

# **New Product Introduction**



May 2024

MOTIX™ TLE989x 32-bit motor control SoC in LQFP

OptiMOS™ power MOSFETs in scalable power block package

OptiMOS™ 6 power MOSFETs 135 V

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**CoolSiC™ MOSFET 750 V G1 Industrial and Automotive graded** 

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OPTIGA™ Trust M Express Shield

# MOTIX™ TLE989x 32-bit motor control SoC in LQFP

MOTIX™ TLE989x 32-bit motor control SoC solutions utilize a B6 bridge N-channel MOSFET driver, an Arm® Cortex®-M3 microcontroller, and a CAN (FD) controller and transceiver. Customers benefit not only from fast and robust communication but also from the highest computing performance thanks to the high system frequency (60 MHz) and its dual flash supporting read-while-write operation.

TLE989x products are available in TQFP and LQFP packages. The new variants in the LQFP package are as well ISO 26262-compliant (ASIL B) and have built-in cybersecurity.

MOTIX<sup>™</sup> software, tools and services complete the product offering.

# Motion Tresson

#### Features

- > 32-bit Arm® Cortex®-M3 core at up to 60 MHz
- > Up to 256 kB FLASH, up to 32 kB RAM
- > 1x CAN FD protocol handler and transceiver
- > ISO26262 compliance (ASIL B)
- Security: layered access right management, secured boot and key storage
- > Single power supply from 5.5 V to 28 V
- > 5 V voltage supply for external loads (e.g. hall-sensor)
- 2- and 3-phase bridge driver with charge pump and PWM generator for motors up to 1 kW
- > Adaptive MOSFET control (AMC)
- > 1 current sense amplifier for motor current sensing via shunt
- > 1x 12-bit ADC with 19 inputs and 1x 10-bit ADC with 14 inputs
- > 14-bit sigma-delta ADC
- > Temperature range: T<sub>i</sub>: -40°C up to 175°C

#### Benefits

- > High performance (60 MHz clock frequency)
- > Optimized BOM and system control
- > Fast and robust communication
- > Functional safety (ASIL B) and cybersecurity features
- > Decreased switching losses and better EMC performance
- > Easy design-in software and comprehensive ecosystem available

# Competitive advantage

Smallest fully integrated motor control solution with CAN (FD) in the market

# Target applications

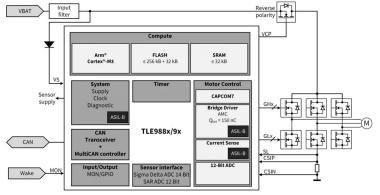
- > Fuel pump
- > Electric coolant pump
- > Oil pump
- > Power sliding door
- > eBike (with companion chip MOTIX™ TLE9140EQW)
- > Any other low voltage motor control applications that require MOTIX™ 32-bit motor control SoC solution with CAN

# Product collaterals / Online support

# Product family page

Board page

# **Block diagram**



OPN	SP Number	Package
TLE9893QKW62SXUMA1	SP004783940	PG-LQFP-64
TLE98932QKW62SXUMA1	SP004783946	PG-LQFP-64
TLE989XEVALBLQFPTOBO1	SP005557434	

# OptiMOS™ power MOSFETs in scalable power block package

The scalable power block is Infineon's latest package innovation that integrates both low-side and high-side MOSFETs (symmetric half-bridge with Q1 and Q2 of similar  $R_{DS(on)}$  in a compact leadless SMD 6.3 x 6.0 mm² package targeting a variety of applications (motor drives, SMPS etc). Lead product offering includes latest OptiMOS<sup>TM</sup> 6 40 V and OptiMOS<sup>TM</sup> 5 100 V silicon technologies providing benchmark performance in a compact footprint. By replacing two discrete packages, ex: PQFN 5 x 6 in a half-bridge configuration, customers can shrink the power section on the board by at least 50%.



## **Features**

- > High chip / package ratio
- > Optimized lead-frame and Cu-clip design
- Internally connected low-side and high side (lowest loop inductance)
- > Dual-side cooling available

# Target applications

- > Motor drives
- > Server
- > Telecom
- > E-bikes
- > Solar

# **Benefits**

- > High power capability
- > Optimum thermal performance
- > Compact and simplified layout design
- > Superior switching performance / EMI

## Competitive advantage

- Compact symmetric dual MOSFET half-bridge solution with highest power density for a wide range of applications
- > Replaces discrete package solutions
- > 50% PCB space improvement of power section
- > Ultra-low package parasitics and superior thermals

# **Block diagram**

Product collaterals / Online support

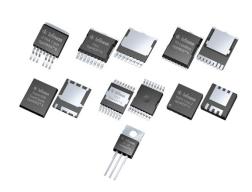
Product family page

OPN	SP Number	Package
ISG0613N04NM6HATMA1	SP005575170	PG-VITFN-10
ISG0613N04NM6HSCATMA1	SP005575174	PG-WHITFN-10
ISG0616N10NM5HSCATMA1	SP005754001	PG-WHITFN-10

# OptiMOS™ 6 power MOSFETs 135 V

OptiMOS™ 6 135 V targets high-power motor-drive applications such as LEV's, e-forklifts, power and gardening tools, as well as UPS, which predominantly use 72 V and 84 V batteries.

This product family effectively bridges the gap between 120 V and 150 V MOSFETs and provides high performance with with the lowest  $R_{DS(on)}$  enabling efficient power handling and reduced power dissipation.



#### **Features**

- >~ Industry's lowest R<sub>DS(on)</sub> in 135 V
- > Low V<sub>gs(th)</sub> spread
- > Ultra-low reverse recovery charge (Q<sub>rr</sub>)
- > Broad package portfolio

# **Target applications**

- > E-forklift
- > LEV
- > E-scooters
- > Power and gardening tools
- > UPS

Product collaterals / Online support

Product family page

#### **Benefits**

- > System cost reduction
- > Less paralleling required
- > Reduced VDS overshoot and switching losses
- > Higher power density designs

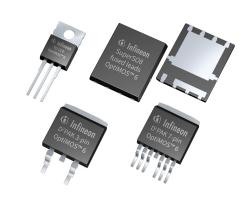
# Competitive advantage

- Cost-efficient solution optimized for motor drives, but also adaptable for other applications such as UPS à reducing dependency on higher-priced 150 V components without compromising performance and reliability
- High performance with the lowest R<sub>DS(on)</sub> enabling efficient power handling and reduced power dissipation
- $>\,$  Improved paralleling capability through low  $V_{gs(th)}$  spread allowing easier scaling and increased power output

OPN	SP Number	Package
IPF021N13NM6ATMA1	SP005677585	PG-TO263-7
IPF031N13NM6ATMA1	SP005677593	PG-TO263-7
IPTG020N13NM6ATMA1	SP005866292	PG-HSOG-8
IPTG029N13NM6ATMA1	SP005677598	PG-HSOG-8
IPP073N13NM6AKSA1	SP005866273	PG-TO220-3
IPT020N13NM6ATMA1	SP005866289	PG-HSOF-8
IPTC020N13NM6ATMA1	SP005866295	PG-HDSOP-16
ISZ143N13NM6ATMA1	SP005866298	PG-TDDSON-8
ISC037N13NM6ATMA1	SP005866309	PG-TSON-8
ISC046N13NM6ATMA1	SP005866301	PG-TDSON-8

# OptiMOS™ 6 power MOSFET 200 V

The new OptiMOS™ 6 200 V MOSFET family represents Infineon's state of the art trench MOSFET technology. It addresses the need for high power density, high efficiency, and high reliability. The technology features a significantly reduced R<sub>DS(on)</sub> resulting in lower conduction losses. A narrow gate threshold voltage spread and reduced transconductance make the OptiMOS™ 6 200 V a superior device for paralleling. Together with the soft diode behavior and the low reverse recovery charge, in addition to a linearity improvement of output capacitance, the OptiMOS™ 6 200 V provides the lowest switching losses, enhancing the system efficiency across all operating conditions.



## **Features**

- > Compared to the previous generation:
  - > 42% lower R<sub>DS(on)</sub>
  - > More than 3 times softer diode and improved capacitance linearity
  - > 89% lower Q<sub>rr</sub>
  - > Improved SOA
- > Pb-free plating and RoHS compliant

# **Target applications**

- > Drives
- > SMPS
- > Solar
- > BMS
- > Audio

Product collaterals / Online support

Product family page

# Benefits

- > Low conduction losses
- > Low switching losses
- > Stable operation with improved EMI
- > Less paralleling required
- > Better current sharing when paralleling
- > Environmentally friendly

# Competitive advantage

- > Best-in-class performance in 200 V
- $> \;\;$  Combination of a soft diode, low  $Q_{\mbox{\tiny TF}}$  and more linear capacitances
- > Improved current sharing when paralleling
- > Available in a wide range of packages

OPN	SP Number	Package
ISC130N20NM6ATMA1	SP005987558	PG-TSON-8
IPP339N20NM6AKSA1	SP006015640	PG-TO220-3
IPB339N20NM6ATMA1	SP005562858	PG-TO263-3
IPF129N20NM6ATMA1	SP005562931	PG-TO263-7

# CoolSiC<sup>™</sup> MOSFET 750 V G1 Industrial and Automotive graded

The new CoolSiC™ MOSFET 750 V G1 is a highly robust SiC MOSFET for the best system performance and reliability. The CoolSiC™ MOSFET 750 V leverages more than 20 years of SiC experience in Infineon. It offers an edge in performance, reliability, and robustness, with gate driving flexibility, enabling the simplified and cost-effective system design for top efficiency and power density.



#### **Features**

- > Highly robust 750 V technology
- > Best-in-class R<sub>DS(on)</sub> x Q<sub>fr</sub>
- > Excellent Ron x Qoss and Ron x QG
- > Low C<sub>rss</sub>/C<sub>iss</sub> together and high V<sub>qsth</sub>
- > 100% avalanche tested
- XT interconnection technology for best-in-class thermal performance

## **Target applications**

- > Industrial
  - > Solid State Relay (SSR)
  - > Solid State Circuit Breaker (SSCB)
  - > EV charging
  - > PV inverters
  - > Energy storage systems
- > Automotive
  - > Onboard battery charger for electric vehicles
  - > High-voltage DC-DC converter for electric vehicles

#### **Benefits**

- > Superior efficiency in hard switching
- > Enables higher switching frequency
- > Higher reliability
- > Withstand bus voltages beyond 500 V
- > Robustness against parasitic turn
- > Unipolar driving

# Competitive advantage

- > The CoolSiC™ MOSFET 750 V is the most balanced technology combining ease-of-use, switching efficiency and superior thermal performances
  - > Enhanced robustness to withstand bus voltages beyond 500 V
  - > Best-in-class figures of merit
  - > Unique diffusion soldering technique
  - > Ultra-low R<sub>on</sub>

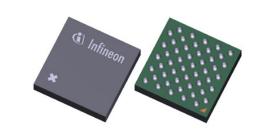
Product collaterals / Online support

Product family page

OPN	SP Number	Package
AIMZA75R016M1HXKSA1	SP005596196	PG-TO247-4
AIMZA75R020M1HXKSA1	SP005596247	PG-TO247-4
AIMZA75R027M1HXKSA1	SP005596244	PG-TO247-4
AIMZA75R040M1HXKSA1	SP005596241	PG-TO247-4
AIMZA75R060M1HXKSA1	SP005596238	PG-TO247-4
AIMZA75R090M1HXKSA1	SP005596235	PG-TO247-4
AIMZA75R140M1HXKSA1	SP005596232	PG-TO247-4
IMZA75R016M1HXKSA1	SP005970685	PG-TO247-4
IMZA75R020M1HXKSA1	SP005970684	PG-TO247-4
IMZA75R027M1HXKSA1	SP005970683	PG-TO247-4
IMZA75R040M1HXKSA1	SP005970682	PG-TO247-4
IMZA75R060M1HXKSA1	SP005970681	PG-TO247-4
IMZA75R090M1HXKSA1	SP005970680	PG-TO247-4
IMZA75R140M1HXKSA1	SP005970679	PG-TO247-4

# BGM687U50 - 7x LNA Bank with Output Cross-Switch for 5G

The BGM687U50 is a 7x LNA-Bank with 2x Low Band and 5x mid / high band LNA groups with a complex output 7P7T cross-switch, designed for EN\_DC/CA and MIMO operations.



#### **Features**

- > Wide operating frequency range: 600 2700 MHz
- > 2x LB LNA group: 600 960 MHz
- > 5x MLB/MHB LNA group: 1400 2700 MHz
- > Highly flexible output MUX
- > Gain Mode Support for MediaTek, LSI and Qualcomm platforms
- > Support of 4 x 4 MIMO and EN-DC with just 2 LNA-Banks
- > Programmable power gain: 21 dB down to -12 dB in 3 dB steps
- > Programmable current consumption for each LNA: 2.5 10 mA
- > Noise figue for high gain mode: 0.8 dB
- > Support of 1.2 V and 1.8 V V<sub>dd</sub> / V<sub>io</sub>
- > RF output internally matched to 50  $\Omega$
- > Suitable for LTE / LTE-Advanced, 4G and 5G applications
- > Integrated DC block capacitors at input and output
- > Pin to pin compatible with MT6191 LNA bank
- > Low power operation
- > Small form factor 2.8 mm x 2.8 mm
- > RoHS and WEEE compliant package
- > USID select pin

#### Benefits

- > Best-in-class RF performance
- > Support for MTK, LSI and QC platforms
- > Suitable for platforms with 1.2 V VIO
- > Space saving due to small package

# **Target applications**

> Mobile phones

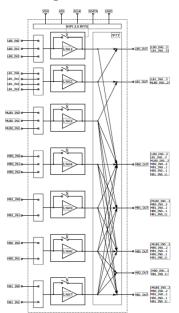
## Competitive advantage

- > Wide operating frequency range: 600 2700 MHz
- > Highly flexible output MUX
- > High gain: 21.0 dB

# Product collaterals / Online support

# Product page

# Block diagram



OPN	SP Number	Package
BGM687U50E6327XUMA1	SP005717410	PG-WF2BGA-50

# XENSIV™ - TLE49SRx8 magnetic angle sensors

The stray field robust magnetic angle sensor family from Infineon shows intrinsically an excellent stray field immunity.

It provides the answer to EMI (electro-magnetic immunity) requirements of safety-critical automotive systems. The new family features high angle accuracy at very little error. The first members of the new XENSIV™
TLE49SR angle sensor family are available with PWM and SPC interfaces.

The TDSO-8 package option is well suited for on-PCB designs for applications such as next generation steering systems.

# Infineon TLE49SRX8

#### **Features**

- > High stray field immunity
- > Exceeding requirements EMC standards ISO 11452-1:2015
- > Magnetic field range of 20 90 mT offers highest flexibility
- > Excellent angle performance, very low jitter, fast response time
- > Developed in compliance with ISO 26262 as safety element out of context
- > Fulfills ASIL C metric (Automotive safety integrity level) on component level
- > Available communication interfaces:
  - > Pulse width modulation (PMW)
  - > Single edge nibble transmission (SENT),
  - > Short PWM code (SPC)

## **Target applications**

- > Torque angle sensor (TAS) for electric power steering
- > Steering angle sensor (SAS) for electric power steering
- > Pedal position sensor
- > Chassis height levelling sensor
- > Throttle position sensor

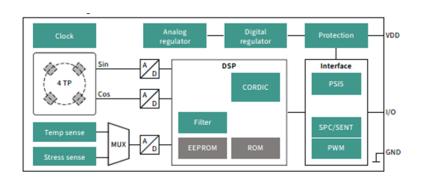
# **Benefits**

- > Robust to withstand magnetic stray field up to 8 mT (OEM typical requirement 5 mT)
- > Look-up table for correction of systematic angle errors
- > Very low jitter delay ±1 µs, very fast response time 9.8 µs ~ 26 ms (configurable)
- > ISO 26262 development compliant process enable functional safe design
- > EEPROM for storage of configuration (e.g. zero angle) and customer specific ID
- > Frame holder mechanism of SPC-interface enables synchronous data acquisition with other sensors

# Competitive advantage

- > Exceed ISO 11452-8, stray field robust up to 8mT
- > Accuracy of less than 0.5° angle error
- > Look up table helps compensate angle errors
- > Frame holder supports sync. data acquisition
- > Complies to ISO 26262 as SEooC (ASIL C)

# **Block diagram**



Product collaterals / Online support

Product page TLE49SRC8

Product page TLE49SRP8

Product page TLE49SRS8

OPN	SP Number	Package
TLE49SRP8XUMA1	SP005398929	PG-TDSO-8
TLE49SRC8XUMA1	SP005398933	PG-TDSO-8
TLE49SRS8XUMA1	SP005398931	PG-TDSO-8

# XENSIV™ - KP467 first autonomous air pressure sensor

KP467 is the first pressure sensor for battery management systems that monitors and sends a warning in case of thermal runaway events, efficiently, quickly and very cost-effectively. With KP467 today's worldwide safety requirements for EV can be fulfilled. Modern electric vehicles are constantly monitored by a large number of sensors and intelligent microcontrollers while driving. In parking mode, these battery functions are disabled. Every energy consumption competes with the range of the electric vehicle. Car manufacturers rely on sensors that consume virtually no energy, even when turned off.



#### **Features**

- > Autonomous low-power monitoring modes
- > ISO 26262-compliant / ASIL B
- > Monitoring pressure
- > High accuracy and reliability
- > Advanced diagnostic functions
- > High and flexible resolution

# **Target applications**

> Battery management systems (BMS)

# Product collaterals / Online support

# Product page

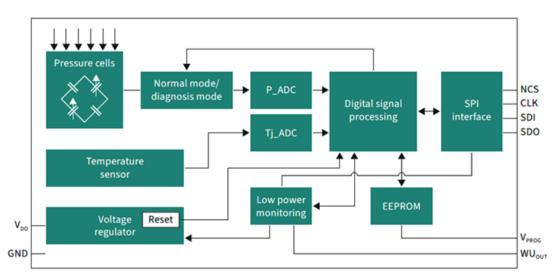
## **Benefits**

- > Regulation compliant battery monitoring
- > Battery power savings while parking
- > Simplification to achieve safety standard
- > Robust sensor failure detection
- > Maximum system efficiency
- > Best fitting configuration

# Competitive advantage

- > Autonomous low power modes
- > Minimal power consumption
- > ISO 26262-compliant / ASIL B
- > Best in class quality
- > Highest reliability

# **Block diagram**



OPN	SP Number	Package
KP467XTMA1	SP005580018	PD-DFN-8

# AIROC™ CYW20829 Bluetooth® LE Module

Infineon's AIROC™ CYW20829 Bluetooth® LE MCU is a v5.4 core specready device that delivers the optimal combination of computing and RF performance, energy efficiency, I/O options and security to enable feature-rich, innovative Bluetooth® solutions for a wide range of applications.

The CYW20829 integrates dual Arm® Cortex®-M33 cores, a powerful and highly efficient Bluetooth® LE radio with a best-in-class RF link budget, application SRAM, a rich set of interfaces and peripherals including a SMIF with XIP capability for external flash, and it features support for secure boot, secured execution environment, eFuse for custom keys, CAN bus and cryptographic acceleration.

The CYW20829B0-P4TAI100 is a fully integrated Bluetooth® LE wireless module. The CYW20829B0-P4TAI100 includes an onboard crystal oscillator, passive components, 1MB flash memory, and the CYW20829 - the Bluetooth® LE 5.4 MCU with Industry's best range, ARM® Cortex® -M33 dedicated for applications. The CYW20829B0-P4TAI100 includes an integrated trace antenna.



## **Features**

- > Highly integrated Bluetooth® low energy 5.4 MCU
- > Up to 96 MHz ARM Cortex M33 application processor
- > 1024 KB SFlash / 256 KB SRAM
- > TX Power: up to +10 dBm
- > Robust Receive sensitivity of -106 dBm
- > Fully qualified by Bluetooth® SIG
- > FCC, ISED, CE, MIC certified
- > 26 programmable GPIO
- > 14.5 x 19 x 1.95 mm<sup>3</sup>
- > PCB trace antenna
- > Up to 85°C operating temperature

# Product collaterals / Online support

Product page

Board page

# **Benefits**

- > Industry's best range and noise immunity BLE solution
- > Future proof your designs with advanced Bluetooth® LE 5.4 MCU
- > Reduce RF design effort with module and integrated antenna
- > Turn-key module with complete Modus Toolbox software support
- > Fast-to-market with fully certified modules

# Competitive advantage

- > Industry-leading RF range and robustness
- > Full feature Bluetooth® v5.4 support
- > System BOM cost savings from highly integrated MCU
- > Enables secure applications at multiple levels
- > Supports external 1 MB flash memory
- > Enables LE audio and pre-spec ULL HID
- > Ultra-low current consumption

# **Target applications**

- > Industrial: asset tracking, solar / energy storage, automation, electronic shelf labels
- > Smart Home: home automation, sensor nodes, remote controls
- Health: medical patches, wearable monitors (e.g. ECG, blood pressure)
- > Gaming: AR / VR controllers and accessories
- PC accessories: mouse, keyboards, ultra low latency HID, microphones

OPN	SP Number	Package
CYW20829B0P4TAI100XUMA1	SP005970282	LG-MLGA-42
CYW920829M2EVK-02	SP005962701	

# XENSIV™ PAS CO2 5 V Sensor2Go kit and miniboard

The XENSIV™ PAS CO2 5 V Sensor2Go kit and the XENSIV™ PAS CO2 5 V miniboard are finally available.

The XENSIV™ PAS CO2 5 V miniboard enables precise CO2 measurements in a compact size. This board requires no reflow process and is compatible with combined PCB layouts, allowing easy transition to reflow assembly for later use. It integrates seamlessly with the Sensor2Go kit and is available in small quantities to enable small-scale evaluations and early-stage application development.

The XENSIV™ PAS CO2 5 V Sensor2Go kit empowers developers with a seamless CO2 sensor integration and a plug & play solution. With effortless connectivity to the graphic user interface (GUI), users can accurately measure real-time CO2 data from multiple kits. This user-friendly development kit facilitates prototyping and represents an ideal CO2 monitoring solution for different ventilation applications.



#### Features

- > XENSIV™ PAS CO2 5 V Sensor2Go kit:
  - > 5 V for the emitter
  - > Plug and play solution via micro-USB cable
  - > Auto baseline correction feature
  - > Pressure correction (user i/p) feature
  - > Integrated signal conditioning
  - > Export data feature
- > XENSIV™ PAS CO2 5 V miniboard:
  - > 5 V for the emitter
  - > Compact size
  - > Easy connection with standard 2.54 pin headers
  - > No reflow process required
  - > Compatibility with combined PCB layouts
  - > Seamless integration with Sensor2Go kit

# **Target applications**

- > Heating, Ventilation and Air Conditioning (HVAC)
- > Air quality monitoring devices
- > Air exchangers
- > Smart thermostats
- > Smart lighting
- > Smart fridge
- > Smart horticulture

# Product overview incl. user manual link

OPN	SP Number
EVALCO25VSENSOR2GOTOBO1	SP006037148
EVALCO25VMINIBOARDTOBO1	SP006037150

#### **Benefits**

- > XENSIV™ PAS CO2 5 V Sensor2Go kit:
  - > Easy performance evaluation
  - > Logging of the sensor history
  - > Direct CO2 read-outs in ppm
  - > GUI connectivity to multiple kits
  - > Compact and portable design
  - > Quick setup and operation
- > XENSIV™ PAS CO2 5 V miniboard:
  - > Space-saving design
  - > Simplified assembly process
  - > Cost reduction (no reflow equipment)
  - > Efficient testing and validation
  - > Fast prototyping
  - > Availability in small quantities

# Competitive advantage

- > Highly selective CO2 measurements without cross sensitivity
- > Miniaturized size
- > High quality data, robust performance and long-term stability
- >~ Fulfillment of WELL<sup>TM</sup> Building Standard
- > Dust-proof design in compliance with ISO 20653:2013-02
- > RoHs compliant and halogen-free material

Product collaterals / Online support

Board page Sensor2Go kit

Board page miniboard

# Block camera kit DEMO\_FX3\_LVDS\_CAM01

DEMO\_FX3\_LVDS\_CAM01 is based on the EZ-USB™ FX3 USB 5 Gbps peripheral controller. Its 2-gen general programmable interface (GPIF II) can connect to a processor, image sensor, FPGA or ASIC. Users can program the GPIF to behave like a FIFO, an asynchronous SRAM, an address / data multiplexed interface, a CompactFlash or a proprietary interface. The kit includes a BT.1120 camera module which can be connected to an EZ-USB™ FX3 FPGA board via an FFC.



#### **Features**

- > Video streaming up to 1080 p @ 60 fps
- > Video streaming in YUV format
- > Onboard image sensor module
- > USB bus-powered operation,
- > Off-the-shelf BT.1120 camera module
- > Onboard regulators
- > UVC or USB3 vision ready
- > Connection via flexible flat cable (FFC)

Product collaterals / Online support

Board page

#### **Benefits**

> Block camera demo kit to test the functionalities of EZ-USB™ FX3 on a camera application

# **Target applications**

> Machine vision

Product overview incl. user manual link

OPN	SP Number
DEMOFX3LVDSCAM01TOBO1	SP006021248

# **OPTIGA™** Trust M Express Shield

The popular mikroBUS™ layout makes it easy to prototype with any MCU or MPU platform. The pre-provisioned certificates can be requested and forwarded to your personal product cloud using Infineon's CIRRENT™ Cloud ID. It can also be used with SBCs with suitable adaptors and evaluated with the PSoC™ 62S2 Wi-Fi BT Pioneer Kit and OPTIGA™ Trust Adapter.



## **Features**

- > Pre-provisioned TLS certificates
- > CC EAL 6+ (high) certification
- > mikroBUS™ compatibility
- > Qwiic compatibility
- > I"C interface / shielded connection
- > ECC, RSA, AES, HMAC, HKDF, TLS PRF

# **Target applications**

- > Smart cities
- > Smart buildings
- > Smart homes
- > Industrial IoT
- > Healthcare

Product collaterals / Online support

**Board page** 

## **Benefits**

- > Easy to evaluate
- > Evaluation of cloud ID provisioning
- > Easy plug-in / plug-out
- > Wide choice of adapters
- > Support for all MCU / MPU platform

OPN	SP Number
TRUSTMEXPSHIELDTOBO1	SP005932950