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ANALOG DEVICES MAX16132 Multi Voltage Supervisors with Xilinx FPGAs Owner's Manual

April 23, 2025

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ANALOG DEVICES MAX16132 Multi-Voltage Supervisors with Xilinx FPGAs

Product Specifications

Product Name

Supervisory Devices Complementary Parts Guide for Xilinx FPGAs

Description

This guide provides information on multi-voltage supervisors compatible with Xilinx FPGAs to ensure system stability.

Xilinx FPGA Family Voltage Specifications

FPGA Family	Core Voltage (V)	Auxiliary Voltage (V)	I/O Voltage (V)
Virtex UltraScale+	0.85, 0.72, 0.90	1.8	1.0, 1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Virtex UltraScale	0.95, 1	1.8	1.0, 1.2, 1.35, 1.5, 1.8, 2.5, 3.3

Product Usage Instructions

Step 1: Identify the FPGA Family Voltage Requirements

Refer to the table above to determine the core voltage, auxiliary voltage, and I/O voltage requirements for your specific Xilinx FPGA family.

Step 2: Select the Appropriate Multi-voltage Supervisor

Based on the voltage requirements of your Xilinx FPGA, choose the corresponding ADI Multi-voltage Supervisor part number MAX16132.

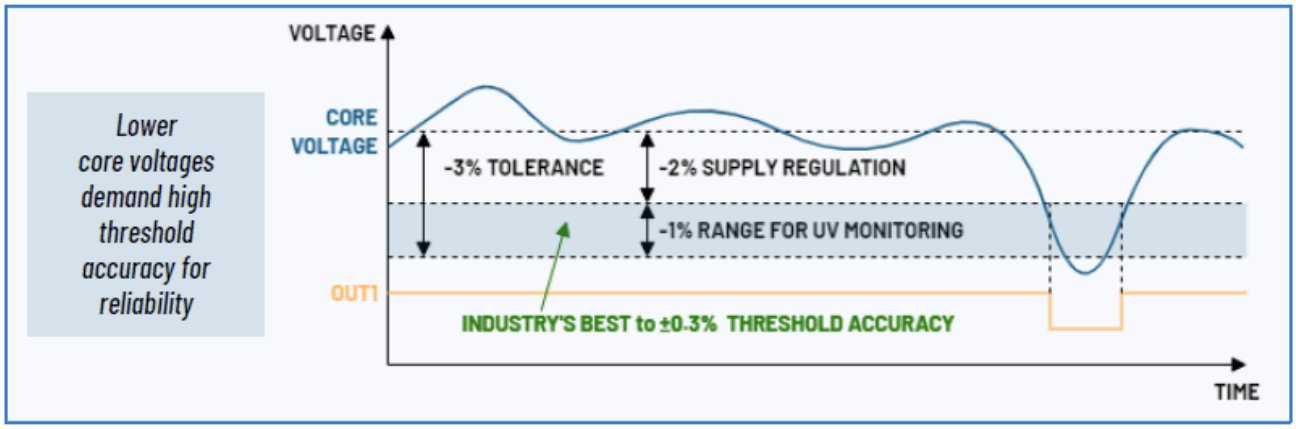
Step 3: Installation and Configuration

Follow the installation instructions provided with the MAX16132 supervisor to monitor and maintain the required voltages for your Xilinx FPGA.

Supervisory Devices Complementary Parts Guide for Xilinx FPGAs

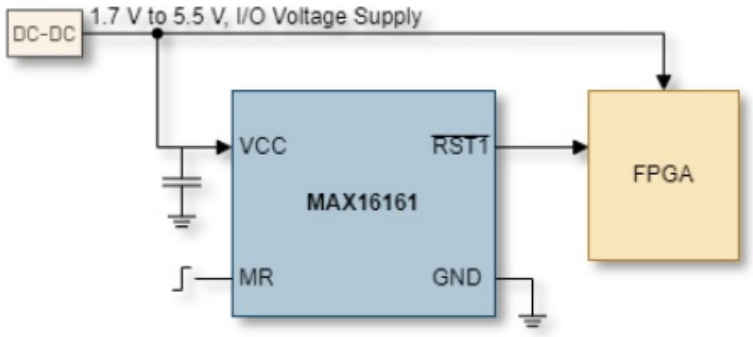
Modern FPGA designs leverage advanced fabrication techniques, enabling smaller process geometries and lower core voltages. This trend, however, necessitates the use

of multiple voltage rails to accommodate legacy I/O standards. To guarantee system stability and prevent unexpected behavior, each of these voltage rails requires dedicated supervision. Analog Devices offers a comprehensive portfolio of voltage monitoring solutions, encompassing a wide range,e; from basic single-channel to feature-rich multi-voltage supervisors boasting industry-leading accuracy (up to ±0.3% across temperatures). The core, I/O, and auxiliary voltage requirements for various Xilinx® FPGA families are presented in a clear and easy-to-reference table. Core voltage ranges typically span from 0.72 V to 1 V, while I/O voltage levels can vary between 1 V and 3.3 V.



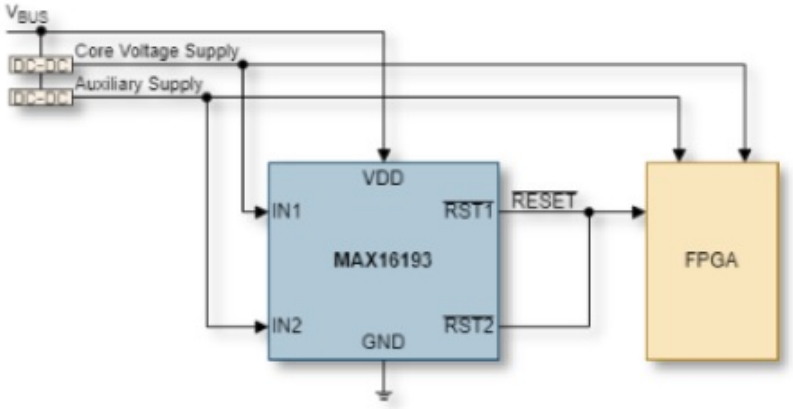
MAX16161:

nanoPower Supply Supervisor with Glitch-Free Power-Up and Manual Reset



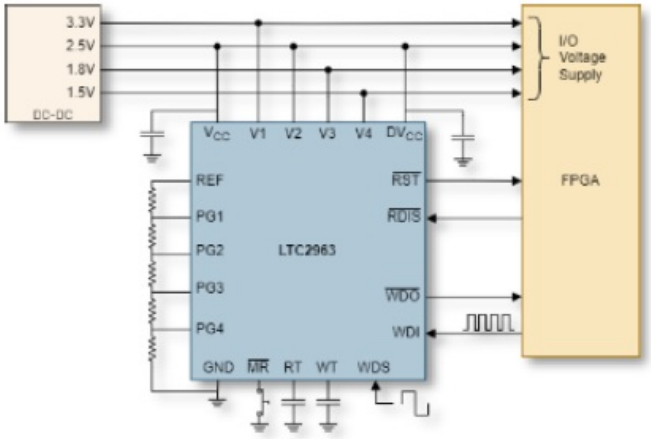
MAX16193:

±0.3% Accuracy Dual-Channel Window-Detector Supervisory Circuit



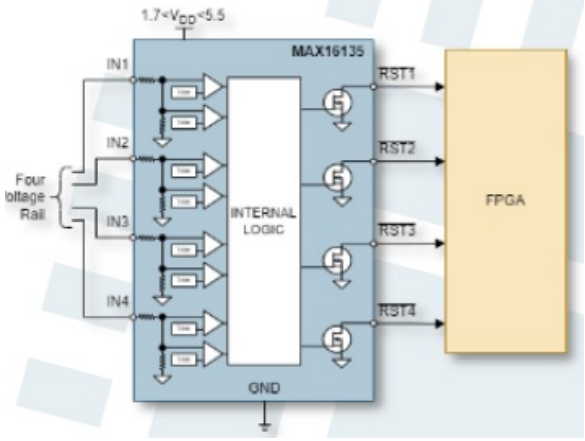
LTC2963:

±0.5% Quad Configurable Supervisor with Watchdog Timer



MAX16135:

±1% Low-Voltage, Quad-Voltage Window Supervisor



Multi-voltage Supervisors with Xilinx FPGAs

Xilinx FPGAs

Xilinx FPGA Family	Core Voltage (V)	Auxiliary Voltage (V)	I/O Voltage (V)
Virtex UltraScale+	0.85, 0.72, 0.90	1.8	1.0, 1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Virtex UltraScale	0.95, 1	1.8	1.0, 1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Virtex 7	1, 0.90	1.8, 2.0	1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Kintex UltraScale+	0.85, 0.72, 0.90	1.8	1.0, 1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Kintex UltraScale	0.95, 0.90, 1.0	1.8	1.0, 1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Kintex 7	1, 0.90, 0.95	1.8	1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Artix UtraScale+	0.85, 0.72	1.8	1.0, 1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Artix 7	1.0, 0.95, 0.90	1.8	1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Spartan Ultrascale+	0.85, 0.72, 0.90	1.8	1.0, 1.2, 1.35, 1.5, 1.8, 2.5, 3.3
Spartan 7	1, 0.95	1.8	1.2, 1.35, 1.5, 1.8, 2.5, 3.3

ADI Multi-voltage Supervisors

Number of Voltages Monitored	Part Number	Voltages Monitored (V)	Accuracy (%)
1	MAX16132	1.0 to 5.0	<1
1	MAX16161, MAX16162	1.7 to 4.85, 0.6 to 4.85	<1.5
2	MAX16193	0.6 to 0.9, 0.9 to 3.3	<0.3
3	MAX16134	5.0, 4.8, 4.5, 3.3, 3.0, 2.5, 1.8, 1.2, 1.16, 1.0	<1
4	LTC2962, LTC2963, LTC2964	5.0, 3.3, 2.5, 1.8, 1.5, 1.2, 1.0, 0.5V	<0.5
4	MAX16135	5.0, 4.8, 4.5, 3.3, 3.0, 2.5, 2.3, 1.8, 1.5, 1.36, 1.22, 1.2, 1.16, 1.0	<1
4	MAX16060	3.3, 2.5, 1.8, 0.62 (adj)	<1
6	LTC2936	0.2 to 5.8 (Programmable)	<1

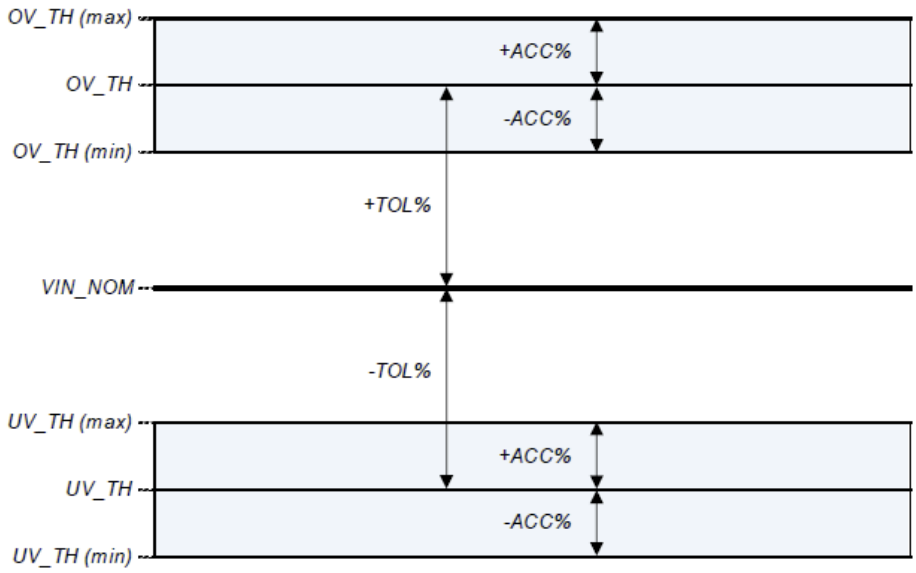
Window Voltage Supervisors

Window voltage supervisors are used to ensure FPGAs operate within a safe voltage

specification range. They do this by having undervoltage (UV) and overvoltage (OV) thresholds and generating a reset output signal if it goes beyond the tolerance window to avoid system errors and prevent damage to your FPGAs and other processing devices. There are two main things to consider when choosing a window voltage supervisor: Tolerance and Threshold Accuracy.

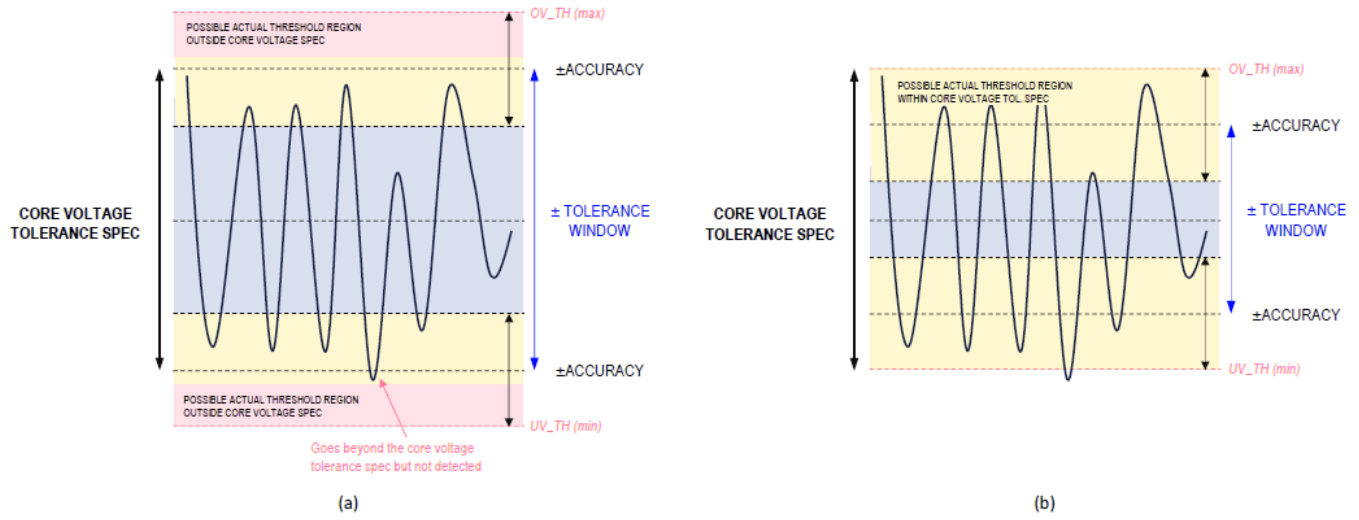
Tolerance is the range around the nominal monitored value which sets the overvoltage and undervoltage thresholds. While, Threshold Accuracy, typically expressed in percentage, is the degree of the conformance of the actual to the target reset thresholds.

- Undervoltage and overvoltage threshold variation with Threshold Accuracy



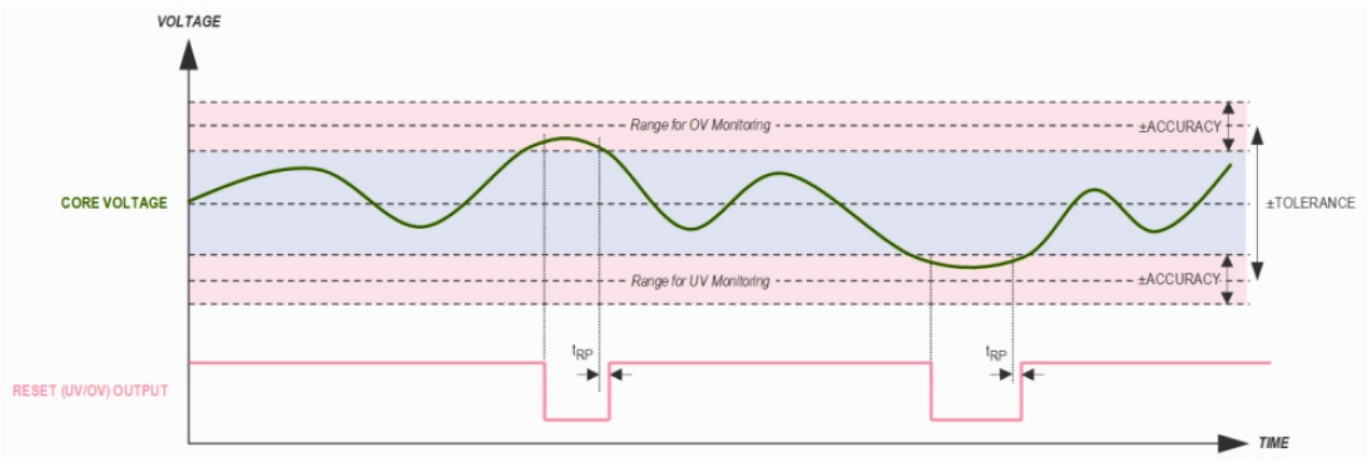
Selecting the Right Tolerance Window

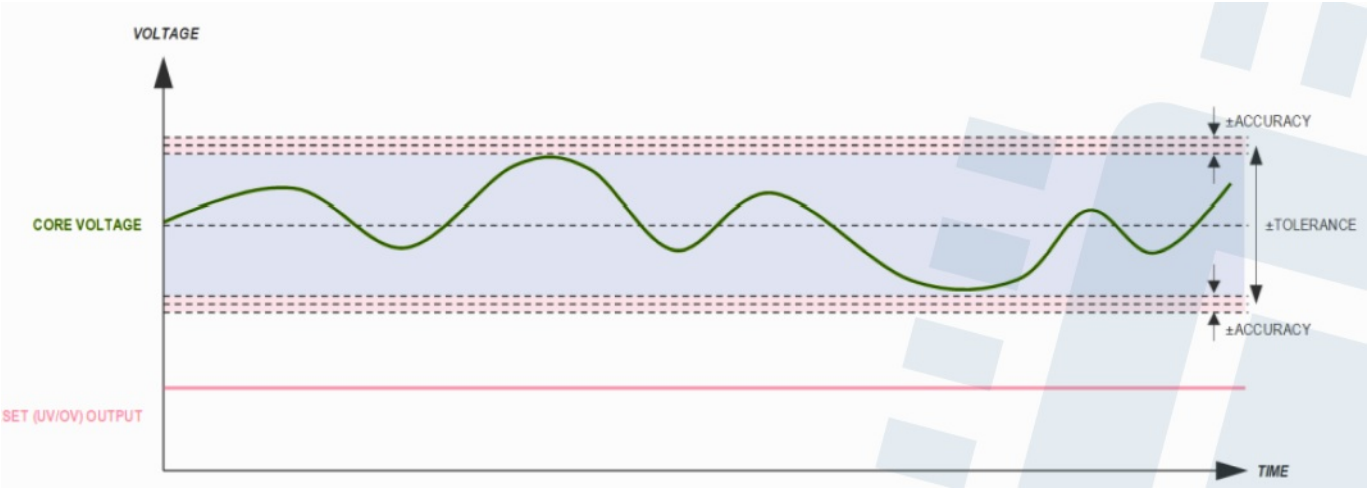
Choosing a window supervisor with the same tolerance as the core voltage requirement can lead to malfunctions due to threshold accuracy. Setting the same tolerance as the operating requirement of the FPGA can trigger a reset output near the maximum overvoltage threshold, OV_TH (max), and minimum undervoltage threshold,d UV_TH (min). The figure below illustrates tolerance setting (a) same with core voltage tolerance vs. (b) within the core voltage tolerance.



Impact of Threshold Accuracy

Compare two window voltage supervisors with different threshold accuracy, monitoring the same core voltage supply rail. The supervisor with a higher threshold accuracy will deviate less from the threshold limits in comparison to voltage supervisors with lower accuracy. Examining the figure below, window supervisors with lower accuracy (a) create a narrow power supply window since the reset output signal can assert anywhere within the UV and OV monitoring range. In applications with unreliable power supply regulation, this could pose a more sensitive system prone to oscillation. On the other hand, supervisors with high threshold accuracy (expand this range to provide a wider safe operating range for your power, which will, overall performance.





Power Supply Sequencing

Modern FPGAs utilize multiple voltage rails for optimal performance. Defined power-up and power-down sequencing requirements are crucial for FPGA reliability. Improper sequencing introduces glitches, logic errors, and even permanent damage to sensitive FPGA components. Analog Devices offers a comprehensive range of supervisory/sequencing circuits specifically designed to address the challenges of FPGA power management. These devices orchestrate the power-up and power-down sequence of various voltage rails, guaranteeing that each rail reaches its designated voltage level within its required ramp time and order. This power management solution minimizes inrush current, prevents voltage undershoot/overshoot conditions, and ultimately safeguards the integrity of your FPGA design.

ADI Supervisory and Sequencing Solutions

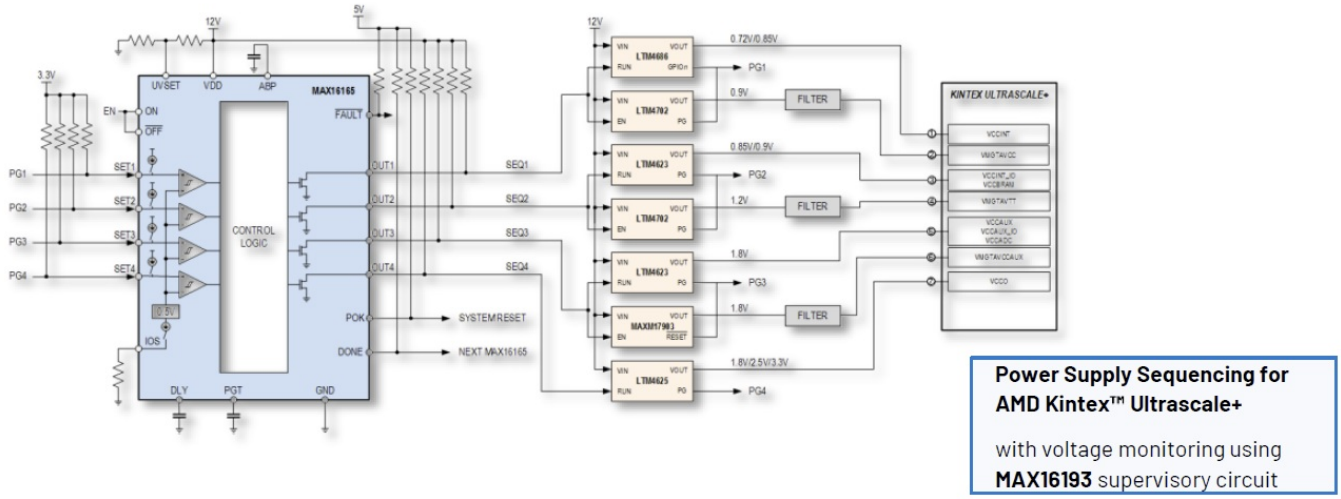
Number of Supplies Monitored	Part Number	Operating Vrange	Threshold Accuracy	Sequence	Programming Method	Package
1: cascadable	MAX16895	1.5 to 5.5V	1%	Up	R’s, C’s	6 uDFN

1: cascadable	MAX16052, MAX16053	2.25 to 28 V	1.8%	Up	R’s, C’s	6 SOT23
2: cascadable	MAX6819, MAX6820	0.9 to 5.5V	2.6%	Up	R’s, C’s	6 SOT23
2	MAX16041	2.2 to 28V	2.7% and 1.5%	Up	R’s, C’s	16 TQFN
3	MAX16042					20 TQFN
4	MAX16043					24 TQFN
4: cascadable	MAX16165, MAX16166	2.7 to 16V	0.80%	Up, Reverse- Power Down	R’s, C’s	20 WLP, 20L TQFN
	MAX16050	2.7 to 16V	1.5%	Up, Reverse- Power Down	R’s, C’s	28 TQFN
5: cascadable	MAX16051					
6: cascadable	LTC2937	4.5 to 16.5 V	<1.5%	Programmable	I2C, SMBus	28 QFN
8	ADM1168	3 to 16V	<1%	Programmable	SMBus	32 LQFP

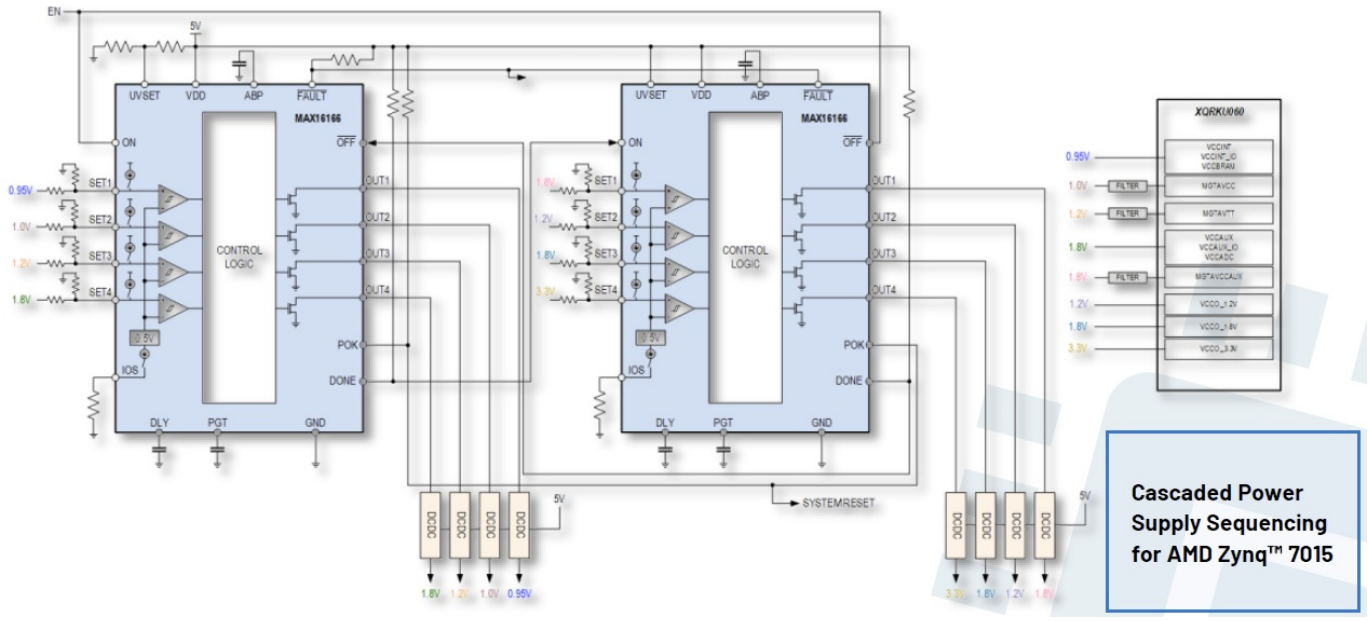
8	ADM1169	3 to 16V	<1%	Programmable	SMBus	32 LQFP, 40 LFCSP
10: cascadable (max of 4)	ADM1260	3 to 16V	<1%	Programmable	SMBus	40 LFCSP
12: cascadable	ADM1166	3 to 16V	<1%	Programmable	SMBus	40 LFCSP, 48 TQFP
17: cascadable	ADM1266	3 to 15V	<1%	Programmable	PMBus	64 LFCSP

MAX16165/MAX16166:

Highly Integrated, 4-Channel Sequencer and Supervisor



Power Supply Sequencing requiring 8 Power Regulators using MAX16165



FAQs

Q: Can I use a different multi-voltage supervisor with Xilinx FPGAs?

A: It is recommended to use the specified ADI Multi-voltage Supervisor MAX16132 for compatibility and accurate voltage monitoring.

Documents / Resources

	ANALOG DEVICES MAX16132 Multi Voltage Supervisors with Xilinx FPGAs [pdf] Owner's Manual MAX16132, MAX16132 Multi Voltage Supervisors with Xilinx FPGAs, Multi Voltage Supervisors with Xilinx FPGAs, Supervisors with Xilinx FPGAs, Xilinx FPGAs

References

- User Manual

Analog Devices

Analog Devices, MAX16132, MAX16132 Multi Voltage Supervisors with Xilinx FPGAs, Multi Voltage Supervisors with Xilinx FPGAs, Supervisors with Xilinx FPGAs, Xilinx FPGAs

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