Octolively

Open source Interactive LED modules
— Ready to use version —

Introduction

Octolively is a tileable, digital interactive LED module filled with ultrabright LEDs that respond in complex and gentle ways to stimulus provided by human interaction.

Each Octolively module is 4 X 8 inches in size, and features eight huge (10 mm) ultrabright LEDs, spaced along a two-inch grid.   Each Octolively module also has eight infrared proximity sensors — one for every LED —to detect nearby motion, even in total darkness. The modules can be tiled in any size or shape of rectangular array. You can use them to cover a full wall, or just make a long strip or border as narrow as 4 inches wide.

Octolively modules come pre-programmed with eight different effects that respond to motion and gradually fade back to idle when there is no motion, making them ideal for interactive LED walls, bar tops, and coffee tables. You can switch between the different effects with a button press: Gently fading trails after your motion, a "heat" mode that gets brighter as it detects more motion, simple positive and negative "shadow" effects that light the LEDs— or darken them — wherever you touch, ripple, sparkle, and a "melting" mode where activated pixels fade only very slowly.

Each Octolively module is controlled by an on-board microcontroller and functions as a self-contained, stand-alone device. You do need to provide power (5 V DC), but no central computer nor complex communication wiring is needed. Because it's self contained, there is no trade-off between array size and performance.

General Specifications

- Kit type: Assembled and tested; Ready to use
- RoHS compliance: Octolively modules are RoHS compliant (lead free)
- Hardware license: Fully open source hardware (TAPR OHL)
- Firmware license: Fully open source software (GPL)
- Documentation is located at: http://wiki.evilmadscience.com/Octolively

Physical dimensions:

- Module size: 4 X 8 inches (10.16 X 20.32 cm) wide, nominal
- Circuit board thickness: 1/16" (1.6 mm), nominal
- Overall thickness: Allow 0.75" clearance above and below circuit board
- Mounting holes: 4, 0.25" x 25" from each corner, 6-32 clearance.
- Included standoffs: 6-32 x 0.75" long aluminum threaded round (4)
- Included fasteners: 6-32 x 1/4" button socket cap head screws (4)
- Shipping weight: 0.35 Lb/module

LEDs and sensors

- LEDs per module: 8
- LED grid spacing: 2 X 2" (50.8 X 50.8 mm) grid
- LED type: Ultrabright, 10 mm OD, with wide viewing-angle diffused lens except as specified.
- LED color: Warm white (standard).
  Other colors available by custom order include cool white, white (clear lens), blue, green, and red.
- Sensors per module: 8
- Sensor type: Near-infrared proximity detector (active/passive)
- Sensor range (active): 10 cm (typical), in dark room
- Sensor range (passive): Unlimited, for detection of light and shadows from IR light sources such as IR LEDs, incandescent lamps, and sunlight
- Surface types: Can be operated below most clear glasses and plastics, with or without surface frosting.

Microcontroller and interfaces:

- Microcontroller: ATmega164A, pre-programmed for stand-alone operation
- Clock source: 8 MHz internal RC (standard)
- Optional clock sources: location provided for 16 MHz crystal or 3-pin ceramic resonator
- User input: Single tactile button switch
- Programming interface: Standard 6-pin AVR ISP (ICSP/SPI)
- Edge-connector network: 4-way broadcast, software only, unsupported
- Other network and serial interfaces: none

Standard firmware features:

- Response functions: 8 response effects, selectable by button press
- Proximity sensor sensitivity: 4 levels, selectable by button press
- Configuration storage: Internal EEPROM, automatic

Alternate configuration option:

- Octolively modules can be reconfigured as an Interactive Game of Life display.
  (Requires addition of 16 MHz crystal and reprogramming with ISP programmer.)
- See http://www.evilmadscientist.com/2012/interactive-game-of-life-kit/ for more info.
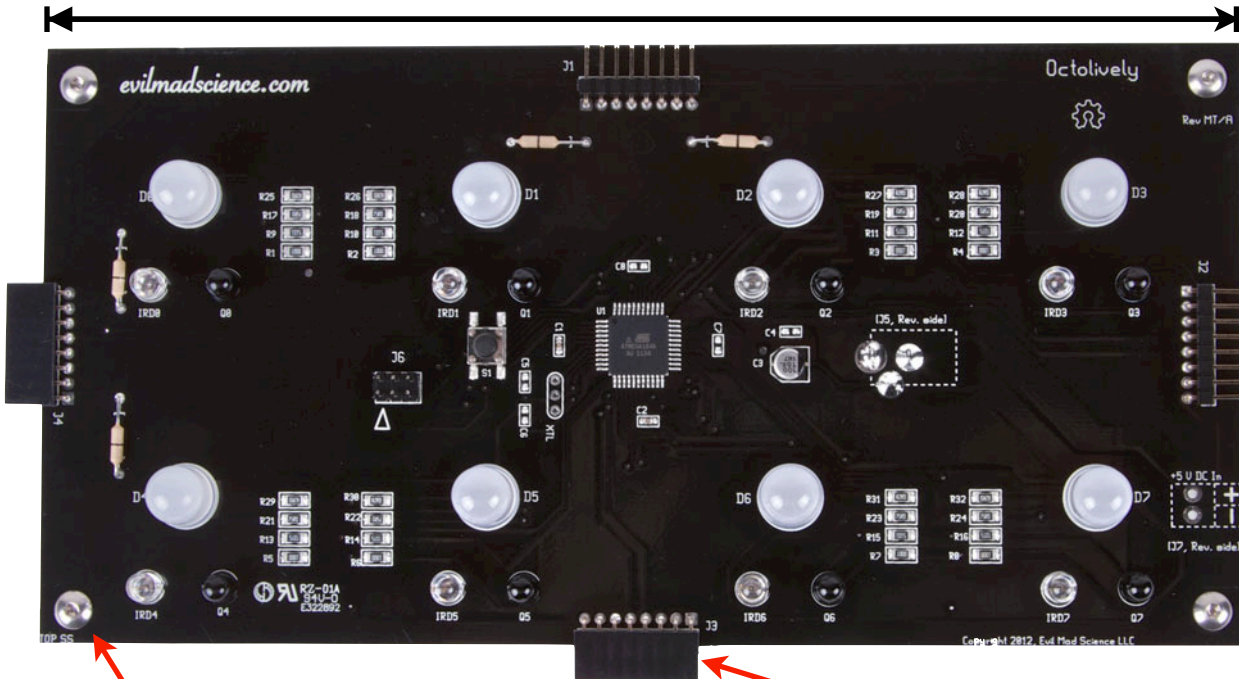
Tiling:

- Edge-to-edge tiling: allowed in both directions
- Recommended module spacing: Allow a 1/16" (1.6 mm) gap between modules
- Maximum grid size: no set limit
- Configurations allowed: any rectangular array

Power requirements:

- Input voltage: 5 V DC, regulated
- Current requirement: 200 mA capacity per panel
- Idle current: 50 mA (typical)
- Current rating of power switch and edge connectors: 4 A
- Input power source: 2.1 x 5.5 mm jack (standard)
- Screw terminal power input: Two-position 3.5 mm terminal (optional)
- Ready-to-use Octolively modules do not support an on-board power switch;
  an external switch should be provided to turn on and off power to the array of modules.
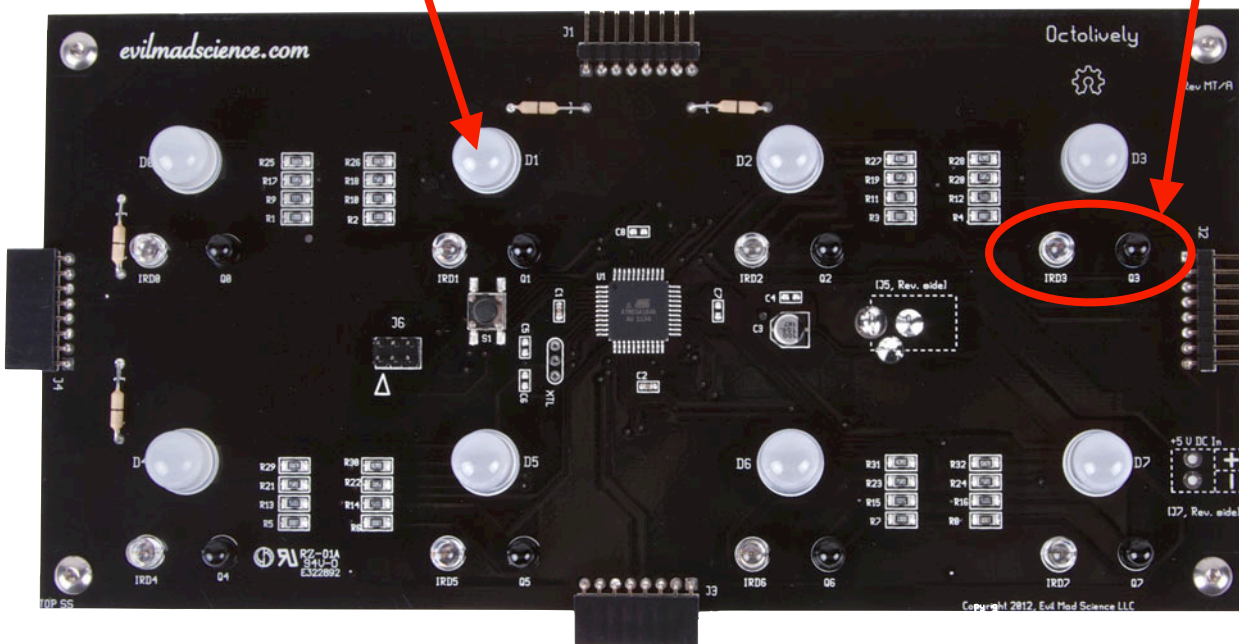
Octolively

8 inch (20.32 cm)

4 inch
(10.16 cm)

"Female" edge connectors can be bent
vertically to obscure them, or removed
from board with wire clippers if desired.

Mounting holes: 6-32 clearance (4),
located 1/4" X 1/4" from each corner
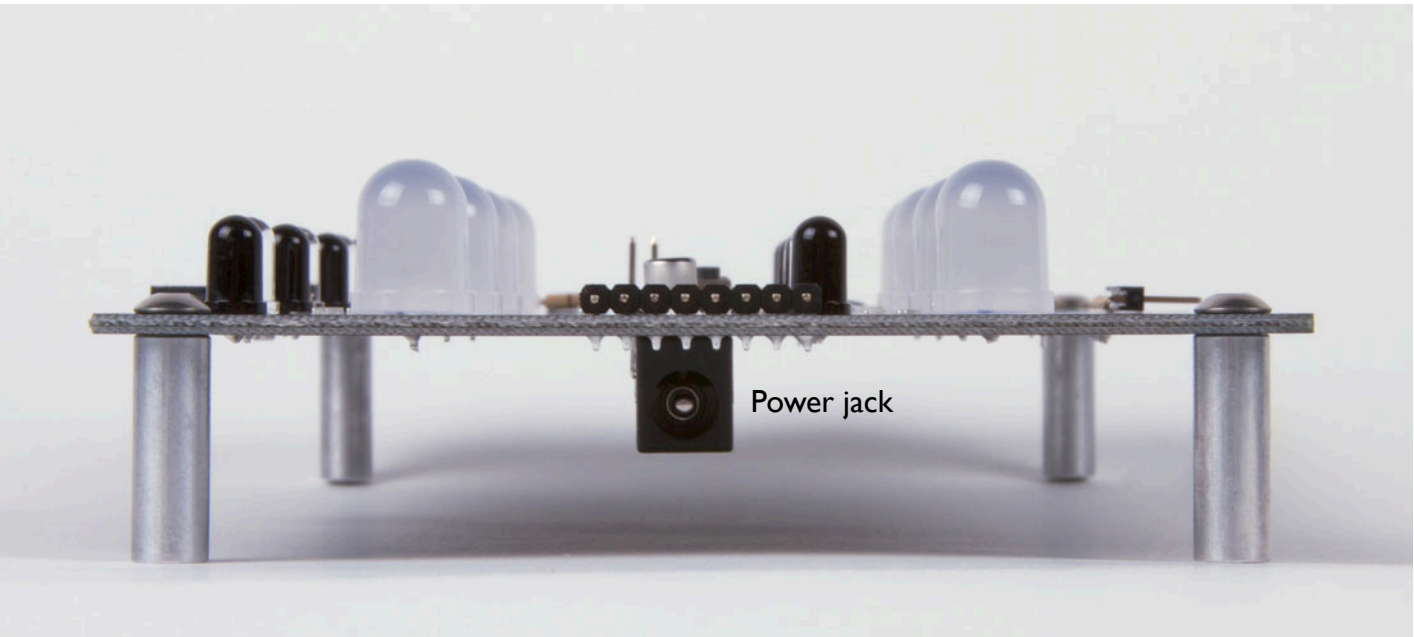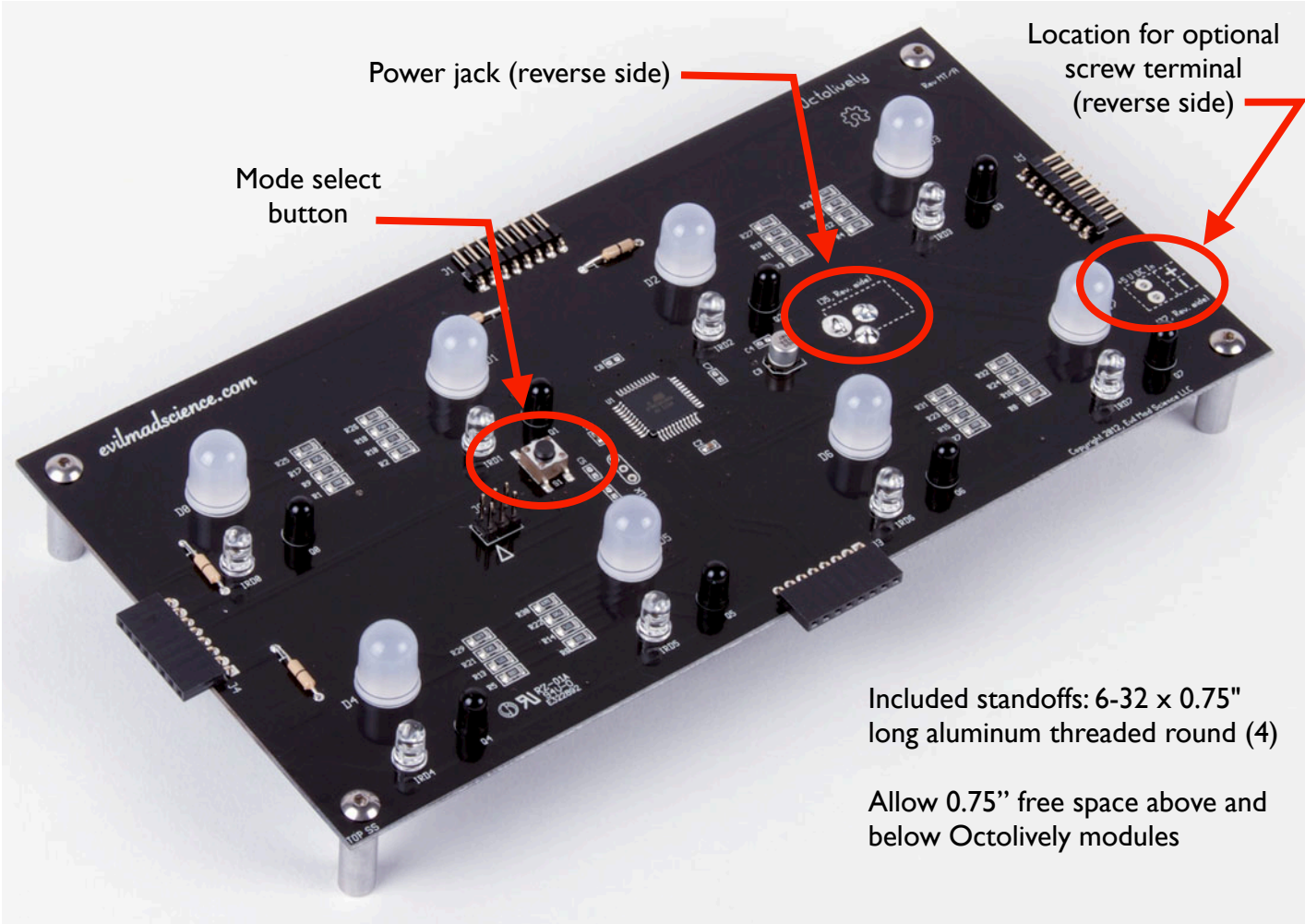(Shown with screws and standoffs installed.)

Visible LEDs (8), 10 mm diffused-lens warm white, standard

Sensor clusters (8)

Edge connectors (M/F)

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Power jack (reverse side)

Mode select button

Location for optional screw terminal (reverse side)

Included standoffs: 6-32 x 0.75" long aluminum threaded round (4)

Allow 0.75" free space above and below Octolively modules
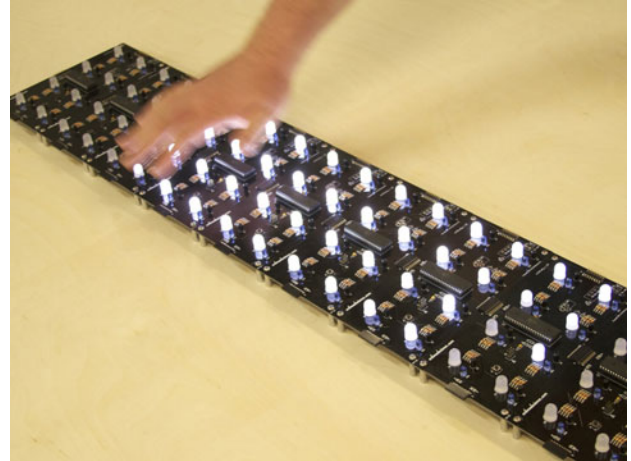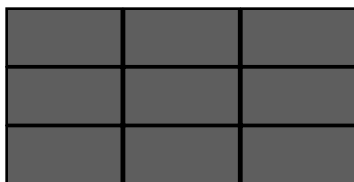

Power jack

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Tiling

Octolively modules can be deployed in any rectangular array. A few possible arrangements are shown here.

8-inch wide strip array

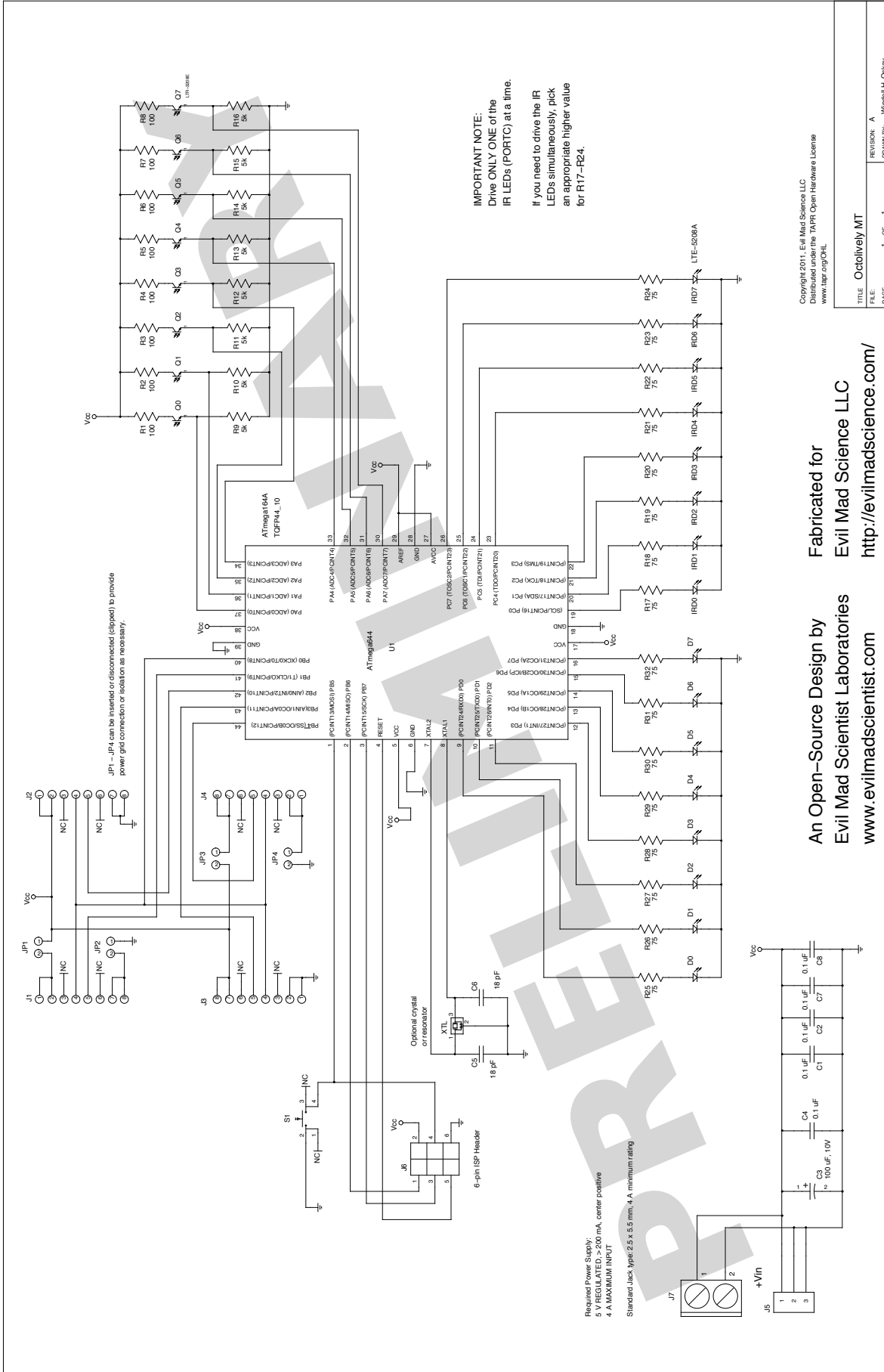4-inch wide strip array

Wider arrays by 2D tiling

Electrical Schematic

IMPORTANT NOTE:
Drive ONLY ONE of the
IR LEDs (PORTC) at a time.

If you need to drive the IR
LEDs simultaneously, pick
an appropriate higher value
for R17–R24.

JP1 – JP4 can be inserted or disconnected (clipped) to provide
power grid connection or isolation as necessary.

Optional crystal
or resonator

6-pin ISP Header

Required Power Supply:
5 V REGULATED, > 200 mA, center positive
4 A MAXIMUM INPUT

Standard Jack type: 2.5 x 5.5 mm, 4 A minimum rating

+Vin

Fabricated for
Evil Mad Science LLC
http://evilmadscience.com/

An Open–Source Design by
Evil Mad Scientist Laboratories
www.evilmadscientist.com

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