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 VS = ±18V)
High Slew Rate: 9 V/μs
Wind Power-Bandwidth: 140 kHz
Very Low Input Noise: 5 nV/√Hz
Wide Supply Range: ±3V to ±20V

APPLICATIONS

High Quality Audio Amplification
Telephone Channel Amplifier
Servo Control Systems
Low-Level Signal Detection
Active Filter Design

ABSOLUTE MAXIMUM RATINGS

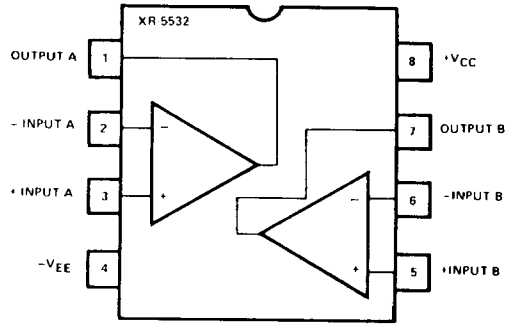
Power Supply	±22V
Input Common-Mode Range	$-V_{EE}$ to $+V_{CC}$
Differential Input Voltage (Note 1)	±0.5V
Power Dissipation (Package Limitation)	
Ceramic Package 8-Pin	600 mW
Derate Above TA = 25°C	8 mW/°C
Storage Temperature	−60°C to +150°C

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°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 ± 3V to ± 18V.

XR-5532/5532A

ELECTRICAL CHARACTERISTICS

Test Conditions: T_A = 25°C, V_{CC} = $|V_{EE}|$ = 15V 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_T = Full Range *
Input Offset Current		10 150 200			10 150 200		nA nA	I_{OS}	T_A = 25°C T_T = Full Range *
Input Bias Current		200 800 1000			200 800 1000		nA nA	I_B	T_A = 25°C T_T = Full Range *
Large Signal Voltage Gain	25 15	100		25 15	100		V/mV V/mV	A_{VOL}	$R_L \geq 600\Omega$, $V_O = \pm 10V$ T_A = 25°C T_T = 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}	$R_L \geq 600\Omega$ $V_{CC} = V_{EE}$ = 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	$V_{OUT} = \pm 10V$ RL = 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 Hz 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

*These parameters, although guaranteed over the recommended operating conditions, are not 100% tested in production.

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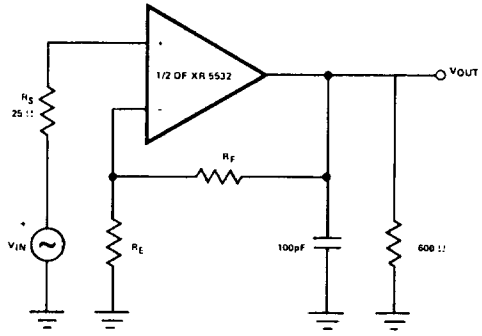
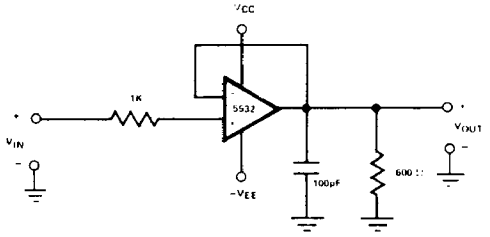
TEST CIRCUITS

CLOSED LOOP FREQUENCY RESPONSE

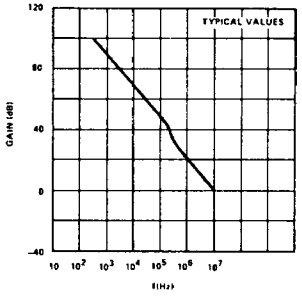


VOLTAGE FOLLOWER

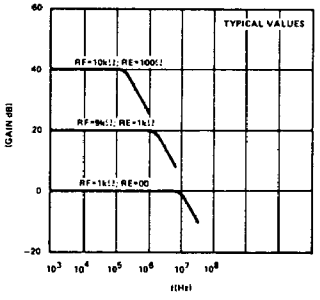


TYPICAL PERFORMANCE CHARACTERISTICS

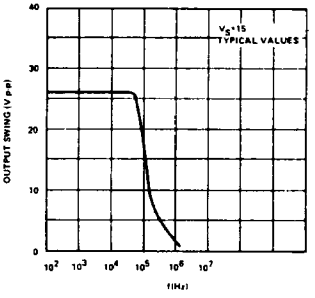
OPEN LOOP FREQUENCY RESPONSE



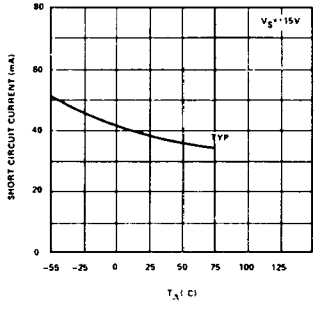
CLOSED LOOP FREQUENCY RESPONSE



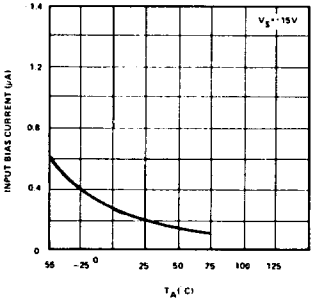
LARGE-SIGNAL FREQUENCY RESPONSE



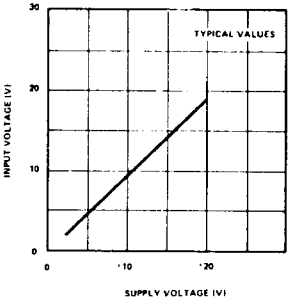
OUTPUT SHORT-CIRCUIT CURRENT



INPUT BIAS CURRENT

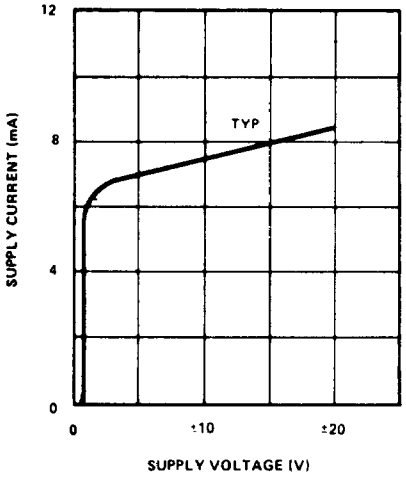


INPUT COMMON MODE VOLTAGE RANGE

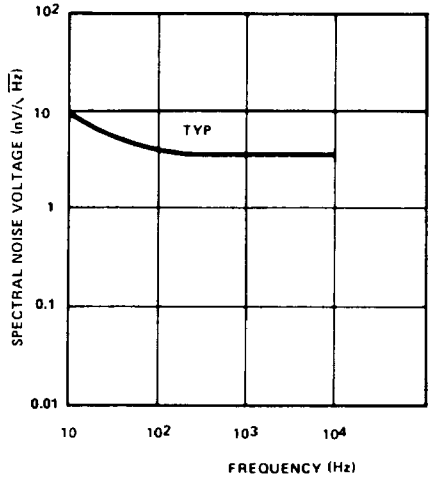


TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

SUPPLY CURRENT



INPUT NOISE VOLTAGE DENSITY



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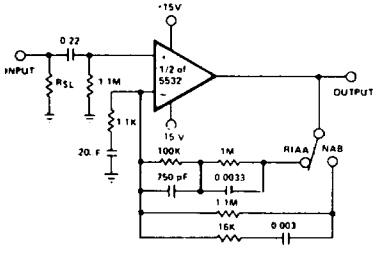
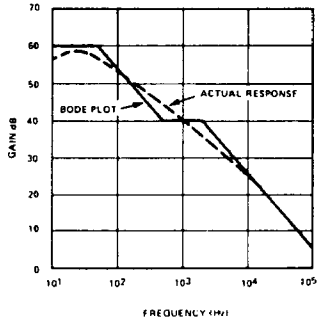
TYPICAL APPLICATION

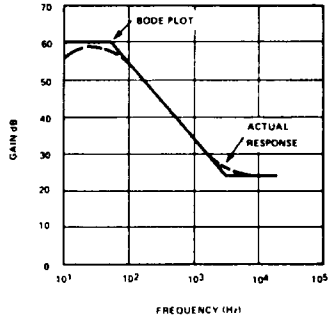
PREAMPLIFIER–RIAA/NAB COMPENSATION



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

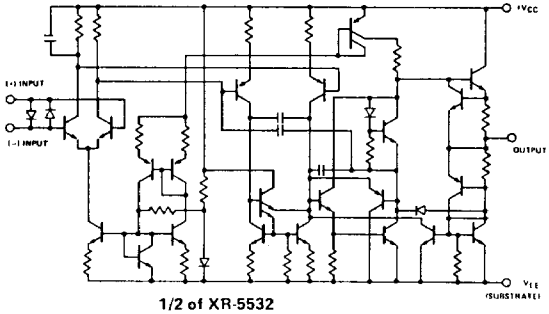


BODE PLOT OF RIAA EQUALIZATION AND THE RESPONSE REALIZED IN AN ACTUAL CIRCUIT USING THE XR-5533

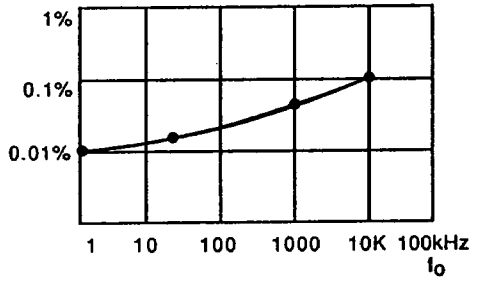


BODE PLOT OF NAB EQUALIZATION AND THE RESPONSE REALIZED IN THE ACTUAL CIRCUIT USING THE XR-5533

EQUIVALENT SCHEMATIC DIAGRAM



1/2 of XR-5532



Total Harmonic Distortion vs Frequency

$V_{IN} = V_{PP}$

EXAR

XR-1488/1489A

Quad Line Driver/Receiver

GENERAL DESCRIPTION

The XR-1488 is a monolithic quad line driver designed to interface data terminal equipment with data communications equipment in conformance with the specifications of EIA Standard No. RS232C. This extremely versatile integrated circuit can be used to perform a wide range of applications. Features such as output current limiting, independent positive and negative power supply driving elements, and compatibility with all DTL and TTL logic families greatly enhance the versatility of the circuit.

The XR-1489A is a monolithic quad line receiver designed to interface data terminal equipment with data communications equipment. the XR-1489A quad receiver along with its companion circuit, the XR-1488 quad driver, provide a complete interface system between DTL or TTL logic levels and the RS232C defined voltage and impedance levels.

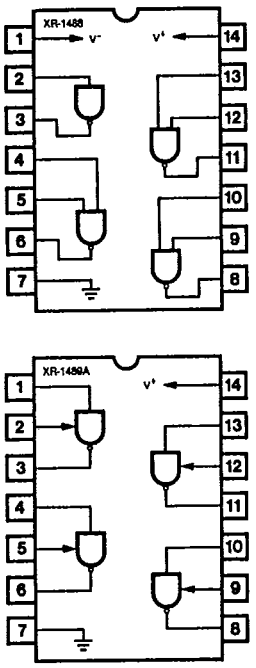
ABSOLUTE MAXIMUM RATINGS

Power Supply	
XR-1488	±15 Vdc
XR-1489A	+10 Vdc
Power Dissipation	
Ceramic Package	1000 mW
Derate above +25°C	6.7 mW/°C
Plastic Package	650 mW/°C
Derate above +25°C	5 mW/°C

ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-1488N	Ceramic	0°C to +70°C
XR-1488P	Plastic	0°C to +70°C
XR-1489AN	Ceramic	0°C to +70°C
XR-1489AP	Plastic	0°C to +70°C

FUNCTIONAL BLOCK DIAGRAMS



SYSTEM DESCRIPTION

The XR-1488 and XR-1489A are a matched set of quad line drivers and line receivers designed for interfacing between TTL/DTL and RS232C data communication lines.

The XR-1488 contains four independent split supply line drivers, each with a ±10 mA current limited output. For RS232C applications, the slew rate can be reduced to the 30 V/μS limit by shunting the output to ground with a 410 pF capacitor. The XR-1489A contains four independent line receivers, designed for interfacing RS232C to TTL/DTL. Each receiver features independently programmable switching thresholds with hysteresis, and input protection to ±30 V. The output can typically source 3 mA and sink 20 mA.