混合信号微控制器

特性

- 低电源电压范围，**1.8V** 至 **3.6V**
- 超低功耗
- **5** 种节能模式
- 从待机模式唤醒
- 锁频环 **(FLL+)**
- **16** 位精简指令集 **(RISC)** 架构
- 具有 **3** 个或 **5** 个捕获**/**比较寄存器的 **16** 位 **Timer_A**
- 用于驱动 **96** 段 **LCD** 的集成型 **LCD** 驱动器
- 片载比较器
- 欠压检测器
- 电源电压监控器**/**监视器**-**可编程电平检测
- 串行板上编程、无需外部编程电压、由安全熔丝实现的可编程代码保护
- 闪存器件中的引导加载程序

说明

德州仪器 (TI) MSP430 系列超低功耗微控制器包含几个器件，这些器件特有面向多种应用的不同外设集。 为了在便携式测量应用中延长电池使用寿命，对这种与五种低功率模式组合使用的架构进行了优化。 该器件具有一个强大的 16 位 RISC CPU，16 位寄存器，和有助于大大提高编码效率的常数发生器。 数控振荡器 (DCO) 可在不到 6μs 的时间里实现从低功耗模式至运行模式的唤醒。

MSP430F417 是一款微控制器配置，此配置具有一个或者两个内置 16 位定时器、一个比较器、96 LCD 驱动能力、和 48 个 I/O 引脚。

典型应用包括传感器系统，此传感器系统可捕获模拟信号、将之转换为数字值，随后对数据进行处理并传送至一个主机系统。 比较器和定时器使得此配置非常适合应用于工业用仪表、计数器应用和手持式仪表。

ORDERING INFORMATION(1)

PRODUCT	PACKAGE DESIGNATOR	PACKAGE	ORDERABLE PART NUMBER	PACKAGE QUANTITY
MSP430F417	TD	Bare die in waffle pack(2)	MSP430F417TDE1	100
			MSP430F417TDE2	10

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.

(2) Processing is per the Texas Instruments commercial production baseline and is in compliance with the Texas Instruments Quality Control System in effect at the time of manufacture. Electrical screening consists of DC parametric and functional testing at room temperature only. Unless otherwise specified by Texas Instruments AC performance and performance over temperature is not warranted. Visual Inspection is performed in accordance with MIL-STD-883 Test Method 2010 Condition B at 75X minimum.

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

Copyright © 2012, Texas Instruments Incorporated

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

BARE DIE INFORMATION

DIE THICKNESS	BACKSIDE FINISH	BACKSIDE POTENTIAL	BOND PAD METALLIZATION COMPOSITION	BOND PAD THICKNESS
11 mils.	Silicon with backgrind	Floating	AlCu/TiN	800 nm

Copyright © 2012, Texas Instruments Incorporated

Table 1. Bond Pad Coordinates in Microns

DESCRIPTION	PAD NUMBER	X MIN	Y MIN	X MAX	Y MAX
DVCC	1	91.95	2586.7	166.95	2661.7
P6.3	2	91.95	2470.75	166.95	2545.75
P6.4	3	91.95	2356.7	166.95	2431.7
P6.5	4	91.95	2241.7	166.95	2316.7
P6.6	5	91.95	2126.7	166.95	2201.7
P6.7	6	91.95	2011.7	166.95	2086.7
N/C	7	91.95	1896.7	166.95	1971.7
XIN	8	91.95	1483.4	166.95	1558.4
XOUT	9	91.95	1251.25	166.95	1326.25
AVSS2	10	91.95	1129.05	166.95	1204.05
N/C	11	91.95	1008.45	166.95	1083.45
P5.1/S0	12	91.95	896.5	166.95	971.5
P5.0/S1	13	91.95	787.45	166.95	862.45
P4.7/S2	14	91.95	674.2	166.95	749.2
P4.6/S3	15	91.95	559.6	166.95	634.6
P4.5/S4	16	91.95	440.95	166.95	515.95
P4.4/S5	17	264.05	91.95	339.05	166.95
P4.3/S6	18	376.5	91.95	451.5	166.95
P4.2/S7	19	905.5	91.95	980.5	166.95
P4.1/S8	20	1007.6	91.95	1082.6	166.95
P4.0/S9	21	1109.7	91.95	1184.7	166.95
P3.7/S10	22	1211.8	91.95	1286.8	166.95
P3.6/S11	23	1313.9	91.95	1388.9	166.95
P3.5/S12	24	1416	91.95	1491	166.95
P3.4/S13	25	1518.1	91.95	1593.1	166.95
P3.3/S14	26	1620.2	91.95	1695.2	166.95
P3.2/S15	27	1722.3	91.95	1797.3	166.95
P3.1/S16	28	1824.4	91.95	1899.4	166.95
P3.0/S17	29	1926.5	91.95	2001.5	166.95
P2.7/S18	30	2290.1	91.95	2365.1	166.95
P2.6/CAOUT/S19	31	2392.3	91.95	2467.3	166.95
P2.5/TA1CLK/S20	32	2494.4	91.95	2569.4	166.95
P2.4/TA1.4/S21	33	2681.55	263.5	2756.55	338.5
P2.3/TA1.3/S22	34	2681.55	737.3	2756.55	812.3
P2.2/TA1.2/S23	35	2681.55	839.4	2756.55	914.4
COM0	36	2681.55	941.5	2756.55	1016.5
P5.2/COM1	37	2681.55	1044.05	2756.55	1119.05
P5.3/COM2	38	2681.55	1146.15	2756.55	1221.15
P5.4/COM3	39	2681.55	1248.25	2756.55	1323.25
R03	40	2681.55	1350.35	2756.55	1425.35
P5.5/R13	41	2681.55	1452.45	2756.55	1527.45
P5.6/R23	42	2681.55	1554.55	2756.55	1629.55
P5.7/R33	43	2681.55	1656.65	2756.55	1731.65
P2.1/TA1.1	44	2681.55	1758.75	2756.55	1833.75
P2.0/TA0.2	45	2681.55	1860.85	2756.55	1935.85
P1.7/CA1	46	2681.55	2228.25	2756.55	2303.25
P1.6/CA0	47	2681.55	2341.95	2756.55	2416.95

Copyright © 2012, Texas Instruments Incorporated

Table 1. Bond Pad Coordinates in Microns (continued)

DESCRIPTION	PAD NUMBER	X MIN	Y MIN	X MAX	Y MAX
P1.5/TA0CLK/ACLK	48	2681.55	2464.1	2756.55	2539.1
P1.4/TA1.0	49	2456.25	2781.15	2531.25	2856.15
P1.3/TA1.0/SVSOUT	50	2350	2781.15	2425	2856.15
P1.2/TA0.1	51	2245.35	2781.15	2320.35	2856.15
P1.1/TA0.0/MCLK	52	2092	2781.15	2167	2856.15
P1.0/TA0.0	53	1991	2781.15	2066	2856.15
TDO/TDI	54	1803.2	2781.15	1878.2	2856.15
TDI/TCLK	55	1401.45	2766.8	1476.45	2841.8
TMS	56	1209.6	2781.15	1284.6	2856.15
TCK	57	1105.85	2781.15	1180.85	2856.15
RST/NMI	58	1003.75	2781.15	1078.75	2856.15
P6.0	59	842.45	2781.15	917.45	2856.15
P6.1	60	721.45	2781.15	796.45	2856.15
P6.2	61	600.45	2781.15	675.45	2856.15
AVSS1	62	475.95	2781.15	550.95	2856.15
DVSS	63	373.75	2781.15	448.75	2856.15
AVCC	64	260.9	2781.15	335.9	2856.15

Copyright © 2012, Texas Instruments Incorporated

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/ Ball Finish	MSL Peak Temp [3]	Samples (Requires Login)
MSP430F417TDE1	ACTIVE			0	100	TBD	Call TI	N / A for Pkg Type	
MSP430F417TDE2	ACTIVE			0	10	TBD	Call TI	N / A for Pkg Type	

[1] The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

[2] Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

[3] MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

重要声明

德州仪器(TI) 及其下属子公司有权在不事先通知的情况下, 随时对所提供的产品和服务进行更正、修改、增强、改进或其它更改，并有权随时中止提供任何产品和服务。客户在下订单前应获取最新的相关信息 , 并验证这些信息是否完整且是最新的。所有产品的销售都遵循在订单确认时所提供的TI 销售条款与条件。

TI 保证其所销售的硬件产品的性能符合TI 标准保修的适用规范。仅在TI 保证的范围内，且TI 认为有必要时才会使用测试或其它质量控制技术。除非政府做出了硬性规定 , 否则没有必要对每种产品的所有参数进行测试。

TI 对应用帮助或客户产品设计不承担任何义务。客户应对其使用TI 组件的产品和应用自行负责。为尽量减小与客户产品和应用相关的风险，客户应提供充分的设计与操作安全措施。

TI 不对任何TI 专利权、版权、屏蔽作品权或其它与使用了TI 产品或服务的组合设备、机器、流程相关的TI 知识产权中授予的直接或隐含权限作出任何保证或解释。TI 所发布的与第三方产品或服务有关的信息，不能构成从TI 获得使用这些产品或服务的许可、授权、或认可。使用此类信息可能需要获得第三方的专利权或其它知识产权方面的许可，或是TI 的专利权或其它知识产权方面的许可。

对于TI 的产品手册或数据表，仅在没有对内容进行任何篡改且带有相关授权、条件、限制和声明的情况下才允许进行复制。在复制信息的过程中对内容的篡改属于非法的、欺诈性商业行为。TI 对此类篡改过的文件不承担任何责任。

在转售TI 产品或服务时，如果存在对产品或服务参数的虚假陈述，则会失去相关TI 产品或服务的明示或暗示授权，且这是非法的、欺诈性商业行为。TI 对此类虚假陈述不承担任何责任。

TI 产品未获得用于关键的安全应用中的授权，例如生命支持应用（在该类应用中一旦TI 产品故障将预计造成重大的人员伤亡），除非各方官员已经达成了专门管控此类使用的协议。购买者的购买行为即表示，他们具备有关其应用安全以及规章衍生所需的所有专业技术和知识，并且认可和同意，尽管任何应用相关信息或支持仍可能由TI 提供，但他们将独力负责满足在关键安全应用中使用其产 品及TI 产品所需的所有法律、法规和安全相关要求。此外，购买者必须全额赔偿因在此类关键安全应用中使用TI 产品而对TI 及其 代表造成的损失。

TI 产品并非设计或专门用于军事/航空应用，以及环境方面的产品，除非TI 特别注明该产品属于“军用”或“增强型塑料”产品。只 有TI 指定的军用产品才满足军用规格。购买者认可并同意，对TI 未指定军用的产品进行军事方面的应用，风险由购买者单独承担，并且独力负责在此类相关使用中满足所有法律和法规要求。

TI 产品并非设计或专门用于汽车应用以及环境方面的产品，除非TI 特别注明该产品符合ISO/TS 16949 要求。购买者认可并同意，如果他们在汽车应用中使用任何未被指定的产品，TI 对未能满足应用所需要求不承担任何责任。

可访问以下URL 地址以获取有关其它TI 产品和应用解决方案的信息：

产品		应用	
数字音频	www.ti.com.cn/audio	通信与电信	www.ti.com.cn/telecom
放大器和线性器件	www.ti.com.cn/amplifiers	计算机及周边	www.ti.com.cn/computer
数据转换器	www.ti.com.cn/dataconverters	消费电子	www.ti.com/consumer-apps
DLP® 产品	www.dlp.com	能源	www.ti.com/energy
DSP - 数字信号处理器	www.ti.com.cn/dsp	工业应用	www.ti.com.cn/industrial
时钟和计时器	www.ti.com.cn/clockandtimers	医疗电子	www.ti.com.cn/medical
接口	www.ti.com.cn/interface	安防应用	www.ti.com.cn/security
逻辑	www.ti.com.cn/logic	汽车电子	www.ti.com.cn/automotive
电源管理	www.ti.com.cn/power	视频和影像	www.ti.com.cn/video
微控制器 (MCU)	www.ti.com.cn/microcontrollers		
RFID 系统	www.ti.com.cn/rfidsys		
OMAP 机动性处理器	www.ti.com/omap		
无线连通性	www.ti.com.cn/wirelessconnectivity		
	德州仪器在线技术支持社区	www.deyisupport.com	

邮寄地址： 上海市浦东新区世纪大道 1568 号，中建大厦 32 楼 邮政编码： 200122
Copyright © 2012 德州仪器 半导体技术（上海）有限公司