

# RC6302 Dual Video Amplifier

## **Features**

- Unity gain stable
- 70 MHz -3 dB Bandwidth
- 20 MHz ±0.1 dB gain flatness
- 0.06% differential gain ( $R_L = 150\Omega$ )
- $0.06^{\circ}$  differential phase (RL =  $150\Omega$ )
- 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

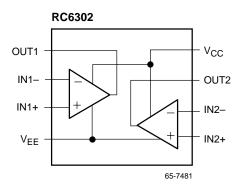
# **Applications**

- Video amplifier
- · Video instrumentation amplifier
- Active filter

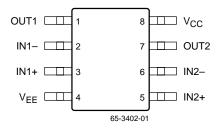
# **Description**

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			
VEE	4	Negative supply voltage			
Vcc	8	Positive supply voltage			

# **Absolute Maximum Ratings**

(beyond which the device may be damaged)<sup>1</sup>

Parameter	Min	Тур	Max	Units		
Positive power supply, VCC			7	V		
Negative power supply, VEE			-7	V		
Differential input voltage			10	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:

# **Operating Conditions**

Parameter		Min	Тур	Max	Units
Vcc	Power Supply Voltage	4.75	5.0	5.25	V
VEE	Negative Supply Voltage	-4.75	-5.0	-5.25	V
θЈΑ	SO8 Thermal Resistance		140		°C/W

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

RC6302 PRODUCT SPECIFICATION

# **DC Electrical Characteristics**

VCC = 5V, VEE = -5V, AV = 2, TA =  $0^{\circ}$ C to  $70^{\circ}$ C, RLOAD =  $150\Omega$ , unless otherwise specified.

Parameter		Conditions	Min	Тур	Max	Units
Vos	Input Offset Voltage	No load		1.0	±5	mV
ΔVos/ΔΤ	Offset Voltage Drift <sup>1</sup>			6.0	±50	μV/°C
lΒ	Input Bias Current			±1.0	±5	μΑ
ΔΙΒ/ΔΤ	Input Bias Current Drift <sup>1</sup>			±8.0	±50	nA/°C
RIN	Input Resistance <sup>1</sup>		1			ΜΩ
CIN	Input Capacitance <sup>1</sup>			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
Rout	Output Impedance <sup>1</sup>	At DC		0.2		Ω
IOUT	Output Current			35		mA
Vout	Output Voltage Swing	No Load	±2.5	±3.0		V
		RL=150Ω	±2.5	±3.0		V
AVOL	Open-loop Gain		58	68		dB

#### Note:

<sup>1.</sup> Guaranteed by design.

## **AC Electrical Characteristics**

 $V_{CC}$  = 5V,  $V_{EE}$  = -5V,  $R_{LOAD}$  = 150 $\Omega$ ,  $R_{G}$  =  $R_{F}$  = 250 $\Omega$ ,  $A_{V}$  = 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	Тур	Max	Units
Frequency Response						
BW	-3 dB Bandwidth (A∨ = 2) <sup>1</sup>	VOUT = 0.4 Vpp		70		MHz
		Vout = 0.8 Vpp		55		MHz
Flat	±0.1 dB Bandwidth <sup>1</sup>		15	20		MHz
Peak	Maximum Small Signal AC Peaking			0.3		DB
XTALK	Crosstalk Isolation <sup>1</sup>	@ 5 MHz		60		dB
Time Doma	in Response					
tr1, tf1	Rise and Fall Time 10% to 90% <sup>1</sup>	2V Output Step		6	8	ns
ts	Settling Time to 0.1 % <sup>1</sup>	2V Output Step		35		ns
OS	Overshoot <sup>1</sup>	2V Output Step		13		%
US	Undershoot <sup>1</sup>	2V Output Step		4		%
SR	Slew Rate <sup>1</sup>	VOUT = ±2.0V		160		V/μs
Distortion						
HD <sub>2</sub>	2nd Harmonic Dist. @ 20 MHz <sup>1</sup>	VOUT = 0.8 Vpp		-50		dB
HD <sub>3</sub>	3nd Harmonic Dist. @ 20 MHz <sup>1</sup>	Vout = 0.8 Vpp		-50		dB
Equivalent	Input Noise			,		,
NF	Noise Floor > 100 KHz <sup>1</sup>			-140		dBm
SND	Spectral Noise Density <sup>1</sup>	100 kHz to 200 MHz		10		nV/√Hz
Video Perfo	rmance					
DG	Diff. Gain (p-p), NTSC & PAL1	$R_L = 150\Omega$ , $V_{OUT} = \pm 1.5V$		0.06		%
DP	Diff. Phase (p-p), NTSC & PAL <sup>1</sup>	$R_L = 150\Omega$ , $V_{OUT} = \pm 1.5V$		0.06		Deg.

## Note:

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<sup>1.</sup> Guaranteed by design.

RC6302 PRODUCT SPECIFICATION

## **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 75 $\Omega$  cable, place the 75 $\Omega$  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.

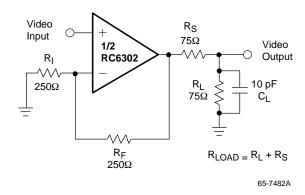
## **Feedback Components**

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**

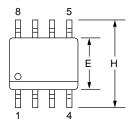


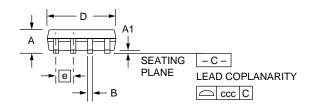
# **Mechanical Dimensions – 8-Lead SOIC Package**

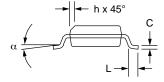
Symbol	Inches		Millim	Natas	
	Min.	Max.	Min.	Max.	Notes
Α	.053	.069	1.35	1.75	
A1	.004	.010	0.10	0.25	
В	.013	.020	0.33	0.51	
С	.008	.010	0.20	0.25	5
D	.189	.197	4.80	5.00	2
Е	.150	.158	3.81	4.01	2
е	.050	BSC	1.27 BSC		
Н	.228	.244	5.79	6.20	
h	.010	.020	0.25	0.50	
L	.016	.050	0.40	1.27	3
N	8	3	8		6
α	0°	8°	0° 8°		
ccc	_	.004	— 0.10		

#### Notes:

- 1. Dimensioning and tolerancing per ANSI Y14.5M-1982.
- "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

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