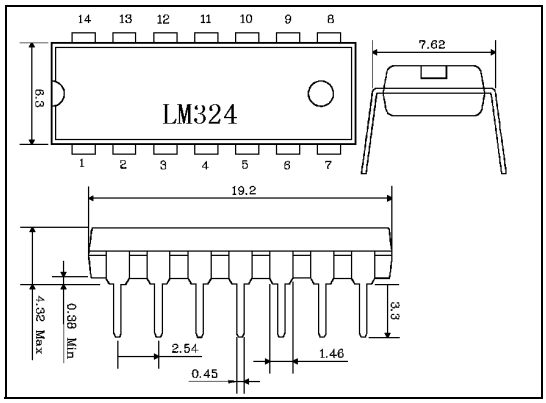
QUAD OPERATIONAL AMPLIFIER LM324/LM324F

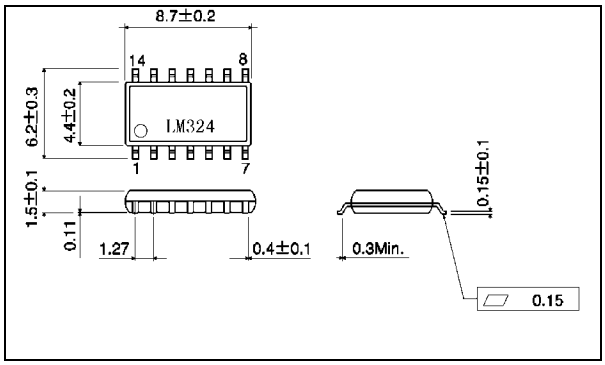
DESCRIPTION

The LM324/LM324F consist of four independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide voltage range. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. Application areas include transducer amplifier, DC gain blocks and all the conventional OP amp circuits which now can be easily implemented in single power supply systems.

Outline Drawing



DIP14

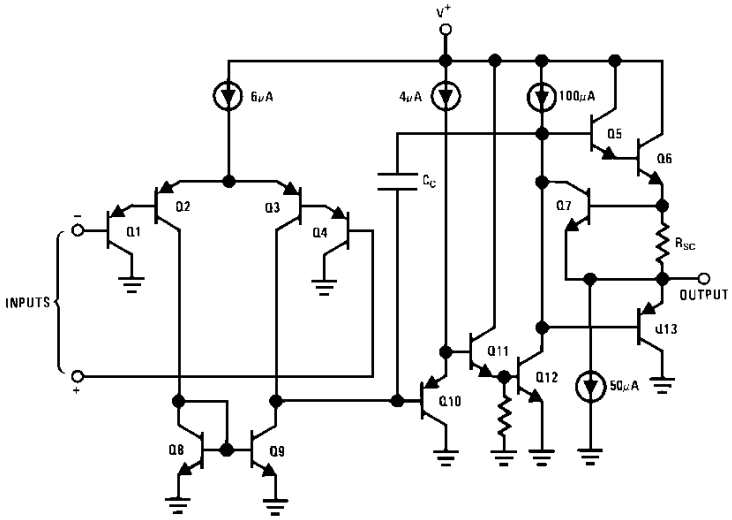


SOP14

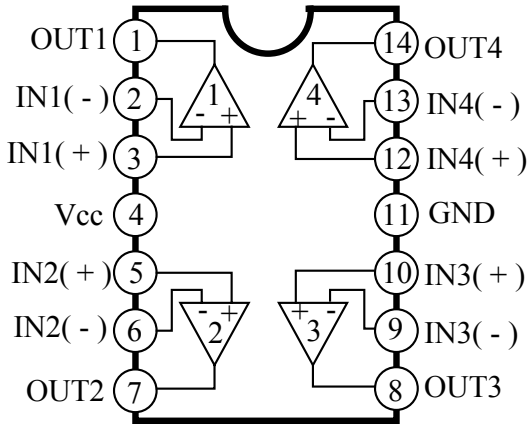
FEATURE

- Large DC voltage gain: 100dB
- Wide power supply range:
  Vcc=3V~32V(or Vcc=±1.5V~±16V)
- Input common-mode voltage range includes ground.
- Large output voltage swing :0V~Vcc-1.5V
- Power drain suitable for battery operation
- Internally frequency compensated for unity gain
- Wide bandwidth(unity gain) 1MHz
- Very low supply current drain(700μA)—essentially independent of supply voltage
- Low input biasing current 45nA
- Low input offset voltage 2mV and offset current 5nA
- Differential input voltage range equal to the power supply voltage
- Compatible with all forms of logic

SCHEMATIC DIAGRAM



INTERNAL BLOCK DIAGRAM AND PIN CONNECTION



ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Characteristic		Symbol	Value	Unit
Power Supply Voltage		Vcc	±16 or 32	V
Differential Input Voltage		VID	32	V
Input Voltage		VIN	-0.3~32	V
Output Short Circuit to GND			Continuous	
Power Dissipation	DIP14	PD	1130	mW
	SOP14		800	
Operating Temperature Range		Topr	-0~70	°C
Storage Temperature		Tstg	-65~150	°C

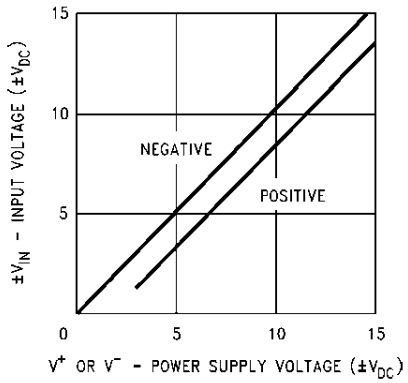
ELECTRICAL CHARACTERISTICS

(unless otherwise specified: Ta=25°C, Vcc=5V)

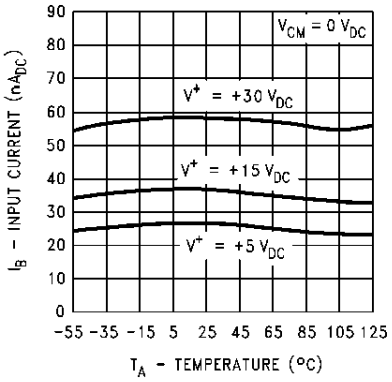
Characteristics		Test Conditions	Min.	Typ.	Max.	Unit
Input offset voltage				2	3	mV
Input bias current		$I_{IN(+)}$ or I_{IN-},V_{CM}=0V		45	100	nA
Input offset current		$I_{IN(+)}$ or I_{IN-},V_{CM}=0V		5	30	nA
Input common-mose voltage range		Vcc=30V	0		Vcc-1.5	V
Supply current		Over full temperature range RL=∞ on all OP amps Vcc=30V Vcc=5V		 1.5 0.7	 3 1.2	mA
Large signal voltage gain		Vcc=15V,R_L≥2kΩ	25	100		V/mV
Common-mode rejection ratio		DC,V_{CM}=0V to Vcc-1.5V	65	85		dB
Power supply rejection ratio		Vcc=5V to 30V	65	100		dB
Output current	Source	V_{IN}^+=1V, V_{IN}^-=0V Vcc=15V,Vo=2V	20	40		mA
	Sink	V_{IN}^+=0V, V_{IN}^-=1V Vcc=15V,Vo=2V	8	20		mA
		V_{IN}^+=0V, V_{IN}^-=1V Vcc=15V,Vo=200mV	12	50		μA
Short circuit to ground		Vcc=15V		40	60	mA
Input offset voltage					5	mV
Input offset voltage drift		Rs=0Ω		7	30	μV/℃
Input offset current		$I_{IN(+)}$-$I_{IN(-)}$, V_{CM}=0V			75	nA
Input offset current drift		Rs=0Ω		10	300	pA/℃
Input bias current		$I_{IN(+)}$ or $I_{IN(-)}$		40	200	nA
Input common-mode voltage range		Vcc=+30V	0		V^+-2	V
Large signal voltage gain		Vcc=+15V R_L≥2kΩ VoSwing=1V to 11V	15			V/mV
Output voltage swing	V_{OH}	Vcc=30V, R_L=2kΩ	26			V
	V_{OH}	Vcc=30V, R_L=10kΩ	27	28		V
	V_{OL}	Vcc=5V, R_L=10kΩ		5	20	mV

CHARACTERISTICS CURVES

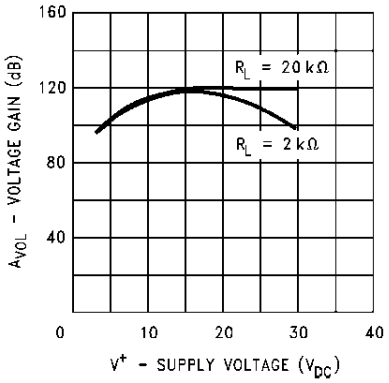
Input Voltage Range



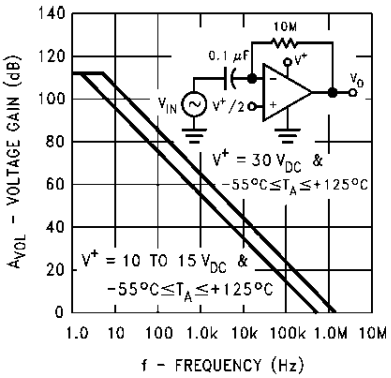
Input Current



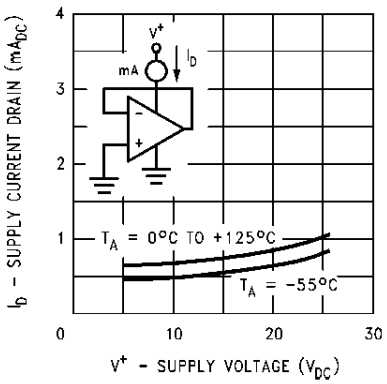
Voltage Gain



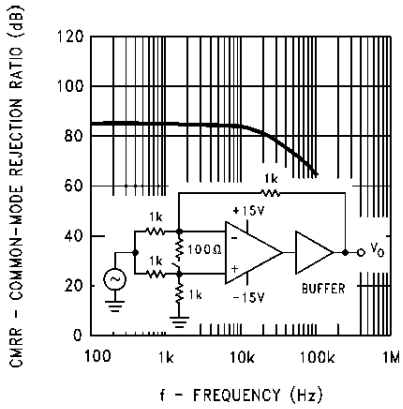
Open Loop Frequency Response



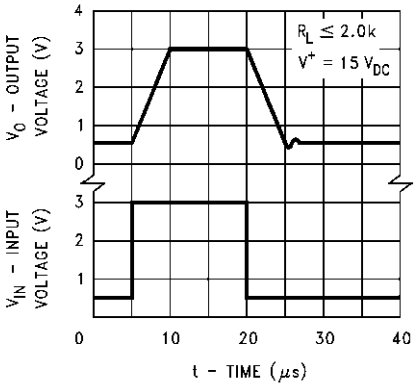
Supply Current



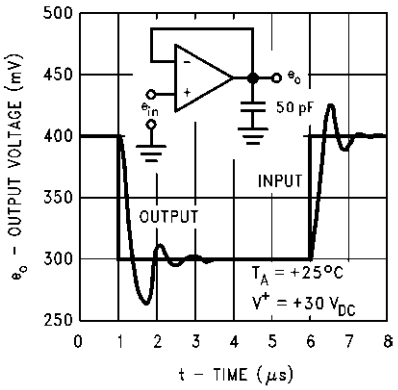
Common Mode Rejection Ratio



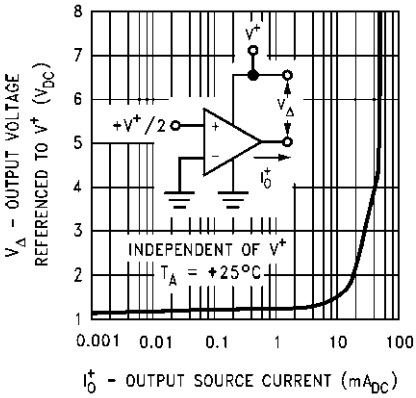
Voltage Follower Pulse Response



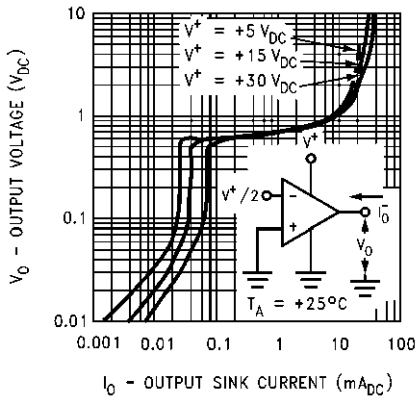
Voltage Follower Pulse Response (Small Signal)



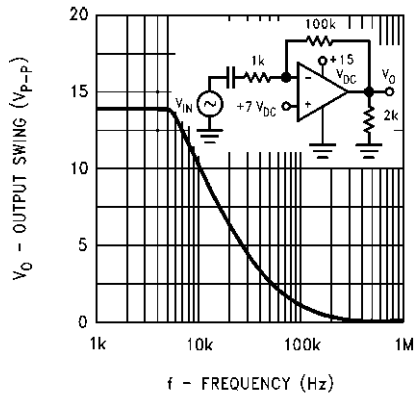
Output Characteristics Current Sourcing



Output Characteristics Current Sinking



Large Signal Frequency Response



Current Limiting