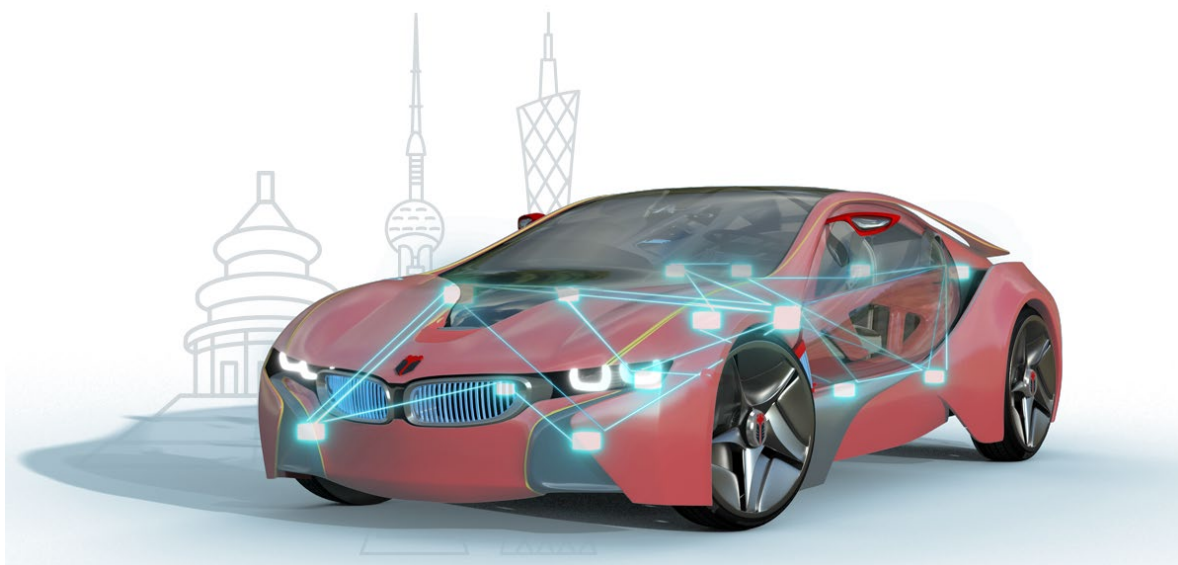




知从木牛 AUTOSAR 软件平台
恩智浦 MPC5744P 产品手册
ZC.MUNIU AUTOSAR SOFTWARE PLATFORM
PRODUCT MANUAL BASED ON NXP MPC5744P
知从木牛基础软件平台
ZC MuNiu Basic Software Platform



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知从 木牛基础软件平台

ZC MuNiu Basic Software Platform

1 功能概述 FUNCTION OVERVIEW

知从木牛（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。该产品参考 AUTOSAR、OSEK 等国际规范，有基于 AUTOSAR ATOP 架构的上位机配置工具，支持上汽、一汽、吉利、广汽、长安、长城等整车厂通讯、诊断、网络管理规范。该平台主要包括：操作系统、通讯协议栈（CAN/LIN）、诊断协议栈(UDS/J1939)、网络管理（OSEK/AUTOSAR）、标定协议栈（XCP/CCP）、存储协议栈、复杂驱动模块等，配套知从的 Bootloader 刷新程序和上位机工具，可以根据不同的客户项目要求进行配置和再开发。知从科技提供基础软件产品的同时，也提供控制器基础软件功能实现的开发服务。

ZC.MuNiu provides complete basic software platform solutions for automotive electronic control unit (ECU) product development. The product references international standards such as AUTOSAR and OSEK, and features a configuration tool based on the AUTOSAR ATOP architecture, supporting communication, diagnostic, and network management specifications for major vehicle manufacturers like SAIC, FAW, Geely, GAC, Changan, and Great Wall. The platform mainly includes: operating system, communication protocol stack (CAN/LIN), diagnostic protocol stack (UDS/J1939), network management (OSEK/AUTOSAR), calibration protocol stack (XCP/CCP), storage protocol stack, complex driver modules, etc., along with ZC's Bootloader update program and PC tools, which can be configured and redeveloped according to different customer project requirements. While providing basic software products, ZC also offers development services for the implementation of controller basic software functions.

2 应用领域 APPLICATION FIELD

木牛基础软件平台可应用于汽车电子控制器产品开发。例如：

ZC.MuMiu Basic Software Platform can be applied to the development of automotive electronic control unit products. For example:

- 电机控制器
Electric Motor Controller
- 电池管理系统(BMS)
Battery Management System (BMS)
- 底盘系统应用
Battery Management System (BMS)
- 电气稳定控制(ESC)
Electronic Stability Control (ESC)
- 电动助力转向(EPS)
Electric Power Steering (EPS)
- 安全气囊和传感器集成应用
Airbag and Sensor Integration Application
- 雷达的应用
Radar Application

3 配置环境 CONFIGURATION ENVIRONMENT

配置环境 Configuration Environment	
Hardware (Chip)	MPC 5744P (MPC5744PMLQ8)
Compilers Supported	WindRiver Diab V5.9.4.0、Greenhill 201516
Evaluation Hardware	SPC5744PFMLQ9
Debugger	Lauterbach (Trace32 R.2018.02) Isystem (IC5700)
Configuration Tools	Muniu_v4.4
Configuration Environment	Win7/Win10 64bit

WindRiver Diab 编译器选项 WindRiver Diab Compiler Options	
WindRiver Diab 编译选项 WindRiver Diab Compiler Options	-tPPCE200Z4VEG:simple -g3 -Xsmall-const=0 -Xsmall-data=0 -XO -Xkill-opt=0x00000004 -ei1824 -Xnested-interrupts -Xdebug-local-cie -Xapu-volatile-context -Xpragma-section-last -Xenum-is-int
WindRiver Diab 链接选项 WindRiver Diab Linker Options	-tPPCE200Z4VEG:simple -m15 >link.map -e __start ../MPC5744P_Safety_Library.dld

Greenhills 编译器选项 Greenhills Compiler Options	
Greenhills 编译选项 Greenhills Compiler Options	--prototype_warnings -Odebug - Osize -Ospace -G -dual_debug - nofloatio -noobj -inline_prologue -pragma_asm_inline -noSPE -- no_exceptions --no_commons - nokeeptempfiles -pnone -- incorrect_pragma_warnings -- slash_comment --long_long - preprocess_assembly_files - passsource -bigswitch -c99
Greenhills 链接选项 Greenhills Linker Options	-o \$*.\$(BINARY_SUFFIX) - map=\$(PROJECT_NAME).map -- preprocess_linker_directive_full - overlap_warn -Manx -stdlib -lansi -lind -larch -LSWC/asn1c/lib - lasn1per -lasn1rt -lasn1xer -lexpat -keepmap

4 开发背景 D

OSEK 标准旨在制定汽车电子标准化接口，主要定义了三个组件：实时操作系统（OSEKOS），通讯系统（OSEKCOM）和网络管理系统（OSEKNM）。OSEK 操作系统始于 20 世纪 90 年代，是第一个商业化的汽车嵌入式操作系统。

The OSEK standard aims to establish standardized interfaces for automotive electronics, primarily defining three components: the real-time operating system (OSEKOS), the communication system (OSEKCOM), and the network management system (OSEKNM). The OSEK operating system, which began in the 1990s, was the first commercialized automotive embedded operating system.

AUTOSAR 组织成立于 2003 年，主要由欧洲汽车制造商、部件供应商及其他电子、半导体和软件系统公司联合建立。致力于为汽车工业开发一个开放的、标准化的软件架构；希望大家“在标准上合作，在应用上竞争”提高基础平台的稳定，降低成本，提高控制器产品开发质量和速度。2006 年底发布了 2.1 版规范，2008 年发布 3.1 版本开始产品化；后续逐步增加了功能安全，以太网等内容，目前广泛使用 2014 年后发布的 4.2.1 和 4.2.2 版本，以及 4.3.1 版本。

The AUTOSAR consortium was established in 2003, mainly by European car manufacturers, component suppliers, and other electronics, semiconductor, and software system companies. It is dedicated to developing an open, standardized software architecture for the automotive industry; The goal is for everyone to "cooperate on standards and compete on applications," improving the stability of the basic platform, reducing costs, and enhancing the quality and speed of control unit product development. The 2.1 version of the specification was released at the end of 2006, and the 3.1 version was productized in 2008, subsequently, functionalities such as functional safety and Ethernet were gradually added. The widely used versions are 4.2.1 and 4.2.2, released after 2014, as well as version 4.3.1.

汽车在电动化、网联化、智能化的大趋势下，电子电器部件日益增多，电气结构越加复杂，整车开发周期不断缩短。平台化、智能化的基础软件起到至关重要。

With the overall trend towards electrification, connectivity, and intelligence of automobiles, the number of electronic and electrical components is increasing, the electrical structure is becoming more complex, and the vehicle development cycle is continuously shortening. The platform-based, intelligent basic software plays a crucial role.

知从.木牛（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，有基于 AUTOSAR ATOP 架构的上位机配置工具，支持上汽、一汽、吉利、广汽、长安、长城等整车厂通讯、诊断、网络管理规范。该平台主要包括：操作系统、通讯协议栈（CAN/LIN）、诊断协议栈(UDS/J1939)、网络管理

(OSEK/AUTOSAR)、标定协栈 (XCP\CCP)、存储协议栈、复杂驱动模块等，配套知从的 Bootloader 刷新程序和上位机工具，可以根据不同的客户项目要求进行配置和再开发。

ZC.MuNiu provides a complete basic software platform solution for the development of automotive electronic control unit products. This product complies with international standards such as AUTOSAR and OSEK and features an upper machine configuration tool based on the AUTOSAR ATOP architecture, supporting communication, diagnostics, and network management specifications of major vehicle manufacturers like SAIC, FAW, Geely, GAC, Changan, and Great Wall. The platform mainly includes: operating system, communication protocol stack (CAN/LIN), diagnostic protocol stack (UDS/J1939), network management (OSEK/AUTOSAR), calibration protocol stack (XCP/CCP), storage protocol stack, complex driver modules, etc., with Bootloader update programs and upper machine tools from ZC, which can be configured and redeveloped according to different customer project requirements.

知从科技提供基础软件产品的同时，也提供符合 ASPICE Level3 流程和功能安全 ASILB\ND 要求的控制器基础软件功能实现的开发服务，SBC 芯片、BCCIC 芯片各种复杂驱动软件的定制开发。同时，集成知从科技的功能安全产品 SafetyFrame，可以满足功能安全要求。

While providing basic software products, ZC also offers development services for the implementation of control unit basic software functions in line with the ASPICE Level 3 process and functional safety requirements ASIL B/D. It also provides customized development of various complex driver software for SBC chips and BCCIC chips. At the same time, by integrating ZC's functional safety product SafetyFrame, functional safety requirements can be met.

知从科技掌握 AUTOSAR 平台软件的开发和应用核心技术，提供本地现场支持，质量好，速度快，成本低。

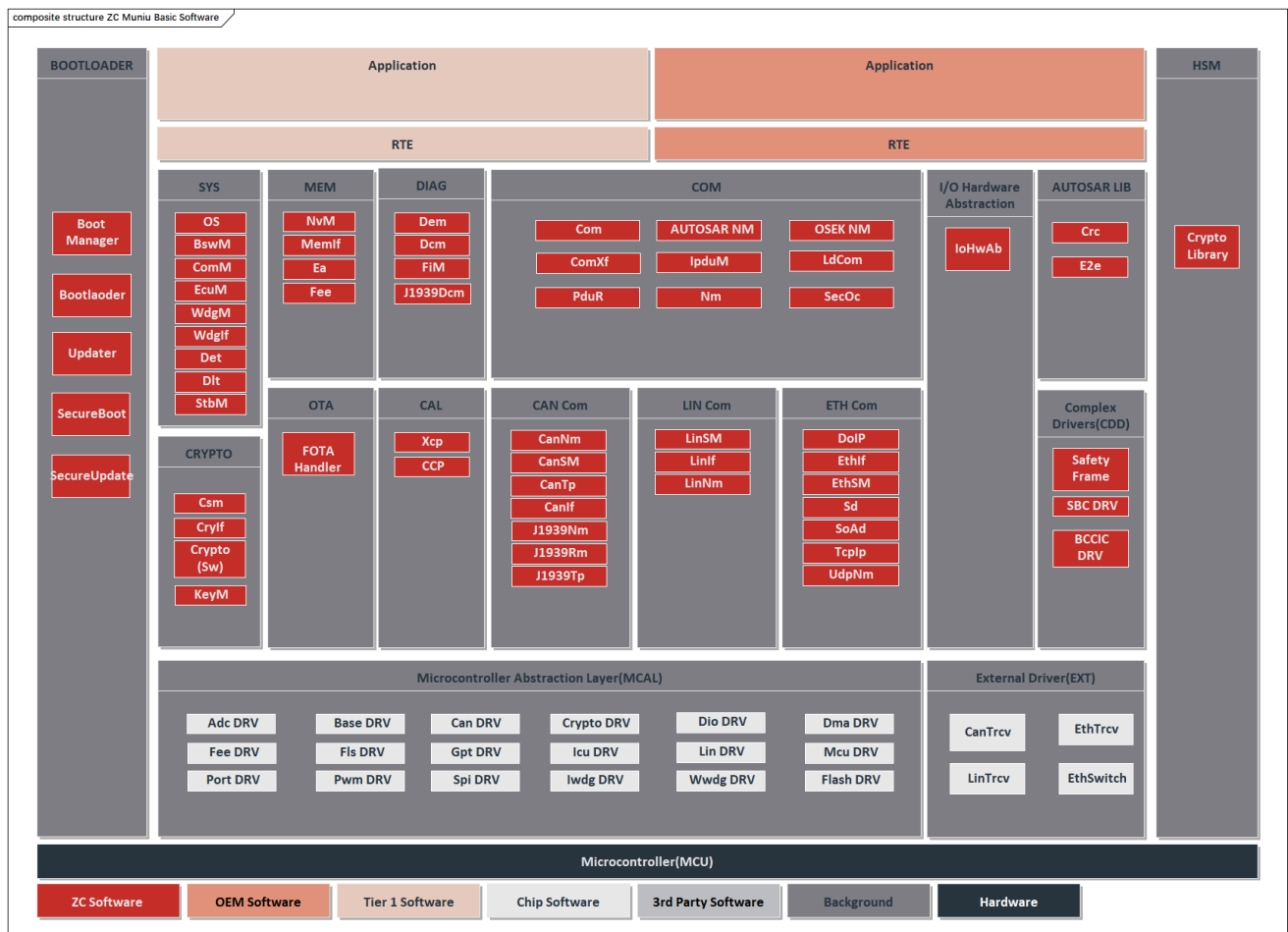
ZC has mastered the core technology of AUTOSAR platform software development and application, providing on-site local support, with high quality, fast speed, and low cost.

5 功能描述 FUNCTIONAL DESCRIPTION

5.1 产品特点 Product Feature

- 符合 AUTOSAR 4.2.2 版本
Compliant with AUTOSAR 4.2.2 version
- ARTOP 架构上位机配置工具，符合 AUTOSAR 4.4.0 版本
The platform includes an upper machine configuration tool based on the AUTOSAR Tool Protocol (ARTOP)
- 符合 OSEK 标准
Compliant with OSEK standard
- 操作系统
Operating System
- 通讯协议栈 (CAN\LIN)
Communication Protocol Stack (CAN/LIN)
- 诊断协议栈(UDS\J1939)
Diagnostic Protocol Stack (UDS/J1939)
- 网络管理 (OSEK\AUTOSAR)
Network Management (OSEK\AUTOSAR)
- 标定协议栈 (XCP\CCP)
Calibration Protocol Stack (XCP\CCP)
- 存储协议栈
Storage Protocol Stack
- 复杂驱动定制开发
Complex Driver Custom Development
- 工程服务
Engineering Services

5.2 软件架构 Software Architecture



知从木牛基础软件平台架构

ZC.MUNIUI BASIC SOFTWARE PLATFORM ARCHITECTURE

模块 Module	子模块 Submodule		描述 Description
微控制器底层驱动集成包 MCAL Integration Package	可集成第三方 MCAL 的集成工程服务包 Integration Engineering Service Package for Third-Party MCAL		
外部底层驱动 (EXT) External Driver	CANTRCV DRV	CAN收发器驱动 CAN Transceiver Driver	实现外部硬件组件的AUTOSAR基础软件模块 The implementation of AUTOSAR Basic Software Module for External Hardware Components Integration
系统服务(SYS) System Service	OS	操作系统 Operating System	实现系统服务的AUTOSAR基础软件模块

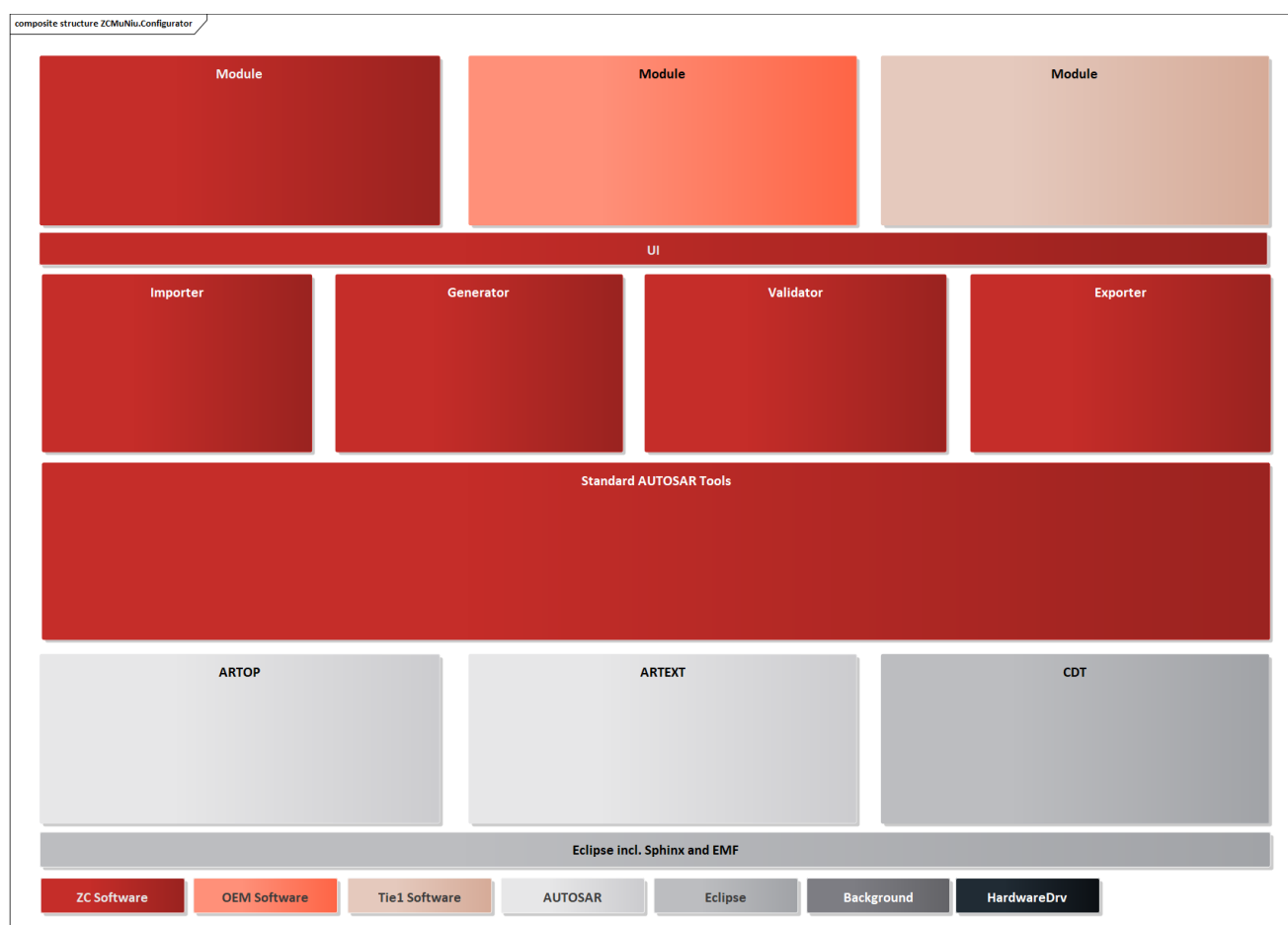
模块 Module	子模块 Submodule	描述 Description
	BSWM	基础软件模式管理 Basic Software Mode Management
	COMM	通信管理 Communication Management
	DET	开发错误追踪 Development Error Tracer
	ECUM	ECU管理 ECU Management
	WDGIF	看门狗接口 Watchdog Interface
	WDGM	看门狗管理器 Watchdog Manager
诊断服务(DIAG) Diagnostic Service	DCM	诊断通信管理器 Diagnostic Communication Manager
	DEM	诊断事件管理器 Diagnostic Event Manager
	FIM	功能抑制管理器 Functional Indicator Manager
存储服务(MEM) Memory Service	EA	EEPROM抽象层 EEPROM Abstraction Layer
	FEE	Flash的EEPROM模拟器 Flash EEPROM Emulator
	MEMIF	存储器抽象层接口 Memory Abstraction Layer Interface

模块 Module	子模块 Submodule	描述 Description
	NVM	NvRam管理器 NvRam Manager
通信服务(COM) Communication Service	COM	通信 Communication
	AUTOSAR NM	网络管理接口 Network Management Interface
	OSEK NM	OSEK网络管理 OSEK Network Management
	PduR	PDU路由 PDU Routing
CAN通信 Communication Service	CANIF	CAN接口 CAN Interface
	CANNM	CAN网络管理 CAN Network Management
	CANSM	CAN状态管理器 CAN Status Manager
	CANTP	CAN传输协议 CAN Transmission Protocol
LIN通信 LIN Communication	LINIF	LIN接口 LIN Interface
	LINSM	LIN状态管理器 LIN Status Manager
输入输出硬件抽象层(IO) Input/output Hardware Abstraction Layer	IOHAB	IO硬件抽象层 IO Hardware Abstraction Layer
AUTOSAR库(LIB)	CRC	CRC程序 CRC Program
复杂驱动(CDD)	SBC DRV	电源芯片驱动

模块 Module	子模块 Submodule	描述 Description
Complex Driver		Power Chip Driver 础软件模块
	BCCIC DRV	电池管理系统采样芯片驱动 Battery Management System Sampling Chip Driver The implementation of AUTOSAR Basic Software Module for Complex Driver Functions
标定管理(CAL) Calibration Management	XCP	XCP 通用标定协议 Universal Calibration Protocol 实现标定管理的解决方案
	CCP	CCP CAN 标定协议 CCP CAN Calibration Protocol The implementation of Solution for Calibration Management

为了满足客户的不同项目需求，提高基础软件平台的扩展性，木牛基础软件平台实现了各个模块可配置性，并且实现了配置工具。客户可根据不同需求，在配置工具上完成各个模块的配置工作，可生成配置代码文件，将生成的配置文件集成到工程中即可。

To meet the diverse project requirements of our clients and enhance the extensibility of the basic software platform, ZC.MuNiu Basic Software Platform has implemented configurable modules and a configuration tool. Customers can complete the configuration of various modules according to different requirements using the configuration tool, generate configuration code files, and integrate the generated configuration files into the project.



木牛配置工具架构

ZC.MUNIUI CONFIGURATION TOOL ARCHITECTURE

木牛配置工具架构

ZC.MUNIUI CONFIGURATION TOOL ARCHITECTURE

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。除了 AUTOSAR 标准定义的模块之外，还支持 OEM 和 Tie1 厂商二次开发自己的模块。配置完成后，可生成各个模块的配置代码。

ZC.MuNiu basic software platform configuration tool is based on the Eclipse platform and is built on the ARTOP architecture, which implements the parsing of the AUTOSAR model and

ARXML. In addition to the modules defined by the AUTOSAR standard, it also supports OEM and Tier1 manufacturers to develop their own modules for secondary development. After the configuration is completed, the configuration code for each module can be generated.

6 证书 CERTIFICATE



木牛软件著作权登记证书
MUNIUI SOFTWARE COPYRIGHT 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

