

DC-DC Converters for Transportation and Railway

Designed for the most demanding applications

Railway
transport



CALEX

Empowering Innovations in Transportation

Calex's rail, transportation, and industrial DC-DC converters are designed to provide isolated DC power for applications requiring high reliability in demanding conditions.

Utilizing the latest in technology development, Calex DC-DC converters cover a wide range of battery input voltages from 9V to 160V DC in a single module (with input voltage ratios up to 10:1).

Specific nominal battery input voltage range converters are also available. Products are suitable for both onboard and trackside rail applications, as well as industrial/manufacturing and farming equipment and e-mobility applications.

Calex Rail/Transportation Series

For demanding transportation applications

Features:

- o 1/2, 1/4, 1/8, and 1/16 brick formats
- o Input voltage ranges from 9-160V
- o Stable no-load operation
- o -40 °C up to 85 °C (ambient) and 110 °C operating temperature
- o Baseplate and flange package options
- o High efficiency – up to 91.5%
- o 5V, 12V, 24V, and 54V output
- o Tight line and load regulation
- o 3000V RMS input/output isolation
- o Dipped varnish coating

Tavelers's cabin

- Wi-Fi
- Infotainment
- Lighting
- Air conditioning
- Smoke Alarm

Facilities

- Door opening control
- Washrooms
- Passenger counter
- Smart sand
- Public address system

Driver's cabin

- Cab radio
- Displays
- Wipers
- CCTV
- Headlights

Propulsion

- Braking
- Axle monitor
- Drive control
- PTC
- Sensor

Trackside

- Signaling
- Level crossing
- Communications
- Lighting
- Thermal rail



Ultra-wide (10:1) input DC-DC Converters

By utilizing proprietary technologies and our component selection process, Calnex developed a range of ultra-wide (10:1) input voltage ratio DC-DC converters, in both component “brick” style format and stand alone fully EN50155 compliant and chassis mount solutions.

CHR Series

- o 16V-160V DC input
- o 12V, 24V, and 54V @ 300W outputs
- o Compliant to
 - EN50155
 - EN45545
 - EN50121
- o Environmentally qualified
- o -40 °C to +70 °C operating (+85 °C for 10 minutes)
- o Optional holdup, parallel function
- o Connector kit available

HBR/QBR Series

- o 16V-160V DC 10:1 input range
- o 250W ½ brick or 150W ¼ brick option
- o Hold-up function pin
- o -40 °C to +100 °C temperature range
- o 12V, 24V, and 54V outputs
- o Under voltage lockout feature
- o Remote sense
- o ±10% adjustment range
- o Extremely high efficiency
- o EN50155



Products support EN50155:2017			
Nominal Input	Variation range of Nominal Input (0.7-1.25 x Vin)	Brownout 100ms (0.6 x Vin)	Transient 1s (1.4 x Vin)
24V	16.8V - 30V	14.4V	33.6V
28V	19.6V - 35V	16.8V	39.2V
36V	25.2V - 45V	21.6V	50.4V
48V	33.6V - 60V	28.8V	67.2V
72V	50.4V - 90V	43.2V	100.8V
96V	67.2V - 120V	57.6V	134.4V
110V	77V - 137.5V	66V	154V

Model	Vin Range (V)	Vout (V)	Iout (A)	Pout (W)	Vin Nom (V)	Package
72WS12.300CHR	16-160	12	25	300	72	CHASSIS
72WS24.300CHR	16-160	24	12.5	300	72	CHASSIS
72WS54.300CHR	16-160	54	5.5	300	72w	CHASSIS
300CHR-MCK	Mating Connector Kit IRV300 series					

Model	Vin Range (V)	Vout (V)	Iout (A)	Pout (W)	Vin	Package
72WS12.250HBR	16-160	12	21	250	72	1/2 BRICK
72WS24.250HBR	16-160	24	10.5	250	72	1/2 BRICK
72WS54.250HBR	16-160	54	4.7	250	72	1/2 BRICK

Model	Vin Range (V)	Vout (V)	Iout (A)	Pout (W)	Vin Nom (V)	Package
72WS12.150QBR	16-160	12	12.5	150	72	1/4 BRICK
72WS24.150QBR	16-160	24	6.25	150	72	1/4 BRICK
72WS54.150QBR	16-160	54	2.8	150	72	1/4 BRICK

Selection Guide

Series	Model	Vin Range (V)	Vout (V)	Iout (A)	Pout (W)	Vin Nom (V)	Package
HBM	110TS12.150HBM	24	12	12.5	150	110	1/2 BRICK
	110TS24.150HBM	54/48	24	6.25	150	110	1/2 BRICK
	110TS5.150HBM	57.6-160	5	30	150	110	1/2 BRICK
	HBM110-EVAL	57-160			100	110	1/2 BRICK
EBM	110TS12.100EBM	57.6-160	12	8.3	100	110	1/4 BRICK
	110TS24.100EBM	57.6-160	24	4.2	100	110	1/4 BRICK
	110TS5.100EBM	57.6-160	5	30	100	110	1/4 BRICK
	EBM110-EVAL	57-160			100	110	1/4 BRICK
	24QS12.120EBM	9-36	12	10	120	12/24	1/8 BRICK
	24QS24.120EBM	9-36	24	5	120	12/24	1/8 BRICK
	24QS5.120EBM	9-36	5	24	120	12/24	1/8 BRICK
SBM	24QS12.50SBM	9-36	12	4.5	50	12/24	1/16 BRICK
	48QS12.50SBM	18-75	12	4.5	50	24/48	1/16 BRICK
	24QS15.50SBM	9-36	15	3	50	12/24	1/16 BRICK
	24QS24.50SBM	9-36	24	2	50	12/24	1/16 BRICK
	24QS48.50SBM	18-75	24	2	50	24/48	1/16 BRICK
	48QS48.50SBM	18-75	48	1	50	24/48	1/16 BRICK
	24QS5.50SBM	9-36	5	10	50	12/24	1/16 BRICK
	48QS5.50SBM	18-75	5	10	50	24/48	1/16 BRICK

Evaluation boards

- EMC filtering (EN50155)
- Output adjustment
- Cage clamp connectors
- LED indication
- Remote on/off
- Full Signals interfacing
- Hold-up



HBM
150W half brick



EBM
100W quarter brick



EBM
120W eighth brick

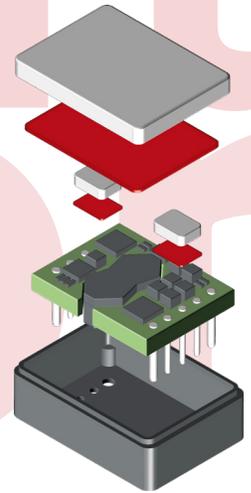


SBM
50W sixteenth brick



Construction

- **Baseplate machined from a single block of aluminum**
- **Thermal interface materials are of the highest quality and thermal conductivity**
- **Plastic components are made from engineered plastics with temperature ratings >300°C**
- **Conformal coated with Cytec CE-1171 — which is qualified to meet IPC-CC-830B**



Testing and Compliance

For rail applications, both onboard and trackside environments have been carefully considered, while meeting the constraints of EN50155:2017.

Wide DC input ranges cater to the battery-powered applications for both 12V and 24V systems, offering the highest power density packages available on the market. Calex's industrial DC-DC products use the latest and most efficient architectures and components for power conversion along with proprietary packaging materials and processes.

To ensure robustness, Calex enforces strict engineering design for reliability processes to maximize the life of the product.

Engineering policies and procedures include strict component derating guidelines to ensure low electrical stress, as well as extensive EVT/DVT testing and evaluation. Each module design is subject to extensive design review stages and rigorous HALT/HASS testing for electrical and mechanical stress testing. To the right is a list of the environmental testing procedures performed.

Environmental Qualification Testing

Qualification testing	Test Conditions
Vibration	EN 61373:1999 category I, class B, body mounted
Mechanical shock	EN 61373:1999 category I, class B, body mounted
DMTBF (life test)	Vin nom, units at derating point, 101 days
Temperature cycling test	-40°C to 125°C, unit temp. ramp 15°C/min., 500 cycles
Power and temperature cycling	Temperature operating = min to max, Vin = min to max, load = 50% of rated maximum, 100 cycles
Temperature, humidity, and bias	85°C 85%RH, Vin = max, load = min load, 1072 hour (72 hours with a pre-conditioning soak, unpowered)
Damp heat test, cyclic	EN60068-2-30: temperatures: +55°C and +25°C; number of cycles: 2 (respiration effect); time: 2 x 24 hours; relative humidity: 95%
Dry heat test	EN60068-2-2, Vin = nom line, full load, 85°C for 6 hours
High temperature operating bias	Vin = min to max, 95% rated load, units at derating point, 500 hours
Low temperature operating	Vin=nom line, full load, -40°C for 2 hours
Highly accelerated life test	High temperature limits, low temperature limits, vibration limits, combined environmental tests



We have what you need. It's a matter of determining your specific requirements and coupling them with the product that will do the job right. With our standards and experience, you won't have to reinvent the wheel. Contact us today to provide a solution for your power needs quickly and cost effectively.



Calex Manufacturing Company, Inc.

+1 925-687-4411

800-542-3355

email: sales@calex.com

www.calex.com

follow us on:    

a division of **muRata** 