

**Application Brief:**  
**RoHS TStik Battery Life**  
2009-03-23

TStik PCB Rev 2.1 and later (read this on the back of the board near the Intel ethernet PHY chip) have a typical battery life of over 3500 days at 20 deg C when powered off. This estimate is based on the performance of available RoHS low-power SRAM and could change at any time. (Since the industry switch to RoHS devices, there is less choice of SRAM than before.)

If TStik is powered on, the battery is not being used and lifetime could be ten years or more<sup>1</sup>. Since batteries are really chemical capacitors, they also can deteriorate chemically – this too is a function of temperature. This becomes the limiting factor in the battery life of a powered-on Tstik -- it's basically the same as the battery shelf life.

**For the best battery life, keep power applied to your TStik and don't store it in areas of high temperature.** If you will be storing TStik for several months, consider opening the paste jumper on the back of the board adjacent to U16 and the negative battery terminal. This will isolate the battery from all of TStik's circuitry. (You can measure the battery current across this opened jumper – that's what we do at time of manufacture.) Use no-clean, RoHS-compliant solder wick to remove the paste jumper and use RoHS solder to reinstall it. Use heat sparingly to avoid pad damage.

**Avoid condensing moisture and and accumulating dust on TStik.** Moist dust can make a resistor which could drain the battery and even interfere with normal operation of Tstik.

The rated operating temperature range of the batteries on TStik is -30 deg C to +80 deg C.

The battery is replaceable. We can do this for \$20 (check the web site to verify the current price), which includes measuring the current and retesting Tstik in the manufacturing test fixture.

**Battery life calculation:** from the manufacturer's 120 mAh 1632 data sheet graph, the battery can drive a 15 Kohm load for 1400 hours at which time it will be depleted to 2 volts. But the load of TStik is about 1 Mohm, not 15 Kohms, or 66.7 times smaller current draw.  $66.7 \times 1400 = 93,000$  hours, or about 3800 days (over 10 years). TStik memory actually retains data down to 1.5 volts, so the useful battery life is better than the 2.0 volts used in this calculation. At higher temperatures, the memory can present a load three or four times lower (lower resistance = higher current drain), so worst case high temperature battery life could be 20,000 hours or less.

**For best deployment reliability you should store your application in Flash.** See our application brief about that: <http://www.tstik.com/appnotes/Flash.html>