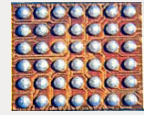# SYNTIANT

NDP120
Neural Decision Processor
### Always-On Speech & Sensor-Fusion Processor

PRODUCT BRIEF

The Syntiant® NDP120 Neural Decision Processor™ is a special purpose chip for audio and sensor processing for always-on applications in battery powered devices and other power constrained systems. The NDP120 applies neural processing to run multiple applications simultaneously with minimal power consumption. Built using the Syntiant Core 2™ programmable deep learning architecture, NDP120 is designed to natively run multiple Deep Neural Networks (DNN) on a variety of architectures, such as CNN, RNN and fully connected networks. NDP120 brings a level of ML performance that delivers 25x the tensor throughput compared to the Syntiant Core 1™ embedded in Syntiant's NDP100 and NDP101 devices. A programmable HiFi 3 DSP is available for classical audio processing.

The NDP120 supports dozens of application-defined audio sequences for a variety of use cases including:

+ Far-field, near-field and close-talk voice interface
+ Multiple wake words and local commands
+ Acoustic Echo Cancellation (AEC), noise suppression, beamforming
+ Speech enhancement
+ Speaker identification and verification
+ Acoustic event and scene classification
+ Multi-sensor fusion

BLOCK DIAGRAM
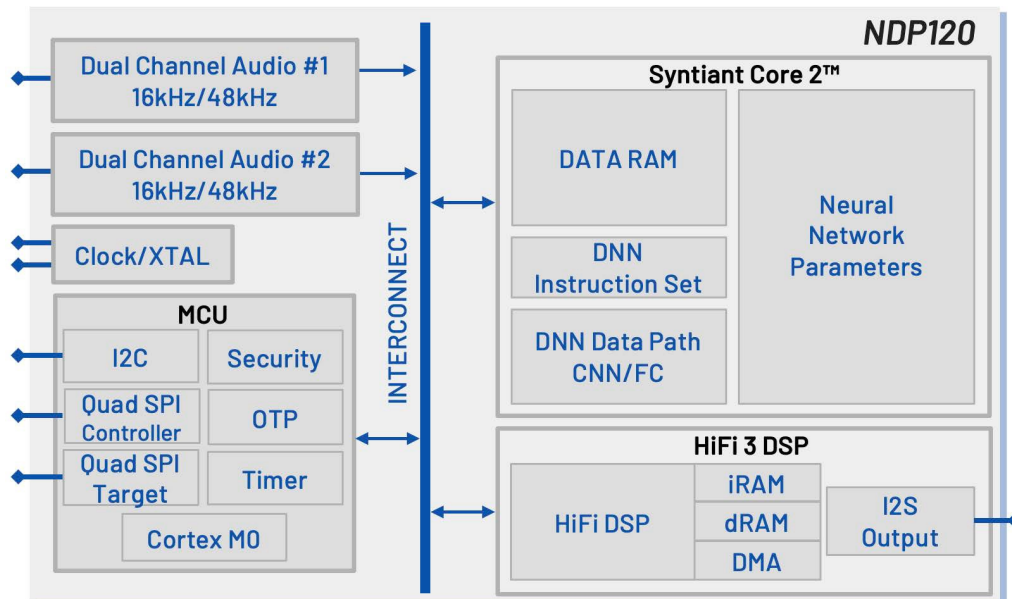
KEY FEATURES & BENEFITS

+ Hardware acceleration support for up to 6.4 GOPS/s

+ Neural network layers supported: fully-connected, 2D convolution, depth-wise convolution, recurrent neural network including LSTM and GRU, average and max pooling

+ Support for concurrent neural networks

+ Up to 896k neural parameters in 8-bit mode, 1.8M parameters in 4-bit mode, and more than 7M parameters in 1-bit mode

+ Quad PDM digital microphone interface

+ Dual I2S channels or TDM4 streaming interfaces

+ Support for up to 7 audio streams including I2S/TDM output audio interface for streaming audio output, including post-processed audio

+ I2C controller and target modes for sensor control and integration

+ QSPI target & controller interfaces

+ 26 GPIO pins

+ Programmable HiFi 3 DSP

+ Input holding-tank with up to 10 seconds of audio recording and faster-than-real-time extraction

+ Up to 100MHz internal operating frequency

+ Embedded Arm Cortex-M0 for device management with 48KB SRAM, dual timers and UART functionality

+ Low power PLL for flexible clock input

+ Onboard firmware decryption and authentication

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

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

+ 3.1mm x 2.5mm 42-ball WLBGA package (0.4mm pitch)

+ 5mm x 5mm 40-pin QFN package (0.4mm pitch) - also available as an AEC-Q100 Grade 3 qualified automotive SKU

APPLICATIONS

The NDP120 enables speech and sensor interfaces in the smallest systems and supports entirely new form factors and always-on detection usage models.

MOBILE PHONES

SMART HOME APPLICATIONS

HEARABLES/ WEARABLES

PC

IOT ENDPOINTS

MEDIA STREAMERS

AR/VR

AUTOMOTIVE