MORNSUN®

EN50155

One-stop solutions of power supplies for Rail Transit

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Company Overview

Established: 1998
Registered capital: US$ 30M
Employees: 2600+
Certifications: ISO9001, IATF16949, ISO14001, ISO45001


R&D Center in Guangzhou

Strong R&D

Patents & IPRs: 1000+
R&D Engineers: 500+


Manufacturing Center in Huaihua

Quick Delivery

20+ SMT lines
Production area: 60000m^2

Headquarter in Guangzhou

Excellent Service

FAE Support
Fast Response

Main Product Lines

- AC/DC Converter
- DC/DC Converter
- AC/DC Enclosed HOT
- Transceiver Module
- IGBT Driver
- LED Driver
- EMC Auxiliary Device
- IC
- Transformer

EN50155 REACH RoHS COMPLIANT

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One-stop solutions of power supplies

Content

Page
1 Company overview
3 Typical railway system
5 Key features of railway power supplies
9 Built-in EMC for integrated power supplies
10 DC/DC railway power selection guide
14 EMC auxiliary device selection guide

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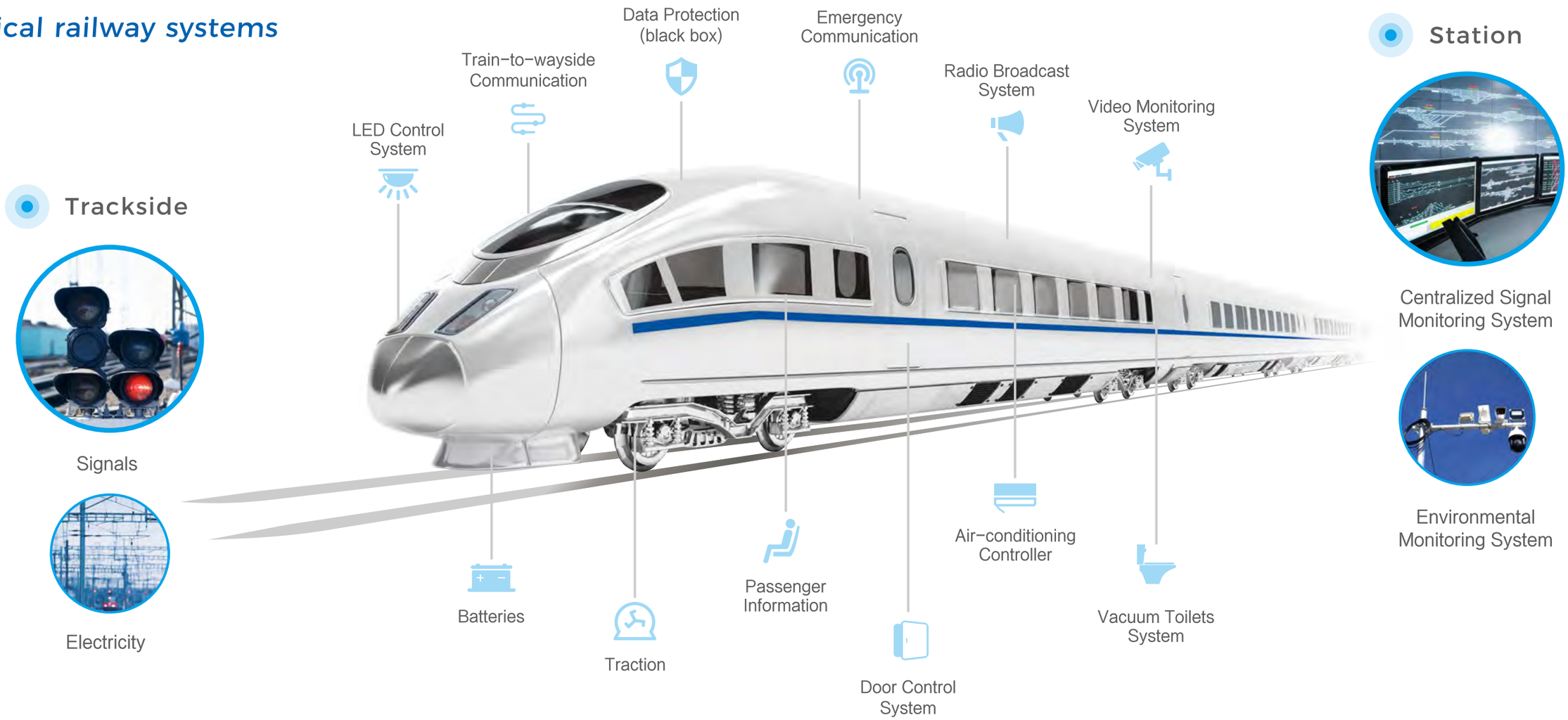
One-stop solutions of power supplies for rail transit

Typical railway systems



Railway power supplies recommendation

4:1 Input DC/DC Railway Power

6–400W URx1D series

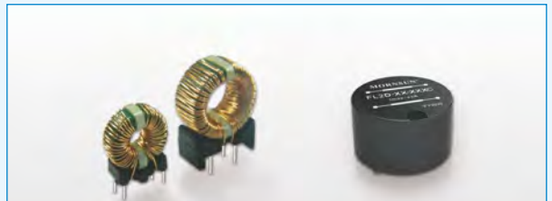
12:1 Input DC/DC Railway Power

50–200W UWF1D, UWTH1D series

DC/DC EMC Auxiliary Device

10 – 250W

Common Mode Filter



0.5 – 25A

Key Features of Railway Power Supplies

1 Wide operating temperature range, suitable for rugged operating environment

The ambient temperature range outside the vehicle is –40℃ to +50℃, the temperature range close to electronic equipments inside the vehicle may be –40℃ to +70℃. As the air temperature near the printed circuit board (PCB) may be affected by the heating of the device, the temperature range of the printed circuit board(PCB) can be –40C to +85C or higher.

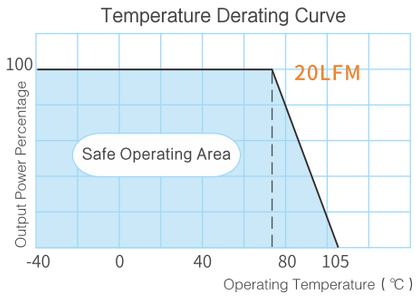
MORNSUN railway power supplies meet the requirements of 85℃ ambient temperature.

- **Operating Temperature Range**

  –40℃ to +85℃ / –40℃ to +105℃

- **Storage Temperature Range**

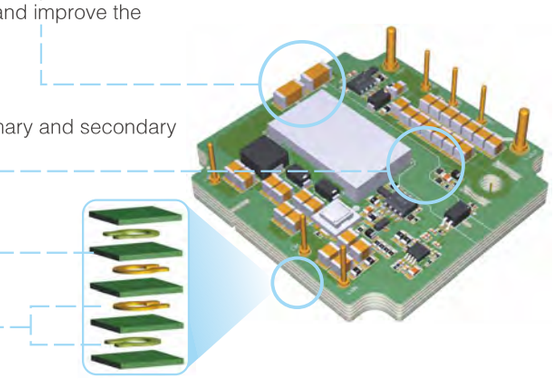
  –55℃ to +125℃



2 3000VAC reinforced insulation, securing your system

Power supplies for railway applications are required to meet strict requirements of isolation and withstand voltage. Mornsun railway power supplies adopt the following reinforced insulation technology to achieve 3000VAC input–output isolation and 2100VAC input–case isolation.

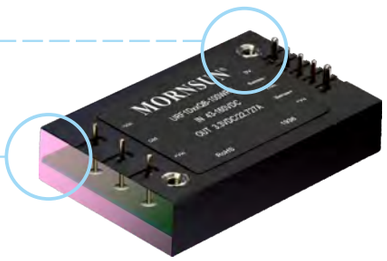
- Adopted Y capacitors in series design between the primary and secondary to improve the insulating strength and reliability.
- Slot type design is made under the critical components for isolation to further increase the creepage distance and improve the insulating strength and reliability.
- Large creepage distance between the primary and secondary
- Planar transformer design, solid insulation
- Coils between the primary and secondary



3 Meeting the requirements of Category 1 Class B

Most of the electronic equipments are hung on the wall of the vehicle or placed inside box of the vehicle equipments, so electrnoics equipments are required to meet requirements of Category 1 Class B. Mornsun railway power supplies are filled with insulating high thermal conductive potting, which can buffer the mechanical stress caused by shock and vibration.

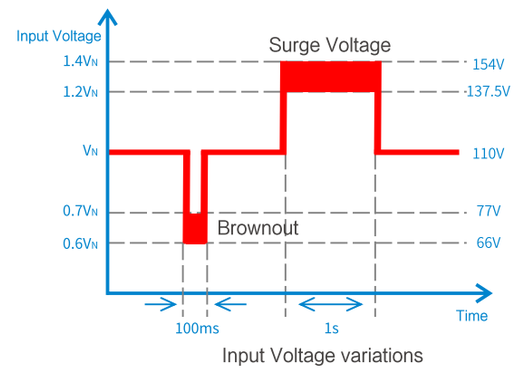
- **Fixed screw holes**
- **Full of high thermal conductive potting**



4 Ultra-wide input voltage range

Mornsun railway power supplies have an ultra–wide input voltage range of 4:1 and 12:1, which meet a variety of locomotive battery voltage requirements. For example, the 14–160VDC ultra–wide input railway power supplies provide 24V, 48V, 72V, 96V, 110V, which meet the voltage requirements of various applications. The input voltage also meets the voltage fluctuations requirement of 06.VN–104VN.

Battery Voltage (V_N)	Input Voltage Range ($0.7*V_N$–$1.25*V_N$)	Brownout (0.1s) ($0.6*V_N$)	Transient Voltage (1s) ($1.4*V_N$)
24V	16.6-30(V)	14.4V	34V
48V	33.6-60(V)	28.8V	67V
72V	50.4-90(V)	43.2V	101V
96V	67.2-120(V)	57.6V	135V
110V	77-137.5(V)	66V	154V



Input Voltage variations

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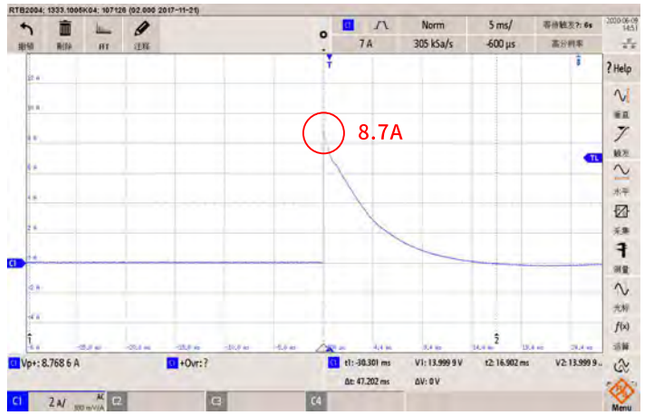
Key Features of Railway Power Supplies

5 Ultra-low inrush current design

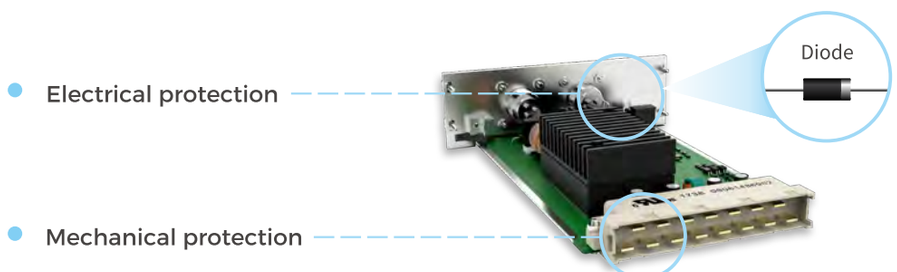
Normally, in consideration of EMC design and hold–up time, engineers connect many large–capacitance capacitors in parallel at the input. However, it will result in a large inrush current at system startup which easily cause the front–end circuit breaker tripped (also known as tripping) and the fuse blown due to false trigger at power–on.
Mornsun is able to provide integrated and customized railway power solutions that meet the needs of customers for EMC, hold–up time and low inrush current.



Mornsun can provide customized power solutions of ultra–low input inrush current.

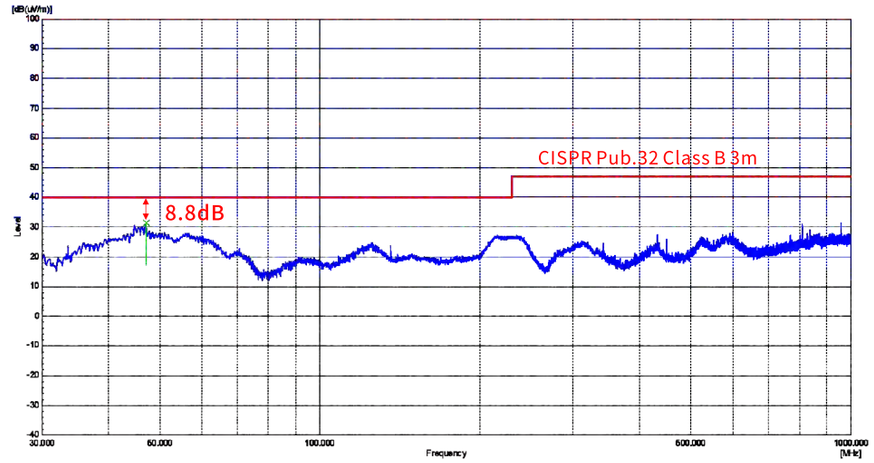
6 The Electrical/mechanical dual anti-reverse connection functions

To prevent any damages to the equipments, electrical or mechanical measures should be adopted to ensure the reverse protection of the power polarity, that is kown as the input reverse polarity protection.
Mornsun adopts two methods to protect the power supplies against reverse connection.
1) Mechanical protection: The terminal adopts fool–proof design to avoid wrong operation and reverse connection; 2) Electrical protection: the reverse cut–off function is realized through internal use of MOS tubes, diodes, etc., to ensure that the equipment is not damaged after reverse connection.



7 Excellent electromagnetic compatibility (EMC) performance

Electromagnetic compatibility refers to the ability of a device or system to meet requirements in its electromagnetic environment and not to produce intolerable electromagnetic interference to any device in its environment.
Mornsun owns a professional EMC design team as well as a perfect test and verification platform. EMC design runs through the entire product development and design process, and has strict quality control to ensure that batch products meet the electromagnetic compatibility performance required by the specification.



URF1D24QB–100WR3 Radiation Waveform

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6 - 10W 4:1 Input DC/DC Railway Power

Power supplies for bow net monitoring equipement

URF1D48HB-250WR3A7

- Integrated EMC
- Input voltage range: 43–160VDC
- Reinforced insulation：3000VAC/2100VAC
- Ultra–wide operating temperature: –40℃ to +100℃
- Ultra–low input inrush current: 15A Typ.
- Input under–voltage protection, reverse polarity protection, output over–voltage, over–current, short–circuit protection, over–temperature protection
- EN50155 approved

Power supplies for vacuum toilets system

URF1D24QB-50WR3A7

- Integrated EMC
- Input voltage range: 43–160VDC
- Reinforced insulation：3000VAC/2100VAC
- Ultra–wide operating temperature：–40℃ to +105℃
- Input under–voltage protection, output short–circuit, over–current, over–voltage, over–temperature protection
- Meets EN50155 standards

Power supplies for high-speed rail lighting system

URF1DxxFB-400WR3

- Input voltage range: 66–160VDC
- Reinforced insulation：3000VAC/2100VAC
- Ultra–wide operating temperature：–40℃ to +100℃
- Input under–voltage protection, output short–circuit, over–current, over–voltage, over–temperature protection
- Meets EN50155 standards

PCB Mounting

"H" suffix: Heat sink mounting

"A2S" suffix: Chassing mounting

"A4S" suffix: DIN–Rail Mounting

- Ultra–wide 4:1 input voltage range
- Reinforced insulation, 2250VDC isolation voltage
- Operating ambient temperature range：–40℃ to +85℃
- Input under–voltage protection, output short–circuit, over–current, over–voltage protection
- Output voltage trim adjustment
- Input reverse polarity protection available with chassis(A2S) or Din–Rail mounting (A4S) version
- Industry standard pin–out

Specification

EN50155

Product Series		URA1DxxYMD–6WR3	URB1DxxYMD–6WR3	URA1Dxx(X)LMD–10WR3	URB1DxxLMD–10WR3
Power		6W		10W	
Input Voltage Range		40–160VDC			
Output Voltage (VDC)		Dual：±5, ±12, ±15	Single：5,12,15,24	Dual：±5, ±12, ±15	Single：3.3,5,12,15,24
Protection		Input under–voltage protection, output short–circuit, over–current, over–voltage protection			
Isolation		2250VDC			
Insulation		Functional insulation		Reinforced insulation	
Vibration		IEC61373 – Category 1, Grade B			
Operating Temperature		–40℃ to +85℃			
EMC Perfor–mance	EMI	EN50121–3–2, GB/T 24338–4 2018, EN55032			
	EMS				
Dimension		25.40 × 25.40 × 11.70 mm		50.80 × 25.40 × 11.80 mm	
Certification		• EN62368 approved • Meets EN50155 railway standards	• EN60950 approved • Meets EN50155 railway standards	• EN62368 approved • EN50155 approved • Meets IEC62368 standards	• EN50155/EN60950 approved • Meets UL62368/ IEC62368 standards

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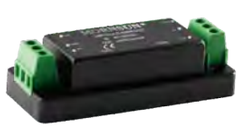
15 - 40W 4:1 Input DC/DC Railway Power

PCB Mounting

"H" suffix: Heat sink mounting



"A2S" suffix: Chassing mounting

"A4S" suffix:DIN-Rail Mounting

- Ultra-wide 4:1 input voltage range
- Reinforced insulation, 3000VDC/1500VAC isolation voltage
- Operating ambient temperature range：-40℃ to +85℃
- Input under-voltage protection, output short-circuit, over-current, over-voltage, over-temperature protection
- Output voltage trim adjustment
- Input reverse polarity protection available with chassis(A2S) or Din-Rail mounting (A4S) version
- Industry standard pin-out

Specification

EN50155

Product Series		URB1DxxLMD-15WR3	URB1DxxLMD-20WR3	URB1DxxLD-20WR3	URE1DxxLD-20WR3	URF1DxxLD-40WR3
Power		15W	20W			40W
Input Voltage Range		40-160VDC				
Output Voltage (VDC)		Single：3.3,5,12,15,24	Single：3.3,5,12,15,24	Single：3.3,5,12,15,24	Dual：±12, ±15, ±24	Single：3.3,5,12,15,24,48
Protection		Input under-voltage protection, output short-circuit, over-current, over-voltage protection				Input under-voltage protection, SCP, OCP, OVP, OTP
Isolation		2250VDC			3000VDC/1500VAC	
Insulation		Reinforced insulation				
Vibration		IEC61373 – Category 1, Grade B				
Operating Temperature		-40℃ to +85℃				
EMC Perfor-mance	EMI	EN50121-3-2, GB/T 24338-4 2018, EN55032				
	EMS					
Dimension		50.80 × 25.40 × 11.80 mm				
Certification		• EN50155/EN60950/UL62368/ IEC62368 approved		• EN50155/EN60950 approved • Meets IEC60950/ UL60950 standards	• Compliant to IEC60950/UL60950/ EN60950 • Meets EN50155 standards	• EN62368/EN50155 approved

50 -250W 4:1 Input DC/DC Railway Power

PCB Mounting

"H" suffix: Heat sink mounting

"A7" suffix: Integrated mounting

- 4:1 input voltage range: 40-160VDC/43-160VDC
- Reinforced insulation, I/O isolation test voltage 3000VAC, I/C isolation test voltage 2100VAC
- Operating ambient temperature range：-40℃ to +105℃
- Remote sense compensation，output voltage trim adjustment
- Input under-voltage protection, output over-voltage, over-current, output short-circuit, over-temperature protection
- Industry standard pin-out
- EN50155 approved

Specification

EN50155

Product Series		URF1DxxQB-50W(H)R3	URF1DxxQB-75W(H)R3	URF1DxxQB-100W(H)R3	URF1DxxHB-150W(H)R3	URF1DxxHB-250W(H)R3
Power		50W	75W	100W	150W	250W
Input Voltage Range		40-160VDC	43-160VDC			
Output Voltage (VDC)		Single：3.3,5,12,15, 24,48	Single：3.3,5,12,15, 24,48	Single：3.3,5,12,15, 24,48	Single：5,12,15,24,48	Single：5,12,15,24, 48,54
Protection		Input under-voltage protection, output over-voltage, over-current, output short-circuit, over-temperature protection				
Isolation		I/O isolation test voltage 3000VAC, I/C isolation test voltage 2100VAC				I/O: 3000VAC I/C: 1500VAC
Insulation		Reinforced insulation				
Vibration		IEC61373 – Category 1, Grade B				
Operating Temperature		-40℃ to +105℃				
EMC Perfor-mance	EMI	EN50121-3-2, GB/T 24338-4 2018, EN55032				
	EMS					
Dimension		60.80 × 39.20 × 12.70mm (1/4 brick)			61.00 × 57.90 × 13.80mm (1/2 brick)	
Certification		• EN50155 approved				

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50 -200W 12:1 Ultra-wide Input DC/DC Railway Power Coming soon

PCB Mounting

"H" suffix: Heat sink mounting

- Ultra-wide 12:1 input voltage range: 14-160VDC
- Reinforced insulation, I/O isolation test voltage 3000VAC, I/C isolation test voltage 2100VAC
- Operating ambient temperature range: -40℃ to +105℃
- There is an ext.cap pin to increase the hold-up time, ultra-low starting inrush current design
- Input under-voltage protection, output over-voltage, over-current, output short-circuit, over-temperature protection
- Industry standard pin-out
- CSA62368/EN62368 approved(pending), compliant to EN50155/EN45545, meets UL/IEC62368 and AREMA standards

Specification

EN50155

Product Series		UWF1D_QB-50WR3	UWTH1D_QB-100W(H/F)R3	UWTH1D_HB-100W(H/F)R3	UWTH1D_HB-200W(F/H)R3
Power		50W	100W		200W
Input Voltage Range		14-160VDC			
Output Voltage (VDC)		Single: 3.3,5,12,24,28, 48,54	Single: 12, 24, 28, 48, 54		
Protection		Input under-voltage protection, output over-voltage, over-current, output short-circuit, over-temperature protection			
Isolation		I/O isolation test voltage 3000VAC, I/C isolation test voltage 2100VAC			
Insulation		Reinforced insulation			
Vibration		IEC61373 – Category 1, Grade B	IEC/EN61373 Class B, AREMA Class I		
Operating Temperature		-40℃ to +105℃			
EMC Perfor-mance	EMI	EN50121-3-2, GB/T 24338-4 2018, EN55032			
	EMS				
Dimension		57.90 x 36.80x 12.70mm (1/4 brick)	57.90 x 37.80 x 12.70mm (1/4 brick)	62.00 x 58.00 x 13.80mm (1/2 brick)	
Certification		• CSA62368/EN62368 approved(pending) • Compliant to EN50155/EN45545 • Meets UL/IEC62368 and AREMA standards			

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DC/DC EMC Auxiliary Device and Common Mode Filter

PCB Mounting

A2S Chassing Mounting

A4S DIN-Rail Mounting

Common Mode Filter

Product Line	Product Series	Input Voltage	Output Current	Output Power	Type	Clamping Voltage	Package
DC/DC EMC Auxiliary	FC-CX3D	66-160VDC	——	100W	Active	165VDC	PCB, Chassing, DIN-Rail
	FC-C01D	40-160VDC	——	10W	Active	165VDC	PCB, Chassing, DIN-Rail
	FC-CX1D	40-160VDC	——	30W	Active	165VDC	PCB, Chassing, DIN-Rail
	FC-C03D	40-160VDC	——	50W	Active	165VDC	PCB, Chassing, DIN-Rail
	FC-E03D	36-75VDC	——	75W	Active	82VDC	PCB, Chassing, DIN-Rail
	FC-B02D	18-75VDC	——	30W	Active	82VDC	PCB, Chassing, DIN-Rail
	FC-D03D	18-36VDC	——	50W	Active	39VDC	PCB, Chassing, DIN-Rail
	FC-AX3D	10-36VDC	——	30W	Active	39VDC	PCB, Chassing, DIN-Rail
	FC-B01D	18-75VDC	1A	——	Passive	——	PCB, Chassing, DIN-Rail
	FC-A01D	9-36VDC	1A	——	Passive	——	PCB, Chassing, DIN-Rail
Common Mode Filter	FL2D-Z5-xxx	10, 15, 22mH	0.5A	——	Passive	——	PCB
	FL2D-10-xxx	1, 2.2, 3.3, 4.7, 6.8, 8.2mH	1A	——	Passive	——	PCB
	FL2D-30-xxx	1, 2.2, 4.7mH	3A	——	Passive	——	PCB
	FL2D-70-360C	36uH	7A	——	Passive	——	PCB
	FL2D-A3-360C	36uH	13A	——	Passive	——	PCB
	FL2D-B5-360C	36uH	25A	——	Passive	——	PCB

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