

## Features

- Single-supply operation: 2.7 V to 5.5 V
- High output current:  $\pm 250$  mA
- Low supply current: 750  $\mu$ A/amplifier
- Wide bandwidth: 3 MHz
- Slew rate: 5 V/ $\mu$ s
- No phase reversal
- Low input currents
- Unity gain stable
- Rail-to-rail input and output

## Application

- Multimedia audio
- LCD drivers
- ASIC input or output amplifiers
- Headphone drivers

## Description

The CBM8531, CBM8532, and CBM8534 are single, dual, and quad rail-to-rail input/output single-supply amplifiers featuring 250mA output drive current. This high output current makes these amplifiers excellent for driving either resistive or capacitive loads. AC performance is very good with 3 MHz bandwidth, 5 V/ $\mu$ s slew rate, and low distortion. All are guaranteed to operate from a 2.7 V single supply as well as a 5.5 V supply.

The very low input bias currents enable the CBM8531, CBM8532, and CBM8534 to be used for integrators, diode amplification, and other applications requiring low input bias current. Supply current is only 750  $\mu$ A per amplifier at 5 V, allowing low current applications to control high current loads.

The ability to swing rail-to-rail at the inputs and outputs enables designers to buffer CMOS DACs, ASICs, or other wide output swing devices in single-supply systems.

The CBM8531/CBM8532/CBM8534 are specified over the extended industrial temperature range ( $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ ). The CBM8531 is available in 8-lead SOIC, 5-lead SC70, and 5-lead SOT-23 packages. The CBM8532 is available in 8-lead SOIC, 8-lead MSOP, and 8-lead TSSOP surface-mount packages. The CBM8534 is available in narrow 14-lead SOIC and 14-lead TSSOP surface-mount packages.

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## Pin Configurations

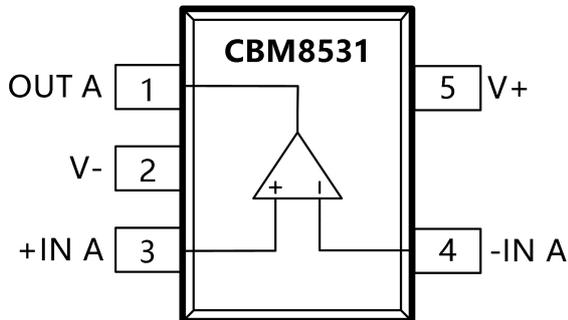


Figure 1. 5-Lead SC70 and 5-Lead SOT-23  
(KS and RJ Suffixes)

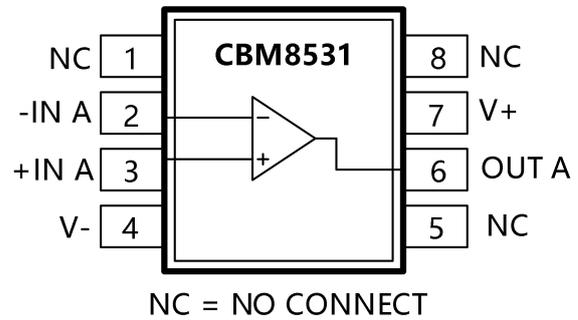


Figure 2. 8-Lead SOP (R Suffix)

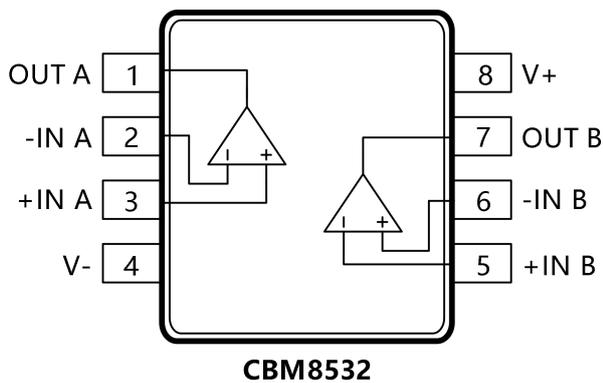


Figure 3. 8-Lead SOP, 8-Lead TSSOP-8 and  
8-Lead MSOP (R, RU, and RM Suffixes)

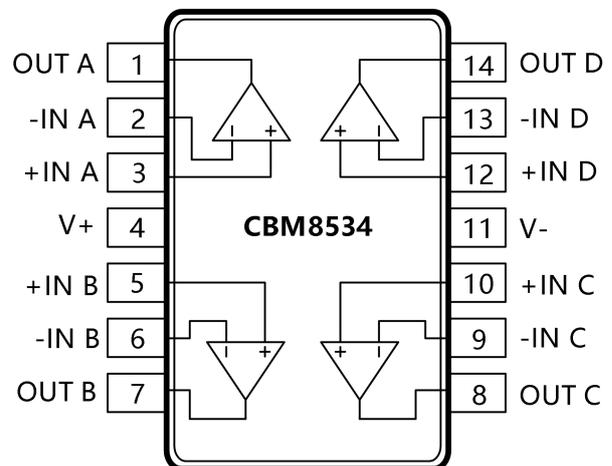


Figure 4. 14-Lead SOP and  
14-Lead TSSOP (R and RU Suffixes)

## Specifications-Electrical Characteristics

$V_S=2.7V$ ,  $V_{CM}=1.35V$ ,  $T_A=25^\circ C$ , unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>INPUT CHARACTERISTICS</b>						
Offset Voltage	$V_{OS}$				25	mV
		$-40^\circ C \leq T_A \leq +125^\circ C$			30	mV
Input Bias Current	$I_B$			5	50	pA
		$-40^\circ C \leq T_A \leq +125^\circ C$			60	pA
Input Offset Current	$I_{OS}$			1	25	pA
		$-40^\circ C \leq T_A \leq +125^\circ C$			30	pA
Input Voltage Range			0		3	V
Common-Mode Rejection Ratio	CMRR	$V_{CM}=0V$ to 2.7V	38	45		dB
Large Signal Voltage Gain	$A_{VO}$	$R_L=2k\Omega$ , $V_O=0.5V$ to 2.2V		25		V/mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$			20		$\mu V/^\circ C$
Bias Current Drift	$\Delta I_B/\Delta T$			50		fA/°C
Offset Current Drift	$\Delta I_{OS}/\Delta T$			20		fA/°C
<b>OUTPUT CHARACTERISTICS</b>						
Output Voltage High	$V_{OH}$	$I_L = 10mA$	2.85	2.92		V
		$-40^\circ C \leq T_A \leq +125^\circ C$	2.8			V
Output Voltage Low	$V_{OL}$	$I_L = 10mA$		60	100	mV
		$-40^\circ C \leq T_A \leq +125^\circ C$			125	mV
Output Current	$I_{OUT}$			$\pm 250$		mA
Closed-Loop Output Impedance	$Z_{OUT}$	$f = 1MHz$ , $A_v = 1$		60		$\Omega$
<b>POWER SUPPLY</b>						
Power Supply Rejection Ratio	PSRR	$V_S = 2.7V$ to 5.5V	45	55		dB
Supply Current/Amplifier	$I_{SY}$	$V_O = 0V$		0.70	1	mA
		$-40^\circ C \leq T_A \leq +125^\circ C$			2.5	mA
<b>DYNAMIC PERFORMANCE</b>						
Slew Rate	SR	$R_L = 2k\Omega$		3.5		V/ $\mu s$
Settling Time	$T_S$	To 0.01%		1.6		$\mu s$
Gain Bandwidth Product	GBP			2.2		MHz

Phase Margin	$\phi_o$		70	Degrees
Channel Separation	CS	$f = 1\text{kHz}, R_L = 2\text{k}\Omega$	65	dB
<b>NOISE PERFORMANCE</b>				
Voltage Noise Density	$e_n$	$f = 1\text{kHz}$	45	$\text{nV}/\sqrt{\text{Hz}}$
		$f = 10\text{kHz}$	30	$\text{nV}/\sqrt{\text{Hz}}$
Current Noise Density	$i_n$	$f = 1\text{kHz}$	0.05	$\text{pA}/\sqrt{\text{Hz}}$

$V_S = 5.0\text{V}, V_{CM} = 2.5\text{V}, T_A = 25^\circ\text{C}$ , unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>INPUT CHARACTERISTICS</b>						
Offset Voltage	$V_{OS}$				25	mV
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$			30	mV
Input Bias Current	$I_B$			5	50	pA
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$			60	pA
Input Offset Current	$I_{OS}$			1	25	pA
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$			30	pA
Input Voltage Range			0		5	V
Common-Mode Rejection Ratio	CMRR	$V_{CM} = 0\text{V to } 5\text{V}$	38	47		dB
Large Signal Voltage Gain	$A_{VO}$	$R_L = 2\text{k}\Omega, V_O = 0.5\text{V to } 4.5\text{V}$	15	80		V/mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$		20		$\mu\text{V}/^\circ\text{C}$
Bias Current Drift	$\Delta I_B/\Delta T$			50		$\text{fA}/^\circ\text{C}$
Offset Current Drift	$\Delta I_{OS}/\Delta T$			20		$\text{fA}/^\circ\text{C}$
<b>OUTPUT CHARACTERISTICS</b>						
Output Voltage High	$V_{OH}$	$I_L = 10\text{mA}$	4.9	4.49		V
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	4.85			V
Output Voltage Low	$V_{OL}$	$I_L = 10\text{mA}$		50	100	mV
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$			125	mV
Output Current	$I_{OUT}$			$\pm 250$		mA
Closed-Loop Output Impedance	$Z_{OUT}$	$f = 1\text{MHz}, A_V = 1$		40		$\Omega$
<b>POWER SUPPLY</b>						
Power Supply Rejection Ratio	PSRR	$V_S = 2.7\text{V to } 5.5\text{V}$	45	55		dB
Supply Current/Amplifier	$I_{SY}$	$V_O = 0\text{V}$		0.75	1.25	mA
		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$			1.75	mA

<b>DYNA POMIC RFORMANCE</b>						
Slew Rate	SR	$R_L = 2\text{ k}\Omega$		5		V/ $\mu$ s
Settling Time	$T_S$	1% distortion		350		$\mu$ s
Gain Bandwidth Product	GBP	To 0.01%		1.4		MHz
Phase Margin	$\phi_o$			3		Degrees
Channel Separation	CS			70		dB
<b>NOISE PERFORMANCE</b>						
Voltage Noise Density	$e_n$	$f = 1\text{ kHz}$		45		nV/ $\sqrt{\text{Hz}}$
		$f = 10\text{ kHz}$		30		nV/ $\sqrt{\text{Hz}}$
Current Noise Density	$i_n$	$f = 1\text{ kHz}$		0.05		pA/ $\sqrt{\text{Hz}}$

## Absolute Maximum Ratings

Parameter	Rating	Parameter	Rating
Supply Voltage (VS)	7V	Operating Temperature Range	-40°C to +125°C
Input Voltage	GND to $V_S$	Junction Temperature Range	-65°C to +150°C
Differential Input Voltage	$\pm 6$ V	Lead Temperature (Soldering,60 sec)	300°C
Storage Temperature Range	-65°C to +150°C		

## Typical Performance Characteristics

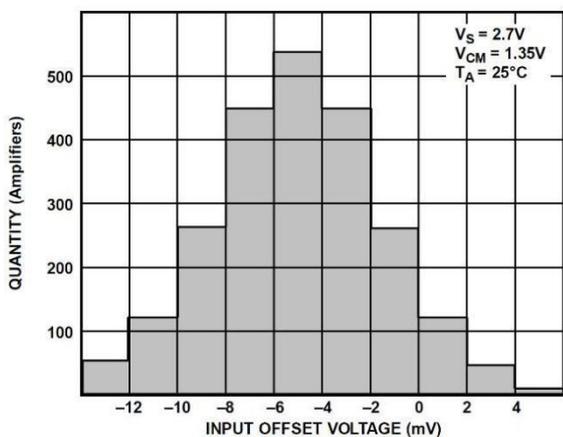


Figure 5. Input Offset Voltage Distribution

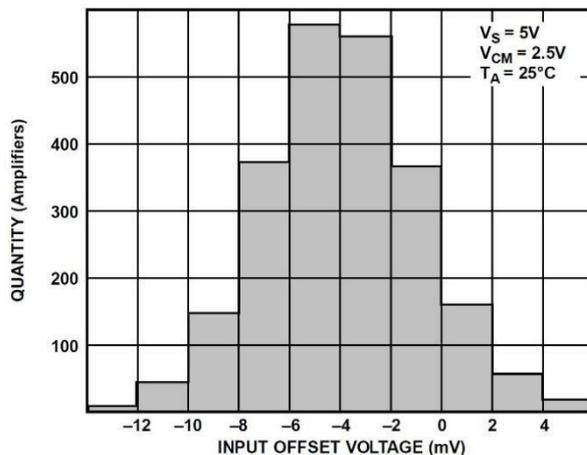


Figure 6. Input Offset Voltage Distribution

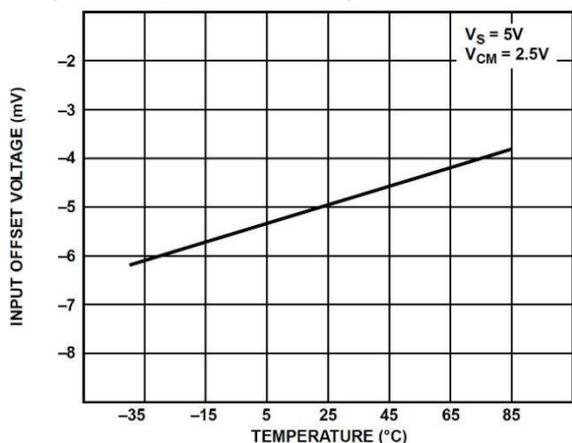


Figure 7. Input Offset Voltage vs. Temperature

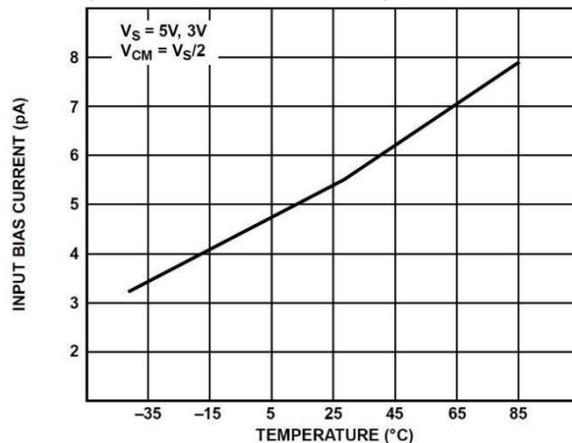


Figure 8. Input Bias Current vs. Temperature

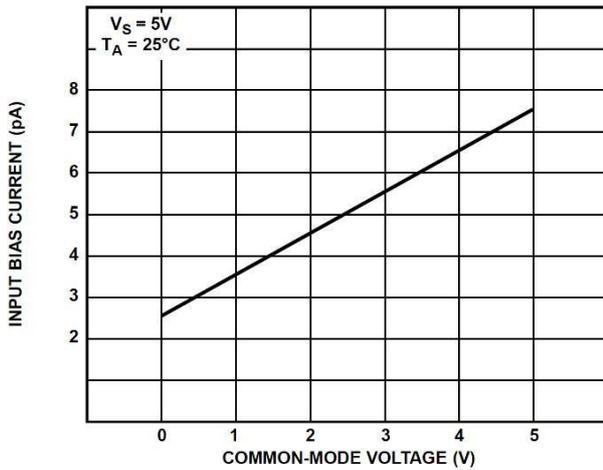


Figure 9. Input Bias Current vs. Common-Mode Voltage

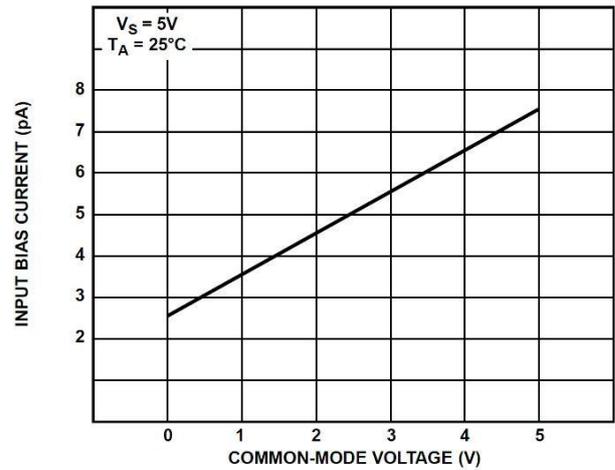


Figure 10. Input Offset Current vs. Temperature

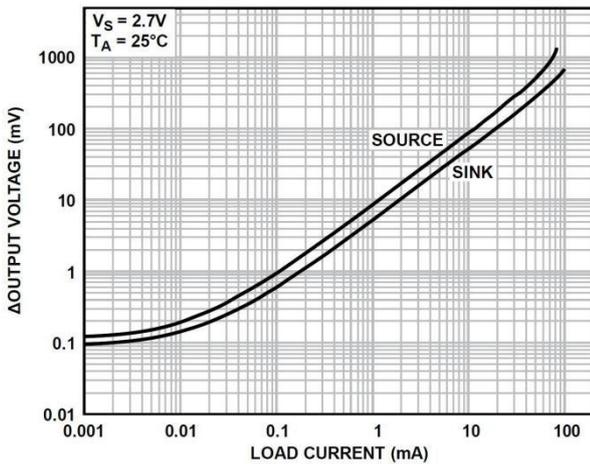


Figure 11. Output Voltage to Supply Rail vs. Load Current

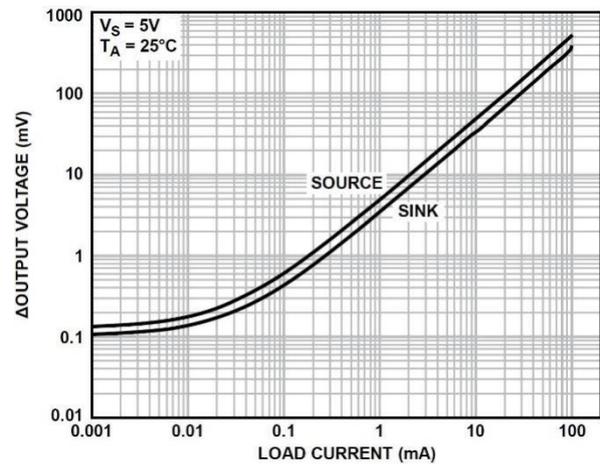


Figure 12. Output Voltage to Supply Rail vs. Load Current

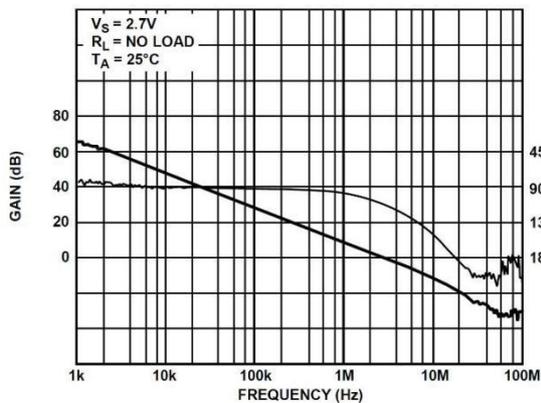


Figure 13. Open-Loop Gain and Phase Shift vs. Frequency

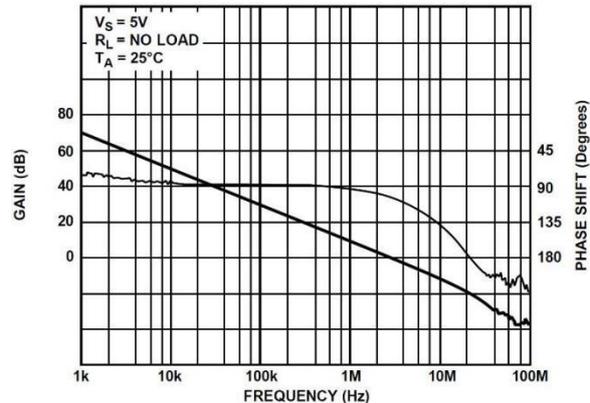


Figure 14. Open-Loop Gain and Phase Shift vs. Figure Frequency

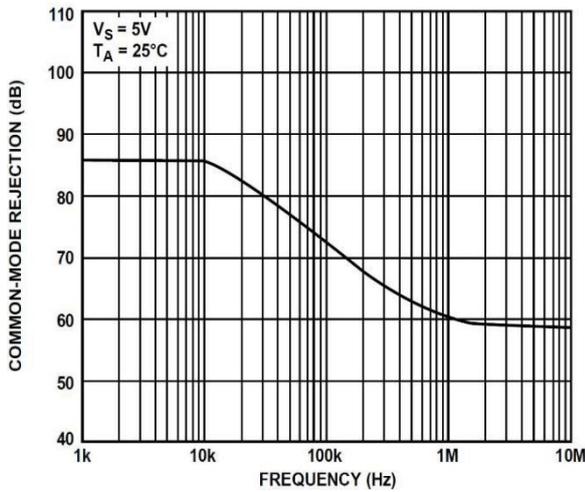


Figure 15. Common-Mode Rejection vs. Frequency

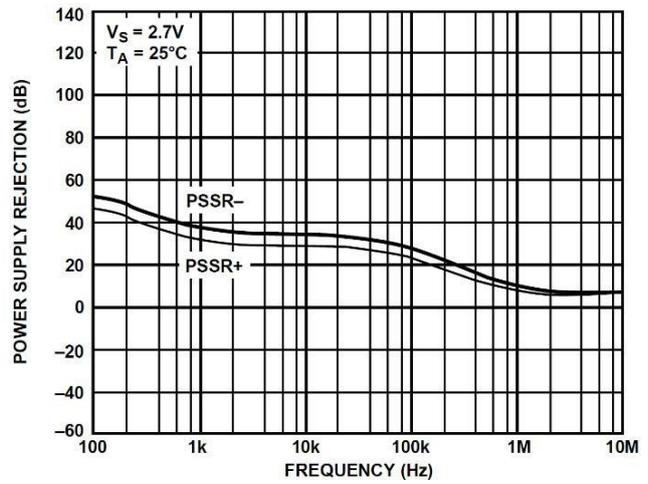


Figure 16. Power Supply Rejection vs. Frequency

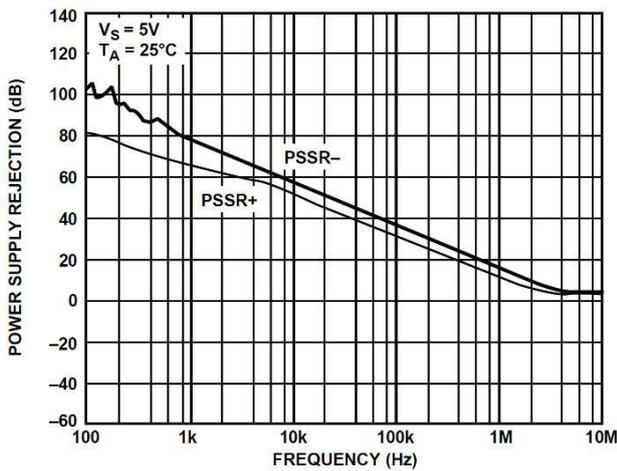


Figure 17. Power Supply Rejection vs. Frequency

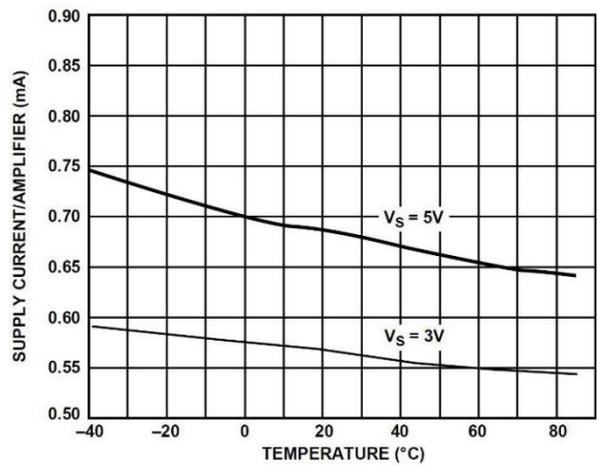


Figure 18. Supply Current per Amplifier vs. Figure Temperature

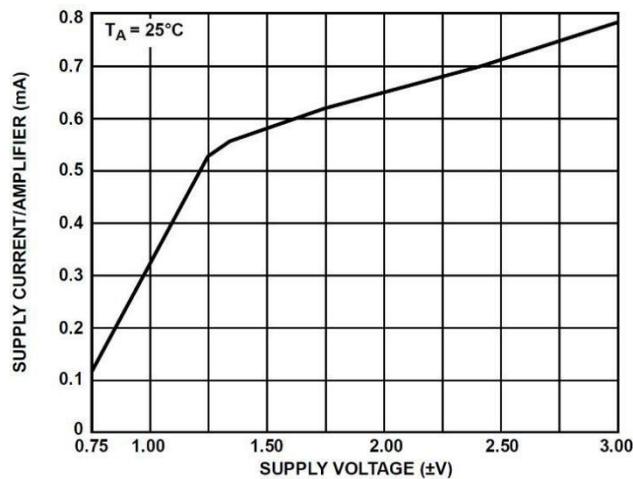


Figure 19. Supply Current per Amplifier vs. Supply Voltage

## Theory Of Operation

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The CBM8531/CBM8532/CBM8534 are all CMOS, high output current drive, rail-to-rail input/output operational amplifiers. Their high output current drive and stability with heavy capacitive loads make the CBM8531/CBM8532/CBM8534 excellent choices as drive amplifiers for LCD panels.

Figure 20 illustrates a simplified equivalent circuit for the CBM8531/CBM8532/CBM8534. Like many rail-to-rail input amplifier configurations, it comprises two differential pairs, one N-channel (M1 to M2) and one P-channel (M3 to M4). These differential pairs are biased by 50  $\mu$ A current sources, each with a compliance limit of approximately 0.5 V from either supply voltage rail. The differential input voltage is then converted into a pair of differential output currents. These differential output currents are then combined in a compound folded-cascade second gain stage (M5 to M9). The outputs of the second gain stage at M8 and M9 provide the gate voltage drive to the rail-to-rail output stage. Additional signal current recombination for the output stage is achieved using M11 to M14.

To achieve rail-to-rail output swings, the CBM8531/CBM8532/ CBM8534 design employs a complementary, common source output stage (M15 to M16). However, the output voltage swing is directly dependent on the load current because the difference between the output voltage and the supply is determined by the CBM8531/CBM8532/CBM8534's output transistors on channel resistance. The output stage also exhibits voltage gain by virtue of the use of common source amplifiers; as a result, the voltage gain of the output stage (thus, the open-loop gain of the device) exhibits a strong dependence on the total load resistance at the output of the CBM8531/CBM8532/CBM8534.

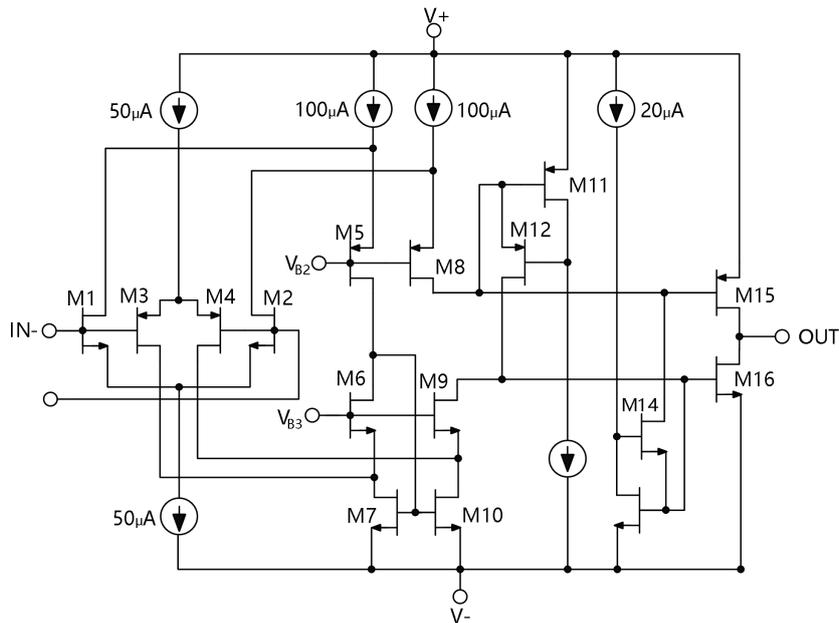


Figure 20. Simplified Equivalent Circuit

## Short-Circuit Protection

As a result of the design of the output stage for the maximum load current capability, the CBM8531/CBM8532/CBM8534 do not have any internal short-circuit protection circuitry. Direct connection of the output of the CBM8531/CBM8532/CBM8534 to the positive supply in single-supply applications destroys the device. In applications where some protection is needed, but not at the expense of reduced output voltage headroom, a low value resistor in series with the output, as shown in Figure 21, can be used. The resistor, connected within the feedback loop of the amplifier, has very little effect on the performance of the amplifier other than limiting the maximum available output voltage swing. For single 5 V supply applications, resistors less than 20 Ω are not recommended.

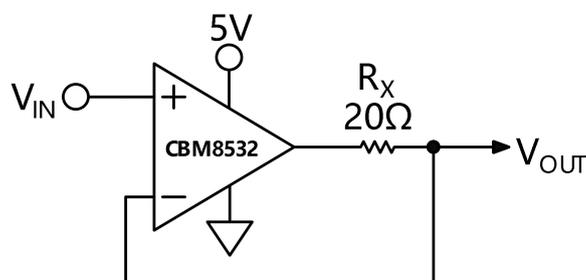


Figure 21. Output Short-Circuit Protection

## Power Dissipation

Although the CBM8531/CBM8532/CBM8534 are capable of providing load currents to 250 mA, the usable output load current drive capability is limited to the maximum power dissipation allowed by the device package used. In any application, the absolute maximum junction temperature for the CBM8531/CBM8532/CBM8534 is 150°C. The maximum junction temperature should never be exceeded because the device could suffer premature failure. Accurately measuring power dissipation of an integrated circuit is not always a straightforward exercise; therefore, Figure 22 is provided as a design aid for either setting a safe output current drive level or selecting a heat sink for the package options available on the CBM8531/CBM8532/CBM8534.

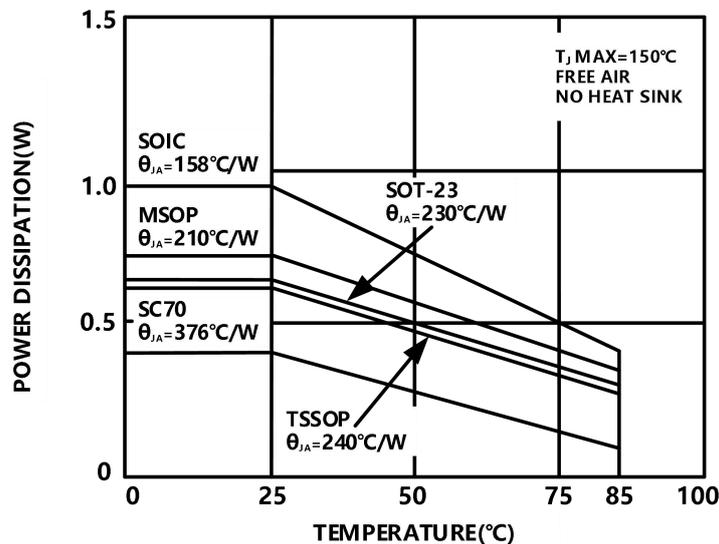


Figure 22. Maximum Power Dissipation vs. Ambient Temperature  $T_j$

## Applications Information

### HIGH OUTPUT CURRENT, BUFFERED REFERENCE/REGULATOR

Many applications require stable voltage outputs relatively close in potential to an unregulated input source. This low dropout type of reference/regulator is readily implemented with a rail-to-rail output op amp and is particularly useful when using a higher current device, such as the CBM8531/CBM8532/CBM8534. A typical example is the 3.3V or 4.5V reference voltage developed from a 5V system source. Generating these voltages requires a three terminal reference, such as the REF196 (3.3V) or the REF194 (4.5V), both of which feature low power, with sourcing outputs of 30 mA or less. Figure 23 shows how such a reference can be outfitted with an CBM8531/CBM8532/CBM8534 buffer for higher currents and/or voltage levels, plus sink and source load capability.

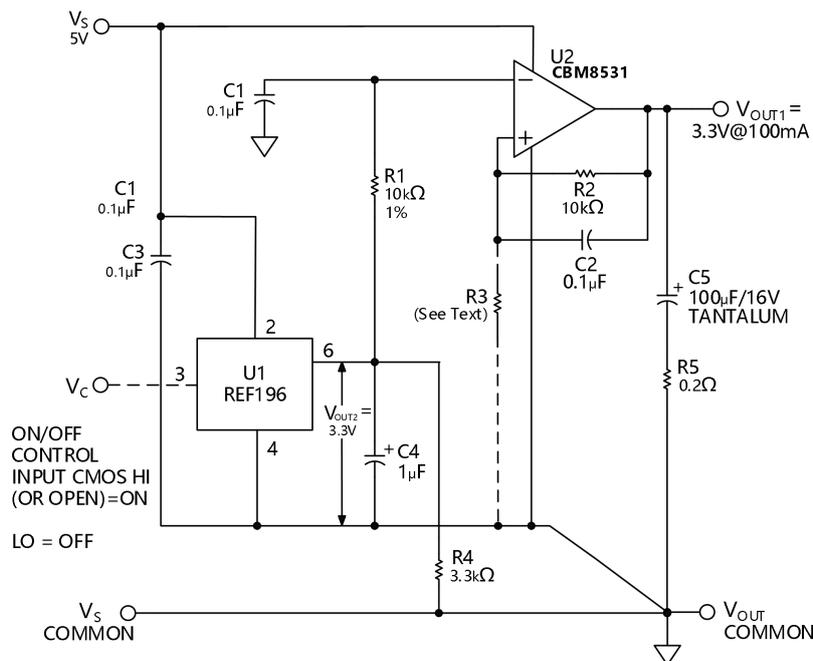


Figure 23. High Output Current Reference/Regulator

The low dropout performance of this circuit is provided by stage U2, an CBM8531 connected as a follower/buffer for the basic reference voltage produced by U1. The low voltage saturation characteristic of the CBM8531/CBM8532/CBM8534 allows up to 100mA of load current in the illustrated use, as a 5V to 3.3V converter with good dc accuracy. In fact, the dc output voltage change for a 100mA load current delta measures less than 1mV. This corresponds to an equivalent output impedance of  $< 0.01 \Omega$ . In this application, the stable 3.3 V from U1 is applied

to U2 through a noise filter, R1 to C1. U2 replicates the U1 voltage within a few millivolts, but at a higher current output at  $V_{OUT1}$ , with the ability to both sink and source output current(s), unlike most IC references. R2 and C2 in the feedback path of U2 provide additional noise filtering.

Transient performance of the reference/regulator for a 100mA step change in load current is also quite good and is largely determined by the R5 to C5 output network. With values as shown, the transient is about 20mV peak and settles to within 2mV in less than 10 $\mu$ s for either polarity. Although room exists for optimizing the transient response, any changes to the R5 to C5 network should be verified by experiment to preclude the possibility of excessive ringing with some capacitor types.

To scale  $V_{OUT2}$  to another (higher) output level, the optional resistor R3 (shown dotted in Figure 23) is added, causing the new  $V_{OUT1}$  to become

$$V_{OUT1} = V_{OUT2} \times \left(1 + \frac{R2}{Rt}\right)$$

The circuit can either be used as shown, as a 5 V to 3.3 V reference/regulator, or with on/off control. By driving Pin 3 of U1 with a logic control signal as noted, the output is switched on/off. Note that when on/off control is used, R4 must be used with U1 to speed on/off switching.

### **SINGLE-SUPPLY HEADPHONE AMPLIFIER**

Because of its speed and large output drive, the CBM8531/ CBM8532/CBM8534 make an excellent headphone driver, as illustrated in Figure 24. Its low supply operation and rail-to-rail inputs and outputs give a maximum signal swing on a single 5V supply. To ensure maximum signal swing available to drive the headphone, the amplifier inputs are biased to  $V+/2$ , which in this case is 2.5V. The 100k $\Omega$  resistor to the positive supply is equally split into two 50k $\Omega$  resistors, with their common point bypassed by 10 $\mu$ F to prevent power supply noise from contaminating the audio signal.

The audio signal is then ac-coupled to each input through a 10 $\mu$ F capacitor. A large value is needed to ensure that the 20 Hz audio information is not blocked. If the input already has the proper dc bias, the ac coupling and biasing resistors are not required. A 270 $\mu$ F capacitor is used at the output to couple the amplifier to the headphone. This value is much larger than that used for the input because of the low impedance of the head-phones, which can range from 32 $\Omega$  to 600 $\Omega$ . An additional 16 $\Omega$  resistor is used in series with the output capacitor to protect the output stage of the op amp by limiting the capacitor discharge current. When driving a 48 $\Omega$  load, the circuit exhibits less than 0.3% THD+N at output drive levels of 4Vp-p.

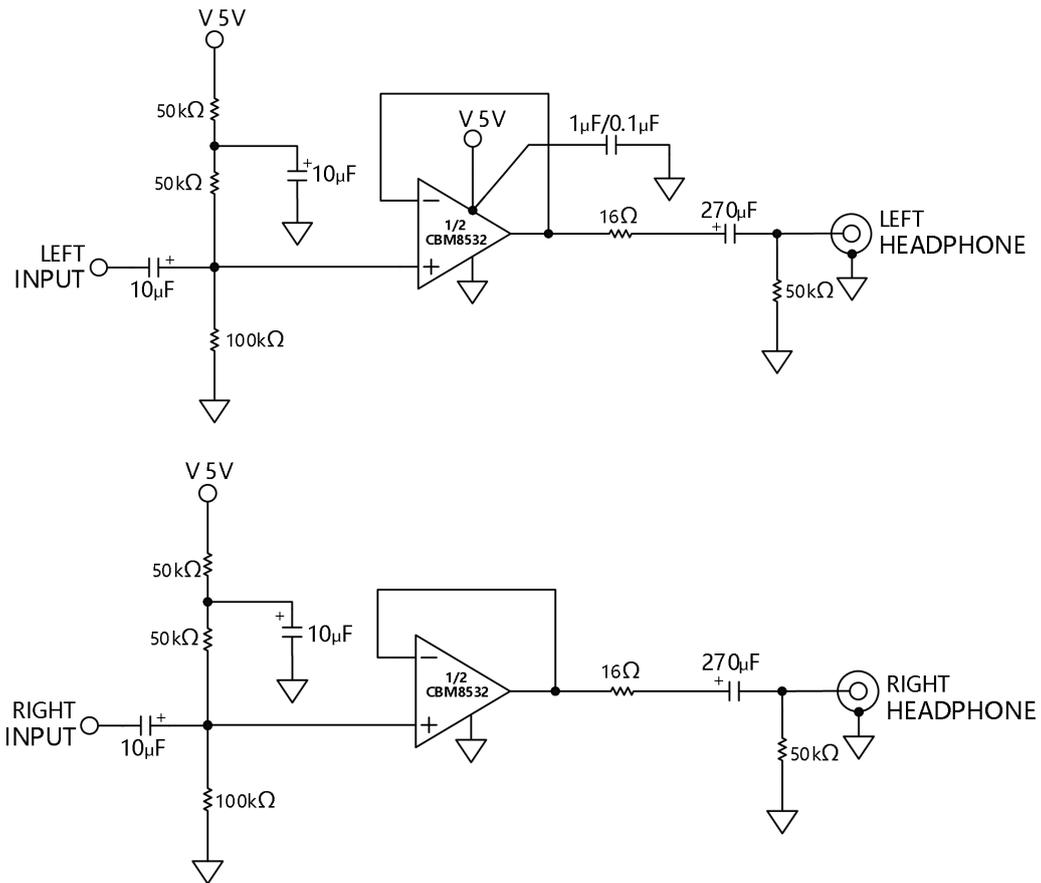


Figure 24. Single-Supply, Stereo Headphone Driver

## Package Outline Dimensions

### SC70-5

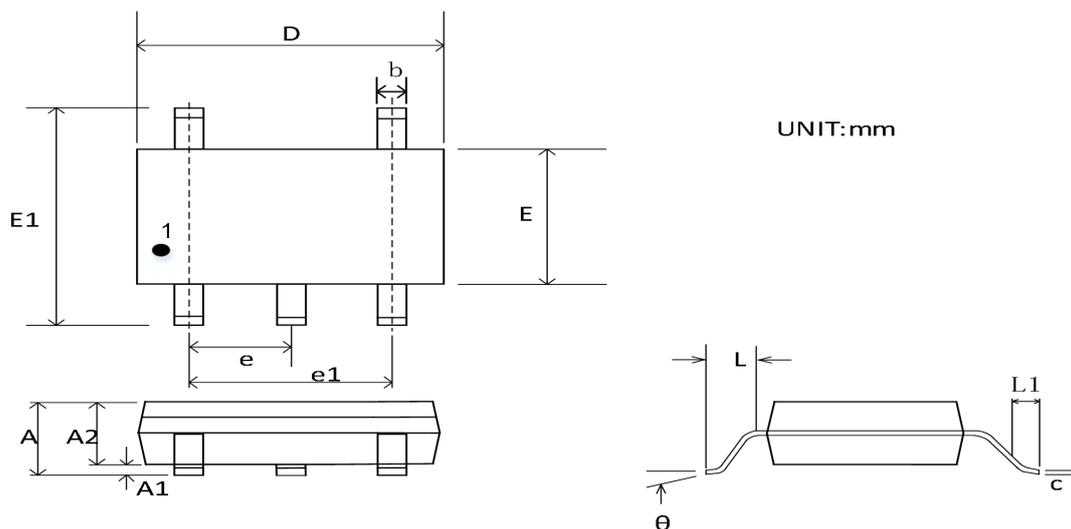


Figure 25. SC70-5 Outline Package

Symbol	Dimensions In Millimeters		Dimensions Inches	
	Min	Max	Min	Max
<b>A</b>	0.800	1.100	0.031	0.043
<b>A1</b>	0.000	0.100	0.000	0.004
<b>A2</b>	0.700	1.000	0.028	0.039
<b>b</b>	0.150	0.300	0.006	0.012
<b>c</b>	0.080	0.220	0.003	0.009
<b>D</b>	1.800	2.200	0.071	0.087
<b>E</b>	1.150	1.350	0.045	0.053
<b>E1</b>	1.800	2.400	0.071	0.094
<b>e</b>	0.650 BSC		0.026 BSC	
<b>e1</b>	1.200	1.400	0.047	0.055
<b>L</b>	0.525 REF		0.021 REF	
<b>L1</b>	0.260	0.460	0.010	0.018
<b>θ</b>	0°	8°	0°	8°

## SOT23-5

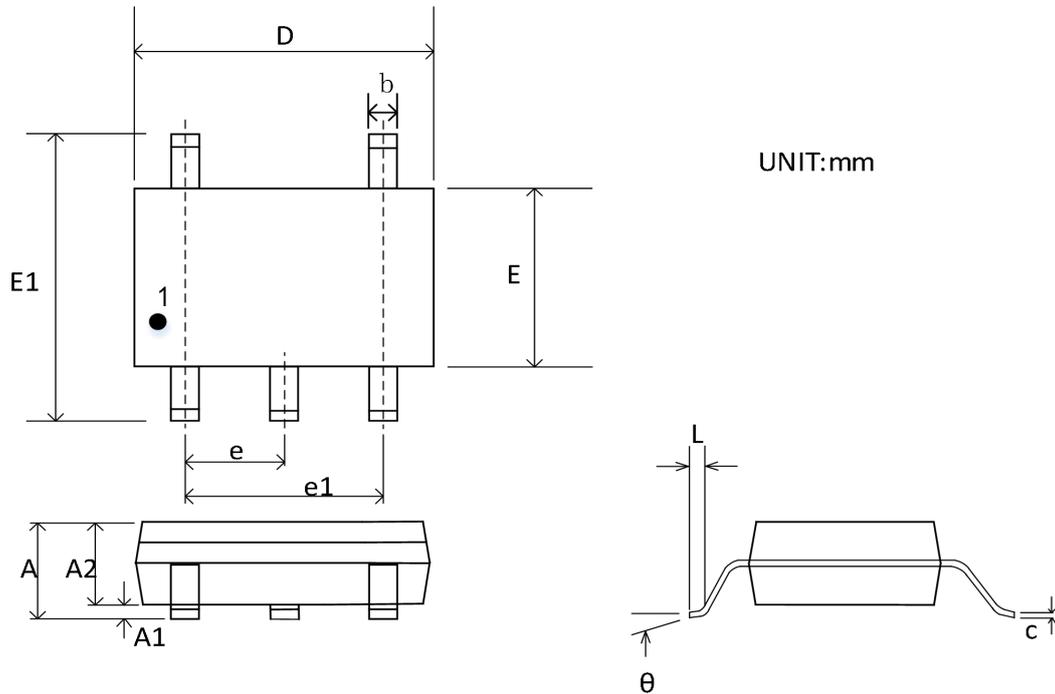


Figure 26. SOT23-5 Outline Package

Symbol	Dimensions In Millimeters		Dimensions Inches	
	Min	Max	Min	Max
A	--	1.450	--	0.057
A1	--	0.150	--	0.006
A2	0.900	1.300	0.035	0.051
b	0.300	0.500	0.012	0.020
c	0.080	0.220	0.003	0.009
D	2.900 BSC		0.114 BSC	
E	1.600 BSC		0.063 BSC	
E1	2.80 BSC		0.110 BSC	
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

## SOP-8

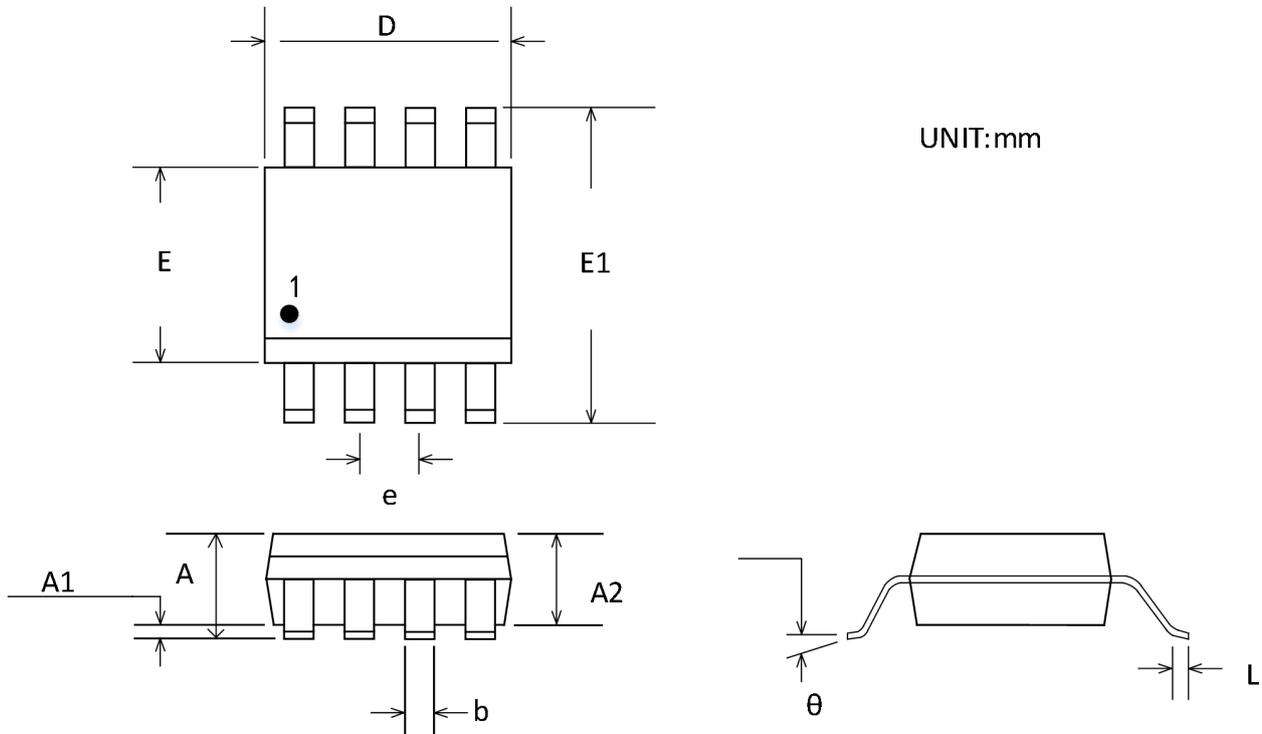


Figure 27. SOP-8 Outline Package

Symbol	Dimensions In Millimeters		Dimensions Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.310	0.510	0.012	0.020
D	4.800	5.000	0.189	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
$\theta$	0°	8°	0°	8°

## MSOP-8

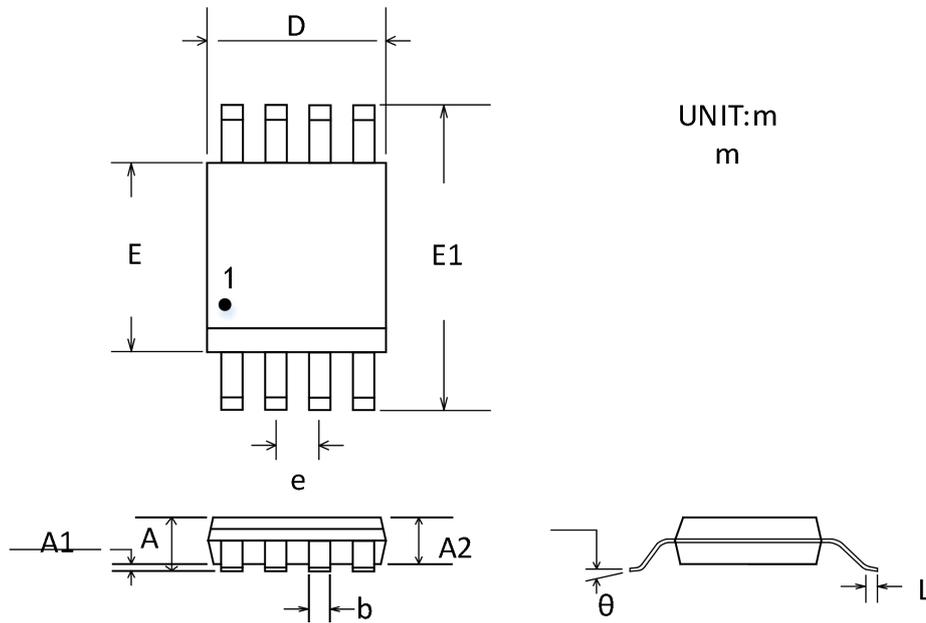


Figure 28. MSOP-8 Outline Package

Symbol	Dimensions In Millimeters		Dimensions Inches	
	Min	Max	Min	Max
<b>A</b>	0.820	1.100	0.032	0.043
<b>A1</b>	0.000	0.150	0.000	0.006
<b>A2</b>	0.750	0.950	0.030	0.037
<b>b</b>	0.220	0.380	0.009	0.015
<b>D</b>	2.800	3.200	0.110	0.126
<b>E</b>	2.800	3.200	0.110	0.126
<b>E1</b>	4.650	5.150	0.183	0.203
<b>e</b>	0.650 BSC		0.026 BSC	
<b>L</b>	0.400	0.800	0.016	0.031
<b>θ</b>	0°	8°	0°	8°

## TSSOP-8

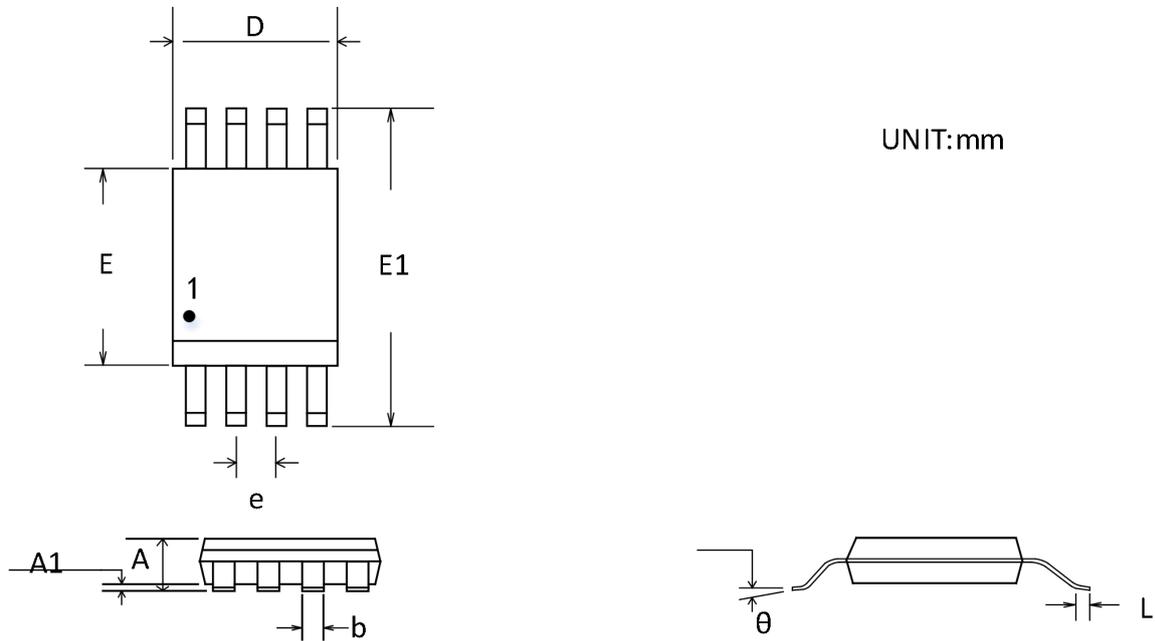


Figure 29. TSSOP-8 Outline Package

Symbol	Dimensions In Millimeters		Dimensions Inches	
	Min	Max	Min	Max
A	--	1.20	--	0.047
A1	0.05	0.15	0.002	0.006
b	0.19	0.30	0.007	0.012
D	2.90	3.10	0.114	0.122
E	4.30	4.50	0.169	0.171
E1	6.40BSC		0.252BSC	
e	0.65 BSC		0.026 BSC	
L	0.45	0.75	0.018	0.030
θ	0°	8°	0°	6°

## TSSOP-14

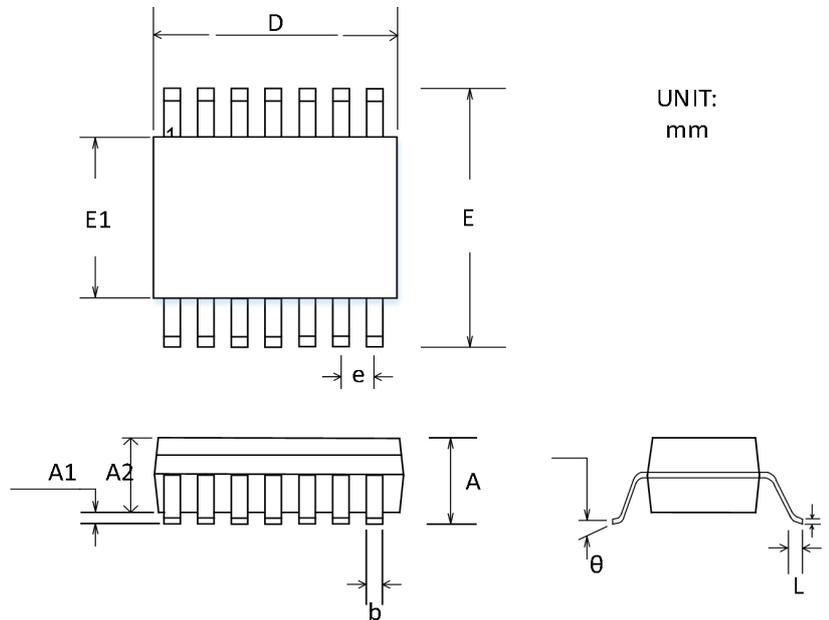


Figure 30. TSSOP-14 Outline Package

Symbol	Dimensions In Millimeters		Dimensions Inches	
	Min	Max	Min	Max
<b>A</b>	--	1.200	--	0.047
<b>A1</b>	0.050	0.150	0.002	0.006
<b>A2</b>	0.800	1.050	0.031	0.041
<b>b</b>	0.190	0.300	0.007	0.012
<b>c</b>	0.090	0.200	0.004	0.008
<b>D</b>	4.900	5.100	0.193	0.201
<b>E</b>	6.40 BSC		0.252 BSC	
<b>E1</b>	4.300	4.500	0.169	0.177
<b>e</b>	0.650 BSC		0.026 BSC	
<b>L</b>	0.450	0.750	0.018	0.030
<b>θ</b>	0°	8°	0°	8°

## SOP-14

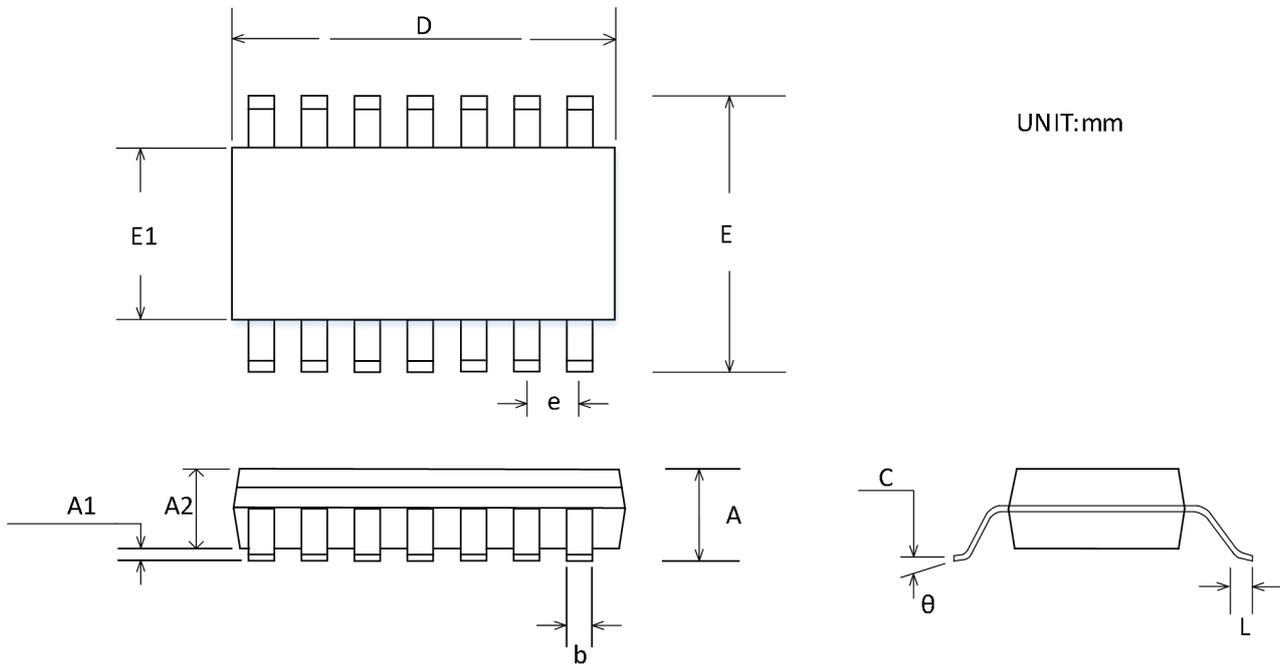


Figure 31. SOP-14 Outline Package

Symbol	Dimensions In Millimeters		Dimensions Inches	
	Min	Max	Min	Max
<b>A</b>	1.350	1.750	0.053	0.069
<b>A1</b>	0.100	0.250	0.004	0.010
<b>A2</b>	1.350	1.550	0.053	0.061
<b>b</b>	0.310	0.510	0.012	0.020
<b>c</b>	0.170	0.250	0.070	0.010
<b>D</b>	8.550	8.750	0.337	0.345
<b>E</b>	5.800	6.200	0.228	0.244
<b>E1</b>	3.800	4.000	0.150	0.158
<b>e</b>	1.270 BSC		0.050 BSC	
<b>L</b>	0.400	1.270	0.016	0.050
<b>θ</b>	0°	8°	0°	8°

## Package/Ordering Information

ORDERING NUMBER	TEMPRANGE	PACKAGE	PAKEAGE MARKING	TRANSPOT MEDIA,QUANTILY
CBM8531ASC7	-40°C~125°C	SC70-5	8531	Tape and Reel,3000
CBM8531AST5	-40°C~125°C	SOT23-5	8531	Tape and Reel,3000
CBM8531AS8	-40°C~125°C	SOP-8	CBM8531A	Tape and Reel,2500
CBM8531AS8-RL	-40°C~125°C	SOP-8	CBM8531A	Tape and Reel,3000
CBM8531AS8-REEL	-40°C~125°C	SOP-8	CBM8531A	Tape and Reel,4000
CBM8532AS8	-40°C~125°C	SOP-8	CBM8532A	Tape and Reel,2500
CBM8532AS8-RL	-40°C~125°C	SOP-8	CBM8532A	Tape and Reel,3000
CBM8532AS8-REEL	-40°C~125°C	SOP-8	CBM8532A	Tape and Reel,4000
CBM8532AMS8	-40°C~125°C	MSOP-8	A32	Tape and Reel,3000
CBM8532ATS8	-40°C~125°C	TSSOP-8	32T	Tape and Reel,2500
CBM8532ATS8-RL	-40°C~125°C	TSSOP-8	32T	Tape and Reel,3000
CBM8532ATS8-REEL	-40°C~125°C	TSSOP-8	32T	Tape and Reel,4000
CBM8534AS14	-40°C~125°C	SOP-14	CBM8534AS	Tape and Reel,2500
CBM8534AS14-RL	-40°C~125°C	SOP-14	CBM8534AS	Tape and Reel,3000
CBM8534AS14-REEL	-40°C~125°C	SOP-14	CBM8534AS	Tape and Reel,4000
CBM8534ATS14	-40°C~125°C	TSSOP-14	CBM8534AT	Tape and Reel,2500
CBM8534ATS14-RL	-40°C~125°C	TSSOP-14	CBM8534AT	Tape and Reel,3000
CBM8534ATS14-REEL	-40°C~125°C	TSSOP-14	CBM8534AT	Tape and Reel,4000