

# ST 48V Conversion Solutions

Overview about PSA and ST Products





# Direct Conversion Platform Update

3

## 6 Cells Digital Controller

P/N	Package	Control Topology	CPU Link
STRG06	VFQFPN68 8x8mm Pin-to-Pin	Resonant PSFB only	VR13
STPDDC60		Configurable, resonant / non-resonant PSFB	VR13.HC / AVS
PSA60		PSA Digital Multi Satellite Controller	



## 30V Secondary Side SR Driver

P/N	Package	Application
STRG02	DFN12 3x3mm Pin-to-Pin	Resonant PSFB
STPRDC01		Resonant / non-resonant PSFB



## 60V Primary Side Full Bridge Driver

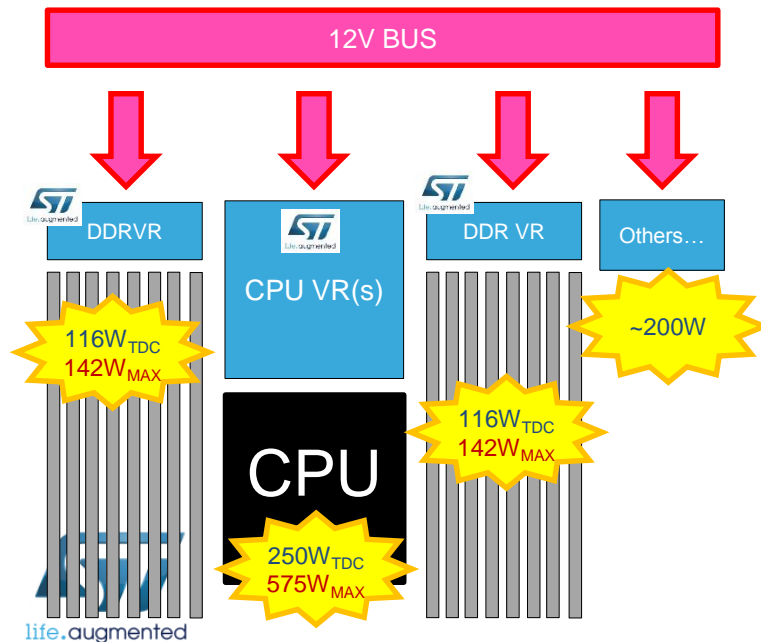
P/N	Package	Supply Voltage
STRG04	QFPN28 4x4mm Pin-to-Pin	5.5V Typ. Bus
STPRDC02		Supports 5V bus



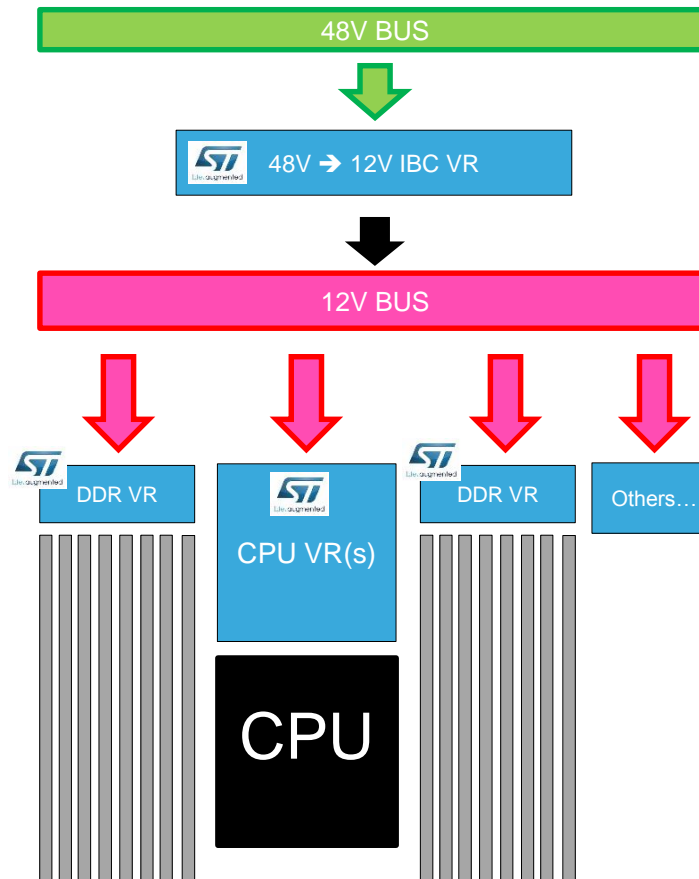
# High Performance Computing Power Distribution Architectures

4

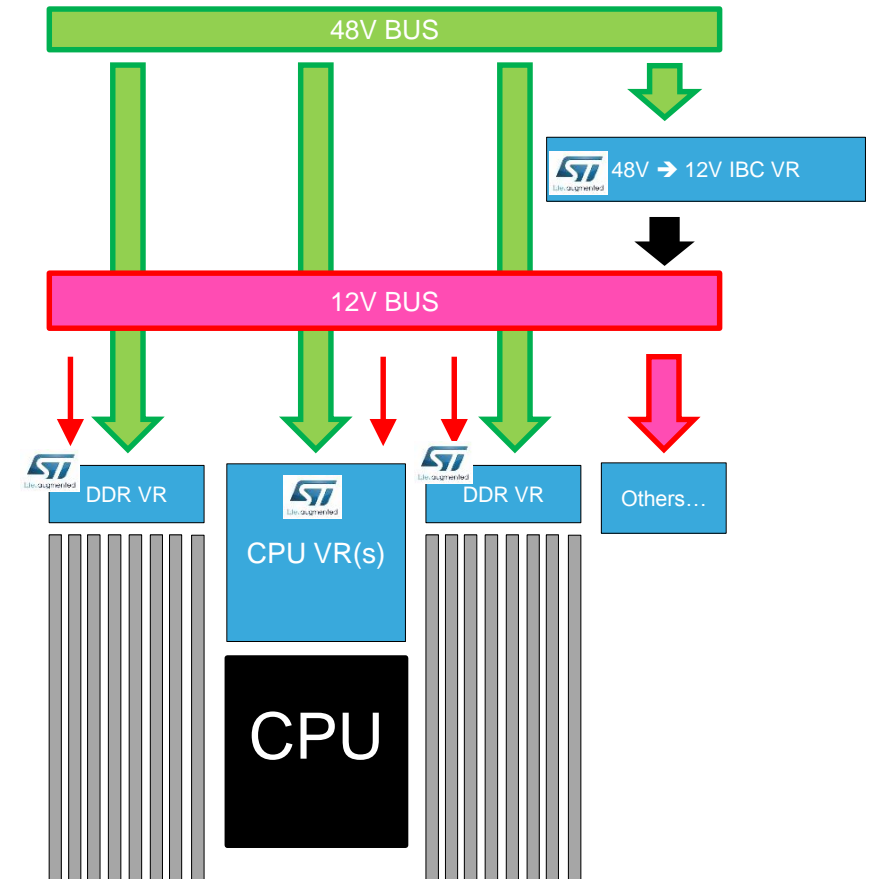
- **Traditional 12V Power Distribution**
- Widely used today
- Limited by max current on Copper bars and max power
- More than 2kW peak 12V Power Supply for 2CPU system
- Limits the future increase in Power requirements



- Easiest solution for 48V transition
- **Re-use of 12V input current converters**
- Still having high-current issues on 12V bus
- IBC regulator can be split to face max power limitations



- **Hybrid architecture**
- Efficiency optimized
- Removes high-current buses
- IBC regulator optimized and used only for low current rails

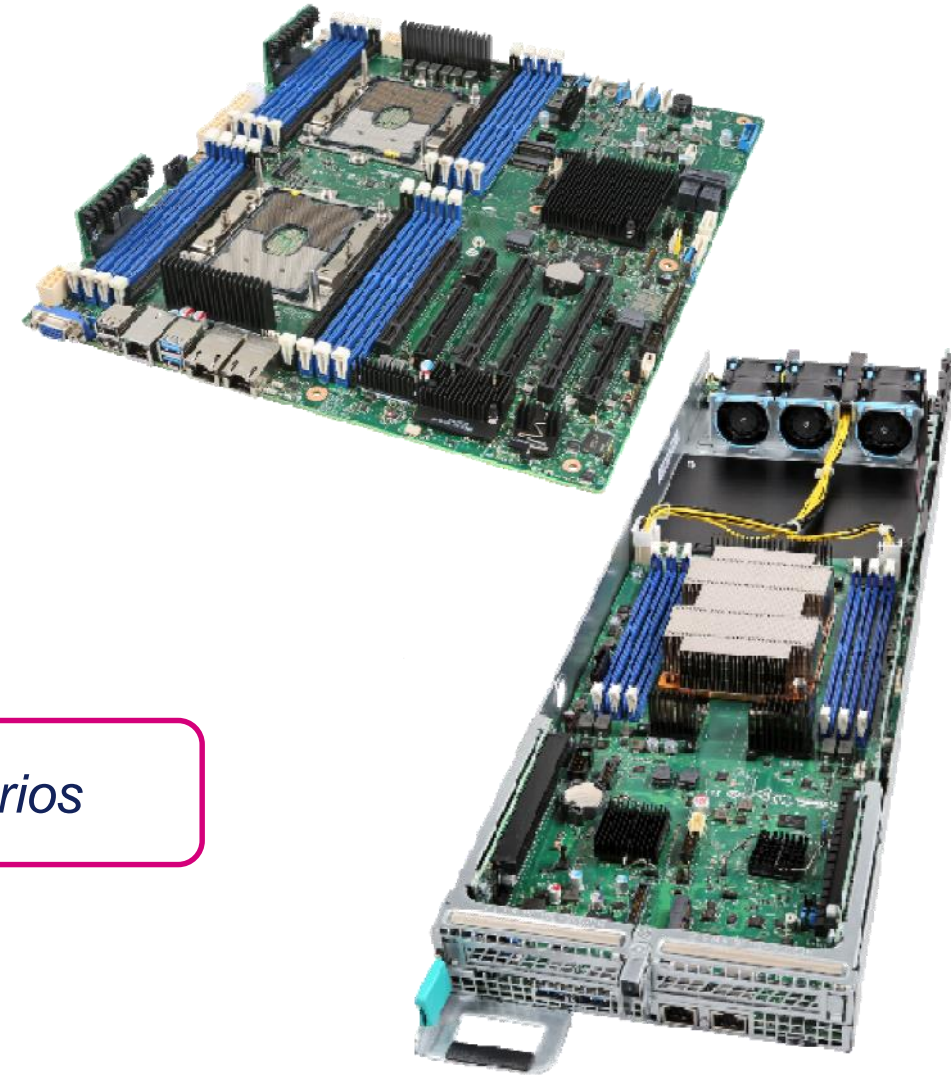


# ST Solutions for 48V Conversion

5

- Direct Conversion
  - (Non)-Isolated → Columbus Resonant (or non-resonant)
  - (Non)-Isolated → PSA Main + Satellites
- Dual Stage Conversion
  - Isolated → Columbus 54V/12V + 12V Multiphase
  - Non-Isolated → STC 4:1 (non regulated) + 12V Multiphase

*ST Columbus has evolved to cover all the possible scenarios*

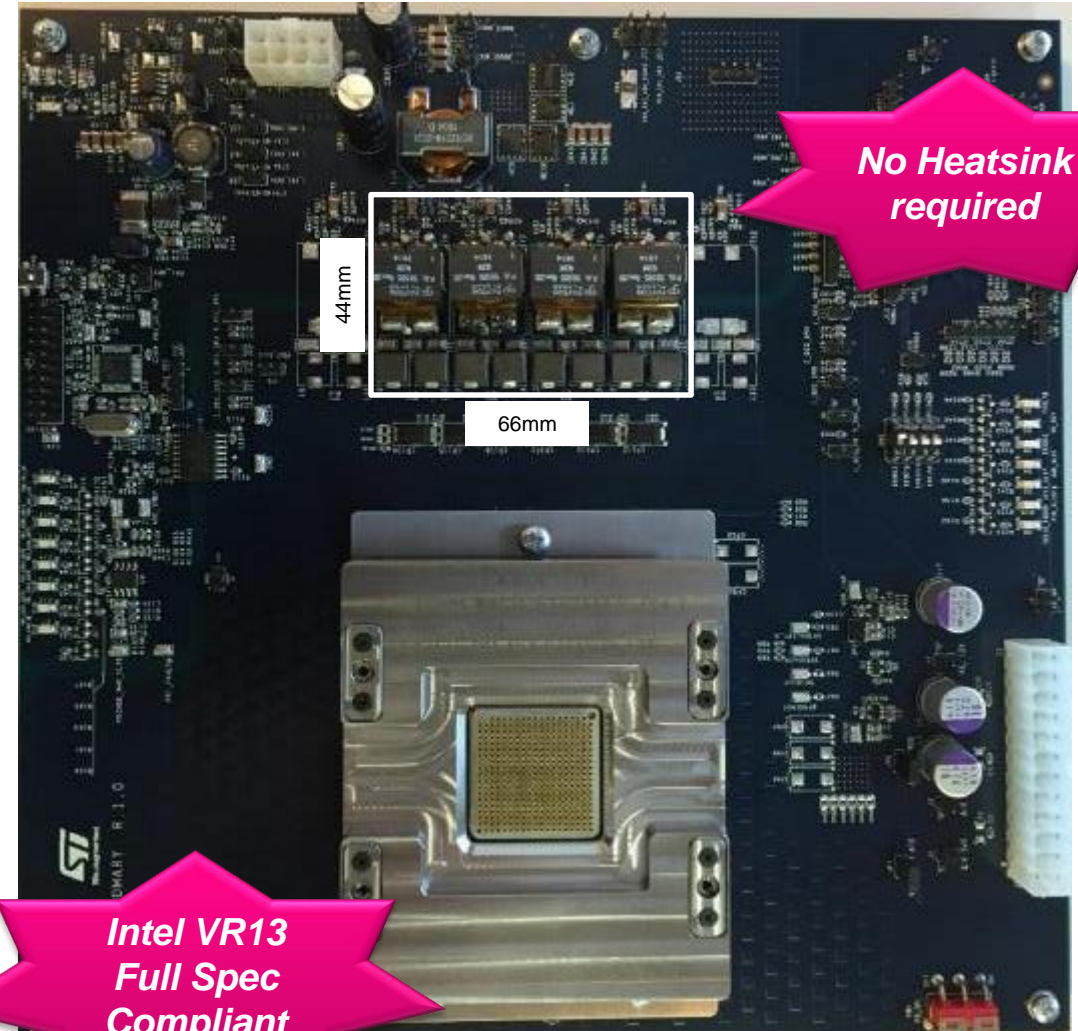




# 54V → CPU, VR13 – 205W TDC Resonant Columbus Reference Design

6

Specifications (Compliant to VR13 Skylake spec)	
$V_{IN}$	40V to 60V (54V <sub>TYP</sub> )
$V_{OUT}$	VR13 (1.8V <sub>TYP</sub> )
Load Line	VR13 (Intel spec)
$P_o$	205W
Max Output current (4 cells)	228A
Frequency of operation / cell	570KHz
Power density	92W/inch <sup>2</sup>
Solution size (Active area)	1.73" x 2.60" (Power cells)

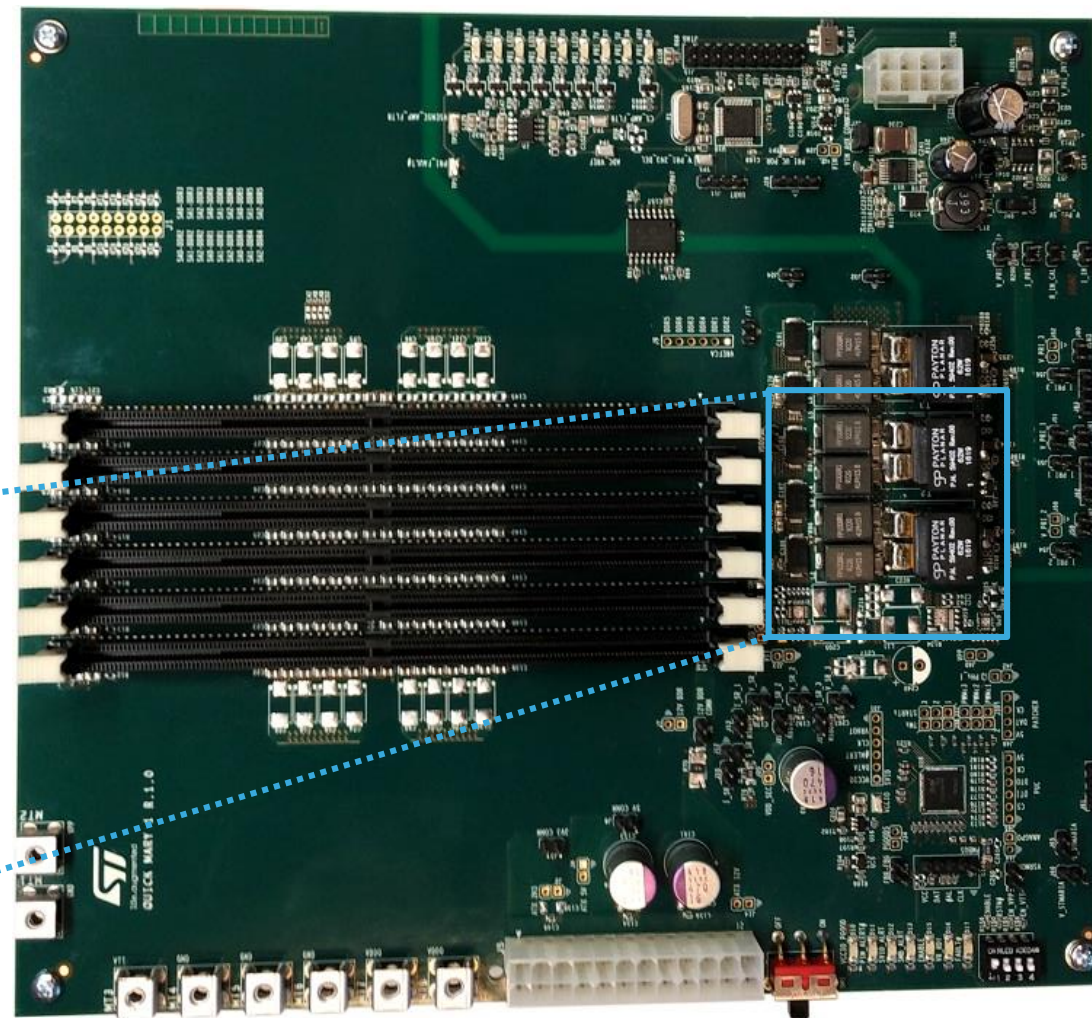
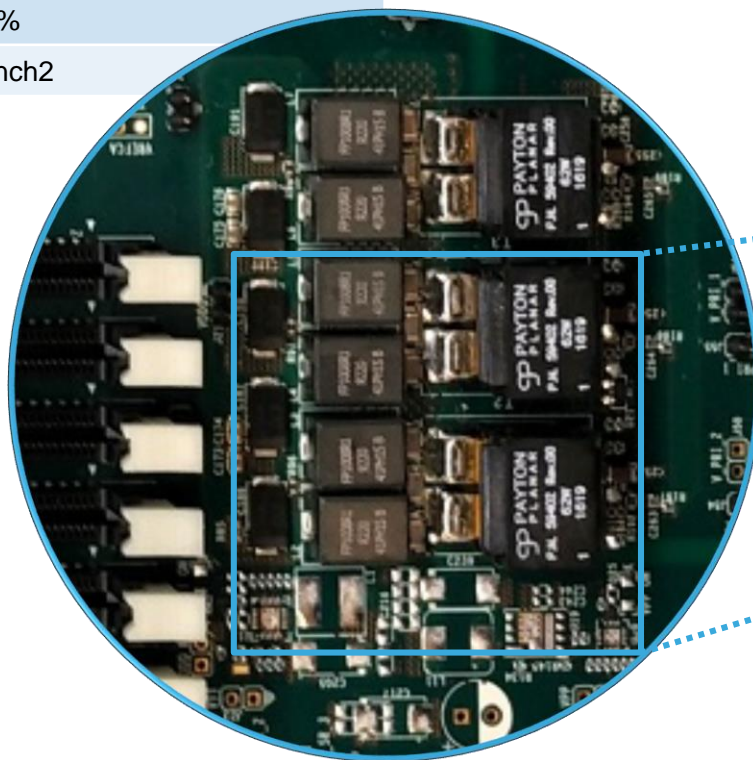


# 54V → DDR4, 120A – 150W Reference Design

7

## Specifications – 2 CELL d

$V_{IN}$	40V to 60V (54V <sub>TYP</sub> )
$V_{OUT}$	1.2V +/-1%
$P_o$	150W (@ $V_{IN}$ =40V)
Output current (2 cells)	125A (@ $V_{IN}$ =40V)
Frequency of operation	215KHz (@ $V_{IN}$ =54V)
Power density	71W/inch <sup>2</sup>
Load and Line regulation	<0.1%
Solution size (Active area)	2.1 inch <sup>2</sup>





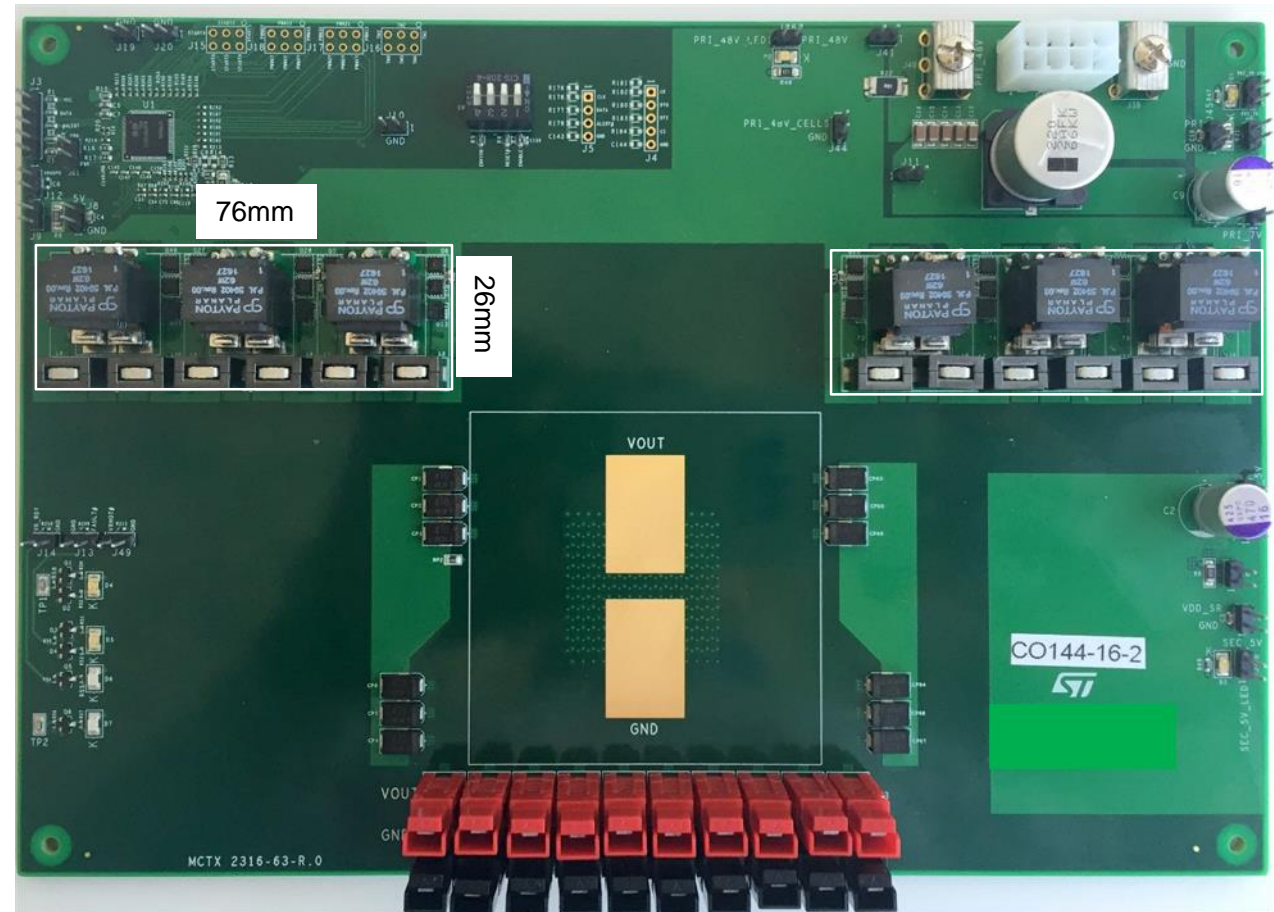
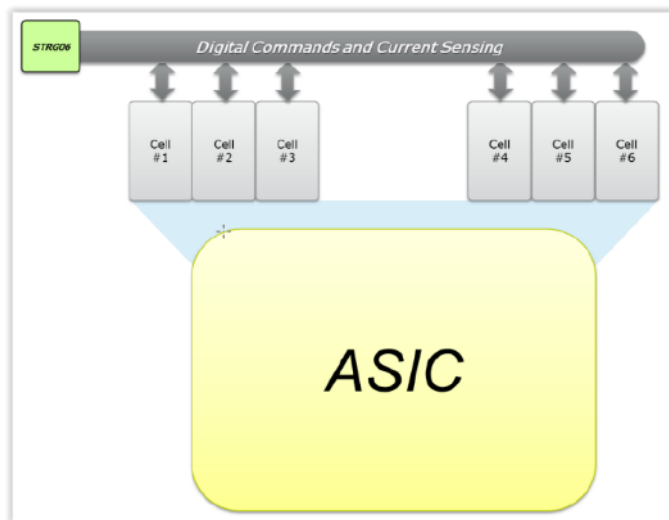




# 54V → 0.9V, 300A – 270W Reference Design

9

Specifications	
$V_{IN}$	40V to 60V (54V <sub>TYP</sub> )
$V_{OUT}$	0.900V
TDC Output current (power)	290A (260W)
Max Output current (power)	360A (325W)
Power density	53 W/inch <sup>2</sup>
Solution size (Active area)	6.12 inch <sup>2</sup>



# The Power Stamp Alliance

10

## **Purpose**

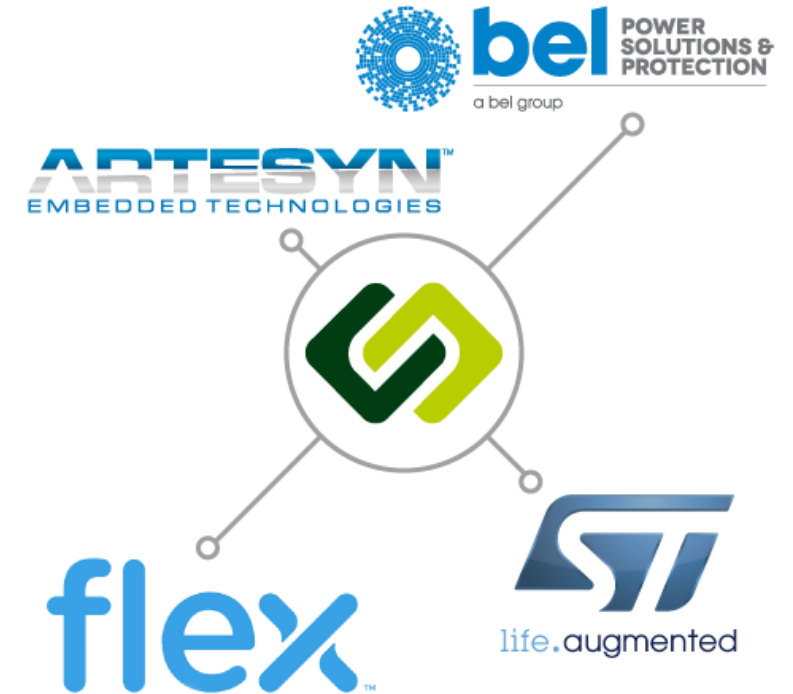
The purpose of the **Power Stamp Alliance** is to facilitate market competition by developing product standards based on STMicroelectronics ICs. In particular the first projects will be based on parallel resonant/non resonant multiphase converters with current doubler (AKA 48V direct conversion)

The **Power Stamp Alliance** will ensure customers multiple sourcing of on-board isolated and non-isolated DC-DC power converters.

The Power Stamp Alliance will share select information to assure the standard form factor and mechanical, feature set, and functional compatibility.

Maintaining cooperation among members in the development of product standards to assure practical levels of alternate source capability, without obligation for cooperation in the development of product topology, circuitry or performance, is a primary tenet of the Power Stamp Alliance. Therefore, parametric product performance variability and increased levels of competition are fully expected and welcomed.

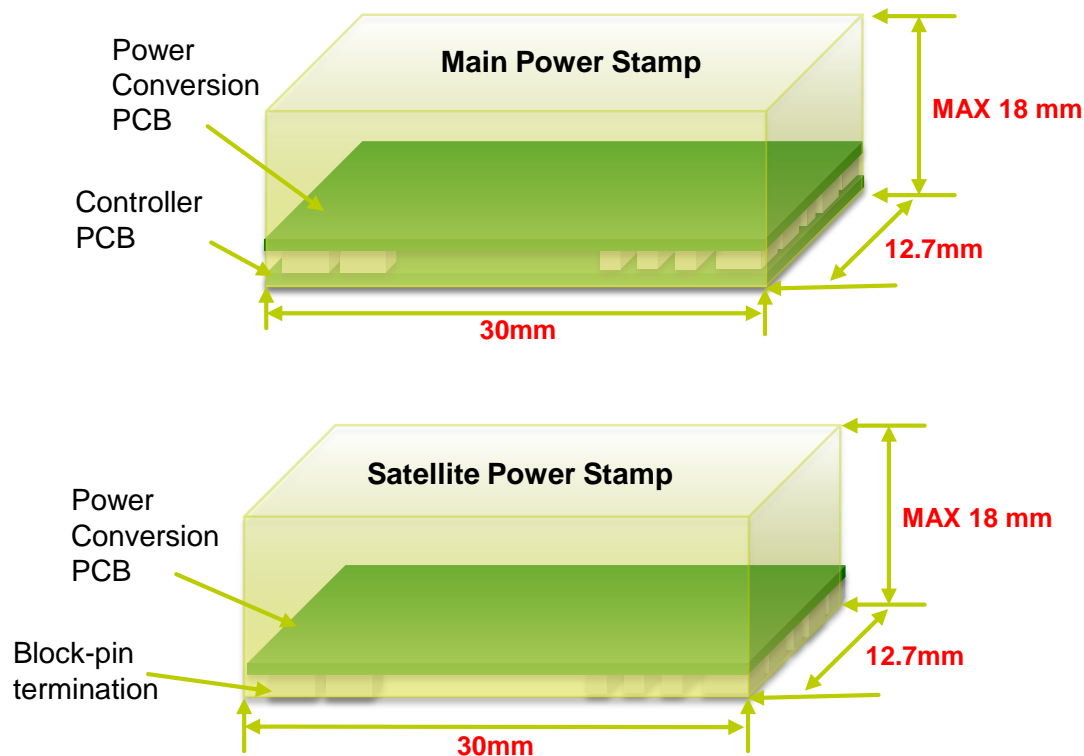
[www.powerstamp.org](http://www.powerstamp.org)



# PSA Value Proposition 11

**Power Stamp Alliance** Define a standard product footprint and functions that provide a multiple-sourced, standard modular board-mounted solution for power conversion for 48Vin to low-voltage, high-current applications.

- ▶ Multiple-sourced standard footprint units for CPU, DDR, ASIC, among others.
- ▶ All members have high-volume manufacturing capability with industry-standard processes and components.
- ▶ Energy Proportional, the operating units are automatically optimised to the load required for optimal efficiency.
- ▶ Provides ease of isolation
- ▶ Has been mechanically and electrically sized to meet the demands of server applications.
- ▶ PMBus AVS and SVID Compliant

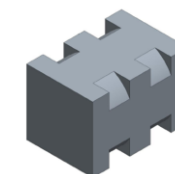
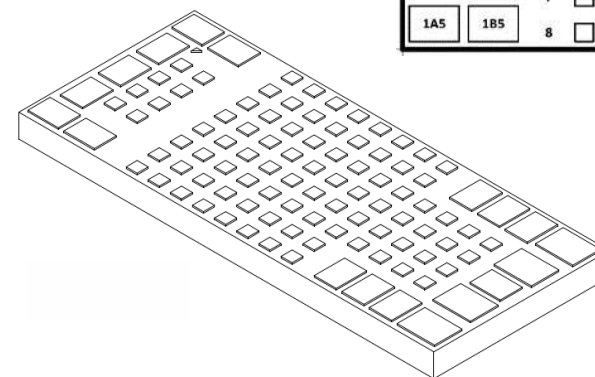
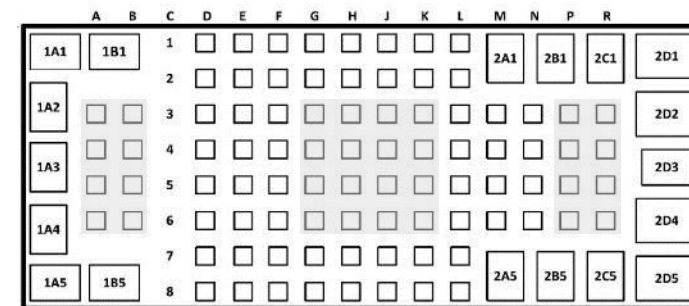




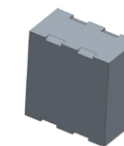
# Main and Satellite Power Stamps

12

- ▶ The **Main Stamp Footprint** contains all signals and functions for
  - ▶ Control interface for itself and all Satellite Power Stamps in the network
    - ▶ PMBus commands supported
    - ▶ AVS / SVID interface supported
    - ▶ Sense/enable functions supported
  - ▶ All drive signals required by up to 5 Satellite Power Stamps
  - ▶ Isolation supported natively



Power pin



Signal pin

- ▶ The **Satellite Stamp Footprint** contains all signals and functions
  - ▶ All drive and control signals provided by the Main Power Stamp
  - ▶ Current and temperature sense

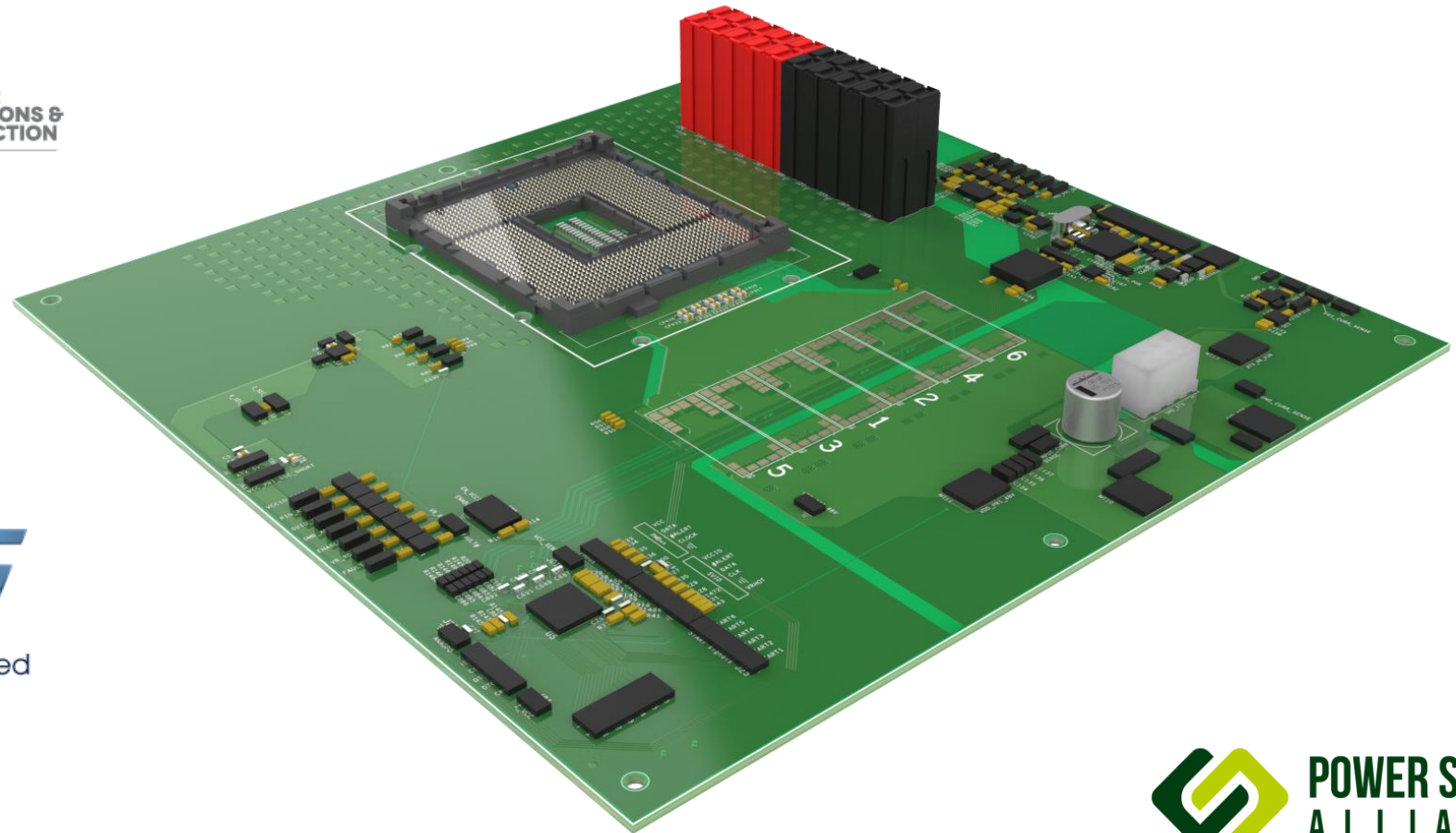


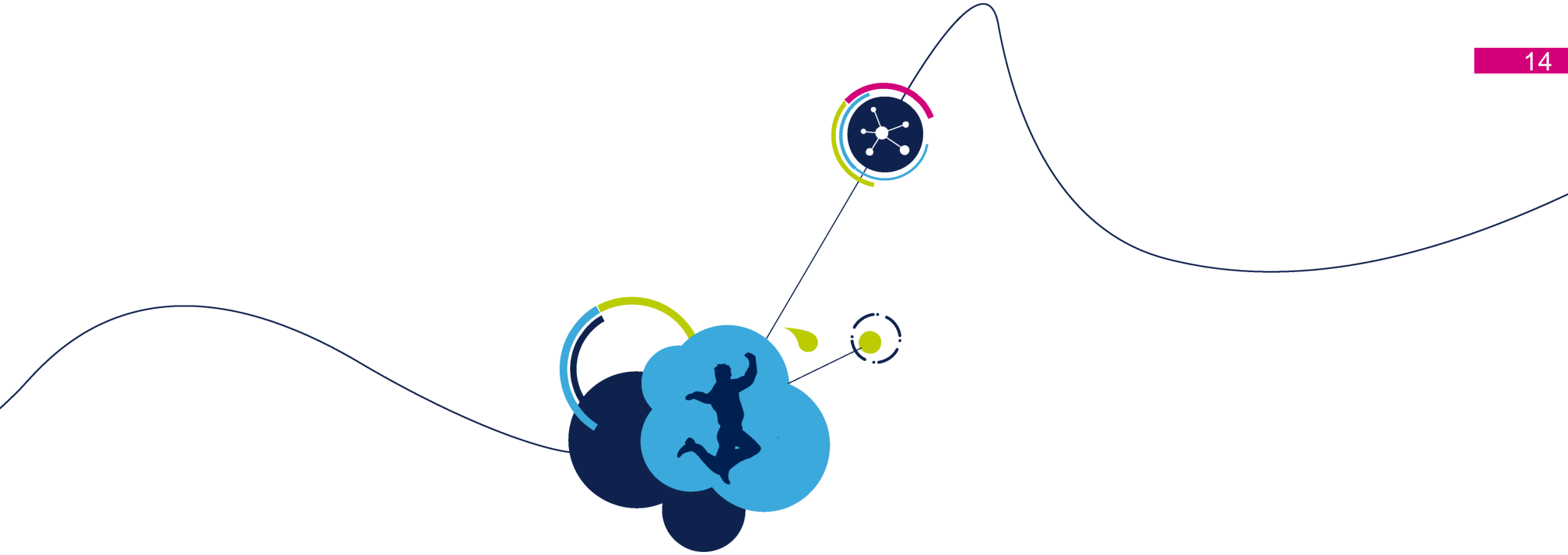
# ST Columbus based PSA solution

[www.powerstamp.org](http://www.powerstamp.org)

13

- 100A / cell in 12.9mm x 29mm x 18mm (WxLxH)





# Thank You