DSO 138mini Oscilloscope DIY Kit

User Manual

Rev. 02

Applicable models: 13805K
Applicable firmware: 113-13810-100 or later

Tools you need

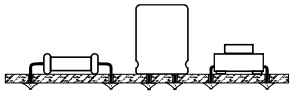
① Iron (20W)
② Solder wire
③ Multimeter
④ Screw driver
⑤ Flush cutter
⑥ Tweezers

Before you start

① Check values & quantities against parts listed
② Understand all part polarities and orientations
③ Prepare a USB cable with USB-micro connector

Soldering Hints

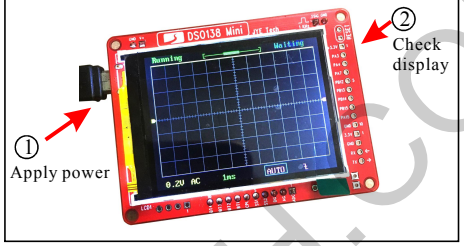
① Put leads through mounting holes from the side with part outline. Ensure component evenly touch PCB.
② Solder leads at the other side. Solder should fully fill and cover soldering pads. Avoid bridges between neighboring pads.
③ Cut unused leads flush with cutter.



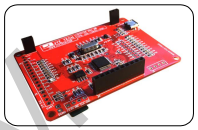
Step 1 Test and Assembly Main Board

1. Check the main board

① Before mounting any parts to the main board Use an USB cable with USB-Micro plug to power the main board through J7.
② You should see the scope boots up to a screen similar to the photo below. D1 (LED) should blink three times during the booting.



2. Pin-headers (female)



☐ J4 : 1 X 10 pin
☐ J8, J9 : 1 X 2 pin

Attention

Do not solder any parts to the board if you find problem. Otherwise warranty will be voided. Report to your vender or JYE Tech for any problem found.

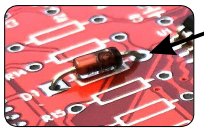
Step 2 Assembly Analog Board (follow the order as numbered)

1. Resistors

Note:
Always meter resistor values before soldering because color bands are easy to mis-read.
Resistors are all 1/8W.

☐ R1, R13	: 100K Ω	☐ R5	: 20K Ω
☐ R2	: 1.8M Ω	☐ R6, R14	: 300 Ω
☐ R3, R15	: 200K Ω	☐ R7, R11	: 180 Ω
☐ R4	: 2M Ω	☐ R8, R12	: 120 Ω
		☐ R9, R10, R16	: 1.1K Ω

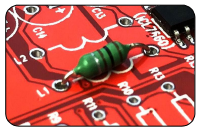
2. Diode



Cathode

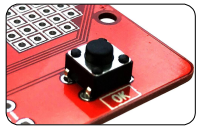
☐ D1 : Zener, 2.0V

3. HF-Chokes



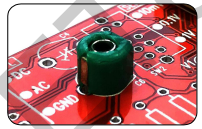
☐ L1,L2 : 100 μ H

4. Tact Switches



☐ BTN1, BTN2, BTN3, BTN4 : 6 X 6 X 5mm

5. Capacitor trimmers

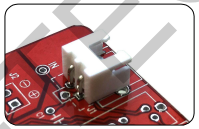


☐ C4, C6 : 5 - 30pF

6. Ceramic Capacitors

☐ C1, C8, C9 : 0.1 μ F
☐ C2 : 220pF
☐ C3 : 3pF
☐ C5 : 1pF
☐ C7 : 120pF

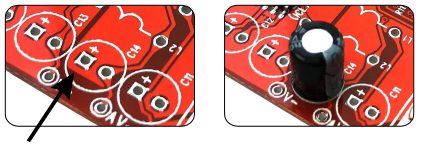
7. Pin header



☐ J1 : 2 Pin, 2.54mm, rightangled

Note:
Do not install this pin-header if BNC connector (box 12) is to be used.

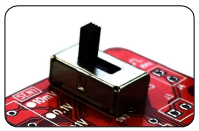
8. Electrolytic capacitors



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

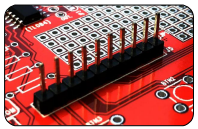
☐ C10, C11, C12, C13, C14 : 100 μ F/16V

9. Slide switches



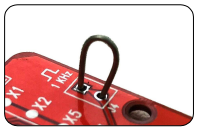
☐ SW1, SW2, SW3 : 2P3T

10. Pin-headers (male)



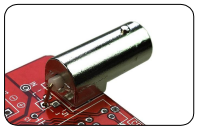
☐ J5 : 1 X 10 pin
☐ J2, J3 : 1 X 2 pin

11. Test signal ring



1) Make a small ring with a lead cut-off.
2) Solder the ring to the two holes of J4 (as shown in the photo).

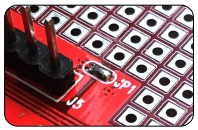
12. BNC connector (optional)



☐ J7 : BNC

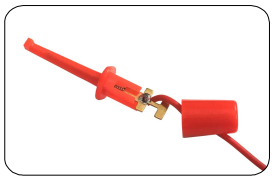
Note:
The thicker pins need to heat up longer to get good soldering result.

13. Jumpers



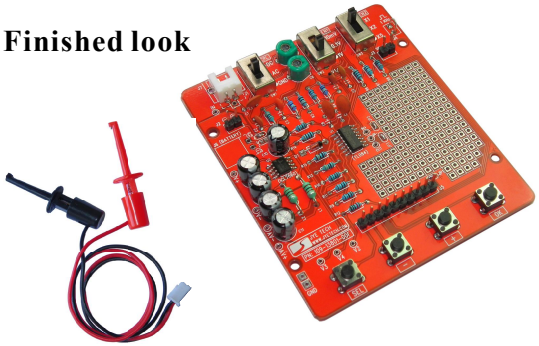
Short JP1, JP2, JP3, and JP5 with solder (see photo at left). Keep JP4 open.

14. Hook Probes



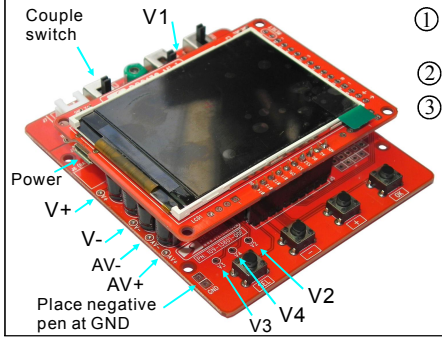
Put wire through hood cap and sold the wire onto hook terminal as shown. Match wire color with hook color.

Finished look



Step 3 Test analog board

1. Check voltages and controls



① Attach the main board to the analog boar. Apply 5V DC power through J7.

② Set couple switch [CPL] to GND position.

③ Check voltages at the points as shown in the photo.

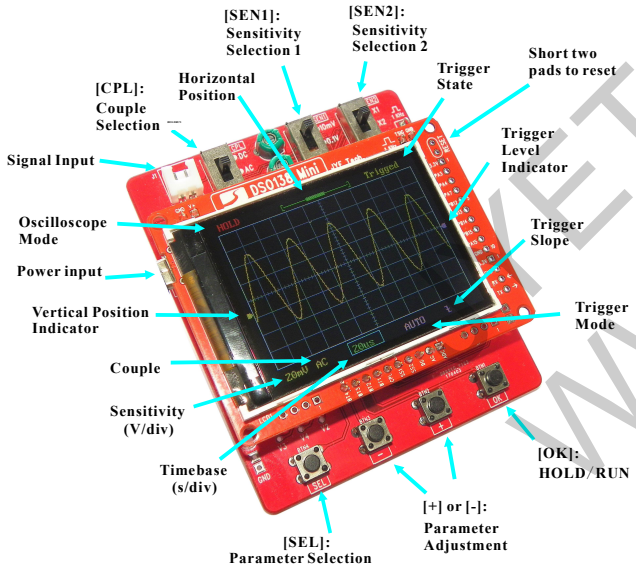
④ Check slide switches and push-buttons for correct operation.

⑤ Calibrate C4 & C6 if everything is fine (see instructions to the right).

References
(*) Input dependent

Input	+5.10V
V+ (*)	+5.10V
AV+ (*)	+5.06V
V- (*)	-4.56V
AV- (*)	-4.54V
V1	0V
V2	1.1V
V3	2.0 ~ 2.2V
V4	-1.1V

Display and Controls



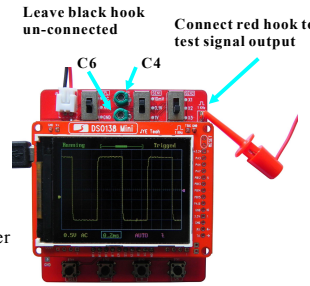
Attention

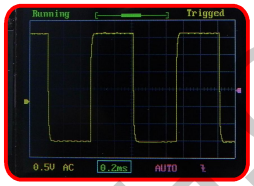
1. Power supply voltage must not exceed 8V.
2. Allowed maximum signal input voltage is 50Vpk (100Vpp) .

Specifications	
Max realtime sample rate	1MSa/s
Analog bandwidth	0 -- 200KHz
Sensitivity range	10mV/div - 5V/div
Max input voltage	50Vpk (1X probe)
Input impedance	1M ohm/20pF
Resolution	12 bits
Record length	1024 points
Timebase range	500s/Div -- 10us/Div
Trigger modes	Auto, Normal, and Single
Trigger position range	Center
Power supply	3.5V - 5V DC
Current consumption	~120mA @5V
Dimension	85 x 75 x 15 (mm)
Weight	50 gram (without probe)

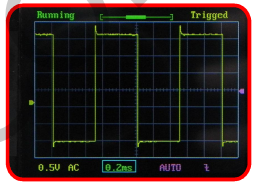
Calibrating C4 & C6

1. Connect the red hook to the test signal terminal J4 and leave the black hook un-connected.
2. Set [SEN1] switch to 0.1V and [SEN2] switch to X5. Set [CPL] switch to AC or DC.
3. 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.
4. Turn C4 (capacitor trimmer) with a small screw driver so that the waveform displays sharp rightangle (photo C).
5. Set [SEN1] switch to 1V and [SEN2] switch to X1while keep all other settings unchanged. Adjust C6 so that sharp rightangle waveform is displayed.

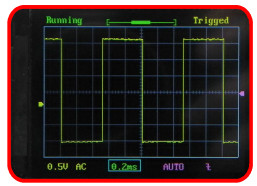




A – Not enough



B – Too much



C – Good

Operations

Press on [SEL] button: Select parameter to be adjusted. The selected parameter will be highlighted.

Press on [+] or [-] 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 disconnected from outside and connected to ground internally (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.

Other features

Functions	Operations
VPos Alignment	Move cursor to VPos indicator. Hold down [OK] for 3 seconds. Then follow screen prompts.
Measurements ON/OFF	Move cursor to timebase. Hold down [OK] button for 3 seconds to turn ON or OFF on-screen measurements including Vmax, Vmin, Vavr, Vpp, Vrms, Freq., Cycle, Pulse width, and Duty cycle.
Save Waveform	Press [SEL] & [+] buttons simultaneously. The currently displayed waveform will be saved to EEPROM. The existing data in EEPROM will be over-written.
Recall Waveform	Press [SEL] & [-] buttons simultaneously. Recalled waveform is always displayed in Hold state.
Default Restore	Hold down [+] and [-] buttons simultaneously for about 3 seconds.
Center HPos	Move cursor to the top bar. Hold down [OK] button for about 3 seconds. This will move the display window to the center of capture buffer.
Center Trigger Level	Move cursor to trigger level indicator. Hold down [OK] for 3 seconds. This will set the trigger level to the medium value of signal amplitude.
Send Waveform Data	Press [ADJ] & [V/DIV] buttons simultaneously will send waveform data in texts via serial port J5. The baudrate is 115200. Data format is 8N1.

Tech Support: www.jyetech.com/forum

JYETech Ltd.
Tel. +86-0773-2113856 www.jyetech.com