

Rigol DS1102D oscilloscope: quick guide

100 MHz, 2 analog channels + 16-channel logic analyzer · student reference for the electronics lab

Getting a trace in 6 steps

- 1. Power on** (button on top) and wait for the screen.
- 2. Connect the probe** to CH1. Clip the black ground lead to circuit ground first, then touch the tip to the test point.
- 3. Match the probe setting.** If the probe switch says 10X, set CH1 > Probe > 10X on the scope (and 1X for 1X). Otherwise every reading is off by 10.
- 4. Press AUTO.** The scope picks scales and a trigger automatically. Good starting point.
- 5. Fine-tune** with the VERTICAL SCALE knob (volts per division) and HORIZONTAL SCALE knob (time per division) until 2–4 cycles fill the screen.
- 6. Read it** with MEASURE (automatic numbers) or CURSOR (manual lines).

Reading the screen

The screen is a grid: **8 divisions tall, 12 wide**. The settings along the bottom say what one division is worth.

Bottom label	Means	Example
CH1 2.00V	Each vertical division = 2 V	A wave 3 divisions tall = 6 V peak-to-peak
Time 500.0us	Each horizontal division = 0.5 ms	One cycle across 2 divisions = 1 ms = 1 kHz
Symbol after CH1	Solid and dashed lines = DC coupling; wavy line = AC	See coupling box

The small colored marker on the left edge (1, 2) shows each channel's 0 V line. Frequency = $1 \div \text{period}$.

Coupling: DC or AC?

DC (default) shows the true voltage, including any steady offset. Use it to check bias points, e.g. the amp output resting at 10 V.

AC removes the steady part and shows only the signal. Use it to look at a small signal riding on a large DC voltage. Set it with CH1 > Coupling.

Triggering: stopping a jittery picture

The trigger tells the scope where to start each sweep so repeating waves sit still. If the trace rolls or smears: press **TRIGGER MENU** > Source = the channel you are watching, Edge, Slope rising. Then turn the **LEVEL** knob until the orange trigger line crosses the middle of the wave, or press **50%**.

Front-panel controls

Control	What it does
AUTO	Automatic setup. Try this first when lost.
RUN/STOP	Freeze the screen (red = stopped) to study or photograph a trace.
SINGLE	Capture one event, e.g. a power-up thump.
CH1 / CH2 buttons	Show the channel's menu; press again to turn the channel off.
VERTICAL POSITION	Moves the trace up or down. Push to re-center.
VERTICAL SCALE	Volts per division. Push to toggle fine/coarse.
HORIZONTAL POSITION	Slides the trace left/right in time. Push to re-center.
HORIZONTAL SCALE	Time per division.
TRIGGER LEVEL	Sets the trigger voltage. Push for 50%.
MEASURE	Automatic Vpp, Vmax, Vmin, Vrms, frequency, period. Up to 3 at once.
CURSOR	Manual measurement lines (Manual or Track mode).
MATH	A+B, A–B, A×B, and FFT (frequency spectrum).
MENU ON/OFF	Hide the side menu to see the whole screen.
STORAGE	Save setups, or restore Factory settings when everything is confused.
Multi-function knob	The knob with the arrow symbol: changes the highlighted menu item. Push to select.

Useful measurements for the amp

To find	Do this
Gain	Input on CH2, output on CH1. MEASURE > Vpp on each. Gain = output Vpp ÷ input Vpp.
Resting (bias) voltage	DC coupling, no signal. MEASURE > Vavg.
Clipping	Raise the input until the tops flatten. RUN/STOP to freeze.
Crossover notch	Small signal (0.1–0.2 Vpp). Zoom in at the zero crossings.
Distortion	MATH > FFT on the output. A clean sine shows one tall spike; harmonics at 2×, 3× the frequency mean distortion.

Safety and good habits

- The probe ground clip is connected to the scope's earth ground. **Clip it only to circuit ground.** Clipping it anywhere else shorts that point to ground.
- Never** connect it to mains (wall outlet) voltages, or across anything powered directly from them.
- Set the probe to **10X** for voltages above about 30 V and for the most accurate high-frequency readings.
- Don't pull probes out by the cable; press the BNC connector in and twist to release.