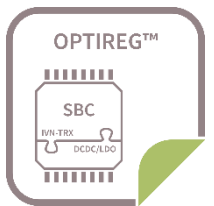




www.infineon.com/SBC

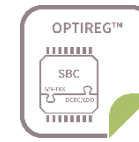
OPTIREG™ System Basis Chips Product Overview

October 2021



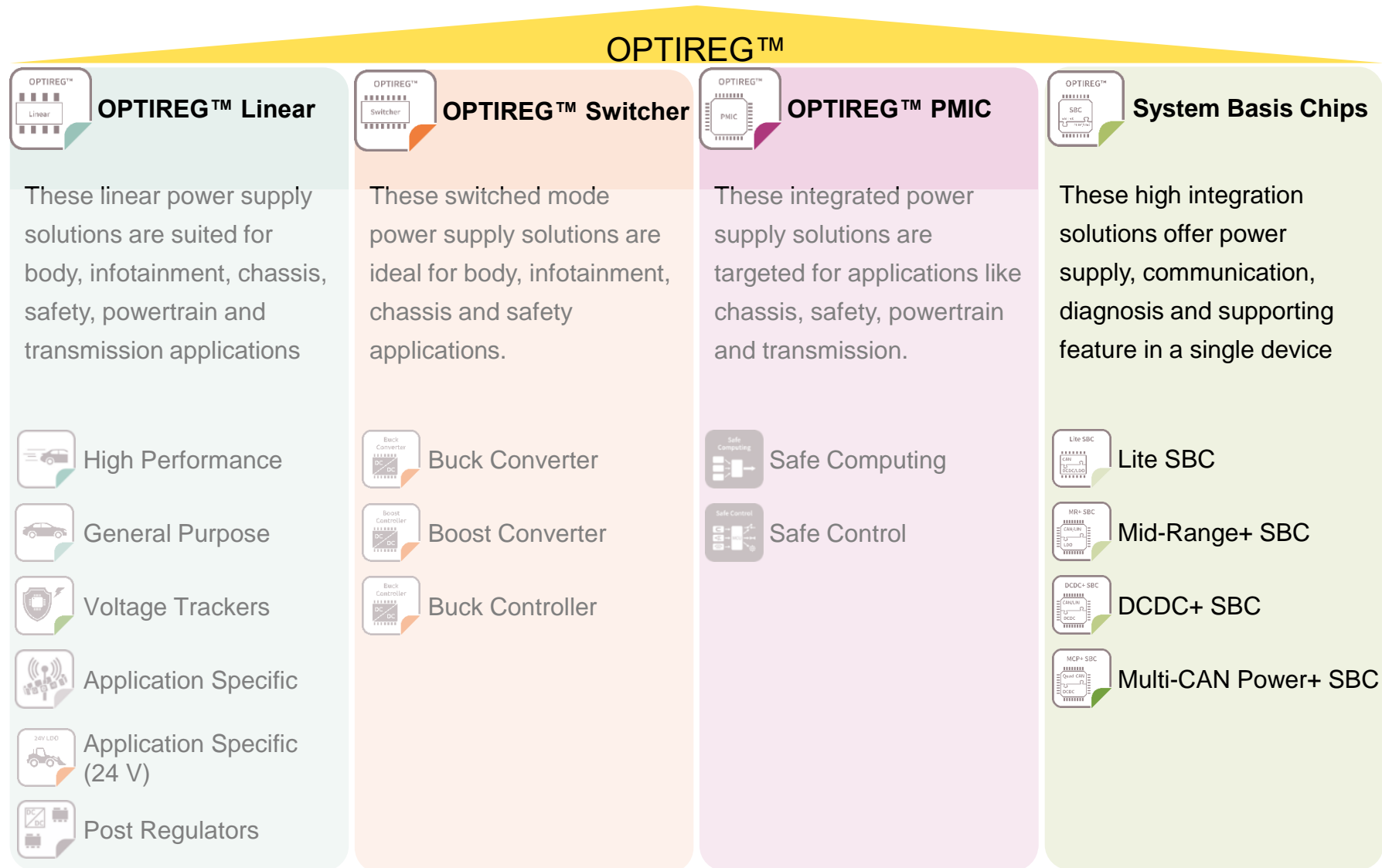
System Basis Chip (SBC)

Collaterals & Support Material

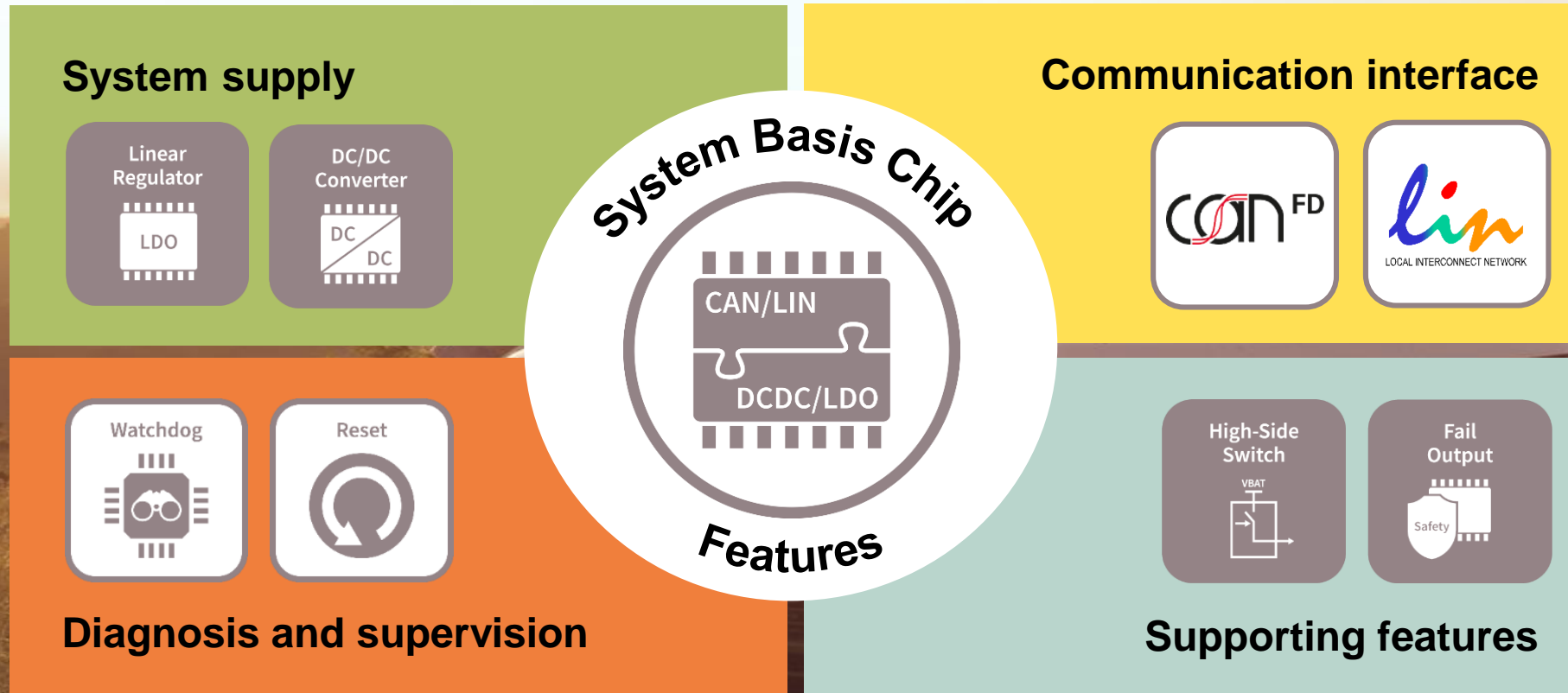


Collaterals and Brochures	<ul style="list-style-type: none">- Product Briefs- Selection Guides- Application Brochures- Presentations- Fighting Guides	<ul style="list-style-type: none">- Link to SBC family page- Automotive Power Selection Guide- Automotive Application Guide- Automotive In-Vehicle Networking
Technical Material	<ul style="list-style-type: none">- Application Notes- User Manual- Datasheets- PCB Design Data	<ul style="list-style-type: none">- Link to SBC family page<ul style="list-style-type: none">- Lite SBC family page- Mid-Range+ SBC family page- DCDC+ SBC family page- Multi-CAN Power+ SBC family page
Evaluation Boards & Software	<ul style="list-style-type: none">- Evaluation Boards- Software:<ul style="list-style-type: none">- SBC Config Wizard- Power Dissipation Tool- Bode Plot- CAN PN Wizard- SBC Microcontroller Library- Current Consumption Tool	<ul style="list-style-type: none">- Link to board pages- Link to software
Videos / Distribution Trainings	<ul style="list-style-type: none">- Technical Videos- eLearnings	<ul style="list-style-type: none">- Link to Videos- Link to eLearning
FAQ	<ul style="list-style-type: none">- FAQ General SBC- FAQ Lite SBC- FAQ MR+ SBC	<ul style="list-style-type: none">- Link to SBC FAQ<ul style="list-style-type: none">- Link to Lite SBC FAQ- Link to MR+ SBC FAQ

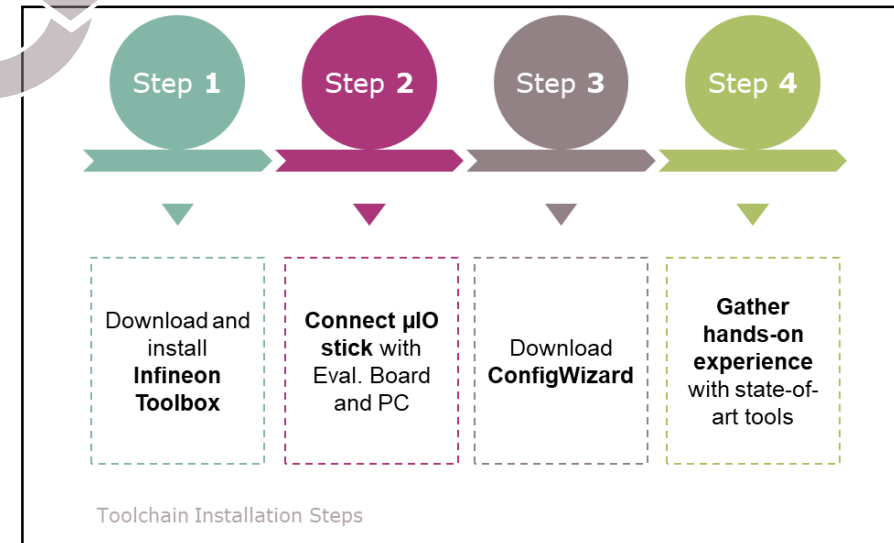
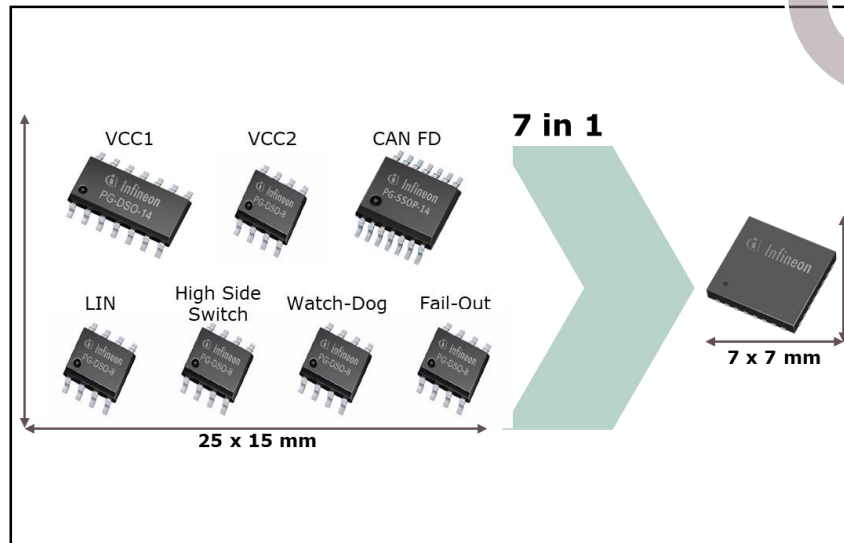
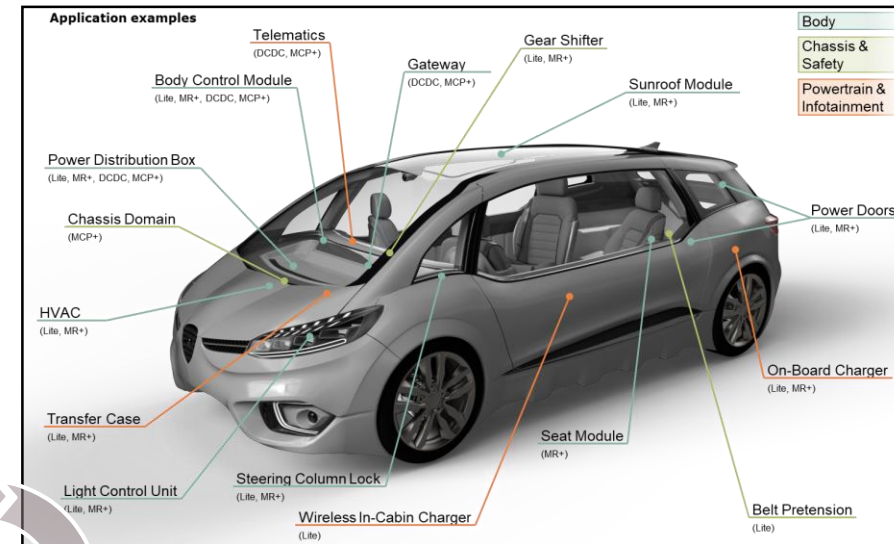
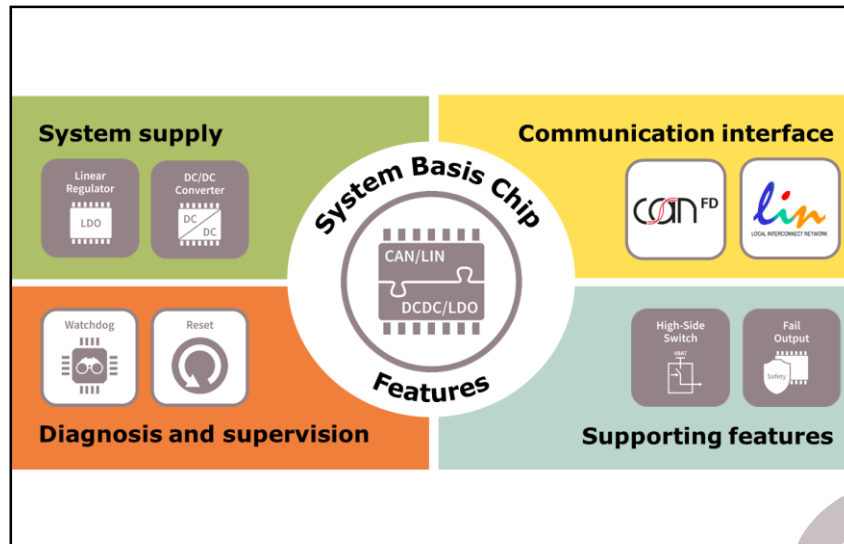
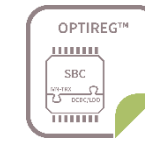
High performance discrete power portfolio and integrated system solution out of one hand

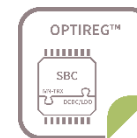


What is an SBC?



SBCs – What? Where? Why? How?





Why should I use an SBC?



Space saving

Power, communication, safety and support features are **integrated into one system** solution reduced PCB by ~90% (e.g. 300mm² vs. 34mm² for Lite SBC)



Energy saving

Extend battery life with very low quiescent current modes and CAN Partial Networking. Lowest Iq to achieve limitation of <100µA per ECU



High system reliability

Extensive **diagnostics and protections are embedded** within the SBC to support FuSa requirements, reduce external component count, improve system reliability in comparison to discrete solutions



Reduced system cost

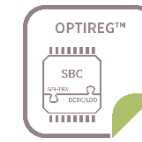
Minimum number of components to **reduce system and BOM cost (7 in 1)**. **Reducing Total Cost of Ownership by ~0.1 USD per ECU**, due to **less active component** (~0.014 USD per active component for assembly, qualification, purchasing, optical inspection, logistics, etc.)



Multiple and flexible designs

Compatibility **reduces development time and effort** for SBC by 1-2 man months for electronic design and 50% SPI configuration software development Scalability (transceiver) nodes reduce customer effort in platform approach.

System Basis Chip in a Nutshell



Revenue CAGR >15% last 5 years
(**>20% CAGR** in next 5 years)



We shipped **more than 400 million SBC** devices



Globally we serve **more than 50 customers**



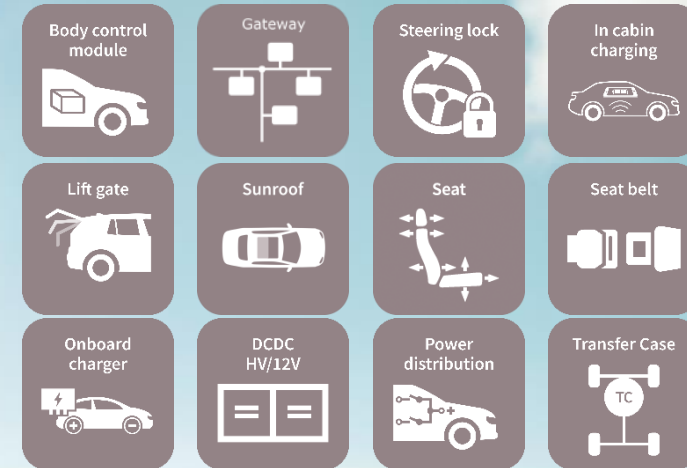
We are **designed-in at major automotive tier-1s** in high volume



SBC **portfolio** has expanded to **30 product variants**



Further portfolio is planned to expand into further applications

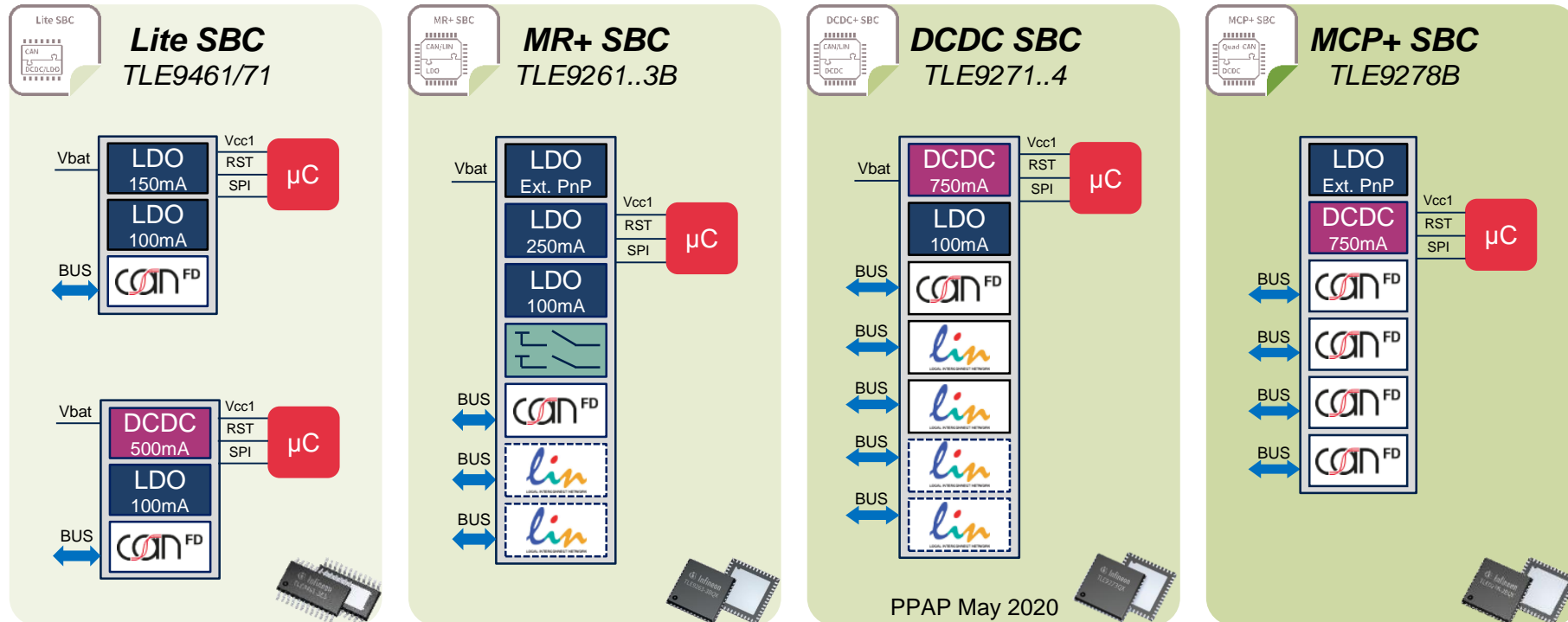


Infiniteon SBC's offer most complete portfolio and key differentiated USP's



Software scalability across all 4 product families

Hardware and Software scalability across 3 families



Unparalleled scalability across Product Families for fast time-to-market

Supports **latest networking standards** CAN FD up to 5Mbps & CAN PN supported

Component releases at all major OEMs

Infineon SBC Families

CAN FD Performance Overview



CAN FD timing parameters

CAN FD EMC Limits

CAN FD EMC & ESD Specification

CAN Partial Networking & FD tolerance

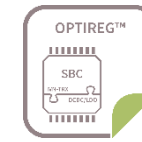
New CAN Wake-up filter timing

SBC Family	Sales Names	CAN FD ISO 11898-2:2016	IEC 62228-3 EMC	US EMC SAE J2962-2*	CAN PN / FD tolerant	$t_{\text{Filter}} / t_{\text{Wake1}}$ CAN activity filter time
Mid-Range+ SBC	TLE9261(-3)BQX (V33) TLE9262(-3)BQX (V33) TLE9263(-3)BQX (V33)	Yes – 5Mbps	Yes – 5Mbps	Yes – 2Mbps	Yes	0.5µs – 1.8µs
DCDC SBC	TLE9271QX (V33) TLE9272QX (V33) TLE9273QX (V33) TLE9274QX (V33)	Yes – 5Mbps	Yes – 5Mbps	Yes – 2Mbps	No	0.5µs – 3.5µs
Multi-CAN Power+ SBC	TLE9278(-3)BQX (V33)	Yes – 5Mbps	Yes – 5Mbps	Yes – 2Mbps	Yes	0.5µs – 1.8µs
Lite SBC	TLE9461(-3)ES (V33)	Yes – 5Mbps	Yes – 2Mbps	Yes – 2Mbps	Yes	0.5µs – 1.8µs
	TLE9471(-3)ES (V33)	Yes – 5Mbps	Yes – 2Mbps	Yes – 2Mbps	Yes	0.5µs – 1.8µs

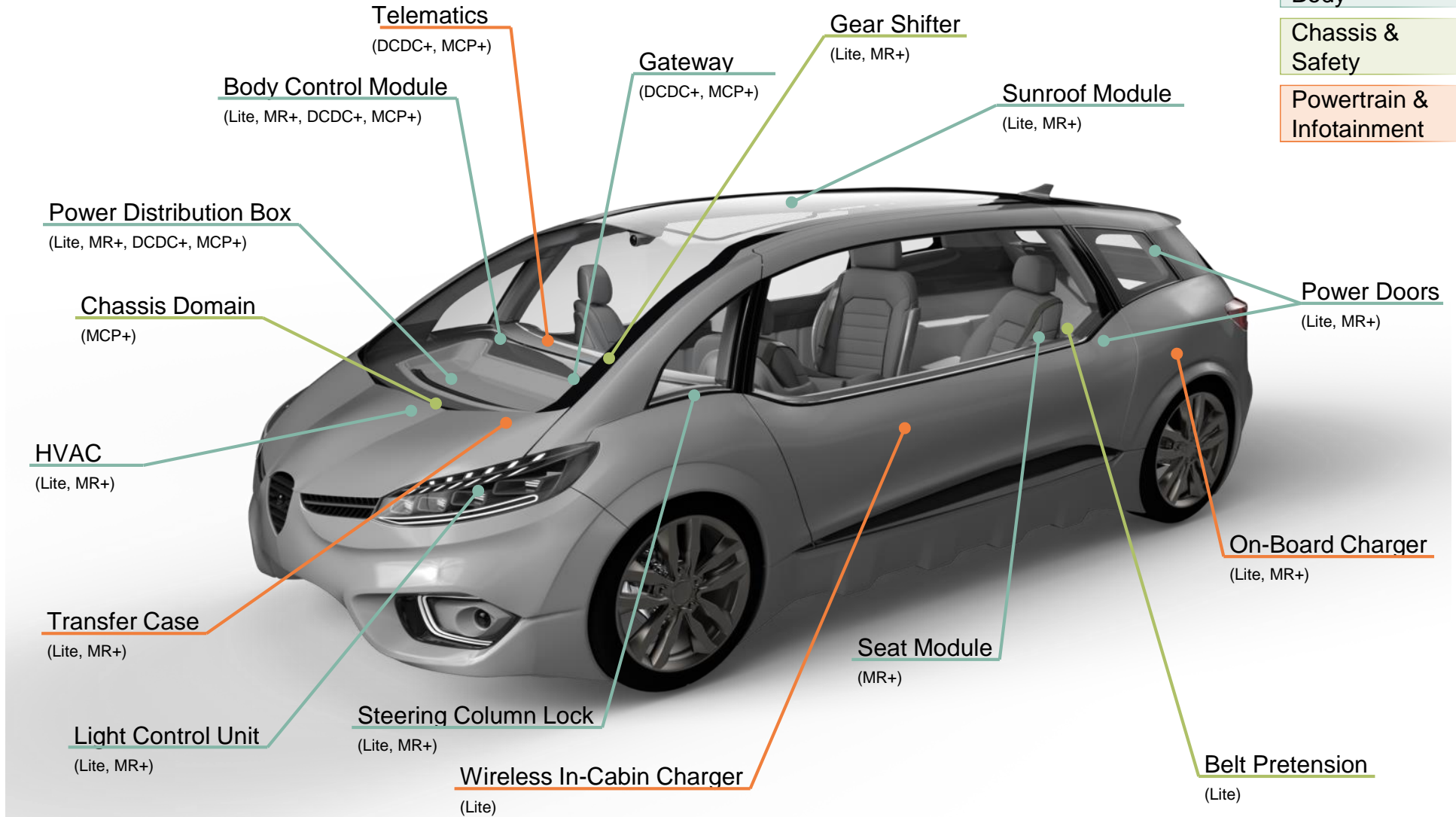
* max. 2 Mbps tested according to SAE

First SBC families on the market fulfilling CAN FD ISO 11898-2:2016 and IEC 62228-3 standards up to 5MBit/s CAN-FD

System Basis Chips can be used in any ECU in the car

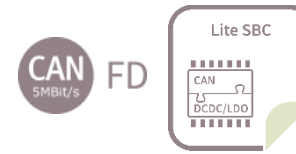


Application examples



Lite LDO SBC – Overview

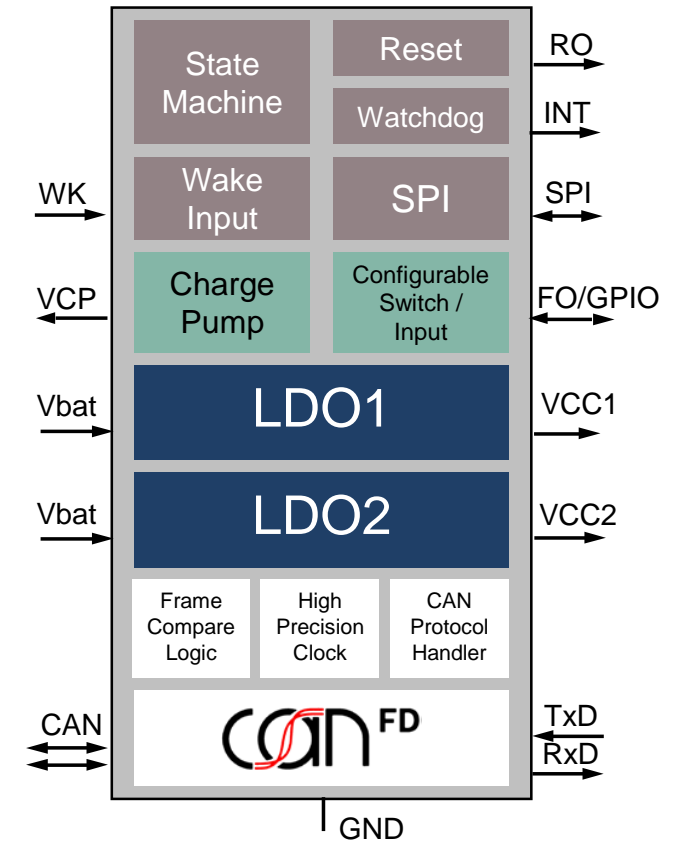
TLE9461(-3)ES (V33)



Key Features

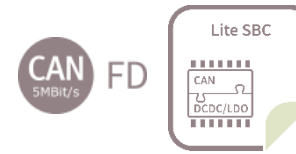
- › 5V/3.3V Linear Regulator up to 150mA (Vcc1)
- › 5V Linear Regulator (off-board protected) up to 100mA (Vcc2)
- › CAN FD up to 5Mbps, CAN PN FD Tolerant ("-3" variants)
- › 1x HV Wake input, Watchdog, Reset, Interrupt, Fail Output
- › Charge Pump Output for Reverse Polarity Control
- › Spread Spectrum for EMI mitigation
- › Alternative Functions to Fail Output:
Configurable as Wake, Low-Side or High-Side Switch (up to 45mA) Low Power and Fail-Safe Operating Modes
- › Package: 8.65x6mm TSDSO-24
- › Software Compatibility w/in TLE9x6y & TLE9x7y

Application Examples



Lite DCDC SBC – Overview

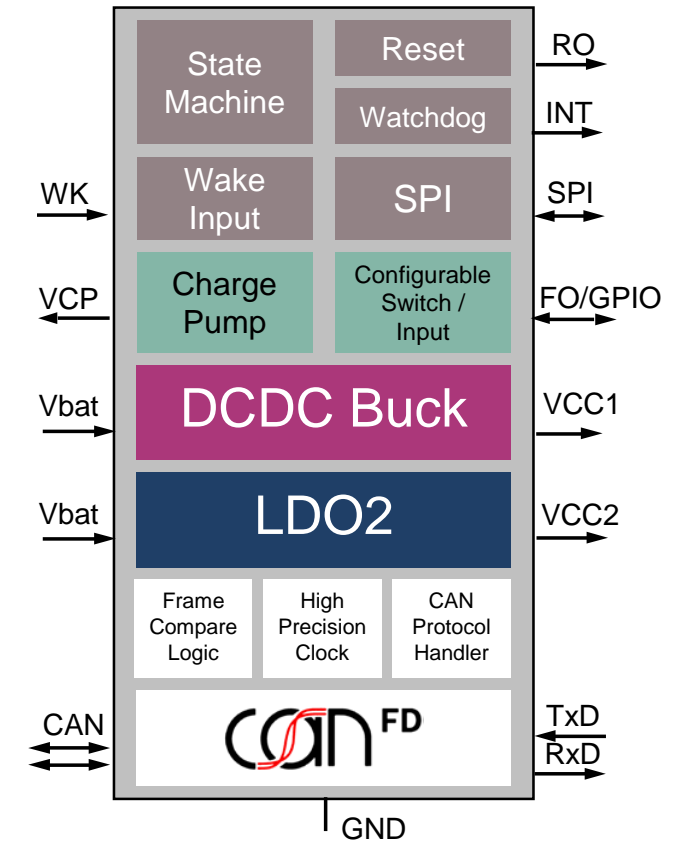
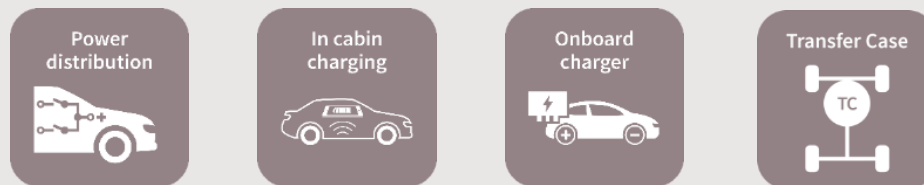
TLE9471(-3)ES (V33)



Key Features

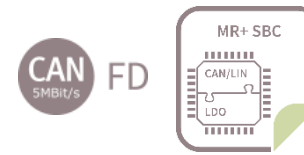
- › 5V/3.3V Buck converter up to 500mA
 - Programmable switching f up to 2.4MHz
 - Spread Spectrum for EMI mitigation
- › 5V Linear Regulator (off-board protected) up to 100mA (Vcc2)
- › CAN FD up to 5Mbps, CAN PN FD Tolerant ("-3" variants)
- › 1x HV Wake input, Watchdog, Reset, Interrupt, Fail Output
- › Charge Pump Output for Reverse Polarity Control
- › Alternative Functions to Fail Output:
Configurable as Wake, Low-Side or High-Side Switch (up to 45mA)
- › Low Power and Fail-Safe Operating Modes
- › Package: 8.65x6mm TSDSO-24
- › Software Compatibility w/in TLE9x6y & TLE9x7y

Application Examples



Mid-Range+ SBC Overview

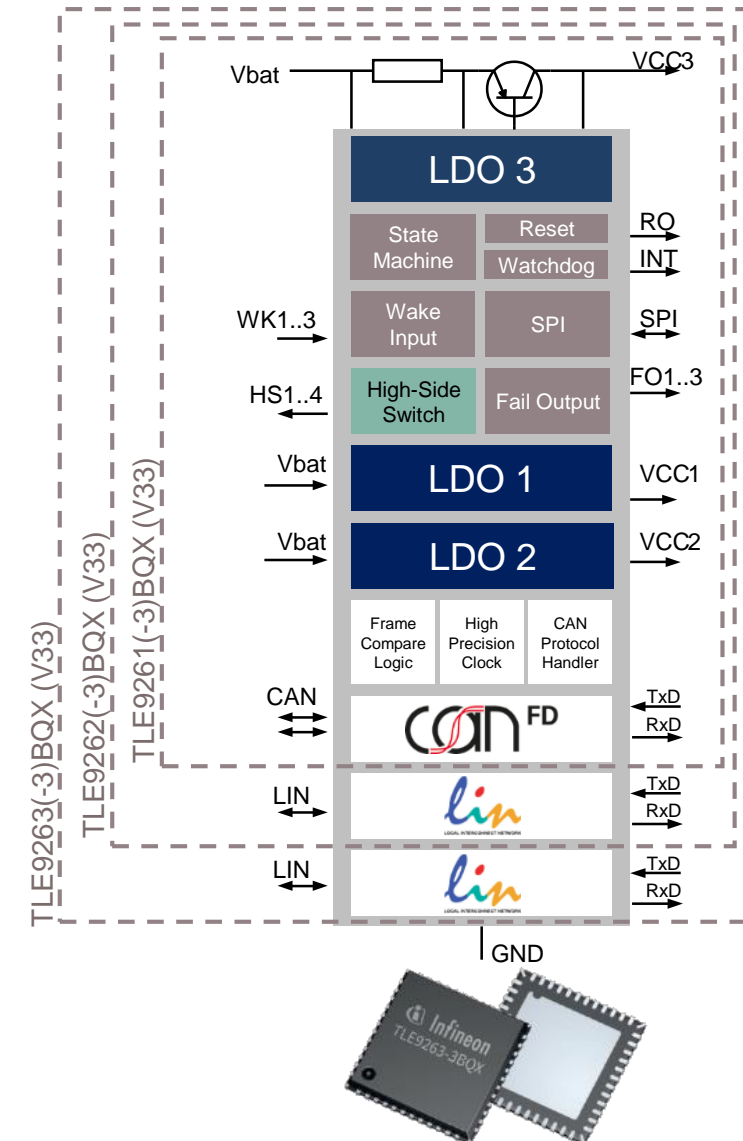
TLE9261/2/3(-3)BQX (V33)



Key Features

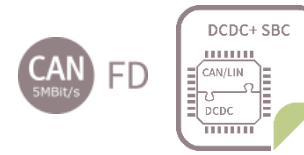
- › 1-to-1 Drop-In with existing Mid-Range SBC family
- › 5V or 3.3V integrated LDO voltage regulators
- › 5V/3.3V/1.8V voltage reg. with external PNP
- › Support CAN FD communication up to 5Mbps, compliant to ISO11898-2:2016
- › CAN PN FD tolerant (-3BQX variants)
- › Very low quiescent current
- › Low-Power and Fail-Safe Operating Modes
- › 7x7mm VQFN-48 supporting AOI
- › Software Compatibility w/in TLE926x/927x/946x/947x

Application Examples



DCDC SBC Overview

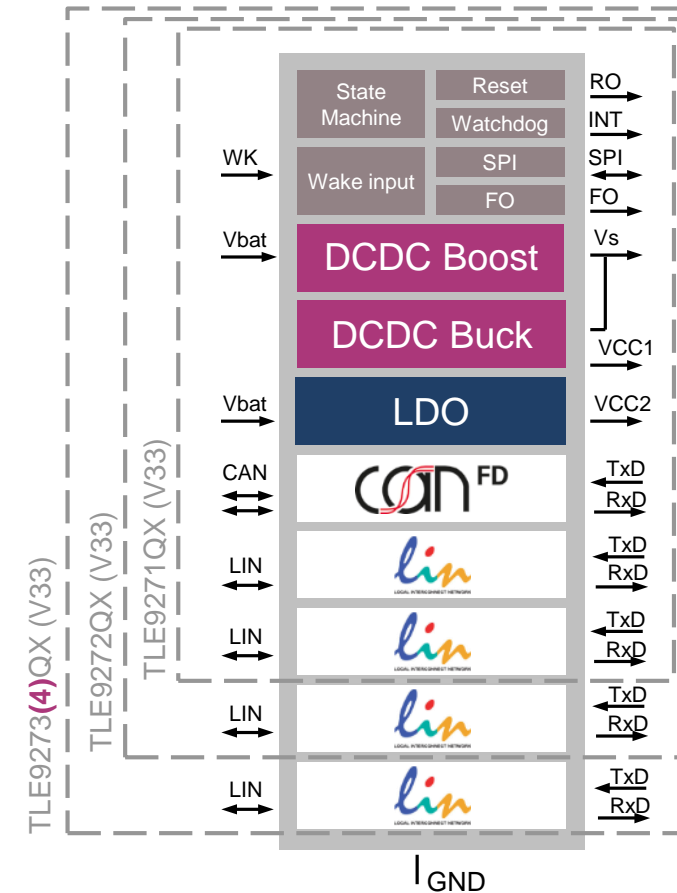
TLE9271/2/3/4QX (V33)



Key Features

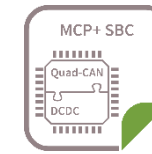
- › 5V(3.3V) BUCK converter up to **750mA**
- › 6.5V/8V BOOST controller (Vs) → **Additional 10V BOOST option for TLE9274QX (V33)** ^{NEW}
- › Switch f = 450kHz w/ edge shaping for low EMI
- › LDO voltage regulator @ 5V up to 100mA
- › CAN FD communication up to 5Mbps
- › Very low quiescent current in PFM mode
- › Low power and Fail-Safe Operating Mode
- › 7x7mm VQFN-48 w/ exposed pad supporting AOI
- › Software Compatibility w/in TLE926x/927x/946x/947x

Application Examples



Multi-CAN Power+ SBC Overview

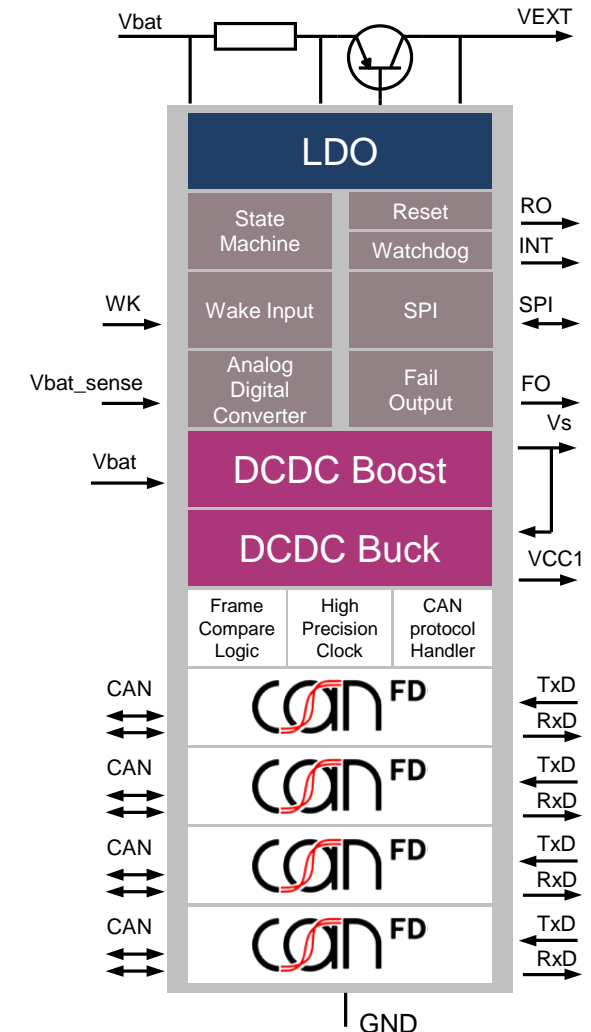
TLE9278(-3)BQX (V33)



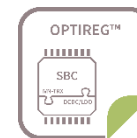
Key Features

- › 5V/3.3V BUCK converter up to 750mA
- › 6.5V/8V/10V/12V BOOST converter
- › Switch $f = 450\text{kHz}$ w/ edge shaping for low EMI
- › 5V/3.3V/1.8V/1.2V LDO with external PNP
- › Four ports CAN FD up to 5Mbps
- › CAN PN FD Tolerant ("-3" variants)
- › Battery Voltage Measurement interface w/ ADC
- › Low Power and Fail-Safe Operating Mode
- › 7x7mm VQFN-48 w/ exposed pad supporting AOI
- › Software Compatibility w/in TLE926x/927x/946x/947x

Application Example

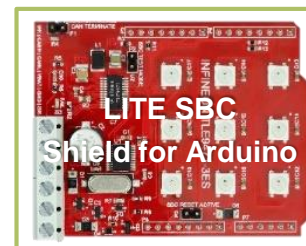
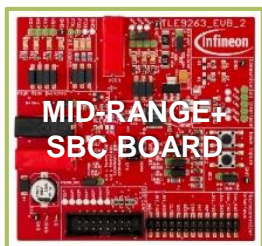


SBC Design Support Tools



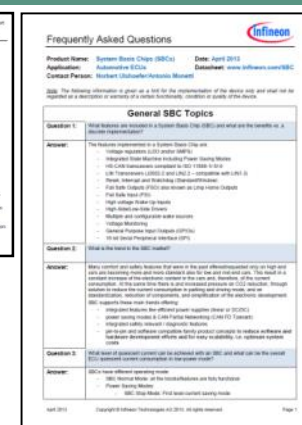
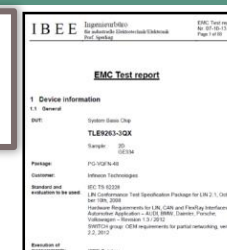
SBC Evaluation Boards

Sales Name of Demoboard	Description
"MID-RANGE+ SBC (V33) BOARD"	Available. Connect thru μ I/O.
"DCDC+ SBC (V33) BOARD"	Available. Connect thru μ I/O.
"MULTI-CAN Power+ SBC (V33) BOARD"	Available. Connect thru μ I/O.
"LITE LDO/DCDC SBC (V33) BOARD"	Available. Connect thru μ I/O.
"SBC-SHIELD_TLE9471"	Available. Connect thru Arduino.
"UIO STICK"	Available. USB dongle between computer & demoboard



Other design in support material

- › Data Sheets (on request before M9)
- › EMC Test Reports (on request)
- › FIT Rates & Module breakdown (on request)
- › eLearning for SBC, Lite SBC and MR+ SBC
- › Config Wizard (Toolbox)
- › Power Dissipation Tool, CAN PN Wizard, Bode Plot and SBC Microcontroller Library, Current Consumption Tool (Toolbox)

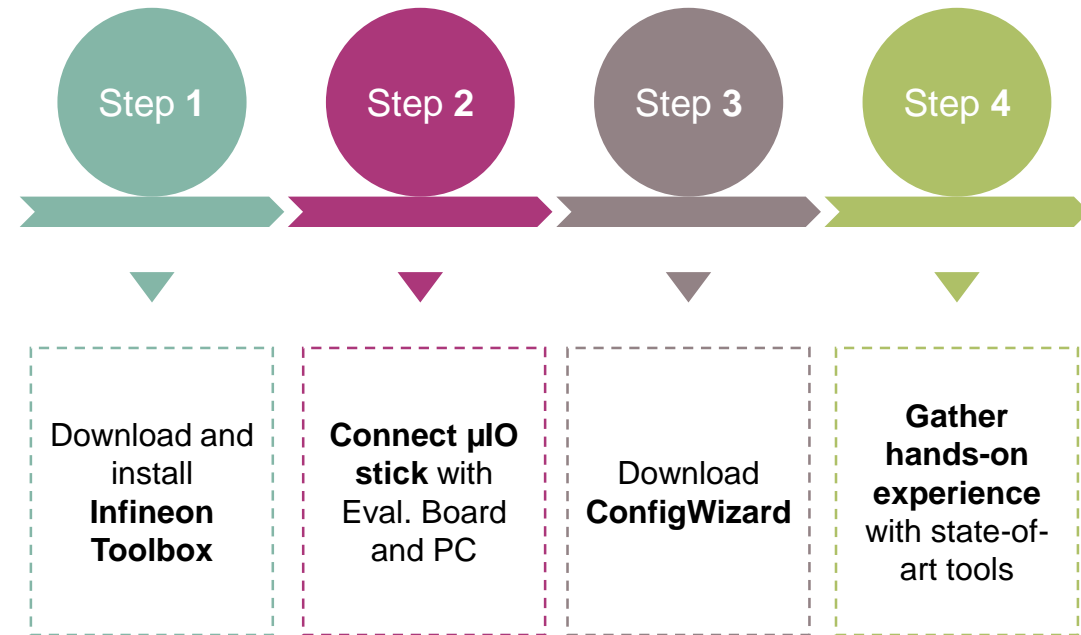




SBC Design in Support & Tool Chain

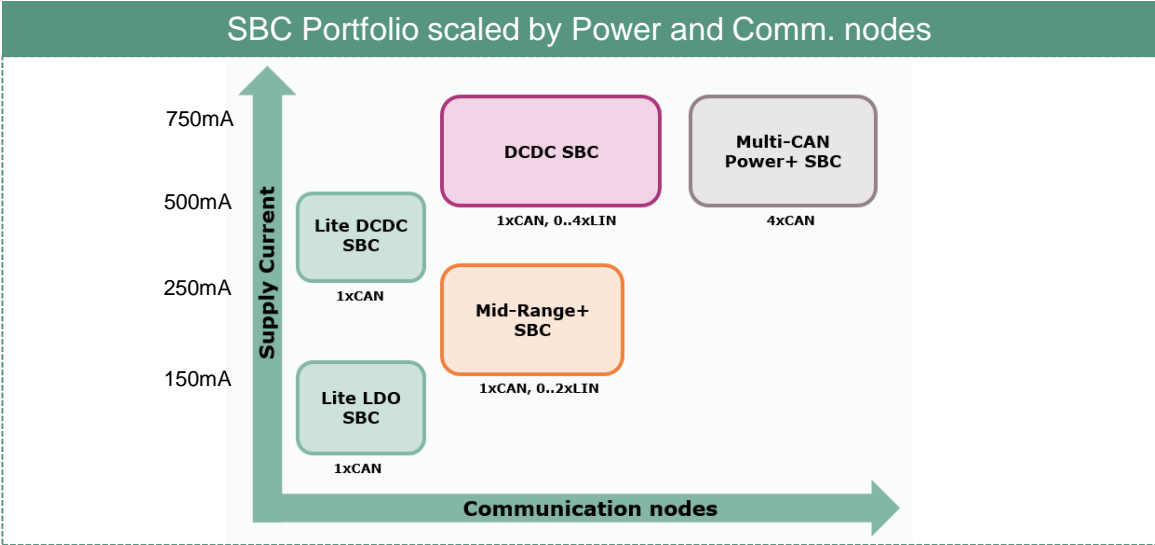
Various support materials are offered by the Infineon:

- › Evaluation Boards
- › Shield for Arduino
- › SBC Config Wizard (Configuration Tool)
- › SBC Microcontroller Library
- › Bode Plot
- › Power Dissipation Tool
- › CAN PN Wizard
- › Current Consumption Tool
- › Application Notes
- › User Manual
- › Data Sheets
- › eLearnings for SBC, Lite and MR+
- › FIT Rates & Module/Area breakdown



Toolchain Installation Steps

Infiniteon SBC's offers complete portfolio and key differentiated USP for customers



Support latest advanced networking standards

SBC Family	CAN 2.0 (ISO11898-2/-5)	CAN FD (ISO11898-2) comm. up to 5Mbps ¹	CAN PN FD tolerant ² (ISO11898-6)
Lite SBC	Yes	Yes	Yes
Mid-Range+ SBC	Yes	Yes	Yes
DC-DC SBC	Yes	Yes	No
Multi-CAN Power SBC	Yes	Yes	Yes



- ### Infineon is your partner of choice for SBC's
- More than **80% board space reduction** compared to discrete components
 - Unparalleled scalability** across Product Families for fast time-to-market
 - Infineon is **FIRST** in the market with SBCs compliant to latest CAN-FD 5Mbps ISO standard
 - Interoperability and EMC compliance tests for **component releases at all major OEMs**
 - System Basis Chips enable **high integration** and **smart energy efficiency**