

# Supercapacitor backup power supply with TPS63802



A backup power supply is an electrical system that provides emergency power to a load when the main power source fails. An appropriate backup power supply provides instantaneous protection from main power interruptions without glitches, by supplying energy which is stored in backup capacitors or batteries. Such backup power supplies are typically used to protect hardware such as telecommunication equipment, solid-state drives (SSDs), storage systems, industrial equipment, or other electrical equipment, where an unexpected power disruption can cause malfunction or data loss.

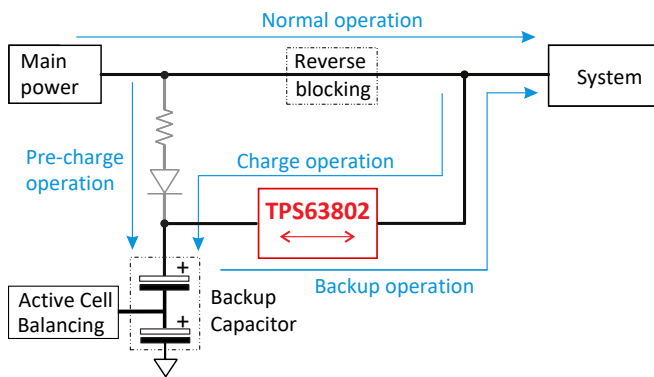


Figure 1. Simplified block diagram

The solution with TPS63802 uses the same principle as the reference design PMP9766. In this application, TPS63802 is used to charge the backup capacitor as long as the main power supply is available. When the main power fails, TPS63802 automatically supplies the system with the stored energy out of the backup capacitor.

The report describes the feasibility of a backup power supply implementation with TPS63802. It also lists the benefits of using TPS63802 over TPS63020. Detailed description and implementation of the circuit used for the measurements can be found in the application report [SLVA726](#).

The simplified block diagram in [Figure 1](#) shows the implementation with TPS63802. This setup was used to perform the following tests with a main power voltage of 3.3 V and a constant load of 0.4 A.

[Figure 2](#) and [Figure 3](#) show the Pre-charging and charging cycle and backup operation.

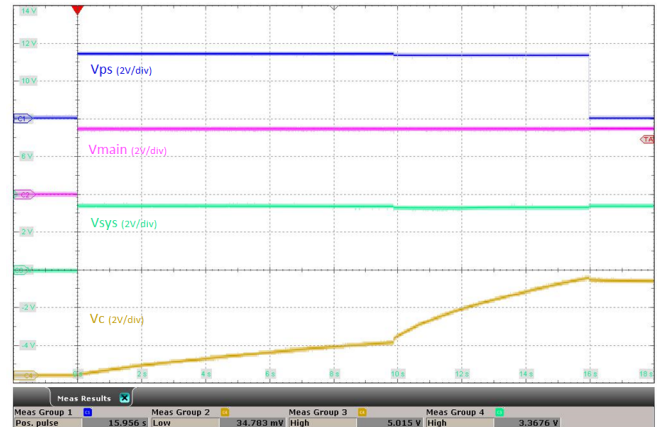


Figure 2. Pre-charging and charging cycle

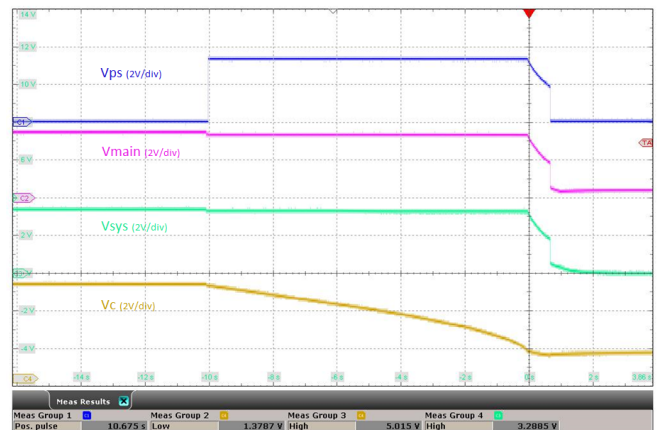


Figure 3. Backup operation

Due to the lower minimum  $V_{IN}$  and higher efficiency of TPS63802, the backup operation time can be improved by 10% compared to TPS63020. Another clear benefit for TPS63802 is the reduced solution size due to 50% smaller package and 3x less minimum output capacitance.

[Table 1](#) summarizes the test results and highlights further benefits of TPS63802.

**Table 1. Device comparison and benefits**

Parameter	TPS63020	TPS63802
Solution size	3 mm x 4 mm QFN package COUT 3x 22 $\mu$ F (0603)	2 mm x 3mm QFN package COUT 1x 22 $\mu$ F (0603)
VIN range	1.8 V to 5.5 V	1.3 V to 5.5 V
Efficiency	good at high load	good at high load and improved at low load
Charging Time	15.7 s	15.9 s
Backup Time	9.6 s	10.7 s

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