RC6302

Dual Video Amplifier

Features

- Unity gain stable
- 70 MHz -3 dB Bandwidth
- 20 MHz ±0.1 dB gain flatness
- 0.06% differential gain (R_L = 150Ω)
- 0.06° differential phase (R_L = 150Ω)
- High CMRR (100dB), High PSRR (80 dB)
- Dual ±5V power supply
- Low offset 1.0 mV
- 8-pin narrow SO package
- 160 V/µs slew rate
- Fast settling time: 0.1% in 35 ns

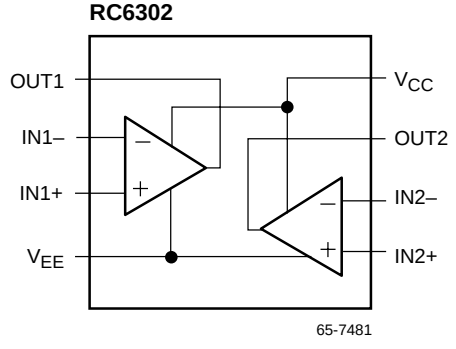
Applications

- Video amplifier
- Video instrumentation amplifier
- Active filter

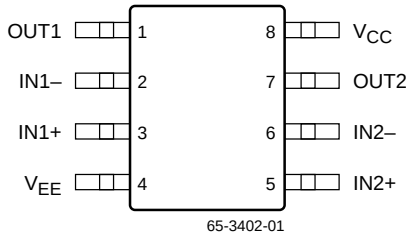
Description

The RC6302 consists of two 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.

Block Diagram



Pin Assignments



Pin Definitions

Pin Name	Pin Number	Pin Function Description
IN1–	2	Amplifier 1 inverting input
IN1+	3	Amplifier 1 non-inverting input
IN2–	6	Amplifier 2 inverting input
IN2+	5	Amplifier 2 non-inverting input
OUT1	1	Amplifier 1 output
OUT2	7	Amplifier 2 output
V_{EE}	4	Negative supply voltage
V_{CC}	8	Positive supply voltage

Absolute Maximum Ratings

(beyond which the device may be damaged)[1]

Parameter	Min	Typ	Max	Units
Positive power supply, V_{CC}			7	V
Negative power supply, V_{EE}			-7	V
Differential input voltage			0	V
Operating Temperature	0		+70	°C
Storage Temperature	-40		+125	°C
Junction Temperature			150	°C
Lead Soldering Temperature (10 seconds)			300	°C
Operating Temperature	0		+70	°C
Short circuit tolerance: No more than one output can be shorted to ground.				

Note:

1. Functional operation under any of these conditions is NOT implied. Performance and reliability are guaranteed only if Operating Conditions are not exceeded.

Operating Conditions

Parameter		Min	Typ	Max	Units
V_{CC}	Power Supply Voltage	4.75	5.0	5.25	V
V_{EE}	Negative Supply Voltage	-4.75	-5.0	-5.25	V
θ_{JA}	SO8 Thermal Resistance		140		°C/W

DC Electrical Characteristics

V_{CC} = 5V, V_{EE} = -5V, A_V = 2, T_A = 0°C to 70°C, R_{LOAD} = 150Ω, unless otherwise specified.

Parameter		Conditions	Min	Typ	Max	Units
V_{OS}	Input Offset Voltage	No load		1.0	±5	mV
$\Delta V_{OS}/\Delta T$	Offset Voltage Drift[1]			6.0	±50	µV/°C
I_B	Input Bias Current			±1.0	±5	µA
$\Delta I_B/\Delta T$	Input Bias Current Drift[1]			±8.0	±50	nA/°C
R_{IN}	Input Resistance[1]		1			MΩ
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	60	80		dB
Is	Quiescent Supply Current	No Load, Whole IC		15	25	mA
R_{OUT}	Output Impedance[1]	At DC		0.2		Ω
I_{OUT}	Output Current			35		mA
V_{OUT}	Output Voltage Swing	No Load	±2.5	±3.0		V
		RL=150Ω	±2.5	±3.0		V
A_{VOL}	Open-loop Gain		58	68		dB

Note:

1. Guaranteed by design.

AC Electrical Characteristics

V_{CC} = 5V, V_{EE} = -5V, R_{LOAD} = 150Ω, R_G = R_F = 250Ω, A_V = 2, T_A = 0 to 70°C, C_L = 10 pF, C_F = 3 pF unless otherwise specified. Closed Loop. See Typical Test Circuit.

Parameter		Conditions	Min	Typ	Max	Units
Frequency Response						
BW	-3 dB Bandwidth (A_V = 2)[1]	V_{OUT} = 0.4 Vpp		70		MHz
		V_{OUT} = 0.8 Vpp		55		MHz
Flat	±0.1 dB Bandwidth[1]		15	20		MHz
Peak	Maximum Small Signal AC Peaking			0.3		DB
X_{TALK}	Crosstalk Isolation[1]	@ 5 MHz		60		dB
Time Domain Response						
t_{r1}, t_{f1}	Rise and Fall Time 10% to 90%[1]	2V Output Step		6	8	ns
t_S	Settling Time to 0.1 %[1]	2V Output Step		35		ns
OS	Overshoot[1]	2V Output Step		13		%
US	Undershoot[1]	2V Output Step		4		%
SR	Slew Rate[1]	V_{OUT} = ±2.0V		160		V/µs
Distortion						
HD_2	2nd Harmonic Dist. @ 20 MHz[1]	V_{OUT} = 0.8 Vpp		-50		dB
HD_3	3nd Harmonic Dist. @ 20 MHz[1]	V_{OUT} = 0.8 Vpp		-50		dB
Equivalent Input Noise						
NF	Noise Floor > 100 KHz[1]			-140		dBm
SND	Spectral Noise Density[1]	100 kHz to 200 MHz		10		nV/√Hz
Video Performance						
DG	Diff. Gain (p-p), NTSC & PAL[1]	R_L = 150Ω, V_{OUT} = ±1.5V		0.06		%
DP	Diff. Phase (p-p), NTSC & PAL[1]	R_L = 150Ω, V_{OUT} = ±1.5V		0.06		Deg.

Note:

1. Guaranteed by design.

Applications Discussion

Capacitive Load

The RC6302 can drive a capacitive load from 10 to over 100 pF. In back terminated video applications, bandwidth will only be limited by the RC time constants of the external output components. A minimum 10 pF capacitive load is required. When driving a 75Ω cable, place the 75Ω source termination resistor as close to the amplifier output as possible.

DC Accuracy

Since the RC6302 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.

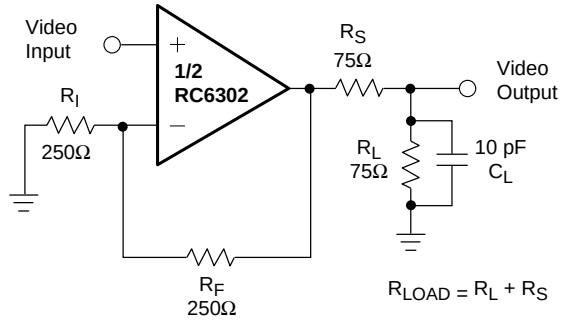
Feedback Components

Because the RC6302 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 three inputs to minimize their crosstalk. Minimal coupling from output to input should exist to prevent positive feedback.

Typical Test Circuit

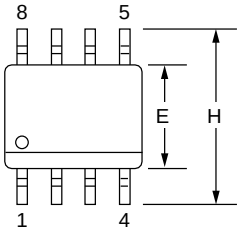


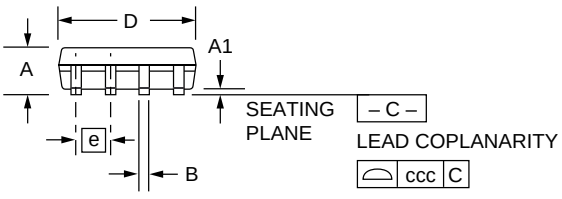
Mechanical Dimensions – 8-Lead SOIC Package

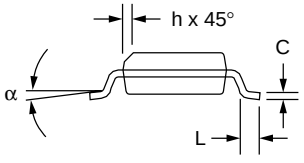
Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	.053	.069	1.35	1.75	
A1	.004	.010	0.10	0.25	
B	.013	.020	0.33	0.51	
C	.008	.010	0.20	0.25	5
D	.189	.197	4.80	5.00	2
E	.150	.158	3.81	4.01	2
e	.050 BSC		1.27 BSC		
H	.228	.244	5.79	6.20	
h	.010	.020	0.25	0.50	
L	.016	.050	0.40	1.27	3
N	8		8		6
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
RC6302M8	0° to 70°C	Commercial	8 Pin Narrow SOIC	RC6302M8

Raytheon Electronics
Semiconductor Division
350 Ellis Street
Mountain View CA 94043
415 968 9211
FAX 415 966 7742