



**THE DATASHEET OF
MK51DX256ZCLL10**





Integrated
measurement
engine, Ethernet
and LCD

Kinetis K50 Family

The Kinetis MCU portfolio consists of multiple pin-, peripheral and software-compatible MCU families based on the ARM® Cortex®-M4 core.

TARGET APPLICATIONS

- ▶ Low-power portable medical devices
- ▶ Clinical and lab equipment
- ▶ Test/measurement equipment
- ▶ Instrumentation applications
- ▶ Monitor and telehealth applications

Kinetis MCU families are built from innovative 90 nm thin-film storage (TFS) flash technology with unique FlexMemory (EEPROM) capability and offer industry-leading low power and mixed signal analog integration.

The K50 MCU family provides designers with an analog measurement engine consisting of integrated operational and transimpedance amplifiers as well as high-resolution ADC and DAC modules. The family also features IEEE® 1588 Ethernet and hardware encryption, Full-Speed USB 2.0 On-The-Go with device charger detect capability and a flexible low-power segment LCD controller with support for up to 320 segments. Devices start from 128 KB of flash in 64 QFN packages extending up to 512 KB in a 144 MAPBGA package.

ONE-STOP ENABLEMENT OFFERING: MCU + IDE + RTOS

Tower® System hardware development environment:

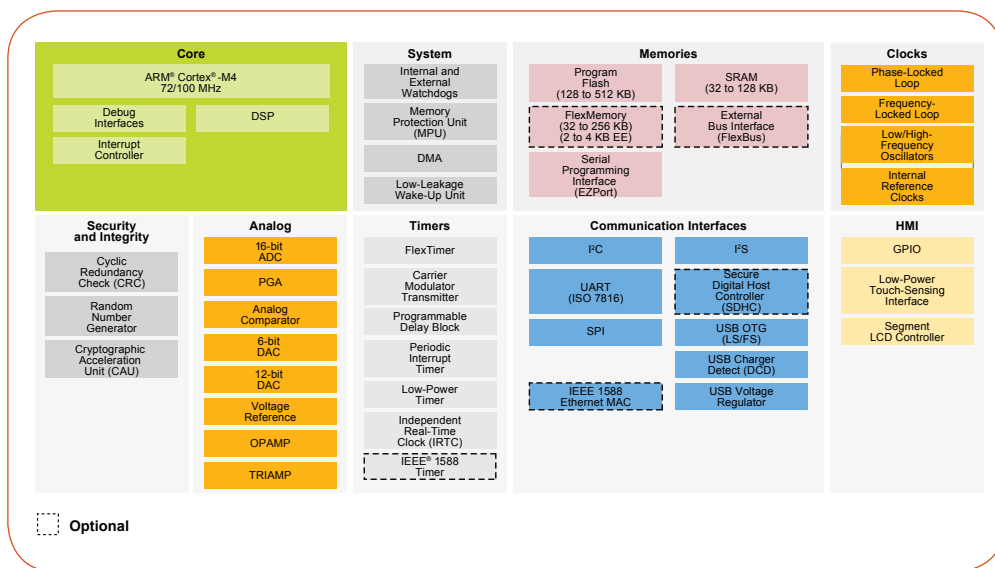
- ▶ TWR-K53N512-KIT (\$179)
 - Includes TWR-SER, TWR-ELEV and TWR-K53N512 modules
- ▶ TWR-K53N512 (\$109)
 - Includes TWR-K53N512 and TWRPI-SLCD daughter card
- ▶ Integrated development environments (IDEs)
 - Eclipse-based CodeWarrior IDE and Processor Expert
 - IAR Embedded Workbench®
 - ARM Keil® MCU development tool
 - CodeSourcery Sourcery G++ (GNU)
- ▶ Portable medical applications demo software: EKG, pulse oximeter, blood pressure monitor, spirometer
- ▶ Math, DSP and encryption libraries
- ▶ Motor control libraries





- ▶ Complimentary bootloaders (USB, Ethernet, RF, serial)
- ▶ Complimentary embedded GUI
- ▶ Complimentary proprietary MQX™ RTOS
- ▶ Cost-effective Nano™ SSL/Nano™ SSH for proprietary MQX RTOS
- ▶ Micrium μC/OS-III
- ▶ Express Logic ThreadX
- ▶ SEGGER embOS
- ▶ FreeRTOS
- ▶ Green Hills μ-veLOsity
- ▶ Mocana (security)
- ▶ Full ARM ecosystem
- ▶ Reduces core interruption, increasing performance
- ▶ Design flexibility and system cost reduction
- ▶ Increases system safety by restricting access to key memory locations
- ▶ Provides scalability needed for key digital power and motor control applications

KINETIS K50 FAMILY



| Features | Benefits |
|--|--|
| <ul style="list-style-type: none"> • ARM® Cortex®-M4 core with DSP instruction support • Up to 16-channel DMA and crossbar switch | <ul style="list-style-type: none"> • Up to 100 MHz core supporting a broad range of processing bandwidth needs • Peripheral and memory servicing with reduced CPU loading. Concurrent multi-master bus accesses for increased bus bandwidth |
| <ul style="list-style-type: none"> • Up to 2 x 16-bit ADC with PGA • Up to 2 x 12-bit DAC • Programmable delay block • Operational and transimpedance amplifiers • Voltage reference (VREF) | <ul style="list-style-type: none"> • High-resolution and high-accuracy ADC provides accurate signal acquisition • Digital-to-analog converter with clock gating optimized for low-power usage • PDB precisely triggers ADC and DAC blocks to complete sensor biasing and measurement (i.e. glucometry strips) • OPAMPS allow signal filtering and amplification, TRIAMPS are optimized for converting current inputs into voltages that can be read by the ADC • VREF allows enhanced accuracy by supplying analog peripherals with fixed reference |
| <ul style="list-style-type: none"> • IEEE® 1588 Ethernet MAC with hardware time stamping • Hardware encryption coprocessor | <ul style="list-style-type: none"> • Precision clock synchronization for real-time networked industrial automation and control • Secure data transfer and storage. Faster than software implementations and with minimal CPU loading. Supports a wide variety of algorithms |
| <ul style="list-style-type: none"> • USB On-The-Go (Full-Speed) with device charger detect | <ul style="list-style-type: none"> • Optimized charging current/time for portable USB devices enabling longer battery life USB low-voltage regulator supplies up to 120 mA off chip at 3.3 V to power external components from 5 V input |
| <ul style="list-style-type: none"> • Flexible, low-power LCD controller with support for up to 320 segments (40 x 8 or 44 x 4) | <ul style="list-style-type: none"> • LCD blink mode enables low average power while remaining in low-power mode • Segment fail detect guards against erroneous readouts and reduces LCD test costs • Frontplane/backplane reassignment provides pin-out flexibility easing PCB design and allows LCD configuration changes via firmware with no hardware re-work • Supports multiple 3 V and 5 V LCD panel sizes with fewer segments (pins) than competitive controllers and no external components • Unused LCD pins can be configured as other GPIO functions |
| <ul style="list-style-type: none"> • FlexBus external bus interface and secure digital host controller | <ul style="list-style-type: none"> • Enables the connection of external memories and peripherals (e.g., graphics displays) • Connection to SD, SDIO, MMC or CE-ATA cards for in-application software upgrades, file systems or adding Wi-Fi® or Bluetooth® support |
| <ul style="list-style-type: none"> • 128–512 KB flash. Up to 128 KB of SRAM • 32–256 KB FlexMemory | <ul style="list-style-type: none"> • High reliability, fast access program memory with 4-level security protection • Independent flash banks allow concurrent code execution and firmware updating • FlexMemory provides 2–4 KB of user-segmentable byte write/erase EEPROM. In addition, Flex NVM from 32–256 KB for extra program code, data or EEPROM backup |



KINETIS K50 MCU FAMILY OPTIONS

| Part Number | CPU (MHz) | Memory | | | | Feature Options | | | | | | Packages | | | | |
|-----------------|-----------|------------|----------------|----------|-------------------------|-----------------|-------|-----|----------|-----|-----|----------------------------|----------------------------|-----------------------------|--------------------------|-----------------------------|
| | | FLASH (KB) | FlexMemory(KB) | SRAM(KB) | EEPROM/ FlexRAM (KB) | TRIAMP | Opamp | DAC | ETHERNET | LCD | ADC | 64 LQFP (10 x 10 mm) LH | 80 LQFP (12 x 12 mm) LK | 100 LQFP (14 x 14 mm) LL | 121 BGA (8 x 8 mm) MC | 144 LQFP (20 x 20 mm) LQ |
| MK50DX128Cyy7 | 72 | 128 | 32 | 32 | 2 | √ | √ | √ | | | √ | √ | | √ | | |
| MK51DX128Cyy7 | 72 | 128 | 32 | 32 | 2 | √ | √ | √ | | √ | √ | √ | | √ | | |
| MK50DX256Cyy7 | 72 | 256 | 32 | 64 | 2 | √ | √ | √ | | | √ | √ | √ | √ | | |
| MK51DX256Cyy7 | 72 | 256 | 32 | 64 | 2 | √ | √ | √ | | √ | √ | √ | √ | √ | | |
| MK51DN256ZCyy10 | 100 | 256 | - | 64 | | √ | √ | √ | | √ | √ | | | | √ | √ |
| MK50DX256ZCyy10 | 100 | 256 | 256 | 64 | 4 | √ | √ | √ | | | √ | √ | √ | √ | | |
| MK51DX256ZCyy10 | 100 | 256 | 256 | 64 | 4 | √ | √ | √ | | √ | √ | √ | √ | √ | | |
| MK53DX256ZCyy10 | 100 | 256 | 256 | 128 | 4 | √ | √ | √ | √ | √ | √ | | | | √ | √ |
| MK50DN512ZCyy10 | 100 | 512 | - | 128 | | √ | √ | √ | | | √ | | √ | √ | √ | √ |
| MK51DN512ZCyy10 | 100 | 512 | - | 128 | | √ | √ | √ | | √ | √ | | √ | √ | √ | √ |
| MK52DN512ZCyy10 | 100 | 512 | - | 128 | | √ | √ | √ | √ | | √ | | | | √ | √ |
| MK53DN512ZCyy10 | 100 | 512 | - | 128 | | √ | √ | √ | √ | √ | √ | | | | √ | √ |

yy = Package designator

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View MK51DX256ZCLL10 on WIN SOURCE](#)

 [NXP / Nexperia Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management