

# **RC6333**

# Triple Video Amplifier

#### **Features**

- · Triple video amplifier
- 175 MHz -3 dB Bandwidth (Ay = 2)
- 50 MHz ±0.1 dB gain flatness
- Unity gain stable
- 0.06% differential gain (AV = 1, RL =  $150\Omega$ )
- $0.06^{\circ}$  differential phase (Av = 1, RL =  $150\Omega$ )
- High CMRR (95dB), High PSRR (80 dB)
- Dual ±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

# **Applications**

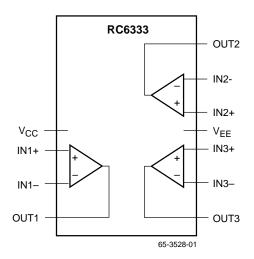
- · RGB amplifiers
- Video instrumentation amplifier
- · Selectable gain amplifier
- Active filters
- Set-top Buffers/Drivers

### Description

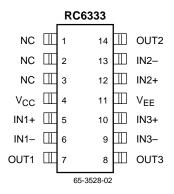
The RC6333 consists of three low power, wide band voltage feedback operational amplifiers. Each channel is capable of delivering a load current of at least 35mA.

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-	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		
NC	1–3	Not Connected.		
OUT1	7	Amplifier 1 output		
OUT2	14	Amplifier 2 output		
OUT3	8	Amplifier 3 output		
Vcc	4	Analog positive supply		
VEE	11	Analog negative supply		

# **Absolute Maximum Ratings**

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

Parameter		Min	Тур	Max	Units
Vcc	Positive power supply			7	V
VEE	Negative power supply			-7	V
	Differential input voltage			10	V
	Operating Temperature	0		+70	°C
	Storage Temperature	-40		±125	°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:

# **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	SO14 Thermal Resistance		105		°C/W

<sup>1.</sup> Functional operation under any of these conditions is NOT implied.

RC6333 PRODUCT SPECIFICATION

### **DC Characteristics**

VCC = 5V, VEE = -5V, AV = 2,  $R_{LOAD}$  = 150 $\Omega$ ,  $T_A$  = 0°C to 70°C, unless otherwise specified. Open Loop.

Parameter		Conditions	Min	Тур	Max	Units
Vos	Input Offset Voltage	No Load		3	±10	mV
ΔVos/ΔΤ	Offset Voltage Drift <sup>1</sup>			±6	±30	μV/°C
lΒ	Input Bias Current			±1	±5	μΑ
ΔΙΒ/ΔΤ	Input Bias Current Drift <sup>1</sup>			±8	±40	nA/°C
Rin	Input Resistance <sup>1</sup>		1			МΩ
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	65	80		dB
Is	Quiescent Supply Current	No Load		26	40	mA
Rout	Output Impedance (Closed Loop) <sup>1</sup>	Enabled, At DC		0.2		Ω
lout	Output Current	Per Amplifier	35			mA
Vout	Output Voltage Swing	No Load	±2.5	±3.0		V
		R <sub>L</sub> = 150Ω	±2.5	±3.0		V
AVOL	Open-loop Gain		60	75		dB

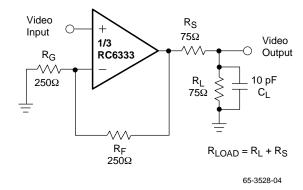
#### Note:

**AC Characteristics**  $V_{CC} = 5V$ ,  $V_{EE} = -5V$ , AV = 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		Тур	Max	Units		
Frequer	Frequency Response							
BW -3 dB Bandwidth (A <sub>V</sub> = 2)		Vout = 0.4 Vpp		+175		MHz		
		VOUT = 0.8 Vpp	75	90		MHz		
Flat	±0.1 dB Bandwidth	Vout = 0.4 Vpp	50	75		MHz		
Peak	Maximum Small Signal AC Peaking	Vout = 0.8 Vpp		0.01		dB		
XTALK	Crosstalk Isolation	@ 5 MHz		50		dB		
Time Do	omain Response	•						
tr1, tf1	Rise and Fall Time 10% to 90%	2V Output Step		10	15	ns		
ts	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	VOUT = ±2.0V	200	250		V/μs		
Distortion	on		•					
HD <sub>2</sub>	2nd Harmonic Dist. @ 20 MHz	VOUT = 0.8 Vpp		-48		dB		
HD <sub>3</sub>	3nd Harmonic Dist. @ 20 MHz	Vout = 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		

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

#### **Test Circuit**



### **Applications Discussion**

#### **Capacitive Load**

The RC6333 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  $75\Omega$  cable, place the  $75\Omega$  source termination resistor as close to the amplifier output as possible.

#### **DC** Accuracy

Since the RC6333 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 RC6333 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.

RC6333 PRODUCT SPECIFICATION

## **Notes:**

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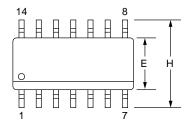
RC6333 PRODUCT SPECIFICATION

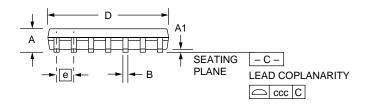
# **Mechanical Dimensions – 14 Pin SOIC Package**

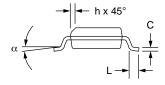
Sumb al	Inches		Millin	Notes	
Symbol	Min.	Max.	Min.	Max.	Notes
Α	.053	.069	1.35	1.75	
A1	.004	.010	0.10	0.25	
В	.013	.020	0.33	0.51	
С	.008	.010	0.19	0.25	5
D	.336	.345	8.54	8.76	2
Е	.150	.158	3.81	4.01	2
е	.050	BSC	1.27	BSC	
Н	.228	.244	5.79	6.20	
h	.010	.020	0.25	0.50	
L	.016	.050	0.40	1.27	3
N	1	4	1	4	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
RC6333M	0° to 70°C	Commercial	14 Pin Narrow SOIC	RC6333M

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