

## Texas Instruments Electronics Online Challenge

### **Introduction:**

Team 750E selected a dated iPhone 3G to disassemble for the Texas Instruments Electronics Online Challenge. We chose this old device because, having been one of the first popular smart phones, we found it interesting to discover what parts made it function properly. Also, its use had long expired so it was a practical choice for this challenge. It certainly provided more useful information during this challenge than sitting around in an old dusty drawer.

### **Internal components and Their Purpose:**

After deconstructing the iPhone 3G, we were able to divide all of the components into four main categories: power source, input, output, and processing. The central power source in this case happened to be a lithium-ion battery.

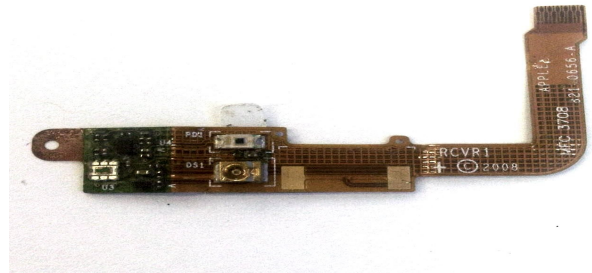
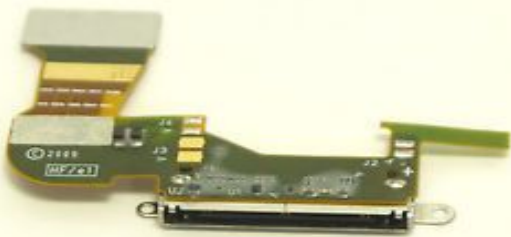
#### **I. Power Source:**

The lithium-ion polymer battery powers the device.

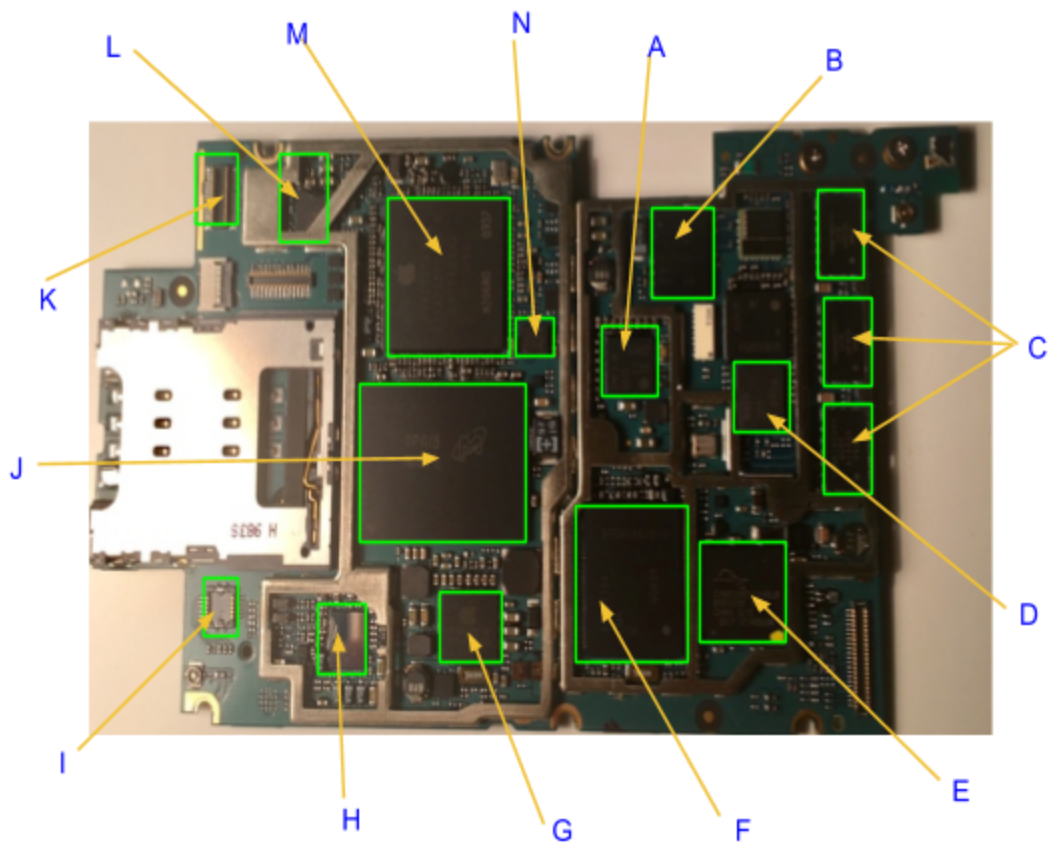


#### **II. Output:**

- System Dock Charging Port (located at the bottom of the device)
- Speaker (located at the top of the device)



### III. Processing



The majority of the essential components were found on the motherboard, which is also called the logic board.

**All components on logic board have been labelled**

#### Components:

- A. Infineon SMP3i ic charging chip (*Power*)
  - Main charging chip

- Regulates the current and the voltage that goes into the lithium-ion polymer battery
- B. Skyworks SKY 77340 (*Power/Processing*)
  - Power module for the phone
  - Contains several semiconductors to conduct current and also absorb some
- C. Triquint TQM666032 (*Processing*)
  - Power amplifier that amplifies audio for the iPhone
  - 3 such components located adjacent to each other, each with a different frequency band
  - In general, increases the amplitude of radio signals and increases the power of the signals
- D. Infineon UMTS Transceiver (*Processing*)
  - Improves radio reception and frequency range
  - Helps with increasing download speeds
- E. Numonyx PF38F3050M0Y0CE (*Processing*)
  - Multichip memory
  - Provides 16gb Flash memory and 8gb RAM
- F. Infineon Digital Baseband Processor (*Processing*)
  - Manages all radio functions, excluding Bluetooth and Wi-fi functions
- G. Linear Technology LTC4088-2 (*Power/Input/Output*)
  - Battery Charger/USB Controller
- H. Infineon PMB 2525 Hammerhead II (*Processing/Input/Output*)
  - GPS receiver
- I. Wolfson WM6180C (*Processing*)
  - Digital Audio Converter
- J. NXP (*Power/Processing*)
  - Power management integrated circuit
- K. National Semiconductor LM2512AA (*Input*)
  - Multi-Touch Touchscreen: Distinguishes between a stylus and a finger
- L. Broadcom BCM5974 (*Processing*)
  - Controls touchscreen
  - Processing unit for touchscreen: calibrates touch and manages power efficiency
- M. 32-bit Samsung ARM 11 Application Processor (*Processing*)
  - Application processor
  - Supports running applications by providing all of the capabilities that the application needs
- N. STMicroelectronics LIS331DL (*Input/Output*)
  - Houses accelerometer
  - Emits sounds and vibrations

**Companies:**

The principal components were manufactured by companies such as Infineon, Skyworks, Triquint, Numonyx, and Wolfson. Some noteworthy components were the accelerometer, power amplifier module, and the transceiver for their familiarity. These components are found in radios, telephones, and other common wireless devices. Although none of the components on the logic board were manufactured by Texas Instruments, the TI line driver was located on the iPhone right below the screen. The line driver acts as a buffer that absorbs excess current to prevent overcharging capacitors, which is essential for the device to work without malfunctioning.

**Conclusion:**

Researching as a part of this project revealed the functions of various components, making it much easier to understand how the iPhone 3G works. Although some of the components seemed familiar, this challenge motivated us to look further into the specific purpose of each part and how they interact with one another. With parts coming from so many different companies, it is interesting to consider how all of these manufacturers contribute to the overall functionality of the phone. Dissecting the structure of the phone and recognizing these contributions made the construction of such a complex device seem much more feasible. The project proved to be very fun and very rewarding, and we look forward to repeating it in the future with different devices.