

ARTESYN DIGITAL DC-DC POWER MODULES

NON-ISOLATED CONVERTERS | ISOLATED CONVERTERS



Digital DC-DC Power Modules

Power management is 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

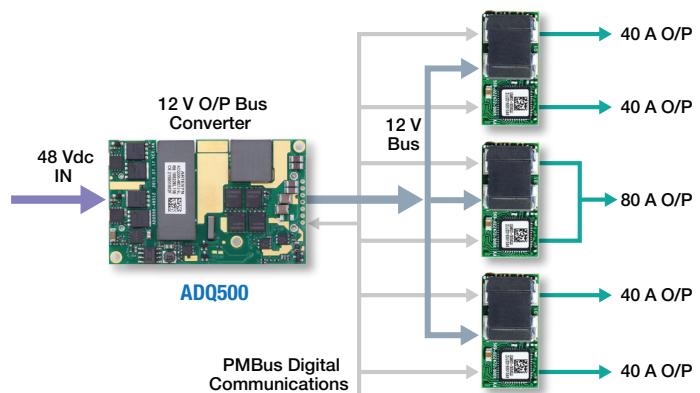
the industry-standard PMBus® command protocol. In the design phase, digital control means that a unit can be configured to be optimal for the system/application with far greater flexibility than analog controlled units. In deployment, the power system can dynamically adapt to changes in operating conditions – 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.

Features	<ul style="list-style-type: none"> ■ 300 W, 500 W, 700 W, and 1300 W Isolated Bricks ■ 100 W and 200 W Non-isolated Unit 	<ul style="list-style-type: none"> ■ Standard PMBus Controlled ■ DOSA Footprint Isolated Brick Form Factor 	<ul style="list-style-type: none"> ■ Input: 48 V (Isolated), 7.5 to 14 V (Non-Isolated) ■ Output: 12 V (Isolated), 0.6 to 5.2 VDC (Non-Isolated)
Applications	<ul style="list-style-type: none"> ■ Server Processors ■ FPGAs ■ Supercomputers 	<ul style="list-style-type: none"> ■ Telecom ■ Networking ■ Data Centers 	<ul style="list-style-type: none"> ■ Graphics Processing ■ Video Processing

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 and Non-Isolated Converters in a Centrally Controlled Network

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.

Advanced Energy's Artesyn 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 in (11 mm), while the baseplate versions require 0.52 in (13.3 mm). 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 DC-DC Modules				
Type	300 W 1/8 Brick ADO300	500 W 1/4 Brick ADQ500	700 W 1/4 Brick ADQ700	1300 W 1/4 Brick BDQ1300
Input Range	36 to 75 V	36 to 75 V	40 to 60 V	40 to 60 V
Output Current	Up to 26 A	Up to 42 A	Up to 58 A	Up to 107 A
Output Voltage	11.7 V	12 V	12 V	12 V nominal
Efficiency	95.2% typical	96% typical	96% typical	97.5 peak

NON-ISOLATED DC-DC MODULES

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 offer 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 ohms) 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 200 W maximum (two 100 W output channels) and LGA50D at 100 W maximum (two 50 W channels).

Non-Isolated DC-DC Modules		
Type	100W LGA50D	200W LGA80D
Input Voltage	7.5 to 14 VDC	
Output Voltage	06 to 5.2 V	
Typical Efficiency	Up to 95.5%	

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 VDC 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 W.



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.



PRECISION | POWER | PERFORMANCE

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