

# 电机驱动与控制方案分享

剧透：工程师的不得不知的PIM模块八大优势

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Martin 田君龙

2017年5月

**SEKORM+**



搞研发·找元件  
世强元件电商

1

## Sekorm +世强元件电商

2

## 电机驱动与控制方案分享

- 交流电机优势产品
- BLDC优势产品



- 成立于**1993年**, 总部设在**深圳**
- **2015年销售额达2.4亿美金**
- 中国专业的**半导体及测试测量仪器代理商**



- 在全国设有**16个办事处及子公司**
- 有员工**420人**, 其中销售**139人**, 技术人员**49人**, 市场经理**23人**



- 实施**SEKORM+互联网战略**, 上线世强元件电商, 打造智能硬件创新服务平台

# 全球先进元件品牌

SEKORM 世强



RENESAS  
瑞 萨

ROGERS  
CORPORATION

Melexis  
INSPIRED ENGINEERING

ALLIANCE  
MEMORY

Wolfspeed<sup>TM</sup>  
A CREE COMPANY

Central  
Semiconductor Corp.

EMC FLORIDA  
Technology Labs  
smiths microwave

Firecomms<sup>TM</sup>

infineon

Kendell<sup>TM</sup>  
POWER  
ELECTRONIC  
CAPACITORS

KODENSHI

Laird<sup>TM</sup>

Littelfuse<sup>TM</sup>  
Expertise Applied | Answers Delivered

EPSON  
EXCEED YOUR VISION

KYOCERA  
京瓷

NEMICON

preci-dip

power  
integrations<sup>TM</sup>

REP  
Rep-Avago (Wuxi)

RICOH  
imagine. change.

Vincotech

SGMICRO

SMi  
PRESSURE SENSORS

Standex  
MEDER<sup>TM</sup>  
ELECTRONICS

TE  
connectivity

TT Electronics

UMS  
United Monolithic  
Semiconductors

WMA

新電元  
SHINDENGEN

KEYSIGHT  
TECHNOLOGIES  
Authorized Distributor

AARONIA AG<sup>®</sup>  
WWW.AARONIA.DE  
\*\*\*\*\*

# 工业电子及设备服务的领域及客户

SEKORM 世强

- 2015年年营业额达1.25亿美金
- 在过去10年客户数由628个增加至13000个
- 服务安防监控，智能仪表，医疗、仪表，电力、电源、新能源，变频、伺服，轨道交通交通等领域

 ahua  
TECHNOLOGY

 海康威视

 dji

 Streamax  
锐明视讯

 荣信股份  
RONGXIN POWER ELECTRONIC

 中国中车  
CRRC

 Inovance

 invt

 GSK 广州数控  
Command the Future

 QIXING  
琦星

 SUNGROW  
阳光电源

 TAIAN

 雷赛智能  
Leadshine

 DELTA

 EAST 易事特

 CONVO  
博世力士乐旗下品牌

 EMERSON.  
Climate Technologies

 NARI  
国电南瑞科技股份有限公司  
NARI TECHNOLOGY CO., LTD.

 NARI-RELAYS

 STEP®  
新时达

 mindray 迈瑞

 GE 健科陆电子

 SUN CREATE

 KSTAR 斯士达

 威胜集团  
WESON GROUP

 新天科技  
SUNTRON

 偉岸測器  
WE CAN PRECISION INSTRUMENTS

 必控电子

 TOPSCOMM

 思维

 CETC

 万龙电气  
WANLONG ELECTRIC

 卧龙  
WOLONG

 JEZETEK 九洲

 Agilent Technologies

 大豪  
DAHAO 科技

 杜亚  
DOOYA  
TUBULAR MOTOR

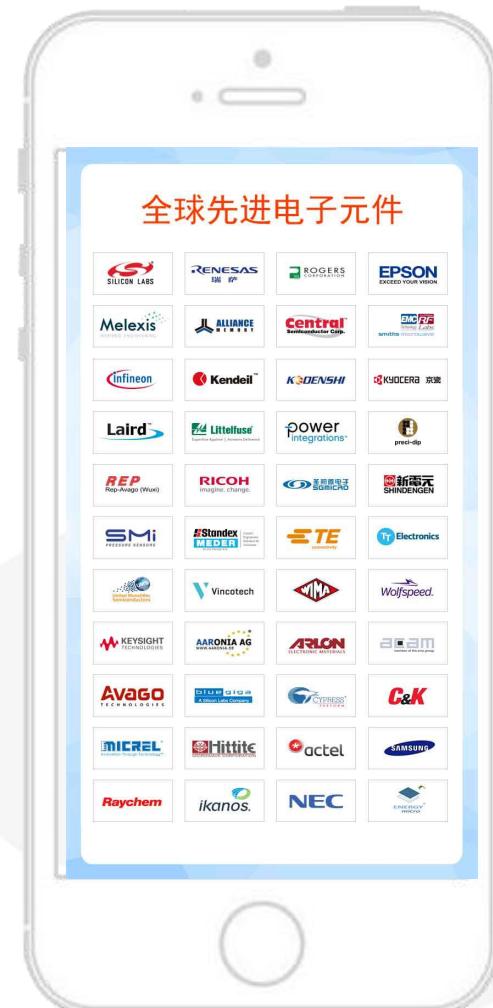


搞研发 找元件 上世强元件电商

2016年1月11日，为提升电子制造企业创新竞争力，为硬件研发、采购等电子元件相关工程师量身订制的世强元件电商正式上线。

涵盖全球四十余家欧、美、日著名半导体企业的数万种电子元器件产品，

覆盖工业电子、消费电子、通信电子、智能物联、汽车电子、测试测量等领域。



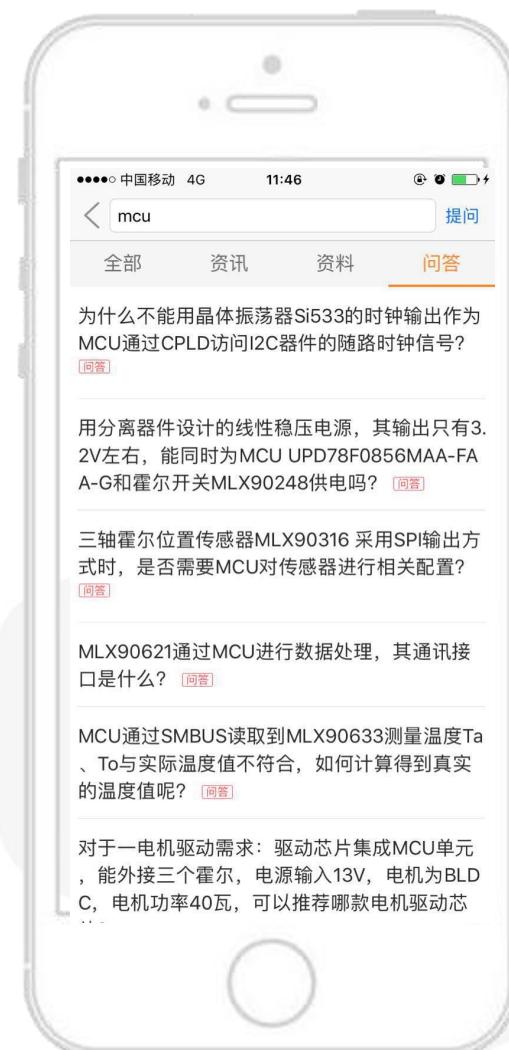
- 新元件新技术知识领先国内半年以上
- 独创智能搜索帮助工程师精准高效获取资讯、资料、方案、元件供应及技术支持等一站式关联服务



- 打通原厂资料库，数十万份最新最全选型/研发机密资料
- 史上最强选型指南，包含原厂最新型号，超流畅在线浏览，点击型号，更多相关应用方案及专业资料一键获取
- 工业4.0、IOT、无人机、充电桩、可穿戴、智能汽车、基站通信等热门领域上百个优先器件方案
- 从性能、供货、性价比、市场验证各角度推荐最优器件型号



- 100个功率电子、工业控制、微波通信、可编程元件领域的专家在线支持
- 10000个真实项目案例常见问题
- 10万个型号的数据手册、测试报告、应用笔记、白皮书、应用方案开发工具... 让研发设计更容易。



- 元件库存和ERP系统实时联动，支持在线查询实时库存
- 支持在线询价、交期
- 支持在线申请样品



加入世强元件电商VIP俱乐部

成为技术大神，  
分千万VIP会员福利红包。

平台高价值服务只为VIP提供！



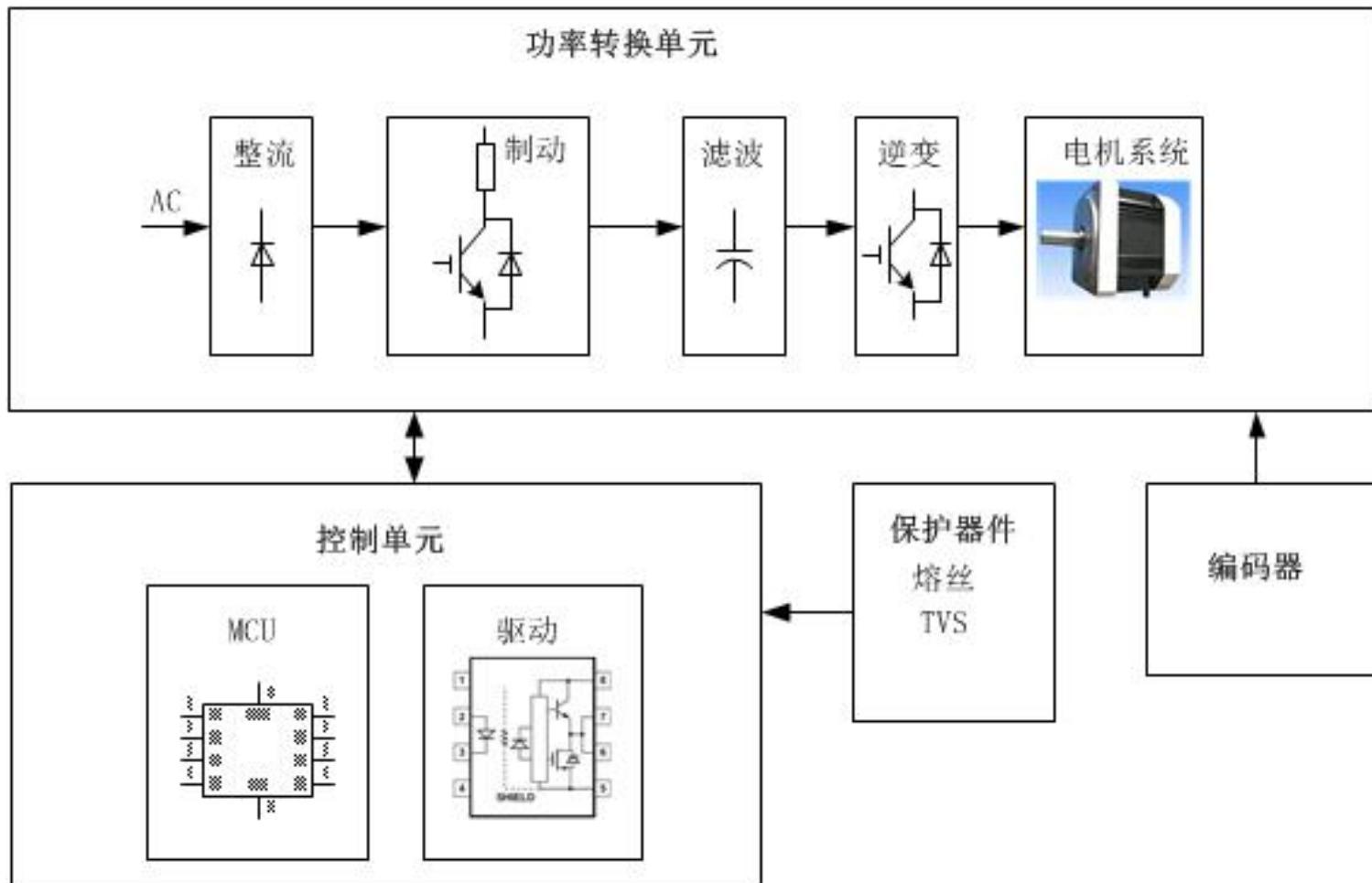
# **SEKORM+**

世强元件电商

让创新更简单   让研发更容易   让元件供应更可靠

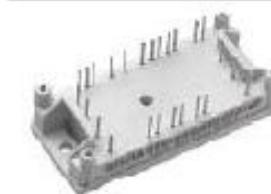
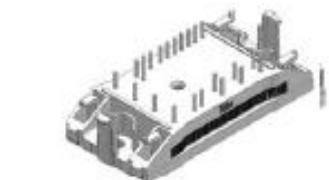
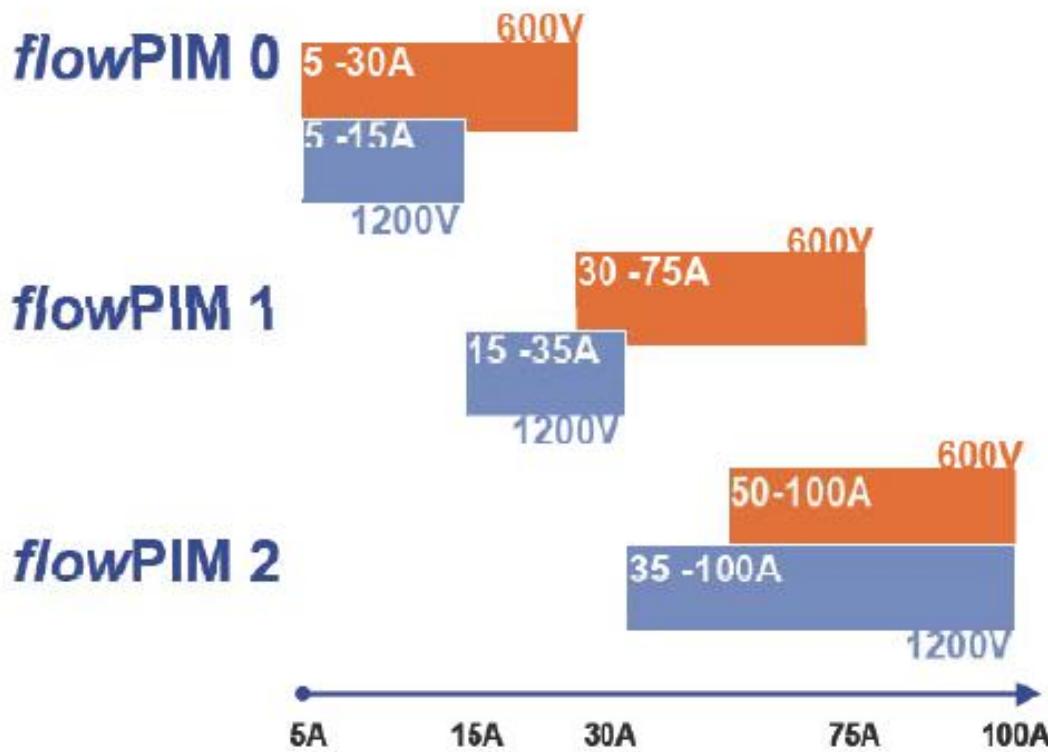
# 电机驱动与控制方案分享

SEKORM 世强



- 交流电机优势产品
- BLDC优势产品

## PIM Power Range



## 90° housing for compact drives

(book shelf shape & Servo drive)



## Lead customer Design phase

Lenze

LUST  
DRIVE TRONICS

BAUMÜLLER

Rexroth  
Bosch Group

SIEMENS

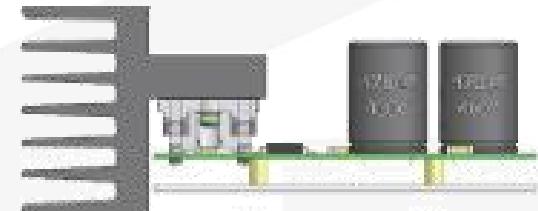
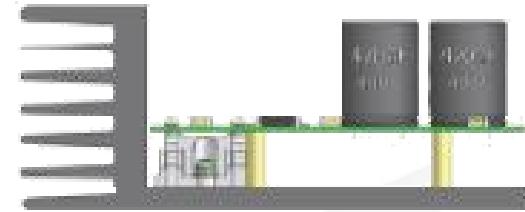
ebm papst

Part-No	Voltage	Current*
V23990-P631-A-PM	600V	6A
V23990-P632-A-PM	600V	10A
V23990-P633-A-PM	600V	15A
V23990-P634-A-PM	600V	20A
V23990-P635-A-PM	600V	30A
V23990-P639-A-PM	1200V	8A
V23990-P630-A-PM	1200V	15A

## flow90°PIM 1 (P63X) – The Problem

Bookshelf inverter Concept

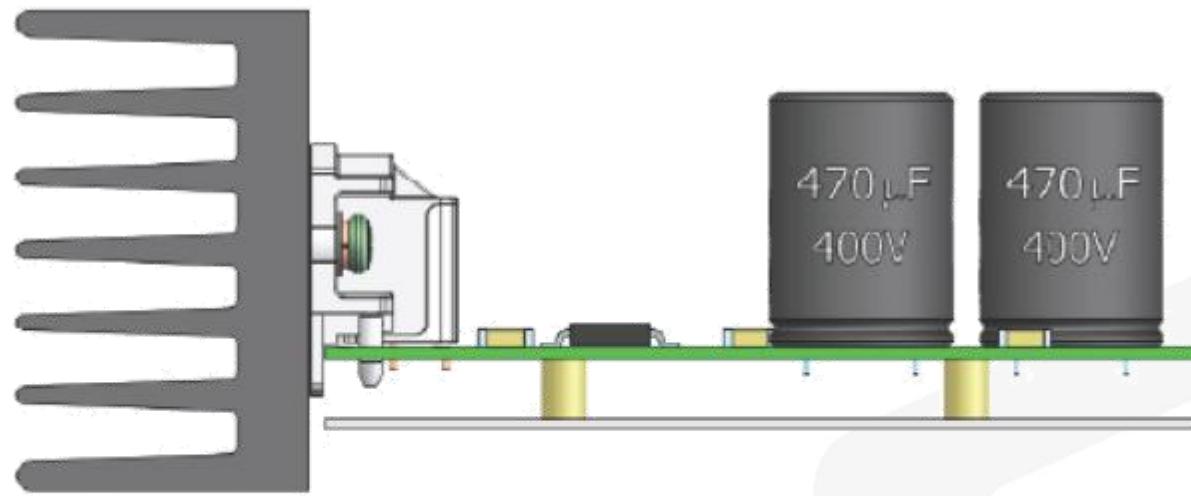
- Module mounted on the bottom side of the PCB  
=>additional solder process required  
=>L-shaped heat sink
- Module mounted on the top side of the PCB  
=>special shaped heatsink required



At ultra slim bookshelf Inverter the PCB is arranged with the heatsink in an angle of 90°

# Flow90PIM1(P63x)----解决方案

SEKORM 世强

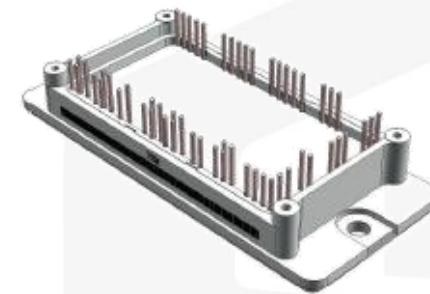
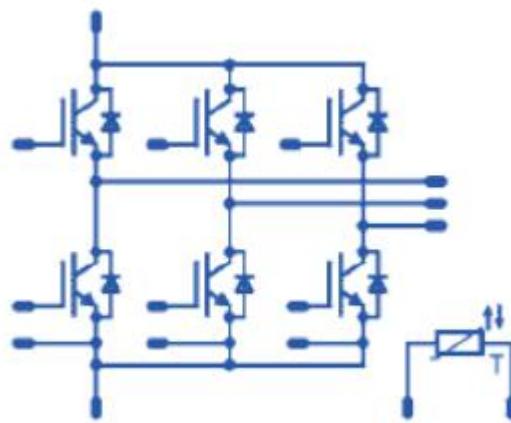
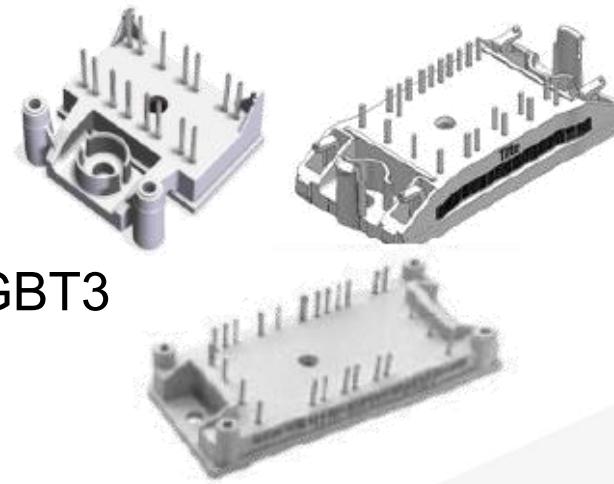


The flow90°PIM 1 is a module dedicated for bookshelf Inverter and the easy replacement of discrete components

# Vincotech 6管产品-SIX PACK

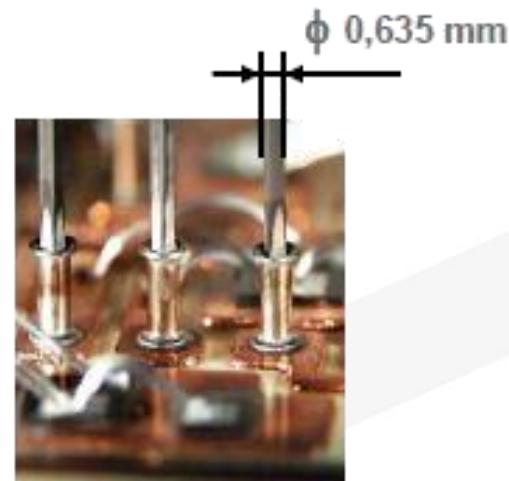
SEKORM 世强

- 3~IGBT inverters
- Temperature sensor
- Trench Fieldstop 1200V IGBT4;600V IGBT3
- UL-housing
- In 12mm and 17mm available!
- $T_{jmax} 175^{\circ}\text{C}$



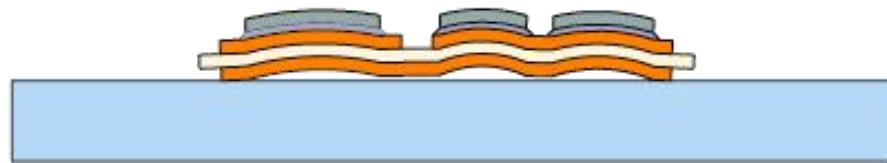
## Advantage 1 - Pins

- Cone shape pins,easy to assembly into PCB holes
- Stress relief mechanism to protect DCB and PCS solder joints after assembly.
- Pins cooled due to direct contact to DCB

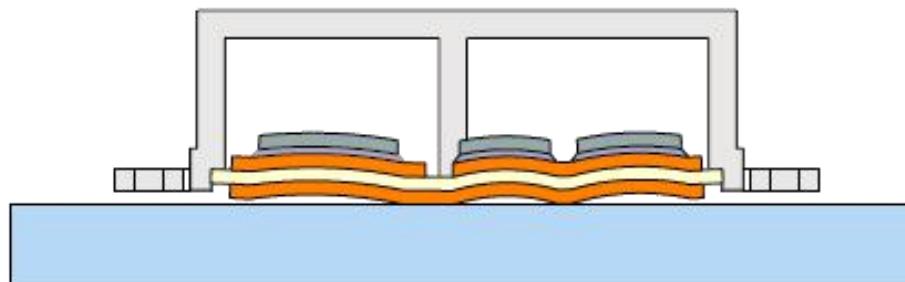


Test	Company A	Flow Family	
PIN	0, 635	1,00	mm
Pull Test	<20	<100	N

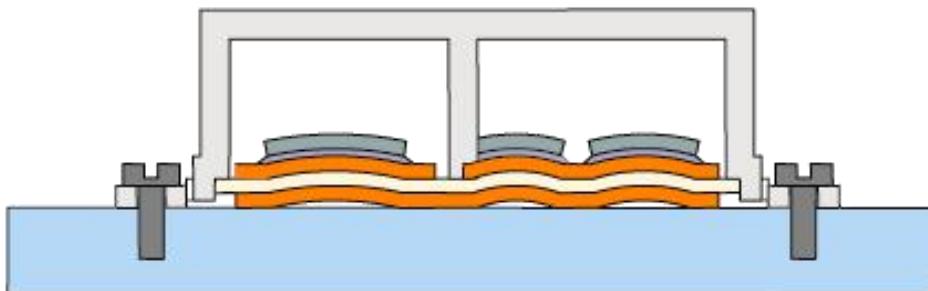
## Advantage 2 – Convex Substrate



Substrate on heatsink without any improvement for better thermal contact



Substrate with convex prebending by housing with integrated plastic pin



Housing with substrate mounted on heatsink. Only a small local concavity with less than 25 $\mu$ m remains.

## Advantage 3 – Thick Substrate

### Module without base plate



**The Substrate of Easys is easy to be broken during the assembly**

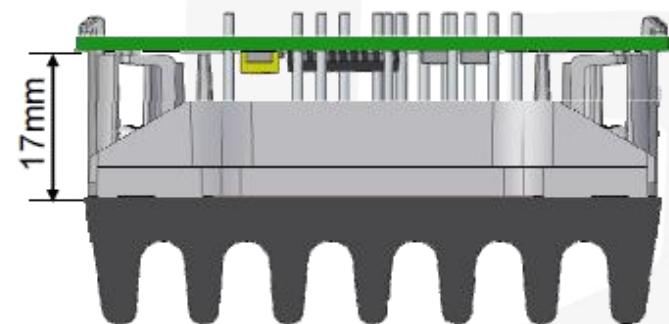
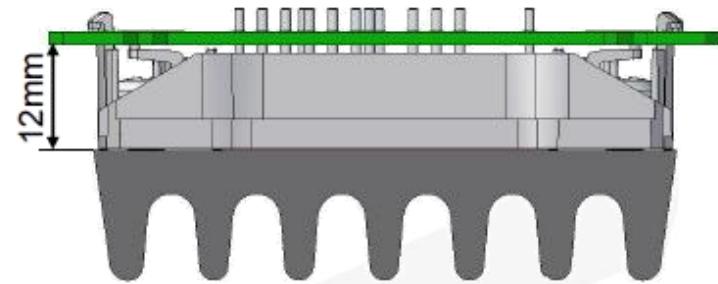
## Advantage 4 – 12mm & 17mm Available

The Advantage:

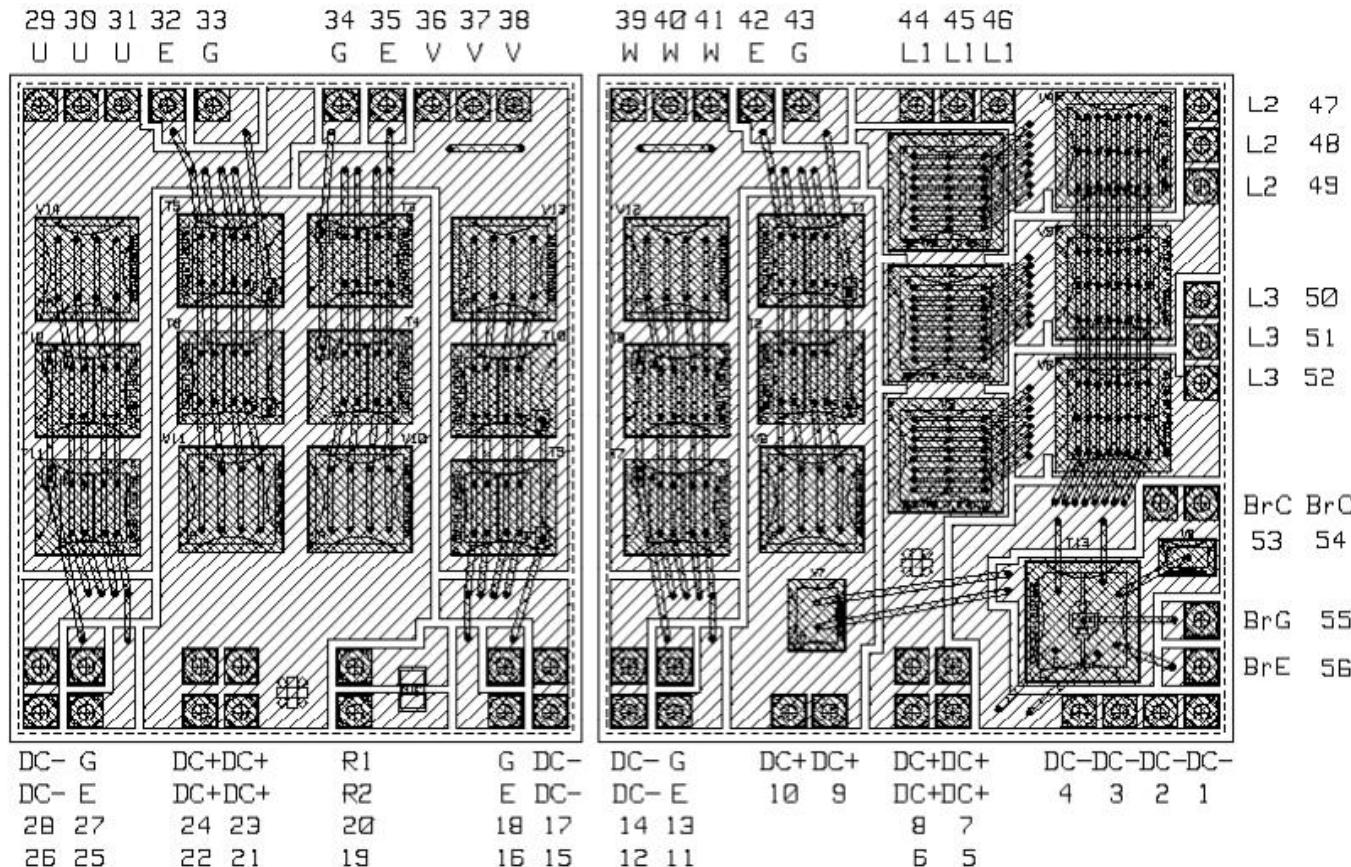
- More space for routing
- More compact construction
- Easier mounting
- Clearance and creepage for 12mm & 17mm

**At 17mm height:**

**Space for components  
between PCB and housing**



## Advantage 5 – Parasitic Inductance



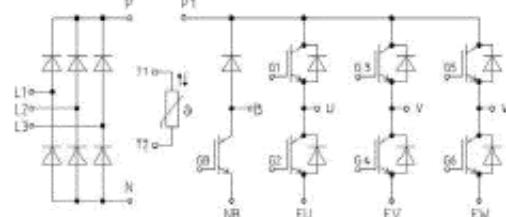
**Chips distributions and bonding wires are in order!**

## Advantage 6 - Emitter Sense Pin

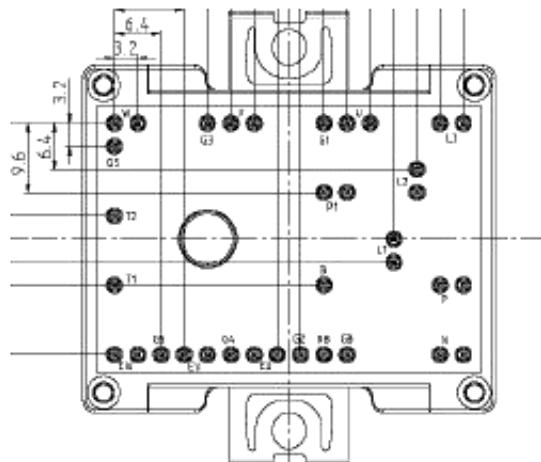
**Technische Information / technical information**

1

### Schaltplan / circuit diagram

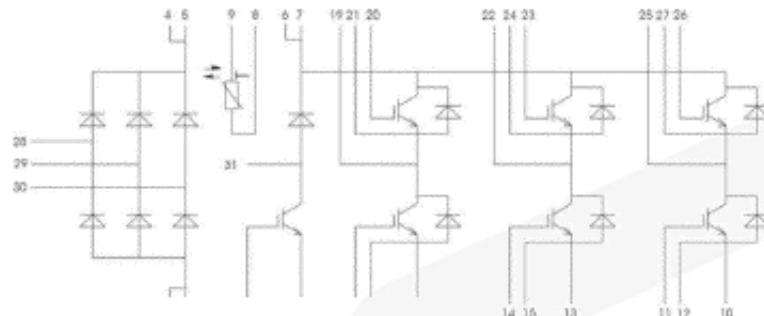


## Gehäuseabmessungen / package outlines



### *Company A PIM pinout*

## Schematics/ Schaltpläne



## P58x pinout

Emitter sense pin makes low parasitic inductance in the gate loop and fast driving

## Advantage 7 - Pre-applied Grease

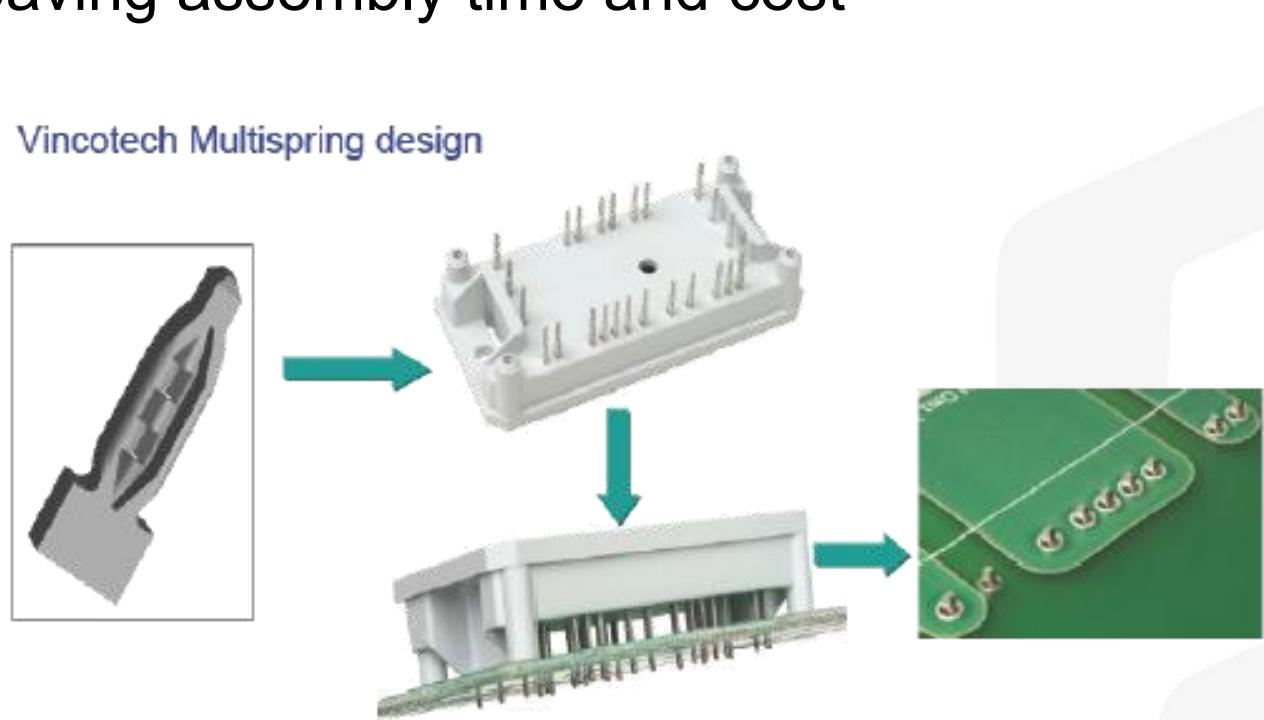
Thermal Interface Material Applied on the Module

- Phase change material is screen printed to the back side of the power module
- The material is not sensitive (pin soldering in the solder wave is no problem)
- Screw down and ready!
- Significant improvement of thermal performance



## Advantage 8 Press-Fit PIN

- Highly reliable and eletrical characteristic
- Saving assembly time and cost



### 三款光电耦合器：

- PS9402-V-E3-AX
- PS9031-Y-V-F3-AX
- PS9531L3-V-E3-AX

系列齐全，满足各种条件要求：

- 8个或6个引脚的贴片或直插封装
- 带过流/过压保护的驱动光耦

采用了先进的生产工艺技术，完美Pin-To-Pin替代A牌光耦，  
成本降低10%

## PS9031：可与ACPL-W340/341以及TLP701，实现 Pin To Pin替换

(PS9031是5PIN, ACPL-W340/341是6PIN, 其中W340的PIN2是NC的)

- 隔离电压可达5KV, 长时间正常工作的隔离电压可达1130Vpeak
- 共模抑制比为50KV/us MIN, 抗电磁干扰能力更强
- 具有-40~125°C宽温度范围特性
- 价格却比同类至少便宜5%。
- 长爬电距离, 最小为8mm
- 大峰值输出电流, 可达2.5A
- 高速转换, 最大转换时间为175 ns
- UVLO欠压锁定（保护滞后）
- 无铅无卤素焊接工艺
- 安全标准: UL、CSA、VDE认证

应用: IGBT及Power MOSFET门级驱动、工业变频器、伺服系统、光伏、UPS

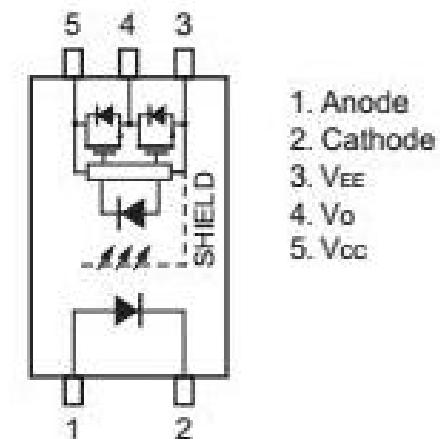


图1：管脚接法顶视图

## PS9402-V-E3-AX: 与ACPL-330J/332J完美兼容

- 采用16引脚塑封SSOP（紧缩小型封装）
  - 温度等级-40~110°C
  - 长爬电距离（MIN : 8 mm）
  - 驱动电流（2.5 A）
  - 高速开关（=200 ns最大值）
  - UVLO（欠压锁定）保护与滞后
  - 米勒钳位，适合驱动IGBT和功率场效应管MOS
  - 高共模瞬态抑制（=25kV/μs MIN）
  - 包装样式：压纹带850 pcs/reel
  - 安全标准：DIN EN60747-5-2（VDE0884 Part2）认证
- 应用：光伏、工业变频器、伺服、不间断电源（UPS）

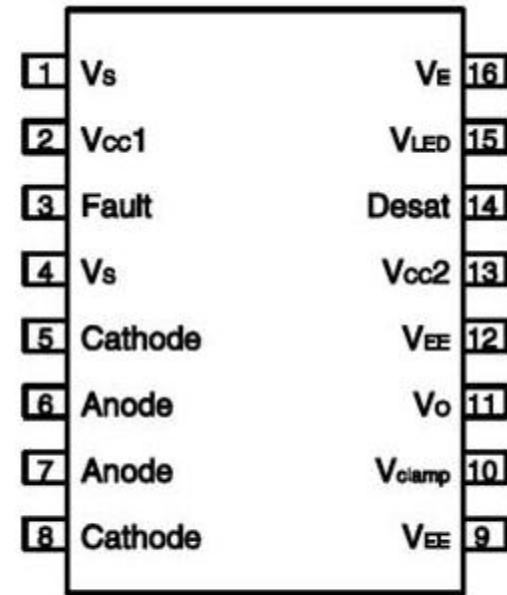


图1：PS9402-V-E3-AX引脚图

推荐型号（400W-6600W TVS）：

TPSMF4L/TPSMA6L/TPSMB/TPSMC/TPSMD/SLD8S系列

## ●功能与特性

- 符合高可靠性应用和汽车级**AEC-Q101**标准要求
- 快速响应时间：从0V-VBR最小值为ns-ps级时间
- 出色的箝位能力，增量浪涌电阻较低
- SLD8S are specially designed for Load Dump application (ISO7637-2 5a/b and ISO16750-2 5a/b) 可应用于感应负载开关,交流发电机负载突降



## ●应用：

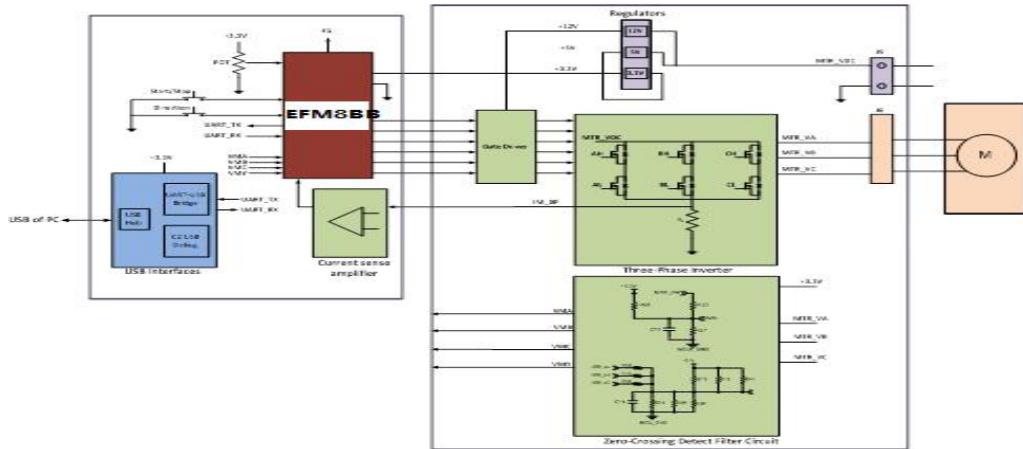
- 电子控制单元，需要高度可靠性的便携设备
- BCM,CAN总线,LIN总线,传感器,娱乐系统,
- 输入/输出接口、VCC总线和其他用于电信、电脑、工业和消费电子产品的易损电路

- 交流电机产品
- **BLDC**优势产品

- 高速MCU
  - 25MIPs, 流水线架构, 单时钟周期8051
- 3通道PCA – 高速PWM
  - 8/9/10/11/16 bit PWM
  - 支持边缘和中间对齐PWM
  - 比较器清零功能
- 10/12 bit ADC
  - 最多支持16通道输入
- 两个高速比较器
  - 反电动势控制
  - 限流控制
  - PWM输出清零 (BB2)
- 灵活的Crossbar和模拟通道配置
- 小封装
  - EFM8BB1 – 16, 20, 24 pin
  - EFM8BB2 – 20, 24, 28 pin



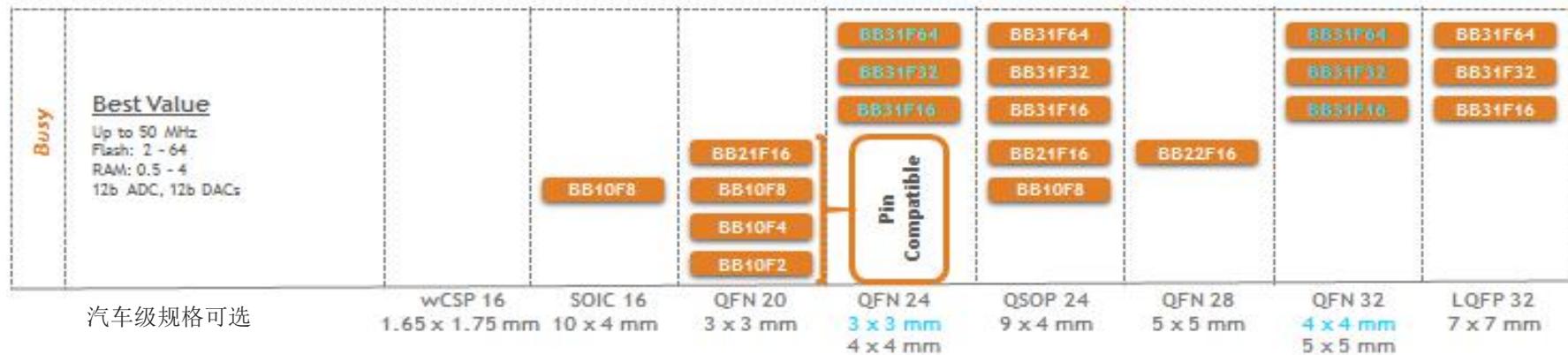
- 完全的参考设计
  - 基于EFM8BB10F8
  - 高性能的马达控制特性
  - 完整的软硬件设计资源



Parameter	Min	Typ	Max	Unit
Power supply	10		24	V
Motor driver PWM frequency		24		kHz
Continuous average output current			10	A
Speed range (2-pole motor)			200,000	RPM
Speed range (4-pole motor)			100,000	RPM
Speed range (6-pole motor)			66,667	RPM

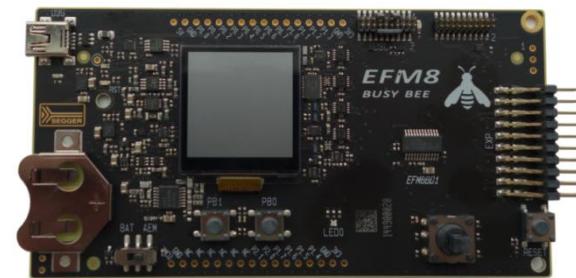
# EFM8BB产品系列

SEKORM 世强



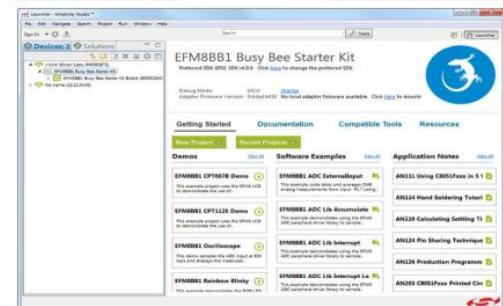
## • 强大的开发平台 - Simplicity4.0

- 8bits & 32bits MCU /Wireless
- 配置向导 /能耗分析 /Keil编译器 /网络分析 /应用配置
- 在线实时更新

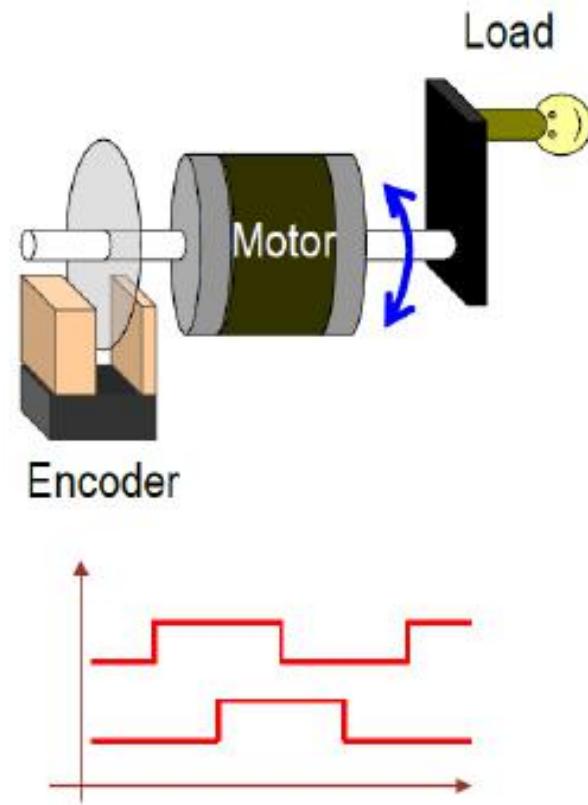
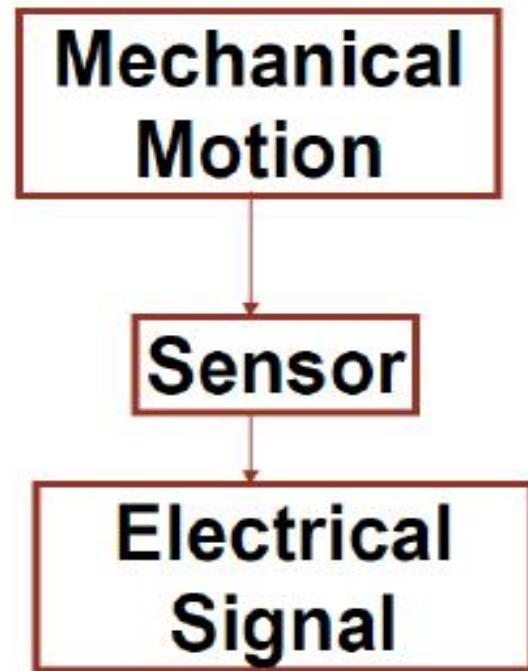
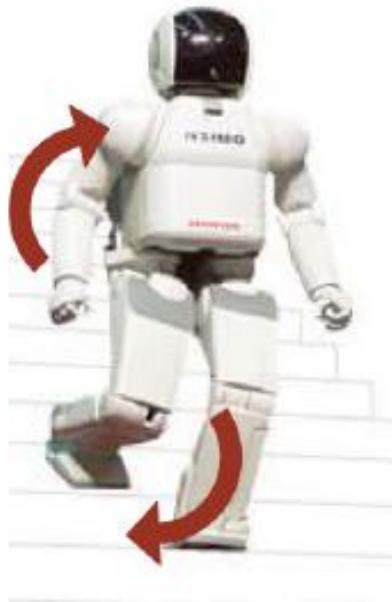


## • 简单易用的开发工具

- SLSTK2020A: EFM8BB1起始者套件
- SLSTK2021A: EFM8BB2起始者套件
- SLSTK2022A: EFM8BB3起始者套件



编码器是一种能将机械运动（如位移，速度，方向等）用电信号表述出来的机电一体化设备



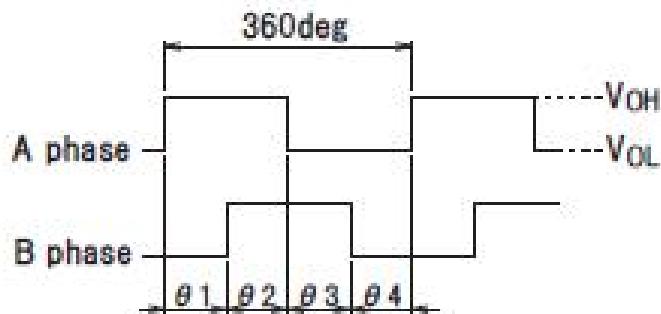


## KE-2N19F-xx系列

- 纤小但可靠的封装
- 齐全的分辨率系列—最高支持600LPI
- 成本较竞争对手30% off

\*4 出力波形

Output waveform



Resolution	RL (Pull Up)
18LPI	10KΩ
45LPI	10KΩ
90LPI	10KΩ
150LPI	10KΩ
180LPI	10KΩ

Contact Us:

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# THANKS!

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