



Summary

This application note describes the start-up characteristics of SynQor converters starting into loads below, near and above the output capacitance limits on the datasheet. This application note applies to Kilo, Mega, Giga, Tera and Peta series dc-dc converters.

SynQor's customers often inquire about how a converter will behave if they exceed maximum output capacitance values published in the converter datasheets.

Many of SynQor's converters utilize a derivative of the output voltage to power the internal housekeeping circuits after a 10ms startup period during which the control circuits are powered from the input voltage. This "handoff period" must complete in a maximum of 10ms. Exceptions to this behavior include the Zeta and Exa families.

To start-up reliably the output voltage has to rise to about 70% of nominal (nameplate) voltage within 10ms from the start of the output voltage rise time. If the capacitance is large, the module may go into current limit during start-up and the rise time is then slowed. If the 10ms point is reached before the voltage is high enough, then the module may fail to start. (See Fig.1)

This relationship is complicated by the actual load current. If load current is also present during the rise time, then the load current is subtracted from the capacitor charging current and slows the rise time even further. We always recommend that customers measure the rise time under their actual system conditions to assure that they have startup timing margin if they are near or over the capacitance limit.

If the load current is present during the output voltage ramp-up and the load is either a constant-current load or a constant-power load (like a point-of-load converter) then the startup timing is further compromised, particularly with constant-power loads, where load current is higher at lower voltages. If load capacitance is high, then electronic loads should be disabled during the startup ramp, either through voltage sensing or a time delay, to allow the output voltage to come up quickly.

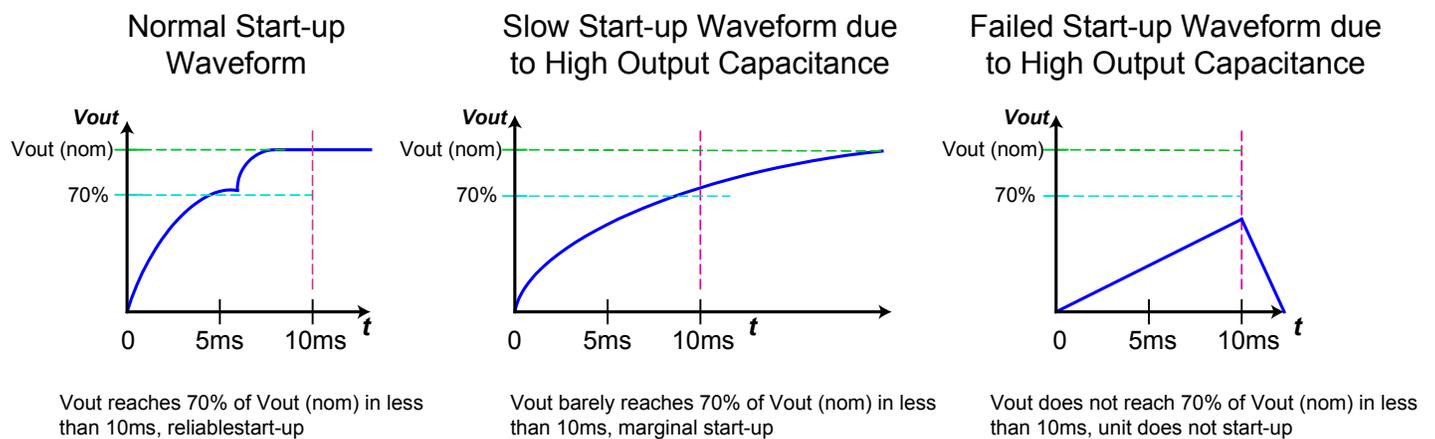


Figure 1: Start up waveforms for below the datasheet recommended value of output capacitance, near the datasheet recommended value of output capacitance and above the datasheet recommended value of output capacitance.