

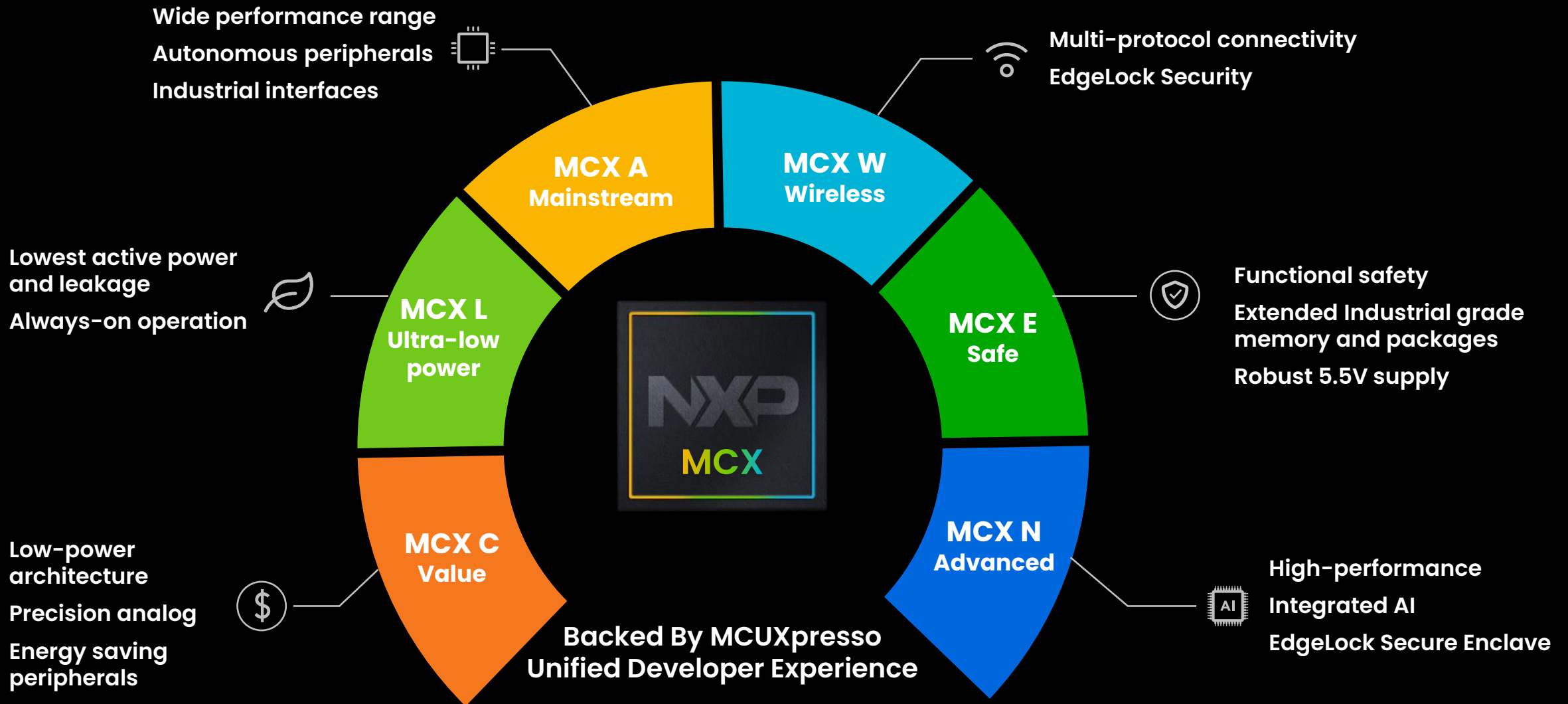


Entenda o MCXN, e as ferramentas da NXP para acelerar o seu desenvolvimento em inteligência artificial

WE Day – Agosto 2025

Peterson Roberto dos Santos
Regional Business Manager

MCX MCUs – one portfolio, addressing numerous application needs



The **complexity factors** at the edge



Then



Now

Increasing needs for designing today's edge devices

- **Higher processing** horsepower for simultaneous tasks
- **Lower power** with increased device active time – always on, always listening
- Everything **secure** and **connected**
- Disruptive trend in **edge AI**
- Product **quality, longevity** and supply **resiliency**
- Reduced total design **cost** and faster **time**-to-market

Cut through complexity and scale with MCX



Then



Now

Complexity



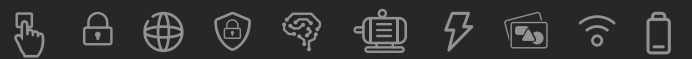
1

One MCX Portfolio



2

Numerous Enabled Technologies



3

Goes beyond the Silicon



MCX MCUs – Strong Legacy, Bold Future



Drive differentiation through innovation...

Cut through complexity with MCX's industry-leading technologies



Beyond the silicon...

Design with NXP as your trusted partner



AI/ML is moving from the Edge down to the Nodes...

MCX is the ultra low-power and compact platform for TinyML



eIQ® Neutron Neural Processing Unit

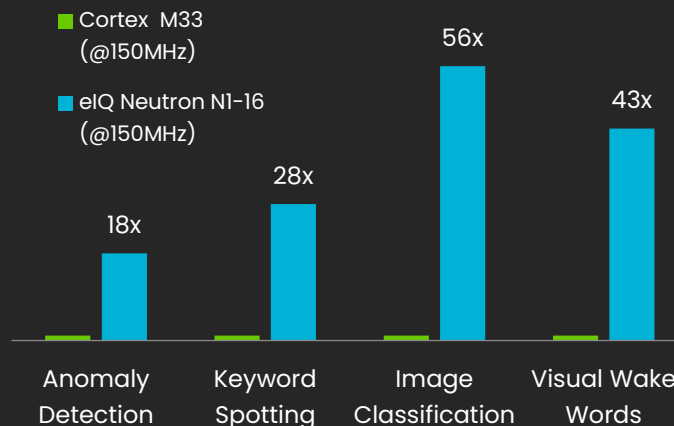
NXP-developed ML
accelerator

Designed to fit and
function in the
microcontroller world

Expands TinyML to
resource and power
constrained edge devices

Compared to using Arm Cortex-M33
core alone:

- 42x faster ML throughput
- 40x less energy
- 40% less ML model size



6x faster in object classification
than ARM Cortex-M7 at 1GHz!



NXP eIQ ML software toolkit



ML models for Industrial
& IoT applications

ML training, inference,
and optimization for
maximum performance

Example ML Use Cases



Command
recognition



Anomaly
detection



Cyber
security

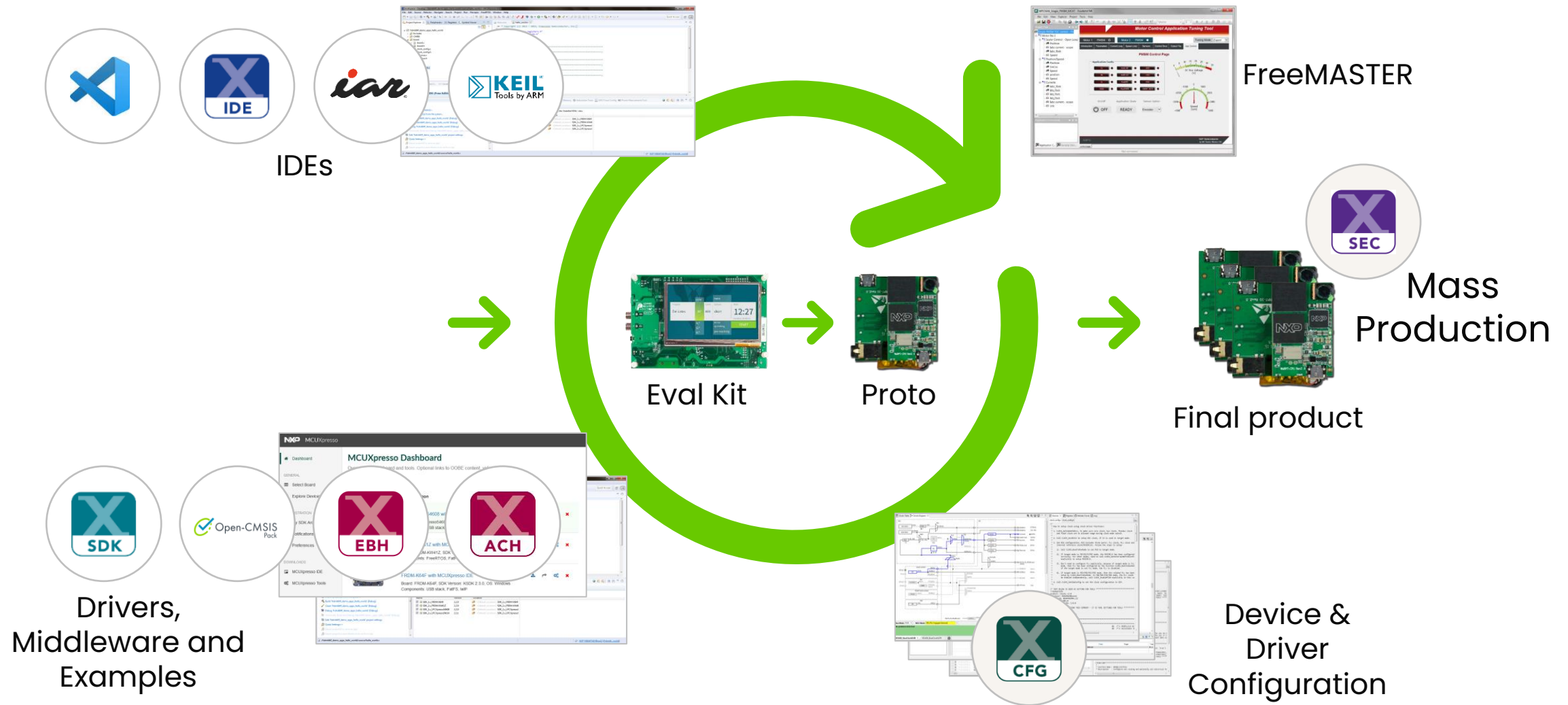


Object
classification



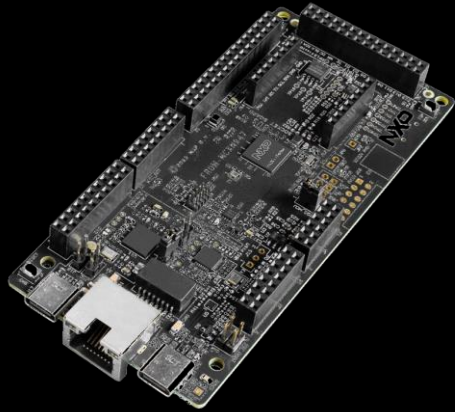
Presence
detection

Streamlined MCUXpresso development flow



Cut through complexity & scale

FRDM Development Platform



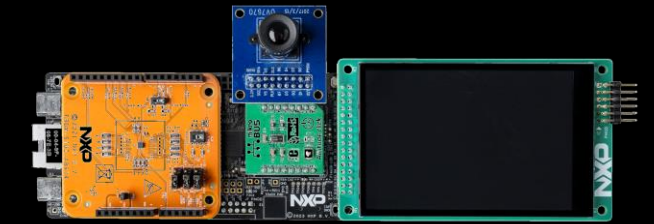
+

Expansion Boards with SW support



=

Easy proof of concept



Enabling technologies with modular hardware and comprehensive software supported by SDK, GitHub or GoPoint

AI/ML

Security

Touch

Motor control

Safety

Industrial Networking

Graphics & Display

Wireless Connectivity

Voice

Vision

Power Conversion

Ultra-Low-Power

FRDM to design without bounds

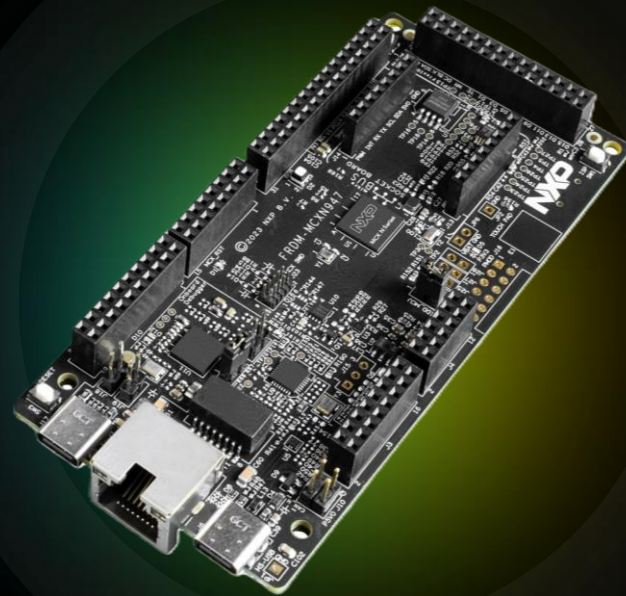
Join our open-source community of FRDM developers migrating to NXP

Flexible and rapid development
FRDM Platform

NXP & Partner **examples in
Application Code Hub**

Zephyr RTOS

14.2K of **users developing
with MCX now!**



125 MCX orderable part numbers
released in 2024, **on track to
double in 2025**

The new MCX MCU portfolio builds
on the legacy of LPC and Kinetis,
**bringing together the best of the
both worlds**

Investments in **specific process
technologies for leadership**

Industry platform **that scales from
low-cost MCUs to Linux based
processors**

MCXN



MCX N Series Highlights

On-chip Accelerators

- SmartDMA for camera, display and fast IO
- PowerQuad for digital signal processing
- PLC Controller



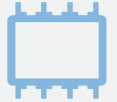
NXP eIQ® Neutron NPU

Up to 42x faster
ML inference

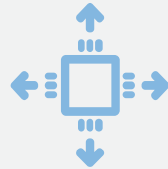


Rich Integrated Analog

- 16-bit high-speed ADC
- 12/14-bit high-speed DAC
- On-chip OpAmp



Communication Peripherals



- Low Power FlexComm
- High-Speed USB w/ PHY
- CAN-FD, I3C, Ethernet
- Touch Sensing, FlexIO

MCX N Series

Dual 150MHz
Arm® Cortex®-M33

Platform Security

- EdgeLock® Secure Enclave
- Crypto, PKC, Intrusion & Tamper detection
- Secure boot
- Life-cycle management



Low Power



- DC-DC Supply
- Autonomous peripherals

Packages

BGA184, LQFP100
HDQFP172



BOM Savings
Active connection
w/o low frequency
crystal

MCX N Series – Family Comparison

	MCX N94x	MCX N54x	MCX N23x
Cortex-M33	150 MHz dual-core	150 MHz dual-core	150 MHz single-core
Accelerators	PowerQuad, NPU, SmartDMA, PLC Accelerator	PowerQuad, NPU, SmartDMA	SmartDMA
Flash	~ 2x 1MB	~ 2x 1MB	~ 2x 512KB
RAM	~ 512kB w/ 32kB ECC	~ 512kB w/ 32kB ECC	~ 352kB w/ 32kB ECC
Octal /Quad SPI I/F	Y	Y	-
Interfaces	10x FlexComm, 2x I3C, 1x Ethernet 10/100, SDIO*, EMV Smart Card Interface*	10x FlexComm, 2x I3C, 1x Ethernet 10/100, SDIO, EMV Smart Card Interface	8x FlexComm, 2x I3C
USB	HS H/D* + FS H/D	HS H/D + FS H/D	HS H/D
CAN-FD	2	1	1
EdgeLock Secure Enclave Core Profile	Y w/ secure boot & TZ	Y w/ secure boot & TZ	Y w/ secure boot & TZ
ADC	2x 16b 2Msps differential Inputs or 4x single ended, 12b mode at 3.2Msps	2x 16b 2Msps differential Inputs or 4x single ended, 12b mode at 3.2Msps	2x 16b 2Msps differential Inputs or 4x single ended, 12b mode at 3.2Msps
Comparators	3	1	2
DAC	2x 12b, 1x 14b	2x 12b	-
Op Amps	3	-	-
Motor Control Subsystem	2x FlexPWM, 2x QDC, SINC Filter	1x FlexPWM, 1x QDC	2x FlexPWM, 2x QDC
HMI	~ 4ch SAI, 4ch DMIC*, parallel CSI, graphic LCD, cap touch	~ 4ch SAI, 4ch DMIC , parallel CSI, graphic LCD, cap touch	~ 4ch SAI, 4ch DMIC , parallel CSI, graphic LCD
GPIO	up to 78 in 100pin, up to 124 in 184pin	up to 74 in 100pin, up to 124 in 184pin	up to 74 in 100pin, up to 106 in 184pin
Package	VFBGA184 HLQFP100 HDQFP172	VFBGA184 HLQFP100 HDQFP172	VFBGA184 HLQFP100 HDQFP172

MCX N94/N54 FRDM Development Board

The MCX N947 FRDM development board is **compact and low-cost board** for advance IIoT applications with NPU embedded

MCX N Target applications

- Factory Automation
- Power & Energy
- Building Control
- Medical Equipment
- Industrial/Consumer HMI
- Hand-held Devices
- Control & Security
- Smart Appliances
- Health & Fitness



Key benefits

- **Cost Optimized** IIoT Platform
- **Ethernet, USB and serial interfaces**
- **Motor Control** subsystem
- **Secure Enclave**

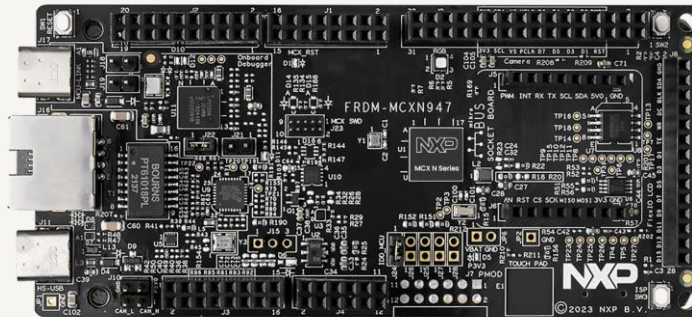
For more information [click here](#)



Key features

- **Arm® Cortex®-M33** @ 150 MHz (Dual core), DSP, SmartDMA co-processor and **Neuronal Process Unit**
- **Ethernet**, HS USB Type-C, CAN-FD transceiver
- P3T1755 Temp Sensor
- **External flash** memory
- Arduino, FRDM, SmartDMA, FlexIO, Pmod and mikroBUS headers and MCU-Link debugger

FRDM-MCXN947



Highlighted SW:

Industrial Panel. With only one core, demo runs motor control, graphics based on lvgl, server, two temperature sensors, touch sensitive and get core performance.

See all demos in

<https://mcuxpresso.nxp.com/appcodehub>

Launch Date	Launch Type	Development boards	Resale Price
Launched	MCX N	FRDM-MCXN947	\$25



MCX N23x FRDM Development Board

The MCX N236 FRDM development board is **compact and low-cost board** for advance IIoT applications

MCX N Target applications

- Factory Automation
- Power & Energy
- Building Control
- Medical Equipment
- Industrial/Consumer HMI
- Hand-held Devices
- Control & Security
- Smart Appliances
- Health & Fitness



Key benefits

- **Cost Optimized** IIoT Platform
- **USB and serial interfaces**
- **Motor Control** subsystem
- **Secure Enclave**

For more information [click here](#)



Key features

- **Arm® Cortex®-M33** @ 150 MHz, DSP & SmartDMA co-processor
- **HS USB Type-C, CAN-FD** transceiver
- FXLS8974CFR3 Accelerometer
- **External flash** memory
- Arduino, FRDM, SmartDMA, FlexIO, Pmod and mikroBUS headers and MCU-Link debugger

FRDM-MCXN236



Highlighted SW:

Industrial Panel. With only one core, demo runs motor control, graphics based on lvgl, server, two temperature sensors, touch sensitive and get core performance.

See all demos in

<https://mcuxpresso.nxp.com/appcodehub>

Launch Date	Launch Type	Development boards	Resale Price
Launched	MCX N	FRDM-MCXN236	\$20



eIQ Time
Series Studio
Six Pack



What can AI/ML do for MCUs

TIME SERIES (1D signals)

Most affordable by MCUs (HOT!)



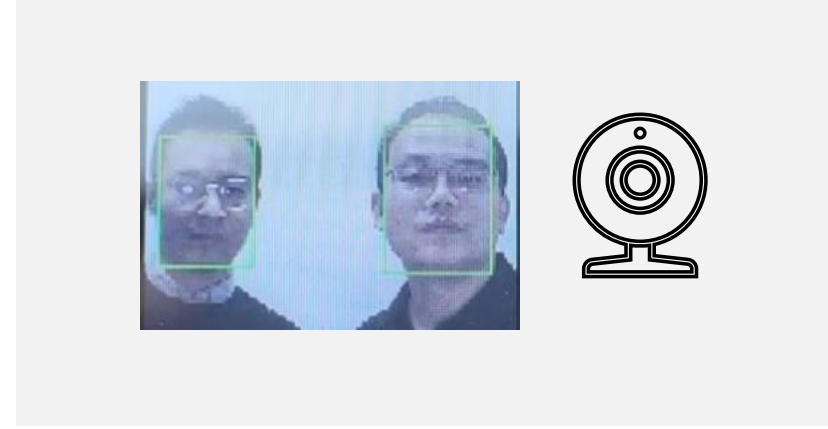
VOICE & SOUND

mid-range MCU or above



VISION

requires NPU or crossover or both



Smart sense & control
Denosing



Anomaly/fault Detection
Motion Recognition
State monitoring



Fault risk prediction
Damage and wearing monitoring



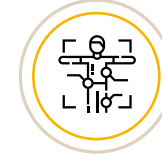
Keyword spotting
Wakup
Voice ID
Text2Speech



Alarm Analytics
sound classification
Sound ID
Denosing



Image classification



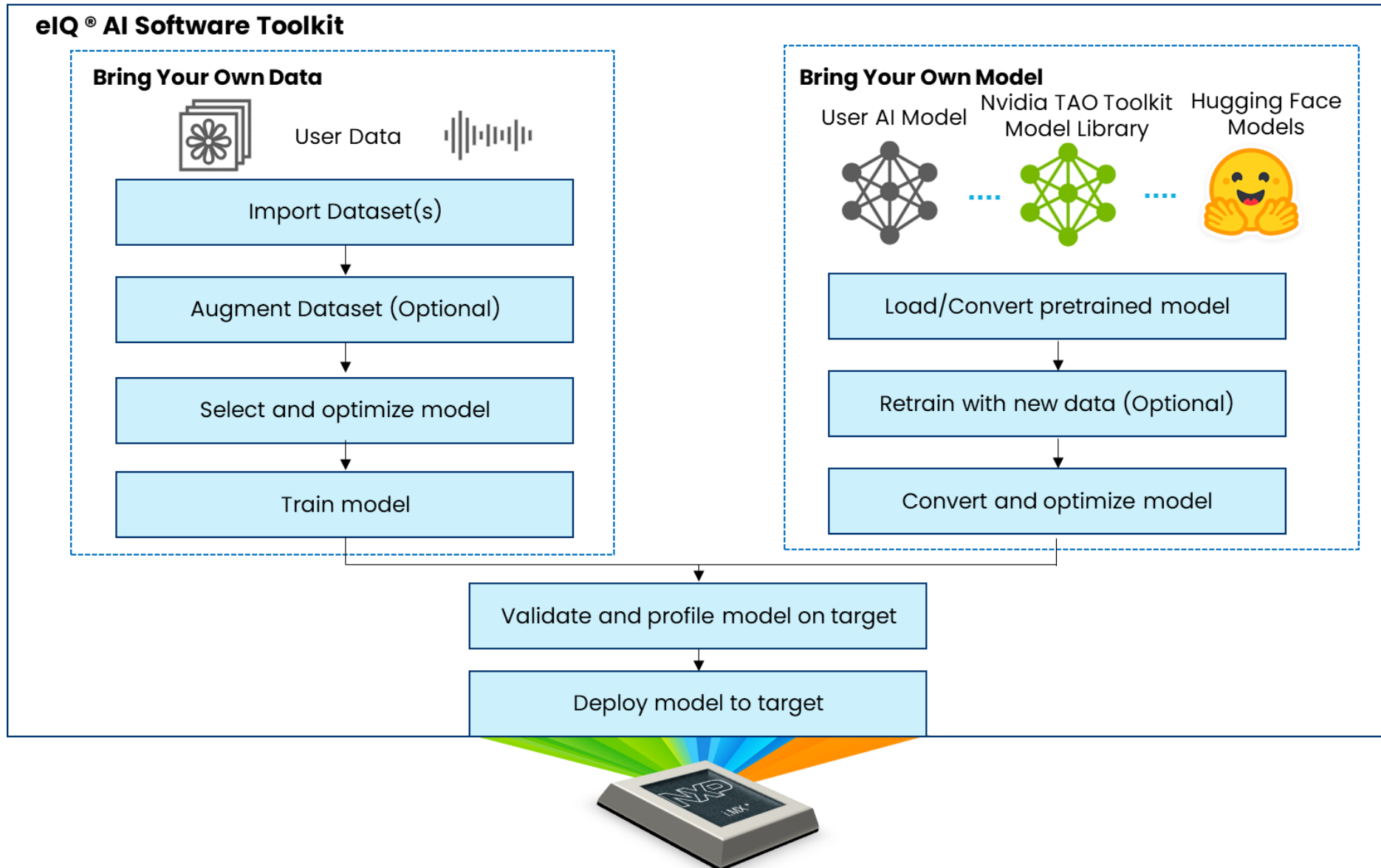
Object Detection, Tracking
Instance segmentation, counting
Keypoints detection



Face and Bio ID
Similar matching

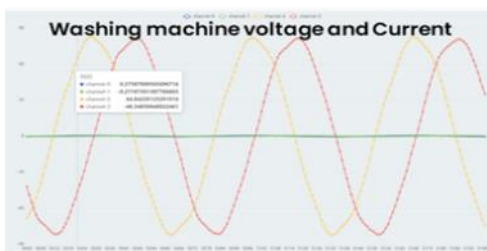
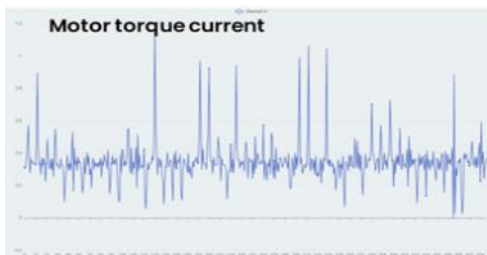
Edge Processing for Privacy, Performance, Cost Factors

eIQ[®] AI Software Toolkit



Edge Born AI, Time Series Studio (TSS) introduction

“Time Series” is time-sequential data, collected over one or multiple channels and frequently used for Anomaly Detection, Classification, and Regression tasks.

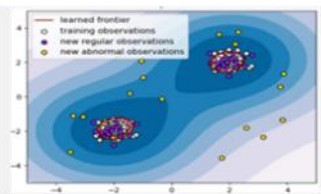


Various Time Series signals

- Different channels
- Different frequency
- Different sampling rate

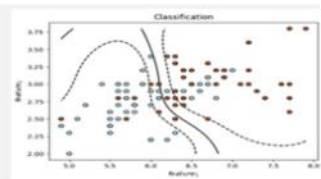
AD (Anomaly Detection)

- Semi-supervised machine learning algorithm for normal and anomaly case identification with on-device learning.



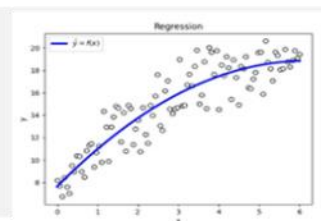
CLS (Classification)

- Classifier to classify no less than two cases by supervised machine learning training with labeled data.



REG (Regression)

- Prediction real or continuous target by supervised machine learning training with labeled data.



Tasks



Smart Motor Health



Washing Machine Load



Arc Detection



Human Activity Recognition

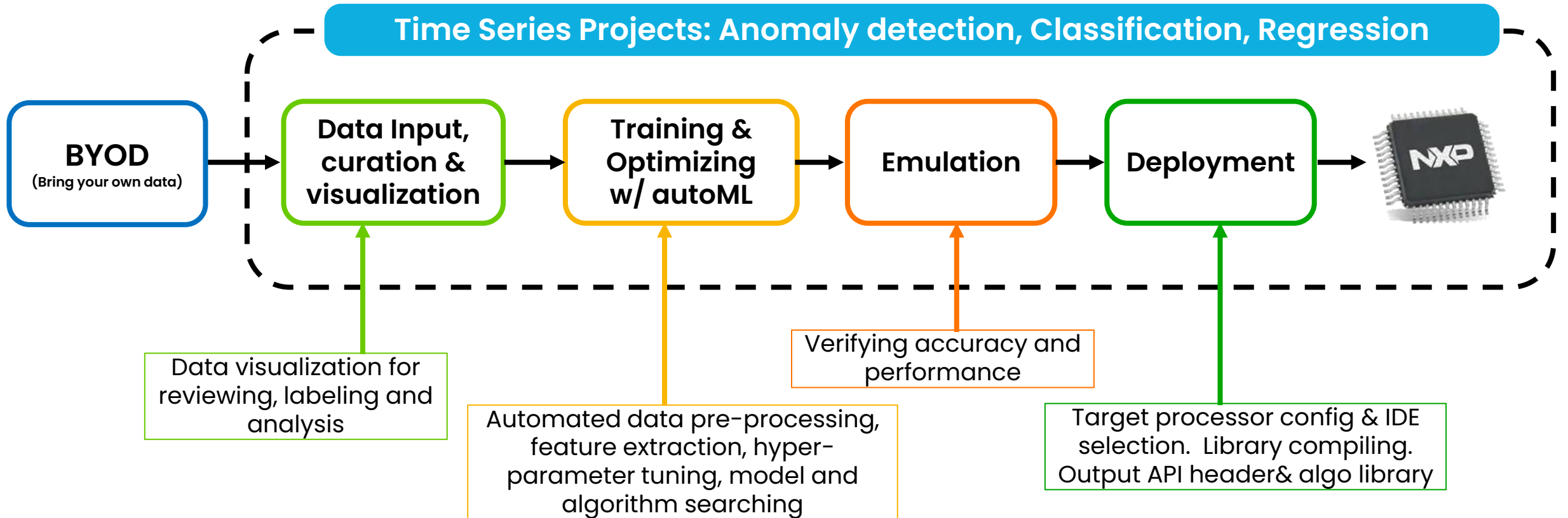
AI Solutions

eIQ Time Series Studio - Overview

Reduce complexity with an end-to-end development flow

Shorten model optimization time with Automated machine learning (autoML)

Deploy on **NXP MCU** platforms



eIQ Time Series Studio – Supported Devices

Board	SoC	Series	CPU	NPU	Support NPU	Deploy Lib	Deploy Project
FRDM-K66F	MK66FN2M0VMD18	Kinetis	Cortex-M4	-	-	Y	Y
FRDM-KV31F	KV31F512VLL12	Kinetis	Cortex-M4	-	-	Y	Y
FRDM-K32L3A6	K32L3A60VPJ1A	Kinetis	Cortex-M4, Cortex-M0+	-	-	Y	Y
MC56F83000-EVK	MC56F83789	DSC	DSP56800Ex	-	-	Y	Y
MC56F80000-EVK	MC56F80748	DSC	DSP56800EF	-	-	Y	Y
LPC55S69-EVK	LPC55S69	LPC	Cortex-M33	-	-	Y	Y
FRDM-MCXA153	MCX-A15	MCX-A	Cortex-M33	-	-	Y	N*
MCX-N9XX-EVK	MCX-N947	MCX-N	Cortex-M33	Neutron N1-16	2025	Y	Y
FRDM-MCXN947	MCXN947VDF	MCX-N	Cortex-M33	Neutron N1-16	2025	Y	Y
MIMCRT1060-EVKB	MIMXRT1062DV	RT	Cortex-M7	-	-	Y	Y
MIMCRT1170-EVK	MIMXRT1170	RT	Cortex-M7	-	-	Y	Y
MIMXRT1180-EVK	MIMXRT1189CVM8B	RT	Cortex-M7, Cortex-M33	-	-	Y	Y
MIMXRT685-EVK	RT500/600	RT	Cortex-M33	-	-	Y	2025
MIMXRT700-EVK	RT700	RT	Cortex-M33	Neutron N3-64	2025	Y	2025

- Oct 2024 launch will support MCU CPU core (ARM M0+, M4, M33, M7) and DSC. MPU and Neutron support are on the roadmap for 2025
- If customer's preferred board is not listed here, selecting a board with the same CPU can still generate an algorithm library for deployment.
- *Due to insufficient onboard memory, projects cannot be deployed on MCX-A

eIQ Time Series Studio – Where to Download

Included as part of the [eIQ Toolkit, starting with version 1.13.1](#)

Downloads

Quick reference to our [software types](#).

- NXP (46)
- Secure Files ⓘ

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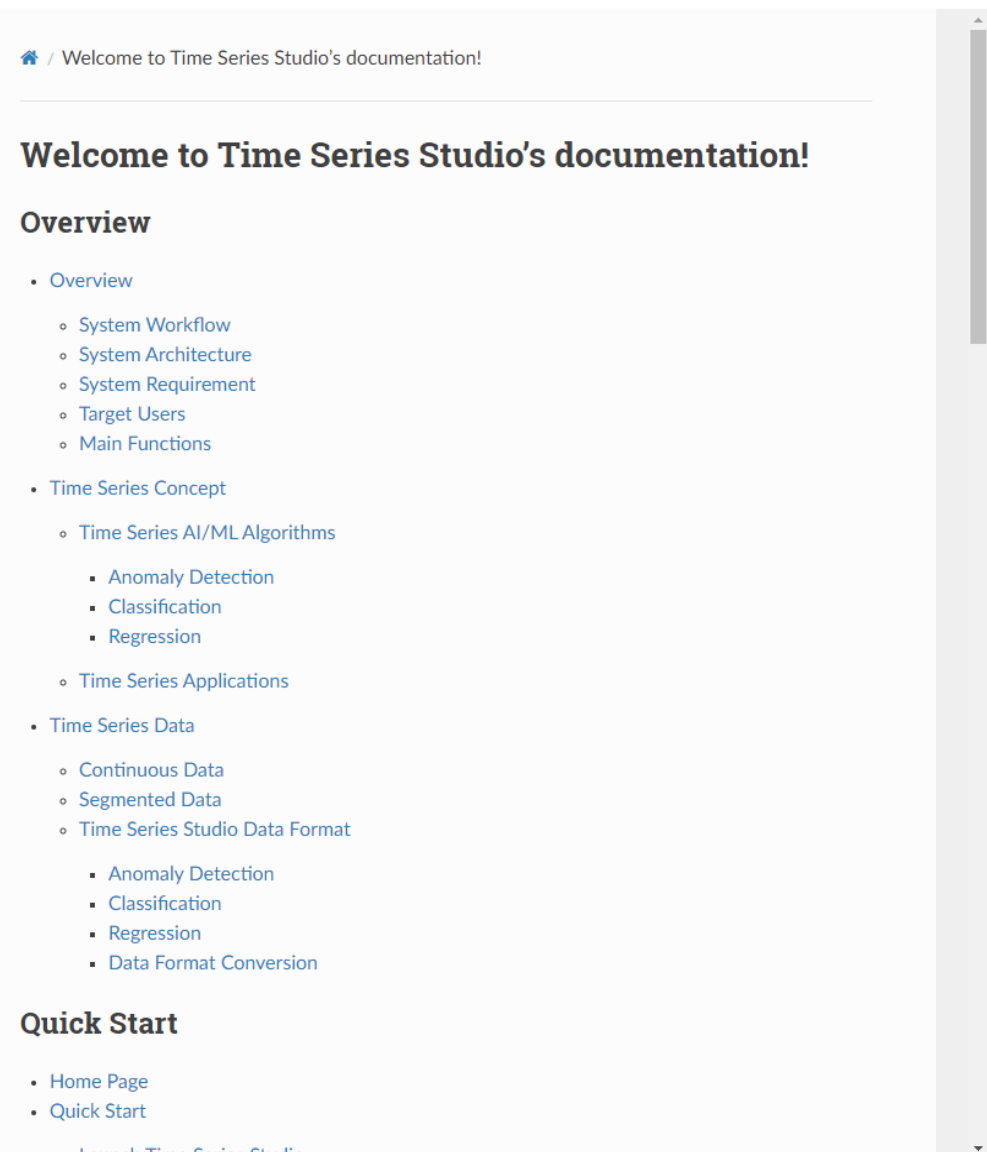
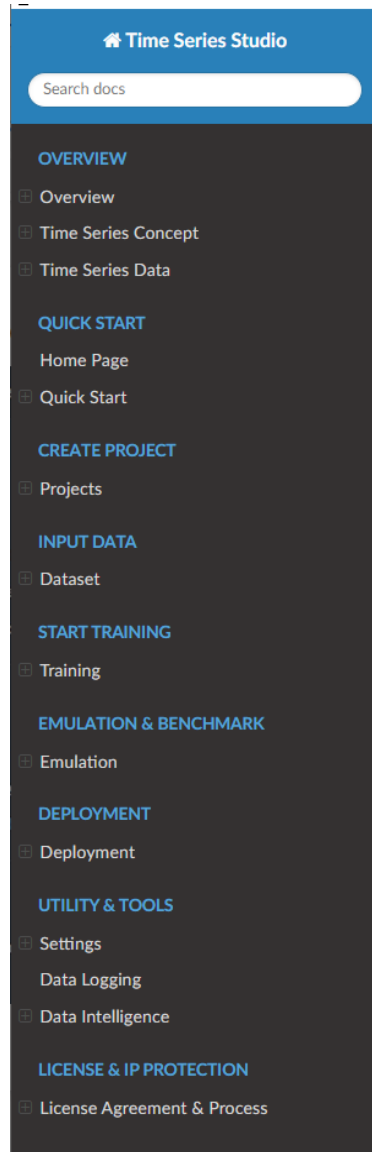
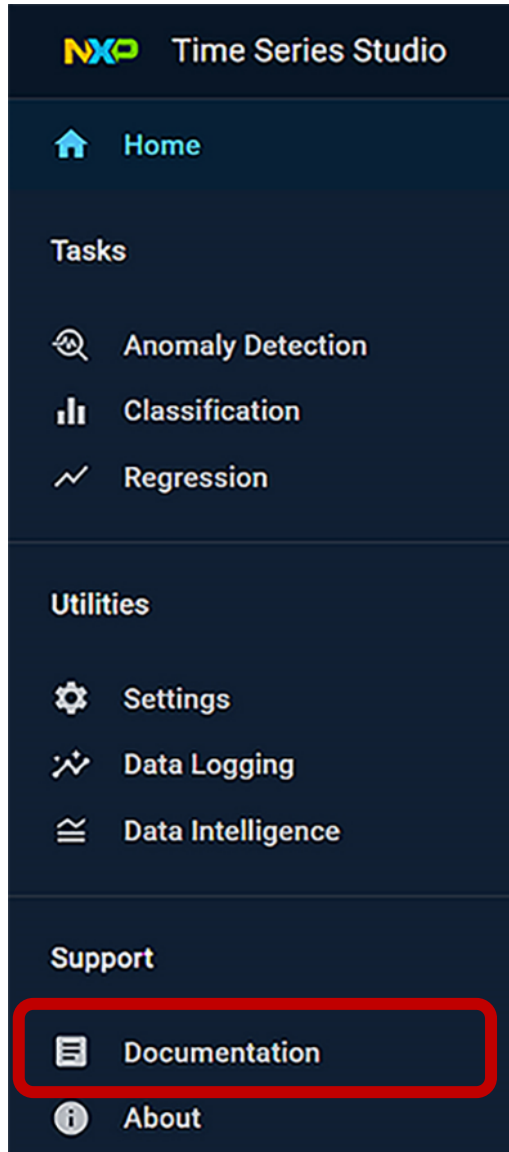
> Because you are interested in...

[eIQ Software Fact Sheet](#)

Fact Sheet PDF 653.2 KB



Documentation

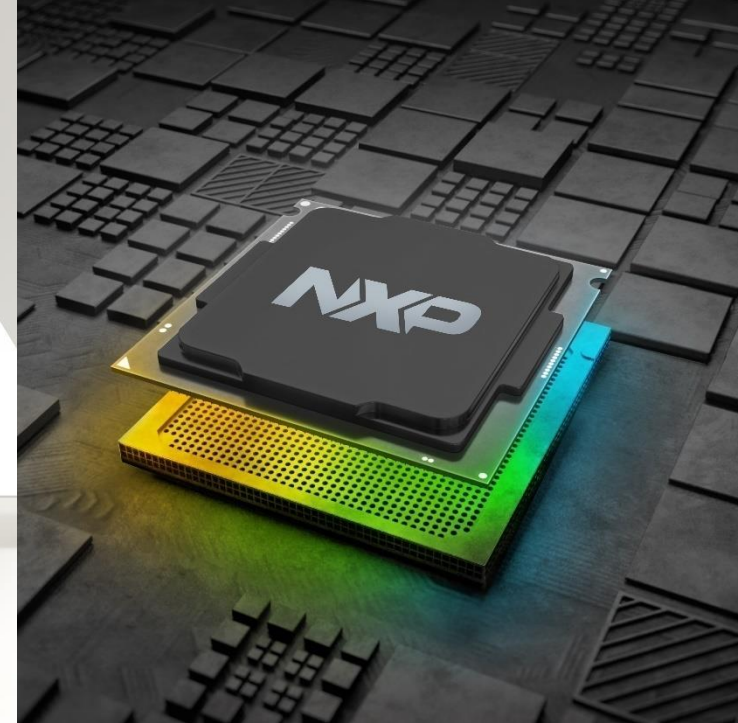


Cut through complexity and scale with
MCX

Strong Legacy, Bold Future –



Together, we make the **future**
bright.



-  One MCX portfolio
-  Numerous enabled technologies
-  Goes beyond the silicon



Presentation Feedback

