



Enhanced power-loss data protection in the Intel® Solid-State Drive 320 Series

Data safety features prepare for unexpected power-loss and protect system and user data.



Worried about data loss during unplanned power shutdowns? Waiting for a solution to address system power loss in client environments or inadvertent drive removal in data center applications? Your wait is over – the Intel® Solid-State Drive 320 Series (Intel® SSD 320 Series) introduces enhanced power-loss data protection features that prepare the SSD for unexpected system power loss and protect your data.

Importance of Power-Loss Data Protection

During a “clean” shutdown, most host systems initiate a command (the STANDBY IMMEDIATE command) to an SSD to give the SSD enough time to prepare for the shutdown. This allows the SSD to save data currently in transition (in temporary buffers) to the non-volatile NAND media.

However, during an unsafe power shutdown, the SSD abruptly loses power before the host system can initiate the STANDBY IMMEDIATE command. This prevents data in the temporary buffers from being saved in the non-volatile NAND.

In the Intel SSD 320 Series, user data and system data are stored in temporary buffers for a very short period of time compared to their residency in the NAND media. The Intel SSD 320 Series makes sure both types of data are protected during unexpected power loss events.

How Power-Loss Data Protection is Implemented

The Intel SSD 320 Series contains hardware- and firmware-based power-loss data protection features. The SSD includes a power-fail detection circuit, which sends a signal to the ASIC controller in the SSD indicating there is an imminent drop in power level. Triggered by this, SSD firmware disconnects the input power from the SSD.

The SSD then relies on its on-board power-loss protection capacitance to provide enough energy for the SSD firmware to move data from the transfer buffer and other temporary buffers to the NAND.

What Type of Data is Protected

During an unsafe shutdown, firmware routines in the Intel SSD 320 Series respond to power loss interrupt and make sure both user data and system data in the temporary buffers are transferred to the NAND media. Additionally, given the energy provided by the capacitor elements and urgency to recover data, firmware de-prioritizes non essential controller activities to quickly get into data saving mode — all with no impact on overall system performance.

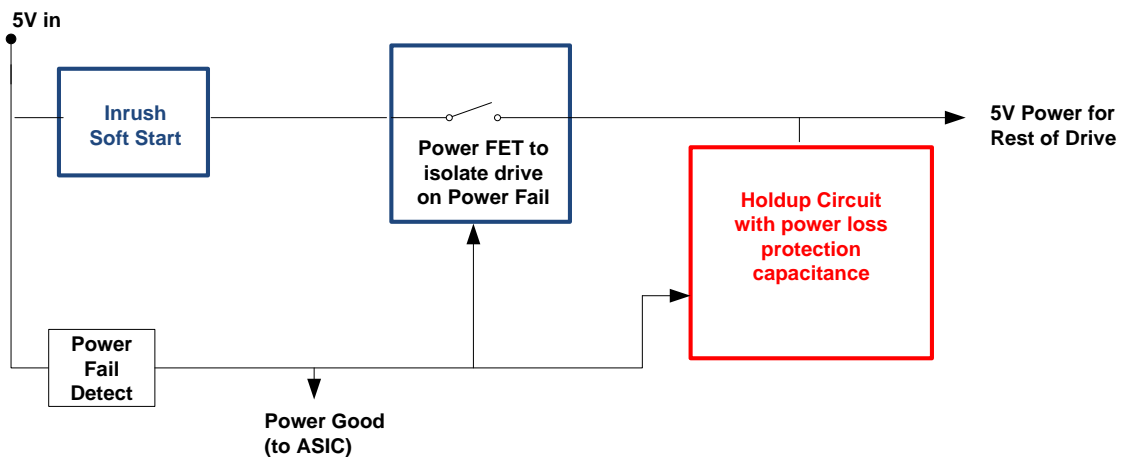
Power-loss Tolerant Storage Capacitance

The heart of the Intel SSD 320 Series power-loss protection scheme is the on-board power-loss tolerant storage capacitance.

The Intel SSD 320 Series uses small value, light-weight discrete capacitances to assure that all user data is saved to the storage media. This solution is different from a super capacitance-based solution. The capacitors are rated to meet Intel SSD operational specifications. This ensures that sufficient energy is stored at any given time during different operating conditions as well as throughout the life of the SSD.

Inrush Current Mitigation Scheme

During hot plugging or inserting, there is possibility of high inrush current (higher than normal operating current) due to charging of input capacitors. The Intel SSD 320 Series has inrush current mitigation circuits (see figure below) to limit these undesired current spikes. This scheme limits the current within 1.2 amps during startup. This helps the system from browning out the power system due to high instantaneous current needs and provides a complete robust solution to handle power management.



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