

# XMC™ Class-B library software

September 2016



# Agenda

- 1 Overview for boot mode index in XMC1000
- 2 Key feature: built-in safety features in peripheral
- 3 Key feature: VDE certified software library
- 4 System integration
- 5 Application: integrating Class-B library software
- 6 Available for download



## Key feature

Built-in safety features in peripheral modules

VDC certified software library routines for internal supervisory functions and self diagnostics

## Highlights

From October 2007, home appliances to be sold in Europe have to comply with IEC60730 standard. Class-B applies for the majority of home appliances. Infineon is providing Class-B software library routines, which can be used for microcontroller internal supervisory functions and for self-diagnostics.

## Customer benefits

Increases CPU performances and frees up memory space

Reduced development effort for customers

# Class-B library software

## Built-in safety features in peripheral modules



Peripheral module	Built in safety feature
Oscillator watchdog	The DCO1 clock frequency is monitored using the standby clock as the reference clock. Loss of clock happens when the oscillator watchdog (OWD) detects a DCO1 frequency not within required range during normal operation. In this case, an interrupt will be generated if it is enabled.
Invariable memory	The protection of the invariable memory is done by hardware error correction (ECC) mechanism. While reading the corrupted memory cell the value read is corrected automatically and the use of the correction mechanism is indicated by a flag. Additionally, an NMI can be triggered, when enabled by software.
Variable memory	All on-chip SRAMs provide protection of content via parity checking. A parity control software test to support in-system testing can be enabled. Once set, an inverted parity bit is generated during a write operation. When a read operation is performed on this SRAM address, a parity error shall be detected.

# Class-B library software

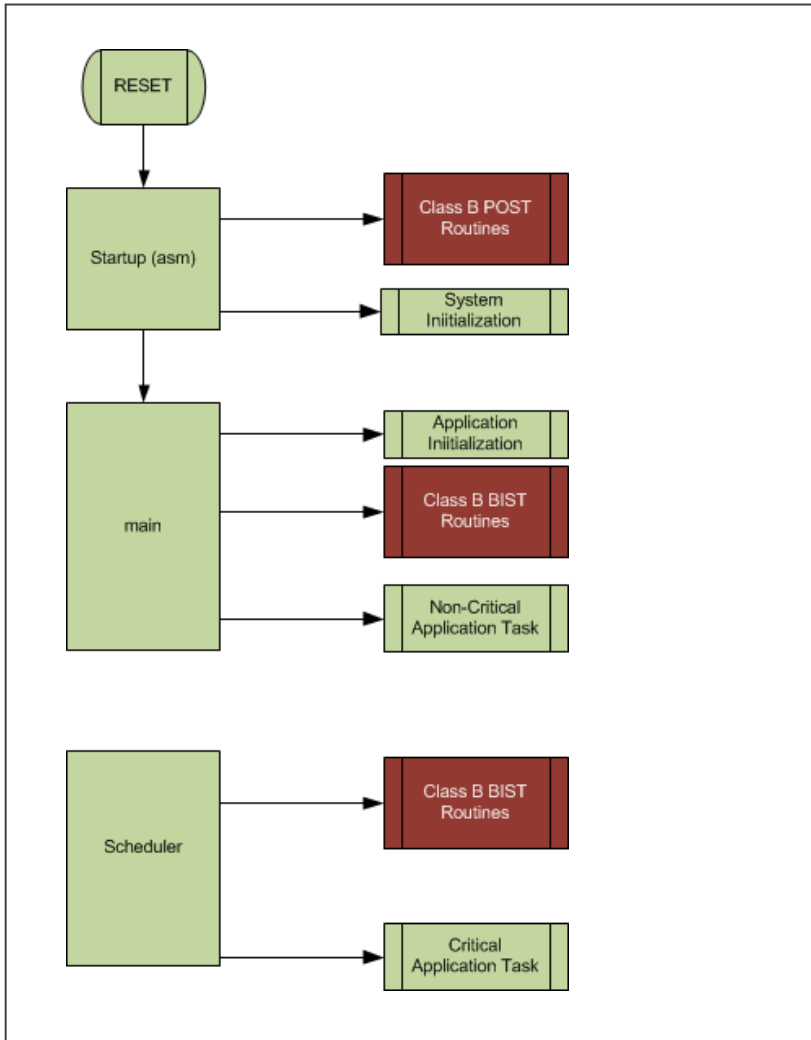
## VDE certified software library



- › This Infineon Class-B library has been developed in accordance with IEC 60335-1 and IEC 60730-1; the relevant requirements are a single channel structure with functional test and periodic self-test
- › The Infineon Class-B library provides routines which can be called by the user application to check the system at start-up and periodically to check the system during runtime
- › Class-B library test routines referenced to Class-B requirements

IEC60730 Table H1	Affected Component	Test Routine	Description
1.1	CPU, registers	ClassB_CPUPTest_POST	POST test of all CPU registers
1.1	CPU, registers	ClassB_CPUPTest_BIST	BIST test of all CPU registers
1.2	CPU, decoding	HardFault_Handler	Decoding and opcode test
1.3	CPU, PC	ClassB_PCTest_POST	POST test of CPU Program Counter
1.3	CPU, PC	ClassB_PCTest_BIST	BIST test of CPU Program Counter
1.3	CPU, PC	ClassB_WDTTest_POST	POST test of the watchdog unit
1.3	CPU, PC	ClassB_SPMon_BIST	BIST time slot monitoring
1.3	CPU, PC	ClassB_WDT_Refresh	BIST logical flow control
1.4	CPU, Address	ClassB_ADTest_POST	POST test of CPU address decoder

# Class-B library software System integration



XMC1000			XMC4000		
1100	1200	1300	4500		
1400					

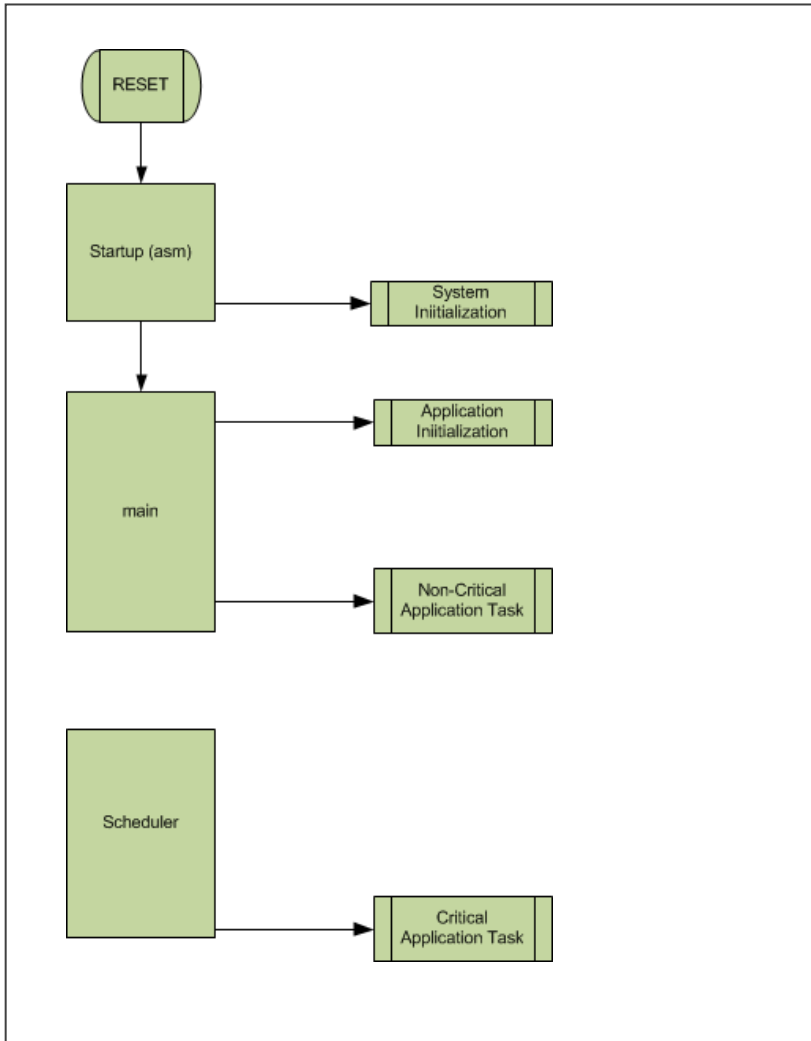
XMC™ Class-B Library is a VDE certified library and has software routines that provides internal supervisory functions and self diagnostics that can be integrated to an application software.

## › Target applications

- Motor control
- Intelligent lighting
- Power conversion
- Human machine interface
- Touch sense
- Connectivity
- General purpose

# Application example

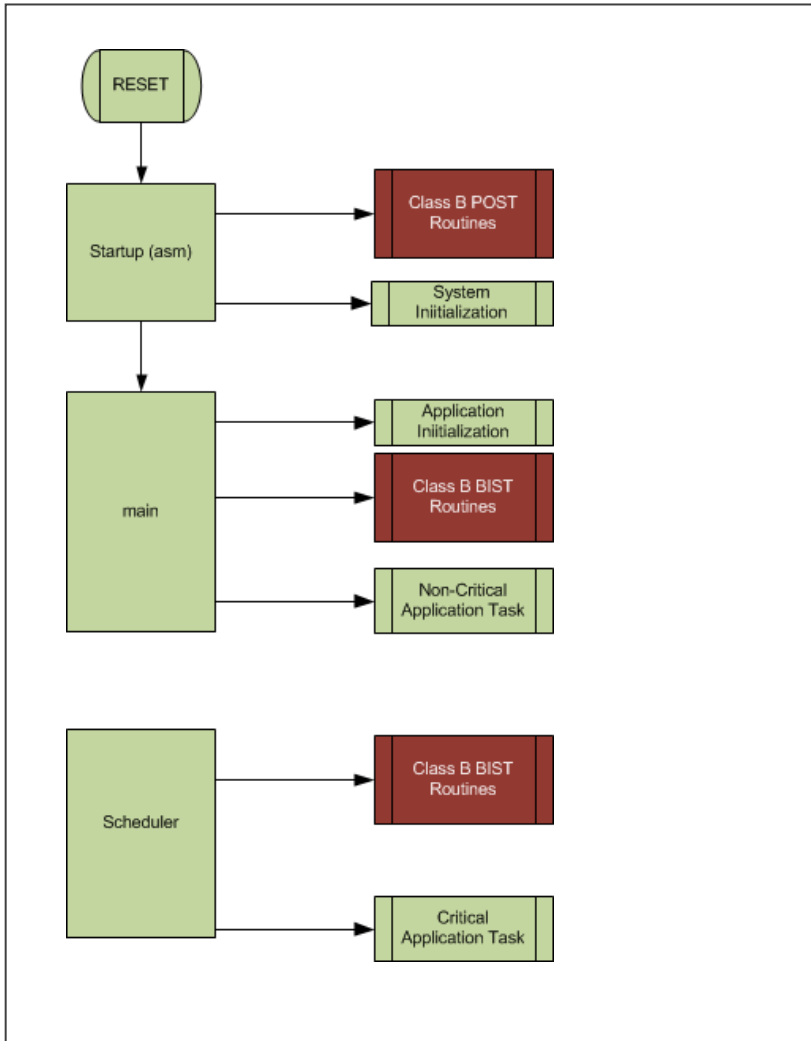
## Integration of Class-B library [1/2]



- › This shows a typical user application implementation. During the startup, the system initialization is done to check that the system is functional before the application operates
- › Once the system is operational, the non-critical application task are running in the background (in main)
- › For the critical task, they are run in a scheduler to be run periodically. This could be a application control operation that needs to be checked periodically

# Application example

## Integration of Class-B library [2/2]



- › Integrating XMC™ Class-B library, the pre-operation(POST) routines are executed before starting the system
- › The runtime routines (BIST) routines are self-testing routines that are executed while system is operational
- › Depending on the application requirement, the BIST routines can be placed to run in the background or in a scheduler where the tasks is deemed critical and needs to run periodically in the system to be checked at regular intervals



# Class-B library software Available for download

- Infineon on Class-B library software is available at [www.infineon.com/classb](http://www.infineon.com/classb)
- [Download XMC1000 Class-B package](#)

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EMBEDDED TOOLS & SOLUTIONS

### Free Download: Selftest Library for XMC1000

The new pre-certified version of the safety library for the XMC1000 microcontroller family is now available for free download. The selftest library enables XMC1000 developments according to IEC 60335 / IEC 60730 standards for home appliances.

By submitting the form on the right side, you will receive an email with download links. In support of this, Hitex also offers full services on all aspects of the V-model approach:

- > Safety Consulting
- > Safety Engineering
- > Certification Support
- > Safety tool Support

Please fill in this form (name and email fields are mandatory) and submit. You will receive an email with the download links.

If you have any questions or need to get more information on Hitex Services and Tools for the XMC controller family, do not hesitate to contact us!

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Last Name:

Email:

Country:

**Submit**

SELF-TEST ROUTINE	XMC1000 Family							
	XMC1000		XMC1200		XMC1300		XMC1400	
	POST	BIST	POST	BIST	POST	BIST	POST	BIST
CORE	o	o	o	o	o	o	o	o
CLOCK	o	o	o	o	o	o	o	o
INTERRUPT	o	o	o	o	o	o	o	o
FLASH ECC Test	o	o	o	o	o	o	o	o
PARITY	o	o	o	o	o	o	o	o
FLASH	o	o	o	o	o	o	o	o
RAM	o	o	o	o	o	o	o	o
RTC	-	o	-	o	-	o	-	o
WDT	o	-	o	o	o	-	o	-
Redundant Data	o	o	o	o	o	o	o	o
FlowControl	-	o	-	o	-	o	-	o
Safety Period Monitor	-	o	-	o	-	o	-	o
EXAMPLE	o	o	o	o	o	o	o	o

- Download XMC1000 Class B Package

#### Legend

- POST** Pre-operation self-test
- BIST** Built-in self-test
- o** ARM/Keil, IAR Systems, DAVE4
- +** ARM/Keil, DAVE3
- N.A.
- <sup>1</sup>** ECC hardware supported on XMC4000 flash
- x** Next release

# General information



- > For more detailed information and the latest updates, please go to:

[www.infineon.com/XMC](http://www.infineon.com/XMC)



<http://www.infineonforums.com/forums/8-XMC-Forum>

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