



SYNTIANT[®]

Making Edge AI a Reality[™]

SYNTIANT SELECTION GUIDE

NEURAL DECISION PROCESSORS[™]
FOR AUDIO APPLICATIONS



Deploying Highly Efficient Audio Models

Syntiant's family of Neural Decision Processors™ (NDPs) are specifically designed to run deep learning models, providing 100x the efficiency and 30x the throughput of existing low-power MCUs.

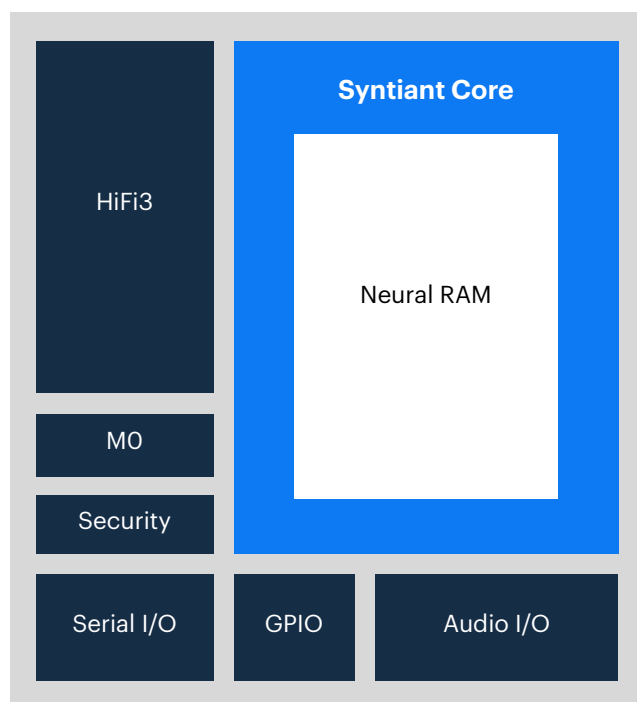
The company's hardware can equip almost any device with powerful advanced intelligence, enabling real-time data processing and decision making with near-zero latency.

If an ARM A53 has a battery life of 3.5 days, Syntiant's NDP120 can run uninterrupted for 1 year executing the same machine learning workload.

**Syntiant Core 2™ @ 32 Mhz =
Arm A53 @ 1 Ghz using 1% of the energy***

	NDP120	Arm A53	Syntiant Advantage
Inferences per million cycles	1.346	0.0471	~ 30x
μJ per inference	166	16,131	~ 100x

*Identical MobileNet V1 0.25 int8 network on A53 & NDP200 (Syntiant Core 2)
tinyMLPerf-style test mechanics: single, identical input vector



Seamless Integration

Syntiant's core architectures process neural network layers directly without any compilers, enabling larger networks at significantly lower power, greatly increasing battery life, privacy and responsiveness, while decreasing infrastructure costs.

With I/O support for a variety of sensor modalities, including vision, audio and motion, the NDPs bring AI to edge applications in all kinds of domains, from earbuds and doorbells to automobiles and manufacturing machinery.

REMOTE CONTROLS

How do you enable always-on wake word detection and remote finders for battery-powered remotes?

Deep learning models enable

- Always-on remote finder 'Hey remote, where are you?'
- Custom wake words and voice commands 'Hey remote, play the football game'
- Maintaining 6+ months battery life

Recommended processor: **NDP115**

AI Models:

- ✓ Wake word
- ✓ Voice command



SMART HOME DEVICES

How do you detect an external window breaking and smoke alarms while ignoring household noise?

Issues with traditional solutions:

- Reliance on sound intensity within a narrow frequency range
- Missed glass-break events (false negatives)
- Frequent false triggers from non-glass noises (false positives)

Syntiant collected thousands of examples of external home glass breaking and trained advanced neural networks to trigger only when an external glass break is detected and ignores other noises, even plates broken in the kitchen.

Recommended processor: **NDP115, NDP120**

AI Models:

- ✓ Voice activity detection
- ✓ Voice command
- ✓ Glass break
- ✓ Fire alarm (T3)
- ✓ CO alarm (T4)

WEARABLES AND HEARABLES

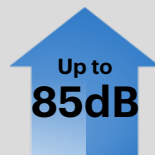
How do I completely remove background noise when calling?

Syntiant's single-microphone edge AI environmental noise cancellation (ENC)

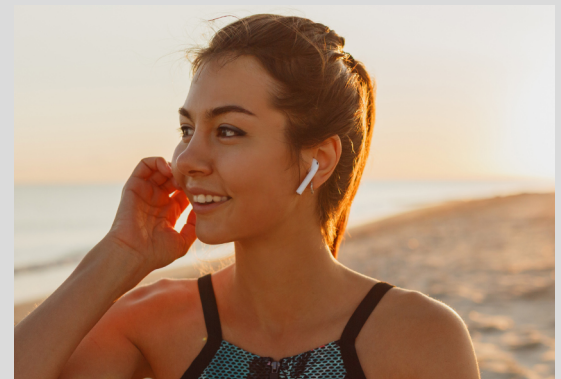


Noise profiles suppressed

Examples include:
Background chatter
Vehicle noise
Wind noise
Air conditioners
Keyboard clicks
Door slams
and many more!



Rejection of environmental noise



Contact your Syntiant representative for a listening demo.

Recommended processor: **NDP115, NDP120**

AI Models:

- ✓ Wake word
- ✓ Voice command
- ✓ Crystal-Clear Environmental Noise Cancellation



AUTOMOTIVE

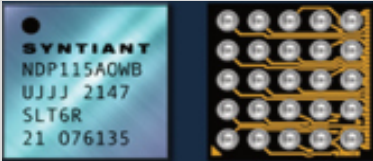
How do I detect events such as sirens and glass break while also improving user convenience?

Paired with Syntiant's V2S200DZA vibration sensor for exterior automotive applications, the NDP120 enables an always-on, environmentally robust module that simultaneously supports multiple safety and convenience features.

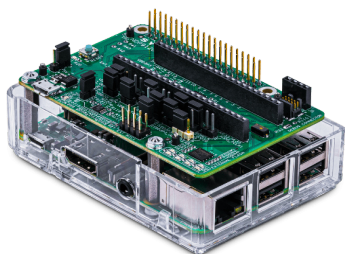
Recommended processor: **NDP120 (AEC-Q100)**

AI Models:

- ✓ Wake word
- ✓ Voice commands (eg. 'open trunk')
- ✓ Siren detection and localization
- ✓ Glass break detection
- ✓ Environmental noise cancellation for 2-way communication

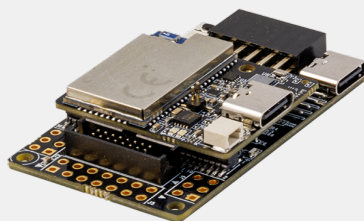
	NDP115	NDP120
		
Target Use Case	Audio & Speech, Sensors	Audio & Speech, Sensors
Neural Layer Types Supported	All (GRU, Convolutional, etc.)	All (GRU, Convolutional, etc.)
Embedded MCU	MO (48KB)	MO (48KB)
Neural RAM	0.5 MiB neural RAM [sharable with HiFi & MCU]	1 MiB neural RAM [sharable with HiFi & MCU]
Neural throughput	6.4 GOPS	6.4 GOPS
On-Chip DSP	Xtensa HiFi3, 0.2 MiB RAM up to 100MHz secure boot & host communication	Xtensa HiFi3, 0.3 MiB RAM up to 100MHz secure boot & host communication
Audio I/O	48kSPS @ 16-bit/channel 1 stereo PDM/I2S/TDM audio in I2S/TDM audio out	48kSPS @ 16-bit/channel 2 stereo PDM/I2S/TDM audio in I2S/TDM audio out
GPIO	13 GPIO pins	26 GPIO pins
Package	2.1mm x 2.1mm BGA @ 0.4mm 3.2mm x 2.8mm eWLB @ 0.4mm	2.1 x 3.5 mm BGA @ 0.4 mm 5 x 5 mm QFN @ 0.5 mm

EVALUATION TOOLS



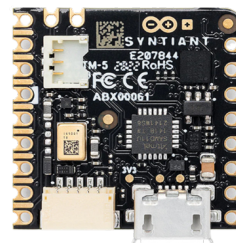
NDP115/NDP120 Evaluation Kit

Syntiant's NDP115/NDP120 evaluation kit is designed to help customers bring up the solution quickly and access features easily. The evaluation kit consists of a shield, featuring our Neural Decision Processor, connected to a Raspberry Pi Model 3B+ single-board.



RASynBoard

Developed in collaboration with Avnet and Renesas, the RASynBoard is a small, ultra-low power, edge AI/ML board, featuring a Syntiant NDP120, a Renesas RA6M4 host MCU plus a power-efficient DA16600 Wi-Fi/BT combo module.



Nicla Voice Platform

Built in collaboration with Arduino and powered by the Syntiant NDP120, the Nicla Voice platform allows for easy implementation of always-on speech recognition at the edge, enabling multiple concurrent AI models.

ADDITIONAL RESOURCES

NDP Portfolio: www.syntiant.com/hardware

Neural Noise Suppression: www.syntiant.com/noise-suppression

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