

Dual Low-Noise Operational Amplifier

GENERAL DESCRIPTION

The XR-5532 dual low-noise operational amplifier is especially designed for applications in high quality professional audio equipment. The low-noise, wide bandwidth and output drive capability make it ideally suited for instrumentation and control circuits as well as active filter design.

The XR-5532A is the specially screened version of the XR-5532, with guaranteed noise characteristics.

FEATURES

Pin for Pin Replacement for Signetics NE 5532

Wide Small-Signal Bandwidth: 10 MHz

High-Current Drive Capability

(10V rms into 600Ω at $V_S = \pm 18V$)

High Slew Rate: 9 V/μs 140

Wide Power-Bandwidth: 140 kHz

Very Low Input Noise: 5 nV/√Hz

Wide Supply Range: $\pm 3V$ to $\pm 20V$

APPLICATIONS

High Quality Audio Amplification

Telephone Channel Amplifier

Servo Control Systems

Low-Level Signal Detection

Active Filter Design

ABSOLUTE MAXIMUM RATINGS

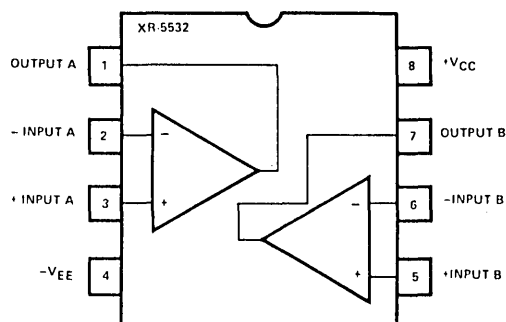
Power Supply	$\pm 22V$
Input Common-Mode Range	$-V_{EE}$ to $+V_{CC}$
Differential Input Voltage (Note 1)	$\pm 0.5V$
Power Dissipation (Package Limitation)	
Ceramic Package 8-Pin	600 mW
Derate Above $T_A = 25^\circ C$	8 mW/°C
Storage Temperature	$-60^\circ C$ to $+150^\circ C$

Note 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 current should be limited to ± 10 mA.

Note 2: Output may be shorted to ground at $V_{CC} = V_{EE} = 15V$, $T_A = 25^\circ C$. Temperature and/or voltages must be limited to ensure dissipation rating is not exceeded.

Note 3: Operation near the absolute maximum ratings will exceed the power dissipation of the package.

FUNCTIONAL BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-5532N	Ceramic	0°C to +70°C
XR-5532P	Plastic	0°C to +70°C
XR-5532AN	Ceramic	0°C to +70°C
XR-5532AP	Plastic	0°C to +70°C

SYSTEM DESCRIPTION

The XR-5532 and XR-5532A are dual monolithic operational amplifiers featuring low noise and very large gain bandwidth products. The devices have low output resistance and can drive 10 Vrms into 600Ω. Input noise is 100% tested on the XR-5532A, and is typically only 5 nV/√Hz. The small signal bandwidth is 10 MHz and slew rate exceeds 9 V/μs. Supply voltage may range from $\pm 3V$ to $\pm 18V$.

XR-5532/5532A

ELECTRICAL CHARACTERISTICS

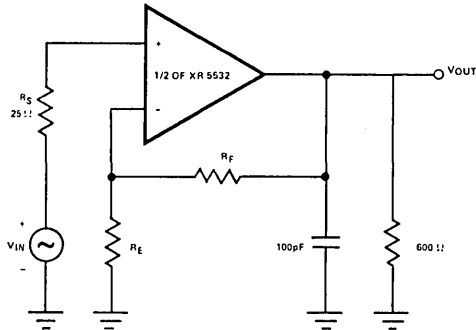
Test Conditions: $T_A = 25^\circ\text{C}$, $V_{CC} = V_{EE} = 15\text{V}$ unless otherwise specified.

PARAMETERS	XR-5532A			XR-5532			UNITS	SYMBOL	CONDITIONS
	MIN	TYP	MAX	MIN	TYP	MAX			
DC CHARACTERISTICS									
Input Offset Voltage		0.5	4 5		0.5	4 5	mV mV	V _{OS}	T _A = 25°C T _A = Full Range
Input Offset Current		10	150 200		10	150 200	nA nA	I _{OS}	T _A = 25°C T _A = Full Range
Input Bias Current		200	800 1000		200	800 1000	nA nA	I _B	T _A = 25°C T _A = Full Range
Large Signal Voltage Gain	25 15	100		25 15	100		V/mV V/mV	A _{VOL}	R _L ≥ 600Ω, V _O = ±10V T _A = 25°C T _A = Full Range
Supply Current		8	16		8	16	mA	I _{CC}	R _L = Open
Output Swing	±12 ±15	±13 ±16		±12 ±15	±13 ±16		V V	V _{OUT}	R _L ≥ 600Ω V _{CC} = V _{EE} = 15V V _{CC} = V _{EE} = 18V
Output Short Circuit Current		38			38		mA	I _{SC}	(Note 2)
Input Resistance	30	300		30	300		kΩ	R _{IN}	
Common-Mode Range	±12	±13		±12	±13		V	V _{ICM}	
Common-Mode Rejection	70	100		70	100		dB	CMRR	
Power Supply Rejection		10	100		10	100	μV/V	PSRR	
Channel Separation		110			110			dB	f = 1 kHz, R _S = 5 KΩ
AC CHARACTERISTICS									
Transient Response Rise Time Overshoot		20 10			20 10		nsec %	t _r t ₀	Voltage Follower R _L = 600Ω V _{IN} 100 mV _{pp} , C _L = 100 pF
AC Gain		2.2			2.2		V/mV		f = 10 kHz
Unity-Gain Bandwidth		10			10		MHz	BW	C _L = 100 pF
Slew Rate		9			9		V/μsec		
Power Bandwidth		140			140		kHz	f _p	V _{OUT} = ±10V R _L = 600Ω
Output Resistance		.3			.3		Ω	R _{OUT}	A _v = 30 dB Closed loop f = 10 kHz R _L = 600Ω
NOISE CHARACTERISTICS									
Input Noise Voltage		8 5	10 6		8 5		nV/√Hz nV/√Hz	e _n	f ₀ = 30 kHz f ₀ = 1 kHz
Input Noise Current		2.7 .7			2.7 .7		pA/√Hz pA/√Hz	i _n	f ₀ = 30 Hz f ₀ = 1 kHz

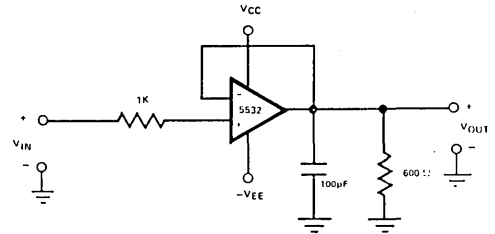
XR-5532/5532A

TEST CIRCUITS

CLOSED LOOP FREQUENCY RESPONSE

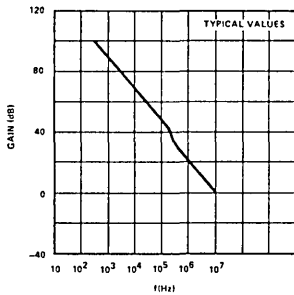


VOLTAGE FOLLOWER

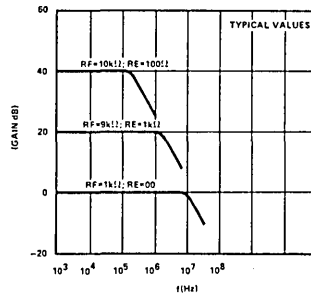


TYPICAL PERFORMANCE CHARACTERISTICS

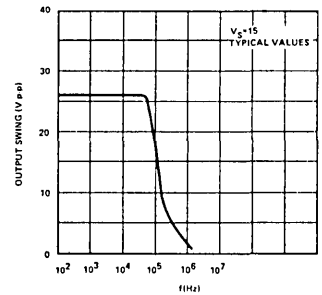
OPEN LOOP FREQUENCY RESPONSE



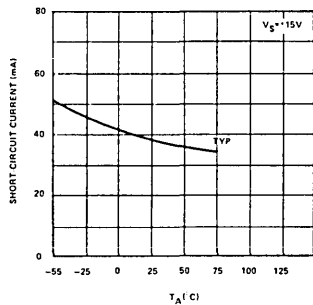
CLOSED LOOP FREQUENCY RESPONSE



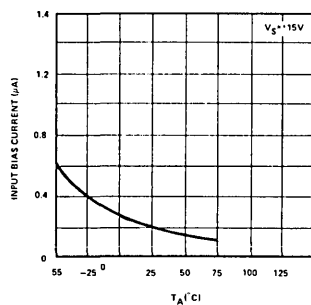
LARGE-SIGNAL FREQUENCY RESPONSE



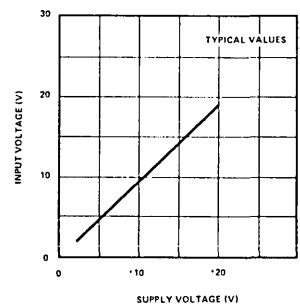
OUTPUT SHORT-CIRCUIT CURRENT



INPUT BIAS CURRENT



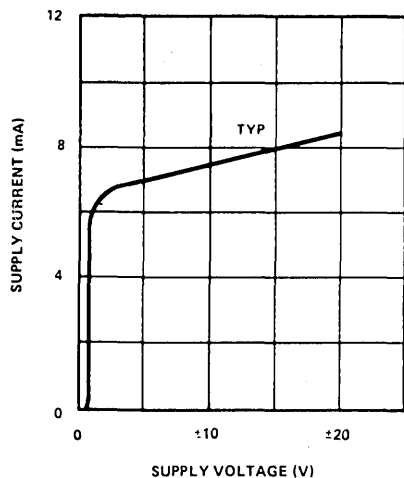
INPUT COMMON MODE VOLTAGE RANGE



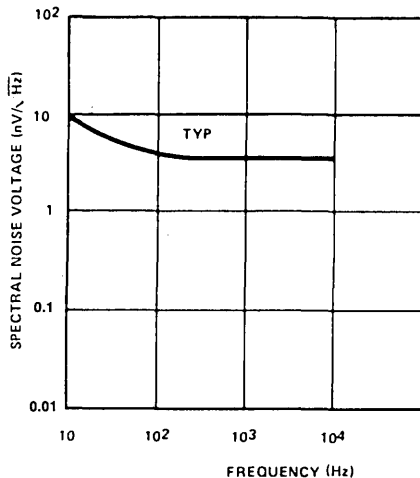
XR-5532/5532A

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

SUPPLY CURRENT

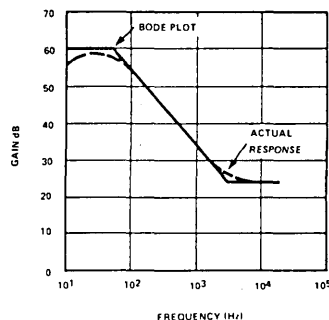
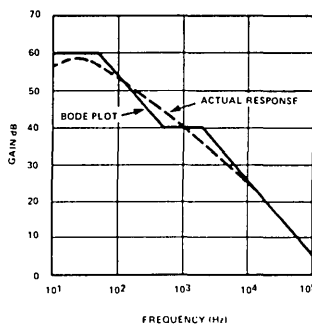
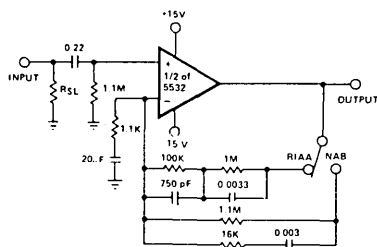


INPUT NOISE VOLTAGE DENSITY



TYPICAL APPLICATION

PREAMPLIFIER-RIAA/NAB COMPENSATION



*SELECT TO PROVIDE SPECIFIED TRANSDUCER LOADING
OUTPUT NOISE 0.8 mV rms (WITH INPUT SHORTED)
ALL RESISTOR VALUES ARE IN OHMS

BODE PLOT OF RIAA EQUALIZATION AND THE
RESPONSE REALIZED IN AN ACTUAL CIRCUIT
USING THE XR 5532

BODE PLOT OF NAB EQUALIZATION AND THE
RESPONSE REALIZED IN THE ACTUAL CIRCUIT USING
THE XR 5532

EQUIVALENT SCHEMATIC DIAGRAM

