

自动驾驶域控制器满足功能安全要求的电源解决方案

石博

汽车电源与功能安全系统架构师

2022年6月



SECURE CONNECTIONS
FOR A SMARTER WORLD

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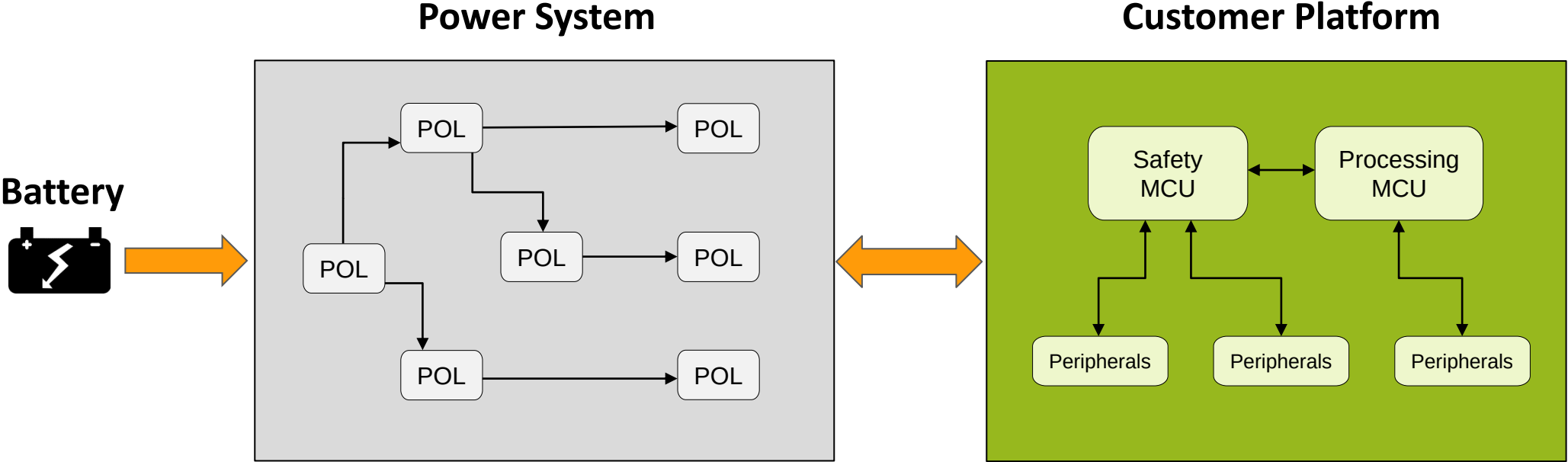


AGENDA

- BYLink Concept Introduction
- NXP Off-battery PMIC Device Portfolio
- NXP Low Voltage PMIC Portfolio
- BYLink Multiprocessor Demo Board
- NXP BYLink Concept Power Sequencing
- NXP BYLink Concept Safety Management
- BYLink Concept Collaterals
- BYLink Power Solution for Different Processors



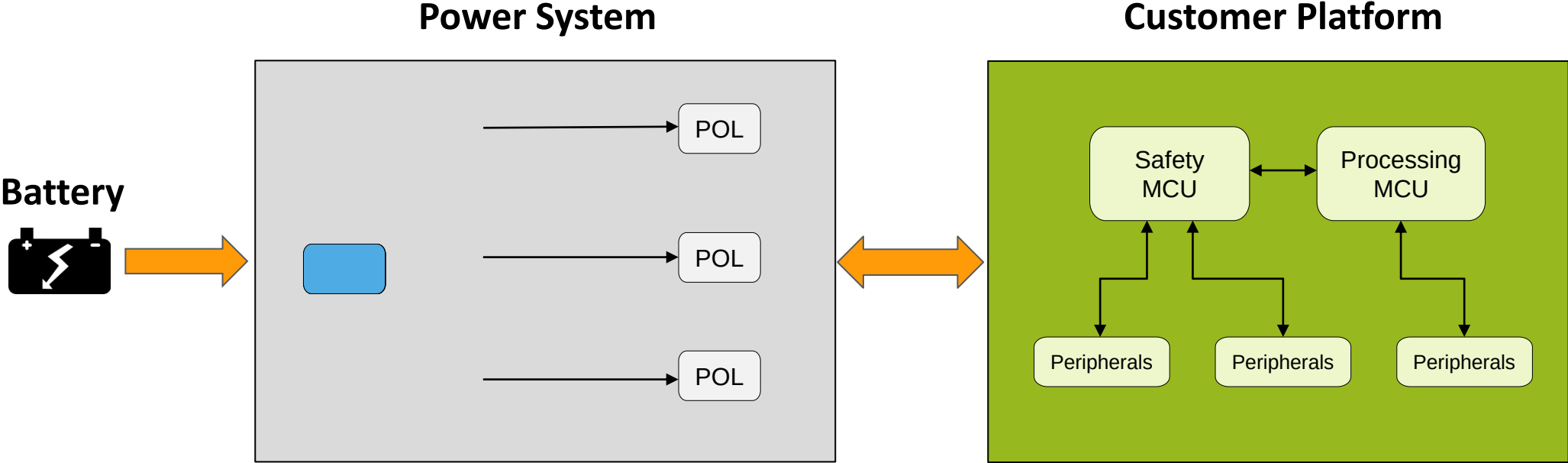
NXP BYLINK ARCHITECTURE INTRODUCTION



*POL: Point Of Load



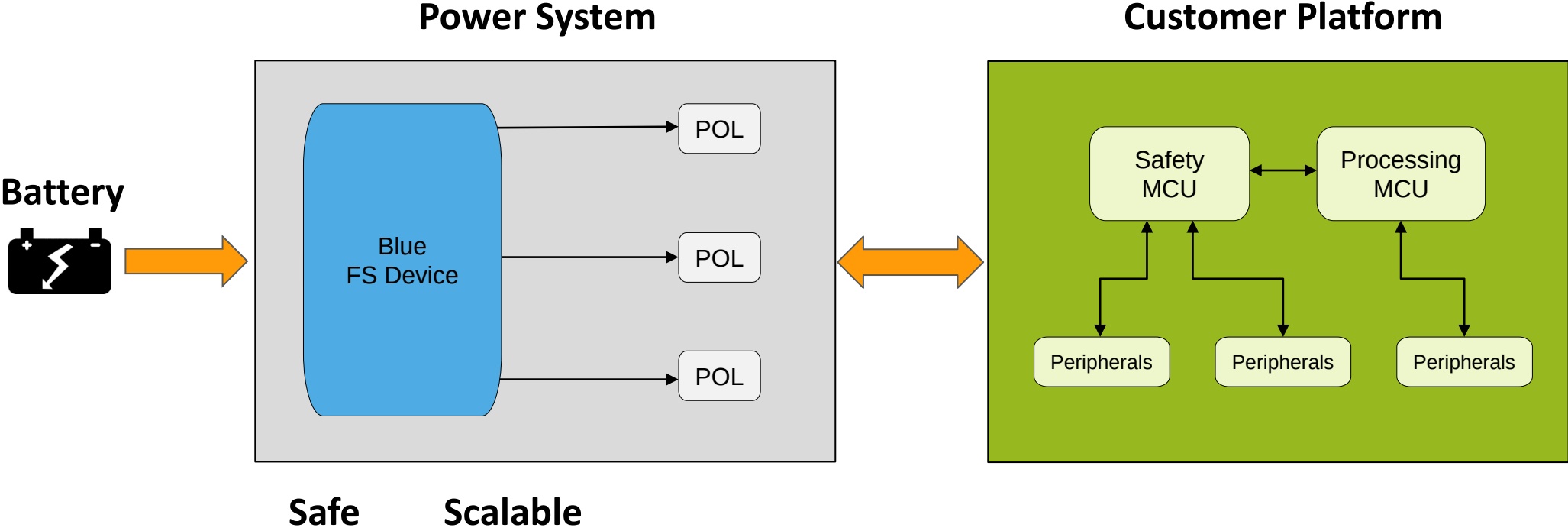
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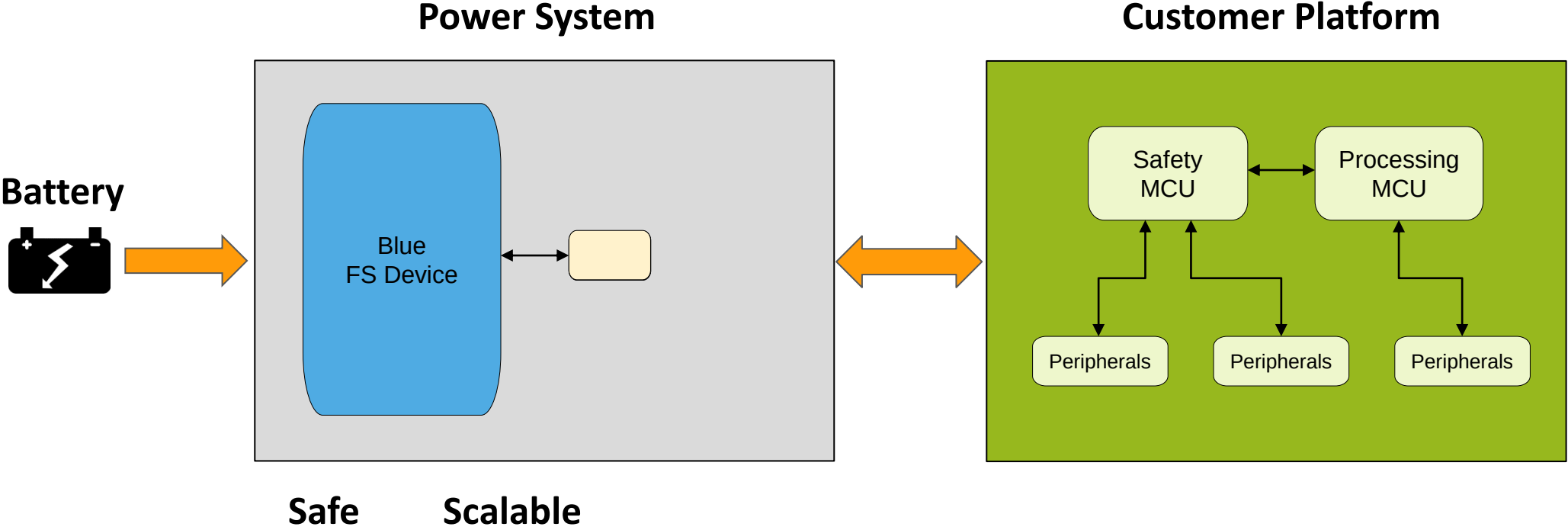
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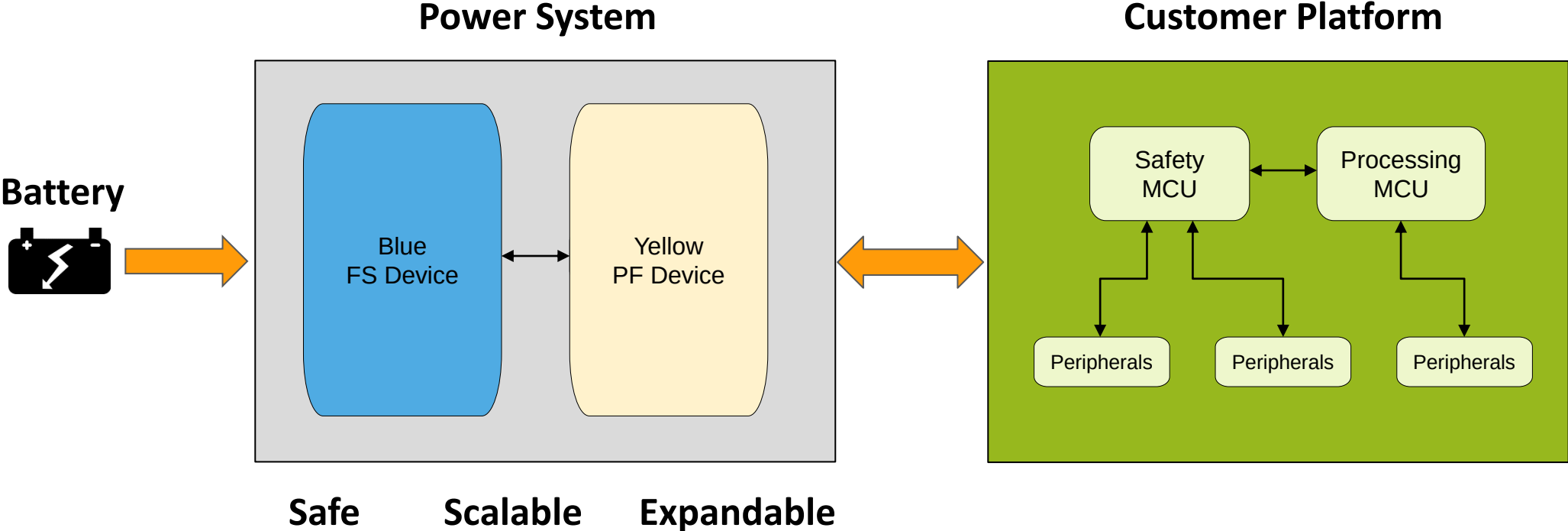


NXP BYLINK ARCHITECTURE INTRODUCTION



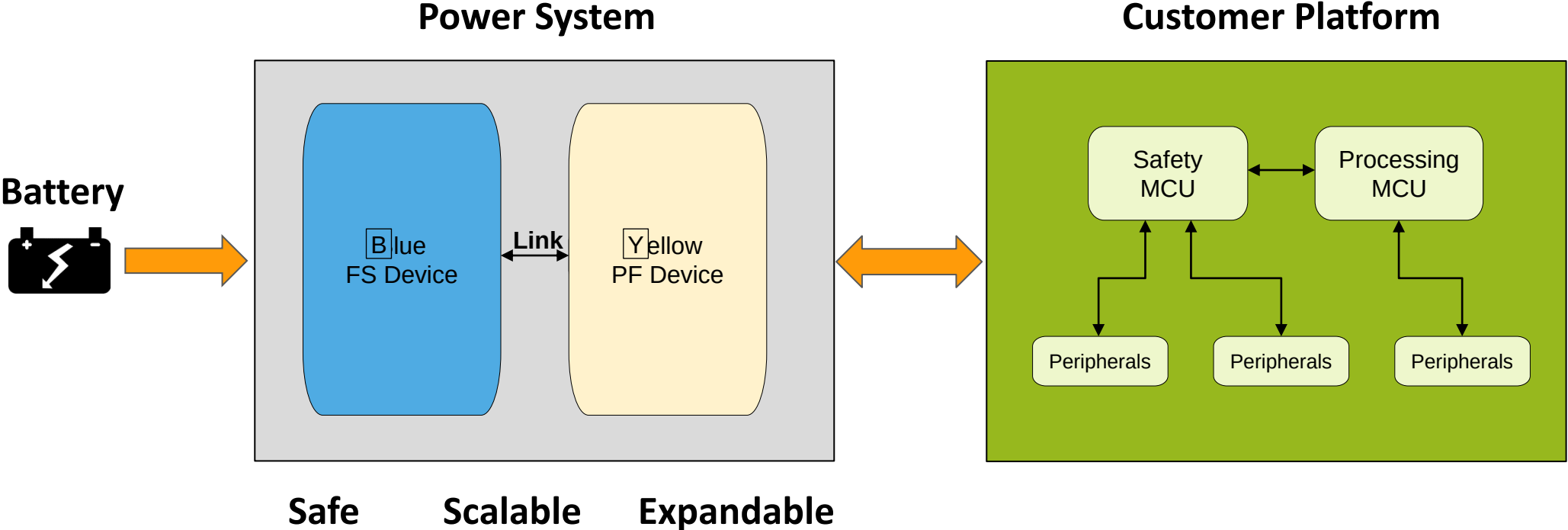


NXP BYLINK ARCHITECTURE INTRODUCTION



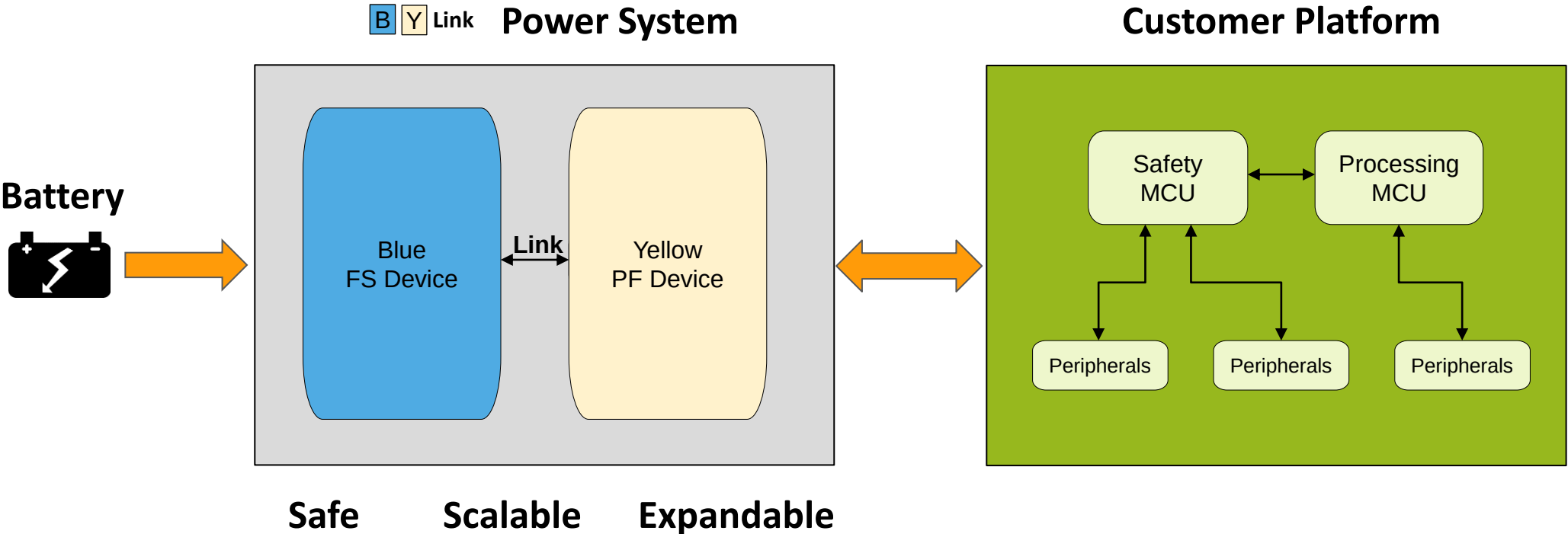


NXP BYLINK ARCHITECTURE INTRODUCTION





NXP BYLINK ARCHITECTURE INTRODUCTION





NXP BYLINK ARCHITECTURE INTRODUCTION

FEATURES

- Pin to pin compatible PMICs:
 - Safety Scalability: From QM to ASIL-D
 - Power rail Scalability: Output, Power-seq
- Common configuration interface for easy software portability
- Cascaded system PMICs behave as ONE with safety and sequencing synchronization



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BENEFITS

- Enable Platform Strategy
- Eases safety integration
- SoC and domain agnostic





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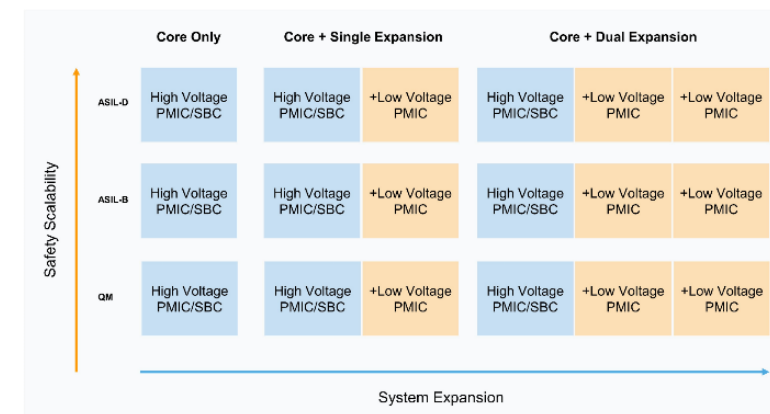
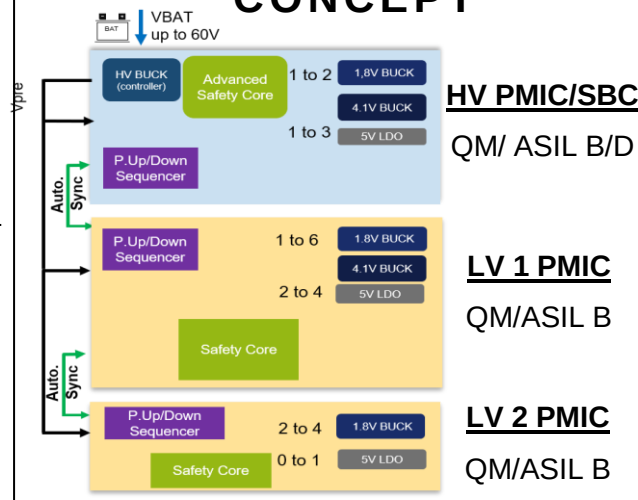
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CONCEPT



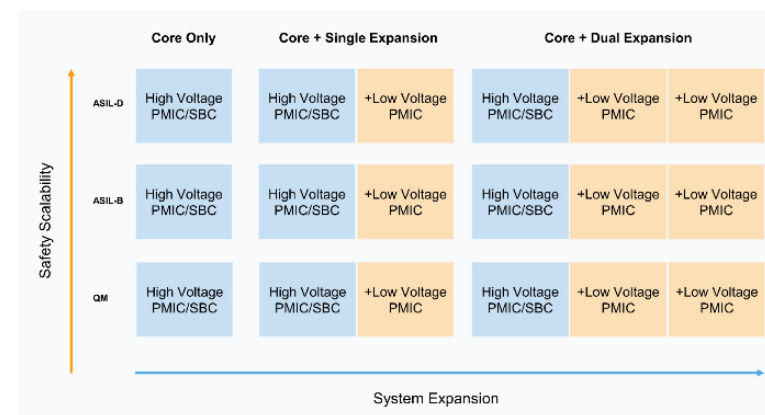
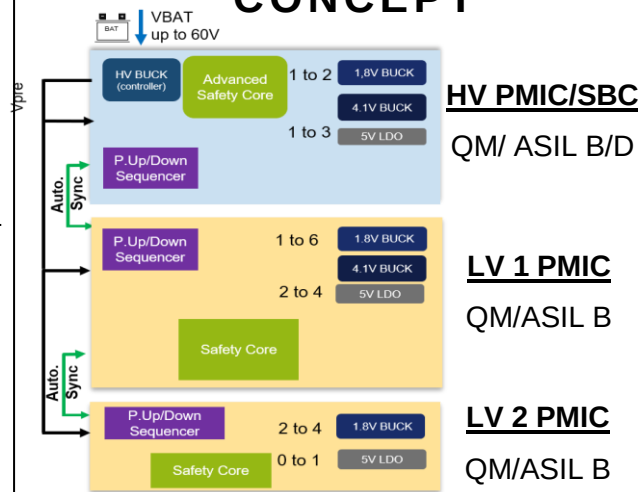


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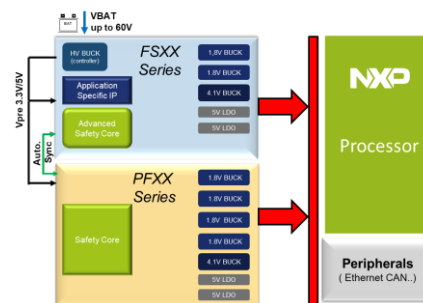
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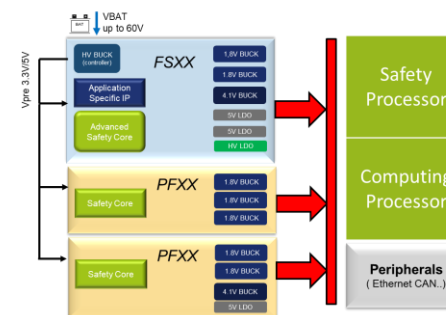


APPLICATION USES CASES

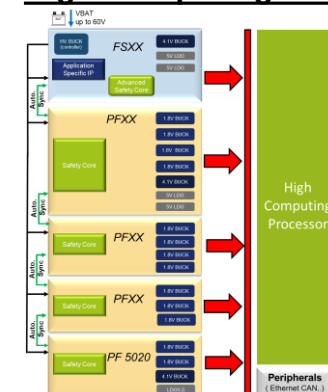
Global System Solution



Multi Processor System



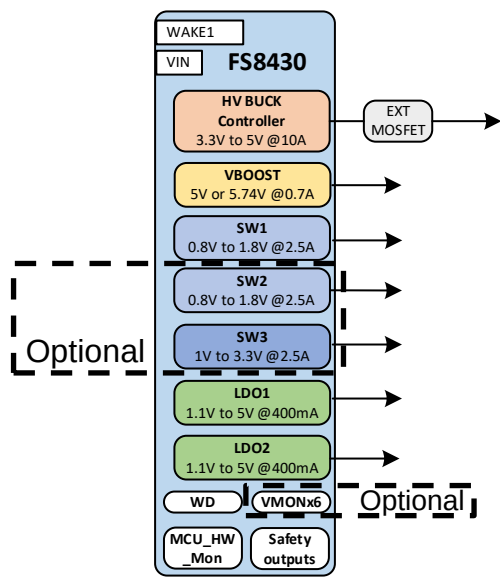
High Computing Soc





NXP FS DEVICE PORTFOLIO

VR5500/FS84/FS85–VPRE 10 A
QM / ASIL B / ASIL D
QFN56



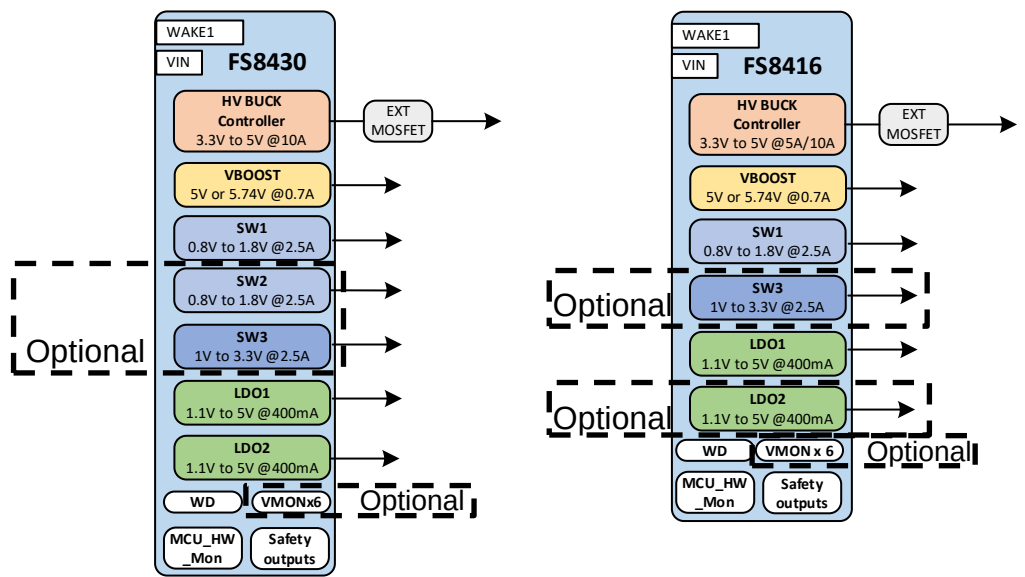
12 V/24V compliant	12 V Automotive systems	12 V/24 V compliant
VMON accuracy +/-2%		VMON accuracy +/-1%
OTP Flexibility: Power-up/down sequence configuration, settings, safety mechanisms		
Safety: Safety scalability / LBIST / ABIST / Watchdog / MCU HW error Mon / voltage monitoring		
HV BUCK 450 Khz/2.25 Mhz / LVBUCK 2.25 Mhz-2.5 A		



NXP FS DEVICE PORTFOLIO

VR5500/FS84/FS85–VPRE 10A
QM / ASIL B / ASIL D
QFN56

FS8416 – VPRE 5A/10A
QM / ASIL B
QFN48



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12 V Automotive systems

12 V/24 V compliant

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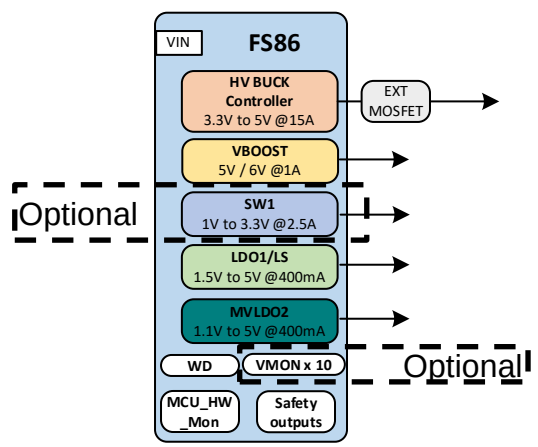
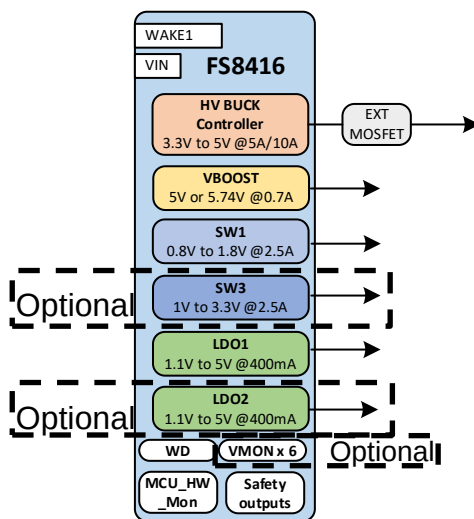
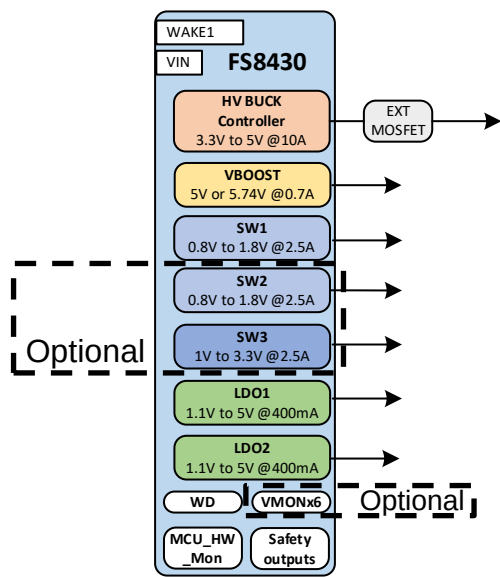


NXP FS DEVICE PORTFOLIO

VR5500/FS84/FS85 – VPRE 10A
QM / ASIL B / ASIL D
QFN56

FS8416 – VPRE 5A/10A
QM / ASIL B
QFN48

FS8600 – VPRE 15A
ASIL B/D
QFN48



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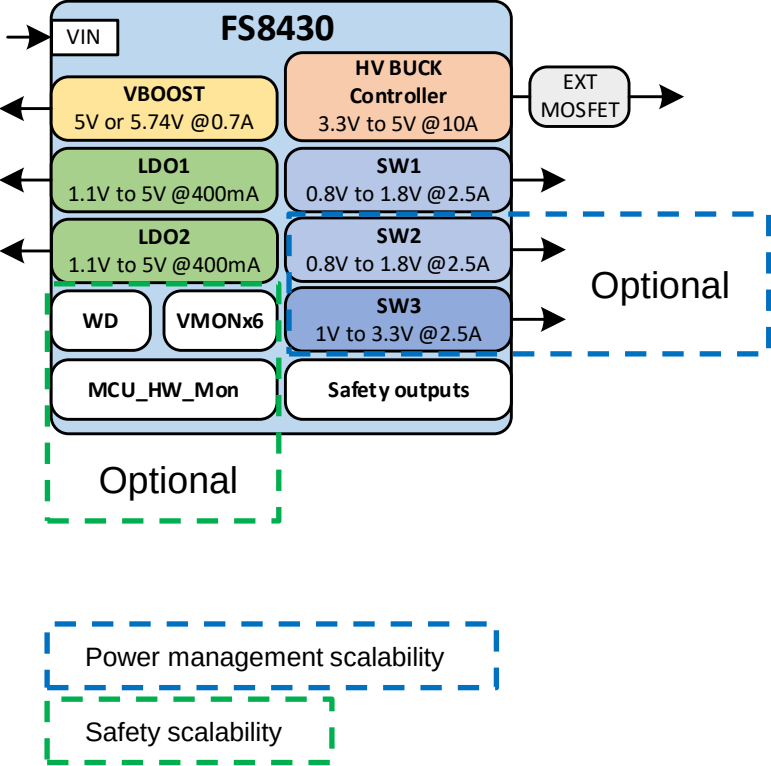
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NXP FS DEVICE SCALABILITY

VR5500 / FS84 / FS85 – VPRE 10A
QM / ASIL B / ASIL D
QFN56

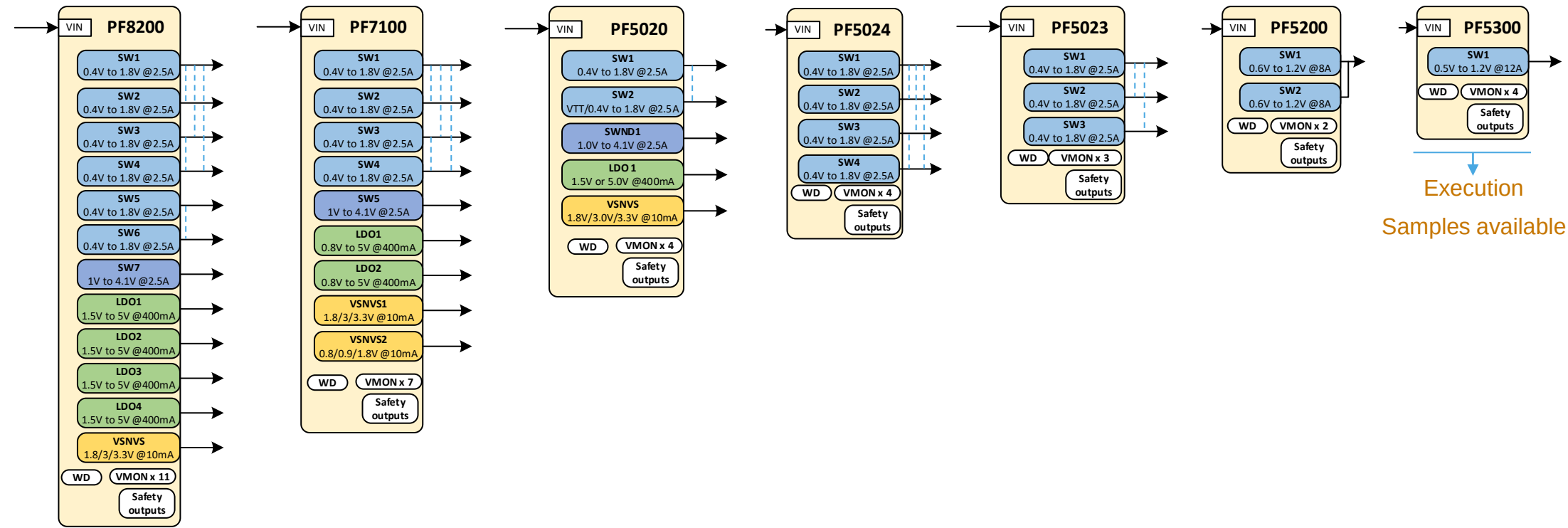


	Platform approach Pin to pin compatible		
	VR5500 – QFN56	FS84 - QFN56	FS85 - QFN56
HV BUCK	10A	10A	10A
SW1	✓	✓	✓
SW2	✓	Optional	Optional
SW3	✓	Optional	Optional
LDO1	✓	✓	✓
LDO2	✓	✓	✓
Vmon	3	Optional 4 or 6	Optional 4 or 6
ABIST	No	✓	✓
MCU_HW_Mon	No	Optional	✓
WD	No	Simple	Challenger
ASIL	QM	B	D

SW Portability



NXP PF DEVICE PORTFOLIO

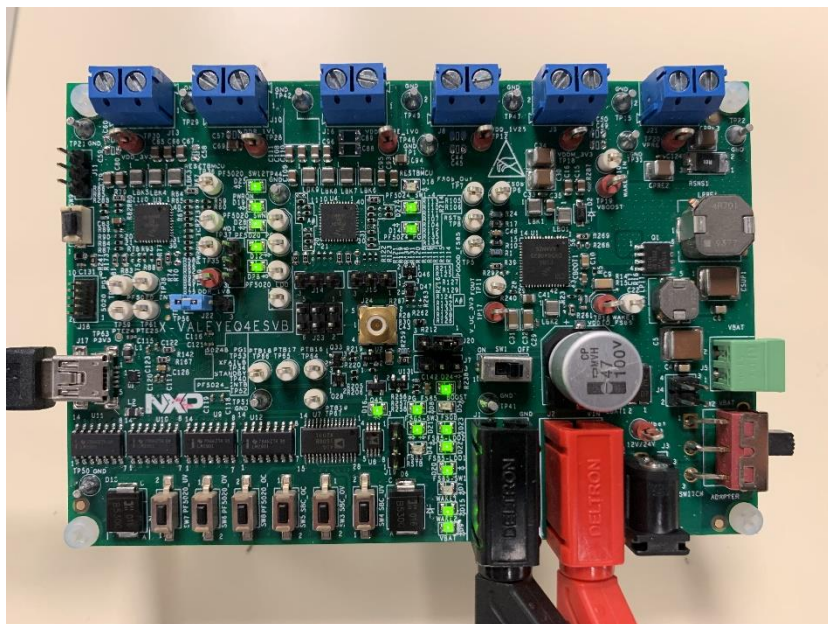


High integration PMIC for SOC core supply (multiphase), IOs, and peripherals		High Power (SOC Core supply)	
Dynamic Voltage Scaling		AVP	
Safety : Safety scalability (QM / ASIL B) / ABIST / Watchdog / voltage monitoring		QM/ASIL B/ASIL D	
OTP Flexibility : Power-up/down sequence configuration, settings, safety mechanisms			
LVBUCK 2.2 Mhz-2.5 A		2.2MHz 8A	2.2MHz 12A



NXP BYLINK MULTIPROCESSOR DEMO BOARD

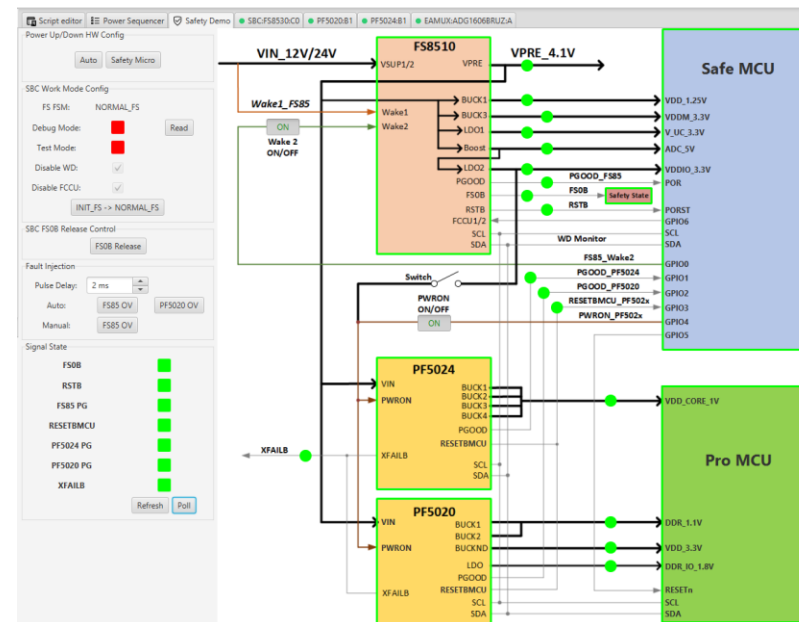
HARDWARE



Multiprocessor system demo board for camera application

- FS85 for safety MCU, peripherals, and pre-regulator
- PF5024 for Processing MCU Core supply
- PF5020 for other Processing MCU rails
- Launched in Q1 2022
- Solution ready (schematics, BOM, layout) for camera application

SOFTWARE



FlexGUI for configuration and diagnosis:

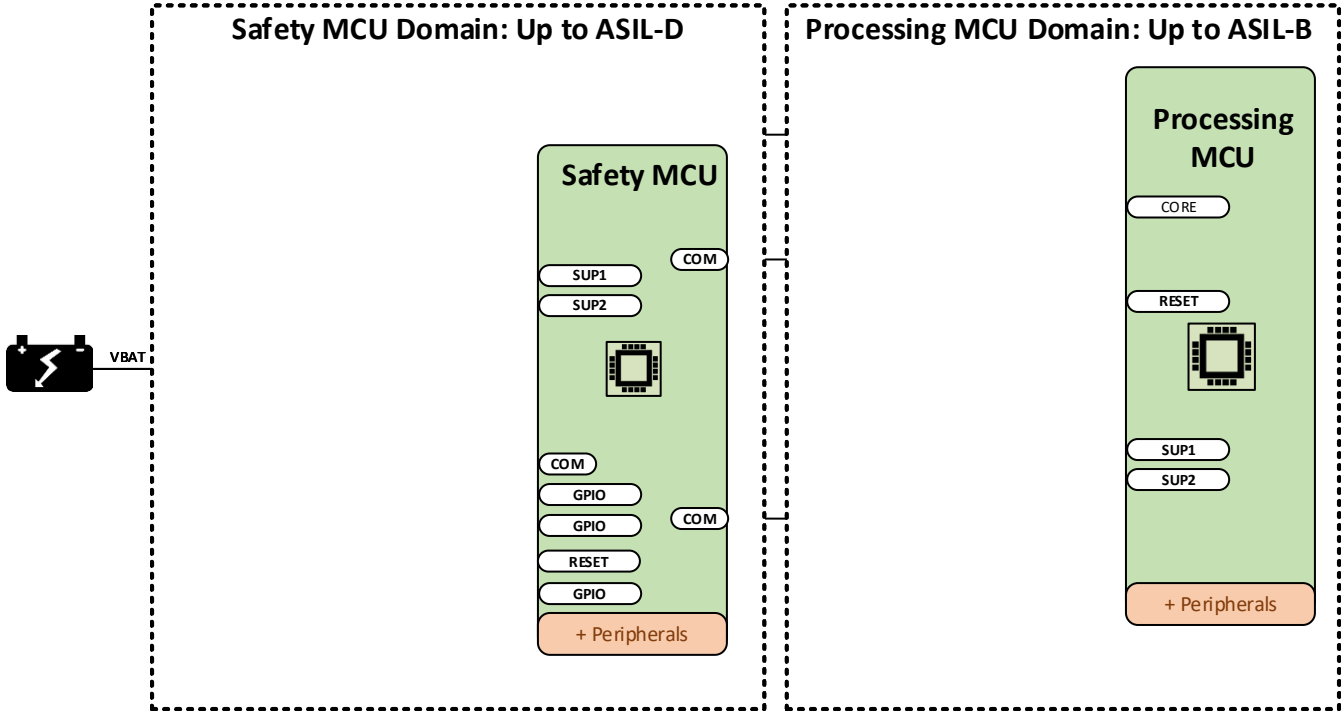
- User friendly interface to learn about power sequencing and safety
- OTP emulation for power-up sequencing
- Fault injection on FS or PF devices
- Register map and interrupt access for each devices



NXP BYLINK MULTIPROCESSOR DESIGN

Application:

- Safety MCU: Supply rails, RESET, GPIOs, COM (I2C/SPI)
- Processing MCU: Supply rails, RESET
- Peripherals: transceivers (CAN), switches, DDR





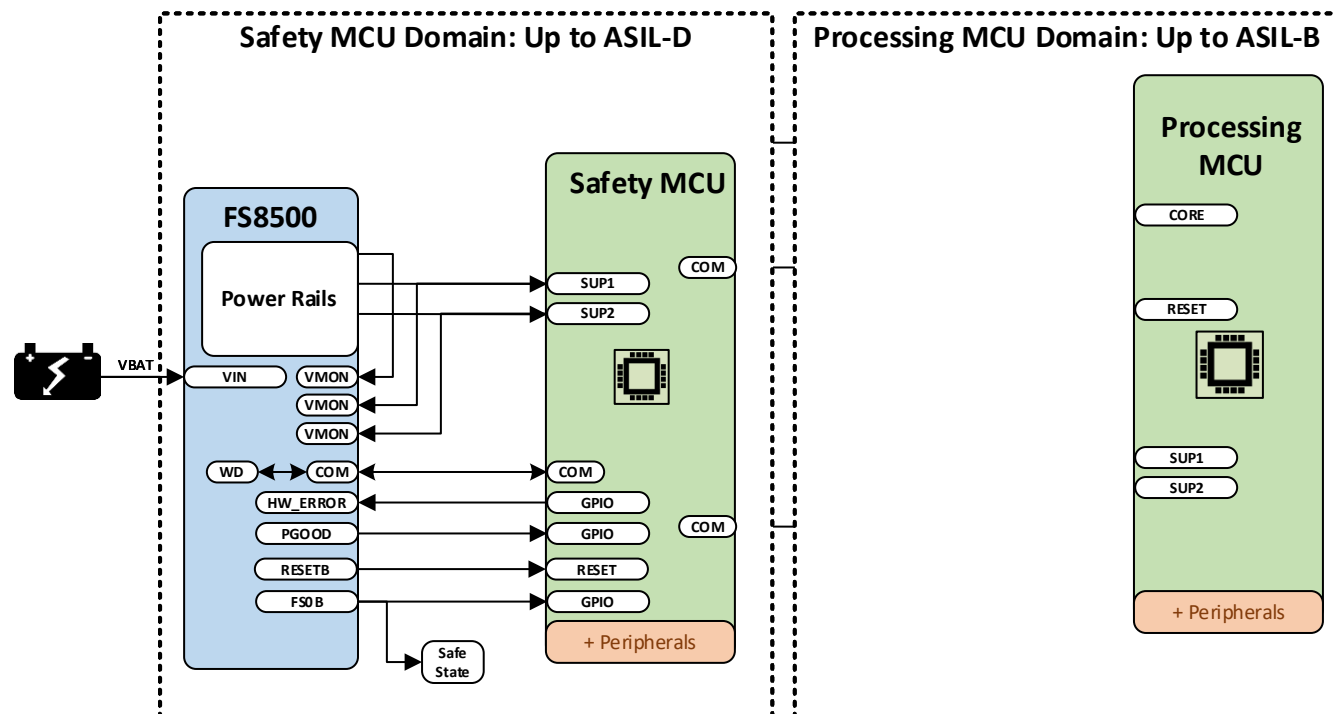
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HV PMIC

- FS85: Safety MCU supply, LV PMICs supply
 - COM (I2C/SPI)
 - Monitoring (VMON, Watchdog, HW error)
 - Safety outputs (PGOOD, RESETB, FS0B)





NXP BYLINK MULTIPROCESSOR DESIGN

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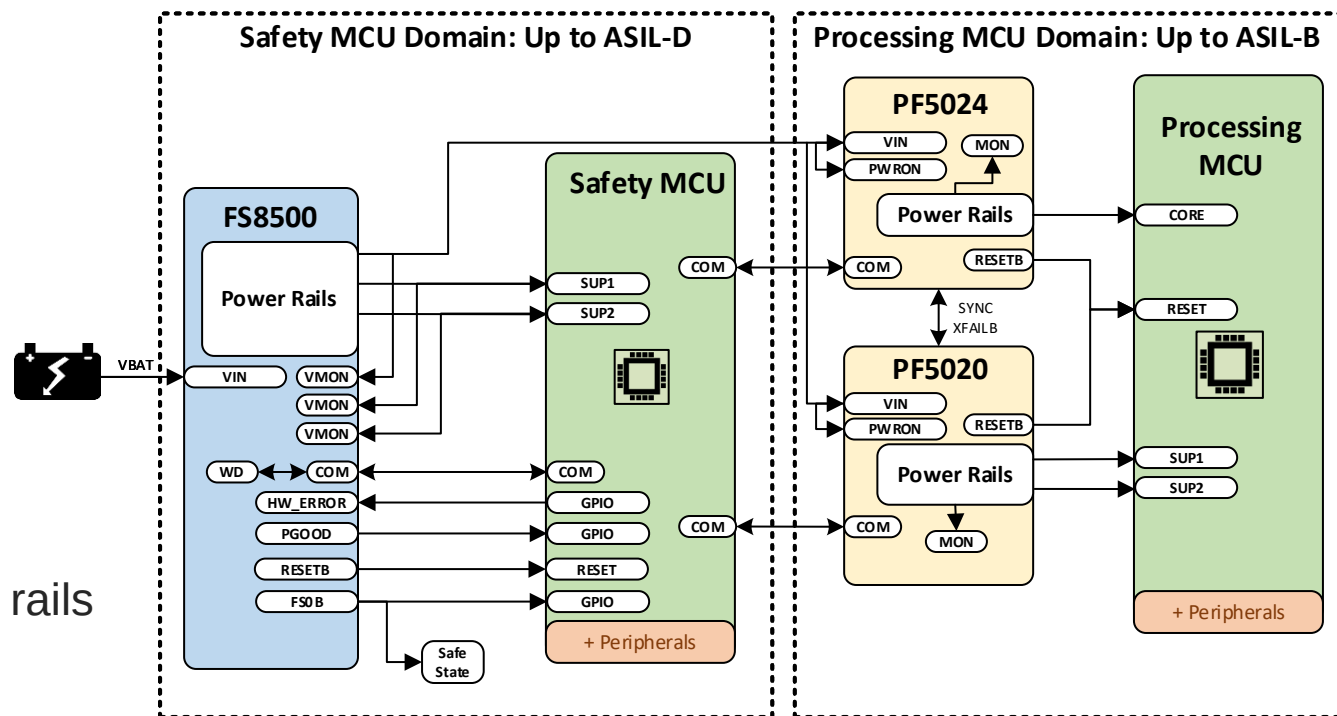
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 - COM (I2C/SPI)
 - Monitoring (VMON, Watchdog, HW error)
 - Safety outputs (PGOOD, RESETB, FS0B)

LV PMIC

- PF5024 + PF5020: Processing MCU core & other rails
- COM (I2C)
- Monitoring (VMON)

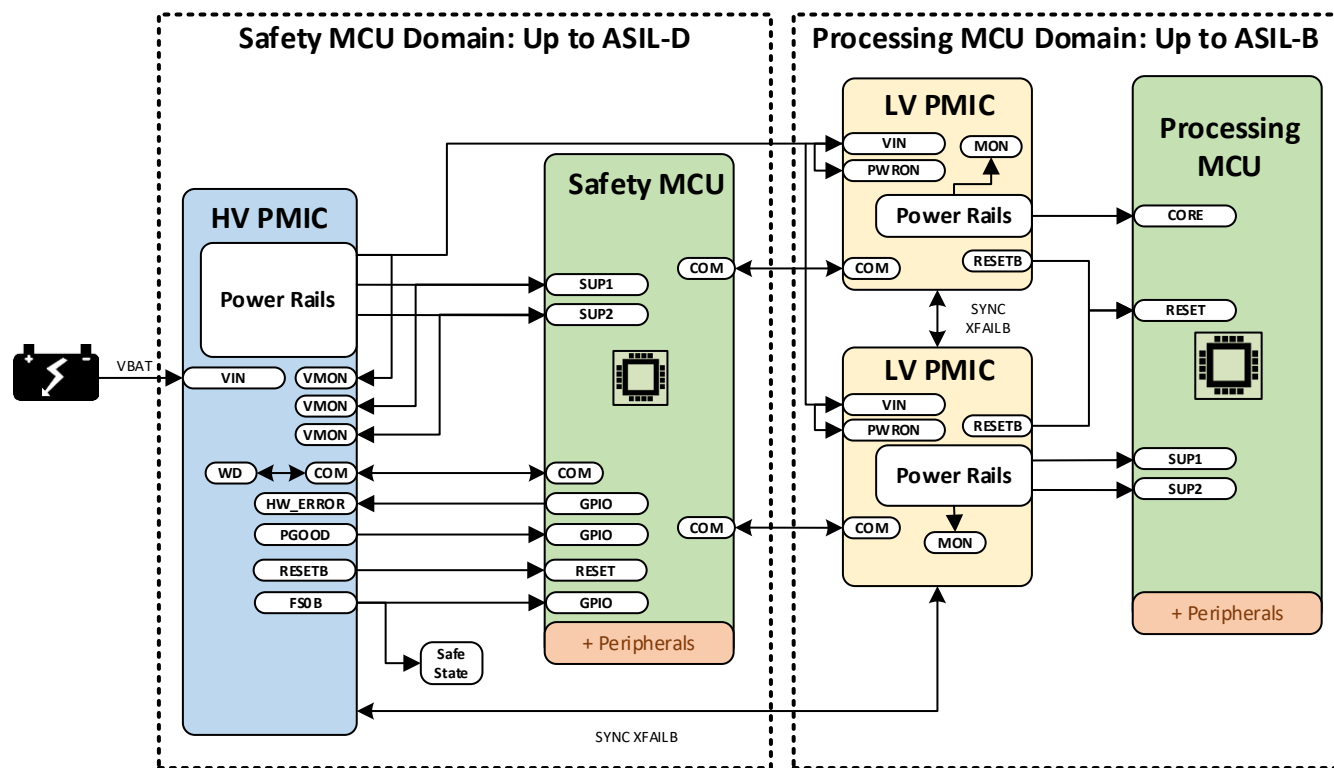




NXP BYLINK CONCEPT POWER SEQUENCING

- **XFAILB pin**

- XFAILB is a bidirectional pin with an open drain output (normally pull-up 1V5 supply)
- The OTP_XFAILB_EN bit is used to enable/disable XFAILB mode of operation
- Used to synchronize power up and power down sequences of two or more PMIC
- Power-up sequencing start once all XFAILB are released
- XFAILB pin should be asserted low during the off modes

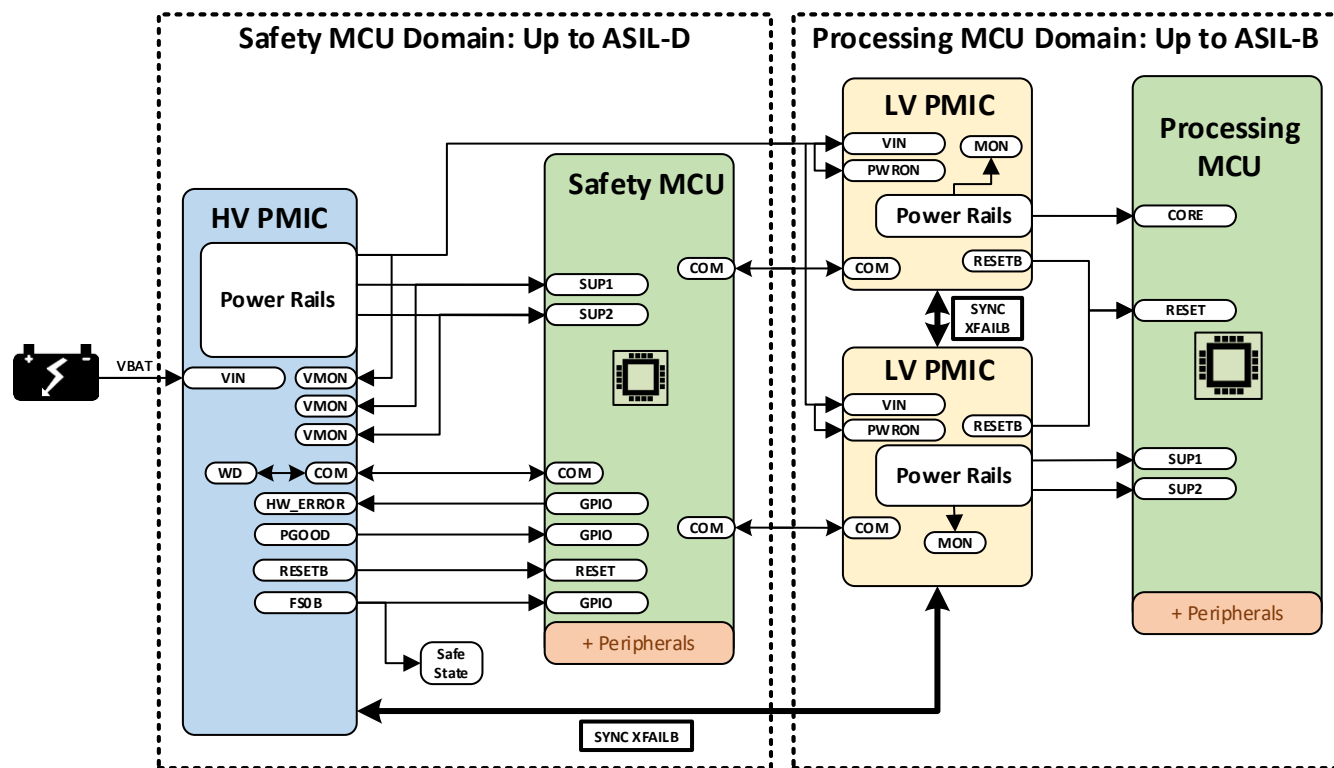




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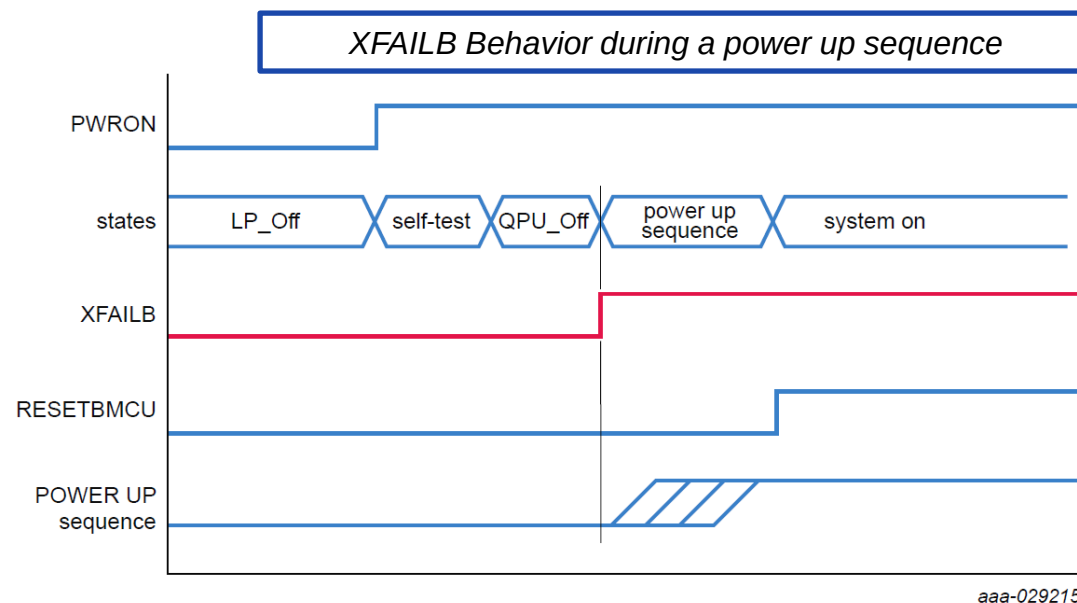




NXP BYLINK CONCEPT POWER SEQUENCING

• Power up event

- If PWRON event is present, the device should only release XFAILB when it's ready to start the POWER UP sequence.
- If XFAILB is pulled down externally, the device shall prevent the Power up sequence.
- This will synchronize PMIC for the Power up sequence only after all PMIC are ready.
- When a power up sequence failure is detected, XFAILB pin shall be asserted low before the device turns off.





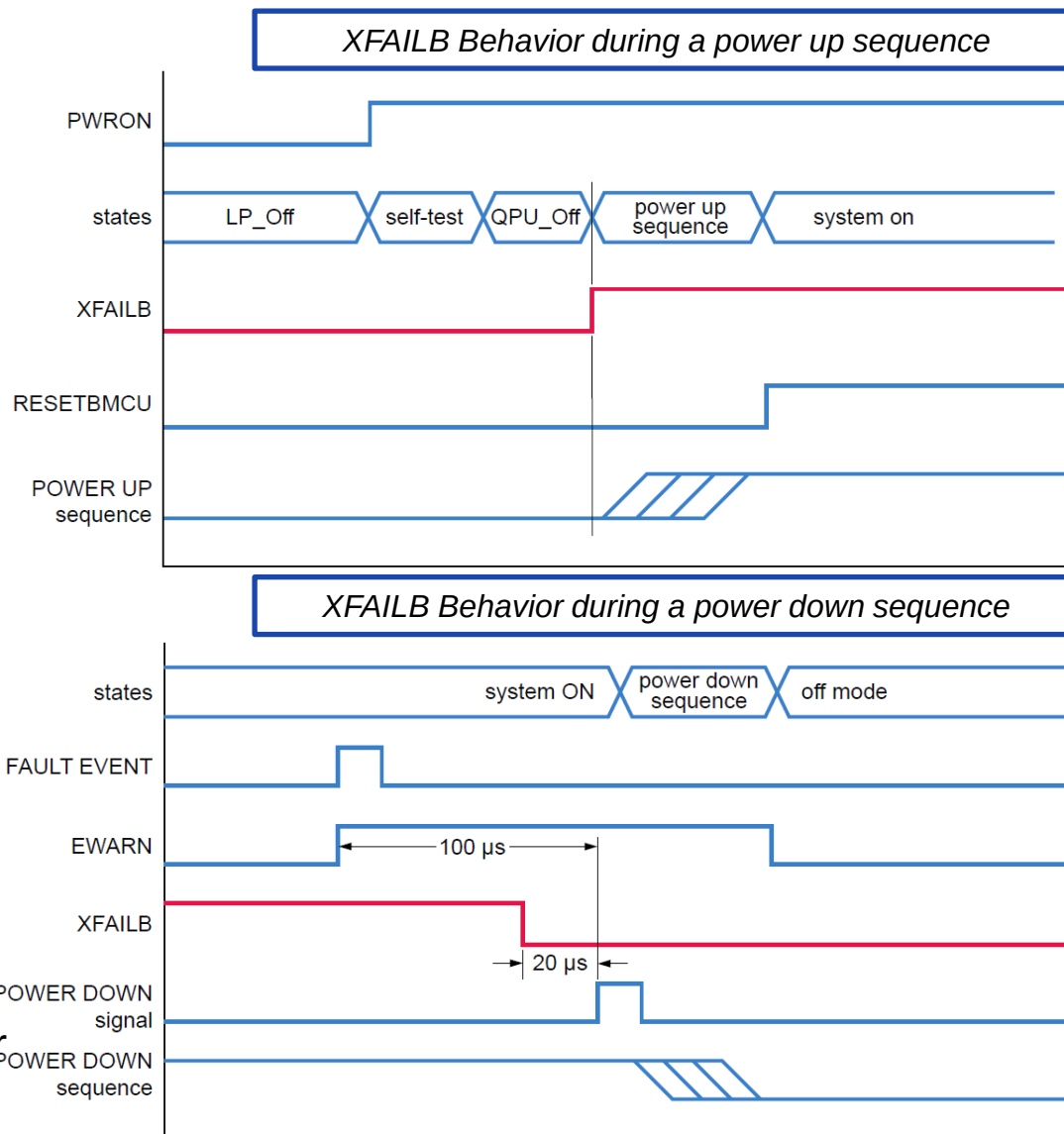
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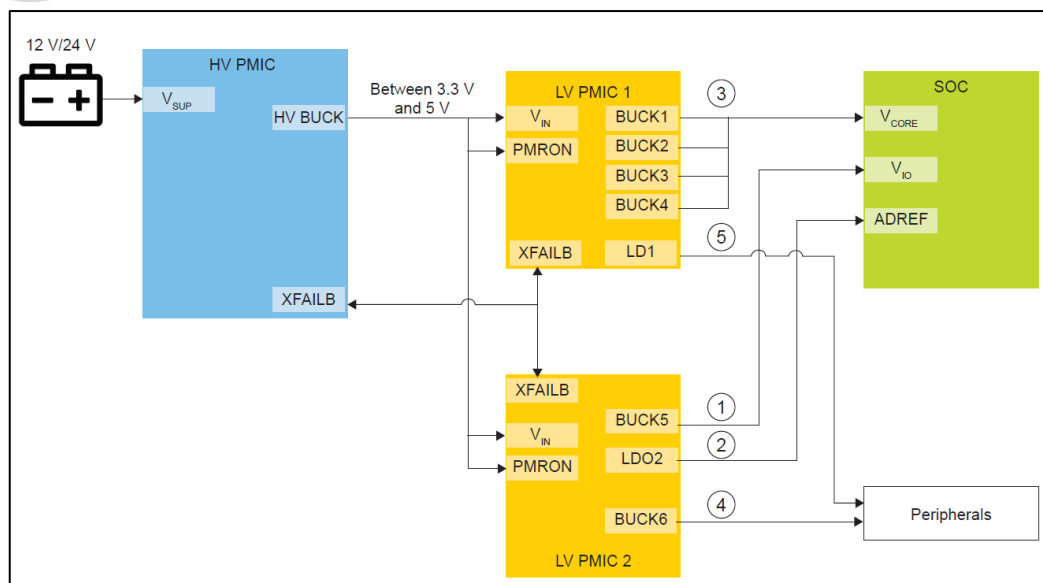
• Power down event

- When a turn off event is generated by an internal fault, XFAILB is asserted low before starting power down sequence.
- If the XFAILB pin is externally pulled low, it shall detect an XFAIL event after 20 us debounce.
- When an XFAIL event is detected, XFAILB shall be asserted low internally and the device shall start a power down sequence.



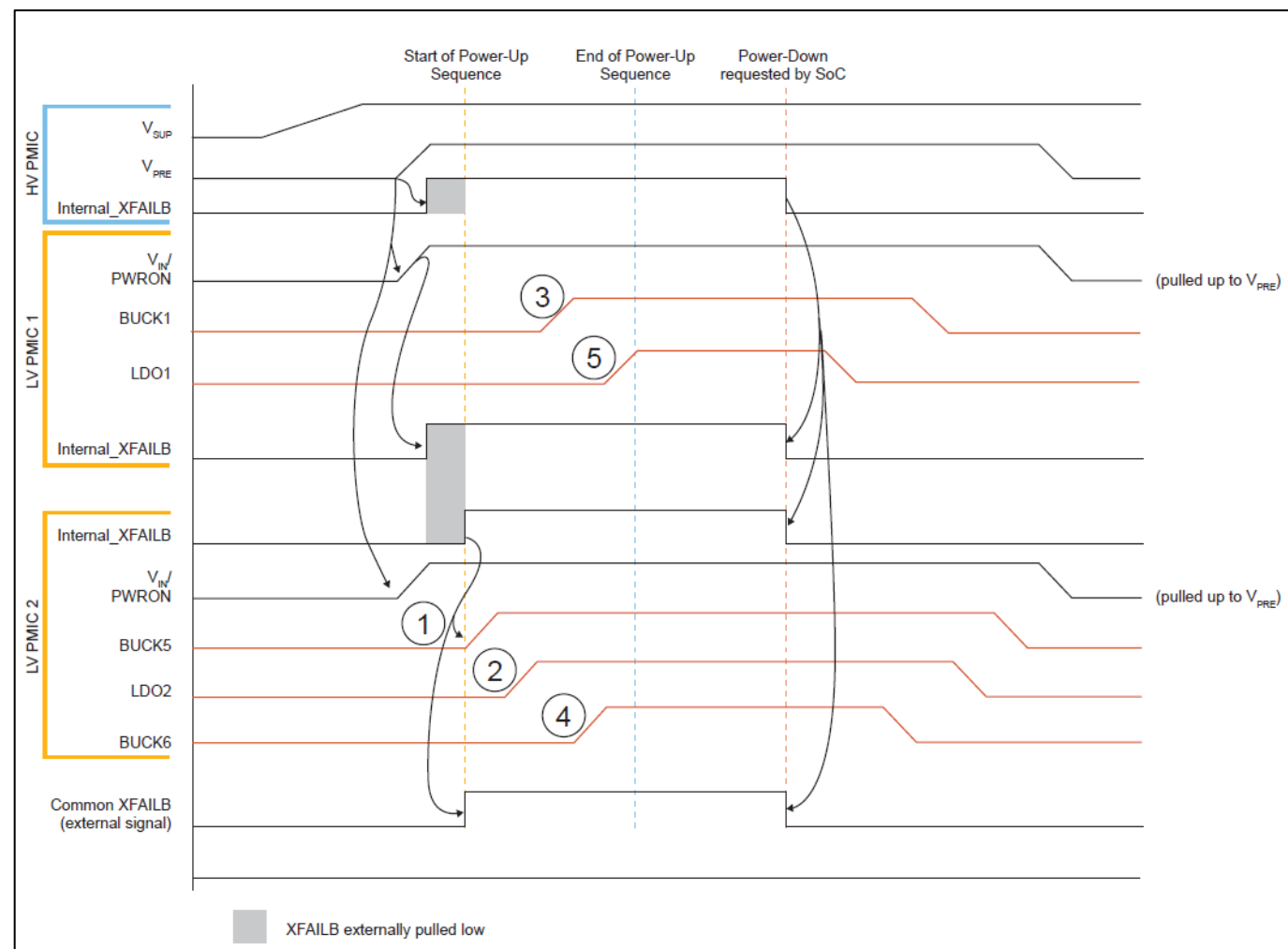


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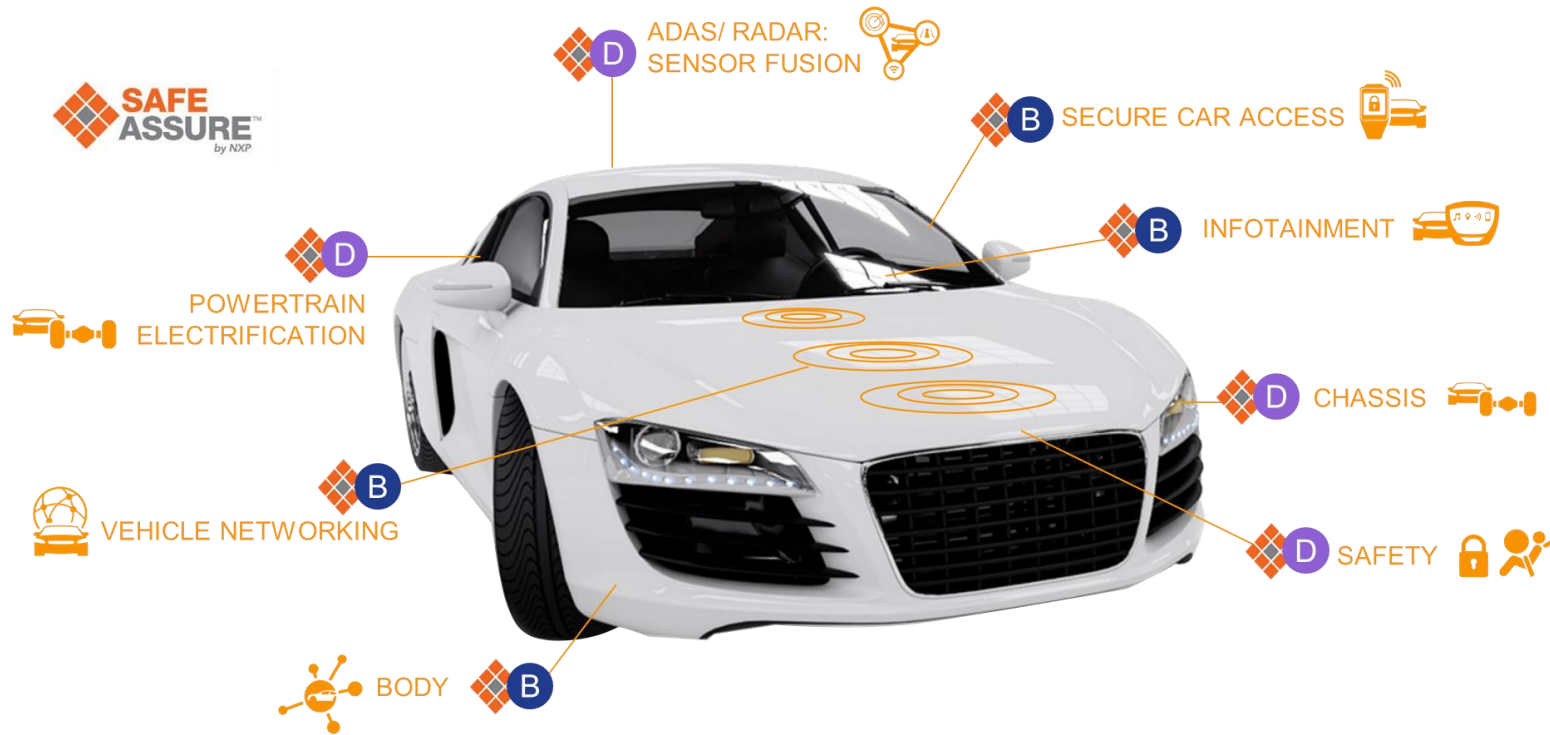
Multiprocessor system demo board for camera application

- A. HV PMIC power-up start (V_{SUP} , V_{PRE})
- B. HV PMIC XFAILB release
- C. LV PMIC power-up (V_{IN} , PWRON)
- D. LV PMIC XFAILB release
- E. ALL PMIC resumes power-up sequencing (OTP config)
- F. Power-down is reverse than power-up





NXP FUNCTION SAFETY POWER SOLUTION



ISO26262

► 3rd Generation of SAFETY PMIC



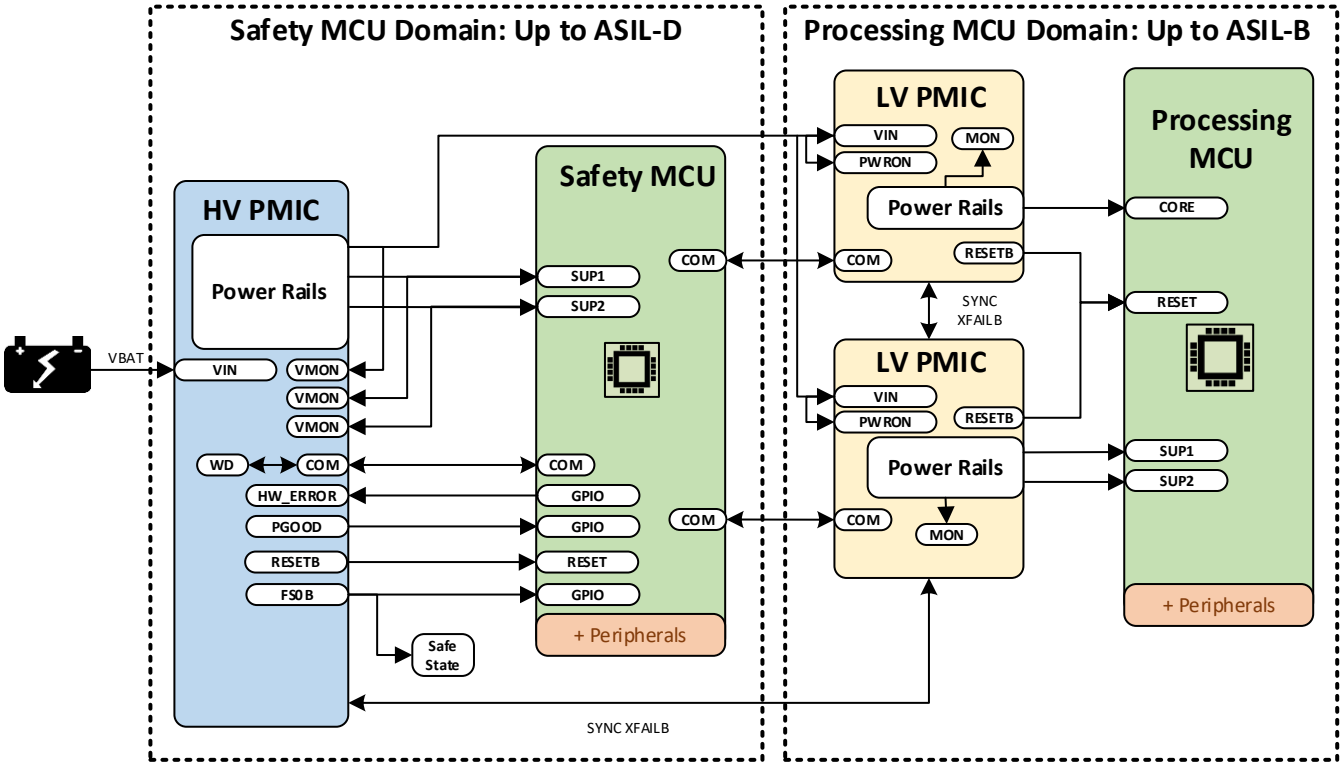
NXP BYLINK CONCEPT SAFETY MANAGEMENT

Safety Strength

- Pin to pin compatible, FS from QM to ASIL-D, PF from QM to ASIL-B
- OTP scalable, different safety mechanism

Safety Features

- Voltage monitoring of supply rails
- MCU/SoC monitoring: Hardware and software (Watchdog)
- LBIST (Logical Built In Self Test)
- ABIST (Analog Built In Self Test)
- Safety output: Transition system into safe state
- Platform scalable with different ASIL domain





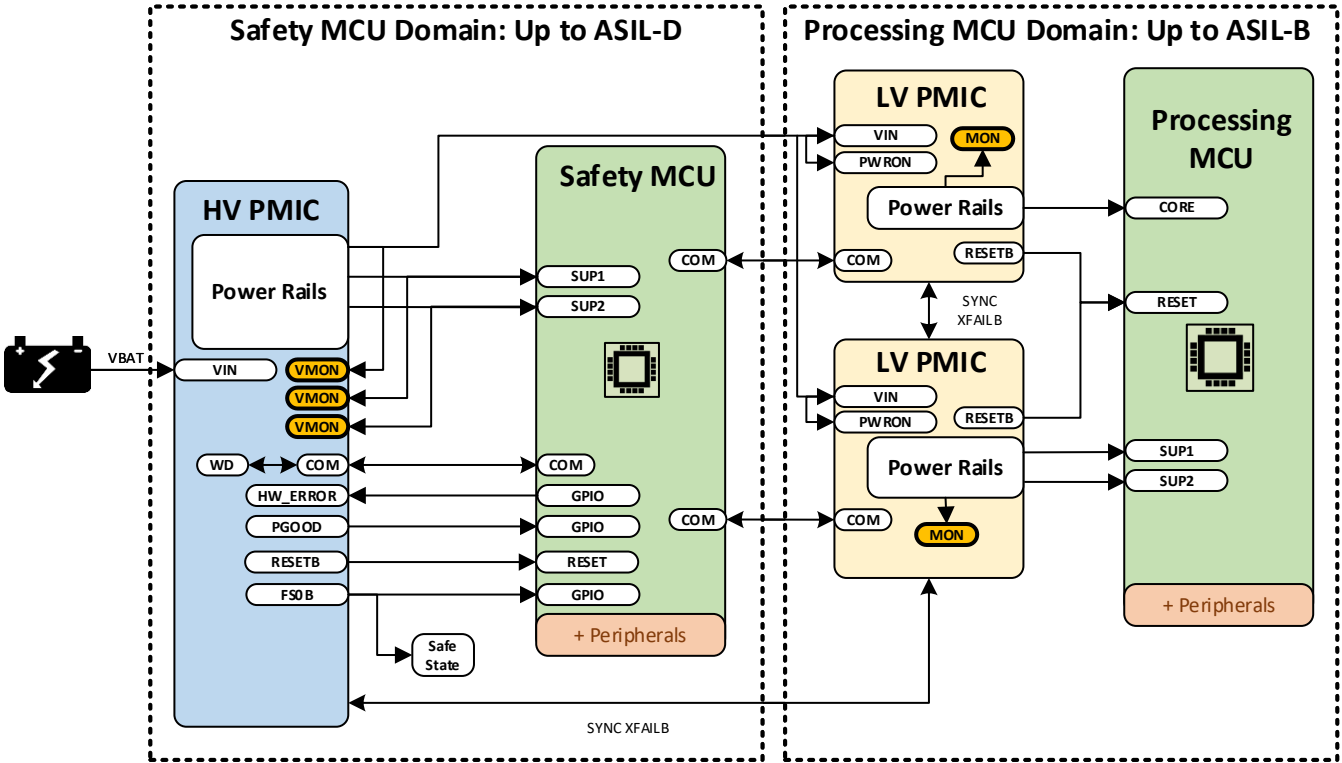
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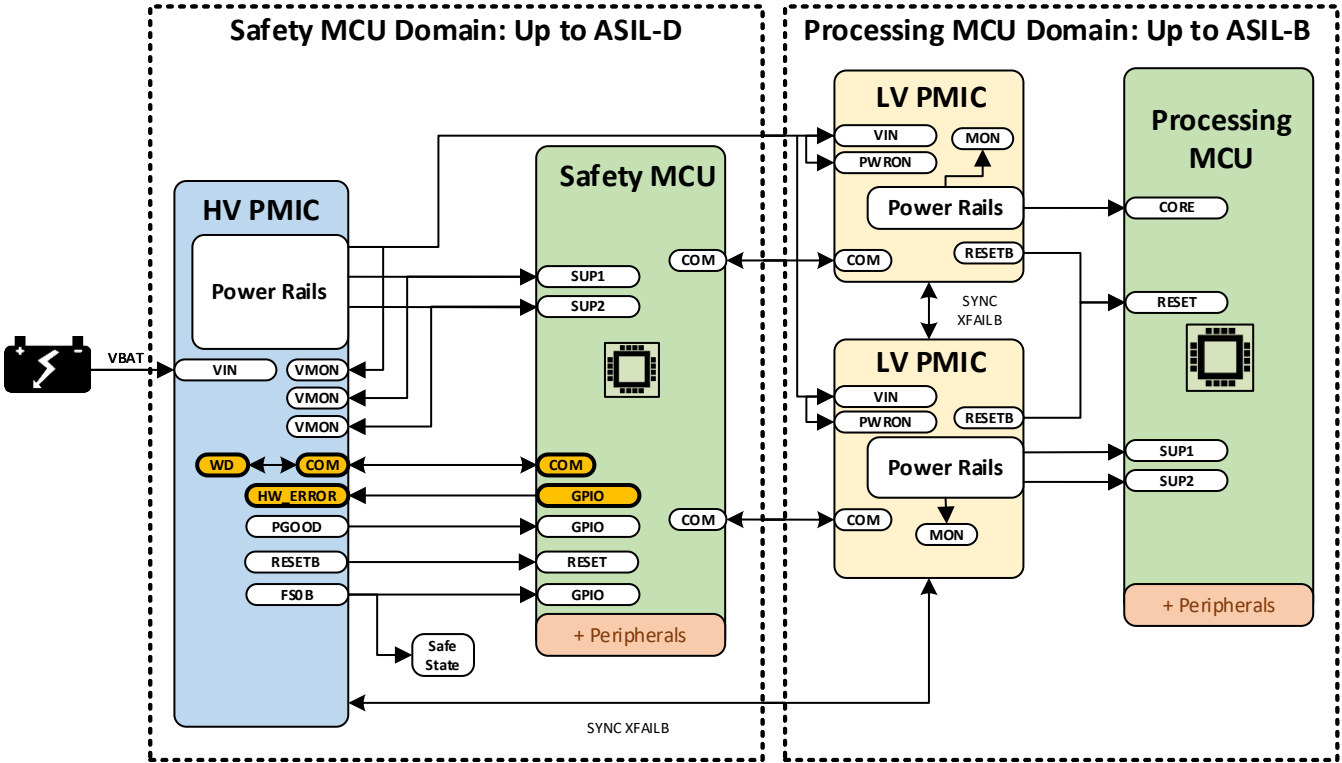
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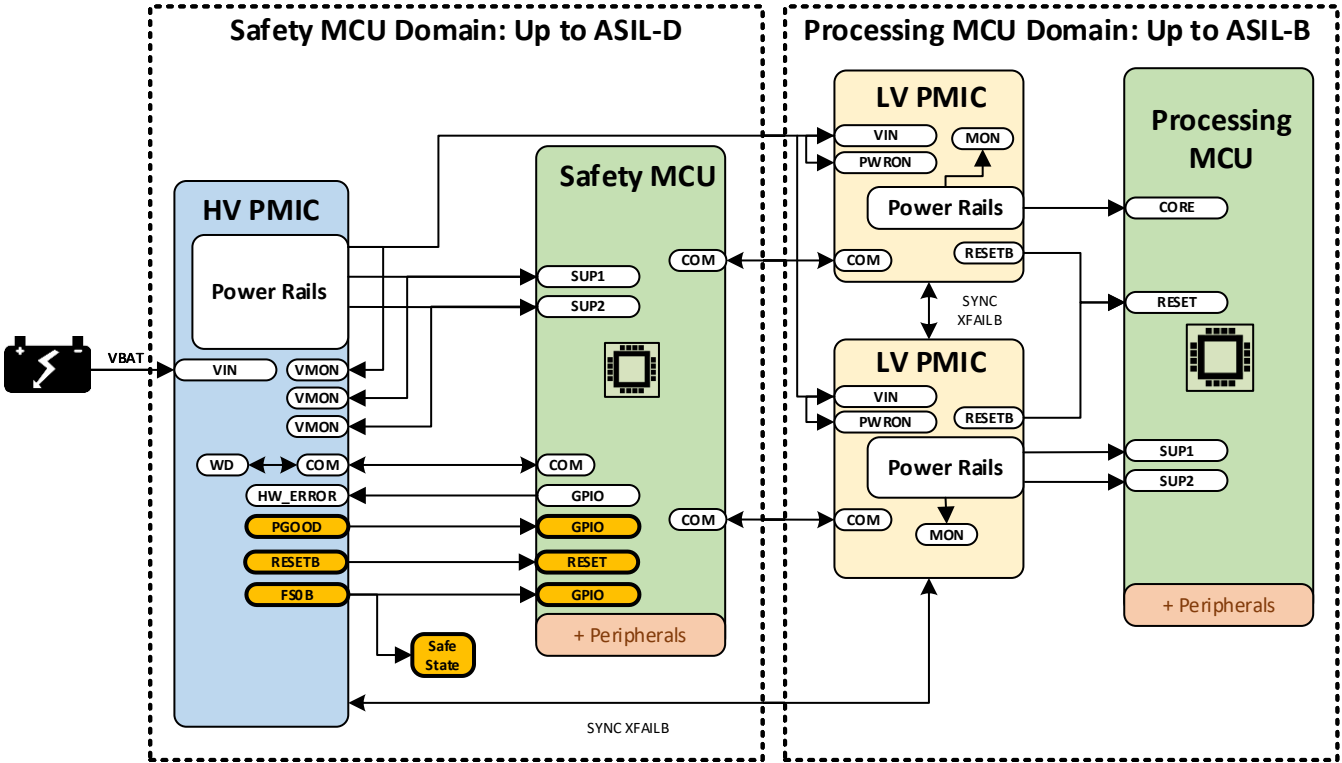
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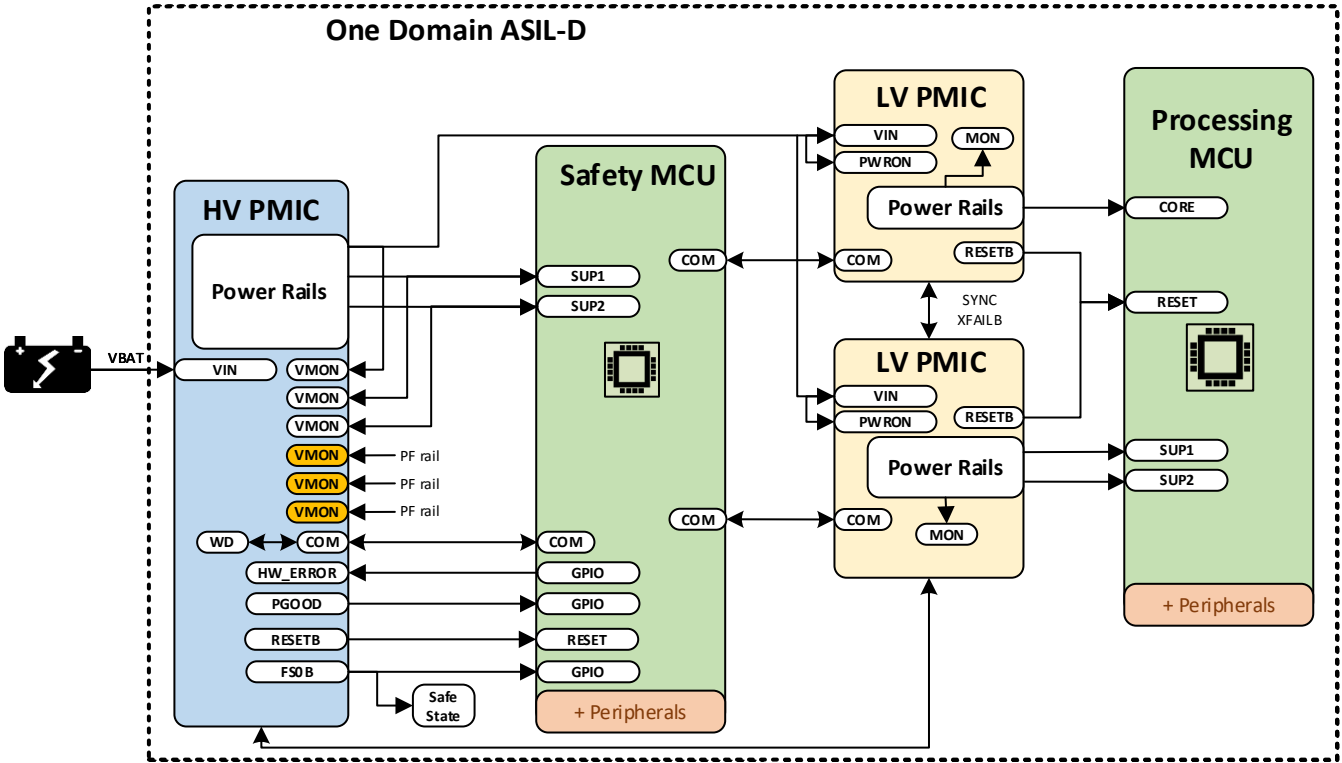
NXP BYLINK CONCEPT SAFETY MANAGEMENT

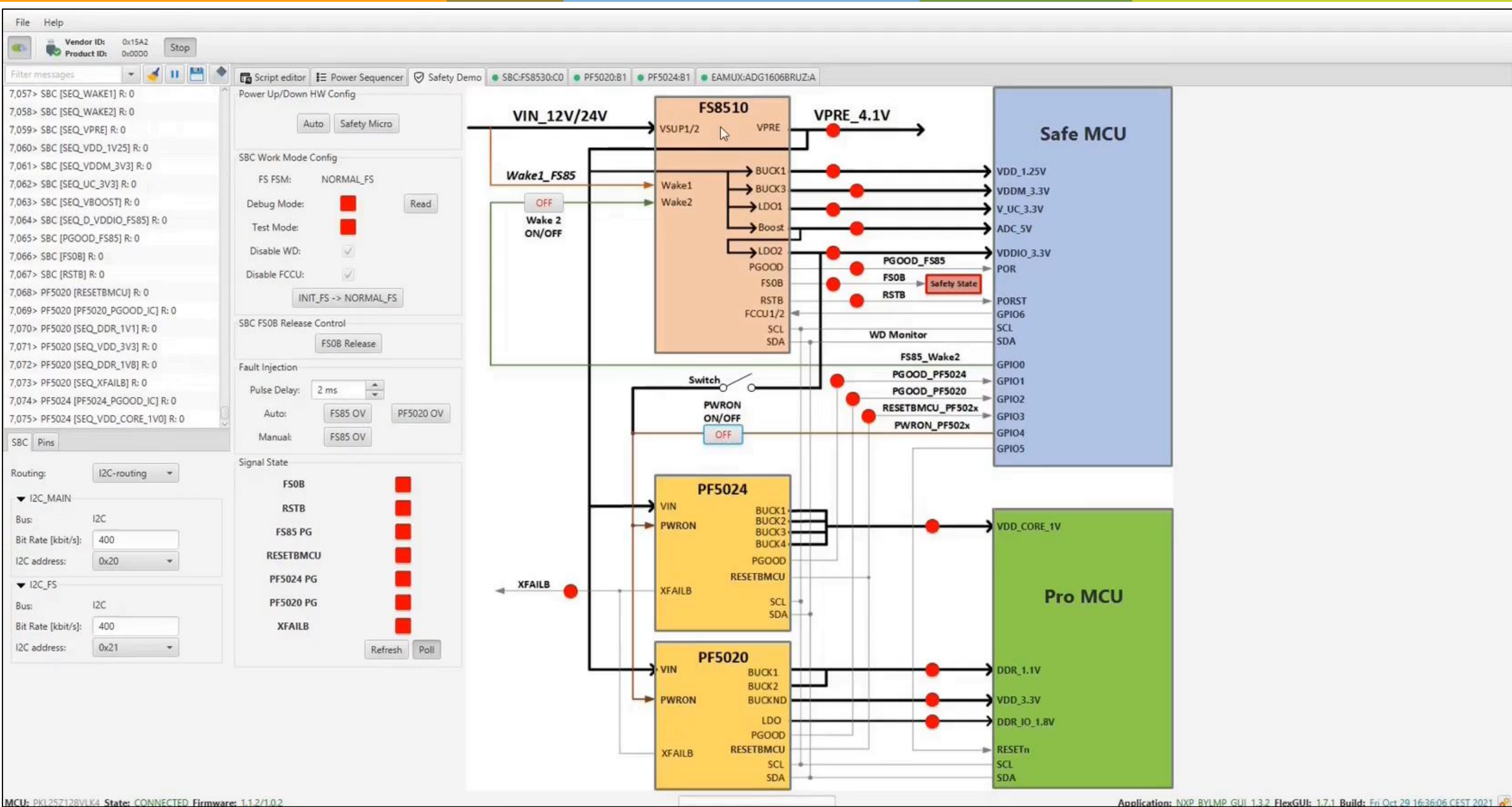
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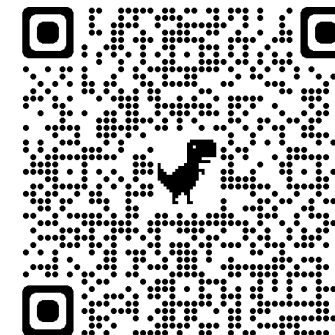




NXP BYLINK COLLATERALS

BYLink System Power platform

- Concept introduction and details
- Challenges and benefits
- Training and videos
- PMIC Devices portfolio
- Blog



Application note

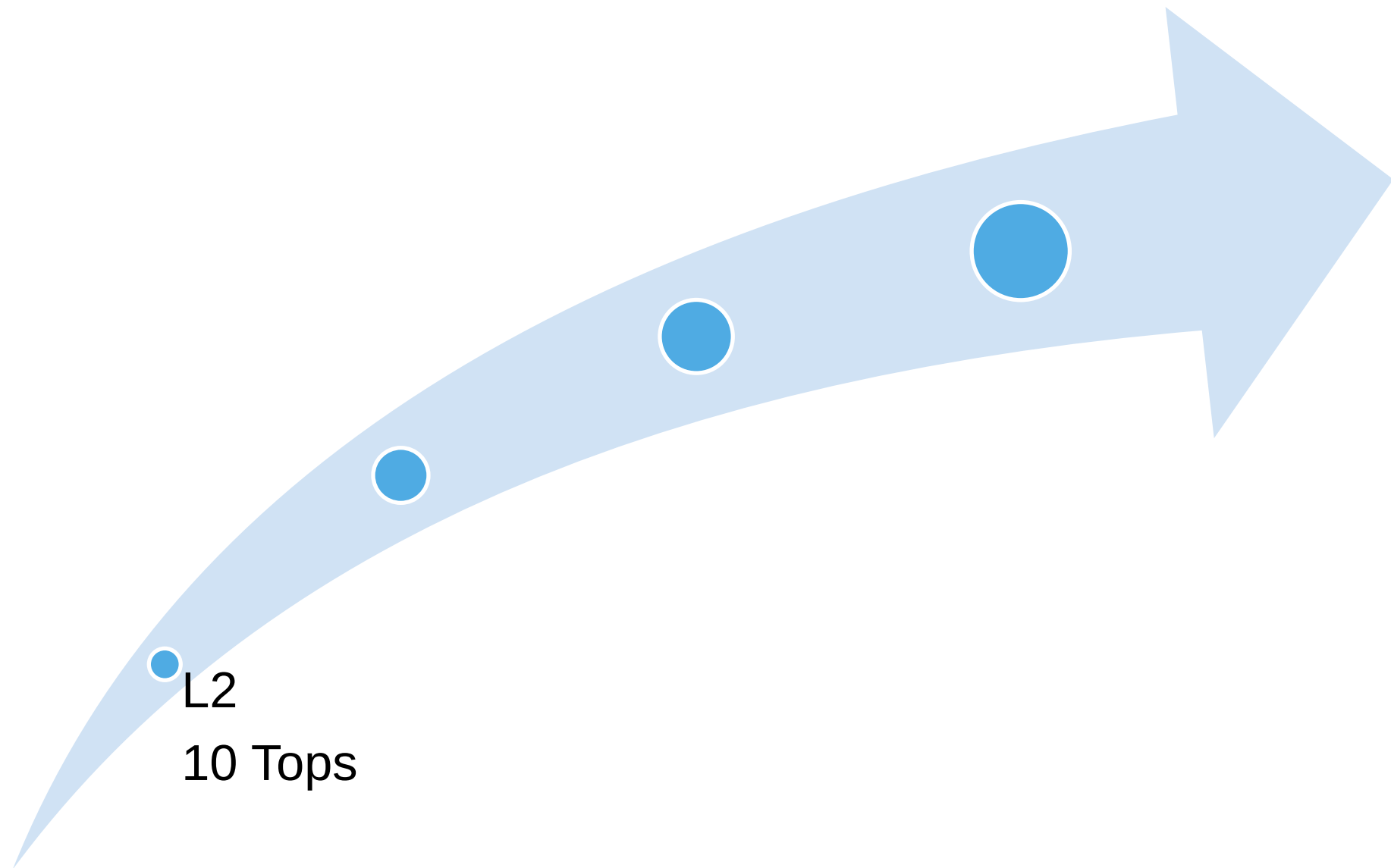
- System power solution using FS84/FS85 and PF502x family
- Multiple low voltage PMIC systems
- FS56 in multi-PMIC system

White paper

- BYLink Power Management concept

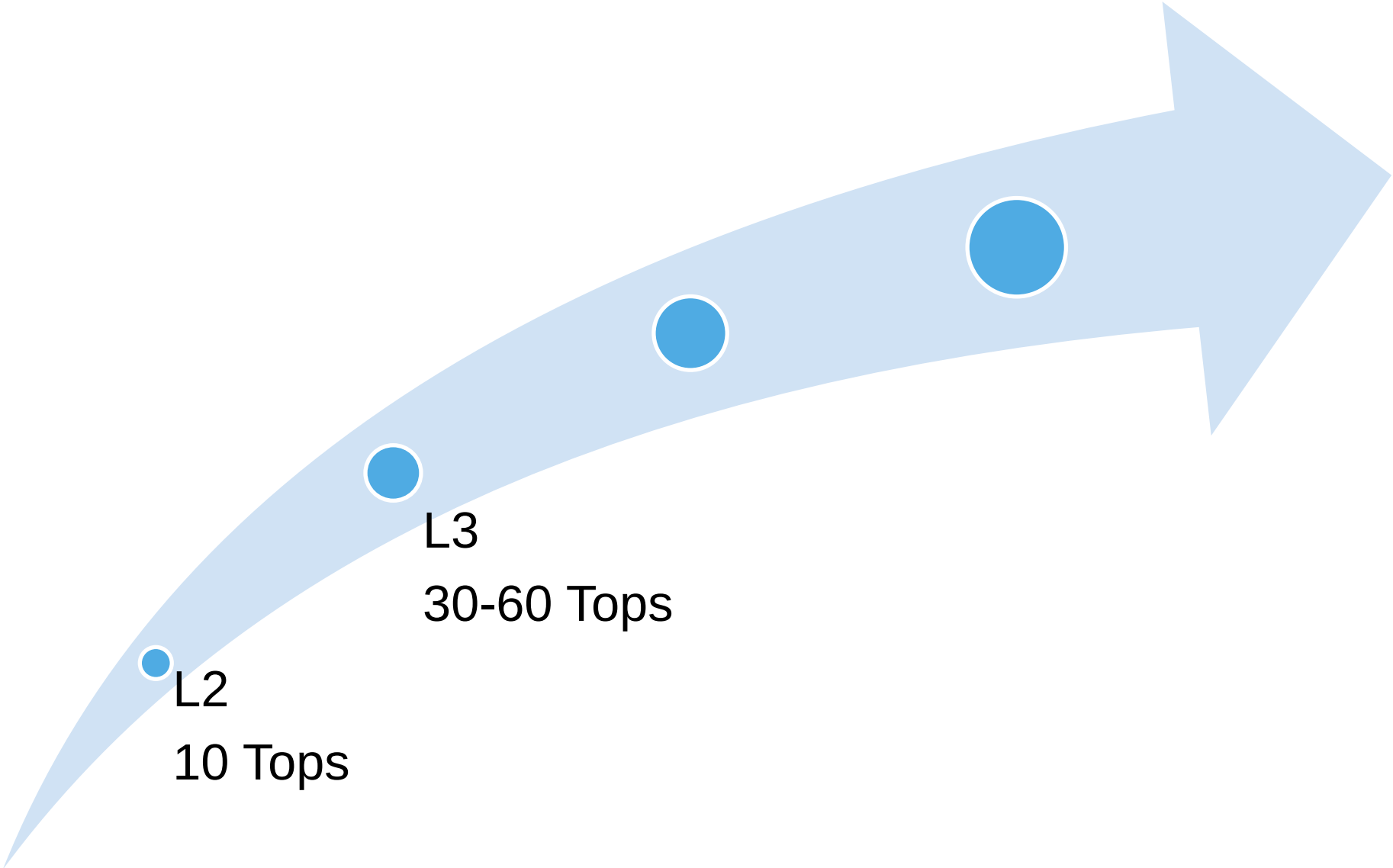
BYLink multiprocessor demo board

- Using FS8400, PF5024 and PF5020 for multi-MCU application



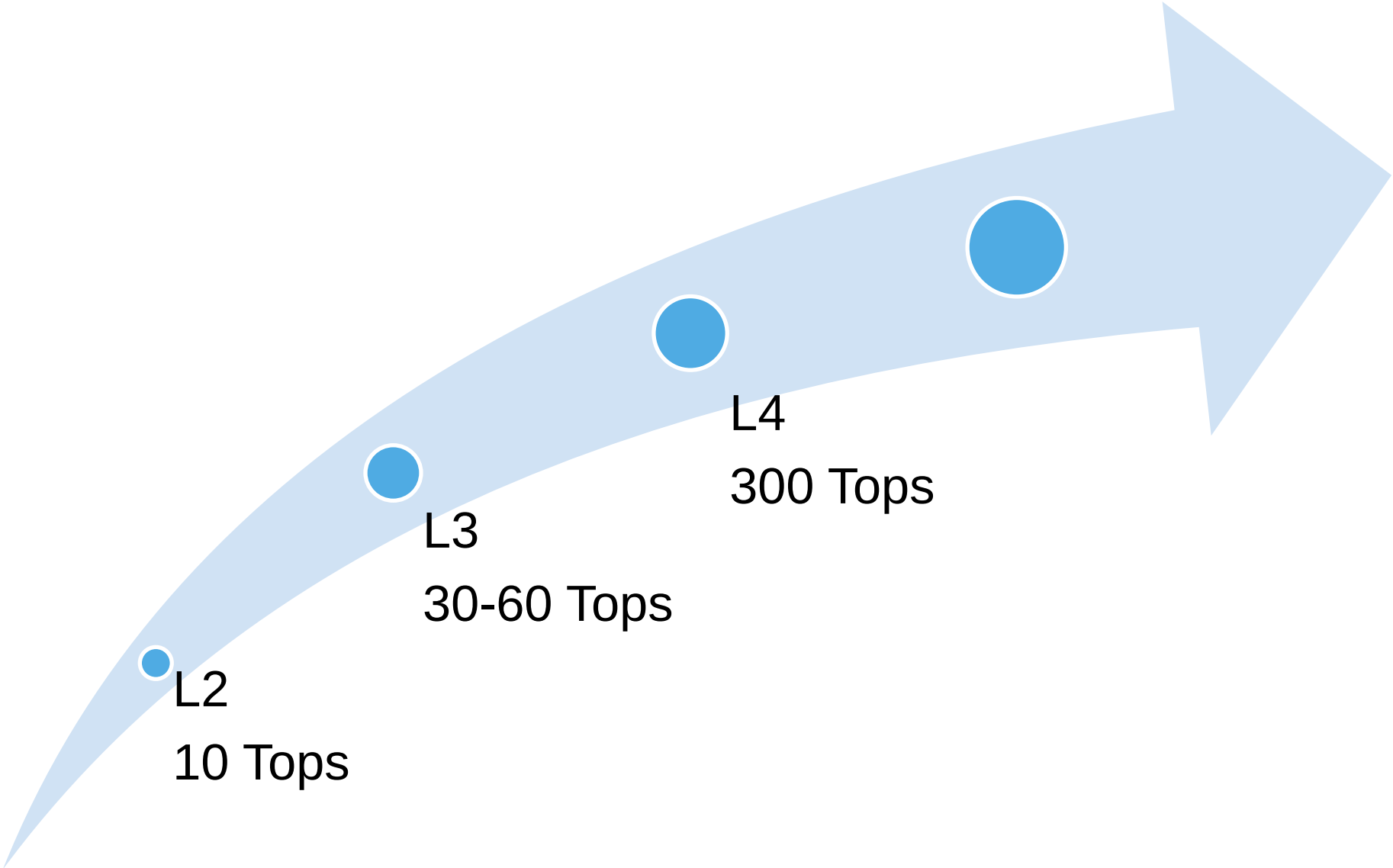


ADAS DOMAIN CONTROLLER SOC





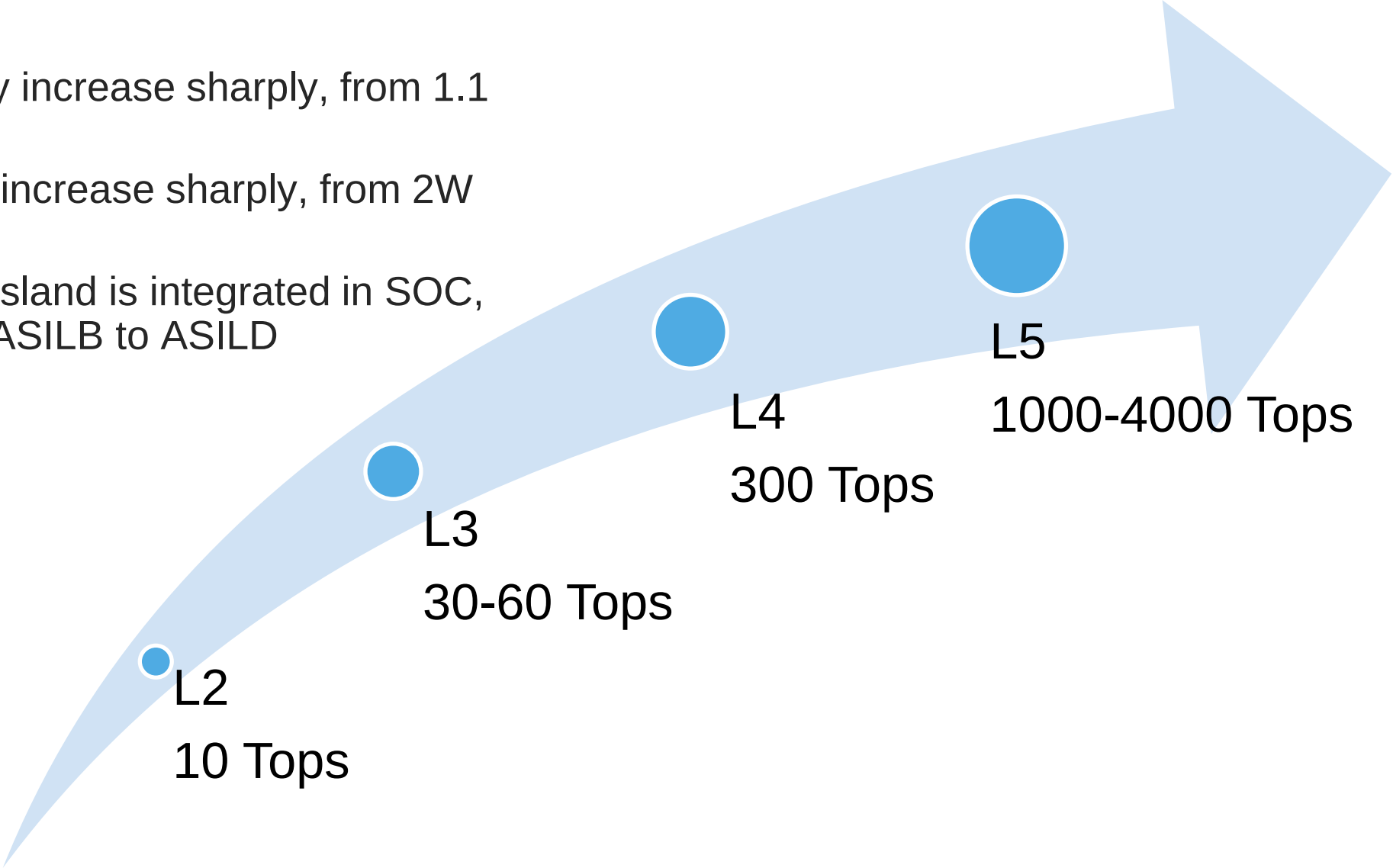
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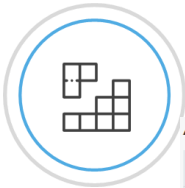




ADAS DOMAIN CONTROLLER SOC

- Computing capability increase sharply, from 1.1 Tops to 1000 Tops
- Power consumption increase sharply, from 2W to 80W
- Safety MCU/Safety Island is integrated in SOC, ASIL increase from ASILB to ASILD

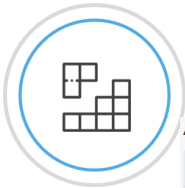




BYLINK FOR MULTI-VENDOR PROCESSORS

Ambarella Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ambarella - CV22/25	FS56 / FS84 + PF81	AN13272, Power Management Solution for CV22/CV25
Ambarella - CV2	FS56 / FS84 + PF71 + PF5024	Coming soon - 2022
Ambarella - CV5	FS56 + PF81 + PF5020	Coming soon - 2022



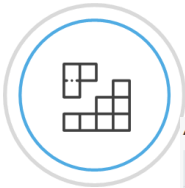
BYLINK FOR MULTI-VENDOR PROCESSORS

Ambarella Power Management Solutions

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Ambarella - CV2	FS56 / FS84 + PF71 + PF5024	Coming soon - 2022
Ambarella - CV5	FS56 + PF81 + PF5020	Coming soon - 2022

Horizon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Horizon Journey™ 2	1. FS56 + PF81 2. FS85 + PF82	AN13318, NXP PMIC Solution for Horizon Journey 2
Horizon Journey 3	FS56 + PF81 + PF5024	Coming soon - Q1/2022
Horizon Journey 5	FS56 + PF52 + PF71	Coming soon - 2022



BYLINK FOR MULTI-VENDOR PROCESSORS

Ambarella Power Management Solutions

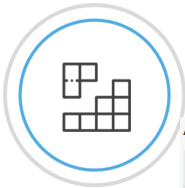
Processor	Recommended PMICs/SBCs	Application Note
Ambarella - CV22/25	FS56 / FS84 + PF81	AN13272, Power Management Solution for CV22/CV25
Ambarella - CV2	FS56 / FS84 + PF71 + PF5024	Coming soon - 2022
Ambarella - CV5	FS56 + PF81 + PF5020	Coming soon - 2022

Horizon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Horizon Journey™ 2	1. FS56 + PF81 2. FS85 + PF82	AN13318, NXP PMIC Solution for Horizon Journey 2
Horizon Journey 3	FS56 + PF81 + PF5024	Coming soon - Q1/2022
Horizon Journey 5	FS56 + PF52 + PF71	Coming soon - 2022

Infineon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Aurix™ TC21/22/23	FS450x	AN13322, NXP SBC solution for Infineon AURIX TC2xx/TC3xx series MCU AN12786, BMS system AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4
Aurix TC26/27	FS650X / FS260X / FS261X	
Aurix TC29	FS651X / FS84 / 85 / FS262X / FS263X	
Aurix TC33	FS450X	
Aurix TC36/37	FS650X / FS260X / FS261X	
Aurix TC38	FS651X / FS262X / FS263X	
Aurix TC39	FS652x / FS84 / 85	



BYLINK FOR MULTI-VENDOR PROCESSORS

Ambarella Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ambarella - CV22/25	FS56 / FS84 + PF81	AN13272, Power Management Solution for CV22/CV25
Ambarella - CV2	FS56 / FS84 + PF71 + PF5024	Coming soon - 2022
Ambarella - CV5	FS56 + PF81 + PF5020	Coming soon - 2022

Horizon Power Management Solutions

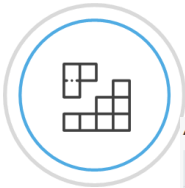
Processor	Recommended PMICs/SBCs	Application Note
Horizon Journey™ 2	1. FS56 + PF81 2. FS85 + PF82	AN13318, NXP PMIC Solution for Horizon Journey 2
Horizon Journey 3	FS56 + PF81 + PF5024	Coming soon - Q1/2022
Horizon Journey 5	FS56 + PF52 + PF71	Coming soon - 2022

Infineon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Aurix™ TC21/22/23	FS450x	AN13322, NXP SBC solution for Infineon AURIX TC2xx/TC3xx series MCU AN12786, BMS system AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4
Aurix TC26/27	FS650X / FS260X / FS261X	
Aurix TC29	FS651X / FS84 / 85 / FS262X / FS263X	
Aurix TC33	FS450X	
Aurix TC36/37	FS650X / FS260X / FS261X	
Aurix TC38	FS651X / FS262X / FS263X	
Aurix TC39	FS652x / FS84 / 85	

MobileEye Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
EyeQ4®-Mid	PF5020 + PF5024	AN13002, NXP PMIC solution for Mobileye EyeQ4 mid processor AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4
EyeQ4-High	PF5020 + PF52	-
EyeQ5-Mid	PF5020 + PF5024	-
EyeQ6	PF5020 + PF5024	Coming soon - 2022



BYLINK FOR MULTI-VENDOR PROCESSORS

Ambarella Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ambarella - CV22/25	FS56 / FS84 + PF81	AN13272, Power Management Solution for CV22/CV25
Ambarella - CV2	FS56 / FS84 + PF71 + PF5024	Coming soon - 2022
Ambarella - CV5	FS56 + PF81 + PF5020	Coming soon - 2022

Horizon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Horizon Journey™ 2	1. FS56 + PF81 2. FS85 + PF82	AN13318, NXP PMIC Solution for Horizon Journey 2
Horizon Journey 3	FS56 + PF81 + PF5024	Coming soon - Q1/2022
Horizon Journey 5	FS56 + PF52 + PF71	Coming soon - 2022

Infineon Power Management Solutions

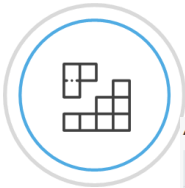
Processor	Recommended PMICs/SBCs	Application Note
Aurix™ TC21/22/23	FS450x	AN13322, NXP SBC solution for Infineon AURIX TC2xx/TC3xx series MCU  AN12786, BMS system  AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4 
Aurix TC26/27	FS650X / FS260X / FS261X	
Aurix TC29	FS651X / FS84 / 85 / FS262X / FS263X	
Aurix TC33	FS450X	
Aurix TC36/37	FS650X / FS260X / FS261X	
Aurix TC38	FS651X / FS262X / FS263X	
Aurix TC39	FS652x / FS84 / 85	

MobileEye Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
EyeQ4®-Mid	PF5020 + PF5024	AN13002, NXP PMIC solution for Mobileye EyeQ4 mid processor  AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4 
EyeQ4-High	PF5020 + PF52	-
EyeQ5-Mid	PF5020 + PF5024	-
EyeQ6	PF5020 + PF5024	Coming soon - 2022

Xilinx® Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Zynq® UltraScale+™ MPSOC - ZU2/ZU3	1. FS56 + PF81 2. FS85 + PF71 + PF5020 + PF5024	AN13320, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU2/ZU3 Processor  Xilinx MPSOC NXP Power Management Solution Guidelines 
Zynq UltraScale+ MPSOC - ZU4/ZU5/ZU6/ZU7/ZU9	1. FS56 + PF52 + PF81 2. FS86 + PF52 + PF71 + PF5020	AN13432, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU4 / ZU5 / ZU6 / ZU7 / ZU9 Processor  Xilinx MPSOC NXP Power Management Solution Guidelines 
Zynq UltraScale+ MPSOC - ZU11/ZU15	FS86 + PF52 + PF71 + 2 X PF5023	AN13433, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU11_ZU15 Processor  Xilinx MPSOC NXP Power Management Solution Guidelines 
Zynq-7000	PF0100	AN4991, Power Management of Xilinx AP SoC using NXP PMIC 



BYLINK FOR MULTI-VENDOR PROCESSORS

Ambarella Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ambarella - CV22/25	FS56 / FS84 + PF81	AN13272, Power Management Solution for CV22/CV25
Ambarella - CV2	FS56 / FS84 + PF71 + PF5024	Coming soon - 2022
Ambarella - CV5	FS56 + PF81 + PF5020	Coming soon - 2022

Horizon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Horizon Journey™ 2	1. FS56 + PF81 2. FS85 + PF82	AN13318, NXP PMIC Solution for Horizon Journey 2
Horizon Journey 3	FS56 + PF81 + PF5024	Coming soon - Q1/2022
Horizon Journey 5	FS56 + PF52 + PF71	Coming soon - 2022

Infineon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Aurix™ TC21/22/23	FS450x	AN13322, NXP SBC solution for Infineon AURIX TC2xx/TC3xx series MCU AN12786, BMS system AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4
Aurix TC26/27	FS650X / FS260X / FS261X	
Aurix TC29	FS651X / FS84 / 85 / FS262X / FS263X	
Aurix TC33	FS450X	
Aurix TC36/37	FS650X / FS260X / FS261X	
Aurix TC38	FS651X / FS262X / FS263X	
Aurix TC39	FS652x / FS84 / 85	

MobileEye Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
EyeQ4®-Mid	PF5020 + PF5024	AN13002, NXP PMIC solution for Mobileye EyeQ4 mid processor AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4
EyeQ4-High	PF5020 + PF52	-
EyeQ5-Mid	PF5020 + PF5024	-
EyeQ6	PF5020 + PF5024	Coming soon - 2022

Xilinx® Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Zynq® UltraScale+™ MPSOC - ZU2/ZU3	1. FS56 + PF81 2. FS85 + PF71 + PF5020 + PF5024	AN13320, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU2/ZU3 Processor Xilinx MPSOC NXP Power Management Solution Guidelines
Zynq UltraScale+ MPSOC - ZU4/ZU5/ZU6/ZU7/ZU9	1. FS56 + PF52 + PF81 2. FS86 + PF52 + PF71 + PF5020	AN13432, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU4 / ZU5 / ZU6 / ZU7 / ZU9 Processor Xilinx MPSOC NXP Power Management Solution Guidelines
Zynq UltraScale+ MPSOC - ZU11/ZU15	FS86 + PF52 + PF71 + 2 X PF5023	AN13433, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU11_ZU15 Processor Xilinx MPSOC NXP Power Management Solution Guidelines
Zynq-7000	PF0100	AN4991, Power Management of Xilinx AP SoC using NXP PMIC

Renesas Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
RH850 Cx/Ex/Px/Ux	FS65	AN13020, NXP PMIC solution for RH850 Cx/Ex/Px/Ux series MCU
R-Car H3	PF82 + PF52 + PF5020 + PF5024	AN13003, NXP PMIC solution for Renesas R-Car H3 processor
R-Car M3	2 X PF82	AN13018, NXP PMIC solution for R-Car M3 Processor
R-Car E3	PF71	AN13019, NXP PMIC solution for Renesas R-Car E3 Processor
R-Car V3M	PF5020 + PF5024	AN13058, NXP PMIC solution for Renesas R-Car V3M processor



BYLINK FOR MULTI-VENDOR PROCESSORS

Ambarella Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ambarella - CV22/25	FS56 / FS84 + PF81	AN13272, Power Management Solution for CV22/CV25 🔗
Ambarella - CV2	FS56 / FS84 + PF71 + PF5024	Coming soon - 2022
Ambarella - CV5	FS56 + PF81 + PF5020	Coming soon - 2022

Horizon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Horizon Journey™ 2	1. FS56 + PF81 2. FS85 + PF82	AN13318, NXP PMIC Solution for Horizon Journey 2 🔗
Horizon Journey 3	FS56 + PF81 + PF5024	Coming soon - Q1/2022
Horizon Journey 5	FS56 + PF52 + PF71	Coming soon - 2022

Infineon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Aurix™ TC21/22/23	FS450x	AN13322, NXP SBC solution for Infineon AURIX TC2xx/TC3xx series MCU 🔗 AN12786, BMS system 🔗 AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4 🔗
Aurix TC26/27	FS650X / FS260X / FS261X	
Aurix TC29	FS651X / FS84 / 85 / FS262X / FS263X	
Aurix TC33	FS450X	
Aurix TC36/37	FS650X / FS260X / FS261X	
Aurix TC38	FS651X / FS262X / FS263X	
Aurix TC39	FS652x / FS84 / 85	

MobileEye Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
EyeQ4®-Mid	PF5020 + PF5024	AN13002, NXP PMIC solution for Mobileye EyeQ4 mid processor 🔗 AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4 🔗
EyeQ4-High	PF5020 + PF52	-
EyeQ5-Mid	PF5020 + PF5024	-
EyeQ6	PF5020 + PF5024	Coming soon - 2022

Xilinx® Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Zynq® UltraScale+™ MPSOC - ZU2/ZU3	1. FS56 + PF81 2. FS85 + PF71 + PF5020 + PF5024	AN13320, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU2/ZU3 Processor 🔗 Xilinx MPSOC NXP Power Management Solution Guidelines 🔗
Zynq UltraScale+ MPSOC - ZU4/ZU5/ZU6/ZU7/ZU9	1. FS56 + PF52 + PF81 2. FS86 + PF52 + PF71 + PF5020	AN13432, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU4 / ZU5 / ZU6 / ZU7 / ZU9 Processor 🔗 Xilinx MPSOC NXP Power Management Solution Guidelines 🔗
Zynq UltraScale+ MPSOC - ZU11/ZU15	FS86 + PF52 + PF71 + 2 X PF5023	AN13433, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU11_ZU15 Processor 🔗 Xilinx MPSOC NXP Power Management Solution Guidelines 🔗
Zynq-7000	PF0100	AN4991, Power Management of Xilinx AP SoC using NXP PMIC 🔗

Renesas Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
RH850 Cx/Ex/Px/Ux	FS65	AN13020, NXP PMIC solution for RH850 Cx/Ex/Px/Ux series MCU 🔗
R-Car H3	PF82 + PF52 + PF5020 + PF5024	AN13003, NXP PMIC solution for Renesas R-Car H3 processor 🔗
R-Car M3	2 X PF82	AN13018, NXP PMIC solution for R-Car M3 Processor 🔗
R-Car E3	PF71	AN13019, NXP PMIC solution for Renesas R-Car E3 Processor 🔗
R-Car V3M	PF5020 + PF5024	AN13058, NXP PMIC solution for Renesas R-Car V3M processor 🔗

Texas Instruments Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ti - TDA2	FS56 + PF81	Coming soon - Q2-2022
Ti - TDA4IDRA82X	FS56 / 86 + PF82 + PF5024 + PF5020	Coming soon - 2022
Ti - TMS570	FS26 / FS65 / FS85	AN13431, NXP PMIC solution for TI TMS570 series MCU 🔗
Ti - AWR2243	PF5020	Coming soon - Q2-2022
Ti - DSP C2000™	FS45 / FS85	AN13245, NXP PMIC solution for TI C2000 🔗



BYLINK FOR MULTI-VENDOR PROCESSORS

Ambarella Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ambarella - CV22/25	FS56 / FS84 + PF81	AN13272, Power Management Solution for CV22/CV25
Ambarella - CV2	FS56 / FS84 + PF71 + PF5024	Coming soon - 2022
Ambarella - CV5	FS56 + PF81 + PF5020	Coming soon - 2022

Horizon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Horizon Journey™ 2	1. FS56 + PF81 2. FS85 + PF82	AN13318, NXP PMIC Solution for Horizon Journey 2
Horizon Journey 3	FS56 + PF81 + PF5024	Coming soon - Q1/2022
Horizon Journey 5	FS56 + PF52 + PF71	Coming soon - 2022

Infineon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Aurix™ TC21/22/23	FS450x	AN13322, NXP SBC solution for Infineon AURIX TC2xx/TC3xx series MCU AN12786, BMS system AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4
Aurix TC26/27	FS650X / FS260X / FS261X	
Aurix TC29	FS651X / FS84 / 85 / FS262X / FS263X	
Aurix TC33	FS450X	
Aurix TC36/37	FS650X / FS260X / FS261X	
Aurix TC38	FS651X / FS262X / FS263X	
Aurix TC39	FS652x / FS84 / 85	

MobileEye Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
EyeQ4®-Mid	PF5020 + PF5024	AN13002, NXP PMIC solution for Mobileye EyeQ4 mid processor AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4
EyeQ4-High	PF5020 + PF52	-
EyeQ5-Mid	PF5020 + PF5024	-
EyeQ6	PF5020 + PF5024	Coming soon - 2022

Xilinx® Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Zynq® UltraScale+™ MPSOC - ZU2/ZU3	1. FS56 + PF81 2. FS85 + PF71 + PF5020 + PF5024	AN13320, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU2/ZU3 Processor Xilinx MPSOC NXP Power Management Solution Guidelines
Zynq UltraScale+ MPSOC - ZU4/ZU5/ZU6/ZU7/ZU9	1. FS56 + PF52 + PF81 2. FS86 + PF52 + PF71 + PF5020	AN13432, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU4 / ZU5 / ZU6 / ZU7 / ZU9 Processor Xilinx MPSOC NXP Power Management Solution Guidelines
Zynq UltraScale+ MPSOC - ZU11/ZU15	FS86 + PF52 + PF71 + 2 X PF5023	AN13433, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU11_ZU15 Processor Xilinx MPSOC NXP Power Management Solution Guidelines
Zynq-7000	PF0100	AN4991, Power Management of Xilinx AP SoC using NXP PMIC

Renesas Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
RH850 Cx/Ex/Px/Ux	FS65	AN13020, NXP PMIC solution for RH850 Cx/Ex/Px/Ux series MCU
R-Car H3	PF82 + PF52 + PF5020 + PF5024	AN13003, NXP PMIC solution for Renesas R-Car H3 processor
R-Car M3	2 X PF82	AN13018, NXP PMIC solution for R-Car M3 Processor
R-Car E3	PF71	AN13019, NXP PMIC solution for Renesas R-Car E3 Processor
R-Car V3M	PF5020 + PF5024	AN13058, NXP PMIC solution for Renesas R-Car V3M processor

Texas Instruments Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ti - TDA2	FS56 + PF81	Coming soon - Q2-2022
Ti - TDA4\DRA82X	FS56 / 86 + PF82 + PF5024 + PF5020	Coming soon - 2022
Ti - TMS570	FS26 / FS65 / FS85	AN13431, NXP PMIC solution for TI TMS570 series MCU
Ti - AWR2243	PF5020	Coming soon - Q2-2022
Ti - DSP C2000™	FS45 / FS85	AN13245, NXP PMIC solution for TI C2000

Other Automotive SoC Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
ST - Chorus SPC5	FS65 / FS85	AN13246, NXP PMIC Solution for the ST SPC58 Chorus Family MCUs
MediaTek - MT27	FS56 + PF81 + PF5024	AN13247, NXP PMIC Solution for MediaTek MT2712 Processors
Cypress Traveo™ II	FS26	Coming soon Q2-2022
Toshiba - TMPV7608	PF71	AN13197, NXP PMIC solution for Toshiba TMPV7608 processor
Black Sesame A1000	FS86 / FS56 + PF81	Coming soon - Q4-2022
Marvel AQR113 (Ethernet Phy.)	PF5020	Coming soon - 2022
Quectel AG55X	FS56	AN13615, NXP PMIC solution for AG55xQ series module



BYLINK FOR MULTI-VENDOR PROCESSORS

Ambarella Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ambarella - CV22/25	FS56 / FS84 + PF81	AN13272, Power Management Solution for CV22/CV25 🔗
Ambarella - CV2	FS56 / FS84 + PF71 + PF5024	Coming soon - 2022
Ambarella - CV5	FS56 + PF81 + PF5020	Coming soon - 2022

Horizon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Horizon Journey™ 2	1. FS56 + PF81 2. FS85 + PF82	AN13318, NXP PMIC Solution for Horizon Journey 2 🔗
Horizon Journey 3	FS56 + PF81 + PF5024	Coming soon - Q1/2022
Horizon Journey 5	FS56 + PF52 + PF71	Coming soon - 2022

Infineon Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Aurix™ TC21/22/23	FS450x	AN13322, NXP SBC solution for Infineon AURIX TC2xx/TC3xx series MCU 🔗 AN12786, BMS system 🔗 AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4 🔗
Aurix TC26/27	FS650X / FS260X / FS261X	
Aurix TC29	FS651X / FS84 / 85 / FS262X / FS263X	
Aurix TC33	FS450X	
Aurix TC36/37	FS650X / FS260X / FS261X	
Aurix TC38	FS651X / FS262X / FS263X	
Aurix TC39	FS652x / FS84 / 85	

MobileEye Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
EyeQ4®-Mid	PF5020 + PF5024	AN13002, NXP PMIC solution for Mobileye EyeQ4 mid processor 🔗 AN13064, NXP Power supply system for camera application using Aurix TC2xx/TC3xx and Mobileye EYEQ4 🔗
EyeQ4-High	PF5020 + PF52	-
EyeQ5-Mid	PF5020 + PF5024	-
EyeQ6	PF5020 + PF5024	Coming soon - 2022

Xilinx® Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Zynq® UltraScale+™ MPSOC - ZU2/ZU3	1. FS56 + PF81 2. FS85 + PF71 + PF5020 + PF5024	AN13320, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU2/ZU3 Processor 🔗 Xilinx MPSOC NXP Power Management Solution Guidelines 🔗
Zynq UltraScale+ MPSOC - ZU4/ZU5/ZU6/ZU7/ZU9	1. FS56 + PF52 + PF81 2. FS86 + PF52 + PF71 + PF5020	AN13432, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU4 / ZU5 / ZU6 / ZU7 / ZU9 Processor 🔗 Xilinx MPSOC NXP Power Management Solution Guidelines 🔗
Zynq UltraScale+ MPSOC - ZU11/ZU15	FS86 + PF52 + PF71 + 2 X PF5023	AN13433, NXP PMIC solution for XILINX UltraScale+ MPSoC ZU11_ZU15 Processor 🔗 Xilinx MPSOC NXP Power Management Solution Guidelines 🔗
Zynq-7000	PF0100	AN4991, Power Management of Xilinx AP SoC using NXP PMIC 🔗

Renesas Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
RH850 Cx/Ex/Px/Ux	FS65	AN13020, NXP PMIC solution for RH850 Cx/Ex/Px/Ux series MCU 🔗
R-Car H3	PF82 + PF52 + PF5020 + PF5024	AN13003, NXP PMIC solution for Renesas R-Car H3 processor 🔗
R-Car M3	2 X PF82	AN13018, NXP PMIC solution for R-Car M3 Processor 🔗
R-Car E3	PF71	AN13019, NXP PMIC solution for Renesas R-Car E3 Processor 🔗
R-Car V3M	PF5020 + PF5024	AN13058, NXP PMIC solution for Renesas R-Car V3M processor 🔗

Texas Instruments Power Management Solutions

Processor	Recommended PMICs/SBCs	Application Note
Ti - TDA2	FS56 + PF81	Coming soon - Q2-2022
Ti - TDA4IDRA82X	FS56 / 86 + PF82 + PF5024 + PF5020	Coming soon - 2022
Ti - TMS570	FS26 / FS65 / FS85	AN13431, NXP PMIC solution for TI TMS570 series MCU 🔗
Ti - AWR2243	PF5020	Coming soon - Q2-2022
Ti - DSP C2000™	FS45 / FS85	AN13245, NXP PMIC solution for TI C2000 🔗

Other Automotive SoC Power Management Solutions

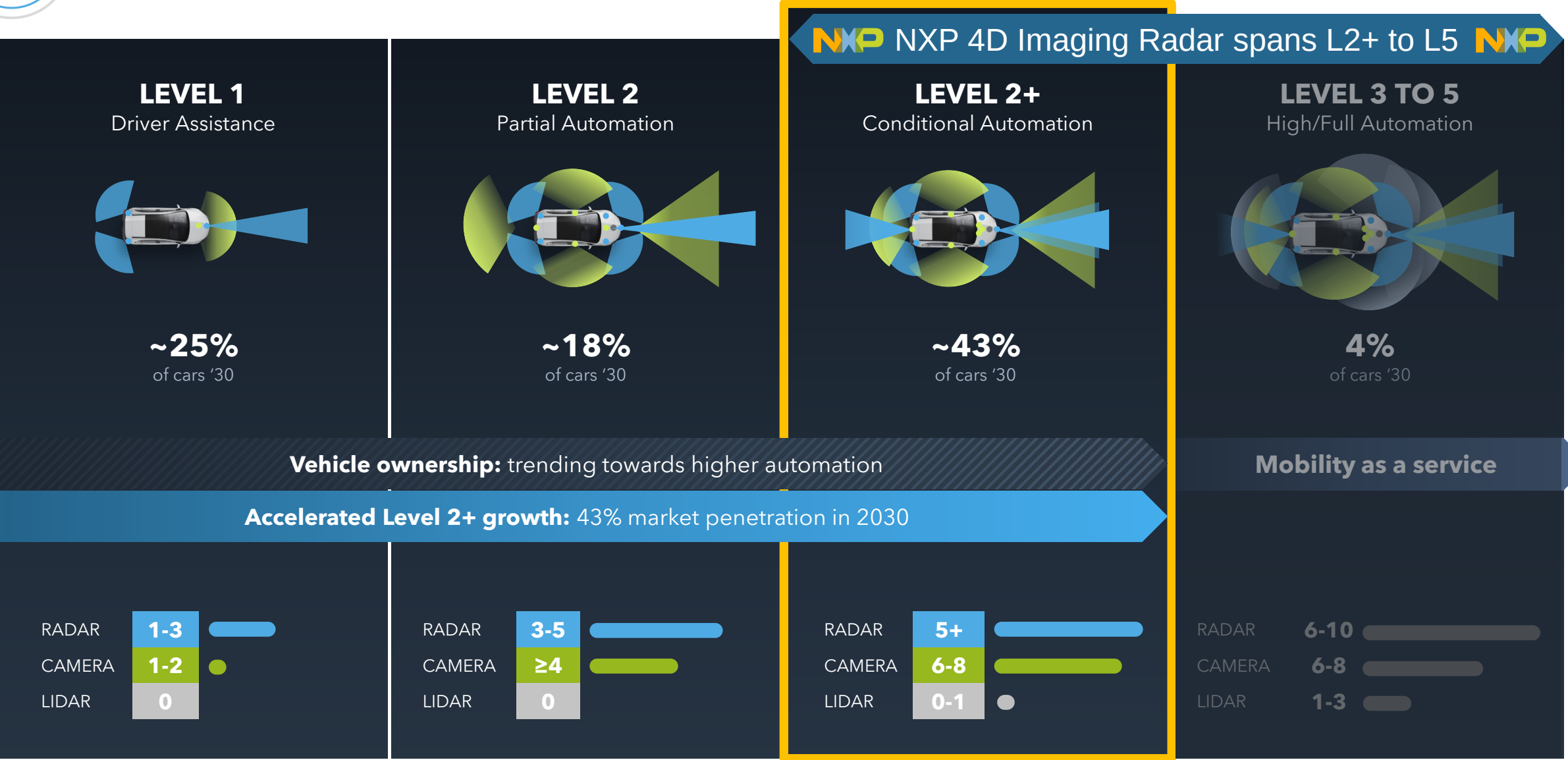
Processor	Recommended PMICs/SBCs	Application Note
ST - Chorus SPC5	FS65 / FS85	AN13246, NXP PMIC Solution for the ST SPC58 Chorus Family MCUs 🔗
MediaTek - MT27	FS56 + PF81 + PF5024	AN13247, NXP PMIC Solution for MediaTek MT2712 Processors 🔗
Cypress Traveo™ II	FS26	Coming soon Q2-2022
Toshiba - TMPV7608	PF71	AN13197, NXP PMIC solution for Toshiba TMPV7608 processor 🔗
Black Sesame A1000	FS86 / FS56 + PF81	Coming soon - Q4-2022
Marvel AQR113 (Ethernet Phy.)	PF5020	Coming soon - 2022
Quectel AG55X	FS56	AN13615, NXP PMIC solution for AG55xQ series module 🔗

Find more information on [PMICs and SBCs for Multi-Vendor Processors Web Page](#)





ADAS MARKET GROWTH ACCELERATING IN L1-2+ VEHICLES

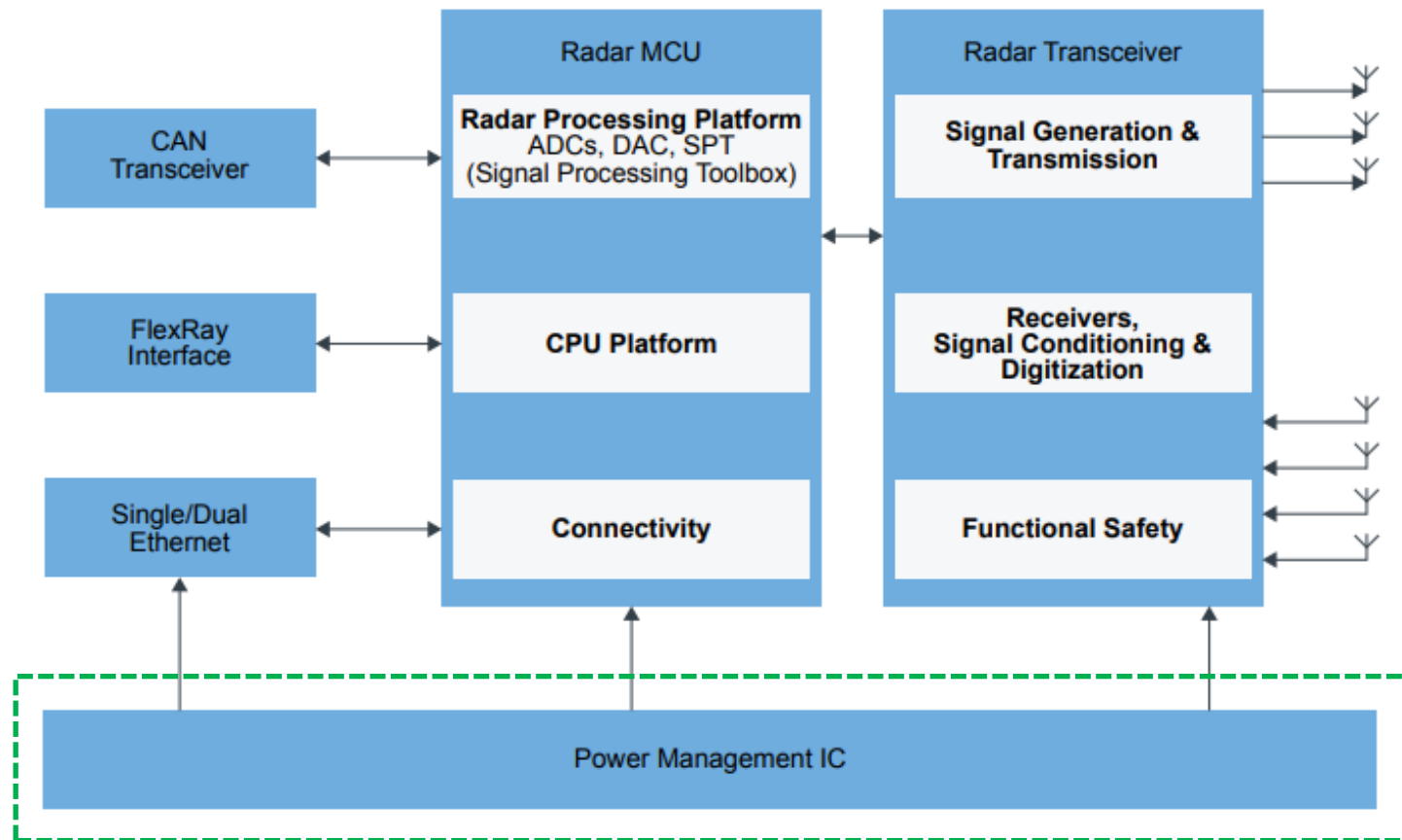




ADAS RADAR SYSTEM

Radar key components:

- Radar transceiver
- Radar MCU
- CAN transceiver
- FlexRay
- Ethernet
- BYLINK system power total solution

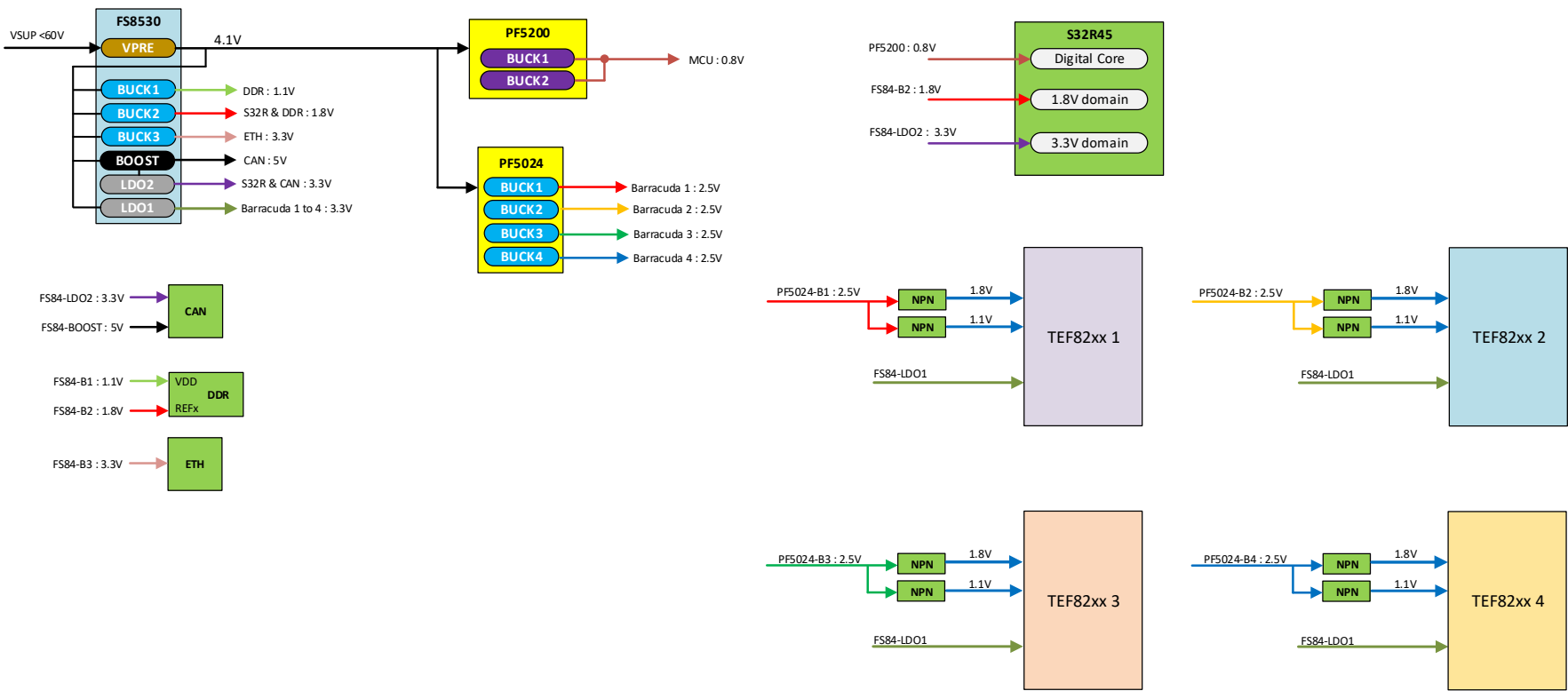




ADAS RADAR SYSTEM

4D image radar BYLINK system power solution:

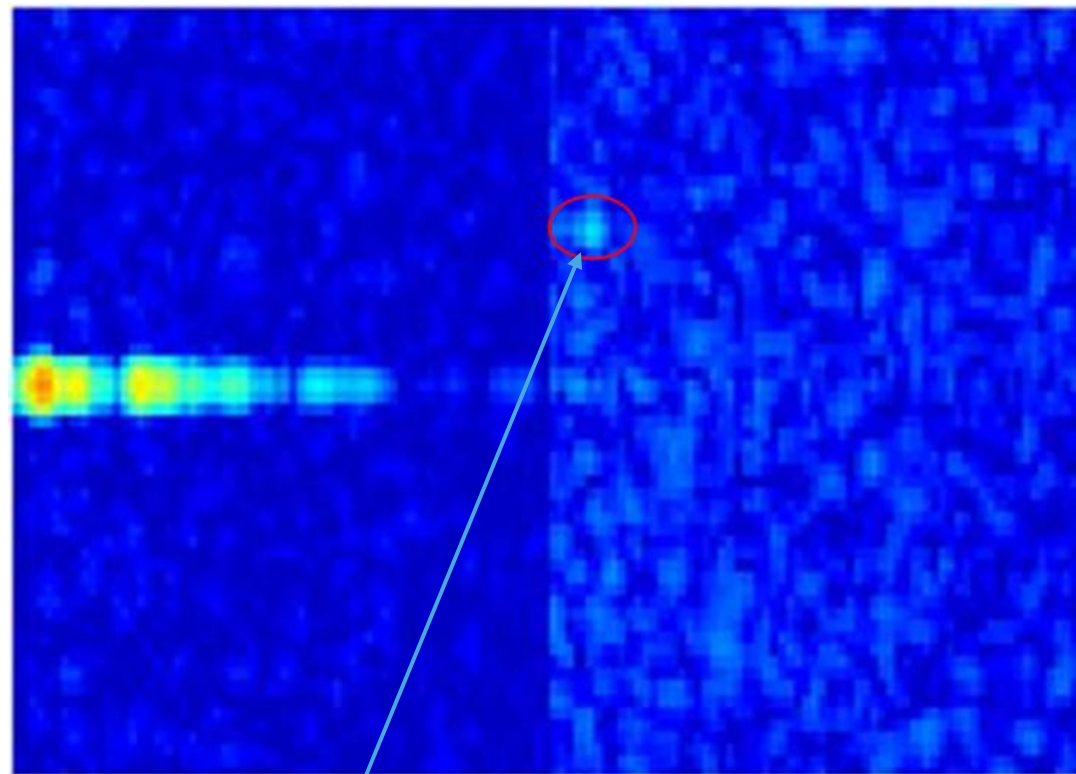
- FS84
- PF52
- PF5024





RADAR POWER CHALLENGE AND SOLUTION

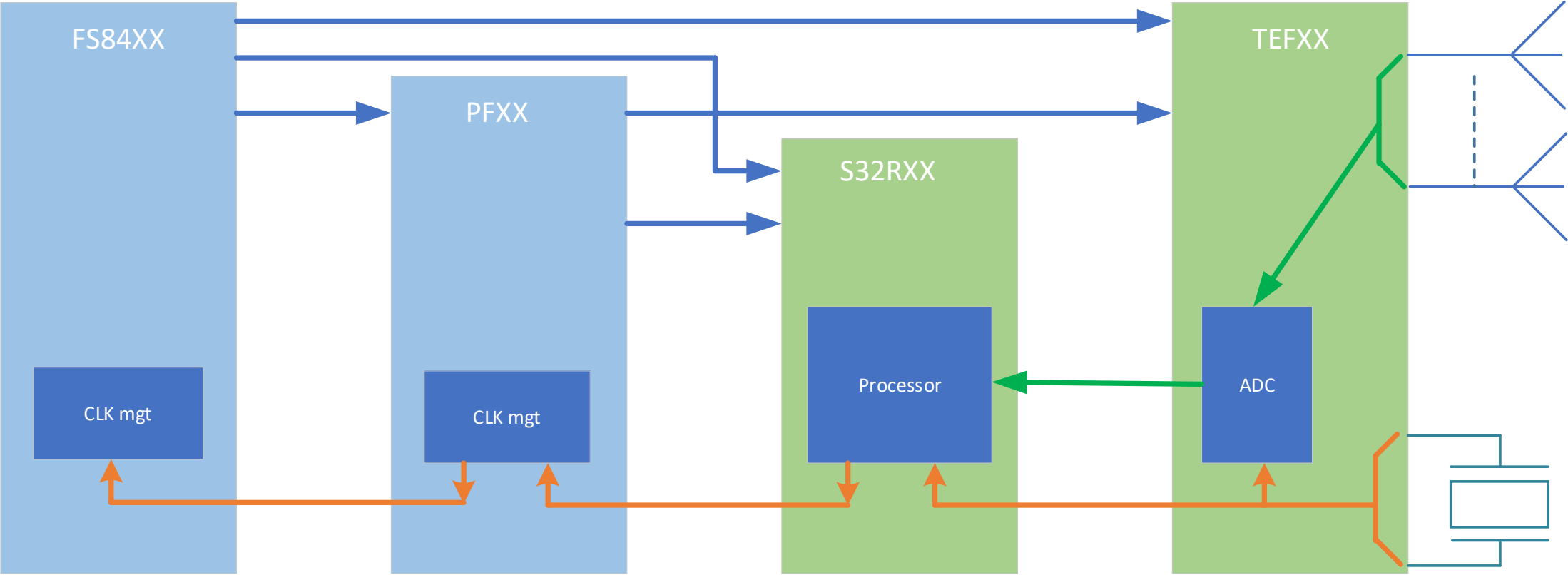
- The small dot in the upper right-hand quadrant is not a real radar reflection, but a result of the **SMPS Frequency leaking into the radar IF signal**. If not dealt with, it would result in a false radar detection.
- The fact that there is interference is not something desirable. But by synchronizing it to the radar chirps makes it **Predictable** and thus can be removed (filtered out) with a **minimal blind spot** for the radar sensor.
- If the SMPS frequency would not be synchronized, the interference would not be at a stable location in the spectrum, but move unpredictably anywhere in a large band in the spectrum (the system is very sensitive to phase and frequency changes), resulting in False radar detections, or an unacceptably Large Blind Spot.



SMPS Switching Frequency Noise



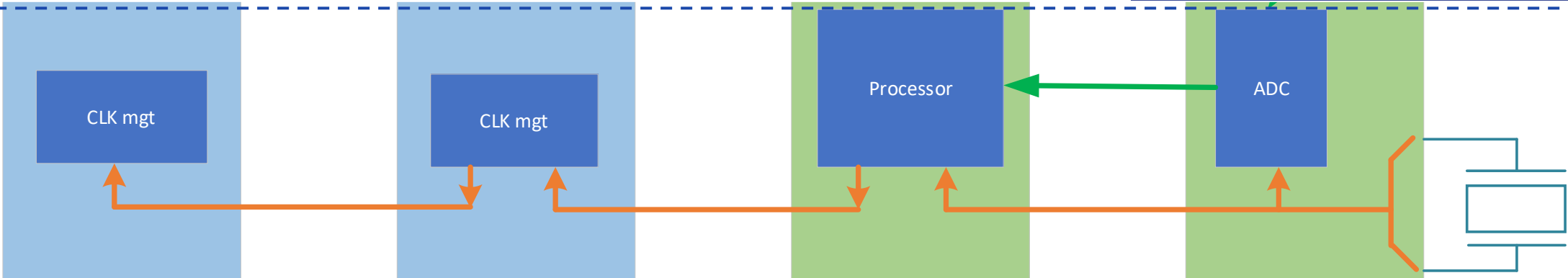
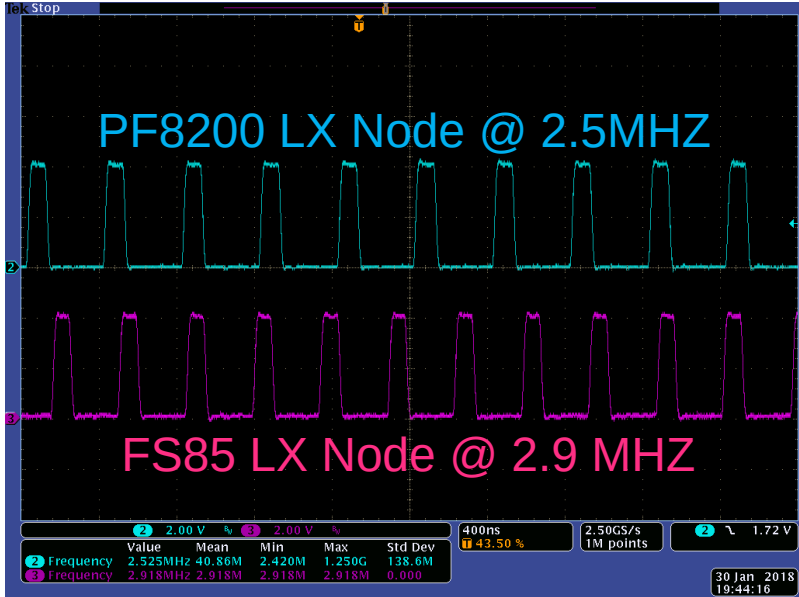
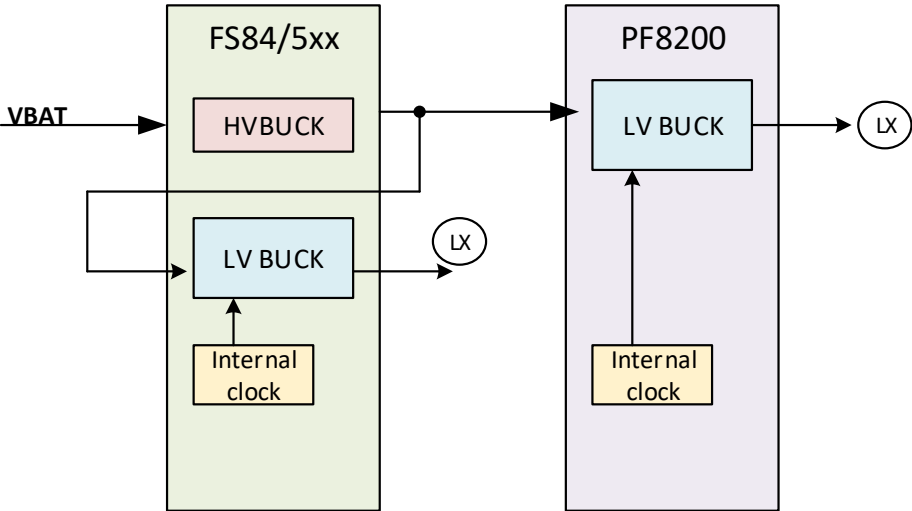
FREQUENCY SYNCHRONIZATION BACKBONE





FREQUENCY SYNCHRONIZATION BACKBONE

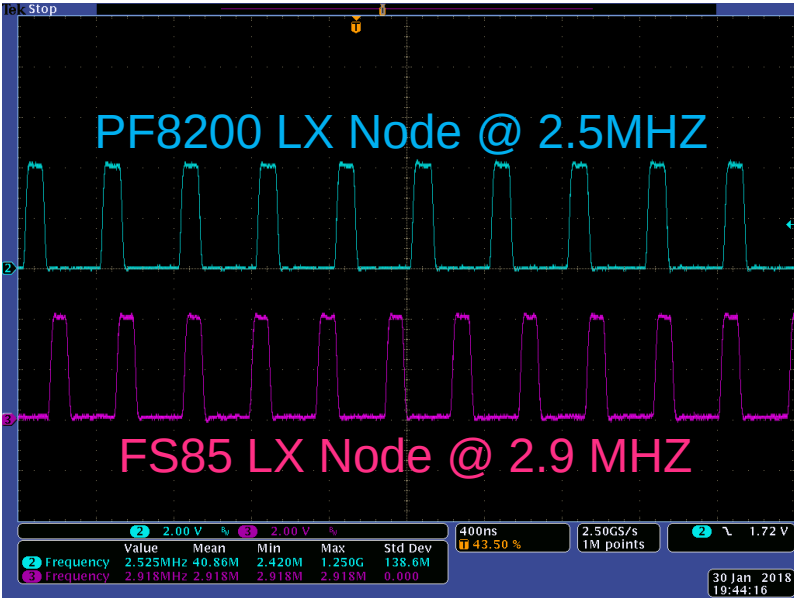
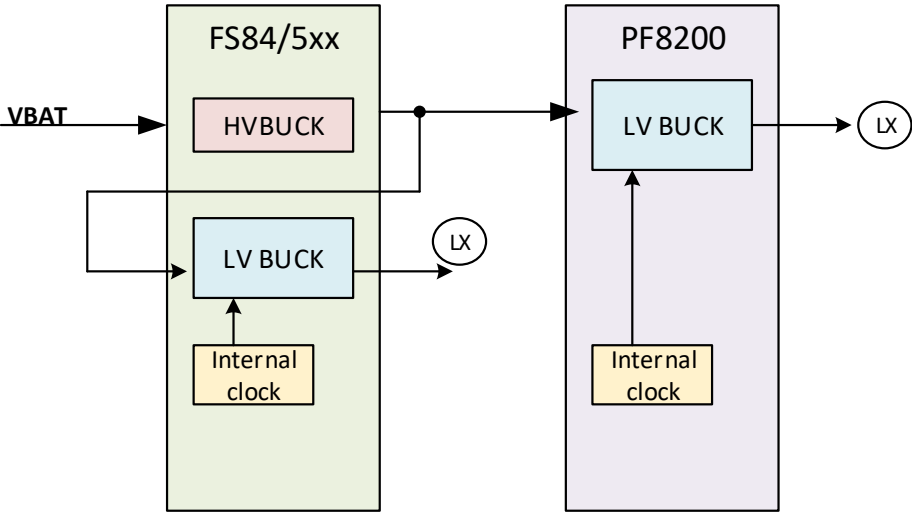
Use Case #1
Each device is working with its own internal clock





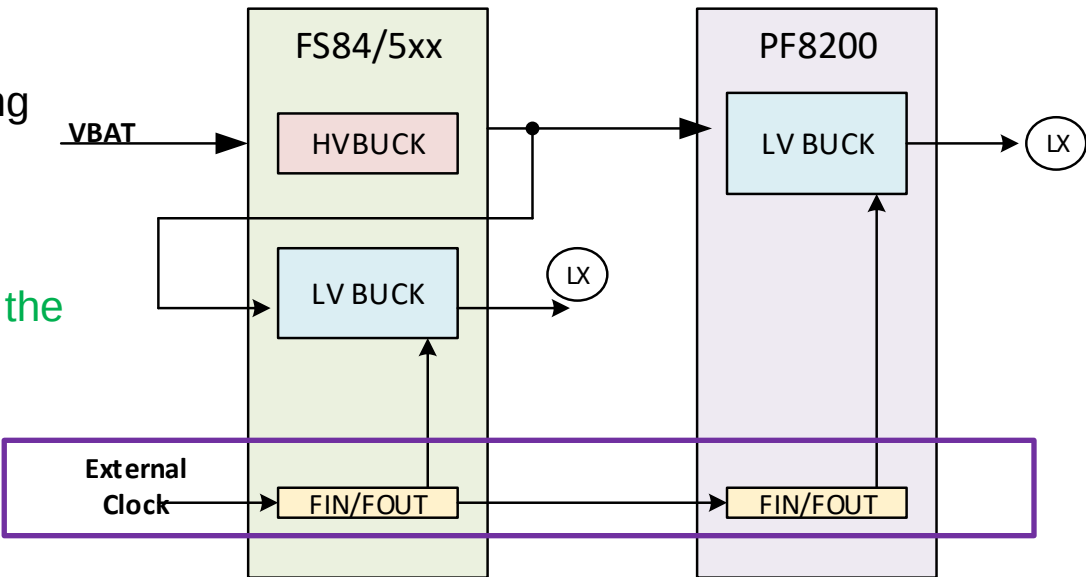
FREQUENCY SYNCHRONIZATION BACKBONE

Use Case #1
Each device is working with its own internal clock

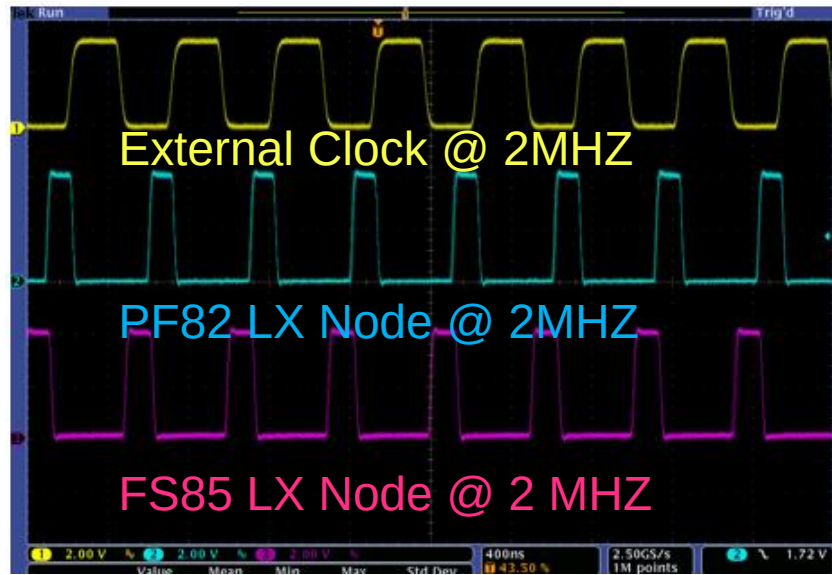


Use Case #2
All devices are working with an external clock

- ➔ System Synchronization
- ➔ MCU could control the entire system



Frequency Sync Backbone





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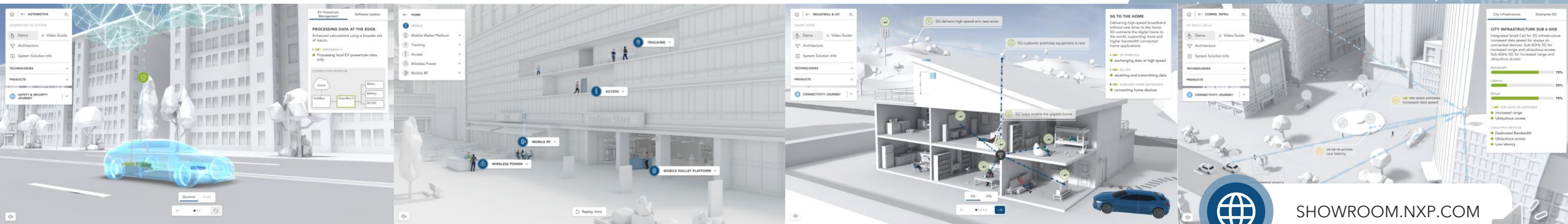
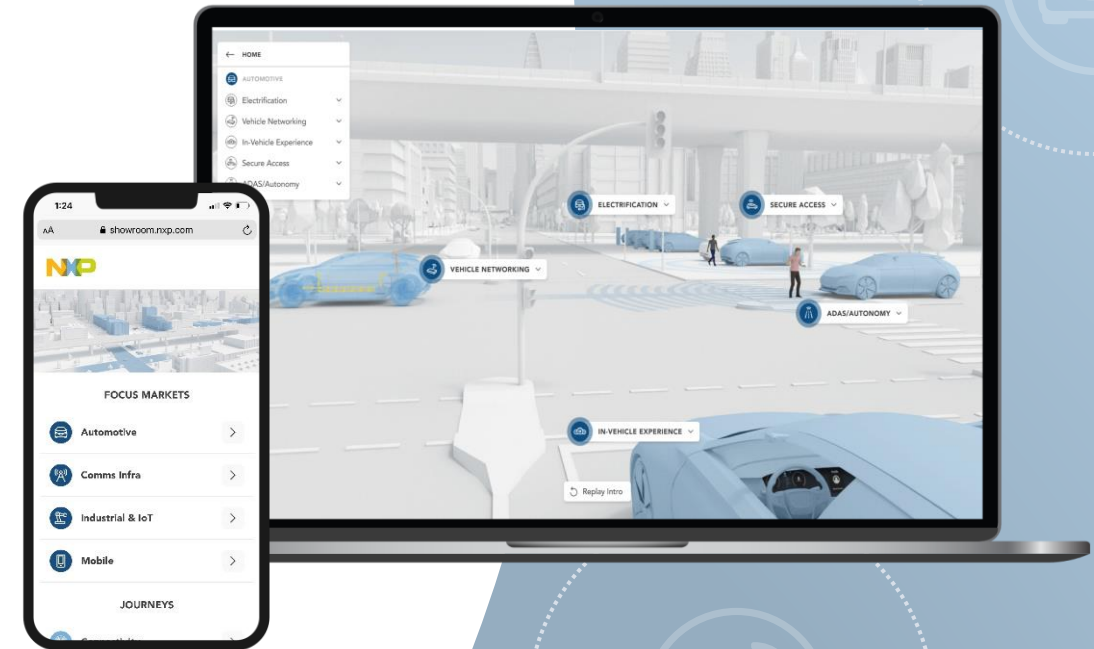
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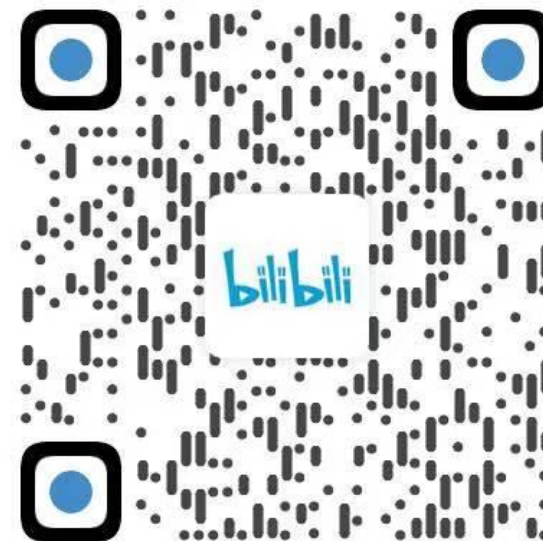
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