

Murata Power Solutions

# DC-DC converters for rail and transportation

*Designed for the most demanding applications*





### IRV300 series

- 16V – 160V DC 10:1 input range
- 300W output power
- 12V, 24V, 48V outputs
- EN50155 compliant
- +/- 10% adjustment
- OR-ing option
- Over temp, over voltage, over current protection
- Fully enclosed for chassis mounting



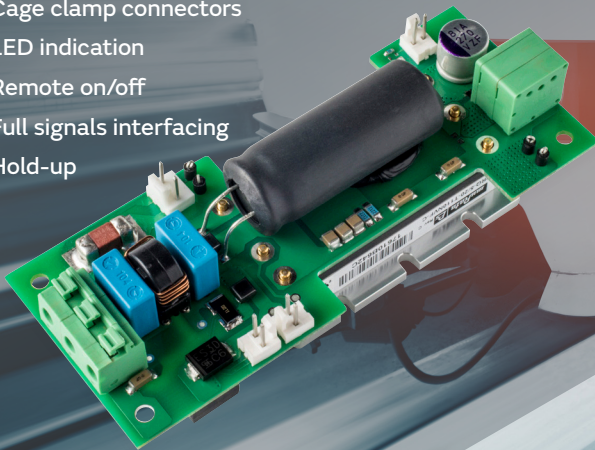
### IRH/IRQ W80 series

- 16V – 160V DC 10:1 input range
- 150W 1/2 brick or 100W 1/4 brick option
- Hold-up function pin
- -40°C to +100°C temperature range
- 12V, 24V, 48V outputs
- Under voltage lockout feature
- Remote sense
- +/-10% adjustment range
- Extremely high efficiency
- EN50155 compliant



### Evaluation boards

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



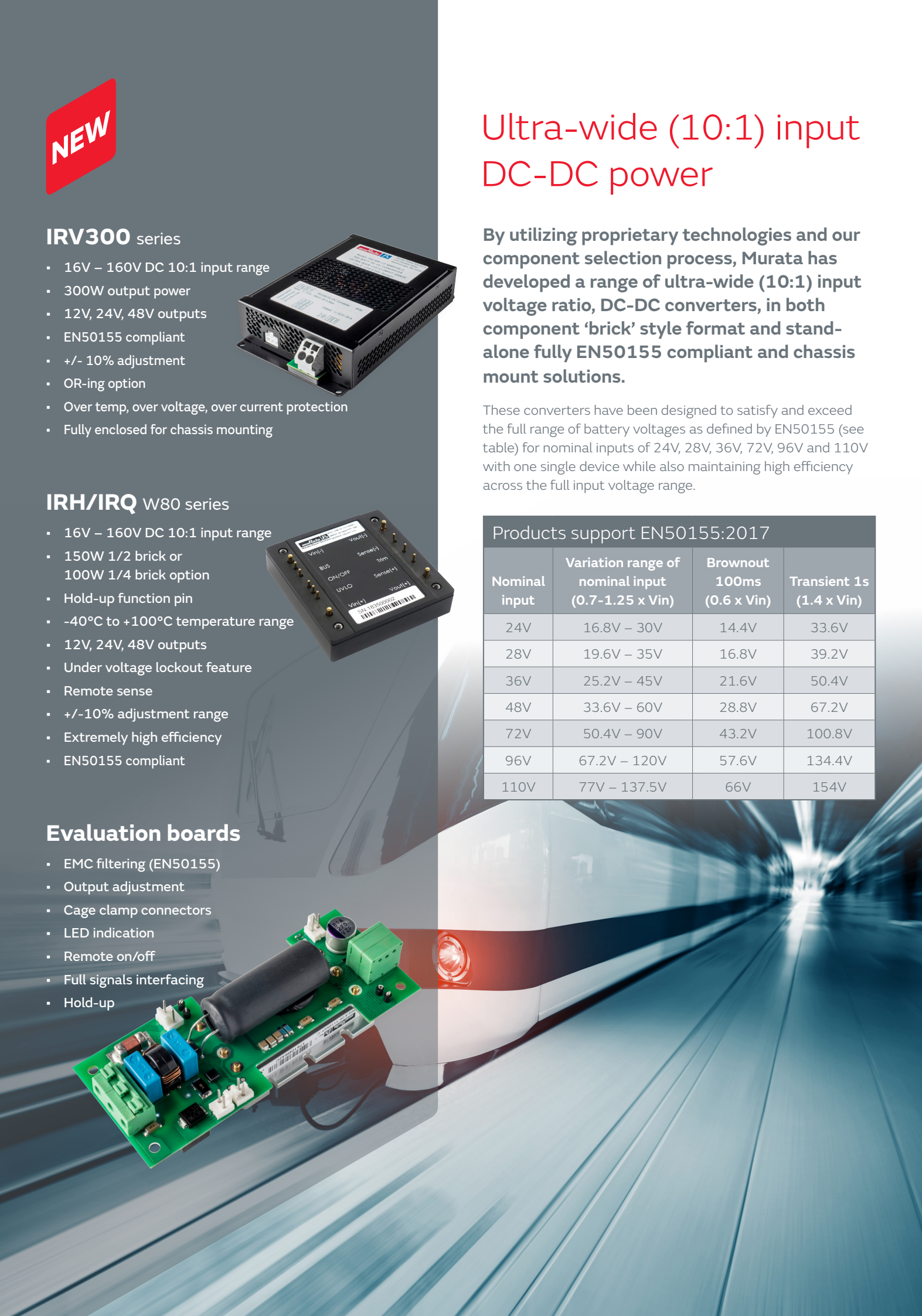
# Ultra-wide (10:1) input DC-DC power

By utilizing proprietary technologies and our component selection process, Murata has 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.

These converters have been designed to satisfy and exceed the full range of battery voltages as defined by EN50155 (see table) for nominal inputs of 24V, 28V, 36V, 72V, 96V and 110V with one single device while also maintaining high efficiency across the full input voltage range.

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



# Empowering innovations in transportation

Murata'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, Murata's DC-DC converters are able to 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 on-board and trackside rail applications, as well as industrial/manufacturing and farming equipment and the automotive industry.

## Travelers' cabin

- WiFi®
- Infotainment
- Lighting
- Air conditioning
- Smoke alarm

**NEW**

## Murata's IR series

### For transportation applications

**IRH**

150W half brick

**IRQ**

100W quarter brick

**IRE**

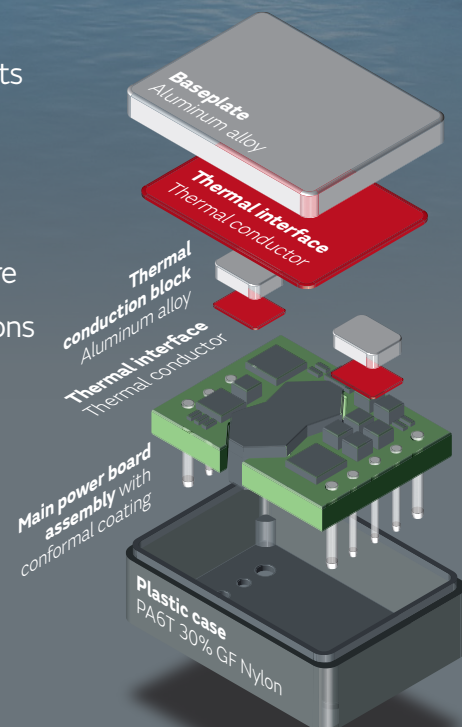
120W eighth brick

**IRS**

50W sixteenth brick

### Features

- 1/2, 1/4, 1/8 and 1/16 brick formats
- Input voltage ranges from 9-160V
- Stable no-load operation
- -40°C up to 85°C (ambient) and 110°C (case) operating temperature
- Baseplate and flange package options
- High efficiency - up to 91.5%
- 3.3V, 5V, 12V and 24V output
- Tight line and load regulation
- 3000V RMS input/output isolation
- Dipped varnish coating



### 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

## 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

Models	Vin Range (V)	Vout (V)	Iout (A)	Pout (W)	Vin Nom (V)	Efficiency (%)	Package
IRH-24/6.3-T110xx-C	57.6-160	24	6.25	150	110	89	1/2 BRICK
IRH-12/12.5-T110xx-C	57.6-160	12	12.5	150	110	89.5	1/2 BRICK
IRH-5/30-T110xx-C	57.6-160	5	30	150	110	91	1/2 BRICK
IRQ-24/4.2-T110xx-C	57.6-160	24	4.2	100	110	88.2	1/4 BRICK
IRQ-12/8.3-T110xx-C	57.6-160	12	8.3	100	110	87.4	1/4 BRICK
IRQ-5/20-T110xw x-C	57.6-160	5	20	100	110	85.5	1/4 BRICK
IRE-24/5-Q12xx-C	9-36	24	5	120	12/24	89.5	1/8 BRICK
IRE-12/10-Q12xx-C	9-36	12	10	120	12/24	91.5	1/8 BRICK
IRE-5/24-Q12xx-C	9-36	5	24	120	12/24	91	1/8 BRICK
IRS-12/4.5-Q48xx-C	18-75	12	4.5	54	24/48	91	1/16 BRICK
IRS-5/10-Q48xx-C	18-75	5	10	50	24/48	91	1/16 BRICK
IRS-3.3/15-Q48xx-C	18-75	3.3	15	50	24/48	89	1/16 BRICK
IRS-24/2-Q12xx-C	9-36	24	2	48	12/24	92	1/16 BRICK
IRS-15/3-Q12xx-C	9-36	15	3	45	12/24	92	1/16 BRICK
IRS-12/4.5-Q12xx-C	9-36	12	4.5	54	12/24	92	1/16 BRICK
IRS-5/10-Q12xx-C	9-36	5	10	50	12/24	92	1/16 BRICK
IRS-3.3/15-Q12xx-C	9-36	3.3	15	50	12/24	92	1/16 BRICK

# Isolated universal input DC-DC converters

## SPM15 series

- 15W single output
- 1" x 1" x 0.41" five-sided EMI shielding
- 3.3V, 5V, 12V & 15Vdc output models
- Up to 90% efficient
- 9 - 36 Vin (Q12) or 18-75 Vin (Q48) range
- 1,600V input/output isolation, basic insulation



## BPM15 series

- 15W dual output
- 1" x 1" x 0.41" five-sided EMI shielding
- $\pm 5V$ ,  $\pm 12V$  &  $\pm 15Vdc$  output models
- Up to 86% efficient
- 9 - 36 Vin (Q12) or 18-75 Vin (Q48) range
- 1,600V input/output isolation, basic insulation



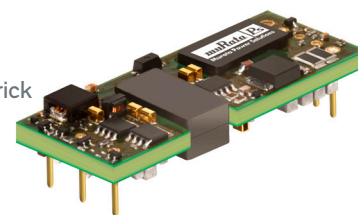
## UWS series

- 50W single output
- 1.3" x 0.9" x 0.36" 1/16th brick
- 3.3V, 5V & 12Vdc output
- Up to 89% efficient
- SMT and through hole models
- 18 - 75 Vin (Q48) range
- 2,250V input/output isolation, basic insulation



## UWE series

- 120W single output
- 2.3" x 0.9" x 0.38" 1/8th brick
- 5V, 12V & 24Vdc output
- Up to 92% efficient
- 9 - 36 Vin (Q12) range
- 1,500V & 2,250V input/output isolation, basic insulation



## Testing & compliance

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

Wide DC input ranges cater to the automotive industry for both 12V and 24V systems, offering the highest power density packages available on the market. Murata'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, Murata 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
Solderability	Pins MIL-STD-883, method 2003 (IPC/EIA/JEDEC J-SID-002B)

# Global locations

For details please visit [www.murata.com](http://www.murata.com)



## ⚠ Note

### 1 Export Control

*For customers outside Japan:*

No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

*For customers in Japan:*

For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

2 Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.

- ① Aircraft equipment
- ② Undersea equipment
- ③ Medical equipment
- ④ Traffic signal equipment
- ⑤ Data-processing equipment
- ⑥ Aerospace equipment
- ⑦ Power plant equipment
- ⑧ Transportation equipment (vehicles, trains, ships, etc.)
- ⑨ Disaster prevention / crime prevention equipment
- ⑩ Application of similar complexity and/or reliability requirements to the applications listed above

3 Product specifications in this catalog are as of August 2013. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.

4 Please read rating and & CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.

5 This catalog has only typical specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

6 Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.

7 No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

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INNOVATOR IN ELECTRONICS