

## Keysight 33502A 2-channel 50 Vpp Isolated Amplifier

Data Sheet



## Introduction

The Keysight Technologies, Inc. 33502A is a dual-channel, high voltage output amplifier. It has an isolated analog front end with up to 50 Vpp ( $\pm 25$  V) output voltage range. It is also a very low-distortion amplifier with  $< 0.01\%$  @ 10 kHz and 40 Vpp. The 33502A is designed to work as a companion for function generators to offer low-distortion, higher voltage outputs.

The 33502A has a fully isolated front end, which offers superior 5X voltage amplification to other amplifiers. You can independently configure input coupling (AC|DC) and input impedance ( $50\Omega|1M\Omega$ ) to match your circuit. The input path can also be switched from amplified to direct (unamplified) without removing or connecting cables.

The 33502A, in a 2 unit, half-rack mechanical form factor, fits well on both your bench and in your test system. It also is configured with LAN (LXI Class-C compliant) and USB interfaces to meet your computer IO needs.

The 33502A provides both a programmable interface and a softkey-driven front panel for flexibility in configuring.

The 33502A is compatible with existing Keysight function/arbitrary waveform generators including the 33120A, 33210A, 33220A, and 33250A. It can also be used to amplify signals from non-Keysight function and arbitrary waveform generators.

## Features

- Full-power BW 100kHz @ 50Vpp
- Small-signal BW  $> 300$ kHz
- Slew Rate  $20V/\mu s$  min.
- THD+N  $< 0.01\%$  @ 10kHz, 40Vpp.
- Output drive 200mA max.
- Isolation Floats  $\pm 42V_{pk}$  to earth

Table 1.

Feature	Characteristic
<b>General</b>	
Number of channels	2
Channel to channel ground connection	Not connected in BYPASS ON. Connected with both channels OFF or in Gain of 5x
Floating Voltage	$\pm 42$ Vpk to earth
<b>Input Configuration &amp; Specification</b>	
<b>Input Coupling</b>	
AC Coupling	Programmable
DC Coupling	Default, Programmable
<b>Input Impedance</b>	
1M $\Omega$	Default, Programmable
50 $\Omega$	Programmable
<b>Input Voltage Range</b>	
Maximum Voltage Range	$\pm 5$ Vpk for gain of 5x, $\pm 30$ Vpk for bypass
Damage Level	$\pm 10$ Vpk for 50 $\Omega$ input $\pm 35$ Vpk for 1 M $\Omega$ input
Input Path	Programmable gain of 5x, bypass (1x), or off state
Input Gain 5X	5X, Fixed, Non-Inverting
Gain Accuracy <sup>2</sup>	$\pm 0.1\%$ @ 1KHz
Flatness DC coupling <sup>1</sup>	0.1% : dc - 10KHz 1% : dc - 40KHz 5% : dc - 100KHz
Flatness AC coupling <sup>1</sup>	0.1% : 30Hz - 10KHz 1% : 10Hz - 40KHz 5% : 3Hz - 100KHz
Small Signal Bandwidth <sup>1</sup>	> 300 KHz (-3db)
Full Power Bandwidth <sup>1</sup>	100KHz @ 50Vpp output
<b>Input Bypass</b>	
Bandwidth for 50 $\Omega$ system	> 300 MHz (-3db)
Maximum Current	0.2 Apk
<b>Noise</b>	
Input referred noise	< 40nV/ $\sqrt{\text{rt-Hz}}$ @ 1kHz
<b>Output Configuration &amp; Specification</b>	
Output Current	200mA. (150mA for continuous output from -8V to +8V)
DC Output Resistance	< 2 $\Omega$
Max Output Level <sup>1</sup>	$\pm 25$ Vpk
Output DC Offset	< 10mV
Output Slew Rate <sup>1</sup>	> 20V/ $\mu$ s
THD + N <sup>1</sup>	< 0.01% @ 10kHz, 40 Vpp
Aberrations <sup>1</sup>	< 5% for waveforms with < 3V input step or non slewing output

1. For all loads > 250 ohms and < 400 pF of capacitance

2. Measured with  $\geq 1$  Mohm load and 1 Mohm input selection.

Table 1 (cont'd).

Feature	Characteristic
Transition time <sup>1</sup> (Final value $\pm 1\%$ of step size)	2.5uSec+ 50nSec/volt of output step
Channel to channel isolation for gains of 5x	> 75dB
Capacitive Load for no oscillation	< 1 nF
Output Protection	Continuous short circuit protection
	Thermal overload shutdown.
	Over temperature status flag.

1. For all loads >250 ohms and <400 pF of capacitance.

Table 2

General Characteristics	
Power Supply	100V/120V/ 220V / 240V $\pm 10\%$
Power Line Frequency	50–60 Hz $\pm 10\%$ , 400 Hz $\pm 10\%$ .
Power Consumption	100 VA peak (typical value depends on configuration and load)
Operating Environment	Full accuracy for 0 °C to 55 °C Full accuracy to 80% R.H. at 40°C Non–condensing
Storage Temperature	–40 °C to 70 °C
Operating Altitude	Up to 3000m
Bench Dimensions (WxHxD)	261.2mm x 103.8mm x 303.2mm
Weight	3.1 kg (6.8 lbs)
Safety	Complies with European Low Voltage Directive and carries the CE-marking Conforms to UL 61010-1, CSA C22.2 61010-1, and IEC 61010-1:2001
EMC	Complies with European EMC Directive for test and measurement products. - IEC/EN 61326-1 - CISPR Pub 11 Group 1, class A - AS/NZS CISPR 11 - ICES/NMB-001 Complies with Australian standard and carries C-Tick mark This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada
Acoustic Noise	Normal operating mode: SPL 35db(A)
Display	4.3" Color TFT WQVGA (480x272), LED backlight
Remote Interfaces	10/100Mbit LAN USB 2.0 Standard
Language	SCPI – 1994.0, IEEE–488.2
LXI Compliance	LXI Class C, Version 1.0
Number of Channels	2
Channel to channel ground connection	Not connected in BYPASS ON. Connected with both channels OFF or in Gain of 5x
Floating Voltage	$\pm 42$ Vpk to earth