MB324

LOW POWER QUAD OPERATIONAL AMPLIFIERS

General Description

The MB324 consist of four independent , high gain and internally frequency compensated operational amplifiers. They are specifically designed to operate from a single power supply . 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. Typical applications include transducer amplifiers, DC gain blocks and most conventional operational amplifier circuits.

The MB324 series are compatible with industry standard 324.

The MB324 are available in two industry standard packages: DIP-14 and SOP-14.

DIP-14 SOP-14

Figure 1: Package Types of MB324

Features

- Internally Frequency Compensated for Unity Gain
- Large Voltage Gain: 100dB (Typical)
- Low Input Bias Current: 20nA (Typical)
- Low Input Offset Voltage: 2mV (Typical)
- Low Supply Current: 0.7mA (Typical)
- Wide Power Supply Voltage:
  Single Supply: 3V to 36V
  Dual Supplies: ±1.5V to ±18V
- Input Common Mode Voltage Range Includes Ground

Pin Configuration (DIP-14 / SOP-14)

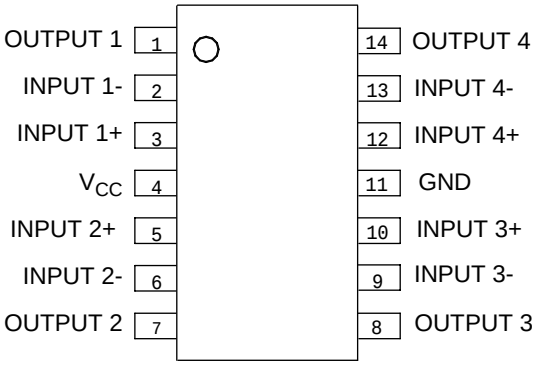
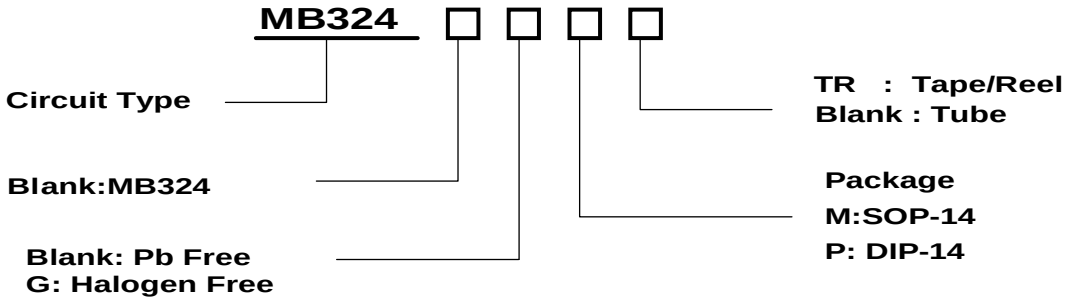


Figure 2: Pin Configuration of MB324 (Top View)

Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply

Ordering Information



Package	Condition	Part Number		Marking ID		Packing Type
		Pb-free	Halogen-Free	Pb-free	Halogen-Free	
SOP-14	3.0mV	MB324M	MB324GM	MB324M	MB324GM	Tube
	3.0mV	MB324MTR	MB324GMTR	MB324M	MB324GM	Tape&Reel
DIP-14	3.0mV	MB324P	MB324GP	MB324P	MB324GP	Tube

Typical Application

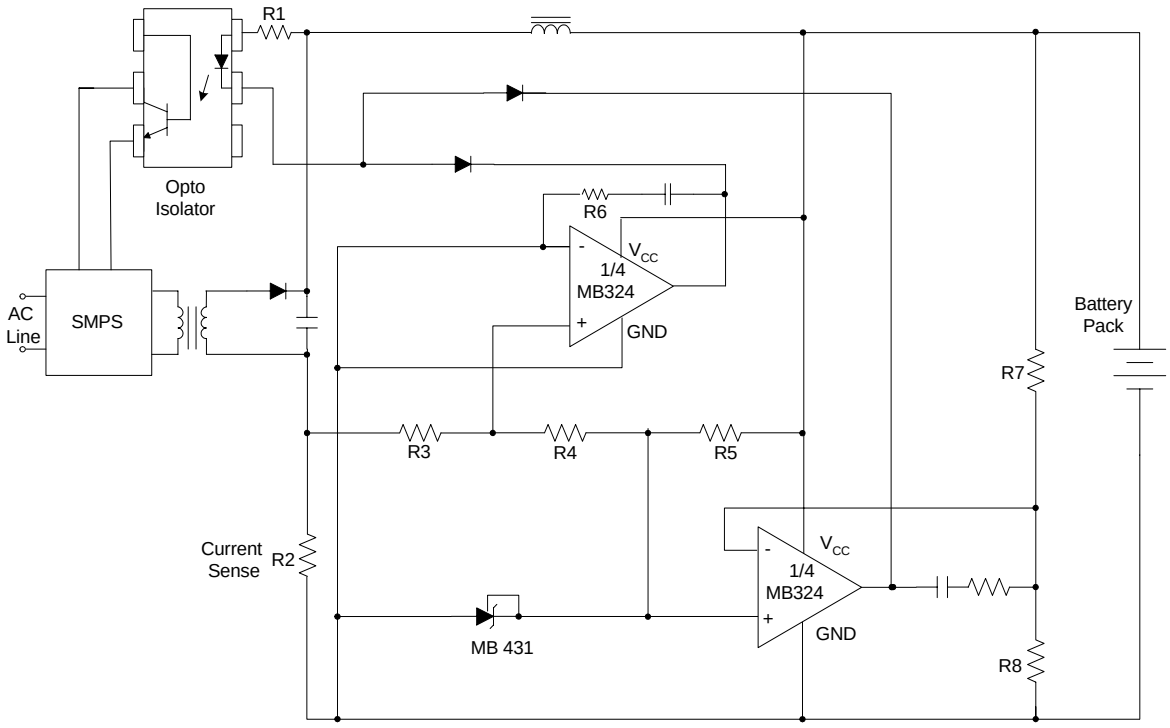


Figure 3: Battery Charger

Typical Application (Continued)

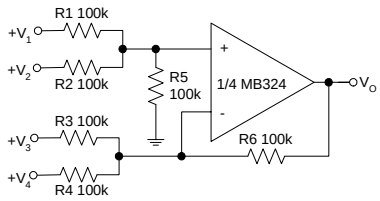


Figure 4: DC Summing Amplifier

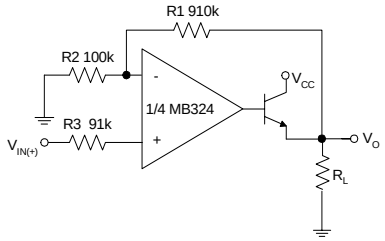


Figure 5: Power Amplifier

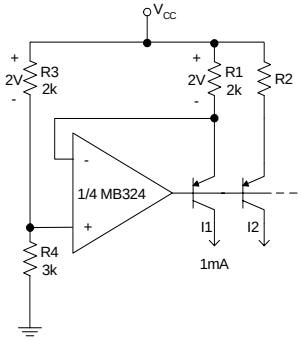


Figure 6: Fixed Current Sources

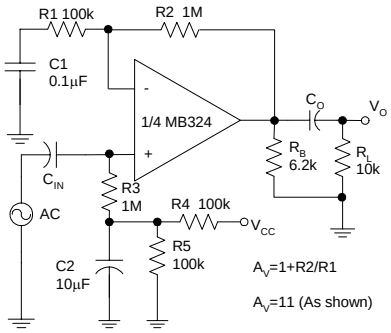


Figure 7: AC Coupled Non-Inverting Amplifier

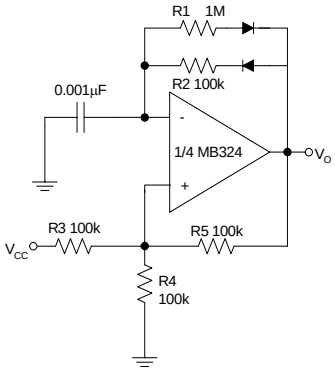


Figure 8: Pulse Generator

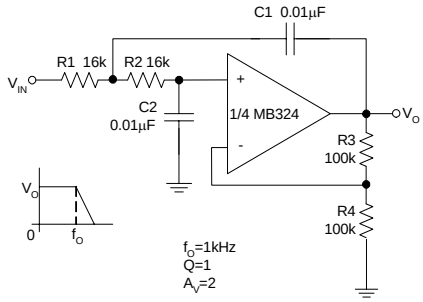


Figure 9: DC Coupled Low-Pass RC Active Filter

Functional Block Diagram

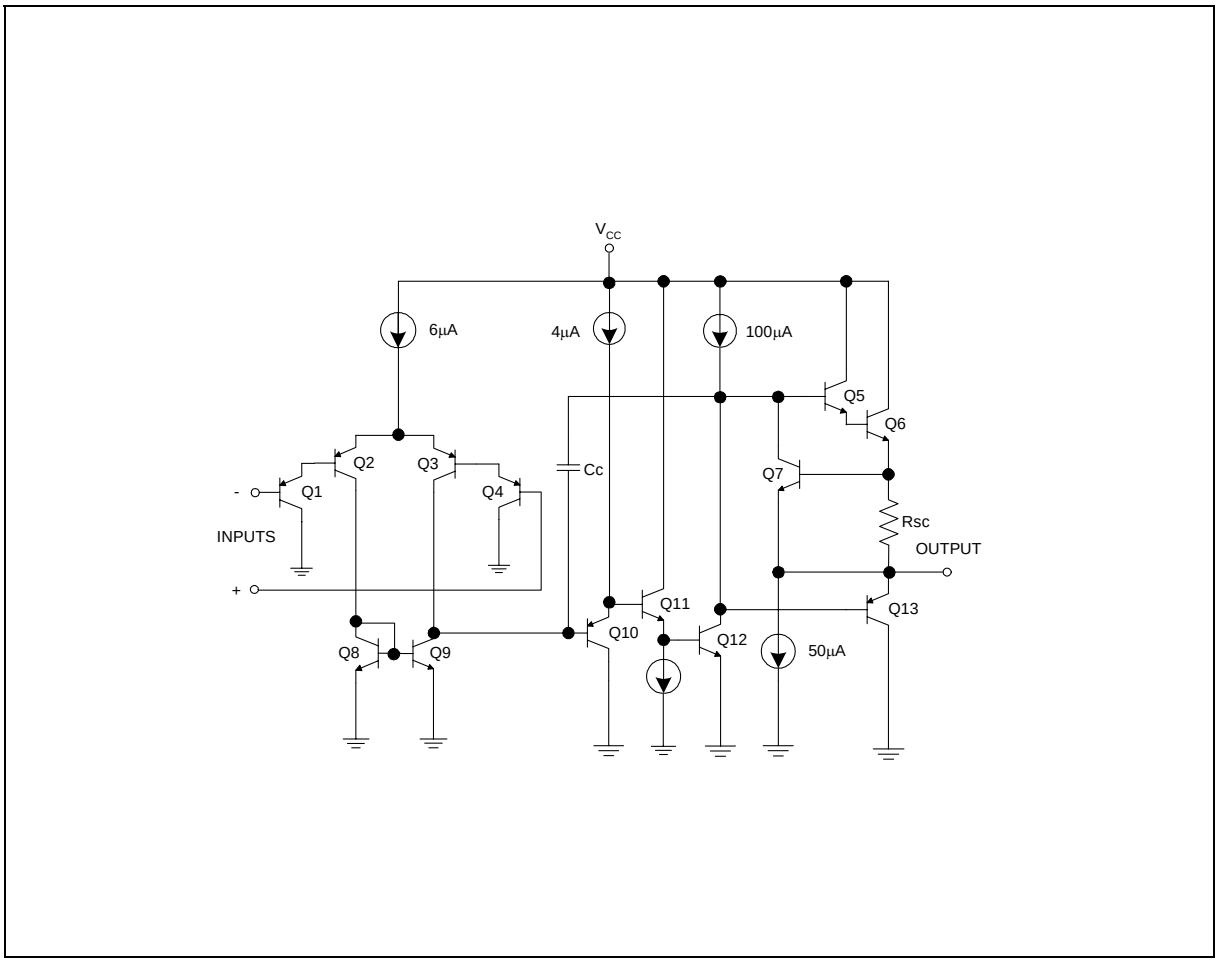


Figure 10: Functional Block Diagram of MB324 (Each Amplifier)

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	40	V
Differential Input Voltage	V_{ID}	40	V
Input Voltage	V_{IC}	-0.3 to 40	V
Power Dissipation	P_D	DIP-14: 1130	mW
		SOP-14: 800	mW
Storage Temperature Range	Tstg	-50 to 150	℃
Lead Temperature (Soldering,10 Seconds)		260	℃

Note1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	3	36	V
Ambient Operating Temperature	T_A	-20	+85	℃

Electrical Characteristics

V_{CC} = 5V, GND = 0V, T_A = 25℃ unless otherwise specified.

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Input Offset Voltage	V_{IO}	V_O=1.4V,R_S=0 V_{CC}=5V to 30V	MB324	-1.7	2.7	3.0	mV
Input Bias Current	I_{BIAS}	I_{IN}+ or I_{IN}-, V_{CM}=0V			20	150	nA
Input Offset Current	I_{IO}	I_{IN}+ - I_{IN}-, V_{CM}=0V			5	35	nA
Input Common Mode Voltage Range	V_{IR}	V_{CC}=30V	0			V_{CC}-1.5	V
Supply Current	I_{CC}	T_A=-20 to 85 ℃,V_{CC}=30V			1.0	3.0	mA
		T_A=-20 to 85 ℃,V_{CC}=5V			0.7	1.2	mA
Large Signal Voltage Gain	G_V	V_{CC}=15V,V_O=1V to 11V R_L≥2KΩ	85		100		dB
Common Mode Rejection Ratio	CMRR	DC,V_{CM}=0 to (V_{CC}-1.5)V	60		70		dB
Power Supply Rejection Ratio	PSRR	V_{CC}=5V to 30V	70		100		dB
Channel Separation	CS	f=1kHz to 20kHz			-120		dB
Output Source Current	I_{SOURCE}	V+=1V,V-=0V,V_{CC}= 15V V_O=2V	20		40		mA
Output Sink Current	I_{SINK}	V+=0V,V-=1V,V_{CC}= 15V V_O=2V	10		15		mA
		V+=0V,V-=1V,V_{CC}= 15V V_O=0.2V	12		50		μA
Output Short circuit current to Ground	I_{SC}	V_{CC}=15V			40	60	mA
Output Voltage Swing	V_{OH}	V_{CC}=30V, R_L=2KΩ	26				V
		V_{CC}=30V, R_L=10KΩ	27		28		V
	V_{OL}	V_{CC}=5V, R_L=10KΩ			5	20	mV

Typical Performance Characteristics

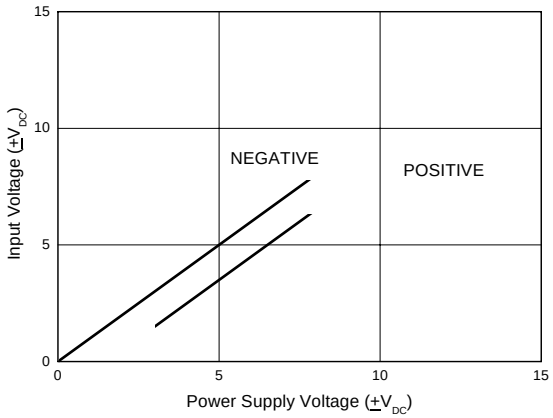


Figure 11: Input Voltage Range

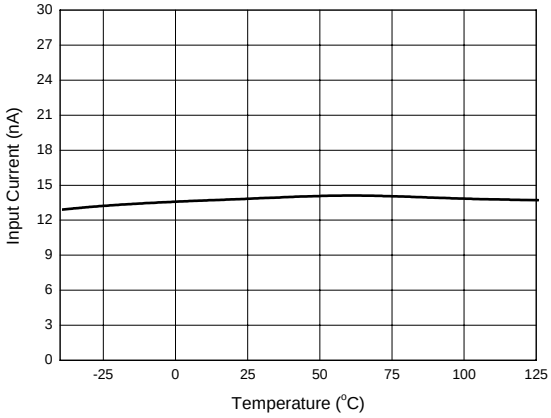


Figure 12: Input Current

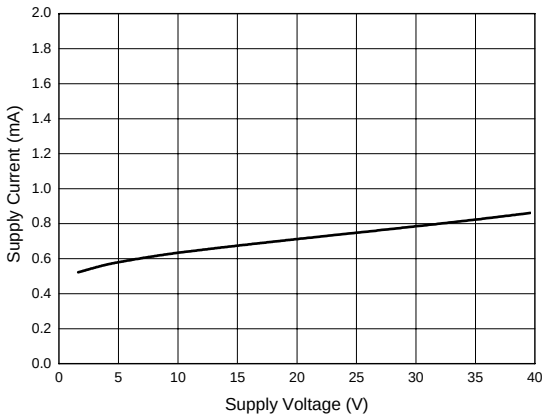


Figure 13: Supply Current

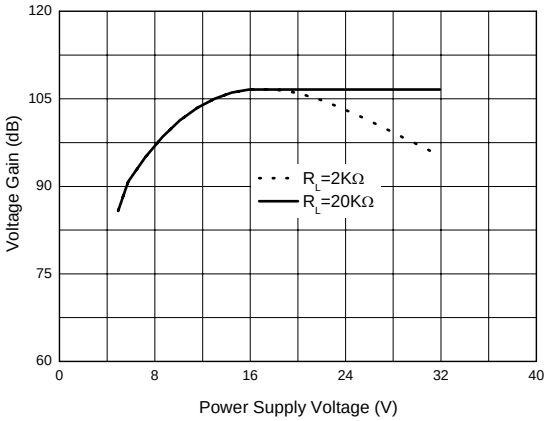


Figure 14: Voltage Gain

Typical Performance Characteristics (Continued)

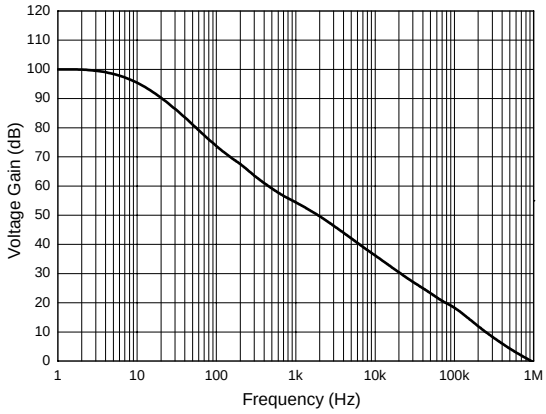


Figure 15: Open Loop Frequency Response

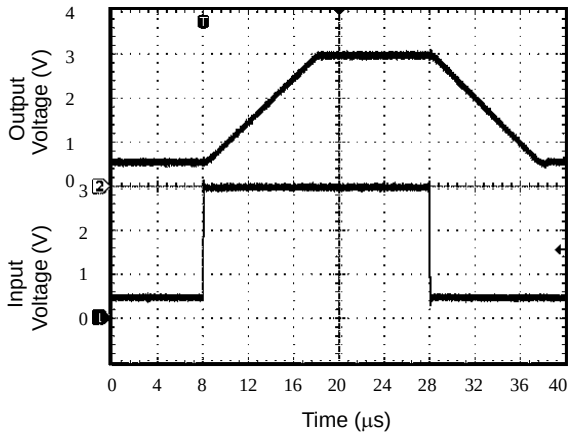


Figure 16: Voltage Follower Pulse Response

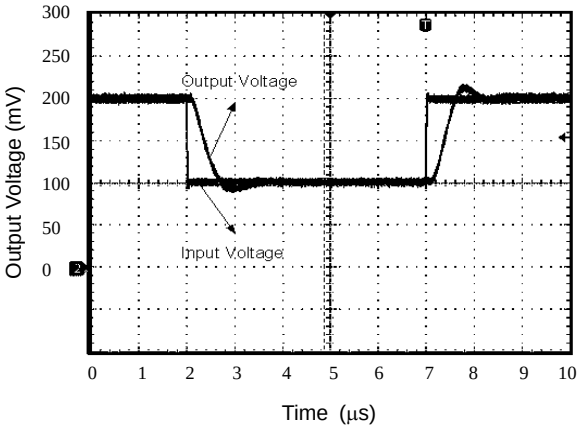


Figure 17: Voltage Follower Pulse Response (Small Signal)

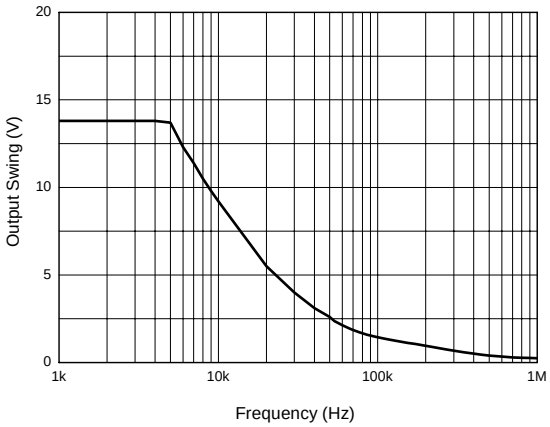


Figure 18: Large Signal Frequency Response

Typical Performance Characteristics (Continued)

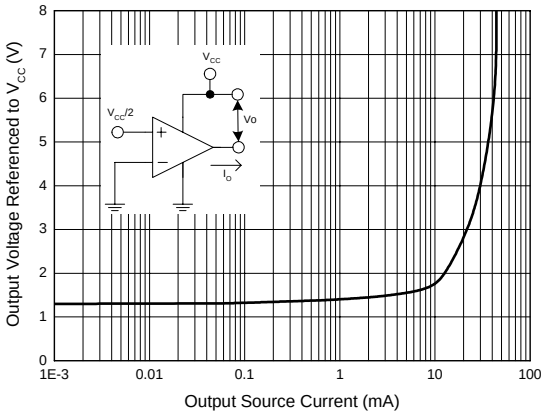


Figure 19: Output Characteristics: Current Sourcing

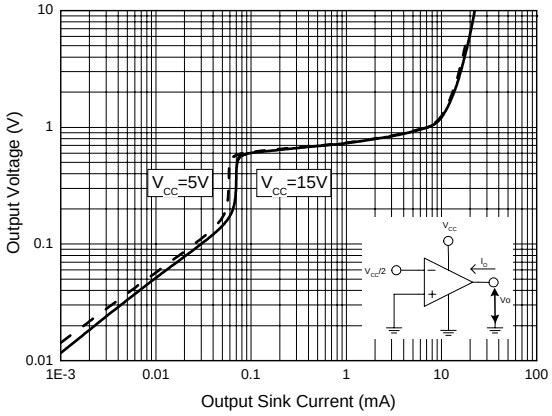


Figure 20: Output Characteristics: Current Sinking

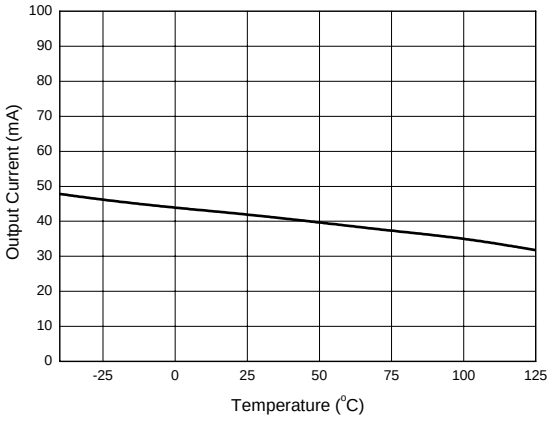
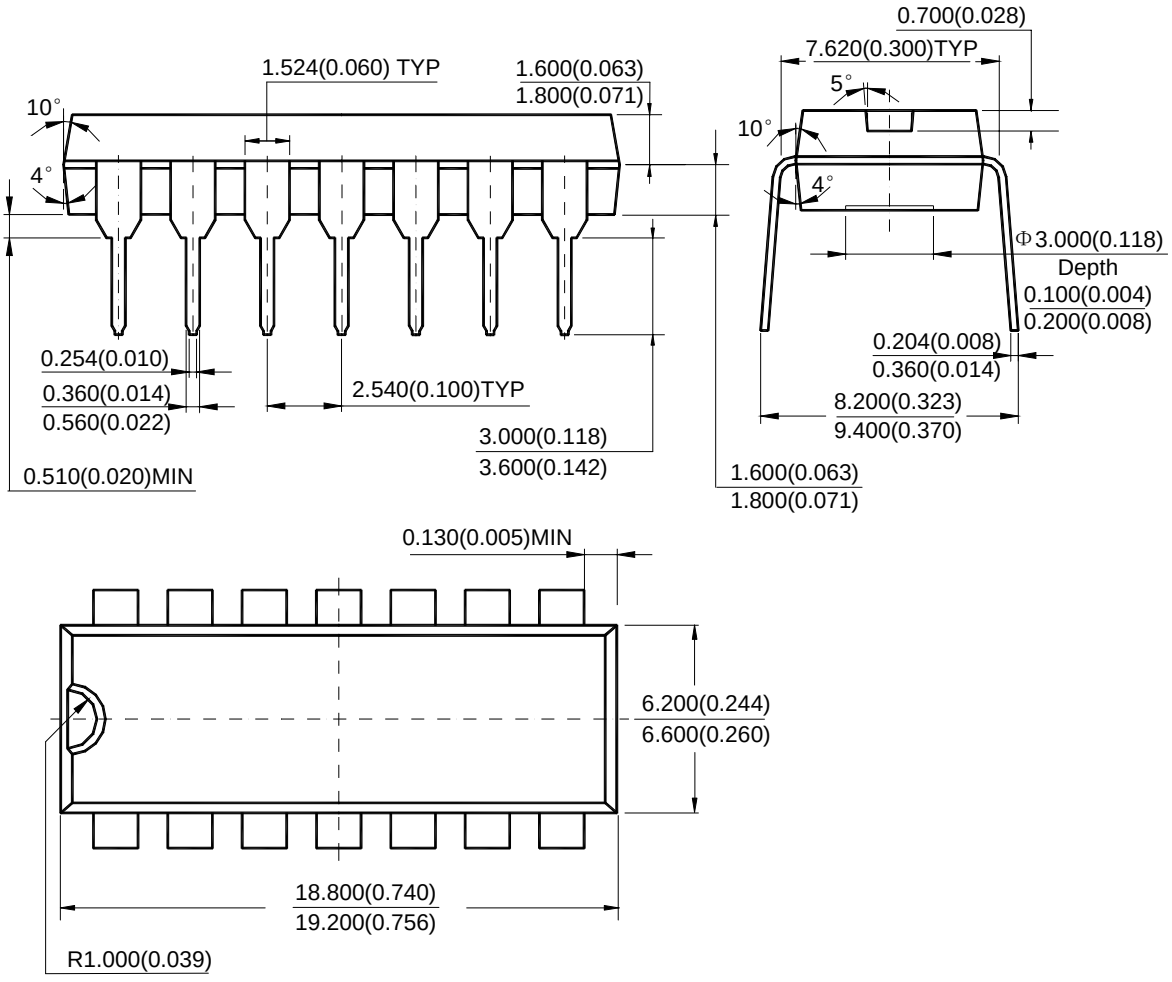


Figure 21: Current Limiting

Mechanical Dimensions

DIP-14 **Unit: mm(inch)**



Mechanical Dimensions (Cont'd)

SOP-14 **Unit: mm(inch)**