



# Funkschlüssel

Grundlagen, Entwicklung und Funktionen

# Agenda

- 1 Überblick Automotive Division**
- 2 Warum Schlüssel?**
- 3 Schlüsselmodelle**
- 4 Basisfunktionen Funkschlüssel**
- 5 Schlüsselloser Zugang (PASE)**
- 6 Herausforderungen**
- 7 Zukünftige Entwicklungen**

# Continental Corporation

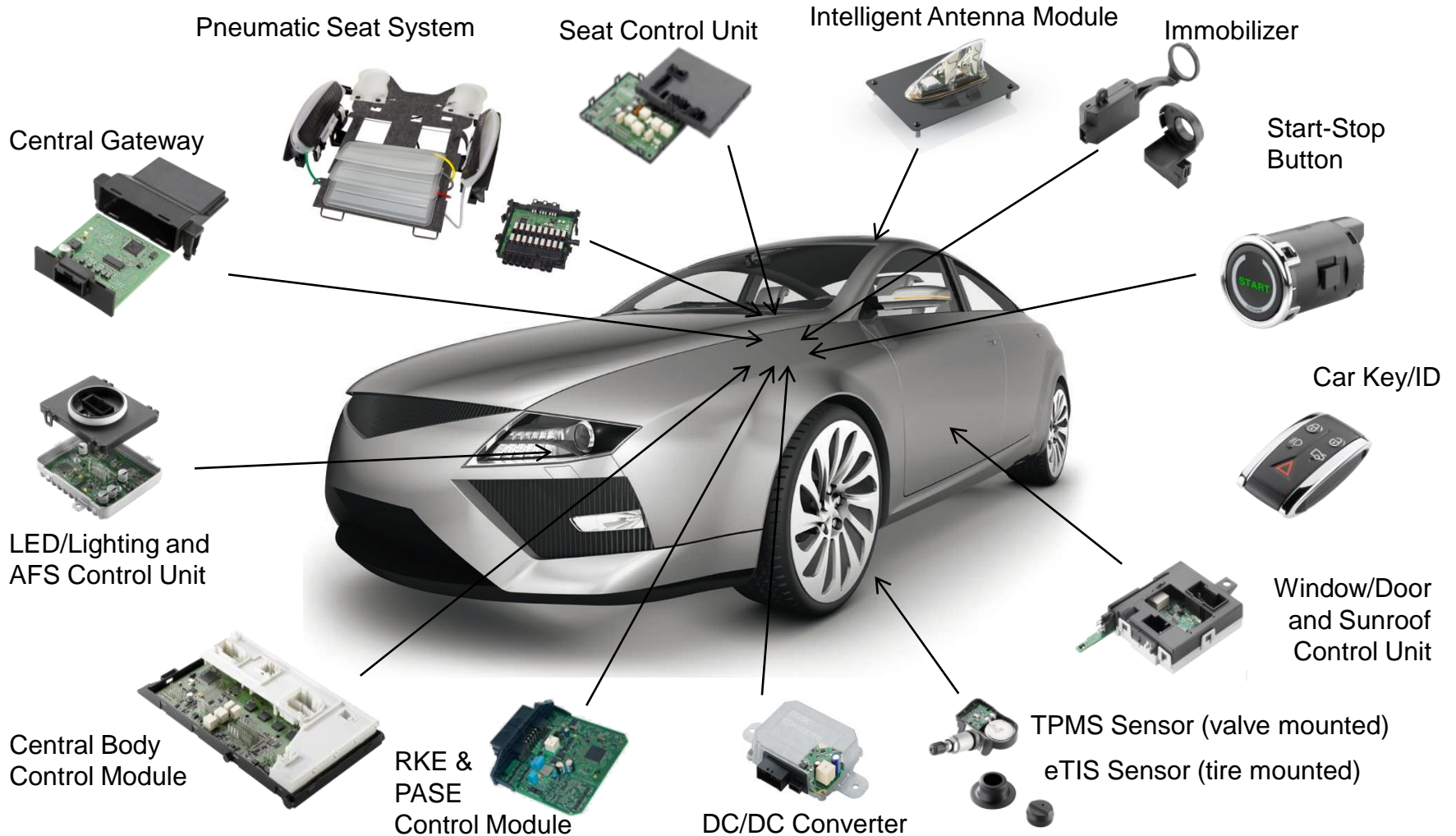
## Five Strong Divisions

Chassis & Safety	Powertrain	Interior	Tires	ContiTech
Vehicle Dynamics	Engine Systems	Instrumentation & Driver HMI	PLT, Original Equipment	Air Spring Systems
Hydraulic Brake Systems	Transmission	Infotainment & Connectivity	PLT, Repl. Business, EMEA	Benecke-Kaliko Group
Passive Safety & Sensorics	Hybrid Electric Vehicle	<b>Body &amp; Security</b>	PLT, Repl. Business, The Americas	Compounding Technology
Advanced Driver Assistance Systems (ADAS)	Sensors & Actuators	Commercial Vehicles & Aftermarket	PLT, Repl. Business, Asia Pacific	Conveyor Belt Group
	Fuel Supply		Commercial Vehicle Tires	Elastomer Coatings
			Two Wheel Tires	Fluid Technology
				Power Transmission Group
				Vibration Control

PLT – Passenger and Light Truck Tires

# Business Unit Body & Security

## Product Overview (main products only)



# Business Unit Body & Security

## Very Comprehensive Product Portfolio (Highlights I)

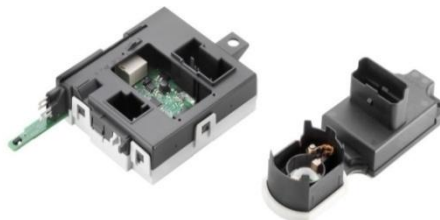


Body Control Modules

### Features

- › Relays & fuse box with integrated electronics
- › Complete lighting control
- › Wiper control
- › Control of head lamp and windshield cleaning
- › I/F to climate control and to electro-hydraulic brake
- › High current PCB for power distribution
- › Proprietary solder free contact system
- › CAN and serial I/F

av. production per day:  
~ 73,000 units



Door Control Units

### Features

- › Power window control with best in class anti-trap (also optional)
- › Mirror adjustment, heating, optional: memory and folding
- › Optional: Central door locking and signal lighting
- › Optional: RF-remote control
- › LIN, CAN (or J-1850) I/F

av. production per day:  
~ 45,000 units



Seat Control Units

### Features

- › Up to 8 directions of adjustment
- › Soft-Start functionality
- › Control of air cushions for contour adjustment
- › Automatic headrest adjustment
- › Easy entry and exit operation with anti-trap protection
- › Key related memory function
- › Occupant Sensing

av. production per day:  
~ 14,700 units

# Business Unit Body & Security

## Very Comprehensive Product Portfolio (Highlights II)



Passive Start and Entry

### Features

- › 433 MHz/ 315 MHz (optional 868 MHz)
- › PEG: Challenge-Response encryption
- › Semiconductor MUX for adaptive antenna with current control (EMI↓)
- › ±10cm interior/exterior discrimination for ID
- › Standalone ECU or Integrated in BCM

av. production per day:  
~ 6,000 systems



Tire Information Systems

### Features

- › eTIS - advanced tire intelligence and cutting edge performance
- › Driver: Enhanced tire maintenance solutions (TPMS, Tread Depth Filling Assistant etc)
- › Vehicle: Robust tire data as input to enhance other vehicle systems (Chassis & Powertrain)
- › Cloud: Pioneering new VEHICLE to CLOUD services
- ➔ Converting tire intelligence into cutting edge solutions

av. production per day:  
~ 62,500 wheel units



Gateways

### Features

- › Operation of vehicle network systems like CAN, LIN, MOST, FlexRay and Ethernet
- › AUTOSAR conform development
- › Vehicle network master & monitor
- › Vehicle diagnostic interface
- › High speed vehicle SW update
- › Easy implementation of new vehicle functions without changing E/E architecture
- › Vehicle application server (SyD)

av. production per day:  
~ 17,000 units

# Business Unit Body & Security

## New Products and Innovations (excerpt)

### Seat Comfort Systems



- › Individual adjustment of seat contour by separated air cushions for shoulder and lumbar area
- › Stabilization of side hold by air cushions
- › Back relaxation by dynamical lumbar functionality
- ➔ Continental as System Supplier (ECU, valves, pump)

### Exterior Light Control Units



- › High performance LED Control for exterior lighting
- › Control of Adaptive Front Lighting (AFL) and leveling
- › Optimized thermo-management
- › Current control
- › LED codings
- ➔ Innovative business field

### electronic -Tire Information Systems (eTIS)



- › Monitoring of tire pressure and temperature
- › Optimization of driving dynamic algorithms incl. friction detection
  - › Chassis functions (ESP, ABS)
  - › driver information
  - › power-train functions
- ➔ Integration in vehicle architecture

### Intelligent Antenna Modules



- › Central air/car interface & gateway for all wireless services
- › Integration of...
  - › External antennas (GPS, Phone, WLAN,...)
  - › Long Range ([AM/FM, HD], ...)
  - › Internal antennas (RKE/PASE/TPMS, WLAN, ...)
  - › Tuners and transceivers
- ➔ Increased performance & flexibility at reduced cost & weight
- ➔ Supporting "Always on"

# Grundlagen Funkschlüssel

Warum Schlüssel ?

- Eindeutige Zuweisung Schlüssel zu Fahrzeug (Identifikation)
- Versicherungsschutz nur mit EWS (Immobilizer)
- Unterschiedliche Fahrzeugeinstellungen in Abh. vom Schlüssel (Personalisierung)
- Verschiedenste Komfortfunktionen
- Speicher für Diagnose-Einträge

**Intro  
Video**

**RKE = Remote Key Entry  
PASE = PAssive Start & Entry  
PEPS = PAssive Entry PAssive Start  
KESY = Keyless Entry System**



# Grundlagen Funkschlüssel

## Typenübersicht



### ID Geber (ID tag)

- ▶ Keyless Entry
- ▶ PASE
- ▶ Transponder

### Funkschlüssel (RKE)

- ▶ RKE
- ▶ Wegfahrsperr
- ▶ Notschlüssel

### Keyless Entry

- ▶ PASE
- ▶ RKE
- ▶ Wegfahrsperr
- ▶ Notschlüssel

### Keyless Entry BiDir

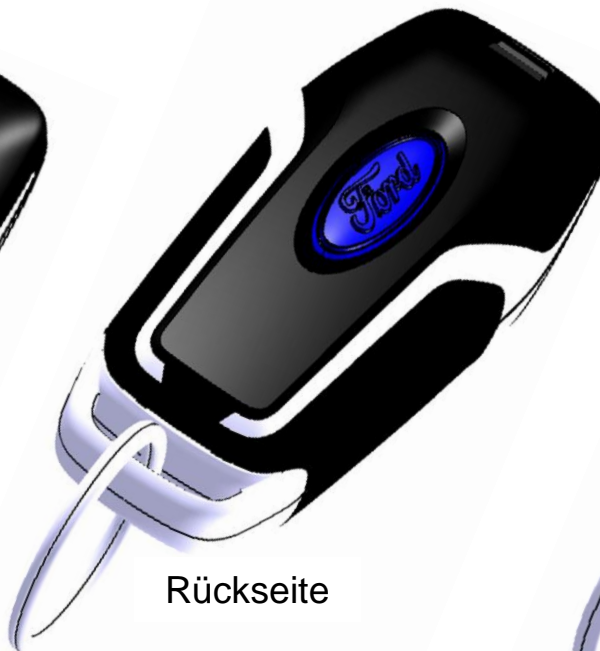
- ▶ Status LED(s)
- ▶ PASE
- ▶ RKE
- ▶ Wegfahrsperr
- ▶ Notschlüssel

# Grundlagen Funkschlüssel

Mechanischer Aufbau (Ford PEPS UniDir MY13)



Europa



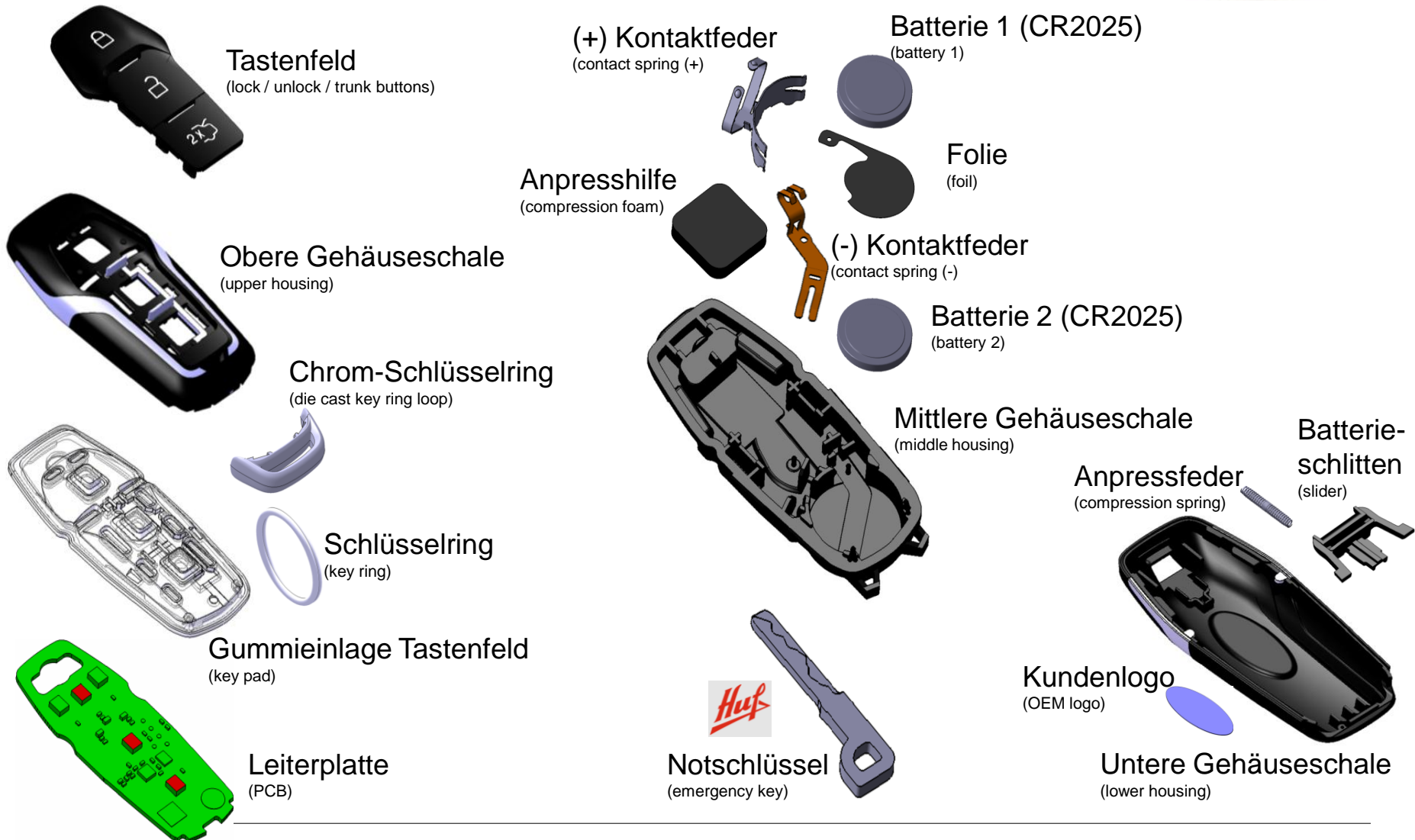
Rückseite



US & Asia Pacific

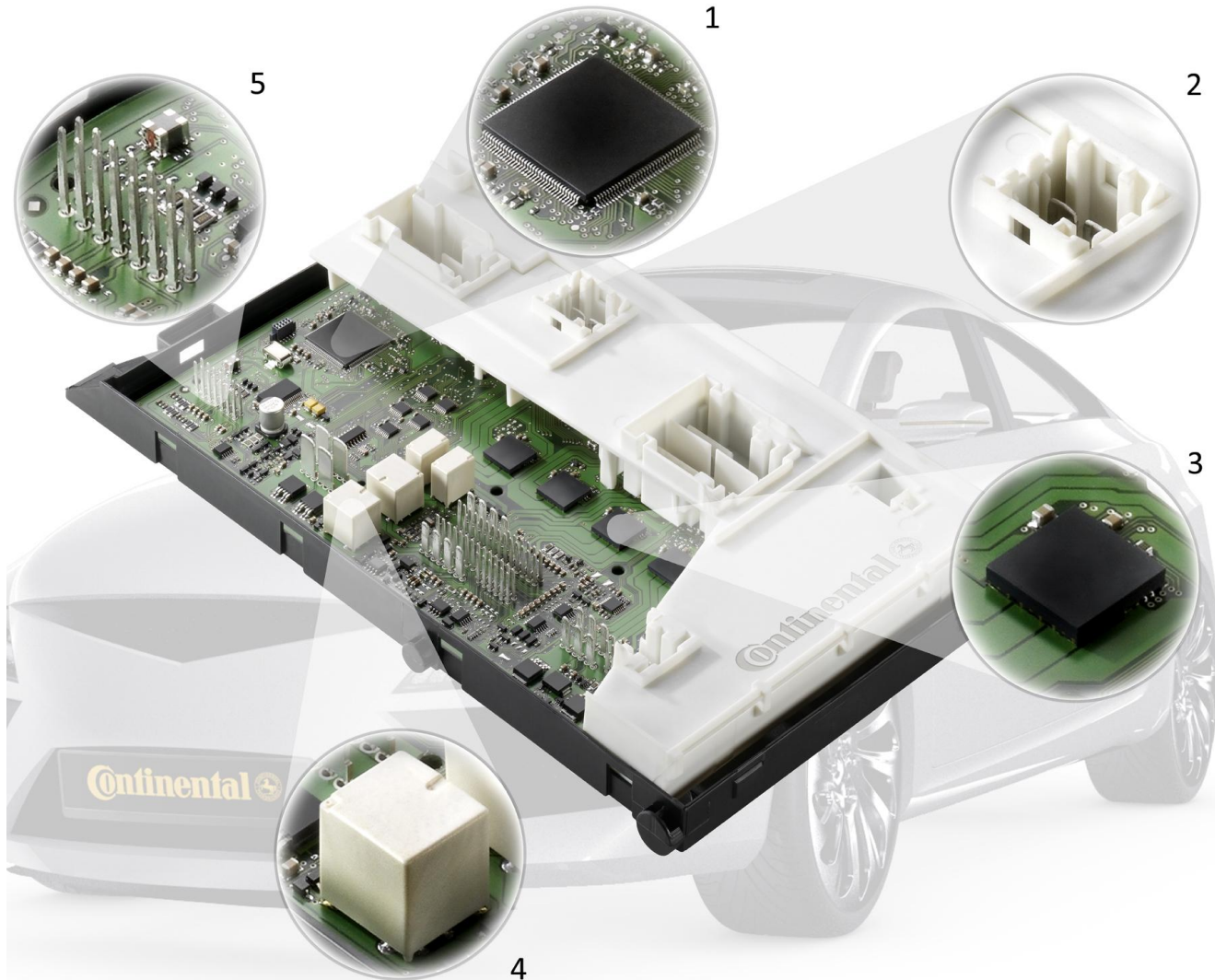
# Grundlagen Funkschlüssel

## Mechanischer Aufbau (Ford PEPS UniDir MY13)



# Basisfunktionen Funkschlüssel

Karosseriesteuergerät (Body controller)



1. Controller

2. HighPower-Ausgang  
(z.B. Heckscheiben-  
Heizung

3. Treiber für externe  
Beleuchtung

4. Relais Scheibenwischer

5. Datenbus-/Sensor-  
Schnittstellen

LF-Antennen

## Ausführungen:

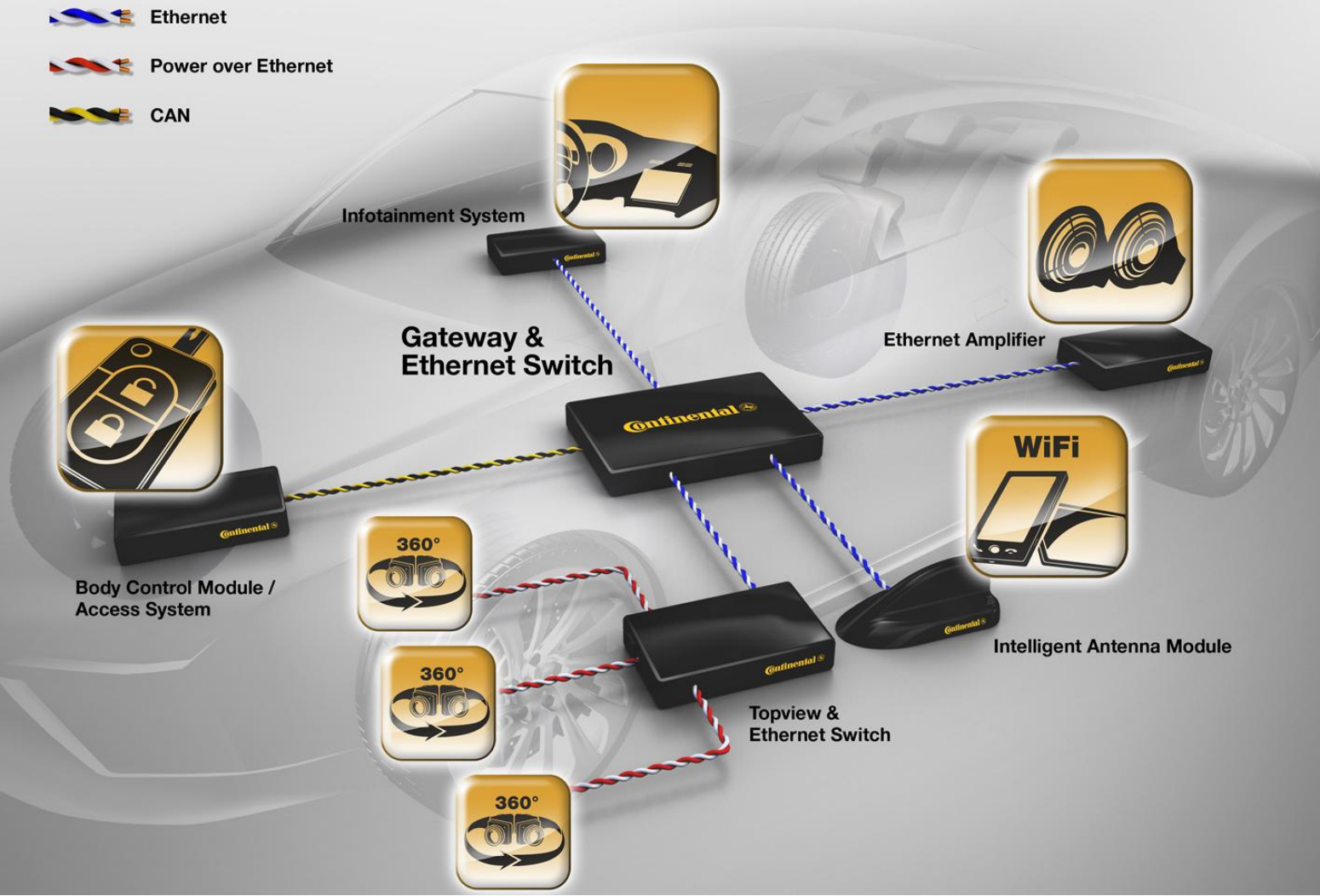
Basic Function Controller

Compact Function Controller

Advanced Function Controller

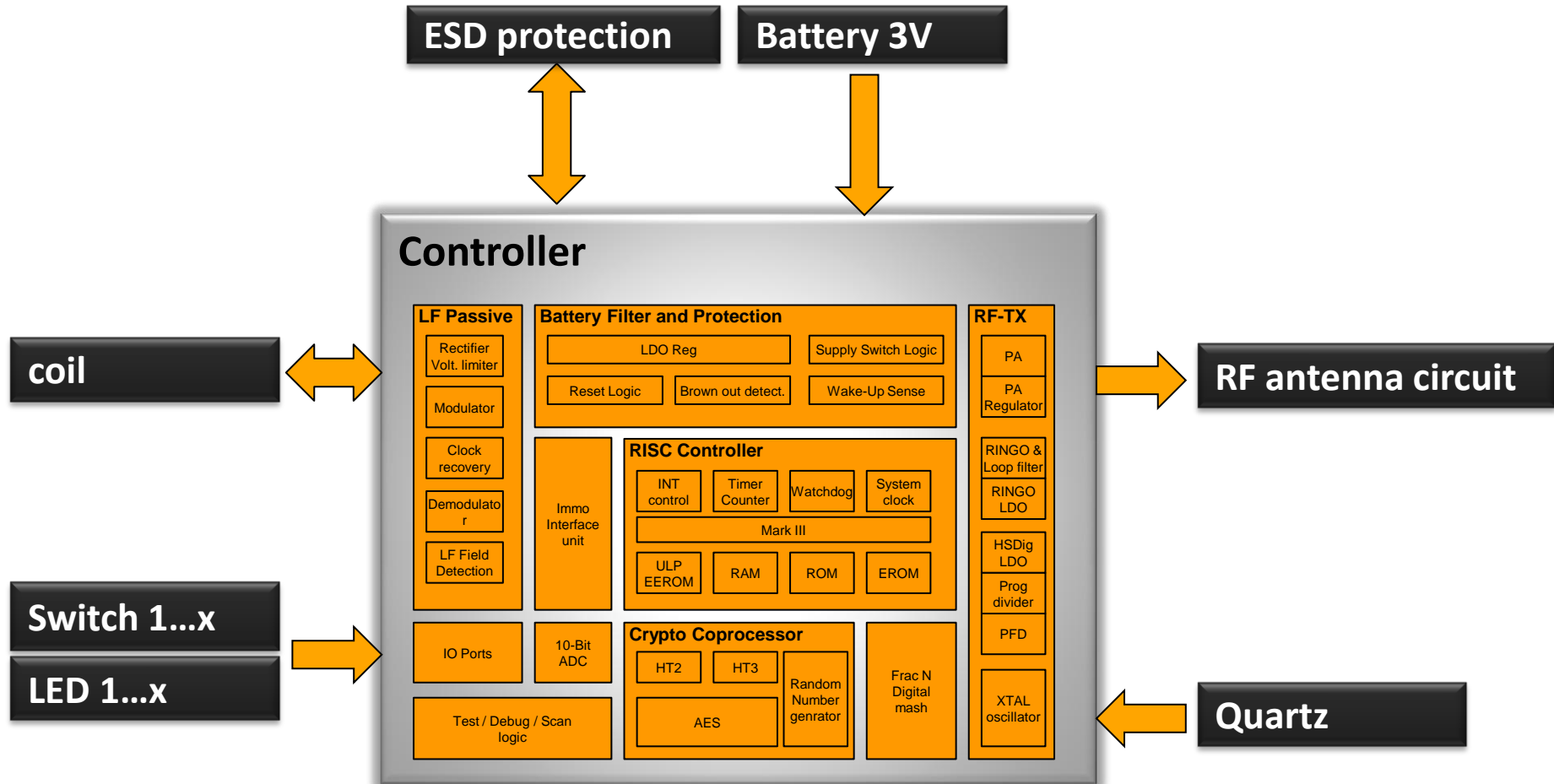
# Basisfunktionen Funkschlüssel

## Karosseriesteuergerät im Verbund



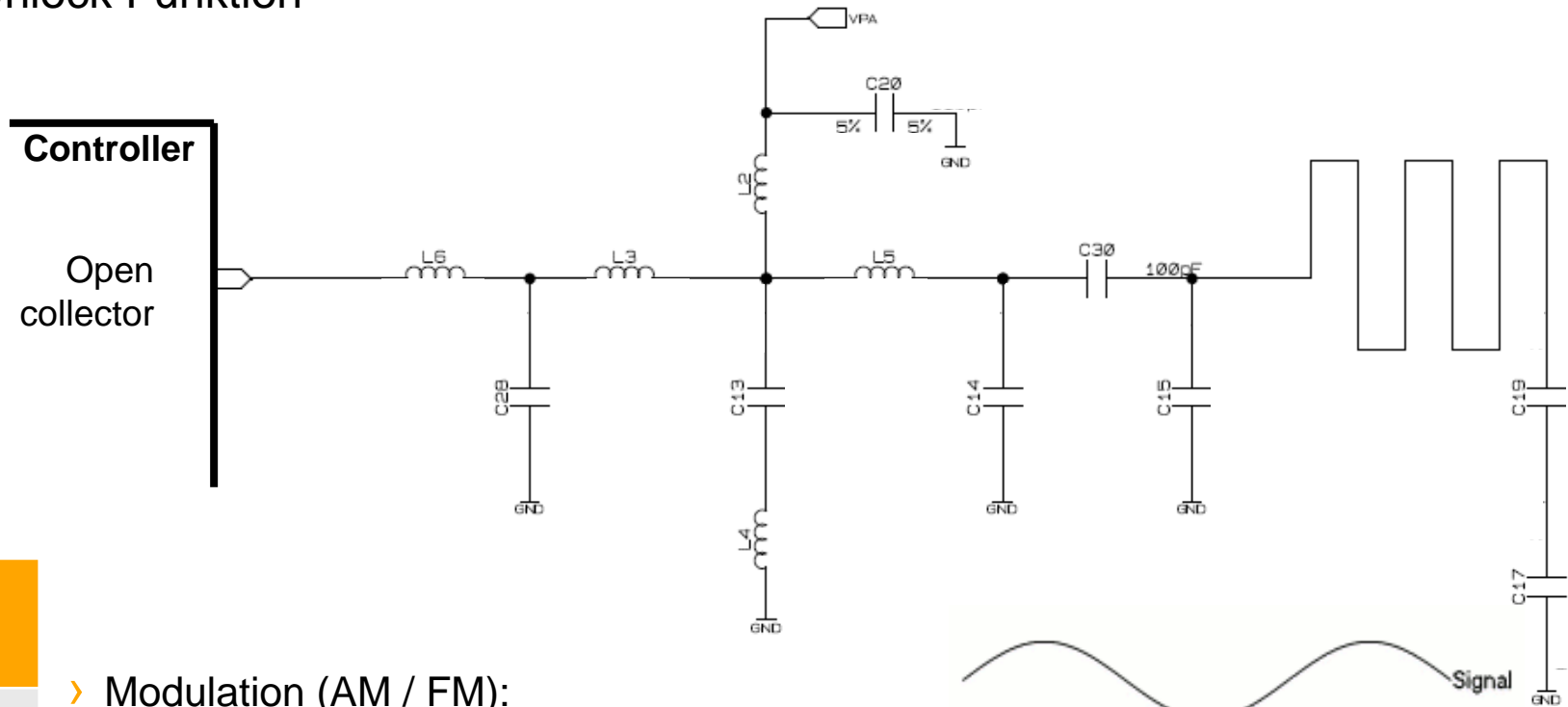
# Grundfunktionen

RKE



# RF Antenne

## Lock / Unlock Funktion



### ISM Bänder

315 MHz

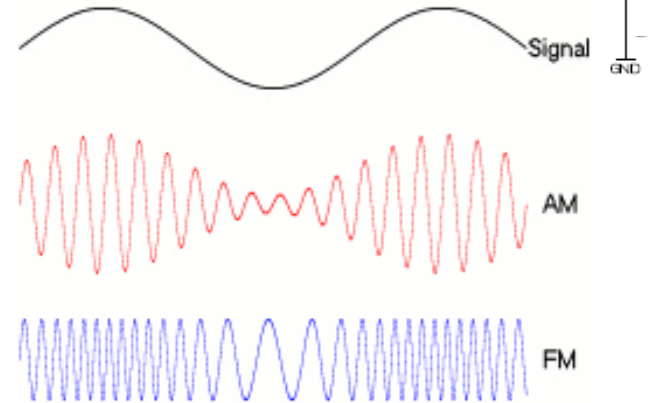
433,92 MHz

434,42 MHz

868 MHz

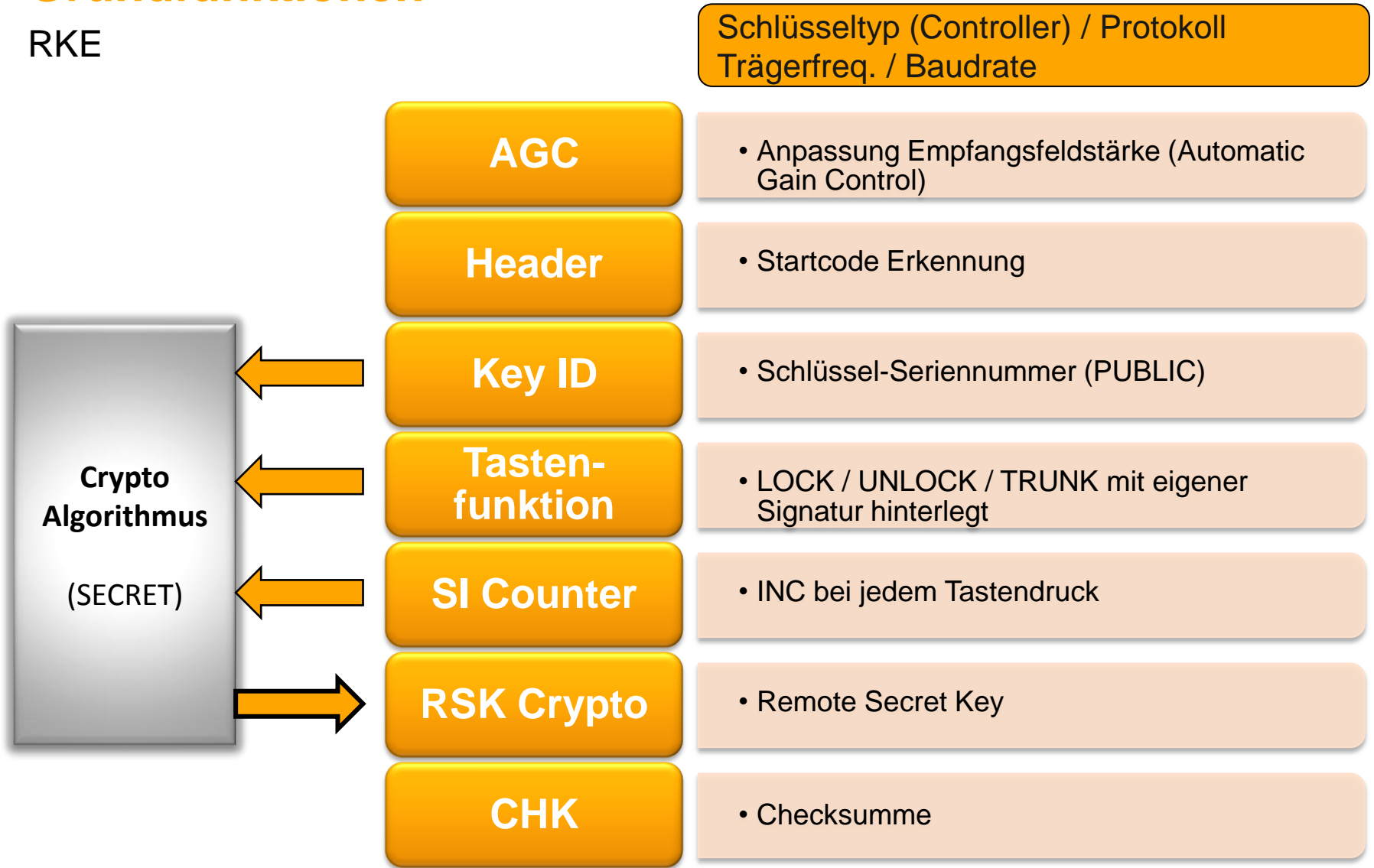
915 MHz

- › Modulation (AM / FM):
  - › Frequency Shift Keying (FSK) / Phase Shift Keying (PSK)
  - › Amplitude Shift Keying (ASK)
- › Trägerfrequenz  $f_T$
- › Resonanzüberhöhung



# Grundfunktionen

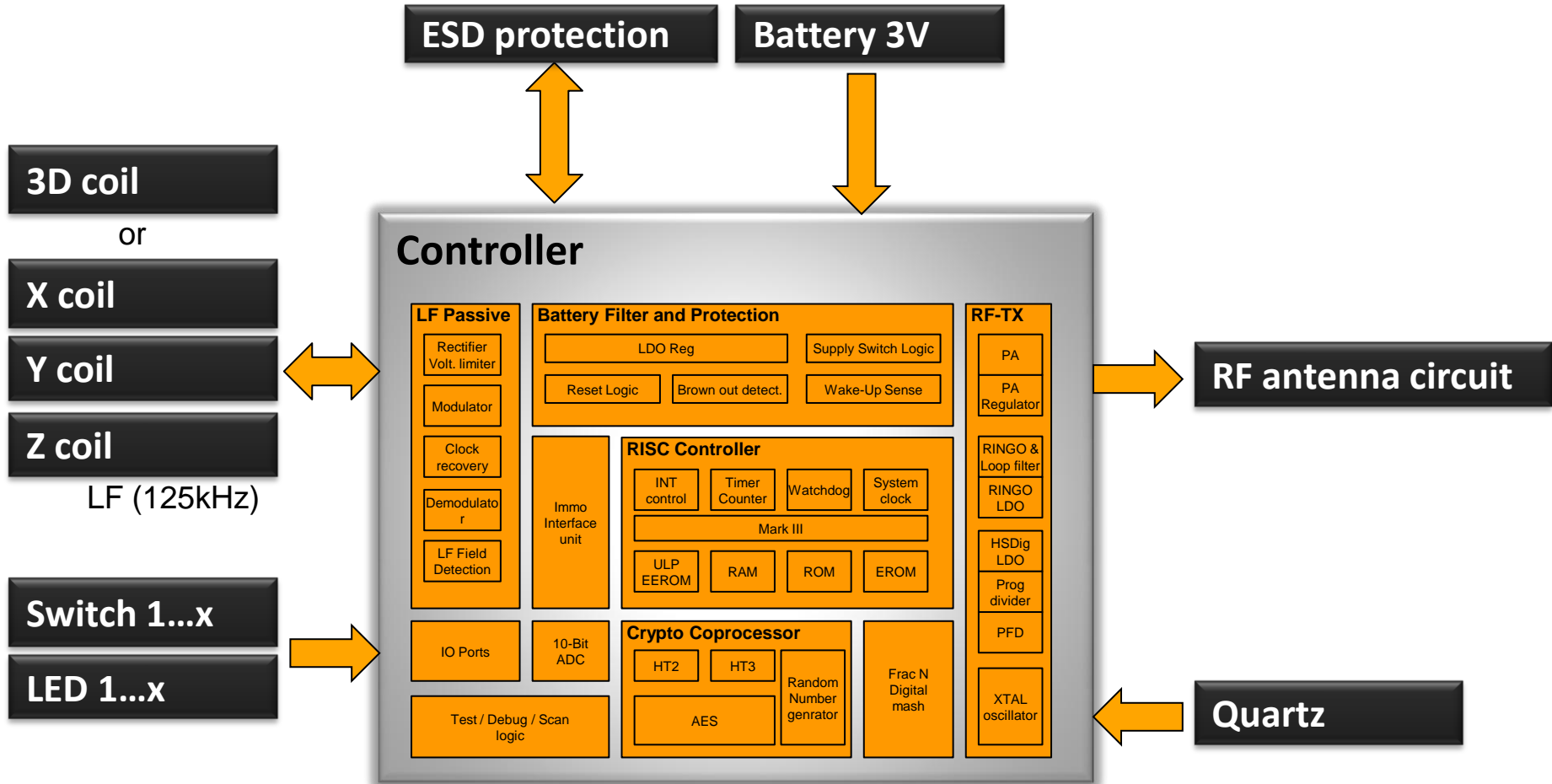
RKE





# Grundfunktionen

PASE



# Herausforderungen

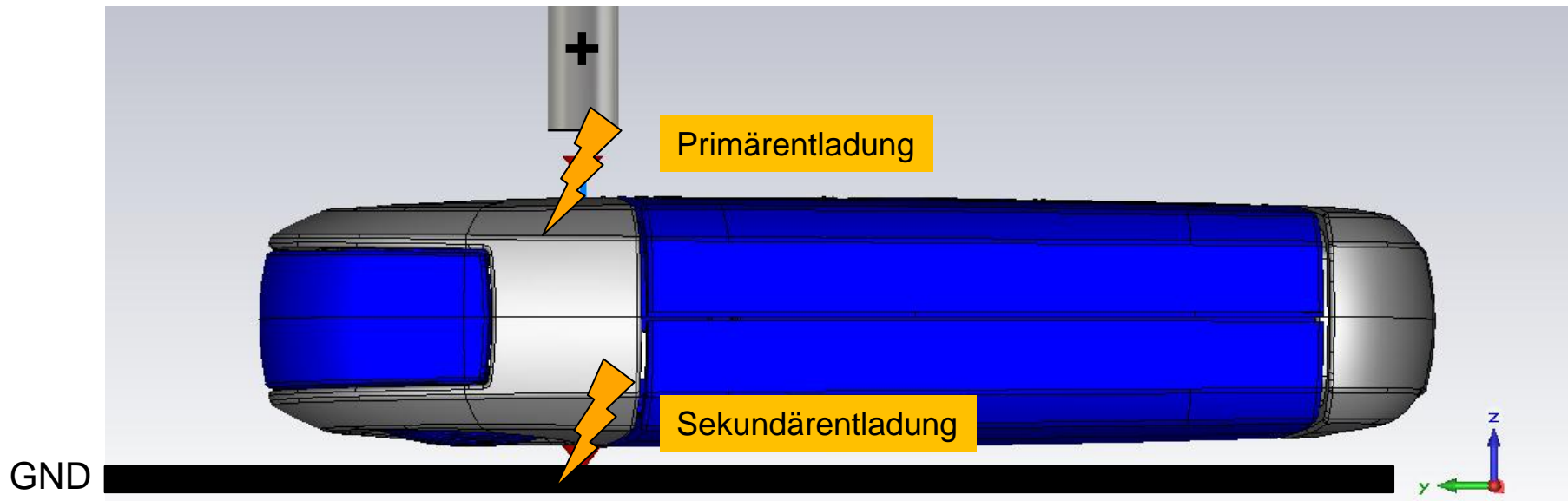
## Übersicht

- › **Batterielebensdauer** (z.B. 2 Jahre mit CR2032)
- › Funkreichweite
- › Empfindlichkeit
- › Reibkorrosion
- › **Elektrostatik (ESD)**
- › **Bauraum / Platzbedarf PCB**
- › **Design / Haptik**

# Herausforderungen

## ESD

- › Primärfunke: begrenzt durch HBM (150pF / 330Ω)
- › Sekundärfunke: Niedrige Impedanz
  - geringer Abstand
  - steile Flanken
  - Stark erhöhte E- bzw. H-Felder
  - Stark erhöhte Abstrahlung / Einkopplung



# Ausblick & zukünftige Entwicklungen

## Technologie vorhanden (Marktakzeptanz):

- › Funkschlüssel mit OLED (BiDir / Long range)
- › Bluetooth low energy (BLE)
- › NFC (Smartphone, Payment) nach ISO14443A / 18092 (13,56MHz)
- › Keyless-Go (Walk away locking)
- › Remote Engine Start (RES)

**Functional  
Safety**

ISO 26262

## Zukünftige Technologien:

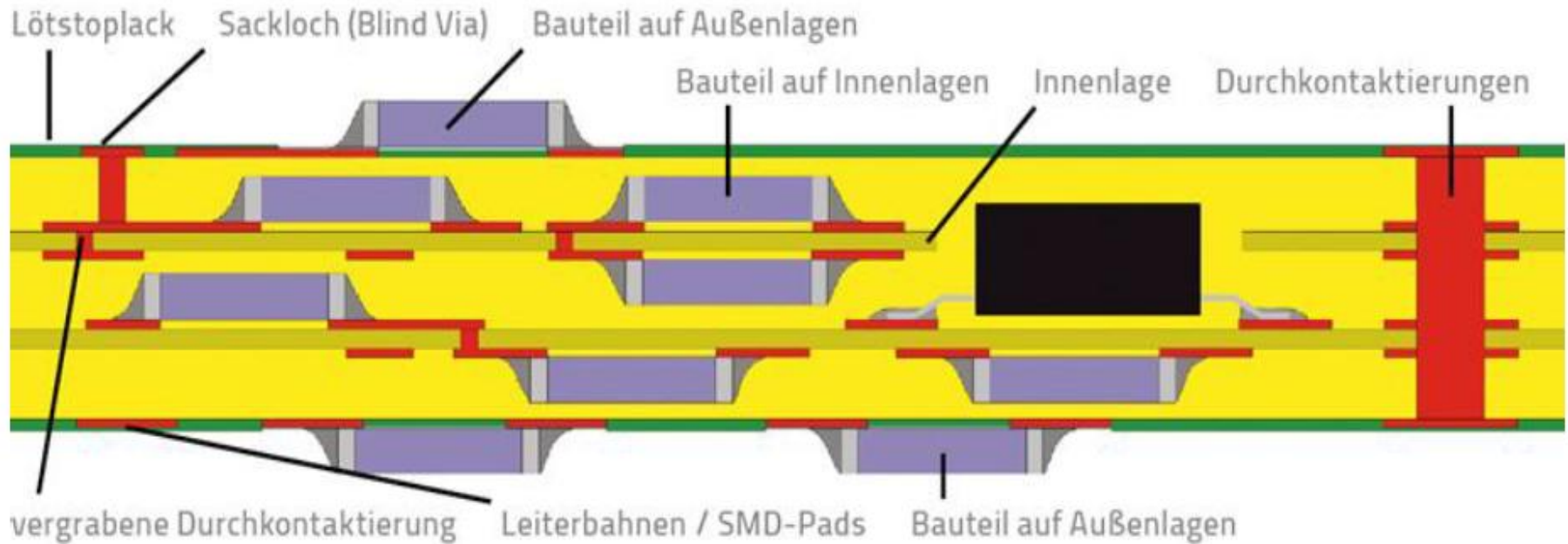
- › Wireless Charging
- › Komfortfunktionen via Handy
- › Embedded components: Active Multilayer Technology (AML)



# Zukünftige Technologien

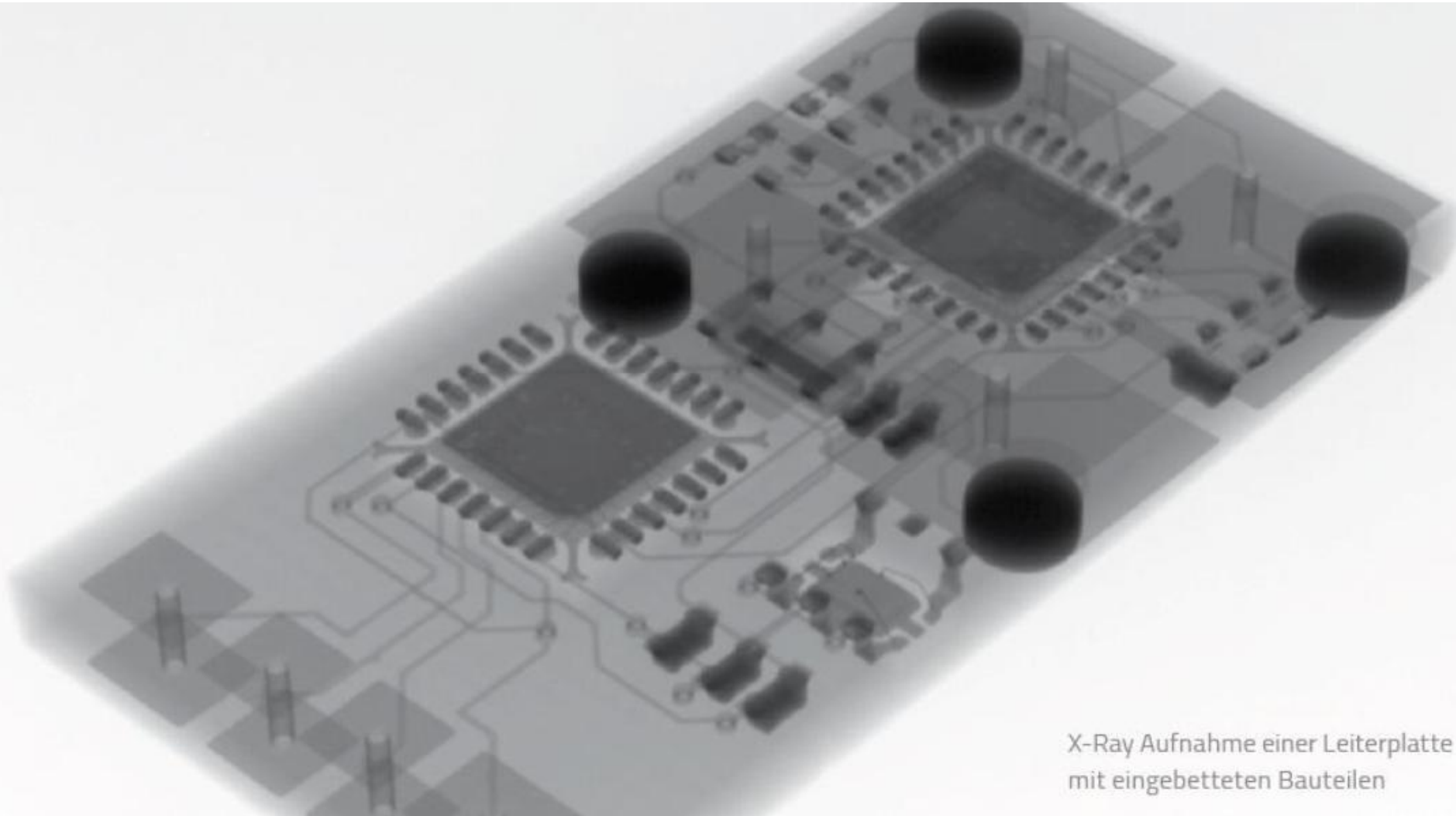
## Embedded Components (AML)

- PCB-Technologie zur Einbettung von Bauteilen im Inneren einer Platine
- Hauptsächlich für SMD-Bauteile
- Passive und aktive Bauteile können eingebettet werden
- 1996 von Hofmann Leiterplatten GmbH (Regensburg) patentiert



# Zukünftige Technologien

## Embedded Components



X-Ray Aufnahme einer Leiterplatte mit eingebetteten Bauteilen

# Zukünftige Technologien

## Embedded Components (AML)

### Vorteile

- › Weitere Miniaturisierung
- › EMV/ESD-Schutz durch zusätzliche Metallisierung
- › Kürzere Signalwege
- › Schutz vor Umwelteinflüssen (Stoß, Vibration, Druck usw.)
- › Bessere Wärmeverteilung
- › Berührungsschutz / Gehäuseersatz
- › Schutz vor Nachbau

### Nachteile

- › Defekte Teile im Inneren können nicht repariert oder gewechselt werden
- › Höhere Herstellungskosten
- › Mehr Ausfälle bedingt durch Herstellungsprozess

**Vielen Dank**  
für Ihre Aufmerksamkeit!