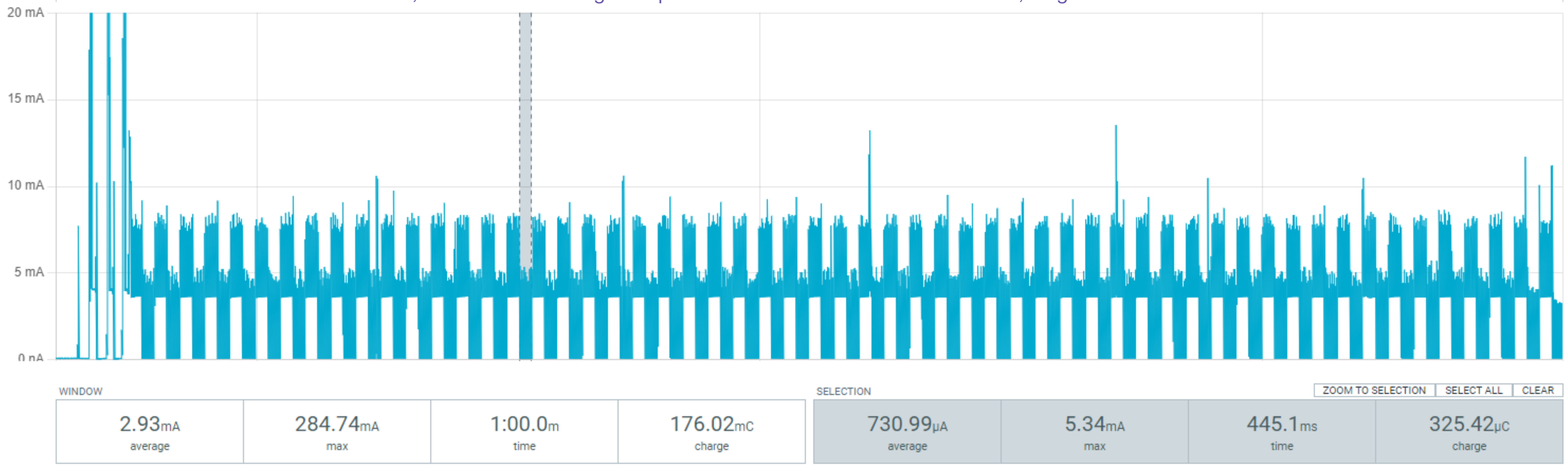
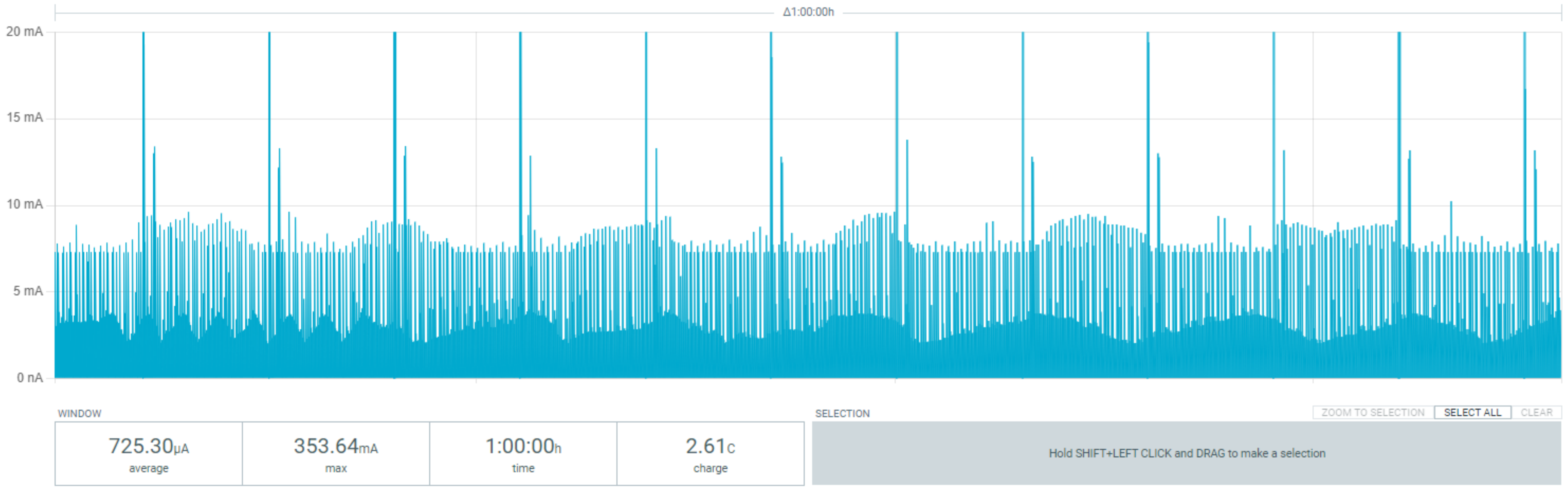
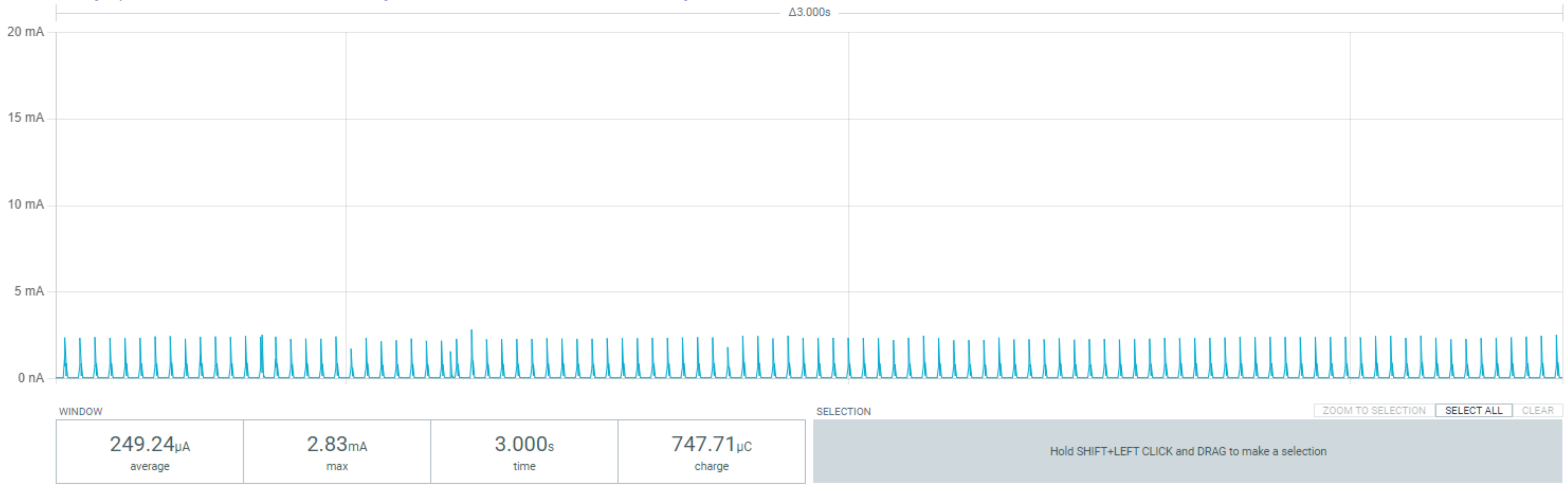
1) This is what our system looks like when we're BLE fast-advertising. The square-wave pattern is due to the fact that we are blinking an LED on-and-off every second in this mode. The selection shown is during a period when the LED is off and we have no threads running, so the nRF52840 is in Sleep. Since approximately 70 uA of current draw comes from our hardware, BLE fast-advertising is responsible for about 660 uA @ 4.2V. So far, so good.



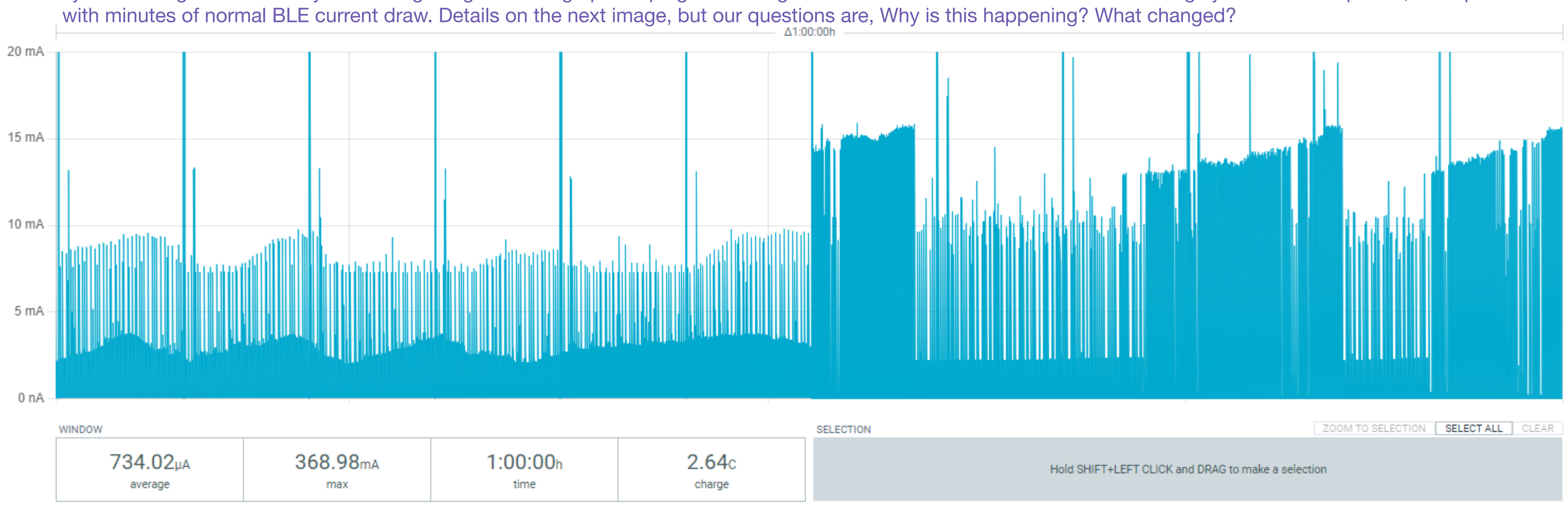
2) This is the view of our system over 1 hour representing what we're seeing typically seeing during the first 6 hours after connecting our device to the iPhone over BLE, whether or not the iPhone is actively being used or is sleeping. The big spikes are periodic measurements every 5 minutes, the forest of spikes up to around 8 mA are our threads briefly running. But what we're focusing on is the solid area at the bottom, which represents BLE current draw; as shown in the next zoomed image, this BLE current draw isn't really solid, and is responsible for about 180 uA on average. This still all good and what we'd expect to see all the time.



3) Here we've zoomed-in on a 3-second section of the above image showing the current draw due to BLE in the first six-hours after connecting the device to the iPhone over BLE. This is a section without any of our threads running, so the nRF52840 is in Sleep mode. Our hardware is responsible for about 70 uA of this, so roughly 180 uA are due to BLE being connected in this mode. Looks good.



4) Here's where the problem we're investigating starts, 6 hours and 20 minutes after connection to the iPhone. This occurred in the middle of the night, no with interaction with the iPhone or change to the test configuration. As shown, starting around the the middle of the image, the nature of the BLE current draw on the system changes dramatically. We start getting these long upsweeping runs of high current draw from BLE that occur over roughly a ten-minute period, interspersed with minutes of normal BLE current draw. Details on the next image, but our questions are, Why is this happening? What changed?



5) Here we've zoomed-in on a 3-second section of the above image showing one of the high-current-draw areas due to BLE. Again, this is a section without any of our threads running, so the nRF52840 is in Sleep mode. Our hardware is responsible for about 70 uA of this, so we're seeing a jump in BLE current draw from roughly 180 uA before the problem starts, to about 550 uA here. We can tell that none of our threads are running this section, so this is not a case where our mobile app is suddenly increasing activity, plus the high current draw is consistent for many minutes at a time.

6) Our best hypothesis so far is that the change in current draw shown above may be due to some interaction between the iPhone and the S113 SoftDevice, perhaps long periods of inactivity on the phone. While the problem started occurring about 6:20 hours after connection, it was probably between 5:45 - 6 hours after the iPhone went to sleep. This made us curious if the problem would disappear once the iPhone (but not our mobile app) started being interacted with the next morning, which occurred around the middle of the image below. Interestingly, we're still getting the high BLE current draw, but we do see a change in behavior: the pattern of BLE current draw changes to much shorter up-ramping runs.