德州仪器微控制器产概览(中文翻译)

S.1
欢迎收看德州仪器微控制器产概览。 我是 Melissa Liu, TI 培训项目经理。

S. 2
这里我们将概括介绍一下 TI 微控制器产品系列， 包括 MSP430，C2000， Stellaris 和 Hercules 以及他们的关键性能优势。

S.3
TI 是业界拥有 MCU 品种最多的公司之一。这里左下方蓝色方框部分列出了我们 MCU 产品系列，从左至右产品性能依次增强。TI 嵌入式处理器统一使用 Code Composer Studio（CCS）这一集合代码开发环境, 因此不管您使用我们哪一个系列，您的 IDE 都是相同熟悉的 CCS。

S.4.
从 16 位超低功耗的 MSP430 到 32 位 Stellaris， C2000 和 Hercules 平台, TI 的高性能，高集成的通用 MCU 产品种类繁多。 MSP430 Value Line 拥有 16 位性能仅按 8 位器件价格出售。Stellaris 基于 ARM Cortex-M 的框架提供了数不胜数的连接选项，深受用户欢迎。实时内核的 C2000 可应用于电机控制和照明领域。最后，基于 ARM Cortex-M 或 Cortex-R 双核 Hercules 更是将最先进的安全和性能集于一体。它常见的应用领域有汽车和医疗等行业。

S. 5
TI 的 MSP430 系列是当今市场上功耗最低的 16 位 MCU。 其优化唤醒和低功耗模式确保了超长电池使用寿命。MSP430 系列产品品种多，成本低，外设多，是您特定应用的最佳候选。包括片上模拟部件的先进集成性最大程度地缩小空间面积，节省材料成本。另外，在 MSP430 器件上使用低成本工具编程,有助于开发者在今后进行设计改动和升级。TI 基于 GUI 的编程和调试工具可加速产品规范化，缩短产品上市时间。

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这里概要介绍一下 MSP430 满足不同应用需要的几个分支系列。每一个分支拥有目标应用最佳集成所需的产品特性和片上外接。其中标价仅为 4.30 美元的 Value Lline 系列以其低成本，16 位性能，8 位价位深受用户欢迎。另外，Value Line 配有全套 TI LaunchPad 开发工具可满足您应用开发的需要。

S.7
基于 ARM Cortex-M 的 Stellaris 系列凭借其自装连接开发工具和软件，可与 220 多种功能强大的 MCU 直接连通。通过 Stellaris 平台，开发者利用芯片上装有的浮定点计算单位可实现最佳产品性能。其高级模拟集成提供多达 24 个通道和高达 22MSPS (million samples per second) 12 位 ADC。片上内存拥有从 512KB 闪存 到 96KB SRAM 的多种选项。 另外 Stellaris 拥有多种连接外设， 如 CAN, USB OTG, SPI, I2C, UART, 以太网等，从而确保你与设计的信息交流 。StellarisWare® 软件提供完整库文件和示范代码来协助你的产品开发。最后，我们的产品设计方向是速度更高，内存更大，以及基于 65 纳米的超低功耗，这将确保设计的最大持续性。

S.8
基于 ARM Cortex 的 M4F 系列是 Stellaris 家族的新成员。 它功能强大，浮点单元优于 Stellaris Cortex-M3 系列。它具有同类最佳的电耗量和与 M3 系列相同的多个连接选项。ARM Cortex M4 内核提供类似于 DSP 的多种功能,优越于早先的产品系列。 它适用于工业自动化，电机控制，数字电源等高计算强度等应用领域。这两种 Stellaris 产品线都配有多个连接选项以满足您的交流需求。

S.9
自问世以来，C2000 成为实时控制应用的专用 32 位微控制器系列。 设计者利用其优化数学内核和优越的 DSP 性

能得以改进系统性能，提高其效率和灵活性。凭借其灵活中断系统，实时调试等诸多特点，C2000 成为名副其实的实时应用所需的优良微控制器。C28X 内核的额定速度范围为 40-300MHz 。 C2000 功能强大的集成外设，诸如同类最佳的 ADC 和业界最高分辨率 PWM，使其成为单芯控制的绝佳解决方案。C2000 的开发工具和 controlSUITE 软件提供了一个开放性平台，可以最大程度地实现器件的实用性，缩短开发时间。除此之外，C2000 的 Cortex-M3 以及 C28X 的双内核设置提高了主机的控制能力。

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经过多年的开发，C2000 系列的高性能数字信号处理内核的性能优势已经与器件长期拥有的高集成，低成本和使用简单的特性有机结合起来。尽管没有任何应用限制，带有控制率加速器选项的 Piccolo 系列目标集中定在成本最为敏感的应用领域， 其应用集中在电机控制，低端驱动，照明，和 PLC 等。Delfino 系列带给开发者浮点微控制器特有的使用简单，精确，速度高达 300MHz。它在 Servo 电机，运动控制，驱动协助模式等领域都有应用。最后还有基于 ARM Cortex M3 和 C28x 的双核 Concerto 产品系列。其高效功能和最大主机控制能力使它成为电子测量, 驱动和自动化以及太阳能应用的理想微控制器。

S.11

基于 ARM® Cortex™ 的 Hercules 安全微处理器平台有三个产品系列：TMS470M, TMS570 and RM4x。 专门为 IEC 61508 和 ISO 26262 安全关键应用而设计的 Hercules 平台提供可扩展性能，连接和存储选项以及先进的集成安全特性。其器件构架的设计可防止随机和系统故障的发生，给与客户应用分化的空间，并且简化开发和安全认证程序。其种类繁多的产品系列运行速度可达 220MHz ，超过 350DMIPS。Hercules 套件还包括 基于 GUI 的 HALCoGen 配置和驱动工具，从而缩短产品上市时间,降低开发成本。最后，开发者可以放心的是 TI 出品的每一款产品都凝聚了我们 20 多年积累的安全关键系统的智慧和专业知识， 其产品的可靠性已经得到充分的验证。

S.12

Hercules RM48x 产品意在满足安全关键行业和医学应用的需要，其基于 ARM 的 220MHz 内核,高达 350 DMIPS 体现了 TI 微控制器的最高性能水准。外此系列还非常适用于负 40 至正 105 摄氏度极端操作环境的工业应用。 具有以太网, USB, CAN, SPI, I2C 和 UART 多种连接选择， 使得 RM48x 在多种工业和医疗领域的应用相得益彰。 || TMS570 产品系列则注重于在高性能交通领域的应用，充分满足汽车/AEC Q100 (等级 1) 的资历要求和负 40 至 125 摄氏度的运行条件。次系列配有以太网, FlexRay, CAN, LIN, SPI, I2C 和 UART 连接， 达到 ISO 26262 ASIL-D 和 IEC 61508 SIL-3 双重安全标准。TMS570 系列所配置的 Cortex R4F 拥有高达 280 DMIPs 的处理速度，内核时钟率高达 180MHz。

TMS470M 产品系列则将目标锁定在低档次，价格优惠的交通和通用安全应用上。它达到汽车/AEC Q100 (等级 1) 的资历要求和负 40 至 125 摄氏度的运行条件。具有 CAN, LIN, SPI and UART 多种连接选择。 凭借其基于 ARM Cortex-M3 CPU 80MHz 的运行速度，其处理性能达到约 100 DMIPs。

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这里，尽管无法逐一描述，概括总结了用于 MSP430, C2000, Stellaris 和 Hercules 的产品套件。如想了解更多 MCU 开发套件，快速启动你的设计程序，请访问 TI 的 eStore 网站。

S.14

TI 提供广泛多样的通用和专用微控制器。每一种产品配有低成本，行业领先的软件支持，可加快应用开发的速度，缩短市场营销的时间。不管设计者选用哪一种 TI 微控制器， 集内存，外设和片上无线技术于大成的产品优势都将帮助您以最少的成本和人工实现未来产品的设计突破。谢谢你的收看。再见。

THE END

Script of MCU Overview

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S. 2

S.3

TI has one of the broadest range of microcontrollers in the industry. The slide above highlights the lines of MCUs in blue, in ascending order of performance from left to right. All of TI's embedded processors use Code Composer Studio to keep you familiar with the coding environment as you migrate across families.

S.4.

TI's portfolio of microcontrollers range from the 16-bit ultra low power MSP430 to the 32-bit Stellaris, C2000, and Hercules platforms. MSP430 offers a high performance and high integration general purpose MCU. The Value Line MSP430's are priced comparably with 8-bit MCUs, and provide 16-bit performance. Stellaris is widely popular for its ARM Cortex-M architecture combined with its vast connectivity options. C2000 is a real-time MCU built from the core up for motor control and lighting applications. Finally, Hercules, which is a dual core MCU based on the ARM Cortex-M or Cortex-R architectures, was introduced to provide cutting edge safety and performance combined into one package. Some popular applications for this family are Automotive and Medical.

S. 5

TI's MSP430 family of MCUs is the lowest power 16-bit microcontroller line in the market. It features many optimized wake-up & low power modes enabling devices to sustain an ultra-long battery life. The extensive portfolio offers plenty of low cost options with a breath of peripherals to find the MSP that is optimal for your specific application. Advanced integration , such as on-chip analog components, minimizes physical footprint and offers significant cost savings on the bill of materials. Furthermore, developers use one low cost tool to program all MSP430 devices to help migration or upgrading along the design process. GUI-based coding and debugging tools are available for rapid prototyping and shortening time to market.

S.6

The slide here highlights the available sub-families of the MSP430 for various applications. The widely popular value line includes our low cost products that offer 16-bit performance at an 8-bit price point. Additionally, you can start developing with the value line with the fully equipped TI Launchpad development tool available for only $4.30. Each sub-family contains features and on-chip peripherals for optimal integration on target applications.

S.7

Stellaris ARM Cortex-M MCUs offer a direct path to a powerful ecosystem of over 220+ MCUs with stellar built-in connectivity, development tools, and software. The platform allows developers achieve maximum performance without compromising accuracy with both floating and fixed point computation units integrated on-chip. Advanced analog integration offers up to 24 channels & up to 2MSPS 12-bit ADCs. On-chip memory options range up to 512KB Flash and 96KB SRAM. Stellaris also has prolific connectivity peripherals, allowing you to communication with your design, including: CAN, USB OTG, SPI, I2C, UART, Ethernet PHY MAC, and much more. StellarisWare® software facilitates development with its comprehensive libraries and code examples. Finally a competitive roadmap to higher speeds, larger memory and ultra-low power based on 65 nm will ensure utmost longevity of designs.

S.8

A new addition to the Stellaris family of products is the Stellaris ARM Cortex M4F series. These powerful MCUs offer a floating point unit over the Stellaris Cortex-M3 offerings. In addition, they offer best in class power consumption and the

same expansive set of connectivity options as that of the Cortex M3. The ARM Cortex M4 also offers DSP-like capabilities that surpass that off its predecessor. This allows use on more computation-hungry applications such as industrial automation, motor control and digital power. Both lines of Stellaris have ample connectivity options for all your communication needs.

S.9
C2000 is the family of 32 bit microcontrollers designed for real-time control applications since its inception. Its math-optimized core gives designers the DSP performance to improve system performance, efficiency, and flexibility. With features such as the Flexible interrupt system and real-time debugging, C2000 is literally fine-tuned from the core for real time applications. Speed ratings range from 40-300MHz on the C28x core. Powerful integrated peripherals, such as best in class ADCs and the industry's highest resolution PWMs, make C2000 devices the perfect single-chip control solution. C2000's development tools and controlSUITE software create an open platform with the goal of maximizing usability and minimizing development time. Also available are dual core offerings that feature a Cortex-M3 in addition to the C28x core allowing advanced host control capabilities.

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The C2000 portfolio has evolved over the years to merge the performance benefits of its high-performance signal processing core with the integration, low cost and ease-of-use traditionally associated with microcontrollers. The Piccolo family has targeted the most cost-sensitive application spaces that can benefit from the additional performance of the integrated Control Law Accelerator option. Piccolo is most targeted, but not limited to, in applications such as motor control, low end drives, lighting, and PLC. TI also introduced floating-point MCUs, Delfino, which brought developers inherent ease-of-use and precision benefits of floating point coupled with up to 300 MHz performance. A few example applications include Servo motors, motion control, and driver assistance modules. And finally, the dual core ARM Cortex M3 + C28x Concerto series offers high performance and maximum host control capabilities. These high performance microcontrollers prove to be ideal for eMetering, drives & automation, and solar applications.

S.11
The Hercules safety microcontroller platform consists of three ARM® Cortex™ based microcontroller families: TMS470M, TMS570 and RM4x. Designed specifically for IEC 61508 and ISO 26262 safety critical applications, the Hercules platform provides advanced integrated safety features while delivering scalable performance, connectivity, and memory options. The device architecture offers protection against both random and systematic failures, grants headroom for customer application differentiation, and allows for simplified development and safety certification. Its broad portfolio offers speeds up to 220MHz and to over 350DMIPS. Hercules also comes bundled with its HALCoGen GUI-based configuration and driver tool to cut time to market and development costs. Finally, developers can be rest assured that each device comes with proven reliability based on TI's 20+ years of safety-critical system expertise.

S.12
The RM48x family is targeted at safety critical industrial and medical applications and features TI's highest performance floating point ARM based MCU core running at 220MHz and providing more than 350 Dhrystone MIPS of performance. This family is also well suited for rugged industrial applications that require negative 40 to positive 105 deg C temperature operation. Ethernet, USB, CAN, SPI, I2C and UART connectivity also make the RM48x MCUs fit well into several industrial and medical applications.

The TMS570 family is targeted at high performance transportation applications that require Automotive/AEC Q100 (Grade 1) qualification and negative 40 to 125C temperature operation. This family also features Ethernet, FlexRay, CAN, LIN, SPI, I2C and UART connectivity. It has been developed to both the ISO 26262 ASIL-D and IEC 61508 SIL-3 safety

standards. The Cortex R4F in the TMS570 devices also provide over 280 DMIPs of performance with core clock rates up to 180MHz.

The TMS470M family is targeted at lower end transportation and general safety applications where price is key. These devices are Automotive/AEC Q100 (Grade 1) qualified for negative 40 to 125C temperature operation. They feature CAN, LIN, SPI and UART connectivity and provide around 100 DMIPs of performance with the ARM Cortex-M3 CPU running at 80MHz.

S.13

This slide highlights some, but not nearly all, kits that are offered for the MSP430, Stellaris, and C2000 family of microcontrollers. You can always check out TI's eStore for more available development kits to jump start your design process.

S.14

TI's families of microcontrollers provides a broad and diverse portfolio of products that offer both general purpose and target-specific microcontrollers. In addition, each product comes bundled with low-cost, industry leading software support to accelerate your development and shorten the time to market. When adopting any of TI's MCUs, designers have the latest advancements in integration of memory, peripherals, and wireless technologies embedded on-chip to help them design the next breakthrough product at minimal cost and effort.

THE END