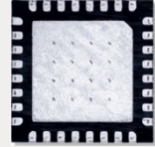# NDP101
## Neural Decision Processor

Always-On Sensor & Speech Recognition Processor

## PRODUCT BRIEF

The Syntiant® Neural Decision Processor™ architecture is built from the ground up to run deep learning algorithms. With embedded Syntiant Core 1™, the NDP101 achieves breakthrough performance by highly coupled computation and memory, exploiting the vast inherent parallelism of deep learning and computing at only required numerical precision. The device combines these elements to achieve approximately 100x efficiency improvement over stored program architectures such as CPUs and DSPs.

**The NDP101 supports dozens of application-defined audio sequences for a variety of use cases including:**

+ Keyword speech interface
+ Wake word detection
+ Speaker identification
+ Sensor applications
+ Audio event and environment classification

## BLOCK DIAGRAM
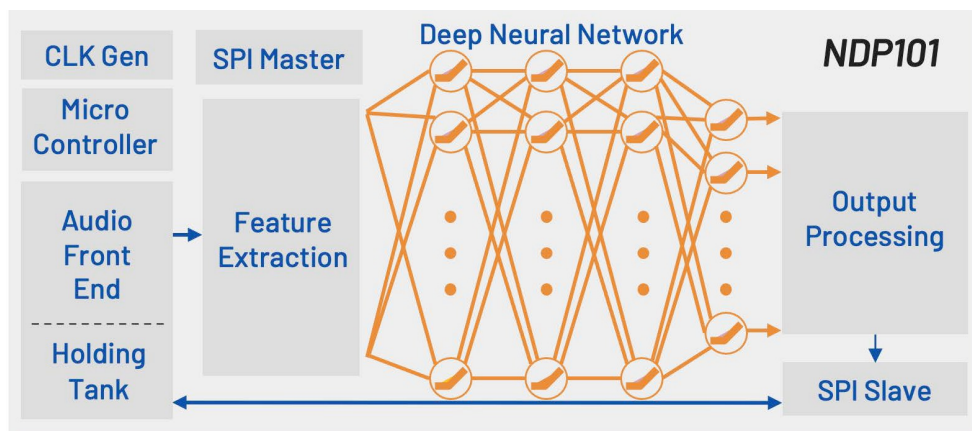
## KEY FEATURES & BENEFITS

+ System on chip in a 32 pin QFN package

+ Suitable for applications that require an MCU for control and a neural engine for decision making

+ Dual PDM microphone input or PCM-over-SPI input

+ Stereo/mono I2S interface multiplexed with PDM

+ Direct access to neural network over SPI for sensor applications

+ Frequency, time-domain & batch input models

+ 16-bit input holding tank with faster than real-time SPI extraction

+ General purpose ARM Cortex-M0 processor with 112KB SRAM

+ Eight GPIO pins with programmable direction and drive strength

+ Support for external serial flash boot

+ Integrated clock multiplier and dividers support low frequency clock source or external clocking

+ Optimized interrupt and SPI slave interface

+ Master SPI interface for sensor interfaces

+ Onboard firmware security and authentication

+ English Speech Service for keyword training

+ Software Development Kit (SDK) integrates in any software environment

+ Training Development Kit (TDK) to enable the user of standard frameworks such as TensorFlow for customer-programmed applications

+ Support for 64 output classifications

+ Active power consumption of <140µW while recognizing words

## APPLICATIONS

The NDP101 enables speech interfaces in the smallest systems, replacing traditional tactile interface elements (buttons, switches and dials) and supporting entirely new form factors and usage models designed to wake up to speech rather than touch.

**MOBILE PHONES**     **SMART HOME**     **REMOTE CONTROLS**     **SMART WATCHES**     **IOT ENDPOINTS**