

How to differentiate between power supply standby voltage and off-load power draw

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This white paper is intended for electronics engineers and designers working with power systems for the industrial environment, and helps to quickly differentiate between power supply standby voltage and off-load power draw.

References

www.uk.tdk-lambda.com/cus350m

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Standby Voltage

The use of a Standby Voltage on computer power supplies became widespread when the ATX specification was published in 1995. It enables a computer to be put into a low power consumption mode without fully powering down the processor, allowing a quick response when activated again. This was achieved by using a remote on/off signal to turn off the outputs, but still supplying a small amount of power to the processor from an independent voltage. This “Standby Voltage” is always present even if the main outputs are inhibited using the remote on/off.

Figure 1 shows a block diagram for a power supply like TDK-Lambda’s CUS350M, which features a main output, an auxiliary output (typically used for driving fans) and a standby voltage. A remote on/off is also provided.

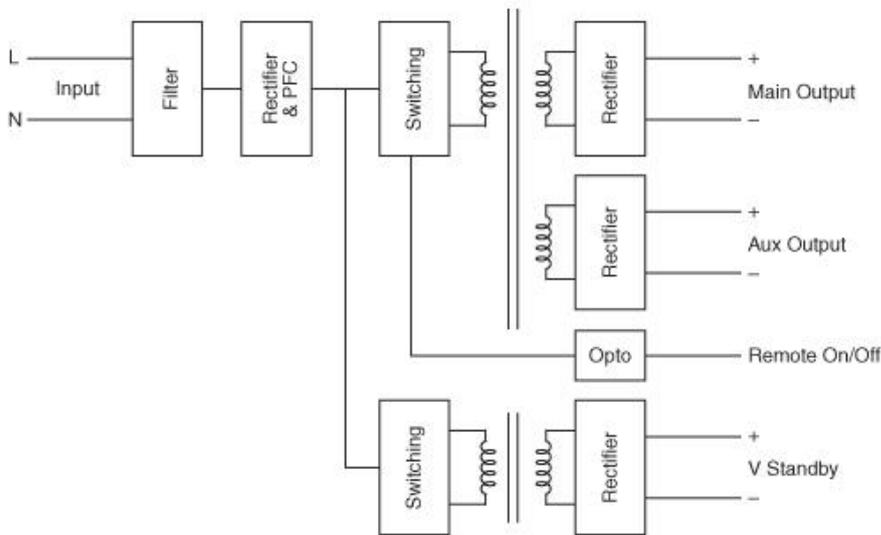


Figure 1: CUS350M power supply block diagram

The main and the auxiliary outputs use a common transformer and switching circuit. If the remote on/off is activated, both the main output and the auxiliary will be turned off. As the V Standby output has an independent transformer and switching circuit, it will continue to operate. Figure 2 shows the timing diagram under the different conditions.

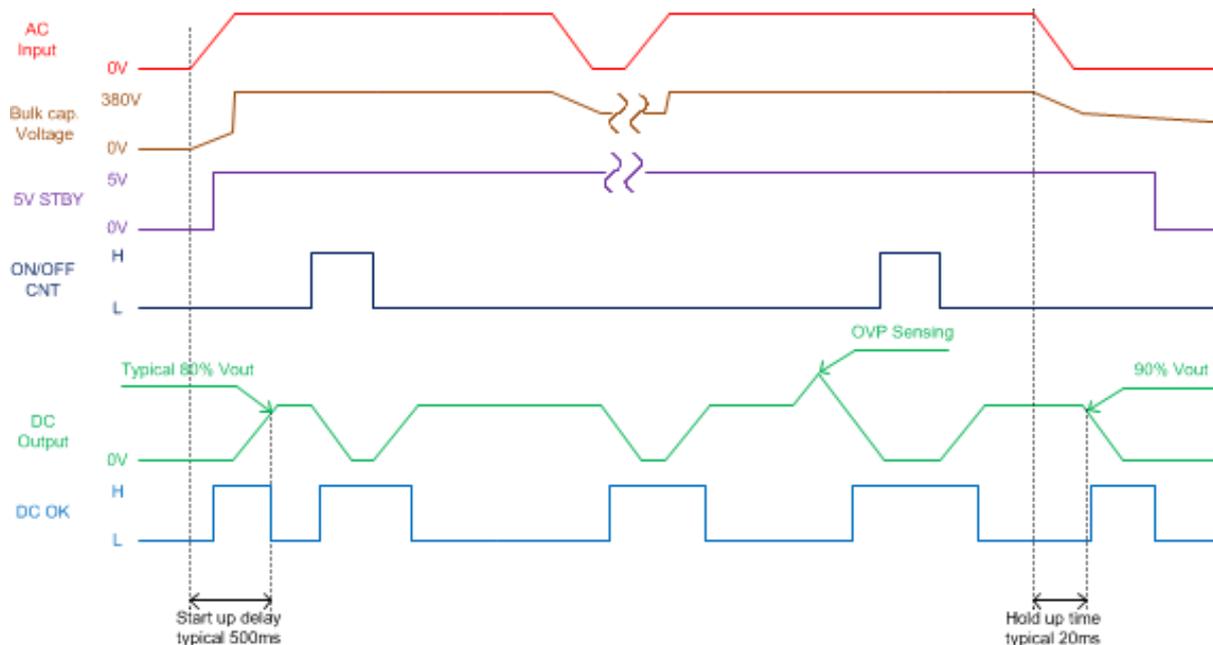


Figure 2: Timing diagram

It can be seen that when the remote on/off (dark blue line) is pulled high, the 5V Standby (purple) continues to operate, but the main DC Output (green) drops until the remote on/off is pulled low again. Of course if the AC Input voltage (red) is removed for an extended period, then the 5V Standby will eventually fall.

Off-load power draw

With low power products (typically 150W or less), the off-load power draw is measured by removing the load and measuring the input power.

With products greater than 150W that have a remote on/off feature, often the off-load power draw is measured when the remote on/off is activated. This may be written in the specification as “Standby input power draw” or “remote off power draw”. Users who want a low off-load power draw must turn off the main converter using the remote on/off function.

It must be noted that if the power supply has a standby voltage, then that load must also be at zero when minimum off-load power draw is needed. If for example the standby is supplying 5V 0.25A (1.25W) and the remote on/off is applied, the standby output will continue to delivery 1.25W, making it impossible to achieve <0.5W input power draw!



For more information and to access our world-leading power supply experience and comprehensive product range, please visit:

www.uk.tdk-lambda.com/350m

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