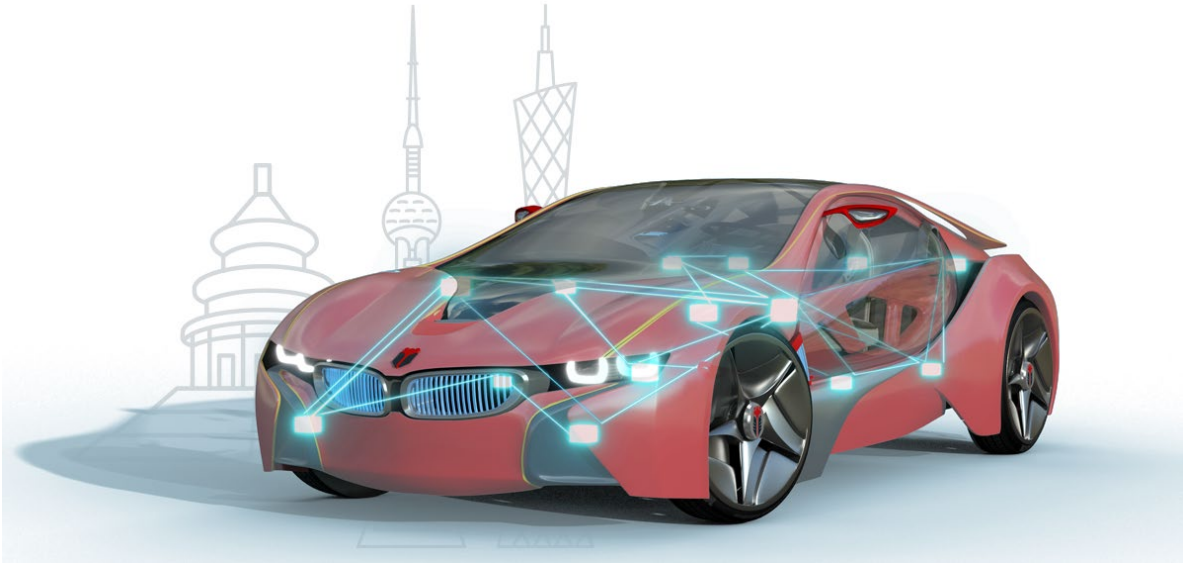
知从青龙 BOOTLOADER 恩智浦 NCJ29D5D 产品手册
ZC.QINGLONG BOOTLOADER PRODUCT MANUAL BASED ON NXP NCJ29D5D

知从青龙 BootLoader

ZC.QINGLONG BootLoader



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知从青龙 BootLoader

ZC.QingLongBootLoader

1 功能概述 FUNCTION OVERVIEW

知从青龙 BootLoader 是由知从科技自主研发的程序刷新软件(BootLoader)，该 BootLoader 可以通过主芯片控制对 NCJ29D5(从芯片)进行程序刷新。使用知从青龙 BootLoader 的控制器，可以通过 CAN、LIN、UART 等多种通信方式传输程序到主芯片，主芯片再通过 SPI 通信方式对 NCJ29D5 实现应用程序的更新功能。

The ZC.Qinglong BootLoader is an independently developed flash programming software (BootLoader) by ZC. This BootLoader can control the NCJ29D5 (slave chip) to perform program updates through the main chip. Using the controller of ZC.QingLong BootLoader, programs can be transmitted to the main chip through various communication methods such as CAN, LIN, and UART, and then the main chip can update the application on the NCJ29D5 via the SPI communication method.

目前，知从青龙 BootLoader 已支持 NXP、Infineon、Renesas、ST、Cypress 等多家芯片，并且支持多家整车厂程序刷新规范，可提供定制开发服务。

Currently, the ZC.QingLong BootLoader supports chips from multiple manufacturers including NXP, Infineon, Renesas, ST, and Cypress, and also supports the program update specifications of various car manufacturers, offering customized development services.

通常每家整车厂都有各自的程序刷新规范，目前知从青龙 BootLoader 支持的整车厂程序刷新规范包括：广汽、长安、上汽、一汽、东风商用车、东风、上海通用、吉利、奇瑞、上汽通用五菱、萨博、长城、北汽新能源等（以上排名不分先后）。

Generally, each car manufacturer has its own program update has its own program update specifications. The car manufacturer program update specifications supported by the ZC.QingLong BootLoader include: GAC, Changan, SAIC, FAW, Dongfeng Commercial Vehicles, Dongfeng, SAIC General Motors, Geely, Chery, SGMW, Saab, Great Wall, BAIC New Energy, Great Wall, BAIC New Energy (listed in no particular order).

2 应用领域 APPLICATION FIELD

恩智浦 NCJ29D5 是新一代超宽带(UWB) IC 系列的第一款产品，专用于满足全球汽车工业的通信连接和安全需求。NCJ29D 芯片可应用于整车各个领域中。目标应用包括：

The NXP NCJ29D5 is the first product in the new generation of Ultra-Wideband (UWB) IC series, specifically designed to meet the communication connection and safety needs of the global automotive industry. The NCJ29D chip can be applied in various fields of the entire vehicle. Target applications include:

- 车身系统 Vehicle Body

  智能门禁系统、充电系统等

  Systems Intelligent access control systems, charging systems, etc.

- ADAS 系统 ADAS Systems

  雷达系统、蓝牙系统等

  Radar systems, Bluetooth systems, etc.

- 功能应用 Functional Applications

  智能支付功能、智能泊车功能等。

  Intelligent payment functions, intelligent parking functions, etc.

3 主控芯片支持 MAIN CONTROL CHIP SUPPORT

主控芯片支持 Main Control Chip Support	
Cypress	CYT2B7
NXP	S32K144/MPC5567/MPC5606B/MPC5634/ MPC5644/9S12G128/S12HY64/ 9S12G64/MC9S12VR64/KW36Z512
Infineon	TC275/TC233/TC1782/XC2364
Renesas	RH850/V8503385
ST	STM8AF51A/SPC584B

主控芯片编译器支持 Main Control Chip Compiler Support	
WindRiver	Diab v5.9.4.0
Tasking	Tasking v4.2r2 / Tasking v2.5r1 / Tasking v3.5r1
GreenHills	GHS v4.2.3 / GHS v7.1.4
HighTec	HighTec v4.6.6.1
Codewarrior	Codewarrior5.1 / CodeWarrior for HCS12(X) v5.2
CS+ for CC	CS+ for CC V3.02.00
Cosmic	Cosmic v4.2.4
S32DS	S32DS_ARM_v2018_R1
IAR	IAR EW for Arm 8.40.1

调试器支持 Debugger Support	
Lauterbach	Lauterbach (Trace32 R.2018.02)
Isystem	Isystem (IC5700)
E1	E1 emulator [R0E000010KCE00]
PE	PE USB Multilink Universal

4 开发背景 DEVELOPMENT BACKGROUND

目前，汽车上的电子电气架构越来越复杂，并伴随着汽车的电动化、智能化、网联化、共享化，软件的研发在汽车上占比越来越大。软件更新的频率越来越高。而且，在汽车的整个生命周期中，包括研发阶段、生产阶段、售后阶段，各个阶段都需要实现软件的更新功能。因此，客户对软件程序更新的需求越来越迫切。

Currently, the electronic and electrical architecture of vehicles is becoming increasingly complex. Along with the trends of electrification, intelligence, connectivity, and sharing in the automotive industry, the proportion of software development in vehicles is growing larger. The frequency of software updates is also increasing. Moreover, throughout the entire lifecycle of a vehicle, including the research and development phase, production phase, and after-sales phase, software update functionality is required in each stage. As a result, customers' requirement for software program updates is becoming more urgent.

对于整车厂或供应商，BootLoader 是控制器开发必备的功能。并且，不同的整车厂有不同的程序更新规范，同时 BootLoader 驱动又依赖于不同的芯片。因此，为了满足不同的整车厂程序更新规范，又适配不同的芯片，知从科技提供了完整的 BootLoader 解决方案—知从青龙 BootLoader。知从青龙 BootLoader 既适用于不同的整车厂程序更新规范，又适用于不同芯片厂商的芯片，让客户更专注与自己的控制器产品研发。

For vehicle manufacturers or suppliers, a BootLoader is an essential feature for controller development. Additionally, different vehicle manufacturers have different program update specifications, and the BootLoader driver depends on different chips. Therefore, to meet the program update specifications of different vehicle manufacturers and to be compatible with chips from various chip manufacturers, ZC provides a complete BootLoader solution—the ZC.Qinglong BootLoader. The ZC.Qinglong BootLoader is suitable for different vehicle manufacturer program update specifications and for chips from different chip manufacturers, allowing customers to focus more on their own controller product development.。

5 功能描述 FUNCTION DESCRIPTION

5.1 产品特点 Product Feature

- 适用于多达十几家整车厂的程序更新规范

  Applies to the program update specifications of up to a dozen car manufacturers.

- 支持多家芯片制造商的芯片

  Supports chips from multiple chip manufacturers

- 支持业界主流编译器

  Supports mainstream compilers in the industry

- 支持应用程序和数据的更新功能

  Supports update functions for applications and data

- 支持 HIS（公路信息系统）标准

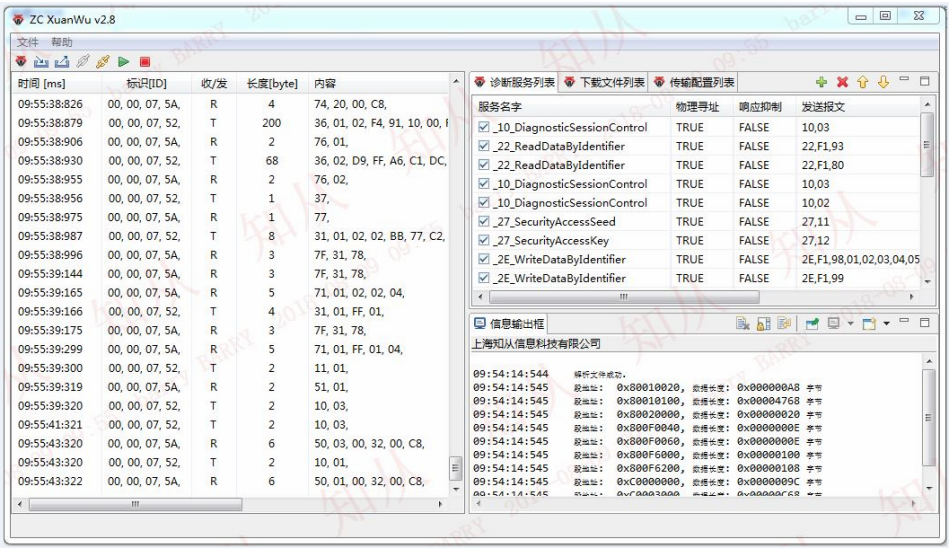
  Supports HIS (Highway Information System) standards

- 支持 CAN->SPI/LIN->SPI/SPI 等通信方式

  Supports communication such as CAN->SPI/LIN->SPI/SPI

- 兼容知从玄武程序更新工具，提供完整的程序更新解决方案

  Compatible with ZC.Xuanwu program update tools, providing a complete program update solution



知从玄武—程序更新工具
ZC.XuanWu—Program Update Tool

5.2 通信协议支持 Communication Protocol Support

知从青龙 BootLoader 主控 MCU 与 NCJ29D5 芯片的架构如下图所示：

The architecture of the main control MCU integrated with the ZC.QingLing BootLoader and the NCJ29D5 chip is illustrated in the figure below.:

NCJ29D5 与主控 MCU 架构
The NCJ29D5 and Main Control MCU Architecture

主控 MCU 与 NCJ29D5 芯片通过 SPI 通信协议实现数据交互。知从青龙 BootLoader 支持一系列的 UCI 或 RCI 指令集接口，可以通过调用这些指令集接口对 NCJ29D5 进行程序更新。

The main control MCU communicates with the NCJ29D5 chip through the SPI (Serial Peripheral Interface) communication protocol to exchange data. The ZC.QingLing BootLoader supports a series of UCI (Unified Command Interface) or RCI (Remote Command Interface) instruction set interfaces, which can be used to update the NCJ29D5 through these instruction set interfaces.

更新程序首先需要从 APP 进入 BOOT，那么第一步就需要调用 SWUP ACTIVE 接口发送激活 BOOT 指令使 NCJ29D5 进入 BOOT 开启程序刷新，后续则可以调用 StartUpdate、Transfer、Verify 等一系列指令接口来实现对 NCJ29D5 整个程序的更新。

To update the program, the first step is to transition from the APP (Application) mode to the BOOT (Bootloader) mode. This requires calling the SWUP (Software Update) ACTIVE interface to send an activation command to the BOOT mode, enabling the NCJ29D5 to enter the bootloader and start the program refresh. Subsequently, a series of instruction interfaces such as StartUpdate, Transfer, and Verify can be called to complete the update of the entire program on the NCJ29D5.

6 过程文档 PROCESS DOCUMENTATION

开发流程 Development Process	文档描述 Document Description
需求收集 Requirement Collection	顾客的需求文档 Customer Requirement Document
软件需求分析 Software Requirement Analysis	ZC 对软件的需求分析 ZC's Software Requirement Analysis
	需求分析规格书 Requirement Analysis Specification
	软件需求追踪表 Software Requirement Traceability Matrix
	客户的问题沟通表 Customer Issue Communication Form
软件架构设计 Software Architecture Design	软件架构说明书 Software Architecture Manual
	软件架构的追踪表 Software Architecture Traceability Table
软件详细设计和单元设计 Software Detailed Design and Unit Design	BootLoader 详细设计说明书 BootLoaderBootLoader Detailed Design Manual
	配置工具设计 Configuration Tool Design
	软件详细设计追踪表 Software Detailed Design Traceability Table
	BootLoader 详细设计评审 BootLoader Detailed Design Review
软件单元测试 Software Unit Testing	QAC 分析报告 QACAnalysis Report
	Tessy 测试报告 Tessy Test Report
	软件单元验证策略 Software Unit Verification Strategy
软件集成和集成测试	集成策略 Integration Strategy
	集成手册

开发流程 Development Process	文档描述 Document Description
Software Integration and Integration Testing	Integration Manual
	集成测试策略 Integration Test Strategy
	集成测试报告 Integration Test Report
	资源分析报告 Resource Analysis Report
软件系统测试 Software System Testing	BootLoader 软件测试报告 BootLoader BootLoader Software Test Report
	BootLoader 软件测试报告评审 BootLoader BootLoader Software Test Report Review
发布 Release	发布文档 Release Documentation

7 功能安全 FUNCTIONAL SAFETY

7.1 功能安全评估报告 Functional Safety Assessment Report

7.2 功能安全证书 Functional Safety Certificate

SGS TÜV SAAR

CERTIFICATE NO FS/71/220/23/1031
ZERTIFIKAT NR.:

PAGE 1/1
SEITE(N)

LICENCE HOLDER & MANUFACTURER
GENEHMIGUNGSINHABER & HERSTELLER

Shanghai ZC Technology Co., Ltd.
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Pudong New Area,
Shanghai,
P.R. China

PROJECT NO/-ID *PROJEKT-NR/-ID*	LICENSED TEST MARK *GENEHMIGTES PRÜFZEICHEN*	CERT. REPORT NO. *ZERTIFIKATSBERICHT NR.*
T4A8-AU01	SGS TÜV SAAR ASIL D COMPLIANT Functional Safety ISO 26262 www.sgs-tuv-saar.com	T4A80002 is an integral part of this certificate. *ist ein integraler Bestandteil dieses Zertifikats.*

Certified product(s)
Zertifizierte(s) Produkt(e)
SafetyFrame
Version 2.1.0

Tested according to
Geprüft nach
ISO 26262-2:2018
ISO 26262-6:2018
ISO 26262-8:2018
ISO 26262-9:2018

Technical Data and Parameter
Technische Daten und Parameter
The judgement of the achieved functional safety for the above-mentioned SafetyFrame Software is "accepted" according to above mentioned standards ASIL D requirements.

The SafetyFrame Software is suitable for integration into systems up to ASIL D.

The certificate is based on voluntary tests. The compliance of the certified product against the requirements of above listed functional safety standards was evaluated. Any changes to the design, components or processing may require repetition of some parts of the certification to retain the certification. All applicable requirements of the testing and certification regulations of SGS-TÜV Saar GmbH have to be complied, see www.sgs-tuv-saar.com/tcr-muc and www.sgs-tuv-saar.com/gtc-muc

Certification Body for Functional Safety & Cyber Security
SGS-TÜV Saar GmbH
Zertifizierungsstelle für Funktionale Sicherheit & Cyber Sicherheit

Reference to SGS Certification Database

Munich, Feb 22, 2023
Gudrun Neumann

SGS-TÜV Saar GmbH, Hofmannstr. 50, 81379 München, *Deutschland* / Germany
Website: www.sgs-tuv-saar.com
E-Mail: fs@sgs.com

CERTIFICATE

8 证书 CERTIFICATES

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3073051号

软件名称：知从青龙bootloader软件
[简称：青龙]
V1.0

著作权人：上海知从科技有限公司

开发完成日期：2018年01月04日

首次发表日期：2018年01月10日

权利取得方式：原始取得

权利范围：全部权利

登记号：2018SR743956

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计算机软件著作权登记专用章
2018年09月13日

No. 02965607

青龙软件著作权登记证书
QINGLONG SOFTWARE COPYRIGHT REGISTRATION CERTIFICATE

软件产品证书

经评估，知从青龙bootloader软件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《软件产品评估标准》（T/SIA003 2017）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：沪RC-2019-3315
证书编号：嵌入式应用软件
有 效 期：五年

评估机构：上海市软件行业协会
日期：二〇一九 年 九 月 廿五 日

青龙软件产品登记证书
QINGLONG SOFTWARE PRODUCT REGISTRATION CERTIFICATE