

5V Robust MCUs with Touch and CAN

NXP Communicator

Introducing KE1xZ64/32 5V Robust MCUs with Touch and CAN

Based on the Arm Cortex-M0+ with up to 48 MHz performance, providing up to 64 KB flash and 8 KB RAM along with a complete set of analog/digital features including Touch Sense and CAN, the KE1xZ64/32 MCUs extend the Kinetis E family with smaller memory footprint options for broad scalability.

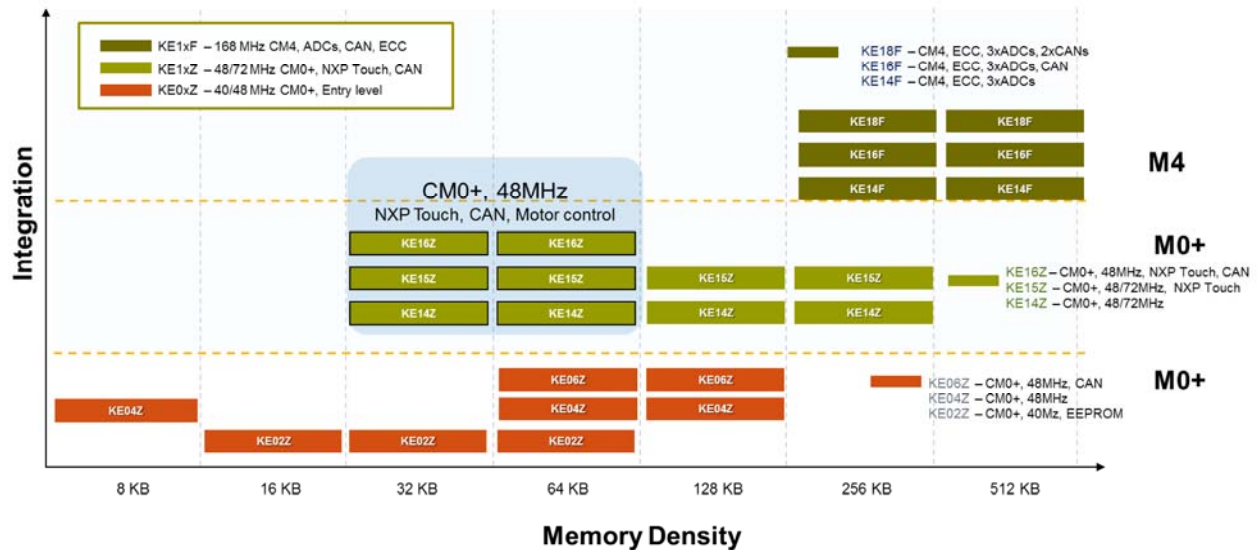
Communicator Finalization Date: Jan 2019

Global Full Market Launch Date: March 7, 2019

Embargo Date: None



Kinetis E



Kinetis E Portfolio

The Kinetis E portfolio is a 5V MCU family that includes MCUs ranging from 8KB up to 512KB Flash, from 20 MHz Arm® Cortex®-M0+ MCUs to 168 MHz Arm Cortex-M4 MCUs, and peripherals such as CAN, Touch, and ECC to address a variety of application requirements. With 2.7-5.5 V supply and focus on EMC/ESD robustness, Kinetis E family is well suited for a wide range of applications in electrical harsh environments

Kinetis KE1xZ Product Family

The 5 V Kinetis KE1xZ MCU family features a 48/72 MHz Arm Cortex-M0+ core with up to 256 KB flash, 32 KB SRAM, and a complete set of analog/digital features. The new Touch Sense Interface (TSI) provides a high level of stability and accuracy for your HMI system, while the 1-Msps ADC and FlexTimer modules offer a perfect solution for Brushless DC (BLDC) motor-control systems.

Kinetis KE1xZ64/32 Product Family

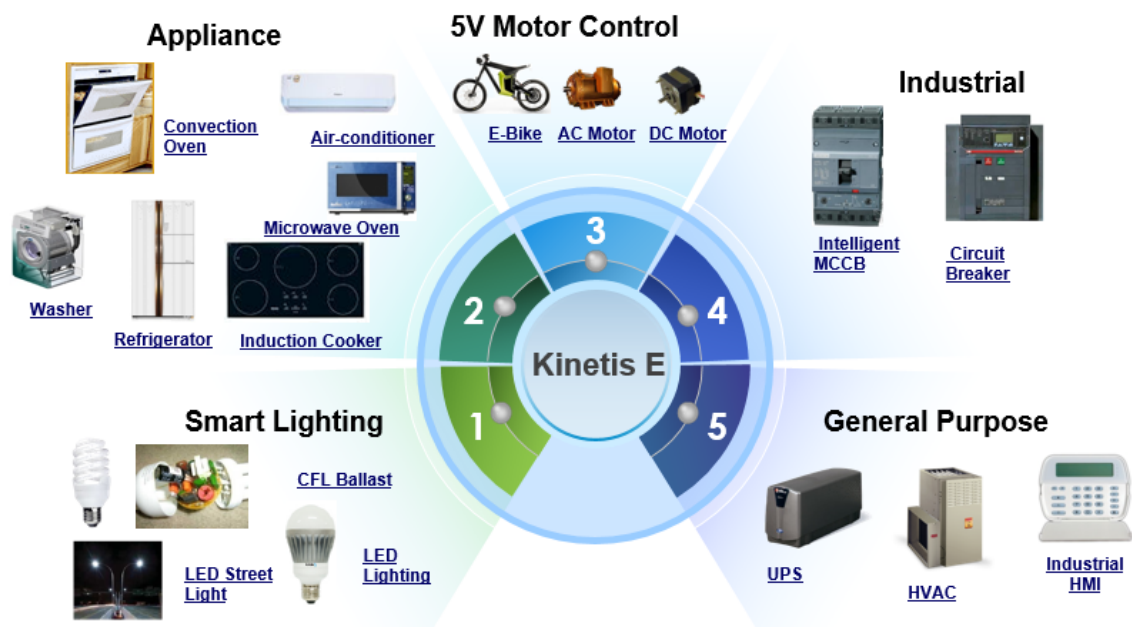
KE1xZ64 product family is based on CM0+ core running at 48 MHz, offering smaller memory options: 64KB/8KB or 32KB/4KB Flash/SRAM. It expands the KE1xZ series down to 64KB and 32KB flash options, 8KB and 4KB SRAM options, leading to optimized BOM cost along with TSI and CAN interfaces

- **KE14Z:** broad offering with mixed-signal integration, ADC, ACMP, Timers, PDB, now ranging from 32KB Flash to 256KB Flash
- **KE15Z:** expansion from KE14Z family, with addition of TSI module, now ranging from 32KB Flash to 256KB Flash
- **KE16Z:** **NEW**, expanding from KE15Z family, with addition of CAN module

Target Applications

Kinetis E Target Application

- **Home Appliance**
 - A/C, washer, MWO, induction cooker etc.
 - UI, main board control (touch, non-touch)
- **Motor and Power Control**
 - Motor, inverter and fan control
 - Low power UPS communication and UI control
- **Industrial Control**
 - Factory automation, HMI control, alarm monitor
 - Elevator external calling board
 - Circuit breaker, MCCB/ACB
- **General 5V Robust Use Cases**



KE1xZ64/32 Market Positioning

Market	Application	Key Features	To Replace
Home Appliance	Touch UI / mechanical button replacement	Robust Touch	<ul style="list-style-type: none"> Cypress PSoC4100/s RX130 Touch SoC
Industrial	Elevator calling board / communication control/ EV charger no auto grade	CAN bus	<ul style="list-style-type: none"> Fujitsu MB96F61x STM32F0xx
Main control	5V Low-end Motor Control / power control	PWM and ADC	<ul style="list-style-type: none"> STM32F0xx Renesas
Others	Robust application / Mass Market	5V, high performance in EMC	<ul style="list-style-type: none"> STM32F0xx Renesas Microchip PIC

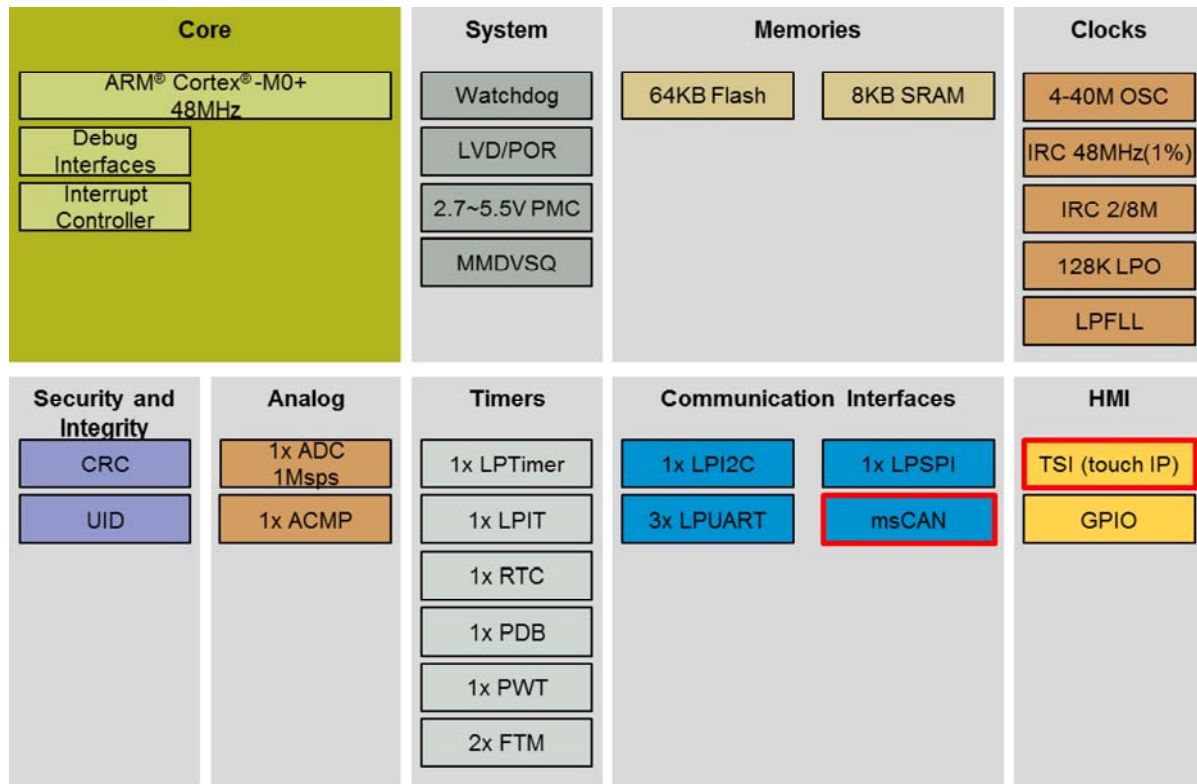
KE1xZ64/32 Product Overview

KE1xZ64/32 Key Highlights

- **Robust for harsh EMC environment**
 - 2.7V – 5.5V Power Supply & 5V I/O pads
 - EMC Test Performance
- **Capacitive Touch sensing solution that provides a compelling user experience**
 - Supports both self-cap and mutual-cap mode
 - 25 touch sensing channels
- **High performance in liquid tolerance**
 - Rich feature integration for industrial and motor control
 - CAN bus
 - PWM, Timers, 1Msps ADC, Comparator
- **Scalable Portfolio**
 - Expands the KE1xZ series down to 64KB and 32KB Flash options
 - Optimizes BOM cost



KE1xZ64 Block Diagram



KE16Z – CM0+, 48MHz, NXP Touch, CAN, 32KB – 64KB Flash
KE15Z – CM0+, 48/72MHz, NXP Touch, 32KB – 256KB Flash
KE14Z – CM0+, 48/72MHz, 32KB – 256KB Flash

Key features

Core/System

- ARM® Cortex® -M0+ up to 48MHz
- MMDVSQ

Communications

- 3 x LPUART / 1 x LPSPI / 1 x LPI2C
- MSCAN

Analog

- 1 x 12b ADC, 1MSPS
- 1 x ACMP
- 25ch touch pins

Packages

- 48LQFP (7mmx7mm, 0.5mm pitch)

Memory

- up to 64KB Flash
- up to 8KB SRAM

Timers

- 1 x 6ch FTM (PWM)
- 1 x 2ch FTM (PWM/Quad Dec.)
- 1 x PDB
- 1 x 4ch LPIT / 1 x LPTMR / 1 x PWT
- 1 x RTC

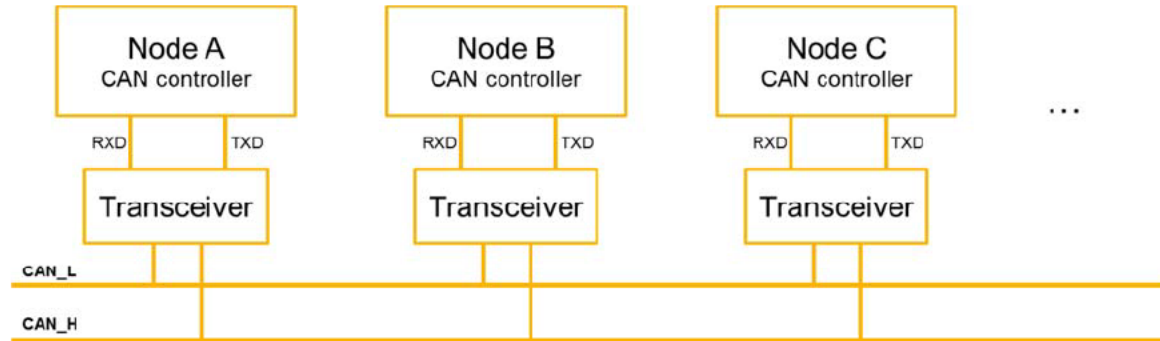
Others

- 2.7-5.5V, -40 to 105°C

- 44LQFP (10mmx10mm, 0.8mm pitch)

Controller Area Network (CAN)

Implementation of CAN protocol - version 2.0A/B, which supports both standard and extended data frames, 0-8 Byte data length, up to 1 Mbps. CAN interface is ideal for industrial control nodes.



KE1xZ64 Sub-Family Feature overview

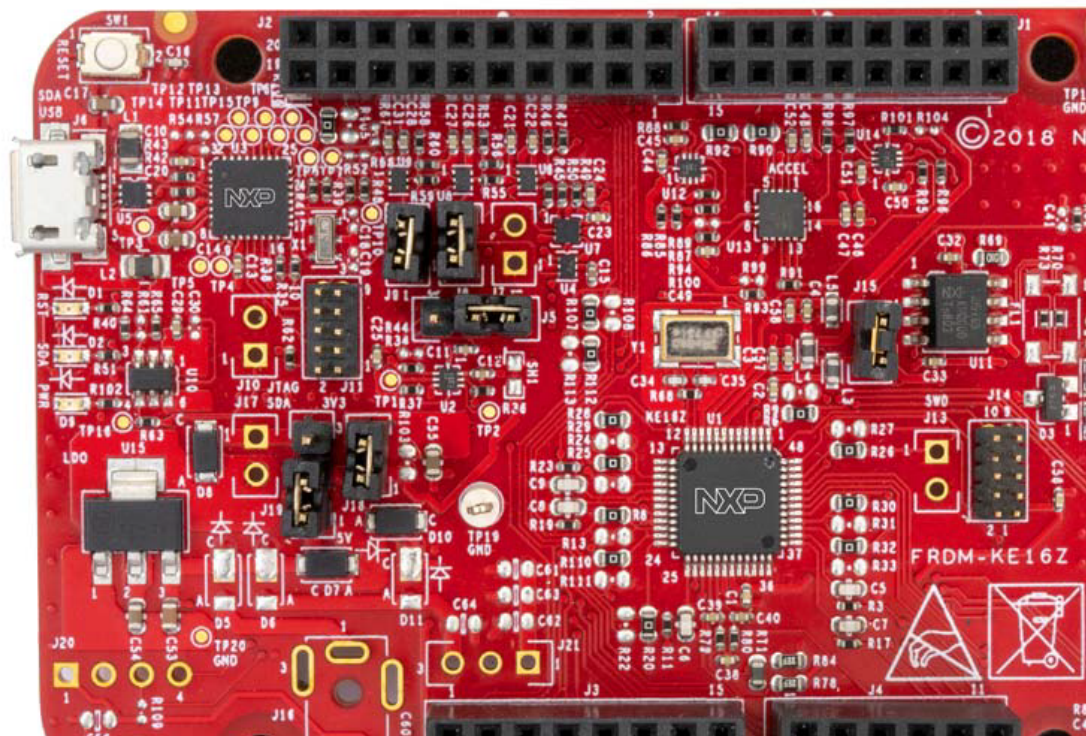
Sub-Family	KE14Z64	KE15Z64	KE16Z64
Core/Freq	CM0+/48 MHz	CM0+/48 MHz	CM0+/48 MHz
Frequency	48 MHz	48 MHz	48 MHz
Flash	32 KB/64 KB	32 KB/64 KB	32 KB/64 KB
SRAM	4 KB/8 KB	4 KB/8 KB	4 KB/8 KB
MMDVQS	YES	YES	YES
Clock	48 M FIRC (1%), 8 M SIRC (3%), XOSC (4-40 M), 128 K LPO	48 M FIRC (1%), 8 M SIRC (3%), XOSC (4-40 M), 128 K LPO	48 M FIRC (1%), 8 M SIRC (3%), XOSC (4-40 M), 128 K LPO
WDT/POR/LVD	Yes	Yes	Yes
ADC	1 x 12b, 1us	1 x 12b, 1us	1 x 12b, 1us
ACMP	1	1	1
Timer			
FTM/LPTMR/PWT	2 /1 /1	2 /1 /1	2 /1 /1
PDB	1	1	1
PIT	1	1	1
RTC	1	1	1
CAN	-	-	YES
UART	3	3	3
SPI	1	1	1
I2C	1	1	1
TSI	-	25-channel TSI	25-channel TSI
VDD	2.7-5.5 V	2.7-5.5 V	2.7-5.5 V
Temperature (Ta)	-40-105°C	-40-105°C	-40-105°C
Package (GPIOs)	48/44 LQFP	48/44 LQFP	48/44 LQFP

Development tools and Ecosystem

Development board (Part Number: **FRDM-KE16Z**), orderable now, shipping from Feb 28, 2019.

FRDM-KE16Z Freedom Development Board

The FRDM-KE16Z Freedom Board is designed to work in standalone mode or as the main board of FRDM-TOUCH. This Freedom board is compatible with DC 5v and 3.3v power supply and features a KE16Z. The onboard interfaces include an RGB LED, a 6-axis digital sensor, a 3-axis digital angular rate gyroscope, an ambient light sensor, CAN control interface and capacitive touch pad.



- MKE16Z64VLF4 MCU (Arm® Cortex® CM0+ 48LQFP package)
- I/O headers for easy access to MCU I/O pins
- Compatible with FRDM-TOUCH, FRDM-MC-LVBLDC, and Arduino™ boards
- Onboard debug circuit: K20DX128VFM5 (OpenSDA) with a virtual serial port
- NXP inertial sensor, FXOS8700CQ
- Reset push button, two user buttons and one RGB LED
- Touch electrodes in self-capacitive mode
- CAN communication interface

FRDM-TOUCH

The FRDM-TOUCH is a Touch Module for FRDM-KE15Z and FRDM-KE16Z with Capacitive Touch sliders. This board can connect FRDM-KE15Z/ and FRDM-KE16Z and control the on-board RGB LED by using keys, slider and rotary touches.

- Touch Module for FRDM-KE15Z and FRDM-KE16Z
- Easy and simple way to evaluate the touch pad, slide and wheel.
- Including self-cap and mutual-cap modes



Software Enablement

The FRDM-K16Z is enabled using NXP MCUXpresso SDK, MCUXpresso Config Tools, MCUXpresso IDE and a large software partner ecosystem.

- **Integrated development environments**
 - IAR Embedded Workbench®, iar.com/kinetis
 - Arm Keil® Microcontroller Development Kit, keil.com/nxp
 - NXP MCUXpresso, nxp.com/mcuxpresso
 - An open-source software development kit (SDK)
 - An easy-to-use integrated development environment (IDE)
 - A comprehensive suite of system configuration tools, including pins, clocks, SDK builder and more
 - Broad Arm ecosystem support through NXP Connect partners
- **Online enablement with Arm mbed™ development platform**
 - Rapid and easy Kinetis MCU prototyping and development
 - Online mbed SDK, developer community
 - Free software libraries
- **Boot-loader**
 - Common boot-loader for all Kinetis MCUs
 - In-system Flash programming over a serial connection: erase, program, verify
 - ROM- or Flash-based boot-loader with open-source software and host-side programming utilities