MIC7122

Rail-to-Rail Dual Op Amp

Features

- Small Footprint MSOP-8 Package
- 350 µA Supply Current per Op Amp at 2.2V Supply
- Guaranteed 2.2V, 5V, and 15V Performance
- 750 kHz Gain-Bandwidth Product at 2.2V Supply
- 0.01% Total Harmonic Distortion at 1 kHz (15V, 2 kΩ)
- Drives 200 pF at 5V and Greater Supply Voltages

Applications

- Battery-Powered Instrumentation
- PCMCIA, USB Peripherals
- Portable Computers and PDAs

General Description

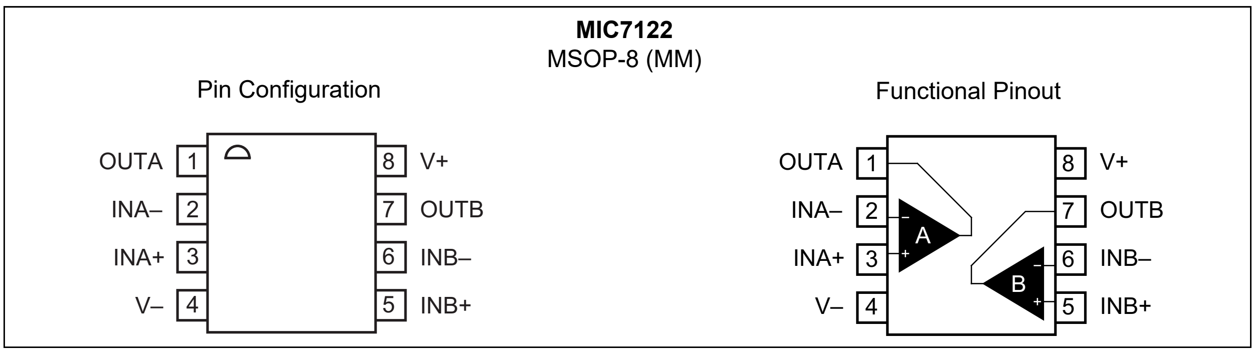
The MIC7122 is a dual high-performance CMOS operational amplifier featuring rail-to-rail inputs and outputs.

The input common-mode range extends beyond the rails by 300 mV, and the output voltage swings to within 150 µV of both rails when driving a 100 kΩ load.

The amplifiers operate from 2.2V to 15V and are fully specified at 2.2V, 5V, and 15V. Gain bandwidth and slew rate are 750 kHz and 0.7 V/µs, respectively at a 2.2V supply.

The MIC7122 is available in an 8-lead MSOP package.

Package Type



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Supply Voltage ($V_{V+} – V_{V–}$) .... +16.5V
Differential Input Voltage ($V_{IN+} – V_{IN–}$) .... ±10V
I/O Pin Voltage (V_{IN}, V_{OUT} Note 1) .... V_{V+} + 0.3V to $V_{V–}$ – 0.3V
ESD Rating (Note 2) .... 1 kV

Operating Ratings ‡

Supply Voltage ($V_{V+} – V_{V–}$) .... +2.2V to +15V

† Notice: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ Notice: The device is not guaranteed to function outside its operating ratings.

Note 1: I/O Pin Voltage is any external voltage to which an input or output is referenced.

2: Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5 kΩ in series with 100 pF.

DC ELECTRICAL CHARACTERISTICS (2.2V)

V_{V+} = +2.2V, V_{V-} = 0V, V_{CM} = V_{OUT} = V_{V+}/2; R_L = 1 MΩ; T_J = +25°C; Note 1.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Input Offset Voltage	V_{OS}	—	0.5	9	mV	—
Input Offset Voltage Average Drift	TCV_{OS}	—	3.0	—	µV/°C	—
Input Bias Current	I_B	—	1.0	10	pA	—
		—	64	500		–40°C ≤ T_J ≤ +85°C
Input Offset Current	I_{OS}	—	0.5	5	pA	—
		—	32	250		–40°C ≤ T_J ≤ +85°C
Input Resistance	R_{IN}	—	>1	—	TΩ	—
Common-Mode Rejection Ratio	CMRR	45	65	—	dB	–0.3V ≤ V_{CM} ≤ 2.5V, Note 2
Power Supply Rejection Ratio	PSRR	60	85	—	dB	V_{V+} = |V_{V-}| = 1.1V to 2.5V, V_{OUT} = V_{CM} = 0
Common-Mode Input Capacitance	C_{IN}	—	3	—	pF	—
Output Swing	V_O	—	0.15	1	mV	Output high, R_L = 100 kΩ, specified as $V_{V+} – V_{OUT}$
		—	—	1		Output high, R_L = 100 kΩ, specified as $V_{V+} – V_{OUT}$, –40°C ≤ T_J ≤ +85°C
		—	0.15	1		Output low, R_L = 100 kΩ
		—	—	1		Output low, R_L = 100 kΩ, –40°C ≤ T_J ≤ +85°C
		—	8	33		Output high, R_L = 2 kΩ, specified as $V_{V+} – V_{OUT}$
		—	—	50		Output high, R_L = 2 kΩ, specified as $V_{V+} – V_{OUT}$, –40°C ≤ T_J ≤ +85°C
		—	8	33		Output low, R_L = 2 kΩ
		—	—	50		Output low, R_L = 2 kΩ –40°C ≤ T_J ≤ +85°C
		—	26	110		Output high, R_L = 600Ω, specified as $V_{V+} – V_{OUT}$
		—	—	165		Output high, R_L = 600Ω, specified as $V_{V+} – V_{OUT}$, –40°C ≤ T_J ≤ +85°C
		—	26	110		Output low, R_L = 600Ω
		—	—	165		Output low, R_L = 600Ω –40°C ≤ T_J ≤ +85°C
Output Short-Circuit Current	I_{SC}	20	50	—	mA	Sinking or sourcing, Note 3
Supply Current	I_S	—	0.7	1.6	mA	Both amplifiers

Note 1: All limits guaranteed by testing or statistical analysis.

2: CMRR is determined as follows: The maximum ΔV_{OS} over the V_{CM} range is divided by the magnitude of the V_{CM} range. The measurement points are: V_{CM} = V_{V-} – 0.3V, (V_{V+} – V_{V-})/2, and V_{V+} + 0.3V.

3: Continuous short circuit may exceed absolute maximum T_J under some conditions.

AC ELECTRICAL CHARACTERISTICS (2.2V)

V_{V+} = +2.2V, V_{V-} = 0V, V_{CM} = V_{OUT} = V_{V+}/2; R_L = 1 MΩ; T_J = +25°C; Note 1.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Slew Rate	SR	—	0.7	—	V/µs	—
Gain-Bandwidth Product	GBWP	—	750	—	kHz	—
Phase Margin	ϕ_m	—	80	—	°	C_L = 0 pF
		—	40	—		C_L = 200 pF
Gain Margin	G_M	—	10	—	dB	—
Interamplifier Isolation	—	—	90	—	dB	Note 2

Note 1: All limits guaranteed by testing or statistical analysis.
2: Referenced to input.

DC ELECTRICAL CHARACTERISTICS (5V)

V_{V+} = +5.0V, V_{V-} = 0V, V_{CM} = 1.5V, V_{OUT} = V_{V+}/2; R_L = 1 MΩ; T_J = +25°C; Note 1.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Input Offset Voltage	V_{OS}	—	0.5	9	mV	—
Input Offset Voltage Average Drift	TCV_{OS}	—	3.0	—	µV/°C	—
Input Bias Current	I_B	—	1.0	10	pA	—
		—	64	500		–40°C ≤ T_J ≤ +85°C
Input Offset Current	I_{OS}	—	0.5	5	pA	—
		—	32	250		–40°C ≤ T_J ≤ +85°C
Input Resistance	R_{IN}	—	>1	—	TΩ	—
Common-Mode Rejection Ratio	CMRR	55	75	—	dB	–0.3V ≤ V_{CM} ≤ 5.3V, Note 2
Power Supply Rejection Ratio	PSRR	55	100	—	dB	V_{V+} = |V_{V-}| = 2.5V to 7.5V, V_{OUT} = V_{CM} = 0
Common-Mode Input Capacitance	C_{IN}	—	3	—	pF	—

Note 1: All limits guaranteed by testing or statistical analysis.
2: CMRR is determined as follows: The maximum ΔV_{OS} over the V_{CM} range is divided by the magnitude of the V_{CM} range. The measurement points are: V_{CM} = V_{V-} – 0.3V, (V_{V+} – V_{V-})/2, and V_{V+} + 0.3V.
3: Continuous short circuit may exceed absolute maximum T_J under some conditions.

DC ELECTRICAL CHARACTERISTICS (5V) (CONTINUED)

V_{V+} = +5.0V, V_{V-} = 0V, V_{CM} = 1.5V, V_{OUT} = $V_{V+}/2$; R_L = 1 MΩ; T_J = +25°C; Note 1.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Output Swing	V_O	—	0.3	1.0	mV	Output high, R_L = 100 kΩ, specified as $V_{V+} – V_{OUT}$
		—	—	1.5		Output high, R_L = 100 kΩ, specified as $V_{V+} – V_{OUT}$, –40°C ≤ T_J ≤ +85°C
		—	0.3	1.0		Output low, R_L = 100 kΩ
		—	—	1.5		Output low, R_L = 100 kΩ –40°C ≤ T_J ≤ +85°C
		—	13	50		Output high, R_L = 2 kΩ, specified as $V_{V+} – V_{OUT}$
		—	—	75		Output high, R_L = 2 kΩ, specified as $V_{V+} – V_{OUT}$, –40°C ≤ T_J ≤ +85°C
		—	13	50		Output low, R_L = 2 kΩ
		—	—	75		Output low, R_L = 2 kΩ –40°C ≤ T_J ≤ +85°C
		—	40	165		Output high, R_L = 600Ω, specified as $V_{V+} – V_{OUT}$
		—	—	250		Output high, R_L = 600Ω, specified as $V_{V+} – V_{OUT}$, –40°C ≤ T_J ≤ +85°C
		—	40	165		Output low, R_L = 600Ω
		—	—	250		Output low, R_L = 600Ω –40°C ≤ T_J ≤ +85°C
Output Short-Circuit Current	I_{SC}	40	140	—	mA	Sinking or sourcing, Note 3
Supply Current	I_S	—	0.8	1.8	mA	Both amplifiers

Note 1: All limits guaranteed by testing or statistical analysis.

2: CMRR is determined as follows: The maximum ΔV_{OS} over the V_{CM} range is divided by the magnitude of the V_{CM} range. The measurement points are: $V_{CM} = V_{V-} – 0.3V$, $(V_{V+} – V_{V-})/2$, and V_{V+} + 0.3V.

3: Continuous short circuit may exceed absolute maximum T_J under some conditions.

AC ELECTRICAL CHARACTERISTICS (5V)

V_{V+} = +5.0V, V_{V-} = 0V, V_{CM} = 1.5V, V_{OUT} = V_{V+}/2; R_L = 1 MΩ; T_J = +25°C; Note 1.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Total Harmonic Distortion	THD	—	0.05	—	%	f = 1 kHz, A_V = –2, R_L = 2 kΩ, V_{OUT} = 4.0 V_{PP}
Slew Rate	SR	—	0.6	—	V/µs	—
Gain-Bandwidth Product	GBWP	—	465	—	kHz	—
Phase Margin	ϕ_m	—	85	—	°	C_L = 0 pF
		—	40	—		C_L = 200 pF
Gain Margin	G_M	—	10	—	dB	—
Interamplifier Isolation	—	—	90	—	dB	Note 2

Note 1: All limits guaranteed by testing or statistical analysis.

2: Referenced to input.

DC ELECTRICAL CHARACTERISTICS (15V)

V_{V+} = +15V, V_{V-} = 0V, V_{CM} = 1.5V, V_{OUT} = V_{V+}/2; R_L = 1 MΩ; T_J = +25°C; Note 1.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Input Offset Voltage	V_{OS}	—	0.5	9	mV	—
Input Offset Voltage Average Drift	TCV_{OS}	—	3.0	—	µV/°C	—
Input Bias Current	I_B	—	1.0	10	pA	—
		—	64	500		–40°C ≤ T_J ≤ +85°C
Input Offset Current	I_{OS}	—	0.5	5	pA	—
		—	32	250		–40°C ≤ T_J ≤ +85°C
Input Resistance	R_{IN}	—	>1	—	TΩ	—
Common-Mode Rejection Ratio	CMRR	60	85	—	dB	–0.3V ≤ V_{CM} ≤ 15.3V, Note 2
Power Supply Rejection Ratio	PSRR	55	100	—	dB	V_{V+} = |V_{V-}| = 2.5V to 7.5V, V_{OUT} = V_{CM} = 0
Large Signal Voltage Gain	A_V	—	340	—	V/mV	Sourcing or sinking, R_L = 2 kΩ, Note 3
		—	300	—		Sourcing or sinking, R_L = 600Ω, Note 3
Common-Mode Input Capacitance	C_{IN}	—	3	—	pF	—

Note 1: All limits guaranteed by testing or statistical analysis.

2: CMRR is determined as follows: The maximum ΔV_{OS} over the V_{CM} range is divided by the magnitude of the V_{CM} range. The measurement points are: V_{CM} = V_{V-} – 0.3V, (V_{V+} – V_{V-})/2, and V_{V+} + 0.3V.

3: R_L connected to 7.5V. Sourcing: 7.5V ≤ V_{OUT} ≤ 12.5V. Sinking: 2.5V ≤ V_{OUT} ≤ 7.5V.

4: Continuous short circuit may exceed absolute maximum T_J under some conditions.

DC ELECTRICAL CHARACTERISTICS (15V) (CONTINUED)

V_{V+} = +15V, V_{V-} = 0V, V_{CM} = 1.5V, V_{OUT} = V_{V+}/2; R_L = 1 MΩ; T_J = +25°C; Note 1.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Output Swing	V_O	—	0.8	2	mV	Output high, R_L = 100 kΩ, specified as $V_{V+} – V_{OUT}$
		—	—	3		Output high, R_L = 100 kΩ, specified as $V_{V+} – V_{OUT}$, –40°C ≤ T_J ≤ +85°C
		—	0.8	2		Output low, R_L = 100 kΩ
		—	—	3		Output low, R_L = 100 kΩ, –40°C ≤ T_J ≤ +85°C
		—	40	80		Output high, R_L = 2 kΩ, specified as $V_{V+} – V_{OUT}$
		—	—	120		Output high, R_L = 2 kΩ, specified as $V_{V+} – V_{OUT}$, –40°C ≤ T_J ≤ +85°C
		—	40	80		Output low, R_L = 2 kΩ
		—	—	120		Output low, R_L = 2 kΩ, –40°C ≤ T_J ≤ +85°C
		—	130	270		Output high, R_L = 600Ω, specified as $V_{V+} – V_{OUT}$
		—	—	400		Output high, R_L = 600Ω, specified as $V_{V+} – V_{OUT}$, –40°C ≤ T_J ≤ +85°C
		—	130	270		Output low, R_L = 600Ω
		—	—	400		Output low, R_L = 600Ω –40°C ≤ T_J ≤ +85°C
Output Short-Circuit Current	I_{SC}	50	250	—	mA	Sinking or sourcing, Note 4
Supply Current	I_S	—	0.9	2.0	mA	Both amplifiers

Note 1: All limits guaranteed by testing or statistical analysis.

2: CMRR is determined as follows: The maximum ΔV_{OS} over the V_{CM} range is divided by the magnitude of the V_{CM} range. The measurement points are: $V_{CM} = V_{V-} – 0.3V$, $(V_{V+} – V_{V-})/2$, and $V_{V+} + 0.3V$.

3: R_L connected to 7.5V. Sourcing: 7.5V ≤ V_{OUT} ≤ 12.5V. Sinking: 2.5V ≤ V_{OUT} ≤ 7.5V.

4: Continuous short circuit may exceed absolute maximum T_J under some conditions.

AC ELECTRICAL CHARACTERISTICS (15V)

V_{V+} = +15V, V_{V-} = 0V, V_{CM} = 1.5V, V_{OUT} = V_{V+}/2; R_L = 1 MΩ; T_J = +25°C; Note 1.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Total Harmonic Distortion	THD	—	0.01	—	%	f = 1 kHz, A_V = –2, R_L = 2 kΩ, V_{OUT} = $8.5V_{PP}$
Slew Rate	SR	—	0.5	—	V/µs	V+ = 15V, Note 2
Gain-Bandwidth Product	GBWP	—	420	—	kHz	—
Phase Margin	ϕ_m	—	85	—	°	C_L = 0 pF
		—	40	—		C_L = 200 pF
Gain Margin	G_M	—	10	—	dB	—
Input-Referred Voltage Noise	e_n	—	37	—	nV/√Hz	f = 1 kHz, V_{CM} = 1V
Input-Referred Current Noise	i_n	—	1.5	—	fA/√Hz	f = 1 kHz
Interamplifier Isolation	—	—	90	—	dB	Note 3

Note 1: All limits guaranteed by testing or statistical analysis.

2: Device connected as a voltage follower with a 10V step input. The value is the positive or negative slew rate, whichever is slower.

3: Referenced to input.

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Junction Temperature Range	T_J	–40	—	+125	°C	—
Storage Temperature	T_S	–65	—	+150	°C	—
Maximum Junction Temperature Range	T_J	—	—	+150	°C	—
Lead Temperature	—	—	—	+260	°C	Soldering, 10 sec.
Maximum Power Dissipation	—	—	—	—	—	—
Package Thermal Resistance						
MSOP-8	θ_{JA}	—	200	—	°C/W	Note 1

Note 1: Thermal resistance, θ_{JA}, applies to a part soldered on a printed-circuit board.

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	OUTA	Op Amp A Output.
2	INA–	Op Amp A Inverting Input.
3	INA+	Op Amp A Non-Inverting Input.
4	V–	Negative Supply: Negative supply for split supply application or ground for single supply applications.
5	INB+	Op Amp B Non-Inverting Input.
6	INB–	Op Amp B Inverting Input.
7	OUTB	Op Amp B Output.
8	V+	Positive Supply.

3.0 APPLICATION INFORMATION

3.1 Input Common-Mode Voltage

The MIC7122 tolerates input overdrive by at least 300 mV beyond either rail without producing phase inversion.

If the absolute maximum input voltage is exceeded, the input current should be limited to ±5 mA maximum to prevent reducing reliability. A 10 kΩ series input resistor, used as a current limiter, will protect the input structure from voltages as large as 50V above the supply or below ground. See Figure 3-1.

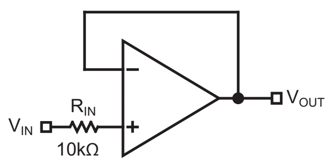


FIGURE 3-1: *Input Current-Limit Protection.*

3.2 Output Voltage Swing

Sink and source output resistances of the MIC7122 are equal. Maximum output voltage swing is determined by the load and the approximate output resistance. The output resistance is:

EQUATION 3-1:

$$R_{OUT} = \frac{V_{DROP}}{I_{LOAD}}$$

V_{DROP} is the voltage dropped within the amplifier output stage. V_{DROP} and I_{LOAD} can be determined from the V_O (output swing) portion of the appropriate Electrical Characteristics table. I_{LOAD} is equal to the typical output high voltage minus V+/2 and divided by R_{LOAD}. For example, using the DC Electrical Characteristics (5V) table, the typical output high voltage drops 13 mV using a 2 kΩ load (connected to V+/2), which produces an I_{LOAD} of:

EQUATION 3-2:

$$\frac{5.0V - 0.013V - 2.5V}{2k\Omega} = 1.244mA$$

Because of output stage symmetry, the corresponding typical output low voltage (13 mV) also equals V_{DROP}. Then:

EQUATION 3-3:

$$R_{OUT} = \frac{0.013V}{0.001244A} = 10.5\Omega$$

3.3 Power Dissipation

The MIC7122 output drive capability requires considering power dissipation. If the load impedance is low, it is possible to damage the device by exceeding the 125°C junction temperature rating.

On-chip power consists of two components: supply power and output stage power. Supply power (P_S) is the product of the supply voltage ($V_S = V_{V+} - V_{V-}$) and supply current (I_S). Output stage power (P_O) is the product of the output stage voltage drop (V_{DROP}) and the output (load) current (I_{OUT}).

Total on-chip power dissipation is:

EQUATION 3-4:

$$P_D = P_S + P_O$$

Where:
P_D = Total On-Chip Power
P_S = Supply Power Dissipation
P_O = Output Power Dissipation

EQUATION 3-5:

$$P_D = (V_S \times I_S) + (V_{DROP} \times I_{OUT})$$

Where:
$V_S = V_{V+} - V_{V-}$
I_S = Power Supply Current
$V_{DROP} = V_{V+} - V_{OUT}$ (Sourcing Current)
$V_{DROP} = V_{OUT} - V_{V-}$ (Sinking Current)

Equation 3-4 and Equation 3-5 address only steady state (DC) conditions. For non-DC conditions, the user must estimate power dissipation based on the RMS value of the signal.

The task is one of determining the allowable on-chip power dissipation for operation at a given ambient temperature and power supply voltage. From this determination, one may calculate the maximum allowable power dissipation and, after subtracting P_S, determine the maximum allowable load current, which in turn can be used to determine the minimum load impedance that may safely be driven. The calculation is summarized below in Equation 3-6.

EQUATION 3-6:

$$P_{D(MAX)} = \frac{T_{J(MAX)} - T_A}{\theta_{JA}}$$

$\theta_{JA(MSOP-8)} = 200°C/W$

3.4 Driving Capacitive Loads

Driving a capacitive load introduces phase lag into the output signal and this, in turn, reduces op-amp system phase margin.

The application that is least forgiving of reduced phase margin is a unity gain amplifier. The MIC7122 can typically drive a 200 pF capacitive load connected directly to the output when configured as a unity-gain amplifier and powered with a 2.2V supply. At 15V operation the circuit typically drives 500 pF.

3.5 Using Large-Value Feedback Resistors

A large-value feedback resistor (>500 kΩ) can reduce the phase margin of a system. This occurs when the feedback resistor acts in conjunction with input capacitance to create phase lag in the feedback signal. Input capacitance is usually a combination of input circuit components and other parasitic capacitance, such as amplifier input capacitance and stray printed circuit board capacitance.

Figure 3-2 illustrates a method of compensating phase lag caused by using a large-value feedback resistor. Feedback capacitor C_{FB} introduces sufficient phase lead to overcome the phase lag caused by feedback resistor R_{FB} and input capacitance C_{IN}. The value of C_{FB} is determined by first estimating C_{IN} and then applying the following formula:

EQUATION 3-7:

$$R_{IN} \times C_{IN} \le R_{FB} \times C_{FB}$$

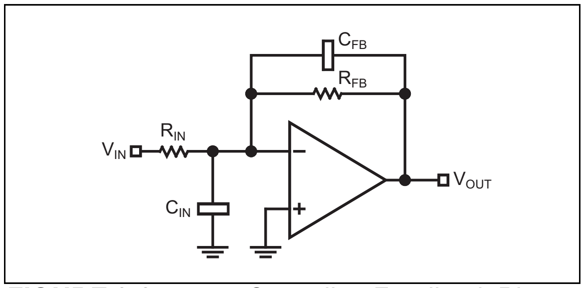


FIGURE 3-2: Canceling Feedback Phase Lag.

Because a significant percentage of C_{IN} may be caused by board layout, it is important to note that the correct value of C_{FB} may change when changing from a breadboard to the final circuit layout.

3.6 Typical Circuits

Some single-supply, rail-to-rail applications for which the MIC7122 is well suited are shown in the circuit diagrams of Figure 3-3 through Figure 3-8.

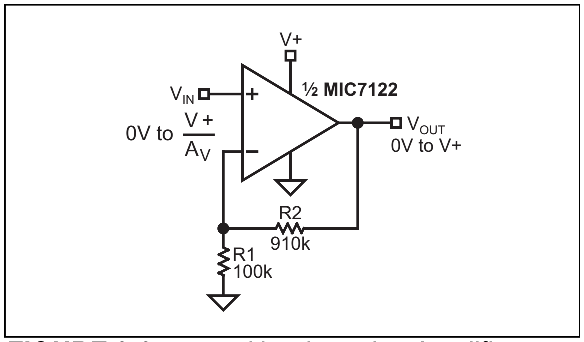


FIGURE 3-3: Non-Inverting Amplifier.

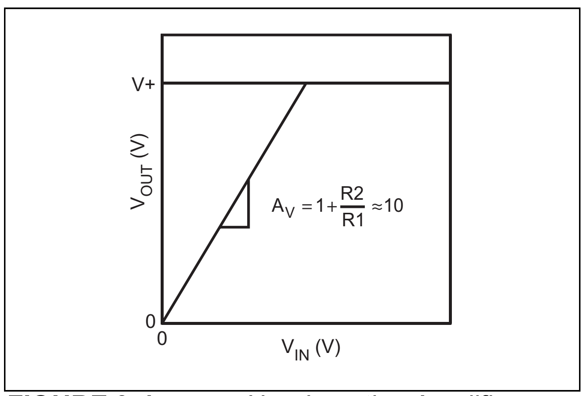


FIGURE 3-4: Non-Inverting Amplifier Behavior.

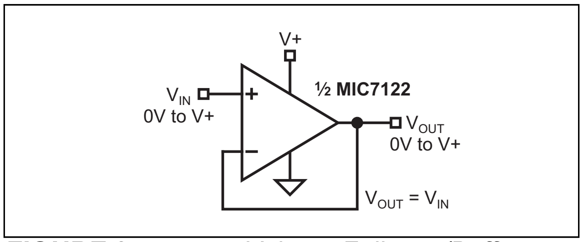


FIGURE 3-5: *Voltage Follower/Buffer.*

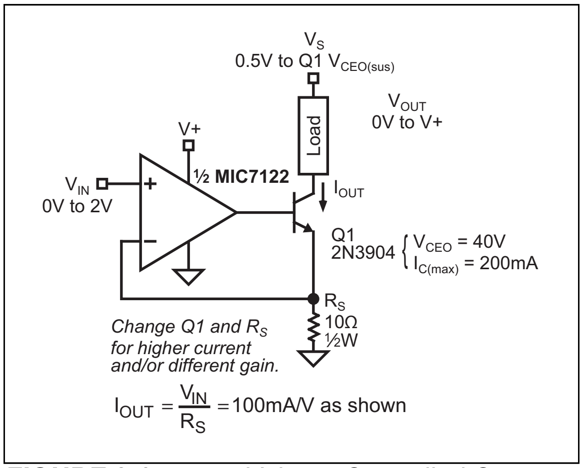


FIGURE 3-6: *Voltage-Controlled Current Sink.*

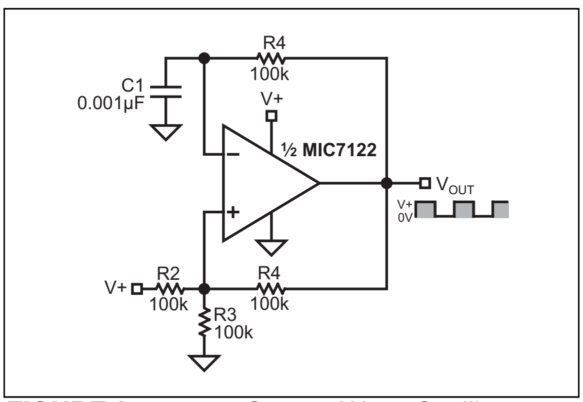


FIGURE 3-7: *Square Wave Oscillator.*

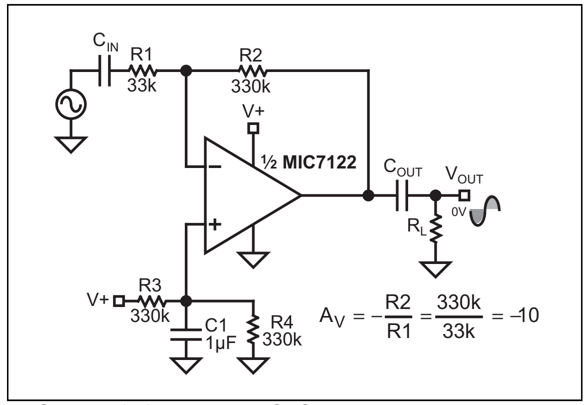
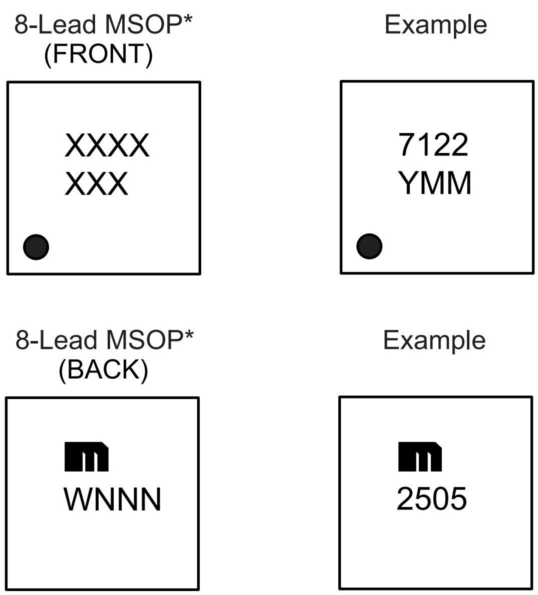


FIGURE 3-8: *AC-Coupled Inverting Amplifier.*

4.0 PACKAGE MARKING INFORMATION

4.1 Package Marking Information



Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
	●, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

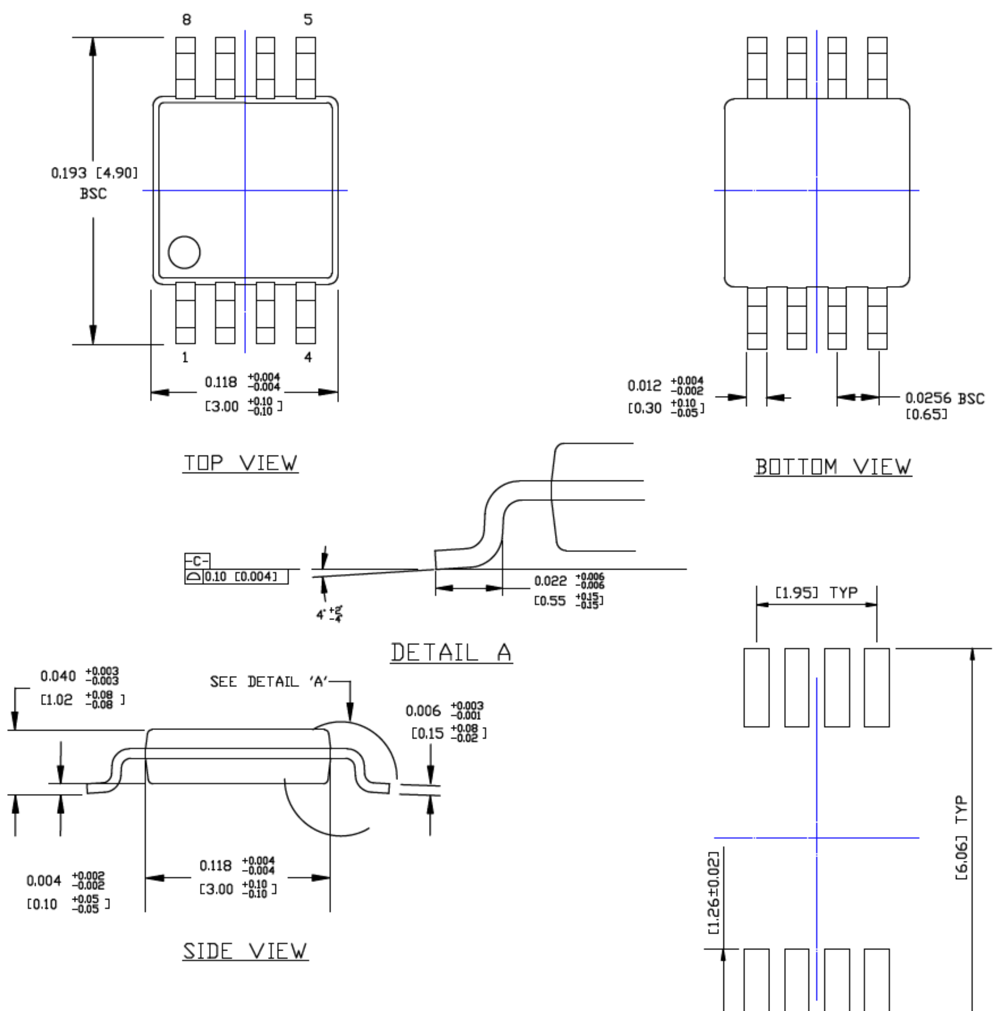
Underbar (_) and/or Overbar (‾) symbol may not be to scale.

8-Lead MSOP Package Outline and Recommended Land Pattern

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging

TITLE
8 LEAD MSOP PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING #	MSOP-8LD-PL-1	UNIT	INCH [MM]



NOTES:
1. DIMENSIONS ARE IN INCHES [MM].
2. CONTROLLING DIMENSION: MM
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.008 [0.20] PER SIDE.

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (January 2020)

- Converted Micrel data sheet MIC7122 to Microchip DS20006290A.
- Minor text changes throughout.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

PART NO.	X	XX	-XX
Device	Temperature Range	Package	Media Type

Device:	MIC7122:	Rail-to-Rail Dual Op Amp
Temperature Range:	Y =	–40°C to +85°C (Industrial)
Package:	MM =	8-Pin MSOP
Media Type:	<blank>= TR =	100/Tube 2,500/Reel

Examples:

a) MIC7122YMM: Rail-to-Rail Dual Op Amp, –40°C to +85°C Temperature Range, 8-Lead MSOP, 100/Tube

b) MIC7122YMM-TR: Rail-to-Rail Dual Op Amp, –40°C to +85°C Temperature Range, 8-Lead MSOP, 2500/Reel

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

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