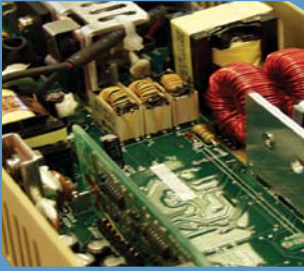


■ Embedded Power for
Business-Critical Continuity™

Power Supply Solutions for Industrial Applications





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Local Support

Our regional sales offices are ready to provide expert local applications and sales support. In addition, an extensive network of manufacturer representatives and distributors bring our products to you. Please call for locations of sales offices near you or visit our website at www.Emerson.com/EmbeddedPower.

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www.Emerson.com/EmbeddedPower



Emerson Network Power & Industrial

At Emerson Network Power – Embedded Power, our engineers have been designing and developing power supply products for industrial electronics applications – including lighting, military & aerospace, process control and robotics, test & measurement – for over 35 years. With Emerson as your power supply partner, we can help you choose, evaluate and source the perfect power supplies for your application.

Emerson – with its long history of quality and innovation, and a deep understanding of our customers' needs – knows that in product development, time is money. You will find that Emerson power supply products help pave the way for advancements in a variety of industrial applications by optimizing or eliminating process steps which accelerate your time to market and lower your R&D costs.

More and more industrial product manufacturers are selecting Emerson Network Power as their trusted power supply partner for the following reasons:

1. *Experience in the industrial market and expertise in power supplies*
2. *Highly developed quality systems focused on the customer*
3. *Processes that are developed to conform to the requirements of international standards and Current Good Manufacturing Practices (cGMP)*

Emerson offers one of the broadest power supply product lines in the industry. In addition to the hundreds of products in our standard portfolio, we offer power solutions tailored to meet your specific application requirements. Our products are very flexible in terms of their input and output voltages, with an increasing number offering digital programmability with GUI software for ease of setup and use. In addition to our configurable line of AC-DC power conversion products, we also offer a very broad line of DC-DC modules to facilitate precise application matching.

At Emerson we are committed to continually combine and advance technologies that will provide a competitive advantage for our industrial equipment customers.

Design Controls

- Design Practices
- Component Selection
- Quality Assurance Verification

Purchasing Controls

- Supplier Qualification
- Supplier Quality Management

Customer Quality

Post Market Surveillance Requirements

- Field Support
- Automatic CAR System
- Field Failure Tracking System Verification

Production and Process Controls

- Process Control
- Quality Assurance and Ongoing Reliability Testing

Additional Emerson Advantages

Low Energy Consumption

Our high efficiency power supply solutions help minimize energy consumption, resulting in increased overall efficiency and reduced costs for the end user and lower environmental impact.

Eco-friendly Products

We are committed to a Design for Environment (DfE) policy that includes full compliance with the RoHS directive on hazardous substances. Our product design philosophy aims to minimize environmental impact – both of our manufacturing processes and the long-term use of our products.

Space-efficient Power Solutions

Many of our products have industry-leading power conversion efficiencies, resulting in very high power densities and very small form factors.

Reliability & Quality Assurance

As a means to maintain our position as a worldwide leader in the power supply manufacturing industry, we will continue to provide quality products and services which meet or exceed your current and future expectations.

Vast Knowledge, Experience & Expertise

Emerson's broad industry experience, strong investment in research and development, thorough understanding of market needs and active participation in various industry forums have led to an extensive portfolio of robust, highly-efficient and cost-effective power supplies.

Worldwide Distributor Network

Emerson Network Power - Embedded Power maintains a worldwide distributor network to quickly respond to your design and manufacturing needs. We have the infrastructure, expertise and financial resources to accommodate all your power supply demands – both now and as you grow in the future.



For additional information go to
www.Emerson.com/EmbeddedPower

Power Supply Design Controls

Emerson utilizes the following design methodologies and techniques to ensure that our power supplies meet the rigorous quality & reliability requirements of the industrial market.

Reliability Models and Predictions

- A prediction of design reliability in terms of Mean Time Between Failures (MTBF) using Telecordia, Bellcore or MIL-HDBK-217F
- Not intended as a measure of expected field performance, but for design trade-off analysis and review of part stress derating performance

Failure Modes and Effect Analysis

- An analytical technique to identify and review failure modes, their causes, mechanisms and effects
- Provides a formal risk assessment to reduce field failures at the customer site

Component Selection

- Database warehouse of all component information
- Design engineers can only select components rigorously approved from suppliers that have undergone strict qualification and auditing process

Derating Analysis

- Intended to reduce the failure rate of components

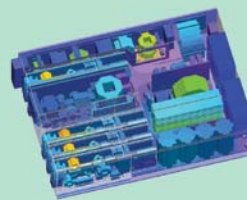
Design for Manufacturability

- Design rules regarding manufacturability

Simulation Analysis – Computer-Aided Engineering Tools

- Thermal Simulation
- Circuit Simulation
- EMI Field Simulation
- Detailed Mechanical Design
- PCB Layout and Tracking
- Structural Simulation

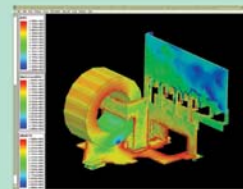
Emerson Computer-Aided Engineering Tools



Thermal Simulation



Circuit Simulation



EMI Field Simulation



Detailed Mechanical Design



PCB Layout and Tracking



Structural Simulation



MyPower Community Portal

Discover. Communicate. Collaborate.

MyPower is a free community portal that provides a variety of tools and resources including:



Community

Utilizing the tools and resources provided will increase your standard knowledge base of our industry. Resources include:

- Industry Links
- What's New
- Trade Shows
- Tools & Calculators



Knowledge Base

Familiarize yourself with our products and services. This section is designed to help build your industry knowledge.

- Product Videos
- White Papers and eBooks
- Industry Books
- Educational Product Videos



Support

Emerson Network Power strives to support your needs. In this section you will find:

- Factory Quality, Safety and Environmental Certifications

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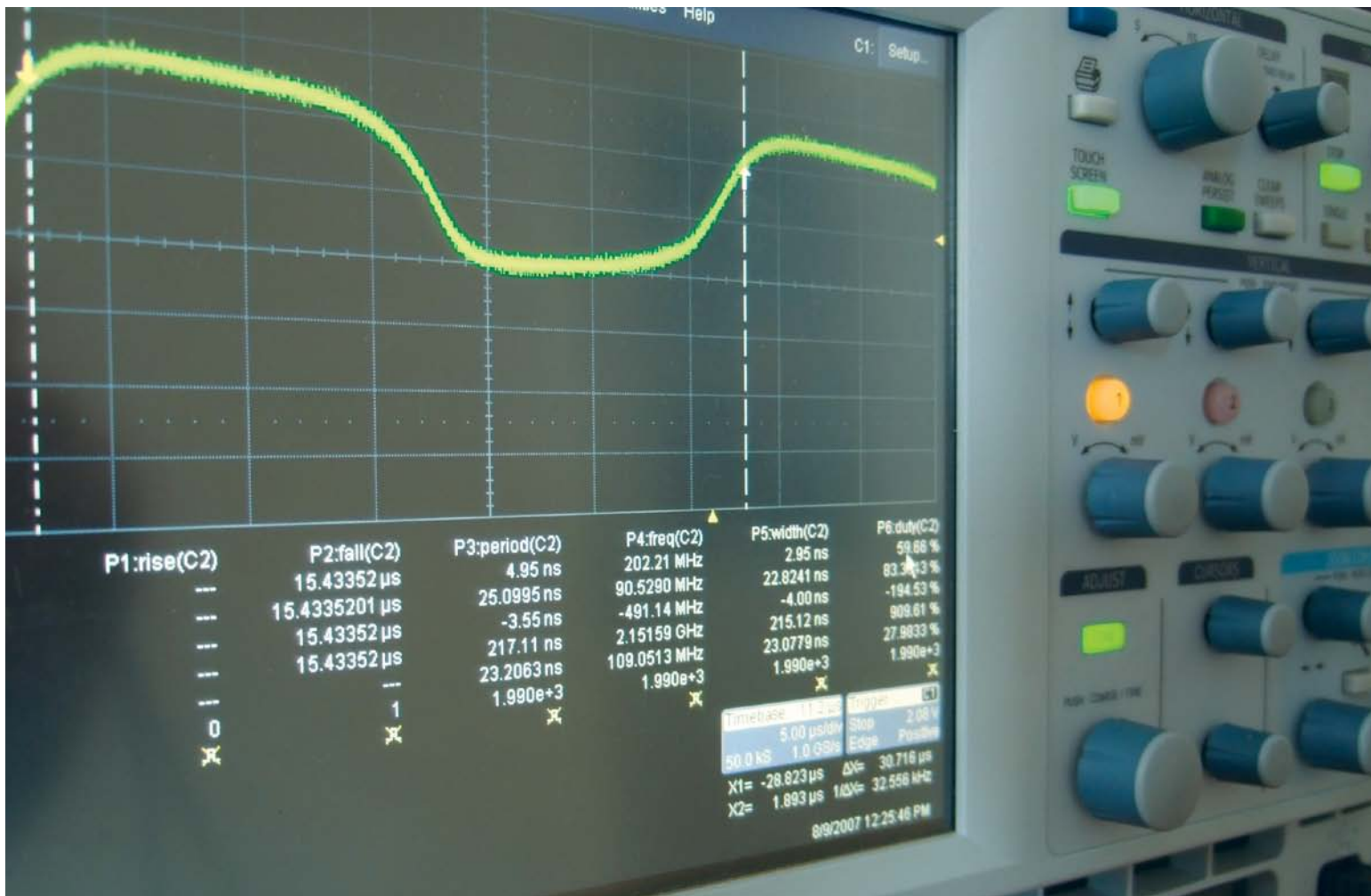
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AC-DC Power Supplies

Emerson Network Power is widely acknowledged as an industry leader and produces an exceptionally wide range of AC-DC power conversion products.



Low Power

Open frame/enclosed 1-4 outputs

20-500 Watts



Special Features

All models feature:




- Industry standard footprints
- Wide-range AC input
- Full power to 50 °C
- High demonstrated MTBF
- Overvoltage protection
- Overload protection
- Built-in EMI filtering
- Extensive safety approvals
- Derated operation to 70 °C

Many models feature:

- EN61000-3-2 compliance
- Supervisory outputs (5 V/12 V)
- Wide-adjust floating 4th output
- Single wire current share
- Medical approvals
- Remote sense
- Adjustable outputs
- Power fail
- Wide-adjust on single output models
- Derated operation to 80 °C

Output Power		Output				Size W x L x H (mm)	Model
[Forced Air]	Free Air	V1	V2	V3	V4		
[20 W]	20 W	NLP25 Series					
		5 V @ 2 A	12 V @ 0.8 A			2.07" x 4" x 0.91"	NLP25-7629J
		5 V @ 2 A	12 V @ 0.8 A	-5 V @ 0.1 A		(52.57 x 101.6 x 23.2)	NLP25-7607J
		5 V @ 2 A	12 V @ 0.8 A	-12 V @ 0.1 A			NLP25-7608J
[40 W]	25 W	LP20 Series					
		5 V @ 5 A [8 A]*				3" x 5" x 1.2"	LPS22
(1)		12 V @ 2.1 A [3.3 A]*				(76.2 x 127 x 30.5)	LPS23
		15 V @ 1.7 A [2.7]*					LPS24
		24 V @ 1.1 A [1.8 A]*					LPS25
		5 V @ 3 A [4 A]	12 V @ 1.5 A [2 A]	-12 V @ 0.5 A [0.7 A]			LPT22
		5 V @ 4 A [5 A]	12 V @ 0.5 A [0.7 A]	-12 V @ 0.5 A [0.7 A]			LPT23
		5 V @ 3 A [4 A]	12 V @ 1.5 A [2 A]	-5 V @ 0.5 A [0.7 A]			LPT24
		5 V @ 3 A [4 A]	15 V @ 1.5 A [2 A]	-15 V @ 0.5 A [0.7 A]			LPT25
[40 W]	25 W	NPS20-M					
		5 V @ 5 A [8 A]*				2" x 4" x 1"	NPS22-M
(1)		12 V @ 2.1 A [3.3 A]*				(50.8 x 101.6 x 25.4)	NPS23-M
		15 V @ 1.7 A [2.7]*					NPS24-M
		24 V @ 1 A [1.8 A]*					NPS25-M
		48 V @ 0.5 A [0.84 A]*					NPS28-M
[47 W]	Enclosed	LCT43-E					
		5 V @ 4 A [7 A]	12 V @ 1 A [1.2 A]	-12 V @ 0.5 A [0.5 A]		3.2" x 6.2" x 1.5"	LCT43-E
						(81.3 x 157.5 x 38.1)	
[50 W]	40 W	NLP40 Series					
		3.3 V @ 9 A*				2.5" x 4.25" x 1.15"	NLP40-7653J
(1)		12 V @ 4 A*				(63.5 x 108 x 29.2)	NLP40-7612J
		5 V @ 9 A*					NLP40-7605J
		12 V @ 4 A*					NLP40-7612J
		15 V @ 3.3 A*					NLP40-7615J
		24 V @ 2 A*					NLP40-7624J
		48 V @ 1 A*					NLP40-7617J
		5 V @ 4.5 A	12 V @ 3 A				NLP40-7629J
		12 V @ 2.1 A	-12 V @ 2.1 A				NLP40-7627J
		3.3 V @ 4.5 A	12 V @ 3 A	-12 V @ 0.5 A			NLP40-76T366J
		5 V @ 4.5 A	12 V @ 3 A	-12 V @ 0.5 A			NLP40-7608J
		5 V @ 4.5 A	15 V @ 2 A	-15 V @ 0.5 A			NLP40-7610J

Options:
 [] Rating with 30 CFM of air
 (1) Optional cover/enclosure
 * Floating output

Output Power		Output				Size W x L x H (mm)	Model	
[Forced Air]	Free Air	V1	V2	V3	V4			
[55 W]  (1)	40 W	LP40 Series				3" x 5" x 1.2" (76.2 x 127 x 30.5)	LPS41	
		3.3V@8A [11 A]*					LPS42	
		5V@8A [11 A]*					LPS43	
		12V@3.3A [4.5]*					LPS44	
		15V@2.6A [3.6 A]*					LPS45	
		24V@1.6A [2.3 A]*				LPS48		
		48V@0.9A [1.2 A]*				LPT41		
		3.3V@4A [7A]		5V@1.5A [2A]	+12V@0.5A [0.7A]		LPT42	
		5V@4A [5A]		12V@2A [2.5A]	-12V@0.5A [0.7A]		LPT43	
		5V@6A [8A]		12V@0.5A [0.7A]	-12V@0.5A [0.7A]		LPT44	
		5V@4A [5A]		12V@2A [2.5A]	-5V@0.5A [0.7A]		LPT45	
		5V@4A [5A]		15V@2A [2.5A]	-15V@0.5A [0.7A]		LPT46	
		5V@4A [5A]		24V@1A [1.5A]	+12V@0.5A [0.7A]			
		[60 W]  (1)	45 W	NPS40-M Series				2" x 4" x 1" (50.8 x 101.6 x 25.4)
5V@8A [11 A]*				NPS43-M				
12V@3.75A [5A]*				NPS44-M				
15V@3A [4A]*				NPS45-M				
24V@1.9A [2.5A]*				NPS48-M				
48V@0.94A [1.25A]*								
[55 W]  (1)	55 W	LP50 Series				2" x 4" x 1.3" (50.8 x 101.6 x 33)	LPT51	
		3.3V@8A		5V@3A	12V@0.5A		LPT52	
		5V@8A		12V@3A	-12V@0.5A		LPT53	
		5V@8A		15V@2.4A	-15V@0.5A		LPT54	
		5V@8A		24V@1.5A	12V@0.5A			
[60 W]  (1)	60 W	5V@11A*				LPS52		
		5V@11A*				LPS52 (-I)		
		12V@5A*				LPS53		
		12V@5A*				LPS53 (-I)		
		15V@4A*				LPS54		
		24V@2.5A*				LPS55		
		48V@1.25A*				LPS58		



Options:
 [] Rating with 30 CFM of air
 (1) Optional cover/enclosure
 * Floating output
 (-I) Industrial version -40 °C up to 80 °C (derated)

Output Power		Output				Size W x L x H (mm)	Model	
[Forced Air]	Free Air	V1	V2	V3	V4			
[75 W]	65 W	NLP65 Series						
			5 V@12 A*				3" x 5" x 1.26"	NLP65-7605J
			5 V@12 A*				(76.2 x 127 x 32)	NLP65-9605J ⁽⁵⁾ G
			12 V@6.5 A*					NLP65-7612J G
			12 V@6.5 A*					NLP65-9612J ⁽⁵⁾ G
			24 V@3.5 A*					NLP65-7624J G
			24 V@3.5 A*					NLP65-9624J ⁽⁵⁾ G
			5 V@8 A	12 V@3 A				NLP65-7629J
			5 V@8 A	12 V@3 A				NLP65-9629J ⁽⁵⁾ G
			5 V@8 A	24 V@2 A	+12 V@1.0 A			NLP65-3322J
			5 V@8 A	12 V@3 A	-12 V@0.8 A			NLP65-7608J G
			5 V@8 A	12 V@3 A	-12 V@0.8 A			NLP65-9608J ⁽⁵⁾ E, G
			5 V@8 A	15 V@2.5 A	-15 V@0.8 A			NLP65-7610GJ
			5 V@8 A	15 V@2.5 A	-15 V@0.8 A			NLP65-9610J ⁽⁵⁾ G
			5 V@8 A	24 V@2 A				NLP65-7620J
	5 V@8 A	24 V@2 A				NLP65-9620J ⁽⁵⁾ G		
[80 W]	60 W	LP60 Series						
			3.3 V@12 A [16 A]*				3" x 5" x 1.65"	LPS61
			5 V@12 A [16 A]*				(76.2 x 127 x 41.9)	LPS62
			12 V@5 A [6.7 A]*					LPS63
			15 V@4 A [5.3 A]*					LPS64
			24 V@2.5 A [3.3 A]*					LPS65
			48 V@1.3 A [1.7 A]*					LPS68
			3.3 V@5 A [8.5 A]	5 V@2.5 A [3 A]	+12 V@0.5 A [1 A]			LPT61
			5 V@7 A [8 A]	12 V@3 A [3.5 A]	-12 V@0.7 A [1 A]			LPT62
			5 V@7 A [8 A]	15 V@2.8 A [3.3 A]	-15 V@0.7 A [1 A]			LPT63
			5 V@7 A [8 A]	12 V@3 A [3.5 A]	-5 V@0.7 A [1 A]			LPT64
			5 V@7 A [8 A]	24 V@1.5 A [2 A]	+12 V@0.7 A [1 A]			LPT65
[110 W]	80 W	NLP110 Series						
			5 V@22 A*				3" x 6.5" x 1.26"	NLP110-9605J
			12 V@9.2 A*				(76.2 x 165.1 x 32)	NLP110-9612J
			24 V@4.6 A*					NLP110-9624J
			48 V@2.3 A*					NLP110-9617J
			5 V@18 A	3.3 V@20 A	12 V@1 A			NLP110-9693J
	12 V@8.5 A	5 V@18 A	-12 V@1 A			NLP110-9608J		
[120 W]	70 W	NTQ120 Series						
			3.3 V@14 A [25 A]	5 V@12.5 A [24 A]	+12 V@1 A [2 A]	-12 V@0.5 A [1 A]	4" x 7" x 1.5"	NTQ123
		3.3 V@14 A [25 A]	5 V@12.5 A [24 A]	+12 V@1 A [2 A]	-12 V@0.5 A [1 A]	(101.6 x 177.8 x 38.1)	NTQ123-DC	

Options:

- E To order an enclosed version of the NLP65-9608J, add suffix 'EJ' to the end of the model number, e.g., NLP65-9608EJ. The enclosed version includes: IEC connector, on/off switch, wire harness output connector and fitted cover.
- G A safety earth ground pin and ground choke are available as an option. To order, please add the suffix 'GJ' to the end of the model number e.g. NLP65-9612GJ.

- [] Rating with 30 CFM of air
- (1) Optional cover/enclosure
- (5) These models feature harmonic current correction to EN61000-3-2
- * Floating output

Output Power		Output				Size W x L x H (mm)	Model
[Forced Air]	Free Air	V1	V2	V3	V4		
[130 W]  (1)	80 W	LP120 Series					
		3.3 V @ 16 A [26 A]*				3" x 5" x 1.29"	LPS121
		5 V @ 16 A [26 A]*				(101.6 x 177.8 x 38.1)	LPS122
		12 V @ 6.6 A [10.8 A]*					LPS123
		15 V @ 5.3 A [8.6 A]*					LPS124
		24 V @ 3.4 A [5.4 A]*					LPS125
						LPS128	
[130 W]  (1)	80 W	LPT100-M Series					
		3.3 V @ 13 A [18 A]	5 V @ 5 A [9 A]	12 V @ 1 A [2.3 A]		2" x 4" x 1.28"	LPT101-M
		5 V @ 13 A [18 A]	12 V @ 5 A [9 A]	-12 V @ 1 A [2 A]		(50.8 x 101.6 x 32.7)	LPT102-M
		5 V @ 13 A [18 A]	15 V @ 4 A [7.2 A]	-15 V @ 1 A [1.5 A]			LPT103-M
		5 V @ 13 A [18 A]	24 V @ 1.5 A [3 A]	12 V @ 1 A [2.3 A]			LPT104-M
[145 W]  (1)	80 W	LP140 Series					
		5 V @ 12 A [25 A] (3.3-5 V)	12 V @ 5 A [6 A]	-12 V @ 1 A [1.5 A] (-12-15 V)	±3.3-25 V @ 1.5 A [4.5 A]*	4" x 7" x 1.5" (101.6 x 177.8 x 38.1)	LPQ142
[150 W]  (1)	100 W	TLP150 Series					
		12 V @ 12.5 A*				3" x 5" x 1.25"	TLP150R-96S12JF
		24 V @ 6.3 A*				(76.2 x 127 x 31.75)	TLP150R-96S24JF
		36 V @ 4.2 A*					TLP150R-96S36J
						TLP150R-96S48JF	
[150 W]  (1)	100 W	LPS100-M Series					
		5 V @ 16 A [24 A]*				2" x 4" x 1.29"	LPS102-M
		12 V @ 8.3 A [12.5 A]*				(50.8 x 101.6 x 33)	LPS103-M
		15 V @ 6.7 A [10 A]*					LPS104-M
		24 V @ 4.2 A [6.3 A]*					LPS105-M
						LPS108-M	
[165 W]  (1)	50 W	NTQ160 Series					
		3.3 V @ 15 A [30 A] (1.8-3.5 V)	5 V @ 10 A [20 A] (3-5.5 V)	12 V @ 2 A [4.5 A]*	12 V @ 2 A [4.5 A]*	4.25" x 8.5" x 1.5" (108 x 215.9 x 38.1)	NTQ162
		5 V @ 15 A [30 A] (3.3-5 V)	3.3 V @ 10 A [20 A]	12 V @ 2 A [4.5 A]*	12 V @ 2 A [4.5 A]*		NTQ163
		3.3 V @ 15 A [30 A] (3.3-5 V)	2.5 V @ 10 A [20 A] (1.8-3.5 V)	5 V @ 2 A [4 A]*	12 V @ 2 A [4 A]*		NTQ165
[175 W]  (1)	110 W	LP170 Series					
		5 V @ 22 A [35 A]* (2.5-6 V)				4.25" x 8.5" x 1.5" (108 x 215.9 x 38.1)	LPS172
		12 V @ 9.1 A [15 A]* (6-12 V)					LPS173
		15 V @ 7.3 A [12 A]* (12-24 V)					LPS174
		24 V @ 4.5 A [7.5]* (24-54 V)					LPS175
		5 V @ 15 A [30 A] (3.3-5.5 V)	12 V @ 6 A [8 A]	-12 V @ 0.2 A [3 A] (-12-15 V)	±3.3-25 V @ 2 A [5 A]*		LPQ172
		5 V @ 10 A [24 A] (3.3-5.5 V)	12 V @ 6 A [8 A]	-12 V @ 1.2 A [3 A] (-12-15 V)	5 V @ 10 A [24 A]* (3.3-5 V)		LPQ173







Options:

F Replace the 'J' at the end of the model number with 'FJ' when the optional standby output and / or remote ON/OFF control is required e.g., TLP150N-99S12FJ

[] Rating with 30 CFM of air

(1) Optional cover/enclosure

* Floating output

Output Power		Output				Size W x L x H (mm)	Model
[Forced Air]	Free Air	V1	V2	V3	V4		
[200 W]	100 W	LPQ200-M Series					
		3.3 V @ 13 A [18 A]	5 V @ 13 A [18 A]	12 V @ 5 A [9 A]	-12 V @ 1 A [2 A]	3" x 5" x 1.32"	LPQ201-M
(1)		5 V @ 13 A [18 A]	12 V @ 5 A [9 A]	24 V @ 1.5 A [3 A]	-12 V @ 1 A [2 A]	(76.2 x 127 x 33.6)	LPQ202-M
[250 W]	125 W	LPS200-M Series					
		5 V @ 20 A [40 A]*				3" x 5" x 1.32"	LPS202-M
(1)		12 V @ 10.3 A [20.8 A]*				(76.2 x 127 x 33.6)	LPS203-M
		15 V @ 8.3 A [16.6 A]*					LPS204-M
		24 V @ 5.2 A [10.4 A]*					LPS205-M
		48 V @ 2.6 A [5.2 A]*					LPS208-M
[250 W]	175 W	NLP250 Series					
		12 V @ 21 A*				4" x 7" x 1.5"	NLP250N-99S12J
(1)		24 V @ 10.5 A*				(101.6 x 177.8 x 38.1)	NLP250N-99S24J
		48 V @ 5.3 A*					NLP250R-96S48J
		NLP250 – DC (-48 Vdc Input)					
		12 V @ 14.6 A [21 A]				4" x 7" x 1.5" (101.6 x 177.8 x 38.1)	NLP250N-48S12J
[250 W]		LP250 Series					
		5 V (3-6 V) @ [50 A]*				5" x 9" x 2"	LPS252-C
(1)		12 V (6-12 V) @ [21 A]*				(127 x 228.6 x 50.8)	LPS253-C
(3), (4)		15 V (12-24 V) @ [16.7 A]*					LPS254-C
		24 V (24-48 V) @ [10.4 A]*					LPS255-C
		5 V @ [35 A]	12 V @ [10 A]	-12 V @ [6 A]	±5-25 V @ [6 A]*		LPQ252-C
		5 V @ [35 A]	15 V @ [10 A]	-15 V @ [6 A]	±5-25 V @ [6 A]*		LPQ253-C
[350 W]		LP350 Series					
		5 V (3-6 V) @ [70 A]*				5" x 9" x 2.5"	LPS352-C
(3), (4)		12 V (6-12 V) @ [29.2 A]*				(127 x 228.6 x 63.5)	LPS353-C
		15 V (12-24 V) @ [23.3 A]*					LPS354-C
		24 V (24-48 V) @ [14.6 A]*					LPS355-C
		5 V @ [50 A]	12 V @ [12 A]	-12 V @ [6 A]	±3.3-24 V @ [6 A]*		LPQ352-C
		5 V @ [50 A]	15 V @ [12 A]	-15 V @ [6 A]	±3.3-24 V @ [6 A]*		LPQ353-C
[350 W]	200 W	NTS350 Series					
		12 V @ 16.6 A [29.2 A]*				4" x 7" x 1.5"	NTS353
(3), (4)		24 V @ 8.3 A [14.6 A]*				(101.6 x 177.8 x 38)	NTS355
		48 V @ 4.2 A [7.3 A]*					NTS358
		54 V @ 3.7 A [6.5 A]*					NTS359
[500 W]	200 W	NTS500 Series					
		12 V @ 16.6 A [41.7 A]*				4" x 7" x 1.5"	NTS503
(3), (4)		24 V @ 8.3 A [20.8 A]*				(101.6 x 177.8 x 38)	NTS505
		18 V @ 11.1 A [27.7 A]*					NTS506
		48 V @ 4.2 A [10.4 A]*					NTS508

Options:

- [] Rating with 30 CFM of air
- (1) Optional cover/enclosure (see datasheet for increased dimensions)
- (3) Optional fan cover (see datasheet for increased dimensions)

- (4) Optional end fan cover (see datasheet for increased dimensions)
- * Floating output

LCC250

Fanless – conduction cooled

250 Watts

Total Power: 250 Watts
 # of Outputs: Single
 Output: 12 V

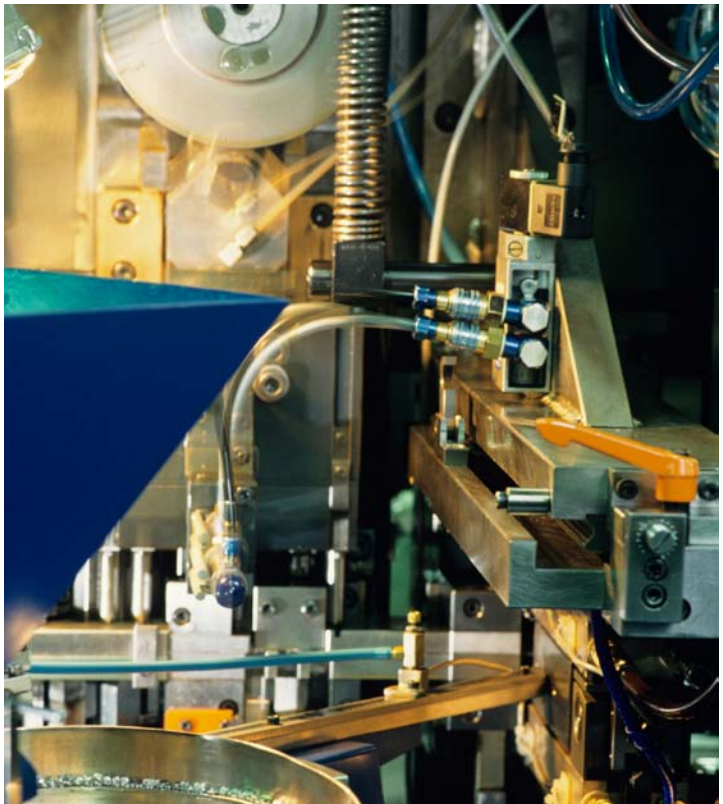


Special Features

- Fanless and conduction cooled power supply
- Ingress protection: IP64 rated
- Wide operating temperature range suited for outdoor/indoor applications
- Conduction mounting or convection cooling
- Active Power Factor Correction
- Wide output adjust range
- Differential remote sense
- Output On/Off (Positive or negative logic user selectable)

Electrical Specifications

Input	
Input range:	85-264 Vac (Operating) 115/230 Vac (Nominal)
Frequency	47-63 Hz
Input fusing	Internal fuse on both L and N lines
Inrush current	50 A
Power factor	>0.92 full load
Harmonics	Meets IEN 61000-3-2 Class C
Input current	3.4 A @ 90 Vac full load
Hold up time	16 ms minimum at 115 Vac; 100% load
Efficiency	89% Typical at 230 Vac; 100% load
Leakage current	<275 μA at 230 Vac



Environmental Specifications

Operating temperature	Suffix 4P (conduction): -40 °C to +85 °C baseplate temperature Suffix 7P (convection): -40 °C to +85 °C ambient temperature
Storage temperature	-40 °C to 85 °C
Humidity	10% to 100%
Altitude	Operating: Up to 13,000 feet above sea level Non-operating: Up to 50,000 feet above sea level
Shock	IEC 68-2-27
Vibration	IEC 68-2-6 / IEC 721-3-2
Ingress protection	IP64

Safety

UL+CSA	60950-1 60601-1
TUV	60950-1 (Pending) 60601-1 (Pending)
CB Scheme	IEC 60950-1

Electrical Specifications

Output		
Output rating	12 V @ 20.83 A	—
Set point	±0.5%	Factory set point
Total regulation range	±2%	Line/load/temperature
Rated load	250 W maximum	—
Minimum load	0 A Load	No loss of regulation
Capacitive load	0-330 µF/amp	Equivalent to roughly 0 to 2X 3300 µF (25 V) capacity
Constant output voltage adjustment range	+10/-10%	Adjust via VR1
Constant output current adjustment range	+0/-50%	Adjust via VR2; CC mode supported from Vo nominal down to ~10 V
Output ripple and noise	1%	See Note 1
Transient response	±5% Vo max transient; recovery <500 µs max	50% load step @ 1 A/µs Step load verified at: 50% to 100% load; 90-264 Vac input; capacitive load from 0 to 2X 3300 µF (25 V)
Remote sense	Capable of stable offset of ±0.5 Vdc at output cable termination	+SENSE (red wire); -SENSE (black wire)
Output On/Off	Remote on/off referenced to secondary side. Positive or negative logic user selectable via CN2	On/off (orange wire); on/off return (white wire)
Overload protection (OCP)	150% Io	Autorecovery
Overvoltage protection (OVP)	110% to 125% Vo	Latching mode; requires input AC recycle
Overtemp protection (OTP)	—	Autorecovery; hiccup mode
Output isolation	4000 Vac Input to Output 1500 Vac Input to Ground 500 Vac Output to Ground	—

Ordering Information

Model Number	Output	Adjustment Range	Output Current		Output Ripple p/p ¹	Combined Line/Load Regulation	Safety Approval ²	Status
			Min	Max				
LCC250-12U-4P	12 V	±10%	0 A	20.8 A	1%	2%	A & B	January 2011
LCC250-12U-4PE	12 V	±10%	0 A	20.8 A	1%	2%	C & D	TBA
LCC250-12U-7P	12 V	±10%	0 A	20.8 A	1%	2%	A & B	January 2011
LCC250-12U-7PE	12 V	±10%	0 A	20.8 A	1%	2%	C & D	TBA

1. Output ripple measured at the end of the output cable terminated with 10 µF tantalum cap in parallel with 0.1 µF ceramic cap. 1% limit is achieved with 2X 820 µF/16 V external cap (e.g. PLG1C821MDO1 from Nichicon or equivalent). Otherwise, maximum limits are 1.5% at Ta ≥0 °C and 2.0% max at Ta <0 °C.

2. Safety Approvals:

(A) UL+CSA 60950-1 2nd Edition

(B) UL+CSA 60601-1 2nd Edition

(C) TUV 60950-1 2nd Edition (different input cable)

(D) TUV 60601-1 2nd Edition (different input cable)

Micro MP Series

Cost-efficient, configurable power supply with market-leading density and efficiency

μMP

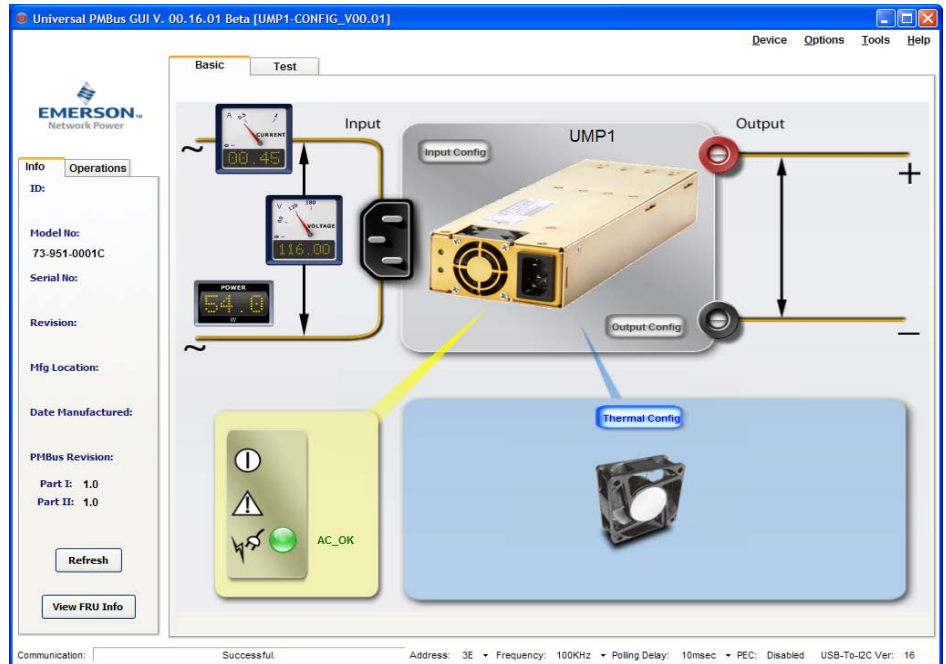
Up to 1200 Watts

Total Power: Up to 1200 Watts
 Input Voltage: 85-264 Vac
 120-300 Vdc
 # of Outputs: Up to 12



Special Features

- Optional conformal coating
- Industrial temp range (-40 °C to 70 °C)
- Industrial shock/vibration (>50 G's)
- Low cost
- Low leakage (< 300 μA)
- PMBus
- High efficiency
- Low profile 1U size
- Multi output
- Current limit modification (foldback or constant current)
- High power density
 - μMP4: 10.8 W/cu-in
 - μMP1: 15.1 W/cu-in
- Intelligent fan (speed control/fault status)
- Downloadable GUI from website
- μP controlled PFC input with active inrush protection
- No preload required
- IEC or terminal block input



Electrical Specifications

Input	
Input range	85-264 Vac 120-350 Vdc (limited to 250 Vac/300Vdc in medical apps)
Frequency	47-440 Hz
Inrush current	40 A peak max. (soft start)
Efficiency	Up to 91% @ full case load
Power factor	0.99 typ. meets EN61000-3-2 (n/a @ 440 Hz)
Turn-on time	AC on 2 sec for μMP1 and 1.5 sec for μMP4, inhibit/enable 250 ms typical
EMI filter	CISPR 22/EN55022 Level "B"
Leakage current	300 μA max. @ 240 Vac for μMP1 and 500 μA max. for μMP4; 47-63 Hz
Radiated EMI	CISPR 22/EN55022 Level "B"
Warranty	Two years

Electrical Specifications

Output	
Factory set point accuracy	±1%
Margining	±3-7% nominal analog (single output module only)
Overall regulation	0.4% or 30 mV which ever is greater
Ripple	RMS: 0.1% or 10 mV, whichever is greater Pk-Pk: 1.0% or 50 mV, whichever is greater. Bandwidth limited to 20 MHz
Dynamic response	<±5% or 250 mV, with 50% step load
Recovery time	To within 1% in <300 µs
Reverse voltage protection	100% of rated output current
Thermal protection (OTP)	All outputs disabled when internal temp exceeds safe operating range.
Remote sense	Up to 0.5 V total drop (not available on triple output module)
Single wire parallel	Current share to within 5% of total rated current
DC OK	±5% of nominal
Minimum load	Not required
Housekeeping standby	5 Vdc @ 1.0 A max. present whenever AC input is applied
Module inhibit	Logic - output on with low or open. Different logic options available
Output/Output isolation	>1 Megohm, 500 V

Voltage Codes

Standard Output Ratings				
Module Output Voltage Code	Single Output ONE SLOT 240 W Max	Dual Output* ONE SLOT 192 W Max		
Module Identification	S2	D		
Output Module Line-Up				
Code	Volts	Output Current V1	Output Current*	
			V1	V2
A	2.0	40.0	N/A	
B	2.2	40.0	N/A	
C	3.0	40.0	N/A	
D	3.3	40.0	N/A	
E	5.0	36.0	4.0	4.0
F	5.2	34.0	4.0	4.0
G	5.5	32.0	4.0	4.0
H	6.0	30.0	4.0	4.0
I	8.0	25.0	4.0	4.0
J	10.0	24.0	4.0	4.0
K	11.0	22.0	4.0	4.0
L	12.0	20.0	4.0	4.0
M	14.0	17.0	4.0	4.0
N	15.0	16.0	4.0	4.0
O	18.0	13.0	4.0	4.0
P	20.0	12.0	4.0	4.0
Q	24.0	10.0	4.0	4.0
R	28.0	8.6	3.4	3.4
S	30.0	8.0	N/A	
T	33.0	7.0	N/A	
U	36.0	6.7	N/A	
V	42.0	5.7	N/A	
W	48.0	5.0	N/A	
X	54.0	4.4	N/A	
Y	60.0	4.0	N/A	

*Outputs share a common ground

Environmental Specifications Safety

Operating temperature	-40 °C to 70 °C ambient. Derate each output 2.5% per degree from 50 °C to 70 °C. (-20 °C start up) Meets full spec after 1/2 load. 10 min warm-up
Storage temperature	-40 °C to 85 °C
Electromagnetic susceptibility	Designed to meet EN61000-4; -3, -6, -11 Level 3, Level 4 for -2, -4, -5
Humidity	Operating; non-condensing 10% to 95% RH
Vibration	MIL-STD-810E
MTBF demonstrated	>350,000 hours at full load, one µMP4 case + two modules, Telcordia SR-332 calculated MTBF
Altitude:	Up to 10k feet; derate linear to 50% from 10k-30k feet

UL	UL60950/UL60601-1
CSA	CSA22.2 No. 234 Level 5
VDE	EN60950/EN60601-1
BABT	Compliance to EN60950/EN60601 BS7002
CB	Certificate and report
CE	Mark to LVD
CCC	Approved

Parallel Codes					
Code	Slots in Parallel	Code	Slots in Parallel	Code	Slots in Parallel
1	1&2	6	1&2&3	B	1,2&3; 4&5
2	2&3	7	1,2,3&4	C	1,2,3&4; 5&6
3	3&4	8	1,2,3,4&5	D	1&2; 3&4; 5&6
4	4&5	9	1,2,3,4,5&6	E	1,2&3; 4,5&6
5	5&6	A	1&2; 3&4	0	no module in parallel

Ordering Information

Case Size	Module/Voltage/Option Codes	Case Option Codes	Software Code	Hardware Code
µMPXY	S2E - DER - DLL	00	A	###
Case Size (mm) Single-Phase Input where X =) 4 = 1.57" x 3.5" x 10"; 400 W - 600 W, 4 slots 1 = 1.57" x 5" x 10"; 1000 W - 1200 W, 6 slots Input Type where Y = T = Terminal Block C = IEC Connector, C14 B = IEC Connector, C16	Module Codes S2 = 200 W Single O/P (1 slot) D = 96 W/96 W Dual O/P (1 slot) Voltage Codes: See Voltage Code Table	Case Option Codes First digit 0 - E = Parallel Code Second digit 0 = No Options 1 = Reverse Air 3 = Global Enable 5 = Opt 1 + Opt 3	Factory assigned for modified standards	Factory assigned for modified standards

MP Series

Modular power supply for optimum flexibility

Up to 1200 Watts

Total Power: Up to 1200 W
 Input Voltage: 85-264 Vac
 120-350 Vdc
 # of Outputs: Up to 21



Special Features

- Low cost
- Current share on all outputs with ratings of 10 A or greater
- Remote sense on all outputs with ratings greater than 2 A
- Overload protection on all outputs
- Voltage adjustment on all outputs
- Margining on all single output modules
- Input OK signal and status indicator LED
- Global DC OK signal and status indicator LED
- Global and individual module inhibits/enable
- Forced air cooling or customer provided air option
- Isolated 1 A 5 V bias voltage
- Power factor correction
- EN61000-3-2 harmonic distortion compliance
- CISPR 22, EN55022 Curve B conducted/ radiated EMI
- European CE Mark requirements
- Optional VME timing and system DC OK module
- Low leakage option
- EN61000 immunity standards
- Standard modification flexibility (see datasheet on Emerson.com/EmbeddedPower)

New Options Now Available

- Optional battery charger module
- Optional 2 A 5 V bias voltage
- Optional extended hold-up module
- Optional high voltage module (non-isolated)
- Optional OR'ing diode module



Electrical Specifications

Input	
Input voltage	85-264 Vac 120-350 Vdc
Frequency	47-440 Hz
Inrush current	40 A peak maximum (soft start)
Efficiency	70-80% typ. @ full case load
Power factor	0.99 typ. meets EN61000-3-2 (N/A @ 440 Hz)
Turn-on time	AC on 1.5 second typical Inhibit/enable 150 ms typical
EMI filter standard	CISPR 22 EN55022 Level "B"
EMI filter (low leakage option)	CISPR 22 EN55022 Level "A"
Leakage current standard	2.0 mA maximum @ 240 Vac
Leakage current (low leakage option)	300 µA maximum @ 240 Vac
Radiated EMI	CISPR 22 EN55022 Level "B"
Holdover storage	20 ms minimum (independent of input Vac)
AC OK	>5 ms early warning minimum before outputs lose regulation Full cycle ride thru (50 Hz)
Harmonic distortion	Meets EN61000-3-2
Isolation	Meets EN60950
Global inhibit/enable	TTL, Logic "1" and Logic "0"; configurable
Input fuse (internal)	MP4: 10 A; MP6: 15 A; MP8: 20 A; MP1: 20 A
Warranty	Two years

Output	
Adjustment range	±10% minimum all outputs
Margining	±4-6% nominal ¹
Overall regulation	0.4% or 20 mV maximum (36 W modules 4% maximum)
Ripple	RMS: 0.1% or 10 mV, whichever is greater; Pk-Pk: 1.0% or 50 mV, whichever is greater; bandwidth limited to 20 MHz
Dynamic response	<2% or 100 mV, with 25% load step
Recovery time	To within 1% in <300 μs
Overcurrent protection	Single, main of dual output module 105-120% of rated output current
Short-circuit protection	Protected for continuous short-circuit Recovery is automatic upon removal of short
Overvoltage protection (measured at sense connection)	Single output modules
Reverse voltage protection	100% of rated output current
Thermal protection	All outputs disabled when internal temp exceeds safe operating range. >5 ms warning (AC OK signal) before shutdown
Remote sense	Up to 0.5 V total drop (not available on triple output module)
Single wire parallel	Current share to within 2% of total rated current ²
DC OK	-2% to -8% of nominal for any monitored output ²
Minimum load	Not required on single or triple output modules. 10% required on main of dual output modules ³
Housekeeping standby	5 Vdc @1.0 A mA maximum present whenever AC input is applied (optional 2.0 A available)
Module inhibit	TTL, isolated, singles and dual (both outputs) only
Switching frequency	250 kHz
Output/output isolation	>1 Megohm
VME signal option board	POR signal & quad external DC OK

Environmental Specifications

Operating temperature	-20 °C to 50 °C (start @ 0 °C) (derate each output linearly to 50% at 70 °C) (-20 °C to 40 °C max. with rear air option)
Storage/vibration	MIL-HDBK 810E
Humidity	95% non-condensing
Storage temperature	-40 °C to 85 °C
Temperature coefficient	0.02% per °C
Cooling:	Internal DC fan or customer provided air (option)

Safety

UL	UL1950
CSA	CSA22.2 No. 234 Level 5
IEC	IEC950, Class 1
VDE	EN60950-1
BABT	Compliance to EN 60950, BS 7002
CB	Certificate and report
CE	Mark

Notes:

1. Single output modules only
2. Single and main of dual output modules only
3. Contact factory for optional preload if required

Ordering Information

Sample below is 1200 W case with 12 V @ 50 A; 5 V @ 60 A; 24 V @ 8.5 A; 12 V @ 10 A; 12 V @ 4 A; extended hold-up with no options.

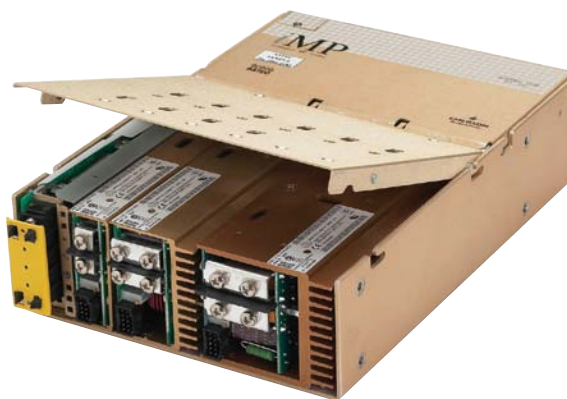
Case Size	Module/Voltage(s) First - Module Code Second - Voltage Code	Add-on Modules Requires 1 slot each	Case Option Codes	Hardware Code
MP1	3L - 2E - 1Q - 4LL	HUP	00	###
Case Size (mm) 4 = 2.5" x 5" x 10"; 400-600 W, 5 Slots (63.5 x 127 x 254) 6 = 2.5" x 5" x 11"; 600-800 W, 5 Slots (63.5 x 127 x 279.4) 8 = 2.5" x 7" x 10"; 800-1000 W, 6 Slots (63.5 x 177.8 x 254) 1 = 2.5" x 8" x 11"; 1000-1200 W, 7 Slots (63.5 x 203.2 x 279.4)	Module Codes Module/Voltage/Option Codes Module Codes: (None) = 36 W Triple O/P (1 slot) 1 = 210 W Single O/P (1 slot) 2 = 360 W Single O/P (2 slot) 3 = 750 W Single O/P (3 slot) 4 = 144 W Dual O/P (1 slot) 5 - 9 = Future Voltage Codes: See Output Module Voltage/Current table	Add-on Modules HUP = Hold up module VME = VME POR signal and isolated DC	Case Option Codes First Digit 0 - 9 = parallel code (See MP parallel codes table on following page) Second Digit Standard Options 0 = no options 1 = rear air exhaust 3 = global enable 5 = option package (options 1 & 3) M = low leakage N = low leakage plus option 1 P = low leakage plus option 3 R = low leakage plus option 5	Factory assigned for modifications

Intelligent MP Series

Intelligent modular power supply for optimum flexibility

Up to 1500 Watts

Total Power: Up to 1500 Watts
 Input Voltage: 85-264 Vac
 120-300 Vdc
 # of Outputs: Up to 21



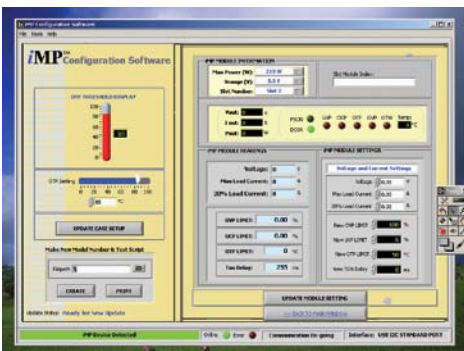
Special Features

- Optional conformal coating
- Industrial temp range (-40 °C to 70 °C)
- Industrial shock/vibration (>50 G's)
- I²C monitor of voltage, current, and temp
- CAN BUS and RS-485 interface option
- Low leakage (<300 µA)
- Intelligent I²C control
- Voltage adjustment on all outputs (Manual or I²C)
- Configurable input and output (case and module) OK signals and indicators
- Configurable inhibit/enable
- Configurable output UP/DOWN sequencing
- Configurable current limit (foldback or constant current)
- High power density (8.8 W/cu-in)
- Intelligent fan (speed control/fault status)
- Downloadable GUI from website
- Customer provided air option
- µP controlled PFC input with active inrush protection
- Programmable voltage, current limit, inhibit/enable through I²C
- Optional extended hold-up module (SEMI F47 compliance)
- Increased power density to 50% over standard MP
- Backward compatibility with standard MP
- External switching frequency sync input
- No preload required



Electrical Specifications

Input	
Input range	85-264 Vac 120-350 Vdc (limited to 300 Vdc in medical applications)
Frequency	47-440 Hz
Inrush current	40 A peak max. (soft start)
Efficiency	Up to 85% @ full case load
Power factor	0.99 typ. meets EN61000-3-2 (n/a @ 440 Hz)
Turn-on time	AC on 2 sec typ., inhibit/enable 150 ms typical Programmable delay; 50 ms internal turn-on delay (Dual Output only)
EMI filter	CISPR 22/EN55022 Level "B"
Leakage current	300 µA max. @ 240 Vac; 47-63 Hz
Radiated EMI	CISPR 22/EN55022 Level "B"
Input fuse (internal)	iMP4: 16 A; iMP8: 20 A; iMP1: 25 A (both lines fused)
Warranty	Two years



The iMP software is designed to make the iMP Power Supply Unit (PSU) accessible to the user. It is intended to provide information gathered from the PSU and interactive controls to the basic capabilities of iMP power supply. To download go to www.PowerConversion.com/jimpsoftware



Electrical Specifications

Output	
Adjustment range*	±10% minimum all outputs (manual) (full module adjustment range using I ² C)
Margining	±4-6% nominal analog (single output module only)
Overall regulation	0.4% or 20 mV max. (1500 W modules 1% max. 36 W modules 4% max.)
Ripple	RMS: 0.1% or 10 mV, whichever is greater Pk-Pk: 1.0% or 50 mV, whichever is greater Bandwidth limited to 20 MHz
Dynamic response	<2% or 100 mV, with 25% load step
Recovery time	To within 1% in <300 μs
Overcurrent protection**	Configurable through I ² C (calibration required). Single output module and main output of the dual output module 105-120% of rated output current. Aux output of dual output module 105-140% of rated output current
Short-circuit protection	Protected for continuous short-circuit Recovery is automatic upon removal of short
Overvoltage protection*	Configurable through I ² C
- Single output module	2-5.5 V 122-134%; 6-60 V 110-120%
- Dual output module	2-6 V 122-134%; 8-28 V 110-120%
- Triple output module	
Reverse voltage protection	100% of rated output current
Thermal protection* (OTP and OTW)	Configurable through I ² C All outputs disabled when internal temp exceeds safe operating range. >5 ms warning (AC OK signal) before shutdown
Remote sense	Up to 0.5 V total drop (not available on triple output module)
Single wire parallel	Current share to within 2% of total rated current
DC OK*	±5% of nominal. Configurable through I ² C
Minimum load	Not required
Housekeeping standby	5 Vdc @ 1.0 A max. present whenever AC input is applied (Optional 2.0 A available)
Module inhibit*	Configured and controlled through I ² C
Switching frequency	250 kHz accepts external sync signal
Output/Output isolation	>1 Megohm, 500 V

- * Can be controlled via I²C
- ** Controlled via I²C but requires load calibration

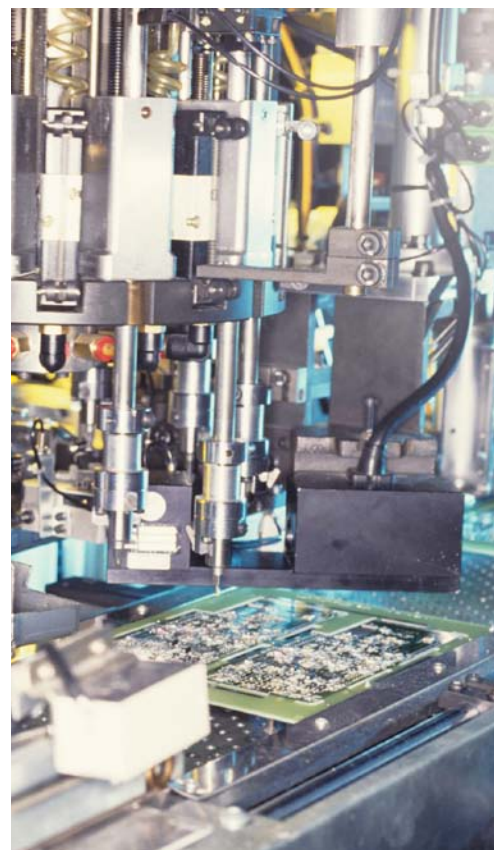


Environmental Specifications

Operating temperature	-40 °C to 70 °C ambient. Derate each output 2.5% per degree from 50 °C to 70 °C. (-20 °C start up)
Storage temperature	-40 °C to 85 °C
Electromagnetic susceptibility	Designed to meet EN61000-4; -2, -3, -4, -5, -6, -8, -11 Level 3
Humidity	Operating; non-condensing 10% to 95% RH
Vibration	IEC68-2-6 to the levels of IEC721-3-2
MTBF demonstrated	>550,000 hours at full load, 220 Vac and 25 °C ambient conditions

Safety

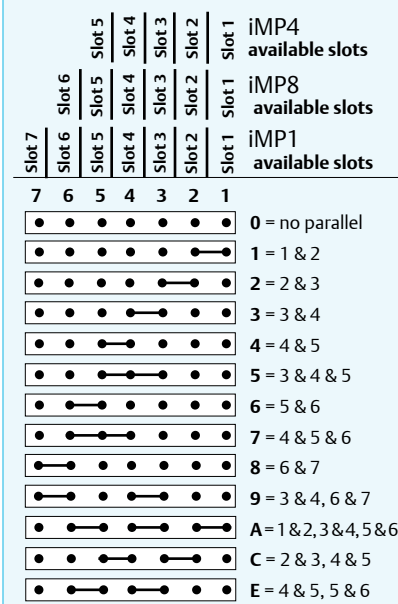
UL	UL60950/UL2601
CSA	CSA22.2 No. 234 Level 5
VDE	EN60950/EN60601-1
BABT	Compliance to EN60950/ EN60601 BS7002
CB	Certificate and report
CE	Mark to LVD



Output Module Voltage/Current

Voltage	Voltage Code	Single Output Module Code				Dual Output***		Triple Output			I ² C Adjustment Ranges****
		1	2	3	5+	V1	V2	-	-	-	
2 V	A	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	1.8-2.2
2.2 V	B	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	2.0-2.4
3 V	C	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	2.7-3.3
3.3 V	D	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	3.0-3.6
5 V	E	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	4.5-5.5
5.2 V	F	35 A	60 A	144 A	—	10 A	10 A	—	—	2 A	4.7-5.7
5.5 V	G	34 A	58 A	136 A	—	10 A	10 A	—	—	2 A	5.0-6.1
6 V	H	23 A	42 A	97.5 A	140 A	10 A*	10 A*	—	—	2 A	5.4-6.6
8 V	I	20 A	36 A	84.4 A	140 A	10 A	4 A	1 A	1 A	1 A	7.2-8.8
10 V	J	18 A	32 A	75 A	140 A	10 A	4 A	1 A	1 A	1 A	9.0-11.0
11 V	K	17 A	31 A	68 A	136.3 A	10 A	4 A	1 A	1 A	1 A	9.9-12.1
12 V	L	17 A	30 A	62.5 A	125 A	10 A	4 A	1 A	1 A	1 A	10.8-13.2
14 V	M	14 A	21 A	53.5 A	107 A	9 A	4 A	1 A	1 A	1 A	12.6-15.4
15 V	N	14 A	20 A	50 A	100 A	8 A	4 A	1 A	1 A	1 A	13.5-16.5
18 V	O	11 A	19 A	41.6 A	83.3 A	—	—	—	0.5 A	0.5 A	16.2-19.8
20 V	P	10.5 A	18 A	37.5 A	75 A	—	—	—	0.5 A	0.5 A	18.0-22.0
24 V	Q	8.5 A	15 A	30 A	62.5 A	4 A	2 A	—	0.5 A	0.5 A	21.6-26.4
28 V	R	6.7 A	11 A	26.8 A	53.5 A	3 A	2 A	—	0.5 A	0.5 A	25.2-30.8
30 V	S	6.5 A	11 A	25 A	50 A	—	—	—	—	—	27.0-33.0
33 V	T	6.2 A	10.9 A	22.7 A	35.8 A	—	—	—	—	—	29.7-36.3
36 V	U	5.8 A	10 A	20.8 A	35.8 A	—	—	—	—	—	32.4-39.6
42 V	V	4.2 A	7.5 A	16 A	35.7 A	—	—	—	—	—	37.8-46.2
48 V	W	4 A	7.5 A	15.6 A	31.2 A	—	—	—	—	—	43.2-52.8
54 V	X	3.7 A	6 A	13.9 A	27.7 A	—	—	—	—	—	48.6-59.4
60 V	Y	3.5 A	6 A	12.5 A	25 A	—	—	—	—	—	54.0-66.0
Non-std**	Z	Special Voltage - Consult factory for specifications									

Parallel Codes



* Note: Contact Factory for extended range down to 6 V.
 ** Increments of current not shown can be achieved by paralleling modules (add currents of each module selected).
 *** Total output power on dual module must not exceed 144 W.
 **** For single output modules only.
 + Applicable for iMP1 only.

Ordering Information

Sample below is 1500 W case with 12 V @ 62.5 A; 5 V @ 60 A; 24 V @ 8.5 A; 12 V @ 10 A; 12 V @ 4 A; with no options.

Case Size	Module/Voltage/Option Codes	Case Option Codes	Software Code	Hardware Code
iMP1*	3L0 - 2E2 - 1Q1 - 4LL0	00	A	###
<p>Case Size (mm) 4 = 2.5" x 5" x 10"; 750-1100 W, 5 slots (63.5 x 127 x 254) 8 = 2.5" x 7" x 10"; 1000-1200 W, 6 slots (63.5 x 177.8 x 254) 1 = 2.5" x 8" x 11"; 1200-1500 W, 7 slots (63.5 x 203.2 x 279.4)</p> <p>*Note: Add "E" after iMP4 to denote IEC input option. e.g., iMP4E (Not available on iMP8 or iMP1)</p>	<p>Module Codes Module/voltage/option codes Module codes: (None) = 36 W triple O/P (1 slot) 1 = 210 W single O/P (1 slot) 2 = 360 W single O/P (2 slot) 3 = 750 W single O/P (3 slot) 4 = 144 W dual O/P (1 slot) 5 = 1500 W single O/P (4 slot) 6 - 9 = Future</p> <p>Voltage Codes: See Output Module Voltage/Current table above</p> <p>Option Codes: 0 = Standard 1 = Module enable 2 = Constant current 3 = 1 & 2 combined 4 = Set for use in standard (non-intelligent case) 5 = Shutdown mode for 1500 W 6 = 1 & 5 combined 7 - 9 = Future</p>	<p>Case Option Codes</p> <p>First digit 0 - 9 = parallel code (See Parallel Codes table above)</p> <p>Second digit 0 = No options 1 = Reverse air 3 = Global enable 4 = Fan off w/inhibit 5 = Opt 1 + Opt 3 6 = Opt 1 + Opt 4 7 = Opt 3 + Opt 4 8 = Opt 1 + 3 + 4 9 = CAN BUS/RS-485 73-544-002 B = USB 73-546-002</p>	<p>Software code used for configuration change. "A" is standard</p>	<p>Factory assembled for hardware of firmware mods.</p>
<p>Ordering Note:</p> <ol style="list-style-type: none"> The cases and modules of both MP and iMP series can be interchanged to allow more flexibility. If intelligent modules are used with non-intelligent cases, a numeric code "4" is placed at the end of the module code (ex. 4LL0 becomes 4LL4). USB to I²C module order code 73-769-001 				

Intelligent VS Series

Intelligent modular power supply for optimum flexibility

Up to 4920 Watts

Total Power: Up to 4920 Watts
 Input Voltage: 85-264 Vdc
 120-300 Vdc
 # of Outputs: Up to 24



iVS1-3E0-210-2Q0-1WD-00-A

Special Features

- Optional conformal coating
- Industrial temp range (-40 °C to 70 °C)
- I²C monitor of voltage, current, and temp
- CAN BUS and RS-485 interface option
- Low leakage (<300 µA)
- Intelligent I²C control
- Voltage adjustment on all outputs (manual or I²C)
- Configurable inhibit/enable
- Configurable input and output OK signals and indicators
- Configurable output UP/DOWN sequencing
- High power density (12 W/cu-in)
- Intelligent fan (speed control/fault status)
- µP controlled PFC input with active Inrush protection
- Programmable voltage, current limit, inhibit/enable through I²C
- Optional extended hold-up module (SEMI F47 compliance)
- Increased power density to 150%
- Uses standard IMP modules
- Field upgradeable firmware
- RoHS compliant



210 W



360 W

Single



750 W



1500 W



144 W
Dual



36 W
Triple

Electrical Specifications

Input

Input range

iVS1 & iVS3: 90-264 Vac 1Ø: 120-300 Vdc
 iVS6 & iVS8: 170-264 Vac 3Ø

Frequency 47-440 Hz

Inrush current 40 A peak maximum (soft start)

Efficiency Up to 85% @ full case load

Power factor 0.99 typ. meets EN61000-3-2

Warranty Three years



Electrical Specifications

Output	
Adjustment range*	±10% minimum all outputs (manual) (full module adjustment range using I ² C)
Margining	±4-6% nominal analog (single output module only)
Overall regulation	0.4% or 20 mV max. (1500 W modules 1% max.)
Ripple	RMS: 0.1% or 10 mV, whichever is greater Pk-Pk: 1.0% or 50 mV, whichever is greater Bandwidth limited to 20 MHz
Dynamic response	<2% or 100 mV, with 25% load step
Recovery time	To within 1% in <300 μs
Overcurrent protection**	Configurable through I ² C. single output module and main output of the dual output module 105-120% of rated output current. Aux output of dual output module 105-140% of rated output current. Special programmable OCP delay on 1500 W module from 100 ms to 25.5 seconds with shutdown features
Short-circuit protection	Protected for continuous short-circuit Recovery is automatic upon removal of short (Shutdown mode on 1500 W module)
Overvoltage protection*	Configurable through I ² C
– Single output module	2-5.5 V 122-134%; 6-60 V 110-120%
– Dual output module	2-6 V 122-134%; 8-28 V 110-120%
– Triple output module	No overvoltage protection provided
Thermal protection*	Configurable through I ² C All outputs disabled when internal temp exceeds safe operating range. >5 ms warning (AC OK signal) before shutdown
Remote sense	Up to 0.5 V total drop (not available on triple output module)
Single wire parallel	Current share to within 2% of total rated current
DC OK*	±5% of nominal. Configurable through I ² C
Minimum load	Not required
Housekeeping bias voltage	5 Vdc @1.0 A max. present whenever AC input is applied
Module inhibit*	Configured and controlled through I ² C
Output/Output isolation	>1 Megohm, 500 V

* Can be controlled via I²C

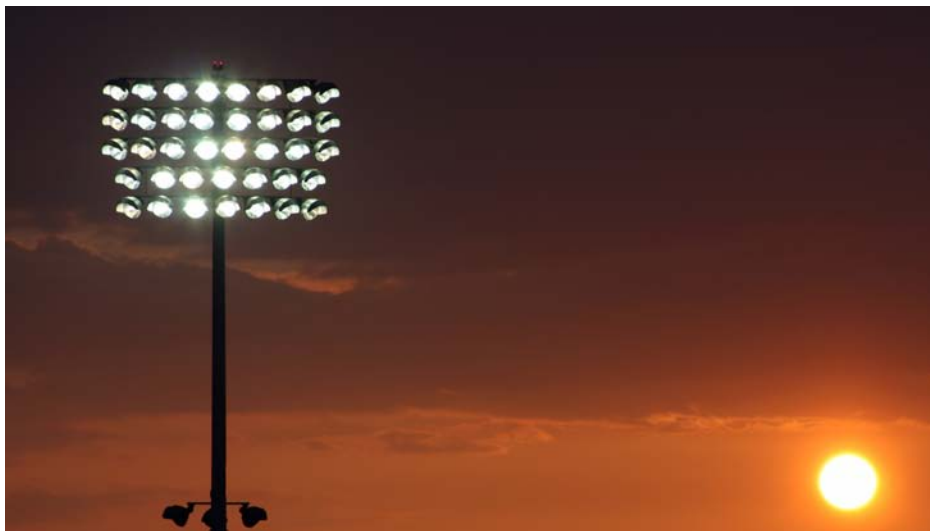
** Controlled via I²C but requires load calibration

Safety

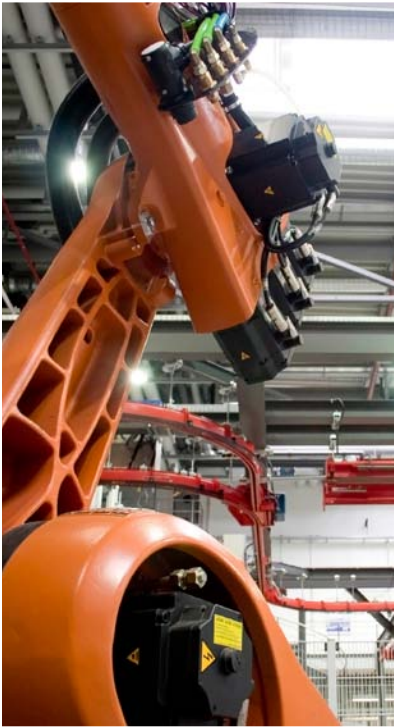
UL	UL60950/UL2601
CSA	CSA22.2 No. 234 Level 5
VDE	EN60950/EN60601-1
BABT	Compliance to EN60950/ EN60601 BS7002
CB	Certificate and report
CE	Mark to LVD

Environmental Specifications

Operating temperature	-40 °C to 70 °C ambient. Derate each output 2.5% per degree from 50 °C to 70 °C. (-20 °C start up)
Storage temperature	-40 °C to 85 °C
Electromagnetic susceptibility	Designed to meet EN61000-4; -2, -3, -4, -5, -6, -8, -11 Level 3
Humidity	Operating; non-condensing 10% to 95% RH
Vibration	IEC68-2-6 to the levels of IEC721-3-2
MTBF demonstrated	>550,000 hours at full load, 220 Vac and 25 °C ambient conditions



Output Module Voltage/Current*



Voltage	Voltage Code	Single Output Module Code				Dual Output**		Triple Output			I ² C Adjustment Ranges***
		1	2	3	5	V1	V2				
2 V	A	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	1.8-2.2
2.2 V	B	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	2.0-2.4
3 V	C	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	2.7-3.3
3.3 V	D	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	3.0-3.6
5 V	E	35 A	60 A	150 A	—	10 A	10 A	—	—	2 A	4.5-5.5
5.2 V	F	35 A	60 A	144 A	—	10 A	10 A	—	—	2 A	4.7-5.7
5.5 V	G	34 A	58 A	136 A	—	10 A	10 A	—	—	2 A	5.0-6.1
6 V	H	23 A	42 A	97.5 A	140 A	10 A*	10 A*	—	—	2 A	5.4-6.6
8 V	I	20 A	36 A	84.4 A	140 A	10 A	4 A	1 A	1 A	1 A	7.2-8.8
10 V	J	18 A	32 A	75 A	140 A	10 A	4 A	1 A	1 A	1 A	9.0-11.0
11 V	K	17 A	31 A	68 A	136.3 A	10 A	4 A	1 A	1 A	1 A	9.9-12.1
12 V	L	17 A	30 A	62.5 A	125 A	10 A	4 A	1 A	1 A	1 A	10.8-13.2
14 V	M	14 A	21 A	53.5 A	107 A	9 A	4 A	1 A	1 A	1 A	12.6-15.4
15 V	N	14 A	20 A	50 A	100 A	8 A	4 A	1 A	1 A	1 A	13.5-16.5
18 V	O	11 A	19 A	41.6 A	83.3 A	—	—	—	0.5 A	0.5 A	16.2-19.8
20 V	P	10.5 A	18 A	37.5 A	75 A	—	—	—	0.5 A	0.5 A	18.0-22.0
24 V	Q	8.5 A	15 A	30 A	62.5 A	4 A	2 A	—	0.5 A	0.5 A	21.6-26.4
28 V	R	6.7 A	11 A	26.8 A	53.5 A	3 A	2 A	—	0.5 A	0.5 A	25.2-30.8
30 V	S	6.5 A	11 A	25 A	50 A	—	—	—	—	—	27.0-33.0
33 V	T	6.2 A	10.9 A	22.7 A	35.8	—	—	—	—	—	29.7-36.3
36 V	U	5.8 A	10 A	20.8 A	35.8	—	—	—	—	—	32.4-39.6
42 V	V	4.2 A	7.5 A	16 A	35.7	—	—	—	—	—	37.8-46.2
48 V	W	4 A	7.5 A	15.6 A	31.2	—	—	—	—	—	43.2-52.8
54 V	X	3.7 A	6 A	13.9 A	27.7	—	—	—	—	—	48.6-59.4
60 V	Y	3.5 A	6 A	12.5 A	25	—	—	—	—	—	54.0-66.0
Consult Factory											
Special*	Z	35 A	60 A	150 A	—	—	10 A	—	—	—	2.3-2.6
Special*	Z	35 A	60 A	150 A	—	—	10 A	—	—	—	3.7-4.4
Special*	Z	20 A	36 A	80 A	140 A	—	8 A	—	—	—	6.7-7.1

* Note: Consult factory for extended range down to 6V.
 ** Total output power on dual model must not exceed 144 W.
 *** For single output modules only

Ordering Information

Sample below is 3210 W case with 12 V @ 125 A; 24 V @ 8.5 A; 5 V @ 60 A; 12 V @ 10 A and 12 V @ 4 A; with no options.

Case Size	Module/Voltage/Option Codes	Case Option Codes	Software Code	Hardware Code
iVS1	5L1 - 1Q1 - 2EO - 4LLO	00	A	###
Case Size (mm) 1-Phase Input 1 = 5" x 5" x 11"; 1500-3210 W, 9 slots (127 x 127 x 279.4) 3 = 5" x 8" x 11"; 1800-4170 W, 15 slots (127 x 203.2 x 279.4) 3-Phase Input* 6 = 5" x 5" x 11"; 3120 W, 9 slots (127 x 127 x 279.4) 8 = 5" x 8" x 11"; 4170 W, 15 slots (127 x 203.2 x 279.4)	First - Module Code Second - Voltage Code Third - Option Code Module Codes Module/voltage/option codes Module Codes: (None) = 36 W triple O/P (1 slot) 1 = 210 W single O/P (1 slot) 2 = 360 W single O/P (2 slot) 3 = 750 W single O/P (3 slot) 5 = 1500 W single O/P (slot 4) 4 = 144 W dual O/P (1 slot) HUP = Extra 30mS hold-up (1 slot) Voltage Codes: See Output Module Voltage/Current table above Option Codes: 0 = Standard 1 = Module enable 2 = Constant current 3 = 1 & 2 combined 4 = Set for use in standard (non-intelligent case) 5 = Shutdown mode for 1500 W 6 = 1 & 5 combined 7-9 Future	Case Option Codes First Digit 0 - 9 = Parallel code (See parallel codes table in datasheet) Second Digit 0 = No options 1 = Reverse air 2 = Not used 3 = Global enable 4 = Fan Off w/inhibit 5 = Opt 1 + Opt 3 6 = Opt 1 + Opt 4 7 = Opt 3 + Opt 4 8 = Opt 1 + 3 + 4 9 = CAN BUS/RS-485 73-544-001 B = USB 73-546-001 M = Medical N = M + 1 P = M + 3 R = M + 1 + 3	Software code used for configuration change. "A" is standard	Factory assembled for hardware of firmware mods.
Ordering Note: 1. USB to I ² C module order code 73-769-001				

Bulk Power (LCM600)

600 Watts

Total Power: 600 Watts
 # of Outputs: Single
 Output: 3.3 to 60 V
 Optional 5.0 V standby



Special Features

- 600 W output power
- Low cost
- 2.4" x 4.5" x 7.5"
- 7.41 W/cu-in
- 5 V standby (Housekeeping)
- Industrial/Medical safety
- -40 °C to 70 °C with derating
- High Efficiency: 89% typical
- Variable speed "Smart Fans"
- DSP controlled front end
- Optional conformal coating
- ± 20% adjustment range
- Margin programming
- OR-ing FET option

Electrical Specifications

Input	
Input range	85-264 Vac (Operating) 115/230 Vac (Nominal) Input through standard IEC connector
Frequency	47-440 Hz, Nominal 50/60
Input fusing	Internal 10 A fuses, both lines fused
Inrush current	≤25 A peak, either hot or cold start
Power factor	0.99 typical, meets EN61000-3-2
Harmonics	Meets IEC 1000-3-2 requirements
Input current	8 A RMS max input current, at 100 Vac
Hold up time	20 ms minimum for Main O/P, at full rated load
Efficiency	>88% at full load
Leakage current	<0.3 mA at 264 Vac
ON/OFF power switch	N/A
Power line transient	MOV directly after the fuse



Environmental Specifications

Operating temperature	-40 °C to +70 °C, linear derating to 50% from 50 °C to 70 °C
Storage temperature	-40 °C to 85 °C
Humidity	20 to 90%, non-condensing. Operating. Conformal coat option available
Fan noise	<45 dBA, 80% load at 30 °C
Altitude	Operating: Up to 15,000 feet above sea level Storage: Up to 30,000 feet above sea level
Shock	MIL-STD-810F 516.5, Procedure I, VI. Storage
Vibration	MIL-STD-810F 514.5, Cat. 4, 10. Storage

Safety

UL	60950-1 508/1598/1433 60601-1
CSA	60950-1
VDE	60950-1 60601
China	CCC
CB Scheme	Report/Cert

Electrical Specifications

Output		
Output rating	See ordering information table below	85-264 Vac
Set point	±0.5%	85-264 Vac
Total regulation range	Main output ±2% 5 Vsb ±1%	Combined line/load/transient when measured at output terminal
Rated load	600 W maximum	Derate linear to 50% from 50 °C to 70 °C
Minimum load	Main output @ 0.0 A 5 Vsb @ 0.0 A	No loss of regulation
Output noise (PARD)	1% max p-p 50 mV max p-p	Main output 5 Vsb output Measured with a 0.1 µF Ceramic and 10 µF Tantalum Capacitor on any output, 20 MHz
Output voltage overshoot	—	No overshoot/undershoot outside the regulation band during on or off cycle
Transient response	<300 µs	50% load step @ 1 A/µs Step load valid between 10% to 100% of output rating Recovery time to within 1% of set point at onset of transient
Max units in parallel	—	Up to 10
Short circuit protection	Protected, no damage to occur	Bounce mode
Remote sense	—	Compensation up to 500 mV
Output isolation	—	Standard per safety requirements
Forced load sharing	To within 10% of all shared outputs	Analog sharing control
Overload protection (OCP)	105% to 125% 120% to 170%	Main output 5 Vsb output
Overvoltage protection (OVP)	125% to 145% 110% to 125%	12 V output 5 Vsb output
Overtemp protection	10-15 °C above safe operating area	Both PFC and output converter monitored

Ordering Information

Model Number	Output	Nominal Output Voltage Set Point	Set Point Tolerance	Adjustment Range	Current		Output Ripple P/P	Combined Line/ Load Regulation	Status
					Min	Max			
LCM600C	3 V	3 V	±0.5%	2.0–4.0 V	0 A	150 A	50 mV	2%	Coming Soon
LCM600E	5 V	5 V	±0.5%	4.0–6.0 V	0 A	120 A	50 mV	2%	Coming Soon
LCM600L	12 V	12 V	±0.5%	9.6–14.4 V	0 A	54 A	120 mV	2%	Coming Soon
LCM600N	15 V	15 V	±0.5%	12.0–19.5 V	0 A	44 A	150 mV	2%	Coming Soon
LCM600Q	24 V	24 V	±0.5%	19.2–28.8 V	0 A	27 A	240 mV	2%	Released
LCM600W	48 V	48 V	±0.5%	38.4–57.6 V	0 A	14 A	280 mV	2%	Coming Soon

Bulk Power (HPS & UFE)

350-12000 Watts

Special Features

- EN61000-3-2 harmonic compliance
- Built-in EMI filter
- Low output ripple
- +5 V standby output
- Built-in cooling fans
- Hot swap/N + 1 redundant
- Overcurrent protection
- Overvoltage protection
- Overtemperature protection
- Built-in OR'ing diodes
- Active power factor correction

New Features Coming Soon

- 500 W HPS50

Voltage Availability

Model	HPS3000	HPS35	HPS15	UFE
Wattage	3000 W ⁴	350 W	1500 W ³	2000 W ⁵
Input Voltage	90-140 Vac 180-264 Vac	90-264 Vac	90-265 Vac	90-265 Vac
Available Standard Output Voltages (order code)¹				
12 (L)		•		
24 (Q)		•	•	•
28 (R)			•	•
30 (S)			•	
48 (W)	•	•	•	•
54 (X)		•	•	•
60 (Y)			•	
Available Options	See Note 1	See Note 1	See Note 1	
Corresponding Rack	HPR12K-00 (Note 2)	HPR1-00	HPR3-00	UFR6000J

- Notes: 1 = Consult factory for other output voltages and options
 2 = Comes with I²C interface
 3 = 1200 W @ 90-264 Vac; 1500 W @ 100-264 Vac
 4 = 3000 W @ 180-264 Vac; 1500 W @ 90-140 Vac
 5 = 2000 W @ 48 V; 1300 W @ 24 V

Environmental Specifications

HPS15 and HPS35	
Operating temp.	-10 °C to 50 °C ambient (derate output @ 2.5% per degree from 50 °C to 70 °C)
HPS3000	
Operating temp.	-10 °C to 40 °C
Storage temp.	-40 °C to 85 °C
Cooling	External fans with Fan Fail and Fan Speed control
Humidity	Operating/Storage: 5-95% non-condensing
Altitude	Operating: Up to 10,000 feet above sea level Storage: Up to 30,000 feet above sea level
Vibration/Shock	Non-operational 5G Sine sweep from 5-500 Hz, dwelling at resonant frequencies for one hour each
RoHS compliant	Yes

Safety

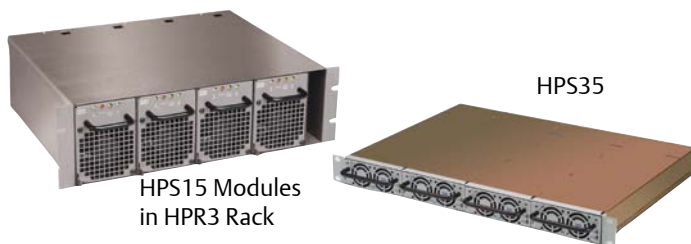
UL	UL60950 (UL recognized)
NEMKO	EN60950
TÜV	EN60950
CE	Mark
CB	Report



HPS3000

HPS3000 Electrical Specifications

Input	
Input range (operating)	180-264 Vac 90-140 Vac
Input range (nominal)	200 Vac 110 Vac
Frequency	43-63 Hz
Input fusing	Internal 25 A fuses (both lines fused)
Inrush current	≤40 A peak (either hot or cold start)
Power factor	0.97 typical (Meets EN61000-3-2)
Harmonics	Meets IEC 1000-3-2 requirements @ 50% load
Input current	19 A max input current
Holdup time	10 ms min @ full rated load
Leakage current	1.4 mA @ 240 Vac
Power line transient	MOV directly after the fuse
Output	
Output rating	48 V @ 62.0 A (180-264 Vac) 5 Vsb @ 3.0 A 48 V @ 29.4 A (90-140 Vac) 5 V @ 3 A
Set point	48 V (Programmable ±10% through I ² C serial bus)
Total regulation range	48 V ±10%; 5 Vsb ±4% (line/load/transient when measured at output connection)
Rated load	3000 W maximum @ 200 Vac Input 1500 W maximum @ 110 Vac Input (no derating over operating temperature range)
Minimum load	48 V @ 0.0 A 5; Vsb @ 0.0 A with no loss of regulation
Output noise	480 mV max P-P for 48 V output 100 mV max P-P for 5 Vsb output Measured with a 0.1µF Ceramic and 10 µF Tantalum capacitor on any input
Output voltage overshoot	±5% maximum of nominal voltage setting
Transient response	5% maximum deviation (50% load step @ 1 A/us. Step load valid between 10-100% of output rating)
Max units in parallel	Up to 4 (total power in 1U 19" rack is 12 KW)
Short circuit protection	120-130% of rated output (output to return)
Output isolation	Per POE specs (>2000 Vac)
Forced load sharing	Within 10% of all shared outputs (digital sharing control)
Overcurrent protection (OCP)	120-130% for 48 V output 100-125% for 5 Vsb output
Overvoltage protection (OVP)	110-120% for 48 V output 110-125% for 5 Vsb output
Overtemperature protection	10 °C to 15 °C above safe operating area. (Both PFC and output converter monitored. 5 Vsb will operate under overtemperature condition. Built-in hysteresis.)



HPS35 Electrical Specifications

Input

Input voltage	90-264 Vac typical
Frequency	47-440 Hz
Inrush current	40 A peak max. @ 25 °C
Efficiency	80% typical @ full load, 230 Vac
Power factor	0.99 typical @ 115 Vac, full load
Turn-on time	AC on 2 sec; inhibit/enable 160 ms typical
EMI filter standard	CISPR 22; EN55022 Level "B"
Leakage current standard	<0.5 mA max @ 230 Vac @ 60 Hz per module
Radiated EMI	CISPR 22; EN55022 Level "B"
Holdover time	20 ms minimum (independent of input Vac)
AC OK	5 ms early warning minutes before outputs lose regulation
Harmonic distortion	Meets EN61000-3-2
Isolation	Meets EN60950

Output

Adjustability	±5% of nominal output voltage
Overall regulation	±2%
Ripple	1% of Vout Pk-Pk (20 MHz bandwidth)
Dynamic response	4% with 25% load step
Recovery time	To within 1% in <300 μs
Overcurrent protection	115-130% of rated output current
Short-circuit protection	Protected for continuous short-circuit Auto recovery
Overvoltage protection	120-140%. AC Reset
Reverse voltage protection	100% of rated output current
Thermal protection	Main and Aux disabled when internal temperature exceeds safe operating range
Remote sense	Up to 0.5 V total drop
Single wire parallel	Current share to within 10% of total rated current on main output
DC OK	±5% of nominal
Minimum load*	Not required (when used as stand-alone module)
Standby voltage	5 Vdc @ 2 A maximum present whenever AC input is applied
Global inhibit	Logic "0"

* 3 A minimum for current share operation

Rack Ordering Information

Module	UFE1300/2000	HPS3000	HPS35	HPS15
Rack #	UFR6000	HPR12K-00	HPR1-00**	HPR3-00**
# of Slots	3	4	4	4
Total Power	6000 W	12000 W	1400 W	6000 W

**See website for option codes on HPR racks.

HPS15 Electrical Specifications

Input

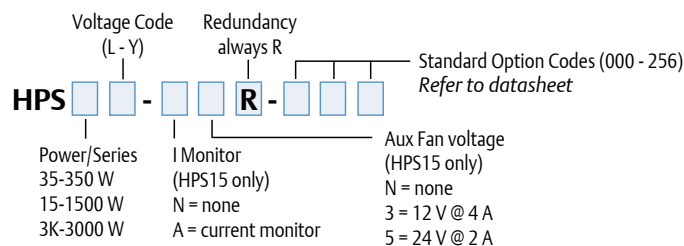
Input voltage	1200 W @ 90-264 Vac 1500 W @ 180-264 Vac
Frequency	47-440 Hz
Inrush current	40 A peak max. @ 25 °C
Efficiency	85% typ. @ full load, 230 Vac
Power factor	0.99 typ. meets EN61000-3-2
Turn-on time	AC on 1.5 sec typical Inhibit/enable 100ms typical
EMI filter standard	CISPR 22; EN55022 Level "B"
Leakage current standard	2 mA max @ 264 Vac @ 60 Hz per module
Radiated EMI	CISPR 22; EN55022 Level "B"
Holdup time	20 ms minimum (independent of input Vac)
AC OK	>5 ms early warning min. before outputs lose regulation. Full cycle ride thru (50 Hz)
Harmonic distortion	Meets EN61000-3-2
Isolation	Meets EN60950

Output

Margining	±5% of nominal
Overall regulation	±1%
Ripple	1% of Vout Pk-Pk limited to 20 MHz
Dynamic response	2% with 25% load step
Recovery time	To within 1% in <300 μs
Overcurrent protection	105-120% of rated output current
Short-circuit protection	Protected for continuous short-circuit Recovery is automatic upon removal of short
Overvoltage protection	105-120%. Recycle AC input voltage to reset OVP circuit
Reverse voltage protection	100% of rated output current
Thermal protection	Main and Aux disabled when internal temp exceeds safe operating range.
Remote sense	Up to 0.5 V total drop
Single wire parallel	Current share to within 10% of total rated current
DC OK	±5% of nominal
Minimum load*	Not required
Standby voltage	5 Vdc @ 5 A max. present whenever AC input is applied (3.3 V @ 5 A optional)
Global inhibit	Logic "0" standard logic "1" optional

* 3 A minimum for current share operation

Ordering Information



For the HPS3000, the ordering part number is HPS3000-9

UFE1300/2000 Electrical Specifications

Input	
Input range (operating)	88-264 Vac 176-264 Vac
Input range (nominal)	120 Vac 240 Vac
Frequency	47-63 Hz
Input fusing	30 A (both lines fused)
Power factor	0.98 (50-100% load)
Input current	15 A max.
Leakage current	2 mA max.
Undervoltage lockout (power up)	176 Vac max. (high line range) 88 Vac max. (wide range)
Undervoltage lockout (power down)	162 Vac min. (high line range) 76 Vac min. (wide range)

Output	
Output rating - Main output	48 V 2000 W (high line range) 48 V 1300 W (wide range) 24 V 1300 W (all ranges)
Output rating - Auxiliary output	11 V ±15%, 2.875 W
Line regulation	±0.15% max.
Load regulation	±0.15% max.
Turn-on delay	5.0 seconds max.
Ambient temp. coefficient	±0.005%/°C
Voltage adjustability (via PMBus)	48 V 42-57 Vdc 24 V 21-28.5 Vdc
Output setpoint accuracy	±0.5%
Default output voltage (@ 25 °C)	48 V ±0.5% @ 41 A 27 V ±0.5% @ 48 A
Total error band	±1.0% max.
Overshoot/undershoot	0%
Ripple and noise (20 MHz)	500 mV pk-pk, 150 mV rms
Dynamic regulation (except droop mode)	2.5% max., recovery in 1 ms max.
Current sharing	15% max.
Electrical insulation	4242 Vdc input/output
Switching frequency	450 kHz fixed
Power limit	115%
Current limit	108% typical
Short-circuit	200 ms on; 1/8 second off
Overvoltage	60 V/32 V
Overtemperature	Non-latching

UFE Power Shelf



UFE2000

Ordering Information

Product Family	Rated Output Power	Input Range	Standard Compliance	Type of Output	Output Voltage	Communications Type	Option Code	Special Modification	RoHS Compliance
UFE	2000	9	6	S	48	P	D	xx	J
UFE = Universal Front-End	1300 = 1300 Watts 2000 = 2000 Watts	9 = Universal Input with PFC	6 = UL/CSA/VDE Class A/B	S = Single	48 = 48 V 24 = 24 V	P = PMBus serial communications	None = Active Ishare D = Droop Ishare HD = PS Enable HI/Droop		J = Pb free (RoHS 6/6 compliant)

Rated Output Power	Output Voltage Vout		Output Current (Min)	Power Limit + 15% / -0% Vout (min)	Line Range at Turn On (Auto Ranging)	Operating Line Range	Current Limit (Vout) < Vout (min)	Model Numbers	Order Number
	Min	Max							
24 Vout Models									
1300 W	21 V	28.5 V	0 A	1300 W	90-264 Vac	65 A	65 A	UFE1300-96S24PJ	UFE1300-5
48 Vout Models									
1300 W	42 V	57 V	0 A	1300 W	90-264 Vac	33 A	33 A	UFE2000-96S48PJ	UFE2000-9
2000 W	42 V	57 V	0 A	2000 W	180-264 Vac	52 A	52 A		
1300 W	42 V	57 V	0 A	1300 W	90-264 Vac	33 A	33 A	UFE2000-96S48PDJ	UFE2000-9-HD
2000 W	42 V	57 V	0 A	2000 W	180-264 Vac	52 A	52 A		
1300 W	42 V	57 V	0 A	1300 W	90-264 Vac	33 A	33 A	UFE2000-96S48PHDJ	UFE2000-9-D
2000 W	42 V	57 V	0 A	2000 W	180-264 Vac	52 A	52 A		

DIN Rail ADN-C Series

120-480 Watts

Special Features

- Slim form factor
- Five year warranty
- High efficiency >90% Typ.
- Full power at 60 °C
- Power Boost™
- Industrial grade design
 - Patented metal mounting clip
 - Metal case
- MTBF >450,000h demonstrated at 40 °C
- Active PFC >0.92
- Adjustable output
- Overvoltage protection with auto recovery
- Continuous short-circuit and overload protection
- SEMI F47 Sag Immunity
- New visual diagnostic LED
- Three Status LEDs
 - Input, Output, Alarm
- DC OK Relay
- Parallel operation capability
- Screw terminal connections
- RoHS compliant
- No tools required for mounting

Models Coming Soon

- 40 A single phase
- Three-phase



Electrical Specifications

Input	
AC Input range	Nominal: 115-230 Vac 85-264 Vac
DC Input range	90-375 Vdc
Frequency	47-67 Hz, 400 Hz
Efficiency	>90%
Inrush current	ADN5-24-1PM-C: < 15 A ADN10-24-1PM-C: < 30 A ADN20-24-1PM-C: < 40 A
PFC	Active, better than 0.92

Output	
Nominal voltage	ADN5-24-1PM-C & ADN10-24-1PM-C: 24 Vdc (22.5-28.5 Vdc Adj) ADN20-24-1PM-C: 24 Vdc (24-28 Vdc Adj)
Initial voltage setting	24.5 V ±1%
Hold-up time	>20 ms at full load (100 Vac Input @ Tamb = +25 °C)
Voltage regulation	<±2% (combination line, load, time and temperature related changes)
Ripple	ADN5-24-1PM-C & ADN10-24-1PM-C: <50 mVpp ADN20-24-1PM-C: < 100 mVpp
Back EMF immunity	<35 Vdc
Power Boost™	1.5 x Nominal current for 4 seconds
Short-circuit current	1.5 x Nominal current at near zero volts at short-circuit condition
Parallel operation	Switch selectable single unit or parallel unit operation. Units will not be damaged by parallel operation (regardless of switch position setting)
Output noise suppression	Radiated EMI values below EN61000-6-2
Overvoltage protection	>30.5 Vdc but <33 Vdc, auto recovery
Line and load regulation	<0.5%
Time and temperature drift	<1%

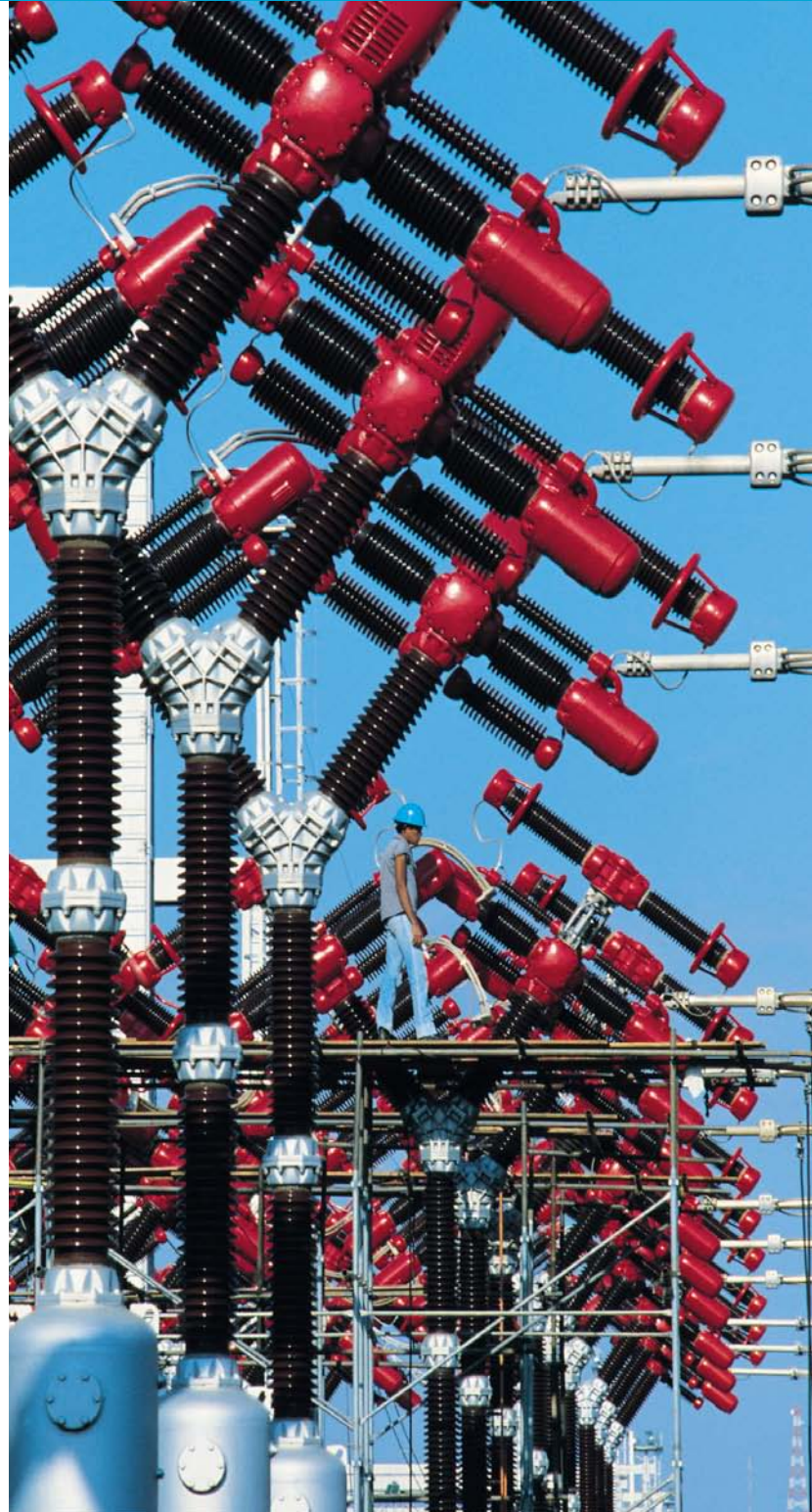


Power	Voltage	Current	Size L x W x H (mm)	Weight	Model Number
120 W	85-264 Vac 90-375 Vdc	5 A	4.85" x 1.97" x 4.37" (123 x 50 x 111)	1.65 lbs (750 g)	ADN5-24-1PM-C
240 W	85-264 Vac 90-375 Vdc	10 A	4.85" x 2.36" x 4.37" (123 x 60 x 111)	1.98 lbs (900 g)	ADN10-24-1PM-C
480 W	85-264 Vac 90-375 Vdc	20 A	4.85" x 3.42" x 4.96" (123 x 87 x 126)	2.60 lbs (1200 g)	ADN20-24-1PM-C



DC–DC Converters

Emerson Network Power is widely acknowledged as an industry leader in distributed power applications and produces an exceptionally wide range of DC–DC conversion products.



RF Power Bricks



RFF700



RFB300

Special Features

- Specialized high power bricks for RF applications such as base station power amplifiers
- Offered in 24 V and 48 V input voltages
- Wide output voltage adjustability
- -40 °C to 100 °C baseplate temperature with no derating at rated power
- International safety standard approvals – UL, CSA, VDE, CB Report

Half-Brick

Vout	Iout	Input Voltage	Package L x W x H (mm)	Efficiency	Model Number
7.2-13.2 V	Baseplate				
	25 A	24 V (18-36 V)	2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7)	86%	RFB300-24S12-R5Y
	29.2 A	48 V (36-75 V)	2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7)	86%	RFB350-48S12-R5J
16.8-29.4 V	Baseplate				
	11 A	24 V (18-36 V)	2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7)	90%	RFB300-24S28-R5Y
	11 A	48 V (36-75 V)	2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7)	91%	RFB300-48S28-R5J
	12.5 A	48 V (36-75 V)	2.4" x 2.27" x 0.5" (60.96 x 57.66 x 12.7)	91%	RFB350-48S28-R5Y

Full-Brick

Vout	Iout	Input Voltage	Package L x W x H (mm)	Efficiency	Model Number
16.8-29.4 V	Baseplate				
	17.9 A	24 V (18-36 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	90%	RFF500-24S28-5Y
	17.9 A	48 V (36-75 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	91%	RFF500-48S28-5Y
	21.4 A	24 V (18-36 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	90%	RFF600-24S28-5Y
	21.4 A	48 V (36-75 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	91%	RFF600-48S28-5Y
	25 A	48 V (36-75 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	91%	RFF700-48S28-5Y



C-Class – High Density LGA C Series

The latest addition to the C-Class non-isolated DC-DC converter offering packaged in an ultra-compact, low-profile Land Grid Array with current densities up to 225 A/in³



Special Features

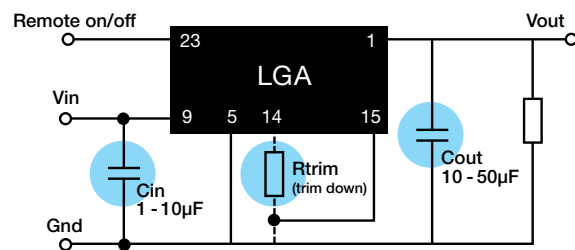
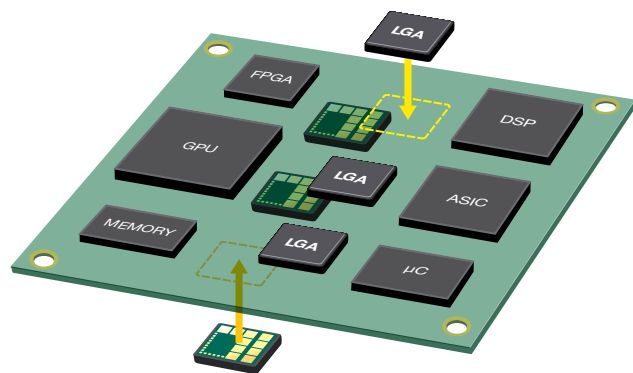
- High density, ultra low profile surface mount module in Land Grid Array (LGA) package
- Available in 4 different output current levels: 3, 6, 10 and 20 Amps
- Wide input voltage range: 3.0-14.0 V
- Adjustable output voltage: 0.59-5.1 V via external resistor
- High efficiency ~92% typical
- Wide ambient operating temperature range: -40 °C to 85 °C
- Input UVLO; Remote On/Off; Output Adjust; Margin; PGood signal, Differential sense
- Current sink capability for voltage termination applications
- Integrated input and output capacitors resulting to minimal external capacitance required for stable operation

LGA C Series Non-Isolated DC-DC Converters

Output Current	Input Voltage	Output Voltage	Efficiency	Package L x W x H (mm)	Model Number
Surface-Mounting					
3 A	3.0-14 Vdc	0.59-5.1 V	92%	0.65" x 0.65" x 0.129" (16.51 x 16.51 x 3.27)	LGA03C-00SADJJ
6 A	3.0-14 Vdc	0.59-5.1 V	92%	0.65" x 0.65" x 0.129" (16.51 x 16.51 x 3.27)	LGA06C-00SADJJ
10 A	3.0-14 Vdc	0.59-5.1 V	92%	0.65" x 0.65" x 0.129" (16.51 x 16.51 x 3.27)	LGA10C-00SADJJ
20 A	4.5-14 Vdc	0.59-5.1 V	91%	0.65" x 0.65" x 0.210" (16.51 x 16.51 x 5.33)	LGA20C-01SADJJ

Note: Optional heatsink kits are available. Ordering part number is LGA-HTSK-KIT-XXX
 XXX = Total height of the LGA20C-01SADJJ with heatsink attached: 045 = 0.45"; 048 = 0.48"; 050 = 0.50"

A Paradigm Shift in Converter Packaging



- Compact LGA package - significant improvement in current density, saves board space
- Allows for bilateral thermal management not easily provided by "down" solutions or typical modules (e.g., uniform height for coldplate cooling)
- Scalable solution, one footprint design for 3, 6, 10 and 20 A offering
- Fully operational DC-DC solution with 3 external components

Power Factor Correction (PFC)



Special Features

- 1600 W/720 W/75 W
- Unity power factor
- Universal input and frequency range
- Positive and negative enable
- Paralleling with current share
- IEC 1000-3.2 compliance
- 100 °C baseplate
- Clock synch (in/out)
- Current monitoring
- Vout adjust
- On/off enable
- Remote sense
- 95% efficiency
- Fast transient response

Vout	Iout	Input Voltage	Package L x W x H (mm)	Efficiency	Model Number
PFC Module - Baseplate					
380 V	4.2 A	85-264 Vac	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	95%	AIF04ZPFC-01L
380 V	4.2 A	85-264 Vac	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	95%	AIF04ZPFC-02L
393 V	0.25 A	100-122 Vac	2.3" x 1.45" x 0.5" (57.91 x 36.83 x 12.7)	90%	AIQ00ZPFC-01NL
393 V	2.08 A	85-264 Vac	3.5" x 2.4" x 0.5" (88.9 x 60.96 x 12.7)	93%	AIT02ZPFC-01NL
393 V	0.35 A	100-122 Vac	3.5" x 2.4" x 0.5" (88.9 x 60.96 x 12.7)	91%	AIT00ZPFC-01NL

High Power 300 Vin



300 V input 65-600 W output

Special Features

- 300 V input (250-420 V PFC-ready)
- 2nd generation product
- Standard through-hole termination
- Power density >100 W/in³
- 100 °C max baseplate operating temperature
- Embedded controls on secondary side (Full- and Half-brick):
 - Temp monitor
 - Current sharing
 - Power good signal
 - Current limit & OVP adjust

	Vout	Iout	Input Voltage	Package L x W x H (mm)	Efficiency	Model Number
AIF 300 Vin	Full-Brick – Baseplate					
	1.8 V	120 A	300 V (250-420 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	80%	AIF120Y300-L
	3.3 V	120 A	300 V (250-420 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	87%	AIF120F300-L
	5 V	80 A	300 V (250-420 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	90%	AIF80A300-L
	12 V	50 A	300 V (250-420 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	90%	AIF50B300-L
	15 V	40 A	300 V (250-420 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	90%	AIF40C300-L
	24 V	25 A	300 V (250-420 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	90%	AIF25H300-L
	48 V	12 A	300 V (250-420 V)	4.6" x 2.4" x 0.5" (116.84 x 60.96 x 12.7)	91%	AIF12W300-L
AIH 300 Vin	Half-Brick – Baseplate					
	1.8 V	50 A	300 V (250-420 V)	2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)	80%	AIH50Y300-L
	3.3 V	50 A	300 V (250-420 V)	2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)	85%	AIH50F300-L
	5 V	40 A	300 V (250-420 V)	2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)	88%	AIH40A300-L
	12 V	20 A	300 V (250-420 V)	2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)	90%	AIH20B300-L
	15 V	16 A	300 V (250-420 V)	2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)	90%	AIH16C300-L
	24 V	10 A	300 V (250-420 V)	2.3" x 2.4" x 0.5" (58.42 x 60.96 x 12.7)	90%	AIH10H300-L
AIQ 300 Vin	Quarter-Brick – Baseplate					
	28 V	2.32 A	300 V (250-420 V)	2.3" x 1.45" x 0.5" (57.91 x 36.83 x 12.7)	89%	AIQ02R300L

BXA Low Power



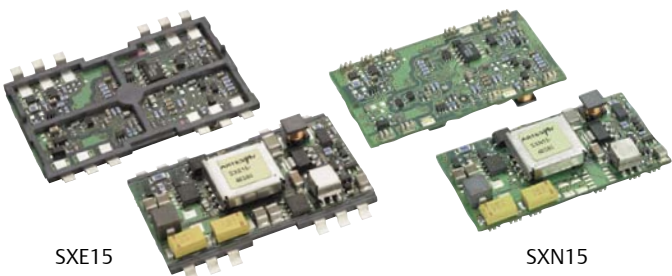
BXA30

Special Features

- Input voltages, 18-36 V, 36-75 V
- Single and dual outputs
- Power 3-40 W
- Regulated outputs
- Operating temperature -40 °C to 105 °C (ambient with derating)
- Protection: overcurrent/short-circuit
- 500-1500 Vdc isolation
- Enclosed and baseplate models
- UL, CSA and VDE safety approvals

	Input Voltage	Output Voltage	Package L x W x H (mm)	I/O Isolation	Efficiency	Model Number
3 W	Enclosed					
	18-36 V	5 V @ 0.5 A	1.25" x 0.8" x 0.5" (31.75 x 20.32 x 12.70)	500 V	76%	BXA3-24S05J
	36-75 V	5 V @ 0.5 A	1.25" x 0.8" x 0.5" (31.75 x 20.32 x 12.70)	500 V	76%	BXA3-48S05J
	36-75 V	15 V @ 0.2 A	1.25" x 0.8" x 0.5" (31.75 x 20.32 x 12.70)	500 V	76%	BXA3-48S15J
25 W	Baseplate					
36-75 V	5 V @ 5 A	3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21)	1500 V	80%	BXA30-48S05J	
30 W	Baseplate					
	36-75 V	15 V @ 2 A	3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21)	1500 V	87%	BXA30-48S15J
	36-75 V	5 V @ ±2.5 A	3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21)	1500 V	80%	BXA30-48D05-FJ
	36-75 V	12 V @ ±1.25 A	3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21)	1500 V	84%	BXA30-48D12J
	36-75 V	15 V @ ±1.0 A	3.02" x 2.41" x 0.52" (76.71 x 61.21 x 13.21)	1500 V	86%	BXA30-48D15J
40 W	Baseplate					
	18-36 V	3.3 V @ 7 A	2.20" x 2.2" x 0.5" (55.88 x 55.88 x 12.70)	1500 V	75%	BXA40-2453V3-MJ
	36-75 V	12 V @ 3.3 A	2.20" x 2.2" x 0.5" (55.88 x 55.88 x 12.70)	1500 V	87%	BXA40-48S12-MJ

SXE & SXN Low Power



SXE15

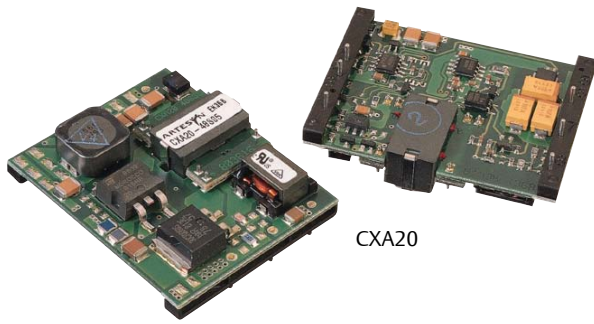
SXN15

Special Features

- Input voltages 33-75 Vdc
- Single and dual outputs
- Power 10.8-15 W
- Regulated outputs
- High efficiency topology – 87% @ 5 Vdc
- Remote on/off
- ±10% output voltage trim
- Operating temperature -40 °C to 70 °C (ambient)
- Protection: overcurrent/short-circuit/overvoltage
- 1500 Vdc isolation
- UL, CSA & VDE safety approvals
- Surface-mount

	Input Voltage	Output Voltage	Package L x W x H (mm)	I/O Isolation	Efficiency	Model Number
15 W	Open-frame Surface-mounting					
	33-75 V	5 V @ 3 A	1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64)	1500 V	87%	SXE15-48S05-RJ
	33-75 V	12 V @ 1.25 A	1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64)	1500 V	85%	SXE15-48S12-RJ
	33-75 V	1.8 V @ 6 A	1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64)	1500 V	83%	SXE15-48S1V8-RJ
	33-75 V	2.5 V @ 6 A	1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64)	1500 V	85%	SXE15-48S2V5-RJ
	33-75 V	3.3 V @ 4.5 A	1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64)	1500 V	86%	SXE15-48S3V3-RJ
	33-75 V	5 V @ 3 A	1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64)	1500 V	87%	SXN15-48S05-RJ
	33-75 V	1.8 V @ 6 A	1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64)	1500 V	85%	SXN15-48S1V8-RJ
	33-75 V	2.5 V @ 6 A	1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64)	1500 V	85%	SXN15-48S2V5-RJ
	33-75 V	3.3 V @ 4.5 A	1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64)	1500 V	86%	SXN15-48S3V3-RJ
	33-75 V	5 V @ 3 A & 3.3 V @ 4.5 A	1.9" x 1.39" x 0.34" (48.26 x 35.31 x 8.64)	1500 V	86%	SXE15-48D05-3V3-RJ
	33-75 V	3.3 V @ 3.5 A & 2.5 V @ 4.5 A	1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64)	1500 V	85%	SXN15-48D3V3-2V5RJ
	33-75 V	5 V @ 3 A & 3.3 V @ 4.5 A	1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64)	1500 V	86%	SXN15-48D05-3V3-RJ
33-75 V	3.3 V @ 3.5 A & 2.5 V @ 4.5 A	1.9" x 1.01" x 0.34" (48.26 x 25.65 x 8.64)	1500 V	85%	SXN15-48D3V3-2V5RJ	

CXA Low Power



CXA20

Special Features

- 4:1 input voltage range, 18-75 V
- Single and dual outputs
- Power 20 W
- Regulated outputs
- Remote on/off
- ±10% output voltage trim
- Operating temperature -40 °C to 70 °C (ambient)
- Protection: overcurrent/short-circuit/overvoltage
- Basic insulation, 1500 Vdc
- UL, CSA & VDE safety approvals

	Input Voltage	Output Voltage	Package L x W x H (mm)	I/O Isolation	Efficiency	Model Number
10 W	Open-frame					
	18-75 V	5 V @ 2 A	2" x 1" x 0.39" (50.80 x 25.40 x 10.00)	1500 V	81%	CXA10-48S05J
	18-75 V	12 V @ 0.83 A	2" x 1" x 0.39" (50.80 x 25.40 x 10.00)	1500 V	83%	CXA10-48S12J
	18-75 V	3.3 V @ 2.4 A	2" x 1" x 0.39" (50.80 x 25.40 x 10.00)	1500 V	78%	CXA10-48S3V3J
	18-75 V	5 V @ ±1.0 A	2" x 1" x 0.39" (50.80 x 25.40 x 10.00)	1500 V	81%	CXA10-48D05J
	18-75 V	12 V @ ±0.41 A	2" x 1" x 0.39" (50.80 x 25.40 x 10.00)	1500 V	83%	CXA10-48D12J
20 W	Open-frame					
	18-75 V	5 V @ 4 A	2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41)	1500 V	83%	CXA20-48S05J
	18-75 V	12 V @ 1.66 A	2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41)	1500 V	83%	CXA20-48S12J
	18-75 V	3.3 V @ 6 A	2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41)	1500 V	80%	CXA20-48S3V3J
	18-75 V	5 V @ ±2.0 A	2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41)	1500 V	84%	CXA20-48D05J
	18-75 V	12 V @ ±0.83 A	2" x 1.6" x 0.41" (50.80 x 40.64 x 10.41)	1500 V	84%	CXA20-48D12J



Terms and Conditions

Terms and Conditions of Sale

The Emerson Network Power company that accepts Buyer's order for Goods is herein referred to as the "Seller" and the person or entity purchasing goods or services ("Goods") and/or licensing software and/or firmware which are preloaded, or to be loaded into Goods ("Software") from Seller is referred to as the "Buyer." These Terms and Conditions, any price list or schedule, quotation, acknowledgment or invoice from Seller relevant to the sale of the Goods and licensing of Software and all documents incorporated by specific reference herein or therein constitute the complete and exclusive statement of the terms of the agreement governing the sale of Goods and license of Software by Seller to Buyer. Seller's acceptance of Buyer's purchase order is expressly conditional on Buyer's assent to all of Seller's terms and conditions of sale, including terms and conditions that are different from or additional to the terms and conditions of Buyer's purchase order. Buyer's acceptance of the Goods and/or Software will manifest Buyer's assent to these Terms and Conditions. Seller reserves the right in its sole discretion to refuse orders. Notwithstanding anything to the contrary, in the event that the provisions of these Terms and Conditions conflict with the provisions of an effective agreement signed by a duly authorized representative of both parties ("Effective Agreement") that applies to the transaction(s) contemplated herein, the Effective Agreement shall control.

1. PRICES: Unless otherwise specified in writing by Seller, the price quoted or specified by Seller for the Goods and/or Software shall remain in effect for thirty (30) days after the date of Seller's quotation or acknowledgment of Buyer's order for the Goods and/or Software, whichever occurs first, provided an unconditional authorization from Buyer for the shipment of the Goods and/or Software is received and accepted by Seller within such time period. If such authorization is not received by Seller within such thirty (30) day period, Seller shall have the right to change the price for the Goods and/or Software to Seller's price for the Goods and/or Software at the time of shipment. All prices and licensee fees are exclusive of taxes, transportation and insurance, which are to be borne by Buyer.

2. TAXES: Any current or future tax or governmental charge (or increase in same) affecting Seller's costs of production, sale, or shipment, or which Seller is otherwise required to pay or collect in connection with the sale, purchase, delivery, storage, processing, use or consumption of Goods, shall be for Buyer's account and shall be added to the price or billed to Buyer separately, at Seller's election.

3. TERMS OF PAYMENT: Unless otherwise specified by Seller, terms are net thirty (30) days from date of Seller's invoice in U.S. currency. Seller shall have the right, among other remedies, either to terminate this agreement or to suspend further performance under this and/or other agreements with Buyer in the event Buyer fails to make any payment when due, which other agreements Buyer and Seller hereby amend accordingly. Buyer shall be liable for all expenses, including attorneys' fees, relating to the collection of past due amounts. If any payment owed to Seller is not paid when due, it shall bear interest, at a rate to be determined by Seller, which shall not exceed the maximum rate permitted by law, from the date on which it is due until it is paid. Any payment due to either party under this agreement shall be made in full without any set-off, restriction, condition deduction or withholding for or on account of any counterclaim. Should Buyer's financial responsibility become unsatisfactory to Seller, cash payments or security satisfactory to Seller may be required by Seller for future deliveries of the Goods and/or Software. If such cash payment or security is not provided, in addition to Seller's other rights and remedies, Seller may discontinue deliveries.

4. SHIPMENT AND DELIVERY: While Seller will use all reasonable commercial efforts to maintain the delivery date(s) acknowledged or quoted by Seller, all shipping dates are approximate and not guaranteed. Seller reserves the right to make partial shipments. Seller, at its option, shall not be bound to tender delivery of any Goods and/or Software for which Buyer has not provided shipping instructions and other required information. If the shipment of the Goods and/or Software is postponed or delayed by Buyer for any reason, Buyer agrees to reimburse Seller for any and all storage costs and other additional expenses resulting therefrom. Risk of loss and legal title to the Goods shall transfer from Seller to Buyer upon delivery to and receipt by carrier at Seller's shipping point. Unless otherwise specified by Seller, all shipments are F.C.A. Seller's shipping point (Incoterms 2000). Any claims for shortages or damages suffered in transit are the responsibility of Buyer and shall be submitted by Buyer directly to the carrier. Shortages or damages must be identified and signed for at the time of delivery.

Buyer shall inspect Goods delivered to it by Seller immediately upon receipt, and, any course of dealing to the contrary notwithstanding, failure of Buyer to give Seller notice of any claim within 10 days after receipt of such Goods shall be an unqualified acceptance of such Goods.

5. LIMITED WARRANTY: Subject to the limitations of Section 6 and unless otherwise specified by Seller in writing, Seller warrants that the Goods manufactured by Seller will be free from defects in material and workmanship and substantially meet Seller's published specifications at the time of shipment under normal use and regular service and maintenance for (a) the period specified in Seller's then current product datasheets from the date of manufacture by Seller for standard Embedded Power Goods, (b) two (2) years from initial shipment for standard Embedded Computing Goods, and (c) the period specified by Seller in writing for custom Embedded Power Goods and custom Embedded Computing Goods. Unless otherwise stated in a separate Software license agreement, Seller makes no warranty as to any Software. **THE WARRANTIES SET**

FORTH IN SECTIONS 5 AND 7 ARE THE SOLE AND EXCLUSIVE WARRANTIES GIVEN BY SELLER WITH RESPECT TO THE GOODS AND SOFTWARE AND ARE IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHETHER OR NOT THE PURPOSE OR USE HAS BEEN DISCLOSED TO SELLER IN SPECIFICATIONS, DRAWINGS OR OTHERWISE, AND WHETHER OR NOT SELLER'S PRODUCTS ARE SPECIFICALLY DESIGNED AND/OR MANUFACTURED BY SELLER FOR BUYER'S USE OR PURPOSE.

These warranties do not extend to any losses or damages due to misuse, accident, abuse, neglect, negligence (other than Seller's), unauthorized modification or alteration, use beyond rated capacity, unsuitable power sources or environmental conditions, improper installation, repair, handling, maintenance or application or any other cause not the fault of Seller. To the extent that Buyer or its agents have supplied specifications, information, representation of operating conditions or other data to Seller in the selection or design of the Goods and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer, any warranties or other provisions contained herein that are affected by such conditions shall be null and void.

If within thirty (30) days after Buyer's discovery of any warranty defects within the warranty period, Buyer notifies Seller thereof in writing, Seller shall, at its option and as Buyer's exclusive remedy, repair, correct or replace per its return policy, or refund the purchase price for, that portion of the Goods found by Seller to be defective. Failure by Buyer to give such written notice within the applicable time period shall be deemed an absolute and unconditional waiver of Buyer's claim for such defects. Advance written permission to return Goods must be obtained from Seller. Such Goods must be shipped transportation prepaid to Seller. Returns made without proper written permission will not be accepted by Seller. Seller reserves the right to inspect Goods prior to authorizing return. Goods repaired or replaced during the warranty period shall be covered by the foregoing warranties for the remainder of the original warranty period or ninety (90) days from the date of shipment, whichever is longer.

Buyer assumes all other responsibility for any loss, damage, or injury to persons or property arising out of, connected with, or resulting from the use of Goods and/or Software, either alone or in combination with other products/components.

PRE-PRODUCTION (Prototype, Engineering Verification Test, or Design Verification Test) UNITS ARE SOLD "WHERE IS, AS IS, WITH ALL FAULTS" WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR INTENDED PURPOSE.

6. LIMITATION OF REMEDY AND LIABILITY: THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY WARRANTY HEREUNDER (OTHER THAN THE WARRANTY PROVIDED UNDER SECTION 7) SHALL BE LIMITED TO REPAIR, CORRECTION OR REPLACEMENT, OR REFUND OF THE PURCHASE PRICE UNDER SECTION 5.

SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE AND THE REMEDIES OF BUYER SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE PAID BY BUYER FOR THE SPECIFIC GOODS OR SOFTWARE PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. The term "consequential damages" shall include, but not be limited to, loss of anticipated profits, business interruption, loss of use, revenue, reputation and data, costs incurred, including without limitation, for capital, fuel, power and loss or damage to property or equipment. It is expressly understood that any technical advice furnished by Seller with respect to the use of the Goods and/or Software is given without charge, and Seller assumes no obligation or liability for the advice given, or results obtained, all such advice being given and accepted at Buyer's risk.

7. PATENTS AND COPYRIGHTS: Subject to the limitations of the second paragraph of Section 6, Seller warrants that the Goods sold, except as are made specifically for Buyer according to Buyer's specifications, do not infringe any valid U.S. patent or copyright in existence as of the date of shipment. This warranty is given upon the condition that Buyer promptly notify Seller of any claim or suit involving Buyer in which such infringement is alleged and cooperate fully with Seller and permit Seller to control completely the defense, settlement or compromise of any such allegation of infringement. Seller's warranty as to utility patents only applies to infringement arising solely out of the inherent operation according to Seller's specifications and instructions of such Goods. In the event such Goods are held to infringe such a U.S. patent or copyright in such suit, and the use of such Goods is enjoined, or in the case of a compromise or settlement by Seller, Seller shall have the right, at its option and expense, to procure for Buyer the right to continue using such Goods, or replace them with non-infringing Goods, or modify same to become non-infringing, or grant

Buyer a credit for the depreciated value of such Goods and accept return of them. In the event of the foregoing, Seller may also, at its option, cancel the agreement as to future deliveries of such Goods, without liability.

8. EXCUSE OF PERFORMANCE: Seller shall not be liable for delays in performance or for non-performance due to acts of God; acts of Buyer; war; fire; flood; weather; sabotage; epidemics; strikes or labor disputes; civil disturbances or riots; governmental requests, restrictions, allocations, laws, regulations, orders or actions; unavailability of or delays in transportation; default of suppliers; or unforeseen circumstances or any events or causes beyond Seller's reasonable control. Deliveries or other performance may be suspended for an appropriate period of time or canceled by Seller upon notice to Buyer in the event of any of the foregoing, but the balance of the agreement shall otherwise remain unaffected as a result of the foregoing.

If Seller determines that its ability to supply the total demand for the Goods, or to obtain material used directly or indirectly in the manufacture of the Goods, is hindered, limited or made impracticable due to causes set forth in the preceding paragraph, Seller may allocate its available supply of the Goods or such material (without obligation to acquire other supplies of any such Goods or material) among its purchasers on such basis as Seller determines to be equitable without liability for any failure of performance which may result therefrom.

9. RESCHEDULE/CANCELLATION: Unless otherwise agreed in writing by Seller, orders under this agreement may not be rescheduled or canceled by Buyer for any reason.

10. CHANGES: Buyer may request changes or additions to the Goods and/or Software consistent with Seller's specifications and criteria. In the event such changes or additions are accepted by Seller, Seller may revise the price, license fees and dates of delivery. Seller reserves the right to change designs and specifications for the Goods and/or Software without prior notice to Buyer, except with respect to Goods and/or Software being made-to-order for Buyer. Seller shall have no obligation to install or make such change in any Goods and/or Software manufactured prior to the date of such change.

11. NUCLEAR/MEDICAL: GOODS AND SOFTWARE SOLD HEREUNDER ARE NOT FOR USE IN CONNECTION WITH ANY NUCLEAR, MEDICAL, LIFESUPPORT AND OTHER HIGH RISK APPLICATIONS WHERE GOODS OR SOFTWARE FAILURE COULD LEAD TO LOSS OF LIFE OR CATASTROPHIC PROPERTY DAMAGE. Buyer accepts Goods and Software with the foregoing understanding, agrees to communicate the same in writing to any subsequent purchasers or users and to defend, indemnify and hold harmless Seller from any claims, losses, suits, judgments and damages, including incidental and consequential damages, arising from such use, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability.

12. ASSIGNMENT: Buyer shall not assign its rights or delegate its duties hereunder or any interest herein without the prior written consent of Seller, and any such assignment, without such consent, shall be void.

13. SOFTWARE: Notwithstanding any other provision herein to the contrary, Seller or applicable third party licensor to Seller shall retain all rights of ownership and title in its respective Software, including without limitation all rights of ownership and title in its respective copies of such Software. Except as otherwise provided herein, Buyer is hereby granted a nonexclusive, non-transferable royalty free license to use the Software incorporated into the Goods solely for purposes of Buyer properly utilizing such Goods purchased from Seller. All other Software shall be furnished to, and used by, Buyer only after execution of Seller's (or the licensor's) applicable standard license agreement, the terms of which are incorporated herein by reference. The Software is Seller's own or Seller's supplier's proprietary information, and Buyer and its employees and agents shall not disclose the Software to others without Seller's prior written consent.

14. TOOLING: Tool, die, and pattern charges, if any, are in addition to the price of the Goods and are due and payable upon completion of the tooling. All such tools, dies and patterns shall be and remain the property of Seller. Charges for tools, dies, and patterns do not convey to Buyer, title, ownership interest in, or rights to possession or removal, or prevent their use by Seller for other purchasers, except as otherwise expressly provided by Seller and Buyer in writing with reference to this provision.

15. DRAWINGS: Seller's prints and drawings (including without limitation, the underlying technology) furnished by Seller to Buyer in connection with this agreement are the property of Seller and Seller retains all rights, including without limitation, exclusive rights of use, licensing and sale. Possession of such prints or drawings does not convey to Buyer any rights or license, and Buyer shall return all copies (in whatever medium) of such prints or drawings to Seller immediately upon request therefor.

16. BUYER'S COMPLIANCE WITH LAWS: In connection with the transactions contemplated by this agreement, Buyer is familiar with and shall fully comply with all applicable laws, regulations, rules and other requirements of the United States and of any applicable state, foreign and local governmental body in connection with the purchase, license, receipt, use, transfer and disposal of the Goods and/or Software.

17. EXPORT/IMPORT: Buyer agrees that all applicable import and export control laws, regulations, orders and requirements, including without limitation those of the United States and the European Union, and the jurisdictions in which the Seller and Buyer are established or from which Goods and/or Software may be supplied, will apply to their receipt and use. In no event shall Buyer use, transfer, release, import, export, Goods and/or Software in violation of such applicable laws, regulations, orders or requirements.

18. GOVERNMENT CONTRACT CONDITIONS: In the event Buyer supplies Goods or Software to the U.S. Government or to a prime contractor selling to the U.S. Government, the following Federal Acquisition Regulation (FAR) clauses are accepted by Seller and are made part of this agreement applicable to such supply: 52.222-21 Prohibition of Segregated Facilities; 52.222-26 Equal Opportunity; 52.222-35 Equal Opportunity For Special Disabled Veterans, Veterans of Vietnam Era, and Other Eligible Veterans; 52.222-36 Affirmative Action For Workers with Disabilities; and 52.219-8 Utilization of Small Business Concerns. No additional FAR or FAR Supplement clauses are accepted by Seller. In the event Buyer elects to sell Goods or Software to the U.S. Government or any national, state, provincial or local non-U.S. governmental entity or to a prime contractor selling to such entities, Buyer does so solely at its own option and risk, and agrees not to obligate Seller as a sub-contractor or otherwise to the U.S. Government or other governmental entity except as described in this Section 18. Buyer remains solely and exclusively responsible for compliance with all statutes and regulations governing sales to the U.S. Government or any national, state, provincial or local non-U.S. governmental entity. Seller makes no representations, certifications or warranties whatsoever with respect to the ability of its Goods, Software, or prices to satisfy any such statutes and regulations.

19. GENERAL PROVISIONS: These terms and conditions supersede all other communications, negotiations and prior oral or written statements regarding the subject matter of these terms and conditions. No change, modification, rescission, discharge, abandonment, or waiver of these terms and conditions shall be binding upon the Seller unless made in writing and signed on its behalf by a duly authorized representative of Seller. No conditions, usage of trade, course of dealing or performance, understanding or agreement purporting to modify, vary, explain, or supplement these terms and conditions shall be binding unless hereafter made in writing and signed by the party to be bound, and no modification or additional terms shall be applicable to this agreement by Seller's receipt, acknowledgment, or acceptance of purchase orders, shipping instruction forms, or other documentation containing terms at variance with or in addition to those set forth herein. Any such modifications or additional terms are specifically rejected and deemed a material alteration hereof. If this document shall be deemed an acceptance of a prior offer by Buyer, such acceptance is expressly conditional upon Buyer's assent to any additional or different terms set forth herein. No waiver by either party with respect to any breach or default or of any right or remedy, and no course of dealing, shall be deemed to constitute a continuing waiver of any other breach or default or of any other right or remedy, unless such waiver be expressed in writing and signed by the party to be bound. All typographical or clerical errors made by Seller in any quotation, acknowledgment or publication are subject to correction. In the event that any provision or portion thereof contained in the Contract is held to be unenforceable, the Contract shall be construed without such provision or portion thereof.

(A) If Seller is a U.S. incorporated entity: This Agreement shall be governed by the laws of the State of Delaware, U.S.A., without reference to its choice or conflict of laws principles. The parties agree to submit to the exclusive jurisdiction of the courts of the State of Delaware for all actions arising in connection herewith.

(B) If Seller is a European incorporated entity: This Agreement shall be governed by the laws of England. Any dispute arising out of or in connection with this Agreement that cannot be resolved through friendly consultation shall be referred to and finally resolved by arbitration in London, England before the London Court of International Arbitration in accordance with its arbitration rules. The arbitral award shall be final and binding on the parties.

(C) If Seller is an entity incorporated in the Asia Pacific region: This Agreement shall be governed by the laws of the Hong Kong Special Administrative Region of the People's Republic of China. Any dispute arising out of or in connection with this Agreement that cannot be resolved through friendly consultation shall be referred to and finally resolved by arbitration in Hong Kong before the Hong Kong International Arbitration Centre in accordance with its arbitration rules. The arbitral award shall be final and binding on the parties.

(D) No action, regardless of form, arising out of transactions relating to this agreement, may be brought by either party more than two (2) years after the cause of action has accrued. The U.N. Convention on Contracts for the International Sales of Goods shall not apply to this agreement.

Revised February 6, 2009

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Ecosystem Leadership

Just as nature relies on communities of organisms functioning as an ecological unit, embedded power solutions depend on a broad and powerful ecosystem, including standards bodies, industry associations, technology alliances and engineering communities. Emerson Network Power brings a wealth of innovation and many years experience to accredited standards development organizations, specification consortia and industry associations through our executive memberships and key committee positions. We have long been committed to a strong ecosystem that works to further the development of the industries and technologies that are important to our customers' success.



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