Flex Power Modules

48 V to Load Direct Conversion

DC/DC Power Conversion
for Data Center &
Open Compute Applications

flex®

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48 V to Load Direct Conversion

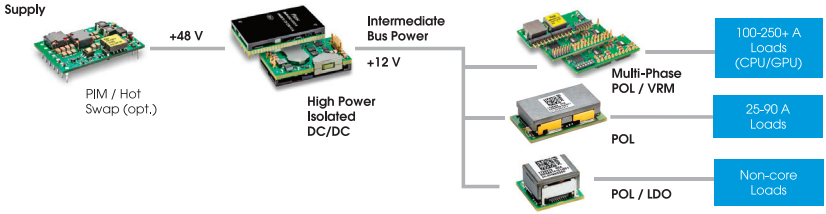
High-density cloud applications, such as big data analytics, autonomous vehicles, AI and deep learning, demand an exponential increase in Data Centers' performance.

As board power requirements continue to increase into the multi-kW range, higher voltage buses, such as 48 V_{DC}, are increasingly being used to reduce distribution losses and copper costs, while simplifying installations.

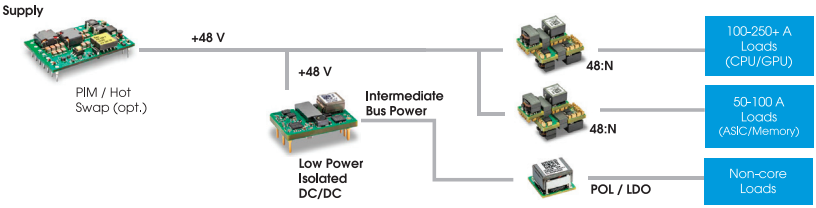
Flex Power Modules' Direct Conversion products eliminate a power conversion stage, converting directly from 48 V to silicon core voltages as low as 0.5 V_{DC}.

The picture below demonstrates Direct Conversion changes when moving from an IBA (Intermediate Bus Architecture) to a hybrid approach employing Direct Conversion for the highest current GPU/CPU/Memory requirements.

BEFORE DIRECT CONVERSION



WITH DIRECT CONVERSION



Benefits of 48 V to Load Direct Conversion

48V Direct Conversion benefits include:

- Higher Efficiency with an increase of 2% - 3% over traditional dual stage conversion from 48 V to 12 V to 1 V – reduced need for Intermediate Bus
- Reduction in board space due to the elimination of potentially several power converters, such as quarter bricks, reaching board savings up to 50% or more
- Reduces distribution challenges - up to 1/16 of copper losses vs. 12 V bus
- Architecture automatically adjusts to maintain optimal efficiency across a wide load range
- Mechanically and electrically sized to meet the demand of server applications
- High-volume manufacturing capability with industry standard processes and components
- Future-proof: The demand for higher core current solutions is expected to grow with a scalability up to 6 modules and higher current up to 600 A+
- Full digital control on the secondary side
- Compliant with PMBus, AVSBus and Intel SVID
- PMBus configurable
- Supported by Flex Power Designer: **www.flexpowerdesigner.com**

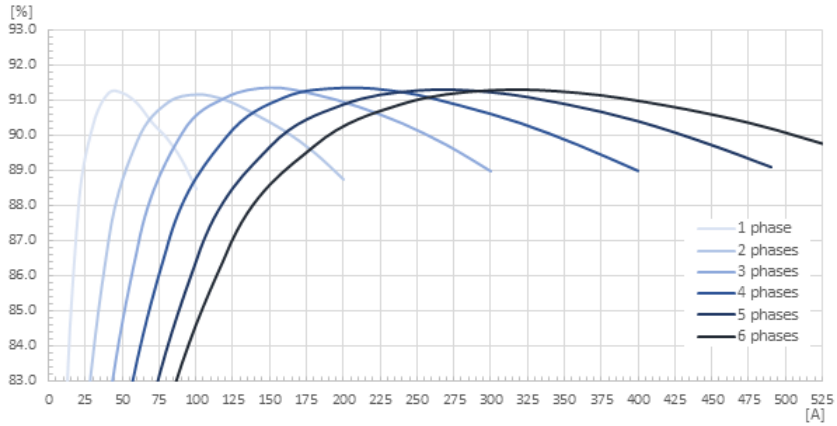
Automatic Efficiency Optimization

Flex Power Modules' Direct Conversion modules offer optimal efficiency across a wide range of loads.

As previously mentioned, the Flex Power Modules Direct Conversion architecture can be configured with 1 phase up to a maximum of 6.

When the current demand increases or decreases during operation, the controller in the Main unit automatically enables or disables Satellites to maintain optimal efficiency across a wide current range.

The figure below shows the efficiency of six BMR482 units providing above 91% at 0.8 V with loads up to 525 A.



Picture: Efficiency versus load current

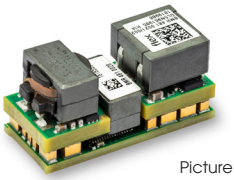
Flex Power Modules' Solution: BMR 481

Flex Power Modules' complete power supply system includes one main unit and up to 5 satellite units (in total 1-6 phases).

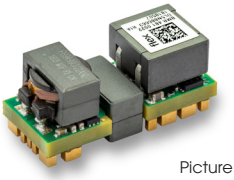
BMR 481

The key features of the BMR 481 series are:

- Efficiency up to 92% @ 53 V / 1V
- Input range: 40 V to 60 V
- Output Voltage range: 0.5 V to 1.35 V
- Output Current: up to 70 A / phase, 420 A
- Isolated Power Train
- PMBus compliant
- Supported by Flex Power Designer Software

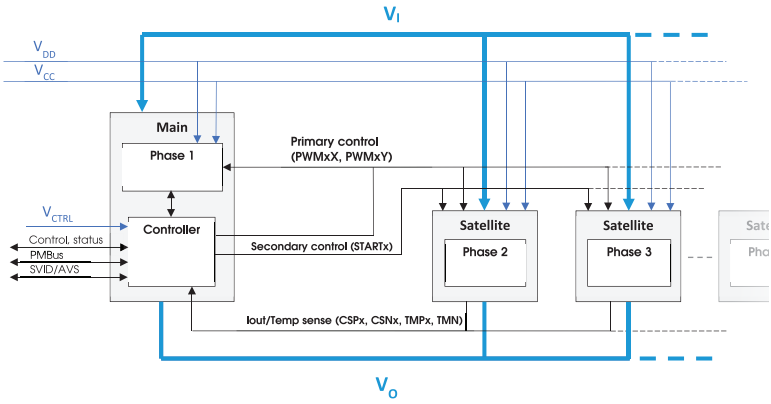


Picture: BMR 481 Main



Picture: BMR 481 Satellite

Mechanical information:
Satellite: 27.7 x 12.0 x 12.6 mm
Main: 27.2 x 12.0 x 14.0 mm
Pinning: SMT Box Pins / LGA



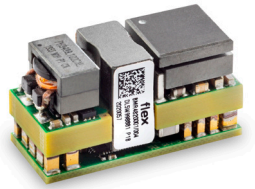
Picture: DiCon Architecture

Flex Power Modules's solution: BMR 482

The BMR482 has the following key features:

BMR 482

- Efficiency 91.6 % at 53 V / 0.8 V
- Input range 40-60 V
- Output Voltage: 0.5 -1.35 V
- Output Current: 100 A+ / phase, 600 A max
- Isolated Power Train
- Supported by Flex Power Designer Software
- Compliant with PMBus, AVSBus and Intel SVID
- Power Stamp Alliance compatible



Picture: BMR482 Main

Picture: BMR482 Satellite

Mechanical information:
Satellite: 30.0 x 12.7 x 15.5 mm
Main: 30.0 x 12.7 x 16.8 mm
Pinning: SMT Box Pins / LGA

Order Information

Available products are:

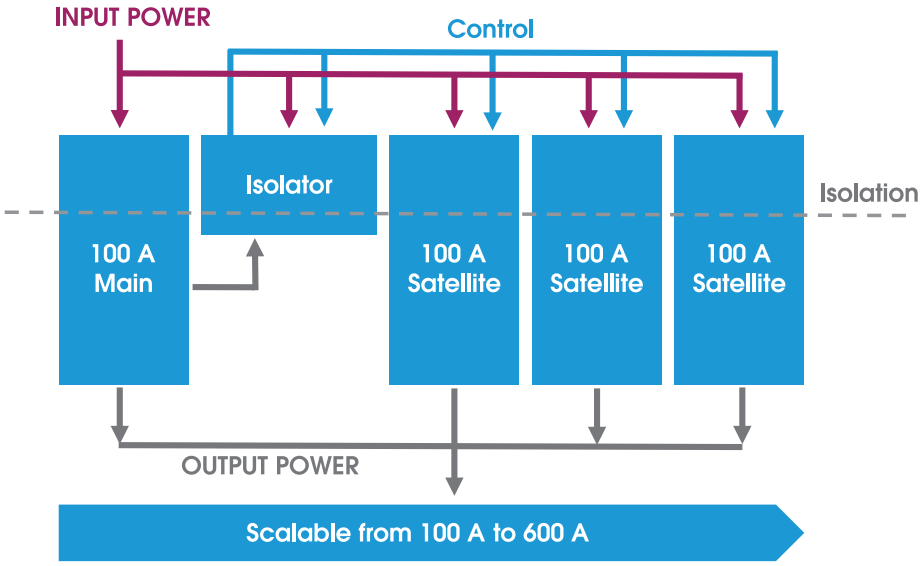
Part number	Type	V_{in}	Output
BMR 481 0021/002	Main	40-60 V	1.0 V/70 A
BMR 481 0022	Satellite	40-60 V	1.0 V/70 A
BMR 482 0001/004	Main	40-60 V	0.8 V/100 A
BMR 482 0002	Satellite	40-60 V	0.8 V/100 A

Power Stamp Alliance (PSA)

Flex is a founding member of Power Stamp Alliance (PSA).
www.powerstamp.org

The Power Stamp Alliance (PSA) was formed in 2018 to promote the benefits of Direct Conversion while addressing the industry's need for multiple sourcing.

The PSA has been formed to define standard product footprints and functions that provide standard power modules solutions for converting 48 V_{in} to low voltage, silicon voltages in high current applications such as CPUs, DDR memory, ASICs, etc.



For more information visit www.flexpowermodules.com

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