

 **TEXAS INSTRUMENTS**

## **ELECTRONICS CHALLENGE**

**DECONSTRUCTION OF A VIVICAM X022 (MID0050113)**

**1410L | UTOPIC UNICORNS | 2017**



**1410L**  
Utopic Unicorns

## Introduction

In today's increasingly technological and digitalized lifestyle, a vast array of electronics constantly present themselves to be possible interesting subjects in a process of disassembly and analysis. Out of this pool, our team chose to investigate a VIVICAM X022 digital camera for possible TI components, as the challenge specifies a GoPro Hero 3 camera to have many of said parts. Although we did not have access to any past or current versions of the GoPro, we were curious to see if the old camera would have any relation to its modern-day reconstruction.

## Components

In investigating specific parts and their functions, we unfortunately were unable to identify any precise TI components. However, as Texas Instruments produces many similar parts to those found, we have listed the corresponding "replacements" in brackets [TI] in the list below. (Figures 2, 3)

- TC1410N MOSFET driver
  - High power transistor translates CMOS signals to higher voltages/currents
  - [UCC27536]
- X039
  - Inductor opposes changes in circuit variables and noise
  - [AN1197]
- GCT USB 1015
  - USB connector port for upload
  - [CC2531]
- WO4 23
  - NPN transistor to amplify small emitter current
  - [LP395]
- OI JL2182A-V2
  - Embedded small-scale microprocessor
  - [MSP432]
- RS1J VISHAY
  - Semiconductor in fast switching rectification of power
  - [CD4046BPW]
- 4R7 Ohm resistor (2x)
  - Divides voltages and signal levels
  - [PMP4337]
- CHIPPOWER CE4890 IC
  - Integrated circuit (IC) microprocessor
  - [MSP430]
- EM638165 ETRONTECH SDRAM
  - High-speed CMOS 64 Mbit memory
  - [TMS427809A]
- JEXCONN Push/Push Type 1
  - SD card connector
  - [TXS0206]

## Unidentified Model Components

- Macro analog switch
  - Detects on/off of macro camera setting
  - [TS5A3359]
- Transformer
  - Increases/decreases alternating voltages through coils
  - [SN6505B]
- CCD camera sensor
  - Converts light into electrons and a sequence of voltages, processed into analog
  - [TC245]
- LCD cable plugin
  - Inputs data to viewer's screen
- Button pressure sensors (x8)
  - Contact discs for button presses

## Conclusion

Through our investigation of the VIVICAM X022, we gained considerable knowledge about the internal workings of digital cameras. Even though many of us harvest interests in photography and graphic design, we have only ever learned the skills and methods to use these devices. With this project, we were also able to familiarize ourselves with the electronics in these popular mechanisms. Although VIVICAM itself contained no TI components, we were able to match many parts that had similar functions and conclude that the GoPro, despite using different models, is definitely closer to the VIVICAM than we had imagined before. This experience answered many questions but raised even more, and we now have new interests about the possibilities that old devices brought to the creation of our modern versions.

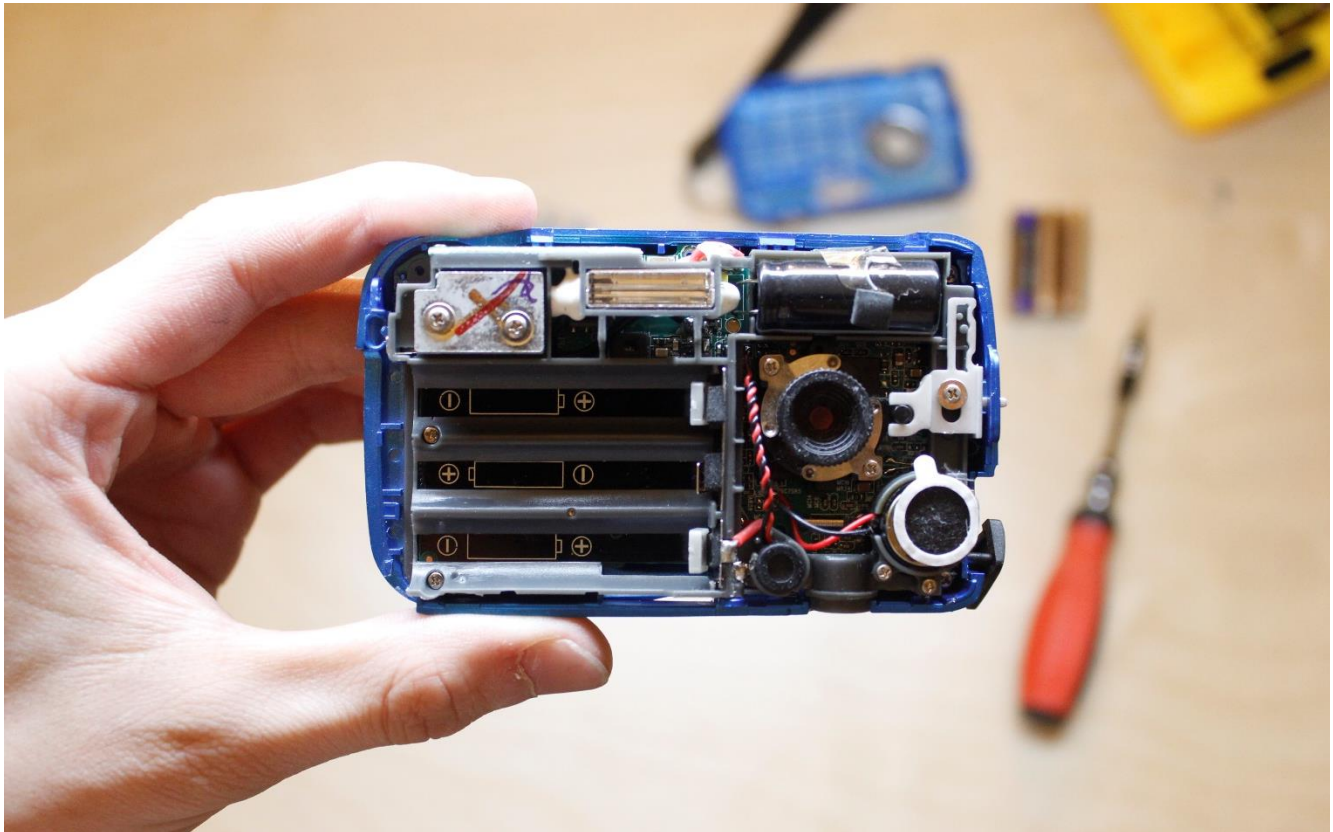
(441 words)

## Visual Documentation

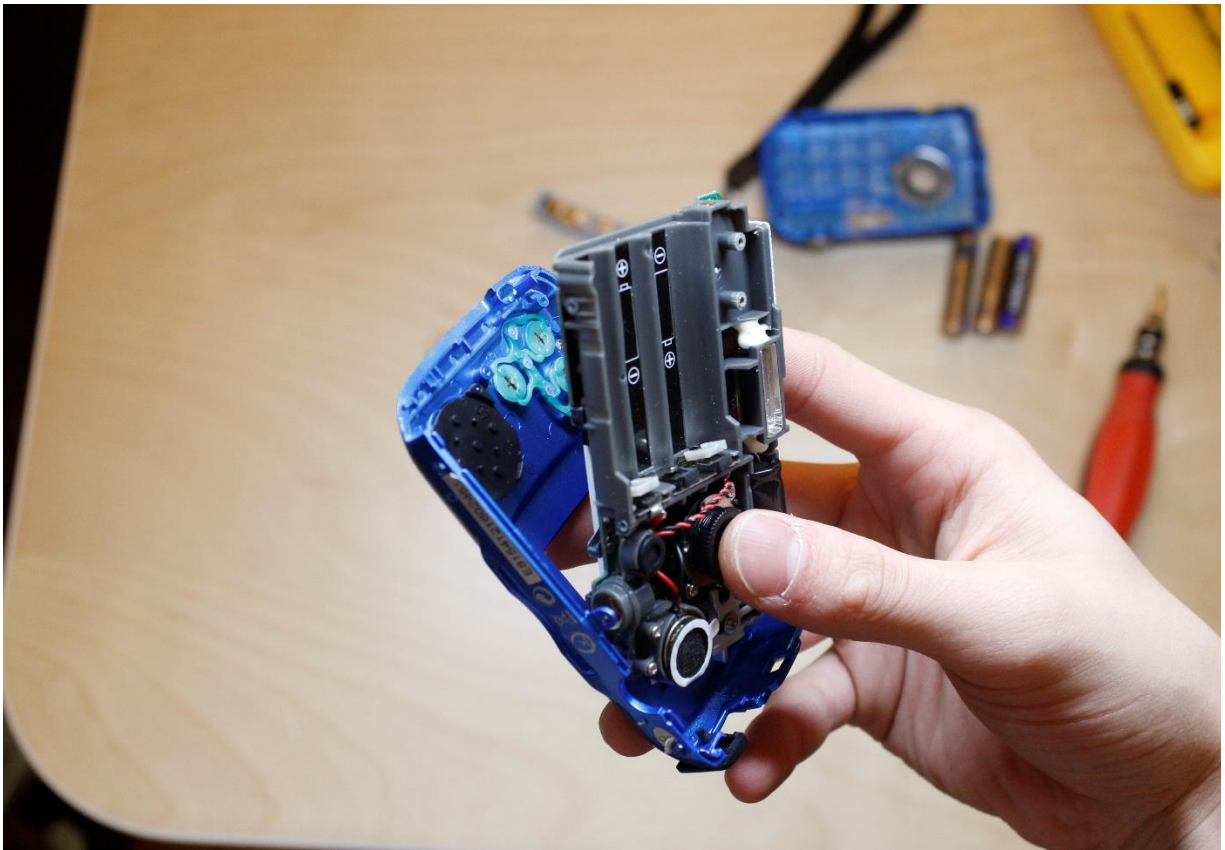


Our device, the VIVICAM X022 camera (MID0050113).

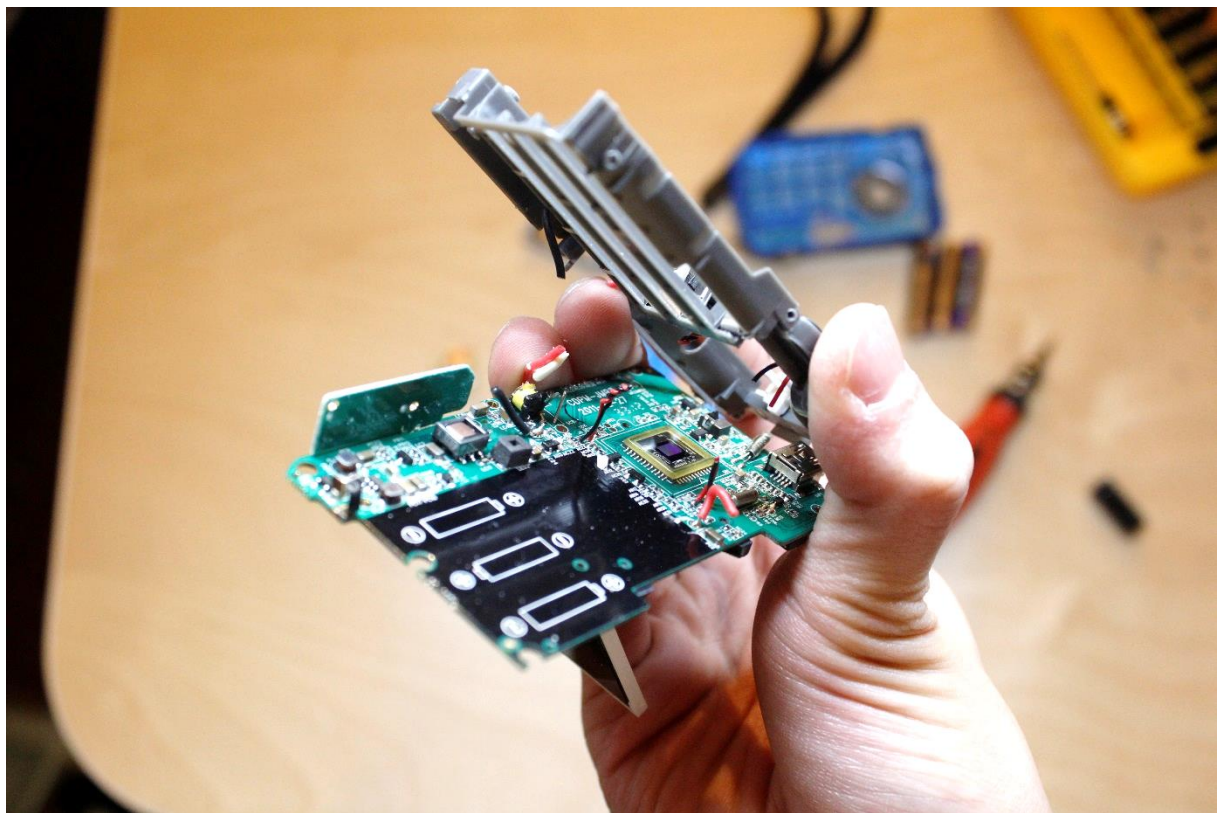
## Deconstruction



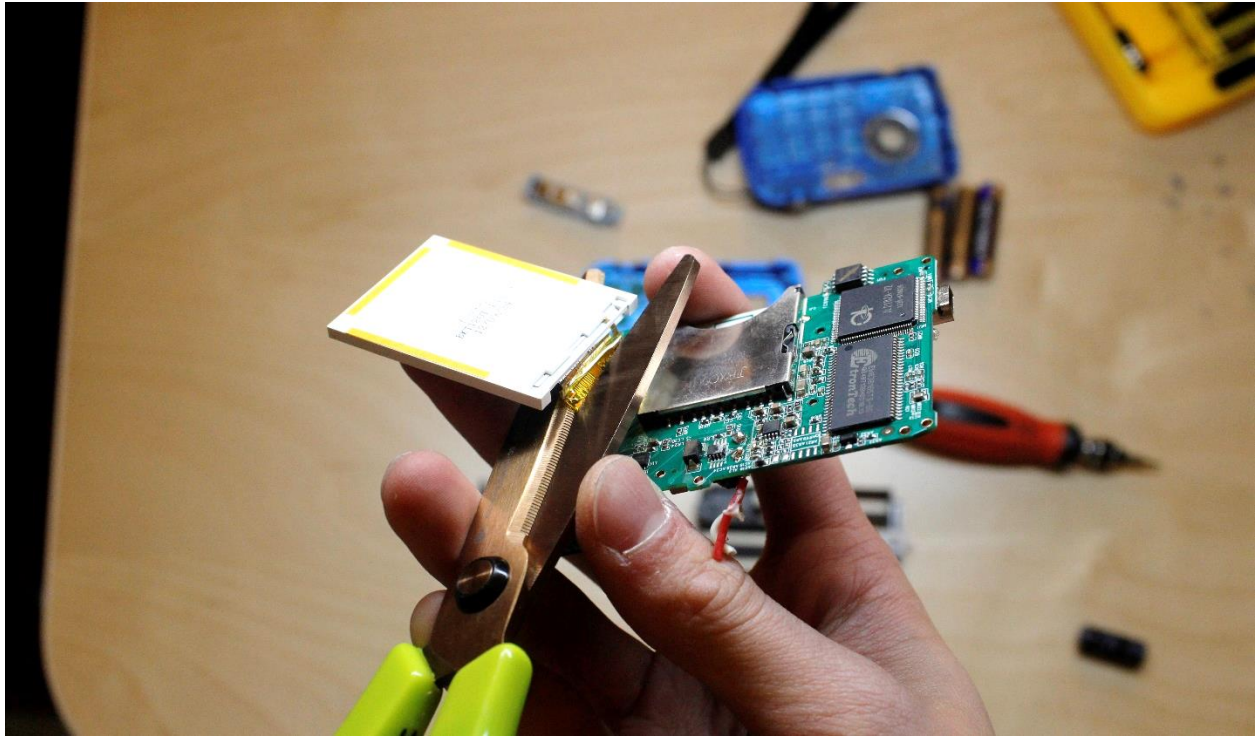
Step 1: Removal of front cover.



Step 2: Removal of back cover.



Step 3: Removal of skeletal structure from motherboard.



Step 4: Removal of LCD screen on opposing side of motherboard.



Step 5: Removal of loose components. Final spread.

## External Components



● LCD screen

● Motherboard

● Internal brackets

● Microphone

● Speaker

● Switch

● Capacitor

● Camera lens

● Flash

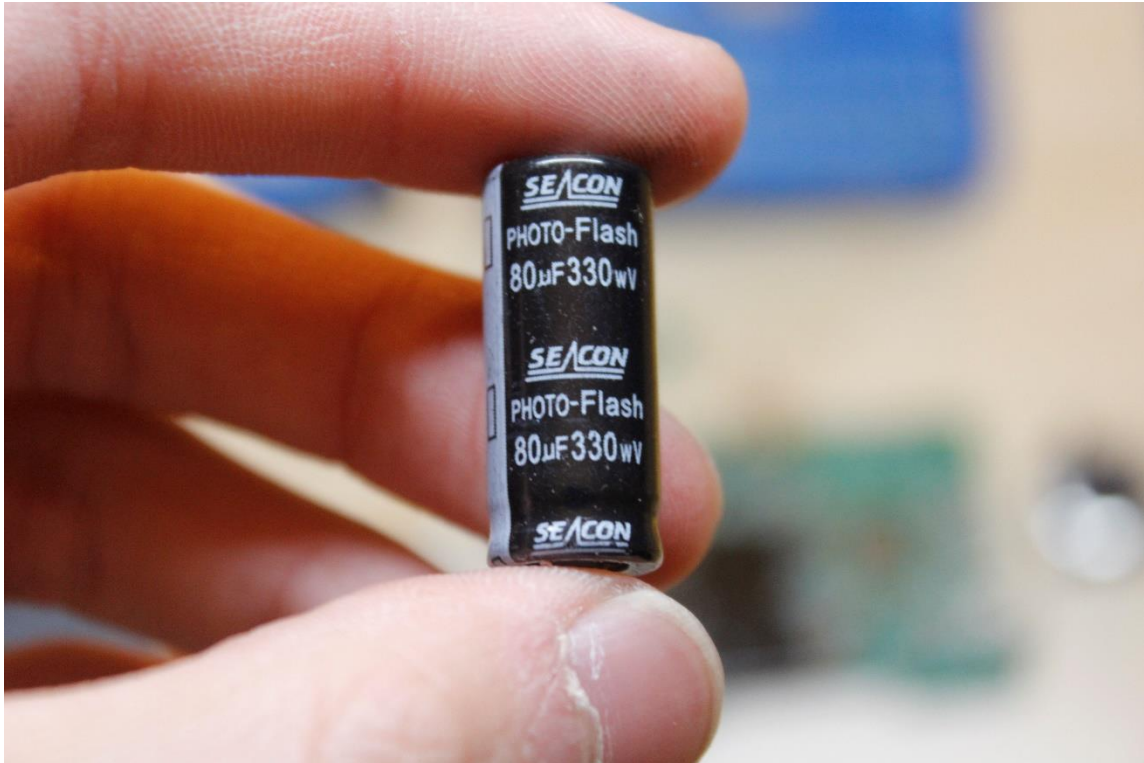
● Battery cover

● Contact plates for buttons

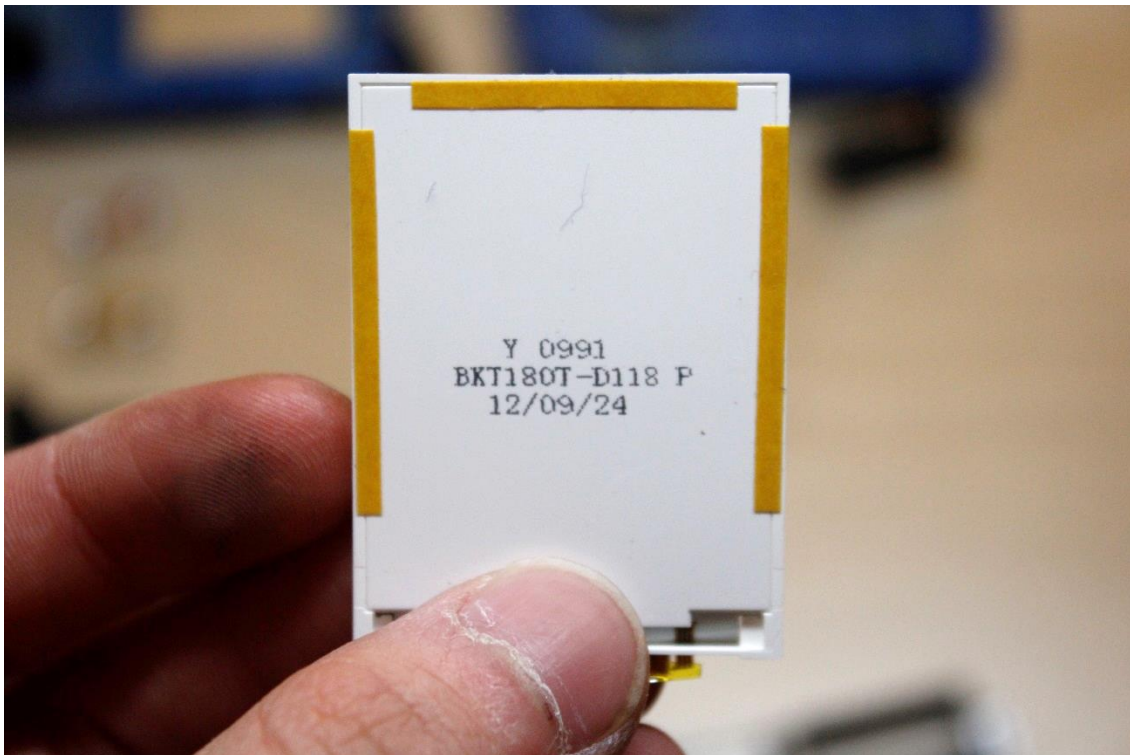
● AAA batteries

Figure 1

## Individual Pieces



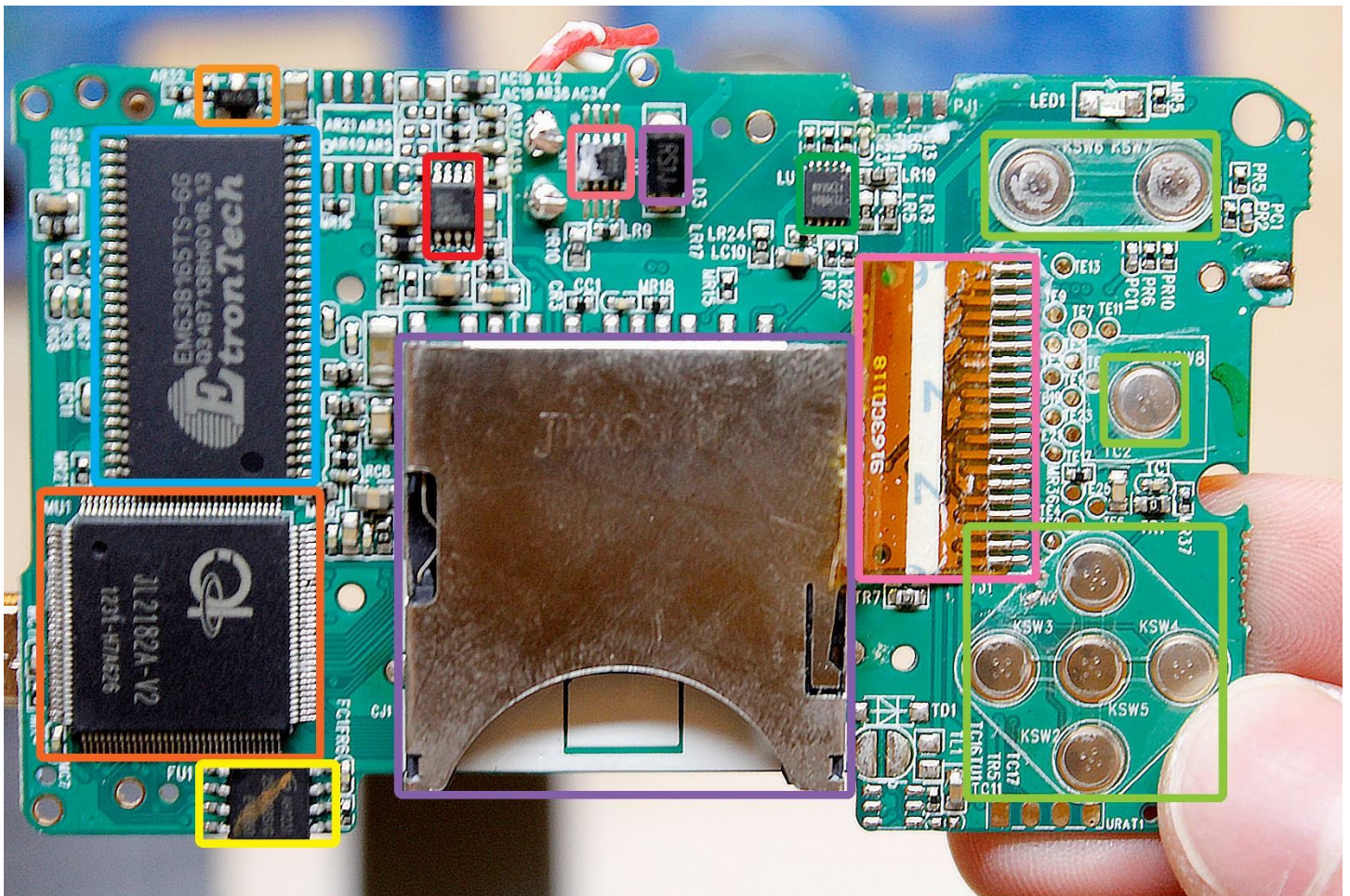
Flash capacitor.



Reverse of LCD screen (BKT180T-D118).

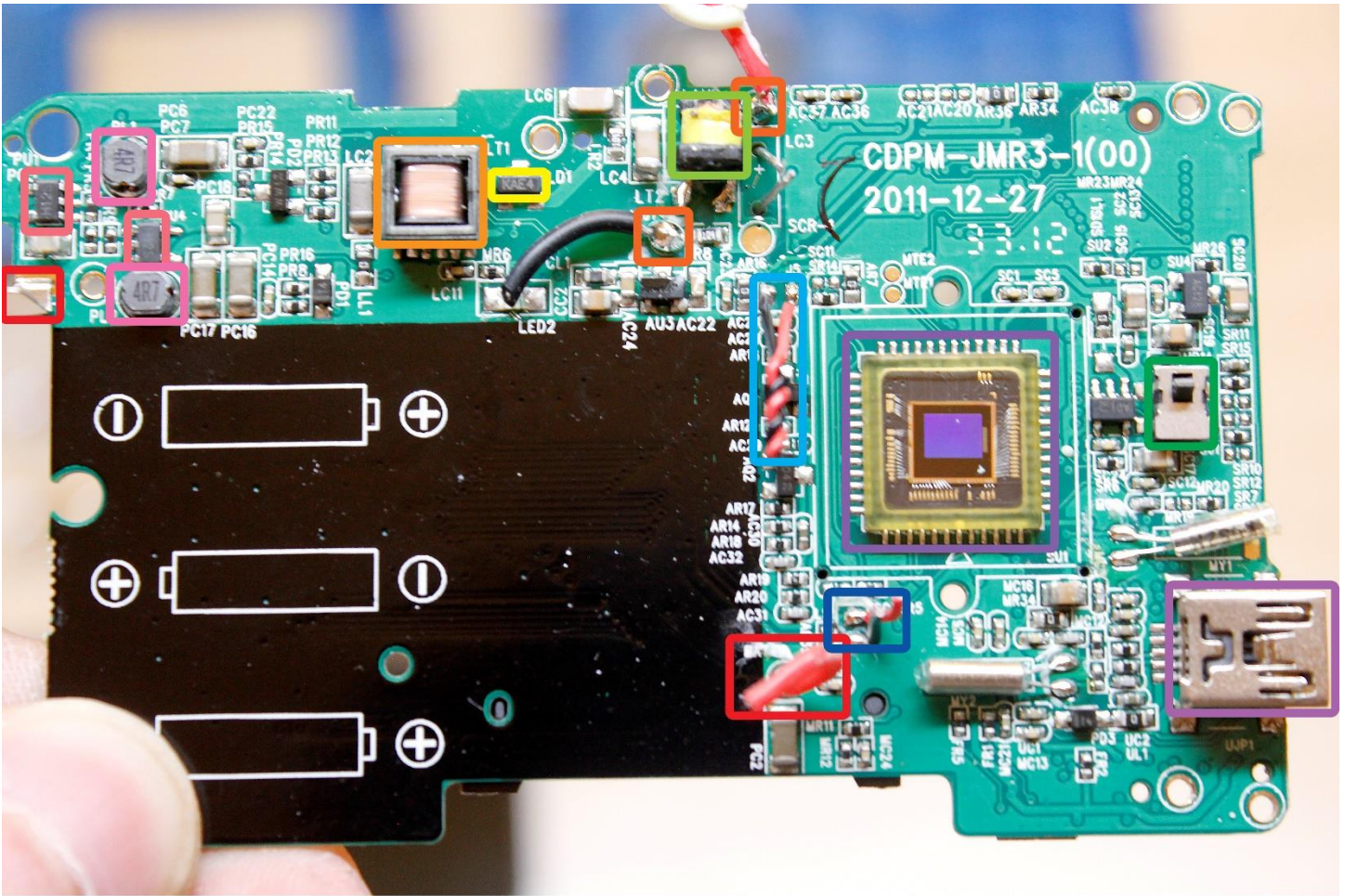


# Motherboard



- Jexconn SD card connector
- Vishay general semiconductor
- Cable plugin for LCD screen
- 24010 262X
- CHIPOWER CE4890 IC
- OI JL2182A-V2 Embedded processor
- WO4 23 NPN transistor
- TI MOSFET driver high-power transistor
- Contact plates for buttons
- 727080H 1235E4M
- EtronTech synchronous DRAM

Figure 2



- CCD camera light sensor
- USB port
- 4,700 Ohm resistor
- HI2S
- Battery pos. wire/neg. contact
- Flash pos./neg. wire
- X039 Inductor
- KAE4
- Transformer
- Switch
- Microphone wires
- Speaker wires

Figure 3

## Works Cited

"SD Card Connector." *Made-in-China.com*. N.p., n.d. Web. 04 Jan. 2017.

<http://www.made-in-china.com/showroom/jexcon/product-detailPMVxSFzHkvWC/China-SD-Card-Connector.html>

"4M X 16 Bit Synchronous DRAM (SDRAM)." *EtronTech*. N.p., n.d. Web. 04 Jan. 2017.

[http://www.etrone.com/manager/uploads/EM638165TS\\_rev3.2.pdf](http://www.etrone.com/manager/uploads/EM638165TS_rev3.2.pdf)

*CE4890 - CHIPPOWER - Integrated Circuits (ICs) - Jotrin Electronics Limited*. Jotrin, n.d. Web. 04 Jan. 2017.

<http://www.jotrin.com/product/parts/CE4890>

"4k7 Means 4700 Ohm Right?" *PICAXE Forum RSS*. N.p., n.d. Web. 04 Jan. 2017.

<http://www.picaxeforum.co.uk/showthread.php?15555-4k7-means-4700-ohm-right>

"Smd Chip 4r7 Inductor." *Smd Chip 4r7 Inductor Suppliers and Manufacturers at Alibaba.com*. N.p., n.d. Web. 04 Jan. 2017.

<https://www.alibaba.com/showroom/smd-chip-4r7-inductor.html>

"Marking of Electronic Components, SMD." "Marking of Electronic Components, SMD Codes. N.p., n.d. Web. 09 Jan. 2017.

<http://www.s-manuals.com/smd/wo>

"Oscillator and Capacitor." *How Camera Flashes Work*. HowStuffWorks. N.p., 30 July 2002. Web. 09 Jan. 2017.

<Http://www.howstuffworks.com/about-author.htm>.

"Motherboard Components Labeled - Motherboard Parts and Functions." *Buildcomputers.net*. N.p., n.d. Web. 10 Jan. 2017.

<http://www.buildcomputers.net/motherboard-components.html>