

# 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 ( $50 \Omega$ | $1 \text{ M}\Omega$ ) 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 100 kHz @ 50 Vpp
- Small-signal BW  $> 300$  kHz
- Slew Rate  $20 \text{ V}/\mu\text{s}$  min.
- THD+N  $< 0.01\%$  @ 10 kHz, 40 Vpp.
- Output drive 200 mA max.
- Isolation floats  $\pm 42$  Vpk 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	±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>	
1 MΩ	Default, programmable
50 Ω	Programmable
<b>Input voltage range</b>	
Maximum voltage range	±5 Vpk for gain of 5x, ±30 Vpk for bypass
Damage level	±10 Vpk for 50 Ω input ±35 Vpk for 1 MΩ input
Input path	Programmable gain of 5x, bypass (1x), or off state
Input gain 5X	5X, Fixed, Non-inverting
Gain accuracy <sup>2</sup>	±0.1% @ 1 KHz
Flatness DC coupling <sup>1</sup>	0.1% : dc - 10 KHz 1% : dc - 40 KHz 5% : dc - 100 KHz
Flatness AC coupling <sup>1</sup>	0.1% : 30 Hz - 10 KHz 1% : 10 Hz - 40 KHz 5% : 3 Hz - 100 KHz
Small signal bandwidth <sup>1</sup>	> 300 KHz (-3 db)
Full power bandwidth <sup>1</sup>	100 KHz @ 50 Vpp output
<b>Input bypass</b>	
Bandwidth for 50 Ω system	> 300 MHz (-3 db)
Maximum current	0.2 Apk
<b>Noise</b>	
Input referred noise	< 40 nV/rt-Hz @ 1 kHz
<b>Output configuration &amp; specification</b>	
Output current	200 mA. (150 mA for continuous output from -8 V to +8 V)
DC output resistance	< 2 Ω
Max output level <sup>1</sup>	±25 Vpk
Output DC offset	<1 0 mV
Output slew rate <sup>1</sup>	> 20 V/us
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
Transition time <sup>1</sup> (Final value ±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 &gt; 250 ohms and &lt; 400 pF of capacitance

2. Measured with ≥ 1 Mohm load and 1 Mohm input selection.

Table 2.

<b>General characteristics</b>	
Power supply	100 V/120 V/220 V/240 V $\pm 10\%$
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 to 55 °C Full accuracy to 80% R.H. at 40 °C Non-condensing
Storage temperature	–40 to 70 °C
Operating altitude	Up to 3000 m
Bench Dimensions (W x H x D)	261.2 mm x 103.8 mm x 303.2 mm
Weight	3.1 kg (6.8 lbs)
Safety	Complies with European Low Voltage Directive and carries the CE-marking
EMC	<p>Conforms to UL 61010-1, CSA C22.2 61010-1, and IEC 61010-1:2001</p> <p>Complies with European EMC Directive for test and measurement products.</p> <ul style="list-style-type: none"> <li>- IEC/EN 61326-1</li> <li>- CISPR Pub 11 Group 1, class A</li> <li>- AS/NZS CISPR 11</li> <li>- ICES/NMB-001</li> </ul> <p>Complies with Australian standard and carries C-Tick mark This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme á la norme NMB-001 du Canada</p>
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

