

Software configurable analog input and output analog front end family



With the advent of Industry 4.0, factory owners and industrial manufacturers are faced with a new challenge: how to adapt their factories quickly and efficiently to meet shifting market demands.

In factory automation (FA) and Process Control systems, the main controller uses embedded or remote I/O modules to receive sensor inputs and provide outputs to the actuators.

An Industry 4.0 system must be so flexible that its inputs and outputs can be digitally configured by software without manual intervention, allowing for quick changes, increasing efficiency and reducing costs. With the latest semiconductor innovations, the I/Os software configurability is now accomplished

with the use of fully configurable Analog Input and Output Front End ICs.

With the aim of offering the above advantages to the PLC and DCS markets, NXP has developed a family of fully configurable Analog Input and Output Front End which features 14 to 18 bits DAC, 16 or 24 bits ADC, high level of integration, extensive diagnostic functions, and a small size. This product family is not a simple replacement of a discrete solution but a significant innovation which extends its benefit outside the mere PCB or BOM reduction but touches several aspects of the overall system solution.



Reconfigurability

Reconfigure a smart factory and adjust settings based on shifting market needs



Accuracy and precision

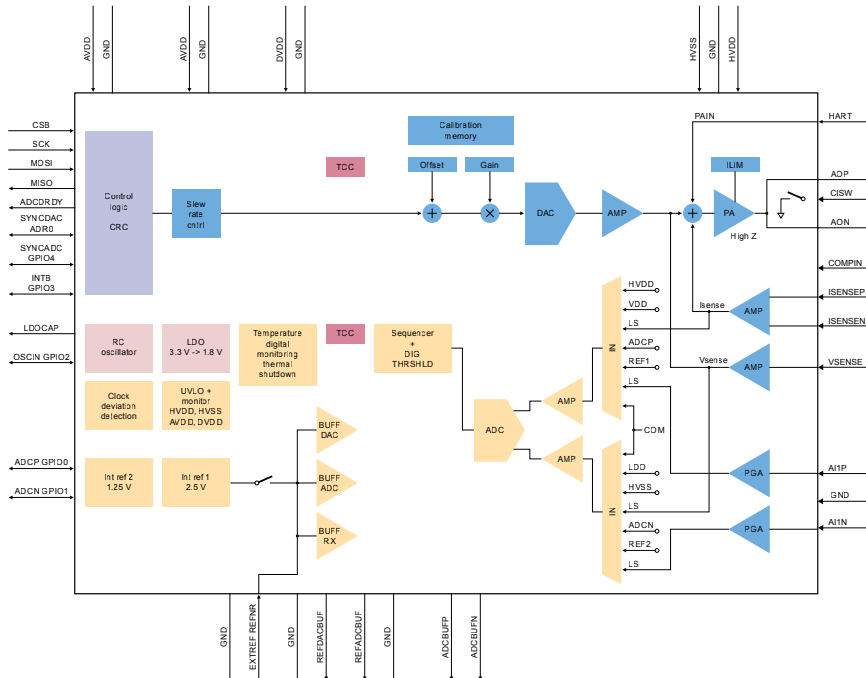
Improved product quality thanks to enhanced accuracy and precision



Predictive maintenance

Diagnostics and anomaly detection to identify issues before they occur

N-AFE block diagram



- Channels configuration
 - One software configurable Analog Input and Output
 - Two universal inputs
 - Ranges: $\pm 12.5\text{ V}$, $\pm 25\text{ mA}$, $1\text{ m}\Omega$ – $1\text{ M}\Omega$
 - Factory calibration or user calibration options
- Resolution
 - DAC: 14-/16-/18-bit options
 - ADC: 16/24-bit options
- Data rate
 - DAC: 0 to 100 kSPS / 200 kSPS for low power/high speed
 - ADC: 7.5 SPS to 288 kSPS/ 576 kSPS for low power/ high speed
- Protections
 - Integrated protection switch with configurable overcurrent threshold
 - $\pm 36\text{ V}$ protected I/O (external transient voltage suppressor (TVS), required for output)
 - Short circuit protection for both input and output
- TUE Accuracy (user calibration)
 - Input: $\pm 0.005\%$ at room, 0.01% over temperature
 - Output: $\pm 0.0025\%$ at room, 0.01% over temperature
- Diagnostics
 - Power supply monitoring
 - Under/over range on signal path
 - Redundant voltage reference
 - Temperature sensor
 - Complete signal path monitoring
- General
 - $\pm 7\text{ V}$ to $\pm 28\text{ V}$ supply voltage range
 - $-40\text{ }^\circ\text{C}$ to $125\text{ }^\circ\text{C}$ temperature range
 - 6 mm x 6 mm small TQFN-40 package

Part Number	I/O Channels	Input Channels	DAC resolution	ADC resolution	Power/Speed
NAFE33352	1	2	18 bits	24 bits	Low Power
NAFE93352	1	2	18 bits	24 bits	High Speed

Other combinations of the below features are available on demand:

- AIO channel only (no input channels)
- DAC Resolution: 14, 16 or 18 bits
- ADC Resolution: 16 or 24 bits