

Discover MOTIX™ TLE994x/5x: Compact SoC solution for motor control with FOC capability at a competitive price


Infineon Technologies AG
Automotive Smart Power | Motor Control Solutions





MOTIX™ 32-bit motor control SoC portfolio expansion: MOTIX™ TLE994x/5x





In production


 BDC MOTOR CONTROL		
Relay	Half-Bridge	H-Bridge


 BLDC MOTOR CONTROL
3-phase


TLE984x 
Cortex®-M0, ≤64k, QFN

TLE985x 
Cortex®-M0, ≤64k, QFN


TLE985x 
Cortex®-M0, ≤96k, QFN


TLE986x 
Cortex®-M3, ≤256k, QFN-48

TLE988x 
Cortex®-M3, ≤256k, QFP

NEW!
TLE994x 
Cortex®-M23, 72k, TSDSO-32

TLE987x 
Cortex®-M3, ≤256k, QFN-48

TLE989x 
Cortex®-M3, ≤256k, QFP

NEW!
TLE995x 
Cortex®-M23, 72k, TSDSO-32

ISO26262

MOTIX™ TLE994x and TLE995x

32-bit motor control SoC based on Arm® Cortex®-M23



KEY BENEFITS

-  **Small PCB size** with compact design
-  **System cost saving** through integration
-  ASIL-B certified **safe motor operation**
-  **Optimized motor control** derived by improved peripherals
-  **Premium design-in experience**



Power	up to 700W
MCTRL Perf.	Dual cycle FOC
Voltage	12V boardnet

arm
Cortex®-M23
40 MHz

Flash
72 kB

Supply

MCTRL
SW Dual
Cycle
FOC



Motor Control

2-/3-phase bridge driver

Charge
Pump

N-FET
Stage

CCU7

CSA

ADC
12



ISO 26262
compliant

TrustZone

TARGET APPLICATIONS



Water pump



Cooling fan



HVAC blower



Fuel pump



Oil pump



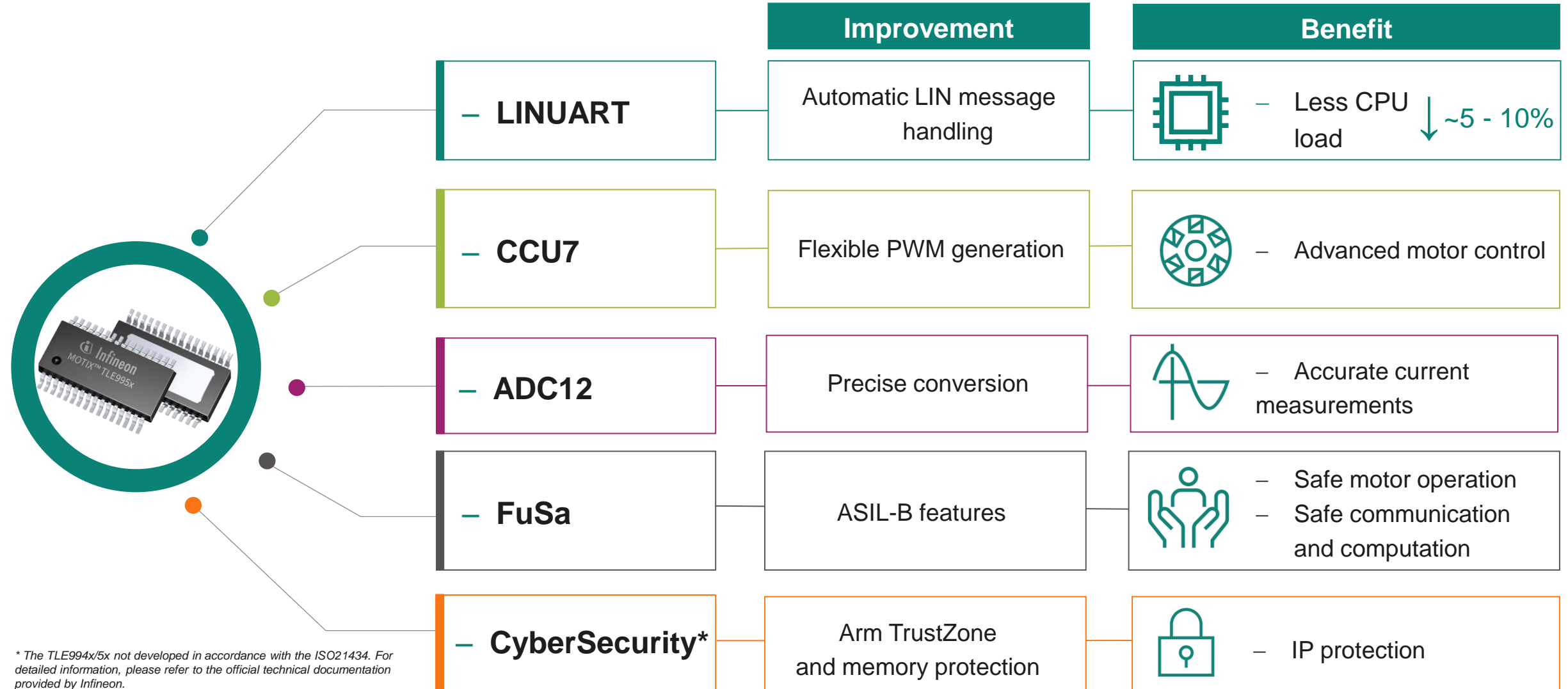
Sunroof



In production

Active & preferred

MOTIX™ TLE994x/5x: Evolving the TLE987x peripherals with enhanced features



MOTIX™ TLE994x/5x variants



BLDC motor

**3-Phase
Bridge
Driver IC**

Device Name	Temperature Grade	Flash / RAM Memory
TLE9954EQA40	Grade 1	72kB / 6kB
TLE9954EQW40	Grade 0	72kB / 6kB



Brushed
motor

**H-Bridge
Driver IC**

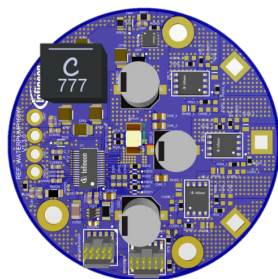
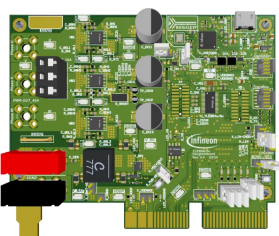
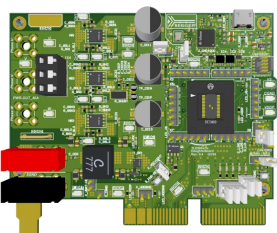
Device Name	Temperature Grade	Flash / RAM Memory
TLE9944EQA40	Grade 1	72kB / 6kB
TLE9944EQW40	Grade 0	72kB / 6kB

MOTIX™ TLE994x/5x solution offering



HARDWARE SUPPORT

Evaluation hardware for an easy getting started



TOOLS

Comprehensive set of tools to facilitate development process



- Device **configuration**
- **Register** viewer and **power simulator**
- **Motor control SW parametrization** and runtime analysis
- **Programmer, memory analyzer**



SOFTWARE

SW for evaluation in target applications and partner ecosystem for productive implementation

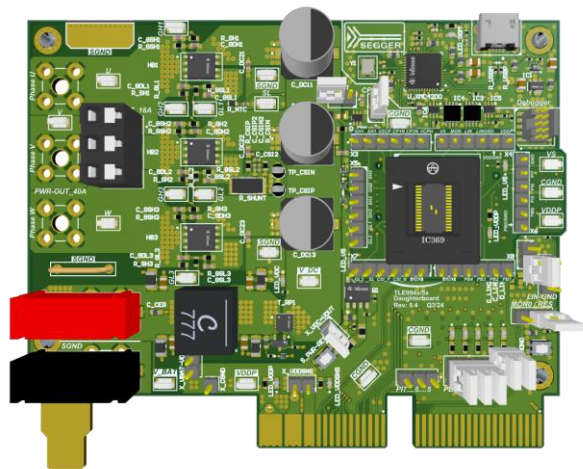
- **Free** evaluation **SDK** including **PDL**, peripheral drivers, example codes and tool configs, KEIL µVision support
- **Free motor control target application examples**: configurable 6/12-step block commutation, CPU load optimized FOC
- Licenses for productive use and end-to-end engineering services by **MOTEON**
- Certified LIN stacks from **IHR**

MOTIX™ TLE994x/5x hardware support for getting started



HARDWARE SUPPORT

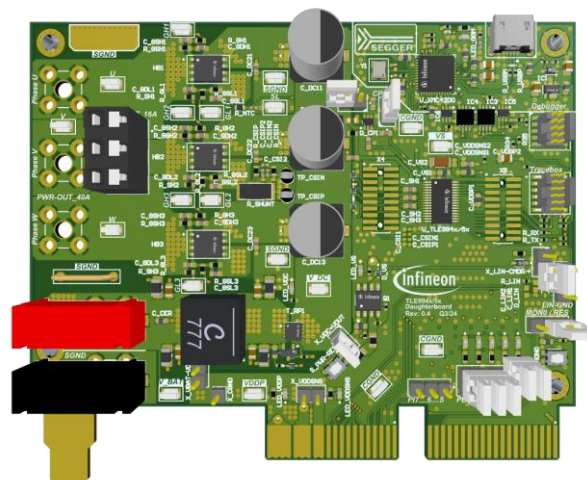
TLE995x Evaluation Board



OPN: TLE995XEVALBOARDTOBO1

Enablement tool with a spring socket for evaluating and testing MOTIX™ TLE994x and TLE995x families.

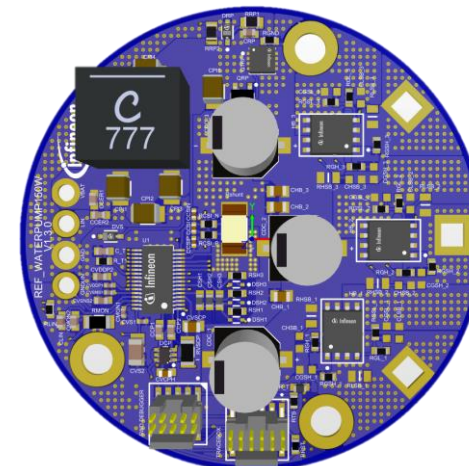
TLE995x Evaluation Kit



OPN: TLE995XEVALKITTOBO1

Evaluation of all functions and peripherals of the super set device, TLE9954EQW40.

150W Water Pump Reference Design



OPN: REFWATERPUMP150WTOBO1

System reference design for a water pump application to simplify design process, enabling reduced development effort and time-to-market.

MOTIX™ TLE994x/5x PC Tools for an easy design-in



MOTIX™ TOOLS



Infineon
Developer Center

Extensive development environment offering a comprehensive set of tools by MOTIX™



Device Configurator

Allows to enable and configure device peripherals.



Solution Designer

A graphical configuration tool to analyse, debug and tune motor control applications.



BSL

User interface to control the firmware of an MCU target via the provided BSL commands interactively.



Automotive Power Explorer

GUI-based Tool which allows users to easily and swiftly compute power dissipation of the device



Register Viewer

Online tool designed to provide users with easy access to accurate and up-to-date information about registers of Infineon devices.



Memory Analyzer

A graphical visualization tool that analyses the memory consumption of Infineon microcontroller families

MOTIX™ TLE994x/5x Software support



MOTIX™ SOFTWARE

Peripheral Driver Library (PDL)

- **MOTIX™ MCU** peripheral drivers, optimized for integration with Motor Control SW
- Automotive SPICE and MISRA C:2012 compliant
- [Infineon Device Configurator](#) GUI tool for device initialization and configuration
- PDL is deployed as part of free [MOTIX™ MCU SDK](#) including code examples and tool configs, supported by KEIL µVision and IAR Embedded Workbench
- Licenses for productive use and end-to-end engineering services by **MOTEON**
- Easy start and faster time-to-market





Motor Control SW

- Best-in-class SW scalability and reuse by modular and layered architecture
- Rich library* of standard and advanced functions optimized for single shunt FOC with **MOTIX™ MCU** family, **Automotive SPICE** and **MISRA C:2012** compliant
- [Solution Designer](#) GUI tool supports in parametrization for various motors, evaluation and runtime analysis
- Free **TLE995x** Demos:
 - Configurable [6/12-step block commutation](#)
 - CPU load optimized **FOC**
- SW and licenses for productive use and end-to-end engineering services by **MOTEON**
- Scalable motor control developments

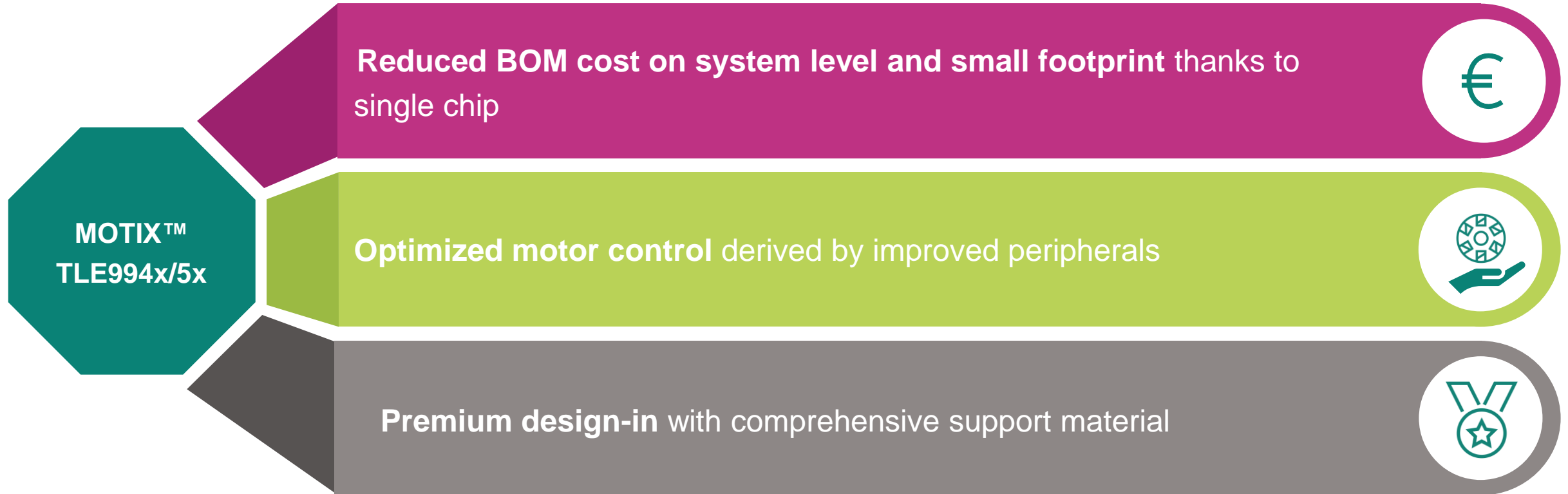
* For free source code evaluation access of latest version please contact your local FAE

MOTIX™ TLE994x/5x Toolchain ecosystem partners

In addition to Infineon's IDC Tools, MOTIX™ TLE994x/5x is supported by a variety of third-party tools, including debuggers, IDEs, and communication protocol software drivers to ensure a seamless development experience

	Tool provider	Description
IDE		Arm® Keil® µVision is an integrated development environment which consists of code editor, compiler and debugger
Debugger	 	Driver for "on-board" or "stand-alone" debugger
Communication protocol		Software driver that implements the LIN protocol, providing a set of APIs for applications to interact with LIN devices

Why MOTIX™ TLE994x/5x?





Technical documents	Status
Datasheet	available*
User Manual	available*
Firmware Reference Manual	available*
HW Design Guideline	available*
Safety Documentation	available*



Software	Status
SDK incl. Low-Level Driver for TLE995x peripherals and getting started examples	available*
Field Oriented Control SW , supports configuration of runtime and static parameters to fit to various motors	Q3 25
12-step block commutation SW	available*

* Please consider NDA restrictions for TLE994x/5x collaterals, software and design tools and contact you regional Infineon sales partner in order to get access to restricted information.



Boards	Status
Evaluation Board	available*
Evaluation Kit	available*
150W Water Pump Reference Design	Q3 25



Design and simulation tools	Status
Simulation Models	available
Device Configurator	available
BSL Tool	available*
Register Viewer	available*
Infineon Automotive Power Explorer	available*
Solution Designer	available
Memory Analyzer	available

More info about products & design support:

www.infineon.com/TLE994x

www.infineon.com/TLE995x

**Download and manage software & tools in the
Infineon Developer Center (IDC):**

www.infineon.com/idc

Ask the community:

[MOTIX MCU | 32-bit motor control SoC](#)

All about MOTIX motor control ICs

www.infineon.com/motor-control-ics



