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# Digital DC-DC Power Module



Power management has become a critical issue in telecom, networking and computing applications. The considerations involved go beyond a simple efficiency calculation, requiring developers of data centers, telecom central offices, cloud infrastructure and hyperscale installations to consider factors such as thermal and load management.

Digital control techniques offer you a comprehensive solution to provide monitoring and management functions. Monitoring voltage, current, power and temperature allow you to measure the power demand of the system and actively control the units. These monitoring functions can also be configured to generate warnings if shutdown points are approached, which improves system reliability and can improve up time.

Digital and analog converters have much in common, with similar power switching devices and magnetic structures (inductors and transformers).

However, the vital inner control loop design, which has traditionally been the domain of analog engineers, can now be implemented using digital techniques. Communications, monitoring and control are implemented over the industry-standard PMBus® command protocol.

In the design phase, digital control means that a unit can be configured to be optimal for the system/application with far greater flexibility than analog controlled units. In deployment, the power system can dynamically adapt to changes in operating conditions – all in real time.

The movement to a digital distributed power architecture allows much greater flexibility and control in system design, management and monitoring functions.

**300 W, 500 W  
and 700 W  
Isolated Bricks**

**100 W and 200 W  
Non-isolated Unit**

**Isolated:  
48 V Input**

**Non-isolated:  
7.5 – 14 V Input**

**Isolated Brick  
Output: 12 V**

**Non-isolated  
Output: 0.6 – 5.2 Vdc**

**Standard PMBus  
Controlled  
Isolated and  
Non-isolated Units**

**DOSA  
Footprint  
Isolated Brick  
Form Factor**

# Artesyn Digital DC-DC Converters

Digital control and monitoring enables a wide range of functions not typically available when using analog-controlled modules, including application-tailored overcurrent protection limits, temperature warning levels, reporting of fault conditions, modified output voltages, and real-time power and efficiency monitoring, all via the PMBus interface. For example, some processors have recommended power rail start-up characteristics, which can be configured digitally and applied to the DC-DC module. Control loops can also be modified to accurately suit the transient load characteristics of applications.

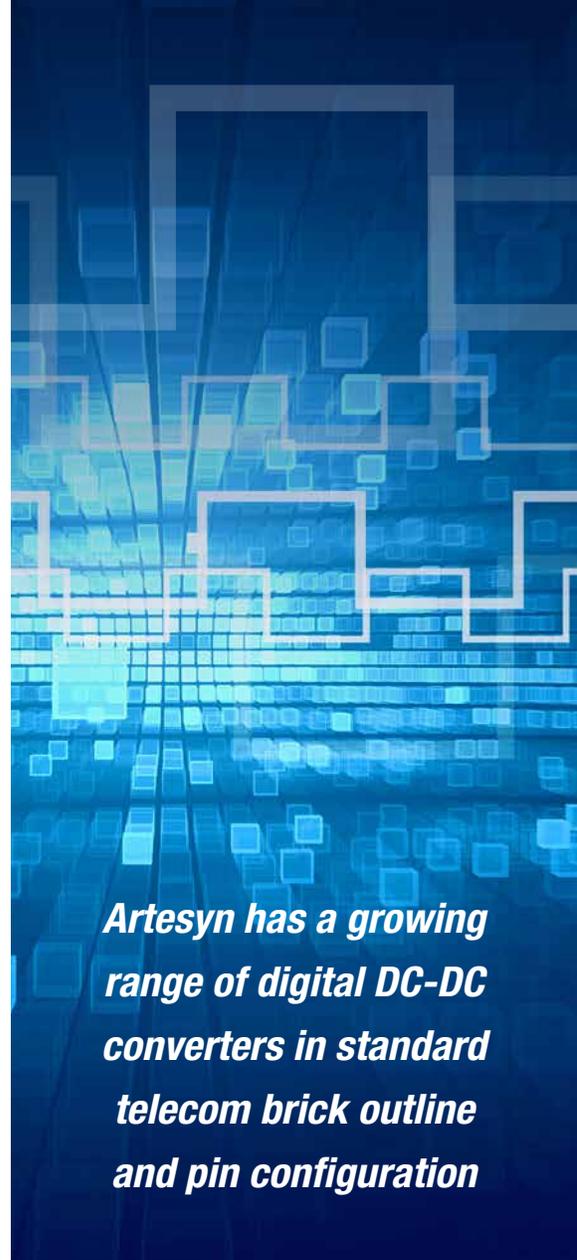
## Isolated DC-DC Modules

These single output isolated modules offer excellent thermal performance, which, together with an enhanced pre-bias start-up capability, makes them an ideal choice for use in data processing and telecommunication applications, particularly in the application of supplying power to non-isolated modules.

Their open-frame design is optimized for forced air or conduction cooling or an aluminum baseplate option is available for enhanced thermal performance.

Artesyn's isolated digital DC-DC converters are low profile units that are ideal for systems with demanding inter-board spacing requirements; the open-frame models have an installed height of 0.43 inch (11 mm), while the baseplate versions require 0.52 inch (13.3 mm).

The  $\frac{1}{8}$  brick and  $\frac{1}{4}$  brick units follow the industry standard PMBus interface DOSA footprints, giving you options to scale your power module with your application, from 300 to 700 watts.



*Artesyn has a growing range of digital DC-DC converters in standard telecom brick outline and pin configuration*



### 300 W $\frac{1}{8}$ Brick

ADO300

- 36 – 75 V input range
- Up to 26 A output current
- 11.7 V output voltage
- 95.2% typical efficiency



### 500 W $\frac{1}{4}$ Brick

ADQ500

- 36 – 75 V input range
- Up to 42 A output current
- 12 V output voltage
- 96% typical efficiency



### 700 W $\frac{1}{4}$ Brick

ADQ700

- 40 – 60 V input range
- Up to 58 A output current
- 12 V output voltage
- 96% typical efficiency

## LGA50D and LGA80D Non-isolated Units

With a footprint of 1" (25.4 mm) by 0.5" (12.5 mm), the LGA family of the LGA80D and LGA50D represent some of the highest density current ratings available in the industry. These innovative units offers two independent outputs, which can either be configured as a single output or 2 completely independently controlled outputs. The LGA80D can be configured as two 40A outputs or one single 80A output, whereas the LGA50D can be configured as two 25 outputs or one single 50A output.

It is also possible to generate a higher current rated rail by connecting units in parallel: For example, by connecting four LGA80D units in parallel up to 320 amps can be supplied as a single power rail.

The LGA family units share all of the same control functionality and flexibility. The wide trim feature of the LGA's (from 0.6 to 5.2 volts) makes them suitable for use with a broad range of semiconductor devices. Both analog and digital control functions are enabled on this unit, which means the LGA's can be either controlled with a resistor or alternatively, be fully controlled and monitored by using the universally accepted industry-standard PMBus digital interface.

For designers using this category of product, critical parameters for consideration are efficiency and derating. The Artesyn LGA's offer class-leading efficiencies with very little or no derating factor applied to the power-limit of the LGA80D at 200W maximum (two 100W output channels) and LGA50D at 100W maximum (two 50W channels).

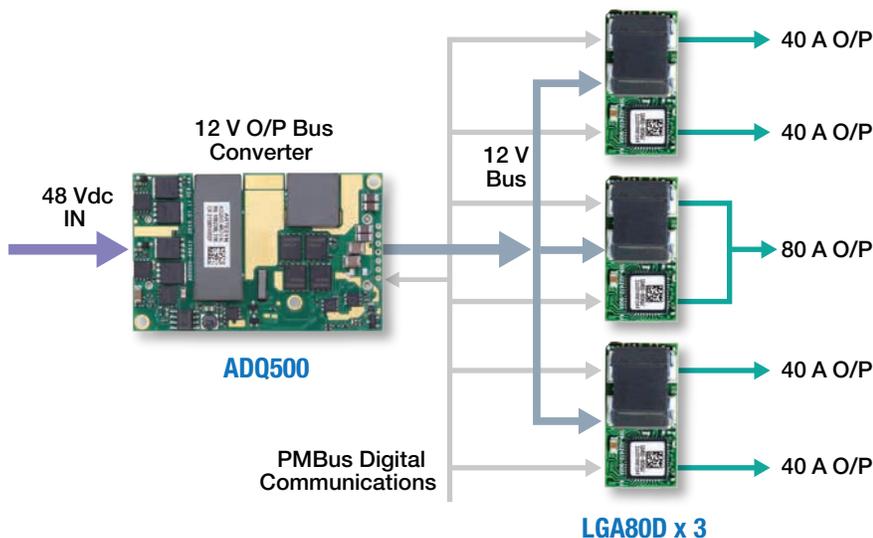
## Evaluation Kits

Artesyn offers two evaluation kits for the range of digital DC-DC modules, to cover the isolated and non-isolated units. Using these evaluation kits, you can connect the demonstration board to a USB socket on a PC with the PMBus interface dongle and cable provided, and control and monitor the DC-DC modules as they would be used in an application.

There are hardware functions on the demonstration board that allow you to enable and select an output voltage by simple dip-switch settings, and the board provides voltage and ripple measurement points. The isolated demonstration board can be connected to the non-isolated board, enabling you to test the full DC-DC conversion process from 48 V DC input at the system level to the low voltages at the processor level, with digital control throughout.

The 1/8 brick and 1/4 brick units follow the industry standard PMBus interface DOSA footprints, giving you options to scale your power module with your application, from 300 to 700 watts.

## Isolated and Non-isolated Converters in a Centrally Controlled Network



**100 W**  
LGA50D

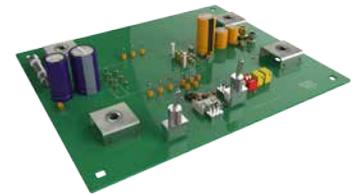


**200 W**  
LGA80D

- 7.5 – 14 Vdc input voltage
- 0.6 – 5.2 V output voltage
- Up to 95.5% typical efficiency



**Isolated:** A single demonstration board can be used with all three isolated modules.



**Non-isolated:** The demonstration board is populated with two LGA80D modules, allowing you to test independent channel or stacked-module operation.



**Artesyn produces an exceptionally broad range of products spanning every aspect of the computing, storage and networking market sector. These include front-end AC-DC and DC-DC power supplies, isolated brick-type DC-DC converters, and non-isolated point-of-load (POL) DC-DC converters.**

Artesyn Embedded Technologies is a global leader in the design and manufacture of highly reliable power conversion solutions for a wide range of industries including communications, computing, consumer electronics, medical, aerospace and industrial automation.

Artesyn Embedded Technologies is one of the world's largest and most successful power supply companies, also embracing the well-known Astec brand. The company's extensive standard AC-DC product portfolio covers a power range of 3 watts to 24 kilowatts and includes open-frame and enclosed models, highly configurable modular power supplies, rack-mounting bulk front end units, DIN rail power supplies and external power adapters. Many of these products are available in medically approved versions and a large number of the higher power models feature extensive built-in intelligence.

As an industry leader in distributed power applications, Artesyn produces an exceptionally wide range of DC-DC power conversion products. These include isolated DC-DC converters, covering industry-standard sixteenth- to full-brick form factors with power ratings from 6 watts to 800 watts, and three application-optimized families of non-isolated DC-DC converters.

As a pioneer in low power switch mode adapters, Artesyn has designed and manufactured solutions for almost every major mobile phone supplier. With well over one billion chargers shipped from its best-cost facilities, Artesyn has aligned itself to meet the demands for the next billion chargers through new platforms, automated manufacturing methodology and unsurpassed quality and reliability.

For more than 40 years, customers have trusted Artesyn to help them accelerate time-to-market and shift development efforts to the deployment of new, value-add features, and services. Artesyn has over 15,000 employees worldwide across multiple engineering centers of excellence, four world-class manufacturing facilities, and global sales and support offices.

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