



Ken Eckert &lt;eckertkp@gmail.com&gt;

---

**Re: [HP-Agilent-Keysight-equipment] General Parts Question**

---

**Chuck Harris** <cfharris@erols.com>

Tue, Oct 5, 2021 at 10:55 AM

Reply-To: HP-Agilent-Keysight-equipment@groups.io

To: HP-Agilent-Keysight-equipment@groups.io

Back in the days of yor, electrolytic capacitors were wound up out of craft paper and aluminum foil, and the whole assembly was immersed in a fairly reactive salt based electrolyte.

The electrolyte reacted with the aluminum to put a thin oxide layer on the aluminum. This oxide layer is the dielectric of the capacitor. The thinner the oxide layer, the greater the capacitance, but the lower the voltage the capacitor could withstand.

To build up the oxide, the manufacturer applied a DC bias, that was current limited, and somewhat above the maximum working voltage of the capacitor.

A given capacitor would reach an equilibrium in its oxide thickness based on the bias voltage it was exposed to during normal operation.

If the capacitor was run at lower than its nominal working voltage, the oxide would be thinned by the salt electrolyte, and the capacitor's capacitance would increase. If the capacitor was run at, or above the nominal working voltage, the oxide would become thicker, and the capacitance would decrease.

This is where the unequal tolerance specification comes from.

In the normal range of useful operating voltages, the capacitor's capacitance can range from 100% of its nominal value, to 10% below its nominal value.

More modern capacitors use an entirely unreactive electrolyte, and as such the oxide dielectric layer remains unchanged regardless of the capacitor's nominal voltage. It is fixed at the factory, and the tolerance range can be specified more tightly.

Because the oxide layer on a 3V capacitor is very thin compared to the usual electrolytic capacitor, they tend to fail more quickly than most other electrolytic capacitors.

-Chuck Harris

On Tue, 05 Oct 2021 10:20:24 -0700 [byterock@hotmail.com](mailto:byterock@hotmail.com) wrote:

> This is more a question on the notation on HP parts lists from the 60s

>

> 'C: fxd elect 200 uf +100% -10% 3vdcw'

>

> I know this much

> Capacitor Fixed Electrolytic 200 uf at 3 volts

> and I know the -10% means it can be down to 190uf

>

> but what does the +100% mean?

- >
- > Does that mean it can be 400~190uf or that it cannot be above 200uf??
- >
- > Thanks in advance
- >
- >
- >
- >
- >

-----

Groups.io Links: You receive all messages sent to this group.

View/Reply Online (#119162): <https://groups.io/g/HP-Agilent-Keysight-equipment/message/119162>

Mute This Topic: <https://groups.io/mt/86099681/1866426>

Group Owner: [HP-Agilent-Keysight-equipment+owner@groups.io](mailto:HP-Agilent-Keysight-equipment+owner@groups.io)

Unsubscribe: <https://groups.io/g/HP-Agilent-Keysight-equipment/leave/4199179/1866426/868183933/xyzzzyeckertkp@gmail.com>

-----