

### Before you start:

1. Separate all the parts in the kit according to component type.
2. Use a multimeter as shown to measure all the resistors. It is fine if the resistance you measure is within  $\pm 5\%$  of the specified value.
3. Arrange the resistors according to their values.



## Waveform Generator DIY Kit User's Manual

### Surface Mount Assembly Instructions

#### Note:

If you are building the full kit including surface mount parts, this is the right page!

**If you are building the kit with the surface mount parts pre-assembled, please skip to the next page.**

#### Tools:

1. Solder paste
2. Stencil
3. Spackle knife
4. Tweezers
5. Reflow oven

Please wear gloves while working with solder paste.

## Step 0: Assemble Main Board Surface Mount Parts

### 0.0. Resistors



R1, R9: 10 k $\Omega$   
R7: 0.24  $\Omega$   
R8: 3.32 k $\Omega$

### 0.3. Micro USB connector



J2: Micro USB

### 0.5. ATmega



U1: ATmega328 P-AU

### 0.8. Op-Amp



U5: Dual-operational amplifier

### 0.1. Diode



D1: 1N5819

### 0.4. Inductor



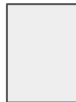
L1: 270  $\mu$ H

### 0.6. Linear Regulator



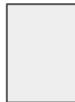
U2: Linear regulator

### 0.2. Ceramic capacitors



C1, C2, C8, C11: 100 nF  
C3, C4: 12 pF  
C14: 1500 pF

### 1.11. Crystal



Y1: 16 MHz Crystal

### 0.7. Inverter



U4: -5V inverter

### Oven

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# Waveform Generator DIY Kit User's Manual

## Through-Hole Assembly Instructions

### Note:

If you are building the kit with the surface mount parts pre-assembled, this is the right page!

**If you are building the full kit including surface mount parts, please see the previous page.**

### Tools:

1. Soldering iron
2. Solder wire
3. Snips
4. Screwdriver

## Step 1: Assemble Main Board

### 1.0. Resistors



R3, R11: 560 k $\Omega$   
R4: 180 k $\Omega$   
R5: 470  $\Omega$   
R6, R10: 1 k $\Omega$

### 1.3. Micro USB connector



J2: Micro USB  
  
This component is already attached to the board, but the through-hole pins need to be hand-soldered.

### 1.6. Switch



SW3: Triple throw switch

### 1.9. BNC connector:



J4: BNC coaxial connector

### 1.1. Waveform generator chip



U3: MAX038-CPP

### 1.4. Buttons



SW1, SW2: Pushbuttons

### 1.7. Male-male pin headers



J1: 1 x 6  
J3: 1 x 2

### 1.10. Potentiometers:



RV1: 500 k $\Omega$   
RV2: 20 k $\Omega$   
RV3: 10 k $\Omega$

### 1.2. Ceramic capacitors



C5: 4.7  $\mu$ F  
C6: 33 nF  
C7: 15 pF  
C9: 220 pF  
C10, C12, C16, C17: 1  $\mu$ F  
C13, C15: 100  $\mu$ F  
C18: 5 pF

### 1.5. Electrolytic capacitors



C13, C15: 100  $\mu$ F  
  
Note: The positive side of the capacitor (longer lead) gets soldered to the square pad (unfilled semicircle).

### 1.8. Male-female pin headers



MOD1: 1 x 8

## Step 2: Assemble LCD

### 2.0. Male-male pin headers



1 x 8

Solder the shorter ends of the pin headers to the bottom of the LCD board.

### 2.1. Connect the LCD to the main board



## Step 3: Test and Use

### 3.1 Power up the board

Plug your 5V battery into the micro USB connector (J2). Do not apply more than 5V.

Disconnect power before step 3.2.



### 3.2 Attach LCD board

Plug the LCD into the female pin headers (MOD1) on the main board.



### 3.1 Check voltages

- Connect the board to power again.
- Connect the COM probe of your multimeter to TP2 (GND) and the other probe to TP1. You should measure -5 V.
- Now connect the probe at TP1 to TP3. You should measure about +3.3 V.
- Finally, connect the probe at TP3 to TP4. You should measure about +5 V.



### 3.4 Use

1. Connect the BNC cable to the BNC connector ( J4) on the waveform generator. Also boot up your oscilloscope and connect the scope probes.
2. Attach the waveform generator BNC cable to the oscilloscope probe, making sure to match red to red and black to black.
3. Turn the waveform generator to a low frequency, around 5 - 20 Hz.
4. Adjust the settings on your oscilloscope until the waveform is satisfactory.



## Display and Controls

