

为电机而生的MCU

Danson.li
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Q4 Y2020



SECURE CONNECTIONS
FOR A SMARTER WORLD

EXTERNAL

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内容提要

公司介绍

产品介绍-RT

开发工具

电机专家讨论

恩智浦半导体足迹遍及全球

我们与客户携手并进，不仅推动技术发展，也在促进社会进步。



汽车

让汽车制造商能够开发更智能的解决方案，帮助应对复杂的自动化、互联化和电气化挑战。

加快打造更便利的交通



工业

帮助企业更高效地运营，从而减少时间、资金和工作量的消耗。

实现更高效的数据处理



移动设备

让可穿戴设备和移动设备更简单地访问服务，使得现代生活在保有安全性的同时，变得更为便利。

改变用户和设备的连接方式



智能家居

这些解决方案实现了聆听和学习功能，融入家居环境，让生活变得更加舒适、经济、安全和便利。

推动智能化的实现



智慧城市

简化人们使用本地服务的方式，让他们更简单地进行交互，将可持续发展、效率、移动性和经济发展提升到全新水平。

预测未来的需求



通信基础设施

在新兴通信领域提供5G连接，利用硬件解决方案，为企业提供洞察力，帮助他们创造出色业绩。

以5G速度提供实时响应

60多年的专业技术经验

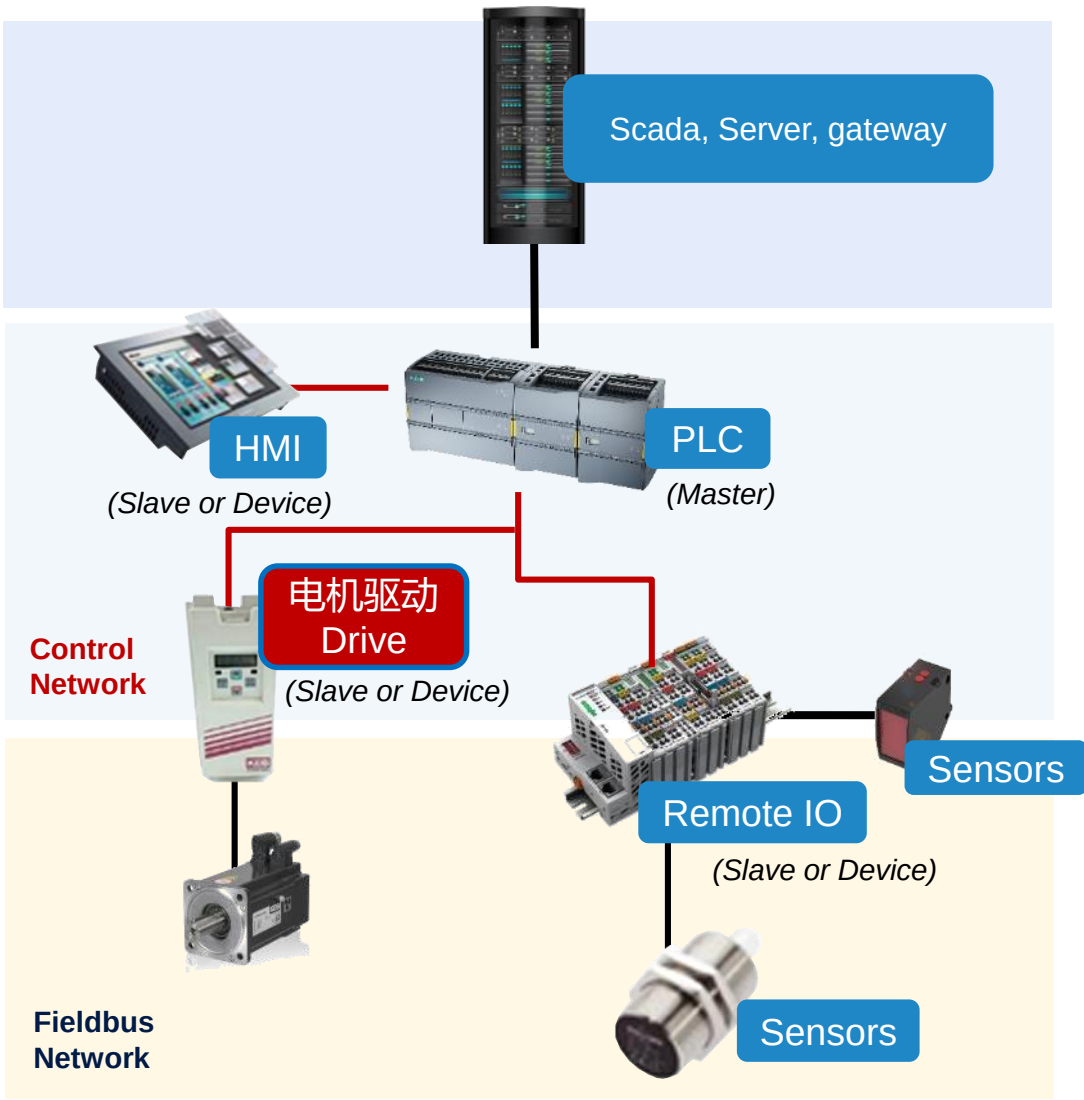
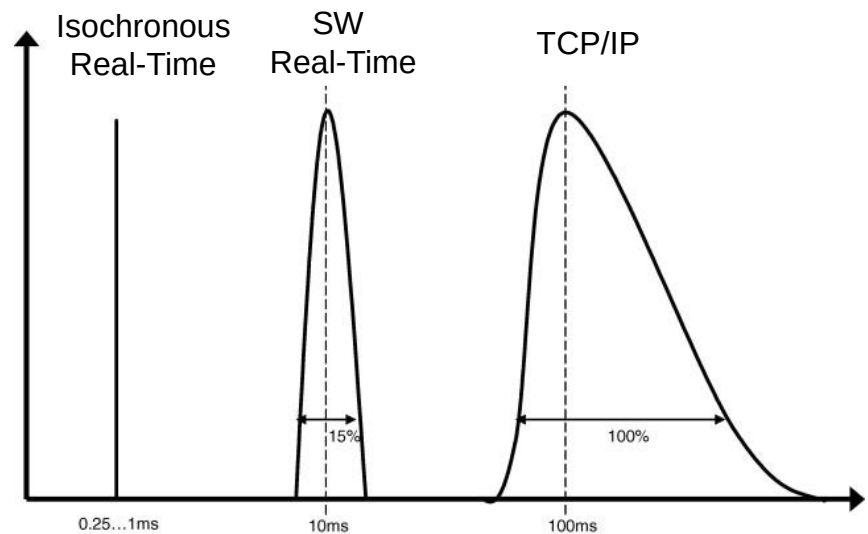
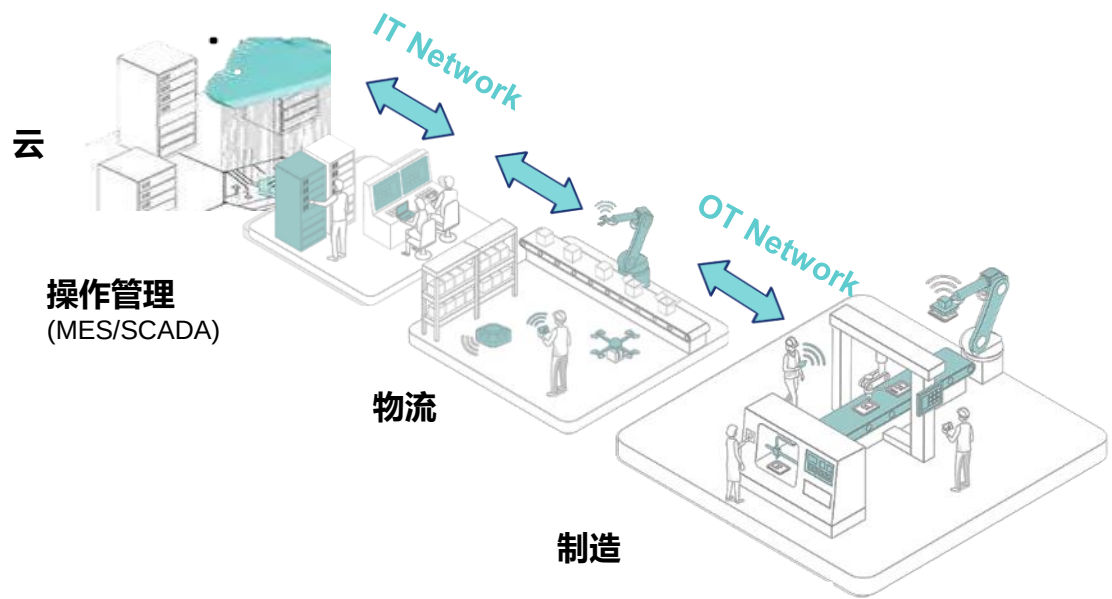
业务覆盖30多个国家及地区

约29,000名员工

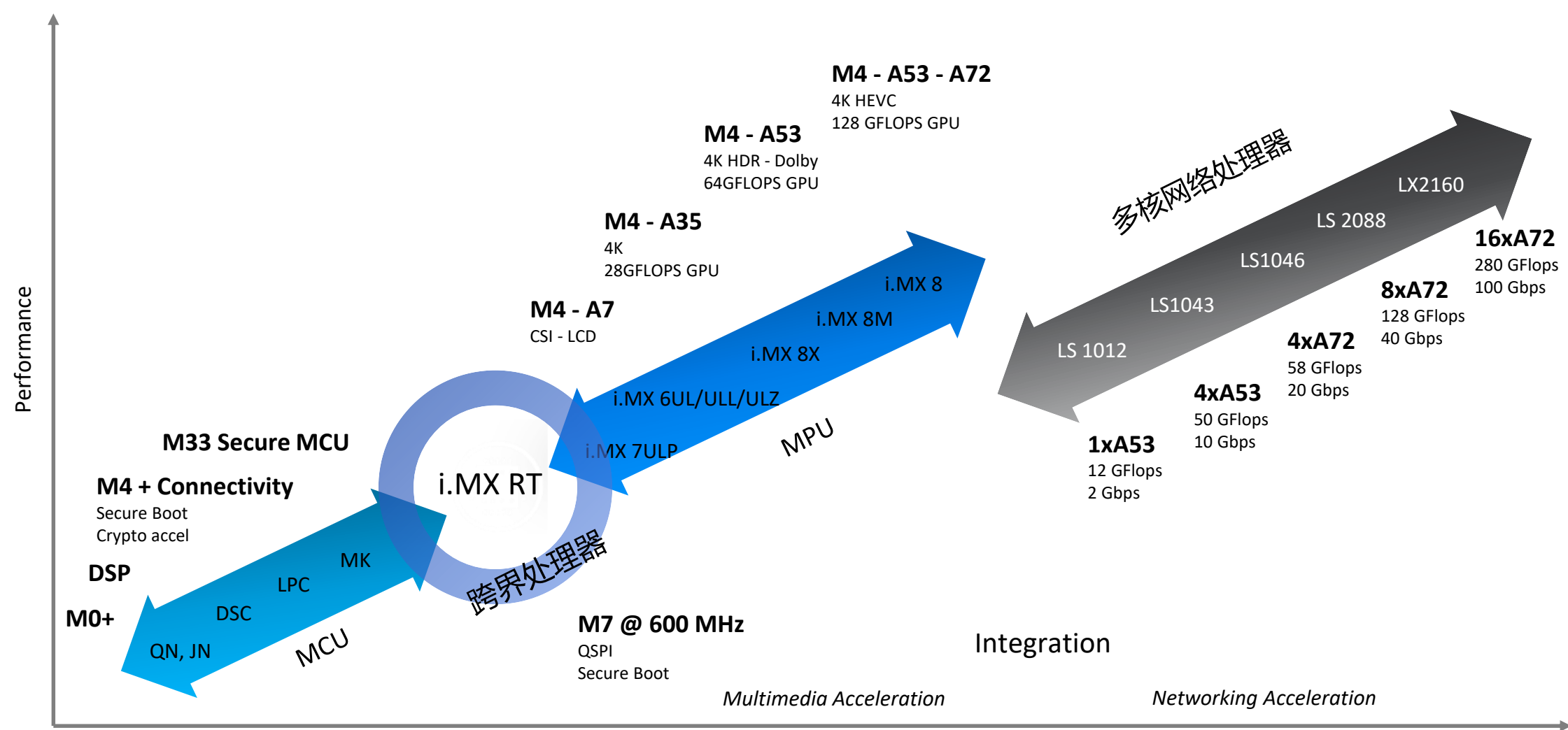
总部位于荷兰埃因霍温



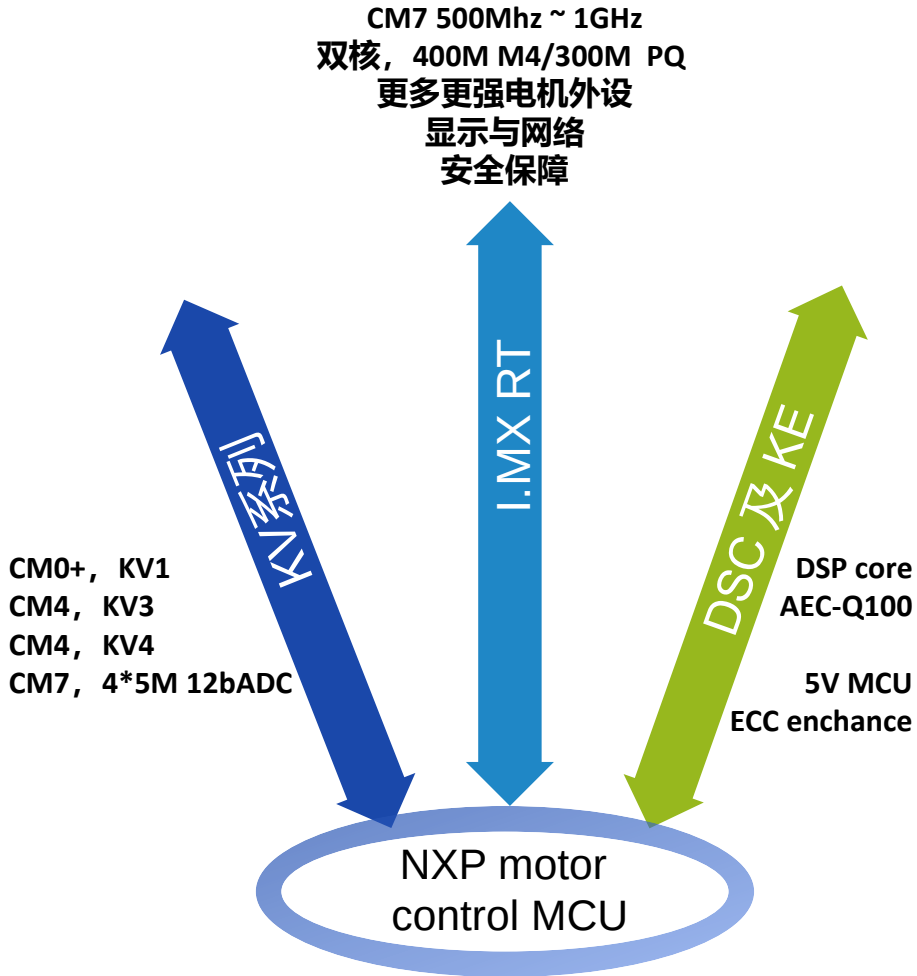
工业自动化，实时REAL-TIME



恩智浦MCU产品阵容



带有电机控制的微控制器



KV, DSC, KE



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KV产品概览

Key Peripherals for Motor and Power Control Applications

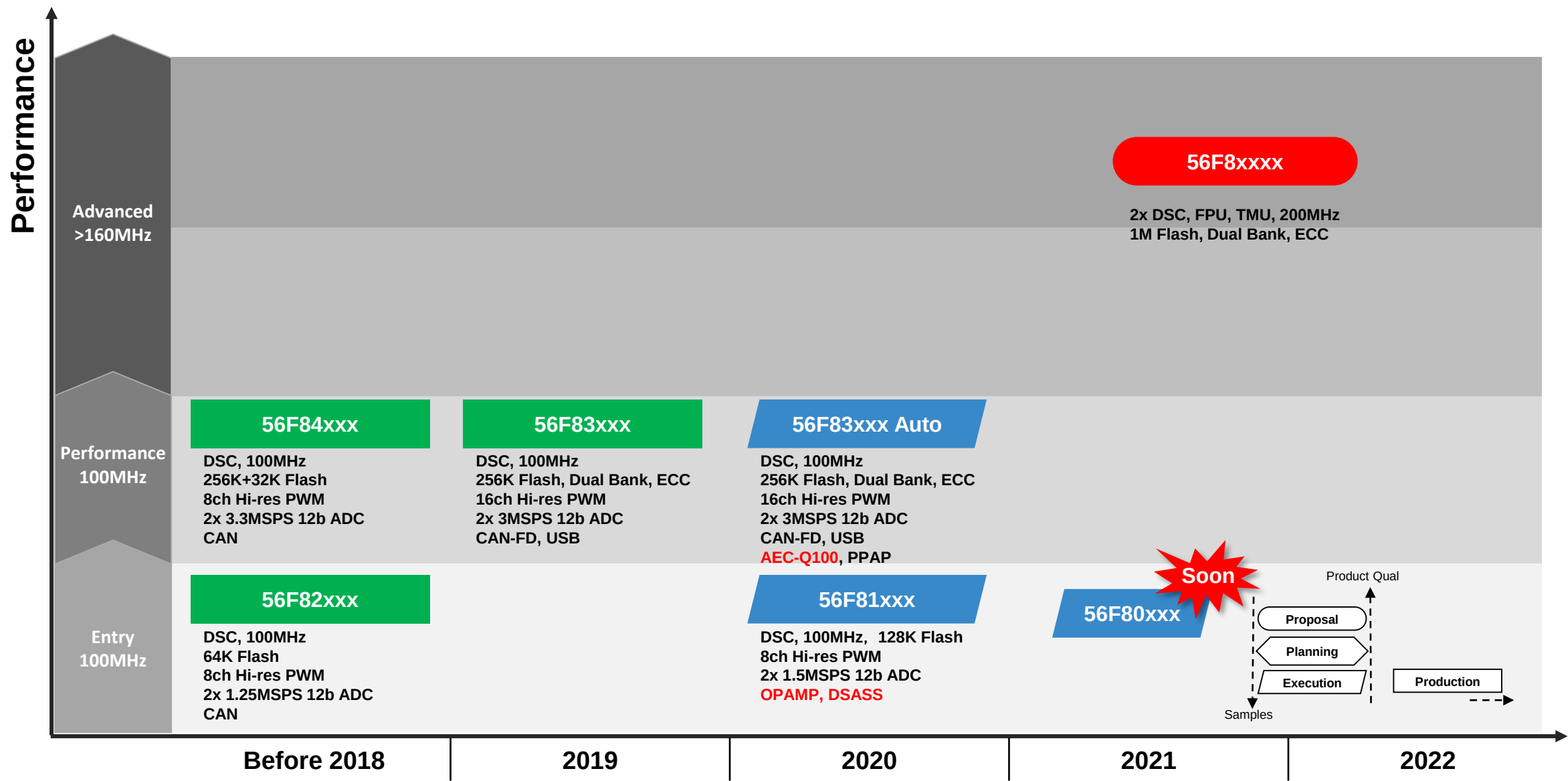
MCU Family	Core	Falsh/RAM KB	Motor Control Timers		ADC	DAC	ACMP	Comms.	Packages
			Flextimer	eFlexPWM					
KV5x	240MHz CM7 DSP + FPU	512/128 1M/256	2 x 8ch 1x 2ch	2 x 12ch / Nano-edge	4 x 12b 5Msps, 1 x 16bit	1x 12b	4x with 6b DAC	Ethernet, 3 x CAN	144 pin 100 pin
KV4x	160MHz CM4 DSP + FPU	64/16, 128/24, 256/32	2 x 8ch 1x 2ch	1 x 12ch /NanoEdge	2x 12b 4.1Msps	2x 12b	4x with 6b DAC	2 x CAN	100 pin 64 pin 48 pin
KV3x	100/120MHz CM4 DSP + FPU	64~512 /16~96	2x 8ch 2x 2ch	-	2x 16b 1.2Msps	2x 12b	2x with 6b DAC	-	100 pin 64 pin 48 pin 32 pin
KV1x	75M CM0+ H/W DIV & SQRT	16~128 / 8~16	1x 6ch 2x 2ch	-	2x 16b 1.2Msps	1x 12b	2x with 6b DAC	1 x CAN	64 pin 48 pin 32 pin



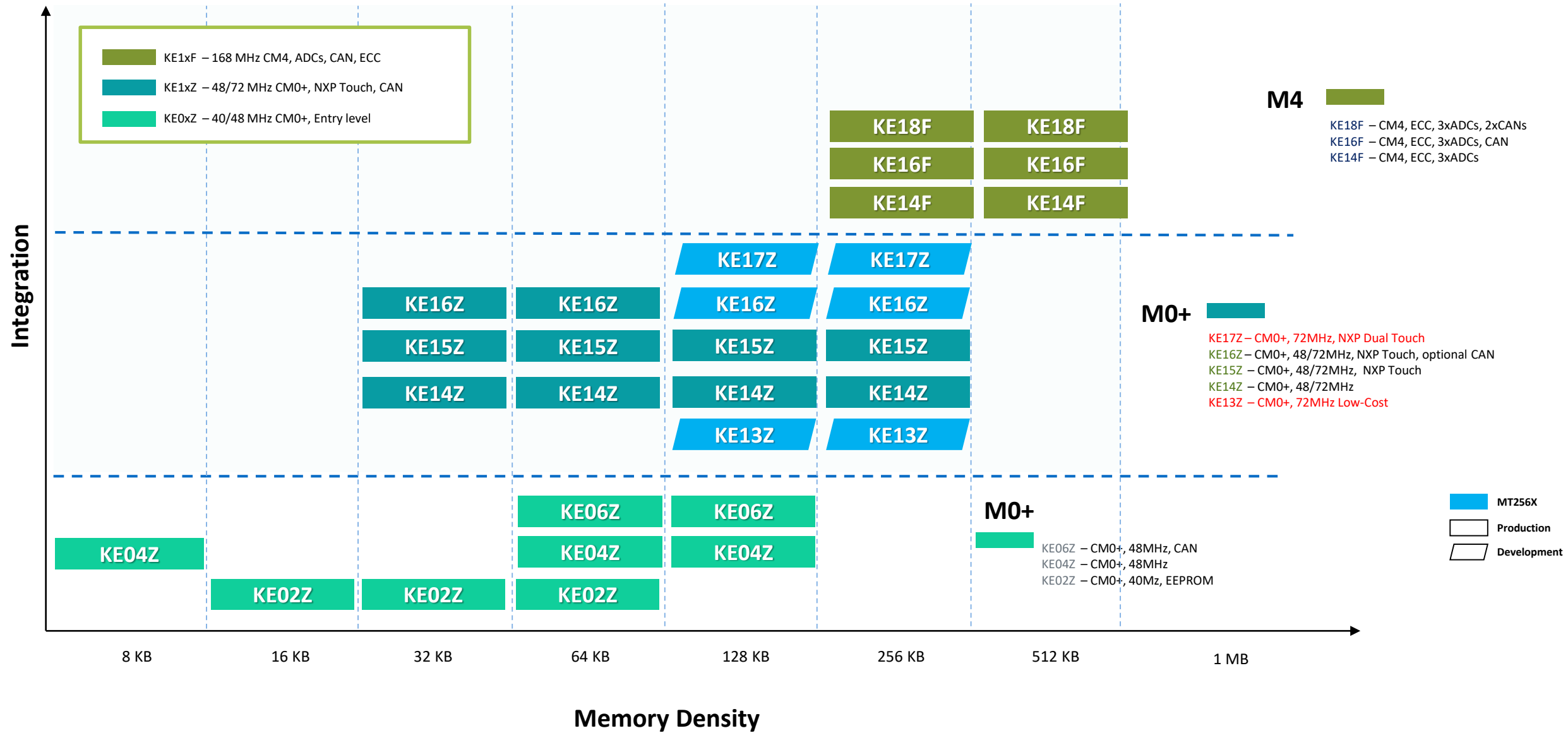
性价比极高的专用电机控制芯片系列

DSC产品阵容

NDA Required



KE产品阵容



i.MX RT系列



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i.MX RT 系列亮点



高性能实时处理

- Cortex-M7主频从500M 到1000MHz (双核有M4核或 PowerQuad核)
- 20ns interrupt latency
- Up to 1.5MB On Chip SRAM
- Up to 512KB Tightly Couple Memory



更高集成度

- High Security enabled by AES-128, HAB and On-the-fly QSPI Flash Decryption
- 2D 图形加速引擎 with Parallel CSI
- LCD显示控制器 up to WXGA (1366x768)
- Audio interface with three I2S for multi-channel high performance audio
- Up to 3x Ethernet and 3x CANFD



降低BOM成本

- 极具竞争力的价格
- 无需外部PMIC或 DC-DC
- 支持4层板 (BGA) & 双层板 (LQFP) PCB设计
- SDRAM interface



方便使用

- MCU 客户可以继续沿用现有的工具链 (MCUXpresso, IAR, Keil)
- Rapid and easy prototyping and development with NXP FreeRTOS, SDK, ARM mbed and the global ARM ecosystem
- Single voltage input simplifies power circuit design
- Scalability to Kinetis & i.MX products

I.MX RT 的目标应用

Voice & Audio

High-end, consumer audio devices, including specialty equipment such as:

- Home Audio
- Professional microphone
- Guitar pedals
- Audio Tuners



Consumer & Healthcare

- Smart appliances
- Cameras & LCDs
- Mobile patient care, e.g. infusion pump or respirator
- Blood pressure monitor
- Activity and wellness monitor
- Exercise equipment with display



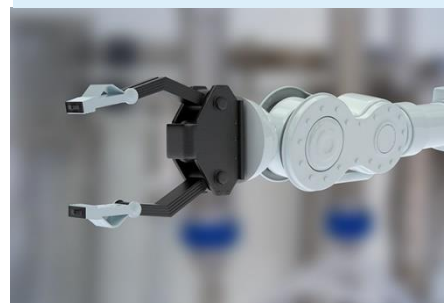
Home & Building Automation

- HVAC climate control
- Security
- Lighting control panels
- IoT gateways
- Thermostats



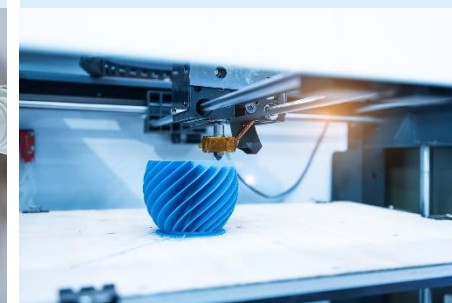
Industrial Computing

- EBS
- PLCs
- Factory automation
- Test and measurement
- HMI control assembly line robotics
- QR Readers
- Barcode Scanners

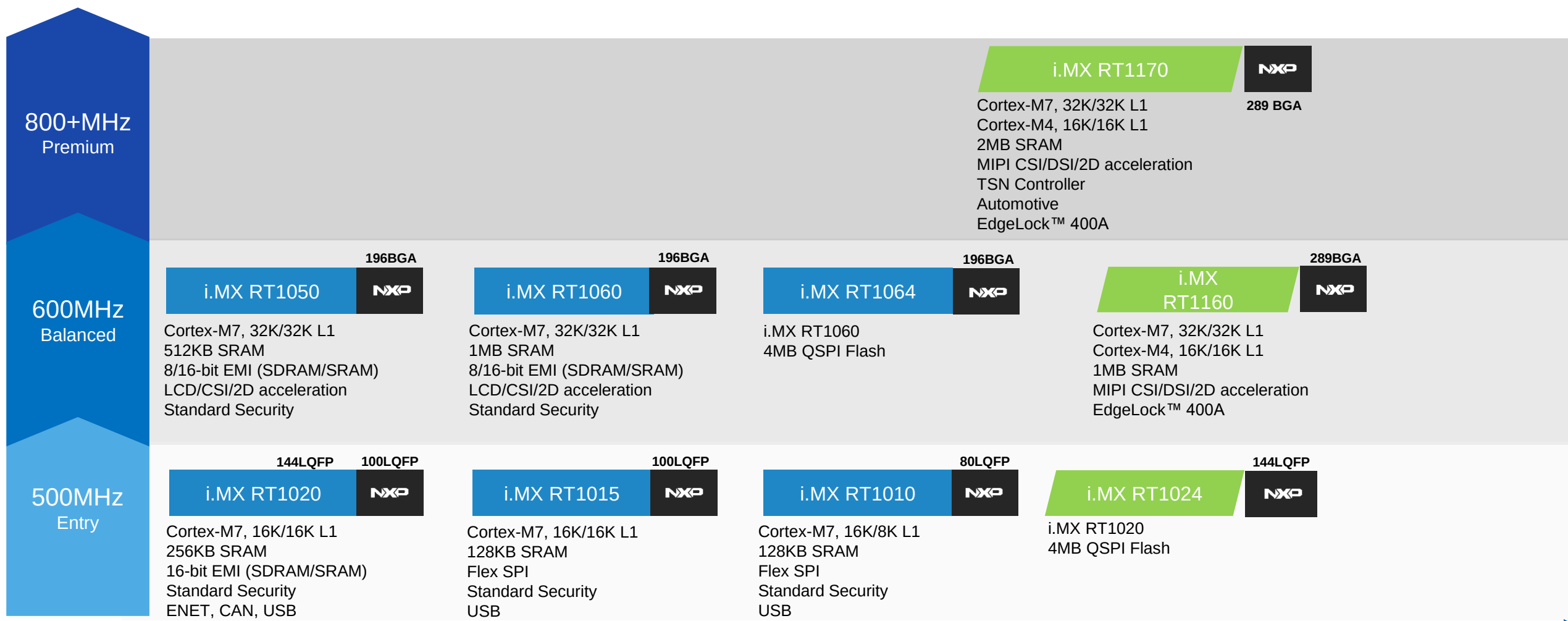


Motor Control & Power Conversion

- 3D printers
- Thermal printers
- Unmanned autonomous vehicles
- Robotic vacuum cleaners
- Drones
- Stepper motor
- Servo motor

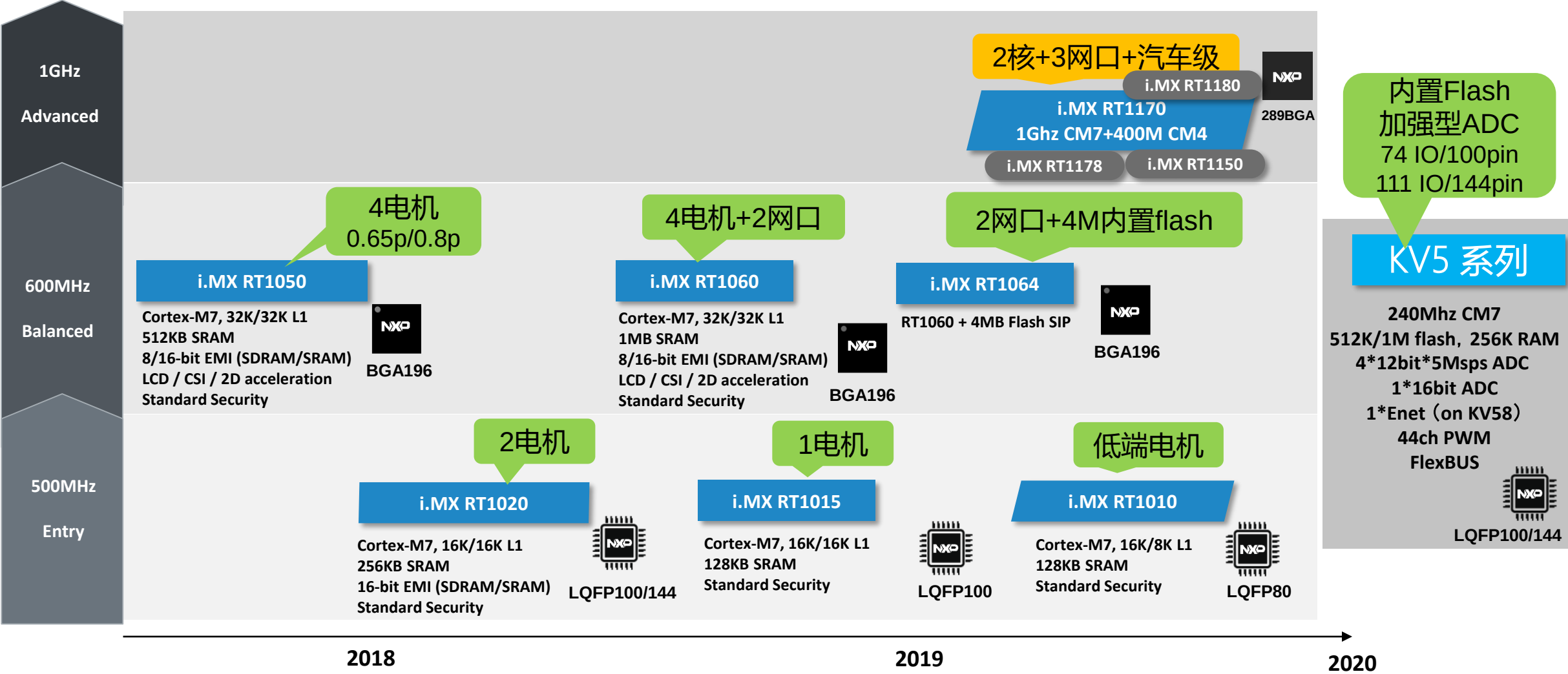


I.MX RT 系列路线图 – 跨界处理器



2020

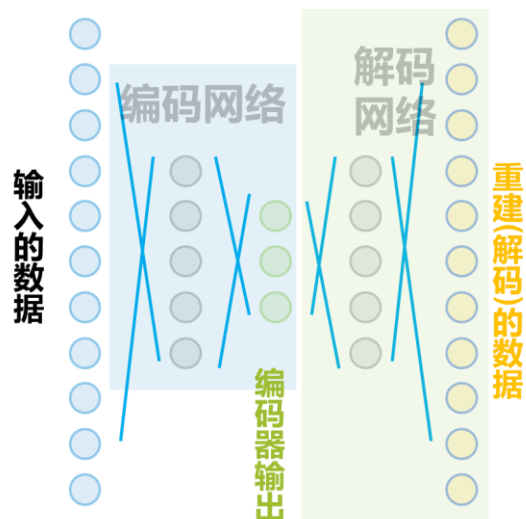
用于电机的CM7核



SUBJECT TO CHANGE

RT的电机控制系统异常检测 DEMO

- 基于autoencoder
- 数据8位友好化预算理
- 检测缺相等多种异常
- 缺相检测精度可达100%
- 模型不足2KB (60->8->4->4->60)
- i.MX RT1010上运行耗时15us以内

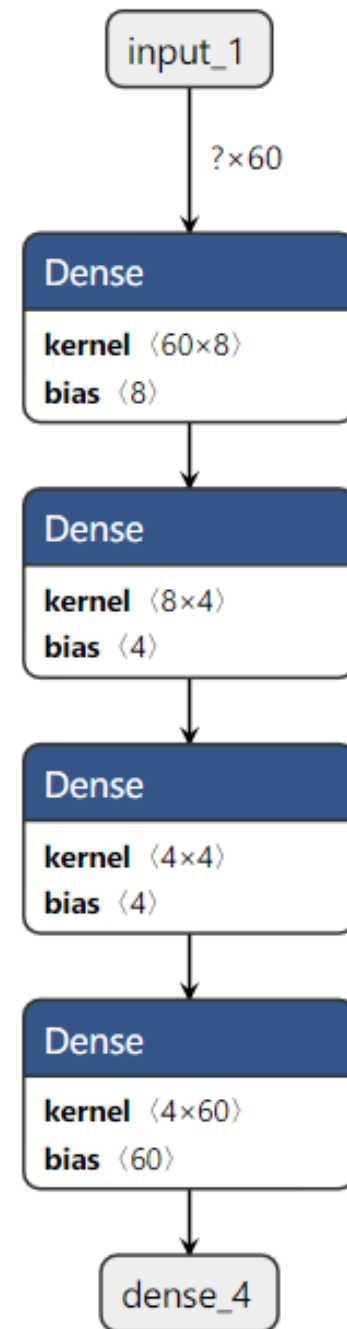


正常数据样本

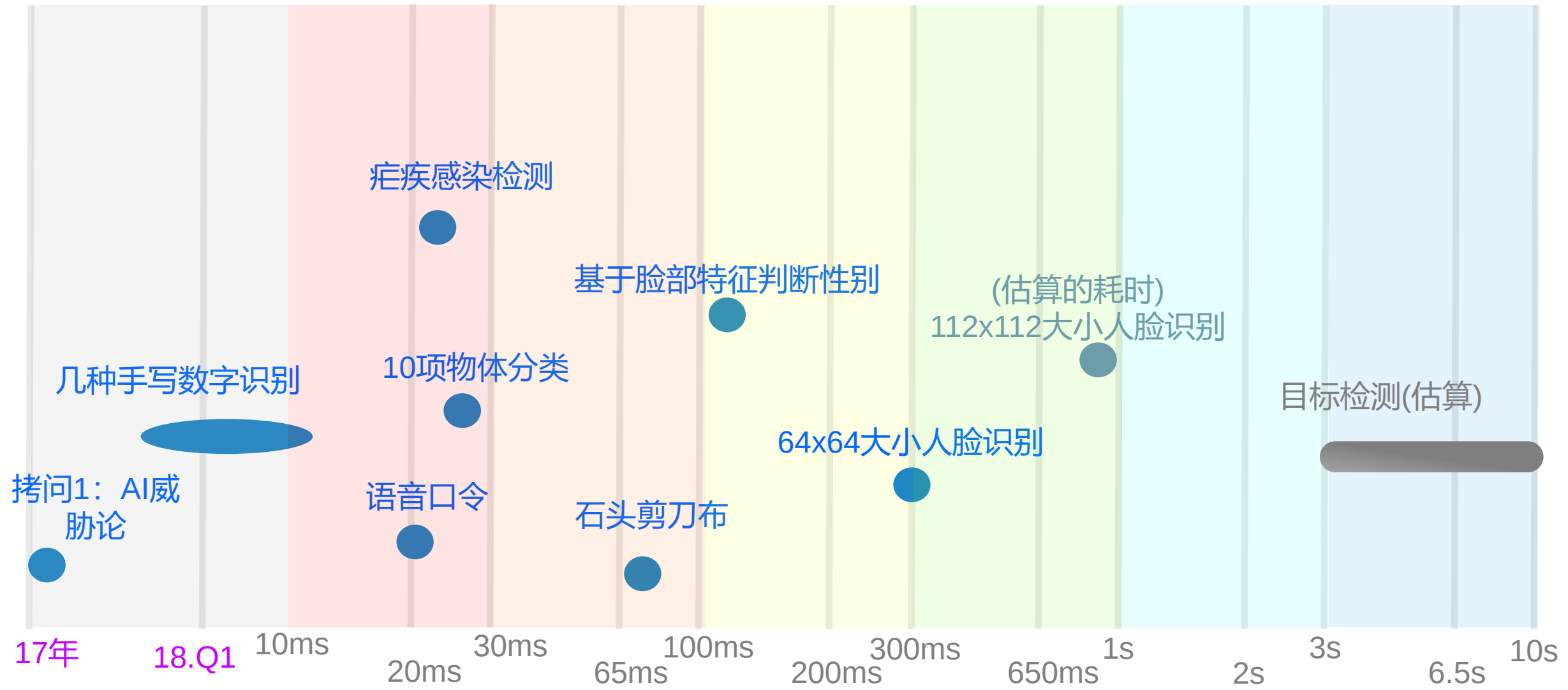
重建误差小

异常数据样本

重建误差大



I.MX RT1050上DEMO模型运算耗时



电机控制参考解决方案



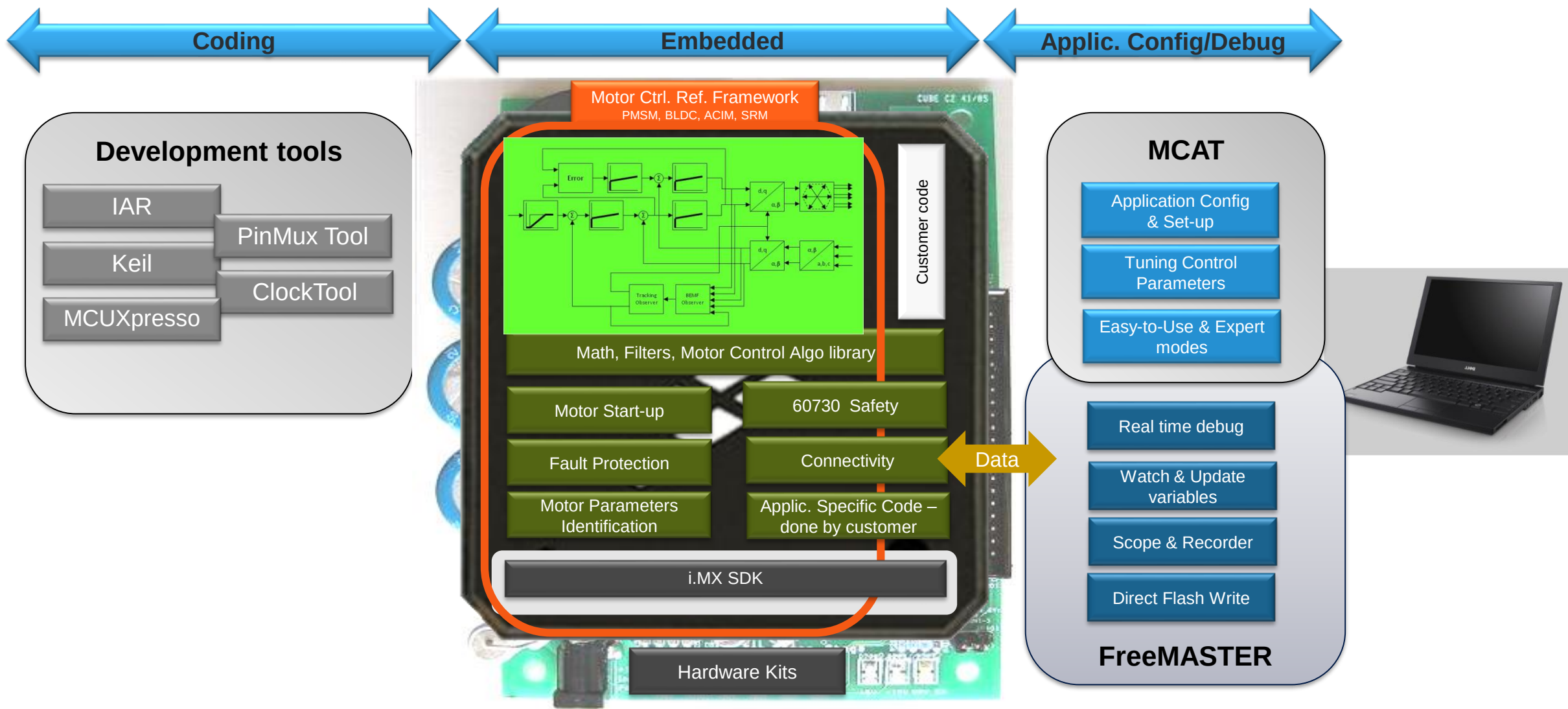
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电机控制开发工具链

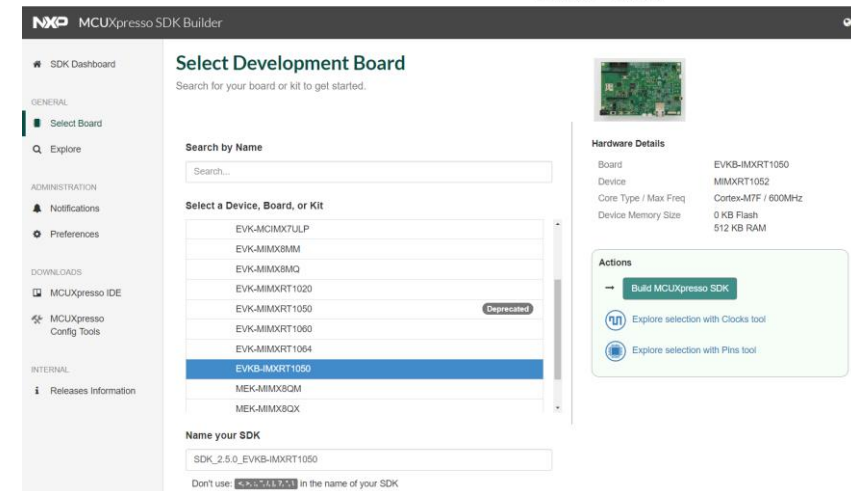
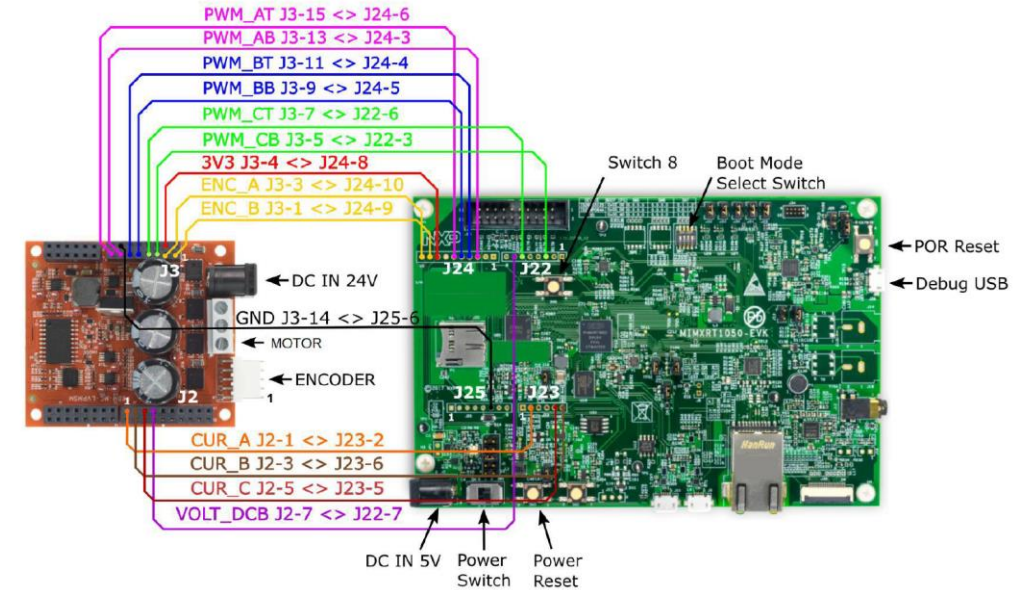


PMSM FOC ON MIMXRT10XX EVK- 文档

- Design reference manual [DRM148](#)
- Application note [AN12214](#) – PMSM Field-Oriented Control on MIMXRT10xx EVK
- Application software package [AN12214SW](#)
- Board configuration and demo setup is fully described in [PMSMFOCRT10xxUG](#)

Application note [AN12591](#) – PMSM Field-Oriented Control with LCD display and controlbase on MiMXRT10xx EVK

[RT1010 EVK开发板](#)



For more information go to:

PMSM FOC Demo application is available in [MCUXpresso SDK](#)

PMSM control homepage https://www.nxp.com/motorcontrol_pmsm.

Processor homepages: [MIMXRT1020](#), [MIMXRT1050](#), [MIMXRT1060](#)

EVK board homepages: [MIMXRT1020-EVK](#), [MIMXRT1050-EVK](#), [MIMXRT1060-EVK](#) and [FRDM-MC-LVPMSM](#)



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