

## PowerQor with Alternative Startup Inhibit Period

### DESCRIPTION

This technical addendum contains additional specifications for a modified version of the PowerQor family of converters that employ an alternative startup inhibit period. These units modify the behavior of the module during the power up sequence. The modified units are identical in all other aspects of form, fit and function except for the differences in startup which are outlined below. The alternative startup modules are identified with the letter "Y" used as the last (15th) character in the full part number as explained in the Part Numbering section.

### STANDARD INITIAL STARTUP PERIOD

The initial standard startup ensures that the converter will remain off for 200mS after the input voltage reaches the Under-Voltage Turn-On Threshold (see Figure 1)

### STANDARD STARTUP INHIBIT PERIOD

The standard Startup Inhibit Period ensures that the converter will remain off for at least 200ms when it is shut down for any reason. When an output short is present, this generates a 5Hz "hiccup mode," which prevents the converter from overheating. In all, there are six ways that the converter can be shut down, initiating a Startup Inhibit Period:

- Input Under-Voltage Lockout
- Output Over-Voltage Protection
- Over Temperature Shutdown
- Current Limit
- Short Circuit Protection
- Turned off by the ON/OFF input

Figure 1 on page 2 shows three turn-on scenarios, where a standard Startup Inhibit Period is initiated at  $t_0$ ,  $t_1$ , and  $t_2$ :

Before time  $t_0$ , when the input voltage is below the minimum operating input voltage range, the unit is disabled by the Input Under-Voltage Lockout feature. When the input voltage rises above the turn-on voltage threshold, the Input Under-Voltage Lockout is released and a Startup Inhibit Period is initiated. At the end of this delay, the ON/OFF pin is evaluated, and since it is active, the unit turns on.

At time  $t_1$ , the unit is disabled by the ON/OFF pin, and it cannot be enabled again until the Startup Inhibit Period has elapsed.

When the ON/OFF pin goes high after  $t_2$ , the Startup Inhibit Period has elapsed, and the output turns on within the 4ms (typ.) "Turn On Time."

### ALTERNATIVE STARTUP INHIBIT PERIOD

Modules with the alternative startup inhibit period will skip the startup inhibit delay when the input voltage is brought up from 0V during initial startup. This is the only difference between the standard unit and the "Y" option. If the module is enabled as the input voltage rises, the output will be present within 6ms plus the standard unit turn-on time (see the Turn-On Time listed in the Dynamic Characteristics parameter section of the standard product technical specification) after the input voltage exceeds the UVLO trip point. If the unit is enabled more than 6ms plus the standard unit turn-on time after the input voltage exceeds the UVLO trip point, the unit will turn on immediately after being enabled.

Figure 2 on page 2 depicts the behavior for this type of module. The startup sequence initiated at time  $t_0$  shows the turn on behavior from the initial application of input voltage. At time  $t_1$ , a startup inhibit delay is initiated by the converter being switched off by the ON/OFF pin. At time  $t_2$ , the converter is switched off for 200mS and turns on immediately after commanded by the ON/OFF pin. At time  $t_3$ , the input voltage falls to zero, and returns to its nominal voltage. The converter responds by turning on in 6ms plus the standard unit turn-on time, which is identical to the sequence shown at time  $t_0$ . At time  $t_4$ , the converter responds to an under voltage lockout condition. When the under voltage fault clears, the converter waits for the startup inhibit delay to pass before turning on.

### PART NUMBERING

The part number for SynQor's PowerQor converters with the alternative startup will have a "Y" as the last character in the part number as shown in the example below.

PQ60015EML15NNY

Modules with the standard 200ms startup inhibit period end with the letter "S" (standard features). All other specifications for the "Y" option modules are identical to PowerQor converters of equivalent input voltage, output voltage and output current. Contact the factory for specific product option availability.

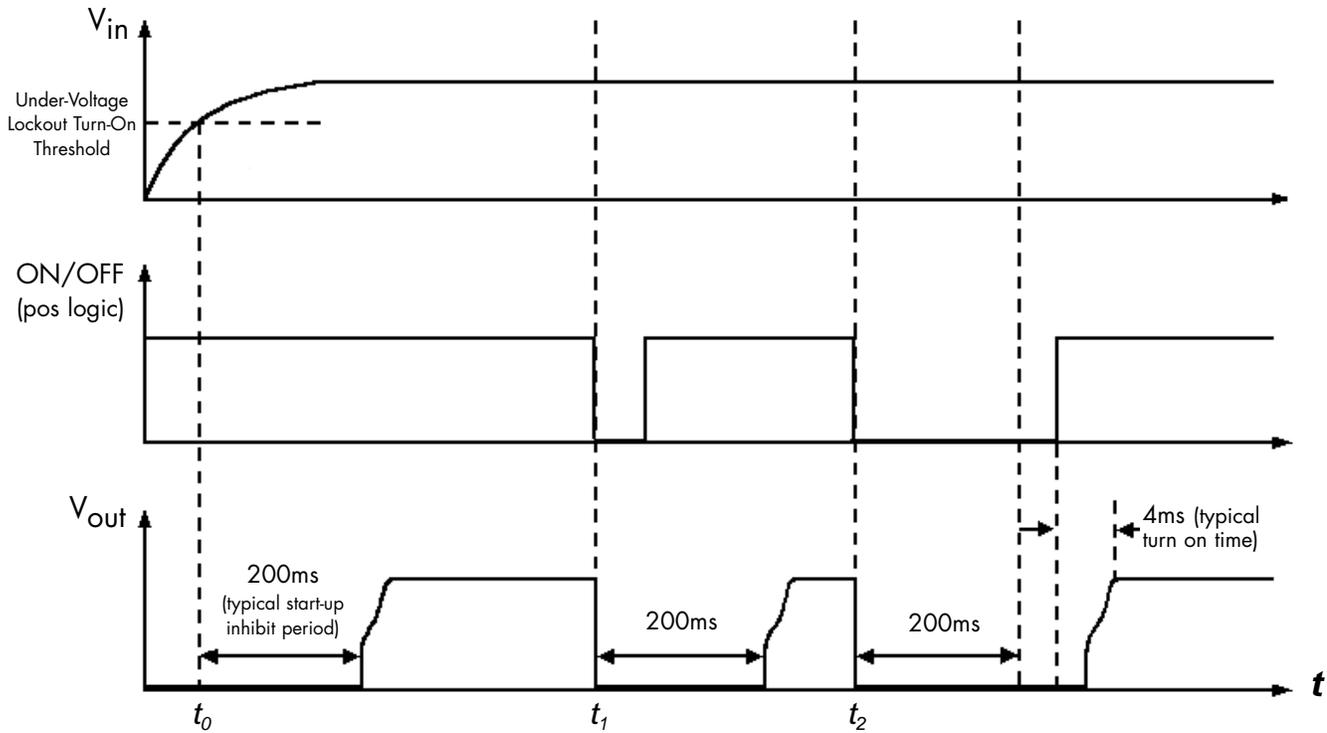


Figure 1: Standard Startup Inhibit Period - "S" option (turn-on & inhibit time not to scale)

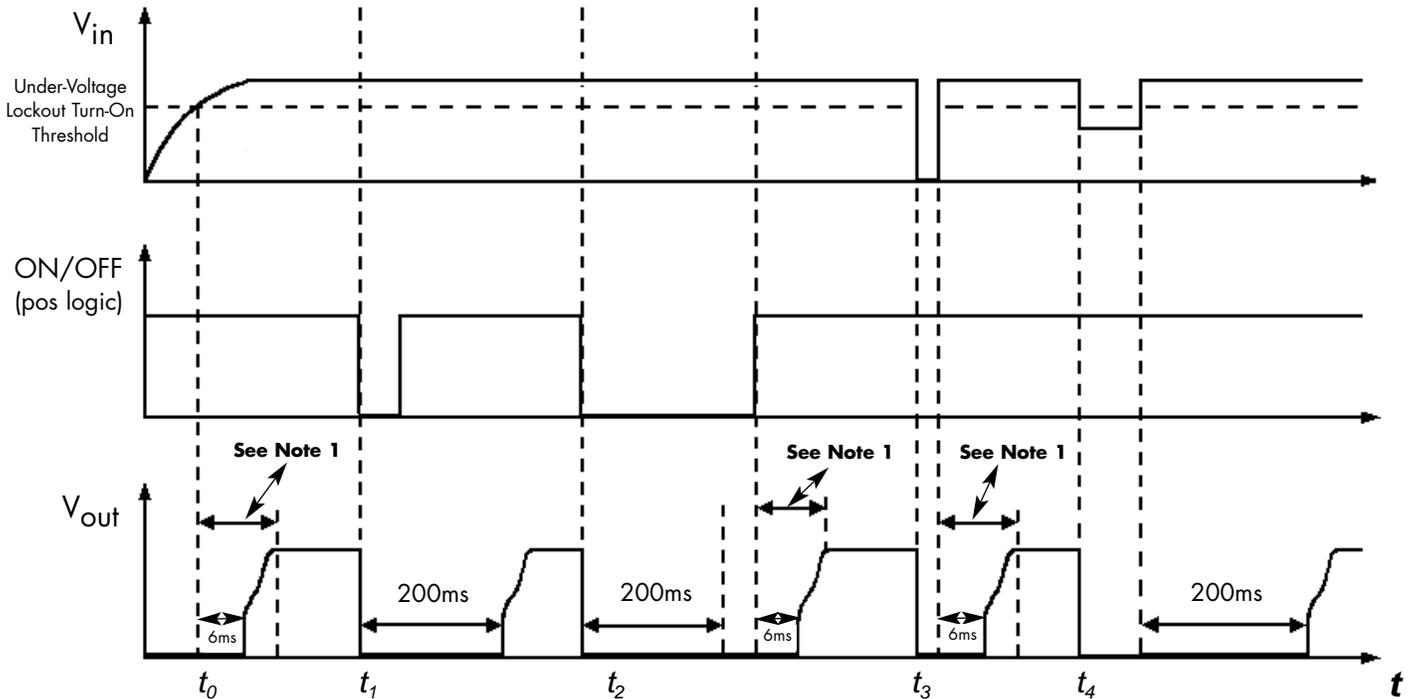


Figure 2: Alternative Startup Inhibit Period - "Y" option (turn-on & inhibit time not to scale)

**Note 1:** If the module is enabled as the input voltage rises, the output will be present within 6ms plus the standard unit turn-on time (see the Turn-On Time listed in the Dynamic Characteristics parameter section of the standard product technical specification) after the input voltage exceeds the UVLO trip point.