RC5532/RC5532A

High Performance Dual Low Noise Operational Amplifier

Features

- Small signal bandwidth – 10 MHz
- Output drive capability – 600Ω, 10 VRMS
- Input noise voltage – 5 nV/$\sqrt{Hz}$
- DC voltage gain – 50,000
- AC voltage gain – 2200 at 10 KHz
- Power bandwidth – 140 KHz
- Slew rate – 8 V/μS
- Large supply voltage range – ±3V to ±20V

Description

The RC5532 is a high performance, dual low noise operational amplifier. Compared to standard dual operational amplifiers, such as the RC747, it shows better noise performance, improved output drive capability, and considerably higher small-signal and power bandwidths.

This makes the device especially suitable for application in high quality and professional audio equipment, instrumentation, control circuits, and telephone channel amplifiers. The op amp is internally compensated for gains equal to one. If very low noise is of prime importance, it is recommended that the RC5532A version be used which has guaranteed noise specifications.

Block Diagram

Pin Assignments

Absolute Maximum Ratings

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

Parameter		Min.	Typ.	Max.	Units
Supply Voltage				±22	V
Input Voltage				$\pm V_S$	V
Differential Input Voltage				0.5	V
$P_D T_A < 50°C$	PDIP			468	mW
Junction Temperature	PDIP			125	°C
Storage Temperature		-65		150	°C
Operating Temperature	RC5532/A	0		70	°C
Lead Soldering Temperature (10 sec)				300	°C

Notes:

1. Functional operation under any of these conditions is NOT implied.
2. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.
3. Short circuit to ground on one amplifier only.

Operating Conditions

Parameter			Min.	Typ.	Max.	Units
θ_{JA}	Thermal resistance	PDIP		160		°C/W
For $T_A > 50°C$ Derate at		PDIP		6.25		mW/°C

DC Electrical Characteristics

(V_S = ±15V and T_A = +25˚C unless otherwise noted)

Parameters	Test Conditions	RC5532/5532A Min.	RC5532/5532A Typ.	RC5532/5532A Max.	Units
Input Offset Voltage			0.5	4.0	mV
	Over Temperature			5.0	mV
Input Offset Current			10	150	nA
	Over Temperature			200	nA
Input Bias Current			200	800	nA
	Over Temperature			1000	nA
Supply Current			6.0	16	mA
	Over Temperature			22	mA
Input Voltage Range		±12	±13		V
Common Mode Rejection Ratio		70	100		dB
Power Supply Rejection Ratio		80	100		dB
Large Signal Voltage Gain	$R_L \geq$ 2 KΩ, V_{OUT} = ±10V	25	100		V/mV
	Over Temperature	15	50		
	$R_L \geq$ 600Ω, V_{OUT} = ±10V	15	50		
	Over Temperature	10			
Output Voltage Swing	$R_L \geq$ 600Ω	±12	±13		V
	R_L = 600Ω, V_S = ±18V	±15	±16		
	$R_L \geq$ 2kΩ				
Input Resistance (Diff. Mode)			300		KΩ
Short Circuit Current			38		mA

Notes:

1. Diodes protect the inputs against over-voltage. Therefore, unless current-limiting resistors are used, large currents will flow if the differential input voltage exceeds 0.6V. Maximum input current should be limited to ±10mA.
2. Over Temperature: RC = 0°C ≤ T_A ≤70°C

Electrical Characteristics

(V_S = ±15V and T_A = +25°C)

Parameters	Test Conditions	RC/RM5532A Min.	RC/RM5532A Typ.	RC/RM5532A Max.	Units
Input Noise Voltage Density	F_O = 30 Hz		8.0	12	nV/√Hz
	F_O = 1 kHz		5.0	6.0	
Input Noise Current Density	F_O = 30 Hz		2.7		pA/√Hz
	F_O = 1 kHz		0.7		
Channel Separation	F = 1 kHz, R_S = 5 kΩ		110		dB

AC Electrical Characteristics

(V_S = ±15V and T_A = +25°C)

Parameters	Test Conditions	Min.	Typ.	Max.	Units
Output Resistance	A_V = 30 dB Closed Loop, F = 10 kHz, R_L = 600Ω		0.3		Ω
Overshoot	Unity Gain, V_{IN} = 100 mV_{p-p} C_L = 100 pF, R_L = 600Ω		10		%
Gain	F = 10 KHz		2.2		V/mV
Gain Bandwidth Product	C_L = 100 pF, R_L = 600Ω		10		MHz
Slew Rate			8.0		V/µS
Power Bandwidth	V_{OUT} = ±10V		140		KHz
	V_{OUT} = ±14V, R_L = 600Ω, V_S = ±18V		100		KHz

Test Circuits

Figure 1. Closed Loop Frequency Response

Figure 2. Follower, Transient Response

Typical Performance Characteristics

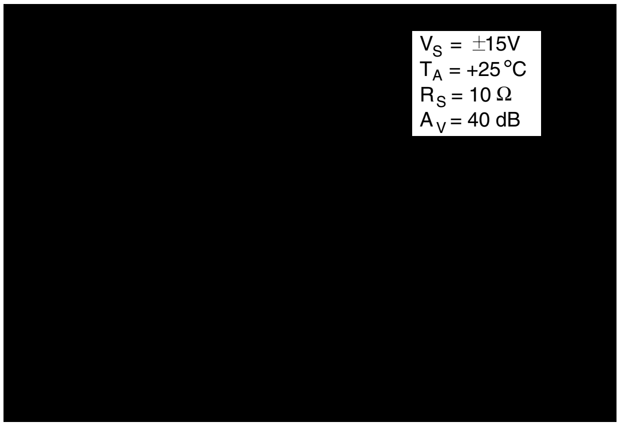


Figure 3. Open Loop Gain vs. Frequency

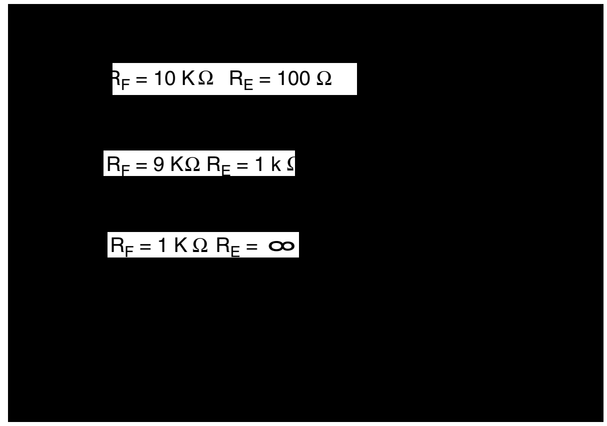


Figure 4. Closed Loop Gain vs. Frequency

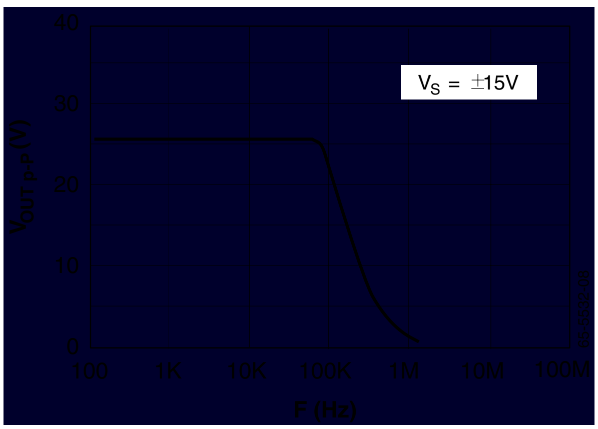


Figure 5. Output Voltage Swing vs. Frequency

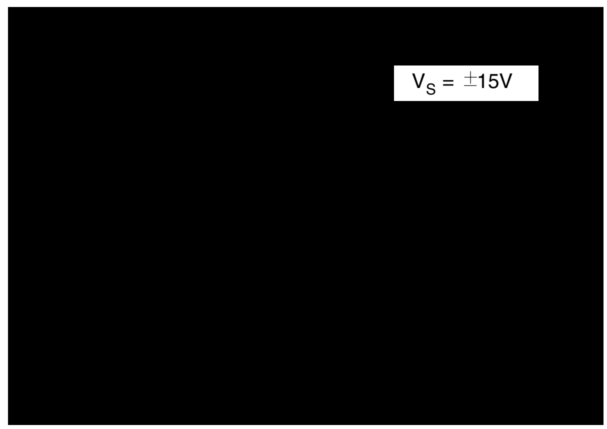


Figure 6. Short Circuit Current vs. Temperature

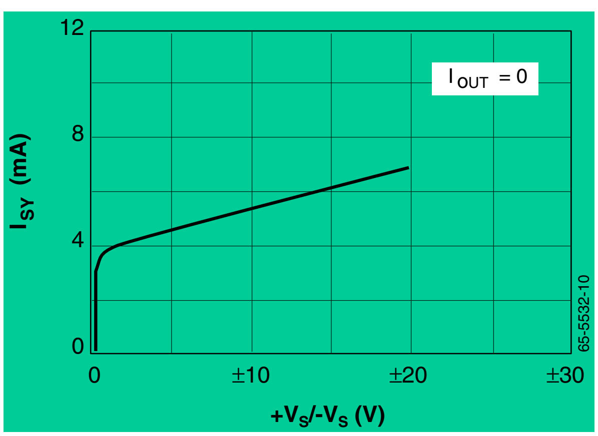


Figure 7. Supply Current vs. Supply Voltage

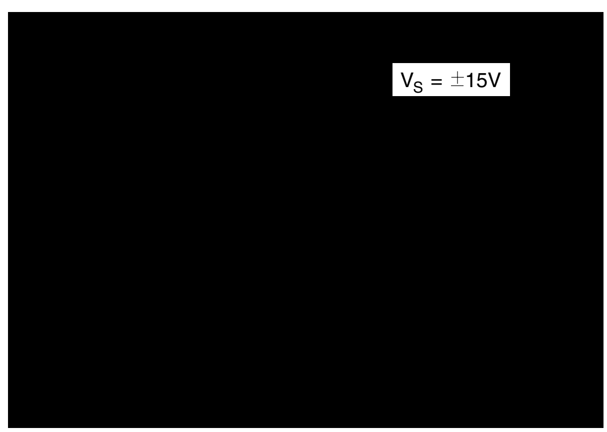


Figure 8. Input Bias Current vs. Temperature

Typical Performance Characteristics (continued)

Figure 9. Output Voltage Swing vs. Supply Voltage

Figure 10. Common Mode Input Range vs. Supply Voltage

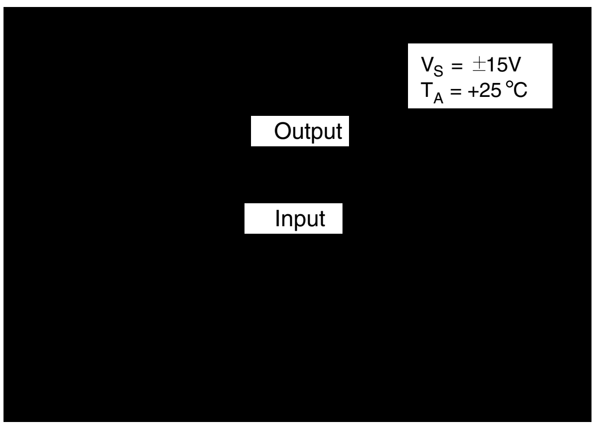


Figure 11. Follower Large Signal Pulse Response

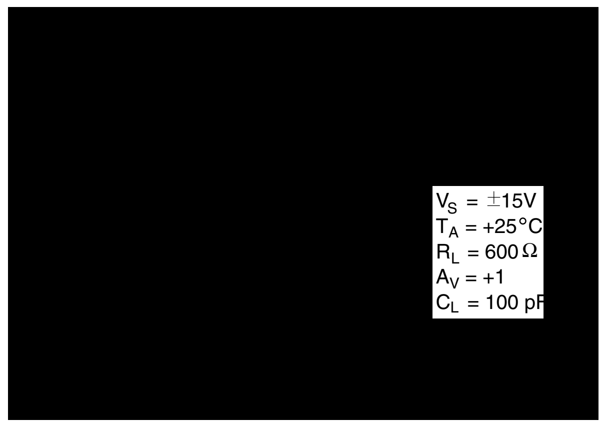


Figure 12. Transient Response Output Voltage vs. Time

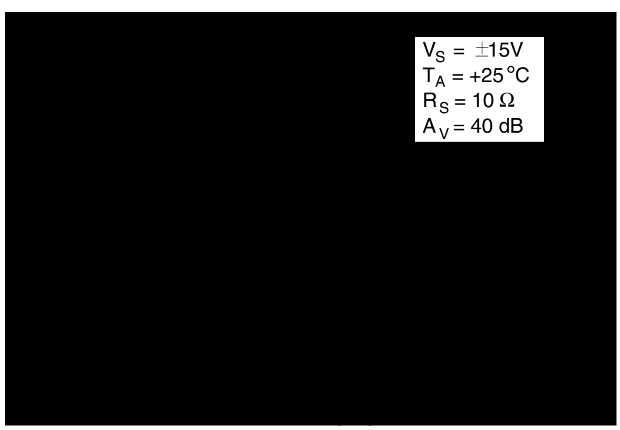
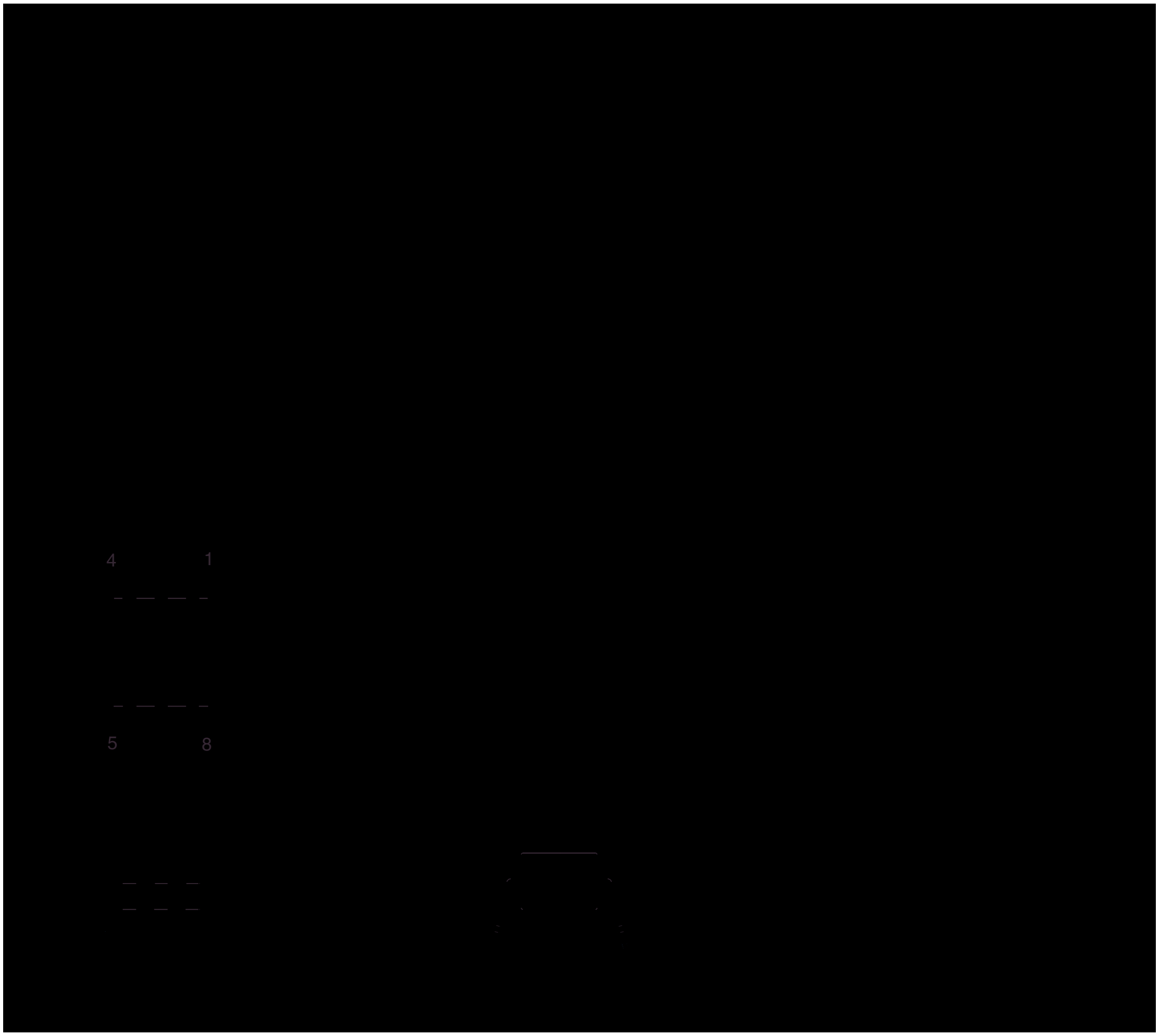


Figure 13. Input Noise Density vs. Frequency

Mechanical Dimensions (continued)

8-Lead Plastic DIP Package



Ordering Information

Product Number	Temperature Range	Screening	Package
RC5532N/RC5532AN	0°C to +70°C	Commercial	8 Pin Plastic DIP

6/14/01 0.0m 003
Stock#DS30004841