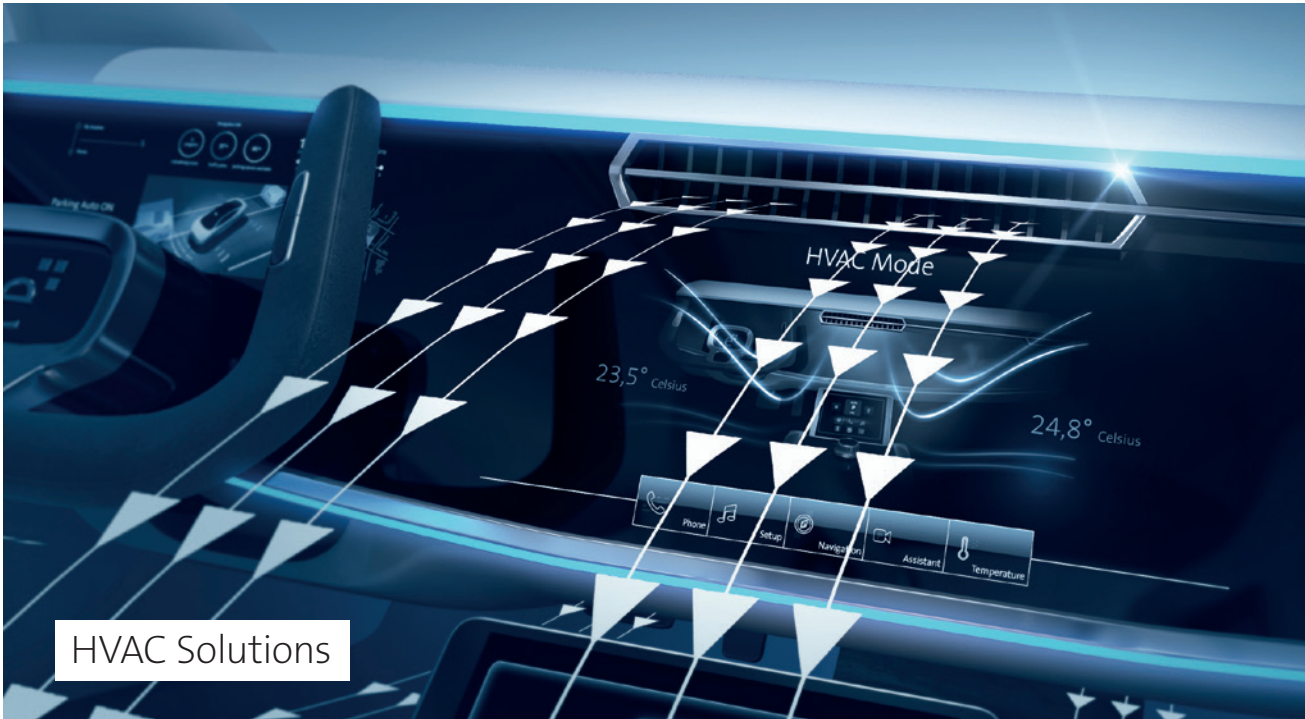# Product Catalog 2018/2019

elmos

LED Ambient Lighting

Safety Applications

Gesture Recognition

HVAC Solutions

We are part of the future car

Elmos develops, produces and markets semiconductors and sensors. For over 30 years, Elmos innovations have been bringing new functions to life and making mobility safer, more comfortable and more energy efficient. Our components, so-called integrated circuits (ICs), offer the right solutions to meet the challenges of the global megatrends:

- Autonomous driving
- Electromobility/CO2 reduction
- Safety, connectivity and comfort

Our ICs bring innovation to the customer's system. That is our claim. We are among the world's most experienced suppliers of customer specific semiconductors for the automotive industry. Our self-defined, application specific ICs are on the cutting edge. More than 350 satisfied customers all over the world are convinced by our innovativeness and quality.

Elmos has expanded its international presence. With locations all over the world, we are represented in all key markets and always close to the customer. Our business model encompasses the entire process of a semiconductor: highly specialized teams create ideas and develop, produce and market the electronic components that make the difference. We provide our customers with innovation for the future car.

- Highly specialised research and development team
- International customer support
- Worldwide production and distribution network

Tailor-made: Perfect fitting ASICs

The ASIC (Application Specific Integrated Circuit) is a chip, which in particular has been manufactured for the customer. The advantage: its know how stays protected and the special chip is tailor-made for the use in the application.

The creative design engineers begin the tasks that are needed to construct a new chip very systematically indeed. To begin with, the customer has his vision of what he wants. In some cases, this actual idea can already take on a very concrete form, it can also be the starting point for comprehensive system consultation. After all, advising the customer is one of the main tasks belonging to the Elmos sales and design engineers. They advise the customer on the optimal technical solution. All those involved fall back on long-standing experience in electronic know-how.

Best possible system integration, which means creating a higher functionality whilst simultaneously reducing the complexity at system level, is the target of the work. System knowledge combined with expertise and the optimal choice of possible integration strategies are prerequisites for success. Elmos has more than 30 years experience in developing and producing ASICs for the automotive and industry sector. Our design teams are experts in following application fields:

- Bus Systems / Network Products
- DC/DC Converter / Power Products
- I/O ICs
- Transponder
- Actuator Driver
- Motor Control
- Sensors

... and other applications requiring a smart mixed-signal semiconductor solution.

Regardless of which solution you prefer, may it be an ASIC or an ASSP, Elmos always offers you the perfect fitting semiconductor for your applications and needs.

AEC-Q100 qualified

e | designed for safety.

www.tuv.com TÜVRheinland® CERT ISO/TS 16949

TÜV CERT ISO 14001 Certificate: 01 104 021415

RoHS compliant

Elmos products are in conformity with the Directive 2002/95/EC of the European Parliament and of the Council of 27th January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

Table of Content

Sensors - Ultrasonic

IO pt-to-pt Interface

Part No. / Description	V$_{SUPPLY}$	Transducer frequency	Architecture	Transducer driver type / output	Measurable Distance*	Interface	Package	Comment
E524.02 Digital Ultrasonic Transducer Driver and Signal Processor	7V to 18V	40kHz to 58kHz	pt-to-pt	transformer / 108mA to 310mA	20cm - 400cm	proprietary bidirectional IO (2-wire)	QFN20L4	▪ For new designs E524.08 is recommended
E524.03 Digital Ultrasonic Transducer Driver and Signal Processor	7V to 18V	40kHz to 58kHz	pt-to-pt	transformer / 108mA to 310mA	20cm - 400cm	proprietary bidirectional IO (3-wire)	QFN20L4	▪ For new designs E524.09 is recommended
E524.05 Direct Drive Ultrasonic Sensor IC	7V to 18V	38kHz to 72kHz	pt-to-pt	direct drive / 8V to 14.5V	25cm - 250cm	proprietary bidirectional IO (2-wire)	QFN20L4	▪ Significant reduction of system costs and size ▪ For new designs E524.32 is recommended
E524.06 Direct Drive Ultrasonic Sensor IC	7V to 18V	38kHz to 72kHz	pt-to-pt	direct drive / 8V to 14.5V	25cm - 250cm	proprietary bidirectional IO (3-wire)	QFN20L4	▪ Significant reduction of system costs and size ▪ For new designs E524.33 is recommended
E524.07 Direct Drive Ultrasonic Sensor IC	7V to 18V	38kHz to 72kHz	external µC	direct drive / 8V to 14.5V	25cm - 250cm	EUSART (2-wire)	QFN20L4	▪ Significant reduction of system costs and size
E524.08 2nd Generation Ultrasonic Transducer Driver and Signal Processor	6V to 18V	30kHz to 83kHz	pt-to-pt	transformer / 168mA to 354mA	10cm - 600cm	proprietary bidirectional IO (2-wire)	QFN20L4	▪ Excellent short and long range performance ▪ High robustness and sensor diagnostics ▪ Advanced IO communication interface
E524.09 2nd Generation Ultrasonic Transducer Driver and Signal Processor	6V to 18V	30kHz to 83kHz	pt-to-pt	transformer / 168mA to 354mA	10cm - 600cm	proprietary bidirectional IO (3-wire)	QFN20L4	▪ Excellent short and long range performance ▪ High robustness and sensor diagnostics ▪ Advanced IO communication interface
E524.32 High Voltage Direct Drive Ultrasonic Sensor IC	6V to 18V	30kHz to 83kHz	pt-to-pt	direct drive	10cm - 400cm	proprietary bidirectional IO (2-wire)	QFN20L4	▪ Best measurement performance without transfromer ▪ High robustness and sensor diagnostics ▪ Near field detection
E524.33/34/35 High Voltage Direct Drive Ultrasonic Sensor IC	6V to 18V	30kHz to 83kHz	pt-to-pt	direct drive	10cm - 400cm	proprietary bidirectional IO (3-wire)	QFN20L4	▪ Best measurement performance without transfromer ▪ High robustness and sensor diagnostics ▪ Near field detection

* Reachable detection range for a standard pole (75mm diameter, 1m height).
Overall system performance depends on external components (transducer, transformer, PCB layout, …) and environmental conditions (supply voltage, noise, ambient temperature, …)

LIN Bus (or pt-to-pt) Interface

Part No. / Description	V_{SUPPLY}	Transducer frequency	Architecture	Transducer driver type / output	Measurable Distance*	Interface	Package	Comment
E524.14 LIN Smart Ultrasonic Parking Assist (FLASH)	8V to 18V	30kHz to 80kHz	Bus or pt-to-pt	transformer / 188mA to 518mA	15cm - 500cm	LIN 2.2	QFN20L5	■ Embedded, customer programmable controller ■ LIN Interface supports SNPD and pin-coding
E524.24 LIN Smart Ultrasonic Parking Assist (ROM)	8V to 18V	30kHz to 80kHz	Bus or pt-to-pt	transformer / 188mA to 518mA	15cm - 500cm	LIN 2.2	QFN20L5	■ Optimized ready-to-use and flexible standard software ■ Cost optimized ROM version of E524.14
E524.16 Smart Direct Drive 1st Gen. with LIN Interface and 8bit Controller	7V to 24V	30kHz to 83kHz	Bus or pt-to-pt or ECU less	direct drive	10cm - 300cm	LIN 2.2	QFN20L5	■ Customer programmable controller ■ System cost optimized direct drive solution ■ Optional use in ECU less systems

* Reachable detection range for a standard pole (75mm diameter, 1m height).
  Overall system performance depends on external components (transducer, transformer, PCB layout, ...) and environmental conditions (supply voltage, noise, ambient temperature, ...)

Part No. / Description	Interface	V_{SUPPLY}	Iq (µA)	VDD	ESD (kV)	Bitrate	Package
E521.50 Master IC	IO / LIN	5V to 28V	17	-	8	up to 20 Kbit/s	TSSOP16

Elmos Product Catalog | 2018/2019

Direct Drive Ultrasonic Sensor IC | E524.05/06

Key Features

- Supports directly driven ultrasonic transducers
- Optimized short & long range performance due to:
  - Active and passive damping mechanisms / Sensitivity time control
- Programmable driver voltage and receiver sensitivity
- One wire I/O interface for programming and communication
- Configurable static and automatic thresholds
- E524.05: 2-wire Interface
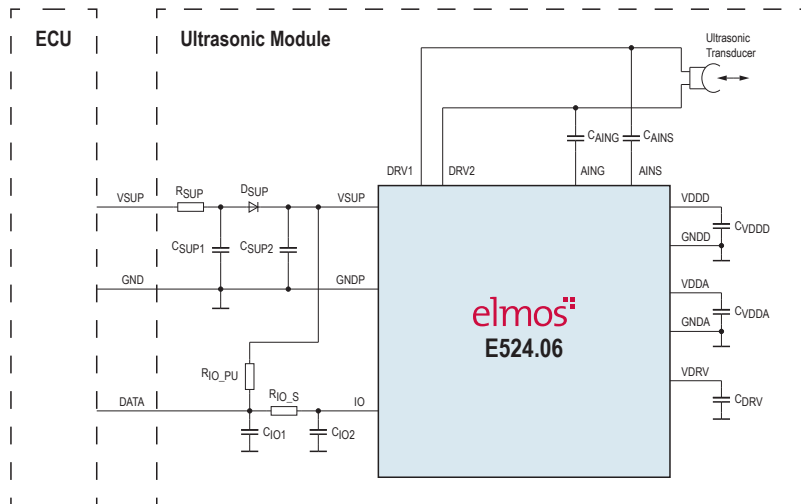- E524.06: 3-wire Interface

Board

- Order No. see page 28

Applications

- Ultrasonic park assist (USPA/PAS/UPA)
- Industrial distance measurement

Packages

- QFN20L4

Application Diagram

Direct Drive Ultrasonic Sensor IC | E524.07

Key Features

- Supports directly driven transducers
- Optimized short & long range performance due to:
  - Active and passive damping mechanisms / Sensitivity time control
- Programmable driver voltage and receiver sensitivity
- Control and signal processing via external controller
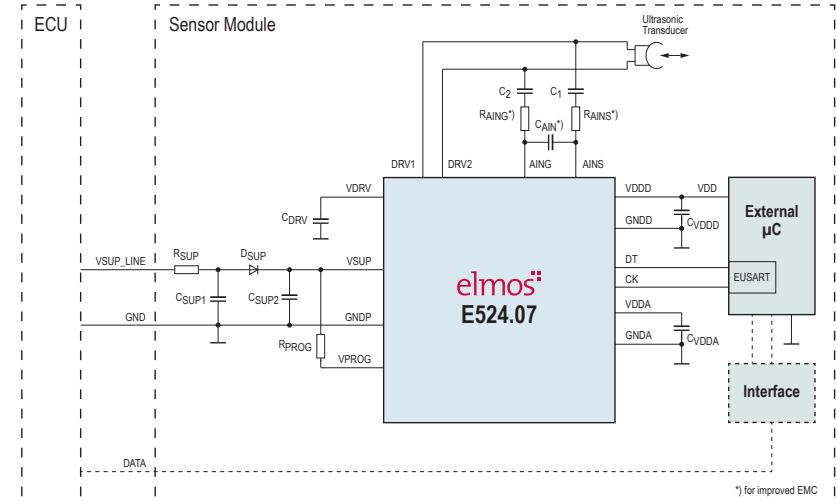- 2 wire EUSART Interface (3.3V)

Board

- Order No. see page 28

Applications

- Ultrasonic park assist systems (USPA/PAS/UPA)
- Industrial distance measurement
- Robotics

Packages

- QFN20L4

Application Diagram

2nd Gen. Ultrasonic Transducer Driver and Signal Processor | E524.08/09

Key Features

- Drives ultrasonic transducer via center-tapped transformer
- Excellent short & long range performance due to:
  - Wide signal gain range / Sensitivity time control / Static and automatic thresholds / Near-field threshold / Echo peak detection / Fast time constant algorithm
- Advanced IO protocol with configurable measurement profiles
- IC and transducer diagnosis information
- E524.08: 2-wire Interface
- E524.09: 3-wire Interface

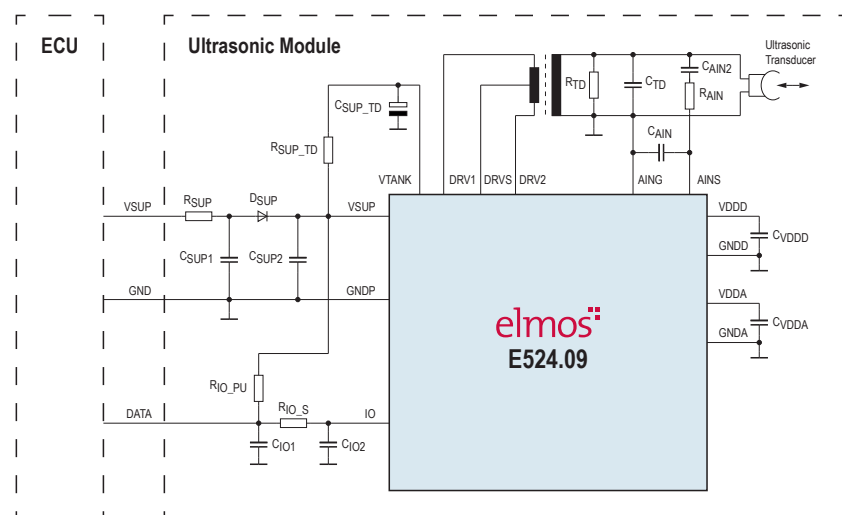### Board

- Order No. see page 28

Applications

- Ultrasonic park assist (USPA/PDS/UPA)
- Automatic parking (SPAS/APA)
- Advanced driver assistance systems (ADAS)
- Industrial distance measurement

Packages

- QFN20L4

Application Diagram

High Voltage Direct Drive Ultrasonic Sensor IC | E524.32/33/34/35

Key Features

- Supports directly driven transducers
- Best measurement performance due to:
  - Smart damping algorithm / Two static and one automatic thresholds / Near field detection / Noise suppression
- High robustness and diagnostics
- Transducer diagnosis information / Temperature sensor
- Advanced IO protocol with configurable measurement profiles
- E524.32: 2-wire Interface | E524.33: 3-wire Interface | E524.34: 3-wire Interface 3.3V | E524.35: 3-wire Interface 5.0V

Board

- Order No. see page 28

Applications

- Ultrasonic park assist systems (USPA, PAS, ...)
- Advanced driver assistance systems (ADAS)
- Distance and level metering

Packages

- QFN20L4

Application Diagram

LIN Smart Ultrasonic Parking Assist (FLASH) | E524.14/24

Key Features

- Drives ultrasonic transducer via center-tapped transformer
- Good measurement performance due to flexible software
- IC and transducer diagnosis information
- Embedded 8bit microcontroller with 8kByte FLASH or ROM / 512Byte SRAM / 128Byte EEPROM
- LIN 2.2 Interface with slave node position detection (SNPD) and alternative pin-coding capabilities
- E524.14: User programmable Flash memory
- E524.24: Ready-to-use and flexible standard software (Rom)
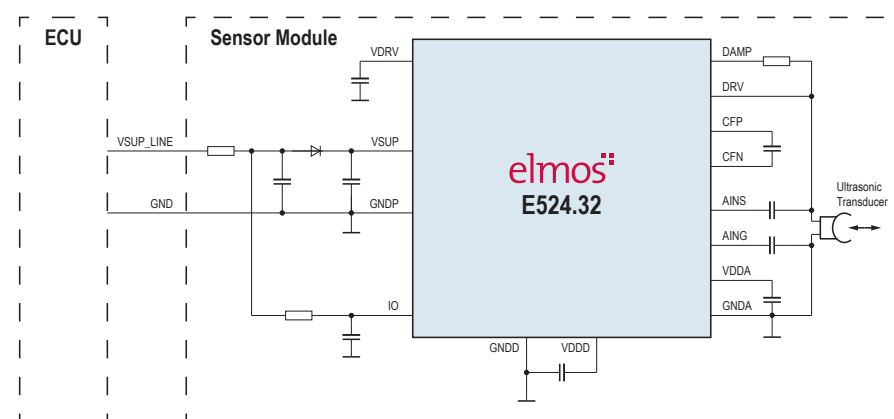
Board

- Order No. see page 28

Applications

- Ultrasonic park assist systems (USPA, PAS, ...)
- Advanced driver assistance systems (ADAS)
- Distance and level metering

Packages

- QFN20L5

Application Diagram

Direct Drive Smart LIN Ultrasonic Sensor IC | E524.16

Key Features

- Supports directly driven transducers
- Best measurement performance due to:
  - Static and automatic thresholds / Near-field detection / Noise suppression
- IC and transducer diagnosis information
- Embedded 8bit microcontroller with 16kByte OTP / 1024Byte SRAM / 256Byte EEPROM
- LIN 2.2 Interface with slave node position detection (SNPD)
- 4 High-voltage GPIOs for ECU less parking systems
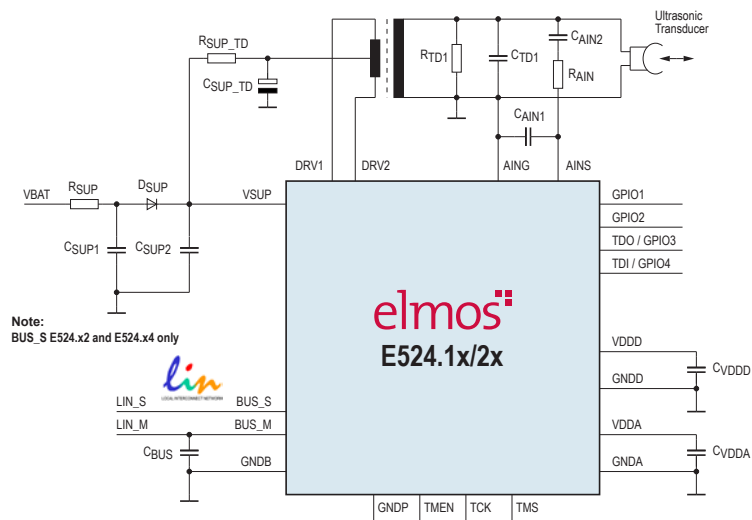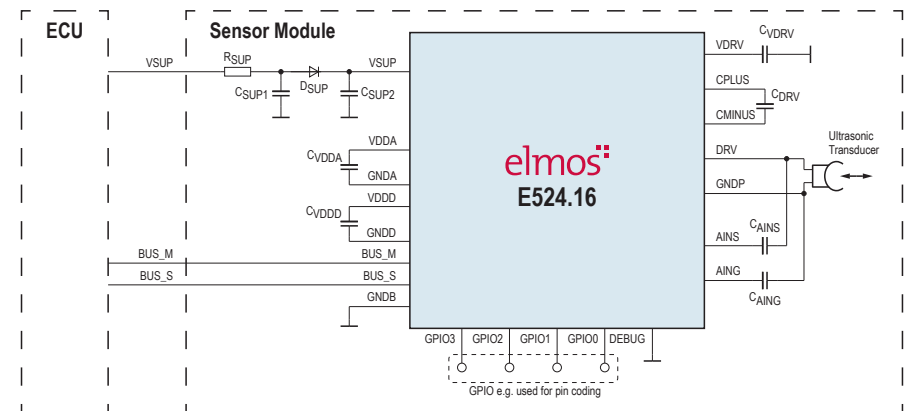
Applications

- Ultrasonic park assist systems (USPA, PAS, ...)
- Advanced driver assistance systems (ADAS)
- Distance and level metering

Packages

- QFN20L5

Application Diagram

Sensors - Ultrasonic, Product Portfolio

IO pt-to-pt Interface

- Proprietary interface
- Optimized state machine
- Most signal conditioning in Park-ECU

BUS (or pt-to-pt) Interface

- LIN Bus-System, less wiring
- Flexible controller solution
- Signal pre-conditioning in sensor
- Potentially without Park-ECU or ECU-less

Sensor-IC Transformer Driven

E524.08/09
Transformer Drive 2nd Gen.
with advanced IO Interface
(10cm – 600cm)

E524.02/03
Transformer Drive 1st Gen.
with IO Interface
(20cm – 400cm)

E524.14/24
Smart Transformer Drive 1st Gen.
with LIN Interface and 8bit Controller
(FLASH and ROM versions)
(15cm – 500cm)

Sensor-IC Direct Driven

E524.32/33/34/35
Direct Drive 2nd Gen.
with advanced IO Interface
(10cm – 400cm)

E524.05/06/07
Direct Drive 1st Gen.
with IO Interface
(25cm – 250cm)

E524.16
Smart Direct Drive 1st Gen.
with LIN Interface and 8bit Controller
(10cm – 300cm)

Master-IC

E521.50
Master IC
4 LIN Transceiver for
LIN and IO Systems

Sensors - SSP: Sensor Signal Processor for Resistive Bridges

Part No. / Description	V_{SUPPLY}	Output	Range	Package	Comment
E520.42 Automotive SSP with Analog or Sent Output - Gen. 2	5V ±0.5V	Analog:Ratiometric to V_{SUPPLY} (10-90%) Digital: SENT interface	Sensor Sensitivity 1mV/V to 50mV/V	QFN20L5 Bare-Die	▪ Automotive protection +40/-28V ▪ Very low noise front-end ▪ Trimmable input low-pass filter ▪ Comprehensive self diagnostics ▪ SENT interface (SAE J2716, Jan 2010)
E520.45 Sensor Signal Processor with SENT and T-Channel	5V ±0.5V	Digital: SENT interface	Sensor Sensitivity 5 mV/V to 50 mV/V	QFN20L5 Bare-Die	▪ Automotive protection ±18V ▪ Low current consumption: 3mA ▪ Trimmable input low-pass filter ▪ Dedicated NTC linearization programmable ▪ Comprehensive self diagnostics ▪ SENT interface (SAE J2716, Jan 2010)
E703.11 Sensor Signal Processor for High Precision Applications	2.7 V to 5.5V	SPI or I²C with CRC, Analog voltage, PWM or FM, End of Conversion/Alarm	Sensor Sensitivity 2 mV/V to 88mV/V	DFN14_3x4 Bare-Die	▪ Precision front end with two 16-bit ADC ▪ Configurable sample rate (2..50kS/s) and low pass filter (10Hz..8kHz) ▪ 6th order polynomial sensor correction ▪ Sleep mode available (I<20µA)

Automotive SSP with Analog or Sent Output - Gen. 2 | E520.42

Key Features

- Very low noise front-end amplifier and ADC allows SNR>70dB for inputs down to 1mV/V FS
- PGA configurable to 50mV/V FS and adjustable offset of ±150% FS
- Digital compensation of offset- and gain-drift and non-linearity up to 3rd order
- Analog voltage or digital SENT output (SAE J2716, JAN2010)
- Supply 5.0 ± 0.5V, over-voltage a. reverse polarity protection (28V)
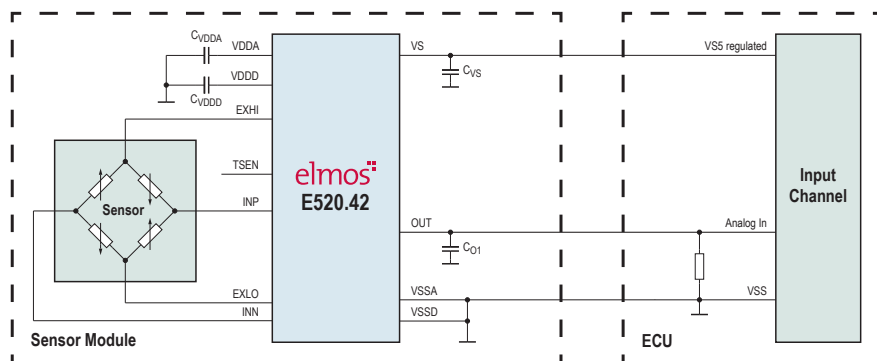- Single-wire programming interface

Board

- Order No. see page 28

Applications

- Exhaust systems
- Engine and transmission

Packages

- QFN20L5
- Bare-Die

Application Diagram

Sensor Signal Processor with SENT and T-Channel | E520.45

Key Features

- Low noise front-end optimized for MEMS resistive sensor bridges
- Sensitivity trimming for 5..50 mV/V full scale input and offset trim
- Media temperature sensing with external NTC and linearization of digital output
- SENT interface for pressure, pressure/secure, or pressure/temperature output data
- 5V-supply with over-voltage and reverse polarity protection (± 18V)

Board
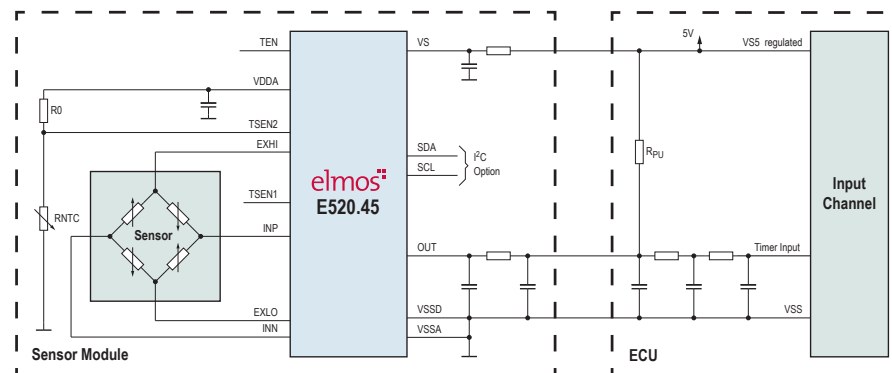
- Order No. see page 28

Applications

- Digital MAP / T-MAP sensors
- Exhaust systems
- Engine and transmission
- Automotive or industrial products using resistive sensor bridges

Packages

- QFN20L4
- Bare-Die

Application Diagram

Sensor Signal Processor for High Precision Applications | E703.11

Key Features

- High precision frontend
- PGA configurable to 2..88mV/V FS, offset adjustable to ±300% FS
- Output signal bandwidth widely configurable: (10Hz..8kHz), accuracy (10..15 ENOB) and sample rate (2..50kS/s)
- Ultra low latency: output update rate 2..50kS/s, DSP time<25μs
- 6th order polynomial sensor correction (16 coefficents)
- Temperature sources: chip, bridge and external (diode, NTC)
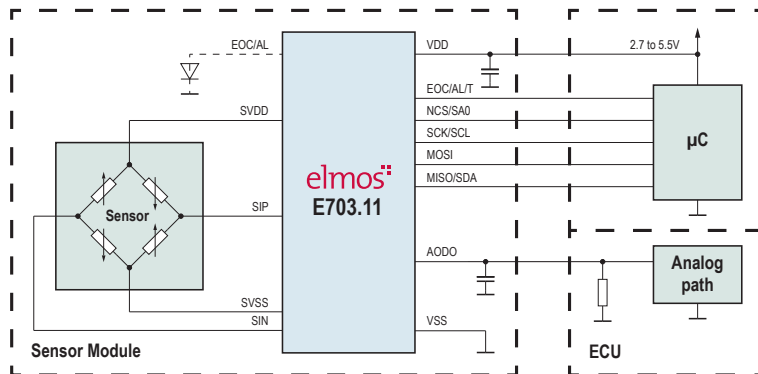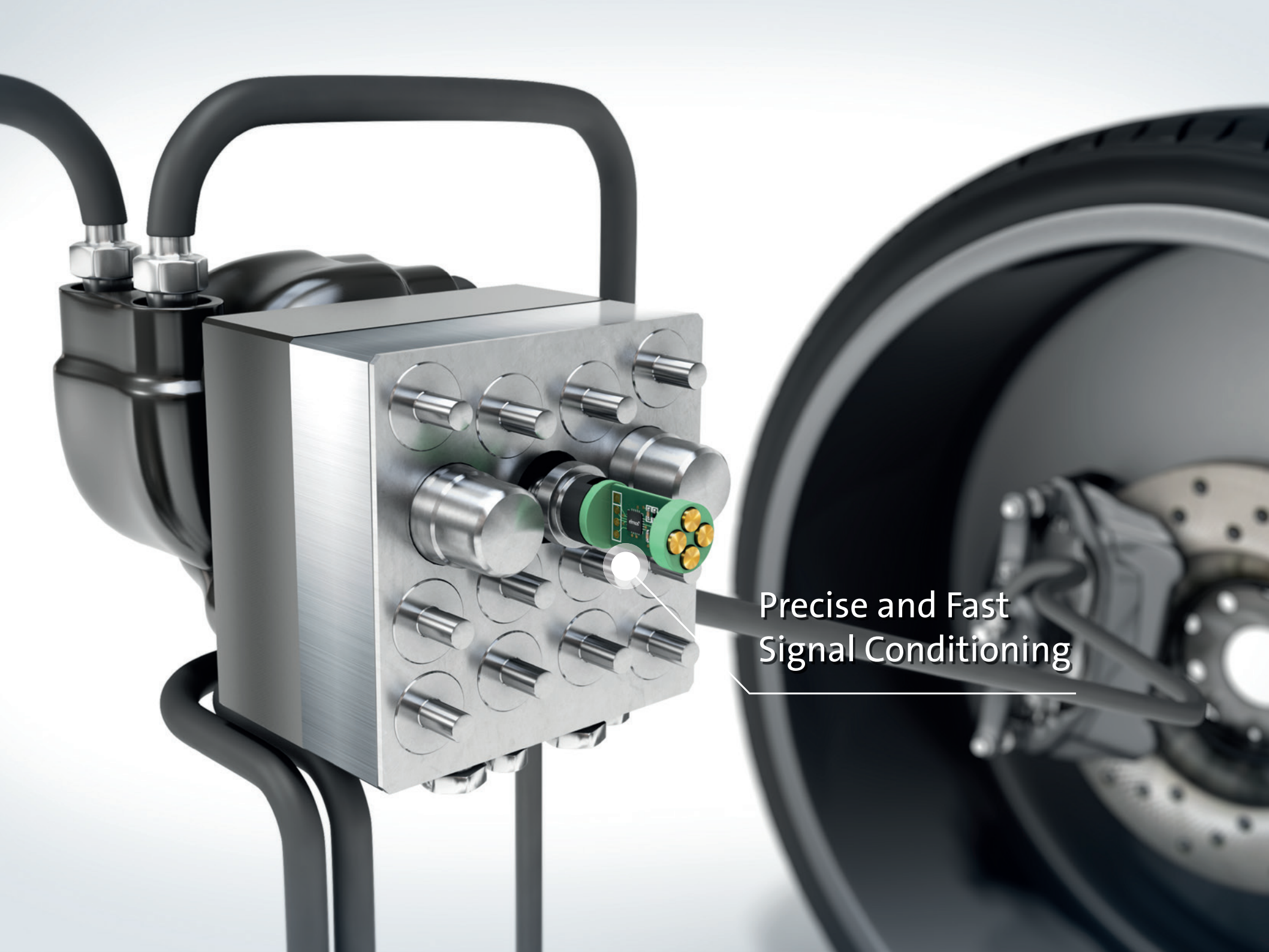
Board

- Order No. see page 28

Applications

- High precision industrial pressure sensors
- Ultra low pressure OEM modules
- Automotive or industrial products using resistive sensor bridges

Packages

- DFN14_3x4
- Bare-Die

Application Diagram

Precise and Fast
Signal Conditioning

Sensors - Optical IR Sensor (HALIOS®)

Automotive

Part No. / Description	V_{SUPPLY}	Iq	Sensitivity	Detection	Bandwidth	Package	Comment
E527.04 Rain and Light Sensor	3.1V to 3.5V	4.5mA (typical)* 8µA (sleep)	-	Rain Ambient Light	-	QFN20L4	▪ Rain Sensor Signal Processor ▪ Logarithmic amplifier for ambient light measurements ▪ SPI interface
E527.05 HALIOS® Rain and Light Sensor with LIN	7.0V to 18V	4.5mA (typical)* 8µA (sleep)	-	Rain Ambient Light	-	QFN44L7	▪ Logarithmic amplifier for ambient light measurements ▪ SPI interface ▪ 3.3V Voltage regulator, 100mA output current
E909.06 HALIOS® Multi Purpose Sensor for Automotive	2.25V to 2.75V 3.3V (GPIO)	2.5mA (typical) <50µA (stop mode)	-	Proximity 1..3 dimensional input devices Touch	-	QFN32L5	▪ Optical/capacitive sensor IC for gesture control and object detection ▪ 5 LED drivers, 8x GPIO ▪ 16 bit µC with flash ▪ SPI-compatible, I²C Interface, LIN UART ▪ Internal temp. compensation
E909.07 Transimpedance Amplifier with High Sensitivity	3V to 3.5V	3mA (typical) <1µA (sleep)	172dBOhm	-	500kHz	QFN20L4 Bare-Die	▪ Enlarges detection range of HALIOS® ICs E909.06 ▪ Limiting amplifier output ▪ High resistive output stage
E909.21 HALIOS® Controller for Proximity and Gesture Recognition	3V to 3.6V	33mA (typical)	-	Proximity 1..3 dimensional input devices	-	QFN32L5	▪ 16 Bit µC with flash, SPI and I²C Interface ▪ Two independent receiving channels ▪ Real time measurement results for rapid gesture detection ▪ 100mA LED output current
E909.22 HALIOS® Signal Conditioner for Proximity and Gesture Recognition	2.2V to 3.6V	18mA (active) 40µA (idle) 1.5µA (sleep)	-	Proximity 1..3 dimensional input devices	-	QFN20L4	▪ Companion chip for E909.21 ▪ Two independent receiving channels ▪ Real time measurement results for rapid gesture detection ▪ 100mA LED output current

* Without LED current and photo diode current

Consumer

Part No. / Description	V$_{SUPPLY}$	Iq	Sensitivity	Detection	Bandwidth	Package	Comment
E527.16 HALIOS® Gesture Switch	2.25V to 2.75V 3.3V (periphery)	3.5mA (typical)	-	Proximity Awareness	-	QFN32L5	■ Advanced ready-to-use function ■ Implemented gesture recognition ■ PWM-Output for innovative motion-controlled lighting application
E909.11 Ultra Low Power HALIOS®	2.2V to 3.6V	10µA (typical) 4.5µA (idle) 0.4µA (sleep)	-	Proximity 1..3 dimensional input devices Ambient Light Measurement	-	QFN20L4 Bare-Die	■ IC for gesture control solutions, proximity and ambient light measurements ■ Adaptive power saving control ■ Self-calibration ■ I²C Interface

Rain and Light Sensor | E527.04

Key Features

- Front end Optical Rain Sensor signal processor
- Four input channels for ambient light measurements
- High sensitivity, no total reflection needed
- Very high robustness against ambient influences
  like sun light, aging and dirt
- Two embedded LED drivers, driving up to 40mA
- Provides a rain drop signal via the WS pin • SPI interface
- Temperature sensor
- Extensive diagnosis during operation

Board

- Order No. see page 29

Applications

- Optical Rain Sensor (wiping systems)
- Industrial camera and window systems
- Ambient Light Sensor (measurement) to control
  - Headlight, Head-up Displays, Air conditioning

Packages

- QFN20L4

Application Diagram

HALIOS® Rain and Light Sensor with LIN | E527.05

Key Features

- Rain Sensor with SBC functionality
- LIN Transceiver
- Configurable µC window watchdog
- High sensitivity, no total reflection needed
- Very high robustness against ambient influences
  like sun light, aging and dirt
- 2 embedded LED Drivers, no external drivers needed
- Supports functional safety (large number of diagnostic functions)

Board

- Order No. see page 29

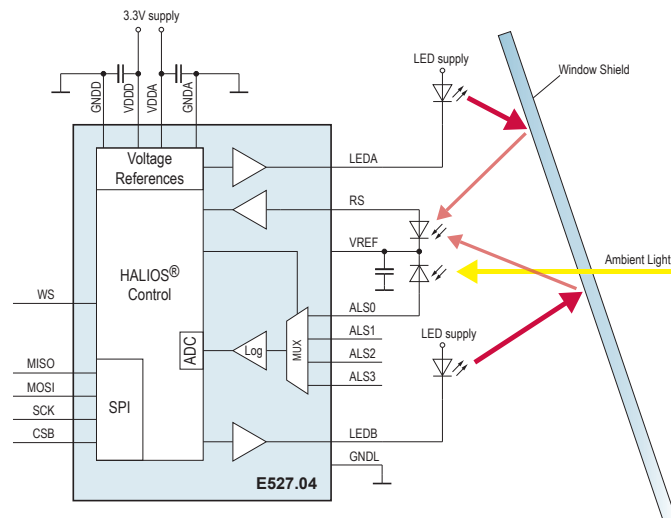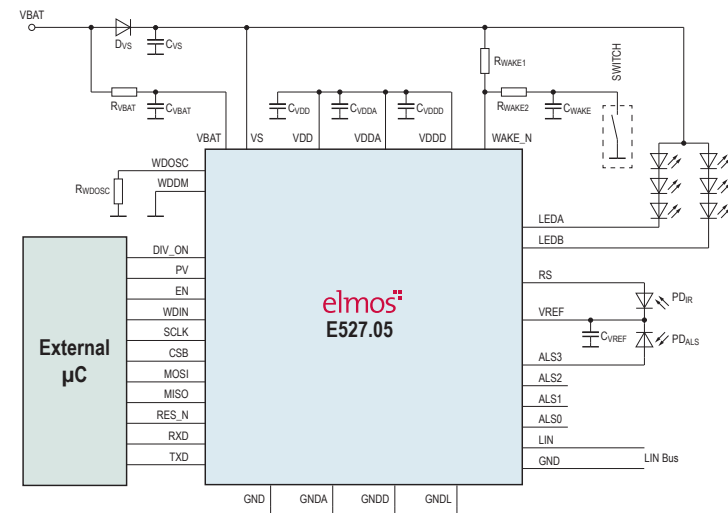### Applications

- Optical Rain Sensor (wiping systems)
  - Windshield, Security Cameras
- Ambient Light Sensor (measurement) to control
  - Headlight, Head-up Displays, Air Conditioning
- Pollution Sensor

Packages

- QFN44L7

Application Diagram

HALIOS® Multi Purpose Sensor for Automotive | E909.06

Key Features

- Optical/capacitive sensor IC for gesture control and object detection
- Controls up to 4 LED sending channels
- 16Bit µC with up to 60k FLASH
- SPI, I²C and LIN-SCI Interfaces
- Standard Firmware implemented
- Scaleable IR based HMI platforms
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 29

Applications

- Proximity & gesture recognition
- HMI for infotainment
- Superior User Experience for touch screen displays

Packages

- QFN32L5

Application Diagram
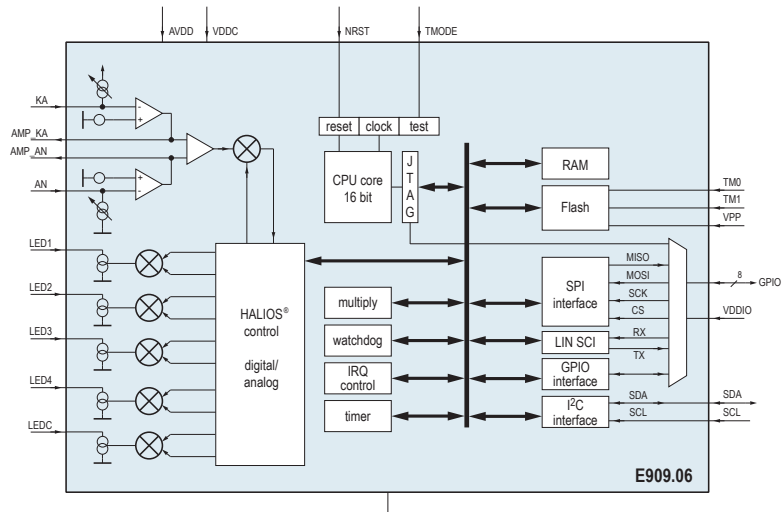
E909.06

Transimpedance Amplifier with High Sensitivity | E909.07

Key Features

- Increases proximity range of E909.06 by factor 5
- Limiting amplifier output
- High resistive output stage
- No current consumption in standby mode
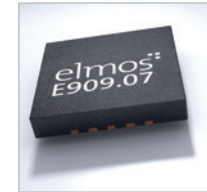
Applications

- Optical receivers
- Transimpedance amplifiers
- Multiplex function for channel expander of chip set

Packages

- QFN20L4
- Bare-Die

Application Diagram

E909.07

HALIOS® Controller for Proximity and Gesture Recognition | E909.21

Key Features

- 4 LED Sending Channels, 100mA per channel
- 2 Receiving Channels
- 1 Compensator Channel
- Scalable HALIOS® frequency up to 1MHz
- 16 bit Harvard Architecture H430 CPU
- 32k Byte Flash
- 4k Byte SRAM and 8k Byte SysROM
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 29

Applications

- HMI for infotainment
  (gesture detection, proximity detection)
- Driver and passenger detection
- Touchless control in harsh environments
  (e.g. explosion protected areas)
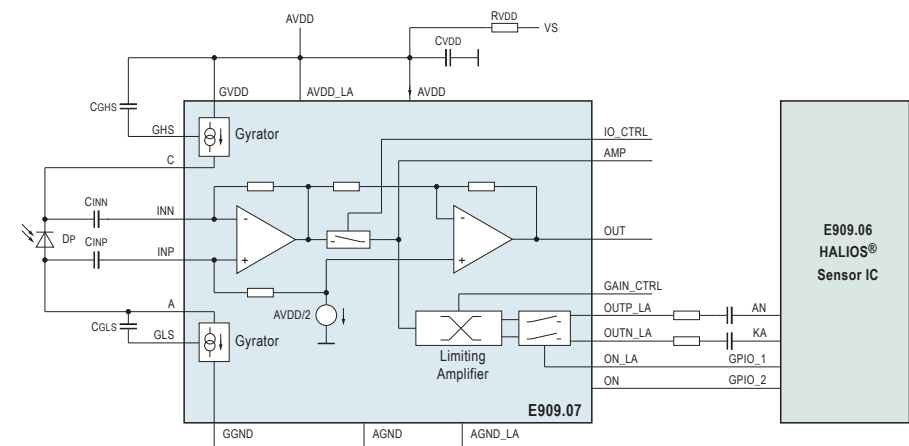
Packages

- QFN32L5

Application Diagram
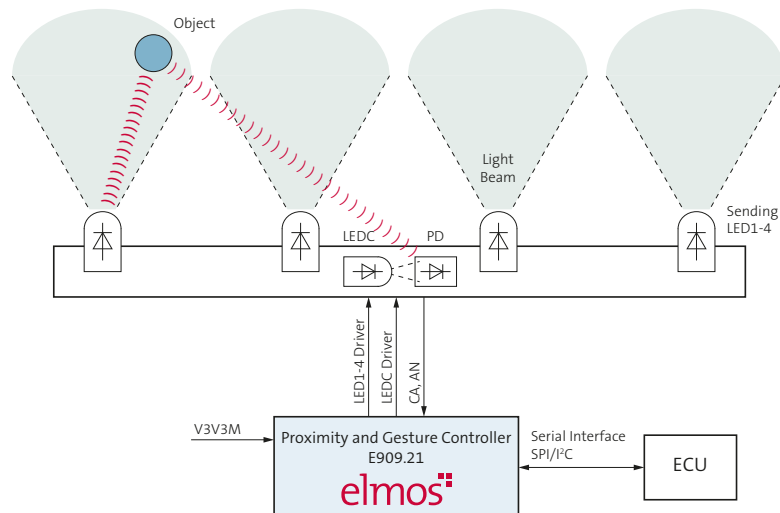
HALIOS® Signal Conditioner f. Proximity a. Gesture Recognition | E909.22

Key Features

- Patented HALIOS® control loop
- 4 LED Sending Channels, 100mA per channel
- 2 Receiving Channels
- 1 Compensator Channel
- Scalable HALIOS® frequency up to 1MHz
- SSI serial sensor interface
- Ambient light immunity up to 200.000 lux
- Temperature Range -40°C to +85°C
- Automotive qualified (AEC-Q100)

Applications

- Proximity a. gesture recognition for automotive touch displays
- Driver and passenger detection
- Wake-up function for displays
- Touchless control in harsh environments
  (e.g. explosion protected areas)

Packages

- QFN20L4

Application Diagram
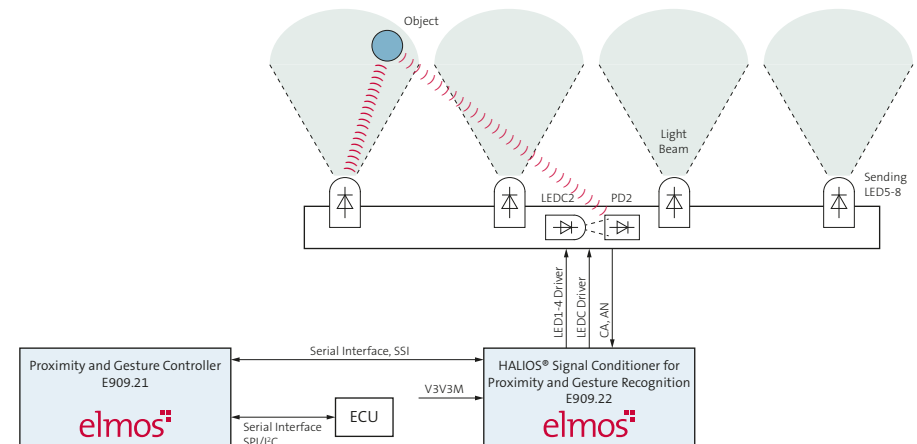
HALIOS® Gesture Switch | E527.16

Key Features

- Ready-to-use functions
- Implemented gesture recognition
- Detection approx. 25cm
- Direct light control possible
- PWM-Output (125 Hz, 8 Bit)
- Reference schematics and reference layout are available

Board

- Order No. see page 29

Applications

- Innovative motion controlled light
- Optical push buttons and controls
- Wake-up function for saving energy
- Pre-selection to simplify menu structures

Packages

- QFN32L5

Application Diagram
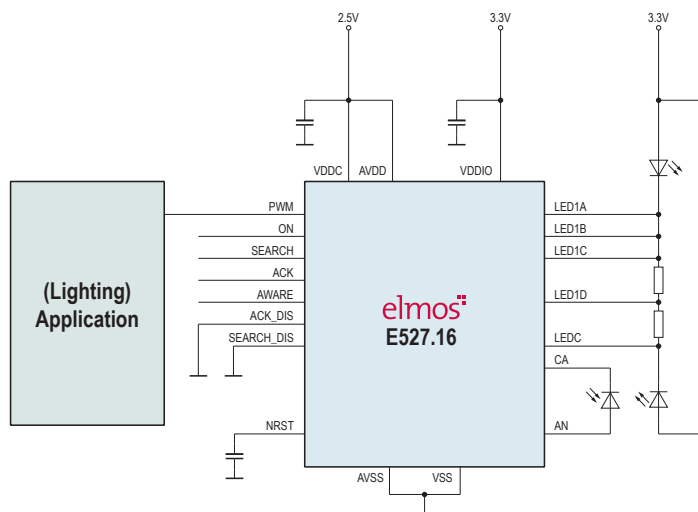
Ultra Low Power HALIOS® | E909.11

Key Features

- Lowest stand by current of 0.4µA
- Up to 1MHz HALIOS® frequency
- Controls up to 3 LED sending channels
- Ambient Light Measurement
- High Speed 3.4MHz I²C Interface
- New electro-optical basic coupling implemented
- Standard Firmware implemented
- Minimal external components

Applications

- High performance proximity detection up to 50cm
- Fast and reliable 3D gesture control solution for mobile and industrial devices

Packages

- QFN20L4
- Bare-Die

Application Diagram
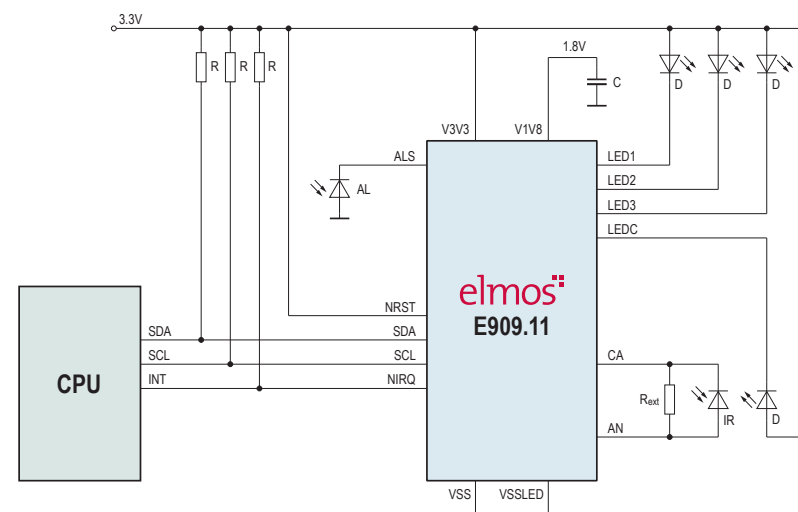
Sensors - Smoke Detector Controller

Part No. / Description	V_{SUPPLY}	Protection	I_{SUPPLY}	Package	Comment
E520.24 Universal Smoke Detector Controller	8V to 50V	60V	Configurable: Down to 90µA	SOIC16 Bare-Die	■ For network addressable, optical smoke detectors ■ 1.5 to 45nA photo current input range ■ 8bit µC with 4kByte or 8kByte, 128Byte RAM ■ Configurable/programmable loop interface

Universal Smoke Detector Controller | E520.24

Key Features

- 2-Wire bus operation with 8V to 50V supply, low supply current down to 90µA
- Embedded 8-bit µC with 4kByte or 8kByte
- Instruction Memory and 128Byte RAM
- 48Byte MTP with 32Byte uncommitted for configuration data + 16 Byte for device ID and calibration
- 2 configurable 420mA LED driver
- Photo current input range (1.5..45)nA
- Thermistor input

Board

- Order No. see page 29

Applications

- Simplifies design of addressable smoke detectors required by legislation
- Fully programmable smoke detectors
- Device with GPIOs and LN24 bus interface
- Alarm Switch Controller

Packages

- SOIC16
- Bare-Die

Application Diagram

Sensors - Passive Infrared Sensors

Pyroelectric Sensor Signal Processor (SSP)

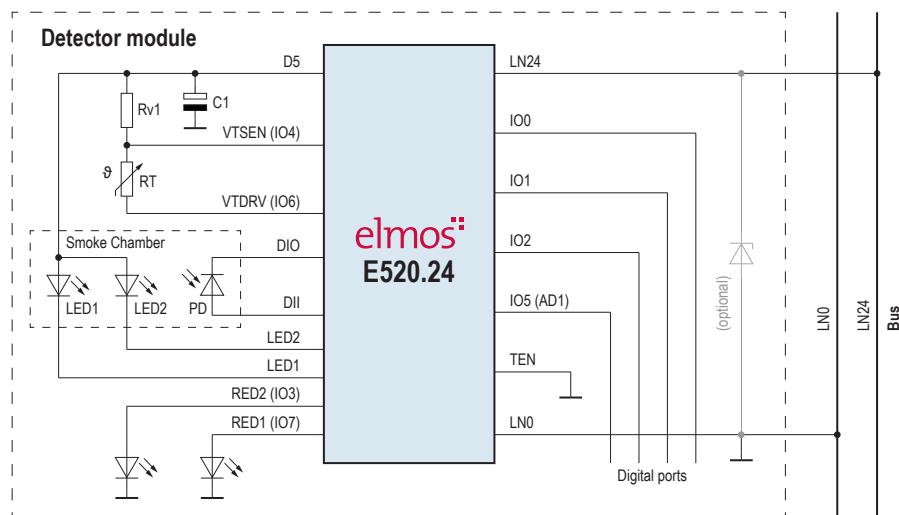| Part No. / Description	V_{SUPPLY}	I_{SUPPLY}	Output	Package	Comment
E931.06 Pyroelectric SSP	2.7V to 3.6V	15µA	PIR Signal and Temperature (DOCI™)	Wafer Bare-Die	▪ Digital signal processing ▪ Single wire interface(DOCI™)
E931.62 Dual Channel Pyroelectric SSP	2.7V to 3.6V	15µA	PIR Signal and Temperature (DOCI™)	Wafer Bare-Die	▪ Dual channel ▪ Digital signal processing ▪ Single wire interface (DOCI™)
E931.96 Low Power Pyroelectric SSP	2.7V to 3.6V	5µA	Motion DETECT, Supply voltage for PIR Detector	SOIC8 Wafer Bare-Die	▪ Ultra low power consumption ▪ Excellent power supply rejection ▪ Programmable detection criteria and operating modes

Pyroelectric Sensor Signal Controller (SSC)

Part No. / Description	V_{SUPPLY}	I_{SUPPLY}	Output	Package	Comment
E931.95 Pyroelectric SSC with Pulse Trigger Select	2.7V to 3.6V	12µA	Motion DETECT, Threshold	SOIC14 TSSOP14 Wafer	▪ Outputs for relay and LED ▪ Insensitive to RF interference ▪ Instanteous settling after power up
E910.97 Pyroelectric SSC with Relay Output	2.7V to 3.6V	15µA	PIR Signal, digital	Wafer Bare-Die	▪ Outputs for motion detect ▪ Insensitive to RF interference ▪ Inputs for sensitivity and on time
E931.97 Pyroelectric SSC with Relay/LED Output	2.7V to 3.6V	12µA	Motion DETECT, Threshold	SOIC14N TSSOP14 Wafer Bare-Die	▪ Outputs for relay and LED ▪ Insensitive to RF interference ▪ Instanteous settling after power up
E931.98 Pyroelectric SSC with Zero Crossing Detection	2.7V to 3.6V	70µA	Motion DETECT, Threshold	SOIC14N TSSOP14	▪ Insensitive to RF interference ▪ Instanteous settling after power up ▪ Adaptive mains zero cross switching

Sensors - Thermopile

Part No. / Description	V_{SUPPLY}	I_{SUPPLY}	Output	Package	Comment
E931.78 High Resolution Thermopile SSP	2.2V to 3.6V	20µA	Thermopile Signal and Temperature and EEPROM Data	Wafer Bare-Die	■ High precision temperature sensing ■ Digital signal processing ■ I²C interface ■ 16 Bit ADC for sensor signal

Motor Control

Power Management

Interface

Special Projects

Pyroelectric SSP | E931.06

Key Features

- Direct connection to PIR sensor elements
- Temperature measurement
- Differential PIR sensor input
- Low Current Consumption
- Excellent power supply rejection
- High dynamic range
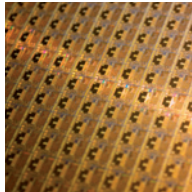
Applications

- Integration with PIR sensor elements
- High end PIR systems
- Building management

Packages

- Wafer
- Bare-Die

Application Diagram

VDD

Digital Output

elmos
E931.06

VSS
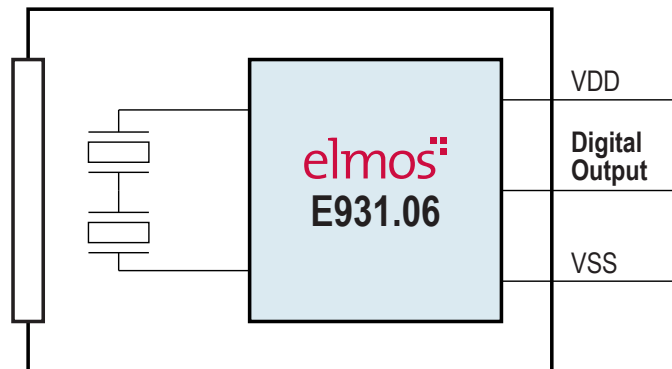
Dual Channel Pyroelectric SSP | E931.62

Key Features

- Direct connection to PIR sensor elements
- Temperature measurement
- Differential PIR inputs
- Digital Signal Processing (DSP)
- Single wire serial interface (DOCI™)
- Operating voltage down to 2.7V
- Low current consumption
- High dynamic range
- High supply rejection
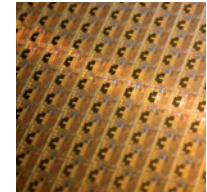
Applications

- Integration with PIR sensor elements (hybrid modules)
- Gas sensors
- High end PIR systems

Packages

- Wafer
- Bare-Die

Application Diagram

ADC CHNL1 — Decimator LPF — Serial Interface — Digital IO

ADC CHNL0 — Decimator LPF — V Ref

ADC °C — Decimator LPF — OSC

VDD

GND

E931.62
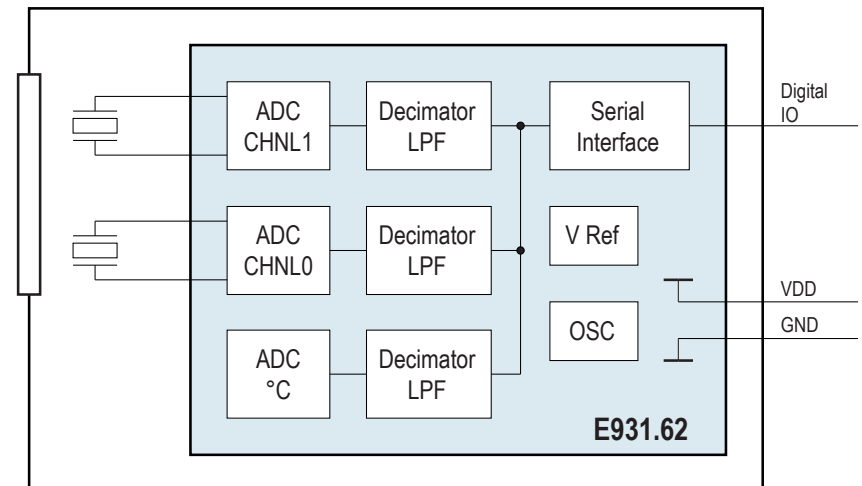
Low Power Pyroelectric SSP | E931.96

Key Features

- Programmable detection criteria and operating modes
- Digital signal processing
- On chip supply regulator for conventional PIR detectors
- Ultra low power consumption
- Differential PIR sensor input
- Excellent power supply rejection
- Insensitive to RF interference
- Instantaneous settling after power up

Board

- Order No. see page 29

Applications

- Wireless intruder detectors
- Battery powered door chimes
- Emergency lighting
- Motion and presence detection

Packages

- SOIC8
- Wafer
- Bare-Die

Application Diagram
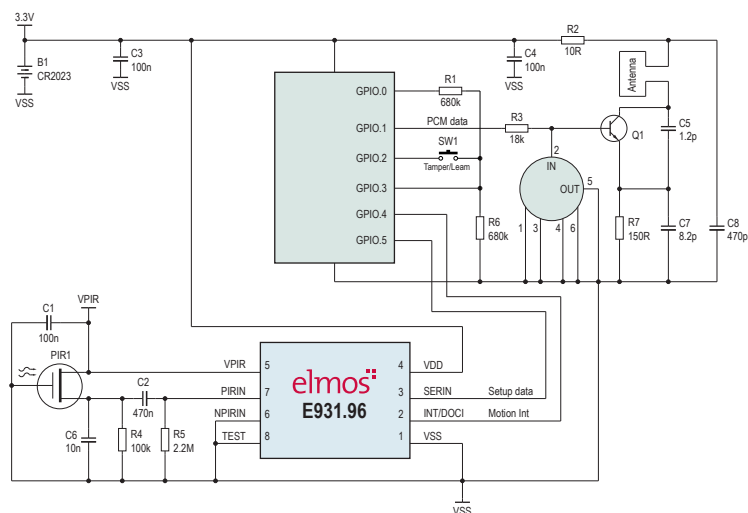
Pyroelectric SSC with Pulse Trigger Select | E931.95

Key Features

- Digital Signal Processing
- On chip shunt regulator
- Low Power Consumption
- Differential PIR sensor input
- Outputs for relay and LED
- Selectable pulse count and pulse window evaluation
- Blind period after load switching
- Insensitive to RF interference

Applications

- PIR motion detection
- Intruder detection
- Occupancy detection
- Motion sensor lights
- Automatic TV standby

Packages

- SOIC14
- TSSOP14
- Wafer

Application Diagram
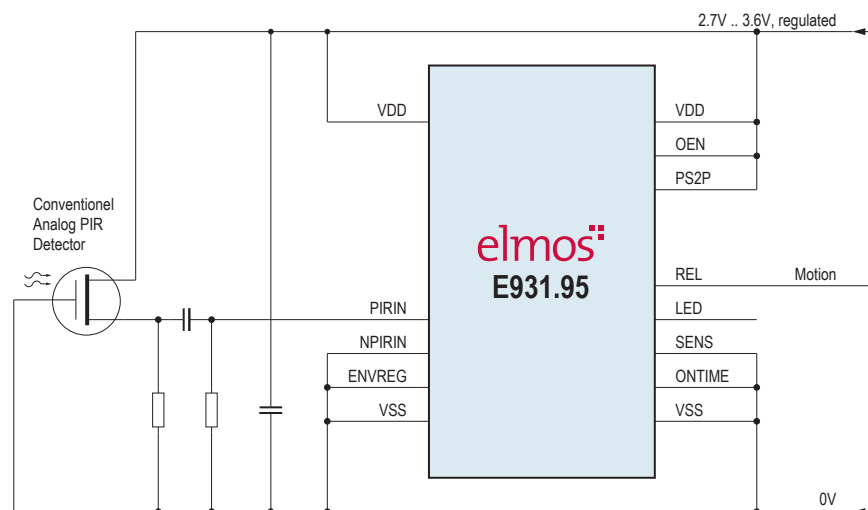
Pyroelectric SSC with Relay Output | E910.97

Key Features

- Digital Signal Processing
- On chip shunt regulator
- Low Power Consumption
- Differential PIR sensor input
- Excellent power supply rejection
- Inputs for sensitivity and on time
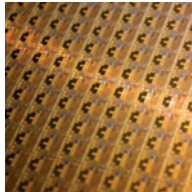
Applications

- PIR motion detection
- Intruder detection
- Occupancy detection
- Motion sensor lights

Packages

- Wafer
- Bare-Die

Application Diagram
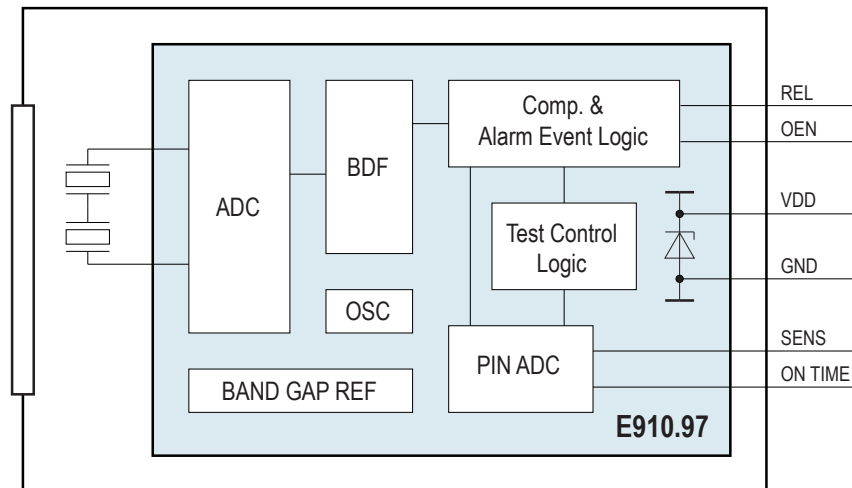
Pyroelectric SSC with Relay/LED Output | E931.97

Key Features

- Digital Signal Processing
- On chip shunt regulator
- Low Power Consumption
- Differential PIR sensor input
- Excellent power supply rejection
- Outputs for relay and LED

Board

- Order No. see page 29

Applications

- PIR motion detection
- Intruder detection
- Occupancy detection
- Motion sensor lights

Packages

- SOIC14N
- TSSOP14
- Wafer
- Bare-Die

Application Diagram
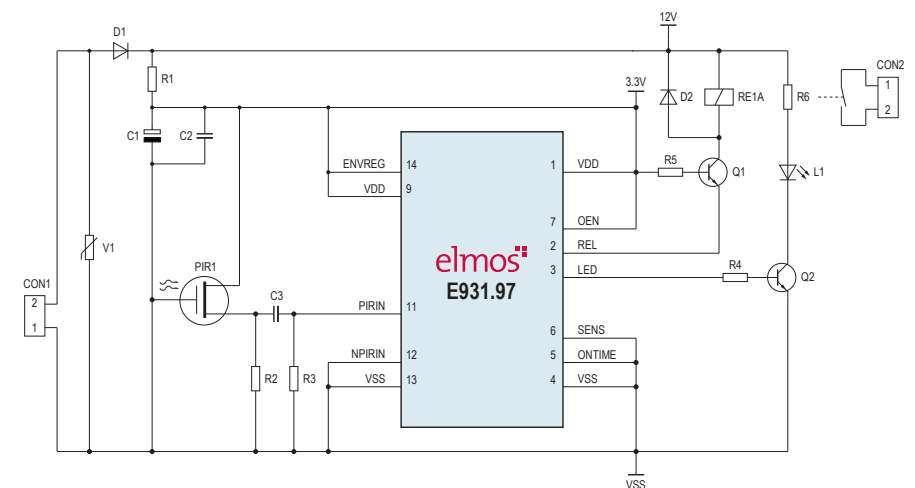
Pyroelectric SSC with Zero Crossing Detection | E931.98

Key Features

- One pulse trigger
- Adaptive zero crossing switching
- On chip shunt regulator
- Low power consumption
- Differential PIR sensor input
- Excellent power supply rejection

Applications

- PIR motion detection
- Intruder detection
- Occupancy detection
- Motion sensor lights

Packages

- SOIC14N
- TSSOP14

Application Diagram
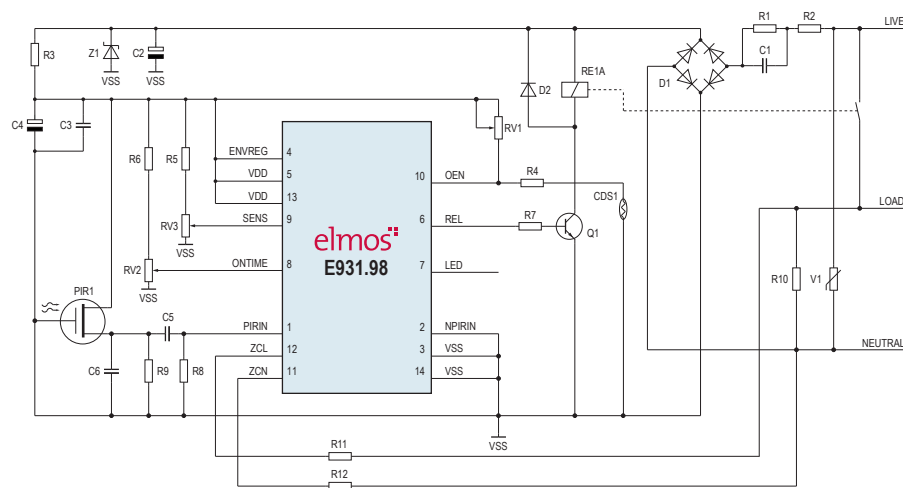
High Resolution Thermopile SSP | E931.78

Key Features

- Direct connection to thermopile elements
- Temperature measurement
- E²PROM for calibration and identification
- I²C Interface
- Operating voltage down to 1.8V
- Low current consumption
- High dynamic range
- High supply rejection
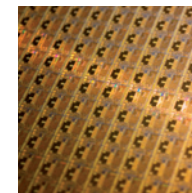
Applications

- Presence and Motion Detection
- High precision remote temperature sensing
- Infrared pyrometers

Packages

- Wafer
- Bare-Die

Application Diagram
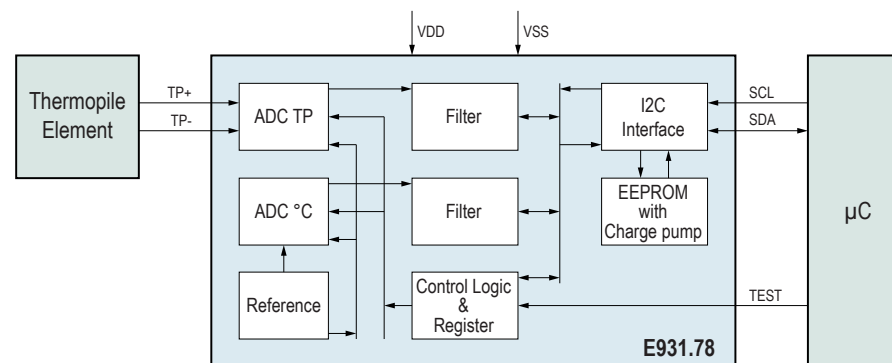
Sensors - Boards

Ultrasonic

Part No.	Description	Board type	Order No.
E524.0x	"Ultrasonic Park Assist" Demonstrator	Master Board	K5240X-0001
E524.02	Ultrasonic Sensor Board	Sensor Board	K52402-0002
E524.03	Ultrasonic Sensor Board	Sensor Board	K52403-0002
E524.05	Ultrasonic Sensor Board	Sensor Board	K52405-0002
E524.06	Ultrasonic Sensor Board	Sensor Board	K52406-0002
E524.08	Ultrasonic Sensor Board	Sensor Board	K52408-0001
E524.09	Ultrasonic Sensor Board	Sensor Board	K52409-0001
E524.14	LIN Smart Ultrasonic Parking Assist (FLASH)	Evaluation Kit	K52414-0001
E524.17	Sensor FPGA Board	Demoboard	K52417-0001
E524.17	Sensor Socket Board	Demoboard	K52417-0002
E524.17	Sensor Application Board	Demoboard	K52417-0003
E524.33	Ultrasonic Sensor Board	Demoboard	K52433-0001
E521.42	Master FPGA Board	Demoboard	K52142-0001
E521.42	Master Socket Board	Demoboard	K52142-0002
E521.42	Master Application Board	Demoboard	K52142-0003

Pressure Sensor

Part No.	Description	Board type	Order No.
E520.42/45	SSP2 Board + Adapter	Evaluation Kit	K5204x-0001
E520.42/45	Adapter for SSP2 Board	Demoboard	K5204x-0002
E520.42/45	SSP Board	Demoboard	Z00000-0010
	SSP2 Multiplexer	Multiplexer	Z00000-0011
E703.11	Sensor Signal Processor for High Precision Applications	Evaluation Kit	K70311-0001

HALIOS®

Part No.	Description	Board type	Order No.
E527.04/05	Evaluation Kit	Evaluation Board	KI 1210005
E527.16	HALIOS® Reference Design Board	Demoboard	RD 1210001
E909.06	Gesture Reference HALIOS® Board	Demoboard	RD 1210005
E909.06	HALIOS® 2 inch slider	Demoboard	RD 1210006
E909.06	HALIOS® COM Board	Com Board	AC 1210001
E909.06	Evaluation Kit V3	Evaluation Board	KI 1210003
E909.11	HALIOS® Reference Design Board	Demoboard	RD 1210002
E909.21	Evaluation Kit	Evaluation Board	KI 1210004
E909.21	HALIOS® ProxDimm-Light G2	-	RD 1210007

Smoke Detector Controller

Part No.	Description	Board type	Order No.
E520.24	Universal Smoke Detector Controller	Demoboard	K52024-0001

Pyroelectric Sensor Signal Processor (SSP)

Part No.	Description	Board type	Order No.
E931.96	Motion Sensing, Ultra Low Power PIR controller, Evaluation Module	Demoboard	K93196-0001

Motor Control - Stepper Motor

Part No. / Function	V_SUPPLY	I_PEAK	P(Motor)peak	RDS_ON	Interface	Package	Comment
E520.01/02 *Driver IC 12x Low-Side for 3 Stepper Motors with/without Stall Detection	3V to 25V (42V)	12x 350mA	≈12x 8.75W	1.5Ω	■ SPI-compatible (3.3/5V)	QFN32L5 SOIC28	■ Stall detection for stepper motors (E520.01) suitable for Full Step, Half Step, Wave Drive ■ 245Hz LED mode ■ 25kHz relay mode ■ 25kHz linear PWM ■ T_{Junc} peak = +150°C
E520.03/08 *Driver IC 8x Low-Side for 2 Stepper Motors with/without Stall Detection	3V to 25V (42V)	8x 350mA	≈8x 8.75W	1.5Ω	■ SPI-compatible (3.3/5V)	SOIC20 QFN20L5 QFN32L5	■ Stall detection for stepper motors (E520.03) suitable for Full Step, Half Step, Wave Drive ■ 245Hz LED mode ■ 25kHz relay mode ■ 25kHz linear PWM ■ T_{Junc} peak = +150°C
E523.30 *SoC Power Stepper Controller with Stall Detection with/without Auto-Addressing (LIN / PWM Interface)	5.5V to 20V (42V)	2x 800mA H-Bridge	≈25W	550mΩ (HS) 450mΩ (LS)	■ LIN 2.x (1.3 comp.) or SAE-J2602 or PWM Interface Optional LIN Auto-Addressing (SNPD) only E523.30 or LIN Flash update ■ JTAG	QFN32L6	■ Current chopper motor control ■ Supply and read-out of up to 3 sensors ■ Embedded 8bit μC ■ 8k FLASH ■ T_{Junc} peak = +170°C
E523.31/32 *Plug & Play Power Stepper Controller with Stall Detection with standard application software (LIN Interface)	5.5V to 20V (42V)	2x 800mA H-Bridge	≈25W	550mΩ (HS) 450mΩ (LS)	■ LIN 2.x (1.3 comp.) or SAE-J2602 ■ LIN Flash update ■ JTAG	QFN32L6	■ Current chopper motor control ■ Supply and read-out of up to 3 sensors ■ Embedded 8bit μC ■ 8k FLASH (E523.31) ■ 8k ROM (E523.32) ■ T_{Junc} peak = +170°C
E910.01 *SoC Stepper Motor 8x Low Side Driver	5.5V to 25.5V	8x 350mA	≈8x 8.75W	1.5Ω	■ SPI-compatible (5V)	SOIC20	■ Short circuit protection ■ Thermal circuit protection ■ Cascadable ■ T_{Junc} peak = +150°C

*Plug & Play   Chip with defined functionality | no controller programming necessary
*SoC   System-on-a-Chip | with integrated microcontroller
*SBC   System-Basic-Chip | with Voltage Regulator Reset, Watchdog, physical Interface
*Driver IC   Driver Chip without SBC or SoC features

12/8x Low-Side Driver with Stall Detection | E520.01/02/03/08

Key Features

- 12 high current outputs (RDS$_{ON}$ typ. 1.5Ω / I$_{MAX}$ = 350mA)
- Low standby current (typically <1µA)
- Serial interface (SPI) for direct µC interfacing
- Short circuit / Open load detection, diagnosis
- Stall detection for full-/half-step, wave drive
- Stall detection qualification service
- T$_{Junc}$ peak = +150°C

Board

- Order No. see page 43

Applications

- Stepper motor driver with/without stall detection
- DC motor driver with PWM
- Relay driver with VBAT- automatically PWM
- LED driver with 3 logarithmic PWM sources

Packages

- E520.01/02
  QFN32L5, SOIC28

- E520.03/08
  QFN32L5, QFN20L5, SOIC20

Application Diagram

*Driver IC

E520.01, E520.02, E520.03, E520.08
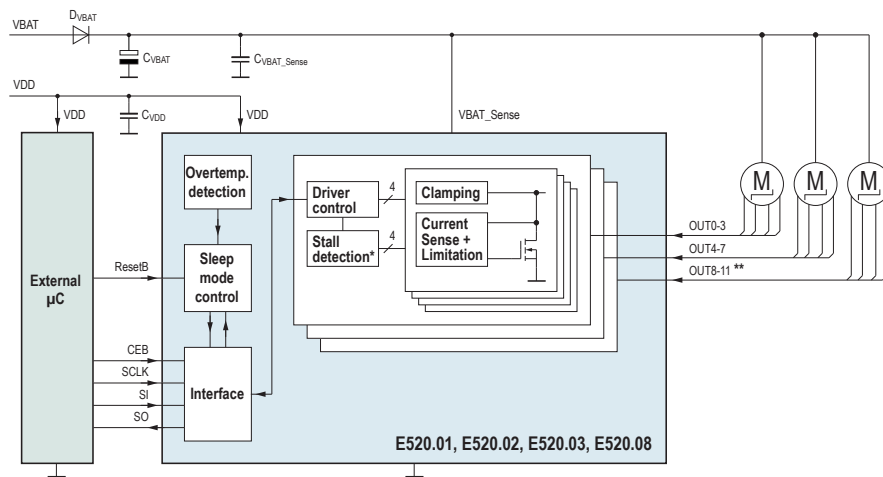
* E520.01, E520.03 only
** E520.01, E520.02 only

Power Stepper Controller with Stall Detection | E523.30/31/32

Key Features

- Drives a bipolar stepper motor
- Sensorless "stall detection"
- I - Coil current up to 2 x 800mA (prog. chopper)
- 5.5V - 20V supply voltage (load dump 42V)
- Sleep mode current typically 30µA
- Embedded 8bit µC 256 Byte RAM, 8k FLASH,
  8k ROM, 64 Byte E²PROM
- Versions: LIN/PWM Interface, optional LIN Auto-Addressing

Board

- Order No. see page 43

Applications

- Stepper or DC motor actuators
- Grill-Shutter
- Head-Light adjust
- Water valve

Packages

- QFN32L6

Application Diagram

*SoC / *Plug & Play

E523.30
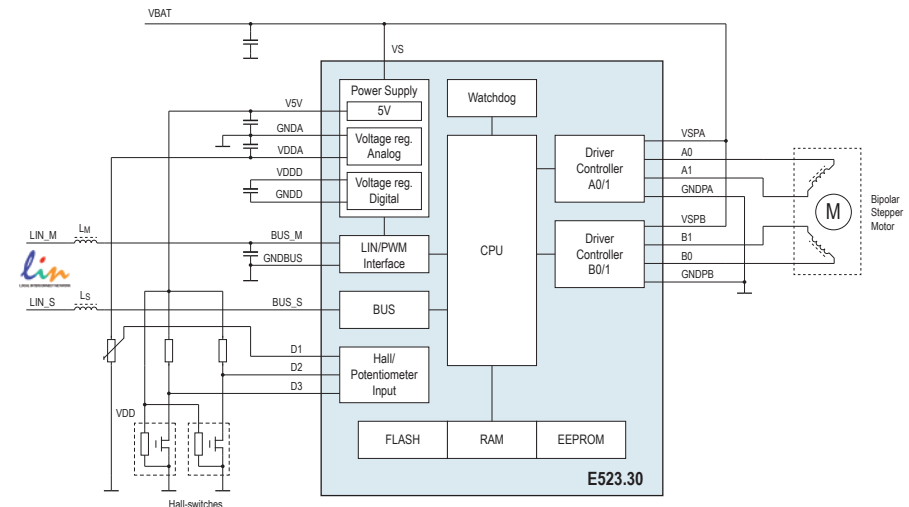
Stepper Motor 8 x Low Side Drive | E910.01

Key Features

- Supply voltage range VDD 4.5V to 5.5V
- Low standby current (typ. <1μA)
- SPI compatible interface to μC
- Addressing modes: daisy chain and chip select
- Output status detection
- 8 high current outputs (RON typ. 1.5Ω / Imax = 350mA)
- Wide output operating voltage range (5.5 to 25.5V)
- Output open/short circuit detection

Applications

- Relays
- Actuator Universal
- Liquid Valves
- Cruise Control
- HVAC Flaps

Packages

- SOIC20

Application Diagram

*SoC / *Plug & Play

Visionary Concepts for Motor
Driven HVAC Solutions.
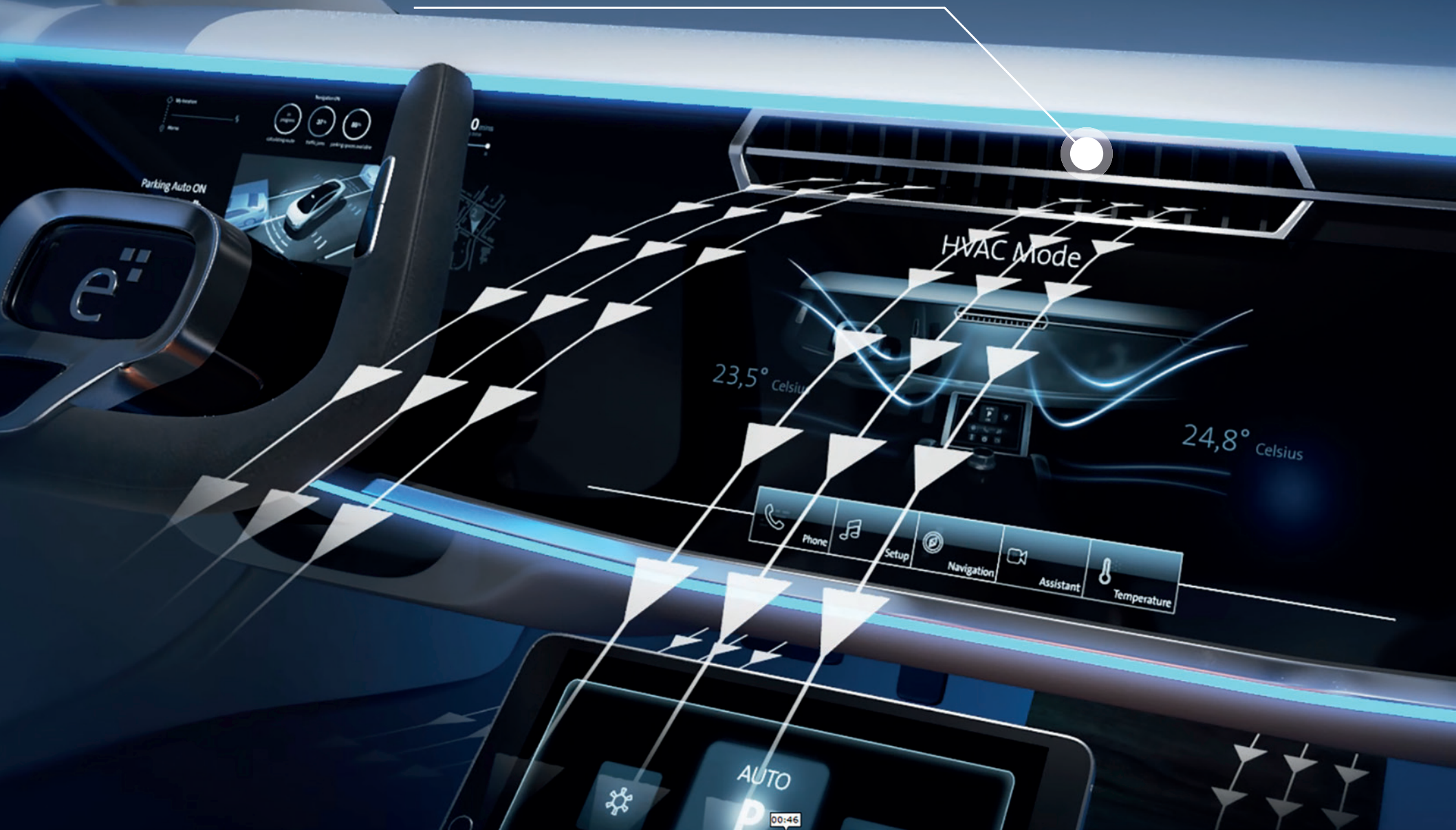
Motor Control - BLDC Motor | Switched Reluctance Motor**

BLDC Motor Controller

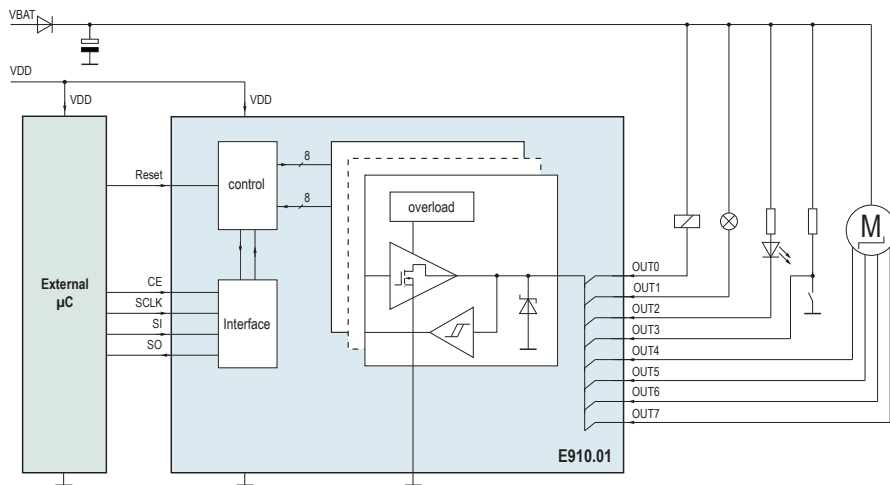| Part No. / Function	V_{SUPPLY}	I_{PEAK}	$I_{MAX}DC$	P(Motor)peak	RDS_{ON}	Interface	Package	Comment
E523.05 *SoC BLDC Motor Controller with 16bit CPU (LIN/PWM Interface)	7V to 28V (5V to 42V)	6x ±400mA	6x ±75mA	≈1.5kW (external FETs) ≈3W (direct drive)	8Ω (HS) 4Ω (LS)	■ LIN 2.x (1.3 comp.), SAE-J2602 or PWM bidirectional ■ SPI for user expansion ■ LIN Flash update ■ JTAG	QFN48L7	■ For new designs E523.06 is recommended ■ 16bit/48 MHzCPU assisted by 2 powerful co-processors ■ Library ROM for LIN-stack software update via LIN ■ Software support on request ■ T_{Junc} peak = +125°C (contact supplier for higher temperature)
E523.06 *SoC Field-Oriented BLDC Motor Controller with 16 Bit CPU *Plug & Play Demosoftware for - sensorless HVAC fan engine cooling fan - field oriented control (FOC) for pumps	7V to 28V (5V to 42V)	6x ±400mA	6x ±75mA	≈1.5kW (external FETs) ≈3W (direct drive)	8Ω (HS) 4Ω (LS)	■ LIN 2.x (1.3 comp.), SAE-J2602 or PWM bidirectional ■ SPI for user expansion ■ LIN Flash update ■ JTAG	QFN48L7	■ 16bit/48 MHzCPU assisted by 2 powerful co-processors ■ Library ROM for LIN-stack software update via LIN ■ Software support on request ■ T_{Junc} peak = +150°C
E523.52 *SoC 72V Brushless Motor Gate Driver with 16bit CPU *Plug & Play Demosoftware on request	12V to 72V (7V to 76V)	6x ±200mA	6x ±50mA	≈1.5kW (external FETs)	10Ω (HS) 5Ω (LS)	■ LIN Interface with external ■ PWM Interface with external components ■ SPI for user expansion ■ LIN transceiver ■ LIN Flash update ■ JTAG	QFN36L7	■ Usable for 24/48V automotive Board Net ■ 16bit/48 MHz CPU assisted by 2 powerful co-processors ■ Library ROM for LIN-stack software update via LIN (software support on request) ■ T_{Junc} peak = +150°C

*Plug & Play   Chip with defined functionality | no controller programming necessary
*SoC   System-on-a-Chip | with integrated microcontroller
*SBC   System-Basic-Chip | with Voltage Regulator Reset, Watchdog, physical Interface
*Driver IC   Driver Chip without SBC or SoC features

**   Please contact Elmos for selecting the right product for SR Motors

BLDC Motor Driver

Part No. / Function	V$_{SUPPLY}$	I$_{PEAK}$	I$_{MAX}$DC	P(Motor)peak	RDS$_{ON}$	Interface	Package	Comment

E523.01/11   *SBC
BLDC Motor Driver
(LIN/PWM Interface)
	7V to 28V
	(5V to 42V)
		6x ±400mA	6x ±75mA	≈1.5kW
				(external FETs)
				≈3W
				(direct drive)
					8Ω (HS)
					4Ω (LS)
						▪ LIN 2.x (1.3 comp.),
						  SAE-J2602
						  (only E523.01) or
						  PWM bidirectional
						▪ LIN Flash update
							QFN44L7
							QSOP44
								▪ Voltage Regulator (3.3V/5V) selectable
								▪ Precise deadtime generation
								▪ Watchdog/Diagnostics
								▪ T$_{Junc}$ peak = +170°C
								▪ Demo software on request (sensorless sinus)

E523.10 *SBC BLDC-Motor Driver with Cold-Crank Capability	7V to 28V (4.5V to 42V)	6x +400mA 6x -600mA	6x ±75mA	≈1.5kW (external FETs) ≈3W (direct drive)	8Ω (HS) 4Ω (LS)	▪ PWM bidirectional ▪ SPI for configuration	QFN44L7	▪ Voltage Regulator (3.3V/5V) selectable ▪ Precise deadtime generation ▪ Watchdog/Diagnostics ▪ T$_{Junc}$ peak = +170°C
E523.50 *SBC 72V Brushless Motor Gate Driver	12V to 72V (7V to 76V)	6x ±200mA	6x ±50mA	≈1.5kW (external FETs)	10Ω (HS) 5Ω (LS)	▪ PWM for motor control ▪ Diagnostic PINs	QFN36L7	▪ Usable for 24/48V automotive Board Net ▪ DC/DC converter for gate supply ▪ 3.3V/20mA supply for external µC ▪ T$_{Junc}$ peak = +150°C
E523.81 *Plug & Play 500mA BLDC Motor Controller	6V to 28V (5V to 42V)	±700mA	-	7kW	10Ω (HS) 5Ω (LS)	▪ PWM bidirectional ▪ analog 0-2.5V ▪ JTAG	QFN20L5	▪ State Machine control ▪ Fully parametrisable via JTAG ▪ True Sinusoidal SVM (Space Vector Modulation) Drive ▪ T$_{Junc}$ peak = +170°C

*Plug & Play   Chip with defined functionality | no controller programming necessary
*SoC   System-on-a-Chip | with integrated microcontroller
*SBC   System-Basic-Chip | with Voltage Regulator Reset, Watchdog, physical Interface
*Driver IC   Driver Chip without SBC or SoC features

**   Please contact Elmos for selecting the right product for SR Motors

Field-Oriented BLDC Motor Controller with 16 Bit CPU | E523.06

Key Features

- IC supply voltage range 7 to 28V (extended 5V to 42V)
- CPU 16 bit, 24 - 48MHz for application tasks
- 32 kByte FLASH, ECC protected
- 24 kByte Masked ROM
- 4 kByte SRAM, parity protected
- Typical deep-sleep mode current 20µA
- 2nd window watchdog and two independent clocks
- LIN 2.x (1.3, SAE-J2602 comp.) or PWM bidirectional
- Fast OpAmp for foot current measurement

Board

- Order No. see page 43

Applications

- BLDC(EC) motor control, multiple DC motor control
- Cooling fans, HVAC fans, positioning systems
- Fuel, hydraulic, oil and water pumps
- Position system

Packages

- QFN48L7
- LQFP48L7EP

Application Diagram
*SoC / *Plug & Play
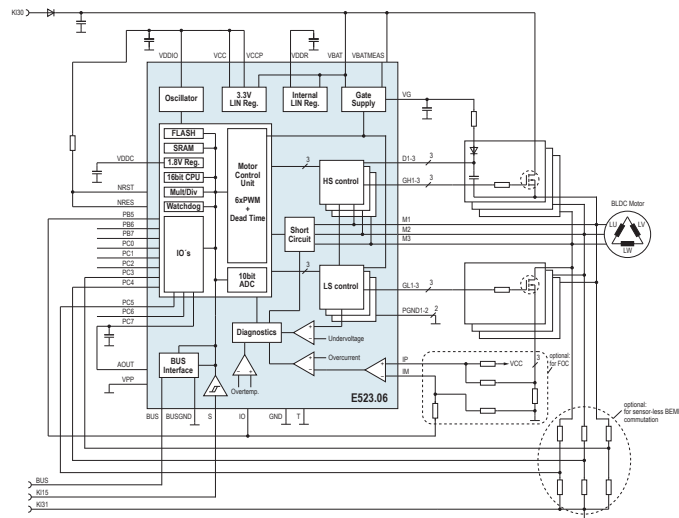
72V Brushless Motor Gate Driver with 16bit CPU | E523.52

Key Features

- Voltage range 12V to 72V (7V to 76V peak)
- CPU 16 bit, 24 - 48MHz for application tasks
- 32kByte FLASH, 16kByte MaskROM, 4kByte SRAM
- 10 bit 1 Msample SAR ADC
- 4x 16 bit PWM generation (edge/center aligned)
- Adjustable window watchdog (independent clock)
- 6x 200mA gate drivers with programmable dead time and protection features
- Fast OpAmp for foot current measurement

Board

- Order No. see page 43

Applications

- BLDC(EC) motors in industrial 24V to 60V applications
- Commercial vehicles
- Fuel, hydraulic, oil, water and urea pumps
- Cooling fans, HVAC fans, positioning systems

Packages

- QFN36L7

Application Diagram
*SoC / *Plug & Play
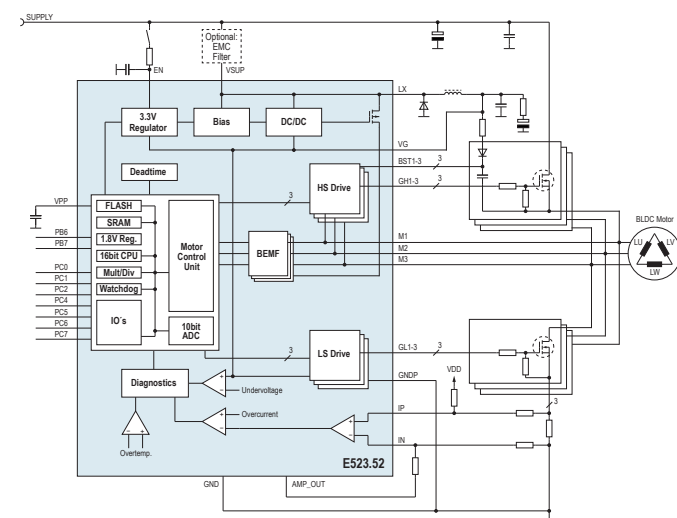
BLDC Motor Driver (LIN/PWM Interface) | E523.01/11

Key Features

- Gate drive circuit for B6-NMOS bridge
- Voltage range 7V to 28V (5V to 42V peak)
- LIN 2.x (1.3, SAE-J2602 comp.) or PWM bidirectional
- Software update via LIN high speed mode
- Precise, dynamical dead-time generation
- Voltage regulator for µC 3.3V or 5V, up to 70mA direct load
- Separate short-circuit protection for each MOS-FET + dynamically adjustable
- Configurable over-current protection

Board

- Order No. see page 43

Applications

- BLDC(EC) motor control, multiple DC motor control
- Fuel, Hydraulic, Oil and Water pump
- Cooling fan, HVAC fan, positioning systems
- Turbo charger adjustment
- BLDC actuators and servo systems

Packages

- QFN44L7
- QSOP44

Application Diagram   *SBC
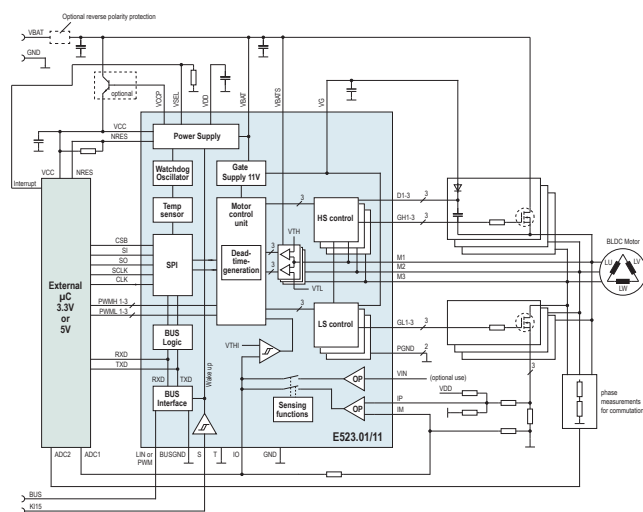
BLDC-Motor Driver with Cold-Crank Capability | E523.10

Key Features

- Gate drive circuit for B6-NMOS bridge
- Voltage range 4.5V to 28V (42V peak) for start-stop systems
- Sleep mode current 20µA typically
- Microcontroller supply 3.3V or 5V
- Adjustable watchdog and reset generation
- Motor current measurement amplifier
- Over current switch-off (dynamical change)
- FET short circuit protections (dynamical change)
- Configurable voltage monitoring

IC

Applications

- BLDC(EC) motor control, multiple DC motor control
- Fuel, hydraulic, oil and water pumps
- Cooling fans, HVAC fans, positioning systems
- Turbo charger adjustment

Packages

- QFN44L7

Application Diagram   *SoC / *Plug & Play
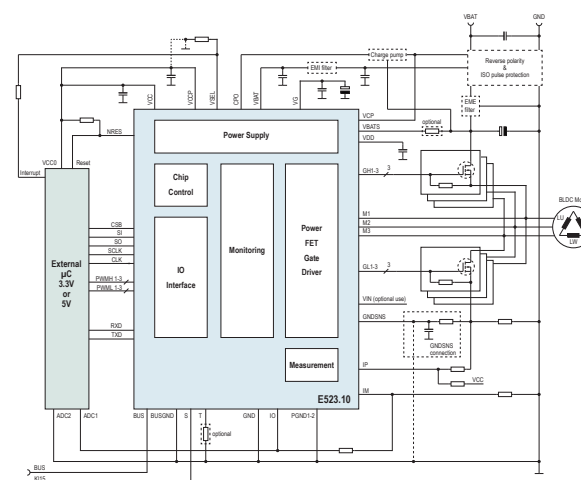
72V Brushless Motor Gate Driver | E523.50

Key Features

- Gate drive circuit for B6-NMOS bridge
- Voltage range 12V to 72V (7V to 76V peak)
- DC/DC converter for 11V/100mA
- µC supply 3.3V up to 20mA direct load,
  higher loads with external boost transistor possible
- 200mA gate drivers including protection features
- Integrated back EMF detection
- T_{Junc} peak = +150°C

Board

- Order No. see page 43

Applications

- BLDC(EC) motors in industrial 24V to 60V applications
- Commercial vehicles
- Fuel, hydraulic, oil, water and urea pumps
- Cooling fans, HVAC fans, positioning systems

Packages

- QFN36L7

Application Diagram   *SBC
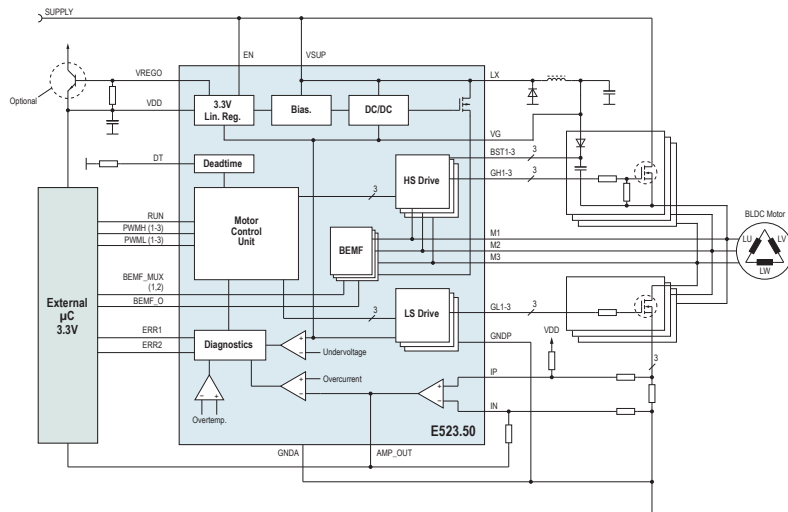
500mA BLDC Motor Controller | E523.81

Key Features

- IC for standalone PMSM applications
- Internal power bridge up to 500mA (rms)
- Selectable PWM speed and error interface
  or analog speed interface
- Tacho output
- Current controlled start up
- Integrated configurable error handling
- Stall detection
- Automatic restart and rotor delocking

Applications

- Small PMSM / BLDC FANs
- Small PMSM / BLDC Pumps

Packages

- QFN20L5

Application Diagram   *Plug and Play

Motor Control - DC Motor

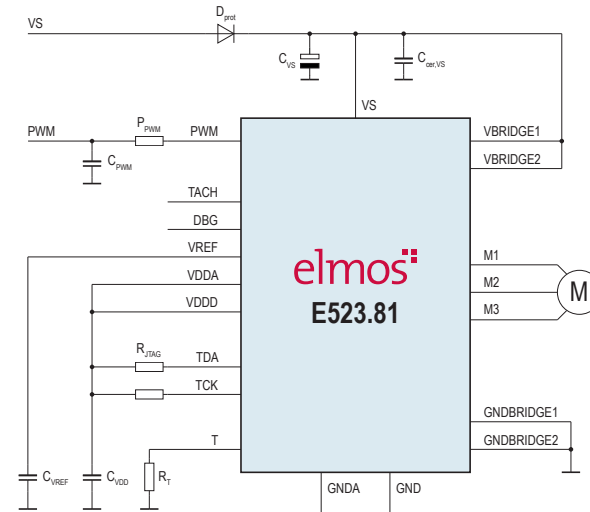| Part No. / Function	V_{SUPPLY}	I_{PEAK}	$I_{MAX}DC$	P(Motor)max	RDS_{ON}	Interface	Package	Comment
E523.03/04/13/14 *SBC DC Motor LS FET Driver (LIN / PWM Interface)	7V to 28V (5V to 42V)	±400mA	±75mA	≈1.5kW (external FETs) ≈1.3W (direct drive)	8Ω (HS) 4Ω (LS)	■ LIN 2.x (1.3) or SAE-J2602 (only E523.03/13) or PWM bidirectional ■ SPI for configuration	QFN20L4 QFN32L5 (with high voltage spacer)	■ Voltage Regulator E523.03/13: 5V | E523.04/14: 3.3V ■ Watchdog/Diagnostics ■ Fast LIN Flash update ■ T_{Junc} peak = +170°C
E523.05 *SoC DC 2x Half-Bridge Controller with 16bit CPU (LIN / PWM Interface)	7V to 28V (5V to 42V)	6x ±400mA	6x ±75mA	≈1.5kW (external FETs) ≈1.3W (direct drive)	8Ω (HS) 4Ω (LS)	■ LIN 2.x (1.3) or SAE-J2602 or PWM bidirectional ■ SPI for configuration ■ LIN Flash update ■ JTAG	QFN48L7	■ For new designs E523.06 is recommended ■ 16bit/48 MHzCPU assisted by 2 powerful co-processors ■ Library ROM for LIN-stack software update via LIN ■ Charge Pump Driver included ■ T_{Junc} peak = +125°C (Contact supplier for higher temperature)
E523.06 *SoC Field-Oriented DC Motor Controller with 16 Bit CPU	7V to 28V (5V to 42V)	6x ±400mA	6x ±75mA	≈1.5kW (external FETs) ≈1.3W (direct drive)	8Ω (HS) 4Ω (LS)	■ LIN 2.x (1.3) or SAE-J2602 or PWM bidirectional ■ SPI for configuration ■ LIN Flash update ■ JTAG	QFN48L7	■ 16bit/48 MHzCPU assisted by 2 powerful co-processors ■ Library ROM for LIN-stack software update via LIN ■ Charge Pump Driver included ■ T_{Junc} peak = +125°C (Contact supplier for higher temperature)
E523.30 *SoC 2x Full Bridge Controller (LIN / PWM Interface) *Plug & Play Demosoftware on request	7V to 20V (5.5V to 42V)	-	2x ±75mA	≈25W (per Motor)	225mΩ (HS) 275mΩ (LS)	■ LIN 2.x (1.3) or SAE-J2602 or PWM bidirectional ■ LIN auto-addressing (slave mode position detection) ■ LIN Flash update for EoL and Service ■ JTAG	QFN32L6	■ Drives 1 or 2 DC motors ■ 8bit CPU, 8k FLASH, 64Byte E²PROM ■ Current chopper motor control ■ Supply and read-out of up to 3, potentiometers or sensors ■ GPIO-pins ■ T_{Junc} peak = +170°C (contact supplier for higher temperatures)
E910.72 *Driver IC 6x Half-Bridge DC Motor with sensorless positioning	6V to 19V (40V)	-	540mA	≈7W (1 Motor Mode)	1.25Ω	■ SPI for configuration	QFN32L5	■ Sensorless motor positioning ■ 3 independent pulse detectors ■ Excellent positioning performance ■ Drives 3 or 5 DC actuators ■ T_{Junc} peak = +150°C

*Plug & Play   Chip with defined functionality | no controller programming necessary
*SoC   System-on-a-Chip | with integrated microcontroller
*SBC   System-Basic-Chip | with Voltage Regulator Reset, Watchdog, physical Interface
*Driver IC   Driver Chip without SBC or SoC features

DC Motor LS FET Driver (LIN / PWM Interface) | E523.03/04/13/14

Key Features

- Voltage range 7 to 28V (5V to 42V peak)
- LIN 2.x (1.3, SAE-J2602 comp.) or PWM bidirectional
- Deep sleep mode current I< 30μA
- Voltage Regulator for ext.μC: 3.3V/5V, I_{MAX}=30mA
- Window-watchdog, dynamical change via SPI
- Amplifier for low side motor current measurement
- Over-current switch-off, dynamical change via SPI
- Monitoring battery voltage, gate supply, temperature

Board

- Order No. see page 43

Applications

- DC Wiper
- DC HVAC fan, engine cooling fan
- DC fuel pump, hydraulic pump, oil pump
- Multiple DC motor control
- Without external FETs: direct driving of small loads

Packages

- QFN20L4
- QFN32L5
  (with high voltage spacer)

Application Diagram   *SBC
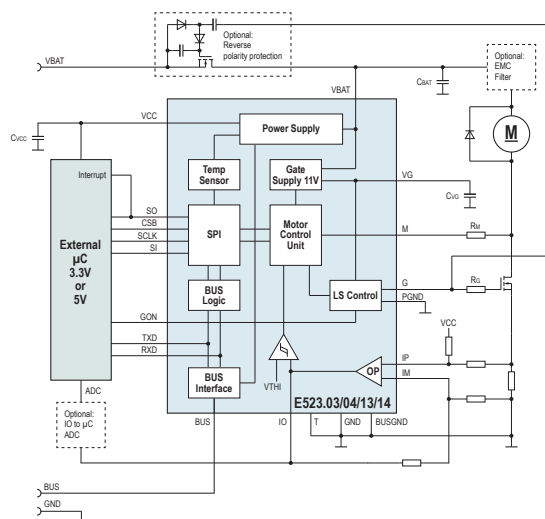
Field-Oriented DC Motor Controller with 16 Bit CPU | E523.06

Key Features

- Gate drive circuit for B6-NMOS bridge
- IC supply voltage range 7 to 28V (extended 5V to 42V)
- CPU 16 bit, 24 - 48MHz for application tasks
- 32 kByte FLASH, ECC protected
- 24 kByte Masked ROM
- 4 kByte SRAM, parity protected
- Typical deep-sleep mode current 20μA
- 2nd window watchdog and two independent clocks
- LIN2.x, LIN1.3 or bidirectional PWM Interface

Board

- Order No. see page 43

Applications

- EC, BLDC, PMSM motors 50W to ~1500W
- Cooling fans, HVAC fans, positioning systems
- Fuel, hydraulic, oil and water pumps

Packages

- QFN48L7
- LQFP48L7EP

Application Diagram   *SoC / *Plug & Play
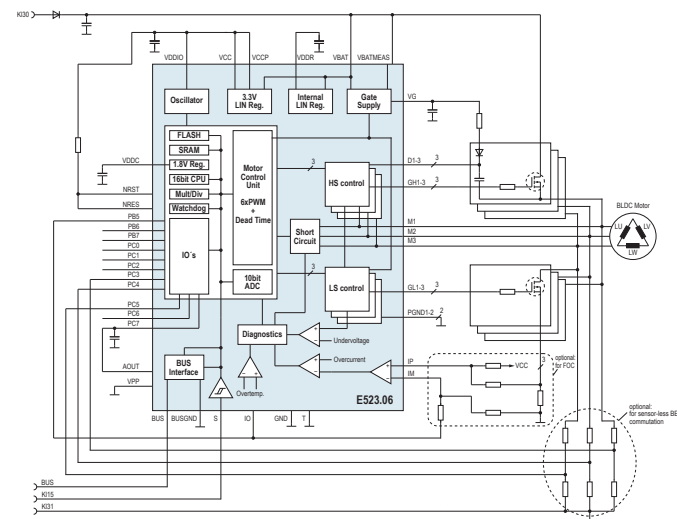
2x 75mA DC Motor 2x Full Bridge Controller (LIN / PWM Interface) | E523.30

Key Features

- Voltage range 7V to 20V (5.5V to 42V)
- LIN 2.x (1.3, SAE-J2602 comp.) or PWM bidirectional
- Drives 1 or 2 DC Motors
- 75mA (2 Motor Mode)
- Programmable chopper current
- Slave node position detection / auto-addressing
- 8bit CPU, 8k FLASH, 64Byte E²PROM
- 3 GPIO pins and sensor supply

Board

- Order No. see page 43

Applications

- Headlight adjust
- Grille shutter
- Water valves
- Multi purpose LIN slave

Packages

QFN32L6

Application Diagram
*SoC / *Plug & Play
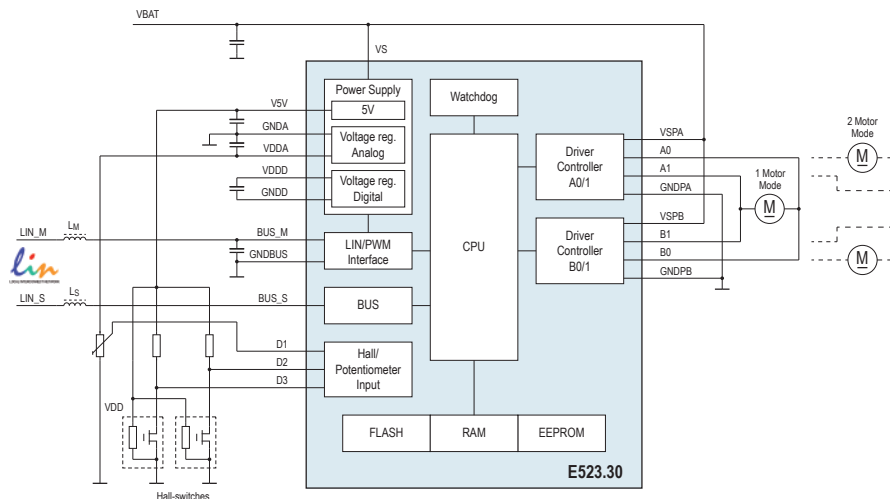
6x Half-Bridge DC Motor with Sensorless Positioning | E910.72

Key Features

- Operating supply voltage range 6V to 19V
- 6 half bridges to drive 3, 4, or 5 DC motors
- $R_{DS,ON}$ of one half bridge typ. 1.25Ω
- Independent pulse detectors for three motors
- 2 different pulse detectors covering the complete speed range
- Adjustable parameters to drive a high number of different motor types
- Diagnostic data via SPI

Board

- Order No. see page 43

Applications

- Automotive HVAC flap
- DC motor servo systems

Packages

- QFN32L5

Application Diagram
*Driver IC
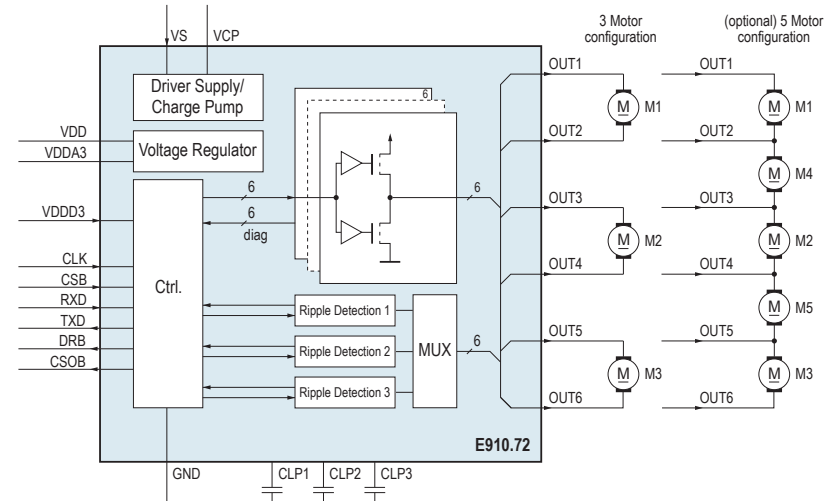
Motor Control - Boards

Stepper Motor

Part No.	Demo also relative for	Function	Board type	Order No.
E520.01	E520.02, E520.03, E520.08	12x Low-Side for 3 Stepper Motors with/without Stall Detection	Demo- / Evaluation Board	K52001-0001
E523.30*	E523.31, E523.34, E523.37	LIN Stepper Evakit (Standard)	Demo- / Evaluation Board	K52330-0001
E523.30*	E523.31, E523.34, E523.37	LIN Stepper Evakit (Generic)	Demo- / Evaluation Board	K52330-0002
E523.30*	E523.31, E523.34, E523.37	LIN Stepper SW Evakit (Standard)	Demo- / Evaluation Board	K52330-0003
E523.30*	E523.31, E523.34, E523.37	LIN Stepper SW Evakit (Generic)	Demo- / Evaluation Board	K52330-0004

* also valid for DC Motor boards

DC Motor

Part No.	Demo also relative for	Function	Board type	Order No.
E523.03	E523.04, E523.13, E523.14	DC Motor LS FET Driver (LIN / PWM Interface)	Demo- / Evaluation Board	K52303-0001
E523.06	-	Field-Oriented DC Motor Controller with 16 Bit CPUv (Standard)	Demoboard	K52306-0001
E523.06	-	Field-Oriented DC Motor Controller with 16 Bit CPU (50W)	50W Demoboard	K52306-0002
E523.06	-	Field-Oriented DC Motor Controller with 16 Bit CPU (300W Climate Blower)	Demoboard	K52306-0003
E910.72	-	6x Half-Bridge DC Motor with Sensorless Positioning	Demo- / Evaluation Board	K91072-0001

BLDC Motor

Part No.	Function	Board type	Order No.
E523.01/11	B6 Bridge FET Driver (LIN / PWM Interface)	Demo- / Evaluation Board	K52301-0001
E523.01/11 V1 Fan	B6 Bridge FET Driver (LIN / PWM Interface)	Demo- / Evaluation Board	K52301-0002
E523.01/11 V2 Pump	B6 Bridge FET Driver (LIN / PWM Interface)	Demo- / Evaluation Board	K52301-0003
E523.01/11 V4 Water Pump	B6 Bridge FET Driver (LIN / PWM Interface)	Demo- / Evaluation Board	K52301-0005
E523.05	BLDC Motor Controller with 16bit CPU (LIN / PWM Interface)	Demo- / Evaluation Board	K52305-0001
E523.50	72V Brushless Motor Gate Driver	Demo- / Evaluation Board	K52350-0001
E523.52	72V Brushless Motor Gate Driver with 16bit	Demo- / Evaluation Board	K52352-0001
E523.81	500mA BLDC Motor Controller	Demoboard	K52381-0001

Power Management - LED Driver

Part No. / Description	Efficiency	V_{SUPPLY}	V_{OUT}	Package	Comment / Converter Topology
E522.31/33 1 Channel Switched-Mode Constant Current LED Controller (Oscillator Spectrum Spread/Narrow)	>90%	5V to 55V	up to 80V	QFN32L5	▪ Boost, SEPIC, Buck-Boost or Buck
E522.32/34 2 Channel Switched-Mode Constant Current LED Controller (Oscillator Spectrum Spread/Narrow)	>90%	5V to 55V	up to 80V	QFN32L5	▪ Boost, SEPIC, Buck-Boost or Buck
E522.46 8 Channel LED Driver with I²C Interface	-	3.3V to 32V	-	DFN18L5040	▪ 8-channel I²C programmable linear LED driver
E522.80-83 Linear LED Controller (High Current Version 48 to 151mA)	-	5V to 25V	-	SOIC16N-EP	▪ 3-channel Low Dropout Linear Regulator (LDO) with Power Management and Diagnosis
E522.84-87 Linear LED Controller (Low Current Version 20 to 60mA)	-	5V to 25V	-	SOIC8-EP	▪ 3-channel Low Dropout Linear Regulator (LDO) with Diagnosis
E522.90-93 Triple 55mA Linear LED Controller (14 to 55mA)	-	5V to 25V	-	SOIC16N-EP	▪ 3-channel Low Dropout Linear Regulator (LDO) with Power Management and Diagnosis

1 Channel Switched-Mode Constant Current LED Controller | E522.31/33

Key Features

- 5.0V to 55V input, up to 80V boosted output voltage
- Boost-to-GND, Boost-to-Battery and SEPIC topologies supported
- Constant current regulation
- Analog dimming and digital dimming 3000:1 at 100Hz PWM
- Advanced In-System diagnostics (e.g. GND loss, output-overload and highside-feedback diagnostics)
- Very low sleep mode currents of typ. 8µA
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 58

Applications

- Automotive LED lighting applications
- Exterior LED lighting
- TFT backlighting
- General current driven applications

Packages

- QFN32L5

Application Diagram

2 Channel Switched-Mode Constant Current LED Controller | E522.32/34

Key Features

- 5.0V to 55V input, up to 80V boosted output voltage
- Boost-to-GND, Boost-to-Battery and SEPIC topologies supported
- Constant current regulation
- Analog dimming and digital dimming 3000:1 at 100Hz PWM
- Advanced In-System diagnostics (e.g. GND loss, output-overload and highside-feedback diagnostics)
- Very low sleep mode currents of typ. 8µA
- PIN compatible to E522.31/33
- Automotive qualified (AEC-Q100)

Board
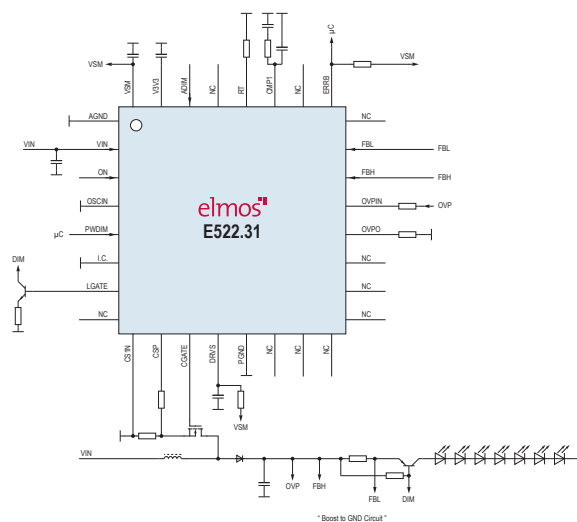
- Order No. see page 58

Applications

- Automotive LED lighting applications
- Exterior LED lighting
- TFT backlighting
- General current driven applications

Packages

- QFN32L5

Application Diagram
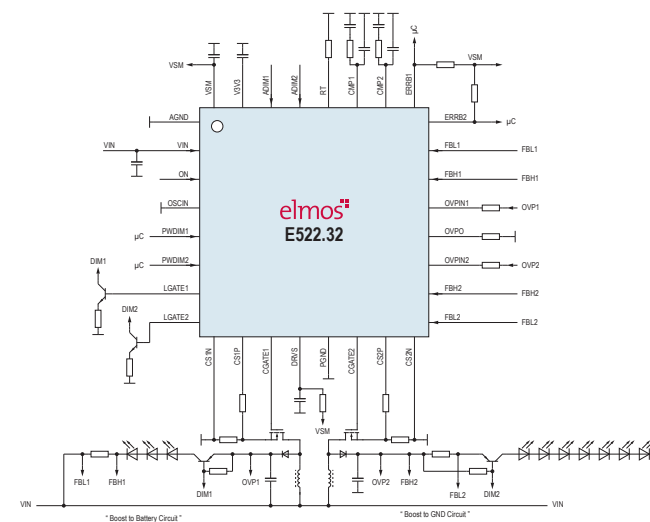
8 Channel LED Driver with I²C Interface | E522.46

Key Features

- Input voltage range 3.3V to 32V (max. 42V)
- 8-channel I²C programmable linear high side driver
- Parallel output operation for up to 200mA
- 8Bit adjustable LED master current 1mA to 26.5mA
- 8Bit PWM based LED luminous intensity level for LED binning calibration
- Global PWM and configurable analog dimming
- Configuration storable in integrated EEProm
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 58

Applications

- Automotive LED lighting
- Multi-channel panel applications
- Low current interior lighting
- Dynamic rear light functions
- LED background lighting
- Driving of OLEDs in cathode to GND topology

Packages

- DFN18L5040

Application Diagram
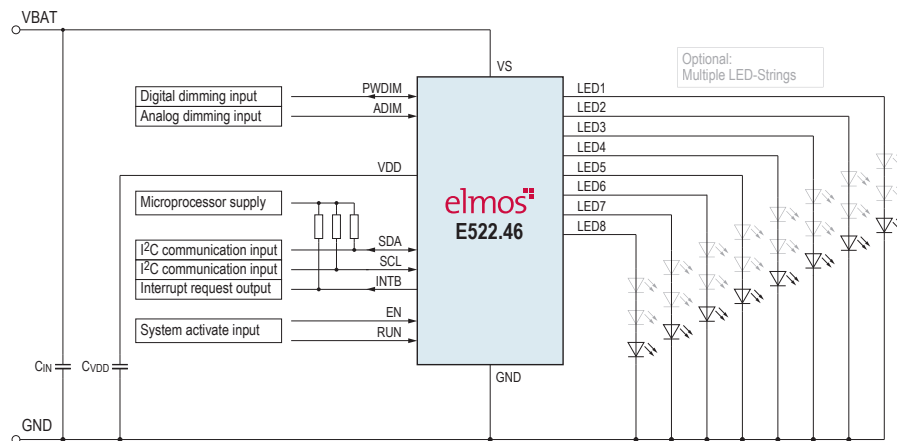
Linear LED Controller (High Current Version 48 to 151mA) | E522.80-83

Key Features

- Three independent linear current drivers (3*150mA)
- Operating input voltage range 5V to 25V, max. 40V
- Advanced diagnostic features
  - Open / short detection
  - Diagnostic "RUN" bus to link multiple ICs
- Different start-up voltages for open diagnostics can be chosen: VS=7.5V, 9V, 10V and 15V
- "Single Lamp" mode disables all LEDs in case of a failure
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 58

Applications

- Automotive LED lighting
- Rear lighting
- Turn indicator driver
- Low current interior lighting
- Industrial LED applications or simple RGB drivers

Packages

- SOIC16N-EP

Application Diagram
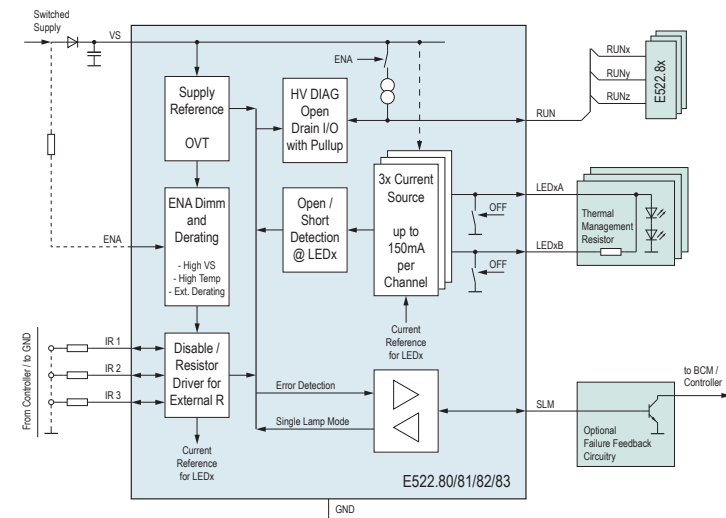
Linear LED Controller (Low Current Version 20 to 60mA) | E522.84-87

Key Features

- Three integrated Linear Current Drivers (3*60mA)
- Operating input voltage range 5V to 25V, max. 40V
- Advanced diagnostic features
  - Open / short detection
  - Diagnostic "RUN" bus to link multiple ICs
- Different start-up voltages for open diagnostics can be chosen: VS=7.5V, 9V, 10V and 15V
- "Single Lamp" mode disables all LEDs in case of a failure
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 58

Applications

- Automotive LED Lighting, Rear Lighting
- Turn Indicator Driver
- Low Current Interior Lighting
- Industrial LED Applications or simple RGB Drivers

Packages

- SOIC8EP

Application Diagram

E522.84/85/86/87
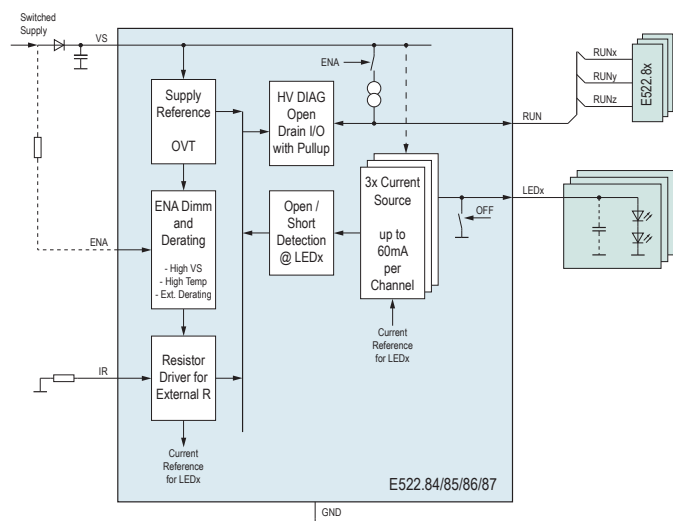
Triple Linear LED Controller (14 to 55mA) | E522.90-93

Key Features

- Operating Input Voltage Range 5V to 25V, max. 40V
- Three independent high-side Current Sources (3*55mA)
- Parallel Operation for up to 165mA
- Low Power Standby / Sleep Mode
- Thermal Management Option per Channel
- External Reference Voltage / Derating Supported
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 58

Applications

- Automotive LED lighting application
  Rear Lamp (e.g. Brake Lamp, Reverse Light, Back Up Light, Rear Fog Light, Rear Light Module)
- Driving of OLEDs in cathode to GND topology

Packages

- SOIC16N-EP

Application Diagram

E522.90/91/92/93
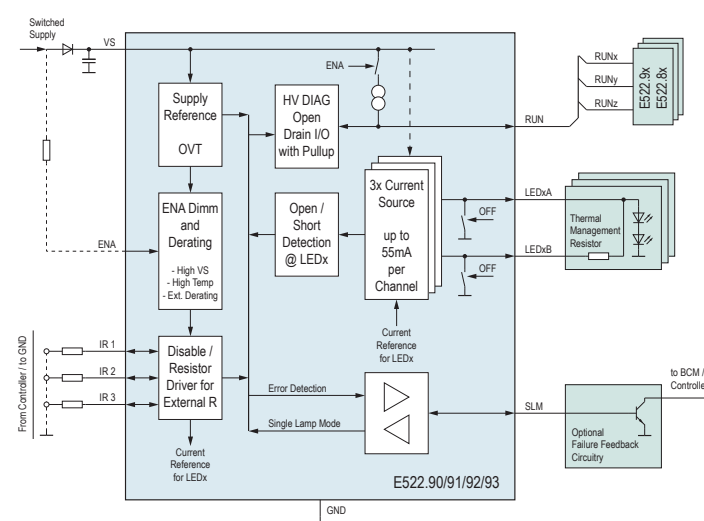
Power Management - DC/DC Converter

Automotive

Part No. / Description	I_{MAX}	Efficiency	V_{SUPPLY}	V_{OUT}	Package	Comment / Converter Topology
E522.01 Low Quiescent Current PFM Step Down Converter (5V/500mA)	500mA	>92%	4.3V to 40V	5V	QFN20L4 / TSSOP16	▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.02 Low Quiescent Current PFM Step Down Converter (3.3V/500mA)	500mA	>92%	4.3V to 40V	3.3V	QFN20L4 / TSSOP16	▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.03 Low Quiescent Current PFM Step Down Converter (5V/350mA)	350mA	>92%	4.3V to 40V	5V	QFN20L4 / TSSOP16	▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.04 Low Quiescent Current PFM Step Down Converter (3.3V/350mA)	350mA	>92%	4.3V to 40V	3.3V	QFN20L4 / TSSOP16	▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.05 Low Quiescent Current PFM Step Down Converter (Adjustable Voltage/500mA)	500mA	>92%	4.3V to 40V	1.5V to 40V	QFN20L4 / TSSOP16	▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.06 Low Quiescent Current PFM Step Down Converter (Adjustable Voltage/350mA)	350mA	>92%	4.3V to 40V	1.5V to 40V	QFN20L4 / TSSOP16	▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout

Part No. / Description	I_{MAX}	Efficiency	V_{SUPPLY}	V_{OUT}	Package	Comment / Converter Topology
E522.07 Low Quiescent Current PFM Step Down Converter (5V/1A)	1000mA	>92%	4.3V to 40V	5V	QFN20L4	■ Idle current of 12µA typ. ■ Sleep current of 8µA typ. ■ Input voltage up to 40V ■ Up to 100% duty cycle ■ Undervoltage lockout
E522.08 Low Quiescent Current PFM Step Down Converter (3.3V/1A)	1000mA	>92%	4.3V to 40V	3.3V	QFN20L4	■ Idle current of 12µA typ. ■ Sleep current of 8µA typ. ■ Input voltage up to 40V ■ Up to 100% duty cycle ■ Undervoltage lockout
E522.09 Low Quiescent Current PFM Step Down Converter (Adjustable Voltage/1A)	1000mA	>92%	4.3V to 40V	1.5V to 40V	QFN20L4	■ Idle current of 12µA typ. ■ Sleep current of 8µA typ. ■ Input voltage up to 40V ■ Up to 100% duty cycle ■ Undervoltage lockout
E522.10 Low Quiescent Current PFM Step Down Converter (2A Buck Converter)	2000mA	>90%	3.6V to 40V	0.8V to 40V	QFN20L4 SOIC8-EP	■ Idle current of 15µA typ. ■ Sleep current of 10µA typ. ■ Input voltage up to 40V ■ Up to 100% duty cycle ■ Undervoltage lockout
E522.41/43 Automotive USB 2.0 Supply with Data Line Protection and I²C Interface	2500mA	>90%	6.0V to 32V (tran. 42V)	5V	QFN20L5	■ Fixed frequency 250kHz..2MHz ± 25% synchronizable ■ Fixed 5V ±3% USB Bus voltage with seven programmable negative resistance adjustments ■ SDP, BC 1.2 CDP, DCP and individual USB charging modes

Power Management - DC/DC Converter

Industry

Part No. / Description	I_{MAX}	Efficiency	V_{SUPPLY}	V_{OUT}	Package	Comment / Converter Topology
E522.71 Low Power Step Down Converter (5V/500mA)	500mA	>90%	4.3V to 40V	5V	SOIC8-EP	▪ Industry version ▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.72 Low Power Step Down Converter (3.3V/500mA)	500mA	>90%	4.3V to 40V	3.3V	SOIC8-EP	▪ Industry version ▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.73 Low Power Step Down Converter (5V/350mA)	350mA	>90%	4.3V to 40V	5V	SOIC8-EP	▪ Industry version ▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.74 Low Power Step Down Converter (3.3V/350mA)	350mA	>90%	4.3V to 40V	3.3V	SOIC8-EP	▪ Industry version ▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.75 Low Power Step Down Converter (Adjustable Voltage/500mA)	500mA	>90%	4.3V to 40V	1.5V to 40V	SOIC8-EP	▪ Industry version ▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout

Part No. / Description	I_{MAX}	Efficiency	V_{SUPPLY}	V_{OUT}	Package	Comment / Converter Topology
E522.76 Low Power Step Down Converter (Adjustable Voltage/350mA)	350mA	>90%	4.3V to 40V	1.5V to 40V	SOIC8-EP	▪ Industry version ▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.77 Low Power Step Down Converter (5V/1A)	1000mA	>90%	4.3V to 40V	5V	SOIC8-EP	▪ Industry version ▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.78 Low Power Step Down Converter (3.3V/1A)	1000mA	>90%	4.3V to 40V	3.3V	SOIC8-EP	▪ Industry version ▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout
E522.79 Low Power Step Down Converter (Adjustable Voltage/1A)	1000mA	>90%	4.3V to 40V	1.5V to 40V	SOIC8-EP	▪ Industry version ▪ Idle current of 12µA typ. ▪ Sleep current of 8µA typ. ▪ Input voltage up to 40V ▪ Up to 100% duty cycle ▪ Undervoltage lockout

Low Quiescent Current PFM Step Down Converters | E522.01-09

Key Features

- Voltage range 4.3V to 40V
- PFM operation up to 1.33MHz
- Up to >92% efficiency
- Very low 8µA sleep mode current
- Ultra low 12µA standby current
- 100% duty cycle capability
- Junction temperature range -40°C to +150°C
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 58

Applications

- Supply of
  - Microcontroller systems
  - Automotive telematics, dashboards
  - Partial networking systems
  - Peripheral control systems

Packages

- QFN20L4
- TSSOP16

Application Diagram
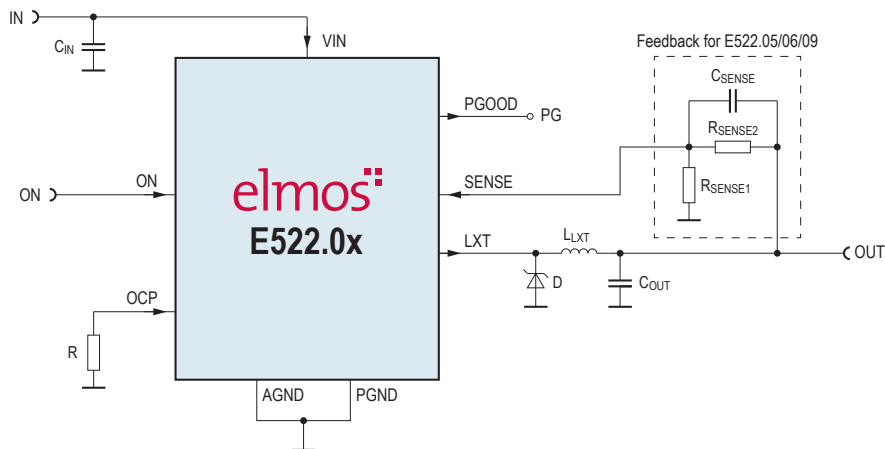
Low Quiescent Current PFM Step Down Converters | E522.10

Key Features

- Voltage range 3.6V to 40V
- PFM operation up to 1.33MHz
- Up to >92% efficiency
- Very low 10µA sleep mode current
- Idle current 15µA
- 100% duty cycle capability
- Junction temperature range -40°C to +150°C
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 59

Applications

- Supply of
  - Microcontroller systems
  - Automotive telematics, dashboards
  - Partial networking systems
  - Peripheral control systems

Packages

- QFN20L4
- SOIC8-EP

Application Diagram
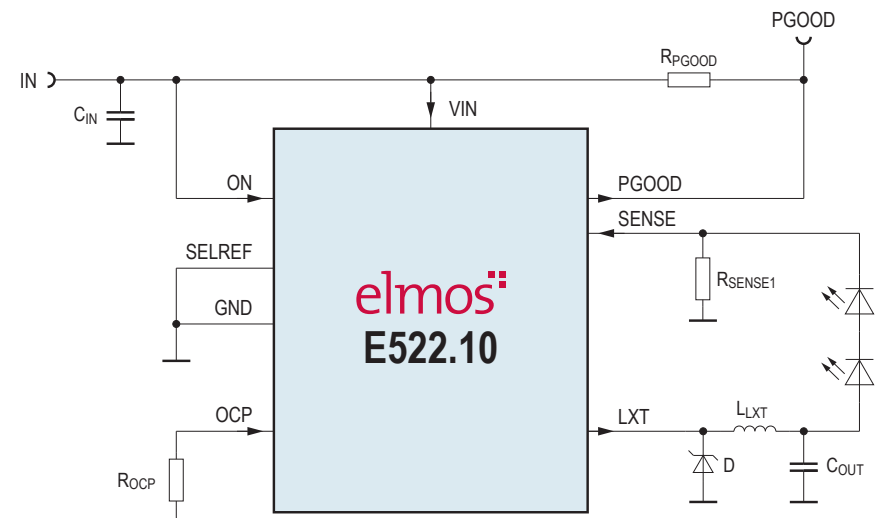
Automotive USB 2.0 Supply w. Data Line Protection a. I²C Interface | E522.41/43

Key Features

- Wide input voltage range from 6V to 32V (tran. 42V)
- PWM Step-Down converter 250kHz, 500kHz, 1MHz or 2MHz
- Advanced PWM voltage regulation with 100% duty cycle
- Fixed 5V±3% USB BUS voltage, w. negative resistance adjustm.
- Output currents of 0.5/1A/1.5A/2.5A w. fixed limits or regulation
- ±25% synchronizable to center frequencies
- Wake-on USB functionality
- Automotive qualified (AEC-Q100)

Board

- Order No. see page 58

Applications

- Automotive infotainment and navigation
- USB-Chargers

Packages

- QFN20L5

Application Diagram
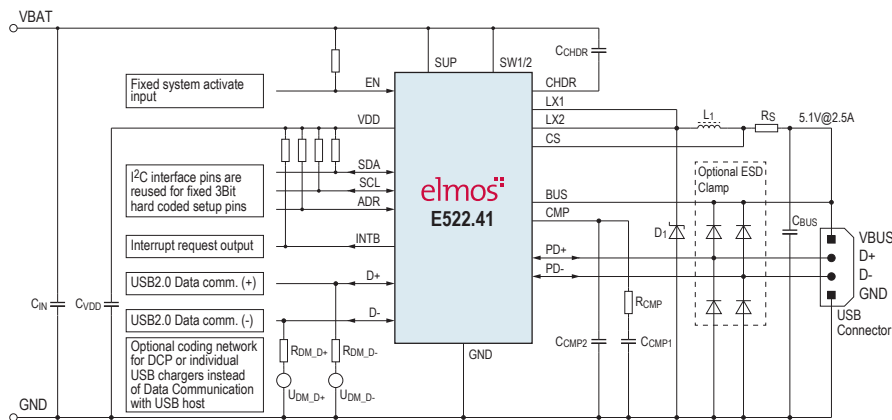
Low Power Step Down Converters | E522.71-79

Key Features

- Voltage range 4.3V to 40V
- PFM operation up to 1.33MHz
- Up to >92% efficiency
- Very low sleep mode current, 8µA
- Ultra low 12µA standby current
- 100% duty cycle capability
- Junction temperature range -40°C to +150°C

Board

- Order No. see page 58

Applications

- High effiicent, low power industrial supplies
- Supplies for consumer products
- High efficient, low cost, shuntless led drivers

Packages

- SOIC8-EP

Application Diagram
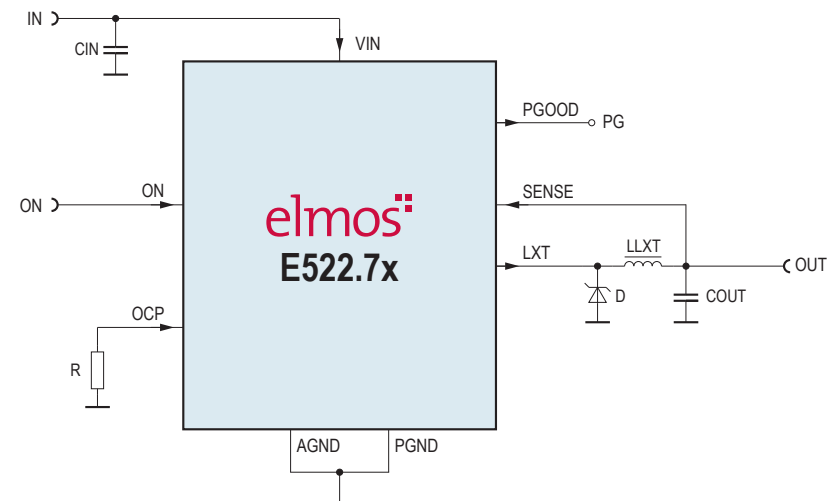
Power Management - LDO

Part No. / Description	Recommended I_{MAX}	V_{SUPPLY}	V_{OUT}	Package	Comment / Converter Topology
E522.40 Dual LDO with Diagnosis	2x 200mA	4.5V to 25V	3.3V to V_{BAT}	QFN20L5	▪ ADC capturing of relevant voltages and currents ▪ I²C interface for programming and monitoring ▪ Multiple protection features
E522.44 Triple Antenna Supply	1x 350mA 1x 200mA 1x 80mA	4.5V to 40V	3V to 40V	DFN18L5040	▪ Parallel regulator operation ▪ ADC capturing of relevant voltages and currents ▪ I²C interface for programming and monitoring ▪ Multiple protection features
E522.51 Dual Buck - Quad LDO	1x 800mA 1x 320mA 3x 350mA	5.2V to 40V	0.5V to 6V	QFN48L7	▪ 2 fixed frequency step-down converters ▪ Multifunctional watchdog 4 linear regulators ▪ Power sequencer ▪ Supply monitoring ▪ SPI Interface
E522.52 Dual Buck - Quad LDO	2x 350mA 1x 700mA 1x 1000mA 1x 1500mA	5.2V to 40V	0.5V to 6V	QFN48L7	▪ 2 fixed frequency step-down converters ▪ Multifunctional watchdog 4 linear regulators ▪ Power sequencer ▪ Supply monitoring ▪ SPI interface

Dual LDO with Diagnosis | E522.40

Key Features

- Input voltage range from 4.5V to 25V
- Two accurate output voltages from 3.3V to V_{BAT}
- Up to 200mA load current with integrated current limit
- Programmable overcurrent and open load detection levels
- Over voltage, overtemperature a. output voltage error protection
- Open-drain error flag for interrupt generation
- 8bit ADC samples system voltages and current ranges
- Optional external NPN pre-regulator
- Programmable comparator for additional control functions

Board

- Order No. see page 59

Applications

- Automotive antenna modules
- Navigation and radio units
- General voltage regulator applications

Packages

- QFN20L5

Application Diagram
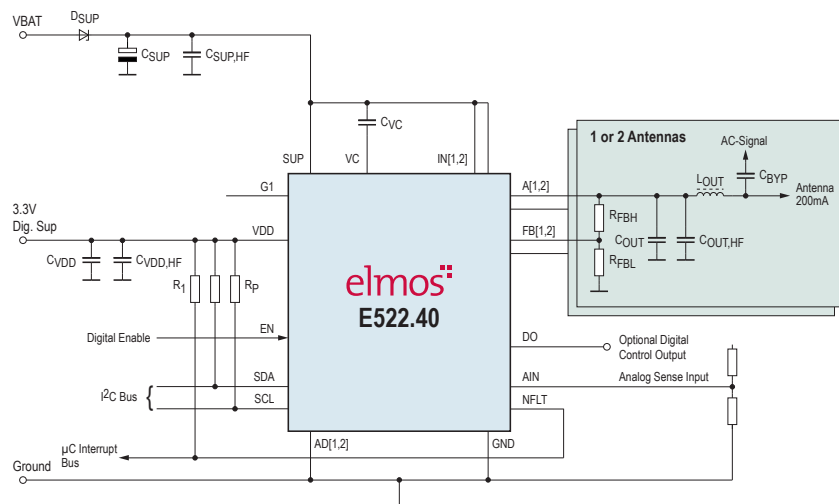
Triple Antenna Supply | E522.44

Key Features

- Input voltage range from 4.5V to 40V
- Resistor programmable output voltage
- Output voltage range 3 to 40V
- Three channels with up to 350mA output current capability
- Parallel regulator operation
- Switch mode operation Output current and voltage sensing
- Thermal protection and temperature monitoring
- Over current/open load protection

Board

- Order No. see page 59

Applications

- Automotive Antenna Modules
- Navigation and Radio Units
- General Voltage Regulator Applications
- Sensors

Packages

- DFN18L5040

Application Diagram
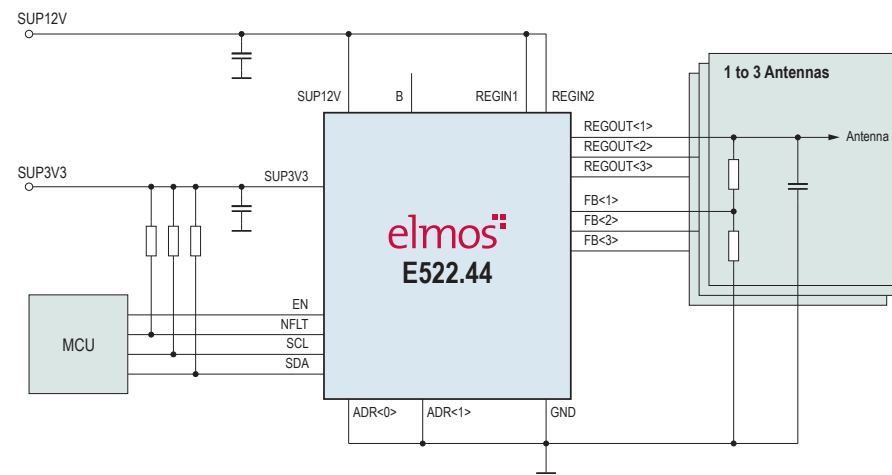
Dual Buck - Quad LDO | E522.51/52

Key Features

- **Fixed frequency primary buck converter**
  V_{IN} max. 40V | V_{OUT} from 4V to 6V | I_{OUT} max. 800mA/1550mA
- **Fixed frequency secondary buck converter**
  V_{IN} max. 6V | V_{OUT} from 0.8V to 5.1V
- **LDO 1 (Master)** Input voltage max. to 40V supporting always-on mode, Outp. voltage progr. in 0.05V steps
- **LDO 2 - 4 (with tracking option)** Input voltage max. 6V Output voltage programmable in 0.05V steps

Board

- Order No. see page 59

Applications

- Microcontroller supply

Packages

- QFN48L7

Application Diagram
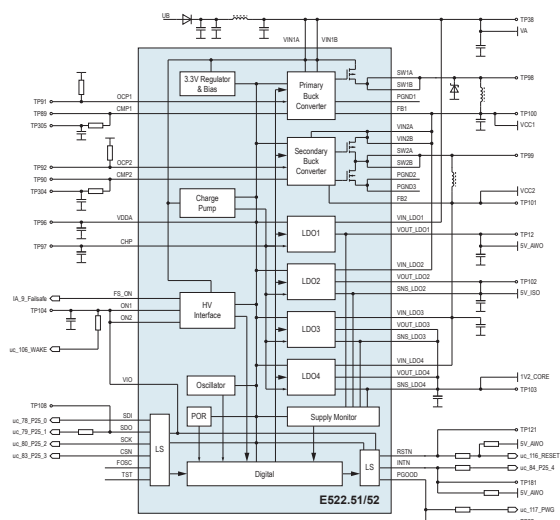
#1 in LED ambient light

For an atmosphere of wellbeing.

Power Management - Boards

Lighting

Part No.	Description	Board type	Order No.
E522.31	EMV Boost to Battery Converter (650mA)	Demoboard	K52231-0002
E522.31	EMV Boost to GND Converter (500mA)	Demoboard	K52231-0003
E522.31	Sepic Converter (750mA)	Demoboard	K52231-0004
E522.31	Buck to Battery Converter (3A)	Demoboard	K52231-0005
E522.32	Headlight LED Demo (2x Boost to Battery Topology) for High Beam, Low Beam (1A) and Daytime Running Light (750mA)	Demoboard	K52232-0003
E522.32	Buck to Battery dual phase Converter (6A)	Demoboard	K52232-0004
E522.46	8 Channel LED Driver with I2C Interface	Evaluation Kit	K52246-0002
E522.8x	Master Controllerboard	Demoboard	K5228x-0001
E522.81	LED Slaveboard Red (3x3 red)	Demoboard	K52281-0001
E522.83	LED Slaveboard RGB (3x red, 3x green, 3x blue)	Demoboard	K52283-0001
E522.9x	LED Slaveboard Red (3x3 red)	Demoboard	K5229X-0001

DC/DC Converter

Part No.	Description	Board type	Order No.
E522.01	Low Quiescent Current PFM Step Down Converter (5V/500mA)	Demoboard	K52201-0001
E522.02	Low Quiescent Current PFM Step Down Converter (3.3V/500mA)	Demoboard	K52202-0001
E522.03	Low Quiescent Current PFM Step Down Converter (5V/350mA)	Demoboard	K52203-0001
E522.04	Low Quiescent Current PFM Step Down Converter (3.3V/350mA)	Demoboard	K52204-0001
E522.05	Low Quiescent Current PFM Step Down Converter (Adjustable Voltage/500mA)	Demoboard	K52205-0001
E522.07	Low Quiescent Current PFM Step Down Converter (5V/1A)	Demoboard High Frequency Low Power 5V 1A Step Down Converter	K52207-0001
E522.07	Low Quiescent Current PFM Step Down Converter (Constant Current)	Demoboard High Frequency Step Down Converter for Constant Current	K52207-0002
E522.08	Low Quiescent Current PFM Step Down Converter (3.3V/1A)	Demoboard	K52208-0001
E522.09	Low Quiescent Current PFM Step Down Converter (Adjustable Voltage/1A)	Demoboard 1.5 - 12V	K52209-0001
E522.09	Low Quiescent Current PFM Step Down Converter (Adjustable Voltage/1A)	Demoboard 10 - 25V	K52209-0002

DC/DC Converter

Part No.	Description	Board type	Order No.
E522.10	Low Quiescent Current PFM Step Down Converter (2A Buck Converter)	Demoboard Adjustable High Frequency Low Power 2A Step Down Converter (V-Demo)	K52210-0001
E522.10	Low Quiescent Current PFM Step Down Converter (2A Buck Converter)	Demoboard Adjustable High Frequency Low Power 2A Step Down Converter for Constant Current Application (CC-Demo)	K52210-0002
E522.10	Low Quiescent Current PFM Step Down Converter (2A Buck Converter)	Demoboard High Frequency Low Power Adjustable Voltage 2A Step Down / Step up Converter (ZETA-Topologie)	K52210-0003
E522.10	Low Quiescent Current PFM Step Down Converter (2A Buck Converter)	Demoboard High Frequency Constant Current (350mA) Step down / Step up Converter (ZETA-Topologie)	K52210-0004
E522.41	Automotive USB Supply with Data-Line Protection and I²C Interface	Evaluation Kit	K52241-0001

LDO

Part No.	Description	Board type	Order No.
E522.40	Dual LDO with Diagnosis	Evaluation Board	K52240-0001
E522.44	Tripple Antenna Supply	Evaluation Board	K52244-0001

Interface - PSI5 Transceiver

Part No. / Description	V_{SUPPLY}	Iq (mA)	ESD (kV)	Bitrate	Package
E521.40 2-Channel Multi-Mode PSI5 Transceiver	5.3V to 19V	1	4	up to 189 Kbit/s	QFN20L5 SOIC20
E521.41 4-Channel Multi-Mode PSI5 Transceiver	5.3V to 19V	2	4	up to 189 Kbit/s	QFN20L5 SOIC20
E981.07 2-Channel Sensor Interface PSI5	8.5V to 25V	1	4	125 Kbit/s	QFN20L5
E981.08 4-Channel Sensor Interface PSI5	8.5V to 25V	1	4	125 Kbit/s	QFN32L7

2-/4-Channel Multi-Mode PSI5 Transceiver | E521.40/41

Key Features

- Provides two respective, four master channels compliant with PSI5 standard v1.3 and v2.1
- Support 125 Kbit/s, 189 Kbit/s, synchronous and asynchronous modes
- Internal sync-voltage generationw
- Programmable bus-voltage 4.6V to 11V
- Automatic threshold adaption to sensor quiescent current
- Reverse polarity protected bus outputs up to 40V

Board

- Order No. see page 74

Applications

- Safety (airbag) control systems
- Powertrain control systems
- Vehicle dynamics control system

Packages

- QFN20L5
- SOIC20

Application Diagram

2-/4-Channel Sensor Interface PSI5 | E981.07/08

Key Features

- Two respective, four independent operating channels
- Device parameters comply with PSI5-P10P-500/3L (PSI5 spec 1.3)
- Applicable for parallel and universal mode (standard) as well as daisy chain mode (increased)
- Channel output short circuit protected against 40V and GND

Board

- Order No. see page 74

Applications

- Passenger restraint systems

Packages

- QFN32L7
- QFN20L5 respective

Application Diagram
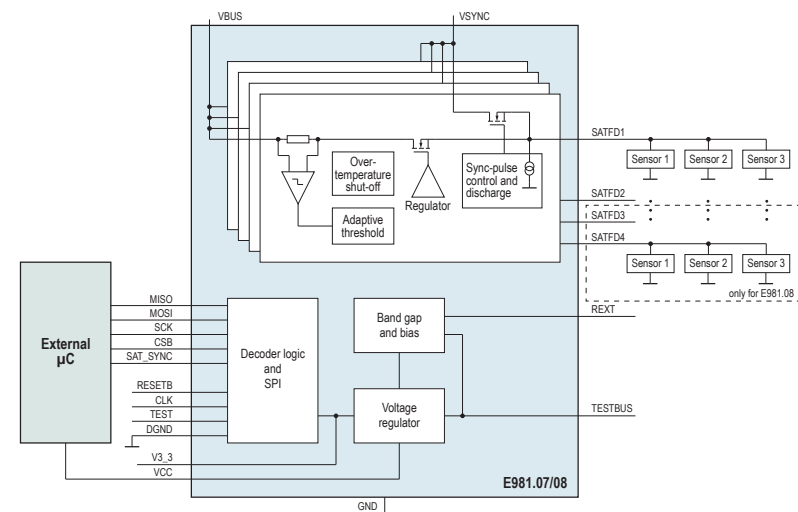
Interface - CAN Transceiver and System Basis Chip

Part No. / Description	Interface	VSUPPLY	Iq (μA)	V$_{DD}$	ESD (kV)	Bitrate	Package
E520.14 Quad-CAN Transceiver	11898-2/-5	5.5V to 30V	30	5V	6	up to 1 Mbit/s	QFN32L5
E521.21 CAN-FD SBC with DC/DC and Highside Switch	11898-2/-5	5.5V to 40V	30	3.3V	8	up to 2 Mbit/s	QFN32L5
E521.22 CAN-FD SBC with LDO and Highside Switch	11898-2/-5	5.5V to 40V	30	3.3V	8	up to 2 Mbit/s	QFN32L5
E521.23 CAN-FD SBC with DC/DC and Highside Switch	11898-2/-5	5.5V to 40V	30	5V	8	up to 2 Mbit/s	QFN32L5
E521.24 CAN-FD SBC with LDO and Highside Switch	11898-2/-5	5.5V to 40V	30	5V	8	up to 2 Mbit/s	QFN32L5

Quad-CAN Transceiver | E520.14

Key Features

- Operating voltage range 5.5V to 30V
- Compliant with ISO 11898-2 and ISO 11898-5
- Supports local and remote wake-up
- Supports low-power modes like sleep and stand-by
- Sleep current consumption typ. 30µA with all wake-up sources enabled
- SPI-compatible interface for configuration and diagnosis
- Three independent voltage monitors
- Fault monitor configurable for each branch

Board

- Order No. see page 74

Applications

- Body Domain Controller
- Gateways

Packages

- QFN32L5

Application Diagram
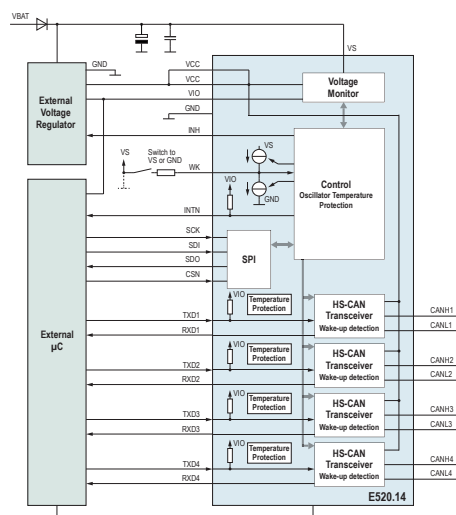
CAN-FD SBC with DC/DC and Highside Switch | E521.21/23

Key Features

- Voltage regulator 3.3V/5V
- DC/DC buck converter up to 200mA
- HS-CAN-FD transceiver (ISO 11898-2:2016) up to 2 Mbit
- Charge pump for external active reverse polarity protection
- Sensor supply voltage regulator 5V/50mA
- Integrated high-side switch typ. 0.15Ω with current sense
- Gate control for external high-side driver (NMOS power FET)
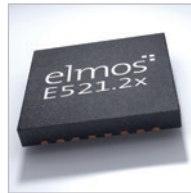
Applications

- ECUs connected to the CAN bus
- Front light modules
- Body computer

Packages

- QFN32L5

Application Diagram
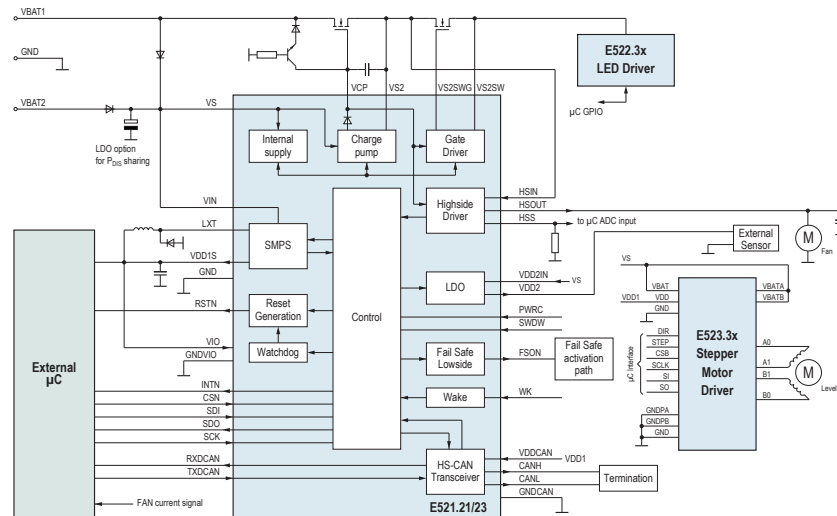
CAN-FD SBC with LDO and Highside Switch | E521.22/24

Key Features

- Voltage regulator 3.3V/5V
- Linear Regulator up to 200mA
- HS-CAN-FD transceiver (ISO 11898-2:2016) up to 2 Mbit
- Charge pump for external active reverse polarity protection
- Sensor supply voltage regulator 5V/50mA
- Integrated high-side switch typ. 0.15Ω with current sense
- Gate control for external high-side driver (NMOS power FET)

Applications

- ECUs connected to the CAN bus
- Front light modules
- Body computer

Packages

- QFN32L5

Application Diagram
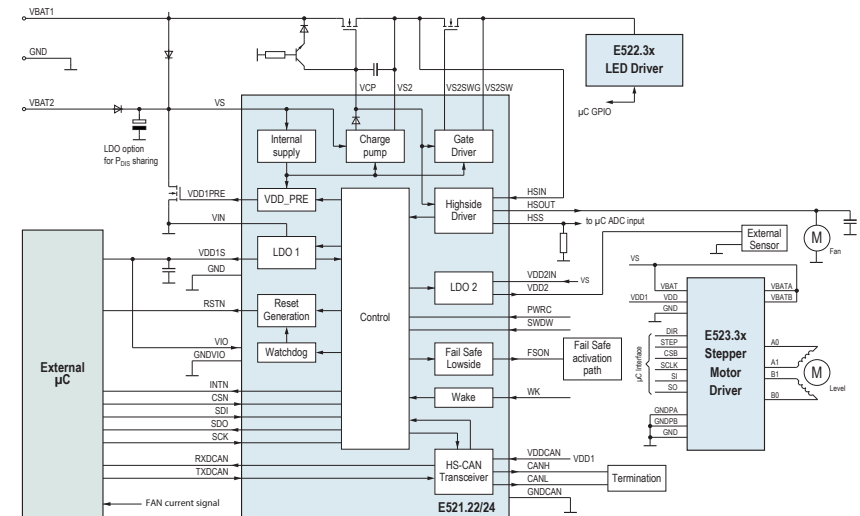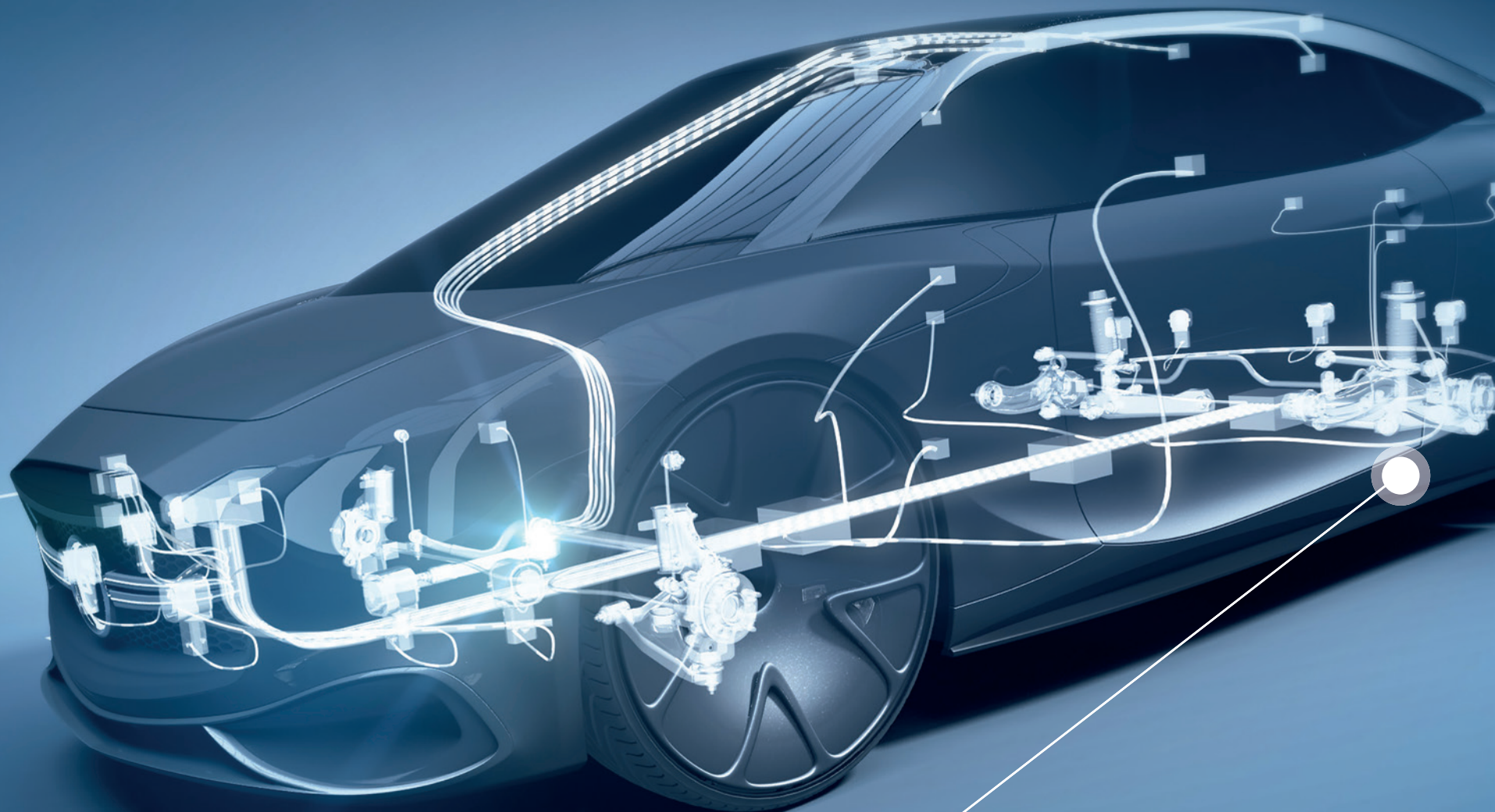
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Interface - LIN Transceiver and System Basis Chip

LIN Transceiver and System Basis Chip

Part No. / Description	Interface	V$_{SUPPLY}$	Iq (µA)	V$_{DD}$	ESD (kV)	Bitrate	Package
E520.34 LIN SBC with Voltage Regulator and Watchdog (3.3V)	LIN 2.1 LIN 2.2 SAE-J2602	5V to 28V	10	3.3V	8	up to 20 Kbit/s	QFN20L5
E520.35 LIN SBC with Voltage Regulator and Watchdog (5V)	LIN 2.1 LIN 2.2 SAE-J2602	5V to 28V	10	5V	8	up to 20 Kbit/s	QFN20L5
E521.25 LIN SBC with Voltage Regulator	LIN 2.1 LIN 2.2 SAE-J2602 ISO9141	5V to 28V	10	3.3V	8	up to 20 Kbit/s	QFN20L5
E521.50 Quad LIN Transceiver	LIN 2.1 LIN 2.2 SAE-J2602	5V to 28V	17	-	8	up to 20 Kbit/s	TSSOP16

LIN RGB Controller

Part No. / Description	Interface	V$_{SUPPLY}$	Iq (µA)	V$_{DD}$	ESD (kV)	Bitrate	Package
E521.31 *SoC LIN Controller with Position Detection	LIN 2.1 LIN 2.2 SAE-J2602	5V to 28V	10	5V	8	up to 20 Kbit/s	QFN32L5
E521.36 *SoC RGB LIN Controller with Current Source	LIN 2.1 LIN 2.2 SAE-J2602	5V to 28V	15	-	8	up to 20 Kbit/s	SOIC8-EP

*SoC   System-on-a-Chip | with integrated microcontroller

LIN SBC with Voltage Regulator and Watchdog (3.3V/5V) | E520.34/35

Key Features

- Transceiver compliant with LIN 2.1, LIN 2.2 and SAE-J2602
- Linear voltage regulator with 3.3V (E520.34) or 5V (E520.35), 100mA
- Voltage regulator accuracy ±2% in active mode
- µC window watchdog
- BUS pin ESD-protected ±8 kV according to IEC-61000-4-2
- Fast flash mode, configurable watchdog, V_{BAT} divider
- Typical current: standby mode 70µA and sleep mode 10µA

Board

- Order No. see page 75

Applications

- Smart applications connected to the LIN bus

Packages

- QFN20L5

Application Diagram
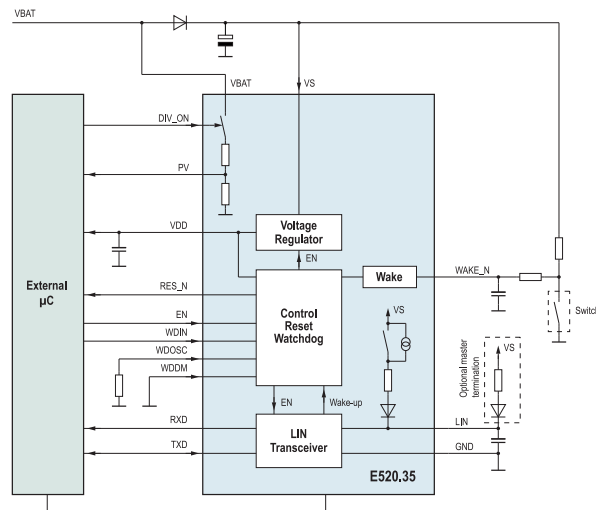
LIN SBC with Voltage Regulator | E521.25

Key Features

- LIN transceiver, V 2.1, V2.2 SAE-J2602, ISO9141
- Operating range VS 5V up to 28V
- Limited functional range 3.8V up to 40V
- Typ. 10µA sleep current consumption
- Very low BUS leakage current
- Reset generation
- µC window watchdog
- Internal 1:6 Voltage Divider for V_{BAT} Sensing
- 3.3V (2%) in active mode, (5%) in standby mode

Applications

- Smart applications connected to the LIN bus

Packages

- QFN20L5

Application Diagram

Quad LIN Transceiver | E521.50

Key Features

- Input voltage range 5V to 28V
- 4 LIN transceiver V2.1, V2.2, SAE-J2602, ISO9141
- Bus over-current limitation
- Low standby mode current
- LIN remote wake-up detection
- LIN flash mode up to 115 kBit/s

IC

Applications

- Body control units

Packages

- TSSOP16

Application Diagram

LIN Controller with Position Detection | E521.31

Key Features

- Transceiver compliant with LIN 2.1, LIN 2.2 and SAE-J2602
- Linear voltage regulator with 5V, 100mA
- State of the art 16bit µC
- Integrated 32kbyte Flash (Flexible EEPROM emulation by SW)
- 4x PWM driven High Side drivers with 5V and up to 30mA each
- µC window watchdog
- ADC 12bit accuracy

Board

- Order No. see page 74

Applications

- Interior light modules

Packages

- QFN32L5

Application Diagram

RGB LIN Controller with Current Source | E521.36

Key Features

- Input voltage range 5V to 28V
- Integrated 16 bit microcontroller
- 32kByte OTP
- 128Byte customer usable non-volatile memory
- 1.25kByte RAM 16kByte SysROM containing standard LIN routines and boot loader
- 4 PWM generators with 48MHz and 16bit resolution
- 2 Timer with 16bit resolution

Board

- Order No. see page 74

Applications

- Interior light modules
- Ambient lighting

Packages

- SOIC8-EP

Application Diagram
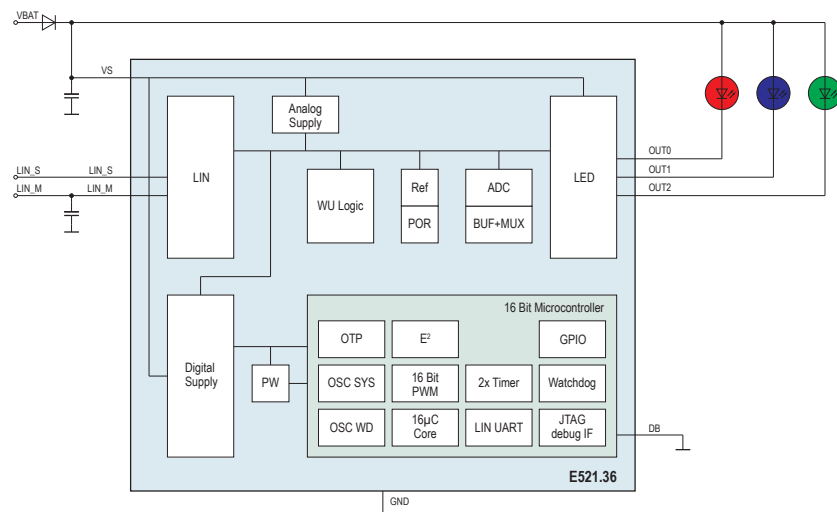
Interface - KNX/EIB Transceiver

Part No. / Description	V_{SUPPLY}	Iq (mA)	V_{DD}	ESD (kV)	Bitrate	Package
E981.03 KNX/EIB Transceiver	19V to 33V	1.9 [1]	3.3V/5V	2	9.6 Kbit/s 19.2 Kbit/s 115.2 Kbit/s	QFN32L7
E981.23 KNX-Transceiver with Hardware Current Programming	19V to 33V	1.9 [1]	3.3V/5V	2	9.6 Kbit/s 19.2 Kbit/s 115.2 Kbit/s	QFN32L7
E981.33 KNX-Bit Transceiver with Hardware Current Programming	19V to 33V	1.9 [1]	3.3V/5V	2	9.6 Kbit/s	QFN32L7

[1] Typical value for V_{DD} = 3.3V

KNX/EIB Transceiver | E981.03

Key Features

- KNX/EIB transceiver, certified according to KNX TP1-256
- Analog mode supported
- Configurable bus current (maximum current and slew rate)
- Voltage regulators
  - 20V: current capability up to 20mA
  - 3.3V or 5V DC/DC converter: current capability up to 70mA
- UART host interface (data rate up to 115.2 Kbit/s)
- SPI for configuration (optional)

Board

- Order No. see page 75

Applications

- Sensors, actuators, routers, gateways, Bus-powered or externally supplied
- Security applications

Packages

- QFN32L7

Application Diagram

KNX-Transceiver with Hardware Current Programming | E981.23

Key Features

- KNX/EIB transceiver, certified according to KNX TP1-256
- Analog mode supported
- Configuration pins for bus current & slope
- Configuration pins for external clock frequency 8 or 7.3728 MHz
- Further configuration and diagnosis via UART
- Voltage regulators
  - 20V: current capability up to 25mA
  - 3.3V or 5V DC/DC converter: current capability up to 100mA
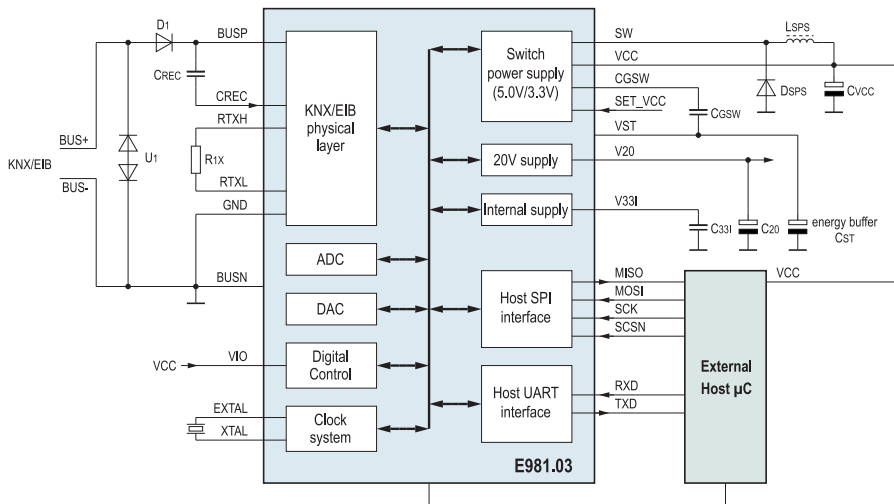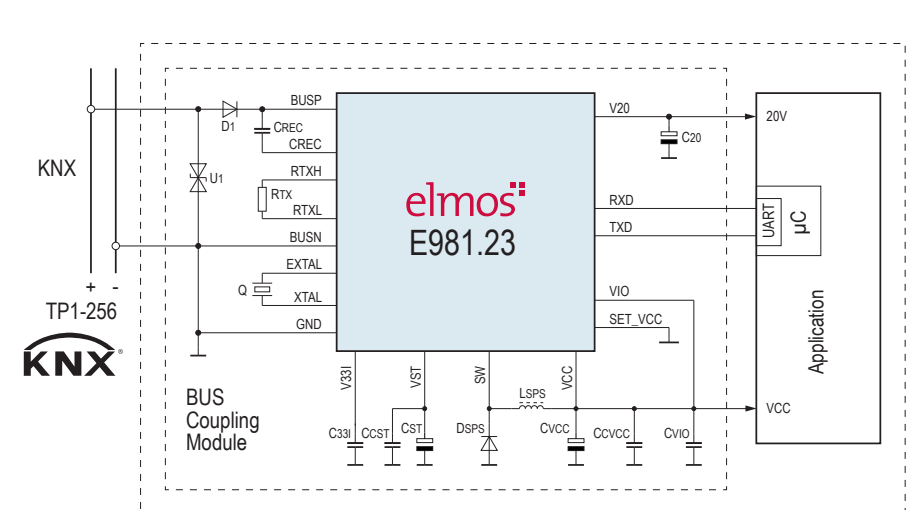
Board

- Order No. see page 75

Applications

- Sensors, actuators, routers, gateways, Bus-powered or externally supplied
- Security applications

Packages

- QFN32L7

Application Diagram

KNX-Bit Transceiver with Hardware Current Programming | E981.33

Key Features

- KNX/EIB transceiver, certified according to KNX TP1-256
- Analog mode supported
- Configuration pins for bus current & slope
- Configuration pins for external clock frequency 8 or 7.3728 MHz
- Further configuration and diagnosis via bit transceiver
- Voltage regulators
  - 20V: current capability up to 25mA
  - 3.3V or 5V DC/DC converter: current capability up to 100mA

Applications

- Sensors, actuators, routers, gateways,
  Bus-powered or externally supplied
- Security applications

Board

- Order No. see page 75

Packages

- QFN32L7

Application Diagram

	E981.03	E981.23	E981.33
KNX EIB transceiver analog mode	■	■	■
KNX EIB transceiver with medium access control	■	■	
Compatible to KNX TP1-256 supporting extended frames up to 254 Bytes payload	■	■	■
Configuration pins for bus current & slope		■	■
Configuration pins for external clock frequency 8 or 7.3728 MHz		■	■
Further configuration and diagnosis via	SPI UART	UART	
UART host interface up to 115kBaud with optional CRC	■	■	
Power management functionality with host wake up on received KNX telegram content	■		
Buck voltage regulator for 3.3 or 5V for up to	70mA	100mA	100mA
Linear voltage regulator for 20V up to 25mA	■	■	■
Over temperature monitoring/protection	■	■	■
Operating temperature range −25°C to +85°C	■	■	■
QFN32L7 package (all pin compatible)	■	■	■

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Interface - Boards

PSI5 Transceiver

Part No.	Description	Board type	Order No.
E521.41	4-Channel Multi-Mode PSI5 Transceiver	Demoboard	K52141-0001
E981.07	2-Channel Sensor Interface PSI5	Evaluation Board	K98107-0001
E981.07	2-Channel Sensor Interface PSI5	Adapter Board	K98107-0002

CAN Transceiver and System Basis Chip

Part No.	Description	Board type	Order No.
E520.14	Quad-CAN Transceiver	Evaluation Board	K52014-0001

Interior Lighting & LIN Controller

Part No.	Description	Board type	Order No.
E521.31	LIN RGB Controller with Position Detection	Evaluation Board	K52131-0001
E521.31	LIN RGB Controller with Position Detection (CPU Board for K52131-0001)	CPU Board	K52131-0002
E521.31	LIN RGB Controller with Position Detection (Full Application in Small Size)	Mini-Demo	K52131-0003
E521.31	LIN RGB Controller with Position Detection (Auto-Addressing Test Board)	Evaluation Board	K52131-0004
E521.31	MiniMux (Mini-Demo Multiplexer)	Mini-Demo	K52131-0005
E521.36	RGB LIN Controller with Current Source (CPU Board with removable socket)	Evaluation Board	K52136-0001
E521.36	RGB LIN Controller with Current Source (CPU Board with removable socket ENPLAS)	CPU Board ENPLAS	K52136-0002
E521.36	RGB LIN Controller with Current Source (CPU Board without removable socket)	CPU Board	K52136-0003
E521.36	RGB LIN Controller with Current Source	Mini-Demo	K52136-0004
E521.36	RGB LIN Controller with Current Source (CPU Board RAM Device)	CPU Board	K52136-0005
E521.36	RGB LIN Controller with Current Source	Mini-Demo ENPLAS	K52136-0006
E521.36	RGB LIN Controller with Current Source	Mini-Demo RAM	K52136-0007

LIN Transceiver and System Basis Chip

Part No.	Description	Board type	Order No.
E520.34	LIN SBC with Voltage Regulator and Watchdog (3.3V)	Evaluation Board	K52034-0001
E520.35	LIN SBC with Voltage Regulator and Watchdog (5V)	Evaluation Board	K52035-0001

KNX/EIB Transceiver

Part No.	Function	Board type	Order No.
E981.03	KNX/EIB Transceiver	KNX TP Demoboard	K98103-0001
E981.03	KNX/EIB Transceiver	KNX TP 815 Evaluation Board V2	K98103-0002
E981.23	KNX/EIB Transceiver	KNX TP 815 Evaluation Board V2	K98123-0001
E981.33	KNX/EIB Transceiver	KNX TP 815 Evaluation Board V2	K98133-0001

Special Projects - Safety

Part No. / Description	V_{SUPPLY}	V_{ER}	Output	Range	Package
E521.40 2-Channel Multi-Mode PSI5 Transceiver	5.3V to 19V	-	PSI5	-	QFN20L5 SOIC20
E521.41 4-Channel Multi-Mode PSI5 Transceiver	5.3V to 19V	-	PSI5	-	QFN20L5 SOIC20
E524.40 Safety Pressure Sensor with PSI5 Interface	5V to 18V	-	PSI5	400..1500hPa/ 400..1900hPa	SOIC20 (cavity)
E981.07 2-Channel Sensor Interface PSI5	8.5V to 25V	-	PSI5	-	QFN20L5
E981.08 4-Channel Sensor Interface PSI5	8.5V to 25V	-	PSI5	-	QFN32L7
E981.17 4-Channel Airbag Squib Driver	4.5V to 5.5V	8V to 35V	-	-	QFN44L7
E981.18 8-Channel Airbag Squib Driver	4.5V to 5.5V	8V to 35V	-	-	QFN44L7
E981.20 4-Channel Squib Driver with Current Counter	4.5V to 5.5V	8V to 35V	-	-	QFN44L7
E981.21 8-Channel Squib Driver with Current Counter	4.5V to 5.5V	8V to 35V	-	-	QFN44L7

2-/4-Channel Multi-Mode PSI5 Transceiver | E521.40/41

Key Features

- Provides two respective, four master channels compliant with PSI5 standard v1.3 and v2.1
- Support 125 Kbit/s, 189 Kbit/s, synchronous and asynchronous modes
- Internal sync-voltage generationw
- Programmable bus-voltage 4.6V to 11V
- Automatic threshold adaption to sensor quiescent current
- Reverse polarity protected bus outputs up to 40V
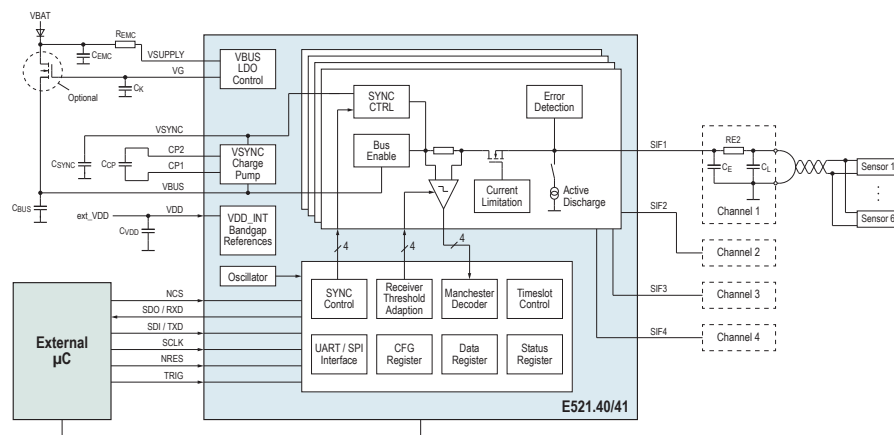
Board

- Order No. see page 86

Applications

- Safety (airbag) control systems
- Powertrain control systems
- Vehicle dynamics control system

Packages

- QFN20L5
- SOIC20

Application Diagram

Safety Pressure Sensor with PSI5 Interface | E524.40

Key Features

- Standard pressure sensor for crash detection (side impact, pedestrian protection) according to specification AK-LV29 (VDA)
- PSI5 data interface using synchronous or asynchronous transmission modes
- Pressure sensor cell integrated with the signal processing IC
- Input precision amplifier and signal chain:
  - Range 1: 400...1500 hPa, for "side impact detection"
  - Range 2: 400...1900 hPa, for "pedestrian protection"
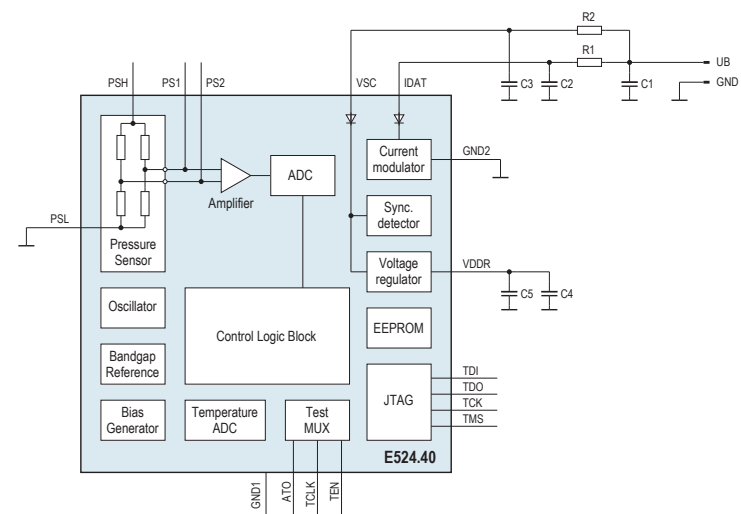
Board

- Order No. see page 86

Applications

- Crash pressure sensor for passive safety
- Active pedestrian protection safety systems

Packages

- SOIC20

Application Diagram

2-/4-Channel Sensor Interface PSI5 | E981.07/08

Key Features

- Two respective, four independent operating channels
- Device parameters comply with PSI5-P10P-500/3L (PSI5 spec 1.3)
- Applicable for parallel and universal mode (standard) as well as daisy chain mode (increased)
- Channel output short circuit protected against 40V and GND

Board

- Order No. see page 86

Applications

- Passenger restraint systems

Packages

- QFN32L7
- QFN20L5 respective

Application Diagram
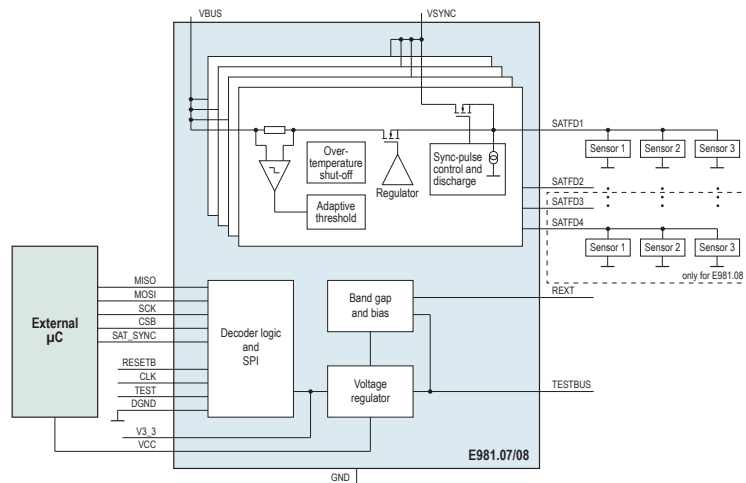
4-/8-Channel Airbag Squib Driver | E981.17/18

Key Features

- Two squib current modes (LCM and HCM) selectable via SPI commands
- Simultaneously firing of 4 loops possible
- Squib channel diagnostics and monitoring
- Autarky voltage & squib supply voltage diagnostics
- Separate low side and high side driver control
- Serial interface (SPI synchronous communication) to µC (3.3V and 5V tolerant inputs)

Applications

- Squib driver in a restraint diagnostic and control module (RDM)

Packages

- QFN44L7

Application Diagram

4-/8-Channel Squib Driver with Current Counter | E981.20/21

Key Features

- Two squib current modes (LCM and HCM) selectable via SPI commands
- Simultaneously firing of 4 loops possible
- Squib channel diagnostics, monitoring and current counter
- Autarky voltage & squib supply voltage diagnostics
- Separate low side and high side driver control
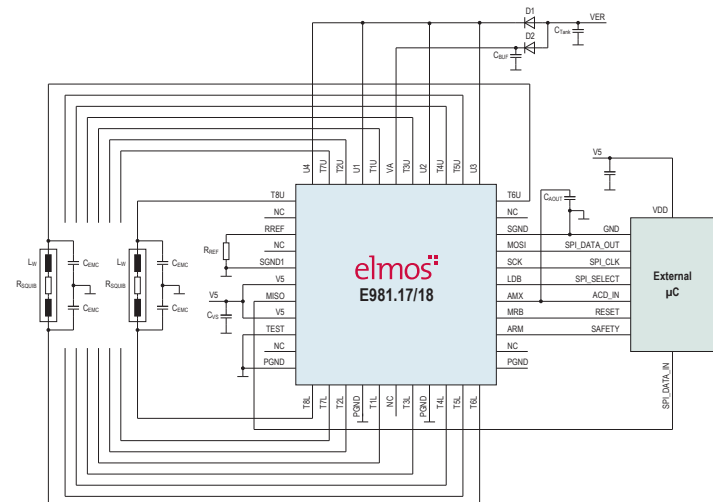- Serial interface (SPI synchronous communication) to µC (3.3V and 5V tolerant inputs)

Applications

- Squib driver in a restraint diagnostic and control module (RDM)

Packages

- QFN44L7

Application Diagram

Special Projects - Engine Management

Part No. / Function	V_{SUPPLY}	RDS_{ON}	Interface	Package	Comment
E525.07 Glow Plug Control IC	5.5V to 16V (45V)	4x Gate driver	PWM, SPI	QFN32L6	■ Slew rate controlled gate driver ■ Gate sequencing ■ Advanced diagnosis ■ Ground shift compensating

Glow Plug Control IC | E525.07

Key Features

- 4 gate drivers for external hi-side power-NMOS
- PWM controlled gate output with integrated charge pump
- Adjustable gate charge / discharge currents
- Gate sequencing for minimum current ripple
- MOS protection by gate-source voltage limitation
- Glow plug current sense with over-current shut-off
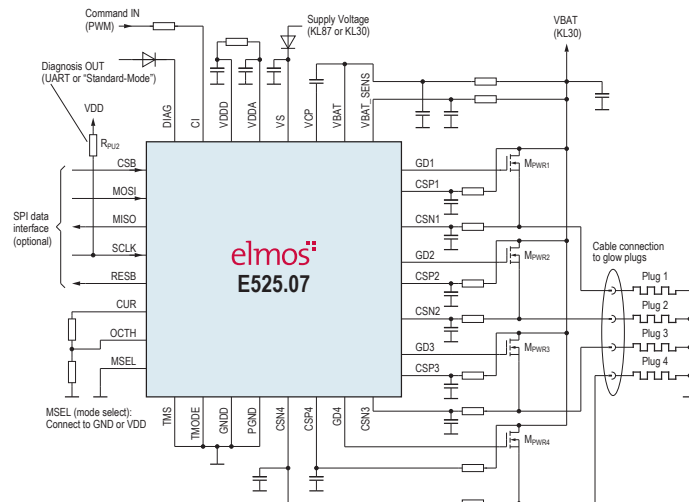- Battery measurement, over-voltage and undervoltage, shut-down, charge pump monitoring

Applications

- Quick start Diesel engine controls for Euro 6
- Ceramic glow plugs
- Steel glow plugs
- For direct and indirect injection

Packages

- QFN32L6

Application Diagram

Special Projects - Relay Driver

Part No. / Function	High-Side Driven	Low-Side Driven	Bi-Stabil	Included µC	Interface	Feed-Back Inputs	Package	Comment
E520.02/08 *Driver IC 12/8x Low-Side Relay driver with constant holding current	-	12/08	-	External	▪ SPI	0 (to ext.µC)	QFN32L5 QFN20L5 SOIC20 SOIC28	▪ Automatical VBAT dependent PWM generation for constant holding current
E523.03/04 *SBC E523.13/14 LIN2.x Relay Node SBC for 1 Relay	1 or	1	-	External 3.3V/5V	▪ LIN1.3/2.x/PWM	0 (to ext.µC)	QFN20L4 QFN32L5	▪ Regulator ▪ Watchdog
E523.01/11 *SBC LIN2.x Relay Node SBC for 6/5 Relays	6 or	6 or	5	External 3.3V/5V	▪ LIN1.3/2.x/PWM	0 (to ext.µC)	QFN44L7 QSOP44 QFN48L7	▪ Regulator ▪ Watchdog
E523.02/12 *SBC LIN2.x Relay Node SBC for 4/3 Relays	4 or	4 or	3	External 3.3V/5V	▪ LIN1.3/2.x/PWM	0 (to ext.µC)	QFN44L7 QSOP44	▪ Regulator ▪ Watchdog
E523.06 *SoC Free Programmable LIN2.x Relay Node for 6/5 Relays	6 or	6 or	**5**	16 bit 4-48Mhz	▪ LIN1.3/2.x/PWM ▪ Flashable via LIN	8	QFN48L7	▪ 32k FLASH (free programmble) ▪ 16k SysROM (hardware LIN library) ▪ 4k RAM
E523.30/34 *SoC E523.31/37 Free Programmable LIN2.x Relay Node for 2-4 Relays	2 or	2 or	3	8 bit	▪ LIN1.3/2.x/PWM ▪ LIN auto-addressing ▪ Flashable via LIN	3	QFN32L6	▪ 8k FLASH and ROM + 4k SysROM library ▪ switchable 5V supply for external needs ▪ 3.3V ADC reference for ratiometric measurements ▪ ROM version available

*Plug & Play Chip with defined functionality | no controller programming necessary
*SoC   System-on-a-Chip | with integrated microcontroller
*SBC   System-Basic-Chip | with Voltage Regulator Reset, Watchdog, physical Interface
*Driver IC   Driver Chip without SBC or SoC features

12/8x Low-Side Relay Driver with Constant Holding Current | E520.02/08

Key Features

- 12 high current outputs (RDS_{ON} typ. 1.5Ω / I_{MAX} = 350mA)
- Low standby current (typically <1µA)
- Serial interface (SPI) for direct µC interfacing
- Short circuit / Open load detection, diagnosis
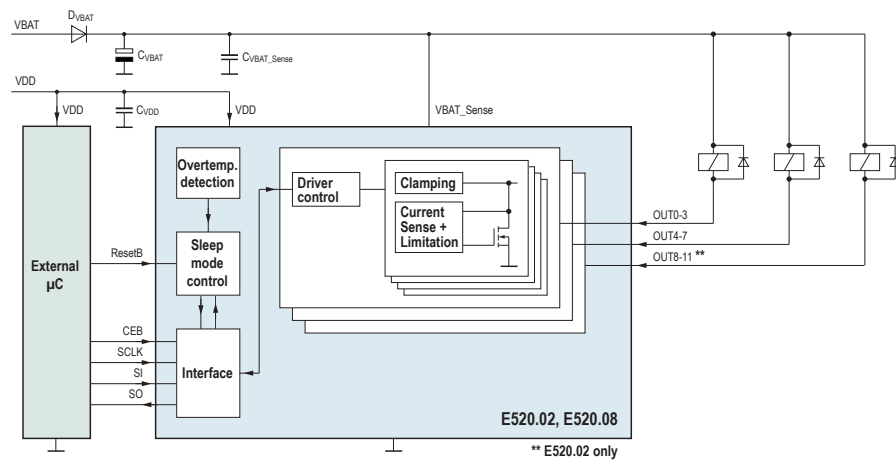- T_{Junc} peak = +150°C

Applications

- Relay Driver with automatically V_{BAT}- dependent WM duty cycle generation
- Low power dissipating relay boards

Packages

- QFN32L5
- QFN20L5
- SOIC20
- SOIC28

Application Diagram

*Driver IC

LIN2.x Relay Node SBC for 1 Relay | E523.03/04/13/14

Key Features

- Voltage range 7V to 28V (5V to 42V peak)
- Controlling 1 low side driven relay or 1 high side driven relay
- Relay pull-in and holding current can be controlled via PWM input
- Power supply 3.3V or 5V for external controller
- LIN2.x(1.3), SAE-J2602 interface or bidirectional PWM
- Several Diagnostic and protection functions
- Adjustable window watchdog
- T_{Junc} peak = +170°C

Applications

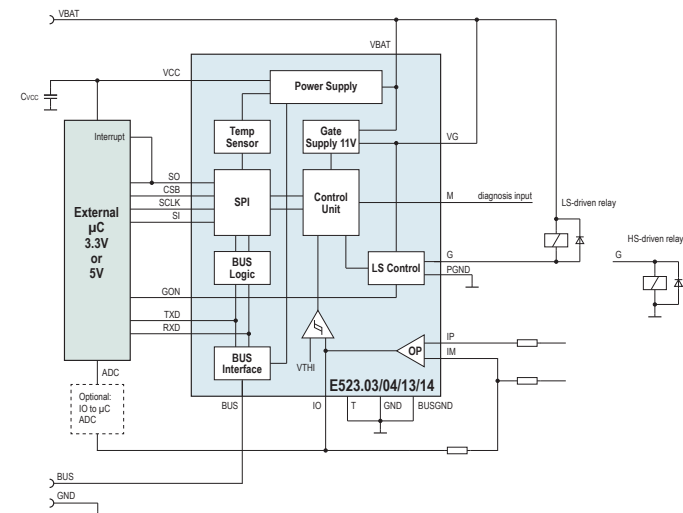- LIN2.x or LIN1.3 relay nodes

Packages

- QFN20L4
- QFN32L5
  (with high voltage spacer)

Application Diagram

*SBC

LIN2.x Relay Node SBC for 6/5 relays | E523.01/11

Key Features

- Voltage range 7V to 28V (5V to 42V peak)
- Controls 6 relays, low- or high-side driven or 5 bistable relays
- Relay pull-in and holding current can be controlled via PWM input
- Power supply 3.3V or 5VC for external controller
- LIN 2.x interface (1.3), SAE-J2602 or PWM bidirectional
- Several diagnostic and protection functions
- Adjustable window watchdog
- T_{Junc} peak = +170°C

Applications

- LIN2.x or LIN1.3 relay nodes

Packages

- QFN44L7
- QSOP44
- QFN48L7

Application Diagram   *SBC

LIN2.x Relay Node SBC for 4/3 Relays | E523.02/12

Key Features

- Voltage range 7V to 28V (5V to 42V peak)
- Controls 4 relays, low- or high-side driven or 3 bistable relays
- Relay pull-in and holding current can be controlled via PWM input
- Power supply 3.3V or 5VC for external controller
- LIN 2.x interface (1.3), SAE-J2602 or PWM bidirectional
- Several diagnostic and protection functions
- Adjustable window watchdog
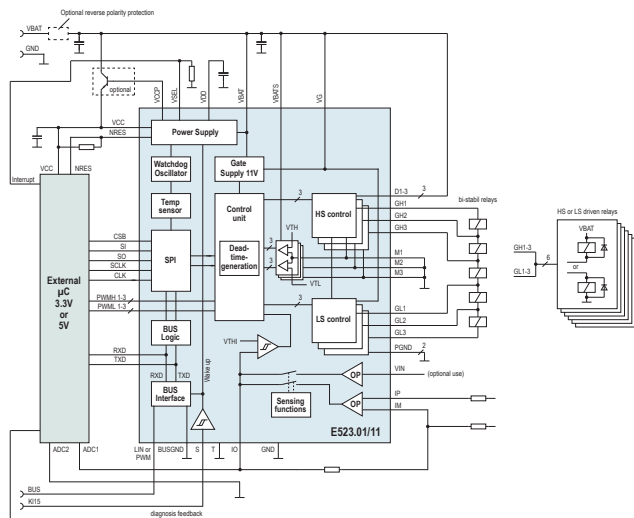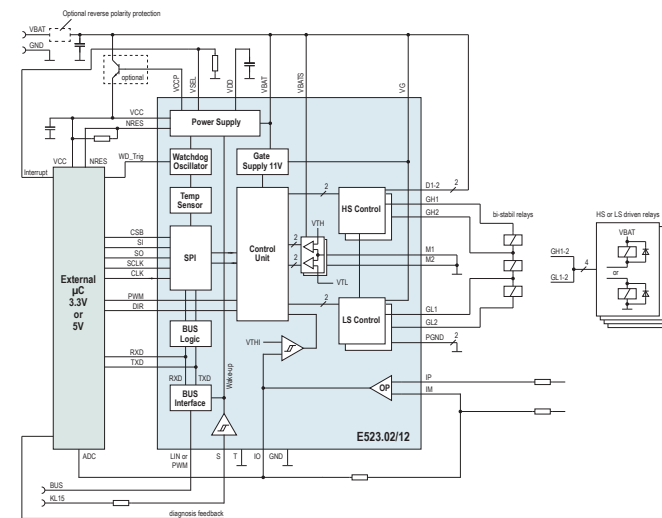- T_{Junc} peak = +170°C

Applications

- LIN2.x or LIN1.3 relay nodes

Packages

- QFN44L7
- QSOP44

Application Diagram   *SBC

Free Programmable LIN2.x Relay Node for 6/5 relays | E523.06

Key Features

- Voltage range 7V to 28V (5V to 42V peak)
- Controls 6 relays high- or low-side driven or 5 bistable relays
- Relay pull-in and holding current can be controlled via PWM input
- LIN2.x(1.3)(SAE-J2602) interface or bidirectional PWM interface
- 16 bit RISK CPU 32k FLASH 16k SysROM 4k SRAM
- 10 bit 1 Msample SAR ADC
- 4x 16 bit PWM generation (edge/center aligned)
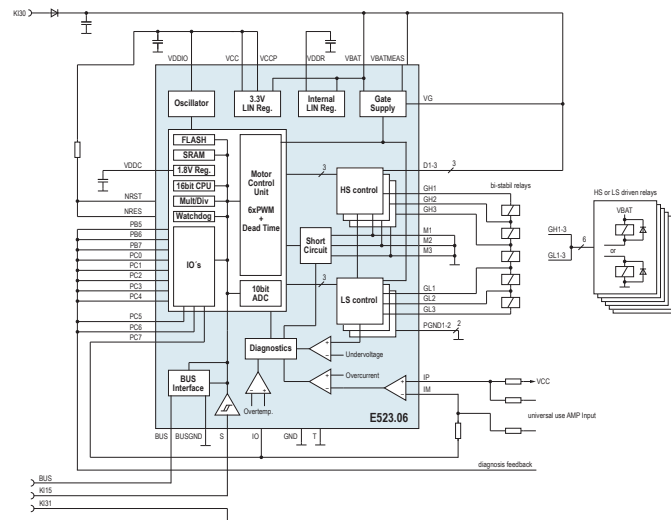- T_{Junc} peak = +150°C

Applications

- LIN2.x or LIN1.3 relay nodes

Packages

- QFN48L7

Application Diagram   *SoC

Free Programmable LIN2.x Relay Node for 2-4 relays | E523.30/31/34/37

Key Features

- Controls 4 high side driven relays or 2 low side driven relays or 3 bistable relays
- Programmable holding current for low-side up to 800mA
- 5.5V to 20V supply voltage (load dump 42V)
- Embedded 8bit µC 256 Byte RAM, 8k FLASH + 4k SysROM, 64 Byte E²
- LIN2.x(1.3), SAE-J2602 or PWM Interface, LIN Auto-Addressing
- T_{Junc} peak = +170°C

Applications

- LIN2.x or LIN1.3 relay nodes

Packages

- QFN32L6

Application Diagram   *SBC
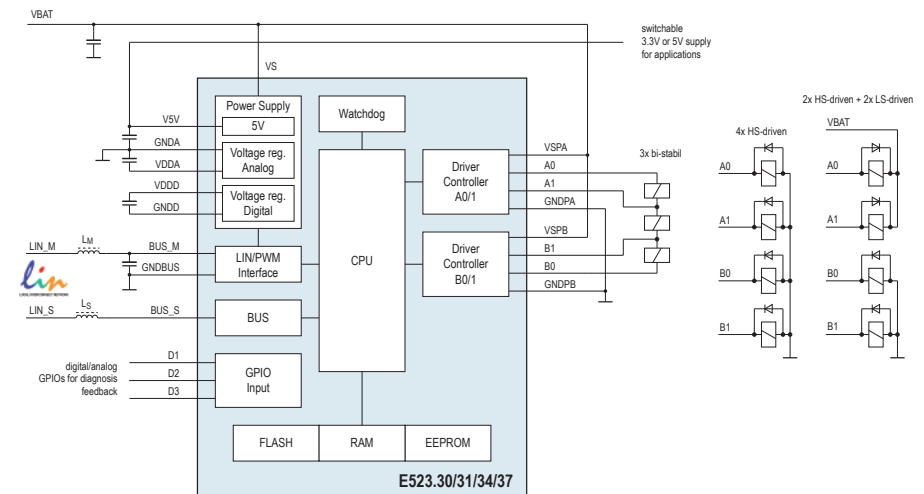
Special Projects - Boards

Safety

Part No.	Function	Board type	Order No.
E521.41	4-Channel Multi-Mode PSI5 Transceiver	Demoboard	K52141-0001
E524.40	Safety Pressure Sensor with PSI5 Interface	Demoboard	K52440-0001
E981.07	2-Channel Sensor Interface PSI5	Evaluation Board	K98107-0001
E981.07	2-Channel Sensor Interface PSI5	Adapter Board	K98107-0002

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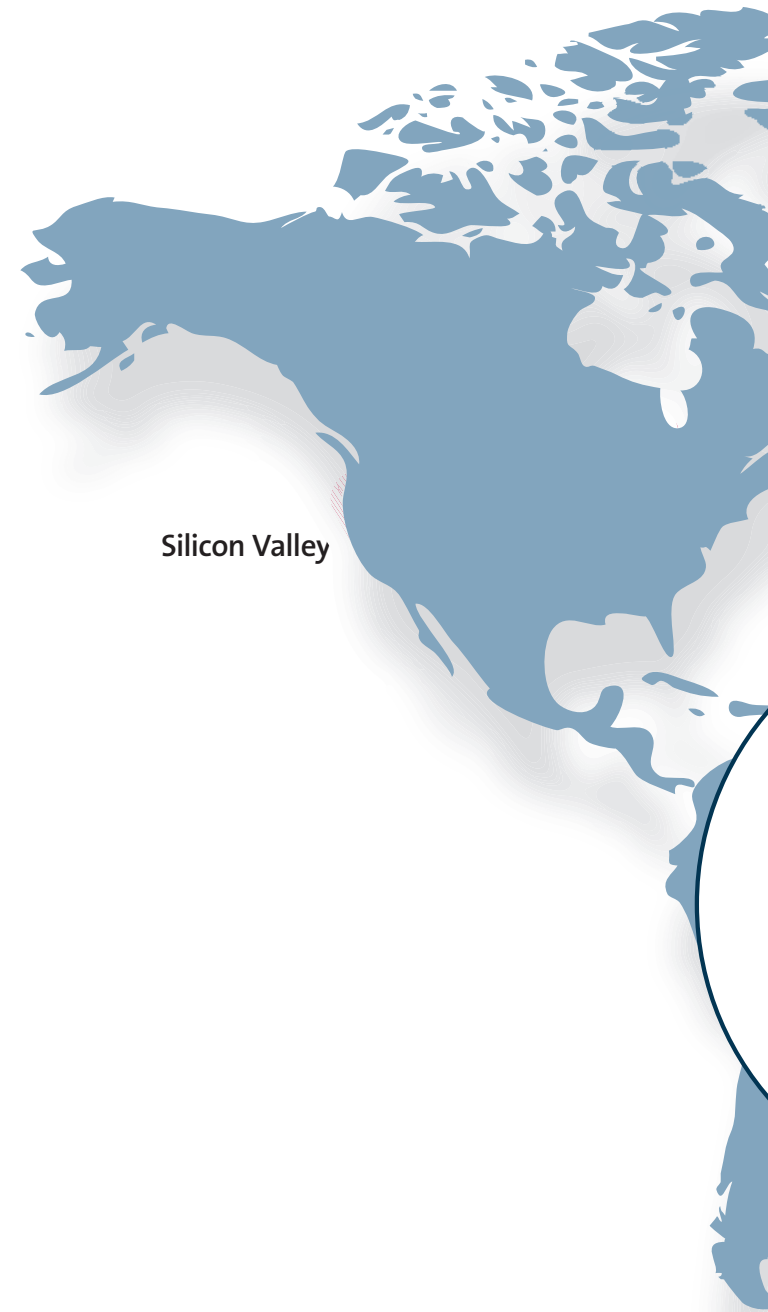
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