XMC1000 / XMC4000 Motor Control Application Kit

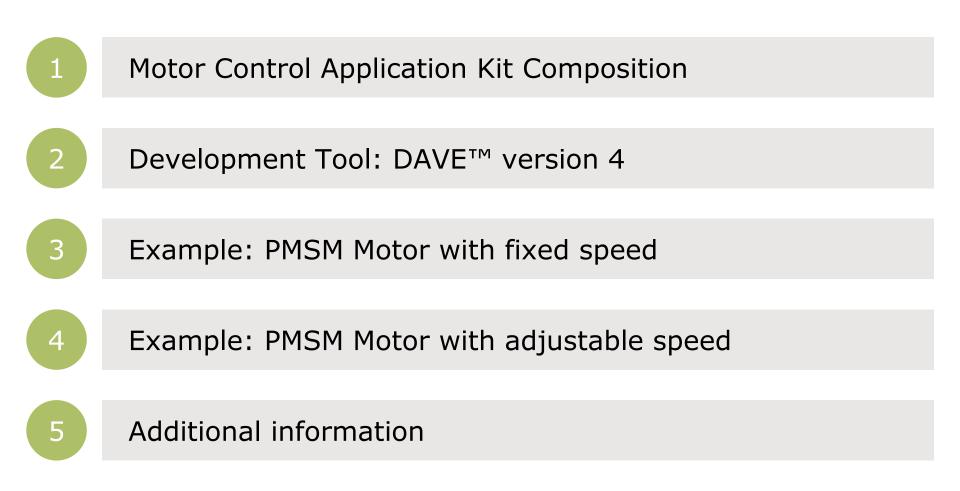
Getting Started 01 v1.0

Induction Motor V/F Control App (ACIM_FREQ_CTRL)



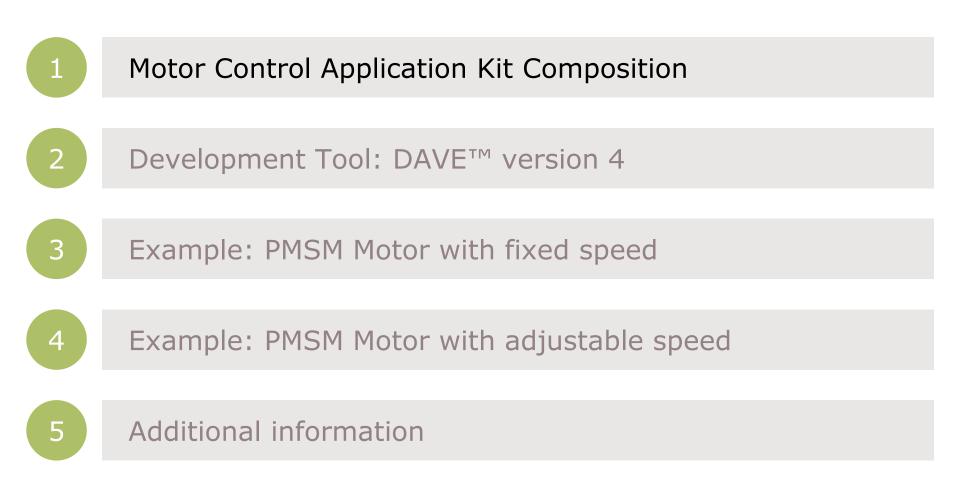


Induction Motor V/F Control App



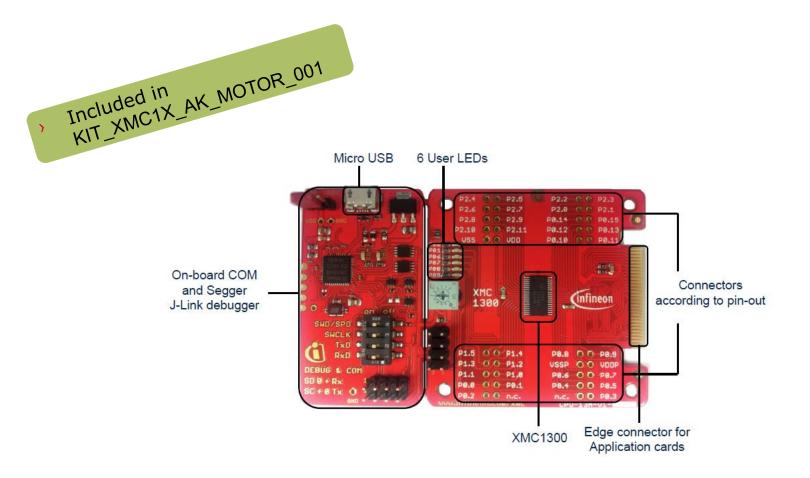


Induction Motor V/F Control App



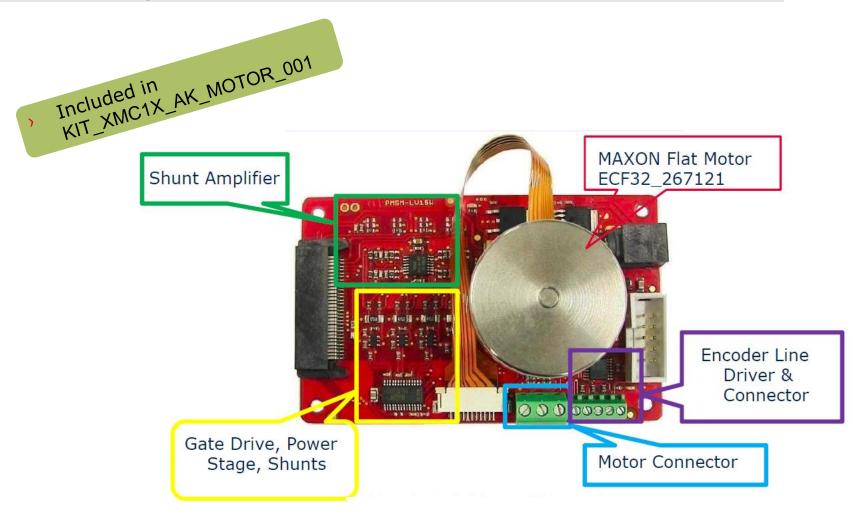


Kit composition – XMC 1300 Boot Kit



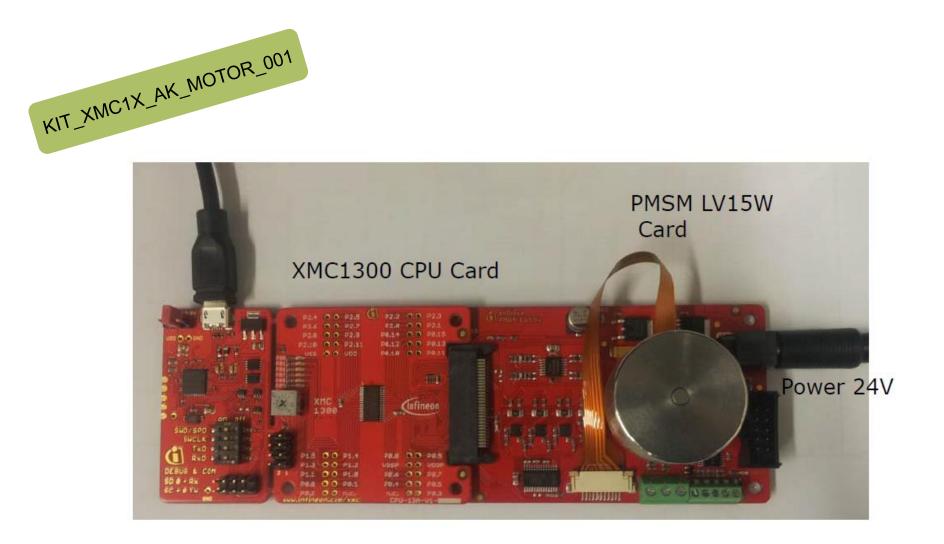


Kit composition – PMSM LV 15W Card



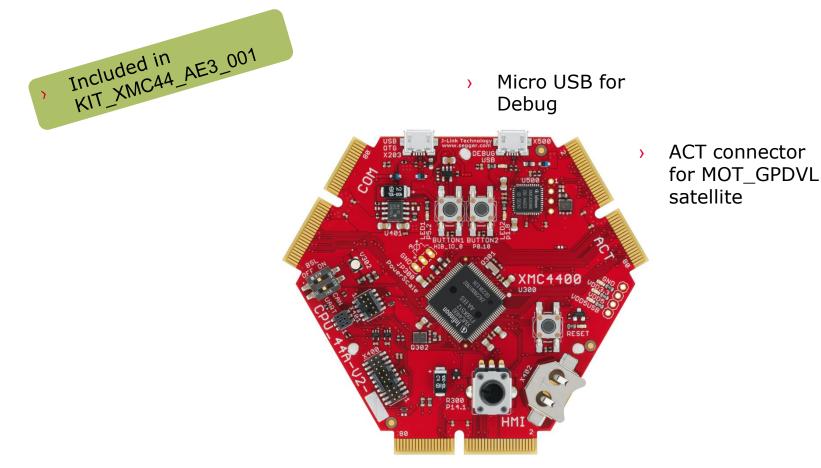


Kit composition – connection XMC1300





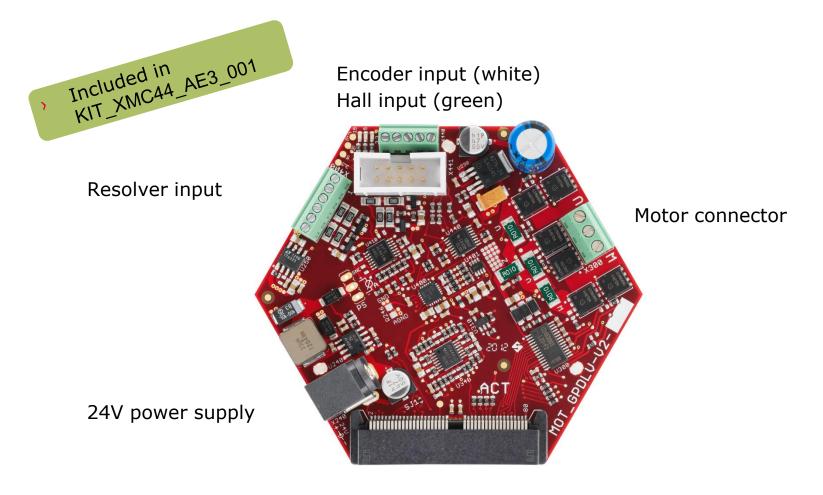
Kit composition – XMC4400 Enterprise Kit



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Kit composition – General Purpose Motor Drive



ACT connector to CPU Card (e.g. CPU_44A)

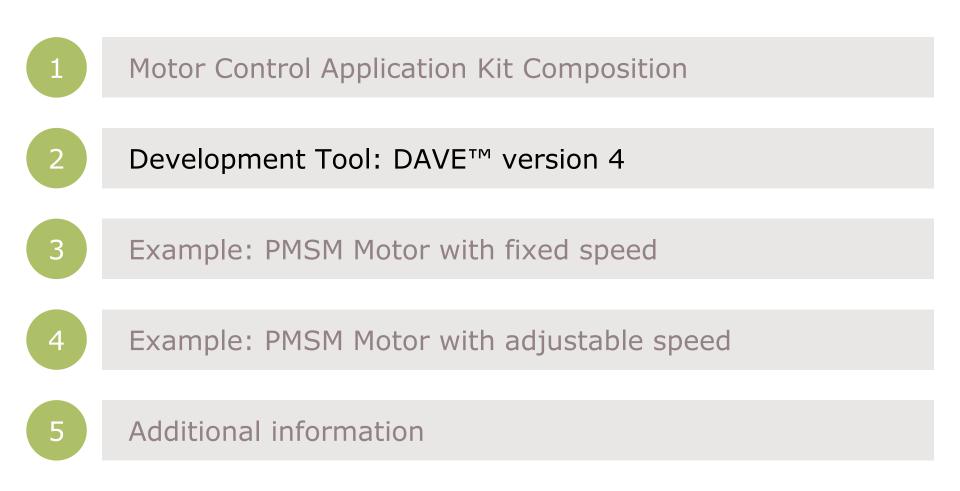


Kit composition – connection XMC4400





Induction Motor V/F Control App





Development Tool: DAVE[™] version 4

- > DAVE[™] is a free development platform for code generation by Infineon
- The Software package: DAVE[™], Examples, Videos, Apps, XMCLib... can be downloaded from
- http://www.infineon.com/DAVE
- > This Getting started is based on DAVETM v. 4.1.2





Induction Motor V/F Control App





Getting started limitations

- > The following example shows the default usage of the App.
- This Getting Started shows how to create an example with the default settings.
 Only the used App configurations are described. More information about the spectrum of the App can be found in the Help or an Application Note.
- The creation is described in steps. If a step is specific to XMC1300 or XMC4400 it is mentioned in the title and a sub-step e.g. 2.a, 2.b. Variation of the example (e.g. with adjustable speed) based on the main example.
- The following examples based on ACIM_FREQ_CTRL/ACIM_FREQ_CTRL APP v.
 4.0.5 beta

Step 1: create new project

- **Open Dave** >
- Select a workspace or use the default workspace >
- Click "OK" >

New

File \rightarrow New \rightarrow DAVE Project... >

DAVE IDE - DAVE™ - C:\Workspaces\DAVE-4.1\Motor

🌜 Workspace Launcher Select a workspace DAVE[™] stores your projects in a folder called a workspace. Choose a workspace folder to use for this session. Workspace: C:\Workspaces\DAVE-4.1\Motor • Browse... Copy Settings OK Cancel File Edit Source Refactor Navigate Project Search Run DAVE Window H

| | Open File | | | Project | |
|---|----------------|----------|---------|---------|--------|
| | Close | Ctrl+W | | Example | |
| | Close All Ctrl | +Shift+W | | Other | Ctrl+N |
| e | Save | Ctrl+S | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Alt+Shift+N) 📸 DAVE Project...





Step 1: create new project

- Enter project name: e.g. GT_ACIM_XMC44_Example1_v1_0 >
- Select "DAVE CE Project" for Project Type >
- Click "Next >" >
- Select your microcontro >
 - **XMC1300**: XMC130 _

- XMC4400: XMC440 _
- Click "Finish" >

| ntroller: | Create a new C/C++ project for Infineon | tool chains |
|--|--|---|
| .302-TO38X0200 400-F100x512 | Project Name: GT_ACIM_XMC44_Example Use default location Location: C:/Workspaces/DAVE-4.1/Mote | |
| New DAVE Project | Project Type: | Tool Chain: |
| Microcontroller Selection Page Select the microcontroller for which the project has to be created | Infineon Projects ARM-GCC Application | ARM-GCC Application |
| ▲ Witcrocontrollers ▲ WAC4000 → WAC4500 Series → WAC4500 Series → WAC4000-F100x256 → WAC4000-F100x256 → XMC400-F100x256 → XMC400-F200x256 → XMC400-F200x256 | Easy Start Project Simple Main Project DAVE CE Project Empty Project ARM-GCC Library Empty Project Show project types and tool chains on | nly if they are supported on the platform |
| Linker Option Remove unused sections Runtime Library | | |
| Library Newlib-nano Add floating point support for printf Add floating point support for scanf | ? < Back | Next > Finish Cancel |
| ? < Back Next > Finish | Cancel | |

New DAVE Project

DAVE Project

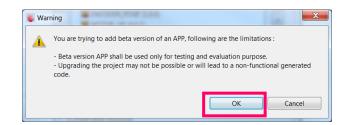
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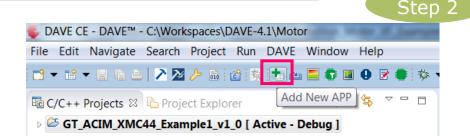
Step 2: add APP

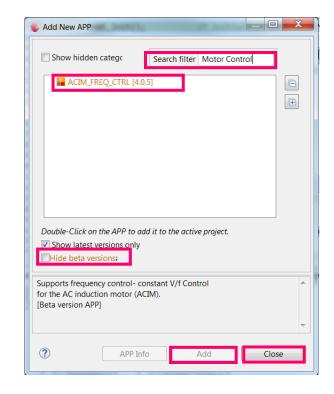
> Click "Add New App"



- Deactivate "Hide beta versions"
- > Enter in search filter "Motor Control"
- Select "ACIM_FREQ_CTRL"
- > Click "Add"
- Read the warning regarding beta versions and Click "OK" to confirm.
- Add in a new APP takes a few seconds
- Click "Close" to hide the "Add new APP" window





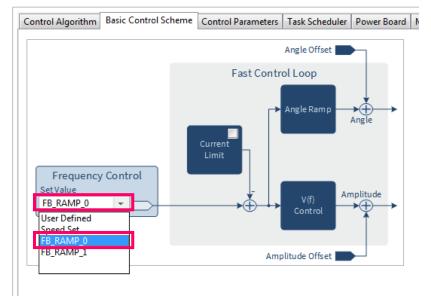


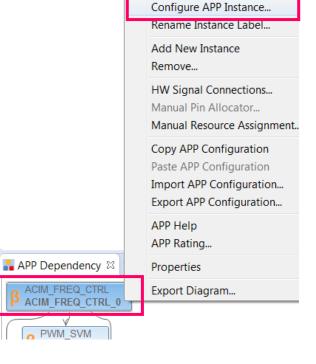
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Step 3: APP configuration

- Open "ACIM_FREQ_CTRL" by double click or right click → "Configure App instance"
- Open "Basic Control Scheme" tab
- Select "FB_RAMP_0"
- This will add the AUTOMATION APP. This can take a few seconds.





Infineon

Step 3



Step 3: APP configuration

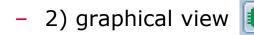
- > Open "Power Board" tab
- Set "Dead time rising edge[ns]" to 1100
- > Set "Dead time falling edge[ns]" to 885

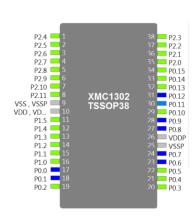
| Control Algorithm | Basic Cont | rol Scheme | Control Parameters | Task Scheduler | Power Board | Mea |
|---------------------|--------------|-------------|--------------------|--------------------|--------------------------|-----|
| Power Board Con | figuration – | | | | | |
| DC link voltage [V |]: | 24 | | | | 11 |
| Dead time rising e | dge [ns]: | 1100 | | PWM Tin Compare | | ~ |
| Dead time falling | edge [ns]: | 885 | | value | / | |
| Switch delay [ns]: | | 500 | | High Side | · | Ц |
| Inverter enable pir | n: | Active Hig | h 👻 | PWM | <u>.</u> | |
| Bootstrap time [m | ns]: | 0 | | Low Side PWM | • | H |
| Output polarity | | | | Phase | : | |
| High side switch | nes: | Active Low | - | Voltage | : → | ! ! |
| Low side switch | es: | Active Low | - | | : | |
| Current Amplifier | Configurati | on | | | | |
| VADC reference [| [V]: | 3.3 | | | Amplifier Bia Voltage | 5 |
| Rshunt [mOhms] |]: | 10 | | ≌↓ | Y | |
| Amplifier gain: | | 21 | | | <pre>{</pre> | |
| | | 4.5.74.4005 | | | 1 | |

Step 4: Pin assignment

- > The pin allocation can be done in two ways:
 - 1) table view 🚺

| Filter PWM_SVM_0 • | | | | |
|--------------------|---------------------|------|------------------------------|-------|
| | | | | E |
| APP Instance Name | APP Pin Name | | Pin Number (Port) | |
| # PWM_SVM_0 | | | | |
| | PhaseU_High Pin | | Not Selected | * |
| | PhaseV_High Pin | | Not Selected | |
| | PhaseW_High Pin | | Not Selected | |
| | PhaseU_Low Pin | | Not Selected | * |
| | PhaseV_Low Pin | | Not Selected | |
| | PhaseW Low Pin | | Not Selected | |
| | Trap Pin | | Not Selected | - |
| | Inverter Enable Pin | | Not Selected | - |
| | | | Not Selected | ~ |
| | | | #17 (P0.0) | |
| | | | #18 (P0.1) | |
| | | | #19 (PO.2) | |
| | | | #20 (P0.3) | - |
| | | | #21 (P0.4) | |
| | | | #22 (P0.5) #23 (P0.6) | |
| | | | #24 (P0.7) | |
| | | | #27 (P0.8) | 1.11 |
| | | | #28 (P0.9) | |
| | | | #29 (P0.10) | |
| | | | #30 (P0.11) | |
| | | | #31 (P0.12) | |
| | | | #32 (P0.13) | |
| | | | #33 (P0.14) | |
| | | | #34 (P0.15) | |
| (?) | | | #16(P1.0) | - |
| 0 | | Save | Reset | Close |









Step 4: Pin assignment- table view

The Pin Allocation can be done in two ways:

- Table view: >
 - Click "Manual Pin Allocator"



- Table: select the corresponding pin for each pin
- Click "Save" _

| File Edit | Navigate | Search | Project | Run | DAVE | Window | He |
|-----------|------------|------------|------------|------|---------|-------------|------|
| H R A | 2 🛛 🌽 | d 3 | 👈 🖿 | C | . • | 2 🜒 🏇 | • : |
| Ec/C++ | Projects 🛛 | 陷 Proje | ect Explor | er M | anual P | in Allocato | or F |

| ilter PWM_SVM_0 🔻 | | | |
|-------------------|---------------------|------------------------------|----------|
| | | | 88 |
| APP Instance Name | APP Pin Name | Pin Number (Port) | |
| PWM_SVM_0 | | | |
| | PhaseU_High Pin | Not Selected | - |
| | PhaseV_High Pin | Not Selected | Ŧ |
| | PhaseW_High Pin | Not Selected | Ŧ |
| | PhaseU_Low Pin | Not Selected | * |
| | PhaseV_Low Pin | Not Selected | - |
| | PhaseW_Low Pin | Not Selected | * |
| | Trap Pin | Not Selected | - |
| | Inverter Enable Pin | Not Selected | - |
| | | Not Selected | ^ |
| | | #17 (P0.0) | |
| | | #18 (P0.1) | |
| | | #19 (P0.2) | |
| | | #20 (P0.3) | = |
| | | #21 (P0.4) | - |
| | | #22 (P0.5) | |
| | | #23 (P0.6) | |
| | | #24 (P0.7) | |
| | | #27 (P0.8) #28 (P0.9) | |
| | | #28 (P0.9) #29 (P0.10) | |
| | | #30 (P0.11) | |
| | | #31 (P0.12) | |
| | | #32 (P0.13) | |
| | | #33 (P0.14) | |
| | | #34 (P0.15) | |
| | | #16 (P1.0) | - |
| ? | | Save Reset | Close |



Step 4: Pin assignment- graphical view

- Graphical view:
 - Click "Pin Mapping Perspective"
 - Select pin in the left table
 - Right click on a colored pin
 - Click "Assign"

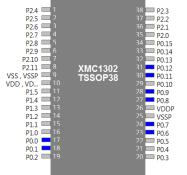
| 🦆 DAVE CE - DAVE™ - C:\Wo | orkspaces\DAVE-4.1\Motor |
|----------------------------|--|
| File Edit Navigate Search | h Project Run DAVE Window Help |
| u n e 🚬 🖉 🄑 🗃 🕏 | N to ≥ ■ 🗘 🖩 O 🖡 🛑 🕏 マ 🕯 🚳 🚳 |
| 🗟 C/C++ Projects 🛛 🏠 Pro | oject Explorer 🔅 🗘 🖗 Pin Mapping Perspective |
| 🛛 😂 GT_ACIM_XMC44_Exa | ample1_v1_0 [Active - Debug] |
| | |
| PinMapping - DAVE™ - C:\We | orkspaces\DAVE-4.1\Motor |
| File Edit Navigate Search | Project Run DAVE Window Help |
| 📬 🕶 🖬 🐑 🖻 🔁 🌌 | /> 🗟 🔞 👯 ங 🔤 💭 🔳 🗣 🖉 🗰 🤷 |
| 🐰 Virtual Pin View 📃 🗆 | Package View |
| Virtual Pin List | |
| ▲ PWM_SVM_0 | |
| Inverter Enable Pin | |
| PhaseU_High Pin | P2.4 1 |
| PhaseU_Low Pin | P2.5 2 |
| PhaseV_High Pin | P2.6 🔲 3 |
| PhaseV_Low Pin | P2.7 🛄 4 |
| PhaseW_High Pin | P2.8 🔲 5 |
| PhaseW_Low Pin | P2 9 6 |
| Trap Pin | P2 10 |
| | D2 11 Assign |
| | |
| | |
| | VDD , VD [10 p1 r [11] |
| | |

Note: See legend color code for additional information



Step 4a: Pin assignment - XMC1300

| Sanual Pin Allocator | | | X |
|----------------------|---------------------|-------------------|----|
| Filter ALL 🔻 | | | |
| | | | ĒĒ |
| APP Instance Name | APP Pin Name | Pin Number (Port) | |
| ▲ PWM_SVM_0 | | | |
| | PhaseU_High Pin | #17 (P0.0) | - |
| | PhaseV_High Pin | #24 (P0.7) | - |
| | PhaseW_High Pin | #27 (P0.8) | - |
| | PhaseU_Low Pin | #18 (P0.1) | - |
| | PhaseV_Low Pin | #23 (P0.6) | - |
| | PhaseW_Low Pin | #28 (P0.9) | - |
| | Trap Pin | #31 (P0.12) | - |
| | Inverter Enable Pin | #30 (P0.11) | - |
| | | | |
| | | | |
| ? | Save | Reset | e |
| | | | |





Step 4b: Pin assignment- XMC4400

| PP Instance Name | APP Pin Name | Pin Number (Port) | | | |
|--------------------|---------------------|-------------------|----------|--|--|
| PWM_SVM_0 | | | | | |
| | PhaseU_High Pin | #97 (P0.5) | - | | |
| | PhaseV_High Pin | #98 (P0.4) | . | | |
| | PhaseW_High Pin | #99 (P0.3) | v | | |
| | PhaseU_Low Pin | #100 (P0.2) | Ŧ | | |
| | PhaseV_Low Pin | #1 (P0.1) | * | | |
| | PhaseW_Low Pin | #2 (P0.0) | T | | |
| | Trap Pin | #89 (P0.7) | T | | |
| | Inverter Enable Pin | #68 (P1.15) | T | | |
| | | | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | P0.11 P0.11 P3.3 P3.3 P3.4 P3.6 P3.6 P3.6 P3.6 P3.6 P3.6 P1.7 P1.7 P1.1 P1.7 P1.1 P1.0 P1.1 P1.0 P1.1 P1.2 |
| | | | | 988681 1 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 |
| 2 | Sa | Reset | Close | P0.0 2 P0.10 3 | |
| Tomorrow and a set | | | | P0.9 4 P3.2 5 P3.1 6 P3.0 7 | |
| | | | | USB_DM 8 USB_DP 9 VBUS 10 | |
| | | | | | XMC4400 LQFP100 |
| | | | | HIB_IO_1 13 HIB_IO_0 14 RTC_XTAL1 15 | |
| | | | | RTC_XTAL2 = 16 | |

Step 5: Generate code

- > Click "Generate Code"
- Code Generation can take a few seconds.

| DAVE CE - GT_ACIM_XMC4400_Example1_v1_0/Dave/Model/APPS/ACIM_FREQ_CTRL/v4_0_5/Uimodel, |
|---|
| File Edit Navigate Search Project Run DAVE Window Help |
| E @ ≜ ≥ ⊠ /> ▶ = = ≈ x → x ≂ x @ % + ≥ = © = ● E ● \$ * + ! ± * |
| \square C/C++ Projects \square \square Project Evolorer \bigcirc \bigcirc \bigcirc \bigcirc \bigcirc \bigcirc \square \square \square \square Generate Code |



Step 6: Add function



 Edit main.c by adding the following function call: ACIM_FREQ_CTRL_MotorStart(&ACIM_FREQ_CTRL_0);

```
23 int main(void)
24 {
25
     DAVE STATUS t status;
26
627
     status = DAVE Init();
                                     /* Initialization of DAVE APPs */
28
29
     if(status == DAVE_STATUS_FAILURE)
30
     {
31
       /* Placeholder for error handler code. The while loop below can be replaced with an user error handler. */
32
       XMC_DEBUG("DAVE APPs initialization failed\n");
33
34
       while(10)
35
       {
36
37
        }
38
     }
39
40
     ACIM_FREQ_CTRL_MotorStart(&ACIM_FREQ_CTRL_0);
41
     /* Placeholder for user application code. The while loop below can be replaced with user application code. */
42
     while(10)
43
     {
44
45
     }
46 }
47
```

Step 7: Build project



> Build Project



| File Edit Navigate Search Run Project DA | AVE Window |
|--|------------|
| III (\$ 4 <mark> > 2</mark> /> & \$ \$ 1 a = (* a) | 0 🖻 🌒 🏇 ୟ |
| C/C++ Pro Build Active Project plorer | ⇔ ⇔ @ 🖪 |

Step 8: Debug – create debug session



- > Click "Debug":
- › Double click "GDB SEGGER J-Link Debugging"
- > Click "Debug"
- The debugger is downloading the program

(See next slide)

| eate, manage, and run configur | ations | Create, manage, and run configurations | | |
|---------------------------------------|--|---|---|--|
| I I I I I I I I I I I I I I I I I I I | Configure launch settings from Press the 'New' button to Press the 'Duplicate' button Press the 'Delete' button Press the 'Filter' button tc Edit or view an existing c Configure launch perspective s page. | Image: Second state Yype filter text C GDB SEGGER J-Link Debugging C GT_ACIM_XMC44_Example1_v1_0 Debug | Name: GT_ACIM_XMC44_Example1 Main Debugger Startu Project: GT_ACIM_XMC44_Example1_v1_0 C/C++ Application: Debug/GT_ACIM_XMC44_Example War Build (if required) before launchir Build configuration: Select Auto Enable auto build Use workspace settings | p & Source Common Browse e1_v1_0.elf iables Search Project Browse 19 |
| | | Filter matched 2 of 19 items | | Apply Revert |
| | | Filter matched 2 of 19 items | | Debug Close |

| Compare | 100.0% | 0.013s |
|---------|--------|--------|
| Erase | 0.0% | 0.022s |
| Program | 0.0% | |
| Verify | 0.0% | |

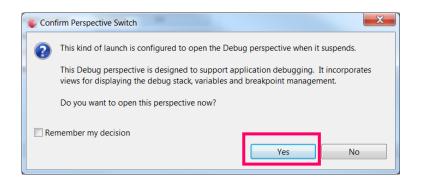
DAVE CE - GT_ACIM_XMC44_Example1_v1_0/Dave/Model/APPS/ACIM_FREQ

File Edit Navigate Search Project Run DAVE Window Help



Step 8: Debug – start program

- > Switch to debug perspective. Confirm with "YES"
- > To start the program click "Resume (F^I)"

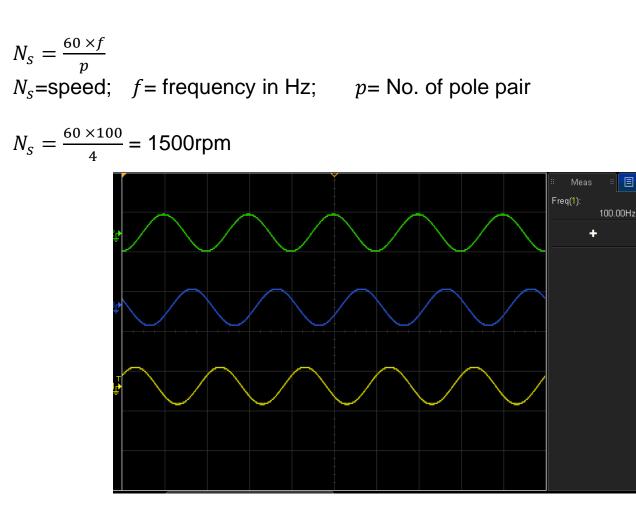


| File Ed | it Source | Refactor | Navigate | Search | Window |
|-----------|-----------|----------|-----------|--------|---------|
| i II (q e | | | . ∿ .r i≯ | ₹.₹ | ا 🗠 ا 🌜 |



Behavior

> The Motor slowly ramps up to 1500rpm





Induction Motor V/F Control App





Getting started limitations

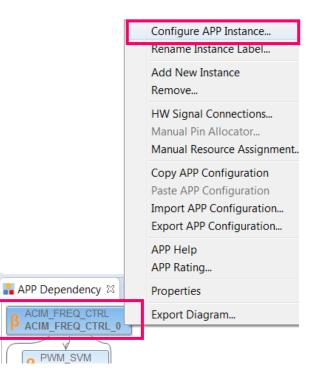
- > The following example shows the default usage of the App.
- This Getting Started shows how to create an example with the default settings.
 Only the used App configurations are described. More information about the spectrum of the App can be found in the Help or an Application Note.
- The creation is described in steps. If a step is specific to XMC1300 or XMC4400 it is mentioned in the title and a sub-step e.g. 2.a, 2.b. Variation of the example (e.g. with adjustable speed) based on the main example.
- The following examples based on ACIM_FREQ_CTRL/ACIM_FREQ_CTRL APP v.
 4.0.5 beta
- > Example 2 with adjustable speed based on example 1. Only the delta is discribed in this cheptar. The target speed is selected by adjusting the potentiometer.

Step 1: APP configuration



- > open "ACIM_FREQ_CTRL" by double click or right click → "Configure App instance"
- Open the "Measurements" tab
- Click "Enable speed set via analog input"
- This will add the ADC APP. This can take a few seconds.

| Control Algorithm | Basic | Control Sche | me | Control Paramete | rs Task Sch | eduler | Power Board | Measurements | Err |
|-------------------------------|---------|--------------|-----|------------------|---------------|--------|-------------|--------------|-----|
| Measurement | | | | | | | | | |
| Current measurer | ment: | None | | | | | Ψ. | | |
| Enable over current detection | | | | | | | | | |
| Enable voltag | e comp | pensation | | | | | | | |
| V Enable speed | set via | analog inpu | t | | | | | | |
| ADC Carfin metia | | | | | | | | | |
| ADC Configuratio | | Request sou | rce | Queue position | Refill | Exter | nal trigger | | |
| I_Average | | Queue A | Ŧ | 0 | Enable | E | nable | | |
| V_DCLink | | Queue A | Ŧ | 1 | Enable | E | nable | | |
| Analog_Inp | ut | Queue A | Ŧ | 2 | ✓ Enable | E | nable | | |
| User_Define | ed 🛛 | Queue A | Ŧ | 3 | Enable | E | nable | | |
| | | | | | | | | | |





Step 1: APP configuration – XMC4400

The V/f control is less efficient than FOC control. To reduce the maximum power consumption the default values is be changed. This only applies to **XMC4400** kits.

- Open the "Control Parameters" tab
- Reduce "No load speed [rpm]" to 2000
- > Enable "User defined"
- > Set "V/f constant" to 70
- > Set "V/f offset" to 300

| Control Algorithm | Basic Control S | cheme | Control Paramet | ters T | ask Scheduler | Power Board | Measurem | ents | Error Handler | Interrupt Settings | |
|--------------------|-----------------|--------|-----------------|---------|---------------|-----------------|----------|------|---------------|--------------------|--|
| Control Panel Para | ameters | | | | | Motor Paramet | ers | | | | |
| Motor direction: | [| Clockw | ise | | - | Nominal voltag | e [V]: | 24 | | | |
| User speed set [rp | om]: | 1500 | | | | No load speed [| [rpm]: | 200 |) | | |
| Over current limi | t [mA]: | 500 | | | | Pole pair: | | 4 | | | |
| Maximum voltag | e limit [%]: | 100 | | | | | | | | | |
| V/f Configuratio | on | Defau | lt 🗸 | User de | efined | | | | | | |
| V/f constant [m | nV/Hz]: | 180 | 70 | | | | | | | | |
| V/f offset [mV]: | : [| 1200 | 300 | | | | | | | | |

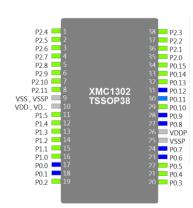
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Step 2: Pin assignment

- > Assign the ADC pin in table or graphical view:
 - 1) table view 💷

| Filter PWM SVM 0 • | | | | |
|--------------------|---------------------|------|------------------------------|-------|
| | | | | |
| APP Instance Name | APP Pin Name | | Pin Number (Port) | |
| # PWM_SVM_0 | | | | |
| | PhaseU_High Pin | | Not Selected | * |
| | PhaseV_High Pin | | Not Selected | |
| | PhaseW High Pin | | Not Selected | * |
| | PhaseU_Low Pin | | Not Selected | * |
| | PhaseV Low Pin | | Not Selected | |
| | PhaseW Low Pin | | Not Selected | |
| | Trap Pin | | Not Selected | - |
| | Inverter Enable Pin | | Not Selected | - |
| | | | Not Selected | ~ |
| | | | #17 (P0.0) | |
| | | | #18 (PO.1) | |
| | | | #19 (PO.2) | |
| | | | #20 (P0.3) | |
| | | | #21 (P0.4) | |
| | | | #22 (P0.5) #23 (P0.6) | |
| | | | #24 (P0.7) | |
| | | | #27 (P0.8) | |
| | | | #28 (P0.9) | |
| | | | #29 (P0.10) | |
| | | | #30 (P0.11) | |
| | | | #31 (P0.12) | |
| | | | #32 (P0.13) | |
| | | | #33 (P0.14) | |
| | | | #34 (P0.15) | 1.11 |
| | | | #16 (P1.0) | + |
| (?) | | Save | Reset | Close |





Note: Pin assignment is explained in example1 step 4

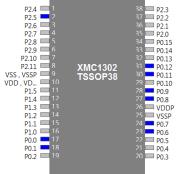




Step 2a: Pin assignment - XMC1300

> Allocate the "Analog_Input pin" to the potentiometer input pin

| APP Instance Name | APP Pin Name | Pin Number (Port) | |
|-------------------|---------------------|-------------------|---|
| ACIM_FREQ_CTRL_0 | | | |
| | Analog_Input pin | #2 (P2.5) | Ŧ |
| ▲ PWM_SVM_0 | | | |
| | PhaseU_High Pin | #17 (P0.0) | - |
| | PhaseV_High Pin | #24 (P0.7) | - |
| | PhaseW_High Pin | #27 (P0.8) | - |
| | PhaseU_Low Pin | #18 (PO.1) | - |
| | PhaseV_Low Pin | #23 (P0.6) | - |
| | PhaseW_Low Pin | #28 (P0.9) | - |
| | Trap Pin | #31 (P0.12) | - |
| | Inverter Enable Pin | #30 (P0.11) | - |





Step 2b: Pin assignment- XMC4400

> Allocate the "Analog_Input pin" to the potentiometer input pin

| PP Instance Name | APP Pin Name | Pin Number (Port) | U | | |
|------------------|---------------------|----------------------|---|---------------------------------------|---|
| PWM_SVM_0 | AFF FIL Name | Fill Nulliber (FOIt) | | | |
| | PhaseU_High Pin | #97 (P0.5) | - | | |
| | PhaseV_High Pin | #98 (P0.4) | - | | |
| | PhaseW_High Pin | #99 (P0.3) | - | | |
| | PhaseU_Low Pin | #100 (P0.2) | - | | |
| | PhaseV_Low Pin | #1 (P0.1) | - | | |
| | PhaseW_Low Pin | #2 (P0.0) | - | | |
| | Trap Pin | #89 (P0.7) | - | | |
| | Inverter Enable Pin | #68 (P1.15) | Ŧ | _ | 903 903 903 904 904 904 904 904 904 904 904 904 904 |
| | | | | P0.1 P0.0 P0.10 P0.9 P3.2 | |

P15.2 0 P14.15 0 P14.14 0 P14.13 0 P14.12 0 P14.12 0 P14.7 0 P14.6 0

Step 3: Generate, build, debug

- > Repeat following steps from example 1:
 - Step 5: Generate code
 - Step 7: Build code
 - Step 8: Debug



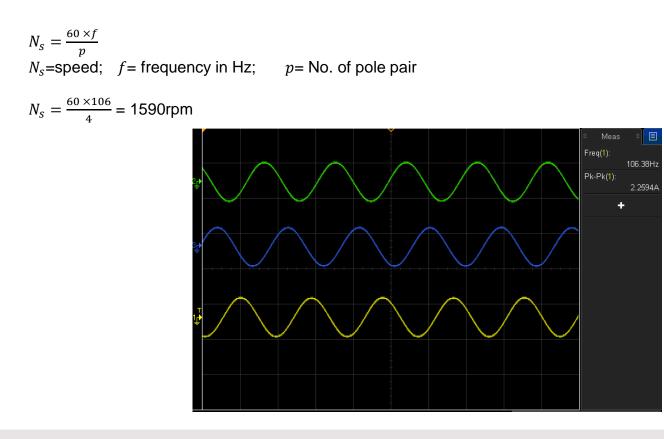
7



infineon

Behavior

- > The target speed is selected by potentiometer
- > The target speed can vary from 0rpm to "No load speed"
- Motor slowly ramps up or down to the target speed





Induction Motor V/F Control App



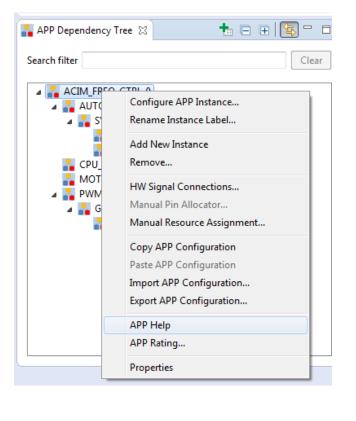


App help

This will show helpful information regarding to the APP:

- Right click on ACIM_FREQ_CTRL_0
- Select "App Help"
- > This will show the help contents this App

| ACIM_FREQ_CTRL | |
|---|--|
| Hide Locate Back Forward Stop | Contraction of the second seco |
| Contents Igdex Search Favorites | ACIM_FREQ_CTRL |
| Copyright Infom | Home |
| License Terms and Copyright Ir Abbreviations and Definitions U) Overview Overview | Overview |
| Architecture Description APP Configuration Parameters Enumerations | Overview |
| Diata structures Solution (Solution) Solution Solution (Solution) Solution (Solut | ACIM_FREQ_CTRL APP implements open loop V/f control algorithm to drive three phase AC Induction Motor. This is scalar control technique which involves controlling the magnitude of voltage or frequency of the induction motor. Constant V/f method maintains the constant flux density by changing the voltage in proportion with frequency. This APP provides the configurations required for the V/f control.This APP also facilitates the use of the AUTOMATION APP for runtime parameter checking, error logging and connecting to the Ramp Generator Function Block. It uses MOTOR_LIB which is math library used for common algorithms. |
| | The ACIM_FREQ_CTRL APP provides the following features: |
| | 1. Basic Control Scheme: This includes mandatory V/f control algorithm parameters. 2. Advanced Control Scheme: |
| | This gives option for adding offset values, inserting user code via call back function and Position control algorithm. 3. Task Scheduler: |
| | Tasks can be scheduled from various time sources. And task execution time can be adjusted. 4. State Machine: |
| | Noto: relation and the security of the motor control algorithm. This APP also supports Drive State Machine (optional) which interacts with the external system and decides the motor state. 5. Measurements: |
| | It supports the average current measurement (overcurrent protection), DC link voltage measurement (Voltage compensation) and analog speed control measurement. 6. Parameter Monitoring: Runtime set/det of the motor parameters. |
| | Error Handler: Logging the errors, warnings reported by the APP which can be communicated to the central system. Ramo Function Block Connection: |
| | Speed of the motor can be ramped in linear or s-curve by connecting the user end speed to the ramp function block. |
| | Hardware and software connectivity of APP Figure 1, shows how the APP is structured in DAVE. The LLD layer provides abstraction for these hardware modules. Control algorithm is built on top of the basic building blocks like PVM (PWM_SVM) and ADC (ADC_QUEUE). It makes use of low level drivers for CCU8, ADC, SCU and GPIO. |
| | |
| < + | user application (main.c) USER CODE |





Where to buy - XMC1300

| Development Boards | S | Order Number |
|---|---|------------------------|
| XMC1300 Boot Kit | | KIT XMC13 BOOT 001 |
| XMC1000 Motor Control Application Kit | | KIT XMC1x AK Motor 001 |



Where to buy – XMC4400

| Development Boards | Order Number |
|--|--------------------------|
| XMC4400 Enterprise Kit | <u>KIT XMC44 EE1 001</u> |
| General Purpose Motor Drive Kit | KIT XMC4x MOT GPDLV 001 |
| XMC4400 Motor Control Application Kit | <u>KIT XMC44 AE3 001</u> |



General information

- Information about all available XMC Motor Control Application Kits:
 <u>LINK</u>
- For latest updates, please refer to: <u>http://www.infineon.com/xmc1000</u> <u>http://www.infineon.com/xmc4000</u>
- > DAVE[™] development platform: <u>http://www.infineon.com/DAVE</u>
- > For support:

http://www.infineonforums.com/forums/8-XMC-Forum



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