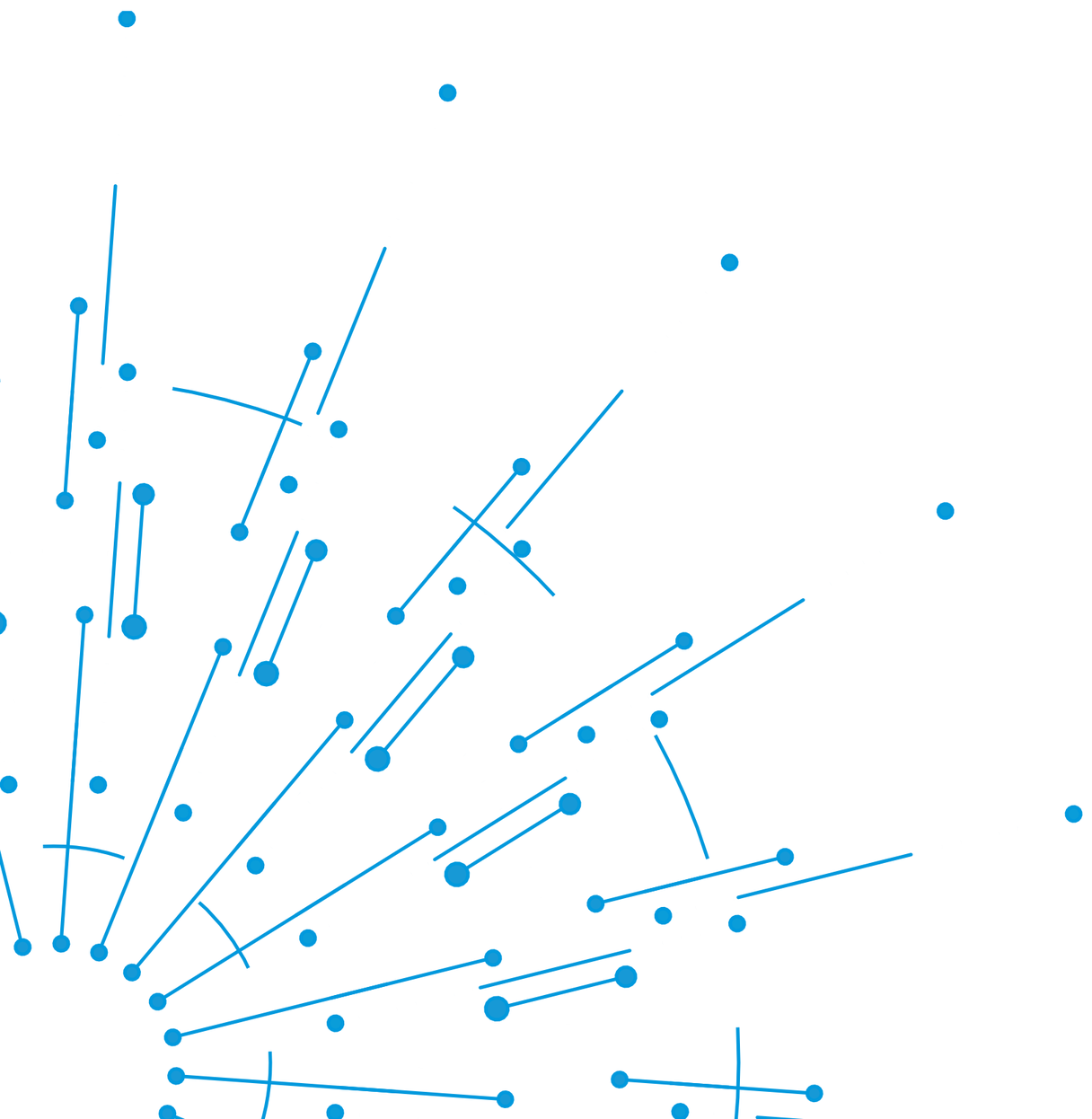
FlexPower

OCP Edge Power Supplies

February 9, 2021

Agenda

- FlexPower CRPS background
- OCP Edge
- Power Supply Considerations for OCP Edge



CRPS Standard Family of Power Supplies for Server, Storage and Network Applications

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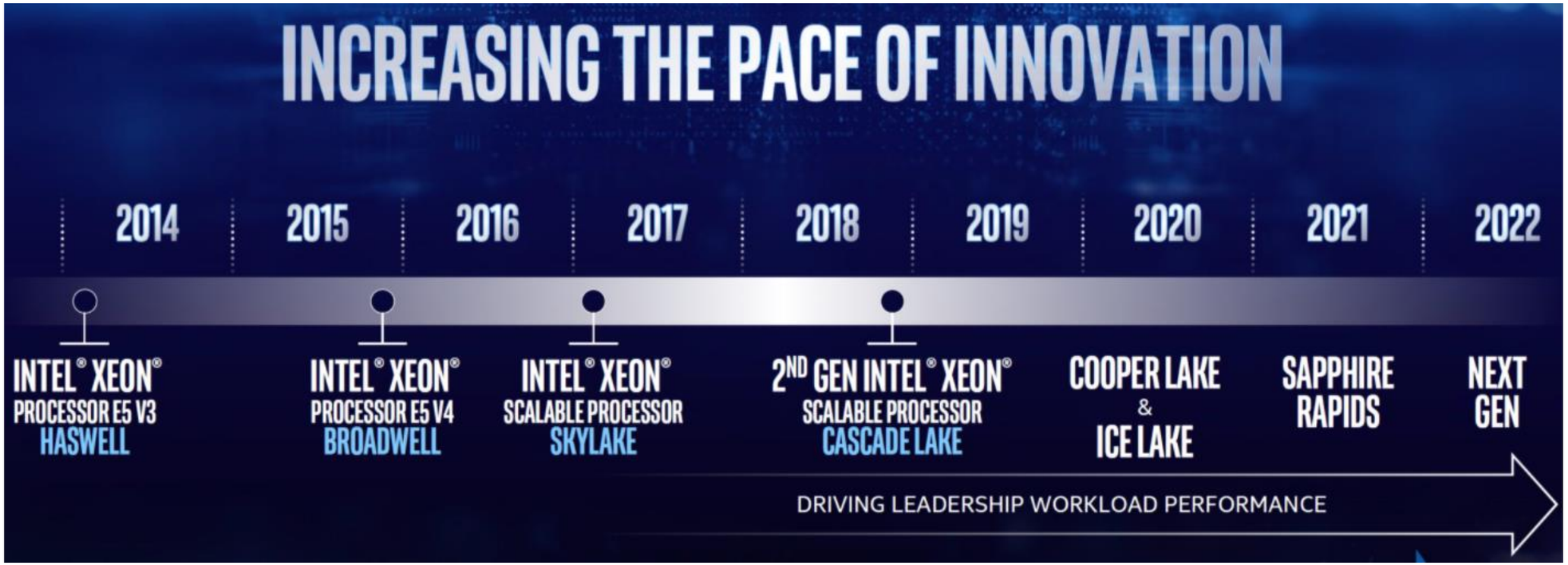
FlexPower CRPS Solutions – Aligns with Intel roadmap

185mm x 73.5mm x 40mm

265mm x 73.5mm x 40mm



CRPS 5G Application
EDGE server project

For more details:
https://www.opencompute.org/projects/edge

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OCP EDGE

- OCP EDGE is an open-source sub-group of OCP standardizing Edge Computing shelves with 2U and 3U rack-mount chassis options
- The system meets NEBS requirements
  - Earthquake, Airborne Contaminants, Humidity, EMC, Surge Levels
- 3U chassis uses two redundant 2000W power supplies
  - AC input 2000W (100-264 VAC)
  - DC input 2000W (40-72 VDC)
- 2U chassis uses two redundant 1200W power supplies
  - AC input 1200W (100-264 VAC)
  - DC input 1200W (40-72 VDC)

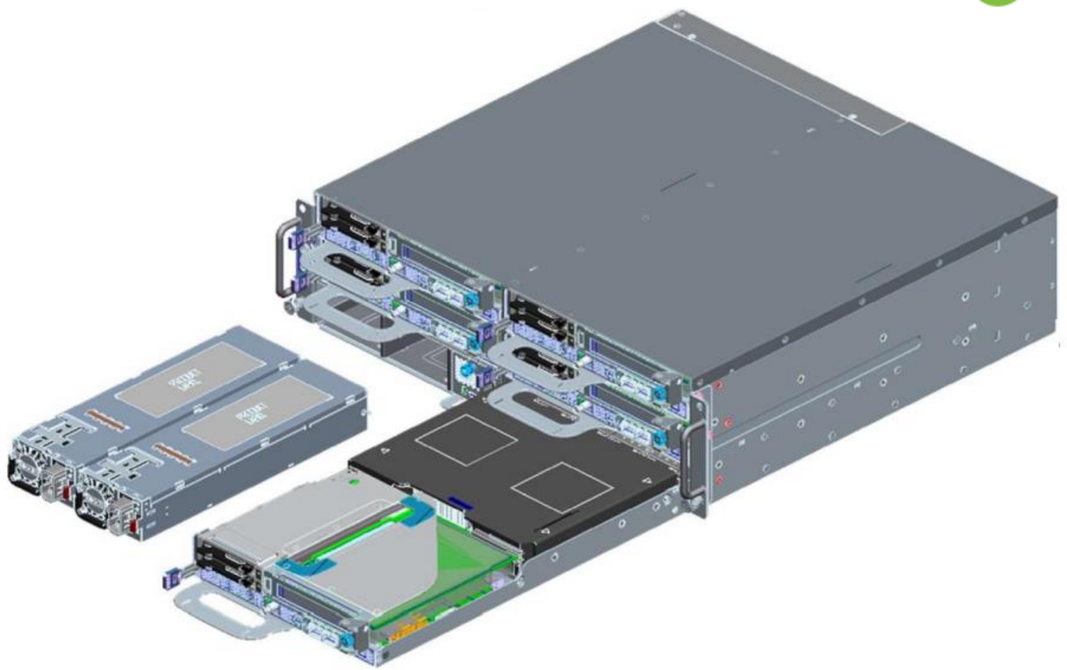

Figure 1 Open edge server chassis

Power Supply Considerations for OCP Edge

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OpenEDGE power considerations

- Comply with openEDGE specifications
- Meet NEBS requirements
  - Earthquake, Airborne Contaminants, Humidity, EMC, Surge Levels
- Communicate with RMC via PMBus
- Power the compute processor – Purley x86 (Skylake or Cascade Lake)
- AC and DC input power supplies must be interoperable
  - Current share, Hot Swap, Protection Circuits
- Hold-Up Time differences between AC and DC input power supplies

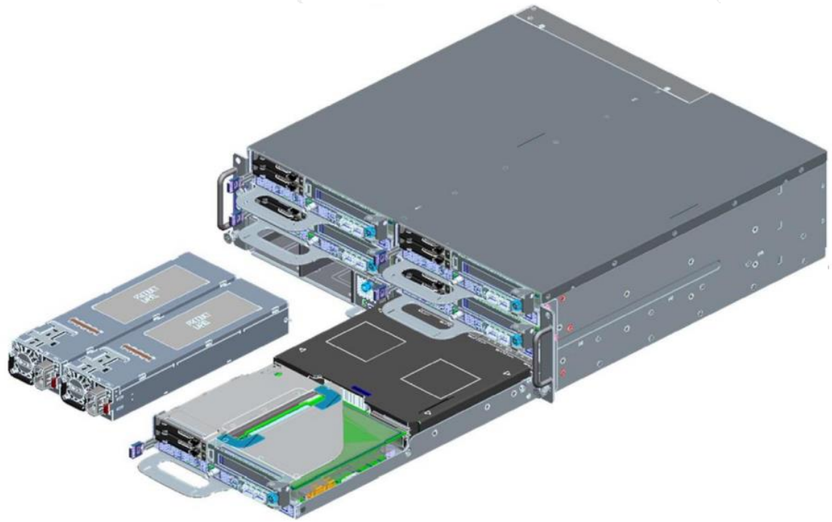
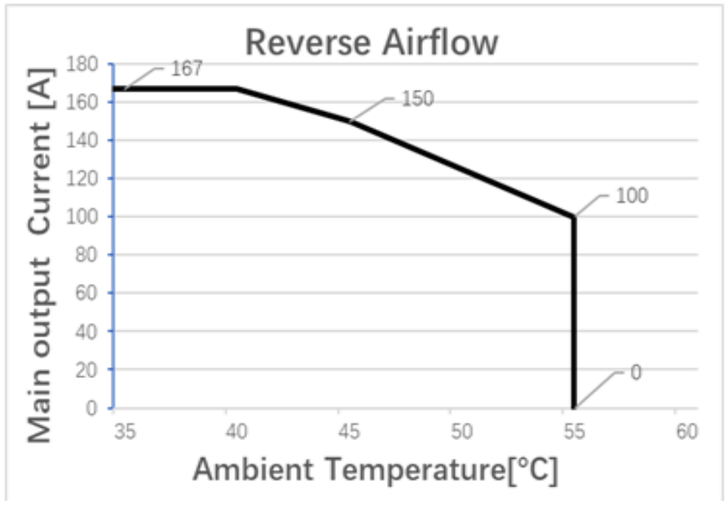
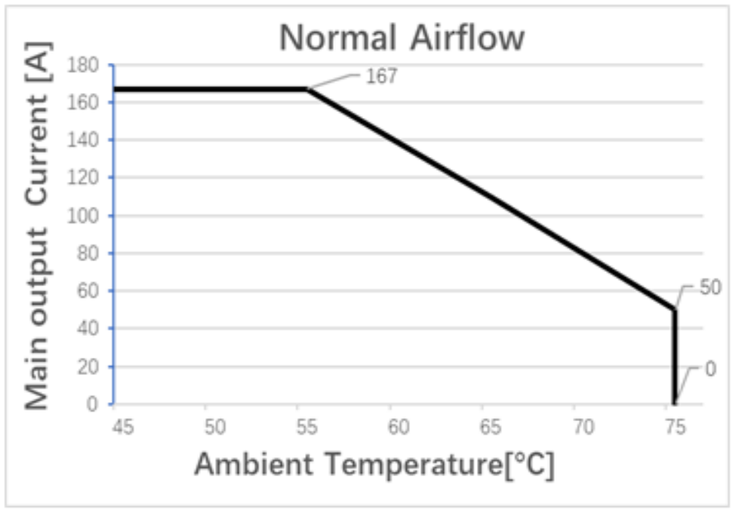


Figure 1 Open edge server chassis

Output Power derating over temperature



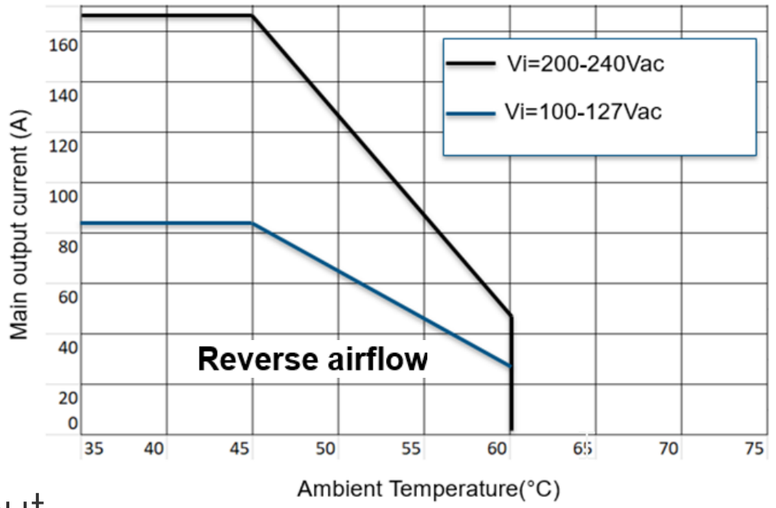


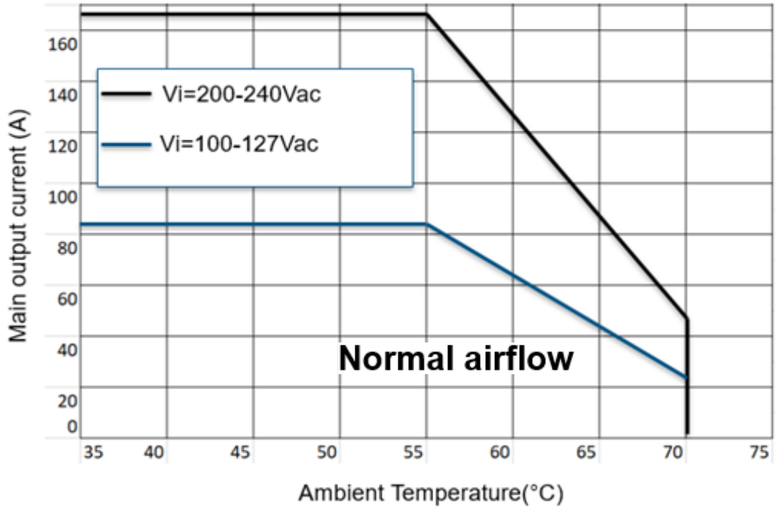
Thermal Hot Spots inside the DC and AC input power supplies are different based on the power stage physical differences in the primary.

DC Input

Need to work closely with the customer to qualify both AC and DC input models for thermal management and overtemperature protection.

AC Input





DC and AC timing differences

Table 9 DC Holdup / Dropout

Loading during DC dropout / holdup	12V Main Output Holdup time / Dropout duration	12V Standby Output Holdup time / Dropout duration
50% of max load	2ms	4ms
70% of max load	1.5ms	3ms
100% of max load	1ms	2ms

Table 9.1 AC Holdup / Dropout

Loading during AC dropout / holdup	Holdup time / Dropout duration
50% of max load	16msec/15ms
70% of max load	11msec/10ms
100% of max load	9msec/7ms

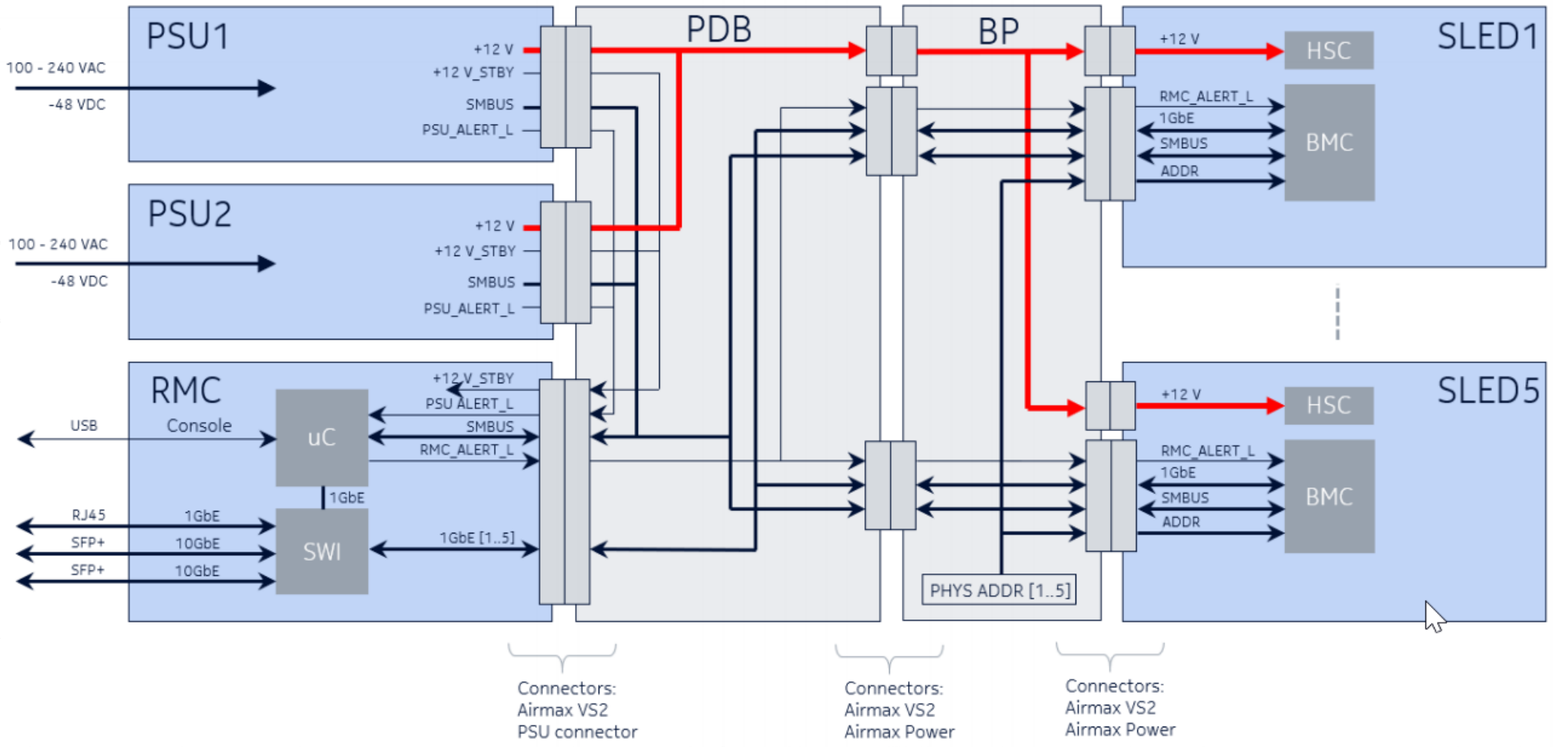
Table 21 Timing Requirements

Item	Description	Min	Nom	MAX	UNITS
Tpwok_holdup	Delay from loss of DC to de-assertion of PWOK at 40VDC 100% load.	0.5		5	ms
Tpwok_holdup	Delay from loss of AC to de-assertion of PWOK at 230V 100% load.	7			ms

The PWOK signal can be used to initiate NV-DIMM memory backup.
It is important to verify proper backup timing for AC and DC input power supplies.

EDGE Block Diagram • Enhancement Opportunities

Flex PN Normal Airflow (Airflow Output to DC Inlet): FPS-S-2000DDU00-101
Flex PN Reverse Airflow (Airflow DC Inlet to Output): FPS-S-2000DDU00-201
Flex PN Normal Airflow (Airflow Output to DC Inlet): FPS-S-1200DDU00-101
Flex PN Reverse Airflow (Airflow DC Inlet to Output): FPS-S-1200DDU00-201



Block diagram of Open edge chassis

Potential Future Power Considerations

- Power Distribution Board (PDB) connects to the Rack Management Controller (RMC)
  - Could use DC/DC converters with PMBus communication to enable more features such as sequencing
- Power supply hold-up time could be optimized to use non-volatile memory (NV-DIMM)
  - Additional hold-up required for NV-DIMM could be provided by battery backup
- Future Server sleds may upgrade Processor
  - Cooper Lake has different peak power requirements than Purley
  - 2100W model Cooper Lake compliant

The key is for the power supply company to anticipate changes based on a deep understanding of the customer's requirements and road map

Summary

- AC/DC and DC/DC Power Supplies are a critical component of edge computing equipment
- Power Supplies have features that can be optimized for unique 5G requirements
- Many features can be changed quickly and easily with firmware
- Some other features are implemented in hardware and require longer leadtime to change or implement
- Working closely with the power supply vendor is the best way to meet the program requirements on time

For further information contact:

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Thank you.