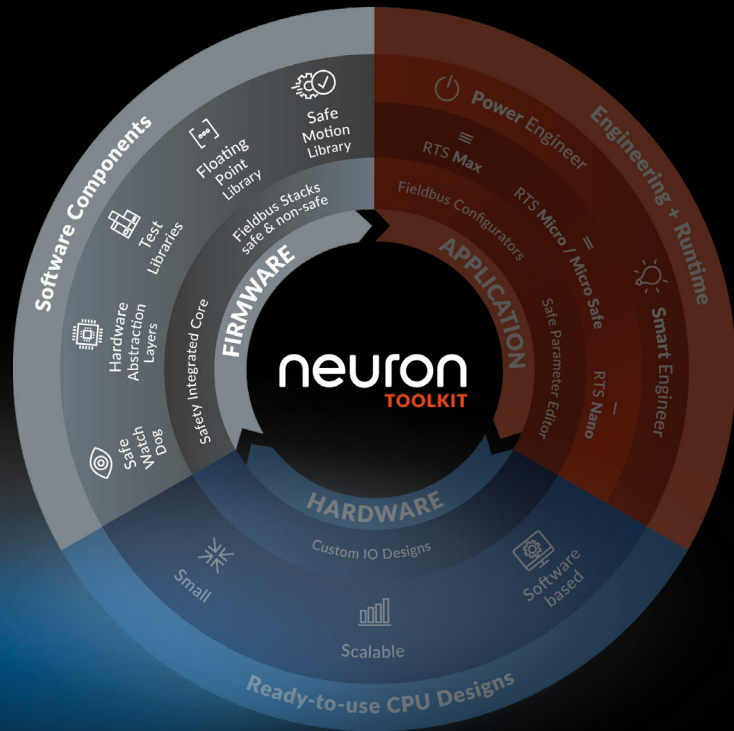


Floating Point library



Summary

The safe floating-point library is developed and certified as a compliant item for ARM-based platforms. On a single processor, the safe floating-point library can achieve up to SIL2. On dual-channel systems, where results can be cross-checked at the end of the processing cycle, it can reach up to SIL3.

Main benefits at one glance



non-linear functions like the exponential-function and (natural) logarithm



higher flexibility with floating point operations



higher precision with less rounding differences



compare both results at runtime (e.g. Cortex M4 and M7)



Onboard FPU-testing

Our safe floating point library not only offers basic mathematical operations such as addition, subtraction, multiplication and division, but also provides advanced functions such as the e-function, the (natural) logarithm and trigonometric functions (sine, cosine, tangent and their inverse functions). Comparison functions for greater than, less than and equality are also integrated.

Our test manager makes it possible to adjust the frequency of the cyclical FPU test and the sequence of the functions to be tested so that the desired diagnostic coverage is achieved. This can be done in a fixed sequence or randomly. The integrator receives a number of core functions to support his system, including the start-up phase for initialising the test functionality, the regular execution of test steps at runtime and the evaluation of the tests performed

Provides secure, verified methods for performing calculations with single or double precision floating-point numbers according to the IEEE 754 Standard for platforms without a dedicated floating-point coprocessor (FPU / Floating Point Unit).

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Functional overview



Specifications

Use as a safe floating point library: For platforms without a dedicated floating point coprocessor (FPU/ Floating Point Unit), e.g. Cortex M0 and Cortex M3 processors, it provides functionally safe, tested methods for calculating floating point numbers with single and double precision in accordance with the IEEE 754 standard

Use as FPU test: On systems with FPU, such as different variants of Cortex M4 and Cortex M7 processors, the library is used to test the FPU at runtime. This is done by performing random floating point calculations with single or double precision according to the IEEE 754 standard by both the safe floating point library and the FPU. The results of these calculations are compared

Serves the purpose of runtime testing the FPU by executing calculations with single or double precision floating-point numbers according to the IEEE 754 Standard on systems equipped with an FPU as well as on a random sampling basis. The results are then compared with those of the FPU