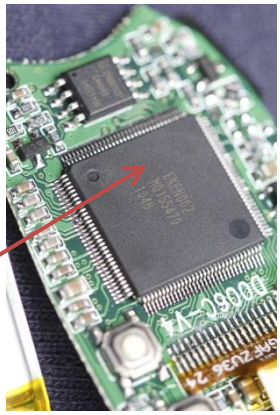
808 camera #08 measurements

06/06/2011

This document is translated from Dutch (it can contain translation errors).

Explanation

This is a test in which video recording properties of the car key "808 #8" camera are measured. Properties include battery capacity, charging time, frame rate, etc. See http://www.chucklohr.com/808/ for a review of these cameras.



→ There are many versions of this camera from different manufacturers in virtually the same housing. The properties and performance of the versions are very different. Chucklohr.com has enumerated the different versions**.**

This test is of the 808 #8. The processor is marked year 2010 and the circuit board is marked V4. The #8 with the year 2011 processor is also marked V4 but there are minor differences in components (IC's especially) and the battery is smaller in size. This can be checked using the manufacturing date code on the video processor (1048 means week 48 of 2010) and of course the size of the battery. Regarding performance, the 2011 model is not very different, but the battery life *can* be different.

Charging

while charging, the battery charging current stops when the battery is fully charged. So there is a charge management IC. Until full charging is complete, the voltage increases to about 4.3V. When charging stops, the battery voltage jumps to 4.7V (fully charged battery with no load).

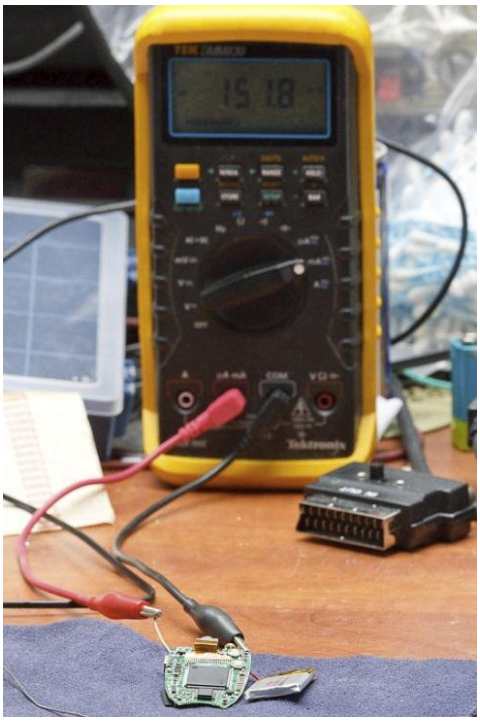
The battery charge current starts at about 175mA to 155mA and then quickly drops to about 75mA when the battery is full. Duration of charging is about 70 minutes.

While USB connected the battery is charging, the camera LED is on and the camera will not record video or photos. Recording is only possible while not USB connected and powered from the internal battery. If the battery voltage is low, the battery charge management IC status might prevent camera operation. Connecting the USB can reset this status, then after a few seconds disconnect the USB and you can record again a few minutes. But the battery charge is low so it is time to re-charge the battery!

Clock standby current

The camera keeps the date time as long as the battery is not discharged. How long will the battery charge and date time last if the fully-charged camera is on the shelf? That depends on two things: the standby current and the battery self-discharge. The standby current is about 37.3 uA in this #8 sample. The self-discharge of the LiPo (Lithium-Ion Polymer) cells is unknown but is expected to be very low. About 20 to 26 weeks of standby time can be expected.

Recording time and power



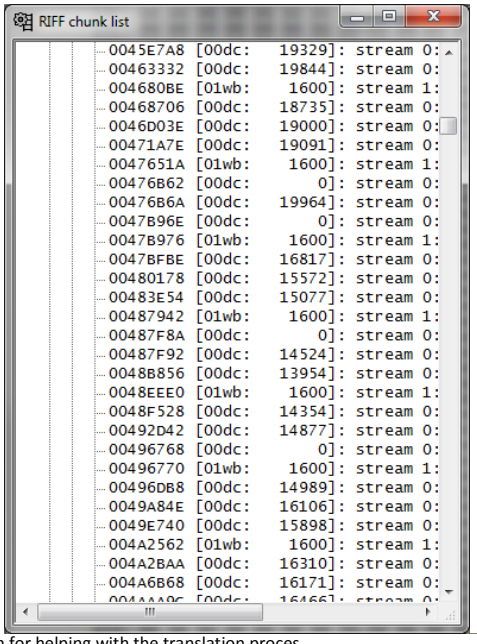
5:08 p.m. start video recording with fully charged battery (160mA LiPo cell)
5:10 p.m. The average current is 150mA drained from the battery during recording. It depends on the amount of light on the sensor and perhaps also the degree of motion. Fully covered (no light) the current drops to an average of 115 mA. The current has peaks up to 200mA. The current is not constant.
5:39 p.m. The battery voltage has dropped to 3.76 V. The current is similar.
5:47 p.m. The battery voltage has dropped to 3.70 V.
5:55 p.m. The camera was turned off at a voltage of 3.765 V by a mistake of mine. The microSD card must first be formatted, and then we resumed the test.
6:07 p.m. We resume the test with a voltage of 3.71 V.
6:09 p.m. Now the voltage drops rapidly below 3.7V. At about 3.60 V the camera can gracefully stop video recording. The video file is closed.
6:13 p.m. the battery is exhausted. The recording duration was approximately 50 minutes. A previous test has shown that complete darkness (he was capped only as audio recorder) recording time was extended to 1.5 hours. So 50 to 90 minutes of video recording is possible from a full battery charge. As the battery ages, it will probably decrease.

Duplicate and drop frames

The #8 records video at 30 frames per second (FPS). Since this camera uses MJPEG, these are 30 JPG images per second.

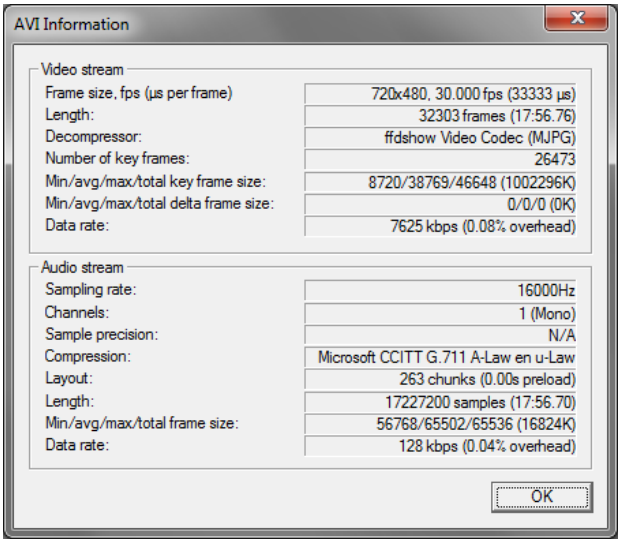
→ (XVID, DIVX, h.264, etc uses a much smarter algorithm and can produce smaller files of higher quality. Some 808 cameras (like #11) use on of these these CODECS)

The #8 AVI MJPEG CODEC and limited computing power sometimes means that the camera can only produce less than 30 FPS. The missing frames will be stored in the AVI file as 0 length frames / 0 bytes (see RIFF chunk list on the right). Your video player repeats (duplicates) a previous good frame until it is changed again by a new good frame.



→ A slow microSD card can increase missing frames. It may be that literally frames are dropped (omitted). Both cases can be seen as a hiccup in the picture during one fluid motion.

So go measure: This camera has about 18% missing frames in this daylight video example. The AVI information shows 32303 frames but only 26473 key frames (good frames). So 26473/32303 is 82% good fames (18% missing frames). In a perfect camera frames and key frames would be the same.



Was my card too slow? I used a class 4 card which should be more than enough speed. The RIFF editor (image above) shows that missing frames are where 0 bytes are written. That would not be orphans in the event of a slow microSD card. In this case, the video processor was not capable of making new frames in the expected time frame (33msec). In the most ideal case, it must make 30 frames per second!

→ If the manufacturer had configured this camera at 20 FPS there would be no zero frames and the video playback would run smoother.

Later, the camera was tested in low light. The missing frame rate increased to about 67%! That is very bad. 2 / 3 of the 30 frames per second were omitted. Presumably it's because of the greater amount of noise produced by the sensor during night shots. The noise reduction algorithm and the MJPEG compressor have more difficulty processing the images. That takes more time, so the processor can produce only about 10 frames per second.

Again a measurement: In total darkness the missing frame rate (MFR) was 72%. With a perfect lighting and no movement the MFR was 17%. In an ideal exposure and plenty of movement the MFR was 25% (fluctuates).

→ This also explains the lower power consumption in low light. Writing good frames to the memory card takes quite a lot of power. It makes quite a difference if you are only writing 10 or 22 frames per second.

Image Quality

Not really measured and quite subjective, but something many people are curious about. These are examples of typical video frames, as you can expect in broad daylight (the on screen date time clock cannot be turned off, unfortunately):