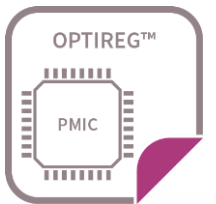




[www.infineon.com/OPTIREG\\_PMIC](http://www.infineon.com/OPTIREG_PMIC)

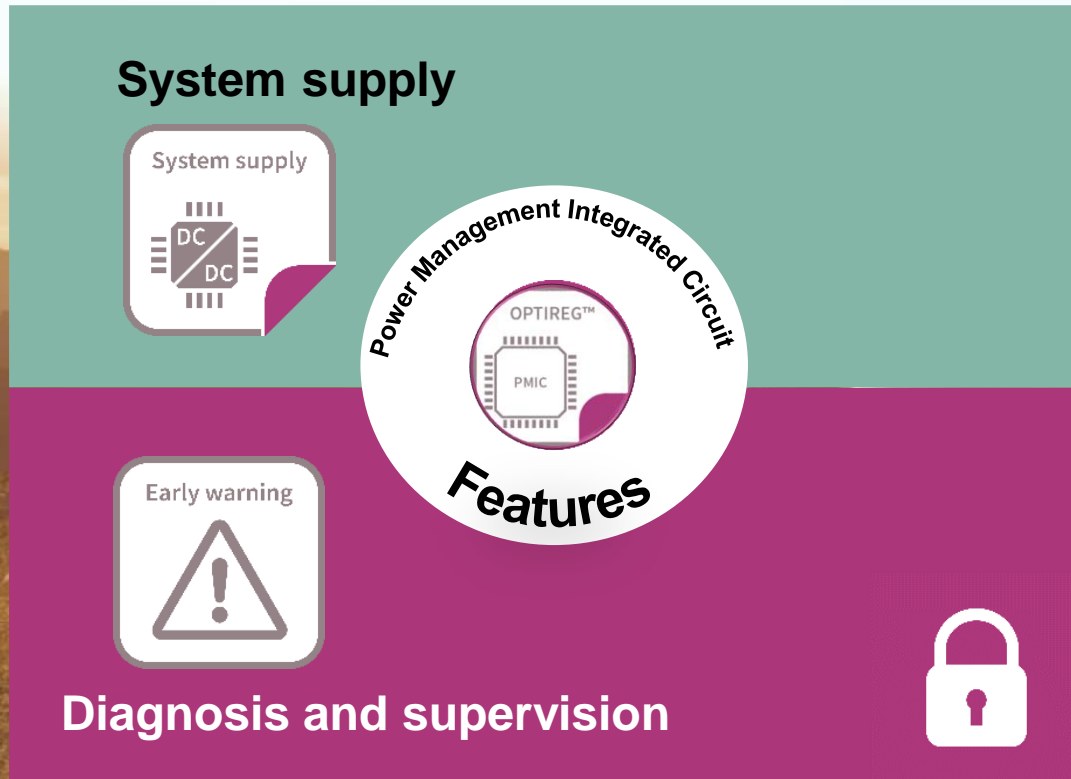
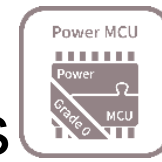
# TLF35584 OPTIREG™ PMIC for Safety-Relevant Applications

September 2021



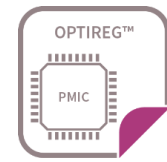
# The OPTIREG™ PMIC

An **integrated power supply** including system safety functions

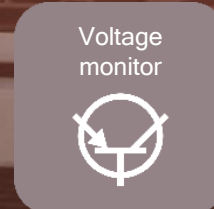
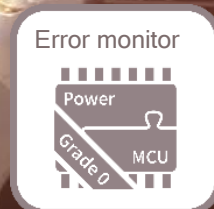
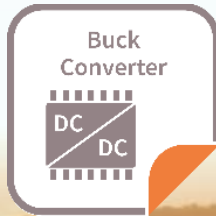
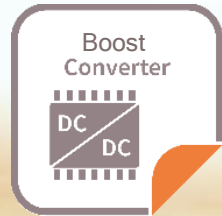




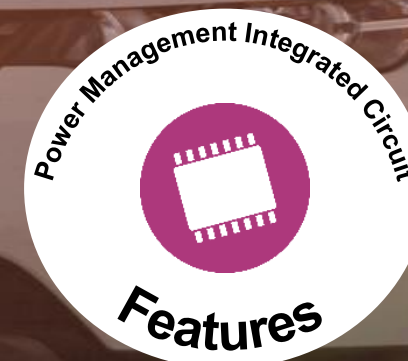
# OPTIREG™ PMIC TLF35584: System **power supply** and **safety** functions integrated into a **single package**



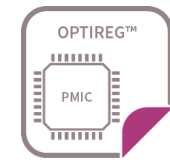
## System supply



## Diagnosis and supervision



# OPTIREG™ PMIC Functional Safety Applications



## › Powertrain

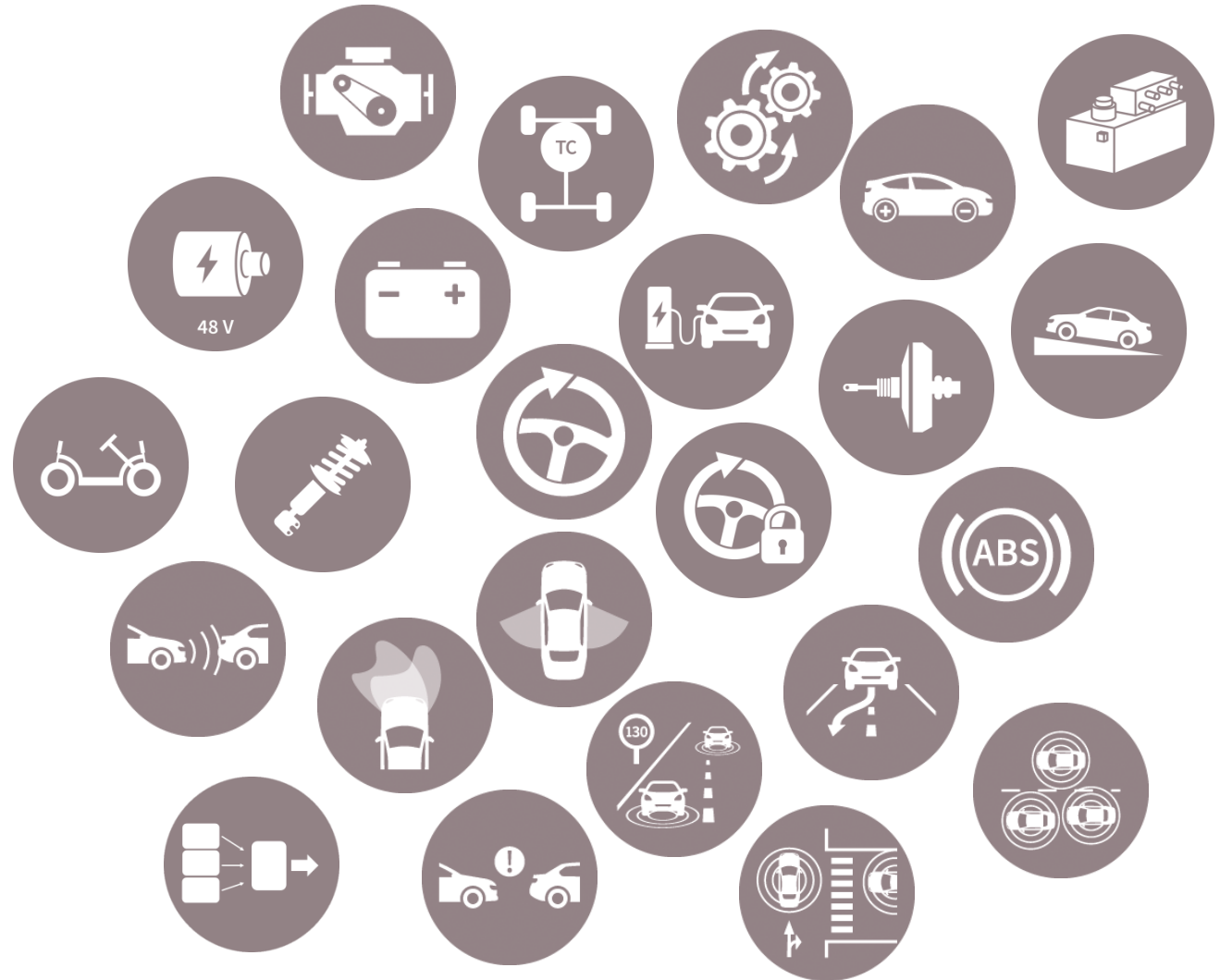
- Engine Management
- Transmission
- Transfer Case
- Clutch Actuator
- Starter Generator (e.g. ISG)

> xEV

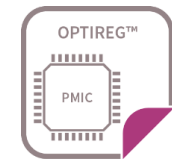
- Battery Management
- Inverter
- ...

## › Chassis/Safety

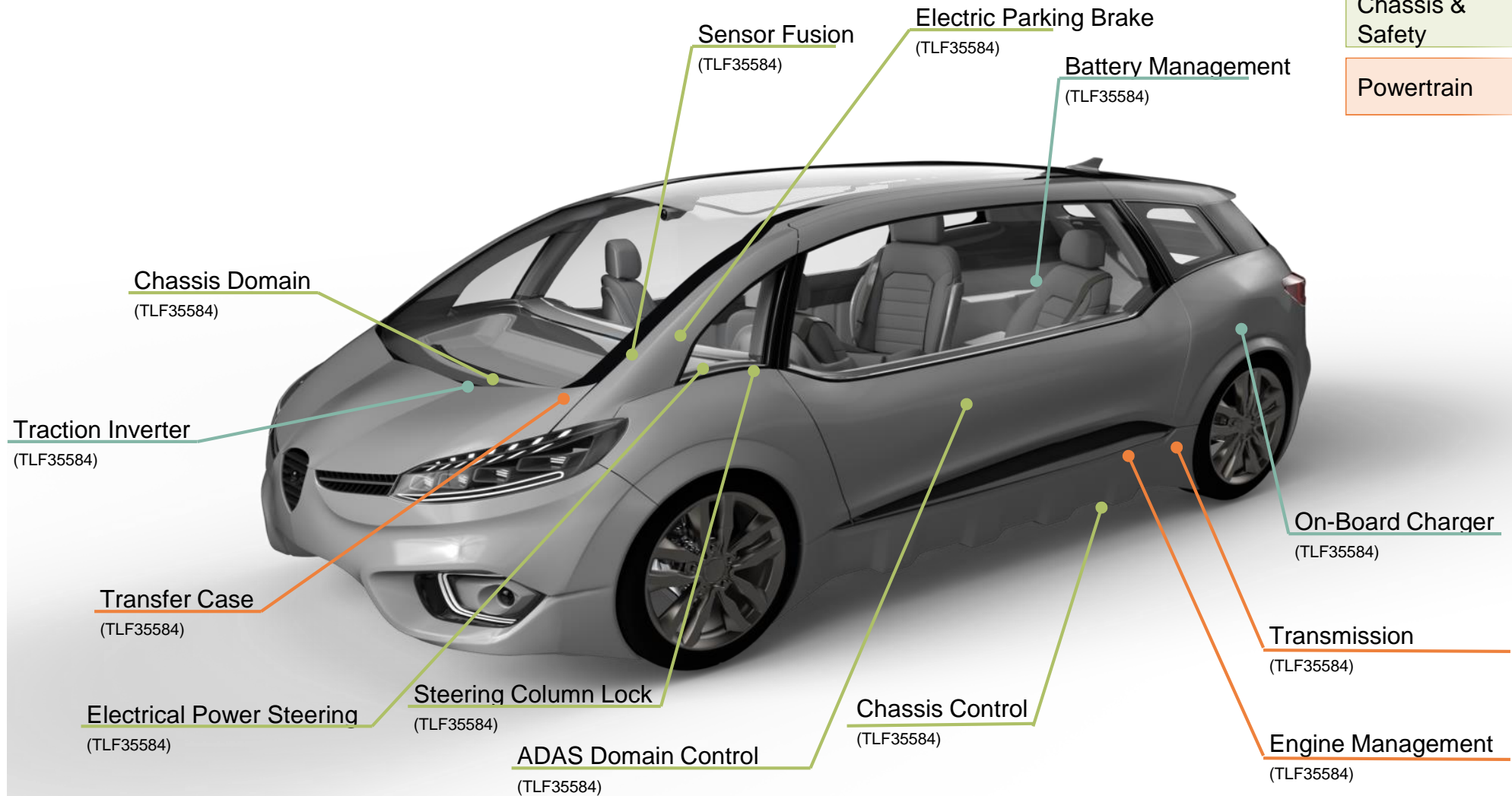
- Electrical Power Steering
- Electr. Steering Column Lock
- Braking (e.g. Brake Booster)
- Electr. Parking Brake
- Active Suspension
- Chassis Control
- Domain Control
- ADAS Domain Control
- ...



# OPTIREG™ PMIC TLF35584 supports ASIL-D applications and harsh automotive environments



## Application examples



# OPTIREG™ PMIC together with OPTIREG™ TLF11251 for a **safe and optimized** multi-channel **power supply** of Infineon **μC families**

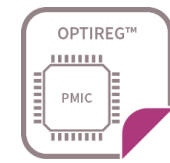


IFX offers a scalable PMIC portfolio which can cover the complete AURIX™ TC2x/TC3x portfolio



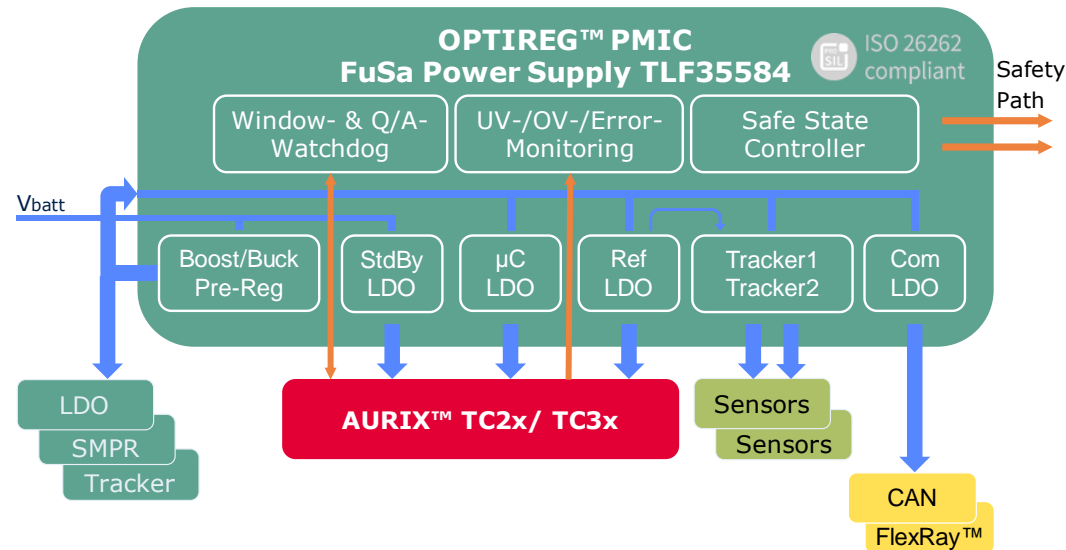
# TLF35584QKV/ VV Sx

## OPTIREG™ PMIC Functional Safety



### Key Features

- › Buck/Boost-Pre-Regulator
  - IQ = 1.3A; f: 300kHz-2.5MHz
- ›  $\mu$ 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
  - Multiple bandgap (supply vs V-monitoring)
  - UV/OV-Monitoring, ERR-Monitoring
  - Functional-WD & Window-WD
  - Safe State Control Secondary Safety Path
  - Protected safety area
  - Built In Self Test
  - Development acc. ISO26262



› Vin: 3V .. 40V

### Package

Grade 1



PG-VQFN-48

Grade 1+

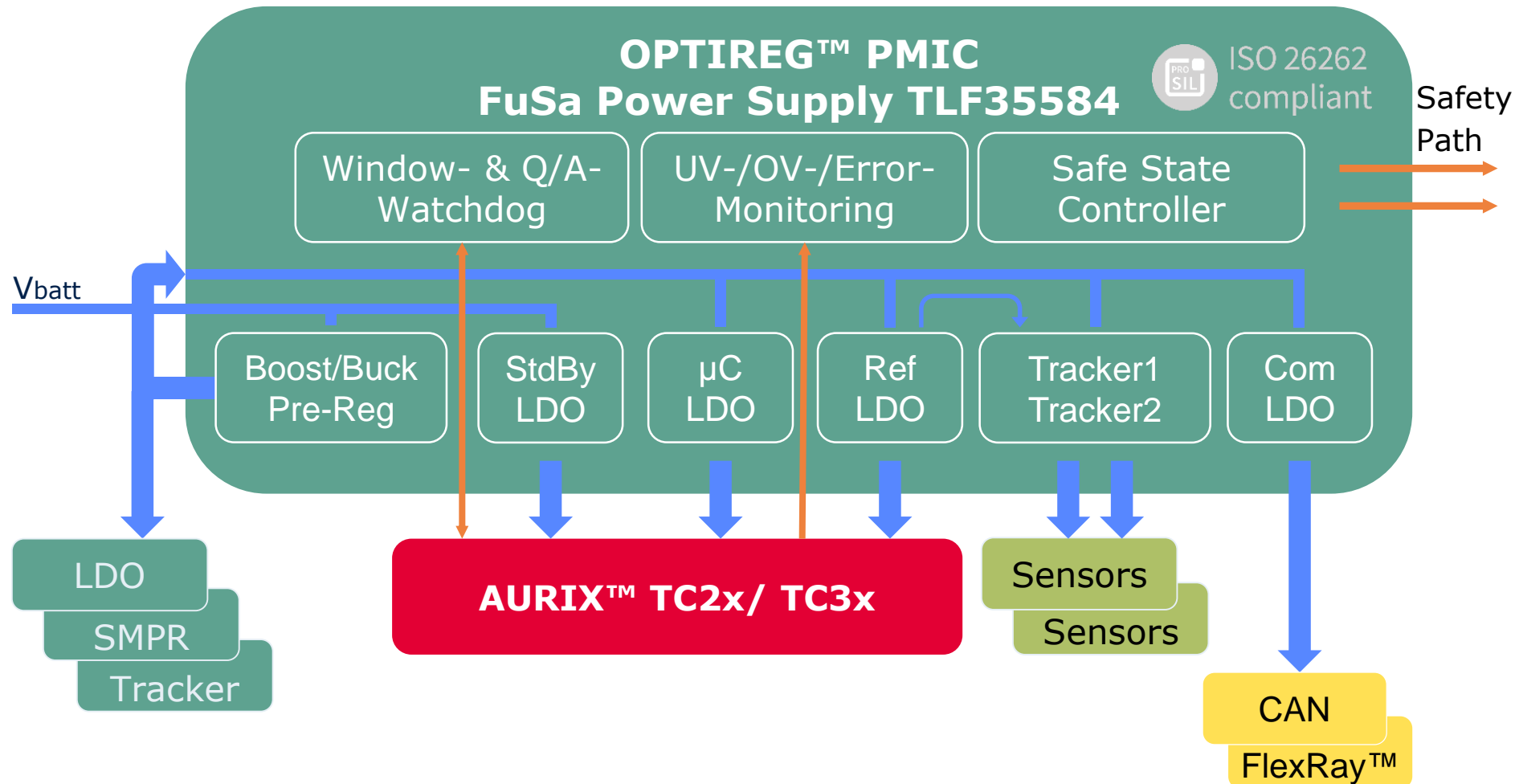
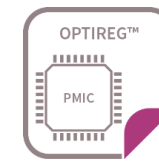


PG-LQFP-64



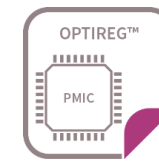


# TLF35584 - OPTIREG™ PMIC Functional Safety to supply the AURIX™ microcontroller and the other loads of your system





# TLF35584 – OPTIREG™ PMIC Functional Safety Features - Benefits



Features
ISO 26262-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



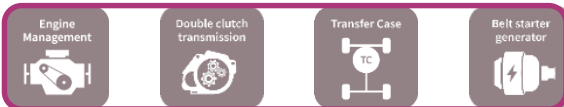
## Benefits

Usage in applications with ASIL-requirement
Ensure operation in cold cranking condition
High Efficiency
System supply: $\mu$ C, communication, sensors
ADC-supply independent of $\mu$ 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

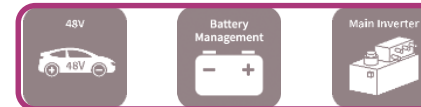
# AURIX™ microcontroller & OPTIREG™ PMIC teaming up for Functional Safety in the focus automotive applications



## Conventional Powertrain



## Electrical Drive Train



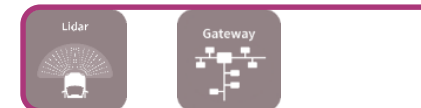
## Chassis



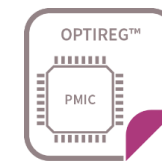
## Safety/ ADAS



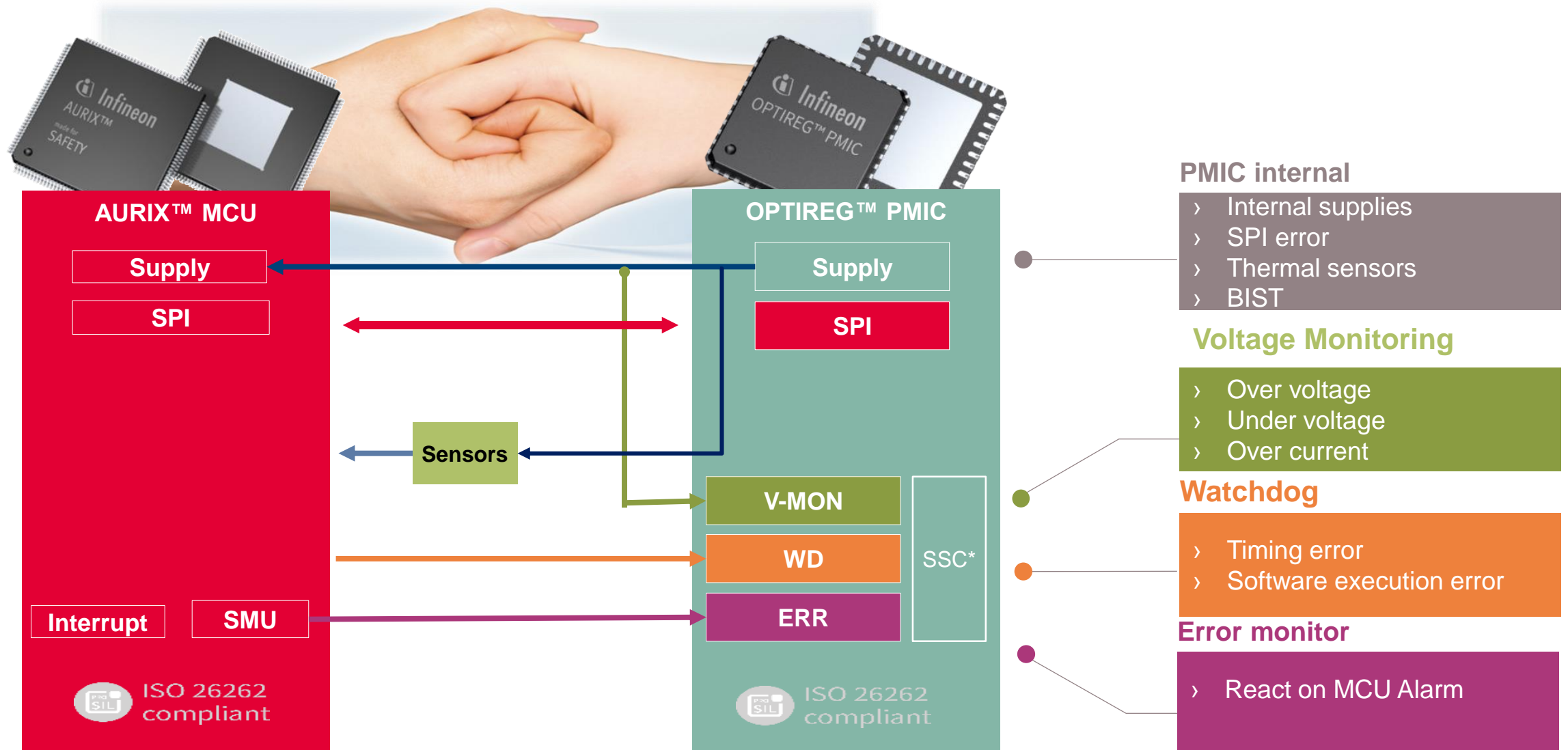
## Body



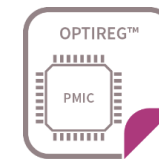
# OPTIREG™ PMIC powers up your automotive system while supervising the microcontroller and the power supply



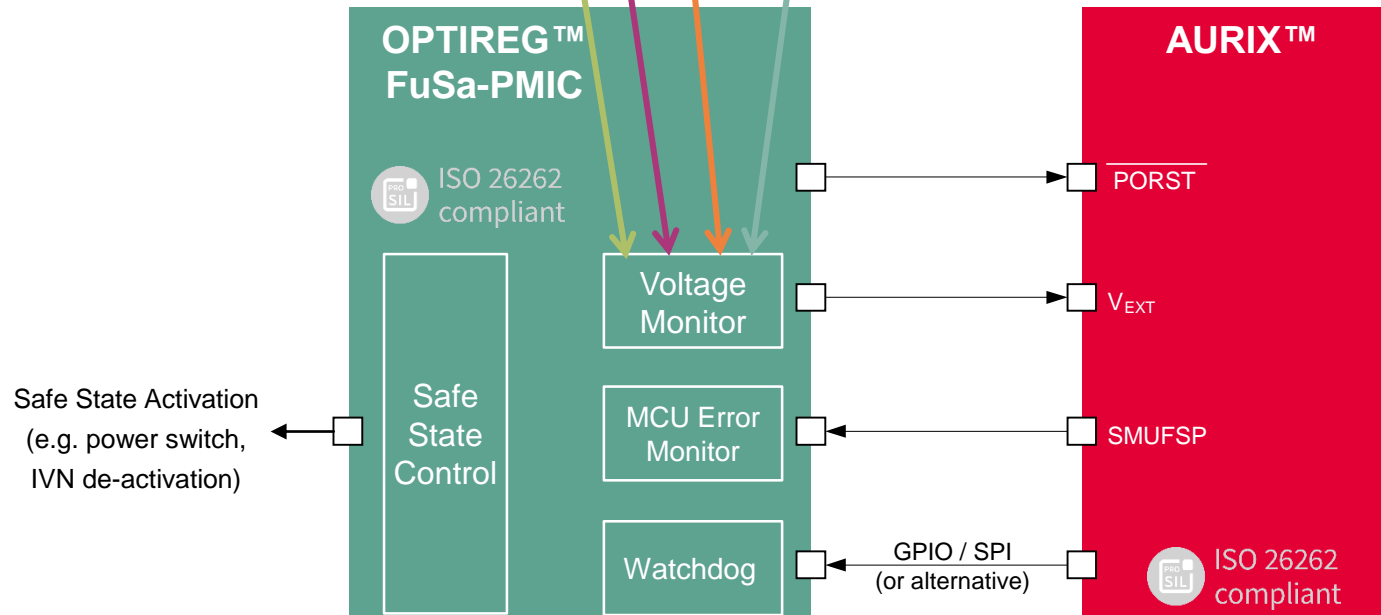
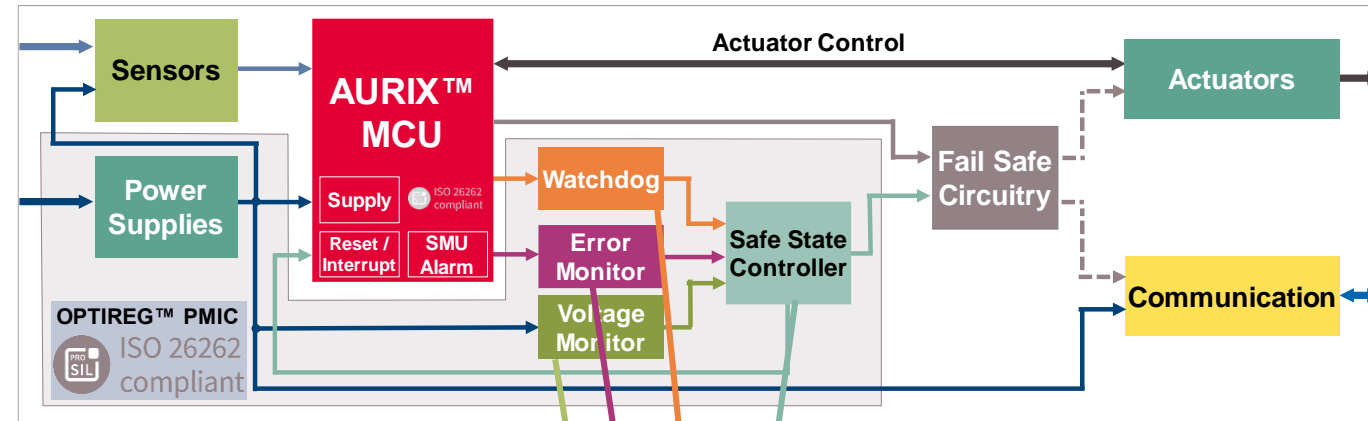
\*Safe State Control



# OPTIREG™ PMIC Functional Safety Genesis of Safety Requirements



- › OPTIREG™ PMIC Functional Safety have been defined based on AURIX™ requirements for external monitoring
- › Those requirements have then been extended to support also other MCUs.
  - Choice between different types of flexible watchdogs (Window- & Functional-Watchdogs)
  - Ability to monitor MCU core supply
- › OPTIREG™ PMIC Functional Safety are developed as Safety Element out of Context (SEooC) supporting ASIL-D acc. ISO 26262







## TLF35584QKVSx

PG-LQFP-64

S1 (5.0V), S2 (3.3V)

Tj: -40°C .. 150°C

- ❖ Grade 1+
- ❖ 12 mm x 12 mm
- ❖ Lead-tip inspection
- ❖ Development acc. ISO 26262 Safety Standard



## TLF35584QVVSx

PG-VQFN-48

S1 (5.0V), S2 (3.3V)

Tj: -40°C .. 150°C

- ❖ Grade 1
- ❖ 7 mm x 7 mm
- ❖ Lead-tip inspection
- ❖ Development acc. ISO 26262 Safety Standard



## TLF35584QVHSx

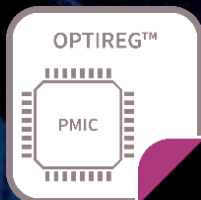
PG-VQFN-48

S1 (5.0V), S2 (3.3V)

Tj: -40°C .. 175°C

- ❖ **Grade 0+**
- ❖ 7 mm x 7 mm
- ❖ Lead-tip inspection
- ❖ Development acc. ISO 26262 Safety Standard

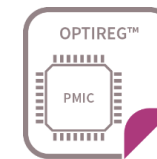
New





# TLF35584 – OPTIREG™ PMIC Functional Safety

## General Information



### › General

- PG-VQFN-48
  - As TLF35584**QV**
  - With lead-tip-inspection
  - Footprint: 7mm x 7mm
  - Pitch: 0.5
- PG-LQFP-64
  - As TLF35584**QK**
  - Footprint: 12mm x 12mm
  - Pitch: 0.5



- Vin: 3V .. 40V  
(60V with rise time >10ms)
- Tj: -40°C .. 150°C  
(extension to be checked on request acc. customer's load/temperature-profile for PG-LQFP-64)
- Development acc. ISO 26262 Safety Standard



ISO 26262  
compliant

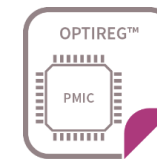


RoHS

Sales Name	Package	LDO1	Standby-LDO	LDO2	Tracker 1 & 2	Ref.-LDO
TLF35584QV <b>VS1</b>	PG-VQFN-48	5V	5V	5V	5V	5V
TLF35584QV <b>VS2</b>	PG-VQFN-48	3.3V	3.3V	5V	5V	5V
TLF35584QK <b>VS1</b>	PG-LQFP-64	5V	5V	5V	5V	5V
TLF35584QK <b>VS2</b>	PG-LQFP-64	3.3V	3.3V	5V	5V	5V

# TLF35584 OPTIREG™ PMIC Functional Safety

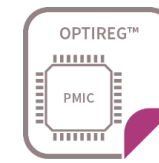
## Variants: **PG-VQFN-48-31**



Sales Name	TLF35584QV <b>VS1</b>		TLF35584QV <b>VS2</b>	
Design Step	C13	C14	C13	C14
Design-In preference	<b>Not for new designs!</b>	Preferred!	<b>Not for new designs!</b>	Preferred!
Order-Number	SP001096170	SP001657934	SP001096172	SP001657936
OPN	TLF35584QVVS1 XUMA1	TLF35584QVVS1 XUMA2	TLF35584QVVS2 XUMA1	TLF35584QVVS2 XUMA2
Marking Line1	TLF35584	35584	TLF35584	35584
Marking Line2	VS1	VS1	VS2	VS2
Package	PG-VQFN-48		PG-VQFN-48	
μC-Supply	5V		3.3V	
Standby-Supply	5V		3.3V	
Reference-Regulator	5V		5V	
Communication-Supply	5V		5V	
Sensor-Supplies	5V		5V	

# TLF35584 OPTIREG™ PMIC Functional Safety

## Variants: **PG-LQFP-64-13**



Sales Name	TLF35584QK <b>VS1</b>	TLF35584QK <b>VS2</b>
Order-Number (C14-step)	SP001613988	SP001613990
OPN	TLF35584QKVS1XUMA2	TLF35584QKVS2XUMA2
Package	PG-LQFP-64	PG-LQFP-64
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




# Learn more about OPTIREG™ PMICs


## Support material





### Collaterals and Brochures


- › Product briefs
- › Selection guides
- › Application brochures
- › Presentations
- › Press releases


 [TLF35584QKV S1 Webpage](#)

 [TLF35584QVH S1 Webpage](#)

 [TLF35584QVVS 1 Webpage](#)

 [TLF35584QKV S2 Webpage](#)

 [TLF35584QVH S2 Webpage](#)

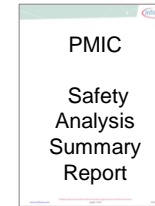
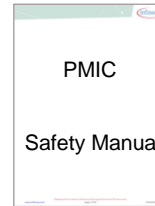
 [TLF35584QVVS 2 Webpage](#)

### Technical Material

- › Application notes
- › Technical articles
- › Simulation models
- › Datasheets, MCDS Files
- › PCB Design Data

 [Datasheet\\*](#)

 [Technical Material\\*](#)



 [Hitex Website](#)


 [AURIX™ SafeTlibTC2x](#)


### Evaluation Boards

- › Evaluation boards
- › Demo boards
- › Reference designs

 [TLF35584 MC Board](#)

 [PMIC Boards](#)

 [TLF35584QV VS1 Board](#)

 [TLF35584QV VS2 Board](#)

Evaluation Board



Companion Board



A  
U  
R  
I  
X  
™

### Further Info

- › Technical videos
- › Product videos

- › [OPTIREG™: Infineon's automotive power supply solutions](#)
- › [Why Infineon's OPTIREG™ families can be used in almost all automotive applications?](#)

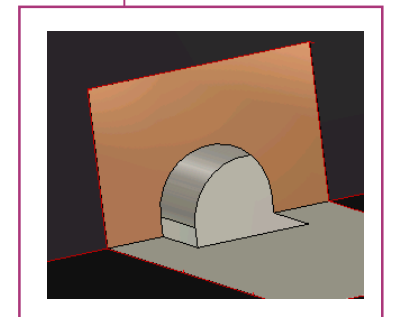
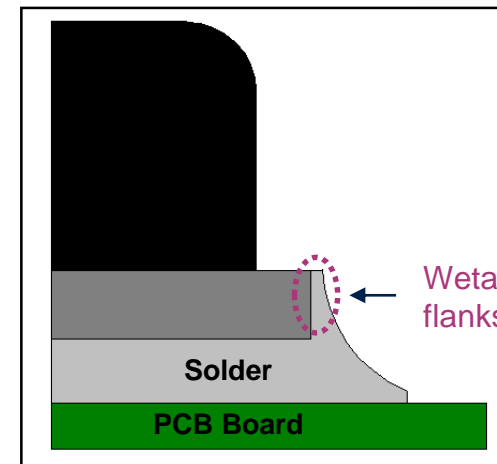
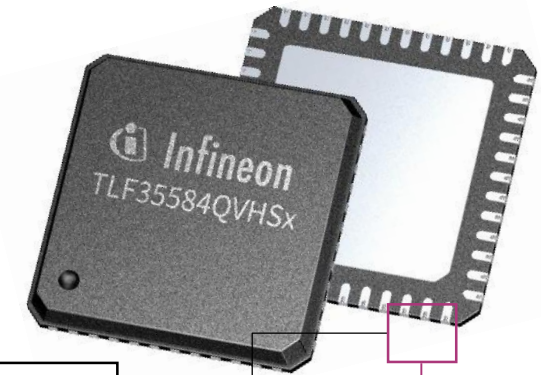


\* Accessible only for customers under NDA



## OEMs/ Tier1s can skip one step in the manufacturing

Providing a solder-able sidewall on lead tip of the VQFN leadless package to enable Automated Optical Inspection (AOI)



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