



Assembly notes:

- 1.) Install all SMD components, except the IR LEDs (D1&D2.) Be sure to orient the indicator LED (D3) correctly. Look carefully at the top side (glass side) of the LED -- you should see the little square LED chip towards one end of the package. A magnifying glass helps here! The LED chip should line up with the short silkscreen lines between the pads for D3 on the board. In other words, the end of the LED with the chip goes towards the right.
- 2.) It's a good idea to test the LED and resistor at this point, because it will be harder to fix any problems once the detector is installed. Apply +5V to the left pad of R1 (by the mounting hole), and GND to the right hand LED pad. The LED should light up. Alternatively, use the diode-test function on a multi-meter.
- 3.) Install the IR LED's
 - a. Note that gold pads on the IR LEDs wrap up one side of the part, where there are little bays cut into the sides (as shown in the above layout picture). These need to face outward. The IR LEDs should be centered in the pad, and should not be placed farther towards the center of the board than the white silkscreen line between the IR LED pads.
 - b. Test the IR LED's at this point, because once the heat-shrink is installed, you won't be able to easily replace them. The best way to test them is to use the diode-test function of a multi-meter: "+" to the left-most detector board pad (right below the "C1" silkscreen); "-" to the right-most detector board pad (right below the "U1" silkscreen.) There should be ~1.9-2.0V drop.
- 4.) Straighten the leads of the IS471F detector (U1) with pliers (preferably ones with non-textured jaws) and bend the leads over 90 degrees against a tabletop away from the front (flat side) of the detector. The leads should be bent right at the detector's case.

- 5.) Insert the IS471F in between the IR-LEDs, making sure it seats completely against the board. The IS471F pins bulge a little at the top of the pins, making the fit a little tight in the holes. You may need to place the detector face down on a smooth, clean surface that won't scratch up the detector's lens, and push down on the board to get the detector to seat properly. Do this after inserting each detector.
- 6.) Before soldering the detectors in place, consider clipping their leads first. This allows the leads to be clipped closer to the board, and makes soldering easier since there are not a lot of leads to work around.
- 7.) Cut off a length of the included square heat-shrink tubing that is a little taller than the IR LED. Note that the square heat-shrink tubing has a solid plastic core. This makes it a little easier to cut squarely. After cutting off a piece, push out the plastic core.
- 8.) Slip the heat-shrink tubing over each IR-LED and be sure it contacts the board along the inside edge of the IR-LED. (If the bottom of the heatshrink tube is not cut perfectly perpendicular, make sure the side with the longer edge goes between the IR LED and the detector.)
 - a. Remove the heatshrink and dip the end that will be contacting the board in a small puddle of super-glue.
 - b. Carefully slip the heatshrink over the LED, and apply pressure to the top of the heatshrink.
 - c. Hold in place until the superglue sets.
- 9.) It turns out that the indicator LED (D3) can interfere with the detector, effectively latching the detector on once an object is detected. To prevent this, apply a small piece of electrical tape (or other IR-blocking tape) to the top edge of the detector, between it and D3.
- 10.) Power up the detector and point it away from any objects or bright lights.
 - a. If the indicator LED is on, then there is light leakage from the IR LED's or the indicator LED.
 - i. Look at the side of the ProxDot, across the tops of the IR LEDs and the detector. If you can see the tips of the IR LEDs, the heatshrink is probably too short.
 1. Try a longer piece.
 - ii. Make sure the heatshrink is seated against the board.
 1. IR can leak underneath the heatshrink to the backside of the detector if there is a gap.
 - iii. Try isolating the leakage by shorting out one IR LED with tweezers or a small piece of wire.
 1. Don't short out both IR LEDs at the same time though!
 2. Be sure you stay out of the field of view of the detector when doing this.
 3. If shorting out an IR LED causes the indicator to turn off, then you've found the problem's source.
 4. If neither IR LED is the problem, then there may be leakage from both, or from the indicator LED.
 5. Also, if the response seems to be slow, especially in turning off, then there is probably some IR leakage, but not quite enough to trigger the detector.
 - a. It's possible to use a little IR leakage to extend the detector's range, but be aware that in doing so -- the detector will be more susceptible to false triggering from other light sources.

- b. If the indicator LED is off and won't turn on when waving your hand in front of the detector, there are a number of possible causes.
 - i. Measure the ProxDot's output voltage.
 1. The output voltage is stuck "low" (~0V)
 - a. Make sure power is properly applied to the ProxDot and it's within voltage range.
 - b. It's possible that there is IR leakage and the indicator LED is just not working.
 - i. Make sure the indicator LED is installed with the proper orientation (see Step 1)
 - ii. Check the indicator LED (see Step 2)
 2. The output voltage is typically "high" (close to the supply voltage (5V)) but toggles "low" (~0V) when you wave your hand in front of the sensors
 - a. Make sure the indicator LED is installed with the proper orientation (see Step 1)
 - b. Check the indicator LED (see Step 2)
 3. The output voltage is stuck "high"
 - a. There may be IR leakage from the left IR LED.
 - i. It turns out that the IS471F sensor has a strange behavior – too much IR leakage from the left IR LED causes the sensor to drive its output high, as if it's not receiving any signal. Perhaps direct feedback on the left side of the IS471F is totally swamping the internal sensor. See Step 10 to investigate the possibility of IR leakage.

ProxDot Parts List

RefDes	Description	Manufacturer	Manufacture Part #	Vendor	Vendor Part #
D1-D2	EMITTER IR 940NM HO 6.0MW SMD	Sharp	GL100MN1MP	DigiKey	425-1023-1-ND
D3	LED SUPER GREEN CLR THIN 0603 SMD	Lite-On Inc.	LTST-C191KGKT	DigiKey	160-1446-1-ND
(D3 alt.)	LED SUPER RED CLR THIN 0603 SMD	Lite-On Inc.	LTST-C191KRKT	DigiKey	160-1447-1-ND
(D3 alt.)	LED SUPER YELLOW CLR THIN 0603 SMD	Lite-On Inc.	LTST-C191KSKT	DigiKey	160-1448-1-ND
(D3 alt.)	LED YEL ORAN CLR THIN 0603 SMD	Lite-On Inc.	LTST-C191KFKT	DigiKey	160-1445-1-ND
U1	LIGHT DETECTOR OPIC 940NM	Sharp	IS471F	Junun	
C1	CAP .33UF 16V CERAMIC Y5V 0603	Kemet	ECJ-1VF1C334Z	DigiKey	PCC1791CT-ND
R1 (*1)	RES 1.5K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ152V	DigiKey	P1.5KGCT-ND

Notes:

- 1.) R1 sets the current through the indicator LED to determine brightness. The default of 1.5k allows about 1mA to flow, and is still plenty bright. Use a smaller resistor value to increase brightness, or a larger value to decrease brightness.