Technical Article

How Can Watchdog Save Your System from Catastrophic Damages?

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Are you concerned about your system safety due to an unexpected voltage spike or current surge on the system? The current surges and voltage spikes could be caused by software running on the system. An unexpected command from software can put the system in an infinite loop resulting current surges or voltage spikes on power rails and potentially damaging the device.

Luckily, there are multiple options to save your system or add protective measures:

- Use a reset button to turn off the system.
- Remove the main power supply.
- Add a monitoring circuit to turn off the power supplies.

All of these options are really good, but come with a hefty price tag and require additional circuitry on the board. For example, the reset button is useless without an external trigger to press the button or a monitoring circuit to cause a reset trigger. Removing the power supply will not happen without human action and adding an external circuit to activate or deactivate the system will add cost.

Instead of paying extra for a monitoring circuit, how about selecting a power supplies that give you a monitoring circuit integrated at no additional cost? The solution to this problem can be very simple if you optimize the system to operate in such a way that it uses an integrated smart watchdog.

A PMIC like the TPS65911, TPS80032 or TPS65217 allows you to use an integrated watchdog, which you can configure in different ways to shut down a system when an unexpected voltage occurs or when the watchdog timer does not reset due to an unexpected software loop. The watchdog has periodic and interrupt operation modes selected by I2C, then sends commands to PMIC registers. Figure 1 shows an example of the different interrupt modes available in PMICs.

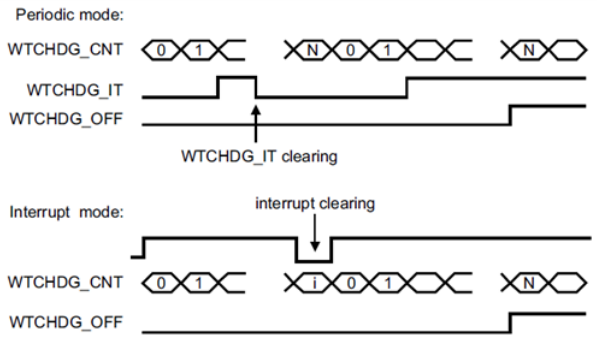

Figure 1. Watchdog Modes

In periodic operation mode, an interrupt is generated with a regular period defined by the PMIC's register setting. The IC initiates watchdog shutdown if the interrupt is not cleared within the period. The watchdog interrupt watchdog counter is reinitialized when power is reset to the PMIC.

In interrupt operation mode, the IC initiates a watchdog counter when the interrupt is set to pending and cleared when interrupt is cleared. If the interrupt is not cleared before the watchdog expiration timer elapses, the device goes into off mode and helps prevent against system overheating. By default, periodic watchdog functionality is enabled with the maximum watchdog time period, which is also configurable as the modes. A simple, smart choice can help save your system and time.

Additional Resources

- Start designing with the TPS65911.
- Sample and purchase the TPS65911.
- Sample and purchase the TPS80032.

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