

# 英飞凌电机控制硬件开发套件及软件开发工具介绍

英飞凌科技（中国）有限公司

工业和多元化市场

2011 马达控制及应用技术研讨会



# 主要内容

- 电机开发套件介绍

- DAVe Drive 软件介绍

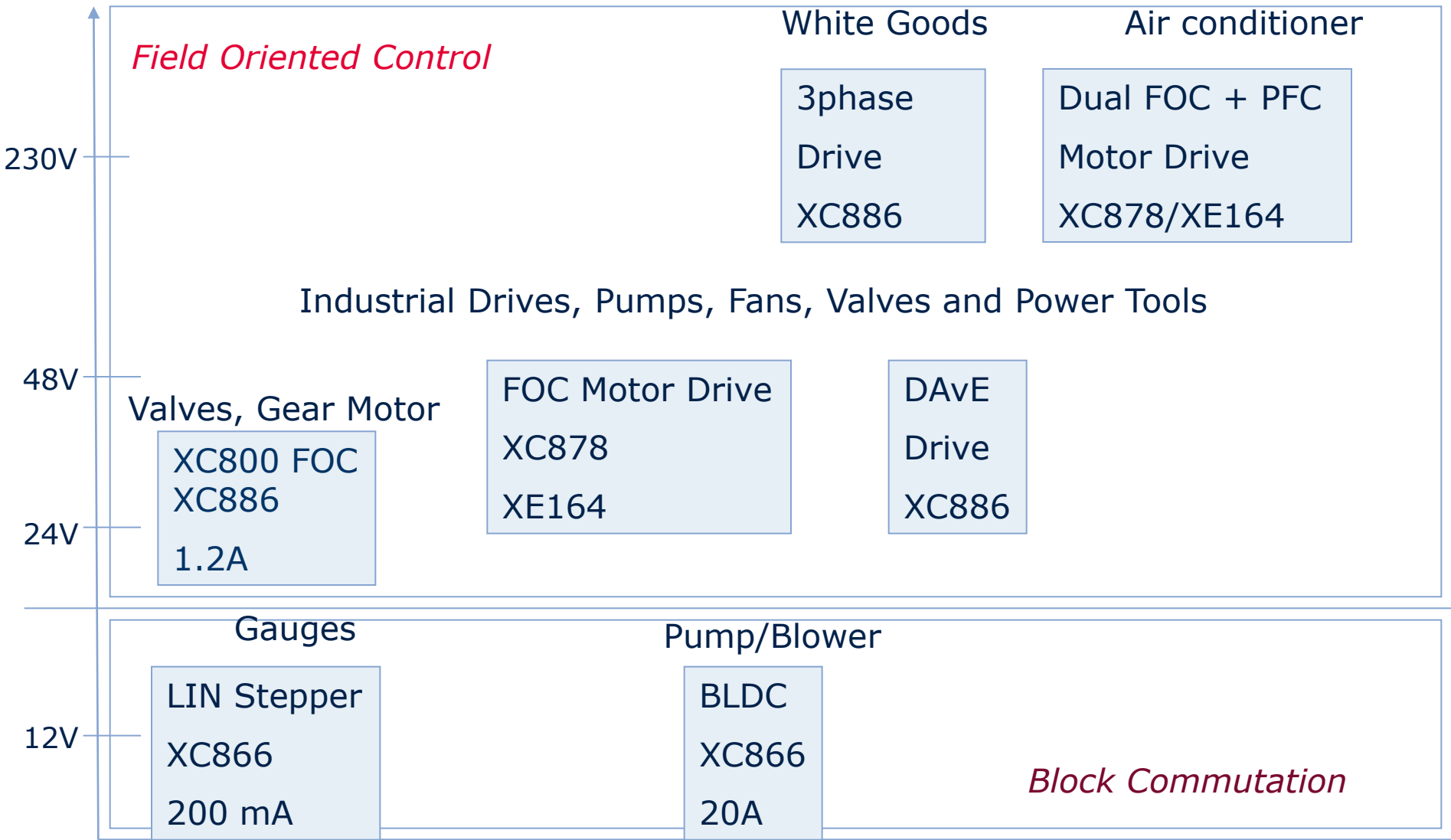
# 主要内容

## ■ 电机开发套件介绍

## ■ DAVe Drive 软件介绍

# Infineon 电机控制开发套件

涵盖了从 12V to 230V 应用范围



# Infineon MCU 马达控制优化的方案

支持块交换, 磁场定向, 数字PFC 及多马达控制



## Scalable Motor Control Solutions using XC800 and XE166 Families

				<b>XE164</b>
				→ MAC Unit
			<b>XC878</b>	
			→ Enhanced Vector Computer	
		<b>XC 83xM</b>		
		<b>XC886/888</b>		
		→ Vector Computer		
	<b>XC 83x</b>			
	<b>XC866-2/4FR</b>			
<b>XC 82x</b>				
<b>XC866-1FR</b>				
PWM Unit with Hall Sensor	PWM Unit with Hall Sensor	PWM Unit triggers ADC	Two PWM Units trigger ADC	Three PWM Units trigger two ADC Units
Block Commutation	Block Commutation	Field Oriented Control sensorless	Field Oriented Control sensorless + digital PFC	Dual Motor Field Oriented Control sensorless + digital PFC

# 带LIN总线步进电机开发套件

## Key Features:

- XC866
  - PWM unit
  - Fast ADC with <200ns sample time
- Supporting 50 to 200mA stepper motor
- On board stepper gauge
- Software package included to control the stepper motor and deploy your own design
- Free toolchain including compiler and debugger
- Mini-Wiggler for JTAG debug via USB interface
- Ready for LIN prototyping
- DAVE compatible software packages
- Suitable for Windows 98/2000/XP



## Applications:

- Instrumentation / Gauges
- Multi-Axis Positioning
- Surveillance Equipment
- CNC machining
- Printers
- Business Machines

## Key Features:

- XC886 with vector computer
  - PWM unit
  - Fast ADC with <200ns sample time
- Discrete Power Inverter 24V, 1.2A
- 15W PMSM Motor and plug in power supply 24V
- Software package including source code for sensorless FOC of PMSM
- Free toolchain including compiler and debugger
- Real time monitoring tool (USB to CAN bridge)
- DAvE compatible software packages
- Suitable for Windows 98/2000/XP



## Applications:

- Valve control
- Gear motor

# BLDC (Brushless DC) 开发套件

## Key Features:

- XC866
  - PWM unit
  - Fast ADC with <200ns sample time
- Power Board 9V - 18V, 20A
- 50W PMSM Motor and plug in power supply 12V
- Using Infineon NovatithIC BTN7960B and TLE4264 LDO
- DAVe Drive Auto code generator (fully functional application code) for
  - Block commutation with hall sensors and sensor less
- Free toolchain including compiler and debugger
- Digital isolated real time monitoring tool (USB to JTAG and CAN bridge)
- Tutorial Videos how to use the Kit
- Suitable for Windows 98/2000/XP



## Applications:

- Water pumps
- Fuel pumps
- Fans
- Valves
- Power Tools



# DAvE 驱动应用套件

## Key Features:

- XC886 with vector computer
  - PWM unit
  - Fast ADC with <200ns sample time
- Power Board 23V - 56V, 7.5A
- 15W PMSM Motor and plug in power supply 24V
- Using 6ED003L06 , BSC196N10 , ICE3B0565 and TLE4264
- DAVe Drive Auto code generator (fully functional application code) for
  - Block commutation with hall sensors and sensorless
  - Sensorless FOC of PMSM
- Free toolchain integrated in DAVe Drive
  - Flexibly generates optimized code and is not based on static libraries
  - Configures Infineon's powerful and flexible motor control peripherals
  - Compresses a detailed user manual into a few mouse clicks
  - Helps designers to quickly and easily implement advanced motor control techniques on low-cost components



## Applications:

- Industrial motor control
- Transportation systems
- Consumer Motor Control
- Appliance Motor Control

# FOC 驱动应用套件

## Key Features:

- XC878 with vector computer
  - 2 independent PWM units
  - Fast ADC with <200ns sample time
- XE164 Real Time Signal controller with MAC unit
  - 3 independent PWM units
  - 2 independent fast ADCs with <200ns sample time
- Power Board 23V - 56V, 7.5A
- 15W PMSM Motor and plug in power supply 24V
- Software package including source code
  - Sensorless FOC of PMSM with XE164
  - Sensorless FOC of PMSM with XC878
- Free toolchain for XC878 and XE164 including compiler and debugger
- Digital isolated real time monitoring tool (USB to JTAG and CAN bridge)
- DAVE compatible software packages



## Applications:

- Industrial drives
- Fans, Blowers
- Pumps

## 3 相电机驱动开发套件

### Key Features:

- XC886 with vector computer
  - PWM unit
  - Fast ADC with <200ns sample time
- Power Board 110V - 230V AC, 3A
  - Inverter with 375W – 750W
- Using Infineon IKCS12F60 CIPOS 12A, CoolSET ICE3B0565 power supply and TLE4264 LDO
- Software package including source code
  - Sensorless FOC of PMSM
  - V/f control of ACIM for quick evaluation
- Free toolchain including compiler and debugger
- Digital isolated real time monitoring tool (USB to JTAG and CAN bridge)
- DAvE compatible software packages
- DAvE Drive ready



### Applications

- Home appliances
  - Washing machines
  - Dish washers
- Industrial motor control
  - Pumps
  - Fans

# 双马达驱动开发套件

## Key Features:

- XC878 with vector computer
  - 2 independent PWM units
  - Fast ADC with <200ns sample time
- XE164 Real Time Signal controller with MAC unit
  - 3 independent PWM units
  - 2 independent fast ADCs with <200ns sample time
- Power Board 110V - 230V AC, 8A
  - Inverter A with 900W – 1800W
  - Inverter B with 100-200W
  - Boost converter for Power Factor Correction (PFC)
- Software package including source code
  - Simultaneous control of two PMSM with sensor less FOC & digital PFC with XE164
  - Sensor less FOC & digital PFC with XC878
  - V/f control of ACIM for quick evaluation
- Free toolchain for XC878 and XE164 including compiler and debugger
- Digital isolated real time monitoring tool (USB to JTAG and CAN bridge)



## Applications:

- Air conditioning
- Industrial drives
- Fans, Blowers
- Pumps
- White goods

# 主要内容

- 电机开发套件介绍

- DAvE Drive 软件介绍

# DAvE Drive 简介

## ■ 特点

- 自动代码生成工具，图形化操作界面
- 支持英飞凌XC800系列，以及部分XE166系列产品
- 支持多种电机控制方式
- 支持免费编译器
  - 8位: SDCC
  - 16位: **Tasking VX toolset Lite.**
- 方便的开发调试界面

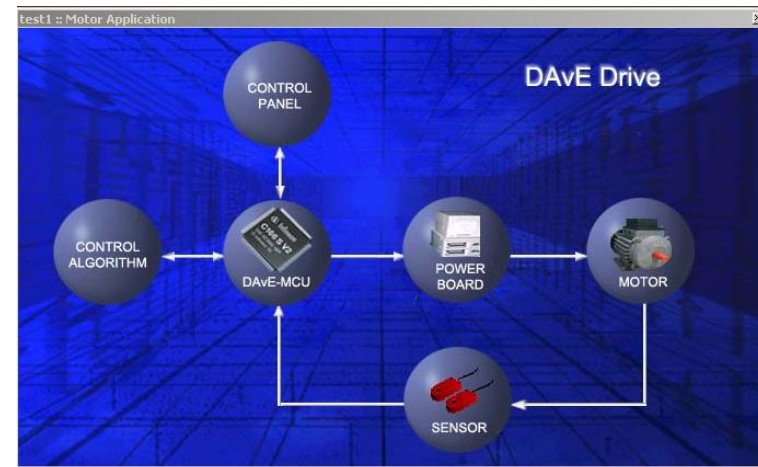
## ■ 配套学习套件: KIT\_AK\_DAVEDRIVE\_V3

## ■ 最新软件版本: V1.8.0

- 下载地址: [www.infineon.com/DAvEDrive](http://www.infineon.com/DAvEDrive)

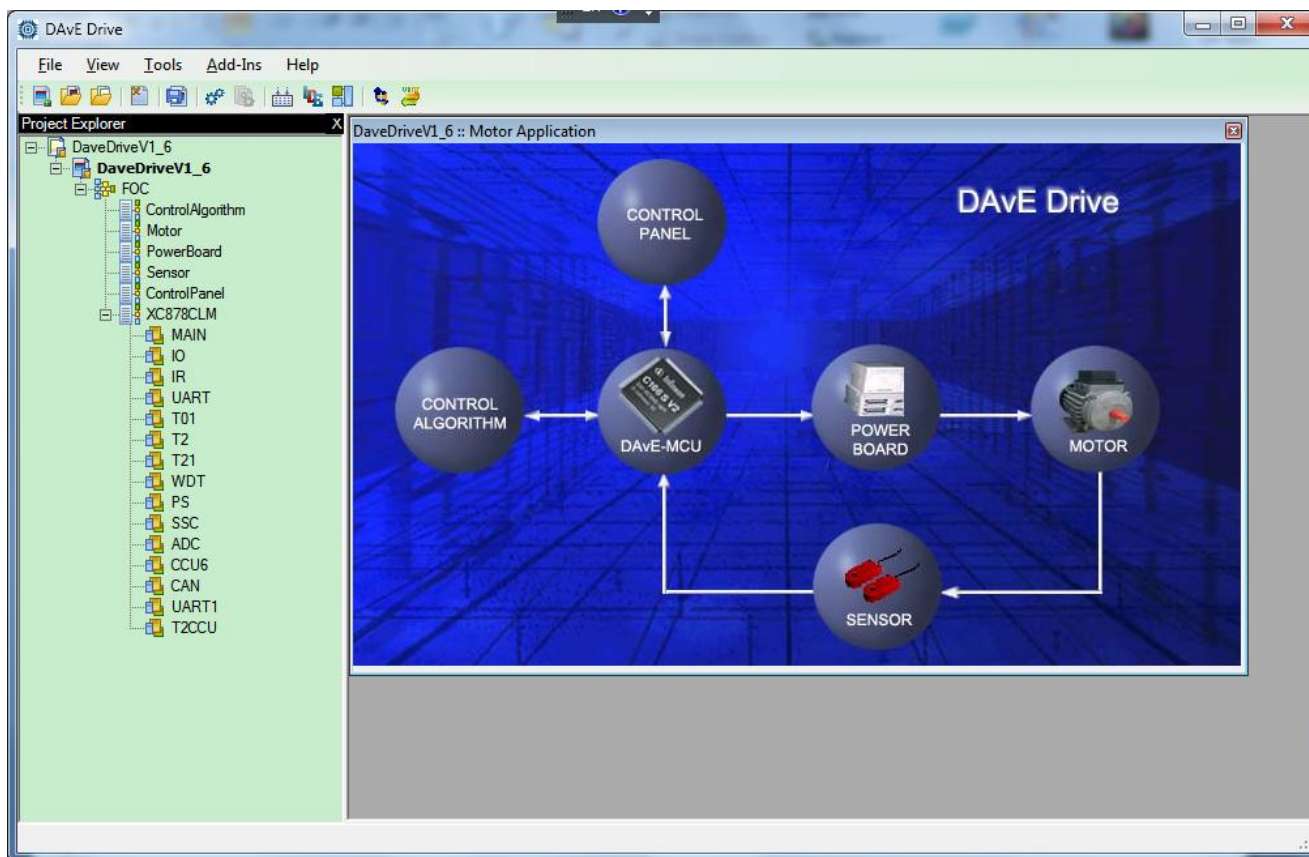
## ■ 在线Training:

- <http://www.infineon.com/cms/media/eLearning/Microcontrollers/DAvEDrive/player.html>



# DAvE Drive – 开发环境介绍

## ■ 主界面



# DAvE Drive – 开发环境介绍

## ■ 控制算法及MCU选择界面

### □ 支持多种Infineon MCU

→ XC866, XC864, XC886, XC888, XC878

→ XE164, XE162FM, XE162FN

### □ 支持多种电机

→ 交流电机

→ 直流无刷电机

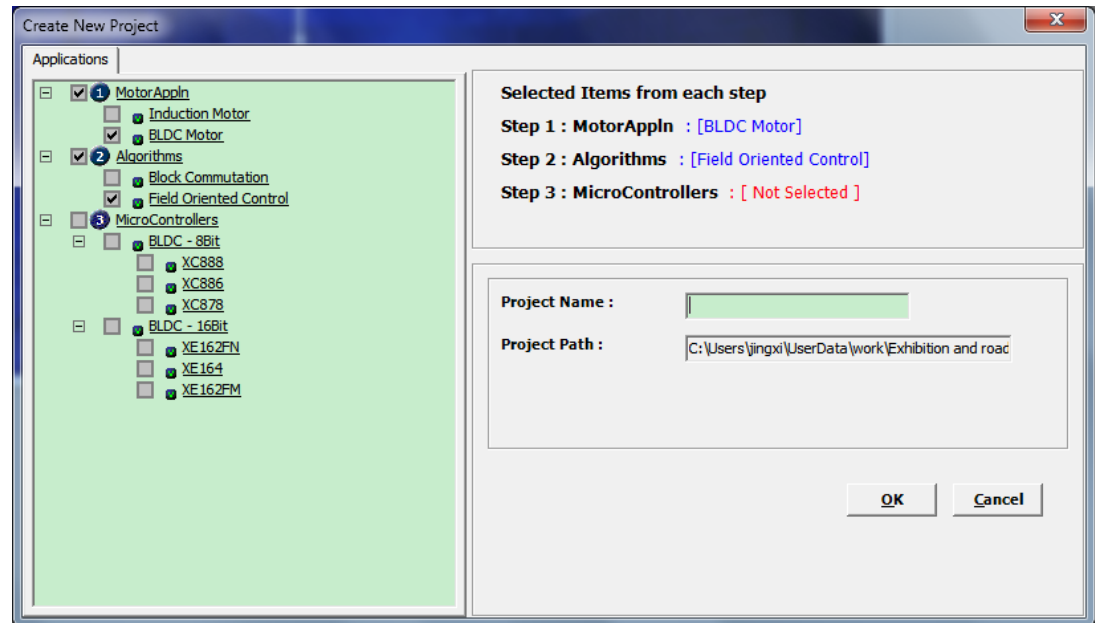
→ 永磁同步电机

### □ 支持多种控制方式

→ 直流无刷电机块交换控制

→ 交流电机V/F控制

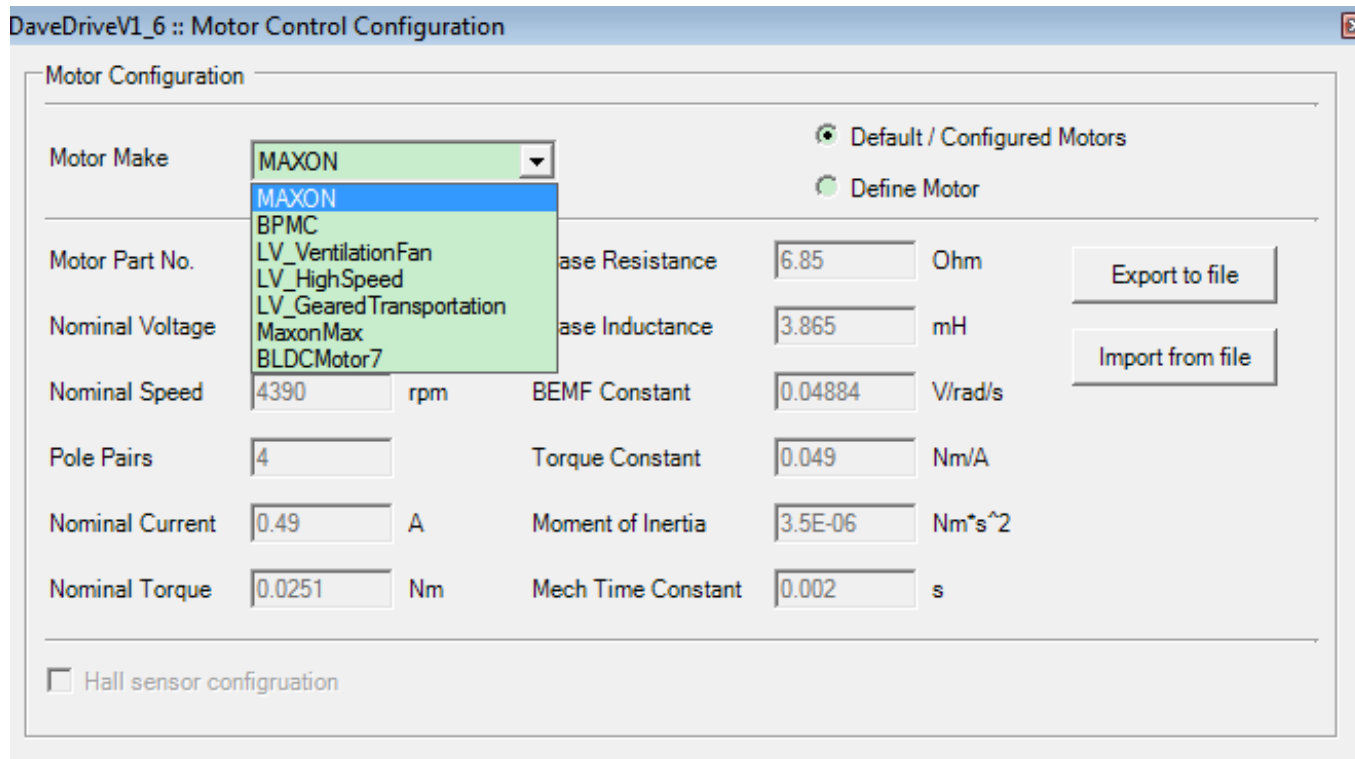
→ 永磁同步电机磁场定向控制





# DAvE Drive – 开发环境介绍

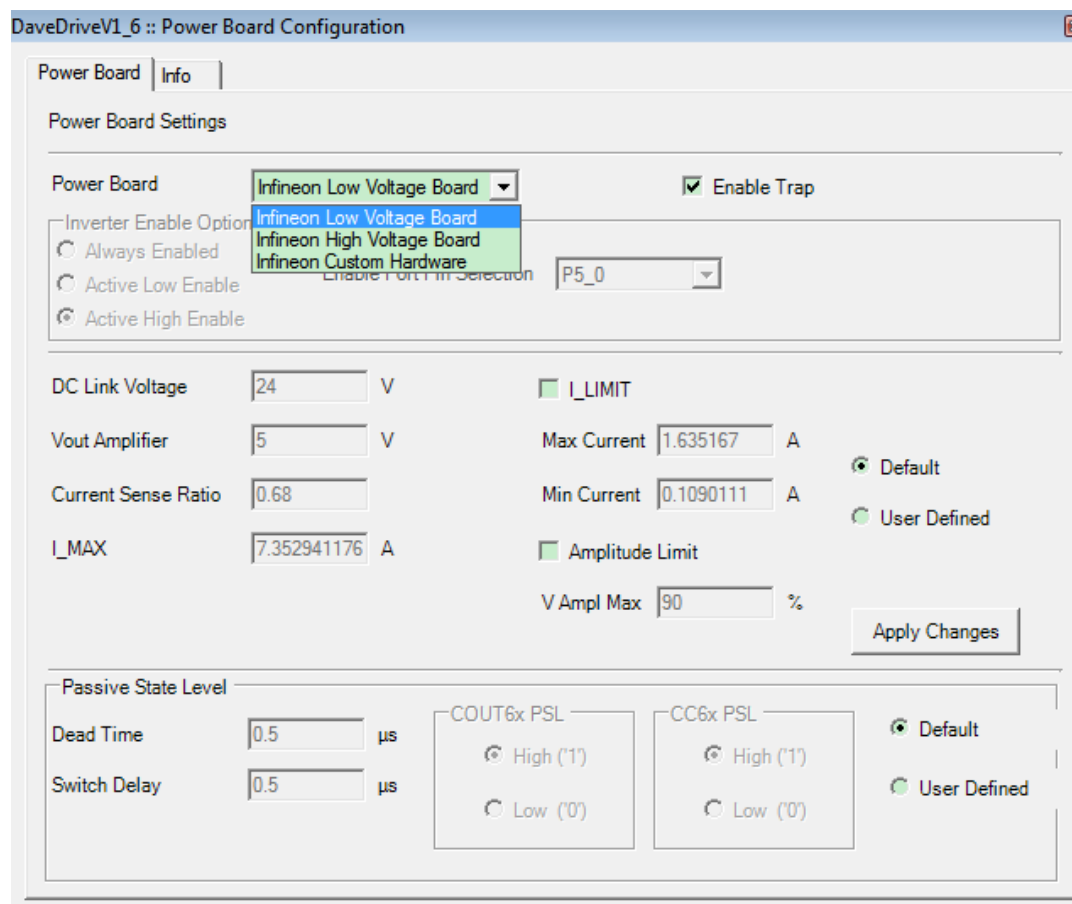
- 电机型号及参数选择界面
  - 可输入用户电机参数
  - 可使用数据库内电机参数



# DAvE Drive – 开发环境介绍

## ■ 目标控制板选择界面

### □ 支持输入客户控制板参数



# DAvE Drive – 开发环境介绍

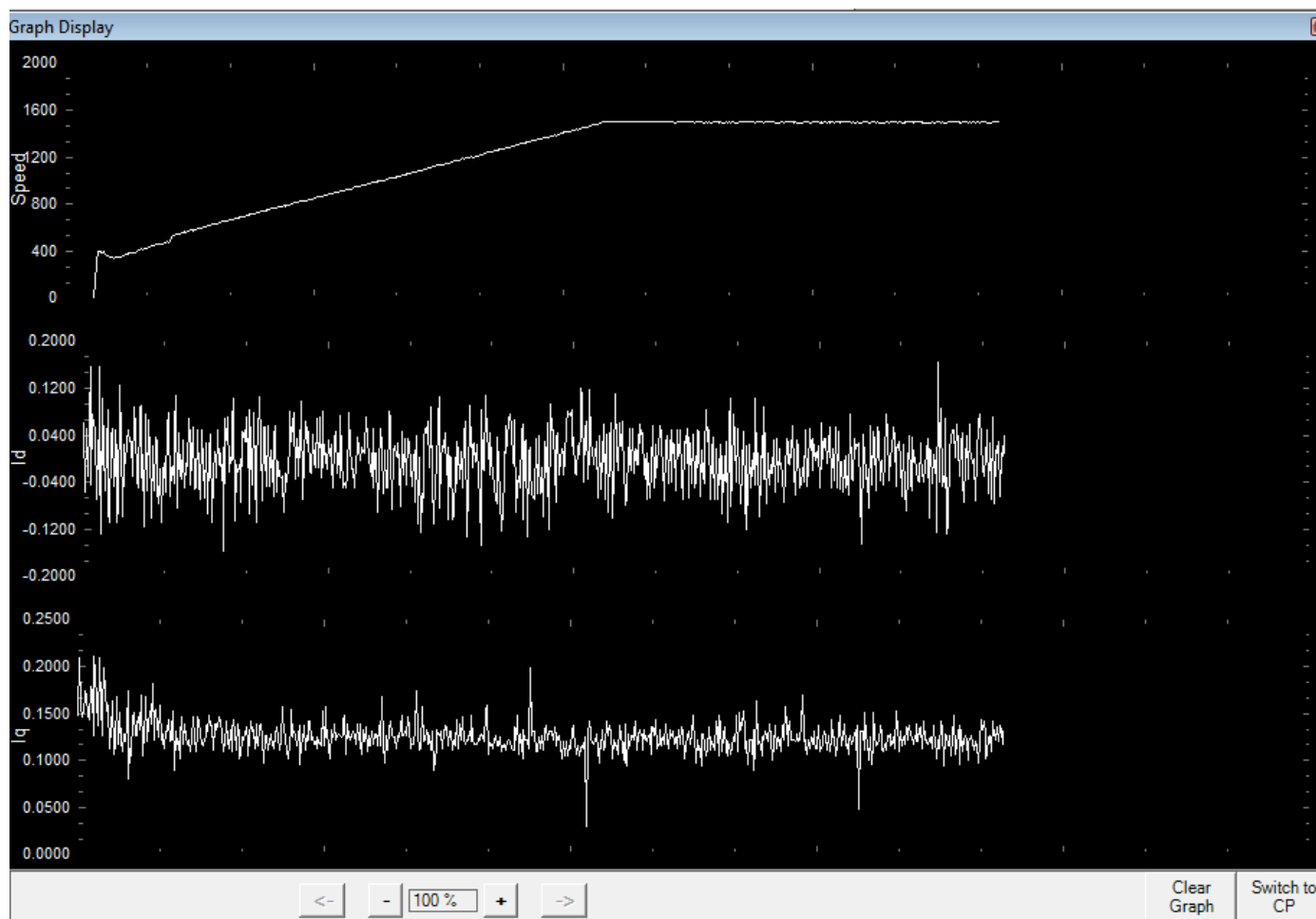
## ■ 程序下载及调试界面-1

The screenshot shows the 'DAvE Drive Runtime Control Panel (CAN)' window. It features several sections for configuring and monitoring the drive:

- Comm Port:** Set to 'DRIVEMONITOR'.
- Hex File Path:** '6\DaveDriveV1\_6\Source\DaveDriveV1\_6.Hex' with a 'Download..' button.
- Targets:** 'XC88x, XC878, XE164, XE162FM/FN'.
- Download Method:** Radio buttons for 'CAN' and 'JTAG'.
- Info:** 'FOC - XC878' with a 'Get Graph' button.
- Speed Control:** Reference: 1498 rpm; Proportional Gain: 20; Integral Gain: 2.5; Slew Rate: 349.57 rpm/sec.
- IQ:** Proportional Gain: 21.57; Integral Gain: 10.19; Startup: 8.93; V/F Constant: 0.08.
- ID:** Proportional Gain: 21.57; Integral Gain: 10.19.
- Status Word Information:** A row of 8 status bits (7-0) with values: 7: X, 6: X, 5: X, 4: X, 3: 0, 2: 0, 1: 0, 0: 1.
- Actual Response:** Speed: 0 rpm.
- Motor Control Operation:** 'Disconnect' and 'Start' buttons; 'Set Direction' section with 'Forward' (selected) and 'Reverse' radio buttons.
- Control Keys:** 'Trap Reset', 'Get', 'Set', and 'Exit' buttons.

# DAvE Drive – 开发环境介绍

## ■ 程序下载及调试界面-2



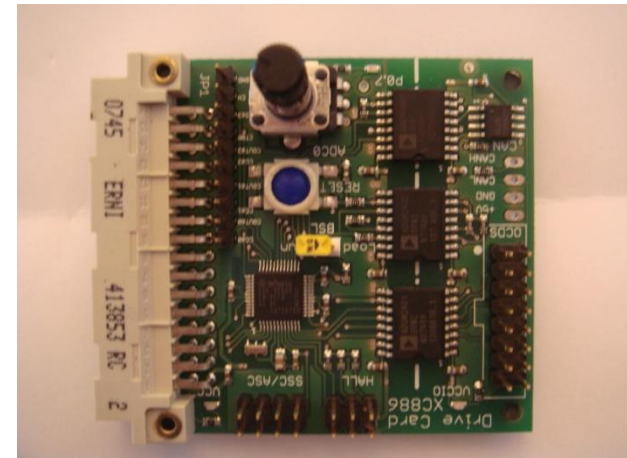
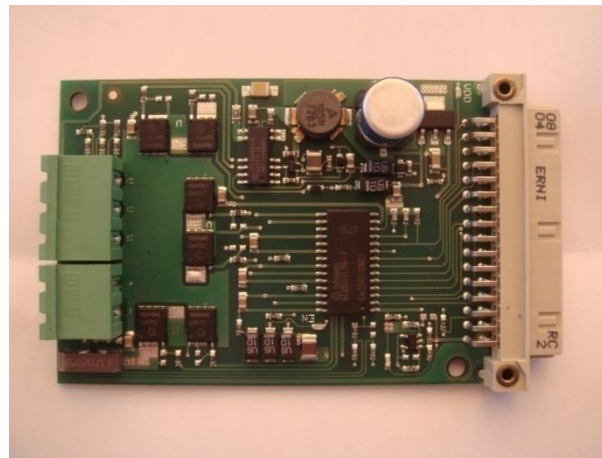
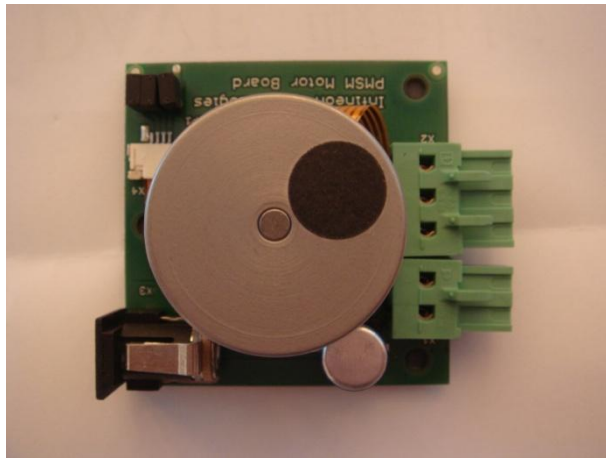
# DAvE Drive Kit

## ■ KIT\_AK\_DAvEDRIVE\_V2

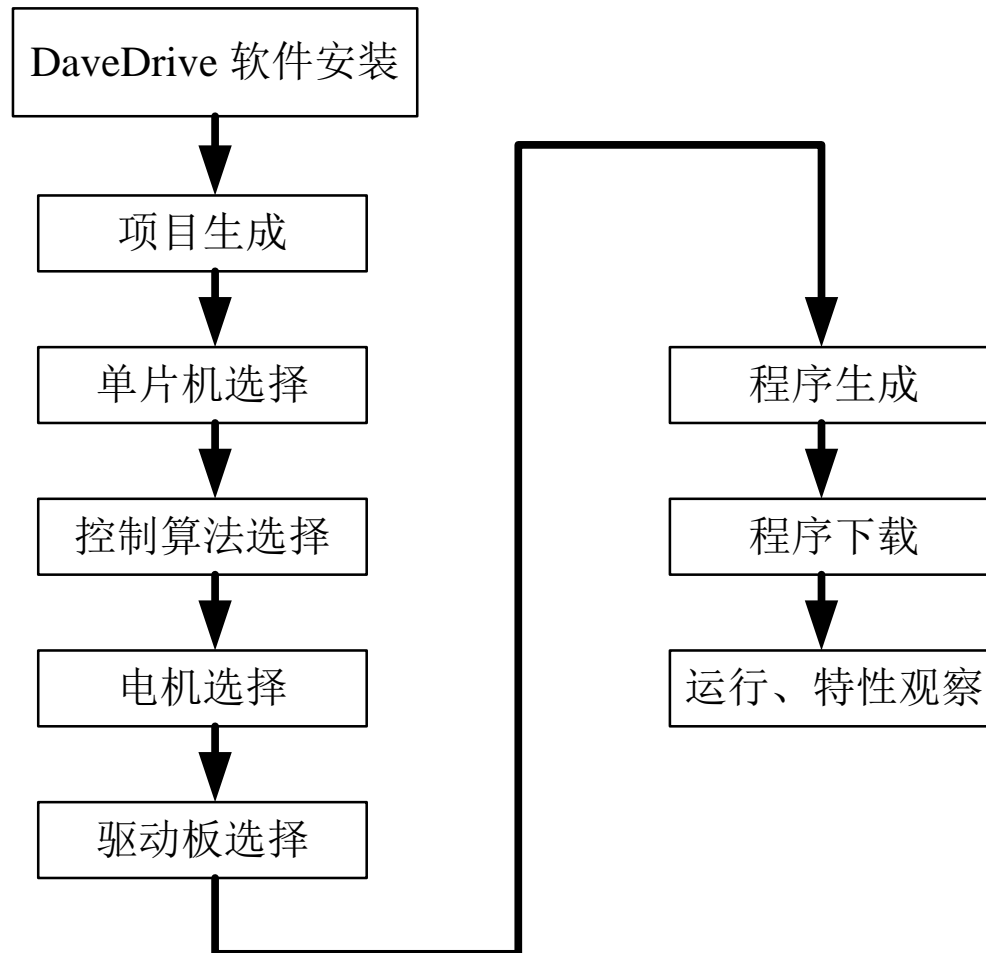
- 电源输入：23V~56V/7.5A
- 15W永磁同步电机，24V直流输入
- 使用英飞凌6ED003L06门极驱动
- MOSFET： BSC196N10
- SMPS: CoolSET ICE3B0565
- LDO: TLE4264
- 附DAvEDrive光盘
  - DAvE Drive安转软件，提供完整的功能应用代码，包括：
    - 带霍尔传感器或无传感器的块交换控制代码
    - 无传感器的永磁同步电机FOC控制代码
- 数字隔离的实时监控工具（USB - JTAG和CAN转换器）



# DAvE Drive Kit



## 操作流程





# ENERGY EFFICIENCY MOBILITY SECURITY

Innovative semiconductor solutions for energy efficiency, mobility and security.

