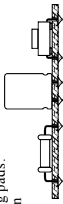


Soldering Hints

- Put leads through mounting holes from the side with part outline. Ensure component evenly touch PCB.
- Solder leads at the other side. Solder should fully fill and cover soldering pads.
- Avoid bridges between neighboring pads.
- Cut unused leads flush with cutter.



DSO 138 Oscilloscope DIY Kit

Rev. 04

Applicable models: 13803K, 13804K

User Manual

Tools you need

- Iron (20W)
- Screw driver
- Solder wire
- Flush cutter
- Multimeter
- Tweezers

Before you start

- Check part values & quantities against part list
- Always meter resistor values before soldering
- Understand all part polarities and orientations

Important !!!

Install all SMD parts before proceeding to Step I if you purchased kit 13804K.

Step I Assembly Main Board and LCD board (follow the order as numbered)

1. Resistors

Note:
Always meter resistor values before soldering

- ☐ R1, R14, R16 : 100K Ω
- ☐ R2 : 1.8M Ω
- ☐ R3 : 200K Ω
- ☐ R4 : 2M Ω
- ☐ R5 : 20K Ω
- ☐ R6 : 300 Ω
- ☐ R7, R36 : 180 Ω
- ☐ R8, R12, R13 : 120 Ω
- ☐ R9, R15, R26 : 1K Ω
- ☐ R10 : 3K Ω
- ☐ R11 : 150 Ω
- ☐ R38 : 1.5K Ω
- ☐ R28, R40 : 470 Ω
- ☐ R37, R39 : 10K Ω



- ☐ J4 : USB mini -B
- Note:**
This connector is optional.

6. Tact Switches

- ☐ SW4, SW5 : 6 X 6 X 5mm SW6, SW7, SW8

2. HF-Chokes

- ☐ L1, L3, L4 : 100 μ H



3. Diodes

- Cathode**
- ☐ D1 : 1N5819
- ☐ D2 : 1N4004 (or 1N4007)



4. Crystal

- ☐ Y1 : 8MHz



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14. Electrolytic capacitors



Solder positive pole (the longer lead) to the square pad

- ☐ C19, C21 : 100 μ F/16V
- ☐ C22, C24, C25, C26

15. Power connector



- ☐ J10 : DC005

16. Pin-header (male) *



- ☐ J5 : 1 X 3 pin
 - ☐ J6 : 1 X 4 pin
- Note:**
These pin-headers are optional.

17. Pin-header (female)



- ☐ J7, J8 : 1 X 2 pin
- ☐ J3 : 2 X 20 pin

18. Slide switches



- ☐ SW1, SW2, SW3 : 2P3T

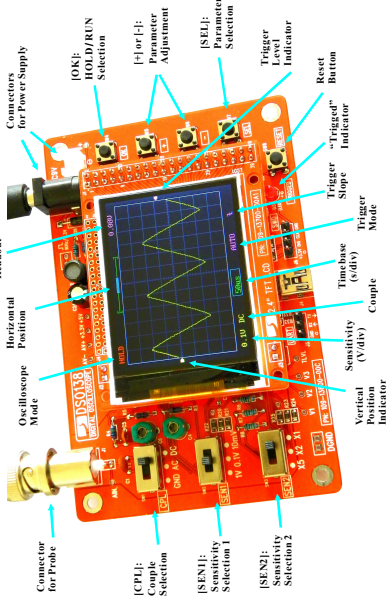
19. BNC connector



- ☐ J1 : BNC
- Note:**
The thicker pins need to heat up longer to get good soldering result.

How to Use

Display and Controls



Connections

- Power Supply:** Connect DC power supply to JP or J10. The power supply voltage must be in the range of 8-12V.
- Probe:** Connect probe to J1.

Attention

- Power supply voltage must not exceed 12V. Otherwise U5 will get hot.
- Allowed maximum signal input voltage is 50Vpk (100Vpp) with the clip probe.

Operations

- Press on [SEL] button:** Select parameter to be adjusted. The selected parameter will be highlighted.
- Press on [H] or [L] button:** Adjust the parameter selected by [SEL] button.
- Press on [OK] button:** Freeze waveform refresh (entering HOLD state). Press on it again will de-freeze.
- Change [CPL] switch:** Set couple to DC, AC, or GND. When GND is selected the scope input is isolated from input signal and connected to ground (0V input).
- Change [SEN1] or [SEN2] switch:** Adjust sensitivity. The product of [SEN1] and [SEN2] settings makes the actual sensitivity which is displayed at the lower-left corner of the panel.
- Press on [Reset] button:** Perform a system reset and re-boots the oscilloscope.

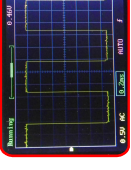
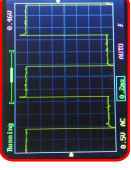
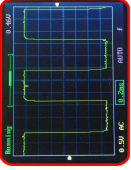
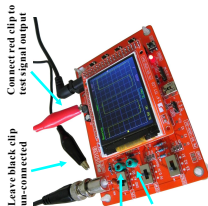
0V Line Alignment

Sometimes you may find the 0V line (the trace corresponding to 0V input voltage) does not match with the VP0S indicator at the screen left border. This can easily be fixed by performing the "0V line alignment" function. First, set the couple switch [CPL] to GND position. Then press on [SEL] button to make VP0S indicator highlighted and hold down [OK] button for about 2 seconds. You will set the trace aligned to VP0S indicator when you release [OK] button. You may see some residue mismatch remain at the highest sensitivity settings. This is normal.

Probe Calibration

Because there is always some capacitance between scope input and ground probe needs to be calibrated to achieve better measurement results for high frequency signals. This can be done with the help of the built-in test signal. To do this please follow the steps below.

- Connect the red clip to the test signal terminal and leave the black clip un-connected (see photo at right).
- Set [SEN1] switch to 0.1V and [SEN2] switch to X5.
- Set [CPL] switch to AC or DC.
- Adjust timebase to 0.2ms. You should see waveform similar to that shown in photos below. If traces are not stable adjust trigger level (the pink triangle on right screen border) so as you get a stable display.
- Turn C4 (capacitor trimmer) with a small screw driver so that the waveform displays sharp rightangle (photo C).
- Set [SEN1] switch to 1V and [SEN2] switch to X1 while keep all other settings unchanged. Adjust C6 so that sharp rightangle waveform is displayed.



Turn On/Off Readouts

Press [SEL] so that timebase is highlighted. Hold down [OK] button for about 2 seconds. This will turn on/off measurement readouts.

Waveform Save/Recall

Press [SEL] & [H] simultaneously. Save currently displayed waveform to non-volatile memory. Press [SEL] & [L] simultaneously. Recall saved waveform.

Triggers and Their Modes

Triggers are events that indicate signal voltage acrossing a set level (i.e. trigger level) along a specified direction (i.e. trigger slope: rising or falling). Oscilloscope uses triggers as reference points in time for stable waveform display and measurements.

Auto Mode

In auto mode oscilloscope will perform display refresh no matter triggers happen or not. When triggers are detected the displayed waveform will be referenced to the trigger points. Otherwise, display waveform at random reference points.

Normal Mode

In normal mode oscilloscope will only perform display refresh when the triggers happen. If no triggers happen waveform display will stay unchanged.

Single Mode

Single mode is same as normal mode except that oscilloscope will enter HOLD state after a trigger has been detected and waveform display has been updated.

Normal and single modes are useful for capturing sparse or single waveform.

Specifications	
Max realtime sample rate	1MS/s
Max sample rate	10MS/s
Maxing bandwidth	10MHz/div; 5V/div
Max input range	50Vpk (1X probe)
Max input range	50Vpk (1X probe)
Input impedance	1M ohm 20pF
Resolution	12 bits
Record length	1024 points
Timebase range	500ns/div ~ 10ms/div
Trigger position range	50%
Power supply	9VDC (8 ~ 12V)
Current consumption	~120mA
Dimension	117 x 76 x 15mm
Weight	70 gram (without probes)

Tech Support: www.jytech.com/forum

