

Standard Power Module

(DC/DC and AC/DC Converter)

DCBU

Delta Electronics, Inc.

Jul. 2015



Business Categories



Power Electronics

- **Embedded Power Supplies**
- Mobile Power Supplies
- Fans and Thermal Management
- Electronic Components for ICT Equipment



Energy Management

- Industrial Automation
- Telecom Power Systems
- UPS & Datacenter Infrastructure
- Renewable Energy
- Automotive Electronics & EV Charging



Smart Green Life

- Networking Systems
- Display & Visualization
- LED Lighting
- Healthcare Devices
- **Innervie**
- **vivitek**



Number-One Power Supply Companies in their respective Products/Markets and Geographic Regions
CY 2014 Sales: US Dollars in Millions (CY: Calendar Year)

PS Companies	HQ Location	Products	Region	Sales
Delta Electronics *	Taiwan	OEM+TEL+UPS+INV+OPS	WW	~\$4706
Delta Electronics *	Taiwan	OEM+TELECOM	WW	~\$4255
Delta Electronics *	Taiwan	OEM	WW	~\$3741
Delta Electronics	Taiwan	OEM: AC-DC	WW	~\$3756
Murata	Japan	OEM: DC-DC	WW	~\$240-\$260
Emerson Network Power	USA	TELECOM	WW	~\$1280-\$1310
Schneider Electric	France	UPS	WW	~\$3000-\$3500
SMA Solar Technology **	Germany	RE: INVERTERS (INV)	WW	~\$876-\$925
Delta Electronics	Taiwan	OEM+TELECOM	NA	~\$1058
Delta Electronics	Taiwan	OEM+TELECOM	EU	~\$677
Delta Electronics	Taiwan	OEM+TELECOM	ASIA	~\$2430
Delta Electronics	Taiwan	OEM	NA	~\$1008
Delta Electronics	Taiwan	OEM	EU	~\$502
Delta Electronics	Taiwan	OEM	ASIA	~\$2184
Emerson Network Power	USA	TELECOM	NA	~\$540-\$550
ELTEK * & Emerson Network Power	Norway USA	TELECOM	EU	~\$240-\$250
Emerson Network Power	USA	TELECOM	ASIA	~\$500-\$510

Micro-Tech Consultants

Power Electronics Industry News

Volume 233 March 2015

Global Sales of Top 9 DC-DC Converter Companies 2013 Merchant OEM DC-DC Converters

No.	Power Supply Companies	Global Sales 2013
1	Murata Power Solutions (Murata)	~\$280-300
2	Ericsson Power Modules ** (Ericsson)	~\$222
3	Vicor	~\$150-170
4	GE Critical Power	~\$150-170
5	Delta Electronics (Delta)	~\$162
6	AcBel Polytech Inc. (AcBel)	~\$159
7	Emerson Network Power * Embedded Computing & Power Artesyn Embedded Technologies (Artesyn)	~\$100
8	TDK-Lambda	~\$90
9	Bel Power	~\$40-50

US dollars in millions; OEM merchant power supplies only

PCB Mount Type

- Open-frame DC/DC Converter
- Encapsulated DC/DC Converter
- Non-isolated POL
- AC/DC Converter

Standalone Type

- Panel Mount DC/DC Power Module
- Din-rail Mount DC/DC Power Module *
- Panel Mount AC/DC Power Module
- Din-rail Mount AC/DC Power Module





- Telecom
- Networking
- Data Center
- Computing
- Railway
- Military and Aerospace
- LED Signage
- Automation
 - Building Automation
 - Control, Logic, Sensing
 - Industrial Ethernet Switch
 - Manufacturing, Testing, Measurement
 - Robotics
 - Infotainment
- Healthcare
 - Dialysis devices
 - MRI
- Non-Automobile Transportation
 - Forklift
 - Heavy Machine
 - Off-road Electric Vehicle



Open-frame On-board DC/DC Converters

- Telecom
- Networking
- Data Center & Computing



History of Delta's Bricks

**Full
Brick**

**Half
Brick**

**Quarter
Brick**

**Eighth
Brick**

**Sixteenth
Brick**

**Thirty-second
Brick**

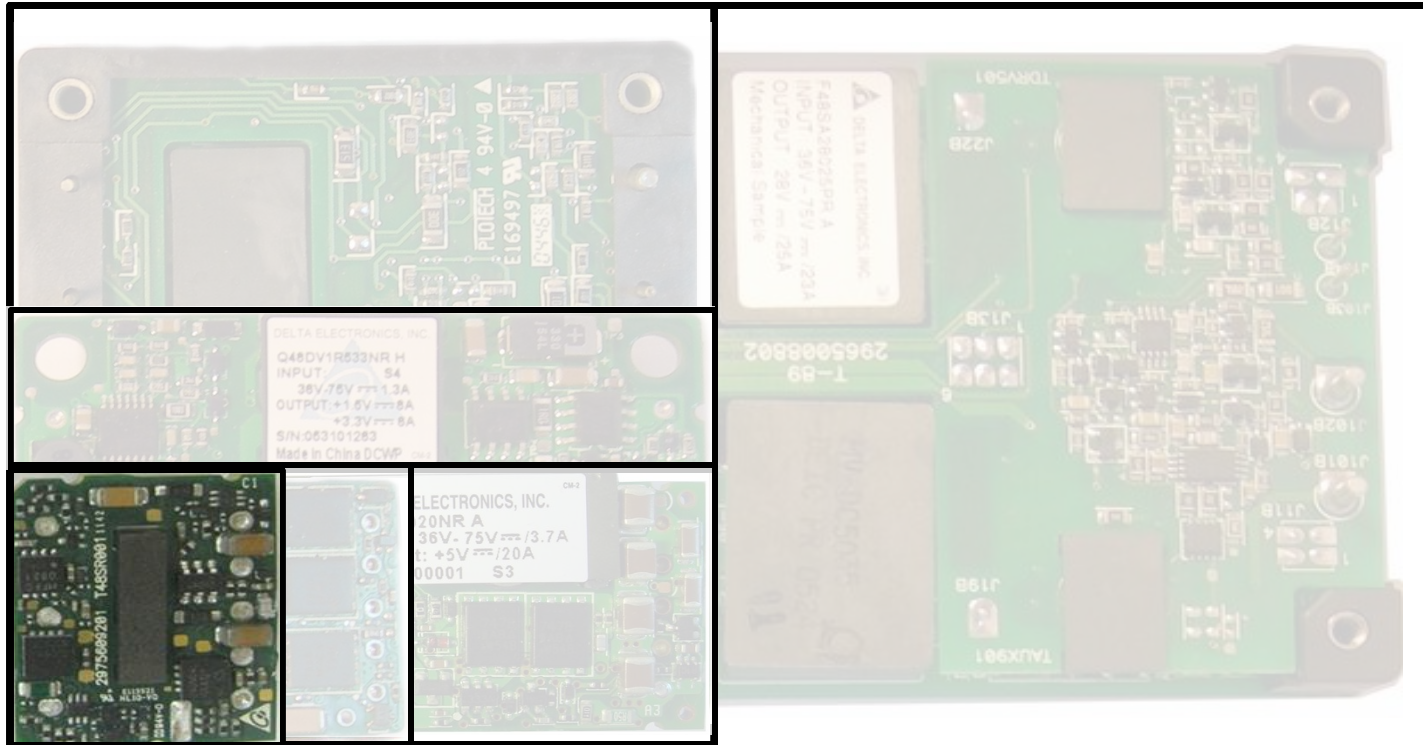
1990

1998

2000

2004

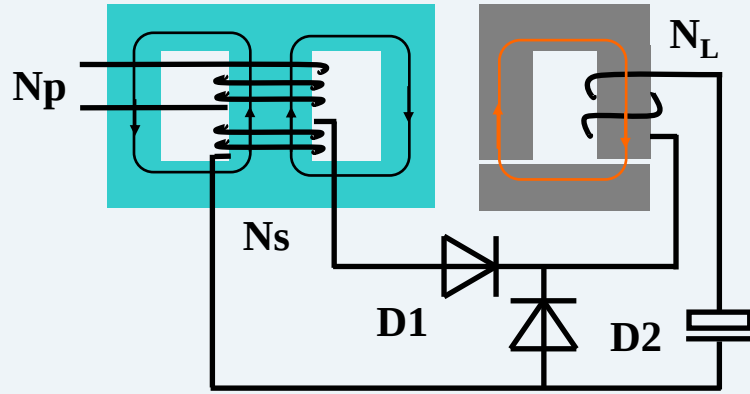
2014



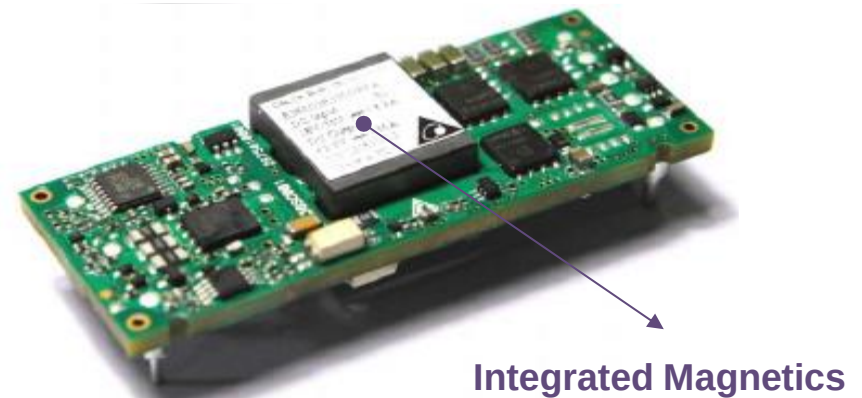
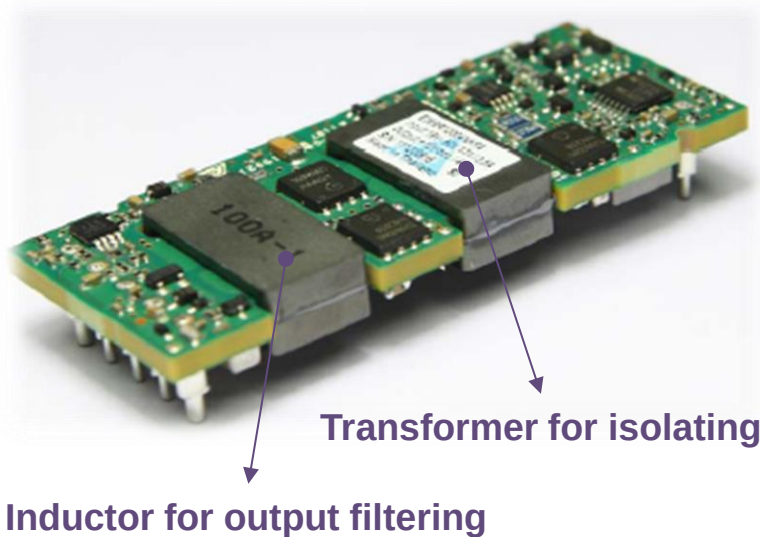
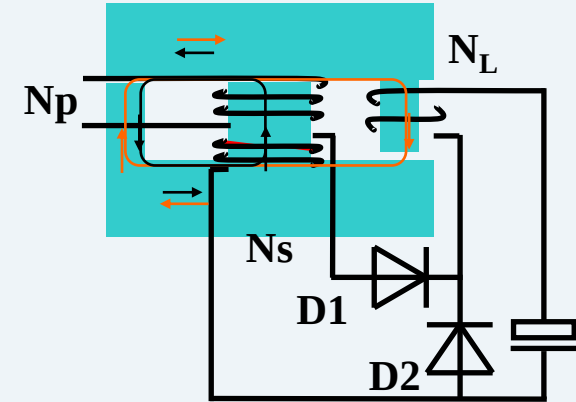
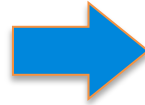
25W, 130 W/in³

0.75" x 0.9" x 0.33"

Magnetic Integration Technology



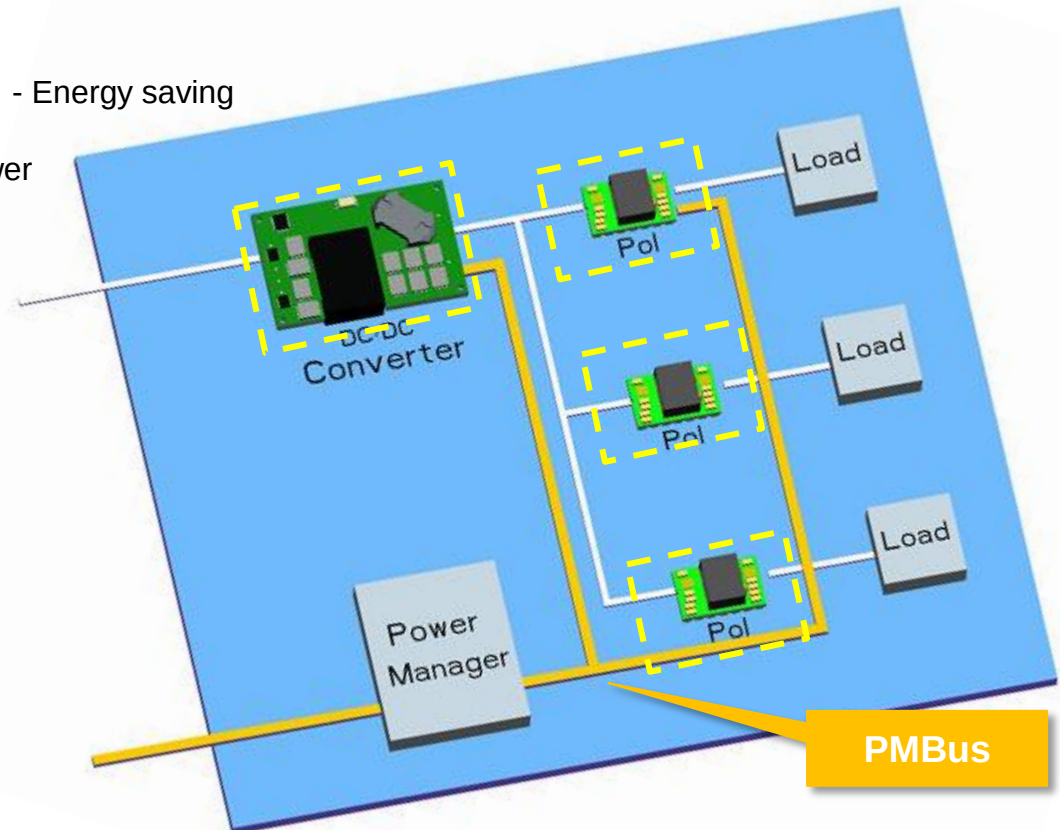
Traditional Forward Type DC/DC Converter



- Benefits**
- Only one magnetic in the converter – **saves space**
 - Easy assembly in mass production – **saves cost**
 - Reduce conduction loss – **improves efficiency**

Benefits

- Monitoring and optimizing system power consumption - Energy saving
- Simple Control Circuit - Increase PWB usage for power
- Flexible Control - Design standardization
- Communication - User friendly
- Deeply and accurately control to duty level

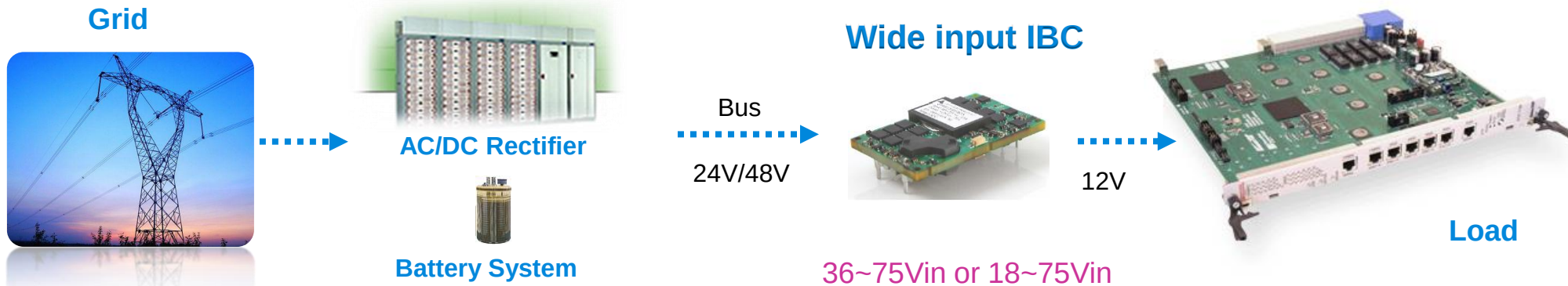


DGQ25A



E48SC E54SD Q48SC Q54SG H48SC

Traditional Telecom System



18~75Vin

Form Factor	Output Power	Series
1/16 brick	50W	V36SE
1/8 brick	66~75W	E36SR
	116~125W	E36SC
1/4 brick	204~240W	Q36SR

36~75Vin

Form Factor	Output Power	Series
1/32 brick	25W	T48SR
1/16 brick	17~100W	V48SH V48SC
1/8 brick	30~60W	E48SR
	50~120W	E48SC E48SH
	200~240W	E48SP
	240~360W	E48SC (digital)
1/4 brick	216~400W	Q48SQ
	300~600W	Q48SC (digital)

Server / Datacenter System

Grid



AC/DC Power Supply



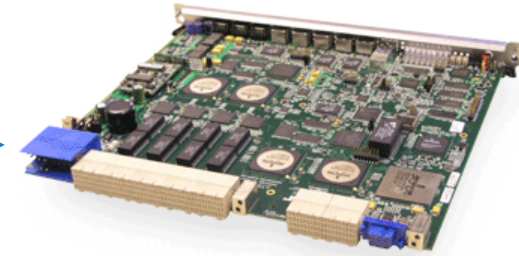
Bus
48V/54V

Narrow input IBC



12V

Load



42~60Vin

Form Factor	Max Output Power	Series
1/8 brick	300W	E54SD (digital)
1/4 brick	400~600W	Q54SG (digital)
	600W	Q48SK

AC/DC Rectifier



Bus
240V/380V

High Voltage IBC



12V

200~420Vin

Form Factor	Max Output Power	Series
Full brick	1000W	FB7SR*

High Power Density HVDC Module

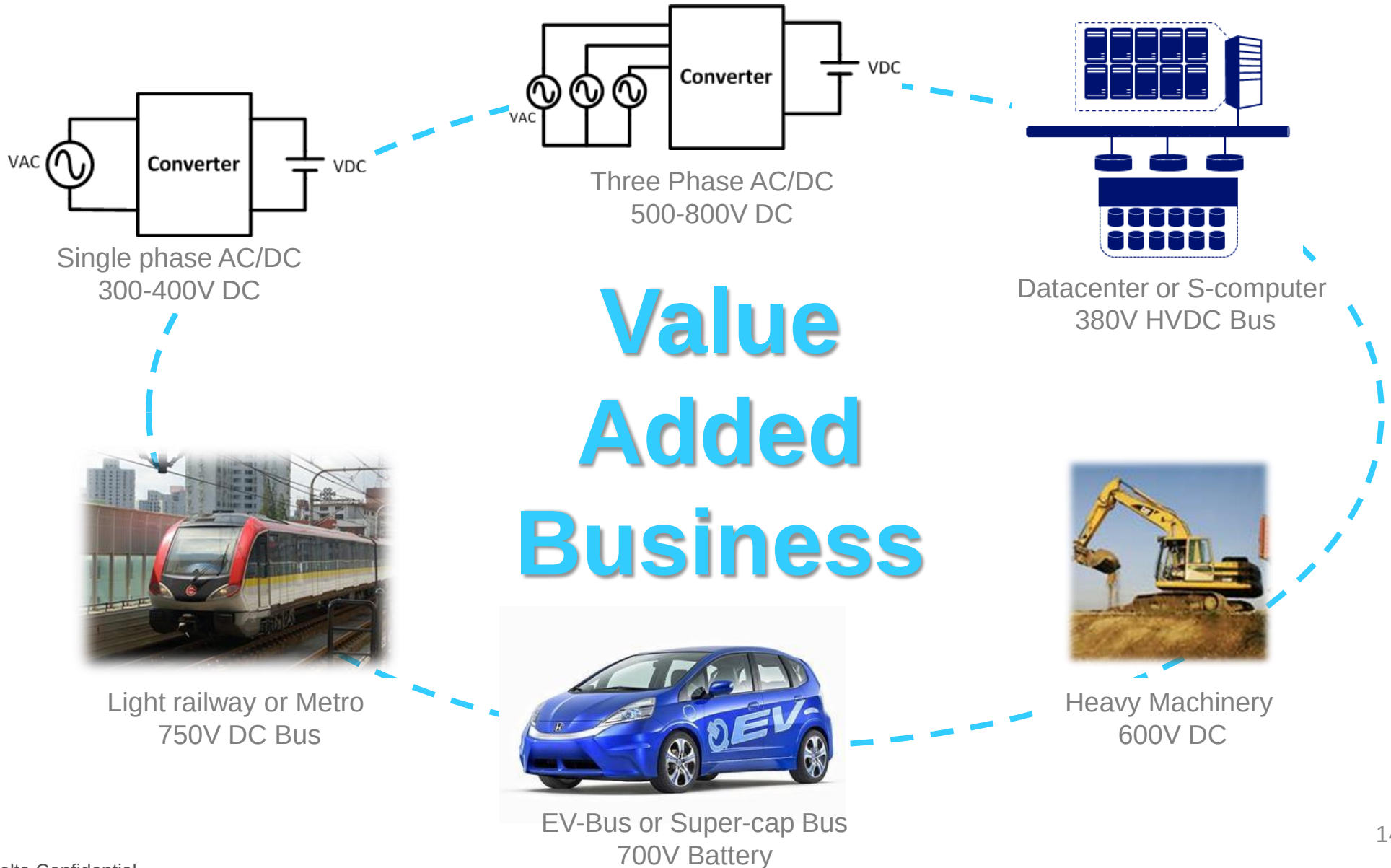


Features:

- Input Voltage:
200V~400V or 400V~800V
- Output voltage: 28V, 12V, 48V
- Output Power: 1.2kW
- Efficiency: 95%
- Parallel Units: up to 6
- Case Temperature: ~100 °C
- 4.6" x 2.4" x 0.5" (230W/inch³)



Applications for HVDC Modules



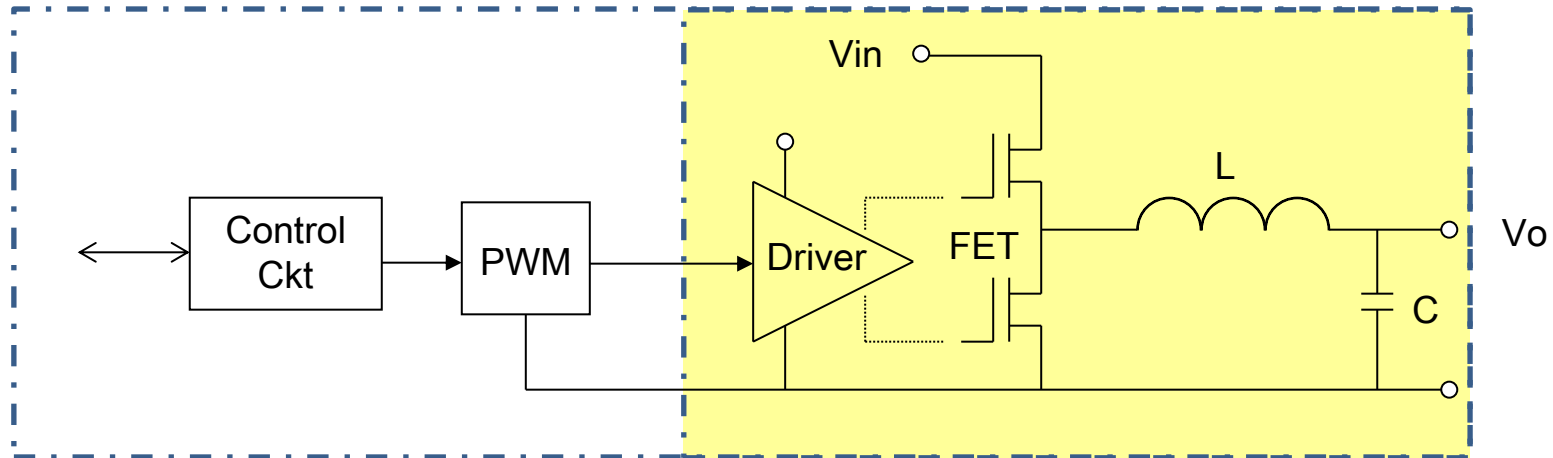
Non-isolated POL

- Telecom
- Networking
- Data Center & Computing



Non-isolated POL and Power Block

	Technical features	Cost	Space	System design
Discrete Solution	IC + Power FET + Power L/C	Low	Large	Difficult
Modules solution	All-in-one power supply	High	Med	Easy
Power Block solution	Power Plock + on board PWM	Med	Small	Medium



All-in-one Power Module

Power Block



Encapsulated DC/DC Converters

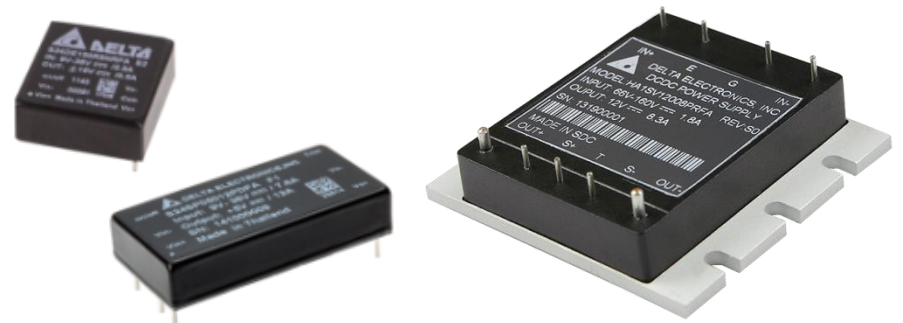
- Industrial Automation
- Healthcare
- Railway





Railway DC/DC Converters

- Railway (EN50155)



Rail Vehicle



Cabin Electrical Equipment



LED Information Displays



internal & External Lighting



Door Control



Video Surveillance Systems



Motor Drive Controllers



Wireless & Radio Communications



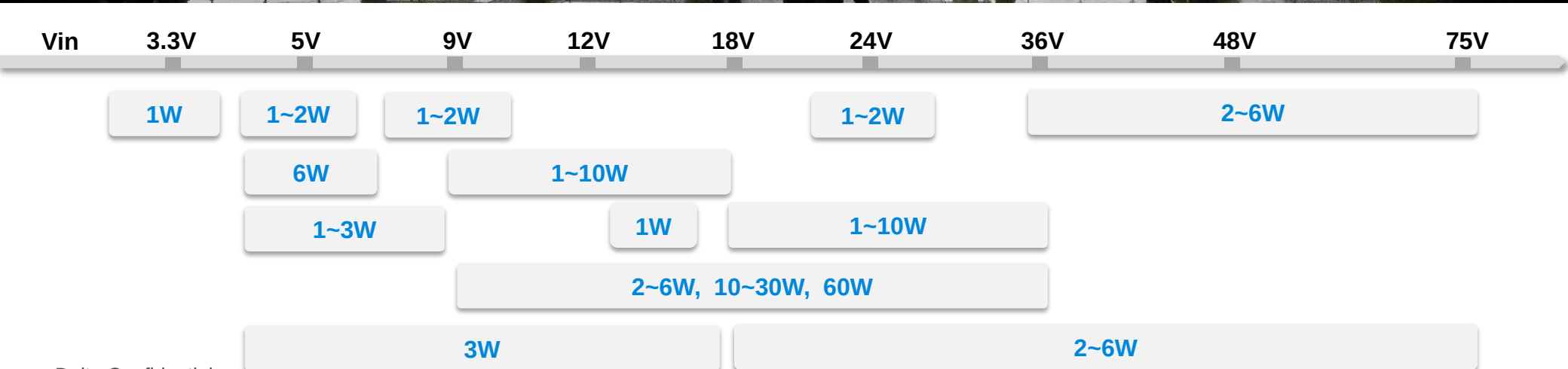
- Cabin Electrical Equipment
- Door Control
- Internal & External Lighting
- Wireless & Radio Communications
- Motor Drive Controllers
- Video Surveillance Systems



1"x1"	24Vin 9~36V	S24SE / S24DE	3.3V,5V,12V,±12V,±15V	30W Max	EN50155 UL/cUL60950-1
2"x1"		New S24SP	5V, 12V, 15V, 24V	40W 60W	
2"x1"	72/110Vin 43~154V	SA1SV Plan 2016	12V, 48V, 24V, 15V, 5V	50W Max	
HB	110Vin 53~154V	HA1SV	12V, 15V, 24V	100W Max	
	24/36/48/72/110Vin 16.8~154V	H80SV in development	12V, 48V, 24V, 15V, 5V	200W Max	

- Access & Ticketing System
- Electrical Control System
- Communication System
- Information Display

EAST RAILWAY STATION





DC/DC & AC/DC Converters for Healthcare

Healthcare

- Dialysis devices
- MRI
- Others



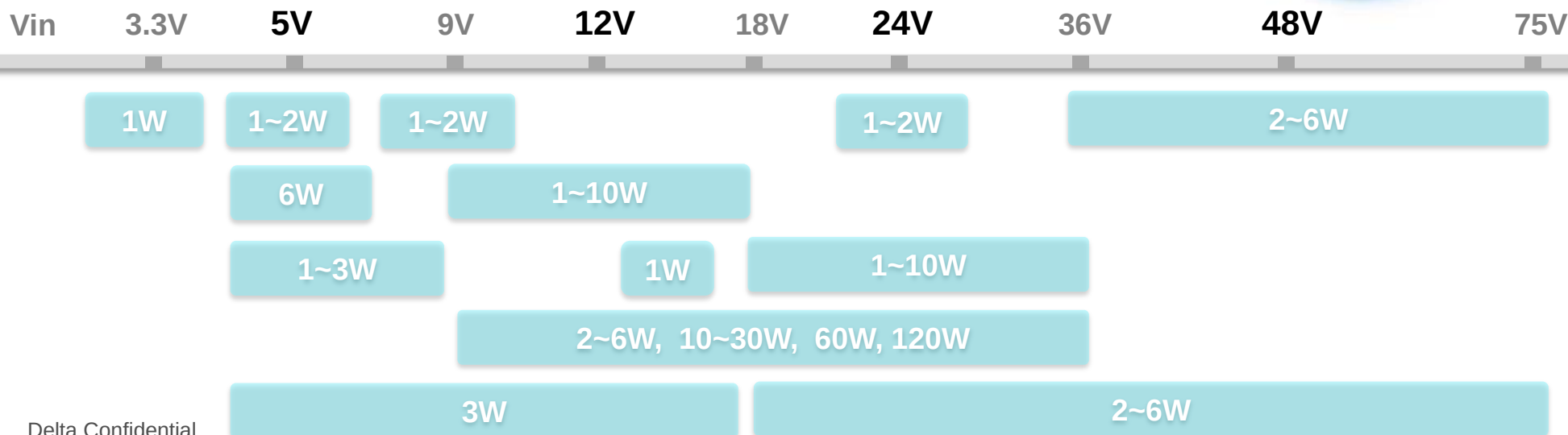


EN60601-1

DC/DC Series: DT10 DU06 SG02 SH01 SK01 Q24SE*

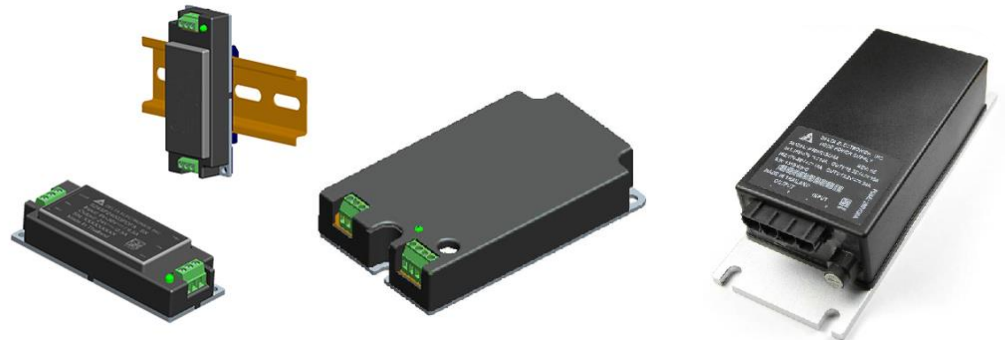
AC/DC Series: AB24 AB40 AB60

* In development



Standalone DC/DC Converters

- Industrial Automation
- Healthcare
- Railway





IP67

Waterproof DC/DC for NAT



Non-Automobile Transportation

- Forklift
- Heavy Machine
- Off-road Electric Vehicle



Options for Applications

Part Number	Input Voltage	Output Power	Output Voltage
B40SR	18~60V	300W *	12V 13.7V
B62SR	18~106V	300W * 360W NEW	12V 13.7V 24V 24V
B70SR	36~106V	300W	12V 13.7V 24V



Option - A

- Built-in Fuse Holder
- Enable Pin



Option - B

- Connector & Fuse Holder
- Enable Pin (optional)



Option - C

- Built-in Fuse Holder
- Enable Pin



Option - D

- Built-in Fuse Holder
- Enable Pin



- Industrial Automation
- Healthcare
- Heavy Machine



Applications



Automation - Manufacturing, Testing, and Measurement



Lighting Controller



Medical Device



Automated Roller



Motor Driver

Standard AC-DC Power module

Output
Power

60W

AA60
AB60



40W

AB40



30W

AA30



24W

AB24



15W

AA15



10W

AA10



7W

AA07



4W

AA04



2W

AC02



AA60
AB60



AB40



AA30



AB24



AA15



AA60
AB60



AB40



AA30



AB24



AA15



Output Number :

- single
- ● single/dual
- ● ● single/dual/triple

All Meet:

- Universal input 85~264VAC
- Frequency 47~440Hz
- Protection Class II

EMI Emission (Build-in)

- ✓ EN55011 Class B
- ✓ EN55022 Class B
- ✓ FCC Part15 Class B

EMC Immunity

According to EN61000-6-1
(Build-In)

Industrial Safety Approval

- ✓ UL/cUL 60950-1
- ✓ EN/IEC 60950-1
- ✓ UL508 (15W and above)
- ✓ CB Report

PCB
Mounting

Chassis
Mounting

DIN-Rail
Mounting

Mounting Type

BACSR Series (with PFC)



Outdoor Use

IP68 Waterproof

Low Profile

Fan-less Cooling

Features:

- Input Voltage: 85V~265VAC
- Output Voltage: 24VDC or 48VDC
- Output Power: 360W
- 93% efficiency
- 3000VAC isolation voltage
- -40°C~75°C operating temperature
- PFC design in
- Package Dimension:
165.0x115.0x25.4mm (6.50"x4.53"x1.00")
- IP68 protection
- Full metal case for heat dissipation
- No fan cooling design
- Meet CISPR22 Class B EMI requirement
- Min 10 years life

AC/DC Brick Converter

PACSR Series



500W AC/DC Converter (with PFC)

Input : 85VAC~265VAC (47Hz~63Hz)

Output : 48V / 28V / 12V

Features

- ✓ High Efficiency: 93% @220VAC 100%loading
- ✓ Inrush control by internal circuit (20/40A VCCI-Class A)
- ✓ Operating temperature: -40°C~85°C
- ✓ Power Factor: >0.95 (110V, 220V full load with external filter)
- ✓ Protection: OCL; OVP, OTP, SCP Hiccup mode
- ✓ Input brown-out and hold up time realized by external AL capacitor
- ✓ Input rectifier design in
- ✓ 3000Vac input to output reinforce isolation
- ✓ Safety: UL60950-1
- ✓ EMC: CISPR11 Class B (with external EMI filter)
- ✓ Other functions: remote sense, power good

PM & DR Series – Proposal 1

Features

Electrical

- Output LED Indicator
- No external circuit for EMC
- UL 60950-1 & CSA C22.2 No.60950-1-07 (pending)

Mechanical

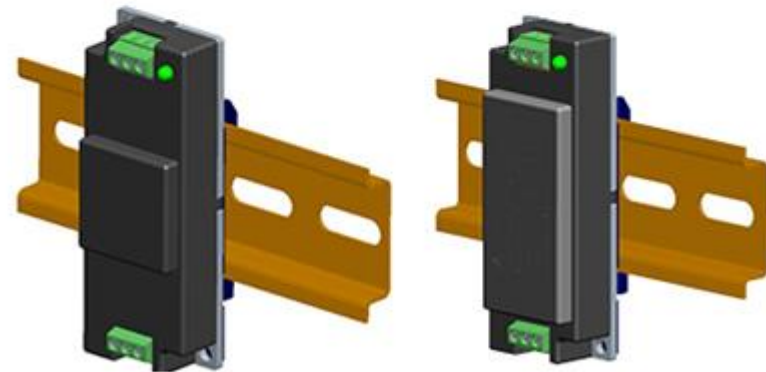
- Plastic Cover
- Panel mount or Din-rail mount baseplate
- Screw terminal
- Size Panel-mount: 81.4 x 29 x 16.8 mm
 Din-rail: 81.4 x 29 x 21.8 mm



(15W 30W)

Panel-mount

(40W 60W)



(15W 30W)

Din-rail

(40W 60W)

PM & DR Series – Proposal 2

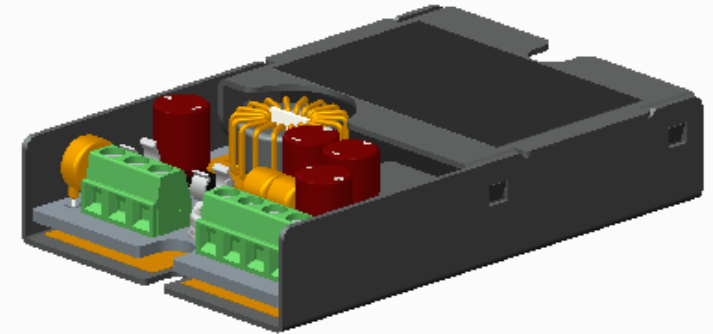
Features

Electrical

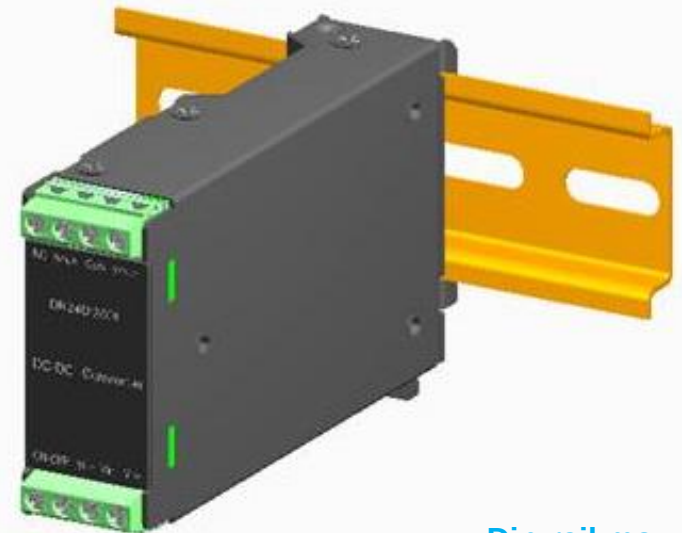
- Output LED Indicator
- EN55022 Class B EMC Filter built-in
- Internal Fuse
- Reverse Polarity Protected
- Minimized Inrush Current
- Output Trim Potentiometer (only for single output)
- -40°C to 85°C Operating Ambient Temperature
- OTP, Input UVLO and Output OVP, OCP
- Isolation Voltage
- No Min Load Required
- UL 60950-1 & CSA C22.2 No.60950-1-07 (pending)
- CE Mark (pending)

Mechanical

- Metal Case
- Screw terminal
- Panel mount or Din-rail mount
- Size
 - Panel mount: 86 x 56 x 20 mm
 - Din-rail: 100 x 23.5 x 56 mm



Panel mount



Din-rail mount



WEBSITE: www.deltaww.com/dcdc

The screenshot shows the Delta website homepage. At the top, there's a navigation bar with links: Solutions, Products, News Center, Investor Services, About Delta, and Careers. Below this, a large banner features three power modules with the text "Standard Power Module (DC/DC & AC/DC)". A sidebar on the left lists "Products", "Embedded Power Supplies", and "Standard Power Module (DC/DC & AC/DC)". The main content area includes a section titled "Delta offers a broad range of standard off-the-shelf DC/DC and AC/DC products ranging from 1W to 500W, covering all popular requirements for various applications. Benefit from the global strength of one of the world's largest providers of power solutions - Delta!" followed by a "Contact us" section with a form and a "Select Your Region" dropdown. Below this is a "News & Events" section with a headline: "Delta Electronics introduces the standard 2W to 50W encapsulated AC/DC power modules for industry, transportation, medical, telecom and telecom applications". A "Category List" section follows, showing "by Product Type" with icons for DCDC Converters, ACDC Converter, and Filter & ATCA Input Module. Another section shows "by Application" with icons for Telecom, Networking and Datacenter, Industrial, Medical, and Transportation. At the bottom, there's a "Display & Lighting" section. A search bar is visible on the right side of the page.

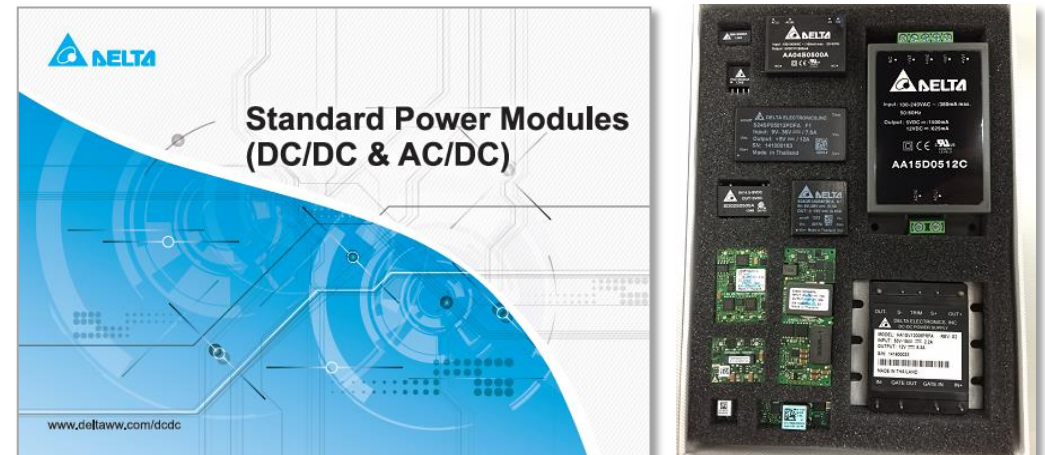
Delta Confidential

About Us

Product Catalog

The image shows the "Standard Power Module Product Catalog 2014". The cover features a blue background with a circuit pattern and the Delta logo. Two internal pages are displayed. The left page is for the "T48SR Series" and includes a list of features, a table of specifications, and a pin diagram. The right page is for the "V36SE Series" and also includes a list of features, a table of specifications, and a pin diagram. The specifications tables list various parameters like Input Voltage, Output Voltage, Output Power, and Efficiency for different models.

Sample Box



EMAIL: dcdc@deltaww.com

Thank You

To learn more about Delta, please visit www.deltaww.com.

