



# SAK-TC233L-32F200F AC

## A powerful AURIX™ microcontroller for automotive & industrial applications

SAK-TC233L-32F200F AC is Infineon's brand new family of microcontrollers. Its innovative multicore architecture, based on up to three independent 32-bit TriCore CPUs, has been designed to meet the highest safety standards, while simultaneously increasing performance significantly. The the TC23xL family belongs to the TC2xx Aurix™ 1st generation. Equipped with a TriCore with 200 MHz, a single voltage supply of 3.3V and a Powerful Generic Timer Module (GTM), the TC23xL series aim for a reduced complexity, best-in-class power consumption and significant cost savings.

### Key Features:

- TriCore™ with 200MHz / DSP functionality
- Up to 2MB Flash w/ ECC protection
- 128KB EEPROM @ 125k cycles
- Up to 192KB RAM w/ ECC protection
- 16x DMA channels
- 24x 12bit SAR ADC converter
- Powerful Generic Timer Module (GTM)
- SENT sensor interfaces
- State of the art connectivity: 1x FlexRay, 2x LIN, 4x QSPI, 6x CAN including data rate enhanced CAN FD
- Wake-up Timer
- Single voltage supply 3.3V
- TQFP-100 package
- ambient Temperature range -40°...+125°
- Programmable HSM (Hardware Security Module)

## **Most innovative safety:**

- Diverse Lockstep Core with clock delay
- Redundant and diverse timer modules (GTM, CCU6, GPT12)
- Access permission system
- Safety management unit
- DMA
- I/O, clock, voltage monitor
- Developed and documented following ISO 26262 to support safety requirements up to ASIL-D
- AUTOSAR V3.2 and V4.x

## **System benefits**

- Diverse Lockstep architecture to reduce development effort for ASIL-D systems
- High integration for reduced complexity and significant cost savings
- Delta-sigma analog-to-digital converters for fast and accurate measurements
- Innovative single supply concept for best-in-class power consumption and cost savings in external supply
- Scalability in terms of performance, packages, memory and peripherals for flexibility across platform concepts
- Available as single and lockstep core
- Latest connectivity CAN FD (flexible data rate)
- Scalable safety from QM to ASIL D for Industrial and Automotive Applications
- Dedicated emulation device chip (ED) for multicore debugging, tracing and calibration
- Hot package options for extended temperature range

## **Target Applications: Industrial Applications**

Industrial & Consumer application never were any better. Thanks to its state-of-the-art safety features, the new TriCore TC22xl enables systems to achieve the highest safety level up to ASIL-D. Its innovative multicore architecture, based on up to three independent 32-bit TriCore™ CPUs, has been designed to meet the highest safety standards (IEC61508/ISO26262), while scaling from low cost to high performance devices. Its scalability allows the selection of a single-core solution for basic PLC and Motor Control to multicore solutions for Elevators and Network Gateway systems. The best cost-performance fit is offered by the wide range of flash, performance and peripheral options available within the AURIX family. With performance of 160 MHz-6x300 MHz, advanced timer unit, totally flexible PWM generation and hardware input capture, Infineon SafeTcore library safety software and many other features, the system offers benefits such as:

- Scalability over flash, RAM and peripherals, offering the best cost-performance ratio
- Innovative supply concept leads to best-in-class power consumption
- The latest diverse lockstep technology with clock delay (diverse lockstep core) significantly reduces the software overhead and enables fast time-to-market.
- Secured high-speed communication with domain controller: CAN FD, FlexRay, SPI and Ethernet

These features enables AURIX to be used on Industrial and Consumer Applications - which requires Safety (SIL) & CAN FD

**Motor Control:** In today's competitive, dynamic environment, there's constant pressure to find new ways to increase energy efficiency, mobility and security – in all motor control applications. At the same time, software's increasingly important role in systems directly contributes to their complexity – and increases costs. Be it low or high voltage, Infineon's semiconductors for motor control and drives offer the right innovative solutions in reliable German-engineered quality. With excellent figures of merit, the price point that fits your budget – and cutting-edge software tools that save you time and money.

**Wireless Charging :** The next generation of wireless charging systems have to meet strict safety, security, environmental and regulatory requirements while still enabling industry-leading charging performance and efficiency. Infineon's AURIX™ microcontroller provides a powerful and cost-effective platform for high performance, smart and safe wireless charging applications

**Multicopters :** Infineon brings ready-to-use multicopter solutions to a high-potential, emerging market. As a leading semiconductor company, we offer a complete system solution that includes every essential semiconductor, from power electronics, to controllers, to securities, to authentication, to sensors.

**Industrial robots:** As a leader in the industrial robotics field, Infineon has a proven track record of offering the broadest portfolio on the market, with high-quality products for the entire system. No other company worldwide comes close to our scope of high-quality components and solutions for robotic applications. By sourcing our products, you benefit from a one-stop shop and can leverage the full potential of an industrial robotics system, with less effort and lower costs. For example, we offer ready-to-use products that are fully integrated along the whole control loop (sense, control, actuate).

**More industrial & consumer applications:**

- **PLC**
- Solar Inverter
- **SMPS**
- **UPS**
- Light Networks & Gateway
- **EV Charging**

## Target applications: Automotive

### Chassis, Safety Applications:

**Telematic Control unit and V2X:** As system complexity increases in cars, so too does the volume of data to be processed and distributed. New payment methods, such as parking fees or road tolls, require a secure flow of transaction data. Infineon can draw on years of expertise in chip card and identification systems to propel automotive data security to the next level.

**Air bag System:** Thanks to its state-of-the-art safety features, the new TriCore™ TC23xL enables systems to achieve the highest safety level up to ASIL-D. Its scalability allows the selection of a single-core solution for basic airbag systems and multicore solutions for airbag systems with an integrated sensor cluster. The best cost-performance fit is offered by the wide range of flash, performance and peripheral options available within the AURIX™ family . Thanks to its High-performance and dedicated safety , the 32-bit the TC23xL enables you also the integration of multiple functions

**Scable EPS solution:** Electric power steering (EPS) offers a host of advantages to automobiles and drivers. From up to 3% less fuel consumption and noticeable space savings to easier integration and software for an enhanced driving experience. What's needed to achieve this? A reliable, high-performance EPS is made possible by aligned solutions featuring sensors and low-loss MOSFETs.

InfineonIn is the only player that offers you a full EPS chipset. And you'll get system and product know-how that's second to none. Need a quick fix? Use our system development platform to accelerate your time to market.

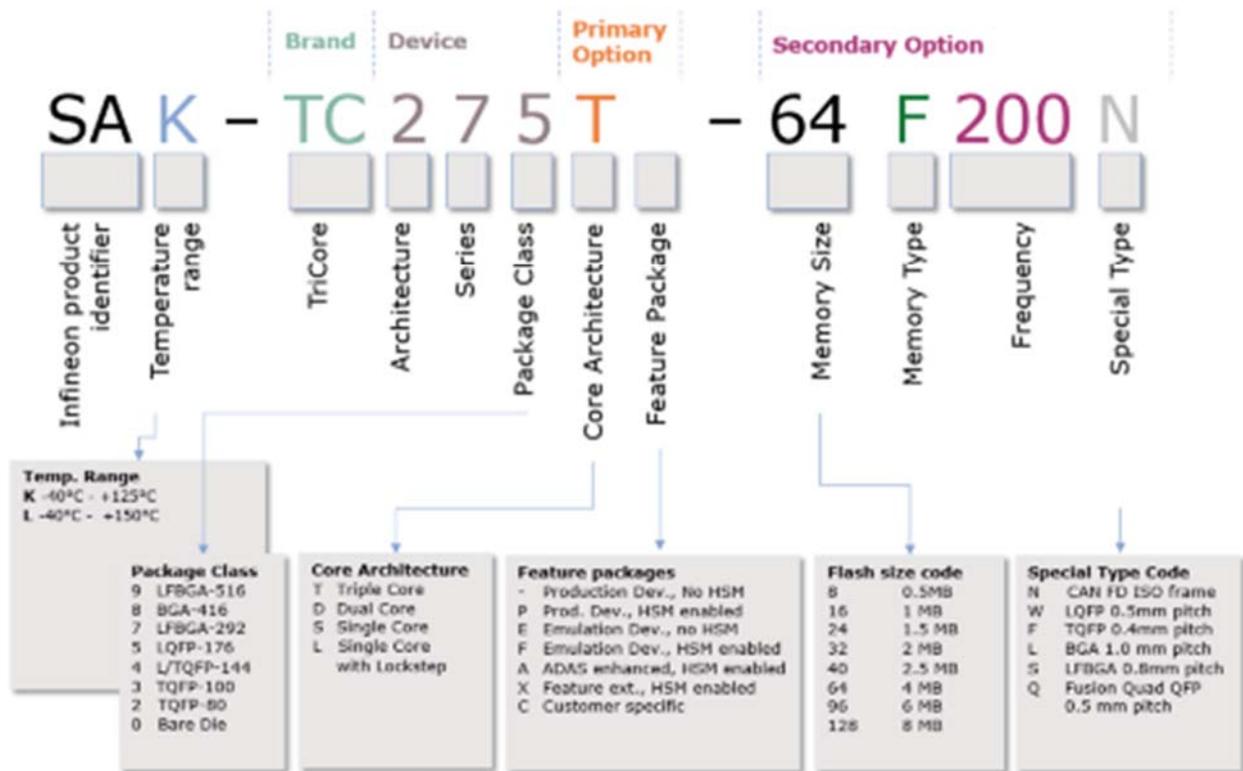
**Transfercase :** As part of the drivetrain in 4-wheel-drive systems (4WD) and all-wheel-drive systems (AWD), a transfer case is used to distribute power between the front and the rear axle. In some cars, a transfer case can adapt to the driving conditions, such as when a car travels off-road (active transfer case.) , Here, it helps reduce fuel consumption and improve the driving dynamics of the car.

### Use cases:

-  DC-DC Converter
-  Industrial robots
-  Gasoline Direct Injection
-  UPS
-  Multicopters
-  Wireless charger solution

-  Hydraulic management system for trucks and agricultural vehicles
-  Electric vehicle charging
-  Motor control
-  DC-DC Converter
-  Industrial robots
-  Gasoline Direct Injection
-  UPS
-  Multicopters
-  Wireless charger solution
-  Hydraulic management system for trucks and agricultural vehicles
-  Electric vehicle charging

## How to unbundle an Aurix product number



Aurix Product Naming

# Parametrics

Parametrics	SAK-TC233L-32F200F AC
# of cores / lockstep cores	1/1
A/D Input Lines (incl. FADC)	24
A/D Input Lines	24
ASIL/SIL support	ASIL-D/ SIL-3
Budgetary Price €1k	5.84
CAN Nodes	6
Clock Frequency <b>max</b>	200.0 MHz
DMA Channels	16
DSP Functionality	yes
External Bus Interface	no
Fast Flash Programming	no
FlexRay™	yes

Parametrics	SAK-TC233L-32F200F AC
Floating Point Unit	yes
Hardware Accelerator	no
I/O Operation Voltages	3.3 V
Instruction Set Architecture	TriCore™ v1.6E (32-bit)
Instruction Width ([bits])	32/16
LIN	2.0
Number of ADC Modules	2.0
On-chip Clock Generation	yes
On-chip Voltage Regulator	yes
Oscillator Watchdog	yes
Program Memory	2.0 MByte
Real Time Clock	yes
SPI	4.0
SRAM (incl. Cache)	192.0 kByte

<b>Parametrics</b>	<b>SAK-TC233L-32F200F AC</b>
Temperature	-40°C - +125 °C
Touch/LED Matrix Control	no
Type of Memory	Flash
Watchdog Timer	yes
eMMC	no

## Order

<b>Sales Product Name</b>	<b>SAK-TC233L-32F200F AC</b>
<b>OPN</b>	TC233L32F200FACKXUMA1
<b>Product Status</b>	active and preferred
<b>Package name</b>	<b>PG-TQFP-100</b>
<b>Order online</b>	
<b>Completely lead free</b>	yes

<b>Sales Product Name</b>	<b>SAK-TC233L-32F200F AC</b>
<b>Halogen free</b>	yes
<b>RoHS compliant</b>	yes
<b>Packing Size</b>	1000
<b>Packing Type</b>	TAPE & REEL
<b>Moisture Level</b>	3
<b>Moisture Packing</b>	DRY