



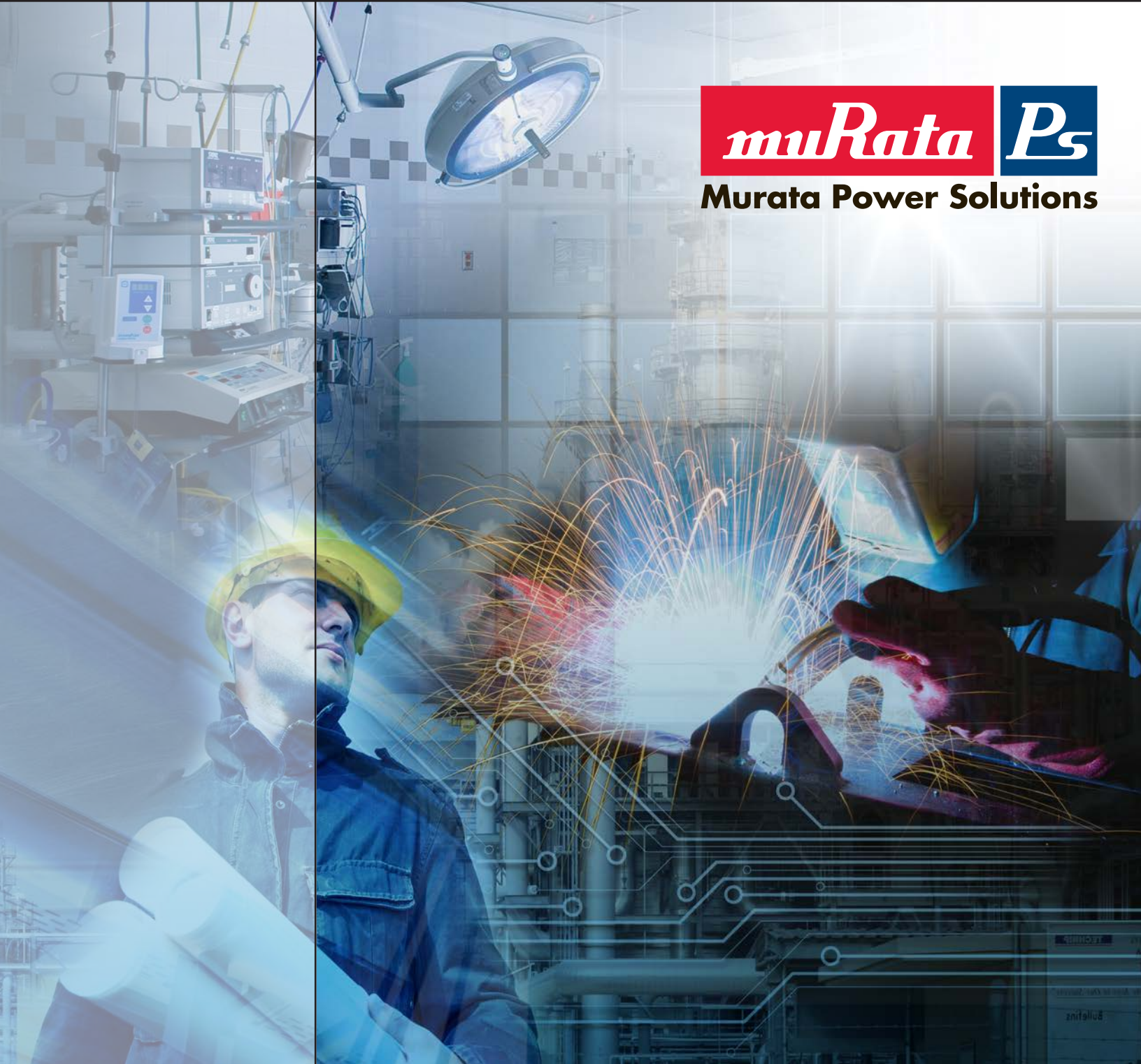
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MURATA POWER SOLUTIONS

DC-DC Converter

Product Selection Guide

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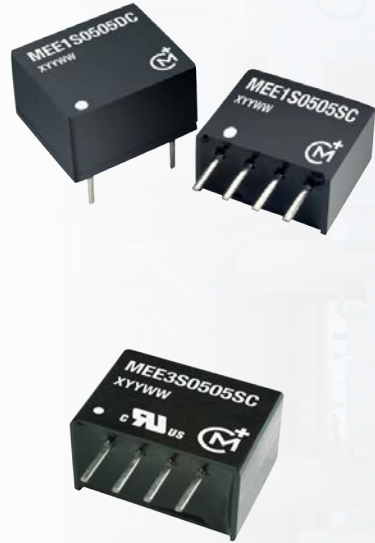


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Murata Power Solutions

The Specialist in Electronic Component Distribution

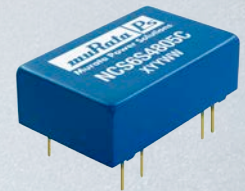
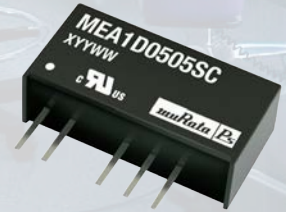
Focus Products – Isolated, Low Power DC-DC Converters

- Regulated and unregulated solutions
- Single, dual and triple output models available
- Small footprints - SIP and DIP pinouts
- Wide temperature ranges
- Robust designs - fully encapsulated, internal SMD construction, UL 94V-0 package material
- UL recognized models available



| Low Power Isolated Single Output (*Regulated) | | | | | |
|---|--------|---------------|------------|------------------------------|----------------------------|
| Series | Rating | Current Range | Package | Input(s) | Output(s) |
| LME | 0.25W | 16-50mA | SIP4/DIP8 | 3.3V, 5V, 12V | 5V, 9V, 12V, 15V |
| MEE1 | 1W | 67-303mA | SIP4/DIP8 | 3.3V, 5V, 12V, 15V, 24V | 3.3V, 5V, 9V, 12V, 15V |
| MER1 | 1W | 67-200mA | SIP7 | 5V, 12V, 15V, 24V, 48V | 5V, 9V, 12V, 15V |
| MEV1 | 1W | 67-200mA | SIP7/DIP14 | 5V, 12V, 15V, 24V, 48V | 5V, 9V, 12V, 15V |
| MTU1 | 1W | 67-200mA | SMD | 3.3V, 5V, 12V | 5V, 9V, 12V, 15V |
| NKE | 1W | 66-203mA | SIP4/DIP8 | 3.3V, 5V, 12V | 3.3V, 5V, 9V, 12V, 15V |
| NME | 1W | 42-200mA | SIP4/DIP8 | 5V, 12V, 15V, 24V, 48V | 5V, 9V, 12V, 15V |
| NMF | 1W | 67-100mA | SIP7/DIP14 | 5V, 12V, 24V, 48V | 5V, 9V, 12V, 15V |
| NMJ | 1W | 67-100mA | SIP7 | 3.3V, 5V, 12V | 3.3V, 5V, 9V, 12V, 15V |
| NMR | 1W | 67-200mA | SIP7 | 5V, 12V, 15V, 24V | 5V, 12V, 15V |
| NMV | 1W | 67-200mA | SIP7/DIP14 | 5V, 12V, 15V | 5V, 9V, 12V, 15V |
| NTE | 1W | 67-303mA | SMD | 3.3V, 5V, 12V | 3.3V, 5V, 9V, 12V, 15V |
| PWR13 | 1.5W | 100-300mA | DIP24 | 5V, 12V, 15V | 5V, 12V, 15V |
| NDL | 2W | 134-400mA | SIP8 | 5V, 12V, 24V, 48V - 2:1 | 5V, 9V, 12V, 15V (*) |
| NMG | 2W | 133-400mA | SIP7 | 5V, 12V | 5V, 9V, 12V, 15V |
| NMK | 2W | 133-400mA | SIP7 | 5V, 12V, 15V, 24V | 5V, 9V, 12V, 15V |
| NML | 2W | 134-400mA | SIP4 | 5V, 12V | 5V, 9V, 12V, 15V |
| MEE3 | 3W | 200-600mA | SIP4 | 5V, 12V | 5V, 9V, 12V, 15V |
| MEV3 | 3W | 200-600mA | SIP7 | 5V, 12V | 5V, 9V, 12V, 15V |
| NDTS | 3W | 200-909mA | DIP24 | 5V, 12V, 24V, 48V - 2:1 | 3.3V, 5V, 12V, 15V (*) |
| NDY | 3W | 200-909mA | DIP24 | 5V, 12V, 24V, 48V - 2:1 | 3.3V, 5V, 9V, 12V, 15V (*) |
| UST | 3W | 200-500mA | STD DIP | Ranges 4.5-9V, 9-18V, 18-72V | 5V, 12V, 15V (*) |
| NCS6 | 6W | 0.4-1.52A | DIP24 | Ranges 9-36V, 18-75V | 3.3V, 5V, 12V, 15V (*) |
| NDS6 | 6W | 0.4-1.2A | DIP24 | Range 18-36V | 5V, 12V, 15V (*) |

| Low Power Isolated Dual Output (*Regulated) | | | | | |
|---|--------|---------------|------------|-------------------------------|-------------------------------|
| Series | Rating | Current Range | Package | Input(s) | Output(s) |
| MEA1 | 1W | 67-200mA | SIP7/DIP14 | 5V, 12V, 15V, 24V, 48V | 5V, 9V, 12V, 15V |
| MEV1 | 1W | 67-200mA | SIP7/DIP14 | 5V, 12V, 15V, 24V, 48V | 5V, 9V, 12V, 15V |
| MTU1 | 1W | 67-200mA | SMD | 3.3V, 5V, 12V | 5V, 9V, 12V, 15V |
| NKA | 1W | 67-304mA | SIP6/DIP14 | 3.3V, 5V, 12V | 3.3V, 5V, 9V, 12V, 15V |
| NMA | 1W | 66-200mA | SIP7/DIP14 | 5V, 12V, 15V | 5V, 9V, 12V, 15V |
| NMD | 1W | 134-200mA | SIP7/DIP14 | 5V, 12V | 3.3V, 5V, 9V, 12V, 15V - Twin |
| NMJ | 1W | 67-200mA | SIP7 | 5V, 12V | 5V, 9V, 12V, 15V |
| NMV | 1W | 67-200mA | SIP7/DIP14 | 5V, 12V, 15V | 5V, 9V, 12V, 15V |
| NTA | 1W | 66-304mA | SMD | 3.3V, 5V, 12V | 3.3V, 5V, 9V, 12V, 15V |
| NTV | 1W | 66-200mA | SMD | 5V, 12V | 5V, 9V, 12V, 15V |
| PWR13 | 1.5W | 100-300mA | DIP24 | 5V, 12V, 15V | 5V, 12V, 15V |
| NMH | 2W | 134-400mA | SIP7/DIP14 | 5V, 12V, 24V, 48V | 5V, 9V, 12V, 15V |
| NMK | 2W | 134-400mA | SIP7 | 5V, 12V, 15V, 24V | 5V, 9V, 12V, 15V |
| NMS | 2W | 134-400mA | DIP24 | 5V, 12V | 5V, 9V, 12V, 15V |
| NTH | 2W | 134-400mA | SMD | 5V, 12V | 5V, 9V, 12V, 15V |
| BST | 3W | 85-250mA | STD DIP | Ranges 4.5-9V, 9-18V, 18-72V | 5V, 12V, 15V (*) |
| NDH | 3W | 125-200mA | SIP9 | Ranges 18-36V, 24-48V, 36-72V | 12V, 15V (*) |
| NDTD | 3W | 200-909mA | DIP24 | 5V, 12V, 24V, 48V - 2:1 | 3.3V, 5V, 12V, 15V (*) |
| NCS6 | 6W | 0.4-1.2A | DIP24 | Ranges 9-36V, 18-75V | 5V, 12V, 15V (*) |
| NCS6 | 6W | 0.4-1.2A | DIP24 | Range 18-36V | 5V, 12V, 15V (*) |



| Low Power Isolated Triple Output | | | | | |
|----------------------------------|--------|---------------|---------|----------|-------------------------|
| Series | Rating | Current Range | Package | Input(s) | Output(s) |
| NMT | 3W | 77-126mA | SIP8 | 5V, 12V | -24V, -48V, -72V Triple |

Focus Products - Isolated Medium to High Power DC-DC Converters

- Isolated industrial power 5-60W
- Ultra-wide 4:1 input ranges available
- Single, dual and triple outputs
- 1"x1", 1"x1.25", 1"x2", 1.6"x2", 2"x2" and other standard industrial form factors

| Industrial Package Styles – Regulated Output | | | | | |
|--|--------|---------------|-----------------|---|--|
| Series | Rating | Current Range | Package | Input(s) | Output(s) |
| PWR | 5W | 180-334mA | STD Industrial* | Ranges 4.5-5.5V, 7-16V, 10-18V | 15V - Bipolar Out |
| NPH10S | 10W | 0.67-2.94A | 1"x1.25" | Ranges 18-36V, 36-75V | 3.4V, 5.1V, 12.1V, 15.1V |
| NPH15S | 15W | 1-4.4A | 1"x2" | Ranges 18-36V, 36-75V | 3.4V, 5.1V, 12.1V, 15.1V |
| TWR | 11W | 1.1-1.4A | 1"x2" | Ranges 4.7-7V, 9-18V, 18-36V, 36-72V | 5V & +/-12V, +/-15V Triple Out |
| TWR | 20W | 4A | 2"x2" | Ranges 9-36V, 18-75V | 5V & +/-12V, +/-15V Triple Out |
| TWR | 22W | 3.5-4.6A | 1"x2" | Ranges 10-18V, 18-36V, 36-72V | 3.3V or 5V & +/-12V, +/-15V Triple Out |
| DWR | 15W | 3A | 1"x2" | Ranges 10-18V, 18-36V, 36-75V | 5V & 3.3V Dual Out |
| BE115 | 15W | 1-3A | 1"x1" | Ranges 9-36V, 18-75V | 5V, 12V, 15V - Bipolar Out |
| BWR | 17W | 1.15-3A | 1"x2" | Ranges 10-18V, 18-36V, 36-75V | 5V, 12V, 15V - Bipolar Out |
| BWR | 20W | 1-3.4A | 2"x2" | Ranges 4.7-7.5V, 9-36V, 18-75V | 5V, 12V, 15V - Bipolar Out |
| UWR | 3W | 200-500mA | 24-pin DIP | Ranges 4.5-9V, 9-18V, 18-72V | 5V, 12V, 15V |
| UWR | 5W | 335-1000mA | 1"x1" | Ranges 18-36V, 36-72V | 5V, 12V, 15V |
| UWR | 10W | 530-2000mA | 1"x2" | Ranges 4.7-7.25V, 9-18V, 18-75V, 18-36V | 5V, 12V, 15V |
| UWR | 15W | 1-4.5A | 1"x2" | Ranges 10-18V, 18-36V, 36-75V | 3.3V, 5V, 12V, 15V |
| UWR | 40W | 7-9A | 2"x2" | Ranges 10-18V, 18-36V, 36-75V, 36-72V | 3.3V, 5V |
| UHE | 30W | 2-7.5A | 1.6"x2" | 12V, 24V, 48V - 2:1 & 24V, 48V - 4:1 | 3.3V, 5V, 12V, 15V |
| UE115 | 15W | 1.1-5A | 1"x1" | Ranges 9-36V, 18-75V | 3.3V, 5V, 12V, 15V |
| UE125 | 25W | 2.1-7.5A | 1"x1" | Ranges 36-75V | 3.3V, 5V, 12V |
| UE130 | 30W | 2-9A | 1"x2" | Ranges 9-36V, 18-75V | 3.3V, 5V, 12V, 15V |
| UEI | 60W | 3.3-18A | STD Industrial* | Ranges 9-36V, 18-75V, 36-75V | 3.3V, 5V, 12V, 15V |
| RUW15 | 15W | 0.125-0.625A | 2"x2" | Ranges 16-160V | 12V, 24V |

*Footprints accepted and adopted by the power industry



Industrial

- Building automation
- Distributed power architecture (DPA)
- Factory automation/ process controls
- Instrumentation
- Lighting
- Motor control/power
- Process automation equipment
- Production equipment
- Test & Measurement
- Wafer handling equipment

Medical

- CT scanners
- Diagnostic equipment (i.e. blood analyzers)
- Instrumentation
- Non-patient contact equipment (i.e. plasma separators)
- Test & Measurement

Transportation

- Distributed power architecture (DPA)
- Motor control/power
- Rail



Broad Market Applications

If There is a Transistor, There is a Power Converter

DC-DC Converter Terminology

Buck Converter – Common converter design that does not use a transformer and the output voltage is always less than the input voltage. Also known as a step down converter.

Boost Converter – Common converter design with an output voltage greater than its input voltage. Contains at least two semiconductor switches and at least one energy storage element (a capacitor, inductor, or a combination of the two).

Distributed-power Open Standards Alliance (DOSA) – A number of competing companies joined to promote open standard POL market. Open standard offering based on standard pinout and features. Pin to pin compatibility critical in addressing possible second source concerns. Product feature may be the same, but performance may differ supplier to supplier.

Efficiency – The difference between power consumed at the input of a power supply and that available at the output, usually stated in percent.

Communications

- Air traffic control
- LAN/WAN
- RF/Microwave
- Telecom switches

Consumer

- Appliances
- Audio equipment
- Video equipment

Computer

- Computing
- Mobile routers
- Peripherals
- Ruggedized computers
- Server equipment
- Storage equipment
- Super computer
- Workstations

Business Machines

- Business equipment
- Camera surveillance
- Education equipment
- Instrumentation
- Passenger screening
- Process automation equipment
- Retail equipment
- Security
- Ticketing



Holdup Time – The time under worst case conditions during which a power supply's output voltage remains following the loss of input power.

Isolation – The maximum voltage applied to the input of a power supply that can be isolated from the output of that supply, in the event of a failure.

Load – Capacitance, resistance, inductance in any combination, which, when connected across a circuit determines current flow and power used.

Negative Remote Control Logic – The DC-DC logic will be inhibited and not start up if the RC pin is logic high.

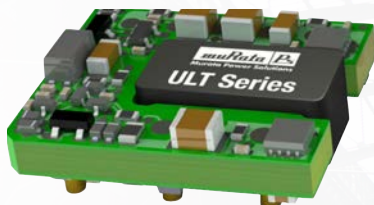
Point of Load (PoL) – Supply regulator placed close to the microcontroller or ASIC to solve the challenge of high peak current and low noise demands.

Point of Load Alliance (POLA) – A number of competing companies working in an alliance to promote, market and sell PoL converters designed by Texas Instruments.

Positive Remote Control Logic – The DC-DC converter will automatically start up with application of input voltage if the RC pin is logic high.

Focus Products - Isolated Medium to High Power DC-DC Converters (Continued)

- Isolated telecom brick power 30 - 360W
- Ultra-wide 4:1 input ranges available
- Available in 1/32, 1/16, 1/8, 1/4 and 1/2 brick form factors



| Brick Package Styles (DOSA) - Regulated Output | | | | | |
|--|--------|---------------|------------|------------------------------|-------------------------|
| Series | Rating | Current Range | Package | Input(s) | Output(s) |
| ULT | 30W | 2.5-7.5A | 1/32 Brick | Range 36-75V | 3.3V, 5V, 12V |
| UWS | 54W | 4.5-15A | 1/16 Brick | Range 18-75V | 3.3V, 5V, 12V |
| ULS | 66W | 2-20A | 1/16 Brick | Range 36-75V | 3.3V, 5V, 12V |
| ULE | 72W | 1.25-20A | 1/8 Brick | Ranges 9-18V, 18-36V, 36-75V | 1.5V-48V |
| UEE | 99W | 15-30A | 1/8 Brick | Range 36-75V | 3.3V |
| UCE | 120W | 8.3-40A | 1/8 Brick | Range 36-75V | 1.2V-12V |
| UWE | 120W | 3-20A | 1/8 Brick | Ranges 9-36V, 18-75V | 3.3V, 5V, 12V, 15V, 24V |
| UQQ | 105W | 4-25A | 1/4 Brick | Ranges 9-36V, 18-75V | 3.3V, 5V, 12V, 15V, 24V |
| UVQ | 120W | 2.5-40A | 1/4 Brick | Ranges 18-36V, 36-75V | 1.5V-48V |
| UCQ | 132W | 8.3-40A | 1/4 Brick | Ranges 18-36V, 36-75V | 1.2V-15V |
| UWQ | 204W | 17A | 1/4 Brick | Range 18-75V | 12V |
| HPQ | 300W | 22-50A | 1/4 Brick | Range 36-75V | 3.3V, 8.3V, 12V |
| UCH | 150W | 6.7-40A | 1/2 Brick | Ranges 18-36V, 36-75V | 1.8V-15V |
| HPH | 360W | 30-70A | 1/2 Brick | Range 36-75V | 3.3V, 5V, 12V |

What is an Isolated Brick?

An Isolated Brick converts a DC input voltage (V_{in}) to an electrically and physically isolated DC Output Voltage (V_{out}).

- An Isolated brick incorporates a high frequency transformer which provides a barrier between the primary side and the secondary side of the DC-DC converter.
- Many safety agencies and/or customers require a separation from the applied input voltage and the output voltage of a DC-DC.
- Isolation eliminates/reduces noise that is generated from the system bus from appearing on the output side of the DC-DC.
- The output of an isolated brick can be configured to be either positive or negative.

Why use Isolated Bricks?

Safety requirements

- UL60950 information technology equipment - SELV (Safety Extra Low Voltage) requirements
- UL60950 isolation or insulation requirements
- UL60601 isolation requirements for medical equipment
- Agency approvals
- Eliminate noise from a system bus
- Eliminate ground loop noise
- Wireless infrastructure equipment 18-75V_{in} range, multiple installation voltages
- Industrial applications requiring 9-36V_{in} range (i.e. 12Vdc/24Vdc battery source)

Focus Products - DOSA PoLs, Non-Isolated Programmable Output

- Programmable output voltage
- Wide input voltage range
- Overcurrent protection
- Over temperature protection
- Industry accepted standard package and pinouts in SMT and SIP
- On/off control
- Pre-bias immunity
- Monotonic startup
- Sequence/tracking
- Ideal for powering the latest generation of FPGAs (Field-programmable gate arrays) and DSPs (Digital Signal Processors)
- Tightly regulated output



Point of Load DC-DC Converters

| Non-Isolated (PoL) - Regulated Output | | | | | |
|---------------------------------------|--------|---------------|-------------------------|---------------|--------------------------|
| Series | Rating | Current Range | Package | Input(s) | Output(s) |
| 78xxSR | 4.8W | 400-500mA | SIP3/LM78XX Pinouts | Range 7.5-36V | 3.3V, 5V, 12V |
| OKI-78SR | 7.5W | 1.5A | SIP horizontal or vert. | Range 7-36V | 3.3V, 5V |
| OKL | 15W | 3-6A | DOSA-SMT iLGA | Range 4.5-14V | 0.591-5.5V programmable |
| OKR | 50W | 3-10A | SIP | Range 4.5-14V | 0.591-6.0V programmable |
| OKI | 36W | 3A | DOSA-SMT | Range 19-40V | 5.021-15.5V programmable |
| OKX | 80W | 3-10A | DOSA-SIP | Range 8.3-14V | 0.7525-5.5V programmable |
| OKY | 80W | 3-10A | DOSA-SMT | Range 8.3-14V | 0.7525-5.5V programmable |
| LSM2 | 125W | 30A | DOSA-SMT | Range 6-14V | 0.8-5V programmable |
| LSN2 | 150W | 30A | DOSA-SIP | Range 6-14V | 0.8-5V programmable |

Advantages of Using PoL Modules

- Ease of use
 - Need input and output capacitors only, and one resistor to program the output voltage
 - Layout, control loop stability, noise issues and protection are resolved in the module
- Multiple sourcing is available via DOSA
- Board savings versus discrete parts design
- Reduced BOM since one module replaces multiple discrete parts
- Higher efficiency is typical versus low profile IC-type DC-DCs



1-800-CALL-TTI

There's a TTI location near you



Murata Power Solutions DC-DC Converter Product Selection Guide

Competitors

- Delta Electronics
- Emerson Network Power (Astec & Artesyn)
- Ericsson
- TDK Lambda
- Vicor
- Traco
- Lineage Power
- Power-One
- SynQor
- Recom

Questions to Ask

Do you use off-the-shelf power converters or do you build your own power converters?

What is the overall power required (W)?

Do you require an isolated or non-isolated DC-DC converter?

How many output voltages are required and what are they?

What package style is preferred? SMT, or through-hole?

What input ranges need to be covered?

Are you interested in developing a strategic power supply sourcing strategy?

DC-DC Converter Selection Guide Index

Do you need a point of load converter? *If Yes, go to page 7*

Are you looking for a low power option in a SIP or DIP package? *If Yes, go to page 2*

Do you need an isolated DC-DC converter for an UL60601 medical application? *If Yes, go to page 2, 3 or 6*

Are you looking for an industrial package? *If Yes, go to page 3*

Are you going to use a DOSA compliant brick package? *If Yes, go to page 6*



**Murata Power Solutions isolated bricks
have UL and CSA approvals**



Scan the code for more information
about Murata Power Solutions.