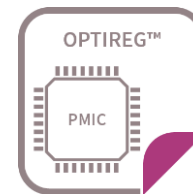


TLF35584 OPTIREG™ PMIC for Safety-Relevant Applications

Ralph M. Trunk (IFAG ATV PSN PM)
September 2019



TLF35584

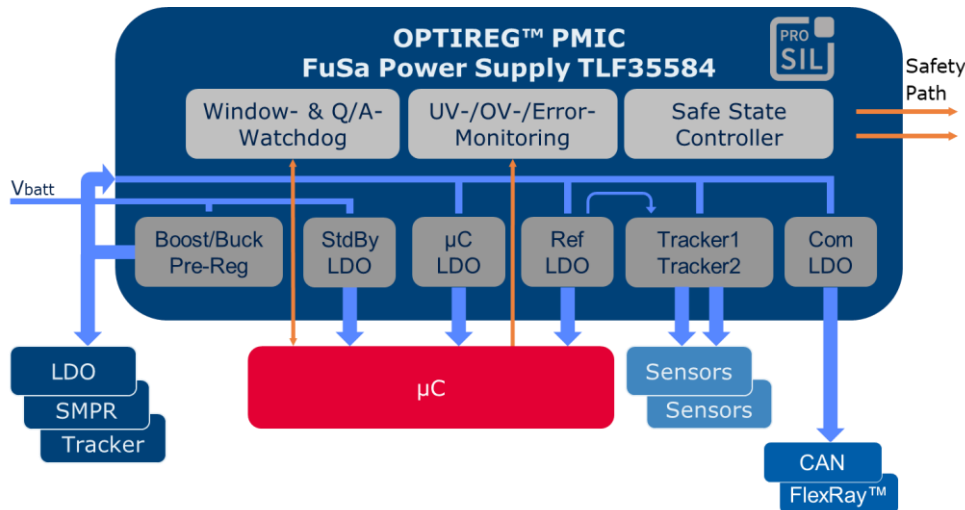
OPTIREG™ Functional Safety PMIC



Key Features

- › Buck/Boost-Pre-Regulator
 - IQ = 1.25A; f: 300kHz-2.5MHz
- › μ C-Supply: 3.3V/5V @ 600mA
- › Reference-LDO: 5V @ 150mA ($\pm 1\%$)
- › 2x Tracker: 5V @ 150mA
- › Communication-Supply: 5V @ 200mA
- › StandBy-LDO: 3.3V/5V @ 10mA
- › EN/Wake (T15 and CAN/FlexRay™)
- › SPI

- › Safety Features supporting ASIL-D systems
 - Functional-WD & Window-WD
 - ERR-Monitoring
 - Multiple independent bandgaps
 - UV/OV-Monitoring
 - Safe State Control
Secondary Safety Path
 - Protected safety area
 - Built In Self Test
 - Development acc. ISO26262 (ASIL-D)
- › Vin: 4V .. 40V



Package

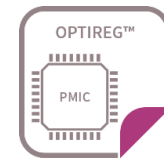


PG-VQFN-48



PG-LQFP-64





> Powertrain

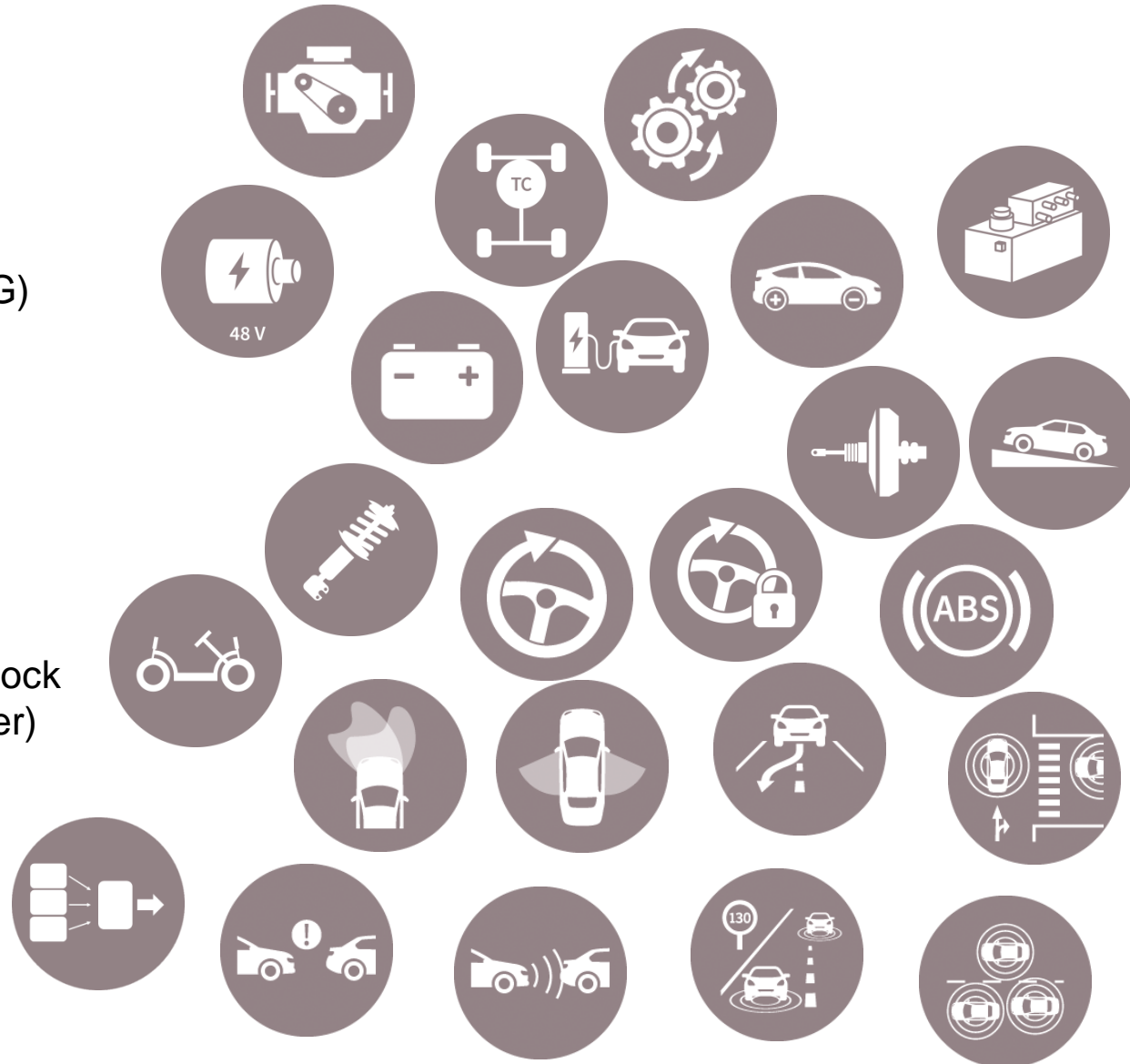
- Engine Management
- Transmission
- Transfer Case
- Clutch Actuator
- Starter Generator (e.g ISG)

> xEV

- Battery Management
- Inverter
- On-Board Charger
- ...

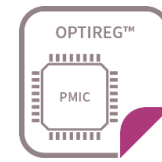
> Chassis/Safety

- Electrical Power Steering
- Electr. Steering Column Lock
- Braking (e.g Brake Booster)
- Electr. Parking Brake
- Active Suspension
- Chassis Control
- Domain Control
- ADAS Domain Control
- ...



TLF35584 – OPTIREG™ FuSa-PMIC

Features - Benefits



Features

ISO26262-compliant

Boost capability

Pre-/Post-Regulator architecture

Multiple voltage supplies

Dedicated reference voltage supply

Bandgap for both safety and supply plus electrical isolation

WWD & Q/A-WD

BIST (analog & logic)

UV/OV-monitoring

Flexible safe state control

Enable/Wake



Benefits

Usage in applications with ASIL-requirement

Ensure operation in cold cranking condition

High Efficiency

System supply: μ C, communication, sensors

ADC-supply independent of μ C-load

Avoid common cause failures

Flexible WD to achieve proper ASIL-level

Ensuring “safe” operation

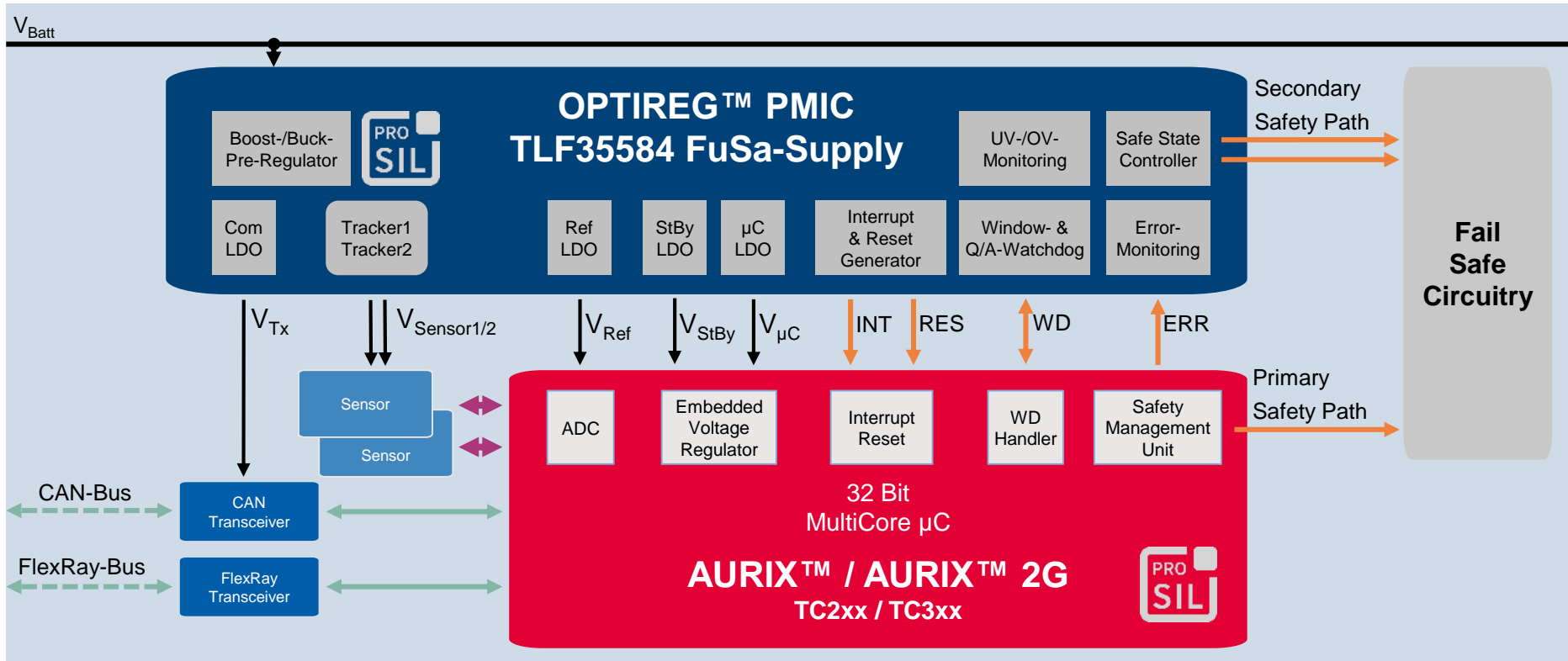
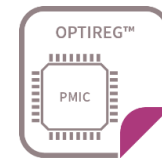
Flexible RESET/interrupt management

Ensuring “safe” operation

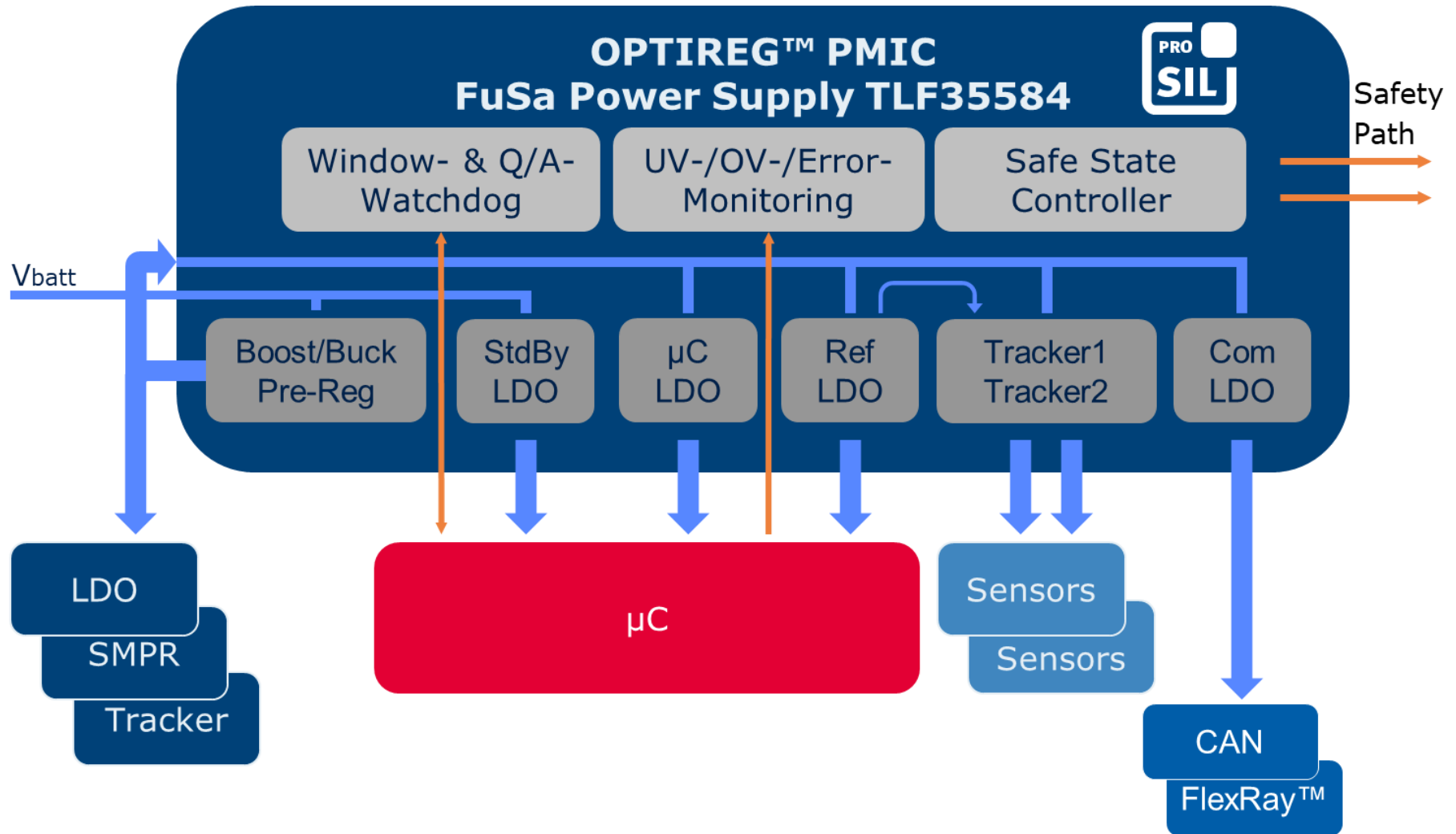
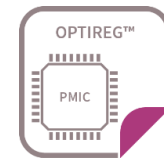
Flexible wake-up management

TLF35584 – OPTIREG™ FuSa-PMIC

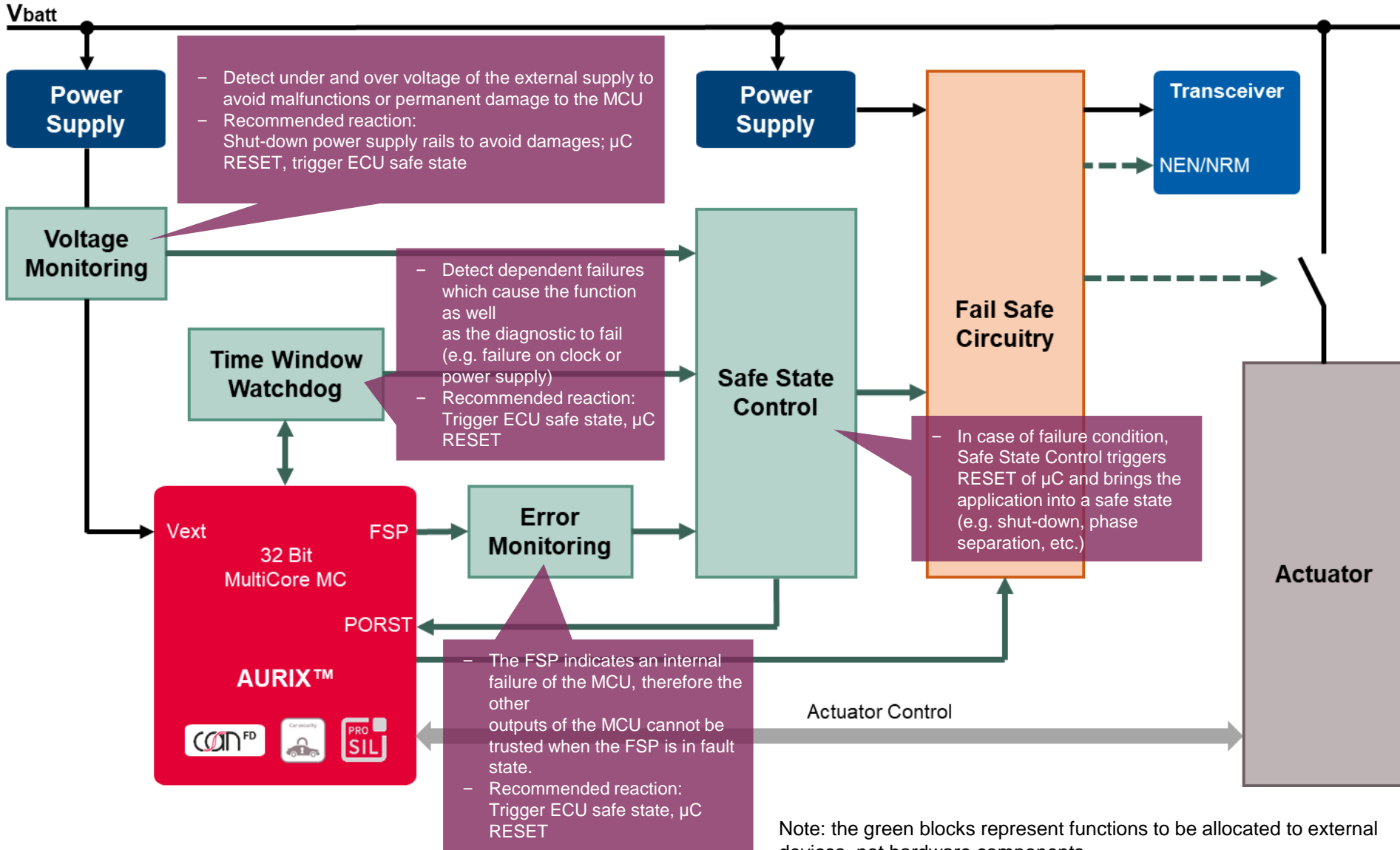
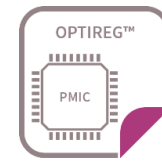
Application Diagram



TLF35584 - OPTIREG™ FuSa-PMIC



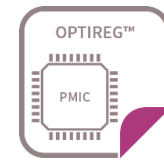
External Safety Integrity Functions Required By AURIX™-μC To Achieve ASIL-D



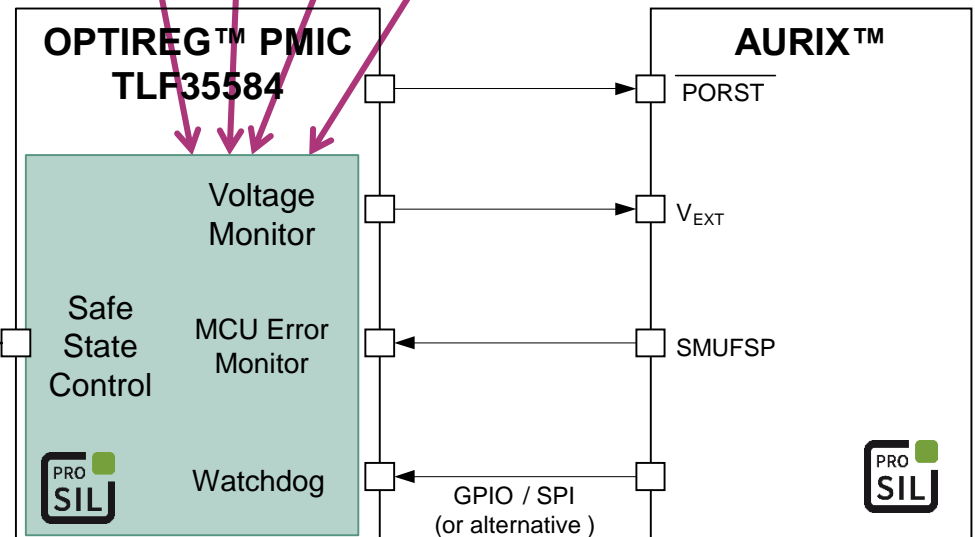
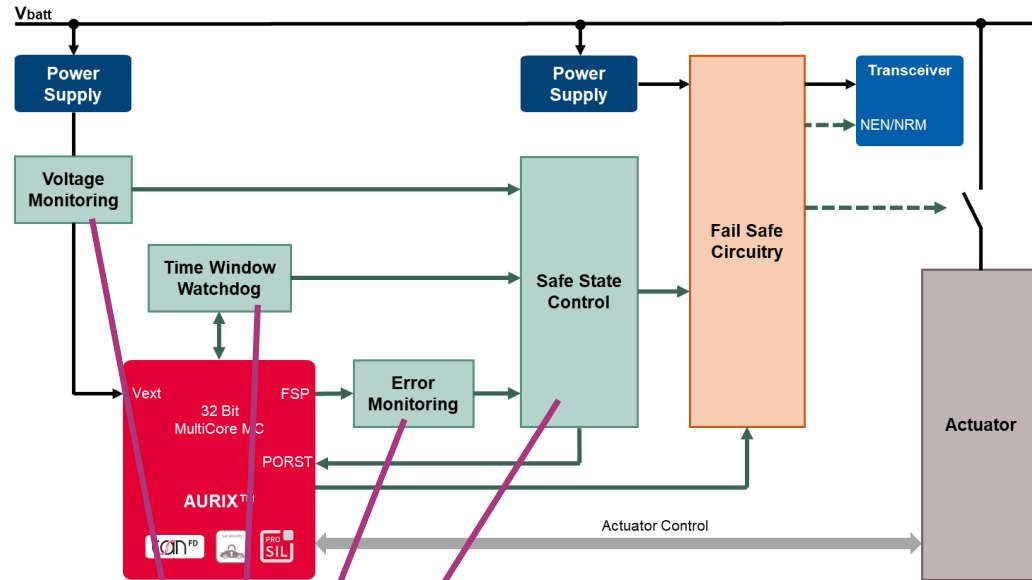
Note: the green blocks represent functions to be allocated to external devices, not hardware components.

OPTIREG™ FuSa-PMIC TLF35584

Genesis of Safety Requirements



- > TLF35584 has been defined based on AURIX requirements for external monitoring
- > Those requirements have then been extended to support also other MCUs.
 - Choice between 2 types of watchdog (Window- & Functional-Watchdog)
 - Ability to monitor MCU core supply
- > TLF35584 is developed as Safety Element out of Context (SEooC) supporting ASIL-D acc. ISO26262



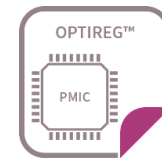
ISO26262
compliant

Safe State Activation
(e.g. power switch,
Trx de-activation)



OPTIREG™ FuSa-PMIC TLF35584QV

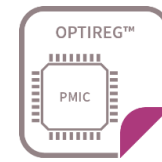
Variants: PG-VQFN-48



Sales Name	TLF35584QV VS1		TLF35584QV VS2	
Design Step	C13	C14	C13	C14
Design-In preference	Not for new designs!	Active and Preferred!	Not for new designs!	Active and Preferred!
Marking Line1	TLF35584	35584	TLF35584	35584
Marking Line2	VS1	VS1	VS2	VS2
Package	<u>PG-VQFN-48-31</u>		<u>PG-VQFN-48-31</u>	
μC-Supply	5V		3.3V	
Standby Supply	5V		3.3V	
Reference Regulator	5V		5V	
Communication Supply	5V		5V	
Sensor Supplies	5V		5V	

OPTIREG™ FuSa-PMIC TLF35584QK

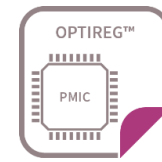
Variants: PG-LQFP-64



Sales Name	TLF35584QK VS1	TLF35584QK VS2
Order-Number (C14-step)	SP001613988	SP001613990
Package	<u>PG-LQFP-64-18</u>	<u>PG-LQFP-64-18</u>
Marking Line1	TLF35584	TLF35584
Marking Line2	QK VS1	QK VS2
μC-Supply	5V	3.3V
Standby-Supply	5V	3.3V
Reference-Regulator	5V	5V
Communication-Supply	5V	5V
Sensor-Supplies	5V	5V

OPTIREG™ FuSa-PMIC TLF35584

Additional Information



Sales Product Name	OPN	SAP Mat Nr	Design step	Add. Status Info	Package	Functional Packing	Moisture Protect. Pack	Large Packing Unit
TLF35584QKVS1	TLF35584QKVS1XUMA2	SP001613988	C14	active and preferred	<u>PG-LQFP-64-18</u>	Tape & Reel	DRY	1900
TLF35584QKVS2	TLF35584QKVS2XUMA2	SP001613990	C14	active and preferred	<u>PG-LQFP-64-18</u>	Tape & Reel	DRY	1900
TLF35584QVVS1	TLF35584QVVS1XUMA2	SP001657934	C14	active and preferred	<u>PG-VQFN-48-31</u>	Tape & Reel	DRY	2500
TLF35584QVVS1	TLF35584QVVS1XUMA1	SP001096170	C13	Not for new designs	PG-VQFN-48-31	Tape & Reel	DRY	2500
TLF35584QVVS2	TLF35584QVVS2XUMA1	SP001096172	C13	Not for new designs	PG-VQFN-48-31	Tape & Reel	DRY	2500
TLF35584QVVS2	TLF35584QVVS2XUMA2	SP001657936	C14	active and preferred	<u>PG-VQFN-48-31</u>	Tape & Reel	DRY	2500



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