



For Data Centers

# Power loss protection (PLP)

Protect your data against sudden power loss

Application note

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## 1. What is power loss protection (PLP)?

PLP is the methodology that protects data in storage devices against sudden power loss. During solid-state drive (SSD) operation, data is temporarily stored in the DRAM cache memory in the SSD to reduce the performance gap between the host interface and the NAND flash memory. However, DRAM memory is volatile and cannot hold data without an external power supply. In the normal power off process when the STANDBY command is transmitted to the SSD device, there's a step to flush data from the DRAM to the NAND flash memory, updating the latest metadata and user data. But in cases of unexpected sudden power loss, such as unplugging the power to the system without prior notification, unexpected power outages, sudden battery loss or unplugging devices from the system, the flushing process cannot be completed and, depending on the type of cached data in the DRAM memory, sudden power loss can cause serious device failure.

Therefore, PLP is a way to create more time for the data flushing process under sudden power off situations by using dedicated capacitor components. These capacitors are charged during power on and offer charged power to the SSD circuit when external power is off so that the data flush can be completed.

## 2. Why is PLP important?

What will happen if sudden power loss occurs without any protection guard? Data not updated will remain in the SSD and this can cause data compatibility problems or even detection failure. More importantly, in data center applications, all stored data is considered property to be offered to the data centers' customers. Therefore, securing data integrity is very important and PLP helps to protect customer data.

## 3. How does PLP protect my data?

To protect all data, regardless of any power supply problems, users should choose the SSD product that supports PLP. When the SSD is powered on, PLP capacitors start to charge the current and, if external power is off for any reason, the charged current in the capacitors starts to discharge to offer additional power (current) to the SSD. This process holds the DRAM data and allocates time for the data flush from the DRAM to the NAND to occur, updating the latest data. This flushing task should be completed within the discharging time.

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### 4. Samsung SSDs for data centers are

Samsung 845DC PRO and 845DC EVO SSDs for data centers are equipped with tantalum capacitors to protect all data in the write cache in case of a power failure. This enterprise-grade PLP provides an added level of security to ensure that valuable data is well protected against data corruption caused by sudden power loss.

Tantalum capacitors are ideal for ensuring that the drive maintains enough power to complete the necessary functions it was performing when an unforeseen power failure occurred. Plus, they offer several advantages over aluminum electrolytic supercapacitors. Because they contain no liquid electrolyte to dry out, tantalum capacitors can last for decades. They are also able to operate in a wide range of temperatures, making them highly suitable for use in harsh environments, and they have a high volumetric efficiency.

Below is a table that shows the PLP support information by model and PLP tantalum capacitor.

Samsung SSDs for data centers	PLP support	Capacitance	Backup time
845DC PRO	Yes	1.5 mF (400GB) 1.8 mF (800GB)	20-40 ms
845DC EVO	Yes	1.4 mF (240GB) 2.1 mF (480GB) 2.3 mF (960GB)	20-40 ms

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