DIY Cellphone

Getting the Parts

There's no kit available for the cellphone but you can order the parts from various websites.

Electronic Components
Most of the electronic components are available from SparkFun and Digi-Key. You'll also need to get the M10 GSM Module from the Arduino store (EU) or D Art Perfect (US).

Bill of Materials: BOM.pdf (LCD variant), BOM.pdf (LED matrix variant).

Note that the super-capacitor listed in the PDF (Digi-Key part 587-2158-1-ND) is no longer available; Digi-Key part 604-1165-1-ND might work as a replacement, but I haven't tried it yet. (The phone will still work without the super-capacitor; it will just stop keeping time when the main battery dies.)

Tools
To assemble the phone, you'll a need a good soldering setup: a soldering iron (e.g. the WES51) with a good tip, fine-pitch solder, desolder wick, tweezers, etc. To program the microcontroller, you'll need an AVR in-system programmer (like the AVRISP mkII) and a 3.3V FTDI Cable (or equivalent breakout board). To charge the battery, you'll need a mini-USB cable.

To make the laser-cut case, you'll need access to a laser cutter and a small philips screwdriver.

SIM Card
The phone should work with a full-size SIM card from any GSM provider. I've been using T-Mobile in the United States but the phone has also been tested with AT&T and in India, China, and Europe.

Other Materials
For the laser cut enclosure, you'll need:

- A sheet of 1/4″ / 6 mm plywood, like this craft plywood from Midwest Products available at many art supply stores. (Avoid the micro-lite aircraft plywood from Midwest Products or other plywood with dark adhesive layers as they tend to burn in the laser-cutter.)
- A sheet of wood veneer, preferably with adhesive backing.
- Six M0, 5/8″, pan-head machine screws (e.g. this 100 pack from McMaster-Carr)
- Six M0 nuts (e.g. this 50 pack from McMaster-Carr)

Or, try making a difference enclosure (e.g. with 3D-printing or by milling a mold).

« **Previous:** Ordering the Circuit Board **Next:** Soldering the Electronics »

18 Responses to "Getting the Parts"

1. *prabhav* says:
   May 2, 2015 at 1:37 pm
   Will this phone will work in India and which sim do you prefer

   Reply
2. *admin* says:
   May 4, 2015 at 3:32 pm
   It should work in India (and anywhere with a GSM network). Any SIM should be fine, as long as the network doesn't restrict the kinds of phones that can be used.

   Reply
3. *bader* says:
   May 26, 2015 at 10:35 am
   Do you have recomendations for sourcing the electronic parts in Germany? I Prefere the LCD version. We will also 3D Print the enclosure. Any experiences / recommendatons?

   Reply
4. *admin* says:
   May 26, 2015 at 2:30 pm
   Hmm… no specific suggestions for getting the parts in Germany. Some of the components might be hard to track down, e.g. the GSM module. Quectel probably does have an EU distributor, though, but you may have to call them up to order the M10. Let me know where you find the parts so I can update the page with links for Europe.

   Reply
5. *William* says:
   June 2, 2015 at 3:36 am
   I found a vendor on AliExpress selling the GSM Modules, it's about $27 USD shipped for a single piece. I decided to roll the dice and as the US vendor wants $55 just for shipping to Canada.

   http://www.aliexpress.com/item/Gprs-gsm-module-m10-850-900-1800-1900-mhz/1831943988.html

   Reply
6. *admin* says:
   June 2, 2015 at 2:36 pm
   I've had good luck with AliExpress so far, but I guess you never know. I hope it works out.

   Reply
   - *BADER* says:
     June 3, 2015 at 11:45 am
     Thank you for the help. Found out, that DIGI-KEY maintains a german web site, with payment to a german bank account in Euro. Works perfect. I keep looking for possibilities for the rest of the parts.

Reply

7. *BADER* says:
June 5, 2015 at 12:38 pm
As suggested, I contacted Quectel, and now I am confused (due to that I am not an engineer at all…) Their response:
"…Moreover, may I know if you ever used M10 before, in which version? M10, M10E, or M10F?
M10 has been already EOL.
M10E (we call it M10 R2.0) has been announced EOL and LTB is end of year. So I recommend M10F (M10 R3.0) here, which has same function but lower price than M10E."
Where is the difference, and which version is recommended by you for the DIY Phone and existing board layout?

Reply

8. *admin* says:
June 5, 2015 at 3:21 pm
Hmm… I hadn't realized there was a distinction between the M10 and the M10E. It looks like I've been using the M10E. At least, the module in my phone says "M10″ in big letters but "M10E-04-NCH-STD" in smaller letters, which suggests that it's an M10E. I couldn't find any information about the differences between the M10E and the M10F, maybe you can ask for clarification or a document describing the differences? Or just go with the M10E?

Reply

9. *BADER* says:
June 9, 2015 at 2:36 pm
I found a Quectel distributor for the M10s in Germany: http://www.soselectronic.de/ . After talking to them, I ordered the M10f, as it is the newest version. Hope it will work. I have a spec document – anyone insterested in a copy?

Reply

10. *BADER* says:
June 16, 2015 at 3:28 pm
In order to explain to students how the phone is designed, is there someting like a schematic circuit diagram available? Have I missed it some place on the web?

Reply

- *admin* says:
June 16, 2015 at 3:54 pm
There's one here for the LED matrix variant:
https://github.com/damellis/cellphone2hw/raw/led-matrix/Eagle/DIY-Cellphone-Schematic.pdf

And for the LCD:
https://github.com/damellis/cellphone2hw/raw/master/Eagle/DIY-Cellphone-Schematic.pdf

Reply

11. *Sagar* says:
June 21, 2015 at 5:20 am
To program the microcontroller, you'll need an AVR in-system programmer (like the AVRISP mkII) and a 3.3V FTDI Cable (or equivalent breakout board). —- Where can I buy these???

To charge the battery, you'll need a mini-USB cable. — What are the specs required for the adapter??

Reply

12. *Gustavo Arriaga* says:
June 28, 2015 at 3:01 am
Can't get the bootloader onto the ATMega. All the wiring is correct, crystal is in place. Using an Arduino UNO as ISP but no device detected on USB when I try to burn the bootloader. Anyone stuck here and/or found a fix?

Reply

- *admin* says:
June 29, 2015 at 5:16 pm
You probably need to use another programmer (like an AVRISP mkII). I don't think the Arduino as ISP works for microcontroller targets with >= 64 KB of flash (like the ATmega1284 on the DIY cellphone).

Reply

- *Ekadasi Newton* says:
August 31, 2015 at 7:34 pm
I ordered an AVISP mkII. It came from China… My computer detects it as a "Prolific usb to serial" and doesnt seem to work. I looked for a legit version and everyplace says its obsolete. i feel pretty stuck…

Reply

13. *ekadasi* says:
September 1, 2015 at 3:50 am
I got an avrisp mkii on ebay. It came from china and my computer detects it as "prolific usb to serial" i try to flash the boot but it fails every time. Every other place i looked says the mkii is obsolete so i cant even get it from digikey or mouser. Im not sure what to do.

Reply

14. *ekadasi* says:
September 2, 2015 at 1:10 pm
I've noticed that when i use this chinese clone of the avrisp mkii, i match the the pins on the programmer to what the sheet says they should match up to on the board for to flash the ATmega1284. the light goes from purple to red to blue on the avr when i plug it into the computer, but if i plug the usb cable into the phone, the light on the avr goes off. the pins on the ATmega that are supposed to show power seem to show sufficient power just fine but flashing the bootloader still fails.

Reply

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