

# 电源管理系统方案

数字电源控制 MCU

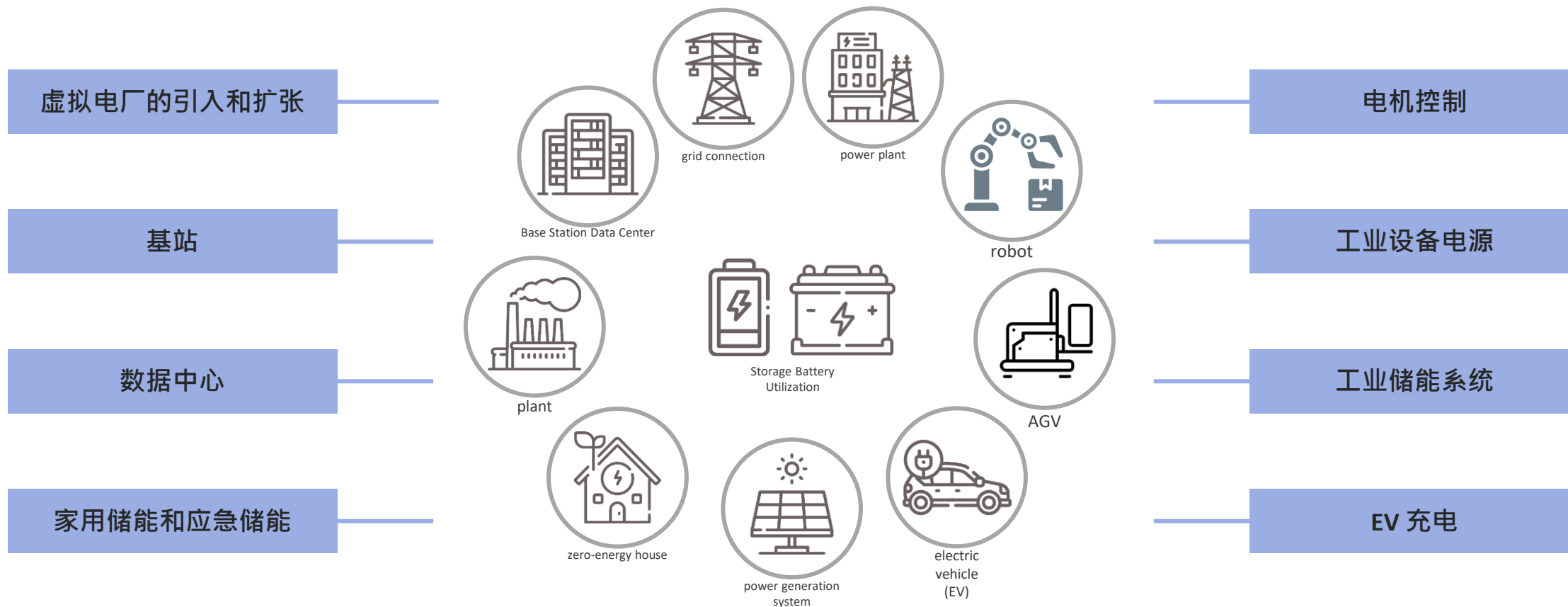
贾雪巍 James Jia

行销应用处 处长



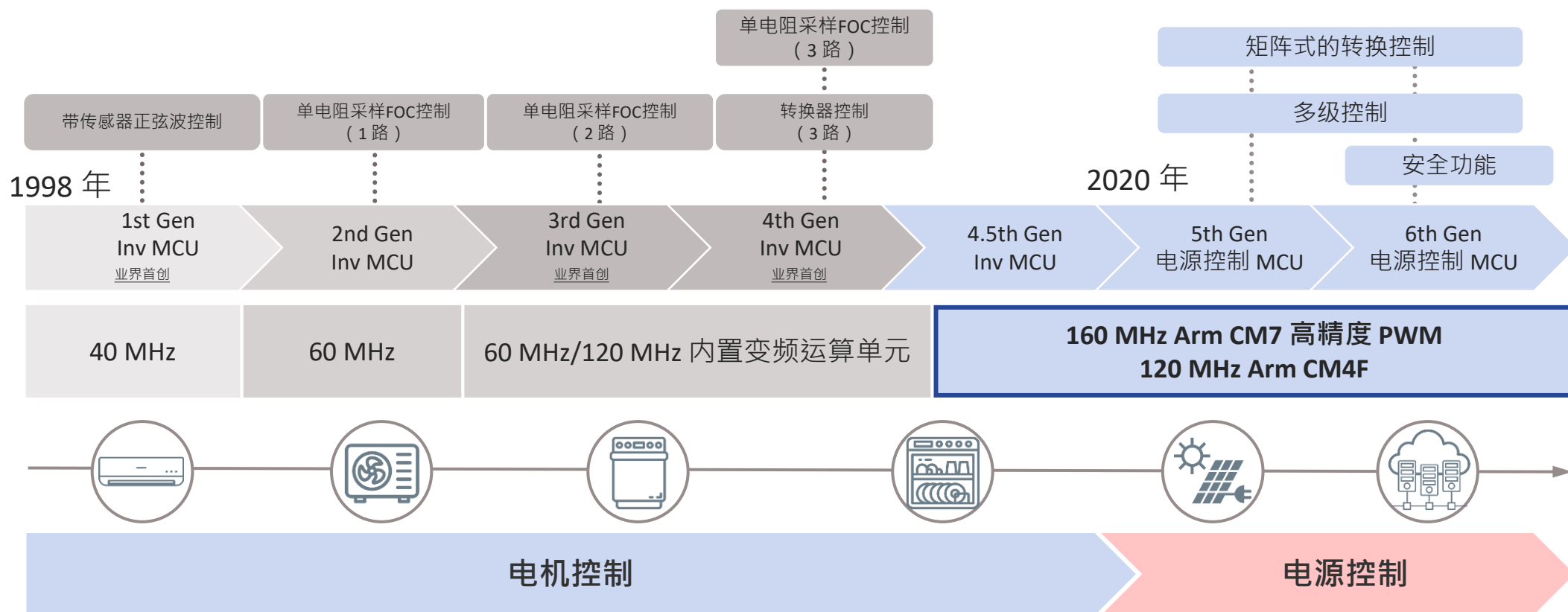
# 电源的周边环境 – 使用场景增多

通过减少用电量和提升电源的使用效率为社会可持续发展做贡献



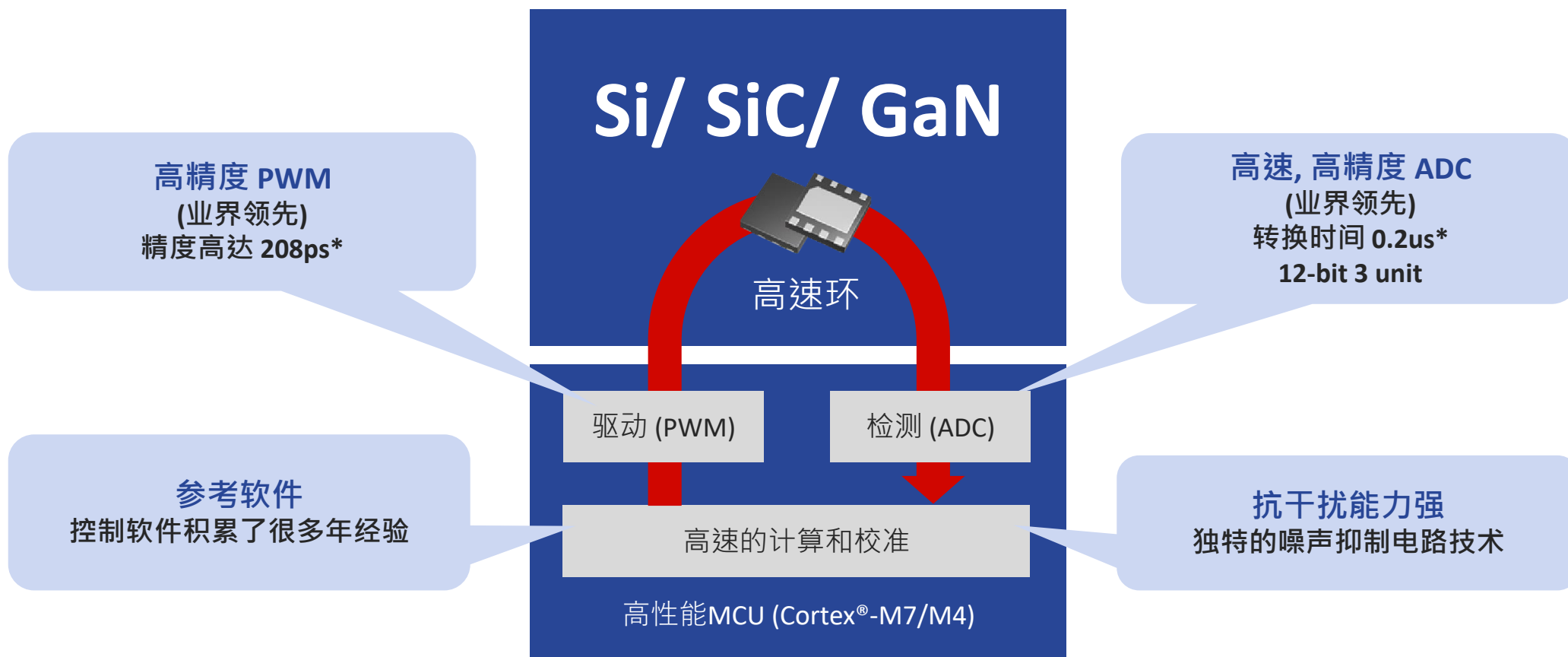
# 新唐电源控制技术的历史路线图

在通过尖端技术实现高性能和低能耗领域积累 20 年以上的经验



# 新唐数字电源控制 MCU 的特点

## 电源控制系统



\*: Functions and specifications vary depending on the product.

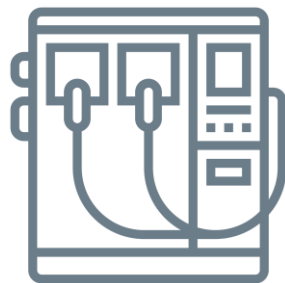
# 数字电源控制 MCU 目标市场

为数字电源控制提供最好的 MCU ACDC/DCAC/DCDC

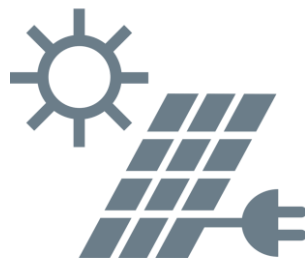
服务器电源



EV 快充



太阳能逆变



储能系统



基站



# 第五代产品介绍 KM1M7AF 系列

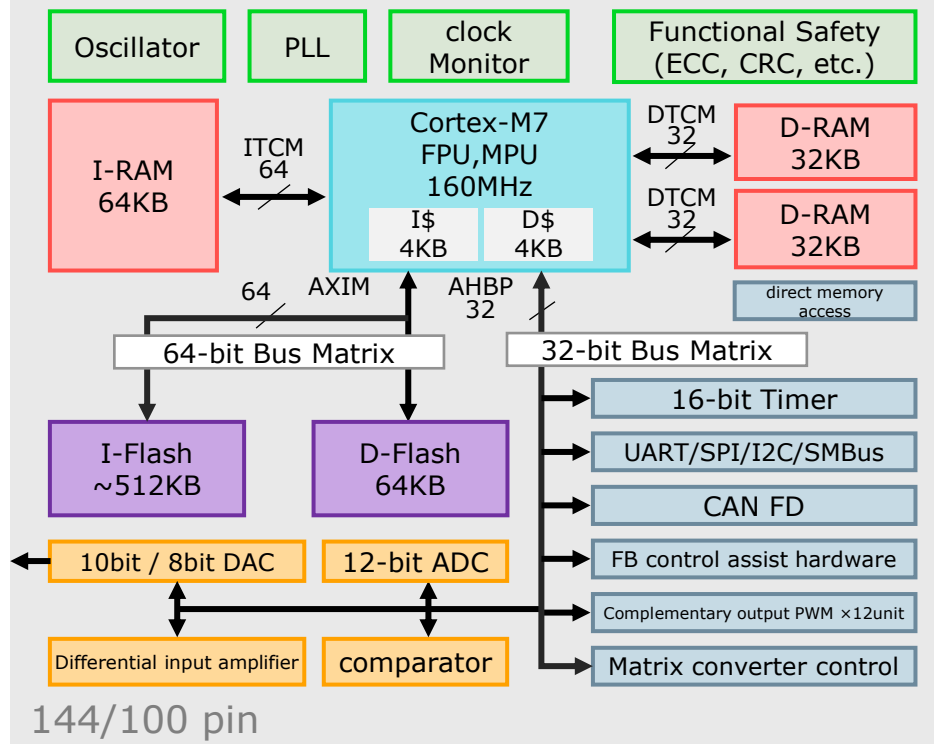
电源控制

1

采用高性能的 Arm® Cortex®-M7 CPU 核 (5.01 Core Mark/MHz)

通过高速 & 高精度的模拟功能为马达和数字电源控制提供最优的产品

通过同时可读写 FLASH 的功能实现内置 EEPROM



CPU 性能	Cortex®-M7 160 MHz
浮点运算	单精度 & 双精度
FLASH/Data	MAX 512 KB / 64 KB Sector 0/1 支持可以切换
ADC	12-bit / 0.5us(2 Msps) / 3unit
PWM 精度	208ps
集成模拟外设	差分运放&比较器
安全功能	Memory 错误矫正、时钟错误检测、AD 失败诊断
供电	5V 供电

# 第六代产品 KM1M7CF 系列

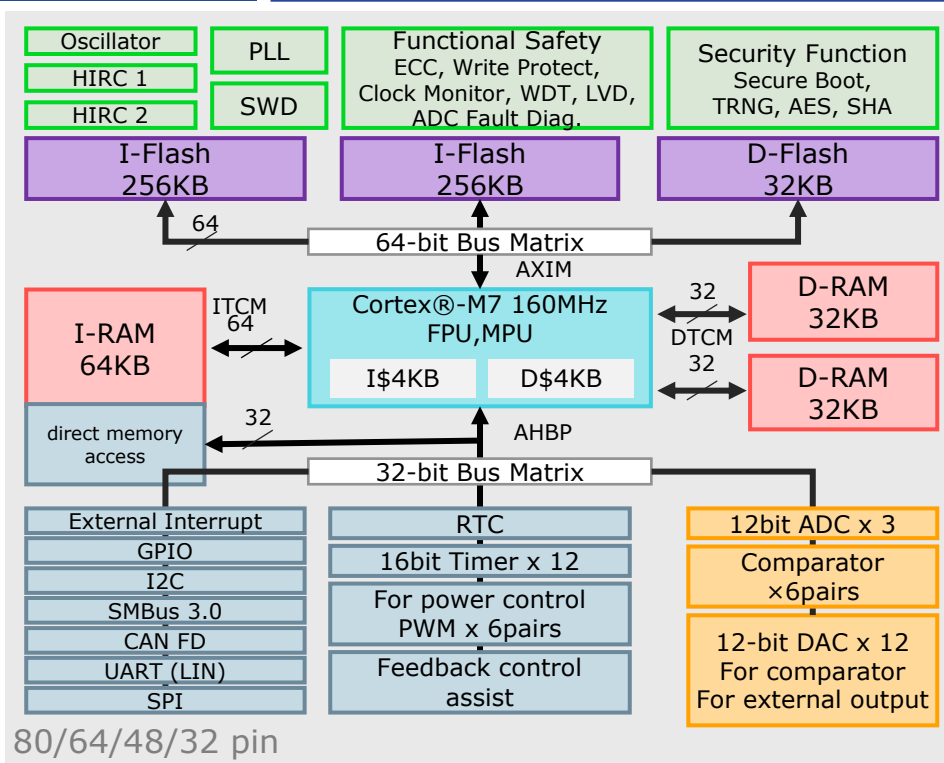
电源控制

2

采用高性能的 Arm® Cortex®-M7 核 CPU (5.01 Core Mark/MHz)







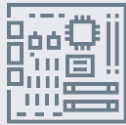
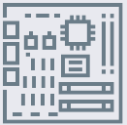






通过高速 & 高精度的模拟功能为马达和数字电源控制提供最优的产品

通过 2Bank Flash 和安全保护功能实现软件更新的保护



CPU 性能	Cortex®-M7 160 MHz
浮点运算	单精度&双精度
FLASH/Data	MAX 256 KB×2Bank / 64 KB
ADC 速度	12bit / 0.2us(5 Msps) / 3unit
PWM 精度	208ps
内置模拟功能	12-bit DAC, 比较器
特性	Memory 错误矫正、时钟错误检测、AD失败诊断
安全功能	安全启动、真随机数发生器、加密引擎, etc.
供电	3.3V 单路供电

# 数字电源控制参考方案

	控制板	~ 1kW ~ 1kW	1kW	1.5kW	3kW ~	10kW ~
<b>DCAC</b>	 <p>Cortex®-M7 (with FPU) PWM output port for gate (max. 4ch) Insulation voltage sensor (3ch) 24V power supply for cooling fan</p>		 <p>PC Apps</p>		1kW~3kW compatible Bidirectional inverter (Grid-connected)	
<b>DCDC</b>	 <p>Cortex®-M7 (with FPU) PWM output port for gate (max. 16ch) Insulation voltage sensor (5ch) 24V power supply for cooling fan</p>		 <p>PC Apps</p>	 <p>1kW~3kW compatible Bidirectional converter LiB control</p>	<p>Under development</p>  <p>3kW LLC Converter</p>	<p>Under development</p>  <p>6kW CLLC Converter</p>
<b>ACDC</b>		 <p>Power supplies for wireless power transmission (Storage Battery Control)</p>	 <p>Power supplies for wireless power transmission (Storage Battery Control)</p>	 <p>Power supplies for wireless power transmission (Storage Battery Control)</p>	 <p>high efficiency TP-PFC (GaN)</p>	
<b>矩阵式转换 ACAC</b>	 <p>matrix converter Control Board</p>	<p>Cortex®-M7 (with FPU) PWM output port for gate (12ch) Equipped with a flow diversion control system</p>				 <p>15 kW Matrix converter (EV quick charge)</p>



# 方案菜单

开发周期的减少

软件品质的提升

最少的维修

快速的本地技术支持



- 控制 MCU
- MCU 评估板
- 参考设计评估板

- 马达控制的应用手册
- 电源控制的应用手册
- 驱动层参考控制软件
- IEC60730, etc.



硬件

软件

Digital power control solution

开发工具

支持



- 集成开发环境
- 开发工具
- 基于模式控制的开发工具

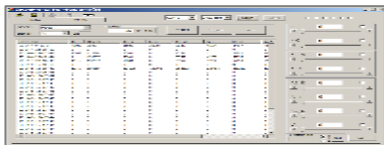
- 合作开发
- 技术支持  
(现场支持、QA、技术培训)

Q&A 快速响应 · 1 个工作日内回复



# 辅助开发的工具

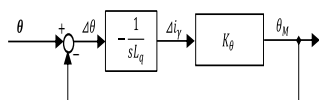
1) 智能化调试工具



调查原型

2) Model-Based 模块化的开发工具

Mathworks, Inc.  
For Matlab®/simulink®



Model-based design support + block sets

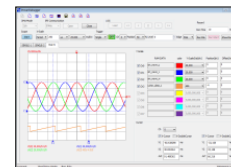
系统设计

功能设计

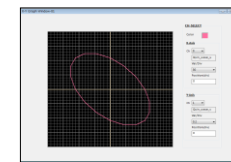
系统校验

功能校验

设备校验



调试工具



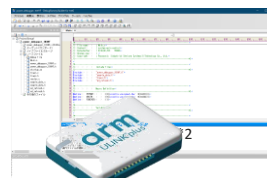
Debug 示波器

4) RAM 监控工具

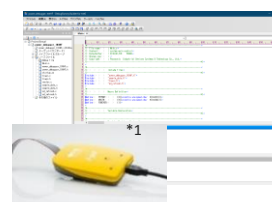
C 语言代码自动生成

编码

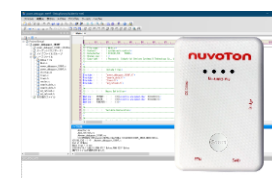
3) 集成的开发环境



ULINKplus  
Keil® MDK-ARM®  
(Methylmethacrylate-ARM®)



I-Jet™.  
IAR EWARM



NU-Link2-PRO

\*1 Source: <https://www.iar.com/jp/products/architectures/arm/i-jet/>

\*2 Source: [https://store.developer.arm.com/store/debug-probes/ulinkpro-debug-adapter?\\_ga=2.145815538.719634597.1632873814-1854199051.1610951068/](https://store.developer.arm.com/store/debug-probes/ulinkpro-debug-adapter?_ga=2.145815538.719634597.1632873814-1854199051.1610951068/)

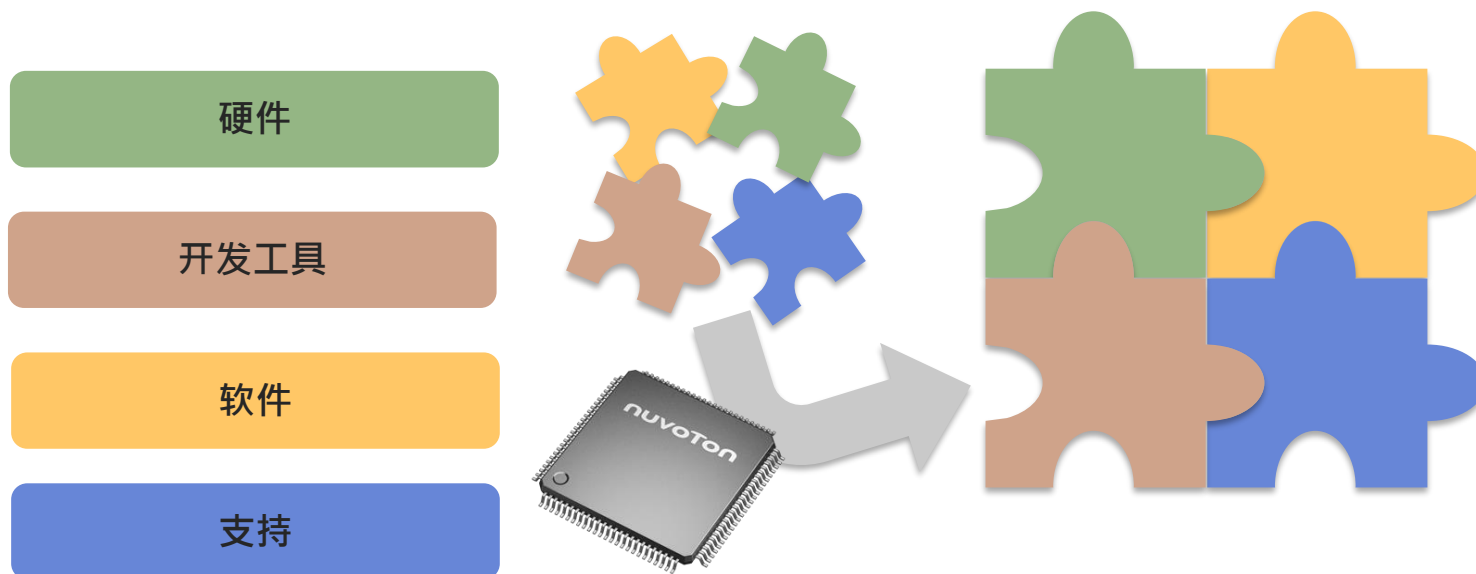
# 总结

## 应用

- 数字电源控制  
(服务器电源、基站电源、无线电源、FA 电源、  
逆变、V2H、储能系统等)

我们为数字电源应用提供整体的解决方案

如果您想了解更多细节，请登录我们的官网  
<https://www.nuvoton.com>



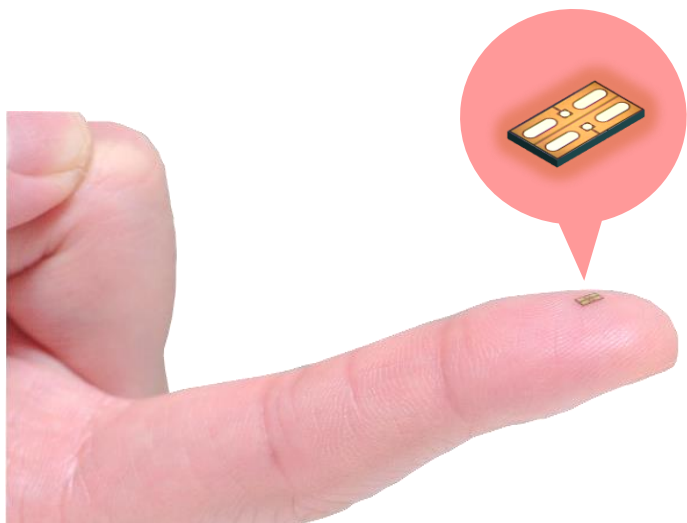
# 电源管理系统方案

低阻抗超小封装 CSP MOSFET



# 我们专注于 CSP 封装 MOSFET

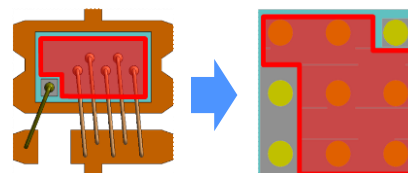
## Chip Scale Package



## 产品优势

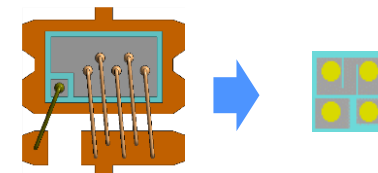
低阻抗

Larger active area



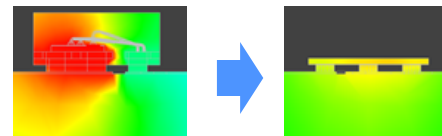
超小尺寸封装

Simple packaging



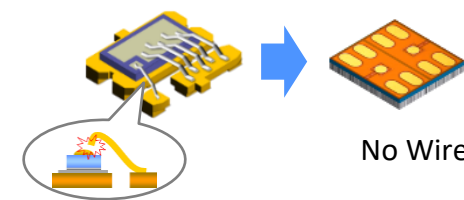
更佳散热性能

Easily transfer heat



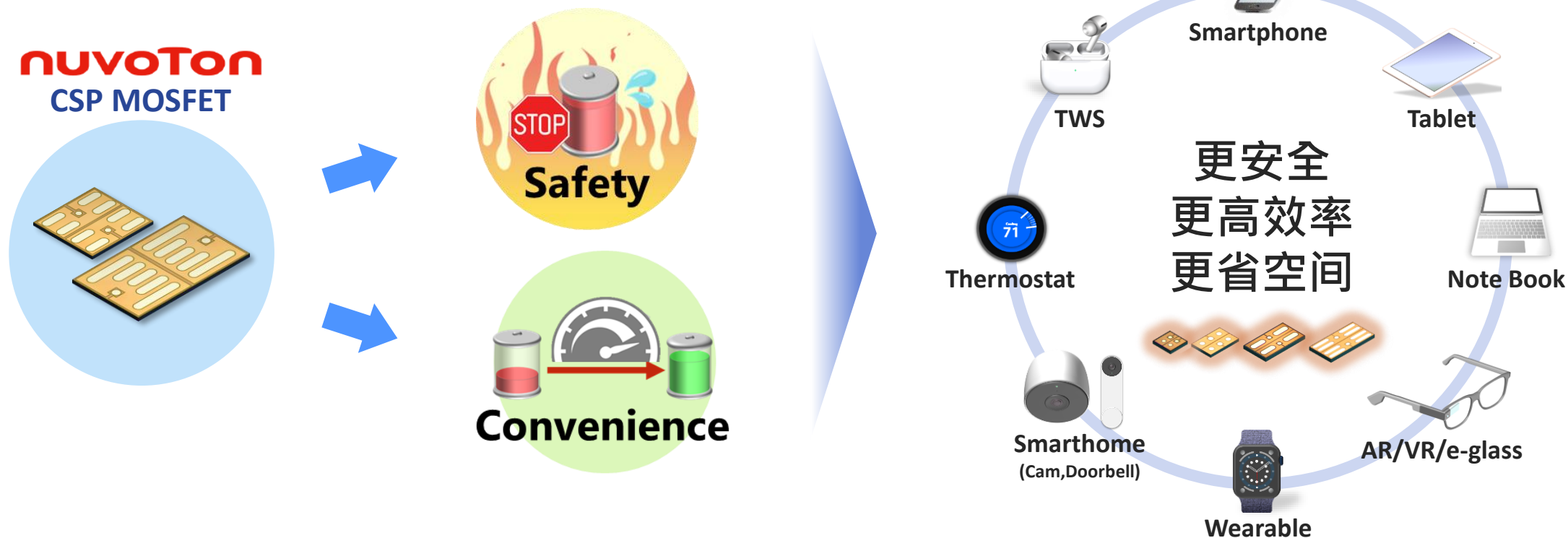
高品质

Low failure rate



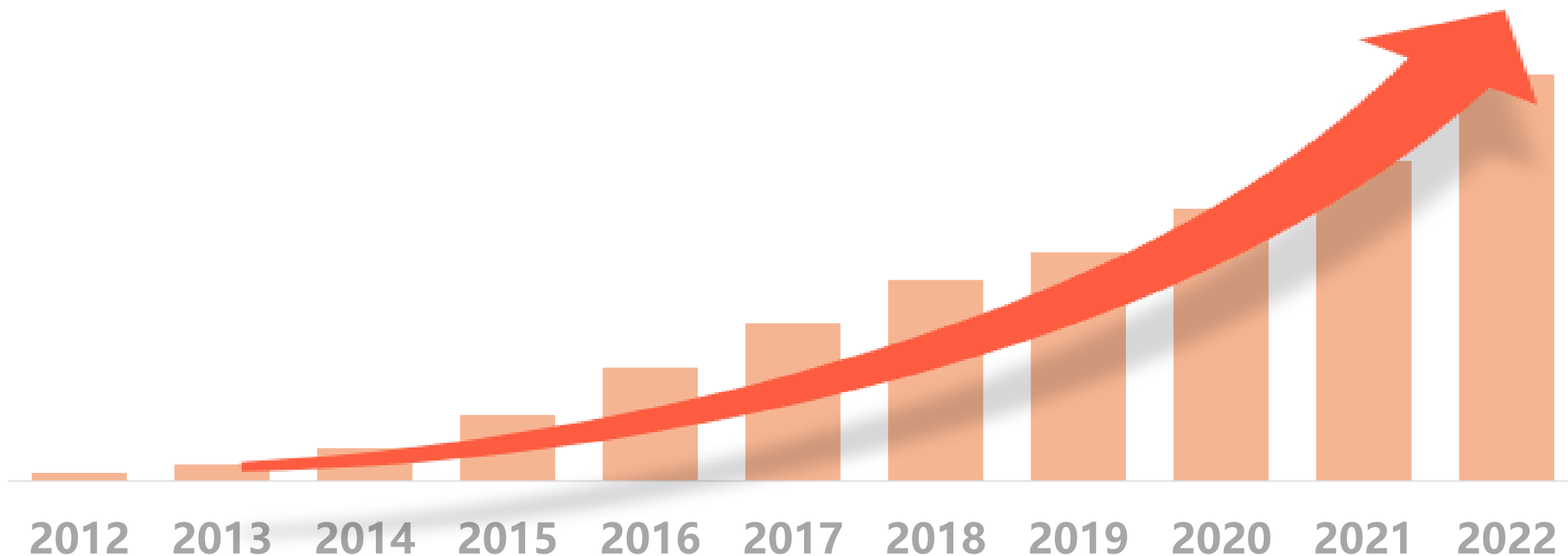
# 广泛应用于锂电池保护电路

通过 CSP 技术优势贡献更安全，更便利的用户体验



# 深耕锂电池市场，市占率首位

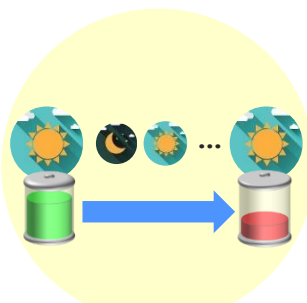
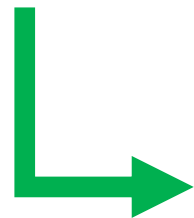
CSP MOSFET 累计出货量超过 115 亿颗



# CSP MOSFET 技术优势及价值体现

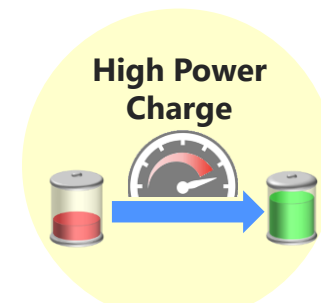


引领更低阻抗性能改善



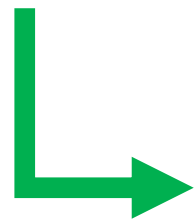
Long battery life

&



Short charging time

拓展小型化封装技术



Small & lightweight

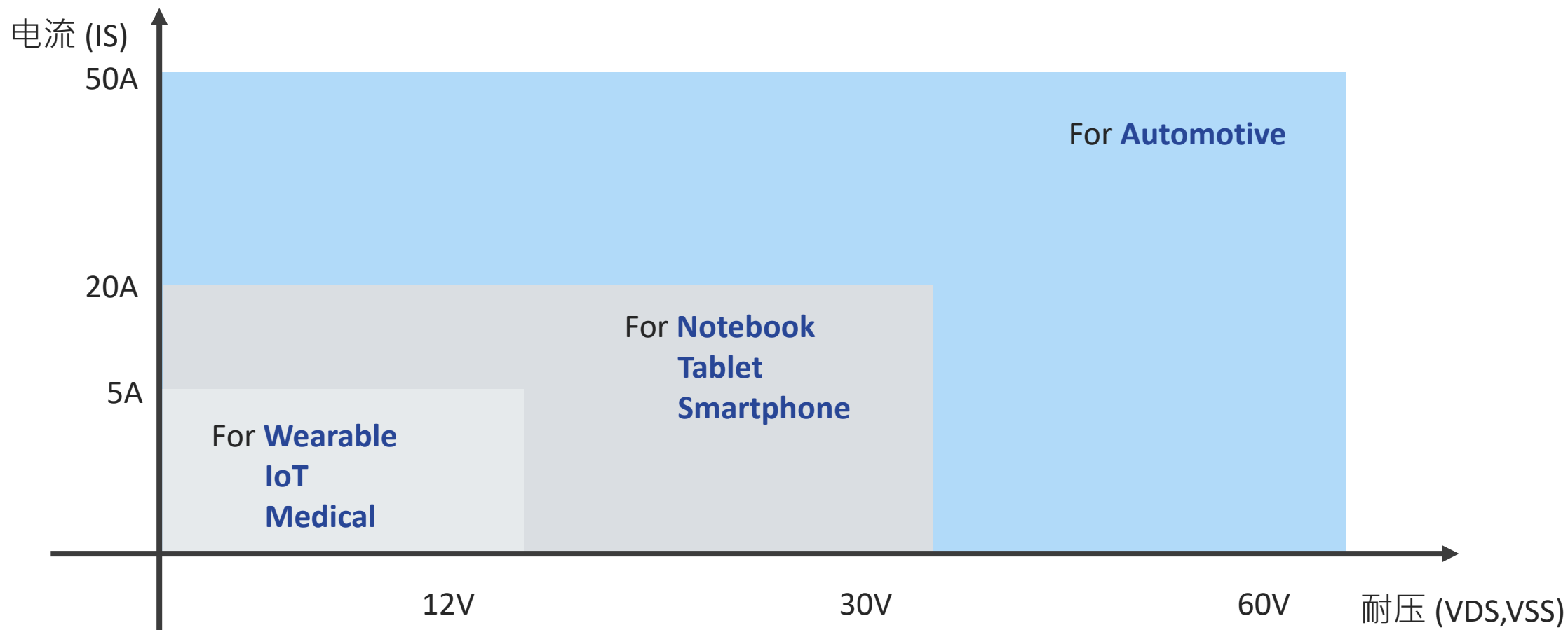
&





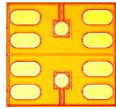
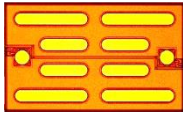
Stylish design



# CSP MOSFET 产品布局



# CSP MOSFET 新产品：用于锂电池保护（新产品）

Part#	KFC6B21B70L	KFCAB21B30L	KFCAB21B50L	KFCAB21B10L	Unit
Outline					-
Size X × Y	1.89 x 1.24	2.08 x 1.45	1.96 x 1.84	3.20 x 1.95	mm
Chip Area	2.34	3.02	3.61	6.24	mm <sup>2</sup>
VSS	12	12	12	12	V
VGS	±8	±8	±8	±8	V
RSS(on) Typ.	VGS 4.5V	4.2	2.05	1.5	mΩ
	<b>VGS 3.8V</b>	<b>4.6</b>	<b>2.2</b>	<b>1.6</b>	<b>mΩ</b>
	VGS 3.1V	5.4	2.55	1.9	mΩ
	VGS 2.5V	7.4	3.3	2.45	mΩ
Status	Under Mass Production				

# CSP MOSFET 新产品：应用于车载开关电路

## 适用于汽车级的小型化器件

### 1. 低不良率

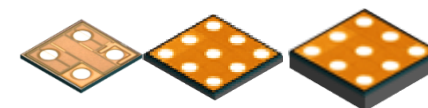
相比于树脂封装不良率更低

### 2. 小封装

Small size; 1.2 x 1.2mm

### 3. 防止干扰造成的故障

Low inductance; L = 0.01nH



Part Number	Type	VDS[V]	VGS[V]	ID[A] *3	Rds(on) Typ.[mΩ]		Package size[mm]		
					VGS=10V	VGS=4.5V	x	y	t
FK9B0439ZL	N-Single	40	+20/-10	11	9.5	11	1.94	1.94	0.1
KFK9B0463ZL	N-Single	40	+20/-10	10.8	11	16	3.05	3.05	0.5
KFK4B0464ZL	N-Single	40	+20/-10	2.1	150	200	0.6	0.6	0.1
KFK9B0652ZL	N-Single	60	+20/-10	8.3	18	20	1.94	1.94	0.1
KFK4B0613ZL	N-Single	60	+20/-10	3.9	53	60	1.2	1.2	0.1
KFJ9B0458ZL	P-Single	-40	-20/+10	-11.6	10	12	3.05	3.05	0.1
KFJ9B0438ZL	P-Single	-40	-20/+10	-7.8	20	23	2.14	2.14	0.1
KFJ9B0466ZL	P-Single	-40	-20/+10	-7	27	30	3.05	3.05	0.5
KFJ4B0421ZL	P-Single	-40	-20/+10	-3.2	74	83	1.2	1.2	0.1
KFJ9B0639ZL	P-Single	-60	-20/+10	-7.5	24	26	3.05	3.05	0.1
KFJ4B0622ZL	P-Single	-60	-20/+10	-3.8	56	60	2.0	2.0	0.1

\* FR4 board (25.4mm×25.4mm×t1.0mm), Full Cu

# 服务与支持

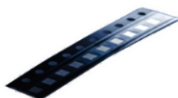
## 1 MOSFET 选型

## 2 样品

Evaluation Board



Cut tape



Reel



## 3 CSP 组装技术服务

## 4 技术支持

## 5 文档

- Data sheet
- Spice
- RoHS/REACH
- Mount application note
- CSP Advantages
- CSP FAQ etc

<https://www.nuvoton.com/products/mosfet/>

Joy of innovation  
**nuvoTon**

谢谢

謝謝

Děkuji

Bedankt

Thank you

Kiitos

Merci

Danke

Grazie

ありがとう

감사합니다

Dziękujemy

Obrigado

Спасибо

Gracias

Teşekkür ederim

Cảm ơn