FEATURES

- High slew rate: 2.7V/μs
- Input/Output full swing
- Low input bias current:2.5pA
- Low input offset current:2.2pA
- Low Offset Voltage: 0.41mV (Typical)
- Quiescent Current:6.2mA
- Bandwidth:4.1MHz
- Supply Voltage:2.4V to 5.5V
- MicroSize Packages: SOIC-14

APPLICATIONS

- Transducers
- Temperature Measurement
- Electronic Scales
- Medical instrumentation
- Handheld Test Equipment
- Battery equipment
- Consumer electronics

GENERAL DESCRIPTION

MT0294 are low supply voltage quad CMOS operational amplifiers. This amplifier has the characteristics of Input/Output full swing, high slew rate, low supply current and high-speed operation. Input bias current is very low at 2.3pA (Typ) .MT0294 has wide temperature range from -40°C to +85°C.

Single or dual supplies as low as 2.4V(±1.2V) and up to 5.5V(±2.75V) can be used.

The MT0294 is available in the 14-pin SOIC packages.

SIMPLIFIED SCHEMATIC

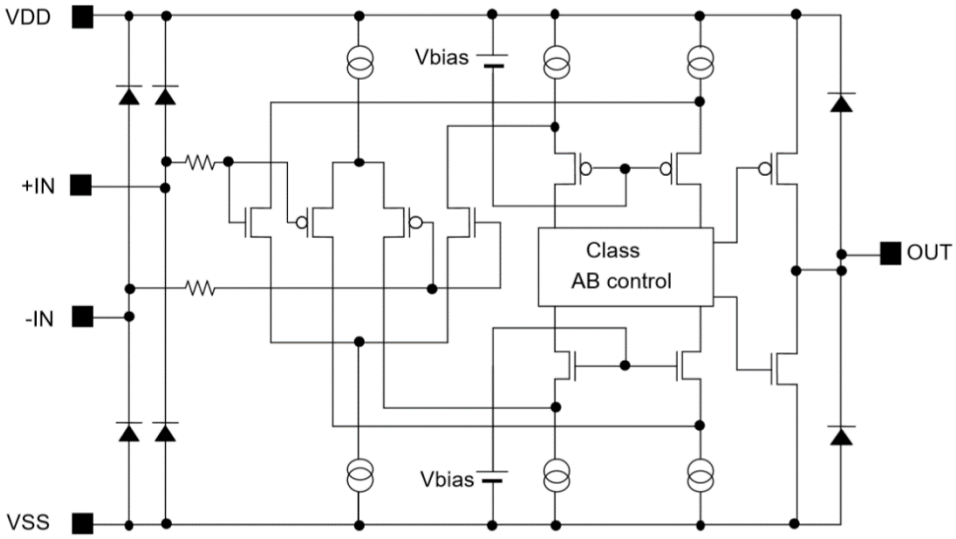


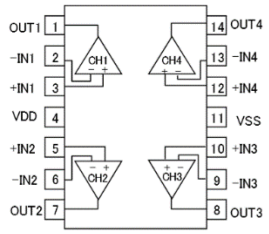
Figure 1. Simplified schematic

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply Voltage.....+2.4V to +5.5V
Input Offset Voltage.....0.41mV(Typical)
Input Offset Current.....2.2pA(Typical)
Maximum Operating Junction Temperature.....85°C
Operating Temperature Range.....-40°C to 85°C
Storage Temperature .....-55°C to 125°C

PACKAGE/ORDER INFORMATION

TOP VIEW



Order Part Number	Package	Top Marking
MT0294	14-Pin SOIC	MT0294CJ

DEVICE INFORMATION

Order Part Number	Top Marking	Package
MT0294	MT0294CJ	SOIC-14

PIN DESCRIPTION

Pin Name	Pin Number	Description
OUT1	1	Output of channel 1
-IN1	2	Inverting input of channel 1
+IN1	3	Noninverting input of channel 1
VDD	4	Positive (highest) power supply
+IN2	5	Noninverting input of channel 2
-IN2	6	Inverting input of channel 2
OUT2	7	Output of channel 2
OUT3	8	Output of channel 3
-IN3	9	Inverting input of channel 3

+IN3	10	Noninverting input of channel 3
VSS	11	Negative(lowest) power supply
+IN4	12	Noninverting input of channel 4
-IN4	13	Inverting input of channel 4
OUT4	14	Output of channel 4

ELECTRICAL CHARACTERISTICS (Note 3)

(At T_A = 25°C, VDD=+3V, VSS=0V, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	V_S=3.0V		0.41	9	mV
Power Supply Rejection Ratio	V_S =2.4V to 5.5V T_A = -40°C to 125°C		96		dB
Input Bias Current	T_A = 25°C		2.5		pA
Input Offset Current			2.2		pA
Common-mode Rejection Ratio		40	85		dB
Open Loop Voltage Gain	R_L=10kΩ	70	107		dB
Gain-bandwidth product	C_L=25pF, f=100kHz		4.1		MHz
Slew Rate	G=+1, C_L=25pF		2.7		V/μs
Phase Margin	C_L=25pF		50		deg
Maximum Voltage Output	R_L=10kΩ	VDD-0.1			mV
Minimum Voltage Output	R_L=10kΩ			VSS+0.1	mV
Output Source Current	VDD-0.4V	5	8		mA
Output Sink Current	VSS+0.4V	9	16		mA
Input Common-mode Voltage Range	VSS to VDD	0		3	V
Supply Current	25°C		6.2		mA
Operating Temperature Range		-40		85	°C

Storage Temperature Range		-65		150	°C

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.
Note 2: T_J is calculated from the ambient temperature T_A and power dissipation P_D according to the following formula: $T_J = T_A + (P_D)$ x (170°C/W).
Note 3: 100% production test at +25°C. Specifications over the temperature range are guaranteed by design and characterization.

TYPICAL PERFORMANCE CHARACTERISTICS

(At T_A = 25°C, +VS=+1.5V, -VS=-1.5V, R_L =10KΩ, CL=25pF unless otherwise noted.)

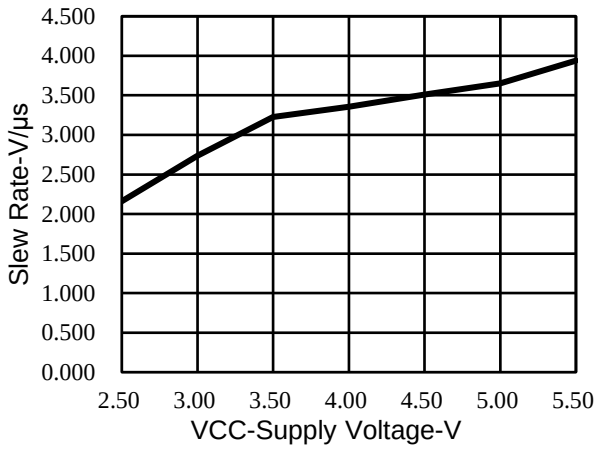


Figure 2. Slew Rate vs Supply Voltage

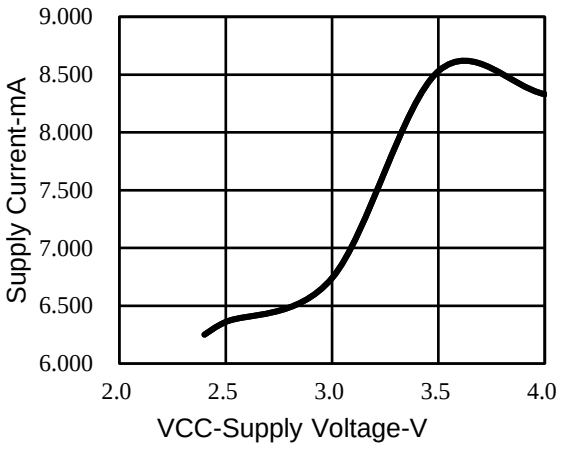


Figure 3. Supply Current vs Supply Voltage

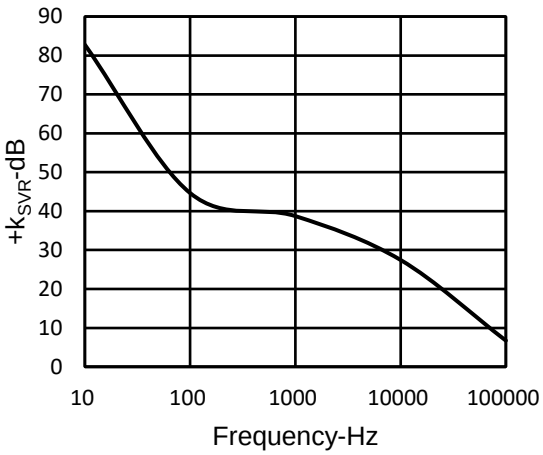


Figure 4. $+k_{SVR}$ vs Frequency

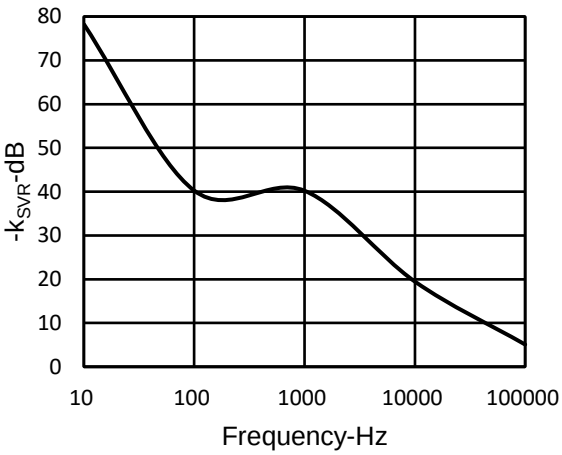


Figure 5. $-k_{SVR}$ vs Frequency

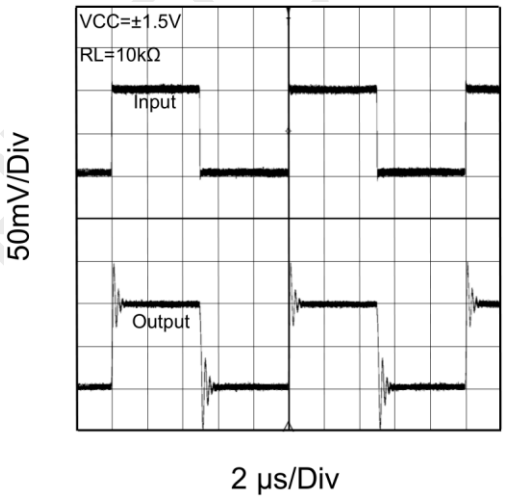


Figure 6. Noninverting Small-Signal Pulse Response

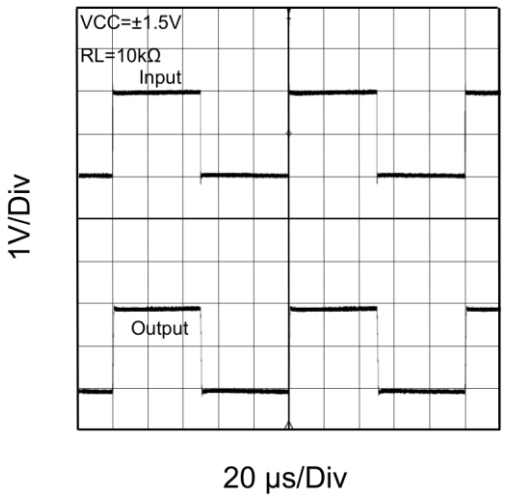


Figure 7. Noninverting Large-Signal Pulse Response

TYPICAL PERFORMANCE CHARACTERISTICS

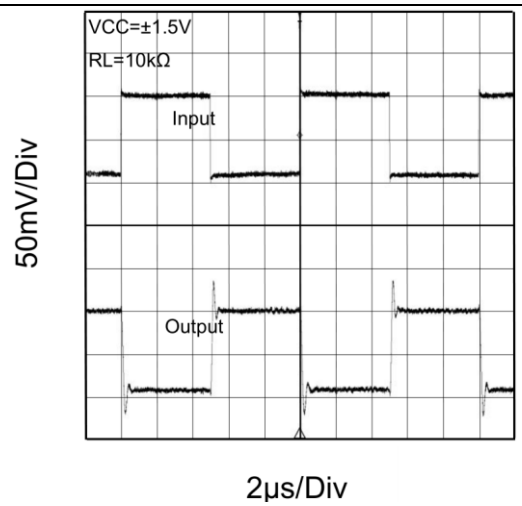


Figure 8. Inverting Small-Signal Pulse Response

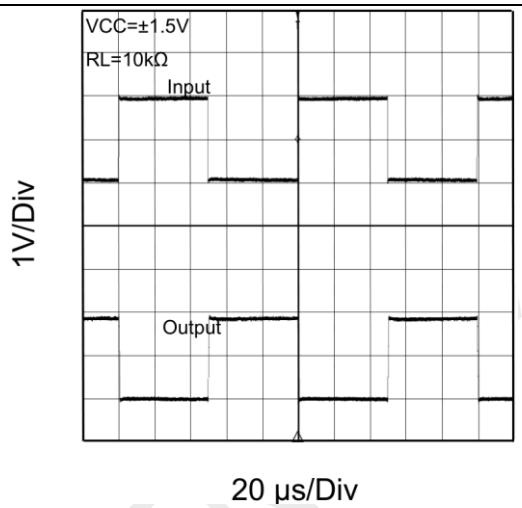


Figure 9. Inverting Large-Signal Pulse Response

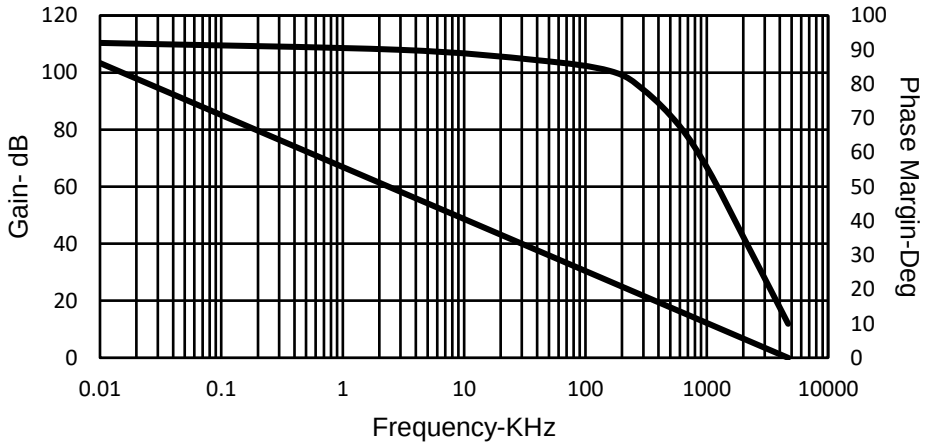


Figure 10. Open-Loop Gain and Phase

APPLICATIONS INFORMATION

MT0294 are low supply voltage CMOS operational Amplifiers. This amplifier has the characteristics of Input/Output full swing, high slew rate, low supply current and high speed operation. Input bias current is very low at 2.5pA (Typ). MT0294 has wide temperature range from -40°C to +85°C. Single or dual supplies as low as 2.4V(±1.2V) and up to 5.5V(±2.75V) can be used.

Voltage follower

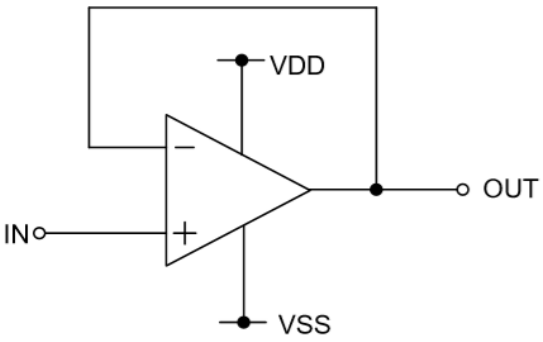


Figure 11. Voltage follower

Voltage gain is 0dB. Using this circuit, the output voltage (OUT) is configured to be equal to the input voltage (IN). This circuit also stabilizes the output voltage (OUT) due to high input impedance and low output impedance. Computation for output voltage (OUT) is shown below. OUT=IN.

Inverting amplifier

For inverting amplifier, input voltage (IN) is amplified by a voltage gain and depends on the ratio of R1 and R2. The out-of-phase output voltage is shown in the next expression

$$OUT=-(R2/R1)\cdot IN$$

This circuit has input impedance equal to R1.

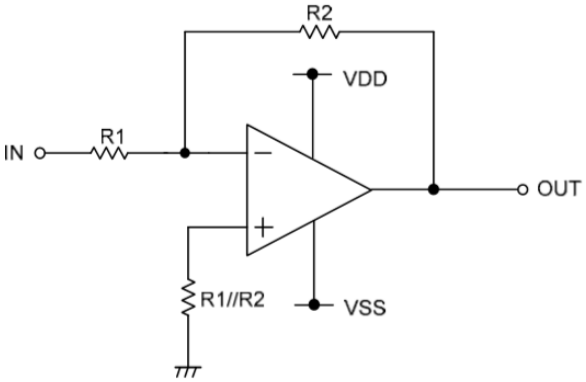


Figure 12. Inverting amplifier circuit

Non-inverting amplifier

For non-inverting amplifier, input voltage (IN) is amplified by a voltage gain, which depends on the ratio of R1 and R2. The output voltage (OUT) is in-phase with the input voltage (IN) and is shown in the next expression.

$$OUT=(1+R2/R1)\cdot IN$$

Effectively, this circuit has high input impedance since its input side is the same as that of the operational amplifier.

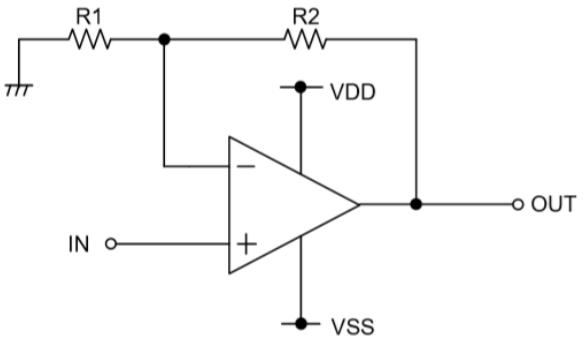
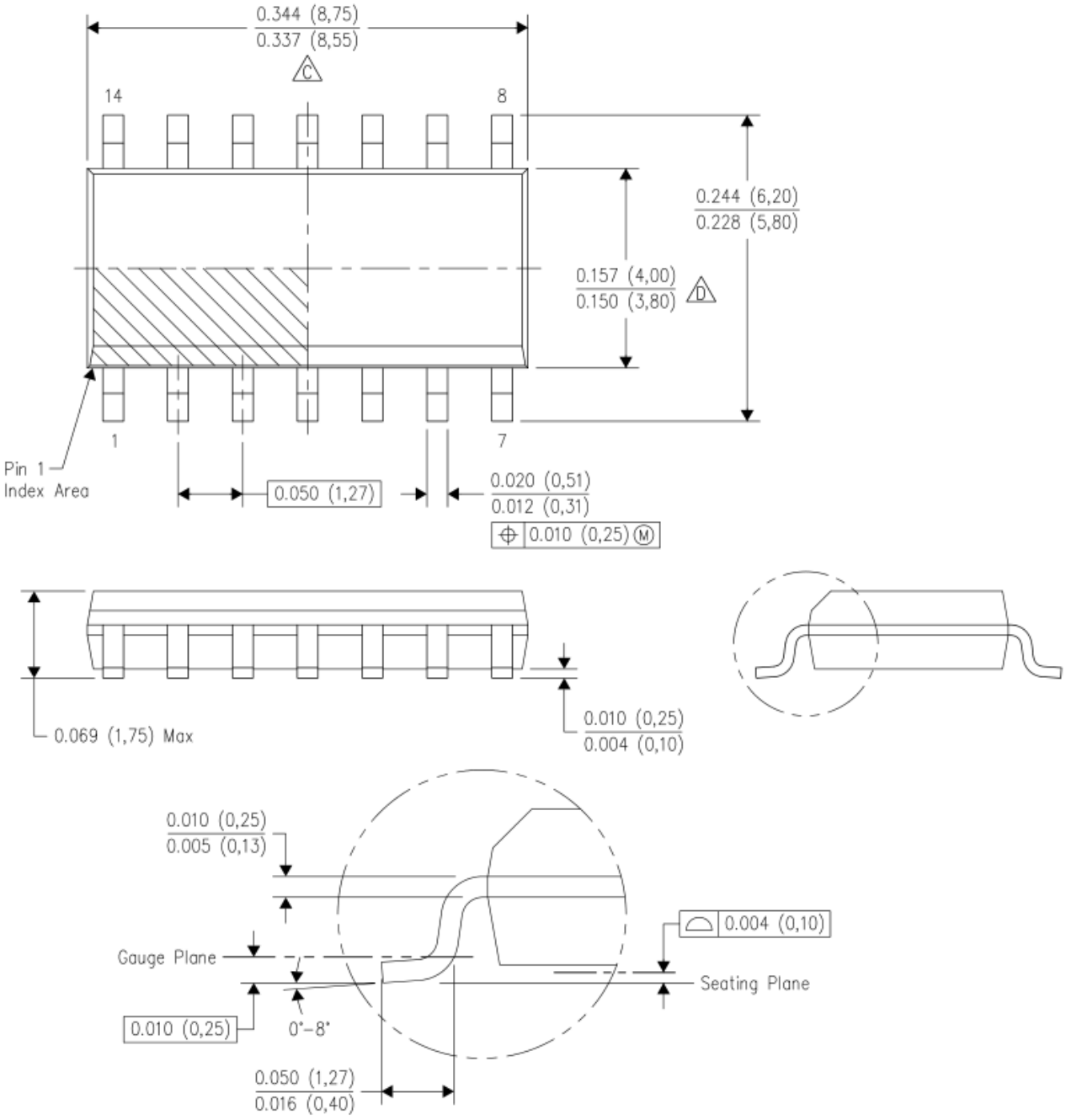


Figure 13. Non-inverting amplifier circuit

PACKAGE DESCRIPTION

SOIC



NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-178.
4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.

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