



# Techday

Taiwan | 2023

OUR TECHNOLOGY STARTS WITH YOU

**Sub-track II –  
Power & Energy Presentation**



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# 48 V power management solution for AI servers

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Technical Marketing

STMicroelectronics

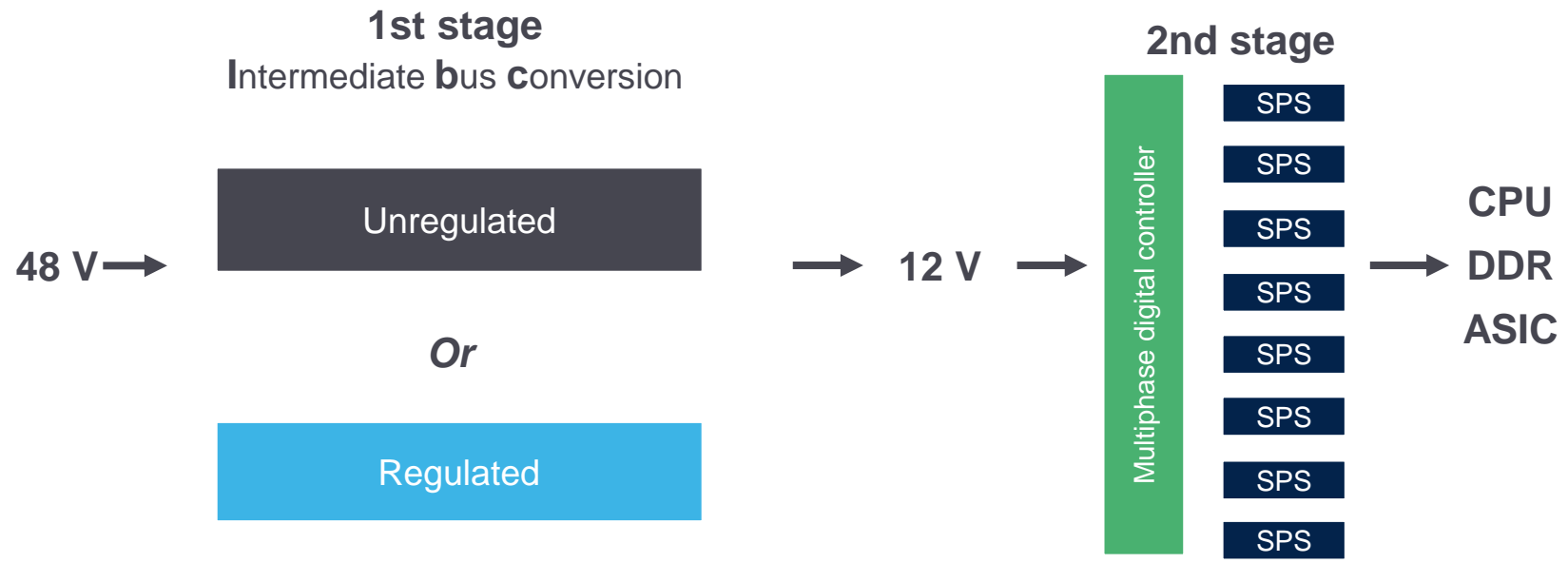
# Driving the evolution of power in server & communications infrastructure

## Complete solution for direct/dual-stage power delivery in 48 V systems

Powering datacenters with highest efficiency solution



Dual-stage conversion



Direct conversion



# Dual stage conversion intermediate bus: 48 V to 12 V

## 3 topologies available based on customer needs for server and telecom 12 V bus distributions

Unregulated

98.2 %  
Efficiency

### STC: switched tank converter

- Low profile solution (5 mm)
- High density 1 KW in 1/8 brick
- High efficiency

MP

STC digital controller  
**STNRG328A**  
VFQFPN32 5x5 mm

MP

Full bridge driver  
**STPRDC02**  
VFQFPN 4x4 mm

Regulated

98.4 %  
Efficiency

### STB: stacked buck converter

- Scalable solution
- High power capability above 3 kW
- **ST patent**

MP

STB digital controller  
**PM6764**  
VFQFPN28 4x4 mm

MP

Full bridge driver  
**STPRDC02**  
VFQFPN 4x4 mm

Unregulated

98.5%  
Efficiency

### HSTC: hybrid switched tank converter

- Flexible conversion ratio
- High power and high-density solution
- Minimized BOM count for any ratio
- **ST patent**

MP

HSTC digital controller  
**PM6780**  
VFQFPN 5x5 mm

MP

Full bridge driver  
**STPRDC02A**  
VFQFPN 4x4 mm

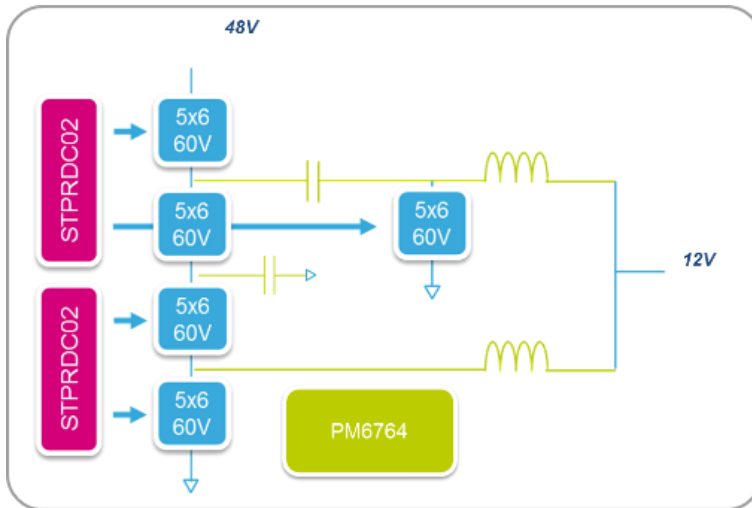
98.3%  
Efficiency

# STB-UCL 1 kW

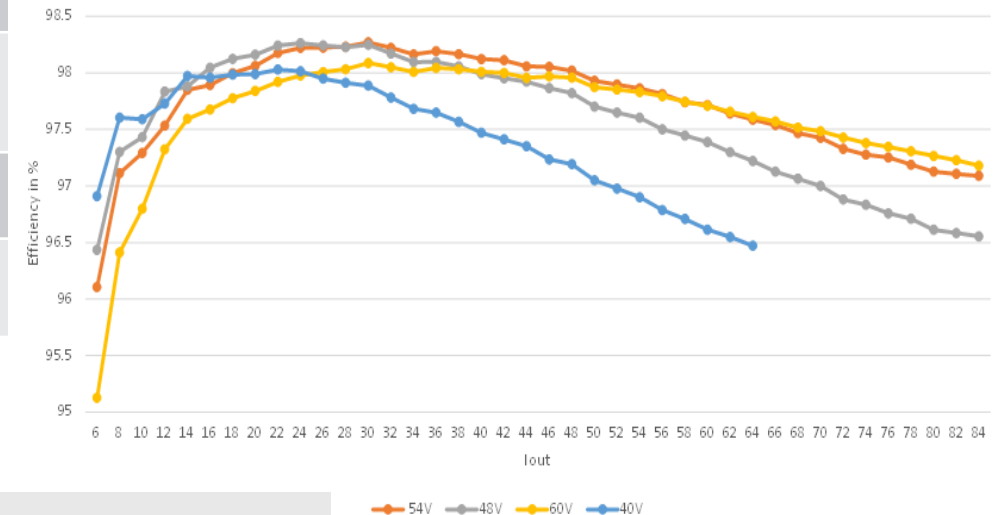
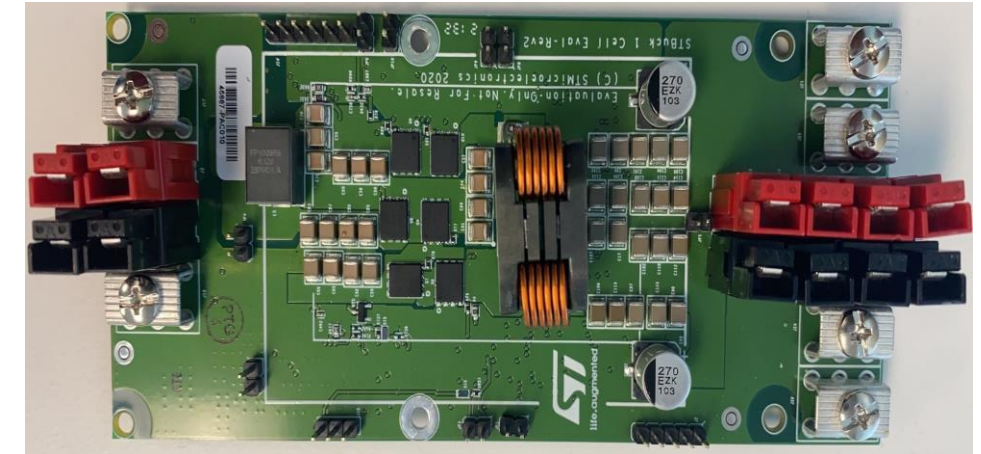
58 x 37 x 14 mm

## Main features

- Regulated output, nonisolated
- Server and telecom 12 V bus distribution
- Input voltage: **38–60 V**
- Output voltage: **12 V** regulated (adjustable by PMBus)
- Thermal design power (TDP): **1000 W**
- Coupled inductor for higher density and efficiency
- Digital controller **PM6779/PM6780**, STPRDC02/A drivers
- Total area: 58x37 mm (quarter brick)

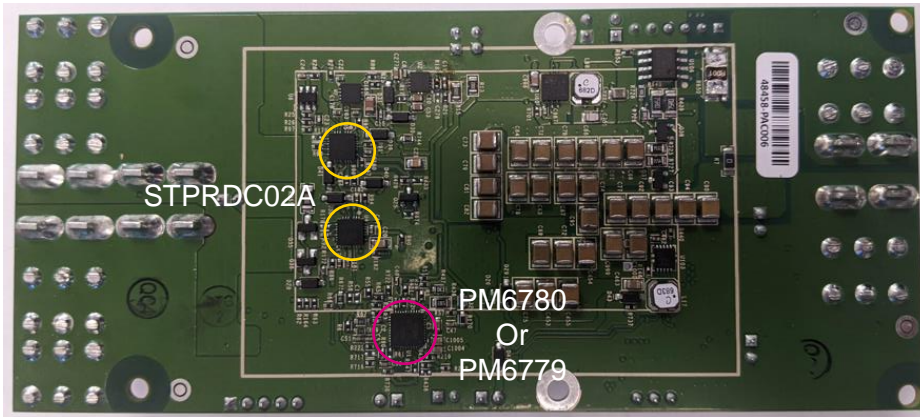
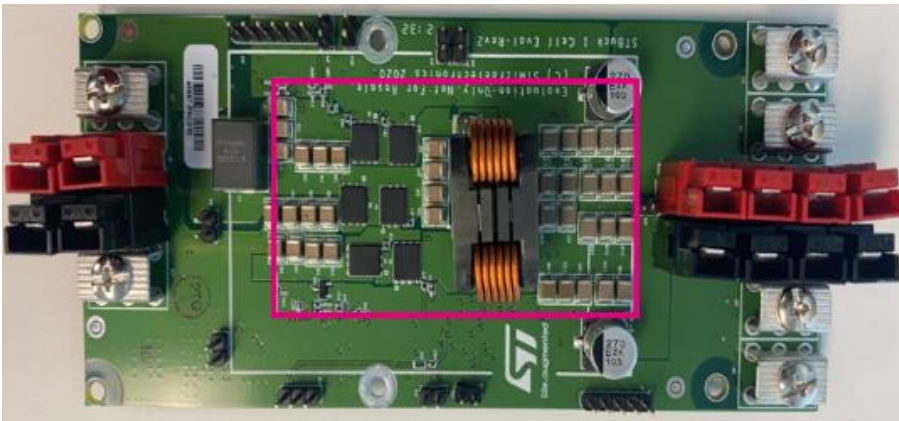


STB-UCL-1kW	
ST PN used	Controller: PM6779/80 Driver: STPRDC02A
TDP (W) (*)	1000
Peak power (W)	1100
Input voltage (V)	38–60
Output voltage (V)	12 V
Regulated or nonregulated	Regulated
Efficiency at 54 V (20%-60%-100%) (**)	98.0%-98.1%-97.3
Peak efficiency (%) At Vin=54 V	98.3
PCB size (X, Y, Z) mm	58 x 37 x 15
Normalized BOM cost	0.6



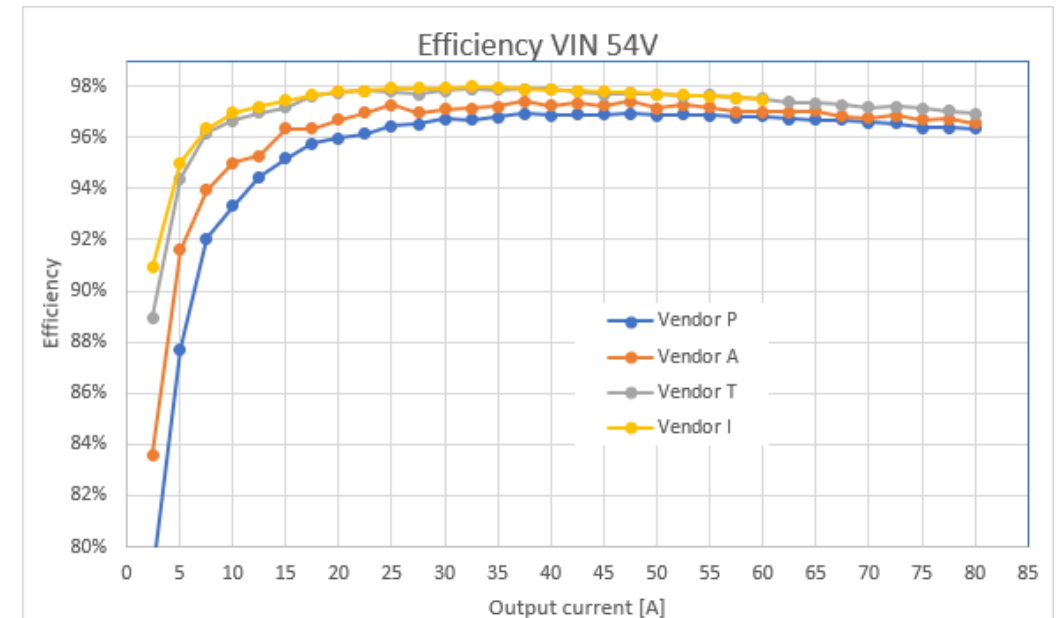
Whitepaper available—board available

# STB-UCL status



- **STB-UCL on-board solution is stable and validated:**
  - Topology already in production since 2Y in one customer
  - Solution in qualification at >10 customers, completed at 2 customers
  - Extensive bench validation (EBV) completed successfully
  - Chamber tests 3 batches (8 boards each) completed successfully

- 2 inductors qualified:
  - Vendor I: max. 14.3 mm height
  - Vendor T: max. 14 mm height
- Keep working with 2 more inductors vendors:
  - Vendor A: max. 16 mm height
  - Vendor P: max. 14 mm height
- 2 MOSFET vendors qualified

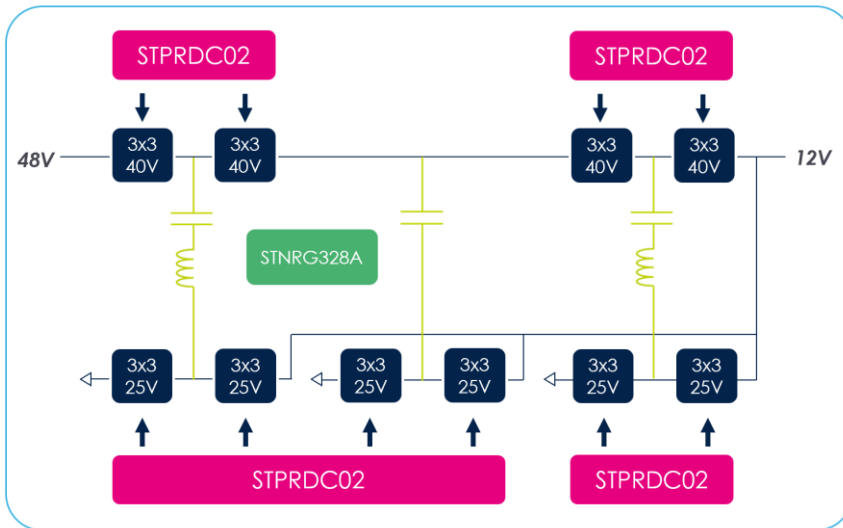


98.5%  
Efficiency

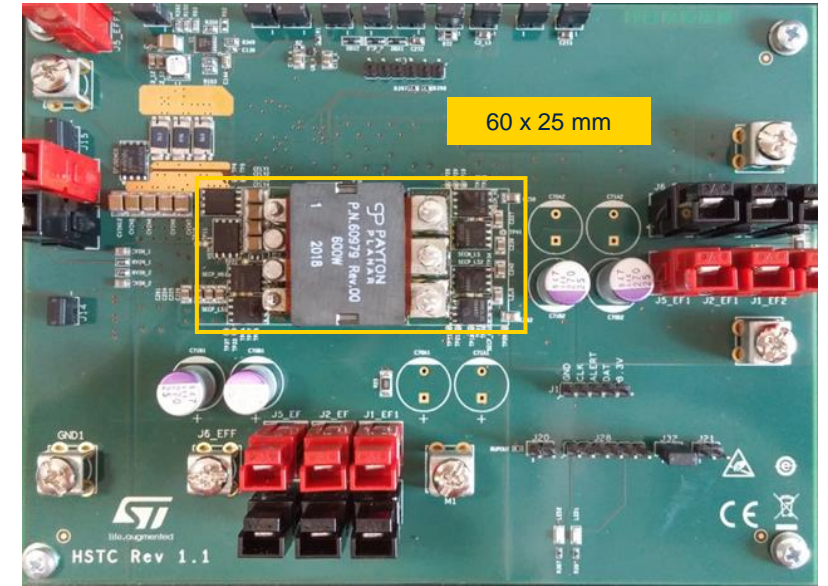
# HSTC 750

## Main features

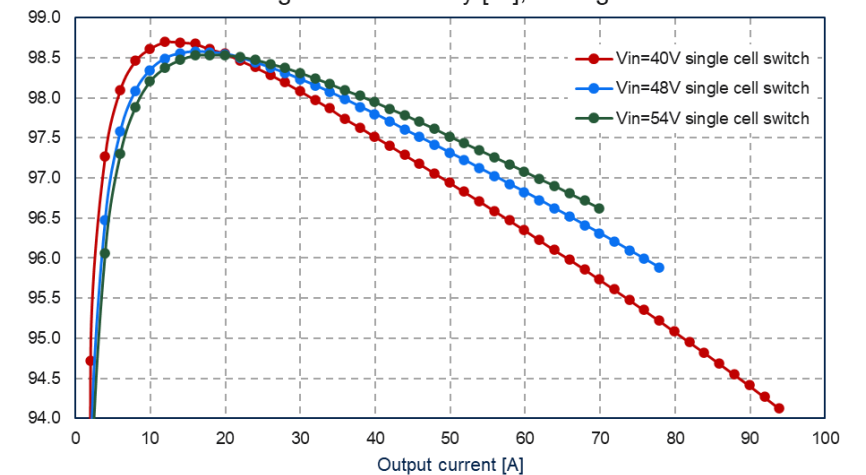
- Fixed conversion ratio
- Nonregulated output (4:1), nonisolated
- High-efficiency and low profile (5 mm)
- Input voltage: **40–60 V**
- Thermal design power (TDP): **1000 W (1200 W peak)**
- Digital controller STNRG328, STPRDC02/A drivers
- Total area: 65 x 55 mm (or 65 x 25 if dual-side PCB)



HSTC 750	
ST PN used	Controller: PM6779/80 Driver: STPRDC02A
TDP (W) (*)	750
Peak power (W)	900
Input voltage (V)	38-60
Output voltage (V)	5:1
Regulated or nonregulated	Non-Regulated
Efficiency at 54 V (20%-60%-100%) (**)	98.4%-98%-96.6%
Peak efficiency (%) At Vin=54 V	98.5
PCB size (X, Y, Z) mm	60x25x12.5
Normalized BOM cost	0.6



HSTC single cell efficiency [%], driving included

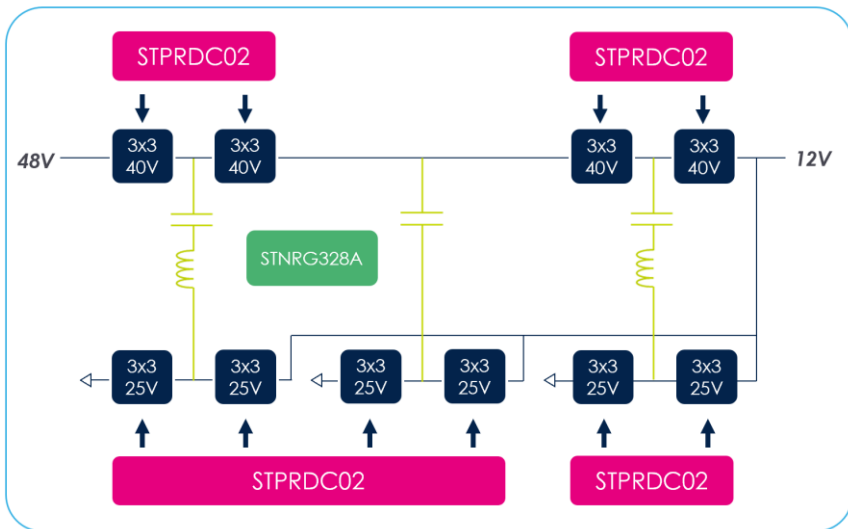


98.3%  
Efficiency

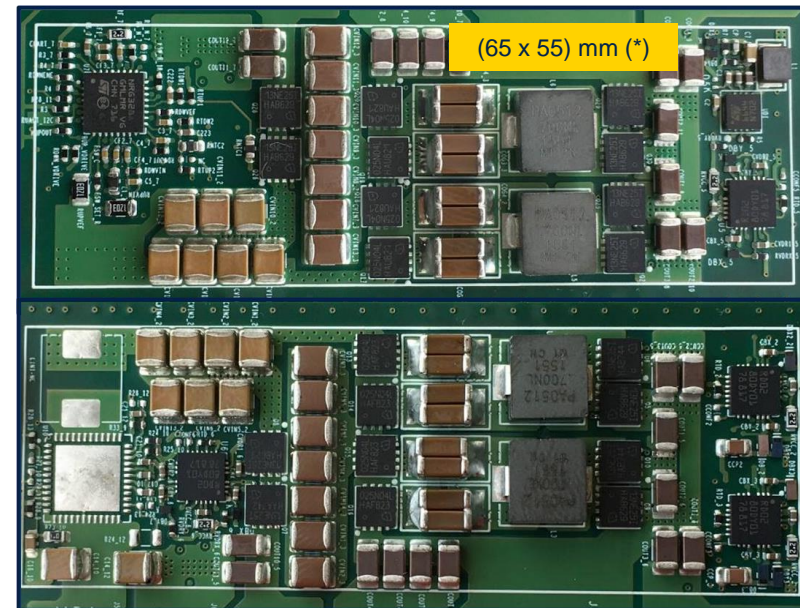
# STC U2J 1KW

## Main features

- Fixed conversion ratio
- Nonregulated output (4:1), nonisolated
- High-efficiency and low profile (5 mm)
- Input voltage: **40V-60V**
- Thermal design power (TDP): **1000 W (1200 W peak)**
- Digital controller STNRG328, STPRDC02/A drivers
- Total area: 65x55 mm (or 65x25 if dual side PCB)



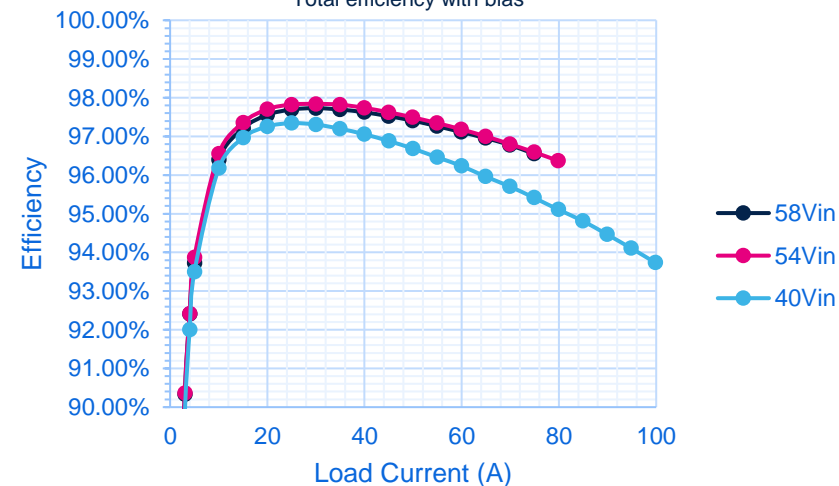
STC U2J 1KW	
ST PN used	Controller: STNRG328 Driver: STPRDC02
TDP (W) (*)	1000
Peak power (W)	1200
Input voltage (V)	40-60
Output voltage (V)	4:1
Regulated or nonregulated	Non-Regulated
Efficiency at 54 V (20%-60%-100%) (**)	97.35%-97.6-96.4%
Peak efficiency (%) At Vin=54 V	97.9
PCB size (X, Y, Z) mm	65x55x6
Normalized BOM cost	1.2



(\*) PCB area equivalent moving from "double side" to "single side" component mounting

## STC 1kW 1/8 Brick Efficiency

Total efficiency with bias

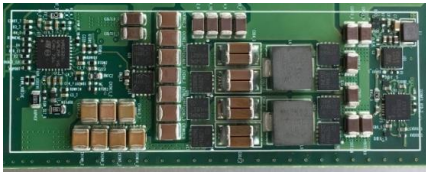


# 54 V solutions: BOM cost roadmap

BOM cost (\$)

## Unregulated solution

STC 600 W U2J



STC 600 W X7R



HSTC 700 W



## Regulated solution

ST is committed to reducing total BOM cost  
And increasing the overall system performance

STB 850 W

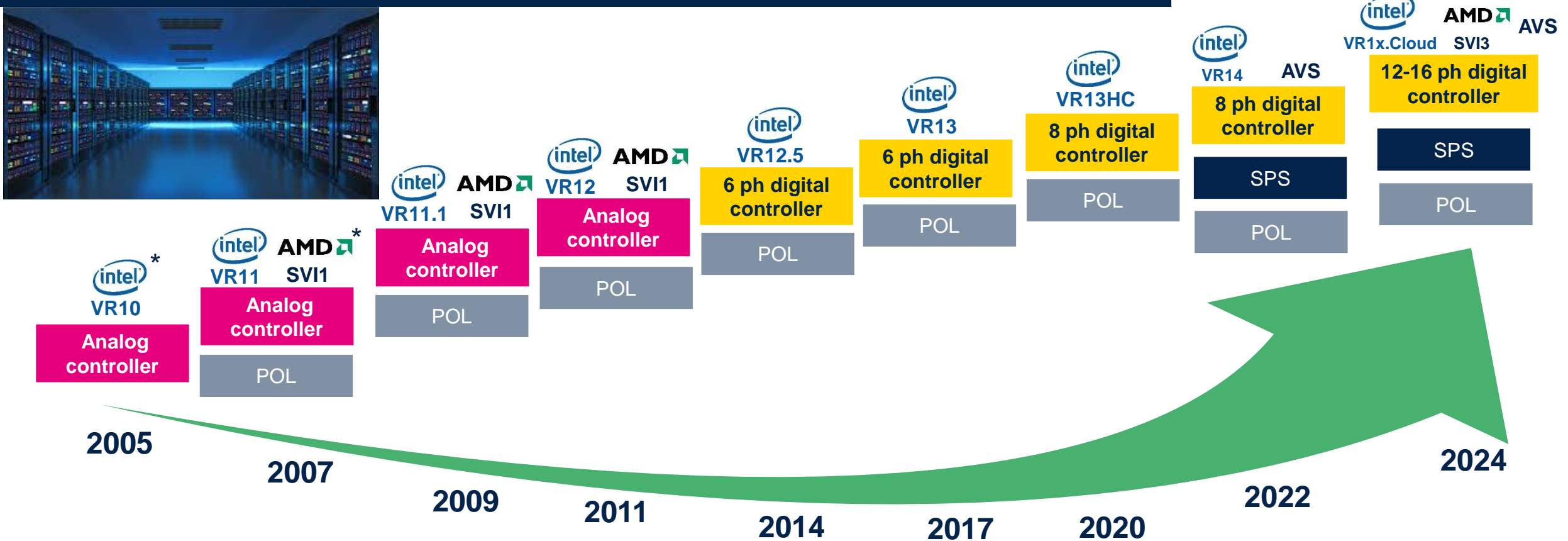


STB-UCL 850 W



# Dual stage conversion second stage: 12 V to CPU/DDR/ASIC

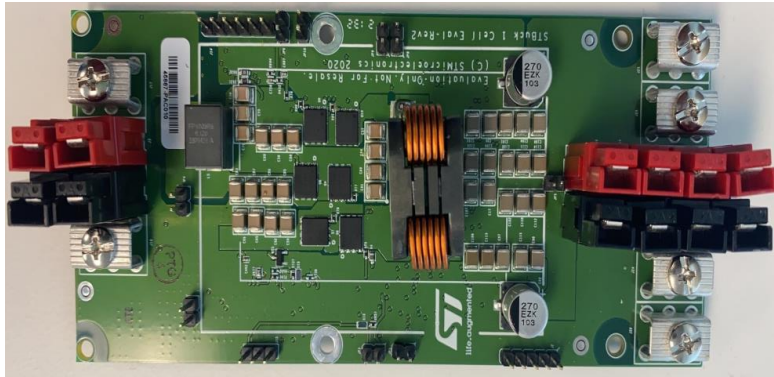
Major experience in 12 V solutions for INTEL/AMD CPU/DDR and SoC



# Total solution VR14 complaint

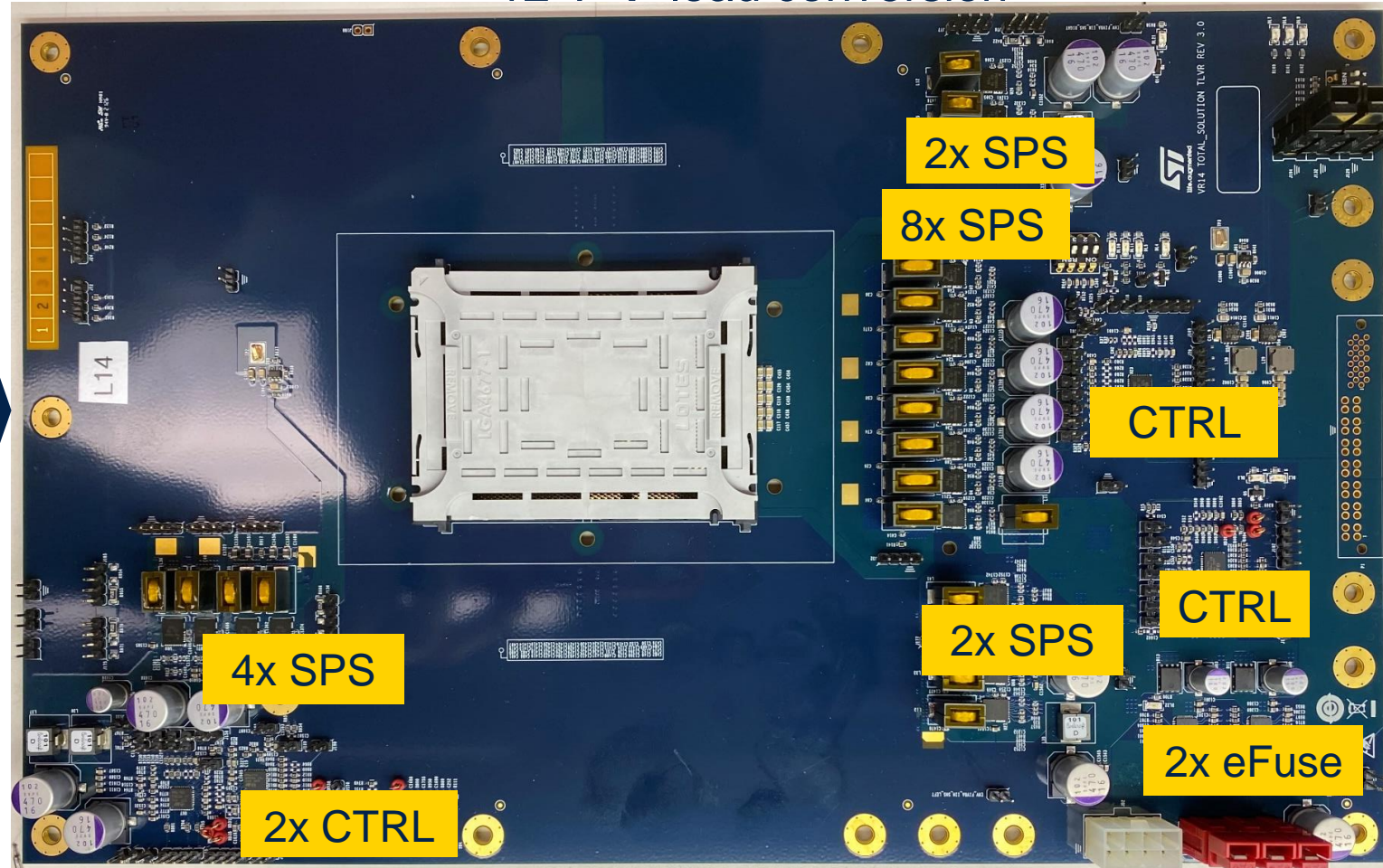
Example of 48 V → 12 V → load ST Total solution

48 V → 12 V conversion



ST components on bottom side:  
controller, driver, MOSFET;  
eFuse coming

12 V → load conversion



ST components: Controller, SPS, eFuse

# Our technology starts with You



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