



# MIC6251/6252

## IttyBitty™ GainBlock™ Amplifiers

### Preliminary Information

### General Description

The MIC6251 and MIC6252 are IttyBitty™ GainBlock™ amplifiers for use as follows:

- MIC6251 ..... +2, +1, -1 gain amplifier
- MIC6252 ..... +0.5, +1 gain amplifier;  
average value amplifier

The MIC6251 and MIC6252 amplifiers operate from 4V to 32V. Both can use single or split supplies. These amplifiers feature internal, well-matched, gain-setting resistors and an input common-mode range that includes the negative supply (ground).

The MIC6251/2 is available in the tiny SOT-23-5 surface mount package.

### Features

- 4V to 32V operation
- Small footprint package
- Internally compensated
- 2MHz bandwidth
- 6V/μs typical slew rate
- Short circuit protected

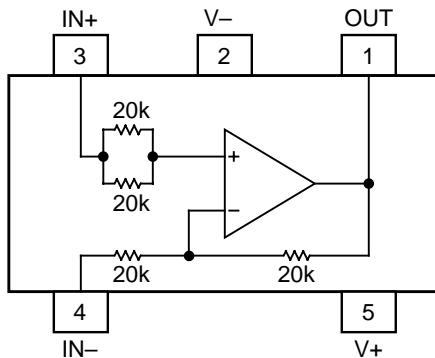
### Applications

- Analog building blocks
- Summing amplifier
- Gain block

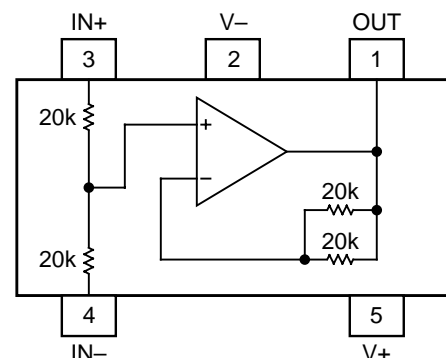
### Ordering Information

Part Number	Marking	Temperature	Range Package
MIC6251BM5	A51	-40°C to +85°C	SOT-23-5
MIC6252BM5	A52	-40°C to +85°C	SOT-23-5

### Functional Configuration



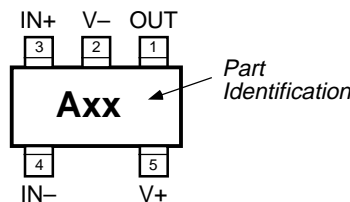
MIC6251



MIC6252

### Pin Configuration

Part Number	Identification
MIC6251BM5	A51
MIC6252BM5	A52



SOT-23-5 (M5)

## Pin Description

Pin Number	Pin Name	Pin Function
1	OUT	Amplifier Output
2	V-	Negative Supply: Negative supply for split supply application or ground for single supply application.
3	IN+	Noninverting Input: See "Electrical Characteristics: <b>Note 1.</b> "
4	IN-	Inverting Input: See "Electrical Characteristics: <b>Note 1.</b> "
5	V+	Positive Supply

## Absolute Maximum Ratings

Supply Voltage ( $V_{V+} - V_{V-}$ )	36V or $\pm 18V$
Differential Input Voltage ( $V_{IN+} - V_{IN-}$ )	$\pm 36V$
Input Voltage ( $V_{IN+}, V_{IN-}$ )	$V_{V-} - 0.3V$ to $V_{V+}$
Output Short Circuit Current Duration	$\infty$
Junction Temperature ( $T_J$ )	150°C
Storage Temperature ( $T_S$ )	-65°C to +150°C
Lead Temperature (soldering, 10 sec.)	260°C
ESD, <b>Note 4</b>	[TBD]

## Operating Ratings

Supply Voltage	4V to 32V
Ambient Temperature Range	-40°C to +85°C
SOT-23-5 Thermal Resistance ( $\theta_{JA}$ )	325°C/W

## Electrical Characteristics (Differential Supply)

$V_{V+} = +15V$ ,  $V_{V-} = -15V$ ;  $V_{CM} = 0V$ , **Note 1**;  $T_A = 25^\circ C$ , **bold** values indicate  $-40^\circ C \leq T_A \leq +85^\circ C$ ,  $T_A = T_J$ ; unless noted.

Symbol	Parameter	Condition	Min	Typ	Max	Units
$G_E$	Gain Error	MIC6251: $A_V = 2$ , $V_O = \pm 10V$		0.3	0.5	%
		MIC6252: $A_V = 0.5$ , $V_O = \pm 10V$		0.3	0.5	%
$G_{NL}$	Gain Non-linearity	MIC6251: $A_V = 2$ , $V_O = \pm 10V$		0.01		%
		MIC6252: $A_V = 0.5$ , $V_O = \pm 10V$		0.01		%
$V_{OS}$	Offset Voltage	MIC6251: Referred to output		4	14	mV
		MIC6252: Referred to output		2	7	mV
$TCV_{OS}$	Average Offset Drift			7		$\mu V/^\circ C$
$I_B$	Input Bias Current			50	250	nA
$V_{CM}$	Input Voltage Range, Differential	<b>Note 3</b>		$\pm 25$		V
	Input Volt. Range, Common Mode		$\pm 13.5$	$\pm 13.8$		V
CMRR	Common Mode Rejection Ratio	$\Delta V_{CM} = 27V$ , -13.5V to +13.5V	65	100		dB
PSRR	Power Supply Rejection Ratio	$\Delta V_S = 25V$ , $\pm 15V$ to $\pm 2.5V$	65	110		dB
$V_{OUT}$	Maximum Output Voltage Swing	$R_L = 2k$	$\pm 12.5$	$\pm 14$		V
$B_W$	Bandwidth			2		MHz
$S_R$	Slew Rate			6		V/ $\mu s$
$I_S$	Supply Current			1.3	2.0	mA

**General Note** : Devices are ESD protected; however, handling precautions are recommended.

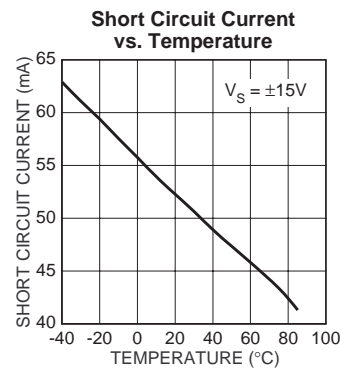
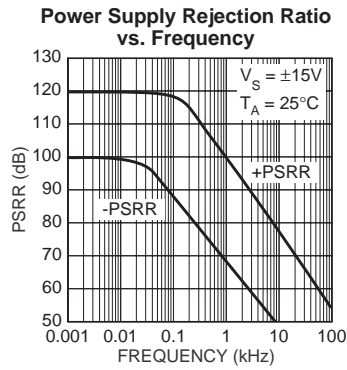
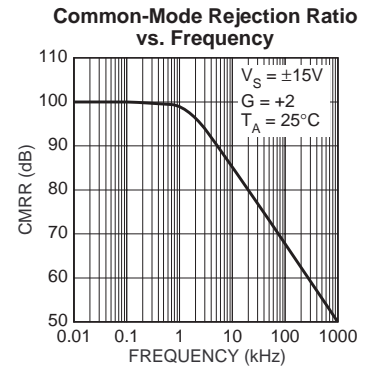
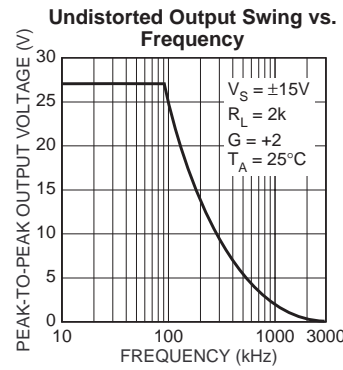
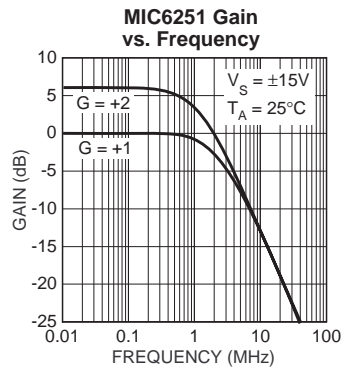
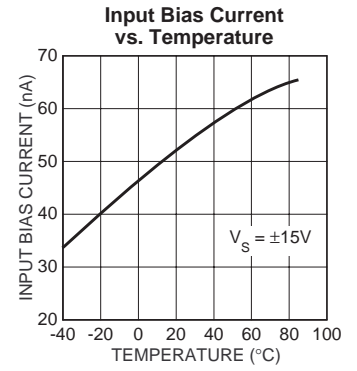
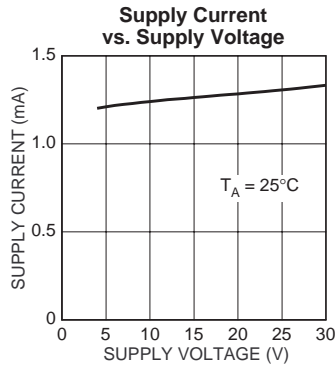
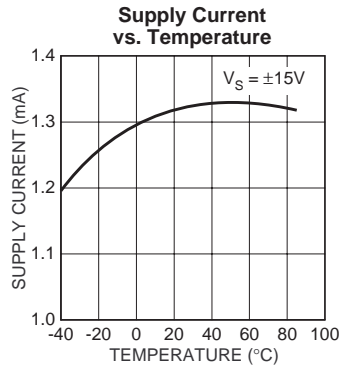
**Note 1** : IN+ and IN- pins on the MIC6252 are interchangeable.

**Note 2** : Gain setting resistors are ratio-matched but have a  $\pm 20\%$  absolute tolerance

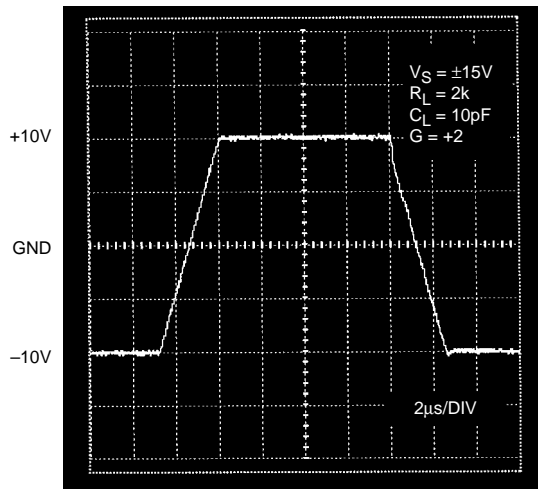
**Note 3** : Limit input current to 1mA.

**Note 4** : Human body model, 1.5k in series with 100pF.

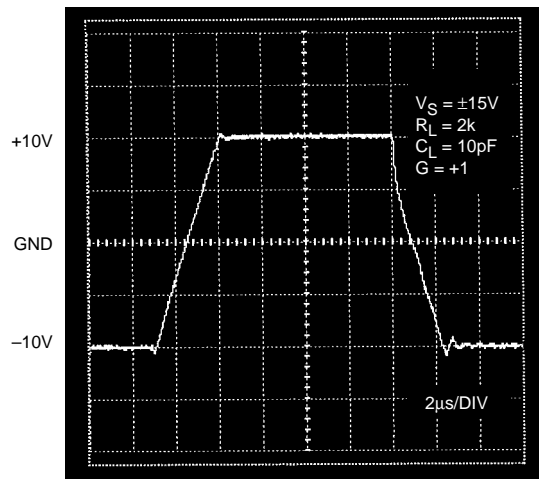
# Typical Characteristics



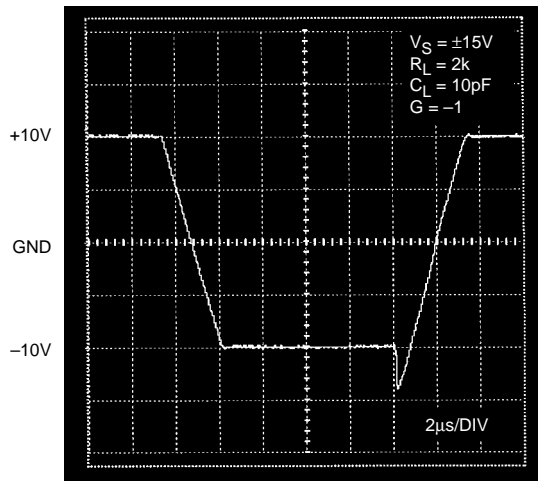
MIC6251 Large-Signal Transient Response



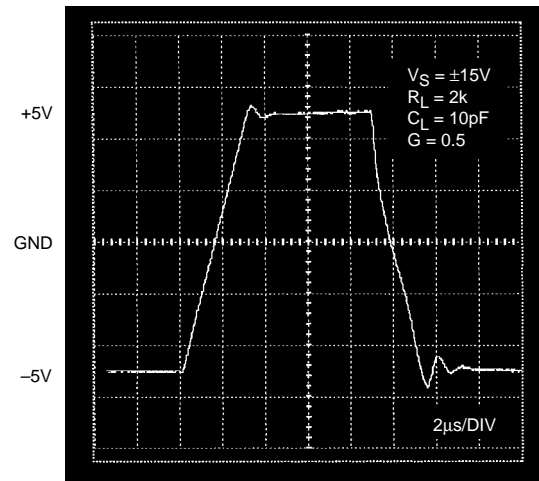
MIC6251 Large-Signal Transient Response



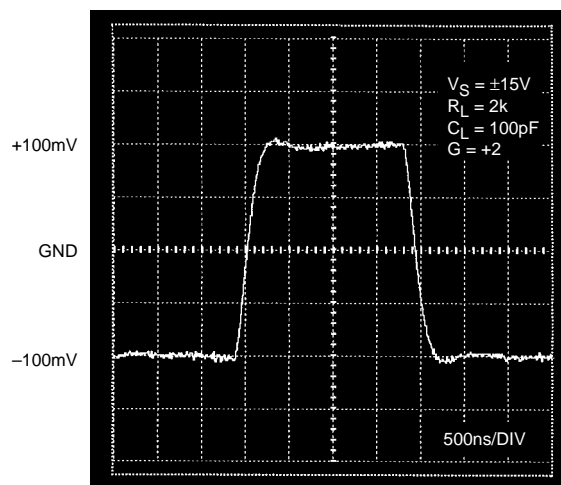
MIC6251 Large-Signal Transient Response



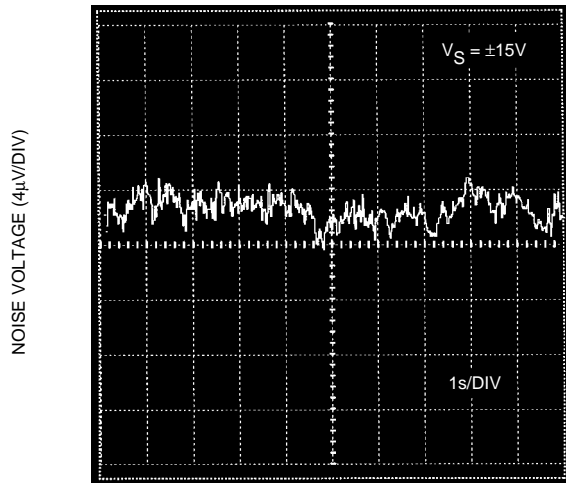
MIC6252 Large-Signal Transient Response



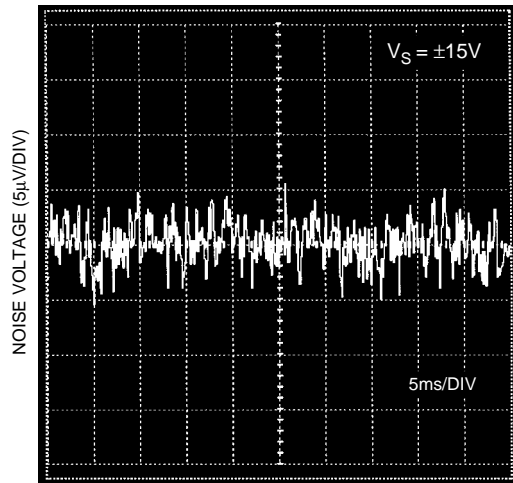
MIC6251 Small-Signal Transient Response



MIC6251/2 0.1Hz to 10Hz Noise  
Gain = +1



MIC6251/2 Wideband Noise  
Gain +1



## Functional Configurations

Figures 1 through 6 illustrate basic MIC6251 and MIC6252 GainBlock™ configurations.

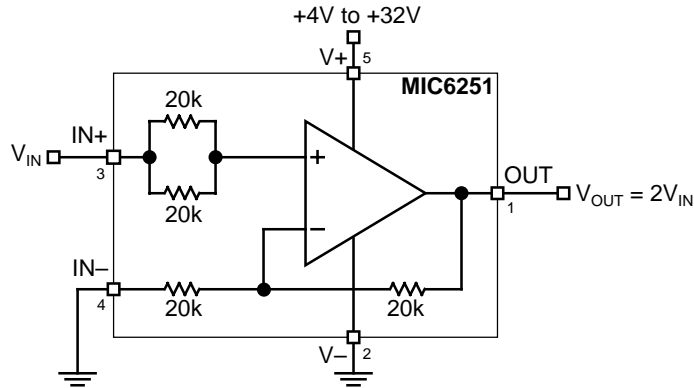


Figure 1. MIC6251  $A_V = 2$  Amplifier

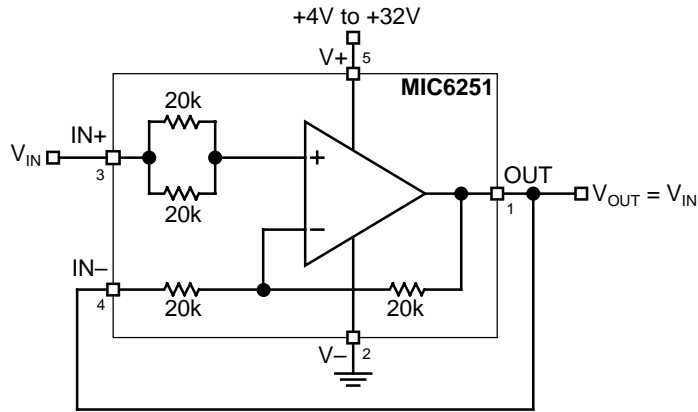


Figure 2. MIC6251 Voltage Follower

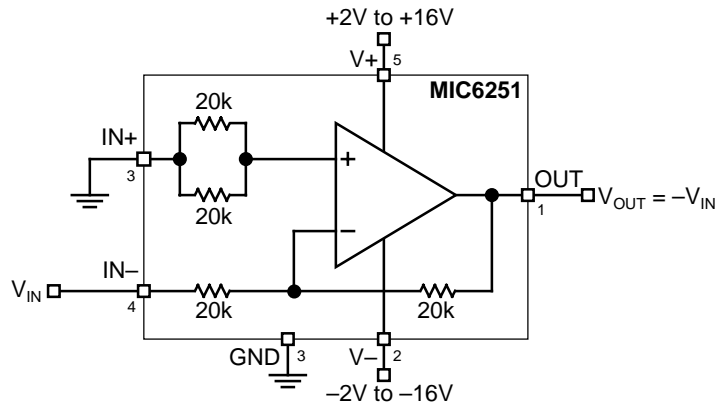


Figure 3. MIC6251 Inverting Unity-Gain Circuit

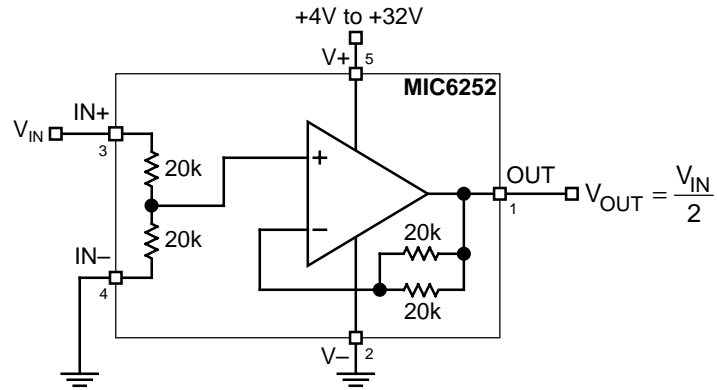


Figure 4. MIC6252 A<sub>v</sub> = 0.5 Amplifier

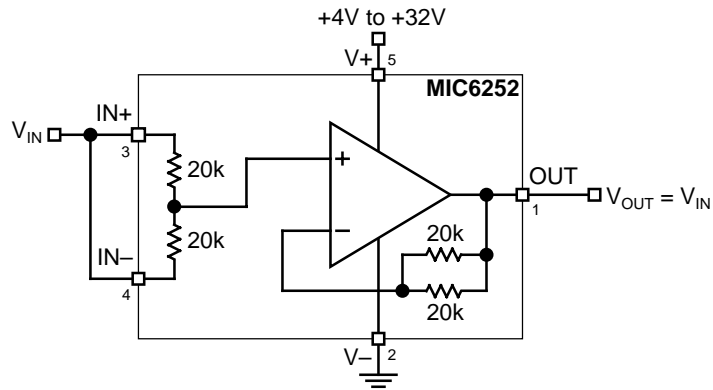


Figure 5. MIC6252 Voltage Follower

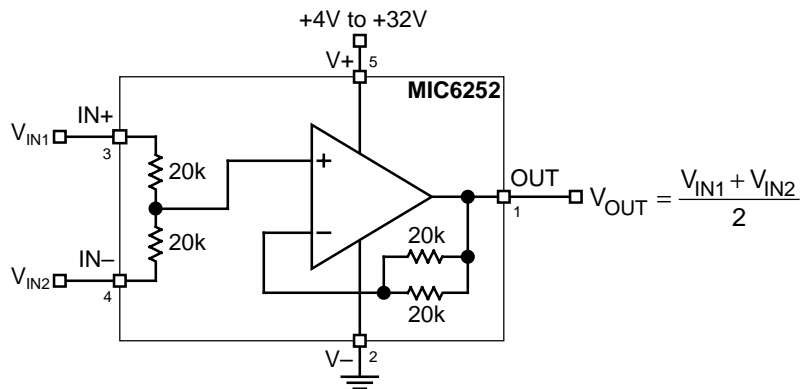
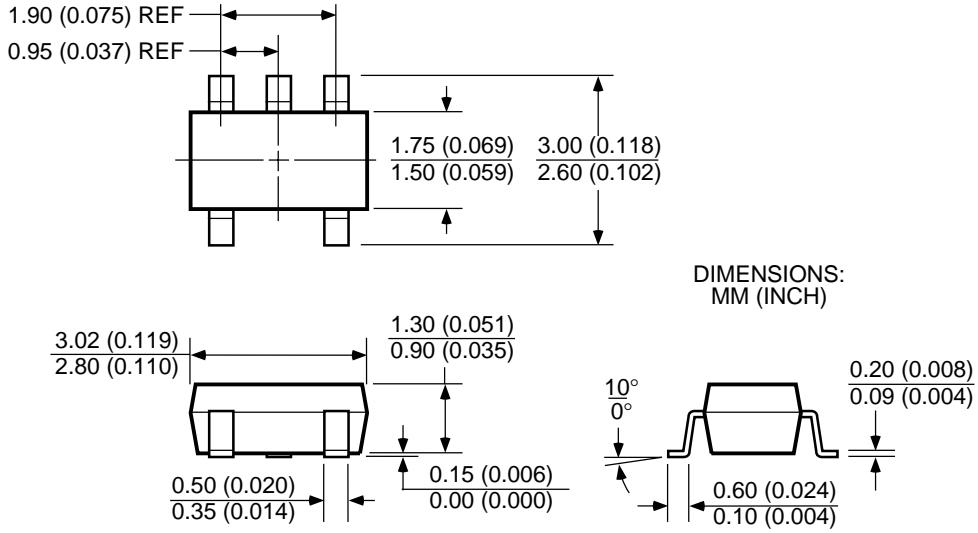


Figure 6. MIC6252 Voltage Averager

**Package Information**



**SOT-23-5 (M5)**

**MICREL INC. 1849 FORTUNE DRIVE SAN JOSE, CA 95131 USA**

TEL + 1 (408) 944-0800 FAX + 1 (408) 944-0970 WEB <http://www.micrel.com>

This information is believed to be accurate and reliable, however no responsibility is assumed by Micrel for its use nor for any infringement of patents or other rights of third parties resulting from its use. No license is granted by implication or otherwise under any patent or patent right of Micrel Inc.

© 1998 Micrel Incorporated