

RC6334

Quad Video Amplifier

Features

- Quad video amplifier
- 175 MHz -3 dB Bandwidth ($A_V = 2$)
- 50 MHz ± 0.1 dB gain flatness
- Unity gain stable
- 0.06% differential gain ($A_V = 1$, $R_L = 150\Omega$)
- 0.06° differential phase ($A_V = 1$, $R_L = 150\Omega$)
- High CMRR (95dB), High PSRR (80 dB)
- Dual $\pm 5V$ power supply
- Low offset 3.0 mV typical
- 14-pin narrow SO package
- 250V/ μs slew rate
- Fast settling time: 0.1% in 15 ns
- TTL or CMOS compatible

Description

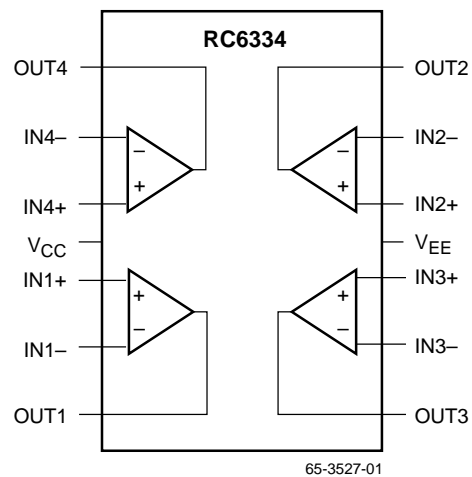
The RC6334 consists of four low power, wide band voltage feedback operational amplifiers. Each channel is capable of delivering a load current of at least 35mA.

The amplifiers are optimized for video applications where low differential gain and low phase distortion are significant requirements.

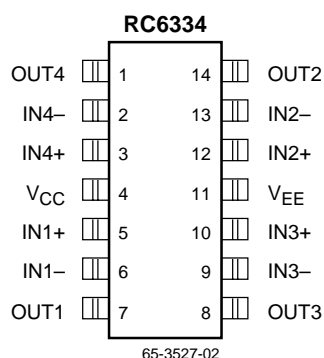
Applications

- RGB amplifiers
- Video instrumentation amplifier
- Selectable gain amplifier
- Active filters
- Set-top box Buffers/Drivers

Block Diagram



Pin Assignments



Pin Definitions

| Pin Name | Pin Number | Pin Function Description |
|----------|------------|---------------------------------|
| IN1- | 6 | Amplifier 1 inverting input |
| IN1+ | 5 | Amplifier 1 non-inverting input |
| IN2- | 13 | Amplifier 2 inverting input |
| IN2+ | 12 | Amplifier 2 non-inverting input |
| IN3- | 9 | Amplifier 3 inverting input |
| IN3+ | 10 | Amplifier 3 non-inverting input |
| IN4- | 2 | Amplifier 4 inverting input |
| IN4+ | 3 | Amplifier 4 non-inverting input |
| OUT1 | 7 | Amplifier 1 output |
| OUT2 | 14 | Amplifier 2 output |
| OUT3 | 8 | Amplifier 3 output |
| OUT4 | 1 | Amplifier 4 output |
| VCC | 4 | Analog positive supply |
| VEE | 11 | Analog negative supply |

Absolute Maximum Ratings

(beyond which the device may be damaged)¹

| Parameter | Min | Typ | Max | Units |
|---|-----------------------------|-----|-----|-------|
| VCC | Positive power supply | | 7 | V |
| VEE | Negative power supply | | -7 | V |
| | Differential input voltage | | 10 | V |
| | Operating Temperature | | 0 | °C |
| | Storage Temperature | | -40 | °C |
| | Junction Temperature | | 150 | °C |
| | Lead Soldering (10 seconds) | | 240 | °C |
| Short circuit tolerance: No more than one output can be shorted to ground. | | | | |

Notes:

1. Functional operation under any of these conditions is NOT implied.

Operating Conditions

| Parameter | Min | Typ | Max | Units | | |
|-----------|-------------------------|-----|-------|-------|-------|------|
| VCC | Power Supply Voltage | | 4.75 | 5.0 | 5.25 | V |
| VEE | Negative Supply Voltage | | -4.75 | -5.0 | -5.25 | V |
| θJA | SO14 Thermal Resistance | | | 105 | | °C/W |

DC Characteristics

$V_{CC} = 5V$, $V_{EE} = -5V$, $A_V = 2$, $R_{LOAD} = 150\Omega$, $T_A = 0^\circ C$ to $70^\circ C$, unless otherwise specified. Open Loop.

| Parameter | Conditions | Min | Typ | Max | Units |
|--------------------------|---|-------------------|-----------|-----------|------------------|
| VOS | Input Offset Voltage | No Load | 3 | ± 10 | mV |
| $\Delta V_{OS}/\Delta T$ | Offset Voltage Drift ¹ | | ± 6 | ± 30 | $\mu V/^\circ C$ |
| I _B | Input Bias Current | | ± 1 | ± 5 | μA |
| $\Delta I_B/\Delta T$ | Input Bias Current Drift ¹ | | ± 8 | ± 40 | nA/ $^\circ C$ |
| R _{in} | Input Resistance ¹ | 1 | | | M Ω |
| C _{in} | Input Capacitance ¹ | | 0.5 | 2 | pF |
| CMIR | Common Mode Input Range | ± 2.5 | | | V |
| CMRR | Common Mode Rejection Ratio | No Load | 70 | 100 | dB |
| PSRR | Power Supply Rejection Ratio | No Load | 65 | 80 | dB |
| I _s | Quiescent Supply Current | No Load | 33 | 48 | mA |
| R _{OUT} | Output Impedance (Closed Loop) ¹ | Enabled, At DC | 0.2 | | Ω |
| I _{OUT} | Output Current | Per Amplifier | 35 | | mA |
| V _{OUT} | Output Voltage Swing | No Load | ± 2.5 | ± 3.0 | V |
| | | $R_L = 150\Omega$ | ± 2.5 | ± 3.0 | V |
| A _{VOL} | Open-loop Gain | | 60 | 75 | dB |

Note:

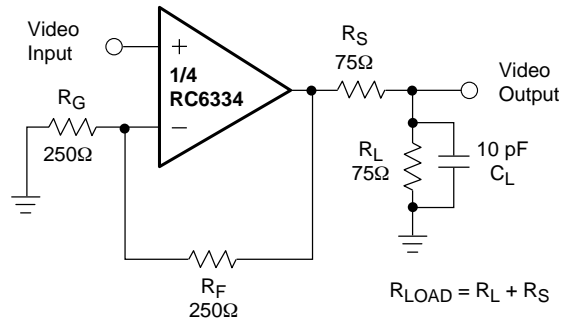
1. Guaranteed by design.

AC Characteristics

$V_{CC} = 5V$, $V_{EE} = -5V$, $A_V = 2$, $T_A = 0$ to $70^\circ C$, $R_{LOAD} = 150\Omega$, $R_G = R_F = 250\Omega$, $C_L = 10$ pF, unless otherwise specified. Closed Loop. Guaranteed by Design. See Typical Test Circuit.

| Parameter | Conditions | Min | Typ | Max | Units | |
|-----------------------------------|---------------------------------|--|-----|------|------------|----|
| Frequency Response | | | | | | |
| BW | -3 dB Bandwidth ($A_V = 2$) | $V_{OUT} = 0.4$ Vpp | | +175 | MHz | |
| | | $V_{OUT} = 0.8$ Vpp | 75 | 90 | MHz | |
| Flat | ± 0.1 dB Bandwidth | $V_{OUT} = 0.4$ Vpp | 50 | 60 | MHz | |
| Peak | Maximum Small Signal AC Peaking | $V_{OUT} = 0.8$ Vpp | | 0.01 | dB | |
| XTALK | Crosstalk Isolation | @ 5 MHz | | 50 | dB | |
| Time Domain Response | | | | | | |
| t _{r1} , t _{f1} | Rise and Fall Time 10% to 90% | 2V Output Step | | 10 | 15 | ns |
| t _s | Settling Time to 0.1% | 2V Output Step | | 15 | | ns |
| OS | Overshoot | 2V Output Step | | 5 | | % |
| US | Undershoot | 2V Output Step | | 2 | | % |
| SR | Slew Rate | $V_{OUT} = \pm 2.0V$ | 200 | 250 | V/ μs | |
| Distortion | | | | | | |
| HD ₂ | 2nd Harmonic Dist. @ 20 MHz | $V_{OUT} = 0.8$ Vpp | | -48 | dB | |
| HD ₃ | 3rd Harmonic Dist. @ 20 MHz | $V_{OUT} = 0.8$ Vpp | | -56 | dB | |
| Video Performance | | | | | | |
| DG | Diff. Gain (p-p), NTSC & PAL | $R_L = 150\Omega$, $V_{OUT} = \pm 1.5V$ | | 0.06 | % | |
| DP | Diff. Phase (p-p), NTSC & PAL | $R_L = 150\Omega$, $V_{OUT} = \pm 1.5V$ | | 0.06 | Deg. | |
| NF | Noise Floor | >100kHz | | -130 | dB rms | |

Test Circuit



65-3527-04

Applications Discussion

Capacitive Load

The RC6334 can drive a capacitive load from 10 to over 50 pF. In back terminated video applications, bandwidth will only be limited by the RC time constants of the external output components. When driving a 75Ω cable, place the 75Ω source termination resistor as close to the amplifier output as possible.

DC Accuracy

Since the RC6334 is a voltage-feedback amplifier, the inverting and non-inverting inputs have similar impedances and bias currents. To minimize offset voltage, match the source resistances seen by inverting and non-inverting inputs.

Feedback Components

Because the RC6334 is a voltage-feedback amplifier, it facilitates using reactive (capacitive and inductive) feedback components for implementing filters, integrators, sample/hold circuits, etc. The feedback network and the parasitic capacitance at the inverting (summing junction) input create a pole and affect the transfer function of the circuit. For stable operation, minimize the parasitic capacitance and equivalent resistance of the components used in the feedback circuit.

Circuit Board

High-frequency applications require good grounding, power supply decoupling, low parasitic capacitance and inductance, and good isolation between the inputs to minimize their crosstalk. Avoid coupling from output to input to prevent positive feedback.

Notes:

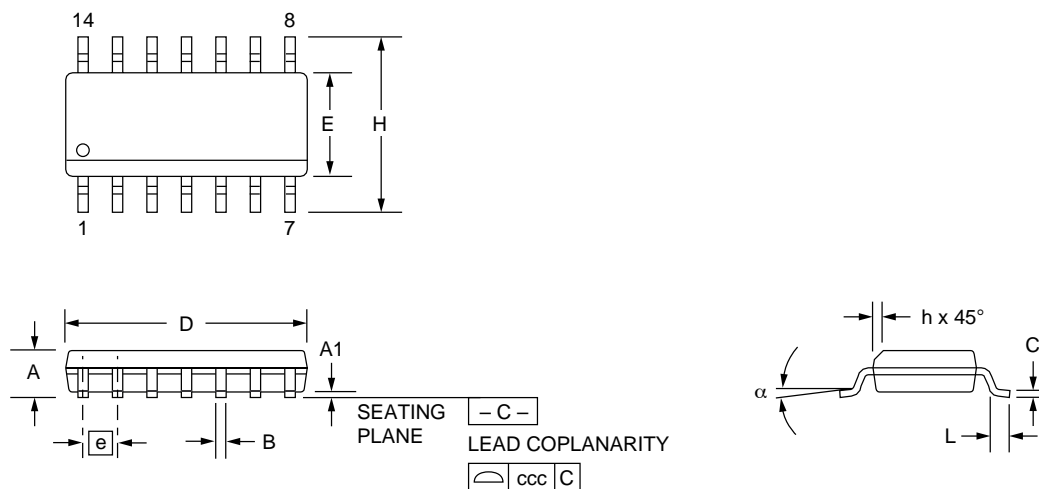
Notes:

Mechanical Dimensions – 14 Pin SOIC Package

| Symbol | Inches | | Millimeters | | Notes |
|----------|----------|------|-------------|------|-------|
| | Min. | Max. | Min. | Max. | |
| A | .053 | .069 | 1.35 | 1.75 | |
| A1 | .004 | .010 | 0.10 | 0.25 | |
| B | .013 | .020 | 0.33 | 0.51 | |
| C | .008 | .010 | 0.19 | 0.25 | 5 |
| D | .336 | .345 | 8.54 | 8.76 | 2 |
| E | .150 | .158 | 3.81 | 4.01 | 2 |
| e | .050 BSC | | 1.27 BSC | | |
| H | .228 | .244 | 5.79 | 6.20 | |
| h | .010 | .020 | 0.25 | 0.50 | |
| L | .016 | .050 | 0.40 | 1.27 | 3 |
| N | 14 | | 14 | | 6 |
| α | 0° | 8° | 0° | 8° | |
| ccc | — | .004 | — | 0.10 | |

Notes:

1. Dimensioning and tolerancing per ANSI Y14.5M-1982.
2. "D" and "E" do not include mold flash. Mold flash or protrusions shall not exceed .010 inch (0.25mm).
3. "L" is the length of terminal for soldering to a substrate.
4. Terminal numbers are shown for reference only.
5. "C" dimension does not include solder finish thickness.
6. Symbol "N" is the maximum number of terminals.



Ordering Information

| Product Number | Temperature Range | Screening | Package | Package Marking |
|----------------|-------------------|------------|--------------------|-----------------|
| RC6334M | 0° to 70°C | Commercial | 14 Pin Narrow SOIC | RC6334M |

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