

Data Center and Cloud Computing Power Delivery



Challenges &
Opportunities



Discover ST
solutions in details

Energy efficiency

The challenges

Optimize the Power Usage Effectiveness (PUE)

Build power delivery systems minimizing energy consumption

ST solutions

Advanced telemetry for PUE optimization

Providing power delivery topologies with the highest efficiency



Data management

The challenges

Massive volume of data to manage

Security for cyber threats and breaches

ST solutions

Data storage leadership in HDD. Expanding presence in SSD

Secure PMBus implemented in CPU within the voltage regulation system



Scalability

The challenges

Scalable system and specialized hardware

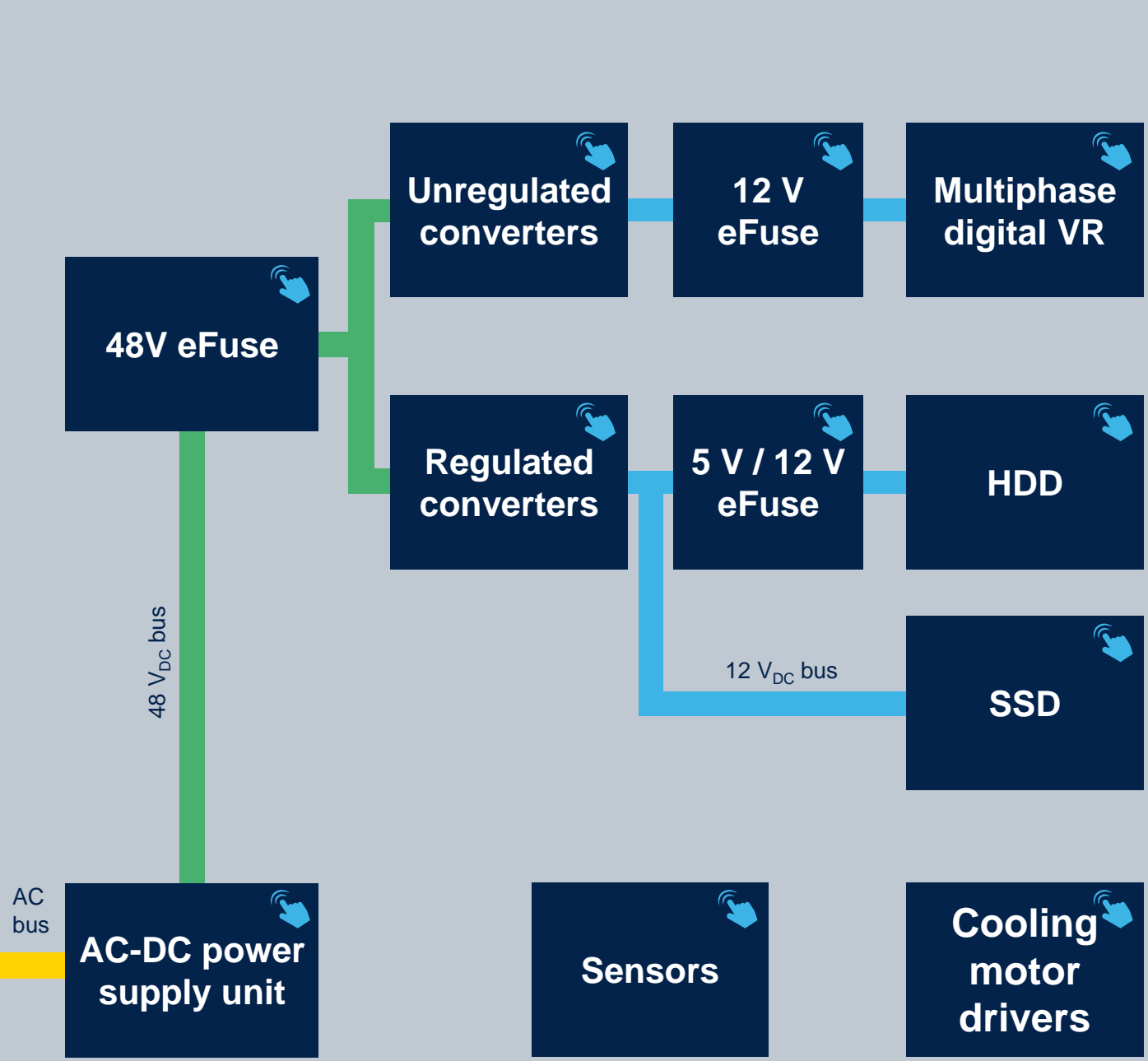
Cost management

ST solutions

Broad portfolio of power delivery solutions enabling optimal system with enhanced scalability

Complete coverage from AC to point of load (POL), allowing BOM optimization

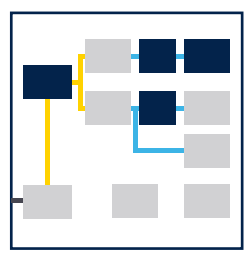




Click to discover
ST solutions
for data center and
cloud computing



Digital multiphase VR and eFuse



eFuse



- 12 V / 60 A, 48 V / 28 A integrated solution
- Integrated CS resistor
- Parallel operations



Digital multiphase controllers

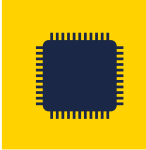
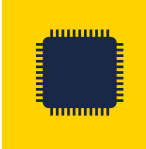
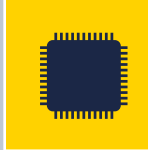
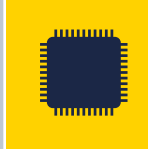
- 12 / 16 phase controllers
- Support Intel, AMD and ARM
- Fully configurable via SW
- Fastest loop for load transient
- Best control loop for TLVR
- Seamless T_{ON} overlapping


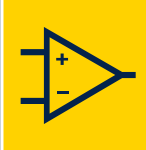
Smart power Stages (SPS)

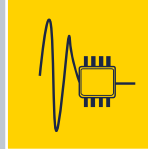
- 50 A, 60 A, 80 A SPS
- Common footprint

eFuse	
	12V and 48V high-current eFuse
	5V and 12V low-current eFuse

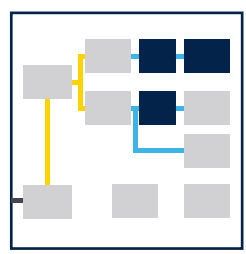
Power transistors	
	LV MOSFET
	Diodes

CPU VRs	
	12 phase digital controller
	8 phase digital controller
	16 phase digital controllers
	50A, 60A, 80A Smart Power Stages (SPS)

Signal conditioning	
	Operational amplifiers
	Comparators

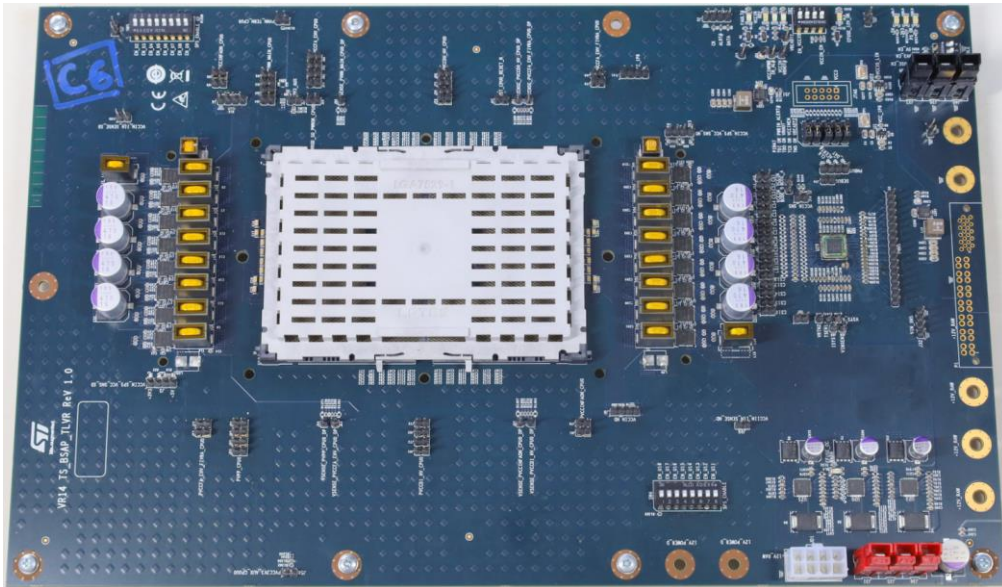
LDOs	
	Broad portfolio of LDOs





Digital multiphase VR and eFuse

Our reference design



12 V / 60 A integrated eFuse

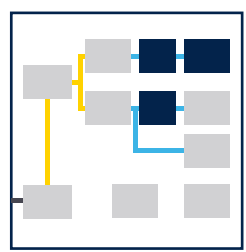
- Integrated CS resistor
- Parallel operations

12 and 16 phase multiphase digital controller supporting Intel, AMD and AVS for ARM

- Fully configurable via SW
- Best control loop for TLVR

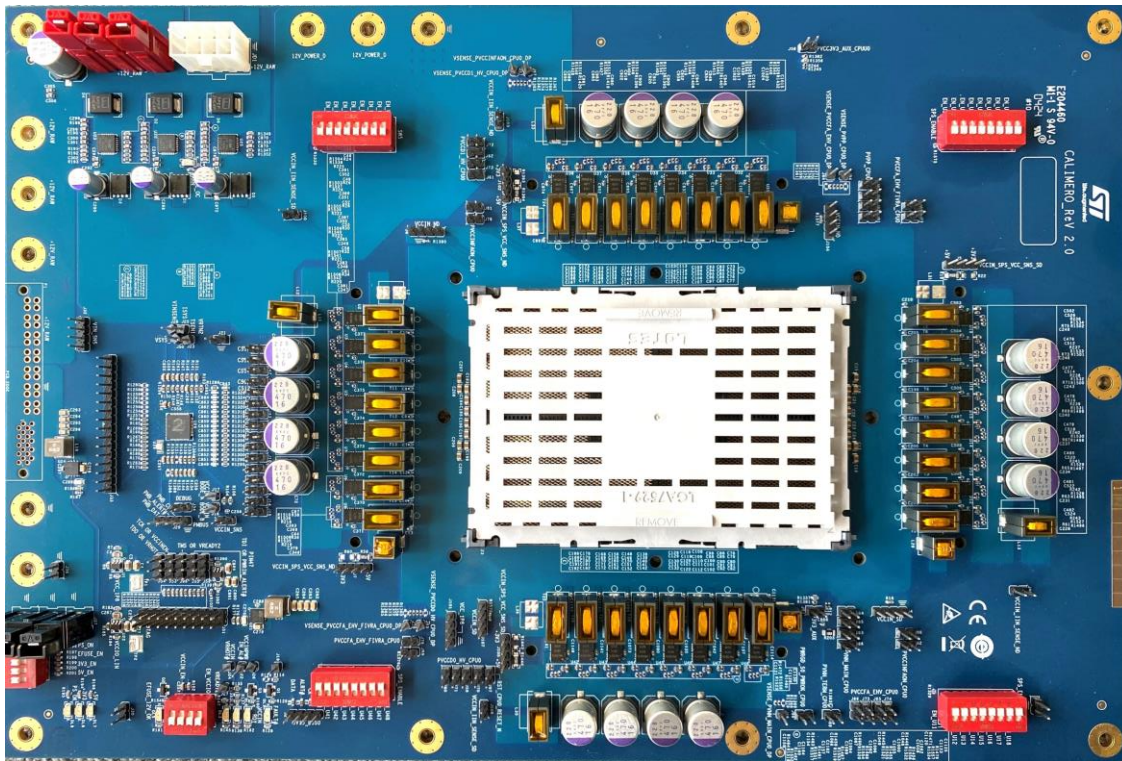
50 A, 60 A, 80 A SPS with common footprint

- QFN 4x6, 5x6, 4x5 packages



Digital multiphase 32 phase VR and eFuse

32 phase reference design



16 phase multiphase digital controller expanded to 32 phase VR for AI/ML high current

- Fully configurable via SW
- Best control loop for TLVR

80A SPS with common footprint

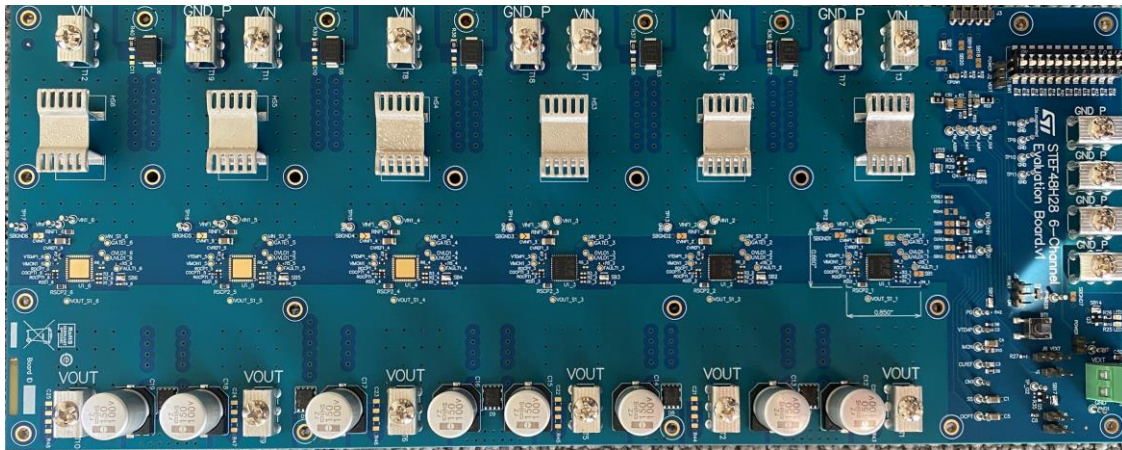
- QFN 4x6 packages

12V/60 A integrated eFuse

- Integrated CS resistor
- Parallel operations

48 V eFuse

Our reference design



Up to 6 paralleled eFuse

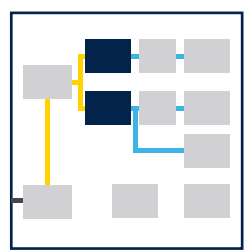
48 V eFuse with 28 A current capability

Integrated solution (MOSFET + Controller)

Integrated CS resistor

Parallel operations





Regulated and unregulated converters

Regulated:

STB-CL (Stacked Buck with Coupled Inductors)

- High power density
- 1 kW TDP reference design
- 4 kW Interleaved topology

Unregulated:

STC (Switched Tank Converter)

- High density low profile
- 1 kW TDP reference design
- X7R capacitor with ZCD

HSTC (Hybrid STC) 5:1, 10:1

- High density, 750 W TDP
- Flexible ratio, minimum BOM

Digital controllers



8 phase digital controller



SMED controllers

Power transistors



LV MOSFET



Diodes

Smart drivers

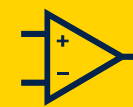


Dual half bridge driver with ZCD

Signal conditioning



Operational amplifiers



Comparators



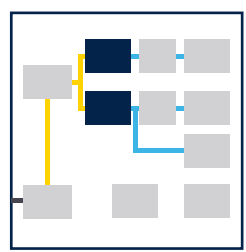
Digital I/V/T monitoring AFE

Switching regulators



Monolithic regulators





Regulated and unregulated converters

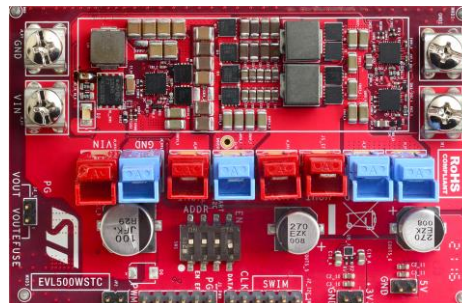
Our reference designs



STB-CL



HSTC



STC

Regulated

Stacked buck with coupled inductors (STB-CL)

- High density, 1kW TDP
- 4 kW Interleaved topology

Unregulated

Switch Tank Converter (STC)

- High density, low profile
- 1 kW TDP reference design
- X7R capacitor with ZCD

Hybrid STC (HSTC) 5:1, 10:1

- High density, 750 W TDP
- Flexible ratio, minimum BOM

HDD and SSD

Power combo market leader


Preamp ramp up

PMIC solutions for enterprise and consumer SSD

Monolithic **DC-DC** regulators

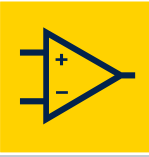
Single and dual **eFuse**

Power combo



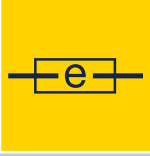
Power combo

Preamp

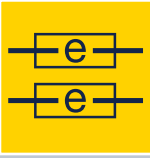


10 channel preamp (MAMR, HAMR)

eFuse



5 V and 12 V single eFuse



5 V and 12 V dual eFuse

PMIC



Monolithic regulators



HDD and SSD

Our reference design

Power Combo



Power Combo market leader

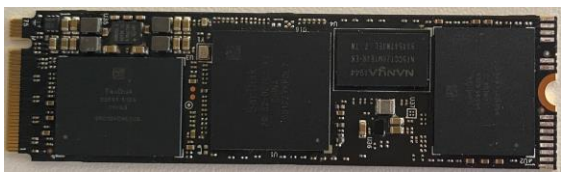
Preamplifier ramp up

PMIC solutions for enterprise and consumer SSD

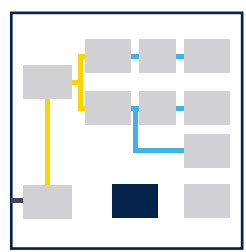
Monolithic **DC-DC** regulators

Single and dual **eFuse**

PMICs





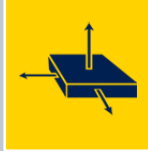
Sensors



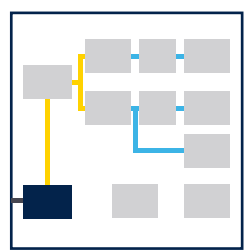
Complete sensor offering:

- Accurate temperature
- Air pressure
- Motion sensors for anti tampering

Environmental	
	Temperature sensors
	Pressure sensors

Motion	
	Motion MEMS



AC-DC PSU




PSU complete solution:

- High efficiency AC-DC
- Full power management features with PMBus
- High power density
- Redundant operation

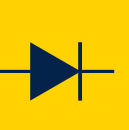
Power transistors

	Low power and high power MOSFET 60V/1500V/1700 V
	SiC MOSFET 1200V/1500V

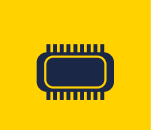
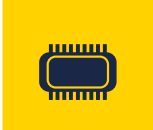
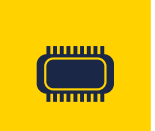
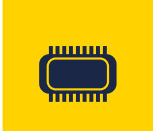
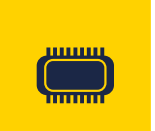
Signal conditioning

	Operational amplifiers and comparators
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Diodes

	Ultrafast, Schottky and FER diodes
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Controllers

PWM		Multimode controller		Quasi resonant controller
Voltage & current		Adjustable voltage reference		CC/CV controller
Sync rect.		Synch rectification controller		




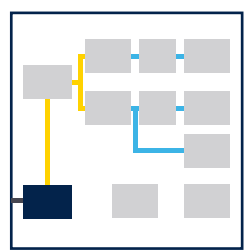
Ref. design

Protections

	TVS protections 400W/ 600W/1500 W
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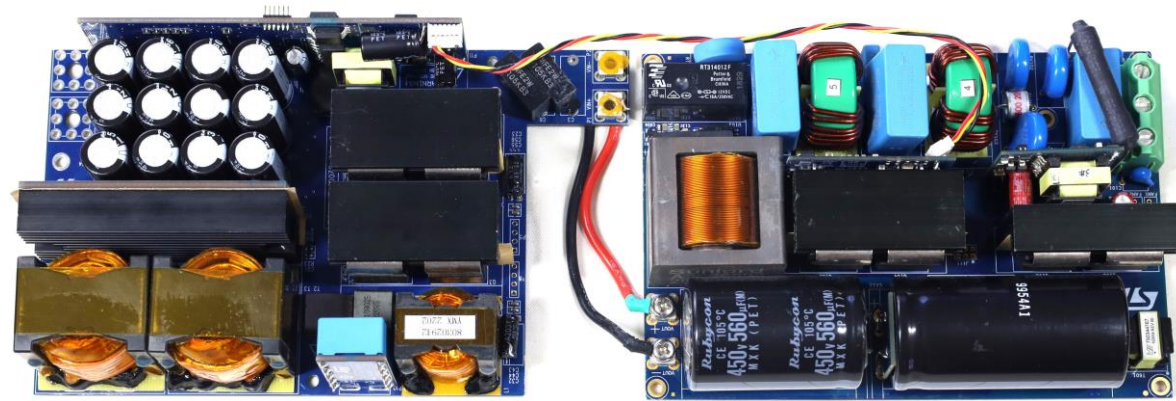
LDOs

	Broad portfolio of LDOs
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AC-DC PSU

Our reference design



AC-DC LLC

PFC Totem Pole

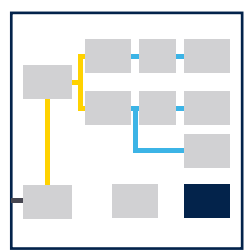
3 kW high efficiency AC-DC

Full power management features with PMBus

High power density

Redundant operation

Motor control for liquid cooling systems



High **system integration** for board space saving

Fully protected for safety and robustness

High flexibility with embedded STM32

High power density in monolithic motor drivers

Easy design tools, full system application expertise

Power transistors



LV MOSFET
100V



HV MOSFET
600V



HV IGBT
600V

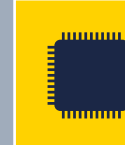
Isolation I/F and ADC



STISO620/1, ISOSD61
isolated digital interface &
Delta-Sigma ADC

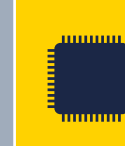
STSPIN motor drivers

High
Voltage
SiP

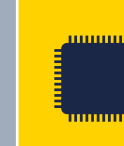


STSPIN32F0601/2
600V, 3-phase BLDC
drivers + STM32F0

Low
Voltage
SiP

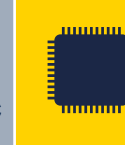


STSPIN32F0
45V, 3-phase BLDC
drivers + STM32F0



STSPIN32G0
45V, 3-phase BLDC
drivers + STM32G0

Low
Voltage
Monolithic



STSPIN948
58V, 4.5 A dual or
single full-bridge

Current sensing



Digital I/V/T
Monitoring AFE

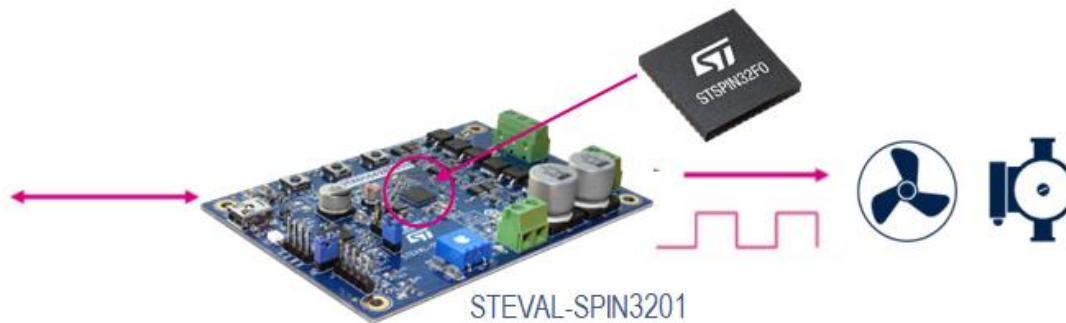


Ref. design



Motor control for liquid cooling systems

Our reference designs



Integration

- 8 ICs in 1 with 64% BOM area saving

Flexibility and performance

- 7 control methods, 1/2/3 shunts

Fully protected

- UVLO, Short-circuit, OCP, OTP

Easy design

- 19 ready-to-use system solutions