Infineon chip-set solutions and design support for Automotive Power Distribution Centers & Zone Controllers

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Presenter

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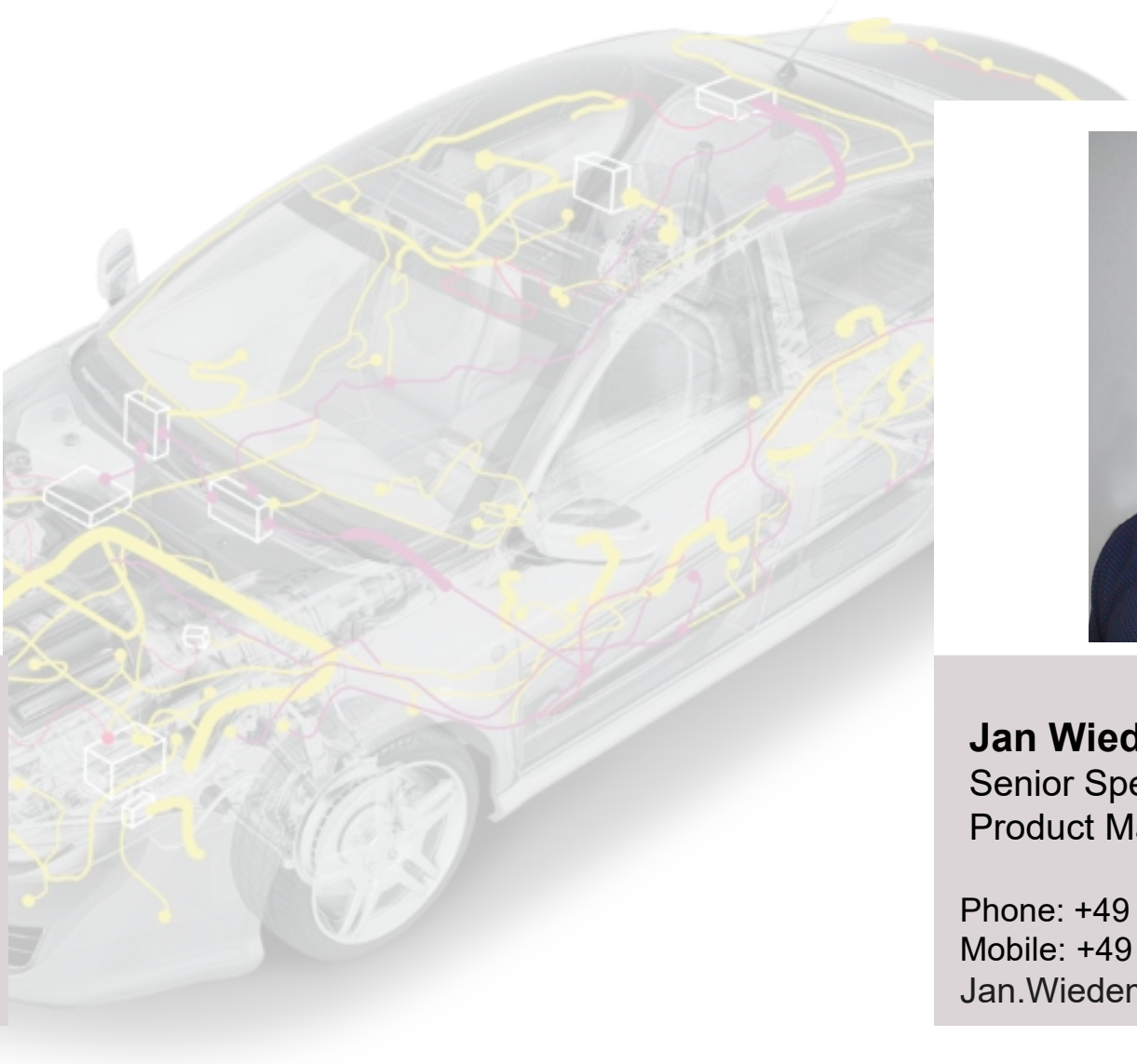

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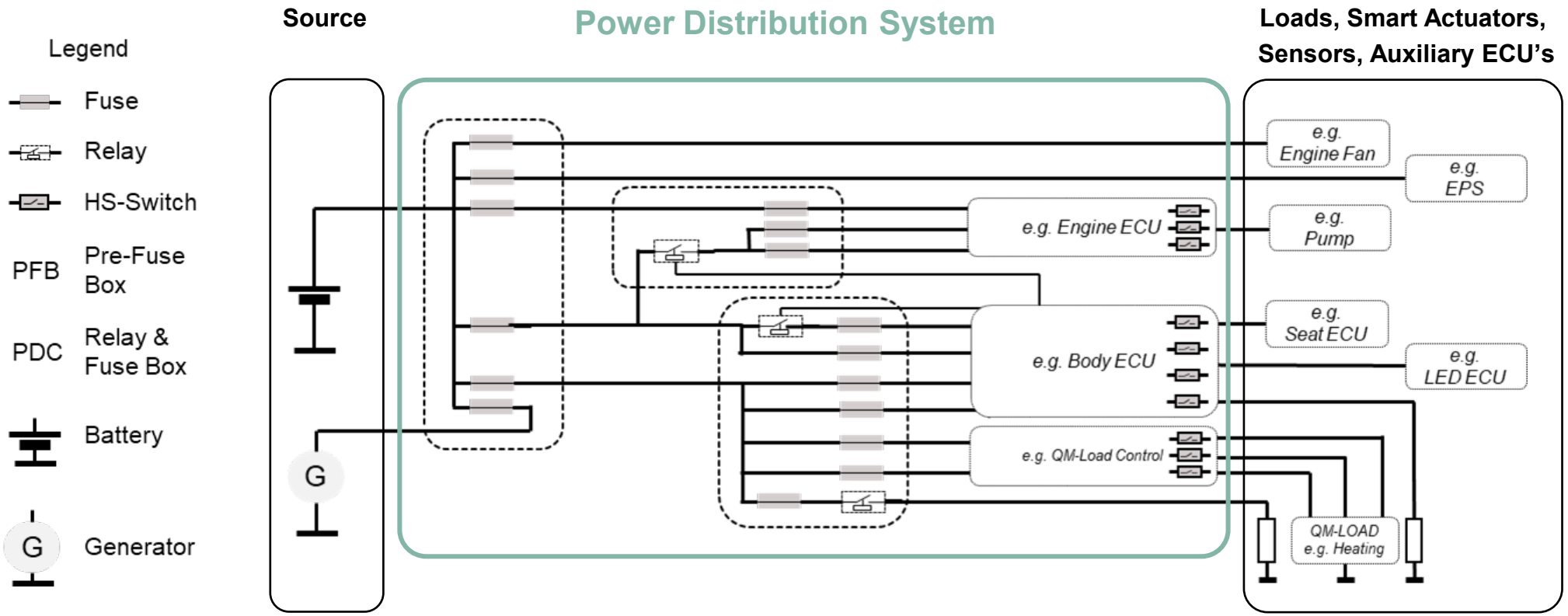
The Power Distribution is the controlled transport of energy via the Power Distribution System from the sources to all kind of loads

The Power Distribution System is based on a wire harness to transport energy, fuses to protect the wire harness, relays / switches to start and stop the energy flow and Electronic Control Units (ECU's) to control the energy flow



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The automotive megatrends have significant impact on the evolution of the vehicle power distribution system

Software Defined Vehicle (SDV), Connectivity & Advanced Security

SOTA → Car2x → Infotain-ment → Security

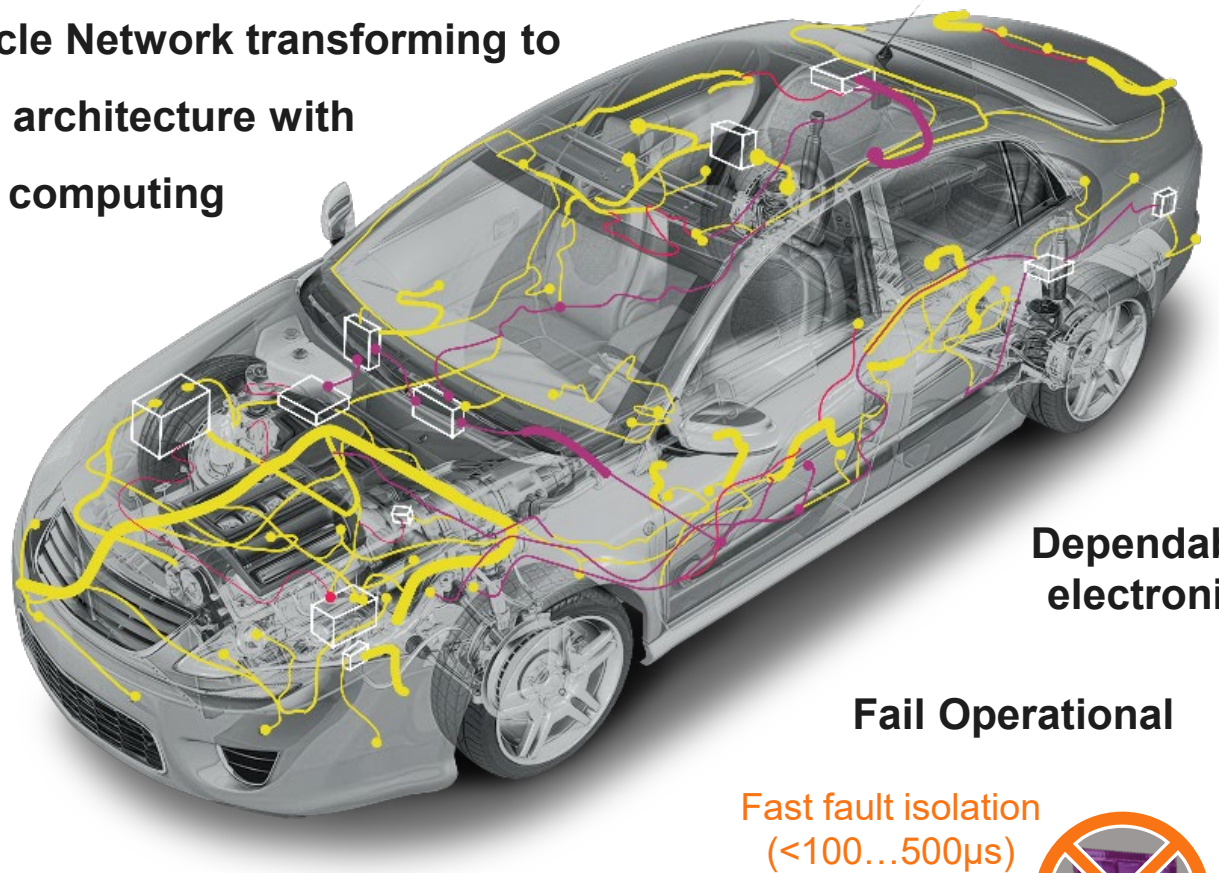
Electro-Mobility, 48 V 3rd voltage layer

MHEV → PHEV → FHEV → BEV

Advanced Driver-Assistance systems (ADAS), Automated Drive (AD), X-by-Wire

L0...L2 → L2+ → L3 → L4...L5

In Vehicle Network transforming to a zonal architecture with central computing



Dependable electronics

Fail Operational

Fast fault isolation (<100…500µs)

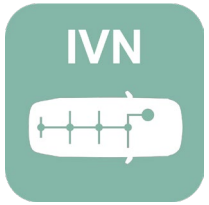
Availability

Functional Safety

The major OEM motivation for the PD architecture transformation are Software Defined Vehicle, Electro-Mobility and ADAS/ AD/ X-by-Wire

Software Defined Vehicle

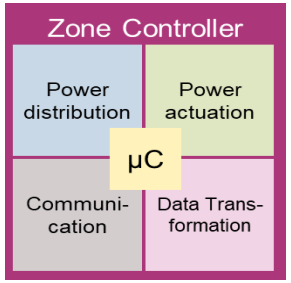
IVN



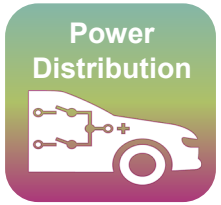
IVN transformation
to zonal architecture

⇩

Zone controller infrastructure reuse for electrification of secondary power distribution functions



Power Distribution



Complexity explosion
in the wire harness

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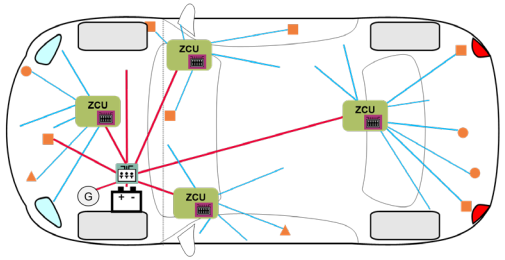
Simplification and significant cost reduction of the wire harness

Wire length reduction (< 4m) for enabling manufacturing and assembly automation



Electro-Mobility

HV / 48V

Additional source
for energy availability

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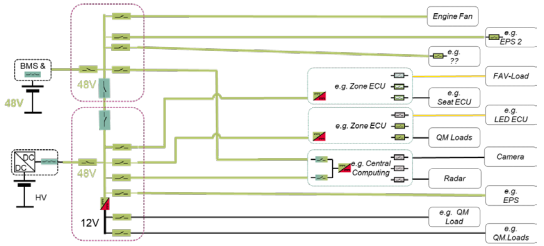
Addition supply domain with different voltages

New class of voltages
with HV / LV optimization



ADAS/ AD/ X-by-Wire

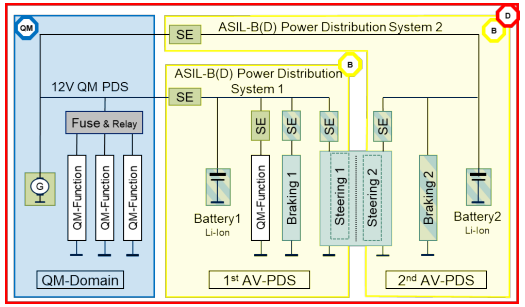
High availability

Dependable electronics
for functional safety

⇩

New power distribution system functions & requirements

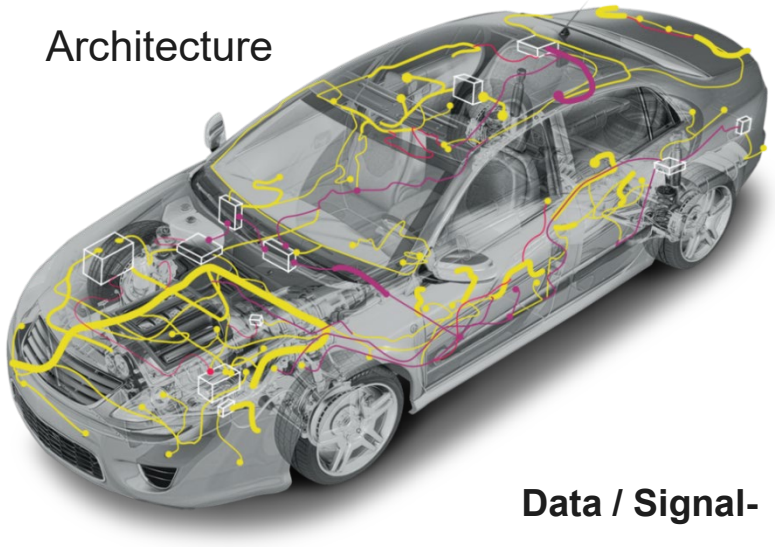
Mandatory introduction of safety elements



Power Distribution transforming to a decentralized architecture, while In-Vehicle Network transforming to a centralized architecture

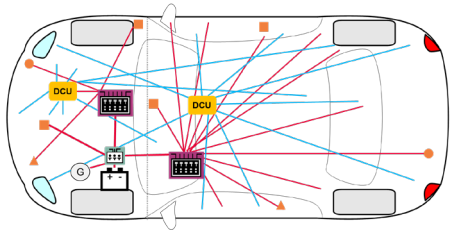
E/E Architecture

Electric and Electronic Architecture

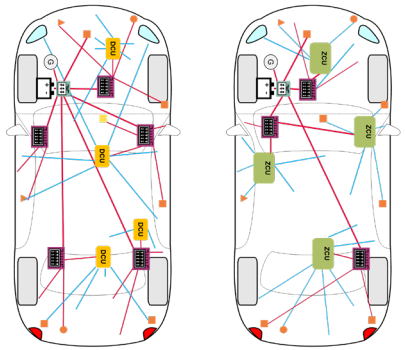


Power Distribution

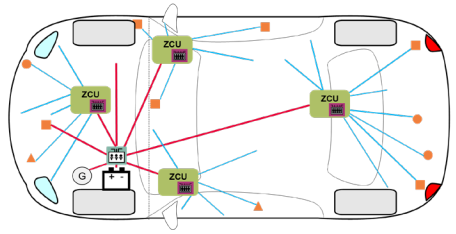
Centralized power distribution
Tree/ star Architecture



Partly decentralized power distribution



Decentralized power distribution
Zone Architecture

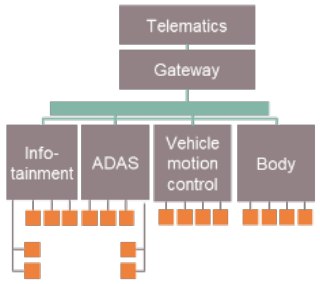


De-centralization

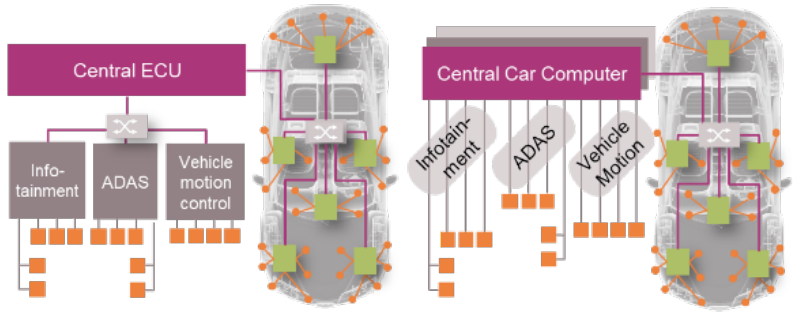
Centralization

Data / Signal-Distribution & Computing

Domain Architecture



Mixed Domain/Zone Architecture



Full Car Computer

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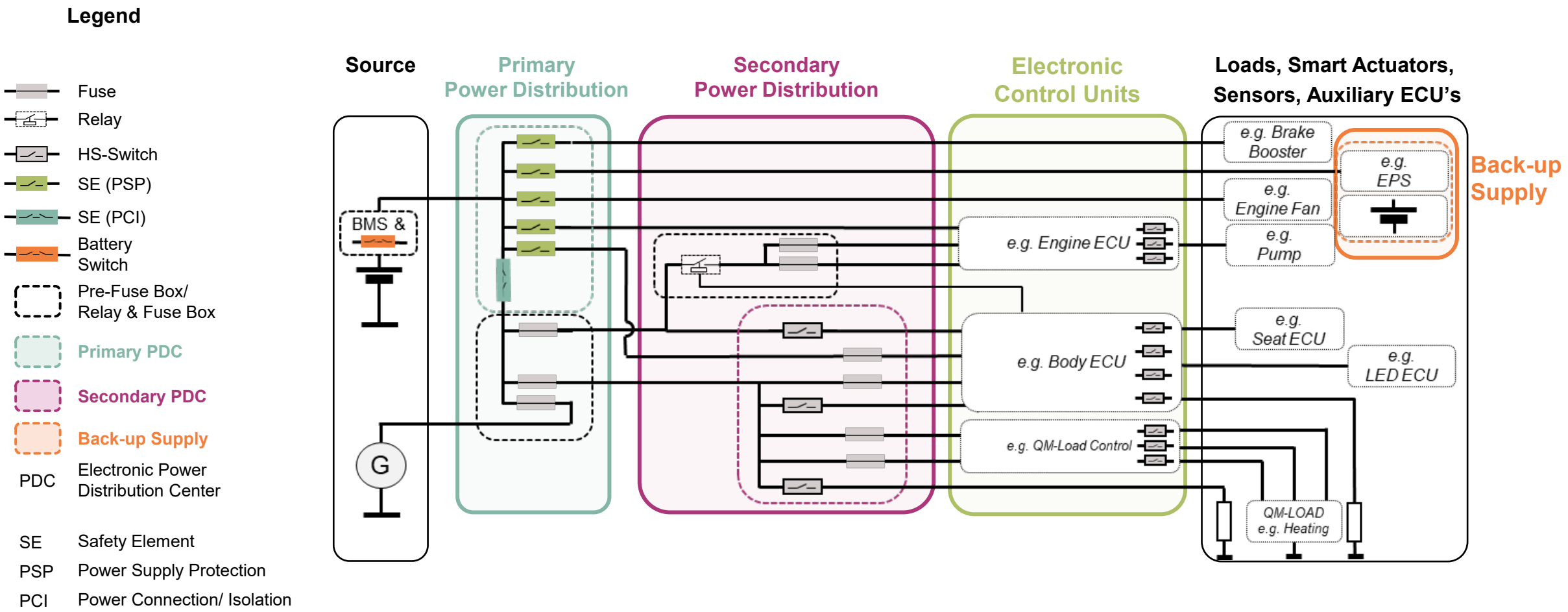
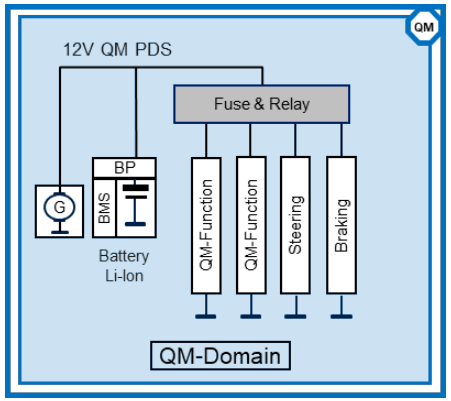
The Power Distribution System is built on three main elements: primary & secondary power distribution and Electronic Control Units



The Power Distribution Architecture trend is determined by the drivers fallback capability via mechanical access to the function

QM PDS

Driver as fallback is able to keep **control** after 1st ADAS system failure **via mechanical access**

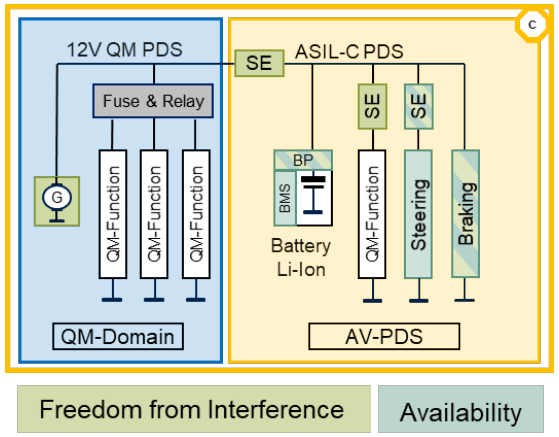


No dedicated FuSa requirement

Available Power Distribution System

Driver as fallback may risk to **lose control** after 1st failure even **with mechanical access**

The availability of the ADAS system has to be increased by **reducing** the risk of a **1st system failure**



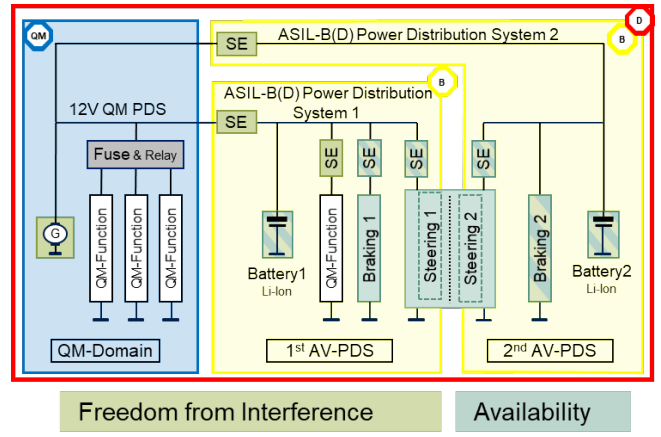
Up to ASIL-C requirement
Introduction of Safety Element (SE)

Fail-Operational Power Distribution System

Driver is **not the fallback** or has **no mechanical access**

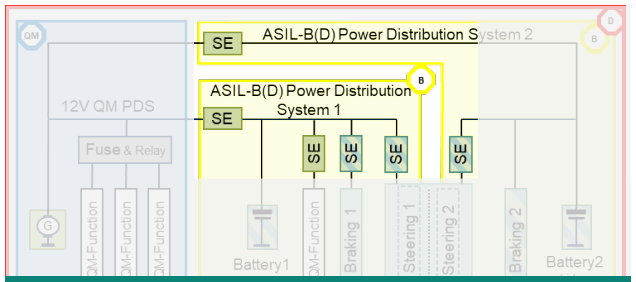
The AD or X-by-Wire **system** needs to keep the **control after 1st failure**

The AD or X-by-Wire system **needs to stay fail-operational**



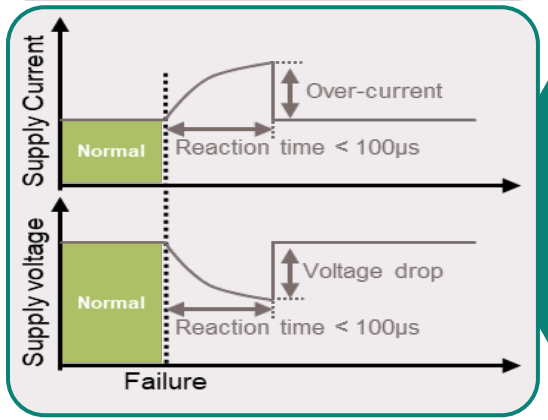
ASIL-D requirement
Introduction of Safety Element (SE)

The intelligent power distribution Safety Elements (SE) have the following key application requirements



High Availability Power Distribution System

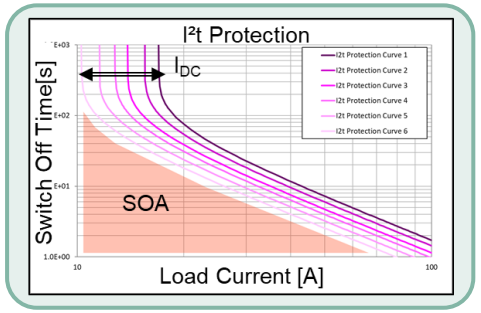
Fast fault isolation* (<100…500µs)

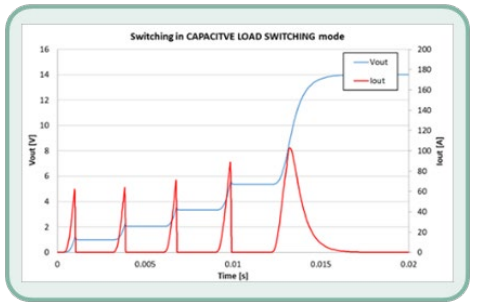


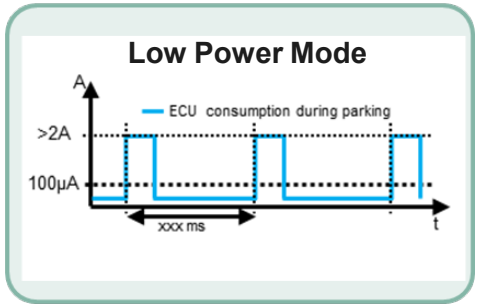
Wire protection*

Capacitive charging

Low Power ON







ISO 26262 ready

*Functional Safety ISO 26262 Failure Mode Coverage

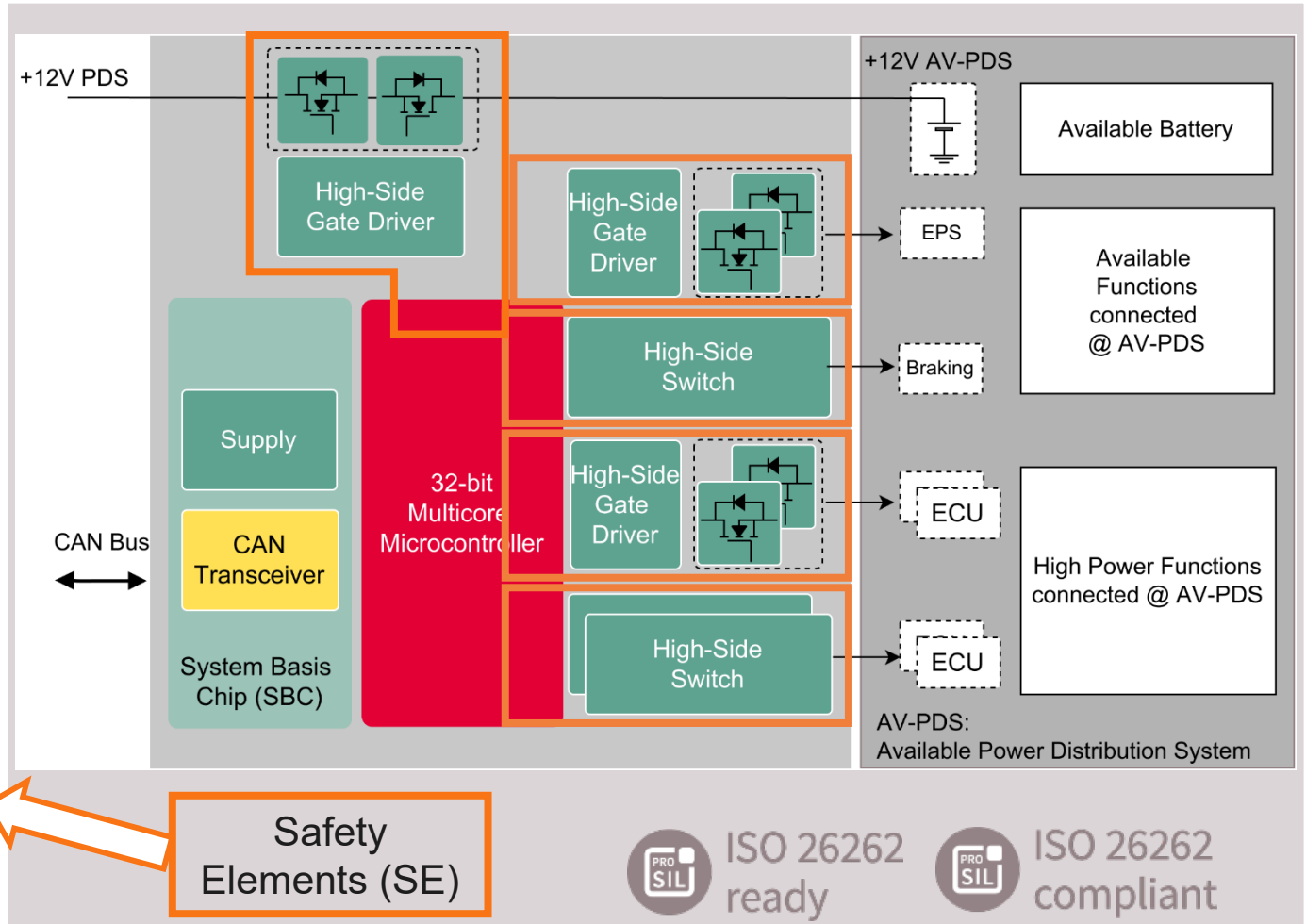
ISO 26262 compliant

The primary Power Distribution Center (PDC) is the electrified primary power distribution which replaces the pre-fuse box

Infineon chip-set & developments

- **Supply**
  - OPTIREG™ PMIC
- **Communication**
  - CAN Transceivers
- **Supply & Communication**
  - OPTIREG™ SBC (System Basis Chip)
- **Microcontroller**
  - Traveo™ II and/ or AURIX™
- **IPD (integrated):**
  - Power PROFET™, Power PROFET™ +
  - PROFET™ +2, PROFET™ Wire Guard
- **IPD (High-Side Gate Driver)**
  - 2ED2410-EM, AUIR3241S and AUIR3242S
- **MOSFET**
  - 40V N-Channel automotive MOSFET

Primary PDC Block Diagram

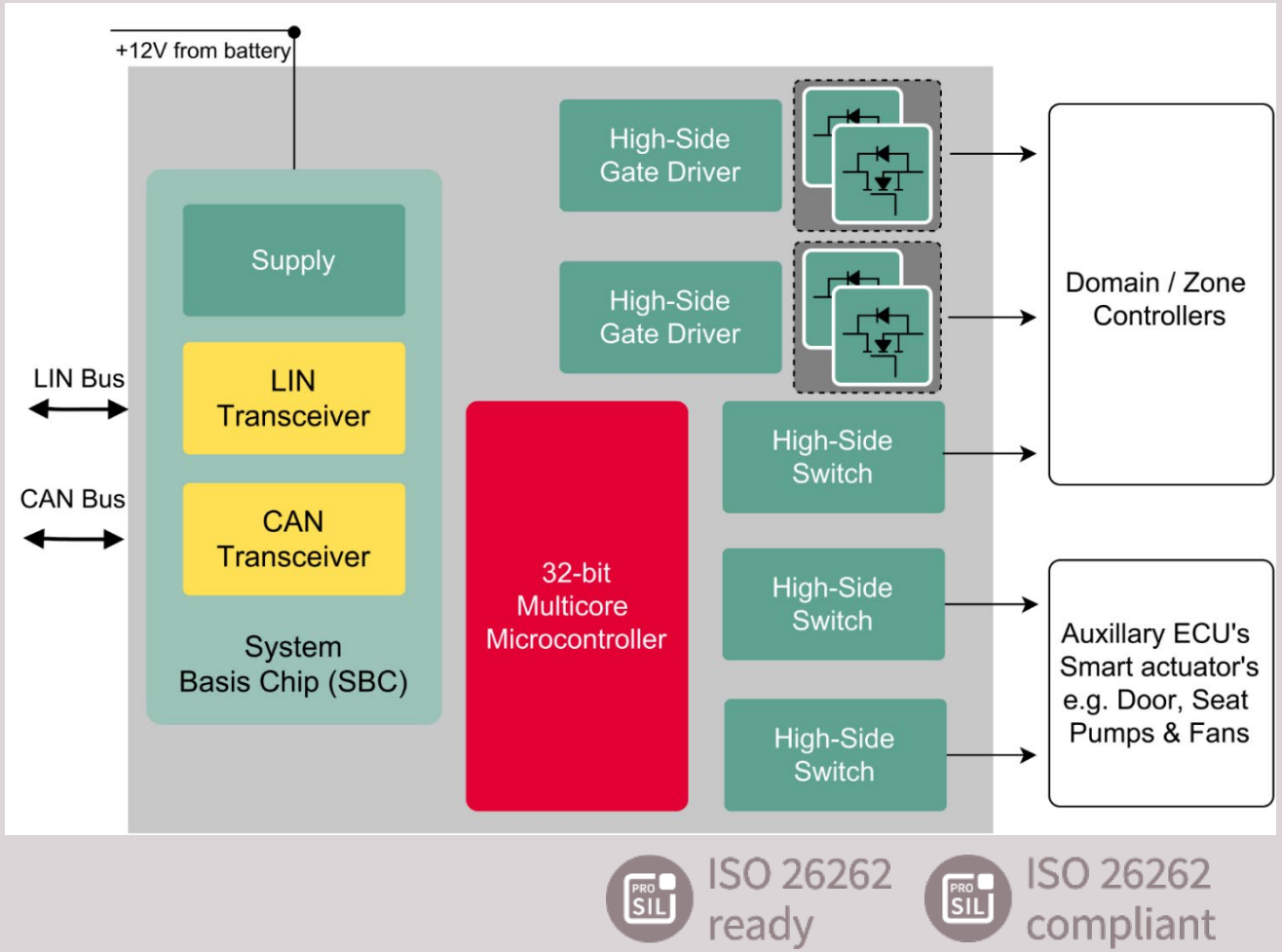


The secondary Power Distribution Center (PDC) is the electrified secondary power distribution which replaces the relay & fuse boxes

Infineon chip-set & developments

- **Supply**
  - OPTIREG™ Switcher, OPTIREG™ PMIC
- **Communication**
  - CAN-FD and LIN Transceivers
- **Supply & Communication**
  - OPTIREG™ SBC (System Basis Chip)
- **Microcontroller**
  - TRAVEO™ T2G and/ or AURIX™ TC3x
- **IPD (integrated switches):**
  - Power PROFET™, Power PROFET™ +, PROFET™ +2, PROFET™ Load Guard, PROFET™ Wire Guard, SPOC™ +2
- **IPD (High-Side Gate Driver)**
  - 2ED2410-EM EiceDRIVER™ APD
- **MOSFET**
  - OptiMOS™ 40V N-Channel automotive MOSFET

Secondary PDC Block Diagram



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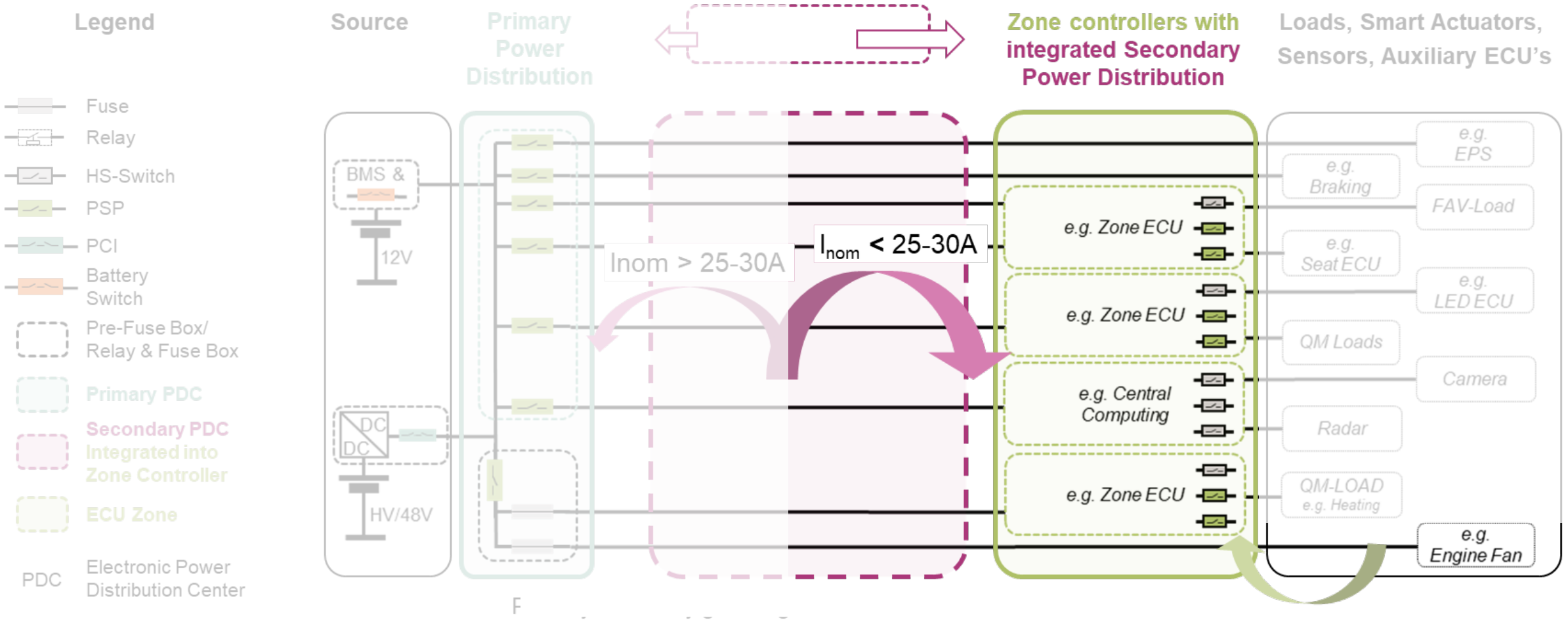
The electrification of the secondary power distribution into the zone controller is supported by an infrastructure reuse

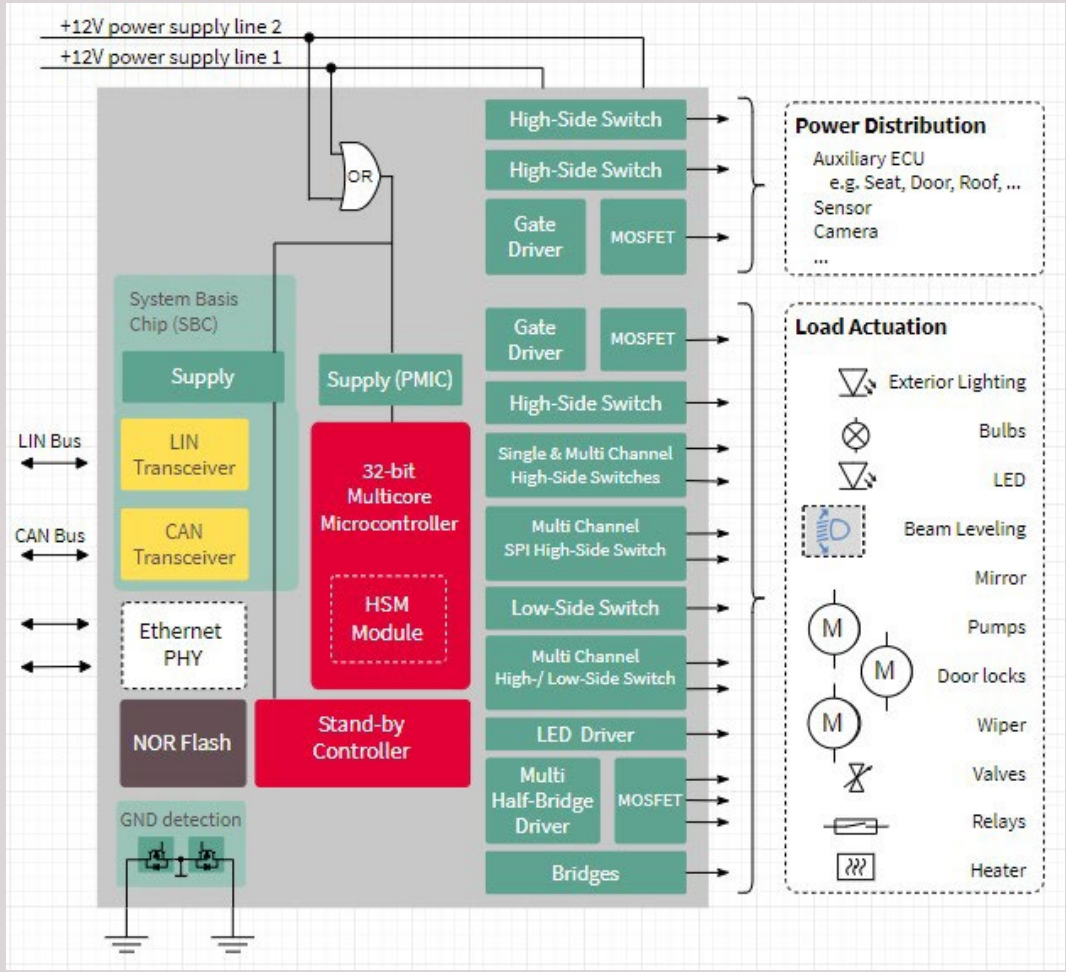


The I/O Aggregator / Zone Controller chip-set solution is based on devices for supply, communication, control, sense, actuation and PD

Infineon chip-set & developments

- **Supply**
  - OPTIREG™ Switcher
- **Communication**
  - CAN Transceivers
- **Supply & Communication**
  - OPTIREG™ SBC (System Basis Chip)
- **Microcontroller**
  - TRAVEO™ T2G and/ or AURIX™ TC3x
- **IPD (Integrated)**
  - Power PROFET™, Power PROFET™ +, PROFET™ +2, PROFET™ Load Guard, PROFET™ Wire Guard, SPOC™ +2
- **Single Half Bridges and Multi MOSFET Driver**
  - Novalith IC's BTN9 and
- **IPD (High-Side Gate Driver)**
  - 2ED2410-EM EiceDRIVER™ APD
- **MOSFET**
  - 40V N-Channel automotive MOSFET

Zone controller block diagram



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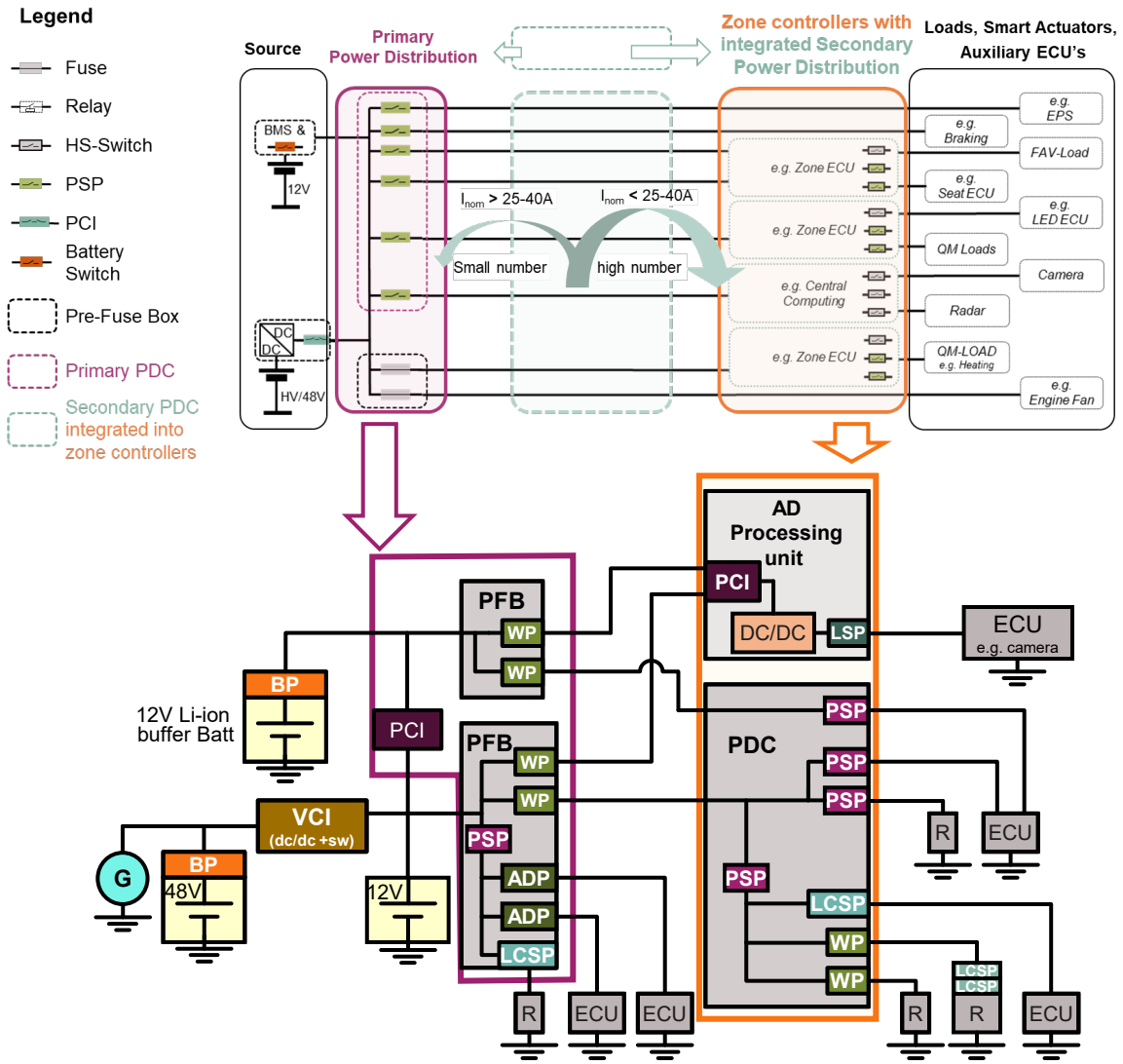
With the evolution of Power Distribution to Zone Controllers, smart power switches face new use cases



IPD devices serve multiple USE CASES in future advanced Power Distribution Systems

Data Exchange (DX)

USE CASE: Sense & provide physical data for software usage and act based on commands and local stored configuration.

Battery Protection (BP)

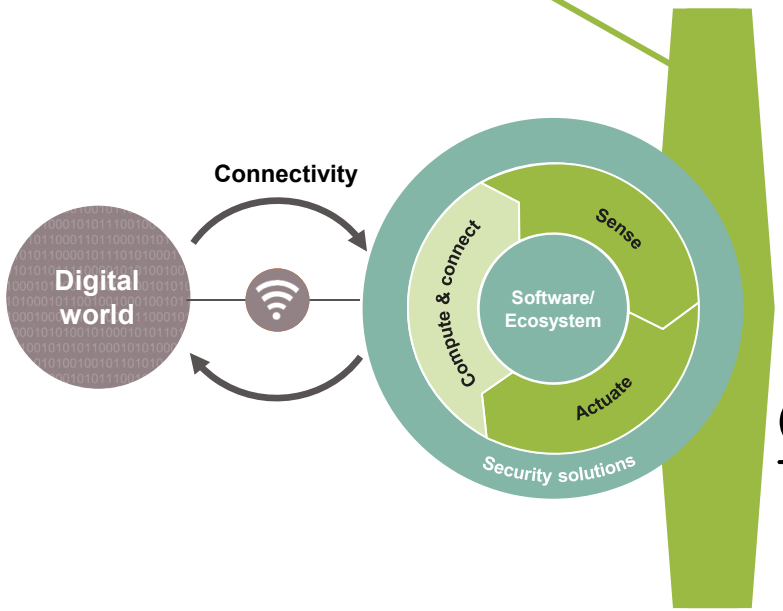
USE CASE: Protect Battery Technologies

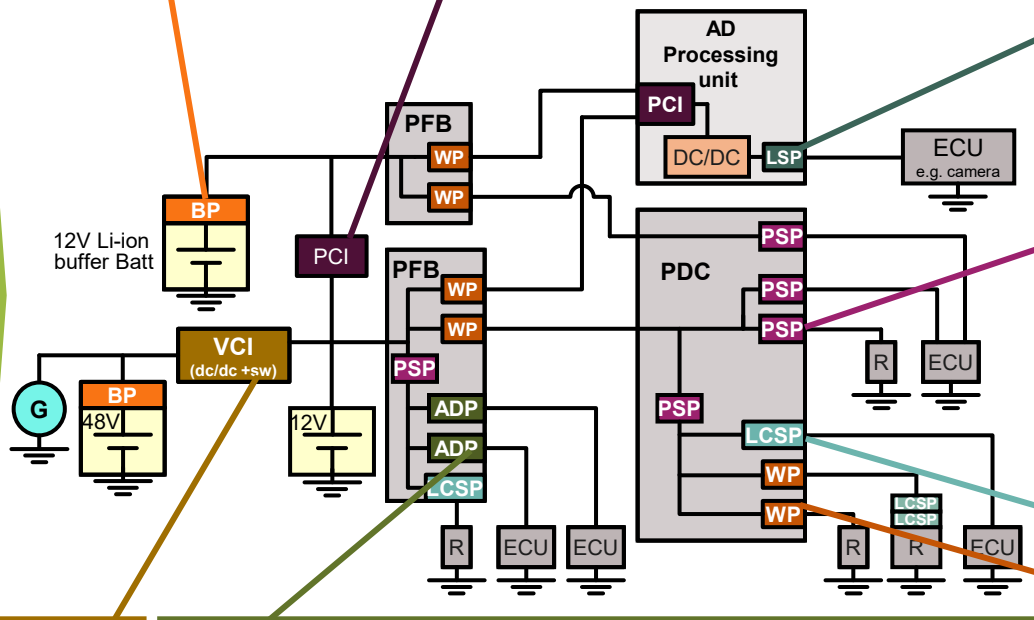
Power supply Connection & Isolation (PCI)

USE CASE: Connect multiples power supply sources and separated supply domain in case of supply failure

Load Supply Protection (LSP)

USE CASE: Protection of supply infrastructure connected to the output.





Power Supply Protection (PSP)

USE CASE: Isolate failures from loads towards the power side.

the “traditional” USE CASE

Load Control & Self Protection

USE CASE: Turn load on & off and protect itself

Voltage Conversion & Isolation (VCI)

USE CASE: Convert & isolate different voltage level (DC/DC + Switch)

Active During Parking (ADP)

USE CASE: Maintain active the power distribution and its protection mechanism with a limited consumption.

Wire Protection (WP)

USE CASE: Protect wire

IPD devices will serve new use cases in secondary power distribution

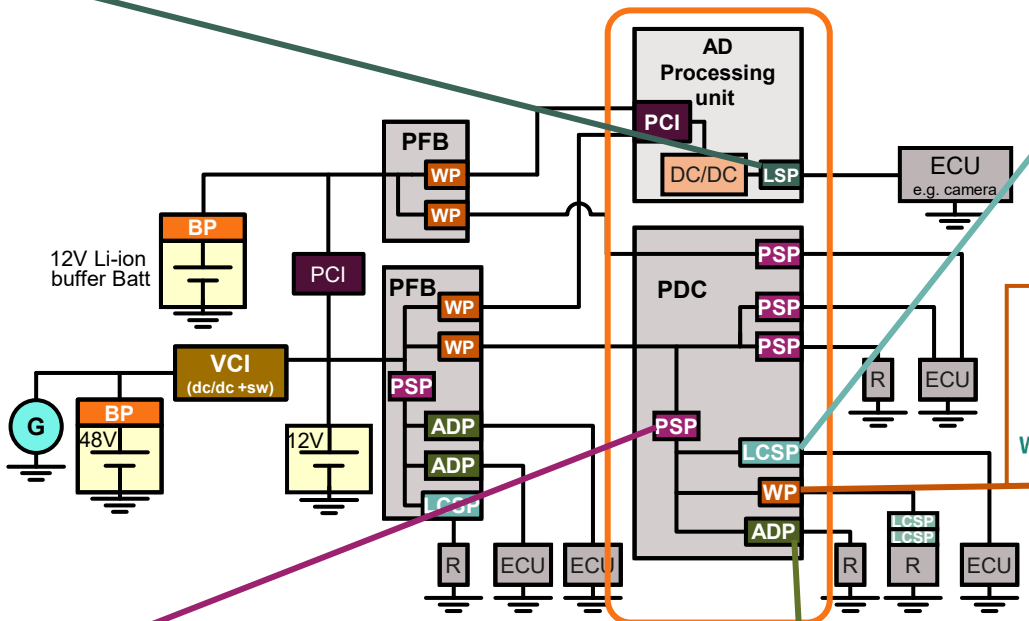
Load supply protection

Load Supply Protection (LSP)

Load control & self protection

Load Control & Self Protection (LCSP)

the “traditional” USE CASE



Wire protection

Wire Protection (WP)

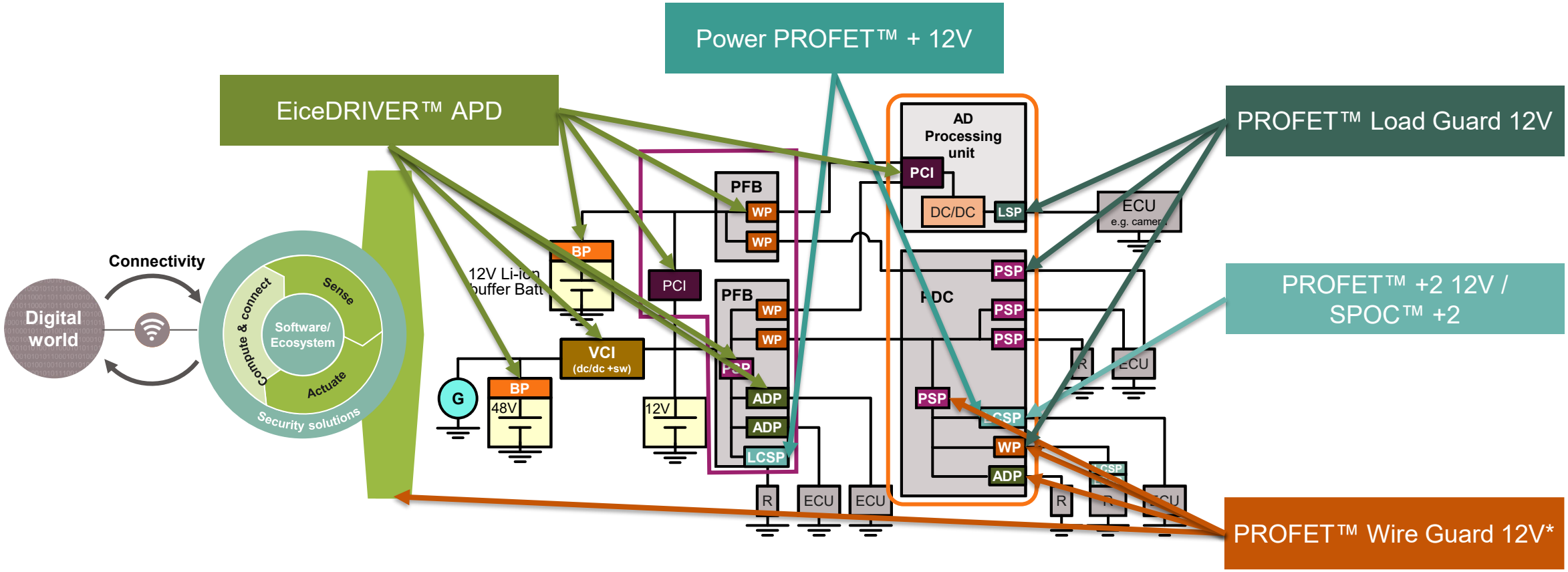
Power supply protection

Power Supply Protection (PSP)

Active during parking

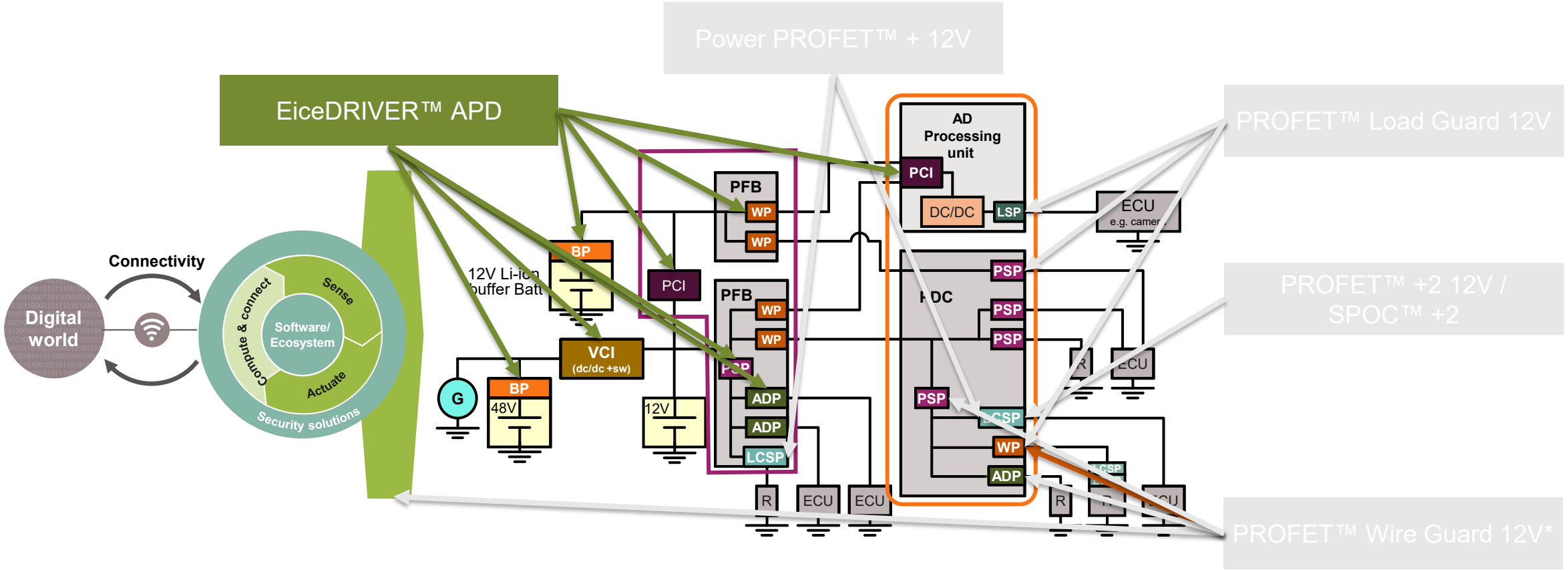
Active During Parking (ADP)

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

EiceDRIVER™ APD 2ED2410-EM – Versatile Gate Driver IC for advanced power distribution

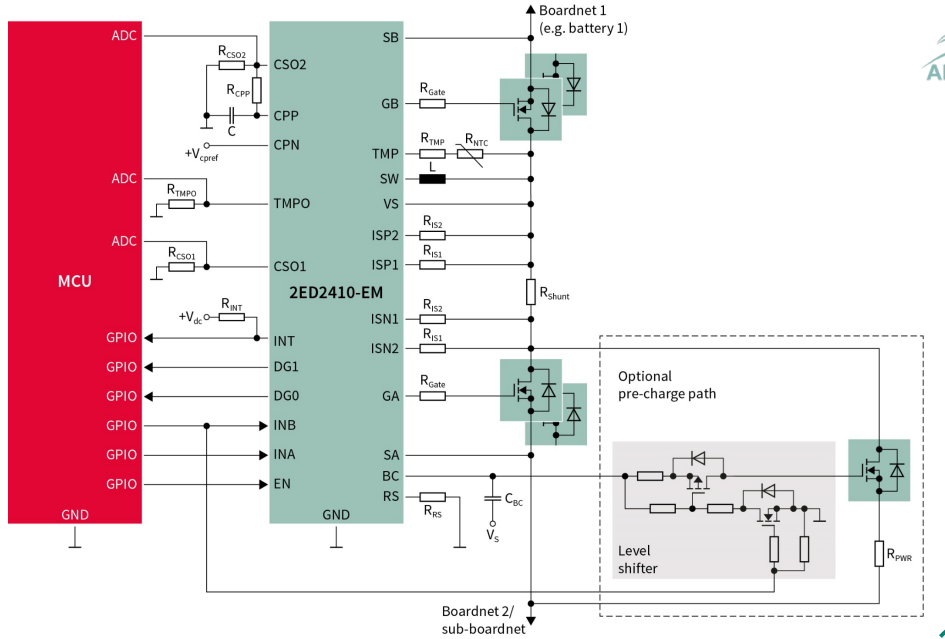
Main features

- Extended supply voltage range: 3 - 58 V
- **Two high-side gate driver outputs** with 3 Ω pull-down and 50 Ω for pull-up for fast switch off/on
- **Low operating current in idle mode < 50 µA**, idle mode with 15 mA load current by-pass
- Supports back-to-back MOSFET topologies (common drain or common source)
- Two **bidirectional high-side analog current sense interfaces** with externally adjustable gain
- Channel control and diagnostic via pins
- Analog interface for external temperature measurement
- Gate undervoltage lockout (UVLO)
- AEC-Q100 qualification

Key benefits

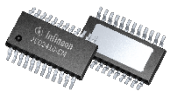
- Suited for new 12 and 24 V power distribution architecture board nets
- Able to manage several hundred amps with fast switch on and off within µs
- Idle mode ideal to supply ECUs in active during parking mode
- Allowing flexible and versatile solutions for various E/E architectures: **Adjustable overcurrent/ short circuit protection, adjustable I-t wire protection, adjustable over/undervoltage protection, adjustable overtemperature protection**

Application diagram example



Status: active and preferred

Wire protection · Battery protection · Power connection & isolation · Active during parking · DC-DC · PROSIL ISO 26262 ready



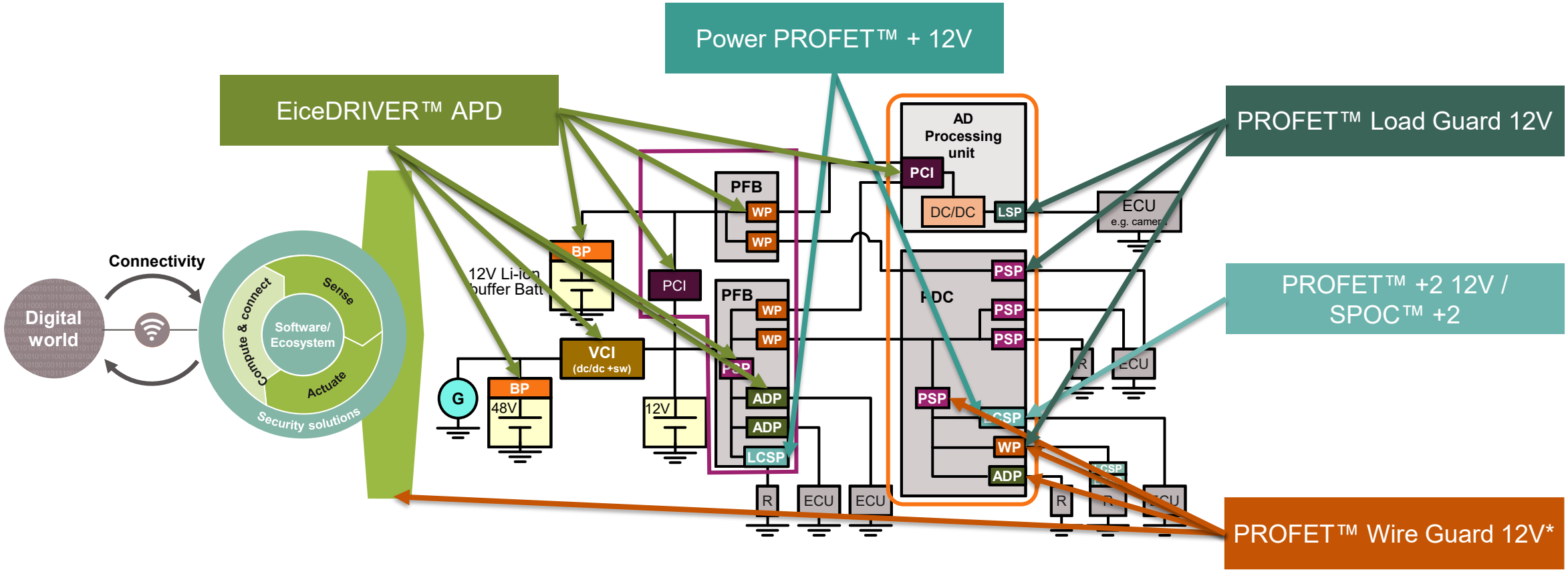
TSDSO-24

EiceDRIVER™ APD 2ED2410-EM – Versatile Gate Driver IC for advanced power distribution

AUIR3241/2 → 2ED4820-EM → 2ED2410-EM

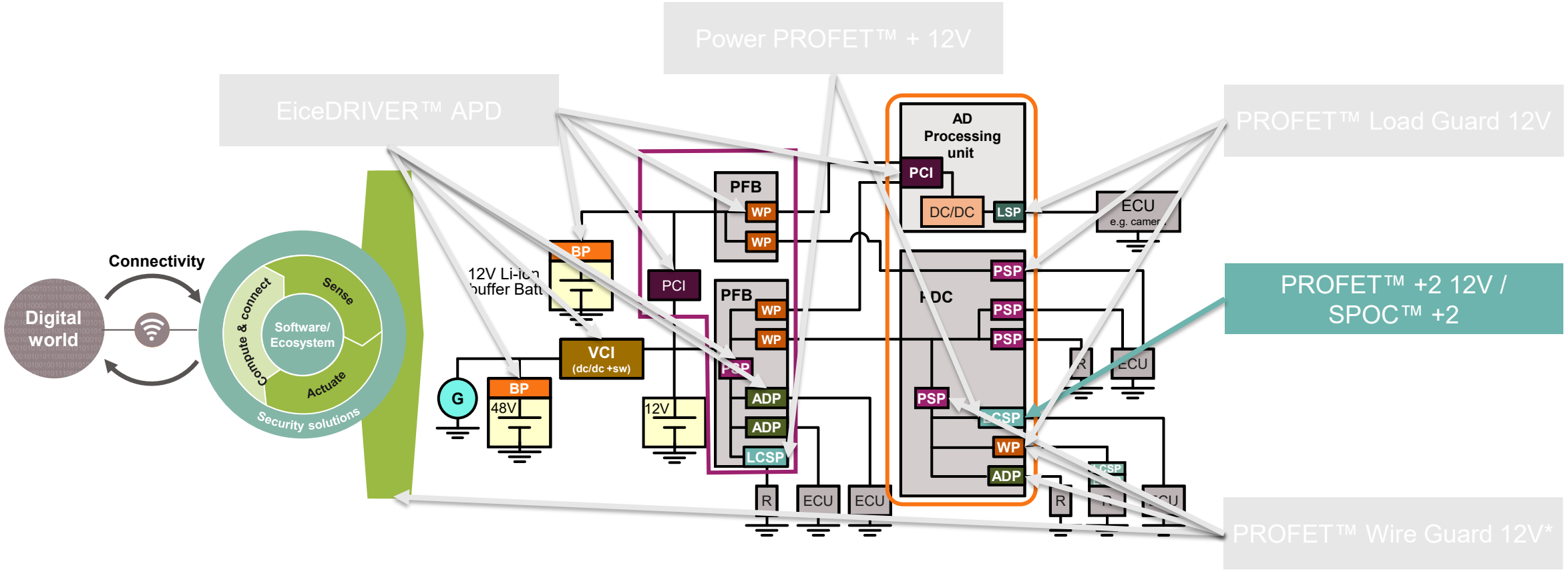
Feature \ Generation	Q-Diode, Battery Switch (BP) F&R replacement	Battery Switch (BP) F&R replacement	**Gen1** BP/PCI/PSP F&R replacement (WP)
Voltage level	**12/24 V**	**48 V**	**12/24 V**
AEC Q100 qualified	✓	✓	✓
Qualification	**QM**	**QM, ISO 26262-ready**	**QM, ISO 26262-ready**
Gate Driver Output(s)	**1**	**2**	**2**
Channel(s), independently protected	**1**	**2** (see datasheet)	**1**
Bi-directional blocking	✓	✓	✓
Short-circuit / overcurrent protection	✗	✓	✓
Temperature monitoring interface	✗	✗	✓
Wire protection (I-t or I^2t), integrated	✗	✗	✓
Drain undervoltage detection/lockout	✗	✓	✗
Ext. MOSFET switchability check	✗	✗	✗
Low operating current in Idle mode	✓	✗	✓ (< 15 mA bypass)
Safe state mode activated by input pin	✗	✓	✗
SPI - configuration and diagnostic	✗	✓	✗

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

PROFET™ +2 12V - Universal smart high-side power switches for 12V power distribution and BCM applications

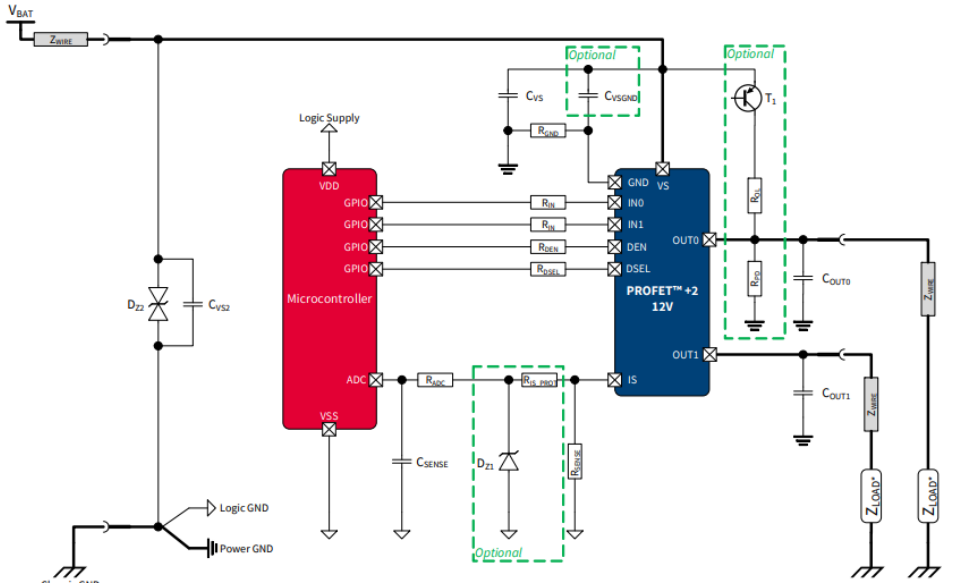
Main features

- Available as **1, 2 and 4 channel device**
- Load current range **up to 32 A**
- State-of-the-art protection and diagnostic features
- Support supply voltage down to 3.1 V (EPC type down to 2.7 V)
- **Different sub-families** to address various application requirements:
  - EPA: with intelligent restart and fast slew rate
  - EPP: with intelligent latch
  - **ESP: with capacitive load switching mode and intelligent latch**
  - **EPL: with capacitive load switching mode and fixed current limitation**
  - EPZ: Qualified according to AEC-Q100 Grade 0

Key benefits

- Versatile features (intelligent restart / latch, capacitive load switching,..)
- **Pin-to-pin compatibility** within whole portfolio
- Reverse ON: low power dissipation in Reverse Polarity
- PCB space saving due to very small packages TSDSO-14
- Available without Undervoltage Recovery delay (EPG/ESP type)

Application diagram example



Status: active and preferred

12 V

Load control & self protection

Zone module

Body control module

Fuses and relay

PRO SIL ISO 26262 ready

TSDSO-14/24

PROFET™ +2 12V - Universal smart high-side power switches for 12 V power distribution and BCM applications

Load current	Single channel	Load current	Dual channel	Quad channel
32A	BTS70012-1ESP			
28A	BTS70015-1ESP			
24A	BTS70020-1ESP			
21A	BTS7002-1EPP			
15A	BTS7004-1EPP			
	BTS7004-1EPZ			
13A	BTS7006-1EPP			
	BTS7006-1EPZ			
10–11 A	BTS7008-1EPP			
10–11 A	BTS7008-1EPA	7–7.5 A	BTS7008-2EPA	
	BTS7008-1EPZ		BTS7008-2EPZ	
8–9 A	BTS7010-1EPA	6–6.5 A	BTS7010-2EPA	
8–9 A	BTS7012-1EPA	6–6.5 A	BTS7012-2EPA	
		5–5.5 A	BTS7020-2EPA	
		4–4.5 A	BTS7030-2EPA	
4–4.5 A	BTS7040-1EPA	3–3.5 A	BTS7040-2EPA	
	BTS7040-1EPZ			
3 A	BTS7050-1EPL	3–3.5 A	BTS7080-2EPA	
			BTS7080-2EPZ	
2 A	BTS7090-1EPL	2-2.5 A	BTS7120-2EPA/G	
		1-1.5 A	BTS7200-2EPC	
		1-1.5 A	BTS7200-2EPA	BTS7200-4EPA

Load control & self protection

Zone module

Body control module

Fuses and relay

PRO SIL ISO 26262 ready

TSDSO-14/24

SPOC™ +2 - Broad portfolio and SPI interface to support intelligent power distribution and enhanced diagnostics

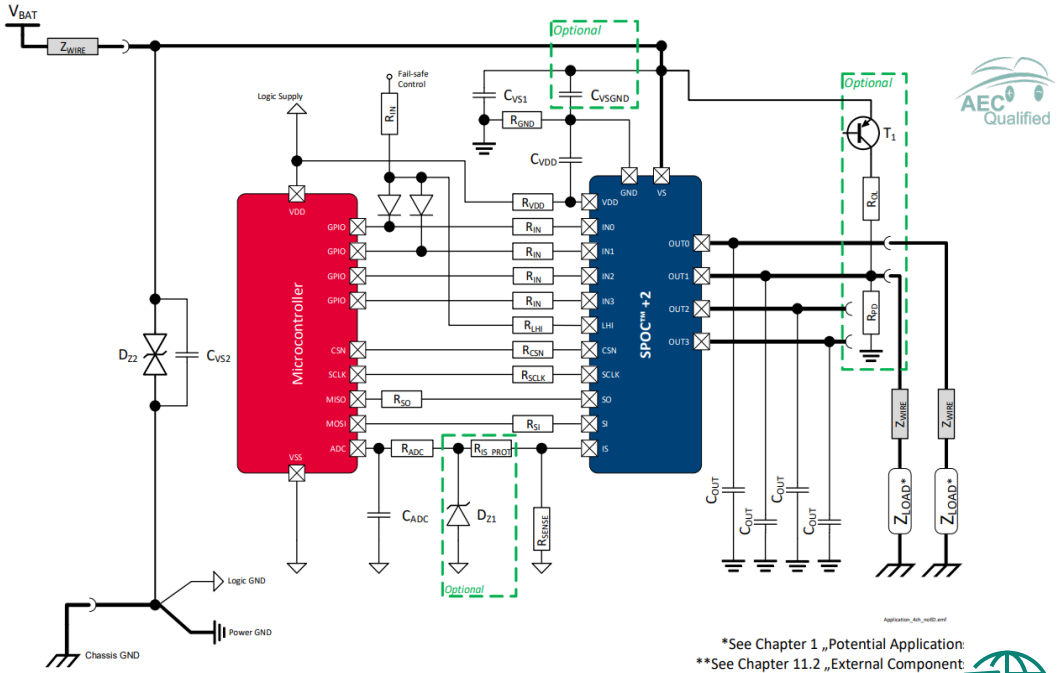
Main features

- Fully protected multichannel **serial interface high-side power controller**
- **4- and 6- channel devices** with an $R_{DS(ON)}$ of 5.5 – 70 mΩ
- Up to 7 A nominal load current (up to 14 A with channel parallelization)
- **8- bit SPI interface**, daisy-chain capable
- Software configurable features:
  - Restart strategy (automatic restart or latch mode)
  - Slew rate control (default or slow SR)
  - Overcurrent detection threshold
  - k_{ILIS} range
- **Limp home (fail-safe) mode**
- PWM operation via SPI or direct input pins
- Integrated GND diode and reverse ON functionality

Key benefits

- Highest design flexibility with **software configurable features** and best-in-class $R_{DS(ON)}$ for multichannel high-side switches
- Significant **cost reduction on system level** possible
- Scalable family with identical footprint of its packages for a broad range of applications and use cases
- All devices with same power stage design, same SPI (SW compatibility) and basic functions

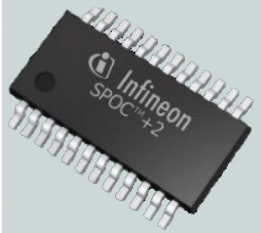
Application diagram example



Status: active and preferred

Load control & self protection | Zone module | Body control module | Fuses and relay | PRO SIL ISO 26262 ready | TSDSO-24

SPOC™ +2 – Broad portfolio and SPI interface to support intelligent power distribution and enhanced diagnostics

	Product	$R_{DS(ON),\ typ}$ @ 25°C	$R_{DS(ON),\ max}$ @ 150°C	Nominal Load Current per Channel $I_{L(NOM)}$	Overload Detection Current $I_{L(OVL0),\ min}$ @ 150°C	Load Current $I_{L(NOM)}$ Parallel Configuration	Footprint
4 Channels	BTS72220-4ESA BTS72220-4ESE BTS72220-4ESP	2x 5.5 mΩ	2x 9 mΩ	2x 7 A	87 A	1x 14 A	 PG-TSDSO-24 8.65 mm x 6.0 mm 0.65 mm pin pitch
		2x 13.5 mΩ	2x 22 mΩ	2x 4 A	46 A	1x 8 A	
	BTS71220-4ESA BTS71220-4ESE BTS71220-4ESP	2x 9.5 mΩ	2x 16.5 mΩ	2x 5 A	65 A	1x 10 A	
		2x 22.5 mΩ	2x 38 mΩ	2x 3 A	35 A	1x 6 A	
	BTS71040-4ESA BTS71040-4ESE BTS71040-4ESP	4x 22.5 mΩ	4x 38 mΩ	4x 3 A	35 A	2x 6 A	
6 Channels	BTS71033-6ESA BTS71033-6ESP	3x 22.5 mΩ	3x 38 mΩ	3x 3 A	35 A	1x 6 A, 1x 3 A	
		3x 70 mΩ	3x 110 mΩ	3x 1.5 A	13 A	- - -	

Load control & self protection

Zone module

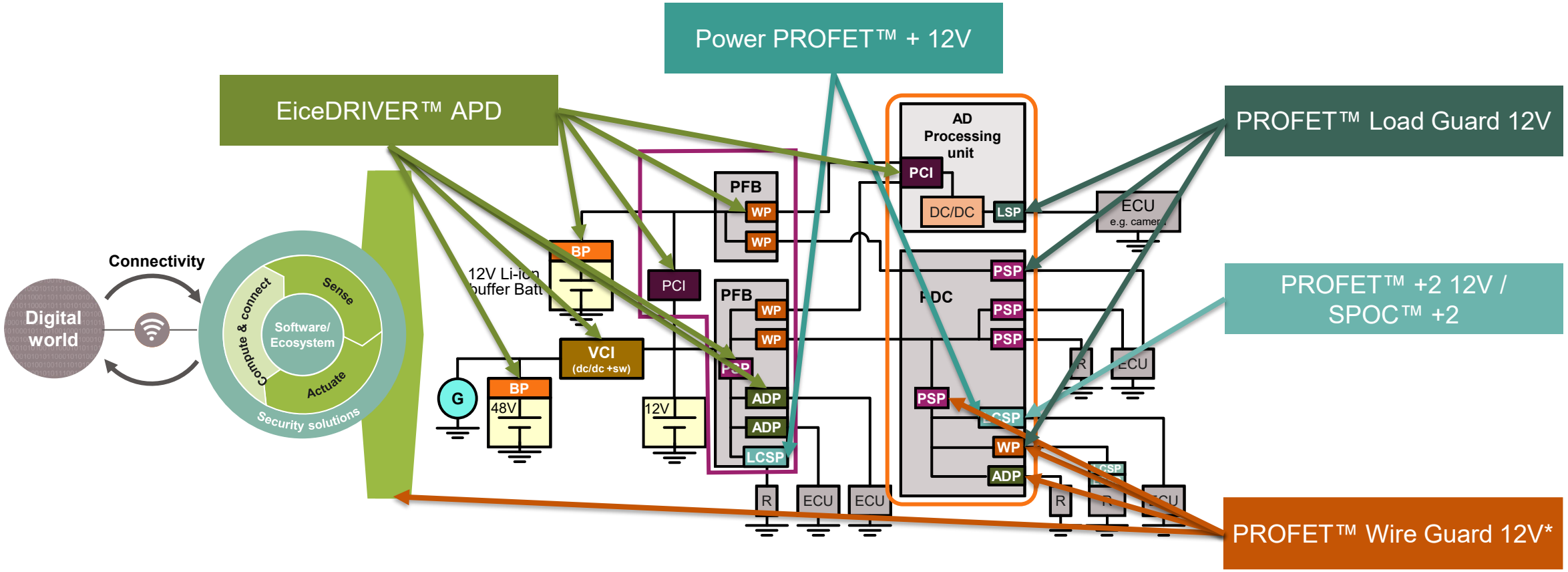
Body control module

Fuses and relay

PRO SIL ISO 26262 ready

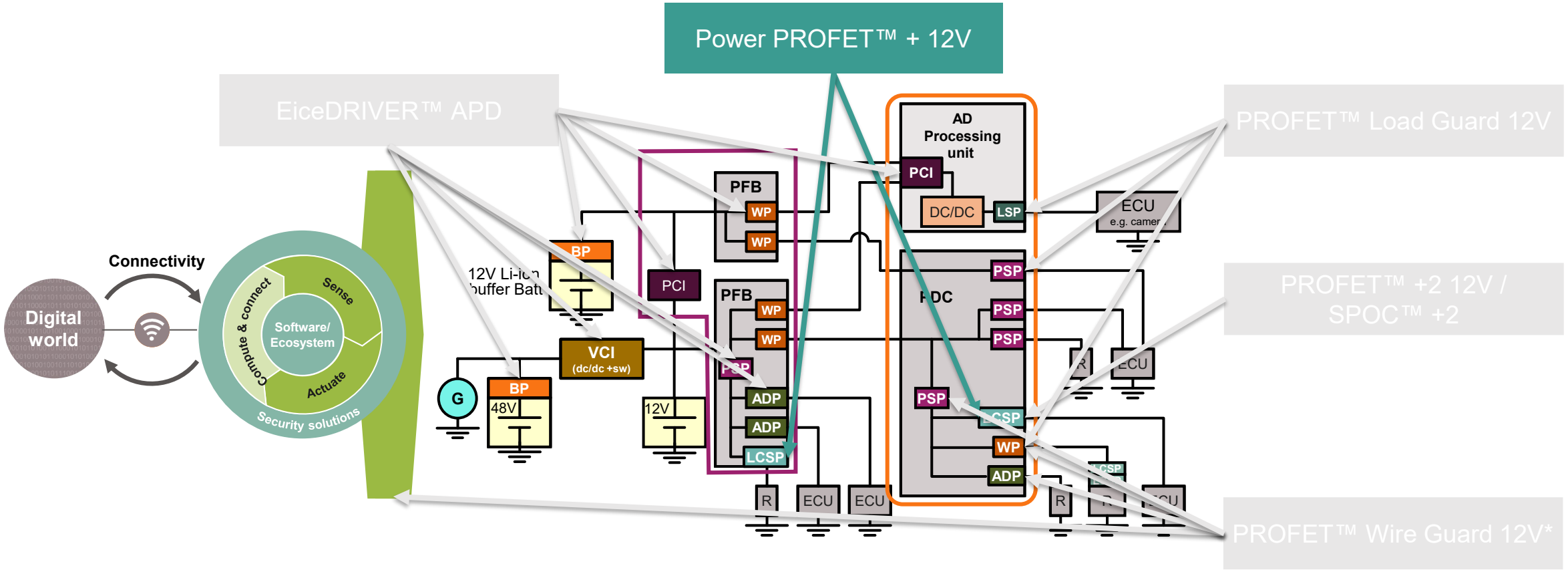
TSDSO-24

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

Power PROFET™ + for 12/ 24/ 48V – smart high-side switches for high-current applications up to 65 A

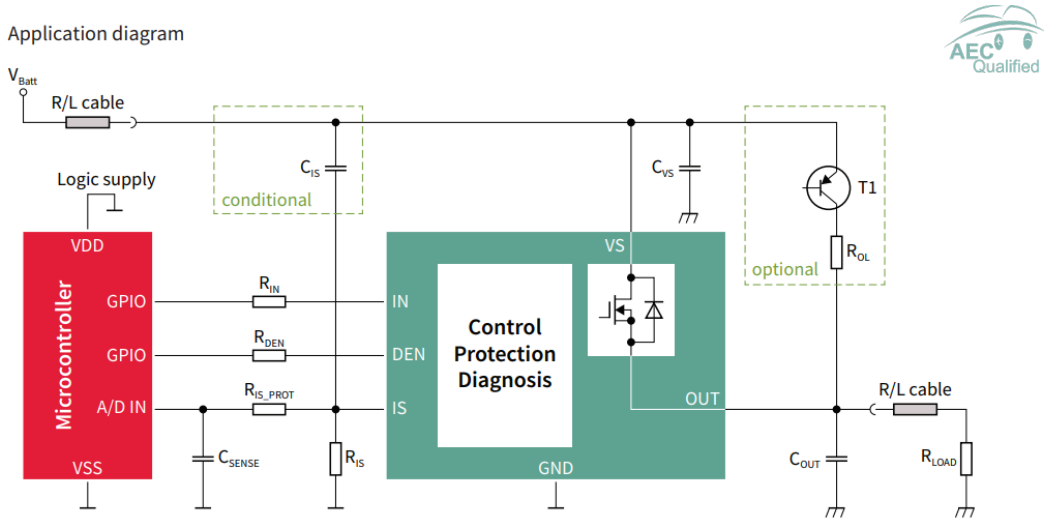
Main features

- Single channel **0.6 - 3.0 mΩ** smart high-side switch for up to **65 A typ**. (12 V) / 35 A typ. (24/48 V) nominal current @ 85° C ambient temperature
- Supply voltage range **12 V – 54 V** (extended 8 V – 60 V) for 24/48 V, **5.8 V - 18 V** (extended 3.1 V – 28 V) for 12 V
- Embedded diagnostic
  - **Proportional load current sense with +/- 5% accuracy**
  - Open load detection in on and off state
  - Diagnosis enable pin (DEN)
  - Latched status signal after short circuit or over temperature detection
- Embedded protection
  - Short circuit protection with latch
  - Overtemperature protection with latch
  - Smart clamping for inductive loads demagnetization

Key benefits

- **Best-in class $R_{DS(ON)}$ for highly efficient designs**
- **Smaller PCB area, less BOM and less development efforts compared to gate driver + external MOSFETs**
- Higher system reliability due to integrated diagnostic, current sense and protection functions
- Pin-to-Pin and function compatible to Power PROFET™ + 12V in TOLL package to scale 12 / 24 / 48 V designs

Application diagram example



Status: 12 V active and preferred,
24/48 V ES Available, SOP Q1 2024

Load control & self protection | Fuses and relay | PTC heating | Rear defrost | Pumps | PRO SIL ISO 26262 ready

HSOF-8

Power PROFET™ + for 12/ 24/ 48V – smart high-side switches for high-current applications up to 65 A

	BTS50005-1LUA	BTS50007-1LUA*	BTS50010-1LUA	BTH50015-1LUA*	BTH50030-1LUA*
Package	TOLL	TOLL	TOLL	TOLL	TOLL
Footprint	9.9 x 11.7 mm	9.9 x 11.7 mm	9.9 x 11.7 mm	9.9 x 11.7 mm	9.9 x 11.7 mm
Extended voltage range	3.1 … 28 V	3.1 … 28 V	3.1 … 28 V	8 … 60 V	8 … 60 V
$R_{THJA\ (2s2p)\ typ.}$	18 K/W	18 K/W	18 K/W	18 K/W	18 K/W
R_{DS_ON} (typ @ 25°C)	0.6 mΩ	0.7 mΩ	1.0 mΩ	1.5 mΩ	3.0 mΩ
R_{DS_ON} (max @ 150°C)	1.1 mΩ	1.4 mΩ	2.0 mΩ	3.0 mΩ	7.0 mΩ
$I_{L(NOM)\ typ}$	65 A	55 A	46 A	25 A	35 A
I_{TRIP} (min)	150 A	130 A	90 A	90 A	55 A
Repetitive energy (EAR) max. 1 million cycles	160 mJ	tbd	75 mJ	180 mJ	100 mJ
Stand-by current at TJ = 25°C max.	3 µA	3 µA	3 µA	7 µA	7 µA

* preliminary

Load control & self protection

Fuses and relay

PTC heating

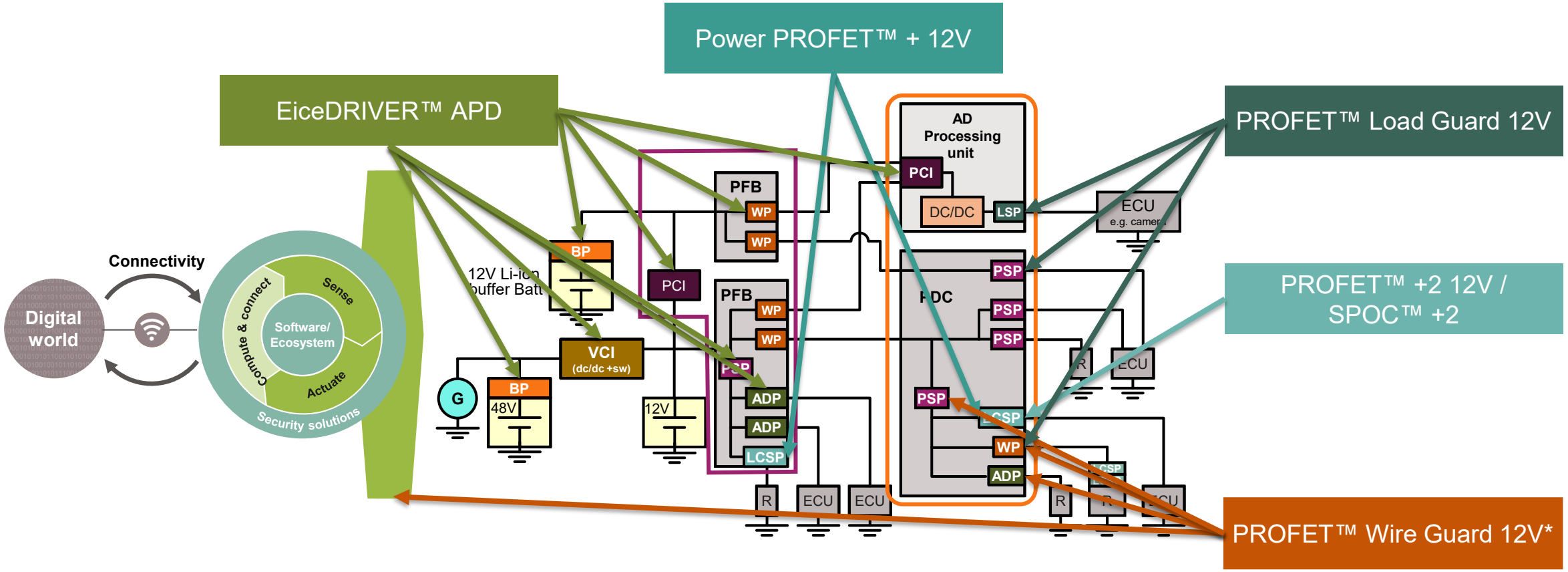
Rear defrost

Pumps

PRO SIL ISO 26262 ready

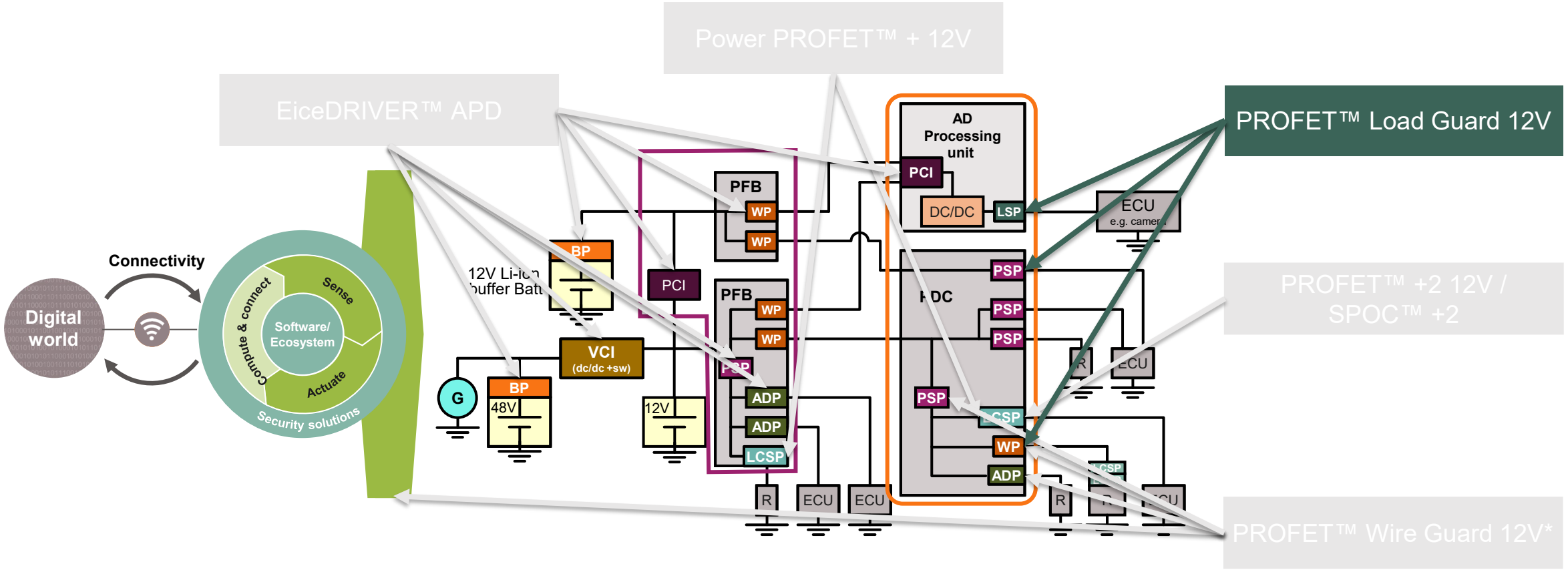
HSOF-8

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

PROFET™ Load Guard 12V – highly flexible smart high-side switch for various use cases in power distribution

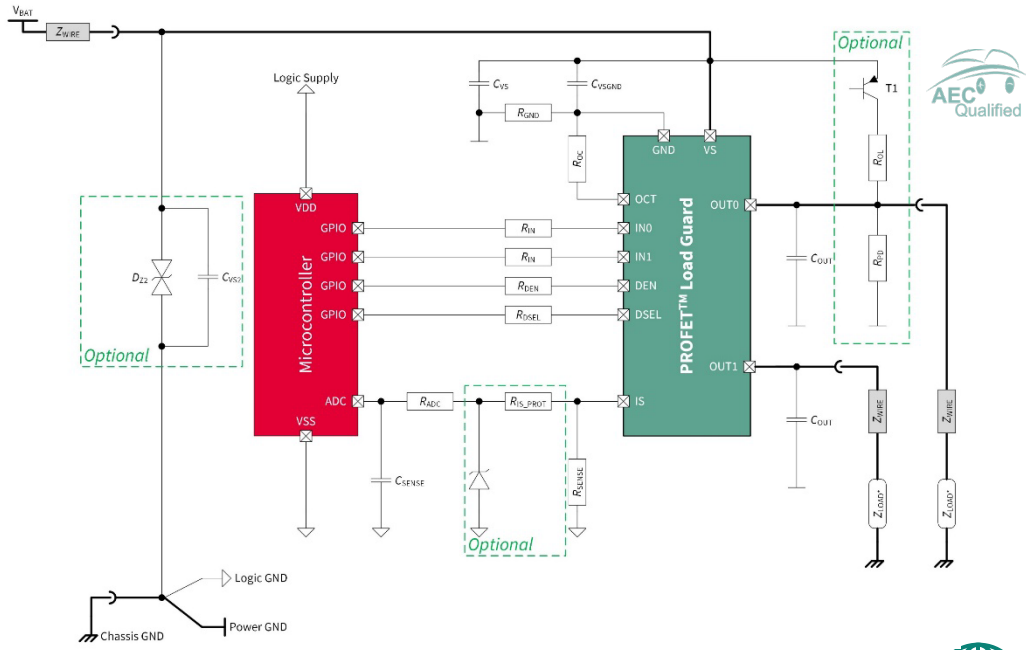
Main features

- **Adjustable overcurrent limitation: range from 0.38 – 8.86 A**, adjustable via resistor
- High k_{ILIS} accuracy: Best-in class proportional load current sense in low current areas in smart high-side switches
- PRO-SIL™ ISO 26262-ready: Safety Application Note available
- **Capacitive load switching mode**: Fast charging of capacitive loads within safe operating area
- **Pin-2-pin compatibility of portfolio**: 90 mΩ and 50 mΩ 1 ch and 2 ch devices adressing nominal currents of 2 - 3 A @ 85 °C ambient temperature
- **High compatibility to PROFET™ +2 12V**
- Supply voltage range 3 – 28 V (cranking 2.7 V)
- Smart high-side power switch with diagnosis and embedded protection

Key benefits

- **Stabilized power supply to modules via adjustable overcurrent limitation**
- **Fast failure isolation towards power supply**
- Protection of sensitive filters of PoC implementations
- Simplified implementation into safety-related applications
- **Increased system robustness via CLS mode for capacitive loads**
- **High design flexibility by pin-2-pin compatible family approach and adjustable overcurrent limitation**

Application diagram example

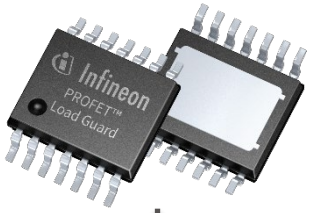


Status: active and preferred

Load supply protection | Load control & self protection | Power supply protection | Wire protection | Zone module | Camera | PRO SIL ISO 26262 ready

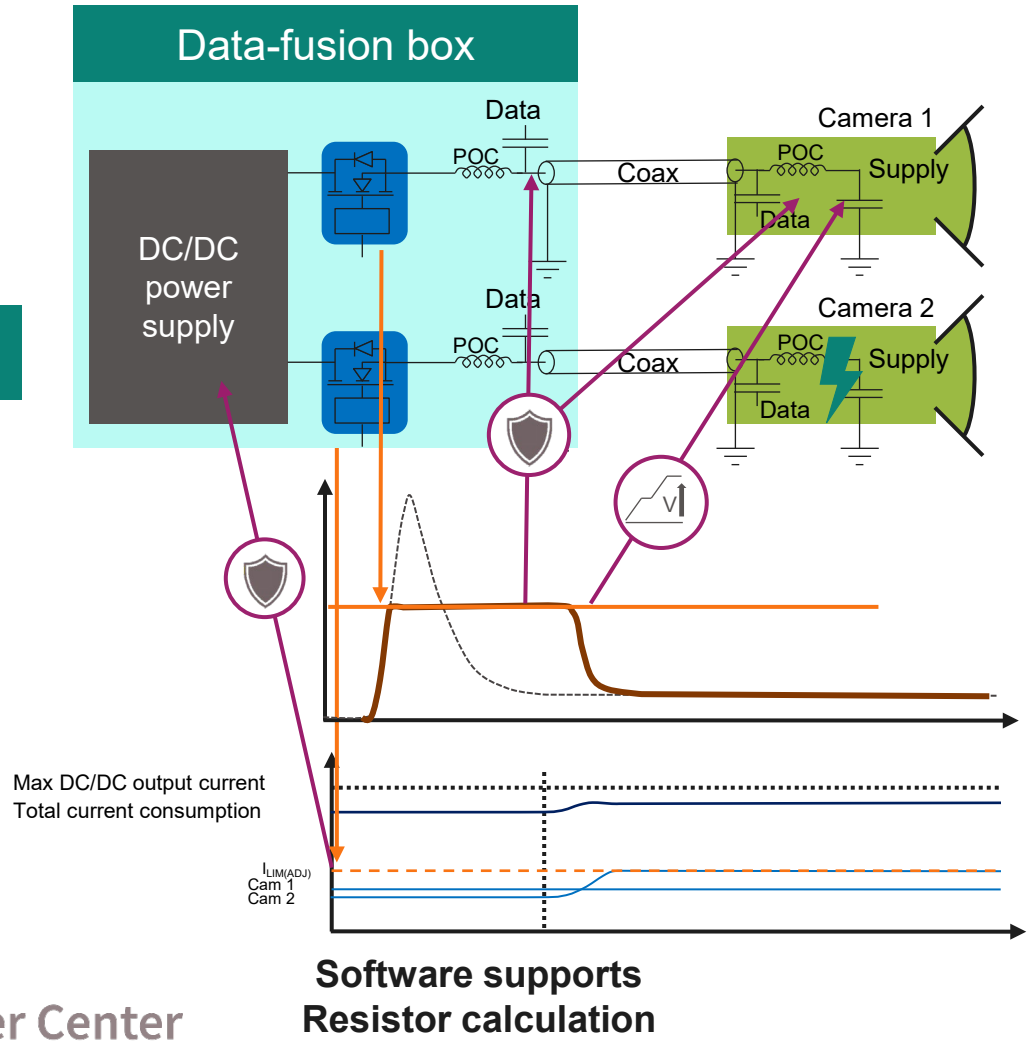
TSDSO-14

PROFET™ Load Guard 12V – highly flexible smart high-side switch for various use cases in power distribution



Adjustable overcurrent limitation

- Adjustable according to requirements 0.38 – 8.86 A
- Protect sensitive filters and loads and the local DC/DC power supply
- Stabilized power supply



Software supports Resistor calculation

Infineon Developer Center

Load supply protection

Load control & self protection

Power supply protection

Wire protection

Zone module

Camera

PRO SIL ISO 26262 ready

TSDSO-14

Infineon‘s Smart Power Switches & Gate Driver ICs
High-side Power Switches | PROFET™ Load Guard

Product Portfolio	Load current	$R_{DS(ON)}$	Overcurrent limitation range	Package
BTG7090-2EPL	1.5 A – 2.0 A	90mΩ	0.3 A ≤ I_{LIM} ≤ 4.3 A	TSDSO-14
BTG7090-1EPL	1.5 A – 2.0 A	90mΩ	0.6 A ≤ I_{LIM} ≤ 8.86 A	TSDSO-14
BTG7050-2EPL	2.5 A – 3.0 A	50mΩ	0.3 A ≤ I_{LIM} ≤ 4.3 A	TSDSO-14
BTG7050-1EPL	2.5 A – 3.0 A	50mΩ	0.6 A ≤ I_{LIM} ≤ 8.86 A	TSDSO-14

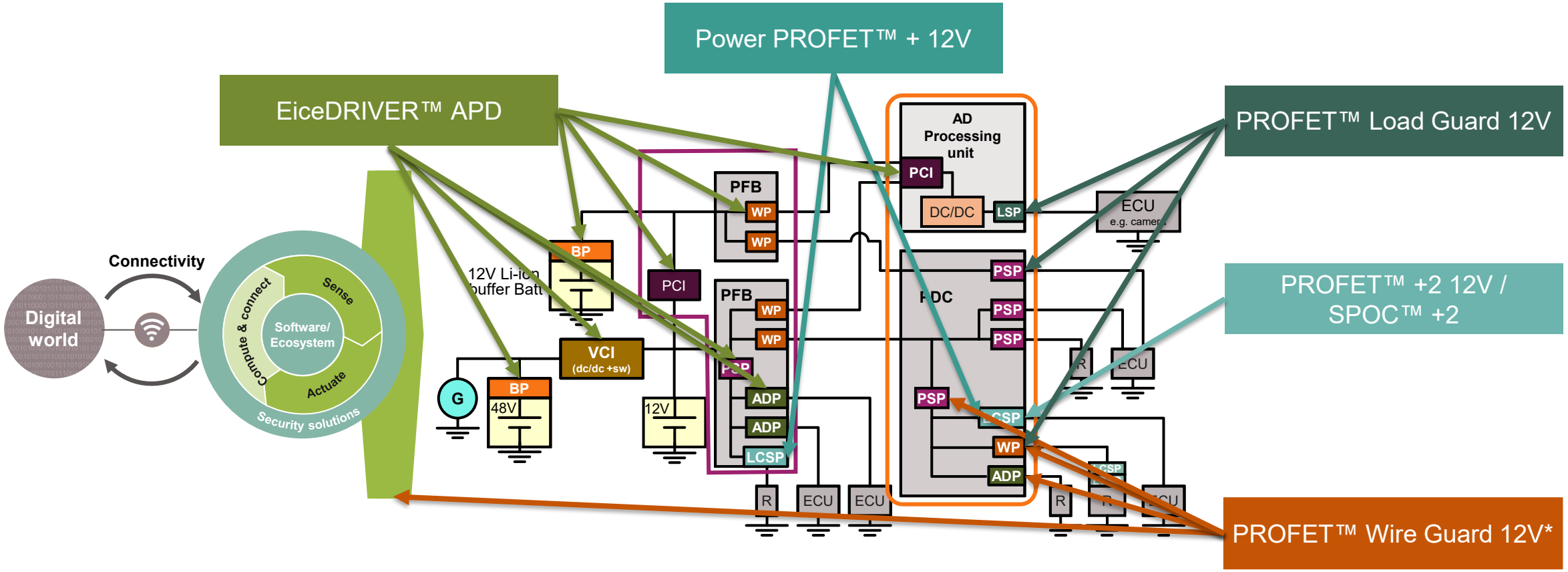
Customer benefits of adjustable overcurrent limitation of PROFET™ Load Guard 12V

- Adjustability via resistor **reduces number of external components** compared to discrete circuitry (comparator etc..)
- **Avoidance of high peak currents** to protect sensitive loads, such as ECUs
- **Design flexibility** and simplified variant handling

PRO SIL
ISO 26262 ready

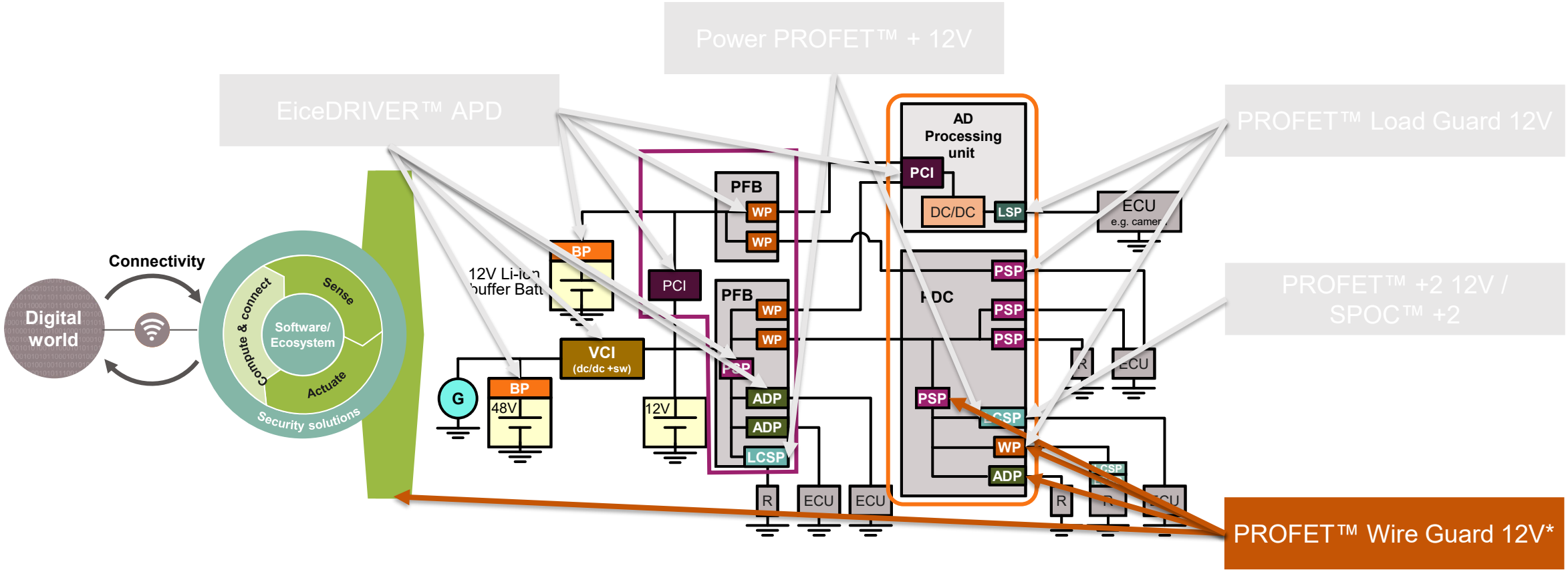
TSDSO-14

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

PROFET™ Wire Guard – integrated I²t wire protection functionality for advanced system protection in automotive power distribution

Main features

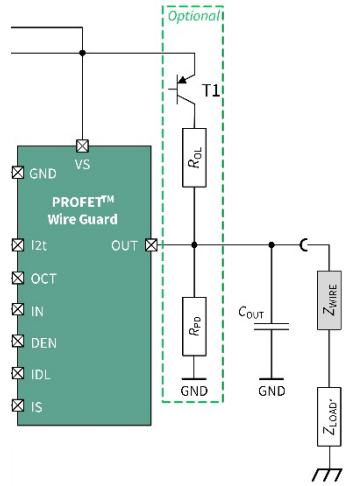
- Integrated **hardware-based I²t wire protection** for wire protection without microcontroller support
- **Automatic IDLE mode** for load control functionality available during parking by power available all time and low power consumption
- **Adjustable overcurrent protection** for fast failure isolation, increasing system protection
- **Sequential diagnosis** for advanced data analysis
- Capacitive load switching mode (CLS mode)
- **PRO-SIL™ ISO 26262-compliant**, Safety Manual available
- 1.3 – 16 mΩ 1 ch devices
- Pin-2-pin compatibility within whole family and high compatibility to PROFET™ +2 and PROFET™ Load Guard

Key benefits

- **Microcontroller-independent, hardware-based I²t wire protection**, also available in key-off mode
- **Low current consumption during parking**, keeping power available all time
- Fast failure isolation, adjustable to system requirements
- **Proactive power management and optimization of system**, based on data analysis
- Simplified use in safety-related applications and increased system robustness

Application diagram example

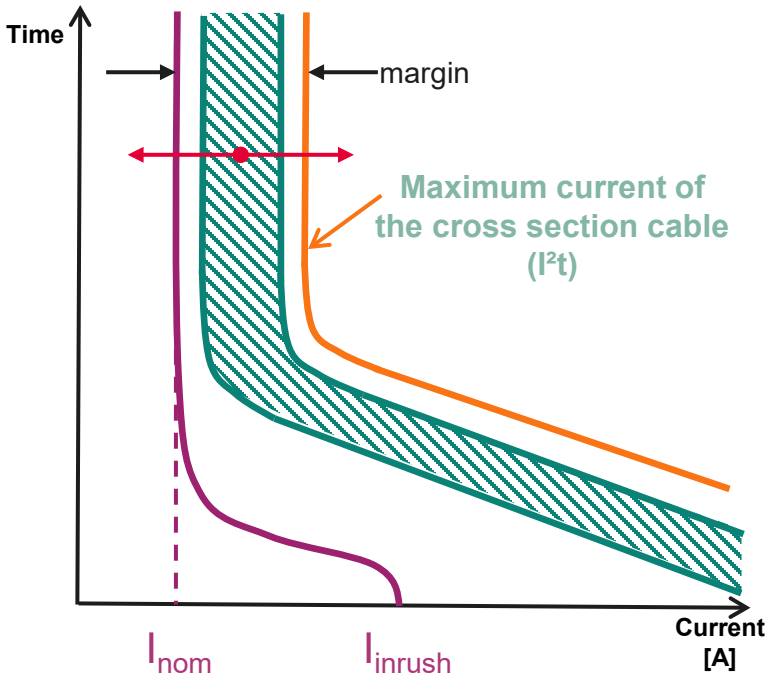
AEC Qualified



Wire protection | Load control & self protection | Active during parking | Power supply protection | Physical data provision | Power distribution | PRO SIL ISO 26262 compliant

TSDSO-14/24

PROFET™ Wire Guard – integrated I²t wire protection functionality for advanced system protection in automotive power distribution



- Slow reaction time
- Inaccurate
- Aging effects to be considered
- No diagnostic function
- Accessibility required for replacement

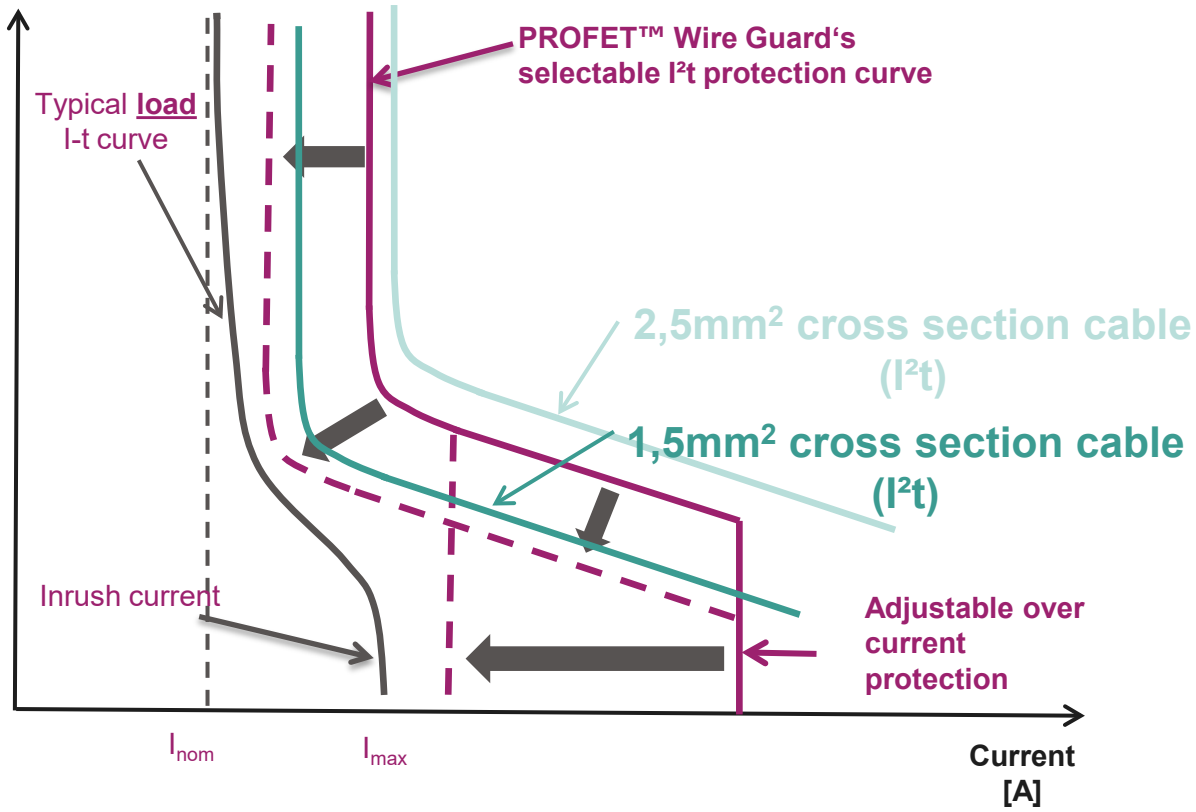
› **Fuses do not meet the requirements for wire protection in upcoming power distribution architectures**

Wire protection
Load control & self protection
Active during parking
Power supply protection
Physical data provision
Power distribution

PRO SIL
ISO 26262 compliant

TSDSO-14/24

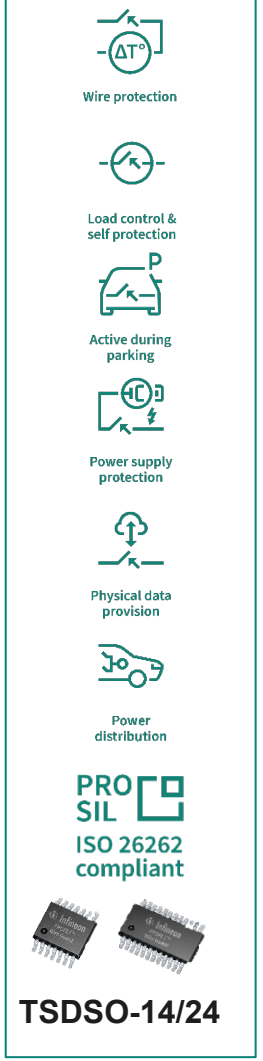
PROFET™ Wire Guard – integrated I²t wire protection functionality for advanced system protection in automotive power distribution



- Selectable I²t protection curves
- Fast, standalone hardware protection, fast failure isolation
- Wire protection in IDLE mode
- High wire protection accuracy (I²t)
- Wire harness optimization (↓ cost, ↓ weight)

Infineon Developer Center

Software supports I²t protection curve selection



PROFET™ Wire Guard – integrated I²t wire protection functionality for advanced system protection in automotive power distribution

PROFET™ +2 12V		PROFET™ Wire Guard		PROFET™ Load Guard
TSDSO-14	TSDSO-24	TSDSO-14	TSDSO-24	TSDSO-14
	BTS70012-1ESP BTS70015-1ESP BTS70020-1ESP		PROFET™ Wire Guard	
BTS7002-1EPP				
BTS7004-1EPP		PROFET™ Wire Guard		
BTS7006-1EPP				
BTS7008-1EPA/P				
BTS7010-1EPA BTS7012-1EPA				
BTS7008-2EPA BTS7040-1EPA BTS7010-2EPA				
BTS7012-2EPA BTS7020-2EPA BTS7030-2EPA				BTG7050-1EPL
BTS7040-2EPA BTS7080-2EPA				BTG7050-2EPL
BTS7120-2EPA BTS7200-2EPA				BTG7090-1EPL
BTS7200-4EPA				BTG7090-2EPL

Wire protection

Load control & self protection

Active during parking

Power supply protection

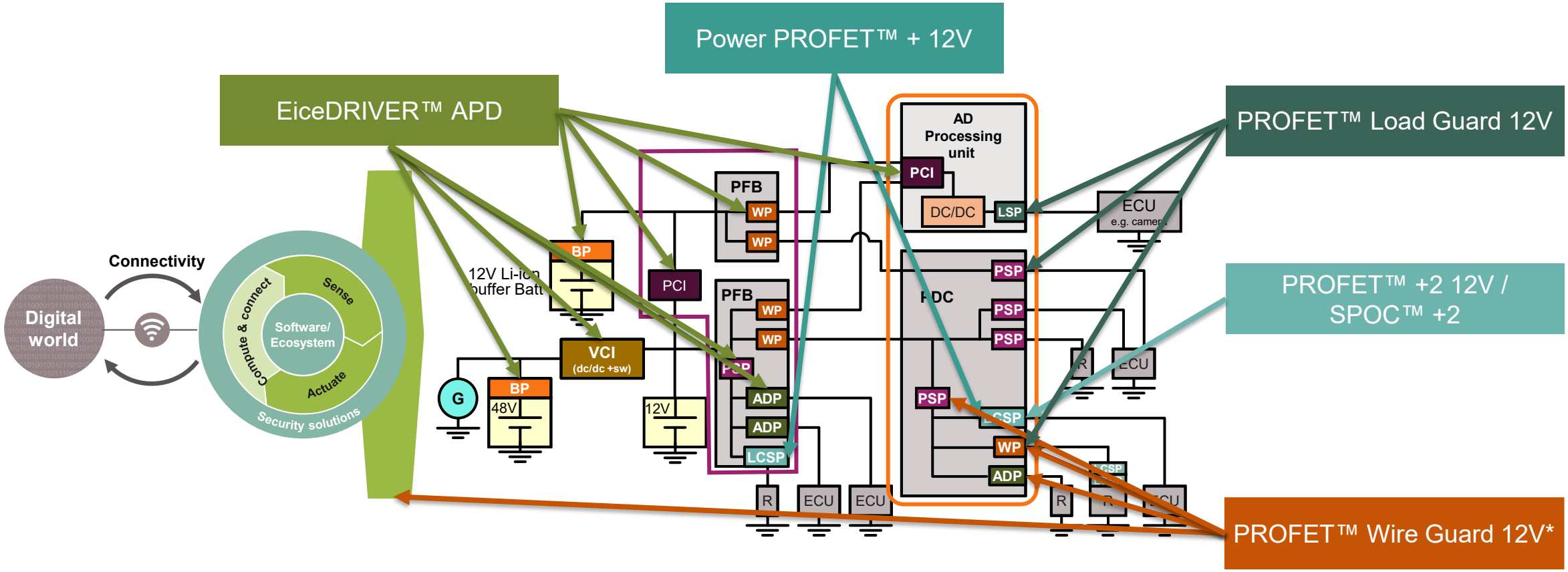
Physical data provision

Power distribution

PRO SIL ISO 26262 compliant

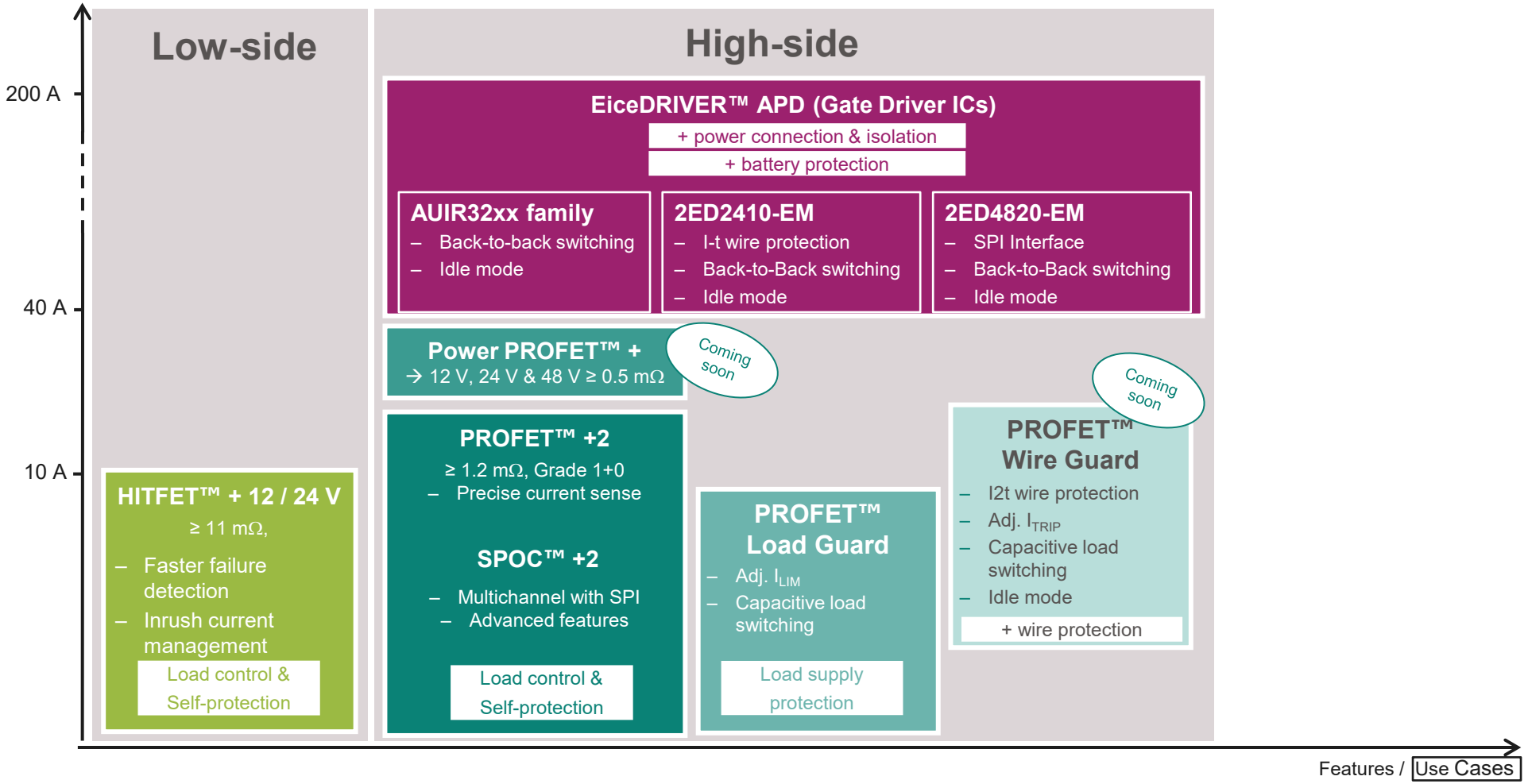
TSDSO-14/24

Infineon offers a broad portfolio of smart power drivers & switches to serve multiple use cases in secondary power distribution



* Coming soon

Infineon‘s Smart Power Switches & Gate Driver ICs for Automotive Power Distribution for 12 / 24 and 48 V

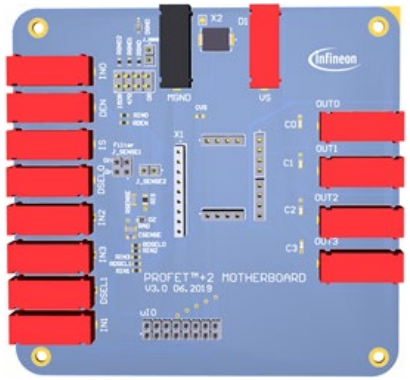


- Suitable portfolio for **wide range of applications** and load currents
- **Optimized feature sets** for different use cases, e.g. wire protection
- **Scalable family concepts** for cost optimized solutions
- High level of **function and package compatibility** to ensure best design flexibilty
- Ready to support future **fail operational PD architectures**

Remark: Overview shows only an extract of the portfolio

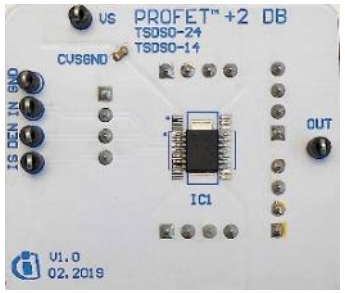
Table of contents

Infineon is offering a broad range of hardware design support via various evaluation boards



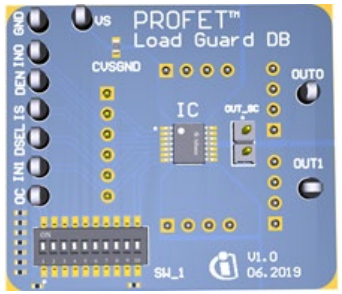
PROFET™ ONE4ALL MB V1

www.infineon.com/switches



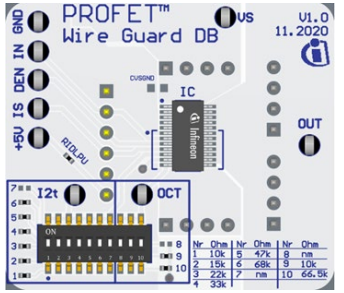
PROFET™ +2 Daughterboards

www.infineon.com/profet+2



PROFET™ Load Guard Daughterboards

www.infineon.com/profetloadguard

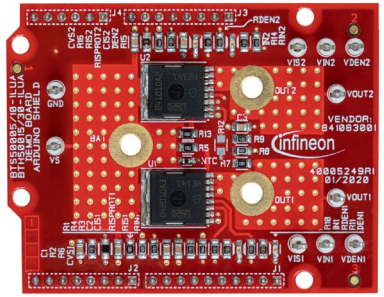


PROFET™ Wire Guard Daughterboards

www.infineon.com/profetwireguard

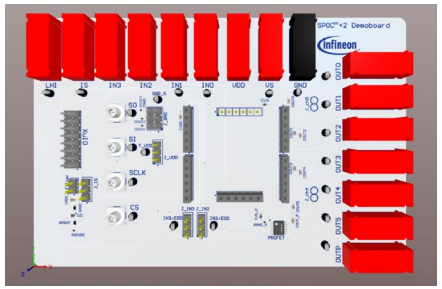
Find more boards at

www.infineon.com/switches



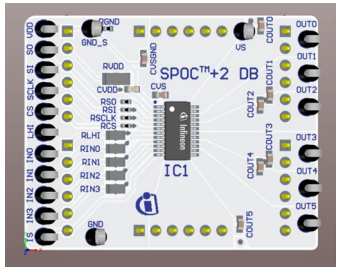
Power PROFET™ + Evaluation boards

www.infineon.com/powerprofet



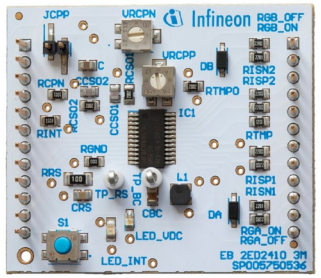
SPOC-2 MOTHERBOARD

www.infineon.com/spoc



SPOC™ +2 Daughterboards

www.infineon.com/spoc



EiceDRIVER™ APD Motherboard

www.infineon.com/automotive-eicedriver

Infineon is offering software and tools to support fast and efficient designs of intelligent power devices for power distribution

Infineon Smart Power Switches & Gate Driver Tool Suite

accessible via the Infineon Developer Center Launcher

Finder & Selection Tools

- Infineon Smart Power Switches Finder
- Infineon Gate Driver ICs Finder
- Infineon MOSFET Finder

Configuration Tools

- Infineon Smart Power Switches Configuration Wizard
- Infineon EiceDRIVER™ 2ED4820 EB Configuration Wizard

Simulation & Modeling Tools

- Infineon Smart Power Switches PROFET™ Guard Tool
- Infineon Smart Power Switches EiceDRIVER™ 2ED2410 Tool
- Infineon Smart Power Switches kILIS Tool
- Infineon Smart Power Switches Intrinsic Fuse Tool

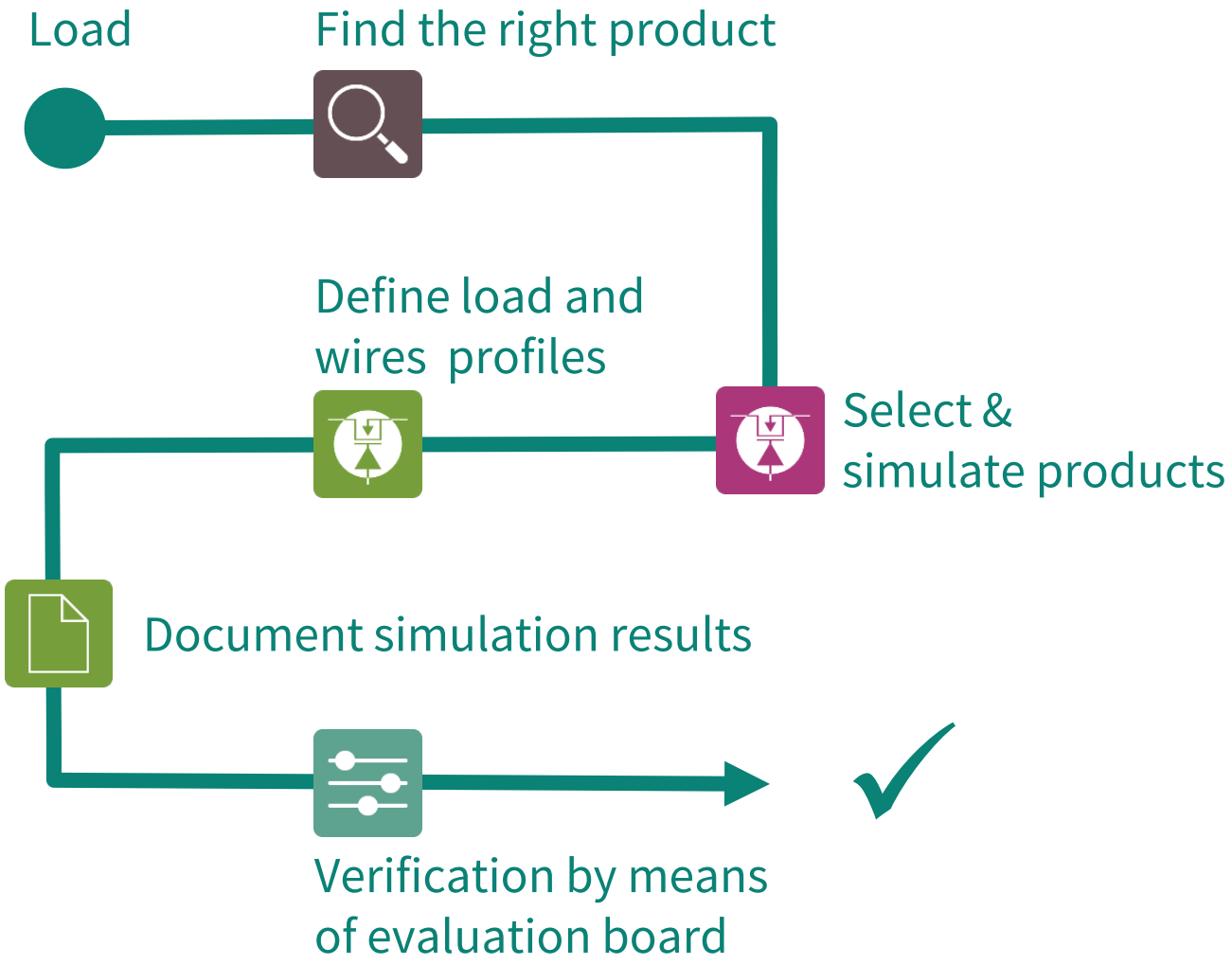
Utility Tools

- Infineon Smart Power Switches Load and Wire Entry Tool
- Infineon Report Tool

Infineon Smart Power Switches & Gate Driver Tool Suite

Infineon is offering software and tools to support fast and efficient designs of intelligent power devices for power distribution

How does the Infineon Smart Power Switches and Gate Driver Tool Suite support during the design-in process ?



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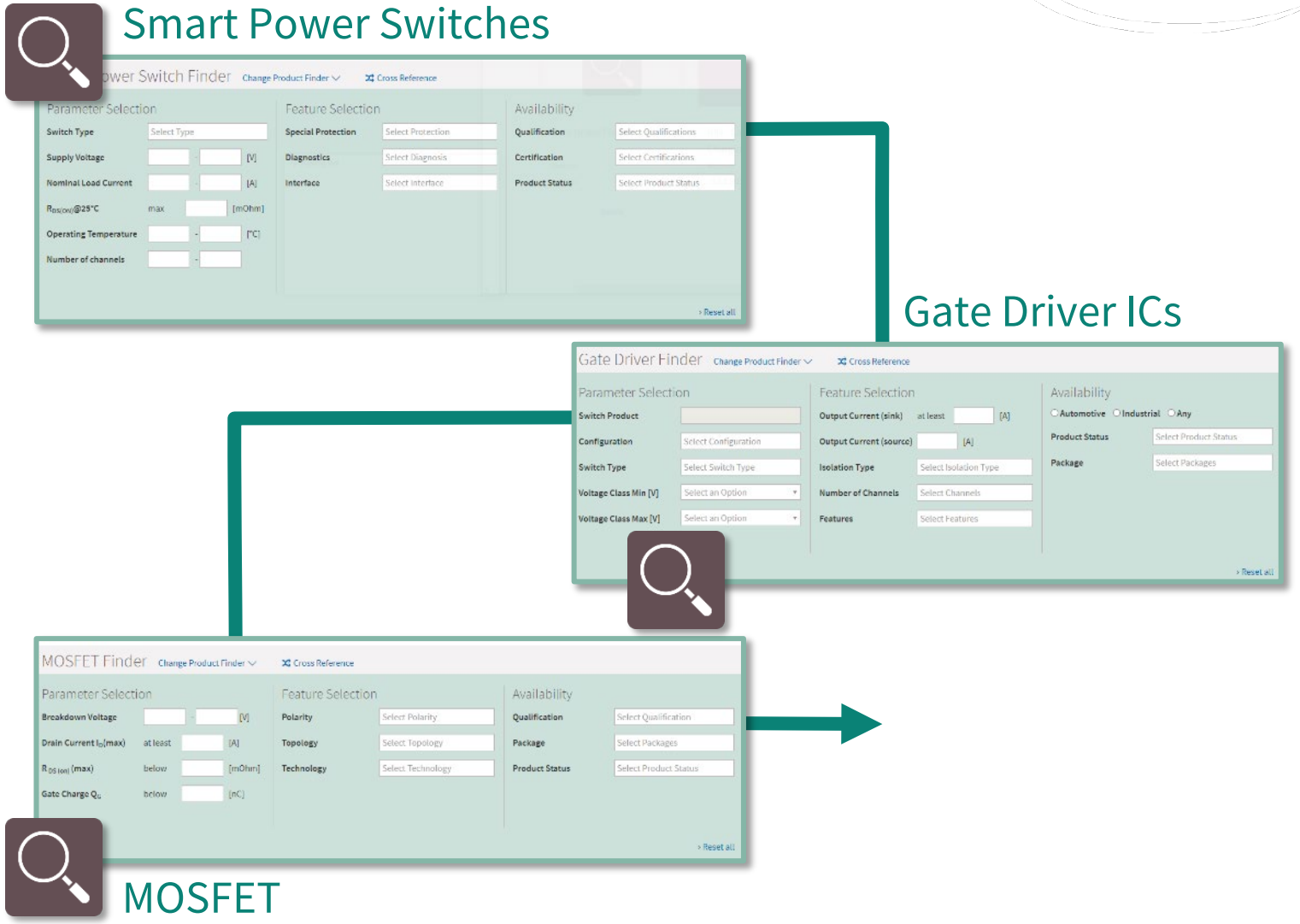
Finder & Selection Tools

- Infineon Smart Power Switches Finder
- Infineon Gate Driver ICs Finder
- Infineon MOSFET Finder



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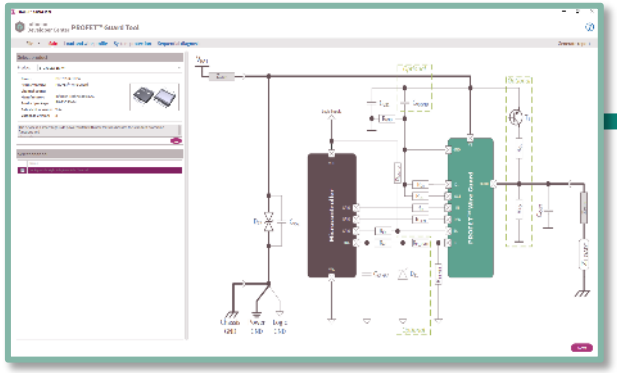
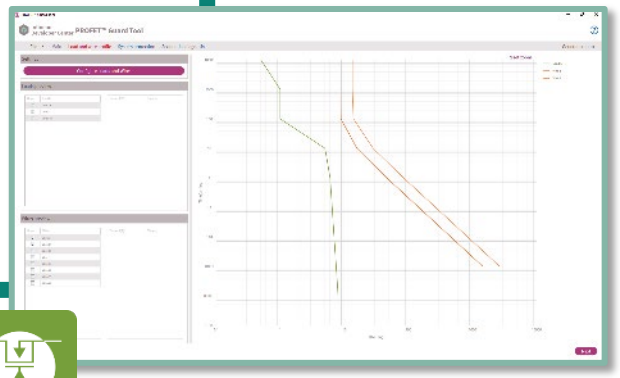
Simulation & Modeling Tools

- Infineon Smart Power Switches PROFET™ Guard Tool
- Infineon Smart Power Switches EiceDRIVER™ 2ED2410 Tool

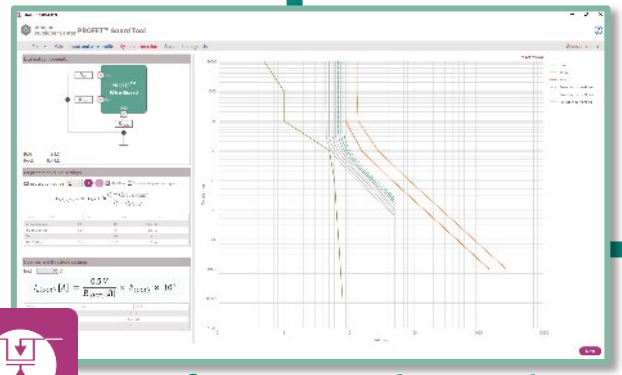
These tools allow to configure and simulate different protection behaviors and to compare them to load and wire profiles. In addition it offers additional simulation: e.g. power consumption, sequential diagnosis….



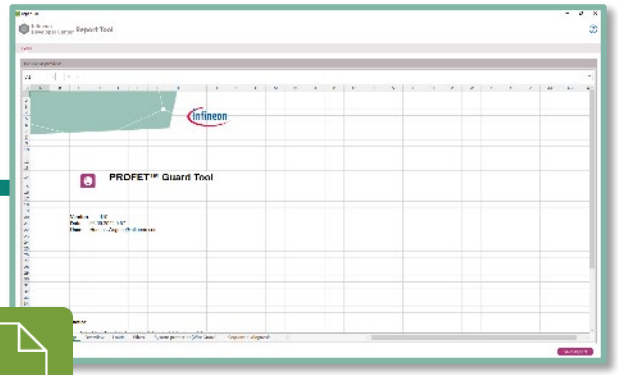
Select product



Define load & wires



Configure and simulate protection



Generate Report

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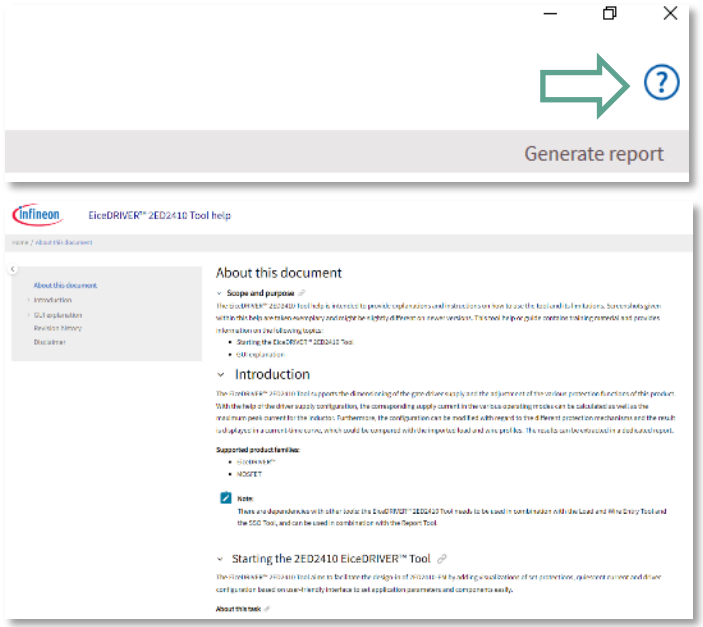
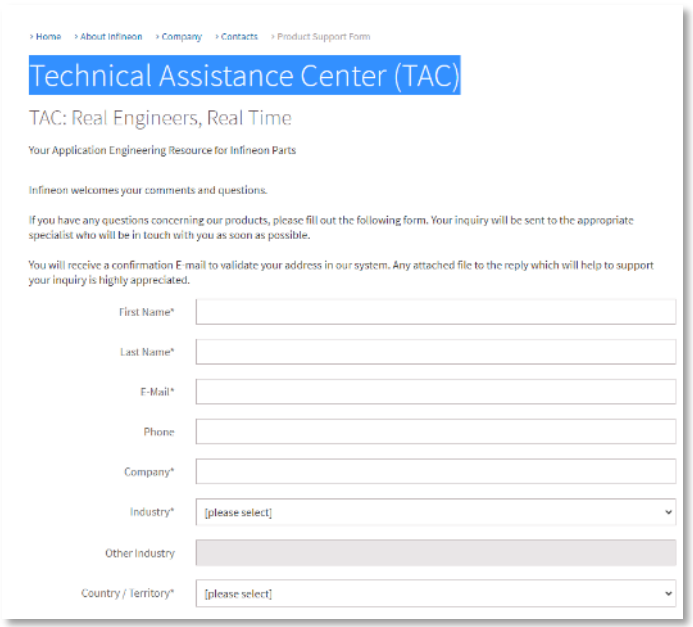
Infineon Smart Power Switches & Gate Driver Tool Suite is offered with different collaterals and support services

Tool Help



Video trainings (MyInfineon – MyICP)

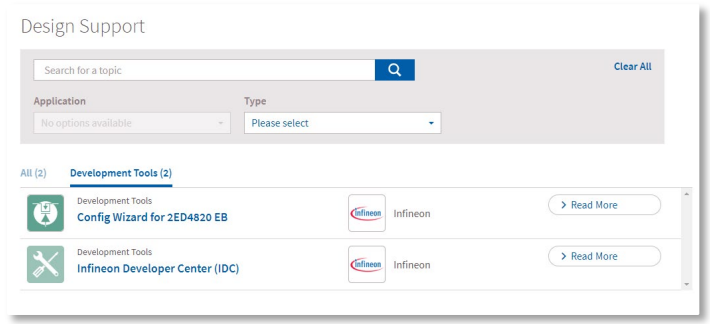
Technical Assistance Center (TAC)



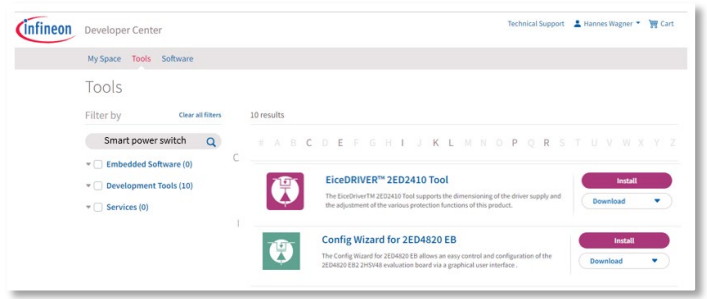
Infineon is offering software and tools to support fast and efficient designs of intelligent power devices for power distribution

How to download the Infineon Smart Power Switches & Gate Driver tools ?

Product related tools are listed on the product page



and in the Infineon Developer Center Launcher, Filter “Smart Switch”



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Infineon Developer Community – A Quick Summary

Infineon Developer Community (community.infineon.com) - Trusted platform for technical support & knowledge sharing.

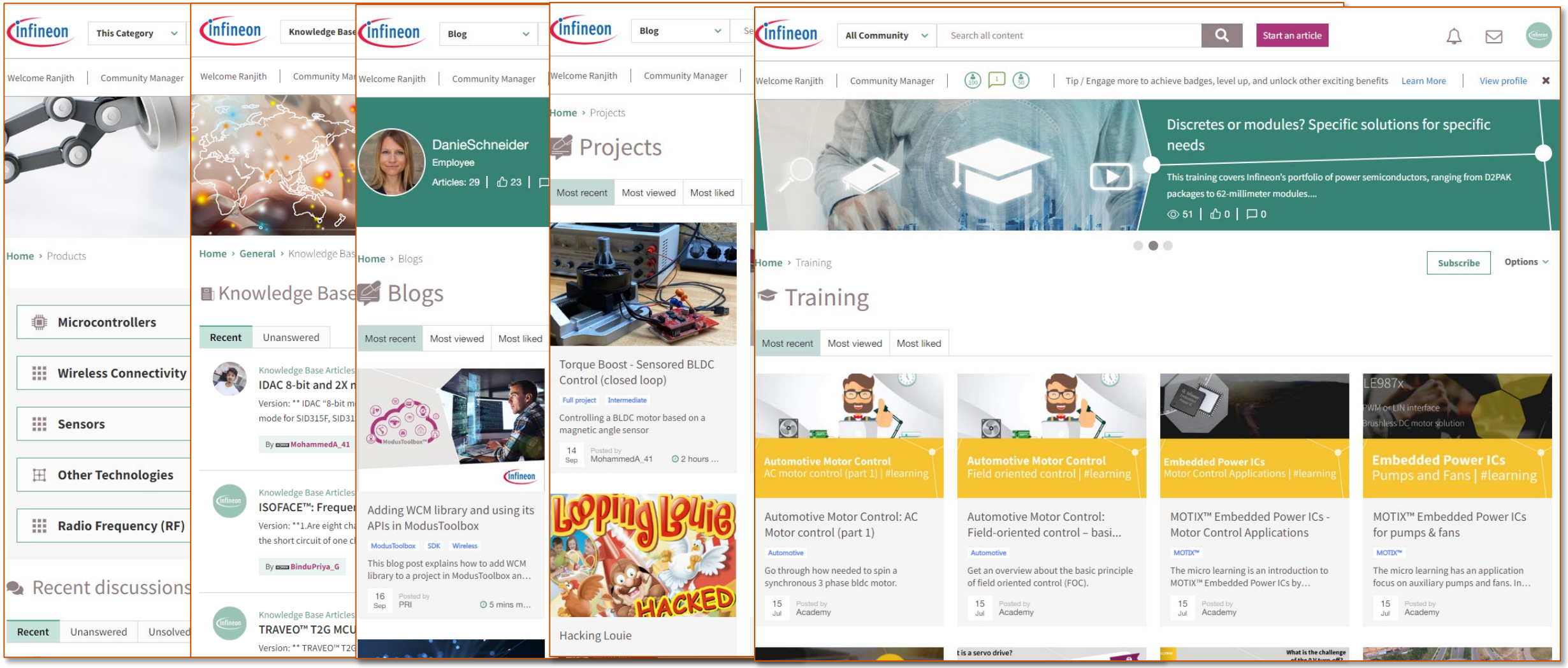
Infineon support engineers & champion members are there to answer your questions at anytime, anywhere, within a multitude of topics, and in your preferred language.
68K discussions, 40K members, 39K answers delivered

Search through already existing discussions, knowledge articles, blogs, code examples, trainings, projects, or ask your own questions (only with non-confidential information).

Register to create your community profile and unlock all member benefits, or you can easily sign-in using your myInfineon credentials. You can also achieve various rewards and recognition based on your contributions.

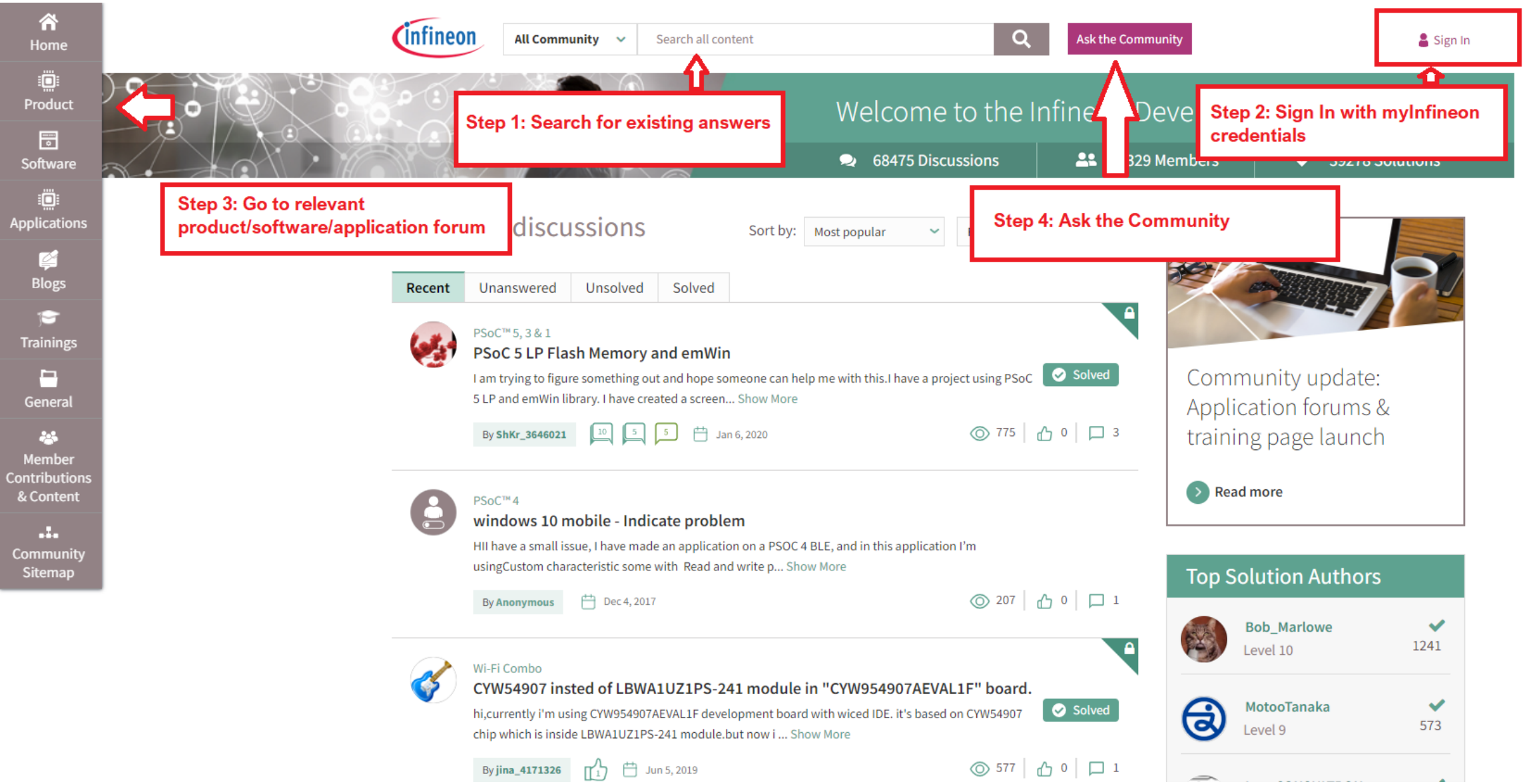
Ask Answer Share Connect Collaborate

Content on Community



› Forums › KBAs › Blogs › Projects › Training

Easy steps to get started with the Infineon Developer Community



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We make life easier, safer, and greener.
Together with our customers and partners.
For a better tomorrow.

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www.infineon.com/switches


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