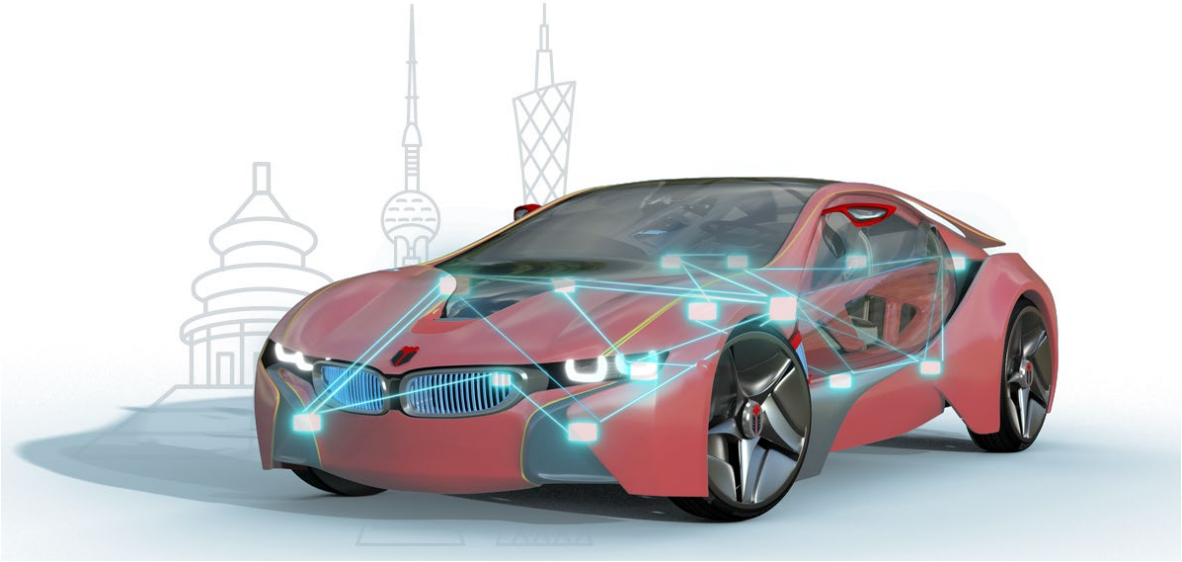
知从木牛 S32K14X MCAL 配置工具产品手册

ZC.MUNIU MCAL CONFIGURATION TOOL

PRODUCT MANUAL BASED ON NXP S32K14X

知从木牛基础软件平台

ZC.MuNiu Basic Software Platform



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知从木牛基础软件平台

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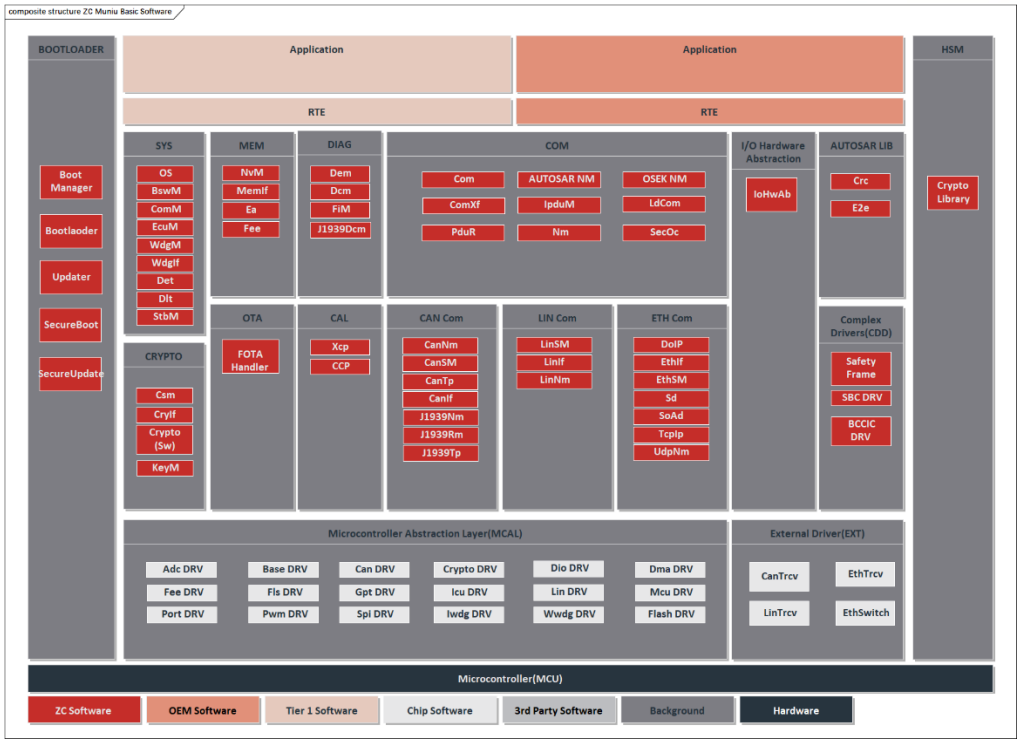
1 功能概述 FUNCTIONAL OVERVIEW

知从木牛基础软件平台(ZC.MuNiu)为汽车电子控制器产品开发，提供完整的基础软件平台解决方案。该产品符合 AUTOSAR、OSEK 等国际规范。

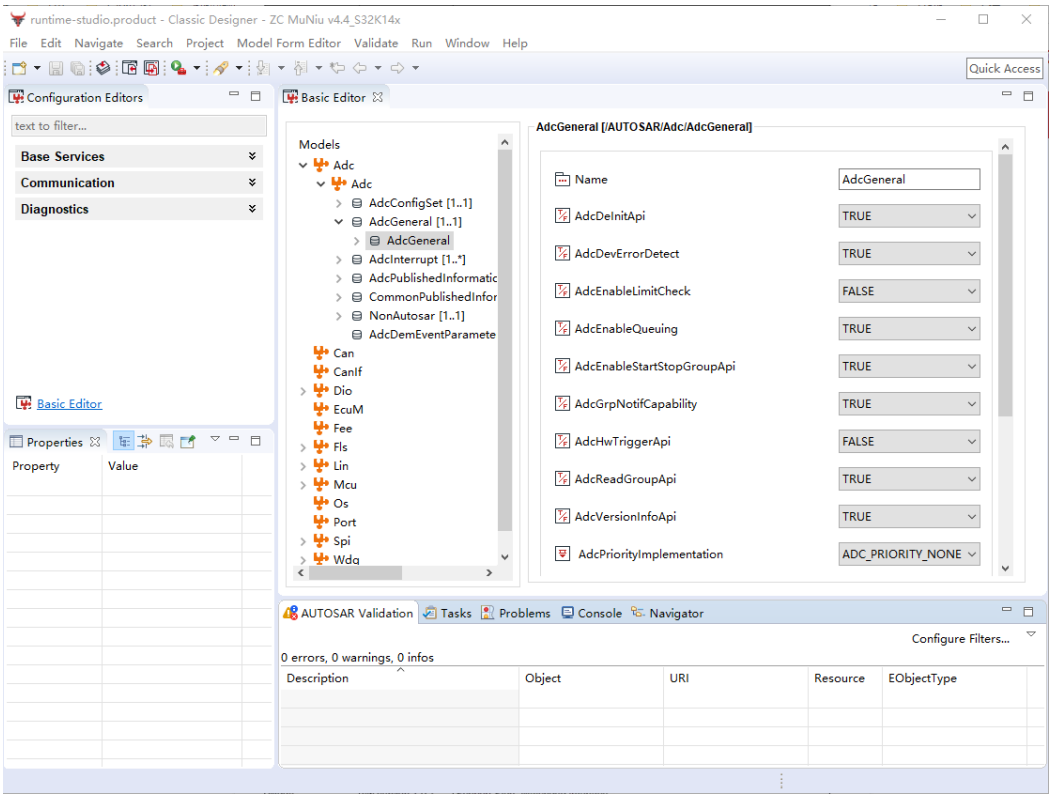
ZC.MuNiu Basic Software Platform offers a comprehensive solution for the development of automotive electronic control unit products, providing a complete basic software platform. This product complies with international standards such as AUTOSAR and OSEK.

目前，知从木牛基础软件平台已经支持 NXP 的 S32K1 系列芯片，并且集成了 NXP S32K14X 的 MCAL 软件包，同时，知从木牛 MCAL 配置工具可以适配 NXP S32K14X 的 MCAL 软件包的配置，用户就可以立即启动自己的项目，无需任何前置时间或投入额外的精力，就能够集成基础标准软件和特定硬件的驱动程序及操作系统。

Currently, ZC.MuNiu Basic Software Platform has supported NXP S32K1 series of microcontrollers and has integrated the NXP S32K14X MCAL software package. Additionally, ZC.MuNiu MCAL Configuration Tool is capable of adapting to the configuration of the NXP S32K14X MCAL software package. This allows users to immediately initiate their projects without any lead time or additional effort required to integrate basic standard software, as well as specific hardware drivers and operating systems.



知从木牛基础软件平台
ZC.MUNIU BASIC SOFTWARE PLATFORM



知从木牛 MCAL 配置工具
ZC.MUNIU MCAL CONFIGURATION TOOL

搭载木牛基础软件平台(ZC.MuNiu)的 NXP S32K1xx 芯片，能够提供完整的 Classic AUTOSAR 解决方案，满足整车各个域中的汽车电子控制器开发需求。这些应用包括车身控制器、网关控制器、电池管理系统（BMS）、车载娱乐 Module 等。

The NXP S32K1xx series of microcontrollers, integrated with ZC.MuNiu Basic Software Platform, can deliver a comprehensive Classic AUTOSAR solution that addresses the development requirements for automotive electronic control units within the entire vehicle domain. Applications encompass body control modules, gateway control units, Battery Management Systems (BMS), and in-vehicle entertainment systems, among others.

为了提供符合 AUTOSAR 标准的全套的解决方案，知从木牛 MCAL 配置工具可以无缝集成到现有工具链中，实现基础软件 Module 与已有成熟软件组件的集成，从而用于 OEM 和 Tier1 专用 Module 的开发，同时缩短上市时间并降低集成成本。

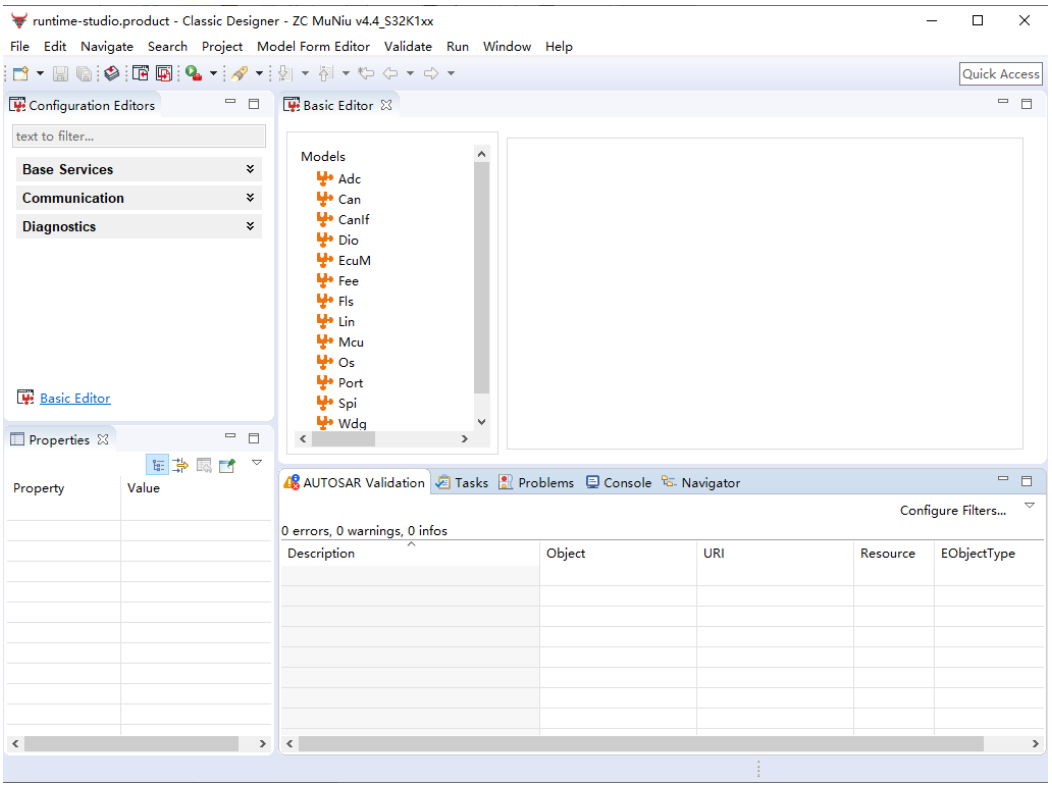
In order to provide a full suite of solutions that meet the AUTOSAR standards, ZC. MuNiu MCAL Configuration Tool facilitates seamless integration into the current toolchain. This allows for the integration of basic software modules with existing mature software components, catering to the development of proprietary modules for OEMs and Tier1 suppliers. Additionally, it helps to shorten the time to market and reduce integration costs.

2 支持 MODULESUPPORT MODULE

知从木牛 S32K14X MCAL 配置工具支持 MCAL 版本：S32K14X_MCAL4_3_RTM_1_0_1 及以上版本，支持可配置的 Module 如下：

ZC.MuNiu S32K14X MCAL Configuration Tool supports MCAL versions S32K14X_MCAL4_3_RTM_1_0_1 and above. The configurable modules supported by this tool are as follows:

- ADC Module
- CAN Module
- CRCU Module
- DIO Module
- ETH Module
- FEE Module
- FLS Module
- GPT Module
- I2C Module
- ICU Module
- LIN Module
- MCL Module
- MCU Module
- OCU Module
- PORT Module
- PWM Module
- SPI Module
- WDG Module



3 开发背景 DEVELOPMENT BACKGROUND

为了应对汽车电子软件开发中不断提高的系统复杂程度，改善软件的一致性和重用性，AUTOSAR 标准在 2003 年被提出并且迅速在产业内取得了广泛认同。Vector 公司和 EB 公司分别基于自己原先的开发工具产品提供了面向 AUTOSAR 开发工具链。此外，ETAS、Continental 等公司也都推出了自己的开发工具与 AUTOSAR 开发方法的整合方案。

To address the increasing complexity in automotive electronic software development and to enhance the consistency and reusability of software, the AUTOSAR standard was introduced in 2003 and rapidly gained widespread acceptance within the industry. Companies such as Vector and EB have provided AUTOSAR-oriented development toolchains based on their existing development tool products. Additionally, companies like ETAS and Continental have also introduced their integration solutions for development tools with the AUTOSAR development methodology.

与国际大公司的解决方案相比，国内符合 AUTOSAR 开发方法的软件开发平台和 ECU 配置工具非常少，基础软件的开发能力也很薄弱。因此，研发和实现一套符合 AUTOSAR 标准开发流程的开发工具，提供一个支持多厂商多平台的基础软件实现的 ECU 配置环境，对于我国的汽车电子软件发展具有重要的意义。

Compared to the solutions of international giants, there are very few software development platforms and ECU configuration tools in China that comply with the AUTOSAR development methodology, and the development capability for basic software is also quite weak. Therefore, developing and implementing a set of development tools that conform to the AUTOSAR standard development process, and providing an ECU configuration environment that supports the implementation of basic software for multiple manufacturers and platforms, is of great significance for the development of automotive electronic software in China.

知从木牛配置工具是符合国产汽车电子系统架构标准的 ECU 开发解决方案。该方案兼容业界主流的 AUTOSAR 标准，包括从系统功能设计，ECU 功能映射和组件配置，运行时环境自动代码生成等一系列的工具套件，提供了一套经过实践验证的，开发可重用 ECU 应用软件的基础。

ZC.MuNiu Configuration Tool is an ECU development solution that complies with domestic automotive electronic system architecture standards. This solution is compatible with the mainstream AUTOSAR standard in the industry, including a suite of tools from system functional design, ECU function mapping, and component configuration, to the automatic code generation of the runtime environment. It provides a foundation for developing reusable ECU application software that has been verified by practice.

4 功能描述 FUNCTIONAL DESCRIPTION

木牛基础软件平台的配置工具是基于 Eclipse 平台，并基于 ARTOP 架构，实现 AUTOSAR 模型和 ARXML 的解析。MuNiu Core 完成配置工具的 UI 界面，在 MuNiu Core 之上的 Module，实现 AUTOSAR 各个 Module 的配置。配置完成后，可生成各个 Module 的配置代码。

The configuration tool of ZC.MuNiu Basic Software Platform is based on the Eclipse platform and is constructed according to the ARTOP (AUTOSAR Tool Protocol) architecture, which enables the parsing of AUTOSAR models and ARXML files. The Core completes the UI interface of the configuration tool. Above its Core, the Module is used to configure various AUTOSAR Modules. After the configuration is completed, it can generate the configuration code for each Module.

知从木牛 MCAL 配置工具架构
THE ARCHITECTURE OF ZC.MUNIU MCAL CONFIGURATION TOOL

4.1 产品特点 Product Feature

知从木牛 MCAL 配置工具特点如下:

The features of the ZC.MuNiu MCAL Configuration Tool are as follows:

- 基于 Eclipse 平台和 Artop 架构，插件化开发，可扩展性强

  Based on the Eclipse platform and Artop architecture, it is developed in a plugin-based manner, offering strong scalability.
- 支持对 AUTOSAR 4.4.0 标准各个 MCAL Module 的配置

  Supports the configuration of various MCAL Modules in accordance with the AUTOSAR 4.4.0 standard.
- 支持配置数据的一致性校验

  Supports consistency checks for configuration data.
- 产品级的自动代码生成

  Product-level automatic code generation.
- 支持 ARXML 格式数据交换

  Supports data exchange in the ARXML format.
- 可以根据客户需要灵活配置和裁减功能组件

  Capable of flexible configuration and tailoring of functional components according to customer requirements.
- 强大的错误检查和提示纠正机制

  A powerful error-checking and prompt-correction mechanism.
- 支持多种格式数据文件(DBC, ODX)的导入

  Supports the import of various format data files (DBC, ODX).
- 支持各种主流的汽车 ECU 芯片 Compatible with a variety of mainstream automotive ECU chips, such as NXP ‘s S32K1XX、S32K3XX、MPC5744P、MPC5746C、MPC5748G，Infineon ‘s TC275、TC397，TI ‘s TMS320f280048，AWR1642 etc., domestic chips like AutoChips ‘sAC7801x、AC781x，ChipOn ‘s KF32A152、FlagChip ‘s FC4150 etc.

4.2 技术架构 Technical Architecture

知从木牛 MCAL 配置工具基于 AUTOSAR 配置工具最新架构开发。

ZC.MuNiu MCAL Configuration Tool is developed based on the latest AUTOSAR configuration tool architecture.

- Eclipse Oxygen.3a Release (4.7.3a)
- ARTOP-SDK-4.13.0 (supports the latest AUTOSAR releases 4.4.0)
- ARTEXT-SDK-1.7.2 1.6.0.
- CDT 8.1.2

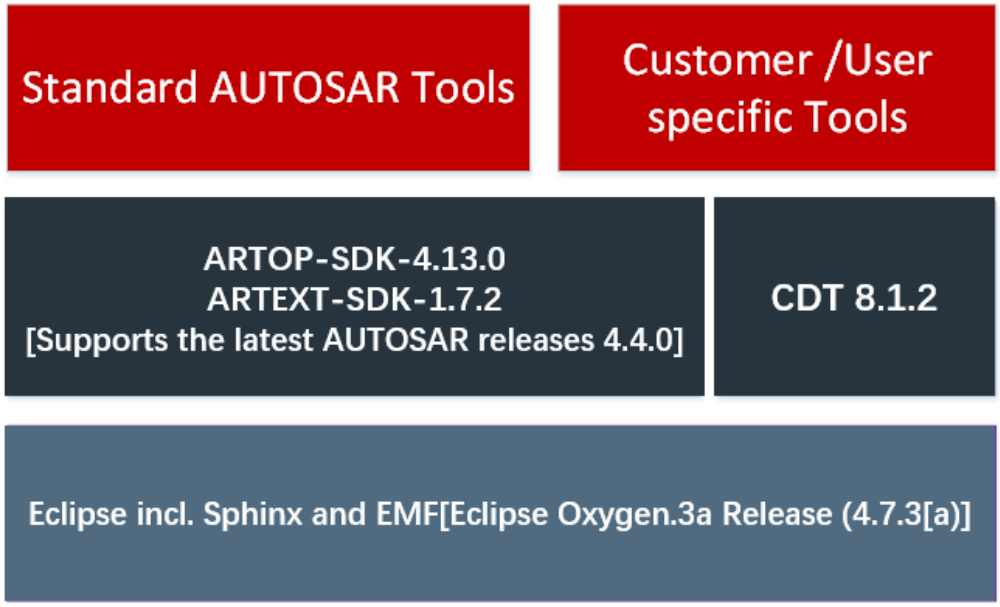


FIG 4 - 2 架构图
FIG 4 - 2 ARCHITECTURE DIAGRAM

4.3 运行环境 Operating Environment

配置环境 Configuration Environment	
Software (Configuration Tools)	Win7/10 64bit
Hardware (Chip)	S32K144/S32K146/S32K148
MCAL Version	S32K14X_MCAL4_3_RTM_1_0_1

5 证书 CERTIFICATE

中华人民共和国国家版权局

计算机软件著作权登记证书

证书号：软著登字第8163137号

软件名称：知从木牛基础软件配置工具软件
[简称：知从木牛]
V2.1.0

著作权人：上海知从科技有限公司

开发完成日期：2021年06月30日

首次发表日期：2021年07月15日

权利取得方式：原始取得

权利范围：全部权利

登记号：2021SR1440511

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2021年09月27日

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上海市软件行业协会

软件产品证书

经评估,知从木牛基础软件配置工具软件[简称：知从木牛]V1.0 符合《进一步鼓励软件产业和集成电路产业发展的若干政策》和《软件产品评估规范》的有关规定，评估为软件产品，特发此证。

申请企业:上海知从科技有限公司

软件类别:应用软件

证书编号:沪ZC-2021-0018

有 效 期：五年

上海市计算机软件评测重点实验室
（上海计算机软件技术开发中心）
二〇二一 年 一 月二十五日

木牛基础软件配置工具软件产品登记证书
MUNIU SOFTWARE PRODUCT REGISTRATION CERTIFICATE

公众号 业务联系

成为全球领先的汽车基础软件公司
To Be the Global Leading Automotive Basic Software Company