MCX N Series microcontrollers

Highly integrated, low-power MCUs designed with intelligent peripherals and on-chip accelerators that provide the ultimate balance of performance and energy consumption

The MCX N Series of Industrial and IoT (IIoT) MCUs feature dual Arm® Cortex®-M33 cores operating up to 150 MHz. This series features our elQ® Neutron Neural Processing Unit (NPU) for machine learning (ML) acceleration. Compared to CPU cores alone, the elQ Neutron NPU delivers up to 42x faster ML inference performance, PowerQuad accelerates DSP voice processing by 8x or more. This higher performance can be used in spending less time awake and reducing overall power consumption.

The low power cache enhances system performance and the dual bank Flash and full ECC RAM support system safety providing an extra layer of protection and assurance.

Our N Series security features the EdgeLock® Secure Enclave, Core Profile and a secured boot and crypto accelerators to meet demanding requirements for over-the-air transactions. The on-the-fly encrypt and decrypt for external serial Flash/PSRAM is connected via the FlexSPI to ensure code and externally stored data is protected.

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

MCX N94x Block Diagram
High Integration and Memory Expansion
The multicore design improves system performance and reduces consumption by enabling smart, efficient distribution of workloads to the analog and digital peripherals. The MCU N series offers a combination of analog integration (operational amplifier, precision reference supply for ADC and DAC), low power consumption and motor control PWMs.

With multiple connectivity options including Ethernet, CAN 2.0, CAN FD, USB HS, FS (Device/Host) and FlexComm interfaces (configurable as either SPI/I2C/UART), these devices feature versatile integration for demanding application needs. The FlexSPI with 16KB Cache support on-the-fly Encrypt/Decrypt enables applications to expand the on-chip memory, supporting various boot options and execute directly from external serial memories.

Developer Experience
The MCX MCU portfolio is supported by the MCUXpresso Developer Experience to optimize, ease and help accelerate embedded system development.

The MCUXpresso suite includes tools for simple device configuration and secure programming. Developers can choose multiple IDEs including MCUXpresso for Visual Studio Code, MCUXpresso IDE, IAR, or Keil.

MCX N9xx and N5xx MCU Options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Flash</th>
<th>SRAM</th>
<th>NPU</th>
<th>FlexSPI</th>
<th>PLC Controller</th>
<th>USB HS</th>
<th>DAC</th>
<th>Op Amp</th>
<th>Flexcomm</th>
<th>CAN-FD</th>
<th>Packages</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCXN546VDF</td>
<td>1024</td>
<td>352</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>1x 12b</td>
<td>-</td>
<td>10</td>
<td>1</td>
<td>VFBGA184</td>
</tr>
<tr>
<td>MCXN546VNL</td>
<td>1024</td>
<td>352</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>1x 12b</td>
<td>-</td>
<td>10</td>
<td>1</td>
<td>HLQFP100</td>
</tr>
<tr>
<td>MCXN547VDF</td>
<td>2048</td>
<td>512 KB (416 KB w/ ECC)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>1x 12b</td>
<td>-</td>
<td>10</td>
<td>1</td>
<td>VFBGA184</td>
</tr>
<tr>
<td>MCXN547VNL</td>
<td>2048</td>
<td>512 KB (416 KB w/ ECC)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>1x 12b</td>
<td>-</td>
<td>10</td>
<td>1</td>
<td>HLQFP100</td>
</tr>
<tr>
<td>MCXN946VDF</td>
<td>1024</td>
<td>352</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>2x 12b + 1x 14b</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>VFBGA184</td>
</tr>
<tr>
<td>MCXN946VNL</td>
<td>1024</td>
<td>352</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>2x 12b + 1x 14b</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>HLQFP100</td>
</tr>
<tr>
<td>MCXN947VDF</td>
<td>2048</td>
<td>512 KB (416 KB w/ ECC)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2x 12b + 1x 14b</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>VFBGA184</td>
</tr>
<tr>
<td>MCXN947VNL</td>
<td>2048</td>
<td>512 KB (416 KB w/ ECC)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2x 12b + 1x 14b</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>HLQFP100</td>
</tr>
</tbody>
</table>

MCX-N5xx-EVK  MCX N54x full evaluation kit VFBGA184
MCX-N9xx-EVK  MCX N94x full evaluation kit VFBGA184
FRDM-MCXN947  MCX N947 FRDM development board VFBGA184

NXP provides drivers and middleware with extensive examples and support for a range of RTOS choices, further complemented by a wide range of compatible middleware from NXP’s partner ecosystem, allowing rapid development of a broad range of end applications.

The MCX MCU portfolio is also supported by eIQ ML SW development environment and eIQ Toolkit for developing or converting ML models to run efficiently on the MCX CPU and eIQ Neutron NPU.

Hardware Platforms
For quick prototyping platforms, we offer both our low-cost, compact and scalable FRDM development boards and a full-featured EVK. Developers have easy access to additional tools like our Expansion Board Hub for add-on boards and the Application Code Hub for software examples through the MCUXpresso Developer Experience.

www.nxp.com/MCXN
NXP, the NXP logo and NXP SECURE CONNECTIONS FOR A SMARTER WORLD are trademarks of NXP B.V. All other product or service names are the property of their respective owners. © 2024 NXP B.V.

Document Number: MCXNFS REV 2