

AVNET[®] ABACUS



Avnet Abacus
power solutions for
railway and transportation

Power solutions to meet railway standards

Electronics systems in railway and transportation applications are subject to challenging environmental conditions, from high temperatures in confined spaces to the heavy vibration felt by body or axle mounted systems. Whether for rolling stock, or control and infrastructure, these electronic systems require DC-DC or AC-DC power conversion that can perform safely and reliably in harsh environments. Demands on railway rolling stock are so challenging and so specific that specialist power supplies must be used that are designed and built to comply with relevant European and worldwide railway systems standards.

Our dedicated technical specialists have a deep knowledge of railway systems, including mission critical and secondary applications. They can help you select power supplies that meet all of the relevant approvals from some of the world's leading power suppliers including ABB Embedded Power, Aimtec, AE Artesyn/Excelsys, Bel Power/Melcher, Delta Electronics, Flex Power Modules, MEAN WELL and Murata PS.

This brochure offers an overview of conversion products designed for EN50155 rolling stock mission critical applications, or those with features that specifically apply to non, automotive transportation, rolling stock non, critical and railway control and infrastructure applications.

ROLLING STOCK

All rolling stock electronic equipment must meet European quality standard EN50155. This umbrella standard refers to various other standards to define the environmental conditions that power supplies must operate in as well as specifying electrical and mechanical performance parameters:

- EN50163 specifies the main characteristics of the supply voltages of traction systems including input ranges, transients and surges
- EN50121 specifies EMC/EMI requirements
- EN50125 specifies environmental conditions
- EN61373 specifies testing requirements for railway equipment subsequently subjected to vibration and shock in the railway operational environment
- EN45545-2 specifies European requirements for fire safety

CONTROL AND INFRASTRUCTURE

In general, control and infrastructure systems should comply with EN62368-1 for safety, and EN61000 and EN55011/22/32 for EMC and EMI, while specific requirements can be set for outdoor, gas, heating systems and PoE applications.

Safety critical Control Command and Signalling systems (CCS) such as ATP/ERTMS circuits must comply with specific directives including EN50126, EN50128, and EN50129 for demonstration of reliability, software and safety related to electronic systems for signalling and communication.

FURTHER RESOURCES

For more information on power solutions for railway and transportation applications from Avnet Abacus, including product highlights and technical articles, visit www.avnet-abacus.eu/railway-power-solutions

TYPICAL NON-MISSION CRITICAL APPLICATIONS INSIDE TRAINS

SURVEILLANCE AND PASSENGER SAFETY

- IP cameras
- Emergency alarms
- Air conditioning

ENVIRONMENTAL MONITORING AND CONTROL

- Fire detection
- Doors
- Lighting control

PASSENGER INFORMATION AND NETWORK ACCESS SERVICES

- Wi-Fi AP
- LCD TVs
- LED displays
- Mobile devices

RAILWAY INPUT VOLTAGE RANGE VALUES

Nominal input (V)	EN50155 standard			NF F 01-510 standard			RIA12 standard			
	Permanent input range (0.7-1.25 Vin)	Brownout 100ms (0.6xVin)	Transient 1s (1.4xVin)	Permanent input range (V)	Brownout 100ms (0.5xVin)	Transient 100ms (V)	Permanent input range (0.7-1.25 Vin)	Brownout 100ms (0.6xVin)	Transient 1s (1.5xVin)	Transient 20ms (3.5xVin)
24	16.6-30	14.4	33.6	18-34	12	40	16.6-30	14.4	36	84
37.5	26-47	22.5	52.5	/	/	/	26-47	22.5	56.25	131.25
48	33.6-60	28.8	67.2	/	/	/	33.6-60	28.8	72	168
72	50.4-90	43.2	100.8	50-90	36	115	50.4-90	43.2	112.5	252
96	67.2-120	57.6	134.4	/	/	/	67.2-120	57.6	144	336
110	77-137.5	66	154	77-137	55	176	77-137.5	66	165	385



Murata IRV300 16V to 160V input EN50155 chassis mount DC-DC converter

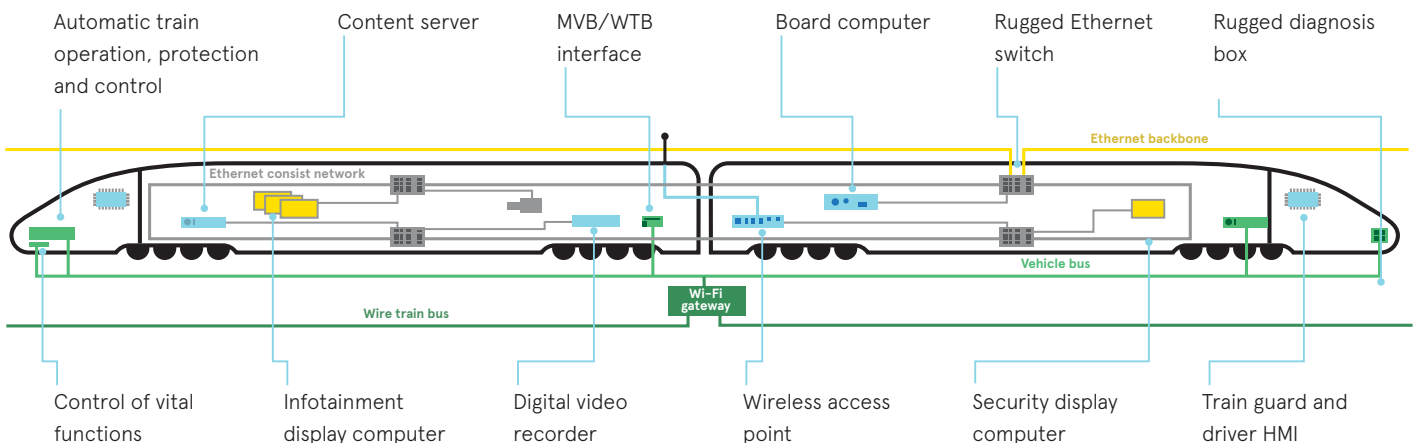


Bel Power/Melcher rugged cassette for mission critical applications



Bel Power/Melcher 300W/500W/1000W rugged chassis DC-DC converters

EMBEDDED MISSION CRITICAL APPLICATIONS IN TRAINS



AE Artesyn LCC conduction cooled AC-DC modules

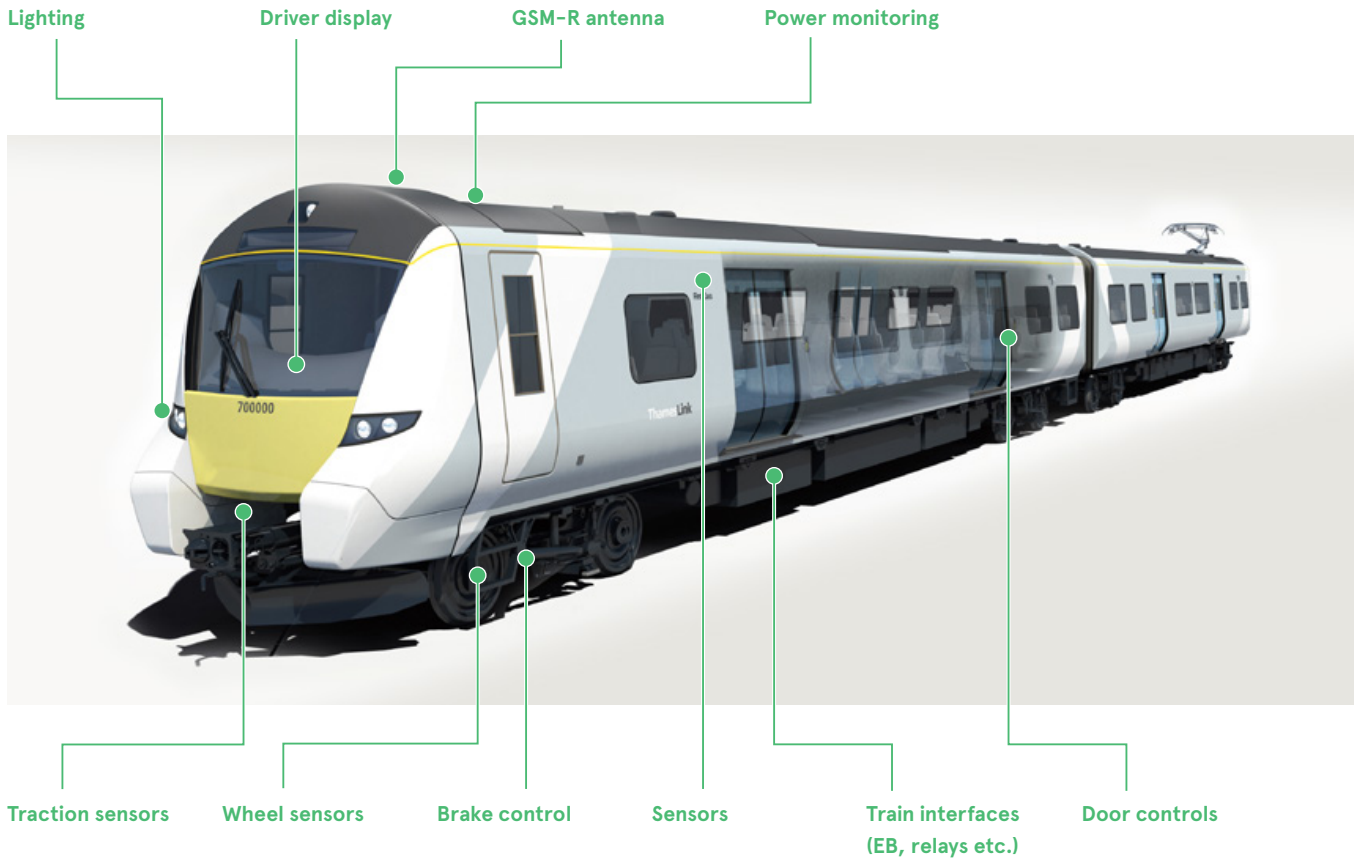


Flex Power Modules 10:1 14V to 160V input converters 50W and 100W



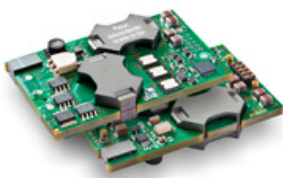
AE Artesyn LCM series Pmbus controlled fan-cooled power supplies 300W up to 3kW

TYPICAL MISSION CRITICAL APPLICATIONS ON-BOARD TRAIN



RAILWAY OPERATING TEMPERATURE

Operating temperature ranges			
Operating temp. classes	Internal cubicle temp.	Internal cubicle overtemp. (10mm)	Air temp. around PCB
T1	-25°C/+55°C	+15°C	-25°C/+70°C
T2	-40°C/+55°C	+15°C	-40°C/+70°C
T3	-25°C/+70°C	+15°C	-25°C/+85°C
TX	-40°C/+70°C	+15°C	-40°C/+85°C



Digital power converters from Flex Power Modules



Delta Electronics PM24 series DC-DC converters with filtering and protection



Bel Power/Melcher RCM150 series rugged chassis mount DC-DC converter

DC-DC portfolio

Avnet Abacus stocks a range of DC-DC converters for various applications in the railway and non-automotive transportation industries. Input range is a dominant factor as applications should be capable of running under severe conditions, as described in the EN50155 railway directive. Other transport applications need a similarly wide range of battery voltages. The range includes rugged cassette and chassis mount converters for mission critical and non-automotive transportation, board mount switching regulators, DIN rail mount, high voltage input, rugged board mount and brick DC-DC converters.

DC-DC rugged 3U cassettes for mission critical applications									
Supplier	Model	Output power (W)	EN50155 compliant	DC input voltage (V)	Output voltages (V)	Convection/ conduction cooling	Fan cooled	Form-factor	# of outputs
Bel Power/Melcher	M series	50	X	8-385 (6 ranges)	5 to 60, 12, ±15, 5, ±12.5, ±15	X		3U-8TE	1, 2, 3
Bel Power/Melcher	MD series	75	X	16.8-137.5 (3 ranges)	5.1, 12.6	X		3U-4TE	1, 2
Bel Power/Melcher	S series	100	X	8-385 (6 ranges)	5, 12, 15, 24, 48, ±12, ±15, ±24	X		3U-8-12TE	1, 2
Bel Power/Melcher	HP series	122	X	16.8-137.5, 12.5-154	5, 12, 15, 24 (2x, 3x, 4x)	X		3U-4TE	1, 2, 3, 4
Bel Power/Melcher	K series	150	X	8-385 (6 ranges)	5, 12, 15, 24, 48, ±12, ±15, ±24	X		3U-11-16TE	1, 2
Bel Power/Melcher	P series	100-200	X	14.4-176 (5 ranges)	3.3-96	X		3U-4TE	1, 2, 3, 4
Bel Power/Melcher	Q series	82-132	X	14.4-176 (5 ranges)	5, 12, 15, 24, 48, ±5, ±12, ±15, ±24	X		3U-4TE	1, 2
Bel Power/Melcher	HR-ER series	140-300	X	12-160	5 to 110, ±12, ±15, ±48	X		3U-8-10-16TE	1, 2

DC-DC converters rugged enclosed									
Supplier	Model	Output power (W)	EN50155 compliant	DC input voltage (V)	Output voltages (V)	Convection/ conduction cooling	Fan cooled	Form-factor	# of outputs
Bel Power/Melcher	24RCM60	60	X	8-36, 16.8-137.5	12, 15, 24	X		Enclosed	1
Bel Power/Melcher	24RCM150	150	X	14.4-50.4	12, 24	X		Enclosed	1
Bel Power/Melcher	24RCM300	300	X	14.4-50.4	12, 24	X		Enclosed	1
Bel Power/Melcher	110RCM150	150	X	43.2-154	12, 24	X		Enclosed	1
Bel Power/Melcher	110RCM300	300	X	43.2-154	12, 24	X		Enclosed	1
Bel Power/Melcher	110RCM500	500	X	66-154	24	X		Enclosed	1
Bel Power/Melcher	110RCM1000	1000	X	66-154	24	X		Enclosed	1
Murata PS	IRV300-W80	300	X	16-160	12, 24, 48, 54	X		Enclosed	1
MEAN WELL	RSD-30	30	X	9-36, 18-72, 40-160	3.3, 5, 12, 24	X		Enclosed	1
MEAN WELL	RSD-60	60	X	9-36, 18-72, 40-160	3.3, 5, 12, 24	X		Enclosed	1
MEAN WELL	RSD-100	100	X	16.8-31.2, 33.6-62.4, 67.2-143	5, 12, 24	X		Enclosed	1
MEAN WELL	RSD-150	150	X	16.8-31.2, 33.6-62.4, 67.2-143	5, 12, 24	X		Enclosed	1
MEAN WELL	RSD-200	200	X	16.8-31.2, 33.6-62.4, 67.2-143	12, 24, 48	X		Enclosed	1
MEAN WELL	RSD-300	300	X	16.8-31.2, 33.6-62.4	5, 12, 24, 48	X		Enclosed	1
MEAN WELL	RSD-500	500	X	16.8-33.6, 33.6-67.2, 67.2-154	12, 24, 48	X		Enclosed	1
MEAN WELL	SD-15	15		9.2-18, 18-36, 36-72	5, 12, 24	X		Enclosed	1
MEAN WELL	SD-25	25		9.2-18, 18-36-36-72	5, 12, 24	X		Enclosed	1
MEAN WELL	SD-50	50		9.2-18, 18-36, 36-72	5, 12, 24	X		Enclosed	1
MEAN WELL	SD-100	100		9.5-18, 18-36, 36-72, 72-144	5, 12, 24	X		Enclosed	1
MEAN WELL	SD-150	150		18-36, 36-72, 72-144	12, 24	X		Enclosed	1
MEAN WELL	SD-200	200		18-36, 36-72, 72-144	5, 12, 24, 48	X		Enclosed	1
MEAN WELL	SD-350	350		18-36, 36-72, 72-144	5, 12, 24, 48		X	Enclosed	1
MEAN WELL	SD-500	500		19-72, 72-144	12, 24, 48		X	Enclosed	1
MEAN WELL	SD-1000	1000		19-72, 72-144	12, 24, 48		X	Enclosed	1
Delta Electronics	PM24	40	X	9-36	5, 12, 15, 24, ±12, ±15	X		Enclosed	1
Delta Electronics	PM80S	200	X	16.8-137.5	12, 15, 24, 48, 54	X		Enclosed	1
Delta Electronics	B62SR	300-360		18-106	12, 13.7, 24	X		Box-type IP65	1
Delta Electronics	B40SR	300		18-60	12, 13.7, 24	X		Box-type IP65	1
Delta Electronics	B70SR300	300		36-106	12, 13.7, 24	X		Box-type IP65	1
Delta Electronics	B70SR500	500		36-106	12, 13.7, 24	X		Box-type IP65	1

DC-DC converters DIN rail mount

	Model	Output power (W)	EN50155 compliant	DC input voltage (V)	Output voltages (V)	Convection/ conduction cooling	Form-factor	# of outputs
Bel Power/Melcher	EWN,EWR	120-240	X	66-150, 90-350	24, 2x24	X	DIN rail mount	1, 2
Bel Power/Melcher	LXR,LXN	375-500	X	85-264AC, 90-350	24, 37, 48, 2x24, 2x37, 2x48	X	DIN rail mount	1, 2
Bel Power	LDD240-WU	10A-240		11-55	11, 55	X	DIN rail mount	1
Bel Power	LDD960-UU	20A-960		10-60	12, 24, 48 UPS	X	DIN rail mount	1
Delta Electronics	DR24	40	X	9-36	5, 12, 15, 24, ±12, ±15	X	DIN rail mount	1
MEAN WELL	DDR-15	15		9-18, 18-36	3.3, 5, 12, 15, 24	X	DIN rail mount	1
MEAN WELL	DDR-30	30		9-18, 18-36	5, 12, 15, 24	X	DIN rail mount	1
MEAN WELL	DDR-60	60		9-18, 18-36	5, 12, 15, 24	X	DIN rail mount	1
MEAN WELL	DDR-120	120	X	9-18, 16.8-33, 33-67, 67-154	12, 24, 48	X	DIN rail mount	1
MEAN WELL	DDR-240	240	X	9-18, 16.8-33, 33-67, 67-154	24, 48	X	DIN rail mount	1
MEAN WELL	DDR-480	480	X	9-18, 16.8-33, 33-67, 67-154	12, 24, 48	X	DIN rail mount	1

DC-DC converters board mount

	Model	Output power (W)	EN50155 compliant	DC input voltage (V)	Output voltages (V)	Form-factor	# of outputs
Bel Power/Melcher	IMX4/IMY4	3-4	X	4.7-121 (4 ranges)	3.3-48 or 2x5/12/15/24	DIL24	1, 2
Bel Power/Melcher	IMX7/IMS7	5-7	X	8.4-150 (6 ranges)	3.3-48 or 2x5/12/15/24	2 x 1"	1, 2
Bel Power/Melcher	IMX15/IMY15/IMS15	15	X	8-36, 17-75, 50-150	3.3-24 5+3.5, 2x12/15/24	2 x 1,6"	1, 2
Bel Power/Melcher	IMX35	35	X	9-150 (4 ranges)	4x 5/12/15 or 2x5/12 or 2x5/15	2.5 x 3"	1, 2, 3, 4
Bel Power/Melcher	IMX70IMY70	60-90	X	15-137.5 (3 ranges)	5.1, 12, 15, 48, 24, 2x24	2.5 x 3"	1, 2
Bel Power/Melcher	IBX15	80-110	X	16.8-160	Non-isolated 50-160	2.16 x 2.16"	1
Bel Power	ORQB-15Y05	15	X	14.5-154	5	Quarter brick	1
Bel Power	ORQB-30Y05	30	X	14.5-154	5	Quarter brick	1
Bel Power	ORQB-50Yxx	50	X	14.5-154	5, 12, 15, 24, 48	Quarter brick	1
Bel Power	ORQB-C5Uxx	150-162	X	16-67, 18-75	24, 54	Quarter brick	1
Bel Power	ORQB-C5Wxx	150-162	X	43-154, 50-160	24, 54	Quarter brick	1
Bel Power	ORQB-D0Wxx	200	X	66-154	12, 57	Quarter brick	1
FLEX Power Modules	PKJ7000A	50	X	12-160	12, 24, 48	Half brick	1
FLEX Power Modules	PKM7000A	100-150	X	60-160	5, 12, 15, 24, 48	Quarter brick	1
FLEX Power Modules	PKM7500W	50	X	12-160	3.3, 5, 12, 13.8, 15, 24, 48, 54	Quarter brick	1
FLEX Power Modules	PKM7100W	100	X	14-160	5, 12, 13.8, 15, 24, 48, 54	Quarter brick	1
FLEX Power Modules	PKJ7200W	200	X	14-160	12, 13.8, 15, 24, 48, 54	Half brick	1
Murata PS	IRS-Q12/IRS-Q48	50	X	9-36, 18-75	3.3, 5, 12, 15, 24	16th brick	1
Murata PS	IRE-Q12 120	120	X	9-36	5, 12, 24	8th brick	1
Murata PS	IRQ 100	100	X	57-160	5, 12, 24	Quarter brick	1
Murata PS	IRQ-W80 150	150	X	16-160	12, 24, 54	Quarter brick	1
Murata PS	IRH 150	150	X	57-160	5, 12, 24	Half brick	1
Murata PS	IRH-W80 250	250	X	16-160	12, 24, 54	Half brick	1
AE Artesyn	ERM-10	10	X	9-36, 18-75, 36-160	5, 12, 15, 24	2 x 1"	1
AE Artesyn	ERM-20	20	X	9-36, 18-75, 36-160	5, 12, 15, 24	2 x 1"	1
AE Artesyn	ERM-50	50	X	43-101, 66-160	5, 12, 15, 24	Quarter brick	1
AE Artesyn	ERM-75	75	X	43-101, 66-160	5, 12, 15, 24	Quarterbrick	1
Delta Electronics	S24SE/S24DE	10-30	X	9-36	3.3, 5, 12, ±12, ±15	1 x 1"	1, 2
Delta Electronics	S24SP	40-60	X	9-36	5, 12, 15, 24	2 x 1"	1, 2
Delta Electronics	E35SE	120	X	9-60	4-6, 9.6-14.4, 19.2-28.8, 38.4-57.6	8th brick	1
Delta Electronics	Q80SV	150	X	14.4-170	5, 12, 24, 54	Quarter brick	1

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DC-DC converters board mount							
	Model	Output power (W)	EN50155 compliant	DC input voltage (V)	Output voltages (V)	Form-factor	# of outputs
Delta Electronics	E24SE	150	X	9-36	4-6, 9.6-14.4, 19.2-28.8, 38.4-57.6	8th brick	1
Delta Electronics	H80SV	100-200	X	16.8-137.5, 14.4-154	5, 12, 15, 24, 48	Half brick	1
Delta Electronics	Q36SR12012	240	X	18-75	12	Quarter brick	1
Delta Electronics	HA0SP	300	X	43-160	12, 13.8, 15	Half brick	1
Delta Electronics	T31SN	100		9-53	Non-isolated 3.3-16.5, 5-30	32nd brick	1
Delta Electronics	E50SN	600		40-60	Non-isolated 12	8th brick	1
Delta Electronics	Q50SN	850-1600		40-60	Non-isolated 12	Quarter brick	1
Delta Electronics	H60SB0A050NRDC	3000		9-60	Non-isolated 0-60	Half brick	1
Aimtec	AM6CW-110-H22-NZ	6	X	9-36, 18-75, 40-160	3.3-24, ±5/9/12/15/24	1 x 1"/chassis/DIN	1, 2
Aimtec	AM8TW-110-xH30-Z	8	X	9-36, 18-75, 13-70	3.3-24, ±5/12/15/24	DIL24	1, 2
Aimtec	AM10EW-110xH22NZ	10	X	9-36, 18-75, 36-160	3.3-24, ±5/12/15/24	2 x 1"/chassis/DIN	1, 2
Aimtec	AM15EW-110xxH30-IZ	15	X	9-36, 18-75, 36-160	5, 12, 15, 24, ±5/12/15	2 x 1"	1, 2
Aimtec	AM15EW-110xH22-NZ	15	X	9-36, 18-75, 36-160	3.3, 5, 12, 15, 24	2 x 1"/chassis/DIN	1, 2
Aimtec	AM20EW-110xx(H22)-NZ	20	X	9-36, 18-75, 40-160	(3.3), 5, 9, 12, 15, 24, ±5/12/15	2 x 1"/chassis/DIN	1, 2
Aimtec	AM20CWR-ZK	20	X	13-70, 42-176	3.3, 5	1 x 1"	1
Aimtec	AM25EUW-Z	25	X	16-160	5, 12, 15, 24	2 x 1"	1
Aimtec	AM40EW-NZ	40		40-160	3.3, 5, 12, 15, 24, 48	2 x 1"	1
Aimtec	AM50QB-JZ	50	X	43-160	3.3, 5, 12, 15, 24, 48	Quarter brick	1
Aimtec	AM75QB-JZ	75	X	43-160	3.3, 5, 12, 15, 24, 48	Quarter brick	1
Aimtec	AM100QB-JZ	100	X	43-160	3.3, 5, 12, 15, 24, 48	Quarter brick	1
Aimtec	AM150HB-JZ	150	X	43-160	5, 12, 15, 24, 48	Half brick	1
Aimtec	AM200QB-NZ	200	X	18-75	5, 12, 15, 24, 48	Quarter brick	1
Aimtec	AM250HB-JZ	250	X	40-160	5, 12, 15, 24, 48, 54	Half brick	1
MEAN WELL	RSDW08/RDDW08	8	X	9-36, 18-75	3.3, 5, 12, 15V, ±5/12/15	DIL24	1, 2
MEAN WELL	RSDW10/RDDW10	10	X	43-160	3.3, 5, 12, 15V, ±5/12/15	DIL24	1, 2
MEAN WELL	RSDW20/RDDW20	20	X	9-36, 18-75, 43-160	3.3, 5, 12, 15, ±5/12/15	2 x 1"	1, 2
MEAN WELL	RSDW-RDDW20UW	20	X	8.5-160	5, 12, 15, ±12/15/24	2 x 1"	1, 2
MEAN WELL	RSDW40/RDDW40	40	X	9-36, 18-75, 40-160	3.3, 5, 12, 15, 24, 48, ±12/15	2 x 1"	1, 2
MEAN WELL	RSDW40/RDDW40	40	X	9-36, 18-75, 40-160	3.3, 5, 12, 15, 24, 48, ±12/15	2 x 1"	1, 2
MEAN WELL	RSDW60/RDDW60	60	X	9-36, 18-75, 40-160	3.3, 5, 12, 15, 24, 48, ±12/15	2 x 1"	1, 2
ABB Embedded Power	JRCS016	400		18-85 buck-boost	Non-isolated 18.5-60	Half brick BMP	1

DC-DC converters DIN rail mount					Typical attenuation @ 400kHz-500kHz 50Ω			
	Model	Output current/power	EN50155 rolling stock	Max DC input voltage(V)	Common mode (dB)	Differential mode (dB)	Mounting	Form-factor
Delta Electronics	FL75L05A/B	5A		0-75	43	45	THD	1 x 1"
Delta Electronics	FL75L07A/B	7A		0-75	40	70	THD/SMD	1 x 1"
Delta Electronics	FL75L10A/B	10A		0-75	30	25	THD	2 x 1.1"
Delta Electronics	FL75L20A/B	20A		0-75	32	26	THD	2 x 1.6"
ABB Embedded Power	FLTR75V05Z	5A		0-75	28	25	THD	1 x 1"
ABB Embedded Power	FLT007A0Z	7A		0-75	50	50	THD/SMD	1 x 1"
ABB Embedded Power	FLTR100V10Z	10A		0-75	36	44	THD	2 x 1.1"
ABB Embedded Power	FLT012A0Z	12A		0-75	45	55	THD/SMD	1.9 x 1"
ABB Embedded Power	FLTR100V20Z	20A		0-75	32	36	THD	2 x 1.6"
Bel Power	F4804A-G/RG	4A		0-80	50	35	SMD	1 x 0.75"
Bel Power	F2410-G/RG	10A		0-45	24	63	SMD	1.2 x 0.815"
Bel Power	F4810-G/RG	10A		0-80	24	63	SMD	1.2 x 0.815"
Aimtec	AMFW110-NZ-ST	100W	X	66-160			THD/chassis	53.8 x 28.8 x 23.5mm
Aimtec	AMFW72-NZ-ST/STD	10-50W	X	40-160			THD/chassis/DIN	2 x 1"

AC-DC portfolio

Avnet Abacus has a comprehensive program of AC-DC power supplies which are designed for EN50155 rugged railway applications. They have IEC/EN62368-1 safety and IEC60068-2 shock and vibration certificates and are even certified for ATEX/hazardous locations. They are grouped by DIN rail mount, rugged 3U cassettes, brick mount for compact designs and ready-to-use fanless or conduction cooled solutions. All these products are suitable for rugged environments like transportation, robotics and heavy industries.

AC-DC rugged 3U cassettes							
	Model	Output power (W)	EN50155 compliant	DC input voltage (VAC)	Output voltages (V)	Form-factor/ dimensions	# of outputs
Bel Power/Melcher	H series	70	X	85-264	5 to 60 2x12/15, 5/2x12, 5/2x15	3HE-8TE	1, 2, 3
Bel Power/Melcher	S series	100	X	85-264 (PFC)	5, 12, 15, 24, 48, ±12/15/24	3HE-12TE	1, 2
Bel Power/Melcher	K/KP series	150-280	X	85-264 (PFC)	5, 12, 15, 24, 48, ±12/15/24	3HE-16TE	1, 2
Bel Power/Melcher	LR series	210-300	X	85-264 (PFC)	2x12/15/48	3HE-11/12/16TE	2
Bel Power/Melcher	T series	500	X	85-264 (PFC)	24-54.5	3HE-28TE	1

AC-DC power brick format board mount								
	Model	Output power (W)	EN50155 compliant	DC input voltage (V)	Output voltages (V)	ATEX/HL	Remarks	# of outputs
Bel Power/Melcher	LWN/LWR	93-244	X	85-264AC, 90-350DC	12, 24, 37, 48 2x12/24/37/48			1, 2
Bel Power/Melcher	LXR/LXN	375-500	X	85-264AC, 90-350DC	24, 37, 48; 2x24/37/48			1, 2
AE Artesyn	ADN-C	120-960		85-264AC, 90-375DC	24	X		1
Delta Electronics	CliQ II/DRP	60-960		1ph 180-305, 2ph 180-550, 3ph 320-600AC	24, 48	(X)	5 sec. 150% boost	1
Delta Electronics	CliQ III/DRP-CAN	120-480		88-264AC, 90-375DC	24		5 sec. 150% boost APB	1
Delta Electronics	CliQ-M/DRM	80-960		1ph 85-276AC, 2/3ph 380-575AC	24	Maritime	7 sec. 150% boost APB	1
Delta Electronics	CliQ VA/DRV	120-480		85-276AC, 90-375DC	24		LCD 7 sec. 150% boost APB	1
Delta Electronics	LITE I/DRL-AA/AS	75-480		85-264AC, 90-375DC	24, 48		(Relay contact)	1
Delta Electronics	LITE II/DRL-EN	75-240		90-264AC, 90-350DC	12, 24, 48		Extra slim	1
Delta Electronics	SYNC/DRS	30-100		85-264AC, 90-375DC	5, 12, 24		Compact (relay contact)	1
Delta Electronics	Chrome/DRC	10-100		90-264AC, 90-350DC	5, 12, 24		Step-shape	1
MEAN WELL	HDR	15-150		85-264AC, 90-375DC	5, 12, 15, 24, 48		Step-shape	1
MEAN WELL	MDR	10-100		85-264AC, 90-375DC	5, 12, 15, 24, 48		Compact	1
MEAN WELL	EDR	75-150		85-264AC, 90-375DC	12, 24, 48		EMC class A	1
MEAN WELL	NDR	75-480		85-264AC, 90-375DC	12, 24, 48		Extra slim	1
MEAN WELL	SDR	75-960		85-264AC, 90-375DC	12, 24, 48		PFC 150% boost	1
MEAN WELL	WDR	120-480		1ph, 2ph 180-550AC	24, 48			1
MEAN WELL	TDR	240-960		3ph 340-550AC	24, 48		DC-OK relay contact	1



Bel Power/Melcher RCM series 60W-1000W rugged chassis mount for mission critical EN50155 applications



MEAN WELL RSD series 30W-500W enclosed DC-DC converters for railway applications



AE Excelsys XSolo series 500W-1000W AC-DC power supplies



Bel Power DIN rail AC-DC and DC-DC converters

AC-DC power fanless/convection/conduction cooled

	Model	Output power (W)	DC input voltage (VAC)	Output voltages (V)	CANbus	I2C PMbus	Form-factor	# of outputs
AE Artesyn	LCC250	250	90-264	12, 28, 36, 48		X	4 x 9" IP65	1
AE Artesyn	LCC600	600	90-264	12, 28, 36, 48		X	4 x 9" IP65	1
AE Artesyn	LCC1200 (tbd)	1200	90-264	12, 28, 36, 48		X	tbd	1
AE Excelsys	CoolX modular	600	90-264	2, 5, 58		X	4.5 x 8.5" modular	1-8
AE Excelsys	CoolX modular	1000	90-264	2, 5, 58		X	6.5 x 10" modular	1-12
Murata PS	PQC250 PQM250	250	90-264	12, 15, 18, 24, 28, 36, 48			3 x 5"	1
Murata PS	PQU650	650 (800)	90-264	12, 24, 48, 54			4 x 6"	1
MEAN WELL	UMP modular	400	90-264	24, 48 + 3x Aux.			250 x 89 x 37mm	1-4
MEAN WELL	UHP-200/350/500	200-500	90-264	3.3, 4.2, 5, 12, 15, 24, 36, 48, 55			Enclosed	1
MEAN WELL	UHP-750/1000	750-1000	90-264	12, 24, 36, 48			Enclosed	1
MEAN WELL	UHP-1500/2500	1500-2500	90-264	24, 36, 48	Opt.	Opt.	Enclosed	1
MEAN WELL	HEP-100/150/185	100-185	90-305	12, 15, 24, 36, 48, 54			220 x 68 x 38.8mm IP65+	1
MEAN WELL	HEP-240	240	90-305	12, 15, 24, 36, 48, 54			244.2 x 68 x 38.8mm IP65+	1
MEAN WELL	HEP-320	320	90-305	12, 15, 24, 36, 48, 54			252 x 0 x 43.8mm IP65+	1
MEAN WELL	HEP-480	480	90-305	24, 36, 48, 54			262 x 125 x 43.8mm IP65+	1
MEAN WELL	HEP-600/C	600	90-305	12, 15, 24, 36, 42, 48, 54			280 x 144 x 48.5mm IP65+	1
MEAN WELL	HEP-1000	1000	90-305	24, 48, 100, charge program			310 x 144 x 48.5mm IP65+	1
MEAN WELL	ERPF-400 LED	400	90-305	12, 24, 48			Enclosed outdoor	1



Delta Electronics CliQ-M 480W DIN rail power supply



Murata PQU650 650W force air cooling 12V-54V AC-DC power supply



Delta Electronics BxxSR series rugged IP67 conduction cooled DC-DC converter for transportation



MEAN WELL HEP-600/C 600W fanless power supply or VRLA/Li-Ion charger

AC-DC power industrial and household commodities

	Model	Output power (W)	DC input voltage (V)	Output voltages (V)	Convection/ fan cooling	EN62368-1 EN60335-1	Form-factor	# of outputs
Delta Electronics	PMT-35/50/2BA	35-50	90-264AC	12, 15, 24, 30, 36, 48	C	X	Enclosed	1
Delta Electronics	PMT-75/2BA	75	90-264AC	5/12, 5/24, 12, 15, 24, 30, 36, 48	C	X	Enclosed	1, 2
Delta Electronics	PMT-100/150/2BA	100-150	90-264/90-132/180-264AC	12, 15, 24, 30, 36, 48	C	X	Enclosed	1
Delta Electronics	PMT-350/2BA	350	90-132/180-264AC	12, 24, 36, 48	F	X	Enclosed	1
MEAN WELL	LRS-35/50	35-50	90-264AC	2, 3.3, 5, 12, 15, 24, 36, 48	C	X	Enclosed	1
MEAN WELL	LRS-75/100	75-100	90-264AC	5, 12, 15, 24, 36, 48	C	X	Enclosed	1
MEAN WELL	LRS-150/150F	150	90-132/180-264/90-264AC (F)	5, 12, 15, 24, 36, 48	C	X	Enclosed	1
MEAN WELL	LRS-200	200	90-132/180-264AC	2, 3.3, 5, 12, 15, 24, 36, 48	C	X	Enclosed	1
MEAN WELL	LRS-350	350	90-132/180-264AC	2, 3.3, 5, 12, 15, 24, 36, 48	F	X	Enclosed	1
Aimtec	AMES15-277NZ	15	85-305AC, 100-430DC	3.3, 5, 12, 15, 24, 36, 48	C	X	Enclosed	1
Aimtec	AMES35-277NZ	35	85-305AC/100-430DC	5, 12, 15, 24	C	X	Enclosed	1
Aimtec	AMES35-NZ	35	85-264AC, 120-373DC	5, 12, 15, 24, 5/12, 5/24, 5±12, 5±15, 5+24+12	C	X	Enclosed	1, 2, 3
Aimtec	AMES50-277NZ	50	85-305AC, 100-430DC	5, 12, 15, 24, 36, 48	C	X	Enclosed	1
Aimtec	AMES50-NZ	50	85-264AC, 120-373DC	5, 12, 15, 24, 36, 48, 5/12, 5/24, 5±12, 5±15, 5+24+12	C	X	Enclosed	1, 2, 3
Aimtec	AMES75-277NZ	75	85-305AC, 100-430DC	5, 12, 15, 24, 36, 48	C	X	Enclosed	1
Aimtec	AMES75-NZ	75	85-264AC, 120-373DC	5, 12, 15, 24, 36, 48, 5/12, 5/24, 5±12, 5±15, 5+24+12	C	X	Enclosed	1, 2, 3
Aimtec	AMES100-277NZ	100	85-305AC, 100-430DC	5, 12, 15, 24, 36, 48	C	X	Enclosed	1
Aimtec	AMES100-NZ	100	85-264AC, 120-373DC	5, 12, 15, 24, 36, 48, 5/12, 5/24, 5±12, 5±15, 5+24+12	C	X	Enclosed	1, 2, 3
Aimtec	AMES150-277NZ	150	85-305AC, 100-430DC	12, 15, 24, 36, 48	C	X	Enclosed	1
Aimtec	AMES150-NZ	150	85-264AC, 120-373DC	12, 15, 24, 36, 48	C	X	Enclosed	1
Aimtec	AMES200-NZ	20	90-132/180-264AC, 240-373DC	5, 12, 15, 24, 36, 48	C	X	Enclosed	1
Aimtec	AMES350-NZ	350	90-132/180-264AC, 240-373DC	5, 12, 15, 24, 36, 48	F	X	Enclosed	1



MEAN WELL 100W industrial and household enclosed power supply



Delta Electronics 350W industrial enclosed power supply with fan cooling



Aimtec 200W 85VAC to 305VAC input industrial and household enclosed power supply

TECHNICAL SUPPORT

Avnet Abacus' Europe-wide team of technical specialists is on hand to help you choose the right power supply for your railway application, and can offer engineering support throughout every stage of your design process. To organise a visit, or ask questions about your design, contact this team in your local language at [avnet-abacus.eu/ask-an-expert](https://www.avnet-abacus.eu/ask-an-expert)

AC-DC power industrial and household commodities

	Model	Output power (W)	DC input voltage (V)	Output voltages (V)	EN60601-1	EN60335-1 EN61558-1	Form-factor/ dimensions	# of outputs	OVC III
MEAN WELL	IRM-01	1	85-305AC	3.3, 5, 9, 12, 15, 24			Encapsulated +SMD	1	
MEAN WELL	IRM-02	2	85-305AC	3.3, 5, 9, 12, 15, 24			Encapsulated +SMD	1	
MEAN WELL	IRM-03	3	85-305AC	3.3, 5, 9, 12, 15, 24		X	Encapsulated +SMD	1	
MEAN WELL	IRM-05	5	85-305AC	3.3, 5, 12, 15, 24			Encapsulated	1	
MEAN WELL	IRM-10	10	85-305AC	3.3, 5, 12, 15, 24			Encapsulated	1	
MEAN WELL	IRM-15	15	85-305AC	3.3, 5, 12, 15, 24			Encapsulated	1	
MEAN WELL	IRM-20	20	85-305AC	3.3, 5, 12, 15, 24			Encapsulated	1	
MEAN WELL	IRM-30	30	85-305AC	5, 12, 15, 24, 48		X	Encapsulated	1	X
MEAN WELL	IRM-45	45	85-305AC	5, 12, 15, 24, 48		X	Encapsulated	1	X
MEAN WELL	IRM-60	60	85-305AC	5, 12, 15, 24, 48		X	Encapsulated	1	X
MEAN WELL	IRM-90	90	80-305AC	12, 15, 24, 48		(X)	Encapsulated	1	X
MEAN WELL	MPM-05	5	85-264AC	3.3, 5, 12, 15, 24	X	(X)	Encapsulated	1	
MEAN WELL	MPM-10	10	85-264AC	3.3, 5, 12, 15, 24	X	(X)	Encapsulated	1	
MEAN WELL	MPM-15	15	85-264AC	3.3, 5, 12, 15, 24	X	X	Encapsulated	1	
MEAN WELL	MPM-20	20	85-264AC	3.3, 5, 12, 15, 24	X	(X)	Encapsulated	1	X
MEAN WELL	MPM-30	30	85-264AC	3.3, 5, 12, 15, 24, 48	X	(X)	Encapsulated	1	
MEAN WELL	MPM-45	45	85-264AC	5, 12, 15, 24, 48	X	(X)	Encapsulated	1	X
MEAN WELL	MPM-60	60	85-264AC	5, 12, 15, 24, 48	X	(X)	Encapsulated	1	X
MEAN WELL	MPM-90	90	85-264AC	12, 15, 24, 48	X	(X)	Encapsulated	1	X
Aimtec	AMESR-1-5S277NZ	1	85-305AC	5			Non-isolated SIL	1	
Aimtec	AMESR-3-12S277NZ	3	85-305AC	12			Non-isolated SIL	1	
Aimtec	AMEOFL3-277HANZ	3	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24			Open board SIL	1	
Aimtec	AMEOFL5-277HANZ	5	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24			Open board SIL	1	
Aimtec	AMEOFL10-277HANZ	10	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24			Open board SIL	1	
Aimtec	AMEOF5-277NZ	5	85-305AC, 70-430DC	3.3, 5, 9, 12, 15, 24		X	Open board SIL	1	
Aimtec	AMEOF8-277NZ	8	85-305AC, 70-430DC	3.3, 5, 9, 12, 15, 24		X	Open board SIL	1	
Aimtec	AMEOF10-277NZ	10	85-305AC, 70-430DC	5, 9, 12, 15, 24		X	Open board SIL	1	
Aimtec	AMEOF15-277NZ	15	85-305AC, 70-430DC	3.3, 5, 9, 12, 15, 24		X	Open board SIL	1	
Aimtec	AMEL15-277UNZ	6-15	18-30AC, 18-42DC 85-305AC, 70-430DC	12			Encapsulated	1	
Aimtec	AMEM3-277HAVZ	3	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24		(X)	1 x 1" encapsulated	1	
Aimtec	AMEM5-277HAVZ	5	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24		(X)	1 x 1" encapsulated	1	
Aimtec	AMEL6-VZ	5-6	85-264AC	3.3, 5, 9, 12, 15, 24			Encapsulated	1	
Aimtec	AMEL5-277NZ	5	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24			Encapsulated	1	
Aimtec	AMEL10-277NZ	10	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24			Encapsulated	1	
Aimtec	AMEL10-277HAVZ	10	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24		X	Encapsulated	1	
Aimtec	AMEL15-277HAVZ	15	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24	(X)	(X)	Encapsulated	1	
Aimtec	AMEL20-277HAVZ	20	85-305AC, 100-430DC	5, 12, 15, 24	(X)	(X)	Encapsulated	1	
Aimtec	AMEL30-277HAVZ	30	85-305AC, 100-430DC	3.3, 5, 9, 12, 15, 24		(X)	Encapsulated	1	X
Aimtec	AMEL45-JZ	45	85-305AC, 100-430DC	5, 12, 15, 24, 48			Encapsulated	1	
Aimtec	AMEL60-JZ	60	85-305AC, 100-430DC	5, 12, 15, 24, 48			Encapsulated	1	
Aimtec	AMEL5-MJZ	5	85-264AC	5, 12, 15, 24	X		Encapsulated	1	
Aimtec	AMEL10-MJZ	10	85-264AC	3.3, 5, 9, 12, 15, 24	X		Encapsulated	1	



Aimtec 20W 85VAC-305VAC input board mount AC-DC power supply



MEAN WELL 90W chassis mount AC-DC power supply



Aimtec 3W 1 x 1" 4kV isolated board mount power supply

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