



High-Performance Buildings for High-Tech Industries

# Server Power Supply Loading Guideline

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# Need for Loading Guideline

- To ensure that the loading for each DC bus for a multi output server power supply is consistent when measuring power supply efficiency.
- To allow consistency in comparing server power supply efficiency reported by vendors as part of the electrical specification.

## Electrical Specifications

### Input

Input Range.....	90-264 VAC (Wide Ranging active pfc )
Frequency.....	47-63 Hz
Input Current.....	6.3A @ 100VAC; 3A @ 200VAC
Peak Inrush Current.....	< 25A peak ,specified line and temperature
Turn-on delay.....	1.5 Seconds maximum from ac applied
Efficiency.....	>68% @ Full load, specified line
EPA.....	>40% @ +5V/2.6A, 3.4V/1A, 5Vaux/0.5A, 115/230Vac
Blauer Engel.....	<8W standby input for 5V <sub>SB</sub> @500mA, 230Vac
EMI/RFI.....	CISPR 22 class B, FCC 47CFR part 15 class B, EN 55 022 class B, CE compliant. EN61000-3-2 class D ,JEIDA 75W to full load Active PFC >0.90PF





# Energy Efficient Power Supplies

## EPS12V - LOADING GUIDELINES (Rev 2.1)

450W Common Plane (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
Full	14.8	12.3	0.0	0.0	13.4	16.1	1.0	0.0
Typical	7.4	6.2	0.0	0.0	6.7	8.0	1.0	0.0
Light	3.0	2.5	0.0	0.0	2.7	3.2	1.0	0.0
550W Common Plane (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
Full	16.0	10.7	7.1	0.0	16.9	16.9	1.0	0.0
Typical	8.0	5.3	3.6	0.0	8.4	8.4	1.0	0.0
Light	3.2	2.1	1.4	0.0	3.4	3.4	1.0	0.0
550W Split Plane (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
Full	8.2	8.2	11.0	6.3	16.9	16.9	1.0	0.0
Typical	4.1	4.1	5.5	3.1	8.4	8.4	1.0	0.0
Light	1.6	1.6	2.2	1.3	3.4	3.4	1.0	0.0
600W Split Plane (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
Full	9.9	9.9	11.5	6.6	15.6	18.8	1.0	0.0
Typical	4.9	4.9	5.8	3.3	7.8	9.4	1.0	0.0
Light	2.0	2.0	2.3	1.3	3.1	3.8	1.0	0.0
650W Split Plane (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
Full	11.2	11.2	12.5	7.2	16.9	16.9	1.0	0.0
Typical	5.6	5.6	6.3	3.6	8.4	8.4	1.0	0.0
Light	2.2	2.2	2.5	1.4	3.4	3.4	1.0	0.0

Entry Chassis Power Supply (EPS) 12V Rev 2.1 Specification defines a non-redundant power supply that supports entry server computer systems.. (<http://www.ssiforum.org/html/adoptedspecs.asp>)

# Energy Efficient Power Supplies

## EPS 1U Version 2.1 LOADING GUIDELINES

125W (Loading in Amps)							
Loading	+12V1	+12V2	+12V3	+5V	+3.3V	+5Vsb	-12V
Full	3.0	N/A	N/A	12.0	6.0	1.0	0.0
Typical	1.5	N/A	N/A	6.0	3.0	1.0	0.0
Light	0.6	N/A	N/A	2.4	1.2	1.0	0.0
250W (Loading in Amps)							
Loading	+12V1	+12V2	+12V3	+5V	+3.3V	+5Vsb	-12V
Full	7.8	6.5	N/A	7.8	10.4	1.0	0.0
Typical	3.9	3.3	N/A	3.9	5.2	1.0	0.0
Light	1.6	1.3	N/A	1.6	2.1	1.0	0.0
350W (Loading in Amps)							
Loading	+12V1	+12V2	+12V3	+5V	+3.3V	+5Vsb	-12V
Full	11.9	10.6	N/A	7.9	10.6	1.0	0.0
Typical	6.0	5.3	N/A	4.0	5.3	1.0	0.0
Light	2.4	2.1	N/A	1.6	2.1	1.0	0.0

Entry Power Supply (EPS) 1U Rack Power Supply Specification defines a common power supply used in entry-level servers. (<http://www.ssiforum.org/html/adoptedspecs.asp>)

## Energy Efficient Power Supplies

# EPS 1U Version 2.1 (Continued)

400W (Loading in Amps)							
Loading	+12V1	+12V2	+12V3	+5V	+3.3V	+5Vsb	-12V
Full	13.7	12.1	N/A	9.1	12.1	1.0	0.0
Typical	6.8	6.1	N/A	4.6	6.1	1.0	0.0
Light	2.7	2.4	N/A	1.8	2.4	1.0	0.0
450W (Loading in Amps)							
Loading	+12V1	+12V2	+12V3	+5V	+3.3V	+5Vsb	-12V
Full	8.8	8.8	12.0	9.6	12.8	1.0	0.0
Typical	4.4	4.4	6.0	4.8	6.4	1.0	0.0
Light	1.8	1.8	2.4	1.9	2.6	1.0	0.0
500W (Loading in Amps)							
Loading	+12V1	+12V2	+12V3	+5V	+3.3V	+5Vsb	-12V
Full	9.8	9.8	14.2	9.4	12.6	1.0	0.0
Typical	4.9	4.9	7.1	4.7	6.3	1.0	0.0
Light	2.0	2.0	2.8	1.9	2.5	1.0	0.0

Entry Power Supply (EPS) 1U Rack Power Supply Specification defines a common power supply used in entry-level servers. (<http://www.ssiforum.org/html/adoptedspecs.asp>)

# Energy Efficient Power Supplies

## EPS 2U Version 2.1 LOADING GUIDELINES

480W (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
Full	15.0	15.0	N/A	N/A	12.8	15.4	1.0	0.0
Typical	7.5	7.5	N/A	N/A	6.4	7.7	1.0	0.0
Light	3.0	3.0	N/A	N/A	3.1	2.6	1.0	0.0
550W (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
Full	8.2	8.2	11.0	6.3	15.6	18.8	1.0	0.0
Typical	4.1	4.1	5.5	3.1	7.8	9.4	1.0	0.0
Light	1.6	1.6	2.2	1.3	3.1	3.8	1.0	0.0
600W (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
Full	9.9	9.9	11.5	6.6	15.6	18.8	1.0	0.0
Typical	4.9	4.9	5.8	3.3	7.8	9.4	1.0	0.0
Light	2.0	2.0	2.3	1.3	3.1	3.8	1.0	0.0
650W (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
Full	11.2	11.2	12.5	7.2	16.9	16.9	1.0	0.0
Typical	5.6	5.6	6.3	3.6	8.4	8.4	1.0	0.0
Light	2.2	2.2	2.5	1.4	3.4	3.4	1.0	0.0

Entry Power Supply (EPS) 2U Rack Power Supply Specification defines a common power supply used in entry-level servers. (<http://www.ssiforum.org/html/adoptedspecs.asp>)

# Energy Efficient Power Supplies

## ERP12V Rev 1.0 - LOADING GUIDELINES

550W Common Plane (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
100%	16.0	10.7	7.1	0.0	18.1	15.1	1.0	0.0
50%	8.0	5.3	3.6	0.0	9.0	7.5	1.0	0.0
20%	3.2	2.1	1.4	0.0	3.6	3.0	1.0	0.0
550W Split Plane (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
100%	8.2	8.2	11.0	6.3	16.9	16.9	1.0	0.0
50%	4.1	4.1	5.5	3.1	8.4	8.4	1.0	0.0
20%	1.6	1.6	2.2	1.3	3.4	3.4	1.0	0.0
650W Split Plane (Loading in Amps)								
Loading	+12V1	+12V2	+12V3	+12V4	+5V	+3.3V	+5Vsb	-12V
100%	10.3	10.3	13.7	7.8	15.6	18.8	1.0	0.0
50%	5.1	5.1	6.9	3.9	7.8	9.4	1.0	0.0
20%	2.1	2.1	2.7	1.6	3.1	3.8	1.0	0.0

Entry Redundant Power (ERP) Supply Guide defines a common redundant power sub-system for use in Pedestal servers and workstation systems. (<http://www.ssiforum.org/html/adoptedspecs.asp>)



# Basis for Loading Guidelines

- **Loading guidelines have been developed based on proportional allocation of load current for each DC bus rail based on the MAXIMUM CURRENT rating of each DC bus rail.**
- **For 100% load level the maximum rating for each DC bus rail is decreased proportionately to ensure that the total combined loading for all the output busses is equal to the overall rating of the power supply **AND** the maximum combined rating for a subset of the output busses (e.g., +5V and +3.3V) is not exceeded.**





## **Next Steps**

- **Review of the proposed loading guidelines by members of Server System Infrastructure (SSI), Project Advisory Group (PAC) and other interested parties.**
- **Recommendation to adopt the proposed loading guideline as part of SSI power supply specifications.**
- **We welcome comments and suggestions. Please send your comments to Arshad Mansoor ([amansoor@epri-peac.com](mailto:amansoor@epri-peac.com)).**